NSF 23-594: Geoinformatics (GI)

Program Solicitation

Document Information

Document History
- **Posted:** May 24, 2023
- **Replaces:** NSF 21-583

<div>View the program page</div>

National Science Foundation
Directorate for Geosciences
  Division of Earth Sciences

Full Proposal Target Date(s):

December 01, 2023

Innovative Resources and Sustained Resources. Prior to submission of full proposals, investigators for the Sustained Resources track are required to submit a Concept Outline, which is due at least three (3) months before the full proposal target date.

December 06, 2024

Sustained Resources only. Prior to submission of full proposals, investigators for the Sustained Resources track are required to submit a Concept Outline, which is due at least three (3) months before the full proposal target date.

December 05, 2025

Innovative Resources only

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Important Information And Revision Notes

This solicitation supersedes NSF 21-583. Changes from the previous Geoinformatics solicitation include:

1. Funding tracks have been updated as **Innovative Resources** (former "Catalytic" track) and **Sustained Resources** (combines former "Facility" and "Sustainability" tracks). Proposal target dates have been shifted, and project budget sizes for the Innovative Resources track are limited to up to $200,000 per year.

2. Prior to submission of full proposals, lead investigators for the **Sustained Resources** track are required to submit a **Concept Outline**, which is due at least three (3) months prior to the associated target date.

3. The solicitation **Introduction** and **Program Description** have been updated to clarify the Geoinformatics program scope. The Program Description describes the updated funding tracks and provides guidance on funding support for the development of cyberinfrastructure through other NSF programs.

4. **Additional Essential Elements** and associated **Additional Solicitation Specific Review Criteria** for proposals have been updated.

5. Proposals may now include requests for **high-throughput computing resources** through the Partnership to Advance Throughput Computing (PATh) project supported by NSF.

6. **Proposal Preparation Instructions** have been updated. Please see the full text of this solicitation for further information.

Any proposal submitted in response to this solicitation should be submitted in accordance with the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) that is in effect for the relevant due date to which the proposal is being submitted. The NSF PAPPG is regularly revised and it is the responsibility of the proposer to ensure that the proposal meets the requirements specified in this solicitation and the applicable version of the PAPPG. Submitting a proposal prior to a specified deadline does not negate this requirement.

Summary Of Program Requirements

General Information

Program Title:

Geoinformatics (GI)

Synopsis of Program:

The Geoinformatics program funds the deployment, operation, and sustainment of cyberinfrastructure (CI) resources to serve and support Earth Sciences research and education. In this solicitation, "Earth Sciences" refers to the academic research communities supported by programs within NSF's Division of Earth Sciences (EAR) (https://www.nsf.gov/funding/programs.jsp?org=EAR).

Goals for Geoinformatics support include (but are not limited to): (i) Enabling the management of and access to data, physical samples, and other research products in the Earth Sciences; (ii) Facilitating the development and use of open-source software and modeling capabilities, preferably via approaches that leverage shared computing resources and collaborative software development processes; (iii) Fostering transparent and reproducible modes of research and education in the Earth Sciences; and (iv) Increasing the capacity of Earth Scientists to utilize cyberinfrastructure resources.

The Geoinformatics program will consider proposals within two tracks of support:

- The **Innovative Resources track** supports the early-stage development, deployment, and community-building for CI resources that serve Earth Sciences research and education.
- The **Sustained Resources track** supports the sustained operations and user community support for mature CI resources that serve Earth Sciences research and education.

Principal Investigators (PIs) are strongly recommended to contact cognizant Program Officer(s) for this solicitation in advance of proposal submission to ascertain that the focus and budget of proposed projects are appropriate for this solicitation and the designated track. Guidance on the appropriate scope of Geoinformatics projects is provided in the Program Description. In addition, all proposers for Sustained Resources track projects must submit a Concept Outline at least three (3) months in advance of the full proposal target date.

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.

- Raleigh L. Martin, telephone: (703) 292-7199, email: geoinformatics@nsf.gov
- Nicole Gasparini, telephone: (703) 292-8550, email: geoinformatics@nsf.gov
- Luciana Astiz, telephone: (703) 292-4705, email: geoinformatics@nsf.gov

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

- 47.050 --- Geosciences

Award Information

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

Estimated Number of Awards: 6 to 8

anticipated number of projects supported through the combined Innovative Resources and Sustained Resources competition. The actual number of awards will be determined based on the results of the merit review process and availability of funds.

Anticipated Funding Amount: $5,600,000

annual average support, pending the availability of funds.

Estimated program budget, number of awards, and average award size/duration are subject to the availability of funds.

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 laboratories, professional societies and similar organizations located in the U.S. that are directly associated with educational or research activities.

