Earth Sciences: Instrumentation and Facilities (EAR/IF)

PROGRAM SOLICITATION
NSF 11-544

REPLACES DOCUMENT(S):
NSF 10-561

National Science Foundation

Directorate for Geosciences
    Division of Earth Sciences

Full Proposal Target Date(s):

July 26, 2012

    Proposals for Acquisition or Upgrade of Research Equipment will not be accepted until July 26, 2012. Post July 26, 2012, proposals for Acquisition or Upgrade of Research Equipment will be accepted at any time.

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

Proposals Accepted Anytime

    Proposals for the Development of New Instrumentation, Analytical Techniques or Software, Support of National or Regional Multi-User Facilities and Support for Early Career Investigators will be accepted at any time henceforth.

IMPORTANT INFORMATION AND REVISION NOTES

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), NSF 13-1, was issued on October 4, 2012 and is effective for proposals submitted, or due, on or after January 14, 2013. Please be advised that the guidelines contained in NSF 13-1 apply to proposals submitted in response to this funding opportunity. Proposers who opt to submit prior to January 14, 2013, must also follow the guidelines contained in NSF 13-1.

Please be aware that significant changes have been made to the PAPPG to implement revised merit review criteria based on the National Science Board (NSB) report, National Science Foundation's Merit Review Criteria: Review and Revisions. While the two merit review criteria remain unchanged (Intellectual Merit and Broader Impacts), guidance has been provided to clarify and improve the function of the criteria. Changes will affect the project summary and project description sections of proposals. Annual and final reports also will be affected.

A by-chapter summary of this and other significant changes is provided at the beginning of both the *Grant Proposal Guide* and the *Award & Administration Guide*.

Please note that this program solicitation may contain supplemental proposal preparation guidance and/or guidance that deviates from the guidelines established in the Grant Proposal Guide.

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.

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 Summary

This solicitation supercedes NSF 10-561. Major changes include:

1) Proposals for **Acquisition or Upgrade of Research Equipment** will not be accepted in the Fiscal Year 2012 competition;

2) The next opportunity for submission of an **Acquisition or Upgrade of Research Equipment** proposal will be on or after July 26, 2012. Post July 26, 2012, proposals for **Acquisition or Upgrade of Research Equipment** will be accepted at any time.

3) Proposals for all other categories including **Development of New Instrumentation, Analytical Techniques or Software, Support of National or Regional Multi-User Facilities, and Support for Early Career Investigators** will be accepted at any time henceforth;

4) Proposals for **Support for Early Career Investigators** that include budget line items associated with support of a new full-time technician no longer have a declining schedule of maximum funding for the technical position;

5) A maximum request level for **Support for Early Career Investigators** was instituted; and

6) The maximum request for support of **Acquisition or Upgrade of Research Equipment and Development of New Instrumentation, Analytical Techniques or Software** proposals was raised.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

> Earth Sciences: Instrumentation and Facilities (EAR/IF)

Synopsis of Program:

