

Antimony dispersion at an abandoned mine site in Sardinia

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Although several researches on Sb occurrence and fate have been carried out so far, the geochemical behavior of Sb in supergene environments is not fully understood. This study aims at investigating the Sb occurrence and dispersion in the soil-water-plant system in the abandoned antimony mine of Su Suergiu (Sardinia, Italy) and surrounding areas.

Antimony was determined in soil, vegetation (*Pistacia lentiscus* and *Asparagus*) and water samples by ICP-MS (detection limit, DL = 0.1 ppb Sb) and ICP-OES (DL = 50 ppb Sb). Dissolved Sb(III) was analysed by anodic stripping voltammetry (DL = 0.5 ppb).

Past mining at Su Suergiu affects the soil-water system downstream of the mine. Soil samples taken upslope of the mine had <200 ppm Sb. Soils close to the mining wastes showed concentrations up to 4400 ppm Sb, with highest values observed in the A horizon. Despite the high contamination of soils, relatively low amounts (up to 31 and 3.9 ppm Sb, respectively in *Pistacia lentiscus* and *Asparagus*) were observed in the investigated plants growing close to the mine wastes. Dust materials deposited on leaves collected in the mine area contain 70 ppb Sb, as compared to 7 ppb Sb observed on leaves collected on upstream slopes [1].

In Sardinia, median concentrations of Sb are estimated at 0.25 ppb in surface waters [2], and 0.50 ppb in ground waters [3]. At Su Suergiu, the waters upstream mine have median 1.7 ppb Sb. Waters interacting with slag materials are characterized by extreme concentrations of Sb (mean: 9200 ppb, maximum value 30000 ppb). Sb is released through dissolution of antimonite and other Sb-bearing solid phases contained in the slag, tailings and waste rocks. Dissolved Sb concentrations decrease as distance from the mine area increases (median 1300 and 25 ppb, respectively at 1 and 10 km downstream mine). Concentrations of Sb(III) range from 0.8 to 760 ppb, thus Sb(III) appears a minor constituent in the aquatic environment of Su Suergiu. Near-neutral pH, oxidizing conditions, and low amount of organic carbon favor Sb dispersion far from the mine, with attenuation probably controlled by dilution processes.

[1] Cidu, Biddau, Dore, Vacca (2013), *Procedia Earth and Planetary Science* **7**, 171-174 [2] Cidu, Frau (2009), *Appl. Geochem.* **24**, 611-623 [3] Biddau (2012) *Report FSE L.R.7/2007*, RAS Cagliari, 123 pp (in Italian).