LAII:
LAND-ATMOSPHERE-ICE INTERACTIONS

Announcement of Opportunity

OFFICE OF POLAR PROGRAMS

DEADLINE DATE: ***September 15, 1997***

NATIONAL SCIENCE FOUNDATION

INTRODUCTION

The National Science Foundation (NSF) Arctic System Science (ARCSS) US Global Change Research Program supports research projects on the role of the arctic system in global change. The ARCSS LAII Science Steering Committee has advised that an integrated program of process, manipulation, long-term measurement, and modeling studies is necessary to understanding global change in the Arctic.

The Arctic plays a crucial role in global change. The region is a sensitive indicator of change through the biota and snow and ice features; short- and long-term climatic records are stored in permafrost and ice sheets, such as the Greenland ice sheet, and in soil layers and lake sediments. The Arctic also affects the global climate directly through interactions between its atmosphere, ice cover, land surface, and ocean, and through strong feedback processes. Practically all climate models predict an amplification of the global greenhouse effect at high northern latitudes, but models as well as observations have produced results that are not easily interpreted. The reports from the Intergovernmental Panel on Climate Change (IPCC 1995) summarize the state of knowledge on global change.

The LAII Plan for Action, recently updated and published, sets out the significant research areas and priorities for one of the components of the ARCSS Program: Land-Atmosphere-Ice Interactions (LAII). It updates the initial 1991 LAII Plan for Action. The overall goal for LAII is to enhance our understanding of the land, atmosphere, and ice interactions in the arctic system, the role that these processes play in the whole earth system, and the effect that global change may have on the Arctic. LAII also has important linkages to the Ocean-Atmosphere-Ice Interactions (OAII) and the Human Dimensions of the Arctic System (HARC) components of ARCSS.

A goal of this LAII plan is to advance LAII as a *more integrated research program* in the future. Toward this integration, the scientific questions raised in this plan are organized under four interdisciplinary themes:

- Detection and analysis of global change.
- Circumpolar extrapolation of climate feedbacks from arctic terrestrial systems.
- Past and future changes within the arctic system.
- Sustainability of the arctic system under global change.

The LAII Plan for Action may be obtained from the LAII Science Management Office, c/o Dr. Patricia A. Anderson, Center for Global Change, PO Box 757740, University of Alaska Fairbanks, Fairbanks, Alaska 99775-7740; Tel: 907-474-5698 FAX: 907-474-6722; email: patricia@gi.alaska.edu. The LAII Plan for Action is also available on the LAII home page: www-cgc.uafadm.alaska.edu/laii.

DESCRIPTION

The Arctic System Science Program of NSF announces a competition for research addressing the four interdisciplinary themes of LAII as described in the LAII Plan for Action. One subprogram described in the LAII Plan for Action, the International Tundra Experiment (ITEX), is currently supported and will not be a part of this competition. Integration of proposed research is encouraged with the ongoing ITEX subprogram.

1. Detection and Analysis of Global Change

The first theme relates to detecting the predicted climate amplification in the Arctic and its effects. The amplification of the global greenhouse signal points to the Arctic as a key region in the detection of global change. Key concepts include:

- Measurement of factors that would indicate substantive changes in arctic system functioning,
- Modeling of cause and effects,
- Long-term measurement networks,
- Measurement of specific environmental parameters sensitive to change,
- Species and community changes,
- Changes in human use of resources.

2. Circumpolar Extrapolation of Climate Feedbacks from Arctic Terrestrial Systems

Circumpolar extrapolation of climate feedbacks from arctic terrestrial systems requires moving our knowledge of the present climate and feedbacks to larger spatial scales and defining the rates at which these feedback processes operate. Key concepts include:

- Understanding and modeling of the present climate-terrestrial system,
- Trace-gases and energy budget on a regional scale,
- Extrapolations to circumpolar scale representing different vegetation and climates,

- Regional differences in vegetation, soil, active layer and permafrost, and glacial history.

