

# Cyberinfrastructure for Environmental Observatories: Prototype Systems to Address Cross-Cutting Needs (CEO:P)

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## Program Announcement

NSF 06-505

**This solicitation has been archived.**



**National Science Foundation**  
Directorate for Biological Sciences  
Directorate for Engineering  
Directorate for Geosciences  
Office of Cyberinfrastructure

## Full Proposal Target Date(s):

January 25, 2006

## SUMMARY OF PROGRAM REQUIREMENTS

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### General Information

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#### Program Title:

Cyberinfrastructure for Environmental Observatories: Prototype Systems to Address Cross-Cutting Needs (CEO:P)

#### Synopsis of Program:

Spatially extensive observing systems for environmental research, together with the increasingly interdisciplinary nature of research on the dynamics of complex environmental systems, create the need for a sophisticated information infrastructure to support these observing systems and to facilitate the integrated use of data from them. There are a number of questions about how to best construct such a cyberinfrastructure. To help answer these questions and to promote planning for Cyberinfrastructure for Environmental Observatories (CEO), this solicitation requests proposals for the development of practical environmental cyberinfrastructure prototypes along with a demonstration of their capability to answer significant environmental research questions. Proposals should be for projects that pursue an end-to-end approach to an information infrastructure prototype. Proposals should identify the types of data involved and the ways in which users might wish to use such data. The proposed projects should include the careful exploration of use cases followed by deployment of a prototype that implements these use cases.

#### Cognizant Program Officer(s):

- Stephen Meacham, ITR Program Director, Directorate for Geosciences, Division of Atmospheric Sciences, 1145 S, telephone: (703) 292-8970, fax: (703) 292-9060, email: [smeacham@nsf.gov](mailto:smeacham@nsf.gov)
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- Elizabeth R. Blood, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N, telephone: (703) 292-8470, email: [eblood@nsf.gov](mailto:eblood@nsf.gov)
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- Patrick L. Brezonik, Program Director, Directorate for Engineering, Division of Bioengineering & Environmental Systems, 565 S, telephone: (703) 292-8320, fax: (703) 292-9098, email: [pbrezoni@nsf.gov](mailto:pbrezoni@nsf.gov)

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

- 47.074 --- Biological Sciences
- 47.041 --- Engineering
- 47.050 --- Geosciences

#### Eligibility Information

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- **Organization Limit:** None Specified.
- **PI Eligibility Limit:** None Specified.
- **Limit on Number of Proposals:** None Specified.

#### Award Information

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- **Anticipated Type of Award:** Standard or Continuing Grant
- **Estimated Number of Awards:** 4
- **Anticipated Funding Amount:** \$8,500,000 - subject to availability of funding.

#### Proposal Preparation and Submission Instructions

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##### A. Proposal Preparation Instructions

- **Full Proposal Preparation Instructions:** This solicitation contains information that supplements the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information.

##### B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required by NSF.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Not Applicable.

##### C. Due Dates

- **Full Proposal Target Date(s):**  
January 25, 2006

#### Proposal Review Information

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

#### Award Administration Information

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- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

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# I. INTRODUCTION

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Spatially extended, terrestrial, atmospheric and aquatic observing systems (environmental observatories), such as those proposed as part of the Ocean Observatories Initiative (OOI), the National Ecological Observatory Network (NEON), the Collaborative, Large-Scale, Engineering Analysis Network for Environmental Research (CLEANER), and the Constellation Observing System for Meteorology, Ionosphere and Climate (COSMIC) will greatly augment the existing collection of environmental observations and facilitate environmental research at a broad range of scales. By harnessing innovations in sensor and networking technology, environmental observatories will expand the types and quality of data available to environmental researchers. Significant factors in the effectiveness of these observatories will be the degree to which the data they collect are made readily available to a wide cross-section of the environmental research community, the range of tools that researchers can bring to bear on the analysis of these data, and the ease with which resources, both data and tools, can be discovered and used. There has been a growing recognition that many of the frontiers in environmental research are associated with understanding the dynamics of complex environmental systems (see the report, [http://www.nsf.gov/geo/ere/ereweb/acere\\_synthesis\\_rpt.cfm](http://www.nsf.gov/geo/ere/ereweb/acere_synthesis_rpt.cfm)) and that many of the associated research questions require interdisciplinary approaches and access to multi-disciplinary datasets. The need to be able to combine data from different environmental observing systems puts an additional constraint on the associated data management systems.

