

## ***Interactive comment on “Amelioration of marine environments at the Smithian–Spathian boundary, Early Triassic” by L. Zhang et al.***

### **Anonymous Referee #1**

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This is an interesting and well-written manuscript that provides further evidence for environmental changes related to postulated cooling at the Smithian-Spathian transition after the Early Triassic hothouse. This work is a valuable contribution applying various geochemical proxies to argue for changes in the weathering rate as well as the oceanic circulation. These environmental changes are further discussed in the light of concomitant changes in the faunal and floral associations.

There are some critical points that should be addressed before this ms can be accepted for publication:

15362, line 10 to 11: .....d13Ccarb(+4 permil) and d34SCAS (-14 permil)..... Please explain what is meant by +4 permil or -14 permil – maximum values; shift in isotope ratios or amplitude of an excursion...?

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15362, line 23 to 24: no new data for a stewise recovery are presented in this contribution .. why then mentioning this in the abstract?

15365, line 2-3: the authors argue that the carbon isotope signals are not significantly affected by diagenetic alteration. However, the line of argumentation in Appendix B is not convincing and unclear. A special focus is on the correlations between the isotope ratios and Mn and/or Sr contents. If the authors want to use manganese contents as an indicator for carbonate diagenesis, only Mn<sup>2+</sup> substituting Ca<sup>2+</sup> in the calcite lattice should be considered (same for Sr). However, no information is given on the methodology of dissolving the rocks and whether the trace element contents refer to whole rock or represent the carbonate-bound fraction. If the given Mn and Sr contents refer to whole rock Mn, no interpretation with respect to a potential diagenetic alteration of the carbonates is possible, since the trace element concentration will not exclusively correspond to Mn and Sr in the calcite lattice.

15365, line 22-23: limited fossil occurrences allow recognition of three conodont zones. The authors illustrate these conodont zones by differently coloured bars in Figure 1. However these zones are defined only by 4 determinations of conodonts (blue dots in Figure 1), which is absolutely inadequate to define the illustrated conodont zones. I recommend to delete the coloured bars in Figure 1 and instead correlate the sections exclusively based on carbon isotope patterns, the latter being convincing.

15366, line 10: Triassic conodont samples of 3 to 4 kgs are not really large.

15366, line 21: the authors have to state whether the given stdevs are 1 or 2 sigma. In addition, they have to provide information how the analyses were calibrated to the V-PDB scale. Measuring a laboratory standard is not sufficient.

15367 line 22: please give details on how the analytical uncertainty was determined.

15368 line 18: the minimum N4 and the correlation of N4 in various sections (Figure 2) is rather a guess and not really convincing. I recommend to omit the N4 correlation

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from Figure 2.

15369, line 2: How can the  $\delta^{13}\text{C}_{\text{carb}}$  and  $\delta^{34}\text{S}_{\text{CAS}}$  values have a significant negative correlation in case a positive (?)  $r^2 = +0.14$  is calculated. This statement has to be revised and the significance of all correlations has to be underlined by further statistic tests

15369 Chapter Sediment fluxes: it is completely unclear how the carbonate and clay mass accumulations were calculated. How were carbonate and clay percentages measured? No information is provided.

15371 line 20: clay mineral production – please rephrase

15372 line 4: no Th-normalized element ratios are provided in the appendix...

Appendix 2:  $\delta^{18}\text{O}_{\text{carb}}$  and  $\delta^{13}\text{C}_{\text{carb}}$  values show an  $r^2 = 0.0001$  which means that the two variables are not correlated. The authors state a "weak covariation"? Please rephrase throughout Appendix 2.

Tables C1 and C2 of the supplement correspond to Figs A1 and A2 of the Appendix. Why this?

Fig. B1a: why presenting a plot of  $\delta^{18}\text{O}$  vs. Mn/Sr. Oxygen isotopes are not discussed in this paper.

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**BGD**

11, C7310–C7312, 2014

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