



**NSF Grants Conference**  
**Tampa**  
**June 1-2, 2015**

**NSF Directorate for Geosciences**

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**Division of Earth Sciences**

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# Directorate for Geosciences: Our Mission

- Supports research in atmospheric, earth, polar and ocean sciences
- Address the Nation's need to understand, predict and respond to environmental events and changes in order to use the Earth's resources wisely

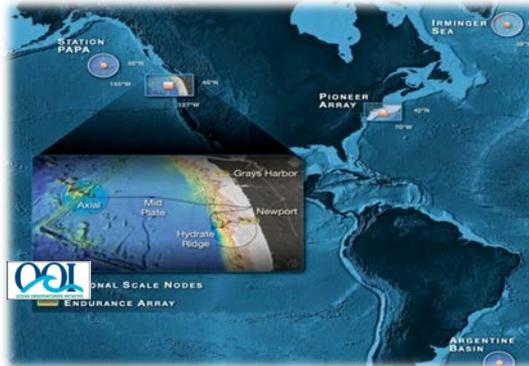


# GEO Profile





Research Vessel Sikuliaq



Oceans



EarthScope Observatory

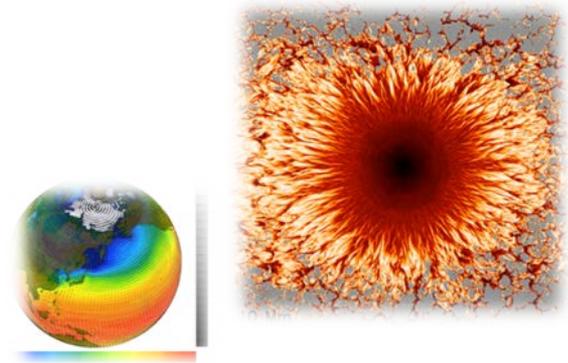
# Era of Observation and Simulation



Water



Satellites



Earth System Modeling

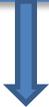
# Division of Atmospheric and Geospace Sciences (AGS)

- Further understanding of weather, climate and the solar-terrestrial system by expanding the fundamental knowledge of the composition and dynamics of the Earth's atmosphere and geospace environment
- Support large, complex facilities required for research in the atmospheric and solar-terrestrial sciences





# Division of Atmospheric and Geospace Sciences



## NCAR and Facilities Section

Lower Atmospheric Observing Facilities

NCAR

Cross-Disciplinary Activities (UCAR, REU, AGS PRF)



## Atmosphere Section

Atmospheric Chemistry

Physical & Dynamic Meteorology

Climate & Large-Scale Dynamics

Paleoclimate



## Geospace Section

Aeronomy

Magnetospheric Physics

Solar Terrestrial

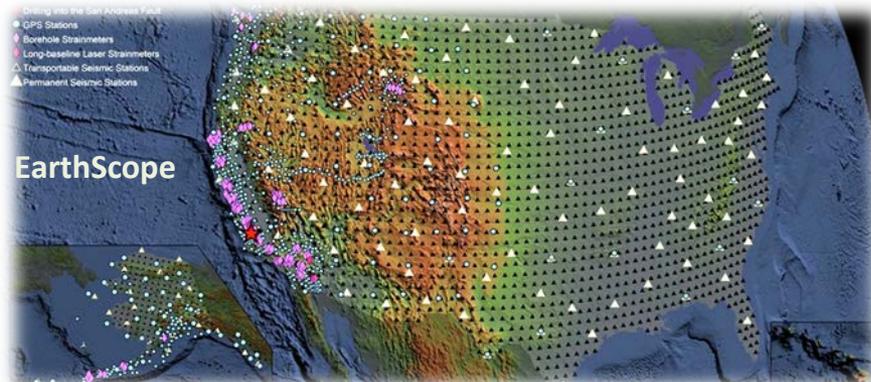
Space Weather Research

Geospace Facilities



# Division of Earth Sciences (EAR)

- Improve the understanding of the structure, composition, and evolution of the Earth and the processes that govern the formation and behavior of the solid Earth
- Support theoretical, computational, laboratories and field stations and state-of-the-art scientific infrastructure