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 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)**:

    December 01, 2023

    > Innovative Resources and Sustained Resources. Prior to submission of full proposals, investigators for the Sustained Resources track are required to submit a Concept Outline, which is due at least three (3) months before the full proposal target date.

    December 06, 2024

    > Sustained Resources only. Prior to submission of full proposals, investigators for the Sustained Resources track are required to submit a Concept Outline, which is due at least three (3) months before the full proposal target date.

    December 05, 2025

    > Innovative Resources only

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review criteria 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.

I. Introduction

Cyberinfrastructure (CI) includes resources for data curation, access, synthesis, and analysis; capabilities for modeling and computation; and other cyber tools that increase capacity for research and education in the Earth Sciences. The 2020 National Academies of Sciences, Engineering, and Medicine (NASEM) report, *A Vision for NSF Earth Sciences 2020-2030: Earth in Time*, stated the critical need for investments in CI, noting that the Earth Sciences are "experiencing an explosion of data acquisition capacity," along with improvements in modeling and analysis, which require resources to maximize the ability of Earth Scientists to harness these technological advancements. CI resources are therefore critical for providing the advanced data analysis, modeling, and computation capabilities essential to addressing priority Earth Sciences questions, such as those identified in the *Earth in Time* report. In this solicitation, "Earth Sciences" refers to the academic research communities supported by the Division of Earth Sciences (EAR) at NSF. Further details on scientific topics supported by EAR can be found within descriptions of individual programs (https://www.nsf.gov/funding/programs.jsp?org=EAR).

The Geoinformatics program seeks to support CI capabilities that provide the broadest possible value to Earth Sciences research and education. Robust and accessible CI is critical for enabling open, inclusive, and transparent research practices, including those expressed through the FAIR Guiding Principles for scientific data management and stewardship (Findable, Accessible, Interoperable, and Reusable), the CARE Principles for Indigenous Data Governance (Collective Benefit, Authority to Control, Responsibility, Ethics), and the principles of reproducibility and replicability (see NSF 23-018, "Dear Colleague Letter: Reproducibility and Replicability in Science").

The Geoinformatics program also recognizes the importance of CI resources for enabling EAR-funded researchers to fulfill requirements of the EAR Data and Sample Policy (https://www.nsf.gov/geo/geo-data-policies/ear/index.jsp) for managing and sharing data, physical samples, and other research products. The 2022 Office of Science and Technology Policy (OSTP) memorandum, *Ensuring Free, Immediate, and Equitable Access to Federally Funded Research*, promoted the need for broad and rapid sharing of federally funded research. To enable such sharing, the OSTP memorandum encouraged the use of digital repositories that align with the 2022 National Science and Technology Council document, *Desirable Characteristics of Data Repositories for Federally Funded Research*. The TRUST Principles for digital repositories (Transparency, Responsibility, User focus, Sustainability, and Technology) also articulate a framework by which CI resources can support the management and open sharing of research products.

II. Program Description

This Geoinformatics solicitation supports efforts to develop, deploy, and expand access to data resources, software, computational tools, and other cyberinfrastructure (CI) needed to facilitate studies of the structure, dynamics, and evolution of the Earth through time, as well as the processes that act upon and within the Earth from the surface to the core. Successful projects will develop community CI to advance research and education goals in the Earth Sciences, including via relevant training and engagement activities. Geoinformatics projects should be designed to broadly support research and education in the Earth Sciences, rather than the needs of a specific research group.

Goals for Geoinformatics support include (but are not limited to): (i) Enabling the management of and access to data, physical samples, and other research products in the Earth Sciences; (ii) Facilitating the development and use of open-source software and modeling capabilities, preferably via approaches that leverage shared computing resources and collaborative software development processes; (iii) Fostering transparent and reproducible modes of research and education in the Earth Sciences; and (iv) Increasing the capacity of Earth Scientists to utilize CI resources.

The Geoinformatics program is committed to fostering broad and equitable access to CI capabilities, data, and other research resources for people and communities historically underrepresented in the Earth Sciences, especially those who face barriers in their ability to utilize such resources. The Geoinformatics program wants to ensure the participation of the full spectrum of diverse talents that society has to offer in a manner that is integrated with the deployment and operation of CI. The program strongly encourages proactive and sustained engagement efforts, including consultation with relevant communities to address ethical considerations, such as those articulated within the CARE Principles.

This Geoinformatics solicitation includes two tracks to support CI at different stages of development and operations: an **Innovative Resources** track to support early-stage development, deployment, and community-building, and a **Sustained Resources** track to support sustained operations and community support for mature cyberinfrastructure resources.

