Review: “Western Indian Ocean bo6om water temperature calibra;on – are benthic foraminifera Mg/Ca ra;os a reliable palaeothermometry proxy?” Larsson & Jung, 2024
The manuscript provides a new dataset of various element/Ca ra;os, focussing on Mg/Ca ra- ;os, for three benthic foraminifera species. The data originate from the western Indian Ocean and were checked by the authors for their applicability as a paleothermometer proxy for bottom water temperatures. Although the number of samples seems too small to establish a valid new calibra;on, the manuscript contributes to an improved understanding of benthic foraminifera and their usability as palaeoproxy in this area. Furthermore, the authors compare their data set with two others from the region and evaluate the quality and relevance of their data as a palaeoproxy in the discussion chapter, under considera;on of significant literature. As I myself am not par;cularly familiar with benthic foraminifera, I cannot make a qualita;ve statement about the methodology which is used here. The authors have presented their results in a sufficient number of graphics, although some of them s;ll need a bit of reworking. Furthermore, the language is a li6le clumsy in some places, but as I am not a na;ve speaker myself, I have only made minor comments here. Overall, I rate the manuscript as good and recommend publica;on, although there are s;ll a few points that need to be improved.
2 Be more consistent throughout the manuscript e.g.: 1) Line 172 “(Table A1 in Appendix A)” vs. Line 201 “(Appendix A Table A1)” 2) Abbrevia;on of the foraminifera. Some;mes you wrote Cibicidoides mundulus vs C. mundulus. You can write the en;re name throughout the manuscript, but I recommend to write the full genus and species name when you first men;on it and then con;nue throughout the manuscript with the abbrevia;on.
3) Same for figure vs. fig. vs Figure (and table, Table, tab.), choose one and stay consistent. Figures and Tables Figure 2 would benefit from gridding the poten;al temperature. Figure 4: Use either two different symbols or two different colors (best is both), it is hard to dis;nguish between both. Figure 6: Same like Figure 4. I find it hard to dis;nguish between the both triangles, since the dark blue and black do not show a strong contrast, but also the other blue symbols could benefit from a different color. Also, the graphic labelling is confusing here. I would write “Mg/Ca ra;o against (a) Fe/Ca ra;os, (b) Al/Ca ra;o and (c) Mn/Ca ra;o in Cibicidoides spp. …” Figure 9: Again. Maybe use a circle for C. spp. ? Table 1: “Wuellerstrofi” is wri6en in capital le6ers, change it. Table A2: Numbers e.g. at 2a, 2g and 3a seem to be smaller. Table A2: Why is the species at samples from 3g to 3i G. ruber? I thought it is Uvigerina spp. and Cibicidoides spp. 3 Minor revisions: Line 74: One space too many ader “i.e.” Line 92: strange bracket ader “(Stripe et al., 2021)” and one space too many Line 107-109: You say “three” water masses but listed just “two” of them Line 136: two dots at the end of the sentence Line 138: One space too many ader “(Table 1)” Line 143: first men;on of G. ruber -> write the en;re name Line 153: write „In experiment 1” to keep it consistent. Furthermore, men;on that you used 6 sets with a varying amount of G. ruber somewhere. Line 162-164: 5.81 ppm and 9.53 ppm, where does these numbers come from? In Table A2 I see three tests with G. ruber for the crushing experiment between two glass slides (Ca 0.55, 7.5 and 3.75 ppm = 3.93) and three tests with G. ruber for the crushing experiment using a metal pin (1.68, 5.1, 5.66 = 4.15). Same for Mg/Ca, can’t find the 3.43 and 3.53 mmol mol-1 in A2, especially since sample 1a has incredibly high values of 35.23 mmol mol-1. Line 170: maybe add “(0.55 to 7.50 ppm in both crushing between two glass slides

Commented [VL1]: Not sure what is the best format to use. I think U. spp is a bit too short. also C. spp. Check with Simon

and when using a metal pin, Table 1A and A2 in Appendix A)" to make sure that the general results, regardless of the method used, are really low. Line 180-184: For your average values 0.38, 2.91 and 3.01 mmol mol-1, I have 0.37, 2.90 and 3.02 respec;vely. I suppose this is because you used a higher number of decimals in your original calcula;on. I am men;on this in case you want to change it, but I think this is fine. For your mean Fe/Ca ra;o of 0.61 mmol mol-1, I have 0.57 mmol mol-1 instead. Please check this again and correct it.

