Proxy Calibrations in the Cold-Water Coral Desmophyllum dianthus: Nutrient Concentrations in Antarctic Intermediate Water

Ko, S. ; **Sherrell, R. M.** ; **Pelejero, C.** ; **Martínez-Dios, A.** ; **Lucas, A.** ; **Calvo, E.** ; **Kozdon, R.** ; **Bostock, H.** ; **Tracey, D. M.**

Element-calcium ratios in the cold-water coral Desmophyllum dianthus represent potential archives for paleo-reconstruction of temperature and nutrient concentrations, as well as other ocean properties. However, applications of D. dianthus have been limited largely because of relatively large uncertainties in their calibrations and heterogeneity in its skeletal composition. We address these issues by analyzing corals cultured under systematically varied seawater conditions (phosphate, barium, temperature, pH, feeding frequency) over a two-year period, and live-collected corals near New Zealand to refine the calibration of P/Ca and Ba/Ca, proxies for seawater phosphate and barium, respectively. We demonstrate the capability to geochemically resolve ~6 month increments in this slowly growing (1-2mm/year) organism using calcein and Pb isotope labelling and laser-ablation ICPMS, and to assess the variability introduced by biological factors such as feeding frequency and extension rate. Regions in the skeleton that are optimal for paleoproxy signals are identified and compositional variability is constrained using LA-ICPMS mapping. These findings and calibration are applied to fossil D. dianthus from New Zealand to generate a record of Antarctic Intermediate Water phosphate and silicic acid, through the Ba-Si relationship, over the past 35kyrs.

Publication:	American Geophysical Union, Fall Meeting 2020, abstract #PP022-0014
Pub Date:	December 2020
Bibcode:	2020AGUFMPP0220014K
Keywords:	1626 Global climate models; GLOBAL CHANGE; 1637 Regional climate change; GLOBAL CHANGE; 4901 Abrupt/rapid climate change; PALEOCEANOGRAPHY; 4934 Insolation forcing; PALEOCEANOGRAPHY