



Geomorphology of subglacial landforms revealed by 3D seismic data, German North Sea

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Geomorphological features produced by ice masses/melt waters ranging in size between tens of meters and several kilometres were studied in two adjacent 3D seismic surveys covering an area of app. 3000 km² in the German North Sea. The North Sea area was partially or completely covered by ice during the Pleistocene glaciations. The most prominent structures generated by glacial processes are subglacial valleys with depth up to 400 m and a complex infill which were most likely formed during the Elsterian (~400 kyr BP) and Saalian (~190 kyr BP) glaciations. Length of subglacial valleys in the study areas range between several kilometres and tens of kilometres. The occurrence of subglacial valleys in the German EEZ is incompletely known so far. In the 3D seismic data sets the distribution, orientation and morphology of subglacial valleys can be studied in great detail. Different generation phases and varying orientations of these valleys are visible. At greater depth at around 800 ms TWT circular structures can be observed which could be relicts of pingos and/or pockmarks produced by permafrost and escaping gas. Buried ice scours are clearly visible in different time slices. Elongated shallow depressions ("wallows") on bedding planes could have been produced by ice masses, which stranded in shallow waters. Also remnants of the former morphology of the glacially formed landscapes seem to be preserved represented by contrasting seismic facies of patchy, rough moraines and more uniform planes. These subtle structures are investigated in time slices across the migrated seismic data and calculated attributes (e.g. variance) and along automatically picked horizons.