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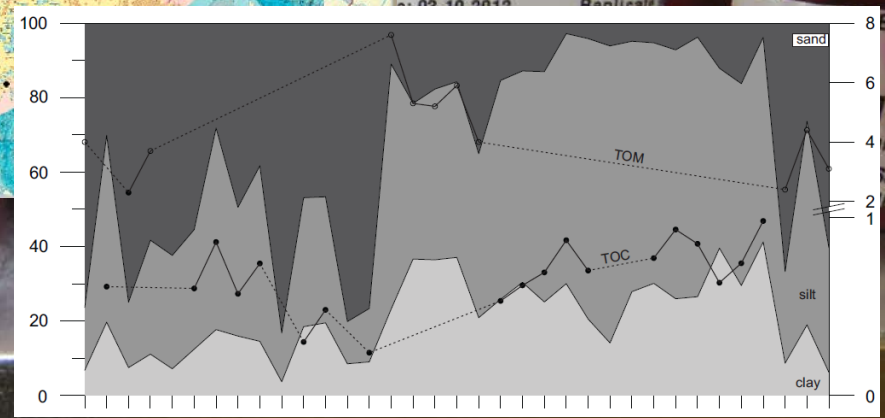
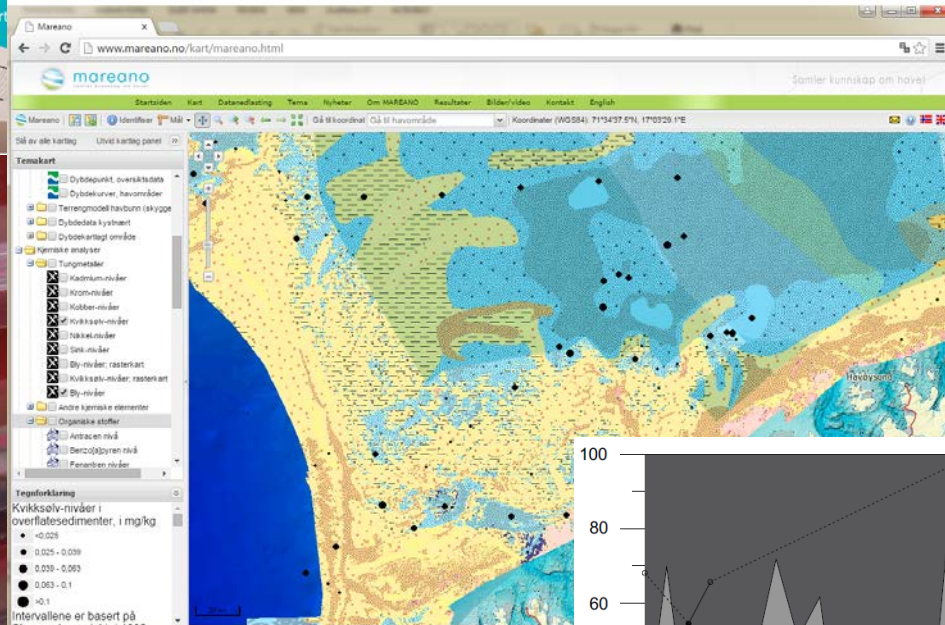
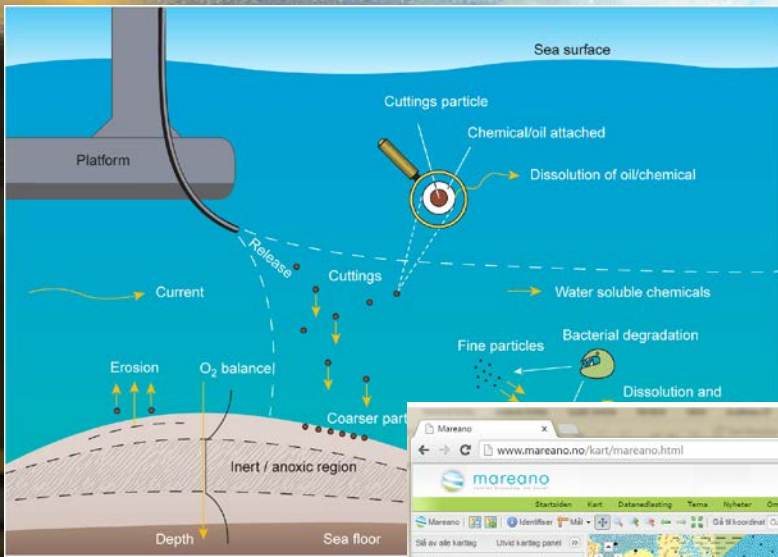
THE ARCTIC
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Monitoring the environment: the importance of pre-impact baselines

