DIRECTORATE FOR GEOSCIENCES (GEO) $1,304,000,000
+$1,360,000 / 0.1%

GEO Funding

(Dollars in Millions)

	FY 2013 Actual	FY 2014 Estimate	FY 2015 Request	Change Over FY 2014 Estimate Amount	Change Over FY 2014 Estimate Percent
Atmospheric and Geospace Sciences (AGS)	$245.03	$250.46	$250.61	$0.15	0.1%
Earth Sciences (EAR)	173.80	177.60	177.75	0.15	0.1%
Integrative and Collaborative Research and Education (ICER)	84.73	83.86	83.96	0.10	0.1%
Ocean Sciences (OCE)	343.76	356.50	356.96	0.46	0.1%
Polar Programs (PLR)	426.45	434.61	435.11	0.50	0.1%
U.S. Antarctic Logistical Support (USALS)	*[64.51]*	*[67.52]*	*[67.52]*	-	-
Total, GEO	**$1,273.77**	**$1,303.03**	**$1,304.39**	**$1.36**	**0.1%**

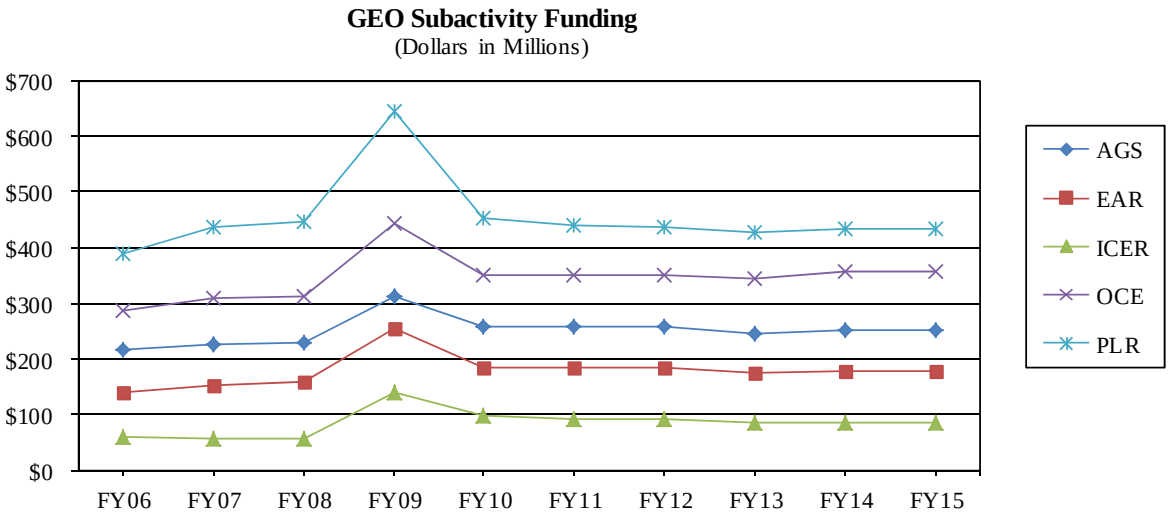
Totals may not add due to rounding.

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 supports research spanning the Atmospheric, Earth, Ocean, and Polar sciences. As the primary U.S. supporter of fundamental research in the polar regions, GEO provides interagency leadership for U.S. polar activities. In the Arctic, NSF helps coordinate research planning as directed by the Arctic Research Policy Act of 1984. The NSF Director chairs the Interagency Arctic Research Policy Committee created for this purpose, which is now a component of the President's National Science and Technology Council (NSTC). In the Antarctic, per Presidential Memorandum 6646, GEO manages all U.S. activities as a single, integrated program, making Antarctic research possible for scientists supported by NSF and by other U.S. federal agencies. The latter include the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), the U.S. Geological Survey (USGS), the Smithsonian Institution, and the Department of Energy. The U.S. Antarctic Program research activity supported by NSF also supports leadership by the U.S. Department of State in the governance of the continent and Southern Ocean under the aegis of the Antarctic Treaty.

GEO provides about 64 percent of the federal funding for basic research at academic institutions in the geosciences.



FY 2015 Summary by Division

- AGS's FY 2015 Request is focused on supporting the NSF-wide Science, Engineering, and Education for Sustainability (SEES) investment, maintaining support for disciplinary and interdisciplinary research activities, and support of the observational infrastructure required to conduct modern research, including overseeing operation of the National Center for Atmospheric Research (NCAR)-Wyoming supercomputer center.

- EAR's FY 2015 Request is focused on supporting the NSF-wide SEES investment, maintaining support for disciplinary and interdisciplinary research activities, and support of the observational infrastructure required to conduct modern research. A realignment of infrastructure support within EAR took place in FY 2013, and while overall support levels remain relatively steady, previously-existing facilities are now integrated into new activities.

