

## **Program Announcement To DOE National Laboratories LAB 01-09**

### ***Scientific Discovery through Advanced Computing: Climate Change Prediction Program***

The Office of Biological and Environmental Research (OBER) of the Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving proposals to develop simulation models for decadal to multi-century climate prediction in conjunction with the Climate Change Prediction Program (CCPP), a part of the U.S. Global Change Research Program.

#### **Background: Scientific Discovery through Advanced Computing and the Climate Change Prediction Program**

Accurate prediction of climate change on decadal and longer time scales remains a major scientific objective of the Environmental Sciences Division (ESD). The Climate Change Prediction Program (CCPP) is the current phase in the evolution of DOE's long-standing climate modeling and simulation research agenda. The program is focused on developing, testing and applying climate simulation and prediction models that stay at the leading edge of scientific knowledge and computational technology. The program will continue the development of models based on more definitive theoretical foundations and improved computational methods that will run efficiently on current and future generations of high-performance scientific supercomputers. The intent is to increase dramatically both the accuracy and throughput of computer model-based predictions of future climate system response to the increased atmospheric concentrations of greenhouse gases. Concurrently, to meet the challenge posed by the new generation of terascale computers with peak speeds of 10 to 100 trillion Operations Per Second (teraOPS), SC will fund a set of coordinated investments in scientific computing, through its Scientific Discovery through Advanced Computing (SciDAC) Program. It will create a scientific computing software infrastructure that bridges the gap between the advanced computing technologies being developed by the computer industry and the scientific research programs sponsored by the Office of Science. The CCPP portion of SciDAC, has been labeled the Accelerated Climate Prediction Initiative.

To ensure that the program meets the broadest needs of the research community and the specific needs of ESD, the project leaders and significant contributors from the funded projects will participate as members of the Climate Change Prediction Program Science Team along with selected scientists from related ESD and SC programs. Costs for the participation in Science Team meetings and workshops should

be included in the proposal. Yearly estimates for Science Team travel should be based on one trip of five days to Washington, DC, one trip of five days to San Francisco, CA, and one trip of five days to Denver, CO. Similarly, project participants are expected to interact and participate in the multi-disciplinary SciDAC activities, which may include workshops and cross-disciplinary computational and information technology research projects.

## **Request for Proposals To Develop State-of-the-Art Comprehensive Coupled General Circulation Models for Decade to Century Climate Prediction**

This announcement requests proposals to develop the next generation of climate prediction models that can be used over the next two to five years to predict climate variability and climate change decades to centuries in the future under a variety of forcing scenarios. This will complement the CCPP's basic research component that is looking to develop the knowledge to build succeeding generations of models beyond the five-year time horizon.

Successful proposals must contain a multi-disciplinary research strategy that addresses both climate science and computational science challenges facing the development of production-quality climate GCMs in the two to five year time frame. These challenges include, but are not limited to, improving component model performance and accuracy, implementing efficient coupling strategies, and maximizing throughput on high-end computers that are anticipated to have theoretical peak speeds of 10 - 50 TeraOPS.

Proposals must include a timetable for the achievement of model improvements, a strategy for evaluating model accuracy against objective diagnostic criteria and a plan for benchmarking model performance. It is understood that any model code developed and the output from any simulations will be documented and made available quickly to the broader community. An explicit policy regarding model data and model code documentation and distribution must be included as part of the proposal. This policy may be subject to revision by CCPP program management as a prerequisite for funding.

### **Collaboration**

Multi-institution collaborations are strongly encouraged, and may be necessary to encompass the requisite expertise. Proposals must contain an explicit management and coordination plan detailing the relationships and responsibilities among the collaborators. The plan must include an adequate description of how dispersed activities will be integrated and managed and as well as assign accountability for the attainment of project objectives.

## **Program Funding**

It is anticipated that the total funding of all projects will be approximately \$4,000,000 annually and multiple year funding is expected, contingent upon the availability of appropriated funds. Continuation of funding will strongly depend upon the ability of projects to demonstrate clear, measurable progress against project objectives and goals. SC plans to initiate one, two or three comprehensive, independent model development projects, depending upon the quality of the proposals received.

## **Preproposals**

Potential investigators are strongly encouraged to submit a brief preproposal that consists of no more than five pages of narrative describing the project objectives, methods of accomplishment, organization and budget. These will be reviewed relative to the scope and research needs of the SC's Climate Change Prediction Program. Point-of-contact address, telephone number, fax number and e-mail address are required parts of the preproposal. A response to each preproposal discussing the potential program relevance of a formal proposal generally will be communicated within 30 days of receipt. There is no deadline for the submission of preproposals, but potential investigators should allow sufficient time so that formal proposal deadlines are met.

