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Biogeosciences Discussions

Interactive comment on "Pteropods from the Caribbean Sea: dissolution as an indicator of past ocean acidification" *by* D. Wall-Palmer et al.

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The discussion paper by Wall-Palmer et al. presents an aragonite dissolution/preservation record based on the Dissolution Index of the pteropod Limacina (LDX) over the past 250.000 years. Comparison of the data with other records point to a global origin as a cause of LDX fluctuations, pCO2. Semi-quantitative LDX records provide a proxy for reconstructing aragonite saturation levels of the past and give important clues for past ocean chemistry and carbonate budgets. It is well written and presented and interesting to the BG community and beyond. The stratigraphic framework and oxygen isotope record have been published before (Le Friant et al., 2008) and provide an age model adequate to the resolution of this study. The paper provides a good overview of earlier work on pteropod preservation on the sea-floor and

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Interactive Discussion

Discussion Paper

describes and documents the used method (LDX) sufficiently. There are a few items whicha re not adequately addressed or taken into account: 1. Increasing atmoshperic CO2 concentration and the resulting change in ocean water pH will has two effects: a. Potential reduction of carbonate production of calcareous organisms and change in carbonate saturation level, leading to enhanced dissolution. Although the paper mainly deals with (a) the authors sometimes mix one with the other. Stariting on page 6907, line 27, at least Moy et al deal with reduction in shell mass (see also de Moel et al. 2009). 2. The correlation between LDX and delta 18O record does not make much sense, as the potentially causal relationship is very limited: the pressure difference at a given depth caused by sea-level change will have only minor effects on saturation levels. It makes much more sense to compare the LDX data with CO2 records from ices-cores as both records are causally related as the authors state. 3. Figure 3 should be changed as folows: a. add an age axis in addition to the depth axes b. mark the ash layers clearly in the lithostratigraphic column with the datings, both Ar/Ar and 14C. This also will shed light on the (in)dependency of the LDX curve from the ash layers. c. remove the menardii curve, which was published in the Friant et al paper 2008, it does not contribute to this story d. add the CO2 record from the Vostok Antarctic ice core, using the independent stratigraphy to potentially also show leads and lags with your 18O record. 4. The authors do not discuss in detail the base of the core where another preservation peak – at least for some parts – is well recorded. Please, do. Again it is situated at a termination now from stage 8 to stage 7. Is the pteropod layer not recovered and potentially below the depth of core penetration?

If these and the following detailed comments are well addressed the paper is to my opinion well-suited to be published in BG as it provides an important contribution for deciphering the ocean carbonate chemistry variations in the past with potential implications for monitoring ongoing and modeling future changes.

specific comments:

title: I suggest to avoid the term ocean acidification and replace by ocean carbonate

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saturation level, and use this term careful in the rest of the paper.

p. 6902, line 24: what is the relationship? Either explain (see above) or simply describe that both curves show similar trends. The story changes of course if you show a correlation with the CO2 ice core record and then you can explain the causal relationship.

p.6905, line 2: isn't it semi-quantitative instead of qualitative?

line 9: find other title for this chapter as it is not just describing correlations line 20: skip last part of the sentence after ,although....

p. 6906, line 14: Ganssen and Lutze decribe pteropod dissolution in modern sediments caused by local to regional productivity. So skip this reference here,

p. 6907, line 3-4: change end of the sentence to: " is caused by atmospheric CO2 fluctuations".

p.6908, line 4: Mention the work of de Moel et al. here carried out on the same core (905) off Somalia where Kloecker et al. worked on. Line 6 and 7 replace "provides a model for..." by "reflect".

Figure 4 caption: It is more a sketch than a model.

de Moel et al.: Planktic foraminiferal shell thinning in the Arabian Sea due to anthropogenic ocean acidification? Biogeosciences, 6, 1917–1925, 2009. www.biogeosciences.net/6/1917/2009/

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