# Division of Earth Sciences

## Surface Earth Processes Section

**Education & Human Resources**

**Hydrologic Sciences**

**Geomorphology & Land Use  
Dynamics**

**Sedimentary Geology &  
Paleobiology**

**Geobiology & Environmental  
Geochemistry**

## Deep Earth Processes Section

**Instrumentation & Facilities**

**Integrated Earth Systems**

**EarthScope**

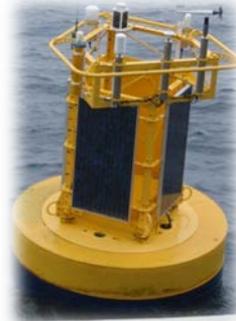
**Geophysics**

**Petrology & Geochemistry**

**Tectonics**

# Division of Ocean Sciences (OCE)

- Enhance understanding of all aspects of the global oceans and their interactions with the solid earth and the atmosphere
- Support major shared-use oceanographic facilities including research vessels and manned deep diving submersibles



# Division of Ocean Sciences

## Marine Geosciences Section

**Marine Geology & Geophysics**

**Chemical Oceanography**

## Integrative Programs Section

**Ship Operations**

**Oceanographic Facilities**

**Oceanographic Instrumentation & Technical Services**

**Oceanographic Technology & Interdisciplinary Coordination**

**Ocean Sciences Education**

**Ocean Drilling**

## Ocean Sciences Section

**Biological Oceanography**

**Physical Oceanography**

# Division of Polar Programs (PLR)

- Polar regions are unique natural laboratories to investigate Earth and its systems, explore the geographical frontier, perform science in extreme conditions.
- Support basic research and its operational activities in the Arctic and the Antarctic.



# Division of Polar Programs

Arctic Sciences

Polar Environment,  
Health & Safety

Antarctic  
Infrastructure and  
Logistics

Antarctic Sciences

Natural Sciences

Observing Networks

Social Sciences

System Sciences

Research Support &  
Logistics

Education and Outreach

Polar Cyberinfrastructure

Glaciology

Earth Sciences

Astrophysics & Geospace

Ocean & Atmospheric Sciences

Organisms and Ecosystems

Integrated System Sciences

Research and Logistics  
Integration

# Fiscal Year 2016 Budget Request

## R&RA Funding (Dollars in Millions)

	FY 2014 Actual	FY 2015 Estimate	FY 2016 Request	Change over FY 2015 Estimate	
				Amount	Percent
Biological Sciences	\$720.84	\$731.03	\$747.92	\$16.89	2.3%
Computer & Information Science & Engineering	892.60	921.73	954.41	32.68	3.5%
Engineering	833.12	892.31	949.22	56.91	6.4%
<b>Geosciences</b>	<b>1,321.32</b>	<b>1,304.39</b>	<b>1,365.41</b>	<b>61.02</b>	<b>4.7%</b>
Mathematical & Physical Sciences	1,267.86	1,336.72	1,366.23	29.51	2.2%
Social, Behavioral & Economic Sciences	256.84	272.20	291.46	19.26	7.1%
Office of International Science and Engineering	48.31	48.52	51.02	2.50	5.2%
Integrative Activities	433.12	425.34	459.15	33.81	7.9%
U.S. Arctic Research Commission	1.30	1.41	1.48	0.07	5.0%
<b>Total, R&amp;RA</b>	<b>\$5,775.32</b>	<b>\$5,933.65</b>	<b>\$6,186.30</b>	<b>\$252.66</b>	<b>4.3%</b>

Totals may not add due to rounding.



