FY 2018 NASA Budget Comparison

Update 1

President's FY 2018 NASA Budget Request; FY 2017 Consolidated Appropriations Act (P.L. 115-31)

This document provides an overview of the President's FY 2018 NASA Budget request in comparison with the Consolidated Appropriations Act for FY 2017. The first section provides a comparison of funding levels provided by each top-line item. The analysis looks in detail at the proposal's allotments within Science, Exploration, Space Operations, and Space Technology.

NASA Budget Proposal Overview – FY 2018 Funding

Budget Authority, $ in millions	FY 2017 Consolidated Appropriations Act (P.L. 115-31)	President's FY 2018 NASA Base Budget Request
Science	5,764.900	5,711.800
Aeronautics Research	660.000	624.000
Space Technology	686.500	678.600
Exploration	4,324.000	3,934.097
Education	100.000	37.300
Safety, Security, and Mission Services	2,768.600	2,830.200
Construction and Environmental Compliance and Restoration	360.700	496.100
Space Operations	4,950.700	4,740.803
Office of Inspector General	37.900	39.300
Total	**19,653.300**	**19,092.200**

Science

Budget Authority, $ in millions	FY 2017 Consolidated Appropriations Act (P.L. 115-31)	President's FY 2018 NASA Budget Request
Earth Science	1,921.0	1,754.1
Planetary Science	1,846.0	1,929.5
Astrophysics	750.0	816.7
James Webb Space Telescope	569.4	533.7
Heliophysics	678.5	677.8
Education	--	--
Total	**5,764.9**	**5,711.8**

President's FY 2018 Budget Request for Overall Science Portfolio

In FY 2018, the President's base budget requested $5.711 billion for Science missions, $53.1 million below the funds appropriated for Science missions in FY 2017.

Earth Science

About

From space, NASA satellites can view Earth as a planet and enable the study of it as a complex, dynamic system with diverse components: the oceans, atmosphere, continents, ice sheets, and life. The Nation's scientific community can thereby observe and track global-scale changes, connecting causes to effects. Through partnerships with agencies that maintain forecasting and decision support systems, NASA improves national capabilities to predict climate, weather, and natural hazards, manage resources, and support the development of environmental policy.

- President's FY 2018 Earth Science Missions:
  - $287.8 million for Earth Science Research and Analysis;
  - $118.9 million for Computing and Management;
  - $92.3 million for Ice, Cloud, and Land Elevation Satellite-2;
  - $20.5 million GRACE Follow-On;
  - $90.9 million for Surface Water and Ocean Topography;
  - $55.4 million for Mission (SWOT) NASA-ISRO Synthetic Aperture Radar (NISAR);
  - $53.4 million for Sentinal-6;
  - $175.8 million for Landsat 9;
  - $289.7 million for Other Missions and Data Analysis within Earth Systematic Missions;
  - $199.1 million for Venture Class Missions;
  - $65.4 million for Other Missions and Data Analysis within Earth Systems Science Pathfinder Missions;
  - $196.5 million for Earth Science Multi-Mission Operations;
  - $60.4 million for Earth Science Technology;
  - $47.9 million for Applied Sciences;

Planetary Science

About

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.

- President's FY 2016 Planetary Science Missions:
  - $197.9 million for Planetary Science Research and Analysis;

- $50.0 million for Near Earth Object Observations;
- $43.6 million for Other Missions and Data Analysis within Planetary Science Research;
- $109.4 million for InSight;
- $101.4 million for Lucy;
- $25.0 million for Psyche;
- $70.3 million for Other Missions and Data Analysis within Discovery;
- $82.1 million for New Frontiers;
- $374.3 million for Mars Rover 2020;
- $210.4 million for Other Missions and Data Analysis within Mars Exploration;
- $425.0 million for Jupiter Europa
- $32.9 million for Other Missions and Data Analysis within Outer Planets and Ocean Worlds;
- $207.2 million for Technology;

Astrophysics

About

Having measured the age of the universe, the scientific community now seeks to explore its ultimate extremes: its birth, the edges of space and time near black holes, and the mysterious dark energy filling the entire universe. Scientists have recently developed astronomical instrumentation sensitive enough to detect planets around other stars.