- The **Innovative Resources** track supports early-stage development, deployment, and community-building for data resources, software, computational tools, and other CI resources that serve Earth Sciences research and education. The resulting CI is expected to be broadly accessible and contribute to advancing scientific priorities for one or more research communities within the Earth Sciences. Projects may build on prototype CI resources (e.g., pilot data or software capabilities developed through previous EAR disciplinary program support) by strengthening these resources, expanding training and access, and/or building communities for collaborative development and governance. Typically, follow-on projects that have previously been supported through the Geoinformatics program are not eligible for Innovative Resources support and should instead be submitted to the Sustained Resources track (see below). The allowable budget for projects supported through the Innovative Resources track is up to $200,000 per year for up to 3 years.

- The **Sustained Resources** track is intended as the next phase of support after the Innovative Resources track. The Sustained Resources track supports the sustained operations and user community support for mature CI resources that serve Earth Sciences research and education. Supported CI resources are expected to be managed to facilitate broad access, training, and usage across multiple disciplines within the Earth Sciences. Proposals to further develop CI resources previously supported by NSF programs may be submitted to the Sustained Resources track, regardless of the duration of previous support (including support through any Geoinformatics program track). Such proposals should demonstrate outcomes of prior NSF investment(s) and describe distinctive new directions to be pursued. Projects that have not previously received NSF support may also be submitted to the Sustained Resources track with appropriate justification. Sustained Resources track projects should adopt sustainable governance approaches that ensure responsiveness to needs of the relevant Earth Sciences disciplines and facilitate continuity of outcomes after completion of Geoinformatics support. Expected budgets for projects supported through the Sustained Resources track may vary widely and should be appropriate to the scope of Earth Sciences communities served. In anticipation of future program changes, the expected duration for Sustained Resources proposals submitted to the December 2023 target date is 3 - 4 years, and the expected duration for proposals submitted to the December 2024 target date is 3 years.

Proposers are asked to identify whether their proposal is an "Innovative Resources" or a "Sustained Resources" submission in the beginning of the proposal title (see Section V.A for details).

General Considerations:

As a part of intellectual merit, proposals should describe plans for developing, deploying, and operating the proposed CI in service of Earth Sciences research and education. Proposals should demonstrate and justify Earth Sciences questions that could be addressed through use of the proposed CI, including outcomes that resulted from past developments. Submissions may include pilot research efforts directly related to CI testing and deployment; however, such research efforts should *not* be a primary focus of the project. Rather, the focus of Geoinformatics support should be on providing CI that facilitates Earth Sciences research by others outside of the proposal personnel. Proposals should also provide sufficient details on the architecture of the proposed CI to evaluate its technical competency. Proposals should demonstrate how the proposed CI development aligns with leading practices, such as through open data and metadata standards, open-source software development practices, and interoperability with existing capabilities. Innovation in new CI capabilities is not required; however, proposals should describe the novelty of the proposed CI deployment and how it fulfills Earth Sciences needs that are not adequately addressed by existing CI capabilities. For CI in support of data management and access, proposals should demonstrate how they would advance the capacity of EAR-supported researchers to fulfill the requirements of the EAR Data & Sample Policy in alignment with open science principles (e.g., FAIR, CARE, TRUST, reproducibility, replicability) and consistent with the 2022 National Science and Technology Council document, *Desirable Characteristics of Data Repositories for Federally Funded Research*.

As a part of broader impacts, proposals should describe how the proposed CI will be deployed to achieve broad adoption and impact for the relevant Earth Sciences communities and other interested parties. Broader impacts activities must be an integral part of the project and commensurate with the overall scope of work, and this should be reflected in the expertise of collaborators, the proposal budget, and the budget justification. Proposers are encouraged to proactively engage and consult relevant communities and people, including persons from historically underrepresented groups, varied institution types, and a range of career stages. Proposals should describe the community(ies) served, including size, expected science, and plans for engagement throughout the project. Engagement approaches may include (but are not limited to) workshops, training activities, collaborative resource development (e.g., hackathons), partnership building, stakeholder consultation, and other outreach or community-building efforts. Proposers are encouraged to explore innovative outreach efforts to ensure the participation of the full spectrum of diverse talents that society has to offer, in tandem with CI development. Examples include (but are not limited to) support for: 1) engaging persons from historically underrepresented groups; 2) partnering with faculty at Minority Serving Institutions and community colleges, 3) outreach to engage K-12 educators and students in project activities, 4) unique webcasting, social media, virtual reality experiences, or other activities to promote engagement, and/or 5) travel to annual conferences of professional societies focused on fostering enhanced diversity in science (e.g., National Association of Black Geoscientists (NABG) -

http://www.nabg-us.org/ ↗, Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) - http://www.sacnas.org/ ↗, American Indian Science and Engineering Society (AISES) - http://www.aises.org/ ↗).

