Atmospheric Chemistry and Physics
An Interactive Open Access Journal of the European Geosciences Union










Atmos. Chem. Phys., 6, 2321-2335, 2006
www.atmos-chem-phys.net/6/2321/2006/


# Rapid ventilation of the Mexico City basin and regional fate of the urban plume

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Abstract. Urban areas can be large emitters of air pollutants leading to negative health effects and environmental degradation. The rate of venting of these airsheds determines the pollutant loading for given emission levels, and also determines the regional impacts of the urban plume. Mexico City has approximately 20 million people living in a high altitude basin with air pollutant concentrations above the health limits most days of the year. A mesoscale meteorological model (MM5) and a particle trajectory model (FLEXPART) are used to simulate air flow within the Mexico City basin and the fate of the urban plume during the MCMA-2003 field campaign. The simulated trajectories are validated against pilot balloon and radiosonde trajectories. The residence time of air within the basin and the impacted areas are identified by episode type. Three specific cases are analysed to identify the meteorological processes involved. For most days, residence times in the basin are less than 12 h with little carry-over from day to day and little recirculation of air back into the basin. Very efficient vertical mixing leads to a vertically diluted plume which, in April, is transported predominantly towards the Gulf of Mexico. Regional accumulation was found to take place for some days however, with urban emissions sometimes staying over Mexico for more than 6 days. Knowledge of the residence times, recirculation patterns and venting mechanisms will be useful in guiding policies for improving the air quality of the MCMA.

Final Revised Paper (PDF, 5898 KB) Discussion Paper (ACPD)

Citation: de Foy, B., Varela, J. R., Molina, L. T., and Molina, M. J.: Rapid ventilation of the Mexico City basin and regional fate of the urban plume, Atmos. Chem. Phys., 6, 2321-2335, 2006. Bibtex EndNote Reference Manager