Thursday, October 11
Poster Session 4
10:30–12:00

Poster 211

LESSONS LEARNED FROM THE APPLICATION OF FRRF AS A TOOL TO ESTIMATE CARBON–BASED PHYTOPLANKTON PRIMARY PRODUCTIVITY

Fast repetition rate fluorometry (FRRF) provides a non-intrusive, instantaneous and potentially autonomous technique to monitor phytoplankton photo-physiology with unmatched spatial and temporal resolution. Numerous studies have examined the feasibility of quantifying carbon-based primary productivity from high-resolution FRRF measurements, utilizing simultaneous estimates of FRRF-derived of electron transport rates and incubation-based 14C-uptake rates. These studies have shown that the electron requirement for carbon fixation (phi_e,C, mol e- mol C) can vary significantly as a function of environmental conditions and phytoplankton community composition. More recent studies have also demonstrated that the magnitude of the conversion factor correlates with the expression of non-photochemical quenching (NPQ) in the pigment antenna, which can also be estimated from FRRF measurements. This correlation improves our ability to constrain variability in phi_e,C, enabling more robust estimates of phytoplankton primary productivity from FRRF measurements. In this presentation, instead of aiming to constrain values of phi_e,C, we focus on the insights which can be gained by observing its variability. We will show results derived from a synthesis of published and unpublished datasets, demonstrating that the slope of the phi_e,C : NPQ correlation changes depending on growth environment, and that understanding this variability provides insight into the bottom-up control of photosynthetic carbon fixation in the oceans. Specifically, we will present field data of region-specific diurnal variability in phi_e,C, reflecting the degree of phytoplankton nutrient limitation. We will also discuss the opportunity to extend the NPQ : phi_e,C correlation to remote sensing approaches.

Nina Schuback, Swiss Polar Institute, École polytechnique fédérale de Lausanne, schuback.nina@gmail.com, https://orcid.org/0000-0001-9535-0086
Phillipe D. Tortell, University of British Columbia, ptortell@eoas.ubc.ca