

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
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Comment on hess-2022-57

Anonymous Referee #1

Referee comment on "Quantitative effects of antecedent effective rainfall on *ID* threshold for debris flow" by Shaojie Zhang et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-57-RC1>, 2022

Dear authors,

I carefully read your manuscript entitled Quantitative effects of antecedent effective precipitation on ID threshold 1 for debris flow.

The scope of the work is to explore the effect of antecedent effective precipitations on ID threshold for the initiation of debris flows in Jiangjia, using Dens-ID model.

The topic of the paper is interesting and fits with the scopes of the journal.

I believe that there are several issues with this manuscript.

The main issue, in my opinion, is the way you conducted your analyses.

The main outcome of the work is that antecedent rainfall plays an important role in debris flows triggering and can also reduce the rainfall amount of the critical event that trigger the debris flow; this is not a novelty, there are several literature papers addressing this topic (I added some references in the attached document); furthermore, according to figure 4, the ID thresholds for AEP= 60 mm have higher alfa values than the thresholds defined for AEP=20 mm, in contrast with your conclusions.

When comparing AEP with alfa and beta values, you used only 1-hour duration, but then you generalised your outcomes without any further investigation. Alfa and beta are empirical parameters of a threshold, hence they are not dependent on duration, but you considered alfa as representative of the Intensity, which varies with duration.

I agree that alfa is equal to the maximum intensity of a threshold when $D=1$, but this is not the maximum intensity of a rain event.

You have to consider that the intensity is dependent on duration and considering only one duration is not correct; you also have only 1 event associated with 1-hour rainfall.

The outcomes are not fully supported by the analyses, since you analysed only few condition (e.g. 1 duration only and 1 density only) and in some cases, results and conclusions are conflicting.

Some results are very obvious statement and cannot be considered as outcomes of your work. E.g.

“These results indicate that the supply of loose solid material is essential to debris flow formation, but the decisive factor in debris flow occurrence is the sharp increase in runoff.”

You wrote that duration is dependent on rainfall intensity, but it's the other way around. Intensity depends on rainfall amount and duration.

It is not clear if the Dens-ID model is a literature model (I did not find any reference about it) or of you developed it. You assumed some boundary condition (e.g. max and minimum density) without any scientific support about them.

I believe that this paper cannot be considered for publication.

Please also note the supplement to this comment:

<https://hess.copernicus.org/preprints/hess-2022-57/hess-2022-57-RC1-supplement.pdf>