> The Instrumentation and Facilities Program in the Division of Earth Sciences (EAR/IF) supports meritorious requests for infrastructure that promotes research and education in areas supported by the Division (see http://www.nsf.gov/div/index.jsp?div=EAR). EAR/IF will consider proposals for:
>
> > 1) *Acquisition or Upgrade of Research Equipment* that will advance laboratory and field investigations, and student research training opportunities in the Earth sciences. The maximum request is $1,000,000. The maximum request for upgrade of research group computing facilities is $75,000;
> >
> > 2) *Development of New Instrumentation, Analytical Techniques or Software* that will extend current research and research training capabilities in the Earth sciences. The maximum request is $1,000,000;
> >
> > 3) *Support of National or Regional Multi-User Facilities* that will make complex and expensive instruments or systems of instruments broadly available to the Earth sciences research and student communities;
> >
> > 4) *Support for Early Career Investigators* to facilitate expedient operation of new research infrastructure proposed by the next generation of leaders in the Earth Sciences. This opportunity allows for submission of a proposal for *Acquisition or Upgrade of Research Equipment* that includes budget line items associated with support of a new full-time technician who will be dedicated to manage the instrument(s) being requested. Any request for technical support under this opportunity is limited to three years duration. The maximum request is $1,000,000.
>
> Planned research uses of requested instruments, software, and facilities must include basic research on Earth processes SUPPORTED BY THE DIVISION OF EARTH SCIENCES.
>
> Support is available through grants or cooperative agreements awarded in response to investigator-initiated proposals.
>
> Human resource development and education are expected to be an integral part of all proposals submitted to EAR/IF.
>
> Efforts to support participation of underrepresented groups in laboratory and/or field instrument use and training are encouraged.
>
> All proposers to EAR/IF are invited to consider *Support of Outreach and/or Broadening Participation Activities.* Proposals submitted to the EAR/IF Program may request up to $20,000 for such activities (please refer to Sections V.A Proposal Preparation Instructions and V.B Budgetary Information).
>
> Proposals requesting equipment, infrastructure or personnel that will also serve disciplines outside the Earth sciences may be jointly reviewed with other programs within the Foundation. EAR/IF will consider co-funding of projects with other NSF programs and other agencies.

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.

- Jonathan Wynn, 790 N, telephone: (703) 292-4742, email: jwynn@nsf.gov

- David D. Lambert, Program Director, 790 N, telephone: (703) 292-8558, fax: (703) 292-9023, email: dlambert@nsf.gov

- Russell C. Kelz, Program Director, 790 N, telephone: (703) 292-4747, fax: (703) 292-9023, email: rkelz@nsf.gov

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

- 47.050 --- Geosciences

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant or Cooperative Agreement

Estimated Number of Awards: 30 to 50

Anticipated Funding Amount: $7,000,000 for new awards annually, pending availability of funds

Eligibility Information

Organization Limit:

> The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the Grant Proposal Guide, Chapter I, Section E.

PI Limit:

> None Specified

Limit on Number of Proposals per Organization:

> None Specified

Limit on Number of Proposals per PI:

> None Specified

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:** Not Applicable

C. Due Dates

- **Full Proposal Target Date(s):**

    July 26, 2012

    > Proposals for Acquisition or Upgrade of Research Equipment will not be accepted until July 26, 2012. Post July 26, 2012, proposals for Acquisition or Upgrade of Research Equipment will be accepted at any time.

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

    Proposals Accepted Anytime

    > Proposals for the Development of New Instrumentation, Analytical Techniques or Software, Support of National or Regional Multi-User Facilities and Support for Early Career Investigators will be accepted at any time henceforth.

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: Standard NSF award conditions apply.

Reporting Requirements: Standard NSF reporting requirements apply.

TABLE OF CONTENTS

I. INTRODUCTION

The Division of Earth Sciences supports meritorious proposals for research focused on improving the understanding of the structure, composition, and evolution of the Earth, the life it supports, and the processes that govern the formation and behavior of the Earth's materials. The results of this research advance understanding of the Earth's changing environments, and the natural distribution of its mineral, water, biota, and energy resources and provide methods for predicting and mitigating the effects of geologic hazards such as earthquakes, volcanic eruptions, floods and landslides.

Earth science is the study of the Earth's structure, properties, processes, and four and a half billion years of biotic evolution. Understanding these phenomena is essential to maintenance of life on the planet. The expanding world population demands more resources; faces increasing losses from natural hazards; and releases more pollutants to the air, water, and land. Sustaining our existence requires scientific understanding of the natural materials and processes linking the geosphere, hydrosphere, atmosphere, and biosphere. Life prospers or fails at the surface of the Earth where these environments intersect.

Detailed descriptions of research programs within EAR are available in the latest Earth Science Research Program Solicitations at:

http://www.nsf.gov/div/index.jsp?org=EAR

The Instrumentation and Facilities Program in the Division of Earth Sciences (EAR/IF) supports meritorious proposals for infrastructure that promotes research and education in areas traditionally supported by the Division in four major funding areas:

1) *Acquisition or Upgrade of Research Equipment;*

2) *Development of New Instrumentation, Analytical Techniques or Software;*

3) *Support of National or Regional Multi-User Facilities;*

4) *Support for Early Career Investigators.*

In all proposals, a common goal should be to advance research and research training in the Earth sciences.

