NASA FY 2015 Budget Request for Science

Actuals FY 2013[1]	Enacted FY 2014[2]	FY 2015	*Notional* FY 2016[3]	*Notional* FY 2017	*Notional* FY 2018	*Notional* FY 2019
$4,782M	$5,151M	$4,972M	$5,022M	$5,072M	$5,123M	$5,174M

The FY 2015 budget provides $4,972 million to the Science Mission Directorate. The budget request:

- Includes five major science areas
  - $1,770 million for Earth Science to improve climate modeling, weather prediction, and natural hazard mitigation, through Earth observation from space.
  - $1,280 million for Planetary Science to explore the planetary bodies of our solar system.
  - $607 million for Astrophysics to scan the universe to learn its expanse and search for Earth-like planets.
  - $645 million to keep the James Webb Space Telescope on track for launch in 2018.
  - $669 million for Heliophysics to study the Sun and its influence throughout the solar system.
- Supports over ninety space missions
  - About 35 missions currently preparing for launch and nearly 60 operating missions.
  - In addition, sounding rockets, aircraft, and high-altitude balloons.
- Invests in developing advanced technologies
  - Developing optics and detectors to find planets around other stars, rovers to investigate for signs of past or present life on Mars, and new instruments to take the pulse of our planet.
  - Engaging industry, academia, and other government labs via open, competitive solicitations
- Supports over 10,000 U.S. scientists
  - Over 3,000 openly competed research awards with universities, industry, and government labs.
  - World-leading research that frequently is highlighted on the covers of *Science, Nature*, and the NYT.
- Includes partnerships with a dozen other Federal agencies and sixty other nations
  - Collaborating with other science agencies and agencies that need science results, including NSF, DOE, NOAA, FAA, USDA, DOI, EPA, and DOD
  - Partnering with longstanding and newly space-faring nations to meet both scientific and foreign policy goals.
  - Building and launching the nation's weather satellites for NOAA.
- Furthers our search to answer some of humanity's most profound questions
  - How are Earth's climate and the environment changing?
  - How and why does the Sun vary and affect Earth and the rest of the solar system?
  - How do planets and life originate?
  - How does the universe work, and what are its origin and destiny?
  - Are we alone?
- Provides benefits to our nation and our planet
  - Leading the scientific exploration of the Earth, the solar system, and the universe beyond.
  - Enhancing economic growth via high-tech jobs and new technologies and improving quality of life through applications such as improved medical imaging devices.
  - Assisting responses to national and international disasters.
- Greatly reduces funding for the Stratospheric Observatory for Infrared Astronomy (SOFIA)
  - Savings from SOFIA can have a larger impact supporting other science missions.
  - Unless partners are able to support the U.S. portion of SOFIA costs, NASA will place the aircraft into storage by FY 2015.

The Opportunity, Growth and Security Initiative also provides $187 million to support the formulation of several new missions, extended mission operations, research and analysis, and continued technology development.

[1] 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.
[2] 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.
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NASA FY 2015 Budget Request for Aeronautics Research

Actuals FY 2013[1]	Enacted FY 2014[2]	FY 2015	*Notional* FY 2016[3]	*Notional* FY 2017	*Notional* FY 2018	*Notional* FY 2019
$530M	$566M	$551M	$557M	$562M	$568M	$574M

NASA's FY 2015 budget provides $551 million to the Aeronautics Research Mission Directorate. This budget will be used to conduct aeronautics research to bring transformational advances in the safety, capacity, and efficiency of the air transportation system while minimizing negative impacts on the environment. NASA recently developed a new and compelling strategic vision that focused the Aeronautics research to best contribute to the nations' future societal and economic vitality. To reach this vision, the Aeronautics research has been aligned to focus on newly defined strategic thrust areas. The budget request provides:

