

**Office of Science
Financial Assistance
Funding Opportunity Announcement
DE-FOA-0000291**

Atmospheric System Research

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 applications to develop innovative laboratory and observational data analyses and to utilize the resulting knowledge from such analyses to improve cloud and aerosol formulations in global climate models. The intent is to improve the understanding and modeling of cloud and aerosol properties and processes and their impact on the atmospheric radiation balance. The research areas of interest include the development or improvement of algorithms for retrieving the required atmospheric parameters from Atmospheric Radiation Measurement (ARM) instruments; alternatively, developing instrument simulators to facilitate more accurate intercomparison of measurements with modeling data; studies utilizing ARM data and Atmospheric Science Program (ASP) measurements to improve the understanding of cloud, aerosol, and radiation physical processes; and, the translation of process study results to improve or develop formulations for the respective processes to improve climate model simulations.

If the application is successful, the research would be part of the Atmospheric System Research (ASR) Program in the Climate and Environmental Sciences Division (CESD). The ASR Program was established in FY2010 by merger of the former ARM Science Program and the ASP; it is one of several DOE programs in the interagency U.S. Global Change Research Program (USGCRP). The mission of ASR <http://asr.science.energy.gov/>, in partnership with the ARM Climate Research Facility (ACRF), is to quantify the interactions among aerosols, clouds, precipitation, radiation, dynamics, and thermodynamics to improve fundamental process-level understanding, with the ultimate goal to reduce the uncertainty in global climate simulations and projections.

PREAPPLICATIONS

Potential applicants are **REQUIRED** to submit a brief preapplication, referencing DE-FOA-0000291 for receipt by DOE by **4:30p.m., Eastern Time April 12, 2010**. Preapplications will be reviewed for conformance with the guidelines presented in this FOA and suitability to the research needs of the ASR Program. A response to the preapplications encouraging or discouraging formal applications will be communicated to the applicants by April 30, 2010. Applicants who have not received a response regarding the status of their preapplication by this date are responsible for contacting the program to confirm this status. Only those preapplicants that receive notification from DOE encouraging a formal application may submit full applications. **No other formal applications will be considered.**

Preapplications referencing DE-FOA-0000291 should be sent as PDF file attachments via e-mail to both the program managers, Drs. Kiran Alapaty and Ashley Williamson: Kiran.Alapaty@science.doe.gov and Ashley.Williamson@science.doe.gov. Please include "Lead PI name -- Preapplication - DE-FOA-0000291 [**Full or Exploratory**]" in the subject line of the e-mail. **No FAX or mail submission of preapplications will be accepted.**

Potential applicants must submit a brief preapplication that consists of a **maximum of two pages** of narrative describing the research objectives, the technical approach(s), and the proposed team members and their expertise. The intent in requesting a preapplication is to save the time and effort of applicants in preparing and submitting a formal project application that may be inappropriate for the program. Preapplications will be reviewed relative to the scope and research needs as outlined in the summary paragraph and in the SUPPLEMENTARY INFORMATION. The preapplication should identify, on the cover sheet, the title of the project, the institution or organization, principal investigator name, telephone number, fax number, and e-mail address, estimated funding levels, and the names and affiliations of the proposed team members. No biographical data need be included, nor is an institutional endorsement necessary. Applicants for collaborative projects should submit a single preapplication identifying all project participants.

APPLICATION DUE DATE: June 1, 2010, 11:59 p.m. Eastern Time

Formal applications submitted in response to this FOA must be received by June 1, 2010, 11:59 p.m. Eastern time, to permit timely consideration of awards. **APPLICATIONS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.**

IMPORTANT SUBMISSION INFORMATION:

The full text of the Funding Opportunity Announcement (FOA) is located on FedConnect. Instructions for completing the Grant Application Package are contained in the full text of the FOA which can be obtained at: <https://www.fedconnect.net/FedConnect/?doc=DE-FOA-0000291&agency=DOE>. To search for the FOA in FedConnect click on "Search Public Opportunities". Under "Search Criteria", select "Advanced Options", enter a portion of the title "Atmospheric System Research", then click on "Search". Once the screen comes up, locate the appropriate Announcement.

In order to be considered for award, Applicants must follow the instructions contained in the Funding Opportunity Announcement.

WHERE TO SUBMIT: Applications must be submitted through Grants.gov to be considered for award.

You cannot submit an application through Grants.gov unless you are registered. Please read the registration requirements carefully and start the process immediately. Remember you have to update your CCR registration annually. If you have any questions about your registration, you should contact the Grants.gov Helpdesk at 1-800-518-4726 to verify that you are still registered in Grants.gov.

