Reply to GMD-2021-343 reviewers' comments

In the following, we reply to the reviewer's comments and suggestions. The original comments/suggestions are in black, and our answers are in red. The added or modified text is in red italic.

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Reply to 'Comment on gmd-2021-343'

Anonymous Referee #2, 12 April 2022

This paper is written in detail and provides a practical tool including data preprocessing, variable analysis and landslide susceptibility zonation for people who engaged in landslide susceptibility assessment. However, this paper is more like the software instruction manual which mainly introduced the extension of LAND-SE. In general, there are few studies on model innovation, whether physical model or empirical statistical model development in this paper.

We thank the referee for the comments and suggestions that help us to improve the manuscript.

This software suite LAND-SUITE mainly based on statistically-based landslide susceptibility assessment models. As the prediction from statistically-based models is not only influenced by input variables, training sample distributions, but also the number and representative of samples, how to carry out landslide susceptibility assessment under the condition of lack of samples is also one of the problems that need to be solved.

The manuscript describes LAND-SUITE and its functionalities. The set of tools implemented in LAND-SUITE is helpful to investigate different issues related to the training and validation datasets, their characteristics, limitations and representativeness. Indeed, to test issues highlighted by the reviewer, there are many possible approaches that can be used when selecting, generating and partitioning training and validation datasets. As we mentioned in the manuscript, the tool facilitates these types of analyses, but it doesn't want to substitute the user's expertise and knowledge, which should be investigated with specific analyses.

I would like suggest the authors further discuss the physically based models in this paper, or consider physical model as one of the directions of software extension in future research.

We think LAND-SUITE should be only focused on statistically-based landslide susceptibility zonation. In the literature, there are already articles that describe tools suitable for the analysis of landslides using physically-based slope stability tools (as for example, SHALSTAB, SINMAP, GEOtop-FS, HIRESSS, TRIGRS, r.slope.stability, etc). Those are already listed in the original manuscript from line 41 to line 43.

This also goes in the direction of many scientific contributions in susceptibility modelling, which are pushing towards the extensive use of AI (Artificial Intelligence) and ML (Machine Learning) approaches, which are proving to be effective and reliable in many applications. We do not believe that LAND-SUITE should go in the direction proposed by the reviewer, which is certainly interesting but out of the scope of LAND-SUITE.

Line 35-36, “As a matter of fact, a standardized methodology, procedure and software for susceptibility assessment is still missing.” How to define the standardized methodology for landslide susceptibility mapping?

LAND-SUITE does not want to propose a standard procedure for landslide susceptibility assessment, but it is an attempt (i) to facilitate the preparation and the selection of the variables/data required for a statistical susceptibility modelling, (ii) to provide largely used statistical approaches to derive susceptibility zonations, and (iii) to give largely recognised metrics to evaluate such modeling outputs.

We carefully checked the use of the term “standard” in the manuscript and where needed we removed or substituted it with more correct terms throughout the text.

Line 41, “In the literature, are available….”. Grammar mistake.

We modified the text as follows:

“*In the literature, several articles describe tools suitable for the analysis of shallow landslides using physically based slope stability simulators (as for example, SHALSTAB by Dietrich & Montgomery, 1998;, SINMAP by Pack et al., 1988;, GEOtop-FS by Simoni at al., 2008;, HIRESSS by Rossi et al.; 2013, TRIGRS by Baum et al., 2008, r.slope.stability by Mergili et al., 2014, etc), but very few articles propose software for statistically-based landslide susceptibility zonation.*”

In Fig. 8, it is clear that landslide susceptibility map from LDA and LRM is quite similar, while the spatial pattern of landslide susceptibility map from QDA and NNM is similar in most places. The NNM result mainly contribute to the final CFM result. Please further explain the possible reasons.

As we mentioned at the beginning of chapter 4, the critical discussion of results and their scientific relevance is out of the scope of this article and requires dedicated analysis, such as those described by Bornaetxea et al. (2018) and Rossi et al. (2021). In addition, the aspects related to the similarities/differences among the different susceptibility maps obtained from the different classification models have been already discussed. For example see the comparison of the spatial pattern and susceptibility values provided in Figure 8 of the cited article Rossi et al, 2010 (Rossi M., Guzzetti F., Reichenbach P., Mondini A., Peruccacci S. (2010) Optimal landslide susceptibility zonation based on multiple forecasts. Geomorphology, Vol. 114, 129-142, doi:10.1016/j.geomorph.2009.06.020).