

Office of Science
Notice 00-11

Atmospheric Chemistry Program

Department of Energy
Office of Science

Office of Science Financial Assistance Program Notice 00-11; Atmospheric Chemistry Program

AGENCY: U.S. Department of Energy (DOE)

ACTION: Notice inviting grant applications.

SUMMARY: The Office of Biological and Environmental Research (OBER) of the Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving applications for participation in the Atmospheric Chemistry Program (ACP) Science Team. The research program supports the Department's Global Change Research Program, the U.S. Global Change Research Program, and the Administration's goals to understand atmospheric chemistry associated with air quality and climate change. Of particular interest are experimental and theoretical studies of atmospheric chemistry processes affected by energy-related air pollutants, e.g., sulfur oxides, nitrogen oxides, organic aerosols, and tropospheric ozone.

DATES: Formal applications in response to this Notice must be received by 4:30 p.m., E.D.T., May 3, 2000, to be accepted for merit review and to permit timely consideration for award in Fiscal Year 2001. Applications that are collaborative with or complementary to DOE laboratory proposals are strongly encouraged.

ADDRESSES: Formal applications referencing Program Notice 00-11 should be sent to: U.S. Department of Energy, Office of Science, Grants and Contracts Division, SC-64, 19901 Germantown Road, Germantown, MD 20874-1290, ATTN: Program Notice 00-11. This address must also be used when submitting applications by U.S. Postal Service Express Mail or any other commercial overnight delivery service, or when hand-carried by the applicant. An original and seven copies of the application must be submitted.

FOR FURTHER INFORMATION CONTACT: Peter Lunn, Environmental Sciences Division, SC-74, Office of Biological and Environmental Research, Office of Science, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD

20874-1290, telephone: (301) 903-4819, E-mail: peter.lunn@science.doe.gov, fax: (301) 903-8519. The full text of Program Notice 00-11 is available via the Internet using the following web site address:

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

SUPPLEMENTARY INFORMATION:

Background: The goal of the overall Atmospheric Science Program of the Department of Energy (DOE) is to develop a comprehensive understanding of the atmospheric processes that control the transport, transformation, and fate of energy related chemicals and particulate matter. The drivers for the program include urban, regional, national, and global concerns for air quality, climate change (global warming), and other atmospheric issues related to energy policy. The current emphasis is upon urban and regional scales.

The objectives of the program are: (1) to improve understanding of the chemical and physical processes affecting energy related air pollutants such as sulfur and nitrogen oxides, and tropospheric ozone, including gas-to-particle conversion processes, and the deposition and resuspension of aerosols; (2) to improve understanding of the meteorological processes that control the dispersion and air chemistry of energy-related trace gases and particulate matter in or released to the atmosphere; and (3) to develop predictive models for the above processes and acquire the data to test them.

The overall Atmospheric Science Program consists of several closely-related science programs and facilities. Each program or activity includes scientist-participants from DOE laboratories, other federal laboratories, colleges and universities, and private industry. All research projects are fully-peer reviewed.

The Atmospheric Chemistry Program (ACP): This program focuses on regional, continental, and global scale research on energy related air pollutants, including: a) chemical transformations relating to tropospheric energy-related materials in the troposphere, b) aerosol influences on air quality and climate forcing, and c) origin, fate, and characterization of fine particles in the atmosphere. Activities include field measurement campaigns, laboratory studies, modeling, and instrument development. More information can be obtained via the ACP web site at <http://www.atmos.anl.gov/ACP/>.

The Environmental Meteorology Program (EMP): This program focuses on the atmospheric transport of energy-related materials through specific and timely program components. Previous components include the Atmospheric Studies of Complex Terrain (ASCOT), the Mexico City Air Quality Study (MCAQS), and the Atmospheric Boundary Layer Experiment (ABLE). The current component and focus

of EMP is the Vertical Transport and Mixing Program (VTMX). More information can be obtained via the VTMX web site at <http://www.pnl.gov/VTMX/>.

The NARSTO Program Office: The Atmospheric Science Program supports NARSTO (formerly known as the North American Research Strategy for Tropospheric Ozone). NARSTO is a public/private partnership, whose membership spans government, the utilities, industry, and academe throughout Mexico, the United States, and Canada. Recently the scope of interest has been broadened to include aerosols. More information can be obtained via the NARSTO web site at <http://www.cgenv.com/Narsto>.

