

The role of downslope versus along-slope sediment transport over the last glacial cycle on the Scotian Rise, Canada

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The Scotian Rise was built by two principal modes of sediment transport: downslope turbidity currents with proglacial sediment and along-slope transport by the Western Boundary Undercurrent. A 14 m long core, for the first time, provides a record back 80 000 years, of how ice advances and retreats played a role in this sediment transport.

Six sediment units were recognized in two piston cores sampled from the central Scotian Rise south of Western Bank. These cores were analyzed to identify the sources of the sediment. ¹⁴C dating and the recognition of Heinrich events established the overall framework for age. The age model corresponding to the units could then be linked to stadial and interstadial times via marine isotopic stages (MIS). The sources of sediments were mostly from glacial supply from the Appalachians and erosion of the Scotian Shelf, as indicated by numerous physical properties, such as clay mineralogy, Nd isotopes, pXRF, and spectrophotometry data.

The sources and the corresponding ages of the units developed in this study indicate the Scotian Rise typically experienced downslope transport during stadial periods (units II, III, V, VI) and along-slope transport during interstadials in unit I (MIS I) and IV (early MIS 3). The data confirm that a major glacial advance (Caledonia phase) took place in Nova Scotia in MIS 4, reaching the edge of the shelf.