

Interactive comment on “Assessing annual variability in the shell thickness of the pteropod *Heliconoides inflatus* in the Cariaco Basin using micro-CT scanning” by Rosie L. Oakes and Jocelyn A. Sessa

Anonymous Referee #1

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GENERAL COMMENTS

The aim of this study is to describe annual variability of different shell growth parameters (thickness, diameter, number of whorls, amount of shell material) of the pteropod *Heliconoides inflatus* in the Cariaco Basin (Venezuelan Shelf). Additionally shell condition was analyzed applying the *Limacina* Dissolution Index (LDX). Pteropod samples were collected over a year period from a sediment trap and compared to prevailing carbonate chemistry and nutrient conditions with the goal to entangle driving abiotic or respectively biotic factors of the various measures. The authors found that food avail-

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ability has a greater control on shell formation than aragonite saturation and that shell condition was not altered with time spent in the sediment trap cup. Hence, the results can serve as baseline data to better quantify the response of this highly vulnerable organism group to ocean acidification (OA) by disentangling abiotic from biotic factors that impact on shell formation.

I think this study is very interesting and addressing a very important question in relation with consequences of OA on highly vulnerable thecosome pteropods. It gives strong in situ evidence that food availability and energy constraints have a major potential to mitigate abiotic stress and shows nicely that various shell parameters indicative for growth and calcification did not depend on the saturation state of aragonite, at least not in the range observed (always above 2).

From my understanding, the purpose of the study was twofold: 1) How does length of time (preservative) in the trap impact shell condition and potentially lead to false conclusions in the OA context? 2) Do changes in water column properties affect shells and how or which? Hence, point 1 looks at dead organisms, point 2 affects live organisms in the water column (including the carbonate chemistry history pteropods experienced in the past). In this context, my main criticism is that the author did not distinguish between processes that happened when pteropods were still alive (in the water column) and already dead (in the water column and the sediment) particularly with respect to potential shell degradation they observed on the preserved samples. Did the authors simply assume, that shell integrity was intact as long as organisms dwelled in the water column alive? Might indeed be reasonable to assume but the authors need to state clearly in their ms what their opinion on that is and whether/when they talk about live or dead organism. Furthermore, one important issue with sediment trap samples is that pteropods might have entered them as “swimmers” not as dead individuals that simply sank into the trap. This problem should be mentioned in the introduction and picked up later in the discussion again, would that impact the conclusions to draw from the results?

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SPECIFIC COMMENTS

TITLE

The title does not reflect the study content well enough. For example micro-CT is not even mentioned in the abstract and shell thickness is only one out of a set of measured parameters mentioned in the abstract. LDX is much more prominent in the abstract instead. Also, I think the title should reflect that the ms is about sediment trap samples of *H. inflatus*. Please change title accordingly to maybe something like this: "Assessing abiotic and biotic impact on annual variability of shell condition of the pteropod *Heliconoides inflatus* in the Cariaco Basin: shell dissolution index, size and thickness as revealed from sediment trap samples."

ABSTRACT

L4–6: This study does not deal with natural variability of pteropods (in terms of abundance of which "variability" is usually understood if not stated otherwise), neither is it discussed. Either remove this sentence or rephrase to harmonize with the variability you are actually focusing on (shell growths parameters).

L11: remove "with"

L14/15: Are the authors talking about dead or live individuals?

L19: ... in shell characteristics of *H. inflatus* of trapped pteropods...

INTRODUCTION

Section 1.2: The authors should shortly mention the problem of collecting live pteropods ("swimmers") in sediment traps and how that could have affected their work approach and results. (Alternatively it might be mentioned on P4 last paragraph). Throughout the ms, they need to make clear whether they talk about live or dead organisms.

P4L6: Lischka and Riebesell 2017 (Polar Biol, Volume 40) also studied metabolic re-

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sponse of pteropods (oxygen consumption).

P4L24: through misses the "r"

P5L33: remove comma between body and whorl

MATERIAL & METHODS:

P6L10: Please detail at what temperature and for how long shells were dried.

DISCUSSION

P10L31/32: Could any changes detected originate in the time prior collection in the trap during live in the water column?

P11L7/8: How can the authors know, pteropods were dead already? How likely is it that shell deterioration happened on the live organism? The assumption that any shell degradation took place only when organisms were dead already, is this simply based on the assumption that under aragonite supersaturated conditions no shell deterioration happened? If so, state clearly and support your view.

P11L20: ... in the overall trend... (remove "is no")

FIGURES

Fig. 4: It would help the clarity of the figure if September, June, December (mentioned in the text) could be indicated on the x-axis.

Fig. 8: Italics for *Heliconoides inflatus*

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