Dear editor and reviewers,

On behalf of my co-authors, we thank you for giving us a chance to revise and improve the quality of our article.

We have read your comments carefully and have made revision. We have tried our best to revise our manuscript according to the comments: “Application of Wave-current coupled Sediment Transport Models with Variable Grain Properties for Coastal Morphodynamics: A Case Study of the Changhua River, Hainan (egusphere-2024-2154)".

The main revisions in the new manuscript are:

1. **Clarifications and Corrections in Text**: We have addressed the inconsistencies in terminology.
2. **Figure Adjustments**: We have revised and removed some figures.
3. **Revised Figure Presentations**: We have adjusted the presentation of Figures 12 and 13 to include speed and arrows for the entire field, as suggested.
4. **Reduction of Arrow Spacing**: In Figures 11 and 12, we have reduced the spacing of the arrows to maintain clarity while providing a detailed representation of the flow field.
5. **Supplementary Material**: Figure 2, 4 and 6b has been moved to the Supplementary Material.
6. **Removal of Redundant Information**: We have removed some sentences that causing confusion.
7. **Unit Consistency**: We have ensured that all figures include the appropriate units for clarity.

Here is a point-by-point response to the comments and concerns (35 comments from reviewers and 17 comments from editor.).

Thank you for taking the time to consider our research and we look forward to hearing from you at your earliest convenience.

Sincerely,

Yuxi Wu

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Detailed comments part:

Point 1 (Abstract): Line 15,18 and 22. I would recommend avoiding mentioning specific locations in the abstract. At this stage, the reader is unaware of the geographical context. The abstract should be written in a way that captures the attention of the reader based on the scientific outcomes of the study.

Line 17 There is no theoretical method in the new version. This must be removed.

Response (Lines 13-23): Thank you for your insightful comments on the abstract of our manuscript. We have taken your suggestion to heart and revised the abstract to focus more on the scientific outcomes of our study rather than specific geographical locations. We believe this new version captures the essence of our research and its broader implications for sediment dynamics in river deltas. Additionally, we have removed theoretical method in the new abstract

The updated abstract now reads:

"*This study introduces an integrated sand transport model that considers wave and current actions alongside variable grain properties to explore sediment dynamics in river deltas. The research delves into a case study of a river delta region, examining sediment transport over a substantial stretch of the river's lower course. The study incorporates topographic data, sediment sampling, and remote sensing to validate the model against observed suspended sediment concentrations at a key monitoring station. The results reveal substantial sediment deposition in both the estuary and lower reaches of the river, influenced by hydrodynamic conditions and geological settings. Deposition patterns in the estuary are primarily driven by coastal currents and wave action, while river channel deposition is linked to river constriction and flow velocity variations. The study demonstrates that the residual current in the region consistently flows towards a nearby bay, suggesting that sediment in the lower reaches of the river will be directed by this residual flow. The study underscore the pivotal roles of current and wave action in sediment transport within multi-branched estuary characterized by low sediment concentrations, which can inform coastal management and environmental planning.*"

Point 2 （Introduction）: Figure 1 I reckon most of the information regarding stations should be included here in separate figure panels. For example, the current map provides an overview of the study case (although the upper and middle reaches are not really of interest). There could be one more panel with the sampling points (Figure 3) and another one with the ADCP stations and calibration stations. I couldn't find any figure showing where the Baoqiao and Bosua stations are. Giving their coordinates is not enough. Such changes could make the manuscript more concise and precise.

Response (Lines 41-44): Thank you for your constructive feedback regarding the figures in our manuscript. We have carefully considered your suggestions and have updated Figure 1 to include all the necessary information in a single, comprehensive figure. Here are the specific changes we have made:

We have integrated the sediment sampling points, which were previously shown in Figure 3, into a new panel within Figure 1. This panel now provides a clear visual representation of the locations where sediment properties were analyzed, as indicated in the caption: "(c): Sediment sampling points in the lower reaches of the river."

We have also added a panel displaying the ADCP stations and calibration stations within Figure 1. This panel offers a detailed map view of the locations where current velocity and direction were measured, as described in the caption: "(b): ADCP stations and calibration stations in the study area."

In response to your comment about the Baoqiao and Basuo stations, we have included their exact locations on the updated Figure 1, ensuring that readers can easily identify these critical sites within the context of our study area.

The revised figure 1 now reads as follows:

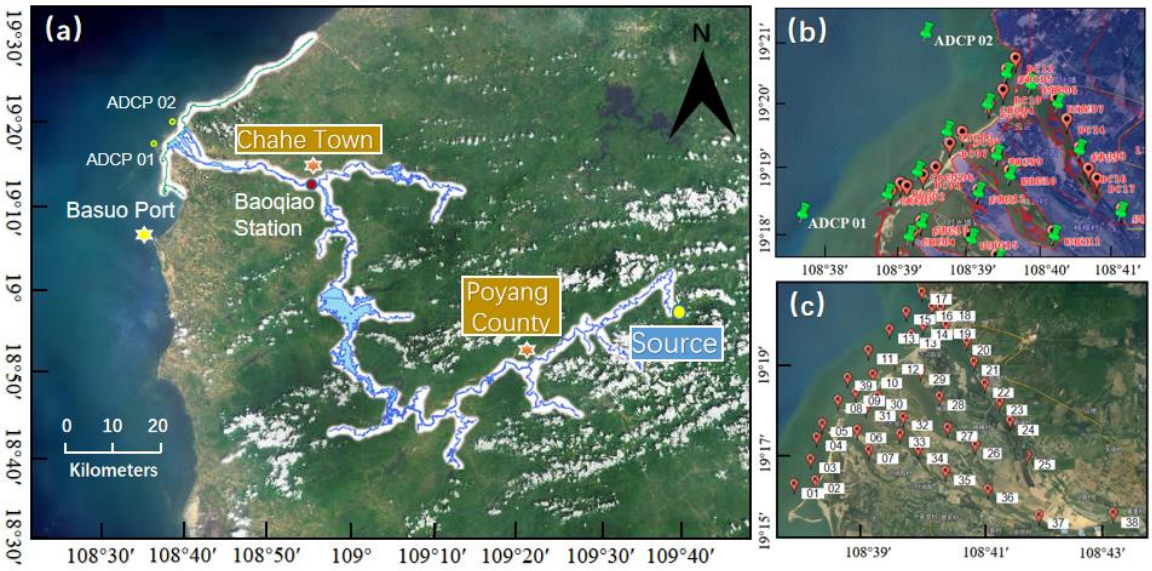

Figure 1: Comprehensive Overview of the Study Area in the Lower Reaches of the River. (a): Division of the Upper, Middle, and Lower Reaches of the Changhua River (Adapted from the Tiandi Map·Hainan); (b): ADCP stations and calibration stations in the study area; (c): Sediment sampling points in the lower reaches of the river.

Point 3 (Introduction): Line 81-91: This paragraph is important as it gives the motivation and goal of this study. To my understanding, what this paper tries to highlight is the role of wave action on determining sediment transport in multi-channel estuaries with small sediment concentrations and the need to use coupled wave - current and sediment transport models for this purpose. A general comment is that the abstract and conclusions do not emphasize on how these results prove this statement.

