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Air quality in Mexico City: Insights from the combination of field measurements and Chemical Transport Models

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Atmospheric aerosols have adverse effects on human health, contribute to the visibility reduction and influence the energy balance of the planet. The Mexico City Metropolitan Area (MCMA), with 18 million people, is an attractive location to characterize the chemical, physical, and optical properties of aerosols. A three-dimensional chemical transport model (PMCAMx) (Gaydos et al., 2007) is used to simulate the particular matter (PM) mass composition distribution in the MCMA. PMCAMx uses the framework of CAMx (ENVIRON, 2002) modelling the processes of horizontal and vertical advection, horizontal and vertical dispersion, wet and dry deposition, and gas-phase chemistry. In addition to the above, PMCAMx includes three detailed aerosol modules: inorganic aerosol growth (Koo et al., 2003a), aqueous-phase chemistry (Fahey and Pandis, 2001), and secondary organic aerosol formation and growth (Koo et al., 2003b). The aerosol thermodynamic model ISORROPIA has been improved as it now simulates explicitly the chemistry of Ca, Mg, and K salts (Fountoukis and Nenes, 2007) and is linked to PMCAMx. Moreover, new primary and secondary organic aerosol modules were added to PMCAMx for use with the SAPRC99 chemistry mechanism (Carter, 2000) based on recent smog chamber studies (Robinson et al., 2007). The new modeling framework is based on the volatility basis-set approach: both primary and secondary organic components are assumed to be semivolatile and pho-

tochemically reactive and are distributed in logarithmically spaced volatility bins. The emission inventory, which uses as starting point the MCMA 2004 official inventory (CAM, 2006), is modified and the primary organic aerosol emissions are distributed by volatility based on dilution experiments (Robinson et al., 2007). The modeling domain covers a 156x156x6 km region in the MCMA with 3x3 km grid resolution. The model predictions are compared with Aerodyne's Aerosol Mass Spectrometry (AMS) observations from the MCMA 2003 Campaign.

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