Clim. Past Discuss., 11, C1263–C1268, 2015
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Climate of the Past Discussions

Interactive comment on "The Eocene–Oligocene transition at ODP Site 1263, Atlantic Ocean: decreases in nannoplankton size and abundance and correlation with benthic foraminiferal assemblages" *by* M. Bordiga et al.

M. Bordiga et al.

manuela.bordiga@geo.uu.se

Received and published: 5 August 2015

Reply to referee Giuliana Villa

We would like to thank Giuliana Villa for the constructive review that was very helpful to improve our manuscript, also from a taxonomical point of view. Below we respond to all points raised. Reviewer: There are a few issues that need to be addressed before publication, but they are relatively minor, thus I recommend the publication with some small corrections/suggestions and some comments listed in the text and below.

Comment 1) I suggest to use the Eocene –Oligocene transition (EOT) whenever it is not strictly referred to the E/O boundary. Many of the changes reported occur across the boundary, not exactly at the boundary.

Reply: We revised the text using the term EOT where possible. New planktonic foraminifer data (in progress, see reply to P. Pearson) will allow to better constrain the boundary and the timing of the biotic changes.

Comment 2a) Biostratigraphy - Line 292 ...Riesselman et al. (2007) placed Oi-1 on the basis of an increase in the benthic δ18 O records from âĹij1.5‰ (94.49 mcd, uppermost Eocene) to âĹij2.6‰ (93.14 mcd, lowermost Oligocene). The Oi-1 according to Reisselman (2007) is instead between 93 and 89 mcd. Also in Peck et al. 2010 is placed between 94 and 93 (fig.6).

Reply: We agree that in the previous version of the text the depth of the increase in δ18O and of the Oi-1 were not clear. We changed the text to make it clearer.

Comment 2b) In your Fig. 2 steps 1, 2 and Oi-1 are indicated as 3 separated events. Step 2 is reported at the same depth as Peck et al., 2010 and therefore Oi-1 should coincide with step 2 (eg. Ladant et al. 2014 Paleoceanography). I cannot understand if it a graph error or if you consider Oi-1 as a third event. Please verify or discuss.

Reply: In Fig. 2 (also other figures) there was indeed a graphical mistake: with the term "Oi-1" we intended to indicate the entire duration of the cooling from above the Oi-1 (=Step 2) and following 400 kyr, but we realize that, as was, the figures might have been somewhat misleading. In the revised figures, we reported the depths of Step 1 and 2, as placed by Peck et al (2010), and we erased the term "Oi-1". In the text we now refer to Step 2 as Oi-1, following Ladant et al. 2014 (see also the reply to P. Pearson).

Comment 3) Line 412 the dissolution index shows more intense dissolution from 87 mcd.

Reply: Correct. The values of the coccolith dissolution index are lower above 87 mcd, but there is also an important dissolution episode at 90.5 mcd. We changed the text and figs 3 and 6 (grey bar of intense dissolution).

Comment 4) R. daviesii is here considered a large species, while it is a medium sized species (5-8 microns). This should be changed.

Reply: We agree that R. daviesii is a medium sized species, and now changed this in the text and figures (i.e. Fig. 5, V:SA for "large species" re-calculated without R. daviesii). Despite this, it has to be noted that the abundance of R. daviesii is not so high as to significantly affect the dotted green curve in Fig. 5, which remained very similar.

Comment 5) R. daviesii is here reported as decreasing at the EOT, while other researchers evidenced a neat increase at the boundary, in particular in the Southern Ocean Sites and at Site 1090, which is quite close to 1263. In Fig S1-15 a specimen classified as Dictyococcites with signs of dissolution does not look like a Dictyococcites, and could be a slightly dissolved R. daviesii. If this is the case, R. daviesii could have been over looked. The different result should be anyway commented.

Reply: We agree that the photo in Fig. S1-15 is ambiguous, so we changed it to a better representative specimen. Nevertheless, the specimens classified as "dissolved Dictyococcites" are very few (1-3 specimens on 300 counted) and very sporadic along the sequence. Even if we would combine the dissolved Dictyococcites with R. daviesii, the trend of the curve would not change. Thus, we cannot say that R. daviesii was overlooked, also because similar trends of this species were independently obtained by two of the authors. However, we now mention in the text the different results reported at other sites for this species.

