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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Derivation and evaluation of landslide triggering thresholds by a Monte Carlo approach" *by* D. J. Peres and A. Cancelliere

D. J. Peres and A. Cancelliere

djperes@dica.unict.it

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We would like to thank R#3 for his helpful suggestions to improve the paper.

[R#3]: *p. 2765, line 14. Please explain why 24 hours was selected as the time interval between separate storms. Was it an arbitrary selection or is this interval related to observed rainfall patterns for the study area? Does it have any connection with soil drainage rates for the study area?*

[A]: The choice of 24 hours as the minimum inter-event time has been done after some tests on the simulations, in order to do not hide peaks of the transient response. Of course it is connected with soil drainage rates and the rainfall patterns for the study

area. A detail discussion on this issue is given in response to R#2.

[R#3]: *p. 2768, line 17, and elsewhere, change "indefinite slope model" to "infinite slope model"*

[A]: We will apply the suggested change.

[R#3]: *p. 2769, line 23 to p. 2770, line 1, what is meant by "a lamination effect?"*

[A]: The word "lamination" is a bad and erroneous translation of the Italian word "laminazione", and hence it is not appropriate. What we meant to explain is the storage effect of a reservoir in which the output flux is generally less than the input flux. In our case the storage is given by the unsaturated layer, the input flux is the infiltrating flux, while the output flux is the flux to the saturated zone $q(d_u, t)$, which results damped and smoothed. In other terms it is what it is explained by the TRIGRS v.2 manual at Figure 8 ("*Plot of example input and output of unsaturated zone infiltration model. Partial absorption of water infiltrating at the surface results in damping and smoothing of the signal at the base of the unsaturated zone*"). In future versions of our work we explain this concept more appropriately.

[R#3]: *p. 2771, section 3. Note that Staley et al. 2013 have recently published a similar approach, applying ROC analysis to instrumental data for deriving thresholds.*

[A]: We will add Staley et al. (2013) to paper references.

[R#3]: *p. 2776, lines 3 - 25. The finding described here seems consistent with intense, short-duration rainfall being mainly responsible for inducing shallow landslides. If I am interpreting Figure 6 correctly, periods of higher intensity rainfall, sometimes following hours of low-intensity rainfall was a major factor in landslide triggering during most of your observed events. If so, then perhaps high-intensity rainfall during storms should be the primary focus of efforts to improve early-warning thresholds for shallow*

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landslides.

[A]: We thank the reviewer for this analysis (which seems to refer to Fig 4 and not Fig 6 of the MS), of which we will take account in future version of the MS, to improve explanations of p. 2776, lines 3 - 25.

[R#3]: *p. 2778, line 18, change "as soon soil" to "as soon as soil"*

[A]: We will apply the suggested change.

[R#3]: *Fig. 4. The flattening of the curve at long duration for the deterministic threshold shown in Fig. 4 results from competition between drainage and decreasing infiltration rates in the TRIGRS model for unsaturated infiltration. As the ratio of infiltration rate to Ks decreases, infiltration rate eventually becomes so small that pressure head cannot rise sufficiently to produce a factor of safety less than 1.*

[A]: We thank the reviewer for this analysis, of which we will take account in future version of the MS to explain better Figure 4 and to improve explanations of p. 2776, lines 3 - 25.

[R#3]: *p. 2781, please add the following reference: Baum et al. (2013)*

[A]: p. 2781. We will add the suggested reference.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 2759, 2014.