Answer to Editor Prof. Appy Sluijs

Thanks to Editor for his comments and suggestions referring the manuscript CP-2015-113 entitled “Palaeoclimatic oscillations in the Pliensbachian (Lower Jurassic) of the Asturian Basin (Northern Spain)”. Together with the valuables comments and suggestions received from the three anonymous referees, have contributed to substantial improvement of the manuscript.

At this respect, attached please find the document “Gomez et al TEXT Corrected Changes Marked_4and Figs”. The pdf file contains the text, after corrections suggested by Referees·1and 2, marked in red colour; the changes indicated by Referee·3 in blue colour, and the changes suggested by Editor, marked in green colour.

After achievement of the corrections indicated by the Editor, the text was corrected by an English native, professional of the scientific translations, who improved the language expressions. Introduced English corrections are also marked in green.

We assume that all the requirements pointed by Editor and Referees have been accomplished, but if any additional modification or clarification is required please do not hesitate to contact us at your earliest convenience.

We are looking forward to receiving your opinion on the revised manuscript.

Line 39. “in this work” has been deleted and replaced with “including an exceptional cooling event, are documented”.

Lines 54&71/72. The conclusion that warming caused the Early Toarcian mass extinction (ETME) has been documented in many papers (see specially Gómez and Goy 2011, Palaleo 3, but also in Gómez et al., 2008; Gómez and Arias, 2010; García Joral et al., 2011; Fraguas et al., 2012; Clémence, 2014; Clémence et al., 2015; Baeza-Carratalá et al., 2015). The ETME coincides with the prominent increase in seawater temperature, both around the Tenuicostatum–Serpentinum zonal boundary and extinction is not due to anoxia as previously published (e.g. Jenkyns, 1988; Bassoullet and Baudin, 1994; Nikitenko and Shurygin, 1994; Little and Benton, 1995; Harries and Little, 1999; Hesselbo et al., 2000; Hylton and Hart, 2000; Pálfy and Smith, 2000; Guex et al., 2001; Bucefalo Palliani et al., 2002; Macchioni, 2002; Vörös, 2002; Aberhan and Baumiller, 2003; Mattioli et al., 2004; Tremolada et al., 2005;Wignall et al., 2006;Mailliot et al., 2006, 2009; Pearce et al., 2006; Bilotta et al., 2009; Mattioli et al., 2009; Hart et al., 2010), because in many parts of the world there are not anoxic environments at this time but the 7ºΔT of the Early Toarcian superwarming and the mass extinction have been documented.

We do not say that this is the case for the PETM, but analysis of the possible causes of the big five mass extinction events led Twitchett (2006) to conclude that all these events are associated with evidence of climatic change. According to this author, environmental consequences of rapid global warming have been particularly detrimental to the biosphere. One of the most evident impacts of warming is the thermal stress that many organisms suffer when their physiological upper thermal limit is surpassed. There is an optimum temperature range for skeletal secretion, biochemical and physiological activity and growth, but there are limits which the effect of temperature is lethal (Twitchett, 2006). If thermal tolerance is exceeded, physiological dysfunctions appear, conducting organisms to subsequent mortality. One of the current examples is the death of the 16% of the world reef-building corals in 1998, a year when sea temperatures exceeded long-term averages (Walther et al., 2002)

In addition, referring the PETM, several papers have recognized a close correlation between this warming interval and the crises recorded in calcareous nannoplankton assemblages. Some of the best examples have been observed in sections containing the PETM, in which important extinctions or drops in nannoplankton productivity, coincident with one of the most important events of rapid warming, have been reported (e.g. Bralower, 2002; Gibbs et al., 2004, 2006; Agnini et al., 2007; Bown and Pearson, 2009).

Line 80. Schootbrugge.

94/95. References to this sentence have been included.

107/108 & 130/138. A new section has been included:

3.3 Belemnite preservation

Belemnites in the Rodiles section generally show an excellent degree of preservation (Fig. 4) and none of the prepared samples were rejected, as only the non-luminescent parts of the belemnite rostrum not affected by diagenesis were selected. It has being assumed that the biogenic calcite retains the primary isotopic composition of the seawater and that the belemnite migration, skeletal growth, the sampling bias, and the vital effects are not the main factors responsible for the obtained variations.

Cross-plot of the $\delta^{18}O$ against the $\delta^{13}C$ values (Fig. 5) reveals a cluster type of distribution, showing a negative correlation coefficient (–0.2) and very low covariance (R^2=0.04), supporting the lack of digenetic overprints in the analyzed diagenetically screened belemnite calcite.

Now old figures 2 and 3 are figures 4 and 5

Lines 141-154. Most Section 3 has been added to the Materials and Methods section and the phrase “The section was deposited in an open marine external platform environment with sporadic intervals of oxygen deficiency” was added to the previous text.

Lines 151-154. The publication of Van Hinsbergen et al. (2015) was consulted and the palaeolatitude has been calculated in paleolatitude.org. The new phrase “palaeomagnetic data, carried out by Osete et al. (2010), locates the studied Rodiles section at a latitude of about 32º N for the Hettangian–Sinemurian interval, which is in good agreement with calculations of Van Hinsbergen et al. (2015)”. The paper has been included in the References section

Lines 158-171. The paragraph is referred to figure 3, the column of the Rodiles section.

Lines 190-205. Depth intervals of the $\delta^{13}C_{bel}$ excursions have been indicated in the text.

Fig. 5 (Now Fig. 3). The notation $\delta^{18}O_{bel}$ has been added to figure in red to indicate that red squares represent oxygen isotopes.

Line 222. The discussion has been reorganized. Section 4.1 summarizes the updated stratigraphy, including all relevant information regarding biostratigraphy. Section 4.2 summarizes carbon isotope stratigraphy and correlation to other sections. Section 4.3 summarizes temperature reconstructions and correlation to other sections.

We agree to include the discussion on the reliability of belemnite in the methods section. That was originally placed there, but it was changed by indication of Reviewer #2.

A time scale has been included in figures 6 and 8.

Line 358. ciclicity has been replaced with cyclicity

Line 383. The phrase: “As mentioned above, some belemnites could swim through the water column, and calculated palaeotemperatures not necessarily correspond only with the temperatures of the bottom water or of the surface water, but the average temperature.” has been included at the end of section 4.3.

Line 527. “normal” temperature has been rephrased. “The Late Sinemurian Warming interval is followed by a period of temperature averaging 16ºC that develops throughout most of the Early Pliensbachian Jamesoni Chronozone and the base of the Ibex Chronozone. This temperature has been considered as the “normal” seawater palaeotemperature, because coincide with the average temperature of the studied Late Sinemurian–Early Toarcian interval.”

Line 552. The Acknowledgments section has been rephrased: “We thank three anonymous reviewers and the editor for their comments and suggestions that improved the manuscript.”