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Interactive comment on "Limpets counteract ocean acidification induced shell corrosion by thickening of aragonitic shell layers" *by* G. Langer et al.

Anonymous Referee #2

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In the present manuscript, the authors describe the impact of a lowered pH on the biomineralization of some limpets (Patella caerulea,) shells, in a natural acidification site.

How the production of bio-carbonate skeletons by marine organism can be affected by sea-water CO2 chemistry is indeed of importance, in order to assess the possible impacts of ocean acidification on these organisms - a topic to which many studies have been dedicated lately.

The choice of the specimens and of the natural site are relevant with the aim of the study: bimineralic shells (e.g. both calcite and aragonite layers) are indeed of interest,

as the solubility of these two polymorph differ, and it could be awaited that ocean acidification affect differently the production of these layers. The technical approach - the use of Raman confocal microscopy on transverse shell section - is also very appropriate to determine the mineralogy and organization of the different shell layers (even if maybe under-exploited).

Although I have a few concerns (see comments below), the results are undeniably of interest. Overall, the manuscript is concise, clear and in accordance with the scope of the journal ; it meets in my opinion the standards required for publication in BioGeosciences.

Remarks:

- p2 l.10-12: the formulation is quite intriguing : the calcite layers still keep growing in thickness. (or not ?) cf. comments below.

- p8 l.11: " inside " (center of the shell) or " inner side " (the whole growth surface of the shell) ?

- p8 l.21-23: " This mechanism allows for compensatory shell thickening through the deposition of additional layers on the inside of the shell ".

Not clear to me. What does " layer " mean here ? Growth layers or structural layers ? Patella shells can display up to 7 structural layers, displaying crossed lamellar (XL) (aragonite), cross-foliated (CF) (calcite) or myostracal (M) microstructures (McClintock, 1967). They are all deposited synchronously, at each growth increment (" growth layer "), on the inner surface of the shell.

Does the authors mean thicker (and not " additional ") growth layers in the center of the shell than in the border (therefore, just different calcification rates in the two zones) ?

Or is there a specific deposit (additional " structural " layers) that recovers the center of the shell, in a mechanism that could be more related to shell -remobilization or -repair processes ? These latter are indeed quite frequently observed in gastropod shells (and

display specific microstructures, ex. Fleury et al, 2008).

It is hard to decipher without a microstructural investigation, that would be much welcomed to validate the mechanism proposed by the authors. The absence of such an investigation is intriguing, as some features are already visible in the Confocal Raman Microscopy pictures provided (in Fig 4 : growth lines, cross-foliated lamellae in M+2/M+3 layers, etc.). Why not provide some more resolute maps ? It seems like the present manuscript acts like a preliminary study, meaning to precede a more complete microstructural investigation. It have no objection to it, given it is clearly stated in the manuscript (in the conclusion perhaps).

- p9: actually, the conclusion is just a copy/paste of p6l20-25, making it redundant and not very useful.

- I am not native english, but the spelling and syntax seem fine to me.

Interactive comment on Biogeosciences Discuss., 11, 12571, 2014.