[This page was last updated 2010-01-04]

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.

MERGER OF ATMOSPHERIC SCIENCE PROGRAM AND THE ATMOSPHERIC RADIATION MEASUREMENT PROGRAM [2009-10-08]

The Atmospheric Science Program and the Atmospheric Radiation Measurement Program (ARM) have merged, effective October 1, into a new program called Atmospheric System Research, ASR. Discussions and planning are underway to bring the research elements of the two programs into better alignment to further the common research goal of understanding the climate system and representing this understanding in models. A major benefit of the merger is expected to be a strengthening of the aerosol- and cloud-related research components of the programs by bringing together the ARM capabilities of continuous remote sensing measurements of cloud properties and aerosol influences on radiation with the ASP capabilities for in-situ characterization of aerosol properties, evolution and cloud interactions. The Science Plan for the new Atmospheric System Research program is in preparation.

Programmatic questions arising out of the merger are addressed here. [2009-09-10]

This web page will be maintained until appropriate content has been migrated to a new web page. [2009-10-08]

JOINT MEETING OF THE ATMOSPHERIC RADIATION MEASUREMENT PROGRAM CLIMATE RESEARCH FACILITY, CLOUD MODELING AND AEROSOL WORKING GROUPS, AND ATMOSPHERIC SCIENCE PROGRAM [2009-09-04]

The cloud modeling and aerosol research elements of the newly combined Atmospheric System Research Program got off to an early start in a joint meeting held in Boulder Colorado, September 29 - October 2.. The meeting commenced on Tuesday, September 29, with the Cloud Modeling Working Group. The Aerosol Working Group and Atmospheric Science Program commenced on Wednesday, September 30, and extended through Friday, October 2.

An agenda of the meeting is available. [updated 2009-09-08]

The new ASR was introduced in several sessions. The science questions facing the aerosol research community of ASR were extensively discussed. Several sessions were devoted to planning of future research activities. Measurements being made and new measurements to be made at ACRF (Arm Climate Research Facility) sites and so-called Value-Added Products (VAPs) were discussed. The latter, a unique and valuable product of ARM, are data streams that, typically, combine data from multiple instruments to yield new data streams that rely on multiple measurements.

The instrumentation that is being acquired with moneys made available under the Recovery Act was presented. Determining how to best use this instrumentation within available resources for deployment will be a challenge. Especially pertinent are aerosol and aerosol-related measurements to be made at ACRF sites and with the ARM Mobile Facilities. A session on Friday morning focused on ongoing and future field projects and future deployments of the ARM Mobile Facility and Aircraft Facility.

The meeting also included sessions dealing with modeling aerosols and clouds and their interactions and the recent ISDAC (Indirect and Semi-Direct Aerosol Campaign) project. A session of the Cloud Modeling Working Group also contained many presentations pertinent to aerosol-cloud interactions. [2009-10-08]

For meeting registration and hotel reservation information see http://science.arm.gov/workinggroup/cpm/scm/meeting_Sep09.html. (The meeting agenda available by a link

ASP Data Policy

ASP Website Archive

2005 Science Team Meeting

Prior Program Components

NARSTO

ACCESS

Acronyms

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from that page may be out of date.) The deadline for hotel registration at the conference rate has passed. [2009-09-08]

2009 ATMOSPHERIC SCIENCE PROGRAM SCIENCE TEAM MEETING [2009-03-23]

The 2009 Science Team Meeting of the Department of Energy's Atmospheric Science Program took place Wednesday through Friday February 25-27 in Santa Fe, New Mexico.

The meeting program has links to pdf files of the viewgraphs from the platform presentations. Files of the posters are being made available as received from the presenters. Also available from that link are the list of attendees and a collage of photos from the meeting.

CLIMATE CHANGE SCIENCE PROGRAM SYNTHESIS AND ASSESSMENT REPORT ON AEROSOLS RELEASED [2009-01-27]

Report Calls Aerosol Research Key to Improving Climate Predictions

WASHINGTON -- Scientists need a more detailed understanding of how human-produced atmospheric particles, called aerosols, affect climate in order to produce better predictions of Earth's future climate, according to a report issued by the U.S. Climate Change Science Program on Friday. Stephen Schwartz, Chief Scientist of ASP served as co-editor of the report (with Mian Chin and Ralph Kahn, both of NASA). Schwartz also served as contributor to the individual chapters.

"Atmospheric Aerosol Properties and Climate Impacts," is the latest in a series of Climate Change Science Program reports that addresses various aspects of the country's highest priority climate research, observation and decision-support needs. The study's authors include scientists from the National Aeronautics and Space Agency, the National Oceanic and Atmospheric Administration, and the Department of Energy.

"The influence of aerosols on climate is not yet adequately taken into account in our computer predictions of climate," said Mian Chin, report coordinating lead author. "An improved representation of aerosols in climate models is essential to more accurately predict the climate changes."

Aerosols are suspended solid or liquid particles in the air that often are visible as dust, smoke and haze. Aerosols come from a variety of natural and human processes. On a global basis, the bulk of aerosols originate from natural sources, mainly sea salt, dust and wildfires. Human-produced aerosols arise primarily from a variety of combustion sources. They can be the dominant form of aerosol in and downwind of highly populated and industrialized regions, and in areas of intense agricultural burning.

Although Earth's atmosphere consists primarily of gases, aerosols and clouds play significant roles in shaping conditions at the surface and in the lower atmosphere. Aerosols typically range in diameter from a few nanometers to a few tens of micrometers. They exhibit a wide range of compositions and shapes, but aerosols between 0.05 and 10 micrometers in diameter dominate aerosols' direct interaction with sunlight. Aerosols also can produce changes in cloud properties and precipitation, which, in turn, affect climate.

Current predictions of how much Earth's average surface temperature will increase in the future fall in a wide range. If the amount of carbon dioxide and other greenhouse gases double from the levels in the atmosphere in 1990, the increase in temperature is expected to be from 2 to 4.5 degrees Celsius, according to the U.N. Intergovernmental Panel on Climate Change. The role of greenhouse gases in global warming is fairly well established, but the extent to which the cooling effect of human-produced aerosols offsets the warming is still inadequately understood. The report states that scientists should strive to improve their understanding of aerosols' climate influences with the goal of cutting that range of uncertainty by nearly two-thirds.

