Anonymous Referee #2

General Comments: This manuscript investigates the debris flow occurrence using rainfall Intensity-Duration (I-D) information in the earthquake-affected areas in Sichuan, China. Two S-band Doppler radars are used to estimate rainfall in the study domain characterized by complex terrain. Therein, traditional Z-R relations are adopted with additional attention paid to vertical profile of reflectivity (VPR) correction and Kalman filter based bias correction. The I-D curves are then calculated using a frequentist approach with the radar derived rainfall products.

Response: We thank the reviewer for valuable and constructive suggestions. The followings are our responses to the reviewer.

Overall, this topic well fits the scope of NHESS. The methodology used in the paper is scientifically sound. The study shows several valuable scientific results, which can possibly be used for guidance of debris flow warnings. Nevertheless, some minor changes will improve paper clarity. Specific comments are listed below:

1. The writing needs to be improved. Please proofread the manuscript before submitting the revised version. Specific examples of mistakes are presented below: 1.1. Page 2, Line 15: highly rely-> highly relies 1.2. Page 3, Line 1: have to be -> has to be 1.3. Page 25, caption of Figure 7: event->events 1.4. Page 26, caption of Figure 8: possibility->probability

   Response: We thank the reviewer for the careful revision. Those were changed as suggested.
2. Reference formatting should be more consistent throughout the manuscript. There are numerous references that are not cited in correct form. For examples, Qiang W. et al., 2015; Xiaojun G. et al 2016; Michele C. et al., 2015; Francesco M. et al., 2014; and many others.

   Additional Related Reference: Willie, D., H. Chen, and V. Chandrasekar, et al., 2017: Evaluation of Multisensor Quantitative Precipitation Estimation in Russian River Basin. Journal of Hydrologic Engineering, 22(5), E5016002, doi: 10.1061/(ASCE)HE.1943- 5584.0001422.

   Response: We thank the reviewer for pointing this out. The references are reformatted in accordance with Endnote template of Copernicus Publications. This reference suggested by reviewer also emphasized the combination of using radar and rain gauges to provide accurate rainfall estimates in complex terrain. It shows the necessity of radar-based rainfall estimation for improving warnings of future precipitation and situational awareness. We referred this article in the revision. (P.3,L6)
3. Page 2, Line 14: Early Warning System Using acronym would be enough since it had been mentioned earlier.

   Response: Agree! The acronym is used as suggested.
4. Page 4, Line 5: performance specifications->system specifications

   Response: Changed as suggested.
5. Page 5, Lines 14-16: The authors are using different tilt data trying to obtain rainfall estimates at the same vertical level. What is the purpose of doing this? Getting rainfall closer to surface might be more useful (provided that lowest level data is not blocked).

   Response: We thank the reviewer for this comment. We agree the idea of getting rainfall closer to surface with the reviewer. However, in our study, the hybrid mode using multiple elevation is not only to get the rainfall closer to surface for complex terrain, but also used to align the radar data from same altitude for the flat area where dense rain gauge are deployed. This manner here is expected to decrease the uncertainty of altitude factor (earth curvature) for correction

using rain gauge. For sure, it might be more useful to get rainfall closer to surface, if radar bias and rainfall microphysics are well understood.

6. Page 6, Line 23: The rationale of using these two Z-R relations is insufficient. It is well known that Z-R is greatly dependent on local rainfall microphysics. A local DSD- based variability analysis would be helpful.

   Response: We thanks the reviewer for this constructive suggestion. The DSD observation and microphysics retrieval has been proven beneficial to improve the accuracy of radar-based rainfall estimate, however, the DSD observations are rarely scarce for study area. It's believed that building the composite rainfall observing network will improve the QPE accuracy, furthermore enhance the performance of EWS.

7. Page 15, Table 1: doppler->Doppler

   Response: Agree! Changed as suggested!

8. Page 15, Table 1: The pulse width seems not matching with the range resolution. Please clarify.

   Response: We thank the reviewer for this detailed check. The original transmitted pulse is 1μs, while the final filed variables are averaged within two range gates, which is pre-defined operational mode and cannot be changed by data user. Therefore, the range resolution is decreased from 150m to 300m. To avoid the misunderstanding for reader, the item of transmitted pulse will be remove from the table 1.