

The Appalachian Glacier Complex

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Large, local ice centres, collectively termed the Appalachian Glacier Complex, developed in Maritime Canada during the Wisconsinan glaciation, effectively barring Laurentide ice from the region. These ice centres shifted in time and space, producing palimpsest glacial landforms including cross-striated bedrock outcrops and lobate drumlins. Based on provenance, offshore glacial sediments were correlated to their terrestrial counterparts, establishing crucial links between ice flow patterns on land and ice margins offshore. From these empirical data five major flow patterns or “phases” were defined along with their offshore margins. During the Caledonia Phase in the Early to Middle Wisconsinan, eastward to southeastward-flowing ice from Appalachian upland sources crossed Nova Scotia and extended to the continental shelf edge where a calving margin was established. Submarine mass-wasting at this margin produced wedge-shaped bodies of diamicton that interfingered with glaciomarine sediments. The Caledonia Phase glacier retreated during the Middle Wisconsinan to the inner Scotian Shelf. During the Escuminac Phase in the Late Wisconsinan (22-19 ¹⁴C ka) an ice centre formed over the Magdalen Shelf (Escuminac Ice Centre) and transported large quantities of local redbed material southward to the outer shelf/slope margin. Just after 18 ¹⁴C ka, the Escuminac Phase glacier configuration was re-organized by northward-flowing ice streams into marine channels bordering the Magdalen Shelf and an ice stream draining the Bay of Fundy into a divide over Nova Scotia (Scotian Ice Divide- Scotian Phase). The Scotian Phase glacier margin offshore is marked by the Scotian Shelf End Moraine Complex dated between 17 and 14 ¹⁴C ka. Between 13.5 and 12.0 ¹⁴C ka the Scotian Ice Divide segmented into local terrestrial ice centres (Chignecto Phase) as a calving bay developed in the Bay of Fundy. These local centres advanced and retreated, responding to mass balance changes during a time of rapidly changing northern hemisphere climates. Responding to increasing climatic warming after 12 ¹⁴C ka, the Chignecto Phase glaciers dissipated and their margins retreated landward. Isolated marine and terrestrial remnants of the Chignecto Phase glaciers re-advanced significantly during the Collins Pond Phase (Younger Dryas) just after 10.8 ¹⁴C ka.