Micro scale elemental distribution in planktonic foraminifera tests: Effect of different biology

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Planktonic foraminifera keep records of the upper ocean environments in their individual shells. Mg/Ca ratio in the shells has been used as temperature proxy, however, the ratio varys significantly at micro-scale within the shells [1]. Such fluctuations can not be explained by temperature change, and considered to be biological origin. In order to investigate the effect of foraminiferal biology on chemical composition in foraminiferal test, we examined three foraminifer species; *Globigerinoides sacculifer*, *Neogloboquadrina dutertrei*, and *Globorotalia menardii* by EPMA mapping. These three species occur in same tropical and subtropical regions, however, each species shows a different biology (e.g., food, spine, habitat, and symbiont). *G. sacculifer* is spinose and omnivorous feeders bearing dinoflagellate symbionts, while other two species are non-spinose, herbivorous, and facultative symbiont bearing.

The Samples were picked from the surface sediment obtained by multiple corer in subtropical area of Pacific Ocean (23°59.504'N, 124°24.752'E, 2196 m in water depth) and prepared as following the method reported by[1]. Mg, S, and Ca concentration of the cross section of foraminifera shells were measured by using EPMA.

The foraminiferal tests show the multi-lamellar microstructures, alternating thin organic sheets and calcitic layers. In the *G. sacculifer* test, most organic sheets contain higher Mg and S concentration compared to the carbonate layers. However, the organic sheets with highest Mg band and highest S band are different. A high Mg band is also observed within the outermost carbonate layer, which does not associate with organic sheet. In the *N. dutertrei* test, outermost organic layer contain highest S concentration. Most high Mg bands are associated with the high S bands. In the *G. menardii* test, Mg and S heterogeneities are larger compared to the other samples. Most organic sheets contain higer Mg and S concentration, and outermost organic sheets contain highest S and relatively high Mg concentraiton. Outermost carbonate layer show low Mg concentration.

Our results suggest that the patterns of micro-scale elemental distributions are different among species, probably derived from different genetic biology.

[1] Kunioka *et al.* (2006) *Geochem. Geophys. Geosyst.* doi, 10.1029/2006GC001280.

Eclogitic sulfide and silicate inclusions in diamonds and sub-continental geological processes

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Harzburgite and lherzolite that comprise most of the subcontinental lithospheric mantle have widely varying Nd isotopic compositions (ε_{Nd} >50 to -55) and low Os isotopic compositions (γ_{Os} = 0 to -15) [1, 2]. This records a multistage history of initial depletion followed by barely decipherable episodes of metasomatism. Although representing an exceedingly tiny sample, silicate and sulfide inclusions encapsulated in diamonds retain pristine Nd and Os isotopic compositions and thus can resolve sub-continental geological processes that may be obscured in xenoliths. Many well-studied diamondiferous kimberlite localities in southern Africa have eclogitic silicate and sulfide inclusion subpopulations that give Proterozoic isochron ages in both the Sm-Nd and Re-Os systems [3-8]. Unlike the xenolith data, initial Nd values for these inclusion suites are characterized by chondritic to low values and initial Os by high values; the low initial Os values that typify peridotites are completely absent. Inclusion ages can be assigned to known geological events recorded in the crust. Jwaneng, Koffiefontein and Orapa inclusions record 1, 1.5 and/or 2 Ga metamorphism seen in the host terranes whereas Premier and Venetia inclusions record Bushveld magmatism. As yet, no suites seem to record the major flood basalt magmatism at 3, 2.7 and 0.2 Ga. This implies that these eclogitic diamond-forming fluids derive their silicate and sulfide components from the lithosphere during compressional tectonic episodes at the craton margin or during intrusion at depth of magmatic material to the lithosphere.

[1] Pearson *et al.* (1995) *GCA* **59**, 959-977. [2] Carlson *et al.* (2005) *RG* **48,** 1. [3] Richardson *et al.* (1986) *Nature* **322**, 623-626. [4] Richardson *et al.* (1990) *Nature* **346,** 54-56. [5] Richardson *et al.* (1993) *Nature* **366,** 256-258. [6] Richardson *et al.* (1999) *P7IKC*, 709-713. [7] Shirey *et al.* (2001) *GRL.* **28,** 2509-2512. [8] Richardson *et al.* (2004) *Lithos* **77**, 143-154.