National Aeronautics and Space Administration

NASA

FY 2021 BUDGET ESTIMATES

www.nasa.gov

FY 2021 President's Budget Request

- A 21st Century budget worthy of 21st Century space exploration and one of the strongest budgets in NASA's history
- Invests $25 billion (nearly a 12 percent increase from FY 2020 levels) for America's future in space, while still supporting NASA's full suite of science, technology, and aeronautics work
  - Continues progress to the goal of landing the first woman and next man on the lunar surface by 2024
  - Provides the first dedicated funding for a human lunar landing system since Apollo
  - Leads the way toward a sustainable presence on the Moon to lay the foundation for operations and capabilities that enable the eventual human exploration of Mars
  - Continues to lead the expansion of a vibrant low-Earth orbit economy for the United States through commercial and international partnerships
  - Supports Science decadal priorities, such as a Mars sample return mission, Europa Clipper, and the development of NISAR and SWOT in Earth Science
  - Invests in technology development to get astronauts to the Moon, Mars, and beyond
  - Advances commercial supersonic aircraft research and invests in unmanned aerial system technologies
  - Renews / revitalizes infrastructure critical to meet mission requirements and reduce program risk
  - Provides technical capabilities and services to enable mission success

Facilitating Humanity's Next Giant Leap

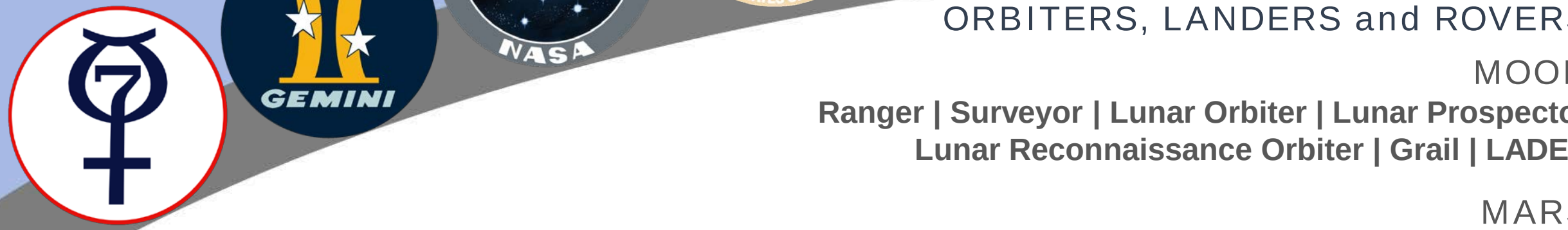
- This funding request supports a bold Moon-to-Mars initiative
  - Returning Americans to the Moon
  - Learning to live and work on the Moon
  - Translating lessons learned so that the United States has capabilities and operational experience for a mission to Mars
- Continues America's standing as the world's leader in space exploration
- Inspires the next generation of explorers, researchers, scientists, and engineers worldwide

"The United States will lead an innovative and sustainable program of exploration with commercial and international partners to enable human expansion across the solar system and to bring back to Earth new knowledge and opportunities. Beginning with missions beyond low-Earth orbit, the **United States will lead the return of humans to the Moon** for long-term exploration and utilization, **followed by human missions to Mars** and other destinations."

Space Policy Directive One

60 YEARS

Experience | Discovery | Exploration



ORBITERS, LANDERS and ROVERS

MOON

Ranger | Surveyor | Lunar Orbiter | Lunar Prospector
Lunar Reconnaissance Orbiter | Grail | LADEE

MARS

Mariner | Viking | Mars Observer | Mars Global Surveyor | Mars Pathfinder
Mars Odyssey | Mars Exploration Rovers (Spirit & Opportunity) | Mars Reconnaissance Orbiter
Phoenix Mars Lander | Mars Science Laboratory | MAVEN | INSIGHT | Mars 2020 | Mars Sample Return

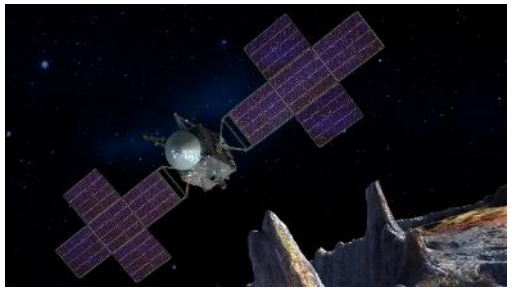
*Represents a sample of NASA Moon and Mars missions

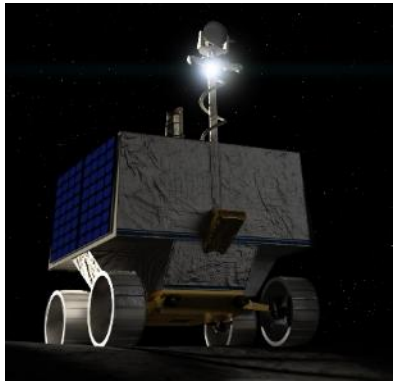
Doing more than ever before

- Using knowledge and programmatic architecture gained from over 60 years of institutional space exploration experience
- Leveraging commercial partnerships
- Partnering with over 120 nations through more than 800 international agreements
- Utilizing cutting-edge technology and manufacturing capabilities
- Achieving success in our Science and Technology programs, which lay the groundwork for human exploration







Moon-to-Mars Strategy

- Gain experience on the Moon to guide future human Mars exploration
  - Establishing how to live sustainably on another planetary body
  - Determining how long-duration human spaceflight affects astronaut health
  - Gaining expertise in developing systems and operations needed for the more difficult exploration of Mars
  - Exploring the resources of the Moon and their ability to aid in spaceflight
- Moon-to-Mars is an integrated multi-directorate effort
  - Launch astronauts to the surface of the Moon and return them to Earth
  - Send robotic missions to both the Moon and Mars
  - Develop needed technologies for Moon and Mars exploration
  - Enhance Earth-based facilities and capabilities for mission success

An Integrated Agency Effort

2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030

HEOMD

Develop and operate systems that will take humans to the Moon and then to Mars

- Develop and produce spacecraft capable of carrying humans beyond LEO and sustain human presence deep into the solar system
- Develop lunar surface systems that increasingly enable long duration trips to the Moon and overall surface sustainability
- Develop and deploy systems to be used on the lunar surface that will also help prepare for the first human Mars surface mission

STMD

Deliver technology to enable Moon to Mars in a measured and sustainable way

- Expand access to diverse surface destinations on the Moon and eventually Mars
- Develop technology required to sustainably live and work on the lunar and eventually Mars surfaces
- Enable transformative NASA missions and discoveries with highly capable technologies

