

Changing Seasonality in the Arctic System (CSAS)

Arctic System Science Program

Program Solicitation

NSF 08-567



National Science Foundation

Office of Polar Programs
Division of Arctic Sciences

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

October 10, 2008

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Changing Seasonality in the Arctic System (CSAS)
Arctic System Science Program

Synopsis of Program:

This solicitation is for research aimed at understanding changing seasonality in the arctic system. There now exists abundant evidence that pervasive changes are underway in the patterns of seasonality in the Arctic. The timing and dynamics of key events such as spring melt and fall freeze-up are shifting in response to a changing arctic climate, impacting the interconnected physical, biological, and human components and processes of the arctic system. Interdisciplinary proposals are sought that employ field studies, retrospective investigation, modeling, or synthesis to explore how changes in succession (here, the sequence, nature, and timing of critical seasonal events, to include but not be limited to ecological succession) affect the linkages between, and feedbacks among, components and processes of the arctic system, thus altering the characteristics and functioning of the system as a whole.

Cognizant Program Officer(s):

- Neil R Swanberg, telephone: (703) 292-8029, email: nswanber@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

Estimated Number of Awards: 10 to 20 - the number of awards depends on the scope and size of highly competitive proposals, available funds and the match of logistics capability to research needs.

Anticipated Funding Amount: \$5,000,000 to \$10,000,000 pending availability of funds

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- Academic Institutions located in the U.S.: U.S. universities and colleges located in the U.S.
- Foreign organizations: For cooperative projects involving U.S. and foreign organizations, support will only be provided for the U.S. portion.
- 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 Proposals:**
 - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. 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.
 - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: <http://www.nsf.gov/bfa/dias/policy/docs/grantsgovguide.pdf>)

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required under this solicitation.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

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

October 10, 2008

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 goal of the NSF Arctic System Science (ARCSS) Program is to answer the following question: What do changes in the arctic system imply for the future?

To address this question the ARCSS research community is striving to:

- Advance from a component understanding to a system understanding of the Arctic.
- Understand the behavior of the arctic system, past, present, and future.
- Understand the role of the Arctic as a component of the global system.

- Include human dimensions as an integral part of the arctic system.

A critical aspect of system-level understanding concerns patterns of change and variability within the system. Over the past decade the ARCSS research community has identified patterns of temporal variability and seasonality as an important scientific focus, especially given the rapid and extreme changes in seasons that characterize the Arctic. This research solicitation provides an opportunity for the research community to engage in a coordinated effort on studies of changing seasonality.

Much of the attention on environmental and climate change in the Arctic has focused on state changes such as loss of sea ice, thawing of permafrost, changes in moisture and general warming. These are very important phenomena that will disrupt the system, but in addition many events, particularly those governed by biological and chemical processes, are tightly coupled in time to, and dependent on, other events, and may actually be more sensitive to changes in their critical linkages than to more general state changes. Shifts in the timing, length, and pattern of individual seasonal events are occurring throughout the arctic system, including physical events (e.g. ocean and atmospheric circulation and fluxes, precipitation, sudden thaws, presence of ice and snow, etc.), biological events (e.g., plant phenology, animal life history events, etc.) and human activities (e.g., resource use, industrial activities, etc.). The physical processes driving these shifts do not affect all parts of the system equally, and the resulting asynchrony of interdependent events may decouple some of the linkages.

