Cd isotopic composition of geological / environmental reference materials and anthropogenic samples determined by MC-ICPMS

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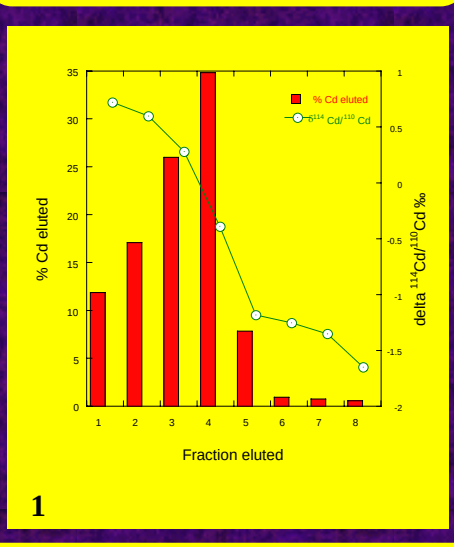
Introduction

Investigations devoted to Cd isotopes systematic in meteorites have shown that Cd isotopes can be useful tracers of cosmochemical processes. However, mainly because of the large analytical uncertainties of these measurements, terrestrial variations of Cd isotopes abundance remained poorly known. High precision (Wombacher et al. 2003) with a new and simple procedure for Cd purification (Cloquet el al, submit.) permits to further investigate geological and anthropogenic samples Cd isotopic composition. This study is motivated by the potential of using Cd isotopes as new tracers of anthropogenic sources and pollution of Cd in the environment.



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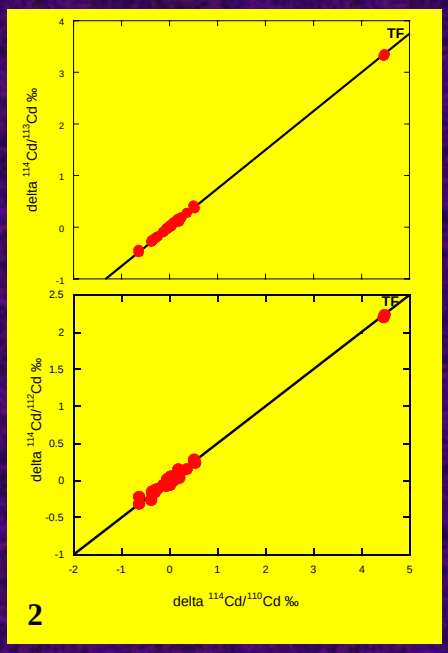

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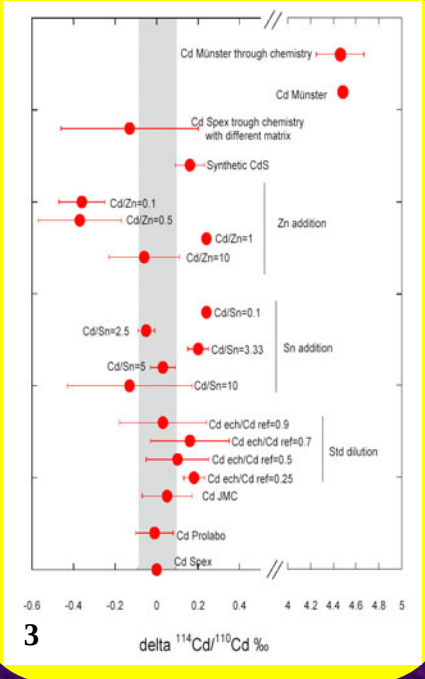
Results :

Cd isotopic fractionation occurring during the column chemistry was investigated and quantified (Fig.1). All the samples analysed in this study fall on the theoretical terrestrial fractionation line (Fig.2). Measurements on the reference solution wich was diluted, doped with Zn and doped with Sn were realised in order to constrain the matrix and isobaric interference effect (Fig. 3). A second reference solution fractionated was analysed giving a delta $^{114}Cd/^{110}Cd$ =4.48 ‰. A lot of geological reference materials were analysed allowing a delta $^{114}Cd/^{110}Cd$ of about 0 in contrast to anthropogenic samples which display a range of about 1 ‰ (Fig.4). The usefulness of Cd isotopes as a tracer was tested. Soils from the area of the dust measured were analysed showing a variation in their Cd isotopic composition (Fig.5)



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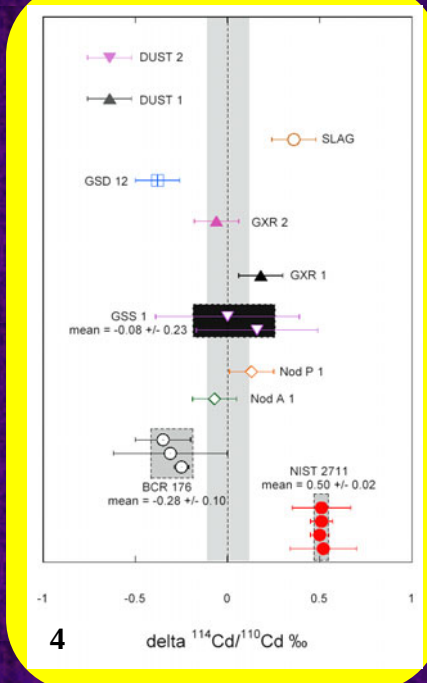

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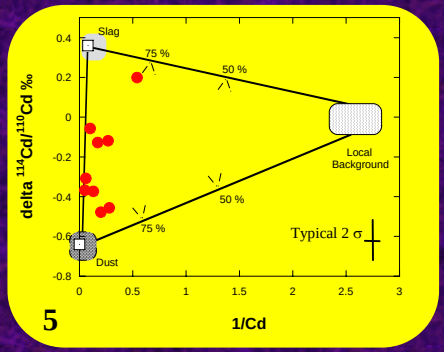

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Conclusions

Efficient and simple purification of Cd was developed.

Three different Cd reference solution have the same isotopic composition.

Proposed secondary isotopic reference material yielded $^{114}Cd/^{110}Cd$ =4.48 ‰.

Natural geological material have almost the same Cd isotopic composition of 0. « Polluted » material and anthropogenic material yielded a range of about 1.2 ‰.

The anthropogenic Cd fractionation permits to hope in the usefulness of Cd isotopes as an environmental tracer.

References :

Wombacher F., Rehkämper M., Mezger K. and Munker C. (2003); **Geochimica et Cosmochimica Acta, 67**: 4639-4654.

Cloquet C., Rouxel O., Carignan J. and Libourel G. (submit.); **Geostandards Newsletter, the journal of geostandards and geoanalysis**.