Geoscience Education (GeoEd)

PROGRAM SOLICITATION
NSF 10-512

REPLACES DOCUMENT(S):
NSF 05-609

National Science Foundation

Directorate for Geosciences
Division of Atmospheric and Geospace Sciences
Division of Earth Sciences
Division of Ocean Sciences

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

March 08, 2010

Full Proposals Due

October 12, 2011

Full Proposals Due

IMPORTANT INFORMATION AND REVISION NOTES

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), NSF 11-1, was issued on October 1, 2010 and is effective for proposals submitted, or due, on or after January 18, 2011. Please be advised that the guidelines contained in NSF 11-1 apply to proposals submitted in response to this funding opportunity. Proposers who opt to submit prior to January 18, 2011, must also follow the guidelines contained in NSF 11-1.

Cost Sharing: The PAPPG has been revised to implement the National Science Board's recommendations regarding cost sharing. Inclusion of voluntary committed cost sharing is prohibited. In order to assess the scope of the project, all organizational resources necessary for the project must be described in the Facilities, Equipment and Other Resources section of the proposal. The description should be narrative in nature and must not include any quantifiable financial information. Mandatory cost sharing will only be required when explicitly authorized by the NSF Director. See the PAPP Guide Part I: *Grant Proposal Guide (GPG)* Chapter II.C.2.g(xi) for further information about the implementation of these recommendations.

Data Management Plan: The PAPPG contains a clarification of NSF's long standing data policy. All proposals must describe plans for data management and sharing of the products of research, or assert the absence of the need for such plans. FastLane will not permit submission of a proposal that is missing a Data Management Plan. The Data Management Plan will be reviewed as part of the intellectual merit or broader impacts of the proposal, or both, as appropriate. Links to data management requirements and plans relevant to specific Directorates, Offices, Divisions, Programs, or other NSF units are available on the NSF website at: http://www.nsf.gov/bfa/dias/policy/dmp.jsp. See Chapter II.C.2.j of the GPG for further information about the implementation of this requirement.

Postdoctoral Researcher Mentoring Plan: As a reminder, each proposal that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. Please be advised that if required, FastLane will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See Chapter II.C.2.j of the GPG for further information about the implementation of this requirement.

Revision Notes:

The Geoscience Education (GeoEd) program solicitation has been revised in order to clarify several aspects of the call for proposals that reflect recent developments and emerging priorities within the STEM and geoscience education communities. The goals and objectives of the GeoEd solicitation have been refined to emphasize four priority investments areas related to advancing public Earth system science literacy, developing the future geoscience workforce, using technology to facilitate and improve geoscience education, and supporting regional networks that collaborate in efforts to improve geoscience education and broaden participation in the geosciences.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Geoscience Education (GeoEd)

Synopsis of Program:

The Geoscience Education (GeoEd) Program is part of a portfolio of programs within the Directorate for Geosciences (GEO) that seeks to increase public understanding of Earth system science and foster recruitment, training and retention of a diverse and skilled geoscience workforce for the future. The program achieves these goals by supporting innovative or transformative projects that improve the quality and effectiveness of formal and informal geoscience education at all educational levels, increase the number of students pursuing geoscience education and career paths, broaden participation of traditionally underrepresented groups in the geosciences, and promote public engagement in Earth system science.

In FY 2010 and FY 2012, the GeoEd program invites proposals in four main areas:

- advancing public Earth system science literacy, particularly through strengthening geoscience education in grades K-14 and informal education settings;
- fostering development and training of the diverse scientific and technical workforce required for 21st century geoscience careers;
- utilizing modern technologies to facilitate and increase access to geoscience education and/or develop innovative approaches for using geoscience research activities and data for educational purposes; and,
- establishing regional networks and alliances that bring together scientists, formal and informal science educators, as well as other stakeholders, in support of improving Earth system science education and broadening participation in the geosciences.

Proposals focused on basic research that might catalyze discovery and innovation at the frontiers of geoscience learning, education, and evaluation will be considered by the GeoEd Program, but are not viewed as a priority in this solicitation. However, the GeoEd Program expects all proposed project activities to be grounded in current understanding of how students learn and effective STEM education practices. Proposals must include an appropriate evaluation or assessment plan that will help to document project effectiveness and/or impact.

The GeoEd Program accepts proposals for pilot or proof-of-concept projects (Track 1) and integrative collaborations (Track 2) , as well as for conferences or workshops related to the mission of the program.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Jill L. Karsten, Program Director, GEO Education and Diversity, GEO/OAD, 705 N, telephone: (703) 292-7718, fax: (703) 292-9042, email: jkarsten@nsf.gov
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Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.050 --- Geosciences

Award Information

Anticipated Type of Award: Standard or Continuing Grants or Supplements

Estimated Number of Awards: 40 (It is anticipated that 35 Track 1 awards and 5 Track 2 awards will be made.)

Anticipated Funding Amount: $5,000,000 pending availability of funds. (This is a biennial solicitation, with a competition being held in FY 2010 and FY 2012. It is anticipated that there will be $5 million total available per competition, with $3 million available to support Track 1 proposals and $2 million available to support Track 2 proposals.)

