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Comment on hess-2021-336

Anonymous Referee #2

Referee comment on "Modeling seasonal variations of extreme rainfall on different timescales in Germany" by Jana Ulrich et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-336-RC2, 2021

REVIEW OF THE ARTICLE « Modeling seasonal variations of extreme rainfall on different time

scales in Germany» by Ulrich et al.

SUMMARY: The authors model monthly precipitation maxima in Germany for a wide range of time scales ranging from 1 min to 6 days. They propose a duration-dependent GEV (d-GEV) with monthly covariates to allow monthly varying parameters. This allows them to show that short duration maxima occur mainly in summer, while longer duration maxima are spread throughout the year. They also show that the annual distribution derived from the monthly distributions are much less uncertain than that derived from annual maxima.

OVERALL COMMENT : The article is well written and very clear. I definitively enjoyed reading it. My main comments are:

- the article is quite long and there are mainly repetitions. In particular the "Discussion" section is very mainly an extended summary of the results. There are actually few sentences of discussion. Would it be possible to drastically shorten this part?

- I’m a bit puzzled by the fact that a constant xi is considered in the d-GEV distribution. As Fig. 8 shows, the xi parameter seems to be decreasing with duration (as expected). The authors claim that the shape parameter in difficult to estimate, which is true, but don’t you think that a simple model on xi (e.g. log-linear wrt duration) could be managable?

DETAILED COMMENTS

- l 4: “IDF curves are steeper”: I think this is not understandable in the abstract

- l 5: “short convective events occur very likely in summer” : the “very likely” may be confusing because it is stille rare (probability vs conditional probability)

- l 24: Kuntz et al is in german so I could not check

- l 95: you consider both 1 and 2 minutes. As shown later in your figures, the distributions for 1 and 2 minutes are very similar so I’m not sure that the 2 minute is necessary.

- l 178: Actually to the best of my understanding, Jurado et al 2020 conclude that accounting for dependence gives better results when d<=10h, which is the case for 10/14 (71%) of the considered durations. So I’m not convinced by your justification (but I agree that accounting for dependence increases much model complexity)

- l 205-206: I’m not familiar with the cross-validated likelihood method so I missed this part. E.g. what is the number of folds? Please consider being more specific here.

- l 233-238: to be sure: do you use the same sampling years also for deriving the annual GEV from the monthly GEV ? (i.e. do all monthly GEV use the same sampling years?)

- l 297-303: If I understood correctly, the sum of the ordinates of the dots of a given duration is equal to 0.1 (due to the 0.9-quantile). So dividing the ordinates by 0.1 gives the proportion of exceedances that occur a given month. Wouldn’t it be easier to interpret Fig 4 this way? For example in Bever 45% of the exceedances occur in July.

- Fig 5: I don’t understand the legend for Pr max. For example what do you mean by “<2%”? Isn’t it “1-2%”? Also I would find it easier to interpret if you divide Pr by 0.1, as said above.

- l 364-366: I don’t understand how you deal for cases p>1-1/T. What is the observed quantile in this case? I guess you consider the maxximul value by I don’t thin that’s correct. So I suggest removing the cases without dots in Fig 6.

- l 426: I agree that Fisher information matrix is correct in this case but for comparison puropose, I suggest using a bootstrap method as for the other cases.

- Fig 8: As said above, the monthly GEV seems log-linearly decreasing with duration

- Section 4: As said above, this is actually almost only an extended summary. Please consider shortening it.

- l 562-563: As a first try, I wouldn’t try the multi scaling model but I’d rather consider xi function of d.

TYPOS:

- l 121 eq 4: xi(p) should be xi(d)

- l 151 : remove the brackets

- l 171: the the

- Fig 6 caption: OSI ☐ QSI