SMD

Conduct ground-breaking decadal science and support human exploration objectives

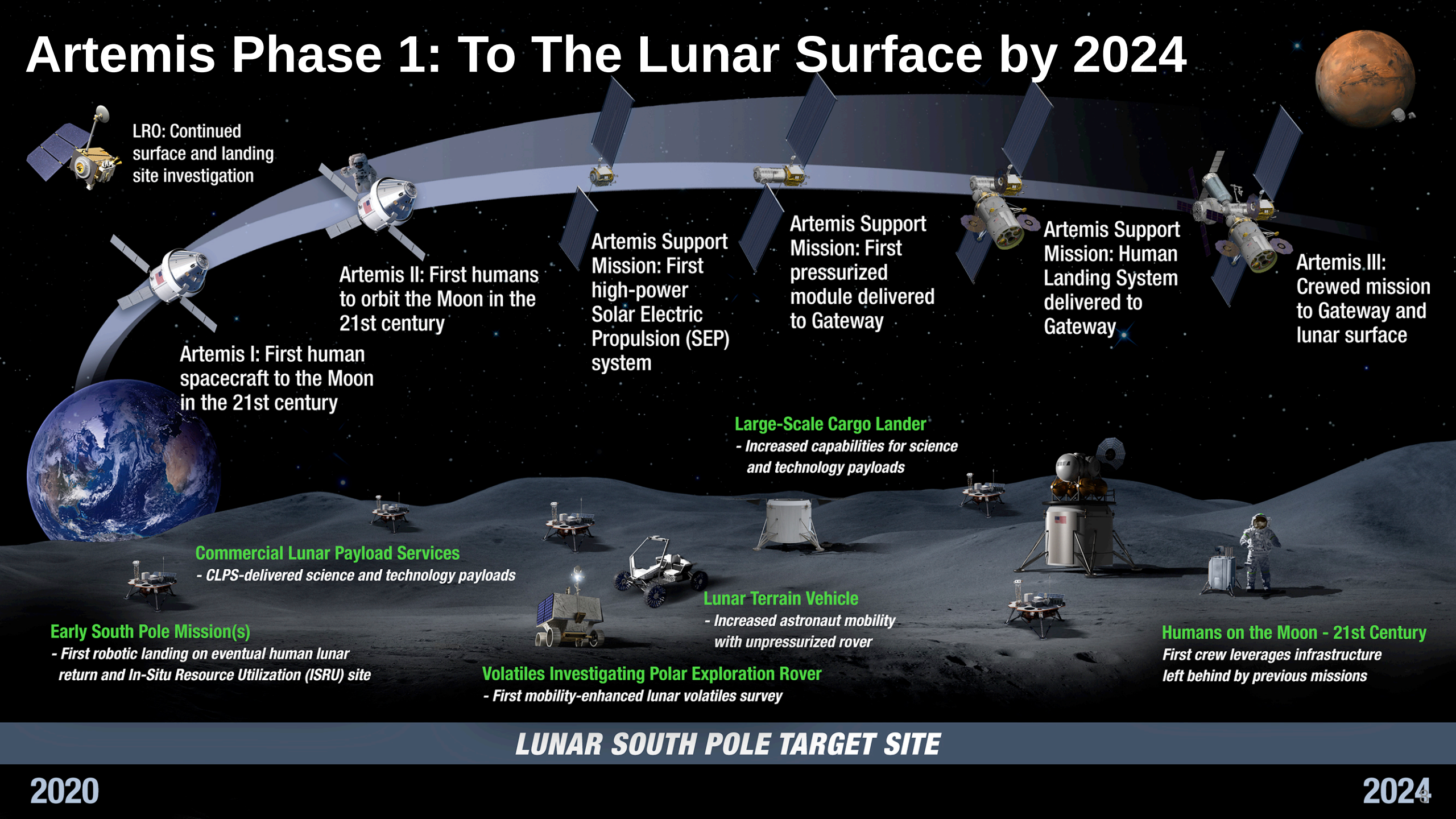
- Deliver science instruments and technology development payloads twice per year using U.S. commercial landing delivery services
- Provide lunar surface mobility beginning in 2022 with robotic rovers to achieve science and human exploration goals and objectives
- Maintain LRO operations for continued science and landing site characterization for robotic and human missions
- Leverage international partnerships for future lunar and Mars robotic missions

MSD

Provide cross-cutting capabilities and services; the enabling foundation for the Artemis program

- Provide design, repair and renewal of mission-critical facilities to deliver test, training, operational support, and launch infrastructure
- Provide mission critical IT services and capabilities to ensure IT assets and data are protected, accessible and reliable
- Provide business services (e.g., legal, procurement) to facilitate timely execution of Artemis program requirements
- Provide protective services to secure access to NASA facilities, technology and information

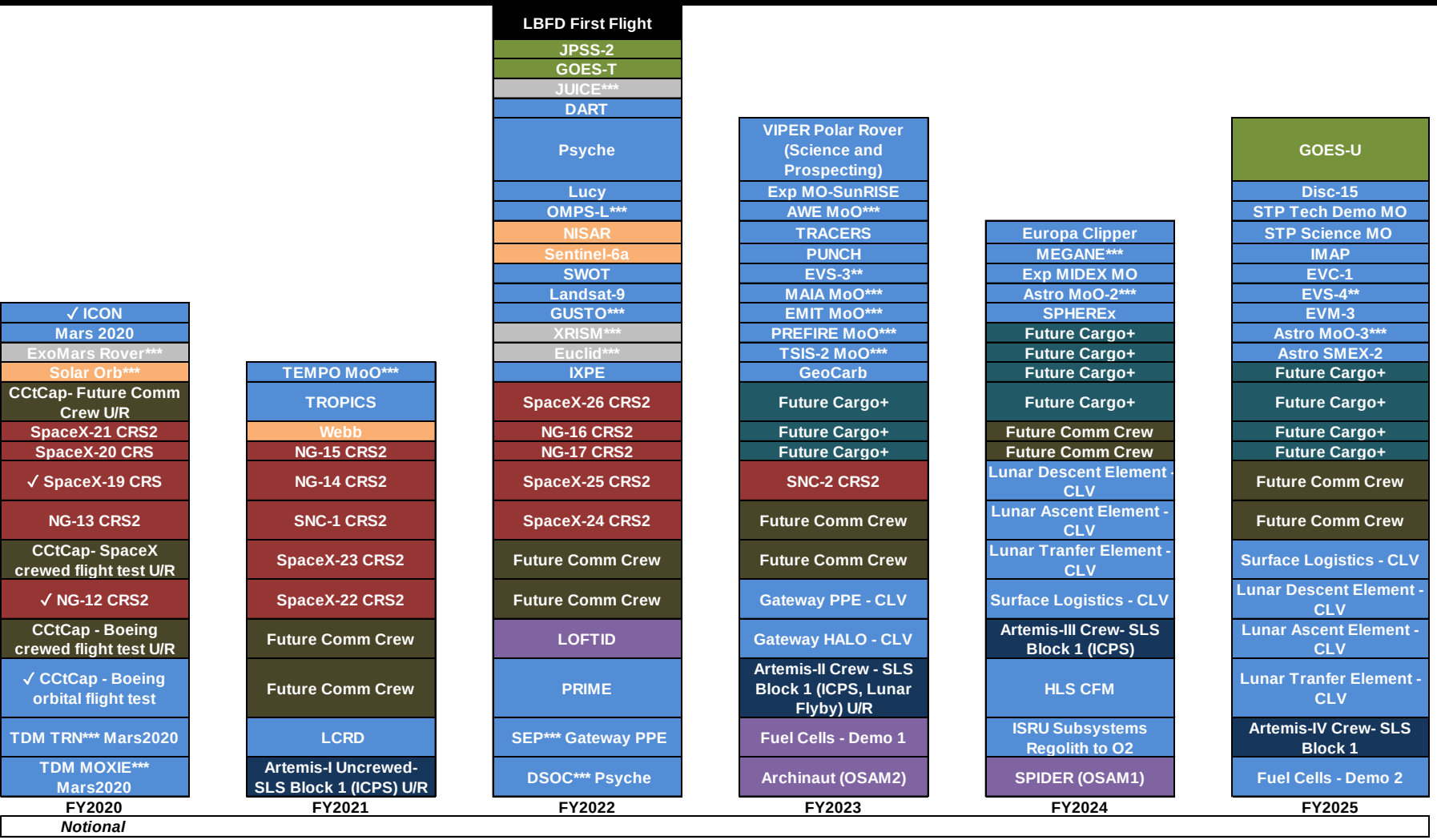
Artemis Phase 1: To The Lunar Surface by 2024



