

Ocean Sci. Discuss., referee comment RC2  
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## **Comment on os-2021-123**

Anonymous Referee #2

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Referee comment on "Quasi-steady circulation regimes in the Baltic Sea" by Taavi Liblik et al., Ocean Sci. Discuss., <https://doi.org/10.5194/os-2021-123-RC2>, 2022

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### **The review of the manuscript 'Quasi-steady circulation regimes in the Baltic Sea' by Liblik et al. submitted for the publication in the Ocean Science.**

The submitted manuscript describes the ocean circulation patterns observed in the Baltic Proper in 2020 and the forcing mechanisms behind them. The authors use extensive set of new observational data from moored instruments (two current meters plus one CTD recorder), 2 glider missions, one Argo float, several CTD profiles and back them with the numerical model results and atmospheric reanalysis data.

#### **General comments**

The major concern in this kind of study is whether the data collected in a restricted area can be representative for a larger region, such is the Baltic Proper in this case. By using the model results and a long Argo trajectory the authors convinced me that the link between the point measurements, as well as rather short glider sections and more general circulation pattern does exist here. The obtained time series are not only thoroughly processed, quality controlled and analyzed but also deliberately matched with the model outcome. Several topics/processes are analyzed. The in situ data-model output comparisons are supported by additional observations and everything is illustrated by the appreciable number of figures (15) and two tables. The complex manuscript is well written and allows the reader to familiarize well with the specifics of the area and science problems. The received results are convincingly yet cautiously discussed in the light of the previous findings and the broader/long-term perspective. The conclusions drawn by authors are interesting and motivate to further studies. Thus, I have only a few questions and some comments that can potentially improve the way of the presentation. Otherwise, I have no more concerns and I suggest a minor revision.

#### **Specific comments**

Page 2, line 52: for the pelagic ecosystem - if it concerns the deep bottom layer it probably also impacts the benthic ecosystem. Consider adding this.

Page 2, line 57: increase hypoxia in the Northern Baltic Proper and Gulf of Finland - why? Please add 'due to ....' that the reader does not need to look for this information elsewhere.

Page 8, line 236: Persistency of the current - what does the persistence tell us? Consider adding a few words, like 'informs about... and is defined by'

Page 9, line 270: The flow resulting from the sea level gradient and due to the inclination of isopycnal surfaces are also a consequence of wind but develop slower - Nicely explained!

Page 9, line 276: 0.6 m/s - this is rather low wind speed, do not you think? Is this a mean for all months from this period? Or for Mar-Aug only? The impact of seasonality could be mentioned here, I think.

Page 11, line 331: a drop in SST from 21 to 15 °C – this is interesting and a bit counterintuitive. In other parts of the Baltic Sea such a fierce drop in surface temperature in summer is often a sign of upwelling, not the downwelling. What is the source of this cold water – the mentioned vertical mixing and cooling alone? I would expect that northerlies are able to cool the sea surface more efficiently than the southwesterlies unless they are much stronger. A set of SST maps from late June/early July would make it clear (possible advection path), I think.

Page 16, line 416: occasionally deviated from the measured values - no surprise, it would be strange for the model to show the same results as in observations all the time.

## Figures

Figure 4 - Are you still able to change the color palette? I think this one is not color-blind friendly.

Figure 5 - Similarly here, it would be nice to avoid red and green color together.

Figure 8 and 12 – Could you add the notation about geographical sites: W and E or Sweden and Estonia? It would help to grasp the bathymetry/orientation at once.

Figure 13 – What is the parking depth for this float? Slightly above the bottom or the same along the whole Argo trajectory (~100 m)? What information does the ANDRO product provide here? The same as Argo GDAC? Could you, please provide WMO for this float?

### **Technical corrections**

Page 2, line 48: so called - this is an informal phrase, use another one

Page 9, line 278: at the Valeport location - this can be a sentence start, stressing the change in instrument being described

Page 10, line 288: low-passed filtered - low-pass filtered

Page 10, line 289: reasonably well – put it at the end of the sentence

Page 10, line 299: evoked - induced

Page 16, line 405: northerly wind prevailed – should not there be a coma here?

Page 16, line 412: The flow was to the south in the upper – rephrase a bit to make this sentence similar to the previous one, like 'On the contrary, a pattern typical for the upwelling ...' and continue in similar way as before. This would make things easier for the reader, because there are many directions and layers in this description and it is easy to get lost.

Page 16, line 414: These vertical patterns - do you mean downwelling and upwelling? If yes, say it (e.g. in brackets).

Page 16, line 422: Next, we analyze the vertical (Fig. 8) and horizontal (Fig. 9–11) structure - this part is somehow disconnected from the previous one. You need to clarify

why do you include it. Say something like: 'To understand (what?)....we next analyze the vertical...'. Similarly, you can explain why do you want to analyze model data in this area (the Eastern Gotland Basin) that is out of the area where all of the measurements were taken (this is the major concern I mentioned in my general comments).

Page 17, line 437: but forced – but was forced?