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Sediment properties in submarine mass-transport deposits using seismic and rock-physics off NW Barents Sea

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Submarine mass movements may have profound effects on the morphology and stratigraphic architecture of continental margins. Furthermore, they can represent a threat to human life and infrastructures, and also have implications for hydrocarbon exploration/production. In polar regions, they are one of the predominant sedimentary processes on the continental slope. Exploration seismology has been widely employed to study masstransport deposits (landslides, glacigenic debris flows, mass flows, etc.), which are usually characterized by chaotic reflections. In this study, we analyse a seismic profile acquired in the southern part of the Storfjorden trough mouth fan (NW Barents Sea margin), showing the presence of two submarine mass-transport deposits (MTDs). A giant MTD (PLS-1) is located on the lower continental slope at 2.6–3 km depth, while a more recent MTD (PLS-2) occurs at 1.9–2.4 km depth. Velocity and attenuation seismic tomography, seismic attributes analyses and rock-physics models reveal distinct petrophysical properties for PLS-1 and PLS-2. Despite the known influence of burial depth(s), fluid flow content, and compaction on the internal character of MTDs, the two deposits studied here, in fact, show distinct petrophysical characteristics that reflect lithological variations - more than to any other control. These results suggest different source areas for the two MTDs. The inferred coarser sediment in PLS-1 indicates provenance from areas with abundant glacigenic debris flows, (such as the Bjørnøya Trough-Mouth Fan). Conversely, the finer, relatively fluid-rich sediments of PLS-2 that underwent little translation could have an origin in the area between trough-mouth fans. Here, slow-moving ice resulted in a relatively scarce release of subglacial debris at the shelf edge and the continental slope was subject to enhanced erosion and degradation with a comparatively higher production of relatively fine-grained turbidite flows.