



A whole-basin study of sediment accumulation using stable lead isotopes and flyash particles in an acidified lake, Sweden

Bindler, Richard, Ingemar Renberg, Maja-Lena Brännvall, Ove Emteryd, Farid El-Daoushy

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ABSTRACT: Using analyses of lead concentrations, lead isotopes ($^{206}\text{Pb}/^{207}\text{Pb}$), and spheroidal carbonaceous flyash particles (SCP), we studied sediment accumulation patterns in the acidified lake Hårsratten in southwest Sweden. After determining the natural background $^{206}\text{Pb}/^{207}\text{Pb}$ ratio (1.5) in deeper sediments in long sediment cores from three basins in the lake, we applied an isotope mixing model to quantify pollution Pb accumulation in 46 gravity cores. The mean pollution Pb inventory in the cores was 2.6 g m^{-2} (range, $0.3\text{--}11 \text{ g m}^{-2}$). Although some variation in Pb concentrations can be explained by loss on ignition (LOI) and water depth (together, $R^2_{\text{adj}} = 0.33$), there is no relationship between pollution Pb inventories and these variables. Contrary to the traditional model of sediment focusing, where higher accumulations of pollutants are expected in deeper waters, the highest inventories for pollution Pb and SCP are generally found at shallow sites (<4 m water depth) and not in the three deep basins of the lake (10, 12, and 24 m deep). Furthermore, the model for sediment focusing, which may be appropriate for describing the physical building of sediments in a lake basin, may be inappropriate for describing the specific processes controlling the distribution of pollutants in a lake basin of this type.

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