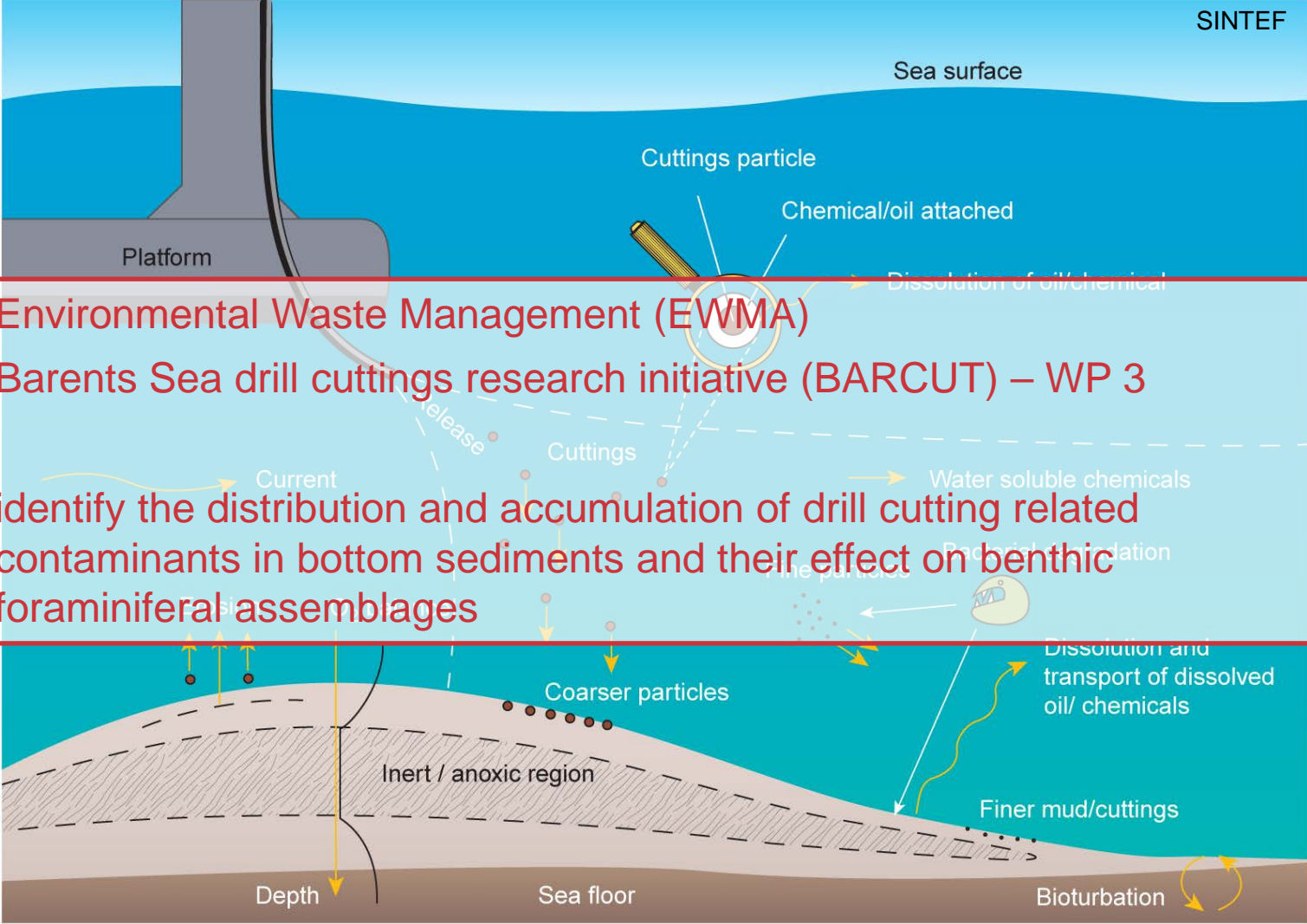
Noortje Dijkstra

29 October 2015





Increased exploration and production requires understanding of environmental effects of drill cuttings



Benthic foraminifera are good bio-indicators to monitor environmental change, both natural and anthropogenic

