Influence of different cleaning methods on seawater εNd extracted from planktonic foraminifera

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Seawater Nd isotope ratios extracted from foraminiferal calcite can be biased by contaminant phases, such as organic matter, ferromanganese coatings or secondary carbonates causing a shift towards bottom water signatures.

We compared two different cleaning methods to extract surface seawater neodymium isotope ratios from planktonic foraminiferal calcite. We used a modified version of the flow through method developed in [1] and a batch method following [2]. Single species samples (*G. menardii* and *G. ruber* pink) were obtained from core top sediments from the Gulf of Guinea to calibrate the method. Down core samples were investigated for paleoceanographic reconstruction of riverine input.

We tested the efficiency of two cleaning methods of the calcite by analysis of different element ratios (e.g. Al/Ca, Mn/Ca). The Al content was used as an indicator for successful clay removal whereas the Mn content reflects remaining early diagenetic coatings. Both elemental data and Nd isotope composition indicated indistinguishable levels of cleaning efficiency, whereby the batch method was less time consuming. For the different core top samples of our study clay particles had the strongest influence on the isotope and element ratios. To obtain a bottom water signature we analyzed mixed benthic foraminiferal carbonates from core top and down core samples. Additionally we compared these data with sediment leach data. The elemental ratios of the down core samples, both planktonic and benthic, showed elevated Mn/Ca ratios. To determine the origin of this contamination we analyzed the Fe/Ca and Mn/Fe ratios. The Mn/Fe ratios of planktonic and benthic samples presumably display different types of contamination.

In summary both planktonic and benthic foraminifera from the down core samples showed the same εNd values as the sediment leachates. Thus the Nd isotope compostition of the foraminiferal carbonate has most probably been overprinted by the bottom water isotope composition.

[1] B.A. Haley, G.P. Klinkhammer (2002) *Chemical Geology* **185**, 51–69. [2] D. Vance, K. Burton (1999) *Earth & Planetary Science Letters* **173**, 365–379.

Use of sequential extractions to evaluate the mobility of heavy metals in the Huanuni basin (Bolivia)

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Water and sediment quality in the Huanuni river basin is affected by acid mine drainage (AMD) from three main mines (mainly on cassiterite deposits). The area, with a population over 50.000 inhabitants approx., is located in the Oruro department, Bolivia. Concentrations of trace metals and REE were determined in stream waters, groundwater wells, suspended materials and bedload sediments. Moreover, a BCR sequential extraction (four-stage) were applied in bedload and suspended sediment in order to better constrain mobility and relative sources of trace metals and REE.

The main stream and tributaries waters are characterized by strongly acidic conditions (pH 2.9-4.5), elevated SO_4^{2-} concentrations (up to 2400 mg/L), and high metal contents (especially Fe, Zn, Cd, Ni, Pb). Hydrochemistry coupled to sequential extraction allow the characterization of the contribution of the three considered main mines.

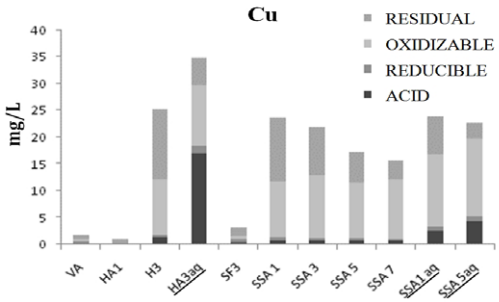

Figure 1: Cu concentration and fractionation pattern

The sequential extraction shows differences in partitioning and total concentration between suspended (in the figure indicated as codeaq, e. g HA3aq) and bedload sediment (e.g. HA3), with higher metal concentrations and exchangeable fraction in the suspended material. Cd, Zn and Cu (only Cu shown in Fig.1) seem related to the oxidizable fraction, whereas Cr and Ba with the reducible fraction.

Preliminary results suggest prioritizing remediation efforts on the suspended sediment.