# Responses to the Comments from the Reviewer 2

**General comment:** Deltas are important areas for organic carbon burial. Hydropower dams have significant impacts on riverine sediment delivery, which in turn can impact in-river primary production dynamics and organic carbon delivery to the ocean and delta environments. Comprehensive studies on how river impoundment can impact organic carbon dynamics, particularly within deltaic environment where burial occurs, is of great interest. This study presents robust work to investigate how OC sources and deltaic OC burial are changing in the discharge of the largest East Asian river with a significant damming project. Some language and concept clarification, as well as data availability, require some improvement before publication. My specific comments on the manuscript are as follows:

**Response:** We are grateful for your thoughtful, constructive, and encouraging evaluation of our manuscript. We appreciate your recognition of the scientific importance of investigating organic carbon dynamics in deltaic environments, especially in the context of reduced riverine sediment delivery caused by large hydropower dams. We also sincerely thank you for your valuable suggestions regarding language clarity, conceptual precision, and data availability. Accordingly, we have carefully revised our manuscript based on your comments, and these revisions have improved the clarity and quality of our work. Detailed modifications are addressed point by point in the responses to your comments below, and we believe they have further improved the quality of our manuscript. In the relevant revised text provided in this response letter, the revised parts have been highlighted in yellow for clarity.

**Specific comments:**

**Abstract:**

(1) Line 19-21: “temporal increment” is unclear, perhaps should be “temporal increase.” “1.5-fold decrease” is also unclear, and perhaps should instead be phrased as: “…drove a decrease in OC preservation efficiency in the subaqueous Changjiang Delta from 15.1% (before 2003) to 10.7% (after 2003), resulting in a pronounced reduction in deltaic OC burial.”

**Response:** Thank you for your careful review and precise language suggestions. We have revised this sentence as you suggested.

(2) Line 21-22: No need for scientific notation to my eye here, just write out the amount in tons or kilotons.

**Response:** Thank you for this helpful suggestion. We agree that scientific notation is unnecessary here and may reduce readability. Accordingly, we have revised the relevant amount using the unit kt and have replaced other unnecessary uses of scientific notation throughout the manuscript where appropriate.

**Introduction:**

(3) Line 33: Incomplete and unclear sentence.

**Response:** Thank you for pointing this out. We apologize for the incomplete and unclear sentence. We have revised it to improve its completeness, clarity, and readability.

**The relevant revised text is provided below:**

Deltas and their adjacent inner shelves account for less than 10% of the global ocean area, but contribute more than 90% of overall OC preservation in the oceans, making them disproportionally important hotspots for oceanic OC burial (Hedges and Keil, 1995; Muller-Karger et al., 2005; Hage et al., 2022).

(4) Line 42: "as the clearly temporal decline of sediment loads in the river (Dang et al., 2010)." The purpose of this remark is unclear. Did river OC loads decline alongside sediment loads?

**Response:** Thank you for pointing this out. We agree that the original phrase was unclear. Your interpretation is correct: suspended sediments are an important carrier of particulate organic carbon (POC), and therefore riverine OC flux can decrease substantially along with reduced sediment flux. Since our focus here is to emphasize the temporal decline in POC flux, we have deleted the description of changes in sediment load to avoid confusion.

(5) Line 43: "exhibit distinct degrees of lability" I wouldn't say there are distinct degrees of lability, it is a spectrum or continuum of lability.

**Response:** Thank you for this helpful comment. We realize that POC lability is better described as a continuum rather than as distinct degrees. Accordingly, we have revised the sentence to avoid implying discrete categories of lability.

**The relevant revised text is provided below:**

Riverine POC originates from multiple sources that span a continuum of lability under varying physicochemical conditions (Hilton et al., 2024).

(6) Line 51: "transported" rather than "conveyed over"

**Response:** Thank you for this correction. We have replaced the phrase "conveyed over" with "transported" in the revised manuscript.

**Methods:**

(7) Line 100: How many samples?

**Response:** Thank you for this comment. We have added the number of collected samples in the method section of our revised manuscript.

(8) Line 149: By “content of terrestrial OC”, is “content” referring to the concentration, mass, or OC%? Please clarify and perhaps replace both instances with a more specific word. I am not totally sure how OC preservation efficiency differs considerably from burial efficiency. What exactly does it mean, mechanistically, to not account for the surface area? Perhaps this could be discussed within the discussion section.

**Response:** Thank you very much for this insightful and constructive comment. We agree that the term “content of terrestrial OC” was not sufficiently specific in the original manuscript. In the revised manuscript, we have clarified that this term refers to the terrestrial OC concentration expressed as weight percent (wt%) of dry sediment. Accordingly, we have replaced the ambiguous wording with “terrestrial OC concentration” and use “concentration” consistently where appropriate throughout the manuscript.

The metric used in this study is a content-based apparent preservation efficiency, calculated by comparing the terrestrial OC concentration in surface sediments with that in riverine SPM. This metric was intended to describe the relative change and retention of terrestrial OC concentrations during transport from the riverine suspended phase to final deposition in the subaqueous delta, because OC concentrations may be altered during sediment transport through a series of physical and biogeochemical processes. Therefore, this metric differs from burial efficiency, which generally requires normalization to sediment specific surface area (SA).

Mechanistically, not accounting for sediment surface area means that the calculated content-based apparent preservation efficiency may include the influence of mineral protection and grain-size sorting, in addition to organic matter degradation and preservation processes. Finer-grained sediments generally have larger specific surface areas and stronger capacity for mineral-associated OC protection (Bergamaschi et al., 1997; Bock and Mayer, 2000; Babakhani et al., 2025), and therefore may retain higher OC concentrations independent of changes in OC input or degradation. Thus, our content-based apparent preservation efficiency should be interpreted as an apparent indicator of terrestrial OC retention from riverine SPM to sediments, rather than a surface-area-normalized preservation or burial efficiency.

