

Antarctic Research

PROGRAM SOLICITATION NSF 09-536

REPLACES DOCUMENT(S):
NSF 08-535



National Science Foundation

Office of Polar Programs
Division of Antarctic Sciences

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

June 08, 2009

REVISION NOTES

Important changes regarding field support In response to recommendations by the most recent Antarctic Science Committee of Visitors, numerous changes have been made to this solicitation. These changes include:

- Principal investigators must submit a summary Operational Requirements Worksheet (ORW) as a document in *Special Information and Supplemental Documents* and a full ORW to be uploaded as a *Single Copy Document*. Both of these documents will be provided as PDF files from POLAR ICE (see section V.A of this solicitation).
- Many costs for field and laboratory support in Antarctica are to be included as part of the proposal budget. These costs must include laboratory consumables, excess baggage requirements, and project specific equipment that will be required in the field. This information must be accompanied by any supporting information needed for reviewers to determine the need of these costs. Costs articulated in the proposal will provide a basis for the evaluation of supportability of the research.
- For those projects requiring air support, the proposal should include a table estimating the type of aircraft required and the expected number of missions. For proposals requesting vessel support, estimates for the number of ship days, excluding transit, must be provided. Principal investigators should consult the U.S. Antarctic Program website (<http://usap.gov/calendarsAndSchedules/>) for the latest information regarding availability of vessel and airborne assets to ensure that a proposed request can be accommodated within the coming field seasons.
- For projects that request laboratory space in Antarctica for analytical work, investigators should justify the need to conduct the analyses in Antarctica rather than analyzing samples in their home laboratory.
- Requests for vessel support must be submitted using the UNOLS Ship Time Request System (http://unolsweb.cms.udel.edu/strs/Public/diu_login.aspx).

Other important changes:

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

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Antarctic Research
Aeronomy & Astrophysics, Organisms and Ecosystems, Earth Sciences, Ocean & Atmospheric Sciences,
Glaciology, Integrated System Science

Synopsis of Program:

Scientific research and operational support of that research are the principal activities supported by the United States Government in Antarctica. The goals are to expand fundamental knowledge of the region, to foster research on global and regional problems of current scientific importance, and to use Antarctica as a platform from which to support research. The U.S. Antarctic Program provides support for field work only when a compelling justification exists for doing the work in Antarctica (i.e., the work can only be done, or is best done, in Antarctica). The

program also supports antarctic-related analytical research performed at home organizations.

NSF is the designated lead agency for the International Polar Year, 2007-2009, for the United States and has made a number of awards in response to IPY solicitations (see list of awards at http://www.nsf.gov/od/opp/ipy/ipy_awards_list.jsp). Proposals that make use of IPY datasets or that otherwise build on IPY investments are welcome in the regular programs.

For information concerning other Federal agencies and their IPY programs, please go to the U.S. government interagency IPY site at <http://www.us-ipy.gov/>.

Cognizant Program Officer(s):

- Kelly Falkner, Program Director, Antarctic Integrated System Science, telephone: (703) 292-7450, fax: (703) 292-9080, email: kfalkner@nsf.gov
- Roberta Marinelli, Program Director, Antarctic Organisms and Ecosystems, telephone: (703) 292-7448, fax: (703) 292-9080, email: rmarinel@nsf.gov
- Peter Milne, Program Director, Antarctic Ocean & Atmospheric Sciences, telephone: (703) 292-8033, fax: (703) 292-9080, email: pmilne@nsf.gov
- Julie Palais, Program Director, Antarctic Glaciology, telephone: (703) 292-8033, fax: (703) 292-9079, email: jpalais@nsf.gov
- Vladimir Papitashvili, Program Director, Antarctic Aeronomy and Astrophysics, telephone: (703) 292-7425, fax: (703) 292-9080, email: vpapita@nsf.gov
- Vladimir Papitashvili, Acting Program Director, Antarctic Earth Sciences, telephone: (703) 292-7425, fax: (703)292-9080, email: vpapita@nsf.gov
- Jessie L. Crain, Research Support Manager, OPP/AIL, telephone: (703) 292-7457, fax: (703)292-9080, email: jlcrain@nsf.gov
- Alexandra Isern, Research Support Manager, OPP/AIL, telephone: (703) 292-7581, fax: (703) 292-9080, email: aisern@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: 50 approximately

Anticipated Funding Amount: \$20,000,000 in FY10, plus up to \$35M in outyear increments for continuing awards, contingent on availability of funds. (See section III)

Eligibility Information

Organization Limit:

None Specified

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:

B. Budgetary Information

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

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):
June 08, 2009

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: Standard NSF reporting requirements apply.

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I. INTRODUCTION

Scientific research and operational support of that research are the principal activities supported by the United States Government in Antarctica. The goals are to expand fundamental knowledge of the region, to foster research on global and regional problems of current scientific importance, and to use Antarctica as a platform from which to conduct research. The U.S. Antarctic Program provides support for field work only when a compelling justification exists for doing the work in Antarctica (i.e., the work can only be done, or is best done, in Antarctica). The program also supports analytical research, as well as modeling and synthesis activities, performed at home organizations.

The Division of Antarctic Sciences strongly encourages proposals from persons under-represented in science and from investigators new to polar research with the goal of broadening participation with respect to both individuals and institutions.

The National Science Foundation funds and manages the U.S. Antarctic Program, which supports research in the areas described in Section II.

INTERNATIONAL POLAR YEAR (IPY)

The International Polar Year (IPY), which extends from March 2007 to March 2009 (see <http://dels.nas.edu/us-ipy> and <http://www.ipy.org>) is near completion.

A large number of awards have been made in response to proposals submitted to the regular Antarctic Research solicitations as well as two special solicitations during FY06 and FY07. A list of IPY awards is available at http://www.nsf.gov/od/opp/ipy/ipy_awards_list.jsp. Proposals to build on prior IPY investments or to make use of new IPY data sets are welcome in all programs within the Division of Antarctic Sciences.

For information about other NSF IPY activities, see <http://www.nsf.gov/od/opp/ipy/ipyinfo.jsp>.

II. PROGRAM DESCRIPTION

RESEARCH AREAS

Aeronomy and Astrophysics

The polar regions have been called Earth's window to outer space. This term originally applied to study of the aurora and other phenomena related to interaction of solar wind (ionized plasma blown from the Sun) with the Earth's magnetosphere. In this context, the polar upper atmosphere is a screen on which the results of such interaction can be viewed and through which other evidence of space physics processes can pass. Today, the concept of Earth's polar atmosphere as a window also includes research in other fields. For example, favorable atmospheric conditions and the unique location of Amundsen-Scott South Pole Station on the high antarctic plateau enable astronomers and astrophysicists to use this window to understand better the internal structure of the Sun, to study our Milky Way and other galaxies, and to probe the early Universe with unprecedented precision. Antarctica's deep, clear ice sheet also is a window, providing a transparent medium for detection of neutrinos - elusive particles that fill space and easily pass through Earth. The cubic-kilometer IceCube Neutrino Observatory is being built in the ice sheet at the South Pole to make use of this dense, transparent medium.

The Aeronomy and Astrophysics Program supports studies of three major domains:

- **Middle and upper atmosphere — mesosphere and thermosphere.** Current research focuses on atmospheric temperature changes and dynamics of neutral winds at the altitudes from 30 to a few hundred kilometers, particularly in the context of the planetary tides behavior and climate change dynamics. The polar upper atmosphere is expected to be a field of continued interest and growth.
- **Near-Earth solar wind, magnetosphere, and ionosphere.** These domains derive many of their characteristics from the interplay of the solar wind's ionized plasma flow and energetic charged particles with Earth's magnetic field. The ionosphere is the ultimate sink of solar wind energy and momentum that are transported into the coupled magnetosphere and ionosphere. This energy dissipates in the ionosphere by precipitating charged particles as a result, in part, of resonant wave-particle interactions, and because of the Joule heating that is a result of currents driven by electric fields.
- **Astronomy and astrophysical studies of the Universe, including cosmic ray and solar physics.** Astrophysical studies are primarily conducted at South Pole Station and on NASA's long-duration balloon flights launched from McMurdo. Research proposals to exploit the special capabilities of these research platforms are welcome. Proposals in astronomy and astrophysics for work at another nation's antarctic facility are welcome, but they must be collaborative with scientists from the other nation and the foreign collaborator must be the lead scientist on the project.

Major goals are to sponsor research that requires or would benefit from the unique conditions of the southern polar region, to contribute to the understanding of the role of the Antarctic in global environmental processes, or to improve understanding of the Universe. Participation in interdisciplinary studies of the middle and upper atmosphere help to improve understanding of the coupling of the Earth's polar atmosphere with the ionosphere and magnetosphere and of the ways in which both are affected by solar activity.

Organisms and Ecosystems

The Antarctic Organisms and Ecosystems Program supports research at all levels of biological organization, from molecular, cellular, and organismal, to communities and ecosystems over regional and global scales. This broad purview encourages development of integrative and interdisciplinary approaches toward fundamental questions in biological and environmental science. Investigators are encouraged to develop and apply theory and innovative technologies to understand how organisms adapt to and live in high-latitude environments, and how populations and ecosystems respond to global change.

