



Astropolitics and Service:
what it's all about and what you can do

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Vassar College

Alphabet Soup of Astropolitics

- American Astronomical Society (AAS)
 - Committee on Astronomy and Public Policy
- International Astronomical Union (IAU)
- National Research Council (NRC) of the National Academy of Sciences (NAS)
 - Board on Physics and Astronomy (BPA)
 - Space Studies Board (SSB)
 - Committee on Astronomy and Astrophysics
- Astronomy and Astrophysics Advisory Committee (for joint NASA, NSF, DOE projects)
- Associated Universities for Research in Astronomy (AURA)
- American Association for the Advancement of Science (AAAS)
- Plus advisory committees for NASA, NSF, Space Telescope Science Institute, etc.

Why?

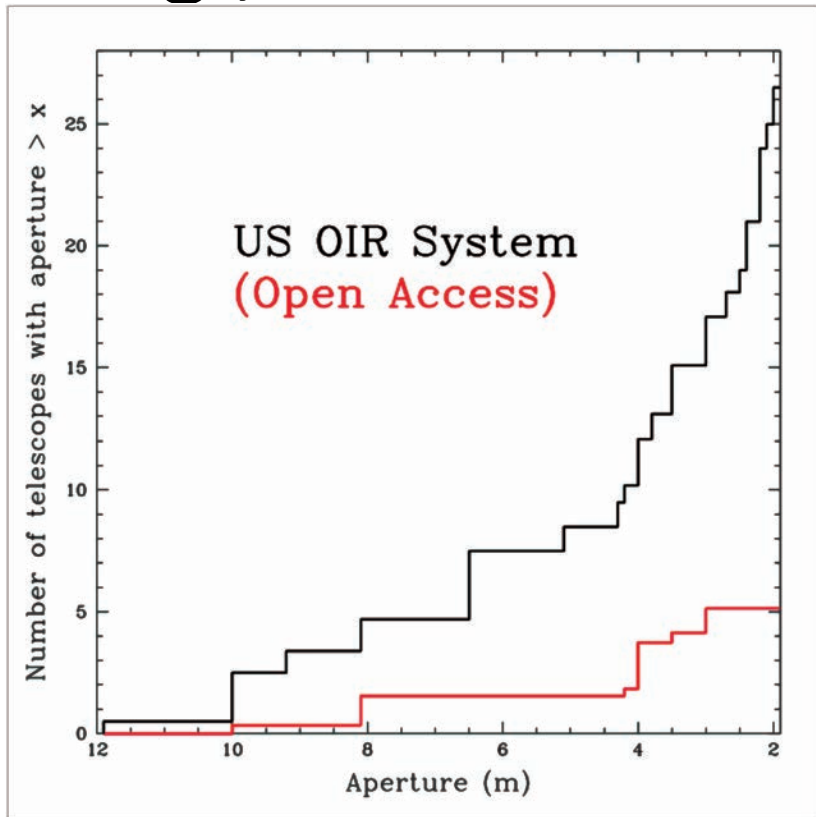
- Astronomers rely on federal grants and federal telescopes to conduct research
- Scientific research comes from the government's non-defense discretionary funding
- The available funds are flat or decreasing
- Astronomy needs advocacy and we don't do enough of it to have a presence in Washington

National Academies Reports

- Decadal surveys set community priorities
 - 60 yrs' worth for astronomy, leading to Hubble Space Telescope, Gemini telescopes, ALMA, LSST, JWST...
- Committee reports to supply detailed recommendations to funding agencies
 - Optical and Infrared Optimization Survey



e.g., the current US OIR System suite



- For U.S. telescopes > 2m, 76% of time is private (open access for 19% 6-12m, 33% 3.5-5m, 8% 2-3m)
- Private facilities don't have all the resources they need, and are open to the idea of sharing

