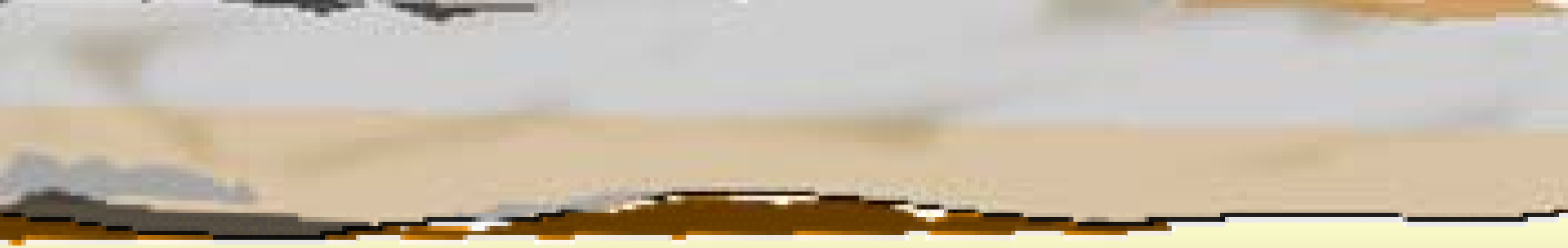

Quality Assurance of Emissions Modeling Process

Track Two: Breakout Five

New Orleans

4-6 May 2004

Wednesday 13:30-15:00

Purpose

- Develop a national wildfire emissions inventory for 2002 that is applicable to RPOs, useful for smoke management, and is capable of detecting change.

Desired Outcome

- Develop QA protocol for wildfire emissions inventory.

Questions

- What have we learned from evaluations to date?
- What are existing QA methodologies?
- What is the purpose of QA?
- Can existing measurements be used for model evaluation?
- What additional measurements are needed?
- What types of field audits and QA procedures can be used to assure the quality of the inventory and assess its accuracy?

What have we learned to date?
Emission Inventories

- Fuel load adds uncertainty (extremely scale dependent)
- Size of burn adds uncertainty (largely scale dependent)
- Consumption depends on fuel condition and strata and complete vs. incomplete (mosaic)
- Not enough speciation in emission factors
- Emission models less sensitive to emission factors than fuel consumption
- Combustion phase influences emissions
- Anthropogenic emissions (toxics, etc.) neglected (avoided in regional haze but important for health impacts)

What have we learned to date?
Dispersion Models (smoke management scale)

- Plume trajectory
  - Good agreement with satellite and airborne observations (top dimension of plume)
  - Affected by plume height
- Concentrations
  - Largely unknown
  - Surface concentrations near source appear reasonable if meteorology is good and plume height calculated correctly
  - At large distances from source other factors affect accuracy of concentrations
- Near misses from point observations challenge evaluations
- NWP models have problems in boundary layer

What have we learned to date?
Photochemical (Grid) Models (regional haze)

- Plume trajectory
  - Depends on grid size
  - Affected by plume height, which often is approximated poorly
- Concentrations
  - Depends on grid size
  - Affected by plume height
  - Re-suspension into grid after deposition causes downwind concentrations to be too high
- Spatial average of grid agree best with time-averaged observations (i.e., day-to-day variation poorly correlated with point observations)
- Cannot create temporal averages of fires (under predicts on days with fires and over predicts on days without fires).
- Don't know sensitivity of models related to physics vs. chemistry

What are existing QA methods?

- Coordinates and spatial where is the fire
  - GIS analysis
- Plotting and visually checking for reasonableness
- Fuels
  - Stand scale – audit 1% of units
  - Investigating methods of regional correlation to stand-specific information (need to understand and describe the correlation)
- Combustion efficiency
  - Define fuel load and moisture with consumption estimates

Purpose of QA?

- Emissions accounting
  - Credit trading
  - Go/no-go decisions
  - Emission reductions (reasonable progress)
- Modeling dispersion (site & time impacts)
- Modeling haze detect change
  - Amount of change determines monitoring protocol
  - What level QA is dictated by the sensitivity of the model

Can existing measurements be used?

- Measurements can be used to show cumulative trends
- Difficult to determine the influence of fire in a grid model without complimentary trajectory analysis
- Density and quantity of measurements depend on sensitivity of models and level of change detection needed
- Background levels need to be understood

What additional measurements are needed?

- Water-soluble potassium
- Is spatial array adequate???
- Value in both filter-based and light-based measurements but don’t know the ratio that is needed
- Sensitivity tests are mandatory to determine if existing measurements are adequate

What types of field audits and QA procedures can be used?

- Consistent collection method
  - Ensure complete story from all 34 databases
  - Consistent between state and RPO or at least defined differences
- Make sure fires located where fuel exists
- Documentation / transparency
  - Define assumptions and methods, for example:
    - Calculate emissions from AP-42 and area
    - Calculate emissions with FOFEM or CONSUME
    - etc.
- Moving toward consistent set of inputs with options for calculating emissions

Conclusions

- Any data is good data !!!
- We have a good idea of what's important to produce reasonable results but we need additional testing (sensitivity and verification) to develop more confidence.