

National Aeronautics and Space Administration



FISCAL YEAR 2015

B U D G E T E S T I M A T E S

www.nasa.gov



Strategic Plan

**Expand the frontiers
of knowledge,
capability, and
opportunity in space**



OUR MISSION

**Drive advances in science,
technology, aeronautics,
and space exploration to
enhance knowledge,
education, innovation,
economic vitality, and
stewardship of Earth**

**Advance understanding
of Earth and develop
technologies to
improve the quality of
life on our home planet**

**Serve the American
public and accomplish
our Mission by
effectively managing
our people, technical
capabilities, and
infrastructure**



2015 Budget Highlights

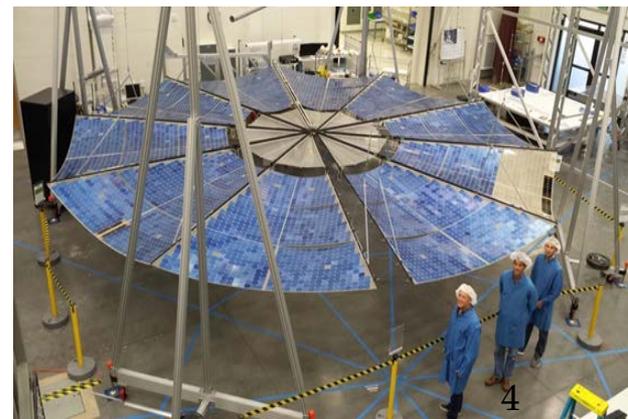
- Provides the necessary resources to advance the Nation's bipartisan space exploration plan and ensure that the United States remains the world's leader in space exploration and scientific discovery for years to come.
- Aligns NASA's activities to send humans to an asteroid by 2025 and Mars in the 2030s.
- Supports the Administration's commitment that NASA be a catalyst for the growth of a vibrant American commercial space industry.
- Builds on U.S. preeminence in science and technology, improves life on Earth and protects our home planet, while creating jobs and strengthening the American economy.
- Extends the life of the International Space Station (ISS) until at least 2024, which is essential to achieving the goals of sending humans to deep space destinations and returning benefits to humanity through research and technology development.





Highlights *(continued)*

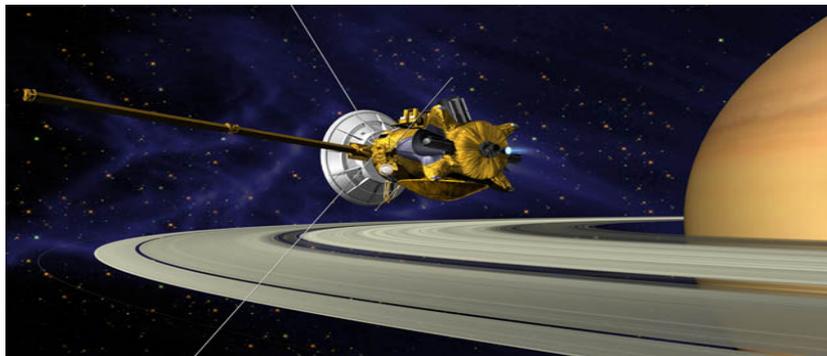
- Acquires commercial cargo supply missions to the ISS with launches from our shores, and further advances NASA's initiative to return human spaceflight launches to the United States by 2017.
- Enables partnerships with American industry to develop new ways to reach space, creating jobs and enabling NASA to focus on new technologies that benefit all of our missions.
- Funds the Space Launch System and Orion space crew vehicle to take astronauts farther into the solar system than we have ever gone before.
- Invests in transformative space technologies, such as high powered solar electric propulsion, advanced robotics, high speed communications and precise navigation that enable future NASA missions, and increase the Nation's capabilities in space.





Highlights *(continued)*

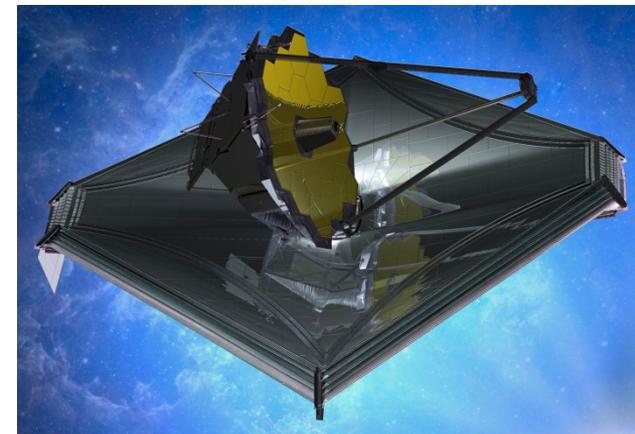
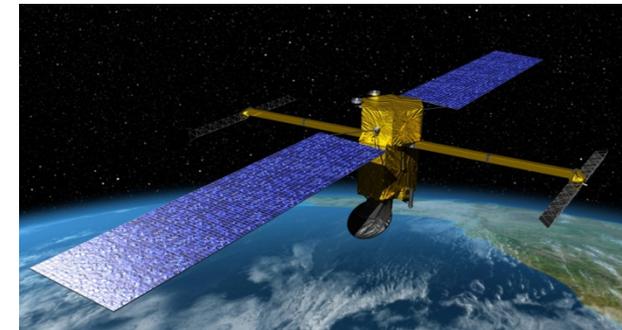
- Advances NASA's first-ever mission to identify, capture and redirect an asteroid. This initiative represents an unprecedented technological feat -- raising the bar for human exploration and discovery, while helping protect our home planet and bringing us closer to a human mission to one of these mysterious objects and building deep space capabilities needed for future missions to Mars.
- Continues to build on our nation's record of breathtaking and compelling scientific discoveries and achievements in space, with science missions that will reach far into our solar system, reveal unknown aspects of our universe and provide critical knowledge about our home planet.





