

CMAS Quarterly

The Quarterly Newsletter of the Community Modeling and Analysis System

Upcoming Training Events:

(All are at UNC-CH unless otherwise indicated)

- SMOKE – September 21-23, 2005 (Friday Center)
- CMAQ – September 29-30, 2005 (Friday Center)
- SMOKE – January 2006
- CMAQ – January 2006



Can't come to us for training? Have the same courses taught on-site at your location by the same experienced trainers. Visit <http://www.cmascenter.org/cmastraining> or contact cmas@unc.edu for more information.



Credits:

Content —
Adel Hanna
Frank Binkowski
Editor —
Jeanne Eichinger

Visit us on the Web!
www.cmascenter.org

Letter from the CMAS Director: Summary of Year 4 and a Look to the Future

Dear Colleagues,

We will soon conclude the fourth and final year of the U.S. EPA's cooperative agreement with the University of North Carolina at Chapel Hill to maintain a center for the Community Modeling and Analysis System (CMAS). With your participation and help, CMAS is now being recognized by the national and international community as a focal point for air quality modeling development and support. This year has been filled with successes and achievements. For example...

New releases of CMAQ and SMOKE, including users' versions such as CMAQ-MADRID and CMAQ-DDM, have been published. We released the CMAQ Unified Archive, which includes CMAQ version 4.4 and other utility programs, on the CMAS web site. We also developed and released a version of the CMAQ graphical user interface (GUI) to a limited group of users for testing. We conducted limited enhancements of the PAVE script to allow running without the software bus.

CMAS staff scientists, in collaboration with EPA scientists, completed the development of several

new science modules that are related to

- ◆ updates to CMAQ particulate matter algorithms, including incorporation of sea salt aerosol;
- ◆ development of radiative transfer calculations for photolysis in CMAQ; and
- ◆ incorporation of the Pleim-Xiu land surface model into the WRF model.

SMOKE has undergone a number of updates and enhancements. For example, we are developing a new version of SMOKE to process toxics emissions for input to CMAQ. SMOKE is also being modified to become an emissions processor for the AERMOD and ISCST3 dispersion models.

CMAQ, the main air quality model supported by CMAS, is always under development to ensure that it reflects advancements in science and also incorporates the results of numerous evaluation studies under different applications, which are reported by community members. This year, CMAS coordinated another peer review of CMAQ that was sponsored by EPA. This second peer review centered on a two-and-a-half-day meeting in Research Triangle Park, NC. The meeting included presentations by various

CMAQ developers to a panel of seven reviewers, who were selected from among leading scientists in air quality modeling. The panel's review report will be posted shortly on the CMAS web site.

Each fall, CMAS holds a well-attended Models-3 user's conference. Last year's three-day event drew over 180 participants. This year, the 4th Annual CMAS Models-3 User's Conference will be held on September 26-28, 2005. We expect more than 200 to attend, including international participants from at least eight countries. We are excited about the response from the community, which has submitted 120 abstracts of papers that will be presented in various sessions.

Twenty-eight journal articles are now in the final stages of review for the special issue of *Atmospheric Environment* that is based on papers submitted under the "Model Evaluations" session of the 2004 annual conference. For the 2005 conference, papers that are presented in the "Model Development" session will be considered (with the consent of the authors) for publication in a special issue of *Journal of Applied Meteorology*. *(continued on p. 2)*

Letter from the CMAS Director: Year 4 and the Future (continued)

The conference this year has a new feature. On the morning of the third day (September 28), two successive panel sessions will be held: "Current Status of Air Quality: Trends and Health Effects" and "The Future of Air Quality Modeling: Addressing Current Shortcomings of the Models." The panel members—experts from science, regulatory, and policy disciplines—will discuss their experiences and ideas regarding the two topics. Your active participation in the discussions will greatly contribute to the messages that will emerge from those panels.

Another important component of the CMAS Center is training. Each year we conduct multiple training sessions to educate users on the application of CMAQ, SMOKE, and MIMS. Modelers acquire valuable hands-on experience using case studies. This year, CMAS conducted training off site at users' request. We are also improving the SMOKE and CMAQ training by normalizing the data that we use for the two classes; use of a common dataset will add value to the training for students who attend both classes by providing a more coherent set of train-

ing materials. We are also planning advanced training courses for scientists who want to pursue more specialized modeling applications, such as those related to particulate matter modeling, process analysis, and evaluation and analysis methodologies

At the start of this letter, I mentioned that this is the last year of the EPA CMAS cooperative agreement. It is my pleasure to inform you that EPA will continue to support the operations of the CMAS Center for the next five years under a new contract with UNC-Chapel Hill.

As always, I am grateful to the members of the CMAS External Advisory Committee (EAC) for their guidance. Each year they provide valuable advice on all issues related to CMAS by participating in the annual EAC meeting and in ad hoc conference calls.

We at CMAS thank all of you for your participation and support. We look forward to seeing you all at the annual conference in September.

*Adel Hanna
Director, CMAS*



A Canadian Study on the Impacts of GEM and MM5 Meteorology on SMOKE and CMAQ

by Weimin Jiang, Ph.D., National Research Council of Canada

Under a collaborative project between the National Research Council of Canada (NRCC) and the Canadian Meteorological Centre (CMC) of Environment Canada, the air quality modeling team at NRCC recently studied the impact of using different meteorological (met) models on pollutant emissions output by SMOKE and on air quality modeling results from CMAQ. Results from a Canadian met model, GEM, and a U.S. met model, MM5, were used to drive SMOKE and CMAQ. The original GEM and MM5 results were obtained from CMC and from the Ontario Ministry of Envi-

ronment, respectively. Two separate SMOKE and CMAQ runs, differing only in meteorology inputs and in meteorology-dependent emissions, were conducted for a July 1999 episode in an Eastern Canada and Northeastern United States domain.

In order to use GEM output to drive CMAQ, NRCC developed a meteorology processor named GEM-MCIP to process and convert GEM results to CMAQ-ready format. GEM-MCIP is an extension of the U.S. EPA's Meteorology-Chemistry Interface Processor (MCIP) with the capability

to read and process meteorological fields generated by either GEM or MM5.

New In-line Photolysis Routine for CMAQ

A new photolysis routine for CMAQ has been developed at UNC. It replaces the existing method of interpolating photolysis rates from a table generated during a CMAQ calculation with an in-line interactive method. The new approach uses seven optimized intervals from 291 to 850 nm. The column

amount of stratospheric ozone is calculated from climatological values as a function of latitude, longitude, and date. The routine accounts for the time varying opacity of calculated O₂ and NO₂ as well as the scattering and absorption of calculated aerosols. The optical depth is calculated using a pseudo-spherical slant path algorithm that allows the solar zenith angle to vary smoothly to 90°. The routine is currently being implemented to calculate photolysis rates within each vertical layer from the surface to the top of the modeling domain. The routine also provides total surface irradiance for all seven bands, so calculated values of UV-A and UV-B are available. Preliminary results from the new method will be presented at the CMAS Conference in September.