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

Samuel Kelley1, Brent Ward2, Jason Briner3, Martin Ross4, Philippe Normandeau5, Barrett Elliott1


Rationale:
• The timing and pace of climatically-driven Laurentide Ice Sheet retreat along the northwestern margin during the Pleistocene-Holocene transition remains poorly constrained by spatially sparse minimum-limiting radiocarbon ages.
• Constraining the spatial and temporal pattern of retreat of the NW sector of the Laurentide Ice Sheet during the Pleistocene-Holocene transition will provide constraints on meltwater production, the evolution of Glacial Lake McConnell, as well as the potential to inform models of current high-latitude ice sheets in a warming climate.

Objectives:
• Determine the timing and pattern of regional Laurentide Ice Sheet deglaciation using newly obtained cosmogenic exposure ages.
• Compare the evolution of Glacial Lake McConnell using cosmogenic exposure ages from topographic highs within the Great Slave Basin.
• Investigate the pace of ice margin recession using new and existing chronology.

Introduction:
Minimum-limiting radiocarbon ages indicate that the Laurentide Ice Sheet received from west to east across the present-day Great Slave Lake basin from ~12,000 to 10,000 years ago. However, chronological control is sparsely limited (Dolan et al., 2020). A glacially impacted proglacial lake, Glacial Lake McConnell, followed the retreating ice margin with the Great Slave Basin filling up to a maximum elevation of ~120 m above Great Slave Lake (recently 85–156 m), though little chronology exists to constrain when various lake levels were achieved (Smith, 1984). Northwest of the Great Slave Basin, retreat of a roughly north-south-covered ice margin through the region occurred by 11,000-8,000 year ago, with no evidence of standstills or re-advances.

Notes on calculations:
No corrections were made to either age set for the correction of 3° for a 3° latitude difference in the age calculation. The uncertainty on a radiocarbon age is converted to a calendar age using CALIB 6.0.1 (Reimer et al., 2013). Ages were calculated using the Arctic production rate (Young et al., 2013 in JQS) and LSDn scaling (Borchers et al., 2015 in JQS). Ages calculated for the first production rate are 11.2 ± 0.2 ka. Ages calculated for the second production rate are 11.3 ± 0.3 ka.

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Preliminary Interpretations:
• The weighted mean and standard deviation of our new chronology places regional deglaciation at 11,100 ± 1,700 years ago, approximately 1,000 years sooner than indicated by minimum-limiting radiocarbon ages.
• This new chronology, placed in the context of other regional cosmogenic exposure ages from Keyes et al. (see display 2654), indicate that existing conceptual models for the timing and pattern of deglaciation of the northwestern sector of the Laurentide Ice Sheet need to be updated to reflect new dating techniques.
• Our ages, in addition to those from Keyes et al., suggest either rapid ice margin retreat of northwest sector of the Laurentide Ice Sheet over 100s of kilometers during the Pleistocene-Holocene transition or rapid downwasting following widespread stagnation of the southeast. Additional ages and regional field mapping may shed more light on the style of deglaciation.