

Reviewer #2:

Overall comments:

Dear Authors,

in the scientific literature, many papers highlight the effect of design hyetographs on slope stability (e.g. Paolo D'Odorico, Sergio Fagherazzi, Riccardo Rigon (2005) - Potential for landsliding: Dependence on hyetograph characteristics) or peak hydrographs generation for flood events (e.g. Lorenzo Alfieri, Francesco Laio and Pierluigi Claps (2008) - A simulation experiment for optimal design hyetograph selection). Your paper introduces the concept of the dependency of the Wetness Index linked to the rainfall pattern, considering that this Index is somehow a proxy of slope instability ($FoS < 1$). However, in my opinion, this is not a significant element of novelty. The paper does not contribute to understanding the effect of rainfall on hydrological soil hillslope, or in which way it is responsible for the decreasing of the factor of safety.

We appreciate the reviewer's valuable comments. As another reviewer also suggested us review previous studies regarding investigating the influence of rainfall patterns on landslide susceptibility, we have carefully reviewed many references including those you recommend (D'Odorico et al., 2005; Alfieri et al., 2008) and summarized them in a paragraph in the Introduction section. Additionally, we have also elaborated more on the novelty of this study as follows.

Lines 87-108:

“Unlike previous studies, this study conducts a comprehensive evaluation of design rainfall temporal distribution models to determine the most appropriate model to detect landslide events recently occurred in Korea. In East Asian regions including Korea, Japan, Thailand, and Indonesia, we develop and apply the pre-determining models that can distribute a total amount of observed storm events to derive design hyetographs (Na & Yoo, 2018). Though these models have mostly been used for hydrologic purposes (e.g., determining the size of hydraulic structures or estimating flood quantiles under specific return periods) (Alfieri et al., 2008), they can definitely be adopted to predict landslide occurrence as it is highly correlated with temporal structure of intense rainfall events (D'Odorico et al., 2005). In fact, there have been several attempts to investigate the influence of temporal rainfall patterns on the risk of landslides (Ibsen & Casagli, 2004; D'Odorico et al., 2005; Tsai, 2008; Tsai & Wang, 2011; Ran et al., 2018; Fan et al., 2020). However, those who applied distribution models are limited to taking into simple-shaped patterns like uniform and linear models with a monotonous increase or decrease or a certain type of probability distribution function which rarely occur in real (D'Odorico et al., 2005; Tsai, 2008; Ran et al., 2018; Tsai & Wang, 2011). Besides, as the temporal characteristics of rainfall become unpredictable or complex due to the impact of changing climate, it is important to widen our perspectives on more models prone to occur landslides by considering observed rainfall patterns. This study focuses on the purposes of designing landslide prevention

structures or early warning systems by figuring out the most suitable observation-based rainfall distribution model for detecting landslide occurrences, and further validates the model's predictability with actual events that occurred in 2011, Korea.”

As the reviewer mentioned, this paper has a few limitations. The authors agree that more intense investigation is needed to understand the effect of rainfall on hydrological soil hillslope, or in which way it is responsible for decreasing the factor of safety. Hence, we plan to address the following research questions as a future study:

- Finding the most impactful drivers for rainfall-induced landslide.
- Looking into which factor mostly cause the reduction of FoS.
- Investigating the effect of rainfall on the hydrological factors in the soil hillslope.

We have also added comments on the promising research expected in the Conclusion section.

References:

- Alfieri, L., Laio, F., & Claps, P. (2008). A simulation experiment for optimal design hyetograph selection. *Hydrological Processes: An International Journal*, 22(6), 813–820.
- D’Odorico, P., Fagherazzi, S., & Rigon, R. (2005). Potential for landsliding: Dependence on hyetograph characteristics. *Journal of Geophysical Research: Earth Surface*, 110(F1).
- Fan, L., Lehmann, P., Zheng, C., & Or, D. (2020). Rainfall intensity temporal patterns affect shallow landslide triggering and hazard evolution. *Geophysical Research Letters*, 47(1), e2019GL085994.
- Ibsen, M.-L., & Casagli, N. (2004). Rainfall patterns and related landslide incidence in the Porretta-Vergato region, Italy. *Landslides*, 1, 143–150.
- Na, W., & Yoo, C. (2018). Evaluation of rainfall temporal distribution models with annual maximum rainfall events in Seoul, Korea. *Water*, 10(10), 1468.
- Ran, Q., Hong, Y., Li, W., & Gao, J. (2018). A modelling study of rainfall-induced shallow landslide mechanisms under different rainfall characteristics. *Journal of Hydrology*, 563, 790–801.
- Tsai, T.-L. (2008). The influence of rainstorm pattern on shallow landslide. *Environmental Geology*, 53, 1563–1569.
- Tsai, T.-L., & Wang, J.-K. (2011). Examination of influences of rainfall patterns on shallow landslides due to dissipation of matric suction. *Environmental Earth Sciences*, 63, 65–75.

Specific comments:

Moreover, citations are not in the style of the journal.

Thank you for the comment. The authors would like to edit all the style of citations (e.g., citing the number of references in the manuscript) after review process owing to the possibility of adding or eliminating the citations.