Investigators interested in a recent history of EAR/IF awards and in learning more about supported national or regional multi-user facilities are encouraged to make use the NSF award search engine (http://www.nsf.gov/awardsearch/tab.do?dispatch=2) by entering Element Code 1580 and/or to browse the EAR/IF homepage at:

http://www.nsf.gov/geo/ear/if/facil.jsp

II. PROGRAM DESCRIPTION

The Instrumentation and Facilities Program in the Division of Earth Sciences (EAR/IF) supports meritorious requests for infrastructure that promotes research and education in areas traditionally supported by the Division. EAR/IF will consider proposals for:

1) *Acquisition or Upgrade of Research Equipment* that will advance laboratory and field investigations, and student research training opportunities in the Earth sciences;

2) ***Development of New Instrumentation, Analytical Techniques or Software*** that will extend current research and research training capabilities in the Earth sciences;

3) ***Support of National or Regional Multi-User Facilities*** that will make complex and expensive instruments or systems of instruments broadly available to the Earth sciences research and student communities;

4) ***Support for Early Career Investigators*** to facilitate expedient development and operation of new laboratory or field equipment resources proposed by the next generation of leaders in the Earth Sciences.

Planned research uses of requested instruments, software, and facilities must include basic research on Earth processes SUPPORTED BY THE DIVISION OF EARTH SCIENCES.

Support is available through grants or cooperative agreements awarded in response to investigator-initiated proposals.

Human resource development and education are expected to be an integral part of all proposals submitted to EAR/IF.

Focused efforts to support participation of underrepresented groups in laboratory and/or field instrument use and educational and community outreach activities are also encouraged. Proposers to EAR/IF are invited to explore innovative outreach efforts to broaden participation of underrepresented groups in experiential learning using state-of-the-art analytical tools and to raise awareness of available geoanalytical capabilities in the U.S. Examples could include requested support for: 1) short courses or summer institutes focused on engaging representatives of under represented groups (faculty and students); or 2) travel to annual conferences of professional societies focused on fostering enhanced diversity in science (*e.g.,* National Association of Black Geologists and Geophysicists *(*NABGG) -- http://www.nabgg.com/, Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) -- http://www.sacnas.org/, American Indian Science and Engineering Society (AISES) -- http://www.aises.org/).

EAR/IF submission is appropriate for proposals that include equipment only. However, equipment needs that are linked to the conduct of a specific research project being proposed to NSF/EAR may be included within the budget of a proposal submitted to an appropriate EAR research program. Investigators planning on submitting an EAR research proposal with a significant equipment budget are encouraged to discuss these plans with the relevant research program officer prior to submission.

Proposal Categories

Acquisition or Upgrade of Research Equipment

EAR/IF accepts proposals seeking support for the acquisition of new research equipment or the upgrade of existing equipment; **such proposals may be submitted at any time on or after July 26, 2012.**

Analytical laboratory and field instrumentation and computational equipment often serve a range of scientific disciplines. EAR/IF will assess the level of financial support appropriate for awards and may seek to partner with other appropriate NSF programs and other Federal agencies.

The ability of organizations to maintain, operate and provide technical support for sophisticated analytical equipment during its expected lifetime will be a review criterion. Management plans for oversight, user access policies and anticipated user fees, if any, should be included in proposals.

Investigators interested in seeking NSF support for the acquisition or upgrade of research equipment that is more expensive than the current $1,000,000 maximum request to EAR/IF might also wish to investigate the Major Research Instrumentation (MRI) Program. MRI maintains a January submission deadline each year and the goals and design of the MRI Program complement those of the EAR/IF Program. Investigators are encouraged to examine the latest MRI solicitation (http://www.nsf.gov/od/oia/programs/mri/).