We acknowledge that the surface-area-normalized OC burial efficiency would be more mechanistically rigorous, because sediment SA exerts an important control on OC retention. However, sediment SA has rarely been measured in previous studies, particularly in older publications. Therefore, we used the content-based apparent preservation efficiency as a complementary indicator, as it allows the integration of a broader dataset based on available terrestrial OC concentrations. This content-based approach has been used in previous study to evaluate and compare OC burial across different regions (Blair and Aller, 2012). Importantly, where data were available, we calculated both the content-based apparent preservation efficiency and the surface-area-normalized OC burial efficiency, and found a significant correlation between the two indicators ($p < 0.001$, Fig. S5, shown below). This relationship suggests that, although the content-based metric does not explicitly account for mineral surface area, it can still provide useful information on broad-scale changes in terrestrial OC retention.

Following your suggestion, we have added a discussion to clarify the mechanistic implications of these two metrics and the limitations of the content-based apparent OC preservation efficiency. Specifically, we have explained that this approach may partly reflect changes in sediment grain size and mineral surface area, and therefore may introduce uncertainty when estimating OC retention in settings where sediment texture varies substantially. We believe that this additional discussion has helped distinguish our apparent concentration-based metric from a more mechanistic surface-area-normalized burial efficiency and has avoided overinterpretation of the results.

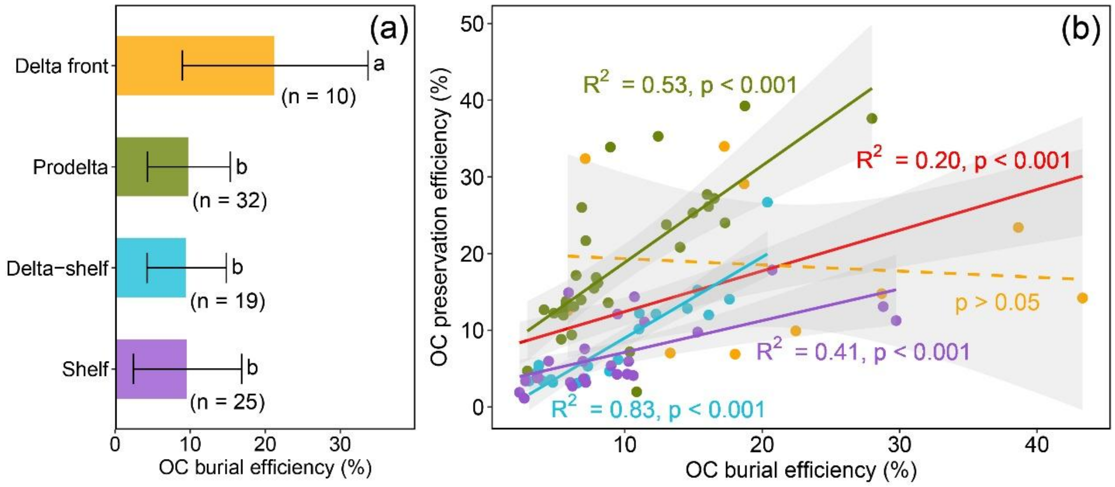

**Fig. S5** Burial efficiency of terrestrial organic carbon (OC) in different sedimentary facies of the Changjiang subaqueous delta (a). Relationships between OC preservation efficiency and burial efficiency in different sedimentary facies (b). The solid and dashed lines represent statistically significant ($p < 0.05$) and insignificant ($p > 0.05$) relationships, respectively, and the light gray areas around the line indicate 95% confidence interval. Different colors in panel (b) represent different sedimentary facies (Yellow, Delta front; Green, Prodelta; Blue, Delta-shelf; Purple, Shelf), and the red line indicates relationships between OC preservation efficiency and burial efficiency for all points irrespective of sedimentary facies.

## References

Babakhani, P., Dale, A.W., Woulds, C., Moore, O.W., Xiao, K.-Q., Curti, L., Peacock, C.L., 2025. Preservation of organic carbon in marine sediments sustained by sorption and transformation processes. Nat. Geosci. 18, 78–83.

Bergamaschi, B.A., Tsamakis, E., Keil, R.G., Eglinton, T.I., Montluçon, D.B., Hedges, J.I., 1997. The effect of grain size and surface area on organic matter, lignin and carbohydrate concentration, and molecular compositions in Peru Margin sediments. Geochimica et Cosmochimica Acta 61, 1247–1260.

Blair, N.E., Aller, R.C., 2012. The fate of terrestrial organic carbon in the marine environment. Annu. Rev. Mar. Sci. 4, 401–423.

Bock, M.J., Mayer, L.M., 2000. Mesodensity organo–clay associations in a near-shore sediment. Marine Geology 163, 65–75.

**The relevant revised text is provided below:**

Beyond assessing OC burial efficiency via OC loadings in riverine SPM and deltaic sediments, the ratio of terrestrial OC concentrations between SPM and surface sediments was also employed as a quantified metric (Blair and Aller, 2012). In our study, we calculated this metric and termed it “OC preservation efficiency” to distinguish from “burial efficiency” (Section 2.5). Unlike surface-area-normalized OC burial efficiency, this content-based metric does not explicitly normalize OC loading to sediment SA. This distinction is mechanistically important because sedimentary OC concentrations are controlled not only by degradation and preservation processes, but also by sediment grain-size sorting and mineral surface area. Fine-grained sediments generally have larger SA and greater capacity for mineral-associated OC protection, whereas coarser sediments tend to have lower OC retention capacity (Bergamaschi et al., 1997; Bock and Mayer, 2000; Babakhani et al., 2025). Therefore, variations in sediment texture may partly influence the calculated OC preservation efficiency and introduce uncertainty when environments with substantially different grain-size compositions are compared.