## **Submission Information**

The technical portion of the proposal should not exceed thirty-five (35) double-spaced pages and should include a narrative budget overview and detailed budgets for each year of support requested. Work performed under funding from this announcement must be clearly differentiated from ongoing or proposed research and model development funded from other sources. Awards are expected to begin on or about June 1, 2001.

Technical information on CCPP is available on the World Wide Web at the following URL: <http://www.sc.doe.gov/production/OBER/GC/model.html> or from the Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831, telephone (423) 576-8401.

**DATES:** Formal proposals submitted in response to this announcement must be received by 4:30 p.m., E.S.T., March 15, 2001, to be accepted for merit review and to permit timely consideration for award in Fiscal Year 2001.

**ADDRESSES:** Preproposals referencing Program Announcement LAB 01-09 may be sent to the program contact, Dr. David C. Bader, via electronic mail at

dave.bader@science.doe.gov or by U. S. Postal Service Mail at the following address: Office of Biological and Environmental Research, Environmental Sciences Division, SC-74, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290.

Formal proposals referencing Program Announcement LAB 01-09 should be forwarded to: U.S. Department of Energy, Office of Science, Environmental Sciences Division, SC-74, 19901 Germantown Road, Germantown, MD 20874-1290, ATTN: Program Announcement LAB 01-09. This address also must be used when submitting proposals by U.S. Postal Service Express Mail, any commercial mail delivery service, or when hand-carried by the proposer. An original and seven copies of the proposal must be submitted; however, proposers are requested not to submit multiple proposal copies using more than one delivery or mail service.

**FOR FURTHER INFORMATION CONTACT:** Dr. David C. Bader, Office of Biological and Environmental Research, Environmental Sciences Division, SC-74, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290, telephone (301) 903-5329, fax (301) 903-8519, Internet e-mail address: dave.bader@science.doe.gov. Program information is available on the DOE/OBER World Wide Web site using the following URL:  
<http://www.sc.doe.gov/production/OBER/GC/model.html>.

The instruction and format described below should be followed. Reference Program Announcement LAB 00-09 on all submissions and inquiries about this program.

**OFFICE OF SCIENCE**  
**GUIDE FOR PREPARATION OF SCIENTIFIC/TECHNICAL PROPOSALS**  
**TO BE SUBMITTED BY NATIONAL LABORATORIES**

Proposals from National Laboratories submitted to the Office of Science (SC) as a result of this program announcement will follow the Department of Energy Field Work Proposal process with additional information requested to allow for scientific/technical merit review. The following guidelines for content and format are intended to facilitate an understanding of the requirements necessary for SC to conduct a merit review of a proposal. Please follow the guidelines carefully, as deviations could be cause for declination of a proposal without merit review.

**1. Evaluation Criteria**

Proposals will be subjected to formal merit review (peer review) and will be evaluated against the following criteria which are listed in descending order of importance:

Scientific and/or technical merit of the project

Appropriateness of the proposed method or approach

Competency of the personnel and adequacy of the proposed resources

Reasonableness and appropriateness of the proposed budget

The evaluation will include program policy factors such as the relevance of the proposed research to the terms of the announcement, the uniqueness of the proposer's capabilities, and demonstrated usefulness of the research for proposals in other DOE Program Offices as evidenced by a history of programmatic support directly related to the proposed work.

## **2. Summary of Proposal Contents**

Field Work Proposal (FWP) Format (Reference DOE Order 5700.7C) (DOE ONLY)

Proposal Cover Page

Table of Contents

Abstract

Narrative

Literature Cited

Budget and Budget Explanation

Other support of investigators

Biographical Sketches

Description of facilities and resources

Appendix

### **2.1 Number of Copies to Submit**

An original and seven copies of the formal proposal/FWP must be submitted.

## **3. Detailed Contents of the Proposal**

Proposals must be readily legible, when photocopied, and must conform to the following three requirements: the height of the letters must be no smaller than 10 point with at least 2 points of spacing between lines (leading); the type density must average no more than 17 characters per inch; the margins must be at least one-half inch on all sides. Figures, charts, tables, figure legends, etc., may include type smaller than these requirements so long as they are still fully legible.