Highlights *(continued)*

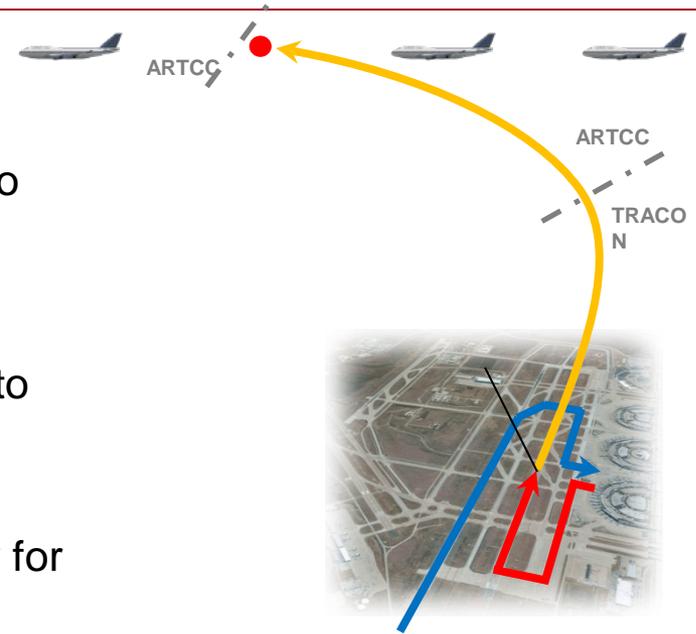
- Continues NASA's global leadership in planetary exploration, with funding for missions to Mars, a potential mission to Europa, missions already heading toward destinations such as Jupiter and Pluto, and missions operating throughout the solar system.
- Sustains NASA's vital role in understanding the Earth's systems and climate and the dynamics between our planet and the Sun. By the end of FY 2015, NASA will have launched an unprecedented five Earth science missions to find answers to critical challenges facing our planet today and in the future, including climate change, sea level rise, freshwater resources and extreme weather events.
- Makes steady progress toward our next Great Observatory as we develop and conduct critical tests on the James Webb Space Telescope. Its planned launch in 2018 will again revolutionize our understanding of the universe.





Highlights *(continued)*

- Aligns Aeronautics research to focus on newly defined strategic thrust areas that address a growing demand for mobility, severe challenges to sustainability of energy and the environment, and technology advances in information, communications, and automation technologies. Continues to develop methods and technologies to support implementation of Next Gen.
- Creates new jobs right here on Earth – especially for the next generation of American scientists and engineers – by supporting cutting edge aeronautics and space technology innovations, education, research and development that will help fuel the nation's economy for years to come.
- Builds on efforts proposed in the 2014 Science, Technology, Engineering, and Mathematics (STEM) Education budget. Continues to reduce fragmentation and supports a more cohesive infrastructure for delivering STEM education and leveraging existing resources to improve the reach of agency assets.





Anticipated Accomplishments in FY 2015

**SLS/Orion:
Complete
analysis of
Orion's Test
Flight (EFT-1) &
design reviews**



**ISS: Increase utilization
with science &
technology payload
hardware to 70 percent.**

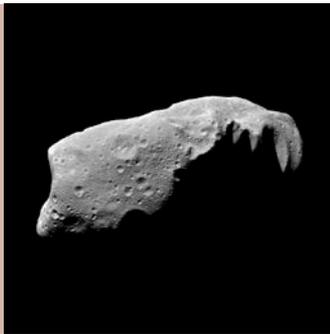


**Launch 16
science and
ISS cargo
missions**



**Commercial
Crew
Program:
Complete
first phase of
certification
efforts with
partners.**

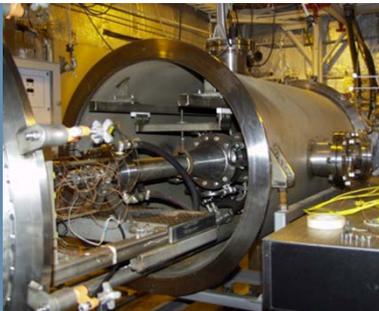
**Asteroid
Redirect
Mission: Hold
Concept
Review**



**JWST: Deliver
primary mirror
backplane and
backplane
support to the
Goddard Space
Flight Center.**



**Space Tech:
Transform
technology with
several major in-
space demos**





Considerations

- **Out-year Funding Assumptions.** In this time of national fiscal austerity, NASA has accepted the challenge to manage to a modest inflation adjusted out-year top-line budget. Funding lines beyond FY 2015 should be considered notional.
- **Campaign to Promote Efficient and Effective Spending.** This budget continues NASA's efforts to improve operational efficiency and maintains reduced spending for service contracting, travel, supplies and materials, printing and reproduction, and IT services.
- **Aligning the NASA Workforce.**
 - ✓ Aligns human capital with the priority requirements of the Agency
 - ✓ Minor reduction in FTE consistent with budget limitations

	FTE Estimates		FY15 higher/ (lower) than	
	FY14	FY15	FY14	% Change
Science Mission Directorate	1,936	1,899	(37)	-1.9%
Aeronautics Research Mission Directorate	1,282	1,247	(35)	-2.7%
Exploration Systems Mission Directorate	3,018	3,030	12	0.4%
Space Operations Mission Directorate	2,216	2,114	(102)	-4.6%
Cross-Agency Support	7,883	7,795	(88)	-1.1%
Education	59	59	-	0.0%
Space Technology	837	784	(53)	-6.4%
Reimbursable/Working Capital Fund*	468	465	(3)	-0.6%
TOTAL	17,699	17,392	(306)	-1.7%
Office of the Inspector General	213	213	-	0.0%

- **Presentation in full-cost,** where all project costs are allocated to the project, including labor funding for the Agency's civil service workforce.



