

Interactive comment on “Environmental controls on the boron and strontium isotopic composition of aragonite shell material of cultured *Arctica islandica*” by Y.-W. Liu et al.

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The manuscript submitted to Biogeosciences entitled: “Environmental controls on the boron and strontium isotopic composition of aragonite shell material of cultured *Arctica islandica*” by Liu et al. is focused on evaluating of geochemical response of bivalve aragonitic shells on change in marine environmental conditions, and therefore, this work is within the scope of Biogeosciences journal. Abstract and title reflect the content of the paper. I think the paper is generally well written. Please see my comments and concerns below.

Page 2980, Line 19: Please define pH(shell)

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Page 2981, Lines 16-19: I suggest splitting this sentence into two.

Page 2982, Line 4: Additional explanation why Sr isotopes were chosen to evaluate growth rate effect will be helpful. Sr is heavy and relative mass difference between 86 and 88 is small. Why effect of growth rate is expected?

Page 2983, Line 6: Please explain what "equilibrium pH" means or rewrite the sentence. For example: " Equilibrium ^{11}B fractionation factor between $\text{B}(\text{OH})_3$ and $\text{B}(\text{OH})_4^-$ does not depend on pH (REF) "

Page 2983, Lines 8-9: There are a number of works suggesting strong effect of $\text{B}(\text{OH})_3$ especially for calcite. Please mention it here.

Page 2984, Line 7: Are there references about those few measurements? Please specify.

Page 2989, Line 2: Please specify the relative masses of sample and H_2O_2 solution. Was the sample ultrasonicated, centrifuged, or kept stagnant?

Page 2990, Lines 15-16: Please expand this sentence. In the present form it is confusing for people who do not use TIMS routinely.

Page 2996, Lines 1-2: Based on Figure 6b significant number of shell $\delta^{11}\text{B}$ data lie below the curve where $\alpha=1.0272$. I think it should be addressed here.

Page 2996, Lines 25-26: I think the term equilibrium is vague here because variation between individual samples was observed. The previous sentence already addressed the observations on Sr isotopic consistency between shell and seawater. I suggest to remove the sentence "Therefore, incorporation of radiogenic Sr ratios into the shells are in equilibrium with ambient seawater." or say that fractionation of radiogenic Sr isotopes is close to equilibrium.

Page 2997, Line 18: Do you mean $\delta^{88/86}\text{Sr}$? If yes then please continue to use delta notation further in the text.

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Page 2997, Line 20: Please identify the studied temperature and growth rate ranges.

Page 2997, Line 26: The suggested physiological control is questioning an achievement of thermodynamic equilibrium stated in the sentence at the end of the page 2996 (Lines 25-26).

Page 2998, Line 3: You may add Gaetani and Cohen (2006) here.

Page 2998, Line 22: Fig.6b shows that some data deviate from the range between prediction lines. Based on Figure 6b significant number of shell d11B data lie below the curve where $\alpha=1.0272$. Please address it in the text.

Page 3000, Line 3: It is possible to relate spring bloom to the data on Figure 7b? Otherwise this sentence could confuse the reader.

Page 3014, Table 1: Please define the alpha below in the table.

Page 3016, Table 3: Please add below: $\Delta pH = (pH_{shell} - pH_{sw})$.

Page 3016, Fig 1: I like illustration of c and d. However, more details are needed for description of Figures a-c. It will help reader to identify differences between those images. Figure captions do not address why figures a and b are shown here. I was not able to find it in the text too.

Page 3022, Fig 6: Please define fractionation factors presented here, i.e. $\alpha = 1.0272$ (Klochko et al., 2006) and $\alpha = 1.0194$ (Kakihana et al., 1977). Specify between what phases or species fractionation occur.

Page 3023, Fig 7b: Please identify the colors of the symbols in (b)

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/12/C867/2015/bgd-12-C867-2015-supplement.pdf>

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