# EarthCube:

## Developing a Community-Driven Data and Knowledge Environment for the Geosciences

## PROGRAM SOLICITATION

### NSF 13-529

**National Science Foundation**

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

Directorate for Computer & Information Science & Engineering
Division of Advanced Cyberinfrastructure

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

March 26, 2013

EarthCube Test Enterprise Governance

March 26, 2013

EarthCube Research Coordination Networks

May 22, 2013

EarthCube Building Blocks

May 22, 2013

EarthCube Conceptual Designs

March 12, 2014

EarthCube Research Coordination Networks

March 12, 2014

EarthCube Building Blocks

March 19, 2015

EarthCube Integrative Activities

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

Proposals Accepted Anytime

EarthCube Research Coordination Networks

## IMPORTANT INFORMATION AND REVISION NOTES

**New Funding Opportunities and Deadlines will appear with Amendments to this solicitation.**

This serves as an umbrella solicitation for EarthCube. It differs from traditional NSF solicitations because funding opportunities will be amended to the solicitation in response to emerging community needs and priorities defined in collaborative activities. This solicitation provides the overarching description, vision, and goals for EarthCube that will remain unchanged over time. Amendments to the solicitation will add information on funding opportunities. Notifications announcing any EarthCube solicitation updates with Amendments will be sent through the NSF solicitation alert system.

The overarching description, vision, and goals of EarthCube can be found in the Program Description section below. All specifications of the proposal call are described in Amendments, including: (a) what types of proposals are being solicited; (b) pointers to the relevant community documents that guide the call and determine the focus of funding opportunities; (c) specific funding mechanism(s) employed; (d) special review criteria and/or reporting criteria; and (e) other specifics of the funding opportunity. As community guidance moves EarthCube forward, new Amendments will replace old Amendments. A listing of all Amendments can be found on the NSF EarthCube Program website (http://www.nsf.gov/geo/earthcube/).

**Amendment IV**

This solicitation has been amended to include the fourth funding opportunity (Amendment IV) in the Program Description section below. Amendment IV describes all specifications of the proposal call including (a) types of proposals being solicited; (b) specific funding mechanisms; (c) award information; and (d) special review criteria and proposal preparation instructions.

Collaborative proposals may be submitted to this Amendment.

**IMPORTANT INFORMATION**

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised NSF Proposal & Award Policies & Procedures Guide (PAPPG) (NSF 15-1), which is effective for proposals submitted, or due, on or after December 26, 2014. The PAPPG is consistent with, and, implements the new Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (Uniform Guidance) (2 CFR § 200).

## SUMMARY OF PROGRAM REQUIREMENTS

### General Information

**Program Title:**

EarthCube
A Community-Driven Data and Knowledge Environment for the Geosciences

**Synopsis of Program:**

EarthCube is a community-driven activity sponsored through a partnership between the NSF Directorate for Geosciences (GEO) and the Directorate for Computer & Information Science & Engineering (CISE) Division of Advanced Cyberinfrastructure (ACI) to transform research in the academic geosciences community. EarthCube aims to create a well-connected and facile environment to share data and knowledge in an open, transparent, and inclusive manner, thus accelerating our ability to understand and predict the Earth system.

Achieving EarthCube will require a long-term dialog between NSF and the interested scientific communities to develop cyberinfrastructure that is thoughtfully and systematically built to meet the current and future requirements of geoscientists. New avenues will be supported to gather community requirements and priorities for the elements of EarthCube, and to capture the best technologies to meet these current and future needs. The EarthCube portfolio will consist of interconnected projects and activities that engage the geosciences, cyberinfrastructure, computer science, and associated communities. The portfolio of activities and funding opportunities will evolve over time depending on the status of the EarthCube effort and the scientific and cultural needs of the geosciences community.

This umbrella solicitation for EarthCube allows funding opportunities to be flexible and responsive to emerging needs and collaborative processes. The EarthCube vision and goals do not change over time, and this section of the solicitation will remain constant. Funding opportunities to develop elements of the EarthCube environment will be described in Amendments to this solicitation. Amendments will appear in the Program Description section of the solicitation and will include details on the parameters, scope, conditions, and requirements of the proposal call. Researchers who receive alerts related to solicitation releases will receive notification when the EarthCube solicitation is updated with an Amendment.

