

EarthScope: Science, Education, and Related Activities

Program Solicitation

NSF 04-589

Replaces Document NSF 03-567



National Science Foundation

Directorate for Geosciences

Division of Earth Sciences

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

July 16, 2005

July 16, annually

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

EarthScope: Science, Education, and Related Activities

Synopsis of Program:

EarthScope is an Earth science program to explore the 4-dimensional structure of the North American continent. The EarthScope Program provides a framework for broad, integrated studies across the Earth sciences, including research on fault properties and the earthquake process, strain transfer, magmatic and hydrous fluids in the crust and mantle, plate boundary processes, large-scale continental deformation, continental structure and evolution, and composition and structure of the deep-Earth. In addition, EarthScope offers a centralized forum for Earth science education at all levels and an excellent opportunity to develop cyberinfrastructure to integrate, distribute, and analyze diverse data sets.

The nucleus of the Program is the EarthScope Facility, consisting of the Plate Boundary Observatory (PBO), the San Andreas Fault Observatory at Depth (SAFOD), and the USArray. The EarthScope Facility is a multi-purpose array of instruments and observatories that will greatly expand the observational capabilities of the Earth Sciences and permit us to advance our understanding of the structure, evolution and dynamics of the North American continent. The Facility is designed to continually incorporate technological advances in geophysics, seismology, geodesy, information technology, drilling technology, and downhole instrumentation.

This Solicitation calls for single or collaborative proposals to conduct scientific research associated with the EarthScope Facility and support activities that further the scientific and educational goals of EarthScope.

Cognizant Program Officer(s):

- Kaye Shedlock, Program Director, Directorate for Geosciences, Division of Earth Sciences, 785 S, telephone: (703) 292-4693, fax: (703) 292-9025, email: kshedloc@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.050 --- Geosciences

Eligibility Information

-
- **Organization Limit:** None Specified.
 - **PI Eligibility Limit:** None Specified.
 - **Limit on Number of Proposals:** None Specified.

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant or Cooperative Agreement
- **Estimated Number of Awards:** 10 to 20
- **Anticipated Funding Amount:** \$4,500,000 for FY2006, pending availability of funds

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Full Proposal Preparation Instructions:** This solicitation contains information that supplements the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required by NSF.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Not Applicable.

C. Due Dates

- **Full Proposal Deadline Date(s)** (due by 5 p.m. proposer's local time):
July 16, 2005
July 16, annually

Proposal Review Information

- **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:** Standard NSF award conditions apply.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

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I. INTRODUCTION

EarthScope addresses fundamental questions about the evolution of continents and the processes responsible for earthquakes and volcanic eruptions. Through the integration of scientific information derived from geology, geochemistry, geophysics, and geodesy, the EarthScope program will yield a comprehensive time-dependent picture of the continent far beyond that which any single discipline or technology can achieve. EarthScope includes new observational technologies that will be linked through high performance computing and telecommunication networks. These observational facilities provide a framework for broad, integrated studies across the Earth sciences, including research on fault properties and the earthquake process, crustal strain transfer, magmatic and hydrous fluids in the crust and upper mantle, plate boundary processes, large-scale continental deformation, continental structure and evolution, deep-Earth structure, and associated educational aspects.

The integrated observing systems that will comprise the EarthScope Facility include: USArray that maps in 3-D the earth's interior by means of seismic and magnetotelluric systems; Plate Boundary Observatory (PBO) that monitors the distortion of the earth's surface by means of geodetic systems; and the San Andreas Fault Observatory at Depth (SAFOD) that defines the conditions and physics of an active plate boundary fault at depth. These systems capitalize on recent developments in sensor technology and communications to provide Earth scientists with synoptic and high-resolution data derived from a variety of geophysical sensors. The intent is that all data from the EarthScope Facility will be openly available in near-real-time to maximize participation from the scientific community and to provide on-going educational outreach to students and the public. Proposals requesting the use of flexarray portable seismometers and/or campaign GPS may request that data collected using these instruments be governed by UNAVCO and/or IRIS/PASSCAL data archiving and accessibility deadlines:

- data must be archived at the appropriate EarthScope Facility archive site as soon as possible, and within six months of the data collection at the latest (for long term deployments, this may mean while equipment is still in the field);
- data and supporting metadata will be made publicly accessible no later than 2 years after data collection; and
- with the PI's permission, data may be released to a particular user(s) prior to public release.

This Solicitation requests single or collaborative proposals that address the science, education, and related support activities of the EarthScope Program.

