

Dynamics of Integrated Socio-Environmental Systems (DISES)

PROGRAM SOLICITATION

NSF 20-579

REPLACES DOCUMENT(S):

NSF 19-528



National Science Foundation

Directorate for Geosciences
Division of Research, Innovation, Synergies, and Education

Directorate for Biological Sciences
Division of Environmental Biology

Directorate for Social, Behavioral and Economic Sciences
Division of Behavioral and Cognitive Sciences

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

November 16, 2020

November 15, Annually Thereafter

November 15, 2021

November 15, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

Important Information

Innovating and migrating proposal preparation and submission capabilities from FastLane to Research.gov is part of the ongoing NSF information technology modernization efforts, as described in [Important Notice No. 147](#). In support of these efforts, research proposals submitted in response to this program solicitation must be prepared and submitted via Research.gov or via Grants.gov, and may not be prepared or submitted via FastLane.

Revision Notes

This solicitation is an update of the program previously known as CNH and CNH2. For this revision, we have changed the abbreviation associated with the program to more accurately reflect the actual title and to reinforce the differences between this solicitation and the earlier programs from which it is derived. The DISES program acknowledges a continuum of environments from those with very limited human populations (e.g. polar regions) to those in which human systems and processes fully dominate (e.g. densely populated megacities). There are integrated systems operating in all these spaces, and many can be considered as domains for DISES study. For the purposes of this solicitation, we define the "socio" or human component of the system as one predominantly governed by human decisions, actions, and behaviors, and we define the "environmental" component of the system as one predominantly governed by biological, physical, and chemical processes. DISES projects can include research that investigates integrated socio-environmental systems in agricultural as well as in urban settings.

Letters of Intent (LOI) are no longer required or accepted.

Restrictions on the number of proposals per PI or co-PI have been removed.

The distinction between Small and Large proposals has been eliminated. All research proposals will be submitted as DISES with a maximum page length in the Project Description of 18 pages.

DISES will continue to accept RCN proposals (DISES-RCN). Maximum page length for the DISES-RCN Project Description is 15 pages.

The proposed budget must include funds to cover travel costs of two members of the research team to participate in an annual PI meeting in Alexandria, VA.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) ([NSF 22-1](#)), which is effective for proposals submitted, or due, on or after October 4, 2021.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Dynamics of Integrated Socio-Environmental Systems (DISES)

Synopsis of Program:

The DISES Program supports research projects that advance basic scientific understanding of integrated socio-environmental systems and the complex interactions (dynamics, processes, and feedbacks) within and among the environmental (biological, physical and chemical) and human ("socio") (economic, social, political, or behavioral) components of such a system. The program seeks proposals that emphasize the truly integrated nature of a socio-environmental system versus two discrete systems (a natural one and a human one) that are coupled. DISES projects must explore a connected and integrated socio-environmental system that includes explicit analysis of the processes and dynamics between the environmental and human components of the system.

PIs are encouraged to develop proposals that push conceptual boundaries and build new theoretical framing of the understanding of socio-environmental systems. Additionally, we encourage the exploration of multi-scalar dynamics, processes and feedbacks between and within the socio-environmental system.

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.

- Richard F. Yuretich, Lead PO, telephone: (703) 292-4744, email: DISES@nsf.gov
- Elizabeth R. Blood, Lead PO, telephone: (703) 292-4349, email: DISES@nsf.gov
- Jeffrey W. Mantz, Lead PO, telephone: (703) 292-7783, email: DISES@nsf.gov

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

- 47.050 --- Geosciences
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 9 to 15

DISES will support research projects and Research Coordination Networks (RCN).

1. DISES research project awards will be two to five years in duration with a budget up to \$1,600,000.
2. DISES-RCN awards will be four or five years in duration with a budget up to \$500,000.

Anticipated Funding Amount: \$15,000,000 to \$18,000,000

The amount of funding is approximate, pending 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 labs, professional societies and similar organizations in the U.S. 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:**

Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):
 - November 16, 2020
 - November 15, Annually Thereafter
 - November 15, 2021
 - November 15, Annually Thereafter

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:

Standard NSF award conditions apply.