**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.*

- Eva Zanzerkia, Directorate for Geosciences, Earth Sciences Division, telephone: (703) 292-4734, email: ezanzerk@nsf.gov
- Amy Walton, Directorate for Computer and Information Science and Engineering, Division of Advanced Cyberinfrastructure, telephone: (703) 292-4538, email: awalton@nsf.gov
- Marco Tedesco, Directorate for Geosciences, Polar Sciences Division, telephone: (703) 292-7120, email: mtedesco@nsf.gov
- Ilia I. Roussev, Directorate for Geosciences, Atmospheric and Geospace Sciences Division, telephone: (703) 292-8519, email: iroussev@nsf.gov
- Baris M. Uz, Directorate for Geosciences, Ocean Sciences Division, telephone: (703) 292-4557, email: bmuz@nsf.gov

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

- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering

### Award Information

**Anticipated Type of Award:** Standard Grant or Continuing Grant

**Estimated Number of Awards:** 20

Up to 20 awards total for Amendment IV. The number will be determined based on the results of the merit review process and availability of funds. Amendment IV anticipates up to 8 awards for RCNs and up to 12 for Integrative Activities.

**Anticipated Funding Amount:** $11,750,000

NSF anticipates funding for Amendment IV (Integrative Activities and Research Coordination Networks) to be $11,750,000 pending availability of funds. The size of awards will vary based on the scope and complexity of the funding opportunity and the projects supported under that call.

Specific size and duration limitations will be articulated in Amendments to this solicitation.

### Eligibility Information

**Who May Submit Proposals:**

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
- Other Federal Agencies and Federally Funded Research and Development Centers (FFRDCs): Contact the appropriate program before preparing a proposal for submission.

**Who May Serve as PI:**

There are no restrictions or limits.

**Limit on Number of Proposals per Organization:**

There are no restrictions or limits.

**Limit on Number of Proposals per PI or Co-PI:**

There are no restrictions or limits.

## Proposal Preparation and Submission Instructions

**A. Proposal Preparation Instructions**

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **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 Deadline(s)** (due by 5 p.m. proposer's local time):

  March 26, 2013

  EarthCube Test Enterprise Governance

  March 26, 2013

  EarthCube Research Coordination Networks

  May 22, 2013

  EarthCube Building Blocks

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  EarthCube Conceptual Designs

  March 12, 2014

  EarthCube Research Coordination Networks

  March 12, 2014

  EarthCube Building Blocks

  March 19, 2015

  EarthCube Integrative Activities

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

  Proposals Accepted Anytime

  EarthCube Research Coordination Networks

## Proposal Review Information Criteria

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

## Award Administration Information

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

**Reporting Requirements:** Standard NSF reporting requirements apply.

## TABLE OF CONTENTS



## I. INTRODUCTION

EarthCube is a community-driven activity aimed at transforming the conduct of geosciences research and education. This effort is a partnership between the NSF Directorate for Geosciences (GEO) and the Directorate for Computer & Information Science & Engineering (CISE) Division of Advanced Cyberinfrastructure (ACI). The goal of EarthCube is to create a well-connected and facile environment to share data and knowledge for all of the geosciences in an open, transparent, and inclusive manner and to accelerate our ability to understand and predict the Earth system.

In 2009 the Advisory Committee for GEO issued the GEOVision report: (http://www.nsf.gov/geo/acgeo/geovision/geo_strategic_plans_2012.pdf), identifying the challenges and opportunities facing the geosciences in the next decade. The report issued this call to action: "Over the next decade, the geosciences community commits to developing a framework to understand and predict responses of the Earth as a system, from the space-atmosphere boundary to the core, including the influences of humans and ecosystems."

In 2011 NSF initiated the Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21). This initiative emphasizes the importance of enabling computational and data-rich science, engineering, and education and creating within the US a sustainable, community-based and open cyberinfrastructure for researchers and educators (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504730).

EarthCube responds to the challenges and opportunities of the GeoVision report and the vision of a national cyberinfrastructure in CIF21. In this effort NSF encourages the community to systematically build cyberinfrastructure for the geosciences that is guided by community dialog, governance, and a common vision. EarthCube endeavors to create an environment that is extendable and manageable, and employs or creates technologies that meet the current and future needs of the geosciences community. EarthCube will foster the training and development of data scientists and cyber-savvy geoscientists. It is expected that EarthCube will build off present NSF and Federal investments in geosciences cyberinfrastructure and will integrate state-of-the art cyberinfrastructure, software development and computer science techniques.

The EarthCube program is designed to be responsive to the needs of and input from the geosciences community, as well as technological advances. Funding opportunities in the EarthCube portfolio will be defined in Amendments to this solicitation and will be based on themes, requirements, and other strategic or community documents from open community activities fostered by EarthCube such as, but not limited to, community meetings, workshops and design and demonstration activities.

Amendments to this solicitation will appear in the Program Description section and will include details on the type, scope, duration,

and size of proposals being requested, funding requirements, additional review criteria, and due dates.

## II. PROGRAM DESCRIPTION

The goal of EarthCube is to create a well-connected and facile environment to share data and knowledge for all of the geosciences in an open, transparent, and inclusive manner, accelerating our ability to understand and predict the Earth system.

