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Interactive comment on "Improving predictive power of physically based rainfall-induced shallow landslide models: a probabilistic approach" *by* S. Raia et al.

Anonymous Referee #1

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This paper presents new model for assessing geographical patterns of rainfall-induced shallow landslide susceptibility. This new model was combined existing simple physically-based model and probabilistic approaches for input geotechnical and hydrological properties of slope materials. I agreed with the authors' concern that it should be very difficult to obtain information about geographical distribution of geotechnical and hydrological properties of slope materials. I also considered that the probabilistic approach might be a reasonable way to overcome this difficulty.

The authors also tested applicability of this new model using two dataset in US and Italy and confirmed advantages of this model, Moreover, the authors examined broad issues about probabilistic approach, such as effects of number of calculation, computation

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time etc.. So, I considered that this paper is novel and worthy for publication, but I would like to the authors add discussions at the following points.

1. Importance of input parameter values

    The authors used simple uniform distribution of geotechnical and hydrological parameters for probabilistic predictions. It can be thought that if we can get values geotechnical and hydrological parameters, the shallow landslide susceptibility can be predicted using the physically-based model, Of course, there are still uncertain points in physically-based models. However, a number of studies confirmed applicability of these models and recent studies discussed this point i.e., importance of input parameters (e.g., Uchida et al., 2012). So, I considered that compared with uncertainty of model, there is a large uncertainty in geotechnical and hydrological properties of slope materials.

    Thus, if the parameter distributions are not approximate representations for complex distribution of these properties, this new model should not well work. My question is that how about the authors think that probabilistic approach always (usually) work well compered to deterministic approach or it's depend on the reasonability of approximately representations for complex distribution of the input parameters. I suspect that if we can get exact value, the deterministic approach might be better than probabilistic approach.

2. Rainfall patterns

    I considered that rainfall amounts also widely distributed in their study site. I would like to the authors discuss about effects of rainfall distribution on their result.

References

Uchida, T., Akiyama, K. and Tamura, K.ÂĄF The role of grid cell size, flow routing algorithm and spatial variability of soil depth of shallow landslide prediction, Italian Journal of Engineering Geology and Environment-Book, p.149-157ÂĄC2011 ,

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