

DIRECTORATE FOR GEOSCIENCES (GEO)

\$906,440,000
+\$21,170,000 / 2.4%

GEO Funding (Dollars in Millions)

	FY 2011 Actual	FY 2012 Estimate	FY 2013 Request	Change Over FY 2012 Estimate	
				Amount	Percent
Division of Atmospheric and Geospace Sciences (AGS)	\$257.65	\$258.66	\$264.06	\$5.40	2.1%
Division of Earth Sciences (EAR)	183.83	183.50	189.20	5.70	3.1%
Integrative and Collaborative Education and Research (ICER)	91.62	91.21	91.21	-	-
Division of Ocean Sciences (OCE)	352.21	351.90	361.97	10.07	2.9%
Total, GEO	\$885.32	\$885.27	\$906.44	\$21.17	2.4%

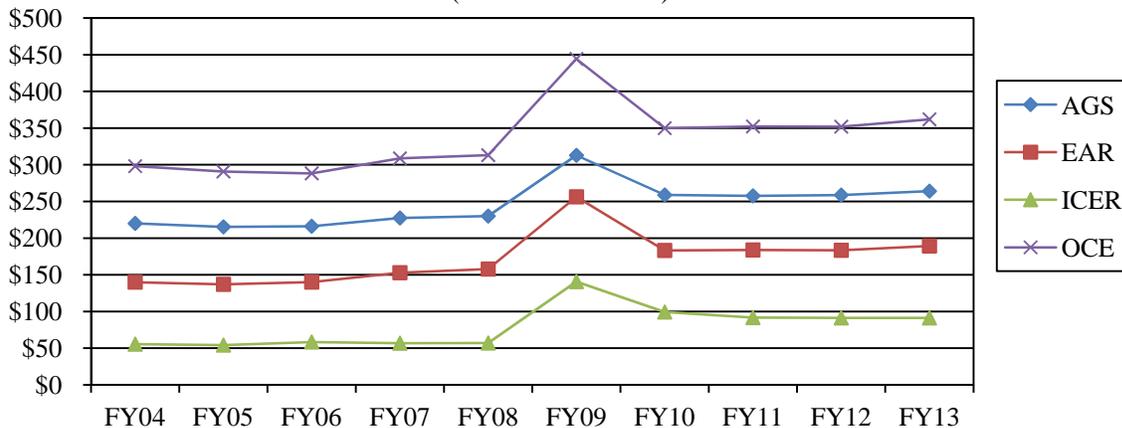
Totals may not add due to rounding.

About GEO:

GEO supports basic research that advances the frontiers of knowledge and drives technological innovation while improving our understanding of the many processes that affect the global environment. These processes include the role of the atmosphere and oceans in climate, the planetary water cycle, and ocean acidification. Support is provided for interdisciplinary studies that contribute directly to national research priorities such as: understanding, adapting to, and mitigating the impacts of global change; developing and deploying integrated ocean observing capabilities to support ecosystem-based management; and understanding future availability of fresh water. Lives are saved and property is preserved through better prediction and understanding of natural environmental hazards such as earthquakes, tornados, hurricanes, tsunamis, drought, and solar storms. Basic research supported by GEO enables preparation for and subsequent mitigation of, or adaptation to, the effects of these and other disruptive natural events.

GEO provides about 55 percent of the federal funding for basic research in the geosciences at academic institutions.

GEO Subactivity Funding (Dollars in Millions)



FY 2009 funding reflects both the FY 2009 omnibus appropriation and funding provided through the American Recovery and Reinvestment Act of 2009 (P.L. 111-5).

