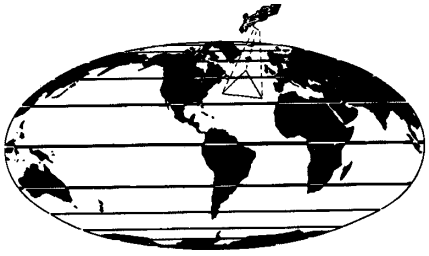
SYNTHESIS AND MODELING PROJECT OF THE U. S. JOINT GLOBAL OCEAN FLUX STUDY:

The Role of Oceanic Processes in the Global Carbon Cycle

Announcement of Opportunity

Deadline: ***August 15, 1998***



U. S. JGOFS

NATIONAL SCIENCE FOUNDATION
Directorate for Geosciences, Division of Ocean Sciences
Chemical Oceanography & Biological Oceanography Programs

SYNTHESIS AND MODELING PROJECT OF THE U. S. JOINT GLOBAL OCEAN FLUX STUDY
The Role of Oceanic Processes in the Global Carbon Cycle

INTRODUCTION

The Chemical Oceanography and Biological Oceanography Programs in the Division of Ocean Sciences hereby solicit research proposals to participate in the continuation of the Synthesis and Modeling Project (SMP) of the U.S. Joint Global Ocean Flux Study (U.S.JGOFS). As the last major activity of U.S.JGOFS, the SMP is open to U.S. scientists without past involvement in U.S.JGOFS as well as past and present U.S.JGOFS investigators.

Funding under this Announcement in FY 1999 is expected to be approximately $4M, from which the Programs anticipate that as many as 15 awards of up to four years' duration will be made. The deadline for proposal receipt at NSF is **August 15, 1998**. Preliminary award decisions will be made not later than 15 December, 1998, which is the earliest possible start date.

To complete the topical coverage of the SMP and contingent upon the availability of funds, the Programs anticipate renewal of this Announcement in CY 1999 and annually thereafter through CY 2002.

Details of the scientific and implementation framework for the SMP are given in the *U.S.JGOFS Science Plan for Synthesis and Modeling*, which is available from the U.S.JGOFS Planning and Implementation Office, Woods Hole Oceanographic Institution, Woods Hole, MA 02543. The *Plan* is also available by Internet via the U.S.JGOFS Office homepage at http://www1.whoi.edu/jgofs.html, which is also a valuable informational resource for tracking current and future U.S.JGOFS activities.

DESCRIPTION

The international Joint Global Ocean Flux Study was organized in the mid-1980's with the twin goals of (1) determining and understanding the processes controlling time-varying fluxes of carbon and associated biogenic elements in the ocean and (2) predicting the response of marine biogeochemical processes to climate change. Organized as part of the U.S. Global Change Research Program, the U.S.JGOFS program has contributed to these goals through three types of studies:

- Regional processes studies designed to estimate geochemical inventories, fluxes, and process kinetics of direct relevance to oceanic carbon cycling. The North Atlantic Bloom Experiment (NABE), The Equatorial Pacific Process Study (EqPac), and the Arabian Sea Process Study (ASPS) have been concluded, although scholarly production is continuing. The field program of the Southern Ocean Process Study (AESOPS) is scheduled to end in CY 1998.

- Oceanic time-series stations for the study of annual to decadal phenomena relevant to the marine carbon cycle and to sea-air exchange of carbon dioxide. The Hawaii Ocean Time Series (HOT) and the Bermuda-Atlantic Time Series (BATS) have been operating continuously since the start of U.S.JGOFS. Work at BATS has also included bio-optical research sponsored by NASA.

- A global marine carbon dioxide survey, co-sponsored by DOE and NOAA, to achieve improved estimates of sea-air CO2 exchange and of anthropogenic CO2 inventories.

The central goal of the SMP is to synthesize results from these efforts into a set of models that can be used for prediction. Model development should be driven by data (including satellite data) and synthesis efforts should be undertaken with an eye to their utility for model development.

To help structure an approach to this central goal, the U.S.JGOFS Steering Committee has organized the SMP conceptually around three elements: (1) global and regional balances of carbon and related biologically active substances; (2) local carbon balances and their mechanistic controls; and (3) extrapolation and prediction. These elements are not stand-alone enterprises, but rather heuristics or points of departure that should support and point to one another.

1. Global and Regional Carbon Balances

The U.S.JGOFS database affords an unprecedented opportunity to develop regional and global mass balances for carbon and other substances with cycles linked with the carbon cycle. The global marine carbon dioxide survey offers a particularly attractive dataset for study. But how does one utilize the survey data, which have extensive spatial coverage but are not synoptic? How can global models be related to the observational databases generated by process studies and the oceanic time-series stations? How do anthropogenic inputs affect -- and how can they be *expected* to affect -- global carbon inventories and mass fluxes? These are only a few of the global-scale questions and challenges that need to be addressed in the SMP.

2. Local Carbon Balances and Mechanisms

Modeling the major mechanisms responsible for observed local inventories and fluxes of carbon and other substances is essential to the development of larger-scale models. There is therefore a need for mass balances for carbon and other associated substances at the process study and time-series sites as well as quantification of the principal controlling mechanisms. How are these mechanisms expressed spatially and temporally? How can these mechanisms and their interactions be parameterized to facilitate regional and global synthesis and modeling? Experience to date suggests that understanding the interdependencies of such mechanisms often, if not generally, requires resolution at the levels of production and export in the euphotic zone, transport and remineralization in the deep ocean, and diagenetic transformation in seafloor sediments.

