

National Science Foundation Appropriations: FY 2013

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The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense..." NSF serves as the funding source for about 20 percent of all federally supported basic research conducted by America's colleges and universities. Key programs of interest to the Earth sciences are mainly within the Research and Related Activities, including the Geosciences Directorate and Office of Polar Programs. Earth sciences are also covered in the Education and Human Resources Directorate, and research equipment funding.

Fiscal Year 2013 (FY13) NSF Appropriations Process

<u>Account</u>	<u>FY12 Estimate</u> (\$million)	<u>President's FY13</u> <u>Request</u> (\$million)	<u>House Action</u> (\$million)	<u>Senate Action</u> (\$million)	<u>Conference</u> <u>Committee</u> <u>Action</u> (\$million)
National Science Foundation (total)	7,033	7,373	7,332		
Research & Related Activities	5,689	5,983	5,943		
<i>Geosciences Directorate</i>	885	906			
Atmospheric and Geospace Sciences	259	264			
Earth Sciences	183.5	189			
Ocean Sciences	352	362			
Integrative & Collaborative Education & Research	91	91			
-- Incorporated Research Institutions for Seismology	12	11			
-- EarthScope Operations	25	26			
-- Academic Research Fleet	79	73			
--Arecibo Observatory*	9	8			
--National Center for Atmospheric Research	98.6	92			
-- Integrated Ocean Drilling Program (IODP)	44	38			
<i>Office of Polar Programs</i>	436	450			
Major Research Equipment & Facilities (MREFC)	197	196	196		

--Ocean Observatories Initiative (OOI)					
Education & Human Resources	829	876	876		

*Formerly part of the *National Astronomy and Ionosphere Center* in previous AGI tables

President's Request

On February 13, Director Subra Suresh unveiled the President's fiscal year (FY) 2013 budget request for the National Science Foundation (NSF). NSF would receive \$7.373 billion, a 4.8 percent increase, which Suresh called, "good news for America and for science everywhere." Suresh underlined the importance of science for the future of American prosperity and described how the request "moves America forward by connecting the science and engineering enterprise with benefits for Americans in areas critical to job creation, a growing economy, and a higher standard of living."

Science, Engineering and Education for Sustainability (SEES), NSF's "flagship portfolio," would receive \$76.70 million to initiate five programs. Coastal SEES, Arctic Regions (ArcSEES), Creating a More Disaster-Resilient America (CaMRA), Sustainable Chemistry, Engineering and Materials (SusCHEM), and the Role of Information Sciences and Engineering in SEES (RISES). An additional \$125.8 million would be provided to SEES to support programs initiated in prior years amounting to a total of \$202.5 million.

The Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21) provides a framework for integrating cyberinfrastructure in research across every discipline. Part of the FY 2013 request is \$17 million for the development of the EarthCube program within CIF21. Overall, the President has requested \$106 million for the CIF21 initiative, a \$28 million increase.

Integrated NSF Support for Interdisciplinary Research and Education (INSPIRE) would receive \$63 million in the President's request to expand the opportunities for discovery through multidisciplinary research. The program will continue with the CREATIV and INSPIRE mid-scale award activities in FY 2013 as a pilot mechanism to help develop large-scale activities in 2014 and beyond.

The NSF Innovation Corps (I-Corps) would receive \$18.85 million in the FY 2013 President's request which NSF anticipates will support up to 375 awards at \$50,000 each or 250 awards at \$75,000 each. I-Corps seeks to "accelerate the movement of research results from the lab to the marketplace" by putting NSF researchers in contact with technology developers, business leaders, and venture capitalists.

The administration would provide \$121.5 million for the Graduate Research Fellowship Program, a 11% increase, and \$216.5 million for the Faculty Early Career Development (CAREER) program.

The Geosciences Directorate (GEO) would receive a 2.4 percent increase over FY 2012 for a total of \$906.44 million in the President's request. All three divisions within GEO: Atmospheric and Geospace Sciences (AGS), Earth Sciences (EAR), and Ocean Sciences (OCE), would receive increases.

All of the increases in research would mean modest cuts to facilities across the agency. The National Center for Atmospheric Research (NCAR) would be cut by about \$6.3 million, Incorporated Research Institutions for Seismology (IRIS) would be cut by about \$1.11 million, the Integrated Ocean Drilling Program (IODP) would be cut by about \$5.5 million, and the Arecibo Observatory (formerly part of the National Astronomy and Ionosphere Center) would be flat funded in the President's request. However, EarthScope (+ \$1.1 million) and the Ocean Observatories Initiative (+ \$13.3 million) would see modest increases in the request. The increase for EarthScope will allow the long-term operation of up to 250 transportable array stations to be left in the central and eastern United States after the transportable array moves to Alaska beginning in 2014. Among other new major facilities with geosciences, the launch of the Alaska Region Research Vessel, Sikuliaq, is scheduled for October, 2012 and the NCAR Wyoming Supercomputer Center is projected to begin operations in June of 2012.