FY 2013 Summary by Division

- AGS's FY 2013 Request is focused on supporting emerging priority areas such as Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21) and enhancing support of the NSF-wide Science, Engineering, and Education for Sustainability (SEES) investment, where emphases will include a new thrust on resilience to natural and technological disasters called Creating a More Disaster Resilient America (CaMRA) and a new activity focused on coastal systems. AGS will also continue support of the observational infrastructure required to conduct modern research including overseeing initial operation of the NCAR-Wyoming supercomputer center.
- EAR's FY 2013 Request is focused on supporting emerging priority areas such as CIF21 while enhancing support of the NSF-wide SEES investment where emphases will include a new thrust on CaMRA and a new activity focused on coastal systems. EAR will also modestly increase support for operation of the EarthScope facility, enabling a number of seismometers to collect extensive data in the Eastern U.S.
- ICER's FY 2013 Request is focused on enhancing support of the NSF-wide SEES investment, particularly a new thrust on Arctic systems, while maintaining support for GEO-wide education and international research activities.
- OCE's FY 2013 Request will support emerging priority areas such as CIF21 while enhancing support of the NSF-wide SEES investment where emphasis will be on understanding coastal systems and CaMRA. OCE is strongly supporting the President's Executive Order establishing a National Ocean Policy (NOP) through enablement of research, education, and infrastructure. OCE is continuing to invest in research infrastructure and to plan for potential new Regional Class Research Vessels.

Major Investments

GEO Major Investments

(Dollars in Millions)

Area of Investment	FY 2011 Actual	FY 2012 Estimate	FY 2013 Request	Change Over FY 2012 Estimate	
				Amount	Percent
CAREER	\$12.72	\$13.08	\$13.71	\$0.63	4.8%
CIF21	-	4.00	12.00	8.00	200.0%
E ²	-	-	12.00	12.00	N/A
I-Corps	-	0.25	1.00	0.75	300.0%
INSPIRE	-	2.00	5.00	3.00	150.0%
SEES	28.85	44.25	70.75	26.50	59.9%

Major investments may have funding overlap and thus should not be summed.

- Faculty Early Career Development Program (CAREER): This Foundation-wide activity offers the National Science Foundation's most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education, and the integration of education and research within the context of the mission of their organizations. Approximately 30 awards will be made in FY 2013.

- **Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21):** GEO support for the NSF-wide CIF21 investment (\$12.0 million) will enable development of EarthCube. A partnership with the Office of Cyberinfrastructure (OCI), EarthCube seeks transformative concepts and approaches to create integrated data management infrastructure across the geosciences.
- **Expeditions in Education (E²):** Through E², GEO will partner with the Directorate for Education and Human Resources (EHR) to infuse current geosciences concepts into undergraduate education, while entraining a broader and more representative cross-section of Americans into science. Emphasis will be placed on rigorous evaluation, resources, and experiences relevant to preparation of a workforce to address complex problems in sustainability.
- **I-Corps:** GEO support of I-Corps gives project teams access to resources to help determine the readiness of technology developed by previously-funded or currently-funded NSF projects to transition from idea to product.
- **Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE):** Intended to encourage cross-disciplinary science, INSPIRE helps to break down disciplinary barriers and encourages program managers to use new tools, collaboration modes, and techniques in the merit-review process to widen the pool of prospective discoveries that may be hidden from or circumvented by traditional means. Leveraged by centralized support, scientists will utilize INSPIRE to pursue novel interdisciplinary research at the forefront of the geosciences.
- **Science, Engineering, and Education for Sustainability (SEES):** GEO supports a portfolio of activities that highlight NSF's unique role in helping society address the challenges of achieving sustainability. In FY 2013, new thrusts on improving resilience to natural and technological disasters and coastal and arctic systems will be initiated.

GEO Funding for Centers Programs and Facilities

GEO Funding for Centers Programs

(Dollars in Millions)

	FY 2011 Actual	FY 2012 Estimate	FY 2013 Request	Change Over	
				FY 2012 Estimate Amount	Percent
Centers Programs Total	\$18.30	\$13.25	\$13.25	-	-
Nanoscale Science & Engineering Centers (ICER)	0.25	0.25	0.25	-	-
Science & Technology Centers (AGS, EAR, OCE)	18.05	13.00	13.00	-	-

Totals may not add due to rounding.

For detailed information on individual centers, please see the NSF-Wide Investments chapter.

