

PI: Sigman, Daniel M.

Institution: Princeton University

Email: sigman@princeton.edu

Topic: Nitrate stable isotopes

Explanation:

Daniel Sigman (Princeton) <sigman@princeton.edu>

My collaborators and I have generated nitrate isotope data from the western North Atlantic and interpreted them in the context of numerical models to estimate regional and basin-wide N fixation rates and other processes. Most of our analyses are at the Bermuda Atlantic Time Series station and to the South of this station. Other groups have generated and are generating data beyond this region, but there is a general need for a broader view of the N isotopes of nitrate across the Atlantic. This will help to define the geographic variations and oceanographic controls on thermocline nitrate $\delta^{15}\text{N}$, leading to first order improvements in our estimation of N fixation rate from the nitrate isotopes. Other processes and parameters will also be illuminated, including the upwelling off the coast of Africa and the intense remineralization that occurs in the subsurface of that region. Much can also be learned by better defining the $\delta^{15}\text{N}$ of different water masses in the Atlantic (Subtropical Mode Water, Antarctic Intermediate Water, Mediterranean Intermediate Water, Lower and Upper North Atlantic Deep Water, and Antarctic Bottom Water). Direct comparison with other TEI's will provide insight into the interconnections among subpolar nutrient consumption, suboxia, coastal processes (including margin sedimentary denitrification), and N fixation.

I will propose to analyze all 24 samples from the 22 full stations (528 samples) as well as all samples from the shallow (1000 m) stations (12 samples per station times the number of shallow stations), recognizing that we do not plan to routinely analyze nitrate isotope samples with concentrations below $1\ \mu\text{M}$. We also plan to measure the O isotopes of nitrate in the same samples. We will use the "denitrifier" protocols for these measurements. We plan to collect 50 ml for samples from below 500 m and 75-100 ml for samples from above 500 m. This water volume will leave additional volume from intercalibration activities as well as other measurements, such as the concentration and isotopes of dissolved organic N. We are open to the concept of collaboration with a second group. We do not require a berth or water from the trace metal clean systems.