Particular emphases include:

- **Marine ecosystems.** Polar marine environments are characterized by complex interactions among biotic, chemical and physical processes, in areas that include the marginal ice-zone, continental shelves, polynyas, and open-ocean systems. Studies that examine food webs, primary and secondary production, the interplay between ecology and biogeochemistry, and the relationship between climate change and ecosystems are welcomed. Polar marine systems are predicted to experience under-saturation with respect to carbonate minerals within several decades, therefore proposals that address organism responses to ocean acidification are particularly encouraged. Remote sensing techniques, long-term observations, and modeling are appropriate tools to enhance these areas of research.
- **Terrestrial and freshwater ecosystems.** Organisms in ice-free areas, in ephemeral streams, and in perennially ice-covered lakes show remarkable persistence in the face of harsh conditions. The Antarctic Organisms and Ecosystems program supports research on adaptive mechanisms in the context of the present day hydrologic and biogeochemical environment. The McMurdo Dry Valleys of southern Victoria Land are of particular interest due to the large body of data available through ongoing research programs, including the McMurdo Dry Valleys LTER, but other locations can be proposed. Research in support of future field exploration of subglacial lakes is also considered.
- **Population dynamics, physiological ecology, and adaptation.** The extremes of light, temperature, and moisture have resulted in unusual adaptations within organisms at all levels of organization. Research concerning metabolic, physiological and behavioral adaptations of marine and terrestrial organisms, their population dynamics, and their diversity is supported. Long-term observations are also supported, with the goal of understanding the impact of environmental change on organismic and ecological processes.
- **Genomics.** "Genome-enabled" biology provides a foundation for understanding the genetic basis of organism-environment interactions. The unusual antarctic environment presents a compelling natural laboratory for the study of environmental genomics. A National Research Council report, *Frontiers in Polar Biology in the Genomics Era*, addresses some of these opportunities.

Earth Sciences

Beneath its thick ice sheets, Antarctica is a dynamic and diverse continent with mountains, volcanoes, deserts, meteorites, fossils, and some of the Earth's most ancient crust. As well, Antarctica's continental shelves and surrounding ocean basins offer insight into the history of Antarctica's ice sheets as well as unique geodynamic processes and other geologic phenomena.

The Earth Sciences Program supports research in both terrestrial and marine settings to interpret Antarctica's rich history and to understand the processes that shape it today. Current projects address such diverse topics as:

- **Understanding the ice sheets** using sediment records to reconstruct their history and determine the geologic controls of their formation and stability
- **Deciphering paleoenvironmental and paleobiological records** to understand global climate, ocean circulation, and the evolution of life
- **Exploring Antarctica's tectonic evolution**; from its central role in Gondwana's breakup to the present-day deformation driving volcanism, rifting, and orogenesis
- **Investigating unique processes**; such as the formation of subglacial lakes or the aeolian and permafrost sculpting of the Dry Valleys

All of these problems require a better understanding of Antarctica's geology, including the structure and composition of its crust and underlying mantle, and its connection to global earth science questions. The program therefore supports and encourages field, laboratory, and theoretical work in geology, geophysics, and any other area of earth sciences, including the intersections between these fields and biology, glaciology, and oceanography.

The program also strongly encourages investigators new to the program, international collaboration, and research-related education and outreach. Work on previously collected samples and data is also encouraged, and proposers should investigate availability from the Program Director, individual researchers, and repositories such as:

- **United States Polar Rock Repository** at Ohio State University, host to thousands of rock samples from around Antarctica. <http://bprc.osu.edu/emuwebusprrr/pages/usprrr/Query.php>
- **Antarctic Research Facility** at Florida State University, housing over 25,000 meters of sediment core from the Southern Ocean and Antarctica. <http://www.arf.fsu.edu/>
- **Paleobotany Collection** of the University of Kansas curating more than 7,000 specimens of antarctic fossil plants from throughout the Transantarctic Mountains. <http://paleobotany.bio.ku.edu/PaleoCollections.htm>
- **UNAVCO's** online archive of GPS data from field campaigns and continuous stations. <http://unavco.org/polar>
- **IRIS's** online archive of seismic data from field campaigns and continuous stations. <http://www.iris.edu/>

Proposers should also be aware that during IPY, the program supported two major initiatives that may have opportunities for additional investigators:

- **ANDRILL**: Drilling McMurdo Sound to understand the history of Antarctica's ice sheets. Samples may be available to researchers offering unique contributions. <http://andrill.org/>
- **POLENET**: Installation of a system of precise GPS devices and seismic stations to weigh Antarctica's ice sheets and study the deep earth. Data will be available to researchers offering unique contributions. <http://www.polenet.org/>

Ocean and Atmospheric Sciences

The Antarctic atmosphere and surrounding oceans play a major role in the global heat, momentum, and biogeochemical cycles. They are key components of global ocean circulation and planetary climate dynamics. As a coupled system they serve both as indicators and determinants of climate and ecosystem change. The Ocean and Atmospheric Sciences Program is intended to foster advances in understanding of the physics and chemistry of both oceanic and lower atmospheric processes and environments at high southern latitudes and their links at local, regional and global scales across the antarctic continent and Southern Ocean. Innovative approaches involving surface and/or satellite-based field observations and/or modeling studies are particularly encouraged.

Major program elements include but are not limited to:

- **Physical oceanographic studies** probing the dynamics and kinematics of the circulation of the polar southern oceans, the effects of interface driving forces such as wind, air-sea-ice exchange, solar radiation, tides, water mass production and modification processes, ocean dynamics at the pack ice, glacial and continental margins, as well as the seasonal effect of polynyas on ventilation and relationships to the distribution of marine biota
- **Meteorological studies** investigating atmospheric circulation systems and dynamics covering aspects from mesoscale and/or global exchange and balances of heat, momentum, moisture, and radiation across the range of meteorological phenomena of the antarctic continent and oceans, as well as operational and observational meteorology
- **Climate dynamics studies** advancing knowledge of the processes responsible for forcing the circulation across synoptic and global scales of interest to the atmosphere over the antarctic continent and southern hemisphere, causes of climate variability and change, numerical parameterization, modeling, data assimilation, predictability and simulation
- **Atmospheric chemistry studies** emphasizing measurement and modeling the concentrations, distributions, and fluxes of gases and aerosols in the antarctic atmosphere, and the processes, transport and chemical reactions within these species and exchanges among the atmosphere, the antarctic continent, and surrounding seas
- **Chemical oceanographic studies** characterizing the chemical composition of and processes occurring in the Southern Ocean, tracking biogeochemical fluxes within ocean basins and across their boundaries, and the application of chemical tracers to study time and space scales of physical and biogeochemical oceanic processes
- **Sea ice studies** encompassing material characteristics from the individual crystal level to large-scale patterns of freezing, deformation, and melting and the relationships of sea-ice dynamics with the ocean and atmosphere over a variety of temporal and spatial scales relevant to chemical and biological processes

Glaciology

The antarctic ice sheet covers about 98% of the continent, extending over almost 14 million square km. The largest mass of ice on Earth, it contains the equivalent of 70 m of sea-level rise if all of its ice were to melt. The Antarctic Glaciology Program is an interdisciplinary program concerned with the history and dynamics of the antarctic ice sheet. The program encompasses the study of the continental East Antarctic Ice Sheet as well as the marine-based West Antarctic Ice Sheet and supports research on the floating ice shelves fringing the continent (including the icebergs that break off of those ice shelves), as well as the glaciers draining the interior of the continent. Another key area of interest is determining the Cenozoic history of the ice sheet, including the uplift of the Transantarctic Mountains and its interaction with global climate (e.g., response to the Pliocene warming). Much of the glacial geological research in the Transantarctic Mountains relates to understanding the history of the ice sheet during the Cenozoic Era, especially during the Quaternary Period.

Recent program emphases include

- the study of climate change from ice cores (including development of new ice-core processing and analysis methods),
- numerical modeling of the ice sheet and numerous ice streams around the continent,

the glacial geologic record preserved in sediments around the continent,

- and studies of the dynamics of the ice sheet (including its subglacial hydrology from ground-based measurements and from remote sensing data obtained from aircraft and satellites).

An ongoing initiative supported by the program is the multidisciplinary West Antarctic Ice Sheet program (WAIS). This program, which is supported by the Antarctic Glaciology Program and the Antarctic Earth Science Program, is designed to advance understanding of the West Antarctic Ice Sheet. Scientists participating in the WAIS program want to know what triggers marine ice sheet collapse and to evaluate the possibility that this could happen in West Antarctica. Predicting the ice sheet's future behavior requires an understanding of its history, current state (including the nature of the bed), internal dynamics, and coupling to the current global climate.