- $131 million for the Airspace Operations and Safety Program to develop and explore fundamental concepts, algorithms, and technologies to increase throughput and efficiency of the National Airspace System safely. The program also provides knowledge, concepts, and methods to the aviation community to manage increasing complexity in the design and operation of vehicles and the air transportation system.
- $214 million for the Advanced Air Vehicles Program to conduct fundamental research to improve aircraft performance and minimize environmental impacts from subsonic air vehicles; to develop and validate tools, technologies and concepts to overcome key barriers, including noise, efficiency, and safety, for rotorcraft vehicles; and to explore advanced capabilities and configurations for low boom supersonic aircraft. The program will also conduct research to reduce the timeline for certification of composite structures for aviation, and will ensure the strategic availability, accessibility, and capability of a critical suite of aeronautics ground test facilities to meet Agency and national aeronautics testing needs.
- $127 million for the Integrated Aviation Systems Program to conduct research on promising concepts and technologies at an integrated system level. The program explores, assesses, and demonstrates the benefits of these potential technologies in a relevant environment. The program includes research into environmentally responsible aviation and unmanned system integration into the national airspace. The program will also support the flight research needs across the Aeronautics programs and projects, and will complete collaborative flight research with partners from across the aeronautical industry.
- $79 million for the Transformative Aeronautics Concepts Program to cultivate multi-disciplinary, revolutionary concepts to enable aviation transformation and harness convergence in aeronautics and non-aeronautics technologies to create new opportunities in aviation. The Program's goal is to knock down technical barriers and infuse internally- and externally-originated concepts across aeronautics, creating innovation for tomorrow in the aviation system. Using sharply-focused activities, the Program provides flexibility for innovators to explore technology feasibility and provide the knowledge base for radical transformation. The program solicits and encourages revolutionary concepts, creates the environment for researchers to become immersed in trying out new ideas, performs ground and small-scale flight tests, allows failures and learns from them, and drives rapid turnover into new concepts.

The Opportunity, Growth, and Security Initiative also includes $44 million to support aeronautics research and capabilities in vertical lift technologies, U.S. operations in low-altitude airspace, advance simulation capabilities, and flight test advancements.

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[2] 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.
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NASA FY 2015 Budget Request for Space Technology

Actuals FY 2013[1]	Enacted FY 2014[2]	FY 2015	*Notional* FY 2016[3]	*Notional* FY 2017	*Notional* FY 2018	*Notional* FY 2019
$615M	$576M	$706M	$713M	$720M	$727M	$734M

The FY 2015 request is $706 million to fund innovative solutions that dramatically improve technological capabilities for NASA and the Nation. Space Technology contains both the near-term mission-driven and long-range transformative technologies required to meet our Nation's far-reaching exploration and science goals. The budget request provides:

- $257 million for Crosscutting Space Technology Development, enabling advances in technology for NASA's future science and exploration missions, and addressing national needs.
  - Conducts 7 launches in 24 months including: deep space atomic clock for advanced navigation, green propellant alternative to hydrazine, Sunjammer solar sail to test propellant-free propulsion, and four small spacecraft demonstrations of pioneering new technologies.
  - Continues on-going development in broadly applicable space-to-ground laser communication for in-space demonstration in 2018.
  - Conducts high-altitude, high-speed, supersonic demonstration of advanced parachutes and inflatable entry, descent and landing technologies.
  - Continues a steady cadence of new technology starts to be conducted by the NASA workforce, academia, and businesses large and small within the aerospace industry, ensuring a healthy pipeline of innovation to NASA's missions.
- $225 million for Exploration Technology Development to develop technologies that specifically address breakthroughs that can help achieve the Nation's human exploration goals.
  - Pursues the high-powered solar electric propulsion capability to enable orbit transfer for satellites, accommodate increasing power demands for satellites, and power the robotic segment of the Asteroid Redirect Mission.
  - Invests in capabilities needed for deep-space exploration at destinations such as Lagrange points, moon and Mars including advanced life support, entry, descent, and landing technologies, advanced space robotic systems, advanced thermal management technologies, advanced batteries and fuel cells, lightweight structures, cryogenic storage and transfer capabilities, and in-situ resource utilization.
  - Aligns investments with NASA's Human Exploration and Operations Mission Directorate (HEOMD) to reduce technological barriers and mission risk and to increase system efficiency.
- $191 million for the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs to support research and development performed by small businesses through competitively awarded contracts.
- $34 million for Partnership Development and Strategic Integration, which:
  - Provides strategy, leadership, and coordination that guides NASA technology and innovation
  - Provides Agency-level leadership and coordination of the use of prizes and competitions to spur innovation
  - Leads technology transfer and commercialization activities across the agency, extending the benefits of NASA's technology investments so they have a direct and measurable impact on daily life.

