Department of the Environment

University of Maryland Modeling Update

Technical Advisory Committee

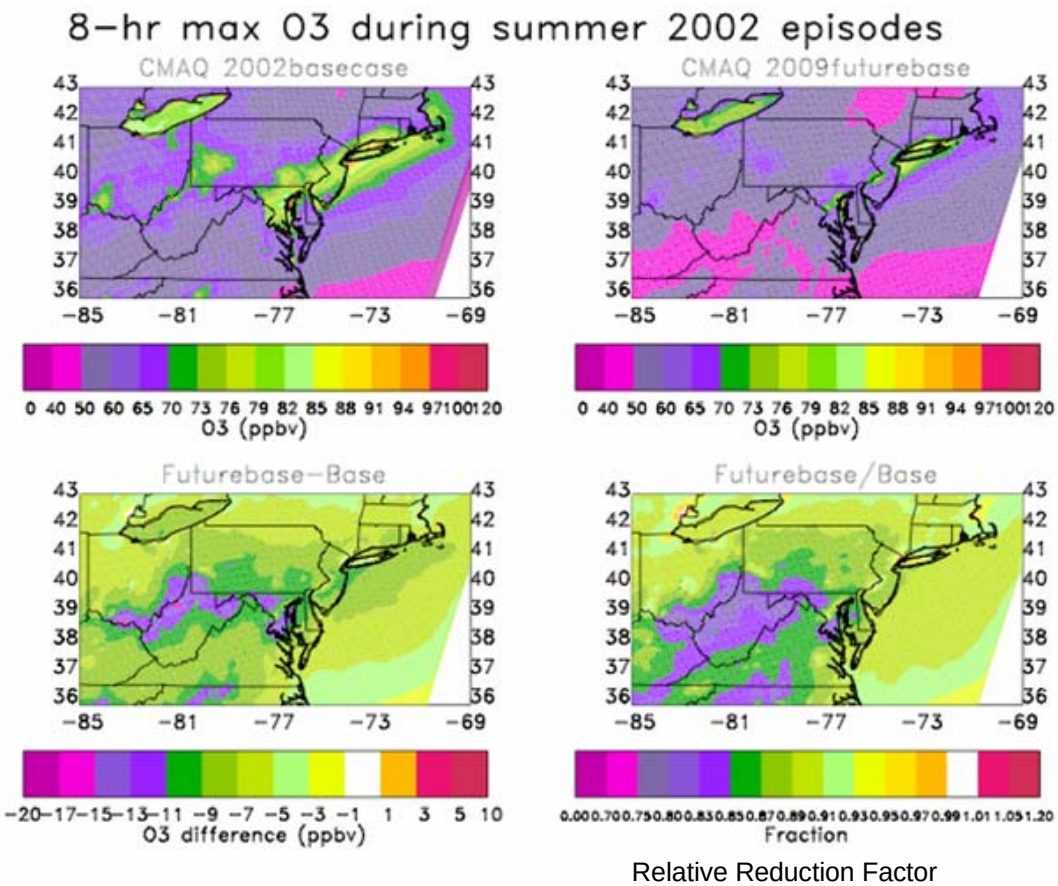
SIP Workshop/Meeting

March 10, 2006

CMAQ Ozone Modeling for OTR

- UMD completed MM5 meteorological modeling for the summer of 2002.
  - Developed a new near-surface modeling scheme which proved itself with greatly improved simulations of winds and temperatures.
- NYDEC is the modeling lead agency.
  - Completed preliminary 2002 base case modeling.
  - Completed preliminary 2009 OTB&OTW CAIR base case modeling.
- UMD prepared preliminary plots of the ozone modeling results.

CMAQ 8-Hour Modeling Results For OTR



Relative Reduction Factor

CMAQ modeling plots prepared by UMD.