# Fiscal Year 2016 Budget Request by Division

## GEO Funding (Dollars in Millions)

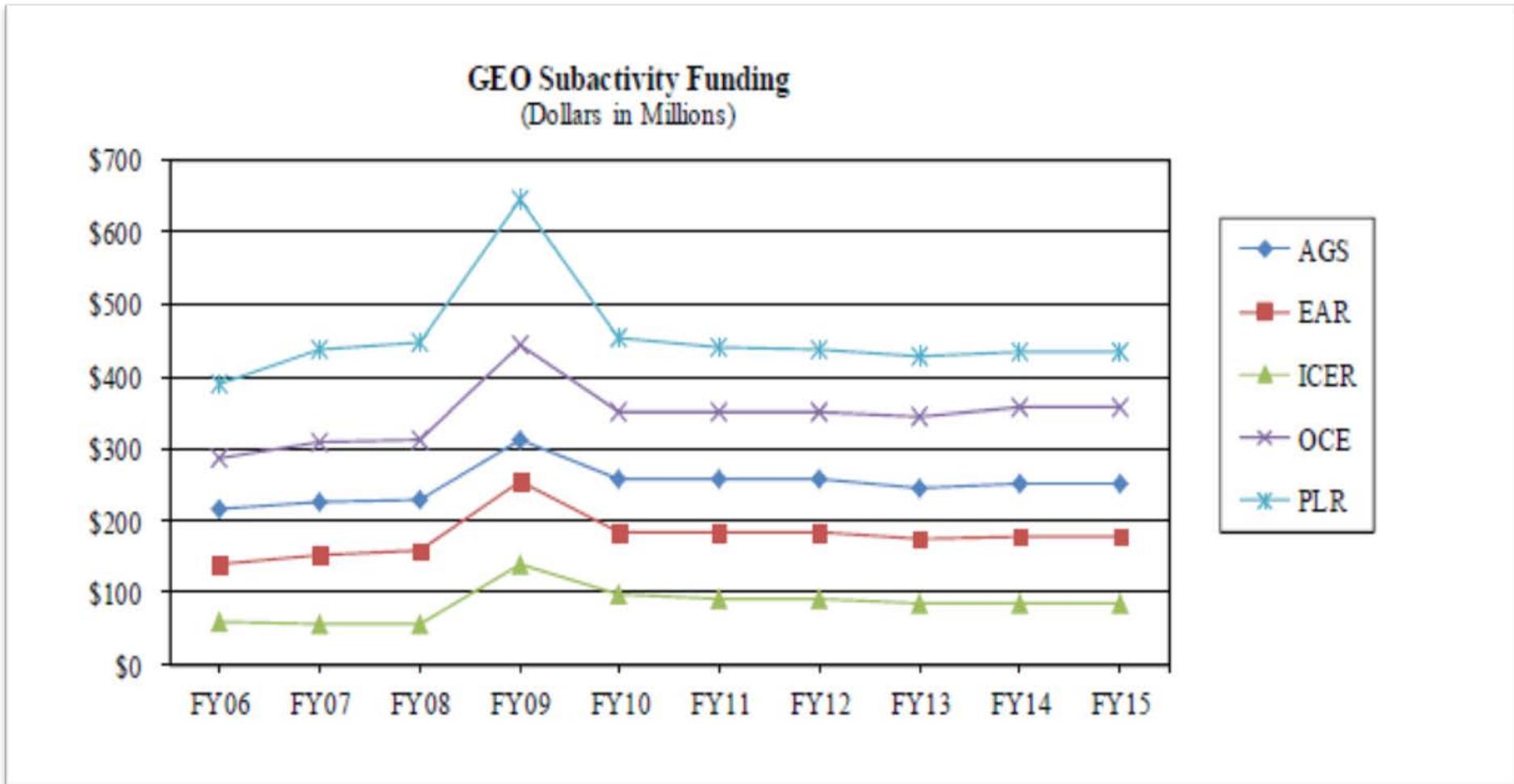
	FY 2014 Actual	FY 2015 Estimate	FY 2016 Request	Change Over FY 2015 Estimate	
				Amount	Percent
Atmospheric and Geospace Sciences (AGS)	\$250.85	\$251.15	\$262.88	\$11.73	4.7%
Earth Sciences (EAR)	177.81	177.20	188.21	11.01	6.2%
Integrative and Collaborative Education and Research (ICER)	83.53	83.74	95.20	11.46	13.7%
Ocean Science (OCE)	356.27	355.95	369.61	13.66	3.8%
Polar Programs (PLR)	452.87	436.35	449.51	13.16	3.0%
<i>U.S. Antarctic Logistical Support (USALS)</i>	<i>[68.94]</i>	<i>[67.52]</i>	<i>[67.52]</i>	-	-
<b>Total, GEO</b>	<b>\$1,321.32</b>	<b>\$1,304.39</b>	<b>\$1,365.41</b>	<b>\$61.02</b>	<b>4.7%</b>

Totals may not add due to rounding.





