The effects of elevated temperature and pCO_2 on coral skeletal boron isotopes: A culturing experiment

V. SCHOEPF[1*], M. T. MCCULLOCH[1], R. J. TOONEN[2] AND C. P. JURY[2]

[1]School of Earth and Environment, UWA Oceans Institute and ARC Centre of Excellence for Coral Reef Studies, The University of Western Australia, Crawley, WA 6009, Australia (*correspondence: verena.schoepf@uwa.edu.au; malcolm.mcculloch@uwa.edu.au)

[2]Hawaii Institute of Marine Biology, SOEST, University of Hawaii, Kaneohe, HI 96744 (toonen@hawaii.edu; jurycp@hawaii.edu)

Coral skeletal boron isotopes are important proxies for seawater pH and ocean acidification, and can provide critical insights into the mechanisms of coral calcification due to the process of pH-upregulation at the site of calcification. However, it remains poorly understood how elevated temperature and heat stress influence pH-upregulation and the boron isotopic composition, especially in combination with elevated pCO_2. We conducted a controlled culturing experiment using the Hawaiian coral species *Porites compressa*, *Pocillopora damicornis* and *Montipora capitata,* which were collected from two environmentally different sites. Coral fragments were maintained at three pCO_2 levels (390, 600, 930 µatm) throughout the course of the experiment. During the first 5 weeks, corals from each of these pCO_2 treatments were exposed to elevated temperature levels (26.8, 28.3°C), followed by 9 weeks of exposure to 1.5°C lower temperatures (25.2, 26.8°C). We will present data on the boron isotopic composition as well as trace elements (B/Ca, Sr/Ca, Mg/Ca, U/Ca, Ba/Ca) of these corals and compare them to the geochemical signature of heat-stressed bleached corals. The findings from this study will result in an improved understanding of how temperature and heat stress influence pH-upregulation and the boron isotopic composition, and thus have important implications for the accuracy of the boron isotope seawater pH proxy in corals.