Revisiting oxygen-18 and clumped isotopes in planktic and benthic foraminifera

Supporting Information

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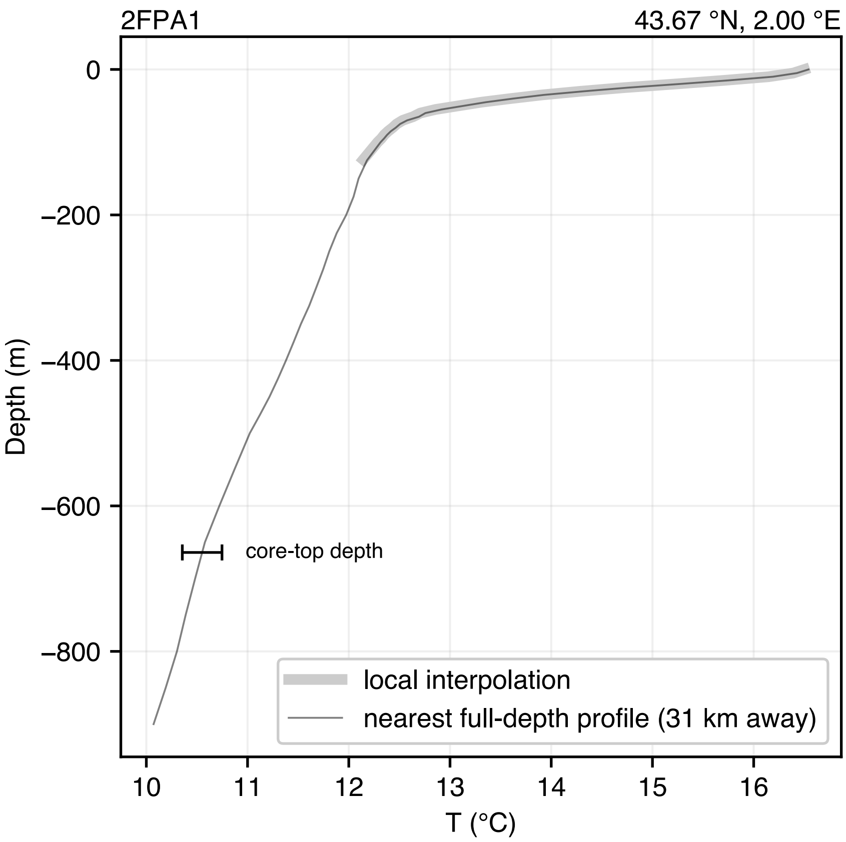

Figure S1 — We estimate bottom seawater temperature (black error bars corresponding to 95 % confidence limits) at each core top by using the nearest neighboring WOA23 grid node with a temperature profile reaching sufficient depth. We check the consistency between the temperature profile interpolated at the latitude and longitude of the core (thick grey line) and the nearest-neighbor temperatures (thin line) by visual inspection of the two superimposed profiles