Below are more details on specific program funding changes copied directly from NSF-GEO budget documents:

GEO-EAR

Research

EAR will continue its participation in Science, Engineering and Education for Sustainability (SEES) with \$7.0 million for the Water, Sustainability and Climate solicitation. EAR will initiate support for two new SEES programs in FY 2013: Creating a More Disaster Resilient America (CaMRA) and SEES Coastal at levels of \$6.0 million and \$2.50 million, respectively. EAR will increase support for GeoPRISMS, a joint OCE-EAR interdisciplinary program to study geodynamic processes at continental margins, by \$500,000, to a total of \$2.0 million. Support for Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21) is initiated in FY 2013 at a level of \$2.60 million. In FY 2013, EAR will increase support for Creative Research Awards for Transformative Interdisciplinary Ventures (CREATIV), part of NSF's new INSPIRE program, by \$500,000, for a total of \$1.0 million. CAREER funding will be increased by \$200,000 above the FY 2012 Estimate, to a total of \$5.0 million,

reflecting EAR's continuing commitment to supporting early career researchers.

Education

EAR's support for Research Experience for Undergraduates (REU), EAR Postdoctoral Fellowships and other education, outreach and workforce development activities will increase by \$70,000 to \$5.0 million in FY 2013.

Infrastructure

Support of Incorporated Research Institutions for Seismology (IRIS) is reduced in FY 2013 by \$1.11 million, to a total of \$11.25 million, reflecting increasing efficiency and streamlining of operations with their new integrated management structure. Total support for EarthScope operations will increase by \$1.12 million in FY 2013, to a total of \$26.17 million. This total includes \$3.0 million for the first year of a 5-year, \$15.0 million project for the capital acquisition, long-term siting and near-term operation of up to 250 EarthScope Transportable Array (TA) stations to be left in the central and eastern United States after the TA's proposed move to Alaska beginning in 2014. A decrease of \$1.20 million, to a total of \$22.87 million, is proposed to support multi-user research instrumentation, acquisition, or upgrading of research equipment, and development of new instrumentation, analytical techniques, and software.

GEO-AGS

Research

Support for early-career researchers is an AGS priority. The division increases its support for CAREER grants (+\$300,000, to a total of \$5.78 million). The Center for Multiscale Modeling of Atmospheric Processes, initiated in FY 2006, will be maintained at \$4.0 million. In FY 2013 AGS will contribute \$9.0 million in support of the cross-directorate research opportunities within the Science, Engineering, and Education for Sustainability (SEES) portfolio. AGS will support the SEES program, Creating a More Disaster Resilient America (CaMRA) at \$5.50 million. For AGS, the overarching goal of SEES CaMRA is to catalyze basic research in hazard-related science to support a broad spectrum of research into the improved understanding and prediction of atmospheric and space weather hazards. In addition, AGS will support SEES Coastal at a level of \$3.50 million. Among the goals of SEES Coastal are enabling place-based, system-level understanding of vulnerable coastal systems; yielding outcomes with quantitative predictive value; and identifying pathways to enhance coastal resilience. Support for Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21) is initiated in FY 2013 within AGS. AGS will contribute \$2.70 million to this Foundation-wide activity through its support for EarthCube, which seeks to support the research, development, and provision of tools consistent with NSF's goal of facilitating data-enabled science. AGS seeks to increase its portfolio of cross-disciplinary science support by funding the INSPIRE program at \$2.0 million in FY 2013.

Education

AGS supports a number of education activities, including GEO Postdoctoral fellows, Research Experiences for Undergraduates (REU) and Research Experiences for Teachers (RET). This portfolio will total \$1.52 million (-\$440,000) in FY 2013.

Infrastructure

Funding for the Arecibo Observatory (formally the National Astronomy and Ionosphere Center) will remain level at \$3.20 million. Support for the National Center for Atmospheric Research (NCAR) is reduced by \$6.31 million, to a total of \$92.29 million. This level of support protects the operations of the NCAR/Wyoming Supercomputer Center (NWSC), completed on schedule and within budget, and maintains support for other key community research infrastructure operated by NCAR. Support for Research Resources is reduced by \$3.52 million, to a total of \$27.10 million. This level of support represents an increased focus on research using existing instrumentation rather than instrumentation development.

