BIOGEOCHEMICAL CYCLING ON THE YERMAK PLATEAU DURING THE LAST TWO GLACIAL CYCLES

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Over the past several decades, Arctic sea ice extent has drastically decreased. Sea ice retreat is expected to continue, with model simulations predicting that the Arctic Ocean will become seasonally ice free within several decades. Changes in sea ice extent are likely to have significant effects on nutrient availability and, subsequently, primary productivity. Nutrient cycling in the Arctic Ocean is poorly constrained in the modern, and even less is known about how nutrient availability will evolve as sea ice continues to retreat. Sedimentary records of past biogeochemical cycling are, therefore, important to evaluate and predict the effects changing sea ice export and oceanographic conditions will have on nutrient cycling within the Arctic Ocean.

Here we present paired pore water and sediment analyses from multiple cores retrieved north of Svalbard near the modern summer sea ice margin during the 2015 TRANSSIZ expedition ("Transitions in the Arctic Seasonal Sea Ice Zone"). Based on preliminary age constraints, the longest of these cores (PS92/39-2) includes sediments from the penultimate glaciation (MIS 6) to the Holocene (MIS 1). Initial results indicate a series of high Fe delivery events during the record with Fe concentrations of up to 9.8 wt.% and Fe/Al ratios of up to 1.3. Tight coupling between Fe and P concentrations throughout the record suggests dynamic nutrient delivery and burial in the region during the last two glacial cycles. Our results also suggest that the last two deglaciations were characterized by distinctly different patterns of biogeochemical cycling, suggesting that oceanographic and sea ice dynamics may have produced different responses in nutrient cycling during glacial terminations 1 and 2.