TABLE 3.1 Telescopes Considered by the Committee

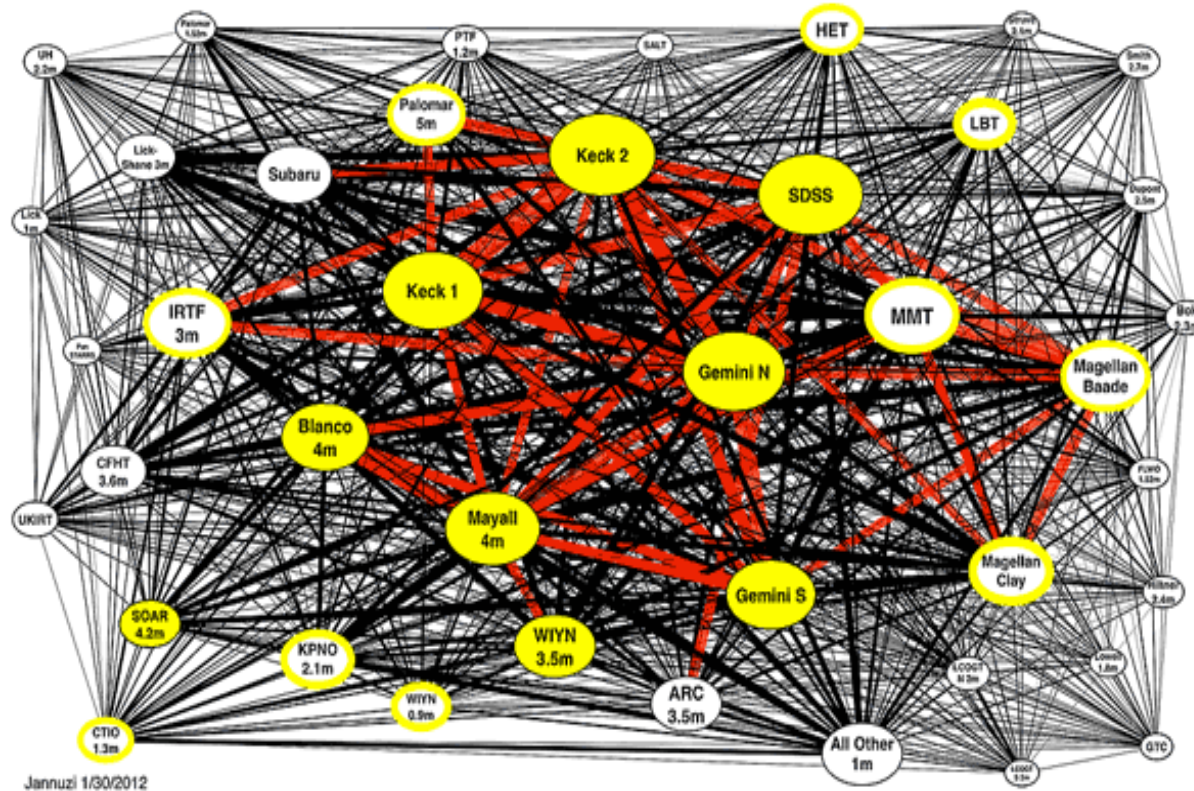
| Observatory/Site | Aperture | U.S. Fraction | Open Fraction | |
|---|--|---------------|---------------|-------------------|
| Large Telescopes (6-12 meters) | | | | |
| Large Binocular Telescope (LBT) | Mt. Graham, AZ | 11.8* | 0.50 | 0.00 |
| Keck 1 | Mauna Kea, HI | 10.0 | 1.00 | 0.17 |
| Keck 2 | Mauna Kea, HI | 10.0 | 1.00 | 0.17 |
| Hobby Eberly Telescope (HET) | McDonald Observatory, TX | 9.2 | 0.89 | 0.00 |
| South African Large Telescope | South African Astronomical Observatory, Sutherland, S.Africa | 9.2 | 0.40 | 0.00 |
| Subaru | Mauna Kea, HI | 8.3 | 0.10 | 0.00 |
| Gemini N (Gillette) | Mauna Kea, HI | 8.1 | 0.69 | 0.60 |
| Gemini S | Cerro Pachon, Chile | 8.1 | 0.59 | 0.60 |
| Magellan (Baade) | Las Campanas, Chile | 6.5 | 0.90 | 0.00 |
| Magellan (Clay) | Las Campanas, Chile | 6.5 | 0.90 | 0.00 |
| MMT | Mt. Hopkins, AZ | 6.5 | 1.00 | 0.00 |
| Effective fractional number of telescopes | | 7.99 | 1.54 | |
| Medium Telescopes (3.5-5 meters) | | | | |
| Hale Telescope | Palomar Observatory, CA | 5.1 | 1.00 | 0.00 |
| Discovery Channel Telescope | Happy Jack, AZ | 4.3 | 1.00 | 0.00 |
| SOAR | Cerro Pachon, Chile | 4.2 | 0.70 | 0.30 |
| Blanco Telescope | Cerro Tololo, Chile | 4.0 | 0.90 | 0.90** |
| Mayall Telescope | Kitt Peak, AZ | 4.0 | 1.00 | 1.00 |
| UKIRT | Mauna Kea, HI | 3.8 | 1.00 | 0.00 |
| CFHT | Mauna Kea, HI | 3.6 | 0.20 | 0.00 |
| ARC 3.5m | Apache Point, NM | 3.5 | 1.00 | 0.00 |
| WIYN | Kitt Peak, AZ | 3.5 | 1.00 | 0.40 |
| Effective fractional number of telescopes | | 7.80 | 2.60 | |
| Small Telescopes (2-3 meters) | | | | |
| Shane | Lick Obser., Mt. Hamilton, CA | 3.0 | 1.00 | 0.00 |
| IRTF | Mauna Kea, HI | 3.0 | 1.00 | 1.00 |
| Harlan Smith | McDonald Observatory, TX | 2.7 | 1.00 | 0.00 |
| DuPont | Las Campanas, Chile | 2.5 | 0.90 | 0.00 |
| Sloan Foundation (SDSS) | Apache Point, NM | 2.5 | 1.00 | 0.00 ⁺ |
| Hiltner | Kitt Peak, AZ | 2.4 | 1.00 | 0.00 |
| WIRO | Jelm Mtn, WY | 2.2 | 1.00 | 0.00 |
| Bok | Kitt Peak, AZ | 2.2 | 1.00 | 0.00 |
| UH 88-inch | Mauna Kea, HI | 2.2 | 1.00 | 0.00 |
| Otto Struve | McDonald Observatory, TX | 2.1 | 1.00 | 0.00 |
| KPNO 2.1m | Kitt Peak, AZ | 2.1 | 1.00 | 0.00 |
| LCOGT | Haleakala, HI | 2.0 | 0.75 | 0.00 |
| LCOGT | Siding Spring, Australia | 2.0 | 0.75 | 0.00 |
| Effective fractional number of telescopes | | 12.40 | 1.00 | |

* LBT is two coupled 8.4-meter telescopes with the equivalent area of a single 11.8-meter telescope.

