



## **Microbial hydrocarbon degradation potentials in shoreline and deep-sea sediments around Svalbard and possible ways for their stimulation**

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The diversity and metabolic potentials of the microbial communities inhabiting sediments in the Northern Barents Sea are largely unknown. Recent reports on natural methane seeps as well as the increase in hydrocarbon exploration activities in the Arctic initiated our studies on the potential of indigenous microbial communities to degrade methane and higher hydrocarbons under in situ pressure and temperature conditions. Furthermore, the sub-seafloor geochemistry in these areas was studied, together with important microbial groups, like methanotrophs, methanogens, metal and sulfate reducers, which may drive seafloor ecosystems in the Northern Barents Sea. A recent focus is on the evaluation of different approaches to stimulate oil degradation by the indigenous microbial populations. The potential of the indigenous microorganisms to degrade methane and higher hydrocarbons as well as different oils under in situ temperatures and pressures was widespread in surface sediments. Degradation rates were higher under aerobic than under anaerobic conditions, and decreased with increasing sediment as well as water depths, i.e. increasing pressures. The addition of different nutrient solutions increased microbial biomass and oil degradation rates. The degradation of the added oils was verified by organic geochemical analyses. Similar activity distribution patterns were found for other metabolic processes, including sulfate, Fe and Mn reduction as well as carbon dioxide and methane production rates. Ongoing molecular biological analyses of original sediments and enrichment cultures indicate the presence of diverse and varying microbial communities.