EGUSPHERE-2025-4837:
Seismic and Tsunami Hazard Potential of the Negros–Sulu Megathrust, Philippines

Dear Reviewer,

We would like to sincerely thank you for the careful review of our manuscript "**Seismic and Tsunami Hazard Potential of the Negros–Sulu Megathrust, Philippines**" and for giving us the opportunity to submit a revised version. The comments have greatly improved the clarity and overall quality of the manuscript.

The comments have been adopted and carefully addressed, and the manuscript has been revised accordingly. Please find below the responses (highlighted in yellow) to the reviewers' comments, and the revised in-line texts and figure captions (highlighted in cyan). Line numbers in the responses and/or actions refer to revisions that appear in the untracked version of the revised manuscript:

This manuscript presents a valuable and timely contribution to tsunami hazard assessment for the understudied Negros-Sulu megathrust in the Philippines. Given the scarcity of geodetic constraints and the complete absence of this subduction zone from global slab models like Slab 2.0, the authors adopt a pragmatic and well-reasoned approach. By combining structural segmentation, multiple dip angle scenarios (10°, 20°, 30°), and rupture-scaling relationships (Allen & Hayes, 2017), they generate 18 plausible rupture scenarios and model the resulting tsunami propagation using the JAGURS code. The study identifies highly exposed coastal regions (e.g., Sindangan-Labason, Sipalay-Bayawan) and provides critical insights into the roles of wave directivity, coastal morphology, and nearshore bathymetry in controlling tsunami intensity. The findings have direct implications for disaster risk reduction (DRR), including evacuation planning and the targeting of paleotsunami studies. The manuscript is well-organized, the figures are clear and informative, and the discussion of limitations (uniform slip, lack of splay faulting) is honest and constructive. I recommend publication in NHESS after minor revisions.

Major Scientific Comments: Uniform Slip Assumption: The authors correctly acknowledge the limitation of using uniform slip (Section 5.2). The reference to misfit analyses (An et al., 2018; Nakata et al., 2019) justifies its use for identifying "highly exposed areas," which is the stated goal. This defense is sufficient.

Specific Suggestions for Revision
Line 50-55 (Introduction): The mention of the washover deposit in Zamboanga del Sur (Claro et al., 2021) is relevant. Consider briefly stating that this could be a paleotsunami candidate related to the Cotabato or Sulu Trench, tying it back to the need for the exposure maps presented later.
Response/Action:

Thank you for your suggestion. This has been incorporated in lines 331–334 (5.*2 Implications for Tsunami Hazard Potential*):

> This indicates that this coastal region is not only susceptible to the Cotabato subduction zone rupture but also to that of the Sulu subduction zone. In addition, prehistoric extreme wave deposits that may be recovered from this coastal region (e.g., Claro et al., 2021) may also be associated with the Sulu megathrust rupture and tsunami.

Line 165-170 (Methodology): The merging of IFSAR DTM (5m) with GEBCO (15 arcsec) is a good practice. Please specify the resolution of the final merged product used in the simulations.

Response/Action:

This has been adopted in lines 168–175 (*3.2 Tsunami Modeling*):

> We utilized the 15 arcsec-resolution 2024 General Bathymetric Chart of the Oceans (GEBCO) bathymetry data (GEBCO Compilation Group, 2024) as input for the tsunami simulation. To have a higher elevation accuracy of the topography, we resampled the interferometric synthetic aperture radar (IFSAR)-derived 5 m-resolution digital terrain model (DTM) (±1 m vertical accuracy) from the National Mapping and Resource Information Authority (NAMRIA) to 15 arcsec and merged it with the GEBCO bathymetry data. The resulting 15 arcsec IFSAR DTM–bathymetry raster served as the input depth in computing the initial seafloor and seawater displacement for tsunami modeling. As the entire coastal areas surrounding the Sulu Sea were considered for tsunami simulations, high-resolution subgrids for inundation models were not performed due to the absence of high-resolution nearshore bathymetry as well as restrictions in computational capacity and processing time.

Section 4.1 (Megathrust Source Parameters): The segmentation into NT1-1, NT1-2, NT2, ST, ST1, and ST2 is clearly explained. However, a small schematic cross-section (in addition to Figure 3b) showing the relative positions of these segments along strike (e.g., a simple 2D profile) could help readers visualize the segmentation more intuitively.

