Evaluation of CMAQ air-surface exchange and WRF energy balance algorithms against flux measurements

Jesse Bash, John Walker, Ian Rumsey, Donna Schwede

The atmosphere-biosphere exchange of trace gases in chemical transport models is a critical process that influences atmospheric chemistry, particulate matter formation and deposition of pollutants and nutrients to ecosystems. Typically these processes are evaluated for a single species at a time using data from short term flux measurement campaigns due to the lack of routine network observations. Recent advances in instrumentation allow for the flux measurement of multiple trace gases. A box model of Community Multiscale Air Quality (CMAQ) chemical transport model dry deposition and bidirectional exchange and the Weather Research Forecast (WRF) meteorological model energy balance algorithms has been developed for field scale model algorithm evaluation and development. This model can simultaneously estimate multiple pollutant air-surface exchange and latent, sensible, and soil heat fluxes. All modeled fluxes use a common resistance framework to constrain the modeled processes. This model was applied to flux measurements of HNO_3, SO_2, NH_3, and latent, sensible and soil heat taken at a grassland site at Duke Forest, NC. An evaluation of model deposition and energy balance algorithms and potential improvements to vegetative resistance parameters will be presented.

Contact:
Jesse Bash
U.S. EPA
Tel: 919-541-0862
Email: bash.jesse@epa.gov
NERL Atmospheric Modeling and Analysis Division
MD: E243-02
Research Triangle Park, NC 27711