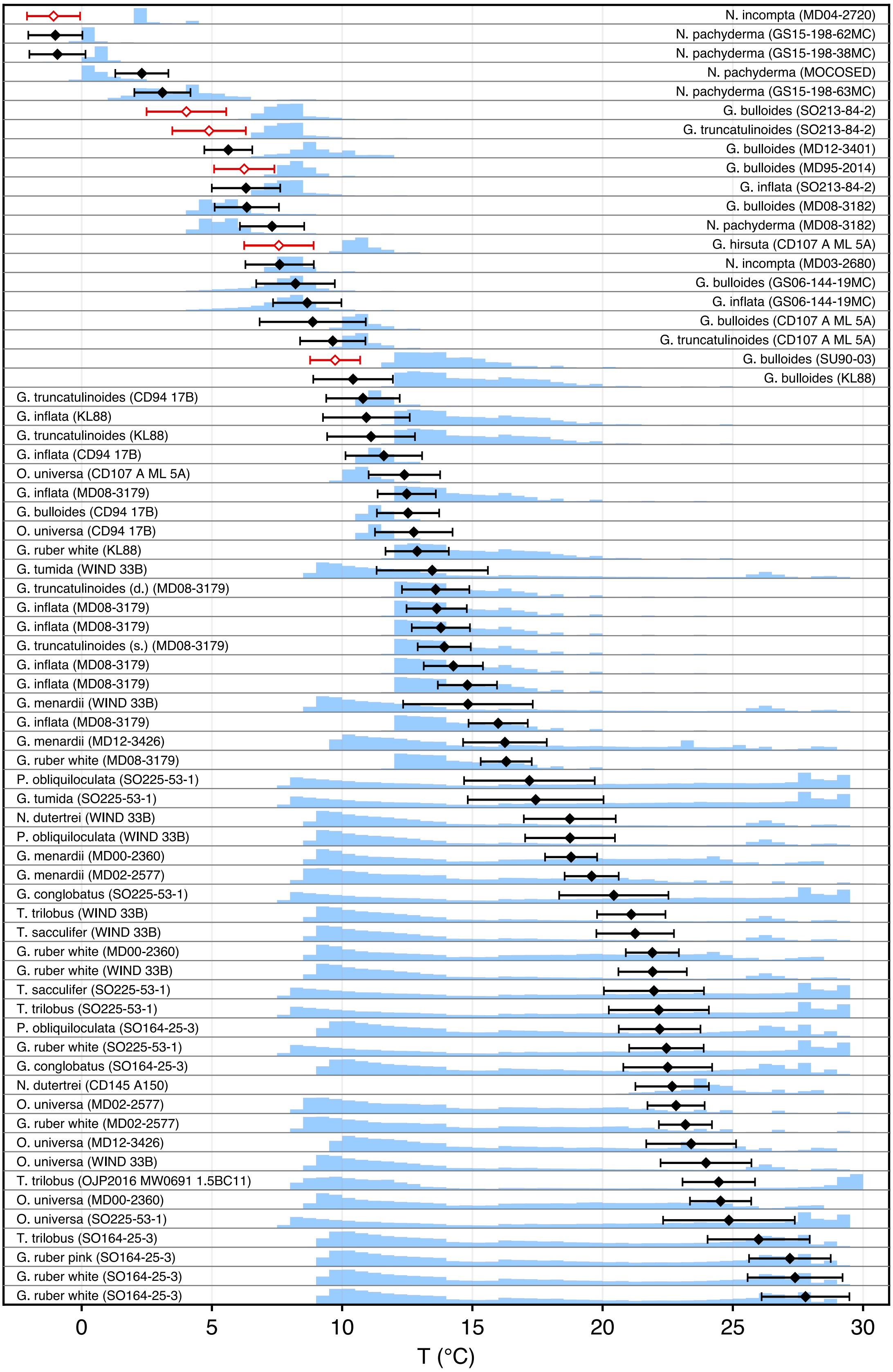

Figure S2 — Comparison, for each planktic sample from *Peral et al.* (2018) and *Meinicke et al.* (2020), between oxygen-18 estimates of calcification temperatures (95 % error bars) and year-long distribution (blue histograms) of monthly mean temperatures over depths of 0–500 m. T_{18} error bars for concordant and discordant samples are shown in black or red, respectively.

