Geophysical Research Abstracts
Vol. 15, EGU2013-7487, 2013
EGU General Assembly 2013

BioGeochemistry of antimony, Sources, Transfers, Impacts and Assessment

Gael Le Roux (1,2), Eric Pinelli (1,2), Mickael Hedde (4), Maritxu Guiresse (1,2), François De Vleeschouwer (1,2), Jérôme Silvestre (1,2), Maxime Enrico (1,2,3), Laure Gandois (1,2), Fabrice Monna (5), Charles Gers (1,2), Anne Probst (1,2)

(1) Université de Toulouse, INP, UPS, EcoLab (Laboratoire Ecologie Fonctionnelle et Environnement), ENSAT, Avenue de l'Agrobiopole, 31326 Castanet Tolosan, France , (2) CNRS, EcoLab, 31326 Castanet Tolosan, France, (3) CNRS; Geosciences Environment Toulouse, 31400, Toulouse, (4) INRA, PESSAC, INRA Centre de Versailles-Grignon, (5) Laboratoire ARTéHIS, UMR 6298, Université de Bourgogne - CNRS - Ministère de la Culture et de la Communication - INRAP

BioGeoSTIB is a project funded by ADEME (French Environmental Protection Agency). Its aim is to provide a better understanding of biogeochemical cycle disturbances of antimony by man. Specifically, it is focused on the atmosphere-soil-organism interfaces. Based on a multi-scale approach, the impact of antimony on organisms and organism communities and the factors of Sb dispersion in the environment aim to better characterized. This report gives the main results of 2 and $^1/_2$ years of research.

Using peat bogs as environmental archives, we show that Sb contamination in soils date back to the beginning of the metallurgy. Atmospheric deposition of Sb largely increased by 100 times during the Industrial Revolution compared to natural levels ($\sim$0,001-0,01 mg m^{-2} an^{-1}) estimated in the deepest peat layers. This disturbance in the antimony geochemical cycle modified its concentrations in soils. One main source of present Sb contamination is automotive traffic due to Sb in braking lines. This emerging contamination was characterized close to a roundabout. This additional source of Sb does not seem to impact soil fauna but Sb concentrations in soil solutions exceed 1 μg L^{-1}.

Genotoxicity tests have been performed on the model plant *Vicia faba* and show that antimony is genotoxic at its lowest concentrations and that there is a synergistic effect lead, a trace metal frequently found in association with antimony in the environment.

It is a main issue to determine Sb critical loads in the environment but main identified lacks are thermodynamic data, which are not available yet, to model the behavior of Sb in soil solutions and the fact the antimony is always associated with other anthropogenic trace metals like lead.

Critical thresholds of Sb have been determined for the first time based on genotoxicity experiment. Simulations show that these thresholds can be exceeded in the future, whereas present limits for invertebrates (US-EPA) are and will not be reached. However, scientific problems to complete the "critical load" approach are, as stated aabove, present lack of thermodynamic data on Sb to model its behavior in the soil solution and the fact the Sb is always linked to other trace metals, with potential ecological impacts too.