Pilot Climate Process and Modeling Teams (CPT)

Program Solicitation
NSF 03-549

National Science Foundation
Division of Atmospheric Sciences
Division of Ocean Sciences

National Oceanic and Atmospheric Administration
Office of Global Programs

Letter of Intent Due Date(s) ***(required):***

March 31, 2003
(due by 5 p.m. proposer's local time)

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

May 27, 2003

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Pilot Climate Process and Modeling Teams (CPT)

Synopsis of Program:

The key aim of the Climate Process Modeling Team (CPT) concept is to speed development of global coupled climate models and reduce uncertainties in climate models by bringing together theoreticians, field observationalists, process modelers and the large modeling centers to concentrate on the scientific problems facing climate models today.

Cognizant Program Officer(s):

- Jay S. Fein, Program Director, Directorate for Geosciences, Division of Atmospheric Sciences, 775 S, telephone: (703) 292-8527, fax: (703) 292-9022, email: jfein@nsf.gov
- Eric C. Itsweire, Program Director, Directorate for Geosciences, Division of Ocean Sciences, 725 N, telephone: (703) 292-8582, fax: (703) 292-9085, email: eitsweir@nsf.gov
- Ming Ji, NOAA, 1100 Wayne Avenue, Suite 1210, Silver Spring, MD, 20910, telephone: 301 427 2089 x 189, fax: 301 427 2073, email: ming.ji@noaa.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:** 8 to 12 - collaborative grants to enable two to four CPTs
- **Anticipated Funding Amount:** $2,500,000 per year pending the availabilty of funds in FY2003

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- **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

- **Letters of Intent *(required)*:**
  March 31, 2003
  (due by 5 p.m. proposer's local time)
- **Full Proposal Deadline Date(s)** (due by 5 p.m proposer's local time):
  May 27, 2003

Proposal Review Information

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the

full text of this solicitation for further information.

Award Administration Information

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

TABLE OF CONTENTS

I. INTRODUCTION

The key aim of the Climate Process Modeling Team (CPT) concept is to speed development of global coupled climate models and reduce uncertainties in climate models by bringing together theoreticians, field observationalists, process modelers and the large modeling centers to concentrate on the problems facing models today. Climate scientists who conduct observational and empirical research to improve knowledge of important climate processes and feedbacks in climate models are often not well connected with modeling centers and model developers. Past practice has been for three separate communities to work on issues such as atmospheric convection, cloud processes and ocean diapycnal mixing: Field experimentalists, process modelers and global-scale modelers. Information was passed between these groups largely through the traditional mechanism of scientific papers, field reports and conference proceedings.

Each team will be comprised of a number of PIs and institutions proposing as a collaborative group (see Section II.D). Each team must

include at least one, and preferably more, of the modeling centers identified in Section II.C, as collaborating institutions.

It is the objective of the CPT concept to bridge the gap between the field programs, the process models and the global modelers by building a new community in which those with expertise (and data) from the field, those with highly detailed process models, and those building global models can collaborate, share information and strive to make sure that our nation's leading climate models are the best that they can be. CPTs would address systematically critical issues that limit progress in improving these models. The CPT is envisioned to provide support for the sharing of information, ideas and results in a manner that is much more efficient than the traditional passing of ideas through long-lead time publications. Such support should include visiting scientist programs, post-doctoral programs that give incentives for modelers and field scientists to interact, workshops for the teams to interact regularly, and computational resources to test and assess new proposals.

The U.S. CLImate VARiability and Predictability Program (CLIVAR) Scientific Steering Committee developed the CPT concept and recommended that, in the pilot phase, CPTs be initially organized around the issues of:

- Climate feedback processes and climate sensitivity for understanding and reducing uncertainties in climate model predictions and projections
- Improving the treatment of mixing in ocean circulation models

II. PROGRAM DESCRIPTION

A. Research Foci

(1) Climate feedback processes and climate sensitivity for understanding and reducing uncertainties in climate model predictions and projections as a CPT.

