Geochemical study on precious coral skeletons: Effects of biomineralization and environmental variation

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Carbonate skeletons and shell of marine organisms have been used as an environmental recorder [1], because the trace element concentration reflects marine environments. In turn, chemical composition of carbonate skeletons is also partly influenced by biomineralization process. Precious corals produce high-Mg calcite with annual growth bandings [2]. In order to assess the possibility that precious coral skeletons records deep-sea environments, the concentration of trace elements was measured. The precious coral samples were collected from the Pacific Ocean (depth between 400-450 m) by the HURL Pisces IV submersible [3] and HURL 2011. After cutting perpendicular to the growth axis, electron probe micro analyzer (EPMA) was employed to observe two-dimensional distribution of Mg of the cross section. Magnesium was enriched in apical growth part, which was surrounded by lateral growth part. The lateral growth was characterized by concentric bandings of high and low Mg concentration. The significant difference in Mg concentration between apical and lateral growth cannot be explained by the change in environmental factors (e. g. temperature), implying the difference in biomineralization processes. In addition, the Mg-rich apical part of *Corallium secundum* was studded by complicated-structure grains with the size of approximately 100 μm. This suggests that a part of sclerites is incorporated into axial skeleton, which agrees with the result of Micro-CT observation of *C. konojoi* [3]. Further, high-resolution analyses by NanoSIMS was carried out to measure trace element concentration (B, F, Cl, S, Mg and Sr etc.) across the lateral growth part. We discuss the variation in trace elements corresponding the growth bandings.

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