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Interactive comment on "Exploring the potential relationship between the occurrence of debris flow and landslide" *by* Zhu Liang et al.

Anonymous Referee #2

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The paper is suitable for NHESS. Unfortunately is not acceptable in present form. There are the following main deficiencies:

1) Introduction should partially enlarged for a better and specific presentation of debris-flow phenomena (see below). 2) Section 3 is not clear: authors should explain the method or model they used. There is no connection between 3.1 and 3.2. Moreover, the presentation of the RF model is not clear. 3) Section 4. The procedure should be introduced at the beginning: at first evaluation of the training data set and after that of the remaining data set. Moreover, there is some confusion on the presentation of data analysis (e.g. see the comment to lines 252-253). 4) Section 5. All the assumptions claimed by the authors should be supported by results shown at the previous section. Otherwise, all this section is thin air. In other words, each assumption should be justi-

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fied by the findings of the previous section. 5) English form is not always acceptable

Introduction

The writer suggests a brief characterization of debris flows based on the triggering mechanisms and conditions to explain the phenomenon and avoid confusion, as that below: Most of debris flows are runoff generated (Imaizumi et al. 2006; Coe et al., 2008, Gregoretti & Dalla Fontana, Ma et al., 2018). In many cases they occur on a channel bed for the entrainment into abundant runoff of debris supplied by deep or shallow slides of slopes incised by the channel. (Theule et al. (2012), Hurlimann et al. (2014), Imaizumi et al. 2019, Zhou et al.,. 2019; Simoni et al., 2020). Conversely, landslide or natural dam failure that evolve into a debris flow (Iverson et al., ; Kean et al., 2013) are not frequent. Moreover, it is not clear the way the potential relationship between debris flow and landslide is approached through the separated susceptibility analysis: some concise information could help the reader.

Other spotted errors and comments are as follows:

Line 75 perhaps “surface” instead of “area”

Line 82 “Three types of lithology were mainly observed” rather than “There were three common lithology observed”

Line 85 “Main common disasters in the study area mainly consist” instead of “The disasters in the study area mainly consist”

Lines 104-105 “The geometry of debris flow is better represented by a polygon or a set of polygons in vector format” Which is the sense of such a sentence? Authors should explain, as in the case of landslide which typology of unit is preferable for debris flow.

Line 115: Moreover, before availability

Lines 114-116 “The occurrence of debris flow emphasizes the indispensability of provenience, topography and triggering factors. Availability, reliability, and practicality of the

factor data were also considered (van Westen et al., 2008)." Such period should be postponed to that at lines 116-119.

Line 122: elevation of what?

Line 124: Figure 5 concerns landslide. The figure 6 concerning debris flow should be also added. The writer suggests to distinguish the reference to these two figures by means of the phenomenon.

Line 126 please separate the controlling factors concerning landslide from those concerning debris flows.

Line 127 Why do the authors use reclassify and not classify?

Line 128: the proximity of roads, rivers rather than roads, river. . ..Therefore the distance from roads, river was classified . . ..

Lines 137-138 "Considering the correlation between the two controlling factors, basin area and main channel length are represented by the same graph, which was reclassified into four classes (Fig.6h)." unclear sentence.

Line 148 "Totally 18 factors are obtained by processing the row data in the ArcGIS 10.2 platform." Perhaps the values of 18 controlling factors were classified by processing. . .. . .

Line 149 The DEM size, 30 m seems too large. The author should justify it. Please consider that Boreggio et al. (2018) suggested the use of 1 m grid size.

Line 153 "under study as a reference." Unclear expression.

Lines 157-158 "data set" rather than "set"

Lines 159-161 The partition of landslide inventory is approached . . .. among them that of one time random selection () is the most used.

Lines 179-180 "RF uses the bagging technique (bootstrap aggregation) to select, at

each node of the tree, random samples of variables and observations as the training data set for model calibration." Unclear sentence

Lines 186-194. Unclear period.

Line 197 "training data set" rather than "training set"

Line 198 "of for"????

Line 199 " with a sensitivity value"

Line 203 "for models" ??????