GEO-OCE

Research

OCE's research budget will increase moderately by \$12.49 million, which includes a \$2.0 million investment (\$1.0 million above the FY 2012 estimate) in NSF's INSPIRE program, which should be attractive to interdisciplinary ocean scientists. OCE will give high priority to research themes that emerge from both the NOP and the NSF SEES program. There are many crossovers between the NOP and SEES objectives as they relate to the oceans. These themes include ocean acidification, addressing the role of the oceans in climate change, the integration of marine ecosystem models with climate change models, interactions between warming oceans and ice-sheets, dimensions of biodiversity, and others. In FY 2013 a refreshed Ocean Research Priorities Plan and Implementation Strategy (ORPPIS) will be released by the Office of Science and Technology Policy (OSTP) Subcommittee on Ocean Science and Technology (SOST). OCE will give priority to the research areas identified in the new plan. OCE will invest \$6.0 million in the new SEES Coastal program. It is expected that much of the new research called for by the NOP will be supported through this initiative. OCE will provide \$4.50 million for a new GEO program, Creating a More Disaster Resilient

America (CaMRA), to support research programs and facilities involving severe storms, tsunamis, long term effects of oil spills, and biotic hazards (e.g., harmful algal blooms (HABs), invasive species). Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21) will be supported at \$2.70 million in FY 2013. OCE will contribute to this NSF-wide initiative by supporting research on geoinformatics, EarthCube, and the enhancement of access and connections to facilities and scientific instruments emerging from national data- and computation-intensive facilities such as the Ocean Observatories Initiative (OOI). The Center for Dark Energy Biosphere Investigations (C-DEBI) will be level funded at \$5.0 million. This Center uses the highly advanced technologies of the Integrated Ocean Drilling Program (IODP) to pursue exploration of the nature and limits of life in the largest biome on earth. The division will continue to partner with OPP, BIO, and other agencies to fulfill priority research recommendations on the biological, ecosystem, and chemical processes involved with decreasing ocean pH and impacts to important marine resources. Divisional investments will be \$6.0 million in FY 2013.

Education

Funding for educational activities will increase slightly and will emphasize initiatives emerging from the NOP that aim to improve public understanding of the oceans, encourage broader participation, and provide additional opportunities for research experiences at the undergraduate level. Funding is provided for continuation of a program initiated in FY 2012, OCE Postdoctoral Fellowship and Research Facilitation Awards. This program aims to broaden participation in the ocean sciences through fellowships and research support to enhance opportunities for women and minority scientists. Funding for the COSEE program continues at a level of \$3.24 million, representing a reduction of \$1.0 million from FY 2012.

Support for REU programs and other research experience activities will rise by \$1.10 million.

Infrastructure

Ongoing investment in fleet renewal will include \$1.0 million for Regional Class Research Vessels (RCRVs) conceptual design and development activities as a potential future project. The Academic Research Fleet operations will be reduced by \$4.75 million due to the completion of support for the replacement of the RHOV Alvin and from savings expected from increased efficiencies resulting from fleet coordination planning in concert with other federal agencies and the expected retirement of the R/V Wecoma. A \$13.30 million increase for continued implementation of the Ocean Observatories Initiative (OOI) will bring the total for operations and maintenance to \$40.10 million in FY 2013. These increased funds support the transition from the design phase to an active network build and deploy phase. Continued support of \$38.90 million, a decrease of \$5.50 million, is requested for the Integrated Ocean Drilling Program to continue to operate the drilling vessel Joides Resolution. FY 2013 is the final year of the current decadal program, with the potential for a new program beginning in FY 2014 currently under review. In FY 2013, NSF investments in IODP will be increasingly leveraged by support from international partners and industry.

House Action

The House of Representatives passed the Commerce, Justice, Science, and Related Agencies Appropriations Act, 2013 (H.R. 5326) on May 10, 2012 on a vote of 247-163. The House bill provides the National Science Foundation with \$7.332 billion. Relevant language from the House Report (112-463) follows:

Research and Related Activities

The Committee recommends \$5,942,693,000 for Research and Related Activities (R&RA), which is \$223,693,000 above fiscal year 2012 and \$40,587,000 below the request.

Research priorities.—The Committee appreciates the National Science Foundation's (NSF) commitment to reviewing its portfolio of programs and proposing reductions or terminations where appropriate. Such proposals provide a more fiscally sustainable way to support new or expanded programs. Accordingly, the recommendation adopts all of the reduction and termination proposals contained in the R&RA budget request except for the proposed termination of the Communicating Science Broadly (CSB) program. The Committee supports the continuation of CSB activities to ensure taxpayers have access to information about the impact and relevance of NSF's scientific research.

