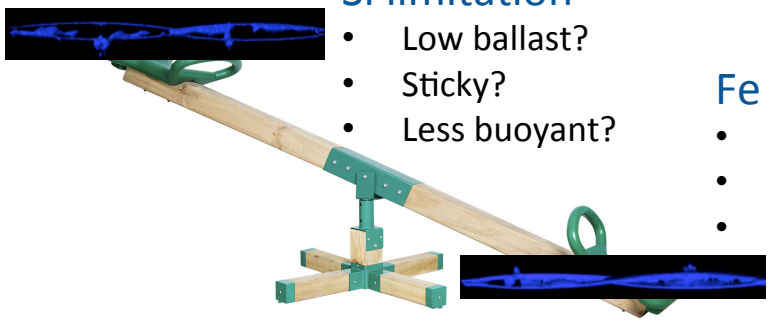
Collaborative Research: Diatoms, Food Webs and Carbon Export - Leveraging NASA EXPORTS to Test the Role of Diatom Physiology in the Biological Carbon Pump

Central Hypothesis: *Diatom community composition and taxon-specific metabolism ultimately determine the efficiency of diatom carbon export from the surface ocean.*

Goals:

- Quantify diatom nutrient limitation
- Determine diatom community composition and elemental stoichiometry.
- Establish metabolic profiles for different diatom taxa via combined molecular and tracer studies
- Test how well export paths are predicted from metabolic profiles through collaborations with EXPORTS PIs and samples that will allow for the determination of diatoms following a particular export pathway.



Images Heather McNair (Brzezinski lab)

Si limitation

- Low ballast?
- Sticky?
- Less buoyant?

Fe limitation

- More ballast?
- Smaller?
- Less buoyant?

TEAM MEMBERS

Bethany Jenkins (URI) PI: diatom communities and nutrient field relationship to exports pathways

Kristen Buck (USF) Co-PI: measurements of dissolved Fe, biologically bound Fe, and Fe uptake rates

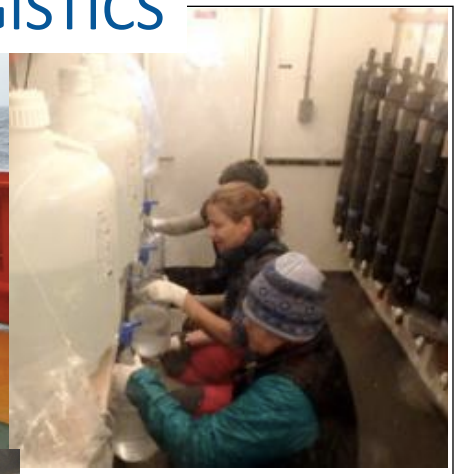
Mark Brzezinski (UCSB) Co-PI: measurement of size fractionated primary production, nutrient uptake rates

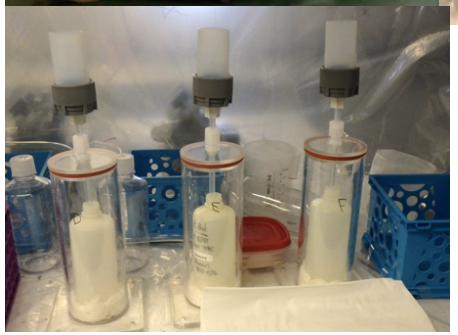
EXPORTS
EXport Processes in the Ocean from RemoTe Sensing

NSF

Diatoms, Food Webs and Carbon Export - Leveraging NASA EXPORTS to Test the Role of Diatom Physiology in the Biological Carbon Pump

LOGISTICS





Trace metal clean sampling (from clockwise: rosette, van and bubble)

Deckboard incubations to measure nutrient uptake and stress

MEASURED PARAMETERS

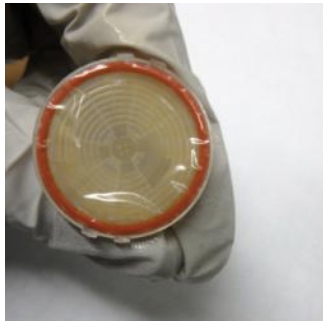
-diatom growth in response to nutrient addition

-uptake rates of stable Fe and NO_3^- and  Si isotopes

-size fractionated primary production

-cell specific Si deposition

-taxa-specific metabolism as measured by gene expression



Phytoplankton biomass collected on filter for genetic analysis (Left)

All photos courtesy of Cara Peckarcik

EXPORTS
EXport Processes in the Ocean from RemoTe Sensing

NSF