Biogeosciences Discuss., 10, C3278–C3280, 2013
www.biogeosciences-discuss.net/10/C3278/2013/

Biogeosciences Discussions
Open Access

BGD
10, C3278–C3280, 2013

Interactive Comment

Interactive comment on "The calcareous nannofossil *Prinsiosphaera* achieved rock-forming abundances in the latest Triassic of western Tethys: consequences for the δ^{13}C of bulk carbonate." *by* N. Preto et al.

Anonymous Referee #2

Received and published: 5 July 2013

The manuscript of Nereo Preto and co-workers deals with a very interesting event in Earth History, namely the "Mid Mesozoic Revolution in Ocean Chemistry“ of Ridgwell & Zeebe. The evolution and radiation of calcareous nannplankton significantly changed the chemical behaviour of the global oceans. The authors quantified the abundance of Prinsiosphaera in two sections from southern Italy by point-counting SEM-photographs, and correlated the results with the carbon isotope curves. The paper is well-written and –illustrated, and the data are convincing. I recommend publication of this ms with just some minor revisions.

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

My co-referee highlighted some issues with the stratigraphic correlation of the carbon isotope curves. I am not an expert in this time slice, so I cannot comment on this point. I have, however, also some questions with respect to the interpretation of the stable carbon isotope values. The authors concluded “As the proportion of nannofossil tests increased, the contribution of microspar with low d13C diminished, determining the isotopic trend.“ This statement might be misleading, because it implies that the rocks are just composed of (a) nannofossils and (b) microspar which is interpreted as a cement. But even a rock that is composed almost completely of microspar today must have consisted originally of sedimentary particles (plus porosity). What was the original composition of such rocks? It might be possible that they were originally aragonitic and therefore the components are not visible anymore. But the authors cite Melim’s papers as argument that the diagenetically altered, primarily aragonitic deposits of the Bahamas still retain more or less the original isotopic sea-water composition (which is probably due to the fact that by far most of the cement carbonate derived from dissolution of aragonite rather that by the decay of organic material). The values are not shifted towards lighter values although according to Melim they contain a lot of microspar. Another important point is the amount of mechanical compaction of the original sediment because this determines the amount of calcium carbonate required to cement the sediment. A reduction in nannofossil abundance does not necessarily imply an increase in cement carbonate. So why should a reduction of calcareous nannofossils shift the carbon isotope values towards lighter values? It is the pre-cementation porosity that determines the amount of cement, not the amount of nannofossils. I am not sure if it is possible at the current state of the manuscript, but information on the amount of compaction might be of interest in this respect.

Why not interpreting the carbon isotope curve as a result of changes in primary productivity? An increase in productivity would (as the authors wrote) probably increase the export of isotopically light organic matter to the sea floor, but on the other hand the surface water, where the calcareous nannoplankton lived and calcified, would be enriched in 13C. High primary productivity would therefore result in a high number of

BGD

10, C3278–C3280, 2013

isotopically heavy calcareous nannoplankton. Couldn't this explain the correlation seen in figure 8?

In summary, apart from the interpretation of the stable isotopes this is a very interesting manuscript and should be published.

Two minor points: - I recommend changing the term "microfacies" to "ultrafacies" throughout the MS. - Figure caption of figure 5: change "Silicization" to "Silification"

Interactive comment on Biogeosciences Discuss., 10, 7989, 2013.