

Interactive comment on “Dynamic neural networks for real-time water level predictions of sewerage systems – covering gauged and ungauged sites” by Y.-M. Chiang et al.

Anonymous Referee #3

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The paper deals with the possibility of predicting flow (depth) in a sewerage system using dynamic neural networks.

Although the paper is interesting, I have few problems with it.

1. From the abstract, I read RNN allows "a signal to propagate in backward direction" (lines 4-5). That seems to imply that rainfall at time t can influence flow at time $t-1$, which makes no sense and I believe is not what the Authors wanted to say.
2. Generally speaking, how can be possibly made a prediction on ungauged sites, when no data are available for training? I believe that - however - simulations have

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to be carried out (in the paper they are performed with SWMM). And therefore, if the Authors have to build a model (distributed and physically based), I do not understand why, afterwards, they want to have a model with RNN. What is the advantage in having both? Or, more generally, what is the advantage on the use of RNN model instead of SWMM? Consider the following advantages of an hydraulic model over the RNN: you can simulate a pump station, any variation in the system (and therefore real time control, where existing), and so on.

3. Page 2319 line 7: I believe "A surface inundation will occur as the surface runoff DISCHARGE (not volume) is larger than..."

4. Same page, lines 10-12. It is quite obvious that a storage tank is more effective if it is empty. Therefore, people usually want to pump as much as possible - we do not need to have the depth forecastings. An exception may be when the system is very complex: in that case an optimization procedure may be needed.

5. Page 2325. A comprehensive catchment description is missing. Especially the time of concentration, which I believe plays a role of paramount importance in the simulations, and which seems to be almost neglected in the paper (page 2326 line 25 Authors say "it is very short").

6. Page 2327 lines 20-22: Authors say "Even if the SWMM is able to produce an accurate set of water level values, the outputs, however, are not predictions but simulations". I can't see the difference (see below).

7. Page 2329 lines 9-10 and later on. Predictions are good up to 20-min-ahead. Again, I believe this depends on the time of concentration. I see very difficult a level prediction for times larger than the time of concentration, but if the Authors claim to be able to predict also the (future) rainfall pattern (which is not in the paper and which I find difficult to believe).

In conclusion, apart minor problems, I do not understand why there is a need to build

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an RNN model of a sewerage system, where the geometry can be known with very good detail and the behaviour can be understood and simulated with hydraulic models (like SWMM). I think this is the main problem with the proposed paper.

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