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Biogeosciences Discussions

# *Interactive comment on* "Benthic foraminiferal Mn / Ca ratios reflect microhabitat preferences" *by* Karoliina A. Koho et al.

**Anonymous Referee #2**

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The manuscript "Benthic foraminiferal Mn/Ca ratios reflect microhabitat preferences" by Koho et al. presents new data on the link between pore water Mn concentrations which are related to dissolved oxygen content, and benthic foraminiferal Mn/Ca. Mn/Ca is receiving a lot of attention recently as it may be a suitable proxy to reconstruct past dissolved oxygen concentrations in the water column/pore water. Using several different species and linking the data with pore water measurements has resulted in a very nice dataset, which partly provides evidence for existing ideas but also points out some issues that still exist. Especially the discussion on these possible issues could still use some more extensive consideration as described below in detail. But in general, the manuscript is well-written, easy and clear to follow, and definitely fitting within the scope of Biogeosciences. I recommend that this manuscript is suitable for publication after moderate revisions have been made.



My main issue is that I feel that the discussion on the part where pore water Mn/oxygen and Mn/Ca in the forams are not fitting, can be explored further. Currently, it is partly contradicting, i.e. living labradorica and fimbriata were found at 0-1 cm but are generally deeper-living species (unless maybe in conditions where the bottom water is already close to anoxic), so that would imply habitat migration. But then the lack of a trend in Mn/Ca in the chambers would indeed point to no migration. In station 8, both species have the highest Mn/Ca again and are deepest, but there is no Mn in the pore water. So under the anoxic conditions all the available Mn has either diffused upwards when reduction took place or it precipitated as MnCO3. How then can the forams have high Mn/Ca? For me this either means that they did migrate and picked up the Mn at a shallower depth; or that pore water oxygen and thus Mn are changing through the seasons, having higher pore water Mn when the forams calcified (assuming they were not calcifying at the moment of collection); or finally that the test Mn/Ca is biased by MnCO3 precipitation. You did write that contamination on in- and outside bits (high Al and or Mn) was discarded, but it would be interested to know if especially in these deep station 8 forams there was indeed a Mn-coating. Because if a coating forms, crystals may as easily form somewhere inside the test to bias the bulk Mn/Ca.

Even though that in general the relation between oxygen and Mn/Ca seems to follow the expected trends, the species-specific correlations are not very good or non-existing. What do you think could be the reason for that? How could the impact of habitat migration be determined? Seasonality may be resolved of course by extra sampling, which is always welcome. As a side note, I do like to point out that it would have been great to have had pore water profiles for stations 7 and 9 too.

Minor Comments: 2.1 add some of the main currents and water masses to figure 1. p.4, 16: part of the previously mentioned loop of possible explanations why not everything fits. Could it be that some of the deeper specimens in the anoxic sediment are stained despite being dead? They would still classify as recently-alive, but that may be enough to have them buried a couple of cms. p.5, 6: Mg? Mg/Ca data would of

course also be interesting to present. But to stick to redox elements, were any other redox elements like Fe or U analyzed? p.5, 26: Internal reproducibility is good, but how was the comparison between both lasers? p.6, 23: shell size; can a trend in different chambers automatically be related to shell size? I am not sure if this is a correct way of naming it. p.7, 29: rations, delete n p.10, 20: where the TROXCHEM, add the; still be, add be p.12, 2: foraminferal table 2: change comma's for decimals to points. Figure 1: add currents and watermasses Figure 5 caption: in indicated, change to is Figure 6 caption: this is exactly the same as the one for figure 5, which I assume should not be the case.

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