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*Supplement of*

# A 15-million-year surface- and subsurface-integrated $TEX_{86}$ temperature record from the eastern equatorial Atlantic

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## Content

This file contains supplemental information on GDGT depth integration for $TEX_{86}$ subsurface calibration and an alternative version of figure 9, using the original age models of the various records.

## $TEX_{86}$ subsurface calibration weights

Figure S1 and igure 7b of the main text illustrate the vertical weight distribution of the $TEX_{86}^{H}$-SubST (Kim et at., 2012), BAYSPAR-SubST (Tierney et al., 2014) and HL16-SubST (Ho and Laepple, 2016) calibrations. The relative weighting of the $TEX_{86}^{H}$-SubST and BAYSPAR-SubST calibrations are explicitly reported in the original papers. $TEX_{86}^{H}$-SubST calibration is equally weighted between 0 and 200 m water dept (Kim et at., 2012) and the BAYSPAR-SubST calibration is weighted by a gamma distribution with a=4.5 and b=15 (Tierney et al., 2015).

The weighting of the HL16-SubST calibration is here determined from the probability distribution in the calibration ensemble (Ho and Laepple, 2016; Supplementary Information .xlsx). The ensemble consists of 95 calibrations targeting various unequal depth intervals between 0 and 1000 m. We defined 20 equal bins of 50 m (see table below) and determined the frequency of each interval in the calibration ensemble. The calibration weight per bin was obtained by weighting the probability distribution ("% calibration" in Ho and Laepple, 2016) of each calibration by the size of the integrated interval and subsequent scaling to the vertical frequency distribution.

**Table S1. Vertical distribution of $TEX_{86}$-SubST calibration weights.**

| Bin | Calibration weight |
|---|---|
| 0-50 m | 0.0252 |
| 50-100 m | 0.0531 |
| 100-150 m | 0.0881 |
| 150-200 m | 0.1231 |
| 200-250 m | 0.1370 |
| 250-300 m | 0.1280 |
| 300-350 m | 0.1005 |
| 350-400 m | 0.0850 |
| 400-450 m | 0.0691 |
| 450-500 m | 0.0533 |
| 500-550 m | 0.0418 |
| 550-600 m | 0.0316 |
| 600-650 m | 0.0230 |
| 650-700 m | 0.0158 |
| 700-750 m | 0.0104 |
| 750-800 m | 0.0066 |
| 800-850 m | 0.0040 |
| 850-900 m | 0.0024 |
| 900-950 m | 0.0014 |
| 950-1000 m | 0.0006 |

Note that Ho and Laepple (2016) endorse subsampling of the calibration ensemble, which affects the relative weight distribution. In this paper, however, we only consider the full calibration ensemble. The obtained probability distribution is representative for both the full calibration ensemble, and the mean calibration (T=40.8*TEX86H+22.3).

