

Review of the manuscript “Long term trends and variability of the mixed layer depth in the Baltic Sea”.

General comments

This manuscript reports on studies of long-term trends in MLD in the Baltic Sea, and also discusses the implications for the ecosystem. It is a nice and fairly well-written manuscript that is easy to read. The figures are also well done, though I have a request for either an additional figure or a remake of one of the figures (the MLD trend; see my specific comments below). I recommend the paper to be published after minor corrections.

Specific comments

l. 9: “...reanalysis data *set*...”

l. 20: “...more stratified *which*...”

l. 49: “...Baltic *proper*...” (...and many other places in the manuscript. Many people write *proper* with Upper-case P, but grammatically it should be lower-case p, as *proper* is not part of the name. Example: *France proper* means mainland France, i.e. not including French Guiana.

l. 87-89: Perhaps you could rewrite this paragraph a bit, to emphasize that the validation was done outside of this paper, and also comment on the result of the validation (e.g. that most validation stations are in open water and that the really deep MLD often seem to be underestimated by the model. The trends that you calculate could still be okay, as I see it.

l. 90: “*The* annual cycle...”

l. 91: “...for *the* whole reanalysis period...”

l. 94: “...10-20m *during the* period...”

l. 95: “...80 m deep during *the* reanalysis period...”

l. 96: “...until *the* end o summer...”

l. 97: “...for *the* reanalysis period...”

l. 98: “...comparison of *the* MLD product...”

l. 104: “...more energy *is* required...”

l. 107: As far as I can see, the variable names “SA” and “CT” are not used anywhere else, so I suggest to simply leave them out (but of course keep the words “Absolute Salinity” and “Conservative Temperature”)

l. 113: “where g is...” (lower-case “w”)

l. 117: What do you mean by “streaming statistics”?

l. 123: “...derived from *the* high-resolution...”

- l. 121-133: This figure caption is too long, in fact I think there has been a mistake here. Everything except the first sentence should be in the main text, *referring* to the figure.
- l. 147: Error in figure heading for subplot “f”): Should be *Total precipitation*.
- l. 151-152: I think there is a mistake here. The areas shaded in red must be the regions with *insignificant* trends, right? And the areas shaded in green are the regions with *significant* trends?
- l.167: “...seasonal fluctuations...” (“s”)
- l. 173-174: Judging from the figure I would say Oct-Mar and Jun-Aug, respectively.
- l. 255: How can you see a “trend toward stronger stratification” in figure 3? Which sub-panel?
- l. 119: I would suggest changing the section heading to simply *Results*, and add a new section heading called *Discussion* between l. 229 and l. 230. Or keep it as it is; just a suggestion...
- l. 266, 276, 279: You discuss a trend toward a shallower MLD during *winter*, but figure 3 a) shows the MLD trend for the year as a whole, as I understand it. If the winter trend is most important, perhaps fig 3 a) can be remade to show that instead of the annual trend? Or do you need both for the discussion?