

# Linking subglacial meltwater through the eastern Great Lakes at the time of the Atlantic Heinrich 1 event with a meltwater flood in the Gulf of Mexico about 13.5 ka (16.2 cal ka)

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The Heinrich 1 event (H1) about 14–13 ka (~17–15.5 cal ka) which discharged icebergs throughout the North Atlantic Ocean led to instability in, and reorganization of, the Laurentide Ice Sheet (LIS). Sediments deposited subglacially between 14.4 and 13.6 ka in the Finger Lakes area of New York State (NYS) by southward flowing meltwater from a modelled subglacial reservoir in the Lake Ontario basin have been related to H1. NYS drumlins formed by southward ice flows are truncated along a WSW trend south of Lake Ontario, suggesting reorganization of the ice and meltwater flows to WSW along the deep lake axis, probably coupled with a similar abrupt switch after 14.4 ka through the upstream Montreal-Ottawa-Kingston area from N-S to SW movement of ice and meltwater. Lakebed relief in deep eastern Lake Ontario is dominated by WSW-trending ridges, interpreted as drumlins from multibeam sonar, seismic reflection, and core data. Erosion of drumlins possibly by horizontal vortices in turbulent meltwater flow is suggested by narrow furrows that wrap around their upstream (ENE) ends and sides. A land-based digital elevation model suggests the erosive ice and meltwater flows continued WSW into the eastern Lake Erie basin where seismic profiles and a borehole reveal an absence of till except for patchy remnants, with glaciolacustrine sediments resting directly on bedrock. The absence of till strata in this region of the southern LIS is unusual where sequences of till sheets are generally preserved. We suggest removal of the till attests to the erosive power of the WSW ice and meltwater flows. The absence of till extends to a cross-lake moraine at the LIS margin at 13.5 ka. The moraine has been breached by a channel that now connects central and eastern Lake Erie. Strong meltwater flows may have initiated erosion of this channel which is generally explained by subsequent eastward drainage of a low-level lake through the Erie basin. During the WSW flows excess meltwater would have continued westward from the ice margin into the Maumee- Arkona glacial lake sequence that existed about 13.8 to 13.4 ka in central and western Erie and southern Huron basins. These lakes would have discharged excess meltwater to the Mississippi drainage and the Gulf of Mexico where a meltwater influx spike has been detected between 13.6 and 13.4 ka.