

## ***Interactive comment on* “On-line multistep-ahead inundation depth forecasts by recurrent NARX networks” by H.-Y. Shen and L.-C. Chang**

**Anonymous Referee #2**

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This study presents a novel and useful approach for on-line multistep ahead inundation forecasts. The most important contribution of this study is the proposed R-NARX models can effectively inhibit error growth when being applied to multistep-ahead inundation forecasts over a long lasting forecast period. The models were trained and well validated using a great number of inundation data sets in Yilan County, Taiwan. The results demonstrate its capability and applicability for on-line multistep ahead forecasts of inundation depths during typhoon events. Overall, this manuscript is well written and is a very interesting work that successfully applies to on-line inundation forecasts. In my opinion, the manuscript has the merits to illustrate the potential of data driven methods to model a real hydrological systems and makes good contribution to scientific community. I highly recommend the acceptance for publication after minor edits

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shows as follows:

1. It is suggested to clear present the model used for on-line forecasting.
2. P.12003, n should be defined.
3. The standard back-propagation learning algorithm (P.12004, line10) and the on-line back-propagation learning algorithm (P.12005, line 11) are not clear to describe the differences between the learning algorithms of T-NARX and R-NARX.
4. P12021-12023 The caption of Figures 1 to 3 can be consider to change as Fig. 1. Architecture of the T-NARX network during training and testing phases in Time-delay mode. Fig. 2. Architecture of the O-NARX network during training and testing phases in On-line mode. Fig. 3. Architecture of the R-NARX network during training and testing phases in Recurrent mode.
5. It is suggested to re-plot Figure 4 to combine the rain guage and inundation-prone sites into one sub-figure and another sub-figure (side) can clear show (enlarge) the flood inundation map.
6. Figure 8 is not clear and the resolution should be improved.

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