Registration Requirements: There are several one-time actions you must complete in order to submit an application through Grants.gov (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the Central Contract Registry (CCR), register with the credential provider, and register with Grants.gov). See <http://www.grants.gov/GetStarted>. Use the Grants.gov Organization Registration Checklist at <http://www.grants.gov/assets/OrganizationRegCheck.pdf> to guide you through the process. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in the CCR registration process. Applicants, who are not registered with CCR and Grants.gov, should allow at least 21 days to complete these requirements. It is suggested that the process be started as soon as possible.

IMPORTANT NOTICE TO POTENTIAL APPLICANTS:

When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e. Grants.gov registration).

Questions: Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov. Part VII of the FOA explains how to submit other questions to the Department of Energy (DOE).

GENERAL INQUIRIES ABOUT THIS FOA SHOULD BE DIRECTED TO:

Technical/Scientific Program Contact:

Program Manager: Dr. Kiran Alapaty
U. S. Department of Energy
Office of Biological and Environmental Research
Telephone: (301) 903-3175
E-mail: Kiran.Alapaty@science.doe.gov

Program Manager: Dr. Ashley Williamson
U. S. Department of Energy
Office of Biological and Environmental Research
Telephone: (301) 903-3120
E-mail: Ashley.Williamson@science.doe.gov

SUPPLEMENTARY INFORMATION:

The CESD has established the following Long Term Measure (LTM): *Deliver improved scientific data and models about the potential response of the Earth's climate and terrestrial biosphere to increased greenhouse gas levels for policy makers to determine safe levels of greenhouse gases in the atmosphere.* The goal of the ASR is to improve the treatment of clouds, aerosols, and radiative processes in climate models used to predict future climate directly addressing the LTM. Thus, the major component of ASR involves integrating and analyzing data for the development and testing of formulations for atmospheric clouds and aerosols with the ultimate goal of improving or developing and validating respective physical formulations for

regional and global climate models. The ASR program information is available on <http://www.science.doe.gov/ober/CESD/asr.html> and background material on ASR science is available through the ASR Science Plan at: <http://www.sc.doe.gov/ober/Atmospheric%20System%20Research%20Science%20Plan.pdf>.

BER's strategy for basic research in climate science is described in a recent strategic plan (<http://www.sc.doe.gov/ober/Climate%20Strategic%20Plan.pdf>).

The ASR program utilizes long-term and/or integrated climate data sets from the ACRF measurements for several atmospheric variables. The ACRF has established and operates three fixed facilities (the Southern Great Plains [SGP], the Tropical Western Pacific [TWP], and the North Slope of Alaska [NSA]), to collect radiation and cloud data on the climatic regimes represented by each of the three respective site locations. In addition, the ARM facility has also developed two ARM Mobile Facility (AMF) units to collect cloud and radiation data in several climatic regimes. Additionally, the ARM climate research facility includes aerial measurement platforms that can be used to support experiments at the fixed sites or in conjunction with the mobile facility. The SGP (<http://www.arm.gov/sites>) was chosen as a field measurement site for several reasons including its relatively homogenous geography, wide variability of climate, cloud type, and surface flux properties, and large seasonal variation in temperature and specific humidity. The TWP site consists of stations at Darwin, Australia, and on the islands of Manus, Papua, New Guinea and the Republic of Nauru respectively. This region was selected because it plays a large role in the interannual variability observed in the global climate system. The NSA site is located at Barrow, Alaska, with a secondary inland site near Atkasuk. The NSA location was selected because it provides data about cloud and radiative processes at high latitudes, and by extension, about cold and dry regions of the atmosphere in general. The AMF was developed to collect climate data to address science questions beyond those addressed by the measurements at fixed sites. The AMF is similar to the fixed site facilities in that it contains many of the same instruments and data systems, but is designed to be deployed around the world for campaigns lasting 6-12 months. Also available is the aerial facility that complements ground-based measurements at various altitudes. The data collected from these facilities comprise a climatic observational database.

Request for Grant Applications:

All applications submitted in response to this Funding Opportunity Announcement (FOA) must explicitly state how the proposed research will support accomplishment of the BER CESD LTM of Scientific Advancement: "**Deliver improved scientific data and models about the potential response of the Earth's climate and terrestrial biosphere to increased greenhouse gas levels for policy makers to determine safe levels of greenhouse gases in the atmosphere.**"

Applicants should justify the importance of the specific proposed studies to reducing uncertainty in atmospheric climate forcing/response.

