

Interactive comment on “A Hydrologically Based Model for Delineating Hazard Zones in the Valleys of Debris Flow Basins” by Kaiheng Hu et al.

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The authors present a quite straightforward approach for debris flow hazard zoning, requiring a minimum of input information. The approach presented is interesting, and the manuscript is generally well structured and illustrated. However, part of the content remains at a very basic level, so that I cannot recommend the manuscript in its present form for publication in a highly-ranked journal such as NHESS. Therefore I recommend some major revisions according to the comments and suggestions given below.

The authors are welcome to contact me at martin.mergili@univie.ac.at in case they disagree with my comments or if they wish to further discuss the one or the other issue.

1. Some standard GIS functions are described in too much detail (e.g. Page 4, Lines 5-

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19 and 34-39). This is not necessary and distracts the reader from the more innovative parts of the manuscript. Fig. 4 does the work of showing which ArcGIS raster functions are used, none of these functions has to be explained in detail.

2. Is it valid to assume $V_i/V_j = A_{fi}/A_{fj}$? Are there some references proving this?

3. What was the value of m chosen for the test analysis?

4. The model testing in general represents a huge potential for improvement. More thorough testing is absolutely necessary to make the manuscript acceptable for publication. (i) The model should be run with different parameter settings (e.g., m) in order to explore the uncertainties and the parameter sensitivity. (ii) A more quantitative evaluation of the results is necessary (“... acceptable agreement ...” is not sufficient). (iii) The test case consists in the reproduction of an observed event. It could be interesting to – after optimizing the parameters with the observed inundation areas - demonstrate some “real” hazard zoning i.e. by considering peak discharges of events with different recurrence intervals and deriving an annual probability of impact for each pixel. The results should be evaluated in another test area. Such an effort could be really interesting to the audience of NHESD and add a lot of value to the article. If there are no frequency-magnitude relationships known for the area, a scenario-based analysis for different debris flow magnitudes could be demonstrated.

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