The range in estimates of model climate sensitivity accounts for a major part of the range of projections for long-term changes in the climate. Climate sensitivity is a measure of the climate's response to changes in the Earth's radiative balance, (e.g., the change caused by a doubling of the atmospheric concentration of CO2). Past research has identified important climate feedback processes that amplify or diminish the influence of radiative perturbations. World-class climate models exhibit a large range in the estimates of the strengths of these feedbacks, with the major U.S. models used in recent Intergovernmental Panel on Climate Change assessments lying close to the opposite ends of this range. The uncertainty that this range in climate sensitivity introduces to the overall findings makes U.S. models an ideal setting for investigating sensitivities to feedbacks.

Among the least well-represented processes are atmospheric convection; hydrological, and cloud processes, which strongly influence the magnitude and geographical distributions of global warming; and ocean mixing, which to a large degree controls the rate of projected global warming. These deficiencies are thought to be related to both limits in understanding the physics of the climate system and insufficient fine-scale treatment of the key processes, together contributing significantly to model uncertainties in predictions of climate variations and projections of climate change. As a result, limitations in model representations of climate feedbacks and climate sensitivity create significant uncertainties in estimating the impacts of future climate changes, in consideration of response strategies, and ultimately in formulation of optimal environmental and energy policies.

The research must be directed and focused on climate feedback processes and climate sensitivity with the goal of identifying, understanding, and reducing uncertainties related to feedbacks in climate model predictions and projections. The climate modeling community has identified two research problems believed to be relevant in this regard and where a CPT approach has the potential for making marked progress:

- Deep atmospheric convection

- Water vapor and cloud (e.g. boundary-layer clouds) processes

However, proposals are not restricted to only these problems. All approaches will be considered on the basis of their scientific merit and relevance to the goal of accelerated improvements in reducing uncertainties in climate models and their predictions and

projections, provided that the proposed research meets the CPT requirements.

(2) Improving the Treatment of Mixing in Ocean Circulation Models as a CPT

There are two key reasons for focusing on ocean mixing as a CPT:

- Ocean mixing plays a pivotal role in climate variability and change
- Mixing is the most uncertain component of modern ocean GCMs

One of the most significant problems with early coupled climate models was the high level of oceanic diapycnal mixing inherent in the numerics and parameterizations. These high levels of mixing affect the heat transport, the stability and the variability of simulated climate in coupled models. As discussed below, new methods have allowed scientists to construct models which can operate with far smaller levels of diapycnal diffusivity. With the combined advent of higher resolution and an appreciation for improved numerical techniques, we have now arrived at a point where diapycnal mixing can be set by physically based parameterizations. Although mixing along isopycnal surfaces is far larger than diapycnal, and we have relied upon that fact to mask the deleterious effects of viscous damping, the problem of adequately representing such mixing is far from solved. The highly energetic eddies of the ocean circulation cause intense motions on scales that are still not well resolved except by the most ambitious computing efforts (and even these can not be sustained for the multiple thousands of years of simulations needed to study coupled climate sensitivity). These eddy motions can lead to significant horizontal re-distributions of mass within isopycnal classes, and the effects of these eddy fluxes can have large effects on the momentum budgets of the ocean circulation. Two features of the eddy resolution question remain problematical: First, for the class of models used for long term climate simulations and national assessment calculations, it is likely that it will be many years before eddy resolving ocean models are used in these integrations; second, the class of eddy-resolving models that can be foreseen in the next 20 years will still need sub-grid scale parameterizations of still smaller motions in order to close the problem. This leaves the problem of parameterization of eddy fluxes as a key issue to improving coupled model simulations of climate and climate sensitivity. If we accept the premise that diapycnal and eddy mixing are the largest sources of model uncertainty and error, we are confronted by an examination of the various ways in which such mixing occurs in the ocean, for the process is not uniform nor does it arise from a single mechanism. Eight various "flavors" of diapycnal mixing mechanisms and three issues related to isopycnal mixing have been brought forth as worthy of study. They have been identified as occurring at some key locations or under some circumstances through field measurements and experiments. For some, a direct consequence on the simulated climate in a coupled model has been shown, while for others, we believe that a significant chance exists that the process could have climate impact. A list of relevant mixing topics includes:

- Equatorial and tropical upper ocean mixing
- Double diffusion and salt fingering
- Interaction of eddies with mixed layers
- Deep gravity current entrainment
- Interior eddy flux regime geography
- Internal wave geography
- Deep convection
- Mixing within the thermocline at lateral boundaries
- Internal tides over deep topography
- Enhanced mixing in the Antarctic circumpolar current

- Surface boundary layer processes

The first four topics have been identified as candidates for the pilot phase, but proposals are not restricted to only these problems. All approaches will be considered on the basis of their scientific merit and relevance to the goal of accelerated improvements in reducing uncertainties in climate models and their predictions and projections, provided that the proposed research meets the CPT requirements.

