

Interactive comment on “Maastrichtian carbon isotope stratigraphy and cyclostratigraphy of the Newfoundland Margin (Site U1403, IODP Leg 342)” by Oliver Friedrich et al.

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Congratulations for a new very useful dataset on the Maastrichtian. This is a nice work. However, I have a few comments on your article and I think that there is a number of issues that need to be dealt with: Minor comments: 1) First of all, I think the title should be slightly modified by adding "Late" before Maastrichtian because your record covers only about half of the stage. Moreover, the base of the "late" Maastrichtian may be placed at the FO of nannofossil *L. quadratus* (base UC20aTP) so your record is clearly within the late Maastrichtian. 2) I understand the caution with not calculating absolute temperatures based on bulk oxygen isotope. However, it seems like temperatures reconstructed from the bulk oxygen isotopes of well-preserved chalk actually

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reflect better sea-surface temperatures than previous studies on Maastrichtian planktic foraminifera such as those from Li and Keller (see Thibault et al., 2016, CP 12, 1-10). I think that a lot of analysis on PF from the pioneer studies of Barrera and Savin and Li and Keller are compromised because diagenetic screening was simply not as thorough as today at that time. Yet, most compilations and/or modelling studies still use those values for SSTs but hesitate using well-preserved bulk chalk values. It is likely that values of the bulk chalk are also slightly overprinted by diagenesis but apparently not much more than PF. Moreover, the argument of bulk chalk being a mix of multi-species with potential vital effects is not valid anymore (see discussion in chapter 3.2 of Thibault et al., 2016, CP). See also discussion in Jarvis et al. (2011, 2015; Reghellin et al., 2015). 3) There is also diachroneity for base C. kamptneri (see attached pdf for full references) 4) Thibault et al., 2015, Lethaia is a miscitation. The discussion on base Micula prinsii is in Thibault et al., 2016, IJES. 5) On Figures 2 and 3, and throughout the text, precise "TP" in superscript after each nannofossil subzone (UC20dTP). TP stands for Tethyan and Intermediate Provinces in the Burnett Scheme. This is important because there are also UC20bBP, UC20cBP and UC20dBP in the Boreal realm whose definitions are different. 6) On Figure 7, it would be useful to add the nannofossil bio-events on each section to highlight the small mismatch mentioned in the text. you also mention the acme and last occurrence of inoceramids. Any data on that in Newfoundland ?

Major comment: 7) The comparison between Site U1403 and Zumaia in the time domain is problematic. Nannofossil events are considered as slightly diachronous between the two sites. I would not be surprised that this is the case, most especially because the biostrat in Zumaia is an issue due to the bad preservation of nannos and the presence of micro-turbidites. However, your two carbon-isotopes curves do not match either. So, in the end, you really don't have any good stratigraphic marker that supports your tuning in time of Site U1403 and allows for comparison to Zumaia. You consider in the text that Zumaia probably represents a more local response whereas U1403 represents a more global signal. This claim could be easily checked and would

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be more solid if you try to correlate your U1403 curve to other carbon isotope curves of the late Maastrichtian which are well-constrained: Site 1210B, Gubbio, Stevns-1. I attach hereby a possible alternative correlation of carbon-isotopes between U1403 and Zumaia. I'm not saying this is the correct solution. There are other possibilities. But such a correlation still appears more likely than the actual comparison of Zumaia and U1403 on Figure 7. I think that this is a serious shortcoming of the paper as for now, there is not much that actually supports your cyclostratigraphic age-model of U1403. Moreover, the spectra of the signals in the time domain give pretty bad results besides the 405 which is of course a direct result from the tuning to the 405 kyr. The periodicities at 143 kyr and 35 to 50 kyr for Ln Fe/Ca are not super convincing. The same is true for the Mag. Sus with bands at 85-97 and 34-54 kyr. I think that the study would be more solid with a comparison of frequency peaks to La2004 using the average spectral misfit of Meyers. It would also be worthwhile to make tests such as different possible correlations of carbon-isotopes to Zumaia, allowing to apply the Zumaia age-model to U1403 and then test the cyclostratigraphy on such age-models. Maybe, you would come up with a different cyclostratigraphic age-model and a better match of carbon-isotope curves.

I attach a pdf with my comments in the supplement.

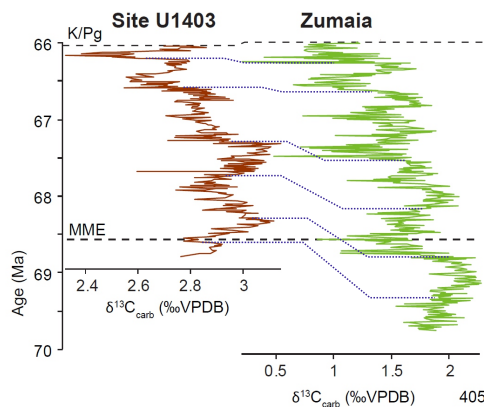
Best regards, Nicolas Thibault

Please also note the supplement to this comment:

<http://www.clim-past-discuss.net/cp-2016-51/cp-2016-51-SC1-supplement.pdf>

Interactive comment on Clim. Past Discuss., doi:10.5194/cp-2016-51, 2016.

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**Fig. 1.**