

Temperature and light effects on Sr/Ca and Mg/Ca ratios in the corals cultivated in experimental tanks

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Coral skeletal chemistry has been used extensively to reconstruct the past climatic variability with high time resolution. However recent studies have mentioned some problems on coral geochemistry, which suggest that temperature is not only controlling factor on incorporation of trace elements especially Sr and Mg.

This study was designed to investigate the effect of light and temperature on Sr/Ca and Mg/Ca ratios in the skeleton of the coral *Porites* sp. for the purpose of evaluating the potential of Sr/Ca variation as a temperature proxy. In addition, we investigated the effect of growth rate on Mg/Ca variation as proposed by Inoue et al. (2007).

In the light experiments, coral samples which were composed of clone were cultivated under three light levels with same temperature variations in each tanks. In the temperature experiments, corals samples were cultivated at five temperature settings between 21 and 29 degree C under a controlled light condition. All coral samples have been cultivated for about one year in both the experiments. We microsampled all coral specimens vertically from the top of the colony along the major axis. Then, Mg, Ca, and Sr were analyzed using 50 ug of bulk samples composed of coral skeletons that formed during the incubation period by ICP-MS.

Growth rate of corals during experiments has been increasing with increasing temperature rather than the light. Sr/Ca ratios showed a negative correlation with temperature as reported before and negligible relationship with lights, suggesting high potential of Sr/Ca as temperature proxies for paleoceanographic applications. On the other hand, Mg/Ca showed positive correlations with both temperature and light. This finding would support that Mg/Ca ratio is controlled by skeletal growth rate rather than temperature.