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Time series of trace element distributions in planktonic foraminifer shells from the oligotrophic Gulf of Aqaba, northern Red Sea

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The trace element chemistry of planktonic Foraminifera (PF) shells records the seawater composition and conditions of the marine environment in which they grow. Yet, long term *in situ* calibration and interspecies differences in proxy systematics are still poorly constrained, hampering the use of trace element distributions as environmental tracers of modern and past oceanic conditions.

Here, we report element ratios using laser ablation mass spectrometry (LA-ICP-MS) in PF shells collected using monthly resolved sediment traps at various water column depths in the northern part of the Gulf of Aqaba (GOA) in 2014 and 2015. In particular, we focus on Calcium-normalized elemental abundances in different morphotypes of the two abundant species *Globigerinoides ruber* and *Turborotalita clarkei*.

The results show that inter-chamber cation/Ca variability is lower in *G. ruber* relative to *T. clarkei*. In general, Mg/Ca in *G. ruber* display a positive correlation with temperature over time and depth. This general relationship does not exist in *T. clarkei*, which displays strong positive Mg/Ca perturbations in the subsurface water column, likely reflecting the impact of bottom sediment resuspension events during winter. B/Ca in *G. ruber* and *T. clarkei* displays a gradual first-order decrease over time that roughly corresponds with surface water *p*H patterns. By contrast, Sr/Ca remains constant around 1.5 mmol/mol between the chambers, species, and over time and different water depths.

Al/Ca, Ti/Ca, Mn/Ca, and Fe/Ca co-vary, most likely reflecting the control of terrigenous end members, while B/Ca, Mg/Ca, and Na/Ca vary independently, each assumed to be controlled by different environmental processes. The results are evaluated in the context of oceanic properties and characteristic seawater trace element compositions, in order to improve their application as environmental tracers and paleo-proxies.