

Reply to review (Referee #1)

Issue No.	Comment	Reply
1	Slope, aspect, curvature, etc. are not methods. They are terrain attributes. Landslide hazards methods could be susceptibility mapping, rainfall thresholds, distributed physical modeling of the initiation of landslides, etc. Moreover the reply “idea for evaluate the landslide hazard when only digital elevation model is available” is weak. Even when only the DEM is available, a number of terrain attributes can be derived and used in susceptibility mapping methods. Therefore the idea of using a single feature for the landslide assessment needs to be revised.	First of all, authors would like to present a complete agreement with Referee’s advice. This study tries to find any capability of Planarity that is a higher order calculation to interpret terrain attributes. With increased use of a high-resolution elevation model, Planarity analysis would give a confident results rather than conventional features that are not using as an indicator for preliminary landslide hazard. However, authors understand the limitation of using a sing feature for landslide hazard assessment. Therefore, authors decided to change the title what Referee recommended.
2	Numbers and percentages should be explicitly entered in the tables.	<p>Based on the general comment of Referee, authors expand Table 2 so that it provides more information that relates to the 2011 landslides (This goes to Issue No. 5).</p> <p>Please note that Table 2 appears in the early stage of this manuscript and therefore it only covers some observations. In order to solve Issue No. 2, authors provide an extra table illustrating more scientific findings with regard to Planarity (This also goes to Issue No. 6-3).</p>
3	Two issues should be incorporated in the manuscript: very rough areas without landslides could be considered an indicator of areas susceptible to future landslides; the mismatch between landslide locations and planarity classes could be due to the influence of other resisting or driving factors.	<p>Authors indicated this issue (a false of identifying distinct geomorphological features) in “4. Results and discussion”.</p> <p>You can find this at lines 242 - 255.</p>
4	Add additional reference for LiDAR applications in landslide studies (Jaboyedoff et al., 2012)	<p>Authors tried to add Jaboyedoff’s hard work in the manuscript as follows:</p> <p>“Other applications augmented by LiDAR derived DEM, from detection to modeling and monitoring, are well described by Jaboyedoff et al. (2012).”</p> <p>You can find this newly added sentence at lines 53 - 55.</p>

5	Each site should provide a consistent description. Moreover, some features may change even at small distances. If a feature is identical in all the three sites it should not be replicated in their singular description, but should introduced in advance in Section 3.	<p>Authors added more detailed descriptions on each landslide area and these will differentiate the characteristics of landslides occurred in north, south, and west part of the study area. Each description has same contents (location, date, precipitation, type of landslide, geomorphology of landslide, subsurface stratigraphy) and is consistent one after another.</p> <p>You can find these at lines 170 - 178, 187 - 195, and 205 - 207.</p>
6	A possible title could be “A study on the use of planarity for quick identification of potential landslide hazard,” and there are major revisions are required.	Authors changed the title based on Referee’s recommendation. Because it is much clearer than previous one.
6-1	Rephrase the scope of work	<p>Authors also changed the scope of this study, which is consistent to the new title.</p> <p>You can find these newly added sentences at lines 29 - 35 and lines 59 - 62.</p>
6-2	Perform a quick review that is based on univariate and bivariate statistics to demonstrate the proposed method is outstanding than other terrain features.	<p>Authors carried out a bivariate analysis to find a relationship with other terrain features. Authors related slope values to Planarity.</p> <p>You can find these newly added sentences at lines 256 - 268.</p>
6-3	A table containing Roughness class, threshold values, percentage of area, and number of landslides should be placed in the Result Section.	Authors added Table 3 for displaying those components that Referee suggested.
6-4	Same procedures should be performed for the other terrain attributes for comparison.	Same as 6-2
6-5	Revise the terminology. Geomorphological feature cannot be used as a synonym of “Roughness.”	<p>Authors also acknowledge those two words are not same. Rather, we speculate that the “development of geomorphological feature” can explain the “degree of roughness” on the ground surface. However, based on reviewer’s recommendation, authors determine to use the “irregularity” instead of “roughness” on ground surface for more clear understanding and consistency as a geomorphological feature.</p> <p>These can be found in the manuscript at lines 6, 61, 124, 131, and 222.</p>

7	(Line 11) ...inventory mapping, (especially) ...	Authors added “especially” in the text where the referee recommended.
8	(Line 143) ...hilly reliefs ...	Authors put “hilly reliefs” instead of “hilly mountains” based on the referee’s advice.
9	(Line 213) Explain how you combined planarity and slope. Explain why you selected the 19 degrees.	As authors described in the manuscript, the number of 19 is the mean slope value of the study area. This screening work would help us to ignore gentler slopes where the possibility of future landslides is relatively low and also make easy to compare planarity and slope values. Authors used the “Raster calculator” in ArcGIS™ program for obtaining certain planarity placed in cells greater than 19 degrees.
10	(Line 236) ...hazard (is) also ...	Authors added a right copula in the manuscript: “is”.
11	(Line 240) Authors add some proofs in order to use this sentence.	Authors revised this sentence as follows: “Spatial distribution of Planarity would distinguish between stable and unstable domains of the study area especially in the landslide initiation zones”
12	(Figure 9) Delete this figure.	Figure 9 is now deleted and the information containing the figure is also represented in Table 3.
13	(Table 2) Does each of the 13 landslides (A-M) have at least an initiation zone located in high or very high roughness areas?	Authors wrote this issue in “4. Results and discussion”. You can find this at lines 242 - 255.