** This is for pre- and post-DES.

⁺ Sloan is a survey instrument; all Sloan Digital Sky Survey (SDSS) I-III data are now public.

The best science often requires multiple capabilities



- Even astronomers with private access don't have all the capabilities they need
- The 9000 nights of telescope time to US astronomers generates 2000 papers from 1500 astronomers

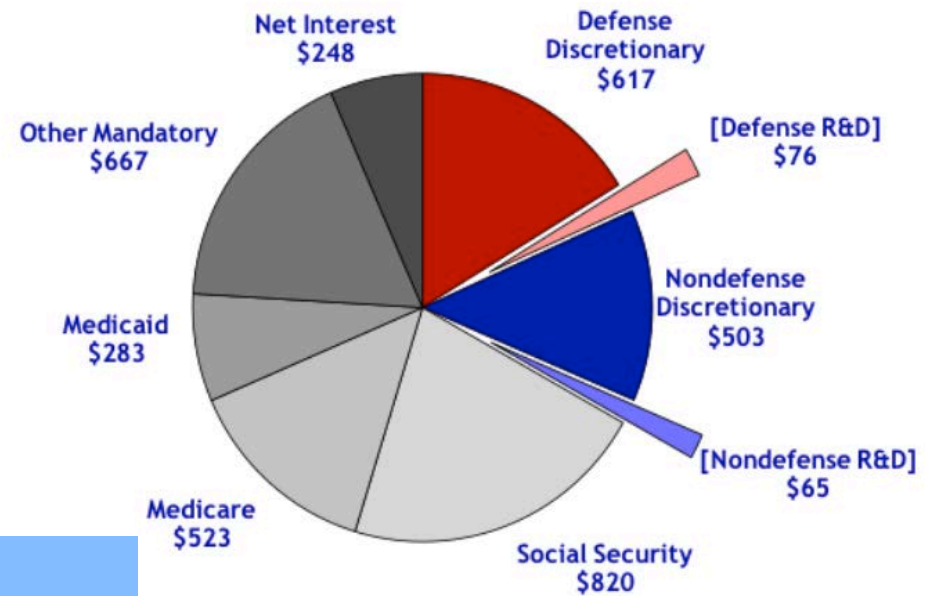
CONCLUSION: Interest from and telescope usage by a large, diverse, and active community of high-quality researchers is correlated with high-impact scientific output.

Federal Budget

Composition of the Proposed FY 2013 Budget

Total Outlays = \$3.8 trillion

outlays in billions of dollars



States Government FY 2013.
billion.



Every dollar the federal government spends....

