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Source apportionment of fine organic aerosol in Mexico City during the MILAGRO experiment 2006

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Abstract. Organic carbon (OC) comprises a large fraction of fine particulate matter ($PM_{2.5}$) in Mexico City. Daily and select 12-h $PM_{2.5}$ samples were collected in urban and peripheral sites in Mexico City from 17–30 March 2006. Samples were analyzed for OC and elemental carbon (EC) using thermal-optical filter-based methods. Real-time water-soluble organic carbon (WSOC) was collected at the peripheral site. Organic compounds, particularly molecular markers, were quantified by soxhlet extraction with methanol and dichloromethane, derivitization, and gas chromatography with mass spectrometric detection (GCMS). A chemical mass balance model (CMB) based on molecular marker species was used to determine the relative contribution of major sources to ambient OC. Motor vehicles, including diesel and gasoline, consistently accounted for 49% of OC in the urban area and 32% on the periphery. The daily contribution of biomass burning to OC was highly variable, and ranged from 5–26% at the urban site and 7–39% at the peripheral site. The remaining OC unapportioned to primary sources showed a strong correlation with WSOC and was considered to be secondary in nature. Comparison of temporally resolved OC showed that contributions from primary aerosol sources during daylight hours were not significantly different from nighttime. This study provides quantitative understanding of the important sources of OC during the MILAGRO 2006 field campaign.

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