

Review of revised manuscript version bg-2019-367

**“The patterns of elemental concentration (Ca, Na, Sr, Mg, Mn, Ba, Cu, Pb, V, Y, U and Cd) in shells of invertebrates representing different CaCO<sub>3</sub> polymorphs: a case study from the brackish Gulf of Gdańsk (the Baltic Sea)”** by Anna Piwoni-Piórewicz, Stanislav Strekopytov, Emma Humphreys-Williams, and Piotr Kukliński

I would like to acknowledge the authors' comprehensive revision. It is a shame that certain changes could not be implemented, but I understand these would require further sampling and measurements that at this stage may no longer be feasible. The authors could, however, keep them in mind for their future work. Overall, I enjoyed reading the new manuscript version, that has been significantly improved and will be of valuable contribution to the field. I only have few minor, mostly editorial comments.

Line 18: 'shells are discussed'

Line 26: '...Cd) are more variable'

Line 30: do you refer to your different sites? The should be 'sampling sites within the Gulf', if this refers to the comparison to literature data then this should be specified.

Line 36: ',mainly polymers,' comma missing

Line 41: different font sizes, please correct

Line 49: I would suggest to move the brackets after chemical factors, i.e. as follows '...chemical factors (e.g. metal...; Blackmore and Wang, 2002)'

Line 52: I do not think this is correct, they are important, but I think dissolved C in the ocean is the largest C reservoir?

Line 117: 'carbonate skeleton'

Line 135: this is the figure to appear so should be Figure 1

Line 156: delete 'and' i.e. 'that is, lower Ca<sup>2+</sup>'

Line 158-159: The equation for omega is incorrect, should be:  $\Omega = \frac{[Ca^{2+}] \times [CO_3^{2-}]}{K_{sp}^*}$ , where

K\*<sub>sp</sub> is the solubility product calcite or aragonite (depending on the in situ conditions). The citation is not necessary as this is basic thermodynamics, but I see Kawahata et al., 2019 present a nice overview so could be put as 'e.g. Kawahata et al., 2019'.

Line 214-215: There is something wrong with this sentence, it is said that 'Three species were found at MA...' but in the brackets there is only one given, and then for following stations M2 and MW it is again one each.

Line 234: Subheading space formatting – above and below not same as for the other headings

Line 234: 'uncertainty (2.5 SD)' please be more specific, 2.5 of what?

Line 259: '4-10 % for all other elements' I would suggest to provide the details for each, unless it is always assumed that the uncertainty is not better than 10%, but then please mention it

Line 260: 'et al. 2017'

Line 275: Should not be '316,000'? Please check the comma positions.

Line 276: Should not be '363,000'?

Line 283: 'Both Sr and Mg were...'

Line 296: 'Shells' which ones you refer to?

Line 300: Two spaces missing, should be 'H ='

Line 310: 'Shells' which ones?

Line 370: better 'increased incorporation'?

Line 372: comma missing after 'in our study'

Line 376: 'while larger Pb radii are favoured in aragonite structure'?

Line 379: 'determine their concentrations'

Line 385: improvement of the data'

Line 405: 'life spans'

Line 409: 'drive its biogeochemical cycles'

Line 411: commas missing ',to some extent,'

Line 413-416: Please rephrase this sentence (seems convoluted)

Line 429: 'if a significant'

Line 431: ' while size class effects were less pronounced in clams'? Also 'the varied elements' please rephrase

Line 451: 'activity of an organism'

Line 488: Mg/Ca in many marine calcifiers has been used a temperature proxy, and known to be positively correlated with temperature. At the same time, Mg incorporation into the lattice is strongly dependent on growth rate, with more Mg incorporated under decreased precipitation rates. In addition, and in contrast to some other elements like Sr for example, Mg is thought to be transported by different pathways, and is strongly physiologically relevant. Growth increments are also lined with very high Mg contents, potentially linked to

increased organics. Some organisms, like low-Mg brachiopods for example, actively discriminate against Mg. In summary, there are many known controls over Mg, but from the data in Figure 3 it is clear that in the studied samples it is the mineralogy (and especially on such larger orders).

Line 530: 'in a shallow zone'

Line 544: 'most likely caused'

Line 545: 'as the trace elements'?

Line 6002: 'Mytilus' should be in italics

Table 1: First row in the table 'in situ' should be in italics

Table 3: Is the SD the standard deviation between all specimens of a species, please specify. Also please include sample size n along with the SDs and SEs.

Table 4: I think there is something wrong with the formatting, some cells have hyphens that appear out of place, please check.

Supplement: 'Table S1' (not Tabke S1)

A couple of suggestions for the authors to consider that could be of aid to their future work:

I assume that the difference in the dissolution procedures between standards and samples should not significantly affect the final results of the study, however, for the future I urge the authors to treat samples and standards exactly the same. They should also consider finding more appropriate standards for biologic samples. A potential easy solution would be the making of an in-house standard by homogenising several individuals of a species, and cross-checking the different dissolution procedures on it. If an accepted international standard is not available for routine measurements, the authors could at least request small aliquots from the community or colleagues, cross check their in-house standard against it, and include it to the routine of running the limestone and dolomite standards. This would make their data and analytical procures way more convincing from the start and overcome some of the misunderstandings.

For the future, I would like to advise the authors to also collect and consider measuring water samples alongside the calcifiers. Such information would be very valuable and of great interest to the field. Widely accepted protocols for water sampling for trace element analyses are available from GEOTRACES.