Late Quaternary variations of the Labrador Current in Flemish Pass

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Sediment drifts of alternating sand and mud on the eastern Canadian margin preserve evidence of Labrador Current strength throughout the last glacial cycle. Drifts formed in Flemish Pass, a narrow, 1000 m deep basin seaward of the Grand Banks of Newfoundland. Previous work in northern Flemish Pass shows that significant grain size variations through time are influenced by the strength of the Labrador Current. A transect of four cores together with seismic profiles were collected across a prominent drift located on the eastern side of southern Flemish Pass during a CCGS Hudson cruise in 2011. Core descriptions, X-radiography, and down-core measurements of colour, grain size, P-wave velocity, bulk density and magnetic susceptibility were used with seismic profiles to correlate the cores. An age model was based on recognizing Heinrich layers previously dated in nearby cores. The grain size variations, down-core and laterally, and changes in sedimentation rates provide evidence for variations in Late Quaternary Labrador Current flow across Flemish Pass. In the past 16 ka, there has been strong sediment partitioning, where sedimentation rates vary across Flemish Pass, with an average of 10 cm/kyr. From 22–16 ka there was blanketing sedimentation and a high average sedimentation rate of 37 cm/kyr, suggesting a weak current. In core 0022, a 0.12 m thick unit of basaltic clasts is found 4 m beneath the seafloor. A comparison study with North Atlantic basaltic ash demonstrates that the basalt was likely from the 23 ka Icelandic eruption, presumably transported by ice, providing additional evidence for ocean circulation in glacial times. Labrador Current variations are a proxy for the North Atlantic Subpolar Gyre strength, which is weakened by freshwater additions from Heinrich events, weakening global ocean circulation and causing climate change.

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