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Concentration, size distribution, and dry deposition rate of particle-associated metals in the Los Angeles region

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ABSTRACT

Daily averaged atmospheric concentrations and dry deposition fluxes of particulate metals were measured seasonally at six urban sites and one non-urban coastal site in the Los Angeles region using a conventional total suspended particulate matter (TSP) filter, surrogate surface deposition plates, and a Noll Rotary Impactor (NRI), which provides information about particle size distribution in four size ranges above 6 µm. With the exception of the non-urban site, particulate metal concentrations and deposition fluxes were remarkably uniform spatially and temporally. At all sites there were significant metal concentrations on particles greater than 10 µm, a commonly used upper limit for many air quality monitoring studies, and these large particles were estimated to be responsible for most of the deposited mass of metals. Annual averaged values of deposition rates measured with a surrogate surface were in good agreement with values estimated using theoretical deposition velocities in conjunction with measured size-segregated particle concentrations. Image analysis of particles deposited on NRI stage A, which collects all particles greater than 6 µm, indicated nighttime metal concentrations and deposition at the non-urban coastal site was higher than in the day time due to offshore advection of urban air associated with the diurnal land breeze. Measured enrichments of crustal elements and metals were correlated, indicating efficient mixing of natural and anthropogenic material from different sources, hypothesized to be the result of cyclical resuspension and deposition of dust by moving vehicles and wind.

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