A related activity involving studies of the antarctic ice sheet is the Center for Remote Sensing of Ice Sheets (CReSIS). CReSIS, a Science and Technology Center established by the [National Science Foundation \(NSF\)](#) in 2005, develops new technologies and computer models to measure and predict the response of sea-level change to the mass balance of ice sheets in both Antarctica and Greenland. CReSIS provides students and faculty with opportunities to pursue research in a variety of disciplines; to collaborate with world-class scientists and engineers in the United States and abroad; and to make meaningful contributions to the study of climate change impacts on world sea level. As such, CReSIS scientists also collaborate extensively with others funded by the Antarctic Glaciology program.

Ice cores from Antarctica are important for determining whether the rapid climate changes recorded in Northern Hemisphere ice cores, such as those obtained from Summit, Greenland, in the Greenland Ice Sheet Project II (GISP2), are global in extent. The ice cores being drilled as part of the WAISCORES program will complement those already under study from Byrd Station and Siple Dome in West Antarctica and Taylor Dome and Vostok Station in East Antarctica. Ice cores are unique in that they contain continuous, or nearly continuous, records of annual precipitation, atmospheric temperature and components of the atmosphere, including gases as well as soluble and insoluble aerosol particles from a variety of sources (biogenic, terrestrial, solar, marine, volcanic, and anthropogenic). The WAIS Divide ice core will provide a Southern Hemisphere equivalent to the Greenland ice cores and will allow detailed comparison of environmental conditions between the Northern and Southern Hemispheres.

The Glaciology Program also supports ice-core curation and ice coring and drilling for polar research. The following organizations provide this support.

- **National Ice Core Laboratory (NICL)**, a government-owned facility for storing, curating, and studying ice cores recovered from the ice-covered regions of the world, and supported through an Interagency Agreement with the U.S. Geological Survey (<http://www.nicl-smo.sr.unh.edu/>).
- **Ice Drilling Program Office (IDPO)**, a university collaboration of Dartmouth College, the University of New Hampshire, and the University of Wisconsin-Madison created to provide scientific leadership and oversight of ice coring and drilling activities (<http://icedrill.org/> **Note: This web site will not be available until 30 March 2009.**)
- **Ice Drilling Design and Operations Group (IDDOG)**, operated by Ice Coring and Drilling Services (ICDS) at the University of Wisconsin-Madison to provide support for field parties in Antarctica, Greenland, and high alpine (including non-polar) areas (<http://icedrill.org/> **Note: This web site will not be available until 30 March 2009.**)

A detailed description of NICL, IDPO, and IDDOG services and requirements for obtaining their support is available on the "Information for Proposers" page (<http://www.usap.gov/proposalinformation/>) on the [USAP.gov](#) web portal.

Integrated System Science

The discoveries of disciplinary science increasingly highlight the need for integrative approaches to forge new understanding of the complex interactions that govern Antarctica and its past, present and future roles in the earth system. To respond to this need and foster progress on some of societies' most pressing issues on a planet subject to potentially accelerated change, the Antarctic Integrated System Science (AISS) program was established in 2007. An initial vision for the AISS program is outlined in the executive committee synthesis of a June 2007 community-based workshop that is available at: <http://cresp.tamu.edu/AISSWorkshop>. The synthesis includes examples of cross-cutting integrated system science questions that are not meant to be exhaustive. Initial activities funded under the IPY call can be found on the IPY award list (URL above).

In general terms, the AISS program administers projects that transcend disciplinary boundaries, are highly integrated and address questions broader in scope than those typically supported by the disciplinary programs described above. AISS projects must have compelling intellectual merit, broad impact and expand the frontiers of our knowledge. AISS does not fund programs that recast disciplinary questions into a form requiring minimal expertise from other disciplines when progress is possible within a discipline. Projects must not be so broad in scope that tractable research strategies are not practical. Projects that involve synthesis from an integrated system science perspective are especially welcome at this juncture. It is recognized that integrated system proposals can be challenging to review. At this juncture in accordance with existing NSF guidelines, proposers may choose to submit single collaborative proposals or multiple related proposals that share some common text. Proposals will be reviewed by both ad-hoc mail reviews and panels as appropriate. Those considering submission to AISS are encouraged to contact the program director in advance.

Program Notes:

- **New investigators .**
If you have not performed research in Antarctica, the URL below contains information that may be useful for potential new investigators. In addition, new investigators are encouraged to contact program directors in the program of interest — see the [ANT](#) and [AIL](#) staff directories. (<http://www.nsf.gov/od/opp/ant/antproginfo.jsp>)
- **Instrumentation.** ANT supports and encourages the development and acquisition of relevant instrumentation and technology by investigators in a number of different ways, both internal to USAP and through broader NSF competitions. The latter includes specialized programs ranging from nationally and internationally significant facility support through the NSF Major Research and Facilities Construction (MREFC) process and NSF Science and Technology Centers: Integrative Partnerships (STC) awards and through smaller, proof-of-concept efforts such as NSF EAGER (EARly-concept Grants for Exploratory Research) awards. The NSF Directorate for Engineering funds the Engineering Research Centers (ERC) program and also the NSF SBIR (Small Business Innovations Research) and STTR (Small Business Technology Transfer) programs, which require the lead participation of industrial partners. Investigators who have an interest in instrumentation development through any of these competitions are asked to contact the appropriate NSF Program Director, through their ANT science program director if this is unknown.

ANT actively encourages investigators to participate in NSF's annual MRI (Major Research Instrumentation) program (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5260), conducted through the Office of Integrative Activities (OIA).

Instrumentation and technology development may also be included in proposals submitted to the annual Antarctic Research solicitation. However, investigators are reminded that such proposals must meet the criterion of being

best or only done in the Antarctic and will compete with other science proposals. It is recommended that investigators contact their ANT science program directors to discuss possible funding pathways prior to any instrumentation and technology submission.

- **Environmental impact research.** Environmental research is integrated into the disciplinary programs described above. An emphasis is research to help reduce the environmental impact of activities in Antarctica. Areas of inquiry might include effects of past practices, materials and waste management, current impacts, resilience of ecosystems, and promising technologies. The goal is to foster and maintain Antarctica's natural conditions while supporting the range of scientific research that can be done best in Antarctica. Investigators who wish to conduct environmental research are encouraged to contact the OPP Environmental Officer, Dr. Polly Penhale (ppenhale@nsf.gov).
- **Medicine and human behavior.** Research involving human subjects, while outside the scope of the Division of Antarctic Sciences, may be of interest to mission agencies, such as NASA or National Institutes of Health. For guidance on potential NSF support of research involving human subjects, investigators are encouraged to contact Michael A. Montopoli, MD, MPH, Head, Office of Polar Environment, Health, and Safety, OPP ([PEHS roster](#)), as well as the cognizant program officer in the relevant mission agency.

FACILITIES, LOGISTICS, AND SUPPORT

Facilities for research in Antarctica include three year-round research stations with scientific equipment and laboratories, helicopters, ski-equipped airplanes, surface vehicles, a wide array of additional research facilities and temporary (usually summer) camps, and two research icebreakers. These facilities are operated by NSF's [Division of Antarctic Infrastructure and Logistics](#) (703-292-8032) through several support contracts and through agreement with other Federal agencies.

The U.S. Antarctic Program includes many organizations that provide logistical and operational support to meet the needs of the field research program. NSF's prime antarctic logistics contractor is Raytheon Polar Services Company (RPSC) of Centennial, Colorado. RPSC coordinates research support and field operations in Antarctica and has a planning group that can provide advice to investigators with questions about field or logistical support. Investigators are strongly encouraged to contact the RPSC Science Planning Group with questions during the proposal preparation phase.

Other organizations offer special technical support for research, and your proposal must include a summary document from that organization in the supplemental documents section. These organizations are

- **UNAVCO** (http://facility.unavco.org/project_support/polar/polar.html): High-precision GPS and LIDAR support
- **Alaska Satellite Facility** (<http://www.asf.alaska.edu/>): Synthetic Aperture Radar (SAR) data
- **Ice Drilling Program Office (IDPO) and Ice Drilling Design and Operations Group (IDDOG)** (<http://icedrill.org/>): Ice core drilling services. Contact IceDrill@Dartmouth.edu
- **University-National Oceanographic Laboratories Systems (UNOLS)** (<http://www.unols.org/> **Note: This web site will not be available until 30 March 2009.**): Ship-board research support. Requests for vessel support must be submitted using the UNOLS Ship Time Request System (http://unolsweb.cms.udel.edu/strs/Public/diu_login.aspx). When the request is submitted, a PDF file will be printed and this can be submitted as part of the supplemental documents in your proposal.

The U.S. Antarctic Program maintains a web portal (<http://www.usap.gov/>) that contains links to research, logistics, and operational information about U.S. activities in the Antarctic. Besides information concerning USAP stations, ships, and related field support, the site provides more detailed descriptions of the research support provided by the organizations in the preceding list. Investigators should use the web portal to access information for proposal preparation purposes. The "[Information for Proposers](#)" page provides links to resources that will be useful as you prepare your proposals. The URL for this page is <http://www.usap.gov/proposalInformation/>.