\$0.20 = Social Security

\$0.20 = Other Mandatory

\$0.19 = Medicare/Medicaid

\$0.17 = Defense

\$0.14 = Nondefense

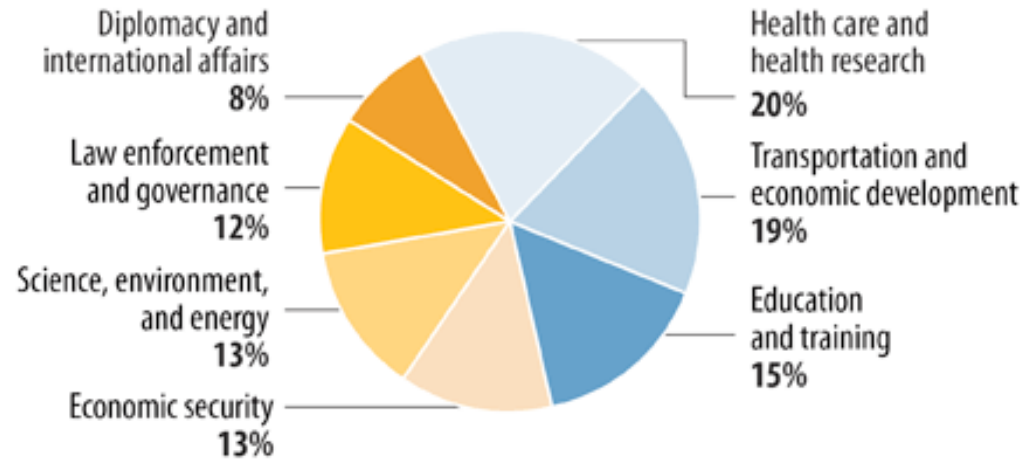
\$0.04 = Research and Development

- Of that: nearly half is weapons development



Non-Defense Discretionary Spending

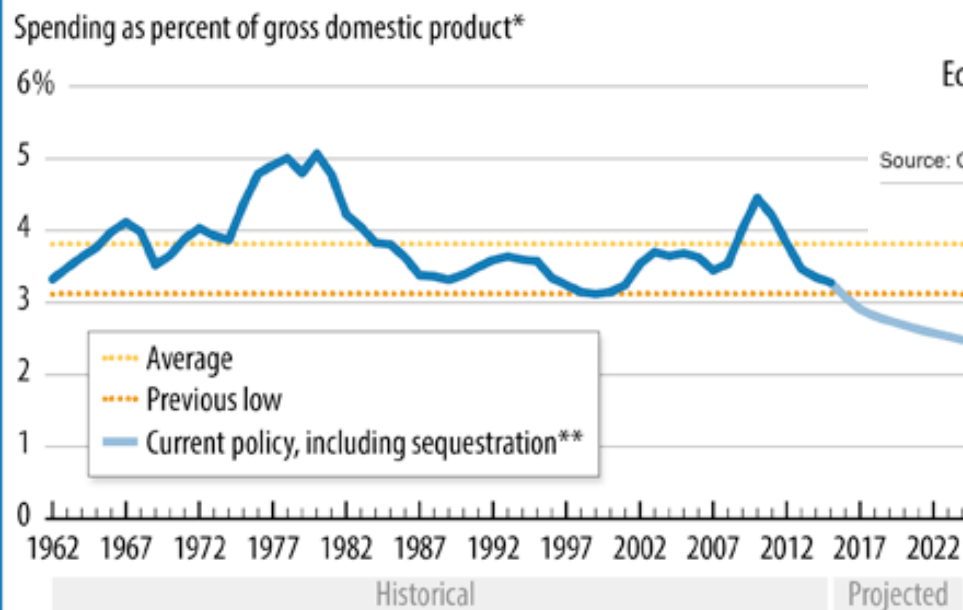
Non-Defense Discretionary Spending, FY 2013



Source: Center on Budget and Policy Priorities based on Office of Management and Budget data.

Center on Budget and Policy Priorities | cbpp.org

Figure 1
Non-Defense Discretionary Spending Falling to Historic Lows



*Data available only back to 1962

**Sequestration budget cuts required under the 2011 Budget Control Act.

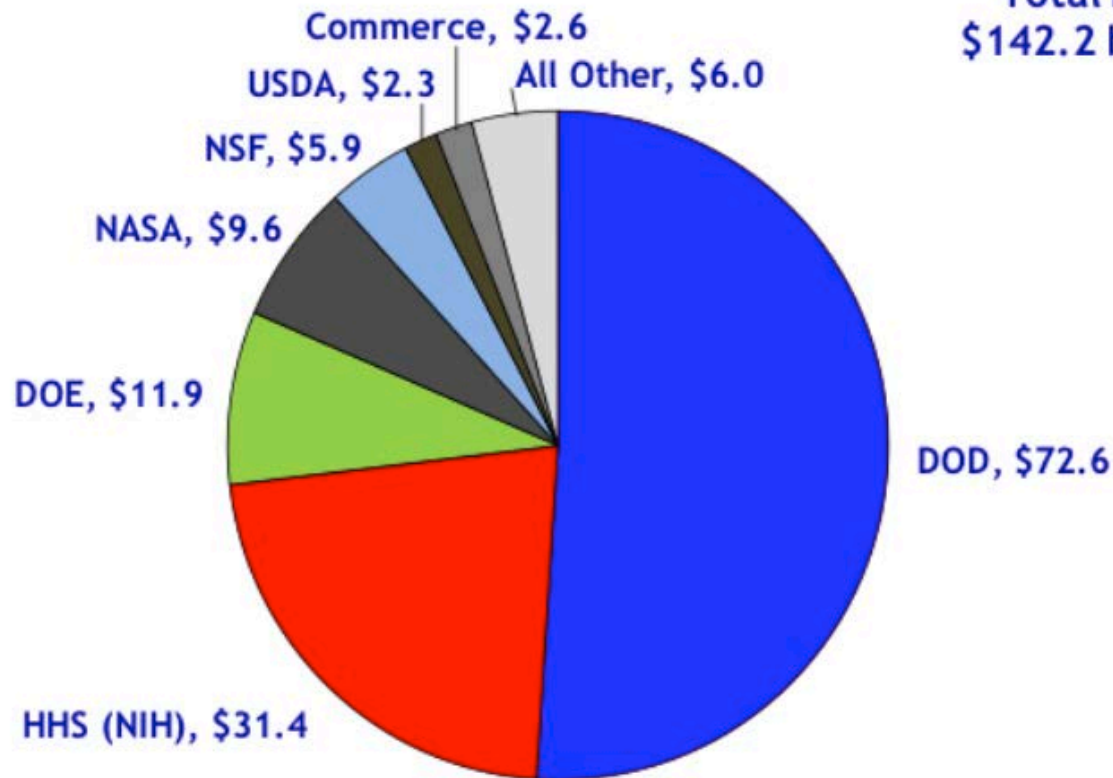
Source: Center on Budget and Policy Priorities based on Office of Management and Budget and Congressional Budget Office data.

