

Integrating BlueSky into the CMAQ/SMOKE modeling system

National Fire Emissions Technical Workshop
New Orleans, LA
May 5, 2004

Presented by
Thomas E Pierce*
Atmospheric Modeling Division
EPA/ORD/NERL
Research Triangle Park, NC

*On assignment from the National Oceanic and Atmospheric
Administration/ARL

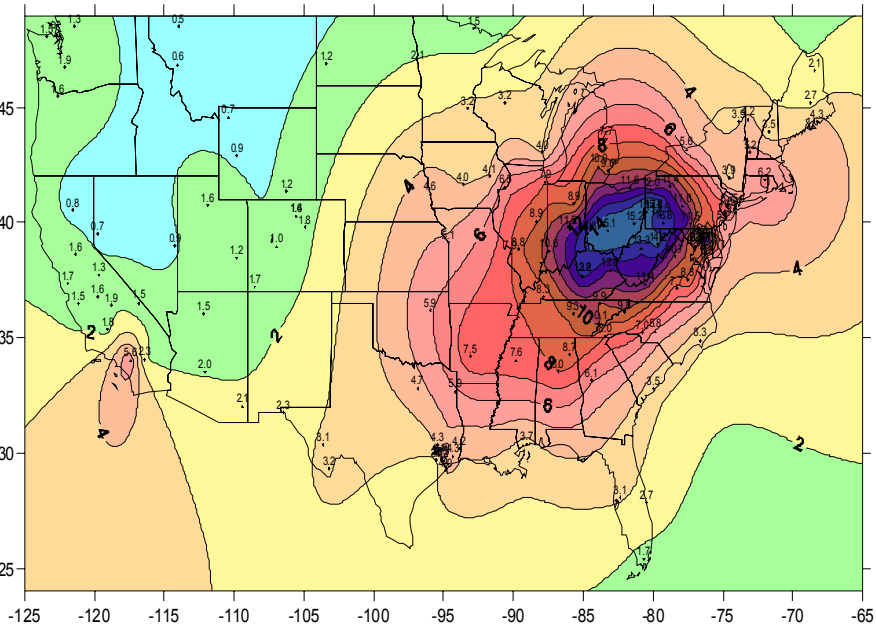
CMAQ “Overview”

- Pollutants such as ozone, PM_{2.5}, and mercury are regional in scope with long-range transport, connecting the emissions from one region to air quality problems in another region.
- The Community Multiscale Air Quality (CMAQ) modeling system is a “one atmosphere” model that enables the evaluation of the efficacies of multiple pollutant control strategies.
- The Atmospheric Modeling Division (AMD) is focused on developing and evaluating CMAQ.

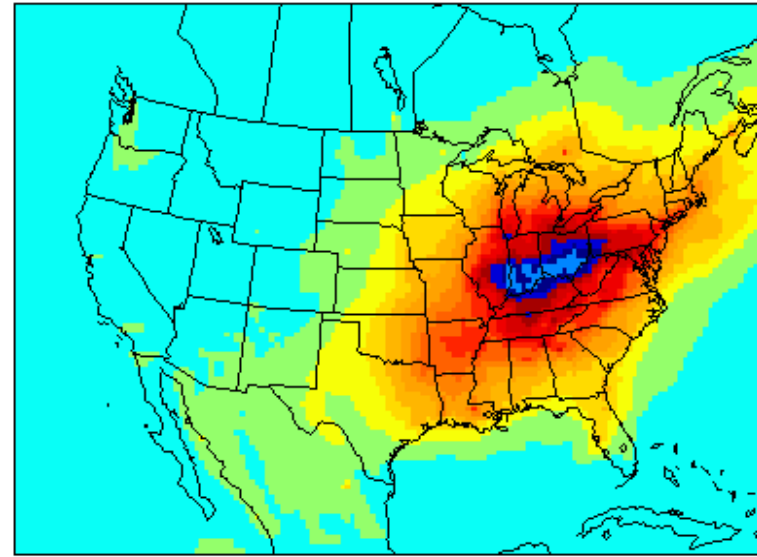
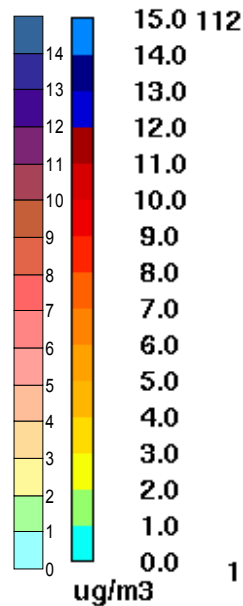
Application of CMAQ ... fine particles