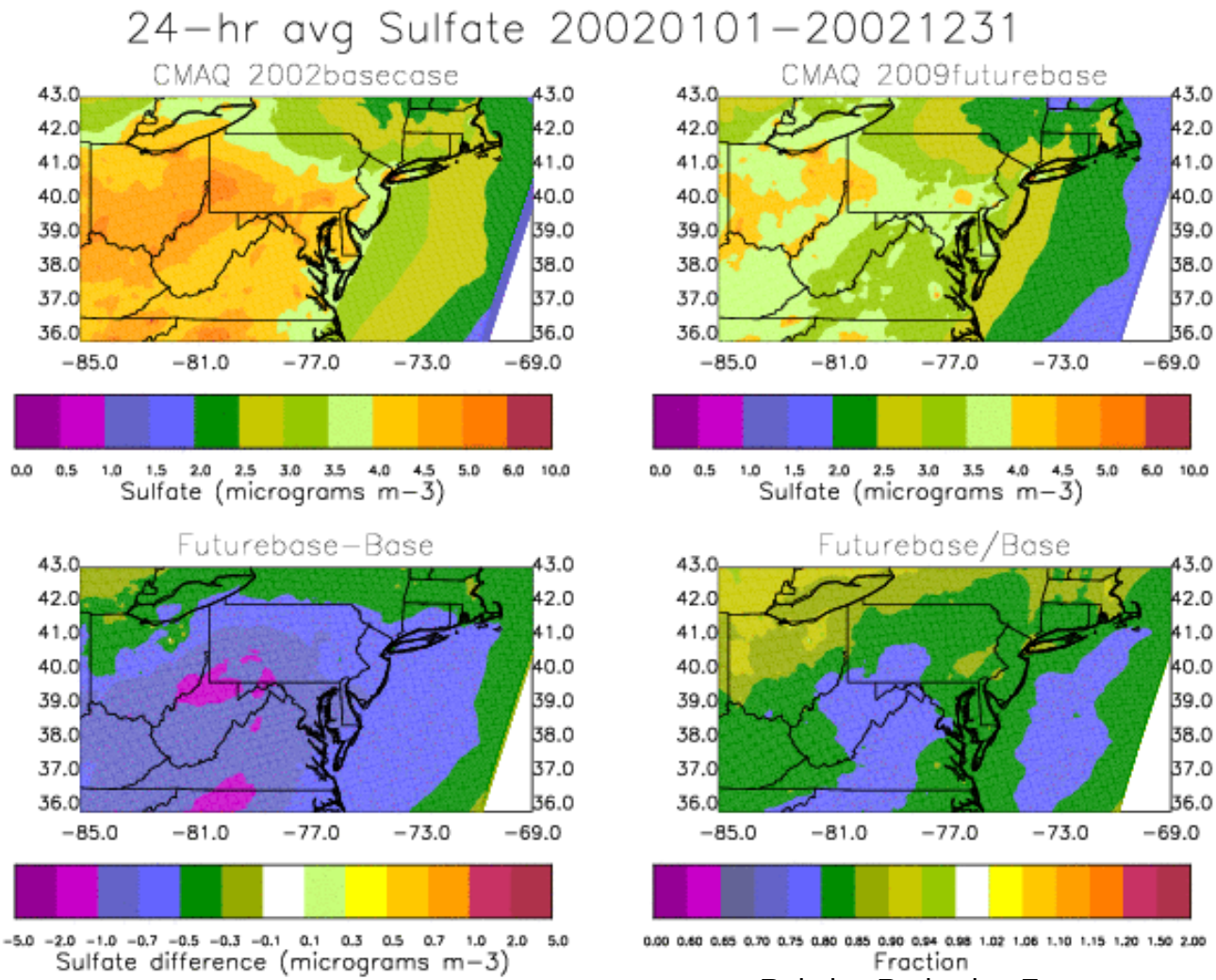
$PM_{2.5}$ CMAQ Modeling for MANE-VU

- UMD completed MM5 meteorological modeling for all of 2002.
  - Developed a new near-surface modeling scheme which proved itself with greatly improved simulations of winds and temperatures.
- MANE-VU annual $PM_{2.5}$ modeling effort being completed by regional modeling centers:
  - UMD (MD), ORC (NJ), NYSDEC, VADEQ, and NESCAUM.
- UMD completed the following:
  - 2002 annual PM2.5 simulation period
    - 12/15/2001 – 2/28/2002
  - 2009 annual PM2.5 simulation period
    - 12/15/2008 – 2/28/2009

$PM_{2.5}$ CMAQ Modeling Results

- UMD prepared preliminary plots for each of the following compounds:
  - $PM_{2.5}$, Elemental Carbon, Sulfate, Nitrate, Crustal Material, Organic Carbon, and Ammonium.
- The preliminary 4 panel plots included the following:
  - 2002 Base case
  - 2009 Future base case
  - Difference (future base – base)
  - Relative Reduction Factor (RRF)

