

Interactive comment on “Event-adjusted evaluation of weather and climate extremes” by M. Müller and M. Kaspar

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Response: The major concern of the review is the rationale of the Weather Extremity Index. We understand that from the hydrological point of view, it seems to be a bit strange to look for the event-adjusted area and to evaluate weather extremity within this area. In hydrology, the unit is always a catchment. Even if a flood is “trans-basin”, it can always be considered as a total of floods in individual catchments (Uhlemann et al., 2010, HESS). However, a meteorological event (heavy rains are presented for example only) does not know such boundaries. Therefore we try to delimit the affected area for each event separately. We hope that our motivation is clear from the text. On the other hand, we originally missed to explain the genesis of eq. 2 (why we suggested

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the presented relation between rarity and area). We improved the text regarding your comment; please see below our responses to the detailed comments.

Page 4490, line 6: I guess the authors mean Fig.2 and not Fig.1.

Response: Thank you, it has been corrected.

Page 4491, line 2: I don't understand the statement saying the return periods are "the most accurate instrument" for quantifying extremeness. It is interesting though. Accurate would mean very close to the "real measure of extremeness", is it? The authors could add a sentence here explaining what they mean.

Response: This is exactly what we wanted to say. We have added the following explanation: "...because they reflect the shape of the statistical distribution of data."

Page 4493, eq. 1: I do not understand the "a" in the equation, shouldn't it be n? How can it be an area? Dimensionally it doesn't make sense.

Response: Thank you, "n" is correct. We originally confused the symbols because the values are the same (however, units are not).

Page 4493, eq. 2: Here is the radius of the circle of the same extent of the considered area introduced. I do not understand the rationale of it. A very extreme but very local extreme (summer storm leading to a flash flood) would be rated as non-extreme compared to milder but larger events. In hydrology we take the catchment size into account to decide the spatial extent we are interested in evaluating the precipitation return period. Here the choice of using R as length scale seems arbitrary. The authors must discuss in detail what is the rationale of their choice. Moreover, is the equality in Eq. 2 correct? The unit of $\log(Gta) \cdot R$ is $\log(\text{yr}) \cdot \text{km}$, but the unit of the right part seems to be $\log(\text{yr})/\text{km}$. Please check the equation (and always indicate the dimension units for clearness).

Page 4496, lines 11-14: this is to me the most important sentence in the paper. $\log(\text{return period})$ and R are multiplied because they are "linear variables in nature,

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so they should have a comparable weight". Is this the rationale with which the spatial extent is taken into account? It seems to me rather weak.

Response: We have added a paragraph before eq. 2 which presents the rationale of it: the factor of the area has to be strong enough to cause that the product increases with a but simultaneously weak enough so that the product starts to decrease when pixels with low return periods are added. We find the square root of the area as a good compromise between these two requirements. There was originally the same mistake in eq. 2 as in eq. 1, thank you for observant reading.

Page 4496, line 18: the WEI calculated for the May event is therefore underestimated. Yes, you are right if considering the event as a whole. Nevertheless, WEI can be computed also for an administrative unit only (as mentioned also in the text).

Response: This is exactly what we present in the case studies (because of lack of return period data from neighboring countries). The aim of the paper is to introduce the method; the events are presented only for example. Systematic studies on various extreme weather phenomena will follow.

Please, see the improved text in supplement. Thank you once again for helping us to improve our paper!

Miloslav Müller and Marek Kaspar

Please also note the supplement to this comment:
<http://www.nat-hazards-earth-syst-sci-discuss.net/1/C1843/2013/nhessd-1-C1843-2013-supplement.pdf>

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 4481, 2013.