Specific habitat

Fast reproduction

Preservation of test



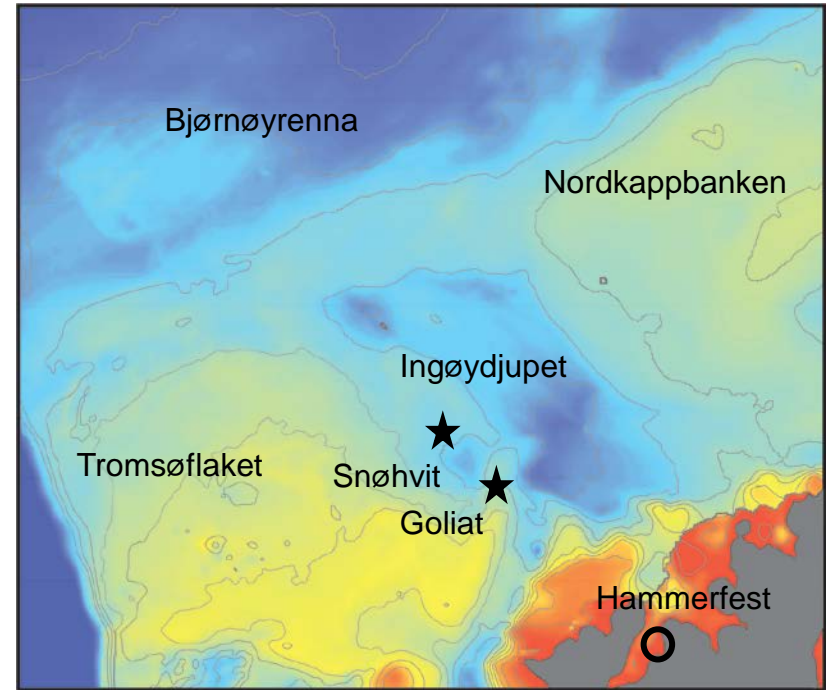
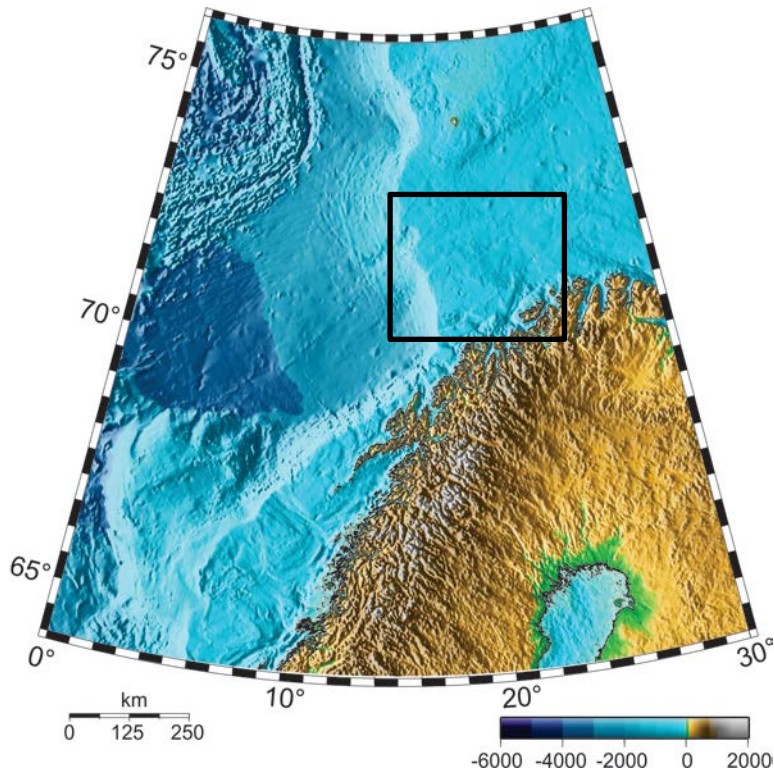
But what about natural variability?

Samples

- Collected between 2006 and 2015 along the Norwegian coast and Barents Sea
- Surface sediment samples (0-1 cm)
- Rose bengal stained



