

EarthCube Office

Science Office for a Community-Driven Data and Knowledge Environment for the Geosciences

PROGRAM SOLICITATION

NSF 19-523

REPLACES DOCUMENT(S):

NSF 15-603



National Science Foundation

Directorate for Geosciences

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

Full Proposal Target Date(s):

February 28, 2019

Proposers must contact a Program Director for any proposal submission beyond the Target Date and receive an email confirming the agreed upon submission date.

IMPORTANT INFORMATION AND REVISION NOTES

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide (PAPPG)* ([NSF 19-1](#)).

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

EarthCube

Synopsis of Program:

EarthCube is a community-driven activity to transform the conduct of geosciences research and education, sponsored through a partnership between the NSF Directorate of Geosciences and the Office of Advanced Cyberinfrastructure in the Directorate for Computer and Information Science and Engineering.

EarthCube aims to accelerate the ability of the geosciences community to understand and predict the Earth system by enabling access to geosciences data. EarthCube will require a long-term dialog between NSF and the interested scientific communities to develop new modes for sharing data that is thoughtfully and systematically built to meet the current and future needs of geoscientists.

This solicitation seeks the services of a qualified organization to act as the EarthCube Office. This organization will provide the services required to maintain and manage the community governance structures and to carry out activities consistent with EarthCube priorities as guided by community governance. The award, to be administered as a Cooperative Agreement, is intended to cover an initial 3-year period.

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, telephone: (703) 292-4734, email: ezanzerk@nsf.gov
- Amy Walton, Directorate for Computer and Information Science and Engineering, Office of Advanced Cyberinfrastructure, telephone: (703) 292-4538, email: awalton@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: Cooperative Agreement

Estimated Number of Awards: 1

Up to one award will be made and determined based on the results of the merit review process and availability of funds.

Anticipated Funding Amount: \$1,000,000 to \$2,000,000

Funding amount listed above is per year. NSF anticipates funding the EarthCube Science Support Office for 3 years, pending availability of funds. The size of the award will depend on the scope and complexity of the proposal selected for funding and availability of funds. The award duration will be for an initial period of 3 years, subject to contraction or extension based on periodic review.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- 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 (PAPPG)* guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - Full Proposals submitted via Research.gov: *NSF Proposal and Award Policies and Procedures Guide (PAPPG)* guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - 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: https://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):**

February 28, 2019

Proposers must contact a Program Director for any proposal submission beyond the Target Date and receive an email confirming the agreed upon submission date.

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.

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I. INTRODUCTION

The goal of EarthCube is 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.

The EarthCube program is designed to be responsive to the needs and input from the geosciences research community, as well as to technological advances. It is expected that EarthCube will leverage present NSF and Federal investments in geosciences cyberinfrastructure and will integrate state-of-the-art cyberinfrastructure, software and computer science techniques through governance activities and lightweight and distributed tools. The status and progress of EarthCube activities may be found on the website <http://earthcube.org/>.

Geosciences community-driven and operated governance structure for EarthCube activities is critically important and represents the best consensus view on managing the EarthCube effort. As a result of these community efforts, priorities for EarthCube activities, and agreements on tools and standards to share data have been organized through EarthCube governance. These community documents, including the EarthCube community priorities, documentation of needs for data sharing, office services and the governance charter may be found at: <http://earthcube.org/info/earthcube-governance>.

II. PROGRAM DESCRIPTION

This solicitation seeks an EarthCube Office to advance sharing data and knowledge for the geosciences in an open, transparent, and inclusive manner and to accelerate our ability to understand and predict the Earth system. The NSF will select a highly qualified organization having the requisite skills and experience to effectively carry out the next three years of EarthCube activities. Community-defined priorities can be found at the EarthCube document page: <https://www.earthcube.org/info/earthcube-governance>.

