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Review and rebuttal of the paper

Storylines of the impacts in the Netherlands of alternative realizations of the Western Europe July 2021 floods

K.M. de Bruijn, B. Van den Hurk, K. Slager, G.W.F. Rongen, M. Hegnauer, K.J. van Heeringen

Editor handling the paper: Hans de Moel

This paper assessed the impacts of the rainfall event of July 2021, had it occurred in different geographical locations. It is an interesting paper with clear importance to society in preparing for possible future flood events. It is well structured and written – but I feel there are a few key comms points which would fit into the scope of the paper well, and enhance the importance of the work for policymakers.

In the introduction the estimated return period of 1/400 years is quoted – based on one study. Are there any other estimates? Are return periods of river discharge in the region available, and do they agree with the rainfall return period estimate?

The topographic differences between the region the real event occurred and the alternative realisations is not fully discussed. Topography is likely to influence the magnitude of the event – is it true that the same rainfall amounts would occur in all regions, or did orographic enhancement have an impact on the real event? Are there any regions which could experience even greater orographic enhancement?

Figure.1 could be improved, with labelling of panels, more clearly marking the river basins, and highlighting which is the real event and which alternative possibilities. Adding topographic features could also be useful.

This paper provides a great communication opportunity for the links between socio-economic impacts and the meteorological impacts of extreme rainfall. I think there are a few points which could be covered but are not currently:

1. A mention of the possibility of even greater events would enhance the discussion. The method used in this study may not be applicable for that – but the use of large ensembles (as mentioned in both introduction and discussion) would allow that, and would be useful future work.

1. The discussion (or perhaps introduction) could be strengthened by the addition of some of the ‘hidden’ impacts flood events such as this one could have on society, for example long-term health impacts such as mental health. For some types of flood events this is a major impact which is often forgotten about – and it fits well with the scope of this paper when considering the alternative impacts if the event had impacted a more densely populated region.

1. Another point which could be incorporated is the changing impacts of similar magnitude events depending on past history of the region – if a similar magnitude event hit Limborg again the region is likely to be better prepared than if one of the alternative realisations was to occur, as the population of Limborg will have personal memory of July 2021.

Smaller comments:

I have seen a similar storyline approaches referred to as ‘what if?’ scenarios – a term I think lends itself well to plain english science communication. Perhaps consider using the term.

Pg2, line6 – Sentence starts with 48 (number), should be written as word

Pg3 line 32 – word ‘also’ unneccessary

Pg 6 line 8 – more in depth description of modelling tools would be useful – what is the difference between the different software suites used? (Why need both?)

Fig3 – It would be good to label each map in figure itself not just caption

Fig4 / Pg8Line 13 – brief introduction of the alert levels (whose are they? Are they based on past impacts?) would be useful.

For author and editor

- The manuscript is well structured, especially the discussion part explains well how such a storyline inspired by a recent extreme rainfall event can be useful is the real world emergency response and disaster management strategy development.
- The approach of this study can be helpful for the Netherlands in particular and neighboring European countries to assess the impact of low probability high impact extreme rainfall and flood events and to prepare in advance to reduce large scale damage.

Minor corrections request:

- Figure. 1 is very small and the names of the regions in the map are too small to follow, especially for the readers who are not familiar with the study area.
- Figure. 5, too small to read the names of the regions in the map, the legend is not written in English.

For editor only

- This is a well documented manuscript. It uses the hydrometeorological background of Western Europe July 2021 floods as a reference to provide insights on the consequences of extreme large scale rainfall events in other Dutch regions.
  - For low probability high impact extreme flood events for which not too many historical records are available, the storyline and stress testing approach described in this study can be helpful to understand possible impacts on the water systems, potential damage and recovery potentials which can eventually contribute to the preparedness of emergency response and climate adaptation policy making.