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Interactive comment on "Reproducing an extreme flood with uncertain post-event information" *by* Diana Fuentes-Andino et al.

Diana Fuentes-Andino et al.

diana.fuentes@geo.uu.se

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We thank Anouk Sprong for suggested literature and for providing constructive comments, which will help us improve the description of our scientific work. All remarks will be carefully considered and, as suggested, for example, we will revise figures and clarify our procedures in the revised paper.

First, we would like to specifically address two key questions that were pointed out by Anouk Sprong.

Comment: In my opinion the results of Bonnifait et al. (2009) and Fuentes-Andino are more or less the same. So the question arises what is the added value of the GLUE framework to the modelling approach of combining a RRM with a hydraulic model.

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Response: Within the uncertainty analysis framework presented in our manuscript, to account for the parameter uncertainty many possible parameter combinations were generated. Bonnifait et al. (2009) considered fewer parameter sets. Both approaches are valid to reflect the uncertain nature of the system, but the meaning of the resulting predictive uncertainty is different for the reason reported above.

Comment: Smith et al. (2002) did also research about the peak discharges caused by Mitch. Using standard USCG techniques, he found discharge value within the range proposed by Fuentes Andino for the same reaches. So why using model techniques while standard USGS techniques give more or less the same result concerning the discharge.

Response: Peak discharge obtained in Smith et al. (2002) were relevant to this study to calibrate the hydrological model so to obtain a hydrograph instead of a peak discharge as input for the hydraulic model. Through that it was possible of, instead of a peak, to propagate the hydrograph thus acknowledging the unsteady nature of the flow, which is crucial not only for hydraulic simulation, but also for the design of flood protection structures (e.g. flood retention reservoirs).

For the other comments, we agree with Anouk Sprong that validation is an important part of the modelling process. Within the limitation of data availability in this work, we compared our results with those produced by JICA (2002) which used a different modelling technique. There was no information about flood extent available to be used for this purpose. The proposed methodology can make use of the Bayesian concept, new data, including post–event, can be used to update the identified parameters.

Also, areas contribution to points 8 and 9 are large enough so the inflow has to be considered for the upstream boundary conditions. As there are no observations for those points, the hydrograph was inferred using behavioural parameters (P8 L28-30). Since those areas were smaller comparing to the rest of contributing area (at points 1, 2 and 5), it is expected a limited impact on the results (P13 L30-33 and P14 L1-3). We

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acknowledge that this was not clear in the original manuscript. Thus, we will clarify this point.

Moreover, we will better explain what we mean by “propagation of the water level uncertainty in the flood extent was more evident at highly dense urban areas”.

We will explain that the time of the peak was not surveyed/available for all the points in Table 1.

We think that details of what we want to show might decrease if we expand to show more of the area in Fig. 1.

Anouk Sprong can also refer to the supplementary document “Major_ revision” including a link where the work of JICA (2002) is available for download. The same document also describes improvement of figures as well as description of models and tools. Please, refers to the points 1, 4, 7, 8 and 9 of that document related to some of the comments in this review.

References

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