

Arctic Observing Network (AON)

PROGRAM SOLICITATION NSF 08-579



National Science Foundation
Office of Polar Programs
Division of Arctic Sciences

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

September 30, 2008

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Arctic Observing Network (AON)

Synopsis of Program:

The National Science Foundation (NSF) invites investigators at U.S. organizations to submit proposals for projects that will contribute to the further development of the Arctic Observing Network (AON) and enable the Study of Environmental Arctic Change (SEARCH). Compared with much of the rest of the Earth, the Arctic is a data-sparse region where large, rapid and system-wide environmental change is occurring. The goal of AON is to enhance the environmental observing infrastructure required for the scientific investigation of Arctic environmental change and its global connections.

This solicitation invites proposals for the following activities:

- continuation of existing NSF-supported AON projects;
- the initiation of new AON projects; and
- projects that address environmental observing system coverage, design and optimization.

AON encompasses physical, biological and human observations, including indigenous knowledge, of the land, ocean and atmosphere (to a maximum altitude of ~90 km, i.e., the top of the mesosphere). Proposals must include a scientific rationale that includes 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 change. Proposals for the research, e.g., data analysis, data synthesis, process studies and computer modeling, that will lead to understanding of Arctic environmental change will not be considered.

Cognizant Program Officer(s):

- Robert Sanford, Program Director, Arctic Observing Networks, 755S, telephone: (703) 292-7120, fax: (703)292-9082, email: rsanford@nsf.gov

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

- 47.078 --- Office of Polar Programs

Award Information

Anticipated Type of Award: Continuing Grant

Estimated Number of Awards: 15 to 20 depending on availability of funds.

Anticipated Funding Amount: \$18,000,000 to \$24,000,000 depending on availability of funds.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs,

professional societies and similar organizations in the U.S. associated with educational or research activities.

- Other Federal Agencies and Federally Funded Research and Development Centers (FFRDCs): Contact the appropriate program before preparing a proposal for submission.

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 supplements 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):
September 30, 2008

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria apply.

Award Administration Information

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

Reporting Requirements: Standard NSF reporting requirements apply.

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I. INTRODUCTION

The Division of Arctic Sciences 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 unique basis for integrated research on global systems and human adaptation.

OPP disciplinary interests appropriate to the Arctic Natural Sciences program encompass the atmospheric, biological, cryospheric, earth, and ocean sciences. A broad spectrum of social sciences research is funded through the Arctic Social Sciences program. The Arctic System Science program provides the unique opportunity for interdisciplinary investigations of the Arctic as a system. OPP also encourages research relevant to both polar regions, especially glaciology, permafrost, sea ice, oceanography, and ecology. The Arctic Observing Network program supports the design and implementation of a broad network of long-term observations of the Arctic useful to a wide segment of the arctic community. The integration of research with education is consistent with NSF's merit review criteria and is encouraged by OPP in proposals to the research programs. Proposals may seek funding for pilot projects linking research with education through the Arctic Research and Education program. Arctic research projects that partner with schools, students (K-12 and higher), and communities in the North and that improve the public's understanding of science and basic research are strongly encouraged.

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.

The United States Arctic Research and Policy Act of 1984 defines the Arctic as all areas north of the Arctic Circle and all United States territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers; all contiguous seas including the Arctic Ocean and the Beaufort, Bering, and Chukchi seas; and the Aleutian chain. Field projects falling outside these boundaries but directly related to arctic science and engineering conditions, or issues, such as laboratory and theoretical studies, may also be appropriate; OPP recommends contacting the program director to verify the appropriateness of the proposed study before preparing a proposal.

Because the Arctic is the homeland of numerous Native peoples, special attention must be given to all aspects of research and education that may potentially impact their lives. An interagency statement of "Principles for the Conduct of Research in the Arctic" has been developed. All arctic research grantees are expected to abide by these principles, which can be found at <http://www.nsf.gov/od/opp/arctic/conduct.jsp>. Researchers may find helpful information in the "Guidelines for Improved Cooperation between Arctic Researchers and Northern Communities" at <http://www.arcus.org/guidelines>.

