Antarctic Research

Program Solicitation
NSF 07-549

Replaces Document(s):
NSF 06-549

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 07, 2007

REVISION NOTES

In furtherance of the President's Management Agenda, NSF has identified programs that will offer proposers the option to utilize Grants.gov to prepare and submit proposals, or will require that proposers utilize Grants.gov to prepare and submit proposals. Grants.gov provides a single Government-wide portal for finding and applying for Federal grants online.

In response to this program solicitation, proposers may opt to submit proposals via Grants.gov or via the NSF FastLane system. 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.

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. For projects involving fieldwork, the U.S. Antarctic Program supports only that research that can be done exclusively in Antarctica or that can be done best from Antarctica. The program also supports analytical research performed at home organizations.

NSF is the designated lead agency for the International Polar Year, 2007-2009, for the United States and recently released a second solicitation "International Polar Year, 2007" (NSF 07-536) (International Polar Year proogram page), which focuses on specific emphases areas in science, education, and outreach. However, IPY-relevant proposals (as outlined in the National Academy of Science vision document, http://www.us-ipy.org) that are outside these emphasis areas may be submitted to this Antarctic Research solicitation. Additional information concerning other NSF IPY-related funding opportunities is available at http://www.nsf.gov/od/opp/ipy/ipyinfo.jsp. 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):

- Thomas Wagner, Antarctic Earth Sciences Program Director, telephone: (703) 292-4746, fax: (703) 292-9079, email: twagner@nsf.gov
- Julie Palais, Antarctic Glaciology Program Director, telephone: (703) 292-8033, fax: (703) 292-9079, email: jpalais@nsf.gov
- Vladimir Papitashvili, Antarctic Aeronomy and Astrophysics Program Director, telephone: (703) 292-7425, email: vpapita@nsf.gov
- Kelly Falkner, Program Director for Antarctic Integrated & System Science, & Antarctic Ocean & Atmospheric Sciences, telephone: (703) 292-7450, fax: (703) 292-9079, email: kfalkner@nsf.gov
- Roberta Marinelli, Antarctic Organisms and Ecosystems Program Director, telephone: (703) 292-7448, fax: (703) 292-9079, email: rmarinel@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: 35 approximately

Anticipated Funding Amount: $10,000,000 per year during the International Polar Year (FY07 through FY09) pending availability of funds (see section IV)

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
- **Full Proposals:**
  - Full Proposals submitted via FastLane: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
  - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/bfa/dias/policy/docs/grantsgovguide.pdf/)

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required by NSF.
- **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 07, 2007

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 support research. For projects involving fieldwork, the U.S. Antarctic Program supports only that research that can be done exclusively in Antarctica or that can be done best from Antarctica. The program also supports analytical research performed at home organizations.

The program has been in continuous operation since the 1957-1958 International Geophysical Year; continuation into the foreseeable future is anticipated. U.S. activities in Antarctica support the Nation's adherence to the Antarctic Treaty, which reserves the region for peaceful purposes and encourages international cooperation in scientific research. At present, 46 nations adhere to the treaty, and 29 of them are involved in antarctic field activities. The United States cooperates scientifically and operationally with many of the Antarctic Treaty nations.

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 underway. The first special solicitation, issued in 2006, (International Polar Year, NSF 06-534), relating to IPY and focused on the thematic areas of 1) polar ice sheet history and dynamics; 2) frontiers of polar biology in the polar night; 3) an arctic observing network; and 4) educational outreach has been released by the Foundation. The second special solicitation, issued in 2007, (International Polar Year, 2007, NSF 07-536) focused on the thematic areas of 1) understanding environmental change in polar regions; 2) human and biotic systems in polar regions; and 3) education and outreach. In addition, data management activities are also part of these special IPY solicitations. NSF anticipates that this will be the final special solicitation for the upcoming International Polar Year.

Proposals to perform activities related to planning or execution of the IPY that are outside of the emphasis areas in the special IPY solicitations may be submitted to programs in the Division of Antarctic Sciences under this program solicitation. The proposed activities should be consistent with program goals described in this solicitation. Additional review criteria apply to IPY proposals. See Section VI ("Additional Review Criteria") of this solicitation.

Information about other NSF IPY opportunities is available at 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 plasmas and fields. In this context the polar upper atmosphere is a screen on which the results of such interactions can be viewed and through which other evidence of space physics processes can pass. Today, this concept of Earth's polar atmosphere as a window also includes research in other fields. With discovery of polar stratospheric ozone depletions, a window previously thought "closed" (the ultraviolet window) is now known to "open" in certain seasons. In astronomy and astrophysics, favorable atmospheric conditions and the unique location of the South Pole enable scientists to use this window to probe the structure of the Sun and the Universe with unprecedented precision. Antarctica's deep, clear ice sheet also is a window, providing a medium for detection of neutrinos that pass through Earth, and a neutrino detector is being installed in the ice sheet at the South Pole.

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

- **The stratosphere and the mesosphere**. Current research focuses on stratospheric chemistry and aerosols, particularly in the context of the ozone hole. The polar stratosphere is expected to be a field of continued interest and growth.
- **The thermosphere, the ionosphere, and the magnetosphere**. These domains derive many of their characteristics from the interplay of ionized plasmas and energetic charged particles with geomagnetic and geoelectric fields. The upper atmosphere, particularly the ionospheric portion of it, is the ultimate sink of solar wind energy that is transported into the magnetosphere. Energy dissipates in the ionosphere because of particle precipitation, which is the 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 solar astronomy and cosmic ray physics.** Astrophysical studies are primarily conducted at South Pole station or on long-duration balloon flights launched from McMurdo.

