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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Modelling dependence and coincidence of storm surges and high tide: Methodology and simplified case study in Le Havre (France)" *by* Amine Ben Daoued et al.

Anonymous Referee #2

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The present works investigates the dependence between tides and extreme surges and presents a new approach to quantify the exceedance probability of extreme sea levels; they compare it to two diferent methods, previously reported in other works. The idea is very interesting in particular in Le Havre site where the interaction between the astronomical components and the signal of surges is very important. The present work is relevant to study the extreme sea levels and assess the risks related to storms. However, many tasks have not been fully addressed and some explanations are required to improve this main bring of this work and make easier for the reader the understanding

of this approach. So, I recommend this work for publication after some moderate revision. Abstract. 'Tide and extreme SSs are considered as independent?' This sentence is disconnected from the previous one. What do you mean exactly? The previous study assumes the independence between SSs and tides? I don't understand the authors would study the dependence while they assume that "Tide and extreme SSs are considered as independent" in line 11 'Tide density? ' What do you mean by tide density The abstract does not reflect the main results of the work!! Introduction A very long sentence, difficult to understand! 'This goal is in line with the recent literature (e.g. Idier et al., 2012) challenging the use of the SSS and clearly demonstrates the importance of conducting extreme value analyses with maximum instantaneous ones. In order to achieve this goal, a third fitting procedure to estimate extreme sea levels using the maximum SS (MSS) between two consecutive 100 tides is introduced with an application so that it can be compared with the two first procedures.' It would be better if the choice of the Le Havre station can be justified: may be for the important interaction of the different driven forces induced by fluvial, tidal and wave activity. Methods What's MSS? What's JPM? It would be better if you can introduce clearly this!! Also, I have not understood how do you determine the SSs from the instantaneous measurements? The total sea level provided by tides is the sum of the SLR component, the long-term geological component, tides and the residual; Do you have considered the long-term components? Also, another important issue can be raised here. We can consider that the residual part as the surges, which is the dominant component sure but it's not the only one for this case Le Havre where the stochastic signal contains both surges and the fluvial effects! May be this should be signaled in the methods and the discussion. Again, I raise the necessity for readers, not expert if this area, to have the full description of the different abbreviations used!!! So, it will be better to introduce at the beginning of use each term! In relation with the use of the timeseries of LE Havre, how do you process the gaps? How do you have determined surges? By harmonic analyses? Line 150 oF page 5: "This feature makes the MSS a variable particularly useful for carrying out a PFHA exploring the entire tidal signal, not only the

high tide". The MSS value is paired with the high tide value within each tidal cycle? Then, the MSS could not occur always randomly within the tidal period. This approach could overestimate the extreme levels, I think line 157: As suggested, the variable of interest would be the maximum sea level between 2 high-tide values. So, my doubts is the following: Did you sample by the use of POT with the consideration of some independence window criteria or by the use of GEV?

Results Lines 253-251: variables are missing!

Page 6: what 's the final threshold selected and the peak number used to fit the distribution in each case Page 6 (line 193) the use of 'storm surge RLs' , do you refer to be water return levels? Page 6 (line 197) the delta method. Please can you explain what 's this?

The results section should be more detailed, may some illustrations are required in this stage!

The paper is very interesting and some improvements are required. I can recommend the publication of this paper after some revisions that I considered then as minor revision.

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