

Interactive comment on “Massive and permanent decline of symbiont bearing morozovellids and $\delta^{13}\text{C}$ perturbations across the Early Eocene Climatic Optimum at the Possagno section (Southern Alps of northeastern Italy)” by V. Luciani et al.

B.S. Wade (Referee)

b.wade@ucl.ac.uk

Received and published: 18 April 2015

The Early Eocene Climatic Optimum (EECO) is a key interval in Cenozoic climate history, with benthic foraminiferal compilations indicating peak warmth. However, the interval is still enigmatic due to its limited recovery in ocean drilling cores. The manuscript by Luciani et al presents quantitative planktonic foraminiferal assemblage with stable isotope data for the EECO from Possagno, Italy. There are very few quantitative as-

C248

semblage studies of planktonic foraminifera. This study examines over 100 samples covering an interval from 55 to 46 Ma, showing changes in the abundances of key taxa and a crisis in Morozovella. The record from Possagno is also compared with ODP Site 1051, providing a direct comparison between Tethys and the North Atlantic. This study is therefore innovative and an important contribution in documenting the biotic response during the EECO. Overall, this is a very interesting study and highly suitable for publication. The manuscript is well written and supported by high quality data and figures. In certain places I felt the study could have gone into more detail and I have some comments and questions below.

Technical comments

The Introduction provides an excellent overview of the EECO in terms of the climate. As the manuscript deals with planktonic foraminifera diversity changes, I think the current state of knowledge on their diversity and evolution could be expanded on here, especially as this is one of the most diverse intervals of the Cenozoic.

Were any replicate analyses performed for the bulk sediment stable isotope analyses? And if so, how do these compare?

Numbering of carbon isotope ‘events’. In section 4.3 it is stated that there are “a series of additional minor” excursions above Chron C22r. These excursions are named according to their chron. However, some of these ‘events’ are minor (only 0.3 per mil) - do we really need to name every $\delta^{13}\text{C}$ wiggle? The precision of the standards is 0.06 per mil, and it seems that no replicate analyses were performed (see question above). The naming system in itself is clear, but I think we need some cut off and admit that C21n-CIE3 is not an ‘event’. Furthermore in section 5.1 it becomes evident that some of these ‘events’ are not global and cannot be correlated with Site 1258 or anywhere else at present. It was not clear to me which ‘events’ could be correlated with Demerara Rise, and how the magnitude of the excursions compared between different sites, this could be shown in a table or an additional figure.

C249

In terms of the foraminiferal assemblages (section 4.4), the authors should provide more details at the species level in the discussion of the results. Is the decrease in *Morozovella* driven by the extinction or local disappearance of one common species? Or is it several species that all decline in abundance?

Page 675, line 17 “These genera are also known as muricates” – true, but the statement is a little misleading, as other genera are also included in the muricates and are not discussed.

Will the stable isotope and assemblage data be made available, either as supplementary information or through data archives such as Pangaea?

Table A1 Several of the species listed are in their original generic affiliation and thus the authors should not have brackets e.g. *eoelava*, *pseudowilsoni*, *pseudoalgeriana*.

Figure 2 is unclear as the $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ records are plotted on top of each other.

Figure 4, why is the striped bands indicating magnetostratigraphic uncertainty carried all the way across the figure?

Page 677, lines 10-11, please add details of how the paleodepth in Bohaty et al. (2009) was derived.

Line changes

There is inconsistency between lines 3 and 25, the first stating that the EECO was the highest temperatures for the last 70 Ma, the second for 90 Ma.

Line 13 (abstract): change loss of symbiosis to loss of photosymbionts

Page 674, line 6 and line 24: not sure that all the references for the PETM and EECO are necessary

Page 683, line 21: change ‘The older and younger sides’ to ‘The initiation and termination’

C250

Page 686, line 18: remove ‘pristine’

Page 687, line 28: change ‘strengthened’ to ‘enhanced’ greenhouse conditions.

Caption, Figure 1: Change ‘blake’ to ‘Blake’

Interactive comment on *Clim. Past Discuss.*, 11, 671, 2015.

C251