Title: Microbial community dynamics in the Great Lakes shift with changes in season and Ice cover

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Abstract (250 words)

The Great Lakes Region features the largest source of available surface freshwater on the planet, and due to its continental mid-latitude climate, will periodically freeze during the winter season. Winter has been regarded as a period of dormancy for limnetic systems, especially regarding their microbial communities. As a result, we know very little about the microbial ecology of the Great Lakes during winter and how the winter assemblages impact the following seasons’ community dynamics. We hypothesized that, rather than being dormant, microbial communities are active to some capacity during the winter season, and that different lakes will have measurable differences in activity. We also hypothesized that different lakes will be more heavily impacted by ice over events marked by shifts in community composition and changes in activity, with more eutrophic lakes seeing reduced activity relative to oligotrophic lakes. To further investigate, we took water samples from several sites from each of the 5 Great Lakes and used them to measure multiple chemical and biological processes. Bacterial communities and activity were measured via cell counting, 16s rRNA genomics, and incubation with tritiated Leucine and Thymidine. Chemical analyses included CDOM (Horiba Aqualog), DOC and TDN (Shimadzu TOC-L), as well as particulate C, N, and P. Physical conditions such as temperature, ice and snow cover, and light penetration were also recorded. We found that the activity of microbial communities shifted to focus on respiration and metabolic processes during the winter and that each lake had varied shifts in microbial communities throughout the seasons.