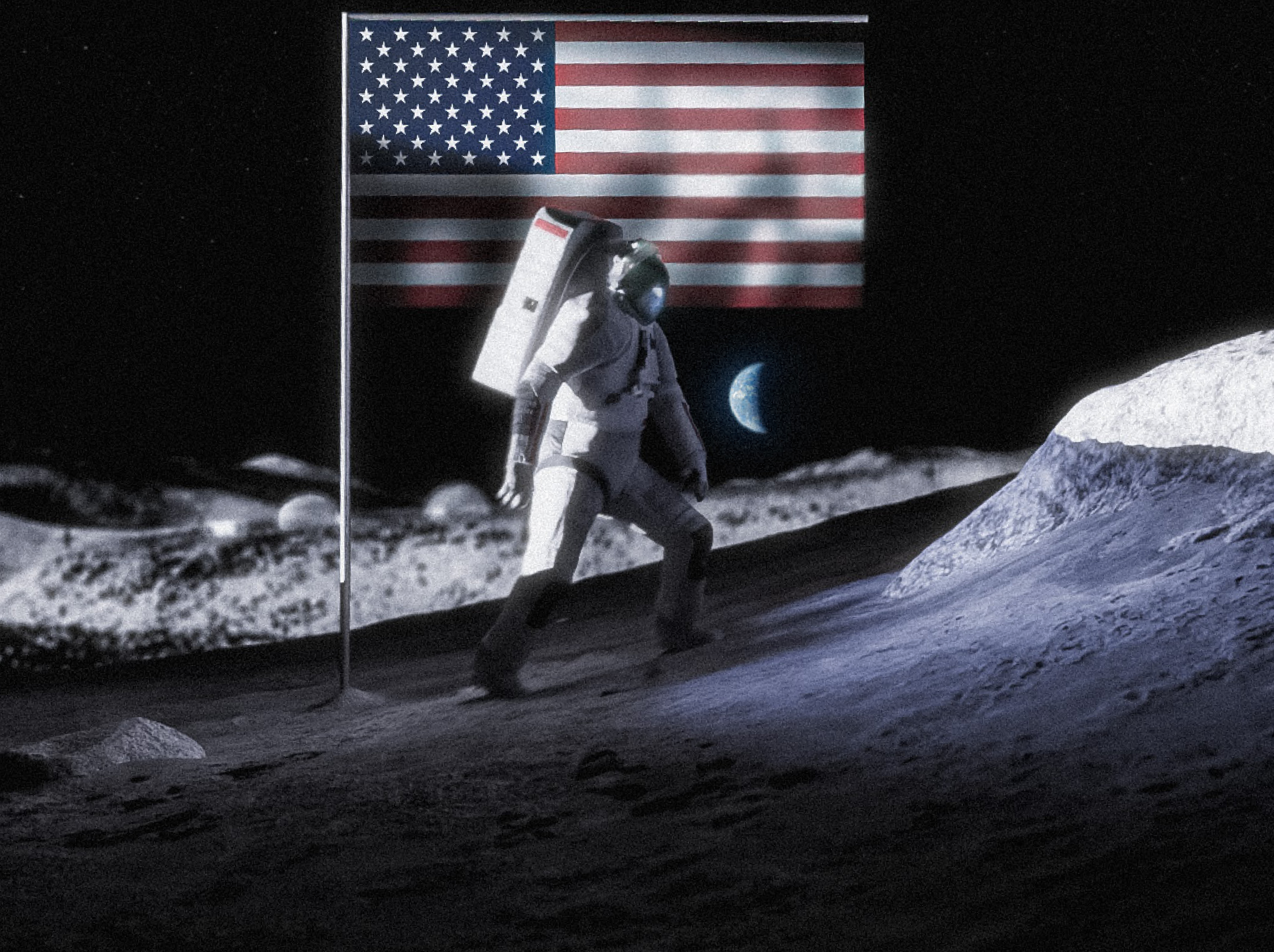
National Aeronautics and
Space Administration

FY 2027
BUDGET ESTIMATES



FY 2027 PRESIDENT'S BUDGET REQUEST SUMMARY

Budget Authority ($ in millions)	Enacted 2025	Enacted 2026	Request 2027	2028	2029	2030	2031
			Fiscal Year				
NASA Total	24,838.3	24,438.3	18,829.1	18,829.1	18,829.1	18,829.1	18,829.1
Exploration	7,666.2	7,783.0	8,513.9	8,493.9	8,173.9	8,153.9	8,133.9
Moon and Mars Transportation System	--	--	4,219.1	3,888.1	3,172.2	3,659.4	3,659.4
Moon and Mars Systems Development	--	--	3,810.1	3,506.5	3,237.7	3,290.5	3,214.5
Human Exploration Requirements & Architecture	--	--	484.7	1,099.4	1,764.0	1,204.0	1,260.0
Space Operations	4,220.0	4,175.0	3,047.2	3,047.2	3,347.2	3,347.2	3,347.2
Commercial LEO Development	--	--	299.7	299.8	599.8	599.8	1,577.2
International Space Station	--	--	921.2	921.2	921.3	921.3	921.3
Space Transportation	--	--	1,152.5	1,152.4	1,152.3	1,152.3	174.7
Space and Flight Support (SFS)	--	--	673.8	673.8	673.8	673.8	674.0
Space Technology	1,100.0	920.5	624.3	644.3	664.3	684.3	704.3
Science	7,334.2	7,250.0	3,893.9	3,893.9	3,893.9	3,893.9	3,893.9
Earth Science	--	--	1,021.2	1,102.7	1,080.7	1,022.3	1,019.9
Planetary Science	--	--	1,875.7	1,847.2	1,819.2	1,884.6	1,885.7
Astrophysics	--	--	552.4	510.4	530.4	523.4	524.7
Heliophysics	--	--	419.6	408.6	438.6	438.6	438.6
Biological and Physical Sciences	--	--	25.0	25.0	25.0	25.0	25.0
Aeronautics	935.0	935.0	609.5	609.5	609.5	609.5	609.5
STEM Engagement	143.0	143.0	--	--	--	--	--
Safety, Security, and Mission Services	3,092.3	3,000.0	1,998.6	1,998.6	1,998.6	1,998.6	1,998.6
Mission Services & Capabilities	--	--	1,536.7	1,536.7	1,536.7	1,536.7	1,536.7
Engineering, Safety, & Operations	--	--	462.0	462.0	462.0	462.0	462.0
Construction and Environmental Compliance and Restoration	300.0	185.3	100.6	100.6	100.6	100.6	100.6
Construction of Facilities	--	--	65.5	65.5	65.5	65.5	65.5
Environmental Compliance and Restoration	--	--	35.1	35.1	35.1	35.1	35.1
Inspector General	47.6	46.5	41.1	41.1	41.1	41.1	41.1
NASA Total	24,838.3	24,438.3	18,829.1	18,829.1	18,829.1	18,829.1	18,829.1

FY 2027 PRESIDENT'S BUDGET REQUEST SUMMARY

Budget Authority ($ in millions)	Enacted 2025	Enacted 2026	Request 2027	2028	2029	2030	2031
NASA Total	**24,838.3**	**24,438.3**	**18,829.1**	**18,829.1**	**18,829.1**	**18,829.1**	**18,829.1**
Exploration	**7,666.2**	**7,783.0**	**8,513.9**	**8,493.9**	**8,173.9**	**8,153.9**	**8,133.9**
Moon and Mars Transportation System	--	--	**4,219.1**	**3,888.1**	**3,172.2**	**3,659.4**	**3,659.4**
Orion Program	--	--	**1,221.8**	**1,001.2**	**779.3**	**565.5**	--
Crew Vehicle Development	--	--	1,214.3	1,001.2	779.3	565.5	--
Space Launch System	--	--	**1,495.3**	--	--	--	--
Exploration Ground Systems	--	--	**757.9**	**649.6**	**579.6**	**574.7**	--
Commercial Moon & Mars Infrastructure & Transportation	--	--	**744.1**	**2,237.3**	**1,813.3**	**2,519.2**	**3,659.4**
Moon and Mars Systems Development	--	--	**3,810.1**	**3,506.5**	**3,237.7**	**3,290.5**	**3,214.5**
xEVA and Human Surface Mobility Program	--	--	**830.3**	**899.5**	**844.2**	**853.6**	**836.6**
Human Landing System	--	--	**2,277.2**	**1,834.2**	**1,542.2**	**1,553.2**	**1,531.2**
HLS Initial Capability	--	--	758.7	362.2	541.5	567.2	585.7
Advanced Exploration Systems	--	--	**163.6**	**163.2**	**163.2**	**163.2**	**163.2**
Mars Technology	--	--	**438.8**	**529.4**	**607.0**	**680.2**	**643.2**
Human Research Program	--	--	**100.3**	**80.3**	**81.1**	**40.3**	**40.3**
Human Exploration Requirements & Architecture	--	--	**484.7**	**1,099.4**	**1,764.0**	**1,204.0**	**1,260.0**
Strategy and Architecture	--	--	**113.2**	**108.9**	**108.9**	**108.9**	**108.9**
Future Systems	--	--	**371.5**	**990.4**	**1,655.1**	**1,095.1**	**1,151.1**
Space Operations	**4,220.0**	**4,175.0**	**3,047.2**	**3,047.2**	**3,347.2**	**3,347.2**	**3,347.2**
Commercial LEO Development	--	--	**299.7**	**299.8**	**599.8**	**599.8**	**1,577.2**
International Space Station	--	--	**921.2**	**921.2**	**921.3**	**921.3**	**921.3**
Space Transportation	--	--	**1,152.5**	**1,152.4**	**1,152.3**	**1,152.3**	**174.7**
Crew and Cargo Program	--	--	**1,070.9**	**1,070.9**	**1,070.8**	**1,070.8**	**93.2**
Commercial Crew Program	--	--	**81.6**	**81.5**	**81.5**	**81.5**	**81.6**
Space and Flight Support (SFS)	--	--	**673.8**	**673.8**	**673.8**	**673.8**	**674.0**
Space Communications and Navigation	--	--	**453.3**	**453.3**	**453.3**	**453.3**	**453.4**
Communications Services Program	--	--	**59.4**	**59.4**	**59.4**	**59.4**	**59.5**
Human Space Flight Operations	--	--	**80.3**	**80.3**	**80.3**	**80.3**	**80.3**
Launch Services	--	--	**80.8**	**80.8**	**80.8**	**80.8**	**80.8**
Space Technology	**1,100.0**	**920.5**	**624.3**	**644.3**	**664.3**	**684.3**	**704.3**
SBIR and STTR	--	--	**169.0**	**169.0**	**169.0**	**169.0**	**169.0**
Space Transportation (GO)	--	--	**86.1**	**105.3**	**117.2**	**135.2**	**151.3**
Solar Electric Propulsion	--	--	7.2	--	--	--	--
Space to Surface Access (LAND)	--	--	**46.5**	**47.4**	**50.6**	**50.9**	**53.2**
Surface Infrastructure & Exploration (LIVE)	--	--	**100.9**	**100.8**	**103.9**	**105.5**	**105.6**

FY 2027 PRESIDENT'S BUDGET REQUEST SUMMARY

Budget Authority ($ in millions)	Enacted 2025	Enacted 2026	Request 2027	2028	2029	2030	2031
			Fiscal Year				
In-Space Infrastructure & Discovery (EXPAND)	**--**	**--**	**66.8**	**66.8**	**67.2**	**67.2**	**68.0**
Foundational Capabilities (ENABLE)	**--**	**--**	**24.4**	**24.5**	**25.8**	**25.9**	**26.6**
Catalysts & Innovative Mechanisms	**--**	**--**	**130.7**	**130.5**	**130.7**	**130.7**	**130.7**
Science	7,334.2	7,250.0	3,893.9	3,893.9	3,893.9	3,893.9	3,893.9
Earth Science	--	--	1,021.2	1,102.7	1,080.7	1,022.3	1,019.9
Earth Science Research	**--**	**--**	**260.3**	**264.6**	**265.4**	**266.2**	**266.2**
Earth Science Research and Analysis	--	--	163.8	163.0	163.8	164.7	164.7
Computing and Management	--	--	96.5	101.5	101.5	101.5	101.5
Earth System Explorers and Ventures	**--**	**--**	**495.4**	**556.6**	**531.0**	**472.4**	**469.1**
GRACE-Continuity	--	--	68.6	70.9	44.1	14.1	14.4
Other Missions and Data Analysis	--	--	426.8	485.7	487.0	458.3	454.7
Earth Science Data Systems	**--**	**--**	**124.8**	**124.9**	**126.9**	**127.0**	**127.2**
Earth Science Technology	**--**	**--**	**33.0**	**49.7**	**49.7**	**49.7**	**49.7**
Applied and Responsive Earth Science	**--**	**--**	**107.7**	**106.9**	**107.7**	**106.9**	**107.7**
Planetary Science	--	--	1,875.7	1,847.2	1,819.2	1,884.6	1,885.7
Planetary Science Research	**--**	**--**	**319.9**	**370.6**	**438.9**	**438.3**	**408.1**
Planetary Science Research and Analysis	--	--	154.6	187.8	249.7	247.6	213.2
Other Missions and Data Analysis	--	--	165.3	182.8	189.2	190.7	194.8
Planetary Defense	**--**	**--**	**324.7**	**86.6**	**83.6**	**83.5**	**84.7**
NEO Surveyor	--	--	283.7	41.4	36.1	36.0	36.0
Other Missions and Data Analysis	--	--	41.0	45.2	47.5	47.5	48.7
Lunar Discovery and Exploration	**--**	**--**	**204.0**	**218.8**	**234.2**	**234.6**	**234.6**
Other Missions and Data Analysis	--	--	204.0	218.8	234.2	234.6	234.6
Discovery	**--**	**--**	**111.5**	**170.0**	**169.5**	**165.1**	**151.2**
Other Missions and Data Analysis	--	--	111.5	170.0	169.5	165.1	151.2
New Frontiers	**--**	**--**	**430.3**	**413.9**	**309.2**	**382.1**	**466.5**
Dragonfly	--	--	423.9	344.2	46.6	44.2	30.9
Other Missions and Data Analysis	--	--	6.4	69.7	262.6	337.9	435.6
Mars Exploration	**--**	**--**	**248.3**	**310.0**	**415.3**	**381.0**	**320.4**
Other Missions and Data Analysis	--	--	248.3	310.0	415.3	381.0	320.4
Outer Planets and Ocean Worlds	**--**	**--**	**101.8**	**126.5**	**168.6**	**200.0**	**220.1**
Other Missions and Data Analysis	--	--	101.8	126.5	168.6	200.0	220.1
Radioisotope Power	**--**	**--**	**135.3**	**150.9**	**--**	**--**	**--**
Astrophysics	--	--	552.4	510.4	530.4	523.4	524.7
Astrophysics Research	**--**	**--**	**108.0**	**109.1**	**109.1**	**109.1**	**109.1**
Astrophysics Research and Analysis	--	--	46.6	47.7	47.7	47.7	47.7
Balloon Project	--	--	15.0	15.0	15.0	15.0	15.0
Science Activation	--	--	10.0	10.0	10.0	10.0	10.0
Other Missions and Data Analysis	--	--	36.4	36.4	36.4	36.4	36.4
Cosmic Origins	**--**	**--**	**224.7**	**214.7**	**214.7**	**214.7**	**214.7**
Hubble Space Telescope (HST)	--	--	72.7	72.7	72.7	72.7	72.7
James Webb Space Telescope	--	--	140.0	130.0	130.0	130.0	130.0
Other Missions and Data Analysis	--	--	12.0	12.0	12.0	12.0	12.0
Physics of the Cosmos	**--**	**--**	**3.8**	**13.6**	**17.5**	**10.5**	**11.9**

FY 2027 PRESIDENT'S BUDGET REQUEST SUMMARY

Budget Authority ($ in millions)	Enacted 2025	Enacted 2026	Request 2027	2028	2029	2030	2031
Other Missions and Data Analysis	--	--	3.8	13.6	17.5	10.5	11.9
Exoplanet Exploration	**--**	**--**	**171.8**	**124.7**	**110.7**	**104.2**	**104.2**
Nancy Grace Roman Space Telescope	--	--	166.8	91.4	78.5	73.0	70.9
Other Missions and Data Analysis	--	--	5.0	33.4	32.2	31.2	33.2
Astrophysics Explorer	**--**	**--**	**44.0**	**48.2**	**78.3**	**84.8**	**84.8**
Other Missions and Data Analysis	--	--	44.0	48.2	78.3	84.8	84.8
Heliophysics	**--**	**--**	**419.6**	**408.6**	**438.6**	**438.6**	**438.6**
Heliophysics Research	**--**	**--**	**118.1**	**120.3**	**117.8**	**117.8**	**117.9**
Heliophysics Research and Analysis	--	--	37.0	40.2	40.2	40.2	40.2
Sounding Rockets	--	--	30.0	30.0	30.0	30.0	30.0
Research Range	--	--	10.0	10.0	10.0	10.0	10.0
Other Missions and Data Analysis	--	--	41.1	40.1	37.6	37.6	37.7
Living with a Star	**--**	**--**	**100.5**	**98.9**	**89.8**	**90.1**	**88.7**
Other Missions and Data Analysis	--	--	100.5	98.9	89.8	90.1	88.7
Heliophysics Explorer Program	**--**	**--**	**123.0**	**92.0**	**126.7**	**126.0**	**120.9**
Multi-Slit Solar Explorer	--	--	64.2	16.7	14.8	0.6	--
Other Missions and Data Analysis	--	--	58.8	75.3	111.9	125.4	120.9
Space Weather	**--**	**--**	**73.0**	**92.4**	**99.3**	**99.6**	**106.1**
Heliophysics Technology	**--**	**--**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
Biological and Physical Sciences	**--**	**--**	**25.0**	**25.0**	**25.0**	**25.0**	**25.0**
Aeronautics	**935.0**	**935.0**	**609.5**	**609.5**	**609.5**	**609.5**	**609.5**
Aeronautics	**--**	**--**	**609.5**	**609.5**	**609.5**	**609.5**	**609.5**
Airspace Operations and Safety Program	**--**	**--**	**96.8**	**112.8**	**115.5**	**117.5**	**117.5**
Advanced Air Vehicles Program	**--**	**--**	**191.1**	**192.8**	**186.4**	**175.6**	**175.6**
Integrated Aviation Systems Program	**--**	**--**	**152.2**	**95.6**	**90.2**	**90.2**	**90.1**
Low Boom Flight Demonstrator	--	--	41.3	5.4	--	--	--
Transformative Aero Concepts Program	**--**	**--**	**79.3**	**113.2**	**117.3**	**121.1**	**121.1**
Aerosciences Evaluation and Test Capabilities	**--**	**--**	**90.1**	**95.1**	**100.1**	**105.1**	**105.2**
STEM Engagement	**143.0**	**143.0**	**--**	**--**	**--**	**--**	**--**
Safety, Security, and Mission Services	**3,092.3**	**3,000.0**	**1,998.6**	**1,998.6**	**1,998.6**	**1,998.6**	**1,998.6**
Mission Services & Capabilities	**--**	**--**	**1,536.7**	**1,536.7**	**1,536.7**	**1,536.7**	**1,536.7**
Information Technology (IT)	**--**	**--**	**485.1**	**485.1**	**485.1**	**485.1**	**485.1**
Mission Enabling Services	**--**	**--**	**526.4**	**526.4**	**526.4**	**526.4**	**526.4**
Infrastructure & Technical Capabilities	**--**	**--**	**525.1**	**525.1**	**525.1**	**525.1**	**525.1**
Engineering, Safety, & Operations	**--**	**--**	**462.0**	**462.0**	**462.0**	**462.0**	**462.0**
Agency Technical Authority	**--**	**--**	**87.9**	**87.9**	**87.9**	**87.9**	**87.9**

FY 2027 President's Budget Request Summary

Budget Authority ($ in millions)	Enacted 2025	Enacted 2026	Request 2027	2028	2029	2030	2031
			Fiscal Year				
Center Engineering, Safety, & Operations	--	--	374.1	374.1	374.1	374.1	374.1
Construction and Environmental Compliance and Restoration	300.0	185.3	100.6	100.6	100.6	100.6	100.6
Construction of Facilities	--	--	65.5	65.5	65.5	65.5	65.5
Institutional CoF	--	--	65.5	65.5	65.5	65.5	65.5
Environmental Compliance and Restoration	--	--	35.1	35.1	35.1	35.1	35.1
Inspector General	47.6	46.5	41.1	41.1	41.1	41.1	41.1
NASA Total	24,838.3	24,438.3	18,829.1	18,829.1	18,829.1	18,829.1	18,829.1

FY 2025 reflects the funding amount specified in Public Law 119-4, Full-Year Continuing Appropriations and Extensions Act, 2025.

FY 2026 reflects the funding amount specified in Public Law 119-74, Commerce, Justice, Science; Energy and Water Development; and Interior and Environment Appropriations Act, 2026.

FY 2027 Working Families Tax Cut (WFTC) Summary

Planned Obligations ($ in millions)	2025	2026	2027	2028	2029	2030	Total
				Fiscal Year			
NASA WFTC Total	575.0	4,010.0	2,110.0	2,025.0	1,275.0	--	9,995.0
Exploration	--	2,845.0	1,775.0	1,775.0	1,025.0	--	7,420.0
Moon and Mars Transportation System	--	1,045.0	1,025.0	1,025.0	1,025.0	--	4,120.0
Moon and Mars Systems Development	--	1,800.0	750.0	750.0	--	--	3,300.0
Space Operations	575.0	250.0	250.0	250.0	250.0	--	1,575.0
International Space Station	50.0	--	--	--	--	--	50.0
Space Transportation	525.0	250.0	250.0	250.0	250.0	--	1,525.0
Construction and Environmental Compliance and Restoration	--	915.0	85.0	--	--	--	1,000.0
Infrastructure Improvements	--	915.0	85.0	--	--	--	1,000.0
NASA WFTC Total	575.0	4,010.0	2,110.0	2,025.0	1,275.0	--	9,995.0

FY 2027 WORKING FAMILIES TAX CUT (WFTC) SUMMARY

Planned Obligations ($ in millions)	2025	2026	2027	2028	2029	2030	Total
NASA WFTC Total	575.0	4,010.0	2,110.0	2,025.0	1,275.0	--	9,995.0
Exploration	--	2,845.0	1,775.0	1,775.0	1,025.0	--	7,420.0
Moon and Mars Transportation System	--	1,045.0	1,025.0	1,025.0	1,025.0	--	4,120.0
Orion Program	--	20.0	--	--	--	--	20.0
Space Launch System	--	1,025.0	1,025.0	1,025.0	1,025.0	--	4,100.0
Moon and Mars Systems Development	--	1,800.0	750.0	750.0	--	--	3,300.0
Gateway	--	1,100.0	750.0	750.0	--	--	2,600.0
Advanced Communications	--	700.0	--	--	--	--	700.0
Space Operations	575.0	250.0	250.0	250.0	250.0	--	1,575.0
International Space Station	50.0	--	--	--	--	--	50.0
International Space Station	50.0	--	--	--	--	--	50.0
Space Transportation	525.0	250.0	250.0	250.0	250.0	--	1,525.0
Crew and Cargo Program	525.0	250.0	250.0	250.0	250.0	--	1,525.0
Construction and Environmental Compliance and Restoration	--	915.0	85.0	--	--	--	1,000.0
Infrastructure Improvements	--	915.0	85.0	--	--	--	1,000.0
Infrastructure Improvements	--	115.0	--	--	--	--	115.0
Center Projects	--	800.0	--	--	--	--	800.0
Space Vehicle Transfer	--	--	85.0	--	--	--	85.0
NASA WFTC Total	575.0	4,010.0	2,110.0	2,025.0	1,275.0	--	9,995.0

In FY 2025, Section 40005 of Title IV of the Working Families Tax Cut Act (P.L. 119-21) amends Chapter 203 of Title 51, United States Code, to provide special mandatory appropriations totaling $9.995 billion, to remain available until September 30, 2032, for NASA Mars missions, Artemis missions, and Moon to Mars program. The above table illustrates funding available for obligation by fiscal year for Exploration and Space Operations. Construction and Environmental Compliance Restoration's table illustrates funding planned for obligation by fiscal year.

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MESSAGE FROM THE ADMINISTRATOR

I am honored to present the President's Budget Request for Fiscal Year 2027 for the National Aeronautics and Space Administration.

This request comes at a pivotal moment for America's civil space program. Rapid technological progress, intensifying global competition, and unprecedented commercial capability are reshaping the strategic environment in space. In response, the President has articulated a clear national objective through the Executive Order on Ensuring American Space Superiority: The United States must lead the world in exploration, innovation, and the peaceful use of space while protecting the economic and security interests that depend on our leadership. NASA's mission is central to achieving that vision.

The FY 2027 Budget Request advances three overarching priorities: sustaining American leadership in deep space exploration, strengthening the nation's space industrial base, and accelerating technological innovations that benefit the American people.

This budget supports the United States' return to the Moon through the Artemis campaign. Our objective is not simply to revisit the lunar surface, but to establish a sustained American presence that enables long-term exploration, science, and economic activity. The Moon is the proving ground for humanity's future in deep space. Through Artemis and its international and commercial partners, NASA is laying the foundation for sustained lunar operations, advanced power systems, and the technologies necessary for the journey to Mars. This budget, in conjunction with Working Families Tax Cut Act resources, increases launch cadence, expands commercial lunar lander testing, and initiates work toward a permanent lunar base, including increasing the cadence of commercial lunar landings, and positions American astronauts to return to the lunar surface by 2028.

The request also supports the continued transition to commercially developed space stations while maintaining safe operation of the International Space Station until its decommissioning in 2030. NASA's partnerships with industry will advance the capability, efficiency, and long-term sustainability of U.S. human spaceflight in low Earth orbit.

Commercial partnerships remain a cornerstone of NASA's strategy. American companies are expanding the nation's capabilities in launch services, lunar transportation, and orbital infrastructure. These partnerships allow NASA to focus resources on the most technically demanding challenges while enabling U.S. industry to lead the rapidly growing global space economy.

The budget also reinforces U.S. leadership in space science through groundbreaking missions, competed research, and next-generation observatories that expand human knowledge while delivering tangible benefits to life on Earth. Consistent with the President's commitment to fiscal discipline, NASA is pursuing a focused and right-sized portfolio that advances scientific discovery while ensuring responsible stewardship of taxpayer resources.

The FY 2027 request also advances technologies that will define the next chapter of exploration, including advanced propulsion, autonomous systems, and space-based power. NASA and the Department of Energy are jointly developing a lunar surface nuclear power system, an essential capability for sustained operations beyond Earth and a key step toward establishing a permanent human presence on the Moon.

MESSAGE FROM THE ADMINISTRATOR

Beyond exploration and science, this request strengthens U.S. leadership in aeronautics through strategic investments in transformative technologies and next-generation air transportation systems that will maintain American competitiveness in aviation.

The President recognizes that space is a strategic domain. American leadership requires technological strength, resilient infrastructure, and close coordination across civil, commercial, and national security space sectors. Infrastructure funding provided through the Working Families Tax Cut Act is enabling critical modernization across NASA centers, investments that will support the next generation of exploration systems and scientific missions.

Ultimately, America's advantage in space has always been its people. NASA's scientists, engineers, astronauts, technicians, and innovators represent one of the nation's greatest strategic assets. This budget empowers NASA's technical workforce and expands pathways for the next generation of aerospace talent, ensuring the agency maintains the core competencies required to meet the challenges ahead.

Our missions deepen our understanding of Earth, expand humanity's knowledge of the universe, and inspire generations of Americans to pursue careers in science and engineering. From studying our changing planet to searching for life beyond Earth, NASA's work strengthens our economy, our security, and our sense of possibility.

The FY 2027 President's Budget Request reflects a clear principle: the United States must lead in space, not only for discovery, but for national prosperity, security, and inspiration. With the support of Congress, NASA will continue to push the boundaries of exploration, strengthen American technological leadership, and ensure that the next great chapter of space exploration is led by the United States.

Jared Isaacman
NASA Administrator

AGENCY FACT SHEET

($ in Billions)	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
NASA Budget	24.8	24.4	18.8	18.8	18.8	18.8	18.8

In FY 2025, Section 40005 of Title IV of the Working Families Tax Cut (WFTC) Act (P.L. 119-21) amended Chapter 203 of U.S.C. Title 51 to provide special mandatory appropriations to NASA totaling $9.995 billion, to remain available until September 30, 2032, and of which NASA plans to obligate $2.110 billion in FY 2027.

FY 2025 reflects the funding amount specified in Public Law 119-4, Full-Year Continuing Appropriations and Extensions Act, 2025.

FY 2026 reflects the funding amount specified in Public Law 119-74, Commerce, Justice, Science; Energy and Water Development; and Interior and Environment Appropriations Act, 2026.

Totals may not add due to rounding.

The President's Fiscal Year 2027 Budget Request for NASA is $18.8 billion. With this proposed budget, NASA will fund the following efforts:

Agency Highlights

- Invests $8.5 billion to support NASA's Artemis program and advance critical Mars-focused capabilities, ensuring America will continue to lead in the ever-expanding high ground of space. NASA will accelerate existing plans to the greatest extent possible, returning American astronauts to the Moon and establishing an enduring presence in the form of a permanent lunar base. The WFTC Act provides an additional $1.8 billion to enable up to two additional flights beyond Artemis III using NASA's legacy Space Launch System (SLS) rocket and for the lunar Gateway program, which the agency will transition to support development of the lunar base camp.
- Allocates $3.0 billion to nurture the growth of a robust commercial orbital economy, ensuring access to and enabling human presence in space, including future exploration and advanced operations in our solar system. Supports the International Space Station (ISS) through end-of-life, prepares for safe deorbit, and funds the transition to commercially owned and operated LEO destinations after the ISS. The WFTC Act provides an additional $250 million to maintain safe operations and maximize research opportunities on the ISS.
- Commits $624 million to fund projects that will advance U.S. space technology leadership and global competitiveness by rapidly developing, demonstrating, and delivering transformative capabilities in partnership with industry, government, and academia. Supports new commercial initiatives to establish an enduring presence on the Moon with extensibility to Mars, including lunar rocket propellant and radioisotope power systems.
- Provides $3.9 billion for groundbreaking science investigations that will increase humanity's knowledge about the universe, inform human exploration of the Moon, Mars, and solar system, and protect and improve life on Earth through research that supports disaster response, natural resource management, and planetary defense. This includes funding for such high-impact and pioneering missions as the Nancy Grace Roman space telescope, VIPER lunar rover to map the location of water ice and other potential resources, Dragonfly mission to investigate the potential for pre-biotic life on Saturn's moon Titan, and NEO Surveyor mission to detect hazardous asteroids.
- Provides $610 million to maintain and advance American leadership in global aviation markets, including improving commercial aircraft, safely increasing the national airspace capacity, and

AGENCY FACT SHEET

developing new hypersonic technologies through key partnerships with industry, the Federal Aviation Administration, and Department of War, which will substantially contribute to the nation's strength, security, and prosperity.

- Invests $2.0 billion in mission-enabling, foundational support capabilities, such as information technology and protective services, and $101 million in modernizing and rightsizing NASA's aging infrastructure.
- Terminates funding for the Office of STEM Engagement. NASA's primary role is space exploration and, similar to prior generations that were inspired by the Apollo lunar landings, NASA will inspire the next generation of explorers through exciting, ambitious space missions.

EXPLANATION OF BUDGET TABLES AND SHEDULES

EXPLANATION OF BUDGET TABLES

FY 2025 reflects the funding amount specified in Public Law 119-4, Full-Year Continuing Appropriations and Extensions Act, 2025.

FY 2026 reflects the funding amount specified in Public Law 119-74, Commerce, Justice, Science; Energy and Water Development; and Interior and Environment Appropriations Act, 2026.

Totals may not add due to rounding.

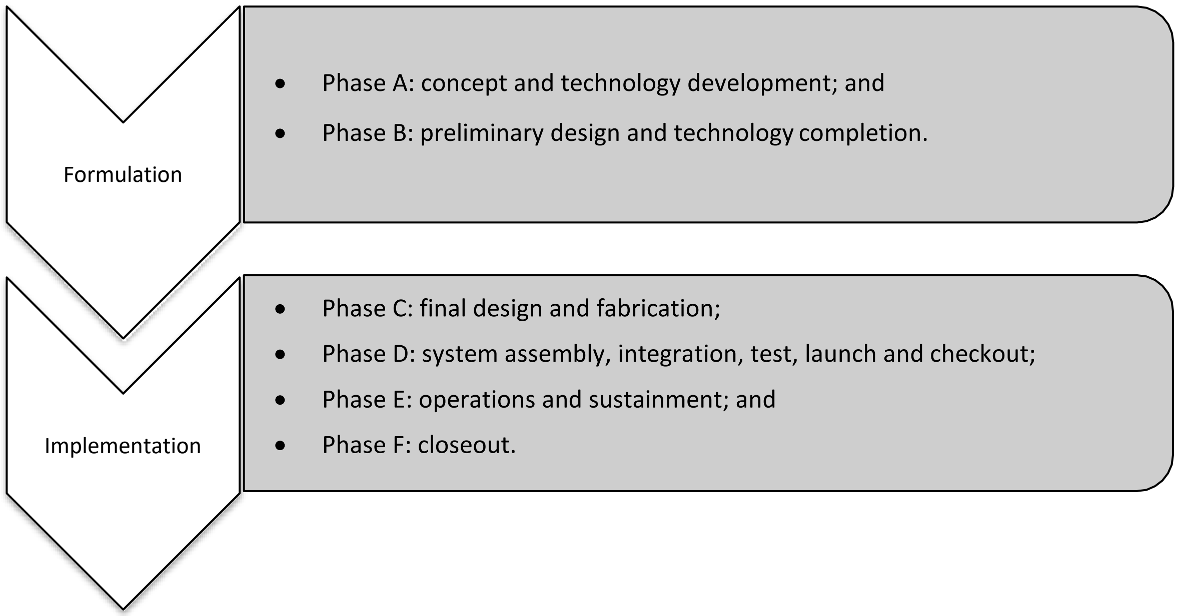
WORKING FAMILIES TAX CUT Act FUNDING SUMMARIES

In FY 2025, Section 40005 of Title IV of the Working Families Tax Cut (WFTC) Act (P.L. 119-21) amends Chapter 203 of Title 51, United States Code, to provide special mandatory appropriations totaling $9.995 billion, to remain available until September 30, 2032, for NASA Mars missions, Artemis missions, and Moon to Mars program. The WFTC tables illustrate funding available for obligation by fiscal year for Exploration and Space Operations, and funding planned for obligation by fiscal year for Construction and Environmental Compliance Restoration.

EXPLANATION OF BUDGET TABLES AND SHEDULES

EXPLANATION OF PROJECT SCHEDULE COMMITMENTS AND KEY MILESTONES

Programs and projects follow their appropriate life cycle. The life cycle is divided into phases. Transition from one phase to another requires management approval at Key Decision Points (KDPs). The phases in program and project life cycles include one or more life cycle reviews, which are considered major milestone events.



A life cycle review is designed to provide the program or project with an opportunity to ensure that it has completed the work of that phase and an independent assessment of a program or project's technical and programmatic status and health. The final life cycle review in a given life cycle phase provides essential information for the KDP that marks the end of that life cycle phase and transition to the next phase if successfully passed. As such, KDPs serve as gates through which programs and projects must pass to continue.

The KDP decision to authorize a program or project's transition to the next life cycle phase is based on a number of factors, including technical maturity; continued relevance to agency strategic goals; adequacy of cost and schedule estimates; associated probabilities of meeting those estimates (i.e., confidence levels); continued affordability with respect to the agency's resources; maturity and the readiness to proceed to the next phase; and remaining program or project risks (e.g., safety, cost, schedule, technical, management, and programmatic). At the KDP, the key program or project cost, schedule, and content parameters that govern the remaining life cycle activities are established.

For reference, a description of schedule commitments and milestones is listed below for projects in formulation or implementation. A list of common terms used in mission planning is also included.

EXPLANATION OF BUDGET TABLES AND SHEDULES

Formulation

NASA places significant emphasis on project formulation to ensure adequate preparation of project concepts and plans, and mitigation of high-risk aspects of the project essential to position the project for the highest probability of mission success. During formulation, the project explores the full range of implementation options, defines an affordable project concept to meet requirements, and develops needed technologies. The activities in these phases include developing the system architecture; completing mission and preliminary system designs; acquisition planning; conducting safety, technical, cost, and schedule risk trades; developing time-phased cost and schedule estimates and documenting the basis of these estimates; and preparing the project plan for implementation.

Formulation Milestone	Explanation
KDP-A	The life cycle gate at which the decision authority determines the readiness of a program or project to transition into Phase A and authorizes formulation of the project. Phase A is the first phase of formulation and means that: • The project addresses a critical NASA need; • The proposed mission concept(s) is feasible; • The associated planning is sufficiently mature to begin activities defined for formulation; and • The mission can likely be achieved as conceived.
System Requirements Review	The life cycle review evaluates whether the functional and performance requirements defined for the system are responsive to the program's requirements on the project and represent achievable capabilities.
System Definition Review or Mission Definition Review	The life cycle review evaluates the credibility and responsiveness of the proposed mission/system architecture to the program requirements and constraints on the project, including available resources, and determines whether the maturity of the project's mission/system definition and associated plans are sufficient to begin the next phase, Phase B.
KDP-B	The life cycle gate at which the decision authority determines the readiness of a program or project to transition from Phase A to Phase B. Phase B is the second phase of formulation and means that: • The proposed mission/system architecture is credible and responsive to program requirements and constraints, including resources; • The maturity of the project's mission/system definition and associated plans is sufficient to begin Phase B; and • The mission can likely be achieved within available resources with acceptable risk.
Preliminary Design Review (PDR)	The life cycle review evaluates the completeness/consistency of the planning, technical, cost, and schedule baselines developed during formulation. This review also assesses compliance of the preliminary design with applicable requirements and determines if the project is sufficiently mature to begin Phase C.

EXPLANATION OF BUDGET TABLES AND SHEDULES

Implementation

Implementation occurs when agency management establishes baseline cost and schedule commitments for projects at KDP-C. The projects maintain the baseline commitment through the end of the mission. Projects are baselined for cost, schedule, and programmatic and technical parameters. Under Implementation, projects are able to execute approved plans for development and operations.

Implementation Milestone	Explanation
KDP-C	The life cycle gate at which the decision authority determines the readiness of a program or project to begin the first stage of development and transition to Phase C and authorizes the Implementation of the project. Phase C is the first stage of development and means that: • The project's planning, technical, cost, and schedule baselines developed during formulation are complete and consistent; • The preliminary design complies with mission requirements; • The project is sufficiently mature to begin Phase C; and • The cost and schedule are adequate to enable mission success with acceptable risk.
Critical Design Review (CDR)	The life cycle review evaluates the integrity of the project design and its ability to meet mission requirements with appropriate margins and acceptable risk within defined project constraints, including available resources. This review also determines if the design is appropriately mature to continue with the final design and fabrication phase.
System Integration Review	The life cycle review evaluates the readiness of the project and associated supporting infrastructure to begin system assembly, integration, and test. The life cycle review also evaluates whether the remaining project development can be completed within available resources, and determine if the project is sufficiently mature to begin Phase D.
KDP-D	The life cycle gate at which the decision authority determines the readiness of a project to continue in Implementation and transition from Phase C to Phase D. Phase D is the second phase in Implementation; the project continues in development and means that: • The project is still on plan; • The risk is commensurate with the project's payload classification; and • The project is ready for assembly, integration, and test with acceptable risk within its agency baseline commitment.
Launch Readiness Date	The date at which the project and its ground, hardware, and software systems are ready for launch.

EXPLANATION OF BUDGET TABLES AND SHEDULES

Other Common Terms for Mission Planning

Term	Definition
Decision Authority	The individual authorized by the agency to make important decisions on programs and projects under their authority.
Formulation Authorization Document	The document that authorizes the formulation of a program whose goals will fulfill part of the agency's strategic plan and mission directorate strategies. This document establishes the expectations and constraints for activity in the Formulation Phase.
KDP	The life cycle gate at which the decision authority determines the readiness of a program or project to progress to the next phase of the life cycle. The KDP also establishes the content, cost, and schedule commitments for the ensuing phase(s).
Launch Manifest	A list that NASA publishes (the "NASA Flight Planning Board launch manifest") periodically, which includes the expected launch dates for NASA missions. The launch dates in the manifest are the desired launch dates approved by the NASA Flight Planning Board and are not typically the same as the Agency Baseline Commitment schedule dates. A launch manifest is a dynamic schedule that is affected by real world operational activities conducted by NASA and multiple other entities. It reflects the results of a complex process that requires the coordination and cooperation by multiple users for the use of launch range and launch contractor assets. Moreover, the launch dates are a mixture of "confirmed" range dates for missions launching within approximately six months, and contractual/planning dates for the missions beyond six months from launch. The NASA Flight Planning Board launch manifest date is typically earlier than the Agency Baseline Commitment schedule date to allow for the operationally driven delays to the launch schedule that may be outside of the project's control.
Operational Readiness Review	The life cycle review evaluates the readiness of the project, including its ground systems, personnel, procedures, and user documentation, to operate the flight system and associated ground system(s), in compliance with defined project requirements and constraints during the operations phase.
Mission Readiness Review or Flight Readiness Review	The life cycle review evaluates the readiness of the project, ground systems, personnel, and procedures for a safe and successful launch and flight/mission.
KDP-E	The life cycle gate at which the decision authority determines the readiness of a project to continue in Implementation and transition from Phase D to Phase E. Phase E is the third phase in Implementation and means that the project and all supporting systems are ready for safe, successful launch and early operations with acceptable risk.
Decommissioning Review	The life cycle review in which the decision authority evaluates the readiness of the project to conduct closeout activities. The review includes final delivery of all remaining project deliverables and safe decommissioning of space flight systems and other project assets.
KDP-F	The life cycle gate at which the decision authority determines the readiness of the project's decommissioning. Passage through this gate means the project has met its program objectives and is ready for safe decommissioning of its assets and closeout of activities. Scientific data analysis may continue after this period.

EXPLANATION OF BUDGET TABLES AND SHEDULES

For further details, visit:

- NASA Procedural Requirement 7120.5F - NASA Space Flight Program and Project Management Requirements: https://nodis3.gsfc.nasa.gov/npg_img/N_PR_7120_005F_/N_PR_7120_005F_.pdf
- NASA Procedural Requirement 7123.1D - NASA Systems Engineering Processes and Requirements: https://nodis3.gsfc.nasa.gov/npg_img/N_PR_7123_001D_/N_PR_7123_001D_.pdf

COMMON ACRONYMS AND ABBREVIATIONS

NASA Centers

ARC	Ames Research Center
AFRC	Armstrong Flight Research Center
GRC	Glenn Research Center
GSFC	Goddard Space Flight Center
HQ	Headquarters
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
KSC	Kennedy Space Center
LaRC	Langley Research Center
MSFC	Marshall Space Flight Center
SSC	Stennis Space Center

Mission Directorates

ARMD	Aeronautics Research Mission Directorate
ESDMD	Exploration Systems Development Mission Directorate
MSD	Mission Support Directorate
SMD	Science Mission Directorate
SOMD	Space Operations Mission Directorate
STMD	Space Technology Mission Directorate

Federal Agencies

DoW	Department of War
DoE	Department of Energy
NOAA	National Oceanic and Atmospheric Administration
NSF	National Science Foundation

Partner Space Agencies

ASI	Italian Space Agency
CSA	Canadian Space Agency
DLR	German Aerospace Center
ESA	European Space Agency
ISRO	Indian Space Research Organization
JAXA	Japanese Aerospace Exploration Agency

Others

CDR	Critical Design Review
ISS	International Space Station
KDP	Key Decision Point
LCC	Life Cycle Cost
LEO	low-Earth orbit
PDR	Preliminary Design Review

PROHIBITION OF FUNDS STATEMENT

PROHIBITION OF FUNDS STATEMENT

In accordance with administration policy announced in the budget, NASA will follow new government-wide grants guidance prohibiting the use of federal funds to pay for subscriptions to academic journals, as well as for the publication of research results that are not specifically required by federal statute or approved in advance by a federal agency. This policy preserves funds to support actual research by ensuring that the American taxpayer does not pay for the research, publication, and access to that research, essentially triple charging the public for the same product.

EXPLORATION

EXPLORATION

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Moon and Mars Transportation System	--	--	**4,219.1**	3,888.1	3,172.2	3,659.4	3,659.4
Moon and Mars Systems Development	--	--	**3,810.1**	3,506.5	3,237.7	3,290.5	3,214.5
Human Exploration Requirements & Architecture	--	--	**484.7**	1,099.4	1,764.0	1,204.0	1,260.0
Total Budget	**7,666.2**	**7,783.0**	**8,513.9**	**8,493.9**	**8,173.9**	**8,153.9**	**8,133.9**

FY 2025 reflects the funding amount specified in Public Law 119-4, Full-Year Continuing Appropriations and Extensions Act, 2025.

FY 2026 reflects the funding amount specified in Public Law 119-74, Commerce, Justice, Science; Energy and Water Development; and Interior and Environment Appropriations Act, 2026.

Working Families Tax Cut Funding Summary

Planned Obligations **(in $ millions)**	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
WFTC – Advanced Communications	--	700.0	**--**	--	--	--	--
WFTC – Gateway	--	1,100.0	**750.0**	750.0	--	--	--
WFTC – Space Launch System	--	1,025.0	**1,025.0**	1,0250	1,0250	--	--
WFTC – Orion	--	20.0	**--**	--	--	--	--
Total Budget	**--**	**2.845.0**	**1,775.0**	**1,775.0**	**1,025.0**	**--**	**--**

In FY 2025, a total of $7.420 billion in mandatory funding was appropriated to the Exploration Mission Directorate through enactment of the Working Families Tax Cut (WFTC) Act, Public Law 119-21. The above table illustrates funding available for obligation by fiscal year.

The FY 2027 President's Budget requests $8.5 billion for the Exploration account to maintain U.S. leadership and strategic advantage in human space exploration. This investment supports America's return to the Moon and establishment of initial elements of a permanent lunar base camp near the South Pole of the Moon. The base camp will establish U.S. superiority on the Moon and provide essential operational experience, technology demonstration opportunities, and scientific data necessary to maintain U.S. leadership and competitiveness in space. This request also prioritizes the transition to commercially provided transportation services for Artemis missions, which will improve cost effectiveness, increase mission cadence, and strengthen the U.S. industrial base. Activities funded under this request will also advance critical Mars-focused capabilities by continuing development of robotic and human transportation options; maturing high-priority, long-lead technologies; and reducing technical, programmatic, and health risks for future crewed missions. The requested funding continues a human exploration program that is safe, effective, and fiscally responsible while delivering measurable progress toward long-term exploration goals.

The FY 2027 President's Budget prioritizes the Artemis missions, which will return humans to the lunar surface by 2028, marking a critical milestone in U.S. human spaceflight. NASA's latest Artemis architecture updates the Artemis III mission in 2027 to test system capabilities in Earth orbit, prior to sending astronauts to the surface of the Moon for the first time in more than 50 years. NASA aims to achieve one lunar mission per year thereafter. Standardizing the Space Launch System (SLS) will help NASA send astronauts to explore the lunar South Pole for the first time in 2028. In conjunction with funding from the Working Families Tax Cut (WFTC) Act, this request enables up to two additional flights beyond Artemis III using NASA's legacy programs in its Moon and Mars Transportation System theme. These investments ensure that the United States continues to set the standard for human space exploration while leveraging American industry to deliver capabilities efficiently and reliably.

In line with the Administration's objective of putting the first human on Mars, ESDMD's budget includes investments for Mars-focused programs. Significant resources will be devoted to accelerating the development of high-priority technologies for crewed missions to Mars. These investments will establish deep space capabilities to deliver on President Trump's vision of American astronauts planting the stars and stripes on Mars.

- ESDMD will continue industry studies on transporting humans to and from Mars for future surface missions.
- With funding from the WFTC Act, ESDMD will leverage commercial capabilities and enhance communications relay capabilities around Mars by developing a Mars telecommunication orbiter to provide more robust communication links between Mars and Earth.
- NASA will continue its Commercial Mars Payload Service effort to launch precursor missions and technology demonstrators to the Martian surface. Near-term efforts will focus on the maturation of commercial robotic Mars lander concepts.

ESDMD will continue to coordinate with SMD to leverage robotic science missions that reduce risk, inform the design and execution of future human missions to the Moon and Mars, and advance priority scientific objectives.

ESDMD will leverage investments from STMD to mature and transition critical technologies into exploration systems and will coordinate with STMD to align Mars-related technology development with human exploration requirements, ensuring efficient use of resources and minimizing duplication.

ESDMD will also utilize capabilities provided by SOMD, including the ISS and the Space Communications and Navigation Program, as testbeds for human systems and technologies and as providers of essential communications and navigation services. This coordinated, cross-directorate approach supports mission readiness, risk reduction, and a sustainable path for U.S. leadership in human space exploration.

The Exploration Systems account consists of three themes which provide for the development of systems and capabilities needed for human exploration of deep space:

- Moon and Mars Transportation System;
- Moon and Mars Systems Development; and
- Human Exploration Requirements and Architecture (HERA).

The Moon and Mars Transportation System theme enables the agency's Artemis campaign to return Americans to the Moon by providing the current transportation capabilities necessary for astronauts to travel between Earth and the lunar vicinity. It also supports the transition of Artemis to more cost-effective, next-generation commercial systems that will provide transportation for astronauts and payloads for future NASA lunar and Mars missions.

For the first five Artemis missions, NASA is using a set of legacy space transportation programs:

- The Orion Program is producing the spacecraft which will carry crew to an orbit where they will meet a lunar lander, which will take them to the lunar surface and back to Orion. The Orion spacecraft will sustain the crew during space travel, provide emergency abort capability, and provide safe re-entry from deep space return velocities.
- The SLS Program is producing a human-rated launch system capable of sending the crewed Orion spacecraft to its destination orbit.
- The Exploration Ground Systems (EGS) Program is developing and operating the systems and facilities necessary to process, integrate, transport, and launch NASA's SLS rocket and Orion spacecraft.

For Artemis IV and V, these systems will be used together to launch astronauts to an orbit where they can rendezvous with and transfer to a prepositioned lunar lander, which will carry the astronauts to and from the lunar surface. To execute missions beyond Artemis V, NASA will initiate a new procurement to obtain commercial transportation services to launch astronauts to rendezvous with with the lunar landers. This procurement will leverage lessons learned from previous commercial acquisitions and draw on NASA personnel with proven experience with successful commercial acquisitions within human spaceflight and across the agency's missions. The new services contracts will be designed to achieve the best value for the government for the Moon and Mars Program. The acquisition will consider and allow a range of options that include services for different phases of the mission as well as end-to-end services to maximize the opportunity for competition and the benefits that have historically been realized because of competition.

In addition, ESDMD is responsible for the Commercial Lunar Payload Services (CLPS) program, along with the newly established Commercial Mars Payload Services (CMPS) program to begin launching precursor missions and technology demonstrators to the martian surface. Funding for development of lunar communications relay services is also included under the Moon and Mars Transportation System theme.

The Moon and Mars Systems Development theme consists of five programs that are developing the capabilities that are necessary for human operations on the lunar surface and will ultimately be required for Mars. Programs under this theme are developing and testing prototypes and planning missions to the Moon to further develop systems and operational practices that will enable the lunar base camp and missions to Mars. For FY 2027, Moon and Mars Systems Development includes funding for five programs: Exploration Extravehicular Activity and Human Surface Mobility Program (EHP), Human Landing System (HLS), Advanced Exploration Systems (AES), Mars Technology, and Human Research Program (HRP). The Gateway program within the Moon and Mars Systems Development theme will be transitioned to support development of a lunar base camp using funding from the WFTC Act; no discretionary funding is requested for Gateway in the FY 2027 Budget.

Moon and Mars Systems Development programs will create the capabilities necessary for astronauts to reach and work on the lunar surface during Artemis missions, which will inform missions to Mars:

- EHP is developing systems that NASA will use to explore and work on the surface of the Moon; providing lessons learned and expertise that will support Mars missions. These surface systems, provided both commercially and internationally, include programs like the Lunar Terrain Vehicle, the Pressurized Rover, and lunar surface suits.
- HLS utilizes commercial partnerships to develop and jointly deploy the integrated landing systems that will transport crew to and from the lunar surface and conduct a series of lunar missions. The

budget provides funding for the HLS program to maintain competition for lunar landing services by supporting the development of multiple lunar landing systems.

- AES works to identify and address knowledge gaps, and deliver fundamental capabilities necessary to provide astronauts with places to live and work with integrated life support, radiation protection, food, fire safety, avionics and software, logistics management, and waste management systems.
- Mars Technology will accelerate the development of high-priority technologies for the lunar base camp that have particular extensibility to Mars.
- HRP is planning dedicated extended-duration research on the ISS to shed light on how the human body adapts to living in space for longer time periods, which will be pivotal for future deep space missions.

The HERA theme includes work to identify the infrastructure required for Artemis missions to the Moon and for human missions to Mars. It also ensures that lunar capabilities are both cost-effective and extensible to future Mars exploration, where technically feasible. HERA is comprised of SAO and Future Systems.

- SAO manages the architecture strategy effort that supports mission manifest planning, overall architecture requirements, and capability identification, including industry studies on transporting humans to and from the surface of Mars.
- Future Systems conducts trade studies to reduce risk and identify required technologies to be utilized as part of the Artemis campaign and act as precursor capabilities for missions to Mars. As savings are realized because of the transition to commercial transportation systems, additional resources will be channeled to further essential surface and other capabilities. Future Systems identifies and tracks the resources needed to develop new lunar capabilities aligned to the architecture. As new elements are approved to proceed through the Acquisition Strategy Meeting, funding shifts from Future Systems to implementing programs.

EXPLANATION OF MAJOR CHANGES IN FY 2027

NASA updated the Artemis III mission in mid-2027 to test combined operations of the Orion spacecraft and one or both commercial landers from SpaceX and Blue Origin in Earth orbit. The updated mission will launch crew in Orion using the SLS rocket to test rendezvous and docking capabilities between Orion and the commercial landers needed to land astronauts on the Moon. The additional tests opportunities provided by the updated plan will help achieve the goal of conducting the first Artemis crew landing in 2028.

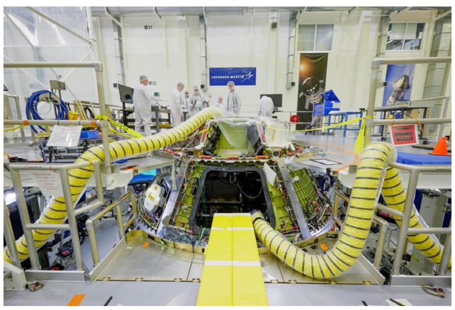
The WFTC Act provides targeted funding and direction to ESDMD to advance U.S. human exploration priorities and maintain American leadership in space. Consistent with congressional intent, ESDMD will use WFTC Act funding to support the Artemis campaign, including continued procurement of the SLS rocket and Orion spacecraft for up to two additional launches beyond Artemis III. The Lunar Gateway program will transition to serve as the foundation for the future Moon base, with key hardware elements repurposed to support ongoing exploration missions.

ESDMD will also advance capabilities that support future human missions to Mars, including coordination on the development of a Mars Telecommunications Orbiter. In addition, the WFTC Act supports ESDMD-managed infrastructure and facility improvements required to maintain mission readiness. For more information, go to: https://www.nasa.gov/directorates/exploration-systems-development

ORION PROGRAM

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Crew Vehicle Development	--	--	**1,214.3**	1,001.2	779.3	565.5	0.0
Orion Program Integration and Support	--	--	**7.5**	0.0	0.0	0.0	0.0
Total Budget	**--**	**--**	**1,221.8**	**1,001.2**	**779.3**	**565.5**	**0.0**



Technicians work on the Artemis III Orion crew module at NASA's KSC.

The Orion spacecraft is a vehicle that carries crew to lunar orbit, sustains the crew during space travel, provides an emergency abort capability, and provides safe re-entry from lunar return velocities.

Orion's design, development, test (including flight tests), and evaluation will have the spacecraft ready to carry crew for the first time on Artemis II, currently planned for April 2026. Artemis III will be dedicated to testing Orion's rendezvous operations in Earth orbit as early as mid-2027. Accelerated hardware build schedules and integration timelines will enable follow-on flight opportunities in both early and late 2028.

Orion Program Integration and Support activities oversee program integration points between Orion and other elements of the Artemis missions. This effort is critical to ensuring the Orion systems' performance meet technical and safety specifications, and support programmatic assessments that are key to achieving integrated technical, cost, and schedule management. In addition, the Orion integration effort is vital for managing interfaces with other ESDMD activities, including strategic studies, feasibility studies, and small-scale research tasks that feed into future human exploration. Coordination and timely integration across ESDMD are aimed at mitigating the impacts of potential design overlaps, schedule disconnects and delays, and cost overruns.

The FY 2027 President's Budget ensures Orion's successful post-mission operations, disassembly, and component refurbishment after Artemis II. The budget also provides support for procurement, assembly, and testing of Orion spacecraft to ensure crew transportation capability through Artemis V. Concurrently, NASA will continue to develop commercial transportation services for future Artemis flights through a competitive contract to improve cost effectiveness, increase mission cadence, and strengthen the U.S. industrial base. Industry partners will be allowed to propose a commercialized Orion spacecraft to support future Artemis missions through this competitive contract process. For more information, go to: http://www.nasa.gov/orion.

EXPLANATION OF MAJOR CHANGES IN FY 2027

NASA updated the Artemis III mission in mid-2027 to test combined operations of the Orion spacecraft with one or both commercial landers from SpaceX and Blue Origin in Earth orbit. The new mission will launch crew in Orion using the Space Launch System (SLS) rocket to test rendezvous and docking capabilities between Orion and the commercial landers that will transport astronauts to the surface of the Moon on Artemis IV. The additional test opportunities provided by the updated plan will help achieve the goal of conducting the first Artemis crew landing in 2028.

ORION PROGRAM

KEY ACHIEVEMENTS PLANNED FOR FY 2027

Complete assembly and testing of the Artemis III crew vehicle.

Deliver the Artemis III Crew Service Module (CSM) to Exploration Ground Systems for final vehicle processing and support the final integration of the Orion CSM with the SLS launch vehicle.

CREW VEHICLE DEVELOPMENT

Formulation	Development	Operations

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	1,214.3	1,001.2	779.3	565.5	0.0

PROJECT PURPOSE

The Orion spacecraft carries crew to lunar orbit, sustains the crew during space travel, provides an emergency abort capability, and provides safe re-entry from lunar return velocities. For more information, go to http://www.nasa.gov/orion.

EXPLANATION OF MAJOR CHANGES IN FY 2027

The WFTC Act funding supports continued procurement, assembly, and testing of Orion spacecraft to provide crew transportation capability for Artemis IV and V.

PROJECT PARAMETERS

Orion can carry a crew of four astronauts to cislunar space and beyond, as well as provide habitation and life support for up to 21 days. The spacecraft's four elements are the Crew Module (CM), the Crew Module Adapter (CMA), the European Service Module (ESM), and the Launch Abort System (LAS). Lockheed Martin is building the CM, also referred to as the capsule, providing a safe habitat from launch through landing and recovery. Lockheed Martin is also building the CMA, which connects the capsule to the ESM and houses electronic equipment for communications, power, and control. ESA is designing and developing the ESM, which provides in-space propulsion for orbital transfer, power and thermal control, attitude control, and high-altitude ascent aborts. While the ESM is mated with the CM, it will also provide water and air to support the crew.

Orion's first mission was Artemis I, an uncrewed flight test that demonstrated many key Orion spacecraft capabilities including the heat shield that will protect the crew on reentry. The Artemis II mission is a crewed test flight, with a current mission profile that transports four crewmembers on a free return trajectory around the Moon. Artemis III, currently planned for as early as mid-2027, will be an additional test flight mission in the Artemis manifest dedicated to testing Orion rendezvous and docking capbiltities in Earth orbit. Orion will accelerate hardware build schedules and integration timelines to enable follow-on flight opportunities in both early and late 2028.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

Complete assembly and testing of the Artemis III crew vehicle.

Deliver the Artemis III Crew Service Module (CSM) to Exploration Ground Systems (EGS) for final vehicle processing and support the final integration of the Orion CSM with the SLS launch vehicle.

CREW VEHICLE DEVELOPMENT

Formulation	Development	Operations

SCHEDULE COMMITMENTS/KEY MILESTONES

Milestone	Confirmation Baseline Date	FY 2027 PB Request
Artemis III Launch Readiness	Apr 2023	Mid-2027

Development Cost and Schedule

Base Year	Base Year Develop-ment Cost Estimate ($M)	JCL (%)	Current Year	Current Year Development Cost Estimate ($M)	Cost Change (%)	Key Milestone	Base Year Milestone Data	Current Year Milestone Data	Milestone Change (months)
2015	6,768.4	70	2026	10,171.8	+50.3	Artemis II	Apr 2023	Feb 2026	34

The above revised baseline cost and Launch Readiness Date were approved by the Agency Program Management Council per section 103 of the NASA Authorization Act of 2005 (P.L. 109-155)

Development Cost Details

Element	Base Year Development Cost Estimate ($M)	Current Year Development Cost Estimate ($M)*	Change from Base Year Estimate ($M)
TOTAL:	**6,768.4**	**10,171.8**	**+3,403.4**
Program Management	671.5	1,198.2	+526.7
Safety and Mission Assurance	191.4	238.5	+47.1
Spacecraft and Payload	3,205.1	6,695.5	+3,490.4
Mission Operations System	0	477.5	+477.5
Systems Engineering and Integration	539.3	825.3	+286.0
Test and Verification	460.6	673.0	+212.4
Other Direct Project Costs	1,700.5	63.7	-1,636.8

Program unallocated future expenses (UFE) was held in "Other" category in the base year estimate and realigned to other elements as the program matured.

CREW VEHICLE DEVELOPMENT

Formulation	Development	Operations

Project Management & Commitments

Element	Description	Provider Details
CM	Provides a safe habitat for the crew, storage for consumables and research instruments, and the docking port for crew transfers.	Provider: JSC Lead Center: JSC Performing Center(s): ARC, GRC, JSC, and LaRC Cost Share Partner(s): N/A
ESM	Provides power, propulsion, thermal control, and other services to the CM from launch through separation before reentry.	Provider: ESA Lead Center: GRC Performing Center(s): ARC, GRC, JSC, and LaRC Cost Share Partner(s): ESA
LAS	Maneuvers CM to safety in the event of an emergency during launch or climb to orbit.	Provider: JSC Lead Center: LaRC Performing Center(s): JSC, LaRC, and MSFC Cost Share Partner(s): N/A

Acquisition Strategy

Please see the Program Overview section.

MAJOR CONTRACTS/AWARDS

Element	Vendor	Location (of work performance)
Orion Design Development, Test, and Evaluation; Orion Production and Operations Contract	Lockheed Martin	Littleton, CO
Orion Main Engine	L3Harris	Redmond, WA

SPACE LAUNCH SYSTEM

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Space Launch System (SLS)	--	--	**1,412.6**	0.0	0.0	0.0	0.0
SLS Program Integration and Support	--	--	**82.7**	0.0	0.0	0.0	0.0
Total Budget	**--**	**--**	**1,495.3**	**0.0**	**0.0**	**0.0**	**0.0**

NASA moves Space Launch System Hardware for Artemis III at MSFC.

The Space Launch System (SLS) is the rocket that will launch the Orion spacecraft and astronauts into space for the Artemis III, IV, and V missions.

SLS Program Integration and Support activities oversee program integration points between SLS and other elements of the Artemis missions. This effort is critical to ensuring the SLS systems' performance meets technical and safety specifications, and supports programmatic assessments key to achieving integrated technical, cost, and schedule management. In addition, the SLS integration effort is vital to managing interfaces with other ESDMD activities, including strategic studies, feasibility studies, and small-scale research tasks that feed into future human exploration. Coordination and timely integration across ESDMD are aimed at mitigating the impacts of potential design overlaps, schedule disconnects and delays, and cost overruns.

The FY 2027 President's Budget, in conjunction with the WFTC Act funding, supports procurement, assembly, and testing of SLS to ensure crew transportation capability through Artemis V. NASA's latest architecture includes using the Artemis III mission in 2027 to test system capabilities in Earth orbit prior to sending astronauts to the surface of the Moon and aims to achieve one lunar mission per year thereafter. Standardizing the SLS design and increasing its flight rate will have a direct safety benefit for crew and will reduce costs to fund additional missions, as well as help NASA meet its 2028 target for a crewed lunar landing. NASA will continue to develop commercial transportation services for future Artemis flights through a competitive contract to improve cost effectiveness, increase mission cadence, and strengthen the U.S. industrial base. Industry partners will be allowed to propose a commercialized SLS rocket to support future Artemis missions through this competitive contract process. For more information, go to: http://www.nasa.gov/SLS.

EXPLANATION OF MAJOR CHANGES IN FY 2027

NASA updated the Artemis III mission in mid-2027 to test combined operatations of the Orion spacecraft with one or both commercial landers from SpaceX and Blue Origin in Earth orbit. The new mission will launch crew in Orion using the SLS rocket to test rendezvous and docking capabilities between Orion and the commercial spacecraft landers that will transport astronauts on to the surface of the Moon on Artemis IV. The additional tests opportunities provided by the updated plan will help achieve the goal of conducting the first Artemis crew landing in 2028.

SPACE LAUNCH SYSTEM

Instead of futher developing the Exploration Upper Stage (EUS), which faced significant cost overruns and delays, the interim cryogenic propulsion stage used for the first three missions will be replaced with a new second stage.

The WFTC Act funding supports continued production, integration, and delivery of SLS vehicles required to ensure crew transportation capability for Artemis IV and V.

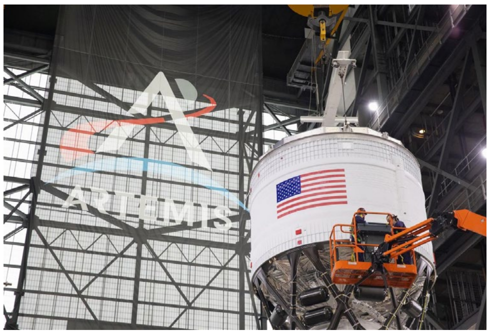
KEY ACHIEVEMENTS PLANNED FOR FY 2027

SLS will support the Artemis III vehicle integration with Orion onto SLS in the Vehicle Assembly Building (VAB). Following final integration of Orion onto SLS in the VAB, the fully assembled vehicle will undergo final testing and preparation for launch.

EXPLORATION GROUND SYSTEMS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	757.9	649.6	579.6	574.7	0.0



Technicians with the agency's Exploration Ground Systems integrating the interim cryogenic propulsion stage to the SLS launch vehicle stage adapter.

Exploration Ground Systems (EGS) is responsible for safely launching the Space Launch System (SLS) and Orion spacecraft in support of the Artemis missions. EGS develops, upgrades, and maintains the necessary ground systems infrastructure and facilities required for assembly, test, and launch of SLS and Orion, along with the landing and recovery activities of Orion. This includes evolving and maintaining several KSC infrastructure elements including the pad, known as Launch Complex-39B (LC-39B), the crawler-transporter, the Vehicle Assembly Building (VAB), Mobile Launcher 1 (ML-1), the Launch Control Center (LCC), and other facilities to support Artemis missions.

EGS Program Integration and Support activities oversee program integration points between EGS and other elements of the Artemis missions. This effort is critical to ensuring the EGS systems' performance meets technical and safety specifications, and supports programmatic assessments key to achieving integrated technical, cost, and schedule management. In addition, the EGS integration effort is vital to managing interfaces with other ESDMD activities. Coordination and timely integration across ESDMD are aimed at mitigating the impacts of potential design overlaps, schedule disconnects and delays, and cost overruns. The FY 2027 President's Budget in conjunction with the Working Families Tax Cut (WFTC) funding, supports associated ground and infrastructure activities to ensure crew transportation capability through Artemis V. For more information, go to: http://go.nasa.gov/groundsystems.

EXPLANATION OF MAJOR CHANGES IN FY 2027

Instead of futher developing the Exploration Upper Stage (EUS), which faced significant cost overruns and delays, the interim cryogenic propulsion stage used for the first three missions will be replaced with a new second stage. This change results in NASA also no longer needing the Mobile Launcher 2, which was designed specifically to support EUS and also faced significant cost overruns and delays.

The WFTC Act funding supports continuing ground and infrastructure activities required to execute two additional flights beyond Artemis III to ensure crew transportation capability for Artemis IV and V.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

For the Artemis III launch, EGS will conduct the rollout, launch operations, landing and recovery operations, post launch operations at the pad, and crew module de-servicing at the Multi-Payload Processing Facility.

COMMERCIAL MOON & MARS INFRASTRUCTURE & TRANSPORTATION

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	**--**	**--**	**744.1**	**2,237.3**	**1,813.3**	**2,519.2**	**3,659.4**

The Commercial Moon and Mars Infrastructure and Transportation Program fosters innovation and reduce costs by leveraging commercial capabilities and increasing investments necessary for human Moon and Mars exploration.

Building on the successful Commercial Orbital Transportation Services (COTS) model, which stimulated efforts within the private sector to develop and operate safe, reliable, and cost-effective commercial space transportation systems, ESDMD will continue the effort from the FY 2026 Budget to develop commercial services for Artemis VI and beyond. The acquisition strategy will use fixed-price, milestone-based, competitive contracts to ensure the development of cost-effective, safe transportation capabilities while responsibly managing taxpayer dollars. The acquisition will consider and allow a range of options that include services for different phases of the mission as well as end-to-end services to maximize the opportunity for competition and the benefits that have historically been realized because of competition.

CoMMIT manages the Commercial Lunar Payload Services (CLPS) contract, which is an open competition to U.S. commercial providers of space transportation services, with the strategic goal of supporting affordable commercial operations on and near the Moon, consistent with the National Space Transportation Policy and Commercial Space Act. CLPS consists of a multi-vendor catalog and a 10-year indefinite delivery, indefinite quantity contract. NASA manages this effort through task order competitions for specific lunar surface transportation services of payloads with NASA being one of several customers. In the FY 2027 request, NASA intends to accelerate development of a lunar base camp, including using CLPS payloads in support of this effort. Likewise, ESDMD will continue establishing the similarly structured Commercial Mars Payload Service with plans to begin launching precursor missions and technology demonstrators to the martian surface. The near-term efforts are focusing funding on supporting the maturation of commercial robotic Mars lander concepts.

ESDMD will also continue development of lunar communications relay services essential for a sustainable American presence at the lunar South Pole.

EXPLANATION OF MAJOR CHANGES IN FY 2027

Establishing a permanent lunar base camp is a cornerstone of sustaining and reinforcing U.S. strategic leadership in space and will require leveraging integrated robotic and human missions to secure a lasting presence on the Moon. Under the FY 2027 Budget, CLPS missions will be used to deliver initial elements to establish the lunar base camp. These efforts are critical to reinforcing U.S. preeminence on the Moon and will provide essential operational experience, technology demonstration, and scientific data necessary to maintain U.S. leadership and competitiveness in space.

Requirements associated with the Mars Communication Relay activities will now be funded under the Working Families Tax Cut through the Advanced Communications Program. This funding supports a procurement, using a competitively bid, firm fixed-price contract with a US commercial provider, for

COMMERCIAL MOON & MARS INFRASTRUCTURE & TRANSPORTATION

a near term Mars communication relay mission. This effort will be an interim communications upgrade for current aging robotic Mars missions with extensibility to support future human Mars missions.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

Lunar Communications Relay will transition from design to integration and test of relay satellites, validate first relay on-orbit and prepare subsequent satellites for deployment.

Upgrades for all six Deep Space Network antennas will be completed through FY 2027.

Award an initial procurement to obtain commercial transportation services to execute future Artemis missions.

Award task orders for two CLPS missions to the lunar surface.

xEVA AND HUMAN SURFACE MOBILITY PROGRAM

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	830.3	899.5	844.2	853.6	836.6

NASA astronauts Loral O'Hara (left) and Stan Love (right) pose for a photo during the first dual spacesuit run at NASA's Neutral Buoyancy Laboratory while wearing Axiom Space's lunar spacesuits.

NASA's Extravehicular Activity (EVA) and Human Surface Mobility Program (EHP) provide safe, reliable, and effective spacewalking and surface mobility capabilities that allow astronauts to survive and work outside the confines of a spacecraft to explore on and around the Moon. This program is responsible for developing next-generation spacesuits, human-rated rovers (pressurized and unpressurized), and tools, along with all the necessary spacewalking support systems for use on the lunar surface, and eventually on Mars. Artemis missions will return humans to the Moon with innovative technologies to explore more of the lunar surface than ever before.

EHP leverages commercial and international partnerships to obtain services related to extravehicular and surface mobility activities to establish the first long-term presence on the Moon and develop surface capabilities that can be used by the first American astronauts to land on Mars. EHP focuses on high-risk technologies for surface systems that will provide mission planners with more choices, thereby increasing mission success.

The goal of the EVA development project is to provide a safe, reliable, and effective EVA capability that allows astronauts to survive and work outside the confines of the base spacecraft, explore the lunar surface on Artemis missions, and prepare for human missions to Mars. The Exploration Extravehicular Mobility Unit (xEMU) is designed to provide astronauts with enhanced mobility to accomplish their exploration tasks on the lunar surface. It is also designed to be more comfortable when worn by astronauts with a wider range of physiological characteristics. The Extravehicular Activity (xEVA) System is a self-contained, miniature spacecraft providing astronauts with life support, mobility, and protection in the vacuum of space for activities like spacewalks or surface exploration. NASA selected Axiom Space to provide surface suits. These suits will give the astronauts increased range of motion and flexibility to explore more of the landscape than on previous lunar missions. Leveraging existing contract mechanisms and lessons learned from xEMU development, EHP will develop a space suit appropriate for use by astronauts on the martian surface. EHP will accelerate the development of the xEVA lunar surface suits and reduce technical risk by integrating on-orbit testing in 2027, either through the Earth-orbit Artemis III test mission or by leveraging ISS-based opportunities.

The Lunar Terrain Vehicle (LTV) will provide astronauts on the lunar surface with a vehicle to safely operate in the extreme environment of the lunar South Pole.

The Pressurized Rover (PR) is a pressurized surface transportation system being developed and built by the JAXA in partnership with NASA that would be used on the Moon to expand the range of excursions even further, allowing crews to perform longer-duration research and exploration activities. Outfitted with robotics, cameras, sensors, and scientific instruments, the PR will be a mobile laboratory for exploration activities across large areas of the lunar surface during both crewed and uncrewed missions.

The capabilities provided by the EHP enable the crews of the new space age the ability to safely explore the lunar surface. The ability to explore the lunar surface will enable new scientific discoveries and promote new technologies, research, and systems needed for future Mars missions. For additional information, please visit: https://www.nasa.gov/suits-and-rovers.

EXPLANATION OF MAJOR CHANGES IN FY 2027

EHP will accelerate the development of the xEVA lunar surface suits and reduce technical risk by integrating on-orbit testing in 2027, either through the Earth orbit Artemis III mission or by leveraging ISS-based opportunities.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

Axiom Space will deliver the xEVAS suits for integration into future missions.

Complete LTV Phase II CDR and Joint NASA-JAXA PR PDR.

Continue technology development of Martian surface suits focusing on defining a Mars Portable Life Support System (PLSS).

HUMAN LANDING SYSTEM

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
HLS Initial Capability	--	--	**758.7**	362.2	541.5	567.2	585.7
Human Landing System	--	--	**1,518.5**	1,472.0	1,000.8	986.1	945.5
Total Budget	**--**	**--**	**2,277.2**	**1,834.2**	**1,542.2**	**1,553.2**	**1,531.2**

NASA astronaut Doug Wheelock and Axion astronaut Peggy Wilson provide hands-on feedback on a mockup of the surface access elevator of SpaceX's Starship HLS while wearing Axion spacesuits. Credit: SpaceX

The Human Landing System (HLS) is the mode of transportation that will take astronauts to the lunar surface on Artemis missions. For early missions, the landers will also serve as living quarters for the astronauts while on the Moon. The crew will collect samples, perform science experiments, test new technologies, and observe the Moon's environment. When the surface mission concludes, the crew will return to orbit in the lander to meet up with their crewmates and head home to Earth. In addition to the landers that will be used for astronauts, the HLS program is also working with its industry providers to develop cargo versions of their crewed landers to deliver large pieces of equipment and infrastructure, such as rovers and habitats, to the Moon's surface in support of establishing a permanent prescence. Partnering with American industry fosters a space-related economic marketplace and maintains America's high-tech industrial base, while reducing costs to taxpayers. NASA shares its knowledge and expertise with industry and maintains oversight of safety, while companies develop, test, and iterate their lander designs.

NASA has two providers under contract to develop HLS capabilities: SpaceX and Blue Origin.

NASA has a contract (NextSTEP-2 Appendix H Option A) with SpaceX to develop its Starship HLS to land astronauts on the Moon during the first Artemis human landing missions. Prior to the first Artemis lunar landing, SpaceX will perform an uncrewed landing demonstration mission on the lunar surface. NASA has also awarded a contract (NextSTEP-2 Appendix H Option B) to SpaceX to further develop its Starship HLS for future missions to meet an extended set of requirements, such as landing more mass on the lunar surface.

Concurrently, NASA has awarded a contract (NextSTEP-2 Appendix P) to Blue Origin and its partners to develop its Blue Moon lander to meet the same set of extended requirements for use during the future missions.

NASA is working with both HLS providers to identify opportunities to safely accelerate their readiness for landings and similify their architectures and operations.

The HLS Program Office oversees all HLS verification, validation, and certification to ensure requirements for flight readiness satisfy NASA's standards for crew safety and human rating. For more information, please visit http://www.nasa.gov/hls.

HUMAN LANDING SYSTEM

EXPLANATION OF MAJOR CHANGES IN FY 2027

NASA updated the Artemis III mission in mid-2027 to test combined operations of the Orion spacecraft with one or both commercial landers from SpaceX and Blue Origin in Earth orbit. The new mission will launch crew in Orion using the Space Launch System rocket to test rendezvous and docking capabilities between Orion and the HLS landers.The additional test opportunities provided by the updated plan will help achieve the goal of conducting the first Artemis crew landing in 2028.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

One or both HLS lander providers will complete rendezvous operations in Earth orbit on the Artemis III mission.

Blue Origin will continue development of Blue Moon Mark 2 system and complete production of the Integrated Lander Structural Test Article.

SpaceX and Blue Origin will continue development of large cargo landers, and the program will conduct Critical Design Review for both providers.

HLS INITIAL CAPABILITY

Formulation	Development	Operations

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	758.7	362.2	541.5	567.2	585.7

PROJECT PURPOSE

NASA’s Human Landing System (HLS) Program is working with two U.S. companies, SpaceX and Blue Origin, to develop landers that will safely carry astronauts from orbit to the surface of the Moon and back throughout NASA’s Artemis campaign.

PROJECT PARAMETERS

The objective of the HLS Initial Capability is to facilitate the rapid development and demonstration of a U.S. landing system that will deliver the first astronaut crew to the surface of the Moon in more than 50 years. The Option A contract scope of work includes both an uncrewed and crewed lunar landing demonstration of the SpaceX Starship HLS.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

Continue developments to certify that SpaceX's Starship HLS is fully ready to transport astronauts from lunar orbit to the Moon's surface and back, assessing its readiness after refueling in orbit and before crew handover from the Orion spacecraft.

SCHEDULE COMMITMENTS/KEY MILESTONES

Milestone	Confirmation Baseline Date	FY 2027 PB Request
CDR	Aug 2025	Q3 FY 2026
ORR/FRR	Oct 2027	Oct 2027
LRD/IOC/IC	Feb 2028	Feb 2028

Development Cost and Schedule

The establishment of an HLS Initial Capability Agency Baseline Commitment of February 2028 for HLS Lunar Orbit Checkout Review (LOCR) in support of Artemis missions represents a risk-informed posture that encompasses potential issues and no target launch date. Joint Confidence Level (JCL) is used to track program performance.

HLS INITIAL CAPABILITY

Formulation	Development	Operations

Base Year	Base Year Develop-ment Cost Estimate ($M)	JCL (%)	Current Year	Current Year Develop-ment Cost Estimate ($M)	Cost Change (%)	Key Milestone	Base Year Milestone Data	Current Year Milestone Data	Milestone Change (mths)
2023	2,338.9	70	2023	2,338.9	0	LOCR	Feb 2028	Feb 2028	0

Note: The confidence level estimates reported reflect an evolving process as NASA improves its probabilistic estimation techniques and processes. Estimate reflects the practices and policies at the time it was developed. Estimates that include combined cost and schedule risks are denoted as JCL; all other CLs (confidence levels) reflect cost confidence without necessarily factoring the potential impacts of schedule changes on cost.

Development Cost Details

Element	Base Year Development Cost Estimate ($M)	Current Year Development Cost Estimate ($M)	Change from Base Year Estimate ($M)
Launch Vehicle/Services	2,338.9	2,338.9	0

Project Management & Commitments

Element	Description	Provider Details	Change from Baseline
HLS Starship	Initial Capability through services contract includes one uncrewed and one crewed human landing demonstration	Provider: SpaceX Lead Center: MSFC Performing Center(s): ARC, GRC, LaRC, GSFC, SSC, JSC, KSC Cost Share Partner(s):	N/A

Project Risks

Risk Statement	Mitigation
In-space cryogenic propellant storage and transfer	Both SpaceX and Blue Origin use long duration storage and transfer of cryogenic propellants within their architectures to meet NASA requirements. Each provider is utilizing a combination of ground and flight tests to gain understanding of the complexities and reduce the risks associated with cryogenic propellant storage and transfer.

HLS INITIAL CAPABILITY

Formulation	Development	Operations

Acquisition Strategy

NASA utilized the NextSTEP Broad Agency Announcement contract vehicle with the Appendix H solicitation for the initial landing development. Option A, the firm-fixed-price, milestone-based procurement for flight and landing demonstrations of initial human landing systems was awarded to SpaceX.

MAJOR CONTRACTS/AWARDS

Element	Vendor	Location (of work performance)
Launch Vehicle/Services	SpaceX	California/Texas/Florida

ADVANCED EXPLORATION SYSTEMS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	163.6	163.2	163.2	163.2	163.2

NASA astronauts Randy Bresnik and Jessica Watkins view some of the evolving technologies in development that astronauts may use to explore the Moon's surface, prepare it for sustainable outposts, and to handle the dust that is collected during moonwalks.

The Advanced Exploration Systems (AES) budget supports the dynamic and evolving technology portfolio of NASA's Mars Campaign Office (MCO). MCO is responsible for the formulation, development and demonstration of exploration technologies to enable human missions to Mars, using a combination of unique in-house activities, public-private partnerships, and international partnerships.

AES supports the Artemis program and future Mars missions by integrating technology plans from across the agency. By identifying and tracking the touch points between the Artemis campaign and NASA's Mars objectives, the portfolio delivers risk-reducing technologies and innovations ready for transition into operational systems through iterative ground testing, flight demonstrations, and human-in-the-loop evaluations.

AES uses a phased development approach, maturing technologies through testing environments that simulate mission conditions, including Earth-based testbeds, LEO platforms, and Artemis elements. This strategic progression accelerates readiness and reduces lifecycle costs, while validating operational concepts for future missions in a manner that maintains flexibility and mitigates risk.

AES will continue to emphasize technology integration, system maturation, and cross-domain coordination, especially in collaboration with STMD and NASA mission planning teams. Ongoing work on crew autonomy tools, space weather forecasting, and closed-loop environmental systems will directly contribute to the current objectives on the Moon and Mars.

By focusing on reusable, scalable, and cost-effective systems, AES serves as the technological backbone of the MCO, empowering the agency to develop technologies critical to furthering human exploration from planet Earth to the surface of Mars. For additional information please visit https://www.nasa.gov/aes-overview.

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

ADVANCED EXPLORATION SYSTEMS

KEY ACHIEVEMENTS PLANNED FOR FY 2027

In FY 2027, AES will continue advancing technologies critical to the Moon and Mars program through both ground and flight testing. As technologies mature, assessments are made to determine ideal test location on Earth or in-space aboard the ISS, Artemis vehicles, or Commercial LEO platforms. Multiple life support and crew health technologies are planned to be delivered for launch to ISS to begin multi-year demonstrations of technologies to support future crew in lunar orbit and on Mars transit missions.

AES will also advance capabilities for Earth-independent operations through the demonstration of crew-in-the-loop evaluation of integrated anomaly response, data integration, mission management, and crew interaction software modules.

The Surface Systems and Environments Domain will complete a load shedding and protection demonstration of the Advanced Energy Management Systems.

AES will continue maturation of technologies in support of overall Mars exploration architecture. The program will perform an annual review of portfolio and identify new start additions that address Mars architecture gaps and the unique challenges of a crewed mission to Mars.

MARS TECHNOLOGY

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	438.8	529.4	607.0	680.2	643.2

The Mars Technology program accelerates the development of high-priority technologies for crewed missions to Mars. The FY 2027 Budget ensures that America's human space exploration efforts remain unparalleled, innovative, and efficient. By uniting experts across industry, academia, and government, NASA will rapidly identify and close the most urgent capability gaps for humans reaching and working on Mars, from life support and propulsion to habitat systems and surface infrastructure.

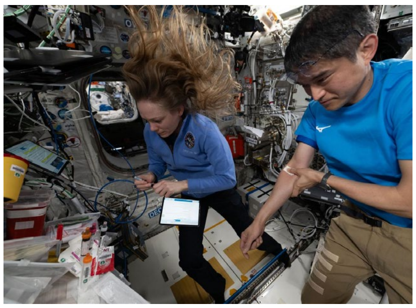
This effort will build on NASA's investments in Artemis. While the environmental conditions and operational strategies will differ between the Moon and Mars, if done correctly, every mission to the Moon can help inform design and operational strategies for future Mars missions by providing key information and approaches necessary to support humans at greater duration and distance in deep space; demonstrating key operational capabilities and techniques; evaluating advanced exploration and surface exploration techniques; and reducing the risk of advanced technologies and system concepts.

A major focus of the Mars Technology Program is development of fission reactors to provide power on planetary surfaces. Fission power will be important for establishing the lunar base camp due to the long periods of darkness that the base camp will experience, and fission can provide low-maintenance, reliable power for initial human efforts on Mars.

HUMAN RESEARCH PROGRAM

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	100.3	80.3	81.1	40.3	40.3



Astronauts Nichole Ayers and Takuya Onishi collect blood samples to analyze for signs of space-caused stress on cellular immune function to help doctors monitor crew health and keep crews healthy on long term space missions.

For more than 50 years, NASA’s Human Research Program (HRP) has studied what happens to the human body in space. Researchers are using what they learn to design procedures, devices, and strategies to keep astronauts safe and healthy throughout their missions. Understanding the effects of spaceflight on humans is essential as astronauts move from the ISS in LEO to deep space destinations on the Moon and beyond. NASA is particularly interested in investigating how the body reacts to extended stays in the lunar-surface environment and long-duration voyages to Mars.

HRP is planning dedicated extended-duration research on the space station that is expected to shed light on how the body adapts to living in the spaceflight environment for various longer time periods, which will be pivotal for future deep space missions. NASA is researching risks for Mars missions which are grouped into five human spaceflight hazards related to the stressors they place on the body. NASA refers to these five hazards as “RIDGE” for short: space **r**adiation, **i**solation and confinement, **d**istance from Earth, **g**ravity fields, and hostile/closed **e**nvironments.

Space poses significant health risks for crew members, including the possibility of long-term health effects manifesting later in life from space radiation and microgravity exposure, health and performance decrements developing during the mission, and decrements in capabilities immediately upon return to Earth. Current research on ISS and in ground-based analog laboratories is expanding NASA's capabilities to enhance crew performance and protect the health and safety of astronauts.

HRP collaborates with NASA’s Office of the Chief Health and Medical Officer (OCHMO), as well as the Crew Health and Safety (CHS) and Spaceflight Crew Operations (SFCO) projects to ensure crew health, safety, and mission success. SFCO and CHS are responsible for astronaut training, readiness, and health, while HRP funds research development on human health and performance countermeasures and technologies that enable safe, reliable, and productive human space exploration. Additionally, HRP is strategically aligning itself for working in a new era of commercial space exploration. Significant coordination with commercial partners will continue as HRP plans for future research. HRP will work with future commercial LEO space stations to support important work needed to enable future Moon and Mars missions. In addition, as is the case with many space-based medical investigations, this research may also lead to advancements in treating patients on Earth.