Nevertheless, the content-based preservation efficiency remains a useful metric for evaluating terrestrial OC retention, because the main objective of our study is to examine changes in terrestrial OC concentrations from riverine SPM to deposited sediments during seaward transport. Moreover, the OC content-based apparent preservation efficiency was tightly correlated with the OC/SA-based burial efficiency ($p < 0.001$; Fig. S5b), indicating that this concentration-based metric provides an assessment broadly consistent with the SA-normalized burial-efficiency approach. This relationship supports its use as an alternative indicator of terrestrial OC retention, particularly when sediment SA or OC loading data are unavailable. This advantage is important for integrating extensive published datasets, as OC concentrations in riverine SPM and surface sediments are much more commonly reported than sediment SA and OC loading data. Thus, although the content-based preservation efficiency should be interpreted as an apparent metric that may partly include grain-size effects, it remains appropriate for assessing temporal changes in terrestrial OC retention and loss in the Changjiang subaqueous delta.

**Results:**

(9) Line 167-168: The remark about anthropogenic activities impacting SPM grain size is interpretation and should be mentioned in the discussion, rather than the results.

**Response:** Thank you for this helpful suggestion. We agree that the statement regarding the influence of anthropogenic activities on SPM grain size represents an interpretation and is therefore more appropriate for the Discussion rather than the Results section. Accordingly, we have removed this interpretive statement from the Results section and retained only the objective description of the observed SPM grain-size trend.

(10) Line 173 and throughout: I would perhaps use the language “sedimentary environments” rather than “sedimentary units” throughout, as sedimentary unit implies, to me, a lithified rock unit. If this language is commonly used in sedimentary studies (which I am not experienced in), however, then ignore this suggestion.

**Response:** Thank you for this constructive suggestion. We agree that the term “sedimentary units” may cause ambiguity, as it can imply lithified stratigraphic or rock units. In the revised manuscript, we have therefore avoided using “sedimentary units”. Instead, we have used “sedimentary facies” in the description and statistical comparisons of the classified regions, consistent with the terminology used in Chen et al. (1991), and this term has also been adopted in a subsequent study (Wei et al., 2007). When discussing the underlying processes and mechanisms, we have used “sedimentary environments” to emphasize that these facies represent different depositional settings characterized by distinct hydrodynamic conditions, sediment sources, and sedimentation rates. This revision makes the terminology more accurate and helps avoid potential ambiguity.

**Reference**

Chen, Z.Y., Xu, S.Y., Yan, Q.S., 1991. Sedimentary facies of Holocene subaqueous Changjiang River Delta. Oceanologia et Limnologia Sinica 1, 29–37.

Wei, T.Y., Chen, Z.Y., Duan, L.Y., et al., 2007. Sedimentation rates in relation to sedimentary processes of the Yangtze Estuary, China. Estuar. Coast Shelf S. 71, 37–46.

(11) Line 180,186-187: I would just quote the increase or change, rather than describing with “2.5-fold”, etc. For example, “…with the value increasing from 0.07 in 1980 to 0.17 in 2025.” Describing decreases in particular with this language is unclear, so I would avoid it if possible.

**Response:** Thank you for this helpful suggestion. In the revised manuscript, we have replaced these fold-change descriptions with the corresponding specific values. We have also checked the entire manuscript and revised similar fold-change expressions into direct numerical descriptions where appropriate to improve clarity and consistency.

(12) Line 198: change to “values of δ13C and C/N in surface sediment increased and decreased

from 1980 to 2025, respectively.” Perhaps include a figure reference for this for this if there is one. Instinctually I wanted to look at figure 2, as this figure seems to show that, but it does not seem to specifically be for the Delta front environment.

**Response:** Thank you for this comment. In the revised manuscript, we have included the relevant figure reference at the appropriate location to avoid any potential confusion.

**Discussion:**

(13) Line 258: Is the citation for the reduced sediment loads in these rivers the same as the next sentence?

**Response:** We thank you for pointing this out and apologize for the confusion. Your understanding is correct that the reduced sediment loads in these rivers refer to the same phenomenon described in the following sentence. To avoid ambiguity and maintain consistency throughout this paragraph, we have no longer emphasized dam-induced reductions in sediment fluxes here, but have instead directly stated that dam construction has altered the composition of river-delivered organic carbon.

**The relevant revised text is provided below:**

In four major rivers in United States—the Mississippi, Colorado, Rio Grande, and Columbia—the construction of dams has substantially increased the relative contribution of plankton-derived POC in downstream waters compared with upstream reaches (Kendall et al., 2001).

(14) Line 260: Is “water-sediment regulation” referring to the decrease in sediment loads due to the existence of the Xiaolangdi Reservoir? If so, perhaps better phrased as “sediment impacts due to Xiaolangdi Reservoir” or something similar. Or, if water-sediment regulation is a frequently used term, please define it earlier.

**Response:** Thank you again for pointing out the unclear expression. The purpose of this sentence was to emphasize the influence of reservoir operation on the composition of riverine organic carbon transported downstream. We agree that the term “water-sediment regulation” may be confusing if it is not clearly defined. Therefore, in the revised manuscript, we have avoided using this term and have instead referred more specifically to the operation of the Xiaolangdi Reservoir and its impacts on downstream organic carbon composition.

**The relevant revised text is provided below:**

In Yellow River, the operation of the Xiaolangdi Reservoir substantially altered the composition of riverine POC transported downstream, increasing the proportion of soil-derived POC from 56.4% to 82.0% and decreasing the proportion of plant-derived POC from 43.6% to 18.0% (Lv et al., 2022).

(15) Line 271: At the end of this paragraph I'm left wondering which one it is, however, the next paragraph shifts to something different. While you may not have the data to be able to determine which of the two hypotheses is correct, could lead on with a sentence about what kind of future work/measurements could be done to better investigate this problem, or leading towards a future later section in the manuscript that discusses this.

**Response:** Thank you very much for this insightful suggestion. As you correctly noted, our intention was to discuss the potential key factors influencing organic carbon dynamics in the Changjiang River basin. However, we agree that the currently available data are not sufficient to determine which of the two proposed hypotheses is more likely. Therefore, following your suggestion, we have revised this paragraph to explicitly acknowledge this uncertainty and have added a sentence outlining future work or measurements that could help better distinguish between these potential mechanisms. This revision has improved the logical flow of the discussion and provided a clearer perspective for future research.