Sulfate Fraction of $PM_{2.5}$

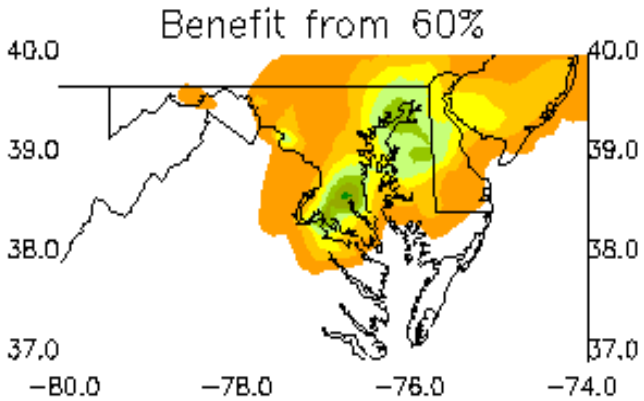


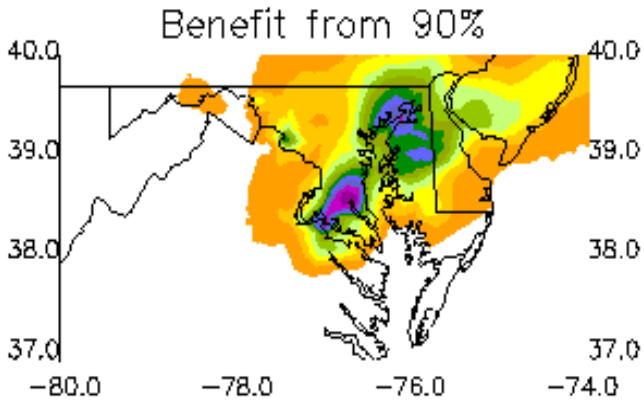
UMD Sulfate plots are considered preliminary.

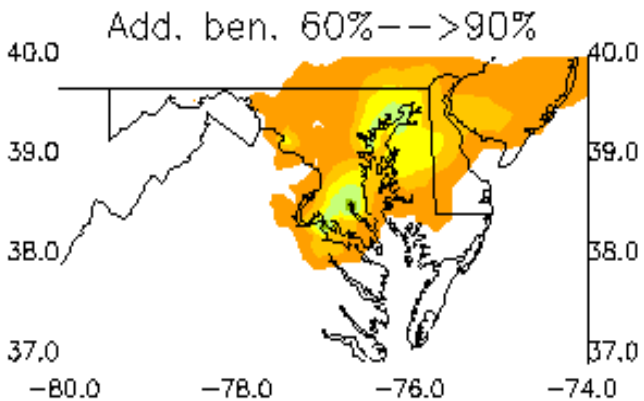
CMAQ Sensitivity Modeling for Clean Power Rule

- UMD Completed modeling three scenarios using a mid-August, 2002 ozone and $PM_{2.5}$ episode in support of the Clean Power Rule (CPR):
  - Base case.
  - 60% reductions of NO_x and SO_2 from all Maryland power plants.
  - 90% reductions of NO_x and SO_2 from all Maryland power plants.

