**Sign of the times: the lipid signature of a collapsing phytoplankton bloom**

**William Kumler, Helen F. Fredricks, Justin Ossolinski, Kimberlee Thamatrakoln, Kay D. Bidle, Benjamin A.S. Van Mooy, and Bethanie R. Edwards**

Phytoplankton play vital roles in carbon capture and sequestration, much of which occurs during large bloom events. These blooms collapse when population controls such as grazing pressure, viral infection and lysis, and nutrient stress are re-established. We used UPLC-HRAM mass-spectrometry methods to analyze total lipid extracts from cells collected during a summer 2013 cruise transect off the coast of California. Proxies for bloom health such as pheophytin:chlorophyll ratios were used to distinguish between a healthy, active bloom near Monterey and a decaying bloom in the Point Reyes region and allowed us to compare lipids between areas of different bloom health via lipidomics. We measured intact polar membrane lipid ratios and found that in eutrophic environments, classic oligotrophic biomarkers for nutrient stress such as SQDG:PG serve as biomarkers for phytoplankton biomass instead of measuring phosphorus or nitrogen stress. Parallel metatranscriptomic data suggests that the bloom decline mechanism responsible was viral infection, as viral reads near Point Reyes were much higher than those near Monterey. This environmental lipidomic method shows promise for future analysis of bloom heterogeneity and the elucidation of bloom decline mechanisms at the sub-mesoscale level.

~1340 characters

**SS027 SMALL SCALE SPATIAL AND TEMPORAL PATTERNS IN PARTICLES, PLANKTON, AND OTHER ORGANISMS**

It has long been known that the myriad of particles/organisms in the aquatic environment are not homogeneously distributed; in fact, strongly localized patches are more often the norm. This ‘patchiness’ in distribution can manifest itself in either horizontal or vertical directions and occur over a wide range of spatial and temporal scales. Examples include harmful algal blooms, ‘thin layers’ of phytoplankton and zooplankton, and schools of krill and fish. This patchiness is driven by a complex set of factors including, but not limited to, ocean mixing/advection at various scales, stratification, nutrients, and light. Patchiness can have significant consequences to aquatic ecology studies, including biological productivity, predator-prey interactions and ecosystem dynamics. Technological advances over the past decade, including reduced computational costs and novel instrumentation, have led to increased research efforts in this area. This session aims to draw researchers working to better understand small scale ‘patchiness’ in particles and/or organisms across spatial scales ranging from a few mm to several km, and over temporal scales ranging from a few seconds to several days, using theoretical, numerical, and/or laboratory/field-based efforts.