

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1 https://doi.org/10.5194/nhess-2021-93-RC1, 2021 © Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.

Comment on nhess-2021-93

Anonymous Referee #1

Referee comment on "A climatology of sub-seasonal temporal clustering of extreme precipitation in Switzerland and its links to extreme discharge" by Alexandre Tuel and Olivia Martius, Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2021-93-RC1, 2021

General comment

Tuel and Martuis 2021 analyze gridded precipitation data sets with regard to the clustering of days with high precipitation sums and assess the impact on flooding in 93 Swiss catchments. It is an interesting study that has the potential to become a valuable contribution to flood hazard research. However, there a few points that need clarification. In the following, a list of comments that should be addressed before the manuscript is considered for publication.

Major comments

Comment 1: Title

"...and its impact" As far as I can see, you only assess the importance of clustering with regard to streamflow peaks. What are the other impacts? In the discussion you meantion "surface impact", but still do no specify.

Comment 2: Persistent floods

For large parts of the manuscript, I was not sure what you mean by 'persistent floods'. Please consider to explain this earlier in the manuscript (introduction?) with one or two sentences. The definition only is given in section 2.2.3, but the term is used a couple of times before already. Furthermore, I am a bit confused about the definition itself. I did not

fully understand it yet, I think. The 99th percentile means that 1 % of the values/days get selected. Doesn't it on an annual level mean that (depending on how you estimate the percentiles; how do you sample them by the way?) you only have 3-4 flood days per year? How can there then be 10 flood days in a 30 day period then? And how is it possible that L < N? Isn't L a time period in days and N the number of flood days in this time period? Please clarify. Another question in this regard: When does a year start and end in your case? Do you consider the hydrological year for Switzerland? Consider to change the seaction title in 2.2.3 to 'Persistent flood events'. Is there a specific reason why you choose the 99th and the 95th percentile? You refer to these events as 'floods'. However, runoff above the 95th percentile on an annual basis does not necessarily cause flooding. On 5 % of the days this value (\sim 18 days every year) is crossed, right? Please consider to pick up this point in the discussion section.

Comment 3: Catchments

I am somehow missing a better overview on the catchments investigates. Something like a table (or overview graph?) summarizing information on gauge locations, names, catchment areas, discharge data availability,...Please provide more information on how you selected this set of catchment? Why does it fit to your type of analysis? Why do you need catchments with glacial, nival and pluvial regimes? Also I do not see what time frame was considered for the different watersheds. It is a bit confusing that in Fig.1 DEM and catchments have both black lines as boundaries. Also some catchments reach outside the DEM/Switzerland. There the DEM does not cover. River gauges usually are marked with reversed triangles, I think. Maybe you can color the catchment areas according to their mean elevation?

Comment 4: Comparison precipitation data sets

The comparison of different gridded data sets is an interesting point of your study and should be already mentioned in the objectives at the end of the introduction. I think it could be interesting to see maps of Ripley's K value (Fig. 6 with K on grid level) of the different data sets in their original resolution. Please consider to try such a figure.

Comment 5: Scheme for methods

In my opinion, a scheme depicting your approach on how to detect temporal clusters in precipitation/discharge would help the reader to understand the methods faster and easier. Please explain in more detail how you calculate percentiles on a monthly basis for precipitation. Do you take only days with rainfall into account or all days (also the days with no rain)? I do not really get the selection of timescales presented Page 4 Line 123. Please consider to extend the explanation on the timescale 5-15 etc. Also consider to compare your precipitation clusters to regular precipitation accumulation periods presented in Froideveaux et al 2015: https://doi.org/10.5194/hess-19-3903-2015. What is the difference? Is the performance in explaining flooding better?

Comment 6: Structure

There is a bit of a mix between results and discussion, I think (see spedific comments). The structure of the discussion could follow the result section. Would make it easier to read, I think. In the discussion, you focus a lot on physical interpretation (4.1). However, I am not sure whether your study provides enough new information that allow to support/challenge any of those hypothesis. There is no need to remove it, but maybe focus more on the discussion of your actual analysis. In line 291 and following you discuss flood risk. You do not address exposure and vulnerability at all. You only provide information on the hazard component, I think. Please specify what new insights you study provides with regard to flood hazard. Fig. 13: Please provide information on this in the method section, present in results and discuss later.

