



EGUsphere, referee comment RC2  
<https://doi.org/10.5194/egusphere-2022-829-RC2>, 2022  
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## **Comment on egusphere-2022-829**

Anonymous Referee #2

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Referee comment on "A climate-conditioned catastrophe risk model for UK flooding" by Paul D. Bates et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-829-RC2>, 2022

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The paper presents a spatially consistent and transparent approach to model flood risk across the UK. The focus of the paper is on comparing the outcomes of a new coupled hydrodynamic – catastrophe model for fluvial, pluvial and coastal flooding with existing approaches, which are in the public domain but insufficiently documented. The authors show that existing approaches used for national flood and climate change risk assessments are likely overestimating the expected annual losses from flooding, due to a number of simplifications, such as when estimating the inundation from coastal flooding.

The paper is an important contribution to flood risk modelling in the UK and the resulting flood hazard and risk maps are the first high skill alternative to the official flood maps provided by UK government agencies and should therefore be published in NHESS. To walk the talk, I would like to encourage the authors to make the flood maps for different return periods and climate scenarios available for the academic community under an open-source license for non-commercial use.

### General comments

The paper addresses the really important issue of a lack of alternatives to the official flood hazard and risk maps in the UK, which are spatially inconsistent and not well documented. The paper is well written, clearly structured and critically reflects on several caveats and limitations of the described approach. I have two main points of criticism, which have already been partly addressed by the authors but could be made clearer.

My first point is in regard to the validation of the estimated EAD from the model against

insurance claims data from the ABI. The ABI data must be seen as the lower end of any damage estimation due to a number of reasons of which many are mentioned in the manuscript (e.g. data only covers insured residential properties, data on commercial flood damage not included etc.). I agree with the authors assessment that both NaFRA and CCRA3 likely overestimates the EAD, but I would argue that the author's approach on the other hand is very likely an underestimation of the EAD, which should be discussed in more detail in the manuscript.

My second point is in regard to the climate scenarios. While the loss exceedance curves in Figure 5 and the EAD in Table 3 for different warming scenarios are scientifically interesting, I wonder what we can learn from a scenario that is above current warming levels but with current levels of exposure and vulnerability as we know that such a risk scenario is highly unlikely to occur (it would mean that we stop all human activity in the UK until the 2030s to make for example the 1.8°C scenario presented by the authors a credible one). In my opinion the spatial analysis shown in Figure 6 is more meaningful as it allows to see spatial changes in the hazard under climate change (although I would think it makes more sense to interpret those changes in qualitative terms).

I would not expect the authors to significantly change their results, but provide a bit more context how they would like readers to interpret their results.

Specific comments:

P7 L194ff: One main advantage of the local modelling approach used by the Environment Agency is that they have a good understanding of local flood defences and other protection infrastructure. Can you say something about how your approach compares to that? I have not checked Wing et al. 2019, but in case you have any information on the accuracy of your approach compared to data on local spatial flood defences that would be great.

P8 L199: How where the 10 different return periods selected? Olsen et al. (2015) (<https://doi.org/10.3390/w7010255>) show that the selection of return periods for the loss exceedance probability curve has a large effect on the EAD. Have you done any sensitivity analysis on how the selection of return periods is influencing your EAD estimates?

P9 L249: You mention the "Fathom model" for the first time in the manuscript. I am assuming this is the name of the model you are presenting in the paper, but would be good to formally introduce the name to avoid confusion.

P9 L257: If possible, it would be great to have the equations for each metric in the text as it makes it easier for the reader to understand how those metrics are calculated.

Figure 2: Would be nice to have an inset showing the location of each flood layer on a GB/UK map

Figure 2 caption: flood hazard maps on the right are shown in red not green

Table 2: Table 2 is an example, but comment is more general: it is sometimes not perfectly clear if values are for England, GB or the UK. As far as I am aware, the NaFRAs are conducted by each of the devolved nations individually. Is the number shown in Table 2, the sum of all NaFRAs or are these values for England only?