



NARSTO News

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NARSTO PM Assessment Entering Final Stretch

NARSTO's draft *Assessment of the Atmospheric Science on Particulate Matter* is currently entering final stages of a formal review by a tri-national committee, chaired by Joe Mauderly of the Lovelace Institute and coordinated by the Canadian Royal Society, the Fundación México Estados Unidos para la Ciencia (FUMEC), and the US National Academy of Sciences. Expected sometime this September, the tri-national review comments will be consolidated with other reviews collected since January. These will be incorporated into a third draft and published as a final report.

Key points in the finalization schedule include a Minneapolis author's workshop during late October. The authors' deadline for final revisions on the individual chapters is set for November 29, after which the Assessment Co-Chairs and Technical Editor will perform final modifications necessary for document cohesiveness and consistency. The Technical Editor will begin page-layout operations in early January, with the intent of producing a final document by late February.

Current plans call for a formal release of the Assessment in conjunction with NARSTO's Executive Assembly meeting this coming March. This will be followed by presentation and discussion at the AAAR PM 2003 conference in Pittsburgh, which is set for March 29 through April 4.

Additional information on the AAAR conference is available on www.aaar.org/PM2003. The current (second) Assessment draft and a listing of the tri-national review committee members are posted on the NARSTO Web site.

NARSTO Model Evaluation Study Approaching Final Phase

The long-awaited completion of NARSTO's Model Comparison and Evaluation Study is in sight. By late August Alan Hansen, our Model Evaluation Coordinator, expects to have all necessary model-output data in-hand for processing, along with associated documentation on emissions, meteorological models and chemical-transport model (CTM) properties.

By design, this particular evaluation compares chemical transport models, freely configured by the participating groups in a relatively unconstrained fashion, and executed for overlapping time periods and domains. No attempt here is made to harmonize model configurations and input data. Under this protocol the evaluation's participants are free to use different methods and data sources for developing gridded emissions and meteorological fields for the CTMs. Accordingly, this evaluation's objectives are limited to investigating the comparability of photochemical simulations using state-of-the-art models, operated under minimal constraint, by experienced practitioners for similar air-quality assessment purposes. A strong motivation for this particular approach stems from the fact that several past pollution assessments have been operated under similar conditions, leading to significant questions regarding comparability and reliability.

This evaluation focuses primarily on model performance for ozone and precursor species, in conjunction with observational data for Eastern North America obtained from NARSTO's data archive. Quite obviously this type of evaluation cannot give definitive answers to why simulations may differ among models. To provide a basis for identifying at least some of the probable causes of divergent results, however, participants were asked to submit

- detailed information on how their models were configured,
- information on key meteorological parameters at selected urban and rural grid cells,
- a completed questionnaire detailing how their gridded emission files were generated, and
- aggregated totals for selected emitted species for a number of states.

Results of the evaluation will be documented in a relatively brief report, which will describe the evaluation protocol and the models deployed therein, provide summary statistics, and indicate procedures to acquire the detailed model output for those interested in further analysis. A number of summary statistics will be reported, including:

- tables of statistical performance metrics based on comparisons with observations,
- scatter plots of daily simulated versus observed 1-hour and 8-hour peak values for subregions of the modeling domain,

(Continued on page 2)



In this edition...

NARSTO PM Assessment	1
NARSTO Model Evaluation	1
Reactivity Research Working Group	2
Cyril Durrenburger Completes Term as Emissions Team Co-Chair	3
NARSTO Workshop on Innovative Methods for Emission Inventories	3
NARSTO Data Archive	4
PM and Human Health Effects	4

Model Evaluation, . . . , Continued

- time series of simulated and observed hourly values averaged for subregions of the modeling domain,
- maps of symbolically coded raw bias between daily simulated and observed peak 1-hour and 8-hour averages at each observational location,
- daily peak 1-hour and 8-hour average contour map plots,
- daily difference and percentage change contour map plots of 1-hour and 8-hour peak ozone for the base case minus the cases with 50% reduction in VOC emissions and 50% reduction in NO_x emissions, and, for selected days,
- hourly contour map plots of ozone concentrations simulated on the same gridding with both coarse and fine horizontal gridding.