Reporting Requirements:

Standard NSF reporting requirements apply.

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I. INTRODUCTION

The DISES Program supports research projects that advance new conceptualizations and scientific knowledge of the complex interactions (dynamics, processes, and feedbacks) within and among environmental (biological, physical, chemical) and human (economic, social, political, or behavioral) components of an integrated socio-environmental system.

DISES is a standing program jointly operated by three NSF directorates (Biological Sciences; Geosciences; and Social, Behavioral, and Economic Sciences). DISES provides support only for proposals submitted to the annual DISES competition. DISES does not engage in co-review with other NSF programs and does not consider RAPID, EAGER, or other proposals that are not reviewed by the DISES panels.

For more information about DISES, consult the relevant website at https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13681.

II. PROGRAM DESCRIPTION

The human population on Earth has had an impact on virtually all aspects of the Earth's near-surface environment and distinguishing between separate human and natural sub-systems is no longer clear or obvious since these are often overlapping and can be considered integrated socio-environmental systems. Such systems include a continuum of environments from those with limited human populations (e.g. polar regions) to those in which human systems and processes mostly dominate (e.g. densely populated megacities). In all these spaces there are integrated systems operating, and many can be considered as domains for DISES study. For the purposes of this solicitation, we define the "socio" or human component of the system as one predominantly governed by human decisions, actions, and behaviors, and we define the "environmental" component of the system as one predominantly governed by biological, physical, and chemical processes. DISES projects can, therefore, include research that investigates integrated socio-environmental systems in agricultural and urban settings, as well as areas more distant from intensive human influence.

DISES projects must clearly identify a socio-environmental system, synthesis of multiple socio-environmental systems, or problem(s) that are amenable to investigation from both environmental-science and social-science perspectives. The analysis of the socio-environmental system must include and integrate the processes through which the environmental components impact or modify the human components, and the reciprocal processes through which the human components impact or modify the environmental component.

DISES projects should examine human societies and environmental characteristics as system components comprised of many individuals or processes at local, regional or global scales. Projects in which either of these components under study stands by itself or focuses on a singular component, process, or organism are unlikely to be supported by DISES.

DISES projects should address research questions that will advance theory in the science of socio-environmental systems or related interdisciplinary fields such as Coupled Human and Natural Systems (CHANS) as well as make contributions in specific disciplines. A DISES research proposal should demonstrate how the proposed research is grounded in relevant theory and on the ability to produce generalizable knowledge, such as, advancing basic conceptual models of how integrated socio-environmental systems interact over a variety of spatial and temporal scales.

Projects that are of interest to a range of sciences and extend across the human and environmental sciences are encouraged. Narrow case studies and projects that are entirely empirical or applicable only to a restricted locality should be avoided. Proposals should present novel, clear, and non-trivial hypotheses (or pose cogent research questions) that can be tested using a scientifically sound research design that employs established or innovative new methods, or a strong integration of several methods. Projects likely to improve capabilities for predicting the responses of integrated systems to endogenous and exogenous changes, including appropriate estimates of uncertainty in model predictions, are encouraged.

The predecessors to the DISES program, CNH and CNH2, have been models of convergence research, and DISES seeks to remain at the forefront of this effort. NSF identifies convergence research as having two primary characteristics:

- Research driven by a specific and compelling problem. Research requiring a convergence paradigm is generally inspired by the need to address a specific challenge or opportunity, whether it arises from deep scientific questions or pressing societal needs.
- Deep integration across disciplines. As experts from different disciplines pursue common research challenges, their knowledge, theories, methods, data, research communities and languages become increasingly intermingled or integrated. New frameworks, paradigms or disciplines can form from sustained interactions across multiple communities.

The convergence paradigm builds upon transdisciplinary approaches to research by intentionally bringing together intellectually diverse scientists, engineers, or both at a project's inception in new collaborations that can generate multiple solutions to complex problems.

DISES research teams should have expertise and management capacity that enables the team to conduct the proposed research effectively. Project personnel should include expertise from both environmental and human (social) sciences; most competitive proposals demonstrate this via a group of investigators working together as a team. Expertise can be demonstrated by earned degrees from disciplines, current departmental and center affiliations, or experience, details of which can be included in the relevant section of the Project Description, the PI Biographical Sketches, and in the Project Management Plan.

