

Specific comments

Grammar: Please make sure that the grammar is consistent throughout the paper. It can be either “all was” or “All were”, “Data was” or “Data were”, etc. Make sure it’s the same throughout the paper.

Abstract: Perhaps the authors could provide in the abstract a list of damage characteristics which were examined in this study, i.e. influence of culverts, influence of inundation distance, influence of debris, influence of road use type, influence of topography. These were the main themes which were explored throughout the paper but were not explicitly stated in the abstract and introduction.

Page 2, Line 44 - 45: “Fragility functions derived from a single tsunami event means they will be characteristic of local asset and event characteristics”. From this statement, I assumed that the authors were going to develop fragility functions based on collective data from both events (i.e. combining two sets of data to create a single function).

Page 2, Line 48: I am not entirely convinced that there is a strong correlation between inundation depth and impact, perhaps for higher levels of damage, yes (it is a very broad statement to make). Rather than risking it, I would suggest that the authors look for literature that supports this statement.

Page 3, Line 78 – 79: Please check if “tsunami waves exceeding 30 m in inundation depth” is an accurate description. Having cross-checked with the referenced paper (Kazama and Noda, 2012), it seems to me that they are referring to inundation heights. Please be aware that they are inherently different terms. Inundation height usually refers to height of inundation above MSL, and inundation depth refers to the depth of inundation above ground level. Please be careful, and make sure the measurements which were used in this paper for analysis are referring to the same unit, i.e. the data collected in Illapel were indeed Inundation Depths and the HIM taken from the MLIT database is indeed inundation depths and not height. As far as I am aware, the MLIT database usually provides a number of measurements for inundation.

Page 4, Line 120 -121: “Areas with flat topography are not typically consistent with direct road damage from shaking alone. However, where soil liquefaction occurred, then this could have resulted in damage.” I do not really understand what the first sentence meant, it could be better phrased.

Page 6, Line 160: Just a suggestion, because I am not sure how best to structure the methodology section. Before talking about splitting the data into inundation depth bins, the authors can perhaps first mention how they would derive the fragility functions and that the data would be split into bins when performing their statistical analysis. It is just a suggestion.

Page 6, Line 160 – 170: The data for Illapel was split into inundation depth bins of 0.25m and 1 m for Tohoku dataset. Why is this?

Page 8, Line 234 - 235: “There was no such empirical source of debris density observations available for the 2011 Tohoku tsunami, so this is not considered in the analysis”. I am not certain if the authors meant that debris density is not considered in this study or just the Tohoku dataset is excluded.

Page 10, Line 298-299: Why did the analysis for distance from coast not warrant the development of fragility functions?

Page 10, Line 304: Be careful here, tsunami debris transport is also a function of velocity. I suggest the authors refer to Charvet et al. (2014) Section 2.2 (pg 1855) to understand more about the flow characteristics which influence the different types of forces acting on structures.

Page 10, Section 3.3: I just want to confirm with the authors if debris density refers to the size of the debris or the distribution of debris. Not a major issue but why was debris distribution measured from inland inundation extent, instead of the coastline? I would assume that it is easier to imagine how distribution differs as we move landwards, e.g. higher distribution of debris nearer to shore and lower distribution away from the shore?

Page 15, Line 462 – 464: I am not sure what “until maximum inundation depths are exceeded” meant, how are they exceeded?

Also, conclusions in this bullet point seem to contradict conclusions of other paper. Authors mentioned that coastal valleys result in higher inundation depths and lower velocities. Please refer to Suppasri et al. (2015) page 585 - “for a given inundation depth, a higher damage probability exists on the ria coast due to higher flow velocity”. I just wondered if perhaps the dataset used is from Ishinomaki (which fringes a ria coast but does not entirely lie in a ria coast).

Charvet, I., A. Suppasri, and F. Imamura. "Empirical fragility analysis of building damage caused by the 2011 Great East Japan tsunami in Ishinomaki city using ordinal regression, and influence of key geographical features." *Stochastic environmental research and risk assessment* 28.7 (2014): 1853-1867.

Suppasri, Anawat, et al. "Fragility curves based on data from the 2011 Tohoku-Oki Tsunami in Ishinomaki city, with discussion of parameters influencing building damage." *Earthquake Spectra* 31.2 (2015): 841-868.