B. Strategy

The pilot phase envisions the formation of 2-4 teams to demonstrate the effectiveness of the CPT concept in making progress rapidly and leading the way to an effective long-term strategy in improving climate models. Each team will be comprised of a number of PIs and institutions proposing as a collaborative group with simultaneous submissions of proposals (see alsoSection V.A). Each team must include at least one, and preferably more, of the modeling centers identified in Section II.C, as collaborating institutions.

The objectives of the pilot phase will be to:

1. Provide a concrete demonstration of the CPT mechanism, by implementing and verifying improved parameterizations for a few processes that have a mature observational and theoretical base.

2. Demonstrate how the CPT can stimulate data mining and development of observations and theory for processes whose observational or theoretical base is less than adequate.

3. Demonstrate how a CPT can interact with the planning for process study initiatives, in particular, with the planning for future field programs.

C. Implementation

The approach is to bring together model developers, process modelers/theoreticians, and field scientists to collaborate and systematically address the identified problem. The management structure needs to foster communication across the team, guide the program to the most timely and "climate-relevant" problems and retain a focus on actual progress such as measurable model improvements . The team composition, activities, and different responsibilities of the CPT are:

- *Modeling Centers:* Teams must include as co-PIs, scientists from the National Center for Atmospheric Research (NCAR), the Geophysical Fluid Dynamics Laboratory (GFDL) and/or the Goddard Space Flight Center (GSFC), who are responsible for model development at their respective institutions. In addition, letters of commitment are required from the modeling institutions involved. These letters should include assurances that institutional resources commensurate with team plans will be available and devoted to team activities.
- *Process Observationalists:* Their participation is essential in order to bring a strong "reality-check" on the development of new parameterizations and to coordinate in the planning of new field experiments.
- *Process Modelers and Theoreticians:* They provide the first line of observation-model interaction, and can explore the dynamics of a process in a variety of contexts far beyond what can be determined through a limited set of field measurements.
- *Model Developers:* While the goal of the CPT is not to encourage a proliferation of sub-critical modeling efforts, the involvement of a variety of Atmospheric and Ocean General Circulation Models types will enhance the relevance and future reliability of any developed parameterizations.

CPTs are envisioned to systematically address model fidelity. A multi-model approach reduces the likelihood of tuning results to a single model and renders the resulting gains more applicable to a wider array of models, many of which share common parameterizations and approaches. Consequently, preference will be given to those proposals that include co-PIs from more than one of the large modeling centers at NCAR, GFDL and/or GSFC and address a modeling problem(s) common to the centers involved. The involvement of scientists from other major climate modeling programs would similarly strengthen CPT proposals. Annual milestones should be clearly stated. Suggested milestones include data analyses, parameterization development and testing, schedule of implementation on NCAR/GFDL/GSFC climate models, schedule for testing through model simulations and intercomparison activities.

A detailed description of the CPT concept and agency interests can be found on the U.S. CLIVAR homepage, http://www.usclivar.org.

D. Management Plan

A management plan must be included in the Project Description. It should identify a lead PI/institution who will be responsible for coordinating the preparation and submission of the collaborating group's proposals. The Plan should clearly detail assignments of responsibilities among the collaborating institutions, including commitments by the modeling center management at NCAR, and/or GFDL and/or GSFC for milestones for implementation and testing their climate models. The lead PI should contact the modeling center leaders listed below to discuss CPT collaboration(s).

