

Younger Dryas Glacierization in the Gulf of St. Lawrence, Canada

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In the summer of 1999, the Maritimes and Northeast Pipeline Company excavated a 3 m deep ditch across northern Nova Scotia to host the Sable Island gas pipeline. A late-glacial paleosol with preserved A-horizon was buried under 2-10 m of surface till over a wide area of the pipeline route. The A horizon peaty layer is only a few cm thick, and consists mainly of herbaceous plant material with a few large wood fragments yielding conventional radiocarbon ages of 10.9 ka and 10.8 ka. The paleosol is relatively flat lying under a gently undulating, fluted glacial topography. Fabric analysis in the reddish surface till, indicate a strong trend parallel to regional glacial lineations. Glacial flow lines indicated by fabric and fluting of the YD surface till sheet in northern Nova Scotia and ice marginal deposits imply an ice cap centred around Prince Edward Island. The YD glacier margin is marked by ice-marginal lakes north of the Cobequid Highlands of Nova Scotia and a series of glacial lakes dammed against the highland-rimmed west coast of Cape Breton Island. Paleosol sites and almost 20 other buried wood and peat organic horizons throughout Nova Scotia allow an accurate reconstruction of glacier limits and provide a robust radiocarbon chronology of deglaciation.

The University of Maine Ice Sheet Model (UMISM) was used to test the hypothesis of development of a glacier in the Gulf of St. Lawrence. The UMSIM model produced a strikingly similar configuration to the empirical glaciation model using a slightly modified modern climate and the GRIP ice core temperature proxy record scaled by 1.5. The Gulf of St. Lawrence region may have also been the locus of increased snowfall during the Younger Dryas as a result of deflection of the jet stream by semi-permanent high pressure cells over the Laurentide ice sheet and a sea-ice covered North Atlantic Ocean. Rapid glacier development in Maritime Canada on both shelf and highland areas during the Younger Dryas may mirror the glacierization in Appalachian regions south of the Laurentide Ice Sheet during MIS 4.

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