ORAL PRESENTATION

HISTORICAL DIATOM COMMUNITY AND PRODUCTIVITY SHIFTS HELP PREDICT THE SENSITIVITY OF BOREAL LAKES TO CLIMATE CHANGE

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The northern boreal lakes region covers 15% of the earth's land surface, contains >60% of the world's fresh surface waters, and holds over 3 million lakes. Multiple lines of evidence suggest that boreal-lake ecosystems are changing rapidly due to human-induced climate warming. Current research, however, has demonstrated variable ecological responses to climate change among lakes. We predict that the sensitivity of boreal lakes to climate change will vary primarily along two physical gradients with one reflecting direct, in-lake climate effects and the other reflecting indirect, watershed effects. To test this framework, we investigated 25 undeveloped boreal lakes using paleolimnological analysis and showed the lakes are changing rapidly, with significant shifts in diatom and other algal communities, unprecedented appearances of noxious cyanobacterial blooms, and increased carbon burial in lake sediments. Here we focus on the historical response of diatom communities to direct and indirect climate drivers to test our two-dimensional sensitivity framework. Historical diatom response in each lake was summarized by measures of community turnover, changes in diagnostic functional and taxonomic groups (e.g., tychoplankton, small *"Cyclotella"* species), and measures of algal production (biogenic silica). Each diatom response metric was estimated across time periods from the mid-1800s to present and projected on the sensitivity framework to determine whether physical characteristics of lakes and watersheds could serve as predictors of lake sensitivity to climate change.