

**Office of Science
Financial Assistance
Funding Opportunity Announcement
DE-PS02-08ER08-23**

**(Eligibility Information has changed
for this Notice.**

**Please visit Grants.gov and view the
Funding Opportunity Announcement for Details.)
(Posted 5/7/2008)**

***Atmospheric Radiation Measurement (ARM) Program
Announcement***

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 methods for observational data analysis and utilize the resulting knowledge from such analyses to improve cloud parameterizations. The intent is to improve the modeling of cloud properties and processes and their impact on the atmospheric radiation balance. If the application is successful, the research would be part of the Atmospheric Radiation Measurement (ARM) Program in the Climate Change Research Division (CCRD). The ARM Program is a part of several DOE programs in the interagency U.S. Climate Change Science Program (CCSP).

PREAPPLICATIONS

Potential applicants are required to submit a preapplication, referencing **Funding Opportunity Number DE-PS02-08ER08-23 for receipt by DOE by 4:30p.m., Eastern Time May 21, 2008.** Preapplications, referencing Funding Opportunity Number DE-PS02-08ER08-23, should be sent to Dr. Kiran Alapaty by e-mail: kiran.alapaty@science.doe.gov. Please include "Lead PI name -- Preapplication -- DE-PS02-08ER08-23" in the subject line of the e-mail.

All preapplications will be reviewed relative to the scope and research needs of the ARM Program. A response to each preapplication, discussing the potential program relevance of research for a formal application, generally will be communicated within 15 days of receipt. Applicants who have not received a response regarding the status of their preapplication within a reasonable time are responsible for contacting the program to confirm the status.

A preapplication should consist of TWO PAGES of narrative describing the research objectives and methods of accomplishment. Additional required parts of the preapplication are: Principal Investigator's address, telephone and fax number, e-mail address, Funding Opportunity Number, estimate of level of funding requested, and names of all senior personnel.

SC's preapplication policy can be found on SC's Grants and Contracts Web Site at: <http://www.science.doe.gov/grants/preapp.html>. Please contact Dr. Kiran Alapaty for any questions related to this Announcement. Applicants should allow sufficient time so that the formal application deadline is met.

APPLICATION DUE DATE: July 21, 2008, 8:00 p.m. Eastern Time

Applications must be submitted using [Grants.gov](http://www.Grants.gov), the Funding Opportunity Announcement can be found using the CFDA Number, 81.049 or the Funding Opportunity Announcement number, DE-PS02-08ER08-23. Applicants must follow the instructions and use the forms provided on [Grants.gov](http://www.Grants.gov).

GENERAL INQUIRIES ABOUT THIS ANNOUNCEMENT SHOULD BE DIRECTED TO:

Technical/Scientific Contact:

Dr. Kiran Alapaty

Telephone: (301) 903-3175

E-mail: Kiran.Alapaty@science.doe.gov

SUPPLEMENTARY INFORMATION:

Background:

The Climate Change Research Division (CCRD) 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 ARM goal to improve the treatment of clouds, aerosols, and radiative processes in regional and global climate models used to predict future climate directly addresses the LTM. The ARM program also addresses the U.S. Climate Change Science Program (CCSP) goal to improve the capability to accurately simulate and predict climate and climate change. Thus, the major component of ARM involves gathering and analyzing data for the development and testing of parameterizations for the atmospheric radiation transfer, clouds, and aerosols with the ultimate goal of improving or developing and validating physical parameterizations for regional and global climate models.

The ARM program has been promoting the development of climate data sets from ARM measurements for several atmospheric variables. The ARM Climate Research Facility 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 program has also developed the ARM Mobile Facility (AMF) to collect cloud and radiation data in several climatic regimes. The ARM Aerial Vehicle Program (AVP) provides 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/sgp.stm>) 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 second facility, TWP (<http://www.arm.gov/sites/twp.stm>), 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 third facility, the NSA (<http://www.arm.gov/sites/nsa.stm>), 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 (<http://www.arm.gov/sites/amf.stm>) 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. The data collected from these facilities comprise a climatic observational database.

Upcoming new ARM measurements are from the Indirect and Semi-Direct Aerosol Campaign (ISDAC) and the China deployment. The ISDAC was conducted in April 2008 at the NSA. Measurement systems included a heavily instrumented aircraft that collected data from the sky, while instruments based at surface sites in Barrow and Atkasuk, Alaska, obtained measurements from the ground. Also in 2008, a campaign utilizing the ARM Mobile Facility will begin in China to collect a comprehensive data set that can be used to study the impact of heavy aerosol loading on radiative fluxes, clouds, precipitation, as well as general climate in China and downwind regions. Applicants are encouraged to review the research status of the ARM data analysis and products available at URLs <http://www.arm.gov/data/> and <http://stm.arm.gov/pastmeetings.stm>

Program information is available on <http://www.science.doe.gov/ober/CCRD/arm.html>. Background material on ARM science is available through the ARM Science Plan <http://www.arm.gov/publications/programdocs/doe-er-arm-0402.pdf>

Request for Grant Applications:

All applications submitted in response to this Announcement must explicitly state how the proposed research will support accomplishment of the BER CCRD's 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."**

This Announcement requests applications for grants, both new and renewal, that address the ARM 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 research areas of interest include the development or improvement of algorithms for retrieving the required atmospheric parameters from ARM instruments; studies utilizing ARM data to improve the understanding of cloud, aerosol, and radiation physical processes; and, the translation of process study results to improve or develop parameterizations for the respective processes to improve climate model simulations.

