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Interactive comment on "Risk assessment of liquefaction-induced hazards using Bayesian network based on standard penetration test data" *by* Xiao-Wei Tang et al.

Xiao-Wei Tang et al.

hujl@hust.edu.cn

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Thanks for your interest in this manuscript. We have revised the English grammar and usage of the manuscript by asking a native English speaker for help according to your suggestion, the improved language certificate can be available in the supplement file 2. The details of revised parts are as follows:

(1) The introductory section has been rearranged and shortened according to your suggestion, the content is controlled in two pages. The part content of Section 2 was merged into the Section 3.

(2) The datum in this study was described in more detail by both texts and figures (see Fig. 5 in the supplement file 1) to provide more information about liquefied sites and severe damages to sites. The new content in Section 3.1 is as follow:

Only four earthquakes above are considered in this study, 'Strong magnitude' (6<Mw <7) is not included. The collected datum of these four earthquakes covers not only different duration and PGA, but also several soil parameters and field conditions, none of which is located within 10 km (defined as 'Near' epicentral distances) from earthquake sources. The grading standard of all 12 influence factors of liquefaction potential in Fig. 5 can reference Hu et al. (2016). The observed liquefaction effects induced by these earthquakes include sand boils, settlement of ground, ground cracks, and lateral spreading, resulting in the destruction of cropland, blocking of channels, and severe damage or collapse of many buildings, highways, bridges, harbour facilities, and other infrastructure components. The liquefied sites of the collected datum in this study are mainly contained in Chi-Chi earthquake and Tohoku earthquake. The characteristics of liquefied soils are predominantly loose and clean sands or silty sands (SPT values less than 10) that deposit within 10 meters in the liquefaction datum of the two earthquakes shown in Fig. 5(2). It is worth noting that duration of ground motion was very long within 100-200s, and the liquefied sites were very far from the epicentre of about 300-450km experienced peak ground accelerations of approximately 150-300cm/s2 in Tohoku earthquake, whereas serious damage induced by soil liquefaction occurred in a wide area of the Tohoku and the Kanto regions along with wide scale of sand boils, cracks and severe uneven settlement of pavements due to cycle shear actions for a long time. However, in Chi-Chi earthquake, durations of the strong motions were short, but PGA values were very big due to near a source earthquake proximal to a fault (proximately 1.0km), e.g. in the Nantou and Wufeng regions as high as 0.7-1.0g, that caused widespread liquefaction in the forms of sand boils, lateral spreads, and settlement of grounds in the towns of Yuanlin, Nantou, and Wufeng, Taiwan. Fig. 5(3) shows proportions of all influence factors for the severe status of the SLH. It is easily seen that most severe damage sites suffered from big or super earthquakes (Mw > 7 or 8) with long loading (duration more than 60s), some epicentral distances were close to the earthquake sources, e.g. the nearest liquefied sites in Nantou city are about 14km away from the epicentre, thus their PGA was sufficiently high. As for soil characteristics, pure sand or silty sand with moderate fine content (30% $<$FC$\leq$ 50%) and moderate average grain diameter (0.075$\leq$D50$<$0.425) values result in severe damage, unlike sites with gravelly soil and sandy silt. The damage phenomena also indicate that, even though gravel and sandy silt are not easily liquefied if the earthquake is sufficiently strong to cause liquefaction, severe damage can be expected shown in Fig. 5(2) and (3). The small SPT number (0 $<$ SPTN $\leq$10) means that the sandy soil is so loose that settlement and lateral spreading are more likely triggered after liquefaction because loose sand is easier to be compressed and flow during seismic liquefaction. As for field conditions, the shallow-buried sandy soil layer has low effective stress (σv' $<$ 50kpa) and the groundwater table is near to the ground surface. Such zones are likely to suffer from severe damage. The above laws fit well with practical engineering experience. The sum of the data size of these twelve variables is not consistent in Fig. 5(1), (2), and (3) respectively, such as epicentral distance, duration of the earthquake, D50, σv', and the thickness of the soil layer due to the missing data. The proportion of missing data for epicentral distance, duration of the earthquake, D50, vertical effective stress, and the thickness of soil layer are $\sim$5%, $\sim$9.7%, $\sim$15.2%, $\sim$29.4%, and $\sim$38.9%, respectively.

(3) Qualities of all figures in this study have been improved with 300dpi that can be found in the supplement file 1.

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2017-80/nhess-2017-80-AC3-supplement.zip

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