As NASA prepares to conduct crewed Artemis missions to the Moon, HRP is using research to develop the scientific and technological capabilities to facilitate these exploration missions. In support of the risk reduction strategy for human space exploration contained in NASA’s Human Research Roadmap, HRP is coordinating with the National Academies, the National Council on Radiation Protection and Measurements (NCRP), and other domestic and international partners to deliver products and strategies to protect crew health and performance during and after exploration spaceflight missions. HRP is specifically focused on achieving research goals to support Artemis missions that will then inform human health risks and mitigation strategies for Mars. For additional information, please visit https://www.nasa.gov/hrp.

EXPLANATION OF MAJOR CHANGES IN FY 2027

The FY 2027 Budget transfers HRP from SOMD to ESDMD and increases the available budget and research from FY 2026 PBR levels.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

HRP is prioritizing FY 2027 research activities and deliverables essential to enabling the Moon and Mars Program by addressing the highest priority human health and performance risks including physiological countermeasures for Spaceflight Associated Neuro-ocular Syndrome (SANS), food and nutrition capabilities for Mars and sustained lunar missions, countermeasures to spaceflight induced sensorimotor changes that cause motion sickness, and human-in-the-loop Mars analog missions to test integrated countermeasures and systems. Integration of HRP research and technology deliverables into Artemis missions involves coordination with the Orion, HLS, EHP, and other programs on highest priority mission risks and gaps.

In FY 2027, major activities expected to be performed by HRP to enable Moon and Mars missions include:

- Complete the SANS bedrest study in collaboration with DLR at the Envihab facility. This bedrest analog, where subjects will lay in bedrest for 30 days, simulates the deconditioning that astronauts experience with microgravity and replicates SANS like on ISS. Some astronauts only experience mild changes in space, while others have clinically significant outcomes. The risk of developing SANS is higher during longer-duration missions which is why SANS is one of the high priority risks associated with long duration missions under the Moon and Mars program. The likely cause of SANS is due to the headward fluid shift and/or intracranial pressure (ICP). The research goals focus on determining whether pharmaceutically (GLP1-R agonist, Exenatide) lowering ICP would prevent the development of SANS or reverse SANS findings, and whether daily use of a pharmaceutical that lowers ICP is a viable countermeasure. This benefits the Moon and Mars program by providing a potential pharmaceutical countermeasure to SANS during long-duration spaceflight and a potential rescue treatment for astronauts diagnosed during the mission.
- Develop HLS space motion sickness countermeasures to support Moon and Mars surface landing capabilities by partnering with the U.S. Navy. During g-transitions while landing on the Moon or Mars, crew may experience spatial disorientation that can impact both supervisory and manual takeover of HLS automated landings. Crews must prepare for the spatial disorientation that they will likely undergo during these gravitational transitions. HRP is collaborating with the Naval Medical Research Unit-Dayton (NAMRU-D) to use the Disorientation Research Device (Kraken) to serve as a full motion flight simulator of the NASA HLS. With the ability to move in six directions on its axis, the device can simulate complex flight scenarios, including landing scenarios that could induce vertigo and nausea. Using the Kraken allows HRP to simulate Lunar landings with spatial disorientation to test countermeasures that will mitigate the risk of spatial disorientation and enable manual takeover during automated landings. HRP will deliver manual piloting countermeasures to

ensure safe operation of the HLS that includes preflight training on motion-based simulations, on-board training during transit, advanced display recommendations, and active real-time countermeasures using a computational model to predict spatial disorientation. The research could also potentially inform treatments for balance issues in patients on Earth.

- Deliver the preliminary Mars Food System definition document that will be based on food and nutrition data compiled from one-year Crew Health and Performance Exploration Analog (CHAPEA) missions. CHAPEA was developed to enable an operationally integrated evaluation of relevant human health and performance outcomes in relation to Mars mission realistic constraints. The CHAPEA food study will provide health, cognitive, and physical performance data in relation to a more restricted, Mars-relevant spaceflight food system. This information is critical because food and nutrition are important mass/resource drivers for future Mars missions. The Mars Food System definition document must address the greater resource restrictions (reduced mass, limited cold stowage, etc.), higher crew stressors, and high-tempo EVAs. The CHAPEA analog mission will provide realistic data to develop a Mars realistic food system and inform NASA standards, associated vehicle mass and volume requirements, and trades between resources and risk to crew health and performance during Moon and Mars missions.
- Implement the one-year Mars Exploration Analog (MEA) Mission that includes both a Mars transit phase and surface phase. MEA will have a heavy focus on Mars mission fidelity, countermeasure testing and validation, and technology demonstration. MEA mission simulation will also include realistic comm delay (0 to ~22 min one way), use of rover module, EVA suits, and EVA surface sand pit. MEA simulations involve realistic isolation and confinement with constrained space and privacy incorporating high fidelity technology demonstrations, research, operational tasks, and mission realistic stressors and anomalies. The MEA mission results will i) inform Mars behavioral health and performance selection requirements; ii) test Mars mission behavioral health and performance training content, approaches, and modalities; iii) define system requirements and protocols for behavioral health and performance monitoring; and iv) test effectiveness and long-term acceptability of behavioral health and performance countermeasure approaches in a Mars mission environment.

STRATEGY AND ARCHITECTURE

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	**--**	**--**	**113.2**	**108.9**	**108.9**	**108.9**	**108.9**

NASA’s architecture approach distills agency-developed objectives into operational capabilities and elements that support science and exploration goals. Working with experts across the agency, industry, academia, and the international community, NASA continuously evolves that blueprint for crewed exploration, setting humanity on a path to the Moon, Mars, and beyond.

The Strategy and Architecture Office (SAO) designs the roadmap for long-term exploration of the lunar surface, our first steps on the Red Planet, and the journey beyond working with our partners in industry, academia, and the international community. This office establishes and documents an objectives-based, as opposed to capabilities-based, approach to human exploration. SAO focuses on the big picture, the “what” and “why” of what NASA should be doing, before prescribing the “how.”

To develop NASA’s Moon and Mars Architecture, SAO begins from its broadest goals, the farthest in the future on the timeline, in a process called “architecting from the right.” This process refines NASA’s Moon and Mars objectives down into the things NASA needs to be able to do to achieve those objectives and then maps them to specific elements, the systems, hardware, and services that will take us back to the Moon, let us establish a permanent presence on the surface, and carry us to Mars.

The Strategy and Architecture team also oversees the directorate's early industry engagement and study efforts using the Next Space Technologies for Exploration Partnerships (NextSTEP) Broad Agency Announcement (BAA) process, a public-private partnership model seeking commercial development of deep space exploration capabilities to support human spaceflight missions. Multiple phases of NextSTEP are used to inform NASA's notional architecture including habitation, surface logistics, mobility capabilities, and more.

Ultimately, SAO translates NASA's vision for crewed exploration into an integrated exploration architecture.

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The annual Architecture Concept Review will provide an updated Moon and Mars architecture to reflect the strategic direction of exploration and address needs with increasing definition and evolution as formulation and acquisition activities occur. The process will ensure continuity in architecture evolution and incorporation of new technologies, opportunities, and best practices as systems develop and progress.

Complete Integrated Surface Power strategic systems review.

Integrated Logistics Project (ILP) KDP-A and transition of the element from SAO to Moon and Mars is planned for early FY 2027.

STRATEGY AND ARCHITECTURE

Address highest priority architectural needs and accelerated acquisition planning to support lunar base activities.

FUTURE SYSTEMS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	**--**	**--**	**371.5**	**990.4**	**1,655.1**	**1,095.1**	**1,151.1**

Artemis missions will establish our long-term presence on the Moon as astronauts learn how to live and work on the lunar surface, explore the surface to learn about the origins of the solar system, and prepare for humanity's next giant leap: human missions to Mars. NASA's Moon and Mars architecture identifies the hardware, operations, and services needed for human missions to the Moon and Mars, and how they function together as a system. The architecture is not a mission, a manifest, or a set of requirements, but it does define the capabilities — space transportation, surface mobility, extravehicular activty, communications, and more — that will be incrementally developed and delivered to the Moon and Mars to expand what humans are able to do there. Future Systems is responsible for the pre-formulation phases of these elements, through integration of mission concepts, identification of key driving requirements, and analysis of alternatives to enable consistent project or program definition for Moon and Mars missions. Once these new capabilities enter the formulation phase of the project development lifecycle, management will be transferred to an ESDMD program for execution.

The integration effort is vital to managing program interfaces within ESDMD and across other mission directorates. Activities include strategic studies, feasibility studies, and small-scale research tasks.

The Future Systems effort conducts pre-project formulation activities that will lead directly to the development of capabilities based on future needs articulated in the Moon and Mars Architecture Definition Document. Future Systems also holds the outyear budget projections for future capabilities. As new elements are approved to proceed, the funding shifts from Future Systems to implementing programs.

EXPLANATION OF MAJOR CHANGES IN FY 2027

As in all years, Future Systems is applied to address the new capability requirements and support the objectives and priorities of the Administration. Planning for Future Systems incorporates projected resources weighed against priorities and available solutions. Changes to scope in FY 2027 may provide for the acceleration of lunar base surface capabilities, key Mars forward developments, and integrated efforts to achieve Administration policy and priorities.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

Develop and initiate acquisition and projects for the highest priority lunar base capabilities per strategic planning. Resources and development leadership for specific capabilities will be transitioned to the appropriate Moon and Mars program or project as appropriate during formulation.

SPACE OPERATIONS

SPACE OPERATIONS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Commercial LEO Development	--	--	**299.7**	299.8	599.8	599.8	1,577.2
International Space Station	--	--	**921.2**	921.2	921.3	921.3	921.3
Space Transportation	--	--	**1,152.5**	1,152.4	1,152.3	1,152.3	174.7
Space and Flight Support (SFS)	--	--	**673.8**	673.8	673.8	673.8	674.0
Total Budget	**4,220.0**	**4,175.0**	**3,047.2**	**3,047.2**	**3,347.2**	**3,347.2**	**3,347.2**

FY 2025 reflects the funding amount specified in Public Law 119-4, Full-Year Continuing Appropriations and Extensions Act, 2025.

FY 2026 reflects the funding amount specified in Public Law 119-74, Commerce, Justice, Science; Energy and Water Development; and Interior and Environment Appropriations Act, 2026.

Working Families Tax Cut Funding Summary

Planned Obligations (in $ millions)	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
WFTC – ISS Operations	250.0	250.0	**250.0**	250.0	250.0	--	--
WFTC - USDV	325.0	--	**--**	--	--	--	--
Total Budget	**575.0**	**250.0**	**250.0**	**250.0**	**250.0**	**--**	**--**

In FY 2025, a total of $1.575 billion in mandatory funding was appropriated to the Space Operations Mission Directorate through enactment of the Working Families Tax Cut (WFTC) Act, Public Law 119-21. The above table illustrates funding planned for obligation by fiscal year. This funding will support the U.S. Deorbit Vehicle (USDV) and ISS operations, which includes maintenance, research, and cargo flights to support crew presence on ISS.

The Space Operations account is dedicated to propelling a commercial space economy, using human spaceflight to advance NASA objectives, ensuring access to space for NASA missions, and supporting future exploration and innovative operations in our solar system—while advancing scientific discoveries that benefit life on Earth.

NASA astronaut, Zena Cardman, treats bioprinted liver tissues in a portable glove bag inside the ISS Harmony module. (September 5, 2025)

Space Operations is comprised of four themes:

- Commercial LEO Development;
- ISS;
- Space Transportation; and
- Space and Flight Support (SFS).

Together, these themes drive growth in the commercial space sector, strengthen U.S. leadership in LEO, ensure access to space for civil, commercial, and national security missions, and lay the groundwork for deep space exploration.

SPACE OPERATIONS

These activities, which support existing and future space operations for both NASA and non-NASA missions, are catalysts for economic development and a commercial future in LEO.

NASA's Commercial LEO Development effort focuses on the development of commercially-owned and operated space stations in LEO from which NASA, along with other customers, can purchase services. The development of LEO destinations will allow NASA to meet enduring LEO human spaceflight and research requirements in a cost-effective manner that provides maximal compatibility with commercial users as the size of the user community continues to grow. The program:

- Takes advantage of private-sector initiative to provide a pathway to human access to LEO after the retirement of the ISS in 2030;
- Ensures U.S. leadership in LEO human spaceflight after ISS; and
- Provides a pathway to a commercial orbital economy.

ISS continues to exemplify American leadership in space, serving as the foundation of a U.S.-led multinational partnership that advances shared objectives. In addition, ISS offers an unparalleled environment for research in microgravity, enabling discoveries that deliver economic and societal benefits on Earth.

ISS also accelerates commercial development by nurturing the growth of a space economy in LEO. This generates nationwide economic opportunities, and continued development of a commercial LEO economy, allowing NASA to concentrate more on ambitious missions to the Moon and Mars. Furthermore, ISS also functions as a vital proving ground for technologies and countermeasures essential for long-duration spaceflight, providing a platform to test and refine systems that will enable future human exploration of Mars.

The Space Transportation theme's objective is to transport astronauts and cargo to and from ISS safely. NASA achieves this through the Commercial Crew Program (CCP) and the Crew and Cargo Program, which also includes the ISS U.S. Deorbit Vehicle (USDV).

- CCP partners with the U.S. commercial sector to develop and operate safe, reliable, and affordable crew transportation systems capable of carrying humans to and from ISS and other LEO destinations.
- The Crew and Cargo Program manages transportation services provided by both international partners and domestic commercial providers, as well as the ISS USDV that was competitively awarded to a U.S. industry partner.

The SFS theme provides mission critical space communication and navigation services, launch services, and astronaut training to support its customer missions. The theme is comprised of the Space Communications and Navigation (SCaN) Program, Communications Services Program (CSP), Launch Services Program (LSP), and Human Space Flight Operations (HSFO) Program.

- The SCaN Program provides communication to missions in LEO, including the ISS, suborbital missions, and some lunar orbital missions, utilizing the Near Space Network. SCaN uses the Deep Space Network (DSN) to communicate with missions more distant from Earth, and the DSN will initially provide primary communication links to early Artemis missions.
- CSP demonstrates the feasibility of using commercially-provided satellite communications services to support NASA and other space missions near Earth.
- LSP procures launch services and provides expertise and active launch mission management for NASA and other government missions in various stages of development.

- The HSFO Program provides training and readiness to ensure crew health and safety and mission success.

For more information, visit: https://www.nasa.gov/directorates/space-operations-mission-directorate

EXPLANATION OF MAJOR CHANGES IN FY 2027

In addition to this budget request, NASA will execute $250 million appropriated via the WFTC Act out of the Crew and Cargo Program to support cargo flights needed to provide transportation for research and consumables (e.g., critical spares, food, life support consumables) to ISS.

In FY 2027, the Human Research Program (HRP) will be transferred from SOMD to ESDMD. This transfer ensures continuity of research critical to exploration activities and allows NASA to focus HRP efforts on the highest priority investigations needed for a human mission to the Moon and Mars.

COMMERCIAL LEO DEVELOPMENT

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	**--**	**--**	**299.7**	**299.8**	**599.8**	**599.8**	**1,577.2**

As ISS plans for retirement, NASA seeks to maintain access to a human-rated platform in LEO to conduct research and other activities to advance U.S. objectives in space. The Commercial LEO Development Program (CLDP) develops LEO destinations to provide services that NASA will be able to purchase to meet its requirements. CLDP is enabling the development of a robust commercial space economy in LEO while ensuring that there will be a U.S. space station in LEO that meets NASA's enduring requirements.

As was done by the Commercial Orbital Transportation Services and Commercial Crew Programs in the development of crew and cargo transportation providers to the ISS, NASA is streamlining and optimizing its approach to enable private sector initiatives and a commercial pathway to replace the ISS by its planned retirement in 2030.

EXPLANATION OF MAJOR CHANGES IN FY 2027

No major changes from the FY 2026 President's Budget Request through FY 2030. In FY 2031, corresponding with the retirement of ISS, the Crew and Cargo Program transfers approximately $1.0 billion to CLDP to support the procurement of commercial space station services. Long-term budget requirements for CLDP services will continue to be refined as the costs of NASA requirements become better understood.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

NASA will continue to enable private sector initiative and a commercial pathway to replacing the ISS by its planned retirement in 2030.

INTERNATIONAL SPACE STATION PROGRAM

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	921.2	921.2	921.3	921.3	921.3

The ISS is the largest and most complex space-based research facility ever constructed. The U.S. Orbital Segment (USOS) is the portion of ISS operated by the United States and its Canadian, European, and Japanese partners. Russia exclusively operates the Russian segment. The USOS includes modules for scientific research, crew habitation, stowage, space control, and airlock operations; all of which must be maintained. NASA's current crew size on the USOS averages four astronauts, with periodic increases in crew size during crew changeouts and Private Astronaut Missions (PAMs). PAMs are an important component of NASA's strategy for enabling a robust and competitive commercial economy in LEO and allow commercial providers to utilize ISS as a destination.

The ISS National Laboratory, as designated by Congress, has been managing non-NASA utilization of ISS with access to not less than 50 percent of the U.S. research capacity. Since 2012, more than 900 payloads have flown under the ISS National Laboratory allocation. For the past four fiscal years, 80 percent of the ISS National Laboratory payloads launched have represented investigations from the private sector, fostering growth to fuel an innovative commercial LEO ecosystem.

ISS also supports development of technologies for potential use in exploration missions, such as Artemis, and longer-duration missions to Mars and beyond. ISS provides a unique opportunity to demonstrate technology and system readiness for use on a human-occupied exploration vehicle by documenting performance in a spacecraft environment with humans-in-the-loop; piloting operational procedures and training requirements; and determining logistics requirements, safety, and interoperability concerns with respect to overall space systems infrastructure. ISS is host to multiple long duration flight experiments and projects, which include investigations in water purification, recovery, and utilization; oxygen generation and filtration systems; carbon dioxide removal systems; and mitigation of known medical issues, all of which contribute to closing the technology and knowledge gap of future long-duration space exploration missions.

ISS must be safely maintained and continuously crewed on-orbit to prevent the risk of an unrecoverable failure, which would result in an uncontrolled reentry and pose a significant risk (one-in-10) to public safety on the ground.

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The ISS Program is planning FY 2027 activities with a focus on maintaining safe operations and maximizing research opportunities, prioritizing Moon and Mars exploration and LEO commercial applications that will evolve upon the retirement of ISS.

The ISS Program plans to support the launch of U.S. crew and cargo flights, Russian crew and cargo flights, and any PAMs. The ISS Program will conduct Extravehicular Activities (EVAs) as needed to address external anomalies and prepare ISS for deorbit. Until the cargo vehicle manifests are finalized, specific flights and EVA hardware installations are under review.

The number of cargo missions supported by the budget impacts the amount of crew supplies and research that can fly to ISS. Reduced crew supplies could result in reduced crew on ISS. ISS will continue to monitor crew supplies to determine the appropriate crew size that can be sustained with the available cargo vehicles. The ISS Program continues to plan onboard research commensurate with crew size and available cargo transportation. In collaboration with the CLDP, ISS is working with research sponsors on what research will be possible on future LEO platforms, including designing new payloads to be "destination-agnostic" wherever possible.

Given its streamlined payload development and integration process, the flight research payload manifest for FY 2027 is still in development.

CREW AND CARGO PROGRAM

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	1,070.9	1,070.9	1,070.8	1,070.8	93.2

Maintaining ISS requires a fleet of spacecraft to sustain a constant supply line of both crew and cargo that is crucial to operations and research. Deliveries not only provide science experiments, supplies, and maintenance hardware, but also rotate crewmembers, return research and equipment for repair, and dispose of waste.

The Crew and Cargo Program facilitates transportation services provided by both international partners and domestic commercial providers, ensuring reliable access to ISS. The program manages logistics using sophisticated planning for supplies like food, water, and spare parts while coordinating visiting crew and cargo vehicle traffic. The program schedules resources to minimize necessary launched mass and maximize returned mass, recycling, and crew time. The Crew and Cargo Program purchases cargo transportation to ISS under Commercial Resupply Services (CRS)-2 contracts with Northrop Grumman, Sierra Space (a subsidiary of Sierra Nevada Corp [SNC]), and Space Exploration Technologies Corporation (SpaceX). Sierra Space was originally awarded a minimum of seven flights. In September 2025, NASA and Sierra Space agreed to modify the CRS-2 contract, changing its focus from a specific number of guaranteed ISS cargo missions to a single, late-2026 free-flight demonstration.

The ISS Program also purchases crew transportation under Commercial Crew Transportation Capability (CCtCap) contracts with SpaceX and Boeing (managed by the Commercial Crew Program). The budget supports other space transportation-related activities, such as integration work required to ensure these visiting vehicles can safely dock or berth to ISS.

EXPLANATION OF MAJOR CHANGES IN FY 2027

In addition to this budget request, NASA will execute $250 million appropriated via the WFTC Act to Crew and Cargo Program in support of cargo flights needed to transport research and consumables (e.g., critical spares, food, life support consumables) to support crew presence on ISS. Further, corresponding with the planned retirement of ISS, NASA will transfer approximately $1.0 billion from the Crew and Cargo Program to the CLDP in FY 2031.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The Crew and Cargo Program is planning FY 2027 activities with a focus on maintaining safe ISS operations and research prioritizing Moon and Mars exploration. In FY 2027, the program will purchase multiple cargo flights to ISS provided by SpaceX and Northrop Grumman, to deliver hardware, crew supplies, and equipment. NASA is planning four cargo missions to ISS in FY 2027, two SpaceX (SpX-36 and SpX-37) and two Northrop Grumman (NG-25 and NG-26).

NASA will continue using CCtCap contracts, with the SpaceX and Boeing providers, to support crewed missions to the ISS. The program is also preparing to support a fifth and sixth PAM in FY 2027. The FY 2027 flight schedule also includes Soyuz crew and Progress cargo missions provided by the Russian Space Agency, Roscosmos, and H-II Transfer vehicle (HTV)-X cargo missions provided by JAXA.

U.S. DEORBIT VEHICLE

Formulation	Development	Operations

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	238.6	197.6	195.2	101.4	23.8

PROJECT PURPOSE

As NASA transitions to commercially-owned space destinations in LEO, it is crucial to prepare for the safe and responsible deorbit of the ISS in a controlled manner after the end of its operational life in 2030.

The U.S. Deorbit Vehicle (USDV) will provide the capability to safely, in a controlled manner, deorbit the space station and ensure avoidance of risk to populated areas. A safe, controlled re-entry allows for advanced planning for a date and time, a targeted location in an uninhabited region of the ocean, and a smaller debris footprint.

NASA competitively awarded a firm fixed price contract to SpaceX in June 2024. NASA will competitively select the launch vehicle through the NASA Launch Services Program.

EXPLANATION OF MAJOR CHANGES IN FY 2027

The USDV project has entered development with cost and schedule baselines approved in February 2026.

PROJECT PARAMETERS

This USDV project includes the procurement of the spacecraft, launch vehicle, and deorbit analysis certification and vehicle configuration. This project is only one aspect of the broader ISS deorbit effort. USDV is scheduled for delivery in late 2028. USDV is based on the Cargo Dragon vehicle, with an enhanced trunk section to allow for more Draco thrusters. USDV will rendezvous and dock with ISS, as well as perform ISS attitude control, translational maneuvers, and the final ISS orbit shaping and reentry burns.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

USDV plans to complete its CDR in February 2027. The project will continue to make progress in the final design phase.

SCHEDULE COMMITMENTS/KEY MILESTONES

Milestone	Confirmation Baseline Date	FY 2027 PB Request
PDR/Project Approval	Feb 2026	Feb 2026
CDR	Feb 2027	Feb 2027

U.S. DEORBIT VEHICLE

Formulation	Development	Operations

Milestone	Confirmation Baseline Date	FY 2027 PB Request
Vehicle Delivery Readiness Date	Oct 2028	Oct 2028
Launch	Jul 2029	Jul 2029

Development Cost and Schedule

Base Year	Base Year Develop-ment Cost Estimate ($M)	JCL (%)	Current Year	Current Year Develop-ment Cost Estimate ($M)	Cost Change (%)	Key Milestone	Base Year Milestone Data	Current Year Milestone Data	Milestone Change (months)
2026	1,042.7	N/A	2026	1,042.7	N/A	Vehicle Delivery Readiness Date	Oct 2028	Oct 2028	0

Note: Separate cost and schedule risk analyses were conducted for USDV instead of a JCL.

Development Cost Details

Element	Base Year Development Cost Estimate ($M)	Current Year Development Cost Estimate ($M)	Change from Base Year Estimate ($M)
TOTAL:	**1,042.7**	**1,042.7**	**0.0**
Spacecraft	497.7	497.7	0.0
Deorbit Analysis Cert/Vehicle Configuration	82.8	82.8	0.0
Other Direct Project Costs	462.1	462.1	0.0

Note: Due to the competitive acquisition process, launch vehicle costs are reflected within Other Direct Project Costs. Total may not sum precisely due to rounding.

Project Risks

Project risks will be formalized as part of the CDR process.

COMMERCIAL CREW PROGRAM

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	81.6	81.5	81.5	81.5	81.6

The Commercial Crew Program (CCP) partners with the U.S. commercial sector to develop and operate safe, reliable, and affordable crew transportation to LEO. NASA awarded Commercial Crew Transportation Capability (CCtCap) contracts to Boeing and Space Exploration Technologies Corp. (SpaceX) in September 2014. Through its certification efforts, NASA ensures the selected commercial transportation systems meet NASA's safety and performance requirements for transporting crew to ISS. While CCP manages the CCtCap contracts and related contractor oversight, the Crew and Cargo Program funds the crew missions.

Crew transportation to ISS is currently provided using the SpaceX Crew Dragon, and the Russian Soyuz vehicle. The Boeing Starliner spacecraft is working to resolve anomalies encountered during the Crew Flight Test (CFT) and complete certification by NASA for crew transportation to ISS. As part of the Boeing CCtCap contract, Boeing was awarded up to six crewed flights to ISS. In November 2025, NASA and Boeing agreed to modify the CCtCap contract to reduce the definitive order to four missions, with the remaining two available as options. The next Starliner flight, known as Starliner-1, will deliver cargo to ISS and allow in-flight validation of the system upgrades implemented following the CFT mission in June 2024.

NASA provides technical insight, oversight, and support to industry partners as they develop and operate crew transportation systems using milestone-based contracts and certifies them to carry astronauts to and from the ISS. Under this acquisition model, NASA defines requirements up-front and pays the partner only once contract milestones are successfully completed. This approach reduces financial risk to taxpayers and incentivizes the private sector to provide increased cost-control and decreased systems development cost. In addition, this approach stimulated growth of new space transportation industry capabilities available to all potential customers, strengthened the U.S. space industrial base, and provided a catalyst for future business ventures that can capitalize on affordable, globally competitive U.S. space access.

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

CCP will focus on mission planning and preparations for future CCtCap missions supporting ISS and stay engaged with providers as they continue space hardware manufacturing, testing, qualification, and verification.

Once Boeing is certified, CCP will transition its workforce to support sustaining operations at a level needed to safely operate with two commercial crew providers. CCP will continue to manage the CCtCap contracts, including providing technical oversight and managing modifications and upgrades to both crew transportation systems. NASA is planning for two commercial crew missions in 2027.

SPACE COMMUNICATIONS AND NAVIGATION

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	453.3	453.3	453.3	453.3	453.4

Pursuant to P.L. 105-261, Division A, Title X, Section 1064(d), this budget incurs no cost for frequency allocations.

NASA's Space Communications and Navigation (SCaN) Program delivers mission-assured communications and navigation services required by all NASA human, robotic, and science missions. These missions range from LEO to deep space missions operating billions of miles from Earth. SCaN enables the collection and delivery of science data, spacecraft and crew health telemetry, transmission of commands, and essential support for Artemis missions.

The SCaN networks provide navigation measurements that allow missions to determine position and trajectory, gather valid scientific data, and avoid spacecraft or space debris. These capabilities are essential to mission assurance and safety-critical operations. SCaN prioritizes safety, mission assurance, statutory requirements, and operational efficiency in delivering these services.

The SCaN Program provides these capabilities through a balanced architecture that combines government-owned infrastructure with commercial and international partner services. This approach ensures resiliency, scalability, and continuity of operations across all mission phases. In addition to operational services, SCaN provides systems engineering, architecture planning, communications and navigation standards, radio frequency spectrum management, navigation policy support, and technology integration to sustain NASA's space communications enterprise.

In addition to supporting NASA missions, SCaN provides communications services to external customers, including international partners and commercial entities, on a reimbursable basis.

NASA manages the Near Space Network (NSN) and the Deep Space Network (DSN) as a unified enterprise—One Network, One Mission, One Team—to support spacecraft science data collection, orbit determination, and real-time mission coverage. Through sustained investment, SCaN maintains NASA's mission essential functions and supports human spaceflight, space exploration, deep space science, and planetary defense missions.

Together, NSN and DSN provide near-real-time communications, navigation, and mission assurance services across the full range of NASA missions. DSN remains a critical national infrastructure providing deep-space communications and navigation capabilities that cannot be fully met through commercial services.

The SCaN networks also support ISS, commercial crew providers, and Artemis missions. These networks further require sustained maintenance, modernization, and scalable capacity expansion to meet increasing mission demand and enable a mix of government and commercial exploration activities. This includes information technology and cybersecurity upgrades necessary to protect U.S. space assets and enable safe human and robotic exploration of the Moon and beyond.

The SCaN Program is modernizing DSN capacity through the DSN Aperture Enhancement Project (DAEP) and DSN Lunar Exploration Upgrades (DLEU) to support increasing demand, enable Artemis missions, and preserve DSN capabilities for Mars and deep space missions that require unique performance and mission assurance.

SPACE COMMUNICATIONS AND NAVIGATION

DLEU builds on DAEP improvements to enable simultaneous lunar and deep-space operations and improve data flow for sustained lunar exploration.

The Lunar Exploration Ground System (LEGS) augments lunar communications capacity to reduce DSN loading while maintaining mission assurance for lunar and Mars missions through commercial services enabled by public-private partnerships.

The SCaN Program collaborates with customers, including the Moon to Mars Program, in planning Artemis exploration and science missions to ensure communications and navigation capabilities meet mission needs. These services include efforts funded by ESDMD, such as lunar relay capabilities for missions not in direct line of sight with Earth, upgrades to support Artemis requirements, and preparation for future Mars relay capabilities as existing assets age. Early investment reduces the risk of future gaps in mission support as exploration cadence increases.

In alignment with interoperability and standardization goals, SCaN has implemented Delay Tolerant Networking (DTN) across the NSN and DSN. DTN provides an internet-like approach to spacecraft communications that increases autonomy, interoperability, and resilience across government and commercial networks while supporting lunar relay services and future deep space architectures.

SCaN's strategy is to transition appropriate near-Earth NSN services from government-owned assets to commercially provided capabilities through the Communications Services Project, consistent with U.S. national policy. NASA will not replenish the Tracking and Data Relay Satellite (TDRS) constellation as assets are decommissioned in the 2030s but will continue to support existing users during the transition. Delays in planned transitions would increase reliance on aging government assets and raise long-term operational risk.

The SCaN Program participates in U.S. and international organizations that coordinate compatibility and interoperability in space communications and navigation through the definition of policies and standards and is responsible for ensuring access to required electromagnetic spectrum and interference-free operations.

Taken together, SCaN's approach aligns mission assurance, stewardship of critical national infrastructure, and increasing commercial integration to deliver resilient, scalable communications and navigation services that support NASA's exploration and science goals.

For more information, visit: http://www.nasa.gov/scan

EXPLANATION OF MAJOR CHANGES IN FY 2027

The budget is increased from the FY 2026 President's Budget Request to support government LEGS and ensure network continuity. Wideband demonstration activities are transferred from SCaN to CSP, where that technology will continue to be tested with CSP providers.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

- The SCaN Program will advance Near Space Network Services by completing provider validation and initiating transition-to-operations activities for commercial Direct-to-Earth services. These efforts will enable the award and execution of operational task orders, begin mission transitions from legacy Space Exploration Network Services and Evolution services, and establish the operational and mission-interface constructs required to deliver resilient, commercial services across the NSN.

SPACE COMMUNICATIONS AND NAVIGATION

- As part of the DAEP effort, progress will continue on the new antenna at DSS-33, (in the Canberra Deep Space Communication Complex), upgrades to DSS-54 (in Madrid Deep Space Communications Complex), and continued installation of high-power transmit capability at DSN complexes. These activities support near-term mission demand while advancing the DAEP baseline toward completion.
- Factory delivery and acceptance of two government purchased LEGS antennas will continue as planned. In parallel, the program is transitioning from a government-owned build to providing the government antennas as part of a public-private partnership, enabling commercial LEGS validation activities through FY 2027 and positioning for subsequent commercial service awards.
- DLEU Phase 2 will be completed through integration and testing of communications upgrades on six DSN antennas, delivering the performance required to support the Artemis Human Landing System and sustained lunar operations.
- Planning and coordination activities will continue to address recovery and corrective actions associated with the DSS-14 antenna, supporting restoration of unique capabilities critical to planetary defense and deep space mission assurance.
- Vendor validation and verification milestones will continue to prepare for the launch and on-orbit validation of an initial lunar relay satellite. In FY 2027, the Increment Alpha capability, providing an initial set of communications and navigation services to support Artemis, is planned to be available with full capability targeted for FY 2029.
- SCaN will continue development and demonstration of advanced communications and position, navigation, and timing technologies to support LunaNet and address technology gaps across future Artemis missions. LunaNet will leverage innovative networking techniques, standards, and an extensible framework to rapidly expand network capabilities at the Moon.
- NASA will continue repair and modernization of Guam Remote Station communications infrastructure damaged or degraded by Super Typhoon Mawar in 2023, restoring critical communications capability that supports TDRS operations, human spaceflight missions, science missions, launch support, and other federal partners.

COMMUNICATIONS SERVICES PROGRAM

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	59.4	59.4	59.4	59.4	59.5

The Communications Services Program (CSP) demonstrates the feasibility of commercially provided satellite communications (SATCOM) services to enable agency-wide transition for NASA missions in near-Earth space. These demonstrations establish the technical, operational, and acquisition foundation required for future NASA missions to use flight-qualified commercial communications services. Ultimately, near-Earth users will transition from using NASA-owned networks to commercially provided services.

The CSP effort is a component of the larger NASA strategy to migrate near-Earth missions from communications and navigation services provisioned by government-owned networks to commercial networks. This transition to commercial services, and particularly commercial SATCOM, is driven by the state of current NASA network assets, National Space Policy, and long-standing federal procurement policies that direct the government to make use of, rather than duplicate, commercially provided services. NASA will not be replenishing the Tracking and Data Relay Satellite (TDRS) constellation as aging spacecraft assets are decommissioned in the 2030s. NASA will continue to support existing users during the transition period; however, future space-relay users will exclusively rely on commercially provided communications services. This approach is consistent with federal policies intended to increase the cost-effectiveness of government operations and leverage investments that have already been made by the private sector.

The Space Communications and Navigation (SCaN) Program has overarching agency responsibility to ensure operational NASA missions receive required communications and navigation support. CSP retains responsibility to execute demonstrations of commercial SATCOM services and provide assessments and recommendations for service acquisition to the agency. SCaN will manage the transition to commercial services in concert with the planned phaseout of the existing NASA-owned network resources.

NASA has a diverse set of users and communications needs against which commercial capabilities will be evaluated, such as launch vehicle support, visiting vehicles to ISS, human space flight, and science missions in Earth orbit ranging from flagship observatories to smallsats and CubeSats. CSP intends to leverage SATCOM capabilities developed for terrestrial users to bring flexibility and functionality of commercial service to the space domain. CSP is working with the commercial market to identify requirements and explore opportunities that are mutually beneficial to NASA and industry. NASA is working with multiple commercial entities to demonstrate capabilities that best fulfill NASA's requirements, while remaining compatible with a larger market where NASA is one of many customers.

On April 20, 2022, NASA awarded $278.5 million to American industry, selecting six SATCOM providers to begin developing and demonstrating near-Earth space communication services that may support future agency missions: Inmarsat Government Inc., Amazon Leo for Government (ALG) formerly known as Kuiper Government Solutions LLC, SES Government Solutions, Space Exploration Technologies Corp. (SpaceX), Telesat U.S. Services LLC, and Viasat Incorporated. These agreements were designed to bolster American industry and reduce the cost of communication services to NASA, while promoting a diverse commercial market and maximizing interoperability between government and commercial service providers.

COMMUNICATIONS SERVICES PROGRAM

NASA expects each company to match or exceed agency contributions, totaling more than $1.5 billion of cost-share investments stimulating the domestic market. These cost-share investments significantly leverage private-sector capital in support of NASA's near-Earth communications transition strategy.

CSP has two Non-Reimbursable Space Act Agreements (NRSAA) that were awarded in FY 2025, including an agreement with Kepler Communications U.S. Inc. and an agreement with Astranis Space Technologies Corporation, with plans to award additional NRSAAs in 2026. These agreements facilitate exchange of capability information as a means of growing the domestic satellite communications market and potentially expanding space-relay offerings for future NASA missions.

CSP's current funded Space Act Agreement partners are solely focused on developing and demonstrating commercial services. In 2027, NASA will release a Request for Proposals seeking satellite relay services from industry with the intention of awarding service contracts to multiple providers by 2028. CSP is responsible for validating all awarded services between 2028 and 2030 before transitioning operational responsibility to the SCaN Program.

EXPLANATION OF MAJOR CHANGES IN FY 2027

Wideband demonstration activities are transferred from SCaN to CSP, where the technology will continue to be tested with CSP providers. These investments prioritize the continuity of critical communications and navigation services while positioning SCaN to scale efficiently through increased use of standardized architectures and commercial services.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

CSP plans to continue monitoring and managing partner progress throughout the demonstration period, which is scheduled to be completed in FY 2028. This will include executing biannual mission engagement forums and completing an updated assessment of commercial readiness. CSP will continue to identify capabilities and gaps, as applicable, during vendor milestone reviews. Partner progress will be tracked against established demonstration milestones to assess technical maturity, service readiness, and alignment with planned acquisition timelines. Major planned accomplishments in FY 2027 include continued engagement and progress across participating providers, including ALG completion of Closeout Review; SES Government Solutions Global Test and Closeout Review; in Command Service Demonstration Closeout and Closeout Review with Inmarsat Government, Inc.; a Risk Reduction Demo Network Development Completion and Space Relay Service Demonstration Closeout with SpaceX; Telesat Availability of Lightspeed Demonstration 1 completion; and an Integrated Space Access Network Demo kickoff and Closeout Review with Viasat Incorporated.

By leveraging demonstration knowledge, CSP will prepare for subsequent acquisition of services and TDRS transition. CSP will continue coordinating and collaborating on the infusion of commercial services with the Near Space Network (NSN).

HUMAN SPACE FLIGHT OPERATIONS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	80.3	80.3	80.3	80.3	80.3

The Human Space Flight Operations (HSFO) Program supports the Astronaut Corps, space flight readiness training, and health of crew members before, during, and after each spaceflight mission to the ISS, Artemis missions, and future Commercial LEO Development missions. Within the HSFO Program, the Space Flight Crew Operations (SFCO) Project provides astronaut selection and space flight readiness training and other support to astronauts, while the Crew Health and Safety (CHS) Project manages all aspects of NASA astronauts' health.

To pave the way to the Moon and onto Mars, NASA is working with industry to develop transportation, habitation, operations, and exploration systems that will enable crewed exploration of destinations beyond Earth’s orbit. NASA must also prepare the human system for living and working for extended periods in the hostile environment of space. As astronauts explore further from Earth, many different issues may arise that require investigation. Questions that should be considered are:

- What health risks will astronauts face and how will they be resolved? For example, what health risks will astronauts face as they adapt to micro- and partial-gravity and reacclimate to Earth's gravity when they return?
- What type of training will crews need to prepare for months of travel in the harsh space environment?
- How will the crew deal with medical emergencies or technical anomalies when Earth is no longer within reach?
- How will NASA keep crews operating at peak performance during their mission to ensure mission success?

CHS, in collaboration with NASA’s Office of the Chief Health and Medical Officer and the Human Research Program (HRP) in ESDMD, address these and other questions to ensure crew health, safety, and mission success. SFCO and CHS are responsible for astronaut space flight readiness training and health, while HRP funds research of human health and performance countermeasures, the human response to space, and technologies that enable safe, reliable, and productive human space exploration.

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

HSFO will focus on supporting the Astronaut Corps, space flight readiness training, and the health of crew members. SFCO will continue to support the crew and their families during launch, landing, and recovery for ISS, CCP, and Artemis missions as resources allow. In FY 2027, major specific activities supported by SFCO will include:

- Managing astronaut training for NASA human spaceflight efforts, including ISS and Artemis missions. This includes fundamental training for the new 2025 astronaut class of ten astronauts. This fundamental training typically takes two years and includes expeditionary skills and competencies to prepare them to become highly successful members of the Astronaut Corps. While SFCO will continue to fund the aircraft needed to support astronaut training, it will not fund other aircraft used for programmatic activities (e.g., NASA aircraft used to transport crews to and from launch and landing).

- Planning for the next astronaut selection class, contingent upon mission requirements and astronaut retention.
- Supporting ISS and Artemis missions, including support to the crew during launch, landing, recovery, and rescue operations. SFCO will support the vehicle hazard safety process to ensure crew and operations safety for all NASA human space flight missions.

CHS will continue to focus on the health of the NASA astronauts during training, inflight, post-flight recovery, and into retirement. In FY 2027, major specific activities supported by CHS will include:

- Maintaining the Astronaut Occupational Health Plan for ISS, Artemis, and CLDP. This includes clinical certification and maintaining health and fitness through training, flight, and post-mission recovery for 40 active and assigned U.S. government astronauts and 10 astronaut candidates.
- Supporting NASA astronauts as they prepare and perform their spaceflight missions for both ISS and Artemis, as well as future CLDP missions, and ensuring astronauts are reconditioned and prepared post-mission for future assignments.
- Supporting astronaut health as the new astronaut class undergoes fundamental training.
- Providing family support to assigned NASA astronauts for Public Affairs events, launches, landings, and on-orbit phases of flight.
- Medically monitoring and supporting U.S. government astronaut training activities for ISS Extravehicular Activities (EVAs), Exploration Extravehicular Mobility Unit development, and Artemis lunar surface EVAs.
- Conducting former astronaut health surveillance, including tracking and analyzing astronaut medical and performance data, in accordance with the To Research, Evaluate, Assess, and Treat Astronauts Act, to inform current and future operational programs and paradigms for crew health, safety and performance.

LAUNCH SERVICES

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	80.8	80.8	80.8	80.8	80.8

NASA's science and discovery missions, civil communications, geographic survey, and civil weather missions provide key services for our nation and the world. The Launch Services Program (LSP) ensures access to space for the nation's civil sector satellite and robotic science as well as technology missions.

National Space Transportation Policy identifies the NASA Administrator as the launch agent for the nation's civil sector. LSP enables the Administrator to execute this role by acquiring and managing domestic commercial launch services for assigned uncrewed missions, certifying new commercial launch vehicles for readiness to fly high-value spacecraft, performing mission design and launch integration activities, and directing launch mission assurance efforts to ensure the greatest probability of launch mission success. LSP has unique launch system expertise involving payloads containing nuclear power sources and for launching one-of-a-kind science exploration missions to other planets, the Sun, or other locations in space. NASA relies on LSP to provide robust, reliable, and cost-effective launch services via commercial launch providers. NASA achieves assured access to space through a competitive mixed-fleet approach utilizing the breadth of U.S. industry capabilities. LSP acquires launch services for future missions through competitively awarding task orders under the NASA Launch Services (NLS) II contract.

In addition, LSP acquires Class D launch services under the Venture-Class Acquisition of Dedicated and Rideshare (VADR) contract. Under VADR, LSP provides a broad range of commercial launch services capable of delivering NASA's high risk tolerant payloads, ranging from Class D payloads to higher risk tolerant payloads, including CubeSats, to a variety of orbits. These Federal Aviation Administration (FAA) licensed Class D and small satellite payloads tolerate relatively high risk and serve as an ideal platform for technical and architectural innovation, contributing to NASA's science research and technology development, in addition to fostering a growing U.S. commercial launch market.

LSP provides launch-related expertise to other NASA programs, such as Crew and Cargo Program (for Commercial Resupply Services), Commercial Crew Program (CCP), and programs supporting the Artemis missions. LSP also provides launch advisory support to NASA payload missions using launch services purchased by other government agencies, the launch industry, or international partners.

In addition to acquiring the commercial launch services, LSP arranges pre-launch spacecraft processing facility support, communications, and telemetry during ascent for its customers. LSP offers insight into the commercial space launch industry, which has been utilized by CCP. LSP also tracks lessons learned to identify and mitigate risks for future managed launches and certifies readiness of new commercial launch vehicles for NASA and other civil sector, uncrewed spacecraft. The program also conducts engineering analyses and other technical tasks to maximize launch success for every assigned payload.

Further, as part of NASA's launch site risk mitigation efforts, NASA is studying safety issues associated with a new generation of launch vehicles that use liquid oxygen and methane propellants. The Liquid Oxygen (LOX) and Methane Assessment (LMA) project is responsible for assembling a data collection, which is beneficial for risk-based considerations related to launch pad explosive siting, launch vehicle fly out, and spacecraft survivability. The LMA project will coordinate between NASA mission directorates and with U.S. government agencies to run concurrent testing, share data, and gain access to data from

LAUNCH SERVICES

previously executed tests to further understand hazards and risks associated with liquid oxygen and methane propellants.

EXPLANATION OF MAJOR CHANGES IN FY 2027

The budget is increased from FY 2026 President's Budget Request levels to support NASA mission launch services and related support.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The program will provide management of NLS contracts, launch mission assurance, mission design, and launch integration support to scientific spacecraft missions in various development phases.

The LMA project will close out activities and provide the final data products and reports to the tri-agency Common Standards Working Group comprised of NASA, the FAA, and United States Air Force. Working with industry, this team will develop standardized policies, methods, and recommendations for safely conducting operations with the new generation of launch vehicles that use liquid oxygen and methane propellants.

SPACE TECHNOLOGY

SPACE TECHNOLOGY

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
SBIR and STTR	--	--	**169.0**	169.0	169.0	169.0	169.0
Space Transportation (GO)	--	--	**86.1**	105.3	117.2	135.2	151.3
Space to Surface Access (LAND)	--	--	**46.5**	47.4	50.6	50.9	53.2
Surface Infrastructure & Exploration (LIVE)	--	--	**100.9**	100.8	103.9	105.5	105.6
In-Space Infrastructure & Discovery (EXPAND)	--	--	**66.8**	66.8	67.2	67.2	68.0
Foundational Capabilities (ENABLE)	--	--	**24.4**	24.5	25.8	25.9	26.6
Catalysts & Innovative Mechanisms	--	--	**130.7**	130.5	130.7	130.7	130.7
Total Budget	**1,100.0**	**920.5**	**624.3**	**644.3**	**664.3**	**684.3**	**704.3**

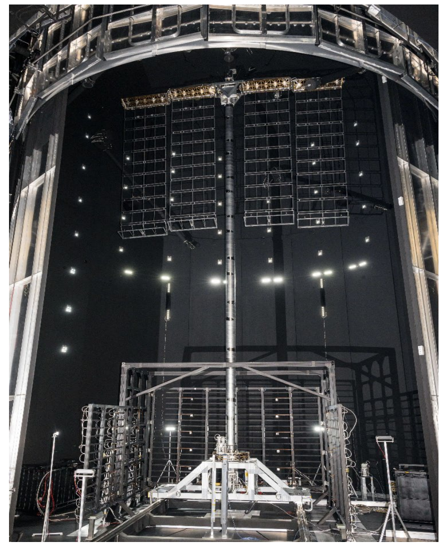
Pursuant to P.L. 115-10 Title VII Sec 702(e), this budget is formulated in such a manner to avoid duplication of projects, programs, or missions conducted by other projects, programs, or missions conducted by another office or directorate of the Administration.

FY 2025 reflects the funding amount specified in Public Law 119-4, Full-Year Continuing Appropriations and Extensions Act, 2025.

FY 2026 reflects the funding amount specified in Public Law 119-74, Commerce, Justice, Science; Energy and Water Development; and Interior and Environment Appropriations Act, 2026.

SPACE TECHNOLOGY

NASA's STMD is shaping the missions of the future while delivering the cutting-edge technology that defines American leadership in space exploration. STMD advances U.S. space technology leadership and global competitiveness by rapidly developing, demonstrating, and delivering transformative capabilities. STMD fosters breakthrough ideas, embraces risk, and fuels a vibrant aerospace economy that empowers both established leaders and emerging innovators. Through strategic partnerships across industry, government, and academia, STMD accelerates high-risk, high-reward technologies that enable future missions, lower costs, and create real world solutions—driving progress in space and improving life for all.



The Honeybee Robotics prototype during lunar Vertical Solar Array Technologies (VSAT) testing inside Chamber A at NASA's JSC in Houston. At roughly 65 feet, or six stories tall, the mast and power system uses a sail-style deployment for its solar arrays and rotates to track sunlight. When in the stowed position, it shrinks to the size of a standard refrigerator to allow for easier transportation.

EXPLANATION OF MAJOR CHANGES IN FY 2027

This budget request provides a $55.4 million increase from the FY 2026 request. This increase supports a new lunar propellant initiative to develop private-sector capabilities to produce, store, transfer, test and transport rocket propellant on the lunar surface, as well as for development and demonstration of commercial radioisotope power systems for use on the Moon and beyond.

This budget reflects several realignments to improve efficiency and collaboration among similar workstreams, including:

- Moving Flight Opportunities activities from Catalysts to In-Space Infrastructure and Discovery (EXPAND) where it better aligns with the goals and structure of the EXPAND program;
- Transferring the Advanced Power & Thermal and Autonomous Systems & Robotics projects from the Foundational Capabilities (ENABLE) program to the Surface Infrastructure and Exploration (LIVE) program; and,
- Transitioning Center Innovation Funds to the agency Independent Research and Development (IRAD) project within Catalysts to further streamline NASA's approach to these unique high-risk, high-reward opportunities across all NASA centers.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) program is increasing award values for Phase I and II awards beginning in FY 2026; therefore, NASA will fund approximately 250 selections in FY 2027, as well as continue to incubate and mature NASA commercial partnerships through post Phase II activities via sequential Phase II awards.

Within the Space Transportation program, NASA is in a partnership with NOAA to fly the Solar Storm Solar Sail Sentinel mission, and NASA will provide a platform to collect data to improve solar sail capability and maneuverability. In the Cryogenic Fluid Management (CFM) portfolio, the 20 watts (W) / 20 kelvin (K) cryocooler work with Creare Space will conclude at TRL 6. The 20W / 20K demonstration will advance high-capacity cryogenic refrigeration for long-duration propellant storage which supports Mars exploration as well as lunar sustainment.

The Space to Surface Access program will continue to analyze plume surface interaction (PSI) data via the Stereo Cameras for Lunar-Plume Surface Studies (SCALPSS) sensor payloads on Commercial Lunar Payload Services (CLPS) flights. This data provides insight into lunar PSI risks and is also extensible to Mars. The Dragonfly Entry Aerosciences Measurements (DrEAM) is a sensor payload on the SMD New Frontiers Dragonfly mission to Titan, Saturn's largest moon. The payload team will complete the post-flight reconstruction approach for the aeroshell sensor data acquired during Dragonfly entry, descent, and landing on Titan in 2034.

Within the Surface Infrastructure and Exploration program, the Vertical Solar Array Technologies (VSAT) will complete thermal vacuum testing with commercial partner, Astrobotic. This will enable the next phase of industry partnerships to demonstrate integrated solar solutions using a mast capable of harnessing the sun's power for eventual power generation on the lunar surface, with extensibility to Mars. The Harmonia Radioisotope Power System for Artemis Tipping Point team will fully fabricate and assemble an electrically heated Stirling generator and lander integration system. Blue Origin's In-Situ Resource Utilization (ISRU)-Based Power on the Moon Tipping point will complete an autonomous, integrated ground demonstration ingesting lunar regolith simulants and producing silicon cells, aluminum wires, oxygen, iron, and slag in lunar environmental conditions.

The In-Space Infrastructure and Discovery program's Small Spacecraft Propulsion and Inspection Capability (SSPICY) demonstration will launch in early FY 2027. SSPICY will enable commercial inspection of defunct, or inoperable, satellites in LEO. NASA will continue work with the Defense Advanced Research Projects Agency (DARPA) on the Lunar Assay via Small Satellite Orbiter, progressing U.S. commercial capabilities in cislunar space while gathering data to inform future ISRU testing and infrastructure. In Communications, Position, Navigation, & Timing, NASA and the Nokia USA team will deliver a demonstration-ready surface networking technology developed from commercial 5G New Radio equipment. Flight Opportunities will leverage commercial capabilities and best practices alongside rapid acquisition approaches to improve collaboration with the space industry. It will partner with commercial flight providers to develop new space test capabilities and continue providing researchers access to emerging commercial space test offerings.

In the Foundational Capabilities program, High Performance Spaceflight Computing (HPSC) will complete processor development and a final product acceptance review in preparation for commercial market release, enabling unprecedented in-space computing performance. Joining Demonstration In Space (JOINS) Tipping Point will launch and conduct an in-space joining experiment on the ISS. This technology is a demonstration of in-space assembly, which is critical for building large structures that are impractical to launch fully assembled from Earth.

Within Catalysts and Innovative Mechanisms, NASA will continue to make new awards and support existing awards to nurture the pipeline of space technology talent and support transformative ideas inspired by the broad community response to the 2024 and 2026 STMD technology shortfalls surveys. These investments enable new capabilities and fields of aerospace technology study, transform NASA missions, and cultivate a world-class U.S. civil space workforce. Some of the Space Technology Research Grants concluding in FY 2027 include innovations in next-generation fluids, materials, and systems for thermal control to meet emerging needs in exploration and other civil space applications. Prizes, Challenges and Crowdsourcing will host a Mars Challenge that will focus on closing STMD priority shortfalls related to Mars exploration. The Technology Transfer team will continue to increase licensing and commercialization successes while engaging local and regional partners to improve life here on Earth and in space. Catalysts will continue to forge strategic partnerships and support other activities across STMD programs to advance and transition innovative capabilities for U.S. leadership in space.

Acquisition Strategy

STMD projects and activities are competitively selected through various acquisition mechanisms. STMD utilizes the Announcements of Collaboration Opportunity and Tipping Point solicitations and makes awards to academia, industry, and NASA centers, while fostering collaboration with other government agencies as needed.

SBIR AND STTR

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	169.0	169.0	169.0	169.0	169.0

NASA used the 3D Backscatter Unit developed by SBIR award winner, Albireo Technologies, LLC, to certify the Orion heat shield prior to flight. NASA also used it in the Artemis Char investigation to help determine why the Orion heat shield lost more material than expected during Artemis 1 return flight to Earth.

NASA's Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) program leverages the nation's innovative small business community to fund research and development in support of NASA's mission in space technology, human exploration, science, and aeronautics. These programs support NASA's Artemis program objectives by identifying and accelerating relevant technologies throughout all phases (i.e., Phase I, II, and Post Phase II). Post Phase II awards may involve matching funding from investors and encourage advancement of innovations and commercialization of technologies developed through Phase I and Phase II. SBIR Ignite is a pilot in its fourth year for Phase I and II awards, seeking to fund relevant ideas in the commercial market with a proposal process more closely aligned with a venture financing process. These programs provide the small business sector with fast-track opportunities to develop and commercialize technology for NASA while spurring economic growth.

EXPLANATION OF MAJOR CHANGES IN FY 2027

The SBIR/STTR program is increasing award values for Phase I and II awards beginning in FY 2026, therefore NASA will fund approximately 250 selections in FY 2027.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

SBIR and STTR intend to select approximately 250 new awards, grants, and contracts to small businesses while incubating and maturing NASA commercial partnerships via post Phase II activities through sequential Phase II awards.

The program pilots ways to reduce barriers to entry and streamline the experience across all program phases, including strategies to encourage transition to NASA, government, and/or commercial use beyond SBIR/STTR awards.

SBIR AND STTR

Program Elements

SBIR

SBIR was established by statute in 1982 and is expected to be reauthorized in 2026 to increase research and development opportunities for small businesses. The program stimulates U.S. technological innovation, employs small businesses to meet federal research and development needs, increases the ability for small businesses to commercialize innovations derived from federal research and development, and both encourages and facilitates participation by socially disadvantaged small businesses consistent with 15 USC 638. The SBIR budget is based on a level of at least 3.2 percent of NASA's extramural research and development budget. The maximum value for an SBIR Phase I contract is $225,000 for a period of performance of six months and the maximum value of an SBIR Phase II is $1,275,000 over a 24-month period of performance. NASA issues annual SBIR solicitations, setting forth a substantial number of topic areas open to qualified small businesses. NASA also supports several Post Phase II vehicles:

- Phase II-E is a contract opportunity on Phase II awards that provides incentives for cost sharing with non-SBIR investors to extend the research and development efforts of the current Phase II contract.
- Civilian Commercialization Readiness Pilot Program (CCRPP) is a Post-Phase II contract opportunity that provides incentives for cost sharing with non-SBIR investors up to $2,500,000 to extend the research and development efforts of previous Phase II contracts with strong customer pull for technology maturation and commercialization.
- Phase II Sequential contracts help accelerate the TRL of technologies to a level where other investors can infuse the technology into other NASA programs.

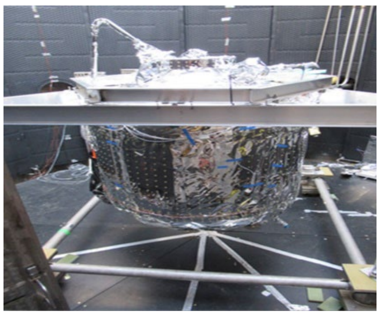
STTR

STTR was established by statute in 1992 and is expected to be reauthorized in 2026 to award contracts to small businesses for cooperative research and development with a non-profit research institution, such as a university. STTR facilitates the transfer of technology developed by a research institution through the entrepreneurship of a small business, resulting in technology to meet NASA's core competency needs in support of its mission programs. Modeled after SBIR, STTR is funded based on 0.45 percent of the NASA extramural research and development budget. NASA issues annual STTR solicitations, setting forth a substantial number of topic areas open to qualified small businesses. Beginning in FY 2026, the maximum value for an STTR Phase I contract is increased to $225,000 for a period of performance of 13 months and the maximum total value of an STTR Phase II is increased to $1,275,000 over a 24-month period of performance. Phase II E, CCRPP, and Phase II sequential contracts can also be available to STTR participants.

SPACE TRANSPORTATION (GO)

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Space Transportation Capabilities	--	--	**78.9**	105.3	117.2	135.2	151.3
Solar Electric Propulsion	--	--	**7.2**	0.0	0.0	0.0	0.0
Total Budget	**--**	**--**	**86.1**	**105.3**	**117.2**	**135.2**	**151.3**



The tank used to conduct CFM two-stage cooling tests in the Test Stand 300 vacuum chamber at NASA's MSFC in Huntsville.

The Space Transportation program (GO) manages all STMD transportation, propulsion, and cryogenic fluid management activities. The primary goal of the Space Transportation program is to enable future science missions and human exploration of the Moon, Mars, and beyond by maturing propulsion, propellant management, maneuverability, and long-duration operational technologies required for reliable transportation across the exploration architecture.

EXPLANATION OF MAJOR CHANGES IN FY 2027

This budget reflects the addition of lunar surface propellant development. This project enables private-sector capabilities to produce, store, transfer, test, and transport rocket propellant on the lunar surface, therefore reducing the cost of transporting humans and cargo between Earth and the Moon while encouraging commercial activity on the lunar surface.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

In Advanced Propulsion, NASA is in an equal cost-sharing partnership with NOAA to develop the Solar Storm Solar Sail Sentinel mission. Solar sails help improve space weather forecasts by allowing for a sun-facing observation platform that improves upon warning time, reliability, and mission affordability for space weather monitoring. In this partnership, Advanced Propulsion will validate solar sail technology throughout the mission, demonstrating solar sail maneuverability and navigation capabilities to attain a TRL 7, the enabling point for industry to leverage this technology. The final design review and delivery of the system will be completed in FY 2027.

The Integrated Rotating Detonation Engine System (InRoDES) is a rotating detonation rocket engine that has the potential to yield significant mass savings for future rocket engines. That team will conduct Engine System Final Design Review in CY 2027 and reach a TRL 5 in FY 2028. The Small Spacecraft Electric Propulsion (SSEP) demonstration partnership with Northrup Grumman will achieve TRL 6 and be ready for commercial launch in FY 2027. This American-made SSEP system increases space mission capability by enabling higher delta-v performance while preserving mass for payload.

In the Cryogenic Fluid Management portfolio, the 20W / 20K cryocooler work with Creare will conclude in FY 2027 at TRL 6 therefore advancing critical technologies required for longer duration missions in space. The low-leakage hydrogen valve infusion focuses on limiting the loss of cryogenic fuels in space, closing in on achieving zero-boiloff objectives. Radio Frequency Mass Gauging will reach TRL 6 for ground operations (settled measurements) and TRL 5 for flight operations (unsettled measurements) advancing toward more precise fuel tank measurements in space. NASA will release a Request for Proposals for the Lunar Propellant project in FY 2027.

Program Elements

CRYOGENIC FLUID MANAGEMENT (CFM)

Cryogenic fluid management strengthens America's leadership in space by delivering the capability to store, transfer, and utilize cryogenic propellant with precision and reliability. This capability enables more ambitious missions, expanding national technical expertise, and demonstrating the ingenuity and excellence that define the United States space enterprise.

STMD is developing technologies that enable long duration spaceflight and extended human presence on the Moon and Mars by optimizing preservation and transfer of cryogenic fluids. Improved cryogenic fluid management helps enable in-space transportation systems, such as human landing systems for lunar and, eventually, Mars surface operations, including in-situ resource utilization. Missions ranging in duration from months to multiple years are far beyond the current state-of-the-art capabilities for in-space cryogenic fluid management.

STMD is also implementing industry and in-house activities to advance cryocooler technology which is critical to long duration storage of cryogens and ground test capabilities to develop propellant transfer operations.

ADVANCED PROPULSION

Advanced Propulsion maturation efforts continue to develop electric propulsion, emerging propulsion technologies, and advanced manufacturing of engines/components that could potentially transform future exploration, science, and commercial missions. Advanced Propulsion development activities include high-performance electric propulsion for the Artemis Architecture; alternative thrusters and fuels designed to withstand the extreme cold of deep space; efficient, low-power electric propulsion systems for small spacecraft using domestic sources for critical components; and high-efficiency liquid propulsion systems, including rotating detonation engines. The advancements in maneuverable solar sail systems allow missions to operate in stable or displaced orbits, allowing for extended science observations and continuous communication coverage without expending propellant. Advanced propulsion technology development is how America powers, maneuvers, and achieves its objectives in space, enabling higher performance, greater operational flexibility, and more sustainable mission architectures across the exploration enterprise.

LUNAR PROPELLANT

Transporting propellant from Earth to the lunar surface is costly. The Lunar Propellant project therefore aims to develop private-sector capabilities to produce, store, transfer, test, and transport rocket propellant on the Moon, reducing the cost of transporting humans and cargo between Earth and the Moon while encouraging commercial activity on the lunar surface. This project supports the establishment of a permanent logistics capability, extends surface operations, generates commercial competition for cost-efficiencies, enables missions deeper into the solar system, and fosters a sustainable lunar economy.

SPACE TRANSPORTATION (GO)

This effort will continue to ramp up in the outyears on its continued potential to achieve significant cost savings.

SOLAR ELECTRIC PROPULSION (SEP)

Formulation	Development	Operations

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	7.2	0.0	0.0	0.0	0.0

PROJECT PURPOSE

As part of the Space Transportation Advanced Propulsion capability area, the development of Solar Electric Propulsion (SEP) technology is pushing the boundaries of space travel with thrusters nearly three times more powerful than current systems. STMD is developing, testing, and qualifying the first 12-kilowatt (kW) SEP Hall Thruster for space. This demonstration will provide NASA with experience in high power electric propulsion, while demonstrating operational approaches and mission life. SEP will enable more efficient orbit transfer and station-keeping for spacecraft while meeting the growing power demands of both government and commercial satellites.

EXPLANATION OF MAJOR CHANGES IN FY 2027

SEP successfully addressed several technical challenges during late FY 2025 and early FY 2026, including incorporation of updated integration hardware and refinement of system performance predictions. These efforts affected the remaining milestones and a replan is required. SEP will complete the first phase of qualification and initiate the second and final phase in FY 2027. STMD will also continue its partnership with the ESDMD on remaining SEP project scope.

PROJECT PARAMETERS

The goal of the SEP project is to qualify a 12-kW solar electric propulsion thruster to use as the primary propulsion for a spaceflight demonstration during an operational mission. Objectives include:

- Qualify high-power SEP thruster technology for operational use through continuous long-term operation of the system in a relevant environment, sufficient to characterize and predict the performance and lifetime of the system; and
- Qualify a 12-kW electric propulsion thruster for baseline operations in deep space.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

Qualification Model 1 (QM-1) acceptance testing will conclude in Q2 FY 2026, with long duration wear testing beginning shortly thereafter and extending through FY 2027. Qualification System Acceptance Review (QSAR)-2 is pending schedule replan review.

SOLAR ELECTRIC PROPULSION (SEP)

Formulation	Development	Operations

Schedule Commitments/Key Milestones

Milestone	Confirmation Baseline Date	FY 2027 PB Request
Formulation Authorization	Mar 2015 (as part of Asteroid Redirect Robotic Mission [ARRM])	Mar 2015 (as part of ARRM)
KDP-A	Mar 2015 (as part of ARRM)	Mar 2015 (as part of ARRM)
PDR	Aug 2017	Aug 2017
KDP-C	Oct 2019	Oct 2019
Delta KDP-C	-	May 2021
CDR	Mar 2022	Mar 2022
Re-baseline	Mar 2022	Mar 2022
KDP-D	Apr 2022	May 2023
QSAR-1	Jun 2024	Feb 2026
QSAR-2	Jun 2025	TBD
Electric Propulsion Thruster Life Qual Test Report	Oct 2028	TBD

Development Cost and Schedule

Base Year	Base Year Develop-ment Cost Estimate ($M)	JCL (%)	Current Year	Current Year Develop-ment Cost Estimate ($M)	Cost Change (%)	Key Milestone	Base Year Milestone Data	Current Year Milestone Data	Milestone Change (months)
2021	203.2	70	2026	TBD	TBD	Electric Propulsion Thruster Life Qual Test Report	Oct 2028	TBD	TBD

Note: The confidence level estimates reported reflect an evolving process as NASA improves its probabilistic estimation techniques and processes. Estimate reflects the practices and policies at the time it was developed. Estimates that include combined cost and schedule risks are denoted as joint confidence level (JCL); all other confidence levels (CLs) reflect cost confidence without necessarily factoring the potential impacts of schedule changes on cost.

SOLAR ELECTRIC PROPULSION (SEP)

Formulation	Development	Operations

Development Cost Details

Element	Base Year Development Cost Estimate ($M)	Current Year Development Cost Estimate ($M)	Change from Base Year Estimate ($M)
TOTAL:	**203.2**	**TBD**	**TBD**
Science/Technology	159.7	TBD	TBD
Other Direct Project Costs	43.5	TBD	TBD

Project Management & Commitments

Element	Description	Provider Details
Project Management	Manages Aerojet Rocketdyne contract, thruster development life testing and qualification testing	Lead Center: GRC
Thruster Development	Thruster development and life qualification testing support	Lead Center: JPL
Thruster Design	Thruster design and qualification	Provider: Aerojet Rocketdyne

Acquisition Strategy

All major acquisitions are in place.

MAJOR CONTRACTS/AWARDS

Element	Vendor	Location (of work performance)
Advanced Electric Propulsion System Contract	Aerojet Rocketdyne	Redmond, WA

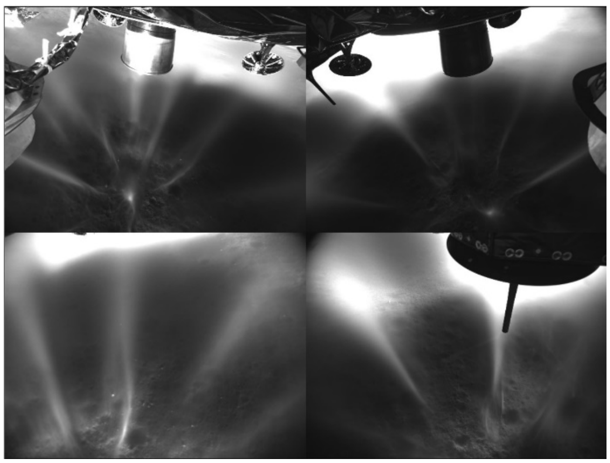
INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	SRB	July 2026	QSAR-1, assess/approve environmental test results for QM-1	TBD
Performance	SRB	TBD	QSAR-2, assess/accept preliminary life test data for QM-2	TBD

SPACE TO SURFACE ACCESS (LAND)

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	46.5	47.4	50.6	50.9	53.2



Imagery from the SCALPSS payload during and after descent and touchdown of the Blue Ghost lunar lander.

In the Space to Surface Access (LAND) program, STMD is developing technologies for Entry, Descent, and Landing (EDL) including sensors, materials, algorithms, and modeling that enable landing higher-mass payloads and with greater touchdown accuracy on the lunar surface, Mars, and other planetary bodies. Activities in LAND are also improving capabilities to return spacecraft from LEO and deep space. Specifically, NASA is focusing on precision landing and hazard avoidance technologies to ensure safe touchdown, as well as advanced modeling, simulation, and flight instrumentation to support EDL system design and the development of future exploration vehicles and planetary entry missions.

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

Technology development in LAND for supersonic retropropulsion test plans, terrestrial campaigns, and predictive modeling will continue to mature entry and descent hardware systems for Mars EDL and Earth-return applications. DrEAM is a sensor payload on the SMD New Frontiers Dragonfly mission to Titan, Saturn’s largest moon. In FY 2027, the payload team will complete the post-flight reconstruction approach for the aeroshell sensor data acquired during Dragonfly EDL on Titan in 2034. The DrEAM entry-performance data will help validate entry prediction models that are relevant to high-speed Mars and Earth re-entry systems.

The SCALPSS version 2.0 payloads team will certify the hardware for an upcoming CLPS launch scheduled in FY 2029. SCALPSS payload data provides the ESDMD Human Landing System team with insight into lunar plume surface interaction (PSI) risks, which are also extensible to Mars. The rocket exhaust at landing causes PSI, blasting surface debris that can endanger astronauts, obscure sensors, contaminate samples, and damage spacecraft, landers and habitats.

SPACE TO SURFACE ACCESS (LAND)

A suborbital rocket flight of the Xodiac-C vehicle will test and validate performance of precision-landing guidance algorithms and the Exploration Lidar Sensor Assembly (ELSA) sensor, helping to decrease risk for lunar and Mars precise and safe landing. The ELSA lidar generates images of the terrain surface prior to landing to help determine safe landing sites and provide onboard navigation information to ensure successful touchdown at the identified site.

Program Elements

ENTRY MODELING & INSTRUMENTATION (EM&I)

It is not possible to fully validate and test a planetary entry system for missions to other solar system bodies on Earth due to significant differences between the Earth's atmosphere and gravity compared to other planets. Therefore, computer models and simulation tools for the heating environment, vehicle aerodynamics, and subsystem performance are critical to design and certify these systems for flight. Inaccurate models can result in inadequate safety margins and an incomplete understanding of mission risks. EM&I develops physics-based models, anchors them with ground test and flight data, and distributes them to the commercial industry designers of robotic and crewed vehicles to increase design robustness, shorten schedules, and reduce unexpected testing costs during development. EM&I consists of several activities. The Entry Systems Modeling (ESM) effort develops validated simulations and sustains the core discipline skillsets within NASA to ensure a strong pipeline of future experts through academic grants, engaged mentoring, and the university-led Advanced Computational Center for Entry System research institute. Numerous U.S. commercial partners leverage core ESM toolsets and engage in public-private partnerships with NASA in the development of commercial EDL vehicles and subsystems. Recognizing that entry models are key to exploring throughout the Solar System, SMD is also a key partner in EM&I, as evidenced by the DrEAM instrument.

DECELERATION SYSTEMS (DS)

New and enabling approaches to entry deceleration systems are required for human-scale missions to Mars, as well as lowering the cost and increasing the frequency of robotic Mars missions. Such advancements benefit all planetary entries, including Earth return, and support both an expanding U.S. commercial space economy and the accomplishment of several Moon to Mars objectives. Key public-private partnerships support the development of a resilient supply chain to provide new thermal protection materials, including solid and fabric-based ones, as well as component parts and complete systems for scaled-up inflatable decelerator technologies. Future investments will continue to focus on materials and hardware component advancements, as well as relevant ground and terrestrial flight test validations, supporting mission infusion and transition into the U.S. commercial supply chain.

LANDING SYSTEMS & ENVIRONMENTS (LS&E)

As landers and probes come to rest on planetary surfaces, they can undergo extreme impact, induce local environments, and contaminate the surrounding area. Aggregating assets in a single area on both the lunar and Martian surfaces will drive the need to understand the effects of landings and launches on the surrounding environment, and to develop and implement mitigation approaches. Creating validated models of these effects will require a suite of sensors that can obtain data from both ground tests and flight missions. This portfolio will advance technologies that improve the likelihood of successful landings while reducing the cost of landing systems. One current activity in this project is SCALPSS, a set of tiny cameras placed around the base of a commercial lunar lander. The SCALPSS monitors crater formation from the precise moment a lander's hot engine plume begins to interact with the Moon's surface. A SCALPSS payload flown on a CLPS mission in 2025 successfully demonstrated the capability and several additional SCALPSS payloads are planned for future commercial-partnered lunar missions. The data gathered will inform future lunar lander vehicle and surface system designs.

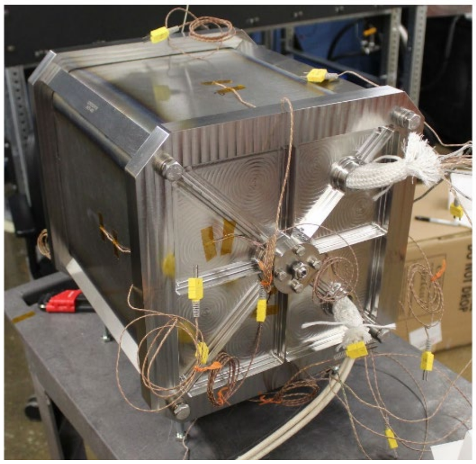
GUIDANCE & NAVIGATION SYSTEMS (G&NS)

The use of precision landing and hazard avoidance enables ready access to sites of high scientific or exploration interest, supports asset aggregation for sustained operations, and ensures crew and vehicle safety. Although planetary landing precision has improved substantially over the last 20 years, future lunar and Mars missions and architectures will require at least another order of magnitude improvement. Advancements in sensors and computational capabilities are critical, but the software and algorithms that connect the measurements together robustly are an additional challenge. Advancing these integrated systems requires a continuum of test techniques, from hardware-in-the-loop simulations to laboratory testbeds to suborbital platforms, that can mimic planetary approaches. Public-private partnerships are common and continue to have high potential in this portfolio due to synergies with terrestrial applications and the cross-cutting nature of the sensors and techniques to support a wide range of destinations and vehicle implementations. Current public-private partnerships support commercialization of a Doppler lidar technology for precise velocity measurements for navigation and soft touchdown, as well as further development of ELSA for onboard hazard detection, navigation, and safe landing. These sensor technologies and the onboard guidance and navigation algorithms enable safe and precise landing for the Moon, Mars, icy worlds, and other destinations at hard to reach and unknown areas that are of high scientific interest.

SURFACE INFRASTRUCTURE & EXPLORATION (LIVE)

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	100.9	100.8	103.9	105.5	105.6



Harmonia Radioisotope Power System Tipping Point's electrical heat source sub assembly engineering unit prior to thermal vacuum chamber testing.

The Surface Infrastructure and Exploration program (LIVE) develops the technologies required to establish the foundational surface infrastructure capabilities needed to explore and operate on the surface of the Moon and Mars. LIVE balances state-of-the-art technology development and robust partnerships to achieve sustainable operational presence on the surface of the Moon and Mars.

EXPLANATION OF MAJOR CHANGES IN FY 2027

This budget request includes support for development and demonstration of commercial radioisotope power systems for use on the lunar surface and elsewhere. It also transfers the Advanced Power & Thermal and Autonomous Systems & Robotics projects from the ENABLE program to the LIVE program to improve efficiency and collaboration.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

VSAT will complete thermal vacuum testing with the commercial partner, Astrobotic, in Q4 FY 2027. This will enable the next phase of industry partnerships to demonstrate integrated solar solutions utilizing a mast capable of harnessing the sun's power to support future power generation on the lunar surface, with extensibility to Mars.

The Harmonia Radioisotope Power System Tipping Point team will fully fabricate and assemble an electrically heated Stirling generator and lander integration system. Upon completion, the Harmonia team will develop a transition plan to transfer the technology to a flight qualified system for future commercial and government missions. The Harmonia Tipping Point is also a critical demonstration of the radioisotope Americium-241 (Am-241) due to its potential as an alternative power source to reduce the strain on the plutonium (Pu-238) supply chain while enabling long-term, reliable energy. Given the long-lived nature of Am-241, lunar surface heat sources can be recycled and used for decades, supporting Artemis sustainability for a variety of assets.

Blue Origin's ISRU-Based Power on the Moon Tipping Point will complete an autonomous, integrated ground demonstration ingesting lunar regolith simulants and producing silicon cells, aluminum wires, oxygen, iron, and slag in lunar environmental conditions. Each product provides a key potential component for power management and distribution for sustained lunar power.

SURFACE INFRASTRUCTURE & EXPLORATION (LIVE)

The Regenerative Fuel Cell is an electrochemical energy storage device that operates like a rechargeable battery. NASA will complete tests to make the fuel cell and electrolyzer technology ready for commercial licensing, creating the opportunity for industry to provide NASA and commercial partners with the ability to improve and demonstrate energy storage for the surface of the Moon.

A new study will focus on how to demonstrate environments and dust mitigation solutions, such as coatings and utilizing an electron beam to remove lunar dust on surface systems, including batteries, radiators, and heaters.

Program Elements

ADVANCED POWER & THERMAL SYSTEMS

Surface Power technologies are a critical enabler for the sustained human presence on the Moon and Mars. They include power generation (e.g., solar arrays, primary fuel cells, power beaming), power management and distribution (e.g., advanced energy management system), simulation models for power grid architectures, cabling, connectors, power electronics, proximity charging, and energy storage (e.g., regenerative fuel cells, batteries) in extreme environments, specifically the Moon and Mars. Advancements in power generation and energy storage will support continuous power throughout day and night operations on the lunar surface. In addition, Surface Power is developing and demonstrating a primary fuel cell system to support operations with long discharge times, including potential applications on rovers, habitats, ISRU systems, and general energy storage.

Surface Power activities include VSAT, a vertical array deployment on masts of up to 10 meters in length to capture continuous sunlight for power at the lunar South Pole; radioisotope power generation; and the ISRU Power Tipping Point, a commercial end-to-end system that produces solar power cells from simulated lunar regolith using molten regolith electrolysis.

NASA will build on the current Harmonia Radioisotope Power Source to evaluate and mature more cost-effective radioisotope sources, including Americium. Managing advanced power and thermal technologies for continuous operation in extremely cold environments is vital to enabling long-term human or science missions.

Future work includes solid oxide fuel cells and system development, advanced modular power systems, a 2-kW primary fuel cell stack with regenerative fuel cell integration, planetary surface long distance power transmission, and a surface element power exchange vehicle interface.

ENVIRONMENTS & DUST MITIGATION

Environments & Dust Mitigation includes development of cross-cutting technologies, materials, processes, test environments, and modeling that will enable robotic and human operations across the full range of surface conditions and environments.

Lunar and Martian dust introduces significant risks to virtually any surface system, including malfunctions and damage to core power systems. LIVE works with industry stakeholders to develop active, passive, and/or operational measures that can be incorporated during the design and development process well before robotic or human surface operations are underway.

Surface Infrastructure & Exploration (LIVE)

Examples of measures applicable to the Moon and Mars include dust-tolerant connectors, coating methodologies, material solutions, dust removal tools, scalable radiators, dust activation and adhesion, and Moon and Mars regolith simulant characterization.

Additionally, Moon and Mars environment modeling, simulation, analyses, and testing ensure that stakeholder hardware developers can design to the appropriate operational environments early in the process.

Surface Sustainability & Logistics

Surface Sustainability and Logistics incorporates design, development, and testing principles throughout the development lifecycle to address interoperability, reliability, and maintainability of interdependent technologies common across most surface systems for Moon and Mars (i.e., power, communications, autonomy, robotics).

To establish logistical permanence, be more Earth-independent, and generate a demand signal for a viable commercial ecosystem, Surface Sustainability & Logistics technologies will excavate, extract, process, and manipulate the local in-situ resources. Example technologies are consumables production, resource mining, and on-demand construction of structures (e.g., roads, landing pads, berms, storage facilities, etc.).

Humans need the ability to robotically explore, scout, and navigate treacherous terrain. Thus, the autonomous, robotic, power, and communications technologies are fundamental to foundational lunar and Mars infrastructure.

Commercial Radioisotope Power Systems (RPS)

Commercial RPS supports the development and demonstration of commercial radioisotope power systems for use on the lunar surface and elsewhere. The goals of this effort are to expand the availability of radioisotope power systems and reduce costs for potential exploration and science applications while enabling a commercially viable supply chain for government and commercial missions.

Lunar Surface Innovation Consortium (LSIC)

LSIC is also supported in the LIVE program. It is a nationwide consortium facilitated by Johns Hopkins Applied Physics Laboratory, comprised of industry, academia, non-profits, NASA, and other government agencies, with a vested interest in establishing the technology infrastructure required for a sustained presence on the Moon and extensibility to Mars.

Since its inception in 2020, the LSIC has engaged over 1,400 organizations across 50 states, the District of Columbia, Guam, Puerto Rico, and 73 countries to advance the technologies needed for surface exploration and to stimulate economic development. Participation has increased by 400 percent over that time, proving its efficacy as an essential incubator for technology acceleration. Of the cross-sector entities who attend the consortium meetings, over 50 percent are from industry, approximately 20 percent from academia, and approximately 10 percent from government, with the remaining from other entities such as non-profit organizations.

IN-SPACE INFRASTRUCTURE & DISCOVERY (EXPAND)

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	66.8	66.8	67.2	67.2	68.0

Team members from the Aerospace Corporation and NASA inspect a DiskSat spacecraft before it launched with three others in December 2025. DiskSat is a joint NASA and U. S. Space Force effort developed for small spacecraft missions needing higher power or larger apertures than CubeSats can provide.

Credits: The Aerospace Corporation

In-Space Infrastructure & Discovery (EXPAND) advances technology for agile missions and the expansion of space commerce to help ensure American leadership in space and advance commercially enabled space exploration, support space-based infrastructure for human exploration of the Moon and Mars, create a sustainable operating environment, and accelerate the pace of scientific discovery. EXPAND invests in capabilities that enable risk tolerant missions and continuous in-space activities across the solar system.

EXPAND facilitates the rapid development and demonstration of capabilities that support scalable in-space infrastructure, accelerate the pace of exploration and discovery, and support U.S space commerce. Each of the EXPAND elements hosts the necessary subject matter expertise to quickly mature technologies from the government, academia, and the commercial space while responding to the evolving needs of the space ecosystem.

EXPLANATION OF MAJOR CHANGES IN FY 2027

This budget reflects the realignment of Flight Opportunities activities from the Catalysts program to EXPAND. Flight Opportunities better aligns with the goals and structure of the EXPAND program and will improve efficiency and collaboration within those activities.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

Within the Small Spacecraft and Distributed Systems partnership with the DARPA, EXPAND subject matter experts continue to support the Lunar Assay via Small Satellite Orbiter (LASSO), which is a small spacecraft that will conduct resource mapping from a very low lunar orbit. In FY 2027, NASA will provide support to DARPA through subject matter expertise, in anticipation of the commercially developed LASSO spacecraft launch by FY 2029.

The AstroNav deep space autonomous navigation demonstration, part of the Cislunar Autonomous Positioning System Technology Operations and Navigation Experiment (CAPSTONE) 02 partnership with ESDMD, will launch in FY 2027. CAPSTONE 02 is a small spacecraft mission designed to mature rendezvous and proximity operations capabilities in multibody cislunar orbits, reducing risk for future lunar exploration missions.

IN-SPACE INFRASTRUCTURE & DISCOVERY (EXPAND)

The Small Spacecraft Propulsion and Inspection Capability (SSPICY) mission will launch in early FY 2027. SSPICY is the first NASA-funded commercial space debris inspection mission, gathering data to support the agency's efforts to extend the life of satellites while reducing space debris.

In FY 2027, the Communications, Position, Navigation, & Timing (CPNT) NASA and Nokia USA team will deliver a demonstration-ready surface networking technology developed from commercial 5G New Radio equipment.

The In-Space Servicing, Assembly, and Manufacturing (ISAM) portfolio will continue to support commercial and U.S. government efforts to advance space mobility and logistics, including the Fly Foundational Robots, a demonstration of a domestic U.S. commercial robotic arm hosted on a U.S. commercial orbital spacecraft, targeting launch readiness for late FY 2027.

Flight Opportunities will leverage commercial capabilities and best practices, alongside rapid acquisition approaches, to enhance collaboration with the entrepreneurial space industry, partner with commercial flight providers on development of new space test capabilities and continue to provide researchers access to emerging commercial space test offerings.

Program Elements

SMALL SPACECRAFT & DISTRIBUTED SYSTEMS

Small Spacecraft and Distributed Systems expands NASA's ability to execute unique missions through rapid development and demonstration of technologies for small spacecraft applicable to exploration, science, and the commercial space sector.

The program element collaborates with U.S. industry to leverage the fast pace of innovation in the commercial space sector to address challenging mission needs. Through these partnerships, Small Spacecraft and Distributed Systems advances small spacecraft technologies to achieve NASA missions in faster and more affordable ways.

This includes expanding the capability of small spacecraft to execute missions at new destinations and in challenging new environments, including cislunar, deep space, and very low Earth orbit (VLEO) applications. The program element also aims to advance mission architectures for which small spacecraft are uniquely suited, including capabilities for autonomous distributed systems and augmenting existing orbital assets and future exploration missions at the Moon and Mars.

Small Spacecraft & Distributed Systems targets a 24-month development cycle for all small missions. As such, EXPAND makes use of a missions-of-opportunity-based approach so that it can identify and initiate investments faster than the typical budget cycle. This improves the ability to work with the entrepreneurial space industry and increases the agility and effectiveness of the portfolio.

COMMUNICATION, POSITION, NAVIGATION & TIMING (CPNT)

CPNT activities develop and demonstrate technologies for advanced in-space communications, navigation, and timing infrastructure that reduces reliance on constrained Earth-based systems and enables scalable mission architectures at the Moon, Mars, and beyond. CPNT seeks to mature in-space technologies that can transition to NASA's Space Communications and Navigation (SCaN) program as well as U.S. commercial industry for operational implementation.

CPNT targets investments to adapt commercial telecom technology for the Moon and Mars, advances technology for deep space "trunk lines" that can deliver high volumes of data to and from Mars and supports technology for Lunar Coordinated Time capabilities needed for lunar navigation constellations.

IN-SPACE SERVICING, ASSEMBLY, AND MANUFACTURING (ISAM)

ISAM activities innovate and demonstrate next-generation space architectures for the assembly and servicing, including refueling, repairing, and upgrading of in-space assets. ISAM works in partnership with academia, industry, and other government agencies to mature critical in-space robotics, rendezvous and docking, refueling, assembly, and advanced manufacturing technologies while establishing approaches and best practices for ISAM operations.

