

## ***Interactive comment on “Evaluation of floods in Western/Central Europe: the role of index design” by Blanka Gvoždíková and Miloslav Müller***

**Anonymous Referee #2**

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The study presented in this paper aims at redefining flood extremity indices over a large region between Western and Central Europe over the period 1950–2010. The approach followed consists of designing flood extremity indices by combining discharge values and the spatial extent of floods. Several versions of such indices were tested, with different weightings of the threshold value of discharge or area parameter for considering a flood event. The topic is suitable for publication in HESS but major revisions would be necessary in my opinion before the paper be published.

General: - The paper lacks a discussion on the consistency of the choices to be made for designing the extremity indices (determination of  $Q_s$  and the threshold  $Q_s/Q_{ma}$ ). There is almost no discussion about this point which constitutes the basis of the whole approach. Also, it seems from the discussion/conclusion section that the main difference between this work and previous other ones upon which the present study builds

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relies on the choice of the threshold selected for discharge: 1) this emphasizes even more the importance of strengthening the discussion on criteria for choosing the best suited  $Q_s/Q_{ma}$  threshold, 2) it questions the value-added of including an area parameter in the approach (the authors themselves state that extremity indices are not very sensitive in changes in the area parameter: if so, then this approach is very similar to previous ones?).

- Conducting a more detailed study on the determinism of the occurrence of flood events seems important in order to relate the extremity indices defined to more concrete or practical hydrological/hydrometeorological processes (in this sense it is surprising that the role of ground water is never even mentioned), it should be addressed here and would certainly constitute the value-added to other previous studies such as those of Uhlemann et al., etc. As a first step, the authors could try to relate the interannual variability and trends of extremity indices to some climate indices for instance.

Specific comments: - Title: Something like "large spatial extent floods" or "extensive floods" (as used in the introduction) could be included in the title to be more specific as it is an important aspect, and would prevent from using "trans-basin" which indeed could be misleading?

- P.4, line 8: I don't get why only the downstream sub-catchment area is considered when an upstream gauging station is available. The downstream station is still representative of flow occurring over the whole upstream area anyway unless the upstream part of flow is subtracted.

P.4-5, "Methods": I do not recommend using the word "significant" in this context, as this does not refer to any statistical meaning here. I think the rationale for using this method to determine a time series of "significant" discharge values lacks explanation. As well, I am concerned by the approach for determining a significant flood event: the choice of the length of the time window needs a little more explanation. As is, it looks like the method suffers from a lack of either statistical or deterministic basis, and the

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definition of a flood event seems to be too much data- and operator-dependent and not enough transposable (see for instance "After analyzing all of the data series, we chose a time window [...]"). The fact that the time window had to be extended for one river, or that an additional rule had to be included to prevent merging events that have different atmospheric origins is also problematic: is an automatic split of flood events in two parts when they are separated by 5 days enough to conclude to different atmospheric causes ?

P.5, line 19: does the separation date between the cold and warm halves of the year also hold for other regions than the Czech Republic?

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