

## ***Interactive comment on* “Temporal variability of social vulnerability to storm surges in Shenzhen, China” by Huaming Yu et al.**

### **Anonymous Referee #1**

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In this paper, an attempt is made to investigate the temporal variability of social vulnerability to storm surges in Shenzhen, China using the indicator system approach. While the motivation is well established, there are several major issues in this study which the authors need to address.

General comments:

(1) Although the impact of storm surge has been discussed in the introduction, there is no indication of how this study is specifically linked to storm surge. All analyses in this study appear to be based on data of the entire Shenzhen rather than the coastal regions of Shenzhen which are actually vulnerable to storm surge risk. This study appears to be an attempt to quantify the social vulnerability of Shenzhen to all types of natural disaster. Thus the authors might want to reconsider the title of this study.

(2) In this study, the authors did not establish any connection between their social vulnerability index (SVI) and storm surges, i.e. validation of the SVI is not included. For example, Su et al. (2015) used total economic loss of hazards to examine the performance of their SVI which consequently show their SVI is linked to loss due to hazards. The authors could address this problem by relating SVI to economic loss, number of injuries due to storm surges, number of fatalities due to storm surges etc.

(3) There are a lot of statements and claims in this paper but the authors did not include the source of information or the studies to support those statements and claims. (Some of them are listed in the specific comments).

Specific comments:

Page 2, lines 36-38: Reference is needed.

Page 4, lines 121-122: Reference is needed.

Page 6, lines 168-169: Full form of AHP and PCA are needed.

Page 6, lines 175-176, 178: References for these methods would be needed.

Page 6, lines 183-184: What is “a theoretical framework” referring to?

Page 7, line 216, equation 2: What does “lnn” mean?

Page 10, line 289-290: I doubt that Shenzhen faces storm surges accompanied by extratropical cyclones on regular basis. Could you please provide studies to support your statement?

Page 11, lines 314-319: I am not sure about your argument here. Could you please provide studies/evidence that support your claim “students at school and women are more likely to suffer casualties outside” due to the harsh meteorological conditions? Why elderly people and people with disability are not included in the vulnerable groups? Could you please provide studies/evidence that support your claim about “social workers”? Are the authors assuming (all) people would still go to school/work despite a

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typhoon is affecting the city? As far as I know, when certain typhoon warning signal (yellow, orange, and red) is issued, school and work would be suspended. People would be asked to stay inside a safe building or evacuate to a safe location, i.e. majority of the people should be in safe locations. Thus I am not sure why students at school, women, and social workers are explicitly included as sensitivity indicators.

Page 12, lines 331-333: Please provide evidence to support your claim – high income level of residents and higher living standard implies strong disaster resilience and faster post-disaster recovery.

Page 12, lines 342-345: It is not clear how does the categorisation of the index, which is developed by Yuan et al. (2016), can be applied to the SVI, which is developed in the current study. These 2 indices do not have the same composition! In addition, the interpretation of this categorisation is not clear. How should we use this categorisation?

Page 13, line 370, 371: Please provide the full form of EI, SI, and RI in the main text.

Page 13, line 374-375: Reference is needed as this information cannot be found in Figure 5.

Figure 2: Figure 2 is not mentioned in the main text! Please name the source(s) of the GDP data set.

Figure 5: It is clear that the downward trend of SVI is mainly driven by the downward trend of RI. However, it is not clear that whether RI could be negative. If RI can be negative, how should it be interpreted? If RI cannot be negative, does this study suggest there exists a threshold in RI that social vulnerability cannot be reduced by further improvement of city's resilience?

Figures 6, 7: I am not sure what does “normalized values” mean.

References:

Su, S. L., Pi, J. H., Wan, C., Li, H. L., Xiao, R., and Li, B. B.: Categorizing so-

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cial vulnerability patterns in Chinese coastal cities, *Ocean Coast. Manag.*, 116, 1–8, <https://doi.org/10.1016/j.ocecoaman.2015.06.026>, 2015.

Yuan, S., Zhao, X., and Li, L. L.: Combination evaluation and case analysis of vulnerability of storm surge in coastal provinces of China, *Haiyang Xuebao.*, 38 (2), 16–24, <https://doi.org/10.3969/j.issn.0253-4193.2016.02.002>, (in Chinese), 2016.

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Interactive comment on *Nat. Hazards Earth Syst. Sci. Discuss.*, <https://doi.org/10.5194/nhess-2019-293>, 2019.

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