

EGU2020-5410

<https://doi.org/10.5194/egusphere-egu2020-5410>

EGU General Assembly 2020

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



The recession of the Laurentide Ice Sheet in southeast Northwest Territories during the Pleistocene-Holocene transition

Samuel E. Kelley^{1,3,4}, Brent Ward², Jason Briner³, Martin Ross⁴, Philippe Normandeau⁵, and Barrett Elliott⁵

¹School of Earth Sciences, University College Dublin, Dublin, Ireland (sam.kelley@ucd.ie)

²Department of Earth Sciences, Simon Fraser University, Vancouver, Canada

³Department of Geology, SUNY at Buffalo, Buffalo, USA

⁴Department of Earth and Environmental Sciences, University of Waterloo, Waterloo, Canada

⁵Northwest Territories Geological Survey, Yellowknife, Canada

The Laurentide Ice Sheet (LIS) during the Pleistocene-Holocene transition provides a useful natural laboratory for examining the behavior of a mid- to high-latitude ice sheet during a period of climatically driven ice sheet thinning and retreat. While the timing and pattern of Pleistocene recession of the LIS are well-constrained along the southern and eastern margins, there is limited chronology constraining the ice margin retreat along the northwestern margin. Here we present new cosmogenic ¹⁰Be exposure ages retreat of the western margin of the LIS during the Pleistocene-Holocene transition. Sampling was performed along three transects located between the northern shore of Great Slave Lake and Lac de Gras. Each of the transects is oriented parallel to the inferred ice retreat direction in an attempt to capture a regional rate of retreat. Our new ¹⁰Be cosmogenic exposure ages from the southeastern Northwest Territories demonstrate that regional deglaciation occurred around 11,000 years ago. The population of ages broadly overlaps, indicating that either the retreat occurred within the resolution of our chronology or that the ice sheet experienced widespread stagnation and rapid down-wasting. These ages, not corrected for changes in atmospheric depth due to isostatic rebound, are older than minimum limiting radiocarbon constraints by ~1000 years, indicating that existing LIS reconstructions may underestimate the timing and pace of ice margin recession for this sector. Constraining the timing of the recession of the northwest sector of the LIS has the potential to inform our understanding about the damming of large proglacial lakes, such as Glacial Lake McConnell. The ages from our southern transect, collected from elevated bedrock hills, indicate LIS retreat from through the McConnell basin occurred after 12,000 years ago, and thus constitute maximum limiting constraints on the expansion of Glacial Lake McConnell southeastward into the present-day Great Slave Lake basin. Our chronology, combined with other emerging cosmogenic exposure ages constraining LIS deglaciation indicates retreat of the ice margin over 100s of kilometres during the Pleistocene-Holocene transition, exhibiting no evidence of a significant readvance during the Younger Dryas stadial.