**Supplementary Material: Informations on quality control/quality insurance for the used analytical techniques.**

Selected samples were analyzed in duplicate, both within the same run and on separate days. These analytical duplicates generally agreed to within ±5% for all elements. Occasionally, duplicate samples were collected in the field, and the analytical error was seen to comprise most of the total error associated with sampling and analysis; the relative differences in concentrations for a set of field duplicate samples were less than 5%. All field and laboratory blanks were below the detection limit of the methods used for all analyses.

Dissolved and particulate metals (Cd, Pb, Tl, Zn) and metalloids (As, Sb) concentrations were measured using ICP-MS (X7 Series II and iCAP Q, equipped with a CCT — Collision Cell Technology chamber — Thermo Scientific). Concentrations were determined with external calibration using In and Bi as internal standards to correct potential sensitivity drifts. The quality of analysis was checked by analyzing international certified reference waters (CNRC SLRS-5, NIST SRM 1643e). Accuracy was better than 5% relative to the certified values and analytical error (relative standard deviation) was better than 5% for concentrations ten times higher than the detection limits. For mineralized solid samples, accuracy was within 10% of the certified values for reference standards (NCS DC70317 from LGC Standards, n = 5). Finally, mineralization blanks represented less than 5% of particulate metal(loid) concentrations; except for Sb and Zn in a set of samples for which these elements were excluded from the results, (Resongles and al; 2015) and Fe was determined by Flame or Graphite Furnace Atomic Absorption Spectrometry (Thermo Electron Corporation, France).

For the analysis of trace elements in water, a certified CNRC lake water sample, SLRS-4, was used. For analysis of Cland SO2 by ionic chromatography, Accuracy was within 5% of the certified values and the analytical error (relative standard deviation) generally better than 5% for concentrations 10 times higher than the detection limit.

The concentrations of Chloride and SO42- were determined with a Dionex ICS-1000 Ion Chromatography System using a conductivity method of detection. The apparatus was equipped with an IonPac AS14A 250 mm) analytical column, IonPac AG14A 50 mm) and CG2 (50 mm) guard columns and ASRS 300 (4 mm) suppressor. The concentrations of Bicarbonate and CO32- were determined by titration with standardized H2 SO42- using the Gran Plot method (Stumm and Morgan, 1996). DOC was determined using a high-temperature catalytic oxidation method (HTCO), with a Shimadzu TOC-VCSH total organic carbon analyzer. Quantitative analyses were performed using a conventional external calibration procedure with In as an internal standard to correct for instrumental drift and possible matrix effects. Analyses of inorganic As species (As(III), As(V)) were carried out using anion-exchange chromatography (25 cm 4.1 mm i.d. Hamilton PRP-X100 column with Varian ProStar gradient solvent delivery system) coupled to Hydride Generation (HG) (VGS 200, FISONS, France) with an Atomic Fluorescence Spectrometry (AFS) detector (Excalibur, PS Analytical, GB) (Casiot et al., 2005). The method has a detection limit of 0.17 lg/L for As(III) and 0.46 lg/L for As(V) and a precision better than 5% (Casiot and al., 2009).

Metals (Pb, Zn, Cd, Tl), metalloids (As, Sb) and Al concentrations in sediments (total and selective extractions) were determined after an adequate dilution using an ICP-MS, X Series II (Thermo Fisher Scientific) equipped with a CCT (Collision Cell Technology) chamber. The quality of analytical methods was checked by analyzing international certified reference waters (SLRS-5, NIST1643e) and was generally better than 5% relative to the certified values. Analytical error (relative standard deviation) was better than 5% for concentrations ten times higher than the detection limits. Accuracy was within 10% of the certified values for method standards (Stream sediments LGC6189 from United Kingdom Accreditation Service and NCS DC70317 from LGC Standards, n = 7)

The distribution of metals between the different phases of the soil (carbonates oxyhydroxides, organic matter and sulphides) was determined by sequential extractions. The protocol has five steps. Many authors (Salomons and Förstner, 1980; Shuman, 1985; Kim and Fergusson, 1991) showed that the experimental protocol of this handling may be interchangeable depending on the number of steps or the reagents used (Resongles and al; 2014)

The organic carbon content in sediment was analysed at the SARM (Service d’Analyse des Roches et des Mineraux) laboratory (Centre de Recherches Petrographiques et Geochimiques (CRPG), Vandoeuvre-les-Nancy, France).

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