**Algorithm Development for Predicting Biodiversity Based on Phytoplankton Hyperspectral Absorption.** Tiffany A.H. Moisan, John R. Moisan, Wallops Flight Facility**,** NASA Goddard Space Flight Center, Wallops Island, VA 23337, Kay Rufty, Global Science and Technology Inc., Wallops Flight Facility**,** NASA Goddard Space Flight Center**,** Wallops Island, VA 23337

**Abstract**

Ocean color remote sensing has provided the scientific community with unprecedented global coverage of chlorophyll a, an indicator of phytoplankton biomass. Together, satellite-derived chlorophyll a and knowledge of Phytoplankton Functional Types (PFTs) improve our understanding of marine ecosystem response to climate change and the resulting alterations to marine biogeochemical cycles. Concentrations of pigments associated with several PFTs were estimated using singular value decomposition and NNLS techniques on phytoplankton absorption spectra images created using empirical relationships and satellite observations. Comparison of the modeled versus in situ measured absorption spectra (400-700 nm) showed linear correlations values (r2) ranged from 0.79 – 0.99, with **~** 25%lower r2 values in the UV region. The prediction of phytoplankton produced r**2** values that ranged from 0.40 to 0.93. Results showed that individual PFTs had unique distributions related to both sea surface temperature (SST), nutrient concentration and to a lesser degree photosynthetically available radiation (PAR). Overall, species shifts were observed in coastal, mid-ocean, and open ocean. Broad shifts of diatoms were observed as their relative abundance decreased in summer with dinoflagellates. In contrast, concentrations of prymnesiophytes became more abundant in summer. Those phytoplankton in lesser abundance overall increased in abundance during. Complex patterns of phytoplankton functional type distribution underly the important between adaptation to light, temperature, and nutrients in the Atlantic Bight. Shifts in phytoplankton functional groups show flexibility in carbon biomass within the Carbon Cycle.

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