

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1  
<https://doi.org/10.5194/hess-2021-596-RC1>, 2022  
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## Comment on hess-2021-596

Anonymous Referee #1

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Referee comment on "A deep learning technique-based data-driven model for accurate and rapid flood predictions in temporal and spatial dimensions" by Qianqian Zhou et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-596-RC1>, 2022

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Dear Editor, dear authors,

I find the topic of the submitted manuscript very interesting and also within the scope of HESS. Rapid flood prediction mapping in urban areas has a few challenges when compared with flood modelling purposes (e.g., fluvial flood mapping). The authors identify these challenges and propose a data-driven flood model based on LSTM networks and Bayesian optimisation.

The optimisation part is interesting, but the implementation and justification of the LSTM flood model lacks, in my opinion, novelty. One of the arguments of the authors for using LSTM to predict flooding is its suitability to predict time series, i.e. to include the time dimension in the flood prediction mapping. However, they fail to do so as they predict only the maximum water depth maps. This has been presented in previous recent studies (that are correctly acknowledged by the authors); so, what are the novel aspects of this study? simple a different network architecture? I believe this is not for a scientific contribution that aims to contribute to the advance of the (applied) science.

One of the main challenges about data-driven models, in general, is the capability of the models to generalise to different case studies or contexts. This aspect is not investigated nor discussed in the manuscript - it is only briefly mentioned, and for the 1st time, in the conclusions section. Since terrain elevation is not part of the input data set, it seems that the proposed model is not at all generalisable to other cases.

The limitations of the model and study presented at the end of the Conclusions section are very similar to those of other previous studies. If the authors are aware of these limitations from previous studies, I would expect them to try to address at least some of the previous studies limitations to improve the knowledge.

As mentioned above, I think the part of the optimisation could be better explored in the manuscript. Perhaps this could be the novel contribution of the study?

The manuscript is, in general, well written, making it easy to read.

Specific comments:

- Line 43: this is valid also for physically-based models. Rephrase?
  
- Line 113 & 115: why different models Mike Urban & Flood vs Mike 21? please provide justification or mention only the model used.
  
- Line 145: can "... for the long-term memory of data" be better described?
  
- Line 149: unclear sentence. It seems that something is missing.
  
- Lines 279 - 282: this can't be seen in the plots. The colour scale does not have units. How does the colour scale relate to the yy axis?
  
- Line 306: the worst and best cases are also interesting to be analysed and discussed.