- ICER's FY 2015 Request will support priority areas such as Cyberinfrastructure Framework for 21st Century Science, Engineering, and Education (CIF21), while enhancing support of the NSF-wide SEES investment. Significant shifts in GEO's education portfolio have occurred, with investment moving into an NSF-wide activity, Improving Undergraduate STEM Education (IUSE), led by the Directorate for Education and Human Resources. ICER will also provide support for the operations and maintenance of the Ocean Observatories Initiative, enabling OCE to maintain a strong research portfolio.

- OCE's FY 2015 Request supports the NSF-wide SEES investment, where emphasis will be on understanding coastal systems and mitigating the impacts of disasters. 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 planning for potential new Regional Class Research Vessels.

- PLR's FY 2015 Request is focused on maintaining strong disciplinary programs, targeted basic research in cross-foundation and interagency priorities, and supporting and improving the efficiency of critical facilities that enable research in both polar regions, as recommended by the recent Blue Ribbon Panel.

Major Investments

GEO Major Investments
(Dollars in Millions)

Area of Investment	FY 2013 Actual	FY 2014 Estimate	FY 2015 Request	Change Over FY 2014 Estimate Amount	Change Over FY 2014 Estimate Percent
CAREER	$17.46	$15.46	$15.64	$0.18	1.2%
CIF21	10.25	16.50	11.00	-5.50	-33.3%
I-Corps	1.18	1.35	1.38	0.03	2.2%
IUSE	-	6.40	10.90	4.50	70.3%
Geoscience Education[1]	*0.18*	-	-	-	*N/A*
NRT[2]	7.65	4.41	5.86	1.45	32.9%
SEES	70.00	68.00	59.00	-9.00	-13.2%

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

[1] Geoscience Education was consolidated into IUSE in FY 2014.

[2] The FY 2013 Actual level represents Integrative Graduate Education and Research Traineeship (IGERT) program funding. Outyear commitments for IGERT are included in the NRT line and are $3.64 million in FY 2014 and $2.04 million in FY 2015.

- 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 new awards will be made in FY 2015.

- Cyberinfrastructure Framework for 21st Century Science, Engineering, and Education (CIF21): GEO support for the NSF-wide CIF21 investment ($11.0 million) will enable continued development of EarthCube, as it transitions from community development activities to implementation. A partnership with the Directorate for Computer and Information Science and Engineering (CISE), EarthCube seeks transformative concepts and approaches to create an integrated data management infrastructure across the geosciences.

- 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.

- IUSE: In FY 2015 GEO will participate in the NSF-wide activity, Improving Undergraduate STEM Education (IUSE), which covers the agency's investments in undergraduate education. Through their undergraduate programs, GEO will continue to support research and development leading to and propagating interventions that improve both the quality and quantity of STEM graduates. For more information regarding IUSE and NSF's undergraduate framework, see the IUSE narrative in the NSF-Wide Investments chapter.

- NRT: In FY 2015 GEO will participate in the NSF-wide activity, NSF Research Traineeship (NRT) program, which is a modernization of the Integrative Education and Research Traineeship (IGERT) program. For more information regarding NRT, see the Major Investments in Science, Technology, Engineering, and Mathematics (STEM) Graduate Education narrative in the NSF-Wide Investments chapter.

- 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 2015, existing areas, especially coastal and hazards-related research, will be strengthened and a thrust on sustainable materials will be supported by GEO. GEO support for Earth System Modeling is being reduced and support for Ocean Acidification is being transitioned to disciplinary programs in OCE, consistent with the SEES sunsetting plan.

GEO Funding for Centers Programs and Facilities

GEO Funding for Centers Programs

(Dollars in Millions)

	FY 2013 Actual	FY 2014 Estimate	FY 2015 Request	Change Over FY 2014 Estimate Amount	Change Over FY 2014 Estimate Percent
Total, Centers Programs	**$18.27**	**$14.75**	**$10.32**	**-$4.43**	**-30.0%**
Nanoscale Science & Engineering Centers (ICER)	1.50	-	-	-	N/A
Science & Techology Centers (AGS, OCE, PLR)	16.77	14.75	10.32	-4.43	-30.0%

Totals may not add due to rounding.

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

- Nanoscale Science and Engineering Centers (NSEC): In FY 2013, GEO decided to partially support a single NSEC, but provided the full amount intended to cover five years of activities in that single year. Additional support for NSEC is not anticipated.

