



Benthic foraminifera as tools in interpretation of subsurface hydrocarbon fluid flow at Veslemøy High and Hola-Vesterålen areas of the Barents Sea.

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Relatively few studies have focused on high-latitude benthic foraminifera related to hydrocarbon seeps. In this study, we present micropaleontological data from 8 gravity cores from the Veslemøy High and 4 surface sediments (0-1cm) from Hola-Vesterålen, Norway.

The study of hydrocarbon impregnation and its effect on benthic foraminifera was conducted on selected sediment samples from the calcium-rich Holocene sediments of the Veslemøy High. The assemblage of foraminifera have been identified from three regional clusters. Cluster I and II are dominated by benthic foraminifera *Buccella*, *Cassidulina*, *Cibicides*, *Discopulvinulina*, *Epistominella*, *Pullenia* and *Trifarina*. Cluster III is distinct with an elevated abundance of *Cassidulina*, *Cibicides* and *Trifarina* with significant (>5 %) occurrence of *Nonionella* and *Uvigerina*. There is no apparent dissolution on the preserved foraminifera. However, there can be differential dissolution or destruction of the more fragile (thinner-walled test) species like *Epistominella*, *Nonionella* or *Pullenia* while leaving behind over-represented species like *Cibicides* or *Trifarina* (both preferring coarse grained, high energy areas that can withstand permanent winnowing and redeposition) with higher preservation potential. Also, Cluster III is placed right over the underlying fault line with shallow seep-indications and thus the fluids released may have induced the dissolution of the fragile species. Moreover, the significant occurrence of benthic foraminifera *Nonionella auris*, and *Uvigerina peregrina*, in Holocene deposits of Cluster III may be indicative of environments influenced by hydrocarbon migration to the seafloor.

Previous studies have reported active natural hydrocarbon seepage in the Hola area and the stable carbon and hydrogen isotopic composition of methane in the sediments suggests a predominantly thermogenic methane source. The seep-assemblage is composed of *Cibicides* (~60%), *Cassidulina*, *Discanomalina*, *Textularia* and *Trifarina*. *Discanomalina coronata* is an indicator species to identify active cold-water coral mounds. A negative carbon isotopic signal is recorded by *D. coronata* in all samples. Seep samples with low diversities also contain deformed individuals of *Cibicides lobatulus* (3.4-6.5 %), similar to those reported for a gigantic oil spill from a tanker or for environments polluted with heavy metals. However, it is an attached form and thus its test shape is affected by the nature of the substratum. Carbon isotopic signature of the deformed specimens reveal slightly lower values than their undeformed counterparts.

One sample from Ullsfjorden was also studied where the assemblage is represented by *Bulimina*, *Cassidulina*, *Globobulimina*, *Melonis*, *Nonionella* and *Reophax*. Infaunal fauna *B. marginata*, *M. barleeaanum*, and *N. labradorica* prefer muddy/silty to sandy substrata and high organic matter input, and thrive under suboxic-dysoxic conditions. All species in this assemblage have recorded negative carbon isotopic signal.