**How To Use This Solicitation:** As noted in the Important Information Section at the beginning of this solicitation, this document serves as an umbrella solicitation for EarthCube. Funding opportunities will be responsive to themes, requirements, and other strategic or community documents from open community activities. In the structure of this solicitation, funding opportunities will be articulated in Amendments in the Program Description.

The description, vision, and overall goals for EarthCube will not change over time. Only the Amendment Section (see below) will change. When a funding opportunity is available, the Amendment section will detail the specifications of the proposal call including (a) what types of proposals are being solicited; (b) references to the relevant community documents that guided the call and determined the focus of the funding opportunity; (c) the specific funding mechanism(s) employed; (d) proposal due dates or submission windows; (e) any special review criteria and/or reporting criteria; (f) and other specifics of the funding opportunity. As EarthCube evolves over time, new Amendments will replace old Amendments. A listing of all Amendments will be found on the EarthCube NSF Program website (http://www.nsf.gov/geo/earthcube/).

**AMENDMENT IV:**

This is the fourth Amendment to the EarthCube solicitation. The objective of Amendment IV is to solicit proposals in two focus areas that complement ongoing EarthCube activities in the Demonstration Phase. 1) EarthCube RCNs: Virtual Organizations for geoscientists to coordinate, plan and prioritize cyberinfrastructure activities, and 2) EarthCube Integrative Activities.

In this document, the geosciences refers to the academic research community supported by the Geosciences Directorate at NSF, and includes the domains of atmospheric and geospace science, ocean sciences, earth sciences and polar sciences. Further details on the scientific topics that are supported in the geosciences can be found with the core programs.

The Amendment is arranged as follows:

Funding Opportunities

(1) EarthCube Research Coordination Networks (RCN)

- Description of the activity
- Specific Requirements
- Additional Review Criteria
- Additional Proposal Preparation Guidelines

(2) EarthCube Integrative Activities

- Description of the activity
- Specific Requirements
- Additional Review Criteria
- Additional Proposal Preparation Guidelines

**Funding Opportunities:**

**(1) EarthCube Research Coordination Networks (RCN)**

Award Information-

Estimated Number of Awards: 5-8

Estimated Award Size and Duration: a maximum of 24 months and a maximum of $300,000.

Proposal Submission: Proposals will be accepted at any time after discussion with program directors and agreement that a proposal should be submitted. Proposals must list the programs and/or program directors that have agreed to the submission in the Project Summary. Proposals without this information will be returned without review. Proposals should be submitted to NSF 13-529, EarthCube.

**Description of the Activity**

The goal of 2015 EarthCube Research Coordination Networks is to be closely tied to the science and cyberinfrastructure needs of core geosciences programs and domains supported by GEO. To that end, potential proposers must coordinate EarthCube RCN ideas and discuss submission of any EarthCube RCN proposal with the relevant GEO program directors as well as at least one EarthCube program director.

EarthCube RCNs are intended to advance geosciences cyberinfrastructure through interaction, discussion and planning between geoscientists and cyberinfrastructure experts. RCNs provide opportunities for academic geosciences communities to organize, seek input, come to consensus and prioritize data, modeling, and technology needs, as well as standards and interoperability within and across domains. Other opportunities exist to realize cyberinfrastructure development and build tools and services. Outcomes must be tangible and directed towards moving geoscientists closer to shared goals. RCNs are an important information and feedback mechanism within the EarthCube process. Results from these projects will provide feedback for the direction of EarthCube, including architecture and geosciences-wide cyberinfrastructure developments.

Awards will support geosciences communities to organize, to partner with like geosciences communities, via virtual organizations, and to discuss, plan and coordinate the standards, policies and cyberinfrastructure that will meet their end users' common data, software, computation, networking and training needs. Proposals must include participation of both geoscientists and cyber/computer scientists to be considered viable. EarthCube RCNs should 1.) build and strengthen partnerships between geo- and cyber/computer scientists; 2.) foster new collaborations that lead to better scientific outcomes; 3.) expose participants to new ideas, methodologies, approaches, tools, and utilities; 4.) reduce redundancies and duplication of effort; and 5.) expose best practices and "lessons learned" in data management.

Examples of possible EarthCube RCN outcomes include, but are not limited to:

- The development of community standards, data citation or other community plans for data management in one or more fields of the geosciences.
- The articulation of common cyberinfrastructure and technology grand challenges across different geosciences disciplines, including dialog towards designing potential solutions for data integration, computation, modeling, software and/or visualization needed to meet future scientific and education goals.
- Agreements on cyberinfrastructure issues involving multiple geosciences fields that will result in improved interdisciplinary access to products of scientific work or training and education.

RCNs should explore innovative ideas for implementing virtual organizations, community networking strategies and collaborative technologies. Successful proposals will need to demonstrate broad academic geosciences participation, with an emphasis on active engagement of early career scientists and large numbers of end users.

