



INTERMITTENT GAS SEEPAGES CAUSED BY SEDIMENT SLUMPING ON THE SOUTHERN SLOPE OF SKAGERRAK - RESULTS OF RADIOCARBON DATING

T. Laier and A. Kuijpers

Geological Survey of Denmark and Greenland (GEUS), (tl@geus.dk)

The presence of gas seeps on the southern slope of the Skagerrak is indicated by distinct methane anomalies in the water column above a limited area at approximately 350 m water depth. Furthermore, patches of black sulphide layers on the seafloor obtained by boxcoring confirm that strongly reducing conditions exist in localised spots of this area. Despite these indications, it has been difficult to obtain more exact information as to nature as well as to the cause of these seeps. In seeking an answer to these questions, radiocarbon dating was carried out on a number of gravity cores, approximately 2 m long, obtained from this area as well as the neighbouring areas. The material for radiocarbon dating included methane, shells, forams as well as organic matter.

Methane from the seep area is distinctly younger (335 - 540 y) than methane from neighbouring sites (1030 - 1425 y). This excludes the possibility of a deeper older source for the gas, furthermore, the youngest gas was found at the shallowest depth. Radiocarbon dating of shell material indicated that the sediments of the seepage area were younger than sediments of similar depths in the neighbouring areas, suggesting higher sediment accumulation rates in the seepage area. However, accumulation rates may have changed considerably over time, as a sudden shift in age from 130 y to virtually recent occurred from 153 cm to 137 cm below surface. A shift in lithology at this depth was also evident visually. The shift in accumulation rate indicates that sediment slumping may have taken place in the surroundings of the seepage site. Slumping may have lead to very fast burial of fresh easy degradable organic matter, resulting in methane production when pore water sulphate had been exhausted.

In analouge, elsewhere in Danish waters it has been observed that methane with a modern carbon signature started to seep from artificial sediment slumping only two months after the slumping took place. The slumping occurred by an unfortunate incident during a tunnelling operation, when water from the sea above entered the tunnel. Adding more seafloor sediment into the hole quickly sealed the hole. Shallow gas has not otherwise been observed in the area of the incident. After another 3 months seeping of gas ceased to occur at this location. Comparing with observations made after the tunnel incident, it is possible that gas seeps caused by slumping in the Skagerrak are only short lived and therefore difficult to detect from time to time.