

Discussion of the paper “Inference for extreme spatial temperature events in a changing climate with application to Ireland” by Dáire Healy, Jonathan Tawn, Peter Thorne and Andrew Parnell. To appear in the Journal of the Royal Statistical Society, Series C (Applied Statistics).

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This paper introduces a number of innovations into spatial extreme value analysis, including use of climate models to inform the spatial variation of extreme value parameters, and r-Pareto processes for the spatial dependence of individual extreme events. The paper is well put together and convincing in its conclusions.

I have a number of questions and ideas for further extensions.

1. Did the authors consider the “point process approach” (Smith 1989, Chapter 7 of Coles 2001) as an alternative to the generalized Pareto distribution for threshold exceedances? This still requires the choice of a threshold, but by parameterizing the model in terms of an equivalent generalized extreme value distribution, it would possibly be less sensitive to the precise choice of a threshold.
2. The authors used climate models to assist the choice of threshold and the GPD scale parameter at each station, but did they consider taking the same approach for the GPD shape parameter? Like the vast majority of authors doing similar analyses, they treat the GPD shape parameter as constant in time and space, but it is not clear whether this simplification is justified.
3. They only use one GCM climate model and one RCM, but did they consider combining multiple models for each? There is by now a large literature on “ensembles of climate models” (for a relatively recent reference see Sansom et al (2021)), and it is well established that there are often wide differences among climate models.
4. The authors ignore time trends within the climate model but this could be a significant omission. One issue that they do highlight is the difficulty of projecting future trends based on the analysis given here. However it is also important to look at past trends from the viewpoint of identifying the human influence (detection and attribution; National Academy of Sciences 2016, van Oldenborgh 2021).
5. Finally, a broader point that was partly addressed during the presentation but I’d still like to raise it here. What exactly is the “punchline” for this paper? The text is largely framed in terms of technical issues of the analysis, but I feel that statisticians would have more influence on broader public policy discussions if we were clearer about expressing our conclusions in language that politicians and the media could understand.

I congratulate the authors on an excellent analysis and look forward to further developments.

References:

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