

# ***Interactive comment on “Shell dissolution observed in *Limacina helicina antarctica* from the Ross Sea, Antarctica: paired shell characteristics and in situ seawater chemistry” by Kevin M. Johnson et al.***

## **Anonymous Referee #3**

Received and published: 11 February 2017

General comments: This paper is an important contribution to the information being gathered on pteropods throughout the world, and in particular, in the Southern Ocean. Pteropods are at risk due to ocean acidification and any changes in their abundance or distribution would have substantial flow on effects in ecosystems and economically (fisheries). This paper follows on from the work of Bednarsek in investigating dissolution by imaging the surface of shells using SEM. However, the sample preparation methods in this work are far less invasive than some processes used in other studies. I recommend that this paper is published after revisions, particularly in the discussion, as outlined below.

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Specific comments: Can the authors explain why they focussed on juvenile pteropods as this may be interesting and add to paper?

Why did the authors use different concentrations of ethanol, between 50% and 90%? I'm not a chemist, but with 50% ethanol, does that mean the other 50% is H<sub>2</sub>O and could thus cause shell dissolution? Was this investigated? Regardless, please explain your approach to preparation methods. There has been some work (not yet published) on shell damage due to use of H<sub>2</sub>O<sub>2</sub> bleaching so it would be good to know if you've investigated this too.

The introduction should include a more detailed description of the shell layers - outer prismatic, thick crossed-lamellar layer and inner prismatic - rather than only referring to these in Fig 6 caption. Informing the reader of these layers early will aid in your discussion of the SEM results.

I consider the number of samples you have managed to obtain and study as sufficient. Due to their small size and fragility it is difficult to obtain enough for a thorough analysis - well done!

The authors don't clearly specify why they have chosen to investigate the first whorl only. What was the dissolution near the growth edge like?

Can you explain more clearly why the specific 6 week period was chosen, and what relevance or link the 6 week chemistry results have with the SEM data. That is, how does the chemistry relate to the shell dissolution, if at all, in that short 6 week period?

Further, the discussion/conclusion section should be re-written to focus on and really draw out information from the results. The authors tend to go straight to discussing others' work, rather than giving their results the emphasis they deserve. Elaborate on your results more, then link to other studies.

Technical comments: Line 15: should be "bleached" rather than "breached" when referring to sample preparation methods. line 19: should be "known" rather than "know".

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Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-467, 2016.

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