Program Announcement
To DOE National Laboratories
LAB 05-14

Atmospheric Radiation Measurement 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 experimental and theoretical studies of the effects of clouds on the atmospheric radiation balance in conjunction with the Atmospheric Radiation Measurement (ARM) Program as part of the U.S. Global Climate Change Science Program (USCCSP). This program announcement requests new proposals that are relevant to the terms of reference for this announcement and responsive to the particular needs defined below.

DATES: Researchers are encouraged (but not required) to submit a brief preproposal for programmatic review. The deadline for submission of preproposals is March 15, 2005. Early submission of preproposals is encouraged to allow time for meaningful responses.

Formal proposals submitted in response to this announcement must be received by 4:30 p.m., Eastern Time, April 12, 2005, to be accepted for merit review and to permit timely consideration for award in Fiscal Year 2006. Awards are expected to begin on or about November 15, 2005.

ADDRESSES:

Preproposals referencing Program Announcement LAB 05-14 may be sent to the program contact, Dr. Wanda Ferrell, via electronic mail at: wanda.ferrell@science.doe.gov or by U. S. Postal Service Mail at: Dr. Wanda Ferrell, 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. Electronic mail is recommended to facilitate a faster response.

Formal proposals in response to Program Announcement LAB 05-14 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 05-14, 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 05-14.

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 05-14.

FOR FURTHER INFORMATION CONTACT: Dr. Wanda Ferrell, 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) 903-0043, fax (301) 903-8519, Internet e-mail address: wanda.ferrell@science.doe.gov. 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.

SUPPLEMENTARY INFORMATION:

Background: Atmospheric Radiation Measurement (ARM) Program. 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 purpose of the ARM Program is to improve the treatment of radiation and clouds in the General Circulation Models (GCMs) used to predict future climate. This program is one component of the U.S. Climate Change Science Program that has the goal to improve the capability to accurately simulate and predict climate and climate change. The major component of the ARM Program involves gathering data for the development and testing of models of the atmospheric radiation transfer, properties of clouds, and the full life cycle of clouds with the ultimate goal of developing and validating new representations of clouds for climate models. Tools that are being used include, but are not limited to, cloud system resolving models (CSRM) that directly and accurately simulate cloud-scale physical processes. Areas of interest include convection triggering conditions, closure assumptions, mechanisms and magnitudes of convective and mesoscale updrafts and downdrafts, convection-PBL interactions, and the importance of 3-D radiative transfer.

The ARM program has established three fixed facilities and has developed a mobile facility to collect cloud and radiation data in several climatic regimes. The Southern Great Plains (SGP) facility began operation in calendar year 1992, with instruments spread over an area of approximately 60,000 sq. km., centered on Lamont, Oklahoma. The SGP facility location 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 Tropical Western Pacific (TWP) facility is located in the area roughly between 10oN to 10oS of the equator from Indonesia to near Christmas Island. It 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 as a location for an ARM facililty because it plays a large role in the interannual variability observed in the global climate system. The third facility, the North Slope of Alaska (NSA), is located at Barrow, Alaska, with a secondary, inland site near Atqasuk. The location of the NSA facility 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 development of the ARM Mobile Facility (AMF) was completed in FY 2005, and its first deployment will begin in March 2005 at Pt. Reyes, CA. In 2006 the AMF will be deployed at Niamey in Niger (13.5ºN 2ºE), during the field phases of the African Monsoon Multidisciplinary Analysis (AMMA) and related experiments. The AMF will deploy instrumentation and data systems similar to those at the fixed ARM sites in NSA and TWP. The AMF will be deployed to sites around the world in various climatic regimes and sites of opportunity for durations of 6 to 18 months to study the effects of clouds and other atmospheric conditions and properties on radiation. The ARM facilities, both mobile and fixed, have been designated as a user facility, the ARM Climate Research Facility (ACRF). AMF deployments and campaigns at the fixed ARM sites will be determined by a review by the ACRF Science Review Board.

Request for Proposals from DOE National Laboratories

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: "Deliver improved climate data & models for policy makers to determine safe levels of greenhouse gases for the Earth system. By 2013, substantially reduce differences between observed temperature and model simulations at subcontinental scales using several decades of recent data."