This evaluation has required considerably more time and effort than was originally anticipated, owing to the enormous (terabyte) quantities of model-output data involved and to the busy schedules of the participants. One particular and perplexing aspect of this evaluation is the almost protean tendency of the models - through progressive improvements by their developers - to metamorphose rapidly, necessitating definitive documentation of the versions actually deployed in the evaluation. Although such changes are a natural and desirable feature of the model-development process, they do require care in analysis and interpretation of the results.

The final model-evaluation report will be posted on NARSTO's Web site when it becomes available. A second report, sponsored by the Coordinating Research Council and covering an extended subset of this evaluation, is currently available in draft form and will be posted on CRC's Web site (www.crao.com/) shortly. This report contains a wealth of practical information on current CTM models and modeling practices, and is recommended reading for all interested individuals.

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 or Jake Hales in the NARSTO Management Coordinator's office, at the following address:

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Reactivity Research Working Group Continues its Research Activities

Since its conception in 1998 the Reactivity Research Working Group (RRWG) has designed a carefully laid out plan of research and has systematically proceeded to implement individual tasks identified on that plan. Currently four contracted tasks, focusing on the reactivity properties of volatile organic compounds (VOC), are underway. Three of these studies are applying photochemical air-quality grid models to investigate VOC reactivity in the Gulf Coast and Eastern United States, while the fourth addresses atmospheric availability and environmental fate of VOC.

The three photochemical modeling projects are being conducted by Georgia Institute of Technology (Dr. Ted Russell, PI); North Carolina MCNC, (Dr. Sarav Arunachalam, PI); and the University of California - Riverside, (Dr. Bill Carter, PI). These three projects have complementary experiment designs with overlapping geographical regions and air-pollution episodes. Although all three modeling domains encompass the eastern half of the US, one also includes the Gulf Coast region. The RRWG is working with the PIs to develop common metrics for presenting and comparing the results of these studies. Preliminary results were presented to the RRWG members at the May 15-16, 2002 meeting in Research Triangle Park, NC. Further information on these efforts is available on the following Web sites:

UCR: <http://pah.cert.ucr.edu/~carter/RRWG/>
MCNC: <http://www.emc.mcnc.org/projects/RRWG/index.html>,
GIT: <http://www.emc.mcnc.org/projects/RRWG/index.html>)

SENES Consultants Limited is addressing the availability and environmental fate task by developing a preliminary multimediam model, which applies emission and deposition-pathway simulations to investigate atmospheric availability and environmental fate of specific VOCs. The objectives are to identify specific VOCs characterized by having a low rate or extent of



release, or by having significant loss pathways other than photochemical oxidation, and to develop a screening model that describes the transport as well as partitioning of such VOCs to several compartments, including air, water, soil or vegetation, particulates, and urban films.

The RRWG meets three times a year and the next meeting is August 28-29, 2002 in Research Triangle Park, NC. If you would like to participate in or receive additional information about RRWG, please contact Don Fox, RRWG Chair at don_fox@unc.edu or 919-966-1024.

Cyril Durrenberger Completes Term as Emissions Team Co-Chair

Cyril Durrenberger recently resigned as Public Sector Co-Chair of NARSTO's Emissions Team. Formerly with the Texas Natural Resources Conservation Commission, last year Cyril accepted a position with the Chemical Engineering Department at the University of Texas. Because the UT position does not explicitly provide for Cyril's activities as Emissions Team Co-Chair and because of the demanding Emissions Team schedule anticipated for future years, he has opted to vacate the position in favor of someone who can dedicate increased time and energy to the role. NARSTO's Executive Steering Committee will be announcing a replacement shortly.

NARSTO expresses its thanks and appreciation to Cyril for his past efforts as Co-Chair. He will continue to participate as an active member of the Emissions Team during future years.