Proposals submitted in response to this solicitation must also address the following Additional Essential Elements. These Essential Elements correspond to Additional Solicitation Specific Review Criteria for the Geoinformatics solicitation, separate from Intellectual Merit and Broader Impacts (see Section VI.A for details). Investigators are encouraged to include distinctive sections within their proposals addressing each of these Essential Elements:

Additional Essential Elements:

1. **Metrics and Assessment:** Proposals must describe specific metrics and/or other assessment mechanisms that will be used to demonstrate engagement, trace progress on proposed activities, and measure impacts on the advancement of the Earth Sciences. Proposals should describe plans for monitoring these metrics and/or other assessment mechanisms throughout the duration of the award, as well as how the outcomes of such monitoring will be used to inform CI deployment that is responsive to user needs.

2. **Sustainable Management:** Proposals must describe plans for project management, governance (i.e., scientific community oversight), scalability to adapt to expanding usage, and sustainability approaches to ensure continuity of outcomes beyond project completion. Proposers are encouraged to establish partnerships with existing facilities/institutions to enable governance and sustainability approaches. The scope of plans for sustainable management should be proportionate to the planned project size and include standard Letters of Collaboration from the partners engaged in the plan (as applicable). For Sustained Resources proposals, management plans must clearly describe personnel roles and responsibilities, a timeline of work, and a breakdown of work commitments, costs, and deliverables expected for each major activity that is proposed. Sustained Resources projects submitted as collaborative proposals must further describe clear plans for the coordination of project management across collaborative organizations and distinctive roles for each organization.

Scope of Supported Activities:

The Geoinformatics program prioritizes support for the deployment and operation of CI that advances research and education in the Earth Sciences. Principal Investigators (PIs) are advised to craft their proposals in response to Geoinformatics program goals and to consider alternative NSF programs for projects that extend beyond Geoinformatics priorities. PI(s) are strongly encouraged to consult with the cognizant Program Officer(s) of potentially relevant programs to ascertain programmatic interest and to facilitate the preparation of proposals aligned with program goals.

Support for CI Innovation: The Geoinformatics program encourages proposals for the deployment and operation of cutting-edge CI capabilities that serve Earth Scientists. Innovative development of such CI capabilities is allowable within Geoinformatics proposals to the extent that such activities broadly support Earth Sciences communities. Projects primarily focused on technical innovation for CI tools and services may be suited to Cyberinfrastructure for Sustained Scientific Innovation (CSSI, https://new.nsf.gov/funding/opportunities/cyberinfrastructure-sustained-scientific-innovation-cssi) or related programs in NSF's Office of Advanced Cyberinfrastructure (OAC, https://www.nsf.gov/funding/programs.jsp?org=OAC). Projects seeking innovative, use-inspired deployments of CI may be appropriate for programs within the Directorate for Technology, Innovation, and Partnerships (TIP, https://new.nsf.gov/tip). A full list of cyberinfrastructure-related programs relevant to research in the Directorate for Geosciences (GEO) can be found here: https://www.nsf.gov/geo/geo-ci/index.jsp.

Support for Research Activities: The Geoinformatics program does not support research-driven projects. Instead, the Geoinformatics program supports CI that broadly enables Earth Sciences research and education by others. Geoinformatics proposals may include pilot research activities only if they are directly tied to the development and deployment of CI. Projects that primarily seek to address Earth Sciences research questions, while secondarily developing related software, database, or other CI capabilities, may consider doing so within the context of submissions to disciplinary programs in EAR (https://www.nsf.gov/funding/programs.jsp?org=EAR).

Support for Physical Samples and Collections: The Geoinformatics program does not directly support activities related to the curation, management, and accessibility of physical samples and collections. However, the program does support CI development and operations associated with physical samples, such as registries of sample metadata or digitized samples.

Support for Cross-Cutting Activities: In some instances, proposed activities may extend beyond the Earth Sciences and/or the development and deployment of CI. Though proposals submitted to the Geoinformatics program must primarily focus on CI for the Earth Sciences, the program may choose to coordinate review with other relevant programs for those facets of proposals that extend significantly into other disciplinary or functional areas. For example, proposals that seek to deploy CI capabilities in tandem with research instrumentation may be reviewed in coordination with the EAR Instrumentation & Facilities program (EAR/IF, https://new.nsf.gov/funding/opportunities/earth-sciences-instrumentation-facilities-earif). In cases of cross-cutting projects, PI(s) are strongly advised to consult with the cognizant Program Officer(s) from Geoinformatics and the other relevant programs in advance of proposal submission.

Utilizing Shared Computing Resources:

This solicitation does not support the development of new computer hardware capabilities or significant hardware acquisition. Investigators are encouraged to consider using the wide range of NSF-supported advanced shared computing resources for their computational needs, including the Advanced Cyberinfrastructure Coordination Ecosystem: Services & Support (ACCESS) program (https://access-ci.org/) and related initiatives through NSF's Office of Advanced Cyberinfrastructure (OAC). PAPPG Chapter II.E.7 provides information on accessing high-performance computing resources, data infrastructure, or advanced visualization resources. In addition to these widely available computing resources, proposers may request specific allocations for high-throughput computing and/or cloud computing in tandem with their proposal submission. This is described in further detail in the Proposal Preparation Instructions (Section V.A).