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, the SEARCH Open Science Meeting 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

NSF has been supporting science-driven Arctic environmental observing projects since 1999. The scope of NSF-supported Arctic environmental observing activities subsequently increased as a result of its International Polar Year (IPY) competitions to begin the development and deployment of a science-driven Arctic Observing Network (AON) that enables research into Arctic environmental change, i.e., the 'Study of Environmental Arctic Change (SEARCH)'. In April 2007, the U.S. Inter-Agency Arctic Research Policy Committee (IARPC) charged the IARPC staff with the development of AON as part of the implementation of SEARCH and as a lasting legacy of IPY. This solicitation represents a further NSF contribution to the development of AON and implementation of SEARCH during IPY and beyond.

The Arctic environment is changing. The changes are large, rapid and system-wide. They have few equals elsewhere on Earth, and some are occurring at greater rates than predicted by computer models. Arctic environmental change has regional and global implications, and continued changes will have significant Arctic and worldwide environmental and societal consequences.

Nothing illustrates the scale of Arctic environmental change, and the sensitivity of the Arctic environment and its global importance, better than the dramatic and unforeseen recession of the Arctic sea ice cover in summer 2007. That the rate of sea ice change far exceeded computer model results also exemplifies the uncertainties inherent in predictions of Arctic system change, and the need to identify the source of those uncertainties. Large changes such as the summer 2007 sea ice minimum and what it reveals about system-wide uncertainty and predictive capability underscore the need for continued and greater vigilance via enhanced environmental observing infrastructure that is coordinated, integrated and sustained.

The magnitude and rate of the system-wide environmental changes in the Arctic are such that there is broad consensus that enhanced Arctic environmental observing capabilities are critically important - see, for example, *The Scope of Science for the*

International Polar Year 2007-2008 by the IPY Joint Committee

(http://216.70.123.96/images/uploads/LR*PolarBrochureScientific_IN.pdf). Current environmental observing capabilities are not adequate to support the research, e.g., data analysis, data synthesis, process studies, and computer modeling, that is essential for better understanding of the regional and global causes and consequences of Arctic environmental change. Without improved environmental observing capabilities and understanding of Arctic environmental change, regional and global society's ability to anticipate, predict and develop effective adaptive responses to future environmental changes will be severely limited.

This solicitation invites proposals for the following activities:

- continuation of existing NSF-supported AON projects;
- the initiation of new AON projects; and
- projects that address environmental observing system coverage, design and optimization.

AON encompasses physical, biological and human observations, including indigenous knowledge, of the land, ocean and atmosphere (to a maximum altitude of ~90 km, i.e., the top of the mesosphere). Proposals must include a scientific rationale 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 change.

AON is a major part of the SEARCH Observing Change component, and it can not develop in isolation from the other components of SEARCH, i.e., Understanding Change and Responding to Change. At the current stage of SEARCH implementation, connections among Observing Change and Understanding Change projects and activities are particularly important. While this solicitation will not consider proposals for research, e.g., data analysis, data synthesis, process studies and computer modeling, that will lead to understanding of Arctic environmental change, observing proposals should be informed by current understanding of Arctic environmental change, and describe how the project will contribute to future Understanding Change research projects and activities.

Proposers are encouraged to 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 US National Academies report *Toward an Integrated Arctic Observing Network* (http://www.nap.edu/catalog.php?record_id=11607), 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 funded projects must conform to the SEARCH data policy (http://www.arcus.org/search/downloads/SEARCH_DataPolicy_051207.pdf). Briefly, the SEARCH data policy requires (1) project data to be fully, freely, and openly available as quickly as possible after collection and quality control, and (2) data, metadata and documentation to be submitted to an appropriate national archive or repository. 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 embargo periods. Proposals must include a data and information management plan that describes how full, free, open and immediate access to data and information by all researchers and others will be achieved during the course of the award, e.g., via a project Web site. Proposers should be aware that posting graphs on a Web site is not sufficient; original data and documentation must be made available. The data and information management plan must also include transfer of all data to a recognized data repository by the conclusion of the award. Proposals should include a letter from the repository describing its commitment to receive, archive and distribute the data. Proposers should budget for the costs (typically 10% of the total request) associated with data and information management, including preparation of data sets for submission to the repository and any repository charges.