DISES also supports **DISES Research Coordination Networks (DISES-RCN)**, which encourage new research directions by supporting groups of researchers

to communicate and coordinate their research, educational, and training activities across disciplinary, organizational, and geographic boundaries. A DISES-RCN should not support either planning or conduct of individual research projects, but it should facilitate future basic research across scientific communities. The scientific work to be advanced must be defined by a relevant socio-environmental system. DISES-RCN awards support the means by which investigators can share information and ideas, foster synthesis and new collaborations, develop community standards, and in other ways advance science and education through communication and sharing of ideas. DISES-RCN awards are not meant to support existing networks or the activities of established collaborations.

A DISES-RCN may receive support for four or five years of activity at a level not to exceed \$500,000 for the total budget over the duration of the project, including both direct and indirect costs.

DISES-RCN organizers should follow the special instructions for preparation of proposals in the latter part of this solicitation. These instructions supplement the guidance given in the general RCN solicitation ([NSF 17-594](#))

Intellectual Merit: Topical and Data Considerations

Although the DISES program is open to and accepts proposals addressing a wide-range of topics, submitting investigators are encouraged to develop proposals that are thematically related to current and emerging NSF-wide activities. As of the time of writing these include the 10 Big Ideas, accessible via https://www.nsf.gov/news/special_reports/big_ideas/index.jsp, and initiatives supported by the Advisory Committee on Environmental Research and Education (ERE). There will likely be other forthcoming emphasis areas, such as research related to the COVID-19 pandemic, and we encourage PIs to look for these on the NSF website.

Use of NSF-supported data networks, data bases, centers, and other forms of scientific infrastructure. Proposals that use current or planned data, samples, or assignable assets from NSF-supported activities, or those that enhance broader scientific infrastructure, are especially encouraged for submissions to DISES. Among these resources are the following: the National Ecological Observatory Network (NEON); database networks and resources such as the Hydrologic Information System of the Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI), the General Social Survey (GSS), the Panel Study of Income Dynamics (PSID), and the Federal Statistical Research Data Centers (FSRDCs); research networks such as the Long Term Ecological Research (LTER) network; research observatories such as the Ocean Observing Initiative (OOI); community models and data sets developed and maintained by the National Center for Atmospheric Research (NCAR); field stations; synthesis centers; and ongoing and proposed academic and federal programs. In all cases, however, proposals must clearly demonstrate how the research will develop fundamentally new knowledge and enhance theory.

Broader Impacts: Emphasis Areas

DISES projects must show promise of strong broader impacts with respect to one or more of the following kinds of activity: (1) providing special education and training opportunities related to socio-environmental research in particular and to convergent research more generally; (2) broadening the diversity of scholars engaged in socio-environmental research; (3) contributing to the infrastructure for future socio-environmental research; (4) using DISES research for societal benefit; and (5) disseminating results beyond the academy. Stakeholder engagement at project inception is encouraged, as are projects that consider co-production of knowledge, are use-inspired, and lead to actionable scientific research while advancing theory. The engagement with and inclusion of "citizen-science" (also known as "participatory science," "community-based science," or "public science") is highly encouraged.

International research

PIs of DISES proposals who anticipate conducting research in international locations are reminded that the research conducted overseas needs to have explicit attention to the potential benefits to US society of that research. The current PAPPG provides guidance about international research, including additional specific conditions on subawards to Foreign Organizations. PIs considering DISES research in non-U.S. locations need to be sure to:

1. Involve local scientists as full collaborators in the design and conduct of the research project;
2. Include Broader Impacts that have clear potential to benefit U.S. society;
3. Emphasize Intellectual Merit that focuses on the broader applicability of the theoretical aspects of the research beyond the specific location of the project.

III. AWARD INFORMATION

DISES will support research projects and Research Coordination Networks (RCN).

1. DISES research project awards will be two to five years in duration with a budget up to \$1,600,000.
2. DISES-RCN awards will be four or five years in duration with a budget up to \$500,000.

