Mercury is a highly toxic trace element to humans and animals. Exposure to trace levels of Hg may cause severe health effects (Fig. 1.).

Mercury is present in the environment as seven stable isotopes (Fig. 2).

**Aims**

I- Investigating and modelling the dynamics of inorganic mercury added to soil (via rainfall or other inputs) by studying the temporal change in solubility of inorganic mercury tracer ($^{196}$Hg$^{+2}$) spiked into soil samples.

II- Assessing the lability and bioavailability of mercury in some mercury contaminated soils by developing a stable isotope dilution procedure using enriched Hg spike (30% $^{196}$Hg).

**Methods**

Soils with varied characteristics and Hg contamination levels were sampled from the Black Forest, Baden-Württemberg, Germany and from the Upper-Valais region, Switzerland (Fig. 3). Soil samples were spiked with enriched $^{196}$Hg (6 mg kg$^{-1}$) and equilibrated for different times before $^{196}$Hg conc. and $^{196}$Hg : $^{201}$Hg ratio were assayed by ICP-MS. Labile Hg (mg kg$^{-1}$) was calculated from (Eq. 1).

$$Hg_E= \frac{M_{soil}}{W} \left( \frac{C_{spk} V_{spk}}{M_{spk}} \right) \left( \frac{^{196}IA_{spk}}{^{201}IA_{spk}} \right) \left( \frac{^{201}IA_{soil}}{R_{ss}^{^{196}IA_{soil}}} \right)$$

Eq. 1.

**Results**

I- In all soils an apparently instantaneous sorption reaction of ($^{196}$Hg) was followed by a slower (time-dependent) sorption (Fig. 4.).

II- Progressive sorption of mercury ($^{196}$Hg) from solution was greatest in topsols with higher organic contents and apparently reaching completion over hours, while substantially slower sorption rate was observed in mineral subsoils (Fig. 4.).

III- Within the soil pH range investigated (3.5-7), soil organic content was found to be the sole factor that dictates the sorption rate of mercury with a direct logarithmic relationship (Fig. 5.).

IV- The Hg$_E$ values were elevated (~40% of total Hg) in contaminated locations compared to background soils indicating greater relative availability.