We appreciate the editor's precious time for handling our manuscript and the reviewers' time for reviewing the manuscript. We have thoroughly considered all the comments that are very helpful for improving the interpretations of our findings. We provide our detailed responses below.

Response to the Referees

Anonymous Referee #1

1. Does the paper address relevant scientific questions within the scope of BG? No

Response: Biogeosciences (BG) is an international scientific journal dedicated to the publication and discussion on all aspects of the **interactions** between the biological, chemical, and physical processes in terrestrial or extraterrestrial life with the geosphere, hydrosphere, and atmosphere. Our study is designed to investigate the spatial distributions of TOC and TIC in the surface sediment of the transitional zone near the Yellow River's mouth, which is influenced by complex interactions of biological, chemical, and physical processes. Our analyses address the underlying mechanisms that regulate the carbon sedimentation in the Yellow River Estuary. In this regard, we believe that our paper address relevant scientific questions within the scope of BG.

2. Does the paper present novel concepts, ideas, tools, or data? Data are incremental to Liu et al., 2012, 2014, 2015 (etc.) who all reported similar data from the same region.

Response: There were only a few studies carried out to evaluate the relevant carbon parameters (i.e., DIC, PIC, DOC, POC, TOC) in sections close to or including some areas of the Yellow River Estuary (see Figure 1). Our study **differs largely from the previous studies in terms of both sampling area and analyzed variables.** Regarding the variables, Liu et al. (2015) and Hu et al. (2016) focused on TOC in sediment, and Gu et al. (2009) and Liu et al. (2014) mainly on DIC, DOC, PIC and/or POC in the water column. However, our study included the analyses of both TOC and TIC in surface sediment of the Yellow River Estuary, which has been lacking although Liu et

al. (2014) and Gu et al. (2009)'s analyses pointed out the importance of $CaCO_3$ precipitation in the estuary.

Figure 1. Sampling locations and measured variables from previous studies and our study

3. Are substantial conclusions reached? No, the discussion is very descriptive and the conclusion overly vague: "Our study points out that the dynamics of sedimentary carbon in the Yellow River Estuary is influenced by multiple and complex processes, and highlights the importance of carbonate in carbon sequestration". In my opinion, this is not enough for Biogeosciences. I would expect the author to come up with a precise discussion of the potential processes and at least some hypothesis to test in the future. Furthermore, I would also expect some sort of quantification of the inorganic carbon sequestration, because how can one claim its important if not measured?

Response: We appreciate the reviewer's constructive comment. Our analysis shows a significantly negative relationship between $\delta^{13}C_{carb}$ and TIC, indicating that higher level

of TIC is a result of higher rate of biological production, which would lead to more negative $\delta^{13}C_{carb}$. Thus, TIC in the surface sediment of Yellow River Estuary is primarily from autogenic carbonate. Interestingly, there is also a significantly negative relationship between $\delta^{13}C_{carb}$ and TOC, implying that higher level of TOC may also result from higher rate of biological production, thus TOC is primarily autochthonous. However, we agree that the discussion and interpretation need to be improved.

Author's changes in manuscript: We will revise our discussion/interpretation, and also make changes in other relevant sections. For example, in Abstract, we will include statements similar to "there is a significantly negative relationship between TIC and $\delta^{13}C_{carb}$, indicating that TIC was primarily from autogenic carbonate", and "our analysis shows a significantly negative correlation between $\delta^{13}C_{carb}$ and TOC, implying that TOC is mainly autochthonous".

4. Are the scientific methods and assumptions valid and clearly outlined? Analytical methods seem fine but assumptions are not clearly outlined and it is hard to understand the logic behind the limited interpretation. Example: "Our analyses revealed a significantly positive correlation between TIC and TOC (r=0.97, p<0.01)". Which statistical test was performed? Is the distribution normal? It doesn't look like it from here. Also, what is the process potentially linking both?

Response: We appreciate the reviewer's constructive comment. In our study, a correlation analysis was carried out to evaluate the relationship between TIC and TOC. Student's t test was used to determine the correlation's significance. The distribution is normal. Regarding "the process potentially linking both", our response to the second comment is relevant, i.e., higher levels of TOC and TIC are primarily a result of higher rate of photosynthesis. However, we agree that the discussion/interpretation need improvements.

Author's changes in manuscript: We will add the relevant information and provide in-depth analyses with "precise discussion of the potential processes" in our revision.

5. Later in the text, it is stated that when TOC decompose it releases CO2, which promote TIC precipitation. But then, why the relationship is positive and not negative? The relationship should be between TIC and the amount of TOC degraded. Would that be correlated to the total amount of TOC left after degradation? One can raise serious doubt about that. Especially with the relatively small range of concentration. Was any

other potential relationship explored? The TOC/TIC and isotopic proxies seem to also follow the same pattern than the composition of the sediment (clay, silt, and sand).Could your distribution simply an effect of different sedimentation regimes?

Response: This is a good point. The statement/interpretation (i.e., OC transfer to IC) we gave earlier is not appropriate. We have re-evaluated our analyses and interpretations, and intend to revise our discussion and interpretation regarding the underlying mechanisms responsible for the spatial distributions of TOC and TIC (see responses to comments 2 and 3).

Author's changes in manuscript: We will make changes accordingly during the revision.

6. Are the results sufficient to support the interpretations and conclusions? No, I feel the conclusion build more on previous study than the actual data presented here.

Response: As given in our responses above, while our discussion and interpretation need some improvements, the main conclusions are almost correct. We believe that with a modest to major revision, our results will be sufficient to support the interpretations and conclusions. Although previous studies have pointed out the importance of TIC near the Yellow River Estuary, there was no measurement to support it. Our study is the first to evaluate both TOC and TIC in the surface sediment, and to explore the underlying processes determining the dynamics of TOC and TIC.

Author's changes in manuscript: We will discuss more in depth the different processes in order to come up with more elaborated interpretations and conclusions in the revision.

Gu, D., Zhang, L., and Jiang, L.: The effects of estuarine processes on the fluxes of inorganic and organic carbon in the Yellow River estuary, Journal of Ocean University of China, 8, 352-358, 10.1007/s11802-009-0352-x, 2009.

Hu, L., Shi, X., Bai, Y., Qiao, S., Li, L., Yu, Y., Yang, G., Ma, D., and Guo, Z.: Recent organic carbon sequestration in the shelf sediments of the Bohai Sea and Yellow Sea, China, Journal of Marine Systems, 155, 50-58, https://doi.org/10.1016/j.jmarsys.2015.10.018, 2016.

Liu, D., Li, X., Emeis, K.-C., Wang, Y., and Richard, P.: Distribution and sources of organic matter in surface sediments of Bohai Sea near the Yellow River Estuary, China, Estuarine, Coastal and Shelf Science, 165, 128-136, https://doi.org/10.1016/j.ecss.2015.09.007, 2015.

Liu, Z., Zhang, L., Cai, W.-J., Wang, L., Xue, M., and Zhang, X.: Removal of dissolved inorganic carbon in the Yellow River Estuary, Limnology and Oceanography, 59, 413-426, 2014.