Elemental systematics of modern and fossil deep water corals from the Perth Canyon, Australia

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Cold-water corals (CWCs) are emerging as an important archive of environmental change. Like many other marine calcifiers their carbonate skeletons are being employed in geochemical proxy studies (e.g. Li/Mg, $\delta^{11}B$, P/Ca), which have shown them to be reliable recorders of ambient seawater temperature [1], pH [2], and nutrient flux [3]. They are especially attractive candidates for such studies given they are azooxanthellate, which limits the influence of 'vital' effects on some proxies, and because they inhabit diverse environments, from the shallow-water fjords at high latitudes to great ocean depths worldwide. These cold conditions inhibit coral skeletal growth to very slow rates, so they can be very long-lived and have great potential to reveal long-term changes in oceanic environments.

Here we have determined the ages and elemental compositions of a suite of scleractinian CWCs collected during the first ROV-based exploration of the Perth Canyon, just 20-60 km offshore Perth, Western Australia. Both live-caught and fossil assemblages were collected between depths of approximately 600 to 1800 m, together with ambient seawater for which full depth profiles have been thoroughly characterised throughout the canyon system.

Uranium-series dating using solution MC-ICPMS has identified fossil samples from the Last Glacial Maximum and Holocene intervals from various depths and sites within the canyon. With emphasis on the Li/Mg temperature proxy and nutrient elements (Cd/Ca, Ba/Ca, P/Ca), we show spatial heterogeneities and temporal variations in fossil and modern specimens analysed by solution and laser ablation ICPMS. Here we discuss these comparative datasets, which provide new insights into the utility of cold-water corals as archives of palaeoseawater chemistry and environmental change.

[1] Montagna, P. et al. (2014) *Geochim. Cosmochim. Acta* **132**, 288–310. [2] McCulloch, M. et al. (2012) *Geochim. Cosmochim. Acta* **87**, 21–34. [3] Montagna, P. et al. (2006) *Science* **312**, 1788–1791.