Sulfate PM -- July 17- August 13, 2001

Observed Data



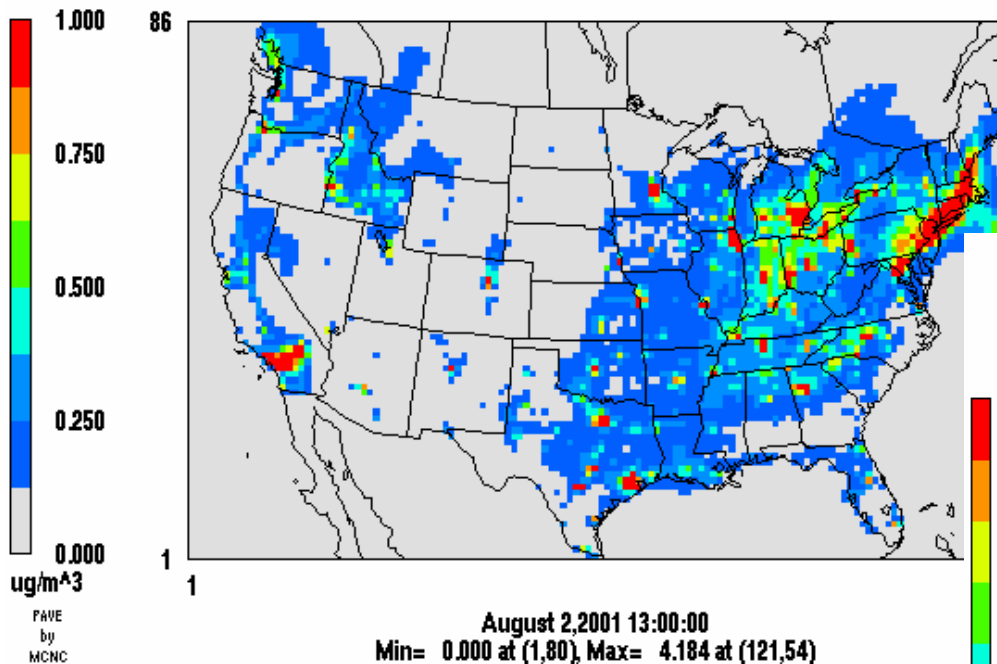
CMAQ



July 17, 2001 4:00:00
Min= 0.1 at (102,1), Max= 15.8 at (106,58)

