

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

Anonymous Referee #1

Received and published: 9 March 2015

The manuscript by Schraml et al. offers an interesting insight into the choice of appropriate parameters to be used into debris-flow simulation models in order to properly predict potential deposition areas. In this study, the authors compared the range and sensitivity of two input parameters μ and ξ for the Voellmy flow model by back calculating two debris-flow events in Austria using RAMMS-DF and DAN3D numerical codes. Results show that the best fit parameters sets are in a similar range for both models but the models have a different response at the parameters variation. In general, the analysis is sound and quite well documented but several points need to be better clarified. My main concern is on the topographic base used in the simulations. It is not clear what Digital Elevation Model was available in the study sites. From what is written at P. 1398 L. 9-10 in the abstract, it seems that the same 1m-resolution DEM was used for

C149

both study sites whereas a grid resolution of 2 m is reported at P. 1404 L. 15-16. Some more information can be found in the discussion chapter at P. 1407 L. 8-9 (airborne LiDAR DEM dating back to 2006) where the problem of DEM representativeness is just mentioned. I think this is a very important point to be addressed since the authors are back calculating a 2009 debris-flow event and several morphological changes may have occurred in the 2006-2009 time window and a 2006 debris-flow event (the LiDAR survey was carried out before or after this event?). In my opinion, a short but comprehensive description the topographic base is needed and the assumption that the DEM is representative of the pre-event conditions should be strengthened (e.g. how many events occurred in the period 2006-2009 in the Reiselehnrinne Creek?). To this end, I suggest to restructure the Methodology chapter, that could be renamed “Methodology and study area”, by moving the subchapter 2.2 (Study sites) at 2.1 and add here the information on the topographic base. The current subchapter 2.1, which describes the two models, is quite long and could be reduced. All the figures are relevant and informative with the need of just few refinements (in Figs. 1, 3, 4 and 6 a scale bar is missing; the symbols for Debris Flow DAN3D and This Study DAN3D seems more yellow than brown as written in the Figure caption).

More specific comments are given below:

P. 1398 L. 2: “For this”-> “To this end”

P. 1402 L. 17: “..writes” -> “..is as follows”

P. 1403 L. 1: you can remove yr-1 and use only mm as it is already stated this is annual rainfall

P. 1404 L. 15-16: why did you use a 2 m grid resolution and not 1 m of the original DEM? To reduce calculation time or for other reasons? This point needs to be clarified

P. 1405 L. 11-14: It is not clear why you choose to increase roughness to an area at the left channel bank of the transit reach to force the simulation to the real debris-flow

C150

path. I guess that the different deposition patterns are due to “the outdated DEM” (P. 1407 L. 8-9) so why not adjust the topography?

Figs 3 b and d are not cited in the text

P. 1406 L. 7: “. . .is favorable”-> “. . .was considered”

P. 1407 L. 4-5: Consider to remove “simulation” (repetition) and use “both” instead “either”

P. 1408-9 L. 30-1: “The DAN3D code can be stopped manually or automatically after a predetermined duration. Here we manually stopped the simulation when the flow front visually came to a halt.” -> this approach seems a bit subjective. What about choosing a threshold of maximum velocity below which setting the stopping condition. However, the approach you choose can be considered acceptable in light of the observations given in the following paragraph.

P. 1411 L. 10-13: this sentence is not clear. Please consider to reformulate

P. 1411 L. 26: “in the models”

In table 1 for RAMMS-DF use “Eulerian framework” to be consistent with the text.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 1397, 2015.