

## Decadal Surveys



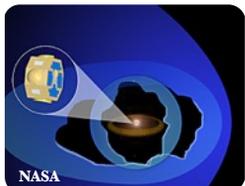
- Scientific *community sets priorities*, recommending *balanced portfolios* including:
  - **Flagship** missions and large facilities
  - **Competed mid-scale** projects & *New Frontiers* missions
  - **Competed small** research grants, technology development projects, and *Discovery-* & *Explorer-class*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

## Small & Mid-Scale Missions

### *Discovery | Explorer New Frontiers*



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



IBEX is helping us to better understand our sun and the boundaries of our solar system.

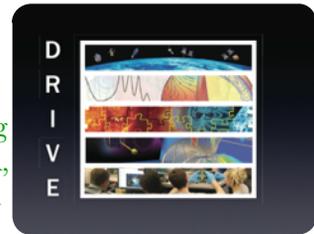


The *New Horizons* flyby of Pluto provided unprecedented resolution of Pluto's surface, revealed a world more dynamic than expected.

- 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

## Decadal Priorities Progress

The **DRIVE** initiative would **maximize the return on federal investment**, by encouraging collaboration between NASA, NSF, and other agencies, and spurring greater innovation.



The **Daniel K. Inouye Solar Telescope** is an NSF-funded MREFC facility that will observe the Sun at the highest level of detail ever seen, resolving features as small as 30-miles wide. This will provide scientists with a more thorough understanding of the physical processes of solar activity and space weather.

## Competed Grants

- Astronomical sciences funded at NASA, National Science Foundation (NSF) & Dept. of Energy (DOE) Office of Science
- Awarded based on the *merit & breadth of impact* of the proposed scientific research
- Research dollars go to *scientists & 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 FY 17-16	
	Actual	Omnibus	Request	Amount	Percent
<b>Total R&amp;D</b>	<b>138,959</b>	<b>146,683</b>	<b>148,760</b>	<b>2,077</b>	<b>1.42</b>
<b>NASA</b>	<b>18,010</b>	<b>19,285</b>	<b>19,025</b>	<b>-260</b>	<b>-1.3</b>
<i>Science (SMD)</i>	5,243	5,589	<b>5,601</b>	11	0.2
<i>Planetary Science</i>	1,447	1,631	<b>1,519</b>	-112	<b>-6.9</b>
<i>Astrophysics+STEM</i>	731	731	<b>782</b>	51	<b>6.9</b>
<i>Heliophysics</i>	636	650	<b>698</b>	48	<b>7.4</b>
<i>JWST</i>	645	620	<b>569</b>	-51	<b>-8.2</b>
<b>NSF</b>	<b>7,398</b>	<b>7,493</b>	<b>7,964</b>	<b>471</b>	<b>6.3</b>
<i>Math, Phys Sci (MPS)</i>	1,376	1,349	<b>1,436</b>	87	6.5
<i>Astro. Sci (AST)</i>	245	247	<b>263</b>	16	6.4
<b>DOE-Science</b>	<b>27,403</b>	<b>29,603</b>	<b>32,490</b>	<b>2887</b>	<b>9.8</b>
<i>Cosmic Frontier</i>	107	131	<b>130</b>	-1	<b>-0.4</b>

- 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

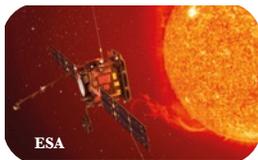
**The FY 2017 Request would underinvest in core competitive research programs at NASA and NSF**, which enable the research community to maximize the scientific return on taxpayer investment in missions and facilities.



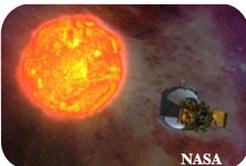
The Expanded Owens Valley Solar Array (EOVSA) was recently expanded to include 13 antennas. This expansion was made possible by NSF grant

funding. EOVSA is a university-led community facility that is improving our understanding of solar flares and of the Sun's influence on the Earth by observing the Sun at long wavelengths.

## Observations of the Sun



We are **encouraged** that the FY 2017 Request includes funds for 2018 launches of NASA's Solar Probe Plus (right) and the NASA-ESA Solar Orbiter spacecraft (left).



These missions will make direct measurements of the Sun's corona and magnetic fields, which will improve our ability to predict space weather events. Large space weather events could be potentially catastrophic to satellites and communications systems.

## Education & Collaboration



We are **concerned** that the request **reduces 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.



## Flagship Delays



We thank Congress for its past support of NASA flagship missions like the Europa flyby mission and Wide-Field InfraRed Survey Telescope (WFIRST), both priorities in their respective decadal surveys. We are **concerned** that these projects would be **delayed under the FY 2017 Request**.

