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Atmospheric dry deposition of trace metals in the Los Angeles coastal region

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ABSTRACT

Emissions of trace metals to the atmosphere and subsequent deposition, either directly to the waterbody surface or indirectly to the watershed as wash-off during rain events, may contribute to the contamination observed in surface waters throughout the urban Los Angeles region. The goals of this study were (1) to provide empirical data on atmospheric concentrations of trace metals on coarse particles; and (2) to estimate the direct and indirect mass loading of these trace metals due to dry atmospheric deposition in coastal watersheds of the Los Angeles Air Basin. To achieve this goal, atmospheric concentrations of chromium, copper, lead, nickel and zinc were measured seasonally using a Noll Rotary Sampler at six urban and one non-urban site throughout the Los Angeles coastal air basin. Dry deposition fluxes were calculated by summing the product of air concentration and theoretical deposition velocities of four coarse particle fractions (6-11, 11-20, 20-29, and >29 μm). Mean fluxes at urban sites ranged from 3.2 to 9.1, 11 to 34, 3.8 to 8.8, 8.3 to 29, and 69 to 228 μg/m^2/day for chromium, copper, nickel, lead and zinc, respectively. Mean fluxes at the urban sites were significantly higher than at the non-urban site. Antecedent rainfall was a dominant factor affecting atmospheric concentrations and estimated fluxes; when sampled within 5 d of measured precipitation, trace metal concentrations at the urban sites were similar to the non-urban site. For the Los Angeles River, dry atmospheric deposition directly to the water surface produced a relatively small load of trace metals to that waterbody. In contrast, dry deposition of trace metals to the land surface within the watershed was potentially a very large contributor to watershed loadings based on comparisons to load estimates from stormwater runoff.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2003_04AnnualReport/ar05-sabin_pg50-60.pdf