This announcement requests new proposals that address the ARM goal of improving the accuracy of climate model simulations by enhancing the models' representation of cloud and radiation processes, including the role of aerosols on radiative transfer and cloud properties. The DOE National Laboratories must submit multi-investigator proposals that have as a focus the development and validation of improved General Circulation Models through the incorporation of new process models or parameterizations. The proposal should focus on investigating the validity of assumptions that are associated with cloud and radiation process models and how well the ensemble of cloud and radiation sub models in the climate models simulate observed clouds and their effect on radiation fields. The proposal may also include relevant cloud and radiation physical process analyses as an element of the research. The proposal may also include research to develop tools and methodologies for making ARM data more useful for the development and testing of climate models. All elements of the proposal must be coordinated to accomplish the primary goal of improving the climate model simulations.

Proposals are expected to provide a clear plan describing the method to be used to quantify the model improvement. Researchers are strongly encouraged to propose research that would 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).

Proposals for research to quantify the effect of aerosols on the radiation field should focus on both the indirect and direct role of aerosols on radiative transfer and cloud properties. Specifically the research should relate observations of radiative fluxes and radiances to the

atmospheric composition, especially the optical properties of aerosols, and use these relations to develop and test parameterizations and/or process models to accurately predict the effect of aerosols on the atmospheric radiative properties. Note that the DOE Atmospheric Science Program (ASP) was reconfigured in FY 2004 to focus on aerosol radiative forcing with new research that began in early FY 2005 and will support aerosol research on aerosol processes and resulting properties that influence radiation fields. A joint ARM-ASP working group will be formed to foster and facilitate collaborations between the two programs.

Proposals on cloud and radiation process analyses should focus on studies to elucidate radiative transfer in cloudy atmospheres, including the overlap problem of stratiform cloud layers. These studies may include, but are not limited to, 3-D radiative transfer, representations of cloud overlap, mixed phase clouds, cloud life cycles, feedback processes (especially in the Arctic), and other processes important for clouds such as convection and turbulence and their effects on radiative transfer. The emphasis on the Arctic feedback is based on the need to test the hypothesis that links large climate feedbacks with surface and tropospheric temperatures, surface albedo, cloud cover, deep ocean water production (the global thermohaline ocean circulation pump), and the polar atmospheric heat sink.

Proposals on research to develop and apply methodologies to use ARM data more effectively in atmospheric models should focus on either providing data to initialize and constrain limited area models, both single column models (SCMs) and cloud resolving models (CRMs), or providing data to evaluate model performance. Research on forcing data sets should develop data to provide the required boundary conditions at model top and sides to run simulations for the NSA and TWP locations. Research to provide data to evaluate model performance should address either converting ARM measurements into the forms that can be directly applied to model output or to developing techniques for converting model output to a form that is equivalent to ARM measurements.

Proposals are limited to those that utilize ARM generated data. Single investigator proposals will not be accepted. Components of proposals for the development of retrieval algorithms will not be considered. Components of proposals for instrument development will not be considered. Proposals that require a special field campaign, which has not already been planned and approved by the ARM Program Manager, will not be accepted for consideration. For approved campaigns see (http://www.db.arm.gov/cgi-bin/IOP/iops.pl.)

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 ARM Science Team members in the appropriate working group(s) relevant to their efforts. Costs for participation in ARM Science Team meetings and subcommittee meetings should be based on two trips of 1 week each to Washington, DC, and two trips of 3 days each to Chicago, Illinois.

Requests for Proposals from Other Federal Laboratories

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: "Deliver improved climate data & models for policy makers to determine safe levels of greenhouse gases for the Earth system. By 2013, substantially reduce differences between observed temperature and model simulations at subcontinental scales using several decades of recent data."

This announcement requests proposals, both new and renewal that address the ARM goal of improving the accuracy of climate model simulations by enhancing the representation of cloud and radiation processes in the models. The research areas of interest include the development of algorithms for retrieving the required measurements from ARM instruments, studies utilizing ARM data to improve the understanding of cloud and radiation physical processes, the translation of process study results into process models and parameterizations, and the incorporation of the submodels into climate models. ARM data consist of time series of vertical profiles of certain observables while parameterizations are geared to produce statistical cloud and radiation properties on the scale of several hundred kilometers. Since the ARM data format is not directly and readily amenable for use by climate modelers, research is also needed to develop tools and methodologies for making ARM data more useful for the development and testing of climate models.

