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Hydrology and Earth System Sciences Discussions

Interactive comment on "Fuzzy set approach to calibrating distributed flood inundation models using remote sensing observations" *by* F. Pappenberger et al.

Anonymous Referee #3

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General comments

The article focuses on the implementation of a fuzzy methodology of evaluating the uncertainty in the spatial flood inundation observations. The 2D-LISFLOOD-FP model is applied but not described in details as the methodology is not supposed to focus on a particular model. The interest and the objective of the study are clearly stated in the introduction. The methods and assumptions are detailed in section 2, along with other references if more information is needed. Section 3 compares the proposed fuzzy evaluation methodology with the traditional measure of fit but it is only a very general overview of the results (see specific comments). Section 4 presents the sensitivity

analysis and the resulting flood inundation map. Again, results are little discussed and there is almost no comparison with traditional methods. The paper is well-structured and referenced. The description of the methodology is very clear. My only regret is the lack of a more thorough comparison with traditional techniques along with a detailed discussion to emphasize the advantages/limits of the methodology.

Specific comments

Section 2.4: The parameter ranges and distributions given in table 1 are poorly explained and discussed in the paper. Why the distribution for the floodplain, channel and outflow roughness was chosen as “log”? I don’t understand the sentence (p. 2250, l25) “A log distribution was chosen to extend the parameter sampling range for more than two decimal places”. Is that the justification for the choice of the log distribution? If so then why was the distribution of the standard deviation for cross-section error chosen uniform?

Section 3.1: What do you mean by “are as expected” (p. 2258, l12) and “behave ‘well’ in comparison to traditional approaches” (p. 2258, l13)? Maybe a more detailed analysis will be useful here. What is the potential of fuzzy performance measure with respect to classical performance measures?

Section 4.1: Fig. 7 is analysed with respect to the model used although the methodology is not supposed to focus on a particular model. Maybe a more general analysis will be more relevant. It will also be interesting to compare this flood inundation map with a map created from conditioning the model on traditional discrete binary category maps.

Technical corrections

p. 2248, l19: reference Pappenberger and Beven is missing.

p. 2258, l5: is it necessary to number section 3.1 as there is no other section in part 3?

p. 2260, l15: is it necessary to number section 4.1 as there is no other section in part

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4?

p. 2268, Table 2, 4=Odds: precise that f is False alarm rate.

p. 2270, Table 4, “Only the roughness of the channel exhibits sensitivity” doesn’t match what is written in the text: (p.2260, l5) only two parameters exhibit any sensitivity (Standard deviation for cross-section error and Roughness channel).

Fig. 3: axis labels are not very legible

Fig. 4 is missing.

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