3. Extrapolation and Prediction

To achieve the original objectives of JGOFS, observations made at small spatial and temporal scales must be scaled upwards to regional/global spatial scales and to seasonal/annual time scales – and beyond. This element of the SMP will draw upon other components to understand and predict aspects of the cycling of carbon and other biologically-active substances in the past, present, and future ocean.

Major SMP Research Trajectories

Realizing the research goals of the SMP and, more generally, the fundamental objectives of U.S.JGOFS will require the coordinated efforts of a wide variety of investigators, both modelers and observationalists. The organization of principal investigators and proposals by teams and the continual interaction of teams with one another will be vital to the success of the SMP.

Nevertheless, individual investigators or teams should focus their efforts at the proposal level on one or more of the defined objectives of the SMP as described above. In general, proposals appropriate for the SMP should be directed toward one or more of the following:

- Global and regional balances of carbon and related biologically-active substances (Element 1).
- Euphotic zone production and export of carbon and related biologically-active substances (Element 2).
- Transport and remineralization of carbon and related biologically-active substances (Element 2).
- Sedimentary diagenesis of carbon and related biologically-active substances (Element 2).
- Extrapolation and prediction (Element 3).

PROPOSAL FORMAT

Proposals submitted in response to this Announcement of Opportunity should be prepared and submitted in accordance with the guidelines provided in the NSF brochure, *Grant Proposal Guide* (GPG) NSF 98-2 (October, 1997). Single copies of this brochure are available at no cost from the Forms and Publications Unit, P. O. Box 218, Jessup, MD 20794-0218, Phone: 301-947-2722, or via e-mail from pubs@nsf.gov, or the NSF homepage (http://www.nsf.gov/). Proposals will be subjected to initial screening for the requirements in the GPG and will be returned without review or advance notification if deficiencies are found. Proposals will

NOT be forwarded to other Programs if found to be inappropriate for this competition.

Prior to proposal preparation, prospective investigators are strongly advised to acquaint themselves with the contents of the official science and implementation plan for the SMP: *U.S.JGOFS Science Plan for Synthesis and Modeling*. Copies are available by mail from U.S.JGOFS Office (see address above) or electronically via the Internet from the U.S.JGOFS Office homepage at http://www1.whoi.edu/jgofs.html

The proposal should *explicitly* identify one or more of the five major SMP components above as the primary research focus. There should be a full scientific justification for the research and not simply a reiteration of justifications laid out in the SMP science and implementation plan.

Because of page limitations (*GPG*, Project Description), individual proposals with overly complex structure and large numbers of investigators are discouraged. Proposals should be written to allow adequate review of the details of goals and objectives, conceptual framework, methodological approaches, and plans for integration with other likely projects.

As discussed in the science and implementation plan, both formal and informal collaboration between modelers and observationalists is encouraged, but not required, in the development of individual proposals. Although formation of partnerships and team building are not required at the proposal submission stage, it is expected that all investigators participating in the SMP will establish such linkages in due course.

PROPOSAL SUBMISSION

All proposals must be submitted to NSF at the address below. Foreign institutions are not eligible for funding through this announcement. Proposals submitted in response to this Announcement of Opportunity must be received at NSF by **August 15, 1998**, and be identified by entering "U.S.JGOFS SMP" in the Program Announcement block of the cover page. Proposals received after the deadline will be returned to the sender without review.

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

U.S.JGOFS SMP
Chemical Oceanography Program
Division of Ocean Sciences
National Science Foundation
4201 Wilson Blvd., Room 725
Arlington, VA 22230

Investigators intending to submit proposals are requested to submit a brief statement of scope to:

Synthesis and Modeling Project
U.S.JGOFS Office
Woods Hole Oceanographic Institution
Woods Hole, MA 02543
Email: mary@dataone.whoi.edu
FAX: 508-457-2161

Investigators who believe that their SMP proposal may be of interest to other federal agencies should consider providing a courtesy copy of the proposal to an appropriate contact person at that agency.

For further information about proposal submission, inquiries should be directed to one of the following program officers:

Dr. Donald L. Rice, Chemical Oceanography Program, Division of Ocean Sciences, NSF: 703-306-1589; Email: drice@nsf.gov

Dr. Philip R. Taylor, Biological Oceanography Program, Division of Ocean Sciences, NSF: 703-306-1587; Email: prtaylor@nsf.gov

PROPOSAL REVIEW

Proposals will be evaluated on the basis of the two general criteria outlined in the NSF *Grant Proposal Guide* and in accordance with procedures for external merit review established by the NSF. Proposal responsiveness to the goals of the U.S.JGOFS SMP and the degree of complementarity with other projects will also be considered. NSF program officers will be assisted in proposal evaluation by a special U.S.JGOFS Peer Review Panel convened specifically for that purpose.

Each proposal must include a plan for documentation, archiving, and dissemination of data and project results. All funded participants must

adhere to data management policies applying to recipients of federal funding in the geosciences. Additionally, participants must adhere to data submission schedules and data management requirements established by the U.S.JGOFS Steering Committee, acting on behalf of the U.S.JGOFS Program. For details on the latter, please consult the U.S.JGOFS Office homepage on the World-Wide Web.

At the conclusion of the review process, investigators at federal laboratories and others who are selected to receive SMP funding from other federal agencies may be required to submit additional documentation required by those agencies.

ADDITIONAL INFORMATION

The Foundation provides awards for research and education 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 and education 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.

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.

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; 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.

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: Reports Clearance Officer, Information Dissemination Branch, DAS; National Science Foundation; Arlington, VA 22230.

This program is described in the Catalog of Federal Domestic Assistance category 47.050

OMB 3145-0058
PT 34
KW 1008004, 0103001

NSF 98-133
(Replaces NSF 97-79)