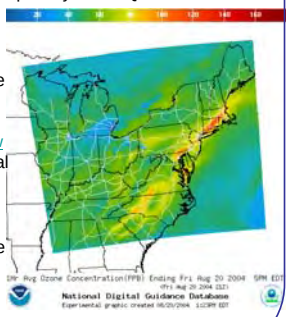
"One Atmosphere" Modeling for Air Quality:
Building Partnerships that Transition Research into Applications

Atmospheric Sciences Modeling Division, NOAA/Air Resources Laboratory, Research Triangle Park, NC

Public Air Quality Forecasts

EPA has partnered with NOAA's National Weather Service (NWS) to provide a national air quality modeling forecast capability. CMAQ has been linked to the Eta weather forecast model to generate daily O_3 forecasts, available to the public at www.weather.gov & www.epa.gov/airnow A multi-day national forecast of fine particulate matter concentrations should be available within the next decade



Support for EPA's National Rulemaking

EPA's Office of Air and Radiation (OAR) recently selected CMAQ as the key model for the Clear Air Interstate Rule (CAIR) and the Clean Air Mercury Rule (CAMR). As cited by OAR, "in the development of CAIR, CMAQ was used to:

- **Quantify interstate $PM_{2.5}$ transport** providing the basis to identify States that contribute significant amounts of $PM_{2.5}$ to nonattainment in other States. These results were used to identify those States to include in the CAIR control region.

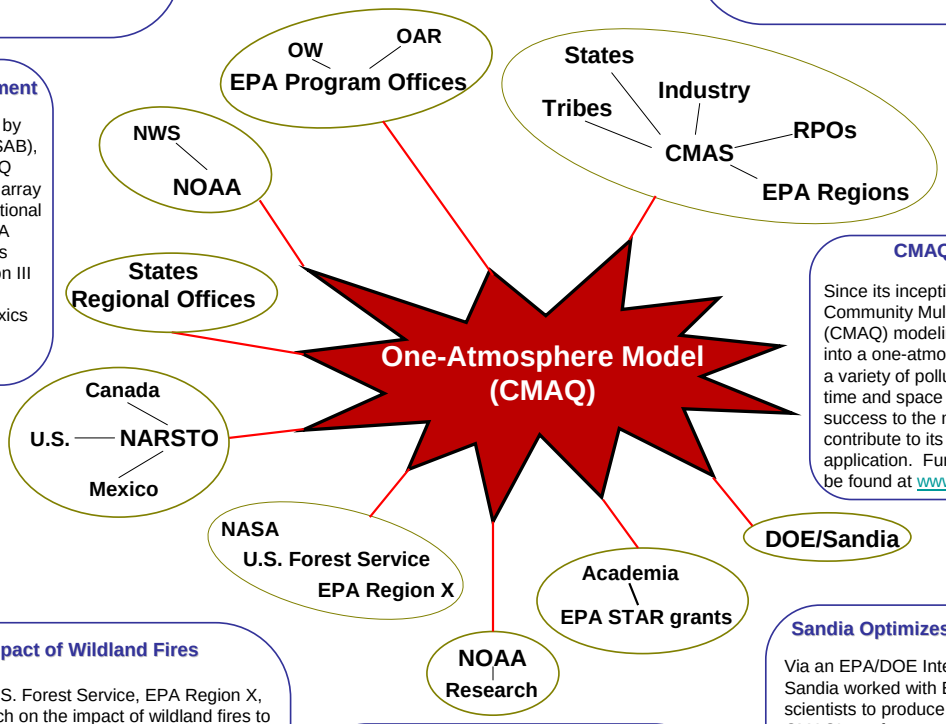
- **Quantify the expected benefits of CAIR controls** in 2010 and 2015 in terms of reductions in $PM_{2.5}$ nonattainment counties, the extent of harmful health effects of $PM_{2.5}$ and acid deposition, as well as the improvements in visibility in Class I areas."

Support for SIP Development

A model clearinghouse has been established to transfer CMAQ to the air quality modeling community to support development of SIPs for O_3 and $PM_{2.5}$. UNC's Center for Environmental Programs provides support for this activity through the Community Modeling and Analysis System (CMAS). CMAS was formed in 2001 as a conduit for community outreach, shared development, and application of air quality tools related to CMAQ. CMAS has also assembled a standing peer review panel to provide independent reviews of CMAQ's science. CMAS has a strong user support system via the Internet, training classes, and well-attended annual meetings. Partners in CMAS include tribal organizations, the states, industry, Regional Planning Organizations (RPOs), and EPA Regional Offices. More info is available at www.cmascenter.org.

National Air Toxics Assessment

In response to recommendations by EPA's Science Advisory Board (SAB), the chemical mechanism in CMAQ has been extended to include an array of air toxic compounds for the National Air Toxics Assessment (NATA). A memorandum of collaboration has also been signed with EPA Region III and Delaware to apply CMAQ for urban "hot spot" analysis of air toxics to support human exposure assessments.



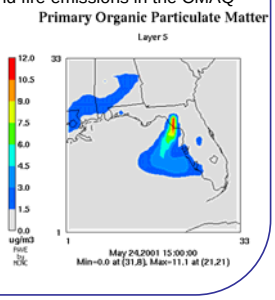
CMAQ Background

Since its inception in the mid-1980s, the Community Multiscale Air Quality (CMAQ) modeling system has evolved into a one-atmosphere model, covering a variety of pollutants over a range of time and space scales. CMAQ owes its success to the many partners who contribute to its research and application. Further info on CMAQ can be found at www.epa.gov/asmdnerl.

Estimating the Impact of Wildland Fires

EPA is teaming with NASA, U.S. Forest Service, EPA Region X, and NOAA to integrate research on the impact of wildland fires to air quality, both for real-time forecasts and regulatory decision-making. An example of this interaction has been work to incorporate key components from the BlueSky forecast model for more realistic estimates of wildland fire emissions in the CMAQ modeling system.

The BlueSky emissions module is used to estimate fuel consumption and emissions based on the fire size and location. This plot shows hourly concentrations of organic matter predicted by CMAQ for May 24, 2001. The plume from the Mallory Swamp fire in northern Florida is clearly visible.



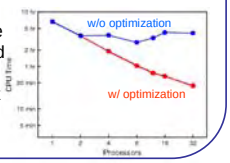
EPA-NOAA Partnership on Air Quality

NOAA's Atmospheric Sciences Modeling Division is celebrating its 50th year as a governmental unit dedicated to air quality modeling research and applications. EPA and NOAA work collaboratively as a group of scientists dedicated to enhancing the research that supports CMAQ and ensuring its successful application to regulatory air quality assessments. The group includes approximately 50 NOAA and EPA scientists stationed in EPA's Atmospheric Modeling Division of the National Exposure Research Laboratory in Research Triangle Park, NC.

Sandia Optimizes CMAQ Performance

Via an EPA/DOE Interagency Agreement, Sandia worked with EPA and NOAA scientists to produce a 15-fold speed-up in CMAQ's performance. With an optimized version of CMAQ, annual simulations of ozone can be completed for the entire nation within a week.

This graph shows the optimization achieved w/ CMAQ for a 24-hr simulation on a Linux parallel cluster.



Disclaimer: The research presented here was performed under the Memorandum of Understanding between the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) and under agreement number DW13921548. This work represents a contribution to the NOAA Air Quality Program. Although it has been reviewed by EPA and NOAA and approved for publication, it does not necessarily reflect their policies or views.