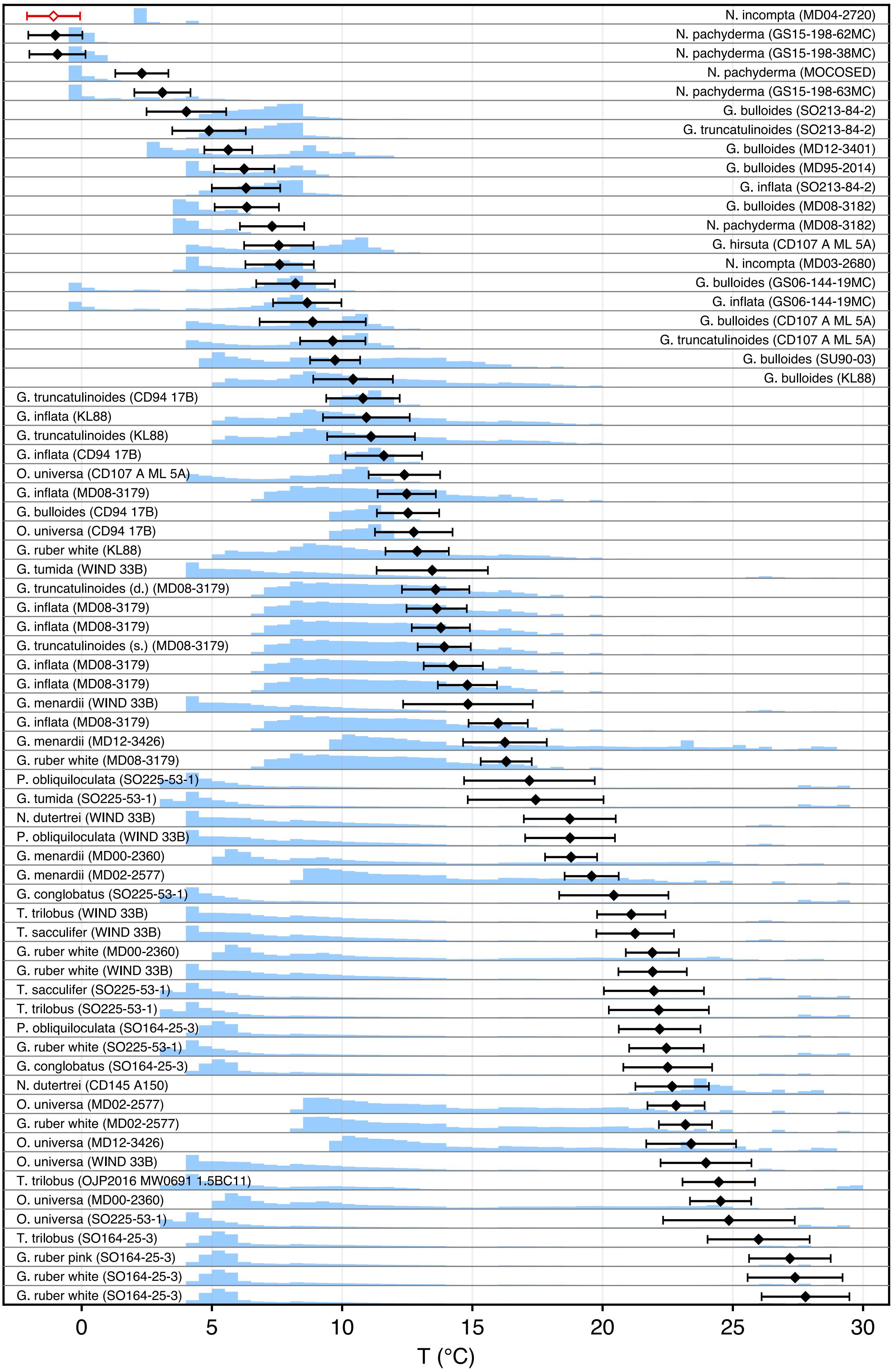

Figure S3 — Comparison, for each planktic sample from *Peral et al.* (2018) and *Meinicke et al.* (2020), between oxygen-18 estimates of calcification temperatures (95 % error bars) and year-long distribution (blue histograms) of monthly mean temperatures over depths of 0–1500 m. T_{18} error bars for concordant and discordant samples are shown in black or red, respectively.