Additional Considerations:

On a limited basis, the Geoinformatics program may support certain non-standard proposal types, such as Conference Proposals (PAPPG Chapter II.F.9). Investigators considering the submission of such proposals must discuss this with cognizant Program Officer(s) in advance of submission. The Geoinformatics program may also consider limited requests for supplemental funding support, but these must be discussed with cognizant Program Officer(s) in advance of submission. Failure to consult with cognizant Program Officer(s) prior to submission of non-standard proposal types or requests for supplemental funding may result in proposals being returned without review. Please note that the Geoinformatics program currently does not accept Early-concept Grants for Exploratory Research (EAGER) or Rapid Response Research (RAPID) proposals.

Because of the collaborative nature of Geoinformatics projects, the program does not participate in NSF career development opportunities, including the Faculty Early Career Development Program (CAREER) or the Mid-Career Advancement (MCA) program.

To ascertain that the focus and budget of proposed projects are appropriate for this solicitation, all proposers for Sustained Resources track projects must submit a Concept Outline at least three (3) months in advance of the full proposal target date. The Proposal Preparation Instructions (Section V.A) explain this in further detail. Principal Investigators (PIs) for Innovative Resources track projects are also recommended to contact cognizant Program Officer(s) for this solicitation in advance of proposal submission for advice on expected proposal submissions.

III. Award Information

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

Estimated Number of Awards: 6 - 8

anticipated number of projects supported through the combined Innovative Resources and Sustained Resources competition. The actual number of awards will be determined based on the results of the merit review process and availability of funds.

Anticipated Funding Amount: $5,600,000

annual average support, pending the availability of funds.

Estimated program budget, number of awards, and average award size/duration are subject to the availability of funds.

Estimated Award Size and Duration:

Innovative Resources track projects will be up to $200,000 per year for up to 3 years. Sustained Resources track projects submitted to the December 2023 target date will be 3 - 4 years in duration, and Sustained Resources track projects submitted to the December 2024 target date will be 3 years in duration. Budget sizes for Sustained Resources track projects should be commensurate with the size and scope of the project and anticipated scientific impact.

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 laboratories, professional societies and similar organizations located in the U.S. that are directly associated with educational or research activities.

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:

Proposers are encouraged to pursue partnerships between academia, industry, and others. Partnerships may be funded (via subaward or consulting arrangements) or unfunded (documented via standard letter of collaboration).

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 Research.gov or Grants.gov.

- Full Proposals submitted via Research.gov: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal and Award*

Policies and Procedures Guide (PAPPG). 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. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov. The Prepare New Proposal setup will prompt you for the program solicitation number.

- 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/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) 292-8134 or by e-mail from nsfpubs@nsf.gov.

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

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via Research.gov. PAPPG Chapter II.E.3 provides additional information on collaborative proposals.

See PAPPG Chapter II.D.2 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 provides additional guidance beyond that contained in the PAPPG or NSF Grants.gov Application Guide.

Concept Outline (*required for Sustained Resources track*)

The following instructions apply to submission for the Sustained Resources track only:

- Prior to submission of a full proposal, prospective proposers to the Sustained Resources track must submit a Concept Outline at least three (3) months in advance of the full proposal target date. Concept outlines may be submitted either by email to a cognizant Program Officer or via the Program Suitability and Proposal Concept Tool (ProSPCT) website (https://suitability.nsf.gov/s/). A single Concept Outline should be submitted by the expected lead investigator for the project. This allows for a preliminary assessment of the appropriateness of proposed activities and for feedback to the PI about potential supportability for proposed activities prior to the development of a full proposal.
- The Concept Outline should include the following information:
  1. **Submission Title.** Please provide the expected title of the proposal.
  2. **Project Personnel.** Please list names and organizational affiliations of all expected senior personnel.
  3. **Concept Outline Text.** In up to 6,000 characters (including spaces), please briefly describe the expected user community for the proposed CI, scope of major activities for the project, and budget size (total budget and budget per major activity) to achieve the project scope. Budget amounts should be aggregate estimates for the overall project and need not be broken down by collaborative institution or budget category.
- If submitting to the ProSPCT website, the submitter should select "Research Proposal" from the Select Proposed Proposal Type dropdown. Then, be sure to identify Directorate for Geosciences and Division of Earth Sciences as the Target Unit and enter "Geoinformatics Sustained Resources" in the Program/Funding Opportunity field. For "Fit to proposed proposal type or funding opportunity," state that the Concept Outline is being submitted in response to requirements for the Geoinformatics solicitation. To get started in ProSPCT, users are required to provide their Login.gov credentials to complete and submit the form.