- President's PBR 2018 Astrophysics Missions:
  - $74.1 million for Astrophysics Research and Analysis;
  - $37.3 million for Balloon Project;
  - $49.1million for Other Missions and Data Analysis within Astrophysics Research;
  - $83.3 million for Hubble Space Telescope;
  - $79.9 million for Stratospheric Observatory for Infrared Astronomy;
  - $28.4 million for Other Missions and Data Analysis within Cosmic Origins;
  - $99.9 million for Physics of the Cosmos;
  - $176 million Exoplanet Exploration;
  - $36.9million for Transiting Exoplanet Survey Satellite;
  - $107.8 million for Other Missions and Data Analysis within Astrophysics Explorer;

James Webb Space Telescope

About

The James Webb Space Telescope (JWST) is a large, space-based astronomical observatory. The mission is a logical successor to the Hubble Space Telescope, extending beyond Hubble's discoveries by looking into the infrared spectrum, where the highly red-shifted early universe must be observed, where relatively cool objects like protostars and protoplanetary disks emit infrared light strongly, and where dust obscures shorter wavelengths. JWST is scheduled to launch in October of 2018.

President's FY 2018 James Webb Space Telescope:

- $533 million for James Webb Space Telescope

Heliophysics

About

Using a fleet of sensors on various spacecraft in Earth orbit and throughout the solar system, NASA seeks to understand how and why the Sun varies, how Earth responds to the Sun, and how human activities are affected. The science of heliophysics enables the predictions necessary to safeguard life and society on Earth and outward journeys of human and robotic explorers.

- President's PBR 2018 Heliophysics Missions:

- $49.9 million for Heliophysics Research and Analysis;
- $59 million for Sounding Rockets;
- $24.1 million for Research Range;
- $67.1 million for Other Missions and Data Analysis within Heliophysics Research;
- $265.8 million for Solar Probe Plus;
- $51.4 million for Solar Orbiter Collaboration;
- $63.8 million for Other Missions and Data Analysis within Living with a Star;
- $12.1 million for Magnetospheric Multiscale;
- $37.8 million Other Missions and Data Analysis within Solar Terrestrial Probes;
- $9 million for ICON;
- $50 million for Other Missions and Data Analysis within Heliophysics Explorer Program;

Exploration

Budget Authority, $ in millions	FY 2017 Consolidated Appropriations Act (P.L. 115-31)	President's FY 2018 NASA Budget Request
Exploration Research and Development	395.0	350.0
Orion Program	1,350.0	1,186.0
Space Launch System	2,150.0	1,937.8
Exploration Ground Systems	429.0	460.4
Total	**4,324.0**	**3,934.2**

President's FY 2018 Budget Request for Overall Exploration Portfolio

In FY 2018 the President's base budget requested $3.934 billion for Exploration missions, $389.8 million below the funds appropriated for Exploration missions in FY 2017.

Space Launch System

About

- The NASA Authorization Act of 2010 directed NASA to develop an evolvable heavy-lift rocket that will allow human exploration beyond low Earth orbit. NASA FY 2016 budget justification documents note that "The vehicle's capabilities will evolve using a block upgrade approach, driven by near- and long-term exploration mission requirements."
  - First, "SLS will carry over 70 metric tons to low Earth orbit and nearly 30 metric tons to the exploration proving ground near the Moon."
  - Next, "follow-on upgrades, including an advanced Exploration Upper Stage (EUS) will improve vehicle lift performance to 105 metric tons to low Earth orbit and 40 metric tons to the lunar proving ground, significantly increasing mission capability."
  - Finally, "SLS will evolve to carry over 130 metric tons to low Earth orbit, necessary to launch the large elements needed for human exploration of Mars."
- EUS "leverages technology investments made by the Space Technology Mission Directorate (STMD) in areas such as cryogenic fluid management and advanced composites." NASA has already begun leveraging "this close coordination demonstrated between STMD and the Human Exploration and Operations Mission Directorate (HEOMD)." to serve as the basis for "future exploration technologies and capabilities needed to explore Mars in the 2030s."

Orion Program

About

NASA's FY 2014 budget justification documents states that the Orion multi-purpose crew vehicle will be capable of carrying "a crew of four astronauts beyond Earth orbit and provide habitation and life support for up to 21 days." The spacecraft has three components: a crew module, service module, and launch abort system, with a separate adapter to connect the crew and launch vehicles.

