

Review (Round 3) of

Do convection-permitting regional climate models have added value for hydroclimatic simulations? A test case over small and medium-sized catchments in Germany

By Oakley Wagner, Verena Maleska, and Laurens M. Bouwer

General Comments

I thank the authors for this new phase of work and their attentive reading and consideration of the reviewers comment.

The paper has reached a mature form and is ready for publication.

However, I would like the authors to consider a couple of comments before the publication. These are minor details relative to their response to the last round of reviews.

We thank the reviewer for the positive comments. We appreciate the time taken to assess our paper.

Technical Comments

1) I would like to return to my first comment, as I believe its importance in the context of your analysis may not have been fully appreciated. Your choice to focus on summer convective events is entirely pertinent for assessing the benefits of convection-permitting regional climate models. I fully understand that snow processes are not the main scope of your analysis, and it is indeed relevant to explain these methodological choices in the methodology section.

However, to ensure clarity for the reader, I suggest adding a sentence somewhere at the end of the introduction to explicitly state that the analysis focuses on hydro-climatic summer convective events. This would help to define the scope of the study from the outset.

We thank the reviewer for the comment, which we have adopted by adding a sentence to the introduction (L. 54 f.), with the respective section (L. 50 ff.) now stating: „Our paper introduces an additional geographical region and CPRCM to the discourse. It looks at the strengths and limitations of ICON-CLM (2.6.4) in convection-permitting setup at 3 km resolution in depicting hourly near-surface air temperature and relative humidity, wind speed at 10 m, global radiation and precipitation over a chosen catchment in East Central Germany, compared to its driving coarser RCM, ICON-CLM (2.6.4) at 12 km resolution. **The focus of the added value of CPRCMs is on the depiction of summer convective events.** The climate model data is further used as input to the distributed hydrological model WaSiM to identify potential added value of the studied CPRCM data for discharge simulations in the catchment, while underlining the results by analyses of soil moisture and evapotranspiration estimations.“

I thank the authors for having greatly improved the frequency analysis with the comparison for higher quantiles. Just to clarify one point : Are the values of 11.7mm for ICON3km and 7.3 mm for RADOLAN 3km stand for the 99.95th percentile (in your response) or for the 99.9 th percentile (in the manuscript). Please check and update the percentile value if necessary in the manuscript.

The same comment can be done for the 11.7mm value (in your response) and 11.6 mm (in the manuscript).

In the manuscript we have used the 99.9th-percentile for a general performance overview of the climate models. For the different data sets, we have stated the median over the 99.9th-percentile (ICON12km: 4.6 mm, RADOLAN12km: 6.6 mm, ICON3km: 11.6 mm, RADOLAN3km: 7.3 mm). We consider this quantile to be high enough to make a clear distinction between the medians and to be of relevance for hydroclimatic impacts.

In our reply to your comment, in turn, we have stated the 99.95th-percentile threshold (with ICON12km being at 4.7 mm, RADOLAN12km at 6.6 mm, ICON3km at 11.7 mm and RADOLAN3km at 7.3 mm) following your suggestion to take a closer look at this quantile in particular. Even though the values are similar to those stated earlier, they are distinct and derived differently: the values in the manuscript represent the medians over the 99.9th percentile, the values in the response describe the threshold (i.e. lower bound) of the 99.95th-percentile.

To conclude, the values stated in the reply in the last revision round, as well as those given in the manuscript are correct.