In addition to its technology development activities, the ISAM program element also manages the Consortium for Space Mobility and ISAM Capabilities (COSMIC). COSMIC is a national U.S. coalition that unites industry, government, academia, and non-profits to make ISAM a routine part of space operations, aiming to extend satellite life, enable new missions, and enhance space sustainability through collaboration and technology development. The COSMIC membership gathers in person for the COSMIC Convergence meeting each year.

FLIGHT OPPORTUNITIES

Flight Opportunities rapidly demonstrates promising technologies for space exploration, discovery, and the expansion of space commerce through suborbital and hosted orbital testing with industry flight providers. The team matures capabilities needed for future missions while strategically investing in the growth of the U.S. commercial spaceflight industry. In addition to solicitations and competitions, Flight Opportunities uses a flights-of-opportunity-based approach to rapidly move technology from benchtop to flight test. This approach uses commercial capabilities and best practices alongside rapid acquisition approaches that improve the ability to collaborate with the entrepreneurial space industry. In addition to buying commercial space flight testing services, Flight Opportunities also invests directly in U.S. commercial space flight capabilities. Activities across the portfolio involve partnerships with commercial flight providers on development of new space test capabilities and aims to provide researchers access to emerging commercial space test offerings.

FOUNDATIONAL CAPABILITIES (ENABLE)

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	24.4	24.5	25.8	25.9	26.6

Pictured here is a production HPSC processor on a test board at Microchip facilities. This new, space-qualified commercial processor enables complex applications such as precision landing and autonomous robotics operations.

The Foundational Capabilities program (ENABLE) aims to advance cross-cutting capabilities and technologies to enable human and scientific exploration of cis-lunar space and beyond. By collaborating across NASA and industry, ENABLE fosters the development and integration of these cutting-edge capabilities into critical systems and missions. Key capability advancements include in-space manufacturing and thermoplastics for exploration, and innovative processors and software necessary for missions across the agency and civil space.

EXPLANATION OF MAJOR CHANGES IN FY 2027

This budget request transfers the Advanced Power & Thermal and Autonomous Systems & Robotics projects to the LIVE program to improve efficiency and collaboration.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

High Performance Spaceflight Computing (HPSC) will complete processor development and a final product acceptance review in preparation for commercial market release, enabling unprecedented in-space computing performance. Additional investments in high-performance computing systems will mature the technologies needed for lunar and Mars applications, ensuring commercial viability and infusion into NASA and commercial flight computing systems. HPSC allows for reduced mass, safer and faster autonomous landing, improved surface navigation, and proximity operations in future missions.

The JOINS Tipping Point will conduct an in-space demonstration to join metals in microgravity and inspect the integrity of the weld. Joining components in space is challenging and if this demonstration is successful, it will enable the ability to conduct future in-space assembly and construction projects.

The Disk Shaped Configurable and Modular Vacuum Unit (DISCMAN) is another tool for advancing in-space welding capabilities and will satisfy the key milestone of creating laser-beam-welded test specimens on the ISS. These test specimens will then be returned to Earth for material testing.

Program Elements

ADVANCED MATERIALS, STRUCTURES, AND MANUFACTURING

Advanced Materials, Structures, and Manufacturing encompass investments in the development and material characterization of thermoplastics and composite structures for exploration and in-space manufacturing, as well as in structures and materials for ultra-stable NextGen observatories. The goal of this project is to advance both ultralightweight materials and in-space manufacturing to enable NASA and commercial industry to develop innovative and mass efficient exploration vehicles and extend the potential of in-space remote observational science. Examples of activities in this portfolio are the DISCMAN vacuum unit and JOINS Tipping Point.

JOINS is a welder and x-ray inspection tool for use in microgravity environments. Reduced gravity, extreme temperature fluctuations, and vacuum conditions all affect the size and integrity of the weld making it difficult to weld in microgravity. This technology is advancing the maturity and reliability of tools needed to reduce risk of welding in-space which is a foundational capability for future in-space assembly and construction projects.

DISCMAN is a laser welder and attached specimen vacuum chamber that will perform an on-orbit demonstration of in-space laser welding to collect high-fidelity weld process and material performance data. This data will inform fundamental development of in-space laser welding processes and anchor computational models of welding. These models can then inform future NASA and industry weld requirements as part of maturing in-space assembly capability.

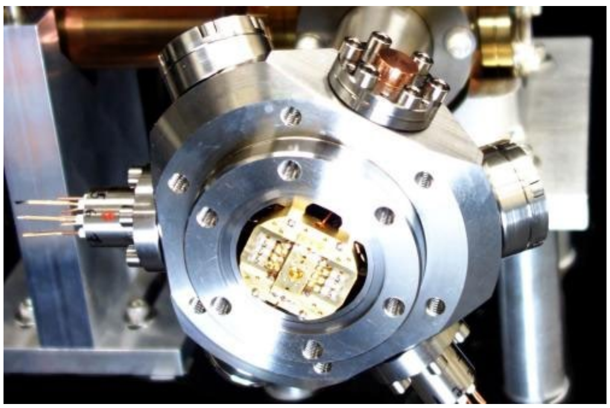
AVIONICS

The focus of Avionics is to continue to develop complex, high-performance spaceflight computing for extreme environments while advancing state-of-the-art sensors to perform resource reconnaissance imaging, mapping, and space weather prediction. These technologies have multiple applications across NASA, industry, and other government agencies. One of the activities, HPSC, is the next-generation flight computing system capable of potentially 100x the computational capacity of current flight processors for the same amount of power. HPSC can enable future NASA and other commercial applications the ability to perform advanced autonomous missions.

CATALYSTS & INNOVATIVE MECHANISMS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	130.7	130.5	130.7	130.7	130.7



Optical atomic clocks are critical tools for NASA missions as they enable autonomous navigation, planetary science, and can help establish lunar timing networks. This is an image of the Optical Atomic Strontium Ion Clock (OASIC), which is a simple, robust, spaceflight compatible high performance atomic clock. OASIC is an ECI started in FY 2025 and will conclude in FY 2027.

The Catalysts and Innovative Mechanisms (Catalysts) program is a portfolio of activities and services that leverages a wide range of procurement and partnership mechanisms to enable NASA and its partners to address capability shortfalls and opportunities, develop a pipeline of talent for NASA and the nation, and manage agency-wide technology and innovation. Through Catalysts, NASA enables partnerships with and between a wide variety of innovators including industry, academia, the NASA workforce, other government agencies, and individual participants using a broad suite of awards, activities, and mechanisms.

The Catalysts program supports concept studies, applied research, early technology development, and open innovation that inspires revolutionary ideas, expands innovation, transforms future capabilities, and rapidly demonstrates promising technologies to support American global competitiveness and leadership in space. Early-stage efforts support NASA’s research and development (R&D) objectives and inspire the American and global public to support NASA's mission. These initiatives use the creativity and technical capabilities of innovators across the nation to give the agency new ideas and alternative approaches to solving NASA’s difficult and far-reaching space technology challenges, while also developing the workforce of tomorrow to maintain and accelerate American leadership in space.

The Catalysts program also manages the STMD Tipping Point and Announcements of Collaboration Opportunity (ACO) solicitations. Through Tipping Point partnerships, NASA uses a cost-sharing model to quickly mature commercial technologies, increase the likelihood of infusion into a commercial space application, and bring the technology to market for both government and commercial applications. Through ACOs, NASA helps reduce the development cost of commercial space technologies and accelerate the infusion of emerging commercial capabilities into future missions using unfunded Space Act Agreements (SAAs), which allow NASA centers to partner with selected companies to provide expertise, facilities, hardware, and software.

The agency Independent Research and Development (IRAD) is also part of the Catalysts portfolio. IRAD fuels NASA’s culture of innovation and exploration, transforming ideas into engineering and science breakthroughs and technologies that shape the future of aeronautics, space technology, exploration, and discovery for NASA and the nation. IRAD advances the foundation of critical technologies for the Moon to Mars architecture; the study of Earth, our Solar System, and the universe; and the vehicles and airspace systems needed for safe and efficient travel into the 2050’s and beyond. The new agencywide approach to

IRAD, stewarded by STMD, ensures a clear focus and consistent approach across all NASA centers and mission directorates.

EXPLANATION OF MAJOR CHANGES IN FY 2027

This budget request transitions Center Innovation Funds to the agency IRAD to further streamline NASA's approach to these unique high-risk, high-reward opportunities across all NASA centers.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The Catalysts program will make new awards and support existing awards in NASA Innovative Advanced Concepts (NIAC), Early Career Initiative (ECI) and Space Technology Research Grants (STRG) to nurture the pipeline of space technology talent and create space for transformative ideas inspired by STMD priority shortfalls. These investments will target and enable potential new capabilities and fields of aerospace technology study, transform future NASA missions, and cultivate a powerful U.S. workforce for civil space.

STRG will offer awards in early-stage research and development to enable future civil space capabilities, potentially including advancements in surface infrastructure sustainability and logistics needs for Moon and Mars exploration. STRG activities concluding in FY 2027 include innovations in next-generation fluids, materials, and systems for thermal control to meet emerging needs in exploration and other civil space applications. These activities also include development of advanced models and tools to address plume-surface interactions and hypersonic transitions and turbulence to support the entry, descent, and landing of vehicles exploring the Moon and Mars, and returning to Earth.

Prizes, Challenges, and Crowdsourcing (PCC) will partner with other STMD programs and external organizations to host a Mars Challenge that will focus on closing STMD priority shortfalls related to Mars exploration. The Challenge will incorporate head-to-head testing and demonstration of prototypes in a relevant Mars environment. PCC will also conduct its next NASA workforce Crowdsourcing Contenders solicitation. NASA will continue to optimize the NASA Spark platform and build upon work with the Center of Excellence for Collaborative Innovation (CoECI) team.

The Technology Transfer team will continue to license and commercialize NASA technologies, while engaging local and regional partners, to improve life here on Earth and in space.

IRAD intends to fund approximately 120 innovative and high-risk, high-reward activities across all NASA centers. At the beginning of FY 2027, IRAD will conduct an annual review of the FY 2026 activities and hold a symposium to spur IRAD knowledge and technology transition to missions, other government agencies, and to industry. Finally, in late FY 2027/early FY 2028, a call for proposals for the FY 2028 IRAD activities will be prepared and released.

The Catalysts program will continue to support recurring solicitations for a range of partners and innovations, while further increasing efficiency across STMD by centralizing solicitation business and review processes. This enables STMD to reduce redundant processes in other programs, for example in support of Tipping Point and ACO solicitations.

Program Elements

NIAC

NIAC offers NASA the opportunity to collaborate with any U.S. entity in search of the most visionary and transformative technology concepts. The NIAC team releases annual solicitations seeking exciting, unexplored, but technically credible new concepts that could one day "change the possible" in space and aeronautics. These efforts keep the agency and our nation on the cutting edge of aerospace research, enabling long-term capabilities and transformative innovations that make aeronautics and space exploration more effective, affordable, and sustainable.

NIAC solicitations are open to NASA centers, other government agencies, universities, industry, and individual entrepreneurs. NASA will continue to facilitate next steps towards realization of visionary NIAC concepts by leveraging other approaches.

ECI

ECI provides the opportunity for NASA early career civil servants to lead two-year technology activities with industry and academic partners, engage in hands-on technology development opportunities, and learn different approaches to project management. Several ECI projects have included ground testing and flight experiments, providing NASA early career innovators with invaluable opportunities to demonstrate the potential impact of their technologies. Designed to invigorate NASA’s early career workforce and technology base as well as champion innovative management processes, ECI successfully partners NASA's leaders of tomorrow with external world-class innovators to deliver transformative national space capabilities.

STRG

STRG conducts a series of competitive solicitations targeting strategic technology shortfalls and stimulating innovative space technology research, engaging the entire spectrum of academic researchers, from graduate students to early career and senior faculty members. STRG emphasizes technology that can make space activities more effective, affordable, and sustainable. In the process, close collaborations between U.S. universities and NASA centers are established and nurtured. Through the students who support these awards, these efforts cultivate a pipeline of the next generation of technologists and innovators who will go on to support aerospace and other institutions with roles in industry, academia, and government.

The NASA Space Technology Graduate Research Opportunities (NSTGRO) solicitation seeks to sponsor graduate researchers who show significant potential to contribute to NASA’s goal of creating innovative new space technologies for the nation’s exploration, science, and economic future. The unique focus of the Early Career Faculty (ECF) is to support outstanding faculty researchers early in their careers as they conduct space technology research. Early Stage Innovations (ESI) efforts are university-led but allow for teaming within academia as well as some external entities including industry. STRG coordinates all topics and technical research area content with program stakeholders within STMD and, where appropriate, across NASA.

CATALYSTS & INNOVATIVE MECHANISMS

PCC

PCC supports open innovation via the Center of Excellence for Collaborative Innovation (CoECI) at JSC. CoECI supports three primary approaches: 1) CoECI provides innovation as a service to NASA and the federal government via the NASA Open Innovation Services (NOIS3) federal-wide multiple award contract, 2) NASA Spark, an internal crowdsourcing and challenge platform designed to improve the ability of NASA employees to connect with others within the agency to solve technical and non-technical problems, and 3) Centennial Challenges, in which team experts collaborate with NASA problem owners to design and administer dynamic technology development challenges, partnering with private and public organizations to offer incentive prizes that drive transformational innovation and solutions to advance NASA’s mission.

TECHNOLOGY TRANSFER

Technology Transfer provides agency-level management and oversight of NASA-developed and NASA-owned intellectual property and manages the transfer of the technologies to external entities. Technology Transfer also accelerates commercialization of NASA technologies through strategic partnerships and entrepreneurial projects to increase licensing and commercialization success. Technology Transfer has led to the development of thousands of innovations, proving NASA technology powers everyday breakthroughs. With every mission, NASA creates new intellectual property and Technology Transfer ensures that those breakthroughs can become beneficial "real-world" products. NASA Technology Transfer has ignited new commercialization pathways, launching entrepreneurial initiatives and forging over 50 university partnerships that accelerate industry adoption and boost U.S. competitiveness.

IRAD

Agency IRAD is an investment in competitively selected R&D activities conducted by NASA center personnel, independent of existing programs and missions. It includes basic and applied research, technology development, systems studies, and concept formulations in areas aligned with future NASA and national aerospace challenges. IRAD enables centers to pursue strategic, long-term research and technology development that combines unique center strengths with NASA's overall goals to drive future success. It is a grassroots approach to the development of high impact innovation that directly enables future NASA missions and strengthens the skills of NASA's technical workforce for upcoming mission challenges.

SCIENCE

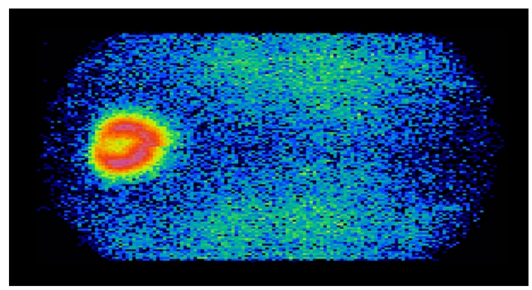
FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Earth Science	--	--	**1,021.2**	1,102.7	1,080.7	1,022.3	1,019.9
Planetary Science	--	--	**1,875.7**	1,847.2	1,819.2	1,884.6	1,885.7
Astrophysics	--	--	**552.4**	510.4	530.4	523.4	524.7
Heliophysics	--	--	**419.6**	408.6	438.6	438.6	438.6
Biological and Physical Sciences	--	--	**25.0**	25.0	25.0	25.0	25.0
Total Budget	**7,334.2**	**7,250.0**	**3,893.9**	**3,893.9**	**3,893.9**	**3,893.9**	**3,893.9**

FY 2025 reflects the funding amount specified in Public Law 119-4, Full-Year Continuing Appropriations and Extensions Act, 2025.

FY 2026 reflects the funding amount specified in Public Law 119-74, Commerce, Justice, Science; Energy and Water Development; and Interior and Environment Appropriations Act, 2026.

NASA's SMD conducts scientific exploration enabled by space-based observatories, which observe the Earth, perform fundamental research, visit other bodies in the solar system, and gaze out into the galaxy and beyond. NASA's scientific exploration will inform human exploration of the Moon, Mars, and the solar system, providing valuable scientific data for such human missions. NASA also strives to drive discovery by studying biological and physical phenomena in space. SMD utilizes technological advances and partnership opportunities, including public-private partnerships leveraging commercial investments, to further NASA's science objectives.



Earth's magnetic environment can be seen glowing bright in this image taken by the IMAP-Ultra instrument, which includes energetic neutral atom data as well as noise. Earth sits at the center of the red donut-shaped structure. This image was taken as IMAP left Earth for its post at Lagrange point 1, after a successful launch on September 24, 2025.

NASA's science programs also help protect and improve life on Earth through research that enables innovative and practical applications for decision makers, including disaster response, natural resource management, and planetary defense.

In determining the content of the Science portfolio, NASA considers the recommendations of the National Academies' decadal surveys, national priorities and policies, budgets, existing technological capabilities, partnership opportunities, and other programmatic factors.

All research conducted across SMD embodies the principles of Gold Standard Science in America, from the inception of ideas into Research Opportunities in Space and Earth Science solicitation proposals, and throughout the evaluation and selection processes, allocation of resources, management of research activities, and dissemination and publication of results. As a result of these practices, NASA science activities create reproducible, transparent, and falsifiable science results that are clear about errors and uncertainties, question underlying assumptions, recognize negative outcomes as valuable findings, avoid conflicts of interest, and undergo unbiased peer review. Proposals are evaluated through the dual-anonymous peer review process, ensuring that assessments are fair and based on objective, have clearly defined merit criteria, and are free from reviewer bias.

SCIENCE

EXPLANATION OF MAJOR CHANGES IN FY 2027

Within Earth Science, the budget supports development of one final government satellite for the Landsat program while NASA and the United States Geological Survey (USGS) concurrently work with industry to support a phased transition to a commercial solution for Landsat. The budget provides additional funds to Sustained Land Imaging to support a new Landsat commercialization strategy.

Due to budget constraints, NASA reduced funding for Earth System Explorers Future missions in FY 2027 and will adjust the implementation schedule for the mission selected in FY 2026 to align with available funds. NASA also reduced funding for Earth Science Technology and will terminate or delay some activities within the Instrument Incubator project and Advanced Technology Initiatives.

Within Planetary Science, the budget supports increased funding for scientific instruments on future Artemis missions, including Artemis handheld instruments, Artemis deployed instruments, and Artemis Lunar Terrain Vehicle instruments. The Artemis crew will use handheld instruments to take measurements on the lunar surface to aid in selection of samples for return and reduce risk for field geology investigations. NASA initiated a new formulation effort called Lunar Volatiles Science using the Volatiles Investigating Polar Exploration Rover as part of a commercial partnership to deliver the rover to the lunar surface.

Funding is increased within Radioisotope Power Systems to ensure completion of the Multi-Mission Radioisotope Thermoelectric Generator (MMRTG), and secure nuclear launch authorization for the Dragonfly mission, including funding to support DoE plutonium-238 production. Funding for the Mars 2020 Perseverance Rover and Planetary Science Research and Analysis projects is decreased to fund other priorities within the Planetary Science division. Funding is added to a new project, Science Agency Support, which supports SMD usage of agency facilities.

Within Astrophysics, funding is partially restored to support the Balloon Project, which will maintain baseline operations. The budget supports continued operations of Hubble and assumes the project will achieve operational efficiencies consistent with modest budget reductions in FY 2027 and out. Funding for the Habitable Worlds Observatory Technology Maturation Project is reduced in FY 2027 and the outyears given higher priorities within the Astrophysics portfolio.

Within Heliophysics, NASA announced final selections for the 2022 Small Explorers Announcement of Opportunity, selecting Cross-scale Investigation of Earth's Magnetotail and Aurora (CINEMA) to advance into Phase B preliminary design and development. NASA also selected Chromospheric Magnetism Explorer mission to continue Phase A concept development for one year. Funding is increased for Space Weather Future Missions in FY 2027 to support future space weather investigations and NASA participation in international space weather missions. Heliophysics will explore opportunities to collaborate with the DoW on shared space weather information needs.

Within Biological and Physical Sciences (BPS), the budget realigns and refocuses Biological and Physical Sciences research efforts within two new projects: Exploration Science and Quantum Science.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The Volatiles Investigating Polar Exploration (VIPER) rover will complete integration and is expected to launch at the end of FY 2027 and begin surface operations. The Lunar Discovery and Exploration Program (LDEP) will deliver payloads for integration onto Commercial Lunar Payload Services (CLPS) landers and expects to run payload investigations on multiple CLPS deliveries. Intuitive Machines' third commercial delivery will include the Lunar Discovery and Exploration Program's (LDEP) first Payloads and Research Investigations on the Surface of the Moon (PRISM) payload, Lunar Vertex and two international payloads, a radiation sensor from South Korea and a retroreflector from the ESA. Lunar Surface Electromagnetics Experiment (LuSEE-Night), the S-Band User Terminal, and an international communications relay will all be launched and operated by the Firefly Aerospace lander Blue Ghost Mission-2 and transfer vehicle. Draper's first CLPS mission will see delivery of the Farside Seismic Suite, Lunar Interior Temperature and Materials Suite, and LuSEE-Lite. Intuitive Machines' IM-4 will deliver six NASA payloads to the lunar surface.

Dragonfly will continue to build both test and flight hardware as the project moves to the start of Integration and Test in FY 2027. Near-Earth Object (NEO) Surveyor will complete instrument integration and observatory integration and test in preparation for launch in FY 2028. NASA will release the fifth New Frontiers Announcement of Opportunity.

The Nancy Grace Roman project remains on schedule for a potential launch as early as September 2026 but no later than May 2027. After launch, Roman will initiate the comprehensive commissioning phase to complete the instrument checkout and calibration activities required to begin mission operations, Sun-Earth L2 orbit insertion, and transition to nominal mission operations. NASA will release an Announcement of Opportunity for the next Astrophysics SMEX mission and will make a new Pioneers selection.

The Gravity Recovery and Climate Experiment-Continuity (GRACE-C) project will complete instrument assembly, integrate them into the twin spacecraft, and will initiate testing. The Total and Spectral Solar Irradiance Sensor-2 (TSIS-2) project will complete system assembly, integration and test, launch and checkout activities and begin prime operations. Multi-Angle Imager for Aerosols (MAIA) will continue integration and testing in partnership with ASI, in anticipation of a launch in late FY 2027.

Sun Radio Interferometer Space Experiment (SunRISE) will begin prime science operations in FY 2027 after a planned launch in FY 2026. The Multi-slit Solar Explorer (MUSE) will complete final system integration of the spacecraft with the Multi-slit Spectrograph and Context Imager, system and environmental tests and pre-ship review in preparation for launch in FY 2028. CINEMA will complete their PDR.

Building on organ-chip research from Artemis II, scientists will use microphysiological systems (tiny models of human tissue) to study how space conditions affect health. NASA also plans a first-of-its-kind study of the spacecraft microbiome aboard Vast’s Haven-1 commercial space station. This research will identify bacteria on spacecraft surfaces during its maiden voyage and help develop future countermeasures.

To support sustainable food production in space, the Multi-use Variable-gravity Platform Plant-02 will launch to the ISS, allowing researchers to study how microbes and microgravity influence plant health. NASA also plans to test a new technology on early Commercial Low Earth Orbit Destinations (CLDs) that will let crews grow select crops for their own meals.

Themes

NASA’s Science budget, managed by SMD, includes five major science areas.

EARTH SCIENCE

NASA’s unique capabilities as a space and science agency ultimately enable decision makers to address the most pressing challenges posed by our rapidly changing planet such as changing agricultural conditions, and severe weather challenges, including droughts, tropical storms, and wildfires. NASA develops innovations in instrument, flight, data, and mission technology to improve capability, resolution, and frequency of our remote sensing and in-situ Earth observations. NASA missions use the vantage point of space to observe our planet and continuously improve our scientific understanding of Earth's interconnected systems, from Earth's core to its atmosphere. Missions include continuity measurements made for decades and advances in observations to advance understanding of the Earth system. NASA selects and funds innovative research enabling the nation's scientific community to build an ever-improving understanding of global-scale changes, connecting causes to effects.

This budget supports translating Earth science into actionable data and information via investments in the Applied and Responsive Earth Science program, which will support applications development and user engagement related to disaster response, wildfires, energy, and agriculture. This program also ensures that NASA is acquiring commercial data and creating Earth observation data products, tools, and models that directly address user needs.

The budget supports progress towards a commercial land imaging solution and development of the next Landsat mission, which will continue the Landsat data record. The budget supports continued formulation of the GRACE-Continuity mission, continued operations of high-impact missions such as NASA-ISRO Synthetic Aperture Radar (NISAR), Surface Water and Ocean Topography (SWOT), Plankton, Aerosol, Cloud, ocean Ecosystem (PACE), and Ice, Cloud, and Land Elevation Satellite 2 (ICESat-2), and continues collecting the decades-long data records of Earth's radiant energy system through the TSIS-2 and Libera missions.

PLANETARY SCIENCE

To answer questions about the solar system and the origins of life, NASA sends robotic space probes to the Moon, other planets and their moons, asteroids and comets, and the icy bodies beyond Neptune. NASA's robotic explorers gather data to help scientists understand how the planets formed, what triggered different evolutionary paths among planets, what processes have occurred and are active, and how Earth, among the planets, became habitable.

NASA is currently operating spacecraft at Mars, Jupiter, and the Moon, and has spacecraft traveling to Jupiter's moon, Europa; the asteroid Psyche; and the Jupiter Trojan asteroids. NASA is preparing to deliver new instruments to the lunar surface; will develop the Dragonfly mission to explore Saturn's moon, Titan; and will develop Near Earth Objects Surveyor mission to survey the solar system for potentially hazardous asteroids. The budget funds the Lunar Discovery and Exploration Program that supports Artemis science, commercial collaborations, and innovative approaches to achieving human and science exploration goals.

ASTROPHYSICS

NASA's Astrophysics Division studies how the universe began and evolved, how it works, and where life might exist beyond Earth. NASA explores the fundamental forces shaping our universe—from the behavior of black holes and dark energy to the mysteries of gravity and space-time itself. By unlocking these secrets, we advance not only human understanding but also the technologies and methods that keep America at the forefront of discovery.

NASA aims to exploit new observational tools to probe the most energetic processes in the universe and address the nature of dark matter, dark energy, and cosmological inflation. NASA links observations and modeling of the stars, galaxies, and the gas and energetic processes that couple their formation, evolution, and destinies. In doing so, NASA revolutionizes our understanding of the origins and evolution of galaxies, from the nature of the tenuous cosmic webs of gas that feed them, to the nature of how this gas condenses and drives the formation of stars.

The budget supports operation of the Hubble and Webb telescopes, development of the Roman Space Telescope, and operations of Spectro-Photometer for the History of the Universe, Epoch of Reionization, and Ices Explorer (SHPEREx), Transiting Exoplanet Survey Satellite (TESS), Imaging X-ray Polarimetry Explorer (IXPE), Nuclear Spectroscopic Telescope Array (NuSTAR), and X-ray Multi-Mirror Mission.

HELIOPHYSICS

The Sun, a typical small star midway through its life, governs our solar system. The Sun wields its influence through its gravity, radiation, solar wind, and magnetic fields, all of which interact with the Earth and its space environment. These processes are crucial for our understanding of the universe, and they relate directly to our ability to live in space as they produce space weather, which can affect technological infrastructure and human activities in space. Using a fleet of sensors on various spacecraft in Earth orbit and throughout the heliosphere, NASA seeks to understand the fundamental processes of how and why the Sun varies in many ways, how Earth and our solar system respond to the Sun, how the Sun and the solar system interact with the interstellar medium, and how human activities are affected by these processes. The science of heliophysics, including space weather, enables the predictions necessary to safeguard life and society on Earth and the outward journeys of human and robotic explorers.

The budget supports development of the MUSE mission and contributions to the ESA Vigil space weather mission. The budget includes the highest funding ever proposed for the Space Weather program, which is focused on applied research and applications to enable the nation to better protect our technology and astronauts from space weather. The budget includes funding for Heliophysics research and analysis and funding for orbital debris investments to enable characterization of the populations of small debris and dust in space to protect space-based critical infrastructure and humans working in space.

BIOLOGICAL AND PHYSICAL SCIENCES

NASA conducts fundamental biological and physical sciences research that contributes to transformational discoveries, improves life on Earth and in space, and enables sustained deep-space human exploration. NASA achieves this by pioneering research to understand how spaceflight affects living and physical systems in space and to prepare for future human exploration missions far from Earth. The experiments NASA conducts on the ISS and other platforms examine how astronauts, plants, animals, and physical systems respond to the extreme conditions of space, including microgravity, ionizing radiation, and altered atmosphere.

EARTH SCIENCE

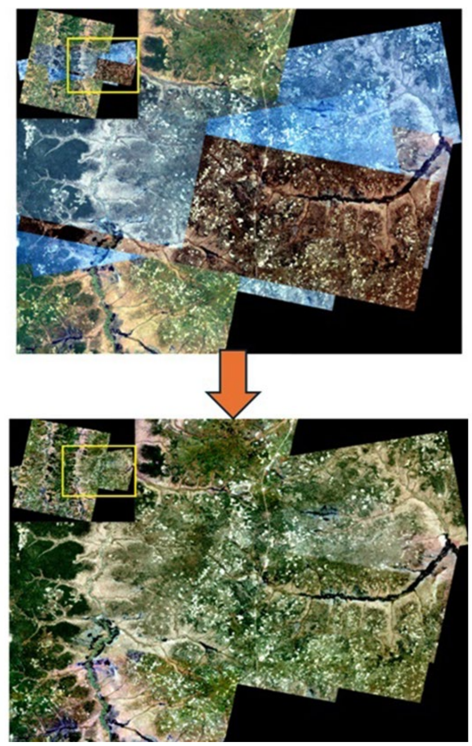
Earth Science

EARTH SCIENCE RESEARCH

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Earth Science Research and Analysis	--	--	**163.8**	163.0	163.8	164.7	164.7
Computing and Management	--	--	**96.5**	101.5	101.5	101.5	101.5
Total Budget	**--**	**--**	**260.3**	**264.6**	**265.4**	**266.2**	**266.2**

The Earth Science Research program addresses Earth science questions in pursuit of a comprehensive understanding of the complex Earth system (Atmosphere, Biosphere, Cryosphere, Geosphere, and Hydrosphere). By linking the most advanced satellite observations of Earth with research on these systems and interdisciplinary connections between them, the Earth science program advances knowledge about the Earth system. Additionally, the program is able to develop technologies that benefit multiple stakeholders, including natural resource managers, disaster responders, academia, and U.S. industry.



Research funded by NASA identified a new approach to correct for image-to-image variations in calibration over time (top), making commercial constellation data more consistent and improving the ability to track land cover changes, ecosystems, farming activity, and environmental disturbances (bottom).

Credit: Yan, L., Roy, D.P, Huang, H (2026). Journal of Photogrammetry and Remote Sensing, 231, 394-413. https://doi.org/10.1016/j.isprsjprs.2025.10.030

EXPLANATION OF MAJOR CHANGES IN FY 2027

To improve efficiency, NASA consolidated core data production activities and funding under Foundational Data Products in Earth Science Data Systems, resulting in a reduction to the Earth Science Research budget.

NASA reduced Earth Science Directed Research and Technology to account for lower than planned future workforce needs.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

In FY 2027, Earth Science Research will continue programmatic restructuring to become more streamlined and efficient, encourage interdisciplinary activities, and simplify Earth Science research opportunities that NASA releases to the science community.

The Airborne Science project will update the current fleet of science aircraft, including retiring or storing three aging aircraft to allow for a more focused transition to newer, more capable platforms. Specifically,

EARTH SCIENCE RESEARCH

high altitude science support will migrate from the ER-2 to the WB-57 aircraft in response to the retirement of all legacy U-2 aircraft and will continue to leverage commercial B200 aircraft services in place of the retiring NASA B200 aircraft. NASA will fly the B777 science laboratory in its new configuration for the first time as part of the North American Upstream Feature-Resolving and Tropopause Uncertainty Reconnaissance Experiment (NURTURE) airborne campaign.

Program Elements

EARTH SYSTEM SCIENCE RESEARCH

Earth System Science Research (formerly Earth Science Research and Analysis) is the core of the research program and funds the analysis and interpretation of data from NASA’s satellites and aircraft. This project funds the scientific activity needed to establish the foundational knowledge which undergirds the satellites’ data and their use in computational models. In addition to foundational research activities, the Earth System Science Research project supports graduate and early career research in the areas of Earth system research, applied science, data systems, and technology; ground-based calibration and validation instrumentation located at various NASA centers; airborne science instrument development, maintenance and operation; and several other enabling capabilities meant to bolster research functions across NASA centers and the scientific community.

INTEGRATED EARTH SYSTEM MODELING (IESM)

Earth system data models translate our theoretical understanding of the Earth system into specific, retrospective simulations of the past, as well as predictions of the near and distant future states of the Earth system. The IESM project includes two components: the Integrated Modeling Virtual Institute (IMVI) and Scientific Computing. IMVI is a focused and consolidated global modeling effort that uses the unique insights of NASA mission observations. The global modeling and assimilation effort creates global Earth system component models using data from Earth Science satellites and aircraft. The Model-E century-scale effort develops long-term projections and simulations that enable investigators and the U.S. private sector to advance their research and analyze Earth system processes and business impacts. The Model-E effort provides a framework to simulate many different configurations of Earth System Models including interactive atmospheric chemistry; aerosols; trace gases; and the standard atmosphere, ocean, sea ice, and land surface components.

Scientific Computing funds NASA’s Earth Science Discover supercomputing system, high-end storage, network, software engineering, and user interface projects, including modeling and data analysis, research on applying Artificial Intelligence/Machine Learning for science, and commercial cloud computing. The design of the Scientific Computing architecture is to specifically meet the needs of global modeling activities that assimilate data collected by Earth Science missions. The proximity to the data and the focus on satellite data assimilation makes the Discover cluster unique in its ability to analyze large volumes of satellite data quickly.

AIRBORNE SCIENCE

The Airborne Science program provides access to airborne platforms that obtain key measurements of the Earth system for research and advances the interpretation of Earth satellite data. Airborne platforms test

EARTH SCIENCE RESEARCH

new measurement approaches, serve as technology test beds, conduct research campaigns, such as the suborbital portion of Earth Venture, and provide calibration/validation information for satellites. Airborne platforms are also an important part of training the next generation of scientists. The current fleet of modified aircraft (https://airbornescience.nasa.gov/aircraft) includes two high-altitude ER-2s, the P-3 Orion, and two business class Gulfstream-III (G-III) aircraft nearing their operational end of life. NASA is currently modifying a Gulfstream-IV and Gulfstream-V to replace both G-IIIs, as well as the large science laboratory B777. Airborne Science provides access to commercially available aircraft. All aircraft are heavily modified to support Earth Science instruments and research requirements, along with the skilled personnel and infrastructure required to plan and execute Earth Science campaigns.

SPACE GEODESY

Geodesy is the science of measuring Earth's shape, gravity, orientation, and rotation, and how these properties change over time. The Space Geodesy Project (SGP) encompasses the development, operation, and maintenance of a global network of space geodetic technique instruments, a data transport and collection system, data analysis, and the public dissemination of data products required to maintain a stable terrestrial reference system. SGP provides the data and analysis essential for fully realizing the measurement potential of the current and next generation of Earth-observing spacecraft.

EARTH SCIENCE DIRECTED RESEARCH AND TECHNOLOGY

The Earth Science Directed Research and Technology project funds the civil service staff who work on emerging Earth Science flight projects, instruments, and research.

DIRECTORATE SUPPORT

The Directorate Support project funds SMD's institutional and crosscutting activities including National Academies studies, the proposal peer review processes, information technology, the NASA Postdoctoral Fellowship Program, working group support, independent mission assessments, NASA center bid and proposal, center and HQ performance awards, center and HQ lump sum payments, HQ civil servant labor, procurement support for the award and administration of all grants, and other administrative tasks.

Program Schedule

Date	Significant Event
Q2 FY 2027	ROSES-2026 selection within six to nine months of receipt of proposals
Q4 FY 2027	ROSES-2027 solicitation release
Q2 FY 2028	ROSES-2027 selection within six to nine months of receipt of proposals
Q4 FY 2028	ROSES-2028 solicitation release
Q2 FY 2029	ROSES-2028 selection within six to nine months of receipt of proposals
Q4 FY 2029	ROSES-2029 solicitation release
Q2 FY 2030	ROSES-2029 selection within six to nine months of receipt of proposals

EARTH SCIENCE RESEARCH

Date	Significant Event
Q4 FY 2030	ROSES-2030 solicitation release
Q2 FY 2031	ROSES-2030 selection within six to nine months of receipt of proposals
Q4 FY 2031	ROSES-2031 solicitation release

Program Management & Commitments

Program Element	Provider
Airborne Science	Provider: Various Lead Center: HQ Performing Center(s): ARC, LaRC, AFRC Cost Share Partner(s): N/A
Earth System Science Research	Provider: Various Lead Center: HQ Performing Center(s): All NASA centers Cost Share Partner(s): Subcommittee on Ocean Science and Technology agencies
Directorate Support	Provider: Various Lead Center: HQ Performing Center(s): All NASA centers Cost Share Partner(s): N/A
Space Geodesy	Provider: Various Lead Center: GSFC Performing Center(s): GSFC, JPL Cost Share Partners: N/A
Integrated Earth System Modeling	Provider: Various Lead Center: GSFC Performing Center(s): HQ, GSFC, Goddard Institute for Space Studies, JPL Cost Share Partners: N/A

Acquisition Strategy

NASA implements the Earth Science Research program via competitively selected research awards. NASA releases research solicitations each year in the ROSES NASA Research Announcements. All proposals in response to NASA ROSES are peer reviewed and selected based on defined criteria. The program competitively awards funds to investigators from academia, the private sector, NASA centers, and Federally Funded Research and Development Centers.

EARTH SYSTEM EXPLORERS AND VENTURES

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
GRACE-Continuity	--	--	**68.6**	70.9	44.1	14.1	14.4
Other Missions and Data Analysis	--	--	**426.8**	485.7	487.0	458.3	454.7
Total Budget	**--**	**--**	**495.4**	**556.6**	**531.0**	**472.4**	**469.1**

NASA's Earth System Explorers and Ventures (ESEV) program seeks to advance scientific understanding of Earth's interconnected systems through innovative, competitively selected investigations and directed missions. This program emphasizes cost-effective and streamlined development approaches to address emerging scientific priorities and improve predictive capabilities for future changes in Earth systems. It supports the development of space-based missions, remote sensing instruments, and suborbital investigations.

Libera instrument fully integrated and undergoing final post-assembly inspection at the University of Colorado's Laboratory for Atmospheric and Space Physics (LASP). NOAA will host Libera on their Joint Polar Satellite System-4 (JPSS-4) satellite, where Libera will use state of the art detectors with carbon nanotube technology to collect measurements. Libera will continue the multi-decade data record about the balance of incoming and outgoing energy from Earth.

Explorer-class missions within this program focus on targeted observables critical to understanding Earth system processes, such as atmospheric winds, ice elevation, ocean surface winds and currents, snow depth and snow water equivalent, and terrestrial ecosystem structures. Venture-class missions allow higher-risk, low-cost concepts that can be rapidly responsive to obtaining observations that are new to science. All missions in the program prioritize innovative technologies and approaches to accommodate rapid mission timelines, constrained budgets, and efficient management methods.

By encouraging high-risk, low-cost concepts, optimizing project schedules, and including competitive Venture and Explorer class opportunities alongside directed missions, the ESEV program provides maximum flexibility to build and operate the satellites that deliver critical measurements and data to the science and applications community, and enhance NASA's ability to continue making new discoveries about the Earth's systems while delivering novel information important for meeting National priorities.

EXPLANATION OF MAJOR CHANGES IN FY 2027

To promote efficiency, NASA plans to consolidate three Earth Science programs - Earth Systematic Missions (ESM), Earth System Explorers (ESE), and Earth System Science Pathfinder (ESSP) into the unified Earth System Explorers and Ventures (ESEV) program. This consolidation streamlined budget for program office and operations support for ESM, ESE, and ESSP under Earth Science Program Management. The Multisource Integrated Observatory now incorporates mission science previously

EARTH SYSTEM EXPLORERS AND VENTURES

funded separately under ESM Research and ESSP Research, facilitating cross-mission science and applications. NASA also consolidated funding for Suomi-NPP data products under the ESDS program.

NASA made several budget adjustments in FY 2027 to optimize its Earth Science portfolio. To ensure full benefit from missions currently collecting observations, NASA increased PACE prime mission operations funding in FY 2027 to increase the breadth of data processing and higher-level data products supporting science and applications from the mission. Similarly, NASA increased budget for GRACE-C in FY 2027 to complete the advances in precision laser ranging between the two spacecraft and maintain launch readiness in July 2029. Overall lifecycle cost for GRACE-C remains unchanged.

The budget supports development of one final government satellite for the Landsat program while NASA and U.S. Geological Survey (USGS) concurrently work with industry to support a phased transition to a commercial solution for Landsat. As part of this effort, the SLI budget supports development of a satellite to sustain Landsat data continuity and provides funding to support a new Landsat commercialization strategy. In coordination with USGS, initial work will address technical remote sensing challenges and limitations in current commercial capabilities, enabling a long-term commercial land imaging solution.

Due to budget constraints, NASA reduced funding for Earth System Explorers Future missions in FY 2027. Both Explorer missions selected in FY 2026 will proceed to confirmation review in FY 2027; the budget supports one mission being implemented in the five-year budget window.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The GRACE-C project will complete assembly of the instruments and undergo instrument integration onto the twin spacecraft and testing. The TSIS-2 project will complete system assembly, integration and test, launch and checkout activities, and begin prime operations. MAIA will continue integration and testing in partnership with ASI, in anticipation of a launch in late FY 2027. The Libera project will support integration and testing with the NOAA JPSS-4 satellite and will undergo an operational readiness review in Q3 FY 2027. The PACE project will complete prime operations in Q3 FY 2027. The Sustained Land Imaging project will award a spacecraft contract completing the major acquisitions for the space segment of the follow-on satellite to Landsat-9. NASA will continue implementation of the Earth System Explorers selection made in FY 2026.

Program Schedule

Date	Significant Event
FY 2026	Earth System Explorers selection
FY 2026	Libera instrument delivery
FY 2027	MAIA launch readiness
FY 2027	TSIS-2 launch readiness
FY 2028	Libera/JPSS-4 launch readiness

EARTH SYSTEM EXPLORERS AND VENTURES

Program Management & Commitments

The ESEV program manages the EV projects. The “Provider” in the following table lists the PI institution for each EV project.

Program Element	Provider
EVS-4: FORTE	Provider: City University of New York Lead Center: ARC Performing Center(s): GSFC Cost Share Partner(s): University of Maryland Baltimore County
EVS-4: FarmFlux	Provider: NASA Lead Center: GSFC Performing Center(s): N/A Cost Share Partner(s): Boston University, Colorado State University
EVS-4: HAMAQ	Provider: NASA Lead Center: LaRC Performing Center(s): N/A Cost Share Partner(s): NOAA
EVS-4: INSPYRE	Provider: Naval Research Laboratory - Monterey Lead Center: ARC Performing Center(s): JPL Cost Share Partner(s): University of Nevada Reno
EVS-4: LACCE	Provider: JPL Lead Center: JPL Performing Center(s): N/A Cost Share Partner(s): University of California Santa Cruz
EVS-4: Snow4Flow	Provider: University of Arizona Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): N/A
EVI-1: TEMPO	Provider: Smithsonian Astrophysical Observatory Lead Center: LaRC Performing Center(s): LaRC, GSFC Cost Share Partner(s): N/A
EVI-2: ECOSTRESS	Provider: JPL Lead Center: JPL Performing Center(s): JPL Cost Share Partner(s): USDA

EARTH SYSTEM EXPLORERS AND VENTURES

Program Element	Provider
EVI-2: GEDI	Provider: University of Maryland Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): N/A
EVI-3: MAIA	Provider: JPL Lead Center: LaRC Performing Center(s): JPL Cost Share Partner(s): ASI
EVI-4: EMIT	Provider: JPL Lead Center: JPL Performing Center(s): GSFC, JPL Cost Share Partner(s): N/A
EVI-4: PREFIRE	Provider: JPL Lead Center: JPL Performing Center(s): JPL Cost Share Partner(s): N/A
EVC-1: LIBERA	Provider: University of Colorado Laboratory for Atmospheric and Space Physics Lead Center: LaRC Performing Center(s): LaRC Cost Share Partner(s): N/A

Acquisition Strategy

NASA will select all Earth System Explorers and Venture missions through full and open competition. Earth System Explorers will use a two-step proposal process. NASA will decide the size of Venture Class solicitations when it releases the solicitation.

MAJOR CONTRACTS/AWARDS

Element	Vendor	Location (of work performance)
SLI	Instrument provider: Raytheon Host Services Provider: TBD	Instrument: El Segundo, CA Host Services: TBD
Libera	PI Institution: University of Colorado Laboratory for Atmospheric and Space Physics Instrument provider: LASP Host Services Provider: NOAA/Northrop Grumman (NOAA-22)	PI: Boulder, CO Instrument: Boulder, CO Host Services: Gilbert, AZ

EARTH SYSTEM EXPLORERS AND VENTURES

INDEPENDENT REVIEWS

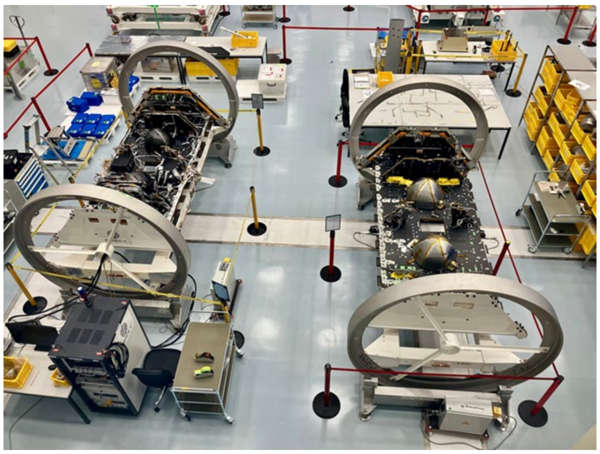
Review Type	Performer	Date of Review	Purpose	Outcome
Performance	SRB	Q4 FY 2025	Libera SIR	Successful
Performance	SRB	Q2 FY 2026	TSIS-2 PER	TBD
Performance	SRB	Q4 FY 2026	TSIS-2 ORR	TBD
Performance	SRB	Q3 FY 2027	Libera ORR	TBD

GRACE-CONTINUITY

Formulation	Development	Operations

FY 2026 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	68.6	70.9	44.1	14.1	14.4



GRACE-C undergoing spacecraft integration at Airbus in Friedrichshafen, Germany in November 2025.

PROJECT PURPOSE

The GRACE-Continuity (GRACE-C) mission will provide month-to-month changes of Earth's gravity field to track water movement and surface mass changes across the planet. GRACE-C will provide a unique, integrated, global view of how Earth's water cycle and energy balance are evolving. These measurements have far-reaching benefits to society, such as providing insights into where global groundwater resources may be shrinking or growing, where dry soils are contributing to drought and fire risk, and where saturated soils increase likelihood of flooding.

GRACE-C will provide continuity of the 20+ year record of monthly measurements of Earth's mass change established by the GRACE and GRACE-Follow On (GRACE-FO) missions. GRACE-C will contribute observations on water resources and mass changes to the integrated observatory.

NASA leads work on GRACE-C in partnership with DLR, building on a relationship established in the 1990s for GRACE and GRACE-FO. The GRACE-C mission concept evolved from the GRACE-FO design and targets a launch in a near-polar orbit in FY 2029 to maintain continuity with the mass change record from GRACE-FO.

EXPLANATION OF MAJOR CHANGES IN FY 2027

NASA provided additional funds in FY 2027 to GRACE-C. Offsetting reductions are reflected in the outyears to maintain the current lifecycle cost.

PROJECT PARAMETERS

The GRACE-C mission architecture consists of a pair of satellites in co-planar, low altitude polar orbits. The mission will achieve its science and applications objectives by making accurate measurements of the inter-satellite range change between the centers of mass of the two satellites, as well as by precisely measuring the non-gravitational forces acting on the satellites and tracking their orientation and position in inertial space. Each satellite carries geodetic quality Global Navigation Satellite System receivers,

GRACE-CONTINUITY

Formulation	Development	Operations

attitude determination sensors, a laser ranging interferometer (LRI) for satellite range change measurements, high accuracy accelerometers, and laser retroreflectors for orbit determination.

Unlike other Earth-observing satellites, the two GRACE-C satellites are the “instruments,” acting directly as the observational system. The two satellites maintain positions approximately 300 kilometers apart and continuously measure the distance between each other to within a few microns. As one satellite approaches a landmass, gravity pulls it towards the landmass and the distance between the two satellites grows. As the second satellite approaches that same landmass, gravity also pulls it toward the landmass, and the distance between the two satellites becomes closer again. This ever-fluctuating change in distance between the two is the primary measurement used to derive Earth’s gravity field.

NASA is responsible for the GRACE-C project and is providing the Project Manager and Project Scientist, project management, system engineering and mission design, safety and mission assurance, delivery of the integrated LRI, and the LRI electronics subsystems. NASA also provides the accelerometers, two spacecraft, instrument integration and on orbit operations, science and applications data processing, and delivery of calibrated/validated science and applications data products to a NASA archive for public distribution and long-term preservation.

DLR is responsible for providing the optics subsystems for the LRI, mission operations and telemetry, tracking and command, the ground data system, laser retroreflectors for ground-to-satellite ranging, and the launch vehicle and launch services.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The GRACE-C project will complete assembly of the instruments and undergo instrument integration onto the twin spacecraft and testing.

SCHEDULE COMMITMENTS/KEY MILESTONES

Milestone	Confirmation Baseline Date	FY 2027 PB Request
KDP-C	May 2024	May 2024
CDR	July 2025	May 2025
SIR	January 2026	October 2025
KDP-D	May 2026	December 2025
Operational Readiness Review	January 2029	January 2029
KDP-E	May 2029	May 2029
Launch Readiness Date (LRD)	July 2029	July 2029

GRACE-CONTINUITY

Formulation	Development	Operations

Development Cost and Schedule

Base Year	Base Year Develop-ment Cost Estimate ($M)	JCL (%)	Current Year	Current Year Develop-ment Cost Estimate ($M)	Cost Change (%)	Key Milestone	Base Year Milestone Data	Current Year Milestone Data	Mileston e Change (mths)
2024	441.7	70	2026	441.7	0	LRD	July 2029	July 2029	0

Note: The confidence level estimates reported reflect an evolving process as NASA improves its probabilistic estimation techniques and processes. Estimate reflects the practices and policies at the time it was developed. Estimates that include combined cost and schedule risks are denoted as joint-confidence level (*JCL*)*; all other* confidence levels (*CLs*) *reflect cost confidence without necessarily factoring the potential impacts of schedule changes on cost.*

Development Cost Details

Element	Base Year Development Cost Estimate ($M)	Current Year Development Cost Estimate ($M)	Change from Base Year Estimate ($M)
TOTAL:	**441.7**	**441.7**	**0**
Aircraft/Spacecraft	124.7	145.0	+20.3
Payloads	91.9	102.3	+10.4
Systems I&T	6.9	6.9	0
Launch Vehicle	1.3	1.3	0
Ground Systems	21.4	26.9	+5.5
Science/Technology	16.4	18.9	+2.5
Other Direct Project Costs	179.1	140.4	-38.7

GRACE-CONTINUITY

Formulation	Development	Operations

Project Management & Commitments

Element	Description	Provider Details	Change from Baseline
Spacecraft	Provides platform for the instruments	Provider: Airbus Defence & Space (Germany) Lead Center: JPL Performing Center(s): JPL Cost Share Partner(s): N/A	N/A
Accelerometers	Measures all nongravitational accelerations of the satellite(s)	Provider: French Office National d'Etudes et Recherches Aérospatiales (ONERA) Lead Center: JPL Performing Center(s): JPL Cost Share Partner(s): N/A	N/A
Laser Ranging Interferometer	Heterodyne interferometric laser will measure the distance between the two spacecraft as a function of time	Provider: JPL and DLR Lead Center: JPL Performing Center(s): JPL Cost Share Partner(s): JPL and DLR	N/A
Launch Vehicle	Delivers spacecraft to orbit	Provider: DLR Lead Center: N/A Performing Center(s): N/A Cost Share Partner(s): DLR	N/A
Project Management	Overall management; system engineering and mission design; safety and mission assurance	Provider: JPL Lead Center: JPL Performing Center(s): JPL Cost Share Partner(s): N/A	N/A
Science and Applications Data Processing	Delivery of calibrated/validated science and applications data products	Provider: JPL Lead Center: JPL Performing Center(s): JPL Cost Share Partner(s): DLR	N/A

GRACE-CONTINUITY

Formulation	Development	Operations

Project Risks

Risk Statement	Mitigation
If: during spacecraft I&T there are increases in rates at JPL, and the potential that exchange rates will affect future Airbus contract milestone payments, Then: project reserves may not be sufficient to cover Phase D costs, leading to exceeding the Management Agreement	Monitor the exchange rate and manage reserves

Acquisition Strategy

NASA is leveraging the acquisition strategy from GRACE-FO. JPL is developing the LRI in partnership with DLR. JPL contracted with Airbus to provide the spacecraft, and ONERA to provide the accelerometers. DLR will provide the launch vehicle.

MAJOR CONTRACTS/AWARDS

Element	Vendor	Location (of work performance)
Spacecraft	Airbus	Germany
Accelerometer	ONERA	France

INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	SRB	March 2024	PDR	Successful
Performance	SRB	May 2025	CDR	Successful
Performance	SRB	October 2025	System Integration Review (SIR)	Successful
Performance	SRB	October 2028	Operational Readiness Review (ORR)	TBD

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
EMIT	--	--	**0.0**	0.0	0.0	0.0	0.0
Earth System Explorers Future Missions	--	--	**13.3**	86.9	104.2	88.6	111.8
NASA-ISRO SAR	--	--	**23.4**	17.3	5.0	0.0	0.0
Sentinel-6	--	--	**8.7**	5.7	7.1	4.9	5.7
Libera	--	--	**10.4**	6.7	2.9	2.7	2.7
TEMPO	--	--	**0.0**	0.0	0.0	0.0	0.0
ECOsystem Spaceborne Thermal Radiometer	--	--	**0.0**	0.0	0.0	0.0	0.0
Global Ecosystem Dynamics Investigation	--	--	**0.0**	0.0	0.0	0.0	0.0
Multi-Angle Imager for Aerosols	--	--	**11.3**	16.0	6.9	5.0	5.2
SWOT	--	--	**4.8**	0.0	0.0	0.0	0.0
Landsat 9	--	--	**3.1**	3.2	3.3	3.4	0.0
Sustainable Land Imaging	--	--	**109.0**	130.1	149.7	150.8	131.4
Total Solar Irradiance Sensor-2 (TSIS-2)	--	--	**15.5**	7.5	7.4	5.5	7.5
Earth Radiation Data Continuity	--	--	**10.0**	10.0	10.0	10.0	10.0
Ozone Mapping and Profiler Suite (OMPS)	--	--	**1.5**	1.6	1.6	1.7	1.7
Total Solar Irradiance Sensor-1 (TSIS-1)	--	--	**0.0**	0.0	0.0	0.0	0.0
Earth Venture Suborbital-4	--	--	**33.8**	23.6	24.4	11.8	1.6
Earth Science Program Management	--	--	**49.4**	46.7	44.5	45.5	45.9
Soil Moisture Active and Passive (SMAP)	--	--	**0.0**	0.0	0.0	0.0	0.0
Global Precipitation Measurement (GPM)	--	--	**0.0**	0.0	0.0	0.0	0.0
ICESat-2	--	--	**0.0**	0.0	0.0	0.0	0.0
GRACE Follow-On	--	--	**0.0**	0.0	0.0	0.0	0.0
Earth Science Senior Review	--	--	**68.8**	67.6	80.3	88.7	91.4
Plankton,Aerosols,Clouds,ocean Ecosystem	--	--	**21.8**	21.1	0.0	0.0	0.0
Multisource Integrated Observatory	--	--	**41.8**	41.8	39.8	39.8	39.8
Polar Radiant Energy in the Far Infrared	--	--	**0.0**	0.0	0.0	0.0	0.0
Total Budget	**--**	**--**	**426.8**	**485.7**	**487.0**	**458.3**	**454.7**

Earth System Explorers and Ventures (ESEV) Other Missions and Data Analysis includes smaller missions in development, operating missions, and their science and applications teams (which define the scientific and applications requirements for their missions and generate algorithms used to process the data into useful data products).

OTHER MISSIONS AND DATA ANALYSIS

Mission Planning and Other Projects

EARTH SYSTEM EXPLORERS FUTURE MISSIONS

Earth System Explorers Future Mission funding supports the selection of new missions through AO solicitations. This funding supports proposals during formulation studies. Once a mission is selected, funding is shifted from the Future Missions line to a mission-specific project line, consistent with mission phase and available funds. Due to budget constraints, NASA reduced funding for Earth System Explorers Future missions in FY 2027. Both Explorer missions selected in FY 2026 will proceed to confirmation review in FY 2027; the budget supports one mission being implemented in the five-year budget window.

LIBERA (EVC-1, SELECTED IN 2020)

Libera was NASA’s first mission selected under an EV Continuity opportunity to provide critical Earth system measurements. The project will provide continuity for the Clouds and the Earth’s Radiant Energy System Earth Radiation Budget (ERB) observations. Its primary goal is to extend the ERB record seamlessly, which is essential for understanding Earth's energy balance. The project will deliver the Libera instrument in 2026 to NOAA for hosting on the Joint Polar Satellite System (JPSS)-4 satellite, targeted for launch in 2027.

MAIA (EVI-3, SELECTED IN 2016)

The MAIA investigation will use a spaceborne multi-angle imager to remotely determine aerosol characteristics and assess linkages between different airborne particulate matter (PM) types and human health (cardiovascular and respiratory disease, and premature death). This project will measure concentrations of fine and coarse particles, sulfate, nitrate, organic and elemental carbon, and mineral dust particles in major urban areas around the globe at one-kilometer spatial resolution. The MAIA science team includes epidemiologists to connect human exposure to particulate matter with adverse health outcomes.

MAIA's primary spaceborne instrument is a specialized digital camera mounted on a two-axis gimbal on a LEO spacecraft, which will collect multi-angle spectropolarimetric imagery to show polarization state of light across different wavelengths over a globally distributed set of major metropolitan areas. It will use this data in conjunction with surface-based pollution monitors and atmospheric models to map PM concentrations and types and conduct epidemiological studies over a three-year prime mission.

ASI has offered to partner on this mission, contributing a PLATiNO satellite to host the MAIA instrument, launch vehicle for access to space, and ground services to support MAIA during operations. NASA plans to provide MAIA instrument operations, ground network operations, and data transportation. The MAIA instrument completed testing and went into storage in October 2022 while development continues on the ASI satellite and launch vehicle.

SUSTAINABLE LAND IMAGING (SLI)

The SLI project supports the development of space systems that will provide U.S. users with high-quality global land-imaging measurements that will continue the existing Landsat record. Under the SLI framework, NASA maintains responsibility for developing, launching, and initial checkout of the mission to follow Landsat 9. U.S. Geological Survey (USGS) is responsible for collecting and documenting user needs, developing the associated ground systems, and funds operations of the on-orbit spacecraft. USGS will also collect, calibrate, archive, process, and distribute data to users.

The budget supports development of one final government satellite for the Landsat program while NASA and USGS concurrently work with industry to support a phased transition to a commercial solution for Landsat. FY 2027 funding will support cost-effective use of the LandIS instrument contract for a future satellite that will sustain Landsat data continuity. This funding line will also support work with industry to implement a roadmap to address technical challenges and demonstrate capabilities as part of the transition to a commercial solution. This approach is consistent with the findings of the Landsat Mission Alternatives Assessment Team, which stated that significant progress has been made in commercial Earth observation capabilities and identified challenges and approaches to enable future commercialization.

TSIS-2

TSIS-2 will extend the 42-year measurement record of total solar irradiance and spectral solar irradiance. Researchers use solar irradiance data to understand how solar energy affects the Earth system over decade-long time scales. The TSIS-2 will ride on a free flying spacecraft and has a launch readiness date in January 2027. The mission will operate for no less than three years.

EARTH RADIATION DATA CONTINUITY (ERDC)

Earth Radiation Data Continuity provides the fundamental understanding of energy stored and circulating in the Earth System that drives all dynamic Earth processes. ERDC uses data from the multiple radiation budget instruments in orbit (e.g., the Clouds and the Earth’s Radiant Energy System [CERES], Terra, Aqua, Suomi National Polar-Orbiting Partnership [Suomi NPP], NOAA-20, and geostationary instruments) and ancillary measurements to produce integrated data products over the entire suite of radiation budget instruments. In total, scientists have used 32 instruments on 26 spacecraft thus far to produce an accurate, temporally consistent description of the radiation budget at the top of the atmosphere, within the atmosphere, and at the surface. ERDC is the only project worldwide whose prime objective is to produce global Earth radiation budget data from dedicated Earth radiation budget satellite instruments.

OZONE MAPPING AND PROFILER SUITE LIMB SOUNDER (OMPS-L)

OMPS is a three-part instrument that tracks the changes in the ozone layer and measures the concentration of ozone in the Earth’s atmosphere: a nadir mapper that maps global ozone with about 50 km ground resolution; a nadir profiler that measures the vertical distribution of ozone in the stratosphere; and OMPS-L, a limb profiler that measures ozone in the lower stratosphere and troposphere. NASA provided OMPS-L for integration on the OMPS instrument that currently operates on the Suomi NPP and NOAA-21 (formerly JPSS-2) spacecraft. These measurements fulfill the U.S. treaty obligation to monitor global ozone concentrations for the Montreal Protocol. The project budget also supports OMPS-L profilers for JPSS-3 and JPSS-4.

OTHER MISSIONS AND DATA ANALYSIS

EARTH VENTURE SUBORBITAL-4 (EVS-4, SELECTED IN 2024)

In April 2024, NASA selected six new airborne missions that include studies of fire-induced clouds, Arctic coastal change, air quality, landslide hazards, shrinking glaciers, and emissions from agricultural lands. These EVS-4 investigations include:

- Arctic Coastlines - the Frontlines Of Rapidly Transforming Ecosystems (FORTE) will combine optical and radar measurements from planes, helicopters, boats, and drones as well as measurements from surface and underwater platforms, to measure water flows and chemistry and observe how ecosystems respond to changing environmental conditions.
- FarmFlux will measure the amount of carbon-and nitrogen-containing gases emitted from agricultural lands across the Midwestern United States.
- Hemispheric Airborne Measurements of Air Quality (HAMAQ) will investigate areas of poor air quality over Mexico City and Atlanta, GA. HAMAQ will also test how satellite information can help improve ground-based forecasting and mitigation strategies.
- INjected Smoke and PYRocumulonimbus Experiment (INSPYRE) studies pyrocumulonimbus clouds, which form when wildfires burn hot enough to make their own weather. Flying over the western United States and Canada, researchers will examine the fire characteristics and plume dynamics that produce pyrocumulonimbus clouds, while exploring the mechanisms that lead these clouds to inject smoke into the stratosphere similar to volcanic eruptions.
- Landslide Change Characterization Experiment (LACCE) will combine airborne measurements with ground-based sensors and models to track the way landslides are evolving as they are impacted by changes in precipitation and glacier extent.
- Snow4Flow will quantify the current state and assess the future of glaciers across the Arctic, using microwave and high-frequency radar sounders to measure snow accumulation and ice thickness. The obtained data combined with satellite assets will be used to improve projections of land ice changes and how those changes contribute to sea level rise and influence water sources, natural hazards and associated socioeconomic impacts.

EARTH SCIENCE PROGRAM MANAGEMENT

The Earth Science Program Management budget supports critical flight project management functions executed by the Earth Science program offices. This budget supports:

- The GSFC conjunction assessment risk analysis function, which determines maneuvers required to avoid potential collisions between spacecraft and to avoid debris.
- The technical and management support for the international Committee on Earth Observation Satellites, which ensures cost-effective coordination of civil space-borne observations of Earth.
- Senior Review Board teams, who conduct independent reviews of the various flight projects in Earth Science.
- Earth Science division civil servant labor and program offices at GSFC, LaRC, and JPL.

OTHER MISSIONS AND DATA ANALYSIS

EARTH SCIENCE SENIOR REVIEW

Every three years, the Earth Science division conducts a Senior Review to evaluate missions that have completed, or will soon complete, their prime mission operation phase. The 2026 Senior Review began in January 2026 with panel results anticipated in May 2026 and extension guidance provided to the missions by September 2026. Following the completion of the Senior Review, this funding will be allocated to the missions with operations extended through 2029.

MULTISOURCE INTEGRATED OBSERVATORY (MIO - PREVIOUSLY IESO)

The Multisource Integrated Observatory funds cross-platform science teams and integrated products that require inputs from multiple missions with the aim of enhancing outcomes for both foundational science and addressing societal challenges. MIO supports science and applications that span multiple missions across the full suite of Earth Science. MIO also works to define integrated or cross-platform science and applications including global precipitation, atmosphere, ocean and land from multiple missions.

Operating Missions

NASA-ISRO SYNTHETIC APERTURE RADAR (NISAR)

The NASA-ISRO Synthetic Aperture Radar (NISAR) mission provides an unprecedented, detailed view of the Earth using advanced radar imaging and a dual frequency (L-band and S-band) Synthetic Aperture Radar (SAR). NISAR is the first dual frequency radar imaging satellite and will observe processes including ecosystem disturbances, ice sheet collapse, and natural hazards (e.g., earthquakes, tsunamis, volcanoes, and landslides). The mission will reveal information about the evolution and state of Earth's crust, broadening scientific understanding of our planet's geologic, biologic, and hydrologic processes and supporting natural resource and hazard management.

SENTINEL-6

The Sentinel-6 mission provides ocean topography measurements. It consists of two satellites, Sentinel-6 Michael Freilich (S6-MF) that launched in 2020 and Sentinel-6B (S6-B) that launched in 2025 to extend ocean topography measurements that underpin ocean circulation models and sea level measurements that support coastal civil and military infrastructure management. NASA provides unique instrument capabilities to the missions in collaboration with ESA to support scientific advancement and critical decision-making.

TROPOSPHERIC EMISSIONS: MONITORING OF POLLUTION (TEMPO) (EVI-1, SELECTED IN 2012)

The TEMPO instrument measures atmospheric pollution covering most of North America throughout the day, providing unique new information on the continent-wide changes in air pollutants and enabling new discoveries about the processes that affect air quality at different times of day. A commercial communications satellite, Intelsat-40e, hosts the instrument and launched in April 2023. On an hourly basis, TEMPO measures atmospheric pollution spanning from Mexico to Canada, and from the Atlantic

Ocean to the Pacific Ocean. TEMPO provides measurements that include the key elements of air pollution chemistry (e.g., ozone, nitrogen dioxide) in the lowest part of the atmosphere. Measurements from geostationary orbit capture the inherent high variability in the daily cycle of emissions and chemistry. Measuring across both time and space creates a revolutionary dataset that provides understanding and improves prediction of air quality and climate forcing. TEMPO completed prime operations in June 2025 and passed end-of-prime-mission review in December 2025. This budget request includes funding for extended operations through FY 2026. NASA will allocate TEMPO funding beyond FY 2026 based on the 2026 Senior Review recommendations anticipated in May 2026.

ECOSYSTEM SPACEBORNE THERMAL RADIOMETER EXPERIMENT ON SPACE STATION (ECOSTRESS) (EVI-2, SELECTED IN 2014)

ECOSTRESS launched in June 2018 to help scientists observe changes in global vegetation from ISS. The sensors give scientists new ways to see how changes in environment or land use affect agriculture, forests, and cities. ECOSTRESS uses a high-resolution thermal infrared radiometer to measure plant evapotranspiration, the loss of water from growing leaves, and evaporation from the soil. This data observes the critical link between the water cycle and effectiveness of plant growth, both naturally and agriculturally. ECOSTRESS began extended operations in August of 2019 and proposed to the 2020 Senior Review for extension through September 2023. NASA conducted an out-of-cycle Senior Review in December 2022 and approved ECOSTRESS to continue operations through September 2026 to align with the 2026 Senior Review. ISS extended site accommodations for ECOSTRESS through its end-of-life. NASA will allocate ECOSTRESS funding beyond FY 2026 based on the 2026 Senior Review recommendations anticipated in May 2026.

GLOBAL ECOSYSTEM DYNAMICS INVESTIGATION (GEDI) (EVI-2, SELECTED IN 2014)

GEDI is a geodetic-class laser ranging system that provides three-dimensional measurements of the Earth's forests from ISS. GEDI measures the height of the Earth's temperate and tropical forests and their vertical structure. This data will help scientists determine, for the first time, how much carbon forests store as biomass, and the net impact of deforestation and subsequent regrowth on atmospheric carbon dioxide. GEDI is the first mission optimized for vegetation measurements from space and provides the first global and transparently available data set that various U.S. agencies can use at relevant scales for both policy and land management.

Launched in December 2018, GEDI completed its prime mission in April 2021. NASA conducted an out-of-cycle Senior Review in December 2022 and approved GEDI to continue operations through September 2026 to align with the 2026 Senior Review. NASA temporarily stowed GEDI on an ISS storage site between March 2023 and April 2024 while another mission operated at its location. NASA reinstalled GEDI at its original location and ISS has approved site accommodations for GEDI through the end-of-life of the ISS in April 2024. NASA will allocate GEDI funding beyond FY 2026 based on the 2026 Senior Review recommendations anticipated in May 2026.

SURFACE WATER AND OCEAN TOPOGRAPHY MISSION (SWOT)

Launched on December 16, 2022, SWOT makes high-resolution measurements of ocean circulation, kinetic energy, and dissipation to improve ocean circulation models and predictions of weather. SWOT also measures the water levels in millions of lakes and water bodies and the discharge of all major rivers to obtain a surface water inventory on the continents and allow for deeper understanding of the natural water cycle and improved water management.

SWOT complements the Jason oceanography missions, as well as Sentinel-6, GPM, SMAP, and Gravity Recovery and Climate Experiment Follow-On (GRACE-FO). SWOT is an international collaborative mission with Centre national d'études spatiales (France's space agency), CSA, and United Kingdom Space Agency (UKSA).

SWOT will remain in prime mission operations until September 2026. NASA will allocate SWOT funding beyond FY 2026 based on the 2026 Senior Review recommendations anticipated in May 2026.

LANDSAT 9

The Landsat data series, initiated in 1972, is the longest continuous record of changes in Earth's surface as seen from space and the only U.S. satellite system designed and operated to make repeated observations of the global land surface at moderate resolution. Landsat data is available at no cost to users, providing a unique resource for people who work in fields such as agriculture, geology, forestry, regional planning, education, and mapping.

Landsat 9, launched in September 2021, extends the record of multi-spectral, moderate resolution Landsat quality data, and meets operational and scientific requirements for observing land use and land change. This funding covers Landsat 9 support activities uniquely requiring NASA expertise as part of the collaboration between NASA and the USGS. Landsat 9 is currently in prime mission operations.

TOTAL SOLAR IRRADIANCE SENSOR-1 (TSIS-1)

Launched in December 2017, TSIS-1 is providing absolute measurements of total solar irradiance and spectral solar irradiance which is important for accurate scientific models of energy balance and solar variability, allowing scientists to better understand solar variability at both short and long-time scales.

The 2023 Senior Review approved extended mission operations for TSIS-1 through FY 2026. NASA will allocate TSIS-1 funding beyond FY 2026 based on the 2026 Senior Review recommendations anticipated in May 2026.

SOIL MOISTURE ACTIVE AND PASSIVE (SMAP)

SMAP, launched in January 2015, maps soil moisture with unprecedented accuracy, resolution, and coverage to improve monitoring and forecasting of water resources and weather. Although SMAP's active radar instrument failed in July 2015, its radiometer continues to provide global mapping of soil moisture with accuracy, resolution, and coverage that exceeds the capability of other on-orbit systems.

The 2023 Senior Review approved extended mission operations for SMAP through FY 2026. NASA will allocate SMAP funding beyond FY 2026 based on the 2026 Senior Review recommendations anticipated in May 2026.

OTHER MISSIONS AND DATA ANALYSIS

GLOBAL PRECIPITATION MEASUREMENT (GPM)

GPM, launched in February 2014, provides a three-dimensional view of tropical storm structural and microphysical properties, and provides estimates of storm rainfall accumulations for major storm events. The GPM Microwave Imager measures energy from different types of precipitation within clouds to estimate heavy to light rain and to detect falling snow. The Dual-frequency Precipitation Radar provides three-dimensional information about precipitation particles, including their size distributions and associated rainfall rates. GPM is a joint mission with JAXA.

The 2023 Senior Review approved extended mission operations for GPM through FY 2026. NASA will allocate GPM funding beyond FY 2026 based on the 2026 Senior Review recommendations anticipated in May 2026.

ICE, CLOUD, AND LAND ELEVATION SATELLITE (ICESAT-2)

ICESat-2, launched in September 2018, measures global elevation to determine sea ice thickness and ice sheet mass change. It also provides topography and vegetation data around the globe, measurements of ocean topography, inland water body elevation, and cloud properties. ICESat-2 has one instrument, the Advanced Topographic Laser Altimeter System, which measures the round-trip time of laser light from the observatory to Earth and back as the basis for the mission’s elevation measurements.

The 2023 Senior Review approved extended mission operations for ICESat-2 through FY 2026. NASA will allocate ICESat-2 funding beyond FY 2026 based on the 2026 Senior Review recommendations anticipated in May 2026.

GRAVITY RECOVERY AND CLIMATE EXPERIMENT FOLLOW-ON (GRACE-FO)

GRACE-FO, launched in May 2018, provides mass change observations and high-resolution global models of Earth’s gravity field, allowing scientists to gain new insights into the dynamic processes of Earth’s water cycle. GRACE-FO also maps large earthquakes and tectonic processes. GRACE-FO data was vital to minimizing the gap in mass change measurements following the decommissioning of the original GRACE mission in 2017. GRACE-FO is a partnership with the German Research Center for Geosciences and was in prime mission operations through May 2023.

The 2023 Senior Review approved extended mission operations for GRACE-FO through FY 2026. NASA will allocate GRACE-FO funding beyond FY 2026 based on the 2026 Senior Review recommendations anticipated in May 2026.

PLANKTON, AEROSOL, CLOUD, OCEAN ECOSYSTEM (PACE)

The PACE mission extends and improves our understanding of how the ocean and atmosphere interact and reveals how aerosols may fuel phytoplankton growth at the ocean surface. PACE's unprecedented spectral coverage is providing the first-ever global measurements designed to identify phytoplankton community composition. This will significantly improve our ability to understand Earth's changing marine ecosystems, manage natural resources (e.g., fisheries), and identify harmful algal blooms.

PACE's primary sensor, the Ocean Color Instrument (OCI), is a highly advanced optical spectrometer that measures properties of light over portions of the electromagnetic spectrum extending key ocean color data records. The interaction of sunlight with substances or particles in seawater such as chlorophyll (a green pigment found in most phytoplankton species) determine the color of the ocean. By monitoring global phytoplankton communities and abundance with unprecedented detail, through measurement of ocean color, OCI helps improve our understanding of the complex systems that drive ocean ecology.

PACE includes two contributed polarimeters to measure how the oscillation of sunlight within a geometric plane, known as its polarization, changes by passing through clouds, aerosols, and the ocean. Measuring polarization states of ultraviolet-to-shortwave light at various angles provides detailed information on the atmosphere and ocean (e.g., particle size and composition). PACE successfully launched on February 8, 2024, and is currently in prime mission operations.

EARTH SURFACE MINERAL DUST SOURCE INVESTIGATION (EMIT) (EVI-4, SELECTED IN 2018)

EMIT uses a sensor mounted to the exterior of ISS to map the mineral composition of regions that produce dust aerosols around the world. Scientists do not currently have a global inventory of the mineral sources of dust, and as a result, the global impacts of dust on atmospheric heating and cooling, weather, and other aspects of Earth's environment are not well established.

EMIT's hyperspectral instrument measures the different wavelengths of light emitted by minerals on the surface of deserts and other dust sources to determine their composition. Science teams are now extending the impact of the EMIT mission by using EMIT data in assessment of vegetation and agriculture health and critical minerals. NASA launched EMIT to the ISS in July of 2022. The project completed its prime mission in November 2023, subsequently passed an out-of-cycle Senior Review in December 2023, which approved extended operations until the next Senior Review in FY 2026. NASA will allocate EMIT funding beyond FY 2026 based on the 2026 Senior Review recommendations anticipated in May 2026.

POLAR RADIANT ENERGY IN THE FAR INFRARED EXPERIMENT (PREFIRE) (EVI-4, SELECTED IN 2018)

PREFIRE consists of miniaturized thermal spectrometers on a pair of small CubeSat satellites to measure far-infrared emissions and how they change throughout the day and over seasons. These CubeSats orbit Earth's poles to probe a little-studied portion of the radiant energy emitted by Earth for clues about Arctic warming, sea-ice loss, and icesheet melting. These observations allow scientists to assess how changes in thermal infrared emissions at the top of Earth's atmosphere are related to changes in cloud cover and surface conditions below, such as the amount of sea ice and meltwater on the surface of ice. PREFIRE launched in mid-2024, completed its Prime Operations in 2025, and is currently in extended operations until the next Senior Review in FY 2026. NASA will allocate PREFIRE funding beyond FY 2026 based on the 2026 Senior Review recommendations anticipated in May 2026.

EARTH SCIENCE DATA SYSTEMS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	124.8	124.9	126.9	127.0	127.2

NASA's Fire Information Resource Management System (FIRMS) provides critical fire data for near-real time monitoring and air quality conditions. Typical values of the Aerosol Index range from zero up to five (yellow); higher values indicate dust storms or biomass burning smoke in the lower troposphere (one to three kilometers). Values at/above five (red/purple) indicate heavy concentrations of aerosols that could reduce visibility or impact human health. The image shown here is from peak fire season on June 1, 2025.

The Earth Science Data Systems (ESDS) program oversees the lifecycle of Earth Science data with the principal goal of maximizing the national benefit from NASA's missions and experiments for research and applied scientists, industry, decision-makers, and the nation.

ESDS acquires, processes, preserves, and distributes observational Earth Science data from spacecraft, aircraft, and in-situ sensors to support Earth Science research focus areas. The ESDS program primarily achieves its mission through the Earth Observing System Data and Information System (EOSDIS), managed by the Earth Science Data and Information System (ESDIS) Project, which has operated since 1994.

EOSDIS has continuously evolved to take advantage of improved technology to meet the increasing demands of data providers and users.

The Data System Evolution (DSE) component of ESDS works to continuously improve the program by innovating new capabilities, adopting new technologies, and collaborating with users. These efforts prioritize investments to meet user needs and identify emerging technologies that improve access to NASA's Earth Science data.

The Foundational Data Products (FDP) project ensures that NASA continues to advance high-quality standardized data necessary for models, research, and commercial applications. FDP also provides a sustainable path for innovative data products that is independent of a single data product/source. This is critical to ensure smooth and cost-effective user transitions between data from different missions as new missions launch, and to maximize value of Earth Science data as advanced instruments replace historical ones.

NASA's Earth Science data is available to the public at https://earthdata.nasa.gov.

EXPLANATION OF MAJOR CHANGES IN FY 2027

NASA created the FDP project to centralize critical data production activities and funding from across the Earth Science portfolio. The consolidation increased $10.2 million in the ESDS budget by transferring data production-related funding and work from the Earth Science Research and the Earth System Explorers and Ventures programs into ESDS.

EARTH SCIENCE DATA SYSTEMS

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The ESDS program continues to improve efficiencies of core services and user experience, transitioning to a more streamlined and cost-effective cloud-based ecosystem. By reducing system redundancies while harnessing enterprise-level capabilities, ESDS is establishing a foundation for sustainable and cost-effective operations. During FY 2027, the ESDIS project will consolidate its disparate ingest and archive activities and streamline its user needs efforts. These changes are milestones for the Science Enabling Teams (SET) transformation already underway within ESDS.

The Earthdata Website Unification and cloud migration efforts of the data archive, two important endeavors for ESDS, will both conclude in FY 2027. Together, these will improve user experience and the accessibility of Earth science data for commercial, government, and research applications.

Program Elements

EARTH SCIENCE DATA AND INFORMATION SYSTEM (ESDIS)

The ESDIS project archives, documents, and distributes data while providing user support for NASA's past and current Earth-observing satellite missions, airborne campaigns, and field measurement programs. ESDIS continues to deliver reliable, robust services to a broad user base to support both traditional scientific disciplines and an increasing number of users whose needs span multiple domains, including government agencies, commercial sector, scientists, and the public.

The ESDIS project has historically managed geographically distributed services with a Distributed Active Archive Center (DAAC) framework, originally developed physical data archive centers with user support, but as data has migrated to the cloud, fewer support teams can modernize and handle the user support function.

NASA is realigning the DAACs into thematic science enabling teams. In parallel with Web Unification efforts, the project will securely archive all data previously held on-premises and all tools and software independently developed and made available in the cloud, along with the critical data used by the private and public sectors to innovate, inform decisions, and advance scientific understanding and research. ESDIS oversees the generation and distribution of high-quality science products from missions and will reprocess products to ensure quality assurance and science value as missions come to the end of their planned operations.

The ESDIS project supports several core services that create a common entry point to discover, access, and visualize Earth Science data from the archive. The program developed core systems to reduce duplication and improve user access to data, including:

- Earthdata Cloud, a platform hosted in a commercial cloud environment that houses the managed archive of Earth Science data and a multitude of cloud-hosted applications.
- Earthdata Search and the underlying Common Metadata Repository, high-performing and high-quality services that allow users to search and discover datasets of interest in ESDIS' vast catalog of Earth data
- Worldview, which provides visual representations of NASA Earth Science data at full resolution in a free, open, and interoperable manner. It enables interactive exploration of data to support a wide

EARTH SCIENCE DATA SYSTEMS

range of applications, including scientific research, applied sciences, natural hazard monitoring, and outreach. The Land, Atmosphere Near real-time Capability for Earth observation provides global satellite data within three hours of overpass and displays the data within Worldview. The general public, first responders, and operational weather agencies all use this data and imagery for monitoring a wide variety of natural and human-created phenomena such as fire, smoke and ash plumes, floods, hurricanes, dust storms, oil spills, snow and ice cover, and agriculture.

- FIRMS, which provides information on active fire/hotspots and email alerts in near real-time to identify the location, extent, and intensity of wildfire activity. FIRMS provides this data to the public and local and international governments for their use.
- Cumulus, a software package for performing Earth Science data ingesting, archiving, and distribution capabilities in the cloud.

DATA SYSTEM EVOLUTION (DSE)

The DSE project strategically enhances ESDS program capabilities through innovation, partnerships, technology development, and user engagement. These efforts aim to broaden the use of NASA Earth Science observations and improve the discoverability and accessibility of NASA data.

DSE supports interagency initiatives, establishes Space Act Agreements with non-governmental organizations, and promotes data system interoperability through the development and adoption of standards via the Interagency Implementation and Advanced Concepts Team (IMPACT). IMPACT collaborates with other federal agencies to expand the use of NASA Earth observations and independently assesses, evaluates, and advances data system capabilities by maturing emerging technologies into reliable, scalable services for operational deployment.

FOUNDATIONAL DATA PRODUCTS (FDP)

The FDP project focuses on stewardship and continuity of Earth system essential observations and measurements. This project will evolve the processing and archival functions historically performed by the Science Investigator-led Processing Systems, a core function of the Earth sciences division and community partners, ensuring transparency, traceability, and sustained availability of authoritative data records. It will address mission transitions, algorithm development and evolution, and reprocessing needs, while positioning NASA to support future scientific and applied uses of Earth system data. The project leverages existing capabilities among NASA centers and elsewhere, while defining a forward-looking processing architecture that supports long-term data integrity, efficient delivery, and technical adaptability. The project will coordinate closely with the ESDIS project, following defined interfaces to ensure consistency, interoperability, and alignment across data production, user support, and data access services.

EARTH SCIENCE DATA SYSTEMS

Program Schedule

Funding for the ESDIS project continuously delivers software to improve functionality and improve efficiency.

Date	Significant Event
Q2 FY 2027	ESDIS Ingest &Archive consolidation into single team
Q3 FY 2027	Complete transition of ESD data archives to the cloud
Q4 FY 2027	ESDIS user services consolidated into single team
Q4 FY 2027	Complete Earthdata Web Unification project

Program Management & Commitments

The ESEV program at GSFC provides program management for the ESDIS project. NASA HQ manages the DSE component of ESDS. Reductions to the ESDIS project will require reducing and realigning the DAACs into five thematic science teams, driving the use of Earth observation data across the value chain for commercial, decision-making, and scientific communities.

Program Element	Provider
EOSDIS core system	Provider: Various Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): N/A
Alaska Synthetic Aperture Radar Facility DAAC (Fairbanks, AK)	Provider: University of Alaska Lead Center: N/A Performing Center(s): N/A Cost Share Partner(s): N/A
Atmospheric Science Data Center (Hampton, VA)	Provider: LaRC Lead Center: LaRC Performing Center(s): LaRC Cost Share Partner(s): N/A
Goddard Earth Science Data and Information System Center (Greenbelt, MD)	Provider: GSFC Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): N/A
Land Processes Data Center (Sioux Falls, SD)	Provider: U.S. Geological Service Lead Center: N/A Performing Center(s): N/A Cost Share Partner(s): N/A

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Program Element	Provider
National Snow and Ice Data Center (Boulder, CO)	Provider: University of Colorado Lead Center: N/A Performing Center(s): N/A Cost Share Partner(s): N/A
Oak Ridge National Laboratory DAAC (Oak Ridge, TN)	Provider: Oak Ridge National Laboratory Lead Center: N/A Performing Center(s): N/A Cost Share Partner(s): N/A
Physical Oceanography DAAC (Pasadena, CA)	Provider: JPL Lead Center: JPL Performing Center(s): JPL Cost Share Partner(s): N/A
Crustal Dynamics Data Information System (Greenbelt, MD)	Provider: GSFC Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): N/A
Global Hydrology Research Center (Huntsville, AL)	Provider: University of Alabama Lead Center: MSFC Performing Center(s): MSFC Cost Share Partner(s): N/A
Interagency Implementation and Advance Concepts Team (Huntsville, AL)	Provider: MSFC Lead Center: MSFC Performing Center(s): MSFC Cost Share Partner(s): N/A

Acquisition Strategy

NASA competitively selects ESDIS support contracts through full and open competition.

MAJOR CONTRACTS/AWARDS

Element	Vendor	Location (of work performance)
EOSDIS Evolution & Development	Raytheon	Riverdale, MD
NSIDC	University of Colorado	Boulder, CO
Alaska SAR Facility	University of Alaska	Fairbanks, AK

EARTH SCIENCE DATA SYSTEMS

INDEPENDENT REVIEWS

NASA plans to conduct and complete an independent review in FY 2026 as part of the DAAC to SET transition plan to guide implementation in FY 2027. The American Customer Satisfaction Index (ACSI) measures customer satisfaction with the NASA EOSDIS services at a national level. NASA EOSDIS scored a 78 in 2024, a decrease of one point from the prior survey in 2022, but still among the highest federal government scores. The survey also highlights key areas NASA can leverage across its services to continuously enhance customer support. NASA will conduct the next survey in 2028.

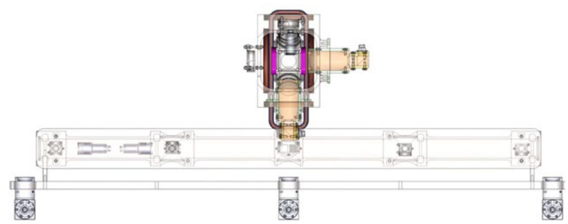
Review Type	Performer	Date of Review	Purpose	Outcome
Performance	Independent Review Board (IRB)	2026	Review of programmatic and/or technical decisions that may impact mission objectives or launch schedules	TBD
Quality	ACSI	2028	Biannual survey of EOSDIS users to assess satisfaction with services	TBD

EARTH SCIENCE TECHNOLOGY

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	33.0	49.7	49.7	49.7	49.7

The Earth Science Technology Program (ESTP) enables previously infeasible science investigations, improves existing measurement capabilities, and reduces the cost, risk, and/or development times for Earth science instruments and information systems, including transition to the U.S. commercial satellite sector.



