Program Solicitation
NSF 03-582
Replaces Document 02-016

Integrated Carbon Cycle Research Program (ICCR)

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

October 22, 2003

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Integrated Carbon Cycle Research Program (ICCR)
Drainage Basin and Ocean Margin Studies

Synopsis of Program:

The purpose of this Program Solicitation is to solicit innovative proposals to conduct basic research into the scientific aspects of the global carbon cycle in support of the U.S. Carbon Cycle Science Plan. Studies of the chemical, biological, ecological, and physical processes driving carbon distribution, transformation and transport within and between terrestrial, atmospheric, and oceanic environments are appropriate for this competition. The topical focus of this solicitation is drainage basin and ocean margin studies.

Cognizant Program Officer(s):

- Rachael Craig, Program Director, Directorate for Geosciences, Division of Earth Sciences, 785 S, telephone: (703) 292-8233, fax: (703) 292-9025, email: r craig@nsf.gov
- Donald Rice, Program Director, Directorate for Geosciences, Division of Ocean Sciences, 725 N, telephone: (703) 292-8582, fax: (703) 292-9085, email: drice@nsf.gov
Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.050 --- Geosciences

Eligibility Information

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

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant
- **Estimated Number of Awards:** 10 to 15 - with a duration of up to five years
- **Anticipated Funding Amount:** $5,000,000 in FY 2004 pending the availability of funds

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

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

B. Budgetary Information

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

C. Due Dates

- **Full Proposal Deadline Date(s) (due by 5 p.m. proposer's local time):**
  - October 22, 2003

Proposal Review Information

- **Merit Review Criteria:** National Science Board approved criteria apply.

Award Administration Information

- **Award Conditions:** Additional award conditions apply. Please see the full text of this solicitation for further information.
- **Reporting Requirements:** Standard NSF reporting requirements apply.
I. INTRODUCTION

The NSF Directorate for Geosciences continues the competition initiated in FY 2002 to support cutting-edge basic research in carbon cycle science. This solicitation reflects NSF's commitment to a national effort to increase significantly our understanding of the processes that regulate the transport and transformation of carbon within and between the terrestrial, oceanic, and atmospheric environments of the Earth.

In keeping with the planning goal articulated in NSF Geosciences Beyond 2000 "to provide a strategy to advance and integrate scientific knowledge across the broad range of geosciences and to provide essential services to the country," the Directorate is continuing support for integrated carbon cycle research. The NSF will continue to coordinate its support of fundamental research on the Earth's carbon cycle with that of other federal agencies and international partners.

The 1999 publication of A U.S. Carbon Cycle Science Plan marked the beginning of concerted planning for the next decade of global carbon cycle research in the United States. This document provided an evaluation of the current state of knowledge of carbon biogeochemistry, including its anthropogenic aspects, and suggested a course of coordinated federal action for advancing carbon cycle science. The document provides a general blueprint for different themes of an overall scientific effort and it points to the need for coordinated and complementary programs of basic and applied research from the U.S. Federal agencies (NSF, DOE, NASA, NOAA, USDA, USGS) with interests and responsibilities in global carbon cycle science. The U.S. Carbon Cycle Science Plan also points to the need for the national effort in carbon cycle science to give priority to understanding the carbon balance in the Northern Hemisphere, and in particular to the North American region and the adjacent ocean basins.