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

Organisms and Ecosystems

The goal of the Antarctic Organisms and Ecosystems Program is to improve understanding of organisms and their interactions within the biosphere and geosphere. The program supports projects directed at all levels of biological organization from molecular, cellular, and organismal, to communities and ecosystems up to regional and global scales. 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 may 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. Topics include interactions among trophic levels, factors influencing primary and secondary production, and the ecological role of organisms in biogeochemical cycling. Remote sensing techniques, long-term observations, and modeling are appropriate tools to enhance this area 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. Research on adaptive mechanisms, in the context of the present day hydrologic and biogeochemical environment, is encouraged. 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 encouraged. Of special interest are processes occurring during the austral winter. 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, dinosaur fossils, and some of the Earth's most ancient crust. The Antarctic Earth Sciences Program supports research to interpret this rich history and the processes that shape Antarctica today. Current projects address such diverse topics as:

- **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 geologic processes**; such as the formation of subglacial lakes or the aeolian and permafrost sculpting of the Dry Valleys
- **Deciphering paleoenvironmental and paleobiological records** to understand global climate, ocean circulation, and the evolution of life
- **Understanding the ice sheets** using sediment records to reconstruct their history, and determining the geologic controls of their formation and stability

All of these problems require a better understanding of Antarctica's geology, including its crustal structure and how Antarctica and its surrounding ocean basins were shaped by global tectonic patterns. The program therefore supports and encourages field, laboratory, and theoretical work in terrestrial and marine earth sciences, including the intersections between these fields and biology, glaciology, and oceanography.

The program also strongly encourages work on existing samples and data. Proposers should investigate availability from individual researchers and repositories such as:

- The **Byrd Polar Rock Repository** at Ohio State University (http://www-bprc.mps.ohio-state.edu/), host to thousands of rock samples from around Antarctica
- The **Antarctic Research Facility** at Florida State University (http://www.arf.fsu.edu/), housing over 25,000 meters of sediment core from the Southern Ocean and Antarctica
- The **Paleobotany Collection** of Kansas University (http://paleobotany.bio.ku.edu/PaleoCollections.htm), curating more than 7,000 specimens of antarctic fossil plants from throughout the Transantarctic Mountains.

Proposers should also be aware that during IPY, the program is supporting drilling in McMurdo Sound under the ANDRILL (http://andrill.org/) program. Samples may be available to researchers offering unique contributions.

Ocean and Atmospheric Sciences

The Antarctic plays a major role in the global heat cycle, is a key component of global ocean circulation and serves both as an indicator and potential driver of climate change. The Ocean and Atmospheric Sciences Program is intended to foster advances in understanding of the oceanic and tropospheric environments at high southern latitudes and their links to each other and global scale processes. 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** that probe the dynamics and kinematics of the polar oceans, such as the effects of interface driving forces like wind, solar radiation, and heat exchange, water mass production and modification processes, ocean dynamics at the pack ice edge, and the effect of polynyas on ventilation and relationships to the distribution of marine biota.
- **Chemical oceanographic studies** that investigate the chemical composition of and reactions in sea water, track fluxes of material within ocean basins and at their boundaries, and apply chemical tracers to study time and space scales of physical and biogeochemical oceanic processes.
- **Sea ice studies** that encompass material characteristics at 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.
- **Meteorological studies** that investigate atmospheric circulation systems and dynamics entailing aspects such as local and/or global exchange of heat, momentum and trace constituents and atmospheric chemistry.

Glaciology

Snow and ice are pervasive elements of high-latitude environmental systems and have an active role in the global environment. The glaciology program is concerned with the study of the history and dynamics of all naturally occurring forms of snow and glacial ice, including floating ice shelves, glaciers, and continental and marine ice sheets. Program emphases include paleoenvironments from ice cores, ice dynamics, numerical modeling, glacial geology, and remote sensing of ice sheets. Some specific objectives are:

- Correlation of climatic fluctuations evident in antarctic ice cores with data from arctic and lower-latitude ice cores, and integration of the ice record with the terrestrial and marine record.
- Documentation of the geographic extent of climatic events noted in paleoclimatic records; and the extension of the ice core time series to provide information on astronomical forcing of climate.
- Establishment of more precise dating methodologies for deep ice cores.
- Determination of the Cenozoic history of antarctic ice sheets and their interaction with global climate and uplift of the Transantarctic Mountains; response of the antarctic ice sheets to the Pliocene warming.
- Investigation of the physics of fast glacier flow with emphasis on processes at glacier beds.
- Investigation of ice-shelf stability.
- Identification and quantification of the feedback between ice dynamics and climate change.

Integrated & System Science

Frequently, innovative research questions cross the disciplinary boundaries described above. This may occur in the context of smaller and more focused research proposals or with larger collaborative efforts that take a broader system view. Such proposals within the realm of antarctic sciences are strongly encouraged. To help foster research of this nature, the Antarctic Sciences Division is currently in the process of establishing an Integrated and System Science Program. It is intended that this program take shape with substantial community input over the coming year. In the meanwhile, prospective investigators interested in interdisciplinary research themes, whether focused or system-oriented, are advised to contact the cognizant program director before submitting a proposal to discuss any questions about such a submission. For example, for large or complex projects, additional lead time may be needed for proper planning. The program director will coordinate the review process in collaboration with other program directors as appropriate.

Program Notes:

- **New investigators**

  If you have not performed research in Antarctica, the results of an NSF workshop for potential new investigators (http://www.nsf.gov/od/opp/antarct/workshop/nsf06032_presentations.jsp) may be useful.

