# PACE Science Team Sub-Group:

## Environmental Methodologies

Steven Ackleson (lead)
Emmanuel Boss
Michael Ondrusek
Collin Roesler
Wayne Slade
James Sullivan
Maria Tzortziou

**OBJECTIVES**

1) Quantify sources and magnitudes of measurement uncertainty associated with in situ observation methods.

2) Recommend best practices for minimizing observation uncertainty in support of ocean color remote sensing.

# Initial Science Questions and Progress

How does measurement methodology effect particle size distribution and what is the resulting impact on measured IOPs?

Preliminary analysis and discussion of PSD under-sampling and IOP averaging

Comparison between in situ and ship flow-through IOPs

What is the expected sub-pixel, IOP-specific variability given PACE target sampling distance (e.g., 250 m, 500 m, and 1 km) as a function of environment?

Analysis of in situ and remotely sensed IOPs and AOPs

- With respect to GSD (sensor design and sampling strategies)
- With respect to distance from land (1 km GSD)

How does the depth variability in IOPs impact satellite-derived products and how does this information inform us about in situ sampling approaches?

Data aggregation underway (e.g., IOP(z) + Rrs)

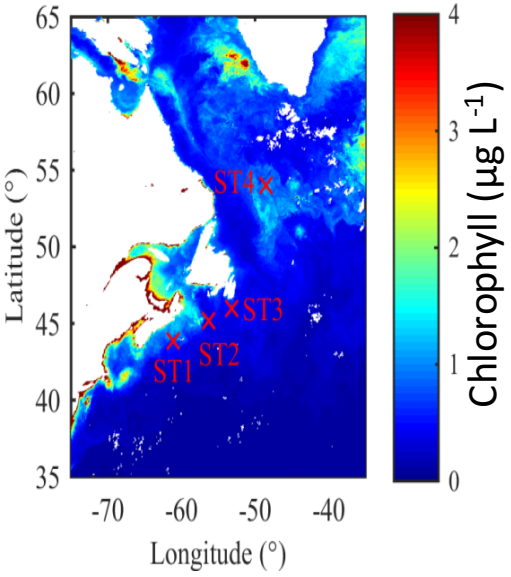
# Characterizing the Phytoplankton Soup: Pump and plumbing effects on the particle assemblage in underway optical seawater systems (Cetinić, Poulton & Slade)

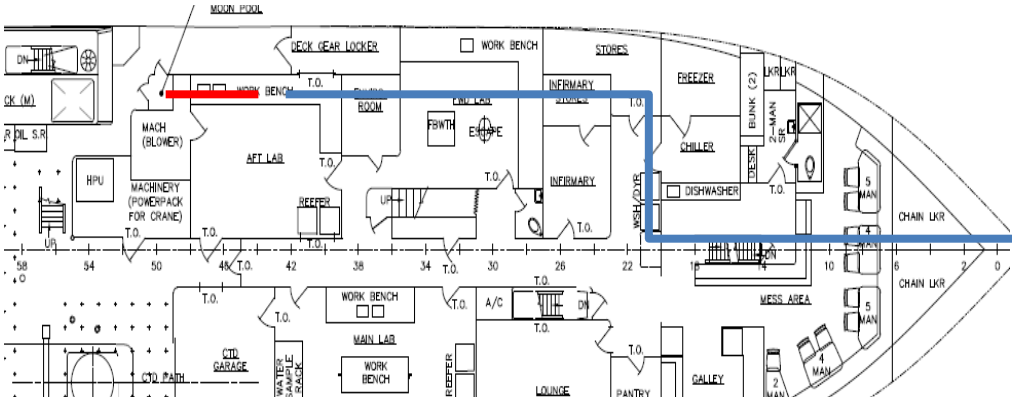
- How does flowthrough sampling effect
  - Particle/phytoplankton size distribution, PFT/PFG community structure, chains, biomass estimates
  - Biases in IOP or other derived biogeochemical measurements
- Comparison of two flowthrough systems

