

This paper represents a valuable contribution to the understanding of tsunamis generated by earthquakes. On the one hand, it provides a global database of tsunami numerical simulations for more than 5,000 seismic events that occurred between 1976 and 2023. On the other hand, it defines a criterion to be implemented in an artificial neuronal-network model aimed at identifying which events can be considered tsunamigenic. In my opinion, both results are original and fall under the scope of the NHESS journal.

Regarding the first of the results, to the best of my knowledge, this is the first database of this kind. As stated in the paper, it provides an openly available resource for tsunami hazard studies and model validation and provides the training dataset for the second target of the paper. In addition, it constitutes a useful dataset for Tsunami Warning Systems. From my point of view, both the event selection and simulation methodology are appropriate.

The second result of this paper, the tsunami-occurrence criterion, is presented as a fundamental parameter of the AI-based decision model introduced in Gallego Jiménez (2025). This model is implemented on the online operational platform IH-Tsusy to evaluate the tsunamigenic potential of ongoing earthquakes. Once IH-Tsusy receives the earthquake's focal parameters, including the CMT solution, the AI-model produces a binary classification, labelling the event as either 'tsunami' or 'non-tsunami'. If the event is classified as 'tsunami', IH-Tsusy triggers a numerical simulation within approximately 10 minutes. The tsunami-occurrence criterion is derived from the statistical analysis of the database obtained in the first part of the paper and validated against the NOAA tsunami catalogue.

In my opinion, this binary classification, although scientifically interesting, has a limited applicability in the operational procedures of a TWS. A TWS must determine, for each monitored coastal segment, whether that specific area will be impacted by a tsunami. In other words, a TWS needs to know not only whether an event is tsunamigenic, but also whether the resulting tsunami will affect the coasts under its responsibility, and precisely which points along those coasts. For this reason, within the IH-Tsusy framework, the TWS must wait for the outcome of the numerical simulation before issuing any warning message. Consequently, the binary classification is only used to decide whether a simulation should be run for a given event. In practice, it seems that a simulation could be launched for all events with magnitude greater or equal than 6,0 in any case. An exploration of the possibilities of upgrading the AI-model to provide more detailed information about the tsunami impact of an event may be worthwhile.

Regarding the statistical analysis performed to obtain the tsunami-occurrence criterion, I believe that a more detailed analysis of the entire solution space is required. The validation against the NOAA catalogue is useful and generally adequate.

Overall, the draft is well structured and clearly written, with an appropriate number and quality of figures and tables.

I provide some specific comments associated with the lines of the draft below.

30: Please review: 'WANG and LIU'. Suggested: 'Wang and Liu'.

38: I suggest 'are not **always** included' instead of 'are not included'. Sometimes they are included (Mw and focal Depth are usually included).

45:

- IGN also uses ETA for their tsunami alerts (Section 2.2.2 in IGN, 2021). ETA appear in all IGN tsunami alerts.
- Roudil et al., 2013 does not appear in References section.
- Should not be 'JMA, 2025' the reference for Japan?
- Is 'U.S. Indian Ocean Tsunami Warning System, 2007' the correct reference for Chile? It does not appear in Reference section.

74: Please review: 'to label an event as a tsunami'. Suggested: 'to label an event as tsunamigenic'.

83: 'Reuters, 2016' appears in References section as 'Reuters, 2017'.

120: Please review: 'to Sect. 2.1-2.6'. Suggested: 'to Sect. 2.2-2.6'.

133: Please review: 'to Sect. 2.1-2.6'. Suggested: 'to Sect. 2.2-2.6'.

138:

- Please review: 'tsunamis catalogue'. Suggested: 'tsunami catalogue'.
- NOAA tsunami catalogue should be cited as: 'National Geophysical Data Center / World Data Service: NCEI/WDS Global Historical Tsunami Database. NOAA National Centers for Environmental Information. doi:10.7289/V5PN93H7 [access date]'

139: Please review: '2000 BC'. Suggested: '2100 BC'.

145: Please review: 'of which 424 seismic origin events'. Suggested: 'of which 424 events of seismic origin'.

151: Could you elaborate on the most common reasons why the remaining 47 tsunamis, with a probable or definite $M \geq 6$ seismic origin, are not associated with the USGS earthquake catalogue? I would have expected to match all 424 records with the USGS catalogue.