The report states that to achieve the goal of reducing uncertainties in aerosol impacts on climate, an advanced, multi-disciplinary approach that integrates surface, aircraft, and space-based measurements with models will have to be developed. Scientists have made gains in modeling aerosol effects, but this capability has not yet been fully incorporated into climate simulations, according to the report.

The complete report is available at: http://www.climatescience.gov/Library/sap/sap2-3/final-report/default.htm

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PRESENTATION OF PRELIMINARY RESULTS FROM VOCALS [2008-11-09]

Pete Daum, ASP Lead scientist for VOCALS, presented some initial results from G-1 Aircraft measurements of aerosol and cloud properties in VOCALS. Viewgraphs from that presentation can be downloaded here as a pdf file. It should be stressed that these viewgraphs are preliminary. Nonetheless the results shown here provide an excellent sense of the magnitudes of aerosol and cloud properties and their variation as a function of distance from the Chilean coast.

VOCALS FIELD STUDY IS CONCLUDED [2009-01-27]

During October and November 2008, some 150 scientists from 40 institutions in eight nations - including ASP investigators - took part in an international field experiment designed to make observations of critical components of the climate system of the southeastern Pacific. Because elements of this system are poorly understood and poorly represented in global climate models, collecting real-time, complementary data from a variety of areas are expected to go a long way toward improving scientists' ability to use these models for making accurate predictions about Earth's climate.

A total of five aircraft - including DOE's G-1 Gulfstream research aircraft, operated by Pacific Northwest National Laboratory (PNNL) with instruments developed at both PNNL and Brookhaven National Laboratory - and two research ships sampled the lower atmosphere and upper ocean during the experiment. Two sampling sites operated by research groups from Chile, Sweden, and the United States conducted complementary studies.

"We are motivated to participate in this study because the vast area of clouds in this region will provide an ideal laboratory for testing theories that have been developed at Brookhaven Lab regarding how precipitation forms in clouds and how aerosols affect cloud optical and microphysical properties," said Peter Daum, lead scientist for ASP-VOCALS, the ASP component of this study.

The southeastern Pacific region is dominated by strong coastal upwelling, bringing cold, dense seawater from the deep ocean closer to the surface and resulting in extensive cold sea surface temperatures. It is also home to the largest subtropical deck of low-lying stratocumulus clouds on Earth.

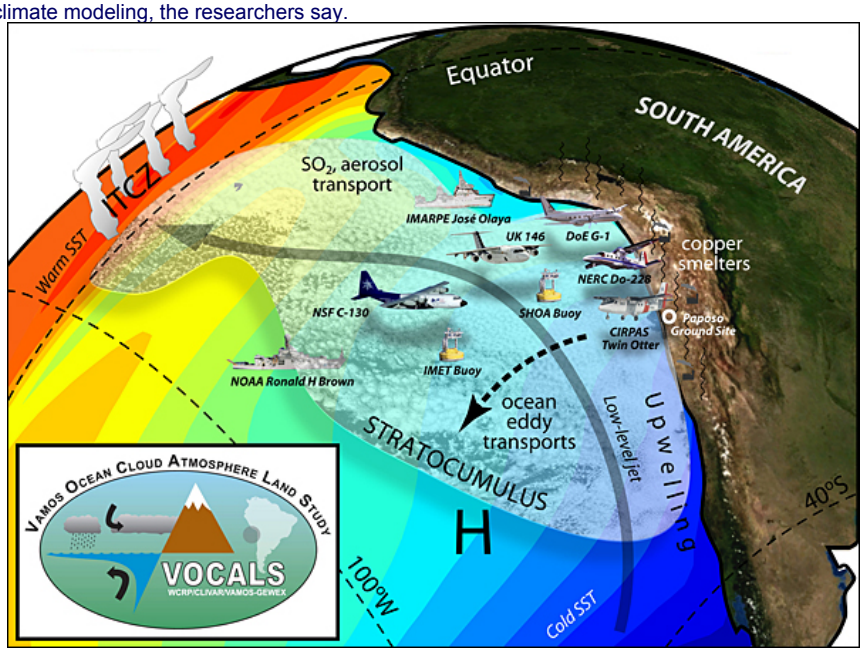
"These and other chemical and physical factors shape the regional climate and affect the global weather in ways that are poorly understood," said C. Roberto Mechoso, a professor of atmospheric and oceanic sciences at the University of California, Los Angeles, who chairs the research program. "Our research should produce a better understanding of the Southeast Pacific Ocean system, and improve our global computer climate models Ñwhich would lead to more confidence in climate forecasts, including predictions about global warming."

Mechoso headed the scientific modeling arm of the research program, while Robert Wood, of the University of Washington, led the experimental field component. Specifically, the scientists focused on gaining a better understanding of:

* the processes that control the properties of stratocumulus clouds - including the influence of tiny aerosol particles emitted from smelters and volcanoes located on the South American continent
* the processes that control the transport of cold freshwater in the ocean
* the chemical and physical interactions between the lower atmosphere and upper ocean

The study, known as the Variability of the American Monsoon Systems (VAMOS) Ocean-Cloud-Atmosphere-Land Study Regional Experiment (VOCALS-Rex), was a component of a larger international climate study program, VOCALS. The major goal of the VOCALS program is to develop and promote scientific activities leading to improved understanding, model simulation, and predictions of the southeastern Pacific ocean-atmosphere-land climate system on day-to-day and year-to-year timescales. The other major components of VOCALS are a modeling program ranging from local to global scales and a suite of extended observations from regular research cruises, instrumented moorings, and satellites.

The combination of intensive field measurements, long-term observations, and modeling are expected to provide important insights that could directly benefit climate modeling, the researchers say.



Schematic of the Variability of the American Monsoon Systems (VAMOS) Ocean-Cloud-Atmosphere-Land Study Regional Experiment (VOCAL-REx). The figure also shows the locations of extended observational buoys: the Improved Meteorology (IMET) buoy and the Servicio Hidrografico y Oceanografico de la Armada de Chile (SHOA) buoy. ITCZ is the Intertropical Convergence Zone.

