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Comment on hess-2021-625

Anonymous Referee #2

Referee comment on "On the links between sub-seasonal clustering of extreme precipitation and high discharge in Switzerland and Europe" by Alexandre Tuel et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-625-RC2>, 2022

Review for manuscript "On the links between sub-seasonal clustering of extreme precipitation and high discharge in Switzerland and Europe"

Authors: Alexandre Tuel, Bettina Schaefli, Jakob Zscheischler, and Olivia Martius

Journal: Hydrology and Earth System Sciences

Summary

This study assesses to which degree temporal clustering of extreme precipitation influences high flow magnitude and persistence using precipitation and streamflow data from Swiss and European catchments. The authors study discharge events following seasonal precipitation anomalies and try to establish a link between precipitation clustering and discharge magnitude and frequency. They show that temporally clustered precipitation leads to more persistent discharge responses than non-clustered events.

General remarks

I think that this is a well-written and –structured study which highlights the importance of looking at precipitation events beyond the ones in immediate temporal proximity to high flow events. I have one methodological concern though regarding the event definition procedure and its potential impacts on the results/conclusions. In addition, I suggest to reconsider figure choice as the results of the Swiss and European analyses are very similar (one could maybe even say redundant). I think that narrowing down the selection might

help to better focus the reader's attention on the main points.

Major points

- I suggest to clearly highlight the research gap after the paragraph ending on l.54. What remains to be investigated given the results presented in the authors' previous study?
- An overlap of only 10 years between precipitation and discharge events (l.72) seems very little given that the study focuses on extreme events.
- Please specify how the baseflow filter parameter (l.82) was determined and why it does not vary in dependence of catchment properties.
- Precipitation extremes are defined as anomalies (l.97-100) while discharge extremes are defined using a fixed threshold (l.115). While I understand the desire to consider precipitation events potentially co-occurring with wet antecedent conditions, I think this is not necessarily achieved by using a seasonally varying precipitation threshold (some events relevant in terms of discharge may still be missed). I think that choosing events based on the discharge rather than the precipitation events would be more consistent with the aim of the study. I think that the effect of choosing one over the other event identification procedure on the results of the analysis should be demonstrated in a small sensitivity analysis (e.g. on a small subset of catchments). Specifically, it would be important to know what effect (a) choosing events based on precipitation has compared to choosing events based on discharge and (b) what an effect choosing a seasonal rather than a fixed precipitation threshold has.
- Were the percentiles computed empirically (l.155)?
- What about uncertainty in percentile computation because of small event sample sizes (l.159)? How does the analysis deal with cases where there are only very few events of the same length and what event sample sizes are we generally talking about?
- I think that the European analysis is nice to put the Swiss analysis into broader perspective. However, I also think that it leads to the presentation of slightly too much material. I therefore suggest to just show a subset of the European results. I would try to focus the reader's attention to the most important information.

Minor points and editing suggestions

l.3: 'this question' lacks a reference in the previous sentence.

l.10: the influence of temporal clustering on what? I understand that the statement refers to high flows and think that this could be made clearer.

l. 310: specify what 'this bias' refers to.

Figure 1: suggest to reconsider color scale choice as a continuous variable is presented

using a non-continuous color scheme.

Figure 2: I like figure 2. However, the horizontal lines in panel b should be explained in the legend.

Figure 11: legend entry for grey color needed.