
ARCTIC HEALTH
An information portal to issues affecting the health and well-being
of our planet's northernmost inhabitants

# Transformation of organic matter in a Barents Sea sediment profile: coupled geochemical and microbiological processes.



Author: Mark A Stevenson
Johan C Faust
Luiza L Andrade
Felipe S Freitas
Neil D Gray
Karen Tait
Katharine R Hendry
Robert G Hilton
Sian F Henley
Allyson Tessin
Peter Leary
Sonia Papadaki
Ailbe Ford
Christian März
Geoffrey D Abbott

Author Affiliation: School of Natural and Environmental Sciences, Newcastle University, Newcastle upon Tyne, NE1 7RU, UK.

Source: Philos Trans A Math Phys Eng Sci. 2020 Oct 02; 378(2181):20200223

Date: Oct-02-2020

Language: English

Publication Type: Journal Article

Abstract: Process-based, mechanistic investigations of organic matter transformation and diagenesis directly beneath the sediment-water interface (SWI) in Arctic continental shelves are vital as these regions are at greatest risk of future change. This is in part due to disruptions in benthic-pelagic coupling associated with ocean current change and sea ice retreat. Here, we focus on a high-resolution, multi-disciplinary set of measurements that illustrate how microbial processes involved in the degradation of organic matter are directly coupled with inorganic and organic geochemical sediment properties (measured and modelled) as well as the extent/depth of bioturbation. We find direct links between aerobic processes, reactive organic carbon and highest abundances of bacteria and archaea in the uppermost layer (0-4.5?cm depth) followed by dominance of microbes involved in nitrate/nitrite and iron/manganese reduction across the oxic-anoxic redox boundary (approx. 4.5-10.5?cm depth). Sulfate reducers dominate in the deeper (approx. 10.5-33?cm) anoxic sediments which is consistent with the modelled reactive transport framework. Importantly, organic matter reactivity as tracked by organic geochemical parameters (n-alkanes, n-alkanoic acids, n-alkanols and sterols) changes most dramatically at and directly below the SWI together with sedimentology and biological activity but remained relatively unchanged across deeper changes in sedimentology. This article is part of the theme issue 'The changing Arctic Ocean: consequences for biological communities, biogeochemical processes and ecosystem functioning'.

PubMed ID: 32862813 View in PubMed