Earth System Dynamics Discussions

Earth Syst. Dynam. Discuss., referee comment RC3
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Comment on esd-2021-51

Anonymous Referee #3

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-RC3, 2021

Comments on the manuscript

Atmospheric regional climate projections for the Baltic Sea Region until 2100 by Ole B. Christensen, Erik Kjellström, Christian Dieterich, Matthias Gröger, and H. E. Markus Meier

The manuscript is about an analysis of the results of a large number of simulations with several different atmospheric regional climate models. In addition the authors include 22 simulations performed with the coupled atmosphere-ocean model RCA4-NEMO. The climate changes of the quantities 2 metre temperature, precipitation (including extreme precipitation), wind speed, and solar irradiation are taken into account.

The manuscript is well structured and the figures are acceptable but the different symbols in figures like Fig.3 are hard to distinguish (e.g. the scenario means are not easy to spot).

While publications of analyses over the Baltic Sea catchment area for the above mentioned quantities are numerous throughout the last decade, the present analysis adds value by including a large ensemble of simulations of different regional climate models and for regional atmosphere-ocean coupled models a number of 22 climate simulations is also outstanding.

One critical comment from my point of view is that the authors did not took the opportunity to investigate a few additional quantities (e.g. sunshine duration, daily temperature range etc.) The ESGF provides a lot of these additional quantities and it is a pity that these data are used only very rarely.

I would recommend the manuscript to be published after taking into account the few comments below.

Lines 137-138

„Higher warming than the global average is generally expected for land areas, which warm more quickly than sea areas". I agree, however, this cannot clearly be seen in Fig.1 where the North-South gradient is more dominant.

Line 361-362

„This attributes to more extensive cloud cover (not shown) in most models for the future."

Can you add a sentence about the reason for the increase in cloud cover over the Baltic Sea Catchment area? Does the moisture in the atmosphere increase, i.e. does the precipitable water results in the ESGF archive show this? If this is not the reason what then? Maybe there is another publication which I am not aware of that covers this. If so please cite this publication.

Line 391

„Also the fact that increasing temperatures may not reach the melting point is significant."

How do the number of frost days change over the Baltic Sea catchment area? Can you give some numbers or point to a publication that covers this, please?

Figure 3

The sub figure (second column, second row) should be „land south" not a redundant „land north"