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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Debris-flow hazard assessment at regional scale by combining susceptibility mapping and radar rainfall" *by* M. Berenguer et al.

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We thank this anonymous reviewer for the comments. Please, find below the detailed answers to this reviewer and the description of the modifications introduced to the text.

1.1: *It would be helpful for the authors to elaborate on how/if their model accommodates different initiation mechanisms of debris flows (landslide vs. runoff). There is a mention that the Papa et al. (2013) model fails to include runoff initiated debris flows. Some text dedicated to addressing how the model presented improves upon this limitation. Or, if the model presented is not applicable to runoff initiated debris flows, then*

this should be emphasized in the discussion and conclusion.

AR: As stated in the text (page 11, lines 20-22), the model of Papa et al. (2013) is "valid for rainfall triggered landslides that evolve into DFs and, therefore, it does not appropriately characterize other DF initiation mechanisms (such as progressive entrainment of sedinment into a water flow". Additionally, this is emphasized in the Conclusions section, in the interpretation of the results obtained in the Rebaixader subbasin ("[...] the intensity-duration curves of Papa et al. (2013) sampled with radar rainfall estimates (which underestimated the highest intensities observed with an in situ raingauge) resulted in insufficient unstable area to classify the rainfall situation as 'moderate' or 'severe' at the beginning of the event. The fact that DFs in the Rebaixader subbasin are probably initiated by a combination of superficial and channel erosion and slope instability, the mechanism considered by the model of Papa et al. (2013) can also in part explain the faster reaction of the basin" (page 19, lines 24-29).

1.2: *A sentence identifying how debris floods and debris flows are distinguised using geophone data would be helpful in section 4.2, line 25.*

AR: The text in section 4.2 has been modified (page 16, lines 9-15) to answer the question of the reviewer:

"During the analysis period the monitoring system detected 3 significant cases: 1 debris flow, and 2 hyperconcentrated flows (also called debris floods); the latter can also be hazardous for persons and infrastructure (Hungr et al., 2014). Debris flows show peak discharges that are much larger than those of debris floods, and the presence of the bouldery front (Hungr et al., 2001). The presence of these characteristics in geophone and level measurements have been used to classify the different events (see Abancó et al., 2014 and Hürlimann et al., 2014 for further details)."

1.3: *The case study section may benefit from a table that shows the hazard level in one column and the resulting runoff result in the second column. As an example: warning level response low no response moderate likely debris flow high debris flow mod - high*

debris flow

AR: Table 3 has been introduced as suggested by the reviewer.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 6295, 2014.