

Decadal Surveys



- Scientific *community sets priorities*, recommending *balanced portfolios* including:
 - **Flagship** missions and large facilities
 - **Competed mid-scale** projects & *New Frontiers* missions
 - **Competed small** research grants, technology development projects, and *Discovery-* & *Explorer-class* missions

Small & Mid-Scale Missions

*Discovery | Explorer
New Frontiers*

- Most are led by researchers at private institutions
- Cost-capped & competitive
- Broadens participation in space sciences
- Encourages innovation
- Delivers high return on federal investment.
- Develops & maintains technical workforce



The K2 mission continues the planet finding work of the revolutionary *Kepler Space Telescope*.



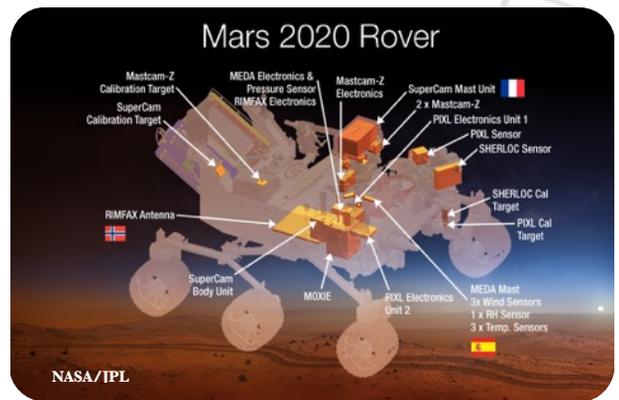
The arrival of *Juno* on 4 July 2016, at Jupiter will help unlock the origin and formation of the giant planets.



The *New Horizons* flyby of Pluto provided unprecedented resolution of Pluto's surface, revealed a world more dynamic than expected.

Revolutionary Flagships

A **Mars 2020** rover will cache samples of the Martian surface—the first crucial step toward returning Martian material back to state-of-the-art labs here on Earth. Flagship-class missions **demonstrate US leadership in science and technology** and **drive technology development**.



Competed Grants

- Astronomical sciences funded at NASA, National Science Foundation (NSF), and Dept. of Energy (DOE) Office of Science
- Awarded based on the *merit and breadth of impact* of the proposed scientific research
- Research dollars go to *scientists and students throughout the country*.

Education & Public Outreach

NASA/IPAC Teacher Archive Research Program (NITARP) Educator Jacqueline Barge works on original astronomical research with her high school students.



Visitors at the Johns Hopkins University Applied Physics Lab celebrated the moment of the *New Horizons* flyby of Pluto in July 2015.

Impact of the President's Budget Request for FY 2017

The main federal agencies for the astronomical sciences are shown below. We have included the proposed FY 2017 mandatory budget authority in this summary.

Without these additional funds, top priorities are stalled and the overall U.S. program will continue to decline. With these funds, some programs do better but others still have serious problems:

	FY 2015	FY 2016	FY 2017	Change	
	Actual	Omnibus	Request	Amount	Percent
Total R&D	138,959	146,683	148,760	2,077	1.42
NASA	18,010	19,285	19,025	-260	-1.3
<i>Science (SMD)</i>	5,243	5,589	5,601	11	0.2
<i>Planetary Science</i>	1,447	1,631	1,519	-112	-6.9
<i>Astrophysics+STEM</i>	731	731	782	51	6.9
<i>Heliophysics</i>	636	650	698	48	7.4
<i>JWST</i>	645	620	569	-51	-8.2
NSF	7,398	7,493	7,964	471	6.3
<i>Math, Phys Sci (MPS)</i>	1,376	1,349	1,436	87	6.5
<i>Astro. Sci (AST)</i>	245	247	263	16	6.4
DOE-Science	27,403	29,603	32,490	2887	9.8
<i>Cosmic Frontier</i>	107	131	130	-1	-0.4

- Puts NASA Heliophysics on a path to **accomplishing highest priority projects**,
- **Delays high priority projects** in NASA Planetary Sciences, and
- Requires **harmful tradeoffs** between existing facilities & individual investigator grants at NASA Astrophysics & NSF.

Funding Research

The FY 2017 Request would underinvest in core competitive research programs at NASA and NSF, which enable the research community to maximize the scientific return on taxpayer investment in missions and facilities.



Principal investigators of MINERVA (Miniature Exoplanet Radial Velocity Array) pose with the array of robotic telescopes during the facility dedication. MINERVA is supported through competed grants from NASA and NSF.

The primary science goal of MINERVA is to discover new exoplanets, with a focus on those in the habitable zone.

Small/mid-scale Projects

Right. The OSIRIS-REx Asteroid Sample Return Mission, shown fully assembled at Lockheed-Martin, will launch in September 2016. In 2018, it will reach the asteroid Benu, collect a sample, and return to Earth in 2023.



We applaud efforts to **increase the cadence** for small-scale *Discovery* and *Explorer* and mid-scale *New Frontiers* missions.

Education & Collaboration



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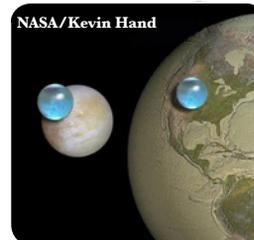
We are **concerned** that the request would **reduce funding for SMD STEM Education activities by more than 30% (\$37M → \$25M)**.

Restrictions on **conference participation** by NASA scientists, engineers, and program officers **harm the scientific enterprise** and limit public-private collaborations.



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Flagship Delays



NASA/Kevin Hand

NASA flagship missions like the Europa flyby mission and Wide-Field InfraRed Survey Telescope (WFIRST), both priorities in their respective decadal surveys, **would be delayed** under the FY 2017 Request.



NASA