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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Regional flood susceptibility analysis in mountainous areas through the use of morphometric and land cover indicators" *by* M. C. Rogelis and M. Werner

Anonymous Referee #2

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GENERAL COMMENTS

The article presents an index for analyzing regional flash flood susceptibility purely based on information derived from digital elevation models and satellite imagery. This index is composed by a morphometric and a land cover indicator and does require neither geological work nor field surveys. Thereby, the study is aiming at providing an approach to analyze watersheds over a large area at low time and financial requirements.

While the focus is put on the development of the methodology - which is in general

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promising - the article would benefit from strengthening the approach used for validating the results.

SPECIFIC COMMENTS

p. 7555 lines 5-7 - is high susceptibility necessarily related to debris flows or can also catchments with unfavorable morphometric and land cover conditions reach high susceptibility?

P. 7555, line 17: a comparison between the two approaches was carried out – how and with what objective? I propose to explain this in the methodology section. You also may want to consider that comparing two methodological approaches is relative unless you can compare with inventory information – you may want to outline how you deal with this issue.

p. 7561 line 12: You may want to explain in some more detail how you compare the results of the morphometric analysis

p. 7562, line 26-27 Section 2.2.3 It would be beneficial to provide more details on the validation approach the subsection title is indicating. What results are you comparing and how? What is the objective?

p. 7566-7567: While in the methodology you refer to "validation of results" the title in the results section mentions "comparison of results". This comparison seems to refer to a check with the observed flood events, however, no numbers are provided as to how many flood observations are located in catchments of what modeled susceptibility. Regarding the flood inventory, it would also be good if you could provide information on the robustness regarding flood frequencies. What are the reasons that you have many observations for some and no/few for other catchments? Can you use the number of observations to check against the susceptibility level you modeled? You may also want to compare the result of the susceptibility index against the result the morphometric indicator provided since you later on make the point that land cover is an important

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factor and should be included. I would be very interesting if you could elaborate more on the last sentence of 3.4 providing more details.

p. 7571 line 24: You may want to indicate on what observation/comparison you base this statement.

p. 7572: I propose to strengthen this subsection 4.3 according to the name of the title. Currently the discussion seems to me rather qualitative and could benefit from a stronger analytical foundation.

p. 7572 line 17-22: Does the flood inventory you have actually capture flood frequency well?

p. 7574 line 6: You mention that the slope-area curve approach overestimates potential sources, however, can you be sure that the other methods don't underestimate? Since you don't compare to observations but between models your conclusions can only be relative I suppose.

p. 7574 line 28-29: "the land cover indicator improved the agreement. . ." – to what extent? Can you provide a stronger basis for this statement?

TECHNICAL CORRECTIONS

Abstract: The abstract is currently not indicating that the objective of the study is to propose a method for regional flash flood susceptibility assessment. Moreover, the abstract would benefit from a clearer line of thought from objective over the methodology used to achieve this objective, the results and how they relate to the objective and finally the discussion. Currently, the indicated objective is to classify susceptibility in a certain area, the approach is the use of a morphometric indicator for identifying sources and then the flow was propagated. The results show, that the morphometric indicator is insufficient to adequately assess susceptibility, so you added on the land cover. The final outcome is the understanding of the relation between morphometric characteristics and land cover.

2. Methodology: You may want to consider adding details on the why and how you carried out your study as well as a clear outline of the underlying assumptions. Currently, the methodology has a strong literature review component while the explanations of the approach you actually chose and applied are rather short. E.g. the principal component analysis is mentioned in a single sentence while then in the results section information on the methodology is provided before the results are presented. I propose to move this information on the methodology to section 2 and in general strengthen this section. Moreover, I propose to move part of the literature review into the introduction to shorten the methodology and rather focus on describing your approach – based on the scientific basis elaborated in the introduction.

It would be easier for the reader to understand the whole approach if it was explained at the beginning of 2.2. Currently, not until p. 7555 line 19 you mention the overall approach shown in figure 2 – please consider mentioning this scheme earlier in the methodology section (directly under 2.2) and explaining in detail the overall approach including underlying assumptions. It would also be helpful to clearer outline how the morphometric and the land cover indicator will be combined afterwards. Currently information on the size and extent of the inventory of past events as well as its use in the analysis process is distributed throughout the article. It would be very helpful if a detailed description was included into the methodology section. Section 2.2.1 Consider clearer structuring this section (e.g. with paragraph titles or an introductory sentence) since it is difficult to guess which piece of the approach you are addressing in any given paragraph. E.g. p. 7557 line 9, it comes to the reader as a surprise that you now explain the methodology regarding the second approach. Approach 1 or 2, Approach 2a or 2b. P. 7559 line 19 you present the “second method” without having mentioned any “first method”. It would be helpful if you would prior to presenting the two methods state, that two methods have been chosen, first . . . and second . . . Same is true for p. 7560, line 9 & 11 where the use of a certain method is stated and then the “second method” is explained.

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p. 7560 line 16: “. . .areas that potentially could be affected by debris flow runout . . .”

p. 7562 line 23: “... resulting indicators of morphometry and land cover were. . .” - which of the two morphometric indicators did you use?

p. 7562 line 25: What is the rationale behind weighting both indicators equally?

3. Results: Consider providing a brief introduction to the section including an outline of its structure.

p. 7563, line 3: This sentence would better fit into the methodology

p. 7564 line 23-26: This explanation of the graph would better go into the figure caption text, not into the flow text.

P 7567, line 4-7: This information on the inventory should be provided in the methodology section

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 7549, 2013.