



Supplement of

Middle to late Holocene cooling and increased zonal asymmetry in the mid-latitude North Atlantic

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Table S1: SST-alk from previously published studies.

GGC 19, GGC 26, GGC30	(Sachs, 2007)
MD95-2015	(Marchal et al., 2002)
MD95-2042	(Darfeuil et al., 2016)
GeoB6518-1, GeoB1023-5	(Schefuß et al., 2005)
ODP 976	(Martrat et al., 2014)
ODP 658	(Zhao et al., 1995)
ODP U1313	(Naafs et al., 2013)
ODP 1304, 1308	This study

Table S2: Radiocarbon Dates and Age control points for ODP U1304 and U1308;

Hole-Core-Section	Depth, mbsf	Species	14C years	Calendar years (calculated from Matlab Undatable) median
1304B_1_1_2-3	2	G. bulloides	645	102 ($\pm 1\sigma$ 0 – 140)
1304B_1_2_18-19	168	G. bulloides	6540	6815 ($\pm 1\sigma$ 6734 – 6894)
1304B_1_2_22-23	172	G. bulloides	5700	5901 ($\pm 1\sigma$ 5830 – 5986)
1304B_1_2_52-53	202	G. bulloides	7665	7940 ($\pm 1\sigma$ 7870 – 8005)
1304B_1_3_29	329	G. bulloides	9685	10580 ($\pm 1\sigma$ 10325 – 10504)
1304B_1_3_87-88	387	Tephra/AZ1		12100 (Hodell et al., 2010)
1304B_1_3_129-130	428	Heinrich 1		13915 (Hodell et al., 2017))
1308B_1_1_3	3	G. bulloides	2155	1567 ($\pm 1\sigma$ 1498 – 1640)
1308B_1_1_37	37	G. bulloides	7430	7707 ($\pm 1\sigma$ 7640 – 7776)
1308B_1_1_64.5-65	64.5	Tephra/AZ1		12100
1308B_1_1_84.5-75	84.5	Heinrich 1		13915 (Hodell et al., 2017))

Table S3: Downcore and Coretop SST-alk used to calculate Δ SST-alk, Unit: $^{\circ}\text{C}$

	0-2 ka	6-8 ka	Δ SST
U1304	10.31	11.96	-1.65
U1308	13.63	13.67	-0.04
U1313 - coretop (SU90-09) Conte et al, 2006	17.21	19.47	-2.26
GGC-26	9.13	12.55	3.43
GGC-19	14.90	17.98	3.07
MD95-2042	19.00	19.69	0.69
ODP976	18.04	18.87	0.83
MD95-2015	11.45	12.17	0.72
ODP658	20.47	20.89	0.42

Figure S1. Seasonality of SST-alk. Color shading represents the offset between productivity-weighted SST and annual mean SST. Circles indicate the offset between core-top SST-alk and annual mean SST. Coretop alkenone measurements are from (Méheust et al., 2013; Tierney & Tingley, 2018).

