

Arctic Research Opportunities

Arctic Natural Sciences; Arctic Social Sciences; Arctic System Science; Arctic Research Support and Logistics; Arctic Cyberinfrastructure and Sensors; and Arctic Research and Education

Program Solicitation

NSF 05-514

Replaces Document NSF 04-587



National Science Foundation
Office of Polar Programs

Full Proposal Target Date(s):

January 24, 2005

and annually thereafter.

REVISIONS AND UPDATES

SINGLE ANNUAL COMPETITION

The Arctic Sciences Section will hold a single general competition annually. This change is intended to facilitate better management of programs, which have a single annual budget, and more efficient processing of proposals. Other announcements of opportunity may occur for particular initiatives.

REVISED TARGET DATE FOR ALL PROGRAMS

The Arctic Sciences Section will hold a single, annual competition with a Target Date of **January 24, 2005 and January 24 each year thereafter** for all programs described in this program solicitation.

PRIOR APPROVAL

Target Dates allow program officers to accept proposals after the appointed date has passed when they give prior approval for late submissions. The principal investigator must receive approval from the cognizant program director prior to the Target Date for the late submission of a proposal. Proposals submitted after the Target Date without prior approval of the program director may be returned without review. Proposals received after the Target Date may miss a particular panel or committee meeting.

INTERNATIONAL POLAR YEAR (IPY)

The international community of polar researchers and funding agents has begun planning for an International Polar Year to take place March 2007-March 2009 (see <http://dels.nas.edu/us-ipy> and <http://www.ipy.org>). Proposals to perform activities related to planning or execution of IPY may be submitted to programs in the Arctic Sciences Section under this program solicitation. The proposed activities should be consistent with program goals described in this solicitation.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Arctic Research Opportunities

Arctic Natural Sciences; Arctic Social Sciences; Arctic System Science; Arctic Research Support and Logistics; Arctic Cyberinfrastructure and Sensors; and Arctic Research and Education

Synopsis of Program:

The National Science Foundation (NSF) invites investigators at U.S. organizations to submit proposals to conduct research in the Arctic including field and modeling studies and data analysis. The goal of the NSF Arctic Sciences Section is to gain a better understanding of the Earth's physical, biological, geological, chemical, social and cultural processes, and the interactions of ocean, land, atmosphere, biological, and human systems in the Arctic.

Arctic research is supported at NSF by the Office of Polar Programs (OPP; <http://www.nsf.gov/od/opp>) in the Office of the Director, as well as by a number of other programs within the Foundation. Program representatives from OPP and other NSF programs that support arctic research coordinate across NSF, including joint review and funding of arctic proposals, as well as mutual support of special projects with high logistical costs.

Researchers interested in submitting proposals for arctic research should consult this solicitation for information and to determine the program best suited to their proposed work. Proposals should be written and planned in accordance with OPP's Guidelines and Award Conditions for Scientific Data (OPP 9-91 available on the OPP website <http://www.nsf.gov/od/opp/start.htm>) and the Principles for Conduct of Research in the Arctic (<http://www.nsf.gov/od/opp/arctic/conduct.htm>).

Cognizant Program Officer(s):

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- Renee D. Crain, Arctic Research and Education Assistant Program Director, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-4482, fax: (703) 292-9082, email: rcrain@nsf.gov
- Jane V. Dionne, Arctic Natural Sciences Program Director, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-7427, fax: (703) 292-9082, email: jdionne@nsf.gov
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- Charles E. Myers, Head, Interagency Arctic Staff, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-8029, fax: (703) 292-9082, email: cmyers@nsf.gov
- Simon N. Stephenson, Arctic Research Support and Logistics Program Director, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-8029, fax: (703) 292-9082, email: sstephen@nsf.gov
- Neil R. Swanberg, Arctic System Science Program Director, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-8029, email: nswanber@nsf.gov
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Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.078 --- Office of Polar Programs

Eligibility Information

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

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant or Cooperative Agreement
- **Estimated Number of Awards:** 130 to 160 - per year, pending availability of funds.
- **Anticipated Funding Amount:** \$75,000,000 per year approximately, pending availability of funds. This includes funds for field logistics support and continuing grant increments. Approximately \$25 million is available each year for new projects.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

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

B. Budgetary Information

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

C. Due Dates

- **Full Proposal Target Date(s):**
January 24, 2005
and annually thereafter.

