

## NASA Appropriations: FY 2014

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The National Aeronautics and Space Administration (NASA) conducts space and aeronautical research, development, and flight activities for peaceful purposes designed to maintain United States preeminence in aeronautics and space. The geoscience community is most interested in the Earth science observations conducted within the Science Mission Directorate within four themes (Earth Science, Planetary Science, Heliophysics and Astrophysics).

Fiscal Year (FY) 2014 NASA Appropriations Process

<u>Account</u>	<u>FY12 Actual</u> (\$million)	<u>President's FY14</u>	<u>House Action</u> (\$million)	<u>Senate Action</u> (\$million)	<u>Conference</u>
		<u>Request</u> (\$million)			<u>Committee Action</u> (\$million)
<b>NASA (total)</b>	17,770.0	17,715.4			
Science (total)	5,073.7*	5,017.8			
--Earth Science	1,765.7	1,846.1			
---Earth Science Research	441.1	443.3			
---Earth Systematic Missions	880.9	787.5			
---Earth System Science Pathfinder	187.5	353.6			
---Earth Science Multi-Mission Operations	168.6	171.7			
---Earth Science Technology	51.2	55.1			
---Applied Sciences	36.4	35.0			
-- Planetary Science	1,501.4	1,217.5			
--Astrophysics	648.4	642.3			
--Heliophysics	644.9	653.7			
Aeronautics	569.4*	565.7			
Exploration	3,707.3*	3,915.5			
Space Operations	4,184.0*	3,882.9			
Education	136.1*	94.2			

\*Number records subprogram total less rescission.

### President's Request

President Obama's budget request for fiscal year (FY) 2014 was released April 10, 2013. The National Aeronautics and Space Administration (NASA) provides a breakdown of the FY2014 budget with regard to their programs.

The House of Representatives considers funding for NSF, NASA, NOAA and NIST in the subcommittee for Commerce, Justice and Science Subcommittee of the House Appropriations Committee.

Senate Action

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The Senate considers funding for NSF, NASA, NOAA and NIST in the Commerce, Justice and Science Subcommittee of the Senate Appropriations Committee.

Appropriations Hearings

- April 17, 2013: House Committee on Science, Space, and Technology Hearing to Review the President's FY 2014 Budget Request for Science Agencies
  - March 20, 2013: House Committee on Appropriations Subcommittee on Commerce, Justice, and Space Oversight Hearing on the National Aeronautics and Space Administration
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**House Committee on Science, Space, and Technology Hearing to Review the President's FY 2014 Budget Request for Science Agencies**

April 17, 2013

*Witnesses:*

**The Honorable John Holdren**

Director, Office of Science and Technology Policy, Executive Office of the President

*Committee Members Present:*

Lamar Smith (R-TX), Chairman

Eddie Bernice Johnson (D-TX), Ranking Member

Dana Rohrabacher (R-CA)

Randy Neugebauer (R-TX)

Zoe Lofgren (D-CA)

Randy Hultgren (R-IL)

Daniel Lipinski (D-IL)

Bill Posey (R-FL)

Donna Edwards (D-MD)

Eric Swalwell (D-CA)

David Schweikert (R-AZ)

Elizabeth Esty (D-CT)

Randy Weber (R-TX)

Suzanne Bonamici (D-OR)

Mark Takano (D-CA)

Marc Veasey (D-TX)

Frederica Wilson (D-FL)

On April 17, 2013, the House Committee on Science, Space, and Technology held a hearing to receive testimony from the White House Office of Science and Technology Policy (OSTP) on President Obama's proposed fiscal year (FY) 2014 budget for science agencies, research and development (R&D), and science, technology, engineering, and mathematics (STEM) education.

Chairman Lamar Smith (R-TX) stated in his opening statement that the committee holds jurisdiction over "\$40 billion in annual federal R&D spending," and that their "budget choices for federal R&D investments...will affect research and technology for many decades to come." He discussed questions facing the committee over how federal R&D investments should best be directed. He pressed the need for future "systems" to "launch American astronauts on American rockets," and for improved research

onboard the International Space Station. He asked if the future of human spaceflight ought to lie in exploring asteroids or the Moon. Smith also noted the budget's proposed \$2.7 billion for climate science projects at 13 agencies, inquiring if further consolidation is possible and how such a budget will "affect other research priorities."

