General comments to the manuscript: Paleogeographic numerical modelling of marginal seas for the Holocene – an exemplary study of the Baltic Sea

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The manuscript deals with paleogeography of the Baltic Sea during the Holocene by combining eustatic sea-level change, glacio-isostatic adjustment and sediment deposition.

They present paleoreconstruction and map of Holocene sediment thickness based on different datasets and calculate total mass of Holocene sediment in the Baltic Sea and yearly sediment accumulation.

Reading the manuscript there are terminological and methodological problems, which are described below.

First there are some errors using terminology, like using plate (plate tectonics) instead plain and its not clear what is meant by platform (lines 64-68 see comments below). For some terms it's not clear the meaning, like inland ice (possibly glacier), gate and gate function or amphibious Digital Elevation Model.

Secondly there are some methodological problems like Baltic Ice Lake /Yoldia Sea transition (look details below **Figure3**) and creation of sediment thickness map.

Chapter 3.4 **Sediment thickness** does not have information about the uncertainties of the used data sources. Why only present-day sea area data were used? In central and northern areas, like Gulf of Botnia, coastline was several hundred meters higher, and sedimentation in the Baltic Sea occurred also in present day mainland. Moreover referred Winterhalter 1972 does not have any datapoints from north of Gulf of Botnia (yellow square in Figure 5) so its not clear how those data were manipulated.

According to line 231 Holocene sediments in Southern Baltic are on top of glacial till. Holocene starts at 11.7 ka BP but glacial till accumulated around 17-15 ka BP, so there was no sedimentation several thousand of years? According to line 241 glacial varved sediments of the Baltic Ice Lake are considered early Holocene age, what is not true as Baltic Ice Lake drainage (end) coincides more or less with the start of Holocene, so Baltic Ice Lake sediments are from Pleistocene, not from Holocene. There has been earlier attempt to create Holocene sediment thickness by Jakobson et al 2007 https://doi.org/10.1016/j.gloplacha.2007.01.006, which differs from results here. So the map presented here seems to include not only Holocene sediments but some Pleistocene sediments also.

There are some issues with Figures:

Figure 1 longitude values starting from 15° and specially 20°-40° are almost 5° wrong. Glacier extent specially for 10.5 ka BP is not the same as in Andren et al 2011. It seems that there is problem with georeferencing.

Figure 2 according to figure Peltier 1999 ice thickness model was used (ICE-4G), but in text Peltier 2004 (ICE-5G)

Figure 3 explains that authors have wrongly modelled Baltic Ice Lake at 11.7 ka BP or they don't understand how Yoldia Sea Stage started. According to that figure the highest BIL water level occurred 12 ka cal BP and not at 11.7 ka BP as suggested by Andren et al 2011. At 11.7 ka BP water level in BIL dropped during ca 1-2 years 25 meters and Yoldia Sea started. So modelled BIL at 11.7 ka BP (Fig 7) is actually Yoldia Sea first stage after BIL drainage not BIL prior the drainage.

Figure 7 reconstruction for 11.7 kyr BP and 11.0 kyr BP look in the southern part near Bornholm exactly same

Figure 8 the caption is not correct. Both curves red (results in manuscript)and black (Rosentau et 2021) are modelled RSL curves according to ICE-5G model. Rosentau et al 2021 has on Figures 7,8,9 shown results with ICE-5G model with three different litosphere thicknesses and also ICE-6G, which one is used here is not clear. Black curve is not field data (or proxy data). Only RSL for Finland N looks similar to Rosentau et al 2021 results.

Figure 9 Comparison in present form is not convincing as shorelines from Andren et al 2011 seems to like freehand drawings and differ from original. Moreover, on Figure9 a) You compare results here with BIL prior final drainage (Andren et al 2011) but its water level was about 25 meter higher than in present reconstruction. That also explains why Figure 9a and 9b coastlines are so similar.

There are some spelling errors in references and reference list and not all reference area on the list. In reference list sometimes only first author is shown are not.

In the following are some comments by line numbers.

Chapter 1. **Introduction**

45 climatically controlled eustatic **sea level** changes

46 Lambeck 2010 not in reference list

Chapter **Geological setting**   some terminology is not clear/correct

62-63 **Danish Straits** and **Swedish Sound**?? First term is enough as it includes all straits, second is The Sound or Öresund

64,68 Russian Plate - there is no such plate, do You mean East European (Russian) Plain?

65 what are **Western** and **Eastern European Platform**?

78, 85, 99, 143 the term **inland ice**   should be replaced by glacier/icesheet

82. **sea-level drop** What about if land uplift is smaller than sea level rise?

83,84 not clear what is meant by **gate and gate function**   its more like technical term used in artificial reservoirs not for natural waterbodies

85 That sentence is not clear and not correct as there are surely sediments and proxy data older than post-glacial period (=last 11700 cal yr BP)

89 There is no LGM on Fig. 1

100 Heinsalu and Veski were using brackish-water Yoldia Sea

102 why so-called?

110. Figure 1 longitude values are wrong. Maps are difficult to read, because its not clear what is light blue and what is blue in Gulf of Botnia and near Oslo fjord. Baltic Ice Lake existed in Pleistocene

Chapter **3. Data and methods**

144 the sentence meaning not clear

150 Figure 2 What ice model was used?

Chapter **3.2. Eustatic data (EC)**

166 Waelbroeck et al 2002 not in reference list

168 global ocean? what in none global ocean?

Chapter **3.3. Vertical crustal movements...**

191-195 add here some references

205 explain how You get 500 years timeslices for reconstructions if GIA resolution is 1000 years

Chapter **3.4 Sediment thickness**

That full section needs more explanation and some information about reliability and resolution of used data sources.

Chapter **Discussion**

399 Rosentau et al 2021 black curves are not proxy-based but modelled by ICE-6G_C(VM5a)

435 Figure 9 Andren et al 2011 coastlines are not similar to published maps.

439-440 that was already in chapter 4.2