

Response to Reviewer#1: Dr. Heather Ford

In this manuscript, the authors use the Mg/Ca values of a surface dwelling and subsurface dwelling foraminifera to investigate climate in the North Atlantic during the early Late Pliocene. They find spectral and temperature differences from the existing alkenone-based record highlighting the seasonality in surface foraminifera and alkenones and the related climatological interpretations. I found the use of the subsurface dwelling records to reconstruct the North Atlantic current and poleward heat transporting compelling. I found the study well executed and the manuscript well-written. I have a few minor comments and suggestions to improve the clarity of the manuscript.

We thank Dr. Heather Ford for her valuable comments and detailed suggestions, which have helped us improve the quality of the manuscript.

Below are our detailed point-by-point responses (in blue) to each comment (in black).

Please note that all line numbers mentioned in our responses correspond to the “No Markup” mode in the revised manuscript. Additionally, to prevent any errors or confusion with line numbers, for certain comments, we have directly copied and pasted the revised text into our responses.

Line 122-123: write out abbreviations to full names.

To keep clear of this part, and in response to reviewer 2’s comment regarding unnecessary content in this part, we have removed the beginning few sentences including the abbreviations.

Figure 1: Avoid rainbow color palette on figures. You can use BlueRed or Viridis in ODV

Followed the suggestion, the color scheme of Figure 1 has been updated to BlueRed in the revised manuscript

Figure 2: Update to ProbStack instead of LR04

As the age model for Site U1313 used in this manuscript was constructed by Naafs et al. (2020) by aligning U1313 benthic $\delta^{18}\text{O}$ with LR04, it is more reasonable to plot U1313 benthic $\delta^{18}\text{O}$ together with LR04 when needed, such as in Figure 2b and Figure 6a. If we replace LR04 with Prob-stack in Figure 2a, it will create an issue of having both LR04 and Prob-stack in this paper, which is unnecessary and might confuse the readers.

Despite some minor differences, LR04 and Prob-stack are highly consistent over the interval discussed in this paper (see the following figure). Considering that the benthic $\delta^{18}\text{O}$ stack is mainly used as an indicator of polar ice volume changes in this paper, the choice between LR04 and the Prob-stack will not make significant difference. Additionally, the data comparisons in this paper are made within Site U1313 itself, thus independent of the age model.

Therefore, to avoid confusion and maintain consistency of the entire manuscript, we prefer to use only LR04 for all the figures.

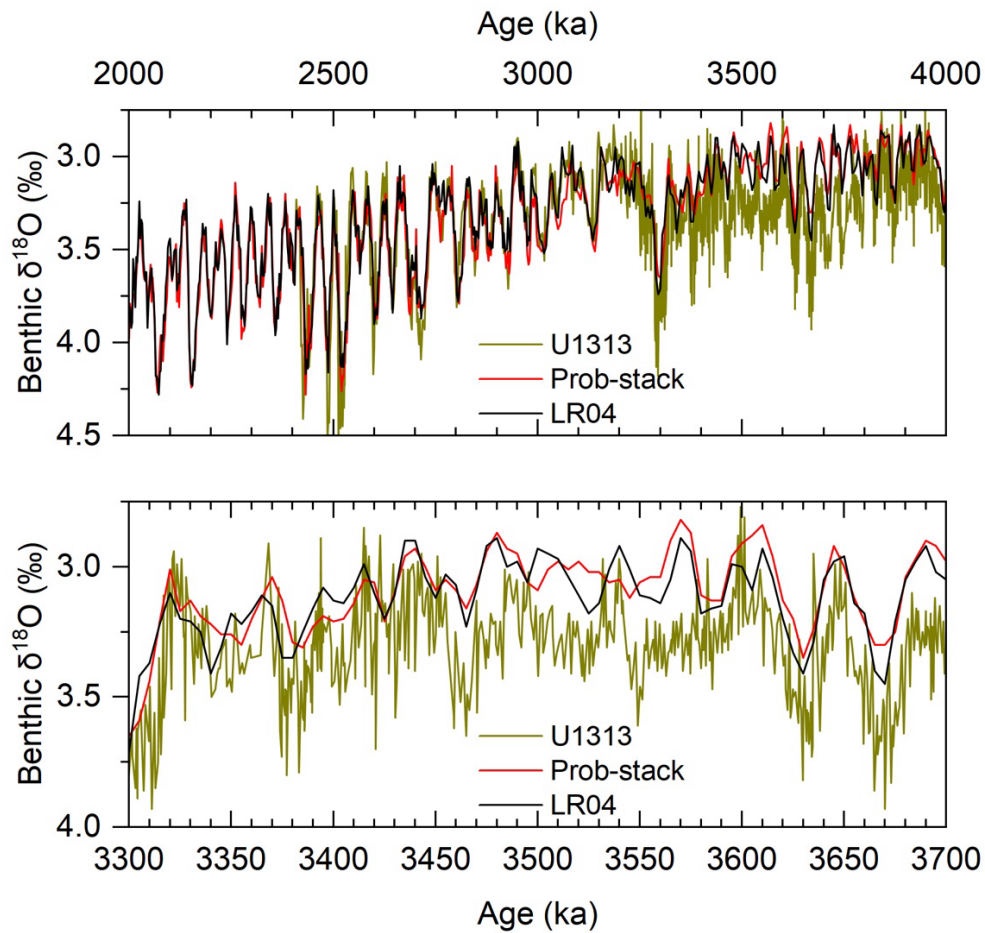


Figure 3c: 100 peak blocked by 100 label – adjust position slightly

Although we also find it looks somewhat strange, this is the actual output of the spectral analysis and is not blocked.

Line 185: In the last sentence I would reiterate the precession cycle is absent from the 2.4 to 2.8 period, i.e. “The results indicate that the 2.4 to 2.8 Ma records are all dominated by obliquity, with a notable absence of a significant precession cycle after iNHG in comparison to the oNHG (3.3 to 3.7 Ma records)”. The first time I read it and then looked at the figure I was confused so I would just be more specific.

We realize the lack of clarity in the last sentence. Following the suggestion, we have further revised it as follows (Line 188 to 193, revised manuscript):

“Together, these spectral analysis results highlight a significant observation: the alkenone-based SST and the Mg/Ca-based SST records exhibit distinct changes in the dominant periodic components during the NHG. Specifically, the alkenone-based SST record was consistently controlled by the obliquity throughout the transition from oNHG to iNHG, with a notable absence of a significant precession cycle. In contrast, the Mg/Ca-based SST record shows a shift in the dominant cycle from precession during the oNHG period (3.3 – 3.7 Ma) to obliquity during the iNHG period (2.4 – 2.8 Ma).”

Line 235-240: Do you mean 2000 AD? I would re-write this as “For our study interval (3.65 to 3.37 Ma), the reconstructed CenCO2PIP CO2 concentration averaged around 300 ppm with a maximum value generally not exceeding 360 ppm (Fig. 4c). This is similar to the high-resolution reconstruction for 3.35-3.15 Ma, i.e. immediately following our study period (de la Vega et al., 2020). For comparison, the modern CO2 value in 2000 was 360 ppm. Considering the reconstructed SSTs are warmer than the modern average temperature from 2000 to 2015 (Fig. 1d), the relatively higher CO2 could not be the primary cause of the warmer temperature during the late Pliocene.”

We agree with the suggested rewrite, which improves the clarity of the text. We have accordingly made the revision in the revised manuscript (Line 242-247).