- Concept Outlines will be reviewed by Program Officers with relevant expertise. Program feedback will occur no later than 4 weeks after receipt of the Concept Outline. (Therefore, PIs seeking program feedback well in advance of the full proposal target date are encouraged to submit Concept Outlines earlier than the required 3 months in advance of the full proposal target date.) Once reviewed, the prospective lead PI will receive a response email from the cognizant NSF Program Officer with written feedback to inform development of the full proposal. When submitting the full proposal, this Program Officer response email must be uploaded under Additional Single Copy Documents.
- Further information on Concept Outlines and the ProSPCT tool is provided in PAPPG Chapter I.D.1.

High-Throughput Computing Resources:

Proposals may request high-throughput computing (HTC) resources through the Partnership to Advance Throughput Computing (PATh 🔗) project supported by NSF.

Proposers should describe the request in a Supplementary Document no longer than two pages with a technical description of, and justification for, the requested HTC resources that includes (a) the expected number of self-contained tasks per ensemble – note that each task can be packaged into one or more batch job; (b) the resource requirements for each task type in the ensemble – for example, requirements for cores, memory, wall-time, and scratch space; (c) the expected number of ensembles; (d) the expected input and output data requirements for each task type; and (e) the expected number and size of shared input files within an ensemble – expected number of times each file is read per ensemble.

Proposers should include "HTCAccess" (one word without spaces) as a keyword on the Project Summary page, at the end of the Overview section (before the section on Intellectual Merit) if incorporating this request into the proposal. Proposers may visit the PATh credit accounts web page (see https://path-cc.io/services/credit-accounts/ 🔗) for more information on the available HTC resources which can be allocated through this program.

See below for specific instructions on how to describe the HTC/PATh request in the Project Summary and the Other Supplementary Documents.

Cloud Computing Resources:

Proposals may request cloud computing resources to use public clouds such as Amazon Web Services (AWS), Google Cloud Platform (GCP), IBM Cloud, and Microsoft Azure. Cloud computing resources described in proposals may be obtained through an external cloud access entity supported by NSF's Enabling Access to Cloud Computing Resources for CISE Research and Education (Cloud Access) Program.

Proposers should describe the request in a Supplementary Document no longer than two pages with (a) which public cloud provider will be used; (b) anticipated annual and total costs for accessing the desired cloud computing resources, based on pricing currently available from the public cloud computing providers; and (c) a technical description of, and justification for, the requested cloud computing resources. The NSF Budget should not include any such costs for accessing public cloud computing resources via CloudBank.org. As applicable, the total cost of the project, including this cloud computing resource request from CloudBank.org, may not exceed the budget limit described in this solicitation.

For example, consider a proposal submitted to the Innovative Resources track, with a total proposal budget limit of up to $200,000 per year. If a PI wishes to request $20,000 in cloud computing resources through CloudBank for a 3 year project, then such a proposal should request, as part of the proposal budget, no more than $580,000. The remaining $20,000 for cloud computing resources should be specified in the Supplementary Document. Suppose an Innovative Resources track proposal is a collaborative 3 year project with two PIs from two different organizations. In that case, each PI may request cloud computing resources separately through independent Supplementary Documents as long as the total budget (on the budget pages plus in the Supplementary Documents) does not exceed $600,000.

Proposers should include "CloudAccess" (one word without spaces) as a keyword on the Project Summary page at the end of the Overview section (before the section on Intellectual Merit) if incorporating this request into the proposal. Proposers

may contact CloudBank.org (see https://www.cloudbank.org/faq ⧉) for consultation on estimating the budget for using cloud computing resources.

See below for specific instructions on how to describe the CloudAccess request in the Project Summary and the Other Supplementary Documents.

Title: To assist NSF staff in sorting proposals for review, proposal titles must include "Innovative Resources" or "Sustained Resources".

Project Summary (1-page limit): If cloud computing resources are being requested from CloudBank.org, then the keyword "CloudAccess" (one word without space) should be included at the end of the Overview section (before the section on Intellectual Merit) of the Project Summary page. Similarly, if high-throughput computing (HTC) resources are being requested, then the keyword "HTCAccess" (one word without space) should be included at the end of the Overview section (before the section on Intellectual Merit) of the Project Summary page.

Project Description: For all projects, in addition to intellectual merit and broader impacts, the proposal Project Description should include sections describing how the proposed work meets the Essential Elements described in the Program Description for this solicitation. The maximum page length for the Project Description for Innovative Resources track proposals is 15 pages including all figures and charts. The maximum page length for the Project Description for Sustained Resources track proposals is 20 pages including all figures and charts.

