Arctic Research Opportunities

Arctic Natural Sciences; Arctic Social Sciences; Arctic System Science; Arctic Observing Networks; and Cyberinfrastructure

PROGRAM SOLICITATION
NSF 10-503

REPLACES DOCUMENT(S):
NSF 08-597

National Science Foundation

Office of Polar Programs
Division of Arctic Sciences

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

January 14, 2010

IMPORTANT INFORMATION AND REVISION NOTES

Important revisions to the program descriptions, proposal preparation instructions and review criteria are included in this solicitation and should be read carefully by all proposers.

We highlight three technical areas that have changed:

First, this solicitation describes changes to the Arctic Division's support for proposals addressing the Arctic environment. Specifically, the Division recognizes a continuum of potential studies of the Arctic environment in discipline, scope and scale; so this solicitation creates a thematic area "Arctic environmental research" that joins the efforts of the Arctic System Science (ARCSS), Arctic Natural Sciences (ANS) and Arctic Social Sciences (ASSP) programs. This should simplify the submission process for investigators. Although management of the programs remains separate, program officers will co-manage this area that has as its key defining feature research about the arctic environment rather than all research in the Arctic. This theme reflects the de facto management of these programs in the past where joint panels were conducted for proposals falling inside this broad area.

Second, clearer, simpler data policies are provided.

Finally, for proposals that request external support for field-work, a 1-2 page summary of the field work and cost estimate is required in the supplementary documents section of the proposal. See the proposal preparation instructions in Section V for more information.

Please be advised that the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) includes revised guidelines to implement the mentoring provisions of the America COMPETES Act (ACA) (Pub. L. No. 110-69, Aug. 9, 2007.) As specified in the ACA, each proposal that requests funding to support postdoctoral researchers must include a description of the mentoring activities that will be provided for such individuals. Proposals that do not comply with this requirement will be returned without review (see the PAPP Guide Part I: *Grant Proposal Guide* Chapter II for further information about the implementation of this new requirement).

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Arctic Research Opportunities
Arctic Natural Sciences; Arctic Social Sciences; Arctic System Science; Arctic Observing Network; and Cyberinfrastructure

Synopsis of Program:

The National Science Foundation (NSF) invites investigators at U.S. organizations to submit proposals to conduct research about the Arctic. Arctic research includes field and modeling studies and data analysis in and about the arctic region.

The goal of the NSF Division of Arctic Sciences is to gain a better understanding of the Arctic's physical, biological,

geological, chemical, social and cultural processes, and the interactions of ocean, land, atmosphere, biological, and human systems in the Arctic. The Division of Arctic Sciences and other NSF programs support projects that contribute to the development of the next generation of researchers and scientific literacy for all ages through education, outreach, and broadening participation in science, technology, engineering, and mathematics. Program representatives from OPP and other non-OPP NSF programs that support arctic research coordinate across NSF, including joint review and funding of arctic proposals and mutual support of special projects with high logistical costs.

The Arctic Research Opportunities solicitation provides investigators with information about available programs and priorities to determine the program best suited to their proposed work. The Proposal Preparation section (Section V.A.) has specific instructions for proposers conducting field work, including information about requesting logistics support or ship time, working with arctic communities and complying with environmental policies that should be adhered to by all proposers. Proposals should be written and planned in accordance with NSF's Grant Proposal Guide (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg) and the Principles for Conduct of Research in the Arctic (http://www.nsf.gov/od/opp/arctic/conduct.jsp).

Cognizant Program Officer(s):

- Renee D. Crain, Arctic Research Support and Logistics Program Director, telephone: (703) 292-4482, email: rcrain@nsf.gov
- Henrietta Edmonds, Arctic Natural Sciences Program Director, 755, telephone: (703) 292-8029, email: hedmonds@nsf.gov
- Patrick Haggerty, Arctic Research Support and Logistics Program Director, 755 S, telephone: (703) 292-8577, fax: (703) 292-9082, email: phaggert@nsf.gov
- Martin Jeffries, Arctic Observing Network Program Director, 740 S, telephone: (703) 292-8029, email: mjeffrie@nsf.gov
- Anna Kerttula de Echave, Arctic Social Sciences Program Director, 740 S, telephone: (703) 292-7432, fax: (703)292-9082, email: akerttul@nsf.gov
- Erica Key, Arctic System Science Program Associate Program Director, 755S, telephone: (703) 292-8029, email: ekey@nsf.gov
- Neil R. Swanberg, Arctic System Science Program Director, 740 S, telephone: (703) 292-8029, email: nswanber@nsf.gov
- William J. Wiseman, Arctic Natural Sciences Program Director, 740 S, telephone: (703) 292-4750, fax: (703) 292-9082, email: wwiseman@nsf.gov

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

- 47.078 --- Office of Polar Programs

Award Information

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

Estimated Number of Awards: 40 per year, pending availability of funds.

