

Biogeosciences Discuss., referee comment RC1  
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## Comment on bg-2021-321

Anonymous Referee #1

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Referee comment on "Suspended particulate matter drives the spatial segregation of nitrogen turnover along the hyper-turbid Ems estuary" by Gesa Schulz et al.,  
Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-321-RC1>, 2022

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The manuscript examines nitrogen cycling along the Ems estuary in north Germany. Some of the authors have published multiple articles on related topics and the content of this manuscript reflects their strong understanding of the physical and biogeochemical characteristics of the estuary system. My comments mostly concern structural and presentation content and are written below.

I was a bit confused when the methods section talked about FerryBox sampling (Line 92) and equilibrator measurements of nitrous oxide (Line 132), yet the datasets only show discrete samples for the sampling stations along the 100 km transect (Figure 2). To be clear, I like the data presentation in Figure 2 because its clear and easy to follow, but at the moment the Methods section highlights sampling that is not reflected in the results section. The only continual measurements are a snapshot of dissolved oxygen concentrations over a 2-3 day period for fixed locations (Figure 3). Also, Figure 3 is less easier to follow than the other figures in the manuscript and I think future readers would appreciate efforts to make it more interpretable.

It wasn't clear to me whether the authors interpret the datasets obtained six years apart (in 2014 and 2020) to be sufficiently similar that they can be considered a sampling replicate or whether there are differences between 2014 and 2020 that indicate changes to the N cycling. Looking at Figure 2, there appear to be differences in nitrite concentrations and also the isotopic composition of nitrate. Is this noteworthy to the readers? Discussion of this could be included when discussing differences in the PCA plots on Figure 5?

Line 362 The authors justify using an isotope effect of 10 ‰ based on unpublished data. This is should be changed. The authors can always deposit the data in a free public database e.g. zenodo, and cite the doi.

Line 443 'Furthermore, our results as well as those from 1997 were obtained from a single survey in June making the comparison ***intruding***' This is just a small language error, the authors should change intruding to intriguing or another word to better reflect their intention.

Figure 1. Is it possible for the authors to either indicate on the map, the four sections that are referred to in the text, or draw a transect below the map that indicates the four zones?

Was the O2 sensor data included in the Supplementary Material? I don't think I saw it there.