

Field application of Na/Ca as salinity proxy in planktonic foraminifera

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Foraminiferal Na/Ca in benthic and planktonic foraminifera is a new approach to determine directly and independently from previous applied methods (i.e. paired shell Mg/Ca and $\delta^{18}\text{O}$, shell Ba/Ca) past seawater salinities. Recent culture and field calibration studies presented a significant positive relationship of Na incorporation into foraminiferal calcite with increasing salinity [1, 2, 3], as confirmed by our culture study of *Trilobatus sacculifer*.

Although temperature could be excluded as a secondary influencing factor by our results, we note that the sensitivity of Na/Ca in response to salinity changes is species-specific. Na/Ca values vary from 1–3 mmol/mol for the same salinity between various planktonic and benthic foraminifera, suggesting a dominant biological control.

To further investigate possible secondary controls on foraminiferal Na/Ca, we here present new data for planktonic foraminifera commonly used for paleoreconstructions (i.e. *Globigerinoides elongatus*, *G. ruber* (pink), *Orbulina universa*, *Globigerina bulloides*) collected by plankton tows in the eastern tropical Atlantic during RV *METEOR* cruise M140. We performed laser ablation ICP-MS measurements on individual foraminifera from locations where salinity and temperature were essentially constant while seawater pH and total alkalinity differed by ~ 0.5 and 100 $\mu\text{mol/kg}$, respectively. These new data from field samples will provide new insights into the possible effects of natural variations in carbonate system parameters on Na incorporation into foraminiferal calcite. Preliminary results confirm for *G. elongatus* and *T. sacculifer* that Na/Ca values correspond to those previously found in culture experiments.

[1] Wit *et al.* (2013) *Biogeosciences* **10**, 6375-6387. [2] Allen *et al.* (2016) *Geochim. Cosmochim. Acta* **193**, 197-221. [3] Mezger *et al.* (2016) *Paleoceanography* **31**, 1562-1582.