

Ocean Sci. Discuss., referee comment RC2
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Comment on os-2021-82

Harri Kuosa (Referee)

Referee comment on "Salinity as a key control on the diazotrophic community composition in the southern Baltic Sea" by Christian Furbo Reeder et al., Ocean Sci. Discuss.,
<https://doi.org/10.5194/os-2021-82-RC2>, 2021

This is a good paper with many interesting observations. Though the text is fine, I would like to focus it more - like the title suggests - to salinity/N-fixer communities. The chapter on Nitrogen fixation rates (3.2.) does not represent typical situation due to the timing of the samplings. nitrogen fixation rates are generally low as the authors have also shown in the text. The chapter could be condensed, and I do not find novelty in the summarizing Table 1. However, the other parts of the article are fine. Introduction should tell us more about the UCYN-A organisms and their ecology as this is one of the major findings in the article.

I have some detailed comments:

Line 30: The Baltic Sea covers an area of 415000 km² with a permanent halocline preventing vertical mixing, oxygen (O₂)-depleted waters in the deeper basins and coastal systems, accompanied with the occasional accumulation of hydrogen sulfide (H₂S) and ammonium (NH₄⁺) below the chemocline.

- Northern deep basins (Åland Sea and Bothnian Sea) do not have a permanent halocline.
- Phosphate accumulation should be mentioned.

Line 44: Reference 'Capone, Douglas G; Carpenter, 1982;' is atypically written compared to others. Capone et al. 1982?

Line 66: 'heterocytous' originating from a cell (cyte) is preferred instead of 'heterocystous'

(cyst).

Line 66 and 70: '*Aphanizomen*' should be '*Aphanizomenon*'.

Line 73: 'available for primary production' = 'available for other primary producers'?

Line 86: '(e.g. the Bothnian Sea) with a salinity of 0-2' There may be an error here as the Bothnian Sea is closer to 5 in its salinity.

Line 87 onwards: see Laamanen, M. J., Forsstrom, L., & Sivonen, K. (2002). Diversity of *Aphanizomenon flos-aquae* (cyanobacterium) populations along a Baltic Sea salinity gradient. *Applied and Environmental Microbiology*, 68, 5296-5303.
<https://doi.org/10.1128/AEM.68.11.5296-5303.2002>

Line 105: DIN analysis includes both ammonium and nitrate(+nitrite)?

Line 164: 'dried' can mean many different methods with different end results. What is used here?

Line 177: 'basin' with capital 'b'.

Line 182: The results are given as NOx instead of DIN in the methods?

Line 184: 'The detected somewhat higher nutrient concentrations in the Bornholm and Eastern Gotland Basins could result from a decaying phytoplankton bloom, decreased microbial activity or increased eutrophication.' This should lead to elevated ammonium concentrations.

Line 192: Only NOx is discussed. Did the samples have notable concentrations of ammonium?

Line 303: 'Moreover, a very recent study showed that ocean acidification has an impact on the diazotroph community composition and can decrease N₂ fixation rates in the subtropical Atlantic Ocean (Singh et al., 2021).' These N-fixers (*Trichodesmium*) are very

different in their ecology. pH may have an effect on their growth, which is then reflected by their N-fixation capacity, not that pH directly affects N-fixation.

Line 313: 'In case of a future freshening of the upper water column...' This conclusion should be tied with basin-wide P-dynamics as it also affects the future of cyanobacterial blooms. I would propose using 'potential' in this paragraph.