

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

## **Anonymous Referee #1**

Received and published: 12 June 2015

GENERAL COMMENTS The paper by Bach on the relationship between calcification and marine carbonate parameters presents a balanced and fair argument on the role of bicarbonate ion to proton ratio as a strong influence on calcification rather than calcite saturation state or carbonate ion concentrations. The manuscript is a pleasant read and contains some very nice statements about the influence of the various carbonate parameters and processes on calcification. The paper is convincing in its argument and nicely aligns with the other publications from the same author progressing the necessary change in our perspective on the influence of carbonate parameters on marine calcifiers. Though the potential limitations are set out in the latter sections of the manuscript, it would be good to emphasise that calcification is not just dependent on carbonate parameters – biologically mediated calcification is also strongly influenced by environmental conditions which influence the physiology and ecology of marine cal-

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cifiers, i.e. light, temperature, nutrients, food availability, etc. Some discussion of these confounding factors would be welcomed to highlight to the (uninformed) reader that patterns in calcification may not simply relate to patterns in  $[\text{HCO}_3^-]:[\text{H}^+]$  ratios (e.g. latitudinal patterns in calcification will vary significantly along a latitudinal gradient where the other factors vary). This will avoid any potential misunderstanding that marine carbonate parameters are the defacto or sole factor controlling global patterns of marine calcification.

#### SPECIFIC COMMENTS (minor)

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  $[\text{HCO}_3^-]/[\text{H}^+]$  as with  $[\text{CO}_2\text{-3}]$  or  $\text{CaCO}_3$  saturation state.

Pg 6691, Ln 18: Remove extra comma after both [Molluscs can have both(,) calcite ...]

Pg 6692, Ln 23: From which reservoir of  $\text{CO}_2$  or  $\text{HCO}_3^-$ ? Cellular or external (boundary layer)?

Pg 6692, Ln 27: Consider the use of ‘success’ – in an ecological or physiological sense? Possibly replace with fitness or growth.

Pg 6693, Ln 21: Replace ‘or’ with ‘and’ so that evidence in bivalves and corals support the point.

Pg 6698, Ln 21: How variable is the cytosol pH?

Pg 6698, Ln 23: Add “be” to the line “. . . in the cytosol and <be> transported as  $\text{HCO}_3^-$  . . .”.

Pg 6702, Ln 7: Extra comma(s)? “. . . start in the  $\text{pCO}_2(,)$  range below 250-500  $\mu\text{atm}$ , where . . .”

Pg 6704, Ln 25: Maybe a good place to state other factors which influence marine calcification that show strong latitudinal patters (e.g., availability of nutrients, food, light,

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etc).

Pg 6707, Ln 16: Extra semi-colon "...Allemand et al., 2004(;))..."

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Interactive comment on Biogeosciences Discuss., 12, 6689, 2015.

**BGD**

12, C2755–C2757, 2015

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