Program Announcement
To DOE National Laboratories
LAB 04-12

Atmospheric Science Program

SUMMARY: The Office of Biological and Environmental Research (BER) of the Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving proposals for research awards in experimental and theoretical studies of aerosol radiative forcing of climate in conjunction with the Atmospheric Science Program (ASP) as part of the U.S. Climate Change Science Program (CCSP). This announcement requests new proposals that are relevant to the terms of reference for this announcement and responsive to the particular needs defined below.

DATES: Formal proposals submitted in response to this announcement must be received by 4:30 p.m., Eastern Time, June 21, 2004, to be accepted for merit review and to permit timely consideration for award in Fiscal Year 2005. Awards are expected to begin on or about November 1, 2004.

ADDRESSES: Formal proposals in response to Program Announcement LAB 04-12 are to be submitted as 2 paper copies of the proposal and one CD containing the proposal in PDF format. Color images should be submitted as a separate file in PDF format and identified as such. These images should be kept to a minimum due to the limitations of reproducing hardcopies. They should be numbered and referred to in the body of the technical scientific proposal as Color image 1, Color image 2, etc.

The 2 copies of the proposal and the CD, referencing Program Announcement LAB 04-12, should be sent to: Climate Change Research Division, SC-74/Germantown Building, Office of Biological and Environmental Research, Office of Science, U.S. Department of Energy, 1000 Independence Avenue, SW, Washington, D.C. 20585-1290, ATTN: Program Announcement LAB 04-12.

When submitting by U.S. Postal Service Express Mail, any commercial mail delivery service, or when hand carried by the researcher, the following address must be used: Climate Change Research Division, SC-74, Office of Biological and Environmental Research, Office of Science, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290, ATTN: Program Announcement LAB 04-12.

FOR FURTHER INFORMATION CONTACT: Peter Lunn, Office of Biological and Environmental Research, Climate Change Research Division, SC-74, Germantown Building, U.S. Department of Energy, 1000 Independence Ave., SW, Washington, DC 20585-1290, telephone (301) 903-4819, fax (301) 903-8519, Internet e-mail address: peter.lunn@science.doe.gov. Program information is available at http://www.science.doe.gov/ober/CCRD/atsi.html and http://www.atmos.anl.gov/ASP/.

SUPPLEMENTARY INFORMATION:

Background: Two major scientific objectives of the Climate Change Research Division (CCRD) are: (1) to improve the performance of predictive models of the Earth's climate, and (2) to thereby make more accurate predictions of the response of the climate system to increasing concentrations of greenhouse gases.

The DOE Atmospheric Science Program (ASP) is a component of the U.S. Climate Change Science Program (CCSP). The objective of ASP is to provide and improve the scientific knowledge needed to simulate and predict radiative forcing by aerosols and their effects on climate. Understanding the role of aerosols in climate forcing is a critical factor in climate change assessment, as well as an essential element in advancing the state of the art in climate modeling. Aerosol forcing appears to be the same order of magnitude as the effect of greenhouse gases, but far more uncertain. The forcing has two major components, direct and indirect.

Direct effects of aerosols are the influence of the aerosols on the Earth's radiation balance due to the scattering and absorption of radiation by particles in clear (cloud-free) air. Indirect effects of aerosols include their influence on the radiation balance and hydrology through their impact on cloud microphysical properties (first indirect effect) and amount (second indirect effect). There is also a semi-direct effect, in which the heating by aerosol particles due to absorption of solar radiation decreases cloud amount.

The direct aerosol forcing is much better understood and quantified than the indirect forcing, especially forcing due to sulfate aerosols. Aerosol indirect effects have been demonstrated and quantified in numerous instances, but the indirect forcing is much more uncertain than the direct forcing.

ASP will focus on two areas of large uncertainty: (1) uncertainties associated with the loading, distribution, and fate of atmospheric aerosols, and their chemical and microphysical properties that affect the absorption and scattering of radiation, and (2) uncertainties associated with direct and indirect effects of aerosols on radiation and cloud properties. ASP will include examination of the amount, distribution, chemical and optical properties of carbonaceous aerosols (organic and elemental) in addition to inorganic aerosols (mainly sulfates and nitrates) associated with energy-related activities.

Both of these areas involve complex questions of atmospheric chemistry and physics as well as transport and transformation issues that need to be investigated in depth to improve the understanding of aerosol climate forcing and reduce uncertainties.