In recent years, information scientists have developed a range of technologies that greatly facilitate the management and analysis of data. For convenience, in this solicitation, these are labeled "cyberinfrastructure," although that term also includes other types of information technology. In order to enable researchers and educators to make the most effective use of environmental observing systems, the environmental and information technology research communities have concluded that a sophisticated information infrastructure will be required to support these observing systems and to facilitate the integrated use of data from them. A number of collaborative research projects are pursuing the development of cyberinfrastructure as a tool for furthering science and engineering research in various disciplines. In the environmental research arena, these projects include the SEEK, SCEC-CME, GEON, ROADNet and LEAD projects. (Please see the Glossary at the end of the Program Description for the definition of acronyms not defined in the body of the text.) In other areas, the BIRN, Tree-of-Life, GriPhyN, NVO, and NEES projects have contributed greatly to the development of information technology for science and engineering. Many of these projects employ general-purpose technology developed as part of the NSF Middleware Initiative (NMI), the PACI program, and computer science research in distributed computing, information integration, and intelligent systems.

While the projects described in the previous paragraph are demonstrating the potential of information technology to permit a larger number of researchers to use diverse data to address complex research questions, a number of questions about how to construct a cyberinfrastructure for environmental observatories remain. Some of these have been identified by the environmental and information technology research communities in recent reports, e.g. "Environmental Cyberinfrastructure Needs for Distributed Sensor Networks,"; "Cyberinfrastructure for Environmental Research and Education,"; and the

presentations collected at <http://www.orionocean.org/office/NSFCyberWkshp.html>. Challenges include: integrating multiple, existing information management systems in different environmental research disciplines; bridging the semantic representations of multiple disciplines within environmental research; expanding the range of resources that can be used by workflow orchestration tools, or other AI-based techniques, to assist users in developing complex, multi-stage processing tasks; supplying technology to support user-configurable event-detection and the execution of event-triggered responses in real-time or near real-time data streams; and providing the ability for users to configure virtual observatories to bring together data streams from sensors in different observing systems.

To address these challenges and to promote Cyberinfrastructure for Environmental Observatories (CEO), this solicitation requests proposals for the development of practical environmental cyberinfrastructure prototypes and a demonstration of their capability to answer significant environmental research questions.

Two important objectives of this solicitation are:

(a) to help insure that the information infrastructure technologies needed to support the widespread use, for cutting-edge research, of large environmental observing systems are available when needed, and

(b) to help environmental research communities and information technologists gain expertise with the technological challenges of deploying such infrastructure so that cyberinfrastructure design can be integrated properly into observatory design and cyberinfrastructure deployment can be integrated properly into observatory deployment.

Competitive proposals will be those that pursue an end-to-end approach to an information infrastructure prototype, discuss the types of data involved, the ways in which users might wish to use these data and how use case scenarios will be developed, and that include a plan for the deployment of a prototype that implements these types of uses. (In this context, an "end-to-end" approach means that the prototype, whatever aspect of cyberinfrastructure is the primary focus, must be capable of working with representative data and being operated by representative users performing tasks that are themselves representative of those needed in the pursuit of environmental research or education activities. The term "use case scenario" consists of a description of how a user wishes to use the system, capturing the desired behavior of the system from the user's point of view. It helps to define the set of interactions needed between external users and a system.)

