Biogeosciences Discuss., 11, C5929–C5931, 2014
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Biogeosciences
Discussions
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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.

G. Langer et al.

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Received and published: 16 October 2014

Reply: We would like to thank Referee 2 for this constructive comment. We have addressed all the points below.

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

Reply: We cannot be sure. It appears to us that the calcite layers might indeed keep growing in thickness, but only during elongation growth (i.e. "normal growth") as opposed to what we have called "enhanced" or "compensatory" shell production. Since we cannot know whether the material produced during compensatory shell production

represents growth layers or structural layers, we substituted "parts" for "layers" in the abstract. That makes clear that there is a vagueness here.

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

Reply: The "inner" side. We changed the word. It is not the whole growth surface, however, but only the aragonitic parts, as we described in the following sentences.

- 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 calciïňĄcation rates in the two zones) ? Or is there a speciïňĄc 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 speciïňĄc 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 aninvestigation 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 then 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).

Reply: As referee 2 correctly says, we cannot know this without a microstructural in-

vestigation, which is indeed a follow up study. We did as suggested by referee 2 and stated that in the conclusion. We also added the following to clarify: “We do not know whether the additional layers are structural layers. One possibility is that the layers we call “additional” are similar to the layers related to shell repair in Haliotis (Fleury et al. 2008).”

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

Reply: We modified the Conclusion. It now reads: “Polymorph distribution analyses of complete cross sections of Patella caerulea shells from a CO2 vent site at Ischia revealed that this species counteracts shell dissolution in corrosive waters by enhanced production of aragonitic shell layers. The question whether these layers represent structural layers will be the subject matter of an upcoming microstructural investigation.”

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

Interactive comment on Biogeosciences Discuss., 11, 12571, 2014. C5552

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