Specific comments

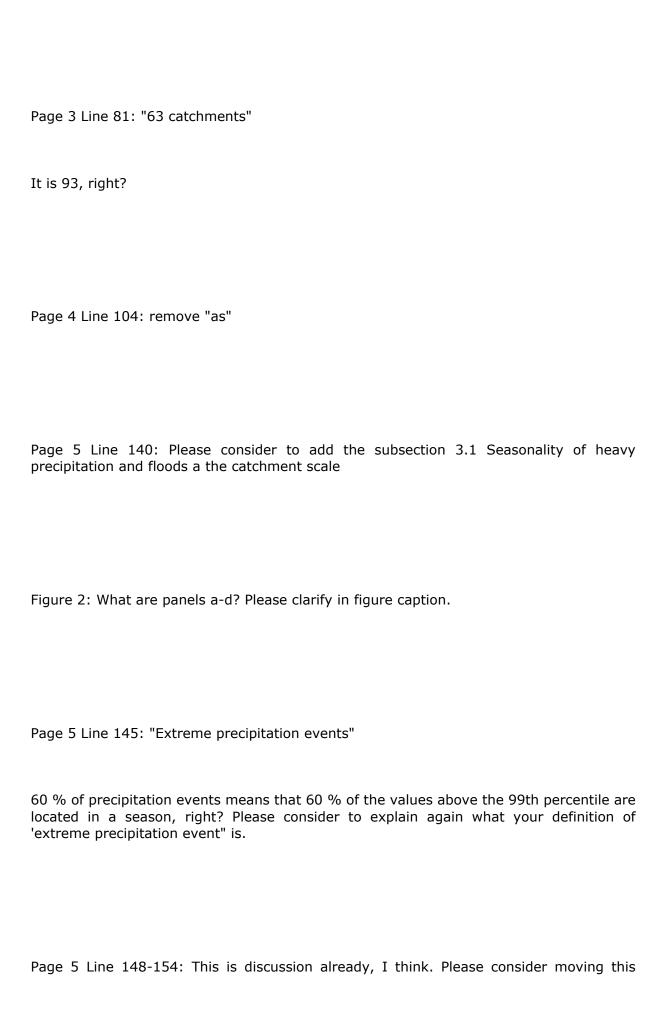
Page 1 Line 9: "...magnitudes decrease more slowly after clustered events"

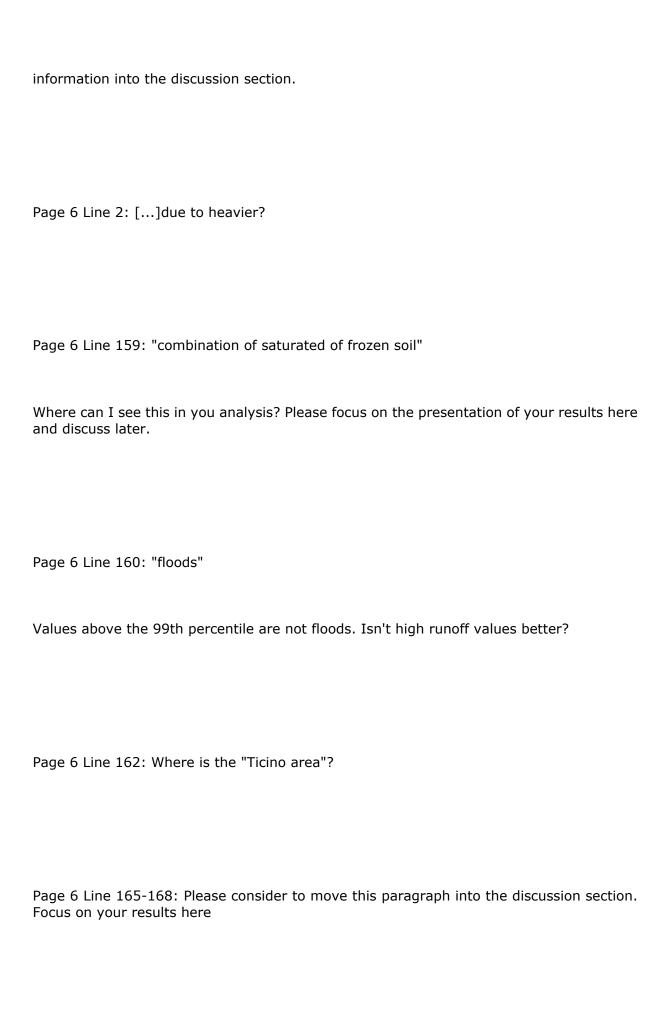
Compared to what other type of events?

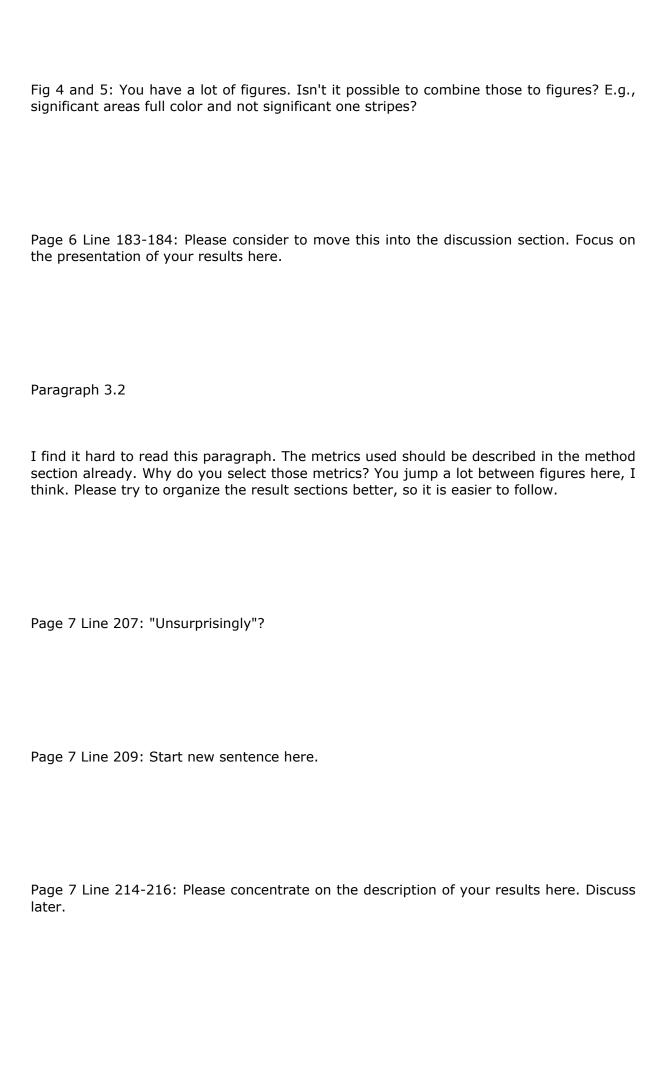
Page 3 Line 70: "[...] scale of ≈ 1000 km2 catchments covering the whole of Switzerland."

