

The paper investigates the change to wide-spread flooding in terms of number of occurrences duration and extend between current and future climate using an ensemble regional climate model. This is a very relevant study showing novel results. However, revisions are required as per the comments below.

Main comments

The novelty and aim of the paper is not clear after reading the introduction. In the introduction the relevance of the work is clearly discussed, however no clear research gaps are mentioned. Also, at the end of the introduction (L46-50) a short summery of the methods rather than the aim of the paper is provided.

Some clarifications are needed in the data and methods sections (see specific points below). Especially, the statement that bias correction of precipitation from climate models is not required when focusing on extremes needs explanation. Furthermore, I think if the sensitivity of the assumptions (event magnitude threshold, extent threshold, and maximum event duration) in section 3.2 should be discussed separately from the methods as the current structure makes it hard to follow the methodology. And the manuscript would really benefit from a discussion on how these assumptions affect the final results (rather than the number of events for a single ensemble).

The conclusion section also contains discussion of the results as well as some limitations. For clarity, I recommend splitting the conclusions and discussion by making a separate section on limitations and moving the discussion of the results in relation to other papers to the “results and discussion” section.

Specific comments

L12: “..., allowing events to last up to 14 days” seems to suggest that the 14 days are a consequence of the event definition given before, but I don’t see how this is the case. Can you clarify?

L36: I suggest to leave out “driving” in “driven by large ensembles of driving data from climate models” as it seems double?

L37: Can you provide more information about what “predominantly stochastic event-based models are”?

L42: Replace “focusing on the United states” by e.g. “for the United States”, as using “focusing” twice in this sentence is confusing

L54: This is the first time UKCP18 is explained while it has already been used in the abstract and introduction. Please explain at the first use.

L66: The authors seem to state that bias correction of precipitation from climate models is not required when focusing on extremes? I would disagree with this and would like to see more better argued why no bias correction is required.

Section 2.1: Why was RCP8.5 selected? It would be good to mention this choice also in the abstract.

Section 3.1 It would be good to add which version of the model is used. Whether the model has been calibrated for this study or a previously calibrated version has been used.

L105: “this was considered equivalent ...”. This subsentence is confusing to me. Please consider leaving it out or clarify its meaning.

Table 1: “PoE” is not explained. Furthermore, it would be clearer if consistent naming of thresholds were used in the “exceedances” column and in the text (e.g. POT2 or 2/yr). Also note the typo in “exceedances”.

L119: I don’t understand why based on minimum-threshold, flood extents that are smaller than this threshold are “retained”. I would expect these are excluded. Could you please clarify?

L154: Why were 60 peaks selected and how does this relate to earlier event magnitude threshold? Also, from which ensemble or for all ensembles? Please clarify.

L159: How is the “daily exceedance probability” calculated from 60 peaks? I’m used to converting these probabilities to annual exceedance probabilities directly based on the average number of peak events per year, which you seem to refer to as an “alternative approach” (L171).

L174: Could you provide more context to the sentence “which might potentially align with discussion of the frequency of 100-year events in the UK”? What is this discussion about?

Section 4: In Figure 3, 5, and 6 event return periods are shown (if I understand correctly). It is however unclear to me how these are calculated? As show in Figure 2 the return period varies spatially, and it is not clear how a single return period is calculated.

L234: I assume AMAX is “annual maxima”? This has not been explained before.

L237: What do you mean by “change in flow”? Is that change in peak event magnitude?

L247: Can you explain what the value of 120 km is based on? In the figure it seems there are still points with significant asymptotically dependence up to 250 km.

L271: I would be very useful to understand how sensitive the change in number of events is to the selection of thresholds in section 3.2. And how significant it is given the differences between ensemble members.

L299: Can you clarify what you mean by surface water flooding as opposed to fluvial flooding?