

## Response point-by-point to Anonymous Referee #3

The point-by-point answers are in blue color, below each Reviewer's comment (reported in *Italic*).

*Overview: The authors did an extension of the SPTHA method previously proposed by Lorito et al. (2015) [GJI] and Selva et al. (2016) [GJI]. A new filtering scheme for earthquake scenarios is developed (Filter P) and the method is applied to a particular coast (Milazzo).*

*Overall evaluation: The application of the SPTHA to a new region and adding some innovations to the previously-developed method may justify publication of this work. The paper is not as good as the other two papers published before (I mean Lorito et al. 2015; Selva et al. 2016). The current manuscript refers to the previous two papers very frequently and does not seem to stand by its own. However, I am positive about this work and I think it can be published in NHESS after some revisions. I made some suggestions below.*

We thank for your positive evaluation. Our manuscript in fact does not propose a totally new method, but develops an upgrade of the method previously proposed by the cited published papers. This is the reason for frequently referring to them.

*Comments:*

- *Page 3, "Method": your Section 2 looks a review of the methods previously published by Lorito et al. (2015) [GJI] and Selva et al. (2016) [GJI]. Your own method is outlined in Section 3. This is confusing. In fact, your current section 2 is sort of literature review. I suggest change the title of Section 2 to "A review of SPTHA" and then change title of Section 3 to "Methods: an improved SPTHA".*

We understood the point, although Section 2 is not properly a literature review of SPTHA but just a summary of the original method. Anyway, we will provide more suitable titles. For example, they might be: "A review of the original method" for Section 2 and "Improvements in the filtering procedure" for Section 3.

- *To show the better performance of the new method over the ones published before (I mean Lorito et al. 2015; Selva et al. 2016), a discussion or a figure is needed.*

The improved method, illustrated in Figure 1 of our manuscript, fits into the general scheme displayed in Figure 1 of Selva et al. 2016, who already foresaw the possibility of performing site specific tsunami hazard, although they did not address nor implemented or tested it.

The performances of the "new" method step (3b) are here benchmarked with respect to step (3a), which corresponds to the original method as, although including some improvements, it lacks the most crucial novelty, that is the separate treatment of the near-field scenarios. It is discussed in several places that this was not done by Lorito et al. 2015. We will consider if stressing this again while summarizing the results.

- *Try not to refer to two previous papers so much. You may want to show more independence.*

Ok, we will remove the references where possible.

- *In Page 9, refer to appropriate figures when discussing the results.*

We agree, and will modify accordingly.

- *Why you have capital letters for STEP? Is that necessary? If not, change it to “step” because when you use capital letters, the reader assumes it is an acronym. I guess it is not an acronym for anything.*

We did not consider possible confusion with an acronym. As capital letters are not really necessary here, we will change it.

- *Page 5, Line 17: explain more about Filter P.*

Filter P is further explained by lines 17-29. We will try to make it clearer in the revised version.

- *Page 6, Line 2: what is intra-cluster? It is unclear. Make sure to explain more about it and clarify how it works.*

Intra-cluster variance means the variance within each cluster; it was used in the original method to define the optimal number of cluster in the cluster analysis procedure, according to the so-called Beale test. This will be better explained in the revised text.

- *Page 6, Line 7: delete statements like “as mentioned before...” it is not suitable for academic writing.*
- *Page 7, Line 32: delete “as discussed in previous ....” Again not suitable.*

We accept the comments and will revise accordingly

- *Page 8: here you use “cluster” and “scenario” interchangeably. Make sure which one you meant. I assume that you meant “Scenario” not “cluster”. They are different. Cluster is much bigger than a single scenario. One cluster can include 200 scenarios. In Line 13, you say: “We obtained 634 and 520 clusters for remote and local sources, respectively, that is a total of 1154 scenarios ...”. Here the sum of 634 and 520 clusters cannot be 1154 scenarios. Instead, the sum of 634 and 520 clusters cannot be 1154 CLUSTERS.*

There is no doubt that “cluster” and “scenario” are two different things. At the end of the cluster analysis we obtain clusters of scenarios, but for each cluster a representative scenario is selected, to which the probability of occurrence of the entire cluster is assigned, and then the representative scenarios are the ones which are explicitly modeled. In this

sense a certain number of clusters corresponds to the same number of scenarios to be simulated. We will clarify in the text.

- Your conclusion has many repeats; for example lines 8-13. Make sure delete all repeats.
- ABSTRACT: try to have more numbers and conclusions, not only generic statements.
- CONCLUSIONS: shorten it to a paragraph and be specific and do not repeat all stuff again.

We will take into account the above general style suggestions in the revised text, thank you.

- *Figure 1: The last box repeats. Delete one of them.*

The last box, relative to step (4) is repeated twice in order to highlight that step (3a) and (3b) are completely separate paths. In our opinion, reporting step (4) just once, connected both to step (3a) and (3b) is misleading, as it could suggest a “merging” of the results of simulations from the two paths to evaluate SPTHA.

- *Figure 2: Explain what are two sets of red dots.*

We agree: this information is missing in the figure caption. We will correct.