ATMOSPHERIC SCIENCE PROGRAM

Welcome to the ASP website!

The Department of Energy's Atmospheric Science Program has as its long-term goal developing comprehensive understanding of the atmospheric processes that control the transport, transformation, and fate of energy related trace chemicals and particulate matter. ***The current focus of the program is aerosol radiative forcing of climate***: aerosol formation and evolution and aerosol properties that affect direct and indirect influences on climate and climate change.

Welcome

ASP Calendar

ASP MAX-MEX AND JOINT MILAGRO FIELD PROJECTS ARE UNDERWAY [2006-03-20]

The MILAGRO (Megacity Initiative: Local and Global Research Observations) 2006 field study and the ASP MAX-MEX component of that study are underway.

After a rocky start to the project, operations in Mexico are going well, with several coordinated flights among the

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several aircraft having taken place. If you haven't visited the Field reports page in the last several days, you are invited to have another look. This page will be updated throughout the campaign, so please check it frequently. It has links to quick-look graphics of PRELIMINARY data.

The official opening ceremony of MILAGRO was held on March 2, 2006, at the Universidad Autonomous Nacional de Mexico (UNAM) main campus at the newly opened Universum - Science Museum in Mexico City, D.F. For an account of that ceremony, which involved officials and scientists from U.S. and Mexican institutions and government agencies, click here (pdf file).

What's New

White paper on Proposed Summer 2007 ASP Field Campaign Cumulus Humilis Aerosol Processing Study (CHAPS). A web page and white paper outlining the objectives and approach for such a field project have been prepared by Carl Berkowitz, Larry Berg, John Ogren, Chris A. Hostetler and Rich Ferrare. The primary objectives of this campaign would be to characterize the chemical, physical and optical properties of aerosols below, within, and above large fields of fair-weather cumulus by in-situ measurements with the DOE Gulfstream-1 aircraft and to independently determine aerosol backscatter and extinction profiles in the vicinity of these fields with the NASA Langley Research Center's High Spectral Resolution Lidar (HSRL). In addition to the science questions to be addressed by these observations this study will obtain information to aid in the development of a parameterized cumulus scheme capable of including multiple cloud fields within regional or global scale models. The study will also compare and contrast the cloud and aerosol properties within and outside the Oklahoma City plume to study aerosol processes within individual clouds. ASP investigators and others interested in this campaign are invited to contact the above investigators. [2006-03-02]

ASP Publications web page. Please visit the new ASP publications page. This page is intended to list all publications of research conducted under ASP support from the year 2000 forward. An innovation is that links are provided, via the DOI numbers of the publications, to the publishers' pages for the publications. This readily allows the published paper to be downloaded, provided one has, or one's institution has, an electronic subscription to the journal. [2005-09-29]

ASP Data archive. Attention is called to the ASP data archive. ASP investigators (and others) who wish to download data from previous ASP field projects are welcome to do so. The data from most prior ASP field projects may be downloaded by FTP from the ASP data server ftp://ftp.ecd.bnl.gov/pub. Data from the 2003 ARM - ACP Aerosol IOP may be obtained from http://iop.archive.arm.gov/arm-iop/. It is strongly recommended that prospective users of these data contact the originator of the data set of interest, who will very likely be able to provide invaluable guidance to the use of the data. [2005-11-02]

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MASE Project Concluded. For an account of the MASE (MArine Stratus Experiment) conducted in the vicinity of Point Reyes, CA, in July, 2005, click here. [2005-08-31]

Adjunct Science Team Formed. ASP welcomes the participation in ASP activities by scientists not funded by ASP who wish, under funding from other sources, to engage in field measurements, modeling, or other collaborative activities with the Program. Scientists who participate in ASP activities in this way will constitute the Adjunct Science Team of the Program and are encouraged to attend Science Team meetings and otherwise contribute to formulation of studies to achieve ASP goals. Members of the Adjunct Science Team will be expected to share their data in accordance with ASP data policies and will likewise be entitled to access to the data of other ASP investigators in interpreting measurements and preparation of scientific papers and the like. For further information or to participate in this activity interested scientists are invited to contact Rick Petty or Steve Schwartz. The current Adjunct Science Team investigators and their projects have been announced and the list is available here. Several of these projects are funded by the Department of Energy through the National Institute for Global Environmental Change (NIGEC). [2005-08-31]

