

# ***Interactive comment on* “Land use and land cover geoinformation properties and its influence on the landslide susceptibility zonation of road network” by Bruno M. Meneses et al.**

## **Anonymous Referee #2**

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This paper analyses landslide susceptibility for an area in Portugal using standard input data and also conventional bivariate statistical analysis. From a methodological point of view, the paper doesn't provide new approaches or insights. The aim was to see what would be the effect of different land use/land cover maps on the overall prediction of landslides. For that two land use maps were used with a different level of detail. Although the authors acknowledge the importance of land use/land cover changes for the occurrence of landslides, they do not make an attempt to use a map of land cover changes as input for their analysis. While this could have been done with the use of multi-temporal satellite images, and also correlate this with the changes in landslides that occurred after these changes. Now the relationship between land use/land cover

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remains vague throughout the paper. It is also not clear when the two land cover maps were made and how these relate to the landslides mapped from images of 2005. Parts of this study area have been affected seriously by forest fires in the past years, and this must have also resulted in higher landslide activity. Nothing of that is mentioned in the paper, and a multi-temporal analysis is also lacking. The relation between the two land use maps should also be presented more in detail: how do the classes overlap? And are differences caused by errors or by temporal changes? Are landslides more frequent in zones where the classification do not match? The relationship between the factor maps is considered as a bivariate relation only, whereas it is a multivariate problem. It matters to know what the slope steepness is in order to assess the importance of different land cover classes for landslide susceptibility. Landslide susceptibility maps are not validated using independent data sets that were not used for making the model. This is not how it should be done. The authors do not develop a specific method for landslide susceptibility along the road, but basically, overlay the susceptibility maps of the two landcover maps with the road network. The assessment of landslide susceptibility along road requires a different approach where engineered slopes and natural slopes are evaluated separately, and where homogeneous road section is outlined with the upslope areas that could influence it. The method presented here is too simple for practical use along roads. The paper does not address the issue of landslide runout, which in the case of roads might be one of the most important hazards: debris (flows) or rock falls from the upslope areas are likely to affect the road. Only addressing landslide initiation is not considered appropriate in such a case. The level of English is problematic, and the text needs to be thoroughly reviewed by an English editor. The paper also uses too many abbreviations which makes it very difficult to read. For example GI, MMU, LUC, COS, CLC, PFM, IV, Ai, Ri, LSM, LSRN. . . The paper refers to other publications of the authors which seem to have a substantial overlap with this manuscript. Some detailed comments: 1/23: locals should be locations 2/1: The landslides.. should be Landslides. The entire sentence should be rewritten 2/9: same 2/10: landslide occurrence 2/16-19: The entire sentence is not clear should be rewritten. I

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would not use the abbreviation GI throughout the paper. Just mention factor maps. 2/23: of landslides 2/23- : you indicate the importance of land use dynamics but do not analyse it yourselves in this paper. 3/8-9: avoid GI . Improve the sentence 3/10-13: is this not the same topic as this paper? 3/16: improve description between brackets. 3/21-22: I don't think you achieved this goal 3/24: what does MMU mean? It is another abbreviation one has to remember. 4/6: high slope: steep slopes 4/10: rankers? 4/15: artificial land? 4/17-18: Improve the sentence 5/15- : there is no need to explain why you use slope steepness as a factor in landslide susceptibility assessment 6/5: how does it reflect moisture retention? What about the dynamic aspect of soil moisture? Table 1: include the date of production. 7/8: why such a coarse scale? 1:500000 for roads is too general. Figure 2: Are all these maps needed? Where is the landslide inventory map? 9/9 and table 2: round off values. What is the size frequency distribution? 10: is it needed to describe this method again? 11: this could actually be better illustrated with a small example, or otherwise referring to the source paper. 12/11-12: explain why this is done? Shouldn't this be based on the final score? Why 10 classes? What is the use of this for the end user of the susceptibility map? 13/15-16: if these are landslide scars then the landslides are not caused by it, but they result in bare areas. 14/15: success rate curves: validation should be done with independent data. What would be the result if you don't use any land-use map? 15/6-9: I don't understand what you are saying here. Explain it better. 15/11-14: not clear. Figure 6: the land use classes should be combined with slope . It is difficult to find out what the codes mean. There is not much description of it in the text. 16-17: I got lost in reading these pages with so many abbreviations and English language issues. Table 4: Not clear what the values indicate? Percentage of the area? Then the combinations are very strange: 86% in very high, and only 0.23 in very low? Figure 10 could be skipped.

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