A directory on the ASP ftp site has been set up to provide information on the project. The site is located at:

ftp://ftp.asd.bnl.gov/pub/ASP%20Field%20Programs/2008VOCALS/

This site serves as the main hub for exchange of data, information and possible photos and newsletters. Within the above public site is a directory labeled 'Participants,' which is password protected for users only. The user name is 'VOCALS_DOE'. The password is available on request from participants (including interested ASP investigators). The site provides first-look data (quick plots, ASCII files of G-1 measurements, etc.). ASP investigators wishing to obtain a password are requested to contact Stephen Springston or Gunnar Senum.

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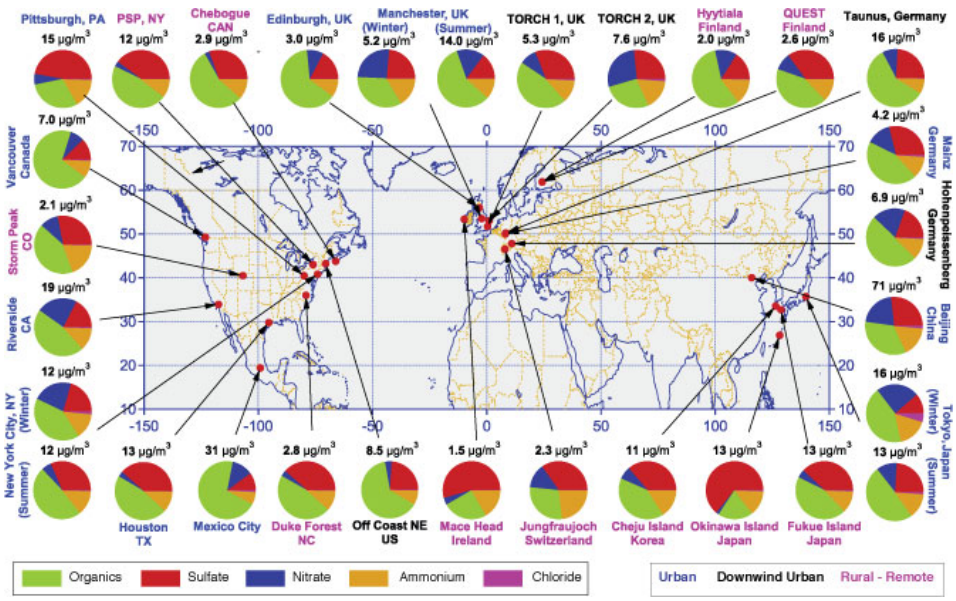
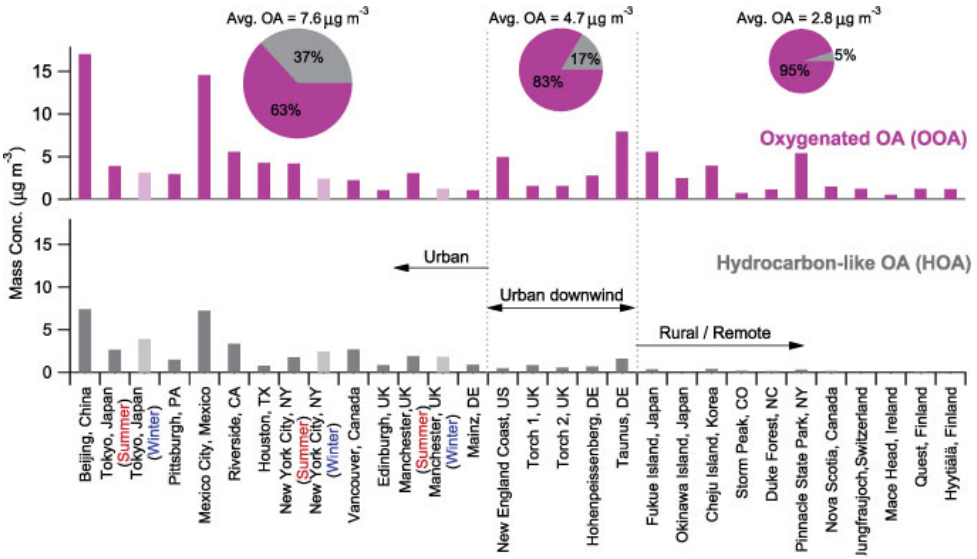
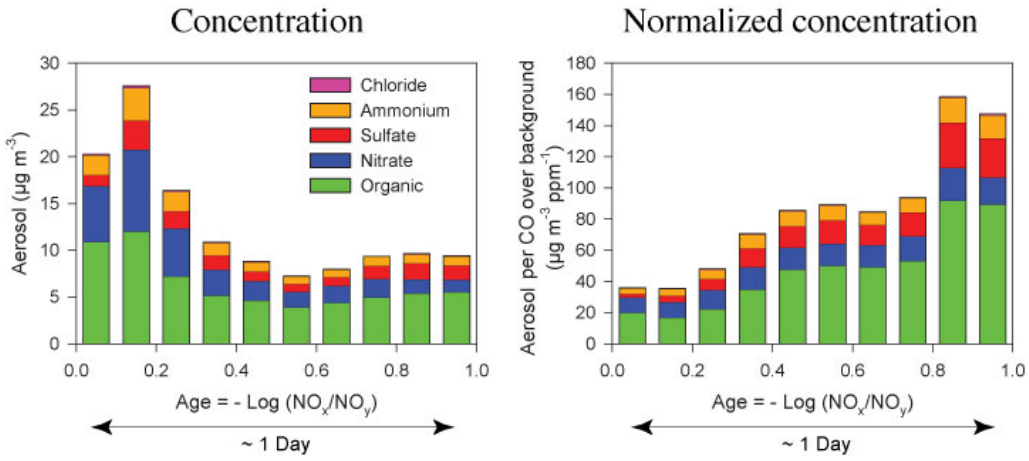
RECENT RESEARCH HIGHLIGHTS
A gallery of recent findings from ASP research



