

BG2022-226 Reports for acceptance:

Report #1:

The authors did an excellent job addressing the concerns of previous reviewers, and this manuscript is far clearer. I noticed some typos in the first pages, and I encourage the authors to take another read through to fix those. Nevertheless, I appreciate the effort that went into this revision, and after a quick look through, this paper should definitely be published!

AC: Thank you very much for this positive feedback. In order to correct the typos, we had the paper read by a native speaker.

Report #2:

Based on the information provided, the article focuses on investigating the nitrate/nitrite respiration pathways and their impact on total alkalinity (TA) generation in the highly turbid estuary of the Ems River. The researchers sampled various locations and conducted incubation experiments to determine the dominant pathways for nitrogen gas (N₂) production. The findings suggest that in the water column of the tidal river, denitrification is the dominant pathway for N₂ production, as indicated by stable nitrate isotopes. However, in the fluid mud of the tidal river, the majority of N₂ production is attributed to anammox (anaerobic ammonium oxidation) rather than denitrification. This implies that anammox plays a significant role in the CO₂ storage capacity of the coastal waters adjacent to the estuary. The article highlights the importance of understanding the carbon cycle and nitrogen dynamics in coastal ecosystems, particularly in estuaries subject to human interventions and high nutrient inputs. The research contributes to our knowledge of the factors influencing CO₂ storage capacity and the relative contributions of different nitrogen respiration pathways in estuarine environments. Overall, the article provides valuable insights into the dominance of anammox in the studied estuary and its implications for carbon and nitrogen cycling. The findings contribute to our understanding of estuarine biogeochemistry and have implications for coastal management and climate change mitigation strategies. I think that it is an interesting and worthwhile topic to be published in BG, but there are some problems to revise. A minor revision is required to make the paper more understandable.

AC: Thank you very much for this positive feedback. We have improved the paper according to your suggestions.

The comments are summarized below:

1) Line 52-53, the sentence "Based on TA generation and an isotope pairing approach, we find that anammox dominates in this heterotrophic environment" is suggested to be deleted, because this conclusion is from this study, which is not suitable to show in Introduction.

AC: We deleted this sentence.

2) Line 85, water samples dried at 550°C and weighed, how to do?

AC: We corrected the temperature and added some clarification and the reference for the detailed sampling protocol.

3) Line 99, "potentiometric titration" not "potentiometric"

AC: Corrected.