The EarthCube Office will facilitate and execute the following activities:

1. **Data Discovery and Access:** EarthCube has initiated efforts to enable discovery of geosciences data, tools and resources through open web standards. In the next three years, the initial data resource registry, Project P418 (<https://github.com/earthcubearchitecture-project418/>), should be expanded in a lightweight, sustainable and open manner. Standards and best practices that may be adopted by any geoscience data provider regardless of the type of hosting institution will be a key part of this effort. Special attention should be paid to enabling resources represented by the Council of Data Facilities and to reaching databases and data sets from NSF-funded awards. Similar efforts to develop a resource registry so that users may discover tools that are useful to their research will also be continued and must be supported by the EarthCube Office. Both registries must be integrated so that standards and best practices may be adopted by any provider of data tools relevant to the geosciences. These registry activities will be guided by strategic directions and plans developed by EarthCube governance.

EarthCube governance continues to work on identifying lightweight and sustainable workbench capabilities for geoscientists researchers. As these efforts continue, the EarthCube Office must be poised to help facilitate development, use and adoption of standards and tools related to scientific workflows and data use. However, the primary focus of the EarthCube Office will be the Registry efforts at the time of proposal submission.

2. **Facilitation of EarthCube Governance:** The EarthCube Office must support and enable community governance to meet current priorities and facilitate the development of new priorities over the course of the three-year project. The EarthCube Office will be responsible for facilitating community decision-making, acting on these decisions and being accountable for outcomes. The current EarthCube governance structures and charter are available to review. The governance structure can and will change to be responsive to changing EarthCube priorities. The EarthCube Office will support governance changes that are outcome-oriented and help meet EarthCube goals. Flexibility to support new structures and leverage existing activities outside of EarthCube is required. It will be necessary to clearly identify, and successfully execute, leadership and co-leadership between the EarthCube Office and existing or new governance structures.

Project Elements

This section outlines the Project Elements that NSF requires for a successful EarthCube Office. This is not comprehensive but is provided to enable proposers to describe their management concepts and organization, structure and work plan. Further tasks and responsibilities may be managed through the Cooperative Agreement with the awardee, as well as through review of the awardee's performance. Proposals must discuss and will be evaluated for the following elements.

1. **Organization and Management:** The awardee will establish and maintain an organizational structure and staff capable of providing the executive, technical and administrative skills and leadership to carry out EarthCube priorities. Proposals must clearly describe the proposed management structure including the administrative, scientific, and technical staff required, the available office environment, and any leveraged services needed to ensure the success of EarthCube.

For each known or planned team entity (including Key Personnel), proposals must describe the entity's role and responsibility, the basis for its inclusion, and how it best contributes to accomplishing the EarthCube activities described in this solicitation and in EarthCube governance documents. Proposals should clearly present the capability, experience and qualifications of any organizations involved, how the organization will be managed and by whom, and the roles of all personnel either at the lead institution or collaborating institutions. NSF considers access to team members a vital aspect of successful oversight. Proposals should describe how communications between NSF, the proposed organization, and EarthCube governance will be organized.

A lead principal investigator must be designated who will have direct involvement with these activities, and who will serve as the point of contact for NSF. The awardee must also have personnel with sufficient seniority and experience to execute EarthCube activities, facilitate geosciences community engagement, and provide technical leadership. Proposals must identify these personnel and how their expertise is appropriate for their roles in the project. Proposals must clearly articulate how these personnel will interact with leadership within the current EarthCube governance structure, including the EarthCube Chair and

Leadership Council. Although these structures and relationships may change, the EarthCube Office leadership must continue to be effective in working with community governance.

Proposals must demonstrate a knowledge of and the ability to interact with the academic geosciences research community. Particularly important are the relationships with the academic geoscientists, data centers and other resources supported by NSF, as well as a diverse and changing set of EarthCube awardees. Demonstrated ability to work with other stakeholders such as U.S., agency, international and industrial/commercial entities with interests aligned with EarthCube will also be evaluated. This can include efforts related to Public Access (e.g., [NSF 15-52](#)), enabling principles for FAIR (Findable, Accessible, Interoperable, and Reusable) data, and using open web standards among others.

The awardee must have the necessary technical expertise to manage tasks associated with the data discovery and access activity. Proposals must describe the staff required for these activities as well as efficient and leveraged use of existing technical infrastructure in the U.S. that will help meet these goals. This can include subawards to other entities to provide services.

