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Hydrology and Earth System Sciences
Discussions
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Interactive comment on "Projected changes in Rhine River flood seasonality under global warming" *by* Erwin Rottler et al.

Anonymous Referee #3

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1. General

This paper analyses future changes in flood seasonality in the Rhine River Basin at three different global warming levels using the mesoscale Hydrological Model (mHM). The paper is well structured and written, considers earlier work quite well, and provides new insights in flood seasonality changes under climate change for the Rhine basin. Finally, the authors list some next steps to improve the modelling approach as including a glacier module or reservoir and lake functionality.

2. Specific comments

Data and Methods: suggest to include that the model does not include a glacier and lakes module. For the basin upstream Basel not including lakes can have quite some

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Discussion paper

effect. Now, this becomes only clear at the end of the Conclusions section.

Page 3, line 15, please describe the downscale and bias correction in more detail. The sentence ”adjusts the monthly mean and daily variability of simulated climate data to observations.” does not describe how this was done.

Page 3, lines 22-25, The calibration procedure could be described in more detail. 1) For example why was the gauge Lobith also included in the calibration procedure? With MPR, one could have choosen for example three smaller sub-basins to find how well parameters are transferable to the larger basin scale. This makes the calibration more efficient, and would also provide an interesting result (although I understand this is not the focus of the paper, it is an important aspect of this study). 2) What were the specific DDS settings (e.g. number of function evaluations)? Please add these to the text. 3) Finally, how many model parameters were calibrated? At least this gives the reader some insight into the model complexity.

Page 14, line 5. Suggest to change “increased precipitation intensity” to amount, the analysis is about a monthly time scale, so probably better to use amount and not intensity.

Page 15, line 10 and lines 13-14: Please add this reference as an example: https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2019WR026807, for a modelling approach also applied to the Rhine basin that already includes a glacier and lake module.

3. Technical corrections

Fig 7. change “elvation” to “elevation”

Page 8, Table 2, change “ration” to “ratio”

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