3. Past and Future Changes within the Arctic System

To understand past and future changes within the arctic system, integrating our knowledge into predictive models of the coupled arctic system and retrospective validation of the models are needed.

i). Past and future changes in hydrologic linkages among land, ocean, and atmosphere in the Arctic. Key concepts include:

- Global and regional climate models,
- Glacier mass balance, soil moisture, water and energy budgets,
- Active layer and permafrost changes,
- Vegetation changes over broad regions,
- Snow accumulation in various types of vegetation,
- Summer runoff, transfer of water, sediments, carbon, and nutrients to streams and to the ocean,
- Modeling ecologically significant extreme weather events.

ii). Past and future changes in biogeochemistry and carbon cycling. Key concepts include:

- Precipitation amounts and chemistry,
- Vegetation changes,
- Soil and soil carbon changes,
- Modeling of past and future.

iii). Past and future changes in plant, animal and human communities. Key concepts include:

- Rates of change,
- Changes in ecosystem functioning and vegetation distribution,
- Impact on animals of snow and vegetation changes,
- Effects on carbon and nutrient cycles,
- Effects of CO_2 and UV change.

4. Sustainability of the Arctic System under Global Change

Assessment of the physical, biological and societal impacts of global change and the sustainability of the arctic system are important and necessary components of any integrated global change program. Key concepts include:

- Impact assessments of global change due to elevated CO_2 warming and UV effects,
- Effects due to long distance pollutant transport,
- Use of resources by arctic peoples,
- Interactions with climate and land use changes,
- Global change effects on natural ecosystems,
- Environmental protection of tundra and taiga ecosystems and maintenance of biodiversity,
- Traditional human use of the arctic (ice cellars, hunting and fishing),
- General human use of the arctic (infrastructure, tourism, exploitation, aesthetics),
- Interactions with changes external to the Arctic (price of oil, fossil fuel use),
- Development alternatives in different regions of the Arctic.

In Table 1 of the LAII Plan for Action additional detailed scientific questions are listed under the four themes. Many questions cut across more than one theme. Priorities focus on those research efforts that will produce significant improvements in our understanding and in our ability to predict changes in the interactive arctic system. Concurrent progress in high priority activities in all science elements is necessary to achieve the overall program goal, although not all will receive equal emphasis.

Integrated proposals of three to five years by groups of investigators are highly encouraged in this competition. It is recommended that proposals incorporate both field studies and modeling components that address multiple research questions (see above) in a coordinated, systemic approach. Proposals by individuals that fit within the larger integrated themes in the group proposals will also be considered. The ARCSS Program may make suggestions for improved integration across proposals.

LOGISTICS

Investigators need to provide a full explanation of what logistics will be required for their projects. This ex-

planation should address how the logistics of the proposed research merge efficiently and effectively with other projects. The full costs of any logistics required to support the proposed research should be included in the proposal budget. Some logistics for LAII field projects may be provided by the Polar Ice Coring Office (PICO) located at the University of Nebraska Lincoln. Information about the type and location of logistics supported by PICO may be found on the World Wide Web at: http://pico.unl.edu. The extent of the PICO logistics support directed to projects selected for awards will be determined by NSF in conjunction with the science review.

AVAILABILITY OF FUNDS

Based on the continuation of current appropriation levels, and depending on availability of funds, about $4,000,000 will be available each year FY 1998-2002 to fund LAII research and logistics. If funded at this level, this would allow funding for research support of about six to eight multi-investigator groups at approximately $400,000 - 500,000 per year each.

PREPARATION OF PROPOSALS

The program announcement block of the cover sheet should indicate "NSF 97-123." Proposals received after 15 September 1997 will be returned. Proposals should be prepared and submitted in accordance with the guidelines provided in the NSF brochure, Grant Proposal Guide (GPG), NSF 95-27. Paper copies of the GPG can be requested at no cost from:

NSF Publications and Supplies Unit
4201 Wilson Blvd.
Room P-15,
Arlington, VA 22230;
Telephone: (703)306-1130, or
via e-mail (Internet: pubs@nsf.gov), or
NSF Home Page www.nsf.gov

WHO MAY SUBMIT PROPOSALS

The ARCSS/LAII Program will consider research proposals from all approved categories of proposers as described in the Grants Policy Guide (NSF 95-27).

An original and 20 copies of the proposal should be sent to:

National Science Foundation PPU
4201 Wilson Blvd. P-60
Arlington, VA 22230

Questions regarding proposal preparation or submission may be directed to Michael T. Ledbetter, Office of Polar Programs, National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230; Tel: (703)306-1029 or Internet: mledbett@nsf.gov; or to Douglas Siegel-Causey, Office of Polar Programs; Tel: (703)306-1029; Internet: dsiegel@nsf.gov.