II. PROGRAM DESCRIPTION

The rich fabric of tectonic provinces in North America provides a solid scientific framework for a major program to investigate the relationships among processes and structures over a wide range of scales within the crust, lithosphere, and mantle, with the goal of understanding the tectonic and geologic processes that have constructed the continents. The North American Continent is also ideally located with respect to global seismicity to provide unprecedented views of the deep mantle. Science proposals submitted in response to this solicitation should address scientific targets that make use of, integrate, or complement data acquired by the EarthScope Facility.

EarthScope incorporates data from new observational systems in seismology, geodesy, and down-hole monitoring. Collectively, these systems provide synoptic data sets to address the science and education goals of EarthScope. For construction and operation purposes, these systems are grouped into three facility components (USArray, PBO, and SAFOD). Data from all three components will be openly available through distributed networks in near-real time. From the perspective of the user, these systems will provide seamless data streams for research and education. Information on the current status and future timetable for the EarthScope Facility is provided on the EarthScope Facility website (www.earthscope.org).

Scientific Targets

EarthScope encompasses a broad array of scientific targets within the context of the North American continent. Examples include, but are not limited to:

- **Fault properties and the earthquake process:** How does strain accumulate and release at plate boundaries and within the North American plate? How do earthquakes start, rupture, and stop? What is the absolute strength of faults and the surrounding lithosphere? What structural and geologic factors give rise to intraplate regions of seismicity? How can we accurately predict earthquake induced ground motions over a wide frequency range?
- **Crustal strain transfer:** How does crust and mantle rheology vary with rock type and with depth? How does lithospheric rheology change in the vicinity of a fault zone? What is the distribution of stress in the lithosphere? What types of transient movements occur in the lithosphere? What is the role of non-tectonic processes in creating lithospheric stress? How do faults interact with one another?
- **Magmatic and hydrous fluids in the crust and upper mantle:** What effect does tectonic deformation have on fluid flow in the crust? What is the role of hotspots in evolution of the continents? How does tectonic rate (convergence, extension, mantle upwelling) affect magma production? Where does melting in the lithosphere occur and what controls magma migration, accumulation, and residence time? What is the relation between magma movement, surface deformation, and volcanic eruption? Over what temporal and spatial scales do earthquake deformation and volcanic eruptions couple? What controls eruption style? What are the predictive signs of imminent volcanic eruption? What are the structural, rheological, and chemical controls on fluid flow in the crust?
- **Plate boundary processes:** What is the geometry of the plate boundary megathrust and how does it relate to spatial and temporal variations in convergence, strain rate, seismicity, and volcanism along the convergent margin? What is the deeper slab and upper mantle structure and how does it relate to intermediate-depth subduction zone seismicity? What is the role of extension, orogenic collapse, and rifting in constructing the continents? How is strain partitioned within plate boundaries? What controls the lithospheric architecture in plate boundaries? What controls the locus of volcanism? How do plate boundary processes contribute to growth of the continent through time?
- **Large-scale continental deformation:** What are the fundamental controls on deformation of the continent? What is the strength profile(s) of the lithosphere? What defines tectonic regimes within the continent? How does convective and advective flow effect plate motions and transfer stresses to the lithosphere? What role do fluids play in lithospheric deformation? How is deformation distributed throughout the continent? How has topography evolved through time?
- **Continental structure and evolution:** What is a continent? How is the lithosphere formed? By what mechanisms are continents dispersed and reassembled? How are the crust and lithospheric mantle related? How are continental structure and deformation related? How does magmatism modify, enlarge, and deform continental lithosphere?
- **Deep-Earth structure:** How and where are forces generated in the upper mantle and transferred to the crust? How is evolution of the continents linked to processes in the upper mantle? What is the level of heterogeneity in the mid-mantle? What is the nature and heterogeneity of the lower mantle and core-mantle boundary?

Development of Information Technology Resources and Related Activities

The infrastructure provided by the EarthScope Facility (USArray, PBO and SAFOD) presents a multidisciplinary field laboratory that can stimulate new mechanisms for collaboration, data integration, and data management of a diverse suite of geologic, geochemical, and geophysical data sets. Proposals are invited for supporting or complementary infrastructure, such as: aerial image acquisition or archive, physical archives for EarthScope materials, upgrade of geochemical facilities, other infrastructure needs. Proposals are encouraged that show evidence of collaborative arrangements between academic and/or industry groups. Activities related to support of EarthScope community coordination, planning, workshops, and development of community resources and products are also welcomed. The EarthScope Facility Office is available to provide organizational and logistical support for EarthScope-related workshops.

The EarthScope Facility is designed to provide an integrated database and archive access capability applying the tools from modern data management and information technologies. Proposals are invited that will extend the power and capabilities of this database through information technology advances, and that will provide standardized data, visualization and analysis tools, and data integration products to the scientific and education communities. This includes facilitating the adoption of standards for data exchange for geologic data and the transcription of existing data into these standards. Pilot projects or prototype development for producing and distributing EarthScope products such as tomographic velocity inversions, GPS velocity vectors, surface wave dispersion, etc. are also encouraged.