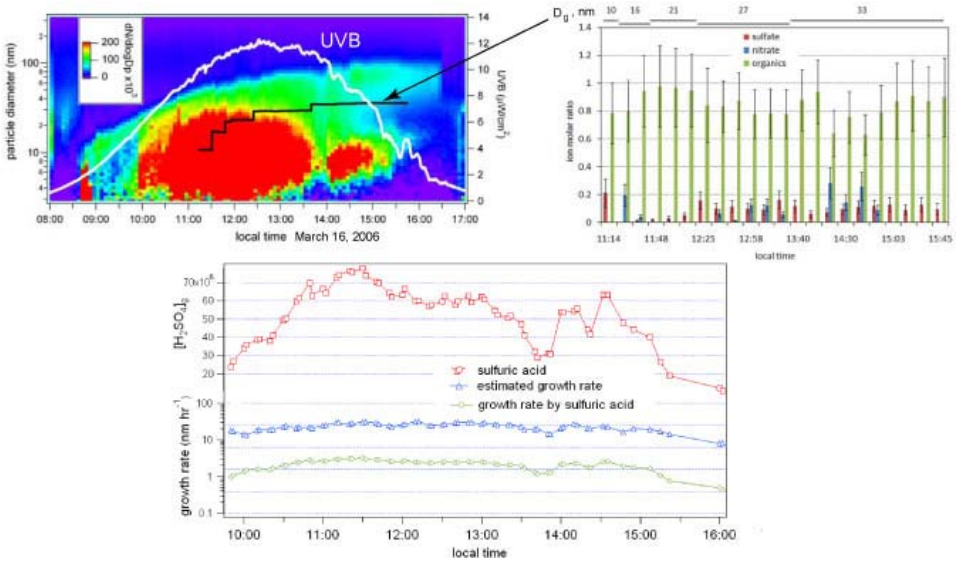
New instruments lead to new insights. Measurements with the aerosol mass spectrometer by many investigators show that organics are the major or dominant aerosol constituent throughout the anthropogenically influenced Northern Hemisphere. From: Zhang Q., J.L. Jimenez, M.R. Canagaratna, J.D. Allan, H. Coe, I. Ulbrich, M.R. Alfarra, A. Takami, A.M. Middlebrook, Y.L. Sun, K. Dzepina, E. Dunlea, K. Docherty, P.F. DeCarlo, D. Salcedo, T. Onasch, J.T. Jayne, T. Miyoshi, A. Shimono, S. Hatakeyama, N. Takegawa, Y. Kondo, J. Schneider, F. Drewnick, S. Weimer, K. Demerjian, P. Williams, K. Bower, R. Bahreini, L. Cotrell, R.J. Griffin, J. Rautiainen, J.Y. Sun, Y.M. Zhang, and D.R. Worsnop (2007) Ubiquity and Dominance of Oxygenated Species in Organic Aerosols in Anthropogenically-Influenced Northern Hemisphere Mid-latitudes, *Geophys. Res. Lett.*, **34**, L13801, doi:10.1029/2007GL029979.



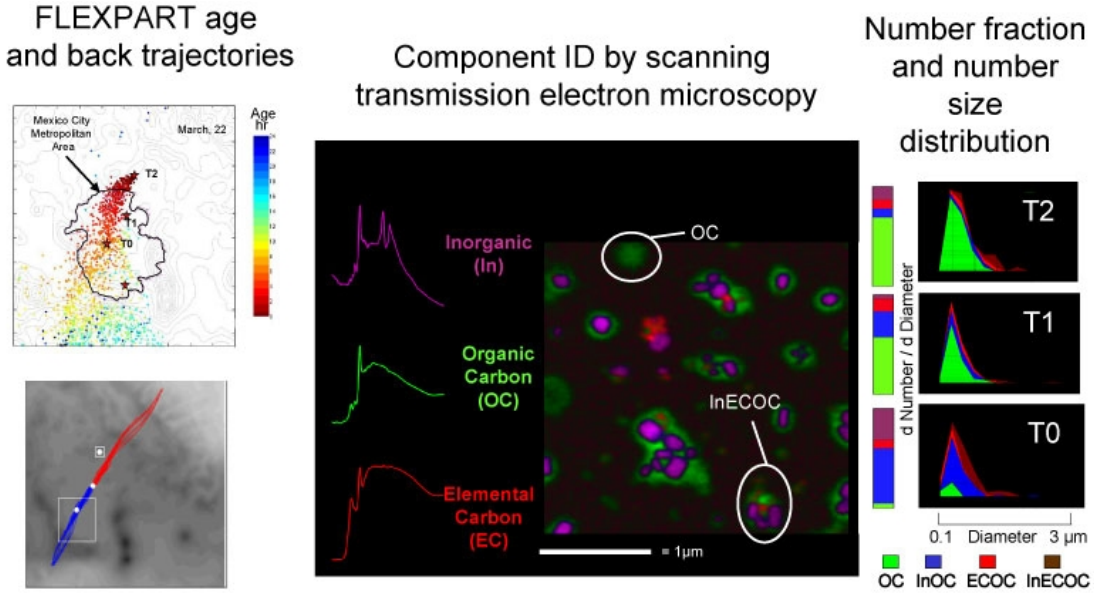
Organic composition systematically varies with location. Measurements with the aerosol mass spectrometer show that the fraction of secondary organic aerosol increases with increasing distance from urban sources. Area of pie is scaled to organic aerosol concentration. From: Zhang Q., J.L. Jimenez, M.R. Canagaratna, J.D. Allan, H. Coe, I. Ulbrich, M.R. Alfarra, A. Takami, A.M. Middlebrook, Y.L. Sun, K. Dzepina, E. Dunlea, K. Docherty, P.F. DeCarlo, D. Salcedo, T. Onasch, J.T. Jayne, T. Miyoshi, A. Shimono, S. Hatakeyama, N. Takegawa, Y. Kondo, J. Schneider, F. Drewnick, S. Weimer, K. Demerjian, P. Williams, K. Bower, R. Bahreini, L. Cotrell, R.J. Griffin, J. Rautiainen, J.Y. Sun, Y.M. Zhang, and D.R. Worsnop (2007) Ubiquity and Dominance of Oxygenated Species in Organic Aerosols in Anthropogenically-Influenced Northern Hemisphere Mid-latitudes, *Geophys. Res. Lett.*, **34**, L13801, doi:10.1029/2007GL029979.



