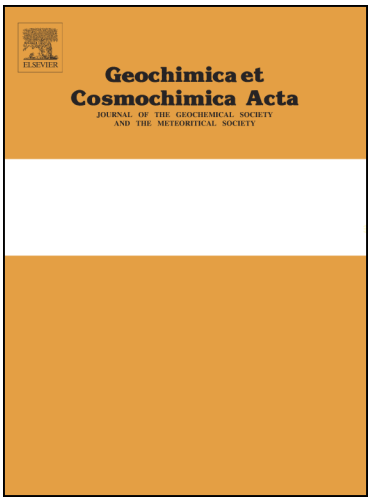

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Ba/Ca ratios in the non-spinose planktic foraminifer *Neogloboquadrina dutertrei*: Evidence for an organic aggregate microhabitat

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Abstract

Ba/Ca ratios in many non-spinose planktic foraminifera are markedly higher than those observed in spinose planktic species, but the cause for these high Ba/Ca ratios is not understood. A better understanding of this geochemical anomaly could provide insights into the habitat and/or controls over Ba incorporation in these species and expand their utility in paleoclimate research. In spinose species shell Ba/Ca depends only on the Ba/Ca ratio of seawater. Possible explanations for high non-spinose Ba/Ca include 1) the empirical partition coefficient, D_{Ba}, differs from the spinose species, 2) shell Ba varies with seawater temperature and pH, or 3) non-spinose foraminifers have a preference for prey that has elevated Ba. We performed laboratory culture experiments to determine D_{Ba} for the thermocline-dwelling non-spinose planktic foraminifer *Neogloboquadrina dutertrei*. We found that the Ba/Ca ratio of foraminiferal calcite secreted in the laboratory varies linearly with the Ba/Ca ratio of the seawater. The D_{Ba} for this species, 0.11 ±0.008 (2SE; 95% CL), is similar to the D_{Ba} for spinose species (0.13 ±0.004, 2SE; 95% CL). As in spinose species, the Ba/Ca ratio of cultured specimens of *N. dutertrei* is not influenced by culture temperature (12 to 22°C) or seawater pH_{NBS} (range 7.8 to 8.3). However, the Ba/Ca ratio of individual plankton-tow *N. dutertrei* specimens that completed their lifecycle in the ocean exceeds the Ba/Ca ratio of cultured specimens by up to three orders of magnitude. It is unlikely this difference between cultured specimens and ocean-grown specimens is due to seawater [Ba] variability, since seawater Ba/Ca ratios calculated using our D_{Ba} are much higher than exist in the ocean. Rather, we suggest that elevated shell Ba/Ca in plankton tow and fossil *N. dutertrei* is due to calcification in the microenvironment of marine organic aggregates such as marine snow, where [Ba] is elevated as a result of Ba release from biogenic particulates.