The Opportunity, Growth and Security Initiative also provides an additional $100 million for Space Technology to support new technology development for life support in space, composite structures, robotics, advanced manufacturing, small spacecraft demonstrations, in-space manufactured and assembled structures, aerospace landing and ascent, and other innovative capabilities.

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[2] 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.
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NASA FY 2015 Budget Request for Human Exploration Operations

Actuals FY 2013[1]	Enacted FY 2014[2]	FY 2015	*Notional* FY 2016[3]	*Notional* FY 2017	*Notional* FY 2018	*Notional* FY 2019
$7,430M	$7,891M	$7,881M	$8,032M	$8,112M	$8,193M	$8,275M

The FY 2015 budget requests $7,881 million for the Human Exploration Operations Mission Directorate ($3,976 million for Exploration and $3,905 million for Space Operations). The budget request provides:

- $3,051 million for the International Space Station (ISS). As the world's only crewed space-based multinational research laboratory and technology test bed, ISS is critical to the future of human exploration beyond low Earth orbit.
  - Enables scientists to identify and quantify risks to human health and performance, develop countermeasures, and develop and test technologies that protect astronauts during extended human space exploration.
  - Supports unique research and development opportunities in the areas of biological and physical processes.
  - Maintains the ISS international partnership that has transformed space exploration from an effort for the advancement of individual nations to an endeavor to the betterment of humankind.
  - Supports current and planned Earth and Space Science observation missions.
  - Sustains NASA's success in transitioning the ISS cargo supply function to American private industry.
  - Supports development of in space servicing equipment and techniques

- $848 million for Commercial Spaceflight
  - Continues NASA's partnership with U.S. commercial space industry to develop and operate safe, reliable, and affordable systems to transport crew to and from the ISS and low Earth orbit. This activity will allow for additional ISS research by providing an additional crewmember, and will provide rescue capability for the crew on the ISS. This strategy assures U.S. access to the ISS, bolsters American leadership, and reduces our reliance on foreign providers.

- $2,784 million for Exploration Systems Development
  - Continues development of the Orion Multi-Purpose Crew Vehicle, Space Launch System (SLS), and Exploration Ground Systems (EGS) that will send astronauts on deep space exploration missions. A crewed mission to rendezvous with a redirected asteroid in cis-lunar space will allow NASA to expand crewed operations beyond low earth orbit as a proving ground for Mars class missions. In FY 2015, both SLS and Orion will undergo their respective critical design reviews to assure that each program's design can meet all requirements with appropriate margins and acceptable risk, as well as demonstrating the Agency's commitment to fiscal responsibility and budget discipline.
  - EGS will continue to refine launch infrastructure and operations requirements concepts and designs in support of the SLS and Orion programs. Modifications to existing facility and command and control systems will be ongoing.

- $343 million for Exploration Research and Development
  - $183 million for Advanced Exploration Systems (AES) to develop foundational technologies for future exploration missions. Major products include systems development for reliable life support, deep space habitats, crew mobility systems, advanced space suits – (including concepts for astronaut extravehicular activity (EVA) with an asteroid), public-private partnerships for lander capabilities, in-space in-situ resource utilization capabilities, and autonomous space operations, which enable future human missions beyond Earth orbit, while reducing life cycle costs of future explorations systems.

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[2] 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.
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This activity maintains competencies through the primary support of NASA civil servants. AES collaborates with the Science Mission Directorate and Space Technology Mission Directorate.
    - $160 million for Human Research to study human systems and develop technologies and tools for understanding and mitigating risks to enable safe, reliable, and productive astronaut health and performance during space exploration.

