

Biogeosciences Discuss., referee comment RC2
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Comment on bg-2022-117

Anonymous Referee #2

Referee comment on "Nutrient release and flux dynamics of CO₂, CH₄, and N₂O in a coastal peatland driven by actively induced rewetting with brackish water from the Baltic Sea" by Daniel L. Pönisch et al., Biogeosciences Discuss.,
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Pönisch et al investigated the nutrient and greenhouse gas response in a coastal peatland rewetted by the Baltic water. They suggest the rewetted peatland could be an overlooked nutrient source to coastal areas. The observations are interesting, and their conclusions could be supported by the data, but the potential of the data could be explored further.

For the nutrient part, the authors have attributed nutrient increase after rewetting to more mineralization. So what about the changes of N to P ratios before and after rewetting? Their ratios could point to some nutrient source changes via rewetting. Another question is organic carbon from the Baltic Sea, could it bring in OC that is mineralized in peatland or most of nutrients were derived from local organic carbon degradation. At least some cross plots of e.g. NH₄ vs PO₄ are needed to explore if there is any patterns or any dependency among variables.

For greenhouse gas part, vegetation could play an important role in regulating GHG flux. Did the chamber measurements cover some typical communities? This is worth mentioning if there are any patterns and variations associated with GHG fluxes. And also dead vascular plant can still affect GHG emissions through their hollow stem, thus this has to be considered as possible factors driving seasonal variations. But the authors have missed all this.

Another issue is flux estimates. I understand the authors have tried both the chamber measurements and the Wanninkhof equation to estimate the flux, however, both of them could generate large uncertainties. Especially for the Wanninkhof equation, it was developed for air-sea exchange in open ocean and it is barely valid when wind speed is below 4 m/s. In peatland, it does not make much sense to compare these two methods. But the large variation range and their influence on evaluating peatland as GHG source

have to be further discussed.