Overview Presentations of ASP. Steve Schwartz presented an overview of ASP at the 2005 Gordon Research Conference on Atmospheric Chemistry to be held September 4-9 in Big Sky Montana. A copy of his poster presentation may be downloaded here. Steve also made a presentation on behalf of the DOE Climate Change Research Division to the participants in the 8th ACCESS Colloquium. This colloquium, whose acronym stands for Atmospheric Chemistry Colloquium for Emerging Senior Scientists, is held every alternate year in conjunction with the Atmospheric Chemistry Gordon Conference. Its participants include some 25 new (or almost) PhDs in atmospheric chemistry and related disciplines who are selected competitively from a national pool of applicants. The purpose of the colloquium is to familiarize these outstanding young scientists with each other, with active scientists in the discipline (through their participation in the Gordon Conference) and with the programs in the several national agencies responsible for conduct of research in atmospheric chemistry. A copy of the viewgraphs from this presentation may be downloaded here. [2005-08-31]

Scientific Background for the Atmospheric Science Program

Atmospheric aerosols affect climate in multiple ways. They scatter and absorb shortwave (solar) radiation and to lesser extent longwave (thermal infrared radiation). In particular upward scattering of shortwave radiation reduces the solar energy absorbed by the earth-atmosphere system, thereby exerting a cooling effect on climate. Atmospheric aerosol particles also serve as the seed particles for cloud droplet formation (cloud condensation nuclei, CCN). In this capacity atmospheric aerosols are essential to the Earth's climate system as we know it, exerting major influences on the hydrological cycle and associated energy flows, as well as the influences on radiative energy fluxes associated with absorption and reflection of long- and shortwave radiation by clouds.

As is well recognized, the loading, geographical distribution, and physical and chemical properties of atmospheric aerosols have changed substantially over the industrial period as a consequence of human activities including energy production and use. In recent years it has become recognized that these changes are of sufficiently great scope, globally, to exert, in the aggregate, influences on the earth's

radiation budget that are comparable in magnitude to the influences of enhanced concentrations of greenhouse gases. Locally in regions of high industrial activity the radiative influences can be substantially greater than these greenhouse influences. Absorption of radiation by aerosols, while exerting a lesser influence on the top-of-atmosphere radiation budget, nonetheless exerts substantial influence on the surface radiation budget. Influences of anthropogenic aerosols on cloud radiative properties are likewise thought in the aggregate to be comparable to radiative influences of enhanced greenhouse gases. However all of these influences are considered highly uncertain, much more uncertain than the corresponding climate influences of enhanced greenhouse gases.

The foregoing considerations are now recognized to limit the ability to quantify human influences on climate change over the industrial period, in turn limiting the ability to evaluate the performance of climate models over this period or to infer climate sensitivity empirically from observed temperature changes together with the total radiative forcing over the industrial period. [2004-11-12]

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Science News

MASE Project. The ASP MASE (MArine Stratus Experiment) field project was conducted in the vicinity of Point Reyes, CA, just north of San Francisco, throughout the month of July, 2005. The project examined the influences of anthropogenic aerosols on marine stratus clouds so that the relevant processes can be more accurately represented in climate models.

The primary measurement platform was the DOE G-1 Research aircraft, which was outfitted for this study with numerous state-of-the-art instruments for characterization of aerosol properties. The project made extensive use of the DOE Atmospheric Radiation Measurement (ARM) program's ARM Mobile Facility (AMF) with its array of in-situ and remote-sensing instruments, supplemented by specialized measurements made by instrumentation provided by ASP investigators and others. Another key measurement platform was the Twin Otter research aircraft operated by the Center for Interdisciplinary Remotely-Piloted Aircraft Studies (CIRPAS) at the Naval Postgraduate School and instrumented by researchers from the California Institute of Technology and ASP investigators.

For additional information regarding the rationale for the study, objectives and deliverables, collaborations, and operations see the MASE Project Overview. For links to data, photos of operations, and other information click on the MASE Project Home Page. [2005-08-31]

Planned field projects. Two field studies are planned for the 2006 time frame. These projects are listed here; click the link to open the project plan. [2005-08-31]

- ASP 2006 Megacity Aerosol eXperiment in MEXico city (MAX-MEX)
- Objectives and motivation for an ASP field campaign in Houston

Potential field projects. An additional field study proposed for consideration as ASP field projects in the 2006 - 2007 time frame is listed here. For a brief description of the project click the appropriate link. ASP participants wishing to propose additional candidate field projects are invited to prepare a similar description and forward it to Steve Schwartz or Rick Petty for posting and discussion. [2005-08-31]

- ASP field campaign to study aerosol processing in cumuliform clouds

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Research Highlights

ASP investigators are invited to submit copies of or links to recent publications or preprints of their work in ASP to be highlighted here.

