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Hydrology and Earth System Sciences Discussions

Interactive comment on "Calibration and sequential updating of a coupled hydrologic-hydraulic model using remote sensing-derived water stages" *by* M. Montanari et al.

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We are grateful to the anonymous referee #4 for his positive and helpful comments. We will fully address them in the final version of the manuscript; here we want to shortly answer to the issues raised by referee #4 at points 2 and 3.

2. Hydraulic simulation:

Although some studies exist integrating remotely sensed information into 2D flood inundation models (e.g. Pappenberger et al., 2007), they restrict their research to the

use of the SAR-derived flood extend instead of water levels. As a matter of fact, we are currently investigating this relevant and interesting issue since we believe that the methodology might be extended also to rivers characterised by more complex geometry (which need to be modelled 2 dimensional). In this context, water levels can be estimated with two dimensional flow directions if the SAR image is acquired after the flood peak (see Hostache et al. 2006). However, further research need to be done in this direction. To derive water levels, the method is based on the merge between the most trustworthy limits of the flood extent map and the underlying DEM. Due to spatial and radiometric uncertainties resulting from the SAR image and its processing, the extracted flood extension limits are always prone to uncertainty. As a matter of fact, during the merging between the flood extension limits and the DEM, this uncertainty is transferred to the water level estimates. Hillslope areas thus imply important uncertainties on water level estimates due to the larger spread of possible elevation values inside the confidence interval of remote sensing derived flood boundaries. As a result, the water level estimation method leads to reliable water level estimates only for relatively large and flat floodplains. Indeed, in presence of a narrow valley uncertainties on the remote sensing derived water levels are important. We will add to the manuscript a discussion on the relevance of the methodology with respect to the floodplain topography.

3. Transferability of model parameters:

We agree with referee #4 regarding his concerns about the limited variety of the flood events magnitude, but we used all the data at hand. Unfortunately discharge data related to more significant flood events are not available for this study area. However we will extend the Table 2 adding the information requested (estimate of the events return period and pre-event flows).

References:

Pappenberger, F., Frodsham, K., Beven, K., Romanowicz, R. and Matgen, P.: Fuzzy set approach to calibrating distributed flood inundation models using remote sensing

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Hostache, R., Puech, C., Schumann, G., and Matgen, P.: Estimation of waterlevels in a floodplain with satellite radar images and fine topographic data (In French: Estimation de niveaux d’eau en plaine inondée à partir d’images satellites radar et de données topographiques fines), Remote Sensing Journal (In French: Revue Télédétection), 6, no. 4, 325-343, 2006.

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