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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Calibration of channel depth and friction parameters in the LISFLOOD-FP hydraulic model using medium resolution SAR data" *by* M. Wood et al.

G. J.-P. Schumann (Referee)

gjpschumann@gmail.com

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This paper describes the use of multiple low resolution SAR images to calibrate channel depth and roughness of a 2D LISFLOOD-FP model of the Severn river floods. The method is based on the identifiability approach using a confusion table performance metric.

The study demonstrates that multiple SAR images albeit low resolution can lead to greater identifiability in the presence of more than one uncertain model parameter. It also cancludes that depth parameter is more sensitive than roughness, which is welcomed since bathymetry can be easier validated than roughness.

The paper is well written and athough it is quite lengthy it is an interesting read and should be publishable after some moderate revisions, particularly related to my last point below. Note that although I selected major revisions, I think the gravity of my concerns would point rather to moderate. I believe they can be addressed without major difficulties.

- The IC approach is really nice and gives an objective assessment of the value of a flood image for calibration. However, what we are still missing in the literature is to find a way that gives an objective IC of a SAR flood map without the need to calibrate first. In other words, in this paper, which I think has a lot of merit, IC is built up based on parameter identifiability rather than for instance inter-comparing each SAR image and applying the score and identifiability that way, so without the need of a model and its parameter but I understand that this is outside the scope of this paper.

- I also think that what is innovative here is the analysis of IC and identifiability in relation to what stage in the hydrograph we are looking at and what type of data we use (single image, combined images, gauge data). I wonder if the title and the introduction should better reflect that since to me this is one of the first papers to try and answer these questions using real data.

- My biggest reservation in this study lies with the choice of performance metric used, which may explain in my opinion why the greatest information content is in the SAR images closest to peak flow. Stephens et al. (2014) showed that the performance measure used here is particularly biased towards largest flooded area (in other words, it always gives the highest score to the biggest flooded area). This is significant in this study and could lead to an unwanted "bias" in the calibration. I suggest the authors repeat the exercise offline with the "F2" measure for instance ((A-B)/(A+B+C)) or an area in error index ((B+C)/(A+B+C+D)) to see if the same SAR images give the highest sensitivity still.

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