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Hydrology and Earth System Sciences
Discussions

Interactive comment on "The role of precipitation for high-magnitude flood generation in a large mountainous catchment (upper Rhône River, NW European Alps)" *by* Florian Raymond et al.

Anonymous Referee #2

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The manuscript presents a method for linking precipitation data and flood discharge data to classify flood types of the upper river basin of the Rhone River. The main aim is to shed light on precipitation characteristics of high-magnitude floods. The study describes a complex case of a main river that is fed by a regulated lake and two tributaries. Moreover, the river basin is influenced by snow and glaciers, and more importantly by reservoirs for hydropower generation. The authors use the ERA-20C dataset for analysing the precipitation characteristics.

The study presents some interesting findings. On the one hand, the study shows an interesting approach to assess flood typologies (hierarchical clustering) in a river basin

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Discussion paper

with a relevant human influence by lake regulation and hydropower reservoir operation. On the other hand, it provides insights in flood generation processes.

However, some improvements are suggested before the publication of the manuscript.

- The main findings could be a bit more highlighted and generalized.

-It would really be interesting to look at the precipitation patterns leading to the superimposition of the flood peaks from the three subcatchments. The topology of the river network and the buffering effect of Lake Geneva suggests that the precipitation patterns (spatio-temporal distribtion of rainfall in the three subcatchments) leading to superimpostion of flood peaks and thus to high-magnitude floods must follow a certain pattern. I suggest to elaborate more on that in the discussion when introducing the "type 1 floods" (see, e.g., Pattison, I., Lane, S. N., Hardy, R. J., and Reaney, S. M.: The role of tributary relative timing and sequencing in controlling large floods, Water Resour. Res., 5444–5458, doi:10.1002/2013WR014067, 2014. or Zischg, A. P., Felder, G., Weingartner, R., Quinn, N., Coxon, G., Neal, J., Freer, J., and Bates, P.: Effects of variability in probable maximum precipitation patterns on flood losses, Hydrol. Earth Syst. Sci., 22, 2759–2773, doi:10.5194/hess-22-2759-2018, 2018).

Minor remarks:

-line 341: In my opinion, the statement on the role of snowmelting cannot be concluded from the present study. The effect of snowmelt was not analysed.

-line 371: As above, the role of snowmelt, although as mixed process, cannot be stated without having analysed it in detail.

-line 394: same as above.

-lines 408-410: Please describe what you mean with "new perspectives".

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