Proposal Review Information

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

Summary of Program Requirements

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- A. Arctic Natural Sciences
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I. INTRODUCTION

The Arctic Sciences Section in the Office of Polar Programs (OPP) supports scientific research in 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 most sensitive regions 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 encompass the atmospheric, biological, physical, earth, ocean, and social sciences. 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, ecology, and aeronomy. Increasing emphasis is being given to the integration of research and education. Scientific programs 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 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.htm>. Researchers may find helpful information in the "Guidelines for Improved Cooperation between Arctic Researchers and Northern Communities" at <http://www.arcus.org/guidelines>.

The Foundation is one of twelve 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 Study of Environmental ARctic CHange (SEARCH) is an interagency effort to study changes occurring in the arctic system (<http://psc.apl.washington.edu/search/>). 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 Section will be guided by the research community through avenues such as the SEARCH Science Steering Committee and the SEARCH Open Science Meeting (<http://www.arcus.org/SEARCH/search.html>). The Arctic Sciences Section has funded components of SEARCH research through special announcements of opportunity and expects to continue supporting the development of SEARCH through this mechanism, as well as through this program solicitation, as funding becomes available.

In fiscal year 2003 NSF spent \$93.08 million on awards for Arctic science, education, and infrastructure projects. Of this, \$67.30 million was from the OPP Arctic Research Program.

A compilation of all NSF Arctic and related research grants for each fiscal year is available from the Polar Information Staff, Office of Polar Programs (phone: 703-292-8031). Information for FY2004 will be available in summer 2005. The current NSF Guide to Programs should be consulted for additional program information. Crosscutting programs at NSF (<http://www.nsf.gov/home/crssprgm/>) have provided support for research, education and infrastructure projects in the Arctic and should be consulted for additional opportunities.

II. PROGRAM DESCRIPTION

RESEARCH PROGRAMS

Below are the descriptions of the programs and emphasis areas in the Arctic Sciences Section of the Office of Polar Programs (OPP) that support arctic research and education.

There are three programs for basic scientific research:

- A. Arctic Natural Sciences,**
- B. Arctic Social Sciences, and**
- C. Arctic System Science.**

The Section has three additional programs to support the activities of the arctic research community:

- D. Arctic Research Support and Logistics,**
- E. Arctic Cyberinfrastructure and Sensors, and**
- F. Arctic Research and Education.**

A. Arctic Natural Sciences Program

The OPP Arctic Natural Sciences (ANS) Program supports research in glaciology and in the atmospheric, biological, earth, and ocean sciences. This program provides core support for disciplinary research in the Arctic and coordinates its support of arctic research with the Directorates for Geosciences, Mathematical and Physical Sciences, Social and Behavioral, and Biological Sciences. Areas of special interest include marine and terrestrial ecosystems, arctic atmospheric and oceanic dynamics and climatology, as well as arctic geological and glaciological processes. For information regarding field support for proposals with field components, please see *Proposal Preparation and Submission Instructions* below.

Atmospheric Sciences

Research in arctic atmospheric sciences focuses on arctic climate and meteorology, including atmosphere-sea and atmosphere-ice interactions. Research on past climates and atmospheric gases preserved in snow and ice is encouraged. The program also supports research on stratospheric and tropospheric processes.

In the areas of upper atmospheric and space physics, proposals often are considered jointly with the Division of Atmospheric Sciences in the Geosciences Directorate and the Antarctic Aeronomy and Astrophysics Program in OPP when conjugate studies are proposed.

Biological Sciences

OPP supports projects that emphasize understanding of the adaptation of organisms to the arctic environment. Biological studies in the Arctic include research in freshwater, marine, and terrestrial biology, and ecology.

Earth Sciences

OPP supports projects in the areas of terrestrial and marine geology and geophysics. Of greatest interest is a better understanding of arctic geological processes that are important for improving our ability to interpret the geologic record of environmental change in the polar regions, particularly in the Late Cretaceous and Cenozoic, with special emphasis on the Quaternary. Understanding the processes responsible for the evolution of permafrost and its consequent effects is also of significant importance. A better understanding and reconstruction of the plate tectonic history of the Arctic Ocean remains a priority, as well.

Glaciology

OPP supports projects that focus on the history and dynamics of all naturally-occurring forms of snow and ice, including seasonal snow, glaciers, and the Greenland ice sheet. The Arctic Natural Sciences Program also supports modeling of mass balance, glacial geology, and remote sensing studies of ice sheets.

Ocean Sciences

OPP supports projects that advance our knowledge of the structure and processes of the Arctic Ocean and adjacent seas and their interactions with their boundaries, including the arctic sea-ice cover. Areas of special interest are: low temperature life processes; the formation, movement, and mixing of arctic water masses; the dynamics of sea ice; and the role of the Arctic Ocean and adjacent seas in global climate. Proposals concerned with the interdependencies of chemical and physical processes and marine organisms and productivity are encouraged.

