

Photoacoustic Measurements of Aerosol Light Absorption and Scattering at Four Sites in and Near Mexico City

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As part of the Megacity Impacts on Regional and Global Environments, MIRAGE-Mex deployment to Mexico City in the period of 30 days, March 2006, a suite of photoacoustic spectrometers (PAS) were installed to measure at ground level the light absorption and scattering by aerosols at four sites: an urban site at Instituto Mexicano del Petroleo (Mexican Oil Institute, denoted by IMP), a suburban site at the Technological University of Tecamac, a rural site at "La Biznaga" ranch, and a site at the Paseo de Cortes (altitude 3,810 meters ASL) in the rural area above Amecameca in the State of Mexico, on the saddle between the volcanoes Popocatepetl and Iztaccihuatl. The IMP site gave in-situ characterization of the Mexico City plume under favorable wind conditions while the other sites provided characterization of the plume, mixed in with any local sources. The second and third sites are north of Mexico City, and the fourth site is south. The PAS used at IMP operates at 532 nm, and conveniently allowed for characterization of gaseous absorption at this wavelength as well. Instruments at the second and third sites operate at 870 nm, and the one at the fourth site at 780 nm. Light scattering measurements are accomplished within the PAS by the reciprocal nephelometry method. In the urban site the aerosol absorption coefficient typically varies between 40 and 250 Mm^{-1} during the course of the day and significant diurnal variation of the aerosol single scattering albedo was observed. Comparisons with TSI nephelometer scattering and aetholometer absorption measurements at the T0 site will be presented. We will present a broad overview of the diurnal variation of the scattering and absorption as well as the single scattering albedo and fraction of absorption due to gases at the IMP site. Insight on the dynamical connections will be discussed.