Non-U.S. facilities; international cooperation

The U.S. Antarctic Program welcomes proposals from U.S. scientists that involve collaboration and cooperation with other Antarctic Treaty nations. Such proposals are usually the result of scientist-to-scientist discussions of potential collaborations. When discussing such projects with foreign colleagues, remember that individuals cannot commit U.S. Antarctic Program resources. U.S. scientists wishing to do research with other nations' programs are asked to contact an Office of Polar Programs program director before submitting a formal proposal. Your acceptance of a generous offer from another nation's antarctic program could be construed as commitment of U.S. resources for some later project.

Do not hesitate in your collaboration with overseas colleagues, but please contact an ANT or AIL program director (703-292-8033 or the AIL Division [personnel directory](#)) upon commencing discussions that could lead to U.S. Antarctic Program involvement.

Automated data collection (AGO and AWS)

The U.S. Antarctic Program supports various automated data collection programs. These are

- **Automated geophysical observatories (AGOs)** for unmanned collection of data at remote locations (<http://space.augsburg.edu/ago/index.html>)
- **Automatic weather stations (AWSs)** at locations in Antarctica for research and operations. (Maintained by the University of Wisconsin: <http://ice.ssec.wisc.edu/>).
- **UV radiation monitoring network at South Pole, Palmer, and McMurdo stations** in Antarctica and at Ushuaia, Argentina; Point Barrow, Alaska; Summit, Greenland; and San Diego, California. Data is available currently at <http://www.biospherical.com/NSF/> but will migrate to the World Ozone and Ultraviolet Radiation Data Center (<http://www.woudc.org>) later this year.

More detailed information about these programs is available on the "Information for Proposers" page (<http://www.usap.gov/proposalInformation/>) on the USAP.gov web portal.

Research ships

Investigators that require time on an ice-capable research vessel should consult the vessel operating schedules at <http://usap.gov/calendarsAndSchedules/>, and contact either the research support manager (Alexandra Isern, aisern@nsf.gov) and/or the relevant program director in Antarctic Sciences to determine availability of ship time beyond 2010. All investigators that request ship time must fill out a UNOLS ship request form.

The U. S Antarctic Program maintains two research ships - the 230-foot *Laurence M. Gould* and the 308-foot *Nathaniel B. Palmer*. For capabilities of research icebreakers, visit the [Marine Operations](#) home page on the U.S. Antarctic Program web site, USAP.gov.

Underway measurements. Instruments on *Nathaniel B. Palmer* and *Laurence M. Gould* are available for not-to-interfere underway measurements on behalf of investigators who do not join a cruise. Instruments include Seacat 21 thermosalinograph, Turner model 10 fluorometer, Simrad EK500 scientific echo sounder and other acoustic and bathymetric systems, LaCoste-Romberg gravity

meter, XBTs, and meteorological sensors. A multibeam swath bathymetry system also is installed on the *Nathaniel B. Palmer*.

Both vessels were designed to accommodate biological, oceanographic, geological, and geophysical experiments. Research equipment includes a seismic system, a portable radioisotope laboratory, and dedicated oceanographic instrumentation (e.g., CTD). Both vessels have a deep sea trawl winch and hydrographic winches, cranes, an interior staging area with telescoping side boom, and starboard and aft A-frames. Both vessels also have satellite navigation, radar, and precision depth recorders.

Proposals for management of long-term measurements and data archiving will be considered by the cognizant program director. Technician staffing and other shipboard support should be identified both in the proposal and on the appropriate research ship worksheet.

Research opportunities on the RVIB *Oden*

The National Science Foundation has entered into an agreement with the Swedish Research Council and the Swedish Polar Research Secretariat to use the RVIB *Oden* in Antarctica during austral summer seasons from 2008 through 2011. Part of this agreement creates opportunities for research on the *Oden*. While much of the available *Oden* science time in the 2009-2011 time frame has been committed through previous competitions, it may be possible to accommodate projects before or after the breakout mission for which the *Oden* presents compelling advantages. Investigators who think that their science projects might fall into this category should consult the report from the workshop

["Forum for Developing US-Swedish Research Cooperation on Oden in Antarctica"](#)

and contact the relevant program director prior to requesting *Oden* ship time. Data collected during each expedition is subject to the Office of Polar Programs Data Policy.

Data sharing

Data collected by US and Swedish investigators during each expedition shall be available to all participants immediately following initial quality control and quality assurance processing by individual investigators. At the same time, all investigators shall respect intellectual ownership of specific hypotheses and lines of scientific inquiry. U.S. investigators are expected to abide by the OPP data policy (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=opp991). Funded investigators will be expected to attend pre-cruise coordination meetings, and are strongly encouraged to plan and budget for a post cruise data workshop organized by the science teams. The latter may be coordinated with a scheduled national or international meeting.

Contacts:

United States

Roberta Marinelli, Antarctic Organisms and Ecosystems, National Science Foundation (rmarinell@nsf.gov)

Peter Milne, Antarctic Oceanic & Atmospheric Sciences, National Science Foundation (pmilne@nsf.gov)

Other ships. University-National Oceanographic Laboratory Systems (UNOLS) ships operate in the Southern Ocean in some years (<http://www.unols.org/>). In addition, ships that provide operational support near McMurdo may be able to provide underway research support in the Southern Ocean and the Ross Sea. Contact the cognizant program director or the research support manager (Alexandra Isern, aisern@nsf.gov) in NSF's Office of Polar Programs to discuss potential use of operational support vessels. Research ships of other Antarctic Treaty nations operate in antarctic waters (see "Non-U.S. facilities; international cooperation").

SAMPLES FOR RESEARCH

Specimens collected in the Antarctic are available to qualified investigators for study. For information, including the policies and procedures for obtaining samples, contact the facilities listed below. Detailed descriptions of these facilities are available on the "Information for Proposers" page (<http://www.usap.gov/proposalInformation/>) on [USAP.gov](http://www.usap.gov)

- **U.S. National Ice Core Laboratory** — supported by NSF-OPP and the USGS-Geological Division, (<http://www.nicl-smo.sr.unh.edu/>),
- **Antarctic Marine Geology Research Facility, Florida State University** — Ocean-bottom sedimentary cores and grab samples; continental cores (<http://www.arf.fsu.edu/>)
- **United States Polar Rock Repository, Byrd Polar Research Center, Ohio State University** — Rock samples from Antarctica and the Arctic (<http://bprc.osu.edu/emuwebusprrr/pages/usprrr/Query.php>)
- **Meteorites from Antarctica, NASA, Johnson Space Center** — Meteorite samples (<http://www.curator.jsc.nasa.gov/antmet/index.cfm>) You must adhere to U.S. regulations governing the collection and curation of antarctic meteorites. These regulations are published on the NSF web site at http://www.nsf.gov/od/opp/antarct/meteorite_regs.jsp.
- **Department of Invertebrate Zoology, Smithsonian Institution** — Biological specimens of antarctic benthic invertebrates, plankton, algae, and fish collected by U.S. Antarctic Program researchers. (<http://nhb-acsmith1.si.edu/emuwebizweb/pages/mnh/iz/Query.php>.)

DATA FOR RESEARCH AND DATA CURATION

Detailed descriptions of the following facilities are available on the "Information for Proposers" page (<http://www.usap.gov/proposalInformation/>) on [USAP.gov](http://www.usap.gov).

- **U.S. Antarctic Data Coordination Center** — U.S.-funded antarctic data for the international Antarctic Master Directory (<http://www.usap-data.org/>)
- **U.S. Antarctic Resource Center (USARC), U.S. Geological Survey** — A comprehensive collection of antarctic maps, charts, satellite images and photographs (<http://usarc.usgs.gov/>)
- **Antarctic Geospatial Information Center, the University of Minnesota** -Creates, collects, distributes and archives geospatial information about Antarctica (<http://www.agic.umn.edu/>)
- **Antarctic Multibeam Synthesis Data Portal** — Bathymetric and other oceanographic data and cruise metadata (<http://www.marine-geo.org/antarctic/>)
- **Antarctic Bibliography** — Research literature concerning Antarctica back to 1951 from around the world (<http://www.coldregions.org/>)

ANTARCTIC CONSERVATION ACT (ACA) OF 1978

Public Law 95-541, the Antarctic Conservation Act of 1978 as amended by Antarctic Science, Tourism and Conservation Act of 1996 (Public Law 104-227), requires your involvement from the time you write a proposal to the time you leave Antarctica.

The law protects native mammals, birds, and plants and their ecosystems. The law applies to all U.S. citizens, whether or not they go to Antarctica with the U.S. Antarctic Program. It applies to all expeditions to Antarctica that originate from the United States.

The Act makes it unlawful, unless authorized by permit —

- to take native mammals, birds, or plants; including harming associated ecosystems
- to engage in harmful interference
- to enter designated special areas
- to introduce species
- to introduce substances designated as pollutants
- to discharge designated pollutants
- to import certain antarctic items into the USA

The Act provides penalties of up to \$11,000 and 1-year imprisonment for each violation. Other penalties could include removal from Antarctica, rescission of a grant, or sanctions by your employer.

