

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC3
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Comment on nhess-2022-49

Anonymous Referee #2

Referee comment on "Brief communication: The crucial assessment of possible significant vertical movements preceding the 28 December 1908, $M_w = 7.1$, Messina Straits earthquake" by Nicola Alessandro Pino, Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2022-49-RC3>, 2022

GENERAL COMMENT

In my opinion it is very clear what Pino highlights in this brief communication. Subsidence processes claimed by Barreca et al. 2021 should have been recorded in somehow. Levelling data cannot be used to separate the two signals of co-seismic and pre-earthquake subsidence. Furthermore, tide gauge graph shows that there is no relative subsidence recorded before the earthquake, suggesting that the claimed modelled subsidence should be ruled out, as the result of some sort of aseismic slip along this E-dipping low angle discontinuity, beneath the supposed W-Fault. Tide gauge shows a slightly uplifting area as confirmed by preserved marine terraces, resulting from a long-term uplift process (see the recent review in Meschis et al., 2019; 2022; for instance). About the subsidence measured by levelling data in the Sicilian side, it would be simpler to think that benchmarks are located in very steep slopes affected by landslides processes and highly fractured rock formations, suggesting that those ones are not reliable to record any co-seismic movement. This latter is also shown by Comerci et al. (2015; 2020) as well as no evidence of pre-earthquake subsidence is reported.

It is important to note that evidence that the W-Fault tectonically deforms the seafloor is actually a confirmation that active faulting is occurring offshore. Indeed, the trace of W-Fault in its offshore part more or less coincides with the one proposed by Doglioni et al. (2012; Doglioni, C., Ligi, M., Scrocca, D., Bigi, S., Bortoluzzi, G., Carminati, E., ... & Riguzzi, F. (2012). The tectonic puzzle of the Messina area (Southern Italy): Insights from new seismic reflection data. *Scientific Reports* (1), 1-9.) and later used by Meschis et al. (2019). In the fault model used by Meschis et al. (2019) there is no pre-earthquake subsidence claimed, instead a co-seismic uplift is calculated matching the area affected by long-term "footwall uplift" shown by tectonically-deformed marine terraces (Meschis et al., 2022; Meschis, M., Roberts, G. P., Robertson, J., Mildon, Z. K., Sahy, D., Goswami, R., ... & Iezzi, F., 2022, Out of phase Quaternary uplift-rate changes reveal normal fault interaction, implied by deformed marine palaeoshorelines. *Volume 416*, 1 November 2022, 108432), with lower rates of uplift closer to the fault tips in Messina and Taormina towns and higher ones in centre of the fault, closer to Roccalumera village.

Finally, a prominent pre-earthquake subsidence claimed as high as 0.2 m/yr should have been noted by people living and working by the sea at that time. This is ruled out by the detailed analysis of historical sources for the 1908 earthquake available in the literature (e.g., Comerci et al., 2015; 2020; and reference therein).

SPECIFIC COMMENT

Reference to the papers cited above should be included in the manuscript. Minor specific comments are included in the annotated manuscript attached here

Please also note the supplement to this comment:

<https://nhess.copernicus.org/preprints/nhess-2022-49/nhess-2022-49-RC3-supplement.pdf>