

Response to the editor,

Thank you for submitting your revised manuscript. I am happy with your responses to reviewer comments, but there are a few places where I would like to see more of the justification that you provide in the manuscript itself. Therefore I would be grateful if you could attend to the following request:

We thank the editor for the positive remarks and have revised the manuscript accordingly.

Reviewer 1 comment # 7 Please could you also add the explanation that site NB8 is similar to another high sedimentation site in the Bothnian Sea to you manuscript

Reply: We have now added the following sentence at P7. Lines 6-7 :

“The geochemistry at site NB8 is strikingly similar to that at another site with a high sedimentation rate in the Bothnian Sea (Egger et al., 2015a, b).”

Please include the justification provided in your answers to reviewer 1 comments #22 and #23 in the main text of the manuscript (not just in an appendix).

Reply:

We have now added the following sentence at P7. Lines 10-12:

“The large number of model components, the parameters specific for the field site and the reaction kinetics and parameters from the literature greatly limit the degrees of freedom while fitting the model to the data (van Capellen and Wang 1996).”

And removed this sentence from the appendix

Reviewer 2 comment #7, please make sure that the likelihood of different salinity changing vivianite burial that arose from your sensitivity analysis is also stated in the manuscript.

The clarify the effect of salinity on the formation if vivianite further we changed the text at P. 14 lines 3-6 as follows.

“Our study also highlights the role of bottom water salinity in vivianite formation. While vivianite is a key sink for P in the Ore Estuary at a salinity of 5, we show that its formation is enhanced further at low salinity. Many studies focus only on the relatively high salinity parts of estuaries (e.g. as compiled for the Baltic Sea in Asmala et al. (2017)). This may explain why the role of vivianite as a sink for P in these systems has been largely overlooked.”