

POSTER PRESENTATION

LINKAGES AMONG LANDSCAPE, WATER QUALITY, AND PLANKTONIC DIATOM COMMUNITIES IN THE CANADIAN LOWER ARCTIC

Mark B. Edlund², Charles E. Umbanhowar² and Chiji Ochiagha³,

¹St. Croix Watershed Research Station, Science Museum of Minnesota, 16910 152nd St. N, Marine on St. Croix, Minnesota 55047 USA

²Department of Biology and Environmental Studies, St. Olaf College, Northfield, Minnesota 55057

³Department of Geology and Geophysics, University of Minnesota, Minneapolis, Minnesota 55455 USA

Arctic regions of North America are undergoing a rapid response to climate change. Temperatures in the arctic have risen 0.4° C per decade over the past 40 years. Responses to this warming include increased lake productivity, permafrost thaw, shrub expansion, and northward shifts in the subarctic tree line. As part of a three-year project to study the Holocene history of lakes and landscapes and their response to climate, we undertook the first hydrobiological survey along the northern Manitoba boreal forest-tundra ecotone. A set of 37 lakes that spanned the boreal-tundra tension zone were sampled for plankton diatom communities and physico-chemistry in July 2008. Diatoms were collected with composited 10 µm-mesh plankton hauls from 5 m to surface. Water quality measures included dissolved and total nutrients, anions and cations, pH, conductivity, Secchi, and water column profiles were taken and analyzed with standard methods. Coupled with lake sampling, landscape variables including watershed area, watershed to lake area ratios, wetland area within 100 m of lake shore and wetland percent within 100 m of lake shore were calculated using GIS and groundtruthing. To investigate the linkages among landscape, lakes, and the siliceous plankton, water quality variables were first ordinated using PCA and RDA against landscape variables. Two primary gradients were identified: a pH-conductivity-Ca gradient and a phosphorus-dissolved organic carbon-Fe gradient. Among the landscape variables, percent wetland within 100 m of lake and latitude were strongly correlated to water quality variables, suggesting that landscape position and development across the tundra-boreal ecotone exert strong influence on water quality. Planktonic diatom communities were prepared using standard oxidative and mounting techniques. Diatoms and cyst morphotypes were analyzed under oil immersion-DIC optics. Species counts were converted to relative abundance against total diatom and cyst counts and ordinated using nMDS. Summer plankton communities in northern Manitoba were characterized by rich *Tabellaria*, *Aulacoseira*, cyclotelloid, chrysophyte, and tychoplanktonic araphid floras. Ordinations of plankton communities were strongly correlated with the pH-conductivity-Ca and SiO₂ gradients and secondarily along the phosphorus gradient. These results suggest that the landscape-water quality-diatom relationships will prove useful for interpreting historical patterns in sediment cores.