**Interactive comment on** “Reconsidering the role of carbonate ion concentration in calcification by marine organisms” by L. T. Bach

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I would like to thank Reviewer #1 for the positive feedback and pointing out that carbonate chemistry is not the sole parameter controlling calcification in the oceans. I fully agree with this statement and emphasized this in the revised version of the manuscript. I updated and restructured section 3.5 (global implications) and pointed out at the very beginning of this section:

“The following paragraphs will address to what extent our view on carbonate chemistry control of calcification in the oceans could be modified when we consider [HCO3-]/[H+] rather than [CO32-] or ΩCaCO3 as the most influential parameter. Before starting the discussion I would like to emphasize, however, that carbonate chemistry patterns discussed here are just one among other abiotic (e.g. temperature or light) or biotic (e.g.
food availability or competition) factors which must also be taken into consideration when trying to understand the patterns of calcification in the oceans.”

Reply to minor comments:

1) REVIEWER #1: Pg 6690, Ln 12-13: As well as temperature, salinity and pressure needing to be constant, biological factors will need to be constant in order for unity in the correlation between calcification and [HCO3-]/[H+] as with [CO32-] or CaCO3 saturation state. REPL Y: I am not sure if I understood Reviewer #1 correctly but according to equations 9 and 12, salinity, temperature, and pressure are the only factors that need to be constant among treatments in order to establish the proportionality between [HCO3-]/[H+], [CO32-], and \( \Omega \)CaCO3. Variation of other factors will have no influence on the proportionality.

2) REVIEWER #1: Pg 6691, Ln 18: Remove extra comma after both [Molluscs can have both(,) calcite ...] REPL Y: I removed the extra comma.

3) REVIEWER #1: Pg 6692, Ln 23: From which reservoir of CO2 or HCO3-? Cellular or external (boundary layer)? REPL Y: From the external reservoir. I added this information to the revised version of the manuscript.

4) REVIEWER #1: Pg 6692, Ln 27: Consider the use of ‘success’ – in an ecological or physiological sense? Possibly replace with fitness or growth. REPL Y: I replaced ‘success’ with ‘fitness’ as suggested by Reviewer #1.

5) REVIEWER #1: Pg 6693, Ln 21: Replace ‘or’ with ‘and’ so that evidence in bivalves and corals support the point. REPL Y: I changed ‘or’ to ‘and’.

6) REVIEWER #1: Pg 6698, Ln 21: How variable is the cytosol pH? REPL Y: According to the reference cited here (Madshus 1988) it is strongly regulated and is typically in the range of 7.0 – 7.4. I added the given range to the revised version of the manuscript.

7) REVIEWER #1: Pg 6698, Ln 23: Add “be” to the line “... in the cytosol and <be> transported as HCO3-...”. REPL Y: I thank Reviewer #1 for spotting this mistake and
changed accordingly.

8) REVIEWER #1: Pg 6702, Ln 7: Extra comma(s)? “... start in the pCO2(,) range below 250-500 µatm, where ...” REPLY: I removed the extra comma.

9) REVIEWER #1: Pg 6704, Ln 25: Maybe a good place to state other factors which influence marine calcification that show strong latitudinal patterns (e.g., availability of nutrients, food, light, etc.) REPLY: I addressed this concern at the beginning of section 3.5 (see major comment).

19) REVIEWER #1: Pg 6707, Ln 16: Extra semi-colon “...Allemand et al., 2004(;)...” REPLY: I removed the extra semi-colon.


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