Anticipated Funding Amount: \$15,000,000 to \$18,000,000

The amount of funding is approximate, pending availability of funds.

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.

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.

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.

See PAPPG Chapter II.C.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.

Proposal Format

Proposals not in conformance with the proposal preparation requirements of the PAPPG or *NSF Grants.gov Application Guide* or the requirements within this solicitation will be returned without review. Please note, however, that the page limits contained in this solicitation take precedence over those given in the PAPPG and *NSF Grants.gov Application Guide*.

Proposal Sections with Special Instructions for Proposals Submitted in Response to This Solicitation

The following sections of the proposal are mandatory and should be prepared in accordance to the following supplementary instructions as well as to guidance in the NSF PAPPG or the *NSF Grants.gov Application Guide*.

Proposal Cover Sheet

The program solicitation number should be specified.

For the NSF organizational unit to consider the proposal, select one of the following: ICER-DISES; BCS-DISES; or DEB-DISES. Regardless of which NSF unit you select, all DISES proposals will be collectively managed by the cross-directorate team of DISES program directors. Designation of multiple DISES entries is superfluous. Because DISES does not engage in co-review with regular NSF programs, no other program or competition should be specified on the cover sheet.

Proposal Title

The title of the proposal should begin with the prefix "DISES:" for a regular research proposal or "DISES-RCN" for a Research Coordination Network proposal.

The rest of the title of the proposal should describe the project in concise, informative language so that a scientifically or technically literate reader could understand what the project is about. The title should avoid study site location, and instead emphasize the scientific work to be undertaken. Proposers should not use cute or attention-grabbing subtitles, because such phrases will lead reviewers to question the intellectual significance of the project.

Personnel Listed on the Cover Sheet

Provide complete information requested on the cover sheet for the PI and for up to four co-PIs.

For DISES-RCN proposals, the network coordinator should be listed as the PI and up to four members of the DISES-RCN steering committee may be listed as co-PIs. Other members of the DISES-RCN steering committee should be treated as other senior personnel.

Project Description

The Project Description **must** include an explicit identification and discussion of the integrated socio-environmental system under consideration and the environmental and human elements of that system. This section **must** be clearly labelled as "The Socio-Environmental System" and may appear anywhere in the Project Description.

DISES-RCN Leadership: This section should list the names and affiliations of the individual who will serve as the lead coordinator and the other individuals who will serve as members of the DISES-RCN steering committee. This section must not be more than one page in length and must be the first page of the Project Description. All members of the DISES-RCN steering committee should be considered as senior personnel and a biographical sketch and current and pending support information must be provided for each steering committee member.

Page Limits:

Project descriptions for DISES research proposals are limited to 18 pages in length.

Project descriptions for DISES-RCN proposals are limited to 15 pages in length.

Special Information and Supplementary Documentation

Project Management Plan (PMP)

All DISES research proposals must include a Project Management Plan to be included as a **Supplementary Document** and be no more than two (2) pages in length. The management plan should (1) describe all the people involved with the project, (2) specify their expertise relevant to the project scope, and (3) describe the specific tasks each member of the research team is expected to oversee. The management plan must include a Project Timeline that specifies milestones and expected completion dates of project deliverables. DISES-RCN proposals will have the management plan as part of the Project Description as outlined in [NSF 17-594](#) and an additional PMP is not required.

Post-Doctoral Mentoring Plan (PDMP)

As specified in the NSF PAPPG and the comparable section of the *NSF Grants.gov Application Guide*, a post-doctoral mentoring plan must be provided if any funding is requested to support a post-doctoral researcher in the proposal budget. This is required whether the funding for the post-doctoral researcher(s) is requested in the lead institution's budget or through a subaward. The post-doc mentoring plan must be no longer than one (1) page in length for the project and must be included as a supplementary document. In addition to guidance on the preparation for PDMPs in the PAPPG, the DISES program wants to see activities in the mentoring plan that prepare the post-doc for conducting interdisciplinary and convergent science; leading and managing interdisciplinary science teams; and provide exposure across the environmental and human sciences represented in the project. In addition, and as appropriate, the PDMP should demonstrate that the post-doc will receive training in cross-cultural fieldwork settings.