Following the publication of the U.S. Carbon Cycle Science Plan, there has been considerable community interest and planning in the
area of carbon cycle research. The original U.S. Carbon Cycle Science Plan focus on carbon dioxide has been expanded to include methane and carbon monoxide. The resulting reports listed below have provided focused guidance to NSF on the range of forefront research directions that are critical to making progress in our understanding of the Earth’s carbon cycle, and in meeting the goals stated in the U.S. Carbon Cycle Science Plan. Investigators interested in submitting proposals in response to this solicitation should familiarize themselves with the U.S. Carbon Cycle Science Plan recommendations and relevant documents that have resulted from the subsequent planning efforts. The reports of additional community workshops/plans and links to carbon cycle programs and funding opportunities currently active or under development in other U.S. federal agencies, as well as internationally can be accessed at http://www.carboncyclescience.gov/iwg.html and include:

- A U.S. Carbon Cycle Science Plan
- North American Carbon Program (NACP)
- Strategic Plan for the US Climate Change Science Program
- The Changing Carbon Cycle: A Terrestrial Focus
- Large-scale CO2 Observing Plan: Oceans and Atmosphere (LSCOP)
- Ocean Carbon Transport, Exchanges, and Transformations (OCTET)
- Ecological Determinants of Ocean Carbon Cycling (EDOCC)
- Ocean Carbon Cycle Research Planning (OCCR)

Additional documents that are useful descriptors of community, government and international planning related to this announcement include:

- Transport, Transformation, and Fate of Organic Carbon in River-dominated Ocean Margins (RIOMAR)
- Land-Ocean Interactions in the Coastal Zone (LOICZ)
- (USGS) Mississippi Basin Carbon Project Science Plan
- Surface Ocean, Lower Atmosphere Study (SOLAS)
- The Global Carbon Project (GCP) Science Framework and Implementation Plan
- CarboEurope (Vth Framework Program)

Those scientists interested in preparing a proposal to NSF under the current ICCR solicitation will find the information available through these linkages to be a valuable asset for clarifying features of the current carbon observational network in the U.S. and elsewhere, for designing research projects with links to other ongoing and forthcoming efforts, and for arranging mutually beneficial collaborations with other carbon cycle scientists.

II. PROGRAM DESCRIPTION

With this Program Solicitation, NSF invites the U.S. scientific community to submit proposals to conduct innovative research into fundamental bio-ecological, geochemical, and geophysical processes of the carbon cycle. The scope of this Program Solicitation is research that contributes to the goals of the U.S. Carbon Cycle Science Plan. Proposals outside of this focus may be better served by core programs. Proposals addressing Drainage Basin and Ocean Margin Studies of carbon biogeochemistry and carbon cycling are of specific interest. Because the contributions of drainage basin and ocean margin processes to global carbon dynamics on climate-relevant time scales are still poorly constrained, there is a need for field and modeling studies to resolve this issue. In FY 2004, there is a special need to initiate research directed toward the following questions:

- What are the major drainage basin and fluvial processes and mechanisms regulating the distribution and redistribution of carbon in terrestrial environments (including soils), its delivery to the ocean margins, and its exchange with the atmosphere?
- What are the size and character of the riverine and groundwater carbon pools and the timing of their mobilization?
- At ocean margins, what are the mechanisms and rates of carbon (including methane hydrates) transformations, transport, and burial, and exchange with the open ocean and the atmosphere?
- What factors control the efficiency of the solubility and biological pumps in coastal environments, and how do biogeochemical processes in ocean margins influence the chemistry and biology of open ocean surface waters?
- What key natural variability and uncertainties in drainage basin and ocean margin carbon flux influence our ability to estimate global and hemispheric carbon budgets in data assimilation and inversion models?
In keeping with the goals of the U.S. Carbon Cycle Science Plan, some projects might be most profitably directed toward the geographic region of North America (Canada, United States, Mexico, and adjacent ocean basins). In other cases, scientific expediency may require that investigations be conducted at sites outside North America and adjacent marine environments. Proposals with any level of organizational complexity -- from single-investigator to multi-investigator, multi-institutional -- will be considered. Investigators are encouraged to take advantage of the wealth of information in the community planning documents above and to organize themselves into interdisciplinary research teams whenever possible and appropriate. This solicitation specifically urges proposals that examine relevant carbon processes using an integrated multi-disciplinary research approach. Workshops and domestic or international organizational activities related to furthering goals of the U.S. Carbon Cycle Science Plan are also eligible for support.