**Specific Requirements**

1. Topic/Focus: EarthCube RCN proposals must be rooted in the academic geosciences community, and include cyber/computer scientists as key participants. Proposals must specify what activities will be undertaken, what groups will be involved, what products will be generated by network activities, and how information about the network and opportunities to participate will be disseminated. The proposal should also outline the expected benefits of the network's activities in moving one or more geosciences fields forward in scientific goals through cyberinfrastructure, as well as the implications for the broader community. The specific outcomes from the RCN should be described.
2. Participation: Participation and involvement in EarthCube activities, including meetings, events and sharing information between RCNs and other EarthCube projects will be required. PIs should allocate financial resources to support representatives in EarthCube meetings and activities. Proposals must include a section on how the network will interact with EarthCube governance activities.
3. Steering Committee: Each RCN must have a steering committee primarily composed of academic geoscientists. Cyber and/or computer scientists should also have key roles within the network, and these should be described in the proposal. The Steering Committee should reflect the diversity of the network's participants, and be responsible for the network's success, but remain a manageable size. The proposal should articulate the roles of the Steering Committee members and the reasons for their selection.
4. Network Participants: The size of an RCN is expected to vary depending on the topic or issue and network needs. It is expected that a network will involve investigators at diverse organizations, including different levels of academic institutions. The inclusion of new researchers, post-docs, graduate students, and undergraduates is strongly encouraged. An initial network of likely participants should be identified by position at the institution and name. However, proposals should clearly articulate well-developed mechanisms that will maintain openness, ensure access, and actively promote participation by interested parties outside of that initial list of participants. Although inclusion of Federal Agencies, international organizations and commercial partners is welcome, RCNs are intended to serve the needs of geoscientists in US academic institutions. NSF funding predominantly supports participation by US researchers. Any proposed international collaboration should articulate how it strengthens the project's activities. Participants from institutions outside the US are encouraged to seek support from their respective funding organizations. NSF funds may not be used to support the expenses of international scientists and students at their home institutions.
5. Information and Material Sharing: EarthCube RCNs must promote effective communication via virtual organizations, foster new partnerships and provide opportunities for collaboration focused on actionable improvements for the academic geosciences community. Any products of the RCN, including discussion forums, documents, policies and practices must be openly shared with the academic community. Proposals should detail mechanisms that will be used to serve these materials. This may include working closely with other aspects of EarthCube, including Test Enterprise Governance.

**Additional Review Criteria**

1. . RCN proposals will be evaluated for their creativity, innovation, and potential to advance geosciences research through effective organization and outcomes. RCNs cannot use resources to fund research, build cyberinfrastructure or prototypes, or to sustain existing networks.
2. RCNs will be evaluated on how well they represent their respective geosciences communities, the quality and caliber of the collaboration with cyberinfrastructure and computer scientists, and the processes and efforts to engage a broad and diverse set of participants.
3. Projects are expected to have strong management and integration plans that describe how the activity will be coordinated between partners and how the partners will function as a whole.

**Proposal Preparation Guidelines for EarthCube RCNs:**

Proposals must follow these guidelines in addition to, or in replacement of, the requirements in Section V.A.

A. Cover Page<= The title of the proposed project should begin with the words: "EarthCube RCN:"
B. Project Summary The Project Summary must begin with a list of the programs and program directors within GEO that have agreed to the submission of the EarthCube RCN.
C. Project Description The Project Description should begin with a list of the Steering Committee members and their institutions. The project description should address aspects of management, coordination, and participant diversity within the 15-page project description, as described below.

   Please note that per guidance in the GPG, the Project Description must contain, as a separate section within the narrative, a discussion of the broader impacts of the proposed activities. Proposers may decide where to include this section within the Project Description.

   1. Management plan. Describe plans and procedures for the development and assessment of the proposed activity. Include formal mechanisms to ensure fair and equitable allocation of group resources. Clearly define the responsibilities for leadership and the role of the PI and the Steering committee. Delineate the procedures used for the selection of initial network participants, along with the plans for maintaining an appropriate degree of openness and for encouraging the involvement of additional interested parties. Means for self-evaluation of progress toward the network goals should be presented as an important part of the management plan.
   2. Coordination plan. Describe the plan for coordinating with other EarthCube activities. If the proposed network will work with other established networks or groups, or if there is a similar activity being planned or ongoing in other countries, describe the plans for coordination and cooperation among the relevant networks.
   3. Increasing participant diversity. A research coordination network is an important opportunity for encouraging the involvement of a diverse group of investigators. Describe a well-designed plan to increase participation of members outside of the steering committee and core group key personnel and, if applicable, a plan to include new researchers, post-docs, graduate students and undergraduates and individuals and institutions underrepresented in

the geosciences and cyberinfrastructure.

