THE SULFATE-METHANE TRANSITION ZONE IN NORWEGIAN TRENCH SEDIMENTS (SKAGERRAK)

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Most of the methane formed in ocean margin sediments is degraded sub-surface by the process of anaerobic oxidation. This microbiological conversion is mostly confined to the Şsulfate-methane-transition zoneŤ (SMTZ) which is the lower boundary to which seawater sulfate penetrates into the sediment and which constitutes a barrier against methane escape from deep sediment strata. The biogeochemical parameters characterizing the SMTZ and the relationship between its sub-surface depth and environmental parameters, such as water depth and the occurrence of free gas in underlying sediments, are investigated by the EU project METROL. Gravity cores (5-6 m) were sampled across the southern slope of the Norwegian Trench (Skagerrak) in June 2003. Special focus was laid on sampling along the depth gradient and on sampling the up to 30 m deep elongated depressions (ĎpockmarksŞ) on the seafloor, which extend up to 2 km parallel to the depth contours. Geochemical profiles measured in upper slope sediments revealed high concentrations of pore water methane and indicate that the SMTZ usually was located within 0.5-1 m below the sediment surface. The shallowest SMTZ was found on the bottom of a ŞpockmarkŞ, which supports the hypothesis of enhanced methane flux based on multi-channel seismic data. On the slopes of this ŞpockmarkŞ, however, the position of the SMT was significantly deeper or methane was almost absent. No methane was found in a core retrieved from 535 m water depth in the central part of the trench.