GSO Dock Phytoplankton and Optics Observatory

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Continuous flow-through observations began at the University of Rhode Island, Graduate School of Oceanography's (GSO) dock in November 2017 and continue through today. Data include temperature, salinity, absorption, scattering and fluorescence, along with phytoplankton identification and enumeration for cells within 10-150 μm via an Imaging Flow CytoBot (IFCB). Real-time IFCB imagery is available at http://phyto-optics.gso.uri.edu:8888.

Flow-through observations are supported by weekly laboratory measurements of chlorophyll-a concentration as well as particulate, phytoplankton, and CDOM absorption at 550 wavelengths. A sample valve has been installed to easily obtain the same water passing through the system for collaborative work. Our efforts have focused on developing a robust classifier of phytoplankton species observed by the IFCB by manually classifying over 13,000 individual phytoplankton images into 60 classes.

These data are used as a training set for a Random Forest classification algorithm that shows >90 percent accuracy for most classes. We present a discussion of classifier strengths and limitations along with strategies for improvement. We will also show results from the classified dataset illuminating species succession and changes in phytoplankton size distribution in Narragansett Bay over the time series. Combined with the optical measurements, these observations will be used for the development of satellite remote sensing algorithms for detecting phytoplankton composition. They are also helpful for harmful algal bloom monitoring, light availability, turbidity, CDOM variability, and real-time "view" of water column conditions.