Presentations

ASP investigators are invited to submit copies of or links to recent presentations of their work in ASP to be highlighted here.

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Program News

ASP Deliverables. One of the most important descriptors of a program within the DOE Climate Change Research Division or, more broadly, within the US Climate Change Science Program is the list of deliverables that the program may be expected to produce. These deliverables are distinguished into two categories:

Science Deliverables are specific advances that form the scientific basis for program deliverables. Science deliverables range from data sets (from field and laboratory studies) comprising the primary results of these studies, to scientific papers published in the peer-reviewed literature that document the findings on which ASP models and parameterizations are based and the associated uncertainties. These science deliverables will generally be completed in a given funding cycle; the current funding cycle extends over FY 2005-FY 2007.

Program Deliverables are the products that will be delivered by the program as a whole. These program deliverables incorporating these advances in science will generally be completed in following three-year funding cycle, i.e., during FY 2008-FY 2010.

A statement of ASP deliverables is being prepared, and a draft of this statement is available for examination. ASP investigators are encouraged to review this document to ascertain whether it adequately sets out the deliverables of their projects and to advise Steve Schwartz and Peter Lunn of any suggested additions or corrections. Additionally investigators are requested to review the Program Deliverables and propose any modifications. [2005-05-05]

A **data policy** is being formulated for ASP. This policy covers the rights and responsibilities of ASP investigators regarding delivery and use of ASP data and also presents the format for data reporting, units, and the like. An **initial draft** was presented and discussed at the Science Team Meeting. Based on these discussions a **second draft** data policy has been formulated and is available for examination and comment. It is requested that comments be directed to Larry Kleinman (kleinman@bnl.gov) with copy to Steve Schwartz (ses@bnl.gov). [2005-05-05]

ASP Science Steering Committee. On March 15 Peter Lunn, DOE Program Director for the Atmospheric Science Program announced the membership of the ASP Science Steering Committee, as follows:

Peter H. Daum	BNL
J. Christopher Doran	PNNL
Jeffrey S. Gaffney	ANL
Steven J. Ghan	PNNL
Chris A. Hostetler	NASA Langley
Sasha Madronich	NCAR
Luisa T. Molina	MIT
John H. Seinfeld	Caltech

For more information see the ASP Website Archive. [2005-03-02]

ASP Topical Working Groups. Based on identification of major classes of research interest, several topical working groups have been organized within ASP. These working groups will server as informal meeting grounds (often virtual) for ASP participants to exchange ideas and findings. Also these working groups can help to identify and focus measurement needs for field projects in support of mutual objectives, and other common science support requirements. The topical working groups and their chairs are as follows:

New Particle Formation	Peter McMurry
Gas-particle Interactions	Rahul Zaveri
Optical Properties	Jim Barnard

Cloud-aerosol Interactions	Peter Daum
Modeling	Jerome Fast

ASP investigators, members of the ASP Adjunct Science Team, and others with interest in these areas of investigation are invited to contact the pertinent working group chair. [2005-10-06]

Report to BERAC. ASP Program Director Peter Lunn presented a report on the status of ASP to the semi-annual meeting of the DOE Biological and Environmental Research Advisory Committee, in April. A copy of his viewgraphs may be downloaded **here**. [2005-05-05]

Program News Archive

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Science Projects

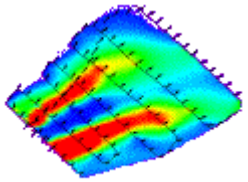
Thirty two science projects have been funded in FY 2005. Project titles and names of participating investigators are listed here. We expect to have project abstracts linked to this web page soon. [2005-02-12]

Science Support

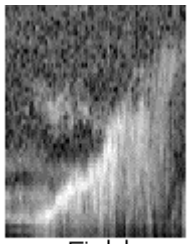
Five Science Support projects have been funded in FY 2005, mainly in support of field activities to be conducted in this program. Project titles and principal investigator names are listed here. We also expect to have abstracts for these projects linked to this web page soon. [2005-02-12]


Research Aircraft

The DOE Research Aircraft Facility at the Pacific Northwest National Laboratory (PNNL) consists of an advanced sampling platform, the PNNL Grumman Gulfstream I (G-1) and associated flight crew, technical and engineering support staff, and state-of-the-art instrumentation, available for support of missions in the DOE Atmospheric Science Program.


