General comments

This paper presents their work on integrated numerical simulation and building damage detection using satellite image. The developed fragility functions will be useful in many points of view such as reconstruction of the tsunami affected area or risk assessment against future tsunami. Therefore the results are surely valuable to be published. However, there are some issues that should be clarify or include to improve the quality to be more up-to-date and reach the international standard.

Specific comments

1. The research method, structure and presentation are quite similar to the works of Koshimura et al. (2009b) and Suppasri et al. (2011). This is fine but please addresses what is the originality of your research. As it is about five years after their paper or ten year after the 2004 Indian Ocean tsunami, there might be something new from your study. What I can learned through the paper is (1) More detail classification of the building damage (four classes) using higher resolution image (QuickBird) than the earlier researches that use IKONOS that allow for only two classes of damage level. (2) Attempt to validate the developed fragility functions provided in the second paragraph of discussion. Are these the originality of your work in addition to apply the same method with different data/area? Are there any other points to be mentioned?
2. Linear least squares regression was a method used in your study. This is ok for now but in future please consider using other advanced statistical methods shown by recent published papers that might improve accuracy of the fragility functions. This is also because you did not validate if the assumptions of the least square regression before you applied to your data which is different to the error analysis (R2). You also mentioned about the study in the same area by Reese et al. (2011). That is one example on how they carefully check or validate the statistical method before applying to the data. They used logistic regression with a Probit link because of the binary observational data (Reese et al., 2011 page 164-165).

   Again, the method already applied in your study is good you do not need to apply a different method for this work but please just address or discuss about the limitation of the classical method and improvement for future works. Please refer other recent works shown below.
   1. Porter, K., Kennedy, R., Bachman, R., 2007. Creating fragility functions for performance based earthquake engineering. Earthquake Spectra 23 (2), 471–489.
   2. Charvet, I., Ioannou, I., Rossetto, T., Suppasri, A. and Imamura, F. (2014) Empirical fragility assessment of buildings affected by the 2011 Great East Japan tsunami using improved statistical models, Natural Hazards, (Published Online)
   3. Charvet, I., Suppasri, A. and Imamura, F. (2014) 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, (Published Online)
   4. Leelawat, N., Suppasri, A., Charvet, I. and Imamura, F. (2014) Building damage from the 2011 Great East Japan tsunami: Quantitative assessment of influential factors - A new perspective on building damage analysis, Natural Hazards (Published Online)
3. It will be more interesting if you can compare your fragility functions with those developed in exactly the same area by Reese et al. (2011) or how it is differ from Indonesia, Thailand or Japan. Some other recently published works related to fragility functions are shown below.
   1. Valencia, N., Gardi, A., Gauraz, A., Leone, F. and Guillannde, R., 2011. New tsunami damage functions developed in the framework of SCHEMA project: application to European-Mediterranean coasts, Natural Hazards and Earth System Sciences, 11, 2385–2846.
   2. Suppasri, A., Mas, E., Charvet, I., Gunasekera, R., Imai, K., Fukutani, Y., Abe, Y. and Imamura, F. (2013), Building damage characteristics based on surveyed data and fragility curves of the 2011 Great East Japan tsunami, Natural Hazards, 66 (2), 319-341.
   3. Suppasri, A., Charvet, I., Imai, K. and Imamura, F. (2013) Fragility curves based on data from

the 2011 Great East Japan tsunami in Ishinomaki city with discussion of parameters influencing building damage, Earthquake Spectra (Published online)

Technical corrections

Page 2 Line 9: manually detecting → visually interpreting?

P2L11: Please add the main findings from your developed fragility functions and comparison with other works.

P3L20: Please explain briefly on the general information about buildings in your study area, i.e., building material, engineering practice, etc.

P4L2: Please describe how data from the post tsunami field survey is linked to your work because in the present form you just mention about the survey.

P4L16: What do you mean by "tsunami inundation behavior"? Do you mean "tsunami inundation model"? Also please clarify the meaning shown in page 6 line 8.

P4L19: I suggest adding "far-field tsunami simulation" or "tsunami propagation simulation" to the end of the title to make it consistent with "3.2 tsunami inundation simulation".

P5L18: I suggest switching sections 3.2.1 and 3.2.2. Alternatively, add one more session about the bathymetry and topography data before explaining about the simulations. The present form has no explanation on what source of bathymetry and topography data used in your tsunami propagation simulation.

P6L11-13: If possible please re-write the sentence so that Fig.3 comes before Fig.4a.

P6L14: Suggested new title "Verification of tsunami inundation simulation"

P6L15: You applied different fault slip for each location so that the results better match with the observations. Could you please mention on how this affect to the total moment magnitude, i.e., slip used for Pago Pago is 9.6 m but Amanave is 14.6 m.

P7L15: manually → virtually?

P7L16: Ikonos → IKONOS

P7L22-24: Please give some the thresholds or definitions of each damage state.

P8L1: Please explain more about the validation result or the accuracy of the visual interpretation.

P8L15: How do you calculate PD in equations (4) and (6)? Data need to be aggregated for the classical method and then you take the mean of each data range. On the other hand, other statistical methods such as used by Reese et al. (2011) (i.e. Fig.9 in page 165) will take into account all single data which will be weighted to the functions.

P9L5-6: flow depth → maximum flow depth? And hydrodynamic force → maximum hydrodynamic force?

P9L14: Undestroyed → Non-destroyed

P9L13-18: Why you finally grouped into two types? What if you plot the curves for all damage state? In my opinion, it will be more interesting to see the gap between each damage state (washed away, collapsed and major damage over survived) shown on the same plot.

P10L13-28: I think one of the reasons is the curve in Fig. 6(a) underestimate the plots of actual data in 1-2 flow depths area.

P11L1: For conclusion, please add about the limitation such as effect from floating debris or scouring that were not taken into account by your study. Please also add comments on application of your results for future works in risk assessment or disaster reduction.

P16: Table 2: Should you add Beavan et al. (2010) at the end of the table? And Parameter → Fault parameters

P19: Table 5: Accuracy rate → Accuracy ratio

P21: Fig.2: Please specify that they are from the tsunami propagation model? Both figures 2 and3 should be described using the same style.

P24: Fig.5 left and right: Major → Major damage

P25: Fig. 6: Add "maximum" in front of all term?