### **3.1 Field Work Proposal Format (Reference DOE Order 5700.7C) (DOE ONLY)**

The Field Work Proposal (FWP) is to be prepared and submitted consistent with policies of the investigator's laboratory and the local DOE Operations Office. Additional information is also requested to allow for scientific/technical merit review.

Laboratories may submit proposals directly to the SC Program office listed above. A copy should also be provided to the appropriate DOE operations office.

### **3.2 Proposal Cover Page**

The following proposal cover page information may be placed on plain paper. No form is required.

Title of proposed project  
SC Program announcement title  
Name of laboratory  
Name of principal investigator (PI)  
Position title of PI  
Mailing address of PI  
Telephone of PI  
Fax number of PI  
Electronic mail address of PI  
Name of official signing for laboratory\*  
Title of official  
Fax number of official  
Telephone of official  
Electronic mail address of official  
Requested funding for each year; total request  
Use of human subjects in proposed project:

If activities involving human subjects are not planned at any time during the proposed project period, state "No"; otherwise state "Yes", provide the IRB Approval date and Assurance of Compliance Number and include all necessary information with the proposal should human subjects be involved.

Use of vertebrate animals in proposed project:

If activities involving vertebrate animals are not planned at any time during this project, state "No"; otherwise state "Yes" and provide the IACUC Approval date and Animal Welfare Assurance number from NIH and include all necessary information with the proposal.

Signature of PI, date of signature  
Signature of official, date of signature\*

\*The signature certifies that personnel and facilities are available as stated in the proposal, if the project is funded.

### **3.3 Table of Contents**

Provide the initial page number for each of the sections of the proposal. Number pages consecutively at the bottom of each page throughout the proposal. Start each major section at the top of a new page. Do not use unnumbered pages and do not use suffices, such as 5a, 5b.

### **3.4 Abstract**

Provide an abstract of no more than 250 words. Give the broad, long-term objectives and what the specific research proposed is intended to accomplish. State the hypotheses to be tested. Indicate how the proposed research addresses the SC scientific/technical area specifically described in this announcement.

### **3.5 Narrative**

The narrative comprises the research plan for the project and is limited to 25 pages. It should contain the following subsections:

**Background and Significance:** Briefly sketch the background leading to the present proposal, critically evaluate existing knowledge, and specifically identify the gaps which the project is intended to fill. State concisely the importance of the research described in the proposal. Explain the relevance of the project to the research needs identified by the Office of Science. Include references to relevant published literature, both to work of the investigators and to work done by other researchers.

**Preliminary Studies:** Use this section to provide an account of any preliminary studies that may be pertinent to the proposal. Include any other information that will help to establish the experience and competence of the investigators to pursue the proposed project. References to appropriate publications and manuscripts submitted or accepted for publication may be included.

**Research Design and Methods:** Describe the research design and the procedures to be used to accomplish the specific aims of the project. Describe new techniques and methodologies and explain the advantages over existing techniques and

methodologies. As part of this section, provide a tentative sequence or timetable for the project.

**Subcontract or Consortium Arrangements:** If any portion of the project described under "Research Design and Methods" is to be done in collaboration with another institution, provide information on the institution and why it is to do the specific component of the project. Further information on any such arrangements is to be given in the sections "Budget and Budget Explanation", "Biographical Sketches", and "Description of Facilities and Resources".

### **3.6 Literature Cited**

List all references cited in the narrative. Limit citations to current literature relevant to the proposed research. Information about each reference should be sufficient for it to be located by a reviewer of the proposal.

### **3.7 Budget and Budget Explanation**

A detailed budget is required for the entire project period, which normally will be three years, and for each fiscal year. It is preferred that DOE's budget page, Form 4620.1 be used for providing budget information\*. Modifications of categories are permissible to comply with institutional practices, for example with regard to overhead costs.

A written justification of each budget item is to follow the budget pages. For personnel this should take the form of a one-sentence statement of the role of the person in the project. Provide a detailed justification of the need for each item of permanent equipment. Explain each of the other direct costs in sufficient detail for reviewers to be able to judge the appropriateness of the amount requested.

Further instructions regarding the budget are given in section 4 of this guide.

\* Form 4620.1 is available at web site:

<http://www.sc.doe.gov/production/grants/forms.html>

### **3.8 Other Support of Investigators**

Other support is defined as all financial resources, whether Federal, non-Federal, commercial or institutional, available in direct support of an individual's research endeavors. Information on active and pending other support is required for all senior personnel, including investigators at collaborating institutions to be funded by a subcontract. For each item of other support, give the organization or agency, inclusive

dates of the project or proposed project, annual funding, and level of effort devoted to the project.