Anticipated Funding Amount: $16,000,000 per year approximately, pending availability of funds.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- U.S. Organizations

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable
- **Full Proposal Preparation Instructions:** This solicitation contains information that deviates from the standard NSF Proposal and Award Policies and Procedures Guide, Part I: 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 under this solicitation.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Not Applicable

C. Due Dates

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

  January 14, 2010

Proposal Review Information Criteria

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

Award Administration Information

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

Reporting Requirements: Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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I. INTRODUCTION

The Division of Arctic Sciences (ARC) in the Office of Polar Programs (OPP) invests in scientific research about the arctic region and related research and operational support. Science programs are suitable for disciplinary, multidisciplinary and broad, interdisciplinary investigations directed toward both the Arctic as a region of special scientific interest and a region important to the global system. Models indicate that the Arctic is among the regions most sensitive to environmental change. Climate records and human settlement spanning thousands of years, as well as vast landscapes and partially ice-covered oceans, provide a basis for integrated research on global systems and human social and cultural adaptation.

Arctic research is supported at NSF by the Office of Polar Programs (OPP), Arctic Sciences Division (http://www.nsf.gov/div/index.jsp?div=ARC), in the Office of the Director, as well as by a number of other programs within the Foundation. The Foundation is one of 12 Federal agencies that sponsor or conduct arctic science, engineering, and related activities. As mandated by the Arctic Research and Policy Act of 1984, Federal interagency research planning is coordinated through the Interagency Arctic Research Policy Committee (IARPC), which is chaired by NSF.

A definition of the Arctic is provided by the United States Arctic Research and Policy Act (ARPA) of 1984. As this solicitation values studies that link Arctic phenomena and the Arctic system to lower latitudes, the ARPA definition should not be viewed as

constraining the work proposed; however, clear relevance to the Arctic should be made in the proposal.

The Study of Environmental ARctic CHange (SEARCH) is an interagency effort to study changes occurring in the arctic system (http://www.arcus.org/SEARCH/index.php). NSF is among the agencies contributing to this effort, which is also gaining support as a major international effort as the International Study of Arctic Change (ISAC). SEARCH themes supported by the Arctic Sciences Division will be guided by the research community through avenues such as the SEARCH Science Steering Committee, open SEARCH science meetings and the SEARCH Implementation Workshop held in May 2005. The Division of Arctic Sciences has funded components of SEARCH research through special announcements of opportunity and expects to continue supporting the development of SEARCH through special announcements and through this program solicitation, depending on the availability of funds.

II. PROGRAM DESCRIPTION

This description provides detailed information on research opportunities to be supported by the following programs:

- **Arctic Natural Sciences Program**
- **Arctic System Science Program**
- **Arctic Social Sciences Program**
- **Arctic Observing Network**
- **Cyberinfrastructure**

The descriptions below should help guide investigators in determining the appropriate program for their proposals. In addition, please consult the full text of this solicitation for further information on proposal preparation, field work, data management, review criteria, award conditions and other pertinent information.

The Arctic environment is changing rapidly as evidenced by numerous research observations, highlighted during the recent International Polar Year and chronicled by the media, often almost daily. One response by the Arctic Sciences Division of the Office of Polar Programs is exemplified by this program solicitation, in which we combine the approaches and resources of the Arctic System Science Program (ARCSS), the Arctic Natural Sciences Program (ANS) and some of the Arctic Social Science Program (ASSP) to address pressing environmental concerns and social and cultural responses to them.

A. **Arctic Natural Sciences, Arctic System Science and Arctic Social Sciences**

As noted in the Revision Notes at the beginning of this program solicitation, the Arctic Division supports a continuum of potential studies in the broad thematic area of Arctic environment research that joins the efforts of the Arctic Natural Sciences, Arctic System Science, and components of the Arctic Social Sciences programs.

