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Comment on nhess-2022-111

Anonymous Referee #2

Referee comment on "How uncertain are precipitation and peak flow estimates for the July 2021 flooding event?" by Mohamed Saadi et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2022-111-RC2, 2022

This work aims to investigate the influence of using a set of different radar-based QPE and different hydrological models on the uncertainties in simulating the record-breaking July 2021 flood event in Germany. Given the lack of peak flow information (the flood partly destroyed the monitoring systems), the analysis is focused on the probability that the simulated peakflow exceeds the highest historically observed peakflow before the flood. This is a very interesting point of view, given the challenges offered by the prediction of a record breaking flood to both precipitation estimation and hydrological prediction. The work is appropriate for NHESS and its readership.

The manuscript is broadly well written and well structured. However, there are some specific issues listed below that should be considered before acceptance.

- Better identifying the main focus of the work. The July 2021 flood in Germany is not only a record-breaking flood. It is a flood that far exceeded previously observed records (the authors could report existing post flood estimates that shows how far the estimated July 2021 peak exceeded the previous records). Of course, existing methods and models for flood forecasting cannot predict these floods well because flood generation processes of large extremes differ from those of smaller, more frequently observed events. Therefore, research aiming precisely to this issue by considering these kind of megafloods is timely and helpful. However, this point is completely ignored in the abstract, and it is elaborated relatively late in the introduction.
- The point (L205-2010) made on the different results obtained based on considering raingauges and raingauge-based catchment-scale precipitation estimates is someway misleading. First, it totally ignores the uncertainty in the catchment-scale estimates based on raingauges (and here I urge the authors to consider techniques better than Thiessen for this). Second, this conclusion obviously depends on the set of raingauges considered. If the reference raingauges are those considered for estimating the catchment-scale precipitation, I doubt outcomes may be different. By the way, this conclusion is missed in the conclusion section.
- The point (L254-256) about the causes leading to the strong underestimation (For the

14 July 2021 event, this underestimation may be explained by intense collision-coalescence processes taking place close to the surface..) lacks any ground. I mean: it is likely that collision-coalescence processes may cause those underestimation, but this attribution needs a far better explanation.

- Information on how antecedent conditions were computed, and about the accuracy of these estimates, is missing, in spite of the critical role this information have on the sensitivity of the model to QPE error.
- The parameter uncertainty of ParFlowCLM is strongly underestimated when focusing only on Manning values, as the authors did. At least they should do a better job considering uncertainty in the information about soil properties (lets only think to soil depth).
- The use of English in the paper, while of a reasonably high standard, contains many idiosyncrasies, like the sentence: "The QPE impacted both GR4H and ParFlowCLM simulations", where 'Errors in the QPE impacted both…' is more likely.
- References are missing lot of standard information.