**Natural Hazards
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Discussions

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Interactive comment on "Radar-Based Quantitative Precipitation Estimation for the Identification of Debris-Flow Occurrence over Earthquake affected Region in Sichuan, China" *by* Zhao Shi et al.

Anonymous Referee #3

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The manuscript presents an analysis of rainfall intensity-duration (I-D) thresholds used for the identification of debris-flow occurrence. Estimation of gauge and radar-based I-D threshold is carried out and compared. The work in this manuscript is very similar to the one carried out by Marra et al. 2014 thus from a methodological point of view there is no significant novelty. However, the authors carry out the analysis in a completely different region with different hydroclimatic characteristics and as such I consider the results to be complementary to what we already know from past studies. Therefore, I consider overall that the results reported in this work add to our knowledge and further

highlight the significance of using remote sensing observations for the estimation of debris flow triggering rainfall. I am including below a list of comments/suggestions that can hopefully help the authors to improve their manuscript.

1. Page 4, L11-25: This last paragraph should be placed in a different section (not the study area and data). You could have a dedicated section to discuss event characteristics. Also in that same paragraph, you mention info that relates to methodology (e.g. identification of individual rainfall event) that should be placed in the methodology section. 2. Provide a more detailed analysis of the comparison between radar rainfall estimates at DF (debris flow location) and closest-gauge estimates. For example, a graph showing relative error (y-axis) vs distance (between closest gauge and DF) would be informative. Using different colors per event (on such a graph) would also provide some more info. Lastly, it would be interesting to show that for both rainfall intensity and duration, since you are reporting differences in duration as well. Differences in duration, although important for building I-D thresholds, are not frequently explored. I believe adding some more info on this would strengthen the overall analysis. 3. Provide also quantification metrics for changes in I-D parameters (α and β). 4. A professional or native English speaker needs to carefully edit the manuscript for grammatical errors and inappropriate wording (e.g. p10L1 "effectivity" p10L7 "induce" etc) 5. P5L3: "ensure the rainfall estimation accuracy" is quite a strong statement. Please revise. 6. P5,L27: Define VIL 7. P5,L31-32: "It can be seen that . . .rely on temperature, air dynamic . . .". I don't think that these can be seen from Figure 4 alone. Please revise. 8. Do you have any justification for the choice of 1.5km as the height threshold for separating the two regions? 9. P7L24: "between each hour is tiny" perhaps should be "within each hour is negligible". Please check and revise accordingly 10. P7L25: "so initial conditions of KF are. . ." I don't believe that the exact numbers for Q, S etc are a result of the previously stated assumption. Revise accordingly. 11. Be consistent with the reporting of equations. Some are in text instead of being numbered as others. Also in P8,L9, you should write log[If(D)] instead of log(I). Revise also the sentence stating "β here accounting for nearly 50% occurrence probability. . ..". It is the

intercept, not the exponent that relates to the probability according to the frequentist approach you used. 12. P9,L1 and elsewhere: use "scenarios" instead of "scene" 13. Equations 14 and 15 have the same formula. Please revise 14. Define what do you mean by "linear ratio". 15. P10,L10-11: "The PDF estimations reveal that the number of positive difference $\delta(D)$ is more than number of negative difference". I am not sure what is the point you are trying to make here. Also, if you think that the distribution of residuals is asymmetric, then you should not fit a Gaussian distribution. This affects also the frequentist approach you followed. Please revise/clarify this point.