Request for Proposals

This announcement requests proposals for awards that address the ASP objective of providing and improving the scientific knowledge needed to simulate and predict radiative forcing by aerosols and their effects on climate. All proposals submitted in response to this announcement should explicitly state in the abstract which of the following functional and scientific categories or combinations of categories are being addressed. Please indicate for both functional and

science categories which activities are the primary or secondary foci of the proposed work (a given project may have multiple foci). ASP will support only research that can be directly related to aerosol radiative forcing of climate.

Functional Categories:

1. Focused laboratory experiments
2. Field measurements
3. Fundamental theoretical and process modeling
4. Development of new instruments and methods to better measure the composition, optical, and cloud nucleating properties of atmospheric aerosols, in support of ASP laboratory experiments and field measurements

Science Categories:

1. Source of particles and gaseous precursors
2. Transport and/or transformation of particles and gaseous precursors
  a. Local scale, < 100 km
  b. Regional and greater scales, > 100 km
3. Concentrations of gas-phase aerosol precursors
4. Aerosol characterization
  a. Optical properties
  b. Size-distribution, number concentration
  c. Humidity effects
  d. CCN properties
  e. Single particle composition
  f. Physical and chemical characterization of carbonaceous particles
5. Transformations
  a. Gas-phase transformations
  b. Condensed-phase and surface transformations
  c. Gas-to-particle conversion
  d. New particle formation
  e. Evolution of aerosol size and/or composition
  f. Dynamics
  g. Activation
  h. Size distribution
  i. Precipitation development
  j. In-cloud and below-cloud scavenging
6. Atmospheric radiation
7. Other (specify)

More detail on these research areas, including clarification of needs and priorities, is provided in the ASP Program Description available at http://www.atmos.anl.gov/ASP/.

All proposals submitted in response to this Announcement must explicitly state how the proposed research will support accomplishment of the BER Climate Change Research Division's (CCRD's) Long Term Measure of Scientific Advancement to deliver improved data and models to determine acceptable levels of greenhouse gases in the atmosphere.

Note that another DOE program, the Atmospheric Radiation Measurement (ARM) Program, also supports research on quantifying the effect of aerosols on the radiation field, by investigating both the direct role of aerosols on radiative transfer and the indirect role on cloud properties. Specifically ARM research relates observations of radiative fluxes and radiances to the atmospheric composition and uses these relations to develop and test parameterizations to accurately predict the atmospheric radiative properties. In contrast, the ASP will support aerosol research with emphasis on aerosol processes and resulting properties that would influence the radiation fields. ASP scientists will be encouraged to utilize pertinent ARM data and to participate in field campaigns associated with one or more of the three stationary ARM sites, and a mobile ARM facility. It is anticipated that the ARM mobile facility, currently under development, will at times be deployed in areas of interest specifically to ARM, at times in areas of interest specifically to ASP, and at times in areas of interest to both programs. It is anticipated that a joint ARM-ASP working group will be formed and collaborations between the two programs will be encouraged. Information about ARM can be found at http://www.arm.gov/.

The climate modeling community, as supported by DOE through the Climate Change Prediction Program, is a major client for the research to be conducted in ASP. It is thus essential that ASP research be tailored to the needs of the climate modeling community and that the program provide specific, measurable, and meaningful deliverables that are of use to the climate modeling community. It is anticipated that a joint ASP-CCPP working group will be formed. Information about CCPP can be found at http://www.science.doe.gov/ober/CCRD/model.html.

Given the close linkages between aerosols, air quality, and climate change, it is anticipated that ASP-funded scientists will be encouraged to participate in selected NARSTO field studies relevant to aerosol forcing. Information about NARSTO can be found at http://www.cgenv.com/Narsto/.

Funding for a project that requires a special field campaign, which has not already been planned and approved by the ASP Program Director, will be contingent on recommendation of the campaign by the ASP Science Steering Committee and final approval by the DOE Program Director. Once the ASP Science Team has been formed, plans for specific field studies will be developed and most ASP Science Team members will be expected to participate in the design, conduct, and/or interpretation of these field studies. For major ASP field campaigns, the program will provide separate support for an aircraft platform and ground-based and air-borne instrumentation, e.g., measurements of relevant trace gas concentrations, particle size distributions, vertical and horizontal wind components, meteorological state parameters, and standard radiation measurements. Additionally, depending on the campaign, the aircraft may also be able to accommodate selected PI-based instruments. Required field measurements not provided separately by the program that are essential to the success of a proposed field study should be included in the proposed budget of the proposal.

