

***Interactive comment on* “Estimation of joint return periods of compound precipitation-discharge extremes for small catchments” by Ivan Vorobevskii et al.**

Anonymous Referee #2

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The manuscript analyses the joint return period of extremes in precipitation and extremes in specific discharge. It is a point of view if considering precipitation and discharge as compound events or as a causal relationship. After Granger (1969), causality is given if one event is triggering another and the effect is occurring after the cause event. Nevertheless of recent discussions of this concept and the increase of data science methods for inferring relationships in cases where only few theoretical knowledge is available for defining cause-effect relationships, discharge can still be defined as an effect of precipitation. Moreover, there is sound theoretical knowledge on this relationship available and rainfall (cause) is in nearly all forecasting systems used as a causal variable for predicting discharge. From this perspective, I don't see any added

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value of the proposed method. The authors do not state why they have chosen the presented approach. Second, the analysis was done on gridded data. Specific discharge was interpolated spatially across catchment boundaries. Mostly, specific discharge is a catchment-related characteristics and the spatial interpolation of this value should consider only areas upstream of the measured values and should not cross catchment boundaries. The analysis of the pairs "precipitation-discharge" at grid-cell basis does not account for upstream processes. This methodological setup would be very interesting for analyzing compound pluvial floods (local rainfall extremes) and fluvial floods (discharge resulting from cumulative upstream rainfall) but it is in my opinion not suited for answering the stated research question. In summary, I do not recommend the publication of the manuscript in its present setup. Thus, I don't go into further details.

Granger, C.W.J. 1988, Some recent development in a concept of causality. *Journal of econometrics* 39.1-2: 199-211.

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