Response/Action:

Figure 3 has been revised as shown below:

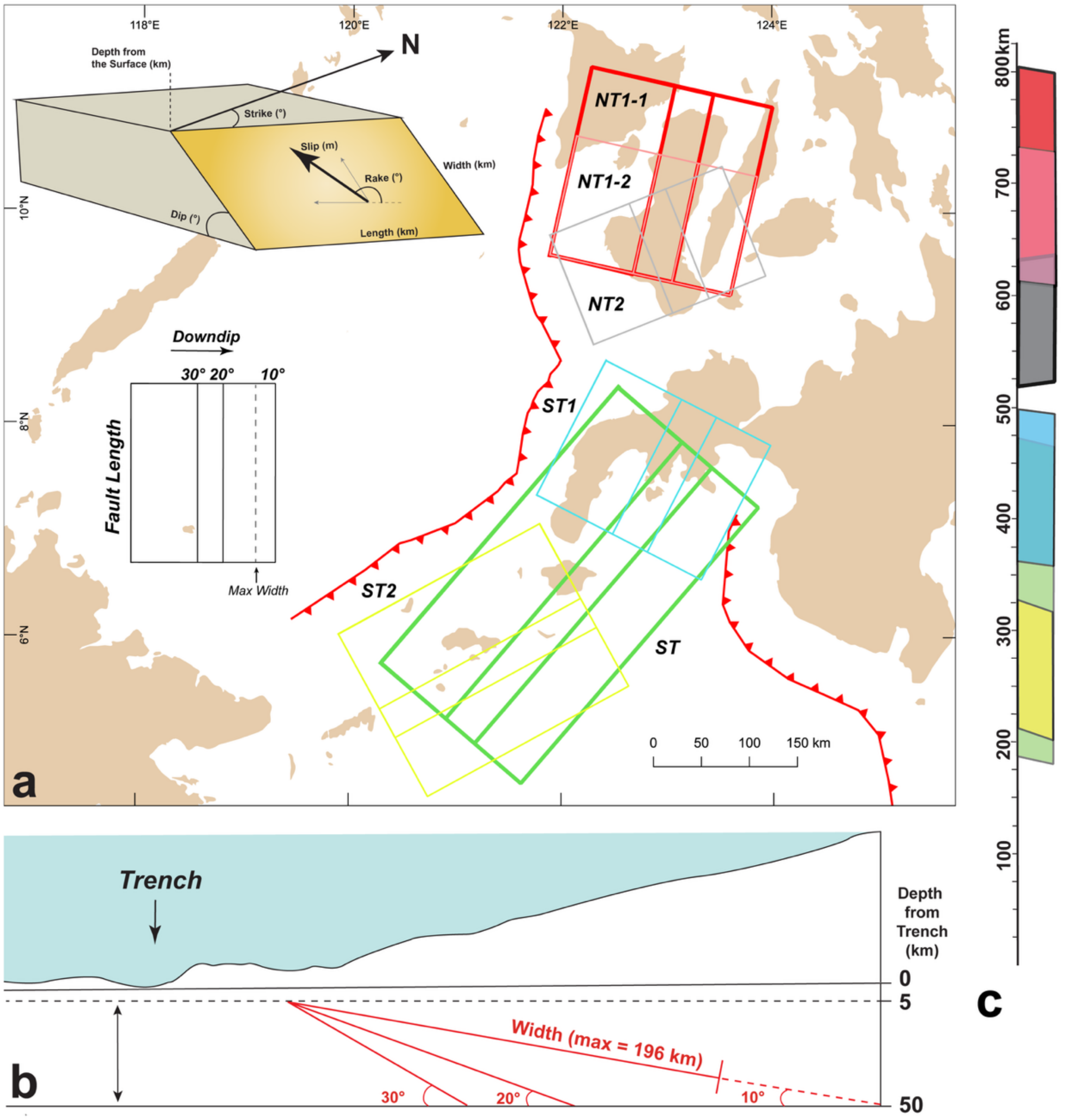

Figure 3. Megathrust fault parameterization of Negros–Sulu Trench segments. (a) A total of 18 sets of megathrust fault parameters were utilized for the tsunami modeling based on six segments and three dip angle scenarios. (b) Cross-section schematic diagram of the megathrust plane, where the width saturates at 196 km and is calculated using sine function. (c) Six cross-sectional segments of the Negros–Sulu subduction zone are projected in the N–S profile. The colors of the megathrust plane follow those in Figure 3a.