GEO Funding for Facilities

(Dollars in Millions)

	FY 2011 Actual	FY 2012 Estimate	FY 2013 Request	Change Over	
				FY 2012 Estimate Amount	Percent
Facilities	\$290.67	\$289.76	\$285.41	-\$4.35	-1.5%
<i>Academic Research Fleet (OCE)</i>	81.67	78.75	73.00	-5.75	-7.3%
<i>Arecibo Observatory (AGS)</i>	3.07	3.20	3.20	-	-
<i>EarthScope (EAR)</i>	26.02	25.05	26.17	1.12	4.5%
<i>Incorporated Research Institutions for Seismology (EAR)</i>	12.37	12.36	11.25	-1.11	-9.0%
<i>Integrated Ocean Drilling Program (OCE)</i>	53.35	44.40	38.90	-5.50	-12.4%
<i>National Nanotechnology Infrastructure Network (ICER)</i>	0.60	0.60	0.50	-0.10	-16.7%
<i>National Center for Atmospheric Research (AGS)</i>	98.10	98.60	92.29	-6.31	-6.4%
<i>Ocean Observatories Initiative (OCE)</i>	15.49	26.80	40.10	13.30	49.6%

Totals may not add due to rounding.

For detailed information on individual facilities, please see the Facilities chapter.

- Funding for the Academic Research Fleet decreases by \$5.75 million to a total budget of \$73.0 million. This reflects the completion of support for the Replacement Human Occupied Vehicle (Replacement of the ALVIN) and savings through more efficient fleet management and utilization.
- Increased support for EarthScope will enable the capital acquisition, long-term siting, and 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.
- Support of Incorporated Research Institutions for Seismology (IRIS) is reduced by \$1.11 million, to a total of \$11.25 million in FY 2013, reflecting increasing efficiency and streamlining of operations with their new integrated management structure.
- Support (\$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. In FY 2013, NSF investments in IODP will be increasingly leveraged by support from international partners and industry.
- Support for NCAR is reduced (-\$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 operation and maintenance of the Ocean Observatories Initiative (OOI) increases to \$40.10 million as planned.

Summary and Funding Profile

GEO supports investment in disciplinary and interdisciplinary research and education, as well as investing in research infrastructure such as the National Center for Atmospheric Research, EarthScope, and the Academic Research Fleet.

In FY 2013, the number of research grant proposals is expected to stay about the same as the FY 2012 Estimate. A number of competitions are being held in FY 2012 that utilize funds from more than one year, in part as a method of managing workload; incremental funds in FY 2013 will largely support additional competitions, which again commit funds from future years. Average annual award size and duration are not expected to fluctuate significantly in FY 2011 through FY 2013.

In FY 2013, GEO will invest \$341.18 million in Research Infrastructure, accounting for over 37 percent of the GEO budget. Inherently observational, the geosciences rely on an array of observing platforms and networks to enable researchers to advance the state of our understanding of the dynamic planet on which we live.

GEO Funding Profile

	FY 2011 Actual Estimate	FY 2012 Estimate	FY 2013 Estimate
Statistics for Competitive Awards:			
Number of Proposals	4,512	5,100	5,100
Number of New Awards	1,413	1,500	1,500
Funding Rate	31%	29%	29%
Statistics for Research Grants:			
Number of Research Grant Proposals	3,951	4,500	4,500
Number of Research Grants	1,167	1,300	1,300
Funding Rate	30%	29%	29%
Median Annualized Award Size	\$128,231	\$130,000	\$130,000
Average Annualized Award Size	\$162,749	\$165,000	\$165,000
Average Award Duration, in years	2.6	2.8	2.8

Program Monitoring and Assessment

The Performance chapter provides details regarding the periodic reviews of programs and portfolios of programs by external Committees of Visitors and directorate Advisory Committees. Please see this chapter for additional information.

Committees of Visitors (COV):

- In FY 2011 COVs reviewed the Integrative Projects Section in the Division of Ocean Sciences, the Geospace Section of the Division of Atmospheric and Geospace Sciences, and the Surface Earth Processes Section in the Division of Earth Sciences. The COV reports were accepted by the Advisory Committee for Geosciences and are available online. www.nsf.gov/geo/acgeo_cov.jsp. In FY 2012, the NCAR Section of AGS and Ocean and Marine Section of OCE will hold COVs. In FY 2013, the

Atmosphere Section of AGS, the Instrumentation and Facilities Section of EAR, and GEO-wide Education and Diversity Programs will be reviewed by COV.

