Geophysical Research Abstracts
Vol. 13, EGU2011-11971, 2011
EGU General Assembly 2011

Trace metal content of benthic foraminifera: field study and modelling approach

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Living (rose Bengal stained) benthic foraminifera were collected from Murray Ridge, Arabian Sea Oxygen Minimum Zone, along an oxygen and pH gradient. The study site represents a natural laboratory to investigate the impact of fluctuating oxygen and/or bottom water chemistry. Trace metal signatures of single chambers analysed by laser ablation ICP-MS (Reichart et al., 2003) will be presented and related to in situ pore water geochemistry. Focus will be on redox sensitive trace metal (e.g. Mn, Mo) incorporation into foraminiferal test calcite and pore water oxygen and carbonate chemistry (pH, alkalinity).
Additionally, trace metal signatures will be used to further constrain a model for foraminiferal calcification. The model, originally developed for coral calcification (Sinclair and Risk, 2006), has been adapted to describe foraminiferal calcification. In this model, physiological processes, such as calcium and proton pumping and endocytosis of seawater, are explicitly defined and constrained to fit with recent observations (Bentov et al., 2009; de Nooijer et al., 2009a, 2009b). The model generates foramineral calcite precipitation at realistic rates and has reproduced co-variation of certain trace element/Ca ratios observed across chamber walls of planktonic foraminifera from a sediment trap (Hathorne et al., 2009). The trace metal contents of benthic foraminifera sampled along the oxygen and pH gradient may help to further refine the foraminiferal calcification model.

References:
Bentov et al. (2009) PNAS 106, 21500.
de Nooijer et al. (2009a) Biogeosciences 6, 2669.
de Nooijer et al. (2009b) PNAS 106, 15374.
Hathorne et al. (2009) Paleoceanography 24, PA4204
Reichart et al., (2003) Geology
Sinclair and Risk (2006) Geochim. Cosmochim. Acta 70, 3855