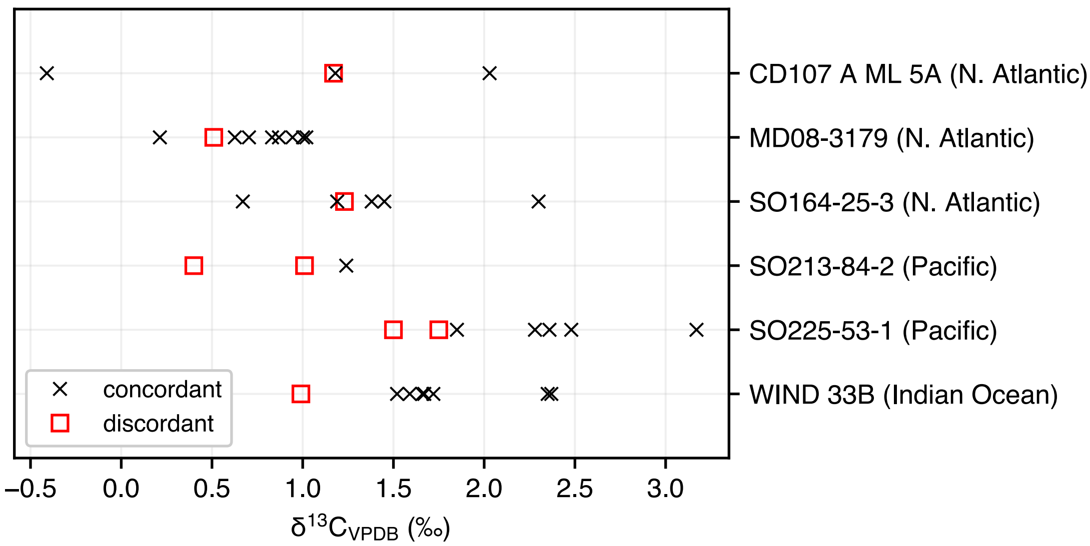

Figure S4 — Differences in $\delta^{13}C$ between discordant and concordant planktic samples from the same site: in ocean basins with strong vertical $\delta^{13}C$ gradients (Indian and Pacific oceans), discordant samples have lower $\delta^{13}C$ values than concordant ones from the same site, whereas discordants from the North Atlantic ocean, where the gradient is much weaker, have $\delta^{13}C$ values indistinguishable from concordant samples from the same site, suggesting that discordant samples may reflect deeper calcification than expected based on typical living depths.