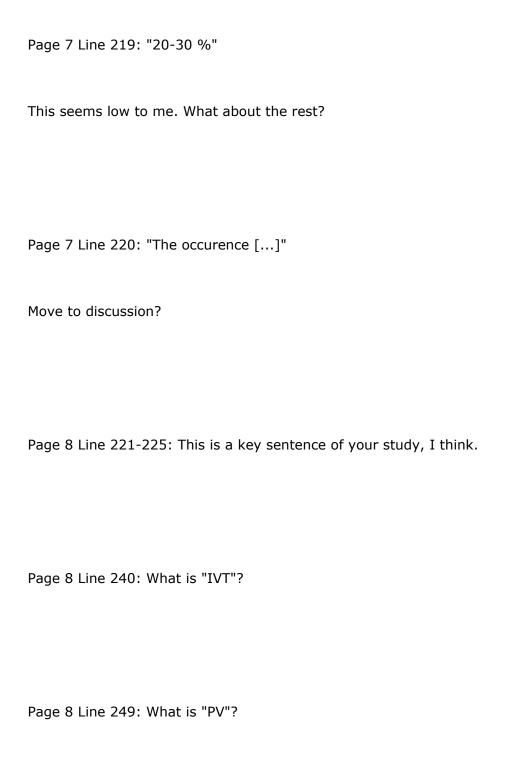
How many catchments? Please consider to rephrase this sentence.

Page 3 Line 72-73: This description of the outline is not necessary in my view. You follow the typical structure and section titles are clear.









Section 4.2 title: Replace "flood risk" with "flooding"?

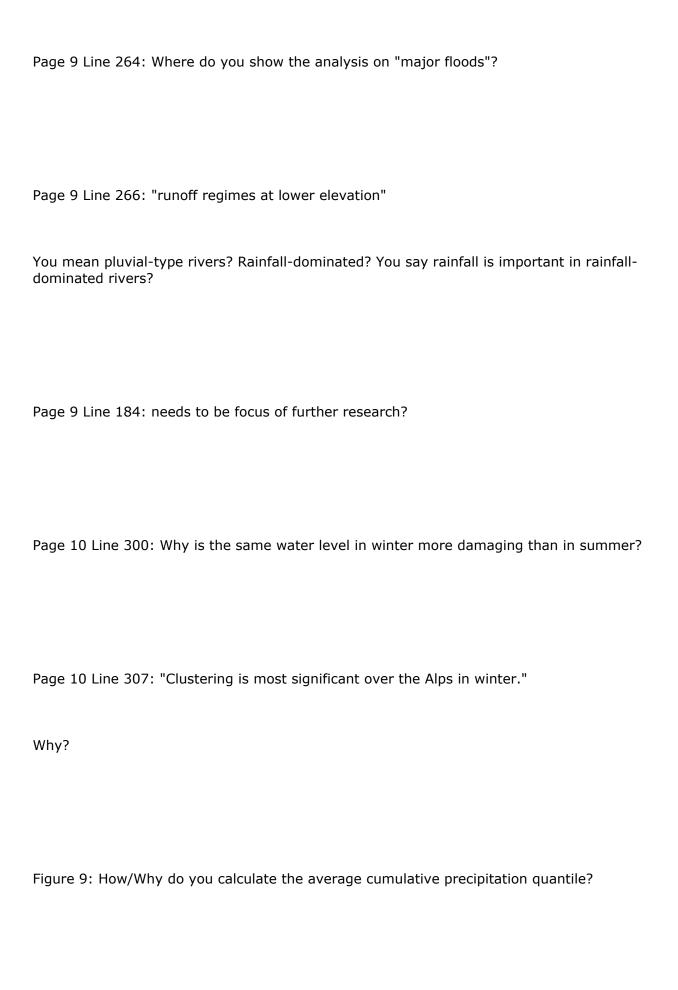


Figure 10: Describe panel b) in figure caption.