- Science and Technology Centers (STCs): GEO supports a total of four STCs in three divisions. FY 2014 will mark the end of support for the Center for Remote Sensing of Ice Sheets. FY 2015 is the final year of support for two STCs. In accord with NSF's sunsetting plan, the Center for Multi-scale Modeling of Atmospheric Processes and the Center for Coastal Margin Observation and Prediction will receive final support in FY 2015. The Center for Dark Energy Biosphere Investigations will continue receiving NSF support.[1]

GEO Funding for Facilities

(Dollars in Millions)

	FY 2013 Actual	FY 2014 Estimate	FY 2015 Request	Change Over FY 2014 Estimate Amount	Change Over FY 2014 Estimate Percent
Total, Facilities	**$593.58**	**$621.04**	**$628.11**	**$7.07**	**1.1%**
Academic Research Fleet (OCE)	84.14	84.00	87.00	3.00	3.6%
Arctic Research Support and Logistics (PLR)	43.99	40.84	38.64	-2.20	-5.4%
Arecibo Observatory (AGS)	3.30	3.45	4.00	0.55	15.9%
Geodetic Facilities for the Advancement of Geoscience and EarthScope (EAR)	9.28	11.58	11.58	-	-
IceCube Neutrino Observatory (PLR)	3.45	3.45	3.45	-	-
International Ocean Discovery Program (OCE)	47.70	50.00	48.00	-2.00	-4.0%
National Center for Atmospheric Research (AGS)	95.75	95.20	98.20	3.00	3.2%
National Nanotechnology Infrastructure Network (ICER)	0.30	0.30	0.30	-	-
Ocean Observatories Initiative (OCE)	36.80	52.80	55.00	2.20	4.2%
Seismological Facilities for the Advancement of Geosciences and EarthScope (EAR)	24.35	24.35	24.35	-	-
U.S. Antarctic Facilities and Logistics (PLR)	180.01	187.55	190.07	2.52	1.3%
U.S. Antarctic Logistical Support (PLR)	64.51	67.52	67.52	-	-

Totals may not add due to rounding.

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

GEO has increased operations and maintenance budgets for facilities in order to provide the infrastructure needed by the broad geoscience research community and to address recommendations related to Antarctic infrastructure. Notable items include:

- Support for NCAR is slightly increased to fund needed research infrastructure for advancing the understanding of high-impact terrestrial and space weather hazards.
- Support for the Academic Research Fleet increases relative to FY 2014, reflecting the start of operation of the RV *SIKULIAQ* and increased fuel costs.
- Operational support for the Ocean Observatories Initiative increases as observatory assets are deployed and operations ramp up.
- U.S. Antarctic Facilities and Logistics increases respond to recommendations of an external panel to improve operational efficiency and increase safety of researchers and contractors working in Antarctica.

Summary and Funding Profile

In FY 2015, the number of research grants is expected to increase slightly compared to the FY 2014 Estimate, with GEO anticipating about 1,350 research awards. Average annual award size and duration are not expected to fluctuate significantly between FY 2013 and FY 2015.

Operations and maintenance funding for GEO-supported user facilities totals $628.11 million, and comprises 48 percent of GEO's FY 2015 Request. GEO has increased operations budgets for facilities to maintain current operational capacity, keep pace with needed increases for OOI operations and maintenance, and respond to recommendations to increase efficiency of activities in Antarctica.

GEO Funding Profile

	FY 2013 Actual Estimate	FY 2014 Estimate	FY 2015 Estimate
Statistics for Competitive Awards:			
Number of Proposals	6,093	6,100	6,100
Number of New Awards	1,571	1,550	1,600
Funding Rate	26%	25%	26%
Statistics for Research Grants:			
Number of Research Grant Proposals	5,615	5,600	5,600
Number of Research Grants	1,336	1,300	1,350
Funding Rate	24%	23%	24%
Median Annualized Award Size	$141,101	$140,000	$145,000
Average Annualized Award Size	$193,952	$195,000	$195,000
Average Award Duration, in years	2.7	2.7	2.7

Program Monitoring and Evaluation

The Performance Information 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.

Program Evaluations:

- No major program evaluations of GEO programs were conducted in 2013, although a major effort to review the activities of the Division of Ocean Sciences was initiated with a report expected in 2015.

Committees of Visitors (COV):

- In 2013, COVs reviewed GEO Education and Diversity activities, the Atmosphere Section within AGS, EAR's Instrumentation and Facilities Program, and Polar's Sections for Antarctic Sciences and Logistics. The COVs' reports were presented to the GEO's Advisory Committee, which convened in April and October of 2013. Polar's Arctic Section was reviewed by a COV in late 2013; that report has not yet been presented to the Advisory Committee for Geosciences.
- In 2015, COVs will be held to review Ocean Research and Education programs, and the National Center for Atmospheric Research (NCAR) and Facilities Section within AGS.

