

Comment on bg-2021-153

Anonymous Referee #2

Referee comment on "Pyrite-lined shells as indicators of inefficient bioirrigation in the Holocene–Anthropocene stratigraphic record" by Adam Tomašových et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-153-RC2>, 2021

This is an original manuscript on a highly relevant topic. I am sure that we will soon witness an explosion in this style of papers. This study is definitely timely. My comments are all minor and aimed towards improving the clarity of the argument, pointing in places to additional background literature.

The authors highlight the role of deltaic systems on sedimentary dynamics, noting the higher sedimentation rates in the prodelta in comparison with areas in the northwest Adriatic Sea. Some cores are coming from prodelta settings (Po and Isonzo) and others from areas off strandplains. Deltaic settings are characterized by a complex array of stressors. It is clear that sedimentation rate is a first-rate controlling factor in this area. However, what about other potential factors, such as freshwater discharge, hypoxia, or substrate consolidation in connection with a deltaic source? Some of these (e.g. hypoxia) are assessed through the text, but a better articulation with the deltaic context would be advisable. A discussion on other influences on pyritization would be useful as well. For example, the higher abundance of pyritized shells is present in nearshore areas where restricted circulation may have been associated with lower oxygen content. Also, these are areas with higher amounts of organic carbon and iron in the fine-grained sediment. In particular, bioturbation is strongly affected by the interplay of these parameters. There are various papers published on this topic during the last fifteen years or so. I suggest, for example, to check MacEachern, J. A., Bann, K. L., Bhattacharya, J. P., 2005. Ichnology of deltas: Organisms' responses to the dynamic interplay of rivers, waves, storms and tides. In: Giosan, L., Bhattacharya, J. P. (Eds.), *River Deltas: Concepts, Models, and Examples*. SEPM Special Publication, 83, 49–85. Also of relevance is: Bhattacharya, J.P., Howell, C.D., MacEachern, J.A. and Walsh, J.P., 2020. Bioturbation, sedimentation rates, and preservation of flood events in deltas. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 560, p.110049. In short, the proposed interpretation relies heavily on sedimentation rates, but bringing other parameters to the discussion would be important to reflect more adequately the complex dynamics of deltaic systems.

In line 61, the classic paper in this regard is: Bromley, R.G. and Ekdale, A.A., 1986. Composite ichnofabrics and tiering of burrows. *Geological magazine*, 123(1), pp.59-65.