B. Arctic Social Sciences Program

The OPP Arctic Social Sciences Program (ASSP) encompasses all social sciences supported by NSF. These include, but are not limited to anthropology, archaeology, economics, geography, linguistics, political science, psychology, science and technology studies, sociology, traditional knowledge and related subjects.

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

The Arctic Social Sciences Program especially encourages projects that are circumpolar and/or comparative; involve collaborations between researchers and those living in the Arctic; or form partnerships among disciplines, regions, researchers, communities, and/or students (K-12, undergraduate, or graduate). Dissertation research proposals will be accepted. Please consult the "Dissertation Panel Advice to Students" guidelines in the Division of Behavioral and Cognitive Sciences (DBCS; <http://www.nsf.gov/sbe/bcs/anthro/cultdadv.htm>). These guidelines are to provide the applicant with a basic outline for their proposals. Applicants should apply to this OPP solicitation and talk to the ASSP program director about funding limits, which vary from those in DBCS.

Projects involving research with human subjects must ensure that subjects are protected from research risks in conformance with the relevant federal policy known as the Common Rule (*Federal Policy for the Protection of Human Subjects*, 45 CFR 690). All projects involving human subjects must either (1) have approval from the organization's Institutional Review Board (IRB) before issuance of an NSF award or, (2) must affirm that the IRB or an appropriate knowledgeable authority previously designated by the organization (not the Principal Investigator) has declared the research exempt from IRB review. Before NSF can make an award for a project involving human subjects, an institution must either have approval from its institutional review board (IRB) or declare an exemption from the government-wide regulation. The box for "Human Subjects" must be checked on the Cover Sheet with the IRB approval date (if available). If IRB approval has not been obtained prior to submission, the proposer should indicate "Pending" in the space provided for the approval date. Advice is available at <http://www.nsf.gov/bfa/dias/policy/guidance.htm#human>. If letters of permission or approval are included, such as those from Native organizations or communities in which the work will take place, please include them as supplementary documents.

The Arctic Social Sciences Program considers joint review and funding within OPP and with other NSF programs, when appropriate. Special funding opportunities may also be available through the human dimensions component of the Arctic System Science (ARCSS) Program (see below). For information regarding field support for proposals with field components, please see *Proposal Preparation and Submission Instructions* below.

C. Arctic System Science (ARCSS) Program

The Arctic comprises a complex, tightly coupled system of air, ice, ocean, land and people. The arctic system behaves in ways that we do not understand fully and has demonstrated the capacity for rapid and unpredictable change with global ramifications. Because the Arctic is pivotal to the dynamics of our planet, it is critical that we understand this complex and interactive system. The goal of the 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 ARCSS must:

- 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 society as an integral part of the arctic system.

Building on a solid foundation of over a decade of observation, modeling, and process studies, the ARCSS program is entering a synthesis-driven enterprise aimed at achieving system level understanding of the Arctic. This may well include some of the kinds of component level studies carried out before, but successful proposals will focus much more on the relationships amongst the pieces of the system than on the pieces themselves and priorities will be set by the needs of the program in understanding the system. ARCSS will focus on achieving that system understanding. The ARCSS program will:

- Integrate modeling, observational, process, and paleoenvironmental studies.

- Develop a hierarchy of conceptual and quantitative models of the arctic system.
- Identify the most sensitive components and interactions driving arctic system behavior.
- Refine understanding of these key components and interactions.
- Strengthen the interactions between arctic system research and the broader Earth system science.
- Enhance two-way communication with stakeholders, decision-makers, and the public.

ARCSS Structure and focus

In recent years ARCSS has had four active, more-or-less disciplinary components: Ocean/Atmosphere/Ice Interactions (OAI); Land/Atmosphere/Ice Interactions (LAI); Human Dimensions of the Arctic System (HARC), and Paleoenvironmental Arctic Sciences (PARCS), under which research activities have been developed. PARCS proposals were considered within the Earth System History competition of the United States Global Change Research Program solicited under a different NSF announcement with separate submission dates.

The ARCSS program has undergone a major transition, led by the research community, away from these somewhat multidisciplinary organizing principles toward a new program that is integrated, more synthetic and truly interdisciplinary. Efforts will continue to extract as much as possible from research already performed and to capture the knowledge and experience achieved under these components. Replacing them will be a more pro-active ARCSS committee that will guide the system science thinking of the program, strive to develop more extensive connections to a broader array of disciplines for new ideas, and devote considerable attention to fostering ARCSS research efforts during their full life cycle from inception of idea through archival of data, synthesis of results and communication of them to the community and public.