- **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 may 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, including DOD.

During any austral summer and into the winter, approximately 140 research projects -- some continued from prior years and

some initiated as a result of new NSF awards for which field work has been approved -- are likely to be active in the U.S. Antarctic Program at numerous locations throughout the continent and the Southern Ocean.

The U.S. Antarctic Program is composed of 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 support or needing assistance with understanding antarctic field logistics. Investigators are encouraged to contact the RPSC Science Planning Group with questions during the proposal preparation phase.

The U.S. Antarctic Program also maintains a web portal http://www.usap.gov that contains links to research, logistics and operational information about U.S. activities in the Antarctic. Investigators are encouraged to use the web portal to access information for proposal preparation purposes.

McMurdo Station 77°53'S 166°40' E

McMurdo, the largest station in Antarctica with a population up to 1,100 persons in summer and 200 in winter, is located on Hut Point, Ross Island. It is the hub of the U.S. Antarctic Program, and the gateway to Amundsen-Scott South Pole Station, the McMurdo Dry Valleys, and continental field camps. Only Palmer Station, reached from South America, is operationally separate. McMurdo is the globe's farthest south land accessible by ship. It has a natural harbor, Winter Quarters Bay, and is supplied annually by a freighter and a tanker with icebreaker escort.

U.S. antarctic air operations are centered at McMurdo. Nearby sea ice supports a runway for large transport planes between late September and early December, when flights are made between New Zealand and McMurdo several times per week. A second runway on groomed glacial ice (the Pegasus runway) can accept wheeled landings year-round. In mid-August it receives flights from New Zealand over several days to initiate preparations for the summer season, and flights from New Zealand during the austral summer (October to February) occur two to three times a week.. Winter operations commence in March. A skiway on the adjacent Ross Ice Shelf can be used at any time of year by LC-130s -- ski-equipped, four-engine transports. LC-130s, operated by the New York Air National Guard are stationed at McMurdo throughout the austral summer.

In winter the station historically has been isolated except for emergencies. However, scientific interest led to an NSF-sponsored workshop that could result in increased winter access. The workshop report, Year-Round Access to the McMurdo Region: Opportunities for Science and Education, discusses the winter potential. It is intended to stimulate further consideration by the community, but does not have specific Foundation endorsement. Research might include extending summer measurements into the austral fall and winter months; winter "access" may include virtual access through remote instrumentation as well as transportation improvements and likely would extend to the McMurdo Dry Valleys.

Communications between McMurdo and the rest of the world, available year-round, 24 hours a day, include telephone, electronic mail, and the Internet. Regular U.S. mail service is provided in the austral summer.

McMurdo is a major research center. Science facilities include the modern Albert P. Crary Science and Engineering Center (more familiarly, the Crary lab). The laboratory is a large, state-of-the-art facility that enables sophisticated scientific research. The lab's five wings total 4,320 square meters of working area for information, computing, and telecommunications including Internet. Typically, studies related to biology (including an aquarium), earth sciences, and atmospheric sciences are supported. The Crary lab has flexible-use laboratory space, environmental rooms, equipment rooms, microscope rooms, offices, facilities for handling hazardous chemicals including radioisotopes, and conference rooms. Most lab spaces have single-pass air and fume hoods. The facility has specialized benchtop equipment for use both in the building and remotely and is stocked with scientific supplies, chemicals, and other consumables. A meteorology center has an interactive data access system that facilitates exploitation of a variety of meteorological data.

Additional McMurdo facilities provide direct support to science involving diving, balloon launches, field party training and outfitting, upper atmosphere investigations, etc. In summer, portable shelters and equipment aid research on and under the sea ice of adjacent McMurdo Sound. Helicopters support projects and camps within 150 kilometers of the station; and surface vehicles provide local transportation and support for traverses.

The McMurdo Dry Valleys is a National Science Foundation Long Term Ecological Research (LTER) site. For information, contact the antarctic organisms and ecosystems program director at OPP.

Amundsen-Scott South Pole Station (90°S)

Amundsen-Scott South Pole Station has operated continuously since 1957. In recent years it has undergone substantial

renovation and improvement to handle increased research needs. The far-reaching modernization will substantially improve or replace existing structures and systems.

South Pole Station is at an elevation of 2,835 meters on the continental ice sheet and has a mean temperature of minus 49.3° C.

Flights between McMurdo and South Pole are frequent from late October to mid-February; the station is isolated at other times. February-to-October (austral winter) population is about 50, and 250 can be accommodated in the summer; these numbers include construction personnel for the modernization program.

The station has an Atmospheric Research Observatory, the Martin A. Pomerantz Observatory for astrophysics, and computer systems for research and communication including Internet access. It has collected the longest continuous set of meteorological data from Antarctica's vast interior ice plateau, and it is well located for studies of the cusp region of the magnetosphere. Astronomy and astrophysics have flourished in recent years, taking advantage of excellent optical properties of the atmosphere (resulting from its high elevation, low temperature, and low humidity) and, for neutrino detection, the extremely clear and homogeneous thick ice below. Other areas of interest include geophysics, seismology, upper atmosphere sciences, and glaciology.

Palmer Station (64°46'S 64°03'W)

Palmer, on Anvers Island off the west coast of the Antarctic Peninsula, has been in operation since 1965. It is operated in conjunction with the icebreaking research ship *Laurence M. Gould*. Small boats are available for sampling in the sea and at nearby islands. Access to Palmer, which is year-round, generally is by ship from southern Chile.

