Dear Editor and Reviewer

We are very pleased to have your comments concerning our manuscript entitled "Statistical analysis of dynamic behavior of continental shelf wave motions in the northern South China Sea" (egusphere-2023-1274). Thank the editor and reviewers for taking time out of your busy schedule to review our paper and provide constructive comments on it.

We have read and dealt with all the comments carefully. The revised manuscript with all comments highlighted with blue fronts has been uploaded, and point-to-point responses to the reviewer's comments are present following.

Response to Comments of Reviewer 1 (Red font in the manuscript)

[**Comment 1**] Introduction. The authors added some basics of continental shelf waves together with some references (the first two paragraph), which I think is fine. But I still think it is not necessary to talk about the relationship between sea level variations in the SCS with ENSO; the ENSO-related variability is not mentioned in the rest of the manuscript except the Introduction.

(Editor: I agree. If you wish to keep this in the Introduction then you should have something new about the relation with ENSO also in the Discussion. I also agree with the following referee comments).

Response: We feel great thanks for your professional review work on our article. It is not easy to analyze the ENSO's impact on CSWs based on the main result. Discussion for ENSO could be carried out from Figure 9-10. However, these results are the secondary outcome. After careful consideration, the references have been deleted. The others, involving seasonal variability of sea level, are kept. We hope we could analyze the relationship between CSW and ENSO in future.

Deleted sentences:

Rong et al. (2007) investigated the relationship between ENSO (El Niño and Southern Oscillation) and interannual variability of sea level in the SCS.

Wang et al. (2017) found that seasonal level anomalies are closely related to ENSO events (Wang et al., 2022).

[**Comment 2**] Fig. 5. The authors added two sentences in L323-327 of the revised manuscript, which do help me better understand the "remarkably different characteristics" between signals with periods shorter and longer than 40d. However, the authors seem to wrongly describe the left and right directions of the arrows, both in the manuscript and the response file. For example, I see from Fig. 5d that the arrow directions are primarily pointing "down-right", instead of "bottom left" as stated in L324. (There are more such cases in the response file.) Also, the arrow directions seem more uniform in the enlarged version (Fig. 5d) than in the original full time range (Fig. 5c) for the period shorter than 40d. But even in Fig. 5d, the arrows are not "uniformly" displayed (e.g., the arrows point rightward at period ~16d from Jan to Feb 1994), then how do you obtain this constant lag period of 15h (L329) for signals at Xiamen and Kanmen?

Response: (1) I'm awfully sorry about the problem of the directions of the arrows. We have checked and revised the error. That is "down-right", not "bottom left".

(2) The arrows are more uniform in Figure 5d than that in Figure 5c. The reason is the resolution and length of the data that we used. The relative quantity of arrows is less for larger data. That is the issue of display. It will not affect the results. Moreover, error bars (from not uniform arrows) are shown in Figure 7.

(3) time lag=phase difference/2π×period. Simply, the arrows point down-right, i.e., π/3. The period of signals is about 100 h. The time lag is about 16.7 h.
We have added sentence into the manuscript.
Line 327: (time lag=phase difference/2π×period of signal)

[Comment 3] Previously I suggest making the theoretical part for CSW and ATW more parallel, but the authors explain that this manuscript focuses on CSW and hence this part leans more toward CSW. I accept that.
Response: Line et al. (2021) has presented an excellent result for ATWs using gridded sea surface height. In this study, we use along-track SLAs to show the cross-shelf structure of ATW. We think it is better to focus on CSWs than ATWs.

[Comment 4] L51-52. motion -> motions, wave -> waves.
Response: The typo is revised.

[Comment 5] L97. Change to "... a counterbalance of contributions from the along-shelf wind and bottom friction and well predicted by the ATW model".
Response: We have added the words "bottom friction" into the manuscript.

[Comment 6] L271. Change to "The solution for SSH based on Eqs. (20a-c) is (Csanady, 1978)"
Response: We sincerely thank the reviewer for careful reading. We have revised the sentence.
L267: "The solution for SSH based on Eqs. (20a-c) gives (Csanady, 1978)"

[Comment 7] L324. "... point ... uniformly" -> "... generally/primarily point ..."
Response: Done.

[Comment 8] L325. uniform -> quasi-uniform.
Response: We agree with this comment. It is done.

[Comment 9] L326. While -> However
Response: The typo is revised.

[Comment 10] L326. "in the lower period band" -> "for the period band longer than 40 d"
Response: Done. The expression is clearer now.

