PERFORMANCE EVALUATION OF AURAMS FOR MULTIPLE CASE STUDIES

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1.0 ABSTRACT

AURAMS, or A Unified Regional Air-quality Modeling System, is an episodic, multi-pollutant, regional air-quality modelling system that considers size-resolved and chemically-characterized particulate matter (PM). It has been developed as a tool to study tropospheric ozone, PM, and acid deposition within a single "unified" framework. The AURAMS chemical transport model uses a sectional approach to represent the PM size distribution (Gong et al., 2003). Currently 12 size bins ranging from 0.01 to 40.96 μm in diameter are considered, where each size bin may include any of 8 chemical components (sulphate, nitrate, ammonium, sea salt, organic matter, elemental carbon, crustal material, and particle-bound water). The CTM is driven with meteorological fields predicted by the Canadian operational forecast GEM (Global Environmental Multiscale) model and with emission fields prepared by the Canadian Emissions Processing System (Makar et al., 2003a). The model includes a detailed treatment of PM interactions with gaseous co-pollutants via gas-phase, aqueous-phase, and heterogeneous chemistry (e.g., Makar et al., 2003b; Zhang et al., 2002).

Performance evaluations of AURAMS have been carried out to date for four historical cases, three in eastern North America (ENA) and one in western North America. The August 1988 and July 1995 ENA cases correspond to two air-quality field experiments, EMEFS and NARSTO NE, while the February 1998 case includes a widespread wintertime $PM_{2.5}$ episode that affected southeastern Canada and the northeastern U.S. An 85 x 105 x 28 model grid with 42-km horizontal spacing has been used for all three ENA cases. The August 2001 case corresponds to a PM field experiment called Pacific2001 that took place in southwestern British Columbia. A model grid with 21-km horizontal spacing has been used to simulate this case.

This presentation provides an overview of AURAMS performance for these four case studies. Both operational and diagnostic evaluation results are presented for multiple gas- and particle-phase species, including SO_2, HNO_3, O_3, NH_3, $PM_{2.5}$, p-SO_4, p-NH_4, p-NO_3, p-EC, and p-OC.

2.0 REFERENCES

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