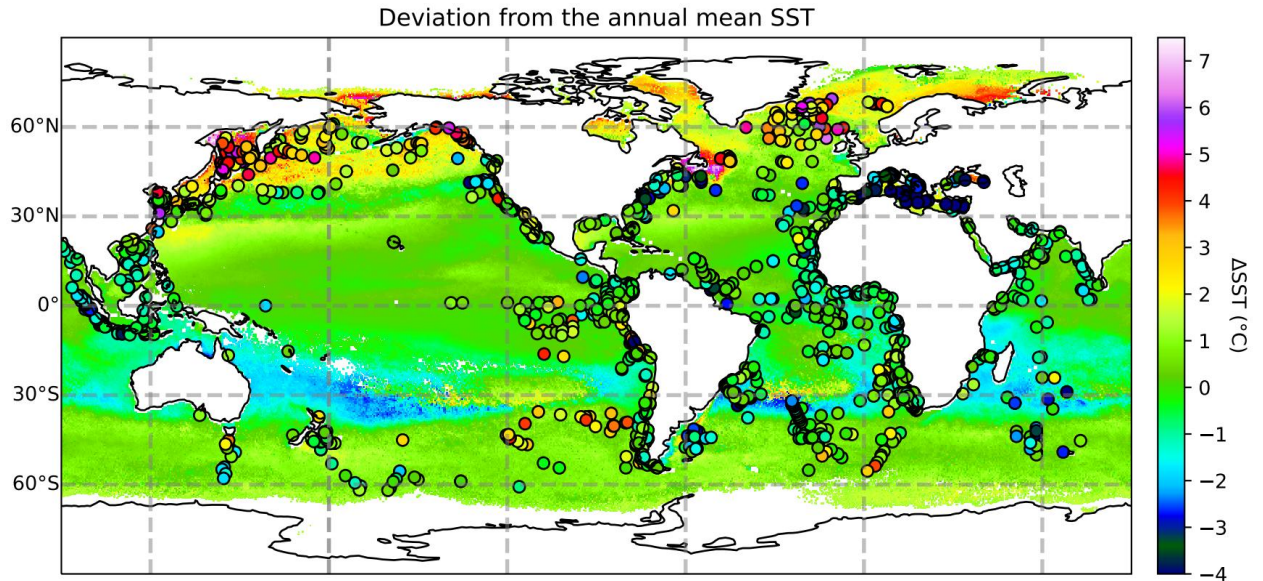


Figure S2: Calibrating alkenone measurements from core tops in the high-latitude North Atlantic and North Pacific ($>40^{\circ}\text{N}$) against productivity-weighted SST reduces offsets from culture-based calibrations.

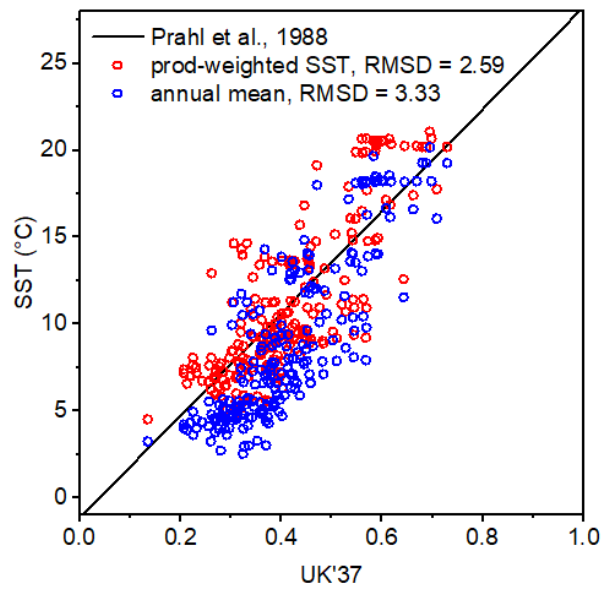


Figure S3. model-data comparison of Δ SST between two time slices (6-8 ka minus 0-2 ka). Blue numbers: Δ SST-alk. Color shading: (a) changes in summer temperature in TraCE-21K, (b) changes in summer temperature in TraCE-21K-II, (c) changes in annual mean temperature in TraCE-21K-II.

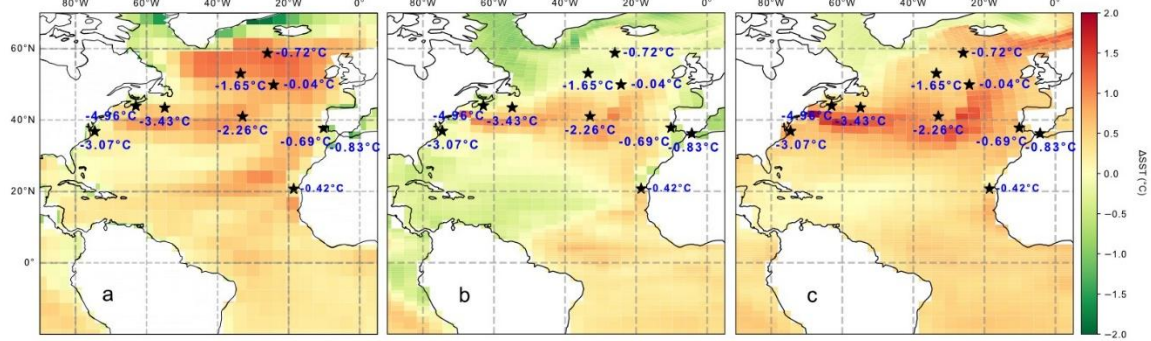


Figure S5. (a) wind-stress-curl during 0-2 ka in the trace model; (b) changes in wind-stress-curl between (6-8 ka) and (0-2 ka).

