

Interactive comment on “Assessing the spatial variability of weights of landslide causal factors in different regions from Romania using logistic regression” by M. C. Mărgărint et al.

Anonymous Referee #2

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1) General comment

The paper addresses an interesting aspect of the spatial variability of the coefficients assigned by logistic regression for the landslide susceptibility. This is an original and interesting approach right in the scope of NHESS. The paper was significantly improved compared to the first submission nevertheless; there are still some major limitations. The major pitfalls concern the methodology and discussion sections.

2) Specific comments

1- p. 1752, l. 11: the reference Thiery et al., 2007 “Landslide susceptibility assessment

C459

by bivariate methods” deals with the WOFE method not the BLR.

2- Study area section: To improve the readability of this section, you should make a sub-section for each of the described study areas.

3- The section should propose a more substantial description of the landslides for each study area: type, number, size, etc.... Usually, for this type of paper the authors give these details with descriptive statistics (table or diagram). Please give some photographs of the landslides to illustrate.

4- The methodology section should be divided in three parts, the first one dealing with the description of the methodology, the second one presenting the data and a third one describing the modeling strategy (calibration and validation of the model).

5- Maybe a multicollinearity diagnostic prior to the stepwise LR could be a good opportunity to assess the correlation between the variables.

6- p.1575, from l. 18 to 24: it still doesn't remain clear how many points were selected per depletion area? Did you select just one point or more?

7- For the “0” or “no landslide” sampling, it is usually preferred to use stratified random sampling, or spatially stratified random sampling than classical random sampling in order to avoid potential overfitting problems.

8- You have selected the Jenks method to classify the susceptibility maps. However this method is strongly dependent of the number of selected classes and of the values distribution. Moreover, it is often considered difficult to compare maps classified with this method. Don't you think that using fixed logistic scores or equal interval classification could be better in order to compare the final maps. (This is rather an open question that can be discussed than a major problem).

9- p. 158: the paragraph describing the LR model quality assessment has to be developed. Please explain what a pseudo coefficient of determination is, I think few people exactly know what it is. Explain clearly what is a ROC curve and AUC.... what is the

C460

real meaning of this test?

10- The major pitfall of the paper concerns the landslide data used to calibrate and validate the LR model. It is commonly admitted that each landslide type has to be modeled independently as they are controlled by different predisposing factors. For example shallow translational slides are rather influenced by steep slopes and surficial formations, whereas deep seated rotational slides are rather controlled by ground geology/hydrogeology. Moreover, including old deep seated stabilized landslide with present day data can be very critical as they triggered on different environmental conditions... Then the variations observed in the coefficients could not only be explained by the regional setting, but also and especially by the different proportion between the landslide types in each region. This critical aspect and limitation is not discussed in the paper.

11- The results section is too short and lacks of a general synthesis of the results. Some of the figures are cited in the text without any further explanation. You should be more accurate in the results description.

12- The ROC curves of the validation samples have to be presented as well on figure 4 or on an additional figure.

13- As mentioned before, the discussion is too shallow as it doesn't discuss any of the limitations of this work and of the quantitative landslide susceptibility in general (e.g. quality of the input data, correlation between the variables, landslide data sampling. . .)

14- p. 1760, l. 24-27: You state that the relative high coefficients attributed to slope height are "explained by the high relative altitude of landslide depletion area on which the model is based". Isn't it that the lithology can be significantly correlated with the altitude in plateau regions with monocline structures? Maybe I'm wrong, but the landslides you describe in the study area section (called hârtoape), seems to be old deep seated landslides, as observed in many other cuesta regions of western Europe (UK, France, Germany, Belgium). This type of landslide can be strongly controlled by the

C461

lithology (sliding panels of hard rocks (limestone, sandstone, chalk. . .) on soft rocks (marls, clay, sands. . .). Then the altitude could be considered as a proxy to identify the sensitive lithology, generally hard rocks located at the top of the hill slopes (in absence of more detailed geological maps).

15- Opening the discussion/conclusion with a reference to other works conducted in Roumania on landslide susceptibility mapping or/and on the possible interest of the local authorities in this work could be interesting.

3) Technical corrections

1- p. 1751, l. 11-12: the susceptibility defines the spatial probability of landslide source area, not the occurrence probability (which is the "hazard").

p. 1751, l. 25: please check the sentence (repetition)

p. 1755, l. 19 and p. 1756, l. 12: I don't understand clearly if the term "surface lithology" refers to the outcropping layers or to the superficial deposits/surficial formations.

p. 1756 l. 8: it is not clear if the aerial images were orthorectified or georeferenced?

p.1756, l. 14: I'm not sure that a higher geological complexity necessarily means that the map is more accurate.

p.1758, l. 5: please provide years of publication of the references.

p. 1758, l. 16-17: please delete the sentence. It was already mentioned in the methodology section.

Figure 1: It is difficult to see the location of the landslides. Can you please increase the contrast between the landslides limits and the hillshade background?

Figure 2c: Please provide the lithology rather than the stratigraphy. The north direction is not indicated on the maps.

Figure 3: The map is still very difficult to read, please select more contrasted colors.

C462

Please indicate the north direction.

Figure 4: Please add the validation ROC curves

Figure 5: The figure might be easier to read with the same y-axis extend on each graph.

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