The climate at Palmer is less severe than that at the other U.S. stations, and the fauna and flora are diverse. There are many opportunities for biology at or near the station; other disciplines (e.g., meteorology, upper atmosphere physics) also are represented. Palmer has biology laboratories, including wet lab areas and sea water aquaria. Palmer's population has ranged from 8 to 12 in winter to 43 in summer.

The Palmer Station area since 1990 has been a National Science Foundation Long Term Ecological Research (LTER) site. For information contact the antarctic organisms and ecosystems program director at OPP.

Temporary camps

In the austral summer, aircraft from McMurdo can place scientific parties almost anywhere on the continent. Tents or heated shelters and snowmobiles can be provided. Helicopters sometimes are deployed to remote locations for close support of research parties. Substantial camps remote from McMurdo Station can be established for large research groups. Camps can be placed by ship in the Antarctic Peninsula area. Summer research camps are a major strength of the U.S. Antarctic Program, and in a typical summer several are in operation.

Automated data collection (AGO and AWS)

The program supports automated geophysical observatories (AGOs) for unmanned collection of data at remote locations. Investigators who have questions about or who desire access to resulting data should contact an Office of Polar Programs science program director (roster).

Under NSF sponsorship, the University of Wisconsin has placed automatic weather stations (AWSs) at locations in Antarctica for research and operations. Information and data are freely available.

UV radiation monitoring network

The U.S. Antarctic Program supports the operation of precision spectroradiometers optimized for measuring solar ultraviolet radiation at South Pole, Palmer, and McMurdo stations in Antarctica and at Ushuaia, Argentina; Point Barrow, Alaska; Summitt, Greenland; and San Diego, California. Data are distributed regularly and are available annually online. The data include irradiance scans and databases of integrated UV exposure and a variety of dosages. Contact Biospherical Instruments (http://www.biospherical.com/NSF/default.asp).

Research ships

For capabilities and schedules of research icebreakers, visit the Marine Operations home page on the U.S. Antarctic Program web site, USAP.gov. Ship schedules are updated regularly. If you have questions, please contact your OPP science program director or the ocean projects manager.

***Laurence M. Gould*.** This 230-foot ice-strengthened research and resupply ship accommodates 28 researchers and support technicians. The hull has an ice classification of ABS-A1, rated for light icebreaking. The ship is permitted to work in moderate pack ice but cannot work in heavy ice and consolidated pack. Another eight people can be accommodated in berthing vans for crossing the Drake Passage. It is equipped for biological, physical and chemical oceanography and marine geophysics. It operates typically along the Antarctic Peninsula and in the South Shetland Islands; research cruises can be made elsewhere as required. The ship regularly transports people and supplies between southern South America and Palmer Station. It entered into U.S. Antarctic Program service in 1998 and is operated under a long-term charter.

Research equipment includes a portable isotope laboratory, and dedicated oceanographic instrumentation (e.g., CTD). The ship has a deep sea trawl winch and hydrographic winches, cranes, an interior staging area with telescoping side boom, and starboard and aft A-frames. It has satellite navigation, radar, and precision depth recorders.

***Nathaniel B. Palmer*.** A 308-foot research ship with icebreaking capability, *Nathaniel B. Palmer* began antarctic operations in 1992 for the U.S. Antarctic Program and continues operations under a long-term contract. The ship is a first-rate platform for global change studies, including biological, oceanographic, geological, and geophysical components. It can operate safely year-round in antarctic waters that often are stormy or covered with sea ice. The hull is rated ABS-A2 and can break 3 feet of ice at 3 knots. It accommodates 39 scientists and support technicians, has a crew of 22, and is capable of up to 75-day missions. It has 4,100 sq ft (380 sq m) of working deck area, 4,000 sq ft (370 sq m) of laboratory spaces, and modern oceanographic equipment.

Research equipment includes a seismic system, a portable isotope laboratory, and dedicated oceanographic instrumentation (e.g., CTD). The ship has a deep sea trawl winch and hydrographic winches, cranes, an interior staging area with telescoping side boom, and starboard and aft A-frames. It has satellite navigation, radar, precision depth recorders, multichannel and single channel seismic system, multibeam swath bathymetry system, and acoustic doppler current profiler.

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 is installed on the *Nathaniel B. Palmer*. Proposals for management of long-term measurements and data archiving will be considered. Technician staffing and other shipboard support should be identified both in the proposal and on the *Nathaniel B. Palmer* worksheet.

Other ships. University-National Oceanographic Laboratory Systems ships operate in the Southern Ocean in some years; see also the NSF Division of Ocean Sciences Web page. Ships that provide operational support near McMurdo might be able to provide underway research support in the Southern Ocean and the Ross Sea; contact the cognizant program director in NSF Office of Polar Programs. Research ships of other Antarctic Treaty nations operate in antarctic waters (see "Non-U.S. facilities; international cooperation").

High precision GPS

The Global Positioning System (GPS) is a worldwide, all-weather navigation and positioning system operated by the Department of Defense. GPS has been used in Antarctica since the early 1990s. The use of GPS for high precision antarctic surveying (1 mm-10 m) is increasing, with applications including geodetic surveying, glacial flow measurement, aircraft position, velocity and acceleration determination, mapping, seismic instrument positioning on moving ice sheets, glacial geology, isostasy, and sample positioning.

The NSF has an agreement with UNAVCO, Inc. for GPS support of research projects. WAP researchers may request support through UNAVCO. Support includes (1) a pool of geodetic quality receivers for the field season, (2) in-field equipment repair, (3) in-field engineering support, (4) in-field and predeployment training in the use of GPS receivers, (5) training in GPS data processing, (6) archiving of GPS data, and (7) assistance in project planning and experiment design.