The Earth Science Technology Office (ESTO) is investing in a quantum gravity gradiometer pathfinder mission, which will make use of cold atom interferometry to make highly precise measurements of the Earth's gravitation field. The mission will be a first-in-its-class demonstration to help determine the movement of ice sheets and monitor critical changes in underground aquifers.

EXPLANATION OF MAJOR CHANGES IN FY 2027

Due to budget constraints, NASA reduced the FY 2027 budget for ESTP by $27.7 million. This reduction will result in terminating some activities and delaying others within the Instrument Incubator project. Impacted activities will include delaying planned development of highly advanced lidar and radar technologies. Under Advanced Technology Initiatives, NASA will discontinue the solicitations for In-Space Validation of Earth Science Technology (InVEST) flight demonstrations. NASA will continue to prioritize the Quantum Gravity Gradiometer.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

ESTP technology development will continue to implement the Quantum Gravity Gradiometer. Advanced Modelling and Technology (AMT) will focus on transformation of NASA numerical models to make use of artificial intelligence/machine learning (AI/ML).

Program Elements

ADVANCED TECHNOLOGY INITIATIVES (ATI)

Under ATI, ESTP performs studies to examine the state of technology transfer to the commercial and defense sectors. The studies also identify gaps in sensor technologies and support technology maturation and risk reduction before their use in deep space. This is necessary because the space environment imposes stringent conditions on components and systems, some of which researchers cannot adequately test on the ground or in airborne systems. ATI no longer supports the InVEST opportunity which selects new technologies to validate in space prior to use in a science mission.

EARTH SCIENCE TECHNOLOGY

INSTRUMENT INCUBATOR

The Instrument Incubator Program (IIP) element develops instruments, instrument concepts, and measurement techniques at the system level, including laboratory breadboards and operational prototypes that often lead to ground or airborne demonstrations. These instrument prototypes provide multiple measurements to support the broad needs of Earth science, such as atmospheric composition, ocean color, and solar spectrum (from ultraviolet to infrared). Instrument Incubator supports the development of instrument design and prototyping through demonstration for innovative measurement techniques that have the highest potential to meet the measurement capability requirements of the NASA Earth science community across the optical and the microwave spectrum. The IIP also supports key instrument maturation activities, which seek to advance the readiness of previously developed instruments that have high potential to meet the objectives of the IIP and substantially improve beyond the current state-of-the-art in Earth science measurements.

ADVANCED MODELING TECHNOLOGY

AMT brings renewed focus to modeling techniques by leveraging emerging computer and information science research as well as new technologies and frameworks that will be essential in the development of digital twins. Earth System Digital Twins (ESDTs) are interactive digital replicas of Earth's systems, represent an emerging capability for understanding, forecasting, and conjecturing complex natural interconnections, especially impacts to humanity. The ESDT effort will develop capabilities toward the development of future digital twins of the Earth or of subcomponents of the Earth, as well as toward the development of an overarching framework that will continuously evolve and connect the various components developed by Research and Analysis, Applied Sciences, Data Systems, and computational capabilities from other Earth Science programs. In additional to supporting ESDTs, the program will also address the need for increased computational performance for existing physics-based models of the atmosphere, oceans, and solid Earth through new artificial intelligence and machine learning techniques.

QUANTUM GRAVITY GRADIOMETER (QGG)

NASA initiated this focused effort to develop a QGG pathfinder instrument, a groundbreaking new area of science that has the potential to make a big leap in the accuracy of Earth's gravitational measurements. It will collect much more precise measurements of Earth's gravitational field than existing methods, such as the Satellite-to-Satellite Tracking utilized by NASA's GRACE-FO mission and could do so from a single satellite. The QGG project will deliver an instrument for on-orbit testing in 2030, using an architecture that could be scalable to a science-grade instrument. Measurements from a QGG would both continue the data record of the GRACE satellites, as well as significantly advance the study of earthquakes, glacial, isostatic adjustment, and glacier-scale processes.

Program Schedule

Date	Significant Event
Q4 FY 2027	ROSES-2027 Solicitation
Q2 FY 2028	ROSES-2027 selection no earlier than six months after receipt of proposals

EARTH SCIENCE TECHNOLOGY

Date	Significant Event
Q4 FY 2028	ROSES-2028 Solicitation
Q2 FY 2029	ROSES-2028 selection no earlier than six months after receipt of proposals
Q4 FY 2029	ROSES-2029 Solicitation
Q2 FY 2030	ROSES-2029 selection no earlier than six months after receipt of proposals
Q4 FY 2030	ROSES-2030 Solicitation
Q2 FY 2031	ROSES-2030 selection no earlier than six months after receipt of proposals
Q4 FY 2031	ROSES-2031 Solicitation

Program Management & Commitments

Program Element	Provider
ATI	Provider: Various Lead Center: HQ Performing Center(s): N/A Cost Share Partner(s): N/A
Instrument Incubator	Provider: Various Lead Center: HQ Performing Center(s): GSFC, JPL, LaRC, MSFC, AFRC Cost Share Partner(s): N/A
AMT	Provider: Various Lead Center: HQ Performing Center(s): GSFC, JPL, LaRC, MSFC, ARC, JSC Cost Share Partner(s): N/A
QGG	Provider: Various Lead Center: HQ Performing Center(s): GSFC, JPL Cost Share Partner(s): N/A

Acquisition Strategy

NASA primarily procures tasks through full and open competition, such as through the ROSES announcements. The solicitation of technology investments is competitive, and NASA selects proposals from NASA centers, industry, academia, other government agencies, Federally Funded Research and Development Centers, and nonprofit organizations

EARTH SCIENCE TECHNOLOGY

MAJOR CONTRACTS/AWARDS

None.

INDEPENDENT REVIEWS

None.

APPLIED AND RESPONSIVE EARTH SCIENCE

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	107.7	106.9	107.7	106.9	107.7

This image shows an ICEYE satellite in orbit (as captured by the Vantor WorldView-3 satellite) over the active Icelandic volcanic eruption at Fagradalsfjall. Commercial data enhances NASA's science and applications and makes unique contributions to our mission by offering higher resolution and more frequent observations; flexible, real-time, niche data services; and cost-effective options for users. Credit: ICEYE US

The Applied and Responsive Earth Science program leverages NASA Earth Science satellite measurements and new scientific knowledge to enable innovative and practical uses by public and private sector organizations, connecting user needs with NASA observations and science.

The program supports economic growth in two main ways: growing the emerging commercial remote sensing sector and helping users (including from the private sector) benefit fully from Earth observations.

Applied and Responsive Earth Science projects empower decision-makers and support their resilience, security, and prosperity by working with end users across federal, state, local, tribal, and territorial agencies, and the private sector.

The program leverages artificial intelligence (AI) and other advanced modeling techniques to broaden the use of Earth observations by all sectors of society and increase the efficiency of application development.

The program supports activities in thematic Earth science applications areas including agriculture, water, and natural resources; wildland fires; and disaster response. In addition to supporting end users through the development of new tools, applications, data products, and models, the Applied and Responsive Earth Science program inspires and prepares Americans for technical careers in applications of Earth science and remote sensing.

EXPLANATION OF MAJOR CHANGES IN FY 2027

NASA consolidated the Applied Sciences Program and the Responsive Science Initiatives programs into a single program to streamline operations. As part of this consolidation, NASA reduced the total number of projects and decreased sub-elements within each project to align with their respective funding levels.

The restructuring created the new consolidated projects: Preparedness and Resilience - combining the former Disasters and Wildland Fires projects with other resilience-related elements; Agriculture, Water, and Natural Resources - merging the Agriculture project with components of the Applications Innovation project; and Earth Resources for Industry & State Empowerment (EarthRISE) - incorporating selected elements, primarily from Crosscutting Activities, to efficiently engage state, local, and private sector users for maximum impact.

APPLIED AND RESPONSIVE EARTH SCIENCE

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The NASA Commercial Satellite Data Acquisition (CSDA) project plans to conduct its third Indefinite Delivery Indefinite Quantity (IDIQ) contract on-ramp in FY 2027 to further expand access to innovative commercial Earth observation capabilities through new vendor contracts and Earth observing products.

EarthRISE will work with NASA applied research programs and multi-mission integrated observations and commercial datasets to transition high-value opportunities to build the resilience of the U.S. state, local, and tribal agriculture and water sectors. For example, EarthRISE will support regional evaluations and application of OpenET, a public-private collaboration for mapping evapotranspiration (ET) at the scale of individual fields, to expand benefits to local agricultural producers.

The Earth Information for Food (EI4Food) initiative in EarthRISE will align leading food system actors (including General Mills, McDonald's, and Costco) around a shared needs assessment and a clear roadmap for co-developing Earth information tools that support business and operational decision-making across the food value chain. The project aims to establish a durable EI4Food platform, including governance and partnership models, that enables industry, NASA, and researchers to jointly develop, sustain, and scale actionable Earth information tools for food system resilience.

In FY 2027, Interagency Satellite Observation Needs (ISON) will be finishing the next assessment of federal agency needs. Several solutions will meet key milestones and become operational (i.e., enter production where data will be fully open and available after multiple years or months of user testing, prototyping, calibration/validation, and other community engagement activities), including low latency Harmonized Landsat Sentinel data.

NASA's disaster applications team will advance the use of AI-powered Earth observation foundation models to detect damage from hazards, train these models to recognize patterns across satellite data, and deliver faster, more accurate insights for emergency response. In FY 2027, the team is scaling up model training using high-performance computing and integrating new data types like radar coherence and NASA-ISRO Synthetic Aperture Radar (NISAR) imagery, laying the groundwork for a unified, multimodal AI model that can support global disaster detection across varied landscapes and hazard types.

Program Elements

AGRICULTURE, WATER, & NATURAL RESOURCES

This project aims to apply Earth observations to address critical challenges facing agriculture, water, and other natural resources. By providing data to address drought, floods, and other extreme events, this project will help with agricultural resilience, securing food and water supplies, and safeguarding natural resources. The Agriculture, Water, & Nature Resources project aims to help stabilize commodity markets and enable farmers, land managers, and water resource managers to make data-driven decisions for the American people.

APPLIED AND RESPONSIVE EARTH SCIENCE

ARTIFICIAL INTELLIGENCE & ADVANCED MODELING APPLICATIONS

This project aims to further the use of AI, including large Earth foundation models and large language models, to dramatically decrease the amount of time and expertise needed for application development or scaling. The project funds directed and competed efforts to develop new models and apply existing models to support decision-making in the most efficient, effective, and scalable way.

COMMERCIAL SATELLITE DATA ACQUISITION

The CSDA project identifies, evaluates, and acquires data from commercial sources to support NASA's Earth science research and applications activities. This provides a cost-effective means to augment and/or complement the suite of Earth observations made available by NASA, other U.S. government agencies, and international partners. The CSDA project also supports efforts that use commercial data in research and applications, and efforts to improve calibration and validation of commercial data sources.

EARTH RESOURCES FOR INDUSTRY & STATE EMPOWERMENT

EarthRISE is a cross-cutting, enabling project that bridges NASA’s interdisciplinary science expertise to co-develop "last-mile" solutions for state, local, tribal, territorial, and private sector stakeholders. EarthRISE will address high priority challenges for stakeholders while infusing cutting-edge satellite data, increasing the return-on-investment from the latest missions. By functioning as a central integration hub, EarthRISE will also drive efficiency across the Earth Action portfolio by scaling solutions.

INTERAGENCY SATELLITE OBSERVATION NEEDS

The ISON project supports NASA's analysis, planning, and implementation of the highest priority needs identified by the U.S. Group on Earth Observation’s Satellite Needs Working Group (SNWG). The SNWG conducts a biennial survey of federal civil agencies to formally document and communicate satellite Earth-observing needs. NASA, in partnership, with the U.S. Geological Survey (USGS) and NOAA, assesses each submitted satellite need, and proposes potential solutions, informing agency planning and budgeting. The ISON project also oversees the implementation of the solutions.

PREPAREDNESS & RESILIENCE

This project addresses critical American challenges—including disasters, health and air quality, and wildland fires—by delivering key Earth observation products, tools, and services. The project supports efforts to empower federal, state, and local governments. It helps mitigate damage, protect infrastructure, and build greater resilience, by providing actionable data, tools, and support for a range of hazards.

Program Schedule

Date	Significant Event
Q2 FY 2027	ROSES-2026 selections within six to nine months of receipt of proposals
Q4 FY 2027	ROSES-2027 solicitation release

APPLIED AND RESPONSIVE EARTH SCIENCE

Date	Significant Event
Q2 FY 2028	ROSES-2027 selections within six to nine months of receipt of proposals
Q4 FY 2028	ROSES-2028 solicitation release
Q2 FY 2029	ROSES-2028 selections within six to nine months of receipt of proposals
Q4 FY 2029	ROSES-2029 solicitation release
Q2 FY 2030	ROSES-2029 selections within six to nine months of receipt of proposals
Q4 FY 2030	ROSES-2030 solicitation release
Q2 FY 2031	ROSES-2030 selections within six to nine months of receipt of proposals
Q4 FY 2031	ROSES-2031 solicitation release

Program Management and Commitments

Program Element	Provider
Agriculture, Water, & Natural Resources	Provider: Various Lead Center: HQ Performing Center(s): ARC, GSFC, JPL, LaRC, MSFC Cost Share Partner(s): U.S. Drought Monitor, NOAA, U.S. Department of Agriculture (USDA)
Preparedness & Resilience	Provider: Various Lead Center: HQ Performing Center(s): ARC, AFRC, GSFC, JPL, JSC, LaRC, MSFC Cost Share Partner(s): DoW
EarthRISE	Provider: Various Lead Center: HQ Performing Center(s): ARC, GSFC, JPL, LaRC, MSFC Cost Share Partner(s): None
ISON	Provider: Various Lead Center: HQ Performing Center(s): ARC, GSFC, JPL, LaRC, MSFC Cost Share Partner(s): None
CSDA	Provider: 15 commercial satellite data vendors Lead Center: HQ Performing Center(s): GSFC, JPL, MSFC Cost Share Partner(s): NOAA, USGS

APPLIED AND RESPONSIVE EARTH SCIENCE

Program Element	Provider
AI and Advanced Modeling Applications	Provider: Various Lead Center: HQ Performing Center(s): MSFC Cost Share Partner(s): ESA, IBM

Acquisition Strategy

NASA bases Applied and Responsive Earth Science acquisitions on full and open competition to the greatest extent possible. Grants are peer reviewed and selected based on NASA research announcements and other related announcements. NASA may acquire certain research, instruments, or services without competition if there is a clear scientific, technological, or programmatic benefit to NASA.

MAJOR CONTRACTS/AWARDS

Element	Vendor	Location (of work performance)
CSDA	IDIQ vendors per awarded task orders	Various (vendor location)

INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Relevance	Applied Sciences Advisory Committee	TBD	Review strategic planning efforts	TBD

PLANETARY SCIENCE

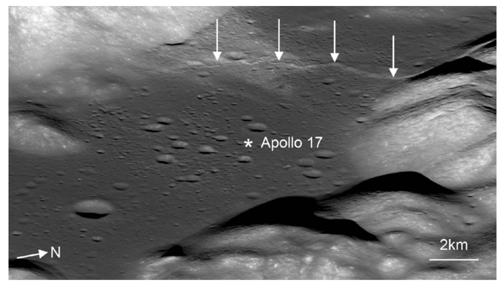
Planetary Science

PLANETARY SCIENCE RESEARCH

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Planetary Science Research and Analysis	--	--	**154.6**	187.8	249.7	247.6	213.2
Other Missions and Data Analysis	--	--	**165.3**	182.8	189.2	190.7	194.8
Total Budget	**--**	**--**	**319.9**	**370.6**	**438.9**	**438.3**	**408.1**

The Planetary Science Research program is at the heart of NASA's planetary science objectives. It informs and inspires future missions while maximizing the return of existing and prior ones. The Planetary Science Research program supports the scientists who use NASA mission data to make discoveries about our solar system. Scientists study NASA mission data to understand the planets and small bodies that inhabit our solar system, to answer questions about its formation - how it reached its current diverse state, how life evolved on Earth and possibly elsewhere in the solar system, and what characteristics of the solar system led to the origins of life. The program also supports development of analytical and theoretical tools, as well as laboratory data, to complement analyses of flight mission data. The research program achieves this by supporting research grants solicited annually and subjected to a competitive peer review process before selection and award. The Planetary Science Research program focuses on five key research goals:



Oblique view of the Taurus-Littrow valley, site of the Apollo 17 landing, taken from the Lunar Reconnaissance Orbiter Narrow Angle Camera (cropped from image M192703697LR). Arrows mark a fault that experienced a moonquake and triggered landslides in the area. A Solar System Exploration Research Virtual Institute (SSERVI)-funded study has led to the development of a new method for estimating the magnitude of seismic shaking—based on data from Apollo-deployed seismometers and focused on the Taurus-Littrow valley region. The new technique will be used to analyze the frequency of moonquakes across the Moon, including the south polar region where Artemis astronauts will explore. Credit: Adapted from Watters & Schmerr, 2025

- Advance the understanding of how the chemical and physical processes in our solar system operate, interact, and evolve;
- Explore and observe the objects in the solar system to understand how they formed and evolve;
- Explore and find locations where life could have existed or could exist today;
- Improve our understanding of the origin and evolution of life on Earth to guide our search for life elsewhere; and
- Identify and characterize objects in the solar system that pose threats to Earth or offer resources for human exploration.

Two cross-organizational activities are embedded within the Planetary Science Research Program that serve the SMD and agency needs. The goals of these activities are:

- Foster cutting-edge data science practices, open science, and the continuous evolution of scientific data and computing systems across SMD.

PLANETARY SCIENCE RESEARCH

- Manage the agency's High-End Computing Capability (HECC) portfolio to serve the supercomputing needs of all NASA mission directorates and NASA-supported investigators.

EXPLANATION OF MAJOR CHANGES IN FY 2027

Funding is added to a new project, Science Agency Support, which supports SMD usage of agency facilities. NASA reduced peer reviewed science in Planetary Science Research and Analysis by 15 percent compared to the plan assumed in the FY 2026 Budget to support other high priority activities within Planetary Science. Funding in Planetary Science Directed Research and Technology is reduced to account for lower than planned future workforce needs.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The Origins, Worlds, and Life: A Decadal Strategy for Planetary Science and Astrobiology 2023-2032, recommended that NASA "catalyze research focused on emerging systems-level thinking about dynamic habitability and the coevolution of planets and life, with a focus on problems and not disciplines" - that is, using and expanding successful programmatic mechanisms that foster interdisciplinary and cross-divisional collaboration. The planetary science research budget will encourage interdisciplinary gold-standard science, expand collaboration opportunities, and facilitate new ideas while continuously working to reduce barriers to proposing.

Astromaterials Curation will focus on Artemis curation readiness, notably completing the outfitting of the Artemis Curation lab facilities, design and procurement of the MMX curation processing glovebox, construction of the updated long-term Curation back-up facility expansion at the White Sands Test Facility, and continued allocation from the existing collections.

Planetary Technology will continue to develop cutting edge technology for planetary science instrumentation, and platform technologies, including models, software, and hardware in NASA's Global Reference Atmospheric Model (GRAM) and Entry Systems Modeling (ESM). The PICASSO and MatISSE technology development programs will be combined into one technology development solicitation to enable more efficient portfolio management, program costs, and evaluation of the individual technology projects. The future combined technology development solicitation, GRAM and ESM, will focus on technology developments for Mars, the Decadal-recommended Uranus Orbiter & Probe mission, New Frontiers and Dragonfly.

The Planetary Data System is migrating planetary data to a cloud-based archive and aims to have a minimum of 50 percent of high-priority data (including that of the moon and Mars) available in the cloud in FY 2027.

The Scientific Artificial Intelligence, Data & Analytics (SAIDA) and HECC portfolios will be managed as an integrated data and computing program for NASA science and engineering, ensuring that the agency’s computational resources effectively advance emerging technologies and reinforce NASA’s leadership in science and technology.

SAIDA will deliver new AI capabilities, including biological models that advance NASA’s space biology research and promote astronaut health, along with updated lunar and Mars foundation models that strengthen scientific and exploration missions. SAIDA will operationalize the consolidated SMD cloud infrastructure and finalize integration activities that provide streamlined access to cloud resources, high-end computing capabilities, and analysis tools, thereby enhancing efficiency and scientific output.

PLANETARY SCIENCE RESEARCH

HECC will continue delivering high-performance computing resources and comprehensive support services, including network connectivity, data storage, analysis capabilities, visualization tools, and application software, across NASA's aeronautics, human exploration, technology, and science missions. HECC will expand Central Processing Unit (CPU) and Graphics Processing Unit (GPU) capacity to meet agency computing requirements, retire outdated systems, and consolidate operations with SAIDA.

Program Elements

PLANETARY SCIENCE RESEARCH AND ANALYSIS (R&A)

Planetary Science R&A powers a continuous cycle of exploration, enhances the scientific return from ongoing and completed space flight missions and provides the foundation for the formulation of new scientific questions and strategies for answering those questions. Planetary Research provides the roadmap for exploration, ensuring every mission targets high-value destinations and the most compelling scientific questions. R&A funds research tasks in areas such as astrobiology and cosmochemistry; the origins and evolution of planetary systems; the observation and characterization of extra-solar planets (i.e., exoplanets); and the atmospheres, geology, and chemistry of the solar system’s bodies other than the Earth or the Sun.

Program Schedule

The Planetary Science Research Program solicits proposals as part of the SMD’s annual Research Opportunities in Space and Earth Science (ROSES) research calls. The program issues solicitations every year. A Senior Review process assesses all missions in the extended operations phase every three years. NASA reviews and evaluates the planetary data archives for mission data every five years.

Date	Significant Event
Q2 FY 2026	ROSES-2025 NASA Research Announcement (NRA) selection within six to nine months of receipt of proposals
Q2 FY 2026	Senior Review Operating Mission (M2020)
July 2026	ROSES-2026 NRA solicitation release
Q2 FY 2027	ROSES-2026 NRA selection within six to nine months of receipt of proposals
Q3 FY 2027	Senior Review Data Archives Support Nodes
July 2027	ROSES-2027 NRA solicitation release
Q2 FY 2028	ROSES 2027 NRA selection within six to nine months of receipt of proposals
Q2 2028	Senior Review Operating Missions

PLANETARY SCIENCE RESEARCH

Program Management & Commitments

Program Element	Provider
R&A	Provider: NASA Lead Center: HQ Performing Center(s): ARC, GRC, GSFC, JPL, JSC, LaRC, MSFC Cost Share Partner(s): N/A

Acquisition Strategy

Planetary Research competitively selects activities from the ROSES omnibus research announcement as funding allows.

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Advanced Multi-Mission Operation System	--	--	**29.0**	30.0	30.0	30.0	30.0
Planetary Data System	--	--	**30.2**	44.6	46.6	46.7	48.7
Astromaterial Curation	--	--	**16.3**	17.2	17.1	17.1	17.6
Robotics Alliance	--	--	**5.0**	5.0	5.0	5.0	5.0
Scientific AI, Data & Analytics (SAIDA)	--	--	**19.4**	19.4	19.4	19.4	19.4
Planetary Technology	--	--	**3.1**	3.1	6.6	6.6	7.1
Science Agency Support	--	--	**37.5**	38.7	39.7	41.1	42.2
High End Computing Capability	--	--	**23.8**	23.8	23.8	23.8	23.8
Planetary Science Directed R&T	--	--	**1.0**	1.0	1.0	1.0	1.0
Total Budget	**--**	**--**	**165.3**	**182.8**	**189.2**	**190.7**	**194.8**

Other Missions and Data Analysis includes activities and infrastructure that support NASA Planetary Science Research and missions, such as the Advanced Multi-Mission Operation System, Planetary Data System, and Astromaterial Curation. It also includes three cross-organizational projects that serve SMD and agency needs: High End Computing Scientific Artificial Intelligence, Data & Analytics and Science Agency Support.

Mission Planning and Other Projects

ADVANCED MULTI-MISSION OPERATION SYSTEM (AMMOS)

AMMOS is a system of reusable software tools and services comprising a mission ground operations and ground data system used across multiple NASA missions. AMMOS provides multi-mission operations, navigation, design, and training tools and services for Planetary Science flight missions, as well as other SMD missions, and invests in improved communications and navigation technologies. This budget reduces funding for AMMOS, eliminating the development of new tools due to the reduced number of future planetary science missions. The AMMOS project will continue to support existing multi-mission software tools for spacecraft navigation, command, control, assessment, mission planning, and data archiving. AMMOS also provides support to our international space agency partners on an as-needed basis. This support typically pertains to navigation assistance and scheduling of NASA's Deep Space Network assets.

AMMOS currently provides multi-mission operations tools and services to 88 missions, and includes support to Planetary Science, Heliophysics, Earth Science, and Astrophysics missions within NASA and critical operations services to 14 international missions. AMMOS continues to provide critical NASA support to international missions from CSA, DLR, ESA, ISRO, JAXA, the Korea Aerospace Research Institute, and the United Arab Emirates Space Agency. NASA support for these missions often results in data sharing agreements with international partners, greatly increasing the amount of data available to U.S. researchers and the public. Operating missions enabled by AMMOS include the Mars 2020 Perseverance rover, Parker Solar Probe, Lucy, Lunar Trailblazer, the Cislunar Autonomous Positioning

OTHER MISSIONS AND DATA ANALYSIS

System Technology Operations and Navigation Experiment, and the Korean Pathfinder Lunar Orbiter, among many others.

PLANETARY DATA SYSTEM (PDS)

The Planetary Data System (PDS) is the online data archive that furthers NASA's Planetary Science goals by efficiently collecting, archiving, and making accessible digital data produced by, or relevant to, NASA's planetary missions, research programs, and data analysis. This curated archive includes raw and fully calibrated orbital and surface observations from NASA missions and instruments exploring the solar system planets, asteroids, and small bodies, as well as high-impact data products from NASA's research and analysis programs. The PDS archives now span more than 50 years of NASA-funded exploration and research, and includes NASA-collected data of the lunar and Martian surface and ground-based observations of Near-Earth objects. The PDS has completed the conversion of up to 90 percent of its total data volume to a more complete data standard (PDS4), making the data more clearly documented and easier to use. The PDS is also migrating planetary data to a cloud-based archive to better enable the use of advance data analysis methods, such as Artificial Intelligence (AI) and Machine Learning techniques, and continues to create training modules for finding and using PDS data. The PDS archives are publicly available through the PDS website. NASA continues to incorporate new PDS enhancements, and is implementing a PDS website unification, centralizing cybersecurity and reducing cost while also making planetary data easier to find and access.

The decreased funding for PDS in this budget will impact on-ramping of new capabilities, such as reducing the rate at which NASA migrates planetary data to the cloud and limiting the availability of those data for the application of advance computing methods, such as AI and Machine Learning techniques.

ASTROMATERIAL CURATION

The Astromaterials Acquisition and Curation Office curates extraterrestrial material under NASA control. Curation is an integral part of sample return missions. Activities conducted by the Curation office include: (1) research into advanced curation techniques to support future missions; (2) sample return mission planning; (3) archiving of witness, engineering, and reference materials related to sample return missions; (4) recovery and transport of returned materials; (5) initial characterization of newly received samples; (6) preparation and allocation of samples for research; and (7) providing clean and secure storage of samples for the benefit of current and future generations.

Materials currently curated include: Antarctic meteorites; cosmic dust; samples collected from the Moon; samples of the solar wind; samples from comet 81P/Wild; dust collected in interstellar space; particles from asteroids Itokawa, Ryugu, and Bennu; cosmic dust collected in Earth's stratosphere; micrometeorites collected at the South Pole, microparticle-impacted flight hardware; witness materials (i.e., small foils and plates placed in spacecraft assembly cleanrooms to collect particles); and coupons (i.e., representative pieces of materials used in construction of spacecraft). Curated materials come from past and present sample-return missions including: Apollo, Luna, Long Duration Exposure Facility, Genesis, Stardust, Hayabusa, Hayabusa2, and Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer (OSIRIS-REx). Planning and research efforts are currently underway to develop the technologies and procedures for proper curation of samples from future missions to the Moon (such as Artemis), to Mars, and to Mars' moon, Phobos (such as Martian Moons eXploration (MMX)).

OTHER MISSIONS AND DATA ANALYSIS

NASA plans to receive 15% of the MMX samples through cooperation with JAXA. New laboratory space, expected to be completed in 2026, is currently under construction to be the long-term home of witness materials and coupons, including for NASA's portion of the MMX samples, and for cold sample processing of Apollo samples. With the OSIRIS-REx mission ending in 2026, the Astromaterials Acquisition and Curation Office will complete the processing of returned samples from the Sample Analysis Team and continue global distribution of this precious material to the scientific community, expanding the scientific return from this mission.

The project maintains ten existing collections of astromaterials in pristine condition for scientific research within ten cleanroom suites at JSC and the White Sands Complex. JSC curation also maintains numerous high efficiency particulate air (HEPA)-filtered air handling systems, an ultrapure water system, high-purity gaseous and liquid nitrogen systems, and a precision cleaning facility to support these sample storage laboratories. The suite of advanced imaging instruments continues to non-destructively characterize the current astromaterials collections, allowing more efficient use of the samples and more robust scientific results.

ROBOTICS ALLIANCE

The Robotics Alliance Project increases interest in engineering, technology, science, and mathematics disciplines among youth in the United States to create an inspired, experienced, and technical workforce for the aerospace community. Annual activities and events expose students to challenging applications of engineering and science, including national robotic competitions in which high school students work with engineering and technical professionals from government, industry, and universities to gain hands-on experience and mentoring.

SCIENTIFIC ARTIFICIAL INTELLIGENCE, DATA & ANALYTICS (SAIDA)

Scientific Artificial Intelligence, Data & Analytics (SAIDA, formerly known as Open Source Science) is transforming SMD's computing and data infrastructure to enhance efficiency and scientific impact. The Core Data and Computing Services (CDCS) element is implementing a unified cloud infrastructure that simplifies access to computing and data resources for all SMD divisions through the consolidation of several existing cloud platforms. CDCS is also improving data stewardship, management, and governance strategies to strengthen the discoverability, availability, and usability of NASA’s scientific information, maximizing the long-term impact of research investments. For example, NASA’s Science Discovery Engine unifies search capabilities, providing an efficient tool for users to discover and leverage NASA's vast archives of scientific information. The Data Science Innovation (DSI) element provides leadership and technical expertise across SMD to evaluate and prototype cutting-edge data science technologies, including AI, to increase the efficiency of the scientific lifecycle and accelerate scientific discoveries. This includes leading the development of tools to integrate AI throughout the scientific lifecycle and AI foundation models that leverage large volumes of NASA science data for multiple downstream applications. DSI collaborates with the Chief AI Officer to ensure alignment in data science investments across the agency. SAIDA and the NASA High-End Computing Capability (HECC) portfolio share common leadership within the Office of the Chief Science Data Officer.

OTHER MISSIONS AND DATA ANALYSIS

HIGH-END COMPUTING CAPABILITY (HECC)

HECC is an agency-wide portfolio that provides high-end computing, storage, and associated services to enable large-scale modeling, simulation, and analysis in support of NASA's aeronautics, human exploration, and science missions. HECC resources are used by scientists and engineers across all NASA Mission Directorates and by NASA-supported investigators. In addition to supercomputing systems, HECC provides a range of services including application optimization to enhance productivity and code performance, end-to-end networking to meet the data distribution and access requirements of geographically dispersed users, and visualization and data analytics tools. Starting in FY 2027, HECC will implement direct charging to partially fund these resources and services.

PLANETARY TECHNOLOGY

Planetary Technology funds promising mission-specific technology investments, such as NASA's Global Reference Atmospheric Model and Entry Systems Modeling as well as non-mission specific, non-nuclear investments in planetary technology, which will enable future Planetary Science missions. The Planetary Exploration Science Technology Office manages these activities and coordinates planetary-relevant technology investments across the agency and maximizes technology infusion into specific missions.

PLANETARY SCIENCE DIRECTED RESEARCH AND TECHNOLOGY

The Planetary Science Directed Research and Technology project funds the civil service staff who work on emerging Planetary Science flight projects, instruments, and research.

SCIENCE AGENCY SUPPORT

This budget includes funding in FY 2027 for agency approved standardization of direct charging in the areas of utilities, logistics, and waste management services, with the intent to create consistency across the agency.

PLANETARY DEFENSE

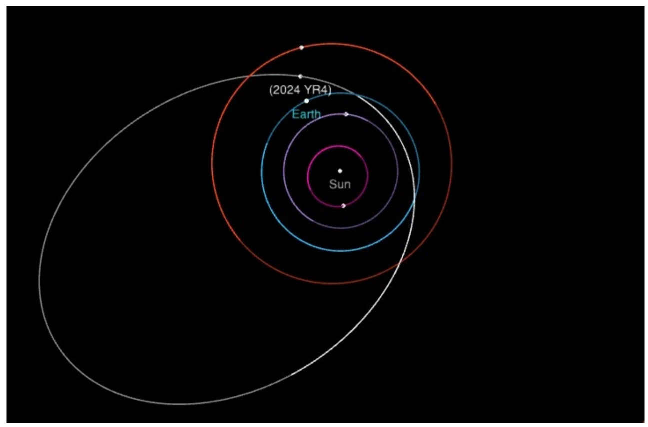
FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
NEO Surveyor	--	--	**283.7**	41.4	36.1	36.0	36.0
Other Missions and Data Analysis	--	--	**41.0**	45.2	47.5	47.5	48.7
Total Budget	**--**	**--**	**324.7**	**86.6**	**83.6**	**83.5**	**84.7**

For nearly four decades, NASA has engaged in studying near-Earth objects (NEOs), asteroids, and comets that orbit the Sun and come within 30 million miles of our planet's orbit. While NEOs have the potential to help planetary scientists better understand the birth and formation of our solar system and perhaps the origins of life, some travel in orbits bring them close enough to Earth's vicinity to make them potential impact hazards.

To address this, NASA established its Planetary Defense Coordination Office (PDCO) in 2016 to manage agency efforts to find, track, characterize, and if necessary, mitigate against NEO impacts.

Planetary Defense encompasses all the capabilities needed to detect and warn of potential asteroid or comet impacts with Earth followed by the prevention or mitigation of their possible effects. The effort involves:



Orbit diagram of asteroid 2024 YR4 on January 31, 2025, which triggered formal notification to the White House and other government agencies of the asteroid's potential future impact threat with Earth on December 22, 2032. Further work across the NEOO project retired that threat on February 24, 2025. Credits: NASA/JPL Center for NEO Studies

- Finding and tracking NEOs that pose a hazard of impacting Earth (greater than 10 meters in size are considered hazardous).
- Characterizing each potentially hazardous NEO found, predicting its precise trajectory, and also determining its size, shape, mass, composition, rotational dynamics, and other parameters to assess the likelihood and severity of devastation if it has a potential Earth impact.
- Warning of the impact timing and potential effects and advising of possible means to mitigate the impact.
- Planning and testing of measures to deflect or disrupt (break up) an object on an impact course with Earth, or to mitigate the effects of an impact.

The project made significant progress in NEO detection in recent years. The NEO Surveyor mission, designed to improve detection capabilities to find greater than 90 percent of NEOs 140 meters or larger within about a decade of being launched in 2028, will roughly triple NASA's current capability. In 2022, the DART mission successfully impacted an asteroid almost seven million miles from Earth, altering its

PLANETARY DEFENSE

orbit and demonstrating NASA's ability to respond to a potential asteroid threat for the first time via a kinetic impactor spacecraft.

The PDCO manages the Planetary Defense Program and administers the Near-Earth Object Observations (NEOO) project, which funds and coordinates efforts across multiple agencies and space institutions to find, track, and characterize any asteroid or comet that could become an impact hazard to Earth. Scientists supported by NASA conduct these NEOO efforts at observatories on the ground and in space, as well as with partnerships for data from assets of the NSF and space situational awareness facilities of the United States Space Force.

In addition to finding, tracking, and characterizing NEOs, NASA also researches techniques for deflecting or disrupting, if possible, NEOs that are determined to be on an impact course with Earth to provide options for government response to any detected impact threat. If deflection or disruption of the NEO is not possible due to insufficient time available before impact, the PDCO is responsible for providing expert input to other government agencies for emergency response operations.

EXPLANATION OF MAJOR CHANGES IN FY 2027

Compared to what was assumed in the FY 2026 Budget, funding in FY 2027 is decreased for the NEO Surveyor mission due to cost savings and improved risk posture. NASA continues to maintain a launch readiness date no later than June 2028.

NEAR EARTH OBJECTS SURVEYOR

Formulation	Development	Operations

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	283.7	41.4	36.1	36.0	36.0

The photo above captures the integration and testing of the NEO Surveyor's instrument enclosure at the Space Dynamics Laboratory (SDL), ahead of its scheduled launch in June 2028.

PROJECT PURPOSE

The Near-Earth Object Surveyor (NEO Surveyor) addresses NASA's objective to find, track, and characterize the asteroids and comets that could potentially impact Earth and cause significant damage. NEO Surveyor consists of ground and space-based segments that constitute a system searching the sky for significant potential impact hazards.

The NEO Surveyor will make significant progress toward the objective given to NASA in Public Law 109-155 Sec. 321, the George E. Brown, Jr. Near-Earth Object Survey Act, which requires detecting, tracking, cataloging at least 90 percent of NEOs equal to or larger than 140 meters in size, and characterizing a representative subset.

The National Academies study, "Finding Hazardous Asteroids Using Infrared and Visible Wavelength Telescopes" (2019), concluded that a space-based mid-infrared survey is the most effective, timely option for meeting the congressional NEO survey completeness and size determination requirements. The most recent Planetary Science and Astrobiology Decadal Survey 2023-2032 (2022) recommended that NASA should fully support the development, timely launch, and subsequent operation of NEO Surveyor to achieve the highest priority planetary defense goals.

NEO Surveyor will find potentially hazardous objects because of its optimized sensitivity in the infrared part of the spectrum and observation cadence. The mission's primary goals are to: (1) identify impact hazards to the Earth posed by NEOs by performing a comprehensive survey of the NEO population; (2) obtain detailed physical characterization data for individual objects that are likely to pose an impact hazard; and (3) advance the understanding of potential impact energies of potentially hazardous NEOs through characterizing physical properties, including object size, to inform potential mitigation strategies.

NEAR EARTH OBJECTS SURVEYOR

Formulation	Development	Operations

EXPLANATION OF MAJOR CHANGES IN FY 2027

Compared to what was assumed in the FY 2026 Budget, funding for FY 2027 is decreased for the NEO Surveyor mission due to cost savings and improved risk posture. NASA continues to maintain a launch readiness date no later than June 2028.

PROJECT PARAMETERS

NEO Surveyor consists of a single scientific instrument: a 50-centimeter (nearly 20-inch) diameter telescope that operates in two heat-sensing infrared wavelengths. It will be capable of detecting both bright asteroids and dark asteroids (the most difficult type to find).

The NEO Surveyor Observatory will travel in a large-amplitude halo orbit around the Sun-Earth Lagrange point 1 (L1). The L1 orbit has the advantages of a flexible launch date and a stable, cold thermal environment that supports passive cooling and enables high data rates needed to downlink full-frame images for asteroid detection and recovery using ground processing and analysis.

After launch, NEO Surveyor will carry out a five-year baseline survey to find at least two-thirds of the undetected NEOs larger than 140 meters (460 feet). These are the potentially hazardous objects large enough to cause major regional damage in the event of an Earth impact. By using two heat-sensitive infrared imaging channels, NEO Surveyor can make accurate measurements of both NEO position and sizes to gain valuable information about their composition, shapes, rotational states, and orbits.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The project will complete Instrument integration and test for delivery to Observatory integration and test. Additionally, the Observatory will complete integration and test in preparation for launch.

SCHEDULE COMMITMENTS/KEY MILESTONES

Milestone	Confirmation Baseline Date	FY 2027 PB Request
KDP-C	Nov 2022	Nov 2022
CDR	Feb 2025	Feb 2025
KDP-D	Aug 2026	Aug 2026
Launch Readiness Date	Jun 2028	Jun 2028
End of Mission	Sep 2033	Sep 2033

NEAR EARTH OBJECTS SURVEYOR

Formulation	Development	Operations

Development Cost and Schedule

Base Year	Base Year Develop-ment Cost Estimate ($M)	JCL (%)	Current Year	Current Year Develop-ment Cost Estimate ($M)	Cost Change (%)	Key Milestone	Base Year Milestone Data	Current Year Milestone Data	Milestone Change (mths)
2023	1,228.6	86	2026	1,208.3	-1.6%	LRD	Jun 2028	Jun 2028	0

Note: The confidence level estimates reported reflect an evolving process as NASA improves its probabilistic estimation techniques and processes. Estimate reflects the practices and policies at the time it was developed. Estimates that include combined cost and schedule risks are denoted as JCL (joint confidence level); all other CLs (confidence levels) reflect cost confidence without necessarily factoring the potential impacts of schedule changes on cost.

Development Cost Details

Element	Base Year Development Cost Estimate ($M)	Current Year Development Cost Estimate ($M)	Change from Base Year Estimate ($M)
TOTAL:	**1,228.6**	**1,208.3**	**-20.3**
Aircraft/Spacecraft	338.0	313.1	-24.9
Payloads	221.7	319.6	+97.9
Systems I&T	4.1	5.0	+0.9
Launch Vehicle	134.0	102.7	-31.3
Ground Systems	25.2	32.6	+7.4
Science/Technology	71.7	63.1	-8.6
Other Direct Project Costs	433.9	372.2	-61.7

NEAR EARTH OBJECTS SURVEYOR

Formulation	Development	Operations

Project Management & Commitments

Element	Description	Provider Details	Change from Baseline
NEO Surveyor Director and Investigation Team	NEO Surveyor science and operations leadership	Provider: University of California, Los Angeles (UCLA) Lead Center: MSFC Performing Center(s): N/A Cost Share Partner(s): N/A	Surveyor Director changed institutions
Flight System Management	Project management, systems engineering, safety and mission assurance, and system integration	Provider: JPL Lead Center: JPL Performing Center(s): JPL Cost Share Partner(s): N/A	N/A
NEO Surveyor Spacecraft	Spacecraft bus with all flight subsystem capabilities	Provider: BAE Systems Lead Center: JPL Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
Telescope	50-centimeter aperture telescope (waveguide and reflectors)	Provider: JPL Lead Center: JPL Performing Center(s): JPL Cost Share Partner(s): N/A	N/A
Camera Assembly Enclosure	Houses the Sensor Chip Assemblies (SCA), Sensor Chip Electronics (SCE), and focal plane modules	Provider: Space Dynamics Laboratory Lead Center: JPL Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
Sensor Chip Assemblies (SCA) and Sensor Chip Electronics (SCE)	Digital image sensors and electronics	Provider: Teledyne Scientific & Imaging Lead Center: MSFC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
Mission Operations	NEO Surveyor Spacecraft operations at existing facility with Deep Space Network connectivity and existing cybersecurity authorization capability	Provider: Laboratory for Atmospheric and Space Physics (LASP), University of Colorado, Boulder Lead Center: JPL Performing Center(s): N/A Cost Share Partner(s): N/A	N/A

NEAR EARTH OBJECTS SURVEYOR

Formulation	Development	Operations

Element	Description	Provider Details	Change from Baseline
NEO's Survey Data System (SDS)	Process, analyze, archive, and distribute NEO Surveyor instrument data.	Provider: Caltech IPAC Lead Center: MSFC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
Launch Vehicle	Launch vehicle and all launch services to deliver mission to orbit	Provider: SpaceX Lead Center: KSC Performing Center(s): KSC Cost Share Partner(s): N/A	N/A

Project Risks

Risk Statement	Mitigation
If: Planned tests and the model validation campaign are insufficient to produce a fully validated flight model due to the complexity and difficulty (such as parasitic heat leak or insufficient vacuum level) of each cryogenic thermal balance test, and the difficulty of stitching test results together to emulate an end-to-end test, Then: The project will need additional cost and time to augment the model or replan the test sequence.	The project completed early risk reduction prototype activities and has developed a detailed test plan campaign, followed by a review of the test campaign focusing on test implementation, model validation, and detailed modeling of the test configuration. After these activities, the project will conduct a test readiness review prior to the testing and evaluate success criteria after each test result during testing. Three thermal balance tests will be completed and results combined for model correlation. These include the External Thermal Balance Test, Internal Thermal Balance Test, and Observatory Thermal Balance Test. The External Thermal Balance test was successfully conducted with the test results meeting pre-test expectations.

Acquisition Strategy

JPL has initiated subcontracts for the major flight and ground support components. NASA contracted directly with UCLA for the Survey Director, investigation team and associated efforts. NASA contracted directly with Caltech/IPAC for SDS.

MAJOR CONTRACTS/AWARDS

Element	Vendor	Location (of work performance)
Survey director and investigation team	University of California, Los Angeles	Los Angeles, CA

NEAR EARTH OBJECTS SURVEYOR

Formulation	Development	Operations

Element	Vendor	Location (of work performance)
Instrument CEA, CEU, instrument I&T, and Focal Plane Modules	Space Dynamics Laboratory (SDL)	Logan, UT
Instrument components, spacecraft bus, and observatory I&T	BAE Systems	Boulder, CO
Mission Operations	Laboratory for Atmospheric and Space Physics (LASP)	Boulder, CO

INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	SRB	Jul 2026	System Integration Review	TBD
Performance	ORR	Aug 2027	Flight Readiness Review	TBD
Performance	SRB	Aug 2027	Operational Readiness Review	TBD

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Near Earth Object Observations	--	--	**41.0**	45.2	47.5	47.5	48.7
Total Budget	**--**	**--**	**41.0**	**45.2**	**47.5**	**47.5**	**48.7**

Mission Planning and Other Projects

NEAR-EARTH OBJECT OBSERVATIONS (NEOO)

The NEOO project funds work that uses ground and space-based assets to search for Near-Earth Objects (NEOs) that have potential to collide with Earth and characterize them to assess if any could do significant damage at the surface of our planet. NEOs range in size from a few meters to approximately 34 kilometers. There are over 40,000 known NEOs, and over 11,500 of them are larger than 140 meters in size. NASA estimates that there are still over 13,000 NEOs left to find in this size range.

The NEOO project supports a network of activities including search and characterization observatories, and the data processing and analysis required to understand the orbits and nature of the near-Earth population of small bodies. In accordance with the findings and recommendations of the Planetary Science and Astrobiology Decadal Survey (2022), as well as NASA's action plan in response to the updated National Preparedness Strategy and Action Plan for Planetary Defense (2023), NASA continues to:

- Increase collection of NEO detection and characterization data by the Catalina Sky Survey, the Panoramic Survey Telescope and Rapid Reporting System, and the United States Space Force’s Space Surveillance Telescope located in Exmouth, Australia.
- Support the operation of the four small telescope wide field survey sites called the Asteroid Terrestrial-impact Last Alert System, designed to detect smaller asteroids as they approach the Earth and warn of any imminent impact, two of which operate at southern hemisphere sites.
- Support data processing and analysis activities critical for planetary defense: The Minor Planet Center (MPC), which is the internationally recognized repository for small body position measurements operated as a sub-node of NASA's Planetary Data System Small Bodies Node, and the Center for Near-Earth Object Studies, which utilizes MPC data to calculate precise orbits for NEOs and identify any NEO impact threats to Earth.
- Support the continued and enhanced operation of low-power planetary radar capabilities on NASA’s Deep Space Network during upgrade activities on its DSS-14 antenna and Solar System Radar facility and support the processing and archiving of radar data from the decommissioned 305-meter telescope at the NSF’s Arecibo Observatory.
- Utilize NASA's Infrared Telescope Facility (IRTF) for targeted measurement of physical characteristics of NEOs.
- Support NEO research teams at multiple universities and space science institutes using their access to research telescopes to observe and characterize the nature of asteroids and comets which can closely approach Earth.

OTHER MISSIONS AND DATA ANALYSIS

- Investigate both ground and space-based concepts for increasing capacity to detect, track, and characterize NEOs of all sizes.

Since NASA's NEO search efforts started in 1998, NEOO research has found over 96 percent of the estimated population of these objects that are one kilometer and larger, and about 46 percent of all those larger than 140 meters in size. NEOs discovered and characterized by the project may be viable targets for future robotic and human exploration, and possible eventual candidates for asteroid resource utilization operations.

The IRTF is NASA's infrared-optimized three-meter telescope at an altitude of 13,600 feet on the dormant volcano Mauna Kea on the Big Island of Hawai'i. The NEOO project fully funds IRTF operations, which is a primary NASA planetary defense asset for NEO physical characterization. IRTF continues its mission of strategic support of NASA flight missions and science goals in both planetary science and astrophysics while being on-call for rapid response observations of NEO targets of opportunity and potential threats.

In FY 2027, NEOO data processing and threat identification capabilities will continue modernization and upgrade efforts in preparation for the expected increase in data volume from next-generation NEO search telescopes such as NEO Surveyor.

LUNAR DISCOVERY AND EXPLORATION

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Other Missions and Data Analysis	--	--	204.0	218.8	234.2	234.6	234.6
Total Budget	**--**	**--**	**204.0**	**218.8**	**234.2**	**234.6**	**234.6**

This image shows the shadow of Firefly Aerospace's Blue Ghost Mission 1, one of NASA's Commercial Lunar Payload Services awards, after landing upright and stable at Moon's Sea of Crises on March 2, 2025. Ten NASA payloads successfully completed operations over 14 days on the Moon.

NASA's lunar discovery and exploration strategy will provide an innovative and sustainable approach to scientific and human exploration, with both commercial and international collaborators to enable human expansion across the solar system and bring new knowledge and opportunities back to Earth. The agency will achieve these accomplishments with emerging commercial capabilities and innovative approaches to achieving human and science exploration goals, including the return of humans to the Moon.

The Lunar Discovery and Exploration Program (LDEP) in SMD is a key component of the agency's exploration strategy and leads all lunar science strategy, instrumentation development, and training for the human and robotic return to the Moon. LDEP continues operations of the Lunar Reconnaissance Orbiter (LRO) and develops lunar science instruments and other payloads for robotic and crewed missions, long-term exploration, and utilization needs. LDEP also develops Artemis Deployed Instrument payloads to be delivered by astronauts on Artemis missions in addition to establishing the integrated lunar science strategy for the agency. LDEP will provide innovative investigations to enhance lunar exploration and science by developing technical capabilities and increased commercialization for an expanded range of lunar services. For example, LDEP will focus on instrumentation to advance knowledge and technologies required to characterize the form, abundance, and distribution of local resources, such as lunar water ice. Working with the science and human exploration communities, our international partners, and U.S. industry, LDEP is defining the goals and objectives for a robust and sustainable lunar science program.

In collaboration with private industry and the scientific community, the program is developing lunar surface payloads (and supporting orbital payloads). These payloads address the nation's lunar exploration, science, and technology demonstration goals as defined in NASA's Moon To Mars objectives. The most recent National Academies of Sciences Planetary Decadal Survey (Origins, Worlds, and Life: A Decadal Strategy for Planetary Science and Astrobiology 2023-2032) emphasized the need to continue supporting commercial innovation and collaboration initiatives to accomplish lunar, and beyond, exploration and science initiatives. The Artemis Deployed Instruments activities will enable greater Artemis science in service of these community goals.

LUNAR DISCOVERY AND EXPLORATION

EXPLANATION OF MAJOR CHANGES IN FY 2027

The budget supports increased funding for scientific instruments on future Artemis missions including: Artemis handheld (HH) instruments, Artemis crew deployed instruments, and Artemis Lunar Terrain Vehicle instruments. The Artemis crew will use HH instruments to take measurements on the lunar surface to aid in selection of samples for return and reduce risk for field geology investigations. The budget continues to fund previously awarded Development and Advancement of Lunar Instrumentation (DALI) selections. NASA initiated a new effort called Lunar Volatiles Science using the Volatiles Investigating Polar Exploration Rover (VIPER) rover as part of a Commercial Lunar Payload Service (CLPS) task order to deliver the rover to the lunar surface. See the Lunar Future project description for more details.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

In FY 2027, LDEP will deliver payloads for integration onto multiple CLPS deliveries. Mission operations expect to conduct payload investigations; subsequent data archival from these CLPS deliveries will also return valuable science and technology results back into the community. Examples of CLPS deliveries to be conducted in this timeframe are Intuitive Machines' third commercial mission. This mission will include LDEP's first Payloads Research Investigations on the Surface of the Moon payload (PRISM) instrument suite and Lunar Vertex, as well as two additional international payloads: a radiation sensor from South Korea and a retroreflector from ESA. Additionally, LuSEE Night, the S-Band User Terminal, and an international communications relay will all be launched and be operated via the Firefly Aerospace lander, Blue Ghost Mission-2 (BGM-2) and its transfer vehicle. Draper's first CLPS mission will deliver the Farside Seismic Suite (FSS), The Lunar Interior Temperature and Materials Suite (LITMS), and the Lunar Surface Electromagnetics Experiment (LuSEE-Lite). Intuitive Machines' IM-4 will also deliver six NASA-sponsored payloads to the lunar surface, including LEIA, another PRISM payload focused on biological investigations.

LDEP plans to begin funding the second of two PRISM-4 instrument suite awards for delivery to the lunar surface in the FY 2030 timeframe. For Artemis Deployed Instruments, LDEP will also deliver the final deployed payload flight models for integration in preparation for the first Artemis lunar Landing mission.

LRO has been in operation since 2009 and will commence its sixth extended mission period. LRO will continue to conduct priority science investigations and acquire valuable datasets that provide support for commercial lunar deliveries and for human exploration.

NASA's Lunar Volatiles Science effort, using the VIPER rover, will complete integration and preparation for launch and landing on the Moon in FY 2027. It is expected to launch at the end of FY 2027 and begin surface operations.

LDEP will release several major solicitations in FY 2027, including: Campaign Science instruments for delivery with CLPS, the Lunar Terrain Vehicle Science Team, the Second Artemis Participating Scientist Program (A4PSP), and award the next community-based Artemis Geology Team (A4GT).

LUNAR DISCOVERY AND EXPLORATION

Program Schedule

Date	Significant Event
Q1 FY 2027	Instruments operations (LuSEE-Night, S-Band User Terminal, and calibration source) on CLPS Landing: Firefly BGM-2/CS-3/4*
Q1 FY 2027	Award of the next A4GT
Q1 FY 2027	Solicitation release for the second A4PSP cohort
Q1 FY 2027	Completion of first set of Artemis Deployed Instruments to be ready for integration onto HLS and for training of crew
Q1 FY 2027	Begin development of 2nd awarded PRISM-4 instrument suite
Q1 FY 2027	Instrument operations (Lunar Vertex, Korea Astronomy and Space Science Institute (KASI) Lunar Space Environment Monitor (LUSEM), ESA MoonLIGHT Pointing Actuator (MPAc), LDES) on CLPS Launch: Intuitive Machines-3*
Q2 FY 2027	Delivery of VIPER for integration onto Blue Origin Mk1 SN-1 lunar lander
Q2 FY 2027	Solicitation release for campaign science instruments for CLPS delivery
Q2 FY 2027	Solicitation release for Lunar Terrain Vehicle Science Team
Q4 FY 2027	Instruments operations (FSS, LITMS, LuSEE-Lite) on CLPS Launch: Draper*
Second half of FY 2027	Instruments operations (Lunar Explorer Instrument for space biology Applications (LEIA), Magnetometer (MAG), ESA Prospect, Lunar Compact Infrared Imaging System (L-CIRIS), Laser Retroreflector Array (LRA), Surface and Exosphere Alterations by Landers (SEAL) on CLPS Launch: Intuitive Machines-4*
FY 2027	Delivery of CLPS payloads to vendors for integration (six payloads for FF, BGM-3 each; three payloads for Draper)

**NASA does not manage the launch vehicle portion of the CLPS effort and does not ultimately control final launch schedules of the selected providers that will deliver NASA and other provider-provided payloads. NASA will work with the CLPS vendors to ensure timely and successful launch and delivery of all science and technology payloads.*

Program Management & Commitments

The Planetary Missions Program Office (PMPO) located at MSFC is responsible for managing the LRO mission as well as Lunar Surface Instrument and Technology Payloads, PRISM payloads, and Artemis Deployed Instruments.

Program Element	Provider
LRO	Provider: GSFC Lead Center: GSFC Performing Center(s): GSFC, JPL Cost Share Partner(s): N/A

LUNAR DISCOVERY AND EXPLORATION

Program Element	Provider
Lunar Instruments	Provider: Various Lead Center: HQ Performing Center(s): N/A Cost Share Partner(s): N/A
Artemis Deployed Instruments-1	Provider: University of Maryland, Baltimore County (LEMS); Space Lab Technologies, LLC (LEAF); University of Tokyo (LDA) Lead Center: MSFC/PMPO Performing Center(s): Goddard Space Flight Center (LEMS), Ames Research Center (LEAF) Cost Share Partner(s): Biological & Physical Sciences Division (LEAF); JAXA (LDA)
Artemis Deployed Instruments-2	Provider: JPL (SPSS); University of CO-Boulder (DUSTER) Lead Center: MSFC/PMPO Performing Center(s): JPL Cost Share Partner(s): N/A
Lunar Terrain Vehicle Instruments	Provider: University of Hawaii-Manoa (L-MAPS); Arizona State University (AIRES) Lead Center: MSFC/PMPO Performing Center(s): N/A Cost Share Partner(s): N/A
DALI	Provider: Various Lead Center: HQ Performing Center(s): ARC, GRC, GSFC Cost Share Partner(s): N/A
PRISM-1	Provider: JPL, Applied Physics Laboratory (APL), Southwest Research Institute (SwRI) Lead Center: MSFC/PMPO Performing Center(s): JPL (Farside Seismic Suite) Cost Share Partner(s): N/A
Artemis Instruments	Provider: Various Lead Center: HQ Performing Center(s): N/A Cost Share Partner(s): N/A
Lunar Management	Provider: HQ, MSFC Lead Center: HQ, MSFC/PMPO Performing Center(s): MSFC Cost Share Partner(s): N/A

LUNAR DISCOVERY AND EXPLORATION

Program Element	Provider
PRISM-2	Provider: ARC, University of Central Florida (UCF) Lead Center: MSFC/PMPO Performing Center(s): ARC Cost Share Partner(s): N/A
PRISM-3	Provider: SwRI Lead Center: MSFC/PMPO Performing Center(s): N/A Cost Share Partner(s): N/A
Lunar International Mission Contributions - ShadowCam	Provider: Various Lead Center: HQ Performing Center(s): JSC, GSFC, JPL Cost Share Partner(s): Korea AeroSpace Administration (KASA)

ACQUISITION STRATEGY

NASA uses its established solicitation mechanisms, such as the Research Opportunities in Space and Earth Science (ROSES) and NASA Research Announcements (NRA), to select and develop exploration, scientific, and technology development payloads for delivery to the Moon. This is how NASA established the PRISM, Artemis Deployed Instrument, and Lunar Terrain Vehicle Instrument payloads, which are solicited through the ROSES call. In some cases, NASA may direct a NASA center to develop a lunar capability or surface payload when it is in the government's best interest, such as when that capability supports multiple NASA applications or when a commercial entity or international stakeholder identifies a near-term opportunity for a lunar surface mission on a timeframe that does not support competitive selection. To the maximum extent possible, NASA will leverage competitive solicitations for science instrument procurement and commercial services.

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Lunar Instruments	--	--	**46.4**	67.4	107.8	88.5	87.8
Payloads and RI on Surface of the Moon-1	--	--	**1.3**	0.5	0.0	0.0	0.0
Payloads and RI on Surface of the Moon-2	--	--	**4.5**	3.3	0.0	0.0	0.0
Payloads and RI on Surface of the Moon-3	--	--	**4.7**	1.8	0.4	0.1	0.0
Artemis Instruments	--	--	**18.0**	13.0	59.0	69.5	70.5
Artemis Deployed Instruments-1	--	--	**1.3**	0.0	0.0	0.0	0.0
Lunar Intl Mission Collaborations	--	--	**2.0**	1.2	0.0	0.0	0.0
DALI	--	--	**5.6**	2.3	0.0	0.0	0.0
Lunar Science	--	--	**22.0**	27.2	27.7	27.7	27.7
Lunar Management	--	--	**12.8**	9.2	9.0	9.1	9.0
Lunar Future	--	--	**42.7**	34.0	0.3	0.7	0.6
Lunar Reconnaissance Orbiter (LRO)	--	--	**22.0**	22.0	22.0	22.0	22.0
PRISM-Stand-alone Landing Site-Agnostic	--	--	**11.0**	10.0	5.0	15.0	15.0
Lunar Terrain Vehicle Instruments	--	--	**1.8**	12.0	3.0	2.0	2.0
Artemis Deployed Instruments-2	--	--	**8.0**	15.0	0.0	0.0	0.0
Total Budget	**--**	**--**	**204.0**	**218.8**	**234.2**	**234.6**	**234.6**

Mission Planning and Other Projects

Other Missions and Data Analysis includes mission planning, small missions in development, instrument and technology development, operating missions, international collaborations, management activities, and funding for future instrument and mission selections.

LUNAR INSTRUMENTS

NASA is developing instruments and technology payloads to manifest on Commercial Lunar Payload Services (CLPS) deliveries and international lunar lander missions. These instruments come from U.S. academia, industry, and from NASA centers. NASA has manifested NASA Provided Lunar Payloads, Lunar Surface Instrument and Technology Payloads (LSITP), and Payloads and Research Investigations on the Surface of the Moon (PRISM) payloads on CLPS deliveries with launch and deliveries starting in 2024 and continuing through FY 2030 with current awards. PRISM builds on lessons learned from earlier payload developments and continues to advance science through recurring competitions for new payload suites.

The Lunar Surface Electromagnetics Experiment (LuSEE) Night instrument builds on the smaller LuSEE instrument originally selected as an LSITP payload. The pathfinder measurements enabled by LuSEE Night will be extremely valuable for understanding the radio-quiet lunar far side environment and the Dark Ages phase of the universe. LuSEE Night is a partnership between NASA and U.S. DoE. LuSEE Night is manifested on a CLPS delivery scheduled to launch in late 2025/early 2026.

OTHER MISSIONS AND DATA ANALYSIS

LAFORGE is a U.S. lunar instrument development that was planned to be flown on a CSA Rover. In March 2025, it was announced that the rover was canceled by CSA. NASA is working options for alternative delivery approaches on CLPS. LAFORGE is an imaging infrared radiometer to better create temperature maps in cold, permanently shadowed regions of the Moon. The Applied Physics Laboratory is leading the development.

PAYLOADS AND RESEARCH INVESTIGATIONS ON THE SURFACE OF THE MOON (PRISM) - 1

The PRISM instrument selections will take the next leap forward in addressing National Academies' decadal priorities and continue to help NASA develop science-driven payloads for manifesting on future CLPS deliveries. NASA made three PRISM-1 selections in June 2021 and will deliver the first of these payloads to high science-value locations on the lunar surface as early as the second half of CY 2026: the Reiner Gamma albedo swirl on the lunar nearside. Subsequently, the second/third payloads to Schrödinger Basin on the lunar far side will occur in 2027. This innovative approach for soliciting science investigations and technology demonstration payloads for future deliveries by CLPS providers will enable decadal-caliber science at the Moon and support the Artemis campaign. The three PRISM-1 selections were: Lunar Vertex (LVx) which is a combination of stationary lander payloads and a rover that will make detailed measurements of the magnetic field, plasma environment, and regolith properties; Farside Seismic Suite (FSS) which will return NASA's first lunar seismic data from the far side of the Moon; and Lunar Interior Temperature and Materials Suite (LITMS), a suite of two instruments which aims to investigate the heat flow and subsurface electrical conductivity structure of the lunar interior in Schrödinger Basin. LVx is on the CLPS manifest awarded to Intuitive Machines's third task order with lunar surface delivery of these payloads no earlier than the second half of CY 2026. FSS and LITMS are both manifested on a CLPS delivery awarded to Draper Laboratory. Draper will deliver these PRISM science investigations to the far side of the Moon no earlier than 2027.

PAYLOADS AND RESEARCH INVESTIGATIONS ON THE SURFACE OF THE MOON (PRISM) - 2

CLPS will deliver the PRISM-2 selections to the lunar South Pole and the Gruithuisen Domes. The solicitation focused on volcanism in the mid-latitudes and environmental monitoring at the south polar region, the latter of which will support Artemis crewed missions. NASA selected the PRISM-2 science instrument suites in July 2022. The Gruithuisen Domes delivery is to a region of silicic late-stage volcanism and will help us understand the volcanic history of the Moon. The Lunar Vulkan Imaging and Spectroscopy Explorer investigation consists of a suite of five instruments, two mounted on a stationary lander and three on a mobile rover provided as a service by the CLPS vendor. The Lunar Explorer Instrument for space biology Applications (LEIA) science suite is a small CubeSat-based device. LEIA will provide biological research on the Moon by delivering yeast to the lunar surface and studying its response to radiation and lunar gravity.

PAYLOADS AND RESEARCH INVESTIGATIONS ON THE SURFACE OF THE MOON (PRISM) - 3

NASA selected the PRISM-3 payload in July 2023. The Dating an Irregular Mare Patch with a Lunar Explorer instrument suite will investigate the Ina Irregular Mare Patch, discovered in 1971 by Apollo 15 orbital images. Learning more about this mound will address outstanding questions about the evolution of the Moon, which can provide clues to the history of the entire solar system. The scientific payload will establish the age and composition of hilly terrain created by volcanic activity on the near side of the Moon. This PRISM call was the first that allowed proposers to choose and justify a particular landing site for conducting high-priority lunar science investigations.

PAYLOADS AND RESEARCH INVESTIGATIONS ON THE SURFACE OF THE MOON: STAND ALONE LANDING SITE AGNOSTIC (PRISM-SALSA)

PRISM-SALSA solicits individual instruments that are destination agnostic across the lunar surface. These stand-alone instruments whose science may be completed at any lunar surface destination will fly on CLPS deliveries in conjunction with other science investigations or be co-manifested on other NASA mission directorates' or international partners' spacecrafts. NASA has selected three instruments for delivery to the lunar surface by a CLPS provider in the FY 2028-2029 timeframe.

ARTEMIS INSTRUMENTS

Artemis instruments funds the Artemis Deployed Instruments that will be deployed by astronauts on crewed Artemis landings. NASA awarded the initial set of Artemis Deployed instruments call in March 2024 and recently announced the second set of Artemis Deployed Instruments in December 2025. Additional instruments for the Lunar Terrain Vehicle and other areas are in development as described below. The first two sets of Artemis Deployed Instruments, originally named "A3DI" and "A4DI" remain in development and will be flown on the first several Artemis crewed lunar surface missions based on vehicle performance and accommodability.

ARTEMIS DEPLOYED INSTRUMENTS-1

NASA solicited for the first set of Artemis Deployed Instruments in May 2023 and made selections in March 2024. These instrument selections were based on the ability to be scientifically relevant at any of the current 13 lunar surface destinations identified for an Artemis lunar landing and the ability to be ready as early as 2027. The instruments will address three Artemis science objectives: understanding planetary processes, understanding the character and origin of lunar polar volatiles, and investigating and mitigating exploration risks. They were specifically chosen because of their unique installation requirements that necessitate deployment by humans during moonwalks. The three instruments selected as part of the solicitation were the Lunar Environment Monitoring Station (LEMS), the Lunar Effects on Agricultural Flora (LEAF), and the Lunar Dielectric Analyzer (LDA). The Artemis Lunar Laser Retroreflector (ALLR) was also chosen to be part of the Artemis deployed instrument manifest.

The LEMS is a compact, autonomous seismometer suite designed to carry out continuous, long-term monitoring of the seismic environment, namely ground motion from moonquakes in the lunar south polar region. The instrument will characterize the regional structure of the Moon’s crust and mantle, which will add valuable information to lunar formation and evolution models.

LEAF will investigate the lunar surface environment’s effects on space crops. LEAF will be the first experiment to observe plant photosynthesis, growth, and systemic stress responses in space-radiation and partial gravity. Plant growth and development data, along with environmental parameters measured by

LEAF, will help scientists understand the use of plants grown on the Moon for both human nutrition and life support on the Moon and beyond.

The LDA will measure the regolith’s ability to propagate an electric field, which is a key parameter in the search for lunar volatiles, especially ice. It will gather essential information about the structure of the Moon’s subsurface, monitor dielectric changes caused by the changing angle of the Sun as the Moon rotates, and look for possible frost formation or ice deposits.

The ALLR, a crucial instrument designed to be placed on the Moon's surface, will precisely measure distances between Earth and the Moon, aiding in understanding lunar geology, internal structure, and precise positioning for future astronauts, building on Apollo-era reflectors but offering far greater accuracy for lunar science and exploration.

ARTEMIS DEPLOYED INSTRUMENTS-2

NASA released the second Artemis Deployed Instruments solicitation in November 2024 and made two instrument selections in December 2025. The instruments will address three Moon to Mars science objectives: understanding planetary processes, understanding the character and origin of lunar polar volatiles, and investigating and mitigating exploration risks. They were specifically chosen because of their unique installation requirements that necessitate deployment by humans during moonwalks.

The knowledge gained from the DUst and plaSma environmenT survEyoR (DUSTER) investigation will help mitigate hazards to human health and exploration. Consisting of a set of instruments mounted on a small autonomous rover, DUSTER will characterize dust and plasma around the landing site. These measurements will advance understanding of the Moon’s natural dust and plasma environment and how that environment responds to the human presence, including any disturbance during crew exploration activities and lander liftoff. The DUSTER instrument suite is led by Xu Wang of the University of Colorado Boulder.

Data from the South Pole Seismic Station (SPSS) will enable scientists to characterize the lunar interior structure to better understand the geologic processes that affect planetary bodies. The seismometer will help determine the current rate at which the Moon is struck by meteorite impacts, monitor the real-time seismic environment and how it can affect operations for astronauts, and determine properties of the Moon’s deep interior. The crew will additionally perform an active-source experiment using a “thumper” that creates seismic energy to survey the shallow structure around the landing site. The SPSS instrument is led by Mark Panning of NASA’s JPL in Southern California.

LUNAR TERRAIN VEHICLE INSTRUMENTS

NASA has selected three instruments to travel to the Moon, with two planned for integration onto a Lunar Terrain Vehicle (LTV) and one for a future orbital opportunity. The LTV is part of NASA’s efforts to explore the lunar surface as part of the Artemis campaign and is the first crew-driven vehicle to operate on the Moon in more than 50 years. By combining the best of human and robotic exploration, the science instruments selected for the LTV will make discoveries that inform us about Earth’s nearest neighbor as well as benefit the health and safety of our astronauts and spacecraft on the Moon.

The Artemis Infrared Reflectance and Emission Spectrometer (AIRES) will identify, quantify, and map lunar minerals and volatiles, which are materials that evaporate easily like water, ammonia, or carbon dioxide. The instrument will capture spectral data overlaid on visible light images of both specific features of interest and broad panoramas to discover the distribution of minerals and volatiles across the Moon's south polar region. The AIRES instrument team is led by Phil Christensen from Arizona State University in Tempe.

The Lunar Microwave Active-Passive Spectrometer (L-MAPS) will help define what is below the Moon's surface and search for possible locations of ice. Containing both a spectrometer and a ground-penetrating radar, the instrument suite will measure temperature, density, and subsurface structures to more than 131 feet (40 meters) below the surface. The L-MAPS instrument team is led by Matthew Siegler from the University of Hawaii at Manoa.

In addition to the instruments selected for integration onto the LTV, NASA also selected the Ultra-Compact Imaging Spectrometer for the Moon (UCIS-Moon) for a future orbital flight opportunity. The instrument will provide regional context to the discoveries made from the LTV. From above, UCIS-Moon will map the Moon's geology and volatiles and measure how human activity affects those volatiles. The spectrometer also will help identify scientifically valuable areas for astronauts to collect lunar samples, while its wide-view images provide the overall context for where these samples will be collected. The UCIS-Moon instrument will provide the Moon's highest spatial resolution data of surface lunar water, mineral makeup, and thermophysical properties. The UCIS-Moon instrument team is led by Abigail Fraeman from NASA's JPL in Southern California.

LUNAR INTERNATIONAL MISSION COLLABORATION

In developing collaborations with our international partners, NASA funds U.S. participating science investigators and provides international collaborators with lunar landing site characterization data, as well as navigation and data relay services, in exchange for U.S. participation. Participation includes establishing U.S. scientists on the international instrument team, access to data returned from the mission, and assurance that participating scientists will publicly archive returned data in a manner consistent with NASA policies. NASA is also providing science instruments to fly on international missions. NASA is planning to contribute a Neutron Spectrometer to the JAXA Lunar Polar Exploration Mission rover, which is a partnership between JAXA and ISRO. NASA is also supporting extended operations for the NASA ShadowCam instrument on the Korean Lunar Pathfinder. NASA is additionally supporting research and analysis from a United Arab Emirates (UAE) and US. Department of Energy collaboration on a UAE Lunar Rover Mission, which will be delivered to the lunar surface via the Firefly BGM-2 mission.

DEVELOPMENT AND ADVANCEMENT OF LUNAR INSTRUMENTATION (DALI)

DALI focuses on advancing the development of spacecraft-based instruments that show promise for use in future lunar missions, including expected commercial ventures. DALI activities develop and demonstrate lunar science instruments to the point where principal investigators may propose their use in response to future announcements of flight opportunity without additional extensive technology development. DALI focuses on instruments with technology readiness levels four through six and may solicit for new technologies related to specific science or technology gaps such as astronaut handheld instrument technologies. With this budget, NASA will finish funding already selected DALI awards by FY 2028.

OTHER MISSIONS AND DATA ANALYSIS

LUNAR SCIENCE

NASA is maximizing the lunar science achieved in this era of lunar exploration through science planning support for Artemis architecture formulation, including support for tool development and astronaut geology training. This project also supports Artemis-specific curation activities to prepare for the return of new lunar samples, such as those containing volatiles or requiring cold curation. It supports surface operations development, including analog activities to help NASA develop a real-time science support room structure and science team integration. Development of the Science Evaluation Room in Mission Control was completed in July 2025 and will be used to support real-time science ops for Artemis II and beyond. In addition, targeted research and analysis funding will prepare the lunar community to take maximum advantage of data and samples from Artemis and CLPS.

LUNAR MANAGEMENT

The Planetary Missions Program Office (PMPO) at MSFC manages Planetary Science flight projects that are not part of the Mars Exploration Program, including elements of the Lunar Discovery and Exploration Program (LDEP) portfolio, such as the LSITP and PRISM payloads selected for lunar delivery by CLPS landers as well as Artemis Instruments awards. PMPO provides programmatic, technical, and business management of these LDEP activities. Lunar Management also includes support for review boards and external technical support as needed and future mission studies.

LUNAR FUTURE

Lunar Future supports future activities, studies, instruments, and missions to enable longer-term lunar science and exploration goals. In 2022, the Planetary Science and Astrobiology Decadal Survey identified potential new strategic missions to accomplish on the Moon and NASA has conducted early preformulation studies for some selected concepts. As funding becomes available in future years, NASA will perform further studies to address these potential strategic missions as defined in the Decadal alongside other strategic goals for science and exploration near and on the Moon.

This budget includes funding for Lunar Volatiles Science activities using the Volatiles Investigating Polar Exploration Rover (VIPER). In September 2025, NASA awarded Blue Origin a CLPS task order with an option to deliver the VIPER rover to the Moon’s South Pole region. NASA’s VIPER will search for volatile resources, such as ice, on the lunar surface and collect science data to support future exploration at the Moon and Mars. NASA previously cancelled the VIPER project due to projected budget and schedule growth, and has since explored alternative approaches using the already developed VIPER hardware to achieve the agency’s goals of mapping potential off-planet resources, like water. Under the CLPS contract, Blue Origin will deliver VIPER to the surface in early FY 2028, and NASA will conduct the rover operations, science planning, and volatiles measurements.

Operating Missions

LUNAR RECONNAISSANCE ORBITER (LRO)

The LRO mission continues to conduct priority science investigations and acquire valuable data sets that provide support for commercial lunar deliveries under the CLPS project and for human exploration. LRO

OTHER MISSIONS AND DATA ANALYSIS

has contributed to a new understanding of the Moon and its evolution, which provides a foundation for understanding all other objects in our solar system, as well as solar systems beyond our own. LRO's investigations include a focus on lunar volatiles like ice and water and can help scientists answer questions about the nature of these volatiles. LRO has also been characterizing the thermal history of the Moon by identifying unusual volcanic features that may be geologically young, as well as tectonic features that reflect the continued gravitational pull from the Earth. Scientists use the instrument suite on LRO to characterize the rate at which volatiles move across the surface, the development of the regolith on different terrains, and the location and composition of unusual rock types on the surface.

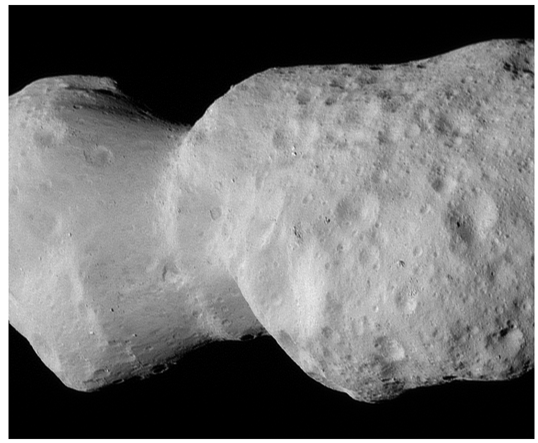
LRO's ongoing characterization of the lunar surface ultimately enables and reduces risk associated with commercial and human exploration initiatives. LRO will characterize areas that may contain volatiles at or near the surface as well as landing sites for upcoming U.S. commercial lunar lander missions. LRO is also providing data products to support current and future Artemis missions. LRO will begin its sixth Extended Mission and remains a key data source for lunar science as well as exploration risk reduction.

DISCOVERY

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Other Missions and Data Analysis	--	--	111.5	170.0	169.5	165.1	151.2
Total Budget	**--**	**--**	**111.5**	**170.0**	**169.5**	**165.1**	**151.2**

NASA's Discovery program supports competitively selected, investigator-led Planetary Science missions to explore the planets, their moons, and small bodies such as comets and asteroids. With a lower mission cost cap than most of NASA's other planetary missions, Discovery provides scientists the opportunity to propose innovative ways to unlock the mysteries of the solar system. The Discovery 2019 Announcement of Opportunity (AO) had a cost-cap of $500 million in FY 2019, excluding launch vehicle and mission operation costs. The Discovery Program also supports research based on completed Discovery missions.



Shown here is asteroid Donaldjohanson as seen by NASA's Lucy spacecraft during its flyby. This image by the Lucy Long-Range Reconnaissance Imager (L'LORRI) was taken April 20, 2025, from a range of approximately 660 miles (1,100 km). Credit: NASA/Goddard/SwRI/Johns Hopkins APL/NOIRLab

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

Lucy will perform its first two Trojan asteroid encounters: Eurybates and its moon Queta in August, and Polymele in September, operating farther from the Sun than any solar-powered spacecraft in history. JAXA will launch the Mars-moon Exploration with GAmma rays and NEutrons (MEGANE) instrument and P-Sampler technology demonstration on the Martian Moons eXploration (MMX) spacecraft, currently scheduled for launch in October 2026. BepiColombo, which includes the NASA-contributed STROFIO instrument, will enter its orbit around Mercury in November 2026.

DISCOVERY

Program Schedule

Date	Significant Event
FY 2027	JAXA launch of the MMX spacecraft including MEGANE and P-Sampler
FY 2027	Lucy flyby encounters with Jupiter Trojan asteroids Eurybates and moon Queta, and Polymele
FY 2028	Lucy flyby encounter with Jupiter Trojan asteroid Leucus
FY 2028	No earlier than date for release of Discovery AO
FY 2029	Psyche arrives at asteroid in August 2029
FY 2029	Lucy flyby encounter with Jupiter Trojan asteroid Orus
FY 2029	JAXA MMX spacecraft lands on Phobos; P-Sampler acquires sample

Program Management & Planned Cadence

The Discovery Program is a multiple-project program, with responsibility for implementation assigned to the Planetary Missions Program Office, located at MSFC. The Discovery Program has a launch cadence goal of 24 months. The current average launch cadence is 25.8 months.

Acquisition Strategy

NASA competitively selects new Discovery missions, releasing AOs when available funding allows.

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Psyche	--	--	**35.8**	37.4	47.5	46.9	41.9
Lucy	--	--	**34.7**	34.9	25.0	25.3	24.6
Strofio	--	--	**2.4**	2.4	0.4	0.0	0.0
International Mission Contributions (IMC	--	--	**8.5**	8.5	5.5	6.4	6.0
Planetary Management	--	--	**21.4**	33.8	37.9	33.8	27.0
Discovery Future	--	--	**0.0**	42.4	42.0	40.5	41.5
Discovery Research	--	--	**5.7**	7.1	7.9	8.7	9.2
Mars-moon Exploration with GAmma Rays an	--	--	**3.0**	3.4	3.3	3.5	1.1
Total Budget	**--**	**--**	111.5	**170.0**	**169.5**	**165.1**	**151.2**

Discovery Other Missions and Data Analysis funds research and analysis; management activities; operations of active missions; small projects and international collaborations; and future mission selections.

INTERNATIONAL MISSION CONTRIBUTIONS (IMC)

NASA works closely with other space agencies to find mutually beneficial opportunities to participate in each other’s missions. Contributions to international missions complement NASA-led planetary missions and expand the opportunities for the U.S. planetary science community to address scientific priorities identified in the Decadal Survey. Under IMC, NASA funds instruments and scientific investigators, and provides navigation and data relay services, in exchange for participation in mission science.

JAXA's extended mission, Hayabusa2, which will fly by L-type asteroid 2001 CC21 in 2026 and rendezvous with asteroid 1998 KY26 in 2031-2032, is an international mission for which NASA will provide communications and science support. Another partnership with JAXA, the Martian Moons eXploration (MMX) mission, is scheduled to launch in late 2026 and will orbit and land on the Martian moon Phobos, returning samples in the early 2030s. Contributions to MMX include the Mars-moon Exploration with Gamma rays and Neutrons (MEGANE) instrument (see below); and the Pneumatic Sampler technology demonstration, a hardware contribution that will complement the JAXA-developed core sampler by demonstrating the collection of surface and near-surface material using compressed gas jets.

Other international mission contributions are to the ESA/JAXA BepiColombo mission, which will enter Mercury's orbit in late 2026 carrying NASA's STart from a ROtating FIeld mass spectrOmeter (STROFIO) (see below) and the ESA Comet Interceptor mission, which launches in 2029, for which NASA provides science support.

IMC also supports competitively selected participating scientists or guest investigators on several international missions, including BepiColombo, MMX, and the ESA Hera mission; these augment and enhance the science teams of these international partner missions.

OTHER MISSIONS AND DATA ANALYSIS

PLANETARY MANAGEMENT

Planetary Management funds the NASA Planetary Science Division's institutional needs as well as programmatic assessments in support of the Planetary Science Division's strategic initiatives. This includes funding for the Planetary Missions Program Office (PMPO) at MSFC, which manages all Planetary Science flight programs outside the Mars Exploration Program. Additional programs include Discovery, New Frontiers, and Outer Planets and Ocean Worlds, as well as Planetary Defense flight missions. The PMPO funding includes support for the day-to-day efforts of the mission managers and business office, as well as independent review boards and external technical support for the missions. Planetary Management also funds the Science Office for Mission Assessments at LaRC to support the proposal evaluation process for all competed missions, as well as the formation and operation of independent review panels to evaluate mission proposals.

DISCOVERY FUTURE

Discovery Future funds mission concept development during step one of the Announcement of Opportunity (AO) down-select process and provides funding for future Discovery mission selections. The next Discovery AO is no earlier than 2028.

DISCOVERY RESEARCH

Discovery Research funds analysis of archived data from Discovery missions and supports participating scientists on Discovery missions, including the Lucy mission, who augment and enhance mission science teams. Discovery Research provides the research community access to data, enabling research to continue for many years after mission completion. Participating scientists bring new ideas to mission teams and frequently provide a pathway for early career investigators to gain experience with planetary missions. This program supports efforts to maximize science return from each of the missions. NASA solicits planetary research proposals from the U.S. planetary science community and evaluates them for selection through competitive peer review.

The Discovery Data Analysis Program element has provided support for continued analysis of spacecraft data from missions such as the Near-Earth Asteroid Rendezvous (NEAR)-Shoemaker; Stardust; Stardust-New Exploration of Tempel; Genesis; Deep Impact; MErcury Surface, Space ENvironment, Geochemistry and Ranging; Dawn; Magellan; Rosetta; Kepler; Lucy; and Psyche. There are also missions in transit to their target destination that will be within scope for this research program, including BepiColombo. The supported projects conduct new scientific inquiries and regularly obtain new scientific results, increasing the science return of these missions.

MEGANE

The Mars-moon Exploration with Gamma rays and Neutrons (MEGANE, also Japanese for "eyeglasses") instrument is a gamma-ray and neutron spectrometer developed by the Johns Hopkins University Applied Physics Laboratory, as a contribution to the JAXA MMX mission. Planned for launch in fall 2026, MMX will operate near the Martian moons Phobos and Deimos for approximately four years and return a sample from Phobos to Earth in 2031. MEGANE will measure the bulk composition of the near-surface materials on Phobos to constrain theories for the origin of the moons. It will also map the near-surface materials on Phobos to enable the study of surface processes and support MMX sample site selection.

OTHER MISSIONS AND DATA ANALYSIS

Operating Missions

LUCY

NASA's Lucy mission launched in October 2021 to explore a diverse population of small bodies known as the Jupiter Trojan asteroids. The Trojans are remnants of our early solar system, now trapped in stable orbits associated with Jupiter. The two "swarms" lead and follow Jupiter in its orbit around the Sun and are almost as numerous as the objects in the Main Asteroid Belt. Over its 12-year primary mission, Lucy will explore a record-breaking number of asteroids, flying by two main-belt asteroids and seven Trojan asteroids. Lucy will arrive at its first prime mission target in August 2027.

Solar System formation models suggest that the Trojans are remnants of the same primordial material that formed the outer planets, serving as time capsules from the birth of our solar system. These bodies hold vital clues to deciphering the history of our solar system and may even tell us about the kinds of organic materials supplied to the early Earth. Lucy's objectives are to determine the range of properties, origins, and histories of the Trojan asteroids by mapping their surface geologies, measuring their colors and compositions, and determining their masses and densities, as well as searching for satellites and/or rings that might exist.

PSYCHE

The Psyche mission launched in October 2023 and will explore one of the most intriguing targets in the main asteroid belt: a giant metal-rich asteroid known as 16 Psyche. This asteroid measures approximately 140 miles in diameter and, unlike most other asteroids that are rocky or icy bodies, is likely comprised mostly of metallic iron and nickel, similar to Earth's core. The mission will help scientists understand how planets and other bodies separated into their layers, including cores, mantles, and crusts, early in their histories. Psyche will arrive in 2029 at 16 Psyche, where the spacecraft will spend more than two years in four different orbits. Each orbit will be at a different distance from the asteroid, allowing the team to study its shape and magnetic field, topography and spectral characteristics, gravitational field, and elemental compositions.

