

Interactive comment on “Coupled machine learning and the limits of acceptability approach applied in parameter identification for a distributed hydrological model” by Aynom T. Teweldebrhan et al.

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It is an interesting paper, on a topic that deserves attention of the readers. However, referees have correctly pointed out a number of aspect requiring serious attention. One of the referees recommednds "reject" but still, I think the paper can be revised, and would classify the following step as "major revision".

May I suggest to check again comments of Referee 2. I noticed he/she points at papers in HESS (2009 and 2014) where machine learning was used for uncertainty estimation

C1

(MLUE method): neural network is encapsulating results of Monte Carlo uncertainty (GLUE is also MC) analysis and it is used to estimate uncertainty of model predictions for new inputs. In your reply you seem not to notice this suggestion, but it would be advisable to consider doing so.

Please answer all the referess comments, and show how the manuscript is revised according to comments and your answers.

Additionally, it would be perhaps also advisable to look at the papers in WRR and HESS which use machine learning to estimate residual model uncertainty (UNEEC method and its variation) (residual uncertaunty means that it is not Monte Carlo framework that you use).

D.P. Solomatine, D.L. Shrestha. A novel method to estimate model uncertainty using machine learning techniques. *Water Resources Res.* 45, W00B11, doi:10.1029/2008WR006839, 2009. Wani, O., Beckers, J. V. L., Weerts, A. H., and Solomatine, D. P.: Residual uncertainty estimation using instance-based learning with applications to hydrologic forecasting, *Hydrol. Earth Syst. Sci.*, 21, 4021–4036, https://doi.org/10.5194/hess-21-4021-2017, 2017.

(sorry for point at papers which I co-authored - but you may find that it is quite relevant useful in the context of your research, and to put in the context of the relevant work done earlier, and publihsed in HESS.) I know, the rules say that "Editors themselves should be extra careful in suggesting additional literature." - but in this case I think this advise is justified (especially, for the two papers recommedned by referee 2).

I wish you success in revising the paper.

Interactive comment on *Hydrol. Earth Syst. Sci. Discuss.*, https://doi.org/10.5194/hess-2019-464, 2019.

C2