In her opening statement, Ranking Member Eddie Bernice Johnson (D-TX) said, "I am pleased that the President remains committed to prioritizing investments in [R&D] and STEM education in his [FY 2014] request." She stated that "there are few more important investments we can make than in our nation's brain power." She praised the budget's "increased support for advanced manufacturing," the U.S. Global Change Research Program, and the National Aeronautics and Space Administration (NASA) "climate research." She approved of "the President's continued commitment to... sustained upward [budget] trajectories initiated in the America COMPETES Act" for the National Science Foundation (NSF), the National Institute of Standards and Technology (NIST), and the Department of Energy's (DOE) Office of Science. She noted that the above "agencies, among others, help to ensure our long-term economic growth through their support for cutting edge basic research and STEM education." Johnson discussed her "support" for creating "a coherent vision and strategy for federal investments in STEM" education, but expressed concern over "the release of this proposal before we have the strategic plan in hand." She requested that OSTP "prioritize getting us the full report" on the reorganization of federal STEM education programs.

John Holdren, director of OSTP for the Executive Office of the President, testified that President Obama supports "three overarching priorities" for science funding: "making America a magnet for new jobs and manufacturing; unlocking the promise of American energy; and educating our citizens with the skills and training to fill the jobs of the future." He stated that the FY 2014 budget proposes \$142.8 billion for federal R&D (1.3 percent higher than FY 2012 enacted levels): \$69.6 billion for non-defense R&D (9.2 percent increase), \$71.5 billion for development (\$3.8 billion decrease), \$17.7 billion for NASA, \$379 million for the Advanced Research Projects Agency –Energy (ARPA-E), \$3.1 billion for federal STEM education (6.7 percent increase), and \$13.5 billion for NSF, DOE's Office of Science, and NIST laboratories combined (8 percent increase). The NASA funding will, among other items, support "the continued development of the space launch system and the Orion Multi-Purpose Crew Vehicle to enable human explorations to new destinations" such as an asteroid. He discussed Obama's proposal to establish an Energy Security Trust to work on transitioning cars away from oil, and support for "several high level interagency science R&D initiatives including the Networking and Information Technology R&D program...and the U.S. Global Change program."

During the question and answer session, questions from Smith, Randy Weber (R-TX), and Bill Posey (R-FL) focused on potentially questionable studies NSF chose to fund in the social, behavioral, and economic (SBE) sciences. The representatives questioned how certain studies are justified, the priorities of the NSF in awarding funds, and if it would be beneficial to add phrasing to NSF's decision guidelines to require all approved studies enhance the nation's national security and economy. Posey stated that SBE studies cost NSF more than \$250 million, with only \$10 million going toward political science research. Additionally, the FY 2014 budget proposes a seven percent increase in SBE funding. Holdren noted examples of "valuable" and "good and important research" funded by NSF in SBE fields. Regarding titles given as examples of "questionable" studies, he stated "it is a perilous business, sometimes, to try to determine from the title of a grant or even from a description of it what value it might have as fundamental research." However, he acknowledged that "as rigorous as NSF's review processes are, there is always room for improvement." He cautioned that intervention may "undermine the basic research dimension" of NSF. Posey voiced support for Senator Tom Coburn's (R-OK) amendment to the Consolidated and Further Continuing Appropriations Act, 2013 (P.L. 113-6) to require that "each and every social science study meets the criteria of promoting national security or economic interest" of the U.S. Holdren disagreed with the amendment claiming such language is "too narrowly drawn." He stated, "It's a dangerous thing for the Congress or anybody else to be trying to specify in detail what kinds of fundamental research the NSF should support" and "the private sector is not going to support basic research to the extent that society's interests require." He noted that it "is a responsibility of the government to fund basic research and...if you say that [a study] has to have a specific application, you're pulling the rug out from under the capacity of the NSF to fund basic research."