Workshops and Reports:

- Many workshops are convened each year to allow the research communities supported by GEO to articulate priorities. As part of the planning process for potential new investments, significant workshops are anticipated for Antarctic research activities, as well as food systems and security, and natural hazards and societal resilience in the next 18-24 months. A report on emerging research questions in the Arctic is due soon, and a recent workshop on Arctic risk management will inform improvements to the execution of field work in FY 2015.

Number of People Involved in GEO Activities

	FY 2013 Actual Estimate	FY 2014 Estimate	FY 2015 Estimate
Senior Researchers	5,766	5,700	5,700
Other Professionals	3,186	3,200	3,200
Postdoctorates	650	600	600
Graduate Students	2,833	2,800	2,800
Undergraduate Students	2,408	2,400	2,400
Total Number of People	**14,843**	**14,700**	**14,700**

DIVISION OF ATMOSPHERIC AND GEOSPACE SCIENCES (AGS) $250,610,000 +$150,000 / 0.1%

AGS Funding

(Dollars in Millions)

	FY 2013 Actual	FY 2014 Estimate	FY 2015 Request	Change Over FY 2014 Estimate Amount	Percent
Total, AGS	**$245.03**	**$250.46**	**$250.61**	**$0.15**	**0.1%**
Research	**120.60**	**125.70**	**122.85**	**-2.85**	**-2.3%**
CAREER	7.50	6.21	6.21	-	-
Centers Funding (total)	4.00	3.32	2.66	-0.66	-19.9%
STC: Multiscale Modeling of Atmospheric Processes	4.00	3.32	2.66	-0.66	-19.9%
Education	**3.68**	**2.54**	**2.54**	**-**	**-**
Infrastructure	**120.75**	**122.22**	**125.22**	**3.00**	**2.5%**
Arecibo Observatory	3.30	3.50	4.00	0.50	14.3%
National Center for Atmospheric Research (NCAR)	95.75	95.20	98.20	3.00	3.2%
Research Resources	21.71	23.52	23.02	-0.50	-2.1%

Totals may not add due to rounding.

The mission of AGS is to extend intellectual frontiers in atmospheric and geospace sciences by making responsible 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 understanding of the dynamics of the Sun, and the physics, chemistry, and dynamics of the Earth's atmosphere and near-space environment. AGS provides support for: 1) basic science projects and 2) the acquisition, maintenance, and operation of observational and cyber-infrastructure facilities and services that enable modern day atmospheric and geospace science research activities. Although the majority of AGS support is through traditional "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 project, subject, or activity; large center or center-like projects; and funding for the research conducted at facilities provided by NSF's 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 continue support in key areas of fundamental atmospheric and geospace science, including dynamics and predictability of high-impact atmospheric and space weather hazards, through its contributions to NSF's Science, Engineering, and Education for Sustainability (SEES) portfolio activity, Hazards SEES.

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 NCAR, a Federally-Funded Research and Development Center, and the Arecibo Observatory. The Arecibo Observatory is also supported by the Division of Astronomy within 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 27 percent of the total AGS portfolio) is available for new research grants. The remaining half of the budget available for research grants (or 63 percent of the total AGS portfolio) funds continuing grants made in previous years.

FY 2015 Summary

All funding decreases/increases represent change over the FY 2014 Estimate.

Research

- Support for the AGS disciplinary and interdisciplinary research programs is maintained to fund basic research into understanding extreme terrestrial and space weather phenomena.
- Investments in the SEES portfolio decrease by $3.0 million, to $13.0 million, as the SEES program Decadal and Regional Climate Prediction using Earth System Models (EaSM) decreases by $3.0 million to $7.0 million.
- $500,000 is provided for the Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE) program.
- Support for early-career researchers remains an AGS priority. The division maintains its support for CAREER grants at $6.21 million. This funding is consistent with GEO and AGS objectives.
- Funding for the Center for Multi-scale Modeling of Atmospheric Processes (CMMAP) decreases by $660,000, to a total $2.66 million, reflecting the planned sunsetting of this Class of 2006 STC.

Education

- The education portfolio remains steady at $2.54 million in FY 2015, reflecting the division's commitment to the Research Experiences for Undergraduates (REU) program, and support for postdoctoral fellows.

Infrastructure

- Funding for the Arecibo Observatory will increase $500,000, to a total of $4.0 million, as support from the Division of Astronomical Sciences in the Directorate for Mathematical and Physical Sciences decreases.
- NCAR support is increased by $3.0 million, to a total of $98.20 million, to fund needed research infrastructure for advancing the understanding of high-impact terrestrial and space weather hazards.
- Research Resources is maintained at $23.52 million, to support the deployment of lower atmosphere observing facilities and to support access to data and software for the research community.