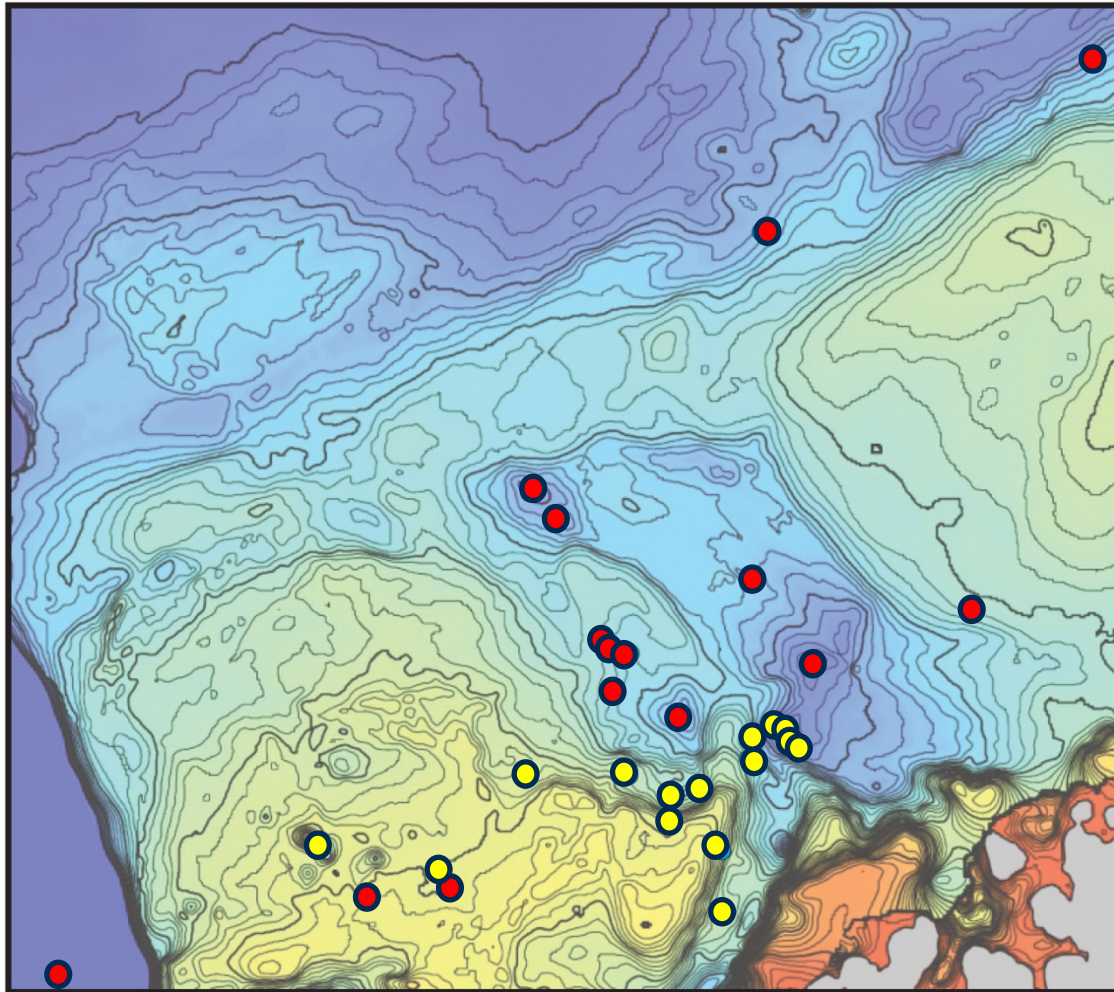
Area of focus



Main objective :

to understand and establish the pre-impacted baseline conditions of the environment, both abiotic and biotic

Material

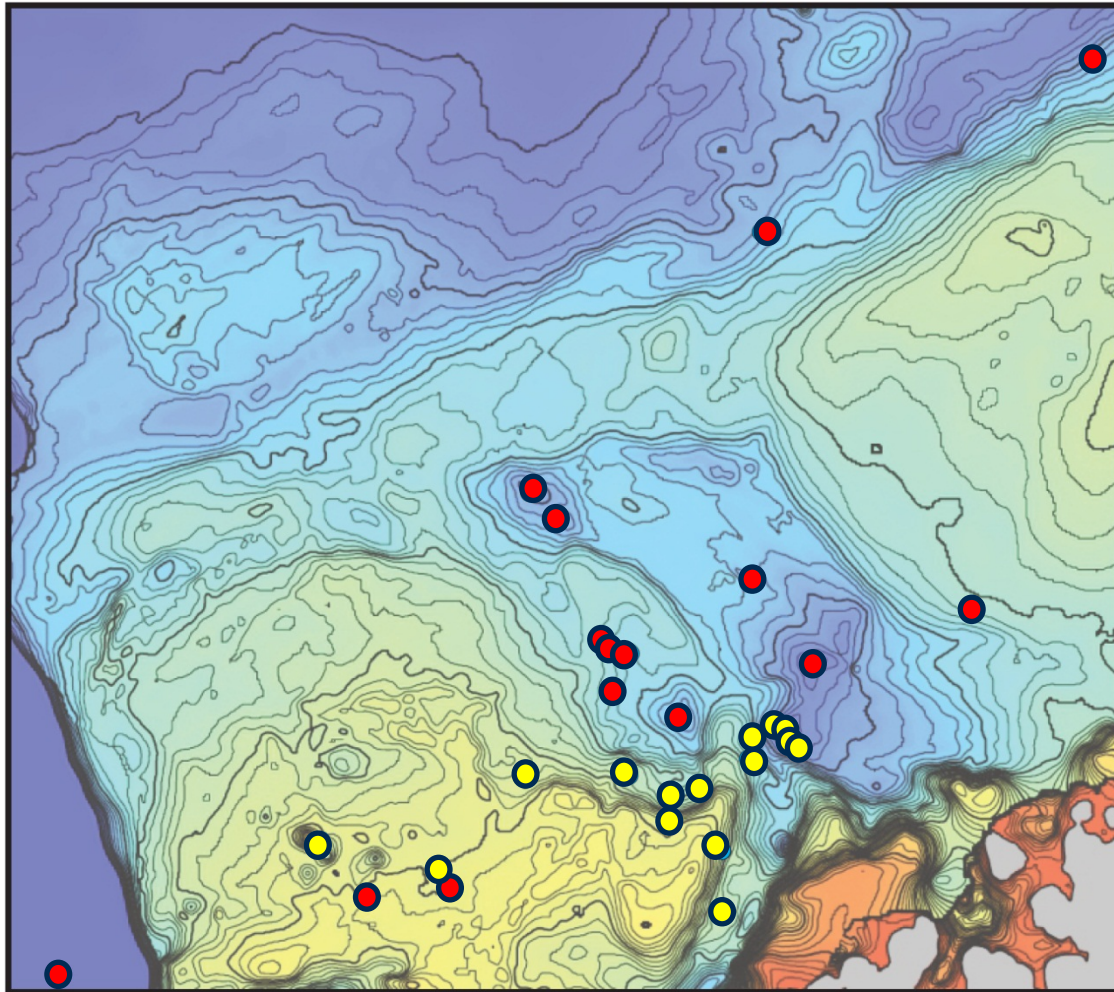


19 surface samples collected during MAREANO cruises in 2006 (2006-612) and 2007 (2007-105)