- $855 million for Space and Flight Support
    - Continues providing mission critical space communications and navigation services to customer missions, including human, science, and commercial crew and cargo missions.
    - Continues the replenishment of Tracking Data Relay Satellite (TDRS) fleet with production of TDRS-M and support to Space Network Ground Segment Sustainment modernization of the aging Space Network.
    - Supports the readiness and health of the crew for all NASA human spaceflight endeavors.
    - Provides safe, reliable, and cost-effective launch services for three NASA payloads in FY 2015 and gives launch-related support to approximately 40 NASA scientific spacecraft missions in various phases of development.
    - Continues to strategically manage NASA's rocket testing core capability to meet U.S. rocket testing requirements.

The Opportunity, Growth and Security Initiative also includes $451 million to support Commercial Crew, SLS, Orion and ISS activities. For Exploration Systems Development, it provides an additional $100 million to support and address long lead procurement challenges, reduce or retire technical and programmatic risks, and maintain concurrent development between Orion, SLS, and EGS. For Commercial Crew, it provides $250 million to support the Agency's goal to maintain industry competition and reduce technical and schedule risk. For ISS, it provides an additional $101 million to offset the reduction of planned CRS flights.

NASA FY 2015 Budget Request for Education

Actuals FY 2013[1]	Enacted FY 2014[2]	FY 2015	*Notional* FY 2016[3]	*Notional* FY 2017	*Notional* FY 2018	*Notional* FY 2019
$116M	$117M	$89M	$90M	$91M	$92M	$93M

The FY 2015 budget requests $89 million for the Education program. The budget request:

- Proposes to restructure the Agency's education efforts to better align to the principles of the Administration's STEM reorganization and Five-Year Federal Strategic Plan on STEM Education.

- Continues the Agency's investment in the Aerospace Research and Career Development (ARCD) program to support Space Grant and Experimental Program to Stimulate Competitive Research (EPSCoR)
  - $24 million for Space Grant, a nationwide network of colleges, universities, and other organizations that provide NASA space-related opportunities to learners, educators, and the public.
  - $9 million for EPSCoR, which provides competitive NASA-related research opportunities to institutions in eligible states.

- Provides $56 million for the STEM Education and Accountability (SEA) program to support the Minority University Research and Education Project (MUREP) and STEM Education and Accountability Projects (SEAP).
  - $30 million for MUREP, which provides financial assistance (internships, scholarships, and fellowships grants and cooperative agreements) to the Nation's Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), Asian American and Native American Pacific Islander-Serving Institutions (AANAPISIs), Tribal Colleges and Universities (TCUs) and eligible community colleges as required by the four Minority Serving Institutions (MSIs) Executive Orders.
  - $26 million for SEAP to support, through a competitive process, the best application of unique NASA assets, missions, and discoveries to advance the Administration's education goals. NASA will continue to work with other agencies to support the goals articulated in the Five-Year Federal Strategic Plan on STEM Education to inspire k-16 student achievement and educator professional development in STEM fields.

- Continues the ARCD and SEA programs' competitive, evidence-based projects to contribute to the infrastructure necessary to support the rigorous collection, evaluation, and dissemination of evidence of NASA's contributions towards the achievement of the Agency's strategic plan and the wider Administration STEM goals.

- Pursues a more focused portfolio of education efforts funded through the Office of Education. Proposes to internally consolidate some functions, assets and efforts previously funded Human Exploration and Operations Mission Directorate, Aeronautics Research Mission Directorate, and Cross Agency Support Accounts.

Additionally, the Opportunity, Growth, and Security Initiative includes $10 million for the Office of Education to enhance the reach and impact of NASA education activities. Specifically, this funding would augment competitive funding within SEAP that would advance learning and engagement via partnerships or forms of direct financial assistance for youth, including undergraduates, and for youth-serving informal education institutions.