**The relevant revised text is provided below:**

On the one hand, a large amount of riverine sediment in upstream of the Changjiang River, primarily derived from montane bedrock weathering and soil erosion, were intercepted in reservoirs after dam construction (Li et al., 2015; Lambert et al., 2017). Therefore, the proportion of OC derived from aquatic biomass in downstream sections increased because of less mixing of petrogenic OC. On the other hand, the declined sediment load in downstream of the Changjiang River, by increasing light transparency into the water column, indirectly enhanced aquatic productivity and thus higher proportion of algae-originated OC (Robertson et al., 1993; Huettel et al., 2014). However, our current data are insufficient to determine which mechanism is dominant. Future studies combining seasonal observations of sediment load, light conditions, phytoplankton biomass would help better constrain the mechanisms driving changes in OC composition in the Changjiang River.

(16) Line 383-384: It seems odd to me that younger OC would be composed of eroded bedrock, while aged OC is composed of (presumably more modern) plant debris. Which Fig. 3 subplot shows this the best? It is also difficult to interpret this statement with figure 5, as younger OC (higher D14C) was more well correlated with low OC/SA, the opposite of what is said in the text. Perhaps there is an error in the text.

**Response:** We thank you for raising this important point and apologize for the unclear wording and figure citation in the original manuscript. We agree that the previous description could be misinterpreted, particularly with respect to the relationships among OC age, grain size, and OC source. However, the intended interpretation of this paragraph was not that younger OC is composed of eroded bedrock whereas aged OC is composed of plant debris. Rather, we aimed first to characterize OC properties across different sedimentary environments using multiple

OC-related indicators, including OC/SA, C/N and $\Delta^{14}C$. We then used previously published interpretations to help constrain the dominant OC sources in the proximal and distal deltaic environments, and finally compared these interpretations with the OC source apportionment shown in Fig. 3 (shown below). Following this logic, we provide a detailed explanation below of the interpretation we intended to convey.

In Fig. 5d and f (as shown below), the yellow data points, representing the Delta front, are characterized by lower $\Delta^{14}C$ values, higher C/N ratios (> 8), and higher OC/SA. These features indicate that OC in the Delta front is dominated by relatively old, coarse-grained terrestrial material. Based on previous studies, these coarse-grained terrestrial materials likely consist mainly of coarse petrogenic fragments and C3 plant debris (Sun et al., 2021; Sun et al., 2022). In contrast, in Fig. 5d and f, the green, blue, and purple data points, representing the Prodelta, Delta-shelf, and Shelf, respectively, are generally associated with higher $\Delta^{14}C$, lower C/N, and lower OC/SA ratios. These features suggest that OC in the distal delta is mainly composed of a relatively younger, fine-grained mixture of petrogenic and marine OC. According to previous studies, these fine-grained mixed materials were likely derived mainly from catchment soil erosion and marine primary production (Zhu et al., 2013; Sun et al., 2021). This interpretation is further supported by Fig. 3b–d, where most samples fall within the petrogenic OC end-member range, while many points also overlap substantially with the marine OC end-member ranges.

We apologize again for the confusing wording. In the revised manuscript, we have revised the original text to present the above interpretation more clearly and concisely.

## References

Sun, X.S., Fan, D.J., Cheng, P., et al., 2021. Source, transport and fate of terrestrial organic carbon from Yangtze River during a large flood event: Insights from multiple-isotopes (δ13C, δ15N, Δ14C) and geochemical tracers. Geochim. Cosmochim. Acta 308, 217–236.

Sun, X.S., Fan, D.J., Hu, L.M., et al., 2022. Oxidation of petrogenic organic carbon in a large river-dominated estuary. Geochim. Cosmochim. Acta 338, 136–153.

Zhu, C., Wagner, T., Talbot, H.M., et al., 2013. Mechanistic controls on diverse fates of terrestrial organic components in the East China Sea. Geochim. Cosmochim. Acta 117, 129–143.

