COASTAL OCEAN PROCESSES (CoOP)

Wind-Driven Transport Processes in the NE Pacific

Announcement of Opportunity

Deadline Date: March 15, 1999

NATIONAL SCIENCE FOUNDATION
Division of Ocean Sciences

INTRODUCTION

This Announcement of Opportunity is under the auspices of the Coastal Ocean Processes (CoOP) program within NSF's Division of Ocean Sciences (OCE). Coastal Ocean Processes (CoOP) is an interdisciplinary program whose overall goal is to obtain a quantitative understanding of the processes that control the transport, transformation and fate of biological, geological and chemical materials on continental margins. A dominant forcing function of cross-margin transport over all the world's continental margins is the wind. It is thus appropriate that CoOP undertake a major process study to understand processes which contribute to cross-shelf transport, where the circulation is strongly wind-driven. The along-shore wind is the dominant forcing agent along much of the U. S. west coast, suggesting that the California Current System of the Northeast Pacific is an ideal location for such a study. The advances that will occur in our understanding of interactions between biological, chemical, geological and physical processes in such a region will contribute to interpretations of ocean observations worldwide.

In July 1993, CoOP sponsored an open community workshop which defined topics for study that would lead to better quantitative understanding of the processes that dominate the transport, transformations, and fates of biologically, chemically, and geologically important matter in a strongly wind-driven system. Workshop results were published as the CoOP Wind-Driven Transport Workshop Report (CoOP Report No. 4). In 1998, the CoOP Scientific Steering Committee concurred that the study topics identified in the Report remain timely and important, but that it was appropriate to update portions of the report to include relevant findings since the 1993 workshop and to revise, if necessary, the important research objectives prior to undertaking a field study. A 1998 CoOP report represents the update as the revised CoOP Wind-Driven Transport Science Plan. Copies of the 1993 workshop report (CoOP Report No. 4) and the CoOP Wind-Driven Transport Science Plan (CoOP Report No. 6) are available from: The CoOP Office, University of Maryland-CES, Horn Point Laboratory, P.O. Box 775, Cambridge, MD 21613-0775. Phone: 410-221-8416; Fax: 410-221-8490. Internet: hawkey@hpl.umces.edu. http://www.hpl.umces.edu/coop

THE COASTAL NORTHEAST PACIFIC

The effect of strong along-shore wind in driving the coastal currents and the resulting cross-shelf transport in the surface and bottom boundary layers is of first order importance in determining the cross-margin transport along the U.S. West Coast. Along-shore winds blowing towards the equator force near-surface waters offshore. In turn, deeper waters are drawn onshore and upward, bringing cold, nutrient rich waters to the surface. High nutrient levels result in enhanced primary production that, in turn, fuels the entire ecosystem. Given these high levels of production, these systems have a substantial role in global biogeochemical cycles. For example, the removal of particulate carbon to the sediments can be large in these regions and is coupled to the removal of nitrate, phosphate and sulfur via suboxic and anoxic diagenetic processes. Thus, coastal upwelling systems are globally important.

Despite this importance, current knowledge of wind-driven coastal systems is incomplete in several aspects. Physical parameters associated with upwelling (summer) conditions have been intensively studied, but knowledge is lacking in such areas as the dynamics of fronts, or the exact processes that govern cross-margin exchange. Further, wintertime (downwelling) conditions are poorly understood in general, despite their importance to such processes as sediment dispersal and larval transport. This interdisciplinary study will address quantitative information on the following subjects:

- The physical, chemical and biological factors that limit primary productivity in wind-driven systems.
- The role of the inner shelf and its topography to continental margin transport processes.
- Processes that transfer materials from the bottom of overlying waters.
- The role of wind-driven shelf circulation in global biogeochemical cycles. The quantity of organic matter recycled by suboxic and anoxic diagenetic pathways in coastal upwelling systems suggests that these systems have major impacts on global biogeochemical budgets.

RESEARCH PROGRAM GOALS

CoOP's primary interest is in research addressing processes that control the cross-margin transport of biological, chemical and geological materials in a strongly wind-driven system.

