



# NARSTO News

A North American Consortium for Atmospheric  
Research in Support of Air-Quality Management

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## NARSTO Launches New Assessment

At last May's meeting in Toronto, the Executive Assembly authorized NARSTO to initiate its fourth Assessment, to address the technical challenges of implementing a multi-pollutant approach to air quality management. This new assessment is motivated by the 2004 National Research Council (NRC) report, Air Quality Management in the United States. In the report, the NRC recommends that the United States transition from a pollutant-by-pollutant approach to air quality management to a multi-pollutant approach that takes an airshed view. The multi-pollutant approach would assess which significant-risk pollutants arise from local, multi-state, national, and international sources and then base control actions on this assessment. The multi-pollutant air quality management approach would create an accountability<sup>1</sup> framework for measuring the effectiveness of air quality management actions. Such a framework would correct or adjust air quality management actions as information on their effectiveness is gathered and assessed<sup>2</sup>.

Although the NRC report was aimed at the U.S. environmental management system, its recommendations are also relevant to Canada and Mexico. Canada is also examining its approach to air quality management because a pollutant-by-pollutant approach may not

<sup>1</sup> Demerjian, K.L., P.M Roth, and C. Blanchard, 1995: A New Approach for Demonstrating Attainment of the Ambient Ozone Standard: Modeling, Analysis and Monitoring Considerations, EPA/600/R-96/134. Also available at <http://www.narsto.org/event.src?ID=18>

<sup>2</sup> NRC, 2004: Air Quality Management in the United States, The National Academies Press, Washington, D.C., p. 16.

always result in air quality management actions that are most efficient and effective in protecting human and ecosystem health. In Mexico, whose national air quality management program is at a much earlier stage in its development and implementation, developments in the United States and Canada are closely tracked. The assessment addressing the multi-pollutant approach will provide potentially important information for revising or evolving Mexico's air quality management program.

NARSTO has been developing the approach to this assessment for much of 2006. We will focus the assessment on the problem of designing and implementing accountability within a multi-pollutant air quality management framework. This focus is motivated by recognition that in order to accomplish multi-pollutant air quality management, air quality managers will need: 1) The means to establish and confirm progress toward air quality, public health, and environmental goals, and 2) The means to determine the adjustments to existing emissions controls that might be needed if progress is not sufficient, if new science identifies different or additional causal sources, or if health and environmental goals are modified. The assessment will be completed during 2008 in order to provide decision-mak-

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ers the information they may need to perform periodic “accountability” studies that address air quality management performance targets. These assessments are expected to begin in the United States in 2010 and to be repeated every 5 to 8 years.

In principle, the assessment approach will start from a conceptual framework of risk assessment, including a clear specification of the health and environmental goals, and work backward to identify the feasibility of estimating end-to-end progress from reductions in emissions to reduction in the exposure of humans and sensitive ecosystems. The assessment will describe the advantages of a multi-pollutant approach to improve human health and ecosystem health, and it will evaluate the technical requirements for determining source emission reductions and ambient air quality improvements needed to achieve stated air quality management goals. Finally, the assessment will identify any technical or knowledge gaps that might impede implementation of an accountability-based, multi-pollutant air quality management process, and it will recommend research necessary to fill these gaps. The assessment process is depicted schematically in Figure 1. Practically, however, the assessment will need to focus on identifying the atmospheric indicators that would be most useful in assessing health and ecosystem effects and in determining whether or not current or projected air quality management actions will work as intended.

Co-chairs of the assessment are George Hidy (Envair/Aerochem), Rich Scheffe (U.S. EPA), Ken Demerjian (SUNY-Albany), and Jeff Brook (Environment Canada). As currently envisioned, the assessment will be accomplished in five tasks:

1. Establish a conceptual risk-based framework for establishing a multi-pollutant air quality management approach, which includes

a means of measuring progress toward air quality goals (accountability).

2. Identify health- and exposure-related air accountability assessment needs.

3. Identify ecosystem-related air accountability assessment needs.

4. Identify multi-pollutant air quality integration and accountability assessment data requirements, tools, and procedures.

5. Produce assessment synthesis.

Information on the assessment will be posted periodically on the NARSTO website <http://www.narsto.org/> (click on “activities” and then on “multi-pollutant accountability”). Assessment progress reports will also be provided in future issues of the NARSTO News.

