



Ground surface temperature histories in northern Ontario and Québec for the past 500 years

Carolyne Pickler (1), Hugo Beltrami (2,3), and Jean-Claude Mareschal (1)

(1) GEOTOP, Centre de Recherche en Géochimie et en Géodynamique, Université du Québec à Montréal, Montréal, Québec, Canada, (2) Climate & Atmospheric Science Institute and Department of Earth Sciences, St. Francis Xavier University, Antigonish, Nova Scotia, Canada, (3) Centre ESCER pour l'étude et la simulation du climat à l'échelle régionale, Université du Québec à Montréal, Montréal, Québec, Canada

We have used 19 temperature-depth profiles measured in boreholes from eastern Canada to reconstruct the ground surface temperature histories of the region. The boreholes are located north of 51°N, and west and east of James Bay in northern Ontario and Québec. The 8 boreholes in northern Ontario come from 3 sites in a region of extensive discontinuous permafrost, while the 11 holes from Québec come from 6 sites in a region of sporadic discontinuous permafrost. The depths of the holes range between 400 and 800 m, allowing a reconstruction of the ground surface temperature histories for the past 500 years. Present ground surface temperatures are higher in Québec, perhaps because the region receives more snowfall as shown by meteorological records and proxy data. The ground surface temperature histories indicate a present-day warming of $\sim 2\text{--}2.5^\circ\text{C}$ in Ontario and $\sim 1\text{--}1.5^\circ\text{C}$ in Québec relative to the reference surface temperature 500 years BP. These results are in agreement with available proxy data for the recent warming in eastern North America. Furthermore, they suggest that the higher snowfall and strong cooling during the Little Ice Age could have muted the borehole temperature record of climate change in Québec.