

## ***Interactive comment on “GIS-based earthquake-triggered landslide susceptibility mapping with an integrated weighted index model in Jiuzhaigou region of Sichuan Province, China” by Yaning Yi et al.***

### **Anonymous Referee #2**

Received and published: 6 March 2019

1-General comments: In this study the susceptibility of the landslides triggered after the Mw 7.0 Jiuzhaigou earthquake is evaluated by combining the FR and the AHP methods. They first visually interpreted the landslides and used the 80 % to train the model and the remaining 20 % for validation. Topographic, seismic, and geological factors were used as causative factors. Finally, they evaluate the performance of the model using the AUC. The main concern about this analysis is its applicability as they are analysing the susceptibility of something that happened due to a very strong earthquake, impossible to predict and whose effects and evolution can be very different in

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the future. Therefore, this analysis only proves that the performance of the integrated model is quite good using this combination of factors, but it cannot be used to prevent the damages of a motion as it is applied afterwards. It implies that the manuscript does not represent a substantial contribution in the understanding of natural hazards.

2-Specific comments: 2-1-The English needs to be revised. 2-2-The authors should be more precise, rigorous and objective in their explanations and keep their personal opinions aside. 2-3-When an affirmation is done, it has to be supported with references or results. 2-4-Some parts of the text need to be re-organised: it has to be well structure and easy to follow. Please describe the study area in the corresponding section, then the methodology, then results and finally conclusion. Do not mix them and repeat things in other sections. 2-5-Always refer to the tables and figures when you are explaining something 2-6-Methodology needs to be more elaborated.

3-Technical corrections: Page 1: -Line 1: I would say assessment rather than map as there is a process, not trivial, that leads to its mapping. Mapping sounds like a simple visually interpretation. -Line 11: Mw instead of Ms -From line 12 to line 15: this is not true. The co-seismic landslides already occurred and the spatial probability of the post-seismic failures can be very different. What are you predicting? -Line 24: “...predictive capability” again what do you want to predict? -Line 26: What does scientific basis mean? -Line 27: “...to mitigate hazards of the EQ-triggered landslides to individuals and infrastructures of the EQ affected region”: you evaluated the susceptibility of the landslides triggered by the EQ, i.e. the susceptibility of something that already happened and which is very likely to change fast in the future.

Page 2: -Line 4: “Landslides are more likely to occur when the slope becomes unstable”. When the slope becomes unstable it directly implies that a landslide will occur, right? This sentence does not make sense. -Line 6: “...especially the earthquake and rainfall...” It looks like EQ and rainfall are anthropogenic. Please re-write it again. -Line 15: “Comprehensive EQ-triggered landslides...”. This is true, but it must be done before the EQ occurs. -Line 16: “...through the proper prevention actions for the future.” This

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is also true, but predicting what it will happen in the future, not during the EQ. -Line 17: which are these many approaches? Please develop this part. -Line 32: "... the mutual relationship between the factors is mostly neglected..." Is it important to evaluate the susceptibility? If so, please explain it.

Page 3: -Line 9: "Umar et al., 2014". Please cite the references properly. Do this for all the other ones. -Line 18: I suggest using present tense. Furthermore, I would say not only apply but also evaluate how the model performs. -Line 21: Please define/quantify "complete". -Line 25: why detailed? Did you apply any specific validation?

Page 4: -Line 4: "...are extremely complex." This is a personal opinion. Please describe it. -Line 6: "...tectonic movements are very intense..." What does it mean? Please describe it. -Line 6: Please describe alpine karst terrain topography. -Line 8: "The geomorphology of the study area is ..." This is evident. Please delete it. -Line 12: A reference is needed here. -From line 13 to line 18: This paragraph is misplaced. You introduced the study area and now you introduce the park again? -Line 20: You did more than mapping. Assess? -Line 26: Landslide inventory is not just "useful". It is the basis for assessing the landslide hazard. -Line 30: is this information relevant for the paper? If not, please delete it.