To ensure that the program meets the broadest needs of the research community and the specific needs of the DOE CCRD, successful researchers are expected to participate as ASP Science Team members in the appropriate working group(s) relevant to their efforts. Costs for participation in ASP Science Team meetings and working group meetings should be included in

the budget and be based on two trips of 4 days each to Washington, DC, and two trips of 3 days each to Chicago, Illinois, for each year of the project.

Program Funding

It is anticipated that approximately $6 million will be available for awards in Fiscal Year 2005, contingent upon the availability of appropriated funds. Multiple-year funding of awards is expected, with out-year funding also contingent upon the availability of appropriated funds, progress of the research, and programmatic needs. The allocation of funds within the research areas will depend upon the number and quality of proposals received. Awards are expected to begin on or about November 1, 2004. DOE is under no obligation to pay for any costs associated with the preparation or submission of proposals if an award is not made.

Collaboration

Researchers are strongly encouraged to collaborate with researchers in other institutions, such as: universities, industry, non-profit organizations, federal laboratories and Federally Funded Research and Development Centers (FFRDCs), including the DOE National Laboratories, where appropriate, and to include cost sharing wherever feasible. Additional information on collaboration is available in the Application Guide for the Office of Science Financial Assistance Program that is available via the World Wide Web at: http://www.sc.doe.gov/production/grants/Colab.html.

The Proposal

The technical portion of the proposal should not exceed twenty-five double-spaced pages. Proposals should also include detailed budgets for each year of support requested. Researchers are asked to use the following ordered format:

- **Field Work Proposal (FWP) Format** (Reference DOE Order 5700.7C) (DOE ONLY)
- **Proposal Cover Page**
- **Project Abstract Page;** single page only, should contain title, PI name, functional and science categories, and abstract text
- **Budget pages** for each year and a budget summary of project period (using DOE F 4620.1)
- **Budget Explanation**
- **Technical Proposal (limited to 25 pages)**
    - **Project Description**
    - **Long Term Measure: <u>All proposals submitted in response to this Announcement must explicitly state how the proposed research will support accomplishment of the BER Climate Change Research Division's (CCRD's) Long Term Measure of Scientific Advancement to deliver improved data and models for policy makers to determine acceptable levels of greenhouse gases in the atmosphere.</u>**
    - **Literature Cited**
    - **Collaborative Arrangements** (if applicable)

- **Facilities and Resources**
- **Biographical Sketches, including list of recent relevant publications,** should be submitted in a form similar to that of NIH or NSF (two to three pages).
- **Current and Pending Support**
- **Letters of Collaboration** (if applicable)

For researchers who do not have access to the World Wide Web (WWW), please contact Karen Carlson, Office of Biological and Environmental Research, Climate Change Research Division, SC-74/Germantown Building, U.S. Department of Energy, 1000 Independence Ave., SW, Washington, DC 20585-1290, phone: (301) 903-3338, fax: (301) 903- 8519, e-mail: karen.carlson@science.doe.gov; for hard copies of background material mentioned in this solicitation.

The instructions and format described below should be followed. Reference Program Announcement LAB 04-12 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 process will include program policy factors such as the relevance of the proposed research to the terms of the announcement and the agency's programmatic needs. Note that external peer reviewers are selected with regard to both their scientific expertise and the absence of conflict-of-interest issues. Both federal and non-federal reviewers will often be used, and submission of an proposal constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

2. Summary of Proposal Contents

Field Work Proposal (FWP) Format (Reference DOE Order 5700.7C) (DOE ONLY)
Proposal Cover Page
Table of Contents
Abstract
Budget and Budget Explanation
Project Description
Long Term Measure
Literature Cited
Description of facilities and resources
Biographical Sketches
Other support of investigators
Appendix

2.1 Number of Copies to Submit

Formal proposals in response to Program Announcement LAB 04-12 are to be submitted as 2 paper copies of the proposal and one CD containing the proposal in PDF format. Color images should be submitted as a separate file in PDF format and identified as such. These images should be kept to a minimum due to the limitations of reproducing hardcopies. They should be numbered and referred to in the body of the technical scientific proposal as Color image 1, Color image 2, etc.

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 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-E.html

3.6 Project Description

The narrative comprises the research plan for the project and is limited to 5 pages per task. 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".

3.7 Long Term Measure

All proposals submitted in response to this Announcement must explicitly state how the proposed research will support accomplishment of the BER Climate Change Research Division's (CCRD's) Long Term Measure of Scientific Advancement to deliver improved data and models for policy makers to determine acceptable levels of greenhouse gases in the atmosphere.

3.8 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.

3.9 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.

3.10 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.

3.11 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.

3.12 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.