ARCTIC FRESHWATER CYCLE: LAND/UPPER-OCEAN LINKAGES

A contribution to the Study of Environmental ARctic CHange (SEARCH)

Program Solicitation

NSF-02-071

OFFICE OF POLAR PROGRAMS

FULL PROPOSAL DEADLINE(S): June 3, 2002

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SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Title: ARCTIC FRESHWATER CYCLE: LAND/UPPER-OCEAN LINKAGES

Synopsis of Program: The hydrologic cycle and heat balance of the Arctic/SubArctic atmosphere, landmass, and ocean are important components of the Earth system. They couple with the global meridional overturning circulation of the ocean and hence become a key element of the larger climate system. In the Arctic, the fluxes and transformation of freshwater, heat and tracers are rapid, changeable and incompletely observed or understood. An understanding of the freshwater system is a key to understanding the environmental impacts from changing global or regional climate. This Solicitation seeks proposals that address the physical, chemical, and/or biogeochemical processes of the Arctic freshwater system and its connections with the subpolar oceans and Arctic environmental change.

Cognizant Program Officer(s):

- Michael Ledbetter, Arctic System Sciences Program, Director, OPP, 755, telephone: (703) 292-7432, e-mail: mledbett@nsf.gov.
- Robin Muench, Arctic Sciences Section, OPP, 755, telephone: (703) 292-7436, e-mail: rmuench@nsf.gov.

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.078 --- Office of Polar Programs

ELIGIBILITY INFORMATION

- **Organization Limit:** FFRDC and Federal agency laboratories are ineligible to be the lead institution. Those institutions may be included as sub-awardees of a proposal from an eligible institution.
- **PI Eligibility Limit:** None
- **Limit on Number of Proposals:** None

AWARD INFORMATION

- **Anticipated Type of Award:** Standard or Continuing Grant
- **Estimated Number of Awards:** 20-30
- **Anticipated Funding Amount:** $30,000,000 for awards up to five years, pending availability of funds.

PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

- **Full Proposals:** Standard Preparation Guidelines
    - Standard GPG Guidelines apply.

B. Budgetary Information

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

C. Deadline/Target Dates

- **Letters of Intent (*optional*):** None
- **Preliminary Proposals (*optional*):** None
- **Full Proposal Deadline Date(s):** June 3, 2002

D. FastLane Requirements

- **FastLane Submission:** Required
- **FastLane Contact(s):**
    - Alicia Shields, Arctic Sciences Section, OPP, 755, telephone: (703) 292-7423, e-mail: ashields@nsf.gov.

PROPOSAL REVIEW INFORMATION

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full program announcement/solicitation for further information.

AWARD ADMINISTRATION INFORMATION

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Additional reporting requirements apply. Please see the full program announcement/solicitation for further information.

I. INTRODUCTION

The hydrologic cycle and heat balance of the Arctic/SubArctic atmosphere, landmass, and ocean are important elements of a tightly coupled component of the Earth system. They also couple with the atmosphere and global meridional overturning circulation (MOC) of the ocean, and hence become a key element of the larger climate system. An understanding of the freshwater system is one of the keys to understanding the environmental impacts from changing global or regional climate. In the Arctic, the oceanic fluxes and transformation of freshwater, heat and tracers are rapidly changeable and incompletely observed.

The North Atlantic provides the major share of high-salinity water to the Arctic Ocean through the east side of Fram Strait and over the Barents Sea shelf. Freshwater is added to the ocean primarily by continental runoff, input of relatively less saline water from the Pacific Ocean, by repartitioning of the freshwater fraction during sea ice formation and by direct precipitation to the sea surface. These processes freshen and stratify the upper Arctic Ocean and consequently affect the outflow to the North Atlantic. That outflow may impact vertical stratification in the far northern Atlantic and act to inhibit the MOC with concomitant effects on Northern Hemisphere circulation.