The solicitation focuses on projects that tackle the issue of how to integrate data from different types of observing systems with different disciplinary foci. It encourages projects which develop prototypes that support a wide collection of users and which are readily generalizable. It also urges projects to leverage existing cyberinfrastructure development efforts, for example those supported through ITR, NMI and SEIII, by utilizing and combining software developed in these projects where possible. Similarly, the solicitation encourages the use of existing sources of data rather than making new observations. Extant environmental observational networks are one potentially fertile source of data. They offer the opportunity to leverage existing activities in the development of emerging environmental observing systems and to produce cyberinfrastructure prototypes that can also advance contemporary environmental research. It is anticipated that successful proposals will involve collaborations between information technologists and environmental researchers from more than one of the following environmental science or engineering fields: ocean science, ecology, atmospheric science, or environmental engineering.

## II. PROGRAM DESCRIPTION

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The intent of this solicitation is to stimulate substantial interdisciplinary collaborations that result in the development and deployment of prototype cyberinfrastructure for environmental observatories and then demonstrate their viability. It is expected that the progress and outcomes of the projects funded will inform the planning of, and development of, an environmental cyberinfrastructure for large-scale, environmental observing systems.

(1) Proposed projects must have all of the following characteristics:

- The project team includes both environmental researchers and information scientists, with environmental researchers from at least two of the following environmental disciplines - ocean science, ecology, atmospheric science, or environmental engineering;
- The project includes the development and deployment of a prototype of a component of cyberinfrastructure for environmental observatories;
- The proposal identifies one or more questions about how cyberinfrastructure for environmental observatories might be designed and function and describes how these will be addressed by the project;
- The project demonstrates the viability of its approach by identifying, in the proposal, one or more compelling environmental research questions that the prototype will be used to address and then tackles these within the lifetime of the project;

- The project works with real environmental data, includes a mechanism for general users to access the prototype, and demonstrates the utility of its approach by attracting users outside of those researchers directly involved in the project. (The proposal should include a plan describing how this will be achieved, describing the types of users targeted, and describing how the users' experiences with the prototype will be documented.)
- To the extent possible, the project leverages the products of existing cyberinfrastructure development efforts, for example, those supported through the ITR, NMI or SEIII programs;
- Where further IT development is needed, the project clearly identifies the gap that this development seeks to fill and its importance to environmental observatory cyberinfrastructure;
- The project pursues an end-to-end approach to a component of cyberinfrastructure, articulating the types of data involved and the ways in which users might wish to use these data through the careful exploration of use cases, and then deploying a prototype that implements these types of uses. In this context, an "end-to-end" approach means that the prototype, whatever aspect of cyberinfrastructure is the primary focus, must be capable of working with representative data and being operated by representative users performing tasks that are themselves representative of those needed in the pursuit of environmental research or education activities.
- The project advances the technological capabilities of the environmental research community beyond what is currently possible;
- The project involves extensive use of existing data streams or data sets, or leverages data that can be expected to come online as a result of other environmental observation projects during the lifetime of the proposed project;
- The project leads to a flexible cyberinfrastructure prototype that is amenable to extension and upgrade as technology evolves.

(2) Proposed projects should not:

- Use a substantial fraction of the requested funds for the collection of new data, the development of new numerical models, or the augmentation of existing numerical models,
- Overlap substantially with an existing project or fall within the scope of an existing funding opportunity

(3) Examples of some of the technological challenges that might be addressed in proposed projects include (this is not intended to be an exclusive list):

- Integrating multiple, existing information infrastructures in different environmental research disciplines;
- Bridging the semantics of multiple disciplines within environmental research;
- Expanding the range of resources that can be used by workflow orchestration tools or other AI-based techniques that assist users in developing complex, multi-stage processing tasks;
- Supporting event-detection and the execution of event-triggered responses in real-time or near real-time data streams;
- Enabling the creation of user-configurable virtual observatories that bring together sensors from different observing systems.

Proposed projects should cover the development of the proposed cyberinfrastructure prototype and a direct demonstration of its viability and utility as described above. Proposals need not address the long-term operation and maintenance of the infrastructure developed beyond the proposed lifetime of the project.

The development, operation and maintenance of cyberinfrastructure for environmental research requires individuals who have familiarity with both information technology and environmental research. The development of these prototype projects will present many training opportunities and the involvement of students in the projects is encouraged strongly.

