Responses to Anonymous Referee #4

Thank you for your helpful review. Please find our answers to each of your comments below.

General comments:

1. *<<"The study is useful as the method have a high efficiency in estimating the earthquake and tsunami loss".*

   We sincerely thank you your positive feedback.

2. *<<"However, there are some details in the technical part should be explained clearly by the author, like the process of select earthquake scenario described in the line 290, " A Mw 9.0 tsunami scenario was selected among a catalogue...", but I cannot find the description of the catalogue, (I'm sorry if I miss something)".*

   We are sorry about the confusion caused by the reference to the catalogue that had not been introduced before. It actually refers to the tsunami scenario database that was calculated within the RIESGOS project. From the corresponding state of this database the 'worst-case' event with regard to the inundation extend in Lima/Callao was chosen for the design of the focus map. The database is still growing and in future studies we will refine the 'worst-case' method by taking into account aggregates of a series of scenarios. Consequently, we have removed from the revised manuscript the sentence referring to 1,000 offshore scenarios.

   With regard to the tsunami modelling, in this study we do not aim at a validation of inundation results for some given event and corresponding realistic source model. Rather we investigate the tsunami impact for events characterized by a range of magnitudes and, having a systematic comparison in mind, we aim at the variation of only one parameter, namely the slip value. The sources used in the study are based on the historic event from 1746 and the source area is taken from Jimenez et al., (2013).

   The scaling law is not specified in Jimenez et al., (2013) but the paper addresses a magnitude range of Mw 8.6 to Mw 9.0, the rigidity is specified to a value of mu= 4.5x10^10 N/m^2 and the source dimension is set to 550x140 km, separated into five subfaults. By modifying the source area, we would increase the number of degrees of freedom considerably since the local bathymetry affects the evolution of the extended initial sea surface elevation in a nonlinear way. Therefore, we restricted in this specific study the source modification to the slip value (constant among subfaults, the values ranging from 2.73m for Mw 8.5 to 15.36m for Mw 9.0), thus scaling the total energy of the event but keeping the other quantities constant.

   The model bathymetry and topography were built from several data sets. The ocean part is based on the GEBCO bathymetry (General bathymetric chart of the ocean, GEBCO_08 Grid, see http://www.gebco.net). The coastal topography is given by SRTM values (Shuttle radar topography mission, 30m resolution, see https://www2.jpl.nasa.gov/srtm/) whereas in the pilot area Lima/Callao additionally the measurements of the TanDEM-X mission (Krieger et al., 2007)

given at a spatial resolution of 12m were provided by the project partner DLR to the RIESGOS consortium. In this region the available data sets were combined to a joint product and augmented by nautical charts in shallow areas by the project partner EOMAP. All these data were bilinearly interpolated to the triangular mesh and slightly smoothed to allow for stable simulations."

As suggested, we extended the section on tsunami modelling and included more information on the approach used in the study.

Part of the modified manuscript:

"The wave propagation and tsunami inundations are obtained through numerical simulations using the finite element model TsunAWI which employs a triangular mesh with variable resolution, allowing for a flexible way to discretize the model domain with good representation of coastline and bathymetric features. Since the simulation of the inundation process needs high resolution, the mean mesh resolution given by the triangle edge length amounts to around 20m in the coastal area of Lima and Callao. TsunAWI is based on the nonlinear shallow water equations including parameterisations for bottom friction and viscosity. Table 1 summarizes some of the most important model quantities. The wetting and drying scheme is based on an extrapolation method projecting model quantities between the ocean part and the dry land part of the model domain."

Table 1. Summary of TsunAWI model parameters used in the tsunami simulations.

Numerical approach	**Time step/ Integration time**	**Resolution range (Triangle edge length)**	**Bottom friction parameterization**	**Viscosity parameterization**
Finite Elements	0.1sec / 4 hrs	From 6km (deep ocean) to 7m (coastal pilot areas)	Manning (n=0.02 constant value)	Smagorinsky

Through this response we would also like to let you know that we have decided to provide the data models and scripts that we have constructed during the elaboration of our study. These models (including the tsunami inundation maps) constitute five data repositories and are supplementary data to the paper. They are assigned an independent DOI, and are accordingly cited in the new version of the manuscript. We consider that this is a transparent approach that could also benefit future readers who will be able to better understand, reuse and cite these datasets. An example can be found accessing the following revision link:

https://dataservices.gfz-potsdam.de/panmetaworks/review/f932840b5c130da18c3a9d407e85f086ce0874b80edbd796e0f096ba94d89cc4/

We also let you know that we asked an editor (a native English speaker) to provide us a strict language review. The new version has been significantly been improved in that regard.

We sincerely thank the reviewer for the time invested in providing us the very constructive feedback and comments.

With best regards,

The team of authors.

References

Jimenez, C., Moggiano, N., Mas, E., Adriano, B., Koshimura, S., Fujii, Y., Yanagisawa, and H., 2013. Seismic Source of 1746 Callao Earthquake from Tsunami Numerical Modeling. Journal of Disaster Research 8, 266–273. https://doi.org/10.20965/jdr.2013.p0266

Krieger, G., Moreira, A., Fiedler, H., Hajnsek, I., Werner, M., Younis, M., Zink, M., 2007. TanDEM-X: A Satellite Formation for High-Resolution SAR Interferometry. IEEE Transactions on Geoscience and Remote Sensing 45, 3317–3341. https://doi.org/10.1109/TGRS.2007.900693