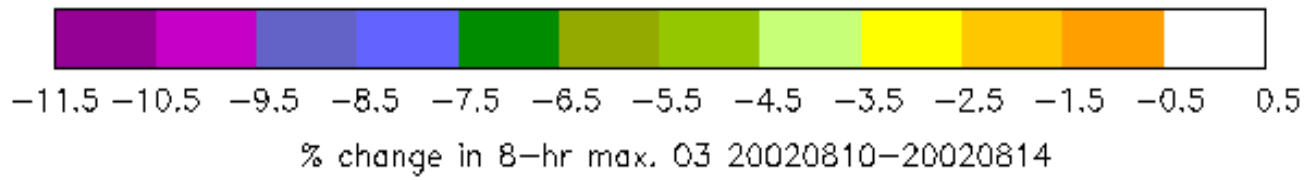
Change In 8-Hour Max Ozone







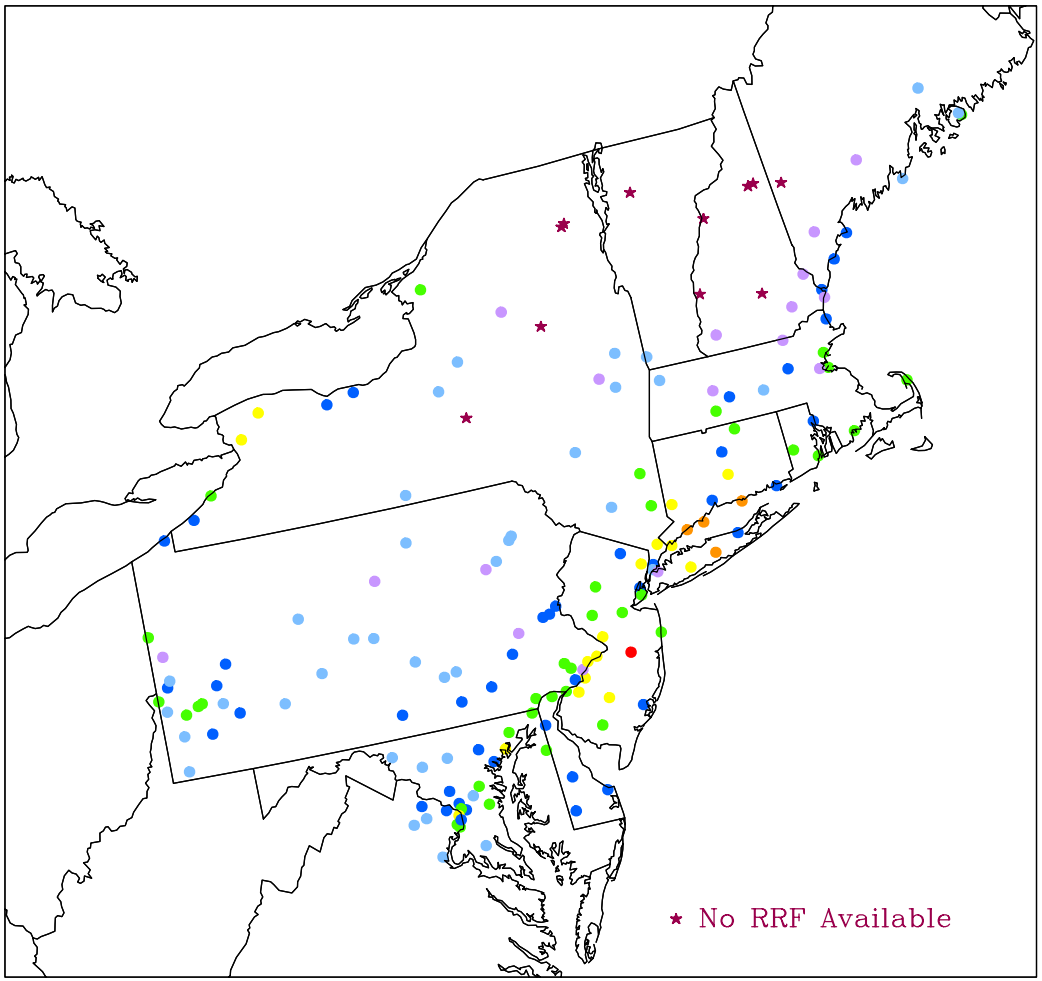
Based on preliminary UMD Ozone Modeling Results

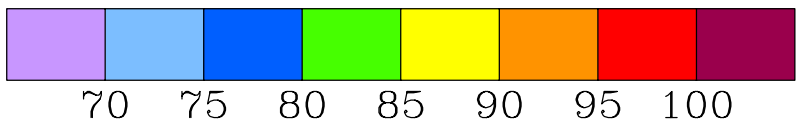


Caveats

- The emission inventories utilized for VISTAS and especially MRPO (both 2002 and 2009) do not reflect their current estimates, and MANE-VU emissions will be updated as well.
- The 2002 inventory is not consistent with the ones used to grow to 2009.