Section 5.2 (Implications for Tsunami Hazard Potential): The statement regarding vertical evacuation is crucial. Please consider rephrasing slightly to emphasize that while the study identifies where rapid evacuation is needed, site-specific inundation modeling is required to determine if vertical evacuation is feasible and where safe structures should be located.

Response/Action:

This has been adopted in lines 383–385 (*5.3 Limitations and Future Work*):

> In addition, as the majority of these coastal areas tend to have short arrival times, site-specific inundation modeling and geotechnical analysis are recommended for identifying and creating infrastructure for vertical evacuation.

Figure 14 (Exposure Map): This is an excellent summary figure. Consider adding a small inset map showing the 16 coastal regions (I-XVI) for reference, as they are discussed extensively in the text and other figures.

Response/Action:

In Figure 14, the 16 coastal regions are highlighted as boundaries with Roman numeral labels.

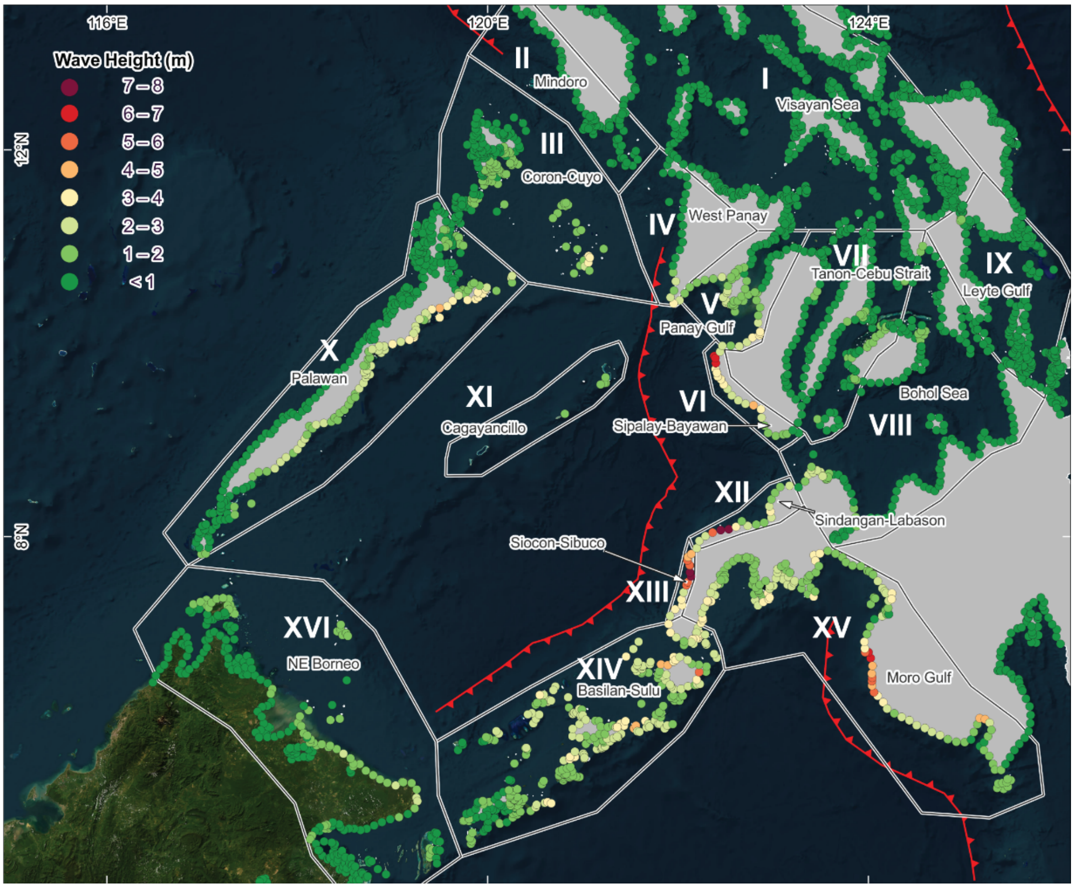

Figure 14. Map of coastal regions in central and southern Philippines showing the highest maximum wave height from the 18 megathrust rupture scenarios. The 6,879 sampling points have a 10 km interval. Basemap from World Imagery.

Technical Corrections

Line 240 (Table 2): The table formatting in the provided PDF appears slightly misaligned (e.g., "NT1-110° v 20°"). Please ensure the final version is typeset correctly so that the segment names and comparison rows are clearly separated.

Response/Action:

Table 2 columns have been aligned.

