Emissions Inventory Lessons Learned by Southeastern Air Agencies and Future Plans for $PM_{2.5}$, Haze, and Ozone

RPO/MJO Panel

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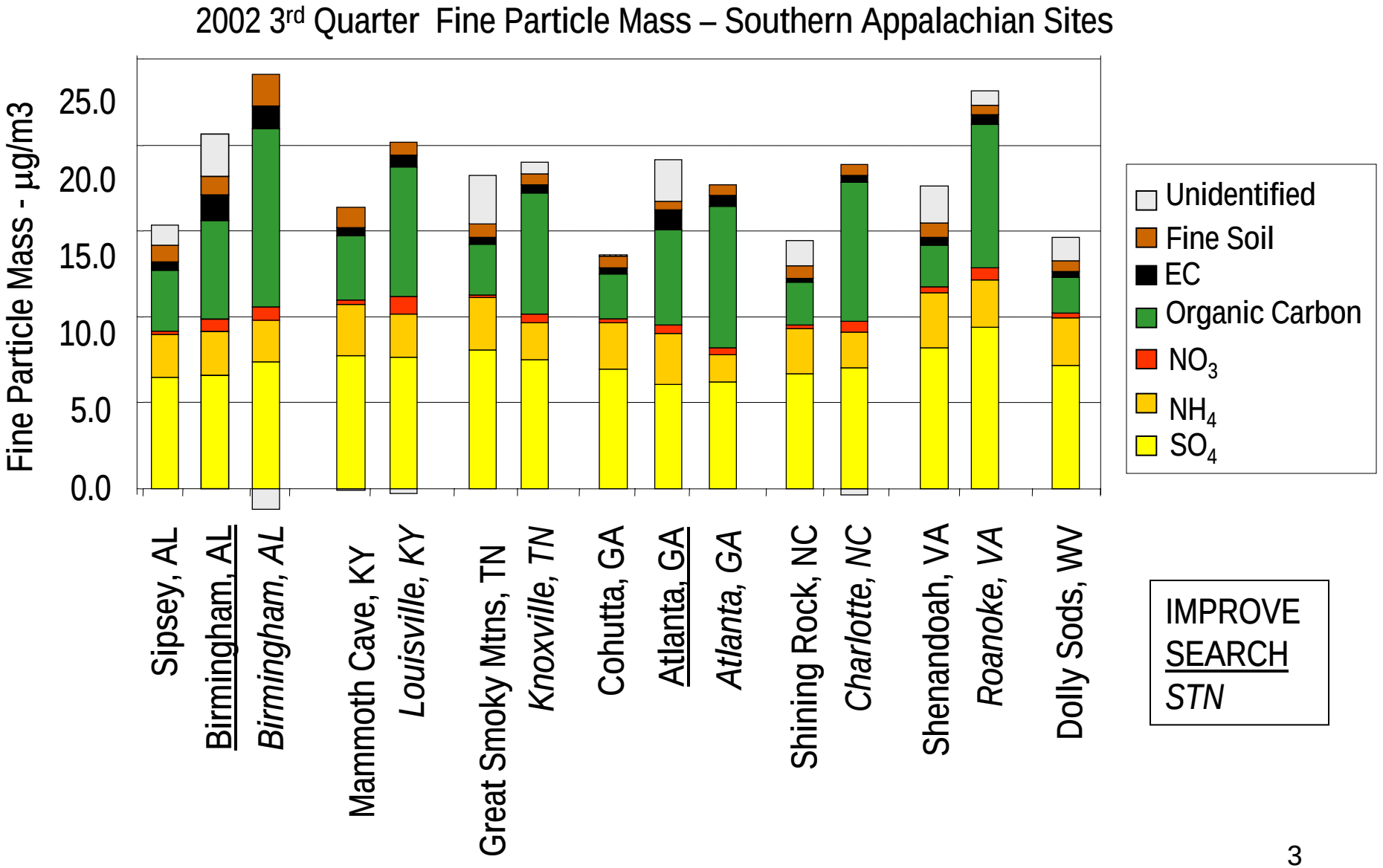
Lessons Learned

- Class I areas in the Southeast are not remote. They are located near $PM_{2.5}$ and ozone non-attainment areas
  - Urban and Class I areas have common regional pollutant contributions (SO_4, carbon)
  - Urban areas have additional local increment (NO_3, OC, EC, metals)
  - Emissions controls to address $PM_{2.5}$ nonattainment areas will improve visibility in Class I areas
  - Integrated air quality management approach needed for ozone, $PM_{2.5}$, and haze