The Arctic Sciences Division encourages proposals that advance understanding of the Arctic environment, in its broadest sense; from projects that seek to advance fundamental disciplinary understanding to complex interdisciplinary work needed to understand the arctic system as a whole. As such, proposals are welcome from single investigators or linked groups of collaborators. Proposals can address a process or component of the system in a disciplinary manner or take a broader, system-wide interdisciplinary view. Areas of special interest include marine and terrestrial ecosystems, arctic atmospheric (tropospheric and stratospheric) and oceanic dynamics, arctic geological, glaciological or palaeoecological processes and hydrology, as well as studies of permafrost, environmental-human interactions and environmental modeling. Proposals that capture and advance our understanding of the dynamics of ice-sheets and glaciers in skillful predictive models are particularly encouraged. At the system end of the continuum, emphasis will be placed on proposals that advance our knowledge of important arctic environmental processes, the relationships among the various components of the arctic system, and the changes occurring in the cycles of water, carbon and energy in the Arctic and their connectivity to similar processes in lower latitudes with priority on subjects relating to environmental change in the Arctic.

Proposals should discuss how their results would contribute to an understanding of the arctic environment. Thus, while it is perfectly acceptable to propose a study of a relatively narrow disciplinary scope, an effort should also be made to explain how one would transfer the results to broader areas of research.

Thus, the Arctic Sciences Division encourages proposals that focus on arctic phenomena and provide hypothesis-driven tests to produce the understanding needed to develop predictive tools based on first principles. Proposals to perform long term observations are best submitted to the Arctic Observing Network Program (AON). Similarly, proposals that treat generic processes that could be studied outside the Arctic are more appropriate to other programs within the Foundation.

Proposers are encouraged to contact a program director if they have questions about the fit of a given research topic.

B. **Arctic Social Sciences Program**

In addition to the environmental research theme described in Section II.A. above, the Arctic Social Sciences Program encompasses all social and behavioral sciences supported by NSF. These include, but are not limited to anthropology, archaeology, economics, geography, linguistics, political science, psychology, science and technology studies, sociology, traditional knowledge and related subjects.

Although proposals in any of the social sciences mentioned above are welcome, areas of particular interest include culture and environment, resources and economic change, development of social and political institutions, ethnic (cultural) and regional identities, and knowledge systems. These five research areas are identified and explained in the report, *Arctic Social Sciences: Opportunities in Arctic Research* (Arctic Research Consortium of the United States, June 1999, Fairbanks, Alaska; available for download at http://www.arcus.org/ASSP/1999_report.html).

The Arctic Social Sciences Program especially encourages projects that are circumpolar and/or comparative; involve collaborations between researchers and those living in the Arctic; or form partnerships among disciplines, regions, researchers, communities, and/or students (K-12, undergraduate, or graduate). In addition, the Arctic Social Sciences Program encourages social scientists to participate in interdisciplinary research teams applying to

the Arctic Environmental Research competition.

Dissertation research proposals are accepted by the Arctic Social Sciences Program. Please consult the "Dissertation Panel Advice to Students" guidelines in the Division of Behavioral and Cognitive Sciences (DBCS; http://www.nsf.gov/sbe/bcs/anthro/cultdadv.jsp). These guidelines are to provide the applicant with a basic outline for their proposals. Applicants should apply to this solicitation and talk to the ASSP program director about funding limits, which vary from those in DBCS.

Projects involving research with human subjects must ensure that subjects are protected from research risks in conformance with the relevant federal policy known as the Common Rule (Federal Policy for the Protection of Human Subjects, 45 CFR 690). Advice is available at http://www.nsf.gov/bfa/dias/policy/hsfaqs.jsp#top

Researchers proposing work that may affect cultural or historic properties, or whose work involves tribal lands, must cooperate with the agency in complying with the consultation requirements of section 106 of the National Historic Preservatiofn Act. Researchers are encouraged to contact ARC for more information about cultural or historic impact considerations of their proposed field work. For additional information on cultural or historic preservation issues, see the Advisory Council on Historic Preservation's website at http://www.achp.gov/work106.html .

The Arctic Social Sciences Program considers joint review and funding within ARC, with other NSF programs, other agencies and international efforts when appropriate. Researchers interested in linguistics are encouraged to examine the announcement of opportunity on Documenting Endangered Languages (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12816) released to support projects to develop and advance knowledge concerning endangered languages.