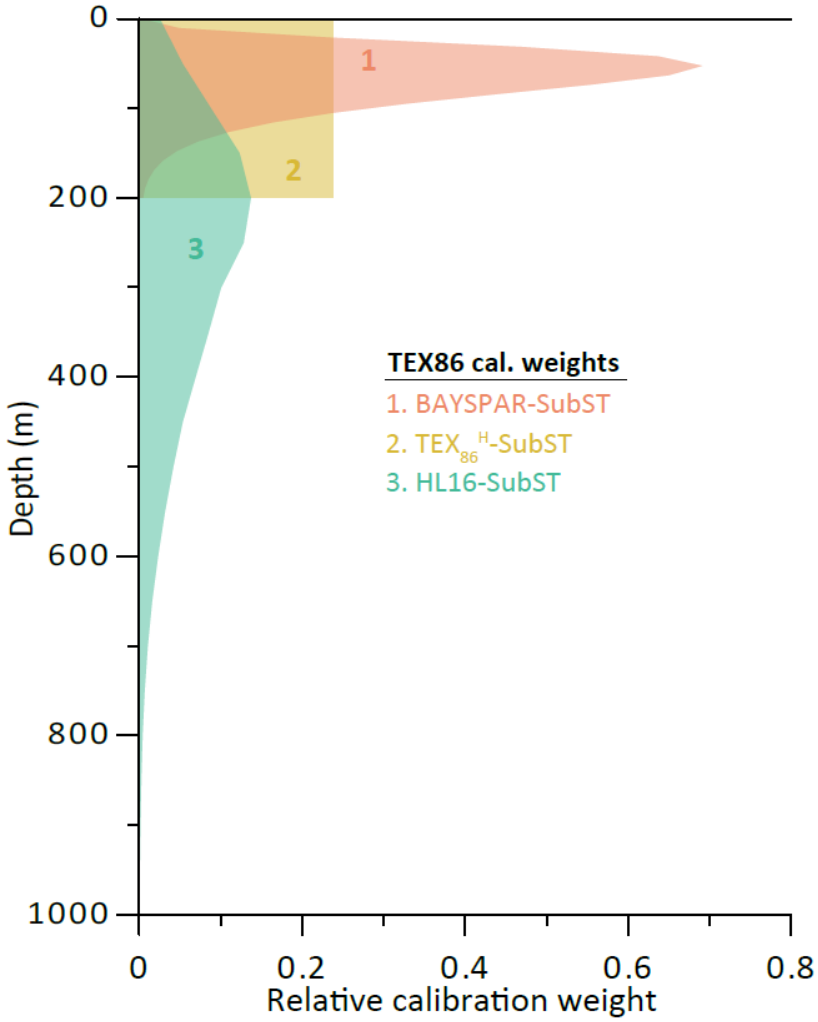


**Figure S1. Vertical distribution of $TEX_{86}$-SubST calibration weights.**

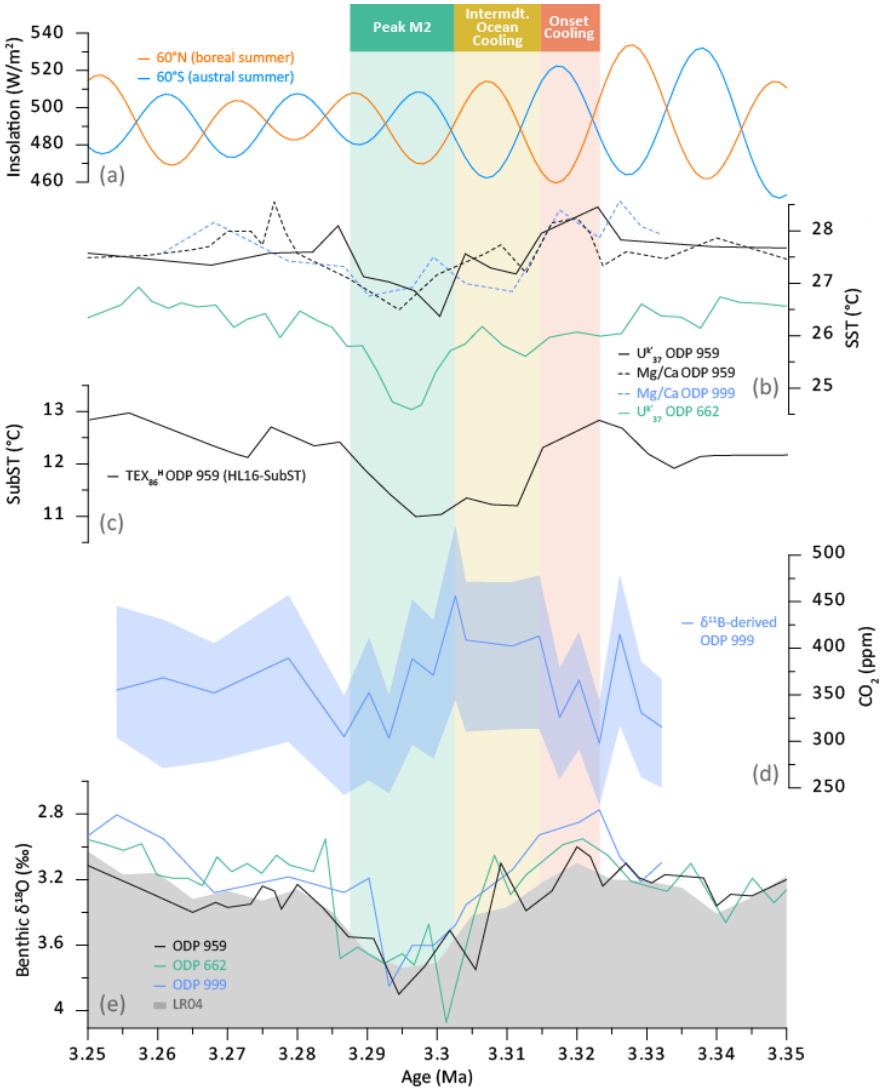


**Figure S2. Same as figure 9 of main text, but data on original age models: Site 959 (van der Weijst et al., 2020), 662 (Lisiecki and Raymo, 2005) and 999 (de la Vega et al., 2020).**

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