D. Budget. Funds from this program may not support independent, individual research projects of the participants; nor are they to be used as a mechanism for a mini-grant awarding program. Note that funds requested to support activities of the network participants, such as participant travel, materials and supplies for the network projects, and network retreats should be listed as "participant support" in the proposed budget, and managed by the submitting organization.
E. Special Information and Supplementary Documents. In replacement of the Results of Prior Support proposals must include, as a Supplementary Document, Current Activities: PI and the Steering committee members listed in the project description must provide, in no more than a single-page per investigator, a description of the relationship between the proposed project and current research activities in his/her laboratory.

**(2) EarthCube Integrative Activities**

Award Information:

Deadline: March 19, 2015

Estimated Number of Awards: 8-12

Estimated Award Size and Duration: Awards must be 24 months in duration and no more than $800,000. In exceptional situations, because of the scale of the collaboration, proposals for more than $800,000 may be submitted after PIs have spoken to EarthCube program directors and received permission to submit.

**Description of the Activity**

The goal of the EarthCube Integrative Activities is to enable geoscientists to participate in EarthCube. Projects are intended to improve access to the products of geosciences research so that a broader array of geosciences communities may help shape future EarthCube activities and outcomes. Projects are also solicited to improve community standards and capabilities through testing of ongoing scientific or cyberinfrastructure efforts, facilities or projects. These efforts may involve existing EarthCube projects, such as EarthCube Building Blocks, but they may also expose and explore other extant cyberinfrastructure resources as solutions to geosciences needs.

These projects are not equivalent in scope or scale to the previous EarthCube Building Blocks awards. Instead, they are meant to move geosciences research communities closer towards the spirit of data, models, and software availability in EarthCube by encouraging the development of scientific community cyberinfrastructure standards and initiating data access and sharing through pilot activities. Two types of projects will be considered, Standards Developments and Data Infrastructure. Clear outcomes within 24 months or less must be articulated in any successful proposal.

Standards Developments for Communities. EarthCube Integrative Activities provide opportunities for communities to develop standards and best practices for data, models, and other research tools in a way that makes these resources more interoperable within a scientific community and within EarthCube, enabling research communities to better participate in EarthCube development. Proposals may provide platforms, such as testbeds, or develop other temporary and provisional tools or cyberinfrastructure for the purpose of reaching these standards. Proposals may involve existing capabilities in EarthCube Building Blocks projects or other existing cyberinfrastructure resources and can develop tools to explore how these resources will meet (or fail to meet) user requirements or community research challenges. The outcomes of these awards will not be cyberinfrastructure, but data or modeling standards or other guidelines that become apparent through the proposed testing. Proposals must describe how these standards will then be adopted as best practices by a research community, and how these standards will make geosciences resources more available or interoperable across the geosciences. A key component of these efforts will be broad involvement of academic geoscientists and the community organizations that represent them. Proposals should clearly describe what testing will be conducted and how that will lead to outcomes within 24 months that better align the participating research communities with EarthCube.

Data Infrastructure for Communities. EarthCube Integrative Activities also provide opportunities for scientific disciplines to collectively define data requirements, metadata, community-recognized data collections and data types, outputs from models and other codes that will improve the community's ability to address geosciences research challenges. Projects may develop prototypes and evaluative pilots to meet common data access and discovery needs, and to extend data resources, of interest either to a large number of researchers within a research domain, or extending beyond to encompass other geosciences domains. These projects are not intended for long-term resource or infrastructure support, but rather initial pilots to make the products of geosciences research more openly and more readily available to the EarthCube effort and the geosciences as a whole. Successful proposals will include detailed descriptions on options for sustaining infrastructure or community data after the end of the 24-month Integrative Activity award. This may be accomplished through existing data facilities, ingestion into other infrastructure at the institutional, regional, national or international level, or through other mechanisms that successfully demonstrate long-term maintenance. Re-use of existing modern tools and resources is highly encouraged, and proposals should describe elements of reuse.

**Specific Requirements:**

1. Collaboration**:** EarthCube Integrative Activities must involve deep engagement and participation of the academic geosciences research community in the development of resources, products or other outcomes. Because EarthCube seeks to build bridges between geoscientists and those that build cyberinfrastructure, strategies for true partnerships and useful developments are necessary for successful proposals. Proposals must identify specific geosciences communities and data/cyberinfrastructure facilities, including other EarthCube projects, such as Building Blocks, RCNs or Conceptual Designs, that will participate in project. Similarly, proposals must identify cyberinfrastructure, computer science, industry, international and agency partners that will participate.
2. Outcomes**:** EarthCube Integrative Activities must produce demonstrable and useful outcomes within 24 months or less. Proposals must discuss what will be demonstrated and evaluated. Proposals must clearly articulate how project outcome(s) relate to the goals of EarthCube and to specific needs articulated by the scientific communities involved. A discussion of the project's lifecycle/sustainability of efforts must be presented.
3. EarthCube Participation**:** EarthCube Integrative Activities must participate in continuing EarthCube governance activities. Awardees will be required to participate in planning and demonstration activities as part of the collaborative spirit of EarthCube. In particular, awardees must participate in governance committees, the EarthCube All-Hands meeting and must be ready to provide any outputs required by the EarthCube Governance organization. Proposers should describe how their anticipated structure, work plan and management plan would accommodate these responsibilities.