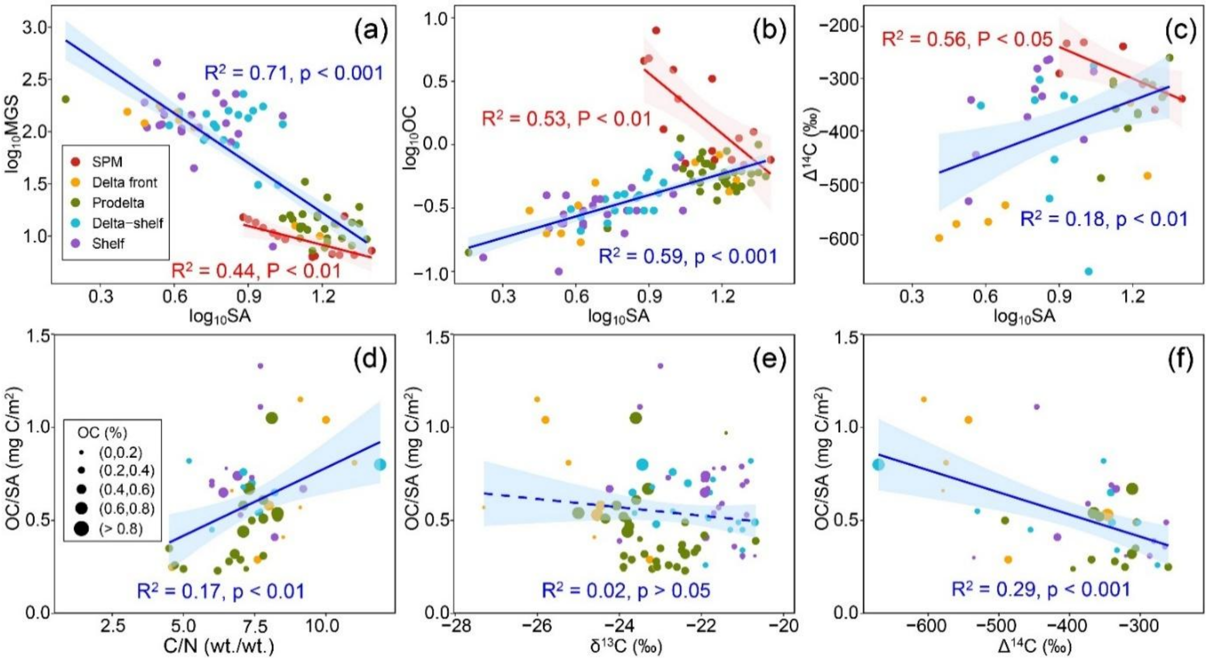

**Fig. 5** Factors controlling organic carbon (OC) contents and loadings in suspended particulate matter (SPM) of the Changjiang Estuary and surface sediments in the Changjiang subaqueous delta. Relationships between specific surface area (SA) and medium grain size (MGS) in SPM and surface sediments (a). Relationships between SA and OC content in SPM and surface sediments (b). Relationships between the OC/SA and C/N in SPM and surface sediments (c). Relationships between the OC/SA and C/N (d), δ13C (e), Δ14C (f), respectively, in surface sediments.

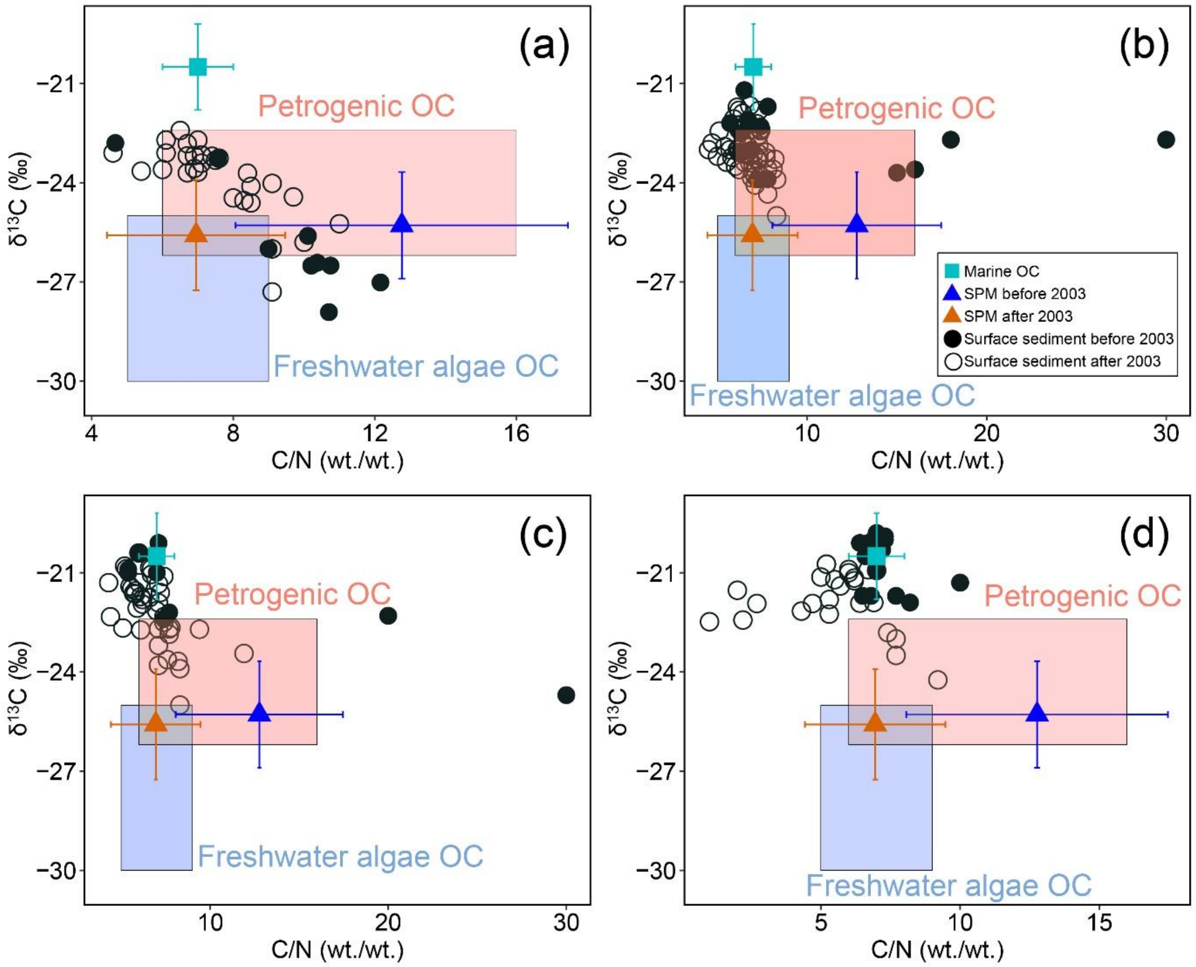

**Figure 3** Relationships between δ13C and C/N in surface sediments in Delta front (a), Prodelta (b), Delta-shelf (c) and Shelf (d) prior to and after 2003. Light red and blue areas represent ranges of δ13C and C/N corresponding to terrestrial organic carbon (OC) derived from petrogenic and freshwater algae OC sources, respectively, in terms of Lamb et al. (2006) and Menges et al. (2020). The marine OC end-member of δ13C is from -19.2‰ to -21.8‰ and of C/N is 6–8 (Xing et al., 2011; Bao et al., 2018). The black solid and open circles represent surface sediment samples collected before and after 2003, respectively.