Center on Budget and Policy Priorities | cbpp.org

Total R&D by Agency, FY 2013

budget authority in billions of dollars

Total R&D =
\$142.2 billion



Source: OMB R&D data, agency budget justifications, and other agency documents.
R&D includes conduct of R&D and R&D facilities.
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The federal budget cycle

| | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------|---|-----|-----|----------------|---|-----|-----|--|----------------------------------|-----|---|-----|-----|----------------|---|-----|-----|--|-----|-----|-----|-----|-----|-----|
| FY 2012 | --- Spend Fiscal Year Budget --- | | | | | | | | | | | | | | | | | | | | | | | |
| FY 2013 | Negotiate and finalize budget proposal with OMB via passbacks | | | Budget Release | • Budget Resolution • 302(a) and (b) • Hearings | | | Write, pass, and conference twelve appropriation bills | | | --- Spend Fiscal Year Budget --- | | | | | | | | | | | | | |
| FY 2014 | Planning within Agency | | | | Agencies receive strategic guidance from OMB | | | | Agencies submit budget proposals | | Negotiate and finalize budget proposal with OMB via passbacks | | | Budget Release | • Budget Resolution • 302(a) and (b) • Hearings | | | Write, pass, and conference twelve appropriation bills | | | | | | |
| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |

↑ Today

Agencies are working on 3 budgets at any given time

- FY 2012: Spending
- FY 2013: Congress at “work”
- FY 2014: OMB/OSTP agency guidance

President's budget request

| Account | FY 2014 Actual | FY 2015 Est. | FY 2016 Request |
|--|-------------------|------------------------|-------------------|
| NASA | \$17,646.5 | \$18,010.2 | \$18,529.1 |
| Science Mission Directorate (SMD) | \$5,148.2 | \$5,244.7 | \$5,288.6 |
| Earth Science | \$1,824.9 | \$1,772.5 ¹ | \$1,947.3 |
| Planetary Science (PSD) | \$1,343.4 | \$1,437.8 ¹ | \$1,361.3 |
| Astrophysics (APD) | \$678.3 | \$726.8 ¹ | \$709.1 |
| Education & Public Outreach** | — | \$42.0 ¹ | \$20.0 |
| James Webb Space Telescope (JWST) | \$658.2 | \$645.4 | \$620.0 |
| Heliophysics (HPD) | \$643.3 | \$662.0 ¹ | \$651.0 |
| NSF | \$7,171.9 | \$7,344.2 | \$7,723.6 |
| Research & Related Activities (R&RA) | \$5,808.9 | \$5,933.6 | \$6,186.3 |
| Mathematical & Physical Sciences (MPS) | \$1,267.9 | \$1,336.7 | \$1,366.2 |
| Astronomy Division (AST) | \$238.4 | \$244.2 | \$246.6 |
| Geosciences (GEO) | \$1,321.3 | \$1,304.4 | \$1,365.4 |
| Atmospheric & Geospace Sciences Division (AGS) | \$250.9 | \$251.2 | \$262.9 |
| Major Research Equipment & Facilities Construction (MREFC) | \$200.0 | \$200.8 | \$200.3 |
| Large Synoptic Survey Telescope (LSST) | \$27.5 | \$79.6 | \$99.7 |
| Daniel K. Inouye Solar Telescope (DKIST) | \$36.9 | \$25.1 | \$20.0 |
| Education & Human Resources (EHR) | \$846.5 | \$866.0 | \$962.6 |
| DOE | \$27,281.0 | \$27,402.4 | \$29,923.8 |
| Office of Science | \$5,071.0 | \$5,067.7 | \$5,339.8 |
| High Energy Physics | \$797.5 | \$766.0 | \$788.0 |
| Cosmic Frontier | \$99.1 | \$106.8 | \$119.3 |

in
millions
of \$

House, Senate Approps Bills

in
millions
of \$

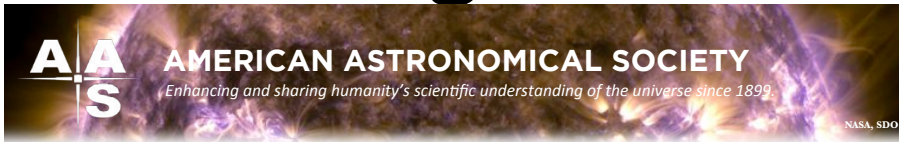
| Account | FY 2015 | FY 2016 President's Request | FY 2016 Senate Committee | FY 2016 House Floor |
|--|------------|-----------------------------------|--------------------------------|---------------------------|
| NASA | \$18,010.2 | \$18,529.1 | \$18,289.5 | \$18,529.1 |
| Science Mission Directorate | \$5,244.7 | \$5,288.6 | \$5,295.0 | \$5,237.5 |
| Earth Science | \$1,772.5 | \$1,947.3 | \$1,931.6 | \$1,682.9 |
| Planetary Science | \$1,437.8 | \$1,361.3 | \$1,321.0 | \$1,557.0 |
| Astrophysics | \$726.8 | \$709.1 | \$730.6 | \$735.6 |
| Education & Public Outreach | \$42.0 | \$20.0 | \$42.0 | \$32.0 |
| JWST | \$645.4 | \$620.0 | \$620.0 | \$620.0 |
| Heliophysics | \$662.0 | \$651.0 | \$649.8 | \$642.0 |
| NSF | \$7,344.2 | \$7,723.6 | \$7,343.8 | \$7,394.2 |
| Research & Related Activities | \$5,933.6 | \$6,186.3 | \$5,933.6 | \$5,983.6 |
| Major Research Equipment & Facilities Construction | \$200.8 | \$200.3 | \$200.3 | \$200.0 |
| Education & Human Resources | \$866.0 | \$962.6 | \$866.0 | \$866.0 |
| DOE | \$27,042.4 | \$29,923.8 | \$29,429.1 | \$29,984.6 |
| Office of Science | \$5,067.4 | \$5,339.8 | \$5,143.9 | \$5,100.0 |
| High Energy Physics | \$766.0 | \$788.0 | \$788.1 | \$776.0 |
| Cosmic Frontier | \$106.8 | \$119.3 | | \$119.3 |