STROFIO

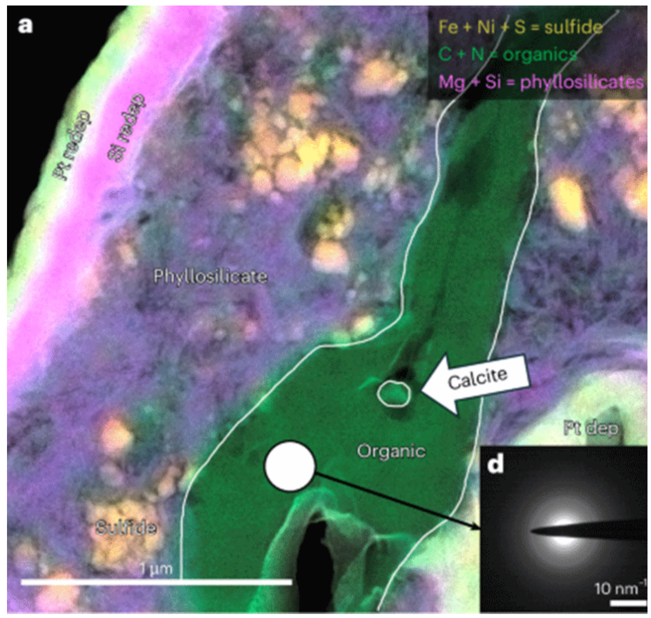
STROFIO is a unique mass spectrometer that is part of the suite of instruments flown onboard the joint ESA and JAXA BepiColombo spacecraft. Launched on October 20, 2018, and planned to enter Mercury orbit in November 2026 and begin science observations in early 2027, STROFIO will study and characterize the chemical composition and dynamics of Mercury's thin atmosphere (exosphere). Ten NASA-funded scientists serve as interdisciplinary scientists, guest investigators, or instrument co-investigators on the BepiColombo Science Team. These investigators collaborate with the BepiColombo team, bringing their expertise to improve understanding of Mercury and its surrounding space environment.

NEW FRONTIERS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Dragonfly	--	--	423.9	344.2	46.6	44.2	30.9
Other Missions and Data Analysis	--	--	6.4	69.7	262.6	337.9	435.6
Total Budget	--	--	430.3	413.9	309.2	382.1	466.5

The New Frontiers program is focused on planetary science investigations using innovative and efficient management approaches. The program's prime objective is to answer unique science questions in the exploration of the solar system. Initiated in 2003, the New Frontiers Program solicits medium-class planetary science missions with high scientific priority and value, led by principal investigators. The program emphasizes competed and peer-reviewed missions accomplished under the leadership of the scientific research community and aligned with the scientific goals of the Planetary Science Decadal Survey.



Electron microscopy image of a small portion of the asteroid sample returned by OSIRIS-REx shows organic material produced in cryogenic reactions (green area) trapped within other minerals altered by much warmer liquid water (purple area). Their coexistence shows Bennu's parent body experienced dramatically different environments, highlighting the range of environments present in the early solar system

Credit: NASA/Ames/ Lawrence Berkeley National Lab /Sanford/Gainsforth

Since its inception, the program has successfully launched three missions, one to study Pluto (New Horizons), a second to study Jupiter (Juno), and a third to return samples from the Bennu asteroid (Origins, Spectral Interpretation, Resource Identification, Security, Regolith Explorer [OSIRIS-REx]). A fourth mission to study the surface of Saturn's moon, Titan, is currently in development (Dragonfly).

The program also supports continued research and data analysis from its missions. NASA issues annual calls for proposals and awards research grants based primarily upon their scientific merit. These grants broaden participation in the missions, produce new discoveries, and train the next generation of scientists.

EXPLANATION OF MAJOR CHANGES IN FY 2027

Funding is increased for the Dragonfly mission consistent with the budget approved at mission confirmation. This increase will not affect the life cycle cost.

NEW FRONTIERS

PROGRAM SCHEDULE

Date	Significant Event
Q2 2026	New Frontiers Data Analysis Program solicitation
FY 2027	Release of New Frontiers 5 Announcement of Opportunity (AO) solicitation
Q4 2028	Dragonfly Launch Readiness Date
FY 2029	Select fifth New Frontiers mission

PROGRAM MANAGEMENT & PLANNED CADENCE

The New Frontiers Program is a multi-project program, with responsibility for implementation assigned to the Planetary Missions Program Office located at MSFC.

The New Frontiers Program has a launch cadence goal of five years. The current average launch cadence has lengthened to 7.6 years.

ACQUISITION STRATEGY

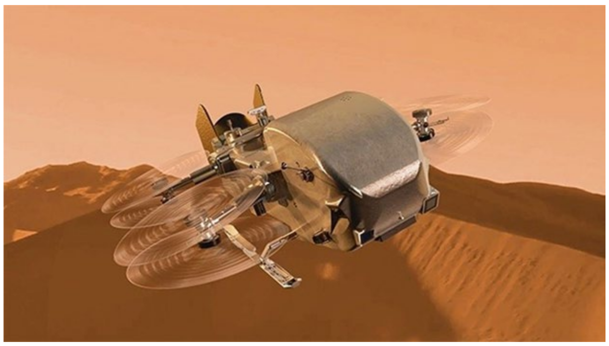
NASA competitively selects New Frontiers missions, releasing AOs when available funding allows.

DRAGONFLY

Formulation	Development	Operations

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	423.9	344.2	46.6	44.2	30.9



Shown here is an artist's impression of Dragonfly soaring over the dunes of Saturn's moon Titan. Credit: NASA/Johns Hopkins APL/Steve Gribben

PROJECT PURPOSE

Dragonfly is a mission to study Titan, the largest moon of Saturn, using a rotorcraft carrying an advanced set of instruments to characterize the surface, atmosphere, and interior from different locations. Titan is a unique world that potentially harbors an interior ocean. Its surface, layered with organic snow on an icy crust possibly shaped by wind and fluvial processes, may be analogous to early Earth, where carbon and nitrogen interacted with water and energy to form life. Through measurements made at diverse locations across Titan, Dragonfly will characterize the habitability of Titan's environment, investigate how far pre-biotic chemistry has progressed, and search for chemical signatures indicative of water-based and/or hydrocarbon-based life.

EXPLANATION OF MAJOR CHANGES IN FY 2027

Funding is increased for the Dragonfly mission consistent with the budget approved at mission confirmation. This increase will not affect the life cycle cost.

PROJECT PARAMETERS

Dragonfly will target a launch in July 2028. After a six and a half year cruise, which includes one Earth gravity assist, Dragonfly will perform an entry, descent, and landing onto Titan's surface. Upon landing, Dragonfly will fly to dozens of locations looking for prebiotic chemical processes on Titan that are analogous to processes on early Earth. Dragonfly, which has eight rotors and flies like a large drone, marks the first time NASA will fly a multirotor vehicle designed to collect science data on another planetary body. It will take advantage of Titan's dense atmosphere (four times denser than Earth's) and low gravity (one-seventh that on Earth) to become the first vehicle ever to fly its entire science payload to multiple sites for repeatable and targeted access to surface materials. It is a scientifically diverse mission that includes an assortment of science payloads: the Dragonfly Camera Suite (DragonCam), which is a set of microscopic and panoramic cameras to image Titan's terrain and scout for scientifically interesting landing sites; the Dragonfly Gamma-Ray and Neutron Spectrometer (DraGNS), which consists of a passive radiation source, Field Illumination with Radioactive Elements, and a set of a gamma-ray and neutron spectrometers, to identify the surface composition under the lander; the Dragonfly Mass Spectrometer (DraMS), an advanced mass spectrometer to identify chemical components in surface and

DRAGONFLY

Formulation	Development	Operations

atmospheric samples, especially those relevant to biological processes; the Drill for Acquisition of Complex Organics, which samples and transfers surface materials to DraMS; and the Dragonfly Geophysics and Meteorology Package (DraGMet), a suite of meteorological sensors and a seismometer.

Titan is an analog to the very early Earth and can provide clues to how life may have begun on our planet. During its nearly three-year baseline mission, Dragonfly will explore diverse environments from organic dunes to the floor of an impact crater where liquid water and complex organic materials, key to life, once existed together (possibly for tens of thousands of years). Its instruments will study how far prebiotic chemistry has progressed. They also will investigate the moon's atmospheric and surface properties and its potential subsurface ocean and liquid reservoirs. A multi-mission radioisotope thermoelectric generator will power the Dragonfly rotorcraft.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

NASA will continue to fabricate and build both test and flight hardware as the project moves to the start of Integration and Test (I&T) in FY 2027. In June 2027, approximately one year prior to launch, NASA will hold a decisional meeting regarding the fueling of the Dragonfly Multi-Mission Radioisotope Thermoelectric Generator (MMRTG) power source.

SCHEDULE COMMITMENTS/KEY MILESTONES

Dragonfly's project schedule is based on a July 2028 launch readiness date.

Milestone	Confirmation Baseline Date	FY 2027 PB Request
KDP-C	April 2024	April 2024
CDR	December 2024	April 2025
KDP-D	Spring 2027	Spring 2027
KDP-E	Spring 2028	Spring 2028
Launch	July 2028	July 2028

DRAGONFLY

Formulation	Development	Operations

DEVELOPMENT COST AND SCHEDULE

Base Year	Base Year Develop-ment Cost Estimate ($M)	JCL (%)	Current Year	Current Year Develop-ment Cost Estimate ($M)	Cost Change (%)	Key Milestone	Base Year Milestone Data	Current Year Milestone Data	Milestone Change (mths)
2025	1963.5	>70%	2026	1963.5	0%	LRD	July 2028	July 2028	0

Note: The confidence level estimates reported reflect an evolving process as NASA improves its probabilistic estimation techniques and processes. Estimate reflects the practices and policies at the time it was developed. Estimates that include combined cost and schedule risks are denoted as JCL (joint confidence level); all other CLs (confidence levels) reflect cost confidence without necessarily factoring the potential impacts of schedule changes on cost.

DEVELOPMENT COST DETAILS

Element	Base Year Development Cost Estimate ($M)	Current Year Development Cost Estimate ($M)	Change from Base Year Estimate ($M)
TOTAL:	1963.5	1963.5	**0**
Aircraft/Spacecraft	530.9	754.2	**+223.3**
Payloads	156.4	225.9	**+ 69.5**
Systems I&T	0	44.0	**+44.0**
Launch Vehicle	350.6	350.6	**0**
Ground Systems	19.3	48.6	**+29.3**
Science/Technology	0	14.2	**+14.2**
Other Direct Project Costs	906.3	526.0	**-380.3**

PROJECT MANAGEMENT & COMMITMENTS

The Principal Investigator is from the Johns Hopkins University Applied Physics Laboratory (APL). APL has project management responsibility for Dragonfly.

DRAGONFLY

Formulation	Development	Operations

Element	Description	Provider Details	Change from Baseline
DraMS	Provides detailed analysis of organic chemistry	Provider: GSFC Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): N/A	Removed the atmospheric mode.
DraGNS	Determines bulk near-surface composition and layering	Provider: APL Lead Center: MSFC Performing Center(s): N/A Cost Share Partner(s): N/A	Replaced the Pulse Neutron Generator with a passive radiation source.
DraGMet	Measures atmospheric conditions, seismicity, and surface/subsurface properties	Provider: APL Lead Center: MSFC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
DragonCam	Documents landforms and processes; provides context for samples; and performs aerial imaging to scout landing sites	Provider: Malin Space Science Systems Lead Center: MSFC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
Drill for Acquisition of Complex Organics Sampling System	Provides pneumatic transfer system and sample acquisition drill	Provider: Honeybee Robotics Lead Center: GSFC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
Multi-Mission Radioisotope Thermoelectric Generator	Provides power to the Dragonfly lander	Provider: DoE Lead Center: GRC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
Cruise Stage	Propulsion stage to get Dragonfly to Titan	Provider: Lockheed Martin Lead Center: MSFC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
Entry, Descent, and Landing (EDL) Assembly	Includes aeroshell, parachutes, and support equipment	Provider: Lockheed Martin Lead Center: MSFC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A

DRAGONFLY

Formulation	Development	Operations

Element	Description	Provider Details	Change from Baseline
Dragonfly Lander	Flight system to carry and support the science instruments	Provider: APL Lead Center: MSFC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A

PROJECT RISKS

Risk Statement	Mitigation
If: usage of energy by lander consumes too large a fraction of the energy generated by the MMRTG, Then: the mission will be unable to meet science requirements as specified in the Program Level Requirements Appendix (PLRA).	The team will work to analyze and assess impacts and options, including extending Phase E to retain full science for mission.
If: the Lander thermal design for the convective cryogenic environment on Titan is not sufficient, Then: Lander components may exceed their tested temperature limits.	Additional testing of the Development Test Model scheduled for spring of 2026 will be used to define surface operations for the existing Dragonfly lander thermal design.
If: there is a fatigue-related failure of a single string component on the Dragonfly lander due to flight related mechanical environments, Then: the team could lose the lander before achieving baseline science.	The team is currently performing endurance vibration testing on key single string components, as defined in their risk mitigation steps. In addition, response accelerometers have been added to the Lander for mitigation.
If: the project underestimates the aerodynamics loads during preparation for powered flight in the model, Then: the lander might not achieve a successful release and transition to powered flight.	Additional testing and analyses have been incorporated to increase fidelity to the existing models. Testing is ongoing and once completed, the additional data will be used to improve models to provide additional confidence in the estimates and ability to transition to powered flight.

ACQUISITION STRATEGY

NASA competitively selected the mission through the New Frontiers 4 Announcement of Opportunity (AO); the final down selection occurred in June 2019. The major elements of the mission and spacecraft are as proposed in the AO.

DRAGONFLY

Formulation	Development	Operations

MAJOR CONTRACTS/AWARDS

Element	Vendor	Location (of work performance)
Principal Investigator; Science Co-Is; Mission Management; Lander Development; DraGMet; DraGNS; System I&T; Science Operations; and Mission Operations	APL	Laurel, MD
Cruise Stage; EDL Assembly; and I&T Support	Lockheed Martin	Denver, CO

INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	SRB	Apr 2027	SIR	TBD
Performance	SRB	May 2028	ORR	TBD

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
New Frontiers Future Missions	--	--	**0.0**	62.1	253.8	329.1	426.8
New Frontiers Research	--	--	**6.4**	7.6	8.8	8.8	8.8
Total Budget	**--**	**--**	**6.4**	**69.7**	**262.6**	**337.9**	**435.6**

New Frontiers Other Missions and Data Analysis includes support for analysis of data from New Frontiers missions and preparation for future missions.

Mission Planning and Other Projects

NEW FRONTIERS FUTURE MISSIONS

New Frontiers Future Missions provides the funding required for future New Frontiers mission selections. NASA will release Announcement of Opportunities as the budget allows, currently in FY 2027.

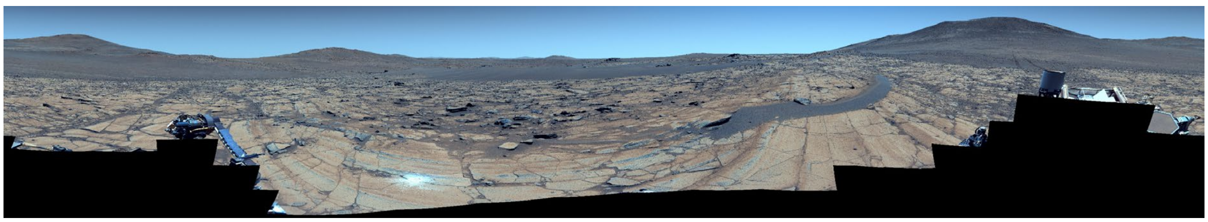
NEW FRONTIERS RESEARCH

New Frontiers Research funds analysis of archived data from New Frontiers missions, as well as participating scientists and selected members of the research community who augment and enhance the science teams of New Frontiers missions. New Frontiers Research provides the research community access to data and samples, enabling research to continue for many years after mission completion. Participating scientists bring new ideas to mission teams and frequently provide a pathway for early career investigators to gain experience with planetary missions. This program supports efforts to maximize science return from each of the missions. NASA solicits planetary research proposals from the U.S. planetary science community and evaluates them for selection through competitive peer review.

MARS EXPLORATION

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Other Missions and Data Analysis	--	--	**248.3**	310.0	415.3	381.0	320.4
Total Budget	**--**	**--**	**248.3**	**310.0**	**415.3**	**381.0**	**320.4**



The Mars 2020 Perseverance Rover used its Mastcam-Z camera to capture this 360-degree panorama of an area nicknamed "Falbreen" on May 26, 2025, the 1,516th Martian day, or sol, of the mission. 96 separate images were stitched together to make the panorama. This enhanced-color version, which had its color bands processed to improve visual contrast and accentuate color differences, shows the Martian sky to be remarkably clear and deceptively blue. Credit: NASA/JPL-Caltech/ASU/MSSS

The Mars Exploration Program is a science-driven, technology-enabled program to characterize and understand Mars, including its current environment, climate and geological history; biological potential; and to prepare for human exploration. Over the past two decades, Mars Exploration has made numerous scientific and technical breakthroughs via a series of missions. As the most Earth-like planet in the solar system, Mars has a landmass approximately equivalent to the Earth's, as well as ancient remnants of many of the same geological features (e.g., riverbeds, river deltas, and volcanoes). Mars also has many of the same "systems" that characterize Earth (e.g., atmosphere, water, ice, and geology), that interact to produce the modern Martian environment. Fundamental differences from Earth include the lack of a global magnetic field and chaotic changes in the orientation of Mars' spin axis over tens of millions of years, which have affected its environment.

In the past two decades, Mars Exploration successfully met high-priority objectives associated with Mars Exploration's evolving science themes: Follow the Water, Explore Habitability, Seek Signs of Life, and Prepare for Human Exploration. Mars Exploration's programmatic planning for the 2024–2044 period evolved from these four science themes into three co-equal, guiding science themes: exploring the potential for Martian life, supporting the human exploration of Mars, and revealing Mars as a dynamic planetary system. These science themes address time-sensitive questions and build the capacity to study Mars the way we study Earth. Today, our scientific missions are paving the way for a future in which humans and robots will explore Mars and the solar system together.

EXPLANATION OF MAJOR CHANGES IN FY 2027

Funding for the Mars 2020 Perseverance Rover is decreased as NASA reassesses objectives for the mission and given higher priorities for funding within the Planetary Science division. The pace of operations will be reduced to continue surface science activities within available resources.

MARS EXPLORATION

Operations of the Mars Atmosphere and Volatile EvolutioN (MAVEN) mission were interrupted in December 2025 following an anomaly and loss of communication with the spacecraft. In the event that NASA concludes the mission cannot be recovered, NASA will assess funding needs for closing out the mission. A previously planned transition of the MAVEN mission management to ESDMD in FY 2027 (to enable ESDMD to maintain operations of surface communication relays and radiation monitoring) would no longer be required.

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Mars Rover 2020	--	--	**38.0**	58.0	62.6	64.0	64.0
Trace Gas Orbiter - ExoMars	--	--	**2.0**	2.0	2.0	2.0	2.0
Mars Program Management	--	--	**13.4**	13.5	14.0	13.4	15.7
Mars Future Missions	--	--	**110.0**	150.0	208.0	175.0	113.0
Mars Mission Operations	--	--	**6.4**	6.1	6.7	6.3	6.7
Mars Research and Analysis	--	--	**9.6**	11.0	13.0	13.4	13.0
Mars Technology	--	--	**5.0**	5.5	45.0	45.0	44.0
2011 Mars Science Lab	--	--	**38.0**	38.0	38.0	38.0	38.0
Mars Reconnaissance Orbiter 2005 (MRO)	--	--	**26.0**	26.0	26.0	24.0	24.0
Total Budget	**--**	**--**	**248.3**	**310.0**	**415.3**	**381.0**	**320.4**

Other Missions and Data Analysis includes mission planning and management, small missions in development, research and technology activities, funding for future Mars missions, and Mars operating missions. The operating projects include Mars Science Laboratory (MSL), Mars Reconnaissance Orbiter (MRO), Trace Gas Orbiter - ExoMars, and Mars Rover 2020.

Mission Planning and Other Projects

MARS PROGRAM MANAGEMENT

Mars Program Management provides for the broad-based implementation and programmatic management of the Mars Exploration Program. Mars Program Management also supports independent review panels, planetary protection studies, advanced mission and program architecture studies, program science, and coordination and integration of telecommunications between the Earth and Mars (including the Mars Relay Network).

MARS FUTURE MISSIONS

Mars Future Missions supports lower-cost, competitively selected missions and instruments that address both human exploration and science objectives.

To maintain and advance U.S. leadership in Mars science exploration, a position that NASA has held for over 50 years, investment is required to strategically enable a flexible and scalable program to conduct priority science investigations on Mars in preparation for the arrival of human explorers. This investment will establish a regular cadence of science-driven, lower-cost mission and hosted instrument opportunities that allow for rapid response to discoveries. New initiatives will leverage industry and science partnerships with initial efforts focused on addressing Martian science objectives to advance the field of science and prepare for human exploration. One example, addressing surface transport mechanisms, will further our understanding of atmospheric evolution and current processes such as dust transport, and will inform and validate transport models to account for contamination from Earth systems.

OTHER MISSIONS AND DATA ANALYSIS

Partnerships with industry and science stakeholders will be achieved through competitive solicitations. Industry capabilities will be assessed for integration and will leverage commercial services to the maximum extent possible. Selected hosted instruments and payloads ($25-$35 million each) would be hosted on NASA or partner-led missions to Mars, such as the new Commercial Mars Payload Services.

A low-cost mission solicitation will be released in October 2026, targeting a 2030 launch, with a $220 million lifecycle cost (excluding launch).

MARS MISSION OPERATIONS

Mars Mission Operations provides management and leadership for the development and operation of Mars multi-mission systems for operations. Mars Mission Operations supports and provides common operational systems and capabilities at a lower cost and risk than having each Mars project produce systems individually.

MARS RESEARCH AND ANALYSIS

Mars Research and Analysis (R&A) provides funding for research and analysis of Mars mission data to understand how geologic, atmospheric, and other processes have worked to shape Mars and its environment over time, as well as how they interact today. Mars R&A has invested in analysis of archived Mars mission data to produce critical products that prepare for the safe arrival, aero-maneuver, entry, descent, and landing of spacecraft on Mars. Data analysis through Mars R&A allows research to continue for many years after data collection and mission completion, increasing scientific understanding of Mars' past and present environments.

MARS TECHNOLOGY

Mars Technology focuses on technological investments that lay the groundwork for successful future Mars missions such as miniaturized telecommunication devices that enable lower-cost science missions, automated manufacturing of low-cost thermal protection system materials, and advanced legged-robotic-mobility elements for exploration of challenging Martian terrain.

NASA will support studies and technology development in support of "Expanding the Horizons of Mars Science: A Plan for a Sustainable Science Program at Mars." Specific areas of near-term interest include advanced robotic surface and aerial commercial mobility systems; new developments in avionics, autonomy, and power; drilling and sample handling; telecommunications; and new techniques for Mars entry, descent, and landing. Investments in these areas are considered the initial steps of a "roadmap" for infrastructure investments to enable future missions. As part of these efforts, NASA will engage with U.S. industry and academia to leverage their unique and growing capabilities with these technologies.

Operating Missions

MARS ROVER 2020

NASA's Mars 2020 Perseverance rover is characterizing the planet's geology and past climate, searching for signs of ancient microbial life on Mars, and collecting and storing carefully selected rock and sediment samples. One of these samples, collected from a rock called "Cheyava Falls" has potential biosignatures, chemical compounds and minerals that together may have been formed by past microbial life using reactions to produce energy for growth. During the Mars Rover 2020 prime mission, it tested new technologies to benefit future robotic missions and pave the way for human exploration of Mars. Subsequent missions could retrieve the sealed samples collected by Perseverance from the surface of Mars and return them to Earth for in-depth analysis. Once returned to Earth, the Perseverance sample suite, including the Cheyava Falls sample, may provide answers to long-standing critical questions about Mars through more precise and in-depth laboratory analysis on Earth.

The Perseverance rover is carrying a competitively selected science and technology payload of seven instruments. Five of the instruments provide the clearest possible measurements for seeking possible signs of ancient life (potential “biosignatures”) on Mars over its 4.6-billion-year history. The remaining two instruments assess environmental hazards and resources for future human exploration. Perseverance also ferried a helicopter named Ingenuity, the first aircraft to achieve powered, controlled flight on another planet. The Mars Rover 2020 mission incorporates new capabilities developed through investments by NASA's STMD and ESDMD and payload contributions from international partners.

The Mars 2020 project team's extended mission proposal will undergo SMD's Senior Review process in 2026.

TRACE GAS ORBITER - EXOMARS

The first mission in the ESA ExoMars program is the 2016 ExoMars Trace Gas Orbiter (TGO), which launched in March 2016 and began its science and relay operations phase in March 2018 with the observations of a global dust storm. For this mission, NASA contributed two Electra ultra-high frequency telecommunication radios, identical to those used successfully on NASA’s MRO and MAVEN. The Electra radio acts as a communications relay and navigation aid for surface assets and supports navigation, command, and data-return needs for Martian landers and rovers. Furthermore, two instruments, the Colour and Stereo Surface Imaging Systems (CaSSIS) and the Nadir and Occultation for MArs Discovery (NOMAD) included significant contributions from U.S. co-investigators.

2011 MARS SCIENCE LABORATORY

The 2011 Mars Science Laboratory (MSL) rover, Curiosity, is collecting Martian soil and rock samples and analyzing them for organic compounds and environmental conditions favorable for microbial life, using its cameras, spectrometers, and the Sample Analysis at Mars (SAM) instrument suite. To look for signs of water that may lie below the rover, a radiation detector pointed downward measures hydrogen up to three feet below the surface. The team expects the Curiosity radioisotope thermal generator to produce enough power into the 2030s to enable the continued exploration and assessment of Martian regions with potential as past habitats for life.

The Curiosity rover is also providing regular measurements of the Martian atmosphere and weather, including temperature, atmospheric pressure, humidity, and wind on the Martian surface. A radiation detector regularly monitors high-energy radiation at the Martian surface.

OTHER MISSIONS AND DATA ANALYSIS

MARS RECONNAISSANCE ORBITER 2005

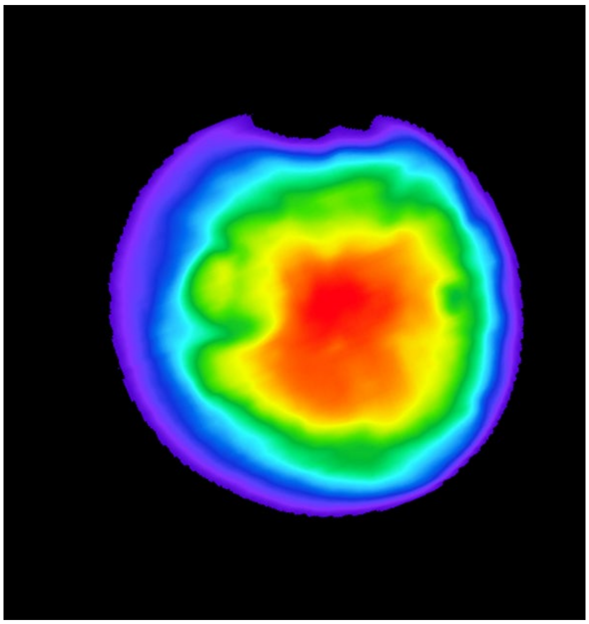
The Mars Reconnaissance Orbiter 2005 (MRO), currently in its seventh extended operations phase, carries the highest resolution camera orbiting another planet, the High-Resolution Imaging Science Experiment (HiRISE). This capability yields a very detailed view of the geology and structure of Mars and is critical in identifying obstacles that could jeopardize the safety of future landers and rovers. HiRISE operations will continue to search for mineral deposits and to reveal the three-dimensional structure and extent and nature of polar ice and subsurface ice in fresh craters; characterize the episodic nature of great dust storms; and expand coverage and quantification of active surface change on Mars today. A second camera, the Context Camera, acquires medium-resolution images that provide a broader geological context for the more detailed observations from higher-resolution instruments. MRO also carries a radar sounder to find deep subsurface water ice, which is an important consideration in selecting scientifically worthy landing sites for future exploration. A wide-angle camera, the Mars Color Imager, provides daily global weather maps, and the Mars Climate Sounder maps the vertical distribution of temperature, dust, and water vapor ice around the globe. A high-resolution imaging spectrometer, the Compact Reconnaissance Imaging Spectrometer for Mars, ceased operations in FY 2022 as its cryocoolers could no longer maintain the low temperatures required by its detectors.

As a communications orbiter that relays commands to and data from the MSL Curiosity and Mars 2020 Perseverance rovers to Earth, MRO also serves as a major element of the Mars Relay Network.

OUTER PLANETS AND OCEAN WORLDS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Other Missions and Data Analysis	--	--	**101.8**	126.5	168.6	200.0	220.1
Total Budget	**--**	**--**	**101.8**	**126.5**	**168.6**	**200.0**	**220.1**



Europa Clipper performed a gravity assist at Mars on March 1, 2025, coming just 550 miles above the surface of the planet. This flyby was used as an opportunity to calibrate the spacecraft's infrared imaging instrument, E-THEMIS. The instrument captured one image per second for about 18 minutes, yielding more than 1,000 grayscale pictures that were then compiled to create this global snapshot of Mars shown here, with colors giving familiar associations (red areas are about zero degrees Celsius; purple regions are about negative 125 degrees Celsius). Comparing these Europa Thermal Emission Imaging System (E-THEMIS) images with data from THEMIS on Mars Odyssey provides a reliable data set to judge the performance of E-THEMIS as Europa Clipper journeys to the Jupiter system.

The Outer Planets and Ocean Worlds Program enables the exploration of worlds currently possessing vast expanses of liquid water in our solar system. These liquid reservoirs provide insight into some of the most fundamental questions about life and the evolution of the solar system.

NASA missions have revealed a surprising number of ocean worlds in our solar system, while at the same time providing enticing, but limited details about these oceans. Underneath its icy crust, Jupiter's moon (Europa) contains a global liquid water ocean holding at least twice as much water as all of Earth’s oceans. Scientists detected a similar, though smaller, global ocean on Enceladus, a small moon orbiting Saturn. Other moons (e.g., Ganymede, Titan, and perhaps Callisto) and possibly even Pluto and Triton possess oceans deep beneath their surfaces. Titan also possesses huge lakes of liquid methane on its surface, the only place beyond Earth known to have lakes exposed to an atmosphere.

Research and spacecraft measurements have increased our confidence that these ocean worlds possess at least some of the conditions needed for life: long-lived oceans, providing liquid water and a stable habitat; hydrothermal activity and other chemical sources, providing energy; and the basic elements along with organics, providing necessary materials. Thus, ocean worlds, like Europa, are the most likely places to search for currently habitable environments in the solar system and any life forms that could exist in them.

The Outer Planets and Ocean Worlds Program enables science investigations spanning the diversity of worlds hosting large liquid bodies in the outer solar system. These missions enable investigation of more focused scientific questions than smaller and less complex missions in the New Frontiers and Discovery programs can pursue.

OUTER PLANETS AND OCEAN WORLDS

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Europa Clipper	--	--	**89.2**	112.2	140.1	172.3	187.7
JUICE - Jupiter Icy Moons Explorer	--	--	**2.6**	2.4	2.9	4.1	8.9
Outer Planets Research	--	--	**10.0**	11.9	13.6	13.6	13.6
Planetary Decadal Future	--	--	**0.0**	0.0	12.0	10.0	10.0
Total Budget	**--**	**--**	**101.8**	**126.5**	**168.6**	**200.0**	**220.1**

Other Missions and Data Analysis includes NASA's contribution to the ESA JUpiter ICy Moons Explorer (JUICE) mission, Europa Clipper, and Outer Planets Research.

Mission Planning and Other Projects

JUPITER ICY MOONS EXPLORER (JUICE)

NASA is collaborating on this ESA-led mission to Ganymede and the Jupiter system. Launched in April 2023, JUICE is currently in its cruise phase and will reach Jupiter in 2031, where it will eventually orbit Ganymede. Together, the Europa Clipper and JUICE missions provide an opportunity for comparative investigation of three of the ocean worlds in the Jupiter system: Europa, Ganymede, and Callisto. Researchers believe all three worlds possess liquid water oceans at varying depths beneath their surfaces. The NASA contribution consists of three separate pieces of hardware: one full instrument, the Ultraviolet Spectrograph; two sensors for the Swedish National Space Agency Particle Environment Package suite of instruments; and the transmitter and receiver hardware for the Radar for Icy Moons Exploration instrument.

OUTER PLANETS RESEARCH

Outer Planets Research increases the scientific return of current and past outer planets missions and paves the way for future missions (e.g., characterizing the interior and surface of Europa; and identifying changes on the surface of Enceladus, which may be caused by its water-rich plumes venting from its sub-surface oceans).

Operating Missions

EUROPA CLIPPER

Europa Clipper launched on October 14, 2024. The spacecraft used a gravity assist from Mars in March 2025, and will use a gravity assist from Earth in December 2026, before arriving at Europa in April 2030. The Europa Clipper mission will spend four years in orbit around Jupiter, conducting its scientific observations by completing 49 close fly-bys of Europa.

OTHER MISSIONS AND DATA ANALYSIS

This mission will leverage the competitively selected payload of investigations to characterize the ice shell and any subsurface water, including their heterogeneity, ocean properties, and the nature of the surface-ice ocean exchange. It will also seek to understand the habitability of Europa's ocean through composition and chemistry of the surface and exosphere; understand the formation of surface features, including sites of recent or current activity; and identify and characterize high interest science locations. This will be the first NASA mission explicitly designed to explore an ocean world.

Europa Clipper's science payload consists of 10 instruments, grouped as follows:

- Cameras and spectrometers will create high-resolution images and composition maps of the moon's surface and thin atmosphere;
- An ice-penetrating radar, a magnetometer, plasma sensors, and a gravity investigation will reveal the moon's ocean and deep interior;
- The spacecraft's thermal camera will pinpoint warmer ice and might reveal recent eruptions of water or bodies of liquid water buried near the surface; and
- A dust analyzer and a mass spectrometer will study the chemistry of particles and gases ejected from the surface and subsurface of the moon.

RADIOISOTOPE POWER

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	135.3	150.9	0.0	0.0	0.0

This view of tracks trailing NASA's Curiosity was captured July 26, 2025, as the rover simultaneously relayed data to a Mars orbiter. Combining tasks like this more efficiently uses energy generated by Curiosity's nuclear power source, shown here, lined with rows of white fins at the back of the rover. Credit: NASA/JPL-Caltech

The Radioisotope Power Systems (RPS) program works in partnership with the DoE to ensure continuing plutonium-238 production and operations infrastructure. The program also supports nuclear launch approval activities and the implementation of RPS on NASA and international partner missions.

EXPLANATION OF MAJOR CHANGES IN FY 2027

Funding is increased to ensure completion of the Multi-Mission Radioisotope Thermoelectric Generator (MMRTG) and secure nuclear launch authorization for the Dragonfly mission, including funding to support DoE plutonium-238 production.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

NASA will work with DoE to complete the acceptance data package of the MMRTG for the Dragonfly mission and will deliver the system to the Idaho National Laboratory (INL).

Program Elements

RADIOISOTOPE POWER SYSTEMS (RPS)

The Radioisotope Power Systems (RPS) program will work with DoE to ensure the completion of the MMRTG, and secure nuclear launch authorization, for the Dragonfly mission, planned for launch in 2028. The budget assumes a pause in the development of additional units after completion of the MMRTG for the Dragonfly mission.

DOE OPERATIONS AND ANALYSIS

NASA funds the DoE national laboratory personnel and infrastructure required to maintain the capability to develop and fuel radioisotope power systems for deep space missions. The DoE Oak Ridge National Laboratory leads the effort and irradiates targets at its High Flux Isotope Reactor. The DoE INL supplies Neptunium-237 and irradiates targets at the Advanced Test Reactor, required to meet plutonium-238 (Pu-238) production rates. The DoE Los Alamos National Laboratory (LANL) manages the existing Pu-238 inventories and manufactures fuel, resulting in continual annual fueled clad manufacturing by

RADIOISOTOPE POWER

LANL and delivery to INL, which integrates the fueled clads with generator systems and manages the transportation and launch operations activities in support of NASA missions.

Program Management & Commitments

Program Element	Provider
RPS	Provider: GRC Lead Center: GRC Performing Center(s): GRC, JPL, GSFC, KSC, DoE Cost Share Partner(s): N/A
DoE Operations and Analysis	Provider: DoE Lead Center: GRC Performing Center(s): GRC Cost Share Partner(s): N/A

Acquisition Strategy

DoE provides radioisotope power systems and production operations on a reimbursable basis.

ASTROPHYSICS

Astrophysics

ASTROPHYSICS RESEARCH

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Astrophysics Research and Analysis	--	--	**46.6**	47.7	47.7	47.7	47.7
Balloon Project	--	--	**15.0**	15.0	15.0	15.0	15.0
Science Activation	--	--	**10.0**	10.0	10.0	10.0	10.0
Other Missions and Data Analysis	--	--	**36.4**	36.4	36.4	36.4	36.4
Total Budget	**--**	**--**	**108.0**	**109.1**	**109.1**	**109.1**	**109.1**

Astrophysics Balloon Payloads on the Ross Ice Shelf near McMurdo Station, Antarctica. On the left is the Pioneers Mission PUEO, a radio detector searching for impulsive radio signature that ultra high-energy neutrinos generate when they interact with the vast Antarctic ice, which serves as the detection volume. On the right is the General Antimatter Particle Spectrometer, which is searching for dark matter signatures by detecting antimatter in the cosmic radiation.

The Astrophysics Research program explores a vast range of astronomical phenomena, from the formation of the first stars, black holes, and distant galaxies to the nature of exoplanets within our Milky Way. Sounding rocket and balloon missions serve as platforms to test cutting-edge instruments designed to observe wavelengths of light inaccessible from the ground.

The program supports research awards that allow scientists to test fundamental theories and maximize the scientific return from existing and future NASA missions. Researchers analyze mission data to investigate exoplanets, stellar explosions that create compact objects like white dwarfs, neutron stars, and black holes; or the signatures of the early universe preserved in the cosmic microwave background radiation. Competitively selected investigations may include data analysis, theoretical modelling, computational work, laboratory astrophysics, and capital equipment purchases. In addition, the program invests in innovative technology developments for future NASA-funded missions, including advanced detectors and electronics, optics, gratings, and coatings.

EXPLANATION OF MAJOR CHANGES IN FY 2027

Additional funding is provided for the Astrophysics Data Curation and Archival project, which will support additional missions' data hosting, machine learning, and advanced data analysis techniques resulting in additional science insights. Funding is partially restored to support the Balloon Project, which will maintain baseline operations.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

NASA will continue a competed Astrophysics Research program with a focus on advancing detectors, instruments, optics, and key enabling technologies for use in future mission payloads. Theoretical work,

ASTROPHYSICS RESEARCH

often conducted by networks of scientists across multiple institutions, will provide the foundation for developing science requirements for upcoming missions. Data analysis will multiply the science yield from NASA's astrophysics missions.

In FY 2027, the Balloon Project will maintain baseline operations and conduct a single annual launch campaign in Antarctica due to its exceptional return on investment.

Astrophysics Data Curation and Archival (ADCAR) will continue supporting Astrophysics Data Centers. Increases in FY 2027 will support additional missions' data hosting, machine learning, and advanced data analysis techniques that will result in additional science insights for the U.S. scientific community. Additionally, ADCAR will support Roman and Near-Earth Object (NEO) Surveyor together to discover transient astronomical sources and follow them to understand their nature.

The Science Activation program will fund a select number of current projects to continue and fund a reduced number of new cooperative agreements.

Program Elements

RESEARCH AND ANALYSIS

This project supports basic research through NASA's annual Research Opportunities in Space and Earth Science (ROSES) solicitations. NASA invites investigations relevant to astrophysics across the full spectrum of photon energies, gravitational waves, and cosmic particles. The Astrophysics Research program evaluates proposals through a rigorous merit-based review process by interdisciplinary panels of scientists and technologies.

This project also solicits technology development for novel detectors and instruments that enable future NASA-funded spaceflight science missions, as well as science and technology investigations utilizing sounding rockets, and other suborbital platforms. A single combined program element will be offered for all mission-specific General Observer/General Investigator (GO/GI) opportunities (instead of seven individual GO/GI programs in previous years), including both U.S.-led missions and international missions in which the United States is a partner.

The Astrophysics Theory element solicits basic theory investigations that support the interpretation of data from NASA's space Astrophysics missions and help define the scientific basis for future missions. Topics include star and planet formation, supernova explosions and gamma-ray bursts, galaxy evolution, dark matter, dark energy, and the cosmic microwave background.

The Exoplanet Research element invites proposals for studies that significantly advance our understanding of exoplanets and their formation.

Through Future Investigators in NASA Earth and Space Science and Technology initiative, NASA funds graduate student-designed and conducted research aligned with the agency's science, technology, and exploration goals. Eligible proposals must come from accredited U.S. universities and other qualified institutions.

ASTROPHYSICS RESEARCH

BALLOON PROJECT

The Balloon Project offers cost effective, high-altitude flight opportunities for scientists to conduct research and test new technologies before space flight application. Balloon experiments cover a wide range of disciplines in astrophysics, solar physics, heliospheric physics, and Earth upper-atmosphere chemistry, as well as selected planetary science, such as comet observations. Observations from balloons have detected echoes of the Big Bang and probed the earliest galaxies.

In FY 2027, the Balloon Project will maintain baseline operations and conduct a single annual launch campaign in Antarctica due to its exceptional return on investment. Antarctica's uniquely stable and isolated wind patterns enable the longest-duration balloon flights in the world, yielding the highest science return of any launch site. By leveraging complementary investments, such as support from the NSF's Office of Polar Programs and prior investments in recovery-capable flight vehicles, NASA can reduce campaign costs while preserving mission impact. At this funding level, the program will launch one campaign, with one to three launches per year. This campaign would allow NASA to sustain the most scientifically valuable missions and maintain U.S. leadership in long-duration balloon-based research.

SCIENCE ACTIVATION & ENGAGEMENT

The Science Activation & Engagement project supports a portfolio aimed at connecting the public with NASA science for the benefit of society and science alike. Science Activation supports cooperative agreements with competitively selected external partners to share NASA science content with the public. At this funding level, Science Activation will competitively select and implement a streamlined set of activities designed to deepen the public's active engagement in the advancement of scientific knowledge. The budget also supports citizen science activities in which the public can participate directly in advancing NASA science. The budget also provides funding for the NASA science website, Ciencia (Spanish-language version of science website) and Spanish-language podcast, social media, conference exhibits and public events, executive presentations, and some multimedia activities.

PROGRAM SCHEDULE

The Astrophysics Research program issues solicitations every year. A Senior Review process assesses all missions in the extended operations phase every three years, and all data archives every three or four years.

Date	Significant Event
Q2 FY 2026	ROSES-2025 selection within six to nine months of receipt of proposals
July 2026	ROSES-2026 NASA Research Announcement (NRA) solicitation release
Q2 FY 2027	ROSES-2026 selection within six to nine months of receipt of proposals
July 2027	ROSES-2027 NRA solicitation release
Mar 2027	Senior Review of Astrophysics Data Archives
Q2 FY 2028	ROSES-2027 selection within six to nine months of receipt of proposals
July 2028	ROSES-2028 NRA solicitation release

ASTROPHYSICS RESEARCH

Date	Significant Event
Feb 2028	Senior Review of Operating Missions

Program Management & Commitments

Program Element	Provider
Research and Analysis Project	Provider: All NASA centers Lead Center: HQ Performing Center(s): All Cost Share Partner(s): None
Balloon Project	Provider: Wallops Flight Facility (WFF) Lead Center: WFF Performing Center(s): WFF Cost Share Partner(s): None
Science Activation	Provider: All NASA centers Lead Center: HQ Performing Center(s): All Cost Share Partner(s): N/A

Acquisition Strategy

NASA issues solicitations for competed research awards each year through ROSES. Panels of subject matter expert scientists conduct peer reviews on all proposals.

INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Quality	Astrophysics Archives Programmatic Review	2027	Review of Astrophysics data archives	TBD
Quality	Senior Review of Operating Missions	2028	Review of Astrophysics operating missions	TBD

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Contract Administration, Audit & QA Svcs	--	--	**10.0**	10.0	10.0	10.0	10.0
Astrophysics Data Curation and Archival	--	--	**26.0**	26.0	26.0	26.0	26.0
Astrophysics Directed R&T	--	--	**0.4**	0.4	0.4	0.4	0.4
Total Budget	**--**	**--**	**36.4**	**36.4**	**36.4**	**36.4**	**36.4**

Astrophysics Research Other Missions and Data Analysis includes the data curation and archival project, and support for contract audits and contract quality assurance, for SMD and Astrophysics-directed research and technology.

Mission Planning and Other Projects

CONTRACT ADMINISTRATION, AUDIT, AND QUALITY ASSURANCE SERVICES

This project provides critical safety and mission product inspections, as well as contract audit services from the Defense Contract Management Agency and Defense Contract Audit Agency, respectively. It also provides for contract assurance audits, assessments, and surveillance by the NASA Contract Assurance Services Program.

ASTROPHYSICS DATA CURATION AND ARCHIVAL RESEARCH (ADCAR)

Astrophysics Data Centers constitute an ensemble of archives receiving processed data from individual missions and making them accessible to the scientific community. After the completion of a mission, the relevant, active, and multi-mission archive takes over all data archiving activities. ADCAR covers the activities of the Astrophysics Data Centers and the NASA Astronomical Virtual Observatories. FY 2027 increases will support additional missions' data hosting, machine learning, and advanced data analysis techniques that will result in additional science insights for the U.S. scientific community. Additionally, ADCAR will support Roman and NEO Surveyor together to discover transient astronomical sources and follow them to understand their nature.

DIRECTED RESEARCH AND TECHNOLOGY

This project funds the civil service staff that will work on emerging Astrophysics projects, instruments, and research.

COSMIC ORIGINS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Hubble Space Telescope (HST)	--	--	**72.7**	72.7	72.7	72.7	72.7
James Webb Space Telescope	--	--	**140.0**	130.0	130.0	130.0	130.0
Other Missions and Data Analysis	--	--	**12.0**	12.0	12.0	12.0	12.0
Total Budget	**--**	**--**	**224.7**	**214.7**	**214.7**	**214.7**	**214.7**

The Webb observed Herbig-Haro 49/50, an outflow from a nearby still-forming star, in high-resolution near- and mid-infrared light. The young star is off to the lower right corner of the Webb image. Intricate features of the outflow, represented in reddish-orange color, provide detailed clues about how young stars form and how their jet activity affects the environment around them. Credit: NASA, ESA, CSA, STScI

"How did we get here?" This simple but fundamental question drives the broad science objectives of NASA's Cosmic Origins program. The search for answers raises underlying questions and topic areas, such as: How and when did the first stars and galaxies form? When did the universe first create the elements critical for life? How did galaxies evolve from the very first systems to the types we observe "in the here and now," such as the Milky Way in which we live? How do stars and planetary systems form and change over time?

Observatories collect data at different wavelengths to fully address these questions. Currently operating facilities in the Cosmic Origins program are the Webb and the Hubble.

EXPLANATION OF MAJOR CHANGES IN FY 2027

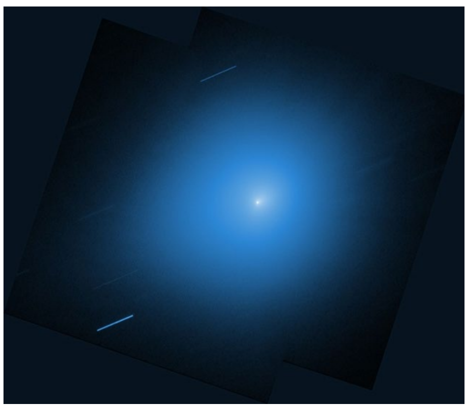
NASA proposes a modest reduction to the Hubble budget, consistent with the implementation of operational efficiencies in FY 2027 and out. Astrophysics Program Management is increased to support Astrophysics mission requirements for high-end computing.

HUBBLE SPACE TELESCOPE OPERATIONS

Formulation	Development	Operations

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	72.7	72.7	72.7	72.7	72.7



Hubble reobserved interstellar comet 3I/ATLAS on November 30, 2025, with its Wide Field Camera-3 instrument.

Credit: NASA, ESA, STScI, D. Jewitt (UCLA), M.-T. Hui (Shanghai Astronomical Observatory).

One of NASA's most successful and long-lasting science missions, Hubble, has beamed over one million images back to Earth, helping resolve many of the great mysteries of astronomy. The telescope helped scientists determine the age of the universe, the identity of quasars, and the existence of dark energy. Hubble launched in 1990 and is currently in an extended operations phase. The fifth servicing mission in 2009, the last visit by a Space Shuttle crew, added new batteries, gyroscopes, and instruments to extend Hubble's life even further into the future. April 24, 2025, marked the start of Hubble's 35th year in orbit. The Hubble Space Telescope Operations budget covers mission operations, software maintenance, guest-observer science grants, and fellowships.

EXPLANATION OF MAJOR CHANGES IN FY 2027

The budget supports continued operations of Hubble and implements operational efficiencies that will deliver modest budget reductions in FY 2027 and out. Examples of these efficiencies include consolidating ground system operations and streamlining support functions, while striving to preserve core scientific capabilities. Specific scenarios and implementation pathways are still under development and will be informed by technical feasibility, science return, and community impacts. NASA remains committed to maximizing the scientific value of Hubble and to continue funding guest observer science grants.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

NASA will support mission operations, systems engineering, software maintenance, ground systems support, guest-observer science grants, and the NASA Hubble Fellowship Program. NASA will release the Cycle 35 call for proposals in early 2027, with announcements expected in mid-2027.

JAMES WEBB SPACE TELESCOPE

Formulation	Development	Operations

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
James Webb Space Telescope	--	--	**120.0**	110.0	110.0	110.0	110.0
Webb Science	--	--	**20.0**	20.0	20.0	20.0	20.0
Total Budget	**--**	**--**	**140.0**	**130.0**	**130.0**	**130.0**	**130.0**

With its powerful infrared vision and massive mirror, Webb reveals previously unseen, breathtaking details, like the swirling dust shells around the Wolf-Rayet Apep. Webb's operations help solve mysteries in our solar system, looking beyond to distant worlds around other stars, and probing the mysterious structures and origins of our universe and our place in it. Credit: NASA, ESA, CSA, STScI

Webb is a large, space-based astronomical observatory. Webb observes the highly red-shifted early universe and studies objects like protostars and protoplanetary disks, which strongly emit infrared light where dust obscures shorter wavelengths. With more light-collecting area than Hubble, and near- to mid-infrared optimized instruments, Webb observes objects farther away and further back in time.

The four main science goals are to:

- Search for the first galaxies or luminous objects formed after the Big Bang;
- Determine how galaxies evolved from their formation until now;
- Observe the formation of stars from the first stages to the formation of planetary systems; and
- Measure the physical and chemical properties of planetary systems and investigate the potential for life in those systems.

While Hubble has dramatically advanced our understanding of the distant universe, it is primarily optimized for visible and ultraviolet wavelengths and only limited infrared capability. This presents a challenge when studying the early universe. Due to the expansion of the universe, light from the earliest galaxies and stars is red-shifted and stretched into longer wavelengths, moving it out of Hubble's range and into the infrared part of the spectrum. Webb, with its highly sensitive infrared instruments, is uniquely equipped to peer deeper into the cosmos and further back in time than any previous observatory. Webb enables exploration of the "cosmic dawn", the poorly understood epoch when the first luminous objects formed after the Big Bang, transforming the universe from darkness into light. This makes Webb a powerful complement to Hubble, expanding our ability to observe the earliest stages of cosmic history.

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

JAMES WEBB SPACE TELESCOPE

Formulation	Development	Operations

KEY ACHIEVEMENTS PLANNED FOR FY 2027

This budget supports mission operations, systems engineering, software maintenance, ground systems support, and general observer science grants. In July 2027, Webb will complete its five-year prime mission and transition into extended operations. NASA will evaluate options for more efficient operations post-prime mission, including scaling back observing modes and time, consolidating ground system operations, or streamlining support functions, while striving to preserve core scientific capabilities and minimize the impacts on the science community. Specific scenarios and implementation pathways are still under development and will be informed by technical feasibility, science return, and community input.

Mission Elements

JAMES WEBB SPACE TELESCOPE

Webb is an infrared-optimized observatory that conducts imaging and spectrographic observations in the 0.6 to 28 micrometer wavelength range. Webb is roughly 100 times more capable than Hubble because its mirror is seven times larger. It spends about twice as much time observing targets since the Earth is not in the way. Webb's detectors cover larger regions of the sky and are always active. Its multi-object spectroscopic capabilities greatly expand the number of spectra per field.

The 6.5-meter primary mirror consists of 18 actively controlled segments. A multilayer sunshield the size of a tennis court passively cools the mirror, telescope optics, and instruments to about 40 kelvin. Webb launched in 2021 from Kourou, French Guiana on an Ariane 5 rocket contributed by the ESA. Webb is currently operating in deep space about one million miles from Earth.

Webb’s instruments include the Near-Infrared Camera, Near-Infrared Spectrograph, Mid-Infrared Instrument, and the Fine Guidance Sensor/Near-Infrared Imager and Slitless Spectrograph.

The operating telescope project supports the telescope operations and science team.

WEBB SCIENCE

The Webb Science project funds research enabled by Webb observations and data. Observation time on Webb is allocated in a competitive process each year in cycles of awards. The Space Telescope Science Institute announces annual calls for proposals for Webb. The proposals are peer reviewed and those that NASA selects are executed by the project team during the next calendar year.

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Astrophysics Program Management	--	--	**12.0**	12.0	12.0	12.0	12.0
Total Budget	**--**	**--**	**12.0**	**12.0**	**12.0**	**12.0**	**12.0**

Mission Planning and Other Projects

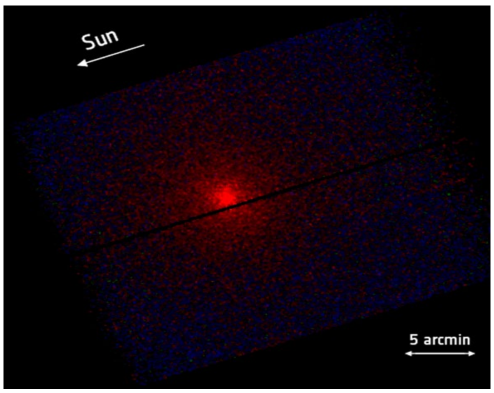
ASTROPHYSICS PROGRAM MANAGEMENT

Astrophysics Program Management ensures streamlined oversight for all of NASA's strategic Astrophysics missions by consistently applying management best practices to maximize mission success. The Astrophysics Strategic Mission Program Office delivers programmatic, technical, business, and scientific leadership across all mission phases, from definition and design to launch and operations, supporting the science derived from these missions. This project supports Astrophysics Division HQ civil servants while implementing efficiencies and cost-saving measures in Astrophysics Program Management and operations. Additional funding in FY 2027 will support Astrophysics mission requirements for high end computing.

PHYSICS OF THE COSMOS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Other Missions and Data Analysis	--	--	**3.8**	13.6	17.5	10.5	11.9
Total Budget	**--**	**--**	**3.8**	**13.6**	**17.5**	**10.5**	**11.9**



XMM-Newton observed interstellar comet 3I/ATLAS on December 3, 2025, for approximately 20 hours. This image shows the comet glowing in low-energy X-rays. Blue marks empty space with very few X-rays, while red highlights the comet's X-ray glow. X-rays are produced when gas molecules streaming from the comet collide with the solar wind.

The Physics of the Cosmos (PhysCOS) program supports investigations at the intersection of physics and astronomy. Scientists explore some of the most fundamental questions regarding the physical forces and laws of the universe: How do matter, energy, space, and time behave under extreme gravity? What is the nature of dark energy and dark matter? How did the universe grow from the Big Bang to its present size? The PhysCOS program incorporates cosmology, high-energy astrophysics, and fundamental physics projects that address central questions about the nature of complex astrophysical phenomena, such as black holes, neutron stars, dark matter and dark energy, cosmic microwave background, and gravitational waves.

The operating missions within the PhysCOS program continue to provide answers to these fundamental questions and more.

PhysCOS develops the technologies necessary for the next generation of space missions to address the science questions of this program.

EXPLANATION OF MAJOR CHANGES IN FY 2027

The request partially restores funding to PhysCOS Supporting Research and Technology project, which will support technology development for future missions with dual use for science and defense.

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Physics of the Cosmos SR&T	--	--	**2.4**	12.1	16.1	9.1	10.4
XMM	--	--	**1.5**	1.5	1.5	1.5	1.5
Total Budget	**--**	**--**	**3.8**	**13.6**	**17.5**	**10.5**	**11.9**

Other Missions and Data Analysis supports Physics of the Cosmos (PhysCOS) Supporting Research and Technology and X-ray Multi-Mirror Mission (XMM).

Mission Planning

PHYSICS OF THE COSMOS SUPPORTING RESEARCH AND TECHNOLOGY

PhysCOS Supporting Research and Technology leads strategic technology development efforts to prepare for the next generation of PhysCOS space missions, including program-specific research and advanced technology development efforts, such as the Strategic Astrophysics Technology program element.

This budget supports development of technologies with dual-use applications and includes critical technology development efforts for strategic missions or mission concepts, such as the Laser Interferometer Space Antenna and the Habitable Worlds Observatory Technology Maturation Project Office. The budget will also leverage and advance new and emerging technologies that could be transferred to or already exist in the commercial sector, and that expand the solution space for potential tactical needs at other agencies.

Operating Missions

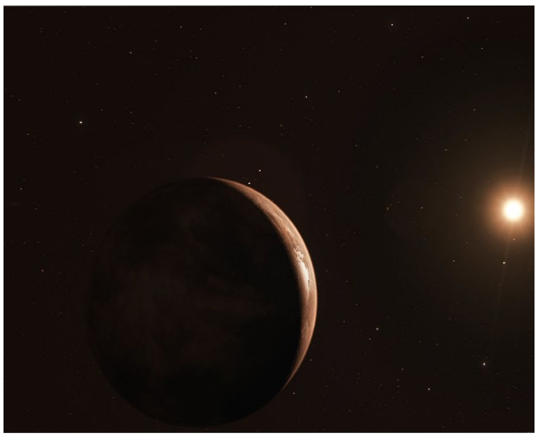
X-ray Multi-Mirror Mission (XMM)

XMM-Newton is an ESA-led mission with substantial NASA contributions. The telescope launched in December 1999. XMM-Newton studies everything from conditions of planetary formation to the distribution of dark matter in galaxy clusters and elliptical galaxies, and the evolution of chemical elements in galaxy clusters. The GSFC operations facility provides a clearing house for project-generated technical information and analysis software as well as budget support for U.S. astronomers who apply for XMM-Newton observation time. The project participated in the 2025 Senior Review and NASA approved extended mission operations. FY 2027 funding will support operations.

EXOPLANET EXPLORATION

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Nancy Grace Roman Space Telescope	--	--	**166.8**	91.4	78.5	73.0	70.9
Other Missions and Data Analysis	--	--	**5.0**	33.4	32.2	31.2	33.2
Total Budget	**--**	**--**	**171.8**	**124.7**	**110.7**	**104.2**	**104.2**



Shown here is the nearest single star to the Sun. It hosts an exoplanet at least 3.2 times as massive as Earth, also known as super-Earth. This image shows an artist's impression of the exoplanet viewed from space. Credit: ESO/M. Kornmesser

Humankind is gaining insight into timeless questions: Are we alone? Is Earth unique, or are planets like ours common? One of the most exciting fields of research within the NASA Astrophysics portfolio is the search for planets, particularly Earth-like planets, around other stars.

Since the discovery of the first exoplanets in the 1990s, astronomers have confirmed over 6,000 planets orbiting most types of stars in our galaxy. At first, most of the planets discovered were so-called "Hot Jupiters"— gas giants similar in size to the planet Jupiter but orbiting much closer to their parent stars. However, analysis of NASA's Kepler Space Telescope data, in conjunction with data from ground-based telescopes, has revealed that smaller planets, with sizes between those of Earth and Neptune, are much more common than Jupiter-like planets. Rocky planets in the habitable zone of their parent stars also appear to be common.

NASA's Exoplanet Exploration Program is advancing along a path of discovery leading to a point where scientists can directly study the atmospheres and surface features of habitable, rocky planets, like Earth, around other stars in the solar neighborhood. Following the recommendation of the recent National Academies of Sciences "Decadal Survey on Astronomy and Astrophysics 2020 (Astro2020)" report, NASA aims to develop systems that will allow scientists to take the pivotal step from identifying an exoplanet as Earth-sized to determining whether it is genuinely Earth-like. One can do so by studying the exoplanet's atmospheres to see if they bear the spectral fingerprints of life via a program of technology development.

EXPLANATION OF MAJOR CHANGES IN FY 2027

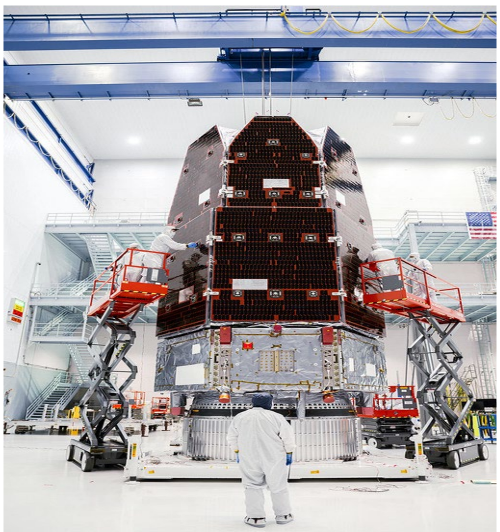
Funding for the Habitable Worlds Observatory Technology Maturation project is reduced in FY 2027 and the outyears given higher priorities within the Astrophysics portfolio.

NANCY GRACE ROMAN SPACE TELESCOPE

Formulation	Development	Operations

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	166.8	91.4	78.5	73.0	70.9



NASA's Roman Space Telescope is now fully integrated at the GSFC.

PROJECT PURPOSE

The Nancy Grace Roman Space Telescope (Roman) will investigate long-standing astronomical mysteries, such as the force behind the universe's accelerating expansion and search for distant planets beyond our solar system. Roman will unravel the secrets of dark energy and dark matter, search for and image exoplanets, and explore many topics in infrared astrophysics. This newest NASA observatory addresses the top priority large mission of the 2010 Decadal Survey in Astronomy and Astrophysics.

Roman carries two instruments. The Wide Field Instrument (WFI) will accomplish the mission's primary science observations over large areas of the sky. The Coronagraph Instrument (CGI) technology demonstration matures components and systems for imaging and spectroscopy of individual nearby exoplanets. The Roman mission's operations are intended to compliment those of the Webb to provide synergistic science capabilities. Roman ushers in a new era of big data for astrophysics, producing an archive averaging over 10 terabytes of data per day of operations during its first five years of operations.

EXPLANATION OF MAJOR CHANGES IN FY 2027

The budget proposes a small adjustment to the FY 2027 funding level that is not expected to impact Roman's launch readiness date.

PROJECT PARAMETERS

Roman is a NASA observatory designed to investigate essential questions in the areas of dark energy, exoplanets, and infrared astrophysics. To address these questions, the telescope has a large, 7.9-foot (2.4-meter) diameter primary mirror, since a larger surface area gathers more light and produces sharper images. Roman's mirror is the same size as the Hubble's primary mirror and is less than one-fourth the weight at only 410 pounds (186 kilograms), thanks to major improvements in technology. To make Roman's sensitive measurements possible, the telescope observes from a vantage point orbiting about 930,000 miles (1.5 million kilometers) away from Earth in the direction away from the Sun. Near this

NANCY GRACE ROMAN SPACE TELESCOPE

Formulation	Development	Operations

location, the second Sun-Earth Lagrange point (L2), the observatory is thermally stable, views more of the sky for longer periods of time, and can more easily prevent stray light from the Sun, Moon, and Earth.

The telescope provides a field of view that is 200 times greater than the Hubble's infrared instrument, allowing it to capture more of the sky with less observing time. The Roman WFI is a 300-megapixel infrared camera and spectrometer built to provide revolutionary surveys of unprecedented size, sharpness, and depth to address key topics in cosmology, exoplanets, and infrared astrophysics. The camera features eight filters for different wavelengths of infrared light suited to studying varied astronomical objects, plus two spectroscopic elements to measure distances and study other physical characteristics of galaxies and supernovae across the universe.

In addition to the WFI, Roman will advance exoplanet imaging by carrying the first active coronagraph into space, employing deformable mirrors and active wavefront control sensing to achieve starlight suppression 100 to 1,000 times better than previous space-based systems. The CGI, built as a technology demonstration, combines multiple technologies and operation modes to block light from the host star and allow high-contrast imaging of faint exoplanets orbiting it. This capability is critical for next-generation telescopes capable of analyzing the atmospheres of Earth-like planets around other stars, directly serving as the pathfinder for future flagship missions, such as the Habitable Worlds Observatory.

Roman is planned for a primary mission lifetime of five years with enough propellant for at least five years of extended mission.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The FY 2027 President’s Budget request provides funding to maintain Roman on schedule for a potential launch as early as September 2026, while preserving the schedule margin to meet the baseline launch readiness date in May 2027. In FY 2027, the project plans to achieve the following key milestones:

- The Launch and Early Operations Phase (first 90-days post-launch), including initiation of the critical observatory deployments and checkouts, the comprehensive commissioning phase to complete instrument checkout and calibration activities required to begin mission operations, Sun-Earth L2 orbit insertion, and transition to nominal mission operations.
- The start of the prime science mission (~90 days post-launch), including implementation of the defined core community surveys and the start of the CGI technology demonstration program, bringing the mission's big-data-enabling capabilities online for the scientific community.
- Implement the General Investigator (GI) awards selected for the first year of the mission and issue the call for proposals for the second year of the mission.

NANCY GRACE ROMAN SPACE TELESCOPE

Formulation	Development	Operations

SCHEDULE COMMITMENTS/KEY MILESTONES

Milestone	Confirmation Baseline Date	FY 2027 President's Budget Request
KDP-C	Feb 2020	Feb 2020
CDR	Jul 2021	Sep 2021
System Integration Review (SIR)	Jul 2023	Sep 2024
Flight Readiness Review	Jun 2026	Jan 2027
Launch	Oct 2026	May 2027
Begin Phase E	Jan 2027	Aug 2027
End Prime Mission	Jan 2032	Aug 2032

Development Cost and Schedule

Base Year	Base Year Develop-ment Cost Estimate ($M)	JCL (%)	Current Year	Current Year Develop-ment Cost Estimate ($M)	Cost Change (%)	Key Milestone	Base Year Milestone Data	Current Year Milestone Data	Milestone Change (months)
2021	2,898	>70	2026	3,038	+5%	LRD	Oct 2026	May 2027	+7

Note: The confidence level estimates reported reflect an evolving process as NASA improves its probabilistic estimation techniques and processes. Estimate reflects the practices and policies at the time it was developed. Estimates that include combined cost and schedule risks are denoted as Joint Confidence Level (JCL); all other confidence levels (CLs) reflect cost confidence without necessarily factoring the potential impacts of schedule changes on cost.

Development Cost Details

Element	Base Year Development Cost Estimate ($M)	Current Year Development Cost Estimate ($M)	Change from Base Year Estimate ($M)
TOTAL:	**2,898.1**	**3,037.6**	**+139.5**
Aircraft/Spacecraft	278.1	417.2	+139.1
Payloads	661.6	896.6	+ 235.0
Systems I&T	183.2	357.2	+174.0

NANCY GRACE ROMAN SPACE TELESCOPE

Formulation	Development	Operations

Element	Base Year Development Cost Estimate ($M)	Current Year Development Cost Estimate ($M)	Change from Base Year Estimate ($M)
Launch Vehicle	238.6	221.1	-17.5
Ground Systems	217.6	299.0	+81.4
Science/Technology	79.4	434.4	+355.0
Other Direct Project Costs	1,239.6	412.1	-827.5

Project Management & Commitments

NASA HQ is responsible for the overall management of Roman and CGI. GSFC has project management responsibility for Roman. JPL has project management responsibility for CGI.

Element	Description	Provider Details	Change from Baseline
Project Management and Systems Engineering	Management of all technical and programmatic aspects of mission development and system engineering of each element and the integrated system	Provider: NASA Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): N/A	N/A
Mission Science Management	Management of all project science activities from formulation through development and operations	Provider: NASA Lead Center: GSFC Performing Center(s): GSFC and partners Cost Share Partner(s): N/A	N/A
WFI	Overall instrument management; in-house development of the Focal Plane System, Grism, Prism, and all subsystems other than the Ball Aerospace-managed Wide Field Instrument Opto-Mechanical Assembly (WOMA)	Provider: NASA, Ball Aerospace Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): N/A	N/A
Instrument Carrier	Structural Support for the Optical Telescope Assembly, WFI, and CGI	Provider: NASA, Northrop Grumman Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): N/A	N/A

NANCY GRACE ROMAN SPACE TELESCOPE

Formulation	Development	Operations

Element	Description	Provider Details	Change from Baseline
Spacecraft	Main bus for Roman; providing power, electrical, thermal, and propulsion systems	Provider: NASA Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): N/A	N/A
CGI	Management of all technical and programmatic aspects of instrument development and system engineering of the technology demonstration for space-based exoplanet characterization	Provider: NASA Lead Center: JPL Performing Center(s): JPL Cost Share Partner(s): N/A	N/A
Star Tracker, Flight Battery	Optical device that measures the positions of stars using photocells or a camera; rechargeable power source	Provider: ESA Lead Center: GSFC Performing Center(s): N/A Cost Share Partner(s): ESA	N/A
Electron-Multiplying Charge-Coupled Device Detectors	Devices for digital imaging under low-light conditions	Provider: ESA Lead Center: JPL Performing Center(s): N/A Cost Share Partner(s): ESA	N/A
Super-polished optics and Off Axis Parabolas	Optical elements to collimate and direct light within the CGI	Provider: French Space Agency (CNES)/LAM Lead Center: JPL Performing Center(s): N/A Cost Share Partner(s): CNES	N/A
Precision Alignment Mechanisms	Mechanisms to direct light within the CGI with one to two arcsecond pointing accuracy	Provider: Max Planck Institute for Astronomy (MPIA) Lead Center: JPL Performing Center(s): N/A Cost Share Partner(s): MPIA	N/A
Polarization Optics	Optical elements to select the polarization state of light within the CGI	Provider: JAXA Lead Center: JPL Performing Center(s): N/A Cost Share Partner(s): JAXA	N/A
Use of Ground Station	Daily use of a ground station in Japan and data transport to the Science Operations Center	Provider: JAXA Lead Center: GSFC Performing Center(s): N/A Cost Share Partner(s): JAXA	N/A

NANCY GRACE ROMAN SPACE TELESCOPE

Formulation	Development	Operations

Element	Description	Provider Details	Change from Baseline
Launch Vehicle	Launch services for Roman on required trajectory for L2 operational orbit	Provider: SpaceX Lead Center: KSC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
Mission Operations	Management of on-orbit operations	Provider: NASA Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): N/A	N/A
Ground Control System and Science Operations and Control Center	Science Operations Center responsible for processing, analysis, and archiving of data from the observatory	Provider: Space Telescope Science Institute Lead Center: GSFC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
Coronagraph Ground Control System and Science Operations and Control Center	Science Center responsible for processing and analysis of coronagraph data for infrared astronomy	Provider: Infrared Processing and Analysis Center Lead Center: JPL Performing Center(s): N/A Cost Share Partner(s): N/A	N/A

Project Risks

Risk Statement	Mitigation
The unprecedented data volume generated by Roman presents a challenge for the scientific community’s capacity to rapidly process and extract discoveries.	Roman will downlink ~1.4 Terabytes of data per day. To efficiently manage this unprecedented volume, the Program prioritizes the safe capture, automated processing, and secure archival of all data. NASA will leverage cloud computing to reduce researchers' computational burdens and strategically phase the GI program to focus on high-impact science first. This ensures early discoveries are maximized while preserving the long-term usability of the archive.

Acquisition Strategy

The project has awarded all major contracts.

NANCY GRACE ROMAN SPACE TELESCOPE

Formulation	Development	Operations

MAJOR CONTRACTS/AWARDS

Element	Vendor	Location (of work performance)
Optical Telescope Assembly	L3Harris	Rochester, NY
WOMA	BAE Systems (formerly Ball Aerospace)	Boulder, CO
Sensor Chip Assemblies	Teledyne	Camarillo, CA
	Hawaii Aerospace	Honolulu, HI
Science Operations Center Support	AURA/Space Telescope Science Institute	Baltimore, MD
Science Center Support	IPAC/Caltech	Pasadena, CA
Launch Vehicle	SpaceX	Hawthorne, CA

INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	Standing Review Board (SRB)	Sep 2024	SIR: Determine Roman readiness to proceed to system integration and test phase.	Successful
Performance	SRB	Jan 2027	Flight Readiness Review (FRR): Evaluate the readiness of the project to operate and perform the mission.	TBD

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Habitable Worlds Observ Tech Maturation	--	--	**5.0**	5.0	5.0	5.0	5.0
Exoplanet Exploration Science	--	--	**0.0**	28.4	27.2	26.2	28.2
Total Budget	**--**	**--**	**5.0**	**33.4**	**32.2**	**31.2**	**33.2**

Mission Planning and Other Projects

Exoplanet Exploration Other Missions and Data Analysis include funding for Habitable Worlds Observatory Technology Maturation and Exoplanet Exploration Science.

EXOPLANET EXPLORATION SCIENCE

This project funds competed science for missions within the Exoplanet Exploration Program. Following the scheduled launch of the Nancy Grace Roman Space Telescope (Roman) in 2027, this project will fund completed research and other related activities from Roman observations and data.

HABITABLE WORLDS OBSERVATORY TECHNOLOGY MATURATION

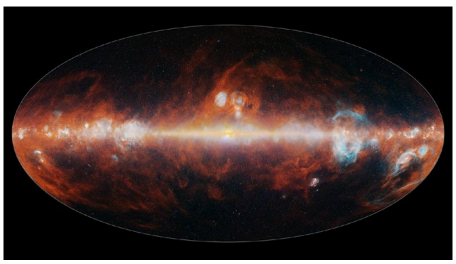
This budget provides support for the Habitable Worlds Observatory Technology Maturation Project Office. By investing early in mission architecture and technology maturation, and coordinating with industry, academic, and international partners, NASA aims to build a sustainable foundation for a potential future Habitable Worlds Observatory (HWO). HWO is NASA's next-generation flagship mission concept, designed to search for and image Earth-like planets around Sun-like stars. By observing approximately 100 nearby stars with advanced sensors, HWO would identify potential signs of life such as oxygen and methane in the atmospheres of distant worlds.

Early investment in technology maturation is expected to reduce the total cost of a potential HWO project and reduce cost/schedule risk for that project. The project office leads the definition of science scope, the exploration of architectures that could meet that scope, and a technology development plan to enable those architectures. In coordination with the Astrophysics Division, the current technology maturation project office coordinates these efforts with industry, academic, and international partners.

ASTROPHYSICS EXPLORER

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Other Missions and Data Analysis	--	--	**44.0**	48.2	78.3	84.8	84.8
Total Budget	**--**	**--**	**44.0**	**48.2**	**78.3**	**84.8**	**84.8**



The Infrared colors emitted primarily by dust (red) and hot gas (blue), both key ingredients for forming new stars and planets, are seen in this SPHEREx image. Though these clouds of material cover a massive portion of the sky they are invisible in most wavelengths of light including those detected by the human eye.

Credit: NASA/JPL-Caltech

The Astrophysics Explorer program provides frequent flight opportunities for world-class astrophysics investigations using innovative and streamlined management approaches for spacecraft development and operations. The program is highly responsive to new knowledge, new technology, and updated scientific priorities by launching smaller missions formulated and executed in a relatively short development cycle. NASA selects new missions based on an open competition of concepts solicited from the scientific community. The program emphasizes the accomplishments of missions under the control of the scientific research community within constrained mission life-cycle costs.

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The Spectro-Photometer for the History of the Universe, Epoch of Reionization, and Ices Explorer (SPHEREx) mission will continue to conduct on-orbit science operations as part of the two-year baseline science mission. NASA will release an Announcement of Opportunity (AO)for the next Astrophysics Small Explorer-class (SMEX) mission and will make a new Pioneers selection.

Program Schedule

Date	Significant Event
2027	Release SMEX AO
2027	Selection of new Pioneers investigation(s)
2029	Selection of new Pioneers investigation(s)

ASTROPHYSICS EXPLORER

Program Management & Planned Cadence

The Astrophysics and Heliophysics Explorer programs are both coordinated sets of uncoupled missions, where each mission is independent and has unique science. The programs share a common program office at NASA GSFC and a common management structure. The Explorer Program Manager resides at GSFC, reporting functionally to the Center Director and programmatically through the Astrophysics and Heliophysics Division Directors to the Associate Administrator for SMD.

Acquisition Strategy

NASA selects all Explorer missions through competitive AO.

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
SPHEREx	--	--	**7.6**	1.8	1.2	1.2	1.2
Pioneers	--	--	**10.0**	10.0	20.0	10.0	10.0
CASE	--	--	**0.0**	0.0	1.5	0.0	0.0
Astrophysics Explorer Future Missions	--	--	**0.0**	14.0	33.2	51.2	51.2
Astrophysics Explorer Program Management	--	--	**5.0**	5.0	5.0	5.0	5.0
Neil Gehrels Swift Observatory	--	--	**4.0**	0.0	0.0	0.0	0.0
Nuclear Spectroscopic Telescope Array	--	--	**4.8**	4.8	4.8	4.8	4.8
Transiting Exoplanet Survey Satellite	--	--	**7.3**	7.3	7.3	7.3	7.3
Imaging X-Ray Polarimetry Explorer	--	--	**5.4**	5.4	5.4	5.4	5.4
Total Budget	**--**	**--**	**44.0**	**48.2**	**78.3**	**84.8**	**84.8**

Mission Planning and Other Projects

Astrophysics Explorer Other Missions and Data Analysis includes funding for Pioneers, operating missions (Imaging X-ray Polarimetry Explorer [IXPE], Transiting Exoplanet Survey Satellite [TESS]), Nuclear Spectroscopic Telescope Array [NuSTAR], Neil Gehrels Swift Observatory), and funding for future mission selections and program management functions.

ASTROPHYSICS PIONEERS

This budget funds the Astrophysics Pioneers program. Astrophysics Pioneers investigations provide high-impact science with low cost by leveraging new, inexpensive SmallSat and CubeSat technologies, new Ultra-Long Duration stratospheric balloon payloads, and ISS payloads. The Astrophysics Pioneers program element solicits proposals every other year for astrophysics suborbital and modest orbital science investigations that are greater in both cost and scope than what is possible within the Astrophysics Research and Analysis program element. This class of small missions fills a critical gap in NASA's portfolio, enabling innovative and focused science that can't be achieved under traditional research grants, but does not require the resources of larger flight opportunities. Investigations are led by a Principal Investigator. NASA encourages participation from early-career researchers and institutions receiving their first NASA spaceflight mission. The Pioneers program has proven to be a successful entry point for new teams into NASA's flight mission portfolio.

This budget supports bi-annual solicitations in 2027 and out. Early career researchers and institutions receiving their first NASA space-flight mission continue to be highly successful within the Pioneers program. Currently active Pioneers investigations include:

- Payload for Ultrahigh Energy Observation, a long duration balloon instrument for particle astrophysics at the highest energies. The NASA schedule for Launch Readiness Date (LRD) is no earlier than December 2025.
- Pandora, a SmallSat for multiwavelength characterization of exoplanets and their host stars. The NASA schedule for LRD is no earlier than January 2026.

OTHER MISSIONS AND DATA ANALYSIS

- Aspera, a SmallSat to measure the intergalactic medium inflow/outflow from galaxies. The NASA schedule for LRD is no earlier than August 2026.
- StarBurst, a SmallSat all-sky monitor for high-energy gamma rays from events, such as the merger of neutron stars, that can be synchronized with the detection of simultaneous gravity waves at facilities such as the ground-based Laser Interferometer Gravitational-wave Observatory. The NASA schedule for LRD is no earlier than January 2027.
- Trans-Iron Galactic Recorder for the ISS, designed for deployment from the ISS to measure ultra-heavy galactic cosmic rays. The NASA schedule for LRD is no earlier than February 2027.
- Landolt, focused on enhancing the accuracy of photometric measurements of stellar fluxes. The mission will place an artificial "star" in orbit, enabling scientists to precisely calibrate telescopes and measure the brightness of stars with greater accuracy. Launch is planned for mid-2027.
- Planetary Origins and Evolution Multispectral Monochrometer, a far-infrared balloon-borne spectrograph to obtain accurate masses of protoplanetary disks around nearby stars. The NASA schedule for LRD is planned for December 2028.

ASTROPHYSICS EXPLORER FUTURE MISSIONS

Astrophysics Explorer Future Missions funding supports future Astrophysics Explorer missions and missions of opportunity through concept studies and selections. NASA plans to release the next SMEX AO no earlier than spring 2027.

ASTROPHYSICS EXPLORER PROGRAM MANAGEMENT

Astrophysics Explorer Program Management is performed at GSFC and provides programmatic, technical, and business management of ongoing missions in formulation and development. This project provides funding for independent assessments of astrophysics projects for life cycle reviews and KDPs, and independent software verification and validation for astrophysics projects in later development. It provides programmatic, technical, and business management assessments and analysis to support projects to ensure they have proper requirements, guidance, and resources. The project also includes support for the Science Office for Mission Assessments (SOMA) at LaRC. SOMA is responsible for the technical and scientific evaluation of Explorer mission proposals.

CONTRIBUTION TO ARIEL (ATMOSPHERIC REMOTE-SENSING INFRARED EXOPLANET LARGE-SURVEY MISSION) SPECTROSCOPY OF EXOPLANETS (CASE)

ARIEL is a joint ESA/NASA mission planned for launch in 2031 that will observe hundreds of warm transiting gas giants, Neptune-sized planets, and super-Earths. The mission responds to high-priority science from the Astro2020 Decadal Survey by addressing the question: What are the characteristics of planetary systems orbiting other stars and do they harbor life?

ARIEL's main science goals include measuring the composition and structure of planetary atmospheres, determining the vertical and horizontal temperature structure, and identifying chemical processes at work. A mission designed and optimized for a large-scale, uniform spectroscopic survey of transiting exoplanet atmosphere will address a key gap in NASA's exoplanet exploration mission portfolio. CASE will fill that gap and ensure the full participation of the U.S. community in ESA's ARIEL mission.

OTHER MISSIONS AND DATA ANALYSIS

NASA's contribution to the ARIEL mission includes a pair of heritage sensor chip assemblies, cold front-end electronics, and cryogenic flex cables, while also including packaging and thermal management capability. These components have been delivered to ESA and are awaiting integration. The outyear budget will support final firmware, integration, payload testing, and post-launch operations science data.

Operating Missions

NEIL GEHRELS SWIFT OBSERVATORY

The Neil Gehrels Swift Observatory (Swift) remains NASA's premier mission for prompt and accurate localization of gamma-ray bursts and rapid response X-ray and ultraviolet follow-up observations of transient sources requested by the astronomical community. The observatory measures the position, brightness, and physical properties of gamma-ray bursts, and is revolutionary in allowing scientists to solve the mystery of their origin in the formation of stellar-mass black holes. The observatory continues to target gamma-ray burst science, while also using its capabilities to increase our understanding of the entire transient universe, ranging in distance from the solar system to high-redshift quasars, and in time from the present to the epoch of reionization. Swift's Burst Alert Telescope detects gamma ray bursts and accurately determines their positions on the sky. Swift then relays a 3-arcminute (3/60th of a degree) position estimate to the ground within 20 seconds of the initial detection, informing the astronomical community for timely follow-up observations using telescopes on the ground and in space. The spacecraft "swiftly" (in less than 90 seconds) and autonomously repoints itself to bring the burst location within the field of view of the sensitive narrow-field X-ray and Ultraviolet/optical telescopes to observe the afterglow. This unique ability to make rapid-response observations to fast-breaking events makes Swift especially beneficial for Time Domain and Multi-Messenger astrophysics. Swift is a Medium-Class Explorer mission that launched in 2004 and completed its prime mission in 2006.

NUCLEAR SPECTROSCOPIC TELESCOPE ARRAY (NUSTAR)

Launched in June 2012, NuSTAR completed its prime mission in July 2014 and is now in extended mission operations. NuSTAR enables scientists to locate supermassive black holes in other galaxies, study extreme accretion onto neutron stars, locate and examine the remnants of collapsed stars in our galaxy and the nearby universe, and observe any new supernovae in the local group of galaxies. NuSTAR's key science products are sensitive X-ray maps of the celestial sky at a higher energy band than any other focusing X-ray satellite. NuSTAR offers opportunities for a broad range of science investigations, ranging from probing cosmic ray origins and studying the extreme physics around collapsed stars, to mapping microflares on the surface of the Sun. NuSTAR performs key follow-up observations of sources found by other satellites. The NuSTAR mission implemented a Guest Observer (GO) program in 2015. NuSTAR is now conducting the observations selected under Cycle 8 of the GO program. The project coordinates some NuSTAR observations with other missions, including Swift, the International Gamma-Ray Astrophysics Laboratory, X-ray Multi-Mirror Mission-Newton, and Neutron Star Interior Composition ExploreR. Such coordinated observations take advantage of NuSTAR's unique access to high-energy X-rays with synergistic lower-energy X-ray capabilities of other missions. The project participated in the 2025 Senior Review, and NASA approved extended mission operations.

OTHER MISSIONS AND DATA ANALYSIS

TRANSITING EXOPLANET SURVEY SATELLITE (TESS)

The TESS mission launched on April 18, 2018, and completed its prime mission on July 4, 2020. TESS is performing an all-sky survey to search for planets transiting nearby stars. TESS monitors the sky with four wide-field visible-light cameras to detect periodic drops in brightness caused by planets passing in front of their stars. TESS is designed to survey over 85 percent of the sky, an area of sky 400 times larger than covered by Kepler, to search for planets around nearby stars (within approximately 200 parsecs). TESS stars are typically 30 to 100 times brighter than those surveyed by the Kepler satellite. Planets detected around these stars are far easier to characterize with follow-up observations, resulting in refined measurements of planet masses, sizes, densities, and atmospheric properties. By finding planets smaller than Neptune that transit stars bright enough to enable follow-up, TESS provides prime targets to learn about the composition and atmospheric properties of planets beyond the solar system.

TESS also obtains full-frame images of the entire field-of-view (24 by 96 degrees), originally at a cadence of 10 minutes, and now at a cadence of 200 seconds. For a subset of preselected targets, TESS collects data at a higher time-resolution of one image every 120 or 20 seconds. These data collection modes enable a broader range of science investigations. The project participated in the 2025 Senior Review, and NASA approved extended mission operations.

THE IMAGING X-RAY POLARIMETRY EXPLORER (IXPE)

NASA launched IXPE in December 2021 and it completed its prime mission in 2023. Due to the hundred-fold improvement in the sensitivity of X-ray polarimeters during the past two decades, IXPE enables astrophysicists to study an important new field of investigation into some of the most unusual objects found in the universe. IXPE examines polarized X-ray emissions from both galactic and extragalactic X-ray sources, such as active galactic nuclei, blazars, pulsars, pulsar wind nebulae, magnetars, accreting X-ray binaries, supernova remnants, and the Galactic Center. These observations have allowed the investigation of general relativistic and quantum effects in the extreme environment associated with these sources and is significantly improving our understanding of fundamental physics. The project participated in the 2025 Senior Review, and NASA approved extended mission operations.

SPECTRO-PHOTOMETER FOR THE HISTORY OF THE UNIVERSE, EPOCH OF REIONIZATION, AND ICES EXPLORER (SPHEREX)

NASA launched the SPHEREx mission on March 11, 2025. SPHEREx serves as a powerful tool for understanding how our universe evolved and how common the ingredients for life are in our galaxy's planetary systems. SPHEREx is NASA's first all-sky spectral astronomy survey mission and investigates the quantum physics of the Big Bang theory of the origin of the universe. The mission charts the origin and history of galaxy formation, from light produced by the first galaxies that ended the cosmic dark ages, to the present day. SPHEREx also surveys water and organic molecules in interstellar ices.

During the two-year prime mission, astronomers will gather data on hundreds of millions of galaxies and stars. The first all-sky scan map capturing 102 infrared wavelengths of light was released to the public in December 2025.