The ARCSS program supports most of its research through special targeted announcements developed in close cooperation amongst NSF, the ARCSS research community and the ARCSS committee. However ARCSS does support a small number of proposals received through this program solicitation. Proposals to this program solicitation should put forth new ideas or efforts that do not fit well under more organized banners and that are smaller in scope than one might find in the specialized announcements of opportunity. Just as any ARCSS proposal, these proposals must focus on advancing our knowledge of the arctic system. Moreover, with the exception of proposals that were specifically encouraged by a panel and NSF to resubmit as filling an essential gap in a particular ARCSS effort, this program solicitation should not normally be viewed as a mechanism to re-submit proposals that were declined in a targeted announcement, because those efforts are assembled as a package.

Information describing the current thinking of the ARCSS program is available on the ARCSS web site (<http://www.arcus.org/ARCSS/ARCSS.html>) and via links therein. Future special announcements for funding opportunities in ARCSS will draw on and aggregate ideas presented in more than one individual disciplinary science plan. Examples of some of the kinds of ideas identified at the 2002 All Hands Meeting as being likely to have high priority in ARCSS in the coming years were:

- Arctic-CHAMP: pan-Arctic Community-wide Hydrological Analysis and Monitoring Program (<http://arcticchamp.sr.unh.edu/>)
- Nearshore and Coastal Processes (http://arctic.bio.utk.edu/screen_LSI_science_plan.pdf)
- Pan-Arctic Cycles, Transitions and Sustainability (http://www.laii.uaf.edu/pubs/PACTS_Plan_screen.pdf)

However, as the ARCSS synthesis develops (http://www.arcus.org/ARCSS/synthesis_process.html), ARCSS is likely to work proactively with its constituent communities to develop these further, along with other new ideas.

Synthesis in ARCSS

The arctic system includes physical, chemical, geological, biological, and cultural factors that respond to global change processes. Some models that predict the climatic response to global change show greater change in the Arctic than any other region. The predicted climatology, however, may not consider the largely unknown interannual to centennial variability in the Arctic. The historical and current human occupation of and dependence on resources in the Arctic, a region subject to possibly large environmental perturbations, makes it important that scientists understand better the interactions of the global and arctic systems. Therefore, the research supported in ARCSS extends beyond purely observational studies to those studies that predict and analyze the consequences of environmental variability and global change important to wise stewardship of renewable resources and development of decision and policy options for resource managers and residents.

To achieve this, ARCSS supports efforts that synthesize knowledge of how the arctic system works, including focus on the linkages between parts of the system, and better articulation of the implications for the future. In general the program is trying to concentrate on understanding the relations amongst the components of the system and leaving the detailed studies at the subcomponent level to other, more disciplinary programs.

Defining an ARCSS Proposal

The interdisciplinary nature of system science can make it difficult to determine whether a proposal is or is not suitable for the ARCSS program. A good rule of thumb is if a proposal is focused on some piece of the system, then it is probably not a good fit to ARCSS, unless the understanding to be achieved about that piece is demonstrably essential to system-level understanding. A proposal suitable for competition in the ARCSS program will normally be expected to:

- have a direct connection to and be essential to success of the ARCSS effort,
- fill a significant gap in our understanding of the arctic system that has been identified by the ARCSS synthesis,
- determine or investigate the important relations amongst components of the arctic system,
- help explain the range of states for the arctic system, or
- contribute significantly to our understanding of the structure and function of the arctic system through synthesis and further study.

To be successful, a proposal to the ARCSS program should have several or all of the above characteristics. Moreover ARCSS proposals must define explicitly how they contribute to system understanding. Failure to do so will result in the return of a proposal without review.

For more information on how a research proposal might best fit the themes of ARCSS, contact the program director. For information regarding field work for proposals with field components, please see *Proposal Preparation and Submission Instructions* below.

OTHER SUPPORT FOR ARCTIC RESEARCH

D. Arctic Research Support and Logistics Program

The Arctic Research Support and Logistics (RSL) program will accept proposals that:

- support long-term observations of the Arctic,
- support the acquisition of data sets useful to a broad segment of the arctic research community,
- will lead to Cooperative Agreements to operate multi-use arctic research facilities, or
- provide services that broadly support the arctic research community, such as facilitating communication, development of research ideas in an arctic-wide community setting, and cooperation with arctic communities.

