

# ***Interactive comment on “Long-term Variances of Heavy Precipitation across Central Europe using a Large Ensemble of Regional Climate Model Simulations” by Florian Ehmele et al.***

## **Anonymous Referee #1**

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This manuscript addresses the issue of heavy precipitation in RCM simulations. This is a very timely issue with importance for many sciences, which rely on RCM simulations. My fundamental concern with this study is the first conclusion (“Extreme precipitation is well represented in LAERTES-EU.”). The same is expressed in the authors’ short summary (“The simulations show a good agreement with observations for both statistical distributions and time series of heavy precipitation.”). I am sorry, but I just can not see enough support for this crucial statement in the manuscript.

1) The authors state that E-OBS underestimates precip by almost a third. To me, this means that these data are not useful to evaluate the performance of extreme value

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simulations. As E-OBS is only available for land surfaces, I also find it surprising that the ME box includes parts of the North Sea.

2) The evaluation using IPCs is good, but doing this on a highly aggregated level seems to limit the opportunity to really test the simulated precip. Here I would like to see more creative tests such as IPCs for smaller areas and/or IPCs for certain seasons. As the analysis is done now, there is a risk for error compensation.

3) I am sorry, but I do not see how the Q-Q plots help to evaluate the performance for heavy precip. If anything, the total precip is evaluated. But even then, comparing cumulative values introduces a spurious correlation, and on top of that, R2 is no suitable measure as a value of one does not ensure a 'perfect' model. May be I miss something here, but I find this analysis not convincing.

4) The 99% of precip (=around 10 mm) is not really 'heavy precipitation.'

Minor comments:

P4L115: "more or less independent simulations". This needs to be clarified. In some respect, these simulations might be independent, but as the same RCM is used, the simulations obviously are dependent!

P6L149: does this mean there was a bias correction? Were extreme precipitation simulations affected by this at all? I assume not but would like to get some clarification.

P7L197ff: I can see the argument that GCMs underestimate heavy precip, but the same argument should, although to a smaller degree, apply to RCMs. So, what is the physical reason that RCMs 'tend to overestimate precipitation intensities'?

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