FY 2015 Budget Request

	FY 2013 Op Plan*	FY 2014 Enacted**	FY2015	Notional			
				FY2016	FY2017	FY2018	FY2019
Science	4,781.6	5,151.2	4,972.0	5,021.7	5,071.9	5,122.6	5,173.9
Earth Science	1,659.2	1,826.0	1,770.3	1,815.5	1,837.6	1,861.9	1,886.3
Planetary Science	1,274.6	1,345.0	1,280.3	1,304.9	1,337.1	1,355.7	1,374.1
Astrophysics	617.0	668.0	607.3	633.7	651.2	696.8	993.0
James Webb Space Telescope	627.6	658.2	645.4	620.0	569.4	534.9	305.0
Heliophysics	603.2	654.0	668.9	647.6	676.6	673.3	675.5
Aeronautics	529.5	566.0	551.1	556.6	562.2	567.8	573.5
Space Technology	614.5	576.0	705.5	712.6	719.7	726.9	734.2
Exploration	3,705.5	4,113.2	3,976.0	4,079.9	4,061.2	4,119.5	3,673.4
Exploration Systems Development	2,883.8	3,115.2	2,784.4	2,863.3	2,917.7	2,993.9	3,106.6
Commercial Spaceflight	525.0	696.0	848.3	872.3	791.7	730.9	172.0
Exploration Research and Development	296.7	302.0	343.4	344.3	351.8	394.7	394.7
Space Operations	3,724.9	3,778.0	3,905.4	3,951.9	4,051.0	4,073.8	4,601.8
Space Shuttle	38.8		0.0	0.0	0.0	0.0	0.0
International Space Station	2,775.9		3,050.8	3,126.5	3,266.9	3,290.3	3,818.6
Space and Flight Support (SFS)	910.2		854.6	825.4	784.1	783.5	783.2
Education	116.3	116.6	88.9	89.8	90.7	91.6	92.6
Cross Agency Support	2,711.0	2,793.0	2,778.6	2,806.4	2,834.4	2,862.8	2,891.4
Center Management and Operations	1,991.6		2,038.8	2,059.2	2,079.7	2,100.5	2,121.6
Agency Management and Operations	719.4		739.8	747.2	754.7	762.3	769.8
Construction & Envrmtl Compl Restoration	646.6	515.0	446.1	379.0	382.7	386.6	390.4
Construction of Facilities	589.5		370.6	302.7	305.7	308.7	311.8
Environmental Compliance and Restoration	57.0		75.5	76.3	77.0	77.8	78.6
Inspector General	35.3	37.5	37.0	37.4	37.7	38.1	38.5
Grand Total	16,865.2	17,646.5	17,460.6	17,635.3	17,811.5	17,989.7	18,169.7

**As reflected in the August 2013 Operating Plan, FY 2013 includes rescissions per P.L. 113-6 Division G, Section 3001(b)(1)(B) and Division G, Section 3004(c)(1) and reductions due to sequestration per BBEDCA Section 215A.*

***FY 2014 reflects funding amounts specified in P.L. 113-76, Consolidated Appropriations Act, 2014, including amounts noted in the Explanatory Statement. Where amounts were not specified, no amount is shown in the budget table.*

Note: Funds associated with out-year estimates for programmatic construction remain in programmatic accounts.



FY14 Enacted to FY 2015 Budget Request

	<u>FY14</u>	<u>FY15 Pres</u>	<u>Delta to</u>
	<u>Omnibus</u>	<u>Budget</u>	<u>FY14</u>
Science	\$5,151.2	\$4,972.2	-\$179.0
Earth Science	\$1,826.0	\$1,770.3	-\$55.7
Planetary Science	\$1,345.0	\$1,280.3	-\$64.7
Astrophysics	\$668.0	\$607.3	-\$60.7
James Webb Space Telescope	\$658.2	\$645.4	-\$12.8
Heliophysics	\$654.0	\$668.9	\$14.9
Aeronautics	\$566.0	\$551.1	-\$14.9
Space Technology	\$576.0	\$705.5	\$129.5
Exploration	\$4,113.2	\$3,976.0	-\$137.2
Exploration Systems Development	\$3,115.2	\$2,784.4	-\$330.8
<i>Multi-Purpose Crew Vehicle</i>	\$1,197.0	\$1,052.8	-\$144.2
<i>SLS Vehicle Development</i>	\$1,600.0	\$1,380.3	-\$219.7
<i>Expl. Grnd Sys.</i>	\$318.2	\$351.3	\$33.1
Commercial Spaceflight	\$696.0	\$848.3	\$152.3
Exploration R & D	\$302.0	\$343.4	\$41.4
Space Operations	\$3,778.0	\$3,905.4	\$127.4
Space Shuttle	-	-	
International Space Station		\$3,050.8	
Space and Flight Support		\$854.6	
Education	\$116.6	\$88.9	-\$27.7
Cross-Agency Support	\$2,793.0	\$2,778.6	-\$14.4
CECR	\$515.0	\$446.1	-\$68.9
Inspector General	\$37.5	\$37.0	-\$0.5
NASA FY 2014	\$17,646.5	\$17,460.6	-\$185.9



Opportunity, Growth, and Security Initiative

- While the President’s Budget adheres to the BBA’s discretionary funding levels for 2015, it is not sufficient to expand opportunity to all Americans or to drive the growth our economy needs.
- The BBA replaced half the sequestration cut for 2014 but just one-fifth of the scheduled cut in the discretionary funding level for 2015. As a result, taking into account unavoidable growth in other Federal programs and other factors, the BBA non-defense discretionary funding levels for 2015 are below the levels Congress provided in the bipartisan Consolidated Appropriations Act of 2014.
- For that reason, the Federal Budget also includes a separate, fully paid for \$56 billion Opportunity, Growth, and Security Initiative.
- NASA’s share of that Initiative is \$885M and is designed to show how additional discretionary investments in 2015 can further enable the NASA mission while spurring economic progress, promoting opportunity, and strengthening national security.

