

Interactive comment on “Late Pliocene age control and composite depths at ODP Site 982, revisited” by N. Khélifi et al.

Anonymous Referee #2

Received and published: 6 July 2011

Late Pliocene age control and composite depths at ODP Site 982, revisited By N. Khélifi, M. Sarnthein, and B. D. A. Naafs Review for Climate of the Past by Peter Bloxson and Martin Ziegler

General comments:

Khelifi et al. present a revised age model for the Pliocene section in North Atlantic ODP Site 982. The revision is based on additional benthic d18O measurements. ODP 982 is a key site in the North Atlantic and has been used in several paleoceanographic studies. Therefore, an adaptation of its age model could potentially have important implications.

Unfortunately, the manuscript remains throughout quite technical and is in its current

C1056

form probably mainly of interest for paleoceanographers who actually work on site 982. Therefore, section 6 (Implications) should in our view be dramatically expanded in a revised version (also considering that this is a submission for "Climate of the Past").

If the revision of the age model is indeed significant and important, then the authors should demonstrate this and really discuss its implications. How does the revision of the age model contribute to our understanding of past climate change? The authors should e.g. show the SST record on the revised and old age scale and show the comparison with other records (e.g. Bartoli et al) in the figures (this is shortly mentioned in the text, but should be shown in figures as well and discussed in more detail). Are the conclusion of the original publication of the SST record still valid? Khelifi and co-workers should also show the CO₂ record of Pagani et al. (which is shortly mentioned in the introduction) on the revised age model and again discuss the implications of the adapted age model for this record as well.

In the conclusions the authors finish with: "the large-scale age reduction [...] implies a number of reasonable shifts of paleoclimatic signals that mark the onset of the Late Pliocene onset of the major NH glaciation" We hope that the authors could be more specific in the revised version and name the main implications and consequences of the adapted age model.

Specific comments:

The paper essentially consists of three parts: 1. Construction of the new splice and hence the new mcd scheme, and the demonstration of the superiority of this new splice by using the d18O records from holes ABC 2. Application of this new splice to retune the d18O record to better fit with the LR04 stack. 3. Recalculating other records for this site using the new age model, and comparisons with other sites.

However these three parts are obscured by the descriptive, not explanatory tone in sections 4 and 5 in particular and therefore the authors should try to improve the structure. Furthermore, brief asides about the methods are scattered throughout the paper. A

C1057

more comprehensive description of the resampling of site 982B would be useful before the discussion of the new measurements begins.

The revision of the age model itself: The authors should try to present the old and the revised age model in the figures in such a way that it is clear why their new tuning is actually superior. At the moment this is not very clear in the figures.

Comments on the construction of the age model.

There is no explanation of how the new core splice was created – was it visual/manual, using software such as Analysieries or using an automated graphical approach similar to that of Lisiecki and Lisiecki (2002), used in Lisiecki and Raymo (2005). Similarly, the method of obtaining the improved fit to the LR04 stack could be shortly explained.

Further clarity is needed when discussing the two competing mcd scales. The texts switches between discussing depths on the old scale and depths on the new scale without being entirely clear as to which depth is being referred to. A clear addition to each use of mcd such as 'mcd (new)' and 'mcd (old)' would assist.

While the age model presented here may well be an improvement on that used by previous workers at Site 982B, this is not clearly presented in this paper. Figure 1 appears overcrowded and hard to decipher. 1. The core break bars in the background are confusing, a better approach would be similar to that used by ODP publications, with core sections in a separate bar (maybe above and below, linked to the MCD scales). 2. Aside from the initial reassignment of the G/M boundary, the magnetic inclination graph does not appear to be heavily used. It could be appended as a separate figure or not included entirely? 3. Excessive labeling complicates the whole chart and could be cut down. Specific examples include the two circles in D), the 'tie lines' between the dates on the LR04 stack and the B) d18O record and labels 'correlation problems' and 'as in Lawrence et al 2009'. The labels are not specific enough to be of use. 4. ~1 Shift label unspecific 5. Age Model of Shipboard sci. . . label should be to one side of the d18O record it refers to, similar to 'New Age Model' 6. Displaying the 2 age models

C1058

adjacent to each other would be a clearer way of showing the poor match of the three holes d18O records on the old age model and the better match of the d18O on the new model. As it is, they are hard to compare visually as they are separated by the LR04 stack. Putting the new model at the top, then the old age model, then the LR04 stack at the bottom would show 6.1. The better correlation between holes of the d18O records when using the new age model, ie the argument for using the new mcd scheme 6.2. the poor fit of the d18O records on the old mcd when compared to the LR04 6.3. the tie lines between both age models and the LR04 are useful and should be retained 6.4. Fig 2 clearly shows the better match of the new mcd and the LR04 stack, and so will serve that purpose, while Fig 1 highlights the superior core splice of the new model

The new age model includes a hiatus of 130,00 years. This hiatus was only identified based on the improved fit of the oxygen isotope records. However, the authors should discuss if there is any additional evidence (e.g. sedimentological etc) for the presence of such a hiatus and if this is not the case, discuss why not.

Figure 2 is considerable clearer and demonstrates the good match between the New d18O record and LR04, however I can find no reference to the epibenthic d13C record in the text, so it could be removed.

Technical corrections:

The last sentence of the abstract is not clear "Our study demonstrates the significance of reliable composite-depth scales and 218O stratigraphies in ODP sediment records....."

Page 1632, Line 20: Lisiecki and Raymo used the orbitally tuned d18O record of 982 for the stack. I think they used the d18O record on composite depth.

Page 1633, line 3: Is the reference to the PhD thesis needed?

Page 1638, line 25: "asymptotical" warming? unclear.

Page 1639, line 20-23: Break down into two sentences.

C1059

C1060