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

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Abstract (250 words)

Winter has been regarded as a period of relative dormancy in limnetic systems, characterized by diminished biological activity. However, recent studies such as the Great Lakes Winter Grab, have shown that microbial communities remain active and that important biogeochemical processes continue. Here, we present work from the Winter Grab network aimed at understanding the microbial ecology of the Great Lakes during winter and how the winter assemblages impact the following seasons’ community dynamics. We hypothesized that different lakes will have measurable differences in activity. We also hypothesized that bacterial production and biomass will covary with primary production, with light availability being the driving factor and the relationship being the strongest at low nutrient concentrations. We took water samples from each of the Great Lakes, as well as, Lake St. Clair . The samples were used to measure bacterial communities and activity via cell counting, 16s rRNA genomics, and incubation with tritiated Leucine and Thymidine. Chemical analyses included fluorescent dissolved organic matter (FDOM) (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 during the winter and that each lake had varied shifts in microbial communities throughout the seasons.