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Comment on hess-2021-502

Jr-Chuan Huang (Referee)

Referee comment on "A contribution to rainfall simulator design – A concept of moving storm automation" by Ravi Kumar Meena et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-502-RC2, 2022

This is a review report for the manuscript entitled, "Innovatory rainfall simulator design – A concept of moving storm automation" by Dr. Meena et al. This study proposed a designation of rainfall simulator with a AM+BM controller to simulate moving storm conditions. Later on, they used the rainfall simulator with different moving storms to evaluate the effect of storm movements on time to peak (tp) and peak discharge (Qp) of surface and subsurface flow as well as recession slope, respectively. But, I could not find the result of subsurface flow in either the section of result or discussion. Finally, the authors proposed a multiple regression model to estimate the tp and Qp under different conditions. Three independent variables, saying direction, hillslope gradient, and velocity of storm movement were taken into consideration.

In general, the study is a good technical note with a preliminary test rather than an article. The structure is well-organized and the writing is good and clear; however, the findings are expected. The effect of storm movement on hydrograph in terms of tp and Qp, in fact, is associated with relativity (or the tension). To deal with this relativity relies on the competition between runoff velocity (including slope, surface roughness, and slope length) and the velocity of storm movement. Only when the difference of the two velocities is large enough, the hydrograph would be changed. Otherwise, the change in hydrograph could not be detected. Certainly, the high recording frequency can help to describe the hydrograph change. Two studies I listed below may help to deal with this issue. What I can suggest for this study is to replace the multiple regression with a conceptual framework to express the relativity issue. Also, two or three additional sets of experiments are encouraged to investigate the effect of storm movement on surface and subsurface flow.

Huang, J.C., Yu, C.K.*, Lee, J.Y., Cheng, L.W., Lee, T.Y., Kao, S.J. (2012) Linking typhoon tracks and spatial rainfall patterns for improving flood lead time predictions over a mesoscale mountainous watershed, Water Resources Research, 48: W09540, doi:10.1029/2011WR011508.

Huang, J.C.*, Kao, S.J., Lin, C.Y., Chang, P.L., Lee, T.Y., Li, M.H. (2011) Effect of subsampling tropical cyclone rainfall on flood hydrograph response in a subtropical mountainous catchment, Journal of Hydrology, 409 (1-2): 248-261, doi: 10.1016/j.jhydrol. 2011.08.037.