AAS Congressional Visits Day

- Learn about science policy through AAS training
- Advocate for Astronomy Priorities on the Hill
- Meet with NASA leaders



Congressional Leave Behinds



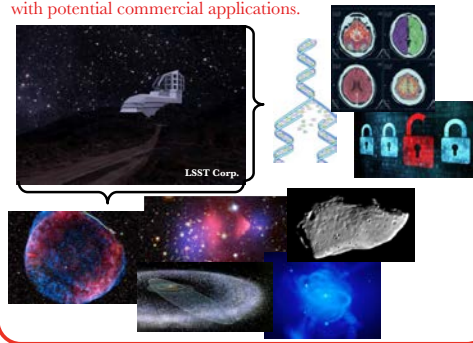
Decadal Surveys



Each decade, the entire community comes together to set priorities for scientific studies in the ten years ahead. Each of the recent decadal surveys recommend **balanced portfolios of large, medium and small projects** as their highest priority, with **robust investment** in each so all can participate in astronomical discoveries. For the U.S. to continue leading the world in the astronomical sciences, we need **revolutionary new flagship projects** in space and on the ground, but we must also maintain support for the **competed research grants** and highly cost-effective **small and mid-scale competed missions**.

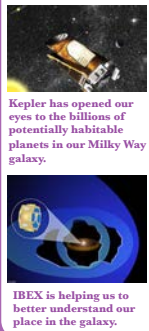
Revolutionary Flagships

Exciting new projects like the Large Synoptic Survey Telescope (LSST), a top decadal survey priority, will revolutionize our understanding of the cosmos, from asteroids to the largest structures in the universe, *and* drive technological innovations with potential commercial applications.



Small & Mid-Scale Projects

Discovery, New Frontiers, and Explorer class missions are revolutionizing our view of the entire universe, from our own solar system to the most distant galaxies. These competed programs broaden participation in space sciences, encourage innovation, and deliver high scientific and technological return on federal investment.



Kepler has opened our eyes to the billions of potentially habitable planets in our Milky Way galaxy.

IBEX is helping us to better understand our place in the galaxy.

MESSINGER is providing new insights on the inner solar system.

Competed Grants

Competed grants are awarded to researchers based on the **merit and breadth of impact** of the proposed scientific research. The suite of astronomical science grant programs at NASA, NSF and DOE Office of Science **award research dollars to scientists and students throughout the country**. Many researchers depend on these programs for their salaries and research expenses.

Education & Public Outreach



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

Large crowds gathered in Times Square, and many other locations, to celebrate the NASA Curiosity Rover's successful landing on Mars.

The Astronomical Sciences in the FY 2015 President's Budget Request

Right: This request proposes a **large cut** for the **Hubble Space Telescope**, in NASA's Astrophysics Division.



Above: The request proposes SOFIA, NASA's Astrophysics Division's telescope on a 747, has been **proposed for grounding**.

For decades, the astronomical sciences have **set priorities as a scientific community**.

Efforts to hurt or harm specific projects **outside community-based processes hurt** our scientific enterprise.

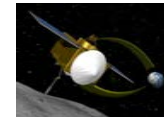
Small/mid-scale Projects

We **applaud** efforts to **increase the cadence** for small-scale *Discovery* missions in NASA's Planetary Science Division and *Explorer* missions in the Astrophysics Division.



Above: Planet hunter, TESS (MIT, Goddard, Orbital Sci. Corp), will be followed by new Astrophysics Explorers selected in 2015.

We **lament** the lack of support for any new mid-scale *New Frontiers* missions in Planetary Science.



Right: **No plans** for another mission in successful Planetary Science's *New Frontiers* line after groundbreaking OSIRIS-REx (Lockheed Martin, Goddard, Univ. of AZ).

Expanding the Frontier



Encouraged by Administration's support for **formulating the Wide-Field Infrared Survey Telescope (WFIRST) mission** within NASA's Astrophysics Division, the top priority in the most recent astronomy decadal survey, which will **revolutionize our view of the universe** in the infrared (left).

The AAS **celebrates** commitment to building the Large Synoptic Survey Telescope (**LSST**), another top priority in the most recent astronomy decadal survey, through facility **construction at NSF** and **camera fabrication at DOE's** Office of Science.



Funding Research

Funding for individual researchers continues to be an area of concern as ever larger missions demand ever more budget authority for operations.

Our exciting new missions **need** accompanying research funding to support our **world-leading scientific community** and train the next generation of **global scientific leaders**.

Education & Public Outreach

We **applaud** the improved plan to restructure STEM Education programs at NASA but **keep them within SMD**, but are **worried that total funding for NASA-SMD would drop by 2/3** under this proposal.