For example, the ice pack north of Alaska now forms several months later in winter than it has in the past, while the spring melt arrives several weeks earlier, and people and animals with behavior that is tied to these processes must either adapt to the changes or cease the behavior pattern. Examples are hunters that use the ice pack as a platform in autumn, and caribou that calve when the snow has melted and high quality forage becomes available for a brief period in spring. Seasonal events are not all shifting in synchrony nor at the same rate, but rather respond variously to their drivers and show different patterns in the various parts of the system and in different regions of the Arctic. In many cases, through serendipity or evolution, these events are timed relative to one another in ways that may be optimal for some triggered event or at least such that the outcome is predictable. Shifts in that timing (and possible changes in sequence) of seasonal events change the nature of interactions among components of the arctic system, with consequences for the overall system functioning and for life in the Arctic as we know it. While the altered timing of events is of increasing concern globally (e.g., a potential breakdown in crop production because flowers and insect pollinators may no longer be synchronized), the extreme speed of seasonal transitions and the high sensitivity of the biological and human components to changes in the Arctic means that even relatively small shifts may have strong influences there. Many of these transitions are regulated by the timing of the autumn freeze-up and the spring thaw, as the presence of snow and ice is a defining characteristic of the Arctic. Consequently, changes in seasonal timing of these key events may be among the most important mechanisms driving change in the Arctic over the next decades. Some examples of changing seasonality can be found at <http://www.arcus.org/ARCSS/seasonality.html>.

II. PROGRAM DESCRIPTION

Better predictability and understanding of the Arctic as a system will require more knowledge of changes in the seasonal timing and synchrony of events that are critical to the functioning of the system. The goal of this solicitation is to improve our understanding of key linkages that are time sensitive and to begin to identify patterns in the kinds of processes that are vulnerable to changes in synchrony. Priority will be on proposals that explore time sensitive linkages among parts of the system, particularly in cases where environmental changes may perturb the synchrony of linked events, resulting in a structural change in the interactions among system components. Proposals are sought that address one or more of the following broad questions:

1. What seasonal events in the arctic system are key to its functioning as it does now, how are they changing and what is changing them?
2. How do shifts in seasonal events alter linkages among system components and how do these changes alter the functioning of the arctic system as a whole?
3. How do seasonal shifts in the biological, chemical and physical elements of the system affect subsistence systems (use of Arctic resources for food, fiber and water)?
4. How do seasonal changes within the arctic system alter linkages between the arctic and larger scale Earth systems?

Following are examples of the types of detailed questions related to specific seasonal linkages that could be addressed by proposals under this solicitation. These are only examples and the list is not intended to be complete:

- How does an earlier melt and later re-appearance of sea ice and terrestrial snow alter climate and ecosystem dynamics and the feedbacks between them?
- How do changes in the timing of sea ice and snowmelt alter vertical fluxes of heat and water, and what are the consequent impacts on atmospheric and oceanic processes?
- How do changes in the timing of freshwater runoff into the arctic peripheral seas affect marine productivity, ocean stratification, and sea ice production?
- How do changes in the timing of snowmelt on land alter the functioning of aquatic systems through changing carbon and nutrient supply relative to the demand for these resources?
- How do changes in the timing of plant production relative to animal migration patterns alter food chain dynamics?

- How do changes in the seasonal properties of cloud cover affect air-sea and air-land energy exchange, marine productivity, and terrestrial vegetation?
- How do changes in the seasonal absorption of solar radiation at the surface alter photochemical reactions that affect atmospheric chemistry, physics, or the biosphere?
- How do changes in the timing of freeze-up and thaw affect human activities and how does this affect other components of the arctic system?
- How do changes in the biological and/or physical components of the system affect human activities and how do changes in the timing of human activities amplify or dampen changes in the biological and/or physical components of the system?

Projects may address any of the components of the arctic system, including land, atmosphere, the cryosphere, freshwater, oceans, and human dimensions. Priority will be placed on proposals that involve interdisciplinary research, including fieldwork, synthesis, and modeling, as appropriate, to develop a novel, integrated understanding of how shifts in the timing of important events alter arctic system functioning, how changes in this system interact with the larger global system, and how they affect people who live and work in the Arctic. Since the ARCSS Program supports research that contributes to broad system-level understanding, projects that consider multiple components and that consider interactions among human, biological, chemical, and/or physical aspects of the arctic system are particularly encouraged. Proposals must address explicitly how the proposed activities will improve system-level understanding, either as stand alone projects or in coordinated collaboration with other projects. Researchers engaged in successful proposals will be expected to participate in a group effort aimed at improving our understanding of the impact of environmental forcing of time-critical events on the functioning of the system.

III. AWARD INFORMATION

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 10 to 20 - the number of awards depends on the scope and size of highly competitive proposals, available funds and the match of logistics capability to research needs.

