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Comment on hess-2021-598

Anonymous Referee #1

Referee comment on "Using NDII patterns to constrain semi-distributed rainfall-runoff models in tropical nested catchments" by Nutchant Sriwongsitanon et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-598-RC1>, 2022

The manuscript illustrates the calibration procedure of a semi-distributed rainfall-runoff model for flow prediction. The model is built based on the FLEXL model structure plus the Muskingum method for river routing, and it is applied to the Upper Ping catchment in Thailand. For this catchment there are 6 gauges and 32 sub-catchments are delineated. For flow prediction it is required to calibrate a large number of parameters for each sub-catchment; the calibration strategy relies on the observed discharge (between 2001 and 2016), the normalized difference infrared index (from 2002 to 2016) and the soil water Index for moisture conditions (from 2008 to 2016). Results are compared to those provided by a different modeling scheme, namely URBS model.

While the topic of this work is of interest for the scientific community, by providing additional developments for rainfall-runoff modeling, my general opinion is that the manuscript needs additional efforts from the Authors to be considered for publication in HESS. The main point here is that the research gaps motivating the present work and the innovative contribution to the literature are not clearly stated. As for results, a key issue is the estimation uncertainty, which should be quantified for model comparison in terms e.g. of prediction intervals. Due to the large number of calibration parameters, it is expected for the prediction intervals to be almost large. Hence, a fundamental aspect of this work should be how the information introduced here for calibration affects the prediction intervals (the estimation uncertainty) for different model structures. Note that only at the end of the manuscript (in the Conclusion Section) the Authors justify their work as a method to avoid uncertainty in runoff estimation (which is not avoidable in my opinion, but it can be reduced). Further, the text could be reorganized to be more concise and objective oriented, especially in the presentation of the methodology, yet not only. Finally, I suggest to revise figures to improve readability (e.g. remove "1 April" on x axis and use scientific notation in y-axis in figures 4 and A.1, increase text size in figures A.6-A.9).