Long Term Observations

The Arctic Research Support and Logistics (RSL) program will accept proposals that seek to establish or maintain long-term observation data sets. They should be justified in the context of providing critical data to regional or global modeling efforts and/or as a framework for process studies. Investigators are encouraged to show strong community support for these measurements and mechanisms to engage the stakeholders in providing guidance on the collection of the datasets. If appropriate, reference should be made to how the proposed activity fits into the SEARCH implementation plan (see the SEARCH web site for more information <http://psc.apl.washington.edu/search/>). Development of robust instrumentation approaches is encouraged and these can be developed in conjunction with support from the Arctic Cyberinfrastructure and Sensors (CIS) effort described below. Data sets from Long-Term Observatories are expected to be made publicly available immediately upon collection.

Data Acquisitions or Collection

The RSL program will accept proposals that:

- Support the acquisition of satellite and airborne imaging and mapping data and the production and dissemination of user-friendly data products that will be made available to the NSF research community.
- Support aspects of collecting underway data from ships. This includes documentation, quality control and archiving. Proposals need not address all possible data streams, but they should address the end-to-end management of any covered data stream to the point that data are suitable for acceptance into an appropriate archive. Researchers are required to develop a website or alternative venue that advertises the existence of the data, and how the data can be obtained. Researchers wishing to propose an underway data project are encouraged to review the posted correspondence that is available on the AICC website (<http://www.unols.org/committees/aicc/>). It is envisioned that proposals may be received to cover the acquisition of multibeam and other bathymetric data, acoustic Doppler current profiler data, and meteorological data.
- Develop components of geospatial information infrastructure to benefit the arctic research community. The Arctic GIS website hosted by the Arctic Research Consortium of U.S. (ARCUS; <http://www.arcus.org/gis>) contains information about meetings, workshops, initiatives and links to data and information about arctic geospatial information infrastructure.

Facility Operations

The RSL program will accept proposals for the operation of new or existing research facilities that support NSF-funded projects. If successful, awards are expected to be made as cooperative agreements. Proposal should show the range of projects and programs supported by the proposed facility.

The proposal should also show the facility's approach to project planning, how decisions are made on project support plans, the approach to project support in a research and polar environment (both of which tend to force adaptation of plans), how the facility solicits user feedback and how that feedback is evaluated and leads to organizational change.

Field Work

The RSL program supports field components of research funded by the Arctic Sciences Section, other directorates at NSF and occasionally other federal agencies. Support includes, but is not limited to, providing transportation, food and shelter while conducting field work, user and day-rate fees at field camps, salaries of staff hired specifically for field work, activities such as travel to coordinate projects with permitting agencies and local communities. More detailed information is available on the RSL web site (<http://www.nsf.gov/od/opp/arctic/suplog.htm>).

Access to logistical support from the RSL program is through the regular proposal process. For information regarding field support for proposals with field components, please see the *Proposal Preparation and Submission Instructions* below.

E. Arctic Cyberinfrastructure and Sensors

The goal of the Arctic Cyberinfrastructure and Sensors (CIS) emphasis area is to enable the development of both sensors and links in an arctic-wide network of multidisciplinary, integrated sensors, connecting to potential users via the Internet.

The term *cyberinfrastructure* was explicated in the 2003 NSF report *Revolutionizing Science and Engineering Through Cyberinfrastructure* (<http://www.cise.nsf.gov/sci/reports/toc.cfm>): “The base technologies underlying cyberinfrastructure are the integrated electro-optical components of computation, storage, and communication that continue to advance in raw capacity at exponential rates. Above the cyberinfrastructure layer are software programs, services, instruments, data, information, knowledge and social practices applicable to specific projects, disciplines, and communities of practice. Between these two layers is the **cyberinfrastructure** layer of enabling hardware, algorithms, software, communications, institutions and personnel. This layer should provide an effective and efficient platform for the empowerment of specific communities of researchers to innovate and eventually revolutionize what they do, how they do it, and who participates.”

The 2004 NSF program solicitation for Sensors and Sensor Networks (<http://www.nsf.gov/pubs/2004/nsf04522/nsf04522.htm>) discusses sensor development at length. These discussions are relevant to the development of sensors and sensor

networks for the Arctic.

Within these contexts, CIS will focus on the research required to create new, more capable sensors of physical, biological or chemical variables in the ocean, ice and air, as well as the methodologies to enable such measurements to be made from fixed arrays or autonomous platforms. Because of a wide range of cyberinfrastructure efforts at NSF, CIS will tend to focus on arctic-specific issues in the areas of communications and software as, for example, methodologies for data transmission from under an ice pack as opposed to data transmission protocols in general.