Eligibility Information

Organization Limit:

None Specified

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

An organization (e.g., a university or museum) may be the lead organization on only one Track 2 proposal submitted per competition.

Limit on Number of Proposals per PI: 1

An individual may be Principal Investigator or co-Principal Investigator on only one proposal submitted per competition to the GeoEd Program, regardless of whether the proposal is submitted under Track 1 or Track 2.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable

- **Full Proposals:**
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
  - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)

B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

March 08, 2010

Full Proposals Due

October 12, 2011

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Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions: Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements: Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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I. INTRODUCTION

"The need for public literacy in the geosciences has never been more critical. Daily, Americans learn about threats to the Earth, such as the peril of global climate change and the increasing frequency of natural and manmade hazards. Consequently, it is imperative the public gain a deeper understanding of the underlying scientific processes that influence these events. Advancing public literacy in Earth system science will not come easily, though. It will require a coordinated government and private investment to reform and strengthen both formal and informal science education, as well as to promote life-long learning."

"The evolutionary path envisioned for the geosciences is compelling, but poses many practical challenges for the current and next-generation geosciences workforce. New curricular waters must be charted to find the proper balance between educating students about fundamental Earth system processes and learning how to facilitate application of this knowledge to problems faced by society. New strategies for engaging traditionally underrepresented communities in the geosciences must be deployed to ensure a diverse pool of talent that encompasses varied geographic, economic, and demographic representation."

-- Excerpts from the 2009 GEO VISION Report of the NSF Advisory Committee for Geosciences

The Geoscience Education (GeoEd) Program supports proof-of-concept and dissemination activities aimed at strengthening geoscience education throughout the United States. GeoEd is part of a larger portfolio, managed within the NSF Directorate for Geosciences (GEO) Office of the Assistant Director, that includes the *Opportunities for Enhancing Diversity in the Geosciences (OEDG), Global Learning and Observations to Benefit the Environment (GLOBE),* and *Geoscience Teacher Training (GEO-Teach)* programs. Additional programs offered through the GEO Divisions of Ocean Sciences (OCE), Earth Sciences (EAR), and Atmospheric and Geospace Sciences (AGS) support complementary educational activities, particularly for post-secondary students and early career scientists. Collectively, these programs support implementation of a strategic framework for GEO's Education and Diversity programs (available at http://www.nsf.gov/geo/adgeo/education.jsp) which focuses on two main goals: to increase public understanding of Earth system science and its relevance; and, to foster recruitment, training and retention of a diverse and skilled geoscience workforce for the future. These broad goals are being achieved through NSF investments to:

- improve the quality of formal and informal geoscience education at all educational levels, with particular emphasis on K-12 and early undergraduate audiences;
- increase the number and competency of K-12 educators who teach geoscience-related courses;
- demonstrate the relevance of the geosciences by identifying and promoting traditional and non-traditional career opportunities in the field;
- increase the number of students enrolling in geoscience courses and degree programs at all educational levels;
- increase the number of students drawn from groups traditionally underrepresented in science, technology, engineering and mathematics (STEM) fields who participate in geoscience courses and degree programs;
- encourage and facilitate the engagement of geoscientists in efforts to strengthen STEM education, while leveraging NSF-funded geoscience research investments; and,
- communicate the importance of the geosciences to the public and increase public literacy regarding Earth system science.

GEO's education and workforce investments have been guided by a number of community-based workshops and reports in which significant issues, needs, and barriers for the geosciences community have been identified (e.g., Ireton et al., 1997; Barstow et al., 2002). Critical documents include reports of the first and second Geoscience Education Working Groups (GEWG and GEWG II), entitled "Geoscience Education: A Recommended Strategy" (NSF 97-171) and "Geoscience Education and Diversity: Vision for the Future and Strategies for Success". These reports have emphasized the importance of aligning geoscience curricula at all educational levels with career paths and workforce needs, as well as the effectiveness of using genuine geoscience research experiences as an educational strategy. Over time, GEO's portfolio has evolved to reflect advances within the broader context of research on STEM learning and cognitive science (e.g., NRC, 1999, 2005, 2007, 2009), which has helped to identify more effective strategies for geosciences education (e.g., Manduca and Mogk, 2006; Kastens et al., 2009). Incorporation of formative and summative evaluation and assessment activities that document impacts on participant learning, achievement, and attitudes are now required in all GEO-funded education projects.

Important caveats:

As a general rule, the GeoEd program does not provide funding for activities typically supported by basic research grants or the NSF Education and Human Resources (EHR) Directorate programs. Proposals focused on basic research that might catalyze discovery and innovation at the frontiers of geoscience learning, education, and evaluation will be considered by the GeoEd Program, but are not viewed as a priority in this solicitation. Investigators seeking to conduct research in this area are encouraged to submit proposals to the Directorate for Education and Human Resources (EHR) *Research and Evaluation on Education in Science and Engineering (REESE)* Program.