Awardees must have the qualifications and relevant organizational experience for successfully administering both activities: data discovery and access and facilitation of EarthCube governance. Administrative tasks include, but are not limited to, carrying out elections in accordance with EarthCube governance guidelines; providing the capabilities required for each organizational unit's virtual and in-person meetings, such as virtual communications platforms; development of community documents and other resources; and implementing and managing technologies that create, index, store and retrieve EarthCube's records, documents, and other information assets. The awardee will be responsible for managing an annual All Hands Meeting of approximately 150 people as well other meetings. It will be responsible for managing and tracking the EarthCube governance budget, including ongoing expenses of all organizational units of EarthCube governance.

2. **Communications and Outreach:** The awardee will be responsible for managing, developing, enhancing and maintaining communications with all EarthCube stakeholders, including NSF-supported facilities, geosciences researchers and collaborating computer and data scientists, NSF and the public. The awardee must be proactive in outreach to enable adoption of data discovery and access standards and tools and to enable technical capabilities in the academic geosciences community. Creating and disseminating materials that articulate EarthCube activities, plans and outcomes is an additional responsibility. The awardee must maintain EarthCube's online presence through the EarthCube.org website and must provide effective services to enable clear communications within EarthCube governance. Proposals must describe the processes, resources and technical staff that will be used for these purposes. An essential element of the outreach strategy will be the annual All Hands Meeting, EarthCube engagement at major geosciences meetings, such as AGU (American Geophysical Union), ASLO (Association for the Sciences of Limnology and Oceanography), AMS (American Meteorological Society), GSA (Geological Society of America) etc., and support for other EarthCube activities such as workshops.

3. **Award Management:** The awardee will ensure that planning, execution, and reporting of the EarthCube Office integrates the requirements of NSF with the needs of EarthCube governance and the scientific community. Proposals should clearly show lines of authority, responsibility and communication between NSF, the Awardee, EarthCube governance and the scientific community.

Proposals must demonstrate that the organization will have the ability to successfully manage and monitor an NSF Cooperative Agreement. This includes providing required reporting, management documents, access to personnel, and responsiveness to external review.

Proposals must provide estimated costs for each year of the three-year performance period, and explain the benefits of the proposed approach, how efficient use will be made of material and personnel resources, and how costs will be controlled. Proposals must take into consideration changing budget requirements for EarthCube activities and should include a discussion of management procedures for selecting, monitoring, and controlling subcontracted and subawarded efforts to meet the governance objectives of EarthCube. In developing their resources and estimates, proposers shall be mindful that the cooperative agreement may be reviewed and revised depending on the outcome of a program review and the availability of funds.

4. **Reporting and Review:** The awardee will provide detailed annual reports to summarize actual awardee results. An Annual Program Plan and Budget devised in concert with EarthCube governance are required to determine the next year's performance plan and funding increment. The awardee will participate in annual program reviews by panels of experts convened by NSF to review awardee performance and management under the Cooperative Agreement. The awardee will also participate in other reviews as required through the Cooperative Agreement, such as NSF Management and Business System Reviews.
5. **Expectation and Management Metrics:** The awardee will demonstrate effective management metrics for quality, cost control, timeliness and consistent completion of activities within budget and schedule. Proposals should also describe how the organization will assess and evaluate its performance in accordance with the following Core Expectations of EarthCube.

1. **Transparency:** Transparent processes that provide information in easily understandable forms and media; that are freely available and directly accessible to those who will be affected by governance policies and practices. Decisions must be taken with respect to community guidance, and recommendations must be in compliance with established rules.
2. **Responsiveness:** Service to stakeholders and their interests within a reasonable timeframe, consistent with community deadlines and standards.
3. **Community Leadership:** Consensus building and leadership are required elements of decision-making. Consultation and reconnaissance to understand the different interests of stakeholders in order to achieve broad consensus in a sustainable and prudent manner for the entire stakeholder group. An outcomes-oriented approach and the capability to persuade and influence the scientific community.
4. **Inclusiveness:** The opportunity for stakeholders to maintain, enhance, or generally improve their well-being through broad participation; engagement of the entire diversity of the geosciences community, including underrepresented groups.
5. **Effectiveness and Efficiency:** Processes established and maintained to produce favorable results, while making the best use of the resources - human, technological, financial, and organizations - at its disposal.
6. **Accountability:** The ability to demonstrate to those who will be affected by its decisions and actions the decision-

making processes and defined rules applied to the process, changes to decisions and actions based on feedback, and transparency in how funds are spent.