NSF is currently supporting the development of the Cooperative Arctic Data and Information Service (CADIS: <http://www.eol.ucar.edu/projects/aon-cadis/>) for AON data and information management. At a minimum, all projects must provide metadata to CADIS, but proposers are encouraged to take advantage of CADIS to meet all their data and information management needs. Proposers should discuss their data and information management needs with CADIS personnel. Information about current NSF-supported AON projects is also available at the CADIS Web site.

All proposals must include a plan for coordination and integration of the observing activity with other Arctic environmental observing activities. Proposals should demonstrate how the proposed activity will have a greater impact through coordination and integration with other projects and programs. Documentation of this impact would include letters from collaborators that demonstrate their commitment to coordination and integration of observing activities, and sharing of resources.

All proposals must include a description of how coordination and integration (e.g., sharing data, information, equipment and logistics; attendance at annual AON PI meetings) with other NSF-supported Arctic observing projects will be achieved. Proposers will find information on the other NSF-funded AON projects at <http://www.eol.ucar.edu/projects/aon-cadis/projects/>. Proposers should also consider coordination and integration with other Federal agencies, observing projects in other countries, and projects coordinated internationally. Proposers will find information about the Arctic observing activities of other Federal agencies in 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>).

Proposals for the continuation of existing NSF-supported Arctic environmental observing projects must include the following information: (1) evidence that data and information have been deposited at a recognized data archive/repository, where full, free, open and immediate access is possible for all researchers and others; (2) evidence that, during the course of the project, data and information have been fully, freely, openly and immediately accessible to all researchers and others, (3) evidence that the data have been used by other researchers, and have contributed to new scientific knowledge and understanding of Arctic environmental system change; (4) a scientific rationale for why the observations should be continued; and (5) why NSF should support continued observations.

Proposals for new Arctic environmental observing projects should also explain why NSF is the appropriate agency to support the proposed observations. With the exception of proposals for AON coverage, design and optimization, all proposals should address the long-term sustainability of the proposed observing activity. NSF does not provide indefinite support, and all proposers should consider how many years of data are required to meet the needs of the data analysis, data synthesis, process studies and computer modeling that would contribute to the Understanding Change component of SEARCH. All proposals should also address the potential for transfer of responsibility to an operational agency, and, where appropriate, include a transition plan and letter of interest from an agency that that would assume responsibility for the observations.

The implementation of AON in the years beyond IPY will benefit from formal analysis of observing system coverage, and design and optimization studies. Proposals addressing coverage, design and optimization should be informed by Chapter 6 in the US National Academies report *'Toward an Integrated Arctic Observing Network'* (http://www.nap.edu/catalog.php?record_id=11607). Proposers should also consider previous and current NSF investments in Arctic observations (for more information go to <http://www.eol.ucar.edu/projects/aon-cadis/projects/>) and have the flexibility and adaptability to take into account the observing

projects that will be funded via this solicitation. The Arctic observing activities of other Federal agencies (e.g., the IARPC AON report 'Arctic Observing Network: Toward a U.S. Contribution to Pan-Arctic Observing', <http://www.nsf.gov/od/opp/arctic/arctrsch/start.jsp>) and international projects and programs should also be taken into account. Proposals for analysis of observing system coverage, and design and optimization studies must also include a plan for making the results fully, freely and openly available in a timely fashion.

