Wednesday, October 10
Poster Session 3
16:00–18:00

Poster 198

OPTICAL CHARACTERIZATION OF MARINE PHYTOPLANKTON ASSEMBLAGES WITHIN THE WESTERN ARCTIC OCEAN

We utilize an extensive dataset of measurements within the Chukchi and Beaufort Seas to characterize the inherent and apparent optical properties of seawater associated with different phytoplankton assemblages. Hierarchical cluster analysis of pigment concentrations were used to partition surface phytoplankton assemblages into distinct communities of varying taxonomic composition and average cell size. Concurrent optical measurements of hyperspectral constituent absorption coefficients (phytoplankton, non-algal particles NAP, and colored dissolved organic materials CDOM), multispectral backscattering coefficients, and remote-sensing reflectance were then used to characterize the optical properties associated with each pigment-based phytoplankton assemblage. The results indicate measurable differences among classes in the average spectral shapes of phytoplankton absorption. However, similar or sometimes greater differences are also observed in the spectral shapes of non-phytoplankton absorption (NAP and CDOM) and the backscattering coefficient. Our analysis demonstrates that the interplay between the relative magnitudes and proportions of all optically significant constituents (including water) generally dampen the influence of varying phytoplankton absorption spectral shapes on remote-sensing reflectance, yet surprisingly there is still a marked discrimination of the spectral shapes of reflectance among the phytoplankton assemblages. This result supports a potential for the development of relatively simple ways to discriminate phytoplankton communities directly from ocean reflectance in western Arctic waters, but the approach is dependent on environmental covariations of optical effects associated with both phytoplankton and non-phytoplankton constituents. We discuss the accuracy and robustness of this method in comparison with more mechanistic approaches based on constituent IOPs for assessing phytoplankton community composition.

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