

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC2
<https://doi.org/10.5194/nhess-2022-144-RC2>, 2022
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Comment on nhess-2022-144

Anonymous Referee #2

Referee comment on "A new index to quantify the extremeness of precipitation across scales" by Paul Voit and Maik Heistermann, Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2022-144-RC2>, 2022

The authors present a cross-scale weather extremity index (xWEI) which is an extension of the original weather extremity index (WEI). They compare the values of both indices for 100+1 events in Germany over a period of 20 years.

I consider the introduction of xWEI as a complement to WEI to be useful, as it adds another dimension to the methodology for assessing the extremity of precipitation events. While the authors point out the different settings for calculating the two indices, I consider the settings they use to be appropriate, especially the use of $\ln(t)$ instead of t when integrating E_{tA} values. I also appreciate the study of the sensitivity of the WEI to the method of determining GEV parameters and especially the discussion of the settings of both indices that may affect the values.

The paper brings new insights, it is well structured, of reasonable length, the authors argue logically and discuss the results. I recommend its publication in NHES after addressing the following comments.

Comments on the content:

The authors analyzed 100+1 events with extra high WEI values and determined the xWEI for these events. While I do not suppose that there could be an event with a very high xWEI and yet a WEI so low that it would not belong to the 101 events analyzed, the authors should check this possibility.

An important parameter is not only the size of the considered area, but also its shape. The authors should mention this aspect in the article, because the affected area is often elongated in one direction compared to a square. It is also not clear from the paper how

the authors dealt with the situation where the core of the event was located at the German border and the 200x200 km square extended beyond the area covered by the data.

The authors note that the NI/Jul2017 event ranked higher than SN/Aug2002 in the WEI, but offer no explanation (Figure 4 does not include NI/Jul2017). Could the reason be the state-border effect, where SN/Aug2002 significantly affected also the neighboring Czech Republic (Müller et al., 2015)?

Formal comments:

In my opinion, flash- or pluvial floods are mainly related to infiltration excess (line 40) while saturation excess is more typical in case of large-scale fluvial floods (e.g., Rogger et al., 2013).

If the form of the short names of HPEs is your choice, I suggest to replace "NI" by "LS" which seems to be more intuitive in English.

Date formats should be unified, compare e.g. beginnings of both case studies.

I recommend expanding the beginning of Figure 6 and Figure 7 captions so that they are not just short names of the events. On the other hand, in my opinion, the interpretation of the two pictures does not belong in the captions, its place is in the text.

Typos:

line 35: In "...Prein et al. (2017), state...", the comma is redundant.

line 310: The second acronym "WEI" should probably be replaced by "xWEI".

line 257: As in the previous line, it would be good to mention also the short name of the event in the brackets.

References:

Rogger, M., Viglione, A., Derx, J., Blöschl, G., 2013. Quantifying effects of catchments storage thresholds on step changes in the flood frequency curve.

Müller, M., Kašpar, M., Valeriánová, A., Crhová, L., Holtanová, E., Gvoždíková, B., 2015. Novel indices for the comparison of precipitation extremes and floods: an example from the Czech territory. *Hydrol. Earth Syst. Sci.*, 19, 4641–4652.