Development of New Instrumentation, Analytical Techniques or Software

EAR/IF accepts proposals seeking support for the development of new instrumentation, analytical techniques and software that extend current research capabilities in the Earth sciences; **such proposals may be submitted at any time.**

Investigators seeking to develop new instrumentation, analytical techniques and software should demonstrate that a community of geoscientists is actively interested in the new capability. Software development proposals seeking funds primarily for web service, web method, service oriented architecture or database development should be directed to the Division of Earth Science Geoinformatics Solicitation. EAR/IF welcomes proposals for collaborative development projects between academic and industrial partners. EAR/IF does not support the sole commercial development of instrumentation or capabilities.

Investigators interested in seeking NSF support for the development of new research instrumentation might also wish to investigate the Major Research Instrumentation (MRI) Program. MRI maintains a January submission deadline each year and the goals and design of the MRI Program complement those of the EAR/IF Program. Investigators are encouraged to examine the latest MRI solicitation (http://www.nsf.gov/od/oia/programs/mri/).

Support of National or Regional Multi-User Facilities

EAR/IF accepts proposals seeking support for national or regional multi-user facilities; **such proposals may be submitted at any time.**

Investigators seeking to establish or continue support of a national or regional multi-user facility are encouraged to contact an EAR/IF Program Officer prior to submission. In general, support for national or regional multi-user facilities is reserved for groups that seek to offer expensive or specialized analytical laboratory or field equipment and services to the broader geosciences community. Typically, EAR/IF looks for specialized leadership capabilities and the availability of adequate and appropriate supporting infrastructure and personnel.

Support for Early Career Investigators

EAR/IF accepts proposals from early career investigators (in a tenure track position but not tenured at the time of submission) who seek to establish new laboratory or field equipment facilities and would demonstrably benefit from the availability of dedicated full-time technical support in the initial years following establishment; **such proposals may be submitted at any time.**

Via this opportunity, EAR/IF seeks to facilitate expedient development and operation of new laboratory or field equipment resources proposed by the next generation of leaders in the Earth Sciences. The opportunity allows for submission of a proposal prepared as an *Acquisition or Upgrade of Research Equipment* submission but may include budget line items associated with support of a new full-time laboratory technician who will be dedicated to the instrument(s) being requested. Any request for technical support under this opportunity is limited to three years duration in order to encourage investigators and their host institutions to carefully plan for future alternative sources for technical support (see details described in section *V.B Budgetary Information*). Proposals for *Support for Early Career Investigators* may budget either solely for equipment, solely for technician support, or both as described above.

III. AWARD INFORMATION

EAR/IF anticipates approximately $7,000,000 will be available annually for 30-50 new awards, subject to the availability of funds. Awards may be standard or continuing grants or cooperative agreements.

IV. ELIGIBILITY INFORMATION

Organization Limit:

> The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the Grant Proposal Guide, Chapter I, Section E.

PI Limit:

> None Specified

Limit on Number of Proposals per Organization:

> None Specified

Limit on Number of Proposals per PI:

> None Specified

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.

Important Proposal Preparation Information: FastLane will check for required sections of the proposal, in accordance with *Grant Proposal Guide* (GPG) instructions described in Chapter II.C.2. The GPG requires submission of: Project Summary; Project Description; References Cited; Biographical Sketch(es); Budget; Budget Justification; Current and Pending Support; Facilities, Equipment & Other Resources; Data Management Plan; and Postdoctoral Mentoring Plan, if applicable. If a required section is missing, **FastLane will not accept the proposal.**

Please note that the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions. If the solicitation instructions do not require a GPG-required section to be included in the proposal, insert text or upload a document in that section of the proposal that states, "Not Applicable for this Program Solicitation." Doing so will enable FastLane to accept your proposal.

