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Morphology and submarine mass movement interactions during the North Sea Fan development

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The glaciated European margin has been affected by recurrent climate-related episodes of growth and retreat of the ice sheets during the Quaternary. This margin has also experienced repeated slope failure in the past 1 Ma and is the location of one of the world's largest exposed slides, the Storegga Slide, with an affected area of 95000 km^2 (Haflidason *et al.*, 2004). The North Sea Fan (NSF), with an area of approximately 142,000 km^2 (King *et al.*, 1996), is one of the largest trough-mouth fans on the glaciated European margin. This fan is located in front of the Norwegian Channel, which is a large cross-shelf trough, and is cut by the Storegga Slide in the east and flanked by the Miller Slide in the west. The study area presented here is situated on the northern flank of the NSF adjacent to the Storegga Slide.

This work has involved stratigraphic interpretation and detailed mapping of the NSF using different acoustic systems (swath-bathymetry, 2D and 3D seismic). It aims to understand the interrelationships between different mass transport processes by studying the morphology of the deposits that they formed.

A 3D seismic cube was used in order to obtain the Digital Elevation Model (DEM) and seismic attributes from the present-day seabed and other significant surfaces. The use of spatial analysis tools of a geographical information system (GIS) enhances the geomorphological interpretation. The 2D and 3D seismic data were also used to examine the underlying geological control on the surfaces morphology.

The area of the seabed studied can be sub-divided into six zones: *Zone S* - where the slope sediments were remoulded; *Zone Ch1* and *Ch2* where the seabed has marked parallel ridges (with $\sim$150 meters width) resulting from compression and shallow deformation of the sediments. Faulting and thrusting of the sediments inside of the com-

pression zone can be traced into a well-defined detachment plane that seems to lie at the top of the Tampen Slide deposits. Down slope it is also possible to identify similar ridges related to another compression zone, *Zone Cl*. The Holocene Storegga slide scar cuts both zones; *Zone B* – where the seabed is dominated by blocky debris flows, that transported detached tabular blocks of ∼100 – to 200 meters in width and ∼5 meters high; and *Zone U* - where the NSF sediments are undisturbed by the Storegga Slide Complex, and is possible to identify several glacigenic debris flows. The thickness variation and spatial distribution of the Tampen deposits show an underlying control resulting from the existence of a slide deposits previously emplaced.

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References

Haflidason, H., Sejrup, H. P., Nygard, A., Mienert, J., Bryn, P., Lien, R., Forsberg, C. F., Berg, K. and Masson, D. (2004). "*The Storegga Slide: architecture, geometry and slide development*" Marine Geology **213** (1-4): 201-234.

King, E. L., Sejrup, H. P., Haflidason, H., Elverhoi, A. and Aarseth, I. (1996). "*Quaternary seismic stratigraphy of the North Sea Fan: glacially-fed gravity flow aprons, hemipelagic sediments, and large submarine slides*" Marine Geology **130** (3-4): 293-315.