

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC2
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Comment on nhess-2022-99

Anonymous Referee #2

Referee comment on "Comprehensive space-time hydrometeorological simulations for estimating very rare floods at multiple sites in a large river basin" by Daniel Viviroli et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2022-99-RC2>, 2022

The manuscript „Comprehensive space-time hydrometeorological simulations for estimating very rare floods at multiple sites in a large river basin” by Viviroli et al. presents an interesting implementation of continuous simulation for the estimation of rare floods, providing progress over previous studies especially concerning temporal resolution, length of the continuous simulations and coverage of multi-sites in a large catchment. As overall evaluation, I find the paper well organized, the methodology is explained in details and for sure it will be a useful basis for further applications and developments. I think yet that some parts should be better discussed and supported by explanations. Please find my comments below, divided by section, followed by a couple of editorial comments.

1 Introduction.

I have the feeling that only the most standard methods have been referenced in the introduction (conventional flood frequency analysis, regional flood frequency analysis, use of historical information etc.), but in the literature other approaches linking flood estimation with physical processes are present (see e.g., Basso et al. (2021) and references herein for a systematized description of a mechanistic-stochastic physically-based approach for the estimation of river flows/floods). I would suggest the authors to mention other-than-conventional and widely used approaches in the paper introduction, especially if relevant in the discussion of physically-based models or methods less affected by the time series shortness, as the standard ones usually are.

2 Study area and observational data

Why do time series end in 2014? Are there no more recent data available?

3 Methods

What is exactly the rationale behind the choice of using two different weather generators? I understand that they are implemented independently, and they are used for different purposes, but I miss a clear explanation of the reasons why for example you choose GWEX instead of the SCAMP as input to the HBV model and not the other way around.

L193: It is not clear to me what do you mean by "...represents the dependence structure of innovations in the generation process"

L268: could you be clearer about the "technical issues"? What are they related to?

4 Results

There is not a clear discussion about the reasons why the two weather generators provide different precipitation ranges. I think that you should spend some time on better describing the differences in the outputs obtained through the simulations and what they are related to.

L370: I would avoid reporting only the Nash-Sutcliffe efficiency values, but at least complement them with another evaluation criterion, as the NSE is not the optimal one when model accuracy needs to be assessed.

L418: I suggest the authors to define the FOEN acronym, as it is not clear what you are referring to (I had to go to the Acknowledgments section to understand its meaning).

Figures

Figure 10a. Despite considering this representation very nice, I have to say that most of the information in the smallest circles is lost. I would suggest leaving it like it is for the entire basin and the sub-regions but simplify the symbols for all the other sites (maybe only showing a couple of representative durations, so that the colors are clear).

Editorial comments

L470: I believe the first comma should be removed

L666: a comma is missed after e.g.

References cited in this review

Basso, S., Botter, G., Merz, R. and Miniussi, A. (2021). PHEV! The PHysically-based Extreme Value distribution of river flows. *Environ. Res. Lett.*, 16 (12).
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