DISES does not permit the inclusion of a *graduate or undergraduate student* mentoring plan as a supplementary document. Proposals may include such plans in the project description.

Data-Management Plan (DMP)

NSF places high priority on the availability of project data to a broad research community. DISES proposals must articulate milestones and deliverables for information management, hereafter referred to as Data Management Plan (DMP), consistent with wording and formatting guidance provided in the NSF PAPPG (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg) and the comparable section of the NSF Grants.gov Application Guide.

It is expected that data and data products derived from DISES funding will be made freely and publicly available within a maximum of two years of the end of the project. The DMP should document the complete data life cycle within the project's research and education mission. It should describe how data management is involved in study design, data collection, processing, validation, documentation, curation, access, analysis, and publication. The DMP should also document policies and procedures for meeting the project's obligation for dissemination of data and related products in accordance with the NSF PAPPG. It should specify clearly what datasets will be produced and where and when they will be made public. Policies regarding prioritization, delay, or limits on access must be justified. If the proposed project involves international collaboration, the DMP must describe agreements with foreign partners that assure access to data produced under the DISES award. In the event of an award, annual reports should include information on the progress of the collection and public availability of these data.

Because DISES research may involve significant data collection, harvesting, integration, assimilation, and modeling among collaborators, the DISES data management and access plan should contain detailed descriptions of the data sets that will be collected or collated, including their sources and plans for interpretation or analysis, for preservation, documentation, and sharing of data, samples, and physical collections, and for their final disposition. The DISES program does not currently prescribe where data must be deposited other than it must be in a national, public data repository that publishes its contents to a higher-level data aggregator that facilitates data discovery. This public repository should be registered with an international body that promotes best practices in data archiving and curation (e.g. <https://www.re3data.org/>). Examples of appropriate data repositories include the Environmental Data Initiative (<https://portal.edirepository.org/nis/home.jsp>), which is supported by NSF to accelerate curation and archiving of environmental data), the Inter-university Consortium for Political and Social Research (<https://www.icpsr.umich.edu/icpsrweb/>), the Biological and Chemical Oceanography Data Management Office (<http://www.bco-dmo.org/>), the Arctic Data Center (<https://arcticdata.io/>), and the Knowledge Network for Biocomplexity (<https://knb.ecoinformatics.org/>). DISES projects are responsible for knowing the standards for data and metadata quality set by these repositories and for ensuring that their data meet these standards.

The Data Management Plan will be reviewed as part of the intellectual merit or broader impacts of the proposal, or both, as appropriate. The data management plan should include plans to disseminate all models, computational programs and scripts, their data sources, and provide information on model calibration and validation information. It should not contain an elaboration of model theory, equations, or algorithms that belong in the Project Description. The NSF encourages appointment of a data management coordinator where appropriate.

Letters of Collaboration

If letters of collaboration are included, the DISES program requires the use of the template for Letters of Collaboration as specified in the PAPPG. Any deviations from the use of the template for these letters will result in the return of the proposal without review.

IRB and IACUC Certifications

Follow current PAPPG guidance.

Research at Undergraduate Institutions (RUI) Supplementary Documents

Follow current PAPPG guidance.

Research Experiences for Undergraduates (REU) Supplementary Documents

If a proposal submitted to DISES includes support for undergraduate students in accordance with provisions outlined in the Research Experiences for Undergraduates (REU) solicitation, text describing the nature of the REU activities must be included in the project description. Such text cannot be included as a supplementary document in a proposal submitted to DISES. (Note that this guidance runs counter to text in the REU solicitation, but because the proposal is being submitted to DISES, the DISES guidance must be used). The total budget request, including the REU supplement, may not exceed \$1,600,000. REU supplements will not be considered after an award is issued.

Other Supplementary Documents

Unless authorized in this solicitation (such as the required Project Management Plan), in the PAPPG, or the *NSF Grants.gov Application Guide*, **no other materials should be included in this section**. Survey or interview protocols are not permitted in this section, nor are reprints of articles previously published by the investigators. Proposals that include materials in this section that are appropriate in the project description but are inappropriate as supplementary documents will be returned without review.

Appendices

No appendices are permitted.