# GEO Funding Trend





# **GEO Modes of support**

- **Unsolicited proposals from all scientists with interests in the geosciences**
- **Special competitions, often interdisciplinary**
- **Integration of research and education in geosciences**
- **Support for infrastructure, instrumentation, facilities**
- **Post-doctoral fellowship programs and workforce development programs**



# Cross-cutting Programs



- Faculty Early Career Program (**CAREER**)\*
- Research in Undergraduate Institutions (**RUI**)
- Research Experiences for Undergraduates (**REU**)\*
- Early Concept Grants for Exploratory Research (**EAGER**) \*
- Grants for Rapid Response Research (**RAPID**) \*

\*contact Program Director before submitting



# GEO Program Due Dates\*



- Atmospheric Sciences: no due dates; proposal may be submitted any time
- Earth Sciences: January and July, no deadlines in some programs
- Ocean Sciences: February and August
- Polar Programs: ARC October, ANT April
- Cross-cutting/special programs: see solicitation or Dear Colleague Letter



\*Check the NSF web site for actual dates and updates to requirements when developing a proposal



# **GEO Instrumentation and Facilities**

## **- Funding opportunities**

- **Major Research Instrumentation (MRI and MRI-R<sup>2</sup>)**  
\$100,000 to \$6M -- proposals requesting less than \$100,000 will be considered only from non-Ph.D. granting organizations
- **Improvements in Facilities, Communications, and Equipment at Biological Field Stations and Marine Laboratories (FSML)**
- **Earth Sciences: Instrumentation and Facilities (EAR/IF)**
- **EPSCoR Research Infrastructure Improvement Program: Inter-Campus and Intra-Campus Cyber Connectivity (RII C2)**



# GEO Instrumentation & Facilities

## - Access



- GEO observing, analytical and supercomputing facilities are available to NSF PIs, students, and sometimes researchers funded by other sources.
- Each facility has its own application and review process.
- Users range from individual PIs and students to large international field campaigns.
- E.g. NCAR supercomputers, aircraft, radar; UNOLS fleet, Arctic and Antarctic logistic programs



# GEO EAR Postdoc Fellowship

## Support

- 24 months grant period
- \$174K total directly to fellows

## Eligibility

- Be US citizen, national, or permanent resident
- Have or will receive PhD by start of fellowship
- Not have worked more than 18 FTE months in positions requiring PhD
- Research within EAR purview

## GOALS

- recognize investigators with significant potential
- fund research on topics supported by EAR and implementation of a broadening participation plan
- enable and establish leaders within the community
- support fellows at any appropriate U.S. or foreign host institution

NSF 15-568 Due: January 12, 2016

More info: [lpatino@nsf.gov](mailto:lpatino@nsf.gov)



# GEO AGS Postdoc Fellowship

## Support

- 24 months grant period
- \$172K total directly to fellows

## Eligibility

- Be US citizen, national, or permanent resident
- within 3 years of PhD
- work to be undertaken at an academic institution or national facility of their choice

## GOALS

- recognize investigators with significant potential
- provide research experience, broaden perspective
- facilitate interdisciplinary interactions as appropriate
- enable and establish leaders within the community

Proposals must describe a research plan that addresses scientific questions that lie within the scope of the AGS programs

NSF 14-509 Due: January 11, 2016

More information: [amadams@nsf.gov](mailto:amadams@nsf.gov)





# Improving Undergraduate STEM Education (NSF-IUSE)

- **Improve STEM Learning & Learning Environments**
  - Improve the knowledge base for defining, identifying, and innovating effective undergraduate STEM education teaching and learning for all NSF-supported disciplines, and foster widespread use of evidence-based resources and pedagogies in undergraduate STEM education practice.
- **Broaden Participation & Institutional Capacity for STEM Learning**
  - Increase the number and diversity of undergraduate students recruited and retained in STEM education and career pathways through improving the evidence base for successful strategies to broaden participation and implementation of the results of this research.
- **Build the Professional STEM Workforce for Tomorrow**
  - Improve the preparation of undergraduate students so they can succeed as productive members of the future STEM workforce, regardless of career path, and be engaged as members of a STEM-literate society.