Workshops and Reports:

- A charrette was held November 1-4, 2011 to frame a new activity called EarthCube. EarthCube, a part of NSF's CIF21 investment, is intended to transform the conduct of research by supporting the development of community-guided cyberinfrastructure to integrate data and information for knowledge management across the geosciences. In addition, two noteworthy reports were released by the National Research Council during 2011. The first, *Scientific Ocean Drilling: Accomplishments and Challenges*, presents a retrospective look at accomplishments enabled by ocean drilling and looks forward, examining the transformative potential of community plans for future ocean drilling. The second report, *New Research Opportunities in the Earth Sciences at the National Science Foundation*, is the first decadal study of research opportunities across the earth sciences since the influential BROES (Basic Research Opportunities in Earth Science) report was published in 2001.

Number of People Involved in GEO Activities

	FY 2011	FY 2012	FY 2013
	Actual	Estimate	Estimate
	Estimate	Estimate	Estimate
Senior Researchers	5,889	6,300	6,300
Other Professionals	2,638	2,800	2,800
Postdoctorates	689	700	700
Graduate Students	2,546	2,700	2,700
Undergraduate Students	1,973	2,100	2,100
Total Number of People	13,735	14,600	14,600

DIVISION OF ATMOSPHERIC AND GEOSPACE SCIENCES (AGS) \$264,060,000
+ \$5,400,000 / 2.1%

AGS Funding
(Dollars in Millions)

	FY 2011 Actual	FY 2012 Estimate	FY 2013 Request	Change Over	
				FY 2012 Estimate Amount	Percent
Total, AGS	\$257.65	\$258.66	\$264.06	\$5.40	2.1%
Research	123.26	124.28	139.95	15.67	12.6%
<i>CAREER</i>	4.98	5.48	5.78	0.30	5.5%
<i>Centers Funding (total)</i>	6.66	4.00	4.00	-	-
<i>Integrated Space Weather Modeling</i>	2.66	-	-	-	N/A
<i>Multiscale Modeling of Atmospheric Processes</i>	4.00	4.00	4.00	-	-
Education	1.95	1.96	1.52	-0.44	-22.4%
Infrastructure	132.43	132.42	122.59	-9.83	-7.4%
<i>Arecibo Observatory</i>	3.07	3.20	3.20	-	-
<i>Nat'l Center for Atmospheric Research</i>	98.10	98.60	92.29	-6.31	-6.4%
<i>Research Resources</i>	31.27	30.62	27.10	-3.52	-11.5%

Totals may not add due to rounding.

The mission of AGS is to extend the intellectual frontiers in atmospheric and geospace sciences by making investments in fundamental research, technology development, and education that enable discoveries, nurture a vibrant, diverse scientific workforce, and help attain a prosperous and sustainable future. AGS supports activities to further our understanding of the physics, chemistry, and dynamics of Earth's atmosphere, from the Earth's surface to the sun, on timescales ranging from minutes to millennia. AGS provides support for: 1) basic science projects and 2) the acquisition, maintenance, and operation of observational and cyberinfrastructure facilities and services that enable modern-day atmospheric and geospace science research activities. Although the majority of AGS support is through individual investigator merit-reviewed multi-year grants, the division also supports small-scale, limited-duration exploratory research projects; collaborative or multi-investigator group projects focusing on a particular problem, subject, or activity; large center or center-like projects; and funding for the research conducted at facilities provided by the NSF-supported National Center for Atmospheric Research (NCAR), which extends and enhances research at universities. More information on NCAR is available in the Facilities chapter. The division will increase support in key areas of fundamental atmospheric and geospace science, including dynamics and predictability of high-impact atmospheric and space weather hazards, and support for research concerning the complex and dynamic interactions among natural and human-driven processes in coastal areas through its contributions to NSF's Science, Engineering, and Education for Sustainability (SEES) portfolio. AGS will also support NSF's Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21) and other OneNSF investments.

Recognizing the close interplay between the division's support for science and the provision of facilities to support that science, AGS seeks a balance between its support for science and facilities. Approximately 50 percent of the annual budget of AGS is used to support observational and computational facilities, as well as the Arecibo Observatory and the Federally Funded Research and Development Facility, NCAR. The Arecibo Observatory is also supported by Division of Astronomy in the Directorate for Mathematical and Physical Sciences. The remaining 50 percent of the AGS budget is

for individual, small group, and center-like research grants. In general, of the 50 percent of the AGS budget available for research grants, about half (or 26 percent of the total AGS portfolio) is available for new research grants; the remaining half funds continuing grants made in previous years.

