

Assessment of increased CO₂ on growth and variation of trace elements of coral polyp skeletons (Genus *Acropora*)

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Ocean acidification caused by increased atmospheric CO₂ is feasible threat for calcifying organisms including corals. Decalcification by lower pH has been reported in several marine organisms, such as foraminifera, sea urchin and corals. In order to evaluate the impact of lower pH on calcifying organisms, the range of tolerable pH on their various life stages should be investigated. In addition, study on variation of chemical compositions in calcifying organisms against pH is important to understand the mechanism of biomineralization for each organism.

In this study, we assessed the effects of increased CO₂ on early life stages of scleractinian corals (*Acropora* spp.), which is one of the most dominant species around Okinawa Island, Japan. In this experiment, four steps of pH (SWS) were controlled using filtered seawater which was bubbled by pure CO₂ at 27 °C (pH 6.6, 7.3, 7.6 and 8.0). Approximately 40 coral polyps were cultured more than 10 days under each pH setting and several polyp skeletons were weighted one by one using a microbalance. Then trace elements (Mg/Ca, Sr/Ca, Ba/Ca and U/Ca) in polyp samples were measured by ICP-MS (HP4500). As a result, smaller polyps were found at lower pH, indicating a positive relation between polyp growth and pH. However, even at pH 7.3, which is under-saturation for aragonite, skeletons were not dissolved and/or grown slightly. It is suggested that a specific physiochemical mechanism may control pH in the coral. Furthermore, as previous studies suggested, Mg/Ca in coral skeletons seem to be controlled by coral growth and it could play important role on coral biomineralization.

Metasomatism in the mantle wedge beneath the Avacha volcano, Kamchatka from xenolith data

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Mantle wedge rocks are believed to have experienced metasomatism by fluids expelled from subducted oceanic lithosphere. Many aspects of this phenomenon continue to be debated and can be addressed by studies of rare peridotite xenoliths hosted by subduction-related volcanic rocks.

Petrographic, major and trace element data were obtained on 17 large and fresh harzburgites and a smaller number of veined xenoliths from the active andesitic Avacha volcano in southern Kamchatka peninsula, Russia (see also [1]). A distinctive characteristic of the Avacha harzburgites is a combination of variable but generally high modal opx (18-30%) with very low modal cpx (1.5-3%). At a given olivine (or MgO) content, they have higher opx (and SiO₂) contents, and lower cpx (as well as Al₂O₃ and CaO) contents than normal refractory peridotite xenoliths in continental basalts; the Mg-Si and Al-Si trends resemble those in cratonic peridotites. These features may indicate either fluid fluxing during melting in the mantle wedge or selective metasomatic enrichments in SiO₂ to transform some olivine to opx. The latter is consistent with replacement of olivine by coarse opx seen in some xenoliths. Whole-rock enrichments in silica in the Avacha suite are restricted to samples with abundant coarse opx and are not correlated with the amounts of fine-grained, late-stage re-crystallisation products, which mainly replace coarse opx and contain euhedral olivine and amphibole. This is at odds with earlier work [2] that argued that the fine-grained opx record a major metasomatic event responsible for the enrichment of the mantle wedge in silica.

Two types of veins are identified in the Avacha xenoliths. Coarse opx-rich veins may have formed in the ancient event that produced silica enrichments in the harzburgites. Thin, fine-grained, cross-cutting veins consist of subhedral opx with variable olivine, cpx, amphibole, glass and accessory sulfides. These veins formed shortly before the transport of the xenoliths to the surface. Trace element patterns of their minerals are commonly different from those in whole-rock harzburgite xenoliths suggesting multiple sources of parental fluids including those linked to subducted oceanic crust.

[1] Bénard and Ionov (2009) *GCA*, this volume. [2] Ishimaru et al. (2007) *J. Petrol.* **48**, 395-433.