Line 425 (References): The reference for GEBCO (GEBCO Compilation Group, 2024) has a placeholder DOI. Please update with the correct DOI. –

Response/Action:
The DOI has been updated accordingly.

Figure 5 and 6:The wavefront contours in Figure 6 are very clear. In Figure 5, consider adding a color bar title (e.g., "Wave Height (m)") for absolute clarity, although it is present in the caption.

Response/Action:

Figure 5 was revised to include a color bar/scale:

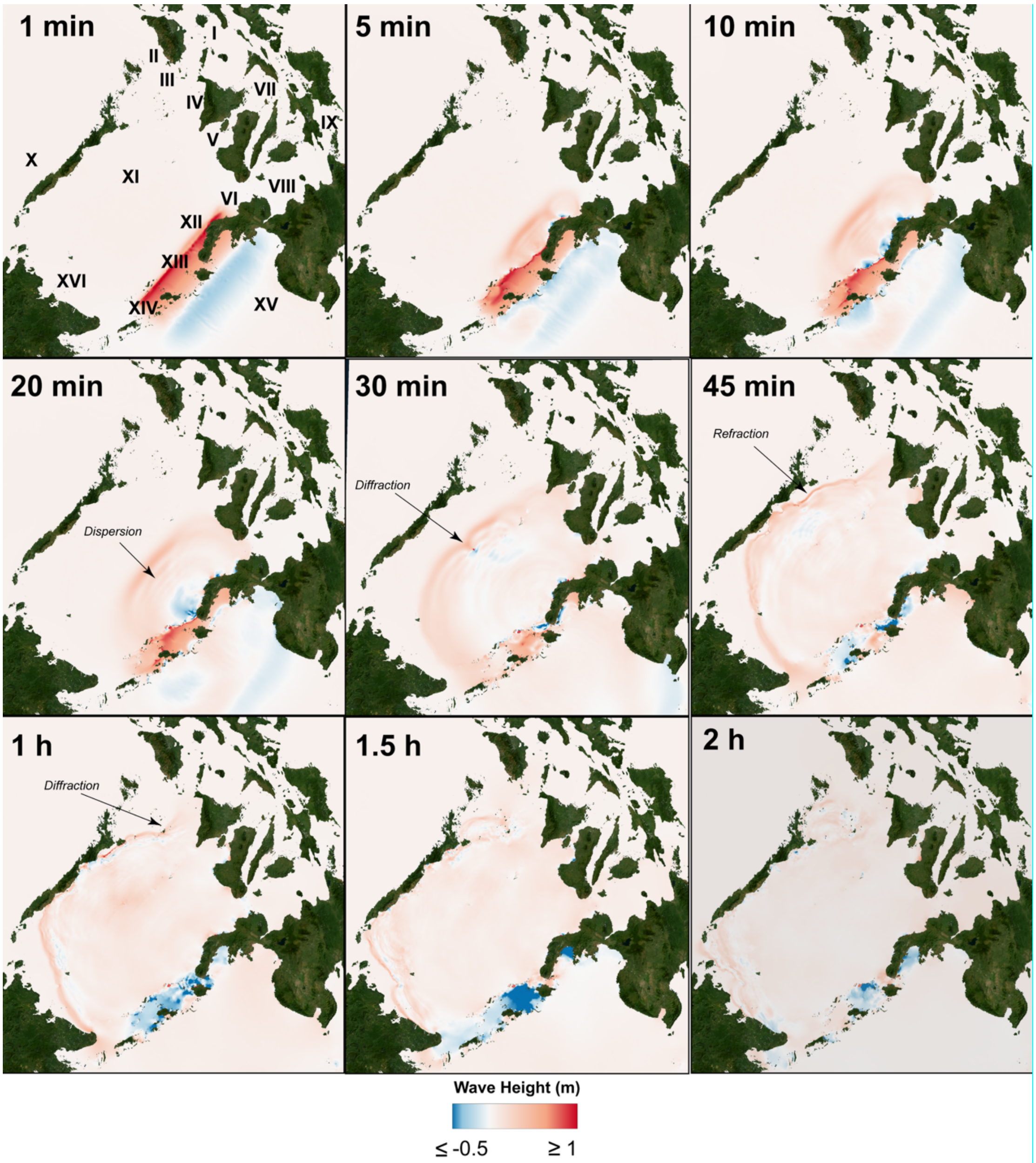

Figure 5. Tsunami wave (2 h) propagation from ST segment at 20° dip angle. Basemap from World Imagery.