FY 2013 Summary

All funding decreases/increases represent change over the FY 2012 Estimate.

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.

DIVISION OF EARTH SCIENCES (EAR)

\$189,200,000
+\$5,700,000 / 3.1%

EAR Funding
(Dollars in Millions)

	FY 2011 Actual	FY 2012 Estimate	FY 2013 Request	Change Over	
				FY 2012 Estimate Amount	Percent
Total, EAR	\$183.83	\$183.50	\$189.20	\$5.70	3.1%
Research	116.59	117.09	123.91	6.82	5.8%
<i>CAREER</i>	4.40	4.80	5.00	0.20	4.2%
<i>Centers Funding , Total</i>	2.47	-	-	-	N/A
<i>Center for Earth Surface Dyanmics</i>	2.47	-	-	-	N/A
Education	4.47	4.93	5.00	0.07	1.4%
Infrastructure	62.78	61.48	60.29	-1.19	-1.9%
<i>Incorporated Research Institutions for Seismology</i>	12.37	12.36	11.25	-1.11	-9.0%
<i>EarthScope</i>	26.02	25.05	26.17	1.12	4.5%
<i>Research Resources</i>	24.38	24.07	22.87	-1.20	-5.0%

EAR supports fundamental research into the structure, composition, and evolution of the Earth, and the life it has sustained over the four and a half billion years of its history. The results of this research will lead to a better understanding of Earth's changing environment (past, present, and future), the natural distribution of its mineral, water, biota, and energy resources, and provide methods for predicting and mitigating the effects of geologic hazards such as earthquakes, volcanic eruptions, floods, and landslides.

Through its Surface Earth Processes section, EAR supports research in geomorphology and land use, hydrologic science, geobiology and low temperature geochemistry, and sedimentary geology and paleobiology. The division's Deep Earth Processes Section maintains programs in geophysics, tectonics, petrology and geochemistry, and continental dynamics. The newest program in EAR is EarthScope, a \$200.0 million facility and science program focused on studying the structure and tectonics of the North American continent. In addition to these core programs, EAR has an Instrumentation and Facilities program that supports community-based, shared-use facilities, and the acquisition and development of instrumentation by individual investigators, and an education program that funds a number of activities to attract and support students and young investigators to the field of Earth science.

Approximately 66 percent of EAR's budget is used to support individuals and small groups of researchers, while about 34 percent of the budget goes to instrumentation and facilities. The two largest facilities supported by EAR are EarthScope and the Incorporated Research Institutions for Seismology (IRIS), a community-based seismic instrumentation facility. In general, 36 percent of EAR's portfolio is available for new research grants. The remaining 64 percent funds continuing grants made in previous years.

FY 2013 Summary

All funding decreases/increases represent change over the FY 2012 Estimate.

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.

**INTEGRATIVE AND COLLABORATIVE
EDUCATION & RESEARCH (ICER)**

**\$91,210,000
\$0 / 0%**

ICER Funding
(Dollars in Millions)

	FY 2011 Actual	FY 2012 Estimate	FY 2013 Request	Change Over	
				FY 2012 Estimate Amount	Percent
Total, ICER	\$91.62	\$91.21	\$91.21	-	-
Research	50.03	72.04	72.14	0.10	0.1%
<i>CAREER</i>	1.75	-	-	-	N/A
<i>Centers Funding (total)</i>	0.25	0.25	0.25	-	-
<i>Nanoscale Science & Engineering Centers</i>	0.25	0.25	0.25	-	-
Education	21.82	18.57	18.57	-	-
Infrastructure	19.78	0.60	0.50	-0.10	-16.7%
<i>Nat'l Nanotechnology Infrastructure Network</i>	0.60	0.60	0.50	-0.10	-16.7%
<i>Research Resources</i>	19.18	-	-	-	N/A

Totals may not add due to rounding.

ICER supports novel, complex, or partnership projects in both research and education. These investments cut across traditional boundaries within the geosciences, encouraging interdisciplinary activities and responding directly to critical needs of the entire geoscience community. ICER’s principal goals are to develop innovative means to initiate and support geoscience education, attract underrepresented groups to careers in the geosciences, foster the interchange of scientific information nationally and internationally, and to join with other parts of NSF in major integrative research and education efforts. In FY 2013, the division will make strategic investments in climate research, international activities, education, diversity, and human resource development.