Response (Line 21-23, 553-555): Thank you for your insightful comments on our manuscript. We have taken your suggestions to heart and have revised both the abstract and the conclusion to better emphasize how our results support the central thesis of our study.

In the abstract, we have added a sentence that underscores the importance of wave action in sediment transport within low sediment concentration estuaries and the effectiveness of our coupled modeling approach. The added sentence now reads:

"The study underscore the pivotal roles of current and wave action in sediment transport within multi-branched estuary characterized by low sediment concentrations, ..."

In the conclusion, we have included a sentence that states how our findings validate the initial hypothesis. The added sentence now reads:

"...Through the application of an integrated wave-current coupled sediment transport model with variable grain properties, we have successfully simulated and analyzed the sediment behavior under the combined influence of waves and currents, particularly in multiple sub-estuaries with low sediment concentrations."

Point 4 (Section 2): Figure 2 I don't think this figure is really needed. Citing Van Rijn's paper where this figure can be found should be enough. Otherwise, it is just an unnecessary waste of space. I would also recommend moving some of the figures and tables to the Supplementary. For example, Figure 4 and 6b could be moved there.

Response: Thank you for your thorough review of our manuscript and for your insightful suggestions regarding the figures. We have taken your feedback into account and have made the following adjustments:

1. **Figure 2 Removal**:

   We have removed Figure 2 from the main text, as you recommended. Instead, we will cite Van Rijn's paper where the relevant information can be found. This change helps to streamline the manuscript and avoids unnecessary repetition.

2. **Figures Relocation to Supplementary Material**:

   Figures 4 and 6b have been moved to the Supplementary Material. This relocation will maintain the integrity of our data presentation while ensuring that the main text remains concise and focused on our key findings.

Point 5 (Section 2): Figure 7 Add units

Response (Line 260): Thank you for your meticulous review of our manuscript. We have carefully reviewed Figure 7 and have now included the necessary units for all measurements displayed. Each data point and axis label now clearly indicate the corresponding units, and the figure caption has been updated to reflect these changes.

The figure has been revised to:

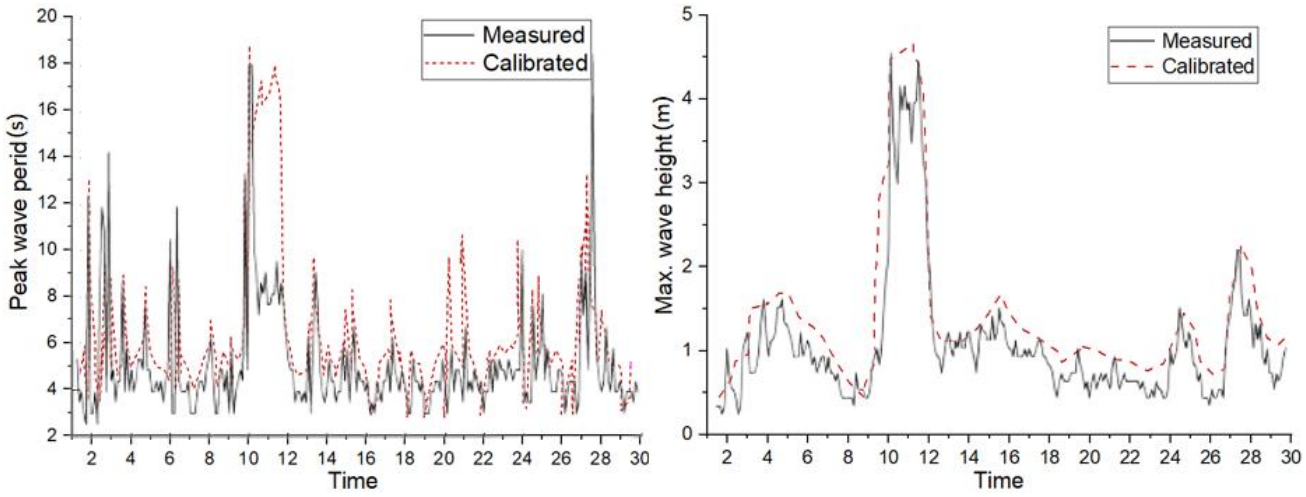

Figure 7: Comparison of maximum wave height and peak wave period calculated with the calibrated model against the field measured (Adapted from the study by Wang (2023)).

Point 6 (Section 2): Line 122 Shields parameter

Response (Line 125): Thank you for your careful review and for pointing out the oversight regarding the Shields parameter in our manuscript. We have corrected the word at line 122 to accurately represent the critical Shields parameter.

The revised part now reads as follows:

"...and the critical Shields parameter."

Point 7 (Section 2): Line 126 Influence

Response (Lines 127): Thank you for your careful review and for drawing our attention to the verb form at line 126. We have made the necessary correction, replacing "influences" with "influence" to ensure grammatical accuracy and consistency within the sentence.

The revised part now reads as follows:

"2.2 Influences of Waves and Currents"

Point 8 (Section 3): Figure 6 I'm afraid there is still an inconsistency between the lat and lon stated in line 210 and what we see in panels a and c. Especially in c, the right limit is cut at 108º 43' and not 108º 50'. Please remove the 'open' and 'land' boundary indications in Figure 6c, these are not correctly placed, and the boundary locations are quite obvious from the bathymetry. Figure 6 b could go in a Supplementary. I would suggest following the pattern of Figure 5, having the bathymetry over a basemap so that everything is given in one panel. The lat and lon coordinates in Figure 5 seem correct and in accordance with line 210. The study area has also been given in Figure 1. No need to repeat it.

Response (Line 217): Thank you for your continued attention to detail and for your feedback on Figure 6. We have made the following adjustments based on your suggestions:

We have corrected the latitude and longitude inconsistencies between what was stated in line 210 and what was displayed in Figure 6.

We have removed the 'open' and 'land' boundary indications from Figure 6c, as they were not placed correctly and the boundary locations are indeed quite obvious from the bathymetry.

Figure 6b has been moved to the Supplementary Material, following your suggestion.

The revised figure 6 now reads as follows:

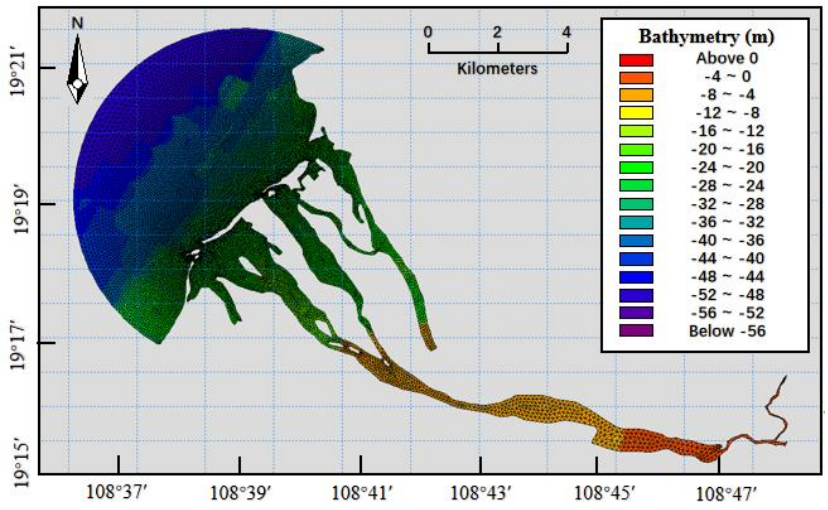

Figure 3: Grids and boundaries of study area

Point 9 (Section 3): Line 234 what means accuracy of 1cm?

