Effects of increased CO2 on growth and trace elements of the coral polyp skeletons

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Ocean acidification caused by increased atmospheric carbon dioxide (CO2) is feasible threat for calcifying organisms including corals. Decalcification by lower pH has been reported in several marine organisms, such as foraminiferan, sea urchin and corals. To judge whether calcifying or non-calcifying marine organisms could survive in future high CO2 world, the range of tolerable pH on various life stages of marine organisms should be evaluated.

In this study, we assessed the effects of increased CO2 on early life stages of scleractinian corals (Acropora sp.), which is one of the most dominant species around Okinawa Island, Japan. In the culture experiments, filtered seawater was bubbled by pure CO2 to attain four pH settings (pH 6.6, 7.3, 7.6 and 8.0) at 27 oC. Coral polyps grown under each pH settings were then weighted and digested with 2% HNO3. Sr/Ca and Mg/Ca ratios in these skeletons were measured by ICP-MS (HP4500). As a result, significant correlation between Mg/Ca ratios and pH were observed, while there is a negligible relationship for Sr/Ca. As previous studies suggested, Mg/Ca in coral skeletons seem to be controlled by coral growth and it could play important role on coral bio-mineralization.