DIVISION OF EARTH SCIENCES (EAR) $177,750,000
+$150,000 / 0.1%

EAR Funding

(Dollars in Millions)

	FY 2013 Actual	FY 2014 Estimate	FY 2015 Request	Change Over FY 2014 Estimate Amount	Percent
Total, EAR	**$173.80**	**$177.60**	**$177.75**	**$0.15**	**0.1%**
Research	**112.23**	**115.18**	**114.87**	**-0.31**	**-0.3%**
CAREER	6.75	5.50	5.50	-	-
Education	**4.08**	**4.95**	**4.95**	**-**	**-**
Infrastructure	**57.49**	**57.47**	**57.93**	**0.46**	**0.8%**
Geodetic Facilities for the Advancement of Geoscience and EarthScope (GAGE)	9.28	11.58	11.58	-	-
Seismological Facilities for the Advancement of Geosciences and EarthScope (SAGE)	24.35	24.35	24.35	-	-
Research Resources	23.86	21.54	22.00	0.46	2.1%

Totals may not add due to rounding.

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 Earth 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 integrated earth systems. In addition to these fundamental research 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, EarthScope, a large-scale facility with an associated science program focused on studying the structure and tectonics of the North American continent, 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 68 percent of EAR's budget is used to support individuals and small groups of researchers, while about 32 percent of the budget goes to instrumentation and facilities. The two largest facilities supported by EAR are Seismological Facilities for the Advancement of Geosciences and EarthScope (SAGE) and Geodetic Facilities for the Advancement of Geosciences and EarthScope (GAGE). In general, 37 percent of the EAR portfolio is available for new research grants. The remaining 63 percent is utilized to support grants made in prior years, along with the research infrastructure necessary for the conduct of cutting-edge research on a variety of earth science topics.

FY 2015 Summary

All funding decreases/increases represent change over the FY 2014 Estimate.

Research

- EAR will continue its participation in SEES, with $7.0 million in support of Water Sustainability and Climate.
- EAR will continue its participation in SEES SusChEM - Sustainable Chemistry, Engineering, and Materials, at $500,000 (a decrease of $500,000 from the FY 2014 Estimate).
- Hazard SEES will be supported at $1.0 million (a decrease of $750,000 from the FY 2014 Estimate)
- In FY 2015, EAR's support for the INSPIRE program will be $500,000.
- CAREER funding will remain at $5.50 million, reflecting EAR's continued commitment to supporting early career investigators.

Education

- EAR's support for Research Experiences for Undergraduates (REU) will remain at $1.80 million, and support for EAR Postdoctoral Fellowships will be $1.70 million, reflecting EAR's commitment to workforce development.

Infrastructure

- SAGE and GAGE will retain funding at the FY 2014 Estimate level. SAGE funding also includes $3.0 million for the third year of the Central and Eastern U.S. Seismic Network.
- Increased funding of $460,000 above the FY 2014 Estimate, to $22.0 million, will enable EAR's Instrumentation and Facilities Program to provide more support for multi-user regional and national facilities. Specifically, EAR will coordinate with the Division of Materials Research, in the Directorate for Mathematical and Physical Sciences, to develop the new concept innovation platforms to provide community infrastructure – suites of instruments, instrument development, cyber and data - focused in strategic materials areas such as crystal growth and extreme conditions materials characterization.

DIVISION OF INTEGRATIVE AND COLLABORATIVE EDUCATION AND RESEARCH (ICER) — $83,960,000 / +$100,000 / 0.1%

ICER Funding

(Dollars in Millions)

	FY 2013 Actual	FY 2014 Estimate	FY 2015 Request	Change Over FY 2014 Estimate Amount	Change Over FY 2014 Estimate Percent
Total, ICER	**$84.73**	**$83.86**	**$83.96**	**$0.10**	**0.1%**
Research	**71.31**	**71.35**	**51.79**	**-19.56**	**-27.4%**
CAREER	0.23	0.22	0.40		
Centers Funding (total)	1.50	-	-	-	N/A
Nanoscale Science & Engineering Centers	1.50	-	-	-	N/A
Education	**12.67**	**12.21**	**17.87**	**5.66**	**46.4%**
Infrastructure	**0.75**	**0.30**	**14.30**	**14.00**	**4666.7%**
National Nanotechnology Infrastructure Network (NNIN)	0.30	0.30	0.30	-	-
OOI	-	-	14.00	14.00	N/A
Research Resources	0.45	-	-	-	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 2014, the division will make strategic investments in climate research, international activities, education, diversity, and human resource development.

In general, 68 percent of the ICER portfolio is available for new research grants. The remaining 32 percent funds continuing grants made in previous years.

FY 2015 Summary

All funding decreases/increases represent change over the FY 2014 Estimate.

