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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Simple Scaling of extreme precipitation in North America" *by* Silvia Innocenti et al.

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OVERALL COMMENTS

The article is well written and mainly clear. There is a substantial amount of work and many interesting results. However

1) Although Sections 1 and 2 are very clear, I had at first reading some difficulties understanding the rest of the paper, mainly because I got confused with the concepts of "d1" and "interval length". For example, if I understood correctly, an interval length of 6 durations with d1=1h for SD corresponds to durations 1h, 1h15, . . ., 2h30, whereas an interval length of 6 durations with d1=1h for ID corresponds to durations 1h, 2h, . . ., 6h. This may be confusing, so the authors may want to clarify these concepts, maybe giving examples or a table with the different intervals.

2) The authors use databases with different measurement frequencies. So I expect, e.g., the 1h-annual maxima at a given location to be larger when they stem from accumulating 15min rainfall than hourly rainfall. Thus I'm concerned about all the comparisons mixing these different measurement frequencies: do we expect H for example to be the same for different measurement frequencies? Likewise for the GEV parameters. In a pretty related study, Blanchet et al 2016 addresses this issue.

DETAILED COMMENTS

- p.3 l.5 "a deeper analysis . . . needed": Blanchet et al 2016 make such a regional analysis in South of France. The study region is much smaller but rainfall variability seems quite comparable.

- p.4 l.11 "Hintensity and Hdepth": not defined

- section 2.2: Blanchet et al. 2016 use a GEV-ML estimation in a single step.

- section 3: it may be clearer for the reader to call the 4 databases 15PD, H1PD, H2PD and DPD.

- p.6 l.20: so if I understand correctly SD comprises stations from 15PD only, ID from both 15PD and HPD, and LD from both 15PD, 1HPD and DPD (DPD only for the duration intervals >=1day). I'm correct? The authors may want to clarify it. In which case, the authors are analysing annual maxima with different measurement frequencies, without taking this at all into account. I wonder how the results/parameters you're comparing later are really comparable.

- p.6 l. 23-26: Papalexiou and Koutsoyannis 2013 and Blanchet et al. 2016 consider also the rank of the observed maxima to decide whether they should consider it or not in the analysis.

- p.8 l. 8: I don't understand what are the "SS" and "non-SS" samples - Figures 1 and 2: it took me time to understand these figures, partly because the x-axis are not labeled. Please add the labels (d1?).

- Figure 3: isn't there also an effect of measurement frequency in the plots for ID and LD?

- section 6: do I understand correctly that "non-SS" cases mean that the GEV parameters are estimated using the data from d* only? Please make it clearer.

- Figure 4: it might be clearer for comparison to use the same US map for the three rows (the first row is different so far). Also there might be here an effect of the measurement frequency for LD and ID, although the spatial patterns are pretty coherent.

- Figure 5: same as Fig. 4.

- p.13 l.26: So if I understand correctly, here you use the H estimated previously and estimation is just for the GEV parameters. Please make it clearer. Have you also tried to estimate all parameters at once (mu*, sigma*, xi*, H) with ML estimators as in Blanchet et al 2016 for example? Theoretically, this should reduce the bias.

- Figure 9: isn't there also an effect of measurement frequency in the plots for ID and LD?

- Figure 10: idem

- Figure 11: please add in the legend "with Hosking test at level 5%"

References

J. Blanchet, D. Ceresetti, G. Molinié, J.-D. Creutin, A regional GEV scale-invariant framework for Intensity–Duration–Frequency analysis. Journal of Hydrology, Volume 540, September 2016, Pages 82–95.

Papalexiou, S.M., Koutsoyiannis, D., 2013. Battle of extreme value distributions: a global survey on extreme daily rainfall. Water Resour. Res. 49 (1), 187–201.

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