It is anticipated that many projects will require field support. For proper review of proposals and to initiate logistics planning and budgeting, the Project Description must include a section that describes the scope of fieldwork, including location, schedule, major equipment, number of people, maps and figures. It is anticipated that many projects will require the services of a third-party field support provider such as CH2M Hill Polar Services (CPS) or the Barrow Arctic Science Consortium (BASC). Proposers planning to use a third-party provider must contact them for an itemized estimate that will be included in the proposal in **Special Information and Supplementary Information**. Alternatively, proposers can organize their own logistics, and include field support costs in the grant budget request along with a comprehensive justification and rationale. For more information on field support planning, see **Proposals Involving Arctic Field Work** in Section V.A.

Proposers should consult the full text of this solicitation for further information on proposal preparation, fieldwork, data management, review criteria, award conditions and other pertinent information.

III. AWARD INFORMATION

Pending availability of funds, up to \$24,000,000 might be available for this solicitation for the period FY09 through FY13. This does not include logistics support that might be provided by the Arctic Research Support and Logistics program. NSF estimates 15 to 20 awards will be made as continuing grants. Awards will be up to 3-5 years in duration, depending on the type of observation project and the need for extended support. Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
- Other Federal Agencies and Federally Funded Research and Development Centers (FFRDCs): Contact the appropriate program before preparing a proposal for submission.

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

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.

In addition to the following, please refer to Section II, Program Description, for specific proposal preparation information and instructions.

Proposals may be returned without review for failing to comply with the Grant Proposal Guide, this solicitation and the instructions that supplement the GPG (if submitted via FastLane) or the NSF Grants.gov Application Guide (if submitted via Grants.gov).

Please note:

- Proposals that are re-submissions must be substantially changed from the original,
- Proposals must comply with specifications for minimum font size and maximum lines and characters per centimeter,
- Biosketches must follow formatting rules, in particular, do not include more than 10 publications,
- For efficiency of processing, please arrange entries alphabetically by last name in lists such as collaborators, students, advisors, other affiliations, and suggested reviewers.

Principles for the Conduct of Research in the Arctic

Researchers should conform to 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 apply to all researchers and are listed at <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/human.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 and safety in the Arctic and interactions with arctic communities. Investigators are encouraged to propose effective and efficient use of logistics resources to reach research goals and cooperate with communities near field research sites. Support from the RSL program is available to projects funded by the Arctic Sciences Division, pending availability of funds. The program endeavors to leverage support to projects funded by other divisions at NSF or other federal agencies also pending availability of funds. More information is available on the RSL program web site (http://www.nsf.gov/od/opp/arctic/res_log_sup.jsp).

The Foundation and researchers to whom it makes awards are obliged to conform to the various acts governing activities affecting the environment and cultural or historic properties. Researchers should be aware of these acts and adhere to their requirements. Further information concerning environmental issues is provided below under the heading 'Environmental Policy Considerations of Fieldwork'.

Requesting support

The Arctic Sciences Division does not require the use of logistics forms for arctic fieldwork. However, for proper review of the proposed work and to initiate logistics planning, the anticipated fieldwork should be described in the proposal in sufficient detail to enable reviewers to appreciate the scope of logistics requirements. Proposals are encouraged to include a section in the Project Description outlining the planned fieldwork, schedule, locations, required services and platforms, maps and related information.

If a third-party is arranging logistics (a logistics contractor or provider receiving funds directly from NSF), logistics costs should not be included in the proposal budget request. Instead, a description of the support required and cost if known should be included in the budget justification to allow the logistics provider and reviewers to assess the scope, cost and feasibility and initiate planning. Contact all third-party logistics providers prior to proposal submission to let them know what you are planning. If time allows, these providers should provide a letter to include in the supplementary documents section that describes the scope of logistics support required and estimates the cost.

Timing of Requests

Proposals requesting support for field work from the Arctic Division science or logistics programs should be submitted a year or more in advance of the field season to allow for logistics planning and budgeting. For example, proposals submitted in autumn 2008 should not plan to go to the field in summer of 2009, but rather in 2010. Third-party logistics providers may be able to accommodate shorter planning times but should be consulted prior to proposal submission to verify feasibility and availability of funds to support the request.