C. **Arctic Observing Network**

Science-driven proposals that will contribute to the development of AON will be accepted in response to this solicitation. The goal of AON is to enhance the environmental observing infrastructure required for the scientific investigation of arctic environmental system change and its global connections. AON encompasses physical, biological and human observations, including indigenous knowledge, of the land, ocean and atmosphere (troposphere and stratosphere). Proposals will include a scientific rationale and an explanation as to why the proposed activity, data (including frequency and duration of observations) and geographic location are essential to research that will advance the understanding of arctic environmental system change.

AON is equivalent to the SEARCH Observing Change component, and it cannot develop in isolation from the other components of SEARCH, i.e., Understanding Change and Responding to Change. The AON Program does not support research that will lead to understanding of and response to Arctic environmental change, but observing proposals should describe how the project will coordinate and integrate with, and provide for the transfer and exchange of information with Understanding Change and Responding to Change research projects.

The AON Program will also consider proposals for (1) the development of sensors and measurement systems that are critical to AON, and (2) observing network design. Proposers should take into account current AON and SEARCH efforts (Observing Change) in constructing a network design; the intrinsic interdisciplinary nature of arctic change; and the needs of modelers to simulate, understand and predict change. New sensor and sensor array designs which can contribute to effective, real-time quantification and transmission of arctic change data, in keeping with the AON data policy, will be reviewed as part of this solicitation.

Proposers should familiarize themselves with SEARCH reports (http://www.arcus.org/search/index.php) and consider the scientific questions and priorities presented in the SEARCH Implementation Plan. Other useful documents include the IARPC report *'Arctic Observing Network (AON): Toward a U.S. Contribution to Pan-Arctic Observing'* (http://www.nsf.gov/pubs/2008/nsf0842/index.jsp), and the *'Arctic Observation Integration Workshops Report'* (http://www.arcus.org/search/meetings/2008/aow/report.php).

All AON projects must conform to the SEARCH data policy (http://www.arcus.org/search/downloads/SEARCH_DataPolicy_051207.pdf). The only exceptions to this policy are some instances with human-dimensions data, where respect for confidentiality, intellectual property rights, or proprietary information sources might take precedence. Exceptions can also be made in cases where data release might cause harm.

AON data are considered to be community data and not subject to any embargo period. Proposals must include a data and information management plan that describes how free and rapid access to quality-controlled and fully-documented data and information by all researchers, and others, will be afchieved during the course of the award, e.g., via a project website and/or a recognized data repository. Proposers should be aware that posting graphs on a website is not sufficient. The plan must include transfer of all data to a recognized data repository by the conclusion of the award. NSF is currently supporting the development of the Cooperative Arctic Data and Information Service (CADIS) for AON data and information management. Proposers should contact CADIS (http://www.aoncadis.org/) to discuss data and information management requirements.

D. **Cyberinfrastructure**

NSF's concept of cyberinfrastructure (CI) involves high-performance computing (HPC), stewardship and utilization of scientific data, and virtual organizations (VOs). This concept is often referred to as "e-science". The Arctic Sciences Division will consider proposals that utilize or provide resources for HPC in ways that apply directly to current arctic research. Priority will be given to proposals that provide significant benefit to the arctic research community with respect to data, including (1) cost-effective transfer from remote field locations, (2) long-term sustainable curatorship and management, (3) visualization, manipulation, and analysis, particularly for understanding complexity, and (4) access and interoperability across scientific disciplines. Proposals that establish or enhance VO resources for arctic research, and its broader impacts, will also be considered. Interested proposers are encouraged to visit the web site for NSF's Office of Cyberinfrastructure (http://www.nsf.gov/dir/index.jsp?org=OCI) to obtain current reports that explain NSF's expectations for the various components of CI.

ADDITIONAL OPPORTUNITIES

Other NSF Funding Opportunities

See Section IX on Other Programs of Interest and consult the NSF online program guide to browse for funding opportunities (http://www.nsf.gov/funding/browse_all_funding.jsp).

III. AWARD INFORMATION

Pending availability of funds, $16,000,000 may be available for proposals to this solicitation. This does not include logistics support that may be provided through the Arctic Research Support and Logistics program. NSF estimates 40 awards per year as standard or continuing grants, or cooperative agreements. The number of awards and average award size and duration are subject to the availability of funds.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- U.S. Organizations

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

Additional Eligibility Info:

Only U.S. organizations are eligible to submit proposals under this solicitation. There is no limit on PI eligibility, and there is no limit on the number of proposals that may be submitted.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Instructions: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the guidelines specified in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-PUBS (7827) or by e-mail from nsfpubs@nsf.gov.

