EGU26-17949, updated on 05 May 2026
https://doi.org/10.5194/egusphere-egu26-17949
EGU General Assembly 2026

Declining lake ice thickness and its implications for community travel in northern regions: a modeling study (1981–2025)

Jipeng Shan[1], Yan Tong[1], R. Iestyn Woolway[1], Ishfaq Hussain Malik[2], and James D. Ford[2]
[1]School of Ocean Sciences, Bangor University, Menai Bridge, Anglesey, Wales (j.shan@bangor.ac.uk)
[2]School of Geography, University of Leeds, Leeds, United Kingdom

Northern regions are experiencing warming rates that significantly exceed the global average, triggering rapid and profound changes in freshwater ice dynamics. These changes manifest as delayed freeze-up, earlier break-up, and, critically, a reduction in ice thickness that threatens the safety of traditional travel routes. Addressing the scarcity of lake-specific ice thickness data in northern communities, this study employs the FLake numerical model to estimate ice thickness variations from 1981 to 2025 for 161 lakes identified along community winter travel routes. By integrating these simulations with safety thresholds derived from local community surveys, we quantify the reduction in days of safe access. Results indicate a significant thinning trend, with annual mean and maximum ice thickness decreasing at rates of 1.42 cm/decade and 1.43 cm/decade, respectively. Consequently, the duration of safe access has declined by a cumulative total of 11.8 days over the 45-year period (a rate of 2.67 days/decade). This study elucidates how accelerated regional warming is compromising essential winter mobility, providing a scientific basis for developing adaptation strategies to mitigate risks for ice-dependent communities across northern latitudes.