- The crew module is described as a "familiar capsule shape on the outside, but inside it contains state of the art crew systems." During a mission the Orion MPCV will "house the crew, providing a safe environment within which to live and work." In addition, "Its advanced heat shield will protect the crew from the reentry heating during a high-speed return from beyond Earth orbit."
- The service module "is comprised of a crew module adapter and an ESA-designed and developed service module section, and together they provide in-space power, propulsion, and other life support systems."
- The launch abort system sits "atop the crew module," and "in the event of an emergency during launch or climb to orbit, will activate within milliseconds to propel the crew module away from the launch vehicle to safety." Further, the launch abort system "provides a protective shell that shields the crew module from dangerous atmospheric loads and heating during descent." The spacecraft will jettison the system "once Orion is out of the atmosphere and safely on its way to orbit."
- A successful EFT-1 Flight Test of the Orion Capsule was conducted in December 2014, the data from which "will help NASA to understand better many of the top risks to astronauts who will fly on Exploration Mission (EM)-2 and future missions."
- Next, "Orion will continue design, development, and testing, focusing on EM-1 and EM-2," while "NASA continues working toward a capability to launch EM-1, which includes launching an uncrewed vehicle to demonstrate the performance of an integrated SLS rocket and uncrewed Orion vehicle prior to EM-2, a crewed flight…" An integrated EM-1 launch date is currently scheduled for November of 2018.

Space Operations

Budget Authority, $ in millions	FY 2017 Consolidated Appropriations Act (P.L. 115-31)	President's FY 2016 NASA Budget Request
International Space Station	--	1,490.6
Space Transportation	--	2,415.1
Space and Flight Support	--	835.0
Total	**4,950.7****	**4,740.8**

**Individual line items were not broken down for this account.

President's FY 2018 Budget Request for Overall Space Operations Portfolio

In FY 2018 the President's base budget requested $4.740 billion for Space Operations missions, $209.9 million below the funds appropriated for Space Operations missions in FY 2017.

- President's FY 2018 Space Operations:
  - $1.1731 billion for ISS Systems Operations and Maintenance;
  - $317.5 million for ISS Research
  - $1.6832 for ISS Crew and Cargo Transportation
  - $731.9 million for Commercial Crew Program
  - $493.0 million for Space Communications Networks
  - $83.3 million for Space Communications Support
  - $124.4 million for Human Space Flight Operations
  - $86.8 million for Launch Services
  - $47.6 million for Rocket Propulsion Test

International Space Station

About

As the world's only space-based multinational research and technology testbed, ISS is critical to the future of human space activities. The facility enables scientists to identify and quantify risks to human health and performance and to develop and test countermeasures and technologies to protect astronauts during extended human space exploration. In addition, ISS offers unique opportunities for research and development, allowing scientists to investigate biological and physical processes in an environment very different from that on Earth.

Space Transportation

About

Transport of U.S. astronauts and cargo safely to and from the ISS is essential to maintaining America's leadership in space and enabling future exploration and discovery in low-Earth orbit (LEO) and beyond. This includes the Commercial Crew Program as well as Crew and Cargo transportation costs for vehicles and support at launch sites. NASA currently purchases cargo transportation to the ISS through Commercial Resupply Services (CRS) contracts with both Orbital ATK and SpaceX. Its only method of crew transportation to LEO is aboard Soyuz rockets operated by the Russian Space Agency, Roscosmos.

Space and Flight Support

About

Space and Flight Support consists of multiple programs providing Agency-level capabilities critical to the success of NASA missions and goals.

Space Technology

Budget Authority, $ in millions	FY 2017 Consolidated Appropriations Act (P.L. 115-31)	President's FY 2018 NASA Budget Request
Space Technology Research and Development	--	466.7
Agency Technology and Innovation	--	31.9
SBIR and STTR	--	180.0
Total	**686.5****	**678.6**

**Individual line items were not broken down for this account.

President's FY 2018 Budget Request for Overall Space Technology Portfolio

In FY 2018 the President's base budget requested $678.6 million for Space Technology missions, $15.8 million below the funds appropriated for Space Technology missions in FY 2017.

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About the Space Foundation

The foremost advocate for all sectors of the space industry and an expert in all aspects of space, the Space Foundation is a global, nonprofit leader in space awareness activities, educational programs that bring space into the classroom and major industry events, including the *Space Symposium*, all in support of its mission "to advance space-related endeavors to inspire, enable and propel humanity." The Space Foundation publishes *The Space Report: The Authoritative Guide to Global Space Activity* and provides three indexes that track daily U.S. stock market performance of the space industry. Through its Space Certification™ and Space Technology Hall of Fame® programs, the Space Foundation recognizes space-based technologies and innovations that have been adapted to improve life on Earth. The Space Foundation was founded in 1983 and is based in Colorado Springs, Colo. Its world headquarters features a public Visitors Center with two main areas - the El Pomar Space Gallery and the Northrop Grumman Science Center featuring Science On a Sphere®. The Space Foundation also conducts research and analysis and government affairs activities from its Washington, D.C., office and has a field office in Houston, Texas. For more information, visit www.SpaceFoundation.org. Follow us on Facebook, LinkedIn and Twitter, and read about the latest space news and Space Foundation activities in *Space Watch*.

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