Response (Line 233): Thank you for your inquiry regarding the "accuracy of 1cm" mentioned at line 234 in our manuscript.

"1cm accuracy" refers to the precision of the tidal level data extracted using the Earth and Space Research's (ESR) Matlab 'Tide Model Driver' (TMD) toolbox. This high level of precision is crucial for ensuring the accuracy of our model's boundary conditions.

We have decided to remove the reference to "1cm accuracy" from line 234 to avoid any confusion.

Point 10 (Section 3): Line 235 The authors need to mention what the abbreviation ECMWF stands for

Response (Line 234): Thank you for your feedback regarding the abbreviation ECMWF mentioned at line 235 in our manuscript. We understand the importance of providing full names

for abbreviations upon their first mention to ensure clarity for our readers.

We have added the full name of ECMWF, which stands for the European Centre for Medium-Range Weather Forecasts, to the text at line 235. The revised sentence now reads:

"..., with data sourced from European Centre for Medium-Range Weather Forecasts (ECMWF) at a resolution of 1/8° × 1/8°."

Point 11 (Section 3): Be careful with the exponents in the units (e.g., line 239 and line 241).

Response (Lines 237, 238, 240): Thank you for your vigilant review and for bringing the exponents in the units to our attention, specifically at lines 239 and 241.

We have carefully reviewed the use of exponents in our manuscript and have made the necessary corrections to ensure that all units are expressed with the appropriate mathematical notation. We have also ensured that our scientific notation is consistent and follows standard conventions.

Point 12 (Section 3): Line 248 I deem this sounds a bit superfluous. Are there really limitations in FVCOM for wave calculations? If yes, they need to be mentioned.

Response (Line 247): Thank you for your feedback on line 248. Upon review, we agree that the mention of limitations regarding the FVCOM model in wave calculations might be misleading and is not necessary for the context of our study.

We have decided to remove the sentence from line 248, as it does not add significant value to our methodology section. The FVCOM model is utilized effectively within its capabilities, and

the inclusion of the SWAN model serves to complement our study's specific focus on wave dynamics.

Point 13: Line 249 Being a model package issued by Deltares, I recommend that the authors cite SWAN by referring to its manual as e.g., (Deltares, 2024) or whatever version of the model they are using.

Response (Line 247): Thank you for your suggestion regarding the citation of the SWAN model at line 249. We appreciate your guidance on ensuring proper academic referencing standards are met.

We have updated the reference to the SWAN model by citing its manual as follows:

" This study selects the widely-used third-generation SWAN model (Deltares, 2024) for numerical simulation of wind waves in this region. "

Point 14 (Section 3): Table 4 Manning equal to 28 is unrealistic. Do you mean 0,028? I recommend removing Shoreline and Bathymetry from the table, these are not really parameters. Info about bathymetry is already given in the manuscript. There is no mention of GSHHS in the manuscript.

Response (Lines 219-220): Thank you for your meticulous review of our manuscript, particularly your comments on Table 4. The Manning coefficient should be 0.028, not 28. This was an oversight, and we have corrected this value in Table 4. We agree that "Bathymetry" do not belong in the table as parameter. We have removed it from Table 4. Upon review, we realized that GSHHS was not mentioned in the main text. We have now incorporated a description of the Global Self-consistent Hierarchical High-resolution Shorelines (GSHHS) in the methodology section, detailing at which resolution we extracted the shoreline data for our

study.

The revised text in line 296 now reads:

" In the study, we utilized the Global Self-consistent Hierarchical High-resolution Shorelines (GSHHS) to extract the shoreline data at full resolution. ..."

And the Table 4 has been updated to:

Parameter	Value
Shoreline	GSHHS
Grid	0.25 km at the boundaries to 25 m near the coastline
Time period	23/4/2023 00:00-30/4/2023 00:00 (Spring to neap tide) 28/6/2022 00:00-1/8/2022 00:00 (Wet season period)
Manning number	28
Eddy viscosity	Smagorinsky formulation data 0.28 m^2/s
Time step	300 s
Tidal constituents	M2, S2, K1, O1, N2, K2, P1, Q1
Wind/Sea level Pressure	ERA 5
Validation	Basuo Port Station (19°06' N, 108°37' E) ADCP 01, ADCP 02

Point 15 (Section 3): Line 250 Table 5 not 6

Response (Line 248-249): Thank you for your attentive review and for pointing out the reference error at line 250. We have corrected the table reference from "Table 6" to "Table 5" as you indicated. This error was indeed a typographical oversight, and we appreciate your diligence in ensuring the accuracy of our manuscript.

The revised text in line 296 now reads:

"The parameters used in the model setups are based on the values listed in Table 5."

Point 16 (Section 3): Figure 7 Add units in the axes

Response (Line 260): Thank you for your previous feedback regarding Figure 7. I have now

reviewed and updated the figure to include the units on the axes, as suggested.

The units have been added to ensure clarity and consistency in the presentation of our data. I believe this adjustment addresses your concern and improves the overall quality of the figure.

The revised figure now shows as follows:

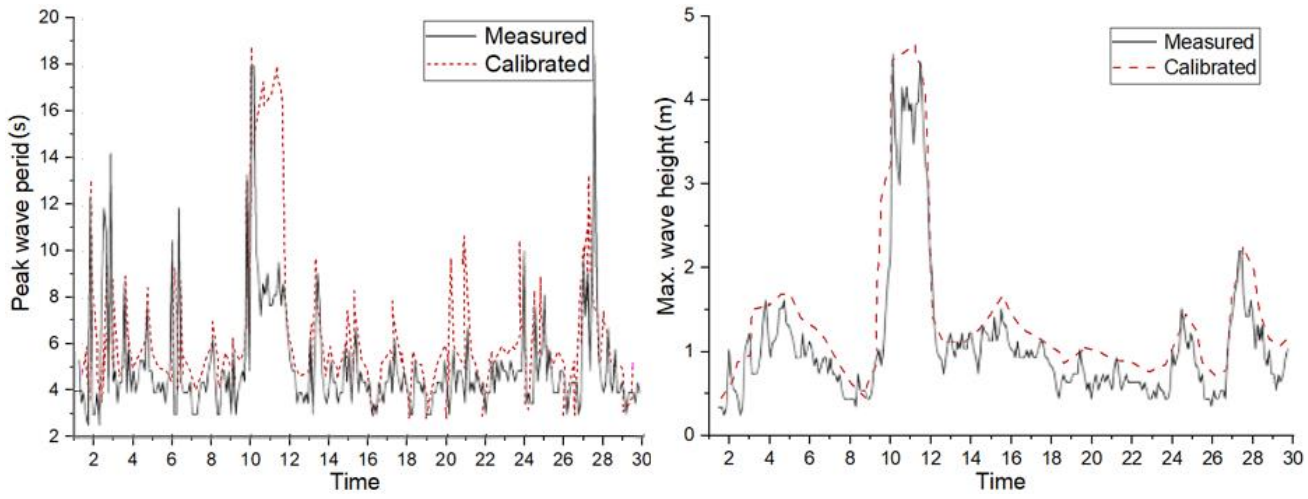

Figure 4: Comparison of maximum wave height and peak wave period calculated with the calibrated model against the field measured (Adapted from the study by Wang (2023)).

