

The behaviour of quaternary debris flows on the northeast Newfoundland slope

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High resolution (3.5 kHz) reflection profiles indicate that a significant portion of the northeast Newfoundland slope (between longitude 46° to 52°W and latitude 48° to 51°N) consists of Quaternary debris flow deposits (debrites) of glacial origin. Generally these debrites appear as well defined, seismically transparent lenses aligned down the slope up to a distance of 200 km from the shelf edge. These lenses have central thicknesses ranging from few meters near the seafloor to tens of meters in deeper horizons (visible up to 100 m depth). They are 0.5 to 75 km long and 0.5 to 25 km wide. They travelled on a very gentle slope (1.5° to about 0.1°) without significantly eroding the underlying sediments.

Cores from debrite lenses reveal structureless, poorly sorted pebbly mud with numerous lithic fragments as well as soft mud clasts. The fine fraction consists of 10 to 39%

sand, 17 to 23% silt and 43 to 67% clay. Clay samples contain about 45% illite and 35% chlorite.

Laboratory measurements of pore fluid pressure were made on a sediment core from a shallow debrite. The sediment was reconstituted to form slurries of different water content. These slurries develop high values of excess pore fluid pressure (approximately 0.7 to 2.5 times hydrostatic, depending on depth and sediment concentration). These high values were maintained for several hours before slowly dissipating. This is mainly due to the poor sorting and the high amount of fines. High pore pressures effectively mobilised these flows by reducing the total normal stress and consequently the shear strength to about < 5% of the original value.