# Dynamics of Zn in an urban soil-plant system : Coupling isotopic and EXAFS approaches

A.M. AUCOUR[1], J.P BEDELL[2], M. QUEYRON[2] AND G. SARRET[3]

[1]LGL-TPE, Université Lyon 1, CNRS, F-69622 Villeurbanne Cedex (*correspondence: aucour@univ-lyon1.fr)
[2]LEHNA, ENTPE, F-69518 Vaulx-en-Velin (jean-philippe.bedell@entpe.fr)
[3]ISTerre, Univ. Grenoble 1, CNRS, F-38041 Grenoble Cedex 9 (geraldine.sarret@ujf-grenoble.fr)

Zn isotope compositions can be an effective tool for monitoring Zn cycling in the soil-plant system. Zn isotope fractionations have been reported for model systems (humic acids, oxi-hydroxides, plant and nutrient solution) and in few natural systems. In the soil-plant system, studies combining isotopic and molecular approaches are necessary to identify abiotic and biotic processes controlling Zn isotope cycling.

This study is focused on Zn dynamics in an infiltration basin receiving urban stormwater and colonized by *Phalaris arundinacea* and *Typha latifolia*. The Zn isotope compositions were determined in the various plant organs (root, rhizome, stem, leaves), in fractions of the substrate (bulk sediments, DTPA and $CaCl_2$ sediment extracts, litter), in suspended and dissolved material from the water entry. The Zn speciation was also studied by EXAFS spectroscopy in the same compartments.

The EXAFS spectra were comparable in the various plant organs and indicated mainly an association of Zn with organic acids, with Zn in octohedral coordination. In contrast, the isotopic study evidenced an enrichment in light isotopes of the aerial biomass ($\delta^{66}$Zn of -0.26‰ to -0.03‰) relative to underground biomass (-0.03 to 0.26‰) that is linked to translocation processes. Both Zn speciation and isotope composition of litter differed from that of the plant organs. The EXAFS data indicated that litter Zn was in tetrahedral coordination, corresponding to high affinity sites. The isotopic composition of litter (0.18 to 0.22‰) was enriched in heavy isotopes relative to aerial biomass and got close to that of sediment (0.14 to 0.19‰). Litter formation is thus accompanied by Zn exchange between the decomposing plant and the sediment. The Zn speciation is drastically modified from organic complexes and weakly sorbed species in entry material to phyllosilicates in the sediment. Zn in phyllosilicate is considered as a stable form. Its remobilization by the plant is however indicated by the litter-sediment exchange.

# U-Pb ID-TIMS zircon ages and coupled Lu-Hf S-ICP-MS data - A tool for terrane characterisation and determination of paleogeographic affinities: An example from the Caledonides

LARS E. AUGLAND[1], ARILD ANDRESEN[2] AND MARK STELTENPOHL[3]

[1]GEOTOP, UQAM CP 8888, Succ. Centre-Ville, Montréal, Québec, Canada H3C 3P8, (augland.lars_eivind@courrier.uqam.ca)
[2]Department of Geosciences, University of Oslo, P. O.Box 1047 Blindern, 0316 Oslo, (arild.andresen.geo.uio.no)
[3] Department of Geology, 210 Petrie Hall, Auburn University, AL 36849, (steltmg@mail.auburn.edu)

Lu-Hf solution ICP-MS data from zircon fractions that have been dated by U-Pb ID-TIMS provide robust information on the sources of magmatic rocks. When combined, the complementary data sets can be used as a tool for terrane characterisation and source rock identification allowing correlation of spatially separated terranes and providing information on their provenance.

In the Scandinavian Caledonides several suspect/exotic terranes are occuring and here we report U-Pb ages and Lu-Hf isotopic data from a number of magmatic rocks, ranging from tonalites to granites, from the highest tectonostratigraphic levels in the Ofoten-Troms region (Upper and Uppermost Allochthons). Ages range from 484 Ma to 449 Ma with $\varepsilon_{Hf(t)}$ varying from + 9.6 to – 6.2. The combined U-Pb and Lu-Hf data provide a new basis for terrane correlations in the area and supports previous suggestions that all of these terranes are entirely exotic with respect to Baltica. Furthermore, the Lu-Hf isotopic data indicate that the different terranes comprise different crustal segments, from ophiolitic terranes most likely formed during westward subduction east of the Laurentian continent (present day coordinates) to terranes formed on the actual Laurentian margin prior to the Caledonian continent-continent collision. The new data can thus give new constraints on crustal accretionary processes and interactions between the continents during the Caledonian orogen. S-ICP-MS Lu-Hf data from magmatic arc rocks in the North East Greenland Caledonides (Augland *et al* 2012) show a similar $\varepsilon_{Hf(t)}$ range to the granitic rocks analysed in this study and we suggest that the exotic terranes with Laurentian age and Lu-Hf isotope signatures had their pre-collisional provenance in the East Greenalnd segment of the Laurentian margin.

www.minersoc.org
DOI:10.1180/minmag.2013.077.5.1