# 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 $10^{-3}$ mg $m^{-2}$ $y^{-1}$) was negligible in comparison with the yearly Hg discharges in the Thur River due to the anthrogenic 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.

# Mercury speciation in water and microbial mats of Yellowstone National Park hot springs

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## Background

Despite the significant flux of Hg to the atmosphere from natural sources, the biogeochemistry and impacts of mercury on microbes within geothermal features are poorly understood. We conducted preliminary sampling of waters and microbial mats from chemically diverse hot springs of Yellowstone National Park for analysis of Total Mercury (THg), Monomethylated Mercury (MeHg), pH, total sulfides, and other constituents important to mercury biogeochemistry.

## Results

THg and MeHg levels varied by orders of magnitude among individual hotsprings. Filtered THg levels ranged from 6 to over 1200 ng/L; filtered MeHg levels varied from below detection (<.020 ng/L) to 9.041 ng/L Highest levels of filtered and particulate THg and MeHg were observed in low pH and high specific conductivity (SC) waters typical of acid-chloride-sulfate springs.

Filtered concentrations of THg and MeHg did not correlate with each other, total sulfide levels or Eh. Correlations of filtered MeHg with pH and SC were weak, ($r^2$ =0.82 with SC; $r^2$ =0.44 with pH), with regression lines influenced strongly by waters from two acid-chloride-sulfate springs.

Preliminary data suggests that methylation of mercury may be occurring in some Yellowstone geothermal waters. Additionally, a limited set of preliminary samples indicate the presence of MeHg in microbial mats. Filamentous microbial bacteria and vegetation in two hot springs revealed that 5-10 % of Hg was in the form of MeHg while less than .1 % of Hg was MeHg in the hot spring waters. The bioconcentration factors are 1,210 and 12,000 (L/kg) for microbial and plant communities in these two hot springs.