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The last interglacial in eastern Canada and the northwest North Atlantic : further evidence for warmer climate and ocean conditions than during the Holocene

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The climate conditions of the last interglacial (LI) in northeastern and southeastern Canada are documented from pollen data of Baffin Island and Cape Breton Island respectively. The LI pollen assemblages indicate very different vegetation than at present and a northern limit of the deciduous forest biome as far as 500 km north of its modern position. The application of the modern analogue technique also reveal warmer climate during the LI than at present, 4-5°C warmer on Baffin Island at ∼67-70°N in the Canadian Arctic, and up to 7°C warmer on Cape Breton Island at ∼45°N in the southeastern Canada. The contrast between LI and Holocene climates is also shown from marine data (dinocysts, foraminifers, oxygen and carbon isotopes) that document warmer than Holocene conditions in surface waters (up to 5.5°C in summer, notably off southwest Greenland) and very distinct distribution of intermediate to deep waters in northern and southern part of the Labrador Sea. An important zonal atmospheric circulation component at mid-latitudes of the North Atlantic is also evidenced from the pollen content of marine cores collected in central North Atlantic (IODP Site 1304), which strongly suggests an origin from southeastern Canada. Altogether the data demonstrate much warmer conditions along the eastern Canadian margins, from North to South. The mild conditions along the coastlines and the relatively warm waters off eastern Canada and southern Greenland suggest reduced Arctic outflow components through the East Greenland Current and Labrador Current. Comparisons with records from eastern North Atlantic lead us to conclude in a more zonal climate during the LI than the Holocene, especially the early Holocene that was marked by a particularly pronounced west to east gradient of temperatures. Hence, the thermal optimum of the LI and that of the Holocene provide two examples of very different climate and ocean circulation regimes in the circum-Atlantic region during the "warm" episodes of the recent geological past.