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Interactive Comment

Interactive comment on "Towards automatic calibration of 2-dimensional flood propagation models" *by* P. Fabio et al.

J. Neal (Referee)

j.neal@bristol.ac.uk

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The paper presents the application of a gradient based automated calibration routine to a 2D hydraulic model. It then discusses the influence of errors associated with using depth observations and a 25 m resolution DEM on the calibration procedure. These errors are believed to be a significant cause of parameter equifinality and to adversely effect model calibration. If possible, a comment on the implications of these findings for future data collection initiatives that might then use automated calibration routines would be interesting. Specifically, the use of depth observations seems to have been problematic here?

Would it be worth plotting CV against some simple metrics such as local DEM slope, distance from the channel etc. and could this information form a physical basis for rejecting/keeping observations? The paper suggests it wouldn't but a plot would add detail. As depth and a 25 m DEM are being supplied as observations it seems likely that these values will be of poor quality in steeply sloping areas (as pointed out in the text). In this sense does depth information present a similar problem to extent information in that its not very useful in steep areas?

Were there any problems when using the automated calibration that might require expert knowledge or additional simulations? In the introduction the gradient based method was criticised for having the potential to find local minima rather than global optimal parameter sets. Was this a problem here, did this change with the number of parameters in a set?

Overall this is an interesting paper that moves towards an important objective, which after taking into account this and the two previous reviewers comments, should be suitable for publication in HESS.

Specific comments:

P6834 L5-10: There has been quite a lot of research on the factors which introduce errors into inundation models, including roughness. With this in mind is it worth very briefly mentioning some of these here and the relevant papers?

L16L: "efficient" do you mean effective and if so is the neglect of turbulent momentum loss not part of the reason why these parameters are effective?

P6836 L1-2: This sentence is difficult to read.

P6838 L19-20: The PEST acronym should be defined when it is first introduced in the introduction.

P6839 L3-8: I don't understand this sentence. It implies the model is both difficult and easy to calibrate without sufficient detail to explain why this is.

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P6839 L26: Could you add some clarification about what each of the terms in Eq.4 are. For example, is Q the inverse of the measurement error covariance and does this imply that measurement uncertainty could be considered by the algorithm. I'm not familiar with the approach used here so it would be nice to have some additional clarification of these points.

P6840 L7-8: Given a different objective function can this method be used with time series data (e.g. gauge data), has this been done in other application areas?

P6841 L4: Presumably, PEST runs several simulations with different parameter vectors at the same time as a batch of jobs? If so this should be distinguished from the case where a single simulation runs in parallel (thus quicker) on multiple cores.

L13: "if the covariance matrix has been calculated" Is this not always done or is it computationally expensive? Again I'm not familiar with the method so this may be a misunderstanding on my part.

P6842 L7-8: Is the gauge upstream or downstream of the site and how far away is it? Presumably the gauge is on the Mulde? How was the flow on the Muhlgraben defined?

L15-18: What data were used to define the DEM?

P6843 L4: "ensemble average roughness" what does this mean?

P6844 L11-14: Could the high roughness be the result of other factors (such as flow errors) or is the model insensitive to channel friction at high flow?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 6833, 2009.