Review: "Spatial Dependency in Nonstationary GEV Modelling of Extreme Precipitation over Great Britain"

General comments:

The authors provide a nation-wide study of historical precipitation by making use of stationary and non-stationary GEV models, with the aim to assess the spatial dependence of the different methods used. Although the study is interesting, it remains purely technical and therefore it is difficult to extract the impact-relevant messages and/or physical processes playing a role. Moreover, the study is also confined to a small geographical area. Performing a similar analysis for the European continent surely will help in improving the impact of the research. I therefore suggest rejection. You can address the above comments and/or submit the paper to a more technical-oriented journal.

Please see below some comments.

Specific comments:

Introduction is lacking a literature review on compound events related to hydroclimatic variables. This is needed as it will help in understanding the usefulness of your study. See below a few references to start with:

Zscheischler, J., Westra, S., van den Hurk, B.J.J.M. *et al.* Future climate risk from compound events. *Nature Clim Change* **8,** 469–477 (2018). https://doi-org.vu-nl.idm.oclc.org/10.1038/s41558-018-0156-3

De Luca *et al* 2017 Extreme multi-basin flooding linked with extra-tropical cyclones *Environ. Res. Lett.* 12 114009

De Luca, P., Messori, G., Wilby, R. L., Mazzoleni, M., and Di Baldassarre, G.: Concurrent wet and dry hydrological extremes at the global scale, Earth Syst. Dynam., 11, 251–266, https://doi.org/10.5194/esd-11-251-2020, 2020

I don't understand from the text if the data used are precipitation or rainfall.

L9 spatial dependency of GEV or extreme precip?

L20 engineering measures are usually needed to reduce socio-economic impacts, not to reduce impacts on natural processes.

L23-24 the second sentence of the introduction seems too much hasty and long. I suggest to 1) provide references of application of EVT to hydroclimatic data; 2) split the sentence in two; and 3) remove "flood" (and "etc.") from the list of hydroclimatic data, as this is a phenomenon that is eventually quantified by making use of data -> you can add "river flows" for instance.

L28 "(e.g. Gumbel, Fréchet, Weibull)" if you mention these three GEV distributions you need to give a bit more context about what they represent. Also change "e.g." with "i.e." since as far as I know they are the only GEV distributions available.

L32 sentence again too hasty. I suggest removing "e.g. precipitation, temperature, streamflow etc.," and explaining how hydroclimaitc variables are changing due to climate change. You can add 1-2 sentences with references.

L36-37 are you referring to nonstationary GEV? Scale and location parameters vary with time **and** other climate indices. Please amend.

L45 "depends on the elevation of study areas." Not clear

L52-53 "spatial dependency of the GEV distribution". Do you mean spatial dependency of extreme rainfall?

L53-58 too detailed for Introduction. I suggest shorten.

L69 "four related aspects of this study:" above you only mention 3 objectives.

L96 "The other two parameters can then be estimated by plugging back ξ into Eq. (3)." Here 1) I cannot see Eq. 3; and 2) I suggest amending "plugging back" with something more appropriate for what is supposed to be a scientific study.

L100 equations need to be introduced in order.

L181 "we follow other researchers here". I suggest rephrasing.

Technical corrections:

L13 "are in favour of nonstationary GEV models"

L13 "as far as the annual maximum daily rainfall (AMDR) is concerned." AMDR is not a person, so please rephrase.

L20 "current engineering design storm practice". Not clear, please rephrase.

L155 please rephrase sentence.