$PM_{2.5}$ constituents are similar at urban and nearby Class I Areas



Lessons Learned

- SO_2 most important contributor to $PM_{2.5}$ and haze in the Southeast
  - Fortunately, high confidence in SO_2 inventory
  - In VISTAS states, point sources are 96% of total SO_2 inventory
  - Even assuming EGU controls under CAIR, in 2018 EGU are still largest contributors to SO_4
  - Second largest source category is coal-fired industrial boilers

Lessons Learned

Southeastern State Air Resource Managers

- Organic carbon is major contributor to $PM_{2.5}$ and haze in the Southeast
  - Higher OC at urban monitors than Class I areas
  - Primary $PM_{2.5}$ from biomass or fossil fuels
  - Secondary organic aerosol, mostly biogenic
- Elemental carbon is important in $PM_{2.5}$ non-attainment areas, less so at Class I areas
  - Primary $PM_{2.5}$ from incomplete combustion of biomass or fossil fuels

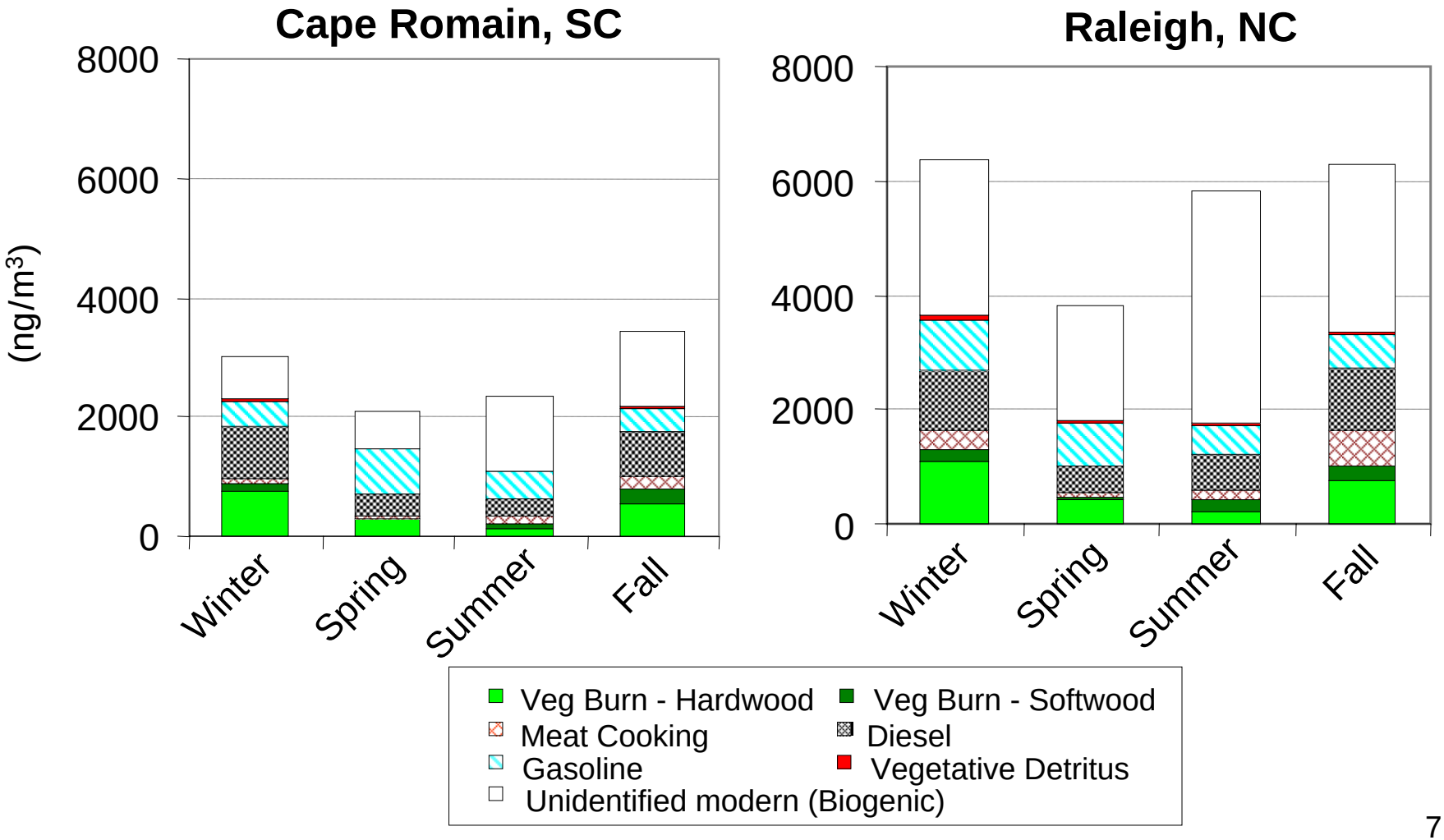
Lessons Learned

Southeastern State Air Resource Managers

- Carbon inventory needs improvement!
  - Improved profiles for mobile, nonroad, point, and area sources
    - LADCO-NREL project to improve mobile profiles
    - Speciation of $PM_{2.5}$ from point sources
  - Fire activity and emissions
    - Significant impacts to ozone, daily $PM_{2.5}$ and haze
  - Biogenic emissions are by far the largest source of VOCs in the Southeast

