Validation of normalisation concepts for *in situ* µ-EDXRF data

Y. HERMANNS[1,2], A.WITTENBERG[2], D. RAMMLMAIR[2] AND A. SCHWALB[1]

[1]Institut für Umweltgeologie, TU Braunschweig, Germany (y.hermanns@gmx.net)

[2]BGR, Hannover, Germany (a.wittenberg@bgr.de, rammlmair@bgr.de)

Column experiments were performed to study hard pan formation processes in mining dumps. The special focus of this study was to develop a better understanding concerning the time-dependent transport behaviour of element towards the capillary fringe. Therefore, three 50 cm long vertical columns were filled with homogenized tailings material from Freiberg/Germany (35cm) and purified silica sand (top part of column). At the bottom of the columns water is injected and because of capillary transport a continuously fluid transport occurs. The resulting changes in the local chemical conditions (e.g. Eh, pH) create the environment for dissolution, transport and precipitation. Hence, an enrichment of mobile behaving elements like Cu, Zn and Fe are expected to occur in the upper levels and accordingly a decrease within the bottom parts of the column.

The measurements were performed by using the µ-EDXRF method, which has been described in detail by Rammlmair *et al* (2006). The experiment was set up for a period of six month. Within this time frame 20 runs were achieved to record the changes in the elemental concentrations. The results were calculated by using the Q-Spec 6.5 software (COX Analytical Systems).

There is no way to compare scans of different dates directly, since we havened found a proper way to calibrate the method yet. In the frame of a student research project the collected µ-EDXRF data are studied for comparison using various normalizing methods. Hence, effects due to e.g. matrix or water content changes can be shown.

Reference

Rammlmair D., Wilke M., Rickers K., Schwarzer R. A., Möller A., and Wittenberg A. (2006) *7.6. Geology, Mining, Metallurgy*. In *Handbook of Practical X-Ray Fluorescence Analysis* (ed. B. Beckhoff, B. Kanngießer, N. Langhoff, and R. Wedell), pp. 640-687. Springer.

A high-resolution study of diatom oxygen isotopes in a Late Pleistocene to Early Holocene laminated record from Lake Chungará (Andean Altiplano, Northern Chile)

A. HERNÁNDEZ[1], R. BAO[2], S. GIRALT[1], M.J. LENG[3], P.A. BARKER[4], J.J. PUEYO[5] A. SÁEZ[5] A. MORENO[6], B. VALERO-GARCÉS[7] AND H.J. SLOANE[3]

[1]Institute of Earth Sciences 'Jaume Almera'-CSIC, C/Lluís Solé i Sabarís s/n, 08028 Barcelona, Spain

[2]Faculty of Sciences, University of A Coruña, Campus da Zapateira s/n, 15701 A Coruña, Spain

[3]NERC Isotope Geosciences Laboratory, British Geological Survey, Nottingham NG12 5GG, UK

[4]Department of Geography, Lancaster University, Lancaster LA1 YB, UK

[5]Faculty of Geology, University of Barcelona, C/ Martí Franquès s/n, 08028 Barcelona, Spain

[6]Limnologycal Research Center, University of Minnesota, 310 Pillsbury Drive SE, Minneapolis, MN 55455, USA

[7]Pyrenean Institute of Ecology - CSIC, Apdo. 202, 50080 Zaragoza, Spain

Lake Chungará (18º15' S, 69º09' W, 4520 m a.s.l. 22.5 Km^2 and 40 m of water depth) is a hydrologically closed lake located on the Andean Altiplano. The lake is polymictic, meso to eutrophic and currently primary productivity is mainly governed by diatoms and chlorophyceans.

Three laminated intervals were selected for detailed petrographical studies as well as a high resolution diatom oxygen isotope analysis. These laminated sediments are made up of bands of white and dark mm-thick laminae and thin layers of diatomaceous ooze with variable carbonates and amorphous organic matter.

Assuming no significant changes in the isotopic compositions of the water sources and according to the diatom microstratigraphy of the laminae, two alternating environmental scenarios can be described. Lower-level water conditions are interpreted during the intervals of white laminae deposition (high values of $\delta^{18}O$), since those conditions are more favourable for the massive short-term deposition of monospecific large centric diatom blooms and $\delta^{18}O$ enrichment. These white laminae are probably the result of exceptional periods of mixing of the shallow water column during lowstands, which recycle nutrients from the hypolimnion. Lower $\delta^{18}O$ values, and therefore deeper water conditions, are more favourable for the development of dark laminae (normal annual cycle of the lake with alternating phases of stratification and mixing).

These conditions would lead to the development of a complex diatom community, among other algal groups.