Monday, October 8
Oral Session 2
14:00–16:00

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SPECTRAL ABSORPTION-BASED ESTIMATES OF PHYTOPLANKTON COMMUNITY COMPOSITION IN THE NORTH ATLANTIC OCEAN

The composition of the phytoplankton community during its annual cycle of growth and accumulation in the North Atlantic Ocean is of great interest due to the disproportionately large role the North Atlantic plays as a sink of atmospheric CO_2 and hence on climate. The North Atlantic Aerosol and Marine Ecosystem Study (NAAMES) is a multi-year campaign spanning several seasons to study the environmental conditions and phytoplankton ecology of the bloom. NAAMES data include in situ hyperspectral absorption measurements, which can be used to estimate several phytoplankton accessory pigments via spectral decomposition. We show these optical-based pigment estimates can explain the major phytoplankton groups comprising communities in a wide variety of environmental regimes in the North Atlantic, as determined by both imaging and traditional flow cytometry. We also find that spectral decomposition provides improved accuracy in accessory pigment concentration retrievals compared to traditional relationships based on pigment co-variations with chlorophyll. This work provides both a methodology and its application for understanding phytoplankton community composition via an analytical use of in situ hyperspectral absorption measurements. Importantly, we observe regions where phytoplankton community composition deviates significantly from traditional correlations with chlorophyll concentration (e.g. that diatoms are often the dominant group present during times of increased chlorophyll concentration). The extensive spatial and temporal coverage of our data and the quantitative imagery and cytometry data used for validations highlight the capability of estimating different phytoplankton groups from in situ hyperspectral absorption measurements.

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