

## ***Interactive comment on “Latitudinal differences in the amplitude of the OAE-2 carbon isotopic excursion: $p\text{CO}_2$ and paleoproductivity” by E. C. van Bentum et al.***

**Anonymous Referee #1**

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This paper explores the compound-specific (phytane) isotope profile of C/T boundary organic-rich shales from Demerara Rise and compares the well-known positive excursion with data from other sites that represent different palaeolatitudes. A fall in  $\text{CO}_2$  levels is suggested, as previously indicated by several authors on different grounds, and the size of the drop is quantified. Organic-carbon burial is credited with drawdown of  $\text{CO}_2$ . One point that the authors must consider is the role of continental weathering as an additional factor in lowering the  $\text{CO}_2$  content of the atmosphere. Frijia and Parente (Palaeo-3, 2008) present Sr-isotope evidence for a pulse of enhanced weathering during OAE 2; Blättler et al. (EPSL, in press) present Ca-isotope evidence. The conclusions of these papers need to be carefully considered. Bearing these effects in

C2283

mind, the final sentence of the conclusions may not be warranted because organic carbon burial is seemingly taken as the only sink for  $\text{CO}_2$ . It would also be useful to look at all sites with a view to comparing stratigraphic variation in TOC calibrated against the carbon-isotope curve. TOC values might well reflect productivity – how do TOC patterns compare with productivity changes suggested on the basis of other criteria?

The authors should also look at the recent paper of Jarvis et al. in *Paleoceanography* (2011) for additional information on the Plenus Cold Event, based on a comparison of the carbonate and organic-carbon isotope profiles across the C/T OAE.

There are many little mistakes in the English grammar that need to be corrected. Subjects, objects and verbs do not always agree. The use of hyphens would eliminate ambiguity in some cases.

Page 6193: Line 7: delete ‘Hugh’

Line 10: cite Jenkyns, 1980

Line 17: need citation for terrestrial isotopic record of C/T OAE (papers by Hasegawa)

Line 18: cite Scholle & Arthur, 1980 – first paper on carbon-isotope stratigraphy

Line 18: ‘because organisms’ instead of ‘as organism’ ‘the remaining carbon in the ocean–atmosphere reservoir’ would be better.

Line 20: ‘fix’ not fixes

Page 6194:

Line 10: it should be ‘the Plenus Cold Event’

Page 6195:

Line 28: ‘corresponds’ not ‘correspond’ ‘trough’ not ‘through’!

Page 6196:

C2284

Line 24: this process was only . . .

Page 6200:

Line 2: I thought all values of delta-13C increased during the OAE????

Page 6205:

Line 12: the TOC record at Tarfaya increases over the C/T OAE interval (Tsikos et al.), more in line with an increase in productivity over this interval.

Page 6206:

Line 14: osmium is generally concentrated in black shales and – as far as I am aware – is not necessarily related to volcanic/magmatic activity. Osmium-isotope ratios, on the other hand, may well be significant in this context.

Line 24: 'became' not 'become'; 'started' not 'start': you are referring to events in the past.

Page 6207:

Line 19: mixing of rock (carbonate-rich layer) and time (period of high SST): rephrase

Conclusions: note that weathering will draw down CO<sub>2</sub> as well as enhancing nutrient supply to the oceans.

Page 6208:

Line 19: 'demonstrate' not 'demonstrated'

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