

Gasometric Anomalies in Bottom Sediments of the Western and Central Barents Sea: a preliminary data report

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Bottom sampling in several areas of the Barents Sea and sub-sampling of hydrocarbon gases from collected sediments were carried out as part of various geological marine expeditions. These expeditions were organized by the UNESCO-MSU Training and Research Centre for Marine Geology and Geophysics of the Moscow State University (Russia) and the University of Tromsø (Norway) onboard R/V «Akademik Nikolaj Strakhov» and R/V “Helmer Hanssen” during the period of 2011-2013.

A total of 304 gas samples from 51 different stations were analysed using Gas Chromatography (GC) and Isotope Ratio Mass-Spectrometry (IRMS) techniques. These were combined in a database which was used to investigate the relationship between the type of the depositional environment, hydrocarbon gas concentration and sediment composition.

Gas samples, collected from shelf deposits, consist mainly of methane (90-99%) with little admixture of ethane and propane. Unsaturated homologues were detected in all samples. Ethylene and propylene predominate over saturated homologues. This, together with the isotopic composition, suggests a biogenic nature of the gases collected in most areas.

Gas concentrations were found to be very low for the majority of analysed sediment samples. This is indicative for their low filtration capacity and low organic matter content. The cause of this is believed to be the pelitic clayey composition of the sediments, their high compaction and the generally frugal bioproductivity in arctic regions.

The specific molecular and isotopic composition and the high concentrations of gas are characteristic for the zones of focused hydrocarbon seepage on the seafloor that were studied during the cruises. Areas with pockmarks, outcropping salt diapirs and gas flares above the seafloor were classified high petroleum potentials, such as the Hjalmar Johansen High and the North-Kildenskoe gas field, were examined in order to verify characteristics of gas emission from deeply seated accumulations of natural hydrocarbon. This showed that even in such areas the background gas seepage is insignificant and anomalous gas concentration were detected only in fault zones according to the results of the gas analyses.

The uppermost sedimentary cover has a strong effect on deep fluid seepage in the Barents Sea region, both in regular areas and at locations with highly focused flows.