UNAVCO's assistance in the design of projects includes advice about both field support and data processing. Resources are limited, and investigators who have their own receivers and field staff are encouraged to use them. Investigators who do not have access to geodetic-quality GPS receivers and are contemplating their use for high-precision surveying as part of their proposed work should contact UNAVCO to discuss the requirements. In general, proposals should build GPS expertise into the science project plan and the budget.

On the Operational Requirements Worksheets (see section with this title), specify the number of receivers required, the time needed to complete the GPS field work, and the in-field engineering required from UNAVCO. Describe how the work will be done, including any need for permanent markers. Contact UNAVCO if you need help developing this information.

LIDAR

Light Detection and Ranging (LIDAR) is a technique for making precise distance measurements over broad areas, and is useful for creating three dimensional images of surfaces. NSF has an agreement with the National Center for Airborne Laser Mapping
(NCALM; http://www.ncalm.ufl.edu/) at the University of Florida to support airborne LIDAR surveys for research projects. USAP researchers may request support from NCALM. Interested principal investigators should contact the NCALM and the appropriate NSF Antarctic Program Officer prior to submitting their proposal. NCALM requires a proposal, from which they will develop a budget to be incorporated into the NSF proposal as a subaward. The LIDAR portion of the project must also be described and justified in the peer-reviewed sections of the proposal.

Synthetic aperture radar

NSF encourages proposals for use of synthetic aperture radar (SAR) data in oceanography, sea-ice research, glaciology, and geology. Under an agreement between NASA and NSF, an earth station has been put into operation at McMurdo, enabling SAR data to be acquired from a large part of Antarctica.

For areas north of 79°S, data are available from the European Remote Sensing Satellite ERS-2 and the Canadian satellite RADARSAT. Opportunities exist for interferometric studies using ERS-2 data collected with a 1-day separation between images. The first antarctic imaging campaign was completed with RADARSAT on 20 October 1997, and a mosaic map was completed in 2001. A mission in 2002 mapped the perimeter of the continent and studied surface velocity of ice.

Access to data is regulated according to international agreements between NASA and the foreign flight agency responsible for the satellite. For archived ERS-1 and ERS-2, data received through McMurdo are available through the Alaska Satellite Facility (ASF) at the University of Alaska, Fairbanks, which is sponsored by NASA. All other antarctic SAR data from ERS-1 and ERS-2 must be requested through the European Space Agency.

Antarctic RADARSAT data are available through the ASF to NASA-approved investigators. Agreements between NASA and the space agencies require you to be an approved user to obtain ASF's SAR-related data. Investigators submitting proposals to the U.S. Antarctic Program for analysis of SAR data must also submit a copy of the proposal to NASA to receive data credits in accordance with the appropriate memorandum of understanding.

For more information about SAR data, contact the Alaska Satellite Facility. NASA's Earth Science Enterprise offers related opportunities. For U.S. Antarctic Program information, contact the OPP program officer for your area of research.

Polar ice core drilling services

The University of Wisconsin Ice Coring and Drilling Services (ICDS) (http://www.ssec.wisc.edu/icds/) provides ice coring and drilling under NSF contract to meet technological requirements of glaciologists and others. Services include design, fabrication, and operation of ice drilling equipment in Antarctica, Greenland, and high alpine areas. Direct support to science parties as tasked by the Office of Polar Programs can include coordination of science support requirements, collection and dissemination of data, facilities and equipment, information systems, and logistics. Ice drilling and technical services include electro-mechanical ice core drills, hot water drill for deep access holes and shot holes, and sub-ice sampling. Notify the relevant NSF program director (see roster) and contact ICDS (http://www.ssec.wisc.edu/icds/contactus.html), when you are requesting ice coring support.

SPECIMENS 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.

Ice cores. The U.S. National Ice Core Laboratory (http://www.nicl-smo.sr.unh.edu/), supported by NSF-OPP and the USGS-Geological Division, houses approximately 12,000 meters of ice cores recovered from Greenland and Antarctica that are available for study. Investigators funded by these agencies may access the facility's resources. Investigators must contact the Scientific Coordinator before submitting a proposal to the funding agency and must include details of expected usage of the NICL facility in the proposal.

Ocean-bottom sedimentary cores and grab samples; continental cores. Shipboard coring supported by the U.S. Antarctic Program over four decades has produced the world's largest collection of antarctic piston cores, housed at the Antarctic Research Facility, Florida State University. Investigators planning proposals that would result in collection of new marine sediment cores should contact the curation facility during proposal development. The facility can provide information about core handling protocols and, in special cases, can provide assistance to projects if planned and justified in the proposal. It should be considered the final repository for core material remaining from a project unless other specific arrangements are made.

Rock Samples. The United States Polar Rock Repository is a new national facility at the Byrd Polar Research Center, The Ohio State University. The repository houses rock collections from Antarctica and the Arctic, along with associated materials such as field notes, annotated photos and maps, raw analytic data, paleomagnetic cores, ground rock and mineral residues, thin sections, and microfossil mounts, microslides and residues.

Meteorite samples. More than half the world's meteorites available to science have been recovered from Antarctica since 1969. Samples collected under U.S. Antarctic Program sponsorship are managed, described, curated, and made available for research at Johnson Space Center, NASA, under an interagency agreement between NSF, NASA, and the Smithsonian Institution. 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.