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[2] 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.
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NASA FY 2015 Budget Request for Cross Agency Support

Actuals FY 2013[1]	Enacted FY 2014[2]	FY 2015	*Notional* FY 2016[3]	*Notional* FY 2017	*Notional* FY 2018	*Notional* FY 2019
$2,771M	$2,793M	$2,779M	$2,806M	$2,834M	$2,863M	$2,891M

The FY 2015 budget provides $2,779 million for Cross Agency Support. NASA will continue to seek additional operational efficiencies across the Agency, including Center and Headquarters services. The budget request provides:

- $2,039 million for Center Management and Operations to fund ongoing management, operations, and maintenance of NASA Centers and associated component facilities, including:
  - $1,584 million to provide the basic support required to meet internal and external requirements; effectively manage human capital, information technology, and facility assets; responsibly execute financial management and acquisition responsibilities; and provide a safe, secure, and environmentally sustainable workplace.
  - $455 million for technical facilities, workforce expertise and skills, equipment, and other resources required to implement the program at the center and ensure engineering and safety oversight of NASA programs.
- $740 million for Agency Management and Operations to fund the management and oversight of Agency missions, programs and functions, and performance of NASA-wide mission support activities, including:
  - $366 million for Agency Management to support executive-based, Agency-level functional and administrative management requirements and for the operational activities of Headquarters as a center.
  - $164 million for Safety and Mission Success activities required to reduce the risk, loss of life and/or mission, in our manned and unmanned programs, including engineering; safety and mission assurance; independent health and medical oversight; and independent software verification and validation.
  - $184 million for Agency Information Technology Services, to improve IT security and provide cross-cutting services and initiatives in IT management, applications, and infrastructure to enable the NASA Mission and improve the security, integration, and efficiency of Agency IT operations.
  - $27 million for the Strategic Capabilities Assets Program to provide the skilled workforce and essential preventive maintenance to keep core test facilities available to meet the current and future Agency needs and to ensure core test facilities are in a state of readiness.

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[2] 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.
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NASA FY 2015 Budget Request for

Construction and Environmental Compliance and Restoration

Actuals FY 2013[1]	Enacted FY 2014[2]	FY 2015	*Notional* FY 2016[3]	*Notional* FY 2017	*Notional* FY 2018	*Notional* FY 2019
$647M	$515M	$446M	$379M	$383M	$387M	$390M

The FY 2015 budget provides $446 million for Construction and Environmental Compliance and Restoration (CECR), and includes funds realigned from mission directorate budgets to effect statutory direction to fund programmatic construction projects in the CECR account. The budget provides:

- $300 million for Institutional Construction of Facilities to fund capital repairs and improvement to ensure that center infrastructure critical to achieving NASA's space and aeronautics programs are safe, secure, environmentally sound, and operate efficiently. NASA seeks to achieve a sustainable and energy-efficient infrastructure by replacing old, inefficient, deteriorated buildings with new, efficient, high-performance buildings while reducing our footprint.

- $71 million for Programmatic Construction of Facilities projects to carry out specific Exploration Systems and Space Operations programmatic requirements in FY 2015. Funding in this category was realigned from the mission directorates to the CECR budget to effect Congressional direction that all NASA construction projects be funded in the CECR account. The FY 2015 request for Programmatic Construction of Facilities includes funding to achieve Space Launch System, Orion, Exploration Ground Systems, 21st Century Launch Complex, and Space Communications and Navigation requirements. Funding associated with all program designs and out-year programmatic construction activities remains in program accounts.

- $76 million for Environmental Compliance and Restoration to support cleanup of hazardous materials and waste released to the surface or groundwater at NASA installations, NASA-owned industrial plants supporting NASA activities, current or former sites where NASA operations contributed to environmental problems, and other sites where the Agency is legally obligated to address hazardous pollutants.

The Opportunity, Growth, and Security Initiative includes $94 million to construct the Langley Research Center (LaRC) Measurement Sciences Laboratory. The facility will be a premier research and development facility for NASA, allowing LaRC to conduct state-of-the-art research in aeronautics for the next 40 years.

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[2] 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.
[3] Funds associated with out-year estimates for programmatic construction remain in programmatic accounts.