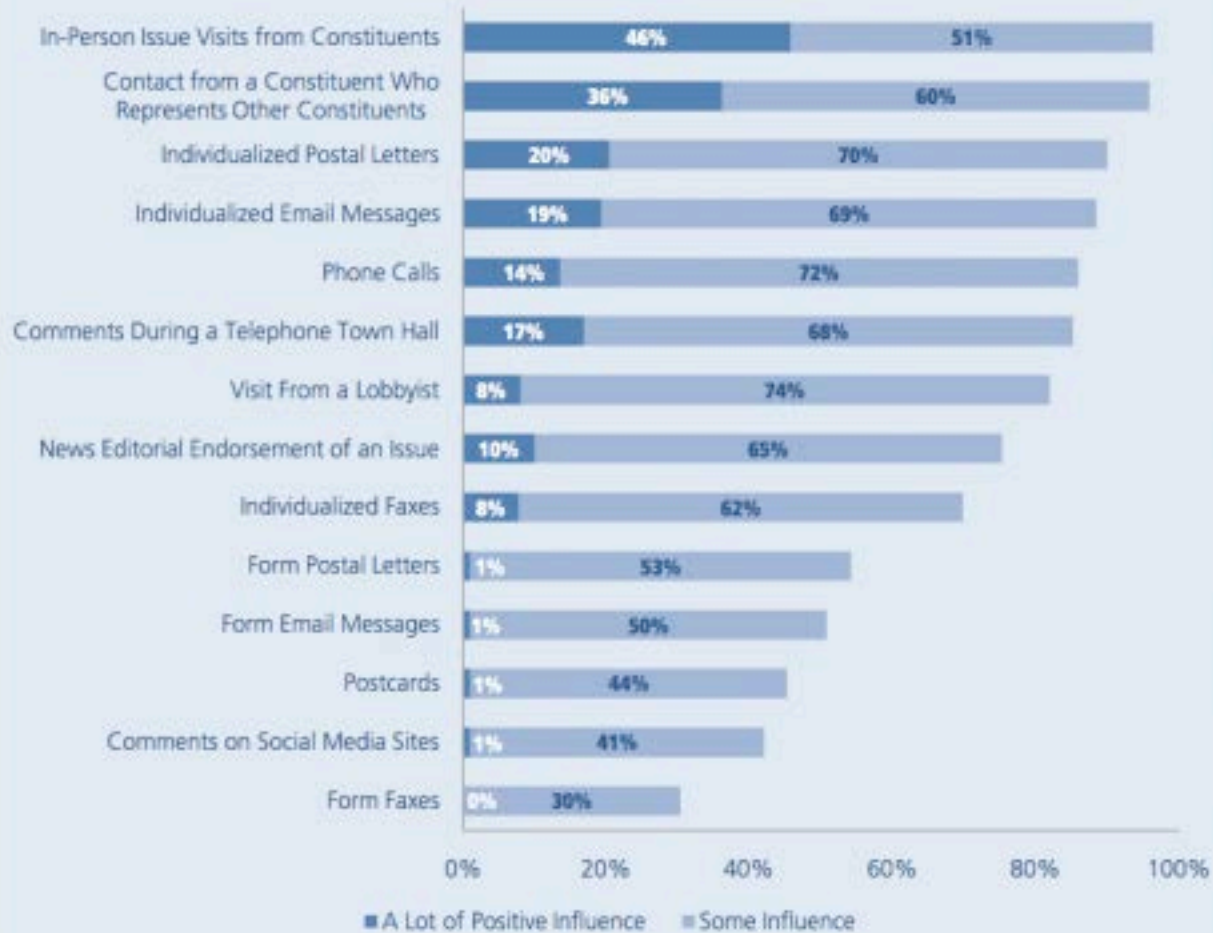


Above: E/PO activities associated with small missions, like Heliophysics' THEMIS, will be **much less likely** to find funding under this request.

Visiting in person is most effective

FIGURE 2

If your Member/Senator has not already arrived at a firm decision on an issue, how much influence might the following advocacy strategies directed to the *Washington office* have on his/her decision?*



*Question was asked only of senior managers and mail staffers. Their responses are aggregated (n=194).

AAS involvement

- Look for announcement on the aas website aas.org in January for a March CVD
- Join the AAS and look for policy alerts asking for letters to be sent to Congress on key issues



