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Hydrology and Earth System Sciences Discussions

Interactive comment on "Effects of runoff thresholds on flood frequency distributions" *by* A. Gioia et al.

A. Gioia et al.

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Response to Reviewer 3 (J.Parajka)

RC: The idea of analytically derived flood frequency distribution is interesting, but just visual comparison of proposed model with another model and/or plotting positions is, in my opinion, not enough. There are plenty of probability distributions and fittings methods available and I'm not sure why one should use the proposed approach? Therefore, I would strongly suggest to state more explicitly (e.g. in the introduction) in which context may be the application of analytically-derived flood frequency distribution beneficial (e.g. in prediction for ungauged sites). Within this context a clear quantitative validation should be performed and presented (e.g. considering gauged sites as ungauged performing a jack-knife crossvalidation).

AC: We respectfully disagree with this point. The introduction of the revised paper has been modified to explain why. In particular, the following paragraph has been included: "A technical use of derived distributions of flood frequency is still far from operational application. The immediate outcome of their development lies in a deeper knowledge of hydrological controls in extreme events. Through this progress, designated factors depending on climate, soil and vegetation should be eligible as signatures for the identification of hydrological heterogeneity and similarity." Thus, we do not propose any quantitative validation of the model in this paper.

RC: The readability of the manuscript should be improved. The authors should be more precise in the formulation of basic assumption beyond their model and conclusions made. They are mixing the terms of arid and humid basins, ordinary and rare events, flood generation process and the conceptualisation of the process using a probability distribution. From the context of the manuscript, one may have a feeling that the ordinary floods are attributed only to the small contribution area or that the rare floods occur only in the arid basins. Similarly the conclusion that the study focuses on the dynamic of flood generation processes is slightly misleading, because the results show more a statistical fitting to the observed floods (based on some assumption) than a real analysis of particular flood generation processes. I would recommend to stress more explicitly that the proposed concept is based upon some simplifications/assumptions and validated over a specific region, which may not completely capture the real variability in flood generation process and may be not valid for some other regions.

AC: We agree with this point. The paper has been completely rearranged and restructured to improve its readability and the description of objectives, hypotheses, estimation procedures and results. All results are explicitly referred to the 10 study basins while their main features (climatic, geologic, etc) are described in section 4.

RC: Authors should, in my opinion, improve the readability of the manuscript and provide more detailed evaluation of the benefits of proposed concept. The regionalisation of model parameters should be discussed in more detail and the predictive accuracy

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should be assessed quantitatively.

AC: The combined use of regional analyses and derived distribution may help understanding and may enhance the reciprocal support between different methods. This concept is now delineated in the introduction and is commented in the conclusions of the actual version of the paper. At the present stage, a quantitative assessment of model performance was not the aim of the paper.

RC: p. 904 (Abstract): I would suggest to put the threshold values found in the analysis into the abstract.

AC: We agree that thresholds values are an important object of this paper, nevertheless we deem that greater attention should be paid to the thresholds scaling behaviour of the two thresholds.

RC: p. 907, l. 10: The following statement is not clear to me and I found it too specific for general goals description. 'The goal is to improve the descriptive properties of theoretically derived distributions with particular attention on their ability of coping with the Matalas condition of separation.' Please consider to revise it.

AC: The Matalas condition of separation has been widely discussed in the framework of flood frequency analysis and regional methods. We rephrased such sentence and incremented the number of references, where the reader will be able to find many information about it.In this paper we only focus on highly skewed annual maximum flood distributions and decided not to report other details for sake of readability.

RC: p. 907-911 (Section 2): Please consider to condense the description of the IF model.

AC: This suggestion is partially in contrast with other reviewers that asked for more clarifications regarding the IF model. Its description was already condensed as much as possible. We decided to keep the IF description with a few simplifications and some more details where requested.

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RC: p. 908: Please explain in more detail the estimation of the routing parameter. How sensitive are the results with respect to this parameter?

AC: We agree that the routing parameter plays an important role in the model. Nevertheless a sensitivity analysis based on this parameter was already performed by Iacobellis and Fiorentino (2000). In this paper, the authors show that the routing parameter plays a secondary role with respect to the second and third order distribution moments.

RC: p. 916: Please provide more detailed information about the estimation of mean runoff coefficient and the permeability index. This is important in the context of parameter regionalisation.

AC: Few more details about mean runoff coefficient and permeability index are now provided in sections 2 and 4. For more information the reader is kindly addressed to De Smedt et al. (2000), Manfreda et al. (2001) and Fiorentino and Iacobellis (2001).

RC: Figures: Figures 2 and 3 are not necessary. This information is already available in Table 1 and Figure 1. Figure 5 is difficult to read.

AC: Figures 2 and 3 were eliminated. Figure 5 (now figure 2b) was re-edited.

References

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