Point 17 (Section 4): Line 278 The location of the Basuo station needs to be included in Figure 9 together with the ADCP stations. Giving only its coordinates is not useful.

Response: Thank you for your continued attention to the details of our manuscript, particularly regarding the location of the Basuo station. I appreciate your suggestion to include the location of the Basuo station in one figure along with the ADCP stations. We have added this information into Figure 1. Figure 1 provides a comprehensive overview of the study area, including the location of the Basuo station and other key sites

Point 18 (Section 4): Figure 10 It would be good to add hours in the x axis in panel

b where results are given only for one day.

Response: Thank you for your suggestion to include hours on the x-axis of Figure 10, Panel b. We agree that adding these details will enhance the readability and clarity of the figure, particularly since the data presented spans only one day.

We have updated Figure 10, Panel b, to include hour markers on the x-axis. This addition provides a more precise temporal context for the data points, allowing readers to easily interpret the results throughout the day.

The revised Figure 10 now reads:

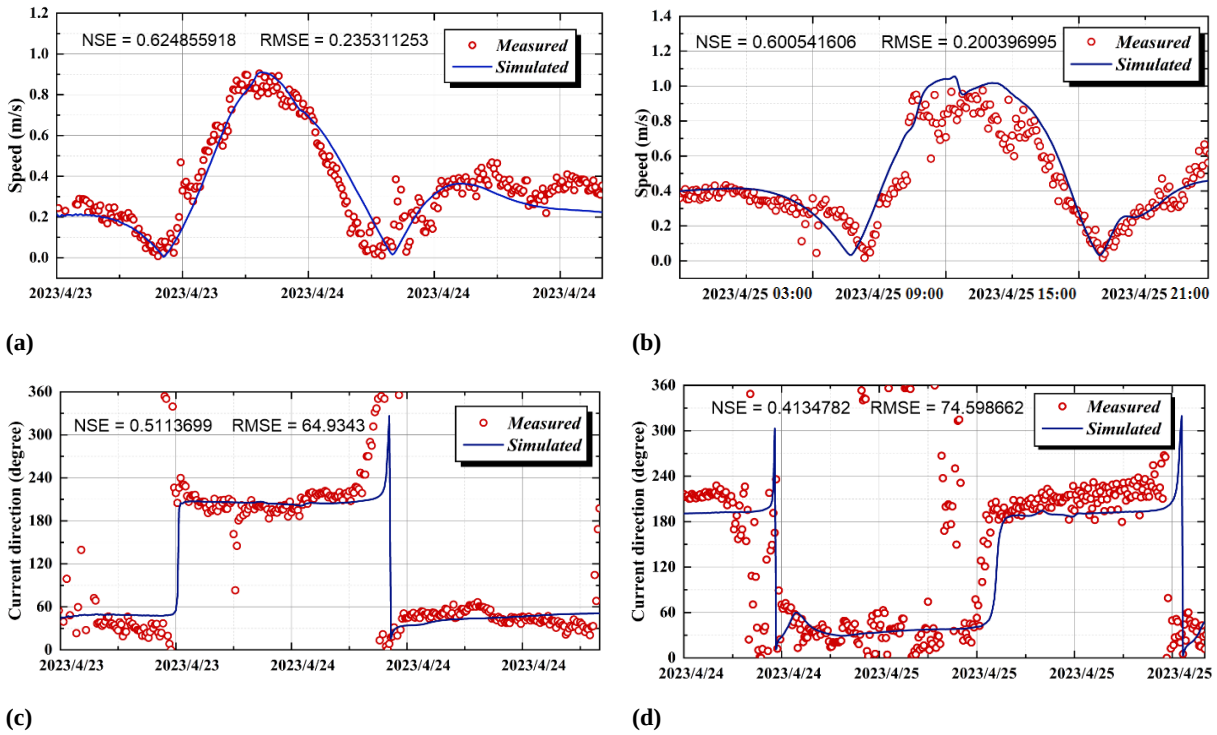

Figure 6: Current speed and direction verification. (a) speed verification of ADCP 01; (b) speed verification of ADCP 02; (c) verification of current direction of ADCP 01; (d) verification of current direction of ADCP 02

Point 19: I think the results analysis described in this section does not correspond to the figures mentioned. In the manuscript, lines 303-307 mention Figure 10b and c but they obviously mean Figure 11. Please check these inconsistencies throughout the manuscript as this makes it very difficult for the reader to

understand the arguments.

Response (Lines 304-305): Thank you for bringing the inconsistencies between the results analysis and the figures mentioned in lines 303-307 to our attention.

We have corrected the references in lines 303-307 from Figure 10b and c to Figure 7, as it aligns with the content discussed in the text.

The revised text now reads:

"The hydrodynamic simulation outcomes, as depicted in Fig. 7, ... Figure 7b and 7c depict the flow field outside the estuary of the Changhua River. Figure 7b shows ..."

Point 20: Line 305 It is probably better to say 'outside of the lower reaches of Changhua River' and not outside the estuary.

Response (Lines 402-405): Thank you for your suggestion to refine the language used at line 305. But following your previous suggestions, we have revised the manuscript, and as a result, the sentence in question has been removed. The revisions were made to ensure clarity and consistency throughout the document, particularly in the representation of geographical details.

Point 21: Line 316 Figure 12 and not 11

Response (Line 423): Thank you for your careful review and for pointing out the reference error at line 316. We have corrected the figure reference from "Figure 11" to "Figure 7". This error was indeed a typographical oversight, and we appreciate your diligence in ensuring the accuracy of our manuscript.

The revised sentence now reads:

"Figure 7a shows the flow field at 23:00 on April 23, 2023, ..."

Point 22: Line 317 The authors name A,B and C as estuaries but later in the conclusions they refer to them as channels. First, there needs to be a consistency in the terminology throughout the manuscript. Second, whether these can be defined as estuaries or channels can be subjective. Personally, I see these more as sub estuaries and not real estuaries.

Response (Line 425-427): Thank you for your feedback on the terminology used for the areas labeled A, B, and C in our manuscript.

