Nat. Hazards Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/nhess-2019-202-AC1, 2019

Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Monitoring of the reconstruction process in a high mountainous area affected by a large earthquake and subsequent debris flows" *by* Chenxiao Tang et al.

Chenxiao Tang et al.

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Received and published: 7 November 2019

Dear referee 1

Thank you for your comments. I will reply your comments on behalf of all the authors of this manuscript.

I agree there is not much innovation in the method, as they are just mapping and statistics, though the result was interesting. I believe science is not only about innovation in method, but also discovering new knowledge and passing it to the society. Our manuscript has shown the necessity of careful planning when recovering from a major

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earthquake, instead of rushing to reconstruction as China did. We hope this work will provide knowledge to international communities that are threatened by earthquakes and post-earthquake hazards. From the aspect of sciences this is part of our plan towards the risk quantification method framework in post-earthquake environment, which is poorly studied.

Sincerely

Chenxiao Tang

Specific comments:

Your comment: Line 68: “The increased debris flow activity lasted for five years”. Do you have an explanation for that (maybe I missed it)?

Reply: The sentence means: The Wenchuan earthquake created large amount of mass wasting and loss of vegetation, which amplified the debris flow activities. As this part was not well-explained, I deleted “The increased debris flow activity lasted for five years” and merged it the upper paragraph. The original lower paragraph was revised (removed descriptions about vegetation recover as it is not so relevant) to explain the enhanced landslides after the earthquake:

The catastrophic debris flows were the result of landslide activities amplified by the destabilized environment. In the epicentral area of the 2008 Wenchuan earthquake, the total active landslides was and has decreased largely in the first five to eight years (Tang et al., 2016;Yang et al., 2017;Yang et al., 2018;Zhang et al., 2016). Similar recovery patterns of co-seismic landslide surface were also observed In the Mianyuanhe area of the Wenchuan earthquake affected region (Li et al., 2016). On Aug 20 2019, several debris flows severely damaged the reconstructed settlements and roads in the Wenchuan area.

Your comment: Line 93: This is repetitive to the previous sentence.

Reply: The paragraph (line 90 - 95) was revised as: In this study we generated seven inventories of elements-at-risk covering a period of 13 years (2005 - 2018) to study the recovery of Longchi valley, located close to the epicenter of the Wenchuan earthquake. Image interpretation was carried out based on a series of satellite images collected between 2005 and 2018 and several field surveys were conducted. The study aims to demonstrate and analyze the process of post-disaster recovery in an unstable geo-environment disrupted by a major earthquake.

Your comment: Section 1.3: Is all the description relevant for the paper? It is a bit long.

Reply: We tried to shortening the section by removing some not so relevant sentences.

Your comment: Line 176 ff and in general: Did the authors consider the usage of any automated change detection approaches for image analysis? For some classes this might have been helpful and faster than digitizing all the features. For example, there are several studies and publications that successfully used such methods for post-earthquake damage assessment.

Reply: We considered using automated method. Due to the limited quality of our data (e.g. Spot 5 image), large areas of bare surfaces created by landslides, vegetation that expanded above the houses, and dusts created by the earthquake in the 2008 image, simple classification methods could not extract the buildings. We do not have more data and advanced commercial software for OOA analysis, thus our only option was by manual digitization. It is also the easiest way to ensure temporal consistency among the multi-temporal inventories.

Shortly after we finished the first version of the element-at-risk inventory we acquired a Landover map of 2014 from the government. We carefully checked and edited our data based on the official map to minimize error.

Your comment: Figure 4: The color of the dormant landslides is not very well visible (it is better in the following figures). What is the dashed line in the image? There is only information later in the text, but not in the legend or the caption.

Reply: In Figure 4 and 6, there were no dormant landslides because all of them were freshly triggered. I removed dormant landslides from the legend in these two figures and added the description of the thick dashed line in the caption.

Your comment: Line 265: First sentence. What is the reason for that? It is caused by large numbers of the destroyed 1-floor WB buildings, which itself was more than all 2-floor buildings combined. This was a careless description.

Reply: This sentence is rewritten: Overall the significance in damage ratio could only be observed in damage level 1. There were relatively more 1-floor buildings survived (22%) than 2-floor buildings (11%). This pattern could be observed from all building types. A difference related with different construction types was observed, as the survive rate of the RCM, WB, W types were 23%, 17%, and 9%. There were only 4 RCF buildings and half of them were repairable. The damage ratios of the three major types (RCM, WB and W), are shown in Figure 5 A.

Technical corrections:

Your comment: In general, the paper is well written. However, spell check is needed,

several typing errors need to be improved, partly formatting (chapter 1.3) should be adapted.

Reply: We did spell and format check.

Your comment: Table 4: The text “Sum: : :” is not readable.

Reply: This was caused by an error when converting .docx file to .pdf file. I adjusted the line spacing of the table to make it visible.

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