

Harmful algal blooms (HABs) are occurring with increasing frequency and severity in Lake Erie. HABs disrupt local economies as well as the livelihoods of humans and animals that reside in or near these areas. Anthropogenic inputs of phosphorus into Lake Erie drive the growth of HABs, and while local sources such as agricultural runoff dominate inputs, estimates of atmospheric deposition are uncertain. Phosphorus can enter the atmosphere from natural sources like dust emissions or biomass burning, as well as anthropogenic sources like fertilizer and ball clay production. This research aims to expand our understanding of the atmospheric deposition of phosphorus and its potential role in the formation of HABs. Ground-based aerosol measurements from the IMPROVE observational network allow us to assess the role of phosphorus deposition from the atmosphere. IMPROVE quantifies chemical compositions of aerosols, including phosphorus and other elemental components, across the United States. We evaluated the seasonal cycle of the phosphorus component of aerosol at 26 sampling sites in the Great Lakes region, and correlate with other elemental species representing dust, and black carbon, indicative of biomass burning. The regions that showed positive correlations between phosphorus and dust components were evaluated against wind speed data by site within each region. The wind analysis did not show conclusive results that higher values of phosphorus were due to high wind events. Overall, the results show that phosphorus deposited into the lake is episodic, and further analysis is required to quantify the contribution of atmospheric deposition to the total phosphorus load.