Thank you very much for your kind review. Please, find our replies below in blue and italic

This paper discusses the connections between antecedent conditions, event rainfall and flooding in 20 large catchments in Switzerland, making use of stochastic weather generation and the HBV model.

It makes use of modelled data to overcome lack of historical flow data, which also allows the use of hourly time-series of precipitation and flow, but acknowledges the shortcomings of investigating short-duration high-intensity rainfall. Return periods of floods and rainfall were explored and quantified using random-forest classification methods, to mixed success. Interesting patterns of the lack of coherence between annual maximum flow and annual maximum event rainfall.

This paper uses one set of parameters which model the "median flood frequency curve". It would be interesting to see the more extreme flood frequency curves made use of, to see the variability of the outcomes.

Thanks for this comment. As correctly noted, we only did the analysis for the median parameter set, which represents the "best guess" behavior for each catchment with given meteorological inputs. We would like to refrain from using other parameter sets in order to keep the focus on the impact of antecedent conditions rather than parameter uncertainty. The uncertainty aspect is the subject of ongoing research, and we feel it is beyond the scope of this paper. Insights on "more extreme" floods can be found in Viviroli et al. (2022).

Overall this is an excellent paper, which only requires a small number of changes to finish.

Thank you!

Major issues:

- A discussion of the variability of the ACRT would be useful to put some of the other values into context, as longer ACRT may have larger volumes.

That is true. We will add other variables in context.

- l125. Were the rainfall and flow records tested for stationarity? Although climate change is not the focus of this paper, understanding whether the stationary stochastic generator is based on stationary data is important. Similarly, if the AMAX flow observations are not stationary, then the relationships between AMP and AMF in reality may also be changing over time.

We did not test precipitation and streamflow records for stationarity, but we did use homogeneous precipitation series. It is difficult to identify long-term trends in precipitation and streamflow records for mean or more extreme statistics due to large interannual variability. Isotta and Frei (2019) find that seasonal precipitation trends in Switzerland are mostly not statistically significant, and signals of systematic change are weak. However, we agree that this is a strong assumption that could be discussed in more detail in the manuscript. Despite the difficulty of this stationarity issue in the context of this study, it is probably not of great importance, as we focus mainly on the effects of antecedent conditions.

- l125. How long were the rainfall, temperature and flow records used to extrapolate out to 10,000 year simulations? If short, then the overall distributions may under-estimate the variablity of these observations.

The precipitation and temperature records are about 85 years long. The streamflow records were shorter for most rivers. The stochastic weather generators were trained on the 85 years of data. The hydrological models were trained on 36 years on 4 sub-periods of 9 years to derive 100 parameter sets.

The dispersion of the rainfall pdfs is obviously of interest. However, for flood generation, this variability is not the only one to be considered. The variability to be captured is that of composite configurations with different precipitation sequences first, and then different initial hydrological states (saturation of soils, importance and extent of snow cover, filling rates of lakes...), which the simulation method allows to explore. However, as with all models, they are based on different assumptions and mathematical representations, and it is true that some types of variability are not represented. The variability of interest for extreme floods is a multivariate variability (in a high multidimensional space), which obviously is never well observed from multidecadal period, and decadal climate variability (see, e.g., Vance et al., 2022) is not represented by the stochastic weather generators. This is a limitation that will be more clearly stated in the revised version.

- l265. Forcing to link the AMP and AMF might lead to problems when close to the start or end of the hydrological year, leading to the pattern of "AMP after AMF". Can this be checked to see whether this is a problem?

If we understand the comment correctly, the question is if snow accumulation hindering the direct response could link the wrong AMP to the AMF. We checked both the time between AMF and AMP as well as the likelihood of the AMP to be snow rather than rain. For the cases of snowfall during the AMP, the respective pair was removed from the analysis. The AMF and AMP with a suspicious time difference in this regard were less than 2% of the cases. We will add these aspects in the discussion.

Minor Issues

- l97. Put numbered lists on new lines for ease of readability

Yes, we will change to a new line there.

- Fig1. Figure could be full page width, or blue point made bigger.

We will adapt the color of the outlet point to make it easier to spot.

- l126. What do you mean by "pseudo-observed"?

Pseudo-observed means that the areal precipitation was calculated for the catchments using both hourly precipitation time series as well as daily time series, as they were available. Before calculating the hourly areal precipitation, the daily stations were disaggregated with the help of the hourly stations. Hence, pseudo as the disaggregated data were not real observations. We will change the term to not confuse.

- Table 1. Are those standard terms for the regimes? If so, provide a reference. Otherwise define the regime terms.

Yes, these are standard terms for the regimes in Switzerland as introduced in Weingartner & Aschwanden (1992). We will add this reference.

- Table 4. Please add more labels to the first row and column.

We will add that.

References

Isotta, F. A., Begert, M., & Frei, C. (2019). Long-term consistent monthly temperature and precipitation grid data sets for Switzerland over the past 150 years. Journal of Geophysical Research: Atmospheres, 124, 3783–3799. https://doi.org/10.1029/2018JD029910

Vance, T.R., Kiem, A.S., Jong, L.M. et al. Pacific decadal variability over the last 2000 years and implications for climatic risk. Commun Earth Environ 3, 33 (2022). https://doi.org/10.1038/s43247-022-00359-z

Viviroli, D., A.E. Sikorska-Senoner, G. Evin, M. Staudinger, M. Kauzlaric, J. Chardon, A.-C. Favre, B. Hingray, G. Nicolet, D. Raynaud, J. Seibert, R. Weingartner & C. Whealton (2022). Comprehensive space-time hydrometeorological simulations for estimating very rare floods at multiple sites in a large river basin. Natural Hazards and Earth System Sciences, 22(9), 2891–2920. doi:10.5194/nhess-22-2891-2022.

Weingartner, R., & Aschwanden, H. (1992). Abflussregimes als Grundlage zur Abschätzung von Mittelwerten des Abflusses. In Hydrologischer Atlas der Schweiz. (Vol. Tafel 5.2). Bern.