Specific areas of interest to the ARM program follow:

- Developing new techniques to retrieve the properties of all clouds, with a special focus on the properties of ice clouds and mixed-phase clouds.
- Conducting analyses to improve our understanding of cloud and radiation processes including the 3D cloud-radiation process at scales from the local atmospheric column to the GCM grid square and the relationship between atmospheric radiation and the life-cycle of ice clouds and mixed-phase clouds.
- Developing and testing new cloud and radiation submodels for global climate models.
- Developing and testing methodologies to use ARM data more effectively in atmospheric models, both at the cloud resolving model scale and the global climate model scale.
- Quantifying the effects of aerosols on cloud properties and the resulting radiation field, using some combination of ARM observations and physical models.

Proposals are limited to those that utilize ARM generated data in the proposed research. Proposals for instrument development will not be considered. Proposals that require a special field campaign, which has not already been planned and approved by the ARM Program Manager, will not be accepted for consideration. For approved campaigns see (http://www.db.arm.gov/cgi-bin/IOP/iops.pl.)

Proposals for research to develop new techniques to retrieve the properties of ice clouds and mixed-phase 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. Proposed research to improve retrieval algorithms provide bulk microphysical estimates for clouds at all ARM fixed and mobile sites and must include uncertainty estimates.

Proposals for cloud and radiation process analyses are requested that involve studies to elucidate radiative transfer in cloudy atmospheres, including the overlap problem of stratiform cloud

layers. The proposed studies may include, but are not limited to, 3-D radiative transfer, representations of cloud overlap, mixed phase clouds, cloud life cycles, feedback processes (especially in the Arctic), and other processes important for clouds such as convection and turbulence and their effects on radiative transfer. The emphasis on the Arctic feedback is based on the need to test the hypothesis that links large climate feedbacks with surface and tropospheric temperatures, surface albedo, cloud cover, deep ocean water production (the global thermohaline ocean circulation pump), and the polar atmospheric heat sink.

Proposals for research to develop and test new cloud and radiation process models should focus on investigating the validity of assumptions that are associated with such models and how well the ensemble of cloud and radiation sub models simulate clouds and their effect on radiation fields in the climate models. Areas of interest include convection triggering conditions, closure assumptions, mechanisms and magnitudes of convective and mesoscale updrafts and downdrafts, convection-PBL interactions, and the importance of 3-D radiative transfer.

Proposals for research to develop and validate cloud and radiation parameterizations for global climate models are expected to provide a clear plan describing the method to be used to quantify the model improvement. Researchers 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).

Proposals on research to develop and apply methodologies to use ARM data more effectively in atmospheric models should focus on either providing data to initialize and constrain limited area models, both single column models (SCMs) and cloud resolving models (CRMs), or providing data to evaluate model performance. Research on forcing data sets should develop data to provide the required boundary conditions at model top and sides to run simulations for the NSA and TWP locations. Research to provide data to evaluate model performance should address either converting ARM measurements into the forms that can be directly applied to model output or to developing techniques for converting model output to a form that is equivalent to ARM measurements.

Proposals for research to quantify the effect of aerosols on the radiation field should focus on both the indirect and direct role of aerosols on radiative transfer and cloud properties. Specifically the research should relate observations of radiative fluxes and radiances to the atmospheric composition especially the optical properties of aerosols and use these relations to develop and test parameterizations and/or process models to accurately predict the effect of aerosols on the atmospheric radiative properties. Note that the DOE Atmospheric Science Program (ASP) was reconfigured in FY 2004 to focus on aerosol radiative forcing with new research that began in early FY 2005 and will support aerosol research on aerosol processes and resulting properties that influence radiation fields. A joint ARM-ASP working group will be formed to foster and facilitate collaborations between the two programs.

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 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 be based on two trips of 1 week each to Washington, DC, and two trips of 3 days each to Chicago, Illinois.

