Diatom-Bound Nitrogen Isotopes as a Diagenetically Stable Proxy for Southern Ocean Nutrient Utilization and Early Pliocene Climatic Warmth

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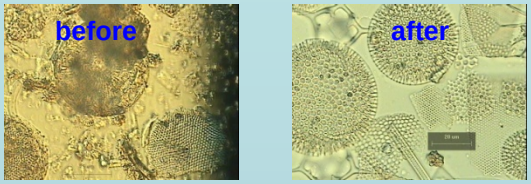

Figure 1. Diatom cleaning effectiveness.

***Goal*: to measure the $\delta^{15}N$ values of bulk sediment and diatom bound organic matter (DBOM) in two cores from the Southern Ocean spanning the late Miocene to Pliocene climate transition (~6-2 Ma) as proxies for nutrient utilization. Differences in the $\delta^{15}N$ values between the DBOM and the bulk sediments should provide information about sediment diagenesis.**

***Hypothesis*: early Pliocene warmth was associated with enhanced atmospheric CO_2 levels due to decreased nitrate utilization.**

***Methods*: One aspect of our study was to develop an efficient method to remove clays, iron oxides and organic phases from the diatom fraction (Figure 1).**

***Preliminary Results*: There are marked differences between the $\delta^{15}N$ of the bulk sediments and the $\delta^{15}N$ of isolated diatoms (Figure 2A). The bulk sediment values are higher by ~4 per mil and display lower overall variability. Reproducibility is excellent for both measurements (open circles in Figure 2A). The C/N ratios vary around the expected ratio of ~7 (Figure 2B), with higher variations in the bulk consistent with the fact that the bulk consists of a mixture of sources.**

Given the uncertainties in the composition of the bulk, it is surprising that the bulk $\delta^{15}N$ data display less down-core variability than the $\delta^{15}N$ values from the DBOM.

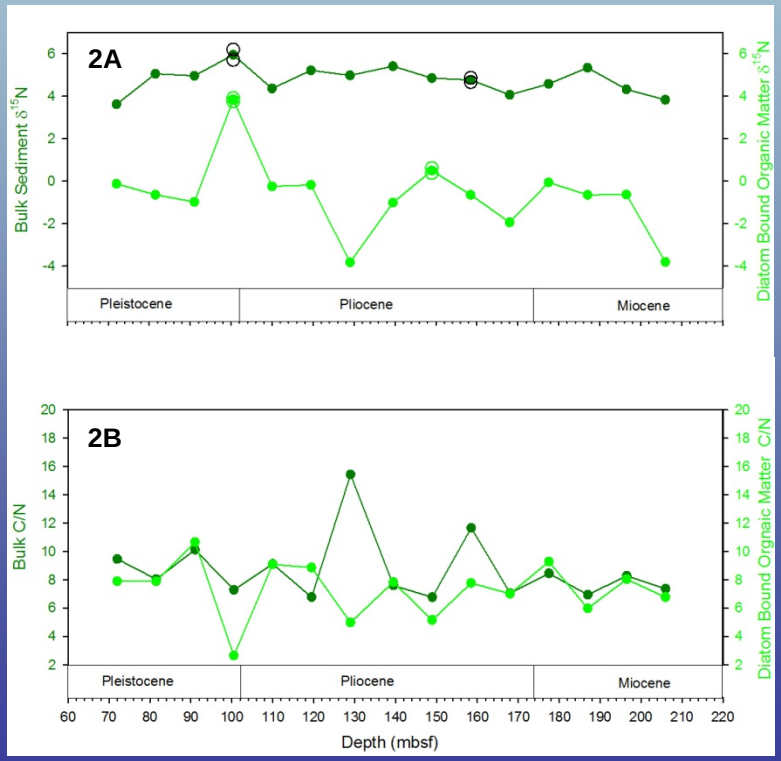

Figure 2. First down-core $\delta^{15}N$ results from Site 745 (dark green lines are from bulk sediments and light green lines from the DBOM) .