Proposals may be returned without review for failing to comply with the Grant Proposal Guide (GPG), this solicitation and the instructions that supplement the GPG.

Principles for the Conduct of Research in the Arctic

Researchers should conform to the *Principles for the Conduct of Research in the Arctic*, approved by the U.S. Interagency Arctic Research Policy Committee (IARPC) in 1990 (http://www.nsf.gov/od/opp/arctic/conduct.jsp). Proposers may also find the “Guidelines for Improved Cooperation between Northern Communities and Arctic Researchers” helpful (http://www.arcus.org/guidelines).

Proposals Involving Human Subjects

The NSF Grant Proposal Guide (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg) provides procedural information for projects with human subjects in the section Projects Involving Human Subjects. Investigators must ensure that human subjects are protected from research risks in conformance with the relevant federal policy known as the Common Rule (*Federal Policy for the Protection of Human Subjects*, 45 CFR 690). Additional information is available at http://www.nsf.gov/bfa/dias/policy/guidance.jsp. Letters of permission or approval, such as those from Native organizations or communities in which the work will take place, should be included in the Supplementary Documents section of proposal.

Proposals Involving Arctic Field Work

The Arctic Research Support and Logistics (RSL) program was created to enhance access to, and safety in the Arctic, and improve interactions with arctic communities.

Proposals involving field work in the Arctic should describe the field work in the body of the proposal and including a schedule of

proposed work. Investigators are encouraged to propose effective and efficient use of logistics resources to reach research goals and cooperate with communities near field research sites.

In order to ensure transparency in the review process all field support for the proposed work that is to be provided by a third party, that is, not funded through the proposal, must be summarized in the supplementary documents section of the proposal. This summary should outline what aspects are to be supported, by whom and include a cost estimate. The summary should be consistent with the summary of the field plan in the body of the proposal, and make reference to it. A link to the list of third party research support and logistics organizations that NSF/OPP has agreements with is provided at the bottom of this section. Researchers may prepare their own descriptions or they may use the services provided by the Arctic logistics contractor, CH2M Hill Polar Services. The planners at CPS can provide an outline and cost estimate to be submitted with your proposal if given at least a month of lead time. In some cases, field plans are complex. NSF/OPP may make an interim award to allow the proposers to develop a detailed work plan prior to making a decision to fund the full proposed activity.

Proposals requesting support for field work from the Arctic Division science or logistics programs should be submitted with adequate time to allow for proposal review and decision making (6 months) and, if necessary, for logistics planning and budgeting. Thus, proposals submitted to this announcement should only plan to go to the field in the first summer following the deadline if the fieldwork is supported through the grant and/or relatively simple. We find most projects should plan at least a full year between proposal submission and commencement of field work.

Projects that will work close to Arctic communities, particularly indigenous communities, are encouraged to discuss the proposed work with those communities while the project is being developed. The RSL program may provide travel support for researchers to visit communities in order to facilitate these discussions. Such projects are also encouraged to share results after the work is completed, and funds should be requested in the proposal for this. These visits are anticipated to be limited to a few days and do not include additional funds for salaries or stipends. Please contact the RSL program managers for information about these opportunities.

More information about the logistics program, logistics providers and facilities and other opportunities for field work is available on the RSL program web site (http://www.nsf.gov/od/opp/arctic/res_log_sup.jsp). For support from CH2M Hill Polar Services in preparing the supplementary documents, please contact Diana Garcia-Lavigne at diana@polarfield.com and/or see the CPS website (http://www.polar.ch2m.com/).

Environmental Policy Considerations of Field Work

Federal agencies must comply with the National Environmental Policy Act (NEPA). Most NSF awards support individual scientific research projects and are not considered 'major Federal actions significantly affecting the quality of the human environment'. Projects involving construction, drilling or major disturbance to the local environment may require an assessment of environmental impacts. All federal agencies are regulated under acts such as the Endangered Species Act, the Marine Mammal Protection Act, and the National Historic Preservation Act. Researchers proposing work that may affect cultural or historic properties, or whose work involves tribal lands must cooperate with the agency in complying with the consultation requirements of section 106 of the National Historic Preservation Act. For additional information on cultural or historic preservation issues, see the Advisory Council on Historic Preservation's web site at http://www.achp.gov/work106.html. Contact the Environmental Officer of the Office of Polar Programs, Dr. Polly Penhale (ppenhale@nsf.gov) for guidance on environmental consultations, permitting, and NSF's obligations under existing environmental laws.

