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Calibration of Mg/Ca and Sr/Ca in planktonic foraminiferal shells and seawater by time-series sediment trap in the South China Sea

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Elemental proxies (Mg/Ca and Sr/Ca) recorded in foraminiferal calcite would allow us to reconstruct the oceanic hydrological properties in the past, providing constraints necessary to evaluate the underlying mechanisms proposed to account for global climate changes. However, only a paucity of attention has been focused on investigation of the potential climatic proxies (such as Sr/Ca and Ba/Ca), except for the calibration of foraminiferal Mg/Ca. Here we examine trace metal calibration (Mg/Ca and Sr/Ca) equations through the use of planktonic foraminifera collected from modern water column by deployment of time-series sediment traps at several water depths in the South China Sea (SCS). This allows us to systematically refine the effect of post-depositional dissolution above and below the lysocline, as well as to identify responses of shell chemistry to changes in seawater conditions.

Our preliminary results indicate: (1) Mg/Ca-derived SST equation for all species can be described by: Mg/Ca=0.31 exp (0.090*T), r= 0.81; (2) The shell Sr/Ca ratios increase with ambient temperature ($\sim$1% per degree) and decrease with salinity ($\sim$10% per psu), similar to previous observation in culture experiments; (3) Partial dissolution may significantly alter the distribution of trace metal in shell calcite above the lysocline in the SCS; (4) Foraminiferal Mg/Ca is more sensitive to partial dissolution than shell Sr/Ca, and the two surface-dwelling species (*G. sacculifer* and *N. dutertrei*) are relatively resistant to this potential artifact affected shell chemistry. Based on the abovementioned observations, we suggest that the use of elemental proxies in *G. sacculifer* is more appropriate for paleo-climatic reconstruction in the SCS.