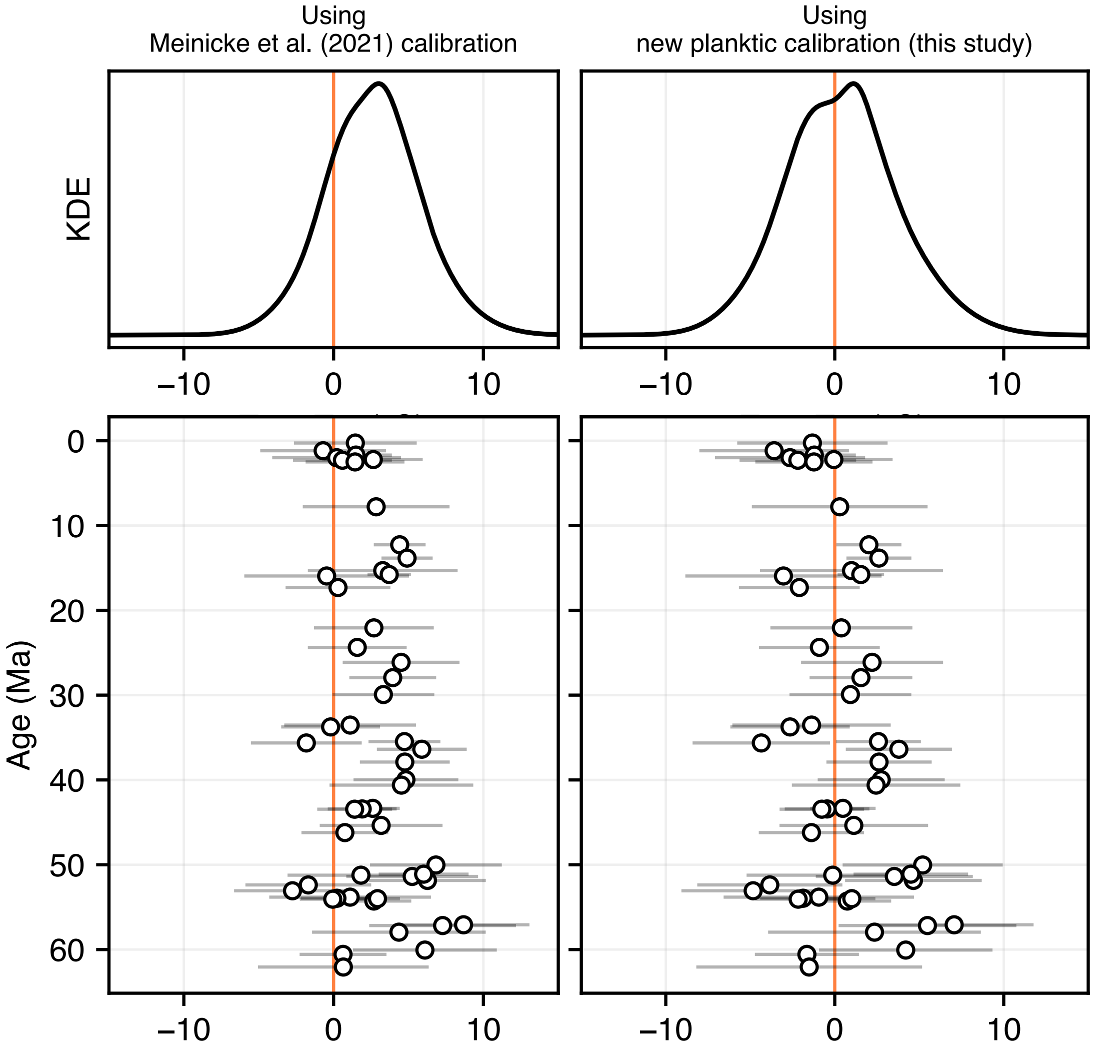

Figure S5 — Left column: offset between T_{18} (based on *Cramer et al.* (2011) and T_{47} (based on the *Meinicke et al.* (2021) calibration as in the original publication) for the Cenozoic deep ocean temperature reconstruction of *Meckler et al.* (2022). Error bars correspond to 95 % confidence limits of Δ_{47} reconstructions, and the corresponding overall kernel density estimation (KDE) is unambiguously offset from zero by 2–3 °C. Right column: the same comparison, but with T_{47} based on this study's planktic Δ_{47} regression (eq. 5), resulting in a zero-centered KDE.