Budget Authority (in \$ millions)	FY2015
Science	\$187.3
Aeronautics	\$43.9
Space Technology	\$100.0
Exploration	\$350.0
Space Operations	\$100.6
Education	\$10.0
Construction of Facilities and Environmental Compliance Restoration	\$93.7
Grand Total	\$885.5

Note: Detailed description of the content can be found in NASA’s FY 2015 Budget Justification



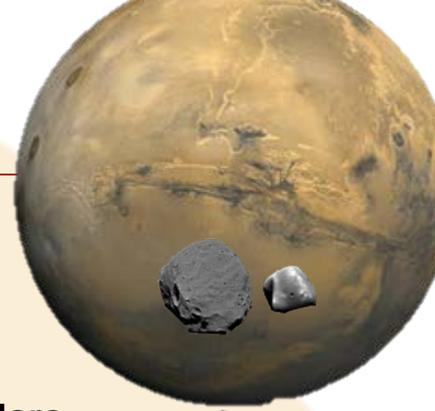
Opportunity, Growth, and Security Initiative Detail

Account	Program/Project	Funding
Science		\$187.3M
	Orbiting Carbon Observatory (OCO)-3	29.3
	Pre-Aerosols, Carbon and Ecosystems (PACE)	50
	Planetary Science -extended mission funding	35
	Radioisotope Power Systems	15
	Research and Analysis	20
	Wide-Field Infrared Survey Telescope (WFIRST)/ Astrophysics Focused Telescope Assets (AFTA)	20
	Earth Science (restoration of Quikscat funding, Solar Radiation & Climate Experiment (SORCE), the President's Climate Action Plan, Big Earth Data Initiative)	18
Aeronautics		\$43.9M
	Altitude Airspace/Unmanned Aerial Systems Research	6
	Computational Fluid Dynamics Analysis Capabilities	24
	Flight Testing Advancements	6
	Vertical Lift	7.9
Space Technology		100M
	Closed Loop Life Support system: ISS Utilization	21
	Composite Structural Technologies	18
	Robotics Challenge	10
	Advanced Manufacturing	7
	Small Spacecraft Technology Demonstrations	10
	In-Space Assembled & Manufactured Structures	6
	NASA Innovative Advanced Technologies	6
	HIAD - Antares	18
	Lander and Ascent Vehicle Composites	4
Exploration		350M
	Commercial Crew	250
	Space Launch System/Orion	100
Space Operations		100.6M
	International Space Station (ISS) Cargo Flights	100.6
Education		10M
	STEM Education and Accountability Projects	10
CECR		93.7M
	LaRC Measurement Sciences Lab	93.7
TOTAL		\$885.5M



The Future of Human Space Exploration

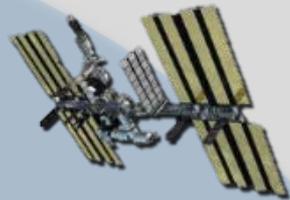
NASA's Building Blocks to Mars



Expanding capabilities at an asteroid redirected to lunar orbit

Exploring Mars and other deep space destinations

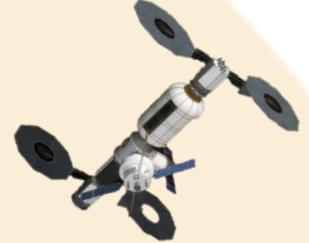
U.S. companies provide affordable access to low Earth orbit



Learning the fundamentals aboard the International Space Station



Traveling beyond low Earth orbit with the Space Launch System rocket and Orion crew capsule



*Missions: 6 to 12 months
Return: hours*

*Missions: 1 month up to 12 months
Return: days*

*Missions: 2 to 3 years
Return: months*

Earth Reliant

Proving Ground

Earth Independent



Human Exploration and Operations

Global Exploration Roadmap



2013

2020

2030





Earth Science

Outyears are notional

(\$M)	2015	2016	2017	2018	2019
Earth Science	\$1,770	\$1,815	\$1,838	\$1,862	\$1,886

- Launches the Soil Moisture Active and Passive mission (SMAP), and the Stratospheric Aerosol and Gas Experiment III (SAGE III) to be mounted on the ISS.
- Formulates and develops ICESat-2, GRACE-Follow On, SWOT, CYGNSS, TEMPO, and a sustained Land Imaging capability.
- Develops and implements plans for measurements of solar irradiance, ozone profiles, and Earth radiation budget.
- Maintains weather and climate change modeling capabilities to enhance forecast accuracy.
- Operates over 21 Earth-observing spacecraft.
- Maintains robust R&A, airborne science (including IceBridge), technology development, and funds the Global Learning and Observations to Benefit the Environment (GLOBE) program.



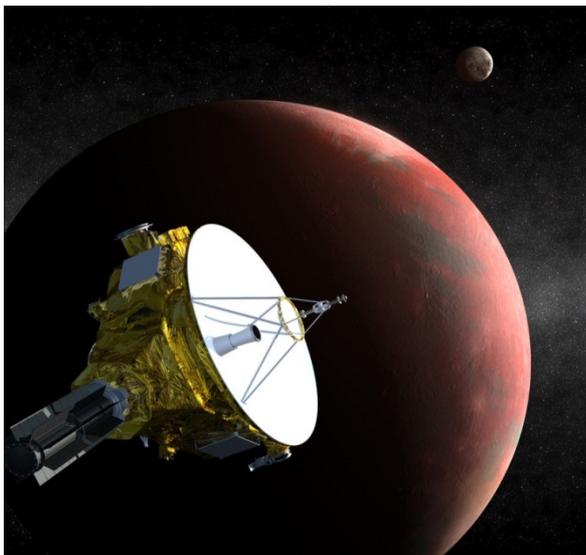


Planetary Science

Outyears are notional

(\$M)	2015	2016	2017	2018	2019
Planetary Science	\$1,280	\$1,305	\$1,337	\$1,356	\$1,374

- Continues formulation and development of the InSight, Mars Rover 2020, and MOMA/ExoMars missions to Mars and the development of the robotic OSIRIS-REx mission to visit an asteroid and return a sample.
- Supports selection of the next mission in the Discovery program.
- Funds pre-formulation work for a potential mission to Jupiter's moon, Europa.
- Continues work on the STROFIO and JUICE instruments in collaboration with European Space Agency partner missions to Mercury and Jupiter,



- Operates 14 Planetary missions including New Horizons (Pluto), MAVEN & Curiosity (Mars), and Cassini (Saturn).
- Maintains a robust R&A program.
- Maintains asteroid detection capabilities to identify and characterize potentially hazardous near-Earth objects (NEOs).