NASA Exploration: CY 2021- CY 2030

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
HEOMD–Led	**Artemis I** Uncrewed test flight + 13 CubeSats, 7 lunar	**Artemis II** Crewed test flight	**Gateway Platform Operations**	**Artemis III** Crew Human Landing System Modules & Gateway Logistics Services **Human Lunar Landing**	**Artemis IV** Crew	**Artemis V** Crew	**Artemis VI** Crew	**Artemis VII** Crew Foundation Hab, Mobile Hab Foundation Hab & Mobile Hab Deployment to Lunar Surface	**Artemis VIII** Crew	**Artemis IX** Crew
	LEO Operations & Research			ISS Commercial Port	Commercial LEO Free Flyer					
STMD–Led	NRHO Pathfinder Precision Landing	ISRU – PRIME Lunar Ice to H_20 Surface Robotic Scout	Lunar Subsurface Mapping Fuel Cells Demo 1	HLS Precision Landing HLS CFM ISRU Subsystems Regolith to O2	Fuel Cells Demo 2		Advanced Cryo Fluid Management Surface Power CDM	Auto Human Assist In-Space Mfg ISRU - End-to-End Pilot Plant	Adv EP / Cryo	
SMD–Led	**LRO & Mars2020** **CLPS Missions**	VIPER Rover				Mars Sample Return	Mars Ice Mapper			
MSD–Led			GRC Space Environment Complex	MAF Roof & Repair ARC Thermal Protection Lab	KSC BFF Repairs		JSC B31 Lunar Curation Facility			
	Mission Enabling CoF									
	Acq & Tech Authority									

NASA Mission Launches FY 2020 – FY 2025



NASA Mission on US ELV

Reimbursable Mission for NOAA

**** NASA does not directly manage/control JASD missions. LRDs reflected are to the best of our knowledge

Joint NASA-Int'l Partner Mission

Int'l Mission with NASA contribution

Joint NASA-USAF Mission

Joint NASA-Public/Private Partnership

Exploration Systems Development Mission

Commercial Crew Mission

Commercial Resupply Services Mission

Future Commercial Resupply Mission

Aeronautics Mission

✓ Mission successfully launched

X Mission unsuccessful

U/R Under Review

** Ground-based elements (includes suborbital) block of 5 missions

*** Instrument only

+ Future CRS-2 unknown, will be updated after award of CRS-2 when cargo delivery capabilities are known

Dates reflect Agency Baseline Commitments or updated Agency schedules and may include schedule margin beyond any manifested launch dates

The Budget proposes launching Europa Clipper on a commercial launch vehicle as early as 2024. Using an SLS rocket would result in a later launch date and cost $1.5 billion more than a commercial launch vehicle.

Continuing Missions

FY 2021 Budget Request ($ in Millions)

Budget Authority ($M)	FY 2019[1/]	FY 2020[2/]	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Deep Space Exploration Systems	5,044.8	6,017.6	8,761.7	10,299.7	11,605.1	10,887.7	8,962.2
Exploration Systems Development	4,086.8	4,582.6	4,042.3	4,011.2	4,071.7	3,767.7	3,634.8
Exploration Research & Development	958.0	1,435.0	4,719.4	6,288.5	7,533.4	7,120.0	5,327.4
Exploration Technology	926.9	1,100.0	1,578.3	1,765.4	1,906.2	1,954.2	2,038.2
LEO and Spaceflight Operations	4,640.4	4,140.2	4,187.3	4,147.3	4,147.3	4,147.3	4,147.3
International Space Station	1,490.3	-	1,400.7	1,390.7	1,338.4	1,314.1	1,319.2
Space Transportation	2,109.7	-	1,877.8	1,771.4	1,826.8	1,848.7	1,843.4
Space and Flight Support	1,000.4	-	758.7	810.2	782.1	784.5	784.7
Commercial LEO Development	40.0	15.0	150.0	175.0	200.0	200.0	200.0
Science	6,886.6	7,138.9	6,306.5	6,553.5	6,575.7	6,705.2	6,766.9
Earth Science	1,931.0	1,971.8	1,768.1	1,878.2	1,846.1	1,834.5	1,984.6
Planetary Science	2,746.7	2,713.4	2,659.6	2,800.9	2,714.9	2,904.8	2,830.7
Astrophysics	1,191.1	1,306.2	831.0	891.2	1,000.9	959.7	975.5
Heliophysics	712.7	724.5	633.1	807.8	841.8	834.1	804.1
James Webb Space Telescope	305.1	423.0	414.7	175.4	172.0	172.0	172.0
Aeronautics	724.8	783.9	819.0	820.7	820.7	820.7	820.7
STEM Engagement	110.0	120.0	-	-	-	-	-
Safety, Security, and Mission Services	2,755.0	2,913.3	3,009.9	2,998.5	2,998.5	2,998.5	2,998.5
Mission Services & Capabilities	1,729.3	-	1,952.0	1,940.6	1,940.6	1,940.6	1,940.6
Engineering, Safety, & Operations	1,025.7	-	1,057.9	1,057.9	1,057.9	1,057.9	1,057.9
Construction & Envrmtl Compl Restoration	372.2	373.4	539.1	530.3	530.3	530.3	530.3
Construction of Facilities	297.3	-	464.4	455.6	455.6	455.6	455.6
Environmental Compliance and Restoration	74.9	-	74.7	74.7	74.7	74.7	74.7
Inspector General	39.3	41.7	44.2	44.2	44.2	44.2	44.2
NASA Total	**21,500.0**	**22,629.0**	**25,246.0**	**27,159.6**	**28,628.0**	**28,088.1**	**26,308.3**
Less Rescission per P.L. 116-93[3/]	-	(70.0)	-	-	-	-	-
Revised Total	**21,500.0**	**22,559.0**	**25,246.0**	**27,159.6**	**28,628.0**	**28,088.1**	**26,308.3**

1/ - FY 2019 reflects total discretionary funding amounts specified in Public Law 116-006, Consolidated Appropriations Act, 2019, as adjusted by NASA's FY 2019 Operating Plan.

