

REVIEWER COMMENTS

Main comments:

The paper shows an innovative approach to evaluate whether tide-surge interactions occur when considering mixed-tide environments (when diurnal and semidiurnal tides happen at the same place). In addition, the paper brings an interesting approach to studying the wind-induced surge and the mechanism of mutual phase interaction between surges and tides. Overall, the paper brings high-quality research, and it is well-written. However, it must be improved before publication. My main comments are:

Introduction: I suggest the authors clarify/highlight why tide-surge interactions are important in the study area. Have there been any remarkable extreme events in the past? Is the area prone to typhoons? What about the geographical setting? The authors have mentioned some aspects of it, but looking at the mapping area (Figure 1), I can easily spot more characteristics that can be interesting to mention, like the presence of islands and a land constriction further south. What is the geographical setting of each tide gauge location?

Data and Methods. Some passages in the section are confusing. Here are some general comments:

1. Before the subsections start, I suggest explaining the structure of the method (TSI identification, semi-empirical model), like a "road map." For instance, generally state what the main databases used are and the main steps of the methodology. It should be a short paragraph.
2. Some terms should be better defined, such as "clusters" and "uniform distribution." Also, why use 168 hours to decluster storms? The authors gave an explanation that is not sufficient, in my opinion. They should provide a physical explanation for that. For instance, what is the main duration of storms in the area?
3. The bootstrapping method is a bit hard to follow, as I am not familiar with it. The authors should improve the explanation by introducing more details, further explaining some basic concepts in the text, or making it more visual with some figure or scheme. That would help readers not used to the methodology understand.
4. Why did the authors not consider the storm surge due to the horizontal gradient of the atmospheric sea level pressure?

Results and discussion. Here is where the paper could improve the most. The authors made some interesting analyses but explored little of that in the discussion. The authors should further discuss the link between the statistical analysis, semi-empirical model and physical processes. Little was discussed in terms of physical interpretation. Below I suggest some discussion points:

1. What are the limitations of the semi-empirical model? Does the semi-empirical approach fully consider the local geographical setting and physical processes? Explain why not in more detail and explain how this affects the results. Try to discuss the results while considering each tide gauge's local characteristics.
2. How could the research's findings be useful worldwide? What are the mixed tide regions around the globe? Comparing the manuscript results with some global studies like Arns et al. 2020 and focusing on analysing mixed tide regions could be a good connection point in your discussion.
3. How are data-driven and numerical models' approaches limited to model TSI, and how can the proposed semi-empirical model provide a valuable option for this type of analysis?
4. (optional) Have the authors considered mentioning/discussing the skew-surge approach? How would the mixed tides regime affect methods using skew-surge?
5. The authors mentioned that considering TSI is important; however, they did not explain the main limitations/concerns of not considering it.

Figures. Please pay attention to referencing the panels that each figure contains in the text. I do not know exactly the limit on the number of figures in the main text, but I suggest the authors consider moving some figures from the Appendix to the main text.

Specific comments:

1. **Line 33.** Please define storm surge; I do not think this statement is true. Actually, storm surges (only atmospheric forcing) are larger when the depth is lower (ebb to low tide). That happens because the effects of shallow water are stronger. For instance, the contribution of wind set-up is larger in shallow waters or low tide. Thus, saying that storm surge is larger when high tide is not true. Some authors define storm surge as the sum of non-tidal residuals and astronomical tides. However, the combined water level resulting from non-tidal residuals and astronomical tides is often called storm tide (e.g., Stephens et al., 2020).
2. **Line 84.** What is the vertical reference? Mean sea level? Does the 2.7-3.6 m range refer to the high tide or tide amplitude?
3. **Line 85.** Please change the sentence "Hydrodynamical processes have a strong influence on the water levels at the seven tide gauges" to "Hydrodynamical processes have shown a strong influence on the water levels at the seven tide gauges analysed in this study".
4. **Line 86.** Which hydrodynamical processes? Please be more specific. Also, detailed the local geographical setting. Are the tide gauges on the open coast, inside bays, sheltered by an island?

5. **Line 97:** "Duration and skewness of the tidal cycle." Skewness is not defined in the text. Is it tidal asymmetry? Moreover, are the different durations and skewness a local characteristic? It should be better explained.
6. **Lines 98 -105.** It seems an interesting approach. However, there is too much information in a single paragraph, where the authors add new terms but do not define them properly. I suggest simplifying or omitting some of the content and keeping it to the methods section. I suggest the focus here to be why we cannot use existing methods to identify TSI in mixed tidal regions. The authors said that tide cycles do not have the same duration. Why and how would that interfere with the TSI assessment? The answer is already there, partially. However, the authors must make it clearer.
7. **Line 141.** Where did this information come from? Would the authors have any references to cite?
8. **Lines 142-144.** The paragraph does not follow a logical order. Why are the authors talking about tide periodicity in this paragraph? I do not see a clear connection between the last sentence and the two first sentences of the paragraph. Please make it clearer or separate it into a new paragraph.
9. **Line 157.** Please define clusters. Expressions like "Longlist" and "shortlisted" should not be used.
10. **Line 161.** I found this time period quite large. The authors' use of this needs to be explained better. Which local characteristics have guided the authors to set such a period? Other works in the field usually use a 3-day period.
11. **Line 187.** A uniform distribution is not the most suitable option in which context? Please specify. Also, uniform distribution of what exactly? "Uniform distribution" should be properly defined.
12. **Line 201-214.** I found this paragraph hard to follow, even with the material in the appendix. Please see my notes on "General comments" (Data and Methods, 3).
13. **Line 210.** I suggest adding a short explanation about what a probability mass function is.
14. **Line 264-266.** The sentence "Plotting... at all seven tide gauges reveal a correlation of 0.7-0.8" shows a result. Please remove it and keep this information in the Results section.
15. **Line 267.** Why do the authors need to fit a linear regression to find k? k is given by constants pair, Cd,p,g,D.
16. **Line 274.** Should L_{tide} be a "tidal wave not under or free of the influence of R_{wind} "?