Projects that provide geoscience research experiences for secondary school students and teachers, or undergraduate students and faculty in community colleges are encouraged. However, projects focused primarily on creation of new curricula or research opportunities for undergraduate students at traditional 4-year colleges and universities will only be considered by the GeoEd program if they do not qualify for the EHR *Course, Curriculum, and Laboratory Improvement (CCLI)* Program or the *Research Experiences for Undergraduates (REU)* program.

Projects that seek to disseminate effective professional development or training activities for pre- or in-service teachers will be given priority over those seeking to develop new models. Proposals that focus on using geospatial (GIS/GPS) technologies without also incorporating activities that provide significant exposure to Earth system science content will not be supported through the GeoEd program.

II. PROGRAM DESCRIPTION

General Program Description

The Geoscience Education (GeoEd) program considers proposals that are submitted under one of two tracks (*Track 1 Pilot Projects* and *Track 2 Integrative Collaborations*). Although the two tracks are designed to accommodate proposals with different goals, all proposals considered by the GeoEd program should focus on improving the quality of geoscience education and be current with regard to geoscience research. The term 'education' refers to learning in both formal (K-16) and informal educational settings, as well as life-long learning. The term 'geosciences' as used in this solicitation refers collectively to those disciplines supported by the Directorate for Geosciences (GEO) at NSF, as detailed at http://www.nsf.gov/home/geo/. Proposals for projects that will make use of current geoscience research results and/or methods are sought, as are proposals that will promote the geosciences and geoscience

careers as highly relevant to modern society. Projects designed to recruit and retain students during the critical transition from high school to college, or from community college to a 4-year undergraduate degree program, are of particular interest to the GeoEd program.

Effective geoscience educators communicate technically sound information in ways that engage and stimulate learners. Because an understanding of both geoscience content and education theory are needed to develop high-quality geoscience education materials and methods, successful GeoEd project teams (PI, coPIs, and Other Senior Personnel) commonly include representatives of both the geoscience and education communities. Clearly, implementation of innovative pedagogical strategies within the geoscience education arena can lead to both improved educational outcomes and new avenues for educational research that will result in further improvements in geoscience education in the future.

Desirable attributes of projects funded by the GeoEd Program include:

- an Earth system science approach;
- a focus on the fundamental concepts that unify the geosciences;
- an emphasis on processes rather than facts;
- mathematical rigor designed to build and demonstrate the application of quantitative skills;
- incorporation of concepts from the other basic sciences;
- alignment of education activities with workforce needs, including problem-solving and critical-thinking skills;
- opportunities for participants to work in culturally diverse teams, and
- the use of data and the scientific method.

Criteria for identifying potentially successful projects include:

- a rationale that demonstrates the underlying need for the proposed activity and indicates how this activity will either be catalytic or advance our understanding of how to improve geoscience education;
- enumeration of goals and objectives that are few in number, but clearly stated;
- identification of the audience to be targeted;
- inclusion of activities that use geoscience data and emphasize inter-disciplinary Earth system science;
- identification of quantitative or qualitative measures that will be used to determine the project's effectiveness at attaining it's goals and objectives;
- use of timelines and benchmarks that are tied to the project's objectives; and,
- plans for dissemination of project results.

Successful GeoEd projects have demonstrable lasting impact by:

- improving the quality of geoscience education for a large number of individuals;
- increasing the number of students enrolled in geoscience courses and degree programs;
- increasing participation in the geosciences by members of groups underrepresented in STEM fields;
- advancing efforts to increase public Earth system science literacy; and/or
- serving as a model that can be replicated at other sites or with different types of participants.

Project activities that seek to disseminate or scale-up successful pilot programs through appropriate partnerships are encouraged. Letters providing evidence of commitment to the project by participating institutions, organizations, and/or industrial partners, should be included in the Supplementary Documents section of the proposal. These documents should describe how the proposed activities would support the mission and goals of all participating entities.

Proposals should include appropriate evaluation and assessment activities that provide formative feedback during development of programs or resources and help to document whether project goals and objectives are being met. Federal guidelines regarding Human Subjects Research (45 CFR Part 690) must be addressed, as needed, which may require Institution Review Board (IRB) review of the proposal. More information on this policy can be found at: http://www.nsf.gov/bfa/dias/policy/human.jsp.

A list of current projects supported through GeoEd funding can be found here.

Program Priorities in FY 2010 and FY 2012

In FY 2010 and FY 2012, the GeoEd Program invites proposals that address any of the broad goals and objectives identified in the Introduction, but particular emphasis is being given to proposals focused in one of these thematic areas:

- Improving Public Earth System Science Literacy (Track 1 or Track 2)
- Development of the Future Geoscience Workforce (Track 1 only)
- Innovative Technologies for Geoscience Education (Track 1 only)
- Regional Geoscience Education Networks and Alliances (ReGENA) (Track 1 or Track 2)