Data Management

Proposals must include a data and information management plan that describes how free and rapid access to quality-controlled and fully-documented data and information by all researchers, and others, will be achieved during the course of the award, e.g., via a project web site and/or a recognized data repository. Proposers should be aware that posting graphs on a web site is not sufficient. The plan must include transfer of all data to a recognized data repository by the conclusion of the award. Please see Policy for Sharing Scientific Data in Section VII.B. of this solicitation for other data reporting requirements.

Identify this Solicitation Number on the Proposal Cover Sheet.

Proposers are reminded to identify the program solicitation number (NSF 10-503) in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing: Cost sharing is not required under this solicitation.

C. Due Dates

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

  January 14, 2010

All programs covered under this solicitation will have a single, annual competition. In order to ensure fair treatment of all proposals the arctic competition has gone to use of a deadline, instead of a target date. Late proposals may miss a particular panel review but may still be reviewed ad hoc or held until the next available panel if received after the deadline, at the discretion of the program director. Failure to obtain prior approval of the cognizant program director for late submissions may result in the proposal being returned without review.

D. FastLane Requirements

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

funding opportunity.

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. Further instructions regarding this process are available on the FastLane Website at: https://www.fastlane.nsf.gov/fastlane.jsp.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program where they will be reviewed if they meet NSF proposal preparation requirements. 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 who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the 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.

A. NSF Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. 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 the reviewer is qualified to make judgements.

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, original, or potentially transformative 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?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf.

Mentoring activities provided to postdoctoral researchers supported on the project, as described in a one-page supplementary document, will be evaluated under the Broader Impacts criterion.

NSF staff also 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:

Proposals submitted in response to this program solicitation will be reviewed by Ad Hoc Review and/or Panel Review. If another federal agency is considering funding proposals in this area, NSF may share proposals with and/or may invite employees from the federal agenc(ies) to sit in on review panels as observers for the purpose of determining whether the agency may provide funding

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 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.

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 is striving to be able to tell

applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's 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 Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

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

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 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 (GC-1); * or Research Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

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

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

Special Award Conditions:

Principles for the Conduct of Research in the Arctic: Principal Investigators are expected to follow the *Principles for the Conduct of Research in the Arctic*, prepared by the Social Science Task Force of the U.S. Interagency Arctic Research Policy Committee (IARPC) and approved by IARPC in 1990. These principles are listed at http://www.nsf.gov/od/opp/arctic/conduct.jsp. Investigators may find useful the Guidelines for Improved Cooperation between Arctic Researchers and Northern Communities (http://www.arcus.org/guidelines).

Policy for Sharing Scientific Data

The Arctic Sciences Division (ARC) of the Office of Polar Programs (OPP) at the National Science Foundation (NSF) has adopted a policy for data sharing that will be applied to all grantees. This policy establishes the criteria for the timely archiving of data in long-lived archives and sets out special conditions applicable to ARC grants. The purpose of this policy is to facilitate full and open access to data and materials for polar research from projects supported by ARC.

The Office of Polar Programs, in conformance with NSF policy (see Grant Proposal Guide, http://www.nsf.gov/pubsys/ods/getpub.cfm?gpg), expects investigators to share with other researchers, at no more than incremental cost and within a reasonable time, the data, derived data products, samples, physical collections and other supported materials gathered or created in the course of the research project. Data sets from ARC-supported scientific research should be deposited in archives appropriate for the specific type of data collected.

Data archives of ARC-supported projects should include easily accessible information about the data holdings (metadata), including quality assessments, supporting ancillary information, and guidance for locating and obtaining the data. National and international data and metadata standards should be used for the collection, processing and communication of ARC-sponsored data sets. The use of graphics to present data or results does not qualify as sharing of scientific data or submission to an archive.

General Data Sharing Policy

For all ARC supported projects:

- Complete metadata must be submitted to a national data center or ARC approved data center within two years of collection or before the end of the award, whichever comes first.
- All data and derived data products that are appropriate for submission to a national data center or OPP-approved data repository, must be submitted within two years of collection or before the end of the award, whichever comes first.

