Origin and down-flow behavior of turbidity currents in Halibut Canyon, eastern Canadian margin

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The origin and behavior of turbidity currents through submarine canyons on eastern Canadian margins is poorly understood. Four piston cores from East Halibut canyon (off southern Newfoundland) have been studied in detail. Cores 18 and 19 are about 180–200 m above the talweg and 20 km from the shelf break. Cores 32 and 33 are 90–155 m above the talweg and 30 km from the shelf break. The cores consist principally of mud with thin sand beds in the lower part of the cores. Correlation of the cores is based on grain size analysis, a* (red = hematite) color values and bulk density measurements. Chronology is provided by two radiocarbon dates in cores 18 and 33. The Younger Dryas period (YD) has been identified as an important marker for correlation. In the probable YD interval, more sand beds are present in the upper transect (9 in core 18; 11 in core 19) than in the lower transect (5 in core 32; none in core 33). Turbidity currents thus decrease in their ability to transport sand down-system. Thickness of sand beds also decreases down-system, from 0.5–3 cm in core 18, 0.5–6 cm in core 19, whereas in core 32 beds are 0.5–2 cm thick. There is no evidence in the YD for enhanced sediment supply to the shelf edge in Halibut Channel, which was distant from any ice margins. The frequency of sand beds suggests that earthquake-triggered landslides are unlikely to have formed the turbidity currents. Modern dense water flows do not transport significant amounts of sediment. Suspension of shelf sediment by storms and advection of that sediment to canyon heads by ebb tidal currents is a possible mechanism for initiating the turbidity currents. Greenland ice core data suggest that the Younger Dryas period was particularly stormy and the volume of sands deposited in a single event are comparable to likely storm erosion around Halibut Channel. Similar conditions are likely in other submarine canyons along the eastern Canadian margin.

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