Comment 6) In the dataset B the presence of R. circus is indicated from about 98 mcd. The specimen illustrated in Fig S 1-20 looks like a R. circus. The graphs of dataset A (Fig. 3) of Ret sp.1 shows a very similar pattern of R.circus of data set B, except

that it occurs 2 meters below, but it could be the effect of more resolution sampling. It is very likely that R.sp.1 is a R. circus and her it could be demonstrated that it has an older first appearance. Marino and Flores (2002), at Site 1090, report of a circular Reticulofenestra sp. before the FO of R. circus that they considered related to the taxon R. circus.

Reply: It is true that the specimens in Fig S1-20 might look like R .circus for its shape, but its size is much bigger (10 μm), and the definition of R .circus according to nannotax3 is "medium sized taxon". We found similar specimens with a size between 9-14 μm, for this reason we described them as specimens similar to R. hillae (see taxonomical remark in the supplement) instead of R. circus. In database B some R. circus (medium size) were detected, but also in Tori (2008) this bioevent was considered unreliable because its presence is discontinuous and it is associated with similar specimens of Cyclicargolithus and Reticulofenestra (Tori, 2008). For the complexity and very low reliability of this datum it was not discussed in the biostratigraphy section.

Comment 7) line 494: PC1 is better mirrored more by the red line than that of all placoliths bearing....

Reply: The two curves in Fig. 5 (red and green area) are very similar in terms of trends. The correlation coefficients between the PC1 and V:SA of Cyclicargolithus (red curve Fig. 5; r= 0.799) and between PC1 and all placolith-bearing taxa (green area Fig. 5; r=0.79) are also very similar. Thus, we can say that both curves correspond very well to PC1.

Comment 8) Fig caption 3 add if these data are form dataset A only.

Reply: Yes, they are just from dataset A. Added in the caption.

Comment 9) Fig .5 there is not the graph of the total abundance (mentioned in Fig caption). The legend of black and white circles are inverted. TDP must be changed in TDP 17/12.

Reply: We changed the caption as suggested.

We also modified the text according to the comments reported in the supplement to this comment.

References

Ladant, J.-B., Donnadieu, Y., Lefebvre, V., and Dumas, C.: The respective role of atmospheric carbon dioxide and orbital parameters on ice sheet evolution at the Eocene-Oligocene transition, Paleoceanography, 29, 810–823, doi:10.1002/2013PA002593, 2014.

Tori, F.: Variabilità climatica e ciclicità nell'intervallo Eocene Oligocene: dati dai nannofossili calcarei, Ph.D. thesis, Department of Earth Sciences, University of Florence, Italy, 222 pp., 2008 (in Italian).

Interactive comment on Clim. Past Discuss., 11, 1615, 2015.

Fig. 2

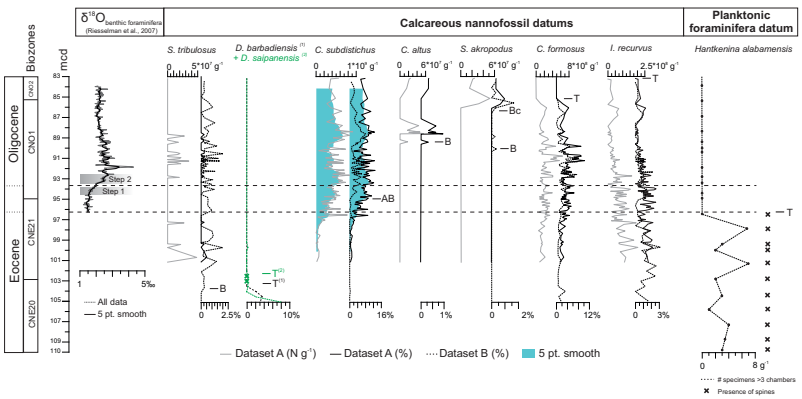

Fig. 1. Fig. 2 modified