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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Adopting I_3–R_{24} rainfall index and landslide susceptibility on the establishment of early warning model for rainfall-induced shallow landslides" *by* Lun-Wei Wei et al.

Anonymous Referee #2

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GENERAL COMMENT

The article presents an early warning model based on both rainfall indices/thresholds and susceptibility maps, for a wide area in Southern Taiwan. The idea of joining susceptibility and rainfall indices, in order to combine spatial and temporal prediction of landslides and to define different thresholds for areas with diverse susceptibility, is interesting. The subject is surely within the topic of NHESS, and of the special issue. Nevertheless, the paper present some drawbacks that must be addressed.

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Discussion paper

In my opinion, the manuscript needs major revisions before being reconsidered for publication. In the following, I list the major issues of the work.

SPECIFIC COMMENTS

First, the paper is very poorly written, with a bad English. Several typos are present everywhere in the text. Moreover, the use of past and present tenses is hardly understandable. Several sentences are not clear at all. The structure of the paper (introduction, data and method, results, discussion, and conclusion) is good but the language is improvable. I some parts of the article, it is very difficult to understand what the Authors want to say. I suggest a strong revision of the paper in this view, possibly with an editing by an English native speaker. I'm sure that this will result in a strong improvement of the quality of the paper.

The introduction could be improved by reporting and analysing some works that have dealt with regional early warning models and early warning systems for landslide occurrence, e.g. Segoni et al. 2014; Calvello et al. 2015, Devoli et al. 2015; Piciullo et al. 2017; Pumo et al. 2017.

The "Data and method" section can be improved by adding more details on data gathering. As an example, it is not clear how Authors identified rock falls from the landslide inventory. Moreover, Authors state that they gathered landslide occurrence time by inquiry residents during field investigations. This should be clarified, in particular because the occurrence time of the landslides is very important for the reconstruction of the 3-hour mean rainfall intensity. In addition, more details on the definition of landslide inventory would be useful. Furthermore, it is not clear why the Authors calculated a precipitation map for the whole study area. What is it for?

Nothing is said about rainfall data. Did authors use rain gauge series? If yes, please explain how many rain gauges.

The whole section regarding the landslide susceptibility analysis (section 3.2.1) should

be rewritten and increased by adding more information. Several details on the adopted method are missing.

In the section on rainfall thresholds, Authors refer to a coefficient of variation (also reported in Table 4); please explain how it was calculated.

In the "3.2.3 landslide early warning model" section, it is very strange that 30%, 60% and 90% thresholds correspond exactly to integer values of I3 (30, 40, 60) and R24 (300, 400, 600). Is it just an example? Please explain.

In the section related to the results of landslide susceptibility analysis, the values of AUC are not so high to justify that "the results showed that LR model was stable and nice in training as well as validation" (Page 6, line 20). I suggest rephrasing this sentence, acknowledging that results could be better. Moreover, I suggest avoiding the word "nice", here and elsewhere in the text.

At the end of section 4.2 (page 7, lines 8-13), several actions to be performed in case of different warning levels are reported. This step leads from an early warning model to an early warning system; therefore, it should be remarked.

Regarding validation of the model (Section 4.3), I would suggest using some indices or scores (e.g., count – and ratio – of correct and incorrect predictions, True Positive Rate, ROC analysis, etc.) to quantitatively evaluate the performance of the validation procedure.

Conclusions section is very short! Authors should add the main findings and the lesson learnt from their work. I suggest increasing a lot this last section.

Figure 1: add more descriptions in the caption.

Figure 3: not useful for the discussion. I suggest deleting it.

Figure 5: in the label of y-axis, pleas change "hr" into "h".

Figure 6: it's a repetition of Figure 8b (for moderate susceptibility areas); I suggest

deleting it.

Figure 7: I would suggest the following labels for x- and y-axes, respectively: “Portion of areas predicted as hazardous” for x-axis, and “portion of landslide occurred” for y-axis.

Figure 8: I suggest enlarging it, and distribute the three panels vertically. Moreover, please add a), b) an c) to the three panels.

Tables 5 and 6: I’m not sure that colours can be used in tables in NHESS journal. I suggest converting them into two figures, if Authors want to maintain colours.

References: Please add DOI to each reference in the list.

TECHNICAL CORRECTIONS

As I already stated, the manuscript is full of technical and grammatical errors, typos, and incorrect use of words. Here I list just some suggestions of technical corrections, but again I suggest a check and a language revision of the whole text.

Page 1, lines 29-31: please check this sentence and rewrite.

Page 3, line 9: correct “form”.

Page 3, lines 15, 22, 23, 30: please check plurals (e.g., slope units, landslides,. . .).

Page 3, line 23: please check and correct the sentence “This study used slope unit that based on the features of. . .”.

Page 4, lines 11-12: please reword.

Page 6, line 5: unclear, please rewrite.

Page 6, lines 22-26: this sentence is unclear, please reword.

Page 7, line 3: replace “rounded to” with “rounded by”.

Page 7, line 22: correct “form”.

Page 7, line 25 and following: authors mention “14th”, “15th”, and others; if they are days, I suggest using the format dd-mmm, which results more clear.

Page 8, line 4: “once landslide”, what does it mean? Please correct.

REFERENCES

Calvello M. et al., 2015 The Rio de Janeiro early warning system for rainfall-induced landslides: Analysis of performance for the years 2010-2013, International Journal of Disaster Risk Reduction, doi:10.1016/j.ijdrr.2014.10.005.

Devoli G. et al., 2015. Landslide Early Warning System and Web Tools for Real-Time Scenarios and for Distribution of Warning Messages in Norway, in: Engineering Geology for Society and Territory, Vol. 2: Landslide Processes, doi:10.1007/978-3-319-09057-3_104.

Piciullo L. et al., 2017, Definition and performance of a threshold-based regional early warning model for rainfall-induced landslides, Landslides, doi:10.1007/s10346-016-0750-2.

Pumo D. et al., 2016. The SESAMO early warning system for rainfall-triggered landsldies, Journal of Hydroinformatics, doi:10.2166/hydro.2015.060.

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