In general, 53 percent of the ICER portfolio is available for new research grants. The remaining 47 percent funds continuing grants made in previous years.

FY 2013 Summary

All funding decreases/increases represent change over the FY 2012 Estimate.

Research

- ICER will support GEO’s increased activities in Science, Engineering, and Education for Sustainability (SEES). Supported activities will lay the foundation for technologies to mitigate against, and adapt to, environmental change that threatens sustainability, with an emphasis in 2013 on vulnerable regions in the Arctic and along coasts. ICER will participate in activities to establish a robust suite of Sustainability Research Networks and in a program to identify clean energy sources and the impact of using those sources on the environment and society. FY 2013 SEES activities in ICER will total \$16.75 million.
- ICER supports a varied portfolio of international collaborative activities. In FY 2013, this will total \$6.50 million, and emphasize collaborative research across the Americas.

Education

- ICER is home to a number of cross-GEO education and diversity activities. This portfolio will total \$18.57 million in FY 2013, including robust investment in the NSF-wide E² activity.

Infrastructure

- ICER provides GEO's contribution to the National Nanotechnology Infrastructure Network, decreasing \$100,000, to a total of \$500,000.

DIVISION OF OCEAN SCIENCES (OCE)

\$361,970,000
+\$10,070,000 / 2.9%

OCE Funding
(Dollars in Millions)

	FY 2011 Actual	FY 2012 Estimate	FY 2013 Request	Change Over FY 2012 Estimate	
				Amount	Percent
Total, OCE	\$352.21	\$351.90	\$361.97	\$10.07	2.9%
Research	177.92	183.21	195.70	12.49	6.8%
<i>CAREER</i>	1.58	2.80	2.93	0.13	4.6%
<i>Centers Funding (total)</i>	8.92	9.00	9.00	-	-
<i>Coastal Margin Observation and Prediction</i>	4.00	4.00	4.00	-	-
<i>Dark Energy Biosphere Investigations</i>	4.92	5.00	5.00	-	-
Education	9.01	7.94	8.47	0.53	6.7%
Infrastructure	165.28	160.75	157.80	-2.95	-1.8%
<i>Academic Research Fleet</i>	81.67	78.75	73.00	-5.75	-7.3%
<i>Integrated Ocean Drilling Program</i>	53.35	44.40	38.90	-5.50	-12.4%
<i>Ocean Observatories Initiative</i>	15.49	26.80	40.10	13.30	49.6%
<i>Research Resources</i>	14.77	10.80	5.80	-5.00	-46.3%

Totals may not add due to rounding.

Research, education, and infrastructure funded by OCE address the central role of the oceans in a changing Earth and as a national strategic resource, as recognized in the President’s 2010 Executive Order establishing a National Ocean Policy (NOP) and creating a National Ocean Council (NOC) to implement the policy and its nine strategic objectives. OCE supports interdisciplinary research on the water column to better understand changing ocean circulation and temperature, the health of marine ecosystems, and changing ocean chemistry with implications for ocean acidification. OCE also supports research on the geology of the ocean margins and sub-seafloor to investigate past ocean and climate conditions, stability of methane hydrates, natural hazards associated with earthquakes and volcanic eruptions, and microbial life deep below the seafloor. Ocean education, formal and informal, draws on the interdisciplinary nature of ocean sciences, sophisticated visualization capabilities, and the impact of the oceans on environmental change. Since ocean science requires access to the sea, OCE supports research vessels, deep submergence capability including submersibles and autonomous vehicles, and technologically advanced sensors and instrumentation. In FY 2013, OCE will allocate \$54.0 million to emphasize research in support of the NOP objectives, especially those involving improved understanding through the advancement of knowledge, ecosystem-based management, coastal marine spatial planning, protection of marine biodiversity, the impact of increased atmospheric CO2 on ocean acidification, ocean observing and the enhancement of infrastructure, and changing conditions in the Arctic.

In general, 33 percent of the OCE portfolio is available for new research grants. The remaining 67 percent funds continuing grants made in previous years.

FY 2013 Summary

All funding decreases/increases represent change over the FY 2012 Estimate.

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.