We have reviewed the terminology throughout the manuscript and have standardized the references to A, B, and C. Based on your suggestion and our reevaluation of the characteristics of these areas, we have decided to refer to them as sub-estuaries to more accurately describe their nature within the context of our study.

Point 23: Figure 12 Choose a different colour for the flow vectors or change the colourmap. The arrows can't be seen.

Response (Lines 425, 430): Thank you for your feedback on the visibility of the flow vectors in Figure 12. In response to your suggestion, we have opted to enhance the visibility of the flow vectors by adjusting the color bar of the flow field rather than changing the color of the vectors themselves. This approach maintains the consistency of the vector colors while improving contrast against the background.

We believe that this modification provides better visibility for the flow vectors and enhances the overall clarity of the figure. The updated Figure 12 now offers a clearer representation of the flow dynamics within the estuary.

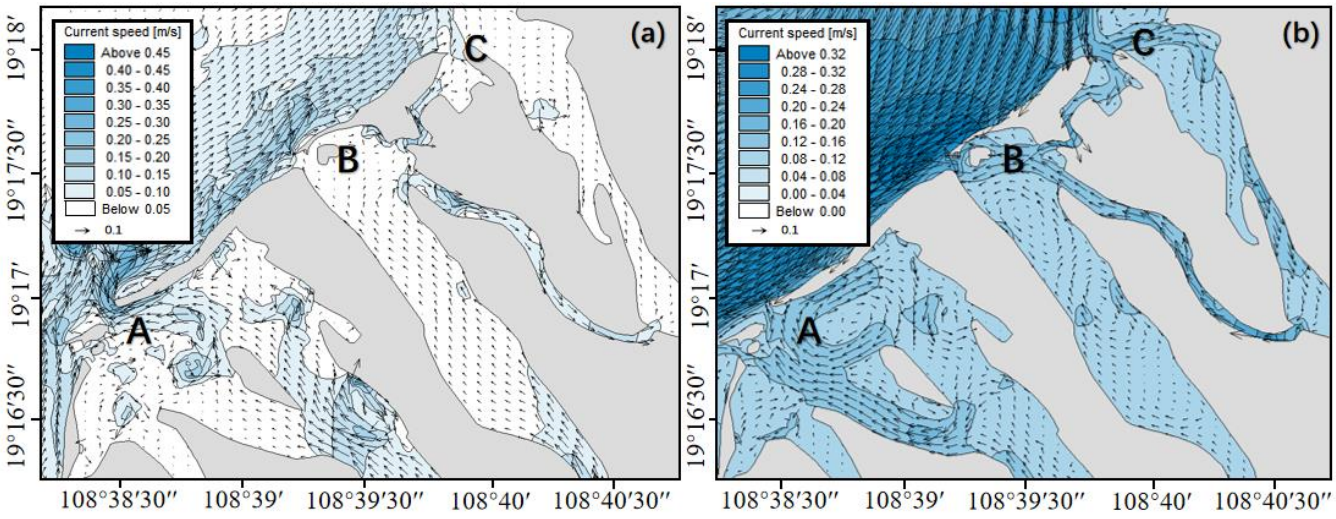

Figure 7: Flow field inside the estuary, displaying depth-averaged flow velocities across the water column. (a) moment of the maximum flood current; (b) moment of the maximum ebb current

Point 24: Figure 13 I find the type of figures presented here a nice addition to the paper. I believe the results could be better communicated through such figures. It would be nice to have the speed and the arrows on top for selected time moments but for the entire field. The content of Figure 11 and 12 could be presented in this way. The authors could reduce the spacing of the arrows if there are concerns about the figures' clarity. It is much helpful to be able to assess the flow field in the entire domain.

Response (Line 350): Thank you for your positive feedback on Figure 13 and for recognizing it as a valuable addition to our paper. We have taken your suggestions into consideration to enhance the communication of our results. Here are the changes we have implemented:

Inclusion of Speed and Arrows: We have added both speed and arrows to the top right corner of Figure 13 for selected time moments and for the entire flow field, providing a comprehensive view of the flow dynamics.

Presentation Consistency: We have also revised Figure 12 to match the style of Figure 13, Figure 11 have been removed.

The updated figure is as follows:

