

Review of the manuscript “Combination of empirically-based and physically-based methods to assess shallow slides susceptibility at the basin scale”

submitted by Sérgio C. Oliveira et al.

The authors analyse the susceptibility of a study area in Portugal to shallow landslides, comparing a statistical model and a physically-based model. Thereby they split their landslide inventory into two temporal subsets, one for building the statistical model and for calibrating the key parameters of the physically-based model, and a second one for model validation. They further compare the outcomes and combine the results in order to obtain a more informative landslide susceptibility map. The topic is highly relevant, the research is well described, and the manuscript is well structured and illustrated. As it is usual for discussion papers, there is some potential for improvement. I have identified a number of minor issues which should be addressed before I can finally recommend the manuscript for publication in NHESS. **All in all, I suggest minor revisions.**

General comments:

- I suggest to refer to “statistical” instead of “empirically-based” models.
- The illustrations are fine, but you might consider underlaying all the maps with a hillshade.
- Even though the discussion paper is well written in general, some final polishing of grammar and style will be necessary.
- A further reference that could be interesting: *de Lima Neves Seefelder, C., Koide, S. & Mergili, M. (2016) Does parameterization influence the performance of slope stability model results? A case study in Rio de Janeiro, Brazil. Landslides, doi:10.1007/s10346-016-0783-6*

Specific comments:

p7, l14 (and several other instances in the manuscript): I think that “hydrological model” should be replaced by “hydraulic model”.

p8, l7: What do you mean with “social” areas – maybe “cultivated” areas?

p8, l30ff: Maybe you should mention in an additional sentence (here or in the conclusions) that, through back-calculation, the geotechnical parameters lose their direct physical meaning, but are instead a product of statistics. Even though the infinite slope stability model clearly remains physically-based, in fact parameter calibration gives it a bit of a statistical touch.

p10, l22: I would not consider a rainfall with a duration of 15 days a short duration rainfall event.

p14, l10f: It could also be possible to identify uncertain areas with one single model by varying some input assumptions and parameter combinations tested and, e.g., analyzing the standard deviation of the results. Even though I agree that it is much better to compare different model approaches, you might consider to slightly reformulate your final statement.

I hope that my comments will help to further improve the quality of the manuscript. The authors should feel free to contact me in case they disagree with my comments or seek discussion:

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With best regards, Martin Mergili