Dear reviewer,

Thank you very much for your constructive review, which will help to improve our manuscript. Our replies to your comments (*in italics*) are shown below in red.

The subject of the ms is a revision of the shipboard splice of ODP Site 982 and some of its direct implications. Site 982 represents one of the most important sites, if not the most important one, to study paleoclimate change for the interval between 8 and 5 Ma in the critical North Atlantic. The interval notably covers the entire Messinian stage and its salinity crisis. Although the title may sound boring for some, this paper is critically important as it highlights the current tendency to revise shipboard splices, using high-resolution land-based core scanning data that are more suitable for splicing than the initial shipboard generated data. This tendency has major consequences for the paleoclimate and -oceanographic and IODP drilling community for instance regarding sample party and strategy, astronomical age models, etc. As such the paper should serve as an eye opener for the community. However, it also shows the time consuming work that is behind the revision of such a shipboard splice, work that does not always seem to be valued. But, in this case, the implications of the revised splice discussed in the ms already make it perfectly clear why such a revision of the shipboard splice should become standard in the procedures of deep-sea drilling legs dedicated especially to paleoclimatic and -oceanographic studies.

The ms itself is clearly written and easy to follow. I only have one major issue as well as some minor ones. The major issue deals with the presentation of the tuning used to establish the astronomical age model. Following an initial age model based on calcareous plankton events, a minimal tuning is presented with approximately one tie-point per 100-kyr. This strategy is used to avoid incorporation of the amplitude modulation of precession by eccentricity in the tuned time series. In the first place, it might be added that the ages of the bio-events represent astronomically calibrated ages, which will facilitate tuning if these ages are (near) correct. The selected tie- points are shown in green in Figure 5 together with additional tie-points (in red) that were subsequently added to generate a next higher resolution astronomical age model. However, it is not made clear how and why the tie-points were selected and this should be made clear in the ms. In other words, what were the criteria and the approach used to select the tie-points for the tuning. The strategy of avoiding the amplitude modulation of precession to enter the tuned time series may suggest that the expression of the short eccentricity cycle itself might have played a central role in the selection of the tie-points every ~100-kyr. However, the expression of the short eccentricity itself is only present in part of the studied interval and thus seems not to have been used in the procedure, at least not over the entire interval. In addition, a minimal tuning might not be necessary as the modulation effect can be avoided by applying appropriate (wide) filters. Finally, it should be realized that the availability of astronomical ages for the bio-events as well as previously published age models may have played an important role in constraining the initial tuning and selecting the tie-points.

We appreciate that a number of things require clarifying in the astrochronology section. The first-order age model, generated using a polynomial fit through the shipboard nannofossil and planktonic foraminiferal datums (updated to the astronomical ages from Hilgen et al., 2012) was solely used to establish whether the strong ~0.8, ~1.6 and the 3.8-5.0 m cycles observed in the $\delta^{18}O$ and $\delta^{13}C$ records were most likely associated with astronomical forcing. We will clarify this in the text.

We did not use the polynomial age model itself as a starting point for the tuning. As we described in the text, we directly tuned the new benthic $\delta^{18}O$ record from 982 to a E+T-P tuning target, specifically correlating $\delta^{18}O$ minima to E+T-P maxima. As only the original dataset was used and no filters of the dataset were used, we did not feel additional explanation was required. However, we will adapt the text to provide a more thorough description of the tuning process, which we describe below in further detail.

The correlation of benthic $\delta^{18}O$ minima to ETP maxima was done visually, going directly from depth to age, facilitated by the tuning functions contained within CODD (Wilkens et al., 2017). The shipboard datums (Supplementary Table 6) were used to guide the correlation, however, these datums were not used as definitive tie points. As the shipboard datums have considerable depth errors (between ±0.25-2.5 m; we will adjust Supplementary Table 6 to include these errors), we did not feel these datums were reliable enough to use as rigid guides for tie point allocation. As such, we also considered the influence of the astronomical calibration of these biostratigraphic datums on our tuning to be minimal, although the reviewer is correct that this influence cannot entirely be excluded.

For the initial tuning, we visually correlated distinctive $\delta^{18}O$ cycles to ETP maxima with a correspondingly distinctive shape, resulting from the interference patterns between obliquity and precession. The minimal-tuning tie points were chosen to align all $\delta^{18}O$ minima and ETP maxima as best as possible across the entire record, especially between the tie points. We tried to use as few tie points as possible for the minimal tuning, following the strategy outlined in Holbourn et al., 2007. We thereby also tried to leave at least ~100 kyr between consecutive minimal tuning tie points, as not to introduce frequency modulation into the record, as outlined in Zeeden et al., 2015. We will particularly rephrase and clarify the part of the text relating to this, as we did not choose a minimal tuning tie approximately ~100 kyr, but rather made sure consecutive minimal tuning ties were ideally at least 100 kyr apart (actual range of time between consecutive ties = 90-377 kyr). As such, we do not believe that short-term eccentricity was important in the selection of our ties. However, we will make sure this misunderstanding is clarified in the text.

The same strategy in visually correlating the $\delta^{18}O$ minima to ETP maxima was employed to obtain the fine-tuning age model, thereby providing higher-resolution age control and remove any remaining misalignments between $\delta^{18}O$ cycles and the ETP curve in between the minimal tuning tie points. We will adapt the current text to clarify this further.

Although there are other ways to avoid amplitude modulation, as the reviewer suggests, we chose to provide the complimentary minimal and fine-tuning age models and allow the reader to choose the tuning strategy that best fits their application (e.g. minimal tuned age model for reconstructing changes in phase over time, versus the fine-tuned age model for high-resolution correlation between different records).

Minor issues.

1) Some data are not fully shown in the figures in the Supplementary Information as they fall somehow outside the range of plotted values;

We will adjust the y-axes of the $\delta^{13}C$ in Panels 6 and 7 of Supplementary Figure 2.

2) Add minor ticks on some of the x-axis in the Supplementary Figures, especially figure 3;

Will add minor ticks to all three supplementary figures. We will additionally revisit the figures in the main manuscript to improve this where necessary.

3) It might be preferable to use an offset between the isotope records in Figures 8A-B, and;

We prefer not to add an offset, as we feel that the overlap in the data shows the disagreement better in panel A and shows the agreement better in panel B.

4) Make sure that there is a space between the genus and species name, also when the first one is abbreviated (i.e. in 2.4).

Thanks for pointing this out. We were not consistent in our use of a space when referencing the benthic foraminiferal species. We will rectify this throughout the text. We additionally defined that *C.* stands for *Cibicidoides*.