

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

J.-P. Malet (Referee)

jeanphilippe.malet@unistra.fr

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The manuscript tackles an interesting topic on the forecast of debris flow occurrences at the regional scale with the combined use of statistical techniques for susceptibility assessment and radar rainfall estimates for the time occurrence. The structure of the manuscript is well organized, the paper is very well written and the techniques used by the authors are relevant for the proposed analysis. The paper is of interest and is in the scope for the Journal NHESS, and should be accepted with major revision. I have a few comments on the manuscript.

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General comments:

- The term hazard is used inappropriately throughout the text. According to the established literature on QRA for landslides, hazard is defined as the spatial and temporal occurrence of an event of a certain intensity. As the authors do not estimate the intensity of the events (either in terms of volumes or runout distances), the term hazard could not be used. I would suggest the authors to rephrase their sentences and the title of the manuscript and use the terms "forecast of DF occurrence" instead of DF hazard assessment.

- The use of a fuzzy logic model for the susceptibility assessment based only on geomorphometric variables is surprising. Important spatial predictors such as lithology (or geotypes) and soil depths (or proxies of soil depth) are not integrated in this assessment. However, this information seems available as it is used in the triggering model (model of Papa et al.) The authors should discuss this point and possibly propose a sensitivity analysis of the predictors of the susceptibility model.

- Further, I wonder why a topographic-hydrological index like water accumulation or water convergence uphill of a certain point has not been introduced as an additional topographic spatial predictor in the assessment?

- The effects of the membership degrees and weights for the predictive variables on the susceptibility and rainfall triggering calculations should also be discussed, and a sensitivity analysis provided.

Figures: - A geomorphological map (including information on the relief) of the study region should be introduced in the manuscript for a better understanding of the work of the possible weather circulation patterns.

- Figure 1: to complement with some geographical locations for purpose of clarity

- Figure 2: the rainfall accumulation map should be enlarged

- Figure 6: a hillshade or an orthophotograph should be added in the background of

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the sub-basins

- Figures 9 and 11: the size of the maps should be increased – Change the term "hazard level".

Conclusion: The paper requires major revision for improving the focus of the work, and its clarity. I am at the disposal of the authors for further discussion.

Jean-Philippe Malet EOST / IPGS, Strasbourg, 8/12/2014

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