Since one of the intentions of this activity is to encourage the development of elements of cyberinfrastructure that will be useful in many environmental observational network applications, proposals should describe how successful software developed during the project will be made robust, documented, and disseminated.

Reviewers will be provided with a copy of the program description and asked to evaluate proposals in the context of how well they match the program goals outlined above.

## GLOSSARY

- AI = Artificial Intelligence
- BIRN = Biomedical Informatics Research Network
- CEO = Cyberinfrastructure for Environmental Observatories
- CLEANER = Collaborative, Large-scale, Engineering Analysis Network for Environmental Research
- COSMIC = Constellation Observing System for Meteorology, Ionosphere and Climate
- GEON = Geosciences Network
- GriPhyN = Grid Physics Network

- ITR = Information Technology Research
- LEAD = Linked Environments for Atmospheric Discovery
- NEES = National Earthquake Engineering System
- NEON = National Ecological Observatory Network
- NMI = NSF Middleware Initiative
- NSF = National Science Foundation
- NVO = National Virtual Observatory
- OOI = Ocean Observatories Initiative
- PACI = Partnerships for Advanced Computational Infrastructure
- ROADNet = Real-time Observatories, Applications, and Data management Network
- SCEC-CME = Southern California Earthquake Center - Community Modeling Environment
- SEEK = Science Environment for Ecological Knowledge
- SEIII = Science and Engineering Informatics and Information Integration

### III. ELIGIBILITY INFORMATION

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The categories of proposers identified in the [Grant Proposal Guide](#) are eligible to submit proposals under this program announcement/solicitation.

### IV. AWARD INFORMATION

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Estimated program budget, number of awards and average award size/duration are subject to the availability of funds. We anticipate project durations of 3 to 4 years with annual budgets that are generally no larger than \$750,000/year. The estimated number of awards is 4 standard or continuing grants. The anticipated funding amount is \$8.5 million subject to availability of funding.

### V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

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#### A. Proposal Preparation Instructions

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##### Full Proposal Instructions:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg). Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [pubs@nsf.gov](mailto:pubs@nsf.gov).

Groups proposing multi-organization collaborations are encouraged to select one organization to be the lead organization. The proposal should consist of a single proposal from the lead organization with the participation of the other organizations in the collaboration supported through sub-awards included in the master proposal.

Proposals should include a section that describes how successful software developed during the project will be made robust, documented, and disseminated. Proposals should include a section describing how the prototype might be integrated into a sustained cyberinfrastructure for environmental observations after the end of the award, the resources that would be required to do so, and the science questions for which the cyberinfrastructure would remain useful.

Proposers are reminded to identify the program announcement/solicitation number (06-505) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

#### B. Budgetary Information

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##### Cost Sharing:

Cost sharing is not required by NSF in proposals submitted under this Program Announcement.

## C. Due Dates

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Proposals must be submitted by the following date(s):

### Full Proposal Target Date(s):

January 25, 2006

## D. FastLane Requirements

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Proposers are required to prepare and submit all proposals for this announcement/solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail [fastlane@nsf.gov](mailto:fastlane@nsf.gov). The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program announcement/solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement/solicitation.

*Submission of Electronically Signed Cover Sheets.* The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the [Grant Proposal Guide](#) for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane Website at: <http://www.fastlane.nsf.gov>

## VI. PROPOSAL REVIEW INFORMATION

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### A. NSF Proposal Review Process

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Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The National Science Board approved revised criteria for evaluating proposals at its meeting on March 28, 1997 ([NSB 97-72](#)). All NSF proposals are evaluated through use of the two merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

On July 8, 2002, the NSF Director issued [Important Notice 127](#), Implementation of new Grant Proposal Guide Requirements Related to the Broader Impacts Criterion. This Important Notice reinforces the importance of addressing both criteria in the preparation and review of all proposals submitted to NSF. NSF continues to strengthen its internal processes to ensure that both of the merit review criteria are addressed when making funding decisions.

