Using soils and geochemical archives to understand spatial and temporal distribution patterns of metal(loid)s near metal smelters

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Ore smelting constitutes an important source of the environmental pollution. Soils represent an important sink for smelter-derived metal(loid)s emitted into the environment and often exhibit extremely high metal(loid) concentrations [1] [2]. Topsoils are suitable indicators of the extent of contamination near smelters and demonstrate the key role of prevailing wind direction on the metal(loid) distribution [1]. Dust particles emitted by the smelters are composed of relatively soluble phases (sulphates, chlorides), which are dispersed by the wind and are deposited into the soils, where they dissolve and released contaminants can be transported downward the soil profiles [3] [4]. Contrasting behaviours of different contaminants released from smelter dusts are demonstrated on laboratory and field experiments in soils [3] and indicate that tropical soils are significantly more vulnerable to this kind of contamination [4]. Temporal patterns of contaminants released by smelters can be depicted from concentration and isotopic records in peat deposits from temperate areas [5] and in tree rings (pine and marula trees) from tropical areas (Zambia, Namibia) [2]. Lead isotopic tracing and variability in chemical and mineralogical compositions of topsoils suggest possible role of bushfires on re-mobilization of smelter-derived particulates [2] [4].

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