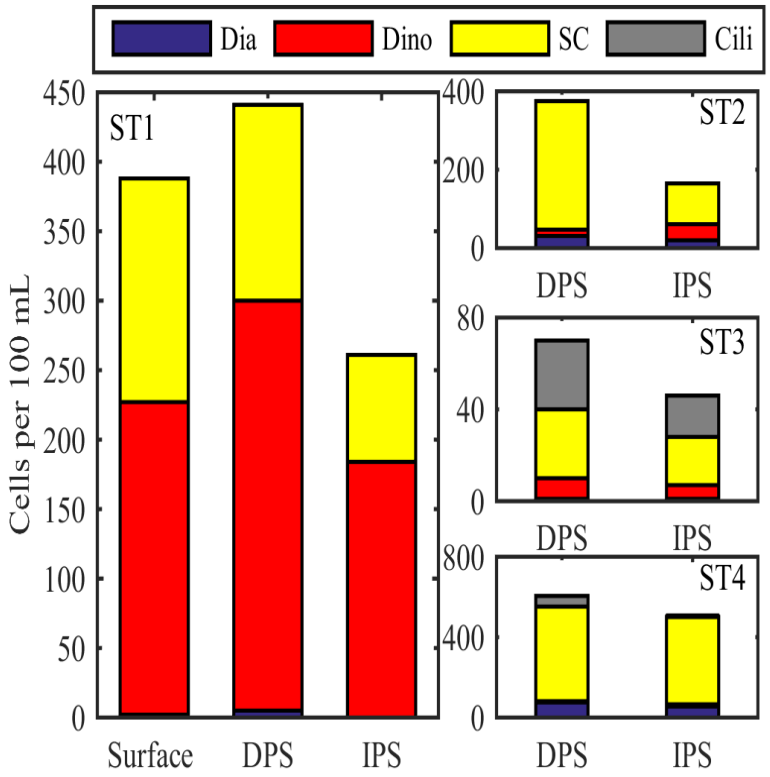
  **IPS** – typical UNOLS ucsw system (impeller pump, long plumbing, seachest fouling)

  **DPS** – diaphragm pump, short plumbing with clean tubing

  **Surface** – bottle sample at Station 1

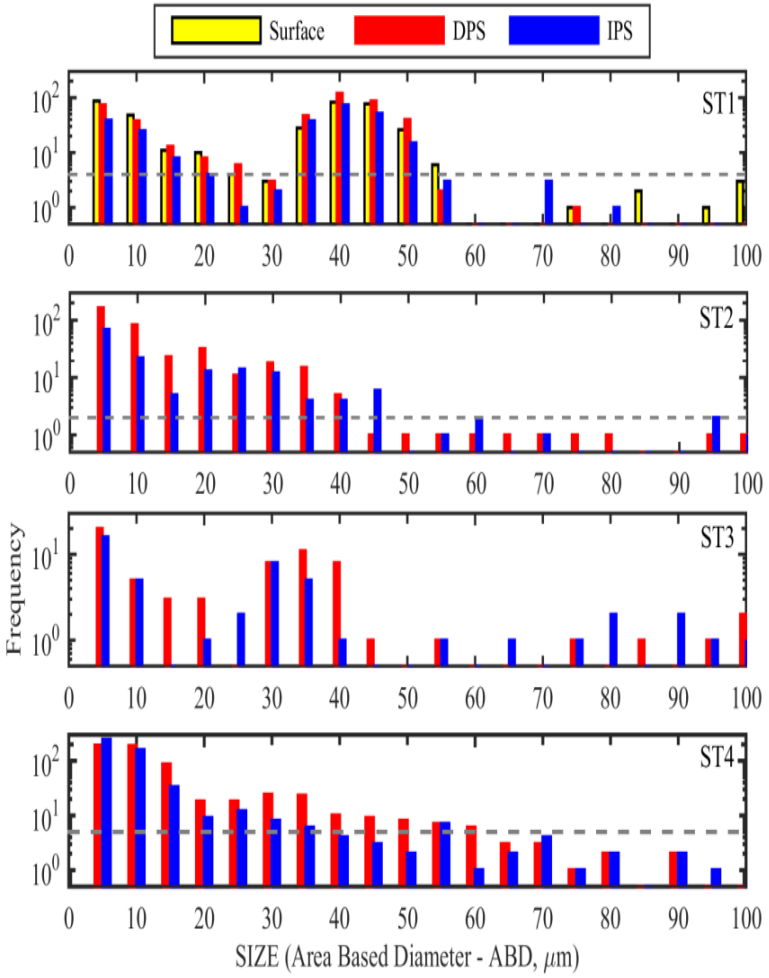





- FlowCAM chlorophyll trigger and sorted into major functional groups
- Comparison of two flowthrough systems
  - Avg. 37% decrease in phytoplankton abundance with IPS compared to DPS
  - Avg. decrease in ciliates (62%), diatoms (41%), and other small cells (38%)
- DPS and IPS compared withSurface bottle?

- FlowCAM chlorophyll trigger and sorted into size bins by area-based diameter
- Grey line is 1% significance level (note low counts at Station 3)
- Comparison of two flowthrough systems with surface bottle
  - Trends in size spectra compare relatively well
  - Avg. 50% decrease in abundance for significant size bins
- Results support particle removal by fouling and/or breakage for IPS
- Recommend further work and thinking about installation of custom UCSW (or validate R/V UCSW for bias)



# Year 2 Objects

Analysis of aggregated data:

- PSD effects
- Vertical inhomogeneity
- Closure within Case II water

Continue investigating scales of intra- and inter-pixel variability and measurement uncertainty:

- Algorithm/product validation
- PSD under-sampling