

***Interactive comment on* “Nitrogen isotope dynamics and fractionation during sedimentary denitrification in Boknis Eck, Baltic Sea” by K. Dähnke and B. Thamdrup**

S. Hietanen (Referee)

susanna.hietanen@helsinki.fi

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This paper discusses results of a single sampling in April 2010 at a southern, coastal Baltic Sea station. Both water column and surface sediment were sampled and analysed for nutrients and isotope signatures of nitrate. Additionally, surface sediment was homogenized and incubated with added nitrate to follow fractionation of the nitrate over time during sedimentary denitrification. A careful analysis of the results revealed plenty of interesting, novel aspects in sedimentary denitrification, the most important being that denitrification in sediments seems to fractionate N and O just like denitrification taking place in anoxic water bodies, and that this might, in some cases, affect the

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bottom water nitrate isotope signatures, which should be taken into account in future studies. The paper is very well written, guiding the reader through different theories and relating them to their results in this complicated but increasingly important topic. My comments are, therefore, very minor. Abstract: I would not state that the denitrification rates were “tremendously high”, as these are potential rates, only – a point that the authors mention themselves in chapter Implications for water column nitrate composition. Additionally, they mention (page 690) that the rate was similar to other shallow coastal sediments. Materials and methods: what was the isotopic composition of the added nitrate? The sediment was depleted of any ambient nitrate after pre-incubation, I presume. Discussion: page 693 row 5 on. Have you possibly mixed concentration and isotope value? How could sedimentary denitrification increase the concentration of nitrate in bottom water? By preferentially depleting 14 over 15 it can affect the isotope signature of nitrate in bottom water, but not the concentration, right? Same chapter, page 694 row 8, shouldn't that be nitrate, not nitrite? Chapters 4.4.1-4.4.2. were slightly confusing. One would not expect re-oxidation of nitrite to nitrate (nitrification) under anoxic conditions. The unsynchronized nitrite processing outside and inside the cell is a nice theory, though. The figures are all very clear and useful.

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