Dear Gerasimos

Thank you for your thorough revision. We completely agree with all points. Effectively, we missed the reference Papadopoulos and Fokaefs (2005, hereinafter PF05), and we apologize for this. The method we selected is substantially different from the one adopted in PF05. However, PF05 and our model have a similar goal, and we fully agree that it is fundamental to revise our manuscript fully acknowledging the contribution of PF05 and adding a thorough comparison of the results. We already started working in this direction. In attachment, you can find a preliminary report in which we discuss the main methodological differences along with the results of our preliminary comparison. ¶

Thank you again,

Jacopo Selva in behalf of all co-authors

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ATTACHMENT¶

Regarding the *methodological differences*, PF05 developed 3 different relationships for both Papadopoulos-Imamura and the Sieberg-Ambraseys intensities, considering variable functional shapes (linear or power-law) and three input datasets (Eastern Mediterranean, Western Mediterranean, or both). The PF05 starting dataset considers the maximum intensity and the maximum wave height for a set of past tsunamis. In other words, PF05 correlates the maximum intensity and the maximum wave height of each tsunami. In our work, we develop a substantially different approach, as we consider all the available local intensities (information not available at the time of PF05) and relate them to the wave-height observed or estimated at the same location. Thus, rather than correlating a single intensity value, estimated from all the effects of the tsunami observed along the coasts, with a single (maximum) observation of the tsunami wave height, we analysed the relationship between local intensity and local wave height across multiple sites affected by the same tsunami. In other words, the correlation is established at local scale, at each site where the tsunami was observed. In addition, we include a formal treatment of uncertainty on both wave height and intensity data and, building on the recent developments on seismic intensity, we adopted a unified and fully invertible exponential relationship (Faenza & Michelini 2010; Gomez-Capera et al. 2007; Cataldi et al., 2021). Similarly to the seismological analogue, we consider only 1 single functional shape (exponential) for both Papadopoulos-Imamura and the Sieberg-Ambraseys intensity, consistent with the seismic case. Of course, all these novelties were impossible for PF05, as individual intensity data were not systematically available, and the literature about seismic intensity was developed years after PF05.

Keeping in mind these differences, the *comparison between PF05 and our findings* is clearly very important. The comparison between the three PF05 and our models is reported in **Figure 1**. For the Papadopoulos-Imamura intensity (Figure 1, top panel), as noted in the revision file, the Eastern Mediterranean PF05 model is compatible (within uncertainty) with our model in the range 3 to 9 degrees, even if PF05 is systematically larger than our mean model. On the

opposite, the western Mediterranean model is not fully compatible, especially for intensities up to 7 (the most populated ones). The whole Mediterranean model follows the Eastern Mediterranean one, as Eastern Mediterranean data dominate the dataset used in PF05. For the Sieberg-Ambraseys intensity (Figure 1, bottom panel), the models are less compatible. The three PF05 models are compatible with our uncertainty bounds for the largest intensity (6, at the limit also 5). For all intensities (apart for 6), PF05 models are quite larger than our mean model.

In all the cases, all *PF05 models tend to provide generally larger wave height values* than our model for the same intensity. This seems to be confirmed also for the 2020 tsunami, which is the most recent event. This is probably related to the methodological difference discussed above, that is the fact that PF05 considers only the maxima, while our study considers all local observations (both intensity and wave height). This hypothesis finds confirmation also in **Figure 2**, where we compare the observations used in PF05 with the ones used in our work, along with all found relationships. It is clear that PF05 observations are in the same range, but they are in prevalence in the upper range of the variability, as expected when you compare maxima from entire distributions.

The *best compatibility occurs with the Papadopoulos-Imamura intensity in Eastern Mediterranean*, as noted by the reviewer, while the results are *less compatible for west Mediterranean and for the Sieberg-Ambraseys intensity*. Considering the Papadopoulos-Imamura intensity regression and the Eastern Mediterranean data, the PF05 model is indeed within the uncertainty bounds that we estimate for all the most populated intensities classes: for the largest intensities the estimates diverge, but no data are available for these values. For the Western Mediterranean and for the Sieberg-Ambraseys intensity (both East and West Mediterranean), PF05 estimates are at the limit or outside our uncertainty bounds. This confirms also that the use of Papadopoulos-Imamura intensity, with its 12 degrees, provides more robust results than the Sieberg-Ambraseys intensity. This was already noted in the manuscript, but this comparison clearly strengthens this consideration. Notably, a full compatibility is observed for the PF05 model based on the largest dataset, where the empirical estimate is more robust. This confirms the importance of treating uncertainty, especially when few data are available, as well as the importance of working to improve and populate these types of intensity datasets with data from recent and future tsunamis, to improve relationships of this type that are fundamental to better characterize and understand past events and to refine future hazard quantification.