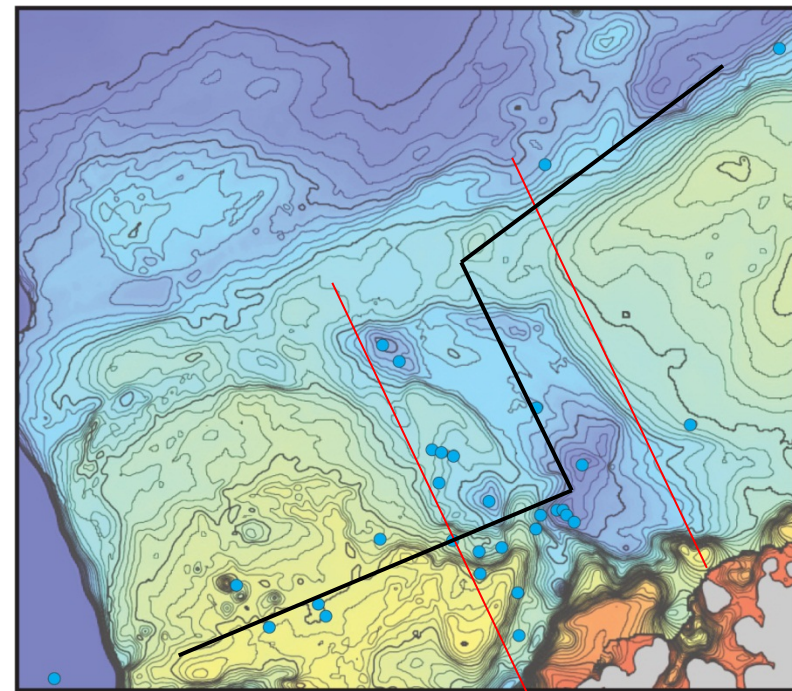
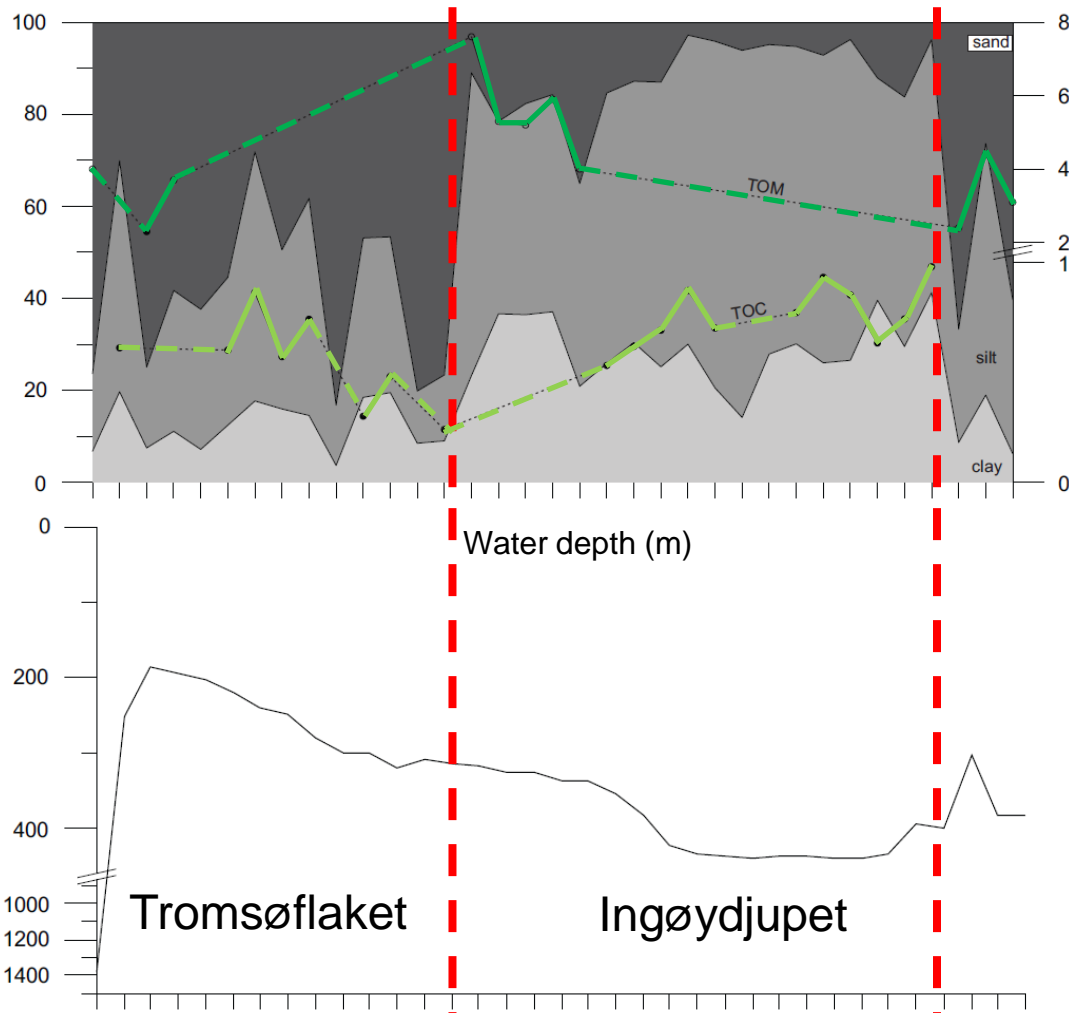
16 additional surface samples

