# Use of Cd and Zn isotopic variations in a sedimentary core to trace anthropogenic contamination

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Source contamination tracers in soils have been recently developed [1]. The potential of Cd and Zn isotopes to trace the pollution generated by an industrial exploitation of a zinc ore was studied. The industry is located in the experimental watershed of Decazeville (Aveyron, France). The contaminated Riou Mort stream contributes 23% and 47% of the total amount of Zn and Cd flux into the downstream Gironde estuary, whereas its hydrological contribution is only 0,4% [2]. The Zn and Cd isotopic composition of polluted sediments were analyzed in a core from the Cajarc dam (Lot River, downstream from the confluence Riou Mort-Lot) with a Thermo-Finnigan Neptune MC-ICP-MS. The core was dated from 1952 to 2001 in a previous study [3].

The sediments dated from 1952 to 1975 have constant $\delta^{66/64}$Zn and $\delta^{114/110}$Cd, 1‰ and -0.10‰ respectively. From 1975 to 1995, the values increase to 1.4‰ and 0.14‰ respectively. A decrease is observed in more recent sediments: the δ values decrease to 0.8 and -0.05 respectively.

The sediments from 1952 to 1975 are clearly dominated by an anthropogenic signature. This is confirmed by the values measured in the downstream Riou Mort inundated soils ($\delta^{66/64}$Zn = 0.68 and 0.84) which are similar to the recent Cajarc core sediments. Contrarily, upstream (of the industry) inundated soils have lower $\delta^{66/64}$Zn values, 0.33 and 0.48, which likely reflect the regional background.

The isotopic excursion observed during the second period also corresponds to an anthropogenic signature. This is either related to an incident that occurred in the pyrometallurgical zinc smelter in 1986 and/or to the changes in waste treatment processes that occurred in the factory between 1975 and the end of activities in 1987.

The perturbation of the system, reflected by the 1987 isotopic peak, appears to have endured for ~ten years. This duration may correspond to the memory of the aquatic system for this specific pollution event. As the signature of the present-day sediments corresponds to the oldest anthropogenic signature, there is still a heavy metal stock available: this signature may be representative of the mining waste.

**References**

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