Author Response Letter

Present and future trends of extreme short-term rainfall events in Germany, by downscaling convective environments of ERA5 and a CMIP6 ensemble

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RC: ***Reviewer Comment***, AR: *Author Response*, ☐ Manuscript text

Dear editor, dear referee,

thanks once more for taking the time and effort to review this manuscript, and for the positive response to the revision of our manuscript.

This letter provides a point-by-point reply to the new referee comments. We have revised the manuscript accordingly and hope that, based on the implemented changes, it can now be considered for publication.

Thanks again for your efforts!

Kind regards,
Gerd Bürger and Maik Heistermann

Responses to the referee

RC: ***In the Conclusions section, I'm missing a few sentences about the performance of the statistical tool/approach in capturing extreme precipitation from modeled CAPE and CIN.***

AR: We revised the conclusions section to reflect upon the performance of our models to predict extreme precipitation from CAPE and CIN. The addition was made near l. 235 of the previous manuscript version.

RC: ***Append "th" to all mentioning of percentiles throughout the the manuscript; for example on L51: "... 99, 99.9, and 99.99 percentiles ..." should be "... 99th, 99.9th, and 99.99th percentiles ...". (not needed for their corresponding labels, though, i.e. P90, P99, etc).***

AR: We revised the manuscript accordingly.

RC: ***L17-20: I still some concern with this sentence. If this is referring to so called convection-permitting models, usually applied at km-scale grid resolution, then for deep convection the main improvement is to be able to not use a convection parameterization - it's not really about replacing one thing (scheme) with another. Perhaps rephrase to: "To quantify future impacts, climate models are increasingly being developed and applied at km-scale resolution, so called convection-permitting climate models, where deep convection is treated explicitly instead of being parameterized, resulting in a highly improved representation of convective precipitation".***

AR: We are thankful for the referee's suggestion and substituted the phrase accordingly.

AR: Thanks for this suggestion. We adopted this sentence in the revised version.

RC: ***L252-254: "For the regions, heavy precipitation, in response to global warming, appears to be increasing uniformly across all of them, and that, if news at all, it bad news anyway." I suggest to change this to simply: "Heavy precipitation, in response to global warming, appears to be increasing uniformly across all regions."***

AR: Thanks for the suggestion. It made us remember that this paragraph is solely on uncertainty, and that the sentence in question (both in our and in your version) simply does not fit here, so we removed it entirely.

RC: ***Fig. 6: Please shift the trend values (annotations) away from the data points, which are partly blocked in the current version.***

AR: We revised the figure so that the annotation does not cover the data points.