Biological specimens. More than 31,000 samples comprising 300,000 specimens of antarctic benthic invertebrates, plankton, algae, and fish collected by U.S. Antarctic Program researchers are available for study and identification. The collection also includes the primary types of more than 400 antarctic invertebrate species. The Smithsonian Institution Department of Invertebrate Zoology handles the collection and maintains a database of cataloged material at http://acsmith.si.edu/emuwebizweb/pages/nmnh/iz/Query.php. NSF-sponsored polar investigators continue to deposit specimens and data.

Maps, aerial photographs, and related information

The U.S. Antarctic Resource Center (USARC) at the U.S. Geological Survey maintains the Nation's most comprehensive collection of antarctic maps, charts, satellite images and photographs. The USARC is the United States' contribution to the SCAR (Scientific Committee on Antarctic Research) Library system. The center is managed through an interagency agreement with the National Science Foundation that also supports USGS mapping and geodesy in the Antarctic.

Bathymetric and Other Oceanographic Data and Cruise Metadata. The Antarctic Multibeam Synthesis Data Portal (http://www.marine-geo.org/antarctic**)** delivers shaded relief maps, bathymetry grids and multibeam bathymetry field data and some other data from the Southern Ocean, primarily collected with the R/V *N. B. Palmer*, but also some date from the R/V *L.M. Gould*.

Antarctic Bibliography

The *Antarctic Bibliography* covers all the world's research literature regarding the region back to 1951. It is produced by the American Geological Institute under a grant from the National Science Foundation and is available for searching and full-document retrieval. Proposers are encouraged to use the bibliography to broaden awareness of past research results relevant to their interests. Investigators are encouraged to provide copies of their published papers and to check the bibliography for completeness in their areas of expertise.

U.S. Antarctic Data Coordination Center

NSF funds the U.S. Antarctic Data Coordination Center to describe U.S.-funded antarctic data for the international Antarctic Master Directory, which contains thousands of data descriptions from over 20 countries. NSF and the U.S. center are leaders in this international activity. The Foundation requires its antarctic grantees to contribute metadata to the U.S. center as part of the Office of Polar Programs data policy.

Non-U.S. facilities; international cooperation

The U.S. Antarctic Program is enthusiastically open to cooperation with other Antarctic Treaty nations when mutually beneficial. These projects often occur because of initiative taken by individual scientists. When discussing such projects, 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 OPP program director (703-292-8033) upon commencing discussions that could lead to U.S. Antarctic Program involvement.

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 and Antarctic Specially Managed areas is maintained by the Committee for Enviromental 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.cep.aq/apa/index.html.

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.

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 or Litchfield Island near Palmer. Other special areas like the Linneas Terrace are in remote locations in which geologists, for example, may want to work.

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 need to take to Antarctica is considered an introduced species, please contact the polar environmental officer at NSF (Polly Penhale at ppenhale@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. This category is large and will require attention if you get a grant to work in Antarctica. Then, the Foundation's prime antarctic contractor will help you report the materials that fall in this category.

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.

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.

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 field work 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 35 new standard and continuing research grants (see definitions in chapter V.A. of the Grant Proposal Guide) 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 $10 million per year may be available for new awards in FY 2007 through FY 2009. If the award is a continuing grant, additional amounts will be forthcoming in future fiscal years. In addition, and separate from these awards to organizations, field and laboratory support will be available in Antarctica for those projects for which field work has been proposed and approved. Anticipated date of awards: no earlier than October of the year in which the proposal is received.

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/bfa/dias/policy/docs/grantsgovguide.pdf). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

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

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

Antarctic research proposal preparation: Supplemental instructions

The following instructions supplement the *Grant Proposal Guide* and the *NSF Grants.gov Application Guide* guidelines.

Page limit:

Single-investigator or two-investigator proposals must not exceed 15 pages in the project description section (see *Grant Proposal Guide* (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 with three or

more organizations may add one page to the Project Description for each organization beyond the first two.

Reporting on prior support:

While the GPG and NSF Grants.gov Application Guide require reporting on prior support from NSF, it is important to follow the instructions carefully. Please note that the GPG limits for reporting on prior support 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. (GPG, Section II.C.2.d.iii.)

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 below. 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://nsidc.org/usadcc/) upon completion of the project.

Examples:

- **System for Earth Sample Registration (SESAR).** A system for sample registry that also generates unique sample identifiers. http://www.geosamples.org/
- **National Snow and Ice Data Center**. Cryospheric databases and other information gathered from such sources as remote sensing instruments, ground measurements, and models. http://nsidc.org/
- **U.S.National Ice Core Laboratory.** A collection of over 12,000 meters of ice cores from Greenland and Antarctica. http://www.nicl-smo.sr.unh.edu/
- **Smithsonian Institution Department of Invertebrate Zoology.** A collection and a database of of antarctic benthic invertebrates, plankton, algae, and fish. http://www.mnh.si.edu/rc/dp/colldb.html
- **U.S.Polar Rock Repository.** A collection of rock samples from the polar regions. http://www-bprc.mps.ohio-state.edu/emuwebusprr/pages/usprr/Query.php
- **EarthChem.** An online database of chemical analyses of rocks from around the globe. http://www.EarthChem.org
- **Antarctic Multibeam Synthesis Data Portal**. An online database of Antarctic marine bathymetry data and maps and other oceanographic information. http://www.marine-geo.org/antarctic/
- **Antarctic Paleobotany Collection**. An online database and collection of Antarctic fossil plants. http://paleobotany.bio.ku.edu/PaleoCollections.htm
- **Antarctic Research Facility.** A national repository for Antarctic and southern ocean sediment cores. http://www.arf.fsu.edu/
- **Incorporated Research Institutions for Seismology (IRIS).** An online archive of seismic data. http://www.iris.edu/
- **CLIVAR Data Assembly Center**. Archives of various climate observation datasets. http://www.clivar.org/data/dacs.php
- **UNAVCO.** An online archive of GPS data and data products. http://www.unavco.org/

Proposals not following these instructions are subject to return without review.