Anticipated Funding Amount: \$5,000,000 to \$10,000,000

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:

- Academic Institutions located in the U.S.: U.S. universities and colleges located in the U.S.
- Foreign organizations: For cooperative projects involving U.S. and foreign organizations, support will only be provided for the U.S. portion.
- 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:

Additional Eligibility Info:

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov. Proposers are reminded to identify this program solicitation number 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.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (<http://www.nsf.gov/bfa/dias/policy/docs/grantsgovguide.pdf>). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

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

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.3 of the Grant Proposal Guide provides additional information on collaborative proposals.

Address Arctic System Relevance

Proposals must state explicitly how the proposed activities will improve arctic system-level understanding, either as stand alone projects or in coordinated collaboration with other projects.

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 November 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.aspl>. 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 the U.S. Coast Guard (USCG) vessels Healy or Polar Sea 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. See the Code of Federal Regulations (CFR) pertaining to NSF Title 45 Part 640 at: <http://www.nsf.gov/bfa/dias/policy/guidance.jsp>.

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

B. Budgetary Information

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

Other Budgetary Limitations: Proposals should be for a maximum duration of three years.

Budget Preparation Instructions: A science team meeting will most likely be held before fieldwork commences, and at that time further integration of projects will be implemented. Costs for that meeting will be met by NSF through other means, but proposers should be prepared to attend this and an annual investigators' meeting, and will be expected to coordinate and integrate plans and results with other investigators supported in the competition.

A brief section in the proposal and budget justification should outline the field plan and associated costs (see Full Proposal Instructions, "Arctic Research Support and Logistics").

Researchers intending to use a vessel from UNOLS or the USCG should follow the UNOLS procedure (<http://www.unols.org>).

C. Due Dates

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

October 10, 2008

D. FastLane/Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. 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>.

- **For Proposals Submitted Via Grants.gov:**

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. The Grants.gov's Grant Community User Guide is a comprehensive reference document that provides technical information about Grants.gov. Proposers can download the User Guide as a Microsoft Word document or as a PDF document. The Grants.gov User Guide is available at: <http://www.grants.gov/CustomerSupport>. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

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>.

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:

Each proposal must include a data management plan that conforms to the OPP data management policy (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=opp991, see also Special Award Conditions below). Proposals without a data management plan will be returned without review.

In addition to external peer review, proposals will be evaluated both for their contribution to a systems level understanding of the functioning of the arctic system and for their potential synergy with other submitted proposals that create an integrated research program contributing directly to the interdisciplinary goals of ARCSS.

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 Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative 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/general_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:

Group Effort

Principle Investigators will be expected to participate in a group effort aimed at improving our understanding of the impact of environmental forcing of time-critical events on the functioning of the system. The nature of such effort will be determined by NSF and the group of awardees, and has normally taken the form of annual PI meetings and some group synthesis exercises.

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.

Special Note for Social Sciences Awards:

The ARCSS Program supports some social science disciplines. The nature of the 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 interviews, and field records. Where appropriate and possible, grantees from all social science fields will develop and submit specific plans to share materials collected with NSF support. These plans should cover how and where these materials will be stored, at reasonable cost, and how access will be provided to other researchers, at their cost. Many complexities arise across the range of data collection supported by the Program. Therefore, such unusual circumstances and any necessary modifications or exemptions to the general policy of data sharing should be described in the OPP-awardees sharing plans.

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 Long-Term Observatories 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.

Failure to provide the required annual or final project reports 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.

Annual reports must include information about the status of data management activities. Noncompliance with the data management policy could be used as grounds for suspension or cancellation of funding commitments.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Neil R. Swanberg, telephone: (703) 292-8029, email: nswanber@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.
- Tianay Robinson, telephone: (703) 292-7859, email: trobins@nsf.gov

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, MyNSF (formerly the Custom News Service) is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail

or the user's Web browser each time new publications are issued that match their identified interests. MyNSF also is available on NSF's Website at <http://www.nsf.gov/mynsf/>.

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: pubs@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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