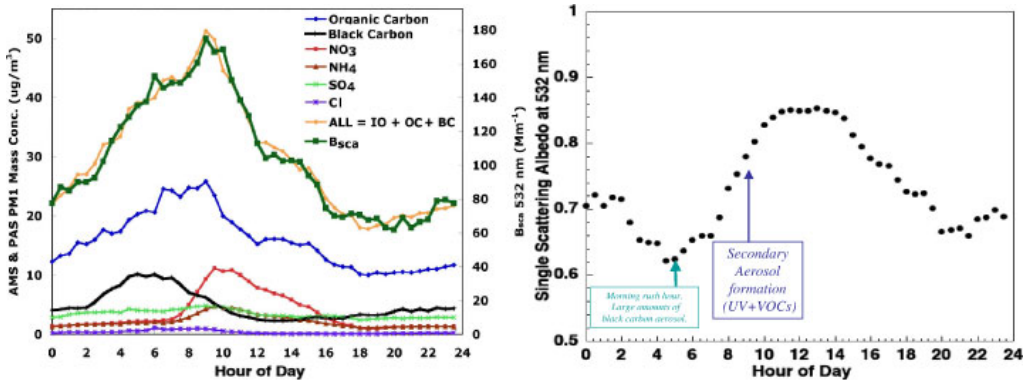
Secondary organic aerosol production in Mexico City plume. Aircraft measurements of the amount and composition of aerosol during the 2006 MILAGRO MAX-MEX field campaign stratified according to photochemical age as determined using -log(NO_x/NO_y) as a clock (left) show increasing organic fraction with increasing age. Normalization of aerosol concentration to mixing ratio of carbon monoxide, a conservative tracer of urban emissions, (right) shows fivefold increase in amount of organic aerosol; sulfate aerosol increases as well. Measured increase in organic aerosol exceeds modeled based on laboratory experiments and measured volatile organic carbon tenfold. From: Kleinman, L. I., Springston, S. R., Daum, P. H., Lee, Y.-N., Nunnermacker, L. J., Senum, G. I., Wang, J., Weinstein-Lloyd, J., Alexander, M. L., Hubbe, J., Ortega, J., Canagaratna, M. R., and Jayne, J. The time evolution of aerosol composition over the Mexico City plateau. *Atmos. Chem. Phys.* **8**, 1559-1575 (2008)



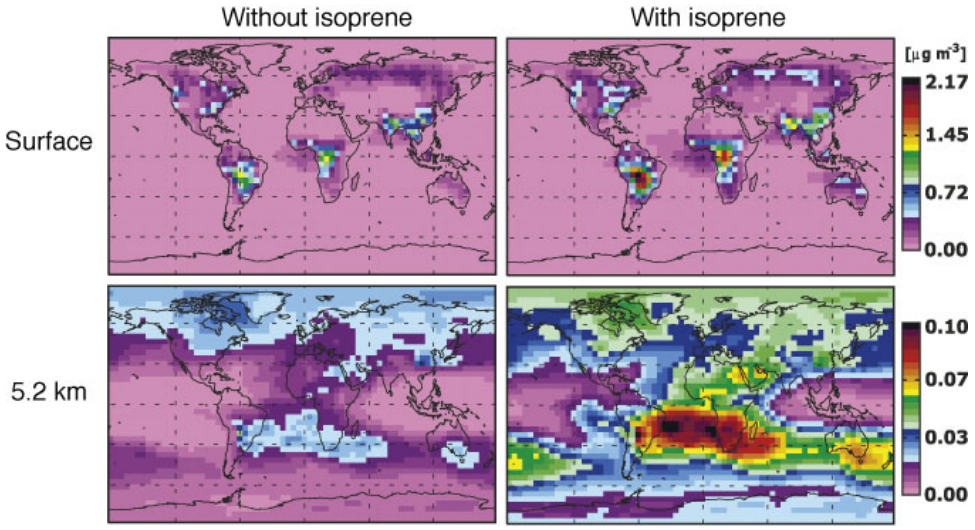
Growth of small particles during a nucleation event at Tecamac Mexico during the MILAGRO MAX-MEX campaign. Nucleation event indicated by great increase in concentration of particles below 10 nm diameter commencing about 1000 local time (upper left) is believed related to photochemical activity triggered by ultraviolet radiation. Composition of particles measured by thermal desorption chemical ionization mass spectrometry as a function of time at diameters coinciding with the peak in particle number concentration indicated by black steps in upper left is dominated by organics (upper right). Estimated rate of growth in particle diameter (lower panel, blue) exceeds that calculated for growth due to uptake of sulfuric acid vapor, as measured (red) by an order of magnitude. From: Smith, J. N., M. J. Dunn, T. M. VanReken, K. Iida, M. R. Stolzenburg, P. H. McMurry, and L. G. Huey. Chemical composition of atmospheric nanoparticles formed from nucleation in Tecamac, Mexico: Evidence for an important role for organic species in nanoparticle growth. *Geophys. Res. Lett.* **35**, L04808, doi:10.1029/2007GL032523 (2008)



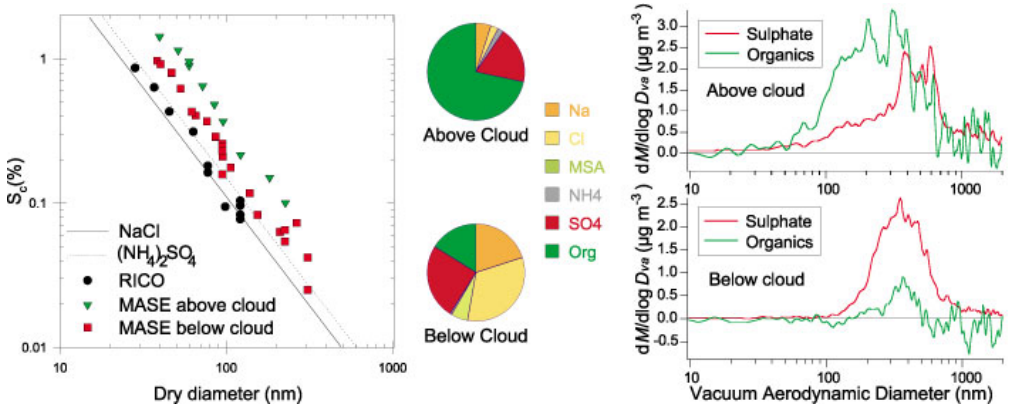
Evolution of single particle composition and morphology on a single day in Mexico City during the MILAGRO MAX-MEX campaign on March 22, 2006. Center panel shows size and composition of collected particles determined by scanning transmission electron microscopy. Note instances of wholly organic particles, inorganic particles surrounded by annular organic shell, and mixed organic inorganic elemental carbon particles. Right panels show systematic increase in organic composition for particles collected succesively downwind from central Mexico City (T0) to T1 to T2. Air trajectories show direction of transport and particle age. From: Moffet R., A. Tivanski, R. Hopkins, Y. Desyaterik, J. Fast, J. Barnard, A. Laskin, and M. Gilles. Aging of an Urban Aerosol Plume. ASP Science Team Meeting, Annapolis MD (2008). http://www.asp.bnl.gov/ASP_ST_mtg_pres_2008/Moffet_et.al_AgingUrbanPlume.pdf