Substantial changes have occurred across the Arctic and in the high-latitude Atlantic Ocean in recent decades. These changes are related to basin-scale and hemispheric-scale atmospheric variability affecting atmosphere, land, and ocean. A slowing of the MOC in coming decades, as predicted by many global circulation models, would alter physical climate and biotic systems leading to impacts on society. Decadal variations of MOC transport and its elements have been attributed to strong atmospheric variability (such as in the Arctic or North Atlantic Oscillation). In the Arctic these variations affect the MOC by changing freshwater pathways through the Arctic Ocean to the North Atlantic, rates of ice formation, and precipitation.

Land-based systems, including continental water, glaciers, and terrestrial ecosystem elements, figure prominently in these changes, yet are incompletely understood due to the complexity of land-based hydrologic processes and the absence of coordinated observations and process modeling. Changes in precipitation, evaporation, snowmelt, permafrost and freeze-thaw dynamics, vegetation, and biogeochemistry are linked directly to changes in the pan-Arctic freshwater budget.

II. PROGRAM DESCRIPTION

This Solicitation seeks proposals that address the physical, chemical, and/or biogeochemical character of the Arctic freshwater system and interactions with the subpolar oceans. It emphasizes particularly the research planning of the Arctic/SubArctic Ocean Fluxes (ASOF; http://asof.npolar.no/), Arctic Community-wide Hydrological Analysis and Monitoring Program (Arctic-CHAMP; http://www.arcus.org/ARCSS/hydro/index.html), and Study of Environmental ARctic Change (SEARCH; http://psc.apl.washington.edu/search/)projects. The proposer is encouraged to examine the Science Plans for each of those projects as guidance for the research goals driving this Solicitation. This Solicitation, however, is not intended to seek proposals for the full ASOF, CHAMP, or SEARCH projects but, instead, will focus on the following topics:

1) Implementation of internationally coordinated observation systems that take advantage of innovative technological advances and can serve as prototypes for sustained, long-term efforts to document and understand variability in key freshwater, ice and chemical tracer fluxes and/or processes within the Arctic land, atmosphere, upper-ocean systems and the teleconnection to the Sub-arctic oceans;

2) Synthesis and integration of available data and modeling studies to reveal processes, linkages and causes of variability in the Arctic terrestrial, atmosphere and upper-ocean hydrologic cycle;

3) Documentation and assessment on the decade-to-century timescale of the variability of the Arctic hydrologic freshwater cycle and associated changes in oceanic water-mass properties in the Arctic Ocean.

Approaches relating to these goals could include, but are not limited to:

· Modeling and data synthesis at scales ranging from local process studies to regional or global climate modeling and integrated earth system modeling;
· Collection, rescue, reconstitution, and synthesis of data (e.g. mooring, hydrography, chemical tracer, remote sensing, atmospheric, terrestrial, and sea ice measurements and paleoclimate);
· Biogeophysical and biogeochemical process studies of high-latitude terrestrial systems that influence the freshwater system in the Arctic or its teleconnections to the global ocean.

Regardless of the approach chosen, the proposed research must demostrate how a contribution is made to a pan-Arctic understanding of the freshwater land/ocean system and its influence on regional or global-scale processes. Proposed research must contribute to the goals of SEARCH (http://psc.apl.washington.edu/search/). Interdisciplinary proposals are especially encouraged.

Collection of new data is encouraged but those projects requiring aircraft, ships, or large field camps must propose field work with sufficient lead-time to arrange for the required logistics. For example, extensive terrestrial projects in remote regions or projects requiring icebreaker or other ship support might not begin until 2004 depending on availablity of logistics assets. Proposals for those projects may include limited support prior to initiation of the field program. That support, however, must be well-justified in the proposal.

III. ELIGIBILITY INFORMATION

The categories of proposers identified in the Grant Proposal Guide are eligible to submit proposals under this program announcement/solicitation.

