

Climate Change and Lake Sediments: An Arctic Perspective

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Abstract

The Arctic is expected to undergo dramatic changes in response to climate warming and large scale modifications in the composition and productivity of terrestrial plant communities are already being observed. These alterations to terrestrial vegetation patterns are likely to change the inputs of organic carbon into arctic lakes.

Lake sediments are dynamic venues for carbon processing. Metabolic processes breakdown organic carbon and release CO₂ into the atmosphere. Simultaneously, sedimentation can bury large amounts of organic carbon and isolate it from contemporary biogeochemical processes. The balance between the breakdown and burial of organic carbon determines a lake's net effect on landscape carbon cycling.

This seminar will report on investigations of sediment organic carbon processing in arctic lakes

on the Alaskan North Slope. A survey of lakes in the region reveals that the sediments are rich in organic carbon and capable of sequestering carbon for relatively long time periods. Using incubations of intact sediment cores the principal factors that appear to affect the breakdown of organic carbon in the sediments are temperature, oxygen concentration, and the proportion of labile organic matter.

Organic carbon can have impacts outside of sediment microbial processes as well. Inputs of organic carbon can affect the physical environment of the lake through the attenuation of light and heat energy. Using a survey of 30 arctic lakes you will see that increased organic carbon loading from the watershed can alter lake thermal and light environments. These changes can indirectly reduce lake temperature, oxygen concentration, and sediment algal production which will reduce the amount of organic carbon breakdown. Taken together the results presented will show that arctic lakes are important locations for the storage and processing of terrestrial organic matter and may be sensitive to a changing climate.