Morphological examination of the NP-28 submarine channel-fan complex in the Amundsen Basin

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The NP-28 channel is a deep-sea turbidite channel supplying sediment to a submarine fan at latitudes between 85 and 90 N. The channel represents the northernmost submarine channel on Earth and was originally identified in 2004 using the International Bathymetric Chart of the Arctic Ocean dataset and three seismic profiles. Emerging hypotheses concerning the behaviour of high latitude submarine channels predict that straighter geometries may dominate at high latitudes due to the increased Coriolis forcing of sediment-laden currents. Sedimentation patterns within the NP-28 channel share similarities with experimental tabletop studies in which the location of the downstream velocity maximum is deflected at low Rossby numbers. This research examines the updated morphology of the channel and evaluates it in the context of these hypotheses.

Initial interpretations of the channel described an aggradational channel with consistent right-hand levee asymmetry stretching from the Klenova Valley into the Amundsen Basin. A compilation of multibeam echosounder data acquired in the past decade provides the first partial view of the plan geometry of the channel path, revealing a low-gradient, low-sinuosity channel running for more than 450 km parallel to the margin of Lomonosov Ridge. High-resolution 3.5 kHz seismic profiles across the channel-levee complex reveal turbidite system elements including confined levee terraces, tapered overbank stratigraphy and low-amplitude sediment waves. Overbank sedimentation on the right-hand side of the channel resulted in construction of large drift-like levee deposits which represent a substantial source of Quaternary basin fill in the Amundsen Basin.

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