Core Measurements

The ASP Core Measurements Project at Brookhaven National Laboratory (BNL) provides a set of field measurements essential to field projects in ASP examining aerosol properties and processes pertinent to radiative forcing. Research-grade instruments are operated on behalf of the program for aerosol precursors, atmospheric oxidants, aerosol microphysical properties, aerosol composition and ancillary trace gases. This equipment has been field proven and meets the unique requirements of aircraft-based sampling, primarily aboard the DOE Research Aircraft Facility. Multiple associated science support activities include providing quality assurance, aircraft installation, trained operators, 'first-look' data in the field, final-data reduction, and archival distribution of final-form results. [2005-05-05]


Field Deployment

Instrumentation and Deployment in Support of ASP Field Studies at Argonne National Laboratory (ANL) provides ASP field projects with surface towers, SODARS, wind profilers, radiosonde launch capability, 570 nm LIDAR, multi-filter shadowband radiometers, nephelometers, UVB radiometers and the like, to characterize horizontal and vertical transport, atmospheric stability, boundary layer dynamics and mixing height, aerosol optical depth, aerosol vertical distribution, downwelling direct and diffuse irradiance, and aerosol light scattering. [2005-06-02]


Meteorological and Aerosol Measurements

The Meteorological and Aerosol Measurements activity at Pacific Northwest National Laboratory provides measurements of the meteorological conditions and ground truth observations of selected aerosol properties during ASP field campaigns. Available Meteorological instruments include a 915 Mhz radar wind profiler, a doppler sodar, a rawinsonde system, and surface weather stations. Aerosol instruments include an optical particle counter, condensation particle counters, nephelometers, and particle soot absorption photometers. [2005-08-24]

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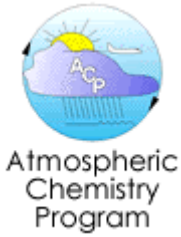
FY 2005 Science Team Meeting

A brief account of the 2005 Science Team Meeting is given in the ASP Website Archive. This account includes links to the meeting agenda, presentations by the ASP investigators, and the list of attendees. Also on the Archive web page is the ASP Chief Scientist's report of the meeting.

Prior Program Components

The following research components comprised the ASP Program prior to reconfiguration of the program to focus on aerosol radiative forcing of climate change. The links provided lead to web pages which provide program descriptions, summaries of findings, lists of publications and the like. [2004-11-12]



Atmospheric Chemistry Program. Examining atmospheric chemistry on regional to continental scales, including aerosol genesis and the fate of tropospheric air pollutants. Laboratory studies to examine rate and equilibrium processes. Field studies conducted with aircraft and surface measurements to examine reaction chemistry, advective influences on the chemical composition of chemistry, and air-surface exchange processes. Model development to represent chemistry and dynamics on regional to global scales.

Environmental Meteorology Program. Investigating the mechanisms responsible for vertical transport and mixing in the lower atmosphere, improving ability to measure quantities required for understanding of these processes, and developing improved treatments of vertical transport and mixing for use in conceptual and numerical models.

Tropospheric Aerosol Program. Developing the fundamental scientific understanding required to construct tools for simulating the life cycle of tropospheric aerosols by conducting closely linked field, modeling, laboratory, and theoretical studies focused on the processes controlling formation, growth, transport, and deposition of tropospheric aerosols.

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NARSTO

NARSTO is a public/private partnership, whose membership spans government, the utilities, industry, and academe throughout Mexico, the United States, and Canada. Its primary mission is to coordinate and enhance policy-relevant scientific research and assessment of tropospheric pollution behavior; its activities provide input for science-based decision-making and determination of workable, efficient, and effective strategies for local and regional air-pollution management. ASP supports NARSTO by providing funding for the NARSTO Management Coordinator and by the ASP Program Director serving on the NARSTO Executive Steering Committee. It is the intent of ASP to make use of the NARSTO data archive and that ASP data policy conform with NARSTO policy. [2005-05-06]

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