Antarctic or Southern Ocean Proposals Involving *No* Fieldwork

FastLane proposals:

Proposers must complete the Worksheet for Proposals With No Fieldwork in Antarctica (http://www.nsf.gov/od/opp/antarct/nofldwrk.doc) and upload it as a *Single Copy Document* through FastLane. Proposals lacking this worksheet are subject to **return without review.**

Grants.gov proposals:

Proposers must complete the Worksheet for Proposals With No Fieldwork in Antarctica (http://www.nsf.gov/od/opp/antarct/nofldwrk.doc). When submitting through Grants.gov, the document in PDF format should be attached to the "National Science Foundation Grant Application Cover Sheet" at item 6, "Additional Single Copy Documents." Proposals lacking this worksheet are subject to **return without review.**

Antarctic or Southern Ocean Proposals Involving Fieldwork

Proposed fieldwork must be described in the proposal at a level of detail sufficient for merit review. The costs for field support in the Antarctic should **not** be itemized or included in the project budget spreadsheet because these costs will be identified through a separate operational review process. To determine field support needs, costs and feasibility, proposers must submit an Operational Requirements Worksheet (ORW) via POLAR ICE (http://polarice.usap.gov/index.htm). This worksheet captures details about the field support requirements that may not be germane to merit review but are critical to feasibility analysis. Completing the ORW is substantial and must be done before the proposal is submitted. OPP recommends proposers start this process two weeks before final proposal submission. Proposals lacking these *Operational Requirements Worksheets* are subject to **return without review. The following instructions describe the process:**

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 a PDF version of the completed ORW.
- Upload the ORW as a *Single Copy Document* through FastLane, and submit the proposal to NSF. Please note that reviewers will not have access to the ORW file, so fieldwork information required for merit review must be included in the proposal s *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 a PDF version of the completed ORW.
- Attach the ORW as a Single Copy Document to the "National Science Foundation Grant Application Cover Sheet" at item 6, "Additional Single Copy Documents" and submit the proposal. Please note that reviewers will not have access to the ORW file, so fieldwork information required for merit review must be included in the proposal s 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.

Operational Requirements Worksheets (ORW) -- Additional information

A researcher proposing field work in the Antarctic must prepare Operational Requirements Worksheets in POLAR ICE, referenced in the above instructions.

The worksheets were devised by antarctic research-support specialists who have years of experience in helping investigators plan field work. Use the ones that are relevant to your needs and that, in your judgment, help to present your operational needs. If a worksheet is not germane to your work, don't complete it.

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.

To the extent that it is technologically and financially possible, this principle is reflected in the field program. However, at any given time some proposals -- highly meritorious scientifically -- are not feasible operationally. The antarctic support system and sometimes the proposed field research itself must be modified.

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. 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 capabilities of the U.S. Antarctic Program have evolved greatly in response to scientific requirements and will continue to do so, motivated primarily by dialog between the U.S. Antarctic Program staff and the research community.

Later, if the proposal appears likely to be approved, NSF's prime antarctic support contractor will solicit details that will expound on and confirm the ORW. If your proposal is awarded, you will also be asked to provide a Support Information Package -- a SIP -- that builds on the Operational Requirements Worksheets you submitted via POLAR ICE. This action by the contractor does not constitute NSF approval, and you should not infer that an NSF award is necessarily forthcoming.

The Antarctic Conservation Act *Application and Permit Form* is on the NSF home page and is not a part of POLAR ICE.

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 testing activities prior to deployment of the project.

Achieving this goal will help to assure that precious field resources are devoted to activities that can only be done or are best done in the Antarctic and that scientific return from field work is maximized. This principal applies to both development of new and modification of existing instruments and equipment. It also applies to proposals for Antarctic field work 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 field work. Working in and 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). This usually means designing for minimizing consumption of resources, and minimizing potentially detrimental EMI, while meeting the compelling science needs in a safe manner. 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/conferencesCommitteesAndWorkshops/user Committees/documents/SPUC%20EMI%20Subcommittee%20Report%2021.pdf.

In summary, the proposal should include a plan for instrument and equipment development, addressing appropriate resource and EMI issues described above, to make a compelling case that the work is justified. The proposed budget and schedule should also be developed appropriately.

The Operational Requirements Worksheets 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://polarice.usap.gov/index.htm).

Environmental protection and waste management

You must convince the Foundation that your project, if approved, can be performed in compliance with antarctic environmental regulations. Operational Requirements Worksheets in POLAR ICE will help you define your plans. Much of your conservation planning will involve common sense -- minimizing pollution, avoiding or reducing impacts on fauna and flowa, avoiding protected areas without a permit to enter -- but the regulations are complex, and you cannot rely on common sense unassisted. 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 be 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. Fill out the Environmental Assessment Questionnaire. If necessary, plan to fill out and submit an Antarctic Conservation Act permit application (discussed at the end of chapter II).

By attending to these matters in your planning you will enable NSF staff to start to plan support of these aspects in time to avoid delaying or interrupting your field work. Neither the planning nor the implementation need be overwhelming. NSF and investigators have learned that diligence at the proposal stage prevents headaches later.

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 may be required to modify your field personnel to include safety personnel such as a mountaineer or field safety guide.