HELIOPHYSICS

Heliophysics

HELIOPHYSICS RESEARCH

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Heliophysics Research and Analysis	--	--	**37.0**	40.2	40.2	40.2	40.2
Sounding Rockets	--	--	**30.0**	30.0	30.0	30.0	30.0
Research Range	--	--	**10.0**	10.0	10.0	10.0	10.0
Other Missions and Data Analysis	--	--	**41.1**	40.1	37.6	37.6	37.7
Total Budget	**--**	**--**	**118.1**	**120.3**	**117.8**	**117.8**	**117.9**

The Sun, a typical medium star midway through its life, governs the solar system. The Sun wields its influence through its gravity, radiation, solar wind, and magnetic fields, all of which spread out through the heliosphere, interacting with other planets, the Earth, and its space environments to produce space weather, which can affect human technological infrastructure and activities. Heliophysics seeks to understand the Sun, heliosphere, and planetary space environments as a single connected system to answer these fundamental questions:

NASA's Voyager 1 spacecraft is depicted in this artist's concept traveling through interstellar space, or the space between stars, which it entered in 2012. Credit: NASA/JPL-Caltech

- How and why does the Sun vary?
- How do Earth, other planets, and the heliosphere respond to the Sun's changes?
- How do the Sun and the solar system interact with the interstellar medium?
- How do these processes affect human activities?

The Heliophysics Research program supports a wide variety of activities in support of these questions, including:

- Investigations of the Sun, including processes taking place throughout the solar interior and atmosphere and the evolution and cyclic activity of the Sun.
- Investigations of the origin and behavior of the solar wind, energetic particles, and magnetic fields in the heliosphere and their interaction with Earth and other planets, as well as with the interstellar medium.
- Investigations of the physics of magnetospheres, including fundamental interactions of plasmas and particles with fields and waves, and coupling to the solar wind and ionospheres.
- Investigations of the physics of the terrestrial mesosphere, thermosphere, and ionosphere, including the coupling of these phenomena to the lower atmosphere and magnetosphere.

HELIOPHYSICS RESEARCH

EXPLANATION OF MAJOR CHANGES IN FY 2027

This budget consolidates and reduces data centers, data archives, and community modeling into program elements within Data and Modeling Services. Additionally, NASA reduced funding in Heliophysics Directed Research and Technology to account for lower than planned future workforce needs.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

NASA will continue research within solar studies, magnetospheric studies, solar wind studies, and investigations of the uppermost regions of the Earth's atmosphere. NASA will select new awards solicited in Research Opportunities in Space and Earth Science (ROSES) 2025, ROSES 2026, and ROSES 2027, focusing on studies that advance fundamental understanding of the space environments of Earth, Moon, and Mars needed for enhanced technology operation and human exploration in these environments.

NASA will review and revise the portfolio of research program elements for ROSES 2027 to reflect administration priorities and recommendations provided in the new decadal survey for solar and space physics from the National Academy of Sciences and Engineering, released in December 2024.

NASA will continue to develop and refine the Artificial Intelligence and Machine Learning capabilities available to the Heliophysics community for data processing of mission science information, including through the Research and Development of Initiatives of Advanced New Technologies program.

NASA is finalizing the sounding rockets mission manifest for FY 2027.

NASA will launch six CubeSats in FY 2027.

Program Elements

HELIOPHYSICS RESEARCH AND ANALYSIS

The Heliophysics Research and Analysis project supports basic research, solicited through NASA's annual ROSES announcements. It supports investigations in all research areas of Heliophysics, including the study of solar interiors, solar wind dynamics, magnetic reconnection in solar and terrestrial magnetic fields, particle acceleration in space plasmas, energy deposition and distribution in the ionosphere, and gravity waves in the terrestrial atmosphere. The investigations emphasize the understanding of fundamental processes and interconnections across the traditional science disciplines, on a broad range of spatial and temporal scales.

Heliophysics Foundational Research supports data analysis along with supporting research, theory, modeling, and simulation, the combination of which is essential for interpreting mission research data collected between the outer edge of the Earth's atmosphere and the interaction of the Sun and solar wind with the local galactic environment (currently explored by Voyager). The Diversify, Realize, Integrate, Venture, Educate (DRIVE) science center element supports large principal-investigator proposed team efforts, which require a critical mass of interdisciplinary expertise, to make significant progress in understanding complex physical processes with broad importance.

HELIOPHYSICS RESEARCH

SOUNDING ROCKETS

NASA's Sounding Rockets project provides suborbital launch vehicles, payload development, and field operations support to NASA suborbital missions within SMD. The approximately 15 suborbital missions flown annually by the project provide researchers with opportunities to build, test, and fly new instrument and sensor design concepts while conducting world class scientific research. The project conducts operations from fixed launch sites such as Wallop Flight Facility's (WFF's) test range in Virginia, Poker Flat Research Range in Alaska, White Sands Missile Range in New Mexico, and foreign sites such as Andøya Space Sub-Orbital in Norway and Esrange in Sweden.

With the capability to fly higher than many LEO satellites and the ability to launch on demand, sounding rockets often offer the only means to study specific scientific phenomena of interest to many researchers. Sounding rockets can place instruments directly into regions where and when the science is occurring to enable direct, in-situ measurements. The mobile nature of the project enables researchers to conduct missions from strategic vantage points worldwide. To study solar and astrophysics phenomena, telescopes and spectrometers fly on sounding rockets to collect unique science data and test prototype instruments for future satellite missions.

RESEARCH RANGE

The Research Range project provides operations support, maintenance, and engineering for the WFF launch range in support of suborbital, orbital, and aircraft missions conducted on behalf of NASA and DoW. The project also supports NASA technology missions, autonomous aerial vehicle flights, and commercial launch and flight projects.

The range instrumentation includes meteorological, telemetry, radar, command, launch and range control centers, and optical systems. Research Range mobile assets provide range services at other ranges and remote locations around the world.

Program Schedule

NASA implements the Heliophysics Research program via a competitive selection process. NASA releases research solicitations each year through the ROSES NASA Research Announcements (NRAs).

Date	Significant Event
Q2 FY 2026	ROSES-2025 selection within six to nine months of receipt of proposals
Q4 FY 2026	ROSES-2026 solicitation
Q2 FY 2027	ROSES-2026 selection within six to nine months of receipt of proposals
Q4 FY 2027	ROSES-2027 solicitation
Q2 FY 2028	ROSES-2027 selection within six to nine months of receipt of proposals
Q4 FY 2028	ROSES-2028 solicitation
Q2 FY 2029	ROSES-2028 selection within six to nine months of receipt of proposals
Q4 FY 2029	ROSES-2029 solicitation

HELIOPHYSICS RESEARCH

Date	Significant Event
Q2 FY 2030	ROSES-2029 selection within six to nine months of receipt of proposals
Q4 FY 2030	ROSES-2030 solicitation
Q2 FY 2031	ROSES-2030 selection within six to nine months of receipt of proposals
Q4 FY 2031	ROSES-2031 solicitation

Program Management & Commitments

Program Element	Provider
Research and Analysis	Provider: HQ Lead Center: HQ Performing Centers: GSFC, MSFC, JPL, LaRC, JSC, ARC Cost Share Partners: None
Sounding Rockets	Provider: GSFC Lead Center: HQ Performing Center: GSFC/WFF Cost Share Partners: None
Research Range	Provider: GSFC Lead Center: HQ Performing Center: GSFC/WFF Cost Share Partners: None

Acquisition Strategy

NASA issues solicitations for competed research awards each year in the ROSES NRAs. To the widest extent possible, NASA fully and openly competes all new acquisitions. Proposals are peer-reviewed and selected from the annual ROSES announcement. Universities, government research laboratories, and industry partners throughout the United States all participate in research projects.

MAJOR CONTRACTS/AWARDS

Element	Vendor	Location (of work performance)
Sounding Rocket Operations	Peraton	Wallops Island, VA

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Science Planning and Research Support	--	--	**3.4**	3.4	3.4	3.4	3.4
CubeSat	--	--	**10.0**	10.0	10.0	10.0	10.0
Solar Data Center	--	--	**0.0**	0.0	0.0	0.0	0.0
Data & Modeling Services	--	--	**13.5**	14.5	14.5	14.5	14.5
Space Physics Data Archive	--	--	**0.0**	0.0	0.0	0.0	0.0
Community Coordinated Modeling Center	--	--	**0.0**	0.0	0.0	0.0	0.0
Space Science Mission Ops Services	--	--	**8.1**	9.2	9.2	9.3	9.3
Voyager	--	--	**5.5**	2.5	0.0	0.0	0.0
Directed Research & Technology	--	--	**0.5**	0.5	0.5	0.5	0.5
Total Budget	**--**	**--**	**41.1**	**40.1**	**37.6**	**37.6**	**37.7**

NASA accumulates, archives, and distributes data collected by the Heliophysics System Observatory, a fleet of operating spacecraft. Combining the measurements from all these observing platforms enables interdisciplinary science across the vast spatial scales of our solar system. This collective asset enables the data, expertise, and research results to contribute directly to fundamental research on solar and space plasma physics and to space weather prediction. NASA teams support day-to-day mission operations for NASA spacecraft and data analysis to advance the state of space science and space weather modeling. NASA conducts science community-based projects to share heliophysics research models and evaluate models containing space weather information that is of value to industry and government agencies. Heliophysics data centers archive and distribute the science data from operating missions in the Living With a Star, Research, and Explorer programs.

Mission Planning and Other Projects

SCIENCE PLANNING AND RESEARCH SUPPORT

This project supports NASA scientists' participation in proposal peer review panels, Decadal Surveys, and National Academies’ studies.

CUBESAT

CubeSats are small spacecraft, built to a standardized form-factor of size and mass, which can launch as secondary or ride-share payloads. With lower development costs per investigation and rapid development cycles, CubeSats can provide frequent science and technology flight opportunities. CubeSats have significant potential to leverage exploratory and systematic science observations at minimal additional cost.

The Heliophysics CubeSat project continues to work on the cross-discipline investigations already underway. In response to the capabilities demonstrated by CubeSat investigations in the initial pathfinder stage, the CubeSat activities expanded to take advantage of new science achievable via investigations in the $2 million to $10 million range. The larger investigations will enable the development of remote sensing investigations with more sophisticated CubeSats, as well as small constellations of in-situ CubeSat investigations. NASA will select CubeSat activities at the rate of at least one per year to establish a regular cadence of flight opportunities for the proposer community.

SOLAR DATA CENTER

The Solar Data Center (SDAC) provides the mission and instrument expertise necessary to transform raw data into high-quality scientific analysis. By leading community-driven development through the Virtual Solar Observatory, SDAC streamlines access to both space-based and ground-based observations while maintaining a centralized repository for essential analysis software. To optimize resource management and technical synergy, NASA integrated SDAC into the Data and Modeling Services project, ensuring a unified and efficient approach to data accessibility and heliospheric research support.

DATA AND MODELING SERVICES

The Data and Modeling Services project supports missions in extended operations and missions planned for decommissioning by preparing their data holdings for long-term archival curation. This project also provides for the creation of higher-level data products, which are of significant use to the science community and not funded during the prime mission. Higher-level data products are data that combine results of multiple missions and/or instruments. The Heliophysics data archives are growing at an exponential rate. All science disciplines have seen a surge of data holdings over the last decade. As such, conventional storage and retrieval has become impractical. This era of big data requires the effective curation and preservation of critical data products. With this budget, NASA cements the transformation of the Heliophysics archives, consisting of the Space Physics Data Archive (SPDA) and SDAC, into a collaborative digital resource library, the Heliophysics Digital Resource Library. In addition, this budget consolidates SDAC, SPDA, and the Community Coordinated Modeling Center as components of the Data and Modeling Services budget to enhance synergies and efficiencies between these components.

SPACE PHYSICS DATA ARCHIVE

The SPDA ensures long-term data preservation and online access to non-solar heliophysics science data. It operates key infrastructure components for the Heliophysics Data Environment, including inventory and web service interfaces to systems and data. It also provides unique enabling science data services. This budget combines SPDA with other related projects under the Data and Modeling Services project.

COMMUNITY COORDINATED MODELING CENTER

The Community Coordinated Modeling Center is a multi-agency partnership that enables and performs the research and development for next generation heliophysics and space weather models. The project provides the United States and the international research community access to simulations that enable “runs on demand,” using models to study space weather events in near-real time. This allows the comparison of observational data and model parameters during or shortly after solar activity, thereby improving accuracy of the models. This budget combines SPDF with other related projects under the Data and Modeling Services project.

OTHER MISSIONS AND DATA ANALYSIS

SPACE SCIENCE MISSION OPERATIONS SERVICES

Space Science Mission Operations (SSMO) Services manages the on-orbit operations of GSFC Space Science missions. SSMO currently manages the following Heliophysics missions: Advanced Composition Explorer, Aeronomy of Ice in Mesosphere, Interstellar Boundary Explorer, Ionospheric Connection Explorer, Interface Region Imaging Spectrograph, Magnetospheric Multiscale Mission, Parker Solar Probe, Solar Dynamics Observatory, Solar and Heliospheric Observatory, Solar Terrestrial Relations Observatory, Time History of Events and Macroscale Interactions during Substorms, Thermosphere Ionosphere Mesosphere Energetics and Dynamics, and Wind. SSMO Services also sustains an operational multi-mission infrastructure for current and future missions.

DIRECTED RESEARCH AND TECHNOLOGY

The Heliophysics Directed Research and Technology project funds the civil service staff who work on emerging Heliophysics flight projects, instruments, and research.

Operating Missions

VOYAGER

The Voyager Interstellar Mission is exploring the interaction of the heliosphere and the local interstellar medium. Voyager 1, launched in 1977, is making the first in-situ observations of the region outside the heliosphere from about 167 astronomical units (AU), or 167 times Earth's distance from the Sun, and is traveling at a speed of 3.6 AU per year, or 38,000 miles per hour. Voyager 2 is about 140 AU from the Sun and traveling at a speed of about 34,000 miles per hour, or 3.2 AU per year. Voyager 2 crossed the heliopause, the theoretical boundary where the interstellar medium stopped the Sun's solar, on November 5, 2018. Its twin, Voyager 1, crossed the heliopause on August 25, 2012, and continues to sail outward through the local interstellar medium.

LIVING WITH A STAR

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Other Missions and Data Analysis	--	--	100.5	98.9	89.8	90.1	88.7
Total Budget	**--**	**--**	**100.5**	**98.9**	**89.8**	**90.1**	**88.7**

Along with IMAP, two other missions shared the launch as rideshares on the same Falcon 9: NASA's Carruthers Geocorona Observatory and NOAA's SWFO-L1 (Space Weather Follow On-Lagrange 1), visible beneath the IMAP spacecraft during encapsulation activities.

The Living With a Star (LWS) program targets specific aspects of the Sun-Earth system that affect life and society. LWS provides a predictive understanding of the Sun-Earth system, linkages among the interconnected systems, and space weather conditions at Earth and the interplanetary medium. Measurements and research from LWS missions may contribute to advances in operational space weather forecasting that help prevent damage to spacecraft, communications and navigation systems, and power grids. LWS products improve our understanding of ionizing radiation, which has human health implications on ISS and high-altitude aircraft flight, as well as operations of future space exploration with and without human presence.

EXPLANATION OF MAJOR CHANGES IN FY 2027

To achieve management efficiencies for directed spaceflight missions, NASA moved the recently launched Interstellar Mapping and Acceleration Probe, and Carruthers missions from the Solar Terrestrial Probe program to the LWS program.

NASA consolidated the out-year extended mission operations budget in the LWS program and established a new project, Heliophysics Senior Review, to fund the operation of mission extensions after 2027.

NASA renamed LWS Science to Heliophysics for Societal Resilience to emphasize the purpose of the LWS Science program in providing scientific advances in heliophysics that directly target societal needs to improve space weather characterization and prediction, and to support human endeavors in the exploration of Moon and Mars.

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Interstellar Mapping and Acceleration Pr	--	--	**23.9**	15.3	0.0	0.0	0.0
Carruthers Geocorona Observatory	--	--	**2.2**	0.3	0.2	0.0	0.0
Heliophysics for Societal Resilience	--	--	**19.8**	19.8	29.8	29.8	29.8
LWS Program Management	--	--	**24.9**	22.9	23.5	23.9	24.3
Solar Orbiter Collaboration	--	--	**4.7**	4.2	0.0	0.0	0.0
Solar Dynamics Observatory (SDO)	--	--	**10.0**	8.0	0.0	0.0	0.0
Parker Solar Probe	--	--	**15.0**	15.0	0.0	0.0	0.0
Heliophysics Senior Review	--	--	**0.0**	13.5	36.4	36.4	34.6
Total Budget	**--**	**--**	**100.5**	**98.9**	**89.8**	**90.1**	**88.7**

Living With a Star (LWS) Other Missions and Data Analysis budget includes operating LWS missions, scientific research, and program management.

Mission Planning and Other Projects

INTERSTELLAR MAPPING AND ACCELERATION PROBE (IMAP)

IMAP will study the interaction of the solar wind with the winds from other stars by directly sampling neutral atoms returning from the interstellar boundary and will elucidate how particles are accelerated to high energies in space environments. IMAP launched on a SpaceX Falcon 9 rocket on September 24, 2025 and will conduct operations at the Earth-Sun Lagrange Point 1 (L1), upstream of Earth at one percent of the distance to the Sun. IMAP will carry 10 instruments, which can be grouped into three categories: energetic neutral atom detectors (i.e., IMAP-Lo, IMAP-Hi, and IMAP-Ultra), charged particle detectors (i.e., Solar Wind and Pickup Ions, Solar Wind Experiment, Compact Dual Ion Composition Experiment, and High-energy Ion Telescope), and other coordinated measurements (i.e., MAG, Interstellar Dust Experiment, Global solar Wind Structure). IMAP will also supply critical real-time space weather data through its IMAP, Active Link for Real-Time. IMAP reached L1 (a spot between the Sun and the Earth, about 1.5 million km from the Earth towards the Sun) in January 2026 and began its two-year prime mission phase in February 2026.

Two secondary rideshare payloads accompanied the IMAP mission, taking advantage of the excess performance capability of the launch vehicle. The first is the Carruthers Geocorona Observatory, a Heliophysics Solar Terrestrial Probes (STP) mission of opportunity, and the second is the NOAA Space Weather Follow-On mission.

CARRUTHERS GEOCORONA

In December 2020, NASA selected the Carruthers Geocorona Observatory, formerly known as Global Lyman-alpha Imager of the Dynamic Exosphere, as an STP Mission of Opportunity. Carruthers will study variability in Earth's exosphere by tracking far ultraviolet light emitted from hydrogen. It will also gather observations at a high rate, with a view of the entire exosphere, to ensure a global and comprehensive set of data, which is currently lacking. Carruthers will help scientists better understand the ways in which Earth's exosphere changes in response to influences of the Sun. This study will provide us with better ways to forecast and, ultimately, mitigate the ways in which space weather can interfere with radio communications in space. Carruthers is a rideshare payload that launched successfully on the IMAP mission launch vehicle on September 24, 2025. It will commence its two-year prime mission phase in March 2026.

HELIOPHYSICS FOR SOCIETAL RESILIENCE

The overarching goal of the Heliophysics for Societal Resilience project (formerly known as LWS Science) is to develop the scientific understanding needed to address those aspects of heliophysics that affect life and society on Earth and in space. To accomplish this goal, NASA solicits targeted research proposals leading to a physics-based understanding of the integral system linking the Sun to the Earth, directly and via the heliosphere, magnetosphere, and ionosphere. Types of investigations in support of this goal may include data analysis, theory and modeling, and the development of numerical tools and methods (e.g., software). Heliophysics for Societal Resilience addresses large-scale problems that cross discipline and technique boundaries. This project also includes funding to train the next generation of heliophysics experts by conducting a graduate-level heliophysics summer school, developing publicly available graduate course content, and supporting a limited number of postdoctoral research positions at universities and government laboratories.

LWS PROGRAM MANAGEMENT

The FY 2027 budget proposes consolidating LWS Program Management and STP Program Management into a unified structure that better aligns with the evolving portfolio of Heliophysics flight missions in development.

The LWS Program Management budget supports critical flight project management functions executed by the LWS Program Office at NASA GSFC and provides the resources required to manage the planning, formulation, and implementation of all LWS missions. The LWS Program Management project includes the SMD Rideshare Office. This office implements an SMD-wide rideshare strategy for Evolved Expendable Secondary Payload Adapter-class payload opportunities. The office is responsible for coordinating rideshare opportunities and collaborating across SMD, other NASA directorates, other government agencies, and the greater rideshare community to foster a culture of cross-collaboration and maximize science return through shared launch opportunities and resources.

NASA will provide a limited contribution to the University of Calgary's refurbishment and expansion of a CSA ground-based network, through the Canadian Fund for Innovation. This network is central to a long-term collaboration between space-based missions and ground-based observatories to study Earth's space environment.

HELIOPHYSICS SENIOR REVIEW

Every three years, the Heliophysics division conducts a Senior Review to evaluate missions that have completed, or will soon complete, their prime mission operation phase. Following the completion of the 2026 Senior Review, this funding will cover operations and scientific analysis for missions with operations extended through 2029.

OTHER MISSIONS AND DATA ANALYSIS

Operating Missions

SOLAR ORBITER COLLABORATION (SOC)

The NASA and ESA SOC mission, launched in February 2020, provides measurements that give NASA better insight on the evolution of sunspots, active regions, coronal holes, and other solar features and phenomena. The instruments explore the near-Sun environment to improve our understanding of the origins of the solar wind streams and the heliospheric magnetic field; the sources, acceleration mechanisms, and transport processes of solar energetic particles; and the evolution of Coronal Mass Ejections in the inner heliosphere. To achieve these objectives, SOC makes in-situ measurements of the solar wind plasma, fields, waves, energetic particles, and imaging/spectroscopic observations. SOC adjusts its orbit to the direction of the Sun's rotation to allow the spacecraft to observe one specific area for much longer than any other currently operating solar observation platforms.

ESA provided the spacecraft and manages operations and most of the instruments. NASA provided the launch vehicle and two science investigations/instruments: The Solar Orbiter Heliospheric Imager and the Heavy Ion Sensor (HIS). The HIS failed in 2023, and NASA and ESA performed a series of tests to attempt to return it to working order. The tests were unsuccessful, leading to closure of HIS in FY 2025. The prime mission phase will continue until May 2027, when the spacecraft will have completed 13 orbits around the Sun.

SOLAR DYNAMICS OBSERVATORY (SDO)

Launched on February 11, 2010, SDO seeks to understand the Sun's influence on Earth and near-Earth space by simultaneously studying the solar atmosphere on small scales of space and time and in many wavelengths. The observatory enables scientists to determine how the Sun's magnetic field is generated and structured and how stored magnetic energy is converted and released in the form of solar wind, energetic particles, and variations in the solar irradiance. SDO collects data to help explain the creation of solar activity, which drives space weather. Measurements of the interior of the Sun, the Sun's magnetic field, the hot plasma of the solar corona, and the irradiance that creates Earth's ionosphere are the primary data products. SDO is currently in extended operations. Following the 2023 Senior Review, NASA approved SDO for continued operations until the 2026 Senior Review. The FY 2027 budget assumes operational efficiencies in the extended mission phase.

PARKER SOLAR PROBE (PSP)

PSP), launched in 2018, is unlocking the mysteries of the Sun's atmosphere. PSP has flown through the solar corona 20 out of an expected 24 times, gradually lowering its orbit closer to the Sun using Venus' gravity during seven flybys over its seven-year prime mission. After the sixth Venus flyby, the spacecraft flew through the Sun's atmosphere as close as 4.6 million miles to our star's surface—well within the orbit of Mercury.

PSP employs a combination of in-situ measurements and imaging to revolutionize our understanding of the corona and expand our knowledge of the origin and evolution of the solar wind. PSP observations are making critical contributions to understanding the behavior of solar eruptions that can improve our ability to forecast changes in Earth's space environment.

OTHER MISSIONS AND DATA ANALYSIS

PSP completed its prime mission in 2025 and will enter the 2026 Senior Review. The FY 2027 budget assumes operational efficiencies in the extended mission phase.

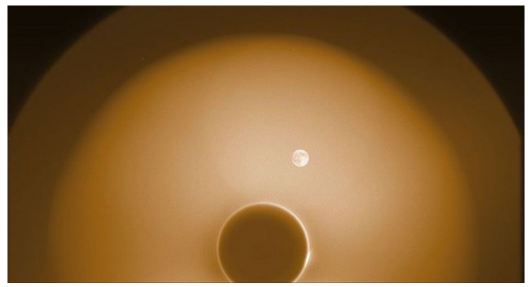
HELIOPHYSICS EXPLORER PROGRAM

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Multi-Slit Solar Explorer	--	--	**64.2**	16.7	14.8	0.6	0.0
Other Missions and Data Analysis	--	--	**58.8**	75.3	111.9	125.4	120.9
Total Budget	**--**	**--**	**123.0**	**92.0**	**126.7**	**126.0**	**120.9**

The Heliophysics Explorer Program provides frequent flight opportunities for world-class scientific investigations on focused and timely science topics. These investigations complement the science of strategic missions of the Living With a Star program. The program is highly responsive to new knowledge, new technology, and updated scientific priorities by launching smaller missions formulated and executed in a relatively short development cycle. The program features missions competitively selected from the scientific research community with constrained mission life cycle costs.

The Explorer Program provides two classes (Medium-Class Explorers [MIDEX] and Small Explorers [SMEX]) of flight opportunities to accomplish the goals of the program. MIDEX missions are the most capable Explorers scientific investigations, with a cost cap of $300 million (not including launch services). SMEX missions focus on targeted scientific objectives and are limited to a $150 million cost cap (not including launch services). Explorers Missions of Opportunity are smaller investigations, which may fly as a hosted payload, sub-orbital flight, SmallSat or CubeSat missions, or ISS-attached payloads.



During commissioning, Polarimeter to UNify the Corona and Heliosphere's (PUNCH) Narrow Field Imager (NFI) instrument captured this image of the new Moon as it passed by the Sun in the sky on April 27, 2025. Earthshine (sunlight-reflected off Earth) makes the new Moon appear full. This image helped the PUNCH team confirm that the Moon will not obscure NFI's view of the corona and solar wind. The dark circle near the bottom is the shadow of NFI's occulter, which hides the Sun. A narrow bright ring of diffracted light surrounds the occulter, not yet fully aligned with the Sun. Around that is a large, hazy circle of stray light glinting off the occulter (the Moon is inside that circle). Outside is a small, dimmer region of the sky that is less affected by glint. Credit: NASA/SwRI

EXPLANATION OF MAJOR CHANGES IN FY 2027

NASA announced final selections for the 2022 SMEX Announcement of Opportunity in December 2025, advancing two missions to their next development phase. The Cross-scale Investigation of Earth's Magnetotail and Aurora (CINEMA) mission will proceed to Phase B preliminary design and development starting Q2 FY 2026, with the design phase continuing into FY 2027. Meanwhile, the Chromospheric Magnetism Explorer (CMEx) mission will enter the extended one-year concept development phase beginning Q2 FY 2026.

NASA consolidated out-year extended operations funding for Explorer missions within the Heliophysics Explorer Future Missions budget.

HELIOPHYSICS EXPLORER PROGRAM

KEY ACHIEVEMENTS PLANNED FOR FY 2027

Multi-slit Solar Explorer (MUSE) will complete KDP-D, final system integration of the spacecraft with the Multi-slit Spectrograph and Context Imager, system and environmental tests, and pre-ship review in FY 2027.

CINEMA will complete PDR in FY 2027.

CMEx will complete Systems Requirements Review in FY 2027.

PUNCH will continue prime science operations in FY 2027.

Tandem Reconnection and Cusp Electrodynamics Reconnaissance Satellites (TRACERS) started prime science operations in FY 2026 and will complete prime science operation in FY 2027.

Escape and Plasma Acceleration and Dynamics Explorers (ESCAPADE) will start prime science operations in FY 2027.

Sun Radio Interferometer Space Experiment (SunRISE) will conduct prime science operations in FY 2027.

Program Schedule

Date	Significant Event
Q1 FY 2027	SunRISE Operational Readiness Review
Q1 FY 2027	SunRISE KDP-E
Q1 FY 2027	SunRISE Launch Readiness Date
Q2 FY 2026	MUSE Systems Integration Review
Q2 FY 2027	CINEMA Preliminary Design Review
Q2 FY 2027	CMEx System Readiness Review
Q3 FY 2027	CINEMA KDP-C
Q3 FY 2027	MUSE Operational Readiness Review
Q1 FY 2028	MUSE KDP-E
Q1 FY 2028	MUSE Launch Readiness Date
Q2 FY 2028	CINEMA CDR
Q3 FY 2029	CINEMA Systems Integration Review
Q1 FY 2031	CINEMA Launch Readiness Date

HELIOPHYSICS EXPLORER PROGRAM

Program Management and Commitments

The Heliophysics and Astrophysics Explorer programs share a common program office at GSFC and a common management structure. The Explorer Program Manager resides at GSFC, reporting functionally to the Center director and programmatically through the Heliophysics and Astrophysics division directors.

Acquisition Strategy

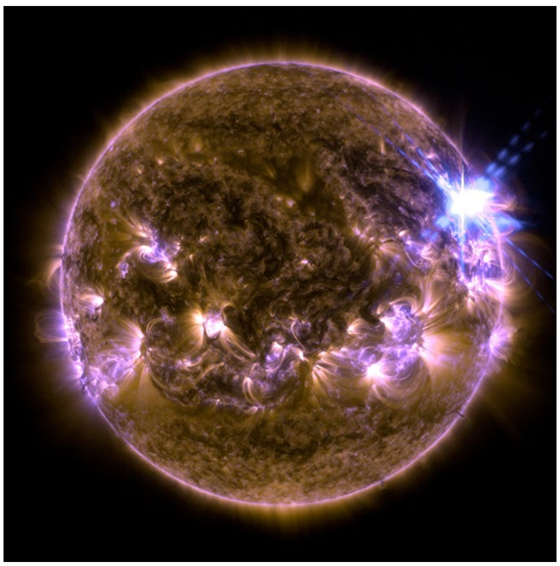
NASA competitively selects new Explorer missions, releasing solicitations when available funding allows. NASA acquires launch vehicles through the Launch Services Program at KSC, except when an international partner provides them under an approved agreement, or when the Explorer mission is not a primary payload on the launch vehicle.

MULTI-SLIT SOLAR EXPLORER

Formulation	Development	Operations

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	64.2	16.7	14.8	0.6	0.0



The MUSE mission will help scientists understand the forces heating the Sun's corona, the outermost region whose eruptions are the foundation of space weather, by observing the Sun's extreme ultraviolet radiation and capturing the highest resolution images ever of this region. This image of a solar flare – as seen in the bright eruption on the upper right — was captured at 8:30 UTC on November 14, 2025.

PROJECT PURPOSE

NASA selected the Multi-slit Solar Explorer (MUSE) mission under the 2019 Medium-class Explorer (MIDEX) Announcement of Opportunity (AO) in February 2022. MUSE will help scientists understand the forces driving the heating of the Sun's corona and the eruptions in that outermost region that are at the foundation of space weather. The mission will offer deeper insight into the physics of the solar atmosphere by using a powerful instrument known as a multi-slit spectrometer to observe the Sun's extreme ultraviolet radiation and obtain the combined highest resolution spectra and images ever captured of the solar transition region and the corona.

EXPLANATION OF MAJOR CHANGES IN FY 2027

The MUSE mission successfully completed its CDR in 2025, confirming the technical maturity and flight readiness of the observatory design. Project teams are currently manufacturing flight hardware elements as they prepare for the System Integration Review scheduled for the summer of 2026. Following NASA's selection of SpaceX for launch services, the mission team initiated formal kick-off activities, including the development of the Launch Vehicle Interface Control Document.

PROJECT PARAMETERS

The primary goal of the MUSE mission is to investigate the causes of coronal heating and instability, such as flares and coronal mass ejections, and gain insight into the basic plasma properties of the corona. This mission consists of one spacecraft with two instruments - a Spectrograph and a Context Imager.

The Multi-slit Spectrograph collects line profiles in bright coronal lines, covering a large temperature range (0.7-12 millikelvin) at a 0.4 inch angular with one second slit dwelling time temporal resolution.

MULTI-SLIT SOLAR EXPLORER

Formulation	Development	Operations

The Context Imager collects 0.33-inch resolution images over a larger field-of-view, showing transition region and coronal morphology and motions.

Using these instruments, MUSE will obtain high-resolution images of the evolution of solar flare ribbons in a field of view focused on a large, active region on the Sun. The mission will use breakthrough imaging spectroscopy techniques to observe radial motion and heating at 10 times the current resolution, and 100 times faster, a key capability when trying to study the phenomena driving heating and eruption processes, which occur on time scales shorter than previous spectrographs could observe.

NASA plans to launch MUSE in November 2027 and will have a prime mission duration of two years in a low-Earth Sun-synchronous orbit.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

MUSE will complete KDP-D and final system integration of the spacecraft with the Multi-slit Spectrograph and Context Imager. The Observatory will then complete system and environmental tests and pre-ship review in preparation for delivery to the launch site.

SCHEDULE COMMITMENTS/KEY MILESTONES

Milestone	Confirmation Baseline Date	FY 2027 PB Request
KDP-C	Aug 2024	Aug 2024
CDR	Feb 2025	Feb 2025
System Integration Review	Jan 2026	Jan 2026
KDP-D	Mar 2026	Mar 2026
Operational Readiness Review	Mar 2027	Mar 2027
KDP-E	Oct2027	Oct 2027
Launch Readiness Date	Nov 2027	Nov 2027

MULTI-SLIT SOLAR EXPLORER

Formulation	Development	Operations

Development Cost and Schedule

This is the first report of development cost for this mission.

Base Year	Base Year Develop-ment Cost Estimate ($M)	JCL (%)	Current Year	Current Year Develop-ment Cost Estimate ($M)	Cost Change (%)	Key Milestone	Base Year Milestone Data	Current Year Milestone Data	Milestone Change (mths)
2025	296.9	70	2026	296.9	0	LRD	Nov 2027	Nov 2027	0

Note: The confidence level estimates reported reflect an evolving process as NASA improves its probabilistic estimation techniques and processes. Estimate reflects the practices and policies at the time it was developed. Estimates that include combined cost and schedule risks are denoted as JCL (joint confidence level); all other CLs (confidence levels) reflect cost confidence without necessarily factoring the potential impacts of schedule changes on cost.

Development Cost Details

Element	Base Year Development Cost Estimate ($M)	Current Year Development Cost Estimate ($M)	Change from Base Year Estimate ($M)
TOTAL:	**296.9**	**296.9**	**0**
Aircraft/Spacecraft	32.4	43.3	+10.9
Payloads	42.7	49.6	+6.9
Systems I&T	7.6	8.8	+1.2
Launch Vehicle	110.6	110.6	0
Ground Systems	3.7	11.9	+8.2
Science/Technology	8.5	10.6	+2.1
Other Direct Project Costs	91.4	62.1	-29.3

MULTI-SLIT SOLAR EXPLORER

Formulation	Development	Operations

Project Management & Commitments

The Principal Investigator for this mission is located at Lockheed Martin Advanced Technology Center. In addition, NASA awarded the contract for the spacecraft and instruments to Lockheed Martin Advanced Technology Center.

Element	Description	Provider Details	Change from Baseline
Instrument	Multi-slit Spectrograph	Provider: Lockheed Martin Advanced Technology Center Lead Center: GSFC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
Instrument	Context Imager	Provider: Lockheed Martin Advanced Technology Center Lead Center: GSFC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
Spacecraft	Provides platform for the payload	Provider: Lockheed Martin Commercial Civil Space Lead Center: GSFC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
Ground Systems	Mission Operations Center	Provider: UC Berkeley Space Sciences Laboratory Lead Center: GSFC Performing Center(s): N/A Cost Share Partner(s): N/A	N/A
Launch Vehicle	Deliver the spacecraft to operational orbit	Provider: TBD Lead Center: GSFC Performing Center(s): KSC Cost Share Partner(s): N/A	N/A

MULTI-SLIT SOLAR EXPLORER

Formulation	Development	Operations

Project Risks

Risk Statement	Mitigation
If: Parts and subsystem procurement issues are not resolved timely, Then: Integration plans may be delayed or altered to mitigate integration disruptions.	Mechanical piece part procurements remain the critical path. Mitigation strategies involve daily project and payload manager tag-ups to actively prioritize and manage procurement schedules. S-Band radio frequency piece part delivery has been delayed due to supply chain consolidation. MUSE has evaluated and put a back-up plan in place that includes a lower performing piece part and has identified a trigger date for that backup plan if the delivery of the primary part is not resolved. NASA HQ has supported discussions with senior personnel at supplier.

Acquisition Strategy

NASA competitively selected the mission through the Heliophysics Explorers 2019 MIDEX AO in 2022.

MAJOR CONTRACTS/AWARDS

Element	Vendor	Location (of work performance)
Principal Investigator, Project Management, Payload (Spectrograph and Context Imager), Systems Integration and Test, Data Processing, Science Operations and Analysis, Science Operations Center	Lockheed Martin Advanced Technology Center	Palo Alto, CA

INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	Standing Review Board (SRB)	Apr 2025	CDR ensures the integrity of the project design and its ability to meet mission requirements with appropriate margins and acceptable risk within the project defined constraints.	Successful

MULTI-SLIT SOLAR EXPLORER

Formulation	Development	Operations

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	SRB	Aug 2026	System Integration Review (SIR) ensures the readiness of the project and associated supporting infrastructure to begin system Assembly, Integration, and Test (AI&T) and evaluate if remaining project development can be completed within existing project resources.	TBD
Performance	SRB	Jul 2027	Operational Readiness Review (ORR) ensures that all system and support (i.e., flight and ground) hardware, software, personnel, procedures, supporting capabilities, and user documentation accurately reflect the deployed state of the system and are operationally ready.	TBD

OTHER MISSIONS AND DATA ANALYSIS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Electrojet Zeeman Imaging Explorer	--	--	**0.0**	0.0	0.0	0.0	0.0
Escape and Plasma Accel and Dynamics Exp	--	--	**4.5**	4.9	4.8	0.0	0.0
Heliophysics Explorer Future Missions	--	--	**34.0**	63.7	99.4	116.3	114.7
Heliophysics Explorer Program Management	--	--	**8.7**	6.6	7.7	9.1	6.2
PUNCH	--	--	**4.2**	0.1	0.0	0.0	0.0
TRACERS	--	--	**0.0**	0.0	0.0	0.0	0.0
Atmospheric Wave Experiment	--	--	**0.0**	0.0	0.0	0.0	0.0
SunRISE	--	--	**7.4**	0.0	0.0	0.0	0.0
Total Budget	**--**	**--**	**58.8**	**75.3**	**111.9**	**125.4**	**120.9**

The Heliophysics Explorer Other Missions and Data Analysis budget includes operating Explorer missions, program management, missions in formulation and development with LCCs less than $250 million, and funding for future mission selections.

Mission Planning and Other Projects

ESCAPE AND PLASMA ACCELERATION AND DYNAMICS EXPLORERS (ESCAPADE)

NASA selected ESCAPADE under the Small Innovative Missions for Planetary Exploration Mission of Opportunity in 2019. ESCAPADE will study the active processes in the magnetosphere of Mars and how the solar wind controls them. Using two identical SmallSats, ESCAPADE will be the first mission to characterize the flow of the solar wind and of Mars-produced plasma through the Mars space environment with the ability to distinguish variations in space (e.g., a spacecraft passes through a structure) and in time (e.g., a structure changes size). The mission will focus on the plasma boundaries that define the regions of Mars’ magnetosphere, Mars’ atmospheric escape, and global changes in the magnetospheric structure under different solar wind conditions. With its thin atmosphere and weak crustal magnetic field in the southern hemisphere, Mars allows the study of fundamental physical processes and their differences across different planetary environments (e.g., Earth and Venus). Further, characterizing the global system and its variability is a necessary component of understanding the space weather environment ahead of any crewed mission to Mars.

The ESCAPADE project delivered two complete spacecraft observatories to the launch site where the spacecraft were integrated to the Blue Origin New Glenn rocket and successfully launched on November 13, 2025. The spacecraft were successfully commissioned in December 2025 and have entered Prime Operations. They will spend 11 months loitering near Earth before the next Mars planetary alignment, when they will slingshot past Earth on a Mars cruise trajectory that will last 10 months before starting their science campaign at Mars.

OTHER MISSIONS AND DATA ANALYSIS

HELIOPHYSICS EXPLORER FUTURE MISSIONS

The Heliophysics Explorer Future Missions budget currently supports Cross-scale Investigation of Earth's Magnetotail and Aurora (CINEMA), Chromospheric Magnetism Explorer (CMEx), and the 2028 Small Explorer (SMEX) Announcement of Opportunity (AO). In December 2025, NASA announced final selections for the 2022 SMEX AO, selecting CINEMA to advance into Phase B preliminary design and development. NASA also selected (CMEx) mission to continue Phase A concept development for one year.

CINEMA

In December 2025, NASA selected the (CINEMA) mission from the 2022 SMEX AO to enter Phase B preliminary design and development, which includes planning and design for flight and mission operations. CINEMA aims to advance our understanding of how plasma energy flows into the Earth's magnetosphere. This highly dynamic convective flow is unpredictable - sometimes steady and sometimes explosive - driving phenomena like fast plasma jets, global electrical current systems, and spectacular auroral displays.

CINEMA will investigate the mystery behind magnetic convection in Earth's magnetosphere - a critical piece of the puzzle in understanding why some space weather events are so influential while other seem to fizzle out. Using multiple, multi-point measurements through a constellation of nine small satellites and instruments including an energetic particle detector, an auroral imager and a magnetometer on each spacecraft, CINEMA will study how energy from the Sun enters Earth's magnetosphere, causing phenomena like the aurora and impacting technology, helping to predict space weather by linking large-scale magnetic fields to visible auroras.

CMEx

The CMEx (Chromospheric Magnetism Explorer) mission is dedicated to understanding the origin of solar storms by observing the Sun's chromosphere—the layer of its atmosphere where magnetic fields evolve and become unstable, leading to explosive eruptions. The CMEx concept is a proposed single-spacecraft mission that would use proven ultraviolet instruments to directly measure the magnetic fields in the Sun's chromosphere.

HELIOPHYSICS EXPLORER PROGRAM MANAGEMENT

Explorer Program Management encompasses the program office resources required to manage Explorer projects. The program office is responsible for providing support and guidance to projects in resolving technical and programmatic issues and risks; for monitoring and reporting technical and programmatic progress of the projects; and for achieving Explorer cost, schedule, and technical goals and requirements. The project also includes support for the Science Office for Mission Assessments (SOMA) at LaRC. SOMA is responsible for the technical and scientific evaluation of Explorer mission proposals.

SUN RADIO INTERFEROMETER SPACE EXPERIMENT (SUNRISE)

NASA provisionally selected the SunRISE mission in February 2019 for an extended Phase A and then authorized the mission to proceed with its Formulation Phase in March 2020. SunRISE will use six solar-powered CubeSats, each about the size of a toaster oven, to simultaneously observe radio images of low-frequency emission from solar activity and share them via NASA's Deep Space Network. The constellation of CubeSats will fly within six miles of each other above Earth's atmosphere, which otherwise blocks the radio signals SunRISE will observe. Together, the six CubeSats will create 3D maps to pinpoint where giant particle bursts originate on the Sun and how they evolve as they expand outward into space. This will help determine what initiates and accelerates these giant jets of radiation. The six individual spacecraft will also work together to map the pattern of magnetic field lines reaching from the Sun out into interplanetary space. This information will help improve understanding of how our solar system works and, ultimately, can help protect astronauts traveling to the Moon and Mars by providing better information on how the Sun’s radiation affects the space environment through which they must travel. The SunRISE launch readiness date is in Q1 FY 2027. The budget supports a 12-month prime mission phase. Operating Missions

ELECTROJET ZEEMAN IMAGING EXPLORER (EZIE)

In December 2020, NASA selected the EZIE mission (proposed as an Explorer Mission of Opportunity) to study electric currents in Earth’s atmosphere linking aurora to the Earth’s magnetosphere—one piece of Earth’s complicated space weather system, which responds to solar activity and other factors. The Auroral Electrojet index is a common measure of geomagnetic activity levels, even though scientists do not yet understand all the details of the structure of these currents. EZIE is a trio of SmallSats that launched together in March 2025 and are currently in prime mission operations. This budget does not support the continuation of EZIE beyond prime mission operations.

POLARIMETER TO UNIFY THE CORONA AND HELIOSPHERE (PUNCH)

NASA selected PUNCH under the 2016 SMEX AO in 2017. The PUNCH mission will focus directly on the Sun's corona and how the corona generates the solar wind. Comprised of four suitcase-size satellites, PUNCH will image and track the solar wind as it leaves the Sun. The spacecraft will also track coronal mass ejections (i.e., large eruptions of solar material that can drive large space weather events near Earth) to better understand their evolution and develop new techniques for predicting such eruptions. These observations will enhance research by other NASA missions, such as Parker Solar Probe and the ESA/NASA Solar Orbiter. PUNCH will be able to image, in real time, the structures in the solar atmosphere that these missions encounter by blocking out the bright light of the Sun and examining the much fainter atmosphere. Together, these missions will investigate how the star we live with drives radiation in space.

PUNCH launched as a rideshare with the NASA Astrophysics mission, Spectro-Photometer for the History of the Universe, Epoch of Reionization and Ices Explorer, in March 2025 and entered prime operations in June 2025.

TANDEM RECONNECTION AND CUSP ELECTRODYNAMICS RECONNAISSANCE SATELLITES (TRACERS)

NASA selected TRACERS in 2019 as a SMEX mission. The TRACERS mission will observe particles and fields at the Earth's northern magnetic cusp region (i.e., the region encircling Earth's pole) where our planet's magnetic field lines curve down toward Earth. Here, the field lines guide particles from the boundary between Earth's magnetic field and interplanetary space down into the atmosphere. In the northern magnetic cusp area, with its easy access to our boundary with interplanetary space, TRACERS will study how magnetic fields around Earth interact with those from the Sun. In a process known as magnetic reconnection, the field lines explosively reconfigure, sending particles out at speeds that can approach the speed of light. Earth's magnetic field will guide some of these particles into the region where TRACERS can observe them.

Magnetic reconnection drives energetic events all over the universe, including coronal mass ejections and solar flares on the Sun. It also allows particles from the solar wind to push into near-Earth space, affecting its space weather. TRACERS will be the first space mission to explore this process in the cusp with two spacecraft, providing observations of how processes change over both space and time. TRACERS' twin satellites will fly in tandem — one behind the other — through the polar cusps, funnel-shaped regions where Earth's magnetic field opens over the north and south poles. This will allow scientists to observe how quickly reconnection changes and evolves by comparing data collected by each satellite.

The twin TRACERS spacecraft successfully launched on July 23, 2025, aboard a SpaceX Falcon 9 rocket. Shortly after launch one of the spacecrafts experienced an anomaly related to its power system and lost contact until September 2025. The second spacecraft is healthy and successfully commissioned. Upon re-establishing contact with the first spacecraft, the project team stabilized the power and communications systems and is working on a plan to finish commissioning to enable the tandem measurements required for meeting the science objectives. Given the challenges with establishing initial science operations, the prime mission duration and resource needs are being reassessed and are not reflected in this budget.

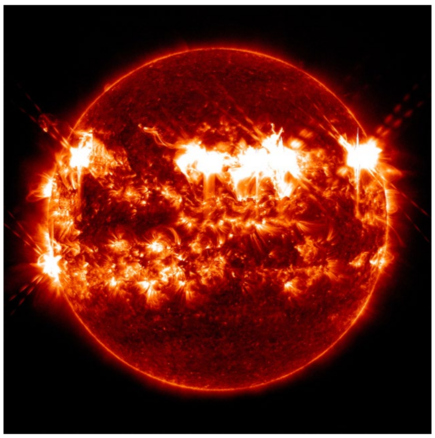
ATMOSPHERIC WAVE EXPERIMENT (AWE)

AWE is observing infrared emissions from the atmospheric layer near 85 kilometers (50 miles) altitude to study how atmospheric gravity waves generated in the lower atmosphere transport energy into the transition region between the upper atmosphere and space. A variety of processes generate gravity (or buoyancy) waves near the surface, including wind flow over topography, severe storms, and atmospheric turbulence. AWE is attached to the External Logistics Carrier on the ISS, where it provides the first comprehensive observations of wave energy propagating from the lower atmosphere into the upper atmosphere. These measurements will broaden understanding of the relationship between terrestrial weather and space weather. The results from AWE will help develop improved models used to predict environmental conditions in this highly dynamic region of the upper atmosphere that are known to affect satellite-based navigation and communication systems in LEO. The mission will complete prime operations in Q3 FY 2026 and will continue science data processing through Q3 FY 2027.

SPACE WEATHER

FY 2026 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	73.0	92.4	99.3	99.6	106.1



Shown here is a blended composite image highlighting all six X-class flares from November 2025. Solar flares, which are intense flashes of light, do not themselves cause geomagnetic storms — but they are often associated with coronal mass ejections, giant eruptions of solar particles, that do. The three back-to-back flares in the middle of this image, erupting on November 9, 10, and 11, accompanied by coronal mass ejections that triggered the intense geomagnetic storm of November 11-13, led to aurora sightings as far south as Florida.

Solar flares, coronal mass ejections (CMEs), solar particle events, and the solar wind form the recipe for space weather that affects life on Earth and astronauts in space. Space weather can pose a significant threat to society through its impacts on the electric power grid, radio and satellite communications, navigation systems, drag on satellites orbiting Earth, and humans working in space. Space weather is also an important factor for everyday decision making by end users in the United States and across the globe in sectors like commercial spaceflight, national security, and agriculture.

The NASA Space Weather Program plays a vital role in the national space weather enterprise by supporting space weather applied research and applications, enhancing understanding of the space environment including orbital debris, advancing modeling capability to enable more accurate forecasting, and providing unique and useful observations and data streams for research and applications. This program is a critical partner to operational forecasting agencies, including NOAA's Space Weather Prediction Center, by focusing the scientific community on addressing the needs of forecasters and end-users and supporting the transition of those results to those partners agencies. NASA’s contributions to observing and understanding space weather will enable the nation to better protect technology, national infrastructure, and astronauts from space weather.

The NASA Space Weather Program involves a diverse mixture of activities including competed applied research and applications projects, directed and competed modeling infrastructure and space flight components, and interagency and international cooperation. This approach allows the program to address gaps in national space weather capabilities wherever they are found and serves to enable the efficient maturation of technologies and subsequent transfer of critical new capabilities to partner agencies (e.g., NOAA and DoW).

EXPLANATION OF MAJOR CHANGES IN FY 2027

This budget increases Space Weather Future Missions in FY 2027 to support future space weather investigations and NASA participation in international space weather missions. The program will also collaborate with agency partners on capacity building efforts for the research and end-user communities in space weather.

SPACE WEATHER

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The Space Weather Program will continue to make progress in efforts to improve space weather forecasting and transition research outcomes to users. The Space Weather Research-to-Operations and Operations-to-Research (R2O2R) program element will issue solicitations for one or more Ideas Labs and an Open Call to support the transition of scientific knowledge into the hands of space weather forecasters and other end users. The Space Weather Program Office will mature its support of the R2O2R program element and transition efforts, expand training opportunities for the science and user communities in collaboration with other government agencies, and support other space weather initiatives.

The program will conduct fourth-year site visits at the Space Weather Centers of Excellence to evaluate and provide advice on progress, user engagement, management, transition to operations, and outreach. The Space Weather Program will continue collaboration with the Living With a Star Program to ensure that applied science projects are appropriately advancing towards application for user needs in space weather. The Space Weather Program will continue implementing recommendations in the Decadal Survey and continue interagency coordination on the National Space Weather Strategy and Action Plan and Decadal Survey.

The Space Weather Program will explore opportunities to increase collaboration with the DoW on shared space weather information needs, and the program will continue to build deeper relationships with the commercial sector to enhance the nation’s preparedness for space weather. The Space Weather Agile Response Team will become fully operational in FY 2027, which will strengthen coordination between NASA and DoW/IC for space weather needs.

The Moon to Mars Space Weather Analysis Office and Community Coordinated Modeling Center (CCMC) teams will partner with NOAA's Space Weather Prediction Center and NASA Space Radiation Analysis Group to support the Artemis missions.

One instrument from the Space Weather Instrument Pipeline program element will fly as a hosted payload in FY 2027. The Orbital Debris/Space Situational Awareness program element effort will see the launch of the Multi-layer Acoustics & Conductive-grid Sensor (MACS) instrument on the JAXA H-II Transfer Vehicle-X3 (HTV-X3) mission in FY 2027.

Program Elements

SPACE WEATHER SCIENCE AND APPLICATIONS

The Space Weather Science Application project supports directed and competed activities across NASA and with the research community that benefit the larger space weather research, forecasting, and end-user communities. This portfolio establishes the ecosystem required to support the effective transition of heliophysics science results, tools, technology, and techniques to applications that enhance the user communities' ability to address impacts caused by the dynamic space environment.

Elements within the Space Weather Science and Application portfolio are described below:

- Space Weather Program Office provides program implementation support,
- CCMC provides research and development for space weather models for the community and operational transition activities for NOAA and DoW,

- Moon to Mars Space Weather Analysis Office provides space weather assessment support to NASA robotic and human exploration missions,
- Space Weather Science Operations Center is an open-source, cloud-based multi-mission Science Operations Center for the community targeting space weather missions,
- The Radiation Assessment Detector instrument on the Curiosity rover provides space environment data at Mars,
- Wang-Sheeley-Arge model team provides operational and research model support,
- Small Business Innovation Research program team provides program support for space weather activities for small businesses in space weather, and
- Orbital Debris/Space Situational Awareness program element supports competed and directed activities addressing scientific aspects of orbital debris and space situational awareness.

SPACE WEATHER RESEARCH AND ANALYSIS

The Space Weather Research and Applications project supports competed activities that address user needs in space weather. To accomplish this, the project engages with users and agencies to understand their space weather needs and with user communities to understand how they are impacted. This portfolio is NASA's primary touchpoint for interagency space weather efforts and is consistent with the recommendations of the National Academy 2013 Decadal Survey for Solar and Space Physics, the 2019 National Space Weather Strategy and Action Plan, and the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow Act of 2020. These competed research opportunities serve to empower the research community to tackle critical existing and emerging challenges in space weather.

Activities supported within the Space Weather Research and Analysis portfolio are described below:

- Space Weather R2O2R (including Ideas Lab and Open Call solicitations) supports activities that accelerate targeted, user-driven applied research and applications toward operational implementation,
- Space Weather Centers of Excellence supports multi-institution collaborations that address grand challenges goals in space weather research and applications toward operational implementation,
- Space Exploration program element supports space weather applications driven by and instrument development for robotic and human exploration needs for the Moon, Mars, and beyond,
- Space Weather Instrument Pipeline supports opportunities to host space weather instruments on commercial and other government agency spacecraft,
- HERMES Instrument Science and Interdisciplinary Science teams supports the scientific activities related to HERMES,
- Space Weather CubeSats supports development and flight opportunities for CubeSat missions for space weather, and
- Space weather technology development coordinated with the Heliophysics Technology Program.

HELIOPHYSICS ENVIRONMENTAL AND RADIATION MEASUREMENT EXPERIMENT SUITE (HERMES)

HERMES will be a space weather payload available to fly on a to-be-determined commercial Mars mission. HERMES was previously developed to be placed on the Gateway orbital outpost, which is no longer planned for deployment in lunar orbit. HERMES has entered a "safe and store" period of extended storage, with a plan to ramp back up to align the project’s future launch timeframe.

HERMES will enable the investigation of fundamental science questions like the acceleration mechanisms of solar energetic particles, variability of solar wind structures and Galactic Cosmic Rays, and magnetotail dynamics. HERMES will support operational forecasting and nowcasting, or prediction of current events, of solar energetic particles that pose a risk to astronauts.

JOINT EXTREME ULTRAVIOLET CORONAL DIAGNOSTIC INVESTIGATION (JEDI)

In May 2024, NASA selected JEDI as an instrument of opportunity to fly on ESA's Vigil mission, an operational space weather spacecraft going to Sun-Earth Lagrange Point 5 (L5) and which is planned to launch in 2031. From L5, Vigil will monitor active regions on the Sun before they rotate to face Earth and will provide unique observations of CMEs as they move through space towards Earth. JEDI will provide Extreme Ultraviolet images of the Sun and its corona that will complement Vigil's operational space weather forecasting data. JEDI will also help researchers better understand the origin of solar storms as they form on the Sun's surface. The Living With a Star (LWS) Program Office at GSFC manages JEDI. JEDI is currently in the formulation phase and will advance to the development phase for final design and fabrication activities in 2026.

SOLAR AND HELIOSPHERIC OBSERVATORY (SOHO)

SOHO, launched in 1995, is a joint mission of ESA and NASA, and it has been a dependable solar watchdog, providing the only Earth-Sun line coronagraph images of solar storms and accurate measurements of solar radiation storm hazards. CMEs drive most of the space weather affecting Earth. SOHO continues to provide essential early alert space weather observations used as inputs for and to validate models that further our understanding of the Sun's effect on the Earth. During its extended mission phase, NASA declared SOHO a national space weather asset. SOHO is currently in extended operations. Following the launch and commissioning of NOAA's Space Weather Follow On L-1 spacecraft, which will provide operational coronagraph imagery, NASA will end the SOHO mission. The transition to operational coronagraph capabilities by NOAA represents a successful research-to-operations handoff between NASA and NOAA.

SOLAR TERRESTRIAL RELATIONS OBSERVATORY (STEREO)

STEREO enables studies of the origin of the Sun's CMEs and their consequences for Earth, other planets, and interplanetary space. The mission launched with two spacecraft, one Ahead of Earth (i.e., STEREO-A) and the other Behind Earth (i.e., STEREO-B) in its orbit. STEREO's instrumentation targets the fundamental process of energetic particle acceleration in the low solar corona and in interplanetary space. The mission can image the structure and evolution of solar storms as they leave the Sun and move through space toward Earth. The mission also provides the foundation for understanding space weather events and developing predictive models. The models, in turn, help to identify and mitigate the risks associated with space weather events. In addition, STEREO improves space weather situational awareness not only for Earth and in LEO, but also throughout the solar system.

STEREO launched in October 2006 and entered its extended mission phase in January 2009. NASA has been unable to communicate with STEREO-B since 2016. STEREO-A continues to operate nominally and is still providing significant data for science and space weather prediction.

SPACE WEATHER

SPACE WEATHER FUTURE MISSIONS

The Space Weather Future Missions portfolio will support future space weather investigations and future NASA participation in international space weather missions which could provide valuable science data to advance understanding of the dynamics of space weather and improve space weather predictions and user-driven needs.

Program Schedule

Date	Significant Event
Q2 FY 2026	JEDI KDP-C confirmation review
Q4 FY 2026	JEDI CDR
Q4 FY 2027	ROSES-27 Space Weather R2O2R solicitation released
Q2 FY 2027	Space Weather Agile Response Team fully operational
Q3 FY 2027	SWx Centers of Excellence annual meeting / site visits
Q4 FY 2027	Instrument pipeline instrument launched as hosted payload
Q4 FY 2027	MACS instrument launched on JAXA HTV-X3
Q4 FY 2028	ROSES-28 Space Weather R2O2R solicitation released
Q2 FY 2028	SWx Centers of Excellence v2 solicitation released
Q2 FY 2028	Transition IMAP Active Link for Real-Time (I-ALiRT) to SWx ALiRT
Q3 FY 2028	JEDI Pre-ship Review and delivery to ESA for integration
Q4 FY 2028	SWx Centers of Excellence v2 solicitation selection
Q2 FY 2029	ROSES-28 Space Weather R2O2R solicitation selection
Q2 FY 2029	Data-as-a-Service pilot
Q4 FY 2029	ROSES-29 Space Weather R2O2R solicitation released
Q1 FY 2031	JEDI launch readiness

SPACE WEATHER

Program Management & Commitments

Program Element	Provider
Space Weather Science and Applications	Provider: Various Lead Center: HQ Performing Center(s): ARC, GSFC, HQ, JPL, LaRC, MSFC Cost Share Partner(s): None
Space Weather Research and Analysis	Provider: Various Lead Center: HQ Performing Center(s): ARC, GSFC, HQ, JPL, LaRC, MSFC Cost Share Partner(s): None
Space Weather Future Missions	Provider: Various Lead Center: HQ Performing Center(s): ARC, GSFC, HQ, JPL, LaRC, MSFC Cost Share Partner(s): None
STEREO	Provider: Various Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): None
SOHO	Provider: Various Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): None
HERMES	Provider: GSFC Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): None
JEDI	Provider: Southwest Research Institute Lead Center: GSFC Performing Center(s): GSFC Cost Share Partner(s): None

Acquisition Strategy

NASA primarily procures space weather research tasks through full and open competition, such as the ROSES announcements. The solicitation of space weather research is competitive and selected from NASA centers, industry, and academia, as well as other government agencies, Federally Funded Research and Development Centers, and nonprofit organizations.

NASA competitively selected the JEDI instrument project as a mission of opportunity to be contributed ESA's Vigil mission.

SPACE WEATHER

INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	SRB	2027	HERMES Pre-Environmental Review	TBD
Performance	SRB	2027	HERMES Pre-Ship Review	TBD
Performance	SRB	2028	JEDI Instrument Delivery Review	TBD

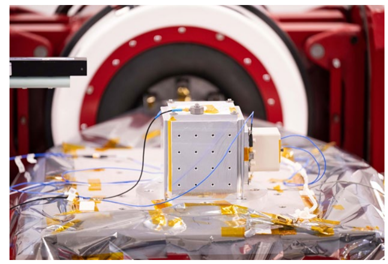
HELIOPHYSICS TECHNOLOGY

FY 2026 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	5.0	5.0	5.0	5.0	5.0

Advancements in Heliophysics depend on the ability to produce novel and transformative technologies, capabilities, and mission concepts. The Heliophysics Technology program makes strategic investments in the development and demonstration of instruments and technologies for infusion into future missions. Investments in new technologies will enable previously infeasible science investigations; improve existing measurement capabilities; reduce the cost, risk, and/or development times for Heliophysics science instruments and advanced space missions of the future; and yield applications that benefit the broader economy in areas of strategic importance such as space weather.

The Heliophysics Technology program supports investigations that NASA competitively selects through the ROSES solicitation under the Heliophysics Technology and Instrument Development for Science (HTIDeS) program element. The program nurtures technology maturation and infusion.



The MAGnetometers for Innovation and Capability instrument – a demonstration magnetic field instrument – is shown here being prepared for vibration testing that will verify they can withstand the rigors of spaceflight in Van Allen Hall at the University of Iowa. Credit: NASA/University of Iowa / Tim Schoon

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

NASA is planning a dual sounding rocket mission named Resolute, targeting launch from Andoya, Norway, in 2027. The primary science objective is to determine how heavy ions loft from Earth's ionosphere to the boundary with the magnetosphere. The research is key to understanding the escape of our atmosphere into space, which impacts the planet's habitability and helps predict the effects of space weather. The Technology Program developed two instruments that will fly as rideshare on the Resolute sounding rocket. These instruments will not only mature through space flight but also enhance the scientific data of the Resolute objectives. These instruments are: (1) the miniature Double Langmuir Probe, which will enable direct comparison with the existing probe, validating measurements from this new instrument design, and (2) the Assistance Magnetometer, which will characterize the magnetic field background generated by the sounding rocket, enhancing the primary magnetometer measurements.

HELIOPHYSICS TECHNOLOGY

Program Elements

TECHNOLOGY DEVELOPMENT

The Technology Development project invests in the development of critical and innovative new instruments and technologies, and novel and transformative capabilities to achieve significant progress toward addressing the scientific and technical challenges in Heliophysics in the coming years, including HTIDeS. This project also supports promising early Technology Readiness Level technologies to proactively nurture and advance these capabilities.

Program Schedule

Date	Significant Event
Q4 FY 2027	Fifth Annual Heliophysics Technology Symposium
Q2 FY 2027	ROSES-2026 HTIDeS selections
Q4 FY 2027	ROSES-2027 HTIDeS solicitation released
Q2 FY 2028	ROSES-2027 HTIDeS selection
Q4 FY 2028	ROSES-2028 HTIDeS solicitation released
Q2 FY 2029	ROSES-2028 HTIDeS selection
Q4 FY 2029	ROSES-2029 HTIDeS solicitation released
Q2 FY 2030	ROSES-2029 HTIDeS selection
Q4 FY 2030	ROSES-2030 HTIDeS solicitation released
Q2 FY 2031	ROSES-2030 HTIDeS selection
Q4 FY 2031	ROSES-2031 HTIDeS solicitation released

Program Management & Commitments

Program Element	Provider
Technology Development	Provider: Various Lead Center: HQ Performing Center(s): TBD Cost Share Partner(s): None

HELIOPHYSICS TECHNOLOGY

Acquisition Strategy

NASA primarily procures tasks through full and open competition, such as the ROSES announcements. The solicitation of technology investments is competitive and selected from NASA centers, industry, academia, other government agencies, Federally Funded Research and Development Centers, and nonprofit organizations. NASA may directly fund critical technologies identified through a gap analysis.

MAJOR CONTRACTS/AWARDS

None.

INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Relevance	National Academies of Science, Committee for Solar and Space Physics	2027	Independent assessment of targeted technology development priorities for Heliophysics Technology	N/A

BIOLOGICAL AND PHYSICAL SCIENCES

Biological and Physical Sciences

BIOLOGICAL AND PHYSICAL SCIENCES

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	25.0	25.0	25.0	25.0	25.0

Organ chips, roughly the size of a USB thumb drive, serving as avatars for Artemis II crew health, flying side-by-side with astronauts during their journey around the Moon. Credit: Emulate

NASA's Biological and Physical Sciences (BPS) division conducts research in space to obtain critical insights into how biological and physical systems function. The unique, extreme conditions found in space, such as altered gravity and deep-space radiation, enable scientists to probe biological and physical systems in ways not possible on Earth. The resulting knowledge can lead to scientific discoveries and technological advancements that support NASA's exploration and deep-space missions and benefit life on Earth.

BPS's five goals, which align with the 2023-2032 Decadal Survey, focus on crucial research needed to enable future Moon and Mars missions and maintain U.S. science leadership in space:

- Quantum Leaps- probing the very nature of the universe using precise space-based quantum sensors to test the Einstein equivalence principle, dark sector physics, and the nature of fundamental physical constants, enabling the United States to continue pioneering quantum science in space.
- Precision Health- leveraging space to unlock the secrets of aging and disease to advance personalized medicine, for not only astronauts on future missions, but for all of humanity.
- Space Crops- conducting the fundamental research needed to establish sustainable, space-based crops for future long-duration exploration of the Moon and beyond, benefitting agriculture in austere environments on Earth.
- Foundations- revealing the novel behaviors of fluids, fire, and materials in space, which inform technologies and methods for ensuring mission safety and operational efficiencies.
- Space Labs- accelerating the pace and productivity of research by partnering with commercial companies, continuing the momentum of mission-focused research, and supporting the growing commercial space industry.

BPS conducts investigations via competitively awarded research grants to scientists at universities, research institutions across the country, and NASA centers. BPS develops critical equipment and processes to support new experiments and shares research results with academia, commercial industry, and other government agencies through open science databases, conferences, and working groups.

The division facilitates and oversees collaborations between a wide range of agencies, including the National Institutes of Health (NIH), National Center for Advancing Translational Sciences, NIH's National Institute of Allergy and Infectious Diseases, NIH's National Cancer Institute Division of Cancer Treatment and Diagnosis, Biomedical Advanced Research and Development Authority, U.S. Department of Agriculture, U.S. DoW, National Research Office, and the Food and Drug Administration.

BIOLOGICAL AND PHYSICAL SCIENCES

EXPLANATION OF MAJOR CHANGES IN FY 2027

The budget realigns and refocuses BPS research efforts within two new projects: Exploration Science and Quantum Science. See project descriptions below.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

NASA is continuing groundbreaking work in quantum science. The Cold Atom Lab, which has achieved several firsts in space, will keep operating on the ISS until the station's retirement. In partnership with the DLR, NASA will also explore dark energy using the German Einstein Elevator. Additionally, NASA will maintain a ground terminal to support the Atomic Clock Ensemble in Space experiment aboard the ISS, which could lead to major advances in navigation and precision timekeeping.

Building on organ-chip research from Artemis II, scientists will use microphysiological systems (tiny models of human tissue) to study how space conditions affect health. NASA also plans a first-of-its-kind study of the spacecraft microbiome aboard Vast's Haven-1 commercial space station. This research will identify bacteria on spacecraft surfaces during its maiden voyage and help develop future countermeasures.

To support sustainable food production in space, the Multi-use Variable-gravity Platform Plant-02 will launch to the ISS, allowing researchers to study how microbes and microgravity influence plant health. NASA also plans to test a new technology on early Commercial LEO Destinations (CLDs) that will let crews grow select crops for their own meals.

In 2027, NASA will send the Flammability of Materials on the Moon (FM2) experiment to the lunar surface. This study will examine how lunar gravity, higher oxygen levels, and lower pressure affect the flammability of materials critical to space missions.

Through the Commercially Enabled Rapid Space Science (CERISS) project, NASA will continue working with commercial partners to speed up research and demonstrate new technologies. This includes parabolic flights through NASA's TechLeap Challenge and new industry challenges to create innovative, cost-effective space lab capabilities.

Program Elements

BPS PROGRAM MANAGEMENT

The FY 2027 budget will fund a streamlined team to enable scientific and programmatic management including dedicated BPS personnel costs, official travel, and contracted services for administration and program integration.

EXPLORATION SCIENCE

The Exploration Science project strategically refines and builds upon NASA's former Space Biology and Physical Sciences projects by streamlining research efforts to focus on the high-priority activities needed to make future Moon and Mars missions safe and successful. The project concentrates resources on three main areas of study while discontinuing lower-priority activities. First, Precision Health research looks at how the harsh conditions of deep space affect human health. Scientists are using organ chip technology to study the effects of extreme radiation and microgravity on the Artemis II mission, providing information that could enable NASA to tailor medical kits to each astronaut on future missions, as well as advance personalized medicine on Earth. This first-of-its-kind research is a collaboration between NASA, other government agencies, and commercial partners. Second, Space Crops research works to find the best crops and growing methods that can provide healthy food for astronauts in the difficult environment of space. This includes studying how plants grow on the Moon and in other austere conditions. Third, Foundations research conducts critical safety testing, with a focus on material flammability in space environments where fire poses extreme risk. The project ensures that all research data from exploration science studies remain accessible to scientists and the public.

QUANTUM SCIENCE

BPS has refocused the Fundamental Physics portion of the Physical Sciences project to create the Quantum Science project, addressing one of the Administration's top five research and development priorities for FY 2027. This Quantum Leaps initiative is dedicated to maintaining America's leadership in space-based quantum research through strategic investments and cutting-edge experiments. BPS is funding the operation of the advanced Cold Atom Laboratory currently conducting experiments aboard the ISS, while also pursuing a significant upgrade to transform equipment into a multi-user facility for quantum research. Additionally, the Quantum Science project will fund promising experiments that expand our understanding of physics and explore new scientific frontiers beyond traditional theories. As quantum technologies advance and enter the commercial market, BPS plays a crucial role in maturing enabling technologies. BPS also expands our understanding of end-user applications and supports the development of technologies that will enable quantum breakthroughs, ultimately benefiting humanity's understanding of the universe.

COMMERCIALLY ENABLED RAPID SPACE SCIENCE (CERISS)

The goal of CERISS is to develop transformative research capabilities with commercial space industry partners to dramatically increase the pace of research within the five goals of the BPS portfolio. It is highly focused on the transition of science capabilities from the ISS to CLD space labs to ensure BPS has modern lab equipment to conduct cutting edge science as well as reduce the time needed to analyze experiment results. Long-term goals for equipment include developing automated hardware for experiments both in LEO on CLDs as well as beyond, including the lunar surface. The benefits will include a dramatically faster pace of research for a wide range of research sponsored by BPS, the NASA Human Research Program, other government agencies, and industry.

CERISS is a cross-cutting project that will support initiatives across all of BPS’s science goals: Space Crops, Precision Health, Quantum Leaps, Foundations, and Space Labs.

Program Schedule

The BPS program solicits proposals as part of SMD's annual Research Opportunities in Space and Earth Science (ROSES) research calls, providing funding through grants and cooperative agreements to universities, commercial entities, and government laboratories. BPS also performs investigations in partnership with other NASA organizations and other domestic and international government agencies.

BIOLOGICAL AND PHYSICAL SCIENCES

Date	Significant Event
Q2 FY 2026	ROSES-2025 NASA Research Announcements (NRA) selection
Q3 FY 2026	Parabolic and suborbital TechLeap award flights
Q4 FY 2026	NASA/DLR microgravity experiment detecting dark energy
July 2027	ROSES-2027 NRA
Q2 FY 2027	Haven-1 commercial space station launch with microbiome of the built environment and space crops experiments
Q3 FY 2027	Artemis III launch with experiment studying the lunar surface environment's effect on space crops and the microbiome of the built environment
Q4 FY 2027	TechLeap award flights

Program Management & Commitments

Program Element	Provider
Exploration Science	Provider: Various Lead Center: ARC, GRC, JSC, KSC Cost Share Partner(s): Biomedical Advanced Research and Development Authority (BARDA), Exploration Science Strategy and Integration Office (ESSIO)
Quantum Science	Provider: Various Lead Center: JPL Cost Share Partner(s): N/A
CERISS	Provider: Various Lead Center: HQ Cost Share Partner(s): N/A

Acquisition Strategy

BPS competitively selects its research via NRAs. Once selected, the principal investigator is paired with a NASA field center and a commercial partner to facilitate the implementation of the project.

INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	Independent Review Board (IRB)	Q1 FY 2027	ISS Cargo Flight Readiness Review*	TBD

BIOLOGICAL AND PHYSICAL SCIENCES

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	IRB	Q1 FY 2027	FM2 Flight Readiness Review	TBD
Performance	IRB	Q2 FY 2027, Q4 FY 2027, Q2 FY 2028, Q4 FY 2028	Vast Haven-1 Payloads Flight Readiness Review	TBD
Performance	IRB	Q3 FY 2027	Virgin Galactic Suborbital Flight Readiness Review	TBD

* ISS Cargo Flight Readiness Review dependent on schedule for ISS Cargo missions

AERONAUTICS

AERONAUTICS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Airspace Operations and Safety Program	--	--	**96.8**	112.8	115.5	117.5	117.5
Advanced Air Vehicles Program	--	--	**191.1**	192.8	186.4	175.6	175.6
Integrated Aviation Systems Program	--	--	**152.2**	95.6	90.2	90.2	90.1
Transformative Aero Concepts Program	--	--	**79.3**	113.2	117.3	121.1	121.1
Aerosciences Evaluation and Test Capabilities	--	--	**90.1**	95.1	100.1	105.1	105.2
Total Budget	**935.0**	**935.0**	**609.5**	**609.5**	**609.5**	**609.5**	**609.5**

FY 2025 reflects the funding amount specified in Public Law 119-4, Full-Year Continuing Appropriations and Extensions Act, 2025.

FY 2026 reflects the funding amount specified in Public Law 119-74, Commerce, Justice, Science; Energy and Water Development; and Interior and Environment Appropriations Act, 2026.

NASA's X-59 quiet supersonic research aircraft is shown here cruising above Palmdale and Edwards, California, during its first flight on Tuesday, October 28, 2025.

The FY 2027 budget represents a deliberate transformation that begins to restore NASA's historic mission: to move U.S. aeronautics higher, farther, and faster. This investment positions NASA to resume the pioneering research and development that has always defined American aerospace leadership. It enables the agency to push the boundaries of what is possible in aerodynamics, propulsion, materials, manufacturing, and airspace operations—ensuring that the United States remains the world's dominant aerospace power.

NASA Aeronautics plays a central role in sustaining U.S. leadership in a sector that remains vital to the nation's economic strength. In 2024, the aviation and aerospace industry contributed a positive manufacturing trade balance of $73.9 billion and supported more than 2.23 million American jobs. Continued federal investment ensures that the United States remains competitive in an increasingly contested global market and that the nation's air transportation system continues to operate safely, efficiently, and sustainably.

NASA's aeronautics research directly supports U.S. leadership in commercial aviation by advancing next generation aircraft technologies that reduce operating costs, improve performance, and open new markets. NASA is preparing the nation for the future of high-speed flight by demonstrating that supersonic aircraft can operate without producing disruptive sonic booms—an achievement that would enable new commercial routes and strengthen U.S. industry leadership.

Working in close partnership with the Federal Aviation Administration (FAA), industry, and academia, NASA is modernizing the national airspace system to safely integrate a rapidly expanding set of air vehicles, including drones, advanced air mobility platforms, and future autonomous systems. These efforts will allow the airspace system to accommodate growing demand while maintaining the highest levels of safety.

AERONAUTICS

NASA also conducts foundational research across a broad range of aeronautics disciplines and provides critical flight and ground test capabilities that enable experimentation, risk reduction, and feasibility demonstrations for emerging technologies.

A NEW STRATEGY FOR A NEW ERA

In FY 2026, NASA Aeronautics implemented a streamlined, more cost-effective organizational strategy designed to strengthen U.S. aviation leadership. This strategy focuses the agency's research portfolio into four transformative areas—each aligned with our NACA heritage of fundamental research and flight demonstration, and each essential to ensuring U.S. dominance in the next century of aerospace.

1. REVOLUTIONIZE ENGINEERING METHODS

The future of aviation will be shaped not only by new aircraft or propulsion systems but also by modernizing the engineering tools and processes used to design them. NASA is leading the development of integrated, intelligent engineering methods that will accelerate innovation, reduce development costs, and expand the range of feasible aviation concepts. These trusted next generation tools will strengthen both commercial and national defense capabilities by making advanced design and analysis methods broadly accessible.

2. PIONEER HIGH-SPEED FLIGHT

Achieving practical commercial supersonic and hypersonic flight requires overcoming significant technical challenges. NASA is uniquely positioned to lead this effort. The X-59 will provide the world's first flight demonstration of quiet supersonic cruise, enabling data collection that could support future regulatory change and open new commercial markets. NASA will also continue advancing critical hypersonic technologies, including combined cycle propulsion and durable high temperature materials, with direct relevance to national security. Flight testing will validate these new concepts and reduce risk for U.S. industry.

This work continues the NACA/NASA tradition of using X-planes to push the boundaries of speed, performance, and capability.

3. AUTOMATE AIRSPACE AND SAFETY MANAGEMENT

NASA's proven expertise in aviation automation, combined with FAA modernization efforts, is enabling a safer, more efficient, and more diverse national airspace system. NASA is demonstrating advanced capabilities that support trajectory-based airline operations, improve systemwide efficiency, and enable new entrants such as small drones and air taxi services. These technologies will help the United States accommodate growing demand while maintaining global leadership in aviation safety.

4. TRANSFORM AIRFRAMES AND PROPULSION

Maintaining U.S. competitiveness requires transformative innovation in aircraft design and propulsion. Incremental improvements to conventional systems are no longer sufficient as global competition intensifies and traditional architectures reach performance limits. NASA is partnering with industry to advance key technologies—including high-rate composite manufacturing, hybrid thermally efficient engines, advanced thin wings, and quiet vertical lift systems.

Looking ahead, NASA will pursue revolutionary engine cycles, alternative fuels, novel propulsion airframe integration concepts for both Hypersonic and low speed general aviation aircraft, high power electrification, and advanced design methods for both fixed wing and vertical lift aircraft. These efforts will provide U.S. industry with the technologies needed to maintain economic competitiveness, enhance energy security, and ensure continued American leadership in aviation.

A RETURN TO OUR ROOTS — AND A LEAP INTO THE FUTURE

This budget restores NASA's role as the nation's engine for aeronautics innovation. It enables the agency to resume groundbreaking research and development, build and fly new X-planes, and deliver the transformative technologies that will define the next century of flight. By investing in NASA Aeronautics, the nation recommits to the NACA legacy of discovery and ensures that American aerospace remains unmatched—higher, farther, and faster than ever before.

EXPLANATION OF MAJOR CHANGES IN FY 2027

The NASA Aeronautics budget includes a planned decrease to the Low Boom Flight Demonstrator project as the project moves into flight.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

The budget request supports five programs within the agency's aeronautics portfolio:

Airspace Operations and Safety Program (AOSP) - advances mobility through modernizing and transforming the national air traffic management system, in partnership with the FAA and the aviation community. The program conceives, develops, and demonstrates technologies to safely improve air traffic management systems for use in the National Airspace System (NAS). The program develops advanced technologies for a service oriented and federated NAS architecture to enable seamless integration of small, AAM vehicles with present-day aircraft to assure continued U.S. global leadership and industrial competitiveness. AOSP also works with other ARMD programs to define safe NAS operational requirements for the next generation of vehicles, mature new transformative concepts, and demonstrate integrated systems. In FY 2027, AOSP, in collaboration with FAA and industry, will:

- Evaluate capabilities, performance requirements, and safety assurance methods needed for safe automated taxi operations to reduce human workload in airfield operations; and
- Complete flight evaluation of a portable airspace management system with beyond visual line-of-sight and nighttime operations to enhance wildland fire aerial responses.

Advanced Air Vehicles Program (AAVP) - develops tools, technologies, and concepts to enable safe new aircraft that are faster, quieter, and more fuel efficient. The program pioneers fundamental aeronautics research and matures the most promising concepts for transition to the community. AAVP works closely with the DoW to advance dual-use technologies for both civilian and military applications. Key focus areas include enabling major leaps in the safety and performance of subsonic fixed and rotary wing aircraft; overcoming noise and other technology challenges to high-speed flight, including demonstration of quiet supersonic flight with the X-59 aircraft; and understanding and resolving critical challenges of hypersonic flight. In FY 2027, AAVP will:

- Advance hypersonic propulsion technologies through flight testing with other government agencies and through ground testing of advanced engine concepts;

- Conduct wind tunnel tests to validate the integration of un-ducted propulsor technology into aircraft configurations. Un-ducted propulsors will deliver fuel efficiency improvements and reduce operating costs; and
- Deliver aircraft wing box components manufactured using high-rate composite manufacturing technologies and demonstrate high-rate inspection and assembly processes.

Integrated Aviation Systems Program (IASP) - explores, assesses, and demonstrates the benefits of the most promising technologies at an integrated system level, including in flight. The program has two major efforts: the Low Boom Flight Demonstrator and advanced thin wing development. The program is accelerating the LBFD project so funds will be available for future X-plane projects. The program also funds flight support capabilities and other aeronautics research related to flight tests. In FY 2027, IASP will:

- Complete X-59 aircraft envelope expansion flights and begin flights needed to validate acoustic characteristics for quiet supersonic flight; and
- Complete flutter wind tunnel test for the scaled X-66 Transonic Truss Braced Wing half-span configuration in the NASA LaRC Transonic Dynamics Tunnel.

Transformative Aeronautics Concepts Program (TACP) - demonstrates initial feasibility of concepts supporting the discovery and development of new transformative solutions. TACP creates advanced and improved computational tools, technologies, and experimental capabilities for use by other aeronautics programs, industry partners, and government collaborators. The program encourages revolutionary concepts, creates an environment for researchers to become immersed in new ideas, and drives rapid turnover of new concept development. In FY 2027, TACP will:

- Conduct flight research of novel electric vertical take-off and landing vehicle technologies to validate improved flight dynamics and controls; and
- Advance NASA's open-source software tools for multidisciplinary design, analysis, and optimization and expand collaboration with other government agencies.

Aerosciences Evaluation and Test Capabilities Portfolio (AETC) - manages NASA's portfolio of 12 large wind tunnels used for ground testing of advanced technologies and configurations across all speed regimes: subsonic, transonic, supersonic, and hypersonic. These ground test facilities support ARMD, other NASA mission directorates, commercial industry, academia, and the military. In FY 2027, AETC will:

- Return GRC 10- by 10-Foot Wind Tunnel, and LaRC’s National Transonic Facility and Unitary Plan Wind Tunnel from operational standby into one-shift campaigning operations; and
- Initiate Transonic and Supersonic capability studies in support of the New Wind Tunnel Landscape strategy.

AIRSPACE OPERATIONS AND SAFETY PROGRAM

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	96.8	112.8	115.5	117.5	117.5

NASA's ARC drone team tests the information sharing, airspace management, communication relay, and aircraft deconfliction capabilities through Portable Airspace Management System (PAMS), which will support wildfire suppression operations.

The U.S. air transportation system is one of the most efficient and safest systems in the world. NASA has substantially contributed to the Federal Aviation Administration (FAA)-led NextGen modernization effort that enabled efficient passage through the increasingly crowded skies. NASA will now focus on the FAA-led Brand New Air Traffic Control System (BNATCS) for additional opportunities to enhance safety, reduce air transport operations costs, reduce flight delays, and support the introduction of new aviation users into the national airspace.

Given future airspace challenges of variety and density of operations, NASA is focused on long-term National Airspace System (NAS) transformation. The Sky For All vision will incorporate automated trajectory negotiation and automated safety mitigation to address the scaling limitations of human bandwidth and reaction time. NASA will work with the FAA on BNATCS for systems analysis to inform FAA investments, transfer technologies for implementation, and leverage BNATCS for the long-term Sky For All vision.

With the FAA, industry, and academic partners, the Airspace Operations and Safety Program (AOSP) conceives, develops, and demonstrates technologies to safely improve air traffic management systems for use in the NAS. The program develops advanced technologies for a service-oriented and federated NAS architecture to enable seamless integration of Uncrewed Aerial Systems and Advanced Air Mobility (AAM) vehicles with present-day aircraft to assure continued U.S. global leadership and industrial competitiveness. AOSP also works with other ARMD programs to define safe NAS operational requirements for the next generation of vehicles, mature new transformative concepts, and demonstrate integrated systems.

EXPLANATION OF MAJOR CHANGES IN FY 2027

AOSP has a planned budget increase to develop airspace management capability for AAM vehicles.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

- NASA will evaluate capabilities, performance requirements, and safety assurance methods needed for safe automated taxi operations. Developed in coordination with the FAA and manufacturers, this capability will reduce human workload in airfield operations, freeing cognitive bandwidth for higher-priority tasks and improving overall safety of flight. (Air Traffic Management and Safety [ATMS])

- NASA will deliver data to standards organizations, FAA, and industry on key safety indicators, precursors, and human contributions to safety that informs current operations best practices. Validated jointly with FAA, industry, and standards organizations, this will advance prognostic, data-driven safety analytics identification of safety hazards, and is a key enabler for future automated mitigation of hazards. (ATMS)
- NASA will complete evaluation of the PAMS that supports wildfire suppression with beyond visual line-of-sight and nighttime operations. The technology development will provide mission planning supplemental data services for terrain, fire information, and ground operations information. This critical capability will enable enhanced coordination of wildland fire aerial response with the FAA, industry, and wildland fire management federal and state agencies. (Advanced Air Mobility Pathfinders [AAMP])
- NASA will complete technology development of the Providers of Services for Urban Air Mobility (UAM) airspace management for tactical deconfliction. This critical capability will be developed in collaboration with FAA, AAM manufacturers, and AAM airspace service providers to safely and efficiently integrate AAM vehicles without overloading air traffic control. (AAMP)

Program Elements

AIR TRAFFIC MANAGEMENT AND SAFETY (ATMS)

The ATMS project will transform and modernize the national air traffic management system, in partnership with the FAA and the aviation community. The project develops and explores advanced technologies for more efficient gate-to-gate flight trajectories, leads research on increasingly autonomous aviation, and provides tools for the integration and analysis of data to support in-time system-wide safety assurance. The project also develops and demonstrates innovative tools for proactive mitigation of risks, increased access to relevant data, improved in-time detection, and decision support for mitigation. ATMS addresses the need for safety-related advances in methods used for the verification and validation of machine learning enabled components and advanced, increasingly autonomous systems. This approach will increase the use of advanced machine learning and artificial intelligence capabilities for air traffic management and contingency management. ATMS is developing airspace requirements and capabilities for integrating highly automated and increasingly autonomous vehicles into the airspace. The project is exploring advanced trajectory management services and advanced flight deck capabilities to enable safe, efficient operations. ATMS works collaboratively with the FAA and industry partners to validate and transfer key concepts and technologies which will transform the NAS.

