**Natural Hazards
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comment**

Interactive comment on "Potential Impact of Climate Change and Extreme Events on Slope Land Hazard – A Case Study of Xindian Watershed in Taiwan" *by* Shih-Chao Wei et al.

Shih-Chao Wei et al.

stanscwei@gmail.com

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Reviewer 2: Anonymous

General comments:

This manuscript describes an integrated approach to forecast the the economic impact of shallow landslides and debris flows in the framework of climate change scenarios. I personally think that the approach proposed is very interesting and useful since provides in quantitative terms the loss related to landslides and debris flows based on well-established literature methods. Anyway I think that the manuscript should be re-

vised and improved before to be accepted for publication in the journal. In general the manuscript is well written but a revision of the manuscript structure and the clarification of some weak points would make the manuscript more clear and readable.

Authors: We are grateful for the helpful specific comments. These comments should substantially improve the manuscript. Please see our response to the specific suggestions below.

Specific comments:

Reviewer 2: I suggest you to revise the Methodology section. I think there is no need to describe in detail (with equations) the TRIGRS and Debris-2D models. In this section I would suggest you to explain better why you have selected these methods among all the literature ones and then refer to the original papers for further information about the model equations. Furthermore, at the beginning of sections 2.1, 2.2, 2.3 and 2.4 you provide a description of the state of the art. This parts should be moved in the Introduction. In general I suggest to shorten the methodology description, moving the state of the art in the Introduction, avoiding the description of the models and the subdivision in sub chapters (2.1, 2.2 and so on)

Authors: Thank you for your suggestion. We will revise the introduction section and methodology section in the next version.

Reviewer 2: In line1-2 of page 4 you state that the "spatial interpolation from 5 km to 40 m is made for the selected scenarios and used as inputs for landslide simulation." What do you mean for spatial interpolation? Please clarify and provide more information.

Authors: In TRIGRS simulation, the 40m*40m DEM was used as topography input. However, the spatial resolution of rainfall were in 5km*5km. To satisfy the spatial resolution as 40m*40m, the rainfall was interpolated by inverse distance weighting (IDW) method from 5km*5km to 40m*40m. We will rephrase the description in the next version.

Reviewer 2: The sentence in line 13-14 of page 4 is not correct since TRIGRS is not an inventory of shallow landslides simulation but a physically-based model to forecast shallow landslides occurrence under rainfall events. Please rephrase

Authors: Thank you for your correction. We will rephrase the sentence according to the suggestion.

Reviewer 2: The reviewer suggests to revise the term landslide in the methodology section. The landslides simulated by the TRIGRS model are shallow landslides. I think you should use this term instead of the general term landslide which include all types of landslides.

Authors: Thank you for your suggestion. We will follow your suggestion to revise.

Reviewer 2: In Fig. 3 historical landslide area from 2008 and 2015 are reported. Please provide more information about how the inventory has been realized.

Authors: The historical landslide area (landslide inventory) were delineated by aerial photo by Central Geological Survey in Taiwan annually. We will add description in the next version.

Reviewer 2: In line 4 of page 5 I suggest you to replace the term during with at the beginning.

Authors: Thank you for your suggestion. We will rephrase this sentence in the next version.

Reviewer 2: In section 3.3 you don't provide any detailed information about the soil parameters used in the simulation of TRIGRS. In general in physically-based models the selection of soil parameters is an important issue. I suggest you to provide a table with soil parameters values and to describe how you have measured these data or which is the source.

Authors: Yes, the parameters are very important. The calibrated parameters of TRI-

GRS are provided in the supplementary document, as shown in Table S1.

Reviewer 2: The sentence in line 11-14 at page 13 is not clear, please rephrase.

Authors: There are 18 geologic settings and we set the landslide rate in 5 classes, therefore totally we have 90 zones. However, there are some geologic settings are stable without landslides. So the total zones decrease to 56 zones for parameter calibration. We will rephrase our description.

Reviewer 2: In my opinion the title of Figure 8 is uncorrect since the TRIGRS model provides factor of safety maps and not a map of soil depth. Please provide a figure with the results of the simulation and specify better what the figure 8 represents.

Authors: In Fig. 8, the shallow landslide area were simulated by TRIGRS. The soil depth were provided as reference because it is one of the input parameter of TRIGRS and DEBRIS-2D. We will rephrase the title of Fig. 8 and give more description to avoid misunderstanding.

Reviewer 2: The results of loss assessment provided in section 4.2 are very interesting, anyway a clear explanation on how they have been obtained is missing. Please clarify better this point, providing clear description of calculation procedure.

Authors: The calculation procedures of economic losses could be divided into three parts. First, we need to identify the impact area and depth of disaster which were got from the simulation results of debris flow. Then, the debris flow coverage area will be intersected with land-use map for identifying the loss of different use (e.g. household use, agriculture use, forest use etc.). Finally, the losses could be evaluated by loss functions and the corresponding parameters established in the database according to the uses. The total losses is the summation of the individual losses in different uses. The debris flow coverage area for different land use are provided in the supplementary document, as shown in Table S3.

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2018-125/nhess-2018-125-AC2-supplement.pdf

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