Supplement for

Divergent estimates of Miocene to Pleistocene upper ocean temperatures in the South Atlantic Ocean from alkenone and coccolith clumped isotope proxies

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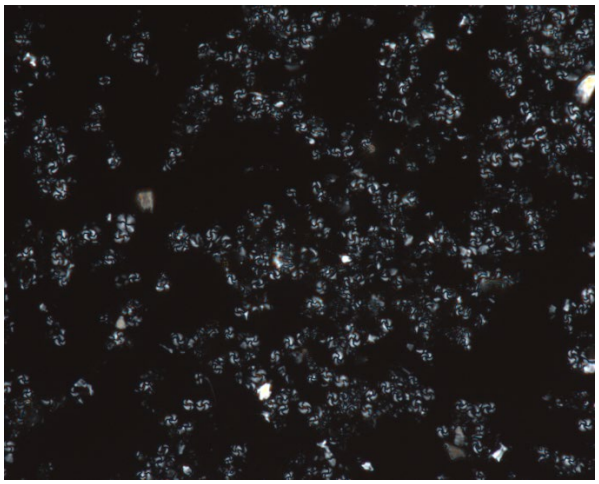
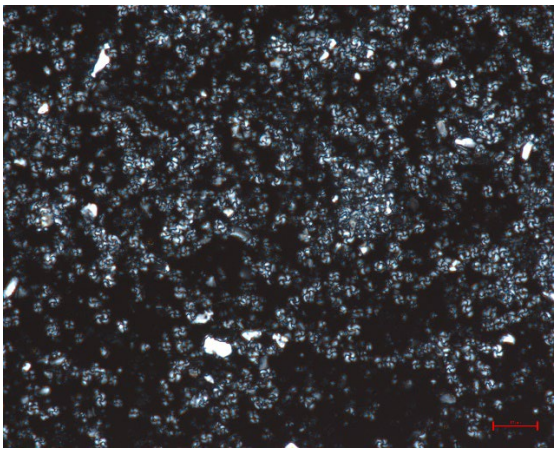
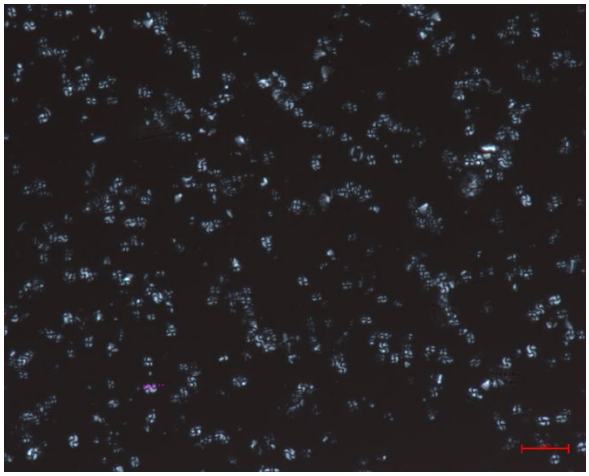
