

**DIRECTORATE FOR GEOSCIENCES (GEO)**

**\$979,160,000**  
**+\$89,520,000 / 10.1%**

**GEO Funding**  
(Dollars in Millions)

	FY 2010 Omnibus Actual	FY 2010 ARRA Actual	FY 2010 Enacted/ Annualized FY 2011 CR	FY 2012 Request	Change Over FY 2010 Enacted Amount	Percent
Atmospheric and Geospace Sciences (AGS)	\$259.87	-	\$259.80	\$286.33	\$26.53	10.2%
Earth Sciences (EAR)	183.26	-	183.00	207.27	24.27	13.3%
Integrative and Collaborative Education & Research (ICER)	98.87	0.40	97.92	100.92	3.00	3.1%
Ocean Sciences (OCE)	349.88	-	348.92	384.64	35.72	10.2%
<b>Total, GEO</b>	<b>\$891.87</b>	<b>\$0.40</b>	<b>\$889.64</b>	<b>\$979.16</b>	<b>\$89.52</b>	<b>10.1%</b>

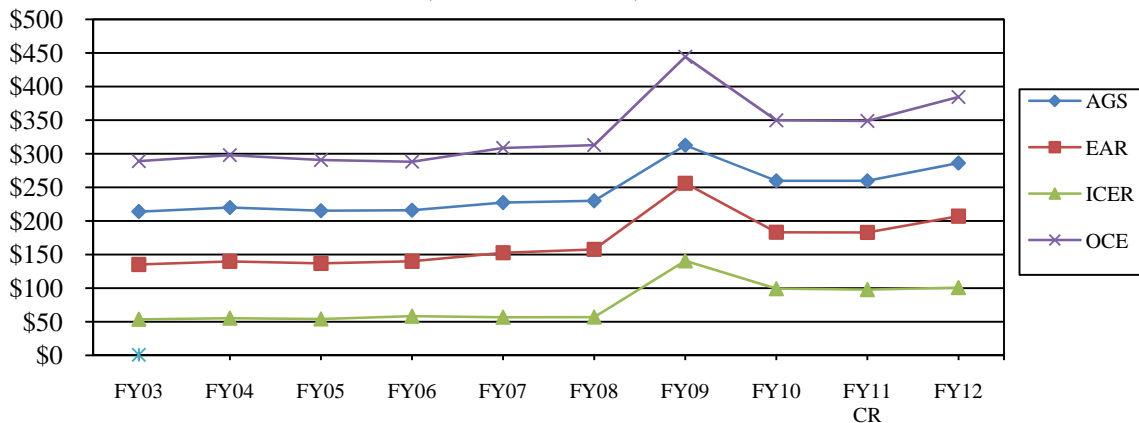
Totals may not add due to rounding.

**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 68 percent of the federal funding for basic research at academic institutions in the geosciences.

**GEO Subactivity Funding**  
(Dollars in Millions)



## FY 2012 Summary by Division

- AGS' FY 2012 Request is focused on supporting the new NSF-wide priority area of Cyberinfrastructure Framework for 21<sup>st</sup> Century Science and Engineering (CIF21) and enhancing support for the ongoing NSF-wide Science, Engineering and Education for Sustainability (SEES) investment, where emphasis will be on developing clean energy and sustainability research networks. Funding for an emerging priority area within GEO, Creating a More Disaster Resilient America (CaMRA), is also supported. AGS will continue support of the observational infrastructure required to conduct modern research, including overseeing the final year of construction of the NCAR-Wyoming supercomputer center.
- EAR's FY 2012 Request is also focused on supporting the new NSF-wide priority area of CIF21, while enhancing support for the ongoing NSF-wide SEES investment. Within SEES, EAR will lead GEO efforts on programs related to clean energy and will participate in the sustainability research networks. EAR also will provide support for CaMRA, and will modestly increase support for operation of the EarthScope facility, enabling EarthScope services to continue at levels similar to those in the past.
- ICER's FY 2012 Request is focused on enhancing support of the NSF-wide SEES investment while maintaining support for GEO-wide education and diversity activities.
- OCE's FY 2012 Request is similarly focused on supporting the new NSF-wide priority area of CIF21, while enhancing support for the ongoing NSF-wide SEES investment, where emphasis will be on developing clean energy and sustainability research networks. OCE is also providing support for CaMRA. OCE's ongoing investments in research, education, and infrastructure strongly support the recent Executive Order 13547, establishing a National Ocean Policy (NOP). OCE is continuing to invest in research infrastructure; support for Ocean Observatories Initiative (OOI) operations increases by \$19.20 million and planning for possible new Regional Class Research Vessels continues.