2009 Base Case 8-hr Future Design Values

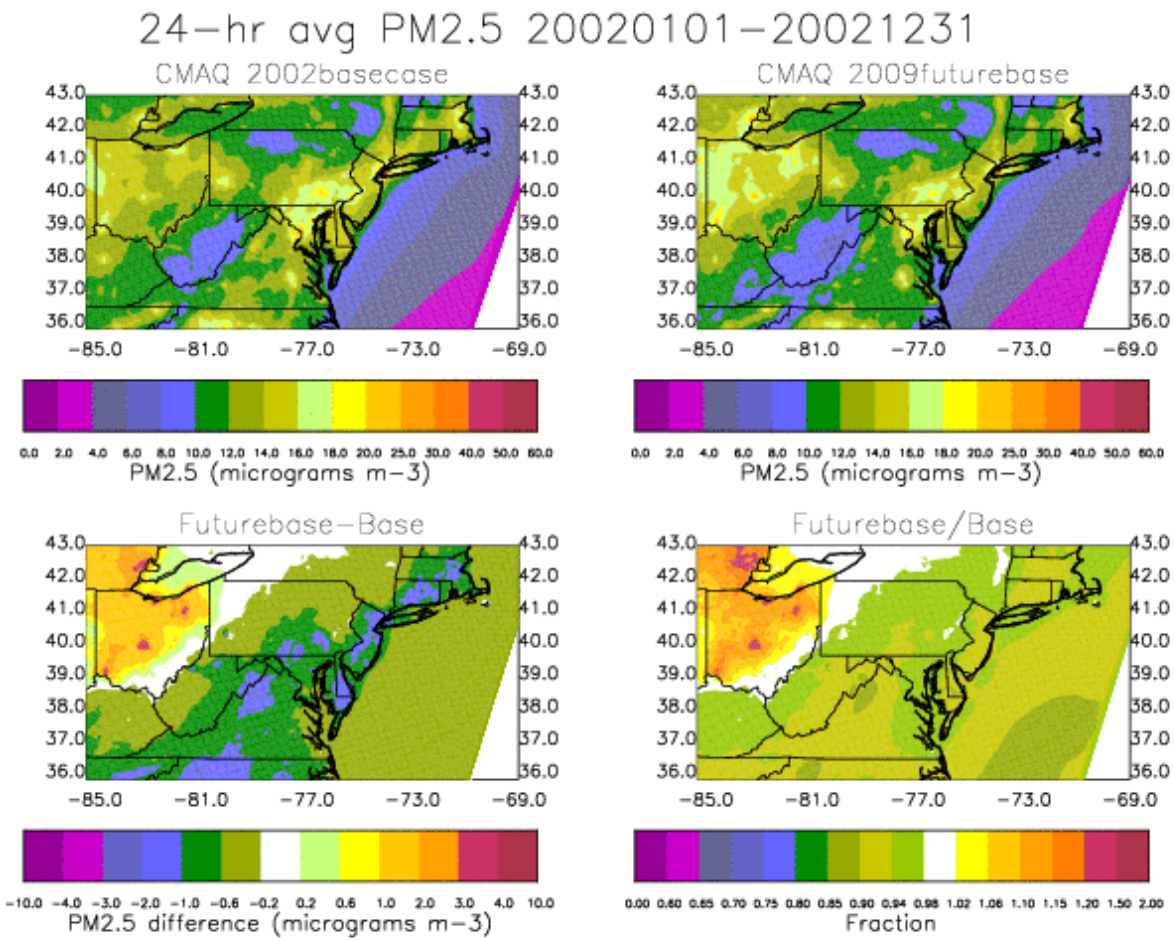




Plot prepared by NYDEC.

- Values for 8-hr O_3 at OTC monitors, estimated by multiplying the "Current Design Values" with the model-predicted RRF for the 2009 OTW scenario.
- These values represent the "Future Design Values" for the purpose of the modeled attainment

MANE-VU $PM_{2.5}$ CMAQ Modeling



Relative Reduction Factor

Plots prepared by UMD.

Future Ozone Modeling Plans

U of MD

- *CMAQ runs for attainment SIP*
- Coordinate with other modeling centers
- Domain includes Baltimore nonattainment area, Washington nonattainment area and portions of the Philadelphia nonattainment area

Future Plans

- *Re-run the same episode with 2009 base emissions…*
- To get a better idea of the overall chemical environment in which these reductions would occur, the simulations will be rerun using anticipated future emissions from cars, trucks, etc.

Future Plans (cont.)

- *Use speciated changes to determine annual impacts*

- $PM_{2.5}$ is composed of many different chemical compounds. In the present case, we have simply used the changes in mass concentrations. In the future, we will determine the changes by individual compounds and apply those to similar measurements to better determine the annual impact of these emissions reductions.

Maryland Department of the Environment

ARMA – Air Quality Planning & Monitoring
and
University of Maryland (UMD)

1800 Washington Boulevard | Baltimore, MD 21230-1718
410-537-3000 | TTY Users: 1-800-735-2258
www.mde.state.md.us