

## Response to reviewer RC2

Review in italics, our response in standard text

We thank the reviewer for carefully reading our paper and for their comments.

*This manuscript's goal is to provide recommendations for how best to develop age models for new ice cores that are anticipated to retrieve ice from 0.8-1.5 Myr ago. As significant resources are being invested to retrieve this ice, the thoughtful advance planning for the creation of these age models is commendable. In proposing specific age modeling strategies, the manuscript also generates useful hypotheses about the types of climate responses that are expected to be found in the new ice cores. This manuscript is well written and appropriately aimed at a relatively broad paleoclimate audience. I recommend publication after minor revision.*

Thank you.

*My suggestions for revision are below:*

- 1. Most importantly, it would be useful for the introduction to be more explicit about the practical goals for dating the new ice. Although the manuscript currently introduces the motivation to compare pre-MPT and post-MPT climate responses, it would be useful to list a couple specific hypotheses to be tested that will require good age models and how precise the age models will need to be to evaluate these hypotheses. For example, how well do ages need to be constrained to evaluate shifts in orbital-scale spectral power across the MPT? Do the authors also hope to be able to evaluate leads and lags in the climate system? If so, how will the proposed alignments to sediment core records affect the ability to measure the relative timing of different climate responses?*

We will add two substantial sections discussing the reasons for seeking precise ages, and the fact that using marine records precludes seeking leads and lags between marine and ice records.

- 2. At the end of the manuscript, it would also be useful to propose some criteria that might be used to evaluate the success or uncertainty of the proposed age models.*

We agree it will be important to put uncertainties on the ice age scale that is derived. This will come from a number of constraints, likely within a Bayesian framework such as that used by the IceChrono and PaleoChrono programs. We have added a sentence near the end to discuss this.

- 3. Line 75: Please clarify that Prob-Stack (Ahn et al., 2017) does not have its own age model. Because Prob-Stack uses the LR04 stack as its initial alignment target, it has implicitly inherited the LR04 age model and, thus, has at least as much age uncertainty as the LR04 stack.*

Thank you for the clarification, which we will add to our text.

- 4. Line 108: This sentence is unclear. What exactly is "higher" at Dome Fuji?*

Concentration of dust is higher at Dome Fuji – this will be clarified in the text.

5. *Lines 151-153: Please describe the characteristics of the deep water temperature signal from 450-550 ka that are also found in some of the older sections of the 1123 signal. Are there specific ways to identify in advance which parts of the 1123 signal may be problematic for alignment?*

We were referring to the similar amplitude of variations. This will be spelt out in the new version.