Research

- ICER will support activities in SEES totaling $15.0 million in FY 2015. Supported activities will lay the foundation for technologies for mitigation and adaption to environmental change that threatens sustainability, with an emphasis in FY 2014 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.
- ICER supports a varied portfolio of international collaborative activities. In FY 2015, this will total $6.50 million, and emphasize collaborative research across the Americas and activities sponsored by the Belmont Forum.

- FY 2015 sees the end of an experimental program, Frontiers in Earth System Dynamics. This $14.0 million effort sought to catalyze interdisciplinary studies of the Earth system, with supported projects spanning multiple disciplines. A retrospective review of the program and the scientific accomplishments it enabled are anticipated.

Education

- In FY 2015, GEO is increasing support for the NSF-wide Improving Undergraduate STEM Education (IUSE) activity at a level of $10.90 million, $4.50 million above the FY 2014 Estimate.
- ICER houses most of GEO's support for Integrative Graduate Education and Research Traineeship (IGERT) and NSF Research Traineeship (NRT), which combined total $3.86 million within ICER in FY 2015. IGERT is being phased out as NRT support ramps up.

Infrastructure

- ICER provides GEO's contribution to the National Nanotechnology Infrastructure Network, totaling $300,000.
- Beginning in FY 2015, ICER is providing $14.0 million in support of operation and maintenance for the Ocean Observatories Initiative. This temporary support through FY 2017 enables the Division of Ocean Sciences to maintain a strong research portfolio while the Decadal Survey of Ocean Sciences report is being prepared. This report is expected to guide GEO's future investment decisions in the ocean sciences.

DIVISION OF OCEAN SCIENCES (OCE) $356,960,000
+$460,000 / 0.1%

OCE Funding

(Dollars in Millions)

	FY 2013 Actual	FY 2014 Estimate	FY 2015 Request	Change Over FY 2014 Estimate Amount	Percent
Total, OCE	**$343.76**	**$356.50**	**$356.96**	**$0.46**	**0.1%**
Research	**161.62**	**158.92**	**170.18**	**11.26**	**7.1%**
CAREER	1.35	1.96	1.96	-	-
Centers Funding (total)	9.00	8.32	7.66	-0.66	-7.9%
STC: Coastal Margin Observation and Prediction	4.00	3.32	2.66	-0.66	-19.9%
STC: Dark Energy Biosphere Investigations	5.00	5.00	5.00	-	-
Education	**5.59**	**4.98**	**4.98**	**-**	**-**
Infrastructure	**176.56**	**192.60**	**181.80**	**-10.80**	**-5.6%**
Academic Research Fleet	81.40	83.00	85.00	2.00	2.4%
International Ocean Discovery Program (IODP)	47.70	50.00	48.00	-2.00	-4.0%
Ocean Observatories Initiative (OOI)	36.80	52.80	41.00	-11.80	-22.3%
Research Resources	7.91	5.80	5.80	-	-
Facilities Pre-Construction Planning (total)	2.74	1.00	2.00	1.00	100.0%
Regional Class Research Vessels (RCRV)	2.74	1.00	2.00	1.00	100.0%

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. OCE supports interdisciplinary research to better understand changing ocean circulation and other physical parameters, biodiversity and the dynamics of marine organisms and ecosystems, and changing ocean chemistry as exemplified by 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 emphasizes undergraduate REU programs and the interdisciplinary nature of ocean sciences. 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 2015, research emphases in OCE will be guided by "*Science for an Ocean Nation: Update of the Ocean Research Priorities Plan*," which was published by the Subcommittee on Ocean Science and Technology, NSTC, in 2013. This report identifies national research priorities in key areas of interaction between society and the ocean. These priorities include improved understanding of marine ecosystems, marine biodiversity, the impact of increased atmospheric carbon dioxide on ocean acidification, the ocean's role in climate change, ocean observing, changing conditions in the Arctic, hazards and extreme events, and the enhancement of infrastructure to support ocean and coastal research. The National Research Council's Ocean Studies Board has undertaken the first Decadal Survey of Ocean Sciences at the request of NSF. The survey will review the current state of knowledge, identify compelling scientific questions for the next decade, analyze infrastructure needed to address these questions versus the current NSF portfolio, and identify opportunities to maximize the value of NSF investments. Expected to be finalized in early 2015, the

report will provide valuable community input as the ocean sciences portfolio of research and infrastructure is shaped to maximize scientific return in the coming years.

In general, 31 percent of the OCE portfolio is available for new research grants. The remaining 69 percent supports continuing grants made in previous years.

FY 2015 Summary

All funding decreases/increases represent change over the FY 2014 Estimate.