Modeling Center Contacts

GFDL: Isaac Held ih@gfdl.noaa.gov

CCSM: Jeff Kiehl jtkon@ncar.ucar.edu

GSFC: Michele Rienecker michele.m.rienecker@nasa.gov

Max Suarez max.j.suarez@nasa.gov

The CPT project management will be the joint responsibility of the lead PI and the management of the collaborating modeling institutions. The responsibilities include coordination of the collaborating PIs and institutions, serving as a focal point for the sponsoring agencies, meeting science milestones and model development goals, and reporting progress and results as required.

III. ELIGIBILITY INFORMATION

The categories of proposers identified in the Grant Proposal Guide are eligible to submit proposals under this program announcement/solicitation. In addition, NOAA scientists are eligible and if successful, would be supported by NOAA. NASA and DOE scientists should contact Jay S. Fein, jfein@nsf.gov, for additional eligibility information.

IV. AWARD INFORMATION

Contingent upon the availability of funds and the quality of the proposals received, NSF will provide up to $2 million, and NOAA will provide up to $0.5 million, per year, for grant awards based on this competition.

Team budgets, that is, the combined budgets of all collaborators comprising the team, are anticipated to be no more than $1 million per team per year. Proposals should include costs for an annual meeting (perhaps associated with the Community Climate System Model workshop) where progress will be reviewed and efficiency of the CPT approach assessed.

Awards will be made for three years with a possibility for a two-year extension (see Section V.A).

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent *(required):*

A letter of intent is required. One team letter should be submitted by the lead PI/Institution of each collaborating group. It should include:

- Brief description of the team?s scientific focus.
- Composition of the team and responsibilities of team members (collaborating PIs).
- Commitment(s) from at least one modeling center director to be a collaborating member of the team (see Section II.D).

The letter should be submitted electronically to Jay Fein, jfein@nsf.gov, The letter is due March 31, 2003, by 5 p.m. proposer's local time.

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.

Follow the guidelines for submission of collaborative proposals in Chapter II.D.3., "Collaborative Proposals," in the Grant Proposal Guide (see http://www.nsf.gov/pubs/2003/nsf032/032_2.htm#IID3).

Awards will be made for up to three years with a possibility of a two-year extension for teams that have met their second year milestones and are performing satisfactorily toward their third year milestones.

Proposals must include a management plan as described in Section II.D. in the Supplementary Documentation section of the proposal.

Proposers are reminded to identify the program announcement/solicitation number (03-549) 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):

Letters of Intent *(required):*

March 31, 2003
(due by 5 p.m. proposer's local time)

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

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. 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

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.

Additional Review Criteria

NSF and NOAA program officers will give consideration to the following more specific review criteria related to the climate process(es) proposed to be studies by the CPTs:

Importance: Is the uncertainty associated with the process related to the quality of simulation in today's coupled GCMs, does it impact the skill and uncertainties of climate prediction and projections, does it impact the sensitivity of coupled GCMs to greenhouse gasses, or does it lead to changed regimes which may be important for abrupt climate change?

Readiness: Has the process been well characterized observationally or through numerical process studies? If not, are the required field experiments underway, funded or in planning (for this announcement, proposals for field campaigns are not encouraged) Also, are climate models prepared to accept parameterizations of the process. For example, do climate/ocean models resolve whatever structures are required for a prospective parameterization?

Likelihood of Payoff: Do parameterization schemes exist which just need "tuning" from observations, or can new schemes be envisioned?

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 solicitation will be reviewed by Ad Hoc Review, possibly 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.

In most cases, proposers will be contacted by the Program Officer after his or her recommendation to award or decline funding has been approved by the Division Director. This informal notification is not a guarantee of an eventual award.

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.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website 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 Website 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.

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:

- Jay S. Fein, Program Director, Directorate for Geosciences, Division of Atmospheric Sciences, 775 S, telephone: (703) 292-8527, fax: (703) 292-9022, email: jfein@nsf.gov
- Eric C. Itsweire, Program Director, Directorate for Geosciences, Division of Ocean Sciences, 725 N, telephone: (703) 292-8582, fax: (703) 292-9085, email: eitsweir@nsf.gov
- Ming Ji, NOAA, 1100 Wayne Avenue, Suite 1210, Silver Spring, MD, 20910, telephone: 301 427 2089 x 189, fax: 301 427 2073, email: ming.ji@noaa.gov

For questions related to the use of FastLane, contact:

- None Specified.

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

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