Other Issues to Address When Preparing a Proposal for This Solicitation

Proposals Involving Multiple Organizations

In the case of a proposal involving multiple organizations, a single organization must be identified as the prime, and a single proposal describing the entire project must be submitted by that organization. Funds must be distributed among partner organizations via subawards from the prime organization. A budget on the standard NSF budget form should be submitted for each subawardee. The requirement for a single organization to submit the sole proposal for a project is designed to facilitate effective coordination among participating organizations and to avoid difficulties that ensue in funded projects when individuals change organizations or cease to fulfill project responsibilities. Of the two types of collaborative proposal formats described in the NSF PAPPG, this solicitation allows only a single proposal submission with subawards administered by that prime organization. Direct submission of linked collaborative sets of proposals by multiple organizations is not permitted.

Proposals Involving Collaborators at Foreign Organizations

As a general principle, NSF expects to support the U.S. side of a research and education collaboration. International collaborators should normally seek funding from their own funding sources. However, a foreign institution may receive limited funding through a subaward if this is the most effective way to accomplish the proposed research and if the foreign partner is making a substantive contribution to the project, following guidance issued by NSF's Office of International Science and Engineering (OISE). These are: mutual benefit of the international collaboration for all partners; true intellectual collaboration with the international partner(s); and benefits to be realized from the expertise and specialized skills, facilities, sites or resources of the international counterpart.

While non-U.S. institutions are not eligible to submit proposals to this competition, the prime U.S. institution may, in limited cases, and meeting special conditions, request funding for non-U.S. institutions through subawards. Please be aware of the special conditions for subawards to Foreign Organizations are elaborated in the PAPPG and must be met for a proposal to be compliant. Indirect costs for such organizations should be determined in accordance with guidance provided in Chapter II.C.2.g.viii of the NSF PAPPG and the comparable section of the *NSF Grants.gov Application Guide*.

Proposers are reminded they must provide biographical sketches of all senior project personnel, including those associated with foreign organizations.

Letters of collaboration (prepared in accordance with the guidelines specified in an earlier subsection in this solicitation) must be provided as supplementary documents (using format as per PAPPG) from organizations that will not be supported through subawards.

Subawards

In accordance with the applicable award terms and conditions, proposers are reminded of their responsibilities with regard to subawardees. Should an award be made, the prime awardee is responsible conveying the appropriate terms and conditions to, as well as being responsible for the management and oversight of, any subawardees on the project, including any foreign subawardees. Please be aware of special conditions for subawards to Foreign Organizations outlined in PAPPG.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

Other budgetary limitations apply. Please follow PAPPG guidance and see the full text of this solicitation for further information.

C. Due Dates

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

November 16, 2020

November 15, Annually Thereafter

November 15, 2021

November 15, Annually Thereafter

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/ProposalPreparationandSubmission.html. 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 the NSF FastLane system 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 *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 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

In addition to the standard NSF review criteria, DISES proposals will be evaluated with respect to the degree to which the project addresses the two-way interactions in the chosen socio-environmental system(s); the degree to which the project will yield positive broader impacts in ways directly aligned with DISES program goals; and the efficacy of the proposed Project Management Plan (PMP). These special criteria are similar in character to the criteria used for the previous CNH and CNH2 competitions.

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) 292-8134 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.

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

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:

- Richard F. Yuretich, Lead PO, telephone: (703) 292-4744, email: DISES@nsf.gov
- Elizabeth R. Blood, Lead PO, telephone: (703) 292-4349, email: DISES@nsf.gov
- Jeffrey W. Mantz, Lead PO, telephone: (703) 292-7783, email: DISES@nsf.gov

For questions related to the use of FastLane or Research.gov, contact:

- FastLane and Research.gov Help Desk: 1-800-673-6188
- FastLane Help Desk e-mail: fastlane@nsf.gov.
- 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 (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: nsfpubs@nsf.gov
 - or telephone: (703) 292-8143
- **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

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National Science Foundation, 2415 Eisenhower Avenue, Alexandria, Virginia 22314, USA
 Tel: (703) 292-5111, FIRS: (800) 877-8339 | TDD: (703) 292-5090 or (800) 281-8749

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