Research

- OCE's research budget will increase moderately by about $11.0 million compared with the FY 2014 Estimate, largely through temporary support for OOI operations and maintenance from ICER. The additional funds will go largely towards bolstering ocean science disciplinary and interdisciplinary research programs, which had been reduced over recent years. Research also includes a $500,000 investment in INSPIRE and $1.96 million in funding for the CAREER program.
- OCE will continue to support the Long-Term Ecological Research (LTER) program, including a $260,000 increase over the FY 2014 Estimate. OCE also supports two STCs, one of which, the Center for Coastal Margin Observation and Prediction, is winding down.
- OCE will invest $14.0 million in SEES. This includes $7.50 million in Coastal SEES, $1.0 million in Hazards SEES, $2.50 million in Dimensions of Biodiversity, and $3.0 million in infrastructure costs associated with SEES research grants.

Education

- OCE will continue to support REU programs at the level of the FY 2014 Estimate.
- Funding will continue for a new program initiated in FY 2012, OCE Postdoctoral Fellowships.

Infrastructure

- OCE will increase investment in planning and design for fleet renewal with Regional Class Research Vessels (RCRVs) as a candidate MREFC project by $1.0 million, to a total of $2.0 million.
- Funding for operations and maintenance of the Ocean Observatories Initiative (OOI) will be at $41.0 million in FY 2015. These funds will be supplemented by $14.0 million from ICER, bringing the total operations and maintenance for OOI to $55.0 million, a $2.20 million increase over the FY 2014 Estimate. ICER's contribution will enable OCE to maintain a strong research portfolio. These funds will support the transition from the testing of the network leading to full commissioning and operation in FY 2015. OOI support from ICER is temporary, pending receipt of the Decadal Survey of Ocean Sciences report, which will inform OCE and GEO on community perspectives and priorities for research in and on the world's oceans.
- Funding is requested for continued support ($48.0 million) for operations of the drilling vessel, *JOIDES RESOLUTION* (*JR*), as part of the U.S. contribution to the International Ocean Discovery Program (IODP). The National Science Board approved a five-year cooperative agreement for management and operations of the *JR* to begin in FY 2014. In FY 2013, NSF investments in IODP were leveraged by support from international partners and sub-leasing of the vessel to industry by the current contractor. The FY 2015 request is $2.0 million lower than the FY 2014 Estimate due to the expectation that such leveraging will continue in FY 2015 and beyond.
- Funding for Academic Research Fleet operations is increased by $2.0 million over the FY 2014 Estimate, to a total of $85.0 million, to support the maintenance and operations of the new R/V *SIKULIAQ*.

DIVISION OF POLAR PROGRAMS (PLR) $435,110,000
+$500,000 / 0.1%

PLR Funding
(Dollars in Millions)

	FY 2013 Actual	FY 2014 Estimate	FY 2015 Request	Change Over FY 2014 Estimate Amount	Change Over FY 2014 Estimate Percent
Total, PLR	**$426.45**	**$434.61**	**$435.11**	**$0.50**	**0.1%**
Research	**124.07**	**125.09**	**125.39**	**0.30**	**0.2%**
CAREER	1.63	1.57	1.57	-	-
Centers Funding (total)	3.77	3.11	-	-3.11	-100.0%
STC: Center for Remote Sensing of Ice Sheets	3.77	3.11	-	-3.11	-100.0%
Education	**4.19**	**3.51**	**3.80**	**0.29**	**8.3%**
Infrastructure	**298.18**	**306.01**	**305.92**	**-0.09**	**-0.0%**
Arctic Research Support and Logistics	43.99	40.84	38.64	-2.20	-5.4%
IceCube Neutrino Observatory (IceCube)	3.45	3.45	3.45	-	-
U.S. Antarctic Facilities and Logistics	180.01	187.55	190.07	2.52	1.3%
U.S. Antarctic Logistical Support (USALS)	64.51	67.52	67.52	-	-
Polar Environment, Health, and Safety (PEHS)	6.22	6.65	6.24	-0.41	-6.2%

Totals may not add due to rounding.

The Division of Polar Programs (PLR) is the primary U.S. supporter of, and serves NSF interagency leadership responsibilities for, fundamental research in the polar regions. Arctic Sciences supports research in social, earth systems, and a broad range of natural sciences; its Research Support & Logistics program responds to research by assisting researchers with access to the Arctic and the planning and sharing of results with local Arctic communities. Antarctic Sciences funds research in a broad range of areas for which access to Antarctica and/or the Southern Ocean is essential to advancing the scientific frontiers. Antarctic Infrastructure & Logistics enables research in Antarctica on behalf of the U.S. Government through a network of stations, labs, equipment, and logistical resources. The Environment, Health, and Safety section provides oversight for the environmental, health, and safety aspects of research and operations conducted in polar regions.