17. **Line 285.** Figure 3 should be described better. For instance, instead of putting Figure 3 in parenthesis, the sentence should start describing the figure. Figure 3 has 7 panels (a-g); why did the authors not mention them in the main text? This happens to most figures with several panels on them. There are no references to the different panels in the text. Please review all your figures and change them accordingly.
18. **Line 290-298.** From a physical point of view (e.g. local geographical set, physical processes), what could explain these differences in time of extreme residual occurrence? That is a good discussion point.
19. **Line 299.** The bootstrapping method should be explained better. Why is it used? Detailed information about it should be described in methods, not results.
20. **Line 311.** Which modes? What figure are you referring to? Are you talking about tidal components, like M2 and S2? Or are you talking about the bins at your histogram of frequency of occurrence? Where did you define modes previously in the text? Is that the statistical mode, e.g., the most frequent value of a distribution?
21. **Line 316.** Please reference the different panels in Figure 4.
22. **Line 331-338.** Please provide some possible physical explanations for the results.
23. **Line 340-343.** This information repeats what was already said in the methods section. Please remove it from methods and keep it here.
24. **Line 344-345.** Are you comparing the timing of Rwind and No-TSI's timing (phase difference)? Or the distribution at which the extremes occur? It is not clear what you are comparing exactly. Please rewrite the sentence to make it clear.
25. **Line 351.** Figures S6-S9 need a better legend. Please replace "counts" with "Rwind" when applicable.
26. **Line 355.** Figures S10-S13 need a better legend. Please replace "counts" with "Rphase" when applicable.
27. **Line 366-373.** Join this paragraph to the last one.
28. **Line 374.** The authors are adding new methods to the results. This procedure should be added to methods, not here. Also, the purpose of Rsum is to compare with Rgauge. Please make it clearer.
29. **Line 378.** "This can also be seen in Figure 4...". Actually, in Cendering, the median and mean are quite similar. Please correct it.
30. **Line 380.** In the sentence " We find that...", where is the result shown? In which figure?

31. **Line 381-384.** This is a good discussion point. Why do diurnal tides not experience the TSI? Please develop a physical explanation for that.
32. **Line 389-394.** I do not understand the connection between the last sentence and the rest of the paragraph. It is not clear what the point of discussion is. This last sentence should be the start of your paragraph (topic sentence), and your results (first two sentences of the paragraph) should support your idea. Please rewrite the paragraph to make your ideas and discussion clearer.
33. **Line 395.** Please Remove “however”.
34. **Line 395.** Should I compare R_{gauge} and R_{sum} ? If so, this needs to be better explained in the methods section and in the text. Which figures should I look at? Please refer to the text.
35. **Line 402 – 406.** Interesting discussion point; however, the authors should develop it further. What could you change in your model to account for these limitations? Here, you should talk about why your model is limited, how you could improve it, and reference works that may have done it somehow. The authors cited 2 references but did not give much detail and explore it further. I could see you used a constant depth to obtain R_{wind} . You should maybe account for shallower depths and several values. For instance, could you repeat the process by considering different depths? For example, you could calculate L_{wind} and R_{wind} from bathymetry 60m-40, then after 40-20, 20-10m... Do you think that would make a difference? Also, should we take different wind directions into account? Another point would be: Are there any local wind observations? You could use it instead of ERA5. Maybe some conceptual figures could be placed here to help explain mutual phase alteration, etc.... Another point is to discuss the other main mechanisms of tide surge interaction: advection, shallow water effects, and bottom friction. Are all your tide gauges located on the open coast? Or is any of them at a bay or harbour/estuary? That could have a massive impact on your results. Please see general comments on other important discussion points.
36. **Line 408.** I believe a similar approach was used by Arns et al. 2020.
37. **Line 411: “No-TSI distribution should be used instead of a uniform distribution.”** I propose you perform a classification using a uniform distribution of your data and see how it performs compared to your approach. This would illustrate clearly what you want to show. It could be for only 1 or 2 sites. This would give you a good discussion point in the discussion section.
38. **Line 423:** " We found the residual component caused by advancement of tidal HW." Does the wind cause this? Please rewrite the sentence.
39. **Lines 430-433.** Please move this sentence to the discussion section. There are usually no citations in the conclusion section.