

## ***Interactive comment on “Ventilation of the Northern Baltic Sea” by Thomas Neumann et al.***

### **Anonymous Referee #3**

Received and published: 30 September 2019

This paper tries to justify that oxygen rich bottom water found in one profile collected in the Bothnian Bay, may have been formed by inflowing water from the Bothnian Sea mixed with surface water in the Northern Quark, and not by salt release from sea ice. The data set is very small, and the processing done poorly explained. It is also hard from the discussion to grasp that the above explanation is what the authors want to say. To make this manuscript more readable they should state more clearly in the discussion whether each explanation they try own ends up with a plausible explanation. I do not suggest any places where to do this in particular, but both the abstract and discussion and conclusions should become clearer. Perhaps add your hypotheses at the end of your introduction. Than it would be easier to state of your data support or do not support each of the hypotheses.

Page 3, line 12: Explain how you collected the brine.

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Page 4, Figure 3 caption: at (red crosses) to stations 7-10.

Page 4, lines 1-2: Explain more elaborate how you measured salinity in both ice core samples (Table 1) and brine samples (Table 2). For instance how big did the samples have to be to measure salinity with the CTD. Also, with the low number of samples you collected, why not measure all with the Guildline?

Page 4, lines 2-7: The Guildline Autosol is a standard instrument used with a standard procedure, so this procedure does not need elaborate description. How you collected ice samples and brine and measured their salinity is on the other hand not standard procedure and needs better description.

Page 5, line 10: Justify how you can assume that 'upper 5m are well mixed and saturated with oxygen'. This might be ok for late winter, although I do not have any reference to recommend.

Page 6, lines 13-14: Can you justify the assumption that all the rejected salt is trapped in brine pockets inside the ice? Some of it can be released into the water column.

Page 6, line 14: You can hardly regard an average of two brine samples an average (14.7g/kg). At least, remove the decimal.

Page 7, line 2: from where and to where is the water 'out-flowing'. I would find the term 'in-flowing' more appropriate if it flows from the Bothnian Sea into the Bothnian Bay.

Page 7, line 2, last words: Change to 'A weak stratification'

Page 9 and 10, Figures 6 and 7: Try to use colors that are more easy to separate from each other. Especially Stations 9 and 10 with purple colors.

Page 9, line 6: Mixing lines do not 'show' water masses. They indicate along which line a mix between two source water types can be placed.

Page 10, Figure 8: It is confusing when the end points of the mixing lines go beyond the source water masses. It is clear where the end water mass is, but not the source water

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masses. You should also indicate better which 'greenish dashed and dash-dotted' lines you are referring to in each case. Where is the brine in this figure, having which temperature? Etc.

Page 11, Figure 9: in this figure, the colors of stations 10 and 12 are difficult to distinguish.

Page 11, line 3: The brine must be way beyond the axis in Figure 8. Again, which TS characteristics do you assume in the brine?

Page 11, line 15: 'mechanisms'

Page 13, line 5: 'weakening'

Page 14, line 18: 'polynyas'

Page 15: make it clearer which formation process you trust and which you do not trust.

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Interactive comment on Ocean Sci. Discuss., <https://doi.org/10.5194/os-2019-48>, 2019.

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