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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "A data-based comparison of flood frequency analysis methods used in France" *by* K. Kochanek et al.

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General comments

In this study, the Authors assess the reliability of eight different approaches that are commonly used in France to perform flood frequency analysis (FFA). In particular, they compare the classical FFA based on parametric distributions directly fitted to discharge data (annual maxima) and a continuous simulation approach involving a rainfall generator and a rainfall-runoff model. Moreover, the impact of using local, regional, and a combination of local and regional information is also taken into account. The comparison is performed by a set of statistical procedures proposed by the Authors in previous papers and comprising a reliability index and a stability index. The analysis relies on a

large data set covering the whole France. The paper is well written and technical details are properly described and/or referenced. In my opinion, the results are valuable and of interest for a wide audience. Even though the final message (the usefulness of combining local and regional information) in not fully new, this study conveys it effectively with a clear and concise language, using well devised diagnostics and summary statistics easy to be understood and interpreted by researchers and practitioners. In this respect, the paper will surely contribute to the claimed homogenization of FFA procedures in France. I suggest the publication after some minor (mainly editing) changes, which the Authors are free to incorporate or not.

Specific comments

P4447L5: maybe "plants" instead of "plant".

P4449L5: "results of a nation-wide".

P4449L13: "Conclusions".

P4450L10: maybe "for estimating extreme values" or "for estimation of extreme values".

P4450L20: maybe "not suitable" instead of "not adapted".

P4453L9-12: Please define CDF, FF and each acronym at its first citation in the text. According to ISO standards, multiple-letter labels such as FF should be upright.

P4453L17: To the best of my knowledge, the Kumaraswamy distribution was introduced to approximate the Beta distribution by a family with an explicit (and analytically tractable and invertible) CDF. Nevertheless, please note that the CDF of a generic order statistic is a Beta distribution. Of course, this holds also for the largest order statistic $X_{n:n} \equiv FF^{(i)}$. In this case, $X_{n:n} \sim Beta(n,1) \equiv K(n,1)$, i.e. Beta and Kumaraswamy coincide. However, even though the approximation is generally pretty good, order statistics are not Kumaraswamy but Beta distributed.

P4454L15: Please define "SPAN" if this is an acronym.

P4457L16: maybe “decomposing all dataset” or “decomposition of all dataset”.

P4458L21: “local implementation”.

P4459L9-15: maybe I missed something, but I cannot see the discussion about the stability index for the regional models (i.e., SPAN10, SPAN100, and SPAN1000 for REG_GUM and REG_GEV summarized in Fig. 8).

P4460L24-26: N_{10} (10-yr) and N_{100} (100-yr) should be switched.

P4461L1-4: I wonder if the 1:1 lines can be complemented by confidence bands. This can help visualize the different uncertainty affecting 10-yr and 100-yr floods and further support the discussion.

P4462L8-10: Maybe it could be fair to mention here an interesting series of papers by Merz and Blöschl (2008a,b) and Viglione et al. (2013).

P4463L9-13: This statement is coherent with the claims of e.g. Klemeš (2000) and Serinaldi (2013).

P4466L12: Recently, Papalexiou and Koutsoyiannis (2013) showed interesting results concerning the sign of the shape parameter of the GEV distribution fitted on a world-wide data set of daily rainfall AM. Even though the present paper deals with discharge data, I wonder if the local GEV results could be improved by using a prior with negative mean for the GEV shape parameter.

Figures 1, 5, 6 and 9: Please, consider to arrange the panels in a 2x2 matrix or in one column. This can improve the readability in the final two-column typesetting.

Figure 3: Please, consider enlarging the panels and using a more effective color scale. For instance, use red and blue for extreme values and pink and light blue for intermediate values.

References

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Merz R, Blöschl G. 2008a. Flood frequency hydrology: 1. Temporal, spatial, and causal expansion of information, Water Resour. Res., 44(8), W08432, doi:10.1029/2007WR006744.

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