Questions from Johnson, Donna Edwards (D-MD), Frederica Wilson (D-FL), and Marc Veasey (D-TX) focused on the proposed reorganization of federal STEM education programs. Johnson noted that the proposal seeks to "better concentrate" 127 programs, but fails to provide a detailed plan. Holdren responded that the final plan would be available in May 2013. He noted that program consolidation would leave the Department of Education responsible for K-12 education, NSF for undergraduate and graduate programs, and the Smithsonian for "engagement and outreach outside of schools." He stated that "over 100 programs spread across the mission agencies" would remain "intact," and that "a very serious effort" has gone into protecting "programs that most leverage the unique assets of the mission agencies" and "reach women and other underrepresented groups in STEM." Additionally, NSF and the Smithsonian are "building up capacity" and the Department of Education is "expanding the staff that is

dedicated to STEM education” to accommodate the reorganization.

Edwards noted problems in “informal” education programs where people at times “don’t know what makes a good program” and need more “guidance and coherence.” She asked if Holdren saw “a role for scientists on the ground to participate” in the new NSF and Department of Education programs. Holdren responded, “Absolutely yes,” and he highlighted some such programs. He noted that the reorganization affects “about half of the dispersed programs” and that the organizations that will take over – Smithsonian, NSF, and Department of Education – “are determined to continue to tap the expertise in the dispersed mission agencies for these purposes.”

Wilson voiced similar concerns, stating that “a lot of these hands on afterschool activities are what get very young children excited about science.” She asked Holdren to “elaborate on the new role of the Smithsonian in coordinating informal STEM education.” He outlined the goals that the Smithsonian plans to pursue: “co-creation” of program content with STEM agencies, development and maintenance of the infrastructure to deliver that content, establishment of “teachers and student agency partnerships,” and “evaluation of these efforts.” He argued that the Smithsonian is making a “well thought out effort” that “will build on and expand their existing efforts in these areas.”

Edwards also asked about continuing funding for basic research at “historically black colleges and universities and minority-serving institutions.” Holdren stated that OSTP “took care not to impact any programs connected with historically black colleges and universities or other programs that were explicitly focused on women or minorities in STEM,” and are reviewing any possible “indirect connections.”

Veasey raised the issue of employment in advance manufacturing and its connection to STEM education. He noted that in 2012 600,000 “highly advanced” and high paying manufacturing jobs “went unfilled largely because” many high school graduates lack specific skills and a sufficient background in STEM education to fill the positions. Holdren outlined a plan for addressing this workforce gap: change the “high school experience” to ensure that graduates are “better prepared for...high-skilled jobs” and “develop community college curricula” in concert with local industry partners “that prepares students for precisely the jobs that exist in the companies in their particular regions.”

Smith noted that there are 13 agencies working on climate science initiatives and asked, “Why not let NASA focus on its missions with regard to space?” Holdren responded that “NASA has long had a mission to planet Earth, a mission looking down as well as a mission looking out.” He stated that “NASA has unique capabilities” and “has long been a multi-mission agency.” Dana Rohrabacher (R-CA) noted that federal funding for the U.S. Global Change Research Program from 1990 to the end of 2013 amounts to \$42 billion. He asked what research fields this program funds in addition to climate change. Holdren listed research in water, soils, desertification, deforestation, and oceans, but pointed out that “climate change has become such a pervasive phenomenon that it is linked in various ways with these other issues.” He noted that the “13 different agencies involved here” have “a wide variety of missions.”

Elizabeth Esty (D-CT) discussed the proposed Energy Security Trust which would apply “revenue from federal oil and gas development” to research into shifting away from the use of oil and toward “more secure alternatives.” She asked for more details on the Trust and if funds would be allocated to existing programs such as the DOE’s Office of Energy Efficiency and Renewable Energy and ARPA-E, or to new programs. Holdren stated that OSTP “envision[s] a variety of approaches including strengthening the support for some existing programs but providing support for some new opportunities.” He emphasized that the program is at an “early stage of formulation and we would expect to do it in consultation with the Congress.”

