

Response to the Referee 1's comments

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Title: An experimental perspective on the effects of initial structures on rock avalanches' propagation and sedimentary characteristics

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Dear anonymous Referee:

On behalf of my co-authors, we would like to express our sincere gratitude for your comments. We have considered your comments very carefully and made corresponding revisions. The revisions are highlighted in red in the manuscript. The responses to your comments are detailed as follows, in which the paragraphs in **normal fonts** are the comments and the authors' responses are in *italic*.

Yours sincerely,

Yan-Bin Wu

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Response to the comments:

Comment 1: The initial discontinuous sets play an important role for the happening of rock avalanches. The authors performed a series of mass flows with different initial configurations and with materials containing blocks and fine particles. This is an interesting experiment, in which the runout of these mass flows at different configurations showed both inhibiting and intensifying effects. However, there are still some points confused me, please clarify.

Figure 2, the caption is "experimental apparatus", but what is mean the right part of the figures? Please clarify and provide more details.

Answer: Thank you very much for your comments. The right part of Figure 2 depicted the data type the 3D scanner can acquire and correspondingly subsequent processing. We have added corresponding description. Please see line 117-118.

Comment 2: L 110, how were the blocks produced? It should be specific and others can

repeat the procedure.

Answer: Thank you very much for your suggestions. We have supplemented the producing process of large blocks. please see line 126-128.

Comment 3: In addition, I noticed that the sand the authors used to produce the blocks is with different colors. Does the attributes of the sand or sand blocks affect by the difference in colors? Besides that, is the particle size of the sand with different colors same?

Answer: Thank you very much for your comments. The sand with different colors has a same mechanical property and the same physical properties (density, specific surface area, and composition). The sand with different colors has a same particle size distribution.

Comment 4: What is the intention the different color blocks were used to simulate the large blocks in field? Is the intention to study the sequence of sliding mass during motion? Because I noted the blocks with different colors was placed in a same layer (Figure 6).

Answer: Thank you very much for your comments. The intention for using different color blocks is just as you guessed to study the sequence of sliding mass during motion. We added related descriptions on the sequence of the sliding mass. please see line 247-253.

Comment 5: The results showed that the blocks contained relatively well the initial structures. Are avalanche events in field with a same phenomenon?

Answer: Thank you very much for your comments. We noted that the sliding mass exhibits well-preserved initial discontinuous structures in the EI Magnifica rock avalanche (Magnarini et al. 2021). This is similar with our study. We added related descriptions in line 325-329.

References:

Magnarini, G., Mitchell, T. M., Goren, L., Grindrod, P. M., and Browning, J.: Implications of longitudinal ridges for the mechanics of ice-free long runout landslides, Earth and Planetary Science Letters, 574, 117177, <https://doi.org/10.1016/j.epsl.2021.117177>, 2021.