Special attention should be paid to the following when submitting a proposal to EAR/IF:

1) Title

The title of the proposal should convey its main topic. Proposals for *Acquisition or Upgrade of Research Equipment, Development of New Instrumentation, Analytical Techniques or Software, Support of National or Regional Multi-User Facilities, and Support for Early Career Investigators* should, respectively, have titles beginning with:

> **"Acquisition of ..."**
>
> **"Upgrade of ..."**
>
> **"Development of ..."**
>
> **"Facility Support: ..."**
>
> **"Early Career: ..."**

2) Project Description

Proposals for *Acquisition or Upgrade of Research Equipment* must include a description of the Earth sciences research projects of the principal investigator(s). The description of the research projects and the equipment should be comprehensive enough to allow reviewers to evaluate the merit of the research and the extent to which the equipment is essential and appropriate.

Proposals for *Development of New Instrumentation, Analytical Techniques or Software* must include a description of the instrument design, technique, or code development that is sufficiently detailed for reviewers to evaluate its technical capabilities and potential benefit to research in the Earth sciences.

Proposals for *Support of National or Regional Multi-User Facilities* must include a description of the technical capabilities of the facility and the impact that these capabilities will make on the Earth sciences. The size and nature of the science community that will make principal use of the facility should also be described, along with any evidence of that community's desire to pool resources in support of the facility.

Proposals for *Support for Early Career Investigators* should follow guidelines above provided for proposals submitted to the *Acquisition or Upgrade of Research Equipment* opportunity. In addition, proposals including a request for support of a full-time research technician must include a description of the laboratory and/or field responsibilities that will be assumed by the technician as well as the anticipated breakdown of the time distribution of their assignments.

3) Maintenance and Operation

Proposals for *Acquisition or Upgrade of Research Equipment, Support of National or Regional Multi-User Facilities, and Support for Early Career Investigators* must include a section describing the provisions for maintenance and operation of relevant laboratory or field equipment. This section should describe how and by whom the requested instrumentation is to be operated and maintained. If the instrument(s) being requested is/are for replacement of similar existing analytical equipment, available data on user charges and related income, machine downtime, cost of instrument service contacts or available technical support should be discussed. Details regarding user scheduling decision procedures, relevant safety provisions and plans for user training should also be included. Biosketches should be included for relevant technical support personnel, whether or not NSF/EAR funding is requested for their support.

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.

4) Inventory of Existing Equipment and Technician Positions

Proposals for *Acquisition or Upgrade of Research Equipment* must list all comparable items of equipment to which the applicants have access at the submitting organization or elsewhere.

Existing and relevant technical support personnel in the department and their source of funding should be described and relevant biosketches included.

5) Support of Outreach and/or Broadening Participation Activities

Focused efforts to support participation of underrepresented groups in laboratory and/or field instrument use and educational and community outreach activities are also encouraged. Proposers to EAR/IF are invited to explore innovative outreach efforts to broaden participation of underrepresented groups in experiential learning using state-of-the-art analytical tools and to raise awareness of available geoanalytical capabilities in the U.S. Examples could include requested support for: 1) short courses or summer institutes focused on engaging representatives of underrepresented groups (faculty and students); or 2) travel to annual conferences of professional societies focused on fostering enhanced diversity in science (*e.g.,* National Association of Black Geologists and Geophysicists *(*NABGG) -- http://www.nabgg.com/, Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) -- http://www.sacnas.org/, American Indian Science and Engineering Society (AISES) -- http://www.aises.org/).

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

Budget Preparation Instructions:

The maximum request for *Acquisition or Upgrade of Research Equipment* and *Development of New Instrumentation, Analytical techniques or software* proposals is $1,000,000. The maximum request for upgrade of research group computing facilities is $75,000. **Proposals that request support in excess of the maximums allowable will be returned without review.**

The budget section of proposals for *Acquisition or Upgrade of Research Equipment* should indicate the current price and any discounts available for the total equipment package requested, itemized by major components. Relevant manufacturers' quotes must be included in the supplementary documents section of the proposal. **Proposals submitted without manufacturer price quotes will be returned without review.**

EAR/IF does not support instrument service contracts. **Proposals that request support for instrument service contracts will be returned without review.**

Personnel costs directly attributable to *Development of New Instrumentation, Analytical techniques or software*, or to *Support of National or Regional Multi-User Facilities* may be requested.