Examples of questions that might be addressed include:

- How do ocean-atmosphere feedbacks act to structure the system?
- How, where, and at what rates are chemical species transported across the vertical and horizontal boundaries of the euphotic zone of continental shelves that are dominated by strong along-shore winds?
- To what extent do nutrient availability, trace chemical contributions, current structures, light, bloom aggregation processes, and trophic interactions actually limit the abundance of phytoplankton?
- How are plankton distribution patterns over the continental margin maintained?
- How do exchanges between the sea floor and the water affect the distribution and fate of biologically, chemically, and geologically important materials?

The specific objectives and scientific rationale related to these examples are described in greater detail in CoOP Report Nos. 4 and 6. These reports should be consulted in responding to this Announcement.

RESEARCH APPROACH

A CoOP process study in a strongly wind-driven system requires close coupling of modeling and observations. Participants of the CoOP Wind-Driven Transport Workshop (CoOP Report No. 4) recommended that field programs take advantage of contrasting wind-driven transport conditions in the NE Pacific in order to better understand the important mechanisms that influence off-shore transport. Although along-shore coastal winds are the dominant forcing function from the northwest tip of Washington (48°N) to Point Conception (35°N) in Southern California, there is a significant difference north and south of about 40°N. During summer, the along-shore winds are strongly favorable for coastal upwelling but are more variable north of about 40°N. During winter, low pressure systems from the Gulf of Alaska cause a strong northward component in the coastal winds and downwelling along the coast of Oregon and Washington, while upwelling generally continues intermittently south of San Francisco (37°N), interrupted by occasional winter storms. These differences in forcing functions and their response form a natural laboratory within which processes responsible for wind-driven cross-shelf transport may be studied intensively and incorporated into theoretical, numerical and laboratory models of these systems. The wide range of conditions within the California Current System (CCS) have led to a recommendation that parallel studies north and south of about 40°N be made. Possible locations are central Oregon and northern California. The logistical proximity, the historical oceanographic data, and the relative environmental simplicity of these regions (lack of major riverine, topographic, or tidal effects) makes them especially attractive for a study of wind-driven processes affecting cross-margin transport and its variability along the U.S. west coast. Individuals or teams of investigators need not

propose to conduct research in more than one region.

PREPARATION AND SUBMISSION OF PROPOSALS

Based on the recommendations from the NSF-CoOP Wind-Driven Transport workshop and the CoOP Scientific Steering Committee, proposals are being accepted for a coordinated study of wind-driven transport processes in the NE Pacific. This initiative anticipates supporting integrated, multi-investigator, interdisciplinary programs of modeling and process studies with the overall goal of improving our understanding of cross-margin transport. Proposals from teams of investigators are encouraged, with clear identification of individual(s) having responsibility for program integration and synthesis. Proposed studies must be interdisciplinary and present a balanced and well-rationalized scientific plan for addressing the goals described in the CoOP Wind-Driven Transport Science Plan (CoOP Report No. 6). Studies may be proposed by submission of several collaborative or individual proposals having some common objectives from different PIs, or by an omnibus proposal that contains various multidisciplinary components. In either case, a common overview statement of research approach and objectives should be prepared.

Prior to proposal preparation, prospective investigators are strongly advised to acquaint themselves with the contents of the CoOP Wind-Driven Transport reports (CoOP Reports No. 4 and No. 6). The CoOP Office at the University of Maryland (see above) will facilitate the exchange of information amongst PIs wishing to develop proposals in response to this Announcement. The CoOP website will provide occasional postings and other useful information.
The exact locations of study will be left to the investigators to propose. However, the study sites must be appropriate for the scientific objectives outlined in the CoOP Wind-Driven Shelf Science Plan (CoOP Report No. 6). Site selection should also consider potential cooperative research benefits from other NSF programs and other U.S. agencies. Of particular relevance are the planned mesoscale process studies and ongoing long-term observations off the Oregon and California coasts by the U.S. GLOBEC Program (www.usglobec.berkeley.edu/usglobec /globec.homepage.html) and the NOAA-sponsored Pacific Northwest Coastal Ecosystems Regional Study (PNCERS - http://seagrant.orst.edu/ ~pncers). In addition, there may be benefits in collaborating with projects funded by the United States Geological Survey, Office of Naval Research, Minerals Management Service and other research agencies and institutions.