The funds made available through reductions and terminations, together with the increase provided by the Committee, will allow NSF to expand or enhance its activities across a range of research areas with significant potential impacts on national security and economic competitiveness. The Committee directs NSF to prioritize these new activities toward cybersecurity and cyberinfrastructure improvements; advanced manufacturing (as further discussed below); materials research; and disciplinary and interdisciplinary research in the natural and physical sciences, math and engineering. Not later than 90 days after the enactment of this Act, NSF shall report to the Committees on Appropriations on the detailed distribution of funding by program within this account.

Major Research Equipment and Facilities Construction

The Committee recommends \$196,170,000 for Major Research Equipment and Facilities Construction (MREFC), which is \$29,115,000 above fiscal year 2012 and the same as the request.

Education and Human Resources

The Committee recommends \$875,610,000 for Education and Human Resources (EHR), which is \$46,610,000 above fiscal year 2012 and the same as the request.

Best practices in K–12 STEM education.—NSF shall continue working to develop and carry out a tracking and evaluation methodology to assess the implementation of the recommendations contained in the NRC’s 2011 report entitled Successful K–12 STEM Education: Identifying Effective Approaches in Science, Technology, Engineering and Mathematics. This work should expand on efforts begun using funds provided in fiscal year 2012.

STEM-focused K–12 schools.—The Committee notes that recent reports of the NRC and the NSB have encouraged education researchers and policymakers to give increased consideration to STEM-focused K–12 schools as an effective means of increasing STEM literacy. With those reports in mind, the Committee encourages NSF to work within its existing programs to promote opportunities for collaboration between universities or non-profit research institutions and STEM-focused schools serving K–12 students.

Informal STEM education.—The Committee believes that exposure to STEM concepts outside of a traditional school setting plays a valuable role in promoting STEM literacy and engagement. NSF has proposed a number of changes to its Advancing Informal STEM Learning program that are intended to increase its focus on innovative learning and engagement strategies, especially as these strategies relate to underrepresented groups, and the Committee accepts these changes. The Committee encourages NSF to work with the informal STEM education stakeholder community as it transitions the program to ensure that sufficient opportunities exist for worthy proposals to compete for funding, including those that implement public engagement and non-school programs. Such proposals could use a broad range of communication formats and experiences, such as mobile and broadcast media, virtual learning environments, exhibitions, TV, radio, films, science festivals, and citizen science programs.

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

Senate Action

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

Appropriations Hearings

- March 11, 2011: House Committee on Science, Space, and Technology Hearing on the Fiscal Year 2012 Budget Requests for the National Science Foundation and the National Institute of Standards and Technology

House Committee on Science, Space, and Technology Hearing on the Fiscal Year 2012 Budget Requests for the National Science Foundation and the National Institute of Standards and Technology

March 11, 2011

Witnesses

Panel 1

Dr. Subra Suresh

Director, National Science Foundation

Dr. Ray Bowen

Chairman, National Science Board

Panel 2

Dr. Patrick Gallagher

Under Secretary of Commerce for Standards and Technology, and Director, National Institute of Standards and Technology

Committee Members Present

Ralph Hall, Chairman (R-TX)

Eddie Bernice Johnson, Ranking Member (D-TX)

Dana Rohrabacher (R-CA)

Zoe Lofgren (D-CA)

Roscoe Bartlett (R-MD)

Marcia Fudge (D-OH)

Sandy Adams (R-FL)

Donna Edwards (D-MD)

Mo Brooks (R-AL)

Hansen Clarke (D-MI)

Dan Benishek (R-MI)

Daniel Lipinski (D-IL)

Randy Hultgren (R-IL)

John Sarbanes (D-MD)

Benjamin Quayle (R-AZ)

The House Committee on Science, Space, and Technology held a hearing on March 11, 2011 to discuss the fiscal year (FY) 2012 budget requests for the National Science Foundation (NSF) and the National Institute of Standards and Technology (NIST). The morning of the hearing, an 8.9 magnitude earthquake occurred off the coast of Japan that caused tsunamis around the world, placing some topics of discussion in an immediately relevant, though tragic, context.

Chairman Ralph Hall (R-TX) opened the hearing by acknowledging both agencies for their “vital contributions to our nation’s competitiveness,” and he listed several achievements that have come from NSF investments, including *Google* and MRIs, and thanked NIST for “making things run smoothly.” However, Hall said, considering the nation’s financial condition, the budget requests and increases are not realistic. Hall expressed concern that the Obama Administration has placed a greater emphasis on applied research at the agencies, whose core missions are to fund basic, fundamental research.