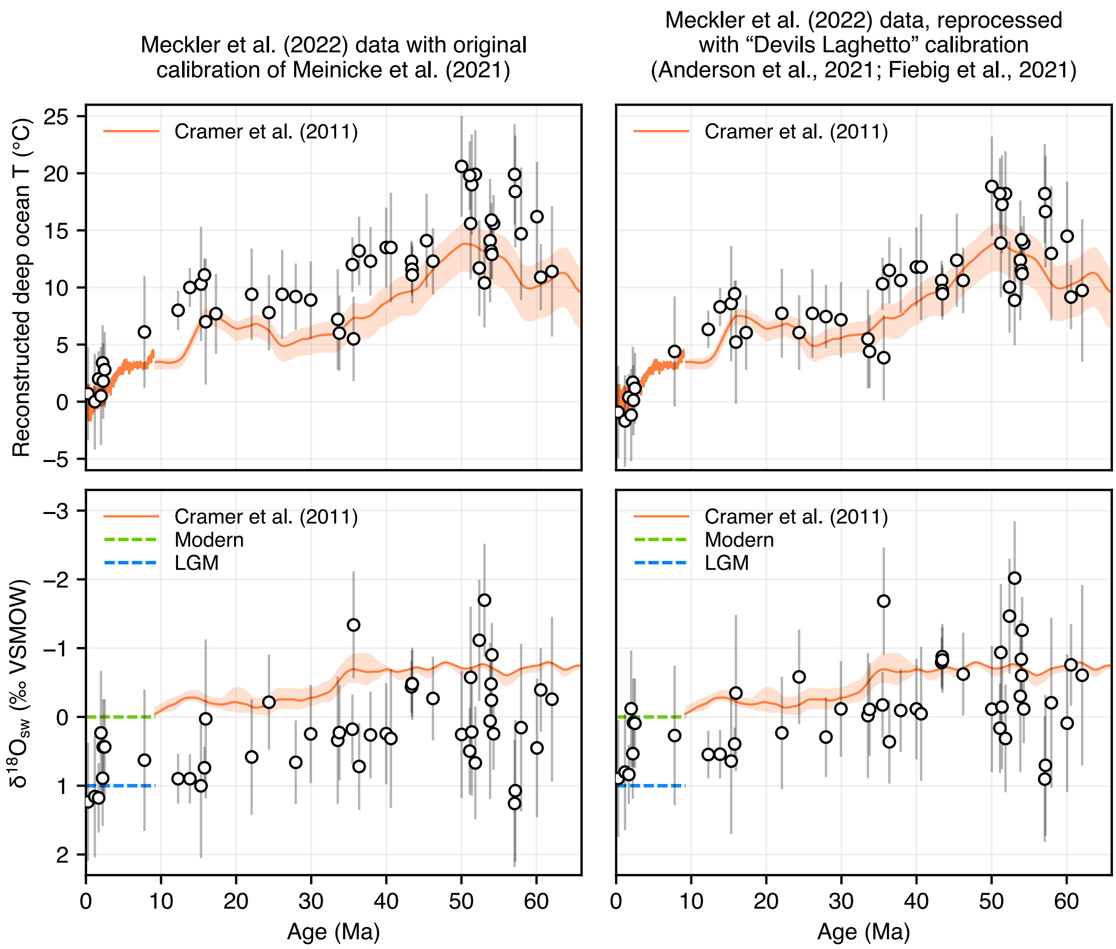

Figure S6 — A different version of fig. 16, using the Devils Laghetto calibration (eq. 4).

