Impact of Updates to the Community Multiscale Air Quality (CMAQ) Model on Predicted Deposition

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The Community Multiscale Air Quality model (CMAQ) is a regional air quality model which provides estimates of concentration, dry deposition, and wet deposition. CMAQ uses a detailed emissions inventory and algorithms for accounting for transport and transformation to provide a representation of the spatial changes in concentration and deposition. The Weather Research and Forecasting (WRF) model is used to provide meteorological data to CMAQ. The Pleim-Xu land surface model in WRF calculates the moisture, heat, and momentum fluxes and this information is passed to CMAQ for use in the deposition calculations. Recent improvements have been made to CMAQ (v5.0) that impact deposition estimates including the addition of the capability to model the bidirectional exchange of NH_3. New methods for estimating fertilizer application rates for agricultural areas and the resulting soil chemistry are a key component of this new capability. Additionally, speciation of dust emissions and inclusion of the dynamic interaction between fine and coarse modes allows for a better representation of base cations. Lightning NO_x is now included in the model which leads to a better characterization of the nitrogen budget. The capability to output land use specific deposition is also available in CMAQ v5.0 which will provide important information for ecological assessments. An overview of these modifications is provided as well as model results showing the impact of these changes.

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