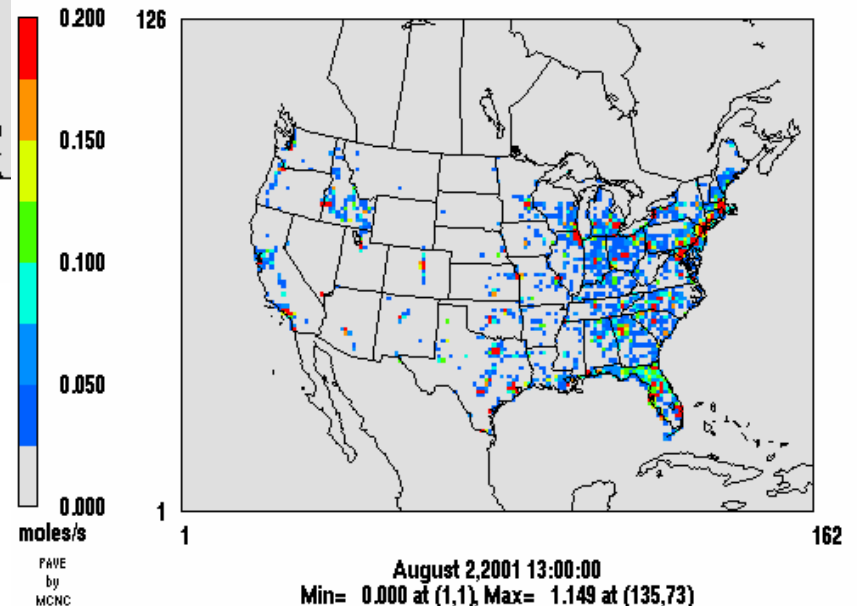
Application of CMAQ ... air toxics

Benzene



Benzene Emissions

All layers

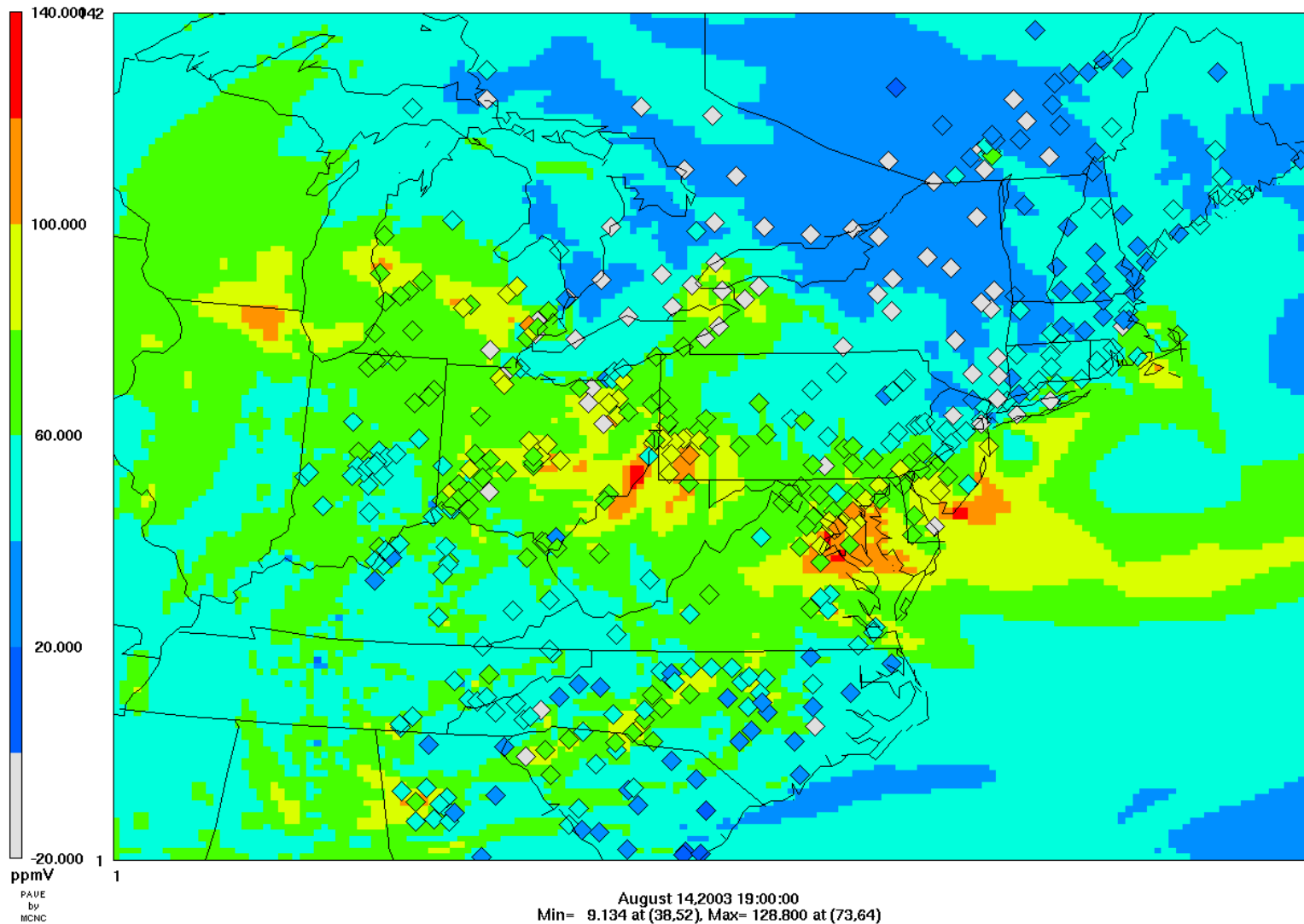


Application of CMAQ ... air quality forecasting

ETA/CMAQ prediction of ozone for 14 Aug 2003

Layer 1 O3k*1000

k=SubnewLU



Motivation for this effort – Emission modeling support to AMD

- **Role:** To obtain the best available emission estimate data for evaluating regional air quality modeling systems; and, to improve these estimates by building emission models that account for meteorological conditions.
- **AMD staff:** W. Benjey, T. Pierce, G. Pouliot (w/ contributions from J. Ching, D. Gillette, A. Gilliland, G. Gipson, P. Bhave, and J. Godowitch)
- **Outside collaborators:** EPA/OAQPS, EPA/ORD, RPOs, States/EIIP, CSC, IGAC/GEIA, Environment Canada, NCAR, universities ... **and the USFS.**
- **Selected R&D areas:** SMOKE, geographical data files, air quality forecasting, biogenic emissions, sea salt, fugitive dust, NH₃ inverse modeling ... **and wildfire emissions.**

Current treatment of wildland fire emissions

- **EPA's wildland fire emissions inventory includes:**
 - Wildfires, Managed (Prescribed) Burns
 - Federal, State, Tribal, Private burners
 - Coverage incomplete, inconsistent for State, Tribal, Private burners
- **Current methodology is *very, very* basic:**
 - **PM₁₀, PM_{2.5}, NO_x, CO, VOC, SO₂, ~ 30 HAPS**
