

CMAQ estimates of deposition to urban area in the US: Current approaches and future challenges

Donna Schwede¹, Kathleen Weathers², Jonathan Pleim³

Estimating atmospheric deposition to urban areas is an emerging area of interest. Regional air quality models are frequently used to characterize air concentrations near cities and much effort has been made to improve these estimates. Less attention has been given to approaches for modeling total (wet and dry) atmospheric deposition to urban ecosystems, particularly dry deposition. The complexities of the urban landscape present particular challenges in modeling meteorology, chemical transport and, ultimately, deposition. In this study, we show patterns of urban deposition across the US using the Community Multiscale Air Quality model (CMAQ) and contrast the results for different urban areas in the US including New York City, Atlanta, Houston, Chicago, Phoenix, and Los Angeles. These cities each present different challenges in emissions, meteorological, and air quality modeling. We examine the annual deposition of oxidized nitrogen (N) to illustrate differences in chemical species contribution to N deposition and to investigate effects of underlying land use type on model results. Finally, we suggest some next steps for urban deposition research.

¹US Environmental Protection Agency, National Exposure Research Laboratory, Atmospheric Modeling and Analysis Division, Research Triangle Park, NC 27711; schwede.donna@epa.gov; (919) 541-3255

²Cary Institute of Ecosystem Studies, Box AB, Millbrook, NY 12545; weathersk@caryinstitute.org; (845) 677-5343

³US Environmental Protection Agency, National Exposure Research Laboratory, Atmospheric Modeling and Analysis Division, Research Triangle Park, NC 27711; pleim.jon@epa.gov; (919) 541-1336