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 call or write 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). If the research team does not have accomplished scientific divers, the support contractor can provide a limited amount of such support.

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 needs to be consistent with your organizational license and NSF policies. Your Radiation Safety Officer will be required to endorse and NSF Safety and Health staff will have to approve your use of radioisotopes in Antarctica.

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

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 field work. 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.

Prospective travelers to the Antarctic with the U.S. Antarctic Program will be provided medical and dental examination forms by the antarctic support contractor. 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.

PROPOSAL DOs AND DON'Ts

A proposal must convince skeptics (reviewers, panelists, NSF) that the public good will be served by giving you public money. Suggestions:

Do read and follow this solicitation and the *Grant Proposal Guide* or *NSF Grants.gov Application Guide*.

Do keep text short.

Do state the problem, the plan, and the anticipated results. Answer the "so what?" and "why do this?" questions early.

Do give credit where credit is due; cite your colleagues' work (include titles) where appropriate.

Do give research results from your *one* previous NSF grant most closely related to the new proposal.

Do check and review the proposal with a colleague. *Reviewers may equate error with sloppy research.*

Do put the number of this program solicitation in the top line of the proposal cover sheet.

Don't assume that everyone reviewing your proposal is expert in all aspects of your research. *Some reviewers may be chosen for their knowledge of just part of the proposal.*

Don't leave out vitae of major investigators, budget explanation, other-grant-support list, etc.

Don't forget the no-fieldwork worksheet if you're not proposing fieldwork.

Don't forget the POLAR ICE Operational Requirements Worksheets if you're proposing fieldwork. In FastLane, these should be uploaded as a "single-copy document." In the Grants.gov application, these should also be attached as a "single-copy document" at item 6 of the "National Science Foundation Grant Application Cover Sheet."

Don't forget to give your NSF proposal number to POLAR ICE if you're proposing fieldwork.

Don't forget to apply to NSF for an Antarctic Conservation Act permit if needed.

Don't inflate the budget.

B. Budgetary Information

Cost Sharing: Cost sharing is not required by NSF in proposals submitted to the National Science Foundation.

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 field work, lowers the cost of acquiring, maintaining, and, especially, shipping things to Antarctica.

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

Describe and budget in your proposal as necessary for these items:

1. equipment and supplies required at home organizations
2. equipment and supplies that are unique to the field project, such as 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)
7. field equipment that is unique to a field project, such as climbing boots and eye protection (the Foundation issues polar clothing including insulated underwear, mukluks, thermal boots, parka, insulated overalls, gloves, and other extreme-cold-weather gear)
8. shipment of your gear between home organization and port of embarkation (usually a West Coast port; see worksheets)
9. 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)
10. living expenses (per diem) during travel to and from Antarctica. Budget under foreign travel
11. mountaineering guide, if warranted, for field work
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 program manager or the Polar Research Support staff 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 manager. Accompanied excess baggage authorized by NSF in advance also will be covered by the contractor. *Do* budget in the proposal for per diem during this travel [see (10) above] and for any travel not involving deployment to Antarctica.

Insurance

Do not budget for 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 07, 2007

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 and, if they meet NSF proposal preparation requirements, for review. 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 with the proposer.

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 and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

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

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

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

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

Additional Review Criteria:

1. International Polar Year (IPY)

For proposals being submitted as contributions to IPY, a statement articulating the relevance to IPY and addressing the IPY goals as expressed by U.S. National Academy of Sciences (U.S. NAS) and the International Council of Scientists (ICSU) should be included in the proposal description. For U.S. NAS IPY information, see http://dels.nas.edu/us-ipy/. For ICSU IPY information, see http://www.ipy.org or http://www.ipy.org/index.php?/ipy/detail/a_framework_for_the_international_polar_year/.

2. Rationale for access to Antarctica

NSF supports fieldwork in Antarctica when the research can only be done, or is best done, there. 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.

3. 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.]

An NSF-supported web site has two topics that may help a proposal respond effectively to these NSF objectives: a list of Polar Research Community Outreach Projects and a tutorial, Educational Outreach and the Polar Research Community, intended to help polar scientists identify and leverage opportunities for integrating educational outreach into their research.

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. During the 2006-2007 austral summer this program focused on the Antarctic Drilling (ANDRILL) project, a multidisciplinary, international program designed to use sediment cores and other proxies to study past climate epochs on the southernmost continent to better understand Antarctica's potential response to future global changes Information concerning the media program can be found at http://www.nsf.gov/news/news_summ.jsp?cntn_id=107035.

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 date of receipt. The interval ends when the Division Director accepts the Program Officer's recommendation.

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

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

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

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

B. Award Conditions

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

Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

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

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

Special Award Conditions:

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. 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:

- Thomas Wagner, Antarctic Earth Sciences Program Director, telephone: (703) 292-4746, fax: (703) 292-9079, email: twagner@nsf.gov
- Julie Palais, Antarctic Glaciology Program Director, telephone: (703) 292-8033, fax: (703) 292-9079, email: jpalais@nsf.gov

- Vladimir Papitashvili, Antarctic Aeronomy and Astrophysics Program Director, telephone: (703) 292-7425, email: vpapita@nsf.gov

- Kelly Falkner, Program Director for Antarctic Integrated & System Science, & Antarctic Ocean & Atmospheric Sciences, telephone: (703) 292-7450, fax: (703) 292-9079, email: kfalkner@nsf.gov

- Roberta Marinelli, Antarctic Organisms and Ecosystems Program Director, telephone: (703) 292-7448, fax: (703) 292-9079, email: rmarinel@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.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

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