Line 199: (6x25): change sentence: "In the procedure, specimens of Globigerinoides ruber (6 sets with a varying amount of 10 - 50 individuals; Table A1, Appendix) picked from …"

Line 200: remove point ader "Uvigerina…"

Line 201: (Table A1 in Appendix A) -> see Line 172

Line 214: Make it two sentences: "… proposed by Hasenfratz et al. (2017). This suggest that Mn-oxide…"

Line 228 230: change to (Figure B1 in Appendix B)

Line 262: One space too many

Line 280: Table A3?

Line 299-300: I see foursamples in water depth deeper than 2500 m and five samples in water depth 2500 m …"

Line 303: Cibicidoides in italics

Line 308 – 310: rephrase sentence: „The Mg/Ca ra;os of Cibicidoides spp., although higher in their Fe/Ca ra;os than >0.1 mmol mol-1, were also included, since they show no correla;on between Mg/Ca ra;os and Fe/Ca ra;os."

Line 310: One space too many between "Table" and "2". Also, write "Figure 6" in capital le6ers to stay consistent.

Line 312: C. mundulus and C. wuellerstorfi, stay consistent.

Line 313: "Figure 9". Also, remove point ader "Cibicidoides". Rich;g: Cibicidoides spp.

Line 318: "Figure 9" Line 314 & 320: BWT Line 321: Sentence in parentheses not in italics

Line 322: "Figure 9" Line 331: Cibicidoides spp.

Line 337: Cibicidoides spp.; Also, one space too many between "Table 2" and "When"

Line 353: One space too many between "Table 2" and "It" Line 356: compared to what? Samples from Cibicidoides spp.?

Line 359: One space too many between "ra;o" and "The"

Line 366: "Figure 10" Line 369: "Figure 10" 5 Line 398: "Figure 11" Line 400: space

Line 401: "SW Indian Ocean" Line 426: Bracket ader Figure 6 missing

Line 427: Bracket in the wrong place

Line 430 - 432: rephrase sentence e.g.: "Although the leaning procedure by Barker et al. (2003) has been widely used (e.g., …) the removal of Mn-Mg coa;ngs is s;ll inefficient (Hasenfratz et al., …)."

Line 439 – 441: rephrase sentence e.g.: "The high Fe/Ca ra;os as well as the high Al/Ca ra;os in most samples of all species used here (Table 2) indicate inefficient removal of silicate contaminants, sugges;ng that the number of rinse/ultrasonica;on repe;;ons of the Barker et al. (2003) procedure is inadequate."

Line 449: what is with the value of 0.15 mmol mol-1 in Table 2 for the lowest range of Uvigerina peregrina? Line 450: add "(… 0.35 mmol mol-1; Table 2)"

Commented [VL2]: kept old averages because correct. But change Fe/Ca to 0.57, mistake in calculation

Commented [VL3]: Changed. Also sentence on line 195 clarified.

Commented [VL4]: done

Commented [VL5]: done

Commented [VL6]: done

Commented [VL7]: Not changed, should be Table as is written

Commented [VL8]: now table A4

Commented [VL9]: Checked and changed

Line 451: rephrase term: compared to Fe/Ca ra;ons in Cibicidoides wuellerstorfi below 0.04 mmol mol-1.
Line 455/457: Do you mean Table A3?
Line 457: add “(0.13 and 0.31 mmol mol-1)” behind Cibicidoides spp. -> There is also a dot missing ader “spp”
Line 465: write: “… core depth, water depth, and morphology”
Line 474-476: Don’t understand this sentence. What is a nearby region here?
Line 477: I think there is a comma missing between contamina;on and Fe/Ca …? Line 478: Bracket closed ader “Figure 8”
Line 479: Bracket closed ader “Figure 7”
Line 498: Missing commas before and ader “respec;vely”, as well as before “but”
Line 507: one space too many between “i.e.” and “Cib”