1. Improving Public Earth System Science Literacy

Whether it is global climate change, clean energy, water resources, hazards, or sustainability, geoscience concepts - and a public that understands them - are vital to our nation's health, security, and prosperity. In spite of this relevance, there are many obstacles to achieving broad public understanding of key Earth system science concepts. Within the K-12 curriculum, variable state and local policies cause the geosciences to be taught with highly inconsistent quality, depth, and rigor (e.g., Stevermer et al., 2007). Many pre-college teachers of Earth Science (and related disciplines) have inadequate subject matter expertise (e.g., Hoffman and Barstow, 2007). Important incentives, such as an Advance Placement geoscience course, are lacking. At all grade levels, the complexity and spatio-temporal scales of processes within Earth systems make student preconceptions and misconceptions particularly difficult to overcome. Access to geoscience classes can also be an issue for many students, with only 14% of the nation's community colleges and fewer than 10 Historically Black Colleges and Universities (HBCU's) offering undergraduate degree programs in geoscience fields (e.g., Gonzalez et al., 2009). Combined, these impediments make it extremely difficult to attract the diverse and talented pool of students required to meet the workforce needs of the field.

In the past few years, the geoscience education and research communities have collaborated in efforts to promote the importance of Earth system science and argue for education reforms that will improve the status and quality of Earth System Science education nationwide. In conjunction with this campaign, several frameworks that identify the "big ideas" and fundamental concepts that all citizens should know and understand about the Earth have been developed, including: "*Ocean Literacy: Essential Principles and Fundamental Concepts of Ocean Sciences*" (2005); "*Atmospheric Science Literacy*" (2008); "*Climate Literacy: The Essential Principles of Climate Science*" (2009); and, "*Earth Science Literacy Principles: The Big Ideas and Supporting Concepts of Earth Science*" (2009). Together, these frameworks articulate the body of knowledge that defines an Earth system science-literate citizen and reveal the inadequacies of current educational practice in achieving this knowledge. On a more practical level, these frameworks are being used to structure development of instructional materials, textbooks, museum exhibits, assessments, and other types of education and outreach activities found in formal, informal, and/or self-directed learning environments.

For the FY 2010 and FY 2012 competitions, the GeoEd Program is particularly seeking Track 1 and Track 2 projects that help to improve public Earth System Science literacy through any of the following approaches:

- promote reforms in K-14 STEM education policies and practice that lead to increased student access to learning about Earth system science;
- develop, test and/or disseminate model educational resources that are linked to state and local standards and assessments and explicitly promote learning of the essential ideas outlined in the Ocean, Earth, Atmospheric, and Climate literacy frameworks;
- facilitate meaningful interactions between the geoscience research community, educators, learners, and the general public that promote learning about Earth system science concepts;
- strengthen K-14 geoscience education in formal or informal settings through integration of research experiences or use of geoscience data;
- improve the Earth system science content knowledge and pedagogical competencies of geoscience educators through effective professional development;
- establish community-based strategic plans for transforming geoscience education through workshops and conferences.

2. Development of the Future Geoscience Workforce

The "*Rising Above the Gathering Storm*" Report (COSEPUP, 2007) identified important challenges to our nation's future prosperity and expressed deep concerns that the "scientific and technological building blocks critical to our economic leadership" were not healthy in comparison to growing competition world-wide. New strategies for engaging the future STEM workforce and providing them with the training to keep our nation on the forefront of scientific and technical innovation are urgently needed. With the emergence of issues related to sustainability, climate change adaptation and mitigation, and energy security as high priority areas for innovation and job growth in the coming decades, there is a growing need for a community of STEM professionals and technicians well-informed in the geosciences. Projections by the U.S. Bureau of Labor Statistics indicate that demand for persons with credentials in a variety of geoscience-related professional and technical fields will significantly outpace the average growth rate for most other fields in the coming decade.

But, student interest in STEM degrees and careers has declined for most fields, including the geosciences, so it is not clear where these future employees will be found. In the recent "*Status of the Geoscience Workforce 2009*" report (Gonzalez et al., 2009), the American Geological Institute summarizes key statistics related to student enrollments, degree attainment, workforce demographics, and employment projections by sector for the geosciences community. The data show disturbing trends regarding recruitment and retention of students in the pipeline, and the report raises concerns about the overall health of many geoscience departments in the country. These trends are exacerbated by the slow progress being made in recruiting and retaining persons from underrepresented populations, including ethnic and racial minorities and persons with disabilities, at a time when they are an increasing share of the general population (e.g., Huntoon and Lane, 2007).

At the same time, the skills required by the future geoscience workforce continue to evolve. Geoscientists have always required important abilities related to spatial and systems thinking. As noted in the 2009 *GEO Vision Report*, the interdisciplinary nature of the geosciences will continue to broaden as the research agenda focuses increasingly on issues of societal importance. Many of today's geoscientists were trained with expertise in core disciplines and sub-fields, but there is a growing need for scientists and engineers to extrapolate known small-scale behavior and properties to larger scale phenomena and systems that lie at the interface between biological and geological realms. The ability to communicate scientific advances to the public and the policymakers who must use this knowledge to inform personal and community decisions regarding their Earth environment has become an essential skill. International collaborations are increasingly important to geoscience research and industry efforts, making cultural competencies, teamwork skills, and ethics training of particular value.