2/ - The FY 2020 Operating Plan was not finalized at the time of Budget release. Therefore, only specific marks from Public Law 116-93, Consolidated Appropriations Act, FY 2020, as well as projects in development, are included in the FY 2020 column.

3/ - FY 2020 reflects net discretionary funding amounts specified in Public Law 116-93, Consolidated Appropriations Act, 2020, which rescinded $70M in FY 2019 unobligated balances from the Science account. Per OMB Circular A-11, Appendix A, the rescission is scored in the year it was enacted.

Moon-to-Mars Funding

Budget Authority ($M)

Account	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Deep Space Exploration Systems	5,045	6,018	8,762	10,300	11,605	10,888	8,962
Exploration Technology[1/]	464	596	1,211	1,442	1,658	1,756	1,854
Science	721	711	847	1,020	1,075	1,172	1,233
Safety, Security & Mission Services	1,239	1,311	1,375	1,361	1,356	1,347	1,335
Construction & Env. Comp. & Rest.	89	192	176	145	145	145	105
TOTAL Moon-to-Mars[2/]	**7,558**	**8,828**	**12,371**	**14,268**	**15,839**	**15,308**	**13,489**

1/ - Include an estimate of SBIR/STTR for the Moon-to-Mars content

2/ - Totals may not add due to rounding

Account Summaries

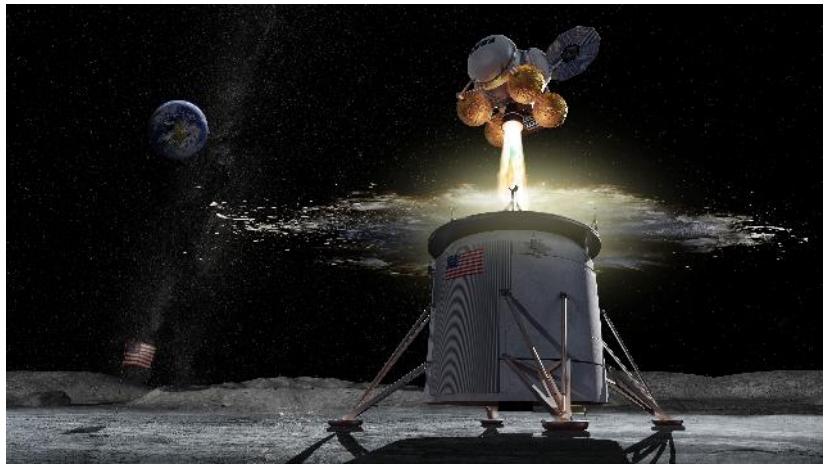
Deep Space Exploration Systems:
Exploration Systems Development

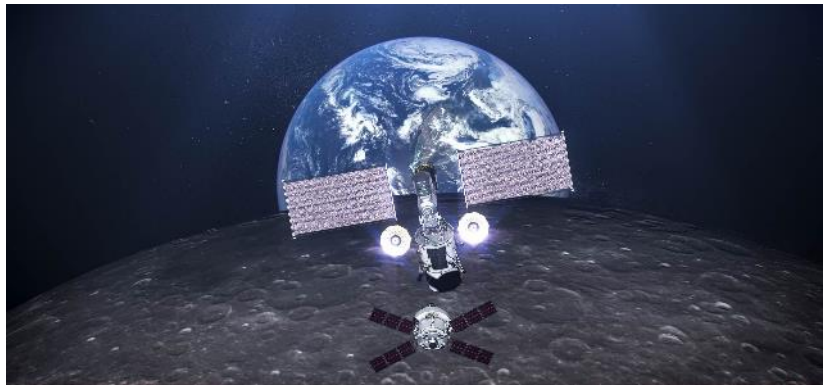
Budget Authority ($M)	FY 2020	**FY 2021**	FY 2022	FY 2023	FY 2024	FY 2025
Exploration Systems Development	4,582.6	**4,042.3**	4,011.2	4,071.7	3,767.7	3,634.8
Moon-to-Mars Content	*4,582.6*	*4,042.3*	*4,011.2*	*4,071.7*	*3,767.7*	*3,634.8*

- Key to the Artemis goal of landing the first woman and next man on the Moon's south pole by 2024:
  - Space Launch System: production and certification for flight will continue at MAF and MSFC along with engine and core stage testing at SSC; Key rocket components will deliver to EGS at KSC for integration into the final flight launch vehicle with the Orion Crew vehicle
  - Orion: will continue final assembly and testing of the Artemis I crew vehicle at KSC and continue Artemis II crew vehicle production
  - EGS: will continue to prepare launch infrastructure and operations requirements in support of the SLS and Orion

Deep Space Exploration Systems:
Exploration Research and Development

Budget Authority ($M)	FY 2020	**FY 2021**	FY 2022	FY 2023	FY 2024	FY 2025
Exploration Research & Development	1,435.0	**4,719.4**	6,288.5	7,533.4	7,120.0	5,327.4
Moon-to-Mars Content	*1,435.0*	*4,719.4*	*6,288.5*	*7,533.4*	*7,120.0*	*5,327.4*