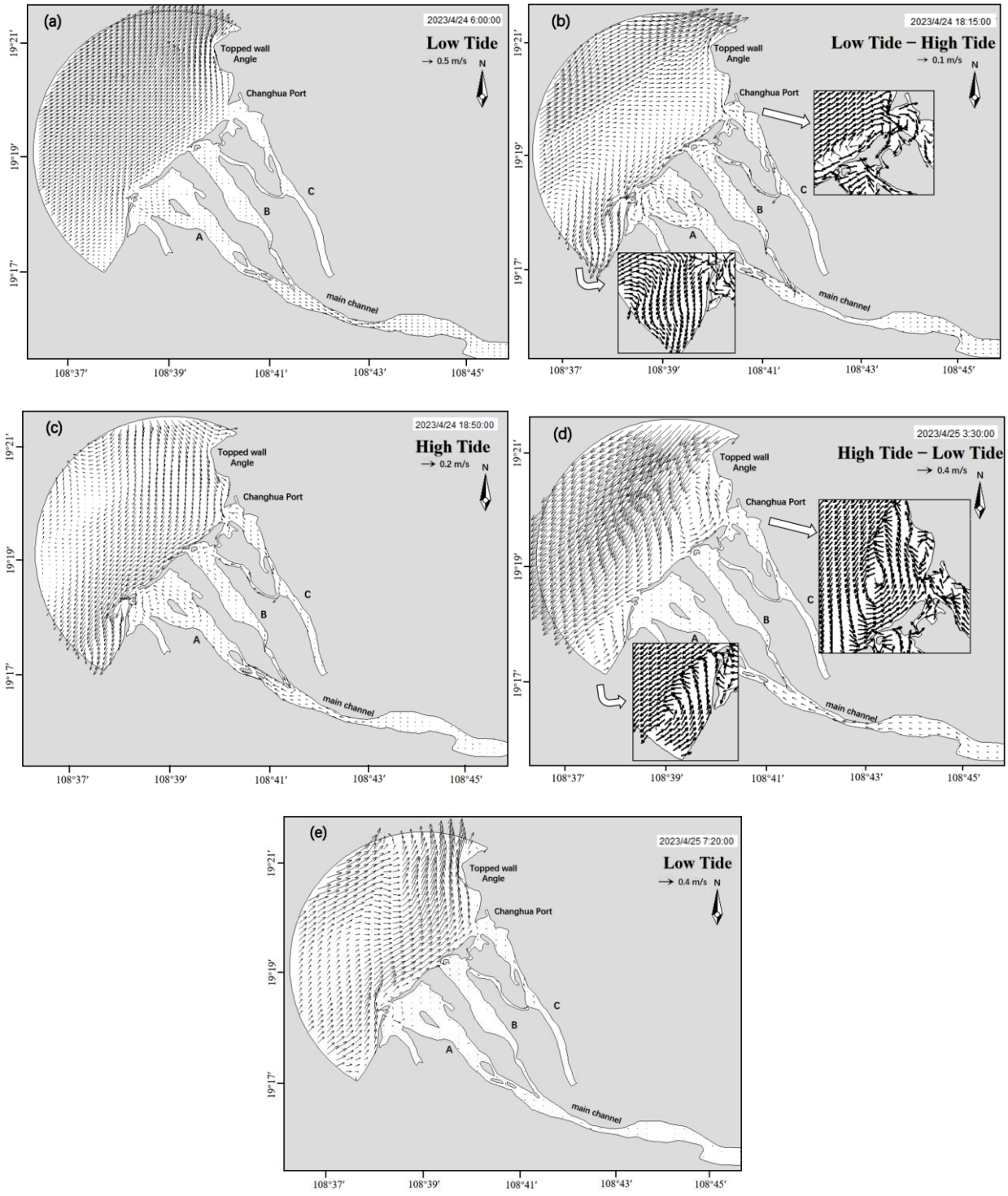

Figure 8: Transition of the flow field and location of the study area.

Point 25: Line 371 where is Baoqiao station? I can't find it in the figures. Figure 14 not 13

Response (Lines 356-357): Thank you for your query regarding the location of Baoqiao Station at line 371. I have made the necessary revisions to ensure that Baoqiao Station is now clearly indicated in Figure 1. The updated Figure 1 now includes comprehensive location information for all stations, sampling points, and ADCP points, providing a clear visual reference for the reader.

Additionally, we have corrected the figure reference at line 371 from Figure 13 to Figure 9 to ensure consistency with the figure that actually displays the station's location and related data. The specific changes are as follows:

"The simulated Suspended Sediment Concentration (SSC) is compared with the daily observed SSC at Baoqiao Station for the month of July (Fig. 9)."

Point 26: Line 376 Wrong figures number

Response (Line 362): Thank you for your vigilance in identifying the incorrect figure number at line 376. Upon reviewing the manuscript, we have corrected the figure reference from Figure 13 to Figure 9.

The specific changes are as follows:

"To further analyze the simulation validation, Fig. 9 presents…"

Point 27: Line 390 Figure 14 . Separate the figure's panels into a and b and add units at the y axis of the absolute error graph.

Response (Line 375): Thank you for your suggestion to enhance Figure 14. We have separated

Figure 14 into two panels, labeled as Figure 14a and 14b, to provide clearer visualization of the data. Additionally, we have added units to the y-axis of the absolute error graph (Figure 14b) to ensure that all measurements are clearly understood.

The revisions are as follows:

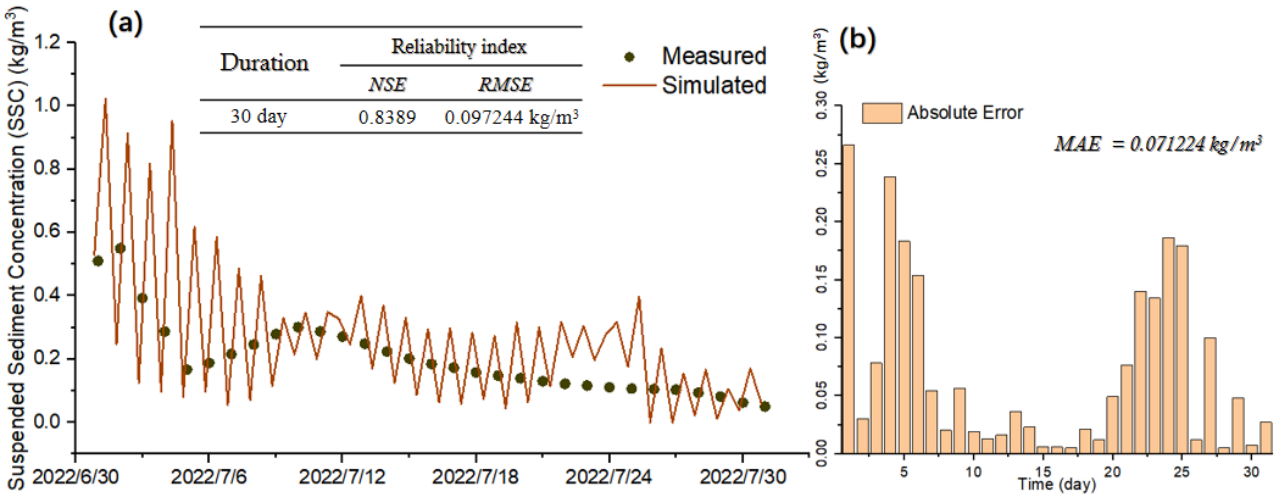

Figure 9: Selection point for sediment concentration verification

Point 28: Line 381-386, I don't understand this. It is implied that for a 5-day period, the authors get lower currents in their model than the real ones and yet higher suspended sediment concentrations. I would expect lower currents to result in lower suspension of sediments through a section. Even if the sign of the wave and tide induced currents counteracts with each other, this cannot happen for five days. Later in the text (line 426), the authors themselves claim that slower current lead to further sediment deposition. This is a bit confusing. Which of the two arguments is true? The authors also mention a second possible reason for this discrepancy which has to do with the grain size distribution. I tend to believe more this because if the grain size is not accurate it could lead to an underestimation of

settling velocities or overestimation of bed shear stresses.

Response (Lines 367-373): Thank you for your insightful comments and for highlighting the apparent inconsistency in our manuscript regarding the relationship between current velocities and suspended sediment concentrations.

Upon reviewing your concerns, we have decided to focus solely on the grain size distribution as the primary reason for the discrepancy in our model's predictions. We have removed the initial explanation involving wave and tide-induced currents, as it seemed to create confusion rather than clarity.

We concur with your assessment that inaccuracies in grain size distribution could significantly impact the model's predictions, leading to an underestimation of settling velocities or an overestimation of bed shear stresses. This factor is indeed a more plausible explanation for the observed discrepancies in suspended sediment concentrations.

We have revised lines 367-373:

"The discrepancy in suspended sediment concentrations during 21-25 July is primarily attributed to the inaccuracies in the initial sediment parameters, particularly the grain size distribution. These parameters were interpolated from a limited number of sampling points within the narrow river channel, which introduced errors. An inaccurate grain size distribution can lead to an underestimation of settling velocities or an overestimation of bed shear stresses, significantly affecting the model's predictions of sediment concentrations. We acknowledge the complexity of sediment dynamics and the challenges in accurately capturing these processes, especially in a dynamic environment like the lower reaches of the Changhua River."

Point 29: On the other hand, Figure 3 shows a quiet dense field of samplings. From

what is shown in Figure 7, the waves calibration seems successful. Have they checked their results in other stations?

Response: Thank you for your continued scrutiny of our manuscript and for your questions regarding Figure 3 and the validation at other stations.

Regarding Figure 3: We have integrated the information from Figure 3 into Figure 1 to provide a comprehensive overview of all stations, sampling points, and ADCP points within our study area. This consolidation aims to enhance the clarity and readability of our presentation, ensuring that all relevant spatial data is accessible in a single figure.

