Nutrient exchange at the Changing Arctic Ocean Seafloor and implications for the water column

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Rapid warming of the Arctic region and dramatic declines in the extent and seasonal duration of sea ice cover are increasingly well-documented. The effects on Arctic Ocean physics, biology and biogeochemistry are beginning to be understood through large international research efforts. The Arctic Ocean seafloor is arguably one of the least understood components of the highly-coupled atmosphere-ice-ocean system, and yet the processes at work there are critical in regulating the storage and/or recycling of carbon and nutrients, their resupply to the water column and their influence on benthic and pelagic productivity. The primary objective of this study is to quantify the exchange fluxes of macronutrients across the sediment-water interface of the highly productive Barents Sea shelf region, and examine their impact on water column nutrient budgets and cycling.

We examine sediment pore water profiles of the macronutrients nitrate, nitrite, ammonium, silicic acid and phosphate collected during the summers of 2017 and 2018. These profiles were collected from a north-south transect along 30^{o}E to capture the seasonal sea ice gradient, as well as the full range of oceanographic and biological conditions in the Barents Sea. The two years of data collection encompassed strongly contrasting sea ice conditions, with heavy ice cover in 2017 and no ice in 2018, allowing us to estimate interannual variability in benthic biogeochemical cycling associated with the variability in ice cover.

We will show significant spatial variability in macronutrient fluxes along the transect in both years and decoupling of the sedimentary cycles of nitrogen, silicon and phosphorus. We will also show strong temporal variability in nutrient fluxes over seasonal and interannual timescales, which is intricately linked to sea ice dynamics during the winter, spring and early summer preceding sampling. Finally, we will estimate the influence of these sedimentary fluxes on water column nutrient inventories, and their potential to drive changes in surface ocean primary production.