<http://www.NARSTO.org>

The NARSTO News is published biannually for the purpose of communicating NARSTO activities and progress to members of the extended NARSTO community. Persons wishing to comment on the newsletter or submit material for publication are invited to do so by contacting either Diane Fleshman at 509-375-5694 or Bill Pennell in the NARSTO Management Coordinator’s office, at the following address:

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## Aerosol Modeling Workshop

Over the week of June 26, 2006, NARSTO hosted two back-to-back workshops concerning the state-of-the-science for modeling the lifecycle of atmospheric particulate matter (PM) as it pertains to air quality management, health effects research, and climate change. The first workshop emphasized processes, i.e., improving the representation of physical and chemical formation and transformation of atmospheric aerosols. It also examined estimating the effects of atmospheric aerosols on clouds and on radiative energy transfer. The second workshop focused on applications, i.e., evaluating the performance of emission-based (chemical transport) and observation-based (receptor) models in identifying the sources of PM. It also examined the application of these models in health effects research, standards-setting, and air quality management. Comprehensive summaries of each workshop's deliberations and recommendations will be posted on the NARSTO website over the next several months. Additional information on the workshops including agendas, questions to breakout sessions, and keynote presentations is available at <http://www.narsto.org/event.src?ID=4>.

The Processes Workshop began with four keynote presentations delivered by Stephan Kinne (Max-Planck-Institute für Meteorologie), Stuart McKeen (NOAA Oceans and Atmospheric Research Branch), Steve Ghan (Pacific Northwest National Laboratory), and Rohit Mathur (EPA Office of Research and Development). Steve Ghan provided an overview of current and proposed approaches for representing aerosol processes in models, and Rohit Mathur discussed the current status and the progress being made in PM forecasting. Stephan Kinne and Stuart McKeen discussed lessons learned from aerosol and PM forecast model evaluation activities conducted by AEROCOM (a European-based

international global aerosol model evaluation project) and ICART (the International Consortium for Atmospheric Research on Transport and Transformation).

After the keynote presentations the workshop broke into four breakout sessions:

- New Particle Formation and Chemistry (led by Peter McMurry and Richard Kamens)
- Aerosol/Cloud Interactions & Wet Deposition (led by Tom Ackerman)
- Emissions, Transport and Dry Deposition (led by Chris Doran and Tami Bond)
- PM Forecasting (led by Rohit Mathur).

Prompted by questions provided to each breakout group (see <http://www.narsto.org/event.src?ID=4>), the breakout sessions generated recommendations for dealing with shortcomings in each of these areas. These recommendations, and their basis, will be discussed in detail in the workshop report.

The Applications Workshop also opened with a series of keynote presentations followed by breakout sessions on specific source apportionment concerns. The presentations were given by Jeff Brook (Environment Canada), Phil Hopke (Clarkson University), and Ken Schere (EPA Office of Research and Development). Jeff Brook discussed the use and value of air quality models in regulatory applications, Phil Hopke reviewed the capabilities of observation-based receptor models in identifying pollution sources, and Ken Schere examined current air quality model evaluation activities.

The workshop then broke into breakout sessions on

- Evaluating air quality models for source apportionment and health/ecosystem risk assessment (chaired by Jeff Brook)



- The use of receptor and chemical-transport models in air quality management applications (chaired by Ted Russell)
- The use of air quality forecasts for air quality model evaluation (chaired by Ken Schere).

Again, the breakout sessions generated recommendations for improving the use and evaluation of models for these applications. Because the scope of the recommendations exceeds what can be covered in a brief article, they will be fully documented in the workshop report, which will be released in 2007.

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## EPRI and NARSTO Host Organic Aerosol Workshop

Contributed by Joe Mauderly and Judith Chow

On October 24 and 25, 2006, EPRI's Palo Alto offices hosted an EPRI/NARSTO-sponsored workshop on the health effects of organic aerosols. The workshop was part of NARSTO's continuing effort to increase communication and collaboration between the atmospheric and health science research communities.

Carbonaceous aerosol, a major component of PM in the atmosphere, has been associated with natural and anthropogenic air pollution, reduced visibility, climate modulation, material and ecosystem damage, and adverse health effects. The objectives of the workshop were to:

- 1) Review the state of knowledge on the health effects of organic aerosol
- 2) Identify key knowledge gaps
- 3) Stimulate discussion between the health and physical science communities
- 4) Establish research priorities.

The workshop involved over 60 participants representing atmospheric and health researchers, federal, state, and local agencies, consultants, and industry. In addition to group discussions, 12

scientists with expertise in research with organic aerosols were invited to address the following fundamental questions in plenary presentations:

- What is the present evidence that the organic component of the ambient aerosol is an important health issue?
- What are the highest priority knowledge gaps that need to be addressed, and what research strategies are required to address these gaps?
- What specific improvements in the linkages between the physical sciences and the health sciences could facilitate the characterization of the health significance of the organic component of ambient aerosol?

These presentations were followed by three breakout sessions attended by workshop participants from a cross-section of backgrounds. The breakout sessions addressed atmospheric composition, human exposure, and health impacts; the participants generated recommendations on research needed to improve understanding of these issues.