**The relevant revised text is provided below:**

To investigate the burial patterns of OC from different sources across sedimentary environments, we examined the relationships between OC/SA and C/N, $\delta^{13}C$, and $\Delta^{14}C$. The $\delta^{13}C$ showed a weak correlation with OC/SA ($p > 0.05$; Fig. 5e), whereas C/N and $\Delta^{14}C$ were positively and negatively correlated with OC/SA, respectively ($p < 0.05$; Fig. 5d, f). In Delta front, the OC was characterized by lower $\Delta^{14}C$, higher C/N ratios (> 8) and higher OC/SA (Fig. 5d, f), suggesting preferential deposition of relatively old, coarse-grained terrestrial OC in the proximal delta. This material likely consists mainly of coarse petrogenic fragments and $C_3$ plant debris derived from the river basin (Sun et al., 2021; Sun et al., 2022). In contrast, in Prodelta,

Delta-shelf and Shelf, the OC was characterized by higher $\Delta^{14}C$, lower C/N (< 8) and lower OC/SA (Fig. 5d, f), indicating a relatively younger, fine-grained mixture of petrogenic and marine OC in the distal delta. This mixture was likely supplied by catchment soil erosion and marine primary production (Zhu et al., 2013; Sun et al., 2021), as further supported by the overlap of many samples with both petrogenic and marine OC end-member ranges (Fig. 3b–d).

**Figure notes:**

(17) Figure 1: For 1B-1E, do the bars represent the mean values of each variable for that sedimentary environment, with the error of the mean? Perhaps this will be better shown as quartile/box plots, rather than a bar plot. Please clarify in figure caption if they are displaying the mean as well, as "characteristics" is vague. For 1G, is the R2 and p-value describing an exponential fit line or a linear fit line? Please describe in the caption, and if it is a linear fit equation please have it displayed as a linear relationship on the graph.

**Response:** We sincerely thank you for these helpful comments. We apologize for the lack of clarity in the original figure caption. In Fig. 1B–E in the original manuscript, the bars represented the mean values for each parameter, with the error bars indicating the standard deviation. Following your suggestion, we have replaced the original bar plots with box plots in the revised version. We have also revised the figure caption to clearly describe the median line, interquartile range, and whiskers shown in the box plots. For Fig. 1G, the fitted line represents a quadratic fit. We apologize for not specifying this in the original caption, and we have clarified this information in the revised figure caption.

**The revised figure and caption are as follows:**

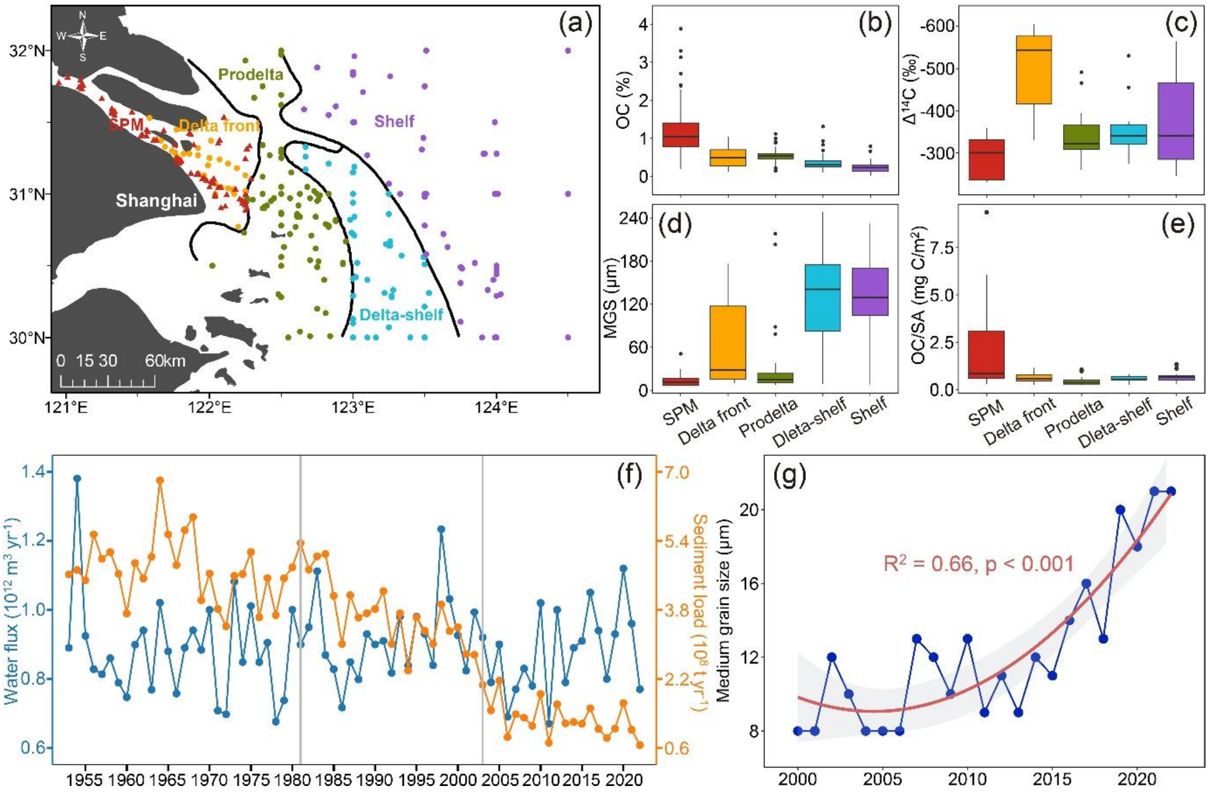

**Figure 1** Sampling sites of suspended particulate matters (SPM) and surface sediment in Changjiang Estuary and its adjacent areas (a). Differences in parameters between riverine SPM and deltaic sediments, including organic carbon (OC) concentrations (b), $\Delta^{14}$C (c), medium grain size (MGS) (d) and ratios between OC concentrations and specific surface area (OC/SA) (e). Variations of annual mean water flux and sediment load of the Changjiang River from 1953 to 2022 (f). Changes of annual MGS of the sediment delivered by the Changjiang River from 2000 to 2022 (g). Four sedimentary facies (Delta front, Prodelta, Delta-shelf and Shelf) of the Changjiang subaqueous delta in panel (a) are classified according to Chen et al. (1991) and delineated by black lines. In panels (b-e), the horizontal line inside each box represents the median, and the lower and upper edges of the box indicate the first and third quartiles, respectively. The box height denotes the interquartile range (IQR), and the whiskers extend to the most extreme data points within 1.5 × IQR of the lower and upper quartiles. The two grey vertical lines in panel (f) correspond to the construction of the Gezhouba Dam in 1981 and the Three Gorges Dam in 2003, respectively, on the mainstream of the Changjiang River. Data of riverine water flux, sediment load and MGS in Datong Gauge Station are applied to represent characteristics of water and sediment input into the East China Sea, which are obtained from annual China River Sediment Bulletin (CWRC, 1953–2022). The fitted line in panel (g) represents a quadratic fit, and the grey shaded area indicates the 95% confidence interval.

