

Influence of Pb smelting on the chemical and isotopic composition of soils and trees in Kabwe, Zambia

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Kabwe in Zambia, is one of the most polluted cities in the world due to its historical Pb, Zn, Ag and Mn mines and associated smelter.

Trace metals as well as stable Pb isotopic ratios ($^{206}\text{Pb}/^{207}\text{Pb}$ and $^{208}\text{Pb}/^{206}\text{Pb}$) were studied in soils close to the smelter and in remote locations. The same was studied in tree rings of *Pinus Montezumae*, complemented with major cations and $^{13}\text{C}/^{12}\text{C}$ isotopic analysis. Total Pb concentrations are always much higher in the soils near the smelter (max: 16400 mg/kg) while in trees, the opposite is true (max: 6.48 mg/kg for Pb). This might be due to the size of particles that are blown from the dump being much smaller and more easily absorbed at a distance. This phenomenon has been observed in previous studies. The difference of Pb concentrations in the polluted and remote site indicates that the above-ground uptake in the plant (bark and leaves) is more important than the root uptake. This was confirmed by similarity of isotopic composition of rings and processed geomaterials. A trend of major elements in rings coincides with an increase of $\delta^{13}\text{C}$ value which may indicate a rise in SO_2 emissions from the smelter.