

Dear reviewer,

Thank you very much for your attention and the referee's evaluation and comments on our manuscript "Debris Flow Risk Mapping Based on GIS and Extenics".

We have studied the valuable comments, and tried our best to revise the manuscript. The respond to the reviewer's comments are as follows:

Comment 1: The concept of Extenics is not clear at all. It is not clear why this concept should bring benefit compared to simple correlation of the parameters. As this paper is based very much on the Extenics concept, it has to be described very clearly and carefully and it has to be explained why it is so important for debris flow hazard mapping. It should also be compared to other, more common approaches. Right now it is only described with catchy keyword such as "innovation", "matter", "solve contradiction problems".

Reply: According to the reviewer's comment, we will compare and analyze the evaluation results of existing debris flow risk assessment methods in first section, the third paragraph. We will make clear statement about the advantages and disadvantages on the existing assessment methods, and give the summary about the difference between extenics approach and other methods on evaluating debris flow risk.

Comment 2: The basic input information, relative elevation, slope, rock hardness, rainfall, gully density, vegetation coverage, historical debris flow and earthquake activity are very essential for the algorithm. But these datasets are not well described at all. A discussion on the quality and uncertainty of these crucial parameters is missing.

Reply: According to the reviewer's comment, we will add a detailed description of the different factor datasets in section 2.2, and discuss the accuracy of the dataset. And meanwhile, giving the reason why the dataset can be chosen.

Comment 3: The authors use a gris of 1 by 1 km spatial resolution to derive parameters sich as slope angle and elevation difference. This is way too coarse to derive these parameters for meaningful debris flow hazard detection in mountainous environments.

Reply: About the reviewer's comment, the author can't understand the reviewer's question clearly. Whether the data is too coarse or too rough. Please make the clear statement.

Comment 4: The validation with points where debris flows were observed is poor. First of all, as far I understand, is the same data used as input for the model. So it could to be used for validation of the model. Secondly, nearly 50% of all recorded debris flow events fall into the classes very low, low and moderate risk for debris flow. This does not look like a very good model performance as the authors claim.

Reply: About the reviewer's comment, the proportion of historical mudslides falling into the corresponding medium, high and heavy danger zones is 76%, rather than 50%. The 50% refers to the proportion of the middle, high and heavy areas corresponding to the study area, which exists ambiguity in this paper. Through highlighting the proportion of historical mudslides falling into the corresponding medium, high and heavy danger zones, the definition can be clear.