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SUPPLEMENTARY INFORMATION

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# Late Miocene global cooling and the rise of modern ecosystems

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Table S1 reports information relevant to site location, sampling resolution and references to sources of original $U^{k'}_{37}$ measurements.

Table S2 reports $U^{k'}_{37}$ data for each site represented in Figure 2, primary sampling information, age determination along with estimated age uncertainty, conversion of to SST $U^{k'}_{37}$ according to two reference calibrations (refs), and SST anomalies both with respect to unfixed geographic location and after correcting for plate motion over time.

Table S3 provides age-depth control points used at Sites 594, 722, 846, 982, 1085, 1088, 1125, and 1208, the nature of these control points, and the parameters input to the Bacon age modeling program[49] for each site.

Table S4 reports site location as a function of age after plate tectonic backtracking

Table S5 reports stacked SST as a function of age shown in Figure 3

SI electronic document: Matlab code used to interpolate modern SST from the SST grid taken from the Levitus World Ocean Atlas database.

**SI Figure 1**: 6$^{th}$ order polynomial fit to all SST data at 10 Ma plus polar ocean imposed temperature anomaly (circles represent alkenone-derived SST anomalies with reference to the present day and squares represent the imposed polar ocean temperature constraint).

**SI Figure 2:** 3$^{rd}$ order polynomial fit to SST data at 10 Ma with piecewise fit to polar ocean constraints.

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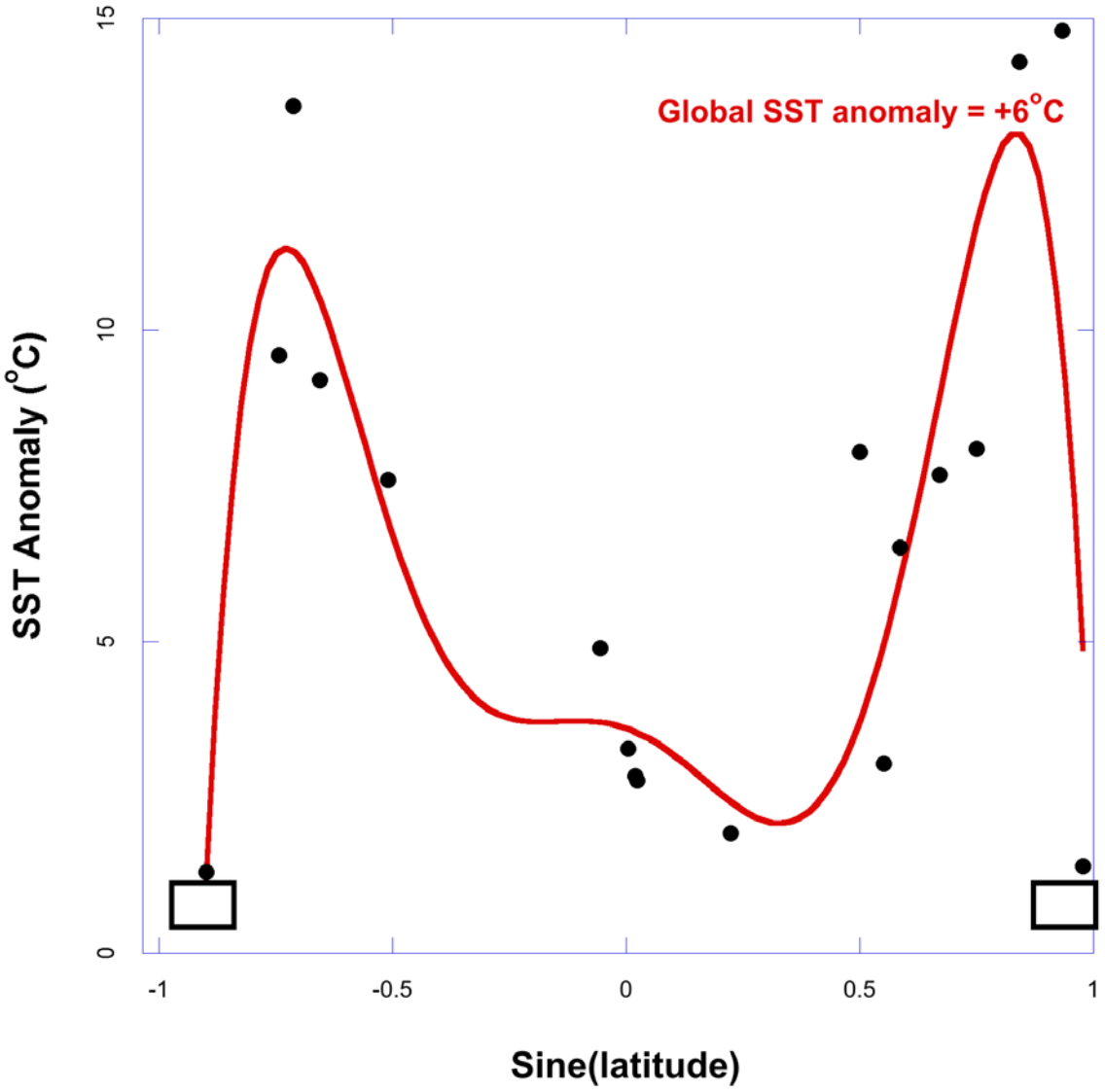
**S1**



S2