

Multi-Proxy relationships in foraminiferal tests as delineated from element-element plots of time-resolved flo-thru data

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Flo-Thru Time Resolved Analysis (FT-TRA) provides a spectrum of element (El) to calcium ratios for every sample. A typical FT analysis produces >7000 El/Ca ratios per proxy (compared to 1 from the traditional cleaning/dissolution technique), and sorts these ratios by phase solubility. One benefit of this approach is seen in examination of El-El relationships in the dissolution spectra. By definition, homogeneous samples display linear El-Ca correlations with zero intercepts and scatter equivalent to analytical precision. These features of homogeneity are seen in flo-thru results from carbonate standards. However, El-El relationships in foram samples can be complex resulting from the presence of multiple biogenic and abiotic phases (see figure).

This study examines Mg/Ca, Sr/Ca, Ba/Ca, and Mn/Ca ratios in samples of *G. ruber* and *G. dutertrei* from ODP site 1242 and piston core Y69-71P from the Panama Basin and Easter Equatorial Pacific, respectively. Many of the Mn dissolution profiles have maxima after Ca, suggesting that these samples are overgrown by secondary Mn-rich carbonate, probably rhodochrosite (MnCO_3). Secondary Ba peaks are even more pervasive, suggesting that biogenic carbonate may be a significant carrier of labile Ba to the sea floor in the form of BaCO_3 (witherite) or highly substituted barite. We will show how Ba-Ca and Mn-Ca relationships from FT-TRA can be used to isolate pristine biogenic calcite from altered material, and further investigate the use of their El/Ca ratios as paleoproxies.