**Additional Review Criteria:**

1. Is there a clear description of the community data, software, or standard development that will be met by this project? What is the likelihood of successful creation and adoption of any product?
2. Is any prototype, pilot, platform or tool development well conceived for the outcome of the project? For Standards Development proposals, will the suggested experiment or testbed be implementable in the proposed timeframe and produce the desired outcomes? For Data Infrastructure proposals, is the resource development modern, robust and responsive to

community needs?
3. How many researchers and which domains in the geosciences will benefit from the outcomes of the project? Are participants from geosciences communities explicitly identified and are their roles clear? How does the project clearly demonstrate end user involvement in development and use of a community capability? How will the work enable the community to participate in EarthCube development?
4. A sustainability plan must be included for any infrastructure component of the project that is intended to continue. It must describe how the infrastructure will be supported beyond the project time period, and may include integration into long-term data or cyberinfrastructure resources either supported by NSF or other institutions, agencies or partners. Plans will be evaluated on the viability of the sustainable resource, the fit to the infrastructure being developed and the likelihood of ingestion into the long-term system.

**Proposal Preparation Guidelines for EarthCube Integrative Activities:**

Proposals must follow these guidelines in addition to, or in replacement of, the requirements in Section V.A in this solicitation.

A. Cover Page The title of the proposed project should begin with the words: "EarthCube IA:". Collaborative Proposals should begin with the words: "EarthCube IA: Collaborative Proposal:"
B. Project Summary-The Project Summary must include a list of all the collaborating institutions involved in the proposal whether they are receiving funds or not.
C. Project Description -
This section may be no longer than 15 pages. In addition to intellectual merit and broader impacts, the project description should describe how the work meets the specific requirements and any additional review criteria indicated. The Project Description must include a Management plan that describes plans and procedures for the development and assessment of the proposed activity. The plan should include a list of all participating members of the collaboration, including non-funded participants, their institutions and roles in the project. A clear time line of expected outcomes should be included. A Sustainability Plan must also be included for any infrastructure developments.

Please note that per guidance in the GPG, the Project Description must contain, as a separate section within the narrative, a discussion of the broader impacts of the proposed activities. Proposers can decide where to include this section within the Project Description.

D. Budget - Any subawards must have associated, annualized budgets with associated budget justifications. Budget justifications can be no longer than 2 pages.
E. Special Information and Supplementary Documents-
To be included in the order specified below:

1. In place of the Results of Prior Support section in the Project Description, Current Activities: the PI and members listed as co-PIs or collaborators must provide a single-page (per investigator) description of the relevant prior support. This should be submitted as a Supplementary Document.
2. Letters of Collaboration must be provided for any organization or individuals that are mentioned in the Project Description and Management Plan but are not receiving funds (i.e., mentioned in the proposal and not listed in any of the associated budgets). Letters of Collaboration must list the personnel participating in the project and their affiliation and describe the work that the unfunded collaborator will be conducting for the project. Information on acceptable content of Letters of Collaboration may be found in the most recent NSF Grant Proposal Guide and must be followed.

F. Additional Required Documents List of Personnel, Collaborators and Affiliates: This document must list all personnel and their collaborators, affiliates and other potential Conflicts of Interest, according to the guidelines in the GPG. Instructions on creating this document are listed in section V.A.k. After receipt of the proposal number from FastLane, send an e-mail to earthcube@nsf.gov. The subject heading of the e-mail should note the proposal number and the lead institution. Attach the document described below, prepared on a template that will be available at http://www.nsf.gov/geo/earthcube. One document per collaborative project is needed.

## III. AWARD INFORMATION

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

**Estimated Number of Awards:** 20

Up to 20 awards total for Amendment IV. The number will be determined based on the results of the merit review process and availability of funds. Amendment III anticipates up to 8 awards for RCNs and up to 12 for Integrative Activities.

**Anticipated Funding Amount:** $11,750,000

NSF anticipates funding for Amendment IV (Integrative Activities and Research Coordination Networks) to be $11,750,000 pending availability of funds. The size of awards will vary based on the scope and complexity of the funding opportunity and the projects supported under that call. Specific size and duration limitations will be articulated in Amendments to this solicitation.

## IV. ELIGIBILITY INFORMATION

**Who May Submit Proposals:**

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
- Other Federal Agencies and Federally Funded Research and Development Centers (FFRDCs): Contact

the appropriate program before preparing a proposal for submission.

