

## ***Interactive comment on “Assessing the characteristics and drivers of compound flooding events around the UK coast” by Alistair Hendry et al.***

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Dear authors, thanks for the very interesting paper. In the following you will find my comments, suggestions and opinion to your contribution.

### **Summary**

The paper “Assessing the characteristics and drivers of compound flooding events around the UK coast” is about a statistical analysis of compound flooding events (mainly storm surges and river flooding) for the UK. A broad data-set about high storm surge water levels and river discharges are statistically analysed. Additionally, meteo-

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rological data and data about the river catchment are included into the analysis. Three main hypotheses are tested:

- Map the spatial dependency between storm surges and high river discharges
- Map meteorological conditions which drive compound / non-compound events
- Map dependency of catchment characteristics and compound / non-compound events

All three hypotheses are well confirmed by the results of the statistical analyses.

Focusing on hydrological and storm surge events the contribution addresses a relevant topic, which matches the scope of the envisaged journal HESS very well (e.g. study of the spatial and temporal characteristics of the global water resources).

### **General remarks/suggestions to style and language**

- Note: I am not capable for any review about the English language because I am not a native speaker. For me, the text is comprehensible.
- Sometimes it is confusing, which figure is relevant, which is for the supplement etc. Maybe check if really all tables, figures etc. are required

### **General remarks to content**

- A lot of the statements requires very good knowledge of the British geography, e.g. "...closest to the tide gauges of Bournemouth, Devonport, Workington, Ullapool, Whitby and Cromer". I excuse my ignorance of the British geography, but I cannot reproduce some of the given statements with help of the figures. I have also no perfect solution, just proposals: Give numbers to (at least) the coastal gauge stations; make detailed figures for some statements; try to focus on special stations etc.
- I missed a bit the focus to one important questions, which arise from the risk analysis / management point of view: does these compound events produce additional damages, because of their compound occurrence? It is stated in the introduction: e.g.

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“Zscheischler et al. (2018) define compound events as the combination of multiple drivers and/or hazards that contributes to societal or environmental risk.” Additionally, some examples are given from the US and the Adriatic coast. But I miss a bit more focus on the UK coast and the events which were analysed in the following chapters. In the discussion section this question is partly discussed; It comes very suddenly and unexpectedly. I suggest to make it much more prominent at the beginning of the paper (at least some remarks in the introduction). Do we observe additional damages due to compound events at the UK coast? A second question is, why “just extreme events” were analysed. It is also stated in the introduction: “combinations of events that are not themselves extremes but lead to an extreme event when combined”! I think especially these events are the important events which we’ve miss until now in risk analysis. Maybe make a remark that this point is excluded from the analysis (if it is not done somewhere).

-I would like to note a very similar remark about the discussion of the forecasting strategies also in the “discussion”-chapter. It comes also very suddenly and unexpectedly in this chapter. I think it could be also (at least) mentioned in the introduction.

-Sometimes I would prefer that the hypotheses are more feed with physical reasoning, especially when the results are described: in some cases, it is done, in other cases it is done in the “discussion”-chapter, sometimes it could be a bit more pronounced. The question is: just give the physical explanation in the “discussion”-chapter or immediately after the description of the results? In this case, where a lot of results are described a direct explanation could be preferable (suggestions!). If the explanations first come in the discussion-chapter, some important details are already forgotten by the reader. Moreover, the purpose of a discussion chapter is more (as far as I know): discuss your findings critically, what are the limitations?, what could be better?, in which direction will it go? Etc.

-Finally, I have a bit the feeling, that too much information (esp. results) is given to the reader. Therefore, much more detailed descriptions are sometimes lacking. Maybe a

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review of important information (text / figures etc.) should be done.

### **Detailed Comments and proposals**

See attached document

### **Conclusion of the review**

The presented article is a very interesting contribution about the statistical analysis of compound flood events. I am convinced that this paper is a valuable contribution to the journal HESS. I hope my suggestions, remarks, comments can help to improve this manuscript further.

Please also note the supplement to this comment:

<https://www.hydrol-earth-syst-sci-discuss.net/hess-2018-632/hess-2018-632-RC2-supplement.pdf>

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2018-632>, 2019.

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