

Earth Syst. Dynam. Discuss., referee comment RC2
<https://doi.org/10.5194/esd-2021-51-RC2>, 2021
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Comment on esd-2021-51

Anonymous Referee #2

Referee comment on "Atmospheric regional climate projections for the Baltic Sea region until 2100" by Ole Bøssing Christensen et al., Earth Syst. Dynam. Discuss.,
<https://doi.org/10.5194/esd-2021-51-RC2>, 2021

The manuscript updates former climate assessment reports for the Baltic Sea region with respect to the discussion of climate projections. They use simulated projections by an ensemble of atmosphere-only regional climate models (RCM) within the Euro-CORDEX (cf. www.cordex.org) initiative and additionally they use an ensemble of simulations by a coupled RCM (with RCA4-NEMO) which has been discussed in literature before. It would be nice to see a model ensemble of coupled simulations, but they are not available or at least not as easily available as the Euro-CORDEX simulations. In my opinion, the assessment update is worth to be published because it discusses causes of changes in the projections too. However, the manuscript needs some improvements before.

In the abstract the authors write "in this review paper, we will concentrate". The manuscript does not properly review, but in put the new simulations in context. I suggest to change the wording.

Line 140: "higher warming is expected for land areas" – the given arguments (a) miss references and (b) miss additional causes (e.g. as water vapor which is mentioned by the authors later at line 166). Line 143: "the spread between quartiles is lower" – here too references are missing. The manuscript tends to lack supporting references.

Line 179: Is it possible that the simulated differential changes, change patterns in precipitation are biased by the selection of GCMs or the over-representation of GCMs (looking at Tab. 1, 3 of 8 GCMs are more often applied than average)?

Minor issues:

- Line 25: There is AR6 now using SSP scenarios. Should be mentioned, even with no RCM ensembles available yet.
- Lines 27 - 100: I have difficulties to understand these sentences and they are probably better placed in the Results section.
- Line 248: “..”
- Line 272: The lower limit of grey zone grid-spacing is ca. 3-5 km.
- Line 377 “because snow”
- Line 393-4: Two times “may”. Are there other possible causes?
- Line 415: This is not true for all atmosphere-only models. Some have their own sea-ice parameterizations which were used, I guess, in their Euro-CORDEX set-up.
- Line 421: How many ensemble members? Only 5 members in total?
- Line 572: The sensitivity of the regional models’ newer versions decreased? Is there any idea why?
- Some of the Figs. titles are cut off (e.g. 11, S26, 27)