For the FY 2010 and FY 2012 competitions, the GeoEd Program is seeking innovative **Track 1 (only)** projects to develop the future geoscience and related STEM workforce through any of the following approaches:

- provide practical experiences that increase student awareness of, and interest in, traditional and non-traditional career opportunities in the geosciences within the academic, government, and private sectors;
- engage talented students from diverse backgrounds in hands-on research experiences in the geosciences;
- pilot model educational programs for high school and undergraduate students that promote development of interdisciplinary skills and address emerging workforce needs;
- establish advanced Earth system science courses and articulation agreements that provide high school students with dual credit at an accredited institution of higher education;
- provide mentoring, networking, and related experiences that support retention of early career geoscientists in academic, industry, and government sectors;
- explore the effectiveness of increasing student engagement in STEM careers through use of Earth system science-intensive educational experiences; and,
- investigate mechanisms to prepare mid-career professionals in the geoscience workforce for second careers in STEM and Earth System Science education or geosciences-related policymaking.

3. Innovative Technologies for Geoscience Education

Technological advances of the past two decades have profoundly influenced the nature of scientific research, changed science education pedagogy, and blurred the boundaries between formal and informal environments for learning science (e.g., NSF Task Force on Cyberlearning, 2008). Within the geosciences, the emergence of cyberinfrastructure, digital media, virtual organizations, and social networking capabilities has created a 24 hour/7 days a week environment for both making scientific observations and learning about the Earth. These tools have also transformed research and learning into global, collaborative activities. There is substantial opportunity for innovative uses of technology to: promote the integration of research and education; improve access to, and the quality of, geoscience education and workforce training; and increase public Earth system science literacy.

Access to a 24/7 learning environment has the potential to overcome many of the barriers noted previously regarding student access and exposure to Earth system science. Distance learning programs offer one strategy for reaching students at institutions in remote settings or where geoscience degree programs are not offered. Virtual reality and remote operation tools can open doors for students with physical limitations who may not otherwise be able to experience field investigations, as well as provide access to unique laboratory instrumentation for off-site users. Hands-on student participation in ongoing scientific investigations, via web-based or, potentially, cell phone-based networks, are also enabled through such technologies. Opportunities for learners to engage in inquiry- and place-based research, and/or be co-creators of their educational resources, abound within the geosciences. Web-based learning environments also create opportunities to embed more sophisticated evaluation and assessment schemes that can help to validate the effectiveness of new Earth system science teaching methods.

New instrumentation and infrastructure that enable geoscientists to investigate processes in real-time and with increasing resolution have revolutionized our ability to document and understand Earth systems. These land- and ocean-based observatories, large arrays, and satellite- or airborne-based platforms for studying Earth's surface and sub-surface are producing unprecedented amounts of data, as well as exciting opportunities for hands-on interactions that can be used for educational purposes and public

engagement in science. It is well documented that participation in authentic scientific research can profoundly influence student attitudes toward learning science. Yet, developing effective strategies to capitalize on the educational opportunities offered by large GEO-supported research projects and create resources that result in improved scientific understanding on the part of learners still poses a significant challenge for the community. Using technology to provide access to ongoing scientific investigations or data, without careful consideration of how to make the experience meaningful - as informed by the "learning sciences" - is not sufficient.

For the FY 2010 and FY 2012 competitions, the GeoEd Program is seeking **Track 1 (only)** projects using innovative applications of cyber-related technologies and tools for geoscience education. These projects should either be for catalytic activities (i.e., one-time funding) or proof-of-concept activities that, if shown to be effective, could be scaled up through subsequent funding from other NSF programs, including those offered through the Office of Cyberinfrastructure (OCI). GeoEd is particularly interested in proposals that:

- provide pedagogically-sound opportunities to engage K-14 students, informal learners, educators, and citizen scientists in large GEO-funded research programs;
- establish sustainable distance-learning programs that substantially increase participation of underrepresented students, including persons with disabilities, in rigorous Earth system science courses and degree programs; and,
- develop and test model programs that strategically link formal and informal environments for learning about Earth system science.

4. Regional Geoscience Education Networks and Alliances (ReGENA)

With only ~800 geoscience-related PhDs being earned in the United States each year and fewer than 700 geoscience departments in colleges and universities nationwide, the geosciences community is not very large (e.g., Gonzalez et al., 2009). The median faculty size within these departments has declined in recent years, largely due to retirements, smaller enrollments and budget pressures. In many settings that serve large minority student populations, including Historically Black Colleges and Universities and community colleges, there are very few geoscience degree programs and, if any, faculty with geoscience expertise. These combined factors make it extremely difficult for the geosciences research community to have a wide educational footprint when it comes to addressing important needs, such as: supporting the professional development of geoscience educators; providing students in formal and informal settings with current scientific knowledge and research experiences in the geosciences; recruiting and mentoring students from underrepresented communities; developing resources to sustain effective education programs through academia-industry partnerships; and, sponsoring outreach activities that help raise public awareness and understanding of Earth system science.