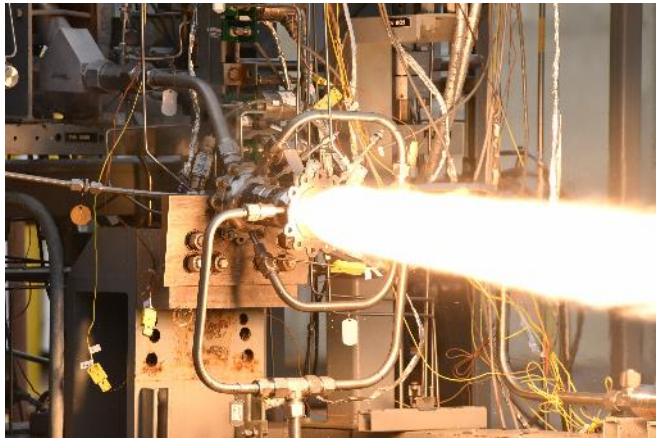


- Utilizes commercial partnerships to develop and jointly deploy the integrated landing system that will transport crew to and from the lunar surface
- Supports Gateway development to support human lunar landings (Power and Propulsion element, Habitation and Logistics Outpost, and the lunar surface suit and system)
- Continues work to identify and address knowledge gaps and deliver fundamental capabilities to provide astronauts a place to live and work with integrated life support systems, radiation protection, food, fire safety, avionics and software, logistics management, and systems to manage waste
- Conducts risk reduction studies to develop strategies and identify technologies to feed into lunar sustainability and future human missions to the Moon and Mars
- Funds continued research to mitigate risks to astronaut health to ensure crews remain healthy and productive during long-duration missions

Exploration Technology

Budget Authority ($M)	FY 2020	**FY 2021**	FY 2022	FY 2023	FY 2024	FY 2025
Exploration Technology	1,100.0	**1,578.3**	1,765.4	1,906.2	1,954.2	2,038.2
Moon-to-Mars Content	*596.2*	*1,211.1*	*1,442.0*	*1,657.5*	*1,755.5*	*1,854.0*

- Funds critical technology research and development required to support a 2024 lunar landing and the long-term success of the Moon-to-Mars campaign
- Develops technology to support sustainable lunar surface operations including surface power to enable surviving the 14 day lunar night
- Delivers a drill for demonstration on the lunar surface to enable In Situ Resource Utilization capabilities
- Demonstrates two technologies during the Mars 2020 entry into the Martian atmosphere, which also includes the first In-Situ Resource Utilization experiment to reach Mars, and technology to provide daily weather reports
- Launches the Laser Communications Relay Demonstration, which provides data rates up to 100 times faster than today's radio frequency-based communication systems
- Delivers Solar Electric Propulsion technologies for Lunar Gateway for integration and qualification
- Encourages innovation and commercial participation, bringing together stakeholders from academia, industry, small businesses, and NASA workforce

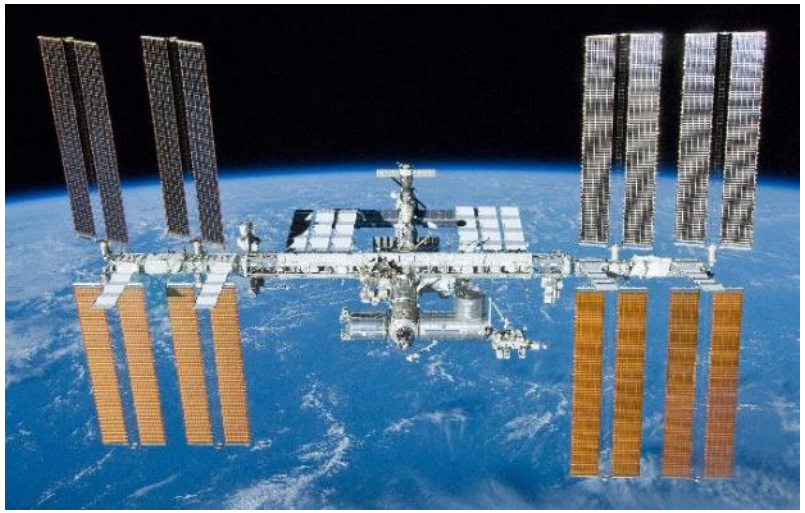


LEO and Spaceflight Operations: *International Space Station*

Budget Authority ($M)	FY 2020*	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
International Space Station		**1,400.7**	1,390.7	1,338.4	1,314.1	1,319.2

* - The FY 2020 Operating Plan was not finalized at the time of Budget release. Therefore, only specific marks from Public Law 116-93, Consolidated Appropriations Act, FY 2020, as well as projects in development, are included in the FY 2020 column.

- Enables long duration spaceflight to support Artemis and Moon-to-Mars by:
  - Conducting human health and performance research and risk mitigation
  - Demonstrating extended performance of equipment critical to long-duration flight, such as habitation system demonstrations
- Continues ISS Focus Areas:
  - Enable development and advancement of a commercial ecosystem in low-Earth orbit
  - Return benefits to humanity on Earth through space-based research and technology development
  - Maintain U.S. global leadership of space exploration
- Supports the above focus areas through use of the National Laboratory by expanding the number of researchers and companies using ISS and enabling new public-private partnerships



LEO and Spaceflight Operations:
Space Transportation

Budget Authority ($M)	FY 2020*	**FY 2021**	FY 2022	FY 2023	FY 2024	FY 2025
Space Transportation		**1,877.8**	1,771.4	1,826.8	1,848.7	1,843.4

* - The FY 2020 Operating Plan was not finalized at the time of Budget release. Therefore, only specific marks from Public Law 116-93, Consolidated Appropriations Act, FY 2020, as well as projects in development, are included in the FY 2020 column.

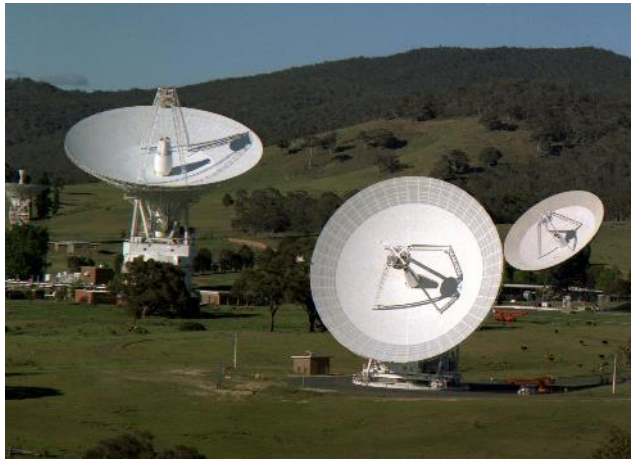
- Continues NASA's partnership with the U.S. commercial space industry to transport astronauts into space safely, reliably, and affordably from American soil
- Assures U.S. crew and cargo transportation to the ISS, bolsters American leadership, and reduces our dependence on Russian spaceflight capabilities for crew transportation
- Enables continued research and technology development on ISS by providing stable crew and cargo flight plan
- Stimulates growth of the space transportation industry and contributes to the foundation of a more affordable and sustainable future for American human spaceflight

LEO and Spaceflight Operations:
Space and Flight Support

Budget Authority ($M)	FY 2020*	**FY 2021**	FY 2022	FY 2023	FY 2024	FY 2025
Space and Flight Support		**758.7**	810.2	782.1	784.5	784.7

* - The FY 2020 Operating Plan was not finalized at the time of Budget release. Therefore, only specific marks from Public Law 116-93, Consolidated Appropriations Act, FY 2020, as well as projects in development, are included in the FY 2020 column.

