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Were the Trænadjupet and Nyk Slides multi-staged?

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Submarine landslides originating from active and extinct trough mouth fans are some of the largest single mass movements evident on Earth. These landslides are capable of damaging offshore infrastructure and can also trigger far-reaching tsunamis. For these reasons understanding the timing, dynamics, and triggering mechanisms of large submarine landslides is important for regional geohazard assessment. The Trænadjupet Slide occurred 4,000 ca. years ago and originated from the Trænadjupet paleo-ice stream on the Central Norwegian margin. The Trænadjupet Slide partially buried the deposits of a previous slide originating from the same section of the Norwegian margin; the Nyk Slide, which occurred at 16,000 ca years ago. Although the Trænadjupet Slide had an estimated volume of 900 km3 and originated from a shallow water depth, it does not appear to have triggered a tsunami. This is in contrast to the comparably-sized Storegga Slide, which produced a tsunami that devastated coastal areas as far away as Scotland. The apparent absence of a tsunami suggests that the failure dynamics for the Trænadjupet slide were different to that of other large slides along the Norwegian Margin. The deposits of both the Trænadjupet and Nyk Slides consist of several blocky lobes extending out into the Lofoten Basin. The lobate morphology of the deposits may imply that both slides occurred in a number of different and possibly temporally-disparate stages. Importantly, multi-staged failures have a much lower tsunamigenic potential due to the lower initial volume displacement. These staggered failures consisting of smaller sediment volumes might explain why no contemporaneous onshore tsunami deposits are found on nearby coastlines, particularly in the case of the post-glacial Trænadjupet Slide. Here we present a new sediment core dataset collected from the previously un-sampled lobes of the Trænadjupet and Nyk Slides. These cores will help us better characterise the deposit types and facies associated with these landslides. We also present a suite of new AMS radiocarbon dates from each lobe to test the hypothesis that the slides occurred in multiple stages. Understanding landslide rheology and identifying multi-staged behaviour is important for both tsunami propagation modelling and future landslide risk assessment in the North Atlantic.