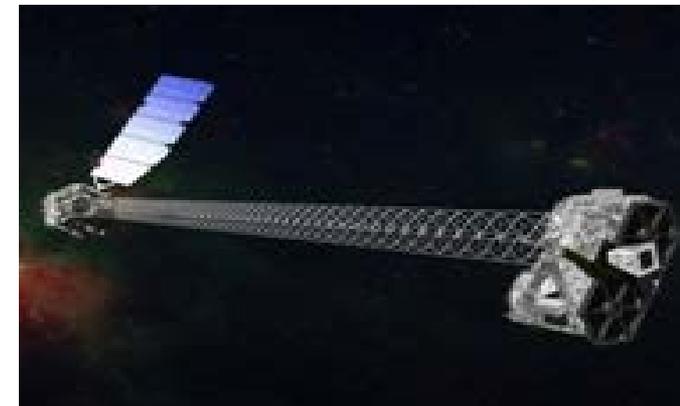
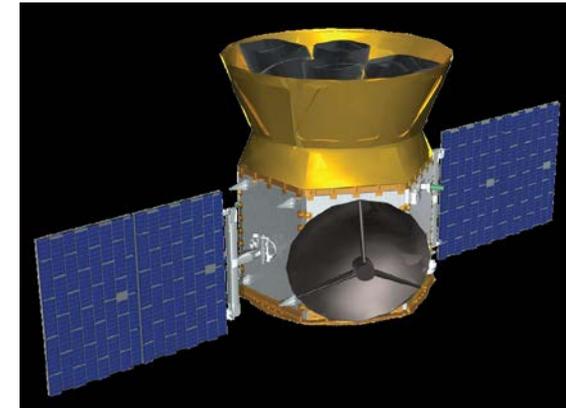


Astrophysics

Outyears are notional

(\$M)	2015	2016	2017	2018	2019
Astrophysics	\$607	\$634	\$651	\$697	\$993

- Supports pre-formulation of WFIRST/AFTA, including technology development for detectors and coronagraph.
- Supports a growing Astrophysics Explorer program with continued development of ASTRO-H, NICER, and TESS, and initiation of the next Small Explorer mission. TESS will continue the search for exoplanets, scanning all of the sky for exoplanets closer to Earth than those found by Kepler.
- Supports operating missions: Hubble, Chandra, and other missions rated highly by the 2014 Senior Review.
- Continues a competed astrophysics research program and support of the balloon program.
- Seeks to work with current partner Germany and potential partners to identify a path forward for SOFIA with greatly reduced NASA funding. Unless partners are able to support the U.S. portion of SOFIA costs, NASA will place the aircraft into storage by FY 2015.





James Webb Space Telescope

Outyears are notional

(\$M)	2015	2016	2017	2018	2019
JWST	\$645	\$620	\$569	\$535	\$305

- Supports the commitment to an October 2018 launch date.
- Continues manufacturing of the flight sunshield structure and membranes.
- Completes and delivers the flight cryogenic cooler tower assembly.
- Delivers the Optical Telescope Element flight structure.
- Initiates integration of the 18 flight primary mirror segments.
- Conducts the final Integrated Science Instrument Module level cryo-vacuum test.

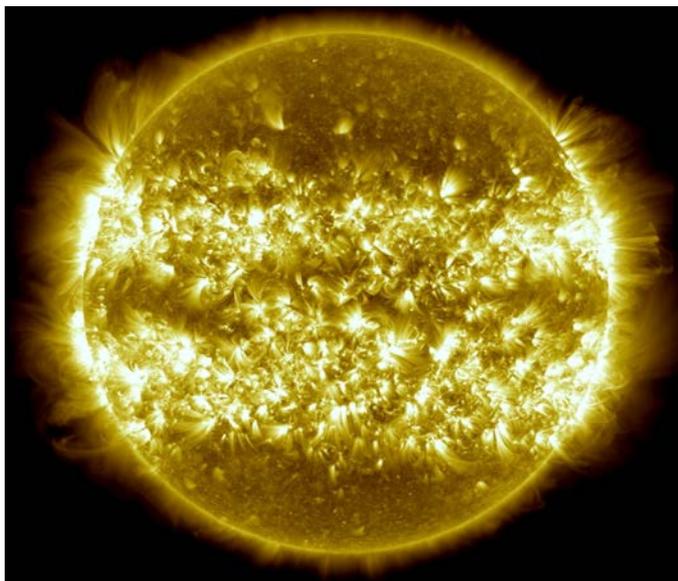
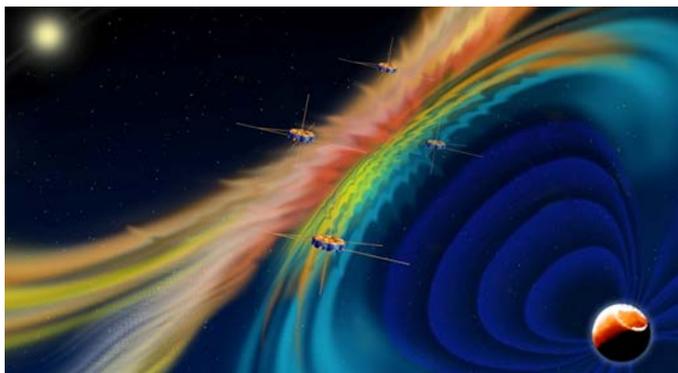




Heliophysics

Outyears are notional

(\$M)	2015	2016	2017	2018	2019
Heliophysics	\$669	\$648	\$677	\$673	\$675



- Launches the MMS mission in FY 2015.
- Continues development of Solar Probe Plus (SPP) project in preparation for 2018 launch.
- Continues Solar Orbiter Collaboration (SOC) partnership with ESA to measure properties and dynamics of solar wind.
- Formulates ICON and GOLD, the recent Explorer selections.
- Supports the robust sounding rocket program as a testbed for new scientific techniques, scientific instrumentation, and spacecraft technology.
- Operates over 19 Heliophysics missions (33 spacecraft), and a robust research program.