Regarding Wave Validation at Other Stations: We have not performed wave validation at additional stations. The scope of our current study is relatively small, focusing intensively on the specific dynamics within this region. The availability of suitable in-situ measurement data in the vicinity of our study area is limited to the station mentioned, which meets our criteria for validation.

We acknowledge the importance of broader validation and plan to expand our study area in future research endeavors. As we delve deeper into the sediment transport pathways of the region, we intend to include more validation points to ensure a more extensive assessment of our models.

Point 30: Figure 15 is not mentioned at all in the manuscript. It needs to be mentioned when a channel is referred so the reader can understand which area we are looking at.

Response (Lines 383-384): Thank you for your observation regarding the omission of Figure 15 in our manuscript. We understand the importance of referencing figures that correspond to

specific discussions within the text.

We have identified the sections where channels are discussed and have added references to Figure 15 to provide readers with a visual aid to better understand the areas under consideration. Specifically, we have updated the following sentences:

"Over time, these processes have resulted in the formation of two river islands, altering the estuary into a complex channel system with multiple smaller estuaries (Fig.10)."

Point 31: Figure 16 The caption needs to be more detailed. The authors should describe better what is depicted in the figures.

Response (Lines 407-409): Thank you for your feedback on lines 520-521. We appreciate your guidance on ensuring the credibility of our residual flow field analysis.

Thank you for your feedback regarding the detail required in the caption for Figure 16. We have updated the figure and its caption to provide a clearer and more comprehensive description of the depicted content.

The revised Figure 16 now includes the following detailed descriptions for each panel:

- Panel (a) illustrates the simulated results of sediment bed level changes at the estuary of Danchangcun, showcasing the deposition patterns within the area.
- Panel (c) presents the simulated bed level changes near the river island in Danchangcun, highlighting the cyclical deposition trends.
- Panel (e) depicts the simulated bed level changes at the front end of the sand mouth in Danchangcun, indicating active sediment scouring and deposition.
- Panel (g) examines the simulated bed level changes at the sand mouth in Danchangcun,

with two distinct locations demonstrating similar sedimentation trends.

Furthermore, Panels (b), (d), (f), and (h) now display the temporal variation of bed thickness at representative points, providing a detailed look at how sediment deposition evolves over time in these specific locations.

The revised caption for Figure 16 reads:

"Figure 11: Simulated results of bed level changes and sediment deposition in Danchangcun. (a) displays the bed level changes at the estuary; (c) near the river island; (e) at the front end of the sand mouth; (g) at the sand mouth itself; (b), (d), (f), and (h) represent the temporal changes in bed thickness at selected points."

Point 32: Line 417 Figure 16h and not 14

Response: Thank you for your careful review and for pointing out the reference error at line 417. We have corrected the figure reference from "Figure 14" to "Figure 16h" as you indicated. This error was indeed a typographical oversight, and we appreciate your diligence in ensuring the accuracy of our manuscript.

The revised sentence now reads:

"Finally, Figure 11h examines sediment deposition ..."

Point 33: Line 425 I think you mean under the influence of the neap tide.

Response (Line 413): Thank you for your attentive review and for pointing out the need for clarification at line 425. We have made the necessary correction to accurately reflect the tidal influence. The text now correctly states that the flow direction changes under the influence of

the neap tide, not the spring neap tide, as previously mentioned.

The revised sentence reads:

"April 27th, under the influence of the neap tide, …"

Point 34: Line 426 Saying that slower currents led to enhanced sedimentation is enough. You don't need that sentence.

Response: Thank you for your feedback on line 426. We have removed the sentence as suggested, streamlining our discussion to focus on the primary relationship between slower currents and enhanced sediment deposition.

Point 35 (Conclusion): The same comment for the abstract applies here. The readers will want to know the conclusions and key messages and may have not read the entire manuscript to know where these specific locations are. In addition, as mentioned in a previous comment, there is an inconsistency about A,B and C which to this point, the authors always referred to as estuaries but here they refer to them as channels. In any case, a potential reader may have not read the full manuscript so it is useless to mention them as A,B and C. I would recommend to include more general statements in the conclusions so that the value and significance of the results can be emphasized and also how these contribute to the research on this topic.

Response (Lines 550-565): Thank you for your feedback on our manuscript, particularly regarding the conclusion section. We have expanded and refined the conclusion to provide a more comprehensive summary of our findings and their implications. The revised conclusion

now includes a detailed discussion of the sediment transport dynamics, the role of wave action, and the significance of residual currents in the lower reaches of the Changhua River. It also emphasizes the broader implications of our research for coastal management and environmental planning.

The revised conclusion reads:

"In conclusion, our comprehensive study on the sediment transport dynamics in the lower reaches of the Changhua River, Hainan, has yielded valuable insights into the complex interplay between wave action, current flow, and sediment deposition. Through the application of an integrated wave-current coupled sediment transport model with variable grain properties, we have successfully simulated and analyzed the sediment behavior under the combined influence of waves and currents, particularly in multiple sub-estuaries with low sediment concentrations.

Our findings reveal significant sediment deposition in both the estuary and lower reaches of the river, which is primarily driven by the prevailing northeast-southwest tidal current direction and wave action. This has led to the formation of a two-way sand mouth, further narrowing the estuary and contributing to the substantial sediment accumulation at the mouth of the Changhua River. Furthermore, our research underscores the significance of residual currents in directing sediment movement and the dispersion of pollutant substances in the study area. The consistent flow of residual currents towards Beili Bay suggests that sediment in the lower reaches of the Changhua River is systematically transported in this direction, highlighting the importance of understanding these currents for coastal management and environmental planning.

Overall, our study contributes to the understanding of sediment transport processes in coastal environments and provides a robust framework for future research and management strategies

in similar estuarine systems. The detailed analysis of sediment deposition and the validation of our model against observed data confirm the reliability and applicability of our approach, offering valuable insights for coastal and environmental researches."

Editor's "Detailed Comments.":

Point 1: Lines 113-118. "V" in (7) needs definition here.

Response (Line 117): Thank you for your feedback on lines 113-118, specifically regarding the need to define the variable "V" in equation (7).

We have added a definition for "V" in the vicinity of equation (7) to clarify that it represents the velocity of the flow. The revised text now reads:

"…V is an average velocity of the fluid flow; …"

Point 2: Line 132. This is not clear – missing verb? Maybe "The model of sediment transport calculates the influence . ."?

Response (Line 133): Thank you for your feedback on line 132 of our manuscript. We have revised the sentence to improve clarity and grammatical accuracy. The revised sentence now reads:

"The model of sediment transport calculates the influence of the waves …"

Point 3: Lines 168-169. "median grain diameters (0-1φ)"; please explain "φ".

Response (Lines 167-168): Thank you for your feedback on lines 168-169 regarding the clarification needed for the term "φ". We have added an explanation for "φ" in the text,

referencing the Udden-Wentworth scale, which is a logarithmic scale used to classify sediment grain sizes. The revised sentence now reads:

"Here, φ represents the Udden-Wentworth scale, a logarithmic scale used to classify sediment grain sizes (Wentworth, 1922)."