# Improving Undergraduate STEM Education (IUSE: EHR)



## 2 Tracks



Engaged Student Learning

*Design, development, and research studies that involve creation, exploration, or implementation of tools, resources, and models*

Institutional and Community Transformation

*Projects that use innovative approaches to substantially increase the propagation of highly effective methods of STEM teaching and learning in institutions of higher education*

**Program Solicitation being revised (old NSF 14-588)**





# IUSE: EHR

Track	October 2014	January 2015
<b>Engaged Student Learning</b>	<b>Exploration</b> <ul style="list-style-type: none"><li>• <i>up to \$250K</i></li><li>• <i>Deadline: 10/22/14</i></li></ul>	<b>Design and Development</b> <ul style="list-style-type: none"><li>• <i>Level I - up to \$600K</i></li><li>• <i>Level II - \$600K - \$2M</i></li><li>• <i>Deadline: 1/13/15</i></li></ul>
<b>Institutional and Community Transformation</b>	<b>Exploration</b> <ul style="list-style-type: none"><li>• <i>up to \$250K</i></li><li>• <i>Deadline: 10/22/14</i></li></ul>	<b>Design and Development</b> <ul style="list-style-type: none"><li>• <i>up to \$3M</i></li><li>• <i>Deadline: 1/13/15</i></li></ul>

**Program Solicitation being revised (old NSF 14-588)**





# Improving Undergraduate STEM Education: Pathways into Geoscience (IUSE: GEOPATHS)

## Program Solicitation - NSF 15-526

- Letter of Intent due – August 14, 2015
- Full Proposal Deadline – November 5, 2015

## Two Funding Tracks

- ***GEOPATHS-EXTRA*** - Engaging students in the geosciences through extra-curricular experiences and training - research universities/very high research activity in Carnegie classification not eligible
- ***GEOPATHS-IMPACT*** - Improving pathways into the geosciences through institutional collaborations – smooth transitions from high school to college, 2yr institutions to 4 yr. institutions, bachelors to grad school, or university to workforce



# Stimulating Research on Effective Strategies in Undergraduate STEM Education at Two-Year Hispanic Serving Institutions



## *Dear Colleague Letter 15-078*

Invites EaGER and Workshops that focus on evidence-based practices that have been shown to be particularly effective for students at HSIs, as well as exploratory research that may lead to new models and best practices. *Deadline of June 19, 2015 (FY 15) and May 31, 2016 (FY 16)*

## *Dear Colleague Letter 15-063*

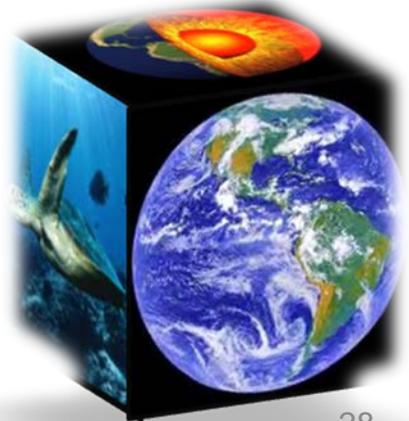
Supplements for 2-yr institutions/students to participate in NSF awards - Both two-year and four-year institutions are eligible to submit proposals. *Deadline of December 15, 2015 (FY 16)*



# EarthCube

- In partnership with CISE, EarthCube creates an integrated data management infrastructure across the geosciences
- Workshops and community events to broaden user base and scientific breadth
- Coordination and community governance
- Part of NSF-wide CI thrust ('CIF21')

[www.earthcube.org](http://www.earthcube.org)



# SEES: Science, Engineering and Education for Sustainability



Mission: Advance science, engineering, and education to inform the societal actions needed for environmental and economic sustainability and sustainable human well-being

- Established in Fiscal Year 2010
- Portfolio of existing and new programs
- All NSF Directorates and offices involved
- Partnerships (e.g. other agencies, CNRS, Belmont Forum)



# **FY 2016 Initiatives**



**Innovations at the Nexus of Food,  
Energy and Water Systems (INFEWS)  
– 75 M\$**

# **FY 2016 Initiatives**



**Risk and Resilience – 58 M\$**  
**Prediction of and Resilience Against**  
**Extreme Events (PREEVENTS)**

