Macronutrient cycling in Arctic sediments and benthic-pelagic coupling

SIAN F. HENLEY[1], JOHAN FAUST[2], MARK STEVENSON[3], ALLYSON TESSIN[2], TIM BRAND[4], CHRISTIAN MAERZ[2]

[1]School of GeoSciences, University of Edinburgh, UK s.f.henley@ed.ac.uk
[2]School of Earth and Environment, University of Leeds, UK
[3]School of Natural and Environmental Sciences, Newcastle University, UK
[4]Scottish Association of Marine Science, Oban, UK

Earth's polar regions are undergoing considerable variability and change in their physical environments, with important implications for ocean chemistry and ecosystems. Some of the largest reductions in sea ice cover have been observed over the continental shelves of the Arctic Ocean, where large spring/summer phytoplankton blooms fuel highly productive foodwebs. The importance of these shelf environments for the oceanic uptake and longer-term storage of carbon dioxide is dependent on the extent to which organic matter produced in the upper water column is buried in sediments, and this is strongly governed by the biogeochemical processes occurring in seafloor ecosystems.

We will present recent results from the Barents Sea, a high-productivity Arctic shelf environment, and use pore water and water column nutrient data to examine the biogeochemical processes at work within the upper sediment horizons and close to the seafloor, and the fluxes of macronutrients across the sediment-water interface. We will also discuss the use of isotopic signatures of nitrate and organic matter to further constrain and quantify the most important sedimentary nutrient recycling processes. These results offer important insight into the key controls on sedimentary nutrient cycling and its influence on water column processes and nutrient budgets. Understanding the importance of benthic nutrient cycling and its key regulating factors now will allow us to predict the ways in which these processes and their importance for ocean chemistry and biology may change in the context of ongoing changes in temperature, sea ice dynamics and ocean processes.