

WRAP/RMC Fire Sensitivity Modeling Project

**WRAP Regional Modeling Center
University of California Riverside**

**Fire Emissions Joint Forum Meeting
Denver, CO
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2004 Sensitivity Cases - completed

- Compared the Optimal and Base Smoke management strategies from the 2018 §309 plans.
- Evaluated the new Wild, Ag and Rx burning emissions inventories using the the 2002 model scenario.
 - Significant contributions from Ag and Rx burning in those states that have an inventory (define $\Delta 0.5$ deciview as a significant effect).
- Modeled natural versus anthropogenic fire emissions:
 - Large contributions from natural fires and from wildfires
- Completed sensitivity analysis of vertical distribution of Ag burning emissions:
 - Model was not sensitive to layer height changes in Ag emissions.

Planned 2005 Sensitivity Cases

- Evaluate sensitivity to changes in vertical distribution of wild fires.
 - Large wild fire plumes can extend into the free troposphere, so we expect much larger effect compared to the Ag burning case
- Evaluate the effects of small fires in or near Class I areas.
 - Air Sciences has developed data on fire sizes in their Phase 2 EI report.

Model Scenarios available

- 2004 fire sensitivities used older version of CMAQ
- For 2002 fire sensitivities, will use latest CMAQ version (4.4), 36-km and 12-km domains
- Depending on CMAQ performance, may also use current version of CAMx model, includes PSAT algorithm.
- Will use final Phase 2 Fire EI data in sensitivities
- Other emissions data are currently available for Preliminary 2002 version D
 - Final 2002 version A will be ready in July.
 - Recommend using Pre02d EI for consistency.

Modeling Approach

- Perform an air quality model base case simulation.
- Run the model sensitivity case evaluate the change in visibility compared to the base case. Show results as:
 - Spatial plots showing changes in PM averaged for a day, month or season.
 - Stacked bar time-series plots at Class I area.
- Perform an air quality model base case simulation.

Modeling Time Period

- Strong seasonal aspect to different components of the fire emissions inventory:
 - Wildfires: July - August
 - Prescribed burning: Sept – Nov
 - Ag burning: more even distribution, max Aug -Sep
- Model simulations can be run for 2 or 3 months to focus on period of interest.

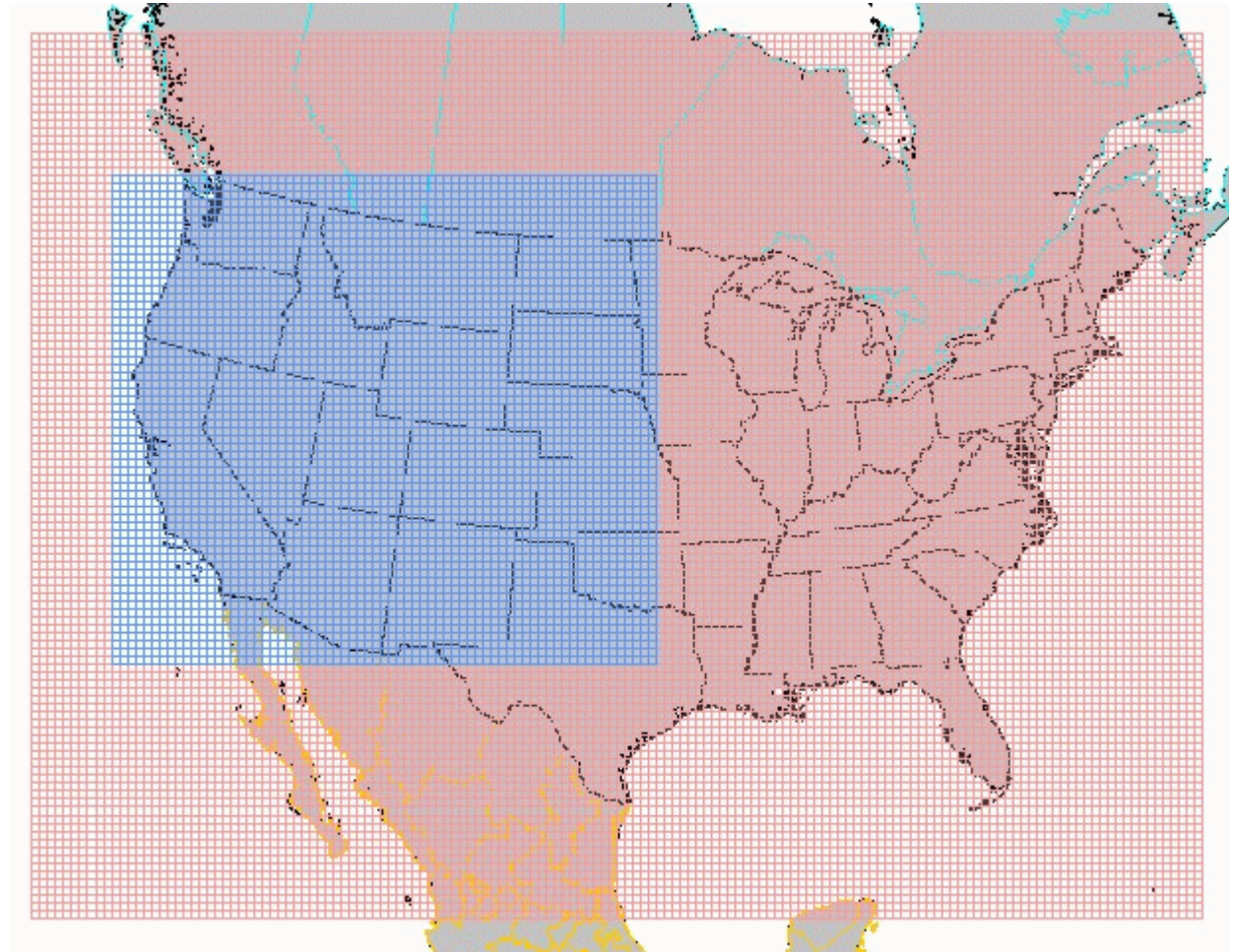
Review of daily spatial plots on RMC web page

Vertical Distribution Sensitivity

- Evaluate sensitivity to changes in vertical distribution of wild fires:
 - Current approach uses a default plume rise profile and does not make use of met data.
 - EPA has developed a new model for fire plume rise heights that uses MM5 met data, used in WRAP air quality models.
 - Run FEPS to generate input data.
 - Requires fire size in acres and daily heat flux.
 - Run CMAQ for episodes with new plume rise and compare to Pre02d case.

Small Fire 2005 Sensitivity

- Evaluate the effects of small fires in or near Class I areas using 12-km model domain



Small Fire Sensitivity Cases

- Model Simulations:
 1. Base Case: no fires
 2. only fires less than 100 acres
 3. only fires less than 50 acres (depending results from #2, above)
 4. all fires

Schedule

- First step is developing new emissions inventories for plume rise and small fires.
 - QA on small fires is in progress, can be completed 2 months after final EI data.
 - Plume rise – see separate presentation.