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Comment

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

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GENERAL COMMENTS

The paper presents a new methodology (index) for analyzing regional “flash flood” susceptibility. The index considers morphometric and land cover parameters to discriminate between debris flow and clear water flow dominated watersheds in order “to understand the level of threat that floods in the watersheds pose”. The presented approach intends to overcome limitations in the availability of field-derived data by combining morphometric and land cover characteristics derived from digital elevation mod-

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els and satellite imagery. The approach is new, innovative and promising, but suffers from sufficient validation of the modelling results. Moreover, some further issues regarding approach and style call for a major revision of the manuscript (see below).

SPECIFIC COMMENTS

- 1) The title is misleading. As the main focus is on debris flows and not on floods, the title should be changed accordingly. (major issue)
- 2) Abstract (lines 20-21): What are “good morphometric conditions”? Please avoid such terms. (minor issue)
- 3) Introduction (p. 7551, line 3): What are “clear water fans”? Do you mean “alluvial fans”? (minor issue)
- 4) Study area. Are all of the studied catchments comparable in terms of lithology (you did not mention the lithology of the catchments!)? What about river engineering? Are there any protection measures (e.g. dams) installed in the systems that potentially influence channel processes? (major issue)
- 5) Study area (p. 7553, line 2). Annual precipitation varies [...] in a bimodal regime”. Please give information on the timing of the rainy seasons (Feb-May, Oct-Nov?). (minor issue)
- 6) Methodology. Section 2.2. You present the variety of definitions for the different processes, but you don’t state to which you (!) refer to. (minor issue)
- 7) Methodology. Section 2.2.1 (p. 7555, lines 19-20). Please explain the DEM construction in more detail (base map?, year?; procedure). (minor issue)
- 8) Methodology. Section 2.2.1 (p. 7555, lines 21-22). Please explain more detailed how the parameter extraction was done, esp. for which units (whole catchment, sub-catchments, river reaches/distances etc.?)! (major issue)
- 9) Methodology. Section 2.2.1 (p. 7559, lines 17-18). You mentioned that the break in

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the slope-area diagram was inferred visually. Please shortly state the chosen criteria for threshold determination. (minor issue)

10) Methodology. Section 2.2.1 (p. 7560, line 7). What do you mean by “extreme events”? Please define (better). (minor issue)

11) Methodology. Section 2.2.1 (p. 7560, line 26). Please explain shortly the variables of the H/L ratios (give the equation?). (minor issue)

12) Methodology. Section 2.2.2 (p. 7561, paragraph 1). Please explain how you performed the land cover classification (visual delineation?, classification based on spectral reflectance (bands)?). (major issue)

13) Methodology. Section 2.2.3. You weighted both indicators equally. Why? This would mean that land use and morphology have the same impact on the occurrence of debris flows, which might or might not be true (see literature!!). This is (just) an assumption of yours! Justify your assumption. (major issue)

14) Methodology. Section 2.2.3. The paper lacks a convincing comparison of the susceptibility index with actual occurrence and type of (hydro)geomorphic processes. This is a major flaw, but could be overcome by performing geomorphological mapping, e.g. from multi-temporal satellite images or in the field. (major issue)

15) Results. Section 3.1 (p.7564, lines 15-18). You stated that “this behaviour is in agreement [...] where on average the watersheds in the Eastern Hills have higher local slope for a given area than in the Tunjuelo Basin watersheds”. Please quantify! (minor issue)

16) Discussion. Section 4.3 (p. 7572, lines 5-6). “This was considered to be due to the land cover effect on the hydrogeomorphic processes of the watersheds”. Again, this is just an assumption of yours (see also comment 13)! This could also be due a bunch of other reasons or even due to a wrong choice/weighting of parameters in your model. Please discuss more extensively/objectively. (major issue)

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TECHNICAL/FORMAL COMMENTS

- 1) Mixing of results and discussion. Please clearly differentiate between results (i.e. presentation and description of results) and discussion (i.e. the interpretation of results). (major issue)
- 2) Conclusions are far too long and inconcise. (minor issue)
- 3) Titles of sections 2.2.1 and 2.2.2. Consider using “development” instead of “construction”. (minor issue)
- 4) The paper needs a spelling check (mistakes such as 4. “Discusion”). (major issue)

I hope this helps to improve the manuscript!

All the best, Ronald Poeppel

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