

Interactive comment on “Anaerobic ammonium oxidation, denitrification and dissimilatory nitrate reduction to ammonium in the East China Sea sediment” by G. D. Song et al.

Anonymous Referee #2

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In this study the authors investigated the co-occurrence of denitrification, anammox, and DNRA along a gradient reaching from coastal sampling sites to further off-shore in the East China Sea. The authors applied a new methodological approach for their rate calculations which also integrated effects of DNRA on calculations of denitrification and anammox as well as effects of nitrate release from organisms on all of these processes. The authors found that all these processes took place at their study site, and they could also show the errors introduced to the quantification of anammox and denitrification if processes such as DNRA or nitrate release were not considered. By proposing this new integrated approach, the authors make an important contribution to this field of research as their recommendations are likely to be relevant for a large number of similar

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studies. All the calculations are explained in detail, and the authors provide a sound mathematical model for the simultaneous investigation of denitrification, anammox, and DNRA.

However, there are two different aspects that the authors should pay attention to:

(1) An approach for measurements of denitrification and anammox based on calculations of isotope ratios that is not affected by the co-occurrence DNRA has been developed by Spott & Stange (2007, Rapid Communications in Mass Spectrometry) and should be mentioned here.

(2) The discussion is very long and should be shortened and be written more concisely. Although this is clearly a paper with a strong method focus, the discussion of the results within the ecological context of sediment N cycling should be further strengthened. Here, this reviewer would like to see more emphasis put on the combined discussion of the measured depth gradients of nitrogen compounds and the depth distribution of the different N cycling processes. In this context, it would also be helpful if data on the oxygen distribution in the sediments could be provided to evaluate which processes are likely to occur. If such data is not available, then the authors should at least take into consideration publications from similar environments. How likely is it that ammonium produced deeper in the sediment can reach the surface? What is the extent of natural sediment perturbation at the study site?

Specific comments

p. 6: Experimental setup: although table 2 gives the complete overview of the experimental setup, I would suggest adding at least one sentence describing the setup also in the text in order to introduce the abbreviations used here to the reader and to briefly outline the different assays.

p. 7, line 13: What does E. Denit and E. Amox mean? Please introduce the abbreviations also in the text.

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p. 11, l. 10 and 14: Is active nitrification likely to occur at this sediment depth? What is the distribution of oxygen in the sediment profile?

p. 13, l. 3: Please consider a modification of this sentence. The increase in denitrification rates you describe here could be mistaken for an increase across the coastal gradient as you just described the decrease in rates across this gradient one sentence before.

p. 14, l. 15-17: This is not exactly true, please see the method introduced by Spott & Stange (2007).

p. 16, l. 15: This sentence is not clear.

p. 16, l. 22-25: Would the addition of nitrate not rather have stimulated further uptake of nitrate? Please explain.

p. 17, l. 18: Please write "quantification of the extent of the effect of DNRA on denitrification and anammox"

Fig. 2: As far as I understand, sediment cores were investigated for pore water chemistry were investigated down to a depth of 60 cm. Why do the authors only provide the data for the first 10 cm in Fig. 2?

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