While it would be desirable to expand the geoscience workforce and build Earth system science capacity in more institutions of higher education, practical considerations suggest this would be unrealistic, especially in the current budget climate. Instead, new strategies for leveraging current capabilities and resources, in order to reach new stakeholders and educational audiences, need to be developed, tested and sustained, if effective. Capitalizing on existing alliances, partnerships and centers, particularly those that focus on engaging and supporting students from underrepresented groups in STEM degree programs, can help to extend the reach of the geosciences community. Among the existing networks that could be utilized are the Louis-Stokes Alliances for Minority Participation (LSAMP), Alliances for Graduate Education to the Professoriate (AGEP), the Centers of Research Excellence in Science and Technology (CREST), and the Advanced Technology Education (ATE) programs at community colleges.

For the FY 2010 and FY 2012 competitions, the GeoEd Program invites proposals to advance geosciences education and workforce development through collaboration with existing networks or creation of new partnerships between multiple stakeholders (e.g., institutions of higher education, large research centers and facilities, state and local school districts, informal learning institutions, the private sector). Track 1 level projects should focus primarily on planning activities, while Track 2 projects should focus on implementation of specific programs or activities that will be enacted through the alliance or partnership. The program is particularly interested in projects that will:

- foster public Earth system science literacy through community-based activities;
- promote systemic reforms in K-14 STEM education policies and practices that increase student access to learning about Earth system science or improve the quality of instruction received;
- significantly incorporate geoscience content or research experiences into effective programs promoting STEM education and broadening participation of underrepresented minorities that currently do not include much geoscience content; and,
- increase the number of underrepresented minorities participating in geoscience educational programs, research experiences, and careers.

Funding Tracks

Track 1 Pilot Projects: Track 1 of the GeoEd program considers proposals to initiate or pilot highly innovative geoscience education activities in the four thematic areas described in the Introduction section. Projects should integrate geoscience research with education. Projects that are informed by the results of current education-related research are appropriate for submission under Track 1 of the GeoEd program.

Proposals to the GeoEd Program may target any formal or informal educational level or venue, although programs that primarily focus on graduate students or postdoctoral appointees are not a priority. Proposals primarily seeking to develop new courses or curricula for undergraduate education should be submitted to the Course, Curriculum, and Laboratory Improvement (CCLI) program in EHR, although exceptions may be made for projects to explicitly incorporate the essential principles and supporting concepts identified in the Ocean Literacy, Atmospheric Literacy, Earth Science Literacy and Climate Literacy frameworks. Awards may be made to supplement active research grants when the specified supplemental activity will make a substantive contribution to geoscience education. Proposals should not request funding to support activities that would be viewed by reviewers as part of an educator's normal responsibilities.

Track 1 awards are intended to provide innovative, catalytic start-up or proof-of-concept funding that will enable projects to reach a level of maturity that will allow them to compete for longer-term funding from other sources, or become self-sustaining. Proposals should include a discussion of plans for, and potential sources of, follow-on funding if such will be required. If the project described in the Track 1 proposal is part of a larger plan to improve geoscience education, the proposal should clearly describe how the proposed project fits in with the overall plan.

Track 2 Integrative Collaborations: Projects that promote active linkages and collaborations among geoscience researchers and education professionals in both formal and informal settings are encouraged for submission under Track 2 of the GeoEd program. Although proposals may outline new partnerships, networks or alliances, preference will be given to Track 2 proposals that seek to include geoscience content and promote the geoscience disciplines within the framework of existing NSF-supported programs that encourage broadening participation in the STEM disciplines. These include programs within the Alliances for Broadening Participation (ABP) cluster and the Centers of Research Excellence in Science and Technology (CREST) program.

The Alliances for Broadening Participation in STEM (ABP) cluster includes the Louis Stokes Alliances for Minority Participation (LSAMP) program, Bridge to the Doctorate (LSAMP-BD) Activity, and the Alliances for Graduate Education and the Professoriate

(AGEP) program. Managed synergistically, these programs enable seamless transitions from the STEM baccalaureate to attainment of the doctorate and entry to the STEM professoriate. ABP support begins at the baccalaureate level through the LSAMP program. LSAMP emphasizes development of broad based regional and national alliances of academic institutions, school districts, state and local governments, and the private sector to increase the diversity and quality of the STEM workforce. Eligible LSAMP undergraduate students may receive continued support for up to two additional years of STEM graduate study through the LSAMP-BD Activity. The Bridge to the Doctorate provides significant financial support for matriculating candidates in STEM graduate programs at eligible alliance sites. A compilation of LSAMP programs and resources can be found at http://www.uab.edu/alsamp/LSAMP_'09.pdf.

The AGEP alliances further the graduate education of underrepresented STEM students through the doctorate level, preparing them for fulfilling opportunities and productive careers as STEM faculty and research professionals. AGEP also supports the transformation of institutional culture to attract and retain STEM doctoral students into the professorate.

The CREST program makes resources available to enhance the research capabilities of minority-serving institutions through the establishment of centers that effectively integrate education and research. CREST promotes the development of new knowledge, enhancements of the research productivity of individual faculty, and an expanded presence of students historically underrepresented in STEM disciplines.

