

Dr. Justin Chaffin, Research Scientist at the Ohio State University and Ohio Sea Grant completed an Ohio Water Resources Center funded project via USGS 104(b) subaward. This project titled “**Effectiveness of Data Buoys as Early Warning Systems for cHABs (cyanobacterial Harmful Algal Blooms) in Lake Erie**” aimed to determine how accurate data buoys are at monitoring for cHABs.



Figure 1 Dr. Chaffin with colleagues during deployment of data buoy

Real-time data buoys have become a valuable tool for lake managers, water treatment plant operators, and the public to monitor cyanobacterial (cHAB) abundance in Lake Erie. However, the sensors on the buoys are located about 1.0 m from the surface, whereas cHABs can regulate buoyancy and may be over or underestimated by the buoy sensors. Furthermore, the data buoys that are deployed in Lake Erie are able to measure only surrogates of these important parameters, such as chlorophyll a, phycocyanin and turbidity. Surface water samples were collected next to a data buoy located near Gibraltar Island throughout summers 2015, 2016 and 2017 (Figure 1) and analyzed for the cyanobacterial toxin microcystin and algal and chlorophyll concentrations. Additionally, on a subset of dates water was collected at every meter throughout the water column and analyzed with a FluoroProbe to determine cHAB-specific chlorophyll.

Overall, cyanobacterial biomass and microcystin concentration followed a very similar temporal pattern as buoy cyanobacteria phycocyanin concentrations (RFUs), suggesting the buoys can serve as an early warning system for cHABs. Buoy data averaged over a one hour before water sample collection had a better correlation with water sample data than the buoy data at the time of sample collection. A comparison of buoy RFU converted-cyanobacteria chlorophyll a (chla) to cyanobacteria chla measured throughout the water column showed that there were occurrences when the buoy both under and overestimated the cyanobacteria chla at specific depths (Figure 2). Overall, the buoy tended to underestimate cyanobacteria chla concentrations at 0 m while overestimating the deeper cyanobacteria chla concentrations. These inconsistencies between the buoy data and every-meter data that could potentially lead to inaccurate warnings and water treatment procedures.

Researcher Profile: Dr. Justin Chaffin is the research coordinator for Stone Laboratory and conducts his own research on cyanobacterial blooms in Lake Erie. His research interest is Lake Erie phytoplankton ecology with particular interest in cyanobacterial blooms (cHABs).

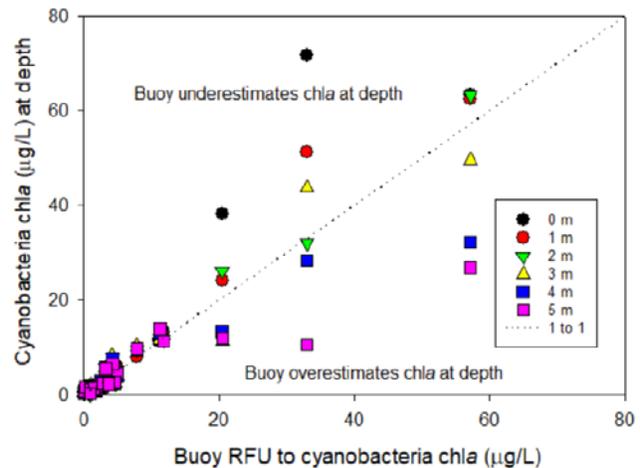


Figure 2 Comparison of measured chlorophyll a at various depths and buoys monitored chlorophyll a at 1 meter