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Interactive comment on "Empirical prediction for travel distance of channelized rock avalanches in the Wenchuan earthquake area" *by* Weiwei Zhan et al.

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Dear Prof. Havenith,

We acknowledge your time and helpful comments, which are valuable for improving the quality of our manuscript. We have revised the manuscript carefully according to your and other reviewers' comments. The revised manuscript will be submitted after the reply to reviewers' comments stage. Your comments are reproduced below, followed by our responses and/or a summary of revisions to the manuscript.

With my kindest regards,

Sincerely, on behalf of my co-authors, Xuanmei Fan

Comments in general: Q1: Some essential aspects about the ratio of volume versus sliding surface are missing in the discussion and conclusions. You mainly considered the relatively classical parameters of volume (alone), slope angle, and total relief. The problem is treated as being almost 1D (linear along the slope) while channeling of rock avalanches is certainly also depending on the channel cross section and the presence of 'turns' along the channel. Those two aspects should be analysed as well. R1: We thank the reviewer for the insightful comments. We have focused on the maximum travel distance prediction of the rock avalanches in Wenchuan earthquake area. The effect of channel cross section and the channel direction turns on mass movement has been being always the challenge in landslide runout prediction, due to multi factors (e.g. channel geometry, material properties). We have address this issue in Section 5.2 to explain the channel geometry) in the revised version, please check the attached section 5.2.

Comments tied to sections: Q2: the specific conclusion of your work is missing. R2: Besides with the prediction models, we plan to draw the conclusion with the focus on influences of topography constrain, landslide types, material types (rock types), and triggers on the landslide mobility through the comparison with other datasets. These has been added in Section 5.2 of the revised version (see the attachment).

Detailed comments tied to lines: Q3: The grammar, terms and other similar details in lines 32, 62,139,156,195,297 R3: We have corrected the above lines.

Q4: Line 88-112; this page is the same as the previous one !!! To be deleted R4: We are sorry about this mistake. This page has been deleted.

Q5: Line 139: is that channel referring to the preexisting channel? R5: Yes. We have rephrased the 'channel' to 'pre-existing channel'.

Q6: Line 149: the concept of initiated slope (source area) R6: We have rephrased this as the source area means where the materials were initiated.

Q7: Line 155: repeat reference to fig. 3 where alpha and beta should be more highlighted. R7: We have highlighted them.

Q8: Line 167: 'desirous' might not be used in this context. Maybe use 'most important prediction parameter'. R8: We have rephrased 'most desirous' to 'most important prediction parameter'.

Q9: Line 291: 'the travel distance of channelized rock avalanche would increase with the channel angle cut down given the same flow discharge' is not convincing ! The negative correlation with alpha is not logical and I think that it has an indirect effect ... meaning that some other parameter not studied here must explain this 'apparent' negative correlation. I think that the negative effect comes from the fact that the smaller alpha is compared to beta, the deeper is the sliding surface in the source area, - a very deep sliding surface ends up almost horizontal at the toe of the source area. This reduces alpha. R9: We agree with the reviewer and will add more explanation in the results part with taking more factors into consideration.

Q10: Line 293: the cross-section morphology was totally neglected in your analysis – why? Actually, the volume has this positive effect on travel distance as normally with larger volumes the volume-contact surface (reducing mobility due to friction) ratio increases. Additionally, curved cross-section profiles. up to a certain amount of curvature (typical for channels) reduce the total friction. For flat areas, the friction is highest as well as for very narrow channels with vertical walls. For medium curved channels the volume -contact surface ratio is lowest. R10: We agree with the reviewer. We have added some new figures to explain the correlation between volume and H/L ratio both from our dataset and world wide dataset. This will be discussed in detail in the revised version. We also would like to point out that the empirical-statistical method that we presented in this study only suits for the rapid assessment of potential runout of channelized rock avalanches in the data-lack situation. The cross-section morphology could be obtained from DEM. However, in most case, DEM is not available. If it is available, numerical simulation using DEM could provide better results with consideration of the detailed morphology than our method.

Comments on figures: Q11: Fig.3: (1) do not understand initiated slope. Maybe better: Failed upper part of the slope? (2) highlight better 'alpha' and 'beta' angles and refer to this figure when you use them in the equations. R11: We have revised Fig.3

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2016-372/nhess-2016-372-AC2-supplement.pdf

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