Joint Agency Satellite Programs

Joint Agency Satellite Division (JASD) within the Science Mission Directorate efficiently manages NASA's fully reimbursable satellite and instrument development program, which currently includes NOAA funded missions. JASD offers the agencies a single interface for planning, development and management of their satellite projects.

During FY 2015, NASA is committed to ensuring the success of critical space observations of the following reimbursable missions essential to the Nation:

- Solar Wind continuity mission, Deep Space Climate Observatory (DSCOVR) refurbishment.
- Operations of geostationary operational environmental satellites (GOES) missions building four new GOES satellites.
- Jason-3: instruments and launch vehicle.
- Joint Polar Satellite System (JPSS): to include a series of advanced spacecraft, two satellites, five highly-sensitive instruments and a versatile ground system.



Aeronautics

Outyears are notional

(\$M)	2015	2016	2017	2018	2019
Aeronautics	\$551	\$557	\$562	\$568	\$573

- NASA has developed a compelling strategic vision for aeronautics research. This vision led to six strategic thrust areas for research to enable NASA to be responsive to a growing demand for mobility, severe challenges to sustainability of energy and the environment, and technology advances in information, communications, and automation technologies.
- The strategic thrust areas are:
 - Safe, efficient growth in global operations
 - Innovation in commercial supersonic aircraft
 - Ultra-efficient commercial vehicles
 - Transition to low-carbon propulsion
 - Real-time system safety assurance
 - Assured autonomy for aviation transformation.
- This research will continue to support economic growth and high quality jobs, and advances in mobility and long-term sustainability within the aviation industry. And it continues to develop methods and technologies to support implementation of Next Gen.
- As NASA completes the Environmentally Responsible Aviation Project the technologies that have been developed to simultaneously reduce fuel burn, community noise and emissions will be transferred for use by the aviation industry.





Space Technology

Outyears are notional

(\$M)	2015	2016	2017	2018	2019
Space Technology	\$706	\$713	\$720	\$727	\$734

Delivers innovative solutions that dramatically improve technological capabilities for NASA and the Nation including:

- Solar arrays, thrusters and power management for high-powered solar electric propulsion system supporting:
 - The Asteroid Redirect Mission
 - On-orbit transfer of satellites
 - Increased power for satellites
- Completion of 7 launches in 24 months:
 - Deep Space Atomic Clock for precise navigation
 - Green Propellant higher-performing alternative to toxic hydrazine
 - Sunjammer Solar Sail to demo propellant-free propulsion
 - Four small spacecraft demos of pioneering new technologies
- A high-altitude, supersonic demo of advanced parachutes and inflatable entry, descent and landing tech to bring heavier payloads to Mars surface.
- Building bridges with academia to solve our toughest problems - over 400 activities through SBIR/STTR awards, Space Technology Research Grants, Flight Opportunities, Centennial Challenges - ensuring a steady pipeline of innovation into NASA's missions.
- Functions of the Office of Chief Technologist, including agency technology transfer, Agency Grand Challenge and strategic planning for NASA's technology portfolio.



Completed 5.5 meter Cryotank

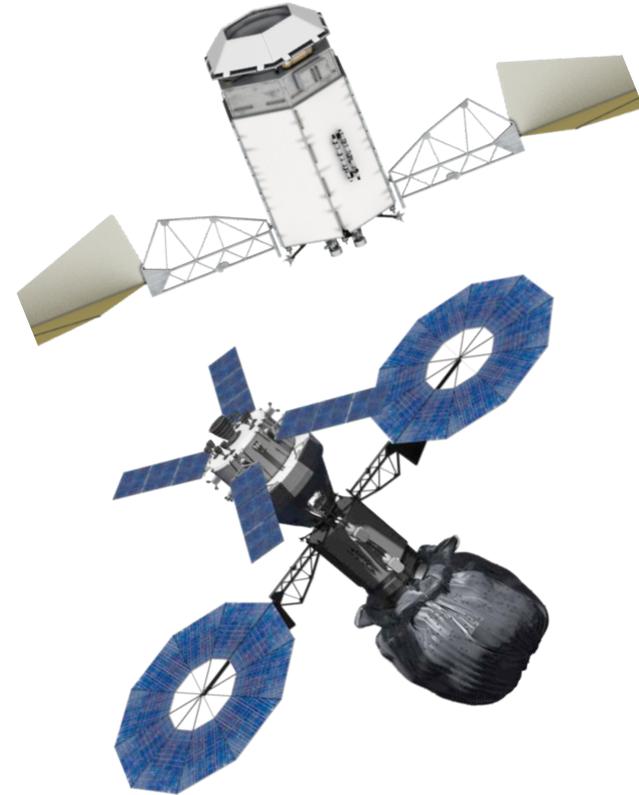


Asteroid Mission/Initiative

NASA's Asteroid Redirect Mission will enable human rendezvous with an asteroid before 2025 and prepare for missions to Mars. NASA is committed to pursuing an affordable and feasible mission. This mission will leverage and align existing activities:

- Asteroid observing efforts to identify and characterize asteroids (in Science);
- Demonstration of high power long life solar electric propulsion (in Space Technology);
- Development of SLS rocket and Orion vehicle for human space flight beyond low Earth orbit (in Exploration Systems); and
- Development of new technologies for exploration in deep space (in ISS and Exploration R&D).

The Budget provides \$133M for early development of the asteroid mission, including advancing solar electric propulsion and capture systems, and conduct of the Mission Concept Review in which the mission architecture will be established.