This FOA requests applications for grants that address the ASR goal of improving the accuracy of regional and global climate model simulations by improving the representation of cloud, aerosol, and radiation processes in these models. **The usage of community models both at the**

regional and global scales is also encouraged. Collaborative applications are especially encouraged.

Applications are particularly sought to perform cloud, aerosol, and radiation research utilizing ARM measurements including those obtained from aerial and mobile facility. Research based on fixed site data is strongly encouraged. Additionally applications are sought to perform research using recently completed, ongoing, or newly approved field campaigns. These include the ARM campaigns listed on <http://www.arm.gov/campaigns/table>. Examples include: Indirect and Semi-Direct Aerosol Campaign (ISDAC); AMF deployment to study aerosol indirect effects in China; Clouds, Aerosol and Precipitation in the Marine Boundary Layer (CAP-MBL) experiment in Azores; AAF Campaigns Small Particles in Cirrus (SPartICus) and Routine AAF CLOUD Optical Radiative Observations (RACORO) over the ARM SGP site; the second Radiative Heating in Underexplored Bands Campaign (RHUBC-II). Also included are the ASP campaigns MAX-MEX, CHAPS, and VOCALS. Applicants are encouraged to review the research status of the ARM data analysis and products available at the URL <http://www.arm.gov>.

Usage of DOE data (i.e., ARM and/or ASP measurements) is mandatory and the usage of additional data from other sources to complement research is encouraged. Applications that require a special field campaign, which has not already been planned and approved by the ACRF Program Manager, will not be accepted for consideration.

Applications for new instrument development will not be considered. Applications for measurement method development will be considered only if judged to address high priority programmatic gaps. (Potential measurement method development applicants are advised to contact one of the ASR Program Managers listed below for early feedback on the programmatic relevance of their proposed project).

The main theme of this FOA revolves around life cycles of clouds and aerosols and their interactions. For cloud life cycle, themes of research interest include retrieval of cloud micro and macrophysical properties in the context of long term climate records, and analysis of cloud properties and their interactions with atmospheric radiation from a climate perspective. For aerosols, the theme is adequate representation of aerosol processes suitable for climate modeling. Interactions themes are quantification of indirect effects of aerosols on clouds and associated processes, including precipitation. Overarching themes include improvement or development of cloud and aerosol formulations suitable for regional and global climate models, and analysis and process modeling studies of cloud and aerosol interactions and their impacts on the atmospheric radiation.

Specific areas of interest to the ASR program include:

- Retrievals and Analysis: Development of integrated cloud and/or aerosol data sets obtained from using multiple ARM instruments to aid analysis, evaluation, or improvement of climate models; development of new retrieval algorithms and simulators suitable for the new 3-D instruments (<http://www.arm.gov/about/recovery-act/instruments>) and characterization of microphysical and macrophysical cloud properties obtained from using 3-D observations; development of algorithms or combined

data sets using new ARM aerosol instrument suite for fixed and mobile sites, including MAOS instruments (<http://www.arm.gov/about/recovery-act/instruments>).

- Cloud Life Cycle: Observational and/or modeling studies relating cloud dynamics and microphysical processes to updrafts speeds associated with different cloud regimes; Intercomparison studies of various convection triggering mechanisms in a single column modeling framework; methods to reduce documented hyper-activity of convection in climate models; testing of computationally efficient cloud microphysical schemes in convective cloud schemes; characterization and quantification of radiative impacts of shallow marine boundary layer clouds and small ice particles in ice clouds using ARM measurements and climate models; evaluation of entrainment and detrainment processes and rates in convective clouds using atmospheric models and ARM measurements.
- Aerosol Life Cycle: Laboratory, data analysis, and/or process modeling studies to quantify or develop predictive relationships of important processes in the aerosol life cycle, including new particle formation and growth, aging, loss processes, optical and droplet/crystal nucleating properties, and direct radiative forcing; tests of process modeling schemes for aerosol concentrations, mixing state, and properties using observational or laboratory data.
- Aerosol-Cloud-Precipitation Interactions: Quantification of radiative forcing by aerosol indirect effects for different cloud regimes using atmospheric models and ARM measurements; development of improved or new methods to characterize particle size distribution for clouds and aerosols to facilitate unified methods for both clouds and aerosols; development of improved measurement methods for aerosol or hydrometeor concentration or properties to fill critical gaps in understanding; methods to develop or validate classification schemes of aerosol effects on precipitation using ARM measurements and process modeling studies.

