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Testing the role of vital effects on foraminiferal trace metal incorporation

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Foraminifera are a valuable tool for reconstructing paleoceanographic conditions because the fossilised tests contain information on unobservable environmental variables that prevailed during their life. The isotopic and trace metal composition of test carbonate is related to the seawater through so called proxy relationships. However, the reliability of those proxies strongly depends on our knowledge of the processes controlling the incorporation of elements and their isotopes into the tests. Ideally, the proxy calibration only depends on a single target parameter (e.g. temperature, salinity, pH). Nevertheless, also physiological processes such as respiration, photosynthesis by symbionts as well as the biomineralization process itself affect the proxy relationships. This is known as "vital effects". Little is known about how vital effects influence the incorporation of Mg. This is especially important when combining this data with δ^{18}O since small offsets have a large impact on the reconstruction of past salinity changes. By analysing trace and minor elements with laser ablation inductively coupled mass spectrometry (LA-ICPMS), δ^{18}O and Mg/Ca ratios can be determined in single specimens. This potentially eliminates a large part of the noise when combining δ^{18}O and Mg/Ca for salinity reconstructions. Laboratory culture experiments will allow deconvolving the effects and thus increase accuracy of proxies. A first experimental series was done in Puerto Rico with SCUBA collected planktonic specimens of *Globigerinoides sacculifer* and *G. ruber*. They were maintained under controlled laboratory conditions at 1) variable temperature (T) (23-29°C) and constant salinity (S) (36.1), 2)

variable S (30-39) and constant T (26˚C) and 3) at variable pH (7.6-8.6) and constant T and S, and 4) variable CO_3^{2-} concentrations (150-600μg) at constant T and S.