

Ocean Sci. Discuss., community comment CC1
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Comment on os-2022-14

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Community comment on "Technical note: Tail behaviour of the statistical distribution of extreme storm surges" by Tom Howard, Ocean Sci. Discuss.,
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The paper is generally well written, the problem is described clearly in the Introduction and the results are summarised clearly (although perhaps too briefly for some) in the Conclusions. However, the middle part (the bulk of the manuscript) does contain some quite complex concepts and methods, which could, I feel, be helped with a little more explanation and perhaps a few equations.

The following line-by-line comments are reasonably minor - if they are attended to, I would have no objection to the manuscript being published.

Page 2, lines 27-29: given that the previous sentence mentions both the annual-maxima and peak-over-threshold methods, this sentence should mention the peak-over-threshold equivalent of the GEV, which is the Generalised Pareto Distribution (GPD).

Page 2, line 37: I generally dislike unnecessary abbreviations; the reference "Howard and Williams, 2021" (here abbreviated to "HW21") only occurs five times in the manuscript, but I leave this decision to the editor. Likewise, "Van den Brink and Können (2008) (henceforth VdBK08)" on Page 6, line 114.

Page 3, line 53: it would probably be good to define the "skew surge" at this stage.

Page 3, line 59: the author uses the terms "geographical variations" and "spatial correlation" throughout Section 2. I don't think this is an appropriate terminology, because there is no actual "geographical" or "spatial" coordinate used in the analysis (for example, there is no analysis of the correlation of the shape parameter with latitude). It just happens that the modelled and observed data come from the same locations - the actual locations are just "labels" which relate modelled data points to their equivalent observational data points. I don't think this, in any way, affects the results but the author may want to clarify his terminology.

Page 5, lines 104-112: I got a bit lost here - it would be good if the author showed what he did by using a few equations. It also seems strange that he says that "the RMS difference based on the real data is more than 6 standard deviations away from the mean of this random distribution", when Figure 2 (a) seems to show that most points are within the 95-percent (approximately 2 standard deviation) uncertainty range of the red line. I am not saying the author is wrong - only that he needs to provide enough equations to

convince me that he is right.

Page 6, line 120: I found the "PIT" at the start of the line very confusing, until I read the whole paragraph and realised that it stood for "probability integral transform". I can't see the point of this initial "PIT" - I'd omit it altogether.

Page 6, lines 128 and 134: it is a bit confusing that the author uses U_i to represent the PIT-transformed Y_i and U_j to represent the PIT-transformed M_j - it would be clearer if a letter other than "U" was used in the second instance.

Page 6, line 129: it would be good to expand on "standard-uniform" (e.g. $f(x) = 1$ for $0 \leq x \leq 1$; $f(x) = 0$ for $x < 0$ or $x > 1$).

Page 8, Figure 3: I may be being pedantic here, but I feel that it would be easier to understand if the PP plots (which were introduced first, on line 142) were on the left and the QQ plots (which were introduced second, on line 144) on the right.

Page 8, Figure 3: the labelling of the vertical axis of the left-hand panels is obscure - it is presumably the gumbel variate of the samples, and so should be labelled something like "Gumbel variate (samples)". For consistency with the right-hand panels, the horizontal axis should be labelled something like "Gumbel variate (theory)". It would also clarify the panels if the labelling of the tics was consistent for both vertical and horizontal axes.

Page 10, line 185: this is the first occurrence of "CFB2018", which is not defined anywhere. It is presumably "Environment Agency: Coastal Flood Boundary Conditions for the UK: update 2018" - this should be defined here.

Page 12, lines 203-207: I love the brevity and clarity of the Conclusions, although some may find it too terse.