**Who May Serve as PI:**

There are no restrictions or limits.

**Limit on Number of Proposals per Organization:**

There are no restrictions or limits.

**Limit on Number of Proposals per PI or Co-PI:**

There are no restrictions or limits.

**Additional Eligibility Info:**

Proposals involving non-NSF FFRDC or Federal agency personnel must be approved prior to submission to ensure appropriate submission parameters related to funding personnel at these institutions. PIs should contact the cognizant PO. In all cases non-NSF FFRDC or Federal agency contributors must appear in one of two ways: (1) a subaward on a proposal submitted by an academic or non-profit institution or (2) a proposal that is submitted as part of a collaborative effort lead by an academic or non-profit institution.

NSF-funded FFRDCs are exempt from the above restriction and may submit proposals without restriction.

Please be aware that if you have not received NSF funding you will be required to submit additional information before an award can be recommended. Please refer to the Prospective New Awardee Guide for information and preparation of the necessary documentation: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=pnag.

For-profit organizations may participate as subawardees on proposals that are led by eligible institutions. The purpose of EarthCube is to serve closely the needs of the academic geosciences community and this type of partnership ensures that close connections between for-profit efforts and academic institutions are maintained.

## 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.

See Chapter II.C.2 of the GPG for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions.

**The following Proposal Preparation instructions should be followed for all proposals, except where an Amendment in Section II of the solicitation notes proposal preparation guidelines. In that case, any instructions provided in the Amendment supersede those listed below.**

a. Cover Sheet The Cover Sheet must conform to the guidelines described in the GPG, unless modifications are described in the Amendment.
b. Project Summary The Project Summary must conform to the guidelines described in the GPG unless modifications are described in the Amendment.
c. Project Description Results from Prior NSF Support Results of Prior Support should be no more than one page per team member and DO NOT need to be included in the Project Description. Instead, they should be included at Supplementary Documents as described below. Refer to the GPG for instructions on the content of the Results from Prior Support.

   Other components of the Project Description must conform to the guidelines described in the GPG unless modifications are described in the Amendment.

d. References Cited Reference information is required. Any Publication that includes any of the team collaborators should have an asterisk as the first character of the reference.
e. Biographical Sketch(es) For all key personnel, please provide a brief biographical sketch. Do not exceed two pages per person for the sketch. Up to five publications most closely related to the proposal and up to five other significant publications may be listed, including those accepted for publication or citations for cyberinfrastructure resources developed by the personnel

   Biographical Sketches must conform to the guidelines described in the GPG. A biographical sketch (limited to two pages) is

required for each individual identified as senior project personnel. (See GPG Exhibit II-7 for the definitions of Senior Personnel.)

f. Budget Each proposal must contain a budget for each year of support requested. The amounts requested for each budget line item should be documented and justified in the budget justification.

   Budget components must conform to the guidelines described in the GPG unless modifications are described in the Amendment.

g. Current and Pending Support The Current and Pending Support must conform to the guidelines described in the GPG unless modifications are described in the Amendment. It is important to identify the number of salary-months covered by each source and whether these are summer, academic or calendar months.
h. Facilities, Equipment and Other Resources The Facilities, Equipment and Other Resources must conform to the guidelines described in the GPG unless modifications are described in the Amendment.
i. Special Information and Supplementary Documentation
   - Postdoctoral Researcher Mentoring Plan. The Postdoctoral Researcher Mentoring Plan must conform to the guidelines described in the GPG unless modifications are described in the Amendment.
   - Data Management Plan: Plans for data management and sharing of the products of must conform to the guidelines described in the GPG unless modifications are described in the Amendment.
   - Results of prior support: 1 page per team member, as described below (these pages are in addition to the 20 pages for Proposed Activities) A maximum of one page per team member (PI, co-PI, post-doc, collaborator) should be included in the supplementary documents. Any researcher who has received prior support from any NSF grant must include results of prior support. If a collaborator has not had prior support, an explicit statement should be included to that effect in this section.
j. Additional Single Copy Documents Proposals that do not provide the following information will be returned without review.
   a. Project Personnel (text-searchable PDF, in FastLane, under Additional Single Copy Documents). List all Senior Personnel in the project. For each person, provide the last name, first name, and institution/organization. In the main body of the proposal, a corresponding biographical sketch should be provided for all individuals included on this list, as instructed in Section II.C.2.f of the Grant Proposal Guide.
   b. Collaborators/Individuals with Conflicts of Interest (text-searchable PDF, in FastLane, under Additional Single Copy Documents). Provide a list, in an alphabetized table, of the full names and institutional affiliations of all persons with potential conflicts of interest as specified in NSF's Grant Proposal Guide. For each PI, Co-PI, collaborator and other Senior Personnel, include all co-authors/editors and collaborators (within the past 48 months), all graduate advisors and advisees, and any other individuals or institutions with which the investigator has financial ties (please specify type). In addition, list all subawardees who would receive funds through the award.
k. Additional Required Documents

