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Discussions

Interactive comment on "Nitrate source identification using its isotopic ratios in combination with a Bayesian isotope mixing model in the Baltic Sea" *by* F. Korth et al.

Anonymous Referee #2

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In general, the manuscript is well written and contains interesting information regarding the nitrate source apportionments estimated by SIAR, a Bayesian isotopic mixing model in the Baltic Sea.

However, the paper needs some clarification and additional support for some of its interpretations.

1. Page 5871 lines 26-27: When low water temperatures reduce microbial activity, the fraction nation can be minimized and neglected, is that right? I do not think so; at least I think nitrification is still going on. We conducted incubation experiments using coastal water at a temperature around 10°C and we found continued nitrification in the time

sequence. Can you provide a detailed explanation?

2. Page 5872: considering your field sampling, it included 2008, 2009, 2010 and 2011. You sampled the surface water in four years for the Baltic sea and compare the performance of source contributions of atmospheric deposition, N2 fixation, pristine soils and agricultural runoff. My question is that did you consider about the uncertainty regarding source variations in these four years? Are there any sudden events that may alter the N pool?

3. Page 5874 lines 20-21: How do you consider the data from Deutsch et al. (2006) as representative agricultural runoff? Moreover, the data was collected in 2003, the land use types, fertilizer application etc. may also change. Please provide a detailed explanation.

4. Page 5876: SIAR mixing model: Please provide the mean and standard deviation of the potential sources.

5. Since your isotopic values of sources are not from literature, the specific source composition should be representative for your study. It is better you provided more detailed and more references to support your assumption for isotopic composition of the potential nitrate sources.

6. Page 5880, lines 1-5: the three rivers you mentioned were all influenced by agricultural activities? You mentioned ERGOM model, but without any description, it is so strange!

7. Page 5883 NO3- from pristine soils: this section is confusing. Lines 10-12: I did not see a low d15N and high d18O values.

8. Page 5884, lines 15-17: again, the sediments data were from 2005, and you compare it to the present ones for coastal water. This means you assume the difference in these years were not significant, right?

9. Considering the source apportionment for the Baltic Sea, you specify source by

source, why not sampling part by part (western Baltic Sea, Baltic Proper etc.), which may be easier to understand.