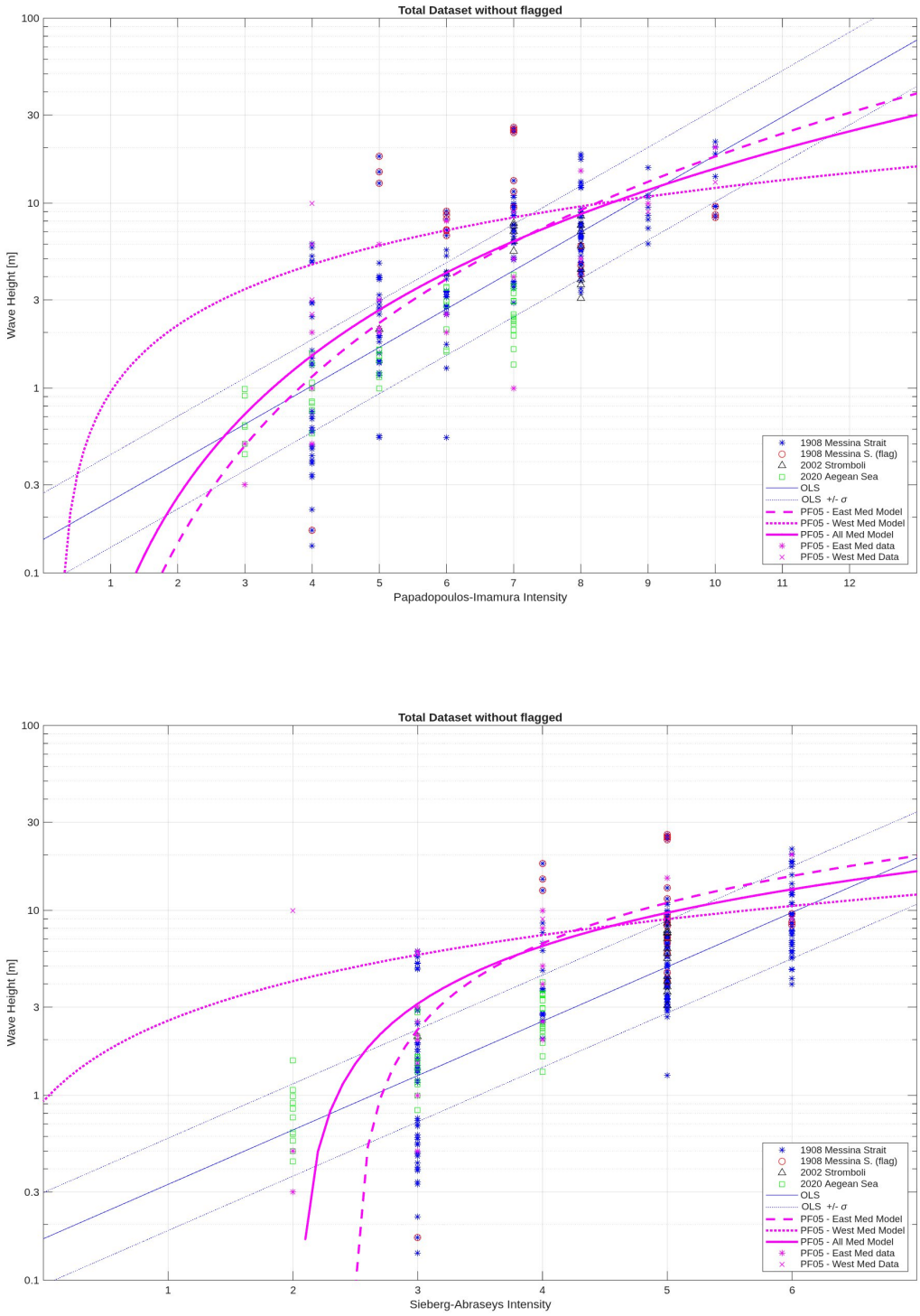


Figure 1: Comparison between PF05 and our models (top panel) for the Papadopoulos-Imamura intensity, and (bottom panel) for the Sieberg-Ambraseys intensity.