170: Please unify the notation in the whole text by using either 'Fig.' as in line 119 or 'Figure' as in line 170.

171: I do not understand the comments regarding the absence of M_0 in the early years of the GCMT catalogue. M_0 is part of the CMT solution, and it is available in <https://www.globalcmt.org/CMTsearch.html> for all records starting at 1976. Moreover, since M_w is computed directly from M_0 , using Kanamori (1977) relation, I do not see practical difference between using M_0 or M_w to characterise seismic events, as they provide the same information.

188: Please review: 'focal mechanisms data and (2) moment tensors data'. Suggested: 'focal-mechanism data and (2) moment-tensor data'.

196: Please indicate in the strike-slip ruptures which is the criterion used in this study to select the nodal plane as the rupture plane. Has it been selected manually considered the geology of the area where it has occurred?

198: Please explain the effects of selecting the wrong nodal plane.

221-224: I do not follow this reasoning. Why 'location and depth parameters were adjusted to ensure the entire source remained on land'? There are well-known cases of shallow earthquakes with onshore epicenters that generated tsunamis. In my view all offshore epicentres must be considered, as well as onshore epicentres whose simplified rectangular rupture surfaces extend offshore.

254-255: This sentence is confusing for me. Why are only simulations of the historical tsunami events (377 events) mentioned? In line 269, it is clearly stated that simulations were conducted for the 5,315 seismic events described in section 2.3.

292: TSUSY Database does not have a hyperlink in the footnote.

298-299: I do not fully agree with the statement that 'Operational tsunami warning systems ultimately require a binary decision: for a given earthquake, should the event be considered as tsunamigenic or not'. In practice, a TWS must determine, for each monitored coastal segment, whether that specific area is going to be impacted by a tsunami or not.

369-413: I consider these lines dispensable, as Figure 7 is self-explanatory. The summary provided in lines 414-417 should be sufficient.

452: Please review: 'within the analysed historical dataset'. Suggested: 'within the analysed dataset of simulations'.

487: The choice of threshold values of 0.1 m and 0.4 m appear somewhat arbitrary. A quantitative justification would strengthen the rationale for adopting these particular values.

510: A commonly used benchmark is a wave amplitude of 0.2 m, not a run up of 0.2 m.

513: 'Japan Meteorological Agency, 2023' appears in References section as 'Japan Meteorological Agency, 2025'.

516: Please clarify what 'the value obtained through the literature review' refers to. Is it equivalent to 'The value obtained from the NOAA catalogue'? However, line 150 states that the number of tsunamis extracted from the NOAA catalogue is 377, which contrasts with the number 340 indicated in line 516. The comparison of the number of events labelled as 'tsunami' and the number of actual tsunami occurrences appears to provide limited insight.

520: Why 'this result aligns more closely with the NOAA catalogue'?

522: I feel that the choice of 0.15 m over 0.2 m or any other value is not sufficiently supported. Beyond reporting the number of events labelled as 'tsunami', it would also be useful to compare, for each threshold value, (i) the number of events labelled as 'tsunami' that correspond to a NOAA catalogue record and (ii) the number of events labelled as 'non-tsunami' that are associated with a NOAA catalogue record. This would provide a more robust indication of the adequacy of the selected threshold.

525: I would have expected that combining the 99.98th-percentile value with the number of grid cells exceeding the threshold would provide a better estimate than using only the value of the 99.98th-percentile. Did you attempt to develop a threshold based on such a combination?

553-554: Why not provide the exact rounded percentages (63% and 37%).

555: It would also be informative to mention that 55 % of the TSUSY events labelled as 'tsunami' correspond NOAA events, while the remaining 45% are not included in the NOAA catalogue, even though an explanation is provided in section 4.2.

588: It would also be informative to indicate whether there are high-impact tsunamis that have been labelled as 'non-tsunami' or to state explicitly that no such cases exist.

623: Please review the word 'Replica' in Figure 14 legend. Suggested: 'Aftershocks/Foreshocks'.

629: I do not follow this reasoning: 'Landslide-related and doubtful events are scattered along active margins, reflecting their dependence on local geological conditions and catalogue uncertainty'. Why should these types of events be located along active margins?

824: Tsunami Inundation Database Portal, 2024, is not in alphabetical order.

835-836: Please review the letter case.