

***Interactive comment on* “Spatial Dependency in Nonstationary GEV Modelling of Extreme Precipitation over Great Britain” by Han Wang and Yunqing Xuan**

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We thank the referee De Luca (De Luca, 2020) for spending time reading the manuscript and providing valuable comments during the discussion that will certainly help improve the quality of paper via revision. While we agree and appreciate most of the points listed in the Specific Comments section, especially those regarding the referencing to ‘compounded events’, we strongly dispute the referee’s view (in the General Comments Section) about the impact of the paper and the fitness to the journal. Our responses are as follows:

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1 Response to the General Comments

Firstly, it is true that extending the research to Europe-wide or worldwide would have an impact in terms of revealing regional or global patterns and further encouraging exploring the climate dynamics behind them. It should be noted that, however, the methods we demonstrated are not the constraint that prevented us from doing so, it is rather the data availability that shaped the choice of using GB, a geographically smaller area but with sufficiently long data records (more than 100 years). This is in fact our overall idea behind this paper: we intend to devise, validate a novel approach and perspective for studying nonstationarity of GEV modelling associated with engineering designs, before applying it to wider areas where regional climate dynamics can be further studied, as the Spatial Random Sampling and nonstationary GEV modelling approach we provided in this paper are not limited by the geographical location but rather by the availability of the data. We agree that applying the methods presented to larger areas is equally important, and we are already exploring other data-reach areas, such as Australia, see Wang Xuan (2020). Another paper based on this conference contribution will be submitted shortly, which addresses the very comment made by the referee. However, given the scope of this manuscript, we don't think it is possible to include such case studies without diluting its main purpose.

Secondly, even the present paper focuses on Great Britain, the findings revealed are not only very relevant to the UK-based researchers and practitioners, they also demonstrate to researchers in other countries that how new features can be identified. The impact of this paper is mainly on the *quantification* of nonstationarity not only in the perspective of temporary changes but its *spatial* dependency, which contributes to improving the engineering designing approaches. As already shown in the paper, we found that, for the first time, not only do the most frequent events become more intensified, the extreme events also become more frequent in most part of the GB with refined spatial distribution. Such quantification will undoubtedly provide a basis to re-

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think how a new, more reliable engineering approach should be developed in view of climate change. And certainly, it will encourage readers/researchers in other regions to apply similar approaches related to the paper. In view of these, we find it hard to understand why the referee thinks there is lack of impact.

Thirdly, from our points above, the present paper fits the journal well based on our understanding as frequent readers of the journal. It may not be worth having yet another interesting discussion about the journal's scope, we can only point out that there are plenty of similar studies published in this journal, e.g. regional statistical analysis of hydrometeorological phenomena. Of course, this will be at the discretion of the journal editors.

2 Response to Specific Comments and Technical Corrections

We agree that discussion of 'compound events' is valuable and thus should be included in the introduction section. Although the main objective of the present paper remains as a univariate based nonstationary GEV modelling, readers should be informed well the relevance and importance of compound extremes, in particular, extreme flooding related to joint river-tide-storm surge impact. We appreciate the recommendation of the related paper which will be cited in the revised version.

We are thankful to the referee for other advices and suggestions of the necessary corrections. We will consider and implement them where appropriate in the next iteration.

3 References:

De Luca, P. (2020): comment on "Spatial Dependency in Nonstationary GEV Modelling of Extreme Precipitation over Great Britain" by Han Wang and Yunqing Xuan, Hydrol.

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Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2020-44-RC1>

Wang, H. and Y. Xuan (2020): Temporal and Spatial Variation of Extreme Rainfall in Great Britain and Australia using the SRS-GDA toolbox, 6th IAHR Europe Congress, June 30th – July 2nd, 2020, Warsaw, Poland, accepted, <https://doi.org/10.13140/RG.2.2.31765.27366>

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2020-44>, 2020.

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