Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2018-120-RC2, 2018
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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Technical note: The Weibull distribution as an extreme value alternative for annual maxima" *by* Earl Bardsley

Anonymous Referee #2

Received and published: 26 June 2018

This paper deals with estimation uncertainty issues arising in Extreme Value Theory (EVT) applications due to finite sample sizes. It showcases how an EV3 fit could be obtained from small sample sizes even for extremes from distributions belonging to the domain of attraction of the Gumbel, presenting as an example the half-normal distribution. The EV3 fit implies the presence of an upper bound for extremes which is generally to be avoided for most geophysical variables. The author proposes the use of a known transformation to obtain sample minima instead, which then could be modeled by the Weibull distribution, which also has EVT justification, and no upper bound. Therefore, this alternative modelling procedure is proposed as a potential remedy, with the author claiming it to have as much EVT support as the straightforward GEV fitting.

The paper emphasizes the important issue of estimation uncertainty and shows how

empirical results could be easily misinterpreted. It also succeeds in conveying the message that data matching does not equal confirmation of theory. However, I find that there is no hydrological context in the paper. There is an attempt to give some hydrological insights by simulating "rainfall extremes" from a half-normal distribution, but this is somewhat unfounded. It is unlikely that the half-normal would be a plausible candidate distribution to model rainfall quantities and I think it is misleading to name outcomes of this arbitrary simulation as "rainfall maxima" in Figure 1.

In the author's words: "Suppose however that this was a situation of real data and a hydrologist...". But obviously this mere hypothesis cannot serve as the motivation for writing a hydrological paper and the paper itself presents no evidence that this could be a real situation. This is not trivial; a paper in order to be within the scope of HESS, should present some contribution to a real hydrological problem. Has the author found this behavior (EV3 fit) in many samples of hydrological variables? If yes, this is indeed of interest and should be presented in the paper and the benefit of the presented methodology should also be demonstrated in this respect. Because usually, Gumbel plots (Figure 1) of hydrological variables show the opposite behavior (towards heavy tails).

If this is not a common hydrological problem and this work is intended as a mere statistical exercise, then I think it is not suited for the audience of HESS and it should be addressed to a more statistical journal, where it would be potentially better appreciated.

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