Relation of aerosol composition and optical properties in Mexico City during the MILAGRO MAX-MEX campaign in March 2006. Left panel shows diurnal profile of composition, determined by aerosol mass spectrometry, and light scattering coefficient as function of time of day, averaged over the campaign; right panel shows diurnal profile of single scattering albedo. Increase in single scattering albedo is attributed to secondary aerosol formation due to photochemistry occurring during daytime. From: Paredes-Miranda L. and Arnott W. P. Aerosol Light Scattering and Absorption at 532 nm at IMP in Mexico City, March 2006. ASP Science Team Meeting, Annapolis MD (2008). http://www.asp.bnl.gov/ASP_ST_mtg_pres_2008/Arnott/ArnottMilagro.ppt. Aerosol mass spectrometry: J. Jimenez, A. Aiken.

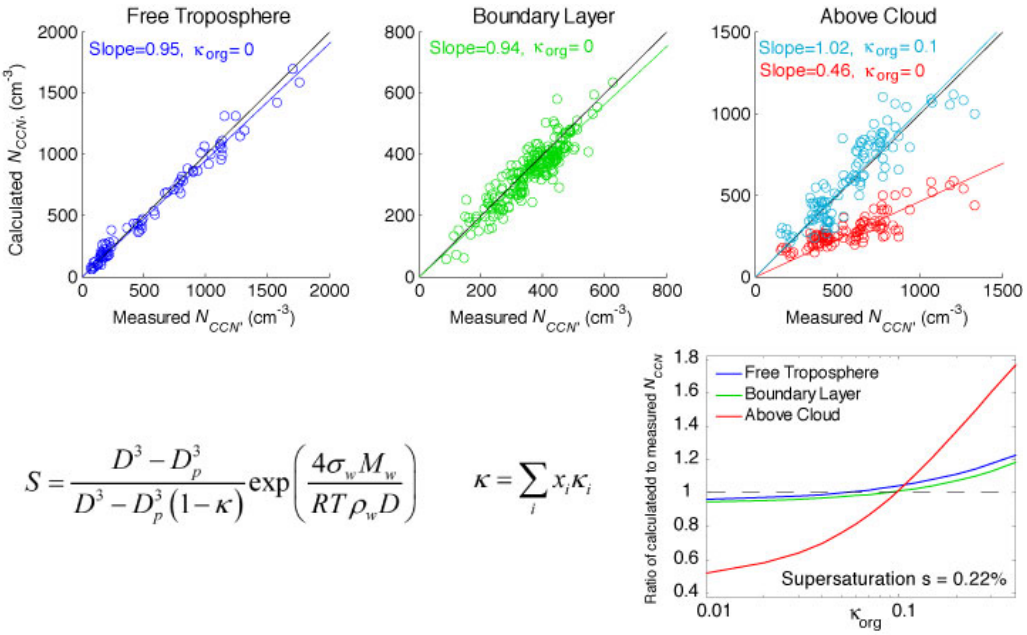


Model study shows major contribution of secondary organic aerosol derived from isoprene. Because of its low molecular weight, isoprene has not been considered to be a significant source of secondary organic aerosol (SOA). However recent laboratory studies have shown a small yield of SOA. Because of the large source strength of isoprene -- it is emitted by deciduous forests -- even a small yield of SOA could constitute a major source of SOA. Examination of SOA from isoprene in a global chemical transport model shows substantial enhancement of SOA in forested regions at the surface (upper right vs. upper left) and much greater relative enhancement in the free troposphere (5.2 km, lower right vs. lower left; note change of scale). From Henze, D. K. and Seinfeld, J. H. Global secondary organic aerosol from isoprene oxidation. *Geophys. Res. Lett.* **33**, L09812, doi:10.1029/2006GL025976 (2006).



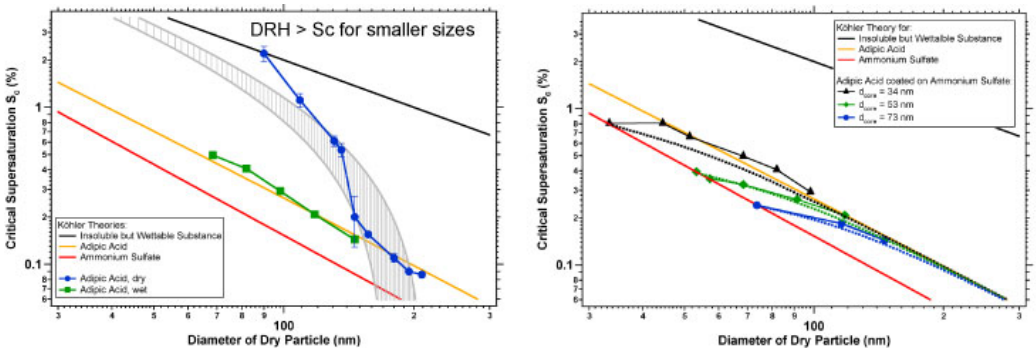
Influence of composition on CCN activity of aerosol particles. The ability of an aerosol particle to serve as a cloud condensation

nucleus (CCN), specifically the supersaturation at which the particle activates to become a cloud droplet, depends on its size and composition. For soluble salts such as sodium chloride and ammonium sulfate a relatively low supersaturation is required for a given particle diameter, as shown in the left panel. Also shown there are data from the RICO campaign in the Caribbean and from the ASP MASE (MArine Stratus Experiment) project conducted off the coast of California north of San Francisco on July 25, 2005. The measurements in the RICO campaign indicate the presence largely of soluble salts. In the MASE measurements a somewhat higher supersaturation was required to activate particles at a given size below cloud (110-170 m above sea level) and a still greater supersaturation above cloud (400-470 m) indicative of composition other than soluble salts. This supposition is confirmed by bulk measurements with PILS (particle into liquid sampler) shown in the pie charts and by composition versus size measurements with the aerosol mass spectrometer. Measurements of J. Hudson, Y.-N. Lee, and M. Alexander.



