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Environmental Lead Flow: Soil Resuspension Contributes to Airborne Lead

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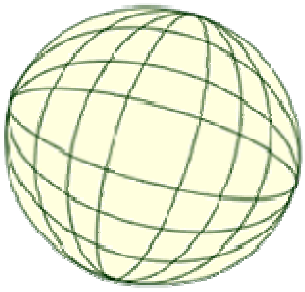

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Background

Concentrations of airborne lead in Los Angeles measured in 2001 are much greater than expected based on emission inventories and atmospheric box models. It is thus likely that a major source category for lead is missing. We hypothesize that the missing source is lead emitted from motor vehicles during the decades of leaded gasoline use. This lead originally deposited on the soil and has been available for resuspension by wind. In this study we explore the role of lead deposited on the soil over many years in affecting current airborne lead concentrations in the LA area.

Approach

The emission inventories of lead from several sources (local air quality agency, state agency, and federal government) have been compared to assess uncertainties in the existing inventories. The inventories have then been used along with estimates of deposition onto land surfaces and atmospheric flow out of the region to construct a mass balance for lead in the Basin for the year 2001. By using retrospective data for lead emitted from motor vehicles from 1970 to the present, estimated lead flows as a function of year have been calculated for the LA environment. In addition, an improved science-based model for soil resuspension has been developed to replace the existing empirical models which provide only rough estimates.

Results

- Resuspension of soil contaminated during the days of leaded gasoline is responsible for most of the airborne lead now measured in Los Angeles. This is probably true of many other urban areas as well.

Results (continued)

- The emission inventories for lead from traditional stationary sources in Los Angeles are highly uncertain. Combining information from all the existing inventories, however, provides a better estimate of lead emissions.

- A new model developed for resuspension of soil, based on force and energy considerations as well as micrometeorology, now permits much better estimates of resuspension so that atmospheric fluxes of any contaminant in soil can be determined.

References

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