Response of Authors on Manuscript Entitled: "Ecosystem-specific patterns and drivers of global reactive iron mineral-associated organic carbon (bg-2023-59)"

Dear Editors and Reviewers,

Thank you for your letter and for the reviewers' comments concerning our manuscript entitled "**Ecosystem-specific patterns and drivers of global reactive iron mineral-associated organic carbon** (bg-2023-59)". Those comments are all valuable and very helpful for revising and improving our paper and of important guiding significance to our research. We have studied comments carefully and have made corrections which we hope meet with approval. Revised portion is marked in yellow in the paper. The main corrections in the paper and the responds to the reviewers' comments are as following:

Response to the Second Referee (Reviewer #2)

(With brown characters as the original comments and suggestions)

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1. The Fe-associated organic carbon is a key component to long-term soil organic carbon (SOC) stocks, making it essential to gain a global understanding of its patterns and drivers. However, there are certain limitations in the current analysis approach. The classification of global ecosystems into continental, wetland, and marine ecosystems lacks precise definitions. Here, "continental" is commonly defined on a geographic scale (e.g., Guerin et al., 2020). Does the term "continental ecosystem" refer to the terrestrial ecosystem?

{Response} Thank you for your valuable and thoughtful comments. According to your suggestion, we have revised the “continental ecosystem” to “terrestrial ecosystem” in the whole manuscript. We agree that “continental” is usually defined in terms of geographical scale, so the expression “continental scale” in the article remains.

2. Additionally, the term "wetland ecosystem" in this article includes both freshwater and coastal or estuarine wetland ecosystems. It is important to note that coastal or estuarine wetlands have unique characteristics of salinity. While it is generally believed that Fe complexes may be less affected by increasing salinity, it is dependent on particle size actually (Simon, 2018). Also, salinity can affect Fe transport capacity (Herzog et al., 2019). As such, it is recommended to separate the analysis into freshwater and saline wetlands for more accurate characterization.

{Response} Thank you for your valuable and thoughtful comments. We agree that salinity can affect the Fe-OC and *f*Fe-OC. The higher the salt concentration in coastal wetlands, the higher the Fe-OC and *f*Fe-OC (Bai et al., 2021). However, there are few research cases on Fe-OC and *f*Fe-OC in coastal wetlands. Among the 17 wetland articles collected in this article, only four involve coastal wetland (the rest are freshwater wetlands), and the sample size is small. With the increasing number of research articles on Fe-OC in coastal wetlands, it is possible to separate coastal

wetlands from freshwater wetlands in the future to further discuss the effects of salinity on Fe-OC.

References:

Bai, J., Luo, M., Yang, Y., Xiao, S., Zhai, Z., Huang, J., 2021. Iron-bound carbon increases along a freshwater-oligohaline gradient in a subtropical tidal wetland. Soil Biology and Biochemistry 154.