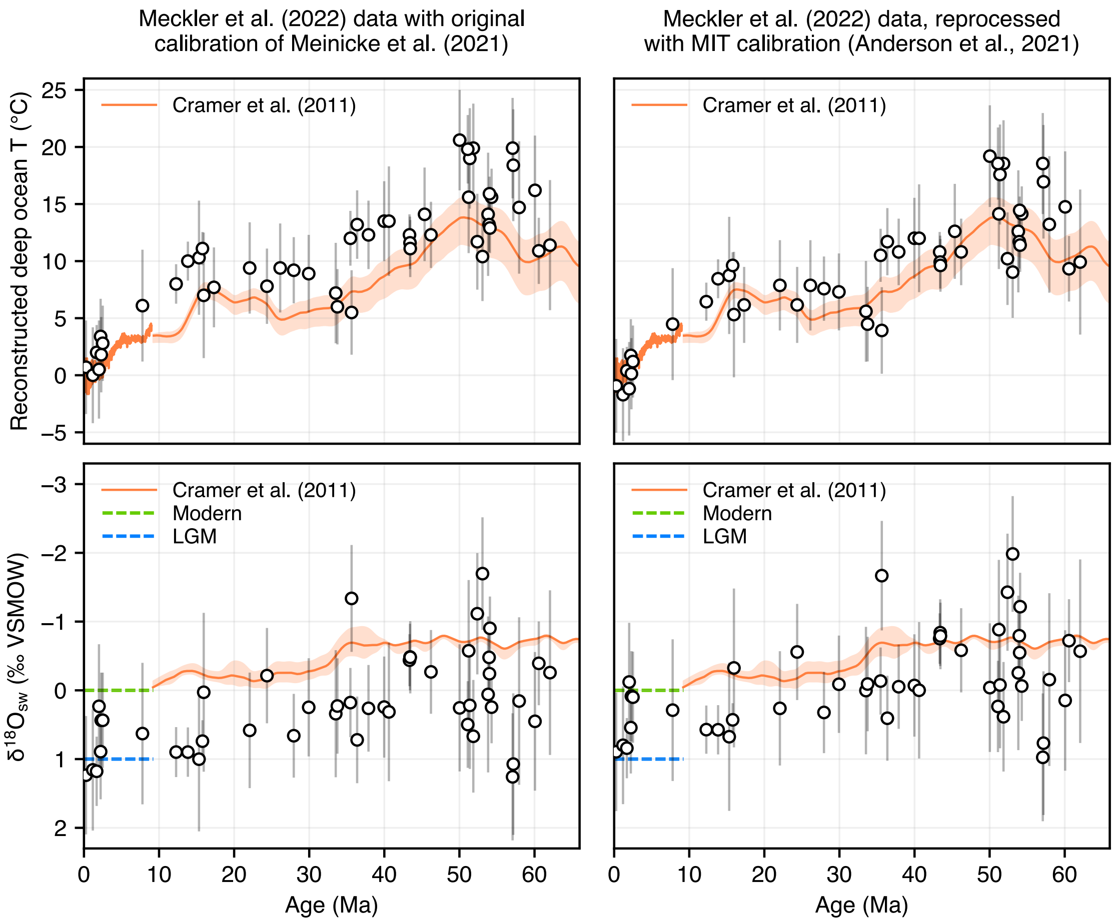

Figure S7 — A different version of fig. 16, using the MIT calibration (eq. 2). As stated in section 3.4.1, this calibration only includes the measurements performed at MIT as originally reported by *Anderson et al.* (2021). Note that fig. S3 of *Meckler et al.* (2022) uses instead the composite calibration equation published by *Anderson et al.*, which includes the whole *Peral et al.* (2018) data set (with calcification temperatures based on *Kim & O'Neil*, 1997) as well as the *Meinicke et al.* (2021) data (with temperatures based on *Shackleton*, 1974).

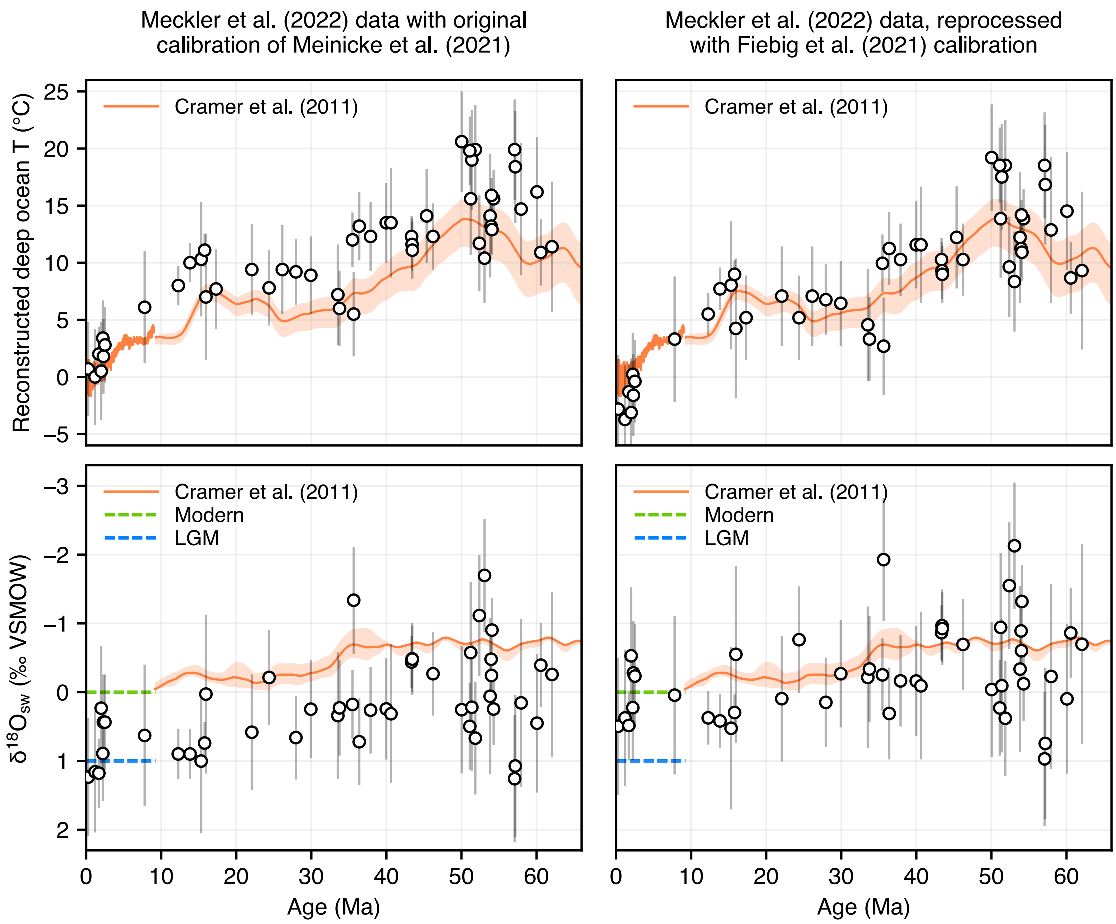

Figure S8 — A different version of fig. 16, using the *Fiebig et al.* (2021) calibration.