NARSTO Planning Workshop on "Innovative Methods for Emission Inventories" Scheduled for October 2003

Planning is currently underway for a NARSTO workshop on advanced and innovative methods for emission-inventory development and verification, to be held at the University of Texas conference facilities in Austin sometime during October 2003. Although the meeting's format is still at a flexible stage, the content definitely will be focused on a future perspective, and channelled along the following principal question and its corresponding sub-questions:

- *Are newer and more innovative techniques possible, which can contribute significantly to emission quantification, and are potentially deployable in the foreseeable future?*

- *What are they, what is their nature, and what are their limitations?*
- *How can these methods best be combined with conventional methods, as well as with other, more modern techniques?*
- *Do recent regulatory changes, such as those associated with fine particles and VOC reactivity, produce additional demands on emission characterization; and if so, are there innovative methods that can contribute to addressing this challenge?*

Although this may be subject to change (see below), the primary meeting product is envisioned to be a Synthesis Paper, which will be published in the refereed journal literature, and will address the meeting's answers to the above questions. This paper is intended to serve as a primary guide to researchers as well as to administrators sponsoring efforts in the emission-research and applications fields.

We anticipate the meeting to last for three full days, with each day fulfilling a specific purpose. Day 1 will include presentations from established members of the traditional emission-research community. This will set the stage for Day 2, which will address techniques which are newer, have received relatively less emphasis, and offer the potential for significant advancement during future years. The final day will be a workshop for all participants, and will conclude with a first draft of the Synthesis Paper.

As noted above, several features of the meeting format may change, depending on decisions to be made by NARSTO's Executive Assembly (EA) at its 2003 Annual Meeting. During its 2002 meeting the EA discussed the possibility of NARSTO performing its next major assessment on the subject of emission-inventory technology, and tabled the subject for further action in 2003. If the EA should indeed decide to proceed with such an assessment, the Austin meeting will serve as an initiation and planning forum for the assessment process.

Currently the Emissions Team is compiling a list of persons to serve on the meeting's Program Committee, and will proceed with planning as soon as the new Public-Sector Co-Chair comes online. Those interested in serving on the Program Committee should contact the NARSTO Management Coordinator at jake@cgenv.com.





Short Subject: Looked at the NARSTO Data Archive Lately?

Although faced with the usual and expected start-up issues (see Winter/Spring 2002 *NARSTO News*), the NARSTO data archive is now moving ahead rapidly and is logging new data from a number of NARSTO efforts. In addition, the Web site now incorporates a number of features designed to make access and deposition more convenient. In particular, it contains a color-coded table indicating the status of data from each project as well as their ultimate disposition, along with dates and additional key information. In addition the site facilitates access to individual data sets via clickable links, allowing intuitive navigation through the resource.

NARSTO recognizes the hard work devoted to this effort, both by personnel at the data center and by scientists delivering their data to the site. We appreciate your good efforts and thank you for your time and perseverance! If you haven't looked at the Web site recently, do so now; you'll like what you see! You can get there either by going through the NARSTO site, or going directly to <http://cdiac.esd.ornl.gov/programs/NARSTO/narsto.html>

PM and Health Effects: New Information from the Health-Effects Community

NARSTO continually monitors scientific findings emerging from the health-effects community, with the intent of using this information for tuning its own programs to maximize scientific benefit of its atmospheric PM research. In principle, identification of a specific PM component or attack pathway responsible for human health impacts would result in significant redirection of NARSTO activities to address information needs associated with that component.

This is not so straightforward in practice, however. Because of the multifaceted nature of atmospheric aerosols and the complexity of unequivocally measuring health impacts, it has been exceedingly difficult to gain any really specific information that is useful for NARSTO program design. One particular problem in this regard is that the preponderance of data on human health effects has come from epidemiologic studies, rather than clinical or laboratory investigations. These studies, while providing a rather convincing argument that health impacts do occur, are notoriously poor at pinpointing causal agents or mechanistic effects.

This situation may be changing, however. In the April 2002 issue of *HEI Perspectives*, the Health Effects Institute provides a nicely written status report, entitled "Understanding the Health Effects of Components of the Particulate Matter Mix: Progress and Next Steps," wherein they address the three following questions:

- What attributes of particles are associated with toxicity?
- How do particles cause adverse effects? and
- Which population subgroups are particularly susceptible?

Besides giving a plain-language description of some of the more conventional physiological-response mechanisms, the report reviews recent laboratory and epidemiologic studies shedding light on the above questions. In addition the report discusses recent findings on PM attributes — including particle size and composition — that are associated with human-health impacts.

In summary the report indicates that, while we still have a long way to go, we are making significant progress. Available by download from www.healtheffects.org, it's recommended reading for anyone interested in a brief and readable update on the subject.

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