Proposed research is intended to fill critical knowledge gaps, including the exploration of some high-risk approaches. BER also encourages the submission of innovative "high-risk" applications with potential for future high impact on cloud and aerosol research. The probability of success and the risk-reward balance will be considered when making funding decisions.

The intent of the exploratory research component is to catalyze the study of new concepts, tools and approaches that could lead to breakthroughs in atmospheric system research and to develop novel ideas for later, more substantial funding opportunities within the program. Exploratory projects spanning a one to two year period are encouraged. Applicants should identify if they consider their proposed research as an **exploratory application or full application**.

Applicants are strongly encouraged to utilize the tools that have been developed for evaluation of model formulations in the Climate Change Prediction Program - ARM Parameterization Testbed (CAPT) (<http://www-pcmdi.llnl.gov/projects/capt/>) effort at DOE's Program for Climate Model Diagnosis and Intercomparison (PCMDI).

DATA SHARING POLICY:

Applicants must describe their data sharing plans appropriate to the nature of the anticipated data as described in the BER data policy below:

"Research data obtained through public funding is a public trust. As such, these data must be publicly accessible. To be in compliance with the data policy of the U.S. Global Change Research Program of full and open access to global change research data, applications submitted in response to this FOA must include a description of the applicant's data sharing plans if the proposed research involves the acquisition of data in the course of the research that would be of use to the climate change research and assessment communities. This includes data from extensive, long-term observations and experiments and from long-term model simulations of climate that would be costly to duplicate. The description must include plans for sharing the data that is to be acquired in the course of the proposed research, particularly how the acquired data will be preserved, documented, and quality assured, and where it will be archived for access by others. Data of potentially broad use in climate change research and assessments should be archived, when possible, in data repositories for subsequent dissemination. For projects funded under this FOA the relevant DOE-funded data repository is the ARM data archive; details may be found at <http://www.archive.arm.gov/armlogin/login.jsp>. The repository where the applicant intends to archive the data should be notified in advance of the intention, contingent on a successful outcome of the proposal review. If data are to be archived at the applicant's home institution or in some other location, the application must describe how, where, and for how long the data will be documented and archived for access by others. Applicants are allowed an initial period of exclusive use of the acquired data to quality assure it and to publish papers based on the data, but they are strongly encouraged to make the data openly available as soon as possible after this period. DOE's Office of Biological and Environmental Research defines the exclusive use period to be one year after the end of the data acquisition period for the proposed performance period of the award but exceptions to extend this period may be justified for unique or extenuating circumstances."

Participation in ASR Meetings:

To ensure that the program meets the broadest needs of the research community and the specific needs of the DOE CESD, successful applicants are expected to attend the annual science team meeting and to participate as ASR program members in the appropriate working group(s) relevant to their efforts.

Costs for participation in ASR annual and working group meetings should be included in the budget. Costs for ASR meeting travel need **not exceed \$5000 per project year and should be based on TWO trips of ONE week each to Washington, DC or to Chicago, Illinois.**

Program Funding

It is anticipated that approximately \$7,500,000 will be available for about 35 to 40 awards (single or collaborative) each ranging from \$50,000 to \$200,000 per year in Fiscal Year 2011, contingent upon the availability of appropriated funds. In the case of collaborative applications, funding limit applies to each application. 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 applications received. Awards are expected to begin in Fiscal Year 2011.

DOE is under no obligation to pay for any costs associated with the preparation or submission of an application. DOE reserves the right to fund, in whole or in part, any, all, or none of the applications submitted in response to this FOA.

Merit Review

Applications will be subjected to scientific merit review (peer review) and will be evaluated against the following evaluation criteria which are listed in descending order of importance codified at 10 CFR 605.10(d):

1. Scientific and/or Technical Merit of the Project;
2. Appropriateness of the Proposed Method or Approach;
3. Competency of Applicant's Personnel and Adequacy of Proposed Resources; and
4. 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 FOA and the agency's programmatic needs. It should be noted that external peer reviewers are selected on the basis of their scientific expertise and the absence of conflict- of-interest issues. Both Federal and non-Federal reviewers may be used, and submission of an application constitutes agreement that this review process is acceptable to the investigator(s) and the submitting institution.

The Catalog of Federal Domestic Assistance (CFDA) number for this program is 81.049, and the solicitation control number is ERFAP 10 CFR Part 605.

Posted on the Office of Science Grants and Contracts Web Site
March 8, 2010.