Page 5: -Line 1: I do not understand this sentence. -Line 2: "with the aid of computer and GIS tools..." What does it mean? Please be more specific. -Line 6: "Smaller landslides" what area? Please define it. -Line 21: "Pioneer studies..." Does it mean that until 2001 no one describe this before? What about slopes <15 degrees? Nothing happens? -Line 23: "29.92". This is average. No decimals. -Line 26: "In the study area the rugged terrain makes the slope very unstable". Why? Please develop this idea. -Line 29: "Lithology is directly related to the slope stability, which plays..." add some references to justify this please.

Page 6: -Line 1 and 2: "The distances of a slope from faults as well as from the river channels..." All of these statements need to be justified by references. -Line 3, 4 and 5:

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"According to the China Earthquake Administration, the epicentre of the Juizhaigou EQ was located near the Minjiang..." This should be explained in the study area. Please add the faults in Figure 1 and refer to them. -Line 5: "Some studies..." I guess you only mean Fan et al. (2018), so please make it clear: they are not "some studies". -Line 7: "streams also have..." This is misplaced. You should move it above when you are talking about the streams. -Line 8: "LULC" did you mention before what it means? I do not think so. -Line 8 and 9: "And the LULC is one of the controlling factors that pose direct impact on the occurrence of landslides." Why? Please justify this. -Line 9 and 10: "Most of the landslides in the study are occurred in the wood land." How do you justify this? Where can the reader see this? -Line 10: "In this study, the Lithological data was..." here you are talking again about lithology. This should be re-organised. -Line 19: "As an important factor..." Why is this sentence located here? Again, re-organise the text to make it clear, understandable and easy to follow. -Line 22 and 23: "Landslide controlling factors..." you already mentioned the controlling factors. Why are you doing this again? -Line 28: "The assumption behind the integrated weighted index model was that future landslides will occur under similar environmental conditions as historical landslides" That is the point! The EQ produced a great disruption in the terrain. What happened in Juizhaigou was a consequence of the EQ and you cannot expect that future landslides will occur under the similar environmental conditions as the latter will change very fast over time.

Page 7: -Line 22: "The FR method is one of the most widely used approaches to assess the landslides susceptibility at regional scale..." Please cite some examples.

Page 8: -Line 6 to 11: This is methodology, not results and discussion. Furthermore, you should re-phrase it. -Line 18: This is methodology. Furthermore, this sentence makes no sense here. Please re-phrase it.

Page 9: -Line 1 to 10: This is very similar to what Fan et al. (2018) did in their analysis. Furthermore, this paragraph is bringing little information. Please extend it and refer to the table where the results are shown. -Line 12 to 18: This is methodology.

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Page 10: -Line 4 to 14: too detailed to be discussions. Please shorten it. -Line 20: 11 % is not very significant. -Line 23: "Firstly, the accuracy of the FR method is highly depended on the quality of the dataset, especially the landslides inventory" Did you observe this? Otherwise, cite any reference where it was observed. -Line 26 and 27: "We did not accurately identify the landslides..." Did you compare the co-seismic landslides with the previous ones? It has to be explained. -Line 32 and 33: "However, results obtained in the past environmental conditions are not a guarantee for the future" Exactly and this is even more important after an EQ. So here my concerns arise again: what is the purpose of you work? Does it really have any application? Is your model reliable if applied in a post-seismic scenario?

Page 10: -Line 2: Urban sprawl is not a good example here. What will change the most is the landslide activity. See works carried out by Fan et al. (2018) in the Wenchuan EQ affected area. -Line 2: "Despite its limitations..." They are very important limitations. -Line 2, 3 and 4: The model only predicts what already happened during the EQ and future scenarios are likely to be very different from what happened in the past. Therefore, I cannot see how it can be used as a scientific basis for reconstruction of tourism facilities. -Line 17: "...useful for serving the scientific basis for disaster mitigation and management". Again, if evaluated in advance it can be useful, but now, once the EQ already occurred, what it is useful is the mapping of the landslides to see identify the most affected areas.

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2019-8>, 2019.