Endolithic aspartic acid as an proxy of fluctuations in the growth of coral skeleton

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Coral skeleton has been widely investigated for monitoring past fluctuations in marine environments. Although stable carbon isotope ($\delta^{13}C$) data appear to record coral metabolism, their interpretations differ from place to place and are sometimes controversial, because of the influence by carbon isotopic composition of dissolved inorganic carbon in seawater. Association of an organic matrix with biological carbonates has been reported in many previous studies. With the help of high-resolution micro-sampling of coral skeleton and advanced technique for amino acid (AA) quantification in low-volume sample, we indicate that aspartic acid (Asp) in coral skeleton varies with distinct seasonal pattern, and is useful in understanding why corals calcify faster in summer than in winter. Since Asp containing organic matrix in the coral skeleton is synthesized by the coral, changes in mole concentration of Asp relative to other AAs of the skeleton make it a potential indicator for monitoring fluctuations in coral physiology in the past.

Kornerupine *sensu stricto* associated with mafic and ultramafic rocks in the Lützow-Holm Complex at Akarui Point, East Antarctica: What is the source of boron?

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Prof. W. Schreyer had a long-standing interest in the MgO-Al_2O_3-B_2O_3-SiO_2-H_2O system, which includes kornerupine, a borosilicate rarely found in mafic or ultramafic settings. We report a new occurrence in two ruby corundum-plagioclase lenses at the same structural level as boudinaged ultrabasic rocks in hornblende gneisses and amphibolite. Ion microprobe analyses of kornerupine give 13-59 ppm Be, 181-302 ppm Li, and 5466-6812 ppm B, corresponding to 0.38-0.47 B per 21.5 O; associated sapphirine also contains B (588-889 ppm). Peak metamorphic conditions are estimated to be 770-790°C and 7.7-9.8 kbar. Kornerupine encloses tourmaline and plagioclase, which suggests the prograde reaction: tourmaline (1) + plagioclase (>An34) + sapphirine ± spinel → kornerupine + corundum (ruby) + plagioclase (<An82) ± (fluid or melt). Kornerupine later reacted with H_2O-CO_2 fluid in cracks: kornerupine + plagioclase + (Na, K, ±Si) → tourmaline (2) + biotite + corundum (sapphire) ± magnesite ± andalusite + (Ca). Secondary tourmaline differs from the included tourmaline in having less Ti and higher Na/(Na+Ca+K). There are two possible scenarios for introducing B into the lenses: (i) infiltration of boron-bearing aqueous fluids released by prograde breakdown of muscovite in associated metasedimentary rocks, and (ii) hydrothermal alteration of mafic and ultramafic rocks by seawater prior to peak metamorphism. The latter scenario is consistent with the suggestion (Hiroi *et al*. 1991) that Akarui Point could be part of an ophiolite complex.

Reference

Hiroi, Y., Shiraishi, K. and Motoyoshi, Y., (1991), *In*: Thomson, M.R.A. *et al*. (eds) *Geological Evolution of Antarctica*, Cambridge University Press, Cambridge, 83-87.