A natural tie exists between the CIS emphasis area and the RSL program; as a rule of thumb, CIS should be the recipient of proposals that address forefront research issues in the development of novel sensors or instruments. Conversely, proposals for long-term observations in the Arctic using more established means should be submitted to the RSL Program. Because development efforts may be a part of proposals to the ANS, Arctic Social Sciences and ARCSS Programs, such proposals will be jointly reviewed and joint funding may result for successful proposals.

F. Arctic Research and Education

The integration of scientific research with education and outreach is important to OPP. Investigators are encouraged to include these activities in their research proposals in accordance with the broader impacts review criterion. Some education and outreach activities may develop during the course of a research grant or warrant a separate proposal specifically for the education and outreach activities.

The Arctic Research and Education program supports activities that bridge research and education in concert with funded research grants and agreements through supplement requests or as separate proposal requests to support new ventures. Proposals to this program may include formal or informal education or outreach for students K-12 and higher or to the broader public. Most commonly awards are made as supplements to research grants or as small grants. The Arctic Research and Education program seeks to collaborate with other directorates at NSF to promote the integration of research and education. For information regarding field support for proposals with field components, please see *Proposal Preparation and Submission Instructions* below.

SUPPLEMENTARY INFORMATION

International Polar Year (IPY)

The international community of polar researchers and funding agents has begun planning for an International Polar Year to take place March 2007-March 2009 (see <http://dels.nas.edu/us-ipy> and <http://www.ipy.org>). Furthering the research themes of the Study of Environmental ARctic CHange (SEARCH) program (<http://psc.apl.washington.edu/search/>) during IPY is a priority for the Arctic Sciences Section. Proposals addressing aspects of IPY or SEARCH themes may be submitted to programs described in this program solicitation if they are consistent with the program goals.

OTHER NSF FUNDING OPPORTUNITIES

See Section IX on Other Programs of Interest and consult the NSF Guide to Programs (<http://www.nsf.gov/pubsys/ods/getpub.cfm?gp>).

III. ELIGIBILITY INFORMATION

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

IV. AWARD INFORMATION

OPP expects to make approximately 130-160 awards each year, with a combination of standard and continuing grants and

cooperative agreements. Award sizes will vary widely depending on the type of work proposed. Funding for the arctic research programs will total approximately \$75 million, per year, including all logistics costs and continuing grant increments, pending availability of funds. Approximately \$25 million is available for new projects each year.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Instructions:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Website at: <http://www.nsf.gov/cgi-bin/getpub?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.

The GPG contains information about proposal preparation, submission, review and administration helpful to the proposing community. Particular style and format rules ensure fairness among proposals and readability for reviewers and program directors. Proposals have been returned without review for failing to comply with the GPG or the solicitation. Please bear in mind the following:

- Proposals that are resubmissions must be substantially changed from the original,
- Minimum font size and maximum lines and characters per centimeter are specified in the GPG,
- Follow the format rules for biosketches, in particular, do not include more than 10 publications,
- For efficiency of processing, please arrange listings alphabetically by last name in the Collaborators, Students, Advisors, Other Affiliations, Suggested Reviewers and related sections.

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.htm>.

Proposals Involving Human Subjects

Projects involving research with human subjects must ensure that subjects are protected from research risks in conformance with the relevant federal policy known as the Common Rule (*Federal Policy for the Protection of Human Subjects*, 45 CFR 690). All projects involving human subjects must either (1) have approval from the organization's Institutional Review Board (IRB) before issuance of an NSF award or, (2) must affirm that the IRB or an appropriate knowledgeable authority previously designated by the organization (not the Principal Investigator) has declared the research exempt from IRB review. Before NSF can make an award for a project involving human subjects, an institution must either have approval from its institutional review board (IRB) or declare an exemption from the government-wide regulation. The box for "Human Subjects" must be checked on the Cover Sheet with the IRB approval date (if available). If IRB approval has not been obtained prior to submission, the proposer should indicate "Pending" in the space provided for the approval date. Advice is available at <http://www.nsf.gov/bfa/dias/policy/guidance.htm#human>. If letters of permission or approval are included, such as those from Native organizations or communities in which the work will take place, please include them as supplementary documents.

