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Biogeosciences
Discussions

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 #1

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"The calcareous nannofossil Prinsiosphaera achieved rock-forming abundances in the latest Triassic of western Tethys : consequences for the ∂13C of bulk carbonateÂż. Nereo Preto and co-authors.

GENERAL - The manuscript reports quantitative estimates of nannolith Prinsiosphaera triassica, a major component of pelagic limestones since the late Norian. Preto & co-authors determined the volumetric proportion of Prinsiosphaera via Âńpoint countingÂż analysing samples from two italian sections belonging to the Northern margin of the Tethys. The authors analysed the stable isotope composition of carbonate beds as well

and results were discussed and interpreted in terms of diagenetic vs original sea-water signatures. The quantitative counts of Prinsiosphaera were compared between the two italian sections (Pizzo Mondelo, Pignola-Abriola) and, thanks to bio- and isotope stratigraphies, they were correlated to those in the Northern Calcareous Alps of Austria also belonging to the northern part of western Tethys. The manuscript is well written, properly organised and thoroughly documented; figures and pictures are of fine quality, abstract and references are appropriated. Though data are not completely new, the subject treated, i.e. the petrographic role of calcareous nannofossils in the late Triassic, is relevant and authors made a genuine effort to quantify this role. The manuscript is suitable for a publication in this journal which I recommend only after the three major points of concern listed below are fixed:

1.The methodology used by Preto & co-authors to evaluate Prinsiosphaera's proportion, IS NOT a volumetric estimate. ÂńPoint countingÂż is indeed an alternative (semi-) quantitative analysis that highlights the petrographic contribution of calcareous nannofossils to rock-forming better than current biostratigraphic semi-quantitative counts. It does not provide ,however, a volume (cc) neither a flux of nannofossil produced calcium carbonate . The authors expressed their results in percentages obtained analysing a surface not a volume of rock. Size and volume of nannofossil carbonate particles should be calculated using the formulas currently employed by nannofossil specialists to quantify the amount of biogenic carbonate (see for example Bornemman et al 2003, Palaeo3 and references therein...). It is beyond the scope of this review to start a discussion on the validity of the quantitative analysis employed to provide reliable proxies for the carbonate produced by nannofossils; Preto & co-authors however, should evaluate and discuss these quantitative approaches in detail if they think that they are unsuitable to estimate total volume of nannofossils. The authors should also be more convincing about the reliability and reproducibility of their data giving a critical estimate of magnitude errors. Providing a reliable volumetric estimation of nannofossil- derived carbonate is not an easy task. I agree with Preto & co-authors that optical microscope analysis are limited in magnification to properly characterize micarbs produced by nannofossils. The point counting method, mapping nannofossils and fragments of them on SEM images as shown in Fig 5, is indeed an alternative quantitative method that gives a fairly accurate estimate of the nannofossil proportion in a rock but not in terms of volume. This major point needs to be fixed.

2.The paragraph on ∂13C interpretation is long, unclear, full of repetitions and useless for the manuscript final conclusions. The carbon isotope interpretation and comparison made by Preto & al suffers from inconsistent stratigraphic correlations. Preto et al compare the ∂13Ccarb negative trend close to the N-R boundary at Pignola with a similar ∂13Corg trend observed in British Columbia around the N-R boundary (Sephton et al 2002), while the Rhaetian ∂13C positive excursion at Pignola is roughly compared to that documented by Matte (2012) in the Northern Calcareous Alps. There are convincing evidences however, that the negative excursion documented by Sephton et al (2002) rather approximates the end Rhaetian event (please, check Hall & Pitaru, 2003; Geology) than the Norian-Rhaetian boundary. On the other hand, the carbon isotope data by Mette et al (2012) from the Eiberg section (Austria) can not document the rise in ∂13C that follows the negative shift at the Norian Rhaetian boundary (line 23, pag 8001) because only sediments belonging to the end Rhaetian Marshi zone outcrop at Eiberg (Krystyn, 2005). Finally, it is not completely true that no negative excursion is recorded at the N-R boundary by Krystyn et al (2007) at Steinbergkogel (line 27, pag 8003). A negative trend is discernible in the ∂13C curve of figure 3 (Krystyn et al 2007) but in a deposition environment like that of Steinbergkogel, situated in a peri-platform setting shallower than that of Pignola and characterised by condensation, the negative shift is less evident. Also, the scale of figure 3 of Krystyn et al (2007) has been squeezed and does not allow a detailed comparison. I recommend to re-write this paragraph.

3. The third point to be fixed is related to the start-up of the ÂńMid-Mesozoic revolutionÂż (Ridgwell 2005) that the authors date back to the late Triassic. There is no evidences till now, and authors do not provide any evidence at all with their data, that

such major turning point took place at the end of Triassic. Even if Prinsiosphaera became a major contributor of pelagic limestones in the Rhaetian, this does not mean that the pelagic carbonate factory already acted in oceanic settings at that time (pelagic is not synonym of oceanic...). During late Triassic, Prinsiosphaera was restricted to hemipelagic environments and, as the authors attest (line 23, page 8000), it was more common in the proximal environments of Pizzo Mondelo that in the open, deep-water setting of the Lagonegro-Pignola section, where it occurs in calci-turbidite deposits. Even if it is reasonable to consider that Prionsiosphaera had probably an important role in the carbonate pump during the upper Triassic, (see Clemence et al 2010 for instance), it was not abundant enough to trigger carbonate sedimentation in deep-ocean settings thus stabilizing the long term carbon cycle. Oceanic sedimentation at that time was still dominated by siliceous deposits and/or clay, the Mid-mesozoic revolution occurred much later, as well documented by Ridgwell (2005).

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