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The character of the glaciated Mid-Norwegian continental margin

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During Pleistocene the development of the NW European continental margin was strongly controlled by the variability in ocean circulation, glaciations and sea-level changes. Repeated occurrence of shelf edge glaciations, from Ireland to Svalbard, started at Marine Isotope Stage 12 (c. 0.5 Ma). During these periods, fast moving ice streams also crossed the Mid-Norwegian continental shelf on a number of locations, and a thick prograding wedge accumulated on the continental slope. During shelf edge glaciations and in early deglaciation phases high sedimentation rates (>2000 cm/ka) existed, and glacigenic debris flows and melt water plumes were deposited. Within these depositional environments we identify three slide events. These slides have affected an area between 2900 and 12000 km2 and involved 580-2400 km3 of sediments, noting that the slide debrites left by the failure events reach a maximum thickness of c. 150 m. The failures have occurred within an area dominated by gradients less than 1 degree, and observation of long run-out distances indicate that hydroplaning was important during slide development. Gas hydrate bearing sediments are identified on the mid-Norwegian continental margin, but appears to be absent in the slide scars. Thus, dissociation of gas hydrates may have promoted conditions for the failures to occur. Within the region of gas hydrate bearing Pleistocene sediments the Nyegga Pockmark Field is observed. This field contains more than 200 pockmarks and is located at a water depth of 600-800 m. The pockmarks identified are up to 15 m deep, between 30 m and 600 m across and reach a maximum area of c. 315 000 m2. The pockmarks are sediment-empty features and are restricted to a <16.2 cal ka BP old sandy mud unit. It seems that the Nyegga Pockmark Field does not show any strong relationship neither to seabed features, sub-seabed structures nor the glacial sedimentary setting. Thus, this implies a more complex development history for the Nyegga pockmarks than previously thought.