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

Anonymous Referee #1

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This paper presents a methodology to quantify the extremeness of short-term weather events taking into account both duration and spatial extent. This is an interesting issue not so easy to deal with. I am an hydrologist and I'm used to look at weather space and time scales in relation to characteristic length and time scales of the catchment I'm interested in. But from a pure meteorological point of view, how can the rareness of events be defined? This paper discusses this issue and proposes one measure: the Weather Extremity Index (WEI). In order to attribute one single WEI, the (log of the) spatial geometric mean of the return period is multiplied by a length scale which correspond to the radius of a circle of same area as the one over which the geometric mean is taken (eq. 2). My major concern is that the authors do not provide a convincing argument for why this should be a good choice. At the end of the paper they state that

this has been done because the two measures are "linear variables in nature, so they should have a comparable weight". Ok, but what does it mean? Another concern is on the usefulness of using WEI for event ranking in terms of extremeness. In the paper, just two events are analysed, and the WEI is probably underestimated because of lack of data from neighboring countries. Also, if flooding is the hazard of interest, the proposed measure should be demonstrated to capture the extremeness of flooding. I imagine that WEI would work well for events occurring in catchments whose size is not too small.

Detailed comments:

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

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.

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.

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)*R is log(yr)*km, but the unit of the right part seems to be log(yr)/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(return period) and R are multiplied because they are "linear variables in nature, 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.

Page 4496, line 18: the WEI calculated for the May event is therefore underestimated.