

## ***Interactive comment on “Estimating high quantiles of extreme flood heights in the lower Limpopo River basin of Mozambique using model based Bayesian approach” by D. Maposa et al.***

**Anonymous Referee #1**

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In this study, authors try to use a GEV distribution to model the extreme floods in the Limpopo River basin. The MLE and Bayesian techniques were used to estimate the GEV parameters and compare the estimation difference. However, the scientific contribution of this manuscript is limited. To the objective of risk analysis, authors didn't consider different sources that affects the flood risks, such as human activities (e.g. land use...), climate variability/changes (e.g. ENSO, IOD,...) and so on.

Technical approach: Authors argued that Bayesian approach improves the results because it offers higher flood height estimates compared with MLE. This is problematic since it is hard to judge whether the Bayesian approach over-estimate the flood height

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or the MLE under-estimate the flood height.

Possible improvement on analyzing extreme flood risks:

- Include the information of human activity, climate variability/change etc.
- To provide a more reliable estimation on the extreme quantiles, authors could investigate more on the shape parameter, which controls the tail behavior of the distribution. (see e.g. Martins and Stedinger (2000), DOI: 10.1029/2001WR000367). Otherwise, authors could also use some expert priors for the Bayesian approach to improve the estimation of shape parameters.
- The uncertainty of single-site analysis is usually large, which leads to a great limitation on estimating the extreme events. Thus it could be better to consider a multi-site regional model to reduce the uncertainty (e.g. Renard, B., et al. (2006)).

Renard, B., et al. (2006). "An application of Bayesian analysis and Markov chain Monte Carlo methods to the estimation of a regional trend in annual maxima." *Water Resources Research* 42(12): W12422.

As a conclusion, the scientific contribution of this paper is limited and the approach used also need to be improved. Thus the current manuscript is not suggested to publish in NHESS.

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