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NSF Geosciences Directorate

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The Mission of the Directorate for Geosciences

- Support research in the atmospheric, earth 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



Division of Atmospheric and Geospace Sciences (AGS)

- Furthers 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
- Supports large, complex facilities required for research in the atmospheric and solar-terrestrial sciences



Division of Earth Sciences (EAR)

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



Division of Ocean Sciences (OCE)

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



Modes of support

- unsolicited proposals from all scientists with interests in the geosciences
 - investigator-initiated collaborative research programs
 - individual investigator-initiated research projects
- special competitions, often interdisciplinary
- promote collaborations with scientists in other disciplines, funding agencies, and nations
- promote the integration of research and education

Long-term support for shared resources

- observational platforms
- analytic facilities
- computational facilities

Recent and Ongoing Major Facility Investments



- HIAPER: Operations began in 2005



- AMISR: Poker Flat, AK: operational; Resolute Bay, Canada: under construction.

- EarthScope: Operational



- Scientific Ocean Drilling Vessel: Operational

- Ocean Observatories Investment: under construction



- Alaska Region Research Vessel: under construction

Cross-Cutting Activities in GEO

- Emerging Topics in Biogeochemical Cycles (with BIO)
- Environment, Society, and the Economy (with SBE)
- Multi-scale Modeling (with BIO)
- Collaborations in Mathematical Geosciences (with DMS)
- Paleo Perspectives on Climate Change
- Critical Zone Observatories
- Geoscience Education & Diversity

Emerging Topics in Biogeochemical Cycles (ETBC)

- BIO and GEO (NSF 09-030)
- quantitative and/or mechanistic understanding of biogeochemical cycles, including the water cycle.
- Integrate physical, geological, chemical, and/or hydrologic processes with biological processes over various temporal and/or spatial scales and/or various levels of biological organization.
- increase our understanding of how biological systems respond to changing physical and chemical conditions and how biological systems influence the physical and chemical characteristics of soils and sediments, air, or water.
- <http://www.nsf.gov/pubs/2009/nsf09030/nsf09030.jsp>

Environment, Society, and the Economy (ESE)

- SBE and GEO (NSF 09-031)
- Goal to increase collaboration between the geosciences and the social and behavioral sciences
- Examples of Prospective topics:
 - Decision-making strategies related to ongoing or predicted global, regional, and local environmental changes;
 - Economic and geosciences evaluation of technology and practices linked to climate change;
 - Development and implementation of mitigation strategies within political and economic constraints;
 - Interplay of environmental change and inequality of income, access to resources, etc.;
 - Politics and economics of resource agreements;
 - Environmental change and its impact on the evolution of human behavior
- <http://www.nsf.gov/pubs/2009/nsf09031/nsf09031.jsp>

Multi-scale Modeling (MSM)

- BIO and GEO (NSF 09-302)
- Focus on the development and/or integration of environmental models that link local, regional and global scales.
- Address key problems linking biological and Earth system processes over a variety of spatial and temporal scales
- Projects will develop theoretical foundations for the modeling and simulations of existing data and data collected by the new and envisioned NSF environmental observatories (e.g., EarthScope, OOI, CZO, NEON).
- <http://www.nsf.gov/pubs/2009/nsf09032/nsf09032.jsp>

Paleo Perspectives on Climate Change

- Solicitation 08-505
- 2009 Deadline: October 15th
- Re-issuance of Earth System History solicitation

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Other NSF Activities of Interest “Crosscutting and NSF-wide”

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

Other NSF Activities of Interest “Crosscutting and NSF-wide”

- CDI: Cyber-enabled Discovery and Innovation
- CMG: Collaboration in Mathematical Geosciences
- ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers
- CNH: Dynamics of Coupled Natural and Human Systems
-

Other NSF Activities of Interest: Instrumentation and Facilities

- Major Research Instrumentation (MRI and MRI-R²)
\$100,000 to \$6M -- proposals requesting less than \$100,000 will be considered only from non-Ph.D. granting organizations or from the disciplines of mathematical science or social, behavioral, and economic science at any eligible organization.
- 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)
- Academic Research Infrastructure Program: Recovery and Reinvestment (ARI-R²) - closed.
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GEO Education

GEO has a Directorate-wide program to fund formal (K-16) and informal geoscience education activities.

Contact: Jill Karsten jkarsten@nsf.gov

- Division of Atmospheric Sciences

Contact: Sue Weiler cweiler@nsf.gov

- Division of Earth Sciences

Contact: Lina Patino lpatino@nsf.gov

- Division of Ocean Sciences

including the Centers for Ocean Science Education Excellence (COSEE)

Contact: Lisa Rom erom@nsf.gov

Opportunities for Enhancing Diversity in the Geosciences (OEDG)

Addresses the problem of underrepresentation of certain groups across the geosciences as compared to their proportion of the general population. The primary goal of the OEDG program is to increase the participation in geoscience education and research by students from these groups.

