

## Origin of sediment column profiles of gases and organic matter at a Laptev Sea gas seeps area (Arctic)

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Gas seeps provides indirect information on deeper subsurface deposit of hydrocarbons that can potentially aid exploration. Two closely spaced seep areas in the Laptev Sea have been studied: Oden (station 5953-3) and C15 (station 5947). The areas of methane seeps are located close to the junction of the Gakkel Ridge with the fault system on the shelf. Station 5953-3 was located in the immediate vicinity of the bubble gases release from the marine sediment. Samples of the sediments were collected using a box corer. To assess diagenetic OM transformation in marine sediments fraction-specific carbon isotope distributions (FCID) have been analyzed. FCID represents a valuable tool to characterize the diagenesis because the shape of isotope type-curve depends on the OM transformation. OM was separated into five fractions: the nonpolar hexane fraction (H), three fractions of increasing polarity hexane-benzene (HB), benzene (B) and benzene-methanol (BM), and asphaltenes (A). The  $\delta^{13}\text{C}$  values of the fraction varied in a wide range from -40 to -28‰. The  $\delta^{13}\text{C}$  values of BM fractions were very low. This is due to the deep oxidation of BM resin. The following hydrocarbon gases were measured: ( $\text{CH}_4$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{C}_3\text{H}_6$ ,  $\text{C}_3\text{H}_8$ ,  $\text{C}_4\text{H}_8$ ,  $n\text{-C}_4\text{H}_{10}$ ,  $i\text{-C}_4\text{H}_{10}$ ,  $n\text{-C}_5\text{H}_{12}$ ,  $i\text{-C}_5\text{H}_{12}$ ,  $n\text{-C}_6\text{H}_{14}$ ,  $\text{neo-C}_5\text{H}_{12}$ ),  $\text{CO}_2$ ,  $\text{CH}_3\text{SCH}_3$ , COS. Neopentane origin is directly related to the thermal maturation of oil. A characteristic feature of the composition of gases from the column of station 5953-3 represents a significantly increased concentration of hydrocarbons. Thus, the average methane concentration was  $16.5 \text{ mg L}^{-1}$  at station 5953-3 and  $5.3 \text{ } \mu\text{g L}^{-1}$  at station 5947. The thermogenic nature of the emitted gases is indicated by a significant excess of the concentration of saturated hydrocarbons (HC) compared with the concentration of unsaturated HC by 1-2 orders of magnitude. The  $\delta^{13}\text{C}$  values of  $\text{CH}_4$  in the vertical profile of core 5953-3 varied from -80‰ on the surface to -58‰ at a depth of 22 cm. The  $\delta^{13}\text{C}$  values of  $\text{CO}_2$  reached -15.9‰ on the surface. The movement of gas to the surface causes active microbiological processes in the thickness of the sediment and on its surface.