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Hydrology and Earth System Sciences Discussions

Interactive comment on "Assimilating SAR-derived water level data into a hydraulic model: a case study" *by* L. Giustarini et al.

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First we would like to thank D. Yamazaki for his interest in our paper and for the comments, which will allow to improve the original version of the manuscript.

The reply to his comments can be found in the following.

1. Thanks for the suggestion on how to better describe the expected SWOT data uncertainty: it will be corrected in the final version of the manuscript.

2. The observed discharge at the upstream boundary condition is available for the event of January 2003, through the application of a calibrated rating curve on the recorded water levels in Pfaffenthal. Considering the observed discharge as input,

the performance of the model was assessed comparing the observed and the simulated hydrographs at all the gauged cross sections, thereby checking the capability of the calibrated model to reproduce the spatio-temporal variations of water levels. The Nash-Sutcliffe efficiency was computed at all gauged cross sections with recorded water stages and available rating curves, obtaining an average value of 0.84. This will be added and better explained in the resubmitted version of the manuscript.

3. During the calibration the inflow discharge observed during the January 2003 storm event was considered as input data. The calibration approach was performed using multiple randomly generated roughness parameter sets. Each parameter set has 4 values for the channel roughness at the 4 gauged stations of Pfaffenthal, Steinsel, Hunsdorf and Lintgen (between the gauging stations, parameters are estimated through linear interpolation) and 1 value for the floodplain, as its contribution is assumed not to be relevant (see also Hostache et al. (2009), Montanari et al. (2009) for more details on the non significant floodplain roughness parameter sensitivity in the study area). The model was evaluated comparing the observed rating curves (points of contemporaneous measurements of water level and discharge) at the 4 cross sections with the internal rating curves of the model itself. The selected model set is the one with the best performance in reproducing the observed water level and discharge values. An effort will be done to better describe and support the calibration procedure in the new version.

4. The possibility of having poor model performances at a local level due to errors in the timing of the inflow peak is an interesting point of investigation. Based on the results obtained with some additional analyses, we will try to address this point in the final version of the manuscript, also taking into account the comment from D. Yamazaki in point 5 of his review.

5. We understand the suggestion of taking into account not only the spread of discharge within a single time step but also some differences in inflow peak timing. We will further investigate this and discuss it in the new version.

All the technical corrections will be taken into account and added to the final version.

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