

Interactive comment on “Landslide susceptibility mapping by using GIS along the China–Pakistan economic corridor (Karakoram Highway), Pakistan” by Sajid Ali et al.

Anonymous Referee #3

Received and published: 10 May 2018

Authors use the well known AHP method to obtain a map of landslide susceptibility 'along' the Karakoram Highway. Explanatory variables are prepared and classified with a variety of different approaches. The topic is relevant and for sure a correct map assessing the susceptibility along the highway would/might help decision makers to mitigate the risk. Unfortunately there are several issues about the work done and the way it is presented that do not make it, in my opinion, suitable for publication.

In general:

the method is already well known in literature and the paper does not seem to me to introduce any originality, it's more like a technical report where a consolidated procedure

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is used to obtain a map.

The description of the input data is very wanting, in particular the main information related to landslides is practically non-existent, something very strange if a landslide susceptibility map is to be prepared. This aspect somehow also invalidates the validation of the map.

Most of the decisions taken in the choice of the model and in its setup are not justified but just given. The literature analysis does not help at all.

Some of the important details are not provided and only in few cases it is possible to deduce or extrapolate the needed information. An example is the study area: is it 2 km large? It's just a 'rigid' buffer along the highway or it is obtained using geomorphological analysis (slopes, catchments?). According to a figure, it should be a 'strip' some km large, but it's my deduction, if true, why this choice?

I was expecting (or hoping) for a discussion to find reasons for the choices, analysis in depth of the consequences of the choices on the final results, but this part is missing.

My personal opinion is that the paper does not reach the minimum standards of quality from too many points of view and it is to be rejected, perhaps deeply re-thought, and eventually resubmitted.

My considerations are, I hope, supported by my comments in detail shown below

Abstract:

Abstract is a copy and paste of some parts of the paper

p1 I14: not sure you need to go so much into geological details in the abstract, just say that geology facilitates the landslide occurrence.

p1 I23: something unclear here.

p1 I27: validation of the credibility?

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1 Introduction

p1 l31 - p2 l3: these first 5 lines should be moved to the area description paragraph

p2 l5: why potentially?

p2 l7: no, landslides are not caused by conditioning factors, they might eventually facilitate the occurrence.

p2 l9: too generic, variation of geology? Geological structure?

p2 l10: too generic... how facilitated?

General comment: the literature analysis is sterile because it does not motivate/support any of the choices taken in the procedure setup.

2. General situation of the study area

I actually cannot understand how is the shape of the study area, is it a buffer (what kind of buffer) along the KKT? How large, how is it defined?

3 Geology along the KKH

p3 l29: active landslide zones: what does that mean? and how can you get it from the distribution of existing landslides? I guess you mean that the susceptibility in the area is high...

p4 l1: again I'm not sure that 'activity' is here used correctly, I suggest to re-phrase to avoid confusion with activity of a landslide which is another thing.

p4 l17: see my previous comment.

4 Seismology

5 Causative factors and spatial distribution analysis

p5 l14: all those parameters are always present, you probably mean depending on the values, or classes...

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p5 l15: what do you mean here with accurate and precise?

p5 l15: entirely dependent on the availability of data relating to controlling factors? Not sure this is in general true, and in particular here using this type of model.

a Lithology

p5 l19: what do you mean with time?

p5 l21: what do you mean with spatial analysis? Did you count landslides for each lithology, or it is a spatial density (landslide area / area)?

b distance from faults

c Geomorphological factors

p6 l5 - p6 l9: the result of the numerical distribution of the landslides inside the classes might depend (actually it will depend for sure) on how the classes were chosen that is not described.

p6 l6 -p6 l9: what do you mean with reduced? According to fig. 6 they seem to have some discriminating capabilities, I think you should support more your conclusion (perhaps correct, but should not be deduced just by looking at fig. 6)

d Hydrology

p6 l15: no doubts about the correlation and the work done by Ali et al., but her it should be better introduced and contextualized.

e Land cover

This is more a description of the land cover of the area instead of a spatial analysis that is entrusted to the reader.

6 Methodology

a Literature review

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The description of the data here is really poor and unsatisfactory. In particular, the description on how the inventories are and they were prepared is completely missing. How many landslides, type, some statistical description... landslides are here the secondary variable, the one that is used to understand how and if the causing factors are (quantitatively) important or not. Furthermore, what is a precipitation map? Is this an annual precipitation map? How did you obtain it? How to make sure that it is not too much event dependent (the bias introduced in the model would be dramatic)..

b Field reconnaissance

p7 l11: for all landslides?

p7 l12 - p11 l13: what does that mean? Another inventory? Is this a buffer around the highway where the map was prepared?

c Remote sensing

Same impression I had about 'Literature review'.

What is the level of pre-processing of the satellite images (are they orthorectified? Atmospheric corrected?), what did you do with QGIS. How did you train the classification, how many ROIs, what model did you use (SVM, ML...)? The map is not divided in 4 classes, probably you did look for 4 classes in the training phase... The confusion method of the map versus what?? The image previously classified? How, by who, so why did not use it?

d Analytical hierarchy process

I think you should refer the explanation to table 2. (and not only in the next paragraph). Not sure you can say x,y axes. I also suggest you to add some references to find easily what CR and CI are.

7 Results.

p8 l15 - p8 l16: how did you choose the classes?

p8 l17: these numbers depend on the previous classification that was not justified, so they say nothing.

p8 l20: what kind of criterion is an 'owed to lucidity'?

a Accuracy assessment

General question: did you use all landslides in the inventory? A part of? I can't understand what is the classifying parameter.

p9 l8: among many you pick up ROC and LDA without justification.

8 Conclusions

p9 l23: a set?

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2018-39>, 2018.

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