III. AWARD INFORMATION

Anticipated Type of Award: Cooperative Agreement

Estimated Number of Awards: 1

Up to one award will be made and determined based on the results of the merit review process and availability of funds.

Anticipated Funding Amount:

NSF anticipates funding the EarthCube Science Support Office for 3 years, pending availability of funds. The size of the award will depend on the scope and complexity of the proposal selected for funding and availability of funds. The award duration will be for an initial period of 3 years, subject to contraction or extension based on periodic review.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- 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 as a subaward on a proposal submitted 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: https://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 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 Proposal & Award Policies & Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG 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: (<https://www.nsf.gov/bfa/dias/policy/docs/grantsgovguide.pdf>). 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 PAPPG 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 PAPPG instructions.

The following Proposal Preparation instructions should be followed for all proposals.

A single institution must represent and coordinate all proposed activities. Separately submitted collaborative proposals are not accepted, and collaborative activities should be supported via subawards. Projects are expected to have strong management and integration plans that describe how the team will effectively manage EarthCube Governance.

a. Project Description

The Project Description may be a maximum of 20 pages. Results from Prior NSF Support DO NOT need to be included in the Project Description. Instead, they should be included as Supplementary Documents.

b. 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.

c. Special Information and Supplementary Documentation

- Results from Prior NSF Support: 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 with an end date in the past 5 years must include a description in their 1 page. If a collaborator has not had prior support, an explicit statement should be included to that effect in this section. Guidelines on the contents of the Results from Prior NSF Support should be taken from the PAPPG.

d. Additional Single Copy Documents

Proposals that do not provide the following information will be returned without review.

- Project Personnel: Each proposal must submit a single unified participant list for the entire project. For each person known at the time of proposal submission, provide the last name, first name, and institution/organization. This document must be a text-searchable PDF.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

C. Due Dates

• **Full Proposal Target Date(s):**

February 28, 2019

Proposers must contact a Program Director for any proposal submission beyond the Target Date and receive an email confirming the agreed upon submission date.

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 PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://www.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 *Building the Future: Investing in Discovery and Innovation - NSF Strategic Plan for Fiscal Years (FY) 2018 – 2022*. 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. (PAPPG 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 PAPPG 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

Proposals will be assessed on the management structure and plan, which must demonstrate clear and effective lines of communications for all personnel involved, clear roles and responsibilities, and management metrics. Proposals must demonstrate ability in project management, oversight, organization, and communications and outreach.

Proposals will be assessed according to the credentials of the proposing group, which must demonstrate expertise in geosciences and

technical capabilities, past accomplishments in delivering outcomes and working with a community governance. Also, projects must demonstrate the ability to interact with the academic research community and other stakeholder groups and to work with NSF.

Proposals will be assessed efficient and effective budgeting, including how costs will be controlled and how EarthCube Governance budgets and subawards will be managed.

Proposals will be assessed on the metrics and evaluation plan produced for the project to meet the Core Expectations of EarthCube.

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 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 generally be completed and submitted by each reviewer and/or panel. 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 https://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 *Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=papppg.

Special Award Conditions:

The award associated with this solicitation will be a Cooperative Agreement (CA), not a standard grant or a contract, that will fund annual EarthCube Office operations in accordance with approved Annual Program Plans. Any special requirements not stated herein will be negotiated at the time of award.

NSF reserves the right to initiate annual site reviews of the awardee and to conduct a mid-term management review that will inform NSF's decision whether to accept a renewal proposal for continued management and operations of the EarthCube Office or to recompetete the EarthCube Office management.

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 no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 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 Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

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, telephone: (703) 292-4734, email: ezanzerk@nsf.gov
- Amy Walton, Directorate for Computer and Information Science and Engineering, Office of Advanced Cyberinfrastructure, telephone: (703) 292-4538, email: awalton@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](#).

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 (FASSED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.E.6 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 <https://www.nsf.gov>

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **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: nspubs@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 other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Office of the General Counsel
National Science Foundation
Alexandria, VA 22314

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