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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Debris Flow Risk Mapping Based on GIS and Extenics" *by* Wenbo Xu et al.

Anonymous Referee #2

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This paper attempts to compute the influence of several factors on Debris Flow risk in a region of China, and to categorize these risks in five different classes.

The idea to analyze the impact of natural and historical factors on debris flows risk, and to assign a weight to all of them might be really interesting and useful. However, the central point of this paper is the use of a new theoretical method (extenics method) which is not explain in a comprehensible manner. Therefore I recommend a rejection of this paper.

Here are my main arguments for this:

1. The methodology to compute correlation factors and weights is not defined in an understandable way. The general concepts of extenics methods (and its advantages

over other methods) has to be defined more precisely and the assossiated mathematical description has to be improved. The symbols used in the equations are not all defined and when they are, it is often without any explanation. Furthermore, the mathematical operation are not explained. For example in eq. 1, M, aj1-ajn and bj1-bjn are not defined, as the operation <a,b> and finally what does exactly means this kind of matrix [] (with columns of different size). Thus, this section is very confused and almost impossible to understand, that takes all credibility away from the results.

2. The input variables (for instance the historical data page 6, line 34 or rainfall page 7, line 11) are used to verify the data obtained. It is absolutely mandatory to find other parameters (or methods) than the input ones to check the results. Otherwise, they do not have any scientific validity. Moreover, to ensure the validity of the Class V, you claimed that the area (covered by the Class V) is constituted by (among other things) large relative elevation. However, when one looks at the debris flow risks as a function of the relative elevation, one sees that terrains with largest relative elevation fall in Class I and II. As far as I understand, there is a big conmtradiction here.

3. Some of your results are not intuitive, in this case a comment would be helpful. For example, risks become smaller with larger slope (page 5, lines 24-25). In this case, it is written: "For the valley with smaller slope, [...], smaller shear force means larger stability and lower probability of debris flow". It seems for me that your results are in complete disagreement with your interpretation, therefore an explication is expected and needed.

4. Your study is based on field and historical data, which are not well described in the paper. It misses especially a discussion about the quality of the data and the associated uncertainty of measurement.

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