Proposals to this competition should include aspects of the following elements:

- Internet-accessible and dynamically updated databases to facilitate the exchange of information among persons and groups likely to be interested in these findings;
- Participation in or establishment of an Internet-accessible knowledge network to disseminate the information resulting from this activity; and
- A clear commitment to make data products and tools openly accessible through an EarthScope data and products

portal.

EarthScope Education and Outreach (E&O)

The EarthScope program invites proposals to address or coordinate program-wide education and outreach objectives. Applicants should be aware of the recommendations articulated in the EarthScope Education and Outreach Plan and related documents on the EarthScope Project Plan and EarthScope Science Plan (www.earthscope.org). EarthScope E&O projects should strive to integrate research components of EarthScope with activities that are broadly defined to include formal instruction at all levels and informal education for the community-at-large. Partnerships or collaborations are strongly encouraged among the members of the EarthScope or other educational communities. Proposals funded in this round may include demonstration products or pilot projects that may be scalable to support larger EarthScope E&O activities in future years. For example, these may include community data products for distribution through an EarthScope data portal that are accessible to students and non-specialists, and teaching modules that will allow EarthScope resources to be incorporated into an inquiry-based learning experience consistent with national educational standards. Supplemental proposal preparation and review criteria for education and outreach proposals are given in Sections V and VI.

Earth Science (EarthScope)/Earthquake Engineering (NEES) Research Opportunities

The George E. Brown Jr. Network for Earthquake Engineering Simulation (NEES) is a national, shared use experimental resource for advancing understanding and improving the design and performance of the Nation's constructed civil and mechanical infrastructure when subjected to earthquake excitation and tsunamis. NEES is a shared national research and education network of 15 experimental facilities and centralized data and model repositories, linked by high-speed Internet2 connections. These resources enable collaboration and advanced research based on experimentation and computational simulations of earthquakes and how buildings, infrastructure, coastal regions, and geologic materials perform during seismic events. NEES will enable engineers and researchers to develop more cost-effective ways to mitigate damage from natural and man-made disasters through the use of improved materials, designs, monitoring tools and construction techniques. The NEES and EarthScope facilities provide complementary capabilities to extend the continuum and interface of knowledge and technology in Earth Sciences and earthquake engineering. Co-funding opportunities will be considered between EAR, through this solicitation, and by the Directorate for Engineering, Division of Civil and Mechanical Systems, for projects that propose research requiring coordinated use of both NEES and EarthScope facilities. Proposals should address both the requirements of this solicitation and the George E. Brown Jr. Network for Earthquake Engineering Simulation Research (NEESR) solicitation (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf05527). Proposals will be co-reviewed by ad hoc mail reviews and/or panels formed to review proposals under both solicitations.

EarthScope Imagery and Geochronology

The EarthScope program invites proposals that include the acquisition of aerial and satellite imagery and geochronology that will examine the strain field beyond the decade time scales available from the PBO geodetic instrumentation. A goal of EarthScope is the improved understanding of the tectonic evolution of the North American continent. Identifying and understanding deformation rates in all tectonic regimes is critical to reaching that goal. Proposals should indicate how the imagery or geochronology will contribute to the success of EarthScope.

Additional Information

In the development of proposals in response to this Program Solicitation, advantage should be made of planning workshops and other reports that have been developed for EarthScope and are available through the EarthScope Website (www.earthscope.org). These include:

EarthScope: An Unprecedented Opportunity for Education and Outreach in the Earth Sciences - Education and Outreach Program Plan, 2002.

EarthScope: Scientific Targets for the World's Largest Observatory Pointed at the Solid Earth -Workshop Report, 2001.

EarthScope: A New View Into Earth - Project Plan, 2001.

The Plate Boundary Observatory: Creating a Four-Dimensional Image of the Deformation of Western North America, 2000.

USArray: A synoptic investigation of the structure, dynamics, and evolution of the North American continent, 1999.

Scientific Drilling into the San Andreas Fault at Parkfield, CA: Project Overview and Operational Plan, 1999.

III. ELIGIBILITY INFORMATION

The categories of proposers identified in the [Grant Proposal Guide](#) are eligible to submit proposals under this program announcement/solicitation.

IV. AWARD INFORMATION

Under this Solicitation, proposals may be submitted for up to five years. The program expects to make approximately 10 to 20 standard or continuing grants or cooperative agreements with durations of 1 to 5 years depending on the quality of submissions and the availability of funds. Approximately \$4,500,000 is expected to be available in FY2006 to support proposals received under this Solicitation.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Instructions:

Proposals submitted in response to this program announcement/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 pubs@nsf.gov.