ADVANCED AIR MOBILITY PATHFINDERS (AAMP)

The AAMP project focuses on one of the most important challenges in the AAM industry – researching how to safely integrate emerging crewed and autonomous vehicles into cities and the national airspace system to ensure continued U.S. leadership and industrial competitiveness. The project will help accelerate the industry's development of this innovative system of aircraft and technologies to move people and cargo safely and efficiently, as well as conduct a variety of first responder operations. Through a series of technical capabilities evaluations with government and industry partners, researchers will collect data to create and test functions and capabilities for safe, and scalable UAM operations. AAMP is focused on addressing FAA's mid-term and long-term Concept of Operations for UAM requirements. The project validates NASA-developed tools and technologies in multiple use cases of passenger and cargo delivery as well as improve aerial response for wildland fire fighting and coordination with FAA for airspace access. The project works with other government agencies and regional fire response organizations to develop and demonstrate capabilities for the coordination of aerial assets and real-time data exchange to increase the duration and density of aerial firefighting operations. The project will demonstrate a common interoperable platform for situational awareness of all aerial assets and data. AAMP's longer term objectives include the development of advanced aircraft technologies and airspace management capabilities to enable diverse simultaneous crewed and uncrewed operations for delivery of passengers and cargo and persistent (up to 24 hours per day) wildfire observation and suppression operations.

Program Schedule

Date	Significant Event
May 2027	AAMP – complete evaluation of Portable Airspace Management System for wildfire aerial response
Jun 2027	ATMS - deliver data on key safety indicators, precursors, and human contributions to safety that informs current operations best practices
Aug 2027	AAMP – complete technology development of the Provider of Services for UAM.
Sep 2027	ATMS - complete assessment of requirements and safety approaches for automated taxi operations

Program Management & Commitments

Program Element	Provider
ATMS	Provider(s): ARC, LaRC, AFRC, GRC Lead Center: ARC Performing Center(s): ARC, LaRC, AFRC, GRC Cost Share Partner(s): FAA, Department of Transportation, Air Force Research Laboratory (AFRL), German Aerospace Center, American Airlines, Southwest Airlines, United Airlines, Envoy Air, Dallas Fort Worth International Airport, Dallas Love Field International Airport, Houston George Bush International Airport, Boeing, GE Aviation, Flight Safety Foundation, Radio Technical Commission for Aeronautics, Joby, Reliable Robotics, Wisk, Jeppesen Foreflight, AeroStar International LLC, ANRA Technologies, AURA Network Systems, SkyGrid, Collins Aerospace, Beta Technologies
AAMP	Provider(s): ARC, LaRC, AFRC, GRC Lead Center: ARC Performing Center(s): ARC, LaRC, AFRC, GRC Cost Share Partner(s): FAA, AFRL, Port Authority of New York and New Jersey, University of North Texas, Metron Aviation, Inc, Joby, Wisk, ANRA, United States Forest Service, Department of Interior, Federal Emergency Response Agency (FEMA), JAXA, National Research Council Canada, California Department of Forestry and Fire Protection, Avision, Inc., Jeppesen ForeFlight, AURA Network Systems

AIRSPACE OPERATIONS AND SAFETY PROGRAM

Acquisition Strategy

AOSP research and technology spans from foundational research to integrated system capabilities. This broad spectrum necessitates the use of a wide array of acquisition tools relevant to the appropriate work awarded externally through full and open competition. For all procurement actions, NASA strongly encourages teaming among large companies, small businesses, and universities.

MAJOR CONTRACTS/AWARDS

AOSP awards multiple smaller contracts, which are generally less than $5 million and widely distributed across academia and industry.

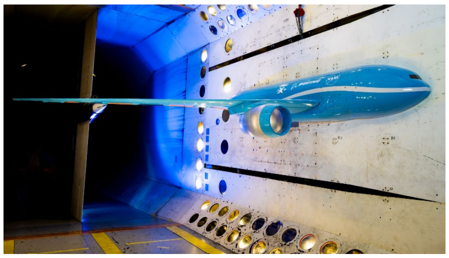
INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	Expert Review	Oct 2024	The 12-month review is a formal independent peer review. Experts from other government agencies report on their assessment of technical and programmatic risk and/or program weaknesses.	Determined that the projects made satisfactory progress in meeting technical challenges and all annual performance indicators.

ADVANCED AIR VEHICLES PROGRAM

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	191.1	192.8	186.4	175.6	175.6



Shown here is the Integrated Adaptive Wing Technology Maturation wind-tunnel model installed in the Transonic Dynamics Tunnel at NASA LaRC in Hampton, Virginia.

The Advanced Air Vehicles Program (AAVP) researches, evaluates, and develops technologies and capabilities for next-generation aircraft systems and explores far-term concepts for revolutionary air travel improvements. AAVP advances technologies that enable safe, innovative aircraft (including subsonic, vertical take-off, and high-speed vehicles) that are faster, quieter, and more fuel efficient. AAVP research will prime the technology pipeline, sustaining U.S. leadership and global competitiveness while supporting the creation of high-quality jobs.

AAVP develops a broad range of technologies to sustain U.S. leadership in aviation while enhancing the nation's economy and quality of life. For subsonic transport aircraft, AAVP accelerates development of critical technologies to ensure readiness by the late 2020s for transition to U.S. industry's next-generation single-aisle transport aircraft, while exploring high-risk, high-reward concepts for future vehicle generations. Across the program, NASA actively engages partners from industry, academia, and other government agencies to maintain a comprehensive perspective on technology solutions to overcome aviation's challenges, foster mutually beneficial collaborations, and maximize opportunities for effective technology transition.

EXPLANATION OF MAJOR CHANGES IN FY 2027

The AAVP budget includes an increase for additional analysis of X-59 performance data and planned increases for advanced engine core demonstration.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

- NASA will collect and analyze X-59 acoustic data to understand the aircraft's acoustic characteristics and validate analytical tools researchers will use during future community test planning. This acoustic characterization will assess whether the aircraft's low boom design performs as intended and inform any necessary adjustments for future test plans. (High Speed Flight [HSF])
- NASA will advance hypersonic propulsion technologies through flight testing with other government agencies, as well as through ground testing of advanced engine concepts. These tests will investigate and demonstrate engine control methodologies, innovative engine designs, and scaling laws for combustor flameholders. (HSF)
- NASA will validate the integration of un-ducted propulsor technology into aircraft configurations through wind tunnel testing conducted in partnership with industry. Incorporated into advanced future aircraft designs, un-ducted propulsors have the potential to deliver fuel efficiency

improvements, reducing operating costs for aircraft expected to enter service in the 2030s. (Subsonic Vehicle Technologies and Tools [SVTT])

- NASA will complete the CDR for an advanced compact engine core in partnership with industry. The review will enable a ground-based demonstration of next-generation engines for single-aisle aircraft, supporting substantial improvement in fuel efficiency, the introduction of hybrid-electric engines into the subsonic transport market, and enhanced operability of future aircraft. (SVTT)
- NASA and industry partners will deliver aircraft wing box components manufactured using high-rate composite manufacturing technologies to a wing box assembly team. The team will demonstrate high-rate inspection and assembly processes to enable production rates that meet market demand and support aircraft with reduced operating costs. (Hi-Rate Composite Aircraft Manufacturing [HiCAM])
- NASA and industry partners will complete specialized tooling to enable high-rate manufacturing of full-scale upper and lower fuselage skin panels using next-generation thermoset materials. Manufacturing separate panels will allow NASA to evaluate new, faster fuselage assembly approaches at full scale that allow industry to deploy composite aircraft at rates that meet market demand. (HiCAM)

Program Elements

SUBSONIC VEHICLE TECHNOLOGIES AND TOOLS (SVTT)

The SVTT project designs and innovates aviation technologies to enable far-term transformation of subsonic commercial aviation. SVTT studies next-generation concept vehicles, focusing on unconventional systems and architectures that can deliver substantial advances in vehicle performance and efficiency. The research advances novel propulsion-airframe integration and vehicle integration technologies critical for transformative propulsion and energy systems on future commercial aircraft. SVTT addresses critical barriers to adoption of future energy solutions across propulsion, airframe, vehicle integration, and supporting infrastructure. The project explores aircraft configurations, systems, and technologies to enable expanded fuel options for commercial aircraft, advancing multi-fuel propulsion and energy systems that include advanced thermodynamic cycles, high-power electrification, and non-drop-in fuel technologies. SVTT develops modeling and simulation tools to explore the noise and performance of multi-rotor urban air mobility vehicles. SVTT research strengthens U.S. industrial competitiveness in both subsonic transport aircraft and advanced air mobility markets by improving marketability, shortening design cycles, reducing operating costs, and accelerating the adoption of cutting-edge advanced technologies beyond what industry could achieve alone.

HI-RATE COMPOSITE AIRCRAFT MANUFACTURING (HICAM)

The HiCAM project demonstrates advanced manufacturing approaches and enabling technologies for large composite primary airframe structures, supporting production rates of up to 80 aircraft per month which is six times faster than current rates, while achieving cost reductions with no weight penalty compared to 2020 technology for composite structures. The project focuses on airframe structural components for single-aisle transport aircraft expected to enter service in the 2030s. HiCAM develops model-based engineering tools to rapidly mature, optimize, and transition high-rate composite manufacturing and assembly methods. NASA collaborates with industry and academic partners to leverage shared expertise, facilities, and resources to accelerate technology maturation and reduce development risk. HiCAM technologies support advanced vehicle concepts that rely on composite structures and integrate manufacturing considerations early in future vehicle designs. The advanced manufacturing techniques developed under HiCAM will be applicable to a variety of composite aircraft structures, with potential applications extending to aircraft engines, urban air mobility vehicles, space launch vehicles, and in-space construction.

HIGH SPEED FLIGHT (HSF)

The HSF project develops technologies, tools, and knowledge that drive advancements in high-speed commercial flight from Mach 1 to Mach 5 and beyond, enabling transformative possibilities in aviation and aerospace. HSF addresses critical challenges limiting reusable, airbreathing high-speed commercial travel and space access, focusing on reductions in sonic boom impact, advanced propulsion systems, high-temperature materials, and vehicle reusability through both fundamental and applied research. This project coordinates closely with the DoW allowing NASA to leverage DoW investments in ground and flight activities to develop and validate advanced physics-based computational models. At the same time, DoW benefits from NASA expertise, analysis capabilities, testing infrastructure, and computational modeling tools, which accelerate the development and validation of next-generation high-speed technologies. The HSF project aligns with U.S. industry interests in commercial high-speed flight and actively collaborates with partners to ensure that NASA remains at the forefront of enabling safe and economically viable high-speed air travel. Additionally, HSF cultivates the future generation of U.S. experts in high-speed aerospace technologies.

Program Schedule

Date	Significant Event
Jan 2027	HiCAM – mature wing and fuselage designs used to demonstrate high-rate composite manufacturing technologies
Mar 2027	SVTT – complete the CDR for the Advanced Engine Core Demonstration, milestone enabling ground test demonstration of next-generation single-aisle aircraft engine technologies
Sep 2027	HSF – acquire X-59 acoustic data to understand aircraft characteristics and provide confidence in the tools supporting future community test planning
Sep 2027	HiCAM - fabricate composite wing components and prepare for initial assembly
Sep 2027	HSF – complete performance and operation testing of novel dual-model ramjet engine in direct connect ground test propulsion facility
Sep 2027	SVTT – complete wind tunnel experiments to validate an unducted propulsor concept for advanced aircraft engine, achieving substantial fuel efficiency gains

ADVANCED AIR VEHICLES PROGRAM

Program Management & Commitments

Program Element	Provider
SVTT	Provider(s): ARC, AFRC, GRC, LaRC Lead Center: GRC Performing Center(s): ARC, AFRC, GRC, LaRC Cost Share Partner(s): Boeing, Pratt & Whitney, GE Aerospace, Raytheon Technologies Corporation, Federal Aviation Administration (FAA), United States Navy, DoE ARPA-e, magniX, Wright Electric, Honeywell
HSF	Provider(s): ARC, AFRC, GRC, LaRC Lead Center: LaRC Performing Center(s): ARC, AFRC, GRC, and LaRC Cost Share Partners: DoW, John Hopkins University/Applied Physics Laboratory, Boeing
HiCAM	Provider(s): GRC, LaRC Lead Center: LaRC Performing Center(s): GRC, LaRC Cost Share Partners: FAA, Advanced Thermoplastic Composites, Aurora Flight Sciences, Boeing, Collins Aerospace, Collier Aerospace, Convergent Manufacturing Technologies - US, Electroimpact, Fives Machining Systems, GE Aerospace, Gulfstream Aerospace, Hexcel, Lockheed Martin, Mississippi State University, Northrop Grumman, Syensqo, Spirit AeroSystems, Toray Advanced Composites, University of South Carolina, Vericut, Wichita State University

Acquisition Strategy

AAVP research and technology spans from foundational research to integrated system capabilities. This broad spectrum necessitates the use of a variety of acquisition tools relevant to the appropriate work awarded externally through full and open competition. For all procurement actions, NASA strongly encourages collaboration among large companies, small businesses, and universities.

MAJOR CONTRACTS/AWARDS

AAVP awards multiple smaller contracts, which are generally less than $5 million, with a few exceptions, and are widely distributed across academia and industry. AAVP anticipates awarding larger contracts to support the HiCAM projects' large technology development and demonstrations.

ADVANCED AIR VEHICLES PROGRAM

INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	Expert Review	Oct 2024	The 12-month review is a formal independent peer review. Experts from other NASA programs and government agencies report on their assessment of technical and programmatic risk and/or program weaknesses.	The Panel provided favorable reviews to the projects. The Panel also gave constructive comments and recommendations.

INTEGRATED AVIATION SYSTEMS PROGRAM

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Low Boom Flight Demonstrator	--	--	**41.3**	5.4	0.0	0.0	0.0
Other Projects	--	--	**110.9**	90.2	90.2	90.2	90.1
Total Budget	**--**	**--**	**152.2**	**95.6**	**90.2**	**90.2**	**90.1**

A Boeing-built X-66 full-span model (shown here) underwent testing in the 11-Foot Transonic Unitary Plan Facility at ARC in California.

The Integrated Aviation Systems Program (IASP) conducts research and demonstrations of advanced technologies in a flight environment to prove, mature and transition them into future air vehicles and systems. The program focuses on technologies supporting faster and more efficient air travel, benefiting the nation and flying public.

IASP has two major demonstration projects: the Subsonic Flight Demonstrator (SFD) and the Low Boom Flight Demonstrator (LBFD). The program also funds flight support capabilities and other aeronautics research related to flight tests through the Flight Demonstrations and Capabilities (FDC) project, which supports the LBFD project.

The SFD project will pursue a ground-based, full-scale wing demonstration of integrated thin-wing technologies that are key for increased efficiency (and thus lower operating costs) of next-generation commercial airliners. The LBFD project will build, assemble, and conduct flight validation tests for the X-59 supersonic aircraft. The results of the LBFD flight tests could lead to the end of current bans on commercial supersonic flight over land, greatly reducing flight times.

EXPLANATION OF MAJOR CHANGES IN FY 2027

IASP has a planned budget decrease to the LBFD project as the project moves into flight.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

- NASA will complete testing of an actuated variable camber Krueger (VCK) flap using a full-scale thin wing segment in the NASA GRC Icing Research Tunnel to evaluate icing prediction for novel configurations. (SFD)
- NASA will complete flutter wind tunnel test for the scaled X-66 Transonic Truss Braced Wing (TTBW) half-span configuration using the NASA LaRC Transonic Dynamics Tunnel (TDT) to inform predictive flight characteristics. (SFD)
- NASA will complete near, mid, and far field airborne measurements of X-59 shock structure informing X-59 design tool validation. (FDC)
- NASA will complete Quesst Mobile Operations Facility operational testing to be ready to deploy to first X-59/Quesst Mission community response test location. (FDC)

Program Elements

The LBFD project within IASP is reported in a separate section since it is a major project of greater than $250 million and has completed KDP-C.

FLIGHT DEMONSTRATIONS AND CAPABILITIES (FDC)

The FDC project conducts complex integrated small scale flight research to validate the benefits of new technologies. By modifying aircraft from FDC's support fleet, the project enables aggressive, success-oriented flight campaign schedules. While many technologies are at mid-levels of technology readiness, the FDC project supports all phases of technology maturation. FDC's support aircraft fleet enables safety chase and in-flight experimental measurements for a variety of NASA missions. FDC collaborates with academia, industry, and government organizations to leverage flight opportunities. The FDC project engages with NASA researchers and university students to bring innovative concepts to flight.

The FDC project operates, sustains, and enhances other national flight research capabilities that enable complex high-risk flight research for both NASA and the aviation industry. These capabilities are located at AFRC and include the Aeronautics Test Data Portal, Flight Loads Laboratory, the Dryden Aeronautical Test Range, and a suite of flight simulators. The project leverages collaborative opportunities for flight testing from across the aeronautical industry.

SUBSONIC FLIGHT DEMONSTRATOR (SFD)

The SFD project is working with Boeing and its industry partners under a Funded Space Act Agreement to develop, integrate, and test thin-wing technologies at full scale on the path to a flight demonstrator, which will allow an aircraft to be more fuel efficient than a traditional airliner due to a shape that would create less drag, resulting in its burning less fuel. When combined with additional technologies, this configuration will reduce fuel consumption up to 30 percent relative to today's most efficient single-aisle aircraft. Technologies and designs demonstrated by the project will help inform industry decisions about the next generation of single-aisle seat class aircraft that could enter into service in the 2030s.

Program Schedule

Date	Significant Event
Apr 2027	SFD - complete testing of an actuated VCK flap using a full-scale thin wing segment in the NASA GRC Icing Research Tunnel to evaluate icing prediction for novel configurations
Sep 2027	SFD - complete flutter wind tunnel test for the scaled X-66 TTBW half-span configuration using the NASA LaRC TDT to inform predictive flight characteristics
Sep 2027	FDC - complete near, mid, and far field airborne measurements of X-59 shock structure informing X-59 design tool validation
Sep 2027	FDC - complete Quesst Mobile Operations Facility operational testing to be ready to deploy to first X-59/Quesst Mission community response test location

INTEGRATED AVIATION SYSTEMS PROGRAM

Program Management & Commitments

Program Element	Provider
FDC	Provider(s): ARC, AFRC, GRC, LaRC Lead Center: AFRC Performing Center(s): ARC, AFRC, GRC, LaRC Cost Share Partner(s): DoW, Air Force Research Laboratory, Lockheed Martin
SFD	Provider(s): ARC, AFRC, GRC, LaRC Lead Center: HQ Performing Center(s): ARC, AFRC, GRC, LaRC Cost Share Partner(s): Boeing

Acquisition Strategy

IASP research and technology development focuses on integrated aircraft system capabilities. The program uses a variety of acquisition tools relevant to the appropriate work awarded externally through full and open competition.

MAJOR CONTRACTS/AWARDS

IASP awards multiple smaller contracts, which are generally less than $7 million and widely distributed across academia and industry for efforts supporting small-scale flight demonstrations. IASP awards substantially larger awards for the design and build of large-scale flight demonstrations (e.g., LBFD, SFD).

INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	Expert Review	Oct 2024	The 12-month review is a formal independent peer review. Experts from other government agencies report on their assessment of technical and programmatic risk and/or program weaknesses.	Given FY 2024 performance and alignment with NASA ARMD Strategic Goals, the Review Panels recommended continuation of IASP projects.

LOW BOOM FLIGHT DEMONSTRATOR

Formulation	Development	Operations

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	41.3	5.4	0.0	0.0	0.0

NASA's X-59 aircraft is shown on its historic first flight. The aircraft traveled to NASA's AFRC in Edwards, California, where it will begin flight testing for NASA's Quesst mission, which aims to demonstrate quiet supersonic flight over land.

PROJECT PURPOSE

The Low Boom Flight Demonstrator project (LBFD) is part of NASA's effort to enable new aircraft noise standards that are required to allow commercial supersonic flight over land. The federal government banned all civilian supersonic flights over land more than 50 years ago due to sonic boom noise. If new standards are established, the U.S. aviation industry can position itself to lead the commercial supersonic market, and passengers will benefit from significantly shorter travel times. Over the past decade, fundamental research and experimentation have demonstrated the possibility of supersonic flight with greatly reduced sonic boom noise - one of several key areas needed to transform commercial supersonic flight. The LBFD project will demonstrate a reduced sonic boom by utilizing a purpose-built experimental aircraft designated the X-59.

The LBFD project supports a multi-phase effort aimed at demonstrating the X-59's ability to fly supersonic without generating loud sonic booms. The LBFD project leads Phase 1 of the Quesst mission, involving the design, fabrication, ground tests, and checkout flights of the X-59. After ensuring the aircraft is safe and performing as expected, the LBFD project will support the rest of the mission team during Phase 2 to prove the aircraft is producing a quiet sound to people on the ground and is safe for operations in the National Airspace System. At the conclusion of Phase 2, the X-59 aircraft will transfer to IASP's Flight Demonstrations and Capabilities project.

EXPLANATION OF MAJOR CHANGES IN FY 2027

The LBFD project has a planned budget decrease as the project moves into flight.

PROJECT PARAMETERS

The LBFD project is responsible for overseeing the construction, integrated ground tests, and flight validation of the X-59 aircraft through Phase 2 of the Quesst mission. The X-59 aircraft was built by prime contractor Lockheed Martin Skunk Works in Palmdale, California. Its unique design and technologies produce a soft "thump" heard on the ground, which is similar to a car door slamming across the street.

LOW BOOM FLIGHT DEMONSTRATOR

Formulation	Development	Operations

KEY ACHIEVEMENTS PLANNED FOR FY 2027

NASA will complete X-59 envelope expansion and move into Phase 2 of the Quesst mission.

NASA will begin X-59 Phase 2 flights within the supersonic test range over AFRC and Edwards Air Force Base in California. The flights will measure the sound and prove the aircraft quiet supersonic technology works as designed and continue to validate that the aircraft is safe for operation.

SCHEDULE COMMITMENTS/KEY MILESTONES

Milestone	Baseline Date	FY 2027 PB Request
Flight Readiness Review	Mar 2024	Mar 2024
First Flight Complete	Oct 2024	Oct 2025
System Acceptance Review (Phase 1) Flight Testing Complete	Q4 FY 2025	Q2 FY 2027
Acoustic Validation (Phase 2) Complete	Oct 2026	Q3 FY 2027
LBFD project Close-Out Complete	Dec 2026	Q1 FY 2028

Development Cost and Schedule

The LBFD project life cycle includes aircraft concept refinement studies, aircraft preliminary design, aircraft final design and build, and acoustic validation flight testing. These activities span from FY 2014 to FY 2027 (Phase 1 and Phase 2 of the Quesst mission). Given continued challenges with contractor performance and, to a lesser extent, persistent COVID-19 impacts from 2020 through 2022, a rebaseline of the remaining work was recommended and agreed to by NASA leadership in early 2023. Since then, plans were made to conduct a thorough assessment of cost and schedule risks associated with remaining work in anticipation of a Rebaseline Review, which was completed on December 12, 2023. Due to contractor performance issues and technical discoveries since the Rebaseline Review, the LBFD project exceeded its rebaselined program developmental schedule milestone of an October 2024 First Flight. As such, a February 4, 2025 Reassessment Review was held, which incorporated a replan of the remaining development work to determine an updated milestone commitment with corresponding budget. The table below reflects the results of the Reassessment Review for remaining milestones.

LOW BOOM FLIGHT DEMONSTRATOR

Formulation	Development	Operations

Base Year	Base Year Development Cost Estimate ($M)	JCL (%)	Current Year	Current Year Development Cost Estimate ($M)	Cost Change (%)	Key Milestone	Base Year Milestone Data	Current Year Milestone Data	Milestone Change (months)
2024	709.2	-	2026	766.9	8.1	First Flight	Oct 2024	Oct 2025	12

Note: Estimate reflects the practices and policies at the time of development. An updated JCL was not conducted for the December 2023 Rebaseline and February 2024 Reassessment due to the level-of-effort nature of remaining work.

Development Cost Details

Element	Base Year Development Cost Estimate ($M)	Current Year Development Cost Estimate ($M)	Change from Base Year Estimate ($M)
TOTAL:	**709.2**	**766.9**	**+57.7**
Flight Sciences	39.7	46.1	+6.4
Flight Systems	37.5	43.3	+5.8
Aircraft	476.7	507.7	+31
Aircraft Operations	70.8	78.0	+7.2
Other Direct Project Costs	84.5	91.8	+7.3

Project Management & Commitments

Element	Description	Provider Details
Flight Sciences	Vehicle sonic boom, aerodynamics, propulsion, structures, and mission performance NASA in-house flight simulation tools, and analysis of vehicle handling qualities and control laws	Provider: ARC, AFRC, GRC, LaRC Lead Center: LaRC Performing Center(s): ARC, AFRC, GRC, LaRC Cost Share Partner(s): N/A
Flight Systems	Design, development, and test of Power Distribution System, Flight Test Instrumentation System, and eXternal Vision System	Provider: AFRC, LaRC Lead Center: AFRC Performing Center(s): AFRC, LaRC Cost Share Partner(s): N/A

LOW BOOM FLIGHT DEMONSTRATOR

Formulation	Development	Operations

Element	Description	Provider Details
Aircraft	Design, build, and initial test of a single-piloted X-plane	Provider: Lockheed Martin Lead Center: AFRC Performing Center(s): N/A Cost Share Partner(s): N/A
Aircraft Operations	Demonstrate airworthiness of aircraft, flight operations, and develop key aircraft subsystems - including life support and crew escape systems Provide Government Furnished Equipment to construct the research aircraft, support and maintain F414 engine, and perform insight/oversight of Ops-related tasks that the vehicle contractor performs	Provider: AFRC, LaRC Lead Center: AFRC Performing Center(s): AFRC, LaRC Cost Share Partner(s)/subcontractors: GE, Northrop, Honeywell, and Lockheed Martin

Project Risks

Risk Statement	Mitigation
Sonic Boom Level is Not Acceptable for Community Overflight Research Given that achieving a fully shaped sonic boom ground signature in the 70-75 perceived decibel level range requires a complex and integrated design solution that is sensitive to outer mold line changes, there is a possibility that the mission requirements related to ground signature loudness may not be achievable - resulting in an aircraft that may not be fully acceptable for community response studies.	NASA will ensure that all configuration assessments use the latest and most mature aircraft configuration and periodically assess any updates to the aircraft configuration, such as the outer mold line or performance characteristics.
Reduced Aircraft Performance Could Impact Mission Effectiveness Given the aircraft and propulsion system selection and integration complexity, there is a possibility of reduced aircraft performance resulting in loss of mission effectiveness and leading to longer duration time to meet flight parameter(s), increased costs, and limitations of flight test points to standard-day conditions.	NASA will ensure that the contractor has sufficient margin for aircraft weight growth with propulsion configuration; assess contractor aircraft performance and thrust predictions (both computationally and experimentally) over the aircraft flight envelope; and perform a trade study on engine performance during demanding conditions.

Acquisition Strategy

The acquisition strategy for LBFD is to award to industry a contract for the detailed design, build, and test of the experimental X-59 aircraft. NASA will provide in-house support that will include in-flight and ground systems, instrumentation and operations, simulation, wind tunnel testing, and safety and mission assurance. NASA supplies aircraft components and systems as Government Furnished Equipment whenever feasible and considered to add value to the development of the X-59 aircraft.

LOW BOOM FLIGHT DEMONSTRATOR

Formulation	Development	Operations

MAJOR CONTRACTS/AWARDS

Element	Vendor	Location (of work performance)
X-59 Aircraft - design, build, and initial testing	Lockheed Martin	Palmdale, CA
F414-GE-100 engine	General Electric Aerospace	Lynn, MA

INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	Flight Readiness Review Board	Mar 2024	Flight Readiness Review	Successful
Performance	Airworthiness and Flight Safety Review Board	Jun 2025	Flight Readiness Review resulting in issuance of a NASA Airworthiness Certificate	Successful

TRANSFORMATIVE AERO CONCEPTS PROGRAM

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	79.3	113.2	117.3	121.1	121.1

The Research Aircraft for electric Vertical takeoff and landing Enabling techNologies Subscale Wind Tunnel and Flight Test, shown here, undergoes a free flight test on the City Environment Range Testing for Autonomous Integrated Navigation range at LaRC.

The Transformative Aeronautics Concepts Program (TACP) develops multi-disciplinary technology solutions and explores revolutionary system concepts to enable aviation transformation. TACP delivers innovative solutions to aviation challenges by driving technology advancements in the aeronautics and non-aeronautics sectors creating new opportunities in aviation. A major goal of the program is to reduce or eliminate technical barriers and infuse groundbreaking concepts into the aviation community.

TACP creates advanced and improved computational tools, technologies, and experimental capabilities for use by other aeronautics programs, agency mission directorates, industry, and government partners. These advancements will accelerate our ability to perform rapid, high fidelity computational design and analysis of complex aerospace designs, leading to revolutionized aerospace engineering methods. TACP collaborates with stakeholders to secure the American competitive position as the world leader in aerospace technology, invests with the U.S. academic community to infuse our research with university innovation, and supports development of the future aerospace workforce.

TACP's exploratory research approaches offer flexibility for innovators to pursue technology feasibility leading to radical aerospace transformation. The program creates an environment for researchers to incubate and test new ideas that can provide paradigm-shifting capabilities. These discoveries and knowledge gained are transitioned to our partners and collaborators enabling new market growth and bolstering U.S. global leadership.

EXPLANATION OF MAJOR CHANGES IN FY 2027

No major changes.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

- Conduct Common Research Model-High Lift (CRM-HL) performance testing.
- Conduct flight research and the PDR for Research Aircraft for eVtol Enabling techNologies (RAVEN) Subscale Wind Tunnel & Flight Test (SWFT) to validate and improve flight dynamics and controls.
- Advance NASA's open-source software tools for multidisciplinary design, analysis, and optimization and expand cross collaboration with other government agencies.

- Continue support for ongoing University Leadership Initiative (ULI) and will successfully complete the following ULI awards, consistent with timelines proposed at the time of award:
    - Boston University: improving multi-rotor performance and noise that are critical to enable Urban Air Mobility operations in an urban setting;
    - Florida State University: Integrated Zero-Emission Aviation using a Robust Hybrid Architecture;
    - George Washington University: Securing High-Density Urban Airspaces;
    - Georgia Tech: improving propulsion efficiency for Civil Supersonic Transport;
    - Ohio University: Safe, Scalable, and Seamless SurfNav4UAS (SurfNav4UAS);
    - Pennsylvania State University: Leading Advanced Turbine Research for Hybrid Electric Propulsion Systems;
    - Tennessee Tech: CarbonLess Electric AviatioN;
    - University of California Berkeley: Stress Testing and Hardening the NAS for Safe, Efficient, and Resilient Growth;
    - University of Central Florida: Zero-Carbon Engine Core with Supercritical Carbon Dioxide Power Cycle for Onboard Power;
    - University of Illinois, Urbana-Champaign: Robust and Resilient Autonomy for Advanced Aerial Mobility;
    - University of Notre Dame: defining a system where multiple small drones can operate safely together within a shared airspace by leveraging a network that continuously monitors and assesses drone safety records; and
    - University of Texas – Austin: Autonomous Aerial Cargo Operation at Scale.

Program Elements

TRANSFORMATIONAL TOOLS AND TECHNOLOGIES (TTT)

The TTT project advances state-of-the-art computational and experimental tools and technologies that are vital to aviation applications. These new simulation-based tools, models, and associated scientific knowledge validated through meticulously collected experimental data, both from ground-based facilities and in flight, provide novel capabilities to analyze, understand, and predict performance for a variety of aviation concepts. Applying these tools will enable and accelerate NASA's research and enable the aviation community to introduce advanced concepts and designs. An example is the development and validation of new computational tools to predict complex turbulent airflow around vehicles and within propulsion systems, ultimately leading to an improved ability to predict future vehicle performance in flight. The project also explores technologies critical to advancing ARMD strategic outcomes, such as understanding new types of strong, durable, and lightweight materials, innovative aircraft control techniques, and experimental methods. Such technologies will support and enable concept development and benefit assessments across multiple ARMD programs and disciplines. The TTT project will also incorporate a research exploration element to support rapid feasibility assessments of early-stage innovations to infuse its portfolio with novel ideas from creative NASA Aeronautics experts.

TRANSFORMATIVE AERO CONCEPTS PROGRAM

UNIVERSITY INNOVATION (UI)

The UI project contains a portfolio of disruptive technologies and other new concepts to meet the future needs of aviation and support education of the next generation of engineers. The project's ULI invests in university-led teams that assess solving the most critical technical challenges to achieve Aeronautics strategic outcomes and propose independent, innovative system-level research projects to find those solutions. Universities develop their own success criteria, progress indicators, and technical approaches. Universities pursue multi-disciplinary approaches and incorporate opportunities with other universities, industry, and U.S. entities. The University Student Research Challenge and Gateway to Blue Skies Competition investments in UI support student-led research in novel concepts and technology advancements addressing current aeronautics problems and future opportunities.

Program Schedule

Date	Significant Event
Dec 2026	TTT – CDR for the Transonic Dynamics Tunnel (TDT) Static Aeroelastic Common Research Model (CRM)
Dec 2026	UI – ULI Round 9 award kick-off
Dec 2026	UI – completion of ULI Round 4 Pennsylvania State University award, ULI Round 5 University of Illinois and Georgia Tech awards
Dec 2026	UI – release of the University Student Research Challenge Solicitation
Mar 2027	TTT – conduct wind tunnel tests in the Flight Dynamics Research Facility using the RAVEN SWFT research aircraft
Mar 2027	UI – release of ULI Round 11 Solicitation
Mar 2027	UI – Gateways to Blue Skies Competition Finals Event
Mar 2027	TTT – fabrication of the TDT Static Aeroelastic CRM Model begins
Mar 2027	UI – completion of ULI Round 4 University of Texas-Austin award, ULI Round 5 University of Central Florida and Florida State University awards, ULI Round 6 Tennessee Tech, University of California – Berkeley awards, and ULI Round 7 George Washington University and Ohio University awards
Mar 2027	TTT – conduct CRM-HL performance testing

TRANSFORMATIVE AERO CONCEPTS PROGRAM

Program Management & Commitments

Program Element	Provider
TTT	Provider(s): ARC, GRC, LaRC, AFRC Lead Center: GRC Performing Center(s): ARC, GRC, LaRC, AFRC Cost Share Partner(s): Boeing; Blue Origin, LLC; Rolls Royce Corporation; DoE Golden Field Office; DoE; Naval Air Systems Command; Dimensional Energy and Oerlikon Metco (US) Incorporated; and U.S. small businesses
UI	Provider(s): ARC, GRC, LaRC, AFRC Lead Center: HQ Performing Center(s): ARC, GRC, LaRC, AFRC Cost Share Partner(s): N/A

Acquisition Strategy

TACP research and technology development focuses on foundational research capabilities. The program uses a variety of acquisition tools relevant to the appropriate work awarded externally through full and open competition. For all procurement actions, NASA strongly encourages teaming among large companies, small businesses, and universities.

MAJOR CONTRACTS/AWARDS

TACP awards multiple smaller contracts, which are less than $5 million and are widely distributed across academia and industry.

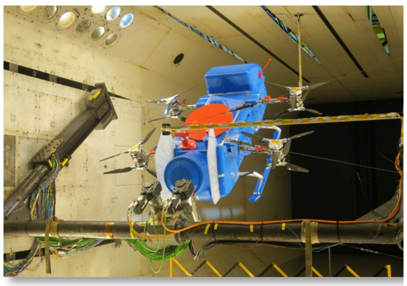
INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	Expert Review	Oct 2024	The 12-month review is a formal independent peer review. Experts from other government agencies report on their assessments of technical and programmatic risk and/or project weaknesses.	Received expert feedback on project improvement. Determined that the projects made satisfactory progress in meeting objectives.

AEROSCIENCES EVALUATION AND TEST CAPABILITIES

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	90.1	95.1	100.1	105.1	105.2



The NASA/Applied Physics Laboratory Dragonfly model is shown here in the Transonic Dynamics Tunnel at LaRC. Dragonfly will fly through the atmosphere of Saturn's moon, Titan.

The Aerosciences Evaluation and Test Capabilities (AETC) portfolio executes strategic efforts to preserve and enhance research and test capabilities for NASA's world-class portfolio of National Wind Tunnel facilities. These facilities are paving the way towards the future offering versatile and comprehensive ground testing in the areas of technology innovation, while providing new capabilities, calibration, and characterization through our diverse and highly skilled workforce.

AETC assets include capabilities in the subsonic, transonic, supersonic, hypersonic speed regimes, and propulsion test facilities at LaRC in Virginia, GRC in Ohio, and ARC in California. AETC's state-of-the art testing support is a crucial component in advancing innovative technologies that will take NASA and the nation into the future, expand the human presence into space, further the understanding of our solar system, and deliver benefits to humanity through national and international collaboration.

Through broad alliances, AETC optimizes the use of these capabilities across the government. NASA participates in the National Partnership for Aeronautical Testing and collaborative working groups that include NASA, the DoW, and other partners. Members of these working groups: (1) gain awareness of capabilities across the government, academia, and industry; (2) share best practices; (3) provide technical support; and (4) refer test programs to facilities best suited to meet test requirements. Within NASA, AETC directly supports the testing needs of five mission directorates: ARMD, ESDMD, SOMD, SMD, and STMD.

EXPLANATION OF MAJOR CHANGES IN FY 2027

AETC intends to return three facilities, the GRC 10- by 10-Foot Supersonic Wind Tunnel, the LaRC National Transonic Facility (NTF), and the LaRC 4-Foot Unitary Plan Wind Tunnel, from operational standby into one-shift, campaigning operational mode with the other 9 AETC facilities.

KEY ACHIEVEMENTS PLANNED FOR FY 2027

- AETC will continue transitioning to a new operational model: Initiated in FY 2026, AETC is optimizing workforce in response to fluctuating test demand by being more efficient with shared workforce across facilities. As required, each facility's operating availability will be adjusted to meet demand and priorities. The operating availability will range from one to two shift operations with not all facilities running tests concurrently.
- AETC will provide support for revolutionary engineering methods in key areas, such as data portal maturity, data pipeline enhancement, test diagnostics, and optical access improvements.

- AETC will initiate a set of New Wind Tunnel Landscape studies (by speed regime) to determine the best approach to AETC's continuing commitment to address gaps in the ability of computational methods to solve critical aerosciences flow and physics challenges. AETC plans to initiate a Transonic test capability study by January 2027, followed by a supersonic test capability study by September 2027.

Program Element

AEROSCIENCES EVALUATION AND TEST CAPABILITIES (AETC)

Aerosciences ground-test capabilities (e.g., facilities, systems, workforce, and tools) that support future aircraft, space vehicles, and operations require efficient and effective investment, operations, and management. Efforts in this area preserve and enhance ground test capabilities necessary to achieve the agency's multi-mission requirements. Among these assets are subsonic, transonic, supersonic, and hypersonic wind tunnels and propulsion test facilities at ARC in Mountain View, California; GRC in Cleveland, Ohio; and LaRC in Hampton, Virginia. These test facilities and capabilities also serve the needs of non-NASA users and are listed below:

- ARC Unitary Plan 11- by 11-Foot Transonic and 9- by 7-Foot Supersonic Wind Tunnels;
- GRC 9- by 15-Foot Low Speed and 8- by 6-Foot Supersonic Wind Tunnels;
- GRC 10- by 10-Foot Supersonic Wind Tunnel;
- GRC Icing Research Tunnel;
- GRC Propulsion Systems Laboratory;
- LaRC 14- by 22-Foot Subsonic Wind Tunnel;
- LaRC National Transonic Facility;
- LaRC Transonic Dynamics Tunnel;
- LaRC Aerothermodynamics Laboratory;
- LaRC 8-Foot High Temperature Tunnel;
- LaRC Flight Dynamics Research Facility; and
- LaRC Unitary Plan Wind Tunnel.

NASA's integrated approach to test capability planning, use, and management will consider the complementary computational tools, software, and related systems to effectively acquire and process research data. NASA offers research customers high-quality data that accurately reflects the simulated test environment and the interactions of test articles in those test environments. Furthermore, NASA expertise helps ensure safe and successful use of the assets and the high quality of research outcomes. The AETC portfolio is cross-cutting and supports ARMD, other government agencies, and industry.

AEROSCIENCES EVALUATION AND TEST CAPABILITIES

Program Schedule

Date	Significant Event
Jan 2027	AETC – Transonic Capabilities Study Kickoff, in support of New Wind Tunnel Landscape strategy
Sep 2027	AETC – 10- by 10-Foot, NTF, 4-Foot UPWT able to return to one-shift testing operations
Sep 2027	AETC – Supersonic Capabilities Study Kickoff, in support of New Wind Tunnel Landscape strategy

Program Management & Commitments

Program Element	Provider
AETC	Provider: ARC, LaRC, GRC Lead Center: HQ Performing Center(s): ARC, LaRC, GRC Cost Share Partner(s): Multiple

Acquisition Strategy

AETC uses of a variety of acquisition tools relevant to the appropriate work awarded externally through full and open competition.

MAJOR CONTRACTS/AWARDS

AETC awards multiple smaller contracts, which are generally less than $5 million and are typically with industry, that provide systems applicable to the sustainment and operations for large-scale wind tunnel assets.

INDEPENDENT REVIEWS

Review Type	Performer	Date of Review	Purpose	Outcome
Performance	Expert Review	Dec 2024	This 12-month review is a formal independent peer review. Experts from other NASA missions report on their assessment of technical and programmatic risk and/or program weaknesses.	This was a very favorable review. The expert reviewers encouraged the team to continue improving its processes including those that support operational efficiency gains and improved investment and divestment decision making.

STEM ENGAGEMENT

STEM ENGAGEMENT

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	**143.0**	**143.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

FY 2025 reflects the funding amount specified in Public Law 119-4, Full-Year Continuing Appropriations and Extensions Act, 2025.

FY 2026 reflects the funding amount specified in Public Law 119-74, Commerce, Justice, Science; Energy and Water Development; and Interior and Environment Appropriations Act, 2026.

The FY 2027 budget proposes no funding for NASA's Office of STEM Engagement (OSTEM) including its four projects: National Space Grant College and Fellowship Project (Space Grant), Established Program to Stimulate Competitive Research (EPSCoR), Minority University Research and Education Project (MUREP), and Next Generation STEM project (Next Gen STEM).

EXPLANATION OF MAJOR CHANGES IN FY 2027

NASA's primary role is space exploration and, similar to prior generations that were inspired by the Apollo lunar landings, NASA will inspire the next generation of explorers through exciting, ambitious space missions. No funding is requested for Space Grant, EPSCoR, MUREP, and Next Gen STEM. NASA proposes to use unobligated balances previously appropriated under this heading to support the closeout of OSTEM activities, including but not limited to, administration, oversight, monitoring, and funding of grants previously awarded by OSTEM.

Safety, Security, and Mission Services

SAFETY, SECURITY, AND MISSION SERVICES

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Mission Services & Capabilities	--	--	**1,536.7**	1,536.7	1,536.7	1,536.7	1,536.7
Engineering, Safety, & Operations	--	--	**462.0**	462.0	462.0	462.0	462.0
Total Budget	**3,092.3**	**3,000.0**	**1,998.6**	**1,998.6**	**1,998.6**	**1,998.6**	**1,998.6**

FY 2025 reflects the funding amount specified in Public Law 119-4, Full-Year Continuing Appropriations and Extensions Act, 2025.

FY 2026 reflects the funding amount specified in Public Law 119-74, Commerce, Justice, Science; Energy and Water Development; and Interior and Environment Appropriations Act, 2026.

The Safety, Security, and Mission Services (SSMS) account enables NASA’s mission success by providing foundational support capabilities responsive to evolving mission needs. SSMS also funds independent analysis for NASA’s missions and programs to ensure the health, safety, and security of NASA's workforce, property, and the public. SSMS programs provide the services and capabilities that ensure NASA has the technical skills, physical assets, financial resources, and workforce to be successful. The SSMS FY 2027 budget is comprised of two themes: Mission Services and Capabilities (MSaC) and Engineering, Safety, and Operations (ESO).

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

MISSION SERVICES AND CAPABILITIES

MSaC provides enterprise solutions under three programs: Information Technology, Mission Enabling Services, and Infrastructure and Technical Capabilities. Strategically, these programs meet workforce, infrastructure, information technology, and business operations requirements necessary to enable NASA's mission. MSaC ensures critical agency operations are effective, efficient, safe, and meet statutory, regulatory, and fiduciary responsibilities. These mission enabling services and capabilities provide efficient and effective administration across all NASA centers and HQ. More information is provided in the program element sections below.

ENGINEERING SAFETY AND OPERATIONS

ESO provides for the management and operations of NASA HQ, centers, and component facilities under two programs: Agency Technical Authority and Center Engineering, Safety, and Operations. Both programs support scientific and engineering activities. More information is provided in the program elements section below.

MISSION SERVICES & CAPABILITIES

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Information Technology (IT)	--	--	**485.1**	485.1	485.1	485.1	485.1
Mission Enabling Services	--	--	**526.4**	526.4	526.4	526.4	526.4
Infrastructure & Technical Capabilities	--	--	**525.1**	525.1	525.1	525.1	525.1
Total Budget	**--**	**--**	**1,536.7**	**1,536.7**	**1,536.7**	**1,536.7**	**1,536.7**

Mission Services and Capabilities (MSaC) provides foundational business service and enterprise solutions to all of NASA. While mission requirements evolve with agency priorities and external conditions, MSaC is focused on the critical requirements that enable all NASA activity.

MSaC offers a range of foundational services. NASA's mission enabling services (MES) includes, but is not limited to, human capital, financial management, physical asset management, software and hardware services, communications, equal opportunity programs, legal services, small business program, procurement services, and safety/protective services. MSaC is comprised of three programs: Information Technology (IT), MES, and Infrastructure and Technical Capabilities (I&TC).

Images depicting NASA's Space Launch System (SLS) rocket are projected onto the Washington Monument as part of an event to kick off the nation's 250th birthday year, Wednesday, December 31, 2025, in Washington.

Program Elements

INFORMATION TECHNOLOGY

The IT program sets IT policy and provides the information and technology services needed to fulfill NASA's multifaceted missions and operations, including cybersecurity, IT asset planning and management, and technical support. NASA's IT program helps improve agency outcomes by accelerating results through tools that increase productivity and drive mission results; sharing NASA's data and discoveries; and increasing the quality, resiliency, and cost-effectiveness of its information systems. Reliable, adaptable, and secure, cloud-based IT is increasingly important to NASA's mission portfolio and is a key enabler for advances in science, technology, aeronautics, and space exploration.

MISSION ENABLING SERVICES

The MES program provides an enterprise approach to setting policy and managing NASA's business operations and mission support activities. Missions rely on these institutional services to provide the business services and skilled staff required to accomplish their objectives. Enterprise management of these areas ensures that critical agency operations are effective and efficient while meeting statutory,

MISSION SERVICES & CAPABILITIES

regulatory, and fiduciary responsibilities. Business services include financial management, human capital management, procurement, small business, legislative affairs, equal opportunity management, legal services, communications, international and interagency relations, and protective services.

INFRASTRUCTURE AND TECHNICAL CAPABILITIES

The I&TC program provides sustainment, operations, and maintenance for facilities and technical capabilities. The program also provides effective management of real property, environmental program activities, aircraft operations, and logistics functions. These capabilities enable NASA to meet its statutory and regulatory responsibilities and ensures that the right infrastructure is available to meet mission requirements. The Agency Master Plan informs the guidance to accomplish this mission through effective management of assets and capabilities, proactive coordination with NASA mission directorates, institutional planning, proactive deployment of sustainable practices, ongoing regulatory compliance, and reducing current and future infrastructure-related risks.

INFORMATION TECHNOLOGY (IT)

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	485.1	485.1	485.1	485.1	485.1

NASA's Information Technology (IT) program provides cross-cutting corporate IT products and services to the agency's workforce, contractors, and partners that support achievement of all NASA's strategic objectives and missions. Corporate products and services include enterprise productivity tools and applications, business process transformation, data management platforms and analytics, devices, cloud and data center computing platforms, and communications networks. All of the products and services are enhanced with cybersecurity to ensure the protection of NASA's people, missions, and assets. IT products and services are tailored to support specific mission and business requirements, including data management and analytics solutions, mission networks, cloud computing, collaboration, and artificial intelligence capabilities. Together, these corporate and tailored capabilities provide the foundational IT platform to deliver NASA's current missions, while enabling ongoing transformation to support the agency's future mission needs.

NASA Integrated Operations Center (NIOC) at MSFC is a unified Enterprise Operations Center currently consisting of the Enterprise Network Operations Center and Security Operations Center. NASA Communications and NASA National Security Systems are actively integrating. Once integrated in the NIOC, it will become OCIO's primary Operations Center for managing and securing NASA's Enterprise Network, OCIO managed Mission Networks, and National Security Systems.

EXPLANATION OF MAJOR CHANGES IN FY 2027

The IT Program will restructure as necessary to eliminate functions not statutorily mandated or mission critical, consolidate management layers and remove duplicative functions, and evaluate/implement technological solutions that automate routine tasks and focus on cost savings through optimization. Through the optimization of software licenses and platform rationalization for IT service management, NASA will reduce costs related to core services and infrastructure.

PLANNED ACHIEVEMENTS AND KEY INITIATIVES FOR FY 2027

- Complete the development and testing to update SAP Enterprise Resource Planning Center Component 6.0, the Core Financial System used to manage and execute NASA's budget, as well as provide NASA with a modernized platform while taking advantage of high-payoff process optimization and new system capabilities. Implementation is set for Q1 FY 2028.
- Accelerate integration of Artificial Intelligence (AI) capabilities that improve mission and operational efficiency by reducing administrative burden, modernizing legacy systems, and accelerating software development through AI-assisted coding, enhanced information retrieval, and routine task

automation, enabling the workforce to concentrate on high-impact mission delivery and decision-making.

- Upskill the workforce through the launch of AI literacy and prompt engineering training, accelerate agency-wide enablement with hands-on labs and tools, and provide onboarding playbooks for general users and developers.
- Continue to analyze and consolidate the remainder of NASA's public web footprint (estimating 450 sites remaining by end of FY 2026) and identify candidates for migration to an enterprise platform or elimination.
- Increase adoption of NASA's Enterprise Data Platform and Agency Data Catalog to facilitate efficient data management, enhance accessibility, maintain integrity, and enable data-driven decisions across the organization.
- Establish dual operation centers to support Artemis and commercial space (SpaceX, Blue Origin, etc.) launches at MSFC and GSFC ensuring mission support capabilities have active backups.
- Optimize and right-size cloud-based applications in alignment with NASA's Mission Cloud Ecosystem strategy to ensure mission-critical applications supporting Artemis, Moon to Mars, and science missions operate at peak efficiency with optimal resource utilization.
- Implement NASA Data Center consolidation and modernization, reducing facilities and operating costs, increasing cloud adoption, and upgrading remaining centers to enhance mission availability and optimize storage.

Program Elements

ENTERPRISE IT

The Enterprise IT program is multifaceted and includes the following six project elements, each with unique functions and work focus:

- Applications and Platforms Services anticipates and aligns customer requirements with solutions that best meet agency needs by delivering secure, sustainable applications quickly and cost effectively. By establishing a platform-centric architecture, the element empowers mission support, enhanced software management to reduce software license costs, and continuous portfolio rationalization.
- Network and Telecommunications Services provides fully managed network and communications services supporting institutions, programs, and projects located at the NASA centers. Network and Telecommunications is also responsible for maintaining, operating, and continually evolving services to improve delivery capabilities, strengthen NASA's cybersecurity posture, and reduce costs.
- Cloud and Computing Services brokers commercial cloud computing services for the NASA community, providing oversight of NASA's compliance with the Federal Data Center Optimization Initiative. Cloud Computing Services extends to all NASA missions, mission support, and external collaborators.
- Workplace and Collaboration Services provides high-quality, reliable, cost-effective service desk, end-user computing services, collaboration, content management systems. This element also provides identity, credential, and access services in support of all NASA federal and contractor employees,

INFORMATION TECHNOLOGY (IT)

including support for laptops, desktops, mobile devices, printing, email, messaging, help desk services, software patching, distribution, and more.

- Information, Data, and Analytics Services provides NASA with framework, guidelines, and services to ensure secure and efficient access, use, analysis, and preservation of the agency's information resources. The program ensures NASA's compliance with federal statutes relating to data access and integrity.
- IT Transformation/Modernization allows for implementation of innovative aspects of our IT strategy through technology infusion, strategic investment decisions, and identification of information technologies to support NASA's needs most effectively in a rapidly changing world.

SAFEGUARDING DATA AND IT ASSETS

NASA OCIO is responsible for agency cybersecurity policy and the implementation and management of enterprise cybersecurity and privacy services. The IT program budget is aligned to the National Institute of Standards and Technology (NIST) Cybersecurity Framework to evaluate cybersecurity gaps and investments against the NIST cybersecurity functions: Identify, Detect, Protect, Respond, and Recover. This alignment allows the agency to make strategic investments to develop, modernize, and enhance agency cybersecurity capabilities to address the greatest areas of risk to the agency, its missions, and supporting functions.

MISSION ENABLING SERVICES

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	526.4	526.4	526.4	526.4	526.4

On January 26, 2026, Oman became the 61st nation to sign the Artemis Accords. MES's Office of International and Interagency Relations supports the accords by ensuring that NASA's international engagements are in alignment with Administration direction and U.S. laws and regulations.

Mission Enabling Services (MES) ensures NASA mission success with foundational support services using enterprise service delivery, while promoting engagement to enhance problem solving and agile responses to evolving requirements. Using an enterprise approach, the MES program eliminates duplicative capabilities, provides opportunities for employees to collaborate across geographic boundaries, and remains agile to shifting demands and surge requirements. These functions are performed while ensuring the health, safety, and security of NASA people, property, and the public. Missions rely on MES' institutional capabilities to accomplish their objectives. Enterprise management ensures that critical agency operations are strategic, mission-focused, agile, and streamlined.

MES provides NASA with a bedrock of business functionality in human capital and financial management; procurement and protective services; small business and equal opportunity programs; legislative affairs; communications; and international and interagency operations. It also supports the agency's outreach and engagement with the public, industry, and both federal and international partners, to ensure the world collaborates on NASA's incredible work of exploration, innovation, inspiration, and discovery.

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

PLANNED ACHIEVEMENTS AND KEY INITIATIVES FOR FY 2027

Change Management

Consistent with Administration priorities on effective mission delivery, workforce engagement, and responsible stewardship of taxpayer resources, NASA will allocate resources, as necessary, to support timely and effective change management. This includes clear, coordinated workforce communications to ensure agency awareness and alignment with Administration objectives and implementation priorities.

Merit Hiring Plan

NASA is committed to merit-based recruitment practices that strengthen the agency's ability to attract, recruit, and retain highly skilled talent required to execute NASA missions. Our Merit-Based Hiring Plan fully supports the President's Management Agenda by strengthening workforce capability, improving HR

MISSION ENABLING SERVICES

operational efficiency, responsibly leveraging technical and alternative assessments while reinforcing accountability.

Restoring NASA's Core Competencies

In support of the President's national space policy and continued U.S. leadership in space exploration, NASA must restore and sustain its in-house engineering, operational, and scientific capabilities, thereby reclaiming technical independence. As outlined in the Administrator's February 6, 2026, "Workforce Directive: Restoring NASA's Core Competencies," NASA will enhance its workforce by building a robust team of civil servants who are equipped to address complex engineering and operational challenges, ensuring each mission is accomplished with expertise, resilience, adaptability, and innovation. The Administrator's directive focuses on correcting over-reliance on outsourced engineering and staffing that diminishes NASA's core competencies and resources essential to agency priorities. This budget-neutral workforce strategy is expected to influence the contractor-to-civil servant ratio at NASA for both FY 2026 and FY 2027.

Business Transformation and IT Modernization

- NASA will invest funding to transition onto the Office of Personnel Management's new, consolidated Core Human Capital Management (Core HCM) system, which will consolidate outdated and inefficient human resources systems into a single, modern Core HCM platform. This single, modern platform will encompass personnel action processing, employee system of record, position management, and workforce analytics, among other human resource functions. This amount includes estimated licensing fees for the new system, data migration, and warehousing of legacy data.

Procurement Strategy

- NASA will align with the Administration's priorities and support implementation of Made in America Laws and maximize spending on American manufacturing.

Program Elements

OFFICE OF THE CHIEF FINANCIAL OFFICER

The Office of the Chief Financial Officer (OCFO) manages the agency's budget and financial operations, directs the preparation and submission of annual financial and budgetary reports, and coordinates agency financial management activities with other federal agencies. Specifically, OCFO provides leadership for the performance reporting, budget analysis, justification, control, and reporting of all agency fiscal resources; provides co-leadership for the strategic planning of all agency fiscal resources; directly supports the development of the agency's overarching strategic plan and associated annual performance reports; leads the agency's planning, programming, budgeting, and execution process; oversees all financial management activities relating to the programs and operations of the agency; and monitors and reports the financial execution of the agency budget.

OFFICE OF CHIEF HUMAN CAPITAL OFFICER

The Office of the Chief Human Capital Officer (OCHCO) provides the full spectrum of human capital services to NASA's employees and supervisors. OCHCO focuses on innovative solutions to ensure NASA's most valuable resource, its people, can meet the needs of NASA's mission today and into the

MISSION ENABLING SERVICES

future. From creating a learning culture to implementing technology that supports work/life balance, OCHCO supports and strengthens the human foundation of NASA. OCHCO focuses on helping agency leaders understand workforce investments, anticipate workforce needs, and easily acquire talent for the task. Recent priorities have included implementing a new service delivery model where self-service puts HR information at employees' fingertips and enhancing our Strategic Workforce planning capability to ensure NASA has the talent needed to accomplish tomorrow's missions. Future areas of focus include performance management and ensuring NASA has a modern employee recognition program that recognizes team accomplishments.

OFFICE OF LEGISLATIVE AND INTERGOVERNMENTAL AFFAIRS

The Office of Legislative and Intergovernmental Affairs provides executive leadership, direction, and coordination of all communications and relationships, both legislative and non-legislative, between NASA and Congress as well as state and local governments.

OFFICE OF PROCUREMENT

The Office of Procurement (OP) explores and executes innovative, effective, and efficient acquisition business solutions to optimize capabilities and operations that enable NASA's mission. NASA spends approximately 85 percent of its budget on acquiring goods and services through procurement and small business professionals across the agency. OP transforms workforce, optimizes capabilities, and provides continuous training opportunities to keep it poised to deliver effective and efficient procurement services that ensure mission agility, resilience, and success.

OFFICE OF SMALL BUSINESS PROGRAMS

The Office of Small Business Programs (OSBP) promotes and integrates small businesses into NASA's industry base of competitive contractors that pioneer the future of space exploration, scientific discovery, and aeronautics research. OSBP provides integration, policy, and initiatives needed to ensure compliance with law and regulation to increase the agency's small business industry base while offering the best technical solutions and value to support the agency's mission. OSBP conducts, sponsors, and participates in small business outreach activities.

OFFICE OF PROTECTIVE SERVICES

The Office of Protective Services (OPS) provides security services at all NASA facilities to ensure the protection of life, information, and property across the agency. OPS provides secure access to intelligence and information essential to mission success, fire services, and emergency management at all NASA facilities. OPS serves as the focal point for coordination and management of agency physical security, intelligence, counterintelligence, counterterrorism, emergency management, continuity of operations, fire services, national security, communications security, classified information security, personnel security, identity and credential management, electronic physical access management, insider threat, Operations Security, and protective services training programs. OPS provides services to ensure the safety and security of people, property, and information at 20 locations across the country.

MISSION ENABLING SERVICES

OFFICE OF EQUAL OPPORTUNITY

The Office of Equal Opportunity (OEO) leads NASA's civil rights programs to include Equal Employment Opportunity (EEO) and Equal Opportunity (EO) to ensure the workplace and conducted programs are free of unlawful discrimination. OEO leadership ensures a talented workforce through the analysis of data to identify barriers to equal employment access, whether during recruitment, to retain the best and brightest, and other employment activities or programs that support religious or medical accommodation and a workplace free of unlawful harassment. OEO also touches external grantees and schools who receive financial assistance to promote NASA's mission. OEO ensures that these entities follow anti-discrimination laws through compliance and complaint processing efforts.

OFFICE OF COMMUNICATIONS

The Office of Communications (OCOMM) delivers NASA's inspiring work to billions of people around the world, pairing transparency and release of information with compelling storytelling through a variety of methods. OCOMM supports NASA's founding function from the 1958 Space Act to "provide for the widest practicable and appropriate dissemination of information" with intentionality and efficiency. It facilitates engagement with the news media and connects directly to the public via digital platforms such as a streaming service, websites, and social media. As NASA makes history, OCOMM captures and preserves that history and agency historical archives and provides additional services managing technical libraries and Freedom of Information Act inquiries. OCOMM's work is critical to ensure that the public goes together with NASA to explore the unknown in air and space, innovate for the benefit of humanity, and inspire the world through discovery.

OFFICE OF INTERNATIONAL AND INTERAGENCY RELATIONS

The Office of International and Interagency Relations (OIIR) provides executive leadership and coordination for all of NASA's international and interagency activities and policy interactions between NASA and other offices and agencies within the U.S. Executive Branch. OIIR manages the agency's Export Control Program, ensuring compliance with federally mandated requirements and all applicable NASA and U.S. export and import laws, policies, and regulations to maximize the benefits of the agency's international efforts.

OFFICE OF THE GENERAL COUNSEL

The Office of the General Counsel (OGC) provides legal services agency-wide, including establishing and disseminating legal policy and interpreting new statutes and cases to enable cutting-edge agency activities, thus ensuring NASA remains in compliance with all statutory and regulatory requirements. Additionally, OGC is responsible for developing the ethics and patent program requirements, establishing metrics, and developing quality standards. OGC serves in an advisory capacity to the Administrator, Enterprise Associate Administrators, and center directors across nearly 20 core legal disciplines, provides litigation expertise to the agency, and acts as the agency representative before the United States Patent and Trademark Office and other administrative forums. NASA attorneys also function as leaders and trusted advisors on matters of policy and legal risk, upholding NASA values and enabling the NASA mission.

INFRASTRUCTURE & TECHNICAL CAPABILITIES

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	525.1	525.1	525.1	525.1	525.1

The NASA Infrastructure and Technical Capabilities (I&TC) program addresses agency-wide operating requirements for NASA's approximately 5,000 physical assets not fully funded by a single NASA mission directorate. Many of NASA's physical assets date back to the Apollo era, with approximately 83 percent of facilities beyond their design life. The agency's aging infrastructure has resulted in increased deferred maintenance costs, currently at approximately $4.8 billion. The program operates and maintains facilities, utilities, structures, and technical capabilities supporting all of NASA's missions. It also provides oversight and management of real property assets, environmental compliance activities, and logistics functions. Critical to support NASA's missions, the underlying infrastructure and skilled workforce keep the centers and facilities operating effectively and efficiently. Funding is allocated between failure prevention, in the form of reliability centered maintenance activities comprised of predictive, condition based, and routine preventative maintenance programs; and other forward-looking investments in capabilities to support NASA's future missions and reinforce strategic goals of strengthening infrastructure readiness and resilience while driving affordability. The agency's mission-driven Agency Master Plan (AMP) catalogs NASA's facilities and infrastructure and aligns them to meet current and future mission needs. The AMP also determines areas of investment and divestment and ensures comprehensive environmental compliance and stewardship, while maintaining effective logistics support.

EXPLANATION OF MAJOR CHANGES IN FY 2027

In accordance with the Administration's priorities, NASA will continue to streamline the I&TC program and make workforce and service adjustments commensurate with programmatic changes across the agency.

The following are major adjustments to the I&TC program in FY 2027:

- NASA will implement an enterprise stewardship charging framework that consistently allocates utility usage, logistics services, and regulated waste costs to mission directorates at each center, freeing I&TC funding for other critical facilities requirements while ensuring baseline mission readiness and transparent, equitable cost recovery across programs.
- NASA will provide preventative maintenance to approximately 55 percent of existing infrastructure (Mission Critical) and the remaining facilities will receive life safety and run-to-fail maintenance.

PLANNED ACHIEVEMENTS AND KEY INITIATIVES FOR FY 2027

Environmental Compliance, Planning, and Stewardship

- Activities will include environmental compliance surveillance, sustaining required regulatory and permit inspections, monitoring, sampling, and reporting to ensure safety and regulatory compliance.

INFRASTRUCTURE & TECHNICAL CAPABILITIES

- NASA will provide required regulatory inspections, monitoring, sampling, and reporting to ensure safety and regulatory compliance.
- A standardized, enterprise-wide reimbursement from regulated waste generators will be implemented by executing consistent, usage-based charging mechanisms for hazardous waste handling, storage, and disposal across all centers, improving cost transparency, accountability, and equitable allocation of environmental compliance costs in support of NASA missions.
- The NASA Environmental Support Services (NESS) enterprise strategy will continue to be implemented to standardize compliance management and environmental services procurement across the agency. Six centers are projected to be fully transitioned to NESS at the start of FY 2027 and NASA is currently exploring the transition of one to two additional centers to NESS during FY 2027.
- NASA will collaborate with the Environmental Protection Agency to prevent abrupt loss of critical materials under the Toxic Substances Control Act, and to mitigate delays to spacecraft development, costly requalification efforts, and disruptions to national priority missions (e.g., Artemis and Science missions).

Facility Management

- In FY 2027, the agency plans to implement a utilities stewardship model to consistently recover the cost of delivering utilities for mission requirements. This process will allow for consistency in processes for all centers and align utility charges to the appropriate users of utilities at each center.
- Center Maintenance and Operations expenditures will be prioritized by mission relevance to ensure maintenance funding is provided to complete preventative maintenance to approximately 55 percent of existing infrastructure (Mission Critical) with the remaining facilities receiving life safety and run-to-fail maintenance.
- Facility engineering, custodial and grounds services will be provided to support NASA missions focusing on key areas at each center.
- NASA will also continue to utilize Reliability Centered Maintenance principles and Condition Based Maintenance on already instrumented facilities.
- NASA will continue to move forward with facility consolidation opportunities, aligned with the Agency Master Plan, across the agency to right size the infrastructure portfolio.
- Tier 1 space environment testing and simulation services for NASA programs and other DoW/Industry Partners will be provided, and space commercialization initiatives will continue to be advanced at strategically important ground-based testing and simulation capabilities at various field centers.

Logistics Management

In FY 2027, the agency will implement a logistics services stewardship model to efficiently deliver logistics services for mission requirements and better align service charging to the appropriate user of the services at each center.

INFRASTRUCTURE & TECHNICAL CAPABILITIES

Program Elements

ENVIRONMENTAL MANAGEMENT

The Environmental Management program enables compliance with applicable federal, state, and local environmental laws and regulations, in day-to-day operations and mission support. Specifically, Environmental Management covers NASA's programs for environmental permitting and compliance, environmental reporting, hazardous materials and waste management, pollution prevention, energy and water management systems and reporting, renewable energy, natural resources, historic properties, and National Environmental Policy Act program support.

FACILITIES SERVICES

The Facilities Services program encompasses the institutional facilities support activities throughout the agency. The I&TC program budget supports utility services, operations and maintenance services, infrastructure and facility repair projects, facilities management, real estate, and facilities engineering to include civil construction designers, engineers, and project managers. I&TC funds the civil servants and procurements that construct, operate, maintain, and manage NASA’s institutional infrastructure. NASA recently deployed a cost model that forecasts the funding requirements to sustain its inventory of facilities at the current condition. NASA manages a portfolio of assets with approximately $4.8 billion in deferred maintenance. The I&TC budget pursues a strategy to reinforce infrastructure readiness and drive affordability by stemming growth of backlogged maintenance and systematically improving the reliability of NASA's critical institutional infrastructure, from transformers and substations to buildings, horizontal infrastructure, and test capabilities, while effectively managing risk and reliability for the remainder of the portfolio.

LOGISTICS MANAGEMENT

The Logistics Management program encompasses the development, implementation, and management of agency-wide logistics policies, processes, services, system innovation, and facilitates the implementation of government and industry best practices for NASA's centers and facilities. Logistics Management provides functional management, oversight, and coordination over the agency's personal property equipment, supply and material, warehouse and receiving operations, property disposal, and artifact property disposition. The program also provides oversight for contractor-held property management, mail and freight management, transportation management, life cycle logistics and supply chain management, policy compliance, and logistics contracts. Logistics Management ensures the readiness of material and equipment for NASA’s scientific, aeronautics, and space exploration mission requirements at ten NASA centers and three component facilities. The program includes receiving and inspecting supplies/materials as well as issuing and moving those materials so that products critical to NASA's mission arrive at the desired locations in an efficient manner.

TECHNICAL CAPABILITIES MANAGEMENT

The Space Environments Testing Management Office provides centralized and strategic management of a portfolio of specific ground-based capabilities in support of agency and other national interests including federal agencies and industry partners. The capabilities include:

INFRASTRUCTURE & TECHNICAL CAPABILITIES

- The high-enthalpy test capability at the Arc Jet Complex (ARC) for simulating atmospheric entry effects on Thermal Protection Systems Flight simulators for human-in-the-loop research and development of various operational platforms at the ARC Vertical Motion Simulator and the LaRC Flight Simulation Facility.
- Space environments testing capabilities and facilities whose primary use is related to spacecraft and instrument development and qualification, space technology development, human-rated space environments, and launch environments. Includes capabilities at GRC, JSC, and MSFC.
- External radiation testing at non-NASA facilities in conjunction with the agency Institute for Electrical and Electronics Engineers parts certification program to meet requirements for space flight programs and projects.

ENGINEERING, SAFETY, & OPERATIONS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Agency Technical Authority	--	--	**87.9**	87.9	87.9	87.9	87.9
Center Engineering, Safety, & Operations	--	--	**374.1**	374.1	374.1	374.1	374.1
Total Budget	**--**	**--**	**462.0**	**462.0**	**462.0**	**462.0**	**462.0**

Engineering, Safety, and Operations (ESO) supports NASA's high standard of safety and mission assurance, that promote mission success. ESO is divided between two distinct programs: Agency Technical Authority (ATA) and Center Engineering, Safety, and Operations (CESO).

ATA protects the overall health and safety of NASA's workforce and programs by providing technical oversight for safety, health, quality, and engineering. The independence of ATA offices is a vital part of NASA's safeguards to ensure safety, quality, and engineering concerns are always vetted, analyzed, and mitigated.

CESO provides funding for the operations and management at NASA centers and component facilities, corporate leadership at NASA HQ, and the execution of delegated technical authority. CESO encompasses ongoing activities and unique projects in support of center operations and infrastructure, while enabling safe and effective mission support as well as agency-level operations at NASA HQ. This ensures the development and implementation of agency-wide policies, standards, and processes are effective and efficient.

Programs

AGENCY TECHNICAL AUTHORITY (ATA)

ATA work is managed by the Offices of the Chief Health and Medical Officer, Safety and Mission Assurance, and the Chief Engineer. These activities provide the foundation for NASA's system of checks and balances, by providing for the technical authority over health, safety, and engineering, independent of the missions and leadership for the agency's occupational safety and health program. Through independent analysis and subject matter expertise, ATA designs procedural requirements and provides recommendations to NASA's Administrator, mission directorates, center directors, and program managers, who are ultimately responsible for the safety and mission success of all NASA activities.

ATA provides training and maintains a competent technical workforce with expertise in system engineering, system safety, reliability, quality, and space medicine. Subject matter experts analyze risks and risk acceptability through an established process of independent reviews and assessments. The information and advice from these experts provide critical data required to develop authoritative decisions related to the application of requirements on programs and projects.

CENTER ENGINEERING, SAFETY, AND OPERATIONS (CESO)

NASA's CESO is a multifaceted program that ensures agency leadership is implemented at the center-level, while centers have the support required to ensure mission success and uphold NASA's high

ENGINEERING, SAFETY, & OPERATIONS

standard of safety and engineering excellence. CESO ensures NASA's unique, technical, and innovative capabilities are mission-ready by supporting center-level institutional and technical capabilities through maintenance of facilities, laboratories, and other mission-critical assets. The technical skill and specialized assets or services that support analyses, design, research, testing, laboratories, and fabrication enable the efficient and effective implementation of mission work at the centers, both now and in the future

CESO funds NASA HQ operations and center management across the agency. Support for institutional administration and operational safety are vital to allow centers to address and manage conditions unique and specialized to their center. CESO also ensures that agency policies and guidance are consistently and efficiently operationalized across centers.

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

AGENCY TECHNICAL AUTHORITY

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	87.9	87.9	87.9	87.9	87.9

IV&V's Jon McBride Software Testing and Research team demonstrates the digital twin user interface for Artemis (ARRISTOTLE), which has matured to the point of being able to execute and script an entire run without any intervention. It now includes new visualization capability with real-time and data-processed playback ability, which allows for data plotting, performing aborts, and reversing time.

The Agency Technical Authority (ATA) program protects the health and safety of NASA's workforce by evaluating programs, projects, and operations to ensure safe and successful completion. ATA capabilities provide expert technical excellence, mission assurance, and technical authority agency wide.

ATA is managed by the Offices of the Chief Health and Medical Officer (OCHMO), Safety and Mission Assurance (OSMA), and the Chief Engineer (OCE). These programs provide the foundation for NASA's system of checks and balances. Through independent analysis and subject matter expertise, ATA designs procedural requirements and provides recommendations to NASA's Administrator, mission directorates, center directors, and program managers, who are ultimately responsible for the safety and mission success of all NASA activities.

ATA provides training and maintains a competent technical workforce with expertise in system engineering, system safety, reliability, quality, and space medicine. Subject matter experts analyze risks and risk acceptability through an established process of independent reviews and assessments. The information and advice from these program experts provide critical data required to develop authoritative decisions related to the application of requirements.

NASA Engineering and Safety Center (NESC)

The NESC assessments plays a crucial role in ensuring safety and mission success in initiatives supporting Moon to Mars goals and objectives. These independent assessments have historically addressed intricate technical issues and aided in averting costly failures. The NESC assists senior agency leaders and major program offices, guiding effective engineering decisions and fortifying technical leadership.

Independent Verification and Validation (IV&V)

The IV&V program is funded through a combination of ATA (OSMA) and mission directorate resources. The following table shows the funds provided by the Safety, Security, and Mission Services; Science; Exploration; and Space Operations accounts.

AGENCY TECHNICAL AUTHORITY

	Estimated IV&V Funding ($M)
Mission Account	FY 2027*
Safety, Security, and Mission Services	$9.9
Science	$0.8
Exploration	$2.0
Space Operations	$0.5
Total	**$13.2**

Note: The IV&V program will work with Mission Directorates to adjust FY 2027 allocations as the FY 2027 Operating plan is developed.

EXPLANATION OF MAJOR CHANGES IN FY 2027

- In FY 2027, the SSMS account will allocate $9.9 million for IV&V to ensure the program can provide software assurance support to the future Moon to Mars programs. NASA will allocate $28 million under this account for the NESC to continue to perform value-added independent testing, analysis, and assessments of NASA's highest-risk projects to ensure safety and mission success for the Moon to Mars programs.

PLANNED ACHIEVEMENTS AND KEY INITIATIVES FOR FY 2027

In FY 2027, the NESC will continue to develop policy, design procedural requirements, and provide recommendations to NASA's Administrator, mission directorates, center directors, and program managers, ensuring safety and mission success of all NASA activities. These activities include:

- Conducting independent assessments of NASA's highest risk challenges to ensure a logical decision-making process for flight readiness, enabling the eventual NASA and commercial science payloads to the surface of the Moon;
- Providing Engineering Technical Authority support to NASA's programs, ensuring independent technical insight and assessment of programs at key programmatic milestones; and
- Providing training and maintenance of a competent technical workforce with expertise in system engineering, system safety, reliability, quality, and space medicine.

Program Elements

OFFICE OF THE CHIEF HEALTH AND MEDICAL OFFICER (OCHMO)

OCHMO promulgates agency health and medical policies and standards to support the medical technical capabilities of NASA. As a functional area, OCHMO provides independent oversight and advances expert health and medical capabilities from development through de-commissioning. It assures the physical and mental health and well-being of the NASA workforce.

OCHMO also ensures that bioethics principles and NASA's policies and practices related to the use of human and animal subjects in research are in accordance with all relevant federal regulations and guidelines. The program oversees NASA's processes for reviewing the use of human and animal subjects in research.

AGENCY TECHNICAL AUTHORITY

OCHMO administers the Human Medical Technical Authority (HMTA), which engages in all crewed programs. The HMTA provides guidance and insight, while translating health and medical standards into tailored technical requirements for all human-rated programs across the agency. HMTA ensures that integrated spaceflight systems reflect the most current knowledge on health and medical impacts related to flight, life support, and environmental systems.

OFFICE OF SAFETY AND MISSION ASSURANCE (OSMA)

OSMA provides direction and assessments for all agency safety, reliability, maintainability, quality engineering and assurance, software assurance, risk management, orbital debris mitigation, nuclear flight safety, aviation safety, and planetary protection activities. OSMA also serves as a principal advisory resource for the Administrator and other senior officials on matters pertaining to safety and mission success. OSMA develops sustainable technical solutions for these activities while assessing and communicating crosscutting and significant risks to appropriate decision makers. OSMA serves as the designated agency-level "official voice" for institutional safety and related standards aimed at protecting the public, NASA workforce, and high-value assets from potential harm. Lastly, OSMA maintains assessment and investigation capabilities to provide leadership with critical information related to mishap events and the state of the agency's safety programs.

The Chief of Safety and Mission Assurance is designated as the Safety and Mission Assurance Technical Authority (SMA TA) for NASA. The SMA TA establishes and is responsible for the SMA processes, specifications, rules, and best practices necessary to fulfill safety and programmatic mission assurance performance requirements. SMA TAs are assigned when new programs or projects begin, and their duties include providing input to program or project planning; overseeing proposed technical or process changes or decisions that could increase risks to safety, quality, or reliability; and guiding and advising the management of this risk.

The NASA IV&V program provides an independent, systems engineering-based assessment of software for the agency's most complex and mission-critical systems. Operating within the OSMA, the program is focused on improving the reliability, safety, and security of software to increase the likelihood of mission success. IV&V applies advanced analysis techniques, simulations, and testing to evaluate how mission software will behave under real-world conditions, uncovering defects and integration issues that may not be identified through standard development or assurance processes.

OFFICE OF THE CHIEF ENGINEER (OCE)

OCE ensures that NASA's development efforts and mission operations are planned and conducted with sound engineering practices and appropriate controls for effective management of technical risks. The program provides independent engineering management and guidance to ensure that decisions benefit from diverse perspectives and are not made in isolation.

OCE provides the foundation for excellence of program/project management and engineering practices, employing system-engineering methodologies, and setting engineering standards throughout the agency. OCE establishes and maintains engineering technical standards and supports spaceflight missions through its Mission Resilience and Protection Program, which integrates potential threat considerations, including cybersecurity, into systems engineering processes. These standards enhance the resilience and protection of systems from the effects of threat actors.

AGENCY TECHNICAL AUTHORITY

NESC provides rapid, cross-agency responses to mission-critical engineering and safety issues at NASA and advances the state of practice in critical engineering disciplines. Established in FY 2003 in response to the Space Shuttle Columbia Accident Investigation Board's recommendations, the NESC performs independent testing, analysis, and assessments of NASA's highest-risk projects to ensure safety and mission success. As an agency-wide resource with a reporting path that is independent of the mission directorates, the NESC helps the agency ensure mission safety and achieve objective technical results.

CENTER ENGINEERING, SAFETY, & OPERATIONS

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	374.1	374.1	374.1	374.1	374.1

NASA's Center Engineering, Safety, and Operations (CESO) program provides strategic management and crucial policy direction at the agency- and center-level in addition to center-level technical authority and capabilities that ensure mission success.

CESO maintains test capabilities, laboratories, and other mission-critical assets so they are available and mission-ready based on mission requirements and timelines. The technical skill and specialized assets or services that support analyses, design, research, testing, laboratories, and fabrication enable the efficient and effective implementation of mission work at the centers.

CESO programs contribute to NASA's overall approach to risk management by providing center-level, independent technical authority. By funding center-level oversight and reporting activities that uphold the strategy and guidance from Agency Technical Authorities, checks on safety, engineering, and mission assurance remain independent from the mission directorates.

CESO funds HQ and agency-level operations, as well as center management across the agency. This institutional support for center operations and infrastructure allows the centers to focus on managing conditions unique to their center. CESO also ensures that agency-wide developed and implemented policies, guidance, standards, and processes are operationalized across the centers with consistency and efficiency.

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

PLANNED ACHIEVEMENTS AND KEY INITIATIVES FOR FY 2027

- Provide foundational business functions at the center-level to include center management, and certain activities deemed center-centric including occupational health, local IT support, and local management personnel, safety audits and assessments, safety surveillance, inspections, testing and observations, mishap investigation and reporting, hazard identification, and safety outreach.
- Based on mission requirements, maintain test capabilities, laboratories, and other mission-critical assets so they are available and mission ready.
- Provide the on-site capability to support research, development testing, and sustaining engineering for science and technologies necessary to support program activities.
- Ensure technical skills and specialized assets and services are available to support analyses, design, research, testing, laboratories, and fabrication to enable the efficient and effective implementation of mission work at the centers.

CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION

CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Construction of Facilities	--	--	**65.5**	65.5	65.5	65.5	65.5
Environmental Compliance and Restoration	--	--	**35.1**	35.1	35.1	35.1	35.1
Total Budget	**300.0**	**185.3**	**100.6**	**100.6**	**100.6**	**100.6**	**100.6**

FY 2025 reflects the funding amount specified in Public Law 119-4, Full-Year Continuing Appropriations and Extensions Act, 2025.

FY 2026 reflects the funding amount specified in Public Law 119-74, Commerce, Justice, Science; Energy and Water Development; and Interior and Environment Appropriations Act, 2026.

Working Families Tax Cut Funding Summary

Planned Obligations (in $ millions)	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
WFTC – Infrastructure Improvements	--	115.0	**--**	--	--	--	--
WFTC – Center Projects	--	800.0	**--**	--	--	--	--
WFTC – Space Vehicle Transfer	--	--	**85.0**	--	**--**	**--**	**--**
Total Planned Obligations	**--**	**915.0**	**85.0**	**--**	**--**	**--**	**--**

In FY 2025, a total of $1 billion in mandatory funding was appropriated to the Construction and Environmental Compliance Restoration (CECR) account through enactment of the Working Families Tax Cut (WFTC) Act, Public Law 119-21. The above table illustrates funding planned for obligation by fiscal year.

NASA's recently constructed Flight Dynamics Research Facility provides vertical wind tunnel testing capability at LaRC. The state-of-the-art facility will enable cutting edge aeronautical technology research, development, and testing.

Within the Construction and Environmental Compliance and Restoration (CECR) account, NASA manages two themes related to the agency's asset portfolio: capital repairs and improvements to NASA's infrastructure, and environmental compliance and restoration activities. Activities related to the design, construction, and demolition of infrastructure, including utility systems and facilities, are funded through the Construction of Facilities (CoF) theme. Environmental compliance, cleanup, and restoration activities are funded through Environmental Compliance and Restoration (ECR) theme.

CECR funding in the CoF theme enables NASA to address the challenges of aging infrastructure needs. More than 83 percent of NASA's infrastructure is beyond its design life, posing significant risk of failure, inefficiency, and potential impacts to health and wellness. To address these growing challenges, CECR is focused on modernizing and rightsizing NASA's infrastructure into fewer, more efficient and sustainable facilities while repairing and upgrading infrastructure before it has failed.

The WFTC Act provided $915 million for infrastructure to help reduce mission risks from aging infrastructure by repairing systems and investing in new facilities. These upgrades will improve reliability, allow consolidation into modern facilities, and enable divestment of outdated assets, thereby strengthening NASA's research and exploration efforts supporting human spaceflight and the Moon to Mars Program.

CECR funding in the ECR theme enables NASA to address its commitment to environmental stewardship by conducting critical cleanup efforts, maintaining compliance with regulatory requirements, addressing emerging regulations, and managing environmental issues. NASA's estimated current environmental liability, excluding asbestos removal that is not funded by the ECR appropriation, is approaching $2.3 billion. The liability is expected to grow as plans to address 179 areas of potential concerns for emerging per- and polyfluoroalkyl substances (PFAS) contaminants are developed.

CECR funding ensures that NASA's assets are ready, available, and appropriately sized to conduct NASA's current and future missions, while remaining compliant with agency and governmental environmental regulations. CECR program priorities are aligned with the Agency Master Plans, which focus on reducing sustainment costs, minimizing the agency's physical footprint, and lowering its environmental impact.

Themes

CONSTRUCTION OF FACILITIES (COF)

CoF funds capital repairs and improvements to NASA's infrastructure to provide NASA programs and projects with the research, development, and testing facilities required to accomplish their missions. CoF repairs the facilities that have suffered degradations, recent failures, or deterioration from inadequate maintenance over time.

The CoF theme is comprised of two programs: Institutional CoF and Programmatic CoF. Both institutional and programmatic construction projects reduce facility-related risk to mission success, reduce sustainment costs, increase sustainability, and improve technical infrastructure capabilities in support of NASA missions. CoF projects and activities are divided across five project definitions: **discrete** projects costing over $10 million; **minor** revitalization and construction costing less than $10 million; **facility planning and design**; **demolition**; and **energy savings investments**. Institutional CoF does not fund routine maintenance and repair projects, or projects with cost estimates of less than $1 million.

Institutional CoF addresses infrastructure and facilities that span all mission areas and enable the effectiveness of NASA centers. Horizontal infrastructure and center-wide systems, such as roads and utilities, support all mission activities and are therefore considered "institutional." Institutional CoF also funds activities that support the overall agency goals of reducing operating costs, maintenance obligations, and utility usage through demolition and energy savings projects.

Programmatic CoF is funded by mission directorates for construction of specialized capabilities that directly support specific NASA missions, with appropriate funding transferred into CoF during the formulation of each budget year. Facilities and infrastructure supporting the execution of specific mission directorate requirements or having a unique capability required specifically for the execution of mission directorate programs and/or projects, are funded through Programmatic CoF. Construction, repairs, and revitalization funded by Programmatic CoF do not have center-wide or agency-wide applications.

ENVIRONMENTAL COMPLIANCE AND RESTORATION (ECR)

ECR supports agency-wide environmental compliance and risk management initiatives. ECR mitigates environmental risks and restores impacted property to beneficial use. ECR supports remediation at current or former sites where NASA operations have contributed to environmental degradation or where the agency is legally obligated due to past releases of pollutants, including emerging contaminants (e.g., PFAS).

At every center, ECR is investigating contaminated sites; remediating contaminated soil, water, and other media; and monitoring for continued compliance with legal standards, agency objectives and obligations. ECR ensures NASA's compliance with environmental requirements, including the Resource Conservation and Recovery Act; Comprehensive Environmental Response, Compensation and Liability Act); Toxic Substance Control Act; state regulatory requirements; consent orders; and legal obligations.

CONSTRUCTION OF FACILITIES

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Institutional CoF	--	--	**65.5**	65.5	65.5	65.5	65.5
Total Budget	**--**	**--**	**65.5**	**65.5**	**65.5**	**65.5**	**65.5**

NASA's Construction of Facilities (CoF) budget funds the agency's highest priority construction projects and continues to replace obsolete and deteriorating facilities that directly support NASA's missions. The capital repairs and improvements to NASA's infrastructure provide NASA programs and projects with the research, development, and testing facilities required to accomplish their missions.

The Aerospace Communications Facility, recently completed at GRC, is comprised of approximately 25 laboratory spaces, including a large high-bay research space, along with rooftop and ground-based antenna fields. The new building with state-of-the-art capabilities supports development of specialized aerospace communication technologies for the agency.

EXPLANATION OF MAJOR CHANGES IN FY 2027

Funding has been prioritized to perform critical, major repairs on existing infrastructure with emphasis on projects that support deep space exploration programs. No new construction or renewal projects are proposed for FY 2027.