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

NSF expects to make the following type of award(s): Standard or Continuing Grant. The estimated number of awards will be 10 to 15 with a duration of up to five years. The anticipated award date is May 15, 2004. The anticipated funding amount is $5,000,000 in FY 2004 pending the availability of funds.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Instructions:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF Website at: http://www.nsf.gov/cgi-bin/getpub?gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

Major equipment purchases (amounts exceeding $50,000) will not be supported under this Program Solicitation.

Proposers are reminded to identify the program announcement/solicitation number (03-582) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing:

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

C. Due Dates
Proposals must be submitted by the following date(s):

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

October 22, 2003

**D. FastLane Requirements**

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

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

**VI. PROPOSAL REVIEW INFORMATION**

**A. NSF Proposal Review Process**

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

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

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

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised proposal preparation guidelines relating to the development of the Project Summary and Project Description. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

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

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

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

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

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

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

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

**B. Review Protocol and Associated Customer Service Standard**

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

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

NSF is striving to be able to tell 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.

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

A. Notification of the Award

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

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1); 

* or Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF’s Website at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.


Special Award Conditions:

As a special condition of awards made under this Solicitation, principal investigators will be required to participate in a project research workshop funded through the participating science programs in the Directorate for Geosciences. The workshop will be held in Autumn 2005 for the delivery of progress reports and to promote data sharing and synthesis activity. This workshop will be open to participation by members of the scientific community who are not recipients of awards under this Solicitation.

PIs on collaborative proposals are expected to make collegial arrangements for disposition of data and publication of results during and subsequent to the grant period.

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.

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

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

General inquiries regarding this program should be made to:

- Rachael Craig, Program Director, Directorate for Geosciences, Division of Earth Sciences, 785 S, telephone: (703) 292-8233, fax: (703) 292-9025, email: rcraig@nsf.gov

- Donald Rice, Program Director, Directorate for Geosciences, Division of Ocean Sciences, 725 N, telephone: (703) 292-8582, fax: (703) 292-9085, email: drice@nsf.gov

- Enriqueta C. Barrera, Program Director, Directorate for Geosciences, Division of Earth Sciences, 785 S, telephone: (703) 292-8551, fax: (703) 292-9025, email: ebarrera@nsf.gov

- Bruce Doddridge, Associate Program Director, Directorate for Geosciences, Division of Atmospheric Sciences, 775 S, telephone: (703) 292-8522, fax: (703) 292-9022, email: bdoddrid@nsf.gov

Several programs in the Directorate for Geosciences support basic research in disciplinary aspects of the carbon cycle. Program Directors for those programs also provide supporting information on questions related to the Integrated Carbon Cycle Research Program. This ensures that proposals are considered by the proper program and enriches the cross-disciplinary nature of the ICCR program. Potential proposers to the ICCR program may contact any of the individuals listed here for further information. For those with older browsers, go to http://www.geo.nsf.gov/ear/iccr-contacts.htm.

For questions related to the use of FastLane, contact:

- Kandace S Binkley, Associate Program Director, Integrative Programs Section, Division of Ocean Sciences, Directorate for Geosciences, telephone: 703-292-8583, email: ocefl@nsf.gov

IX. OTHER PROGRAMS OF INTEREST

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

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

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.
NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF, although some programs may have special requirements that limit eligibility.

Facilitation Awards for Scientists and Engineers with Disabilities (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 GPG Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

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

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

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

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

- **TDD (for the hearing-impaired):**
  (703) 292-5090 or (800) 281-8749

- **To Order Publications or Forms:**
  Send an e-mail to: pubs@nsf.gov
  or telephone: (703) 292-7827

- **To Locate NSF Employees:**
  (703) 292-5111

**PRIVACY ACT AND PUBLIC BURDEN STATEMENTS**

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

An agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid
OMB control number: 3145-0058.