Reviewer 3

General comments.

The paper is concerned with complex amount of knowledge that needs to be explained and discussed widely in the text. The overall quality of the paper is a bit scarce. Abstract is confused. Discussion is incomplete. The paper contains mistakes, and several unclear sentences. The text should be revised by an English speaking person. The paper needs some major revision.

Reply:
We restructured abstract, introduction, method, results and discussion in the reversion. Moreover, grammatical and writing style errors in the original version have been corrected by our colleague who is a native English speaker.

Specific comments.

Is not clear if landslides are triggered by earthquake or by typhoons;
Reply: Occasionally large landslides can be triggered by earthquakes. Moreover, landslides were usually triggered by typhoons with heavy rainfalls.

Is not clear the aim of the study;
Reply: The study concerns about landslide landscape across a large scale. In the study area, land cover contains historical memory in landslides activity. Landscape metrics enhance a way to characterize and quantify landslide composition and configuration with various occurrences. Landscape metrics can be categorized as the following: area, density, edge, shape, isolation and connectivity metrics. From the landscape metrics results, landslide patches in low-frequency landslide spread the catchment near stream channel while the high- frequency landslide areas cluster near the ridge and stream channel. Moreover, the study followed the landscape ecology concept. Landscape ecology emphasizes the interaction between the spatial pattern and ecological process, that is, the causes and consequences of spatial heterogeneity across a range of scales (Turner et al., 2001).

Spatial frequency of occurrence depends on rainfall intensity, geological settings, land

cover, slope, curvature, and landslide typology also. Please, discuss this extensively in the text;
Reply: Thanks for the comments. The content of discussion was added in the reversion.

The abstract is quite confused, please go directly to the point and focus on the study area characterization, method and results (briefly;
Reply: Thanks for the comments. The abstract was modified in the reversion.

We can do attempt to mitigate the landslide risk; mitigation of hazards is more difficult. Please clarify this;
Reply: Thanks for the comments. The sentence was modified in the reversion.

Is the frequency of occurrence comparable with landslide index (the ratio between the area under landslides and geological formations, or slope, or land cover for example)? Please clarify;
Reply: This study clarifies the relationships between the driving factors and the landslides with various occurrence frequencies using logistic regression.

The paper concerns the reconstruction of the relationships between driving factors and landslide occurrence (based on frequency of landslide occurrence) by means of logistic regression analysis. I understand it a bit late in the text;
Reply: Thanks for the comments.

I would like to see some data regarding the landslide density relating to geology, topography, land cover, distance to the rivers, distance to faults, etc;
Reply:
The discussion was added in the reversion. For example, landslides were observed in mountainous areas and most occurred in gullies with a slope greater than ten degrees in the study area (Lin et al., 2004). Most high-frequency landslides occur in Metamorphic and Nanchuang formations. Metasandstones within the metamorphic series are strong and intercalated slates are much weaker, but their alteration is less regular than in the Nanchuang and Hoshe formations. This may result in a greater variability of rock mass strength within the metamorphic substrate. Moreover, Nanchuang formation can be classified as medium weak in the classification of the International Society for Rock Mechanics (Lin et al., 2004).

Landscape metrics is too poorly described. I would like to find highlights, advantages and pitfalls of this methodology, and comparison with other indirect methods. Please discuss this more in the text;
Reply: The modification was added in the reversion. In the study area, land cover contains historical memory in landslides activity. Landscape metrics enhance a way to characterize and quantify landslide composition and configuration with various landslide occurrences.

ROC curves allow for the choice of predicted value threshold (the threshold used to compute the correctly predicted events and evaluate the success of the model) and also for comparing different tests. For evaluating of the logistic model reliability, the LR test (likelihood-ratio test) should be performed;
Reply: Through forward stepwise iteration, the likelihood- ratio test was used to determine that the model is statistically significant. In the study, the overall models are statistically significant.

Table 4 needs to be discussed extensively in the text. Please try to explain for example why distance to river and distance to road are reliable driving factors for low occurrence landslides but not for high occurrence set.
Also why “Nanchuang” is positively correlated for entire landslide and low occurrence sets, but negatively correlated with the high occurrence set.
Reply:
Frequency in low-frequency landslides is positive to the distance to rivers and roads. High- frequency ones only are on local hot spots far from rivers and roads in the northeast. However, there are few high- frequency landslides far from rivers and roads in the southeast. Therefore, distance to rivers and roads are not reliable driving factors.
Moreover, there are a small proportion of high- frequency landslides and a large proportion of low- frequency landslides in the area with the Nanchuang formation. Therefore, “Nanchuang” is positively correlated for entire landslide and low occurrence sets, but is negatively correlated with the high occurrence set.
Now, followed the suggestion of Reviewer 4, we modified the regression model in high-frequency landslides (Table 1). Alluvim formation was used for the reference category in high- frequency landslide. Results show that Metamorphic and Nanchuang formations are positively correlated for high- frequency landslide model.

