Projection of Lake Ice Thickness and Phenology under Representative Concentration Pathways (RCP) Scenarios: Great Slave and Great Bear Lakes, Northwest Territories

ARIANA MANSINGH[1], HOMA KHEYROLLAH POUR[1], AND GIFTY ATTIAH[1]

ABSTRACT

Cold region lakes are key ecosystems acting as sentinels of climate change. The increased severity of climate change is causing a demand for enhanced environmental understanding. Thus, knowledge gaps within the field must be addressed. Currently, the understanding of far future implications of climate change on lake ice thickness and phenology is limited and is challenging in projecting a spatially and temporally extensive lake ice thickness and phenology. This project is taking place on Great Bear Lake and Great Slave Lake, Northwest Territories, to better understand the long-term implications of greenhouse gas emissions and their influence on the future lake ice formation and duration, using a spatially distributed lake ice model, CLIMoGrid. To do so, Representative Concentration Pathways (RCPs) are used; these portray different scenarios of greenhouse gas concentrations and emissions. Data from a pre-existing model called MRI-CCGM is used based on the different RCPs to force CLIMoGrid, such as cloud cover, air temperature, humidity, snowfall, and wind speed. The model was able to project future ice thickness and phenology based on the future RCPs scenarios with more rapid changes under the RCP8.5 scenario by 2085. The overall outcome of this research was to produce a trend analysis of ice thickness and phenology and project future changes that consider different RCPs and climate change's long-term implications. This research provides support to the emerging spectrum of climate change issues throughout cold regions.

[1] Department of Geography and Environmental Studies, Wilfred Laurier University, Waterloo, ON, Canada