Track 2 proposals must document collaboration in the form of Letters of Commitment from ongoing LSAMP, AGEP, or CREST programs, if proposed as a partner for the OEDG project, or from any institutions that would be part of a newly-formed alliance or partnership. These letters should be included in the Supplementary Documents section of the proposal.

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III. AWARD INFORMATION

This is a biennial solicitation, with a competition being held in FY 2010 and FY 2012. It is anticipated that there will be $5 million total per competition, pending availability of funds, with $3 million available to support proposals submitted under the Track 1 option and $2 million available to support proposals submitted under the Track 2 option.

NSF anticipates making 40 awards in both FY 2010 and FY2012, with 35 Track 1 and 5 Track 2 awards being made each competition.

Track 1 proposals: The maximum amount that can be requested is $150,000, but the average award size is anticipated to be on the order of $100,000. Track 1 projects can have a maximum duration of two years.

Track 2 proposals: The maximum amount that can be requested is $500,000, but the average award size is anticipated to be on the order of $400,000. Track 2 projects can have a maximum duration of four years.

IV. ELIGIBILITY INFORMATION

Organization Limit:

None Specified

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

An organization (e.g., a university or museum) may be the lead organization on only one Track 2 proposal submitted per competition.

Limit on Number of Proposals per PI: 1

An individual may be Principal Investigator or co-Principal Investigator on only one proposal submitted per competition to the GeoEd Program, regardless of whether the proposal is submitted under Track 1 or Track 2.

Additional Eligibility Info:

The categories of proposers identified in the Grant Proposal Guide are eligible to submit proposals under this program solicitation.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.4 of the Grant Proposal Guide provides additional information on collaborative proposals.

Proposals submitted should include the following information that supplements the GPG and the Grants.gov Application Guide, and, unless otherwise noted, applies to both types of submissions (Track 1 and 2):

The Project Description section of the proposal should include the following components:

- **Rationale for Proposed Work:** This section should describe the intellectual merit, broader impacts, and scholarly foundations of the proposed work, as well as expected outcomes. Projects are expected to have potentially broad impacts

that may lead to innovative intellectual developments and/or partnerships. Key project personnel and the contributions of partner institutions should be defined. Plans for recruiting participants for proposed project activities should be clearly articulated, if relevant. A brief discussion of how the project is aligned with the long-term goals of all participating entities should be included.

- **Prior Geoscience Education Experience**: Prior efforts by the Principal and co-Principal Investigators in the field of geoscience education should be summarized briefly. Such efforts might include: 1) integration of contemporary geoscience research results, techniques, and/or data into educational experiences; 2) contributing to the literature on geoscience teaching and learning; 3) developing or implementing plans to increase interest in the geosciences among pre-college students or the general public; 4) reforming geoscience courses or curriculum; and/or 5) applying the results of education research within geoscience education venues.

- **Work Plan**: A statement of the specific activities to be undertaken, and the ways in which funds will be used to support those activities, should be given.

- **Management Plan**: Proposals for larger Track 2 projects, or projects that involve multiple institutions, must clearly describe the roles of all key participants and how their efforts will be coordinated.

- **Sustainability Plan:** The goal of Track 1 GeoEd projects is to reach a level of maturity that allows the activity to be self-sustaining or sustained through additional funding from other programs. Unless the proposed project is focused on a one-time, catalytic activity, the proposal should describe a plan for how effective programs are expected to be continued once NSF funding expires.

- **Dissemination Plan**: Proposals should outline a plan to share the outcomes of the project and lessons learned, regarding what is both effective and ineffective, with the broader geoscience education and research community.

- **Evaluation Plan**: A plan to evaluate the effectiveness of the proposed project's activities that is appropriate for the scope of project should be described. Because Track 1 GeoEd projects are typically exploratory and short-term in nature, the evaluation plans do not necessarily include the use of external evaluators. All evaluations should, however, be conducted by an evaluator with some independence from the project. Project evaluations should provide credible evidence about the extent to which the project has achieved its goals and objectives. The evaluation should inform the PI about the effectiveness of the project, and should provide information that can be used in subsequent proposals or projects to increase the likelihood of future success. Awardees should plan to include the results of the project evaluation with their final project report. For Track 2 proposals, an external evaluator from a different institution is strongly encouraged.

- **IMPORTANT INFORMATION ABOUT HUMAN SUBJECTS RESEARCH**: Evaluation activities included in GeoEd proposals are likely to constitute Human Subjects Research. All proposals must comply with the section of the GPG on Proposals Involving Human Subjects (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg) and, if necessary, be reviewed by an Institution Review Board (IRB). The proposer should mark the Human Subjects box on the cover sheet and then indicate whether the proposed project has been determined by the IRB to be exempt, approved, or pending. The process is considered pending if the IRB has not yet approved a submitted application, or if the proposer has not yet submitted an application to the IRB. This section should not be left blank. Final documentation of the IRB determination must be provided to NSF prior to any award.