## Major Investments

### GEO Major Investments

(Dollars in Millions)

Area of Investment	FY 2010	FY 2010	FY 2010	FY 2012	Change Over	
	Omnibus	ARRA	Enacted/ Annualized		FY 2010 Enacted	Percent
	Actual	Actual	FY 2011 CR	Request		
SEES Portfolio	\$195.95	-	\$195.50	\$282.70	\$87.20	44.6%
CIF21	-	-	-	16.00	16.00	N/A
CAREER	12.59	0.05	12.60	13.80	1.20	9.5%
Science and Technology Centers	14.62	-	14.64	13.00	-1.64	-11.2%
CaMRA	-	-	-	10.00	10.00	N/A

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

- GEO will support the NSF-wide SEES investment by funding activities that will lay the foundation for technologies to mitigate against, and adapt to, environmental change that threatens sustainability.

Support for new activities will be housed in all GEO divisions, with emphasis on the emerging Sustainability Research Network activity, as well as Sustainability Energy Pathways activities to identify clean energy sources and their potential for future use and the impact of their use on the environment and society. Funding for the U.S. Global Change Research Program (USGCRP) is contained within SEES.

- Support for the new NSF-wide CIF21 investment will focus on the New Computational Infrastructure and Data Enabled Science components of the activity. In particular, geoinformatics – the tools and techniques that facilitate data-enabled geoscience – will be a priority. These investments will contribute to enhancing community research networks and the ability of geoscientists to access and connect to output of observing facilities.
- GEO supports the CAREER program, an Administration priority. GEO’s CAREER awards support young investigators 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.
- FY 2012 support for Science and Technology Centers reflects the planned ending of two centers in FY 2011 and the initiation of one new center in FY 2010.
- In FY 2012, GEO will initiate a new \$10.0 million GEO-wide program on Creating a More Disaster Resilient America (CaMRA). The overarching goal of CaMRA is to catalyze basic research efforts at NSF in hazard-related science to improve forecasting and prediction of natural and man-made hazardous events.

### **Summary and Funding Profile**

GEO supports investment in research, centers, and education, as well as the infrastructure and facilities required to conduct cutting-edge geoscience investigations.

In FY 2012, the number of research grant proposals is expected to increase by approximately 600 compared to FY 2010 Enacted. GEO expects to award approximately 1,500 research grants in FY 2012. Average annualized award size and duration will remain level with FY 2010 Enacted.

Funding for infrastructure accounts for 37 percent of GEO’s FY 2012 Request. Overall, infrastructure support is about the same as at the FY 2010 Enacted level, but significant changes within the infrastructure portfolio are occurring. Support for OOI operations and maintenance is increasing by \$19.20 million, while support for construction of the NCAR-Wyoming Supercomputer Center is reduced by \$25.0 million, reflecting the completion of construction support.

**GEO Funding Profile**

	FY 2010 Actual Estimate	FY 2010 Enacted/ Annualized FY 2011 CR Estimate	FY 2012 Estimate
<b>Statistics for Competitive Awards:</b>			
Number of Proposals	4,819	4,400	5,100
Number of New Awards	1,689	1,200	1,800
Regular Appropriation	1,645	1,200	1,800
ARRA	44	-	-
Funding Rate	35%	27%	35%
<b>Statistics for Research Grants:</b>			
Number of Research Grant Proposals	4,243	3,800	4,500
Number of Research Grants	1,397	900	1,500
Regular Appropriation	1,395	900	1,500
ARRA	2	-	-
Funding Rate	33%	24%	33%
Median Annualized Award Size	\$123,466	\$125,000	\$125,000
Average Annualized Award Size	\$159,210	\$175,000	\$175,000
Average Award Duration, in years	2.6	3.0	3.0