- Provides mission-critical space communications and navigation services to customer missions, including human spaceflight, science, and commercial crew and cargo missions
- Begins demonstration of commercially provided satellite-based communication services to more efficiently meet future NASA mission requirements
- Supports readiness and crew health for all NASA human spaceflight endeavors
- Provides safe, reliable, and cost-effective launch services for NASA payloads and launch vehicle acquisition and advisory services to NASA missions in development
- Continues certification of new commercial launch vehicles
- Provides NASA's rocket testing capability to meet U.S. rocket testing requirements



LEO and Spaceflight Operations: *Commercial LEO Development*

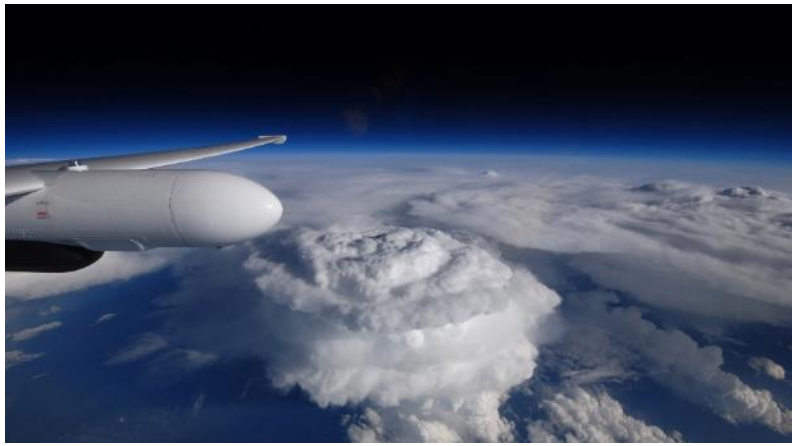
Budget Authority ($M)	FY 2020	**FY 2021**	FY 2022	FY 2023	FY 2024	FY 2025
Commercial LEO Development	15.0	**150.0**	175.0	200.0	200.0	200.0

- Supports commercial space industry efforts to develop a sustained commercial low-Earth orbit (LEO) presence
- Continues transition of LEO human space flight operations to commercial partners
- Supports development of commercial destinations in LEO and capabilities for use by NASA and the private sector to enable a seamless transition from ISS
- Increases efforts to develop a commercial space ecosystem in LEO

Science:
Earth Science

Budget Authority ($M)	FY 2020	**FY 2021**	FY 2022	FY 2023	FY 2024	FY 2025
Earth Science	1,971.8	**1,768.1**	1,878.2	1,846.1	1,834.5	1,984.6

- From the vantage point of space, NASA satellites can view and study our home planet and its dynamic system of diverse components: oceans, atmosphere, continents, ice sheets, and life
- As recommended in the 2017 Decadal Survey, begins formulation activities on the first Earth Science Designated Observable mission
- Continues development of Landsat 9, SWOT, Sentinel-6, TEMPO, NISAR, GeoCarb, MAIA, and TSIS-2
- Supports recommendations made by the interagency Satellite Needs Working Group, including
  - Adding a global soil moisture product in the NISAR mission
  - Expanding capabilities in Earth Data Systems to support SWOT and JPSS-2
- Selects the next Earth Venture Instrument (EVI-6)
- Does not support PACE and CLARREO Pathfinder
- Supports over 20 missions in operation in addition to Airborne Science
- Invests in CubeSats/SmallSats that can achieve entirely new science at lower cost



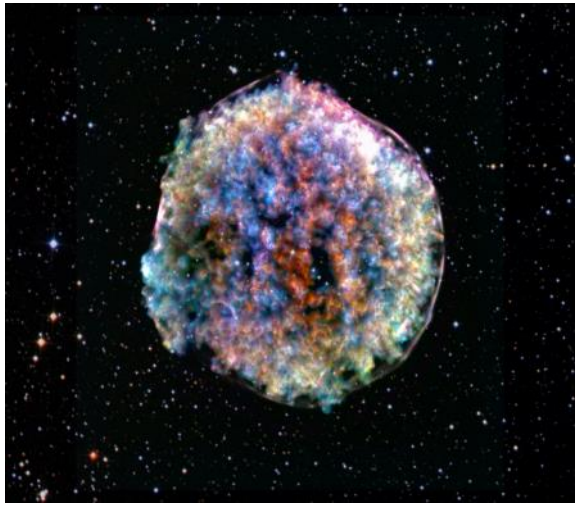
Science:
Planetary Science

Budget Authority ($M)	FY 2020	**FY 2021**	FY 2022	FY 2023	FY 2024	FY 2025
Planetary Science	2,713.4	**2,659.6**	2,800.9	2,714.9	2,904.8	2,830.7
Moon-to-Mars Content	*711.3*	*846.5*	*1,019.9*	*1,075.1*	*1,171.6*	*1,233.3*

- 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
- Accelerates the Lunar Discovery and Exploration program
  - Partners with industry to develop instruments and other payloads for missions to the lunar surface
  - Formulates the VIPER mission, a lunar rover to investigate volatiles
- Supports a Mars Sample Return mission launch as early as 2026 and begins planning for the Mars Ice Mapper
- Proposes to launch the Europa Clipper as early as 2024 on a commercial launch vehicle, which saves over $1.5 billion compared to an SLS rocket
- Continues development of the Lucy, Psyche, and Dragonfly missions
- Continues the Planetary Defense program (e.g., Double Asteroid Redirection Test (DART)) and development of a space-based infrared instrument
- Lands Mars Rover 2020 to begin a new chapter in Mars surface exploration
- Supports operations on 15 Planetary missions
- Invests in CubeSats/SmallSats that help achieve entirely new science at lower cost

Science: *Astrophysics*

Budget Authority ($M)	FY 2020	**FY 2021**	FY 2022	FY 2023	FY 2024	FY 2025
Astrophysics	1,306.2	**831.0**	891.2	1,000.9	959.7	975.5



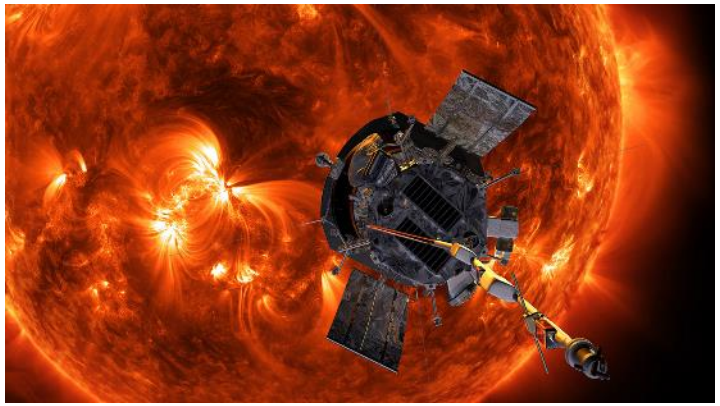
Having measured the age of the universe, the scientific community now seeks to explore further extremes: its birth, the edges of space and time near black holes, and gravitational waves. To answer these questions, the Astrophysics Budget:

- Operates Great Observatories, such as the Hubble Space Telescope and the Chandra X-ray Observatory, alongside 10 innovative missions. Together, these missions account for much of humanity's accumulated knowledge of the heavens
- Continues development of IXPE, Euclid, GUSTO, XRISM, and SPHEREx
- Releases Announcement of Opportunity for new Astrophysics MIDEX
- Continues support of CubeSats/SmallSats, taking advantage of the technological progress in the public and private sector toward meeting high-priority science goals
- Consistent with the FY 2020 request this budget does not support the WFIRST mission in FY 2021 due to its significant cost and higher priorities within NASA, including the need to complete the James Webb Space Telescope
- Does not support the SOFIA mission

Science:
Heliophysics

Budget Authority ($M)	FY 2020	**FY 2021**	FY 2022	FY 2023	FY 2024	FY 2025
Heliophysics	724.5	**633.1**	807.8	841.8	834.1	804.1

- The Sun wields its influence through its gravity, radiation, solar wind, and magnetic fields. Understanding these processes is crucial for our ability to live in space as they produce space weather, which can affect human technological infrastructure and activities in space
- Supports final design and fabrication of the Interstellar Mapping and Acceleration Probe (IMAP), which will help researchers better understand the heliosphere, a magnetic bubble surrounding and protecting our solar system
- Continues development of new Explorer missions:
  - PUNCH - focus on how the Sun's corona generates the solar wind
  - TRACERS – observe particles and our planet's magnetic field
  - AWE – understand the relation between terrestrial weather and solar wind
- Continues support for CubeSats/SmallSats, Sounding Rockets, and Space Weather Science and Applications
- Supports operation of 21 additional missions, including ICON, Parker Solar Probe, and Solar Orbiter Collaboration



Science:
James Webb Space Telescope

Budget Authority ($M)	FY 2020	**FY 2021**	FY 2022	FY 2023	FY 2024	FY 2025
James Webb Space Telescope	423.0	**414.7**	175.4	172.0	172.0	172.0

James Webb will look further back in time than ever before by exploring the infrared spectrum

- The budget level:
  - Completes post-environmental sunshield deploy, stow and fold activities for launch configuration
  - Conducts testing of the Webb flight operations system and science processing system
  - Transports Webb to the launch site in Kourou, French Guiana
  - Supports March 2021 launch and start of science operations in October 2021

Aeronautics

Budget Authority ($M)	FY 2020	**FY 2021**	FY 2022	FY 2023	FY 2024	FY 2025
Aeronautics	783.9	**819.0**	820.7	820.7	820.7	820.7

- Enables U.S. industry to open a new supersonic air travel market that will further connect the world
- Supports the Low Boom Flight Demonstration Mission schedule with an anticipated first flight of the X-59 in early 2022
- Advances Urban Air Mobility (UAM) by partnering with industry and reducing barriers for a safe and scalable UAM transportation system
- Funds new ground and flight research activities to validate new electric aircraft propulsion systems
- Conducts the first flight of the X-57 Maxwell aircraft, NASA's first all-electric experimental aircraft
- Invests in research on artificial intelligence capabilities relevant to Unmanned Aircraft Systems traffic management
- Fully funds the Aeronautics Evaluation & Testing Capability Project

STEM Engagement

- Redirects funds from the Office of STEM Engagement's portfolio of grants and cooperative agreements to NASA's core mission of exploration
    - NASA headquarters will continue to be accountable for strategic direction and coordination of the Agency's STEM engagement efforts
- Continues fellowships and student STEM engagement activities and learning opportunities funded by NASA mission directorates
- SMD's Science Activation program will continue to focus on delivering SMD content to learners of all ages through cooperative agreement awards

Safety, Security, and Mission Services

Budget Authority ($M)	FY 2020	**FY 2021**	FY 2022	FY 2023	FY 2024	FY 2025
Safety, Security, and Mission Services	2,913.3	**3,009.9**	2,998.5	2,998.5	2,998.5	2,998.5
Moon-to-Mars Content	*1,311.0*	*1,374.7*	*1,360.9*	*1,356.4*	*1,346.5*	*1,335.2*

- Funds ongoing operations across NASA Centers and major component facilities to accomplish NASA's mission priority of human landing on the lunar surface by 2024, a sustainable lunar capability, and robotic precursor and technology development missions to Mars
- Provides independent technical and safety expertise in the oversight of NASA missions and operations
- Provides mission enabling capabilities that support all NASA missions by optimizing acquisition and Small Business services, human capital management, budget and financial management, International Relations, Protective Services, Equal Opportunity & Diversity Management, and Legal and Communications capabilities
- Provides strategic information technology (IT) investments to improve security, reduce costs, and increase efficiency by modernizing systems (including financial system modernization), increasing automation, and delivering affordable enterprise-wide solutions
- Strengthens cybersecurity resilience capabilities to meet Artemis requirements by safeguarding critical IT assets

Construction and Environmental Compliance and Restoration

Budget Authority ($M)	FY 2020	**FY 2021**	FY 2022	FY 2023	FY 2024	FY 2025
Construction & Envrmtl Compl Restoration	373.4	**539.1**	530.3	530.3	530.3	530.3
Moon-to-Mars Content	*191.6*	*176.3*	*145.0*	*145.0*	*145.0*	*105.0*

- Funds construction of 2 new facilities:
  - Vehicle and Aerospace Ground Equipment Maintenance Facility (Armstrong Flight Research Center)
  - Engineering and Mission Operations Facility (Ames Research Center)
- Funds major repair/revitalization projects of critical facilities, including:
  - Repair Building 103 Roof System (Michoud Assembly Facility)
  - Virtual Motion Simulator (Ames Research Center)
  - Launch Infrastructure Modifications (Kennedy Space Center)
  - Upgrade Compressor Station (Langley Research Center)
  - Mechanical Systems Revitalization (Marshall Space Flight Center)
  - Potable Water System (Stennis Space Center)
  - Deep Space Network 34-M Beam Wave Guide Antennas (Jet Propulsion Laboratory)
  - Astromaterials Curation Annex (Johnson Space Center)
- Funds minor construction projects to build, revitalize, repair or modernize facilities at all NASA Centers
- Invests in demolition projects that reduce the Agency's footprint to make way for more efficient, modernized facilities
  - Propulsion and Structural Test Facility (Marshall Space Flight Center)
  - Advanced Propulsion Research Facility (Marshall Space Flight Center)
  - Test Stands 302 & 303 Demolition - Phase 2 (White Sands Testing Facility)
- Invests in energy savings projects to reduce utility usage and costs, including installing solar systems with energy storage at the Jet Propulsion Laboratory
- Manages NASA's environmental clean-up responsibilities, such as at Santa Susana