COF PRIORITIES

Both the Institutional and Programmatic CoF prioritize CoF projects based upon mission requirements and long-term affordability, in alignment to the Agency Master Plan (AMP). As part of the AMP, NASA has developed and maintains an Agency Capital Investment Program Plan (ACIPP), which serves as a prioritized roadmap for agency-wide investments, ensuring that the agency's mission-driven infrastructure requirements are met efficiently and sustainably. The ACIPP is used by agency leadership to inform Planning, Programming, Budgeting, and Execution (PPBE) prioritization decisions. The Working Family Tax Cut (WFTC) Act provided $915 million and agency priorities to support NASA decisions to fund key projects identified in the ACIPP. The renewal of aging infrastructure enabled by WFTC will embolden NASA's research and exploration efforts for human spaceflight and the Moon to Mars Program.

PLANNED ACHIEVEMENTS AND KEY INITIATIVES FOR FY 2027

The following list includes the FY 2027 Institutional CoF projects that are additional to the projects started in FY 2026 with funding provided under the WFTC Act. No Programmatic CoF projects are planned for FY 2027. The FY 2027 program includes funding for two discrete projects, one minor construction project, demolition of unneeded infrastructure, and facility planning and design activities.

CONSTRUCTION OF FACILITIES

Institutional Discrete Projects

- Upgrade Compressor Station at LaRC (Phase 3 of 4), $18 million:
    - Replaces an obsolete compressor and associated ancillary systems with a new compressor system and associated ancillary systems.
    - NASA missions and major projects that rely on the compressor station include Commercial Crew, Entry Descent and Landing, Orion, Hypersonic Technology Project, Space Launch System, Commercial Cargo, Common Research Model - Natural Laminar Flow, and Full Span Common Research Model.
- Replace NASA Road One at JSC White Sands Test Facility (WSTF), $14 million:
    - Replaces existing pavement structure of the only secured access road to White Sands Complex, which includes NASA JSC WSTF and Aerospace Data Facility (ADF).
    - As a Mission Essential Facility, loss of access would impact all launches (NASA and military) from the continental United States. No alternate secured access point exists, and NASA/ADF would shut down all functions that are not paramount to national defense and human spaceflight, including mission critical hazardous material and propulsion testing supporting Artemis, science missions, DoW, and Commercial Crew.

Institutional Minor Projects

Repair Substation A at GRC.

Demolition

The FY 2027 budget funds demolition activities of multiple facilities to reduce the agency's facility footprint, reduce operational costs, and increase environmental sustainability. This footprint reduction will be achieved over several years as the projects are completed.

Facility Planning and Design (FP&D)

FP&D activities are essential for ensuring optimal outcomes across all CoF projects and positioning the agency for the lowest lifecycle cost of facilities. Specific key activities may include comprehensive planning and design of all projects, with an emphasis on consolidating workspaces to reduce the agency's footprint, decrease lifecycle cost of facilities, and increase utility efficiency. Also included are the assessment and analysis of engineering, design, construction management, facility operations, maintenance, condition-based maintenance, facility utilization, and support for engineering in facilities management systems, including oversight and capital leveraging research.

ENVIRONMENTAL COMPLIANCE AND RESTORATION

FY 2027 Budget

Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	--	--	35.1	35.1	35.1	35.1	35.1

Installation of a groundwater monitoring well at White Sands Test Facility (WSTF). The 500 feet deep well was required by the state of New Mexico, per WSTF's Resource Conservation Recovery Act permit, to monitor the leading edge of groundwater contamination at this location.

NASA's Environmental Compliance and Restoration (ECR) Program cleans up hazardous materials and waste products released to the environment at current and former NASA installations or associated facilities that may pose a risk to human health or the environment. It is the agency's ethical and legal responsibility to address hazardous pollutants and environmental impacts. NASA currently has a greater than $2.1 billion unfunded environmental liability, which is growing as new contaminated sites are identified, new clean-up standards are established, and as contaminants at un-remediated sites spread impacting more soil and groundwater.

ECR Priorities

ECR activities are prioritized based on a combination of legal and statutory requirements, assessed risk, and mission requirements. ECR's overarching goal is to ensure public health, conserve land and groundwater resources, and reduce NASA's environmental burden. ECR activities are conducted in each of the following high priority areas:

- Compliance: Ensure the public and the NASA workforce are not exposed to harmful chemicals from current or previous mission activities by monitoring, measuring, assessing, mitigating, treating, and identifying significant environmental risks; and executing regulatorily required compliance actions and reporting environmental compliance challenges and risks.
- Restoration: Conduct cleanup activities, including contaminant surveys, groundwater and soil investigations, groundwater treatment, soil removal, demolition and associated regulatorily required activities to eliminate harmful substances or materials and reduce environmental impacts.
- Stewardship: Ensure the responsible use and protection of the NASA infrastructure, assets, cultural and natural environment, and resources through the active execution of conservation and affordability efforts practices that conform with legal requirements and directives.

EXPLANATION OF MAJOR CHANGES IN FY 2027

In FY 2027, ECR projects have been prioritized based upon the protection of human health and the potential for stipulated penalties for failure to meet regulatory compliance dates. The highest priorities include the elimination of contamination from drinking water utilized by the public and center personnel, and the protection of building occupants from harmful vapors originating from contaminated groundwater. All new investigations, soil and groundwater cleanups of legacy contaminants, polyfluoroalkyl substances assessments, and pilot studies will be temporarily paused.

ENVIRONMENTAL COMPLIANCE AND RESTORATION

PLANNED ACHIEVEMENTS AND KEY INITIATIVES FOR FY 2027

ECR will continue cleanup activities, with priority given to protecting health, and conforming to environmental regulations and statutory requirements. In addition to the specific achievements below, the ECR program will continue, as feasible, agency-wide compliance initiatives, site-wide restoration activities, operation and maintenance of groundwater treatment systems, and soil contamination investigations. The program will also continue to provide regulatory risk analysis and communication support. Planned achievements and key initiatives include:

- Completing Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) five-year reviews at centers (AFRC, ARC, JPL, and LaRC).
- Continuing to provide contaminant-free drinking water for the City of Pasadena, Town of Chincoteague, and WSTF.
- Continuing vapor intrusion monitoring at relevant centers/facilities (ARC, GSFC, KSC, MAF, and MSFC) for the protection of on-site personnel.
- Maintaining operating groundwater treatment systems at relevant centers/facilities (AFRC, ARC, KSC, MAF, MSFC, SSC, and Santa Susana Field Laboratory [SSFL]).
- Continuing to monitor groundwater to comply with regulatory requirements at centers, component facilities, and work areas.
- Continuing to monitor closed landfills to comply with regulatory requirements at relevant centers/facilities (ARC, KSC, LaRC, SSC, and SSFL).
- Continuing to collaborate with the California Department of Toxic Substances Control to develop an implementable soil cleanup plan at SSFL.
- Continuing to work closely with regulatory agencies to optimize the cleanup objectives and monitoring requirements at all centers, component facilities, and work areas.

INSPECTOR GENERAL

INSPECTOR GENERAL

FY 2027 Budget

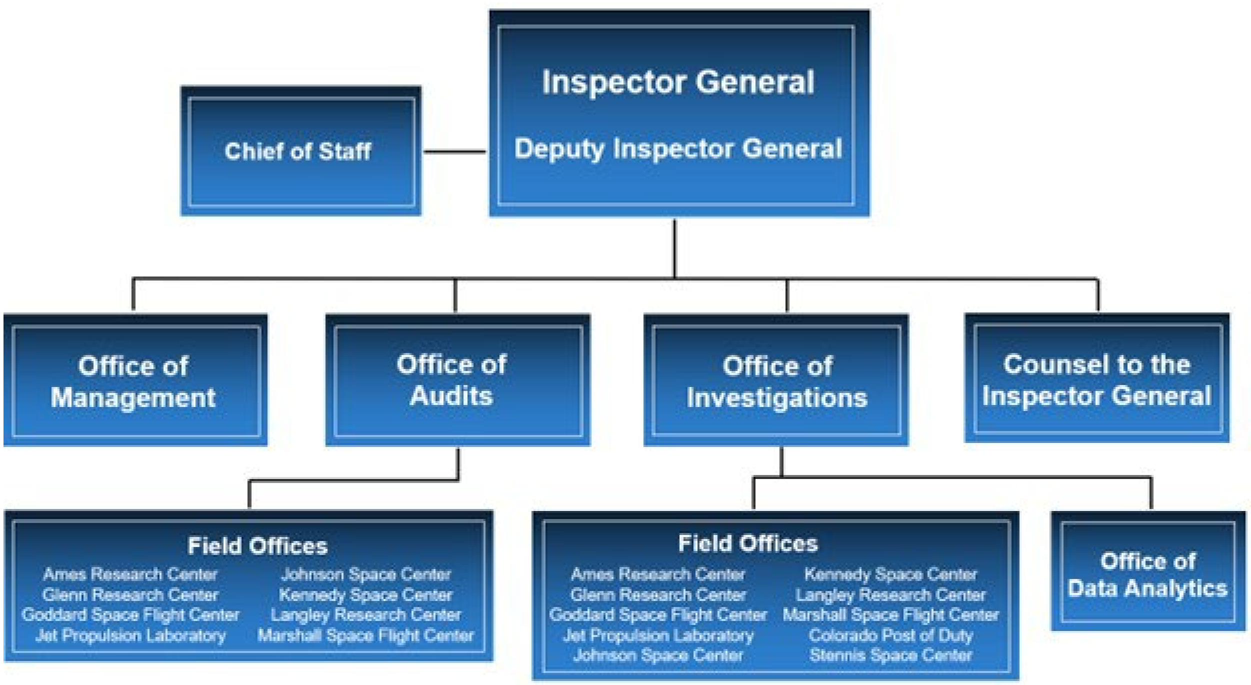
Budget Authority (in $ millions)	Enacted FY 2025	Enacted FY 2026	Request FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Total Budget	47.6	46.5	41.1	41.1	41.1	41.1	41.1

FY 2025 reflects the funding amount specified in Public Law 119-4, Full-Year Continuing Appropriations and Extensions Act, 2025.

FY 2026 reflects the funding amount specified in Public Law 119-74, Commerce, Justice, Science; Energy and Water Development; and Interior and Environment Appropriations Act, 2026.

The Office of Inspector General (OIG) conducts audits, investigations, and reviews of NASA programs and personnel to prevent and detect fraud, waste, abuse, and mismanagement. Through its oversight role, the OIG assists NASA leaders and Congress in promoting economy, efficiency, and effectiveness. To accomplish this work, OIG employs auditors, investigators, data analysts, attorneys, and support staff at NASA HQ in Washington, DC, and nine locations throughout the United States. The OIG operates through four organizational offices: Office of Audits (OA), Office of Investigations (OI), Counsel to the Inspector General, and Office of Management (OM).

OIG Organizational Chart



OA conducts independent and objective audits of NASA programs, projects, operations, contractor activities, as well as annual audits of the agency's financial statement and information security programs. By targeting high-risk areas and top management challenges, OA delivers fact-based analysis and actionable recommendations that help NASA enhance its space exploration, scientific discovery, space technology, and aeronautics goals.

OI investigates allegations of fraud, waste, abuse, cybercrime, and misconduct affecting NASA programs, operations, and resources. OI refers its findings to the U.S. Department of Justice for criminal prosecution and civil litigation or to NASA leadership for administrative action, while also issuing recommendations to reduce systemic risks and strengthen the agency's integrity. OI leverages secure cloud-based and on-premises infrastructure to support investigations and proactively identify emerging threats. Special Agents work alongside data scientists, engineers, forensic accountants, and analysts to uncover patterns, automate detection, and deliver timely, actionable insights. This integrated, technology-driven approach strengthens accountability and safeguards taxpayer's funds across NASA's mission activities.

The Counsel provides legal advice and assistance to OIG managers, auditors, and investigators, including on administrative litigation, and assists the Department of Justice with proceedings. In addition, the Office of Counsel educates agency employees about prohibitions on retaliation for protected disclosures and about rights and remedies for protected whistleblower disclosures.

OM provides financial, procurement, human resources, administrative, and information technology (IT) support to OIG staff. OM advises OIG senior management on budget issues and human resources staffing matters, directs OIG internal management and support operations, and oversees development and adherence to management policies and procedures. Additionally, OM ensures state-of-the-art IT system capabilities for OIG staff.

BUDGET REQUEST OVERVIEW

For FY 2027, the NASA OIG requests $41.1 million in direct appropriations to support its mission to improve NASA's programs and operations through independent and objective oversight. This budget request seeks the funding necessary for the OIG to continue delivering impactful audits and investigations. OIG oversight ensures that NASA receives full value for its expenditures, reinforcing both congressional and public confidence in investments in NASA programs. Further, OIG work consistently yields a positive return on investment ensuring taxpayers receive full value for funds spent on NASA programs and support NASA's implementation and compliance with the Working Families Tax Cut legislation. Providing sufficient funding for the OIG also enables the OIG to assist NASA in meeting the priorities described in the Executive Order on Ensuring American Space Superiority, particularly the priority to enhance sustainability and cost-effectiveness of launch and exploration architectures.

In addition to supporting OIG's current level of mission-critical law enforcement, auditing, and oversight work, this funding supports OIG oversight and enforcement activities to stop fraud and recover misspent funds and strengthen national security by countering foreign influence; creating an improved cyber posture, including an investment in artificial intelligence (AI) capability to proactively identify high-risk activities; and providing for increased oversight of grants and contracts to recover misspent funds and protect from further misuse.

The OIG remains committed to supporting the Administration's efforts to improve government efficiency. Through more focused oversight efforts, the OIG will ensure its work not only meets but consistently exceeds the highest professional standards and delivers a strong return on investment.

INSPECTOR GENERAL

BUDGET SUMMARY

For FY 2027, the NASA OIG requests $41.1 million in direct appropriations. The request funds 149 full-time equivalents (FTE) and provides for other operational costs such as travel, training, and IT procurement.

Budget Resources and Obligations (dollars in millions)

	President's Budget FY 2027
Budget Authority	$41.1
Anticipated Collections	$0.0
Total Budget Resources	**$41.1**
Breakdown by Built-ins	
Salaries & Benefits	$36.6
Non Pay Operations and Support	$4.5
Current Services Budget	**$41.1**
Obligations (Actual/Estimates/Projections)	**$41.1**

In accordance with the reporting requirements of Section 6(g)(1) of the Inspector General Act of 1978, as amended, the Senior Official, performing the functions and duties for the Inspector General, certifies that $0.1 million included in this request for staff training will satisfy all known training requirements for FY 2027. Additionally, as required, the OIG has requested the resources necessary to support the Council of the Inspectors General on Integrity and Efficiency. The OIG has requested $0.2 million, or 0.4 percent of the OIG's FY 2027 designated funding level based on the President's Budget of $41.1 million.

EXPLANATION OF MAJOR CHANGES IN FY 2027

None.

APPROPRIATIONS LANGUAGE FOR FY 2027

The information provided below provides the proposed appropriations language for FY 2027.

For necessary expenses of the Office of Inspector General in carrying out the Inspector General Act of 1978, $41,100,000, of which $2,500,000 to remain available until September 30, 2028.

INSPECTOR GENERAL

ACHIEVEMENTS IN FY 2024 AND FY 2025

To support the budget request, the OIG has included the following select accomplishments and ongoing work performed by OA and OI.

Over the past two years, the OIG has issued 17 audit products containing 54 recommendations for improvement. Examples of those products included reports that examined NASA's programs, projects, processes, and/or compliance with federal and agency requirements on the following topics:

- Zero trust architecture;
- Implementation and management of its planetary defense strategy;
- Approach to infrastructure and operational resilience;
- Standing Review Board practices;
- Government property for the Artemis campaign;
- Dragonfly project;
- FY 2025 financial statements;
- FY 2024 Payment Integrity Information Act; and
- FY 2025 Federal Information Security Modernization Act.

OI's investigations included a wide variety of criminal and administrative matters, including procurement and grant fraud, theft, counterfeit parts, ethics violations, computer intrusions, and cyber incidents. These efforts led to more than $7.3 million in criminal, civil, and administrative penalties, settlements, and recoveries—approximately $1.4 million of which was returned directly to NASA. OI's efforts in FY 2025 resulted in 10 indictments, nine convictions, 10 sentencings, one pretrial diversion, two civil settlements, one civil judgment, 35 administrative actions, and seven debarments. Examples of OI's work completed during FY 2025 include the following:

Procurement and Safety Concerns

- Delaware University Settles Civil Allegations - a NASA OIG investigation led a university in Delaware to agree to a $715,580 civil settlement to resolve allegations of failing to disclose a professor's affiliation with, and support from, the government of the People's Republic of China in connection with NASA-funded research.

- New Jersey and Texas Companies Issued Credit to NASA - two companies corrected improper cost reporting related to Paycheck Protection Program loans after NASA OIG investigations. A New Jersey firm reported $1.1 million in Paycheck Protection Program loan forgiveness, with $882,000 credited to a NASA contract, while a Texas company credited $34,854 of unallowable indirect costs to NASA contracts due to non-compliant policy changes.

- Contractors Sentenced and Debarred - the former head of an engineering company received 18 months supervised release and a fine for falsifying documents to obtain a security clearance for a NASA subcontract, while an associate received 12 months of supervised release, 50 hours of community service, and a fine for the same crime. Both individuals were debarred from federal contracting for a period of four years while an affiliated employee and two other firms were debarred for one year for related misconduct.

- Former University Professor Pleads Guilty - a joint investigation by NASA OIG and several federal agencies resulted in a former university professor pleading guilty for failing to report a foreign bank account and entered into a cooperation agreement with the United States. The university had previously settled allegations of failing to disclose the professor's affiliations with the government of the People's Republic of China and paid a civil settlement of $875,689.

- West Virginia Family Members Guilty of COVID-19 Relief Fraud - a NASA OIG-led investigation revealed that three members of a West Virginia family fraudulently obtained $6 million in pandemic relief funds. The case led to criminal convictions; restitution of $515,997, with over $3.5 million pending; and a civil judgment of $451,238.
- Marshall Civil Servant Sentenced for Stalking - an MSFC civil servant pleaded guilty to stalking, receiving a suspended six-month jail sentence, fines, court fees, and orders to complete a 12-month rehabilitation program, with failure to comply resulting in incarceration.
- KSC Contractor Charged with Stalking - after a joint investigation by NASA OIG and the Cocoa Beach Police Department, a contractor at KSC was charged with cyberstalking using a NASA-issued computer.
- North Carolina Residents Sentenced for COVID-19 Relief Fraud Scheme - two North Carolina residents fraudulently obtained nearly $1 million in pandemic relief funds. One conspirator received 50 months of imprisonment and was ordered to pay $655,869, while the other individual received 28 months of imprisonment, probation for five years, and was ordered to pay $113,000.

Cyber and affiliated crimes

- North Korean Government Hacker Charged for Ransomware - NASA OIG played a critical investigative role in linking a North Korean actor to ransomware attacks that compromised multiple U.S. government agencies and private sector businesses, resulting in a Justice Department indictment and arrest warrant.
- Pennsylvania University Agrees to Civil Settlement - a university in Pennsylvania agreed to pay $1.25 million to resolve allegations of not adhering to cybersecurity requirements affecting multiple government agencies, including NASA. This qui tam investigation is part of the Justice Department's Civil Cyber Fraud Initiative.

Export Control Violations

- Contractor Employee Terminated - a NASA contractor was terminated following an investigation into alleged export control violations involving Chinese foreign nationals, concurrent employment by multiple companies involved with government contracting, and unauthorized use of foreign nationals to complete tasks on government contracts.

Other Cases

- California Resident Sentenced for Impersonating Law Enforcement Officer - a California resident impersonated a federal law enforcement officer to access sensitive information from the DoW, receiving a 27-month prison sentence.
- Texas Resident Sentenced for Burglary - a Texas resident unlawfully entered a building leased by SpaceX and stole five encrypted iPads containing undisclosed information related to the Commercial Crew Program, leading to a 12-month prison sentence.

- California Resident Charged for Hoax Bomb Threats - a California resident was charged with 15 counts of making false bomb threats across six states, targeting government facilities, airports, sports arenas, and other public venues.

WORK IN PROGRESS AND KEY ACHIEVEMENTS PLANNED

The OIG will examine NASA's Moon to Mars Program, including the Artemis campaign, by reviewing the agency's center operations and engineering support services. The OIG will continue to examine NASA's human exploration activities in LEO, focusing on the Commercial Crew Program and NASA's efforts to facilitate commercialization of LEO. Additionally, the OIG will examine NASA's management of communications requirements for deep space human exploration missions.

Further, the OIG will continue to monitor NASA's ambitious science and aeronautics research programs including management of the Aerosciences Evaluation and Test Capabilities portfolio, as well as the Gravity Recovery and Climate Experiment – Continuity mission. Upcoming reviews include NASA's role in the National Academies' decadal survey process and management of developed assets following mission cancellations.

The OIG is also assessing the agency's mission support services, including IT systems, cybersecurity, and infrastructure and facility management, to determine whether existing infrastructure and facilities are sufficient to meet current and future mission requirements. Further reviews will evaluate NASA's management of elevated privileges, export control program compliance, and end-of-life systems.

Ongoing investigative initiatives aim to identify acquisition and procurement fraud schemes within NASA's major programs and projects. The OIG is working to identify, access, and develop cutting-edge tools and platforms for advanced data analytics and AI capabilities. These efforts facilitate identifying fraud indicators, analyzing historical trends, and improving decision-making processes, enhancing fraud detection and optimized resource allocation. By leveraging these technologies, the OIG expects to deliver a higher return on investment in our audits and investigations. One such tool launched in FY 2025 has already been integrated into operations, fostering stronger partnerships across the OIG community to combat fraud in the Small Business Innovation Research and Small Business Technology Transfer programs.

Building on priorities established in our January 2026 report on NASA's top management and performance challenges, the OIG will focus on improving management of major programs and projects, partnering with commercial industry, and enabling mission critical capabilities and support services.

Additionally, the OIG will continue mandated oversight in financial management and quality control, including:

- Compliance with the Payment Integrity Information Act;
- Oversight of NASA grants;
- Oversight of the financial statement audit;
- Risk assessments for purchase and travel card programs; and
- Compliance with the Federal Information Security Modernization Act.

As NASA continues to work toward returning humans to the Moon, with the eventual goal of landing humans on Mars, enhanced resources will enable the OIG to continue its oversight of major milestones.

The FY 2027 budget request will sustain efforts to investigate cybercrime, fraud, waste, abuse, and misconduct across NASA programs, projects, personnel, and operations. Recognizing the importance of NASA's contracting practices, along with the risk of foreign influence, the OIG has several proactive initiatives focused on acquisition activities:

- Identifying reimbursable credits to NASA contracts from the COVID-19 Paycheck Protection Program;
- Detecting and deterring fraud involving grant and contract recipients who receive financial support from foreign governments and/or fail to disclose foreign-based conflicts of interest under NASA policies or federal law;
- Collaborating in multi-agency efforts to prevent illicit acquisition of sensitive U.S. advanced technologies by foreign adversaries;
- Conducting investigative intelligence analysis to identify foreign influence, specifically Chinese involvement, within U.S. universities using open-source data;
- Searching for and evaluating reports of NASA contractor cyber compromises that may violate the civil False Claims Act, with referrals to the Department of Justice; and
- Performing procurement collusion analysis to uncover pre-award bid data flags indicative of potential collusion.

Supporting Data

FUNDS DISTRIBUTION

BUDGET REQUEST BY MISSION BY NASA CENTER

Budget Authority ($ in millions)	FY 2027*
Exploration	42.8
Space Operations	0.5
Space Technology	38.8
Science	127.7
Aeronautics	140.0
STEM Engagement	-
Safety, Security, and Mission Services	118.5
Construction and Environmental Compliance and Restoration	-
ARC Total	**468.4**
Exploration	0.4
Space Operations	0.1
Space Technology	22.5
Science	14.2
Aeronautics	71.3
STEM Engagement	-
Safety, Security, and Mission Services	40.9
Construction and Environmental Compliance and Restoration	-
AFRC Total	**149.4**
Exploration	71.4
Space Operations	69.2
Space Technology	61.3
Science	16.4
Aeronautics	123.2
STEM Engagement	-
Safety, Security, and Mission Services	156.1
Construction and Environmental Compliance and Restoration	5.5
GRC Total	**503.0**
Exploration	19.8
Space Operations	121.4
Space Technology	20.6
Science	1,490.5
Aeronautics	-
STEM Engagement	-
Safety, Security, and Mission Services	178.7
Construction and Environmental Compliance and Restoration	-
GSFC Total	**1,831.1**

FUNDS DISTRIBUTION

Budget Authority ($ in millions)	**FY 2027***
Exploration	45.7
Space Operations	135.0
Space Technology	18.3
Science	722.0
Aeronautics	-
STEM Engagement	-
Safety, Security, and Mission Services	-
Construction and Environmental Compliance and Restoration	-
JPL / NASA Office of Management and Oversight (NMO) Total	**921.0**
Exploration	2,738.6
Space Operations	1,830.8
Space Technology	25.1
Science	59.0
Aeronautics	-
STEM Engagement	-
Safety, Security, and Mission Services	191.4
Construction and Environmental Compliance and Restoration	14.0
JSC Total	**4,859.0**
Exploration	810.5
Space Operations	612.3
Space Technology	6.9
Science	61.3
Aeronautics	-
STEM Engagement	-
Safety, Security, and Mission Services	208.6
Construction and Environmental Compliance and Restoration	-
KSC Total	**1,699.5**
Exploration	27.2
Space Operations	1.5
Space Technology	37.3
Science	91.8
Aeronautics	145.5
STEM Engagement	-
Safety, Security, and Mission Services	149.6
Construction and Environmental Compliance and Restoration	18.0
LaRC Total	**470.9**
Exploration	2,980.4
Space Operations	26.8
Space Technology	46.0
Science	147.1
Aeronautics	-
STEM Engagement	-
Safety, Security, and Mission Services	338.6
Construction and Environmental Compliance and Restoration	-
MSFC Total	**3,538.9**

FUNDS DISTRIBUTION

Budget Authority ($ in millions)	FY 2027*
Exploration	1,768.4
Space Operations	249.5
Space Technology	344.5
Science	1,163.6
Aeronautics	129.6
STEM Engagement	-
Safety, Security, and Mission Services	583.7
Construction and Environmental Compliance and Restoration	63.1
Office of Inspector General	41.1
NASA HQ and Inspector General (IG) Total	**4,343.4**
Exploration	8.7
Space Operations	-
Space Technology	2.9
Science	0.3
Aeronautics	-
STEM Engagement	-
Safety, Security, and Mission Services	32.6
Construction and Environmental Compliance and Restoration	-
SSC Total	**44.5**
****Total**	**18,829.1**

**Totals may not add due to rounding.*

***The table only reflects the FY 2027 direct discretionary budget. Therefore, it does not include $2.110 billion in FY 2027 mandatory funding from the Working Families Tax Cut Act.*

NOTE: Funds will not be fully distributed to the centers until after final acquisition decisions are made. Thus, FY 2027 allocations by center should not be considered final or directly comparable to prior year allocations.

WORKING CAPITAL FUND

NASA established the Working Capital Fund (WCF) to satisfy specific recurring needs for goods and services through use of a business-like buyer and seller approach under which NASA's WCF entities provide goods or services pursuant to contracts and agreements with their customers. The overarching aim of the WCF is to promote economy, efficiency, and accountability with fully reimbursed rates and by focusing on streamlining operations, measuring performance, and improving customer satisfaction.

NASA's WCF is comprised of five entities:

- NASA Shared Services Center (NSSC);
- Solutions for Enterprise-Wide Procurement (SEWP) Government-Wide Acquisition Contract;
- Enterprise IT Services Program [formerly Information Technology Infrastructure Integration Program (I3P)];
- National Center for Critical Information Processing and Storage (NCCIPS); and
- IT Modernization.

WORKING CAPITAL FUNDS BUDGET SUMMARY

Spending Authority from Offsetting Collections ($ in millions)	Actual FY 2025	Estimate FY 2026	Request FY 2027
NSSC	82	76	77
SEWP	45	55	56
Enterprise IT Services	58	-	-
NCCIPS	27	-	-
IT Modernization	-	33	33
Total New Spending Authority	**212**	**163**	**166**
Unobligated Brought Forward, Oct. 1	60	49	100
Recoveries of Prior Yr. Unpaid Obligations	23	47	9
Total Budgetary Resources	**295**	**259**	**275**
NSSC	87	77	90
SEWP	43	45	37
Enterprise IT Services	76	-	-
NCCIPS	36	33	36
IT Modernization	4	4	2
Total Obligations	**246**	**159**	**165**
Unobligated Balance (end-of-year)	**49**	**100**	**110**

NASA SHARED SERVICES CENTER (NSSC)

NSSC opened in March 2006 to provide centralized administrative processing services and customer contact center operations for support of human resources, procurement, financial management, agency IT, and agency business support services. NASA established NSSC, a function under the NASA HQ MSD, as a public/private partnership. NSSC has awarded its major business management and IT services contract to COLSA Corporation and InspiriTec. Typical expenditures are related to the civil service workforce, support contractor, other direct procurements, and agency training purchases.

NSSC is located on the grounds of SSC and operates in a manner that provides for transparency and accountability of costs and services. NASA has reduced its administrative costs through centralized processing at NSSC. The work performed by NSSC reduces duplicative efforts and increases cost efficiencies.

NSSC's revenue streams include funding from the NASA mission support enterprise offices, mission directorates, and various NASA mission support offices. During FY 2027, NSSC will continue to offer similar services as in FY 2026, making minor changes to existing services.

SOLUTIONS FOR ENTERPRISE-WIDE PROCUREMENT (SEWP)

SEWP refers to operations related to the Government-Wide Acquisition Contract (GWAC) that was established under the authority of section 5112 of the Information Technology Management Reform Act (40 U.S.C. 1412[e]), enacted in 1996, under which NASA is designated by the Office of Management and Budget (OMB) as a Federal Government Executive Agent for SEWP contracts.

SEWP was established as a WCF entity to allow all federal agencies use of a best value tool to purchase IT product solutions and services. Under this approach, the buying power of federal agencies is combined to acquire best value for IT products and services more efficiently. Typical acquisitions include a wide range of advanced technologies, such as: UNIX-Linux and Windows-based desktops and servers, peripherals, network equipment, storage devices, security tools, software, and other IT products and product-based solutions.

Executive Order 14240 "Eliminating Waste and Saving Taxpayer Dollars by Consolidating Procurement" directs a series of actions to consolidate domestic Federal procurement of common goods and services in the General Services Administration (GSA). As a result, NASA's executive agent designation for SEWP will be rescinded. NASA is working closely with GSA to plan transition of its GWAC to GSA.

ENTERPRISE IT SERVICES PROGRAM

WCF operations supporting Enterprise IT Services Program began in early FY 2012. WCF enables Enterprise IT Services Program to improve the efficiency and economy in which contract services and management are provided to support NASA's IT strategic initiatives and to increase visibility into NASA's IT budget and expenditure. The Enterprise Applications Service Technologies (EAST2) contract supports Agency Applications Office (AAO) applications hosted by MSFC. The AAO operates and maintains a broad spectrum of NASA's enterprise applications, with an emphasis on fully integrating business process expertise with application and technical knowledge. A small team of civil servants and support contractors sustain operations, implement new applications and capabilities, and provide business readiness support to the stakeholders and end-users.

Under the Enterprise IT Services Program, NASA consolidated 19 separately managed contracts into four centrally managed contracts. The Enterprise IT Services Program's consolidated contracting approach provides NASA with cost saving opportunities by reducing the administrative burden of contract management and significantly lowering procurement transaction volume. Additional benefits include streamlined budgeting and funding for program services, increased transparency through detailed monthly billing, and consistent, agencywide reporting on the consumption of Enterprise IT Services Program goods and services.

The Enterprise IT Services Program is unique in that revenue streams and expenditures are limited to contract costs for its service contracts. Revenue streams include funding from the NASA centers, NASA mission directorates, and various NASA mission support offices. Beginning in FY 2026, Enterprise IT Service Contracts are managed outside of the WCF.

NATIONAL CENTER FOR CRITICAL INFO. PROCESSING AND STORAGE (NCCIPS)

NCCIPS is a federal shared services data center designed for sensitive and secure processing and storage. NCCIPS is a 211,000-square-foot secure data center facility on a 64-acre campus within SSC. NCCIPS offers federal customers collocation services from a state-of-the-art data center facility. NCCIPS offers 24x7x365 availability at a Tier III level as defined by the Uptime Institute, with complete redundancy in the cooling system and in the electrical distribution system from the national power grid to the rack-level.

NCCIPS provides the following infrastructure/services:

- Five Layer Security – Buffer Zone/perimeter fencing, armed security at all gates, roving guards, and NCCIPS armed guards, and NCCIPS Access Control System;
- Three separate commercial power generation systems available to NCCIPS;
- Tier III redundant (N + 1) power from commercial power systems down to racks on the datacenter floors with N + 1 diesel generator backup;
- Tier III redundant (N + 1) cooling;
- Expert IT staff with a proven track record of uninterrupted service;
- 24x7 facility operations staff monitoring;
- Robust network infrastructure with multiple, discreet communication paths; and
- FE-25 clean agent fire suppression.

The NASA WCF provides NASA with a mechanism to collect amounts sufficient to finance continuing operations, acquire capital assets, and adjust for prior year results of operations, in addition to normal operating expense recovery at NCCIPS. NCCIPS WCF benefits NASA and its customers by:

- Enabling funds to be collected over time and (once earned) used for new equipment and technology.
- Allowing the NSSC to incorporate a level of equipment replacement, maintenance, and technology refresh costs into customer rates.
- Helping to normalize rates charged to NCCIPS customers from year-to-year, as the need for facility repairs, infrastructure upgrades, and routine equipment maintenance increases; thus, enabling NCCIPS customers to maintain their appropriation funding without incurring potentially large unplanned expenses.
- Facilitating NCCIPS business opportunities for new customers.
- Reducing the probability of hardware failure within the NCCIPS operational environment.

The NCCIPS revenue streams include funding from the NASA SSC and NSSC Centers, NASA HQ Office of the Chief Human Capital Officer, and external federal agencies, including Department of

Homeland Security (DHS), U.S. Army Program Executive Offices - Missiles and Space (ARMY –APEO) and Aviation (ARMY – AAVN), U.S. Navy DoD Supercomputing Resource Center (DSRC), DoW High Performance Computing Modernization program – Engineer Research and Development Center, National Reconnaissance Office (NRO), Government Services Administration (GSA), Department of Transportation OCIO (DOT-OCIO), DOT Maritime Administration, Department of Housing and Urban Development (HUD), and Naval Air Systems Command (NAVAIR). During FY 2025 and FY 2026, NCCIPS will continue to offer similar services as in FY 2024 with no significant scope changes anticipated.

IT MODERNIZATION

In FY 2023, NASA's existing authority under 51 U.S.C. 30102 was amended to authorize the WCF for IT Modernization activities on a non-reimbursable basis and included transfer authority from the Safety, Security, and Mission Services account into the WCF to fund such activities. The Administrative Provisions in the FY 2027 Budget include transfer authority for up to $32,600,000 for purposes of IT modernization.

BUDGET BY OBJECT CLASS

FY 2027 ESTIMATED DIRECT DISCRETIONARY OBLIGATIONS

($ in millions)

Code	Object Class	Exploration	Space Operations	Space Technology	Science	Aeronautics	STEM Engagement	Safety, Security, and Mission Services	Construction & Environmental Compliance & Restoration	Inspector General	NASA Total*
11.1	Full-time permanent	566	254	88	234	133	--	666	--	25	**1,966**
11.3	Other than full-time permanent	4	2	2	4	6	--	14	--	1	**32**
11.5	Other personnel compensation	51	6	2	6	4	--	20	--	--	**90**
11.8	Special Personal Services Payments	1	1	--	--	--	--	1	--	--	**3**
11.9	*Subtotal Personnel Compensation*	*622*	*263*	*92*	*244*	*143*	--	*701*	--	*26*	***2,091***
12.1	Civilian personnel benefits	228	95	33	86	51	--	252	--	11	**756**
13.0	Benefits to former personnel	--	--	--	--	--	--	1	--	--	**1**
Total Personnel Compensation & Benefits		**850**	**358**	**125**	**330**	**194**	**--**	**954**	**--**	**37**	**2,848**
21.0	Travel and transport of persons	18	9	--	--	--	--	9	--	--	**36**
22.0	Transportation of things	1	1,441	13	3	--	--	1	--	--	**1,459**
23.1	Rental payments to GSA	--	--	--	2	--	--	18	--	--	**20**
23.2	Rental payments to others	1	1	--	1	--	--	--	--	--	**3**
23.3	Communications, utilities, & misc.	19	21	1	4	3	--	55	--	--	**103**
24.0	Printing & reproduction	--	--	--	1	--	--	1	--	--	**2**
25.1	Advisory & assistance services	588	103	41	85	21	--	325	3	--	**1,166**
25.2	Other services from non-Federal sources	48	95	14	82	20	--	139	27	3	**428**
25.3	Other purchases of goods & services from government accounts	29	22	12	137	4	--	31	15	1	**251**
25.4	Operation & maintenance of facilities	124	13	3	7	38	--	147	12	--	**344**
25.5	Research & development contracts	5,689	814	355	2,503	240	--	85	2	--	**9,688**
25.6	Medical care	--	--	--	--	--	--	1	--	--	**1**
25.7	Operation & maintenance of equipment	245	114	3	15	20	--	80	20	--	**497**
26.0	Supplies & materials	52	9	5	9	10	--	6	--	--	**91**
31.0	Equipment	516	18	11	96	23	--	132	--	--	**796**
32.0	Land & structures	317	1	--	1	1	--	9	22	--	**351**
41.0	Grants, subsidies, & contributions	17	28	41	618	35	--	5	--	--	**744**
42.0	Insurance claims & indemnities	--	--	--	--	--	--	1	--	--	**1**
Other Object Classes		**7,664**	**2,689**	**499**	**3,564**	**415**	**--**	**1,045**	**101**	**4**	**15,981**
	NASA Total, Direct*	**8,514**	**3,047**	**624**	**3,894**	**609**	**--**	**1,999**	**101**	**41**	**18,829**

**Totals may not add due to rounding.*

NOTE: The table only reflects the estimated FY 2027 direct discretionary obligations. Estimated FY 2027 obligations of anticipated reimbursable budget authority and a total of $2.110 billion of obligations funded by Working Families Tax Cut Act or prior year direct or supplemental unobligated balances are not shown.

STATUS OF UNOBLIGATED FUNDS

The table below displays actual and estimated unobligated balances of direct and reimbursable budget authority in each NASA account at the end of each fiscal year.

END OF YEAR UNOBLIGATED FUNDS SUMMARY BY APPROPRIATIONS ACCOUNT

Budget Authority ($ millions)	Unobligated Balances Sept. 30, 2025	Estimated Unobligated Balances Sept. 30, 2026	Estimated Unobligated Balances Sept. 30, 2027
Exploration	7,605	5,110	3,335
Space Operations	1,347	1,097	847
Space Technology	218	218	218
Science	678	678	678
Aeronautics	24	24	24
STEM Engagement	21	21	21
Safety, Security, and Mission Services	965	965	965
Construction & Environmental Compliance & Restoration	1,602	802	802
Working Capital Fund	49	100	110
Office of Inspector General	-	-	-
Total NASA	**12,509**	**9,015**	**7,000**

**Totals may not add due to rounding.*

REIMBURSABLE ESTIMATES

Reimbursable agreements are agreements where the NASA costs associated with the undertaking are borne by the non-NASA partner. NASA undertakes reimbursable agreements when it has equipment, facilities, and services that it can make available to others in a manner that does not interfere with NASA mission requirements. Reimbursable agreements are executed under various legal authorities including:

1. National Aeronautics and Space Act of 1958, as amended [P.L. 85–568] - Space Act Agreements (SAAs) and Enhanced Use Leasing (EUL) authority [incorporated through P.L. 108-7].
2. Commercial Space Launch Act [P.L. 98-575] – authority to outsource the use of its launching facilities and services to private companies.
3. National Historic Preservation Act (NHPA) [P.L. 89-665] – leasing authority for historic property.
4. Government Employees Training Act [P. L. 85-507] – authority to conduct employee training for other government organizations.
5. Economy Act [P.L. 31–15359] – authority for agencies to obtain supplies or services from another agency.

The agreements are transacted in two accounts (Safety, Security, and Mission Services [SSMS] and Construction and Environmental Compliance and Restoration [CECR]). Most of the work is managed by a specific NASA center and performed by the relevant mission directorate or office program at the center (i.e., Science, Aeronautics, Space Operations, Exploration, Space Technology, Mission Support, Office of STEM Engagement, and Office of Inspector General). Examples include the use of NASA-operated wind tunnel test facilities and rocket test stand facilities by other government agencies or private sector users. Some larger agreements and those that involve multiple centers or mission directorates are managed by NASA HQ.

The table below presents the budget authority for NASA's reimbursable work. As most reimbursable requests to NASA do not occur until the year of execution, the FY 2026 and FY 2027 estimates are based on anticipated reimbursable agreements reported by NASA HQ and centers.

REIMBURSABLE BUDGET AUTHORITY BY APPROPRIATIONS ACCOUNT

($ millions)	Actual	Estimate	Request
	FY 2025	**FY 2026**	**FY 2027**
Safety, Security, and Mission Services (including NHPA)	1,796	4,137	2,936
Construction and Environmental Compliance and Restoration (including EUL)	20	46	46
Office of Inspector General	-	-	-
Total	**1,816**	**4,183**	**2,982**

ENHANCED USE LEASING

In 2003, Congress authorized NASA to enter into leasing arrangements at two centers. In 2007 and 2008, Congress expanded that authority such that NASA may enter into Enhanced Use Leasing (EUL) arrangements at all centers. EUL revenues help NASA maintain critical facilities and address deferred maintenance challenges as well as support centers' revitalization plans. Additionally, NASA's EUL authority enhances important relationships with industry, academia, and non-profit organizations.

NASA's EUL authority expired without an extension on December 31, 2021, pursuant to the "sunset" provision in 51 U.S.C. 20145(g). However, Title III of Division B of the FY 2023 Omnibus Appropriations Act extends the existing EUL authority through December 31, 2032.

After deducting the costs of administering the leases, NASA centers are permitted to retain 65 percent of net receipt revenue. The balances are made available to NASA for use agency wide. These funds are in addition to annual appropriations. The table below depicts the estimated FY 2027 EUL expenses and revenues. The amounts identified under Capital Asset Account Expenditures may be adjusted between projects listed based on actual contract award. There are no civil servants funded from EUL income.

SUMMARY OF PROJECTED FY 2027 EUL ACTIVITY

FY2027 EUL Expenses and Revenues ($ Whole Dollars)	ARC	GRC	LaRC	AFRC	GSFC	JPL(NMO)	MSFC	SSC	JSC	KSC	Agency	Total
Base Rent	9,929,850.2	7,032,000.0			519,849.0	113,300.0	1,575,000.00	2,000,000	500,000.0	7,573,559.20	0.0	29,243,558.4
Institutional Support Costs (AAI, ISP, Shared Center Support Costs)	1,058,983.7	1,113,000.0			64,503.0	45,320.0	136,000.00	209,000	80,000.0	1,089,150.60	8,000,000.0	11,795,957.3
Lease Management and Administration	1,030,010.0						78,750.00			50,000.00		1,158,760.0
Operations and Maintenance Included in Lease NOT AS a DEMAND SERVICE							4,725,000.00	15,000		295,154.30	0.0	5,035,154.3
Total Estimated Lease Collections (N + E Funds Lease Project Code) - Program Year 2027	**12,018,843.9**	**8,145,000.0**	**0.0**	**0.0**	**584,352.0**	**158,620.0**	**6,514,750.0**	**2,224,000.0**	**580,000.0**	**9,007,864.1**	**8,000,000.0**	**47,233,430.0**
Estimated Lease Costs												
Institutional Support Costs (AAI, ISP, Shared Center Support Costs)	1,058,983.7	-1,113,200.0			-64,503.0		-136,000.00	-400,000	-80,000.0	-1,089,150.60	-4,047,000.0	-5,870,869.9
Lease Management and Administration	1,030,010.0					-22,660.0	-78,750.00			-50,000.00	0.0	878,600.0
Operations and Maintenance Included in Lease NOT AS a DEMAND SERVICE							-4,725,000.00			-295,154.30	0.0	-5,020,154.3
		0.0	0.0	0.0	0.0	0.0		-15,000	0.0	-295,154.3	0.0	-310,154.3
Total Estimated Cost Associated with Leases (N Fund) - Program Year 2027	**2,088,993.7**	**-1,113,200.0**	**0.0**	**0.0**	**-64,503.0**	**-22,660.0**	**-4,939,750.0**	**-415,000.0**	**-80,000.0**	**-1,729,459.2**	**-4,047,000.0**	**-10,322,578.5**
Estimated Net Proceeds from Lease Activity (E Fund) - Program Year 2027	**9,929,850.2**	**7,031,800.0**	**0.0**	**0.0**	**519,849.0**	**135,960.0**	**1,575,000.0**	**1,809,000.0**	**500,000.0**	**7,278,404.9**	**3,953,000.0**	**32,732,864.1**
Projected Balance, Capital Asset Account - Prior Program Years	**2,630,619.1**	**4,899,005.0**	**0.0**	**0.0**	**222,421.9**	**131,274.0**	**2,470,000.0**	**0.0**	**325,000.0**	**2,472,895.3**	**8,543,097.7**	**21,694,313.0**
Estimated Net Proceeds from Lease Activity Retained at Center - Program Year 2027	**6,454,402.6**	**4,570,670.0**	**0.0**	**0.0**	**337,901.9**	**88,374.0**	**1,023,750.0**	**1,175,850.0**	**325,000.0**	**4,730,963.2**	**11,303,510.7**	**30,010,422.4**
Total Estimated Available, Capital Assest Account - All Program Years	**9,085,021.7**	**9,469,675.0**	**0.0**	**0.0**	**560,323.8**	**219,648.0**	**3,493,750.0**	**1,175,850.0**	**650,000.0**	**7,203,858.5**	**19,846,608.4**	**51,704,735.4**
Planned Capital Projects for Net Proceeds for Fiscal Year 2027												
Planned Maintenance, Various Buildings					-50,000.0		-500,000.0	-1,175,850			-5,000,000.0	-6,725,850.0
TBD	6,454,402.6				-386,000.0							6,068,402.6
Estimated Capital Asset Account (OSI Project Codes) Expenditures	**6,454,402.6**	**0.0**	**0.0**	**0.0**	**-436,000.0**	**0.0**	**-500,000.0**	**-1,175,850.0**	**0.0**	**0.0**	**-5,000,000.0**	**-657,447.4**
Estimated Capital Asset Account (OSI Project Codes) Ending Balance	**2,630,619.1**	**9,469,675.0**	**0.0**	**0.0**	**124,323.8**	**219,648.0**	**2,993,750.0**	**0.0**	**650,000.0**	**7,203,858.5**	**14,846,608.4**	**38,138,482.8**

ENHANCED USE LEASING

DEFINITIONS

Base Rent

The income generated from tenants as payment for leasing land or buildings, ensuring continued access to the rented property.

Institutional Support Costs

Cost for institutional shared services, such as fire, security, first responder, communications, common grounds, road, and infrastructure maintenance, as well as routine administrative support and management oversight (e.g., environmental).

Total Lease Income – All Program Years

The total revenue generated from EUL activities, encompassing all earnings before deductions, including costs associated with renting. This amount includes prior year revenue collected in FY 2026.

Demand Services

Services, such as janitorial, communications, and maintenance, that solely benefit the tenant and are provided for their convenience. There is no net income received by NASA, as these payments may only cover the costs of NASA and its vendors providing these services.

NATIONAL HISTORIC PRESERVATION ACT

The National Historic Preservation Act (NHPA) 54 U.S.C. §306121-306122 provides NASA with the following authority.

> §306121. Lease or exchange
>
> (a) Authority To Lease or Exchange.-Notwithstanding any other provision of law, any federal agency after consultation with the Council [the Advisory Council on Historic Preservation], shall, to the extent practicable, establish and implement alternatives for historic properties, including adaptive use, that are not needed for current or projected agency purposes, and may lease an historic property owned by the agency to any person or organization, or exchange any property owned by the agency with comparable historic property, if the agency head determines that the lease or exchange will adequately insure the preservation of the historic property.
>
> (b) Proceeds of Lease.-Notwithstanding any other provision of law, the proceeds of any lease under subsection (a) may, notwithstanding any other provision of law, be retained by the agency entering into such lease and used to defray the costs of administration, maintenance, repair, and related expenses incurred by the agency with respect to such property or other properties which are on the National Register which are owned by, or are under the jurisdiction or control of, such agency. Any surplus proceeds from such leases shall be deposited into the Treasury of the United States at the end of the second fiscal year following the fiscal year in which such proceeds were received.
>
> §306122. Contracts for management of historic property
>
> The head of any federal agency having responsibility for the management of any historic property may, after consultation with the Advisory Council on Historic Preservation, enter into contracts for the management of such property. The contract shall contain such terms and conditions as the head of such agency deems necessary or appropriate to protect the interests of the United States and insure adequate preservation of historic property.

In FY 2014, NASA established a program for leasing its historic properties based upon the NHPA authorities. Funds received from historic property leases are expended for the purposes of operating, maintaining, and managing the properties, or for authorized demolition or removal of buildings. Federal workforce costs associated with executing the leasing program are funded from annual appropriations, not leasing revenues.

The table below depicts the estimated amounts of anticipated NHPA expenses and revenues for FY 2027 for the use of several historic properties at ARC Moffett Field, CA and Building 925 and adjacent land at JSC Houston, TX, as well as two buildings at GRC. NASA currently expects total rental income of approximately $23.0 million. Of the $23.0 million in total rental income, approximately $15.1 million represents net revenue from lease activities. $8.6 million of the net revenue amount will be used for historic building maintenance and repairs at ARC, GRC and JSC.

NATIONAL HISTORIC PRESERVATION ACT

FY2027 NHPA Expenses and Revenues ($ Whole Dollars)	Ames Research Center	Johnson Space Center	Glenn Research Center	Total
Base Rent	5,750,179.1	1,500,000.0	709,500.0	7,959,679.1
Institutional Support Costs (AAI, ISP, Shared Center Support Costs)	14,154,320.9	240,000.0	112,815.0	14,507,135.9
Lease Management and Administration	595,500.0	-	-	595,500.0
Operations and Maintenance Included in Lease NOT AS a DEMAND SERVICE	-	-	-	-
Total Estimated Lease Collections (N Fund and E Fund Lease Project Code)	**20,500,000.0**	**1,740,000.0**	**822,315.0**	**23,062,315.0**
Institutional Support Costs (AAI, ISP, Shared Center Support Costs)	14,154,320.9	240,000.0	112,815.0	14,507,135.9
Lease Management and Administration	595,500.0	-	-	595,500.0
Operations and Maintenance Included in Lease NOT AS a DEMAND SERVICE	-	-	-	-
Total Estimated Cost Associated with Leases (N Fund)	**14,749,820.9**	**240,000.0**	**112,815.0**	**15,102,635.9**
Estimated Net Proceeds from Lease Activity (E Fund Lease Project Code)	**5,750,179.12**	**1,980,000.00**	**935,130.00**	**8,665,309.12**
Planned Capital Projects for Net Proceeds for Fiscal Year 2027	**5,750,179.1**	**1,980,000.0**	**935,130.0**	**8,665,309.1**
Unobligated Proceeds Prior Years (as of 9/30/2027)	**-**	**-**		**-**
TBD	(5,750,179.1)	(1,980,000.0)	(935,130.0)	(8,665,309.1)
Estimated Capital Asset Account Expenditures (E Fund OSI Projects)	**(5,750,179.1)**	**(1,980,000.0)**	**(935,130.0)**	**(8,665,309.1)**
Estimated Capital Asset Account Ending Balance (E Fund OSI Projects)	**11,500,358.2**	**-**	**-**	**11,500,358.2**

DEFINITIONS

Base Rent

The income generated from tenants as payment for leasing land or buildings, ensuring continued access to the rented property.

Institutional Support Costs

Cost for institutional shared services such as fire, security, first responder, communications, common grounds, road, and infrastructure maintenance, as well as routine administrative support and management oversight (e.g., environmental).

Total Lease Income

The total revenue generated from NHPA activities encompasses all earnings before deductions, including costs associated with renting, as well as the proceeds from NHPA activities including expenses due to renting NASA property. This amount includes prior year revenue collected in FY 2026.

Demand Services

Services, such as janitorial, communications, and maintenance, that solely benefit the tenant and are provided for their convenience. There is no net income received by NASA, as these payments may only cover the costs of NASA and its vendors providing these services.

CONSULTING SERVICES

NASA uses paid experts and consultants to provide advice and expertise beyond that which is available from its in-house civil service workforce. Management controls ensure that there is ample justification for consulting services before these services are obtained. Much of the agency's expert and consultant support is for the NASA Advisory Council and the Aerospace Safety Advisory Panel. NASA uses experts and consultants to provide expertise on the selection of experiments for future space missions. The use of these experts and consultants provides the agency with an independent view that promotes the selection of experiments likely to have the greatest scientific merit. Other individuals provide independent views of technical and functional problems to offer senior management a wide range of information to support decision-making. Historically, each mission directorate engages consultants to primarily support programmatic and Aerospace Safety Advisory Panel issues.

NASA CONSULTING SERVICES BUDGET SUMMARY

	Actual	Estimate	Request
(Cost in $ millions)	FY 2025	FY 2026	FY 2027
Number of Paid Experts and Consultants	25	25	25
Salaries	$0.7	$0.7	$0.7
Benefits Costs	$0.1	$0.1	$0.1
Travel Costs	$0.1	$0.1	$0.1
Total Costs	**$0.9**	**$0.9**	**$0.9**

FY 2025 are actual obligations. FY 2026 and FY 2027 are estimated Budget Authority

A broader definition of consulting services could include the total of the Advisory and Assistance Services object class as shown in the Supporting Data - Budget by Object Class section of this volume.

Advisory and Assistance Services includes:

1. Quality Control, Testing, & Inspection Services
2. Management and Professional Support Services
3. Studies, Analysis, & Evaluations
4. Engineering and Technical Services
5. IT Services

	Actual	Estimate	Request
(Cost in $ millions)	FY 2025	FY 2026	FY 2027
Quality Control, Testing & Inspection Services	$67.8	$73.7	$56.5
Management and Professional Support Services	$993.5	$1,080.7	$829.4
Studies, Analysis, & Evaluations	$59.8	$65.1	$50.0
Engineering and Technical Services	$12.4	$13.5	$10.3
IT Services	$416.5	$453.1	$347.7
Total Costs, Advisory & Assistance Services	**$1,550.0**	**$1,686.0**	**$1,294.0**

CONSULTING SERVICES

DEFINITIONS

Consultant - A person who can provide valuable and pertinent advice generally drawn from a high degree of broad administrative, professional, or technical knowledge or experience. When an agency requires public advisory participation, a consultant also may be a person who is affected by a particular program and can provide useful views from personal experience.

Expert - A person who is specially qualified by education and experience to perform difficult and challenging tasks in a particular field beyond the usual range of achievement of competent persons in that field. An expert is regarded by other persons in the field as an authority or practitioner of unusual competence and skill in a professional, scientific, technical, or other activity.

These definitions are located under 5 CFR 304.102. The appointments are made under 5 U.S.C. 3109, and the use of this authority is reported to Office of Personnel Management (OPM).

RE-BASELINED PROJECTS

FY 2027 Congressional Justification

Original Agency Baseline Commitments vs. Re-baseline Life Cycle Calculation Section

As part of the NASA Corrective Action Plan related to the Government Accountability Office (GAO) High Risk List, re-baselined projects are reported periodically to Congress, GAO, and the Office of Management and Budget (OMB). For projects that have been re-baselined due to performance (vice scope change), and for transparency purposes, NASA includes original cost and schedule Agency Baseline Commitments (ABCs) in quarterly, semi-annual, and annual external cost and schedule reports alongside the current re-baselined LLCs.

Orion	Date	Prior	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	BTC	Total
Original Life Cycle Cost	2015	11,162	121	-	-	-	-	-	-	-		11,283
Rebaselined Life Cycle Cost	2021	13,160	404	156	92	-	-	-	-	-		13,811

Solar Electric Propulsion (SEP)	Date	Prior	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	BTC	Total
Original Life Cycle Cost	2019	321	9	6	-	-	-	-	-	-		336
Rebaselined Life Cycle Cost	2021	308	21	22	20	6	4	2	2	-		384

Dollars in Millions

Totals may not add due to rounding

BTC: Budget To Complete

COST AND SCHEDULE PERFORMANCE SUMMARY

2026 Major Program Annual Report Summary

The 2026 Major Program Annual Report (MPAR) is provided to meet the requirements of Section 103 of the NASA Authorization Act of 2005 (P.L. 109-155). The 2026 MPAR consists of this summary and FY 2027 Congressional Justification pages designated as "Projects in Development" for the projects outlined below. These project pages constitute each project's annual report or, if this is the first year for which it is reporting, the baseline report. The MPAR summary also includes the confidence level of achieving the commitments, as requested in the Conference Report accompanying the FY 2010 Consolidated Appropriations Act (P.L. 111-117).

Changes in MPAR Composition since FY 2026 NASA Budget Estimates

There is one new project with an estimated lifecycle cost greater than $250 million, which received authority to proceed into the development phase since NASA submitted its 2025 MPAR in the FY 2026 NASA Congressional Justification. The U.S. Deorbit Vehicle (USDV) received approval to move into development, with a Lifecycle Cost estimate of $1,236.0 million and a key schedule milestone of vehicle delivery in October 2028.

The four projects below are no longer reporting because of launches or cancellations.

1. The Interstellar Mapping and Acceleration Probe (IMAP) project successfully launched on September 24, 2025.
2. The Low Boom Flight Demonstrator (LBFD) project successfully executed a first flight on October 28, 2025.
3. The NASA-ISRO Synthetic Aperture Radar (NISAR) project successfully launched on July 30, 2025.
4. The Electrified Powertrain Flight Demonstrator (EPFD) project has been modified to a smaller scale flight test, per direction in FY 2026 Consolidated Appropriations to NASA (P.L. 119-74).

Additionally, Sentinel-6 completed development reporting as the first spacecraft (S6-MF) successfully launched in November 2020. The second spacecraft (S6-B) successfully launched in November 2025.

Changes to Cost and Schedule Estimates since the 2025 MPAR

There are three projects with development cost increases/decreases and/or schedule changes since last year's MPAR. (Note: Percent changes in this section are measured against last year's MPAR, not from the project Baseline which is shown in Table 1.)

1. Orion development costs increased nearly two percent with no change to the anticipated launch readiness date (LRD) for Artemis II.
2. Nancy Grace Roman telescope development costs decreased by four and a half percent with no change to the LRD.
3. Near-Earth Object (NEO) Surveyor development costs decreased 0.1 percent with no change to the LRD.

There are nine projects with no changes to their development cost or schedule estimates over the last year including: Compton Spectrometer and Imager (COSI), Dragonfly, Gateway Initial Capability, Gravity

COST AND SCHEDULE PERFORMANCE SUMMARY

Recovery and Climate Experiment-Continuity (GRACE-C), Human Landing System Initial Capability (HLS IC), Mobile Launcher 2 (ML2), Multi-slit Solar Explorer (MUSE), Solar Electric Propulsion (SEP), and the Space Launch System (SLS) Block-1B.

MPAR Summary Table

Table 1 provides cost, schedule, and confidence level information for NASA projects currently in development with lifecycle cost estimates of $250 million or more. Additionally, the cost and schedule estimates for projects continuing will continue to be refined through the development cycle. This data was current as of February 27, 2026.

The Base Year column is the calendar year when the project was confirmed at Key Decision Point-C, or the year of any subsequent rebaseline. NASA records the project's estimated development cost and a key schedule milestone (i.e., baseline or base year) and then tracks changes from that point forward. NASA tracks one of several key milestones, listed below, for reporting purposes:

- Approved delivery and inspection (DD250);
- Launch Readiness Date (LRD);
- Launch Readiness for Artemis II;
- Design Certification Review (DCR);
- Vehicle Delivery; or
- Lunar Orbit Checkout Review (LOCR).

As a note for clarification, LRD schedule milestones, as reported here, are not typically the launch dates on the NASA launch manifest, but are the desired launch dates as determined by the payload mission and approved by the NASA Flight Planning Board. A launch manifest is a dynamic schedule that is affected by real world operational activities conducted by NASA and multiple other entities.

Additional information on the projects shown in the table below can be found in their individual program and project pages.

COST AND SCHEDULE PERFORMANCE SUMMARY

Table 1: MPAR Summary and Confidence Levels

Project	Base Year [1]	JCL (%)	Development Cost Estimate ($M)		Cost Change[3] (%)	Key Milestone Event	Key Milestone Date		Schedule Change (months)
			Baseline	Current Estimate[2]			Baseline	Current Estimate	
COSI	2024	60	224.0	224.0	0.0%	LRD	Nov 2027	Nov 2027	0
Dragonfly	2024	70	1,963.5	1,963.5	0.0%	LRD	Jul 2028	Jul 2028	0
Gateway IC	2023	70	3,561.8	3,561.9	0.0%	LRD	Dec 2027	Dec 2027	0
GRACE-C	2024	70	441.7	441.7	0.0%	LRD	Jul 2029	Jul 2029	0
HLS IC	2023	70	2,339.0	2,339.0	0.0%	LOCR	Feb 2028	Feb 2028	0
ML2*	2024	70	1,873.1	1,873.1	0.0%	DD250	Sep 2027	Sep 2027	0
MUSE	2024	70	296.9	296.9	0.0%	LRD	Nov 2027	Nov 2027	0
NEO Surveyor	2022	86	1,228.6	1,208.3	-1.7%	LRD	Jun 2028	Jun 2028	0
Orion	2021 (2015)	70	9,301.2	10,174.4	9.4%	Artemis II LRD	May 2024	Apr 2026	21
Roman	2020	78	2,898.1	3,120.2	7.7%	LRD	Oct 2026	May 2027	7
SEP[4]	2021 (2019)	70	203.2	223.2	9.8%	Electric Propulsion Thruster Life Qual Test	Oct 2028	Jan 2029	3
SLS Block 1B*	2023	70	3,675.3	3,904.7	6.2%	DCR	Jan 2028	Jan 2028	0
USDV	2026	N/A[5]	1,042.7	1,042.7	0.0%	Vehicle Delivery	Oct 2028	Oct 2028	0

* Funding is not proposed for these projects in the FY 2027 budget

1 Original year of KDP-C approval shown in parenthesis

2 Not budget aligned, represents most recent project Development cost estimate

3 Percent change is from Baseline or Rebaseline

4 The FY 2026 MPAR Development Estimate for SEP reflects the total Development Cost reported by NASA in January 2026. The project is currently undergoing a comprehensive replanning process. The requested budget authority is inclusive of Space Technology only. Electric Propulsion Thruster Life Qual Test: The test demonstrates continuous long-term operation of the system sufficient to characterize and predict the capability and lifetime of the system.

5 Separate cost and schedule risk analyses were conducted for USDV instead of a JCL

Initial Operating Capability (IOC) Launch Readiness Date (LRD) Lunar Orbit Checkout Review (LOCR)

FY 2027 Proposed Appropriations Language

Exploration

For necessary expenses, not otherwise provided for, in the conduct and support of exploration research and development activities, including research, development, operations, support, and services; maintenance and repair, facility planning and design; space flight, spacecraft control, and communications activities; program management; personnel and related costs, including uniforms or allowances therefor, as authorized by sections 5901 and 5902 of title 5, United States Code; travel expenses; purchase and hire of passenger motor vehicles; and purchase, lease, charter, maintenance, and operation of mission and administrative aircraft, $8,513,930,000, to remain available until September 30,2028.

Space Operations

For necessary expenses, not otherwise provided for, in the conduct and support of space operations research and development activities, including research, development, operations, support and services; space flight, spacecraft control, and communications activities, including operations, production, and services; maintenance and repair, facility planning and design; program management; personnel and related costs, including uniforms or allowances therefor, as authorized by sections 5901 and 5902 of title 5, United States Code; travel expenses; purchase and hire of passenger motor vehicles; and purchase, lease, charter, maintenance, and operation of mission and administrative aircraft, $3,047,170,000, to remain available until September 30, 2028.

Space Technology

For necessary expenses, not otherwise provided for, in the conduct and support of space technology research and development activities, including research, development, operations, support, and services; maintenance and repair, facility planning and design; space flight, spacecraft control, and communications activities; program management; personnel and related costs, including uniforms or allowances therefor, as authorized by sections 5901 and 5902 of title 5, United States Code; travel expenses; purchase and hire of passenger motor vehicles; and purchase, lease, charter, maintenance, and operation of mission and administrative aircraft, $624,310,000, to remain available until September 30, 2028.

Science

For necessary expenses, not otherwise provided for, in the conduct and support of science research and development activities, including research, development, operations, support, and services; maintenance and repair, facility planning and design; space flight, spacecraft control, and communications activities; program management; personnel and related costs, including uniforms or allowances therefor, as authorized by sections 5901 and 5902 of title 5, United States Code; travel expenses; purchase and hire of passenger motor vehicles; and purchase, lease, charter, maintenance, and operation of mission and administrative aircraft, $3,893,910,000, to remain available until September 30, 2028.

FY 2027 PROPOSED APPROPRIATIONS LANGUAGE

AERONAUTICS

For necessary expenses, not otherwise provided for, in the conduct and support of aeronautics research and development activities, including research, development, operations, support, and services; maintenance and repair, facility planning and design; space flight, spacecraft control, and communications activities; program management; personnel and related costs, including uniforms or allowances therefor, as authorized by sections 5901 and 5902 of title 5, United States Code; travel expenses; purchase and hire of passenger motor vehicles; and purchase, lease, charter, maintenance, and operation of mission and administrative aircraft, $609,490,000, to remain available until September 30, 2028.

SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS ENGAGEMENT

Unobligated balances previously appropriated under this heading shall be available for necessary expenses to carry out the closure of the Office of STEM Engagement.

SAFETY, SECURITY, AND MISSION SERVICES

For necessary expenses, not otherwise provided for, in the conduct and support of science, aeronautics, space technology, exploration, space operations and education research and development activities, including research, development, operations, support, and services; maintenance and repair, facility planning and design; space flight, spacecraft control, and communications activities; program management; personnel and related costs, including uniforms or allowances therefor, as authorized by sections 5901 and 5902 of title 5, United States Code; travel expenses; purchase and hire of passenger motor vehicles; not to exceed $63,000 for official reception and representation expenses; and purchase, lease, charter, maintenance, and operation of mission and administrative aircraft, $1,998,630,000, to remain available until September 30, 2028.

CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION

For necessary expenses for construction of facilities including repair, rehabilitation, revitalization, and modification of facilities, construction of new facilities and additions to existing facilities, facility planning and design, and restoration, and acquisition or condemnation of real property, as authorized by law, and environmental compliance and restoration,$100,600,000, to remain available until September 30, 2032: Provided, That proceeds from leases deposited into this account shall be available for a period of 5 years to the extent and in amounts as provided in annual appropriations Acts: Provided further, That such proceeds referred to in the preceding proviso shall be available for obligation for fiscal year 2027 in an amount not to exceed $33,000,000,: Provided further, that each annual budget request shall include an annual estimate of gross receipts and collections and proposed use of all funds collected pursuant to section 20145 of title 51, United States Code.

FY 2027 PROPOSED APPROPRIATIONS LANGUAGE

OFFICE OF INSPECTOR GENERAL

For necessary expenses of the Office of Inspector General in carrying out the Inspector General Act of 1978, $41,060,000, of which $500,000 shall remain available until September 30, 2028.

ADMINISTRATIVE PROVISIONS

(INCLUDING TRANSFERS OF FUNDS)

Funds for any announced prize otherwise authorized shall remain available, without fiscal year limitation, until a prize is claimed or the offer is withdrawn.

Not to exceed 10 percent of any appropriation made available for the current fiscal year for the National Aeronautics and Space Administration in this Act may be transferred between such appropriations, but no such appropriation, except as otherwise specifically provided, shall be increased by more than 20 percent by any such transfers. Any funds transferred to "Construction and Environmental Compliance and Restoration" for construction activities shall not increase that account by more than 20 percent. Balances so transferred shall be merged with and available for the same purposes and the same time period as the appropriations to which transferred. Any transfer pursuant to this provision shall be treated as a reprogramming of funds under section 504 of this Act and shall not be available for obligation except in compliance with the procedures set forth in that section.

Not to exceed 5 percent of any appropriation provided for the National Aeronautics and Space Administration under previous appropriations Acts that remains available for obligation or expenditure in fiscal year 2026 may be transferred between such appropriations, but no such appropriation, except as otherwise specifically provided, shall be increased by more than 10 percent by any such transfers. Any transfer pursuant to this provision shall retain its original availability and shall be treated as a reprogramming of funds under section 504 of this Act and shall not be available for obligation except in compliance with the procedures set forth in that section.

The spending plan required by this Act shall be provided by the National Aeronautics and Space Administration at the theme, program, project, and activity level. The spending plan, as well as any subsequent change of an amount established in that spending plan that meets the notification requirements of section 504 of this Act, shall be treated as a reprogramming under section 504 of this Act and shall not be available for obligation or expenditure except in compliance with the procedures set forth in that section.

FY 2027 PROPOSED APPROPRIATIONS LANGUAGE

Amounts made available in the current-year Construction and Environmental Compliance and Restoration (CECR) appropriation may be applied to CECR projects funded under previous years' CECR appropriations. Use of current-year funds under this provision shall be treated as a reprogramming of funds under section 504 of this Act and shall not be available for obligation except in compliance with the procedures set forth in that section.

Not to exceed $32,600,000 made available to the National Aeronautics and Space Administration for the current fiscal year in this Act may be transferred to the Working Capital Fund of the National Aeronautics and Space Administration. Balances so transferred shall be available until expended only for activities described in section 30102(b)(3) of title 51, United States Code, as amended by this Act, and shall remain available until expended. Any transfer pursuant to this provision shall be treated as a reprogramming of funds under section 504 of this Act and shall not be available for obligation except in compliance with the procedures set forth in that section.

There is hereby established in the Treasury of the United States a fund to be known as the "National Aeronautics and Space Administration Nonrecurring Expenses Fund" (the Fund). Unobligated balances of expired discretionary funds appropriated for this or any succeeding fiscal year from the General Fund of the Treasury to the National Aeronautics and Space Administration (NASA) by this or any other Act may be transferred (not later than the end of the fifth fiscal year after the last fiscal year for which such funds are available for the purposes for which appropriated) into the Fund. Amounts deposited in the Fund shall be available until expended, and in addition to such other funds as may be available for such purposes, for facilities infrastructure improvements, including nonrecurring maintenance, necessary for the operation of NASA, subject to approval by the Office of Management and Budget. Amounts in the Fund shall not be available for the purpose described in subsection (b)(3) of section 30102 of title 51, United States Code. Amounts in the Fund may be obligated only after the Committees on Appropriations of the House of Representatives, and the Senate are notified at least 15 days in advance of the planned use of funds.

ACRONYMS AND ABBREVIATIONS

A4GT	Artemis Geology Team
A4PSP	Artemis Participating Scientist Program
AAM	Advanced Air Mobility
AAMP	Advanced Air Mobility Pathfinders
AAVP	Advanced Air Vehicles Program
ACIPP	Agency Capital Investment Program Plan
ACSI	American Customer Satisfaction Index
ADCAR	Astrophysics Data Curation and Archival Research
ADF	Aerospace Data Facility
AEMS	Advanced Energy Management Systems
AES	Advanced Exploration Systems
AETC	Aerosciences Evaluation and Test Capabilities
AFRL	Air Force Research Laboratory
AI	Artificial Intelligence
AIRES	Artemis Infrared Reflectance and Emission Spectrometer
ALG	Amazon Leo for Government
ALLR	Artemis Lunar Laser Retroreflector
Am-241	Americium-241
AMMOS	Advanced Multi-Mission Operation System
AMP	Agency Master Plan
AMT	Advanced Modelling and Technology
AO	Announcement of Opportunity
AOSP	Airspace Operations and Safety Program
APL	Applied Physics Laboratory
ARC	Arc Jet Complex
ARIEL	Atmospheric Remote-sensing Infrared Exoplanet Large-Survey mission
ATA	Agency Technical Authority
ATI	Advanced Technology Initiatives
ATMS	Air Traffic Management and Safety
AU	Astronomical Units
AWE	Atmospheric Wave Experiment
BAA	Broad Agency Announcement
BNATCS	Brand New Air Traffic Control System
BPS	Biological and Physical Sciences
CaSSIS	Colour and Stereo Surface Imaging Systems
CCMC	Community Coordinated Modeling Center
CCP	Commercial Crew Program
CCtCap	Commercial Crew Transportation Capability
CDCS	Core Data and Computing Services
CDR	Critical Design Review
CECR	Construction and Environmental Compliance and Restoration

ACRONYMS AND ABBREVIATIONS

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERISS	Commercially Enabled Rapid Space Science
CESO	Center Engineering, Safety, and Operations
CFT	Crew Flight Test
CGI	The Coronagraph Instrument
CHAPEA	Crew Health and Performance Exploration Analog
CHS	Crew Health and Safety
CINEMA	Cross-scale Investigation of Earth's Magnetotail and Aurora
CIS-Moon	Ultra-Compact Imaging Spectrometer for the Moon
CLDP	Commercial LEO Development Program
CLPS	Commercial Lunar Payload Services
CM	Crew Module
CMA	Crew Module Adapter
CMEx	Chromospheric Magnetism Explorer
CMPS	Commercial Mars Payload Services
CNEOS	Center for Near-Earth Object Studies
CNES	French Space Agency
CoECI	Center of Excellence for Collaborative Innovation
CoF	Construction of Facilities
Core HCM	Core Human Capital Management
COTS	Commercial Orbital Transportation Services
CPU	Central Processing Unit
CRM	Common Research Model
CRM-HL	Conduct Common Research Model-High Lift
CRS	Commercial Resupply Services
CSDA	Commercial Satellite Data Acquisition
CSM	Crew Service Module
CSP	Communications Services Program
DAAC	Distributed Active Archive Center
DAEP	DSN Aperture Enhancement Project
DALI	Development and Advancement of Lunar Instrumentation
DLEU	DSN Lunar Exploration Upgrades
DLR	German Space Center
DraGMet	Dragonfly Geophysics and Meteorology Package
DraGNS	Dragonfly Gamma-Ray and Neutron Spectrometer
DragonCam	Dragonfly Camera Suite
DraMS	Dragonfly Mass Spectrometer
DrEAM	Dragonfly Entry Aerosciences Measurements
DRIVE	Diversify, Realize, Integrate, Venture, Educate
DSE	Data System Evolution
DSI	Data Science Innovation

ACRONYMS AND ABBREVIATIONS

DSN	Deep Space Network
DTN	Delay Tolerant Networking
DUSTER	DUst and plaSma environmenT survEyoR
EarthRISE	Earth Resources for Industry & State Empowerment
ECOSTRESS	Ecosystem Spaceborne Thermal Radiometer Experiment on Space Station
ECR	Environmental Compliance and Restoration
EDL	Entry, Descent, and Landing
EEO	Equal Employment Opportunity
EGS	Exploration Ground Systems
EHP	Extravehicular Activity and Human Surface Mobility Program
EM&I	Entry Modeling & Instrumentation
EMIT	Earth Surface Mineral Dust Source Investigation
EO	Equal Opportunity
EOSDIS	Earth Observing System Data and Information System
EPSCoR	Established Program to Stimulate Competitive Research
ERB	Earth Radiation Budget
ERDC	Earth Radiation Data Continuity
ESA	European Space Agency
ESCAPADE	Escape and Plasma Acceleration and Dynamics Explorers
ESDIS	Earth Science Data and Information System
ESDS	Earth Science Data Systems
ESE	Earth System Explorers
ESEV	Earth System Explorers and Ventures
ESM	Earth Systematic Missions
ESM	Entry Systems Modeling
ESM	European Service Module
ESO	Engineering, Safety, and Operations
ESSP	Earth System Science Pathfinder
ESTP	Earth Science Technology Program
ET	Evapotranspiration
EUS	Exploration Upper Stage
EVA	Extravehicular Activity
EZIE	Electrojet Zeeman Imaging Explorer
FAA	Federal Aviation Administration
FDC	Flight Demonstrations and Capabilities
FDP	Foundational Data Products
FM2	Flammability of Materials on the Moon
FORTE	Frontlines Of Rapidly Transforming Ecosystems
FP&D	Facility Planning and Design
FRR	Flight Readiness Review
FSS	Farside Seismic Suite

ACRONYMS AND ABBREVIATIONS

G&NA	Guidance & Navigation Systems
GEDI	Global Ecosystem Dynamics Investigation
GI	General Investigator
G-III	Gulfstream-III
GISS	Goddard Institute for Space Studies
GO	Guest Observer
GO/GI	General Observer/General Investigator
GPM	Global Precipitation Measurement
GPU	Graphics Processing Unit
GRACE-C	GRACE-Continuity
GRACE-FO	GRACE-Follow On
GRAM	Global Reference Atmospheric Model
HAMAQ	Hemispheric Airborne Measurements of Air Quality
HECC	High-End Computing Capability
HEPA	High Efficiency Particulate Air
HERA	Human Exploration Requirements and Architecture
HERMES	Heliophysics Environmental and Radiation Measurement Experiment Suite
HH	Handheld
HiCAM	Hi-Rate Composite Aircraft Manufacturing
HIS	Heavy Ion Sensor
HLS	Human Landing System
HMTA	Human Medical Technical Authority
HRP	Human Research Program
HSF	High Speed Flight
HSFO	Human Space Flight Operations
HST	Hubble Space Telescope
HTIDeS	Heliophysics Technology and Instrument Development for Science
HTV	H-II Transfer Vehicle
HWO	Habitable Worlds Observatory
I&T	Integration and Test
I&TC	Infrastructure and Technical Capabilities
IASP	Integrated Aviation Systems Program
IBEX	Interstellar Boundary Explorer
ICESat-2	Ice, Cloud, and Land Elevation Satellite
ICP	Intracranial Pressure
IDIQ	Indefinite Delivery Indefinite Quantity
IESM	Integrated Earth System Modeling
IIP	Instrument Incubator Program
ILP	Integrated Logistics Project
IMAP	Interstellar Mapping and Acceleration Probe
IMC	International Mission Contributions

ACRONYMS AND ABBREVIATIONS

IMPACT	Interagency Implementation and Advanced Concepts Team
IMVI	Integrated Modeling Virtual Institute
INL	Idaho National Laboratory
InRoDES	Integrated Rotating Detonation Engine System
INSPYRE	INjected Smoke and PYRocumulonimbus Experiment
INTEGRAL	International Gamma-Ray Astrophysics Laboratory
InVEST	In-Space Validation of Earth Science Technology
IRB	Independent Review Board
IRTF	Utilize NASA's Infrared Telescope Facility
ISON	Interagency Satellite Observation Needs
ISS	International Space Station
IT	Information Technology
IV&V	Independent Verification and Validation
IXPE	Imaging X-ray Polarimetry Explorer
JCL	Joint Confidence Level
JEDI	Joint Extreme ultraviolet coronal Diagnostic Investigation
JPSS	Joint Polar Satellite System
JUICE	JUpiter ICy Moons Explorer
KASA	Korea AeroSpace Administration
KASI	Korea Astronomy and Space Science Institute
kW	Kilowatt
L1	Lagrange Point 1
L5	Lagrange Point 5
LACCE	Landslide Change Characterization Experiment
LANL	Los Alamos National Laboratory
LAS	Launch Abort System
LASP	Laboratory for Atmospheric and Space Physics
LBFD	Low Boom Flight Demonstrator
LC-39B	Launch Complex-39B
LCC	Launch Control Center
LDA	Lunar Dielectric Analyzer
LDEP	Lunar Discovery and Exploration Program
LEAF	Lunar Effects on Agricultural Flora
LEGS	Lunar Exploration Ground System
LEIA	Lunar Explorer Instrument for Space Biology Applications
LEMS	Lunar Environment Monitoring Station
LEO	Low Earth Orbit
LIGO	Laser Interferometer Gravitational-wave Observatory
LITMS	Lunar Interior Temperature and Materials Suite
LMA	LOX and Methane Assessment
L-MAPS	Lunar Microwave Active-Passive Spectrometer

ACRONYMS AND ABBREVIATIONS

LOCR	Lunar Orbit Checkout Review
LOX	Liquid Oxygen
LRA	Laser Retroreflector Array
LRD	Launch Readiness Date
LRI	Laser Ranging Interferometer
LRO	Lunar Reconnaissance Orbiter
LS&E	Landing Systems & Environments
LSITP	Lunar Surface Instrument and Technology Payloads
LSP	Launch Services Program
LTV	Lunar Terrain Vehicle
LuSEE	Lunar Surface Electromagnetics Experiment
LuSEE-Lite	Lunar Surface Electromagnetics Experiment
LWS	Living With a Star
MACS	Multi-layer Acoustics & Conductive-grid Sensor
MAVEN	Mars Atmosphere and Volatile EvolutioN
MCO	Mars Campaign Office
MEA	Mars Exploration Analog
MEGANE	Mars-moon Exploration with GAmma rays and NEutrons
MES	Mission Enabling Services
MIDEX	Medium-Class Explorer
MMRTG	Multi-Mission Radioisotope Thermoelectric Generator
MMX	Martian Moons eXploration
MPC	Minor Planet Center
MPIA	Max Planck Institute for Astronomy
MRO	Mars Reconnaissance Orbiter
MSaC	Mission Services and Capabilities
MSL	Mars Science Laboratory
MUREP	Minority University Research and Education Project
MUSE	Multi-slit Solar Explorer
NAMRU-D	Naval Medical Research Unit-Dayton
NAS	National Airspace System
NCRP	National Council on Radiation Protection and Measurements
NEAR	Near-Earth Asteroid Rendezvous
NEO	Near-Earth Object
NEOO	Near-Earth Object Observations
NESC	NASA Engineering and Safety Center
NESS	NASA Environmental Support Services
NET	No Earlier Than
Next Gen STEM	Next Generation STEM project
NextSTEP	Next Space Technologies for Exploration Partnerships
NIH	National Institutes of Health

ACRONYMS AND ABBREVIATIONS

NISAR	NASA-ISRO Synthetic Aperture Radar
NIST	National Institute of Standards and Technology
NLS	NASA Launch Services
NOMAD	Nadir and Occultation for MArs Discovery
NRA	NASA Research Announcement
NRSAA	Non-Reimbursable Space Act Agreements
NSN	Near Space Network
NTF	National Transonic Facility
NURTURE	North American Upstream Feature-Resolving and Tropopause Uncertainty Reconnaissance Experiment
OA	Office of Audits
OCE	Office of the Chief Engineer
OCFO	Office of the Chief Financial Officer
OCHCO	Office of the Chief Human Capital Officer
OCHMO	Office of the Chief Health and Medical Officer
OCI	Ocean Color Instrument
OCOMM	Office of Communications
OEO	Office of Equal Opportunity
OGC	Office of the General Counsel
OI	Office of Investigations
OIG	Office of Inspector General
OIIR	Office of International and Interagency Relations
OM	Office of Management
OMPS	Ozone Mapping and Profiler Suite
OMPS-L	Ozone Mapping and Profiler Suite Limb Sounder
ONERA	Office National d'Etudes et Recherches Aérospatiales
OP	Office of Procurement
OPS	Office of Protective Services
ORR	Operational Readiness Review
OSBP	Office of Small Business Programs
OSIRIS-REx	Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer
OSMA	Office of Safety and Mission Assurance
OSTEM	Office of STEM Engagement
PACE	Plankton, Aerosol, Cloud, Ocean Ecosystem
PDCO	Planetary Defense Coordination Office
PDS	Planetary Data System
PFAS	Polyfluoroalkyl Substances
PhysCOS	Physics of the Cosmos
PLRA	Program Level Requirements Appendix
PLSS	Portable Life Support System
PM	Particulate Matter

ACRONYMS AND ABBREVIATIONS

PMPO	Planetary Missions Program Office
POEMM	Planetary Origins and Evolution Multispectral Monochrometer
PPBE	Planning, Programming, Budgeting, and Execution
PR	Pressurized Rover
PREFIRE	Polar Radiant Energy in the Far Infrared Experiment
PRISM	Payloads and Research Investigations on the Surface of the Moon
PSP	Parker Solar Probe
Pu-238	Plutonium
PUEO	Payload for Ultrahigh Energy Observation
PUNCH	Polarimeter to Unify the Corona and Heliosphere
R&A	Research and Analysis
R2O2R	Research-to-Operations and Operations-to-Research
RAVEN	Research Aircraft for eVtol Enabling techNologies
Roman	Nancy Grace Roman Space Telescope
ROSES	Research Opportunities in Space and Earth Science
RPS	Radioisotope Power Systems
S6-MF	Sentinel-6 Michael Freilich
SAIDA	Scientific Artificial Intelligence, Data & Analytics
SAM	Sample Analysis at Mars
SANS	Spaceflight Associated Neuro-ocular Syndrome
SAO	Strategy and Architecture Office
SAR	Synthetic Aperture Radar
SATCOM	Satellite Communications
SCA	Sensor Chip Assemblies
SCaN	Space Communications and Navigation
SCE	Sensor Chip Electronics
SDAC	Solar Data Center
SDL	Space Dynamics Laboratory
SDO	Solar Dynamics Observatory
SDS	Survey Data System
SEAL	Surface and Exosphere Alterations by Landers
SET	Science Enabling Teams
SFCO	Space Flight Crew Operations
SFD	Subsonic Flight Demonstrator
SFS	Space and Flight Support
SGP	Space Geodesy Project
SIR	System Integration Review
SLI	Sustainable Land Imaging
SLS	Space Launch System
SMAP	Soil Moisture Active and Passive
SMEX	Small Explorer

ACRONYMS AND ABBREVIATIONS

SNWG	Satellite Needs Working Group
SOC	Solar Orbiter Collaboration
SOHO	Solar and Heliospheric Observatory
SOMA	Science Office for Mission Assessments
SOST	Subcommittee on Ocean Science and Technology
Space Grant	National Space Grant College and Fellowship Project
SPDA	Space Physics Data Archive
SPSS	South Pole Seismic Station
SRB	Standing Review Board
SSMO	Space Science Mission Operations
SSMS	Safety, Security, and Mission Services
STEREO	Solar Terrestrial Relations Observatory
STP	Solar Terrestrial Probes
STROFIO	STart from a ROtating FIeld mass spectrOmeter
SunRISE	Sun Radio Interferometer Space Experiment
SVTT	Subsonic Vehicle Technologies and Tools
SWFT	Subscale Wind Tunnel & Flight Test
SWOT	Surface Water and Ocean Topography
TACP	Transformative Aeronautics Concepts Program
TDRS	Tracking and Data Relay Satellite
TDT	Transonic Dynamics Tunnel
TEMPO	Tropospheric Emissions: Monitoring of Pollution
TESS	Transiting Exoplanet Survey Satellite
TGO	Trace Gas Orbiter
TIGERISS	Trans-Iron Galactic Recorder for the International Space Station
TRACERS	Tandem Reconnection and Cusp Electrodynamics Reconnaissance Satellites
TSIS-1	Total Solar Irradiance Sensor-1
TTBW	Transonic Truss Braced Wing
TTT	Transformational Tools and Technologies
UAM	Urban Air Mobility
UCF	University of Central Florida
UCIS-Moon	Ultra-Compact Imaging Spectrometer for the
UCLA	University of California, Los Angeles
UFE	Unallocated Future Expenses
UI	University Innovation
UKSA	United Kingdom Space Agency
ULI	University Leadership Initiative
USDV	U.S. Deorbit Vehicle
USOS	U.S. Orbital Segment
VAB	Vehicle Assembly Building
VADR	Venture-Class Acquisition of Dedicated and Rideshare

ACRONYMS AND ABBREVIATIONS

VCK	Variable Camber Krueger
VIPER	Volatiles Investigating Polar Exploration Rover
Webb	James Webb Space Telescope
WFF	Wallops Flight Facility
WFI	Wide Field Instrument
WFTC	Working Families Tax Cut
WOMA	Wide Field Instrument Opto-Mechanical Assembly
WSTF	White Sands Test Facility
xEMU	Exploration Extravehicular Mobility Unit
xEVA	Extravehicular Activity
XMM	X-ray Multi-Mirror Mission