Reply on RC1

Jiale Qian et al.

Author comment on "Quantifying unequal urban resilience to rainfall across China from location-aware big data" by Jiale Qian et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2022-167-AC1, 2022

- The flowchart in Fig.1 is too complicated to follow the key information. It should be simplified to present the key information.

Response: Thanks for the comment. We simplified the flowchart in Fig.1 and adjust the corresponding text to present the key information. Corresponding revision can be found on line 108 and 125~130 of page 5.

- For "the annual precipitation in China since 1980" in Section 2.1, are there several annual precipitation values? Are the six indicators at the national-scale or the city-scale?

Response: Thanks for the comment. "The annual precipitation since 1980" is replaced by the annual precipitation calculated by aggregating GPM data in 2017. The six indicators are at the city level. Corresponding revision can be found on line 90~95 of page 3.

- The definition of the stable TLR number should clarify in 2.2.1.

Response: Thanks for the comment. We add the definition to the sentence in 2.2.1. *"The stable grids are the regions with stable human activity and rhythm in urban area."* Corresponding revision can be found on line 109 of page 5.

- In Section 2.2.4, it's not clear for me for the definition of rainfall threshold.

Response: Thanks for the comment. The rainfall threshold is the peak intensity of the rainfall event which triggers collective human activity anomalies. Corresponding revision can be found on line 62~72 of page 2.

- 7 shows the regression coefficients for the six indicators, however, the description of the figure focuses on the correlation coefficients. It confuses me as they are different.

Response: Thanks for the comment. We modify the correlation coefficients to regression coefficients. Corresponding revision can be found on line 287 and 297 of page 13.

- I am struglling to follow the manuscript, but I cannot know the scale of the analysis in 2.1. If it is the city level, how to transform the TLR and GPM grids into it?

Response: Thanks for the comment. We reorganized the structure and content of the methods. The section 2.2.1 represents the transform of TLR data from the grid scale to the city scale. We firstly employed the S-H-ESD method to detect anomalies from the gridded TLR time series. Then we extracted the total numbers of the grids with positive (PTLR) and negative anomalies (NTLR) by city, respectively and then examined the variations in the PTLR/NTLR time series over the periods with rains and without rains to identify whether a rainfall event triggers collective human activity anomalies.

The section 2.2.2 represents the transform of GPM data from the grid scale to the city scale. We first extracted the hourly rainfall intensity for each city/hour, i.e., the average hourly GPM precipitation within the stable grids of the city. And then, the rainfall events for each city are extracted from the hourly rainfall intensity time series. Corresponding revision can be found on page 6 and 7. Corresponding revision can be found on line 110~140 of page 5.

- There are several citation errors. For example, "activities(Jiawei Yi et al., 2019;" should be "activities(Yi et al., 2019;","the method Qian et al.(Jiale et al., 2021) proposed." should be "the method proposed by Qian et al. (2021)."

Response: Thanks for your valuable suggestion. All issues about citation in the text have been corrected. Corresponding revision can be found on line 44 and 109 of page 2 and 5.