Award instrument: The award will be administered under a Grant in accordance with the NSF Grant General Conditions (NSF GC-1). Copies of these documents are available at no cost from the NSF Publications and Supplies Unit. More comprehensive information is contained in the NSF Grant Policy Manual (NSF 95-26, July 1995), available on the NSF Home Page at www.nsf.gov, and for sale through the Superintendent of Documents, Government Printing Office, Washington, DC 20404. The telephone number at GPO is (202) 783-3238 for subscription information.

PROPOSAL REVIEW

Merit Review Process

Proposals submitted in response to this program announcement will be subject to the NEW merit review criteria approved by the National Science Board on March 28, 1997 (NSB97-72). The new merit review criteria are:

What is the intellectual merit and quality of the proposed activity?

The following are suggested questions that the reviewer will consider in assessing how well the proposal meets this criterion. Each reviewer will address only those questions which he/she considers relevant to the proposal and for which he/she is qualified to make judgments.

How important is the proposed activity to advancing knowledge and understaning within its own field and 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 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?

The following are suggested questions that the reviewer will consider in assessing how well the proposal meets this criterion. Each reviewer will address only those

questions which he/she considers relevant to the proposal and for which he/she is qualified to make judgments.

> 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, 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?

Additional Review Criteria

In addition to these generic review criteria, reviewers will be asked to use the following criteria when reviewing proposals that respond to this announcement. These criteria are as follows:

1. Does the proposed research address ***more than one of the themes*** described in the LAII Plan for Action, using a ***coordinated, integrated approach***?
2. Does the proposed research demonstrate a clear contribution to model predictions at ***regional to circumarctic scales***?
3. Does the proposal provide ***linkages to other components*** of ARCSS?

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

Data Sharing

To ensure a coordinated LAII program, proposals must include statements indicating expected adherence to the ARCSS data management plan. This plan calls for dissemination of LAII research data products to other LAII investigators within one year after collection of data. Awardees will be required to archive and document data at the ARCSS Data Coordination Center at the University of Colorado National Snow and Ice Data Center or another center appropriate to the type of data. Information about the ARCSS Data Coordination Center may be obtained from Matt Cross, University of Colorado, Campus Box 449, Boulder, CO 80309-0449; Tel: 303-492-1192; Internet: cross@kryos.colorado.edu or on the ARCSS Data Coordination Center home page on the World Wide Web: http://arcss.colorado.edu.

ADDITIONAL INFORMATION

The Foundation provides awards for research in the sciences and engineering. The awardee is wholly responsible for the conduct of such research and preparation of the results for publication.

The Foundation, therefore, does not assume responsibility for the research findings or their interpretation.

The Foundation welcomes proposals from all qualified scientists and engineers and strongly encourages women, minorities, and persons with disabilities to compete fully in any of the research related programs described here. In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving financial assistance from the National Science Foundation.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF projects. See the program announcement or contact the program coordinator at (703)306-1636.

PRIVACY ACT AND PUBLIC BURDEN

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the application review process; to applicant institutions/grantees to provide or obtain data regarding the application review process, award decisions, or the administration of awards; to government contractors, experts, volunteers, and researchers as necessary to complete assigned work; and to other government agencies needing information as part of the review process in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the Government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as NSF reviewers or advisory committee members. See Systems of Records, NSF 50, "Principal Investigators/Proposal File and Associated Records", 60 *Federal Register* 4449 (January 23, 1995), and NSF-51, "Reviewer/Proposal File and Associated Records", 59 *Federal Register* 8031 (February 17, 1994). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of your receiving an award.

Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to:

Gail McHenry
Reports Clearance Officer
Division of Administrative Services
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230.

The National Science Foundation has TDD (Telephonic Device for the Deaf) capability, which enables individuals with hearing impairment to communicate with the Foundation about NSF programs, employment, or general information. To access NSF TDD dial(703) 306-0090; for FIRS,1-800-877-8339.

Programs described in this publication are in Category 47.050 (Directorate for Geosciences) in the Catalog of Federal Domestic Assistance.

NATIONAL SCIENCE FOUNDATION
ARLINGTON, VA 22230

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

RETURN THIS COVER SHEET TO ROOM P35 IF YOU DO NOT WISH TO RECEIVE THIS MATERIAL ❒ , OR IF CHANGE OF ADDRESS IS NEEDED ❒ , INDICATE CHANGE INCLUDING ZIP CODE ON THE LABEL (DO NOT REMOVE LABEL).

OMB 3145-0058
P.T.:22
K.W.:1008004 1008000