- The following references may be useful during preparation of a GeoEd proposal:

    - The User-Friendly Handbook for Project Evaluation (NSF 02-057), Directorate for Education and Human Resources, National Science Foundation: http://www.nsf.gov/pubs/2002/nsf02057/start.htm

    - User Friendly Handbook for Mixed Method Evaluation (NSF 97-153), Directorate for Education and Human Resources, National Science Foundation: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf97153

    - Online Evaluation Resource Library (OERL): http://oerl.sri.com/

    - Evaluation Handbook, W.K. Kellogg Foundation: http://www.wkkf.org/default.aspx?tabid=1174&NID=331&Year=&Issue=15&LanguageID=0

    - Field-tested Learning Assessment Guide (FLAG): http://www.wcer.wisc.edu/nise/CL1/flag

    - Student Assessment of Learning Gains (SALG): http://www.salgsite.org/

    - Shavelson, R. J. and L. Towne, Editors (2002) *Scientific Research in Education,* National Research Council, 188 p.

    - Wiggins, G.P. and J. McTighe (2000) *Understanding by Design*, Prentice Hall, 201 pp.

    - Wiske, M. S. (1998) *Teaching for Understanding: Linking Research with Practice,* Jossey-Bass, 379 p.

The Supplementary Documents section of the proposal should contain the following:

- Letters of commitment from all collaborating institutions that describe how the proposed activities will support the long-term goals of all collaborating entities must be included in the "Supplementary Docs" section of the proposal.

- Track 2 proposals must include evidence of collaboration in the form of Letters of Commitment from ongoing LSAMP, AGEP, or CREST programs, if proposed as a partner for the OEDG project, or from any institutions that would be part of a newly-formed alliance or partnership.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

Other Budgetary Limitations: It is important to assess the effectiveness of ongoing and newly developed programs. Awardees should plan to include the results of an evaluation with their final project report. Methods to assess program effectiveness must be

included in program description. The proposal budget should include funds to support the evaluation component of the project.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

  March 08, 2010

  Full Proposals Due

  October 12, 2011

  Full Proposals Due

The GeoEd Program holds competitions on a biennial schedule, when sufficient program resources are available. The current solicitation invites proposal submissions for the FY 2010 and FY 2012 competitions.

D. FastLane/Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

  Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are available at: https://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

  Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: https://www.fastlane.nsf.gov/fastlane.jsp.

- **For Proposals Submitted Via Grants.gov:**

  Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www07.grants.gov/applicants/app_help_reso.jsp. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

  Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program where they will be reviewed if they meet NSF proposal preparation requirements. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal.

A. NSF Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgements.

What is the intellectual merit of the proposed activity?
How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the

reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?
How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf.

Mentoring activities provided to postdoctoral researchers supported on the project, as described in a one-page supplementary document, will be evaluated under the Broader Impacts criterion.

NSF staff also will give careful consideration to the following in making funding decisions:

Integration of Research and Education
One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities
Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

Additional Review Criteria:

Does this project include activities informed by education research on teaching and learning STEM concepts?

Does the project use or build on known best practices in STEM education and STEM workforce development?

Does the project effectively leverage or incorporate the results of geoscience research?

Does the project advance efforts to increase public Earth system science literacy?

Is the project designed so that the funds provided through a GeoEd award will be catalytic and enable the project to reach a level of maturity that will allow it to compete successfully for longer-term funding from other sources, or become self-sustaining?

Will this project potentially serve as a model for other geoscience education efforts?

Is there evidence that the project is aligned with the mission and goals of participating entities?

If this project is part of a larger effort to improve geoscience education, is the vision for the larger framework compelling, and will the proposed project contribute to the success of the larger effort?

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); * or Research Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

Special Award Conditions: Important award conditions apply to awards that involve pilot testing and evaluating materials. Proposers should see Section 711 of the GPM. Additional award conditions may apply to projects involving commercial distribution or commercial publication of developed materials (see Sections 730-753 of the GPM). Projects that involve human subjects research should obtain approval for the project from their institution's or organization's Institutional Review Board. (Chapter II, Section D.6 of the Grant Proposal Guide provides additional information on proposals involving research with human subjects.) Human subjects research is subject to applicable federal regulations.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through FastLane, for preparation and submission of annual and final project reports. Such reports provide information on activities and findings, project participants (individual and organizational), publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

It is important to assess the effectiveness of ongoing and newly developed programs. Awardees should plan to include the results of an evaluation with their final project report. Methods to assess program effectiveness must be included in program description. The proposal budget should include funds to support the evaluation component of the project.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Jill L. Karsten, Program Director, GEO Education and Diversity, GEO/OAD, 705 N, telephone: (703) 292-7718, fax: (703) 292-9042, email: jkarsten@nsf.gov
- Carolyn E. Wilson, 705N, telephone: (703) 292-7469, email: cwilson@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.
- Brian E. Dawson, 705 N, telephone: (703) 292-4727, fax: (703) 292-9042, email: bdawson@nsf.gov
- Melissa Lane, 705N, telephone: (703) 292-8500, email: mlane@nsf.gov

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

For questions related to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representative (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of the application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, National Science Foundation Update is a free e-mail subscription service designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the NSF web site.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at http://www.grants.gov.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 40,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

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