**GEO Funding for Centers Programs and Facilities**

**GEO Funding for Centers Programs**

(Dollars in Millions)

	FY 2010 Omnibus Actual	FY 2010 Enacted/ Annualized FY 2011 CR	FY 2012 Request	Change Over FY 2010 Enacted	
				Amount	Percent
<b>Centers Programs</b>	<b>\$14.87</b>	<b>\$14.89</b>	<b>\$13.25</b>	<b>-\$1.64</b>	<b>-11.0%</b>
<i>Science and Technology Centers (AGS, EAR, OCE)</i>	14.62	14.64	13.00	-1.64	-11.2%
<i>Nanoscale Science and Engineering Centers (ICER)</i>	0.25	0.25	0.25	-	-

No FY 2010 obligations for centers were made with funds provided by the ARRA.

Detailed information on individual centers can be found in the NSF-Wide Investments chapter.

**Centers Programs**

- GEO supports three Science and Technology Centers (STC) in FY 2012, with the GEO funding for the Center for Dark Energy Biosphere Investigations (C-DEBI) beginning in FY 2011, and continued funding for two ongoing centers. Final funding in FY 2011 concludes two STCs initiated in 2002.

**GEO Funding for Facilities**

(Dollars in Millions)

	FY 2010	FY 2010	FY 2012	Change over	
	Omnibus	Enacted/ Annualized		FY 2010	Enacted
	Actual	FY 2011 CR	Request	Amount	Percent
<b>Facilities</b>	<b>\$281.68</b>	<b>\$277.11</b>	<b>\$292.61</b>	<b>\$15.50</b>	<b>5.6%</b>
<i>National Astronomy and Ionosphere Center (AGS)</i>	2.35	2.20	3.20	1.00	45.5%
<i>National Center for Atmospheric Research (AGS)</i>	96.29	97.00	100.00	3.00	3.1%
<i>National Nanotechnology Infrastructure Network (ICER)</i>	0.60	0.60	0.60	-	-
<i>Academic Research Fleet (OCE)</i>	78.04	80.00	69.35	-10.65	-13.3%
<i>Incorporated Research Institutions for Seismology (EAR)</i>	12.36	12.36	12.36	-	-
<i>EarthScope (EAR)</i>	25.25	25.05	26.00	0.95	3.8%
<i>Integrated Ocean Drilling Program (OCE)</i>	50.80	43.40	45.40	2.00	4.6%
<i>Ocean Observatories Initiative (OCE)</i>	15.99	16.50	35.70	19.20	116.4%

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

**Facilities**

- Funding for the Academic Research Fleet decreases by \$10.65 million to a total budget of \$69.35 million. This reflects the completion of support for the Replacement Human Occupied Vehicle (which replaces the *ALVIN*) and the retirement of the *R/V OCEANUS*.
- Support for operation and maintenance of the OOI increases to \$35.70 million as planned. The increased funds support the transition from the design phase to an active network build phase.

**Program Evaluation and Performance Improvement**

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

In FY 2010, GEO held three COVs – for cross-directorate education and diversity programs, the Atmosphere Section in the Division of Atmospheric and Geospace Sciences, and the Instrumentation and Facilities Program in the Division of Earth Sciences. The Directorate for Geosciences’ Advisory Committee (AC/GEO) met twice in FY 2010.

In FY 2011, COV reviews are planned for research programs in EAR, the Upper Atmosphere Research Section in AGS, and the Integrative Projects Section in OCE.

In FY 2012, COV reviews will take place in the AGS’ NCAR and Facilities Section, and for OCE’s Marine Geosciences and Ocean Sections.

