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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.

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Comment on 'Oi1' and EOB at Site 1263

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This is an interesting paper that demonstrates major changes in nannoplankton and benthic foraminiferal assemblages during the Eocene Oligocene transition in the South Atlantic (Site 1263, Walvis Ridge). My overall impression is that this makes a significant and detailed contribution to the field, but I have a couple of remarks on the stratigraphic terminology and recognition of the Eocene/Oligocene boundary at Site 1263.

1: 'Oi1'

The first issue relates to the isotope shift and the term 'Oi1'. The use and abuse of this term was discussed in Coxall and Pearson (2007). It was originally defined very clearly by Miller et al. (1991) as an 'isotope zone' of over three million years duration in the lower Oligocene between specific maxima in the (then) relatively low resolution benthic isotope records. Its base was clearly and formally defined on Walvis Ridge in fact quite close by to Site 1263 (DSDP Site 522) at 113.13 mbsf, at the point of the Stilostomella d18O maximum. This usage is clear throughout the Miller et al paper including the abstract, but perhaps unfortunately Miller et al. (1991:6843) also referred to "the d18O increase associated with this zone" which refers to the interval immediately below the zone as formally defined. This seems like a minor change in emphasis but it makes a big difference when high resolution records (like this paper) became normal.

Miller et al.'s concept of long isotope zones between d18O maxima never seems to have taken off, and the meaning of Oi1 morphed in various publications, first into the level of the basal isotope maximum (remember we had Oi1a and Oi1b etc), then to the isotope transition or shift that leads in to this maximum over a period of several hundred k.yr (called the E-O Transition, EOT, by Coxall and Pearson, 2007). The current paper under review equates Oi1 to the 'major expansion of the Antarctic ice sheet' (1617:26) which involves an additional stage of interpretation (Oi means Oligocene isotope not ice, see Miller et al. 1991:6836) and refers to events 'during' Oi1 which by original definition occurred before / stratigraphically below the base of Oi1. One example is the hantkeninid extinction in Tanzania (1619:6) which is described here as being 'within Oi-1' - absolutely not, that occurs well below the isotope maximum in Tanzania and between the two most prominent steps in the EOT that underlies Oi1. In my opinion, the several ambiguities associated with the term Oi1 are not conducive for clarity in discussion hence I recommend abandoning the term Oi-1 by which I mean no disrespect

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to the work of Miller et al. (1991) which is one of the seminal papers in the field.

2: Correlating the EOB

The Eocene / Oligocene boundary (EOB) is defined by a metal marker ('golden spike') in the Massignano stratotype in Italy which is driven in at the level of extinction of both Hantkenina and Cribrohantkenina. The boundary is not 'defined' by these extinctions (1618:26) - they are merely a potential means of correlation (one can say they denote the boundary). This is important because one does not have to slavishly correlate the EOB with the last Hantkenina although it is an excellent marker when well preserved. Other planktonic foram levels of help are a distinct size reduction in Pseudohastigerina which has been found at exactly the same level as the boundary and the extinction of several species of Turborotalia about 40 cm below the golden spike (corresponding to abut 60 kyr) (see Wade et al., 2001, for discussion).

Unfortunately the hantkeninids on Walvis Ridge are poorly preserved and fragmentary, as noted also in this paper. A similar situation was recorded at Site 522 (Poore 1984). Hence one must question the drawing of the boundary so far below the isotope maximum formerly known as base Oi1, and in particular the two steps identified (not very clearly - see also site 522) in the isotope curve. Given the fact that the Hantkenina / Cribrohantkenina extinction occurs clearly and sharply between the steps in Tanzania (Pearson et al., 2008), my suspicion is the EOB is best correlated to Site 1263 using a combination of the Tanzania constraint and the isotope stratigraphy to about 93.5 mcd. The lack of Hantkenina fragments in the few metres below this could be sampling. A formal correlation to Site 522 would be an interesting exercise.

However there are other ways to improve the planktonic foram biostratigraphy, which is to find the level of the Pseudohastigerina size reduction and the T. cerroazulensis group extinctions in Site 1263, not done in this study. I would like to know where these are in the core before confirming correlation of the boundary. My prediction is they would be found at a higher level than the top Hantkenina so far found. This seems not to have been attempted in this study, but could be very important for the interpretation, correlation and geohistory of the events under consideration.

One Minor comment: the Tanzania cores in Fig 1 seem to have been transposed to Somalia.

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