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Hydrology and Earth System Sciences Discussions

Interactive comment on "Estimation of high return period flood quantiles using additional non-systematic information with upper bounded statistical models" *by* B. A. Botero and F. Francés

Anonymous Referee #1

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General comments

The paper deals with an important issue: the use of additional prior knowledge in the estimation of return periods of floods. The authors have done valuable work. The result is a very interesting conference paper, but it needs some additional work before appearing in HESS.

Specific comments

The introduction (2 pages) and the section on data classification (2 pages) seem long when compared to the text on page 5421, that describes an important aspect of the

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method, namely the inclusion of non-systematic data in the Maximum Likelihood in a way that differs from most of the references to deserve some explication.

The conclusions seem to contain a part of a summary (page 5429, lines 13-20) and part of a discussion of the results (page 5430, lines 4-10).

At line 12 of page 5415 the authors refer to Klemes (1993), this paper not only states the objection they cite, it also seems to disapprove of the type of approach they proceed to use, therefore I doubt whether the current use here is appropriate.

At line 3 of page 5416 there is an argument against unbounded distributions. This argument presumes that all distributions for annual maxima must have a physical background. Extreme value theory shows that this is not true for series of maxima in general. Therefore this argument is not very strong, moreover, I feel it is superfluous for the following reason. Hydrology, like physics, explores the natural world, it should therefore be allowed from time to time to use a method simply because it matches observed data well. Once this is established, one can start to look for deeper reasons for this fit.

At line 9 of page 5416 it is claimed that the use of unbounded distributions causes a significant error for high return periods. For series of maxima in general this contradicts the theory of extreme value distributions, but even when this statement is taken to apply only to series of the type discussed in this paper, I object to the use of the word “must” without a stronger supporting argument or support in the form of citations from the literature.

At line 5 of page 5421 the authors seem to assume that the probability of the presence of certain information about a flood (either physical or historical) depends only on the probability distribution of the floods and that the same probability distribution can be used for the systematic floods. Most references given in the paper allow for a threshold of some form for non-systematic data. Given the nature of non-systematic data some form of threshold is to be expected, as is stated earlier in this paper. An example of how this is included in the scheme used by the authors would be most welcome because

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the presentation of scheme on page 5421 does not make this clear.

In the section that deals with uncertainty analysis the choice of type and value of disturbances is not motivated.

At line 15 of page 5428 the expression “robustness with respect to itself” needs to be explained. As far as I know robustness of a method is determined by its behavior when certain statistical assumptions made during in its formulation are not met, so what are those assumptions in the case of “robustness with respect to itself”? The section is too short to properly explain the contents and plots.

On page 5428, line 23 in the section on robustness analysis it is stated that TCEV gives good results when applied to EV4 data, which contradicts the claim from line 10 of page 5416.

At line 1 of page 5429 they state “a general assumption in the hydrological ... can only be estimated deterministically”, I cannot find support for this statement in the current paper (in fact Eliasson [1994] discusses two methods for statistical estimation of the PMP). If I overlooked such support then please emphasize it, else please remove this statement.

At line 2 of page 5429 it is stated: “It has been shown that ...”, given lines 10 to 16 on page 5426, I feel this statement is somewhat optimistic with regards to the estimate of the PMP or PMF. Moreover, it probably applies only to the the case study.

At line 28 of page 5429 the statement: “The resulting estimate is not out <of> the possible range ... at its sea mouth” is much weaker than the claim made on line 11 of page 5429.

3 Technical comments

page 5420, line 19: Please rephrase the sentence “This means ... between an interval ... bounds”.

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page 4522, line 19: “notice” should be “noticed”

page 5431, line 11: 339 should probably be 33 or 33(9), page 5431, line 20: 333 should probably be 33 or 33(3) and so on for all references to Water Resources Research.

page 5431, line 16: Full title of the proceedings is: “Hydrologic frequency modeling; proceedings of the International Symposium on Flood Frequency and Risk Analyses” I found 1655-1681

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