**Number of People Involved in GEO Activities**

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	FY 2010 Actual Estimate	FY 2010 ARRA Estimate	FY 2010 Enacted/ Annualized FY 2011 CR Estimate	FY 2012 Estimate
Senior Researchers	5,426	61	5,200	4,900
Other Professionals	2,909	32	2,800	2,000
Postdoctorates	685	5	600	1,800
Graduate Students	2,593	17	2,400	3,600
Undergraduate Students	1,942	9	1,300	2,000
<b>Total Number of People</b>	<b>13,555</b>	<b>124</b>	<b>12,300</b>	<b>14,300</b>

**DIVISION OF ATMOSPHERIC AND GEOSPACE SCIENCES (AGS)                    \$286,330,000**  
**+\$26,530,000 / 10.2%**

**AGS Funding**  
(Dollars in Millions)

	FY 2010 Omnibus Actual	FY 2010 Enacted/ Annualized FY 2011 CR	FY 2012 Request	Change Over FY 2010 Enacted	
				Amount	Percent
<b>AGS</b>	<b>\$259.87</b>	<b>\$259.80</b>	<b>\$286.33</b>	<b>\$26.53</b>	<b>10.2%</b>
<b>Research</b>	<b>129.38</b>	<b>131.25</b>	<b>152.78</b>	<b>21.53</b>	<b>16.4%</b>
<i>CAREER</i>	6.17	5.70	6.20	0.50	8.8%
<i>Centers Funding (total)</i>	7.30	7.32	4.00	-3.32	-45.4%
<i>Center for Integrated Space Weather Modeling</i>	3.32	3.32	-	-3.32	-100.0%
<i>Center for Multi-scale Modeling of         Atmospheric Processes</i>	3.98	4.00	4.00	-	-
<b>Education</b>	<b>1.34</b>	<b>2.85</b>	<b>2.85</b>	<b>-</b>	<b>-</b>
<b>Infrastructure</b>	<b>129.15</b>	<b>125.70</b>	<b>130.70</b>	<b>5.00</b>	<b>4.0%</b>
<i>NAIC</i>	2.35	2.20	3.20	1.00	45.5%
<i>Nat'l Center for Atmospheric Research</i>	96.29	97.00	100.00	3.00	3.1%
<i>Research Resources</i>	30.52	26.50	27.50	1.00	3.8%

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 our understanding of the physics, chemistry, and dynamics of the 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 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 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 increase support in key areas of fundamental atmospheric and geospace science including space weather, the genesis and dynamics of storms and severe weather, and biogeochemical cycling. In addition, the AGS will also support research in NSF’s Science, Engineering, and Education for Sustainability (SEES) and Cyberinfrastructure Framework for the 21<sup>st</sup> Century Science and Engineering (CIF21) investments, as well as, in a GEO-wide program, Creating a More Disaster Resilient America.

Approximately 45 percent of the annual budget of AGS is used to support NCAR and other observational and computational facilities and 55 percent for individual, small group, and center-like research grants. In general, of the 55 percent of the AGS budget available for research grants, 54 percent (or 30 percent of the total AGS portfolio) is available for new research grants. The remaining 25 percent of the budget funds continuing grants made in previous years.

## **FY 2012 Summary**

### **Research**

- FY 2012 will see a strong emphasis on Science, Engineering and Education for Sustainability (SEES), with a particular emphasis on clean energy research. AGS will lead GEO activities in establishing a robust suite of Sustainability Research Networks and participating in Sustainable Energy Pathways to identify clean energy sources and the impact of using those sources on the environment and society. SEES support in AGS will total \$24.50 million in 2012; a \$12.50 million increase.
- Support for Cyberinfrastructure Framework for 21<sup>st</sup> Century Science and Engineering (CIF21) is initiated in FY 2012. AGS will contribute \$6.0 million in FY 2012 to this NSF-wide activity by increasing funding for research in geoinformatics and for the use of computational infrastructure. This is consistent with NSF's goal of facilitating data-enabled science.
- In FY 2012 AGS will contribute \$3.0 million in a new GEO-wide program, Creating a More Disaster Resilient America (CaMRA). The overarching goal of CaMRA is to catalyze basic research in hazard-related science to support a broad spectrum of research into the prediction of atmospheric and space weather hazards.
- CAREER funding increases by \$500,000 above the FY 2010 Enacted to a total of \$6.20 million in FY 2012. This increase is consistent with AGS's emphasis on supporting early career researchers.
- Centers
  - As planned, support for the Center for Integrated Space Weather Modeling, an NSF Science and Technology Center will end in FY 2011.
  - Support for the Center for Multi-scale Modeling of Atmospheric Processes, an NSF Science and Technology Center focused on improving the representation of cloud processes in climate models, continues into its fifth year at the planned level of \$4.0 million.

