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Assessing environmental impact from gas and oil exploration in the SW Barents Sea using benthic foraminiferal assemblages

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During the last decades petroleum industry and shipping activities have increased in the SW Barents Sea. Oil exploration wells were drilled in the 1980s with production starting in 2007. These activities are projected to expand in the coming years. As part of the Northern Environmental Waste Management (EWMA) project, a competence cluster for petroleum industry related waste handling, we investigate the impacts of enhanced anthropogenic activities on benthic foraminiferal assemblages in the SW Barents Sea.

Sediment cores (0-20 cm) from sites in proximity to two oil- and gas fields are under investigation. These sediment cores, dated with the 210Pb method, represent the last 90 to 150 years. Both dead and living benthic foraminifera (100 μm–1 mm) were counted to elucidate differences in foraminiferal assemblages between pre-impact and recent conditions. In addition, the heavy metal concentrations, persistent organic pollutant (POP) concentrations, grain size and total organic content (TOC) of the sediment cores have been analyzed.

Pollution levels of the surface sediments (0-1 cm) are of background to good level (level I-II) according to the definitions of the Water Framework Directorate (WFD). Patterns in living benthic foraminiferal assemblages identified in the sea floor surface sediments, are the result of natural environmental changes such as depth, water mass and sediment composition. Further downcore (1-20 cm) pollution levels are in general of background environmental status (WFD level I). However, at some depth intervals, especially in sediment cores from the near proximity of the oil- and gas- fields, pollution levels are slightly enhanced (WFD level II). Further work will include statistical comparison of dead and living foraminiferal assemblages with sediment pollution levels, sediment properties, and oceanographic conditions. This research contributes to the development of foraminifera as a useful bio-monitoring technique for the Arctic region as industrial activities increase in the coming years.