Isotopic and elemental mapping of bamboo corals – reference to calcification mechanism and proxy applications

S. FLÖTER[1*], J. FIETZKE[1], M. GUTJAHR[1], J. FARMER[2], T. M. HILL[3], B. HÖNISCH[4], G. NEHRKE[5], A. EISENHAUER[1]

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

[2]Department of Geoscience, Princeton University, Guyot Hall, Princeton, NJ 08544, USA

[3]Department of Earth & Planetary Sciences, University of California, Davis, CA 95616, USA

[4]Department of Earth and Environmental Sciences and Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY 10964, USA

[5]Alfred Wegener Institut, 27570 Bremerhaven, Germany

Bamboo corals are calcitic octocorals dwelling in a broad range of water depths and in all ocean basins. Their skeletons could give insight into the temporal variability of environmental parameters at their growth locations, in areas where long-time observations are often lacking. A thorough understanding of calcification mechanisms is essential to interpret the chemical composition of their high-magnesium calcite skeleton with regard to environmental fluctuations. To address this issue, we employed electron microprobe analysis, confocal Raman spectroscopy, laser ablation-ICPMS and solution based multi collector-ICPMS that together provide insights into the fine-scale spatial heterogeneity of the coral chemical composition. We report how the elements Na, S, Ca, and B, as well as organic matter are distributed in skeletal sections of specimens of *Keratoisis grayi* (family Isididae) from the Atlantic and the Pacific Ocean. Further, maps of $\delta^{11}B$ over the sample radii will be presented. The elemental and isotopic data are subsequently combined to propose a calcification model of Isidids explaining the observed compositional patterns. Finally, we evaluate the robustness of skeletal Na/Ca and $\delta^{11}B$ as proxies for salinity and pH_{SW}, respectively, in bamboo corals. Our study provides new insights into underlying biogeochemical controls for bamboo coral trace elemental incorporation which are required for applying bamboo corals as environmental archives in the deeper ocean.