



Air Quality Projections for Continental North America using CRCM-AURAMS

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Climate change can impact gas- and aerosol-phase chemistry, transport, and cloud processes which, consequently, may modify the formation and distribution of both ozone and particulate matter, two key indices for air quality. Recently, regional climate models have been used to provide the driving meteorology for air pollution models, showing how air pollution may be affected by future climate regimes. This work links two existing numerical models, the Canadian Regional Climate Model (CRCM) and A Unified Regional Air-quality Modelling System (AURAMS), to study the effects of climate change on air quality at a 42km resolution over continental North America. AURAMS is a comprehensive air-pollution model including size (12 bin) and species-resolved particles, inorganic and organic heterogeneous chemistry, gas-phase chemistry, transport, and removal. The driving meteorology for AURAMS is provided here by the CRCM, itself a limited-area model driven at the boundary by fields from the Canadian Coupled General Circulation Model.

The first stage of the project simulates air pollution for 10 summers (June-August) with the current climate (1997-2006) and analyzes the results against observed station data. The second stage examines the impact of climate change alone by simulating 10 summers of future climate (2041 – 2050) using current emissions. Subsequent stages will examine the changes to ozone concentrations and other pollutants resulting from future climate with projected emissions, current climate with projected emissions, and the importance of boundary conditions.

In addition to providing an overview of the combined CRCM-AURAMS system, this presentation will focus on our progress through the first and second stages. The climate model is free-running (unlike the case of the driving meteorology originating in a data assimilation/weather forecast system). Comparisons between observations and model simulations, and between model simulations, are therefore made on the basis of climatological averages. A brief review on the importance of future climate change on air quality will also be provided, adding perspective to planned future activities.