Additional Funding for Asteroid Initiative

Asteroid Redirect Mission

	FY2014 Operating Plan	FY2015 Request
Science Planetary/Planetary Science Research - Near Earth Object Observations	\$40.5 million* <i>*Includes continuation of \$20.5 million in base funding for asteroid detection</i>	\$40 million <i>*Includes continuation of \$20.5 million in base funding for asteroid detection</i>
Human Exploration Mission Enabling technologies	\$40 million	\$40 million
Space Technology Exploration Technology Development/Technology Demonstration Missions	\$38 million	\$93 million
Space Technology Agency Grand Challenge: Crosscutting Space Technology Development	\$7 million	\$7 million
Total	\$125.5 million	\$180 million
Increase above FY13	\$105 million	\$160 million



Exploration Systems Development

Outyears are notional

(\$M)	2015	2016	2017	2018	2019
ESD	\$2,784	\$2,863	\$2,918	\$2,994	\$3,107

- Provides necessary funding for SLS, Orion and associated Exploration Ground Systems (EGS).
- Maintains the Orion on track for uncrewed test flights in 2014 and FY 2018 and a first crewed flight in FY 2021-22.
- Continues modifications to the Kennedy Space Center's Launch Complex 39-B, Vehicle Assembly building and Launch Control Center to support FY 2018 launch.
- Begins planning for an asteroid mission.
- Note: Exploration Systems Development (ESD) construction funding of \$52M million is requested in the Construction and Environmental Remediation account.





Commercial Spaceflight

Outyears are notional

(\$M)	2015	2016	2017	2018	2019
Commercial Spaceflight	\$848	\$872	\$792	\$731	\$172

- Facilitates development of U.S. commercial crew space transportation capability with a goal of achieving safe, reliable, and cost effective access to and from low Earth orbit and the International Space Station.
- Regains American leadership and reduces our dependence on Russian spaceflight capabilities for crew transportation.
- Builds on successes of the commercial cargo capabilities, the Commercial Crew Development (CCDev) activities, and Commercial Crew integrated Capability (CCiCap) activities.
- Ensures contracted services meet the Agency's crew transportation system certification requirements.





Exploration Research and Development

Outyears are notional

(\$M)	2015	2016	2017	2018	2019
Exploration R&D	\$343	\$344	\$352	\$395	\$395

- Includes the Human Research Program (HRP) and the Advanced Exploration Systems (AES) Program.
 - HRP researches the human system to provide countermeasures, knowledge, technologies, and tools to enable safe, reliable, and productive human spaceflight missions.
 - AES pioneers new approaches for rapidly developing prototype systems, demonstrates key capabilities, and validates operational concepts for future human missions beyond Earth orbit.
 - AES maintains critical competencies at the NASA centers and is seeking to increase the use of that expertise in public-private partnerships to work in collaboration with the outside entities. AES also partners with the Science Mission Directorate and Space Technology Mission Directorate on robotic missions and technologies that meet science and exploration objectives.
- Expands fundamental knowledge and develops advanced human spaceflight capabilities required to explore space in a more sustainable and affordable way.
- Continues investment in concepts for astronaut extravehicular activity (EVA) technologies including concepts for an EVA with an asteroid.



International Space Station

Outyears are notional

(\$M)	2015	2016	2017	2018	2019
ISS	\$3,051	\$3,127	\$3,267	\$3,290	\$3,819

- Maximizes utilization of the ISS to support U.S. and International partners' research and technology development, including establishing "open source science" platforms to advance Space Life and Physical Sciences research throughput on ISS.
- Enables:
 - Extension of station to at least 2024. (No additional budget required in FY 2015-2019)
 - ISS activities, including EVA and visiting vehicles.
 - As-needed anomaly resolution and failure investigation.
 - Development of hardware that supports research.
 - Utilization of new hardware to perform plant research and investigate gravity effects on physiology and biology.
 - Cargo resupply of the ISS.
 - In-space robotic servicing technologies such as autonomous rendezvous and docking, dexterous robotics, and advanced robotic tools for ARM, satellites, Orion, etc.





Space and Flight Support

Outyears are notional

(\$M)	2015	2016	2017	2018	2019
SFS	\$855	\$825	\$784	\$784	\$783

- Continues modernization efforts to provide capabilities and infrastructure for developing public and private space market.
- Funds space communication and navigation sustainment activities that endow capabilities to all missions through numerous networks.
- Supports government and commercial rocket propulsion testing at NASA test facilities.
- Ensures crew health and expertise for current and future missions by maintaining the U.S. astronaut corps with appropriate skills and experience.
- Provides safe, reliable, and cost effective launch services for NASA, Commercial and NASA-sponsored payloads using ELVs.
 - Launch Services Program will manage 3 launches in FY 2015 - Magnetospheric Multiscale, the Soil Moisture Active Passive, and NOAA's Jason-3 missions.





Education

Outyears are notional

(\$M)	2015	2016	2017	2018	2019
Education	\$89	\$90	\$91	\$92	\$93

- Proposes education efforts within the Agency to support the principles of the Administration’s STEM reorganization and aligns education investments with the Five-year Federal Strategic Plan on STEM Education.
- Supports the Office of Education efforts that use competitive processes to fund the best education and public outreach programs within NASA and to coordinate closely with the CoSTEM agencies to broaden the reach of NASA’s capability to inspire and educate.
- Continues the Agency’s investment in the Space Grant, EPSCoR, and MUREP. Also maintains a focus on Minority Serving Institutions and community colleges, which generally serve a high proportion of minority students and prepare them for entry into the STEM workforce and for study at a four-year institution. These investments are critical and unique components that NASA can integrate in the STEM Coordination efforts.