"List of Personnel, Collaborators and Affiliates": After receipt of the proposal number from FastLane, send an e-mail to earthcube@nsf.gov. The subject heading of the e-mail should note the proposal number and the lead institution. Attach the document described below, prepared on a template that will be available at http://www.nsf.gov/geo/earthcube. NSF personnel will use automated data handling of this document. To facilitate this, the file should be in the CSV "flat text" format, with unformatted data entry under the column headings (Proposal Number, PI or SP Last_Name, etc.) in the template. Carriage returns, splitting items over multiple cells, extra spaces, etc., will interfere with automated handling. The document is a spreadsheet containing two lists: one (columns C-E) lists the last names, first names and institutional affiliations of all PIs, Co-PIs, and other senior personnel; the second (columns F-H) lists the full names and institutional affiliations of all people having conflicts of interest with any PIs, Co-PIs, and other senior personnel. This list will be used by NSF to check for conflicts of interest in assembling the review community. The file name should be the seven-digit proposal number (not the temporary proposal number used during proposal preparation) followed by the three characters "coi" (for example, for a proposal number 1212345, this file name will be 1212345coi.csv). The extension csv will be automatically added by Excel when saving the file using the CSV format. The 7-digit proposal number should appear in every row of the file, in column B, as indicated by the sample that will be available at http://www.nsf.gov/geo/earthcube. Each project participant in columns C-E should be listed (repeatedly) in all rows that name his/her conflicted individuals in columns F-H, as in the sample.

(There is redundancy between the Additional Single Copy Documents, which become part of the FastLane proposal file, and Electronic Document (a), which is used for automated data handling. At present, it is not technically possible for one document to perform both functions.)

## B. Budgetary Information

**Cost Sharing:** Inclusion of voluntary committed cost sharing is prohibited.

## C. Due Dates

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

  March 26, 2013

  EarthCube Test Enterprise Governance

  March 26, 2013

  EarthCube Research Coordination Networks

  May 22, 2013

  EarthCube Building Blocks

  May 22, 2013

  EarthCube Conceptual Designs

  March 12, 2014

  EarthCube Research Coordination Networks

March 12, 2014

EarthCube Building Blocks

March 19, 2015

EarthCube Integrative Activities

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

  Proposals Accepted Anytime

  EarthCube Research Coordination Networks

EarthCube Research Coordination Networks (RCN) proposals will be accepted at any time after discussion with program directors and agreement that a proposal should be submitted. Proposals must list the programs and/or program directors that have agreed to the submission in the Project Summary. Proposals without this information will be returned without review. Proposals should be submitted to NSF 13-529, EarthCube.

## D. FastLane / Grants.gov Requirements

**For Proposals Submitted Via FastLane:**

To prepare and submit a proposal via FastLane, see detailed technical instructions 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.

**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://www.grants.gov/web/grants/applicants.html. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical 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.

Proposers that submitted via FastLane are strongly encouraged to use FastLane to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

# 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://nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018*. 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 strategic objectives 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 must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of 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**

Additional Review Criteria for EarthCube funding opportunities will be detailed in the Amendment in Section II.

## B. Review and Selection Process

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

Specific additional review criteria will vary depending on the funding opportunity and will be articulated for each funding opportunity in the Amendment section of this solicitation.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will be completed and submitted by each reviewer. 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 strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

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. After an administrative review has occurred, Grants and Agreements Officers perform 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.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, 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.

## 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 notice, 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 notice; (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 notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

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

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

**Special Award Conditions:** Any Special Award Conditions will be described in the Amendment in Section II.

### 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:

- Eva Zanzerkia, Directorate for Geosciences, Earth Sciences Division, telephone: (703) 292-4734, email: ezanzerk@nsf.gov
- Amy Walton, Directorate for Computer and Information Science and Engineering, Division of Advanced Cyberinfrastructure, telephone: (703) 292-4538, email: awalton@nsf.gov
- Marco Tedesco, Directorate for Geosciences, Polar Sciences Division, telephone: (703) 292-7120, email: mtedesco@nsf.gov
- Ilia I. Roussev, Directorate for Geosciences, Atmospheric and Geospace Sciences Division, telephone: (703) 292-8519, email: iroussev@nsf.gov
- Baris M. Uz, Directorate for Geosciences, Ocean Sciences Division, telephone: (703) 292-4557, email: bmuz@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, "NSF Update" is an information-delivery system 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 Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on NSF's website at https://public.govdelivery.com/accounts/USNSF/subscriber/new?topic_id=USNSF_179.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this 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** (NSF Information Center)**:** (703) 292-5111
- **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.

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