The book *Antarctic Conservation Act of 1978 (Public Law 95-541), with Regulations, Management Plans With Maps for Special Areas, Permit Application Form, and Protocol on Environmental Protection (NSF 01-151)* is free from NSF or available online at <http://www.nsf.gov/od/opp/antarct/aca/nsf01151/start.jsp>.

The most current information on Antarctic Specially Protected Areas (ASPAs) and Antarctic Specially Managed Areas (ASMAs) is maintained by the Committee for Environmental Protection (CEP), which consists of representative from all Parties to the Protocol on Environmental Protection to the Antarctic Treaty. Detailed descriptions of sites, maps, and management plans are available at http://www.ats.aq/e/ep_protected.htm.

The following paragraphs discuss major provisions of the Antarctic Conservation Act, which is the U.S. law implementing adherence to the international Protocol on Environmental Protection to the Antarctic Treaty.

Taking native mammals or birds

It is unlawful, unless authorized by permit, to take antarctic native mammals, birds, or plants. To *take* means to remove, harass, molest, harm, pursue, hunt, shoot, wound, kill, trap, capture, restrain, or tag a native mammal or bird or to try to do so.

If you are on the sea ice near McMurdo and try to hustle a Weddell seal into position for a photograph, you are breaking the law. If you are an ornithologist with a grant to band giant petrels, you may not do so until you apply for and receive a permit. A grant and a permit are two different things. See the "Applying for a Permit" section of this solicitation for more information.

Entering designated special areas

A number of precisely defined places in Antarctica are designated under the Antarctic Treaty, and in the U.S. law, as Antarctic Specially Protected Areas. You must have a compelling need to enter one of these areas, and you must have a permit to do so.

Some of these special areas are near stations, such as Arrival Heights next to McMurdo Station or Litchfield Island near Palmer Station. Other special areas like the Linneas Terrace are in remote locations in which geologists, for example, may want to work. Maps, and management plans for these sites are available at http://www.ats.aq/e/ep_protected.htm.

Introducing species

Introducing non-indigenous species to Antarctica (*i.e.*, south of 60°S latitude) generally is prohibited. However, if your work requires it, a permit may be issued for the following species under controlled conditions:

- domestic plants
- laboratory animals and plants including phytoplankton, viruses, bacteria, yeast, and fungi

Living non-indigenous species of birds may not be introduced into Antarctica.

If you are uncertain whether the species you want to take to Antarctica is considered an introduced species, please contact the polar environmental officer at NSF (Polly Penhale at popenhale@nsf.gov).

Introducing substances designated as pollutants

The Antarctic Conservation Act regulates what types of materials can be taken to Antarctica and specifies how these materials must be used, stored, and disposed of.

Banned substances. These substances are banned from Antarctica:

- pesticides (except those required for science or hygiene: a permit is needed)
- polychlorinated biphenyls (PCBs)
- nonsterile soil
- polystyrene beads and plastic chips

Designated pollutants. Designated pollutants include any substance listed by name or characteristic (flammable, corrosive, reactive, toxic) in the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act, and other U.S. regulations. Waste containing designated pollutants is *antarctic hazardous waste*, and it has to be used, stored, and disposed of in controlled ways.

Many research and industrial supplies - and common substances like lighter fluid and fingernail polish remover - at U.S. antarctic stations are designated pollutants. Designated pollutants must be *permitted* to enter Antarctica. NSF's prime antarctic support contractor annually compiles an application for a master permit to cover common items. The task obviously requires the cooperation of grantees; this chore is part of preparing for research in Antarctica.

At the proposal stage, it is enough to think about how to *minimize* the types and amounts of substances you need, to *substitute* benign substances for designated pollutants wherever possible, and to *handle* the designated pollutants that you must take. In the proposal and, if you get a grant, in your later dealings with the prime antarctic support contractor, err on the side of *disclosure*. In the proposal's *Operational Requirements* package (see section with this title below), use the worksheet to list major amounts of waste you expect to generate.

Discharging designated pollutants

Some categories of waste must be removed from Antarctica. The list includes radioactive materials, batteries, fuel, heavy metals, lubricants, treated timbers, plastic (except low density storage bags), solid noncombustibles, and drums that held oil or chemicals.

The U.S. Antarctic Program employs specialists to handle and remove designated pollutants in accordance with the regulations. Grantees receive assistance and instructions in the Antarctic, but are required to keep track of the designated pollutants they use, to sort and store them according to instructions provided, and to turn the waste over to U.S. Antarctic Program officials in accordance with specified procedures.

Open burning is prohibited in Antarctica. If your proposal will include the operation of a remote field camp, plan to haul all your trash back to the station or ship from which you began your sortie.

Import into and export from the USA

In the United States it is unlawful, unless authorized by regulation or permit, to have or sell or to import or export native mammals, birds, or plants. An application for a permit must demonstrate that the import or export would further the purposes for which the species was taken or collected, demonstrate that the import or export is consistent with the purposes of the Antarctic Conservation Act, and provide other details that are needed for evaluation of the permit application.

Mailing items to or from the United States constitutes import or export.

Other Requirements

Mineral samples for scientific purposes normally may be collected and removed from Antarctica without an Antarctic Conservation Act permit. However, the Act requires a permit for "any activity that results in the significant adverse modification of habitats of any species or population of native mammal, bird, plant, or invertebrate." The Antarctic Protection Act of 1990 (Public Law 101-594) states, "it is unlawful for any person to engage in, finance, or otherwise knowingly provide assistance to any antarctic mineral resource activity."

Meteorites. A [U.S. regulation governing antarctic meteorites](#) ensures that meteorites in Antarctica will be collected for scientific research purposes only. U.S. expedition organizers who plan to collect meteorites in Antarctica will ensure that any specimens collected must be properly collected, handled, documented, and curated to preserve their scientific value.

Applying to NSF for a permit

If NSF funds your proposal, an Antarctic Conservation Act [permit](#) may be required for the proposed activities. You are the person who initially decides if a permit is needed. If there is any doubt, contact an Office of Polar Programs science program director, the permit officer (Nadene Kennedy, nkennedy@nsf.gov), or the environmental officer (Polly Penhale, ppenhale@nsf.gov).

If a permit appears necessary, send the *Antarctic Conservation Act Application and Permit Form* to the National Science Foundation at the address shown on the permit. Be sure NSF gets it no later than 90 days before fieldwork is to start. During the 90 days, a summary of your application is published in the *Federal Register*, and the public is given 30 days to comment on it. The Foundation evaluates the public comments and performs an internal review. It then approves the application, approves it with modifications, or disapproves it. NSF will not allow work in Antarctica until a permit either has been approved and issued or is found to be not required. You may not conduct research or other activities that require a permit unless you have a permit. An application cannot be made retroactive.

Other permits

Additional permits may be required for certain activities, such as research involving marine mammals or importation of bird or mammal tissue, plants or soils. Please contact the environmental officer for additional information.

III. AWARD INFORMATION

In the U.S. Antarctic Program, NSF expects each year to fund approximately 50 new standard and continuing research grants with durations averaging 2 to 4 years depending on the quality of submissions and the availability of funds. In exceptional cases, awards for longer than 4 years may be considered if the justification and promise are compelling. Approximately \$20 million will be available for new starts in FY 2010, with up to about \$35 million available to be committed from future years as continuing increments if warranted by the proposals.

In addition, and separate from these awards to organizations, field and laboratory support will be available in Antarctica for those projects for which fieldwork has been proposed and approved. Anticipated date of awards: no earlier than October of the year in which the proposal is received. Complex projects may require additional time to evaluate logistical needs and determine how to support the project.

IV. ELIGIBILITY INFORMATION

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the [Grant Proposal Guide](#), Chapter I, Section E.

Organization Limit:

None Specified

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal 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/pubs/policydocs/grantsgovguide607.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.

**Antarctic research proposal preparation:
Supplemental instructions**

The following instructions supplement the *NSF GPG* and the *NSF Grants.gov Application Guide* guidelines. **Proposals not following these instructions are subject to return without review**

Contents:

1. [Page limit](#)
2. [Reporting on prior support](#):
3. [Data and sample disposition](#)
4. [Antarctic or Southern Ocean Proposals Involving No Fieldwork](#)
5. [Antarctic or Southern Ocean Proposals Involving Fieldwork](#)

- [Operational Requirements Worksheets](#)
- [Deployment of Scientific Instruments and Equipment](#)
- [Electromagnetic Spectrum Management](#)
- [Information Security Management](#)
- [Environmental protection and waste management](#)
- [Safety and health](#)
- [Underwater diving](#)
- [Radioactive materials and waste](#)
- [Research ship EEZ clearances](#)
- [Composition of field teams](#)
- [Physical and psychological screening](#)

1. Page limit:

Proposals involving one or two organizations must not exceed 15 pages in the project description section (see *NSF GPG* or *NSF Grants.gov Application Guide* for details).

The normal 15-page limit for the Project Description will be strictly enforced. However, collaborative proposals involving three or more organizations may add one page to the Project Description for each organization beyond the first two.

