A Performance Evaluation of the 2004 Release of Models-3 CMAQ

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Brief Description:

The Clean Air Act and its Amendments require that the United States Environmental Protection Agency (EPA) establish National Ambient Air Quality Standards (NAAQS) for ozone and particulate matter and to assess current and future air quality regulations designed to protect human health and welfare. The most reliable tools for performing these assessments are air quality models, like EPA's Models-3 Community Multiscale Air Quality model (CMAQ). CMAQ is an Eulerian grid model that simulates concurrently the atmospheric and land processes affecting the transport, transformation and deposition of air pollutants and their precursors on both regional and urban scales. CMAQ performs these simulations following first principles and employs a "one atmosphere" philosophy that manages the complex interactions among multiple atmospheric pollutants including ozone, particulate matter, airborne toxics and acidic and nutrient species. As with any model, CMAQ, requires evaluation against observational data to determine its value to the air quality and regulatory communities. Accordingly, a full, one year simulation (2001) will be performed for the contiguous U.S using the 2004 release of CMAQ that will be evaluated against observations from numerous networks including: the Air Quality System (AQS) from which hourly observations of O3 (ppb) data will be obtained from over 700 stations; the Clean Air Status and Trends Network (CASTNet) from which weekly average concentrations of SO_4^{2-}, NO_3^-, HNO_3 and NH_4^+ (μg m-3) will be obtained from nearly 70, mostly rural stations; and the Interagency Monitoring of PROtected Visual Environments (IMPROVE) network from which (every third) daily average concentrations of SO_4^{2-}, NO_3^-, PM2.5, OC and EC (μg m-3) from 50 rural sites will be used. Numerous statistical metrics and graphics will be used in this evaluation, including summary statistics, least squares coefficients and several measures of bias and error.