Line 206 Values of 88.69 and 86.05 % are claimed for sensitivity and specificity respectively. Why at the previous lines the values are 91.62 and 89.96%? Please explain

Line 207 "with a value"

Line 208 "training model"???? perhaps it is training dataset

Line 214 delete "reached 179"

Lines 215, 216, 231 what does relate the percentage? The total number of units? Please specify

Line 219 "were" instead of "was"

Line 230 delete "reached to 26"

Line 235 which is the sense of the following sentence? "which has significant influence on the occurrence of debris flow"

Line 236 substitute "which are" with ":"

Figure 8. The writer suggests the use of the same colours for both the susceptibility maps

Lines 249-251 "There are 23 watershed units belonging to high-class in the debris

flow susceptibility zoning map (Fig.8), of which 17 units are covered with high or very high-class slope units in the landslide zoning map (Table 5)." 1) it is better substitute "are covered" with "correspond to high or very high-class" Moreover, add the following sentence: "Therefore, there are 6 units that does not overlap (about 26%)."

Line 251 about the 4 watershed units: do the belong to the 6 watershed units with no high or very-high slope units?

Lines 252-253 which susceptibility maps do belong the 19 high and very-high class watershed units (19)

Line 269 which two models?

Lines 313-314 "has been little used until now for susceptibility analysis of landslide and debris flows " instead of "has less application in landslide and debris flow analysis"

Line 322 "from the concept" unclear expression

Lines 326-329 this period should be summarized in a more concise and clear form

Line 338 Where the relationship between landslide and debris flow is illustrated?

Lines 348-349 "The fact that the appropriate prediction method and mapping units applied to the two disasters makes it possible to merge the two zoning maps" Which appropriate prediction method? Which is sense of this sentence?

Line 359 "models based on random forest " if the authors mean "based on RF models" the expression is unclear (see lines 197; 241). This ambiguity is elsewhere present in the submitted manuscript.

Points 2 and 3 of the conclusion could be merged in a unique one. This point should begin after explaining that there is no potential relationship between the occurrence of the two considered phenomena. After that, the authors could explain the reasons in 2.1. and 2.2 corresponding to the points 2 and 3 of the submitted work.

REFERENCES

Boreggio, M., Bernard, M. Gregoretti C. (2018) Evaluating the influence of gridding techniques for Digital Elevation Models generation on the debris flow routing modelling: A case study from Rovina di Cancia basin (North-eastern Italian Alps). Frontier in Earth Sciences, doi: 10.3389/feart.2018.00089

Coe, J. A., Kinner, D. A., and Godt, J. W. (2008). Initiation conditions for debris ïňĆows generated by runoïňĂ at Chalk CliïňĂs, Central Colorado. Geomorphology 96, 270–297. doi: 10.1016/j.geomorph.2007.03.017

Gregoretti, C., and Dalla Fontana, G. (2008). The triggering of debris ïňĆ ow due to channel âĂŘ bed failure in some alpine headwater basins of the Dolomites: Analyses of critical runoff. Hydrological Processes, 22, 2248 – 2263.

Hurlimann M., Abanco C., Moya, J., Vilajosana I. 2013. Results and experiences gathered at the Rebaixader debris-flow monitoring site, Central Pyrenees, Spain. Landslides. doi:10.1007/s10346-013-0452-y 161-175

Imaizumi F, Sidle RC, Tsuchiya S, Ohsaka O. 2006. Hydrogeomorphic processes in a steep debris flow initiation zone. Geophysical Research Letters 33: L10404.

Imaizumi F, Masui T, Yokota Y, Tsunetaka H, Hayakawa YS, Hotta N. 2019. Initiation and runout characteristics of debris flow surges in Ohya landslide scar, Japan. Geomorphology 339: 58 – 69.

Iverson RM, Reid ME, Lahusen RG. 1997. Debris-ïňĆow mobilization from landslides. Annual Review of Earth and Planetary Sciences 25: 85–136.

Kean J.W., McCoy S.W., Tucker G.E., Staley D.M., Coe J.A. (2013). Runoff-generated debris flows: Observations and modeling of surge initiation, magnitude, and frequency. Journal of Geophysical Research Earth Surface, VOL. 118, 2190–2207. doi:10.1002/jgrf.20148, 2013

Ma C., Deng J. Wang R. (2018) Analysis of the triggering conditions and erosion of a runoff triggered debris flow in Miyun County, Beijing, China. Landslide, DOI 10.1007/s10346-018-1080-3

Theule, J.I., Liebault, F., Loye, A., Laigle, D., and Jaboyedoff, M., 2012. Sediment budget monitoring of debris flow and bedload transport in the Manival Torrent, SE France.

Zhou, W., Fan. J., Tang, C., Yang, G. (2019) Empirical relationships for the estimation of debris flow runout distances on depositional fans in the Wenchuan earthquake zone. Journal of Hydrology, 577, https://doi.org/10.1016/j.jhydrol.2019.123932

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