Table 1 Logistic regression models with entire, low- frequency and high- frequency landslides

	Entire landslides		Low-frequency landslides		High-frequency landslides	
Variable	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Lithology		<.001		<.001		.001
Metamorphic					0.66	.003
Alluvim	0.45	<.001	0.55	<.001		
Hoshe	0.50	<.001	0.54	<.001	0.54	.008
Nanchuang	0.57	<.001	0.62	<.001	0.67	<.001
Wetness index	7.61E-02	<.001	7.41E-02	<.001	0.13	<.001
NDVI	-28.42	<.001	-21.94	<.001	-39.45	<.001
Elevation	-1.53E-03	<.001	-1.37E-03	<.001	-1.61E-03	<.001
Slope	2.94E-02	<.001	2.54E-02	<.001	3.36E-02	<.001
Distance to faults	1.40E-04	<.001	1.12E-04	<.001	1.40E-04	<.001
Distance to rivers	1.31E-04	<.001	1.30E-04	<.001	1.10E-04	.010
Distance to roads	1.60E-04	<.001	1.75E-04	<.001	#	#
Distance to built-up lands	1.83E-04	<.001	9.61E-05	<.001	4.40E-04	<.001
Const.	6.61	<.001	4.43	<.001	6.07	<.001
ROC	0.829		0.806		0.946	

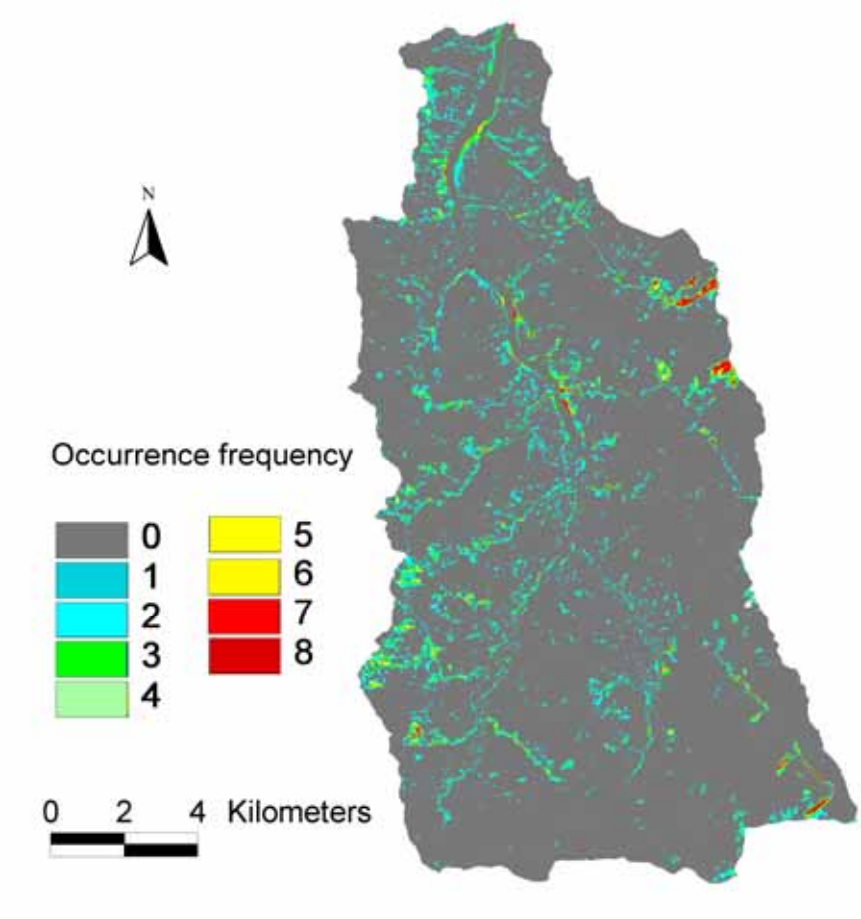
Discussion should take into account for advantages and pitfalls of the presented

methodology and remarks on results. How the results fit the real geological and geomorphological characteristics of the study area? Further investigation will confirm this approach to landslide susceptibility mapping?

Reply: The significant differences in various frequencies models and spatial patterns in frequencies could be clarified in the study. Further investigation will confirm this approach to landslide susceptibility mapping. This sentence was added in the suggestion of the reversion.

Landslide susceptibility map. Probably you can reduce the nine classes' classification using five classes. Please try this solution, will take the reading of the map easier.

Reply: Thanks for the comments. The figure was modified as five colors level in nine classes.



References

Lin, C. W., Shieh, C. L., Yuan, B. D., Shieh, Y. C., Liu, S. H., and Lee, S. Y.: Impact of Chi-Chi earthquake on the occurrence of landslides and debris flows: example from the

Chenyulan River watershed, Nantou, Taiwan, Engineering Geology, 71, 49-61, 10.1016/s0013-7952(03)00125-x, 2004.

Turner MG, Gardner RH, O'Neill RV, *Landscape Ecology in Theory and Practice*: *Pattern and Process*, Springer, 2001.