The Research Aircraft Facility (RAF): The Research Aircraft Facility consists of a Gulfstream 1 (G1) twin turboprop aircraft research facility, equipped by participating scientists for measurements in atmospheric chemistry, aerosols, turbulence, and radiant energy. The G1 is available to support ACP and EMP projects as well as related research endeavors by other agencies. More information can be obtained via the RAF web site at http://www.pnl.gov/atmos_sciences/as_g1.html.

The Tropospheric Aerosol Program (TAP): This program is under development. More information can be obtained via the TAP web site at <http://www.tap.bnl.gov>.

This Announcement is specific to the Atmospheric Chemistry Program (ACP). ACP is concerned primarily with the atmospheric chemistry of energy related pollutants. Collaborations are maintained with counterparts in other agencies, e.g., EPA, NOAA, NSF, and NASA, as well as with other parts of DOE, i.e., and programs concerned with environmental issues related to energy consumption and/or energy production.

Research applications are encouraged that demonstrate the continuity and progress of the DOE ACP during the 1997-2000 period (see research abstracts in <http://www.atmos.anl.gov/ACP>), i.e., new work that builds upon on or complements previous ACP activities.

The objective of the ACP is to identify and understand the atmospheric processes that are key to anticipating and predicting the effects of energy-related emissions on air quality. This capability is needed by DOE for both short-range and long-range energy planning. Although ACP activities do not include research in human health or other biological sciences, those air quality issues that are related to human health and effects on ecosystems in the United States are currently of direct concern. Tropospheric processes are addressed that affect the amounts and geographic distribution of ozone, particulate matter, air toxics, and the associated precursors compounds near the surface of the Earth. Research is conducted by modeling, laboratory, and field studies.

Analysis and publication of results, including those from past ACP field experiments, are an integral part of the ACP program.

Information on national issues that the DOE is addressing in coordination with other federal agencies can be found in several publications:

1. "Rethinking the Ozone Problem in Urban and Regional Air Pollution" by the Committee on Tropospheric Ozone Formation and Measurement of the National Research Council; "Air Quality Research Subcommittee Strategic Plan" by the Committee on Environment and Natural Resources of the National Science and Technology Council. http://www.nnic.noaa.gov/CENR/AQRS/Aqrs_sp.pdf.
2. "Research Priorities for Airborne Particulate Matter: I. Immediate Priorities and a Long-Range Research Portfolio" by the Committee on Research Priorities for Airborne Particulate Matter of the National Research Council.
3. "Research Priorities for Airborne Particulate Matter: II. Evaluating Research Progress and Updating the Portfolio" by the Committee on Research Priorities for Airborne Particulate Matter of the National Research Council.
4. "Global Environmental Change, Research Pathways for the Next Decade" by the Committee on Global Change Research of the National Research Council.
5. In addition, considerable information on current air quality issues involving ozone, aerosols, and volatile organic compounds can be found on the NARSTO web site <http://www.cgenv.com/Narsto/>.

Categories

This ACP Program Announcement consists of three categories. Prospective investigators should explicitly specify in the abstract what category or categories are addressed by the proposed research. Individuals or groups intending to participate in field experiments should describe what measurements they intend to make and what instruments will be used to make them, and what process information the measurements are intended to provide. Those intending to analyze data from one or more instruments or who will use data in numerical or conceptual modeling should specify what data are required for their purposes.

Category 1. Oxidant Studies. Research to evaluate the causes of spatial and temporal variations in tropospheric concentrations of ozone and other oxidants, especially for areas that experience non-attainment of U.S. ozone standards. Modeling, theoretical, and experimental efforts to address geographic regions having different mixes of

atmospheric trace chemicals and atmospheric transport conditions are encouraged. Studies of nighttime as well as daytime chemistry involving oxidants are encouraged. Research may include the application and testing of numerical models to evaluate the causes of high ozone concentrations over regional and urban scales and to generalize findings.

Category 2. Aerosol Studies. Research in conjunction with ACP oxidant studies to evaluate causes of spatial and temporal variations of tropospheric aerosol chemical composition and concentrations, particularly with regard to national standards on particulate matter and visibility (and issues of concern to human health). Topics of interest include particle nucleation and growth, processes affecting chemical composition, interactions with water, and aerosol characterization emphasizing particle chemical composition as a function of particle size. Numerical models may be used to develop methods of estimating aerosol composition over regional and urban scales.