(18) Figure 3: I would suggest for clarity (particularly for colour-blind individuals) that the datapoints be kept in one colour (e.g. just black) and do variations in shape, filled and solid, particularly for the sediment before/after 2003 points.

**Response:** We sincerely thank you for this helpful suggestion. Following your comment, we have revised the data points in Fig. 3 to improve clarity and accessibility, particularly for colour-blind readers. Specifically, the surface sediment samples collected before and after 2003 have been distinguished using filled and open black circles, respectively.

**The revised figure and caption are as follows:**

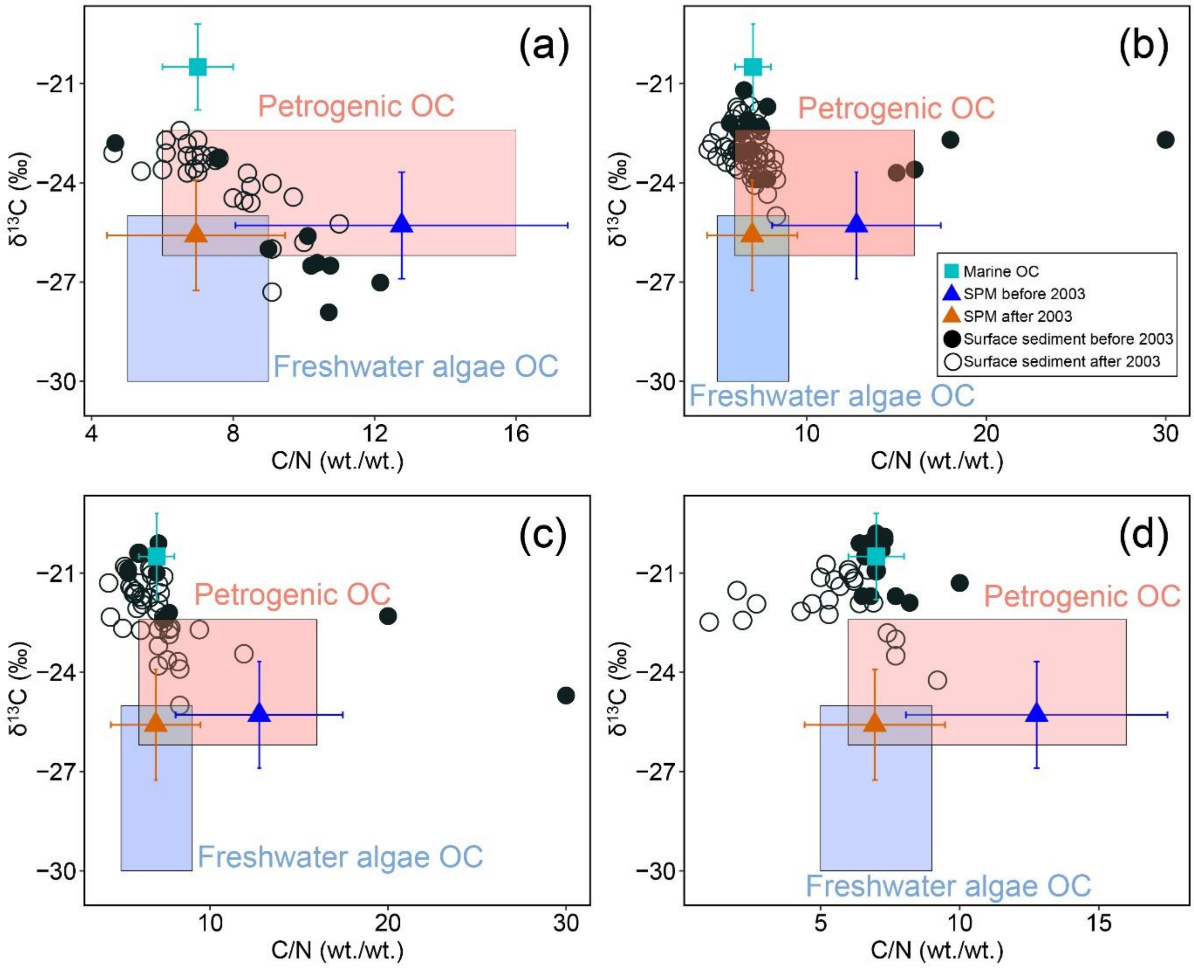

**Figure 3** Relationships between δ$^{13}$C and C/N in surface sediments in Delta front (a), Prodelta (b), Delta-shelf (c) and Shelf (d) prior to and after 2003. Light red and blue areas represent ranges of δ$^{13}$C and C/N corresponding to terrestrial organic carbon (OC) derived from petrogenic and freshwater algae OC sources, respectively, in terms of Lamb et al. (2006) and Menges et al. (2020). The marine OC end-member of δ$^{13}$C is from -19.2‰ to -21.8‰ and of C/N is 6–8 (Xing et al., 2011; Bao et al., 2018). The black solid and open circles represent surface sediment samples collected before and after 2003, respectively.

**Optional figure note:**

(19) I would suggest changing some figure colour palettes to ones that are more colour-blind and black and white printing friendly, for example those from the Viridis package. Figure 1 A-E (and any related figures referencing sedimentary environment with those colours) would be a good candidate. However, if difficult, it is not necessary.

