Evaluation of a Three-Dimensional Chemical Transport Model (PMCAMx) in the Mexico City Metropolitan Area

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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. A three-dimensional chemical transport model (PMCAMx) (Gaydos et al., 2007) is used to simulate the particular matter (PM) mass composition distribution in the Mexico City Metropolitan Area (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 (Gaydos et al., 2003; Koo et al., 2003a), aqueous-phase chemistry (Fahey and Pandis, 2001), and secondary organic aerosol formation and growth (Koo et al., 2004). The aerosol thermodynamic model ISORROPIA has been improved as it now simulates explicitly the chemistry of Ca, Mg, and K salts and is linked to PMCAMx. The hybrid approach (Koo et al., 2003b) for modelling aerosol dynamics is applied in order to accurately simulate the inorganic components in coarse mode. This approach assumes that the smallest particles are in equilibrium while the condensation/evaporation equation is solved for the larger ones. The new CMU organic aerosol model, which is based on the splitting of the organic aerosol volatility range in discrete bins, is also used. The model predictions are evaluated against the PM and vapour concentration measurements from the MCMA-2003 Campaign (Molina et al., 2007).

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