Mussel shells as potential hydrothermal biomonitor

M. AMINI*[1], D. E. JACOB[2], A. KOSCHINSKY[3] AND D. WEIS[1]

[1]Pacific Center for Isotopic and Geochmical Research, EOAS, University of British Columbia, Vancouver BC, Canada (*mamini@eos.ubc.ca)

[2]Dept. of Earth and Planetary Sciences, Macquarie University, North Ryde, NSW, Australia

[3]Jacobs University, Bremen, Germany

Hydrothermal vent sites on the ocean floor are extraordinary environments with exceptional physico-chemical characteristics. Inspite of extreme living conditions, these sites offer habitats to a number of species, including the widespread mytilid *Bathymodiolus* sp.. Since vent-specific metals inherent to the emanating fluids are incorporated in their shells, they have been proposed as bioarchives of hydrothermal activity. Previous studies demonstrated that fluid-specific chemical signals such as Eu anomaly are preserved in Bathymodiolus shells [1, 2]. However, the bioaccumulation of some metals has been shown to be regulated by the organism, while others seem to be processed passively.

In this study, we apply in-situ LA-ICP-MS analyses to trace metal accumulation in Bathymodiolus shells from the Logatchev hydrothermal vent along the Mid-Atlantic Ridge [3]. Significant REE and heavy metal accumulation can be localized in a narrow layer of ~20um terminating the nacrous layer. A two to three times enrichment of Ba, La, Eu, Cu, Zn and Pb can be detected in this layer compared to the bulk of the nacreous layer. This implies that hydrothermal characteristics are recorded in the innermost nacreous layer. In general, determining time-constraints in the nacreous layer of bivalve shells is challenging. However, since this layer may be less altered than the outer prismatic layer, the detection of hydrothermal signals here documents the potential for the establishment of Bathymodiolus shells as bioarchives. Linking trace element results to sclerochronological data offers the possibility to utilize Bathymodiolus shells as biomonitors for the evolution of hydrothermal activity.

[1] Cosson *et al* (2008), *Mar Env Res* **65**, 405-415 [2] Bau *et al* (2010), *Earth Planet Sci Lett* **299**, 310-316 [3] Dubilier *et al* (2010), *MSM10/3 cruise report,* pp. 46