Natural Hazards and Earth System Sciences Discussions

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# Comment on nhess-2021-382

Anonymous Referee #1

Referee comment on "Assessment of building damages and risk under extreme flood scenarios in Shanghai" by Jiachang Tu et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2021-382-RC1, 2022

Thank you for inviting me to review the manuscript entitled 'Assessment of building damages and adaptation options under extreme flood scenarios in Shanghai'. This manuscript assesses possible exposure and damage losses of buildings in Shanghai and provides a detailed description of the technical methods and results using the case study. It is well written, and the results are clearly presented. However, my primary concern is about its theoretical or methodological contributions to the field of flood risk assessment, which are not sufficiently articulated or developed. Assessing very extreme flood scenarios (e.g., return period = 5,000 years) is not innovative enough by itself.

## Other general comments

- Why is it needed to assess extreme flood scenarios with return periods of 5,000 years?
- Please can you provide more information about what each extreme flood scenario is like in Shanghai (e.g., their discharge or precipitation)?
- What is the implication of this study to other cities or future research?
- Have you considered validating your simulated results or comparing them with other Shanghai flood risk assessments?

## Specific comments

- Line 39. Why do you think Shanghai 'should increasingly install flood protection, with a focus on hard measures'? Please can you justify or provide evidence?
- Line 53. Please explain what a two-dimensional MIKE 21 flow model is and its features as part of the introduction.
- Line 68. I agree with the authors that "Accurate loss data play an integral role in assessing the damages of buildings. But obtaining accurate data is a challenge shared in many areas (Middelmann-Fernandes, 2010), especially in assessing the damage of buildings." However, the challenge of obtaining accurate loss data is not the focus of this manuscript or hasn't been solved by this study. Therefore, I don't think they are directly relevant as part of the introduction. Consider moving it to the methodology section.
- Line 95. What does 'construction industry value' mean?
- Line 102. Three types of models were developed for the assessment, including atmospheric models, ocean models, and coastal models. Consider placing them in the methodology section instead of the data section. Again, more information about these models is expected.
- Line 126, Table 1. How were the Average Construction Costs calculated? Were different building types weighted? Why is the Average Construction Cost (1157) smaller than the lower bound of the range (1228) for commercial buildings?
- Line 154. The 'W' in 'Where' should be in lowercase.
- Line 154. What does 'surface area of building' mean? Does it include the wall as well?
- Line 164, Equation 2. f(x) means a function at an element x. However, an x is missing on the right to the equal sign. Please modify the equation and explain what x means.
- Line 175, Equation 3. More information is needed to explain Equation 3.
- Line 178. Explain Getis-Ord.
- Line 199. Is the building asset value for the first floor of all four building types?
- Line 207, Figure 4 (also Line 231, Figure 5 and Line 251 Figure 6). Since the Average Construction Cost is used for each of the four building types, is it true in Figures 4-6 that the buildings with higher 'Building Asset Values' are buildings taking a larger land area?
- Line 329, Table 5. Table 5 provides a comparison of flood adaptation measures in Shanghai. However, how can these measures, especially the soft ones, be reflected in the simulations? The simulation results and the soft adaptation measures are disconnected, and more discussion is needed here.