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Effect of highly alkaline seawater on growth and geochemical proxies of coral polyps

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While various ocean-based carbon dioxide negative emission technologies have been recently proposed and considered, one of which is ocean alkalization. Although our knowledge on how ocean alkalization affects the skeleton growth and composition of calcifying organisms is limited, few rearing experiments has been conducted in highly alkaline seawater. In this study, we report the results of rearing experiments of coral polyps (*Acropora* sp.1) under multiple condition of total alkalinity and pCO_2 to investigate the pH influences on skeletal growth and composition. The culture conditions were as follow: Control (total alkalinity= ~2000 μmol/kg, pCO_2= ~400 ppm); high alkalinity (total alkalinity= ~4000 μmol/kg, pCO_2= ~400 ppm); high alkalinity& pCO_2 (total alkalinity= ~4000 μmol/kg, pCO_2= ~2000 ppm). The high alkalinity condition showed the largest amount of calcification among the three experimental conditions, suggesting a favorable impact of ocean alkalization to mitigate ongoing decline of coral calcification. In addition, we examined boron isotope ratios ($\delta^{11}B$) and uranium/ calcium ratios (U/Ca) in coral skeletons, both are often used as a seawater pH proxy. The pH dependence of $\delta^{11}B$ and U/Ca ratios in coral skeleton was examined to determine whether they are maintained in seawater with higher than normal alkalinity.