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Mercury dynamic in a mountainous catchment polluted by chlor-alkali activity (Alsace, France)

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Total atmospheric mercury contamination was measured using CV-AFS in soils, river bottom sediments, river waters and bryophytes (*Hypnum cupressiform*) samples collected in a French mountainous catchment upstream from a chlor-alkali industrial activity. Natural and atmospheric/anthropogenic contributions to total Hg contents in soils and stream sediments were assessed using Hg concentrations in the deepest soil mineral horizon and in the stream bottom sediments. Soil Hg stock and mean annual particulate and dissolved Hg river fluxes coming from the upper part of the basin are estimated for the first time in this catchment.

The natural background level of Hg content deriving from rock weathering was estimated to 32 ± 9 ng g⁻¹ in the deepest soil layers. The soils appear to be Hg contaminated in two ways: atmospheric deposition and Hg-organic matter complexes leaching through the soil profiles. Hg concentrations in upper stream sediments varied between 108 and 639 ng g⁻¹. The Hg enrichment factor (EF_{Hg}) which could be calculated by normalization to Sc, allow to estimate the major contribution (63 to 95%) of the atmospheric inputs, even in the upper part of the basin. This contribution may be attributed to diffuse regional atmospheric deposition of Hg and is mainly due to the geographic location of this chemical plant. The suspended matter was the main phase of Hg fluvial transportation in the different tributaries, with concentrations close to those of river bottom sediments. The Hg flux due to the weathering of the upper basin ($0,58 \cdot 10^{-3}$ mg m⁻² y⁻¹) was negligible in comparison with the yearly Hg discharges in the Thur River due to the anthropogenic activities. The calculation of the Hg residence time indicates that Hg is trapped in the soils of the upper catchment for a long time in such a polluted hydrosystem.