



Identifying the “Foot of the Continental Slope” of high-latitude continental margins influenced by trough mouth fans

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The continental slope of high-latitude margins often include trough mouth fans, which are sediment fans situated in front of large troughs crossing the continental shelf. The troughs acted as corridors for paleo-ice streams, sectors of fast-flowing ice within the large ice sheets of the last glacial maximum as well as previous glacials. The paleo-ice streams were highly efficient erosional agents, eroding and transporting large volumes of sediments to the continental shelf edge. Here, these sediments were released to move downslope as large debris flows, the “building blocks” of these fans. Due to the very large sediment volume included within these fans, they represent prominent depocenters forming low-gradient sectors (axial gradient often being as low as ~ 1 degree or less) with no clear morphological distinction of the continental slope including its lower limit. Under the UN Convention on the Law of the Sea, the criteria provided in Article 76 includes the lower limit or “foot” of the continental slope as one important parameter in the extended Continental Shelf delineation (i.e. beyond the 200 M exclusive economic zone). Because of this, the Norwegian submission regarding the outer limits of the continental shelf in the Norwegian Sea and the Arctic Ocean argued that the origin of the sub-sea floor sediments on the slope needed to be considered when identifying the location of the foot of the continental slope. This was done by mapping the outer limits of the large debris flow deposits of the trough mouth fans, deposits that without doubt have their origin from the continental shelf. Thus, in these cases, the foot of the continental slope coincide with the downslope termination of the large debris flow deposits and the outer limit of the continental shelf lies 60 M beyond this point. The data used for mapping includes swath bathymetry, sub-bottom profiles and short sediment samples (< 10 m), and we present and discuss examples from the Bear Island Trough Mouth Fan (Norwegian Sea) and the Franz-Victoria Trough Mouth Fan (Arctic Ocean).