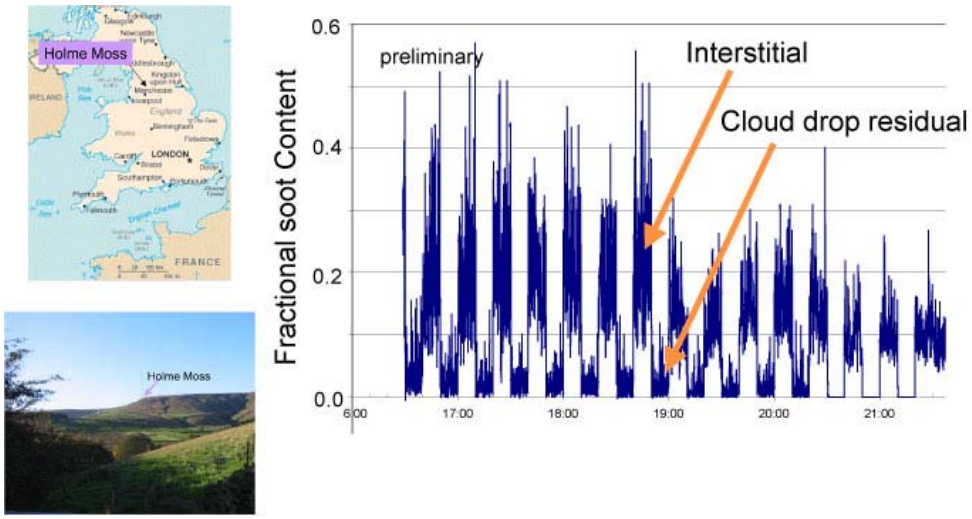
$$S = \frac{D^3 - D_p^3}{D^3 - D_p^3(1-\kappa)} \exp\left(\frac{4\sigma_w M_w}{RT\rho_w D}\right) \qquad \kappa = \sum_i x_i \kappa_i$$

Closure study on CCN Concentration. The expression at the lower left gives the critical supersaturation for activation of an aerosol particle as a function of its diameter D_p, surface tension taken as that of water σ_w, the molecular weight of water M_w, and composition, as reflected by the parameter κ that reflects particle hygroscopicity; κ is evaluated as a sum of the κ values of individual components of a mixed composition aerosol weighted by their volume fraction x_i, with increasing κ indicative of increasing hygroscopicity. The accuracy of this expression is examined for data taken on nine aircraft flights during the ASP MASE (MArine Stratus Experiment) project conducted off the coast of California north of San Francisco in July, 2005 by comparisons of calculated and measured number concentrations of cloud condensation nuclei CCN, shown here for supersaturation ~0.22%, with good accuracy being indicated by the points lying on the one-to-one line. The organic fraction was determined by aerosol mass spectrometer. For particles in the free troposphere and the boundary layer, good agreement was achieved by setting the κ values for the organic fraction equal to zero. This is attributed to the rather low organic mass fraction, 50% or less. However for particles above cloud, for which the measured organic fraction was about 80%, the calculated number concentration was quite sensitive to the κ value and was substantially less than the measured concentration for κ equal to zero. When the &kappa value was set to 0.1, good agreement was again achieved. The dependence of the ratio of calculated to measured CCN concentration as a function of &kappa is shown at lower right. Wang J., Lee Y.-N.; Daum P.H., Alexander M.L., and Jayne J.



Laboratory studies of activation of mixed adipic acid - ammonium sulfate particles. The two graphs give critical supersaturation vs. particle dry diameter for particles of different composition. For a soluble salt such as ammonium sulfate a low critical supersaturation at any given diameter is expected according to Koehler theory (red line); for a sparingly soluble organic acid such as adipic acid a somewhat higher supersaturation is expected, tan line; and for an insoluble but wettable particle a considerably greater supersaturation is expected. Experimentally it is seen (left) that initially wet adipic acid particles exhibit the expected behavior. However for particles which are initially dry, the behavior exhibits a transition from that expected for adipic acid (small particles) to that expected for insoluble wettable particles

(larger particles) because activation occurs prior to dissolution; these results demonstrate the importance of prior history in governing particle behavior as a cloud condensation nucleus (CCN). Right panel shows critical supersaturation of particles consisting of ammonium sulfate cores (diameters 34, 53, and 73 nm) coated with adipic acid of varying thickness to give the indicated dry diameter. With increasing thickness of coating the particles exhibit a transition in critical supersaturation from that of ammonium sulfate to that of adipic acid. These findings suggest approaches to modeling the supersaturation behavior of inorganic particles coated with organics that are found in the ambient atmosphere. Hings S. S., W. C. Wrobel, E. S. Cross, D. R. Worsnop, P. Davidovits, and T. B. Onasch. CCN activation experiments with adipic acid: effect of particle phase and adipic acid coatings on soluble and insoluble particles. *Atmos. Chem. Phys. Discuss.* **8**, 4439-4482 (2008)



Soot-containing fraction of particles in cloudwater and interstitial air. Time series shows alternately the fraction of interstitial cloud air particles and of cloud drop residuals containing soot, as measured with single particle soot photometer during a fog event at Holme Moss, U.K. (north of Manchester). Greater soot fraction in interstitial air demonstrates that soot-containing particles are less efficiently activated to cloud drops than particles not containing soot. Andrews E., J. Ogren, J. Allan, K. Bower, H. Coe, B.Corris, M. Flynn, D. Liu, W. Morgan, P. Williams. Aerosol Properties Within and Without Clouds. ASP Science Team Meeting, Annapolis MD (2008). http://www.asp.bnl.gov/ASP_ST_mtg_pres_2008/Ogren_Andrews_AerosolProps.pdf

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RECENT EVENTS

MILAGRO campaign featured in IGAC newsletter [2008-06-30]

The MILAGRO 2006 campaign in Mexico City was prominently featured in "IGACtivities" the April 2008 newsletter of the IGAC (International Global Atmospheric Chemistry) Program. .

