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Natural Hazards and Earth System Sciences
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Discussions

Interactive comment on "From regional to local SPTHA: efficient computation of probabilistic inundation maps addressing near-field sources" *by* Manuela Volpe et al.

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Dear Reviewer,

we thank you for your thoughtful comments. We addressed all of them as specified in detail in the point-to-point answers in the supplement pdf file, both in response to the general and to the specific comments of yours.

Here, we make some general remarks, since we made one important change in the revised manuscript. We also ask for a minor change to the title to insert in it the word "tsunami", which was missing in the original title. This letter is repeated in all the three

responses to the three Reviewers.

Changes to the results and to the manuscript.

We first of all need to point out that the change we made was necessary, since we found a bug in one of the numerical codes we had written for this study. This bug was found while performing some tests, some of them conceived for addressing your comments, particularly as far as the robustness and the importance of the correction for the near-field sources compared to the "noise" introduced by the tuning of the various filtering thresholds were concerned.

The bug consisted in a missing sum operator in the computation of the cluster probability (a missing cycle over one variable!). Hence, the probability of the entire cluster was not assigned to the cluster representative.

The new results, computed after the bug was corrected, do not differ in essence, although the resulting probabilities are obviously overall higher. All the new Figures are enclosed.

Conversely, for hazard intensities higher than 1 meter, the results now show even more pronounced differences between the "corrected" and "uncorrected" filtering procedures (new Figure 3c).

Our results now more clearly point out that not considering an appropriate correction for the near field would lead to overestimate the tsunami hazard. This is true in the case of this specific setting, though, since we found a prevalence of clusters causing coastal uplift from the near-field sources (the situation may be the opposite as well or a mix for different source-coast configuration).

These uplifts would tend to diminish tsunami inundation. Hence, the tsunami hazard would be overestimated without taking this into account. We hope this is illustrated by the new Figure 3c.

We now in fact added to panel c of this Figure a new quantity, that is the Mean Uplift (hereinafter MU) on a random point on the coastline in the inner - highest resolution - grid domain.

The MU provides the mean - over all scenarios contributing to some hazard intensities and all coastal points - co-seismic coastal displacement (with positive sign if uplift) plotted versus different hazard intensities, and it is compared to the relative percentage differences between the corrected and uncorrected results.

In more detail, the MU is obtained:

1.for the mean model - the same considered before as far as epistemic uncertainty is concerned;

2. for each single hazard intensity threshold, as said;

3. by performing a weighted average of the uplifts from each model (represented through the centroid of the cluster), where the weights are the annual probabilities of the individual models (of the individual earthquakes then), set to zero if the earthquake do not deform the coastline (i.e. for far-field sources) or if the tsunami doesn't exceed the given hazard intensity threshold; the weighted average is normalized to the total probability of the near- and far-field sources contributing to the tsunami hazard for that threshold;

4. by further averaging the result along the coastline, hence the MU may be interpreted as the mean on a random point of the coastline, from all the far-field and near-field scenarios, the latter including those causing both subsidence and uplift (note than that the absolute MU value in meters is then rather small being averaged over sources that cause either uplift or subsidence, or no coastal displacement at all).

Note that the intermediate results (before applying item 4.), that is the MU on each coastal point, for different intensity thresholds, both for single cluster representatives (red lines) and for the weighted average (according to item 3., blue line) are plotted in the new Figure S4. While we note that there are both positive and negative displace-

ments (red lines corresponding to uplift and subsidence along the coast respectively), the predominant one is unveiled by the sum over the different clusters plotted (the a blue line).

Moreover, the results in Figure 3c now show very little differences between the "corrected" and "uncorrected" filtering procedures at low hazard intensities, that is those below the Filter H thresholds value of 1 meter.

In summary, for the specific case study, that is for this specific source-target configuration, our findings show that not considering an appropriate correction for near field would lead to overestimate the tsunami hazard for Hmax greater than 1m, and this overestimation is correlated to dominant coastal uplift. At lower intensities differences are small but not meaningful, as the results are biased by Filter H.