Commented [VL10]: fixed
Commented [VL11]: fixed
Commented [VL12]: added
Commented [VL13]: added
Commented [VL14]: clarified
Commented [VL15]: added
Commented [VL16]: added
Commented [VL17]: added
Commented [VL18]: added
Commented [VL19]: fixed

Referee2

14: the word entailed doesn’t seem appropriate. Perhaps the word elucidated?
-Rephrased sentence

19: with what error can the 'wider' Indian ocean calibrations be used in the Western Indian Ocean? Could report that error here for brevity and maximal impact of abstract
No idea – ask Simon

22: With what error can BTW be reconstructed? What does your calibration error translate to in degrees C error of the BTW?
- Ask Simon how to appropriately make conversion

24
- Fixed

25
- Fixed

28
- Fixed

34
- Fixed

41
- Fixed

43
- Fixed
- Fixed

44
- Sentence clarified as suggested, but flow can be improved if there is time.

48
- Defined

49
- Fixed

54
- Fixed

71
- Rephrased sentences

80
- Fixed

84
- Fixed

85
- provide example citations for the use of benthic species for stable δ18O and δ13C reconstructions

87
- fixed

91
- removed sentence as doesn't add much

92
- rephrased sentences
- fixed

95-96
-fixed

113
-fixed

134
-fixed

144
Fixed
145
Fixed

159 (162) How long water bath and what temperature?

224: Please describe in more detail what the standards were, I don't think I have this info – can I ask Laetitia?

225

- done

Section headings 3.1 and 3.2 –
-fixed

261-264: It does not look like the samples are below the contamination thresholds? you even indicate in table 2 which samples are eliminated due to contamination.... so this statement can't be true.
-yes this sentence is true. This is refering to Cibicidoides spp. samples that contained specimens mixed Cibicidoides species

298
-It should be r^2

310
-go back to again – write a sentence and clarify how many samples were left included in the calibration at the end. How many included in cibicidoides wuellerstorfi? How many samples were left if following the contamination thresholds?

318

- done

323
-go back to again: does the calibration fall away if I remove the datapoint at high temperature? (likely yes) Add a sentence stating this? Ask Simon

350 – 360
-go back to again; add sentences clarifying which are excluded/included.

362
-fixed

369
-fixed

393
-fixed

426
-fixed

428
-added

474
-need to check in odv

514
-fixed

Referee 3

Line by line comments:

Lines 24-31: This paragraph seems out of place; reading it, I thought this paper was about to go in a very different direction. I think you could start from line 32 and be fine.

-Have rearranged and changed first paragraph

Lines 94-97: This whole paragraph or a statement of this kind belongs further towards the beginning – maybe at the end of Section 1?

-edited

Line 121 (?): What is the small inset panel on the right? I assume it's ship tracks but the information would be good to have in the caption.

-added

Lines 153-216: Can you divide Experiments 1-3 into their own subheadings? I.e., "2.2.1. Preparation experiment 1: XYZ?" As it is now, it's a massive section that's difficult to follow. I could also see this being divided up where you explain the experiments simply and clearly in Section 2.2 and describe your findings in the Results.

-added Table 2 clarifying differences

Line 219: There's inconsistency in foraminifera abbreviations: G. ruber vs. Cibicidoides wuellerstorfi, for example. I would go with the abbreviation, but be consistent either way.

-fixed

Line 265: Where's panel D?

-removed

Line 325: Capitalize "c" in "c. wuellerstorfi."

-fixed

Line 369: "Figure ???11"

-fixed

Section 4.2. header: Not sure why this is blue?

-fixed

Lines 467-472: Is there any support for this in the literature or is it speculation? I hate to ask, but any possibility of elemental mapping to support?

Thanks for these comments. Elemental scanning is unfortunately beyond the scope of the

project, but we will add references supporting the habit statements.

Lines 478-479: Missing parentheses.

-fixed

Lines 484-493: I think Section 4.8 belongs in the introduction – it's critical motivation for your cleaning tests but you don't bring it up until the end.

Lines 495-521: This is too long of a block of text, it's dense and hard to follow.

-rephrased

Lines 523-535: This is a great conclusion and summary! Bring some of this clarity to the introduction and method explanations.

-clarified intro