Methodology

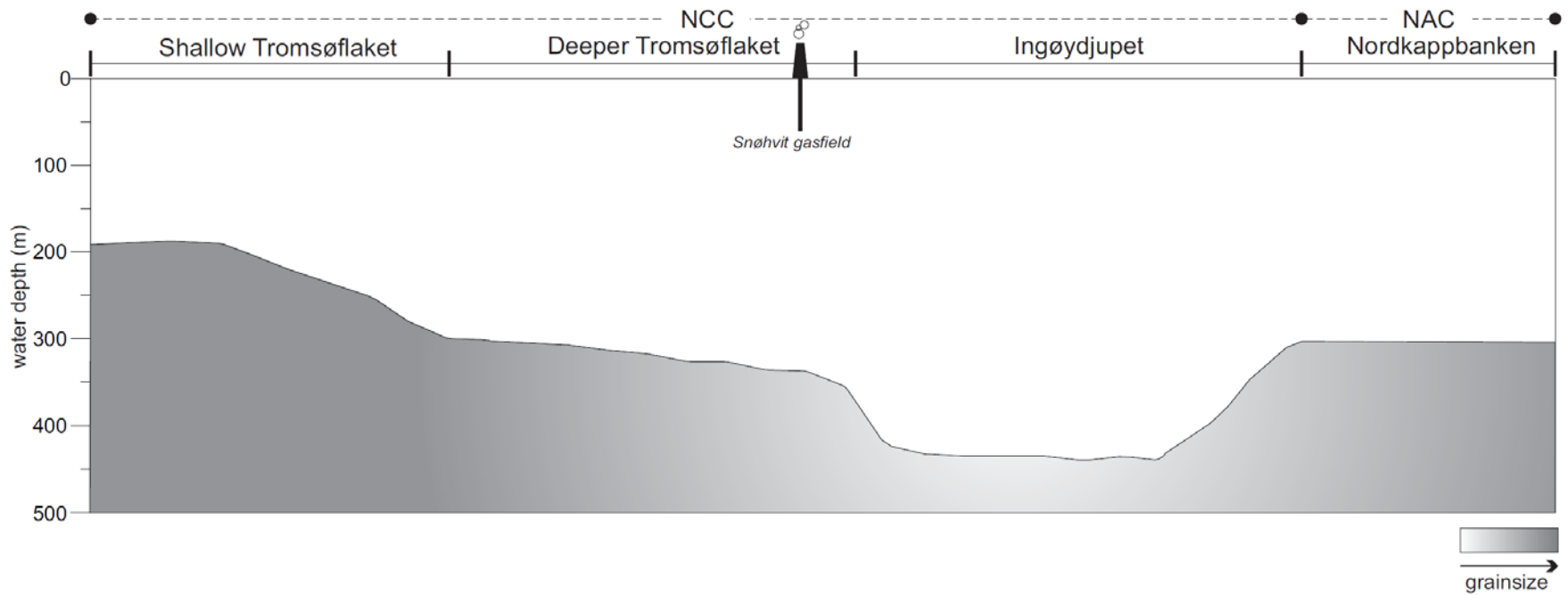


- Benthic foraminiferal assemblages
- **CTD**
- Grain size
- Sortable silt mean grain size
- **TOC**
- **Clay minerals**
- **Heavy metals**
- PAHs