For all ARC supported Arctic Observing Network projects:

- Real-time data must be made publicly available immediately. If there is any question about what constitutes real-time data, please contact the appropriate program officer.
- All data must be submitted to a national data center or ARC-approved data repository within 6 months of collection, and be fully quality controlled.
- All data sets and derived data products must be accompanied by a metadata profile and full documentation.

Special Note for Arctic Social Sciences Awards

The Arctic Social Sciences Program supports the full range of social science disciplines and adheres to the ARC Data Management statement that "Proposals must include a data and information management plan that describes how free and rapid access to quality-controlled and fully-documented data and information by all researchers, and others, will be achieved during the course of the award, e.g., via a project web site and/or a recognized data repository." However, the program recognizes that the nature of social science data, the way they are collected, analyzed, and stored, and the pace at which this occurs, vary widely. Different storage facilities and access requirements exist for different types of social science data, e.g., archaeological data, specimens from physical anthropology, large-scale survey data, oral histories, taped interviews, and other narrative materials elicited from individuals or groups, and field records. Therefore, "rapid access" is defined in the Arctic Social Science Program as 3-5 years and "recognized data repository" can be discipline-specific. However, increasing efforts are being made by the social science community to provide disciplinary relevant guidelines (in the form of best practices), set data and ethical standards, create open source software for social science data, and create new data repositories. In recognition of these efforts, all proposals to the Arctic Social Sciences program must include a data and information management pan. Providing access to data collected in projects supported by the Arctic Social Sciences Program necessarily engages a broad range of potential complexities. Investigators should identify those that can be anticipated and explain fully when and why a modified application of the ARC Data Management policies might be appropriate.

Responsibilities of Principal Investigators of Awards Funded by the Arctic Sciences Division

Coordinated programs (multi-investigator and/or multi-agency programs) may (in consultation with the ARC program managers and other funding agencies involved) establish data submission procedures that are more rigorous than those for typical single-investigator projects, as necessary to meet the coordinated mission objectives. Principal Investigators with ARC-funded awards should comply with data policies established for these coordinated programs and submit their data as required to the appropriate repository stipulated by the coordinated program office.

Compliance with the data guidelines will be considered in the program managers' overall evaluation of a Principal Investigator's prior support record. Annual and final reports may not be approved if program managers determine that data sharing requirements have not been met. This can hold up future funding increments and awards.

Any questions concerning this policy should be directed to the cognizant program officer in the Arctic Sciences Division.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after 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 that PI. 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. Such reports provide information on activities and findings, project participants (individual and organizational) 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. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report 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.

Please see the instructions, Section VII. B. Award Conditions in this program solicitation for information about award conditions for data.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Renee D. Crain, Arctic Research Support and Logistics Program Director, telephone: (703) 292-4482, email: rcrain@nsf.gov
- Henrietta Edmonds, Arctic Natural Sciences Program Director, 755, telephone: (703) 292-8029, email: hedmonds@nsf.gov
- Patrick Haggerty, Arctic Research Support and Logistics Program Director, 755 S, telephone: (703) 292-8577, fax: (703) 292-9082, email: phaggert@nsf.gov
- Martin Jeffries, Arctic Observing Network Program Director, 740 S, telephone: (703) 292-8029, email: mjeffrie@nsf.gov
- Anna Kerttula de Echave, Arctic Social Sciences Program Director, 740 S, telephone: (703) 292-7432, fax: (703)292-9082, email: akerttul@nsf.gov
- Erica Key, Arctic System Science Program Associate Program Director, 755S, telephone: (703) 292-8029, email: ekey@nsf.gov
- Neil R. Swanberg, Arctic System Science Program Director, 740 S, telephone: (703) 292-8029, email: nswanber@nsf.gov

- William J. Wiseman, Arctic Natural Sciences Program Director, 740 S, telephone: (703) 292-4750, fax: (703) 292-9082, email: wwiseman@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.
- Linda Izzard, Program Coordination Specialist, 755, telephone: (703) 292-7430, fax: (703) 292-9082, email: lizzard@nsf.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, National Science Foundation Update is a free e-mail subscription service 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 Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the NSF web site.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at http://www.grants.gov.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 40,000 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 Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

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

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

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

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

  or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records, " 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

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
Division of Administrative Services
National Science Foundation
Arlington, VA 22230