We will of course add the necessary new text in the revised manuscript concerning MU and the corresponding analysis.

New title.

We propose the following new title for this study: "From regional to local SPTHA: efficient computation of probabilistic tsunami inundation maps addressing near-field sources" That is, we just inserted the word "tsunami" before inundation. This would make easier to find the article if searching NHESS for tsunami-related papers.

Kind Regards, Manuela Volpe, on the behalf of the co-authors.

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2018-202/nhess-2018-202-AC2-supplement.pdf

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2018-202, 2018.

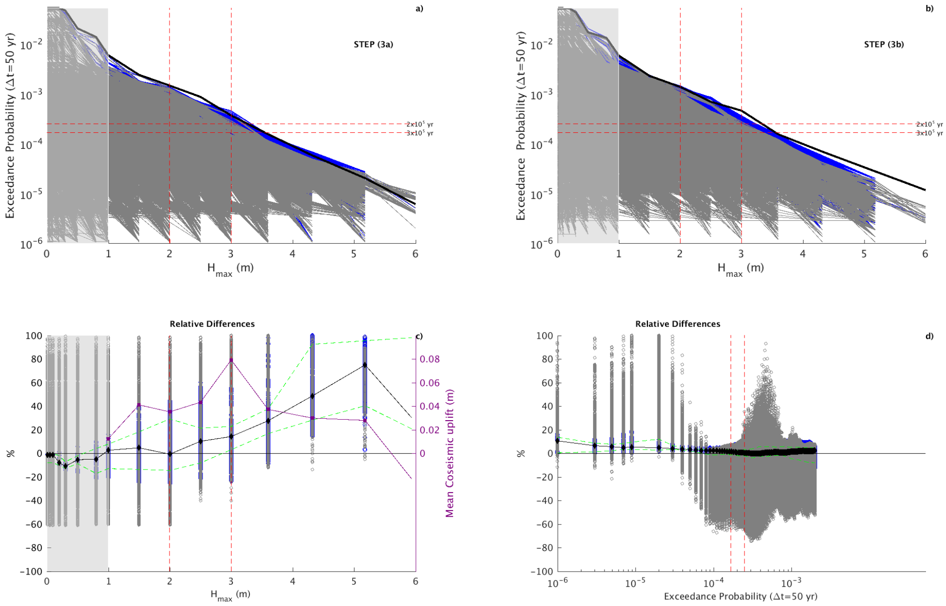

Fig. 1. Figure 3

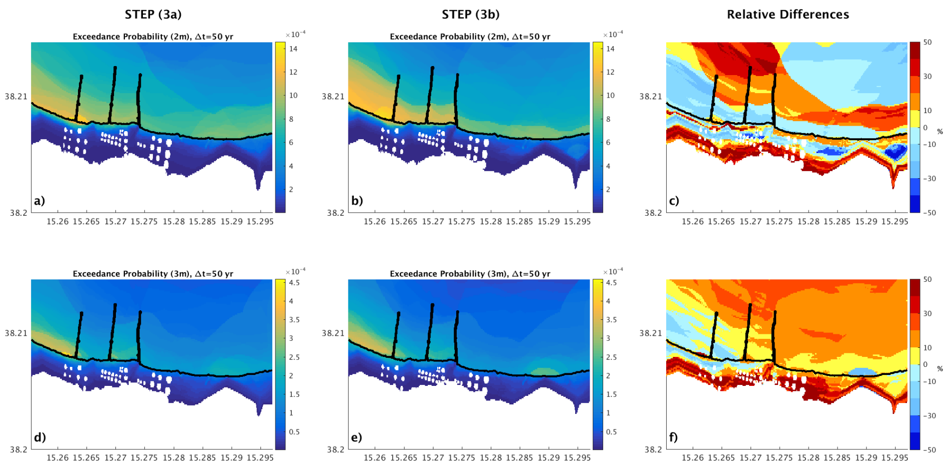

Fig. 2. Figure 4

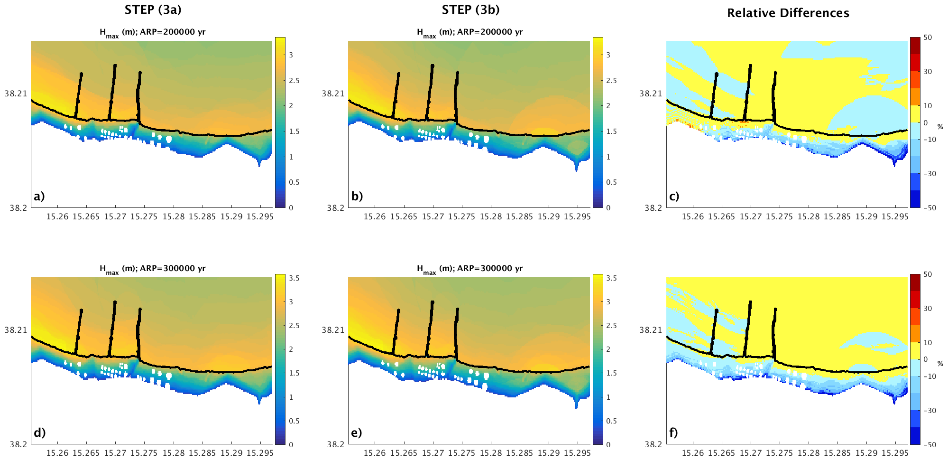

Fig. 3. Figure 5

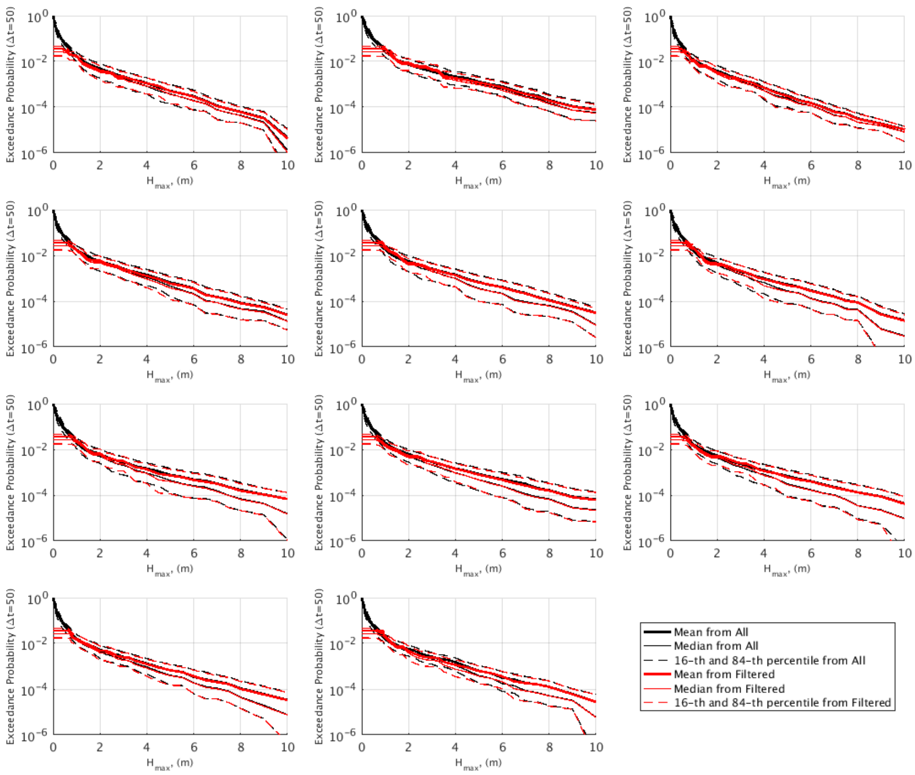

Fig. 4. Figure S2

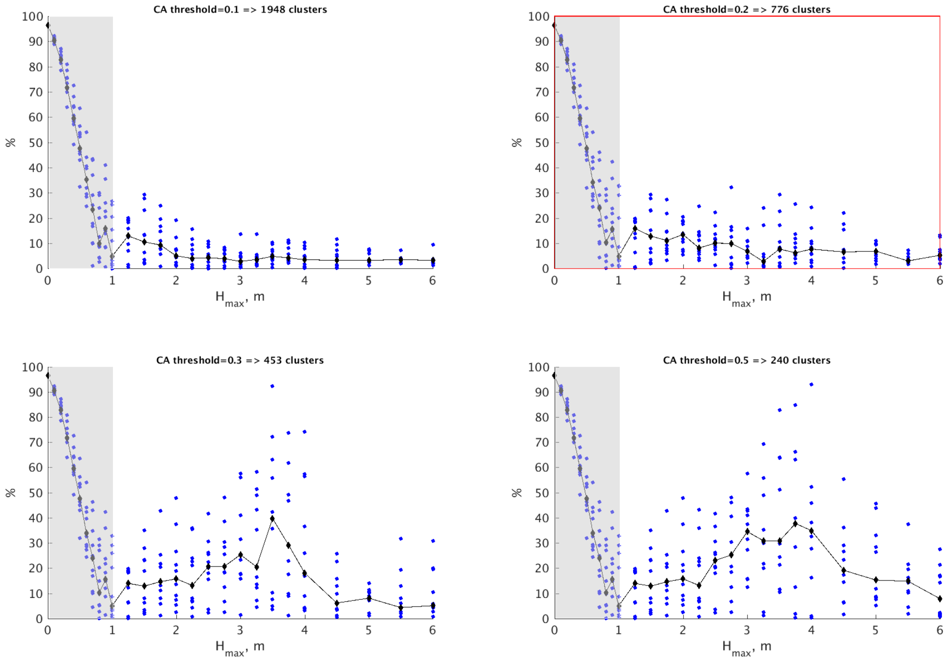

Fig. 5. Figure S3

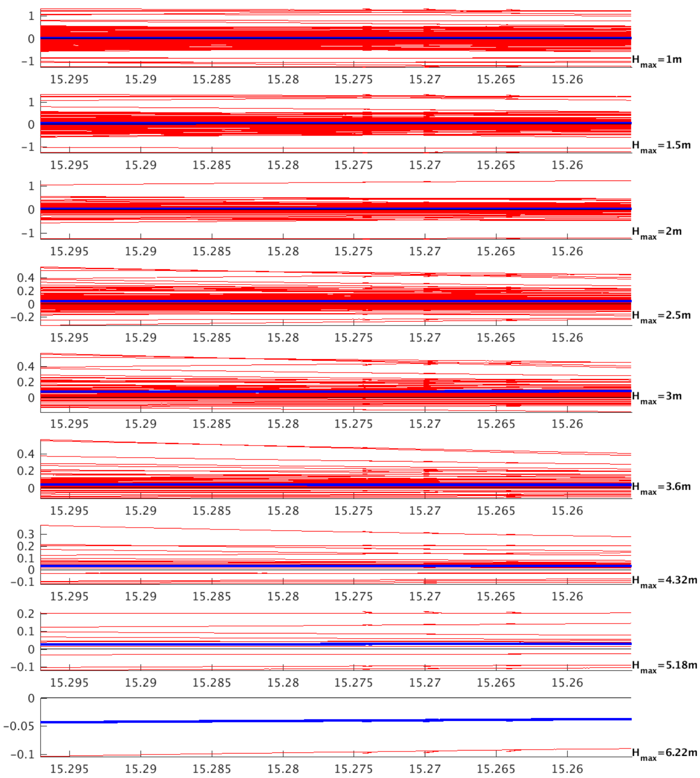

Fig. 6. Figure S4