Esty also inquired about the reason behind the “substantial increase in the ARPA-E budget” proposed for FY 2014, and the projects it would fund. Holdren replied that ARPA-E “has developed a strong reputation for thinking outside the box and for developing new ideas that can contribute substantially” to society. He noted advances in energy storage, advanced biofuels, and grid efficiency. He concluded that “money invested in ARPA-E has had a lot of leverage and so we’re proposing to expand it.” Smith asked about the choice to invest in “capturing” an asteroid and drawing it closer to Earth to allow human exploration as opposed to pursuing more manned missions to the Moon. He pointed to the 2012 National Academy of Sciences report titled NASA’s Strategic Direction and the Need for a National Consensus which showed more support among scientists for a lunar mission than one to an asteroid. Holdren responded that while there was initially a “lack of enthusiasm among some,” the creation of “an extraordinarily ingenious and cost effective approach to that mission” is generating “a lot of enthusiasm.” The new plan employs the Space Launch System and Orion Multi-Purpose Launch Vehicle as well as transporting the asteroid to a location that NASA had already planned to visit.

-KAC

March 20, 2013

*Witnesses:*

**The Honorable Charles Bolden**

Administrator, National Aeronautics and Space Administration

*Committee Members Present:*

Frank Wolf (R-VA), Chairman

Chaka Fattah (D-PA), Ranking Member

John Culberson (R-TX)

Adam Schiff (D-CA)

Jo Bonner (R-AL)

José Serrano (D-NY)

On March 20, 2013, the House Committee on Appropriations Subcommittee on Commerce, Justice, and Space held a hearing to receive testimony on the operations of the National Aeronautics and Space Administration (NASA).

Subcommittee Chairman Frank Wolf (R-VA) stated in his opening statement that, given the current lack of a budget, the hearing would focus mainly on discussing general goals for NASA rather than specific funding levels. He focused on discussing security issues facing NASA given the recent attempted theft of NASA technology by a Chinese national formerly working as a contractor. He noted that China is an “active, aggressive espionage threat,” attempting to steal space and flight technology; therefore, it is “critically important for us to have confidence in NASA’s ability to protect sensitive technologies and information from exploitation by entities that are looking to gain an advantage over the United States economically or militarily.” Wolf stated that while previously “this subcommittee has worked very hard...to protect the research and development programs from the full impact of recent budget reductions...[it] cannot continue to do” so without assurance from NASA “that those investments will be adequately protected from entities and countries that have been designated as potential threats.”

Chaka Fattah (D-PA), subcommittee ranking member, referred to the 2012 landing of the Curiosity rover on Mars as an “event galvanizing the nation” to recognize the degree of NASA’s success, and a “message to the nation that NASA really was at the forefront.” He outlined some of the major developments currently taking place at NASA, from Curiosity to the James Webb Space Telescope to the Space X program. He noted that he too was concerned regarding NASA’s ability to protect “our national security and intellectual property.”

In his testimony, Charles Bolden, administrator of NASA, opened by discussing “NASA’s continuing progress in implementing the bi-partisan program” created by the “President and Congress...[to] ensure the United States continues to lead the world in space exploration, technology, innovation, and scientific discovery.” He listed some current objectives that NASA is working toward including sending “humans to an asteroid by 2025 and on to Mars in the 2030’s,” constructing the Space Launch System and Orion Multi-Purpose Crew Vehicle with the first manned missions in 2021, continuing the work on the International Space Station (ISS), expanding Mars research programs, launching the James Webb telescope in 2018, and developing new technologies. He stated that “NASA’s on track to send our astronauts to space from American shores, using American companies by 2017” and remains the “world’s premier space science organization.”

In his written testimony, Bolden expanded on the status of NASA’s earth science research. He mentioned the current 17 earth science missions orbiting Earth and the addition of the Landsat Data Continuity Mission, “which is currently undergoing on-orbit checkout.” He stated, “NASA is working to complete and launch three new Earth science missions in FY 2014, with a fourth scheduled for launch in Fall 2014:” the Global Precipitation Measurement (GPM) mission, Orbiting Carbon Observatory-2 (OCO-2), Stratospheric Aerosol and Gas Experiment III (SAGE III), and the Soil Moisture Active Passive (SMAP) mission. In astrophysics, the James Webb Space Telescope, “the most powerful telescope in history,” is set to launch in 2018 and “will allow us to observe objects even fainter than the Hubble Space Telescope can see.” The Stratospheric Observatory and Infrared Astronomy (SOFIA) airborne observatory continues making “science observations...that are unobtainable from telescopes on the ground.”

