ATMOSPHERIC MODELING OF AIR POLLUTANTS WITH THE COMMUNITY MULTISCALE AIR QUALITY (CMAQ) MODEL

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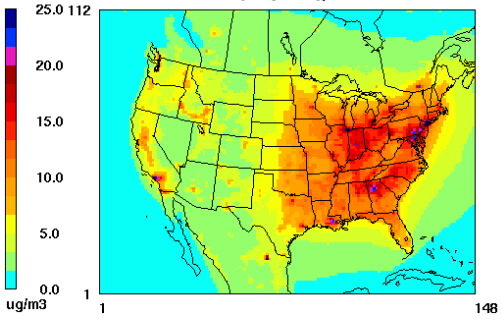
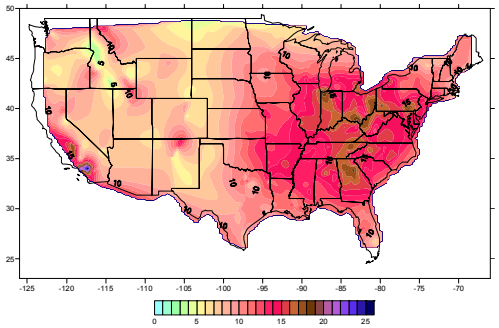
- EPA's Community Multiscale Air Quality (CMAQ) modeling system provides a state-of-science operational system for air quality assessments and forecasts of regional to urban air concentrations of ozone, particulate matter, visibility, acid/nutrient deposition, and air toxics.
- Annual public releases of the CMAQ model and the establishment of a Community Modeling and Analysis System center to provide user support and outreach have helped to grow and maintain a large national and international community of users, spanning research, policy, and operational applications of the model.
- New emerging CMAQ model research areas include the linkage of CMAQ to global scale models to study intercontinental transport and the interactions of air quality and climate change, as well as the extension of the modeling system to explore sub-urban "neighborhood" scale air toxics issues.
- More information on the CMAQ modeling system can be found on the website: http://www.epa.gov/asmdnerl/models3/
- Examples of some current CMAQ model applications are shown below.

CMAQ Applications for Particulate Matter

PM2.5 - CMAQ

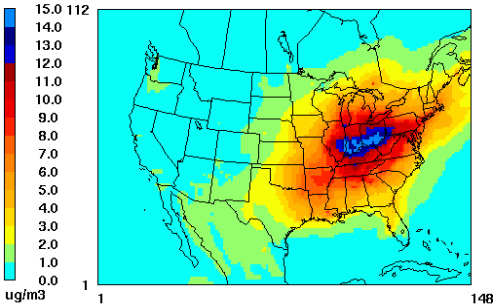


PM2.5 - Observations

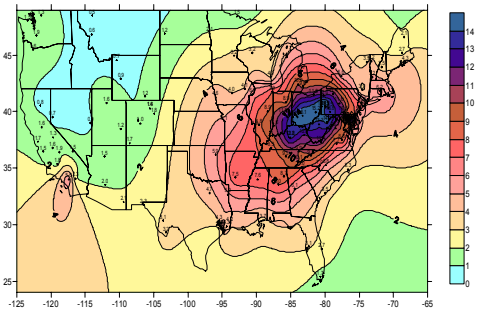


- CMAQ model assessments conducted for full year, 2001, through joint ORD/NERL and OAR/OAQPS collaborations.
- Model results and observations shown are averaged over full year.
- Observations of PM2.5 mass are interpolated from Federal Reference Method (FRM) network data.
- CMAQ model simulates well the PM2.5 spatial patterns in the eastern U.S. and in California.

Sulfate PM - CMAQ



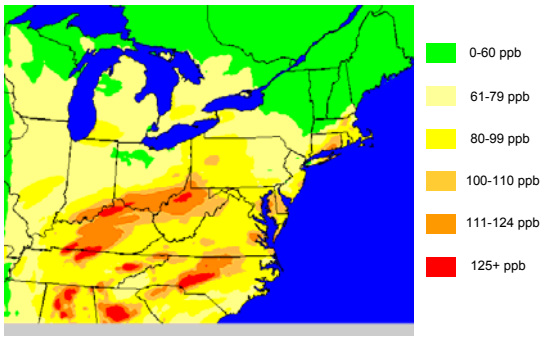
Sulfate PM - Observations



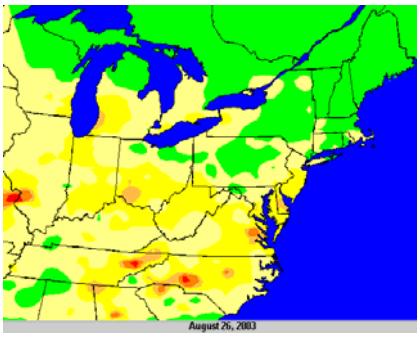
- Sulfate is the largest component of PM2.5 mass over the eastern U.S. for much of the year.
- Model results and observations shown are averaged over the summer period from mid-July through mid-August 2001.
- Observations of sulfate PM mass are interpolated from IMPROVE and CASTNet network data.
- CMAQ model captures the observed location, magnitude, and spatial gradients of the sulfate plume in the eastern U.S.

CMAQ Applications for Ozone Forecasting

Ozone - CMAQ



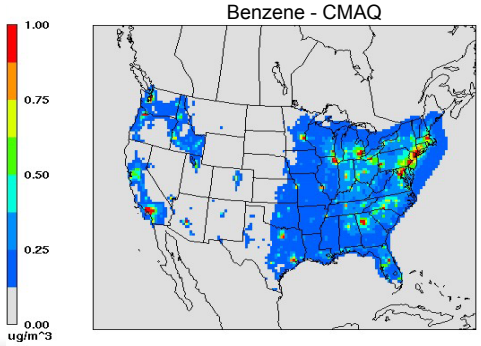
Ozone - Observations



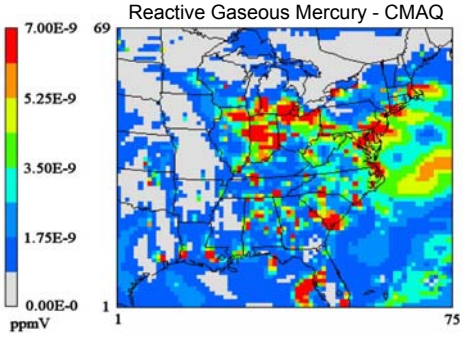
- U.S EPA and NOAA are collaborating on developing and testing an operational modeling capability for short-term real-time air quality forecasting.
- Model results shown are for 24-h forecast of maximum 1-h ozone on August 26, 2003. CMAQ model was initialized at 8am EDT on August 25 to make this next-day forecast.
- Observations of ozone concentrations are interpolated from U.S. and Canada national surface network data.
- On this day, CMAQ model provides good forecast of higher ozone in southeast U.S., but overpredicts the concentrations in the Ohio Valley.

CMAQ Applications for Air Toxics

Benzene - CMAQ



Reactive Gaseous Mercury - CMAQ



- Benzene concentrations shown are average CMAQ model results over full year 2001 simulation performed for the National Air Toxics Assessment.
- Mercury air concentrations are from CMAQ model simulation for 7am EST, April 15, 1995.
- Only U.S. emissions were included in air toxics simulations; no Canadian or Mexican emissions.
- CMAQ model capabilities for air toxics are emerging; model evaluations are underway.

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