

## ***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.***

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Technical comments:

Introduction: The brief part below has been added (from line 14) in the introduction about knowledge of planktic forams diversity and evolution of the studied interval. A more extended discussion on planktic foraminiferal evolution is given in Pearson et al. (2006).

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(line 14) At the beginning of the Eocene, planktic foraminiferal history was far enough from the K-Pg mass extinction to have originated several phylogenetic lines with taxa occupying different ecological niches in the upper water column. The Eocene is a crucial interval in evolution of planktic foraminifera that encompassed one of their major diversifications reaching a peak in the middle Eocene (Norris, 1991, Paleobiology; Pearson et al., 2006JFR).

Numbering carbon isotope ‘events’: We actually do not have duplicates of the analyses and are not going to do it now. We however underline the good reputation of the Stockholm isotope laboratory that ensure high quality outcomes. We admit that some of the recorded shifts are of very small magnitude. We have tentatively named them as ‘events’ only when changes in isotopic composition are associated with changes in planktic foraminiferal assemblages and/or fragmentation index. This is because increase in both fragmentation index and some foraminiferal taxa is similar to the record observed during early Eocene hyperthermals from the same geological setting (e.g., Luciani et al. 2007 MarMic, Agnini et al., 2009). We agree that the identification of some minor shifts such as C21-CIE3 are tentative, therefore we decide to add a question mark in the figures. Low values in the carbon-shift amplitude could be explained with sample spacing not close enough to catch the peaks in magnitudes for each event. In the lower part of the section, where resolution is even lower, some 0.3 per mil shifts well correlate with the globally known hyperthermals. We cannot therefore exclude a priori that some of the carbon-isotope shifts recorded for the first time at Possagno above the EECO are global and/or that they are true events. Concluding, in our opinion, a further solid motivation for suspecting some of the minor shifts as events is the foraminiferal record that mime the modifications recorded from the unquestionable pre-EECO hyperthermals at the investigated Tethyan domain. It would be more difficult to explain the recorded biotic changes at Possagno as occurring in correspondence of pure diagenetic, accidental shifts. We have added a table showing the post-EECO events that probably correlate with Demerara Rise.

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Section 4.4. We have added more details (see below) on abundances of the morozovellid species although based on qualitative observations. Quantitative data will be object of an incoming, dedicated study.

(line 20) Qualitative examination of species variability shows that, in the lower part of the Zone E5 where the greater morozovellids abundance is recorded, no dominance of particular species is recognized, even though *M. marginodentata*, *M. subbotinae* and *M. lensiformis* are relatively more common forms with respect to *M. aequa*, *M. aragonensis*, *M. formosa* and *M. crater*. In the interval with the low abundance of morozovellids within the EECO, an overturn is observed since *M. aragonensis*, *M. formosa*, *M. crater* and, in the upper part of the E5 Zone, *M. caucasica* are the most common species.

(line 25) Similarly to Possagno, the lower part of Zone E5 with the higher percentages of morozovellids does not record the dominance of selected species, but at Site 1051 *M. aragonensis* and *M. formosa* besides *M. subbotinae* are relatively common whereas *M. marginodentata* is less frequent. Within the interval of low morozovellid abundances, *M. aragonensis* and *M. formosa* are the most common taxa. The general decline of morozovellids does not appear therefore related, both at Possagno and Site 1051, to the extinction or local disappearance of a dominant species.

Page 675 line 17: We have re-phrased as follow: "These genera belong to the muricate group".

The isotope data are already present in the supplementary information.

Table A1: Thanks for your observation. The authors of the species with the original generic name were correctly cited in the text without brackets (see below). Errors are likely due to automatic editing of the software, that we did not notice.

*Globanomalina australiformis* (Jenkins, 1965) *Morozovella aequa* (Cushman and Renz, 1942) *Morozovella gracilis* (Bolli, 1957) *Morozovella lensiformis* (Subbotina, 1953),

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*Morozovella marginodentata* (Subbotina, 1953) *Morozovella subbotinae* (Morozova, 1939) *Parasubbotina eoclava* Coxall, Huber and Pearson, 2003 *Parasubbotina griffiniae* (Blow, 1979) *Parasubbotina pseudowilsoni* Olsson and Pearson, 2006 *Subbotina corpulenta* (Subbotina, 1953) *Subbotina eocena* (Guembel, 1868) *Subbotina hagni* (Gohrbandt, 1967) *Subbotina senni* (Beckmann, 1953) *Subbotina yeguanesis* (Weinzierl and Applin, 1929) *Planoglobanomalina pseudoalgeriana* Olsson & Hemleben, 2006

Figure 2: Not sure to have understand the request. From the figure should be clear that the red line is referred to the carbon isotopes and the blue one to the oxygen data. However, we have added a colour legend in the figure caption.

FIGURE 4: Thanks for the observation. We have erroneously used the same symbol (striped band) for the intervals of magnetostratigraphic uncertainty and for the not-recovery interval. Now graphic symbols are different and the figure caption was corrected consequently.

Page 677 How paleodepth in Bohaty et al. (2009) was derived: Bohaty et al. (2009) derived a paleodepth of about 2200 m for the interval around to 50 Ma through a standard subsidence model.

Line changes OK, accepted all the corrections suggested. Page 674, line 6 and 21: Actually the references should be even more numerous. We selected for line 6 those referred to the PETM and to the other pre-and post PETM hyperthermals. Line 21: The papers have been cited as documenting high CO<sub>2</sub> pressure across the EECO, probably the Lunt et al.(2007) and Royer et al. (2011) citations are not pertinent here.

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