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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Approaches for delineating landslide hazard areas using receiver operating characteristic in an advanced calibrating precision soil erosion model" *by* P. T. Ghazvinei et al.

Anonymous Referee #1

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The paper presents an attempt to model landslide susceptibility through soil erosion estimation. Two main issues affect the paper. First of all, the English language is insufficient for publication. This is not only a matter of formal correctness of the language, but, more importantly, it is a matter of correct and appropriate use of scientific and technical words, thus leading to difficulties in the understanding of the paper. I started reviewing the text, as in the attached manuscript, but I needed to give up when I realized that it was impossible to do it consistently for the entire manuscript. The language problem is serious, and cannot be solved by proofreading

the text by an English speaker, because the most important problem is the correctness of the scientific vocabulary. The second issue regards the rationale itself of the paper. The authors use a soil erosion approach to model landslide susceptibility, but the link between erosion and landslide occurrence is not investigated in deep. Considering that the fundamental assumption on which the entire research is founded is the existence of a relationship between soil erosion and landsliding, I would have expected a serious attempt to demonstrate this assumption, either through reference to literature, or with some theoretical/physical/statistical analyses. The only attempt to justify the link between erosion and landslides is the sentence "water erosion (indeed, "water erosion" is meaningless, suggesting that water is eroded, and not soil. The appropriate expression is "soil erosion due to water" or simply "soil erosion") over time triggers surface-landslide (this expression "surface-landslide" is also meaningless: do the authors mean "superficial landslides" or, better, "shallow landslides"?) by increasing slope (again, slope is the slope, and not its gradient or angle. The correct expression is "slope angle") at affected area". This justification is insufficient and questionable. First of all, it is not true, in general, that soil erosion increases the slope angle, since this could happen in the upper part of a slope, or along the river banks, but not in the lower part of the slope, where the eroded material is deposited. In the upper part, soil erosion is so much efficient that can completely remove the soil cover, thus hampering landslide occurrence. It has been widely observed that slopes at higher angle (larger than 50°) are less susceptible to landsliding with respect to medium angle slopes (between 30 and 50°). This is not true for erosion. Secondly, erosion along the river banks is significant for the triggering of deeper landslides. Summarizing, the authors do not justify the link between erosion and landsliding, and this is a serious problem being this link the fundamental assumption of the paper. Moreover, I believe that this link is very weak and should be considered case by case. By using ROC curves the authors show that the soil erosion model allows to fairly "predict" landslides, but this could be merely the effect of the fact that the RUSLE model is strongly dependent on slope angle that is, of course, a conditioning factor

for landslides. Thus, the performance of the model could be only the indirect effect of slope angle. The authors should try to apply the ROC curve to a simple model that includes only slope gradient to be compared with the RUSLE model performance to demonstrate that the performance of the erosion model is not only an artifact. Regarding landslides, the authors do not discuss in detail relevant issues such as the type of landslides, the age, the state of activity, the size (area and depth). These information affect the applicability of the model to landslides, since the erosion model seems reasonably more applicable to shallow landslides more than deeper ones.

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/3/C2529/2015/nhessd-3-C2529-2015-supplement.pdf

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 6321, 2015.