The main theme of this solicitation revolves around clouds and aerosols. For clouds themes of interest include: (a) retrieval of cloud micro and macrophysical properties in the context of long term climate records; (b) analysis of cloud properties and their interactions with atmospheric radiation from a climate perspective; (c) improvement or development of cloud parameterizations suitable for regional and global climate models using the ARM data and other complementary data; and (d) analysis and process modeling studies of cloud impacts on the atmospheric radiation. For aerosols, the theme is analysis and process modeling studies of indirect effects of aerosols on clouds using ARM measurements from ISDAC and the China deployment of the ARM mobile facility as well as other existing ARM data. **Usage of ARM data is mandatory and the usage of additional data from other sources to complement research is strongly encouraged.** The usage of community models both at the regional and global scales is also encouraged. A community model can be defined as a model that has the following attributes: it should (1) be an open-source numerical model; (2) be easily accessible to any user (e.g., via internet); (3) have documentation of the structure and physics; (4) have some level of user support and training; and (5) have user community meetings to promote the exchange of new science among the users. Large-eddy simulation (LES) and cloud resolving models (CRMs) or other limited area models can be used and such models that are based on community regional models are particularly encouraged. Also, applications proposing to use LES and/or CRMs with additional research plans to improve cloud/radiation/aerosol processes' representation in regional and/or global climate models will be given high priority. Additionally, applications dealing with multiple themes identified above, for example, themes (a) and (b); or (b) and (c); or (a) and (b) and (c) will also be given high priority. In that respect, collaborative applications are especially encouraged.

Specific areas of interest to the ARM program follow:

- Improve existing or develop new cloud and radiation parameterizations for regional and global models.
- Improve cumulus convection schemes in global climate models by incorporating mesoscale effects of convection. Community models are encouraged.
- Alternatively, develop a multi-scale cumulus convection parameterization that is applicable to horizontal grid-scales typically used in Mesoscale and Global models. Thus, the new parameterization should be able to: (1) simulate deep convection in a mesoscale model, and (2) represent mesoscale effects of convection when used in a global model.

Usage of ARM data is mandatory and the usage of additional data from other sources to complement research is strongly encouraged. Additionally, if applicable, usage of relevant data that may be available from other DOE research programs (e.g., Atmospheric Science Program) is also encouraged. Applications for instrument development will not be considered. Applications that require a special field campaign, which has not already been planned and approved by the ARM Climate Research Facility Program Manager, will not be accepted for consideration. For approved campaigns see: (<http://www.db.arm.gov/cgi-bin/IOP/iops.pl>.)

Applications for research to develop new techniques to retrieve the properties of clouds using ARM data should be targeted on the development of methods for deriving long-term records of

cloud microphysical and macrophysical properties at multiple locations. Also, these retrieval techniques must include quantitative uncertainty analysis for estimates of cloud properties. New or improved methods for radiative transfer in cloudy atmospheres, including the overlap problem of cloud layers, are especially encouraged.

Applications for research to develop and test new cloud and radiation process models should highlight scientific advancement over existing models and focus on investigating the validity of assumptions that are associated with such models and how well the ensemble of cloud and radiation submodels simulate clouds and their effect on radiation fields in the climate models. Applicants are strongly encouraged to utilize the tools that have been developed for this purpose 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 Plans:

Research data obtained through public funding is a public trust. As such, this data must be publicly accessible. To be in compliance with the data policy of the U.S. Global Change Research Program (now called the U.S. Climate Change Science Program) of full and open access to global change research data, applications submitted in response to this solicitation 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 would be preserved, documented, and quality assured, and where it would be archived for access by others. Data of potentially broad use in climate change research and assessments should be archived, when possible, in a central data depository for dissemination, such as in DOE's Carbon Dioxide Information Analysis Center. The central depository where the applicant intends to archive the data should be notified in advance of the intention, contingent on a successful outcome of the application review. If data are to be archived at the applicant's home institution or in some other location besides a central repository, 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. The DOE Office of Science defines the exclusive use period to be one year after the end of the data acquisition period for the proposed performance period of the grant application but exceptions to extend this period may be justified for unique or extenuating circumstances.

Participation in ARM Science Team

To ensure that the program meets the broadest needs of the research community and the specific needs of the DOE CCRD, successful applicants are expected to participate as ARM Science Team members in the appropriate working group(s) relevant to their efforts.

Costs for participation in ARM Science Team meetings and working group meetings should **not exceed \$4,500 per project year or should be based on two trips of 1 week each to Washington, DC, and two trips of 3 days each to Chicago, Illinois.**

Program Funding

It is anticipated that approximately \$3,000,000 to \$4,000,000 will be available for about 20 awards (single or collaborative) each ranging from \$50,000 to \$175,000/year in Fiscal Year 2009, 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 2009. Equal consideration will be given to renewal and new applications. DOE is under no obligation to pay for any costs associated with preparation or submission of applications. DOE reserves the right to fund, in whole or in part, any, all, or none of the applications submitted in response to this Announcement.

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 process will include program policy factors such as the relevance of the proposed research to the terms of the announcement and the agencies' 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 may be used, and submission of an application constitutes agreement that this 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
April 22, 2008.