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

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MULTI-PARAMETER ASSESSMENT OF PHYTOPLANKTON COMMUNITY COMPOSITION FROM ABSORPTION, REFLECTANCE, AND QUANTITATIVE IMAGING

The composition of phytoplankton pigments differs between phytoplankton groups, making pigments useful chemotaxonomic markers for determining phytoplankton community structure. The composition and concentration of pigments directly affect the shape and magnitude of spectral phytoplankton absorption (aph), an Inherent Optical Property (IOP), making absorption a proxy for taxonomy. aph in turn affects the shape and magnitude of spectral remote-sensing reflectance (Rrs), an Apparent Optical Property (AOP). While these optical properties can be used to determine phytoplankton taxonomy, the gold standard for assessing phytoplankton community composition is through cell quantification with microscopy and imaging. Thus, phytoplankton pigments provide the logical link between optical properties (absorption and reflectance) and measured phytoplankton taxonomy (imaging). Here, we perform a multi-parameter assessment of phytoplankton taxonomy in a tidally variable coastal Maine estuary using IOPs, AOPs, and cell imaging. Our IOP data include aph measured with the Quantitative Filter Technique and extracted pigment absorption spectra, which is then decomposed into phytoplankton pigment composition and concentration. Our AOP data include in- and above-water Rrs. We use a reflectance inversion algorithm to derive aph from Rrs and compared the measured and inverse-modeled aph, as well as the measured and forward-modeled Rrs. We confirm these results with direct assessment of phytoplankton community composition from quantitative imaging of fluorescing cells via the Imaging FlowCytobot. Our results show coherence between the optical proxies and the quantitative imaging data, and suggest a dominance of dinoflagellates at the time of sampling, indicated both by cell counts and spectral features in the optical data.

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