We have also added a reference to the original work by C.K. Wentworth, which introduced the scale, to provide historical context and academic backing for our use of the term.

Point 4: Line 172. ". . (Table 2) . ."

Response (Line 172): Thank you for your feedback on line 172 regarding the reference to Table 2. We have revised the sentence to ensure that the reference is clear and complete. The revised sentence now reads:

"Through these data (Table 2), we can conclude that the majority of the areas are characterized by turbulent, …."

Point 5: Table 2. Grain size cannot be negative. Please explain "-1φ – 0".

Response: Thank you for your feedback on Table 2 and the query regarding the grain size range "-1φ – 0". We have added a note to clarify the Udden-Wentworth scale, which is a logarithmic scale used to classify sediment grain sizes. On this scale, a decrease in grain size corresponds to an increase in the φ value, with -1φ-0 corresponding to a grain size of 1-2 mm.

Point 6: Line 184. ". . (Table 3) . ."Line 246. "(Table 4)."Line 250. "(Table 5)."

Response (Lines 182, 245, 249): Thank you for your feedback on the referencing of tables in

our manuscript. We have reviewed and revised the referencing of Tables 3, 4, and 5 to ensure they adhere to the journal's formatting guidelines. The sentences now read:

"According to the classification criteria of the sorting coefficients by Focke–Ward (Table 3), …"

"The calibrated model parameters are presented in Table 4."

"The parameters used in the model setups are based on the values listed in Table 5."

Point 7: Line 252. 36 or 40 directional sectors?

Response (Line 250): Thank you for your attention to detail regarding the number of directional sectors mentioned at line 252. Upon reviewing our data and methods, we have confirmed that the wave model at the open boundary is defined by the JONSWAP spectrum with a spectral resolution of 40 frequency bins and 36 directional sectors. We have updated the text to reflect this accurate number.

The revised sentence now reads:

"The wave model at the open boundary is defined by the JONSWAP spectrum, with a spectral resolution of 40 frequency bins and 36 directional sectors."

Point 8: Figure 10. You need to state the depth (or height above bottom) of the model current shown, and also the depth (or height above bottom) of the ADCP bin.

Response (Line 298): Thank you for your feedback on Figure 10 and for highlighting the need to include depth information.

We have reviewed the depth settings for our model and ADCP measurements. The model currents are represented at a depth of 2 meters, and the ADCP measurements, as detailed in

Table 6, are taken at 20.9 meters and 22.8 meters above the bottom. We have updated the caption for Figure 10 to include this information:

"Figure 6: Average current speed and direction verification across the water column. Current speed and direction verification. (a) speed verification of ADCP 01; (b) speed verification of ADCP 02; (c) verification of current direction of ADCP 01; (d) verification of current direction of ADCP 02"

Point 9: Line 305. ". . Figure 11b and 11c depict . . . Figure 11b shows . ."

Response (Lines 303-304): Thank you for bringing the inconsistencies between the results analysis and the figures mentioned in lines 303-307 to our attention.

We have corrected the references in lines 303-307 from Figure 10b and c to Figure 7, as it aligns with the content discussed in the text.

The revised text now reads:

"The hydrodynamic simulation outcomes, as depicted in Fig. 7, ... Figure 11b and 11c depict the flow field outside the estuary of the Changhua River. Figure 7b shows ..."

Point 10: Line 316. ". . River. Figure 12a shows . ."

Response (Line 303): Thank you for your careful review and for pointing out the reference error at line 316. We have corrected the figure reference from "Figure 11" to "Figure 7" as you indicated. This error was indeed a typographical oversight, and we appreciate your diligence in ensuring the accuracy of our manuscript.

The revised sentence now reads:

"Figure 7a shows the flow field at 23:00 on April 23, 2023, …"

Point 11: Line 322. ". . Figure 12b . ."

Response (Line 309): Thank you for your careful review and for pointing out the reference error at line 322. We have corrected the figure reference from "Figure 11" to "Figure 12" as you indicated. This error was indeed a typographical oversight, and we appreciate your diligence in ensuring the accuracy of our manuscript.

The revised sentence now reads:

"Figure 7b shows the flow field at 13:30 on April 24, 2023, …"

Point 12: Line 376. ". . Fig. 14 . ."

Response (Line 362): Thank you for your careful review and for pointing out the reference error at line 376. We have corrected the figure reference from "Figure 13" to "Figure 14" as you indicated. This error was indeed a typographical oversight, and we appreciate your diligence in ensuring the accuracy of our manuscript.

The revised sentence now reads:

"To further analyze the simulation validation, Fig. 9 presents…"

Point 13: Line 402. I think you mean ". . and take this point to represent the whole area. . ."

Response (Lines 387-388): Thank you for your feedback on line 402 and for raising the concern about the representation of the entire area. We have rephrased the sentence to focus

on the sediment deposition processes at a specific point within the study area, without implying that this point is representative of the whole region. The revised sentence now reads:

"To elucidate the sedimentary characteristics of the study area, we extract the bed level change data of a particular point in the obvious change area of river bed."

Point 14: Line 417. "Finally, Figure 16h . ."

Response (Line 403): Thank you for your careful review and for pointing out the reference error at line 417. We have corrected the figure reference from "Figure 14" to "Figure 11" as you indicated. This error was indeed a typographical oversight, and we appreciate your diligence in ensuring the accuracy of our manuscript.

The revised sentence now reads:

"Finally, Figure 11h examines sediment deposition at the sand mouth, with two distinct locations showing similar sedimentation trends, ..."

Point 15: Line 425. Avoid "spring neap" which makes no sense. Better ". . influence of decreased tidal amplitude . ."

Response (Line 413): Thank you for your feedback on line 425 regarding the use of the term "spring neap." We have revised the sentence to avoid the term "spring neap" and instead focus on the influence of decreased tidal amplitude on sediment deposition. The revised sentence now reads:

"After April 27th, under the influence of neap tide, the reduced tidal range and slower currents led to enhanced sediment deposition."

Point 16: Line 426. Better ". .sizes, including finer particles."

Response: Thank you for your feedback on line 426, along with the comments from the reviewers. After careful consideration of all the input received, we have decided to remove the sentence at line 426 from the manuscript. This decision was made to streamline the narrative and ensure that the discussion remains focused on the key findings of our study.

Point 17: Line 552. "upward" –> "northward"?

Response (Line 539): Thank you for your suggestion regarding the term "upward" at line 552.

Upon reviewing the context, we agree that "northward" is a more appropriate term to describe the direction in question. We have replaced "upward" with "northward" to accurately reflect the direction of the Eulerian residual current.

The revised sentence now reads:

"The northward Eulerian residual current, upon encountering the sea area outside Changhua Port, …"

Once again, we appreciate the time and effort you have dedicated to evaluating our manuscript. Your expertise and guidance have been invaluable in strengthening our research!