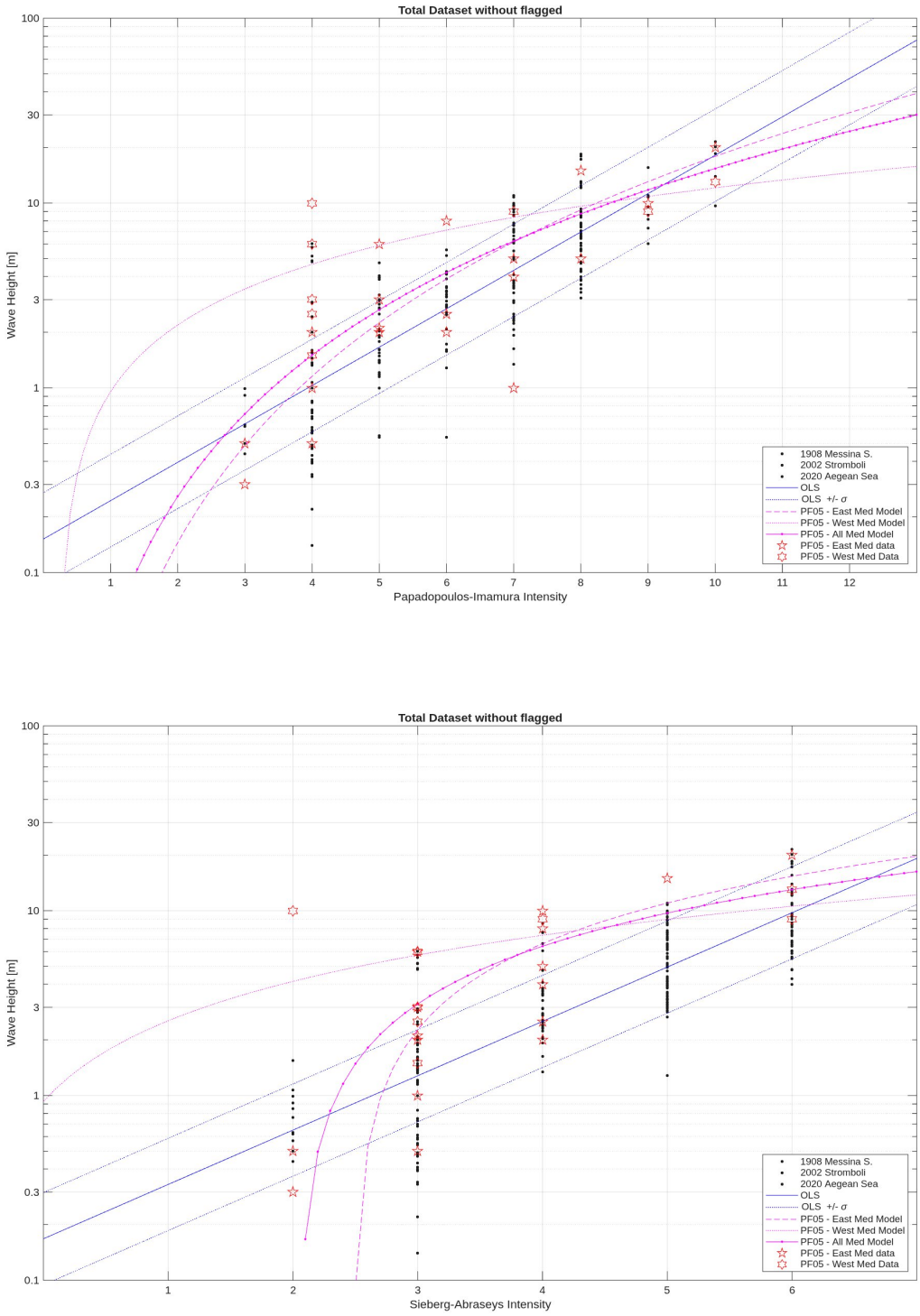


Figure 2: Comparison between the observations used in PF05 and our model, (top panel) for the Papadopoulos-Imamura intensity, and (bottom panel) for the Sieberg-Ambraseys intensity.