Response to referee comment 2

The manuscript presents a surrogate-based approach for probabilistic assessment and investigation of the optimal placement of facilities under tsunami forces. The topic is interesting and the manuscript is generally well written, and the presented approach could be used as an efficient alternative for probabilistic risk assessment of coastal infrastructure assets. Therefore, the manuscript is valuable to be published after some revisions.

Thank you for your valuable comments. Our responses are summarized below.

1. In the numerical simulation of the tsunami, results obtained from the 2D analysis are used as the input of the 3D analysis. Please clarify the validity of this simplification and show some comparison results (if any) with theoretical results or experiments.

The validity of the connection between the 2D and 3D analyses was discussed by Takase et al. (2016). Its performance was demonstrated through comparison with the experimental result. We will add this explanation in the revised manuscript.

2. When calculating the tsunami force, what was the exact mesh sensitivity in the full-scale analyses? Did the authors conduct the mesh sensitivity to ensure that the mesh sensitivity is the same for the whole range of the investigated random parameters?

Thank you for pointing out the important discussion point. We have roughly checked mesh sensitivity by performing the simulations with different mesh sizes. Then we determined the mesh size with sufficient resolution to represent the actual inundation depth observed in the Tohoku tsunami. Nevertheless, it is hard to claim that we have adequately examined the reliability of our fluid force calculations. Since we have concentrated on the development of the presented framework and paid scant attention to the mesh sensitivity of the force acting on the building considering the whole range of the investigated random parameters. When applying the proposed method to actual problems, we will examine in detail the reliability of our numerical simulations in the future. We ask for your understanding.

3. According to the results shown in Figure 12, most of the prediction errors are larger than 10%, indicating that the samples may not sufficiently large enough for the surrogate model to be generalized well. How to determine the appropriate number of samples is an important ingredient in data-driven approaches. I suggest the author should define (or add as the future research work) an appropriate stopping criterion to determine whether the sample size is sufficient or not, or resort to the so-called adaptive surrogate modelling to reach a balanced performance by sequentially adding new samples to the training set.

Thank you for your suggestion. As you pointed out, improving the accuracy of surrogate model and deciding an appropriate number of samples for an accurate surrogate model are important and common challenges for data-driven models. Because we used the simulation data set which has been already published, we cannot discuss the appropriate number of samples in this paper. However, since the point the reviewer pointed out is really important, we will add some discussion in the revised manuscript and summarize the point as one of the future works.

4. The manuscript is well written, yet the language should be double-checked to make it more readable, e.g., “Although different placements were obtained, the risk for both parallel and series systems as shown in Table 3” on Page 21.

Thank you for pointing this out. The sentence you pointed out was incorrect. We will carefully check the entire manuscript by all co-authors and revise the manuscript.