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Discussions

Interactive comment on "Identification and classification of urban micro-vulnerabilities in tsunami evacuation routes for the city of Iquique, Chile" *by* Gonzalo Álvarez et al.

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General comments:

This paper addresses the identification and classification of urban micro-vulnerabilities affecting the capacity of evacuation routes and hindering evacuees 'safety. The method is applied to the city of Iquique, which has a population of around 185,000 inhabitants and is located in a tsunami-prone area affected by tsunami events in the past.

The paper includes an introduction, a theoretical background, a description of the study area, a description of the methodology, a discussion of the main results, as well as

conclusions. The article is well written and based on an in-depth understanding of the evacuation's main concepts. The methodology applied is based on a previous work by Leon and March (2016) in Iquique, which is complemented here with a detailed micro-scale analysis of the same city. The main contribution of the paper is a method to prioritize evacuation routes based on the calculation of friction rates and the effect in the decreasing of the evacuation flow capacity of the routes. The method and the conclusion obtained from its application to Iquique prove that the research is highly useful for evacuation planning and for the rethinking of the cities 'urban design in post-disaster reconstruction phases. It can be easily replicated to other areas and by future researchers or coastal practitioners.

Specific comments:

The method applied includes three steps: (i) diagnosis of evacuation routes, (ii) geo-referencing and classification of micro-vulnerabilities, and (iii) calculation of the friction rate. The titles of the various sections in the method chapter would give a clearer idea of the work if they mention the method steps instead of generic terms valid for any scientific study as "fieldwork" and "data analysis".

The work is based on a previous publication by Leon and March (2016) as mentioned in Page 6, and a great part of the method applied here follows that one. At least two of the three steps (diagnosis of the evacuation routes and classification of micro-vulnerabilities) seem to be based on criteria and categories defined in Leon and March (2016). This reviewer has not been able to have access to the work by Leon and March (2016), and consequently could not prove if the work presented by the authors is original or if it is a case study or a method already published. It is crucial that the authors clarify which parts from their work are original and which ones are not. The main differences between the two works carried out in Iquique should be clarified to better understand if there are scientific innovations in this work or if it is a case study applying the method from Leon and March (2016).

In the Data analysis Section, two different classifications of the elements found in the evacuation routes are described. The first classification, based on (i) blockages, (ii) level changes, and (iii) surface roughness, seems a bit disconnected to the method described in pages 8-9. Only after reading the next section on friction rates (pages 10-11) the role of this classification is understood. It would be advisable to mention in page 8, lines 5-7, that this classification is used later for the calculation of the friction rates.

Technical corrections:

âĂć Page 2, line 9: replace ". . .at the coast Mori et al. (2013); Fraser et al. (2013)" with "at the coast (Mori et al., 2013; Fraser et al., 2013)" âĂć Page 4, line 19: please add the year of the Mw 7.7 earthquake and tsunami in Mentawai Islands. 2010? âĂć Page 4, line 23: replace "spacial" with "special" âĂć Page 9, Table 1: Leon and March (2016) should be cited in the table caption.