Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
https://doi.org/10.5194/hess-2021-334-RC2, 2021

Comment on hess-2021-334

Anonymous Referee #2

Referee comment on "Flexible and Consistent Quantile Estimation for Intensity-Duration-Frequency Curves" by Felix S. Fauer et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-334-RC2, 2021

The paper proposes a new flexible approach to derive IDF relationships enabling curvature or multiscaling features to model very short or long-duration rainfall. The paper adds value in modeling short-duration rainfall and I suggest minor revisions:

- Line # 29: could be written as Methods
- In lines # 65-70: A few aspects of nonstationarity could be discussed here, discuss briefly the added value of this study to address nonstationarity as compared to the methods discussed in the literature (Cheng and AghaKouchak 2014; Ganguli and Coulibaly 2017).
- Section 2.1: Lines 90 – 95: This is not very clear - why 8 stations were merged into a single station leaving 92 overall stations out of 100 stations? Which physiographic or hydrologic similarity measures were adopted for regionalization?
- It has been shown in the literature that the Generalized Maximum likelihood method, in general, does not provide a credible estimate of the shape parameter, yielding an abrupt estimate of shape estimate (Martins and Stedinger 2000). Have your values lie within the credible limits of shape parameter range as shown in the literature, boxplots showing the range of shape parameters for different duration could help to identify this issue
- In skill score index in lines 190-200: what M and R represent, If R denotes empirical distribution, which empirical plotting position formula was used to estimate it? Typically Gringorten's plotting position formula is in use to characterize extremes.
- Fig. 7: Could you please show the difference in return levels in an inset diagram with vs without flattening? How much is the percentage difference between the two statistics in order to qualify as significant?
- Between lines 360-363: Any discussion on copula-based IDF estimation that claims to preserve the inherent non-linearity between intensity vs duration?
- Line # 433: few outlying events correspond to higher quantile (or at the tail of the distribution) leave the confidence intervals.

References

Cheng L, AghaKouchak A (2014) Nonstationary Precipitation Intensity-Duration-Frequency

Curves for Infrastructure Design in a Changing Climate. Scientific Reports 4:srep07093. https://doi.org/10.1038/srep07093

Ganguli P, Coulibaly P (2017) Does Nonstationarity in Rainfall Requires Nonstationary Intensity-Duration-Frequency Curves? Hydrol Earth Syst Sci Discuss 2017:1–31. https://doi.org/10.5194/hess-2017-325

Martins ES, Stedinger JR (2000) Generalized maximum-likelihood generalized extreme-value quantile estimators for hydrologic data. Water Resources Research 36:737–744