### **Education**

- Funding for AGS education activities including Research Experiences for Undergraduates (REU) site and supplemental awards, as well as for Research Experiences for Teachers (RET), is maintained at the FY 2010 enacted level of \$1.13 million. The Atmospheric and Geospace Sciences Postdoctoral Fellowship funding at \$1.72 million remains consistent with the FY 2010 Enacted level.

### **Infrastructure**

- Support for the National Astronomy and Ionosphere Center (NAIC) will increase by \$1.0 million to \$3.20 million. This facility is supported collaboratively by GEO and MPS.
- Support for the National Center for Atmospheric Research (NCAR) will increase by \$3.0 million in FY 2012 to \$100.0 million. This augmentation will support research and infrastructure activities related to SEES, CIF21, and CaMRA.



**DIVISION OF EARTH SCIENCES (EAR)**

**\$207,270,000**  
**+\$24,270,000 /13.3%**

**EAR Funding**  
(Dollars in Millions)

	FY 2010	FY 2010	FY 2010	Change Over	
	Omnibus Actual	Enacted/ Annualized FY 2011 CR	FY 2012 Request	FY 2010 Enacted Amount	Percent
<b>EAR</b>	<b>\$183.26</b>	<b>\$183.00</b>	<b>\$207.27</b>	<b>\$24.27</b>	<b>13.3%</b>
<b>Research</b>	<b>117.19</b>	<b>116.48</b>	<b>136.78</b>	<b>20.30</b>	<b>17.4%</b>
<i>CAREER</i>	4.12	4.40	4.80	0.40	9.1%
<i>Centers Funding (total)</i>	3.32	3.32	-	-3.32	-100.0%
<i>Center for Earth Surface Dynamics</i>	3.32	3.32	-	-3.32	-100.0%
<b>Education</b>	<b>4.29</b>	<b>4.93</b>	<b>5.08</b>	<b>0.15</b>	<b>3.0%</b>
<b>Infrastructure</b>	<b>61.78</b>	<b>61.59</b>	<b>65.41</b>	<b>3.82</b>	<b>6.2%</b>
<i>Incorporated Research Institutions for Seismology</i>	12.36	12.36	12.36	-	-
<i>EarthScope</i>	25.25	25.05	26.00	0.95	3.8%
<i>Research Resources</i>	24.17	24.18	27.05	2.87	11.9%

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 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 32 percent of the budget goes to instrumentation and facilities. The two largest facilities supported by EAR are EarthScope and IRIS, a community-based seismic instrumentation facility. In general, 40 percent of EAR's portfolio is available for new research grants. The remaining 60 percent funds continuing grants made in previous years.

## **FY 2012 Summary**

### **Research**

- EAR will participate in Science, Engineering and Education for Sustainability (SEES) with \$7.0 million for the Water, Sustainability and Climate solicitation, and ongoing support for EAR's Critical Zone Observatories. EAR will contribute funds, as part of the NSF-wide clean energy activity, to identify clean energy sources and their potential for future use, as well as the impact of that use on the environment and society (\$8.0 million);
- Support for Cyberinfrastructure Framework for 21<sup>st</sup> Century Science and Engineering (CIF21) is initiated in FY 2012. EAR will contribute \$4.0 million in FY 2012 to this NSF-wide investment by increasing funding for research in geoinformatics and for the acquisition and use of computational infrastructure. This is consistent with NSF's goal of facilitating data-enabled science and making data acquired by NSF-funded investigators openly available to any interested user;
- In FY 2012, EAR will invest \$4.0 million in a new \$10.0 million per year GEO-wide program on Creating a More Disaster Resilient America (CaMRA). The overarching goal of CaMRA is to catalyze basic research efforts at NSF in hazard-related science to improve forecasting and prediction of natural and man-made hazards;
- CAREER funding will be increased by \$400,000 above FY 2010 to a total of \$4.80 million, reflecting EAR's continuing commitment to supporting early career researchers;
- As planned, support for The Center for Earth Surface Dynamics, an NSF Science and Technology Center, ends in FY 2011 after 10 successful years of operation.

### **Education**

- An increase of \$150,000 is proposed for EAR's Postdoctoral Fellowship program.

