

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC2  
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## Comment on nhess-2021-370

Anonymous Referee #2

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Referee comment on "An interdisciplinary agent-based evacuation model: integrating the natural environment, built environment, and social system for community preparedness and resilience" by Chen Chen et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-370-RC2>, 2022

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This is an interesting study that explored evacuation efficiencies of a coastal community in face of tsunami threats. It considered natural environment, built environment, and social systems that have an impact on the emergency evacuations. Though I have some concerns on specific contents of the model, I suggest to consider it for publication after major revisions. Please see my detailed comments below.

- The BtW model in abstract shall be spelled out. So is the LCD in introduction.
- I see there is a Tsunami inundation layer in the model but no simulation of tsunami process. Is the tsunami inundation considered stable from the beginning to the end of the model? I mean do you consider the tsunami process from the start of the tsunami from the coast, the rising of water depth, the extension of inundation areas to inland and the decline of tsunami water? It can make big difference if the tsunami inundation is dynamic or stable.
- The authors always stress the unique use of empirical data and evacuation drilling data in this study. But using different data only is not sufficient to be an innovative study. Could you clarify other innovative aspects of the study, e.g. in terms of methodology, evacuation theory or others?
- Tsunami is not as flood water that may rise over a time period (e.g. in several hours), but likely occurs and threatens people in minutes or seconds. Every second matters in such a tsunami triggered by earthquake. So it is important to know what kind of tsunami is simulated in the study, better with more details of the tsunami scenario.
- Figure 1, please enlarge the map, while the curve plots can be smaller. The pedestrians and cars can not be seen. And, what do the colors in the map mean?
- It is still hard to understand the process of people evacuation from receiving warnings to being evacuated. How do people make decisions and how much time do each activity take? I suppose a flow chart would be helpful to illustrate the decision behaviors, process and their time needs. The authors may want to refer to the daily routine chart in the study: An agent-based modeling framework for simulating human exposure to environmental stresses in urban areas. Urban Science 2 (2), 36. <https://doi.org/10.3390/urbansci2020036>
- what does the equation 1 mean? What is  $x$  and  $f(x)$ , and why is it this equation but not

others?

- In figure 3b, why is it more percentage of people evacuating by foot when the distance is longer?
- Section 2.3.2. Built Environment shall better be introduced as traffic environment. There is only roads and bridges considered but no buildings at all.
- Figure 6, when milling time is 50 minutes, mortality rate is 100%, which means all people died. This is not realistic unless you assume all people in all areas of the study region will all be in the tsunami water. This requires a sound explanation or major update.
- I assume the very important factors shall include warning time in advance and the location of shelter destinations that could more significantly affect the mortality rate. It would be great if the authors can run the model with some longer warning time and more or less shelter destinations, and to compare the mortality rates. I suppose the result would be more significant than walk speed or travel mode.
- In conclusion, you wrote "Three distinct contributions of this study ..." but you actually listed four contributions.