2. Reporting on prior support:

Proposals submitted to this solicitation must report on prior support from NSF. The GPG requires that reporting on prior support is limited to **a single award** within the last 5 years for each PI, CoPI, or Co-I named on the cover sheet. Furthermore, when an investigator has received more than one award, the report on prior support must cover the award most closely related to the new proposal. (NSF GPG, [Section II.C.2.d.iii.](#))

3. Data and sample disposition

NSF policy requires that grantees and investigators make samples and data available to other researchers. Given the costs

for research in Antarctica, all proposals must describe how these requirements will be met. Please see OPP's [Guidelines and Award Conditions for Scientific Data](#) for more details. The program strongly encourages the use of national data centers, sample repositories, museums and other registration and curation systems. For physical and chemical oceanographic data, principal investigators are encouraged to consider compliance with the CLIVAR data policy (http://www.clivar.org/data/data_policy.php) and submit their data to the appropriate Data Assembly Centers (<http://www.clivar.org/data/dacs.php>).

Some examples of these resources are listed on the [USAP web portal](#). Unless otherwise justified, samples and data should be made publicly available no more than two years after collection. In addition, all awardees must submit a metadata listing to the Antarctic Master Directory (<http://www.usap-data.org/>) upon completion of the project.

4. Antarctic or Southern Ocean Proposals Involving No Fieldwork

Proposals should be clear about whether or not field work in Antarctica is needed. If no field work is required, then a "no special field work" form should be submitted with the proposal. This form can be downloaded at <http://www.nsf.gov/od/opp/antarct/nofldwrk.doc>

5. Antarctic or Southern Ocean Proposals Involving Fieldwork

The U.S. Antarctic Program is committed to the principle that scientific needs should determine the research conducted in Antarctica, with logistics deriving from and supporting the research rather than dictating it. Prepare your proposal to NSF with the presumption that science can be supported operationally, even if it has not been done before.

Prior discussion with a science program director in the Office of Polar Programs (703-292-8033) can help define research objectives that match the operational realities at any given time and will help NSF plan changes in operational support to meet research needs. Prior to submitting a proposal, PIs are advised to check the availability of vessel and airborne assets on the USAP website to ensure that these assets are not already committed for the time period requested in the proposal. PIs also are advised that, because the R/V *L.M. Gould* charter expires in 2010, vessel availability in the Peninsula region after May 2010 may be limited. However, NSF is reviewing options for maintaining research capabilities in the Antarctic Peninsula region and welcomes proposals to conduct the type and scope of research currently supported by the R/V *Gould*.

For investigators who have not previously worked in Antarctica, contact with the Division of Antarctic Infrastructure and Logistics of the Office of Polar Programs (703-292-8032) during proposal preparation also can be helpful.

- **Operational Requirements Worksheets**

Proposed fieldwork must be described in the proposal at a level of detail sufficient for merit review. To determine field support needs, and to help estimate costs and feasibility, proposers must submit an Operational Requirements Worksheet (ORW) via POLAR ICE (<http://www.usap.gov/scienceSupport/polarice/>). Use only the worksheets that are relevant to your needs. If a worksheet is not germane to your work, don't complete it.

The ORW captures details about the field support requirements, some of which may not pertain to merit review, but are critical to feasibility analysis. For this reason, a summary ORW will be produced from information provided by the proposer as part of completing the full ORW. This action by the contractor does not constitute NSF approval. This summary will be available to reviewers, however, the full ORW will not.

If a proposal appears likely to be supported, NSF's prime Antarctic support contractor will solicit details that will expand on and refine the ORW. If your proposal is awarded, you will also be asked to provide a Support Information Package (SIP) that builds on the ORW (<http://www.usap.gov/scienceSupport/polarice/>). This action by the contractor does not constitute NSF approval.

Completing the ORW is time consuming and must be done before the proposal is submitted. OPP recommends proposers start this process at least two weeks before final proposal submission. Proposals lacking these *Operational Requirements Worksheets* are subject to **return without review**.

The following instructions describe the process of submitting the summary and full ORW:

FastLane proposals:

- Prepare, but **do not yet submit**, the proposal in FastLane.
- Log on to POLAR ICE, and apply for a new account. You will be issued a password within one business day.
- Fill out the *Operational Requirements Worksheets* (ORW). Please note that if your proposal is recommended for an award, your ORW will be used to define your field program.
- Use POLAR ICE to produce PDF versions of a summary ORW and the completed full ORW.
- Upload the summary ORW as a *Supplemental Document* and the full ORW as a *Single Copy Document* through FastLane, and submit the proposal to NSF. Please note that reviewers will not have access to the full ORW file, so fieldwork information required for merit review must be included in the proposal's *Project Description*. Although reviewers will see the summary ORW, the information in this document augments the fieldwork information in the Project Description.
- Log back into POLAR ICE and follow the instructions for providing the NSF proposal number.

Grants.gov proposals:

- Prepare, but do not yet submit, the proposal in Grants.gov.
- Log on to POLAR ICE, and apply for a new account. You will be issued a password within one business day.
- Fill out the *Operational Requirements Worksheets* (ORW). Please note that if your proposal is recommended for an award, your ORW will be used to define your field program.
- Use POLAR ICE to produce PDF versions of a summary and the completed full ORW.
- The summary ORW should be attached as a supplementary document in Field 11 of the R&R Other Project Information Form. Attach the ORW as a Single Copy Document to the "National Science Foundation Grant Application Cover Sheet" at item 6, "Additional Single Copy Documents." After attaching both documents, submit the proposal. Please note that reviewers will not have access to the full ORW file, so fieldwork information required for merit review must be included in the proposal's *Project Description*. Although reviewers will see the summary ORW,

- the information in this document augments the fieldwork information in the Project Description.
- The proposer will receive a confirmation message from NSF within 60 hours of submission of the proposal via Grants.gov. When you have received your NSF proposal number, log back into POLAR ICE and follow the instructions for providing the NSF proposal number.

- Deployment of Scientific Instruments and Equipment**

NSF's goal for scientific instruments and equipment deployed in Antarctica is to maximize the likelihood of successful operation within the operating parameters of the U.S. Antarctic Program (USAP). This will be achieved through proper development and engineering tests prior to deployment of a new or existing piece of equipment. Proper testing will help ensure that precious field resources are devoted to activities that are field ready and can only be done or are best done in the Antarctic. This principle applies to both development of new and modification of existing instruments and equipment. It also applies to proposals for Antarctic fieldwork submitted to programs outside the Division of Antarctic Sciences, such as proposals considered under the Major Research Instrumentation (MRI) program and proposals considered jointly with other Divisions.

Scientific instruments and equipment are expected to function in very harsh environmental conditions, especially if deployed over the austral winter, and also must be immune to damage that could occur during shipment to the field or during the conduct of fieldwork. Deploying people, equipment, and instruments to Antarctica is very expensive. Instruments and equipment must be developed with due consideration of power, communications, space, ease of deployment, and other technical support needs, as well as consideration of potentially detrimental effects of electromagnetic interference (EMI).

Furthermore, all computers, instruments, and equipment that will be connected to the USAP IT network must conform to U.S. Government Information Security requirements.

For all scientific instruments and equipment, and particularly for those intended for use at South Pole Station, NSF will carefully review EMI aspects as part of the environmental review process and may conduct additional technical review. NSF will require development of an operating schedule for any transmitting equipment. All new transmitters should operate in a half-time mode for at least one year. This means that transmitters should be off for a period of at least a minute, and on for a similar time interval. Coordination of transmission schedules across all experiments will be done, but deviations from a set schedule to observe particular events can be considered. This will enable sensitive receiving experiments to divide their respective data sets into "transmitter on" and "transmitter off" intervals that have meaningful statistical weight. Proposers should review recommendations of the South Pole Users Committee, EMI Subcommittee Report available at <http://www.usap.gov/conferences/CommitteesAndWorkshops/user/Committees/sctnSPUC.cfm>

Proposals should include plans for instrument and equipment development, addressing appropriate resource and EMI issues described above, to make a compelling case that the work is justified. A proposed budget and schedule should also be developed.

The Operational Requirements Worksheets developed in POLAR ICE should include:

1. A summary of the proposed plan that illustrates the process of development, test, and acceptance prior to shipment to Antarctica;
2. A plan for deployment and operation of the instrument or equipment;
3. A plan for a field readiness review appropriate to the project;
4. For South Pole research, in particular, where living space, power, and communication bandwidth are at a premium, detailed information about the support resources needed, any timing or schedule issues, and information related to evaluation of EMI are critical; and
5. Information that would help USAP support planners to understand where there may be flexibility in the proposed plan. This information should be developed on the POLAR ICE application's web site (<http://www.usap.gov/scienceSupport/polarice/>).