Lack of data, measurement uncertainties, and the crudeness of multiple pollutant models inhibit definition of relationships between carbonaceous aerosols and health effects. The workshop identified a number of specific knowledge gaps that must be filled in order to address these areas and to advance understanding of the possible effects of organic aerosols on health. As no single research discipline has the depth of expertise needed to understand the consequences of exposure to ambient aerosols, the workshop urged an increased focus on true interdisciplinary research (i.e., research in which teams of scientists from different disciplines participate jointly in aerosol health-effects studies). Although there is both the opportunity and need for researchers to take greater initiative in identifying and pursuing interdisciplinary strategies, it is ultimately the responsibility of funding agencies to ensure that this type of research flourishes by providing appropriate incentives for these approaches.

Workshop plenary presentations, summaries of the breakout sessions, and a more detailed summary of the workshop and its conclusions can be found on NARSTO's website at <http://www.narsto.org/mpacc.src>.



## What's New on the QSSC Web Site?

Contributed by Les Hook and Jeff West

Over the past several months, new data and resources have been made available at the NARSTO Quality Systems Science Center (QSSC). All of these resources are found on the QSSC web site at <http://cdiac.ornl.gov/programs/NARSTO/>.

### Measurement Sites in Google Earth

You can download measurement site locations for various atmospheric monitoring networks and NARSTO projects that have been incorporated into Google Earth coverages with links to additional site information, data, and documentation when available.

### Data Sets Now Available to the Public for Downloading

#### **New York EPA Supersites Data**

NARSTO EPA\_SS\_NY *Air Chemistry, Particulate Matter, and Met Data*

A total of 108 data files from all components of the PM<sub>2.5</sub> Technology Assessment and Characterization Study in New York State (PMTACS-NY) Supersite program are archived in this single data set. Time-series plots are included for all of the numeric variables in each of the data files. These plots are useful for screening for outliers and visualization of values less than the detection limit and values with other quality flags. QA plans and the final PMTACS-NY Supersite report are included as documentation.

#### **Fresno EPA Supersites Data**

NARSTO EPA\_SS\_FRESNO *Meteorological Data*

This data set contains measurements taken from six meteorological instruments operated at the Fresno Supersite from 5/24/2000 to present.

NARSTO EPA\_SS\_FRESNO BAM *Particulate Mass Concentration Data*

This data set contains measurements taken from two Beta Attenuation Monitors (BAM) operated at the Fresno Supersite. The PM<sub>10</sub> BAM has been operating from 12/4/99 to present and the PM<sub>2.5</sub>

BAM has been operating from 12/16/99 to present. One BAM samples through an impactor size-selective inlet to collect particles with aerodynamic diameters less than 10 $\mu$ m at a flow rate of 16.7 liters/min. The other BAM samples through a cyclone size-selective inlet to collect particles with aerodynamic diameters less than 2.5  $\mu$ m at a flow rate of 16.7 liters/min. Each BAM reports data for one hour.

NARSTO EPA\_SS\_FRESNO PM<sub>2.5</sub> *Particulate Nitrate and Sulfate Data*

This data set contains measurements taken from two nitrate monitors (Model R&P8400N) which have been operated at the Fresno Supersite from 12/1/2000 to present, and one sulfate monitor (Model R&P8400S) which has been operated at the Fresno Supersite from 1/29/2002 to present. The sample collection time for all of these instruments is 8 minutes. The sample analysis time is 2 minutes. Data are output once every 10 minutes.

Check all of the available data sets at the NARSTO Permanent Data Archive at the Langley Atmospheric Science Data Center.

### More Resources for Managing and Archiving Your Data

#### **Guidelines for Archiving Data in the NARSTO Permanent Data Archive**

Outlines how data are selected for archiving; identifies ways that projects can foster archiving; lists items to consider when preparing data for archiving; and describes the archiving process.

#### **Data Management Planning Guide**

A compilation of data management policy and guidance modules for program, project, and investigator use in developing and implementing data management plans.

#### **Archive Data File Format Template**

Data Exchange Standard (DES) format and Site Information templates with picklists for standardized metadata fields.



## Standardized Variable Names and Metadata Values for both NARTSO and ICARTT Data File Formats

Find consistent values for names and units that can be used to report measurements and metadata for various data types across multiple platforms. ICARTT values have been specifically constructed to be friendly to most data user software and data systems.

### Need Additional Information?

Contact Les Hook at the QSSC, Oak Ridge National Laboratory, by either e-mail ([hookla@ornl.gov](mailto:hookla@ornl.gov)) or phone (865-241-4846) for more information.

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- NARSTO Executive Assembly Meeting
- New NARSTO Assessment Considered
- Dan Albritton Retires
- NARSTO's Website Gets a Facelift
- NARSTO to Host Pm Modeling

#### **NARSTO EXECUTIVE ASSEMBLY MEETING**

The NARSTO Executive Assembly meeting will be held on March 27-28th at the American Geophysical Union building in Washington, DC. Invitations, hotel arrangements, agendas and other information will be sent out in the near future.

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