 - Spatial & temporal ~ Fires treated as nonpoint sources
 - Acres burned ~ 5 federal agencies, some private & State
 - State-to-county allocation by "forested area"
 - **Emissions**
 - Fuel consumption ~ regional averages only (AP-42)
 - Emission Factors (AP-42)
 - Annual emissions ~ statewide (monthly) & diurnal profiles in EP
 - **Plume rise ~ EPA treats all fires as ground level; WRAP est. plume rise**
 - **Data Flow**
 - Spreadsheet calculations >> NEI "area source EI" >> EP >> CMAQ

Proposed treatment of wildland fire emissions

- User inputs: fire locations, duration, size
- Model components (modules from BlueSky):
 - Fuel loading: NFDRS/FCC coverages
 - Fuel moisture: calculated from met model (MM5/ETA)
 - Fuel consumption: Consume/FOFEM
 - Emissions and plume rise: EPM and modified Briggs
- Outputs: gridded hourly emissions, resolved vertical allocation
- Integrate, test, and release module (late 2004/early 2005)
- Data flow:
“Inputs File” >> WLF EM >> NIF format >> Emiss. Processor >> CMAQ

Integrating BlueSky into the CMAQ/SMOKE modeling system

- Interagency Agreement between USFS & EPA
- USFS/PNW responsibilities
 - Adapt BlueSky modules for use with SMOKE and other emission modeling systems
 - Build GIS coverages of fuel loadings (1 km resolution) using the FCCS
- EPA/ORD responsibilities
 - Plume rise/vertical allocation (J. Godowitch)
 - Oversee documentation and tech transfer
- Status: IAG should be active ... any day now