Cross-Agency Support and Construction

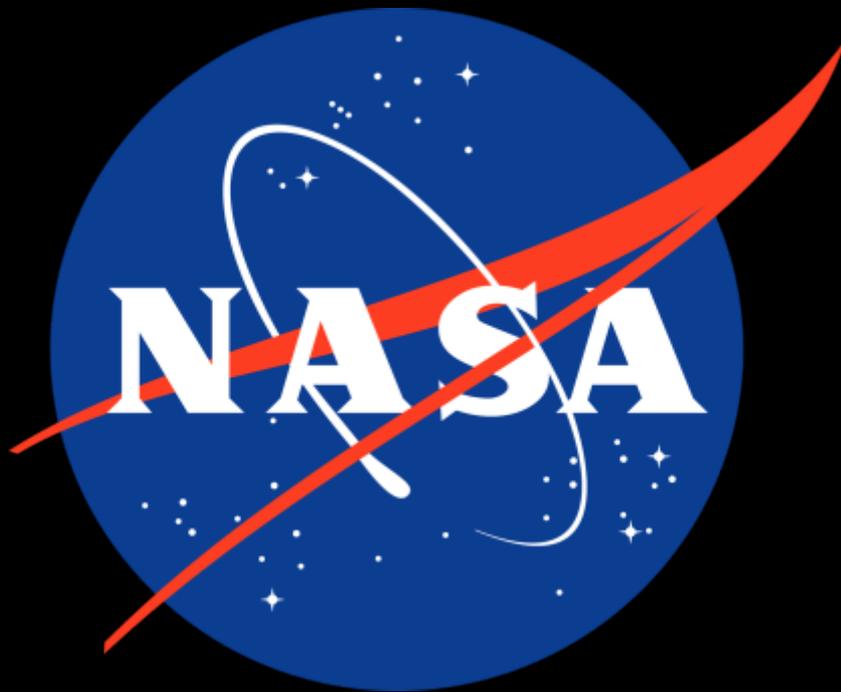
(\$M)	Outyears are notional				
	2015	2016	2017	2018	2019
Cross-Agency	\$2,779	\$2,806	\$2,834	\$2,863	\$2,891
Construction & ECR	\$446	\$379	\$383	\$387	\$390

➤ Cross-Agency Support

- Funds ongoing management, operations and maintenance of nine field centers and associated major component facilities
- Provides management and independent oversight of Agency missions, programs, functions, and performance of NASA-wide mission support activities
- Maintains and ensures the availability and safety of critical capabilities necessary for advancing our space, air, and Earth-based activities including attracting and advancing a highly skilled, competent, and diverse workforce

➤ Construction and Environmental Compliance and Restoration

- Funds repair, revitalization, demolition, and recapitalization projects that reduce the Agency's footprint and provide efficient, modernized facilities
- Constructs new or modified facilities to conduct NASA's program missions
- Manages NASA's environmental clean-up responsibilities





Acronyms

- **AES: Advanced Exploration Systems**
- **CCDev: Commercial Crew Development**
- **CCP: Commercial Crew Program**
- **CRS: Cargo Resupply Services**
- **CYGNSS: Cyclone Global Navigation Satellite System**
- **DSCOVR: Deep Space Climate Observatory**
- **ECR: Environmental Compliance and Restoration**
- **EGS: Exploration Ground Systems**
- **EFT: Exploration Flight Test**
- **ELV: Expendable Launch Vehicle**
- **EM: Exploration Mission**
- **EPSCoR: Experimental Program to Stimulate Competitive Research**
- **ESA: European Space Agency**
- **ESD: Exploration Systems Development**
- **EVA: Extravehicular Activity**
- **EVI: Earth Venture Instrument**
- **EVS: Earth Venture Sub-Orbital solicitation**
- **FTE: Full Time Equivalent**
- **GLOBE: Global Learning and Observations to Benefit the Environment**
- **GOES: Geostationary Operational Environmental Satellite**
- **GOLD: Global Scale Observations of the Limb and Disk**
- **GPM: Global Precipitation Mission**
- **GRACE: Gravity Recovery and Climate Experiment**
- **HRP: Human Research Program**
- **ICESat: Ice Cloud and Land Elevation Satellite**
- **ICON: Ionospheric Connection Explorer**
- **IRIS: Interface Region Imaging Spectrograph**
- **ISS: International Space Station**
- **JASD: Joint Agency Satellite Division**
- **JPSS: Joint Polar Satellite System**
- **JWST: James Webb Space Telescope**
- **JUNO: Jupiter Uranus Neptune Outreach**
- **LADEE: Lunar Atmosphere Dust Environment Explorer**
- **LDCM: Landsat Data Continuity Mission**
- **LWS: Living With a Star**
- **LSP: Launch Services Program**
- **MAVEN: Mars Atmosphere and Volatile Evolution**
- **MMS: Magnetospheric Multiscale Mission**
- **MoO: Missions-of-Opportunity**
- **MSL: Mars Science Laboratory**
- **MPCV: Multi-Purpose Crew Vehicle**
- **MUREP: Minority University research and Education Program**
- **NOAA: National Oceanographic and Atmospheric Administration**
- **NICER: Neutron Star Interior Composition Explorer**
- **NPP: NPOESS Preparatory Project**
- **OCO: Orbiting Carbon Observatory**
- **OSIRIS-Rex: Origins Spectral Interpretation Resource Identification Security Regolith Explorer**
- **POES: Polar Operational Environmental Satellite**
- **R&D: Research & Development**
- **SAGE: Stratospheric Aerosol and Gas Experiment**
- **SET: Space Environment Testbeds**
- **SFS: Space and Flight Support**
- **SLS: Space Launch System**
- **SMAP: Soil Moisture Active-Passive Mission**
- **SOFIA: Stratospheric Observatory for Infrared Astronomy**
- **ST: Space Technology**
- **STEM: Science, Technology, Engineering and Mathematics**
- **SWOT: Surface Water and Ocean Topography**
- **TCTE: Total Solar Irradiance Calibration Transfer Experiment**
- **TDRS: Tracking and Data Relay Satellite**
- **TEMPO: Tropospheric Emissions Monitoring of Pollution**
- **TESS: Transiting Exoplanet Survey satellite**
- **WFIRST: Wide Field Infra Red Survey telescope (AFTA: Astrophysics Focused Telescope Assets)**