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Benthic nitrogen turnover processes in coastal sediments at the Danube Delta

Alexander Bratek (1,2), Kirstin Dähnke (1), Andreas Neumann (1), Jürgen Möbius (2), and Florian Graff (2)

(1) Helmholtz-Zentrum Geesthacht, Centre for Materials and Coastal Research, Geesthacht, Germany, (2) University of Hamburg, Institute for Geology, Hamburg, Germany

The Black Sea Shelf has been exposed to strong anthropogenic pressures from intense fisheries and high nutrient inputs and eutrophication over the past decades. In the light of decreasing riverine nutrient loads and improving nutrient status in the water column, nutrient regeneration in sediments and biological N-turnover in the Danube Delta Front have an important effect on nutrient loads in the shelf region.
In May 2016 we determined pore water nutrient profiles in the Danube River Delta–Black Sea transition zone, aiming to assess N-regeneration and elimination based on nutrient profiles and stable N- isotope changes (nitrate and ammonium) in surface water masses and in pore water. We aimed to investigate the magnitude and isotope values of sedimentary NH4+ and NO_3- and their impact on the current N-budget in Black Sea Shelf water.
Based on changes in the stable isotope ratios of NO_3- and NH4+, we aimed to differentiate diffusion and active processing of ammonium as well as nitrate sources and sinks in bottom water.
First results show that the concentration of NH4+ in pore water increases with depth, reaching up to 1500 μM in deeper sediment layers. We find indications for high fluxes of ammonium to the overlying water, while stable isotope profiles of ammonium suggest that further processing, apart from mere diffusion, acts on the pore water ammonium pool. Nitrate concentration and stable isotope profiles show rapid consumption in deeper anoxic sediment layers, but also suggest that nitrate regeneration in bottom water increases the dissolved nitrate pool. Overall, the isotope and concentration data of pore water ammonium clearly mirror a combination of turnover processes and diffusion.