CMB-C14 Apportionment of Total Carbon

Largest contributions from biomass burning, mobile, and unidentified modern carbon attributed to biogenic emissions



Lessons Learned

Southeastern State Air Resource Managers

- NO_x small contributor to $PM_{2.5}$ in Southeast
  - NO_x and NH_3 contribute to NH_4NO_3
  - NH_4NO_3 may be elevated on some winter days
  - NO_x fairly good inventory
  - NO_x emissions important for ozone
- NH_3 inventory needs improvement!
  - Primarily from livestock and fertilizers, also human waste management systems
  - Large uncertainty in current assumptions

Lessons Learned

Southeastern State Air Resource Managers

- "Soil" or "Crustal" minor contributor to $PM_{2.5}$ in Southeast except in local nonattainment areas
  - Need better $PM_{2.5}$ profiles
  - Industrial PM profiles include metals in "soil" category with crustals, results in model over predicting "soil"
  - Fugitive dust is issue for West, not populated East

Lessons Learned

- Emissions Inventories need to support Air Quality Modeling
  - Speciation of primary $PM_{2.5}$
  - Temporal allocation: how much simplification is too much?
    - Utility daily and annual profiles
    - Mobile profiles
    - NH_3
  - Improve spatial resolution of inventory data for modeling
    - E.g. fire, agricultural emissions, rail yards as point source emissions

Lessons Learned

Southeastern State Air Resource Managers

- Process and Policy
  - RPOs shared methods and inventories, but schedules didn't align across RPOs
  - Eastern RPOs used different utility projections
    - Range of 2018 forecasts reflects future uncertainties; we won't know which is most accurate until 2018
    - GA and NC have state rules for EGU controls
    - Consent decrees and federal court order require additional controls in AL, FL, KY, SC, TN, VA, WV
  - Eastern RPOs need to coordinate inventories better for next SIPs

Prospective View - Planning for Next SIPs

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- One-atmosphere modeling for ozone, $PM_{2.5}$ and haze SIPs
  - One emissions inventory supporting all SIPs
  - VISTAS has selected contractors for emissions inventory development
    - Contractor to support state inventory staff
    - Currently developing contracts
  - Working with ERTAC to define improvements for base year inventory and projection methods
    - Expect to follow ERTAC recommendations unless issues arise that preclude

Prospective View - Planning for Next SIPs

- Southeastern inventory priorities
  - EGU projections: what requirements, what controls, where, when
  - Fire: how much can we afford to do?
  - NH_3 emissions from agricultural sources
  - Mobile emissions improvements
  - Rail improvements per ERTAC
  - ERTAC recommendations re area source methods
  - Better international emissions
    - Cuban emissions added?
  - Work with EPA to benefit from their improvements

Important Issues Being Resolved

- No one modeling base year will be representative for all Southeastern states
  - 2005 hurricanes in Gulf, more typical for NC, VA
  - 2007 record drought, large fires in GA and FL
  - 2008 still drought, large fire in eastern NC affected VA
- Assume that 2008 is focus for emissions development
  - 2008 inventory will not be available until 2010
  - Expect to do preliminary modeling with an initial 2005 inventory
  - Evaluate 2005 LADCO and NEI inventories for initial modeling
  - May use meteorology from more than one base year for modeling demonstrations, still to be evaluated


June 2008 fires in eastern NC

Models for the Future

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- Mobile emissions plans
  - EPA recommends MOVES model but model is not yet available
  - MOVES will project inventory but will not be integrated with emissions models (why?)
  - Intend to continue to use MOBILE 6 for emissions modeling
- Biogenic emissions: still evaluating options
  - MEGAN has additional secondary organic aerosol formation
  - EPA updated SOA formation in CMAQ v4.7
- CONCEPT emissions model
  - Open source model
  - Conceptually more transparent than SMOKE model
  - But….need better documentation for other users
  - VISTAS states will continue to use SMOKE

Success for the Future

Southeastern State

Air Resource Managers

- Coordination with other regions
  - Need to do better than regional haze experience
  - Already cooperating to improve and standardize methods through ERTAC ad-hoc group
    - NH_3, EGU projections methods in 2009
  - Already cooperating through State Collaborative effort on common modeling platform
  - Build success through existing technical efforts
- Making do with less
  - Budgets are much tighter
  - Need take advantage of all resources available