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised proposal preparation guidelines relating to the development of the Project Summary and Project Description. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

Effective October 1, 2002, NSF will return without review proposals that do not separately address both merit review criteria within the Project Summary. It is believed that these changes to NSF proposal preparation and processing guidelines will more clearly articulate the importance of broader impacts to NSF-funded projects.

The two National Science Board approved merit review criteria are listed below (see the [Grant Proposal Guide](#) Chapter III.A

for further information). The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which he/she is qualified to make judgments.

**What is the intellectual merit of the proposed activity?**

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

**What are the broader impacts of the proposed activity?**

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

NSF staff will give careful consideration to the following in making funding decisions:

***Integration of Research and Education***

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

***Integrating Diversity into NSF Programs, Projects, and Activities***

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- 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.

**Additional Review Criteria:** Reviewers will be asked to evaluate how well the proposal conforms to the intent of the solicitation as described in the Program Description.

**B. Review Protocol and Associated Customer Service Standard**

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All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Ad Hoc and/or panel review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

NSF is striving to be able to tell proposers whether their proposals have been declined or recommended for funding within six months. The time interval begins on the closing date of an announcement/solicitation, or the date of proposal receipt, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.



## VII. AWARD ADMINISTRATION INFORMATION

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### A. Notification of the Award

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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 Division 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.A. for additional information on the review process.)

### B. Award Conditions

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An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1); \* or Federal Demonstration Partnership (FDP) Terms and Conditions \* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

\*These documents may be accessed electronically on NSF's Website at <http://www.nsf.gov/awards/managing/>. Paper copies of these documents may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [pubs@nsf.gov](mailto:pubs@nsf.gov).

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpm](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpm). The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Website at <http://www.gpo.gov>.

### C. Reporting Requirements

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For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for the PI and all Co-PIs. 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 FastLane, for preparation and submission of annual and final project reports. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

## VIII. CONTACTS FOR ADDITIONAL INFORMATION

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General inquiries regarding this program should be made to:

- Stephen Meacham, ITR Program Director, Directorate for Geosciences, Division of Atmospheric Sciences, 1145 S, telephone: (703) 292-8970, fax: (703) 292-9060, email: [smeacham@nsf.gov](mailto:smeacham@nsf.gov)
- Alexandra Isern, Program Director, Directorate for Geosciences, Division of Ocean Sciences, 725 N, telephone: (703) 292-8583, fax: (703) 292-9085, email: [aisern@nsf.gov](mailto:aisern@nsf.gov)

- Elizabeth R. Blood, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N, telephone: (703) 292-8470, email: [eblood@nsf.gov](mailto:eblood@nsf.gov)
- Kevin L. Thompson, Program Director, Office of the Director, Office of Cyberinfrastructure, 1145 S, telephone: (703) 292-8962, fax: (703) 292-9060, email: [kthompso@nsf.gov](mailto:kthompso@nsf.gov)
- Patrick L. Brezonik, Program Director, Directorate for Engineering, Division of Bioengineering & Environmental Systems, 565 S, telephone: (703) 292-8320, fax: (703) 292-9098, email: [pbrezoni@nsf.gov](mailto:pbrezoni@nsf.gov)

For questions related to the use of FastLane, contact:

- Brian E. Dawson, Information Technology Specialist, Directorate for Geosciences, 705 N, telephone: (703) 292-4727, fax: (703) 292-9042, email: [bdawson@nsf.gov](mailto:bdawson@nsf.gov)

## IX. OTHER PROGRAMS OF INTEREST

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The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF *E-Bulletin*, which is updated daily on the NSF Website at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's *MyNSF News Service* (<http://www.nsf.gov/mynsf/>) to be notified of new funding opportunities that become available.

## ABOUT THE NATIONAL SCIENCE FOUNDATION

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The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF, although some programs may have special requirements that limit eligibility.

*Facilitation Awards for Scientists and Engineers with Disabilities* (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the GPG Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
  
- **For General Information** (NSF Information Center): (703) 292-5111
  
- **TDD (for the hearing-impaired):** (703) 292-5090
  
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