

Fire Emissions Joint Forum Sensitivity Model Runs for Fire

Purpose

- To determine the sensitivity of the model to varying parameters in the fire emissions inventory
- Minimize need to produce new emission inventories
- Perform the work with \$50k contract to RMC

Development Process

- Straw-man Memo
- Conference calls
- Input from Regional Modeling Center (RMC)
- Modeling Plan for the RMC

What we know about CMAQ

- Characterizing Sources (point vs. area)
- Post processing of SMOKE data files
- Vertical distribution of emissions
- Air chemistry in the model
- Grid resolution (36k now moving to 4k)

Objectives of the Sens Runs

- Prioritize Data Collection Efforts
- Prioritize Long-Term Research Needs
- Improve Smoke Management Decisions

Metric to Evaluate Sens Runs

- Recognized importance of a systematic way to organize and analyze the model results
 - Large amounts of data
 - Establishing a common metric
 - Change in visibility at ea. Class I area
 - One-size-fits-all metric may not be enough
 - Extinction as a function of dx from Class I
 - Extinction as a function of emissions into 1st layer
- Will prepare Protocol for results analysis

Suggested Sens Model Runs

- Analysis of results from existing runs
 - Contribution of extinction from ea. fire sources
 - Wildfire / Rx fire / Ag burning
 - Use 2018
 - Effect of OSM on extinction
 - 2018 OSM vs. 2018 Base
 - Effect of changes in small changes in spatial/temporal distribution of fires
 - "old" 2018 Ag Base vs. "new" 2018 Ag Base
 - Effect of changes in mass in the EI
 - "old" 2018 Rx Base vs. "new" 2018 Rx Base (>450 tpy)

Suggested Sens Model Runs

- Effect of small fires on extinction
 - Remove fires (<10, 25, 50, 100 acres?)
 - Use 2002 WF or 2018
- Effect of changes in diurnal distribution
 - Change diurnal profile (more emissions in late eve / early morning)
 - Use 1996 WF

Suggested Sens Model Runs

- Effect of changes in plume characteristics
 - Adjust % of plume fumigated into first layer
 - Synch up FEJF's 1st layer ht (91.5 m) with RMC's 1st layer ht (38 m)
 - Adjust assigned height of the bottom of the plume (PBOT)
 - Review suggests that FEJF's original values for PBOT are too low (for large fires, 1/3 too low)
 - Use 1996 WF EI

Other Issues

- Sens runs to done over the entire modeling domain
- May restrict sens runs to shorter time period (wildfire season, Spring/Fall for Rx)
- CMAQ performance runs don't include Rx fire or Ag burning...what to do?
- Use alternative model to improve physical representation of plumes from fire.
 - BlueSky or CSEM
 - Rely on CMAQ runs for changes in physical environment

What's Next?

- Final Plan from FEJF to RMC.
- Several products from FEJF to RMC
 - New diurnal profiles for WF
 - New 1st layer & 2nd layer percentages
 - Table of new PBOT levels
- Air Sciences to provide bid for providing new EI's at various fire size cutpoints
- RMC to provide Plan/Cost estimate to do the work
- RMC to prepare Protocol to analyze model results

What's Next

- Timeline
 - Oct 2003 – Finalize plan, protocols, scope of work, contract.
 - Late 2003 / Early 2004 – Perform sensitivity model runs.
 - Spring 2004 – Results/report of results of sensitivity model runs.

Questions Raised

- What happens to other emissions (held constant?) and at what level?
 - Does the sensitivity of the model to changes in fire emissions change with different versions of non-fire EI's (base vs. max control).