**Response:** We sincerely thank you for this kind suggestion. We agree that colour-blind- and black-and-white-printing-friendly palettes can improve figure accessibility and readability. In our figures, however, the different colours are used to distinguish the four sedimentary facies of the Changjiang subaqueous delta, namely the Delta front, Prodelta, Delta-shelf, and Shelf, as well as the riverine SPM samples where applicable. Using only black-and-white tones may reduce the visual distinction among these sedimentary facies and make the spatial and statistical comparisons less intuitive.

In addition, these colours are used consistently throughout the manuscript to represent the same sedimentary facies, including Fig. 1A–E, Fig. 4b, Fig. 5, and some related figures in the Supplementary Material. Therefore, changing the colour scheme in Fig. 1 would require corresponding changes across multiple figures to maintain consistency. Given that you indicated this suggestion as optional, we would prefer to retain the current colour scheme, if acceptable. Nevertheless, if you or editor considers that adopting a more colour-blind- and black-and-white-printing-friendly palette would substantially improve the presentation, we would be happy to revise the relevant figures accordingly.

**Supplement notes:**

(20) Is there a data table with all the 13C and C/N values measured in this study? In the supplement, I see Table S3 appears to be the compilation of previous data. Is this the same data used in, for example, figure 3? There appear to be many more datapoints than are in Table S3. I suggest a table compilation of the values measured in this study.

**Response:** We sincerely thank you for this valuable comment. We apologize for the lack of clarity regarding the data sources in the original Supplementary Material. Table S3 includes all SPM C/N and $\delta^{13}C$ data used in this study. In addition to compiled SPM data from previous studies, it also includes newly collected and measured SPM data from the summer and winter of 2025. We note that the C/N and $\delta^{13}C$ values of SPM before and after 2003 shown in Fig. 3 were calculated as average values and used as end-member values in the analysis (please see the blue and dark orange triangles in each sub-figure in Fig. 3). We have revised the descriptions of Table S3, and we have compiled these surface sediment data into a new table (Table S4, shown below) in the Supplementary Material.

**The newly added supplementary table is as follows:**

**Table S4** Characteristics of various parameters in riverine suspended particulate matter (SPM) and different sedimentary facies of the Changjiang subaqueous delta. The values represent mean ± standard error. OC, organic carbon; TN, total nitrogen; SA, specific surface area; MGS, medium grain size.

| | **OC (%)** | **TN (%)** | **C/N** | **$\delta^{13}C$ (‰)** | **$\Delta^{14}C$ (‰)** | **SA ($m^2/g$)** | **OC/SA (mg $C/m^2$)** | **MGS (µm)** |
|---|---|---|---|---|---|---|---|---|
| **Riverine SPM** | | | | | | | | |
| Summer | 1.67 ± 0.20 | 0.26 ± 0.04 | 7.91 ± 0.41 | -25.5 ± 0.24 | -291.4 ± 18.3 | 14 ± 1.40 | 2.4 ± 0.71 | 9.78 ± 0.90 |
| Winter | 1.07 ± 0.11 | 0.17 ± 0.02 | 10.17 ± 1.11 | -25.6 ± 0.25 | | | | 29.33 ± 5.61 |
| **Surface sediment in different sedimentary facies** | | | | | | | | |
| Delta front | 0.50 ± 0.05 | 0.07 ± 0.01 | 8.01 ± 0.30 | -24.3 ± 0.24 | -495.3 ± 42.8 | 8.52 ± 2.02 | 0.63 ± 0.09 | 64.41± 14.17 |
| Prodelta | 0.52 ± 0.02 | 0.08 ± 0.00 | 7.52 ± 0.44 | -22.9 ± 0.09 | -344.4 ± 17.0 | 15.28 ± 0.83 | 0.42 ± 0.03 | 26.46 ± 5.67 |
| Delta-shelf | 0.37 ± 0.03 | 0.06 ± 0.00 | 7.53 ± 0.63 | -21.8 ± 0.13 | -382.9 ± 33.1 | 6.96 ± 0.46 | 0.57 ± 0.04 | 132.24 ± 11.41 |
| Shelf | 0.25 ± 0.02 | 0.04 ± 0.00 | 6.23 ± 0.30 | -21.4 ± 0.13 | -350.3 ± 23.6 | 5.57 ± 0.52 | 0.64 ± 0.05 | 321.0 ± 59.14 |

(21) Within Table S3, 14C values are not included, although those discussed in the study appear to come from this compilation of previous data. Please either include these, or have some other data table with 14C values used in this study included.

**Response:** Thank you for this suggestion. As the available $\Delta^{14}C$ data for SPM are relatively sparse and do not provide continuous annual coverage, they were not included in Table S3. Instead, following your suggestion, we have added a new supplementary table (as shown above) that includes the available $\Delta^{14}C$ values for SPM and for different sedimentary facies of the Changjiang subaqueous delta. This revision has improved the clarity and transparency of the data used in our study.

**Dataset notes:**

(22) Overall, I had confusion throughout on which datasets were used for what. For example, the recent samples that were collected and are being presented in this study, and the older, compiled data. More complete tables with all of the data would do well to provide clarity on this.

**Response:** Thank you very much for this helpful comment. We apologize that the distinction between the newly collected and compiled datasets was not sufficiently clear in the original manuscript. The newly collected samples in this study refer to the 2025 SPM data presented in Table S3, whereas the other SPM and surface sediment data were compiled from previous studies. To improve transparency and clarity, we have added a new table (as shown above) in the Supplementary Materials to summarize the data characteristics of all riverine SPM samples and surface sediments from different sedimentary facies used in this study. In addition, all data used in this study have now been made publicly available through Zenodo, including the sample locations, sampling years, data sources, and measured parameters. The dataset can be accessed at https://doi.org/10.5281/zenodo.20260902. We believe that these revisions have allowed readers to more clearly understand the sources and applications of the datasets used in this study.