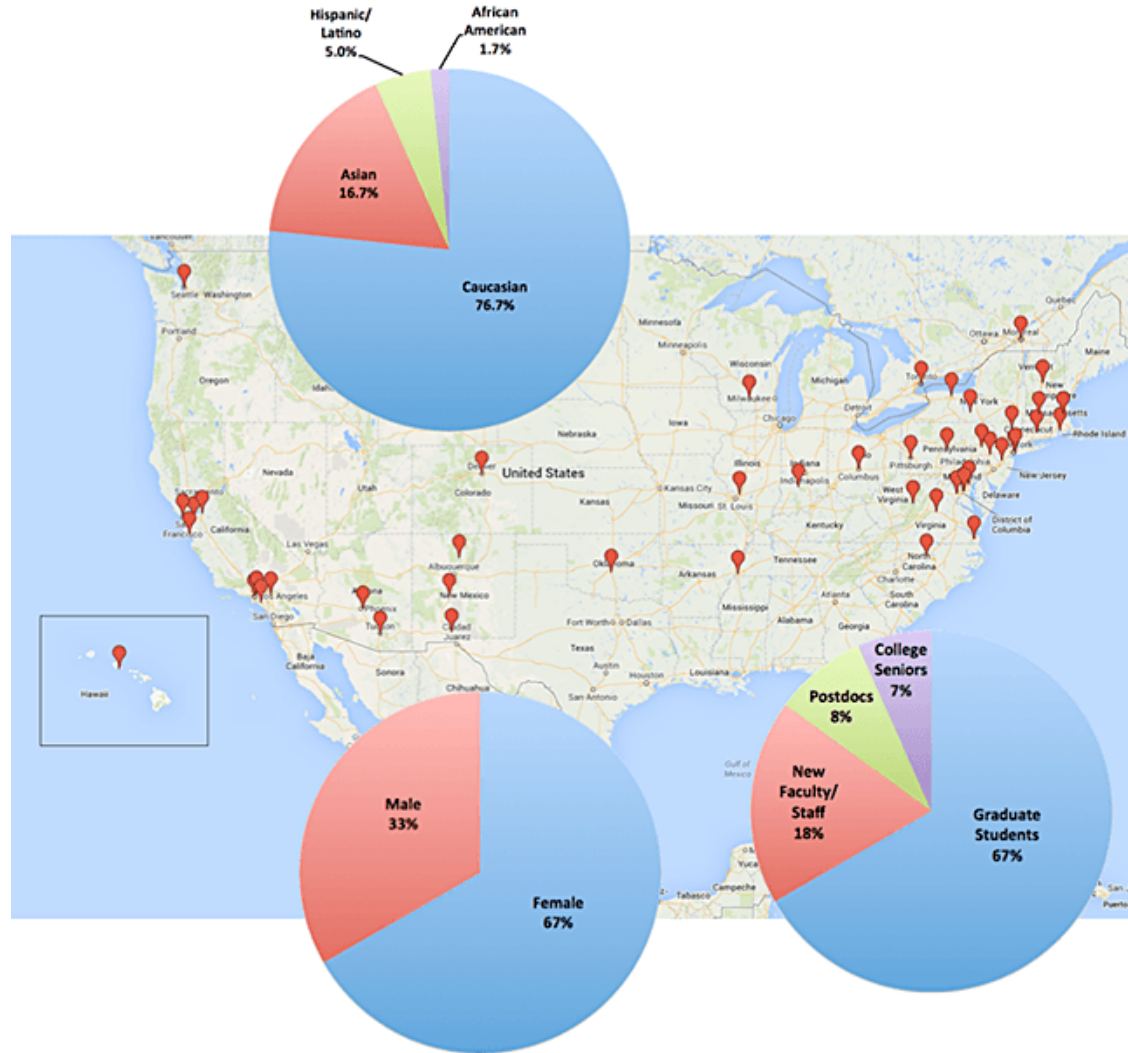
Astronomy Ambassadors



AMERICAN ASTRONOMICAL SOCIETY

- Professional development workshops for early career astronomers (incl. students)
- Goal: to communicate effectively with the public
- Hands-on training and tools

Demographics of AAS Astronomy Ambassadors so far



- **Apply by Mon. Oct. 19** for Jan. 3-4 workshop in Kissimmee, Florida at AAS meeting: aas.org

AIP Mather Policy Internship

- Undergraduate summer internship via SPS (Society for Physics Students) to work on Capitol Hill
- promotes awareness of and interaction with the policy process for undergraduate physics students
- direct engagement in science policy issues and efforts in the nation's capital

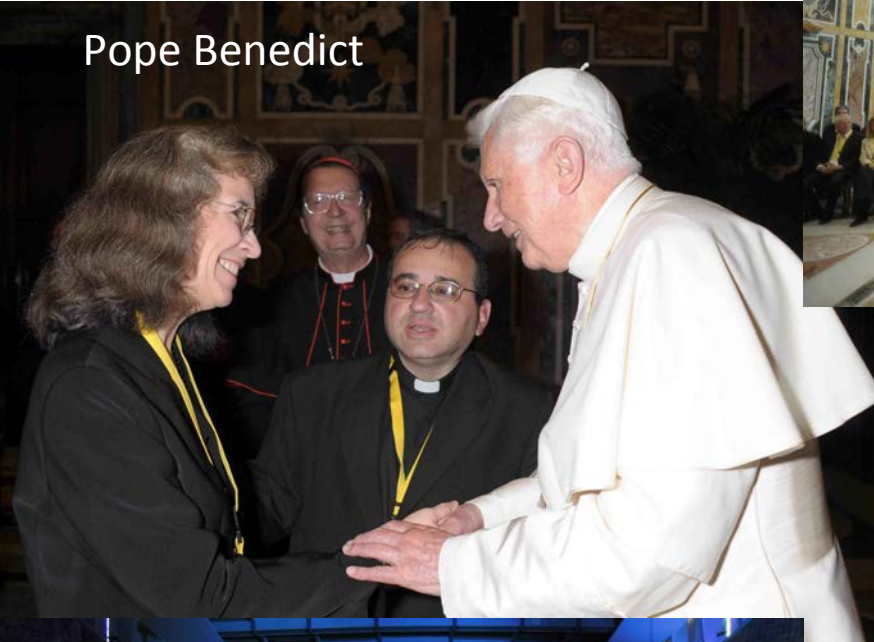
AAAS Science & Technology Policy Fellow

- Postdoctoral (or higher) position, typically 2 yrs
- Congressional Fellow (Capitol Hill) or Agency Fellow (EPA, DOE, NSF, etc.)
- Apply after PhD in any science



Some perks of service

Pope Benedict



Papal quarters



HST 25th –
Senator Mikulski



HST 25th



Oslo prize banquet



NASA administrator Bolden



South African Minister
of Science Pandor

