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

Poster 207

CHARACTERIZATION OF NON-PHOTOCHEMICAL FLUORESCENCE QUENCHING BY PHYTOPLANKTON TYPE USING MULTISPECTRAL FLUOROMETRY AND THE PARTICULATE ABSORPTION COEFFICIENT: A LAKE ERIE CASE STUDY

Chlorophyll-a fluorescence is widely used as an in-situ estimate of phytoplankton abundance as the measurement is easy to make and many instruments exist for a variety of applications. Profiles of chlorophyll-a fluorescence can provide detailed information on the vertical structure of phytoplankton biomass in environments ranging from the deep ocean to shallow lakes. The presence of non-photochemical quenching (NPQ) can lead to anomalous vertical biomass structures as near surface fluorescent yields can be artificially low relative to deeper assemblages experiencing lower levels of incident irradiance. Methods have been developed to correct for the effect of NPQ on vertical structure which either use night-time measurements or coincident backscattering observations. Both of these methods have limitations for their application in highly dynamic case II waters where significant horizontal and vertical changes in phytoplankton biomass occur between day and night as well as the substantial contribution of non-algal particles to measured backscatter. This study examines a method using the particulate absorption chlorophyll line height profiles measured with a WETLabs AC-S in conjunction with a profiling radiometer to quantify and potentially mitigate NPQ effects on vertical structures measured with a multi-spectral fluorometer that is capable of determining phytoplankton type. Vertical profiles were measured weekly from May-October at 8 sites in Lake Erie in 2016, 2017, and 2018. Weekly observations throughout the Spring-Fall period captured the progression of the phytoplankton community dominance from diatoms to cyanobacteria. The effect of NPQ is shown to be variable depending on chlorophyll concentration and phytoplankton group composition.

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