### **3.9 Biographical Sketches**

This information is required for senior personnel at the laboratory submitting the proposal and at all subcontracting institutions. The biographical sketch is limited to a maximum of two pages for each investigator.

### **3.10 Description of Facilities and Resources**

Describe briefly the facilities to be used for the conduct of the proposed research. Indicate the performance sites and describe pertinent capabilities, including support facilities (such as machine shops) that will be used during the project. List the most important equipment items already available for the project and their pertinent capabilities. Include this information for each subcontracting institution, if any.

### **3.11 Appendix**

Include collated sets of all appendix materials with each copy of the proposal. Do not use the appendix to circumvent the page limitations of the proposal. Information should be included that may not be easily accessible to a reviewer.

Reviewers are not required to consider information in the Appendix, only that in the body of the proposal. Reviewers may not have time to read extensive appendix materials with the same care as they will read the proposal proper.

The appendix may contain the following items: up to five publications, manuscripts (accepted for publication), abstracts, patents, or other printed materials directly relevant to this project, but not generally available to the scientific community; and letters from investigators at other institutions stating their agreement to participate in the project (do not include letters of endorsement of the project).

## **4. Detailed Instructions for the Budget**

(DOE Form 4620.1 "Budget Page" may be used)

### **4.1 Salaries and Wages**

List the names of the principal investigator and other key personnel and the estimated number of person-months for which DOE funding is requested. Proposers should list the number of postdoctoral associates and other professional positions included in the proposal and indicate the number of full-time-equivalent (FTE) person-months and

rate of pay (hourly, monthly or annually). For graduate and undergraduate students and all other personnel categories such as secretarial, clerical, technical, etc., show the total number of people needed in each job title and total salaries needed. Salaries requested must be consistent with the institution's regular practices. The budget explanation should define concisely the role of each position in the overall project.

## **4.2 Equipment**

DOE defines equipment as "an item of tangible personal property that has a useful life of more than two years and an acquisition cost of \$25,000 or more." Special purpose equipment means equipment which is used only for research, scientific or other technical activities. Items of needed equipment should be individually listed by description and estimated cost, including tax, and adequately justified. Allowable items ordinarily will be limited to scientific equipment that is not already available for the conduct of the work. General purpose office equipment normally will not be considered eligible for support.

## **4.3 Domestic Travel**

The type and extent of travel and its relation to the research should be specified. Funds may be requested for attendance at meetings and conferences, other travel associated with the work and subsistence. In order to qualify for support, attendance at meetings or conferences must enhance the investigator's capability to perform the research, plan extensions of it, or disseminate its results. Consultant's travel costs also may be requested.

## **4.4 Foreign Travel**

Foreign travel is any travel outside Canada and the United States and its territories and possessions. Foreign travel may be approved only if it is directly related to project objectives.

## **4.5 Other Direct Costs**

The budget should itemize other anticipated direct costs not included under the headings above, including materials and supplies, publication costs, computer services, and consultant services (which are discussed below). Other examples are: aircraft rental, space rental at research establishments away from the institution, minor building alterations, service charges, and fabrication of equipment or systems not available off-the-shelf. Reference books and periodicals may be charged to the project only if they are specifically related to the research.

### **a. Materials and Supplies**

The budget should indicate in general terms the type of required expendable materials and supplies with their estimated costs. The breakdown should be more detailed when the cost is substantial.

### **b. Publication Costs/Page Charges**

The budget may request funds for the costs of preparing and publishing the results of research, including costs of reports, reprints page charges, or other journal costs (except costs for prior or early publication), and necessary illustrations.

### **c. Consultant Services**

Anticipated consultant services should be justified and information furnished on each individual's expertise, primary organizational affiliation, daily compensation rate and number of days expected service. Consultant's travel costs should be listed separately under travel in the budget.

### **d. Computer Services**

The cost of computer services, including computer-based retrieval of scientific and technical information, may be requested. A justification based on the established computer service rates should be included.

### **e. Subcontracts**

Subcontracts should be listed so that they can be properly evaluated. There should be an anticipated cost and an explanation of that cost for each subcontract. The total amount of each subcontract should also appear as a budget item.

## **4.6 Indirect Costs**

Explain the basis for each overhead and indirect cost. Include the current rates.