An Investment in America's Future

- The FY 2021 President's Budget Request enables more than flags and footprints on the Moon by
  - Maintaining American leadership in space and focusing on the Agency's core missions of exploration, scientific discovery, cutting-edge technology, and aerospace investments
  - Stimulating economies in every state, creating good paying jobs, and improving life every day here on Earth
  - Developing technology that can be transferred to American businesses to maintain America's technological leadership
  - Inspiring a new generation of explorers and engaging educators, students, and the public to explore new frontiers and launch new dreams as part of the Artemis Generation

Appendix

Acronyms (1 of 3)

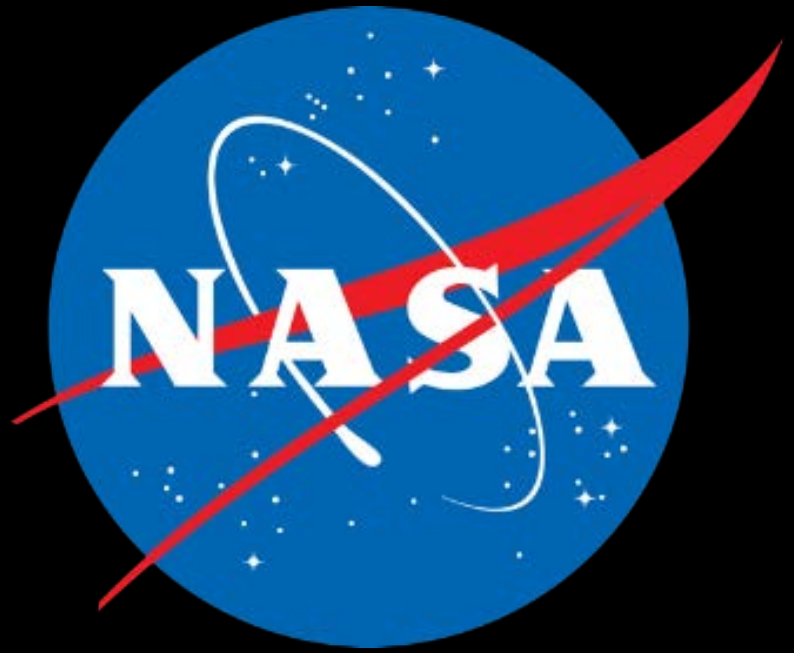
- AWE - Atmospheric Waves Experiment
- CCtCap – Commercial Crew Transportation Capability
- CECR – Construction and Environmental Compliance and Restoration
- CFM – Cryogenic Fluid Management
- CLARREO PF - Climate Absolute Radiance and Refractivity Observatory Pathfinder
- CLPS – Commercial Lunar Payload Services
- CLV – Commercial Launch Vehicle
- CRS – Commercial Resupply Services
- DART - Double Asteroid Redirection Test
- Disc -Discovery
- DO - Designated Observables
- DSAC - Deep Space Atomic Clock
- DSOC - Deep Space Optical Communications
- EGS – Exploration Ground Systems
- ESD – Exploration Systems Development
- EVC - Earth Venture Continuity
- EVI – Earth Venture Instrument
- EVM – Earth Venture Mission
- EVS - Earth Venture Suborbital
- EVS - Earth Venture Suborbital
- GeoCarb - Geostationary Carbon Observatory
- GOES-T - Geostationary Operational Environmental Satellite system
- GUSTO - Galactic/Extragalactic ULDB Spectroscopic Terahertz Observatory
- HEOMD - Human Exploration and Operations Mission Directorate
- HLS – Human Landing System
- ICON - Ionospheric Connection Explorer
- ICPS - Interim Cryogenic Propulsion Stage

Acronyms (2 of 3)

- IMAP - Interstellar Mapping and Acceleration Probe
- ISRU - In-Situ Resource Utilization
- ISS – International Space Station
- IT – Information Technology
- IXPE - Imaging X-ray Polarimetry Explorer
- JPSS-2 - Joint Polar Satellite System-2
- JUICE - Jupiter Icy Moons Explorer
- KSC – Kennedy Space Center
- LBFD – Low Boom Flight Demonstrator
- LCRD – Laser Communications Relay Demonstration
- LEO – Low-Earth Orbit
- LOFTID - Low-Earth Orbit Flight Test of an Inflatable Decelerator
- LRO – Lunar Reconnaissance Orbiter
- MAF – Michoud Assembly Facility
- MAIA - Multi-Angle Imager for Aerosols
- MEDLI – Mars Entry Descent and Landing Instrumentation
- MEGANE - Mars-moon Exploration with GAmma rays and Neutrons
- MIDEX - Medium-Class Explorers
- MoO - Missions of Opportunity
- MSD – Mission Support Directorate
- MSFC – Marshall Space Flight Center
- NEOSM – Near-Earth Object Surveillance Mission
- NG – Northrop Grumman
- NISAR - NASA-ISRO Synthetic Aperture Radar
- OMPS-L – Ozone Mapping and Profiler Suite-Limb

Acronyms (3 of 3)

- OSAM - On-orbit Servicing, Assembly, and Manufacturing
- PACE - Plankton, Aerosol, Cloud, ocean Ecosystem
- PCM – Post Certification Mission
- PREFIRE - Polar Radiant Energy in the Far-InfraRed Experiment
- PUNCH - Polarimeter to Unify the Corona and Heliosphere
- R&D – Research and Development
- SEP - Solar Electric Propulsion
- SLS - Space Launch System
- SMD – Science Mission Directorate
- SMEX - Small Explorers
- SNC – Sierra Nevada Corporation
- SOFIA - Stratospheric Observatory for Infrared Astronomy
- SPHEREx - Spectro-Photometer for the History of the Universe, Epoch of Reionization and Ices Explorer
- SSC – Stennis Space Center
- SSMS – Safety, Security, and Mission Services
- STEM - Science, Technology, Engineering, and Mathematics
- STMD – Space Technology Mission Directorate
- SWOT - Surface Water and Ocean Topography
- TDM – Technology Demonstration Mission
- TEMPO - Tropospheric Emissions: Monitoring Pollution
- TRACERS - Tandem Reconnection and Cusp Electrodynamics Reconnaissance Satellites
- TRN – Terrain Relative Navigation
- TROPICS - Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats
- TSIS - Total and Spectral Solar Irradiance Sensor
- UAM – Urban Air Mobility
- VIPER - Volatiles Investigating Polar Exploration Rover
- WFIRST - Wide Field Infrared Survey Telescope
- XRISM - X-ray Imaging and Spectroscopy Mission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