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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "A spatio-temporel optimization model for the evacuation of the population exposed to natural disasters" *by* H. Alaeddine et al.

Anonymous Referee #2

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Evacuation prior to natural disaster is a crucial issue in disaster risk reduction. This work made efforts in pushing forward the flooding evacuation techniques. The literature review is adequate and the work is complete. But the paper is not clearly written and language editing is definitely needed. I suggest major revision. Here are some questions regarding to the context: 1. The title of the paper needs to be specific. For different natural disasters, the evacuation plan varies a lot (e.g. the evacuation after earthquakes and the evacuation prior to cyclones). This work is dedicated to severe flooding, so please specify that in your title. 2. Please describe the abstraction of network in details. a) Which levels of road (e.g. freeway, highway, and arterials)

are used in your network? b) On page 7, line 1 "assign each building to the nearest network node": how did you select the nearest network node? What are the impact of various network generation methods on evacuation? c) On page 7, line 25 "(3) all the remaining nodes": you specified the first two types of nodes, but what is the exact meaning of the third type of nodes? Please elaborate on it. 3. On Page 10, line 22, you consider the capacity of roads and evacuation paths are predetermined. In your optimization objectives, there are multiple evacuation paths associated with different evacuation time. If so, you cannot predetermine the evacuation paths but should select the evacuation paths based on the optimization results. The section "Determination of evacuation routes" cannot clearly describe the process. 4. How will traffic congestion influence the evacuation time? When large amount of traffic surged into evacuation road network, severe traffic jam will appear in critical intersection and segments. How did you handle this issue? Is there contraflow approach or assessment control in case of emergency? You mentioned polynomial traffic model. Which one did you use? Please define the model in this paper. 5. How do you select the location of shelters (safe points)? You refer to three publications but without detailed explanation. The locations of shelters have significant impacts on evacuation routes and evacuation time. If you consider the location of shelters simultaneously with evacuation routes, the results will be quite different. 6. On page 9, line 10 "the authors assigned a score per region defining the level of vulnerability": how did you quantify the level of vulnerability? 7. Please explain the "fall percentage of roads capacities" (Fig 19): how do you reduce the road capacity? On specific routes? How do you select these routes or segments? With certain probability or not? If the early warning signal can be sent out 48 hours in advance, why should we consider the capacity reduction? 8. Please double check the legend to make sure readers can easily understand your figures (e.g. Figure 9, Figure 12, Figure 13), and translate all French to English (e.g. Figures 14, 15, 17). 9. Please correct typos (e.g. mesoscopic → mesoscopic)

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