Logistics Providers and Field Stations

The RSL program works with several organizations to meet the needs of arctic field research. NSF's prime arctic logistics contractor is CH2M Hill Polar Services (CPS; <http://www.polar.ch2m.com>), formerly known as VECO Polar Resources. CPS can provide advanced planning for projects, regardless of whether they ultimately provide the logistics services. CPS supports projects throughout the Arctic, including Greenland, Russia, Canada, Svalbard, Alaska and the Arctic Ocean. They are helpful in proposal preparation and can provide logistics scope letters to establish the feasibility and estimated cost of proposed logistics. They do not charge proposers for this service. Investigators are encouraged to contact CPS to develop a preliminary plan and to provide project support if appropriate. The RSL program will work with CPS, the investigator and funding program manager to determine if requests are supportable.

Barrow, Alaska

Researchers proposing to work near Barrow, Alaska are required to contact the Barrow Arctic Science Consortium (BASC) prior to submission of a proposal. Please use the online logistics help form available on their website (<http://www.sfos.uaf.edu/basc/>). BASC funding is through a cooperative agreement with the RSL program. Support requested from BASC must be approved by NSF through the cooperative agreement mechanism, thus BASC cannot make commitments, but can scope out the type and cost of support requested and provide it if approved by the RSL program or paid for directly by the user.

Greenland

Principal investigators contemplating work in Greenland should obtain the Danish Polar Center application form for research in Greenland. Application forms are available at <http://www.dpc.dk/sw6492.asp>. A copy of the application should be included in the Supplementary Documents section of the proposal.

Toolik Field Station, Alaska

Researchers proposing to work at Toolik Field Station are required to contact the station prior to submission of a proposal to ensure the project can be accommodated, see (<http://www.uaf.edu/toolik/>). Please use their online reservations forms to request use of the facilities. Toolik is funded by a cooperative agreement between the Institute of Arctic Biology at the University of Alaska Fairbanks and the RSL program. The RSL program will work with the investigator, funding program manager, Toolik and CH2M Hill to determine if requests can be supported.

UNOLS, USCG, and other Vessel Requests

Researchers intending to use a vessel from the University-National Oceanographic Laboratory System (UNOLS) or U.S. Coast Guard (USCG) vessels should follow the UNOLS procedure (<http://www.unols.org>). If requesting use of a non-UNOLS or USCG vessel, please include a letter from the vessel operator with an estimate of the costs, supportability, and approximate schedule of the work in the proposal supplementary documents. The RSL program will work with the vessel operator and the investigator to determine if the request is supportable.

Additional Logistics Services

Drilling Services

For ice core and other drilling services, please select your preferred provider and request an estimate to include in your proposal. Ice Core Drilling Services (ICDS) has provided drilling support to arctic projects. For drilling services through ICDS or any other provider, please contact them during the proposal stage for an estimate of costs and include this estimate and a letter from ICDS in the supplementary documents of your proposal (<http://www.ssec.wisc.edu/icds/>). The RSL program will work with the investigator, funding program manager, and their selected drilling provider to determine if the request can be supported.

GPS and Ground-based LiDAR

UNAVCO (<http://www.unavco.org>) is a non-profit organization funded by a cooperative agreement with NSF's Earth Sciences Division to support and promote Earth science by advancing high-precision geodetic and strain techniques such as the Global Positioning System (GPS). UNAVCO provides state-of-the-art GPS equipment and field engineering support for projects, by installing, operating and maintaining continuous GPS networks globally, undertaking new technology development and evaluating commercially available products for research applications, and by archiving GPS data and data products for future applications. UNAVCO maintains Differential GPS stations, has developed a ground-based LiDAR capability and provides other services to arctic researchers. Investigators should contact Bjorn Johns at UNAVCO (bjorn@unavco.org or 303-381-7470) for a proposal letter and budget estimate to include in the supplementary documents section of the proposal. NSF will work with the investigator and UNAVCO to determine if the request can be supported.