Contact Jill Karsten for further information at (703) 292-8500 or at jkarsten@nsf.gov

FY 2009: Education & Diversity Investments

- Opportunities for Enhancement of Diversity in the Geosciences
 - \$4.6 million
- Geoscience Education
 - \$2.5 million including \$1 million to foster linkages with LSAMP
- GEO Teach
 - \$3.0 million
- Global Learning and Observations to Benefit the Environment (GLOBE)
 - \$1.1 million
- Centers for Ocean Science Education Excellence
 - \$5.55 million

In addition, most facilities, centers, and many individual investigator awards include strong education and outreach programs.

GEO Budgets

- FY 09 estimated: \$807M (+\$49/FY 08)
- FY 09 ARRA (American Reinvestment & Recovery Act) : \$601M (~20% of NSF funds)
(\$347M for Research and Education grants and \$254M for MREFC projects)
- FY 10 request: \$909M (+\$102/FY 09)

GEO Priorities for ARRA

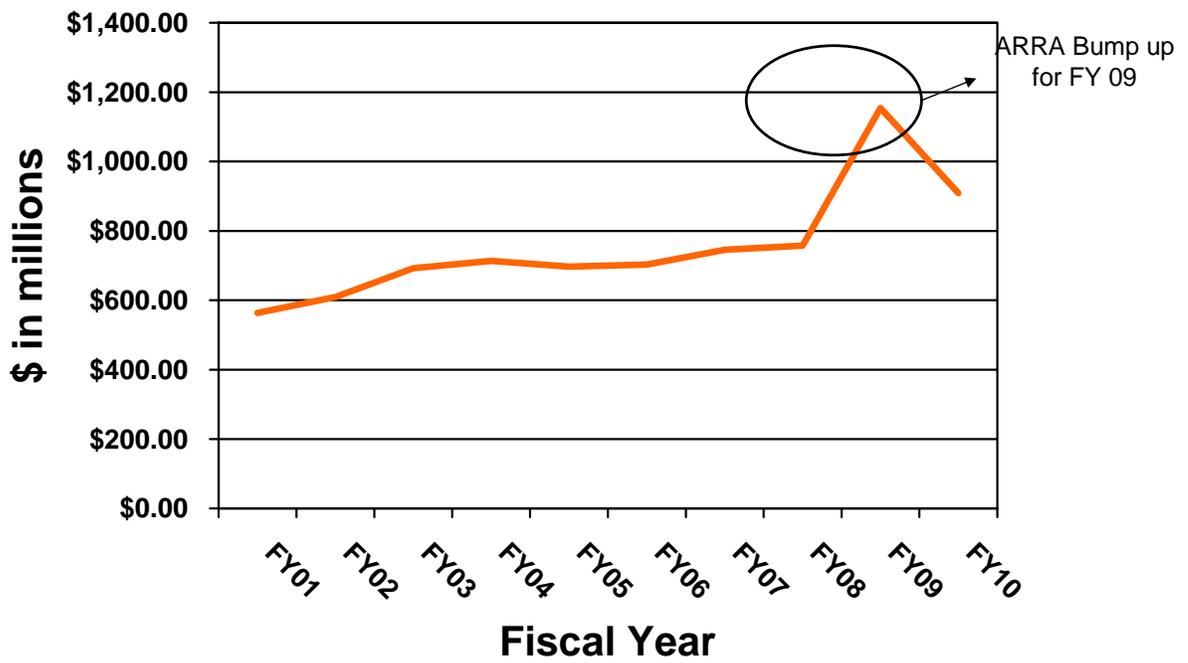
R&RA: \$347 million

- Jump-start Climate Research
- Explicitly focus on raising overall success rates
- Emphasize early career investigators and graduate research fellows
- Focus on GEO education, IGERT and Earth System Science Education
- Make strategic investments in infrastructure to offset anticipated future costs
 - Maintenance and Upgrade of Academic Fleet
 - Avionics Upgrades
 - IODP Operations
 - EarthScope O&M

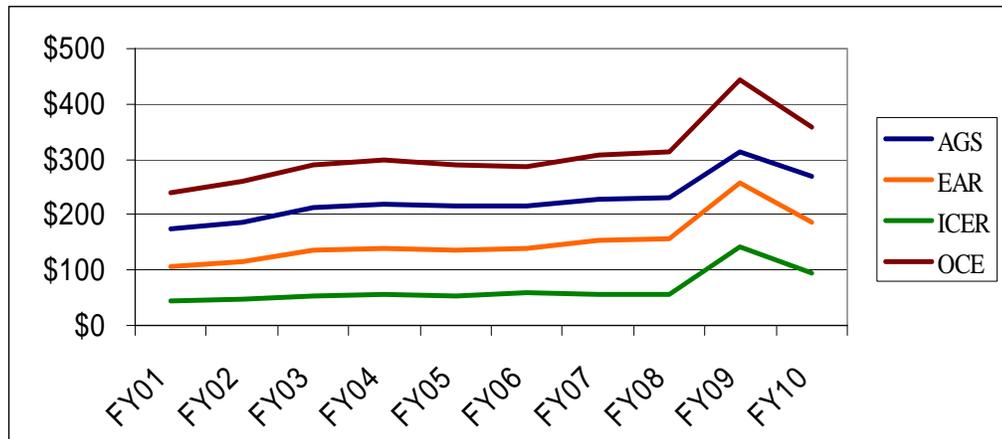
GEO ARRA Investments - MREFC (Major Research Equipment and Facilities Construction)