IV. AWARD INFORMATION

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds. Total available for this solicitation includes logistics costs not included in the proposal budget (see Other Budgetary Limitations).

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Web Site at: http://www.nsf.gov/cgi-bin/getpub?gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

Proposers are reminded to identify the program solicitation number (NSF-02-071) in the program announcement/solicitation block on the *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.

B. Budgetary Information

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

Other Budgetary Limitations: Costs for large logistics assets (e.g. research ships, aircraft, large field camps) should not be included in the budget but requirements for such assets should be clearly identified in the budget justification with sufficient detail to allow logistics providers to accurately determine the cost.

Costs must be included in the budget for attendance at annual meetings of the awardees for coordination of data collection and modeling as well as integration of results into an arctic system underestanding of the freshwater cycle.

C. Deadline/Target Dates

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

Full Proposals *by 5:00 PM local time*: June 3, 2002

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this Program Solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: http://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call 1-800-673-6188 or e-mail fastlane@nsf.gov.

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 certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane website at: http://www.fastlane.nsf.gov.

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

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

The two 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 he/she 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

Each proposal must include a data management plan that conforms to the Arctic System Science (ARCSS) Program data management policy. For a copy of the policy refer to the ARCSS Data Coordination Center (located at the National Snow and Ice Data Center) web site: http://arcss.colorado.edu/. Proposals without a data management plan that incorporates the ARCSS data policy will be returned without review.

In additon to external peer review, proposals will be reviewed both for potential synergy with other submitted proposals that create an integrated research program contributing directly to the interdisciplinary goals of SEARCH. The contribution of proposed research to SEARCH goals (http://psc.apl.washington.edu/search/)will be used as an important review criteria. Proposers may be required to attend a pre-award meeting to coordinate their research plans in a way that focuses on SEARCH goals and demonstrates synergy with other projects selected for support.

For examples of activities that address the standard review criterion, "What are the broader impacts of the proposed activity," proposers are encouraged to consult with the report of the OPP Advisory Committee on this topic: http://www.nsf.gov/od/opp/opp_advisory/oaccrit2.htm

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

B. Review Protocol and Associated Customer Service Standard

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

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 closing date of an announcement/solicitation or the date of proposal receipt (whichever is later). The interval ends when the Division Director accepts the Program Officer's recommendation.

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

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

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

B. Award Conditions

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

*These documents may be accessed electronically on NSF's Web site at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Web site at http://www.nsf.gov/cgi-bin/getpub?gpm. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Web site at http://www.gpo.gov.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Each awardee will be expected to attend annual meetings to coordinate and integrate plans and results with other investigators supported in the project.

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

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

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

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding ARCTIC FRESHWATER CYCLE: LAND/UPPER-OCEAN LINKAGES should be made to:

- Michael Ledbetter, Arctic System Sciences Program, Director, OPP, 755, telephone: (703) 292-7432, e-mail: mledbett@nsf.gov.
- Robin Muench, Arctic Sciences Section, OPP, 755, telephone: (703) 292-7436, e-mail: rmuench@nsf.gov.

For questions related to the use of FastLane, contact:

- Alicia Shields, Arctic Sciences Section, OPP, 755, telephone: (703) 292-7423, e-mail: ashields@nsf.gov.

IX. OTHER PROGRAMS OF INTEREST

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

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

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

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

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-supported projects. See the program announcement/solicitation for further information.

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, FIRS at 1-800-877-8339.

The National Science Foundation is committed to making all of the information we publish easy to understand. If you have a suggestion about how to improve the clarity of this document or other NSF-published materials, please contact us at plainlanguage@nsf.gov.

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Pursuant to 5 CFR 1320.5(b), an agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230, or to Office of Information and Regulatory Affairs of OMB, Attention: Desk Officer for National Science Foundation (3145-0058), 725 17th Street, N.W. Room 10235, Washington, D.C. 20503.

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