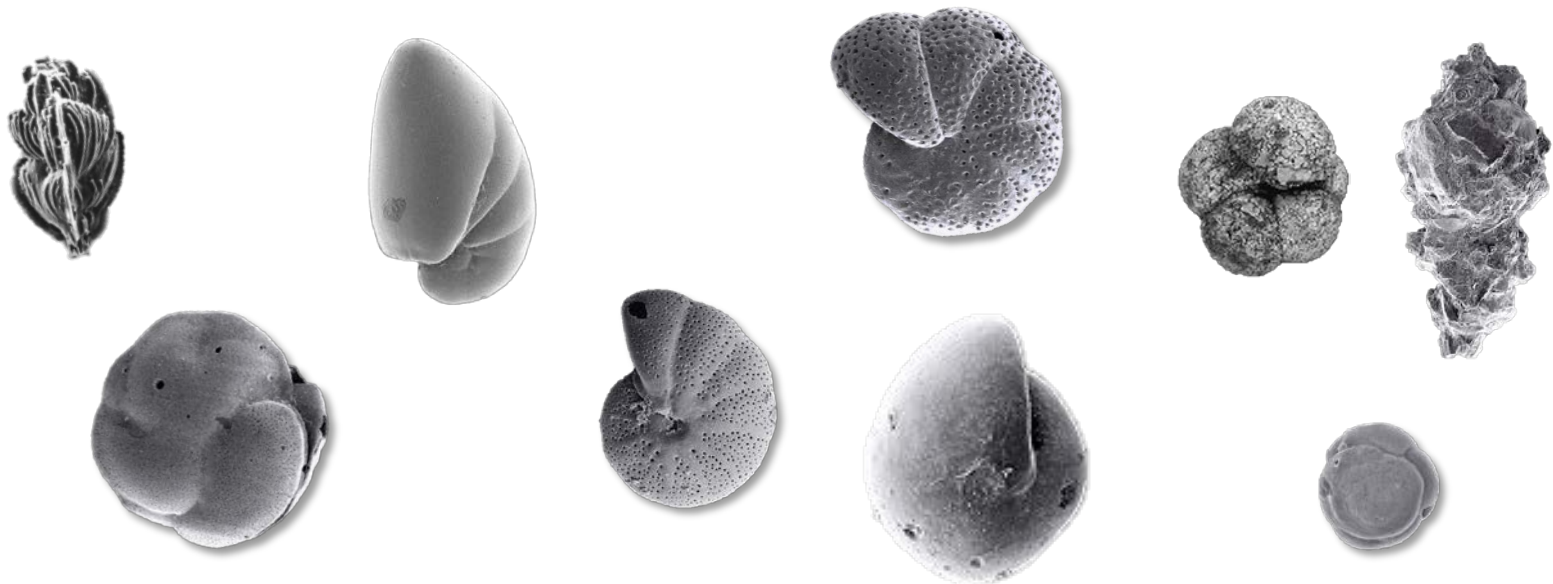
Abiotic parameters

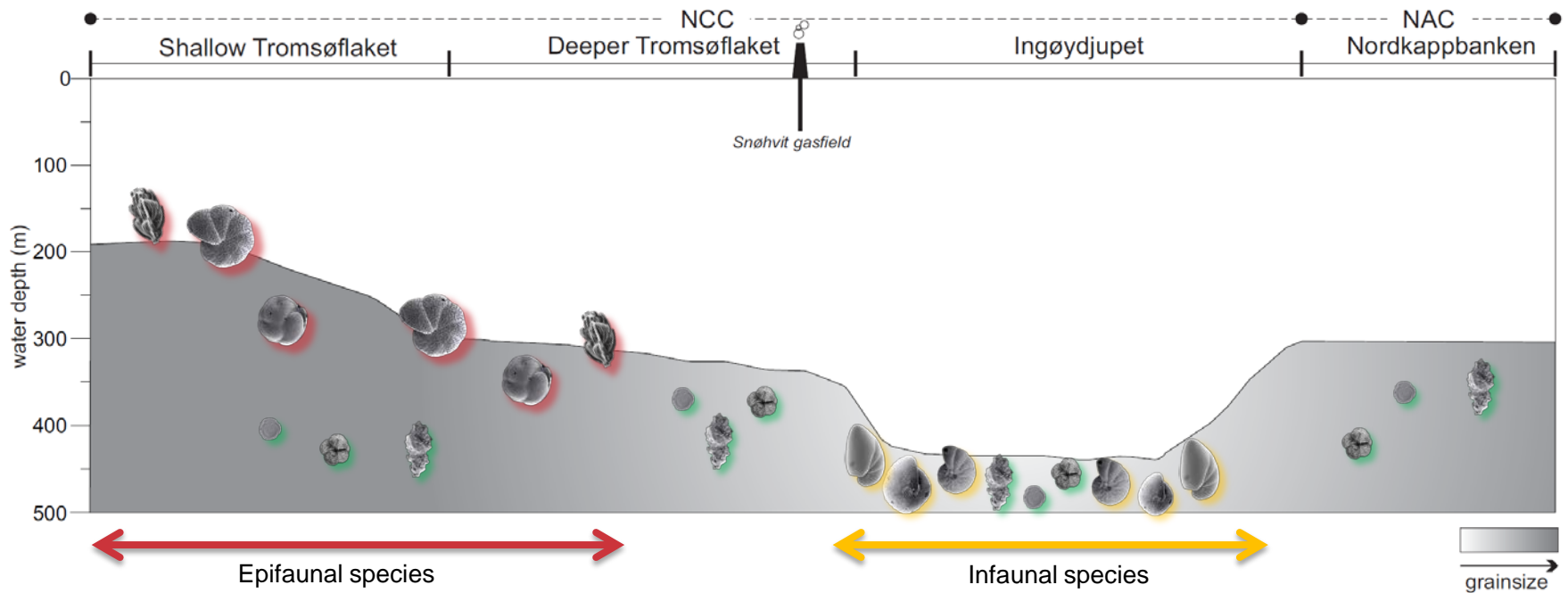


Heavy metals and PAHs are mainly of background values



Benthic foraminiferal assemblages





no specific habitat

Group I
T. angulosa
C. lobatulus
C. laevigata



Group II
M. barleeanus
P. bulloides
N. auricula



Group III
Reophax spp.
E. nipponica
Trochammina spp.