- Alaska Region Research Vessel (ARRV): \$148M
- Ocean Observatories: \$106M

GEO Funding Trend

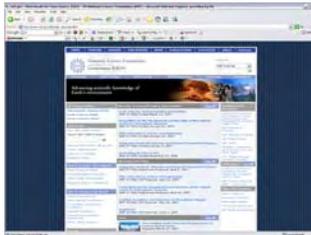


Geosciences Funding



FY 2010 GEO Priorities – additional funds:

- \$46.0M NSF's new Climate Research activity
 - Modeling , scaling, complexity
 - Fundamental research
 - Environmental observation
 - Adaptation
- \$1.5M for climate change education (new FY 2010 activity)
- \$6.0M GEO/EHR Collaborations to enhance activities to broaden participation and education in the geosciences
- Additional \$1.69M to CAREER for total of \$12.22M
- \$1.0M for graduate research fellowships (new in FY 2010)



Proposal Preparation

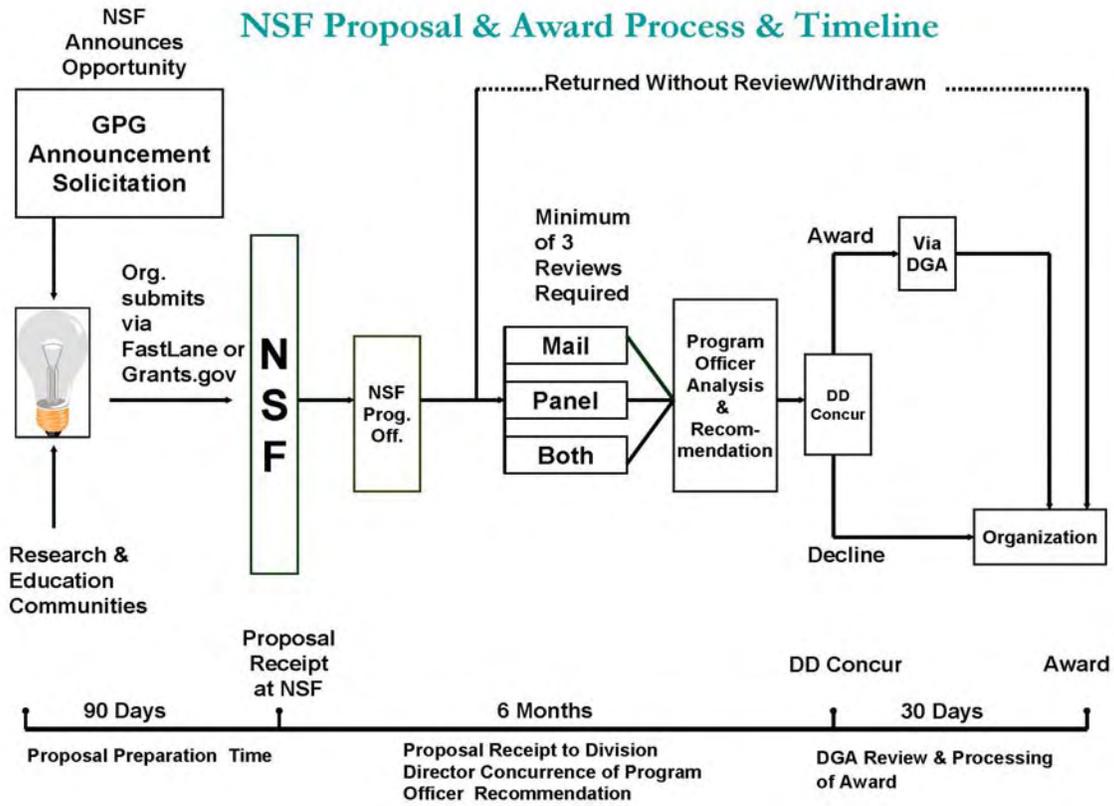
- Proposal and Award Policies and Procedures
http://www.nsf.gov/publications/pub_summ.jsp?ods_key=papp
- NSF Home Page -- Guide to Programs
- Program Solicitations - eligibility, goals, special requirements
- Program Officers - current or former rotators
- NSF Custom News Service - what's new

Words of Wisdom

- Talk to your Program Directors
Ask us early, ask us often!!
- Learn the culture - each Division and Directorate has a different *modus operandi*
- Volunteer to be a reviewer
- Don't forget to address "Broader Impacts"

Questions ??

NSF Proposal & Award Process & Timeline



NSF Merit Review

NSF Review Criteria

- Intellectual Merit
- Broader Impacts

Programs can also have additional review criteria - read the Program Solicitation!

Merit Review is conducted through ad hoc peer review and/or panel review