PLR's FY 2015 Request reflects three key priorities: (1) maintaining strong disciplinary programs that provide a base for investments in cross-disciplinary science programs; (2) focusing basic research on cross-foundation (e.g., SEES) and interagency priorities; and (3) supporting and improving the efficiency of critical facilities that enable research in both polar regions. For Antarctica, the primary objective is to continue progress on a multi-year commitment toward more efficient and cost-effective science support as recommended by the U.S. Antarctic Program (USAP) Blue Ribbon Panel (BRP) report, *More and Better Science in Antarctica through Increased Logistical Effectiveness*.[1] NSF issued a formal response to this report in March 2013.[2] Emphases include safety and health improvements, investments with positive net present value, and facilities renewal at McMurdo and Palmer stations. Additionally, the Antarctic Sciences community is planning for the more effective observational approaches that were outlined in the 2011 National Research Council report, *Future Science Opportunities in Antarctica and the Southern Ocean*,[3] and endorsed by the BRP. For the Arctic, shared cross-directorate basic research objectives, the Interagency Arctic Research Policy Committee's (IARPC) *Arctic Research Plan:*

[1] www.nsf.gov/od/opp/usap_special_review/usap_brp/rpt/index.jsp
[2] www.nsf.gov/news/news_summ.jsp?cntn_id=127345&org=NSF&from=news
[3] www.nap.edu/catalog.php?record_id=13169

FY 2013-2017,[4] and the *National Ocean Policy Implementation Strategy*[5] inform science investment priorities.

As with most GEO divisions, PLR funds both research and the necessary research support in the form of logistics and infrastructure. The research budget is approximately 30 percent of the total division budget. Of this amount, 50 percent is available for new grants each year. The supporting logistics and infrastructure budget is 70 percent of the overall budget.

FY 2015 Summary

All funding decreases/increases represent change over the FY 2014 Estimate.

Research

- Funding for research increases slightly. There is a $2.0 million decrease in some SEES activities, to a total of $8.50 million, to enable progress on other priority research areas such as implementation of the Arctic Research Plan and the National Ocean Policy, and investments in more effective observational approaches will pay dividends in the future for the Antarctic.
- $500,000 is provided for NSF's INSPIRE program.
- The Center for the Remote Sensing of Ice Sheets sunsets as planned in FY 2015; therefore, funding is not requested (-$3.11 million).

Education

- PLR maintains a commitment to Research Experiences for Undergraduates (REU), supporting enhanced research experiences for students in their first two years of college.
- In FY 2015, PLR supports IGERT continuing grants at $1.45 million and NRT at $550,000.

Infrastructure

- Arctic Research Support & Logistics: This program provides support for Arctic researchers, including airplanes, helicopters, access to icebreakers, and field camps for approximately 150 projects in remote sites in Alaska, Canada, Arctic Scandinavia, Russia, and the Arctic Ocean. Summit Station on the Greenland ice cap operates as a year-round international site for a variety of atmospheric and geophysical measurements. Reduced funding (-$2.20 million, to a total of $38.64 million) will limit the use of marine platforms such as the newly available RV *SIKULIAQ*.
- IceCube Neutrino Observatory: PLR continues to match the Directorate for Mathematical and Physical Sciences' contribution of $3.45 million for operation and maintenance of the Observatory.
- U.S. Antarctic Facilities & Logistics:
  - Funding provides all necessary infrastructure, instrumentation, and logistics for scientists from all disciplines performing research in Antarctica. This support includes forward staging facilities in New Zealand and South America; operation of three year-round stations in Antarctica; Department of Defense fixed-wing aircraft, contracted rotary- and fixed-wing aircraft; two leased research vessels; and icebreaking services from the U.S. Coast Guard in support of annual resupply efforts.
  - The FY 2015 Budget Request for U.S. Antarctic Facilities & Logistics also focuses on implementing recommendations from the USAP BRP totaling $18.50 million. These include:
    - Funding remaining equipment needs for an operational robotic traverse ($9.50 million). The traverse will be operational in FY 2016 and will provide significant return on investment.

[4] www.nsf.gov/od/opp/arctic/iarpc/arc_res_plan_index.jsp
[5] www.whitehouse.gov/administration/eop/oceans/implementationplan

  - Utility upgrades that are needed in advance of addressing other future improvements at McMurdo Station will be implemented ($2.0 million).
  - Another project expected to result in future savings is the consolidation of warehousing and trade facilities at McMurdo. Procurement and shipment of materials ($7.0 million) will enable the construction of these new facilities to begin in FY 2016.
- Polar Environment, Health, and Safety: Funding is provided for implementation of both environmental protection and environmental stewardship to minimize the environmental impact of PLR-supported activities in polar regions, as well as programs to ensure the safety and health of participants in Antarctica, and some Arctic operating locations.