

2nd review of “Winter stratification phenomena and its
consequences in the Gulf of Finland, Baltic Sea” manuscript
OS-2020-40

General comments

The authors did a decent job in addressing my comments, and I am glad to see that the manuscript improved since my first read. However, I still have some concern regarding the quality of the writing and the figures. Some parts of the text, particularly the paragraphs introduced after the revision, contain some repetitive sentences and feel a bit jumbled. I also have a pseudo-major comment that I missed in the first round. I have the feeling that one of the main points of the manuscript is that wintertime haline stratification resulted in enhanced chlorophyll-*a* concentrations. You show this very nicely with the cruise data. Then you make a thorough effort to assess the generality and the spatial coverage of the haline stratification with different datasets, but there is no equivalent assessment for phytoplankton bloom or chlorophyll dynamics. The biological implications of your results is thus much weaker than the description of the physical rationale. Would it be possible to use a satellite product to expand the spatio-temporal coverage of chlorophyll observations? Below, I list a series of specific comments concerning mainly writing and presentation issues, but I may be missing a significant number of them. I suggest a careful inspection of these aspects before publication.

Specific comments

Abstract. Please revise the abstract language. It feels patchy and contains repetitive sentences. For example the “relaxation of westerly winds” is mentioned twice to give a very similar message.

Line 12 “In this study, we demonstrate that wintertime UML stratification is common in the Gulf of Finland.”. This sentence is contradictory, if it is a mixed layer is not stratified by definition. I recommend formulating it differently.

Line 15 “Fresher water and haline stratification occurs”. That sounds a bit weird to me. Reformulate.

Line 154 Add space after “simulations”.

Line 206 “m⁻⁰²” → “m⁻²”

Lines 256-258 I think this sentence about the mechanism driving the spreading of haline stratification belongs more to the discussion. You need to support it with references. There is another interesting point that emerges from Figure 11b. There are a number of eddy-like frontal instabilities that seem spread shallow mixed layers towards the south. It may be worth mentioning this in the discussion. See for example: <https://science.sciencemag.org/content/337/6090/54.full?rss=1>

Line 287 “Restratification phenomenon were”. Phenomenon is singular, so “was”.

Lines 291-305 This part is a bit dense and hard to follow sometimes. Consider rephrasing a bit.

Section numbering Section numbering is wrong for Discussion and Conclusions

Line 327 “Deepen the mixed layer depth”. I would remove “depth”.

Lines 341-357 This paragraph is also a bit jumbled and contains typos like “accounts contributes”. In line 344, it is not clear to me what you mean by “topography”.

Line 359 The meaning of “occasionally” here is blurry. Please try to be more precise.

Lines 390-393 This sentence is weirdly constructed.

Lines 395 “We can assume” doesn’t sound very convincing to me, maybe “Therefore, our results suggest/indicate”

Figure 4, caption There is a double “..” after 2911/12. Also 2911 is wrong.

Figure 6 The tick labels of the colorbar overlap with the ticklabels on the y-axis.

Figure 10a It is extremely difficult to extract information from this new panel, too many superimposed lines. Please consider improving this.

Panel labelling The labelling of the different panels (a, b, c, etc) is located in different places for the different figures, sometimes it is inside the figure, sometimes in the panel title, others in the y-axis label. It would be better for the reader to homogenise this.