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Variability of N-transformations in the Benguela upwelling System

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The Benguela upwelling system (BUS) is a highly productive coastal region, which also is an important hot-spot of nitrogen cycling. Past studies reported significant N-removal by denitrification and/or anammox during upwelling events. In austral summer 2013/2014, we analysed the nutrient distribution and stable isotope composition of nitrate and nitrite in water column samples from the shelf region. Additionally, we quantified N2 production from denitrification or anammox in hypoxic to anoxic water samples using the isotope pairing technique.
Hypoxic conditions with $[O_2] < 20$ μmol L-1 prevail above shelf sediments in the upwelling region. Interestingly, we find only little decrease in water column [NO_3-] and only slight isotope enrichment. IPT measurements also indicate that N2 production in the water column is negligible.
Our results are in contrast to previous investigations and suggest that little canonical denitrification takes place in hypoxic water masses, and that the influence of sedimentary nitrate removal on the water column inventory is limited during our cruise. Previous investigations in this region were limited to austral winter and spring. We accordingly hypothesize that these results reflect the so far understudied seasonal variability of N-isotope changes, which is coupled to seasonal variation in current regimes in the Benguela Upwelling System.