

Nat. Hazards Earth Syst. Sci. Discuss., author comment AC3
<https://doi.org/10.5194/nhess-2022-167-AC3>, 2022
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Reply on RC3

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-AC3>, 2022

1. Urban resilience is a very complex concept. I can't find how the author define urban resilience in this study and how can they relate resilience to the anomalies in human activities induced by the heavy rainfall. Please, try to explain better.

Response: Thanks for your valuable suggestion. We reorganized the definition of urban resilience and the relationship between the resilience and the human activities to the Penultimate paragraph in section 1. Specific information is as follows: "Urban resilience refers to the ability of an urban system to prepare for, respond to, and recover from adverse events (Ambelu et al., 2017; Hong et al., 2021a; Liao, 2012; Meerow et al., 2016). For example, Hong et al., (2021b) quantified changes of mobility behaviour before, during, and after the Hurricane Harvey using smartphone geolocation data, and analysed the spatial variable of community resilience capacity which was defined as the function of the magnitude of impact and time-to-recovery. Human activities may also change in response to mild yet frequent adverse natural events, such as urban rainstorms. Unlike Hurricanes, dwellers are usually not mobilized by relevant authorities to prepare for and resettle after such events. Instead, nearly 90% of flood-related tweets in a city are released during heavy rains (Wang et al., 2020). Consequently, human activities mainly show how an urban system respond to but not prepare for and recover from such adverse natural events (Qian et al., 2022; Zhang et al., 2022). As a result, urban resilience to mild and frequent adverse events refers to the ability of an urban system to respond to adverse events." Corresponding revision can be found on line 31~32 and 50~60 of page 2.

2. The authors cite the supplementary material as fundamental part of the manuscript. Please select the figures you consider to be important and try to add to the text (as for example figs 4 and 6).

Response: Thanks for your valuable suggestion. We have put the supplementary Fig. 6 to the right position. Supplementary Fig. 4 is not added to the text because Fig. 3 (a) presents the result for the same topic. Supplementary Fig. 4 is the complement of Fig. 3(a). Corresponding revision can be found on line 218 of page 9.

3. The cities classification into different types HL, ML, HM, LL is not described, while it is very important for the discussion section

Response: Thanks for your valuable suggestion. We add the classification method to the

section 2.2.4. "Finally, we separately classified the rainfall threshold and response sensitivity indices of the 346 cities into three classes using the Jenks natural breaks classification method, which clusters data into different groups by seeking minimum variance within a class and maximum variance between classes (McDougall and Temple-Watts, 2012)." Corresponding revision can be found on line 172~175 of page 7.

4. I would suggest to add a discussion regarding limitations and future perspectives of this study since the authors do not investigate some important relation between the physical factors and the human activities. For example, it could be crucial to relate the indices the author found with physical data, altitude of the city, the average slope, while for the human activities they could investigate the number of emergency call, or the number of car accident, for citing someone. Please add a legend with acronyms explanation

Response: Thanks for your valuable suggestion. We add a discussion for the limitations of this study and the prospect for future study at the end of the manuscript. Specific information is as follows: "The study could be further studied. Rather than all the residents of a city, the Tencent location request dataset is generated by over one billion monthly active users. The Tencent dataset's aggregate geotagged human activities may underestimate the effects of rainstorms on infrequent users, particularly the elderly and children. To address this limitation and further investigate human responses to various weather events, our future studies would aim to integrate multisource geospatial datasets. Furthermore, identifying disaster types such as rainstorm, waterlogging, and flood from social media data and then analyzing regional response variation of large-scale human activity in different disasters can improve deep understanding of urban resilience". Corresponding revision can be found on line 340~347 of page 15.