National Center for Airborne Laser Mapping (NCALM)

NCALM is supported through a cooperative agreement with NSF's Earth Sciences Division to provide laser mapping services to projects. If you need such services, please contact NCALM about your project needs and include a letter with an estimate of costs from NCALM in the supplementary documents of your proposal (<http://www.ncalm.org/>). NSF will work with the investigator and NCALM to determine if the request can be supported.

Environmental Policy Considerations of Fieldwork

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.

In addition to NEPA, 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>.

Researchers proposing projects with fieldwork involving perturbation of the environment, excavation of archaeological sites, use of underwater seismic air guns, drilling, construction, or other activity that may be considered a major Federal action should 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.

Identify this Solicitation Number on the Proposal Cover Sheet.

Proposers are reminded to identify the program solicitation number (Populated with NSF Number at Clearance) 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):

September 30, 2008

Any proposer who wishes to submit a proposal after the Proposal Deadline must contact the AON Program Director for approval. This is essential for orderly and timely review of all submissions. Failure to obtain prior approval for late submission of a proposal might 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.

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 pubs@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>).

Guidelines for Scientific Data (OPP 9-91)

This statement provides guidelines from the Office of Polar Programs (OPP) at the National Science Foundation (NSF) and sets out special conditions applicable to OPP grants to implement the Foundation's Sharing Policy by assuring timely submission of OPP-award data to national data centers and other OPP-specified repositories for secondary use by the scientific community. 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. The purpose of this policy is to facilitate full and open access to data and materials for polar research from projects supported by OPP.

General Guidelines

For all OPP supported projects:

- All data and derived data products collected under OPP-awards, which are appropriate for submission to a national data center or OPP-specified data repository (OPP-approved web site), should be promptly submitted within a reasonable amount of time, as described below, in responsibilities of Principal Investigators of OPP-Awards.
- OPP considers the documentation of data sets, known as metadata, as vital to the exchange of information on polar research and to a data set's accessibility and longevity for reuse.
- Data archives of OPP-supported projects should include easily accessible information about the data holdings, including quality assessments, supporting ancillary information, and guidance for locating and obtaining the data.
- National and international standards should be used to the greatest extent possible for the collection, processing and communication of OPP-sponsored data sets.

Responsibilities of Principal Investigators of OPP-Funded Awards

Principal investigators should make their data available to all reasonable requests and where applicable the principal investigators should submit the data collected to designated data centers as soon as possible, but no later than two (2) years after the data are collected. Data sets from Arctic Observing Network projects are expected to be made publicly available immediately upon collection.

Principal investigators working in coordinated programs (multi-investigator and/or multi-agency programs) may (in consultation with the OPP program managers and other funding agencies involved) establish more stringent data submission procedures to meet the needs of these larger coordinated programs. Principal Investigators with OPP-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.

Conditions for OPP Awards

Principal Investigators of OPP-funded awards are REQUIRED to submit to appropriate electronic data directories, a description of their data (i.e., metadata) resulting from OPP-funded research in the form of a Directory Interchange Format (DIF) entry. Submission of the DIF may be at any time during the tenure of the grant. At the time of submission of the Final Report to NSF, a copy of the DIF must be sent to the cognizant program officer in OPP. Failure to provide final technical reports delays NSF review and processing of pending proposals for that Principal Investigator. Principal Investigators should examine the formats of the required reports in advance to assure availability of required data. Sample DIFs can be found on the Global Change Master Directory web page at <http://gcmd.gsfc.nasa.gov>.

Data sets from OPP supported arctic scientific research should go to the appropriate data center for the specific type of data collected. Any questions concerning this policy should be directed to the cognizant program officer in the Office of Polar Programs.

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.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Robert Sanford, Program Director, Arctic Observing Networks, 755S, telephone: (703) 292-7120, fax: (703)292-9082, email: rsanford@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@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

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