Presentations to DOE Grand Challenge Workshop and Climate Change Science Program Atmospheric Composition Interagency Working Group [2008-06-30]

Steve Schwartz presented talk entitled "Grand Challenge" Requirements for Aerosol Research to the DOE Workshop on Identifying Outstanding Grand Challenges in Climate Change Research: Guiding DOE's Strategic Planning, which was held in Arlington VA, March 25-27, 2008. Click here for viewgraphs.

Subsequently Schwartz together with Ashley Williamson briefed the Climate Change Science Program Atmospheric Composition Interagency Working Group on Highlights from the 2008 Science Team Meeting and the DOE Climate "Grand Challenge" workshop. Click here for viewgraphs. .

ASP data policy finalized

As a DOE Program ASP adheres to the data policies of the Department of Energy and the Climate Change Science Program, one of the objectives of which is to maximize the scientific return from multi-investigator field campaigns. As such it is the policy of ASP to assure the availability and usability of data collected in ASP field campaigns. This requires timely submission of data to an archive and adherence to data formats. The goals of ASP's data policy are to provide data and supporting information to ASP investigators in readily readable files, widen the audience of potential end-users, and foster collaborations among campaign participants and with outside

users. To a large extent, the success of ASP will be measured by its ability to disseminate information that is needed to address questions on global climate change. It is a shared responsibility of all participants to help achieve this goal, and the hope is that this can be done in a way that is not overly burdensome to individual investigators. To this end ASP has established a data policy that applies to measurements made during multi-investigator field campaigns. This policy applies to investigators who receive financial support from ASP or who receive in-kind support such as the use of platforms or facilities. ASP investigators and prospective collaborators are encouraged to familiarize themselves with the policy and to adhere to its guidelines. [2007-03-13]

Representing aerosol processes in global climate models

A paper entitled "Aerosol Properties and Processes: A Path from Field and Laboratory Measurements to Global Climate Models" by Steve Ghan and Steve Schwartz has been published in the *Bulletin of the American Meteorological Society*. The paper describes the DOE strategy for improving representation of the properties, processes, and effects of tropospheric aerosols in global climate models. The strategy begins with a foundation of field and laboratory measurements that provide the basis for modules describing specific aerosol properties and processes. These modules are then integrated into regional aerosol models, which are evaluated by comparing with field measurements. Issues of scale are then addressed so that the modules can be applied to global aerosol models, which are evaluated by comparing with satellite retrievals and other observations. Finally, the validated set of modules is applied in global climate models for multi-century simulations. This strategy is expected to be applied to successive generations of global climate models.

The paper may be downloaded from the BAMS website here. [2007-10-09]

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ASP Field Projects

The following are quick links to the web pages of future and recent ASP Field Projects.

VOCALS - ASP Chile, October, 2008.
ASP study to be conducted in conjunction with NSF VAMOS Ocean-Cloud- Atmospheric-Land Study.

CHAPS - Cumulus Humilis Aerosol Processing Study Oklahoma, June, 2007.
ASP study to be conducted in conjunction with DOE ARM CLASIC (Cloud and Land Surface Interaction Campaign).

MAX-Tex - Megacity Aerosol eXperiment - Texas Houston, August - September, 2006.
ASP Study conducted in conjunction with TEXAQS II (Second Texas Air Quality Study) / GoMACCS (Gulf of Mexico Atmospheric Composition and Climate Study).

MAX-Mex - Megacity Aerosol eXperiment - Mexico City Mexico, March, 2006.
ASP study conducted as part of MILAGRO (Megacity Initiative: Local and Global Research Observations).
Overview Presentation (10 M PDF file)

MASE - MArine Stratus Experiment California, July, 2005.
ASP study conducted in conjunction with DOE ARM MASRAD MArine Stratus Radiation, Aerosol, and Drizzle study.

Data from prior field studies are available from the **ASP data archive**

ASP investigators wishing to propose additional candidate field projects are invited to prepare a similar description and forward it to Steve Schwartz or Ashley Williamson for posting and discussion.

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Items of interest

ASP Publications web page. Please visit the 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.asd.bnl.gov/pub/ASP Field Programs/. 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; note change in ftp address, 2006-04-13]

Adjunct Science Team. 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 Ashley Williamson 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 Climatic Change Research (NICCR) (formerly National Institute for Global Environmental Change, NIGEC). [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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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]

ASP Science Steering Committee. Membership of the ASP Science Steering Committee is 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]

Program News Archive

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Science Projects

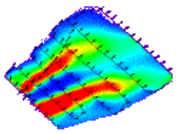
Thirty two science projects are supported by ASP. Project titles and names of participating investigators are listed here together with links to project abstracts. [2006-05-26]

Science Support

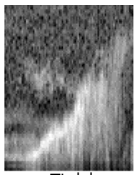
Five Science Support projects are supported by ASP, mainly in support of field activities to be conducted in this program. Project titles and principal investigator names are listed below together with links to descriptions of the projects.


Research Aircraft Facility

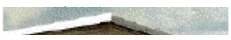
The DOE Research Aircraft Facility at the Pacific Northwest National Laboratory (PNNL) consists of an advanced sampling platform, the PNNL Grumman Gulfstream I (G-1) and associated flight crew, technical and engineering support staff, and state-of-the-art instrumentation, available for support of missions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

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]



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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ASP Science Team Meetings

Brief accounts of previous ASP Science Team Meetings, including links to the presentations, are given in the ASP Website Archive.

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

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

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

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]

ACCESS

ACCESS (Atmospheric Chemistry Colloquium for Emerging Senior Scientists) is a program for researchers within two years of receiving their Ph.D. degrees in atmospheric chemistry or a related disciplines. Held biennially, in odd numbered years, in

conjunction with the Gordon Research Conference in Atmospheric Chemistry, this program consists of a three-day meeting in which the participants present their research to each other and to representatives of the leading federal agencies responsible for support of research in atmospheric chemistry. ACCESS participants also attend the Gordon Research Conference, which immediately follows. The sponsoring agencies are the U.S. Department of Energy, the U.S. Environmental Protection Agency, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, and the National Science Foundation. [2006-04-03]

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