### **Infrastructure**

- An increase of \$2.87 million (to a total of \$27.05 million) is proposed for support of multi-user research instrumentation, acquisition or upgrading of research equipment, and development of new instrumentation, analytical techniques or software;
- EarthScope operations will increase to \$26.0 million, 3.8% over FY 2010, reflecting rising personnel and field costs;
- Support of Incorporated Research Institutions for Seismology (IRIS) is maintained at FY 2010 levels.

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

**\$100,920,000  
+\$3,000,000 / 3.1%**

**ICER Funding**  
(Dollars in Millions)

	FY 2010 Omnibus Actual	FY 2010 ARRA Actual	FY 2010 Enacted/ Annualized FY 2011 CR	FY 2012 Request	Change over FY 2010 Enacted Amount	Change over FY 2010 Enacted Percent
<b>ICER</b>	<b>\$98.87</b>	<b>\$0.40</b>	<b>\$97.92</b>	<b>\$100.92</b>	<b>\$3.00</b>	<b>3.1%</b>
<b>Research</b>	<b>46.09</b>	<b>0.38</b>	<b>43.35</b>	<b>74.65</b>	<b>31.30</b>	<b>72.2%</b>
<i>CAREER</i>	0.40	0.05	-	-	-	N/A
<i>Centers Funding (total)</i>	0.25	-	0.25	0.25	-	-
<i>Nano Centers</i>	0.25	-	0.25	0.25	-	-
<b>Education</b>	<b>21.18</b>	<b>0.02</b>	<b>26.97</b>	<b>25.67</b>	<b>-1.30</b>	<b>-4.8%</b>
<b>Infrastructure</b>	<b>31.60</b>	<b>-</b>	<b>27.60</b>	<b>0.60</b>	<b>-27.00</b>	<b>-97.8%</b>
<i>NNIN</i>	0.60	-	0.60	0.60	-	-
<i>Academic Research Fleet</i>	-	-	2.00	-	-2.00	-100.0%
<i>Research Resources</i>	31.00	-	25.00	-	-25.00	-100.0%

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 2012, the division will make strategic investments in climate research, international activities, education, diversity, and human resource development.

In general, 40 percent of the ICER portfolio is available for new research grants. The remaining 60 percent funds continuing grants made in previous years.

**FY 2012 Summary**

**Research**

- In FY 2012, 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 2012 on vulnerable regions in the Arctic and along coasts. Also in FY 2012, a strong emphasis will be placed on clean energy. 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 2012 SEES activities in ICER will total \$27.75 million.
- ICER supports a varied portfolio of international collaborative activities. In FY 2012 this will total \$6.50 million and will emphasize collaborative research across the Americas.

**Education**

- ICER is home to a number of education and diversity activities, including ADVANCE, GEO Disciplinary Education, GEO Teach, and IGERT programs. This portfolio will total \$25.67 million in FY 2012.

**Infrastructure**

- ICER supports limited infrastructure activities. The most significant change in 2012 is the completion of construction support for the NCAR-Wyoming Supercomputer Center, funded through Research Resources.
- All FY 2012 funding for the Academic Research Fleet is provided through OCE. The FY 2010 Enacted amounts shown support fleet operations.

