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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "A numerical study of tsunami wave run-up and impact on coastal cliffs using a CIP-based model" *by* Xizeng Zhao et al.

Anonymous Referee #1

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The paper present a numerical study of the run up on cliffs located at the back of a beach. In order to do the experiments the authors propose the use of an "in-house" model based on VOF techniques and a numerical channel of 1 m long. In order to test the validity of the model, authors reproduce experiments published by Sim et al., 2015. In these experiments, solitary waves of different heights are propagated over four segments profiles (sea floor, continental slope, continental shelf, beach, and cliff) obtaining results accordingly to the previous observations. Next, Authors investigate the effect of cliff slope on the run up using the same channel configuration and varying the cliff slope. On a second channel setup, Authors investigate the effect of continental shelf gentle slope with four different solitary waves and two cliff slopes. Finally, some results are explained.

Although model results are worthy and validation with laboratory experiments are also

good in my opinion the paper is not suitable for publication as it is for the next reasons:

a) The paper applies an 'in-house' CIP model, probably a VOF. Although this is not completely clear, model description is very poor. For example is not clear what are the differences and advantages of using this model instead of a traditional VOF.

b) Regarding the experiments setup it is not stated the scale of the channel, moreover being numerical experiments, why experiments should be scaled? Considering the water depth of the channel (0.35 m) and a complete ocean profile (from the coast to deep ocean) a scale of the order of 1:10000 can be guessed. This lead to continental shelf length of 15 km and depth of 1 km (typical values for these are 80 km and 200 m). The use of these values must be justified. The wave heights used on simulations are one order of magnitude less than the ocean depth i.e., total depth h=0.35 and tsunamis waves H from 0.025 to 0.06 (For example a wave of 0.025 scaled to 1:10000 gives a wave of 250 m). This is completely unrealistic for tsunamis. In the case of laboratory experiments, some concessions must be done, but on numerical experiments there is no reason to do this. If there is a numerical or mathematical reason to scale the waves like this, it must be stated.

c) On section 3.4 where time evolution of wave is analyzed on tank #2, Authors find, as expected, that the longer the gentle slope is, the later the wave arrives. Since we are taking about long waves this is an obvious results and there is nothing new on the description.

d) On section 3.5, authors evaluate the relative wave height in front of the cliff on tank #2 at different distances. Data describes a linear trend, nevertheless authors do not mention the trend values, and do not intent to find an explanation. Furthermore, was possible to find a relationship between this trend and profile slope. None of these is done by authors.

e) On section 3.6, authors evaluate the run up on tank #2. They found that for larger continental platforms the run up is larger. This implies that (section 3.4) longer conti-

nental slopes, produce waves traveling slower and with higher run up. Authors do not discuss this idea or any other.

f) In conclusion, description of results is very poor, there is no discussions and conclusions are just a summary of the remarkable results.

g) Finally it is rather hard going and the English needs to be improved considerably.

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