

Endogenous loading of phosphorus (P) from lake bottom sediments into Missisquoi Bay, Lake Champlain perpetuates the occurrence of harmful algal blooms (HABs) in the summer months. Seasonal patterns of P loading may change from summer to winter due to ice cover, temperature, and organic activity. A seasonal analysis of organic phosphorus (P_O), total reactive phosphorus (TRP), and the reactive metals iron and manganese (Fe and Mn) will provide insight to the P cycle within Missisquoi Bay sediments. Two ten-centimeter diameter gravity cores were extruded (August 14, 2012 and January 29, 2013) and cut into centimeter sections. P_O was determined by ignition and malachite green colorimetry, while an ascorbic acid extraction and ICP-OES was used to determine TRP, Mn, and Fe concentrations. The water column chemistry of both sampling days was measured using a YSI Sonde with a 650 data-logger. The sediment profiles indicate that TRP, Fe, and Mn accumulate in the top 2cm in the winter, but are depleted in the summer. TRP is strongly associated with Fe ($R^2=0.973$) and Mn ($R^2=0.889$) in sediments. P_O levels may reflect the seasonal variation in biological activity. Changes in climate that result in warmer surface water temperatures and diminished ice-cover in the winter could lead to (1) more rapid and prolonged turnover of P due to biological activity and (2) earlier depletion of reactive P from sediments.