To adequately address the scope of the study described in this Announcement, the CoOP Science Steering Committee envisions a five-year study encompassing a pilot program/ startup year, two years for field studies, and two years for data synthesis and analysis. Depending on availability of funds, approximately $2.5M, $3.0M, $3.0M, $2.5M, and $2.0M will be made available in FY2000, FY2001, FY2002, FY2003 and FY2004 respectively, for one set of collaborative, interdisciplinary proposals from 8-12 investigators to cover activities herein described. Proposed efforts should take advantage of existing research efforts and facilities sponsored by other agencies.

If you have questions or require further information, contact H. Lawrence Clark at the NSF Division of Ocean Sciences: 703-306-1584 (e-mail: hclark@nsf.gov).

REFERENCES

CoOP Report No. 2, 1992. Coastal Ocean Processes: A Science Prospectus.
CoOP Report No. 4, 1994. Wind-Driven Transport Processes on the U.S. West Coast.
CoOP Report No. 6, 1998. CoOP Wind-Driven Transport Science Plan.

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 99-2 (October, 1998). 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.

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 March 15, 1999, and be identified by entering "CoOP NE Pacific, NSF 99-10" 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:

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

Investigators who believe that their CoOP 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.

PROPOSAL REVIEW

Proposals will be evaluated on the basis of the two general criteria outlined in the NSF Grant Proposal Guide (NSF 99-2) and in accordance with procedures for external merit review established by the NSF (see below). Proposal responsiveness to the goals of the CoOP Program and the degree of complementarity with other projects will also be considered. NSF program officers will be assisted in proposal evaluation by a special 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 CoOP Science Steering Committee, acting on behalf of the CoOP Program. For details on the latter, please consult the CoOP Office homepage on the World-Wide Web (see above).

Proposal Reveiw Information

A. Merit Review Criteria.

Review 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. Special care is taken to ensure that reviewers have no immediate and obvious conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority serving institutions, adjacent disciplines to that principally addressed in the proposal, etc.

Proposals will be reviewed against the following general merit review criteria established by the National Science Board. Following each criterion are potential considerations that the reviewer may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Each reviewer will be asked to address only those that are relevant to the proposal 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 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?

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 learner perspectives. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

Integrating Diversity into NSF Program, 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. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

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.

B. Grant Award Conditions.

An NSF grant consists of: (1) the award letter, which includes any special provisions applicable to the grant 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 grant conditions, such as Grant General Conditions (NSF GC-1)* or Federal Demonstration Partnership Phase III (FDP) Terms and Conditions* and (5) any NSF brochure, program guide, announcement or other NSF issuance that may be incorporated by reference in the award letter. Electronic mail notification is the preferred way to transmit NSF grants 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/>. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone 301.947.2722 or by e-mail from pubs@nsf.gov.

Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, (NSF 95-26) available electronically on the NSF Web site. The GPM also is available in paper copy by subscription from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. The GPM may be ordered through the GPO Web site at: <http://www.gpo.gov>.

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Grantees 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 or contact the program coordinator at (703) 306-1636.

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 regarding NSF programs, employment, or general information. TDD may be accessed at (703) 306-0090 or through FIRS on 1-800-877-8339.

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 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.

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.

YEAR 2000 REMINDER

In accordance with Important Notice No. 120 dated June 27, 1997, Subject: Year 2000 Computer Problem, NSF awardees are reminded of their responsibility to take appropriate actions to ensure that the NSF activity being supported is not adversely affected by the Year 2000 problem. Potentially affected items include: computer systems, databases, and equipment. The National Science Foundation should be notified if an awardee concludes that the Year 2000 will have a significant impact on its ability to carry out an NSF funded activity. Information concerning Year 2000 activities can be found on the NSF web site at http://www.nsf.gov/oirm/y2k/start.htm.

This program is described in the Catalog of Federal Domestic Assistance category 47.050
OMB 3145-0058
PT 34
KW 1008004, 0103001

NSF 99-10