Proposals Involving Arctic Field Work

The Arctic Sciences Section does not require the use of logistics forms for arctic field work. However, for proper review of the proposal and to initiate logistics planning for successful proposals, the anticipated field work should be described in the proposal. A description of fieldwork is appropriate in a section of the proposal describing the overall project schedule. Figures

showing the field work area are encouraged.

If a third-party is arranging logistics (a logistics contractor) their costs should **not** be itemized or included in the fastlane budget forms. Instead, the scope and kind of support should be described clearly in the budget justification to allow the logistics provider and reviewers to assess the scope, feasibility and initiate planning (see Section II, "Arctic Research Support and Logistics").

Proposals that include fieldwork should be submitted well in advance of the field season. For example, for fieldwork in Summer 2006, proposals should be submitted by 24 January 2005.

The RSL program was created, in part, to enhance access, safety and interactions with arctic communities. Accordingly investigators are encouraged to propose effective and efficient use of logistics resources to reach research goals and cooperate with communities near field research sites. More information is available on the RSL program website (<http://www.nsf.gov/od/opp/arctic/suplog.htm>).

Logistics Providers and Field Stations

The RSL program works with several organizations to meet the needs of arctic field research. Projects working through NSF's prime logistics contractor (VECO Polar Resources; <http://vecopolar.com/>) are encouraged to contact them to develop a preliminary plan. Researchers proposing to work near Barrow, Alaska are required to contact the Barrow Arctic Science Consortium (BASC) prior to submission of a proposal to ensure the project can be accommodated, see (<http://www.sfos.uaf.edu/basc/>). 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/>).

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/Res&Log/ProjectPlanner/Start.html>. A copy of the application should be included in the supplementary documentation with the proposal submitted to OPP (in the Supplementary Documents section of Fastlane).

UNOLS 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*, *Polar Sea* or *Polar Star* should follow the UNOLS procedure (<http://www.unols.org>).

Identify this Solicitation in Proposal

Proposers are reminded to identify the program announcement/solicitation number (05-514) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing:

Cost sharing is not required in proposals submitted under this Program Solicitation.

C. Due Dates

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

Full Proposal Target Date(s):

January 24, 2005
and annually thereafter.

All programs covered under this solicitation will have a single, annual competition with the Target Date of January 24th.

Proposers must contact the cognizant program director for approval prior to the Target Date when intending to submit a proposal after the target date. This is essential for orderly review of all submissions. Though a particular proposal may miss a panel or competition, proposals may still be reviewed if received after the target date provided that the proposer has prior approval from the program director. Failure to obtain prior approval of the cognizant program director for late submissions may result in the proposal being returned without review.

D. FastLane Requirements

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

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

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

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

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

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

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised

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

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

The two National Science Board approved merit review criteria are listed below (see the [Grant Proposal Guide](#) Chapter III.A for further information). The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which he/she is qualified to make judgments.

What is the intellectual merit of the proposed activity?

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

What are the broader impacts of the proposed activity?

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

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

Integration of Research and Education

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

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

B. Review Protocol and Associated Customer Service Standard

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

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

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the

Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

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

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

VII. AWARD ADMINISTRATION INFORMATION

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 Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See section VI.A. for additional information on the review process.)

B. Award Conditions

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

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/home/grants/grants_gac.htm. 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 is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at <http://www.nsf.gov/cgi-bin/getpub?gpm>. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Website at <http://www.gpo.gov>.

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.htm>.

Guidelines 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, Section VI-I <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 website) 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 Arctic Social Sciences Awards: The Arctic Social Sciences Program supports the full range of social science disciplines and adheres to the Data Sharing Policy developed by NSF's Directorate for Social Behavioral and Economic Research (SBER). 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 Arctic Social Sciences 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-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. PIs with OPP-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-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 proposal for that PI. PIs 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 please contact 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 PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Please see the Guidelines for Scientific Data under Section VII. B. Award Conditions in this program solicitation for information about award conditions for data.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for the PI and all Co-PIs. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project reporting system, available through FastLane, for preparation and submission of annual and final project reports. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding this program should be made to:

- Dennis Conlon, Arctic Cyberinfrastructure and Sensors Emphasis Area Director, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-4658, fax: (703) 292-9082, email: dconlon@nsf.gov
- Renee D. Crain, Arctic Research and Education Assistant Program Director, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-4482, fax: (703) 292-9082, email: rcrain@nsf.gov
- Jane V. Dionne, Arctic Natural Sciences Program Director, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-7427, fax: (703) 292-9082, email: jdionne@nsf.gov
- Anna M. Kerttula, Arctic Social Sciences Program Director, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-7432, fax: (703) 292-9082, email: akerttul@nsf.gov

