Assessing μm-scale heterogeneity of boron isotopes and B/Ca ratios in cold-water coral *Lophelia pertusa* using Laser-Ablation 2D-Scanning

J. FIETZKE[1]* AND M. WALL[1]

[1]GEOMAR Helmholtz Centre for Ocean Research Kiel, 24148 Kiel, Germany (*correspondence: jfietzke@geomar.de)

Boron isotopes have been applied to reconstruct seawater pH in marine carbonates since 1980s. Despite the fact that the working principle of this pH proxy, i.e. the pH-dependant speciation of boron in seawater and the equilibrium isotope fractionation between borate ion and boric acid are well-established from inorganic chemistry, the incorporation of boron into biogenic carbonates is less well constrained.

Recently, ocean acidification studies have fostered an increased interest in applying boron isotopes to reconstruct pH from a large variety of marine habitats. So far the relationship between boron isotopes and pH needs to be established using empirical correlation. A comprehensive understanding on how calcifying organisms' physiology deals with the uptake and transport of boron would strengthen the applicability of the proxy quite significantly. Therefore, the reverse approach becomes more important recently, i.e. using boron isotopes to study the impact of changing environmental pH on the physiological control of calcification performed by marine organisms to build hard-parts like shells or skeleton.

Bulk techniques to quantify boron isotopes are commonly applied for the pH proxy application. These techniques appear insufficient to provide insights into small-scale variability/heterogeneity within the skeleton, which is ultimately needed for deeper insights into processes involved. Laser-Ablation-MC-ICP-MS is capable to probe the samples at μm-resolution and provide good precision (~0.5 per mill) for boron isotope ratios.

We present an improved LA method allowing for the simultaneous acquisition of 2D images of boron isotopes and B/C elemental ratios. In a *Lophelia pertusa* test sample a spatial resolution of ~20μm is applied to record images of ~1.5mm x 2mm as well as one covering the whole sample section at resolution of 80μm.

Results show a strong internal variability of both, B isotopes and B concentration. The total range in boron isotope ratios covered by our sample is as large as 20 per mill and displays a spatial distribution related systematically to the respective local amounts of organics.