[Comment 11] L329. Kamen -> Kanmen
Response: The typo is revised.

Response to Comments of Editor (Blue font in the manuscript)

Comments:
(1) Line 53. "Overall, . . ." This sentence should exclude flat bottom boundaries.
Response: Thanks! Kelvin wave is a kind of gravity wave. The former sentence has been deleted from the manuscript.
"If the bottom boundary is flat, it propagates as a Kelvin wave."

Comments:
(2) Lines 63, 101. "repeated" –> "repeat".
(3) Line 117. "repetition" –> "repeat".
(4) Line 124. "processed" –> "processes"
Response: Thanks for your comment.
All "repeated" have been replaced by "repeat" in Lines 62, 97, 424, 428, 599, 560.
"repetition" has been replaced by "repeat" in Line 113.
"processed" has been replaced by "processes" in Line 120.

Comments:
(5) Line 176. You cannot say that "$\partial u/\partial t = 0$" but you should summarize your response to review 1 Comment 6 that the scaling implies $\partial u/\partial t \ll$ fv in (1a).
Response: Thanks for your useful comment. Corrections have been done.
Line 171: "Under the long-wave assumption, a nondimensionalized could be applied to Eqs. (1a-b). Then, $\partial u/\partial t \ll fv$. We neglect the $\partial u/\partial t$ term, and Eqs. (1a-b) become"

Comments:
(6) Line 255. "evolution" –> "structure" or "profile".
(7) Line 271. "becomes" –> "give"
(8) Lines 283-284. This is confusing. I think best to omit "equal to the deformation radius, and" in line 283.
Response: Done.

Comments:
(9) Line 318. You need to say which of Kanmen and Xiamen is leading (for pointing down) or lagging (for pointing up).
Response: Yes, we have added additional sentence as suggested.
Line 314: "In (d), arrows point down-right (about $\pi/3$), indicating SLA in Kanmen is leading that in Xiamen."

Comments:
(10) Line 326. "lower" –> "longer"
(11) Line 414. ". . Even though one can see . ."
Response: We have corrected and added the words as suggested.

Comments:

(12) Lines 417-418. I think better ". . The sea level . . should show coastal trapped waves influenced by stratification." There is only one set of waves (i.e. not "baroclinic and barotropic") and your response Table 1 precludes "baroclinic . . CSWs" all the symbols, i.e. red crosses.

Response: We have corrected the sentence as suggested.

Line 416: "The sea level variation in this study should show coastal trapped waves influenced by stratification."

Comments:

(13) Line 434. "outliers at the 5 % significance level" is unclear. How exactly is an outlier defined? Figure 8 caption needs to explain all symbols, i.e. extent of boxes, dashed lines and red crosses (better here than in the main text).

Response: We have corrected the sentences as suggested. We have deleted "outliers at the 5 % significance level". Outliers are the most extreme data points and explained in the figure caption.

Line 446: "In each box, the central red line indicates the median, and the bottom and top edges of the blue box indicate the 25th (Q1) and 75th (Q3) percentiles, respectively. The upper (Q3+1.5IQR) and lower (Q1-1.5IQR) whiskers extend to the most extreme data points not considered outliers. The outliers are the most extreme data points (larger than upper whisker or smaller than lower whisker), plotted individually using the red cross marker. IQR= Q3-Q1."

Comments:

(14) Lines 446-447. Better "The along-track SLA is averaged for each 15 km offshore"?

Response: Many thanks. I have replaced the sentence as suggested.

Comments:

(15) Please format Table 2 to optimise vertical alignment. Better "Maxi" –> "Max", Mini –> "Min".

Response: Thanks. I have revised the words as suggested.

Comments:

(16) Lines 464-465. "It should contain higher modes in the along-track SLA." –> "The along-track SLA should contain higher modes."?

Response: Thanks. I have replaced the sentence as suggested.

Comments:

(17) Figure 10 caption. What is the green curve in panel h?

Response: We have added the caption.

Line 510: "Green curve in (h) is climatological monthly mean of sea level data at tide-gauge station Zhapo."

Comments:

(18) Line 538. Please define Peβ.

Response: We have added information for Pe$_\beta$.

Line 543: "Wu (2021) used a nondimensional parameter (Pe$_\beta$= D$_\beta$/α) to describe the influence of open ocean forcing on shelf circulation, which is determined by the ratio of long-wave-limit

planetary to TRW speeds (D_β) and linear Ekman number (α)."