- Electromagnetic Spectrum Management**

Deployed science field programs that require the use of radio spectrum must coordinate their requirements with USAP Spectrum Manager, a service provided to NSF by the U.S. Navy. All systems to be introduced into Antarctica that intentionally emit radio frequency energy must be registered with the USAP Spectrum Manager and undergo a spectrum conflict coordination process to minimize the potential of interference with existing systems. A proposed system may be required to change its design parameters, operating location, or time of operation to address potential interference concerns. Please note that no distinction is made relative to FCC (or other national spectrum authority) designations for spectrum or type acceptance. All emitting systems must be coordinated via the registration process, including unlicensed national information infrastructure (UNII) bands.

Systems introduced into Antarctica that are passive in their use of the radio frequency spectrum, other than GPS, are also required to register with the USAP Spectrum Manager. By registering a system, potential interference from previously approved instrumentation can be identified and options for corrective action can be taken to allow time to implement engineering design, operational concept, or configuration changes for either system involved. Additionally, registration of passive systems provides a greater measure of protection from any future conflicts with transmission systems.

Spectrum management coordination is implemented via the POLAR ICE, both in the Operational Requirements Worksheet and Support Information Package phases (<http://www.usap.gov/scienceSupport/polarice/>). If you have questions, contact Patrick Smith (pdsmith@nsf.gov) in OPP's Antarctic Infrastructure and Logistics Division.

- Information Security Management**

United States statute law and Executive Office of the President guidance regarding information security requirements for Federal information systems apply to the information technology (IT) infrastructure of the USAP.

All grantee scientific research instrumentation, personal computing devices (e.g., laptop computers), and remote interactions from home institution computing/networks to systems within the USAP general network infrastructure (i.e., within the usap.gov domain) must comply with NSF/USAP information security requirements. Compliance is mandatory.

Federal information security guidance and requirements are constantly evolving. It is impractical to capture specific requirements in this document. Specific requirements for information security compliance are gathered and assessed via the POLAR ICE operational requirements worksheet, support information package, and on-going USAP science support process. USAP information security policy, guidance instructions, advisories, and other related information can be found on the USAP web portal on the USAP Information Security Program homepage (<http://www.usap.gov/technology/contentHandler.cfm?id=1562>).

If you have questions, contact Patrick Smith (pdsmith@nsf.gov) in OPP's Antarctic Infrastructure and Logistics Division.

- **Environmental protection and waste management**

You must convince the Foundation that your project, if approved, can be performed in compliance with antarctic environmental regulations. The ORW will help you define field plans. Much of the required conservation planning will involve common sense – such as minimizing pollution, avoiding or reducing impacts on fauna and flora and avoiding protected areas without a permit to enter. However, the regulations are complex, and must be reviewed. Failure to provide for environmental stewardship and waste management in your proposal could change the Foundation's decision from award to declination.

The summary of the Antarctic Conservation Act in this document should provide enough information for most projects. However, do not hesitate to review the Antarctic Conservation Act book ([NSF 01-151](#)) to be sure you understand your responsibilities for environmental protection and waste management. Proposers must fill out the Environmental Assessment Questionnaire, and, if necessary, fill out and submit an Antarctic Conservation Act permit application. The Antarctic Conservation Act *Application and Permit Form is on the NSF home page is not part of POLAR ICE*. By attending to these matters in your planning you will enable NSF staff to plan support of environmental aspects early to avoid delaying or interrupting fieldwork. If you have questions, contact Dr. Polly Penhale, OPP Environmental Officer.

- **Safety and health**

A project that involves work in Antarctica must consider aspects of the research that may pose safety and health risks. Current U.S. Antarctic Program policies regarding safety and health are consistent with U.S. laws and regulations affecting research in the USA.

Office of Polar Programs safety and health specialists will review your proposal and operational requirements carefully. They have found that most proposed antarctic research can be carried out without undue risk. However, advance planning is essential, often in collaboration with the proposer. Your full and careful attention to safety and health aspects will help to make the planning efficient and effective. During review you may be asked for more information.

While USAP operates a comprehensive field safety program in Antarctica, this training is very general in nature and is not a substitute for specialized field safety training. If you are proposing to work in hazardous field locations, you should plan and budget for appropriate field team expertise, including, as needed, field safety guides.

Grants are made only if questions regarding a project's safety and health risks can be resolved. The Office of Polar Programs has staff that are assigned full time responsibilities in safety and health. Please feel free to contact them (see [roster](#)) during proposal preparation.

- **Underwater diving**

The U.S. Antarctic Program supports a scientific diving program similar to those of institutional members of the American Academy of Underwater Science. Scientific divers are expected to comply with guidelines in the *Antarctic Scientific Diving Manual* (NSF 99-22), available from the support contractor's dive coordinator (1-800-688-8606). Funded researchers intending to conduct underwater diving in support of their research will be asked to document their dive plans and diver credentials (including polar diving experience). The proposal should include plans and budget information appropriate for the diving activity. In rare situations, the support contractor may be able to provide limited diving assistance. Contact the appropriate Program Director with questions.

If your proposed research involves underwater diving, check the appropriate box on the Safety, Environment, and Health worksheet in [POLAR ICE](#). If your proposal receives funding, you will be asked to complete worksheets detailing your diving plans and the credentials of your dive team for review and approval by NSF. Only approved dive plans and divers will be authorized to dive in Antarctica. Your organization's Diving Safety Officer must endorse your request to engage in scientific diving in Antarctica.

- **Radioactive materials and waste**

If you wish to use low-level radioactive materials (open or sealed sources) in Antarctica, you need to do so under your organization's radiation use license and with the approval of NSF. Budget for this in your proposal, buy the materials through your organization, and register as a radioisotope user with your radiation safety committee. You also must abide by any additional requirements imposed by NSF, in particular radioactive waste generation and packaging criteria for proper disposal of low-level radioactive waste generated during the research.

If your research involves use of low-level radioactive materials in Antarctica (open or sealed sources), complete the Radioactive Materials worksheets in [POLAR ICE](#). Investigators who have completed that worksheet will receive an additional questionnaire, after the proposal has been funded, requesting details of their proposed radioisotope usage. Proposed use of radioisotopes must be consistent with your organizational license and NSF policies. Your Radiation Safety Officer will be required to endorse your plans to use radioisotopes in Antarctica. Following this endorsement, your request must still be approved by NSF Safety and Health Staff.

- **Research ship EEZ clearances**

Any research that is north of 60 °S and involves work in the Exclusive Economic Zone (EEZ) of another nation (typically within 200 nautical miles of the coast of that nation), including underway measurements such as collecting multibeam data, gravity data, or surface water samples, requires an appropriate research clearance from the nation involved.

Justify any EEZ work in your proposal, and provide information needed for a permit application in the Operational Requirements Worksheets. NSF's prime antarctic contractor assists in the preparation of and provides to NSF the application for clearance. NSF must submit the application to the Department of

State, which must receive it no later than 6 months before the cruise.

- **Composition of field teams**

The size and general composition of your field team must be justified in your proposal. In addition, identify in your Operational Requirements Worksheets the number of people who will be involved in the prospective field project. Team members must be scientists, technicians, students, or others with experience or strong interests in the goals of the project, must be necessary to the completion of the project as described in the proposal, and must have a direct interest in its outcome. NSF may request institutional certification of the qualifications of team members, especially in unusual circumstances such as when family members are proposed as part of a field team.

Parties must have field safety expertise that is appropriate for the anticipated activities, conditions, and hazards. Examples of potentially hazardous situations include mountaineering, working in crevassed terrain, and working on sea ice. Investigators should consider augmenting their teams with persons experienced in field safety, particularly if the group is inexperienced in antarctic fieldwork. Training of field party members in first aid is highly recommended. Feel free to consult with NSF (see [roster](#)) during proposal preparation.

- **Physical and psychological screening**

Because medical facilities in Antarctica are not equipped to deal with all possible medical emergencies, and because immediate medical evacuation may be impossible, it is important that all persons deploying to Antarctica be in good health. Before deploying, participants must meet physical and dental health criteria established for the program. Candidates for work during the austral winter isolation also must pass a psychological screening.

The antarctic support contractor will provide prospective travelers to the Antarctic with the U.S. Antarctic Program medical and dental examination forms. Travelers are responsible for completing their physical and dental examinations and sending the completed forms to the support contractor. Candidates for the winter isolation period will be provided instructions for the psychological screening. Information concerning physical and dental screenings is available on the U.S. Antarctic Program web portal at <http://www.usap.gov/travelAndDeployment/deploymentPackets.cfm>.

B. Budgetary Information

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

Budget Preparation Instructions:

Budget provisions for field services in Antarctica

In Antarctica, most support services are provided and paid for by the NSF-funded U.S. Antarctic Program. NSF does not provide funds in antarctic research grants for acquisition of all needed field items and services. Instead, common-use items are bought and shipped to Antarctica in bulk for allocation to field parties. This practice, while affecting the way an investigator plans for fieldwork, lowers the cost of acquiring, maintaining, and shipping items to Antarctica. However, as with other research programs at NSF requests for field support must be outlined in sufficient detail in the proposal so that reviewers can assess whether this support is appropriate for the research program proposed.

Investigators use their proposals and Operational Requirements Worksheets (ORWs) to specify services and items of equipment that are required for their research. To plan and budget for acquisition of these items, NSF must know well in advance what they are and approximately how much they cost.