**DIVISION OF OCEAN SCIENCES (OCE)**

**\$384,640,000**  
**+\$35,720,000 / 10.2%**

**OCE Funding**  
(Dollars in Millions)

	FY 2010		FY 2012 Request	Change over	
	FY 2010 Omnibus Actual	Enacted/ Annualized FY 2011		FY 2010 Enacted	Percent
<b>OCE</b>	<b>\$349.88</b>	<b>\$348.92</b>	<b>\$384.64</b>	<b>\$35.72</b>	<b>10.2%</b>
<b>Research</b>	<b>169.91</b>	<b>187.65</b>	<b>207.57</b>	<b>19.92</b>	<b>10.6%</b>
<i>CAREER</i>	1.90	2.50	2.80	0.30	12.0%
<i>Centers Funding (total)</i>	4.00	4.00	9.00	5.00	125.0%
<i>Coastal Margin Observation &amp; Prediction</i>	4.00	4.00	4.00	-	-
<i>Dark Energy Biosphere Investigations</i>	-	-	5.00	5.00	N/A
<b>Education</b>	<b>8.97</b>	<b>8.37</b>	<b>8.82</b>	<b>0.45</b>	<b>5.4%</b>
<b>Infrastructure</b>	<b>171.00</b>	<b>152.90</b>	<b>168.25</b>	<b>15.35</b>	<b>10.0%</b>
<i>Academic Research Fleet</i>	78.04	78.00	69.35	-8.65	-11.1%
<i>Integrated Ocean Drilling Program</i>	50.80	43.40	45.40	2.00	4.6%
<i>Pre-Construction Planning (total)</i>	-	2.00	2.00	-	-
<i>Regional Class Research Vessels</i>	-	2.00	2.00	-	-
<i>Ocean Observatories Initiative (OOI)</i>	15.99	16.50	35.70	19.20	116.4%
<i>Research Resources</i>	26.17	15.00	17.80	2.80	18.7%

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 July 19, 2010 Executive Order 13547, 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 of 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. 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 2012, OCE will 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 CO<sub>2</sub> on ocean acidification, ocean observing and the enhancement of infrastructure, and changing conditions in the Arctic.

In general, 38 percent of the OCE portfolio is available for new research grants. The remaining 62 percent funds continuing grants made in previous years.

**FY 2012 Summary**

**Research**

- OCE will participate in the SEES emphasis on clean energy and research networks at a level of \$8.50 million in FY 2012. 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, integrated social and natural science models of our coasts, dimensions of biodiversity, LTERs, and others.

- Investment of \$3.0 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).
- Investment by OCE of \$4.0 million in support for Cyberinfrastructure Framework for 21 Century Science and Engineering (CIF21) is initiated in FY 2012. OCE will contribute to this NSF-wide initiative by supporting research on geoinformatics and the enhancement of access and connections to facilities and scientific instruments emerging from national data- and compute-intensive facilities such as the Ocean Observatories Initiative (OOI).
- Investment of \$5.0 million in the Center for Dark Energy Biosphere Investigations (C-DEBI). Initial funding for this STC began in 2010 within Integrative Activities. 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 sub-seafloor biosphere, and the interactions of this life with the largest hydrological system on our planet.
- OCE will also continue its partnership on the theme of Oceans and Human Health with the National Institute of Environmental Health Sciences (NIEHS), and on the theme of ecosystem-based management in the Comparative Analysis of Marine Ecosystem Organization program with the National Oceanographic and Atmospheric Administration (NOAA).
- In late CY 2010, OCE received a National Research Council report with recommendations for research on ocean acidification. The division will again partner with OPP, BIO, and other federal 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 up to \$10.0 million in FY 2012.

### 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 and encourage broader participation in ocean sciences.
- Funding is provided for a new program, the OCE Postdoctoral Fellowship and Research Facilitation Awards (\$1.90 million). This program aims to broaden participation in the ocean sciences through fellowships and research support.
- Funding for the Centers for Ocean Science Education Excellence (CoSEE) program continues at a level of \$4.24 million, representing a reduction of \$1.45 million from the FY 2010 Enacted level. During FY 2011, CoSEE will complete a decadal review of its program successes along with a forward-looking strategic plan to define new opportunities and directions.

### Infrastructure

- A modest increase in funds (+\$2.0 million) is requested for the Integrated Ocean Drilling Program to capitalize on enhanced investment returns from the successful operation of the retro-fitted drilling vessel, *JOIDES RESOLUTION*, under the current science plan and in support of the C-DEBI STC. In FY 2011, OCE will receive the results of an NRC study evaluating the impact of scientific ocean drilling on the geosciences and assessing a new Science Plan, developed by the international community, for a possible new ocean drilling program post-FY 2013.
- Decreases in the Academic Research Fleet operations result from the retirement of the *R/V OCEANUS* and completion of the *RHOV ALVIN* replacement in FY 2011. Investments are continued (\$2.0 million) for planning and design for a possible fleet renewal effort.
- Implementation of the Ocean Observatories Initiative (OOI) continues with a planned \$19.20 million increase, bringing the total for operations and maintenance to \$35.70 million in FY 2012. These increased funds support the transition from the design phase to an active network build phase.