

# ***Interactive comment on “Strategies to increase the accessibility of tsunami shelters enhances their adaptive capacity to risks in coastal port cities: The case of Nagoya City, Japan” by Weitao Zhang et al.***

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1. In the title: Please reduce words number for title to make the key objective be highlighted. There is too much information in the title which makes it difficult to identify the primary objective for this study.

Reply: Thank your for your precious advice. We have reduced words number for title. The final title is “Strategies for increasing tsunami shelter accessibility to enhance hazard risk adaptive capacity: A Study of Nagoya City, Japan”. “tsunami shelter”, “ac-

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cessibility”, and “hazard risk adaptive capacity” are highlighted.

2. In the introduction part: The relationship among hazard-product risk, hazard-affected risk, and adaptive capacity is not expressed very clearly. Please rearrange the explanation of their relationship.

Reply: Thank you for your valuable suggestion. We have rearranged this paragraph as “...Therefore, in a broad sense, the hazard-affected risk is a comprehensive concept. Within this concept, exposure and sensitivity are factors that are proportional to the hazard-affected risk and the final integrated hazard risk. In contrast, adaptive capacity refers to different measures taken by hazard-affected bodies to mitigate, prepare, prevent, and respond to disasters, and to recover from them (León and March, 2014; Desouza and Flanery, 2013; Solecki et al., 2011). However, when focusing on the narrow sense of hazard-affected risk related to negative risk-related factors, adaptive capacity becomes the major research object and can be studied independently, outside of the hazard-affected risk dimension.”

3. In Section 3.2.: Please explain the “the first transfer stage” and “the second tsunami transfer stage” in Figure 3.

Reply: Please forgive us for not adding them in Figure 3 and allow us to make the following explanation: When we resorted to the paragraph including these two transfer notions, we decided not to add them in Figure 3. It is because the transfer order proposed is only used to express the complexity of transfer activity, but is not the point of this research. Adding them in Figure 3 will make Figure 3 too complicated to make the more important objectives (sheltering and traffic) unclear. At the same time, we rewrote the sentence including “the first transfer stage” and “the second tsunami transfer stage” to weaken their role in this paper.

4. In Section 3.2.: Please explain “(long-term) tsunami shelters” and “(short-term) tsunami shelters” shown in Figure 3.

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Reply: Thank your for your valuable suggestion. We have explained them in the text as “In general, only tsunami shelters in inland and high terrain can support long-term safe sheltering. In contrast, shelters in flooding-risk areas are appropriate for short-term emergency sheltering. Therefore, populations in these short-term shelters are organized in a way that allow them to be continuously transferred by vehicles to inland or higher terrain.”

5.In Section 3.3.: Why “the urban service indicator can be used to represent the location of humanized facilities with barrier-free design”? More explanation is suggested to be added.

Reply: Thank your for your valuable suggestion. We have added explanation as “...That is because openness, fairness, and security are key factors in public service use. Furthermore, public service building complexes provide a high-density tsunami shelter area.”

6.In Section 3.3.: Why Equation (2) and Eq. (3) were assumed that all indicators contributed evenly to the final risk value? More explanation is suggested to be added.

Reply: Thank your for your valuable suggestion. We have added more explanation as “Equations (2) and Eq. (3) assume that all indicators contributed evenly to the final risk value. This assumption provides significant flexibility with respect to the required input data and the practicability at a local level. An assumption of equal weight is preferred because of its easy comprehensively, replicability, and calculability (Prasad, 2016; Kontokosta and Malik, 2018).”

7.In Section 3.4.:More explanation why you use hot spot analysis to identify spatial clustering of the integrated values is suggested.

Reply: Thank your for your valuable suggestion. “The analysis outcome shows that high-value areas are surrounded by high-values. The reverse is also true: low-value areas are surrounded by low-values.” Therefore, a Hot Spot Analysis can visualize the

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spatial distribution of the risk levels separately for the hazard-product risk and hazard-affected risk. And we also added it in the text.

In Section 4.1.: How is Figure 4-c mapped? You should explain it in the text.

Reply: Thank your for your valuable suggestion. We have explained it in its capital as “ (c) High exposure/sensitivity and low exposure/sensitivity are divided by the average of exposure/sensitivity value.”

Please also note the supplement to this comment:

<https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2018-267/nhess-2018-267-AC3-supplement.zip>

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