Ranking Member Eddie Bernice Johnson (D-TX) applauded the agencies for presenting budgets that invest in science and innovation to help stimulate economic growth. She compared the requests to the Full Year Continuing Appropriations Act of 2011 (H.R. 1) that the House passed in February, which includes cuts to both agencies. In fact, Representative Johnson said she was “dumbfounded” that some were considering cutting investments that help reduce the national debt and create well-paying jobs. Dr. Patrick Gallagher, director of NIST, outlined the priorities of the NIST FY 2012 budget request. He described the initiatives included in the request that aim to bolster manufacturing, infrastructure and education in the U.S. Dr. Gallagher mentioned the importance of disaster mitigation in which NIST is engaged, specifically its responsibility of the National Earthquake Hazard Reduction Program (NEHRP). He acknowledged that the events in Japan serve as an unfortunate reminder of hazard reduction significance.

Representative David Wu (D-OR) expressed the importance of NIST research to develop more earthquake resistant buildings and structures to help communities become more resilient. He explained that the Cascadia subduction zone off the coast of Oregon has the potential for a magnitude 9.0 earthquake. Gallagher responded that the timeliness of the topic was tragic, and went on to describe the federal agencies that are critical to disaster reduction and response. He explained how the U.S. Geological Survey (USGS) is responsible for obtaining and producing seismic data and for mapping the areas in danger; the Federal Emergency Management Agency (FEMA) deals with response and recovery following a disaster; NSF invests in research for long-range engineering issues related to disasters; and NIST supports development of infrastructure and buildings that are resilient against earthquakes. This involves using research conducted by other agencies to develop model building codes that can then serve as an example and be adopted in local community codes. He stated that the NEHRP advisory committee is at NIST and told the committee that more research needs to be done on hazards mitigation.

Dr. Subra Suresh, director of NSF, highlighted some of the priorities included in the \$7.8 billion FY 2012 budget request. NSF plans to invest heavily in cyberinfrastructure, the Advanced Manufacturing Initiative, nanotechnology initiatives and three new science, technology, engineering and mathematics (STEM) education programs.

Dr. Ray Bowen, chairman of the National Science Board, added his support for the NSF budget request. He noted that investment in science, technology, infrastructure and the workforce are critical to America’s continual economic growth, and that Congress must not lose sight of “long term investment during near term challenges.”

Several questions related to STEM education programs. Ranking Member Johnson asked for an update on efforts to increase women and minority participation in STEM fields. Dr. Suresh said that though the number of women in higher education and

those entering the workforce has increased in recent years, there is room for improvement for retaining them . Representative Hansen Clarke (D-MI) expressed concern about the proposed cuts to K-12 STEM education programs, in particular the termination of the Graduate STEM Fellows in K-12 Education (GK-12) program. Dr. Suresh assured him that NSF remains “very, very strongly committed” to K-12 education. Other STEM education programs will incorporate the best aspects of GK-12 in an attempt to streamline priorities, he said, and the elimination and reduced funding of the program in no way reflects a reduced commitment to improving STEM education. Noting that 12 federal agencies have roles in STEM education, Representative Dan Benishek (R-MI) asked whether it is necessary to have more than one agency working on the issue. Dr. Suresh stressed that NSF has the unique upstream role of researching, developing and testing models of the best teacher practices that other agencies then implement. He reminded Representative Benishek that NSF is the only federal agency that is involved in every science and engineering field.

There was varied response to the budget request. Representative Mo Brooks (R-AL) said it is “irresponsible for the White House to propose these increases” considering the country’s financial situation and asked Dr. Suresh what fields of research have the highest priority. Dr. Suresh noted that the FY 2012 budget outlines NSF’s priorities. He told him that NSF-funded research historically creates near and long term job opportunities and that innovation, the “engine of the economy,” is more important in an unstable economy than a thriving one. Representative Zoe Lofgren (D-CA) agreed that “when times are tough it’s time to double down on science investments.”

Talk turned to discussion of the Full Year Continuing Appropriations Act of 2011 (H.R. 1). Representative Lofgren told Dr. Suresh that research universities in California have warned her that the cuts included in the act would result in far fewer grants in science and technology fields, therefore “killing the future prosperity.” Dr. Bowen added that if the funding decreases, “there will be impacts” for long term fundamental research. He mentioned that young students and scientists beginning their careers in STEM areas would have fewer opportunities.

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Sources: NSF Budget Information web site and Thomas

Please send any comments or requests for information to AGI Geoscience Policy at govt@agiweb.org.

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