Identifying Nitrogen Sources to Planktonic Groups in the Surface Ocean by Coupling Flow Cytometry and Stable Isotope Measurements

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Project Aims:

A. to develop the skills necessary to perform relevant oceanographic research both in the lab and the field
   * collecting samples in the field
   * designing and conducting relevant experiments
   * preparing samples for analysis
   * running various analytical equipment (mass spec, NOx box, flow cytometer)

B. to understand the use of stable isotopes of nitrogen to study oceanic nitrogen cycling

C. to use these skills to design and carry out my own stable isotope lab and field research experiments
   * Lab grown nitrate limited diatom culture (Princeton)
   * Experiment with samples collected from the Sargasso Sea (Bermuda)
Experiment growing a diatom (*Thalassiosira weissflogii*) culture in a nitrate limited sea water medium.

**Growth Rate**

\[ y = 0.0564x + 4.5093 \]
\[ y = 0.0566x + 4.51 \]

- Constant growth rate until day 6
- Still nitrate left in water

- Something else must be limiting growth

![Graph](image.png)
Bermuda

- Sargasso Sea
  - Nitrate limited in summer
- RV Atlantic Explorer
- BATS- 31°40’N, 64°10’W
Experiment at Sea

- Obtain particles from surface water (30m)
- Reduce to deep water (100m)
- Incubate for 7 days at surface water temperature and light conditions
- Sort and study $^{15}$N/$^{14}$N
Flow Cytometry

- Sort by populations: total eukaryotes vs total cyannobacteria
- So far only the integrated signal has been studied: total biomass
- Unfortunately, science can take a long time...

*(no results yet...)*
Future Work

- Repeat TW experiment
  - Correct for possible errors
- Sort and run Bermuda samples
- Modify/ repeat with sorts for other populations
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