

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1
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Comment on nhess-2021-397

Anonymous Referee #1

Referee comment on "Climate-induced storminess forces major increases in future storm surge hazard in the South China Sea region" by Melissa Wood et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-397-RC1>, 2022

This manuscript investigated the storm surge and total water level variabilities along the coasts of South China Sea induced by tropical cycles, using numerical model and synthetic TC database. The study is of interest to the research field because of the novel approach and a region of less studied. Overall, the methodology, results and discussion are reasonably presented. However, there are some concerns related to results method that need to be clarified. There are also some typos in the manuscript and so a thorough editorial review is recommended. The manuscript can be considered for publication after addressing following comments.

Comments:

- Figure 1: change "model location, with location of" to "model domain, with locations of". Also, I think there is a typo "at ~ 250 km depth", it should be "at ~250 m depth".
- Table 1 should be moved to Section 2.1 for discussion. Also the title of Table 1 indicates values reported are for tidal constitutes, which constitutes?
- I have some concerns on the value reported in the Table, it is very questionable that the "mean tidal range" is greater than 8.5 m for Xiamen, 7 m for Beihai, 5.9 m for Vong Tau. Figure 3 clearly showed that the max tidal range at Vong Tau is less than 4 m. Please check and clarify.
- The model resolution of 11 km along mostly the coastal, with finest of ~2.3 km along the coastline of Vietnam, is not sufficient to represent the details of the shoreline and bathymetric features, which are critical for storm surge simulations. Discussion on model accuracy in estuaries and bays is necessary to clarify that the model results should be treated with care in those areas.
- Section 2.3 and Figure 4: storm surge validation is important for this study. It is not sufficient to use Figure 4 to demonstrate the Holland Model is better than ERA5. Model-data comparison at more stations and error statistics should be provided.
- Figure 5. Are the values shown in the figure the number of cyclones? Please provide unit in the legend.
- Line 449: statement "...that tides intensify storm surge hazard" implies the nonlinear

effect of tide and surge interaction but in ~Line 336 the authors showed the nonlinear effect is negligible and therefore the total water level can be calculated by the sum of two separate runs: tide and storm surge. Please clarify.

- How tidal elevation is added to storm surge to obtain the total water level since the synthetic CT does not have a realistic time and date?