# Response to reviewer comments: HESS-2019-77

We thank the three anonymous reviewers and Peter Stucki for their constructive comments. In the following, we focus our reply to the major comments. Based on these comments, we conclude to rewrite the article. Later, we will take care of the minor comments, which then will be still important. Reviewer #1 pointed out that the title could be adjusted. However, we realized that not the title has to change but the content of the paper. Thus, a complete revision of the paper is necessary. We aim to use a different bias correction method and shorten/change the validation of the bias correction, and include corresponding literature. At this point we will also change the focus for possible applications in hydrology and what requirements are necessary for such purpose.
In the first version of the paper, we focused on downscaled ERA-Interim (and ERA-20C) simulations as an example. Now, we think that the second version of the paper would benefit a lot from the inclusion of a larger RCM dataset (ensemble of the MiKlip project, https://www.fona-miklip.de/). In total, we have over 10.000 simulated years, making it possible to do proper statistics, and which fits better to the chosen title "Towards the Development of a Pan-European Stochastic Precipitation Dataset".

## RC1) Interactive comment on "Towards the Development of a Pan-European Stochastic Precipitation Dataset" by Lisa-Ann Kautz et al.

**Anonymous Referee #1**

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This study presents the result of the dynamical downscaling of the reanalysis dataset and its validation based on the observed dataset.

First, I appreciated reading this article. In general, I think the focal point of the article is worthy of highlights in our society especially considering the huge efforts put into developing and getting the RCM running. However, I cannot recommend the publication of this article if it is viewed from the the novelty perspective and presentation quality. Therefore, I decided to give "reconsideration after major revision."

***Here are the major comments:***

1. This study applied the existing RCM and the bias-correction method for the downscaling. If this is true, the novelty should arise from the quality of the downscaling. However, I find a significant bias in the mountainous area and the areas with sparse in-situ gage network. At some locations, the annual bias exceeds 1 meters, which is enough to call a dry region in reality a wet region and vice versa. I appreciate that authors pointed out this issue in the paper, but this degree of bias over such a large region is unacceptable according to my standard. Authors should at least quantitatively compare their result with those of previous studies. If the comparison proves that your methods is superior, I would accept your methodology.

We agree with the reviewer that the novelty of the paper, namely that the project provides ~10.000 simulated years, was not sufficiently shown. In the first version of the paper, we showed results from downscaled ERA-Interim and ERA-20C data without clarifying that these datasets were just examples for a large ensemble. In addition, in the new version we want to revise the bias correction method and offer a quantitative comparison to previous studies.

2. The authors validated their model in the watersheds with massive sizes (Figure 1). Isn’t the purpose of downscaling to be able to obtain the rainfall at the watersheds with smaller sizes? At least the methodology should be proven at some selected small-size watersheds in Germany where precipitation data is accurate, precise, and abundant.

We thank the reviewer for this idea. However, as we focus on flooding events over large river catchments and this long enduring precipitation. Furthermore, this study aims for a bias correction method which is valid for the whole domain and the whole time period to keep the final stochastic dataset consistent. A validation on smaller domains would add an unnecessary level of complexity. In addition, with a model resolution of 25 km, smaller catchment sizes mean also that notably less grid points would be used for further statistics.
Furture work will include also statistical analysis of precipitation for smaller catchments in Germany as the reviewer suggests as we plan detailed analysis for smaller catchments in Rhine basin to show the added value of downscaling.