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

14:40–15:00

DEVELOPMENT OF OPTICAL FINGERPRINT LIBRARIES TO EVALUATE PHYTOPLANKTON COMMUNITY COMPOSITION FROM OCEAN COLOR SATELLITE PRODUCTS

Ocean biota are responding to recent climate change. Quantifying the response of phytoplankton communities is essential for predicting future ocean food resources, occurrences of harmful algal blooms, ocean food web dynamics, carbon and other elemental cycles, etc. However, one of the best tools for quantifying the response of phytoplankton communities across relevant time scales (multi-decadal) is constrained by several factors such as adequate spectral capabilities of ocean color satellite sensors. Another limitation of remote sensing estimates of phytoplankton community composition and carbon-based biomass is adequate optical models linked to comprehensive spectral libraries of significant phytoplankton species and functional types. To address this deficiency, our project combines the expertise at the National Center for Marine Algae and Microbiota (NCMA) in culturing, physiology and biogeochemistry of phytoplankton with expertise in ocean optics and biogeochemistry at NASA Goddard Space Flight Center. Over forty strains of phytoplankton were grown to exponential and/or stationary phase for optical, physiological and biogeochemical characterization. We selected strains based on the following criteria: globally or regionally significant distributions, fulfill key ecosystem function, represent either unique or typical morphological traits, and pigment profile similarity. The optical measurements accomplished include: hyperspectral UV-Vis absorption coefficients, multi-angular and multi-spectral backscatter coefficients, volume scattering function, particle size distribution, fluorescence, and hyperspectral remote sensing reflectance. The suite of biogeochemical measurements included phytoplankton organic carbon and nitrogen, HPLC pigments, phycobilin pigments, and nutrients. Phytoplankton cell counts and biovolumes were also quantified. Preliminary results relating carbon-based phytoplankton biomass and chlorophyll-a to measured optical properties will be presented.

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