

Interactive comment on “Landslide and debris flow susceptibility zonation using TRIGRS for the 2011 Seoul landslide event” by D. W. Park et al.

Anonymous Referee #1

Received and published: 24 July 2013

General Comments:

This manuscript applies TRIGRS, a regional physically-based stability model, to assess rainfall-induced shallow landslides for a storm event on 26–27 July 2011, Woomyeon Mountain, Seoul, Korea. The model produced results reasonably well in predicting landslide timing and landslide location. Because of the difficulty in delineating landslide boundaries and determining stable/unstable area, a new index, LRclass, is therefore proposed to evaluate model prediction of landslide location, with consideration of over-estimation issue of landslide susceptibility assessment. In addition, the study extends the applicability of TRIGRS by incorporating the flow routing module to predict potential debris-flow paths. It can be useful to quickly produce a preliminary result for a regional scale application, when large-scale parameters are not available to perform a complex

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debris-flow simulation.

The topic is apparently related to the interest of NHESS, and I suggest the manuscript is suitable for publication in NHESS, after some modifications. Please find my comments below.

Specific Comments:

Does the paper address relevant scientific and/or technical questions within the scope of NHESS?

Yes

Does the paper present new data and/or novel concepts, ideas, tools, methods or results?

Yes.

Are these up to international standards?

Yes.

Are the scientific methods and assumptions valid and outlined clearly?

I suggest the authors should specifically introduce the operation of the use of flow routing module. For example, how the authors define the beginning points (cells) of debris flows: do the authors use every landslide points as debris-flow initiations? Suggesting by Griswold et al. (2008) and Chiang et al. (2012), not every landslide initiation will deliver debris flows.

The study area looks like to be constrained in hillslope area, not extending to flooding area. Hence, the debris flow prediction does not include the affected/ inundation area over communities. Can the routing module extend to the low land area?

Citation:

Griswold, J.P., Iverson, R.M., 2008. Mobility and statistics and automated hazard map-

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ping for debris flows and rock avalanches. U.S. Geological Survey Scientific Investigation Report 2007-2576.

Chiang, S.H., Chan, K.T., Mondini, A.C., Tsai, B.W., Chen, C.Y., 2012. Simulation of event-based landslides and debris flows at watershed level. *Geomorphology* 138, 306-618.

Are the results sufficient to support the interpretations and the conclusions?

The proposed LRclass is a quantitative index used to evaluate the prediction of landslide location. I agree with the authors' idea, suggesting it's useful to avoid over-estimation. However, to me, this index mainly highlights the "effectiveness" of model prediction, instead of "accuracy". The study only obtained 49/147 (33.3

Does the author reach substantial conclusions?

I suggest the authors put their analysis of "landslide and debris flow susceptibility zonation" in the study, as mentioned above, and then they may modify/add more results in current conclusion.

Is the description of the data used, the methods used, the experiments and calculations made, and the results obtained sufficiently complete and accurate to allow their reproduction by fellow scientists (traceability of results)?

The authors need to explain how they estimate the soil depth. And please provide the source of observed landslide timing (interviewing people?/from news?/from government report?)

In addition, as mention above, the authors should explain the operation of the use of flow routing module. It's important to fellow scientists who really want to reproduce the work.

Does the title clearly and unambiguously reflect the contents of the paper?

As mention above, the authors should consider to add their analysis of "landslide and

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debris flow susceptibility zonation" in the study.

Does the abstract provide a concise, complete and unambiguous summary of the work done and the results obtained?

Yes.

Are the title and the abstract pertinent, and easy to understand to a wide and diversified audience?

Yes.

Are mathematical formulae, symbols, abbreviations and units correctly defined and used? If the formulae, symbols or abbreviations are numerous, are there tables or appendixes listing them?

Please go to the "technique corrections".

Is the size, quality and readability of each figure adequate to the type and quantity of data presented?

Yes.

Does the author give proper credit to previous and/or related work, and does he/she indicate clearly his/her own contribution?

The authors pay more attentions to literatures of landslide modeling. To combine a landslide model and a debris-flow model, however, is not new. Several articles have proposed their own ideas for various application purposes. The authors should review more works related to landslide-debris flow modeling, such as:

Chiang, S.H., Chan, K.T., Mondini, A.C., Tsai, B.W., Chen, C.Y., 2012. Simulation of event-based landslides and debris flows at watershed level. *Geomorphology* 138, 306-618.

Are the number and quality of the references appropriate?

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As mentioned above, the authors should add their references regarding landslide – debris flow model.

Are the references accessible by fellow scientists?

Yes.

Is the overall presentation well structured, clear and easy to understand by a wide and general audience?

Yes.

Is the length of the paper adequate, too long or too short?

The length of the paper is adequate.

Is there any part of the paper (title, abstract, main text, formulae, symbols, figures and their captions, tables, list of references, appendixes) that needs to be clarified, reduced, added, combined, or eliminated?

Please check the “technique corrections”.

Is the technical language precise and understandable by fellow scientists?

Page 2548, line 4: In Abstract, the “catchment” (the contributing area of upstream flows) is not adequate for the study area. Please consider using another term to describe.

Page 2550, line 19: Regarding the introduction of SHALSTAB: “This model correctly predicts the observed tendency for soils to be thick. ...”. “This model” indicates the process-based model for soil depth estimation, which is not a part of SHALSTAB. It’s a particular case and application, along with SHALSTAB, in Dietrich et al. (1995), and many others, after Dietrich et al. (1995).

Page 2559, line 14: Consider to use “rainfall distribution” to replace “climate”, or rewrite the sentence: please change the term “climate”, because the climate is used to indicate

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a long-term statistical meteorological property for a given region. Same in line 15.

Is the English language of good quality, fluent, simple and easy to read and understand by a wide and diversified audience?

Yes.

Is the amount and quality of supplementary material (if any) appropriate?

No supplementary materials for the manuscript.

Technique Corrections:

1. Page 2552, line 1: “Some research has” → “Some researchers have”
2. Page 2555: notation of eq (2) should be deleted.
3. Page 2556: eq. (3) should be changed as eq. (2); please consider that to use FS to replace Fs to make all nations in the manuscript being consistent (same in line 9).
4. Page 2556: add eq. (3) for equation in line 20.
5. Page 2557: add eq. (4) for equation in line 2.
6. Page 2558: eq. (4) should be changed as eq. (5).
7. Page 2562, line 7: “was” → “is”
8. Page 2563, line 13: “factors” → “indices”
9. Page 2563: add eq. (6) for equation in line 25.
10. Page 2564, line 9-11: consider to rewrite the sentence: double-use of “in other words”.
11. Page 2566, line 12: “factor” → “index”
12. Table 2: the horizontal line below “parameter (unit)” is missing, but I can find it in the original text.

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13. Some technique problems may occur during pdf format converting. Similar problems can be found: In figure 11, the later part of figure caption ((a)...(b)...(c)...)) should move to figure 12; and so dose figure 12: the later part of figure caption ((a)...(b)...)) should move to figure 13.

14. I suggest put the boundary of study area in Figure 2.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 2547, 2013.