Describe and budget in your proposal as necessary for the following items:

1. equipment and supplies required at home organizations
2. equipment and supplies that are unique to the field project, such as special chemicals, radioisotopes, genetically-modified organisms, fish traps, remote camera systems, and computer equipment and media
3. non-recoverable and potentially non-recoverable equipment, such as moorings, drifters, XCTDs, and satellite tracking tags
4. equipment that is not considered standard lab equipment, such as protein analyzers, specialized sensors, flow cytometers, and beta counters
5. equipment that will be dedicated to your project for multiple seasons, if you are submitting a proposal with several field seasons
6. physical and dental examinations for all persons going to Antarctica (including those who have been before) Note: Awards cannot be used to support the subsequent medical or dental procedures required to meet physical and dental health criteria established for the program as per the "[Physical and psychological screening](#)" section in Section V. 5. of this solicitation.
7. field equipment that is unique to a field project, such as specialized cold-weather clothing, climbing boots and eye protection. Note: The USAP issues at no charge to the award limited amounts of basic polar clothing including insulated underwear, mukluks, thermal boots, parkas, insulated overalls, gloves, and other extreme-cold-weather gear.
8. cost of shipping equipment and samples back home (the antarctic program provides northbound sea shipment to a U.S. port without cost to the grantee, but onward transport to the home organization is paid for using your grant funds)
9. costs of excess accompanied baggage during your deployment travel, if required
10. living expenses (per diem) during travel to and from Antarctica. Budget under foreign travel
11. mountaineering guide, if warranted, for fieldwork
12. specialized packaging or preparation of equipment needed for transport of special equipment to and/or from Antarctica. (For examples of specialized equipment, please consult with your science program director or science support manager in the Division of Antarctic Infrastructure and Logistics during proposal preparation.)

Commercial air travel

Do **not** budget in your proposal for commercial air travel between your home organization and the departure point for Antarctica (normally Christchurch, New Zealand, or Punta Arenas, Chile). The Foundation's antarctic support contractor will issue tickets at no cost to your grant. Under most circumstances the support contractor will not pay for travel from a point outside the United States. If you contemplate such foreign travel, please discuss this with your program director.

Do budget in the proposal for accompanied excess baggage needed for your research as well as for per diem during this travel [see (10) and (11) above] and for any travel not involving deployment to Antarctica.

Insurance

Do not budget for life or disability insurance. NSF does not provide insurance for grantee personnel in Antarctica, and it does not fund acquisition of this insurance in its research grants.

Persons traveling to Antarctica are expected to have insurance appropriate to their normal life situations so that any needed health care, compensation for property loss, worker's compensation, or survivor benefit will be provided for.

Emergency medical care for U.S. Antarctic Program participants in Antarctica is provided in clinics at the year-round stations. Persons who need hospital care will be transported to health care facilities in New Zealand, South America, or the United States, at which point they or their sponsors will be responsible for medical costs.

Check your health and life insurance policies to be sure that flights aboard scheduled military aircraft are covered.

All research staff (paid or volunteer) should be affiliated in some manner with your organization(s), so any worker compensation issues arising from injuries sustained while deployed can be addressed by your organization.

C. Due Dates

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

June 08, 2009

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:**1. Rationale for access to Antarctica**

NSF supports fieldwork in Antarctica for research that can only be done or is best done in Antarctica. Proposals must make a compelling case that the fieldwork is needed to accomplish the goals of the proposed investigation. External reviewers will be asked to comment on the importance of fieldwork, and program officers will consider this in their recommendation.

2. Operational feasibility

Proposals involving fieldwork will also be evaluated for operational feasibility, which includes resource availability, environmental protection and waste management provisions, safety and health measures, and safeguards of radioactive materials. Proposers must recognize that proposals may be declined for operational reasons. For proposals involving fieldwork in the Antarctic, this operational evaluation is based largely on the Operational Requirements Worksheets that the proposer must complete as instructed in Section V.A. (Proposal Preparation and Submission Instructions).

All antarctic field participants must also meet specified U.S. Antarctic Program health and dental requirements. See Section V.B. (Budget Preparation).

Candidates for wintering at the year-round stations are screened for psychological fitness.

Joint support from international partners and other federal agencies

International collaborative proposals, especially when joint fieldwork is involved, as well as proposals that involve other US federal agencies require special efforts for coordination between the sponsoring organizations. NSF will engage potential partner organizations as required to determine project feasibility prior to making awards.

NSF's BROADER-IMPACTS REVIEW CRITERION

Antarctica presents exceptional opportunities for projects in all of the above areas to respond to NSF's broader-impacts proposal evaluation criterion -- "What are the broader impacts of the proposed activity" -- that asks how well the proposed activity will advance understanding while promoting teaching and learning; how well it will broaden the participation of underrepresented groups; to what extent it will enhance the research and education infrastructure (facilities, instruments, networks, partnerships, etc.); how well the results will be disseminated broadly to enhance scientific and technological understanding; and what may be the benefits to society of the proposed activity.

The Foundation's Advisory Committee for Polar Research, Working Group on Implementation of criterion 2, has produced a document, [Criterion 2 Background and List of Representative Activities](#), that proposers may want to consider when addressing the broader-impacts review criterion. The NSF Office of Budget, Finance, and Award Management has also prepared a document, [Merit Review Broader Impacts Criterion: Representative Activities](#), describing activities that demonstrate broader impacts. [Note: The term "Criterion 2" used to be synonymous with the term "Broader Impacts Criterion." The latter term alone is currently used. The OPP Advisory Committee completed their work on the issue prior to this change in the criterion name.]

PolarTREC, funded by the Foundation and managed by the Arctic Research Consortium of the U.S., enables K-12 teachers to participate in polar research by working closely with scientists as a pathway to improving science education. The program's website (<http://www.polartrec.com/>) provides information about how researchers can participate. This activity offers a way for polar scientists to integrate education outreach into their research and help to meet the broader impacts criterion.

Proposers are encouraged to develop "Broader Impacts" activities that are specific to their research. Awareness of or collaboration with two other Foundation programs also may be helpful in achieving broader impact. They are the [Antarctic Artists and Writers Program](#), which deploys scholars in the humanities to help record the U.S. antarctic heritage, and the annual program for media representatives to visit and interview research teams and others in the U.S. Antarctic Program. Information concerning the media program can be found at http://www.nsf.gov/news/news_summ.jsp?cntn_id=110142.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

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

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

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

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

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); * or Research Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

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

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

Special Award Conditions:

Data. The Office of Polar Programs [Guidelines and Award Conditions for Scientific Data](#) requires submission of data, derived data products, samples, physical collections, and other supported materials to national data centers and other specified repositories. OPP expects investigators to share these things with other researchers at no more than incremental cost and within a reasonable time. Investigators should use national and international standards to the greatest extent possible for collection, processing, and communication of OPP-sponsored data sets.

Metadata. Principal investigators of OPP-awards are required to submit, to appropriate electronic data directories, descriptions of their data (i.e., metadata) resulting from OPP funded research. Note that a metadata description (DIF) that describes data and its location must be submitted to the Antarctic Master Directory (AMD). OPP funds the [U.S. Antarctic Data Coordination Center](#) for this purpose.

Antarctic Bibliography. The NSF-funded [Antarctic Bibliography](#) is the world's most complete bibliography of antarctic scientific literature. Please [send the Bibliography one copy](#) of every publication developed under the award, labeled with the award number, to assure its citation in this valuable reference tool. Doing so will waive the General Grant Condition that requires submission of copies of every publication, developed under an NSF award, to the cognizant NSF program officer.

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.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Kelly Falkner, Program Director, Antarctic Integrated System Science, telephone: (703) 292-7450, fax: (703) 292-9080, email: kfalkner@nsf.gov
- Roberta Marinelli, Program Director, Antarctic Organisms and Ecosystems, telephone: (703) 292-7448, fax: (703) 292-9080, email: rmarinel@nsf.gov
- Peter Milne, Program Director, Antarctic Ocean & Atmospheric Sciences, telephone: (703) 292-8033, fax: (703) 292-9080, email: pmilne@nsf.gov
- Julie Palais, Program Director, Antarctic Glaciology, telephone: (703) 292-8033, fax: (703) 292-9079, email: jpalais@nsf.gov
- Vladimir Papitashvili, Program Director, Antarctic Aeronomy and Astrophysics, telephone: (703) 292-7425, fax: (703) 292-9080, email: vpapita@nsf.gov
- Vladimir Papitashvili, Acting Program Director, Antarctic Earth Sciences, telephone: (703) 292-7425, fax: (703)292-9080, email: vpapita@nsf.gov
- Jessie L. Crain, Research Support Manager, OPP/AIL, telephone: (703) 292-7457, fax: (703)292-9080, email: jlcrain@nsf.gov
- Alexandra Isern, Research Support Manager, OPP/AIL, telephone: (703) 292-7581, fax: (703) 292-9080, email: aisern@nsf.gov

For questions related to the use of FastLane, contact:

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

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