- Charles E. Myers, Head, Interagency Arctic Staff, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-8029, fax: (703) 292-9082, email: cmyers@nsf.gov
- Simon N. Stephenson, Arctic Research Support and Logistics Program Director, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-8029, fax: (703) 292-9082, email: sstephen@nsf.gov
- Neil R. Swanberg, Arctic System Science Program Director, Office of the Director, Office of Polar Programs, 755 S, telephone: (703) 292-8029, email: nswanber@nsf.gov
- William J. Wiseman, Jr., Arctic Natural Sciences Program Director, Office of the Director, Office of Polar Programs, 740 S, telephone: (703) 292-4750, fax: (703) 292-9082, email: wwiseman@nsf.gov

For questions related to the use of FastLane, contact:

- Linda Izzard, Program Coordination Specialist, Office of the Director, Office of Polar Programs, 740 S, telephone: (703) 292-7430, fax: (703) 292-9082, email: lizzard@nsf.gov

IX. OTHER PROGRAMS OF INTEREST

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

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

Postdoctoral Fellowships in Polar Regions Research

OPP remains committed to providing opportunities for education and increasing diversity in the science workforce. In 2004 OPP held the first *Postdoctoral Fellowships in Polar Regions Research* (<http://www.nsf.gov/pubsys/ods/getpub.cfm?nsf04566>) competition to support postdoctoral training and research on any aspect of scientific study of the Antarctic and/or the Arctic. Please see the solicitation for complete information and deadline dates.

Research Experiences for Undergraduates (REU)

Annually OPP supports Research Experiences for Undergraduates (REU; <http://www.nsf.gov/pubsys/ods/getpub.cfm?nsf04584>) as supplements to research grants and as awards for REU sites (<http://www.nsf.gov/home/crssprgm/reu/start.htm>). The REU program is intended to provide meaningful experiences to undergraduate students in planning, conducting, analyzing and if possible publishing original research to develop a new generation of researchers. The REU program is a major contributor to the NSF goal of developing a diverse, internationally competitive, and globally-engaged scientific and engineering workforce.

REU support comes from program research budgets, pending availability of funds. Requests for REU students should be made in the original research proposal or as supplements to existing grants. As with all supplement requests, **contact the cognizant program officer prior to submitting a supplement request to host an REU student**. The emphasis will be on selecting the best research experiences for students, increasing diversity, and providing REU opportunities to researchers who have not had them in the past.

Other Programs at NSF

Crosscutting programs at NSF include interdisciplinary programs, programs that are supported by multiple Directorates at NSF, and programs jointly supported by NSF and other Federal agencies. Selected major programs are listed on the Crosscutting programs website at <http://www.nsf.gov/home/crssprgm/>.

Environmental Research and Education contains several emphasis areas compatible with arctic research, including Biocomplexity in the Environment, Global Change Research, and Environmental Education. More information about these emphasis areas at NSF can be found on the ERE web site at <http://www.nsf.gov/geo/ere/ereweb/index.cfm>.

OPP also works closely the Geosciences Directorate (<http://www.geo.nsf.gov/start.htm>), including Ocean Sciences, Atmospheric Sciences, Earth System History and Geosciences Education. OPP has also co-funded education projects with the Elementary, Secondary and Informal Education (ESIE) program in the Education and Human Resources Directorate (<http://www.ehr.nsf.gov/>).

The Arctic Social Sciences Program works closely with the Directorate for Social, Behavioral, and Economic Sciences (SBE) including the emphasis area of Human and Social Dynamics (<http://www.nsf.gov/home/crssprgm/hsd/start.htm>), which seeks to stimulate breakthroughs in knowledge about human action and development as well as organizational, cultural, and societal adaptation and change. In addition, researchers interested in linguistics research are encouraged to examine the announcement of opportunity on Documenting Endangered Languages (http://www.nsf.gov/pubsys/ods/getpub.cfm?ods_key=nsf04605) released to support projects to develop and advance knowledge concerning endangered human languages.

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

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

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

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

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

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230

- **For General Information** (NSF Information Center): (703) 292-5111

- **TDD (for the hearing-impaired):** (703) 292-5090

- **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; 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 applicant 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 needing information as part of the review process or in order to coordinate programs; 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," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). 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 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 this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230.

OMB control number: 3145-0058.



The National Science Foundation
4201 Wilson Boulevard, Arlington, Virginia 22230, USA
Tel: 703-292-5111, FIRS: 800-877-8339 | TDD: 703-292-5090

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