THE FOLLOWING INFORMATION IS RELEVANT TO BOTH DOE NATIONAL LABORATORIES AND OTHER FEDERAL LABORATORIES

Program Funding

It is anticipated that approximately $3M will be available for awards in Fiscal Year 2006, 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 15, 2005. Annual budgets for single investigator proposals are expected to range from $100,000 to $300,000 total costs. Annual budgets for multi-investigator proposals are expected to range from $500,000 to $900,000 total costs, unless there is prior approval from the Program Manager.

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.science.doe.gov/grants/Colab.html.

Preproposals

Potential researchers are strongly encouraged to submit a brief preproposal that consists of two to three pages of narrative describing the research objectives and methods of accomplishment. These will be reviewed relative to the scope and research needs of the ARM Program. Principal Investigator (PI) 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 research that would be proposed in a formal proposal generally will be communicated within 15 days of receipt. Use of e-mail for this communication will decrease the possibility of a delay in responses to the preproposal. The deadline for the submission of preproposals is March 15, 2005. Researchers should allow sufficient time so that the formal proposal deadline is met.

Submission Information

The technical portion of the proposal should not exceed twenty-five double-spaced pages and should include detailed budgets for each year of support requested. DOE is under no obligation to pay for any costs associated with the preparation or submission of proposals if an award is not made.

The proposal should be arranged in the following order:

- **Field Work Proposal** (FWP) Format (Reference DOE Order 5700.7C) (DOE ONLY)
- **Proposal Cover Page** Also provide the PI's phone number, fax number, and e-mail address
- **Table of Contents**
- **Budget** (DOE Form 4620.1) and **Budget Explanation** for each year and a budget summary of project period
- **Abstract** (one page) should contain title, PI name, and abstract text
- **Project Description - Narrative** (main technical portion of the proposal, including background/introduction, proposed research and methods, timetable of activities, and responsibilities of key project personnel).
- **Long Term Measure**
- **Renewal proposals** should include a special section entitled "Accomplishments Under Previous Support." (See http://www.science.doe.gov/grants/App.html.) This section shall address the following:

  (a) continued relevance of their work to the goals of the ARM Program
  (b) the contribution of work conducted under previous support to the goals of the ARM Program, including a listing of publications and presentations

- **Collaborative Arrangements**
- **Literature Cited**
- **Biographical Sketch(es)** should be submitted in a form similar to that of NIH or NSF (two to three pages).
- **Description of Facilities and Resources**
- **Current and Pending Support**
- **Appendix** (optional)
- **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.

Abstract (on a page by itself)

Provide an abstract of less than 400 words. Give the project objectives (in broad scientific terms), the approach to be used, and what the research is intended to accomplish. State the hypotheses to be tested (if any). At the top of the abstract give the project title, names of all the investigators and their institutions, and contact information for the principal investigator, including e-mail address.

Narrative

The narrative comprises the research plan for the project and is limited to **25 pages (maximum).** It should contain enough background material in the Introduction, including review of the relevant literature, to demonstrate sufficient knowledge of the state of the science. The major part of the narrative should be devoted to a description and justification of the proposed project, including details of the methods to be used. It should also include a timeline for the major activities of the proposed project, and should indicate which project personnel will be responsible for which activities.

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: "Deliver improved climate data & models for policy makers to determine safe levels of greenhouse gases for the Earth system. By 2013, substantially reduce differences between observed temperature and model simulations at subcontinental scales using several decades of recent data."

Collaborative Arrangements

If any portion of the project is to be done in collaboration with another institution (or institutions), provide information on the institution(s) and what part of the project it will carry out. 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".

Literature Cited

Give full bibliographic entries for each publication cited in the narrative.

Biographical Sketches

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

To assist in the identification of potential conflicts of interest or bias in the selection of reviewers, the following information **must be provided in each biographical sketch.**

> **Collaborators and Co-editors:** A list of all persons in alphabetical order (including their current organizational affiliations) who are currently, or who have been, collaborators or co- authors with the investigator on a research project, book or book article, report, abstract, or paper during the 48 months preceding the submission of the proposal. Also include those individuals who are currently or have been co-editors of a special issue of a journal, compendium, or conference proceedings during the 24 months preceding the submission of the proposal. If there are no collaborators or co-editors to report, this should be so indicated.