Personnel costs will not be supported through grant proposals for *Acquisition or Upgrade of Research Equipment*. An exception includes proposals submitted to the *Support for Early Career Investigators* opportunity. The inclusion of technical support on such proposals is limited to three years duration for the total of salary, fringe benefits and related indirect costs. The budget justification should demonstrate how the requested NSF support will result in a new full-time technical position.

All proposals submitted to the EAR/IF Program may request up to $20,000 for *Support of Outreach and/or Broadening Participation Activities* to engage audiences that otherwise will not have access to the instrumentation and/or data generated and/or to support focused efforts to broaden participation of underrepresented groups in experiential learning using state-of-the-art analytical tools and/or to raise awareness of available geoanalytical capabilities in the U.S. Budgetary requests for such activities may appear over multiple categories on the NSF Budget Form but the total should not exceed $20,000. The budget justification section should summarize all planned *Support of Outreach and/or Broadening Participation Activities* expenditures and their total separately from other line item justifications.

C. Due Dates

- **Full Proposal Target Date(s):**

  July 26, 2012

  Proposals for Acquisition or Upgrade of Research Equipment will not be accepted until July 26, 2012. Post July 26, 2012, proposals for Acquisition or Upgrade of Research Equipment will be accepted at any time.

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

  Proposals Accepted Anytime

  Proposals for the Development of New Instrumentation, Analytical Techniques or Software, Support of National or Regional Multi-User Facilities and Support for Early Career Investigators will be accepted at any time henceforth.

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 for acknowledgement and, if they meet NSF requirements, for review. 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 either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with 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. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in the GPG as Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: http://www.nsf.gov/bfa/dias/policy/meritreview/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for Fiscal Years (FY) 2011-2016*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the core strategies in support of NSF's mission 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 variety of learning perspectives.

Another core strategy in support of NSF's mission is broadening opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which 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.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (GPG Chapter II.C.2.d.i. contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including GPG Chapter II.C.2.d.i., prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the

achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
    a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
    b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

In addition to the general NSF merit review criteria (intellectual merit/broader impacts), criteria considered in the evaluation of *all* proposals submitted to EAR/IF include:

- the intrinsic merit of the Earth science research that will benefit from the equipment, technique, or multi-user facility;
- the number of investigators who will substantially benefit from the equipment, technique, or multi-user facility, and the strength of their Earth science research programs;
- the degree to which the equipment, technique, or multi-user facility is appropriate and essential for the intended Earth science research;
- the degree to which core research projects supported by the Division of Earth Sciences will benefit from the proposed equipment, technique, or multi-user facility

An additional criterion considered in the evaluation of proposals submitted to EAR/IF for *Acquisition or Upgrade of Research Equipment* includes:

- the ability to operate and maintain complex equipment during its expected lifetime.

An additional criterion considered in the evaluation of proposals submitted to EAR/IF for *Support of National or Regional Multi-User Facilities* includes:

- the ability to provide access to a facility intended to serve a national or regional research community.

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.

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 prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). Within 90 days following 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 all identified PIs and co-PIs on a given award. 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 Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also 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.

More comprehensive information on NSF Reporting Requirements 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.

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:

- Jonathan Wynn, 790 N, telephone: (703) 292-4742, email: jwynn@nsf.gov

- David D. Lambert, Program Director, 790 N, telephone: (703) 292-8558, fax: (703) 292-9023, email: dlambert@nsf.gov

- Russell C. Kelz, Program Director, 790 N, telephone: (703) 292-4747, fax: (703) 292-9023, email: rkelz@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@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.

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 55,000 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 Arctic 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.

> 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**   (703) 292-5111
>   (NSF Information Center)**:**
>
> - **TDD (for the hearing-impaired):**   (703) 292-5090
>
> - **To Order Publications or Forms:**
>
>   Send an e-mail to: nsfpubs@nsf.gov
>
>   or telephone: (703) 292-7827
>
> - **To Locate NSF Employees:**   (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Division of Administrative Services
National Science Foundation
Arlington, VA 22230