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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Modeling debris-flow runout patterns on two alpine fans with different dynamic simulation models" *by* K. Schraml et al.

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General comments

Schraml et al compare and analyze two debris flow models by applying them to two recent events in Austria. This is not a spectacular, ground-breaking paper but in my opinion a very useful and valuable one, both for science and engineering/hazard assessment practice. Even though the use of numerical debris flow models has greatly increased over the last years there is a lack of studies that systematically analyze different models, their application to real-world cases and go into some depth concerning the different model parameters and the related calibration procedures. The paper is solid, well structured and well written and I recommend to publish it after some minor

revisions.

Specific comments

Page 1404, line 10: it would be interesting to learn whether the use of hydrographs instead of block release would have a significant effect on the results. If no hydrograph based model runs were performed I suggest to include a statement in the Discussion on what has been seen elsewhere on this (i.e. in the literature).

p. 1404, line 27: I suggest to generally use the term 'observed' instead of 'mapped'. I think it is clearer (or less ambiguous, because simulation results can also be mapped).

p. 1405, eq (4) ff: indicate unit of area (m2, I guess?) even though the units are eventually canceled out by the dimensionless term. I suggest to include a sentence saying that value of âĎę close to 1 indicate high observation-model correspondence.

p. 1406, section 3.6: I suggest to define sensitivity more precisely. E.g. sensitivity of runout against μ. p. 1406, lines 9-11: In the figure captions or in the main text you should state at what values you hold the parameters constant while varying one of them.

p. 1408, line 2: I guess the values mentioned for the friction parameters do not relate to forest areas? Could be clarified because it is mentioned in the context of forest areas.

p. 1408, line 22ff: I'm wondering whether you don't want to mention the flow height as an additional stopping criterion. And related to this: is the larger runout for lower stopping criteria/thresholds (5, 10%) relevant in terms of flow height? For instance, if the additional runout area is overrun by flow height of e.g. 5cm this might no longer be relevant. You may explain why you think that a stopping criterion related to mass momentum is the most appropriate one. An additional question to clarify is where the reference mass momentum is measured along the flow path.

p. 1409, line23-25: This sounds like that this effect was not analyzed even though mentioned previously?

p. 1411, line 9: Bartelt 2013a and 2013b should be distinguished.

Figure 7: This figure is interesting but it may also imply some need for further clarification. The processes of the different mass flows included in this figure are obviously very different and the classification into the dimension of the two friction parameters masks this differences, at least to some degree. For instance, an ice-rock avalanche may transform into a highly mobile debris flow or hyperconcentrated flow along the flow trajectory, and a single friction parameter value may not be appropriate. I don't see a basic problem with the figure because you just report the values from the referenced literature but I suggest to include some clarifying statements. An additional option may be to include a third dimension, e.g. with the water/sediment concentration of the flows (where available, see also Figures in Schneider et al., 2011). In any case I recommend improving the visual distinction of the grey values of the triangles.

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