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Biogeosciences Discussions

Interactive comment on "Planktic foraminiferal shell thinning in the Arabian Sea due to anthropogenic ocean acidification?" *by* H. de Moel et al.

Anonymous Referee #2

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This manuscript describes a very interesting observation and suite of data. These are among the first strong evidences -a recent paper by Howard et al., PNAS, 2009 discuss similar results- of recent foraminifera shell thinning due to anthropogenic ocean acidification. This a very sensible subject and this paper will receive a very broad reading, coverage and success. The manuscript is based on the observation of an age difference in the shell weight fractions in the same sample: the finer shells being the younger ones. In order to provide a solid discussion the authors discuss present seasonality of shell weight and geochemistry of the foraminifera. The results are clearly exposed, and the discussion is based on a solid background. The most probable hypothesis are a seasonal and the acidification hypothesis. The reason why the season hypothesis

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does not work is well express, but a paragraph giving some potential problems in the acidification hypothesis is missing (even is they reject those problems at the end of it).

I see some tests that could have been done to make their case stronger :

-1- It would have been easy to test the validity of acidification hypothesis in opposition to the seasonal hypothesis by doing exactly the same exercise they did at a depth greater than 25 cm. Below 25 cm the effect of acidification should be null. Therefore the light shells which are produced during the SW Monsoon period should be of the same age or older than the heavy ones, if the acidification hypothesis is correct. If it is not the case then the seasonal hypothesis should be the good one. The geochemistry of this area should be studied in more detail to understand the geochemical problems that these results would bring. However i bet that the age of the light shells will be the same or older that the heavy ones. The discussion at the end of the paper would be more easy and stronger.

-2- I am surprised by the large mixing layer in that sediment. With such a 15 cm of mixing in a 20 cm/1000 yr sedimentation rate that give a window of 750 years. Jung et al. 2002 described in the same core, centennial climatic variability showing that d18O of foraminifera shells was varying at cm scale. My question first is : “is the plateau of shell weight in the last 15 cm truly due to mixing ?” It is indeed surprising that the mixing of lead which is carried on much smaller particles present the same mixing depth than that of the large foraminifera particles, since we know that bioturbation does not affect different size fractions to the same depth. An easy test to show that I am wrong could be to provide some 14C dates at depth in the mixed layer (for example at about 12 cm) to show an exact same age than at the core top.

I am aware that these two tests could take some time if they are not yet done. This excellent manuscript should be published rapidly and therefore this data could be provided in latter. This type of observation are urgently needed in the acidification discussion, and the manuscript is publishable as is. i have very few other remarks and

BGD

6, S499–S501, 2009

i was astonished by the simplicity of this observation and its importance. The paper goes in depth in the discussion and therefore i strongly recommend for publication in Biogeosciences.

Interactive comment on Biogeosciences Discuss., 6, 1811, 2009.