

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1  
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## **Comment on nhess-2020-418**

Anonymous Referee #1

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Referee comment on "Atmospheric triggering conditions and climatic disposition of landslides in Kyrgyzstan and Tajikistan at the beginning of the 21st century" by Xun Wang et al., Nat. Hazards Earth Syst. Sci. Discuss.,  
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### ***General comments***

This paper combined gridded atmospheric data from HAR v2 with 87 landslides records from GLC and GFLD to evaluate the critical condition that triggered landslides in Kyrgyzstan and Tajikistan. The results show the significant role of snowmelt in landslide triggering processes. The optimal thresholds of landslide for the sum of rainfall and snowmelt were assessed as well. Overall speaking, this paper is well organized and the research results are valuable for understanding the landslide occurrence caused by mixed triggering factors. However, some issues in my opinion need further clarification prior to it can be considered for publication. The first issue is the limitation of landslide inventory, the landslide record extracted from GLC and GFLD mainly based on media report (more concentrated in the populated area) and mixed-up new landslides and recurrent landslides. This limitation will directly affect the representative of obtained thresholds in the entire study area. In addition, the critical thresholds for different landslide type (new landslide and recurrent landslide) should be discussed separately. Thus more solid and spatial representative landslide inventory that can cover all study area obtained from remote sensing identification is necessary. The second issue is how to prove the spatial resolution (10 km) of the gridded atmospheric data from HAR v2 is sufficient to precisely reflect the rainfall or snowmelt condition in each landslide site. The third, the surface runoff, subsurface runoff and ground water caused by rainfall and snowmelt have different time lag characteristic, why these two factors can directly be summed up? Please plot the temporal hydrograph of rainfall and snowmelt respectively, make sure the individual time lag then proceed further calculation. Except the current thresholds evaluated for the mixed-up landslide occurrence, I suggest the authors further discussing the occurrence thresholds for different landslide types (new landslide and recurrent landslide), and the relation with landslide scale (area) in order to strengthen the contribution of this paper.

### ***Specific comments***

- P. 5, Ln 117-118, "...landslide event occurred during or one day after a rainfall event...." Why limit to only one day, please give more explanation or references.
- P. 6, Ln 144, "...events were randomly split into k folds with k=8..." Why select k=8?
- P. 7, Ln 161-162, "...Nine landslides events did not occur within any rainfall event, snowmelt event or rainfall + snowmelt event..." This "not detected" uncertainty comes from landslide inventory or observed atmospheric data need more explanation.
- P. 7, Figure 2, what are the subtitle (DJF, MAM, JJA, SON) on the left top means?
- P. 9, Figure 4, since daily-based atmospheric data were used in this study, and the exact date of landslide occurrence is available. Please select some landslide cases to plot the event-based temporal process of rainfall and snowmelt.
- P. 10, Ln 184-185, "...Predictive performance is better when using the entire period than just using the UTL period..." Why? The rainfall properties calculated in the period up to the day of landslide occurrence should have more direct contribution to landslide initiation.
- P. 16, Figure 7, numbers of historical landslides located in the zone with low to moderate susceptibility. Please give more explanation.

### ***Technical corrections***

- P. 11, Ln 212, "... from median report....." should be "media".