Comment on esd-2021-68

Boris Chubarenko (Referee)

Referee comment on "Oceanographic regional climate projections for the Baltic Sea until 2100" by H. E. Markus Meier et al., Earth Syst. Dynam. Discuss., https://doi.org/10.5194/esd-2021-68-RC1, 2021

Comments of Boris Chubarenko to ESD manuscript:

Title: Oceanographic regional climate projections for the Baltic Sea until 2100
Author(s): H. E. Markus Meier et al.
MS No.: esd-2021-68
MS type: Review
Special Issue: The Baltic Earth Assessment Reports (BEAR)

General comments

The paper is very informative and well structured. It is written in clear language and wishes to explain the main aspects and details to a reader sincerely.

The paper clear overviews the results of several profoundly advanced (at its time) attempts to develop the climate projections for the Baltic Sea. These attempts were made during BACC (2008), BACC II (2015). BEAR (this study), ECOSUPPORT, BalticApp and CLEAMSEA projects. All of them are mentioned in the text everywhere. It would be good to present the general overview scheme to help the reader quickly understand the differences between these initiatives and projects without reading the whole text.

The paper emphasizes a significant step of CLEMASEAS - including a new driver, the global sea-level rise. It appeared (according to the Conclusions) that this third driver causes "a more or less complete compensation for the projected increasing river runoff" that changes previously concluded the future drop of the average salinity. It would be better to

clarify whether it is the same for all used scenarios of the global sea-level rise (0.9, 1.26 or 2.34 m water depth rise) or the extreme only?

For such complicated issues as climate projections for the Baltic Sea, I would expect a more extended summary that includes final statements for all analyzed variables. Or at least the reference to the appropriate section of the text.

My opinion is that the idea that NAO well controls the interannual variability of the climate variables in the Baltic Sea has outlived its usefulness. Figure 25 clearly illustrates that correlation is so low that the discussion of this relationship is on the verge of physical meaning (no technically reliable instrument will not work with such characteristic correlation). The idea to find the good simple predictor for the Baltic Sea climate variability is attractable, but unfortunately, it seems, it is not realizable.
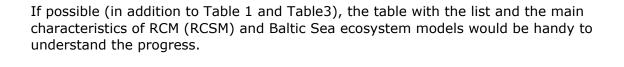
It is remarkable, and I personally very much support the massage of the paper that "BSAP would lead to a significant improvement" of the state of the Baltic Sea. And, more generally, human activity in the Baltic Sea catchment and the sea has a more substantial influence than the natural influence of global climate change. In this regard, it is not clear why the previously formulated (probably in ECOSUPPORT) strong sound statement "that climate change will worsen the situation in the Baltic if people do nothing" is not included in the number of conclusions.

Specific comments

The statement (lines 796-797) needs more clarification as it is not well understood. Maybe via the words that the existed natural negative south-north gradient will be partly compensated.

The sentence (lines 832-835) is too long. Better to split into several more simple sentences to more clearly present the idea.

The list of abbreviations would be helpful.

If possible (in addition to Table 1 and Table3), the table with the list and the main characteristics of RCM (RCSM) and Baltic Sea ecosystem models would be handy to understand the progress.

Technical corrections

Lines 774-776: It seems that the word 'model is absent after 'physical-biochemical'.

Figure 25: Please, insert the legend explanations in the figure caption.

Table 3: Please, introduce the column titles to link with the Table caption (via numbers, for example). The acronym of scenarios (BSAP, REF and BAU) have to be explained in the caption.

Table 4: Please, introduce the sign '+' (as in the other tables) to indicate the positive changes. There is enough space in the table to have explicit column titles; for example, December-January-February (DJF), not only DJF.

Table 6 and 7: the last raw 'BAU/WORST': Why is only one number given for these two scenarios? Better explain in the caption.