The following information provides instructions that supplement the Grant Proposal Guide.

The proposal budget should include support for presentation of results at EarthScope Annual Meetings.

Proposed activities that require Facility support (PBO, SAFOD, and/or USArray) outside that requested in the submitting organization(s) proposal budget(s), or that require permits, etc., should include support commitment letters and/or permits as appendices. **Note:** This is not a cost sharing requirement.

For EarthScope Education and Outreach proposals, the following items should be included in the 15-page Project Description and will be considered in the review:

- A description of previous educational efforts of the investigators. This might include how the investigator has: 1) influenced his or her research discipline; 2) incorporated or integrated contemporary research questions, processes, and results into educational experiences; 3) contributed to the literature of teaching and learning; 4) mentored others to conduct research and to educate students; or 5) demonstrated leadership among colleagues in promoting the above.
- A description of the activities to be undertaken related to EarthScope research and to exploring and experimenting with ways to integrate education and research.
- A plan for assessing and evaluating the effectiveness of the E&O activities.
- A plan to disseminate those activities that are found to be effective.

Proposers are reminded to identify the program announcement/solicitation number (04-589) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing:

Cost sharing is not required by NSF in proposals submitted under this Program Solicitation.

C. Due Dates

Proposals must be submitted by the following date(s):

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

July 16, 2005

July 16, annually

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this announcement/solicitation through the FastLane system. Detailed instructions for proposal 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 announcement/solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement/solicitation.

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. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane Website at: <http://www.fastlane.nsf.gov>

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The National Science Board approved revised criteria for evaluating proposals at its meeting on March 28, 1997 ([NSB 97-72](#)). All NSF proposals are evaluated through use of the two merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

On July 8, 2002, the NSF Director issued [Important Notice 127](#), Implementation of new Grant Proposal Guide Requirements Related to the Broader Impacts Criterion. This Important Notice reinforces the importance of addressing both criteria in the preparation and review of all proposals submitted to NSF. NSF continues to strengthen its internal processes to ensure that both of the merit review criteria are addressed when making funding decisions.

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised proposal preparation guidelines relating to the development of the Project Summary and Project Description. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

Effective October 1, 2002, NSF will return without review proposals that do not separately address both merit review criteria within the Project Summary. It is believed that these changes to NSF proposal preparation and processing guidelines will more clearly articulate the importance of broader impacts to NSF-funded projects.

The two National Science Board approved merit review criteria are listed below (see the [Grant Proposal Guide](#) Chapter III.A for further information). 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 he/she is qualified to make judgments.

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 and original 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?

NSF staff 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:

Because the EarthScope facility construction is just beginning, proposals will be judged additionally on their relevance to facilitating planning and organization, defining community data products that will help integrate different EarthScope data types and/or create synergy among the various EarthScope components, developing community tools and other similar activities while awaiting commencement of facilities operations.

The following items will be considered in the review of proposals that are primarily for EarthScope Education and Outreach:

- A description of previous educational efforts of the investigators. This might include how the investigator has: 1) influenced his or her research discipline; 2) incorporated or integrated contemporary research questions, processes, and results into educational experiences; 3) contributed to the literature of teaching and learning; 4) mentored others to conduct research and to educate students; or 5) demonstrated leadership among colleagues in promoting the above.
- A description of the activities to be undertaken related to EarthScope research and to exploring and experimenting with ways to integrate education and research.
- A plan for assessing and evaluating the effectiveness of the E&O activities.
- A plan to disseminate those activities that are found to be effective.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Ad Hoc Review followed by 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.

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 Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

NSF is striving to be able to tell proposers whether their proposals have been declined or recommended for funding within six months. The time interval begins on the closing date of an announcement/solicitation, or the date of proposal receipt, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

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 Division 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.A. 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 (NSF-GC-1); * or Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

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

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpm. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Website at <http://www.gpo.gov>.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for the PI and all Co-PIs. 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. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, 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.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding this program should be made to:

- Kaye Shedlock, Program Director, Directorate for Geosciences, Division of Earth Sciences, 785 S, telephone: (703) 292-4693, fax: (703) 292-9025, email: kshedloc@nsf.gov

For questions related to the use of FastLane, contact:

- Brian E. Dawson, Directorate for Geosciences, 705 N, telephone: (703) 292-4727, fax: (703) 292-9042, email: bdawson@nsf.gov

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF *E-Bulletin*, which is updated daily on the NSF Website at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's *MyNSF News Service* (<http://www.nsf.gov/mynsf/>) to be notified of new funding opportunities that become available.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF, although some programs may have special requirements that limit eligibility.

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the GPG Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090

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The National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230, USA
Tel: (703) 292-5111, FIRS: (800) 877-8339 | TDD: (800) 281-8749

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