In the heliophysics program, the Van Allen Probes launched last year, the Interface Region Imaging Spectrograph (IRIS) launches this year, and the Magnetospheric Multiscale (MMS) mission is projected to launch in 2015. He noted that “NASA continues to



formulate the Solar Probe Plus (SPP) mission and develop its contribution to the European Space Agency's Solar Orbiter mission."

Bolden also addressed the security concerns raised by Wolf and Fattah outlining the steps taken regarding the recent breach at Langley Research Center involving a Chinese national contractor who is no longer working for the organization. He provided seven steps that he is taking to improve NASA security.

During the question and answer section, Fattah asked Bolden to discuss the relationship between NASA and CASIS in supporting and constructing the "nation's newest federal [national] laboratory," the International Space Station. Bolden responded that "CASIS is a private entity" with the responsibility of "recruiting and managing experiments and researchers in the U.S. segment" of the ISS. The goal of working with CASIS is to "bring credibility to the work...being done on station." He stated that this relationship has led to the decision to "put up some earth science instruments on station" and a solar science mission. He noted that "I was led to believe that the station was not a good platform for earth science, that was not true."

Fattah also inquired about the relationship between NASA and the National Science Foundation (NSF). Bolden stated that "the big thing is collaboration between agencies." He noted that NASA has a number of facilities that are sponsored or funded by NSF. He outlined how the NASA/NSF collaboration assists with the new "observatory in Chile [that] will give us another instrument...for identification and tracking" of asteroids, as well as flights "towards both poles to do ice research."

John Culberson (R-TX) asked for an outline of the trajectory for the heavy lift and Orion vehicles as well as the planetary science program and Mars and Europa projects. Bolden stated that Orion would "fly its first flight a little more than a year from now" in fall 2014 and the heavy lift would be available in 2017. The first combined unmanned launch is planned for 2017 with the first manned launch in 2021.

Bolden described the science program as "aggressive and ambitious and highly successful." Some developments he listed included next year's Mars Atmosphere and Volatile Evolution (MAVEN) mission, the 2016 launch of the Interior Exploration using Seismic Investigations, Geodesy and Heat Transport (InSight) mission which will "core meters into the martian surface," and the 2020 launch of a "Curiosity-like" Mars rover. He mentioned U.S. involvement with the 2016 and 2018 European Space Agency's ExoMars missions, but noted that a lack of funding prevented more significant participation in the project.

Culberson inquired specifically into Bolden's commitment to missions to Europa. Bolden responded that the Mars mission and a sample return from Mars are the first priority for NASA as per the National Research Council's (NRC) decadal survey directive. He noted that if Congress and the Administration are unable to agree on funding that "will not preclude that lander from being able to be the beginning of a sample return mission," they will likely "forget" about Mars and head on to Europa. He stated that given the current funding levels, NASA will continue to invest in Europa mission development at lower levels but cannot afford to fully develop both Mars and Europa missions.

Culberson asked Bolden to comment on the Senate appropriation and continuing resolution funding for fiscal year 2013, particularly with regard to the heavy lift rocket and planetary research programs. Bolden discussed the "opportunity to put the triangle back together" meaning to create the space program outlined in the 1970s that never came to fruition. The triangle he described is based on the establishment of the ISS, construction of a heavy lift launch vehicle and multipurpose crew vehicle, and development of commercial crew and cargo capabilities. As far as funding, Bolden stated, "I'm always happy to get whatever the Congress appropriates me," but while the amount "is close to what we asked for" there are "shortcomings" that are "exacerbated by sequestration" and could be harmful to the program later. He advocated for "flexibility within the top line" of the budget to move money where it is needed so as to keep the programs running sequentially. He stated he doesn't need "a lot of extra money in the heavy lift" vehicle but does need money for the commercial crew work so as to not pay Russia for crew capabilities beyond 2016.

Fattah prompted Bolden to discuss the work NASA does in terms of education. Bolden responded that he will follow President Obama's interest in that increasing "the number of engineers in STEM fields that come out of this country." He noted that the U.S. is no longer able to bring in scientist and engineers from outside the U.S. to train and work in the states but instead needs to train American engineers in order to compete with other countries. He indicated that NASA focuses on STEM education in K-12 and on encouraging involvement in STEM fields in underserved communities.

-KAC

Please send any comments or requests for information to the AGI Geoscience Policy at [govt@agiweb.org](mailto:govt@agiweb.org).

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