Hydrology and
Earth System
Sciences
Discussions

Interactive comment on "An Uncertainty Partition Approach for Inferring Interactive Hydrologic Risks" *by* Yurui Fan et al.

Anonymous Referee #1

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This is a very good paper with some very interesting results. The authors have conducted the onerous task of evaluating the uncertainty in parameters (that may or may not be interacting) that describe probability distributions typically used in flood prediction. They have selected appropriate methods for characterizing those uncertainties (FSFA approach), describing the contribution to uncertainty and laid out all the relevant equations in as succinct a way as possible. Everything is clearly outlined and the results are clearly stated. The paper shines in particular in the way the results are presented visually. A wide range of measures (parameters and their paired interaction) are evaluated creating a large number of results. The visual presentation of these results is excellent. This is no easy task but they managed to convey the outcomes graphically in an easily accessible way that makes this kind of research accessible overall (where

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generally it is not due to the forest of indices and equations). On that note, there are minor technical errors mostly in language that I will not list here; only one error in the equation I could find (line 331, the dot normally indicating placement of index "l" should not be there) and a question on whether all those significant digits are actually warranted in Tables 2-6 and in Figures 10-13. Figure 1 could be expanded I would argue to explicitly indicate copulas, etc and provide a few more details on the framework. The work as a whole is nice and succinct – although, greater discussion in the discussion section could be given in view of the importance of this work. Thus, I ask the authors just two questions to consider here explaining in their discussion section: 1. The two watersheds selected are not very different but you find discrepancies between which copulas perform best on which stations (lines 409 to 412) for predicting flood peak and volume, and different copulas are chosen to characterize uncertainty in the risks for each station (line 414-416). The authors are using data driven methods that have no explicit consideration for causal mechanisms (as with most data driven methods) but surely the differences in copulas selected are caused by physical differences in the watersheds. Can the authors please explain these discrepancies in terms of physical watershed characteristics (or perhaps make the case for why the differences cannot be ascribed to physical differences)? 2. Please detail what part of the analyses is watershed specific and thus, what analysis should each user conduct each time and for every station they wish to understand prediction uncertainty and parameter interaction with the outcomes of their analyses; or conversely, what can they simply adopt from the Tables and Figures for their watersheds?