Comment on hess-2021-371

Anonymous Referee #2

Referee comment on "Impact of spatial distribution information of rainfall in runoff simulation using deep learning method" by Yang Wang and Hassan A. Karimi, Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-371-RC2, 2021

The authors have presented the novelty of using information of spatial distribution of rainfall in rainfall runoff modelling of two basins using deep learning. The study is interesting and is very relevant for HESS. The manuscript mainly suffers from lack of clarity on different aspects. Some of them are listed here but I am afraid that based on the responses more suggestions may follow.

- Tables 2, 3, 4 and 5 will be much easier to read with numbers correct up to 2 decimal places. You do not need to present RMSE/ NSE numbers correct up to 6 decimal places. Is there any reason behind it?
- RMSE in the text should be described with unit (mm/d?). Please also provide the average value so that the reader can interpret the quality of the model from the RMSE values.
- Data splitting: In my opinion the data splitting is very unfair. The authors have used 40 years' data for training whereas 1 year for testing. Considering the climatic variability the models need to be tested over a longer period of time. Very often a 65-25-10 split for training-testing-cross validation is used. Any wider deviation needs to be explained. The naming of the datasets (training as well as calibration) is also confusing.
- Data splitting: Some data plots/ description and statistics (mean and standard deviations) of the 3 datasets will be good. The authors need to show that data from the 3 partitions are comparable.
- Data splitting: If the results are provided based on the testing data then how sure are the authors that the conclusions for the 4 experiments will be similar for other years (dry/ wet/average/..) as well?
- Look back windows: There is not much discussion on the selection of the look back windows. Presumably, the selection of the window will depend based on the catchment properties and as a result may vary from catchment to catchments. How were they selected?
- Look back windows: The look back windows up to several days will be very important (e.g. from catchment wetness point of view). However, the look- back windows of 180 and 365 days are a bit confusing. What information do they carry?
- Process description: The manuscript has almost no description on the catchment processes. What are the sizes of the two catchments? What kind of hydrological

processes are there? Do you expect snow melt? Do you observe very strong seasonal variation? Flood/ droughts?

- Figures 4,5,6,7,8,9,10,11 and 12: These figures have low resolution. Font sizes of axes labels are too small. What can we learn from these figures? It is impossible to distinguish between the lines. The authors may consider zooming on selected periods of high flows and low flows to highlight the differences.
- Equations 1 to 6: Please check if you have explained all the terms used in the equations?
- Line 174, 176: Perhaps authors want to say 'rain gauge' instead of 'stream gauge'.
- Line: 179: activation instead of activate