Graduate and Postdoctoral Advisors and Advisees: A list of the names of the individual's own graduate advisor(s) and principal postdoctoral sponsor(s), and their current organizational affiliations. A list of the names of the individual's graduate students and postdoctoral associates during the past 5 years, and their current organizational affiliations.

Description of Facilities and Resources

Facilities to be used for the conduct of the proposed research should be briefly described. Indicate the pertinent capabilities of the institution, including support facilities (such as computer support), that will be used during the project. Include this information for each subcontracting institution (if any).

Current and Pending 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 (months per year or percentage of the year) devoted to the project.

Appendix (optional)

Information not easily accessible to a reviewer may be included in an appendix, but **do not use the appendix to circumvent the page limitations of the proposal.** Reviewers are not required to consider information in an appendix, and reviewers may not have time to read extensive appendix materials with the same care they would use with 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).

The instructions and format described below should be followed. Reference Program Announcement LAB 05-14 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 a proposal constitutes agreement that this is acceptable to the investigator(s) and the submitting institution. A separate panel will be convened to determine the programmatic relevance of the proposal.

2. Summary of Proposal Contents

- Field Work Proposal (FWP) Format (Reference DOE Order 5700.7C) (DOE ONLY)
- Proposal Cover Page
- Table of Contents
- Budget (DOE Form 4620.1) and Budget Explanation
- Abstract (one page)
- Narrative (main technical portion of the proposal, including background/introduction, proposed research and methods, timetable of activities, and responsibilities of key project personnel)
- Long Term Measure
- Renewal Proposals
- Collaborative Arrangements
- Literature Cited
- Biographical Sketch(es)
- Description of Facilities and Resources
- Other Support of Investigator(s)
- Appendix (optional)

2.1 Number of Copies to Submit

Formal proposals in response to Program Announcement LAB 05-14 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 Narrative

Narrative (main technical portion of the proposal, including background/introduction, proposed research and methods, timetable of activities, and responsibilities of key project personnel)

The narrative comprises the research plan for the project and is limited to **25 pages (maximum).** It should contain enough background material in the Introduction, including review of the relevant literature, to demonstrate sufficient knowledge of the state of the science. The major part of the narrative should be devoted to a description and justification of the proposed project, including details of the methods to be used. Describe new techniques and methodologies and explain the advantages over existing techniques and methodologies. It should also include a timeline for the major activities of the proposed project, and should indicate which project personnel will be responsible for which activities.

If any portion of the project is to be done in collaboration with another institution (or institutions), provide information on the institution(s) and what part of the project it will carry out. 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".

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: "Deliver improved

climate data & models for policy makers to determine safe levels of greenhouse gases for the Earth system. By 2013, substantially reduce differences between observed temperature and model simulations at subcontinental scales using several decades of recent data."

Renewal proposals should include a special section entitled "Accomplishments Under Previous Support." (See http://www.science.doe.gov/grants/App.html.) This section shall address the following:

(a) continued relevance of their work to the goals of the ARM Program
(b) the contribution of work conducted under previous support to the goals of the ARM Program, including a listing of publications and presentations

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/grants/Forms-E.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 institution submitting the proposal and at all subcontracting institutions (if any). The biographical sketch is limited to a maximum of **two pages** for each investigator.

To assist in the identification of potential conflicts of interest or bias in the selection of reviewers, the following information **must be provided in each biographical sketch.**

> **Collaborators and Co-editors:** A list of all persons in alphabetical order (including their current organizational affiliations) who are currently, or who have been, collaborators or co- authors with the investigator on a research project, book or book article, report, abstract, or paper during the 48 months preceding the submission of the proposal. Also include those individuals who are currently or have been co-editors of a special issue of a journal, compendium, or conference proceedings during the 24 months preceding the submission of the proposal. If there are no collaborators or co-editors to report, this should be so indicated.
>
> **Graduate and Postdoctoral Advisors and Advisees:** A list of the names of the individual's own graduate advisor(s) and principal postdoctoral sponsor(s), and their current organizational affiliations. A list of the names of the individual's graduate students and postdoctoral associates during the past 5 years, and their current organizational affiliations.

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.