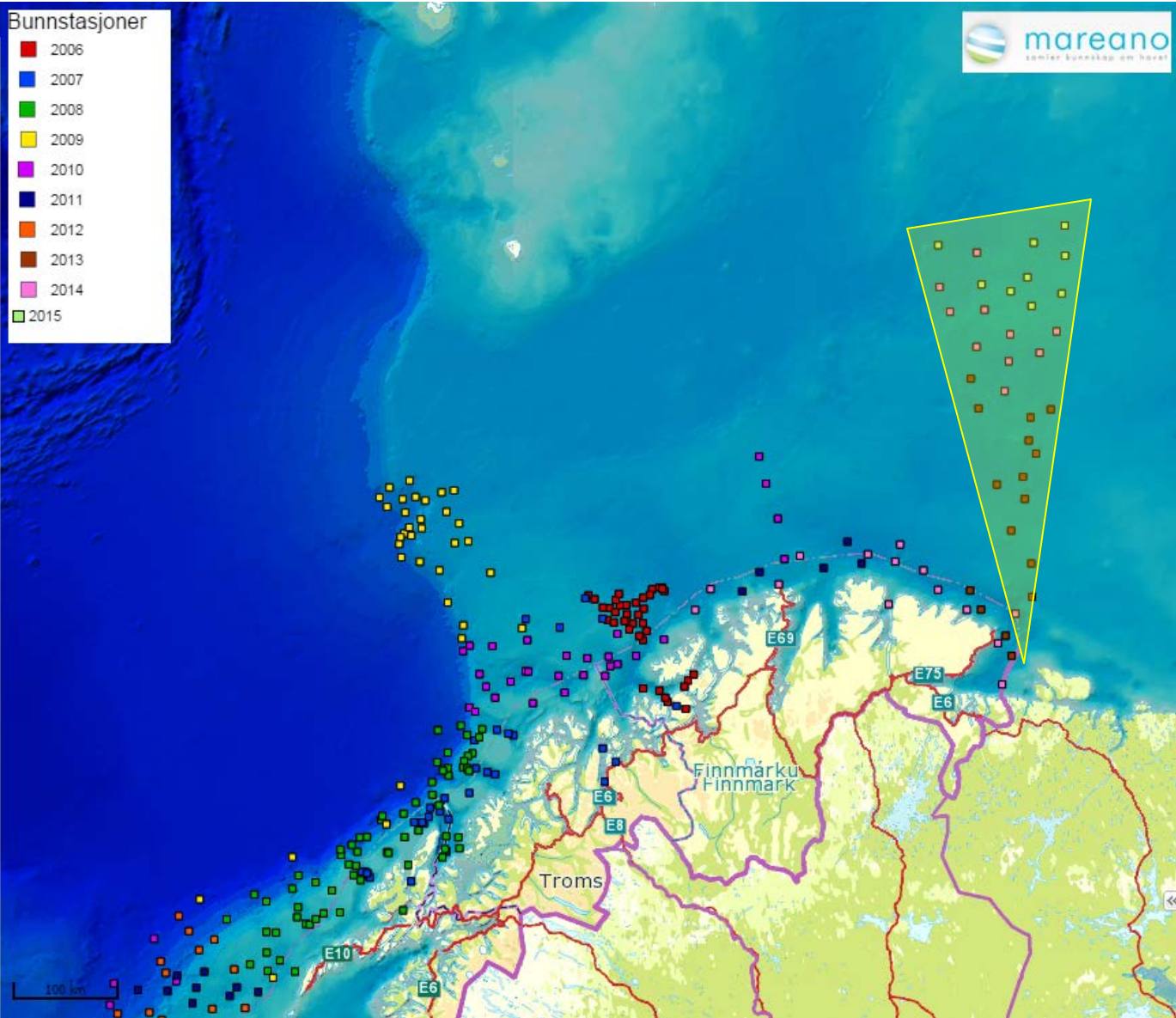


Bio- monitoring?

Summary

- Contaminant levels are of background level and can be related to natural variability of abiotic parameters
- Benthic foraminiferal assemblages reflect the natural variability of the region, i.e. grain size properties and food availability
- With increasing petroleum activities in the region, this area is a valuable natural laboratory to study impact of potential increase of contaminants in the future

Future research and areas of interest





Baseline benthic foraminiferal assemblages and habitat conditions in a sub-Arctic region of increasing petroleum development



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ABSTRACT

The aim of this study is to establish pre-impact baseline conditions for an Arctic region where petroleum activities are projected to increase in the coming decades. We characterize the spatial distribution of living benthic foraminifera in the Tromsøflaket–Ingøydjupet region of the Barents Sea and relate this to sediment properties and their associated metal concentrations. Metal concentrations of the sediments did not exceed threshold levels of harmful environmental effects, indicating that the area exhibits pre-impact baseline conditions. Foraminiferal assemblages reflect the pristine environment. Epifaunal species dominate in Tromsøflaket, a high energy environment characterized by coarse grained sediments. Infaunal species dominate in Ingøydjupet, a low energy environment characterized by fine grained sediments. Metal concentrations were slightly elevated in the fine grained sediments from Ingøydjupet which suggest that these areas may in the future serve as trapping zones for contaminants associated

Variability of present and past PAH (polyaromatic hydrocarbons) concentrations in sediments of the SW Barents Sea

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The concentration and distribution of polyaromatic hydrocarbons (PAHs) in surface and subsurface sediment samples from Tromsøflaket and Ingøydjupet, southwestern Barents Sea, were investigated in order to provide insight into the levels and origins of PAHs in a region with petroleum activities. PAH profiles in sediments were evaluated in context with sediment grain size and total organic carbon in order to assess the influence of ocean currents on the transportation and deposition of PAHs. The PAH concentrations are of background (Level I) to good level (Level II) based on the Water Framework Directive classification system. SUM PAH (SUM of 26 PAH compounds) ranged from 39 to 2197 µg/kg (average 225 µg/kg), and NPD (naphthalene, phenanthrene and dibenzothiophene, including their C1–C3 alkyl homologues) in surface samples ranged from 14 to 2045 µg/kg (average 157 µg/kg). However, the average values presented here are higher than have been reported in previous studies. The observed changes in PAH

Dijkstra et al., 2013;
Marine Environmental Research

Junttila et al., 2015;
Norwegian Journal of Geology

<http://site.uit.no/ewma/>

Thank you!
MAREANO

&

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