Budget: The project's total budget, including any cloud computing resource request from CloudBank.org, may not exceed the budget limits for the respective tracks described in this solicitation (as applicable). The total cost of the cloud computing resources requested from CloudBank.org should not be included in the NSF budget and should be specified only in the associated supplementary document (see below for additional instructions).

Other Supplementary Documents:

In addition to the guidance specified in the PAPPG, the following Supplementary Documents should be included as applicable. Proposals missing any of the required documents may be returned without review. Each proposal (the lead proposal for collaborative projects) must submit the following documents, as applicable:

1. **Letters of Collaboration (if applicable):** Letters must be provided for any organization or individuals that are mentioned in the Project Description but are not receiving funds (i.e., mentioned in the proposal and not listed in any of the associated budgets).

2. **High-Throughput Computing Resources (if applicable):** If requesting high-throughput computing (HTC) resources, include a description of the requests (not to exceed 2 pages) as a supplementary document that includes (1) title of the proposal; (2) institution name; (3) the anticipated total HTC resources required, with yearly breakdown; and (4) a technical description and justification for the request. The latter should include information regarding (a) the expected number of self-contained tasks per ensemble – note that each task can be packaged into one or more batch job; (b) the resource requirements for each task type in the ensemble – for example, requirements for cores, memory, wall-time, and scratch space; (c) the expected number of ensembles; (d) the expected input and output data requirements for each task type; and (e) the expected number and size of shared input files within an ensemble – expected number of times each file is read per ensemble. Proposers should include "HTCAccess" (one word without space) as a keyword on the Project Summary page, at the end of the Overview section (before the section on Intellectual Merit).

3. **Cloud Computing Resources (if applicable):** If requesting cloud computing resources, include a description of the requests (not to exceed 2 pages) as a supplementary document that includes: (1) title of the proposal; (2) institution name; (3) the anticipated total cost of computing resources, with yearly breakdown; (4) which public cloud providers will be used; and (5) a technical description and justification of the request, along with how the cost was estimated. The NSF Budget should not include any such costs for accessing public cloud computing resources via CloudBank.org. As applicable, the total cost of the project, including this cloud computing resource

request from CloudBank.org, may not exceed the budget limit described in this solicitation. Proposers should include "CloudAccess" (one word without space) as a keyword in the Project Summary page, at the end of the Overview section (before the section on Intellectual Merit).

Please note that Research.gov currently can accept only one file for Other Supplementary Documents. If submitting via Research.gov, please combine all documents designated as Other Supplementary Documents into one PDF.

Additional Single Copy Documents:

In addition to the guidance specified in the PAPPG, the following Additional Single Copy Documents should be included as applicable. Proposals missing any of the required documents may be returned without review. Each proposal (the lead proposal for collaborative projects) must submit the following documents, as applicable:

- **Concept Outline response (if applicable):** For Sustained Resources proposals, the Geoinformatics Program Officer response email to the Concept Outline must be uploaded under Additional Single Copy Documents.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Budget Preparation Instructions:

Prospective PIs are reminded that proposals with budgets exceeding the maximum total (if applicable) will be returned without review. For this purpose, a multi-organization collaborative project is treated as one proposal for which the above limits apply.

C. Due Dates

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

    December 01, 2023

        Innovative Resources and Sustained Resources. Prior to submission of full proposals, investigators for the Sustained Resources track are required to submit a Concept Outline, which is due at least three (3) months before the full proposal target date.

    December 06, 2024

        Sustained Resources only. Prior to submission of full proposals, investigators for the Sustained Resources track are required to submit a Concept Outline, which is due at least three (3) months before the full proposal target date.

    December 05, 2025

        Innovative Resources only

D. Research.gov/Grants.gov Requirements

For Proposals Submitted Via Research.gov:

    To prepare and submit a proposal via Research.gov, see detailed technical instructions available at: https://www.research.gov/research-portal/appmanager/base/desktop?
    _nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationa
    For Research.gov user support, call the Research.gov Help Desk at 1-800-673-6188 or e-mail rgov@nsf.gov.
    The Research.gov Help Desk answers general technical questions related to the use of the Research.gov

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: https://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 Research.gov for further processing.

Proposers that submitted via Research.gov may use Research.gov 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 *Leading the World in Discovery and Innovation, STEM Talent Development and the Delivery of Benefits from Research - NSF Strategic Plan for Fiscal Years (FY) 2022 - 2026*. 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.D.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.D.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 other underrepresented groups 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 evaluated on how successfully they meet the Additional Essential Elements described in the Program Description (see Section II for details):

1. **Metrics and Assessment**. How well do proposed metrics and/or other assessment mechanisms provide effective approaches to evaluating success? Are appropriate plans in place to monitor progress throughout the project to inform cyberinfrastructure development that is responsive to user needs?

