

SEISMIC EVIDENCE FOR GAS ESCAPE FROM MESOCOIC ROCKS IN THE NORWEGIAN TRENCH / SKAGERRAK

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In order to investigate occurrence and migration of fluids and gas the central Norwegian Trench and its southern slope has been investigated in the Skagerrak region by means of high-resolution multi-channel seismics. The multi-channel seismic (MCS) gear consisted of a S15 watergun (Sodera) and a 24 channel high-resolution streamer of 150 m active length.

On the plateau south of the Norwegian Trench the boundary between Quaternary and Cretaceous strata is marked by a conformity. Where the seafloor steepens towards the Norwegian Trench the conformity changes into a prominent erosional unconformity. Signal attenuation and acoustic whitening indicate gas loading within the up to 150 m thick Quaternary succession of the upper slope in water depth between 80 and 420 m. Here, elongated depressions align on the upper shelf and slope as it was described by other authors. The alignments of these current-modified pockmarks correlate with the location of bright reflections within Cretaceous rocks which subcrop at the erosional unconformity. We interpret the bright reflections as the top of porous and permeable conduits for thermogenic gas. Chaotic and contorted reflections between the pockmarks and the subcropping bright reflections mark vertical gas upflow towards the seafloor. Downslope of the gas front and in water depths of more than 420 m the seismic data reveal acoustic turbulence and bright spots beneath the unconformity. This observation points to gas accumulation within the Cretaceous rocks. The Quaternary deposits form a less permeable capping sequence for the thermogenic gas. The seismic data corroborate the thesis that thermogenic gas escapes from Cretaceous strata and thus supports the formation of elongate depressions on the upper southern slope of the Norwegian Trench.