Category 3. Heterogeneous Chemistry. Research on heterogeneous processes that affect chemical rates of reactions involving oxidants, nitrogen oxides, volatile organic compounds, and sulfur oxides, and precursors in the troposphere and planetary boundary layer. Studies that lead to information important for evaluating, simulating, and predicting oxidant and particle concentrations and composition are particularly encouraged. Topics of interest include reactions of nitrogen oxides on organic aerosol surfaces, halogen atom-releasing surface reactions, interactions of gas-phase organic gases with aerosol surfaces, interactions of inorganic gases with organic surfaces, photochemistry at the surface and aqueous phase reactions.

Programmatic Issues

Experimental field campaigns may be carried out in collaboration with the DOE Atmospheric Radiation Measurement Program, the DOE Environmental Meteorology Program, and with other relevant programs supported by federal, state, and private agencies. Collaborative efforts contributing to NARSTO are encouraged. Collaborative use of the DOE Research Aircraft Facility is also encouraged.

Possible future field studies are listed at the ACP web site. A diversity of atmospheric conditions, some of which might exist outside the United States, needs to be addressed by ACP. In such studies, the dynamic atmospheric conditions that affect chemical reactions need to be considered. Air-surface exchange rates of gases and particles are sometimes an important component of the atmospheric budget of chemicals.

Modeling and laboratory experiments are important aspects of this research. Modeling studies devoted to interpretation and generalization of the experimental findings are particularly encouraged. Laboratory studies may include studies of the reactions of oxidant precursors, formation and distribution of product species, aerosol formation, and heterogeneous processes relevant to oxidant formation and loss in the atmosphere. Development and deployment of advanced field instrumentation to make surface and aircraft-based observations necessary for ACP field studies are encouraged.

Educational Opportunities

Opportunities exist for the financial support of undergraduate and graduate students wishing to participate in this program through the Department of Energy's Global Change Education Program. Information can be obtained at <http://www.atmos.anl.gov/GCEP/>.

Program Funding

It is anticipated that up to \$2 million in first-year funding will be available for participation in the Atmospheric Chemistry Program. Multiple awards are expected to be made in Fiscal Year 2001 in the categories described above, contingent upon availability of appropriated funds. Applicants may request project support up to four years, with out-year support contingent on availability of appropriated funds, progress of the research, and programmatic needs. The number of awards and range of funding will depend on the number of applications received and selected for award. Typical annual budgets range from \$60,000 to \$200,000 in total costs. Some studies involving field measurements may have larger budgets.

Merit Review

Applications will be subjected to scientific merit review (peer review) and will be evaluated against the following evaluation criteria listed in descending order of importance as 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,
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 an 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. Non-

federal reviewers will often be used, and submission of an application constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

Information about the development and submission of applications, eligibility, limitations, evaluation, selection process, and other policies and procedures may be found in 10 CFR Part 605, and in the Application Guide for the Office of Science Financial Assistance Program. Electronic access to the Guide and required forms is made available via the World Wide Web at <http://www.sc.doe.gov/production/grants/grants.html>. DOE is under no obligation to pay for any costs associated with the preparation or submission of applications if an award is not made.

The research project description must be 20 pages or less, exclusive of attachments and must contain a 1 or 2-page abstract or summary of the proposed research and a 1 or 2-page statement of relevance to the DOE and national interest. On the SC grant face page, form DOE F 4650.2, in block 15, also provide the PI's phone number, fax number, and E-mail address. Attachments must include curriculum vitae, a listing of all current and pending federal support, and letters of intent when collaborations are part of the proposed research. Applications should include detailed and justified budgets for each year of support requested. Lengthy application appendices are discouraged. Curriculum vitae should be submitted in a form similar to that of NIH or NSF (two to three pages), see for example: <http://www.nsf.gov:80/bfa/cpo/gpg/fkit.htm#forms-9>.

Although the required original and seven copies of the application must be submitted, researchers are asked to submit an electronic version of their abstract of the proposed research in ASCII format and their E-mail address to the Program Director for Atmospheric Sciences, Peter Lunn, by E-mail to peter.lunn@science.doe.gov.

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

John Rodney Clark
Associate Director of Science
for Resource Management

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