2. **Sustainable Management**. How well do proposed plans for project management, governance, scalability, and sustainability articulate effective mechanisms to adapt to user needs and to ensure continuity of outcomes beyond project completion? Are appropriate plans in place for partnerships? For the Sustained Resources track, is

each proposed major activity achievable based on the description of expected personnel roles and responsibilities, timeline of work, and breakdown of work commitments, costs, and deliverables?

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 or the Division of Acquisition and Cooperative Support 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 an NSF Grants and Agreements Officer. 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) 292-8134 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=pappg.

Administrative and National Policy Requirements

Build America, Buy America

As expressed in Executive Order 14005, Ensuring the Future is Made in All of America by All of America's Workers (86 FR 7475), it is the policy of the executive branch to use terms and conditions of Federal financial assistance awards to maximize, consistent with law, the use of goods, products, and materials produced in, and services offered in, the United States.

Consistent with the requirements of the Build America, Buy America Act (Pub. L. 117-58, Division G, Title IX, Subtitle A, November 15, 2021), no funding made available through this funding opportunity may be obligated for an award unless all iron, steel, manufactured products, and construction materials used in the project are produced in the United States. For additional information, visit NSF's Build America, Buy America webpage.

Special Award Conditions:

Some awards associated with the Sustained Resources track of this solicitation may be made as Cooperative Agreements (CAs) that fund annual awardee operations in accordance with annual work plans approved by NSF prior to each year of work. 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.

Ensuring Adequate COVID-19 Safety Protocols

Any cooperative agreement awarded in response to this solicitation will contain the following term and condition:

(a) This clause implements Section 3(b) of Executive Order 14042, Ensuring Adequate COVID Safety Protocols for Federal Contractors, dated September 9, 2021 (published in the Federal Register on September 14, 2021, 86 FR 50985). Note that the Department of Labor has included "cooperative agreements" within the definition of "contract-like instrument" in its rule referenced at Section 2(e) of this Executive Order, which provides:

For purposes of this order, the term "contract or contract-like instrument" shall have the meaning set forth in the Department of Labor's proposed rule, "Increasing the Minimum Wage for Federal Contractors, " 86 Fed. Reg. 38816, 38887 (July 22, 2021). If the Department of Labor issues a final rule relating to that proposed rule, that term shall have the meaning set forth in that final rule.

(b) The awardee must comply with all guidance, including guidance conveyed through Frequently Asked Questions, as amended during the performance of this award, for awardee workplace locations published by the Safer Federal Workforce Task Force (Task Force Guidance) at https://www.saferfederalworkforce.gov/contractors/.

(c) *Subawards*. The awardee must include the substance of this clause, including this paragraph (c), in subawards at any tier that exceed the simplified acquisition threshold, as defined in Federal Acquisition Regulation 2.101 on the date of subaward, and are for services, including construction, performed in whole or in part within the United States or its outlying areas. That threshold is presently $250,000.

(d) *Definition*. As used in this clause, *United States or its outlying areas* means:

(1) The fifty States;

(2) The District of Columbia;

(3) The commonwealths of Puerto Rico and the Northern Mariana Islands;

(4) The territories of American Samoa, Guam, and the United States Virgin Islands; and

(5) The minor outlying islands of Baker Island, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Midway Islands, Navassa Island, Palmyra Atoll, and Wake Atoll.

(e) The Foundation will take no action to enforce this article, where the place of performance identified in the award is in a U.S. state or outlying area subject to a court order prohibiting the application of requirements pursuant to the Executive Order (hereinafter, "Excluded State or Outlying Area". A current list of such Excluded States and Outlying Areas is maintained at https://www.saferfederalworkforce.gov/contractors/.

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:

- Raleigh L. Martin, telephone: (703) 292-7199, email: geoinformatics@nsf.gov
- Nicole Gasparini, telephone: (703) 292-8550, email: geoinformatics@nsf.gov
- Luciana Astiz, telephone: (703) 292-4705, email: geoinformatics@nsf.gov

For questions related to the use of NSF systems contact:

- NSF Help Desk: 1-800-673-6188
- Research.gov Help Desk e-mail: rgov@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 https://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 (FASED) 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.F.7 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**   (703) 292-5111
  (NSF Information Center)**:**

- **TDD (for the hearing-impaired):**   (703) 292-5090

- **To Order Publications or Forms:**

    Send an e-mail to: nsfpubs@nsf.gov

    or telephone: (703) 292-8134

- **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 System of Record Notices, NSF-50, "Principal Investigator/Proposal File and Associated Records," and NSF-51, "Reviewer/Proposal File and Associated Records." 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
Policy Office, Division of Institution and Award Support
Office of Budget, Finance, and Award Management
National Science Foundation
Alexandria, VA 22314

Vulnerability disclosure | Inspector General | Privacy | FOIA | No FEAR Act | USA.gov | Accessibility |
Plain language |

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