Predictions of Aerosols Downwind of Mexico City using a Fully-Coupled Meteorology-Chemistry-Aerosol Model

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Abstract. Extensive meteorological, chemical, and particulate measurements were made over the central Mexico during March 2006 as part of the MILAGRO field campaign to better understand the evolution of pollutants downwind of a megacity. Our study will focus on preliminary findings from the chemistry version of the Weather Research and Forecasting model, WRF-chem. WRF-chem is used to simulate the evolution of particulates and direct radiative forcing for periods in which southwesterly synoptic winds transported anthropogenic pollutants over the two surface sites (T1 and T2) northeast of the city. Data assimilation is used to constrain the meteorological fields to be in agreement with the radar wind profiler and balloon sounding measurements. The model employs a sectional approach with 8 size bins to represent the particulate size distribution. Since the meteorology, chemistry and aerosols are fully-coupled, feedback processes have been incorporated so that aerosols alter photolysis rates (and thus trace gas chemistry) and radiation (and thus meteorology). Various in-situ and remote sensing measurements are used to evaluate the predicted boundary layer structure, the vertical mixing and dilution of trace gases and particulates, and the magnitude and spatial variation in aerosol direct radiative forcing.