

Evaluating planktic foraminiferal Na/Ca as an environmental proxy

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The quantitative reconstruction of past seawater salinity has yet to be achieved and the search for salinity proxies is ongoing. The combination of foraminiferal Mg/Ca and $\delta^{18}\text{O}_{\text{CaCO}_3}$ to decipher the past $\delta^{18}\text{O}$ of seawater ($\delta^{18}\text{O}_{\text{sw}}$) provides robust, although qualitative results. A culturing study [1] suggested Na/Ca in shallow benthic foraminiferal tests as a new direct proxy for seawater salinity.

This study assesses the reliability of Na/Ca ratios in planktic foraminiferal calcite as a proxy for seawater salinity. We studied archived specimens of *Globigerinoides sacculifer* from culture experiments [2, 3]. The first experiment was conducted at variable salinities of 23-45 (psu) and a constant temperature of 26.5 °C. In the second experiment, planktic foraminifera were cultured at various temperatures (19.5-29.5 °C) and constant salinity. All cultured specimens were measured with a JEOL JXA 8200 electron microprobe to observe Na distributions in both single chambers and chamber wall profiles.

Preliminary results suggest a positive relationship between foraminiferal Na/Ca and salinity, with the slope of the regression line around half that found for shallow benthic foraminifera [1]. Na/Ca ratios of the temperature experiments vary insignificantly. Primary and secondary calcite, both formed during culture at constant conditions, exhibit different Na/Ca ratios suggesting some influence of biomineralization pathways.

[1] Wit, J.C. et al. (2013) Biogeosciences 10, 6375-6387.

[2] Bijma, J. et al. (1990) J. Foram. Res. 20, 95-116.

[3] Nürnberg, D. et al. (1996) Geochim. Cosmochim. Acta 60, 803-814.