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## Nutrient regeneration and benthic fluxes in the Coastal Baltic and North Sea

**Kirstin Dähnke**, Andreas Neumann, and Tina Sanders

Helmholtz Zentrum Geesthacht, Institute of Coastal Research, Geesthacht, Germany

Sediments in the coastal ocean can play an important role in nutrient regeneration and in recharging the water column with dissolved inorganic nutrients. This function, however, depends on various variables, such as physical characteristics, but also on biological traits like fauna composition and activity. To unravel and quantify these effects, we investigated nutrient fluxes and nitrate stable isotope composition in water samples along a North Sea – Skagerrak – Baltic Sea gradient during the Maria S. Merian cruise MSM 50 in January 2016.

Especially in the North Sea and the Skagerrak region,  $d^{15}N$  values of nitrate were unexpectedly high, suggesting that underlying sediments with relatively enriched isotope signatures were a source of nitrate. This nitrification signal, however, resembled an autumn situation rather than the expected winter values. Parallel sediment incubations confirm that the benthic rates of oxygen consumption and nutrient turnover were indeed very similar to respective rates in autumn and that the sediment was a source of recycled nitrate. From the North Sea towards the Baltic Sea, we found, in accordance with previous studies, a depletion in nitrate stable isotope values. This is indicative of different nitrate sources in the respective basins: in the North Sea region, N of anthropogenic origin leads to high N values in surface sediments and in newly generated nitrate. Due to a higher share of nitrogen fixation, the nitrogen stable isotope signal of surface sediments in the Baltic Sea was depleted, which in turn was mirrored in lower nitrate isotope values in the water column above the sediment.

Overall, the data highlight the importance of nitrate regeneration. Parallel flux measurements reveal that faunal activity shifts the nutrient balance from sequestration to regeneration. Seasonal differences enable us to unravel seasonal effects of fauna and microbiota on nutrient budgets.