

INTEGRATING EMISSION ESTIMATES OF BIOMASS BURNING FROM THE HMS-HYSPLIT PROCEDURE INTO THE AIR QUALITY FORECAST VERSION OF CMAQ

Thomas Pierce^{1*}, George Pouliot^{1*}, Rohit Mathur^{1*}, and Jeffrey Vukoich²

¹Atmospheric Sciences Modeling Division/NOAA
Research Triangle Park, North Carolina

²Carolina Environmental Programs
University of North Carolina
Chapel Hill, North Carolina

ABSTRACT

The National Weather Service (NWS) is deploying the Community Multi-scale Air Quality (CMAQ) modeling system coupled with its meteorological model to forecast near-surface ozone concentrations across the eastern United States. Because the NWS is planning to extend its model forecasting capability to include aerosols, spatially- and temporally-resolved estimates of biomass burning are needed. Currently, emission inventories of forest fires, slash burning, prescribed fires, and agricultural fires are resolved rather crudely, at a county level and on a monthly basis.

We will report on an initial step to integrate the Hazards Mapping System-Hybrid Single-Particle Lagrangian Integrated Trajectory (HMS-HYSPLIT) procedure (www.arl.noaa.gov/smoke/forecast.html) for estimating the “real-time” contribution of emissions from individual fires into the CMAQ modeling system. The HMS-HYSPLIT estimate relies on daily estimates of satellite-derived burn area as reported by NOAA’s Fire Detection Program (www.ssd.noaa.gov/PS/FIRE/hms.html). It is assumed that each reported fire consumes 1 ha per hour and emits 5 kg of total particulate mass (PM₁₀) per ha burned. Emissions computed using the HMS-HYSPLIT procedure for 2004 across the eastern United States are 60% less than the emissions estimated for the traditionally-developed EPA’s National Emission Inventory for biomass burning sources.

The HMS-HYSPLIT estimates have been allocated to individual grid cells on an hourly basis, and plume rise has been calculated using the assumed heat output. Selected cases from the 2004 forecast season have been identified to test model sensitivity. Results from CMAQ simulations for the eastern United States will be presented to identify the sensitivity of using the HMS-HYSPLIT derived biomass burning estimates in a forecast version of CMAQ.

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PRIMARY AUTHOR’S BIOGRAPHY: Thomas Pierce is Chief of the Air-Surface Processes Modeling Branch in NOAA/Air Resource Laboratory’s Atmospheric Sciences Modeling Division. He has performed research on air quality modeling techniques for the past 25 years, focusing more recently on the development of emission models that account for meteorological conditions. Mr. Pierce received his undergraduate and graduate degrees in meteorology from North Carolina State University.

*Working in partnership with the National Exposure Research Laboratory, U.S. Environmental Protection Agency. Contact person: pierce.tom@epa.gov