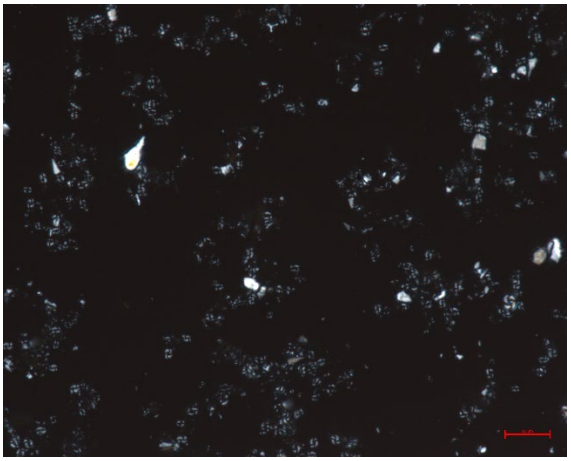
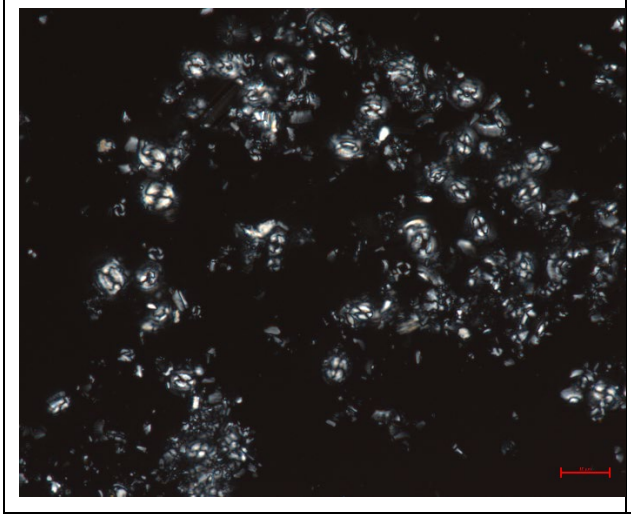
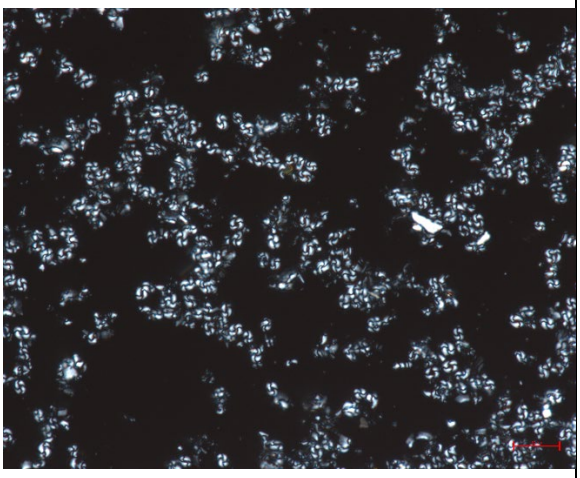
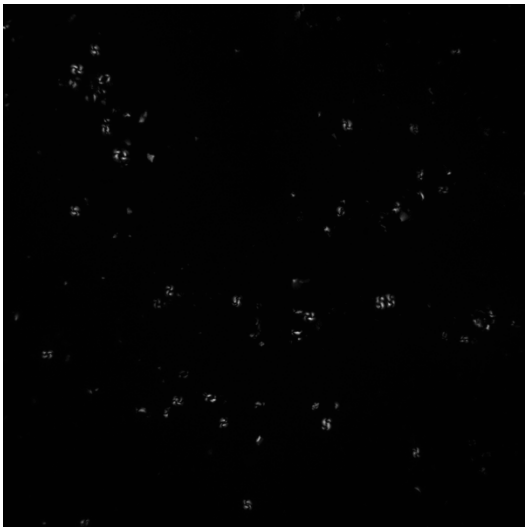
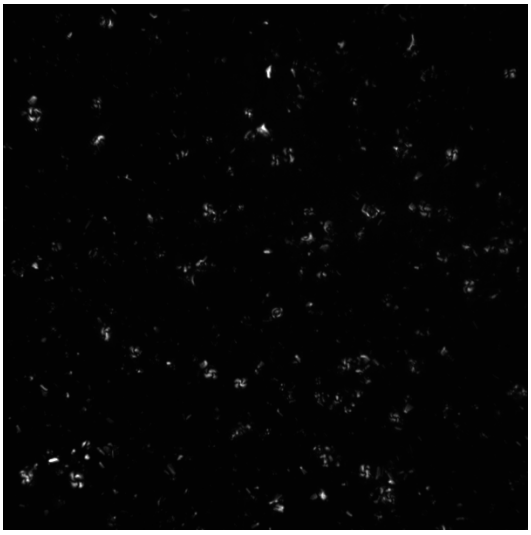
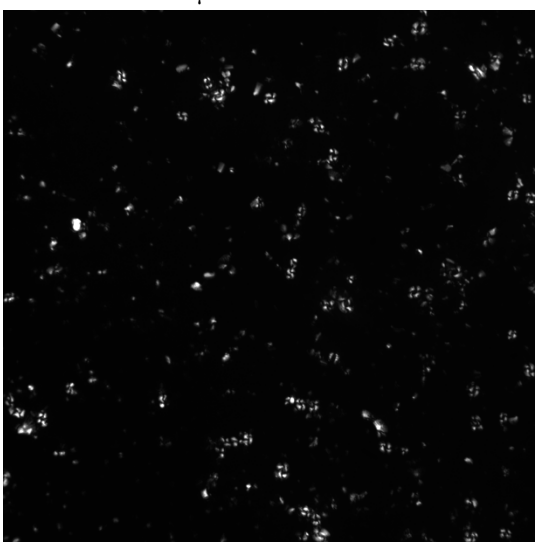
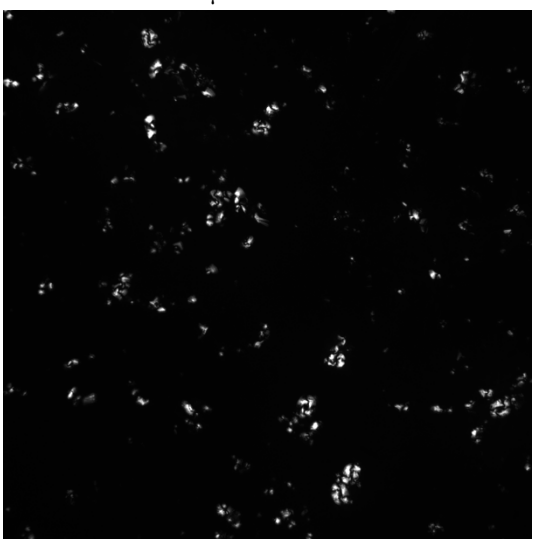
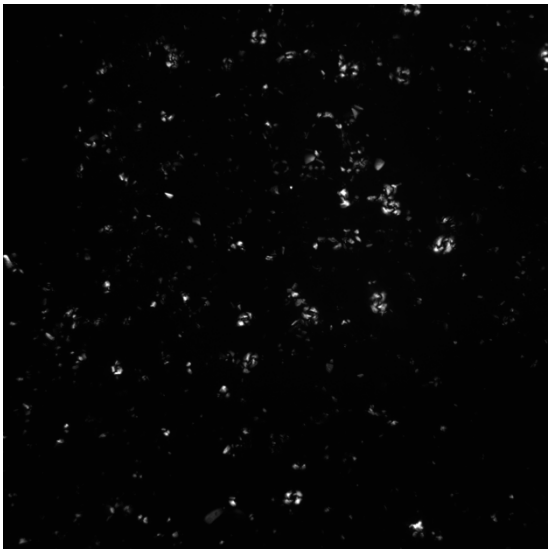
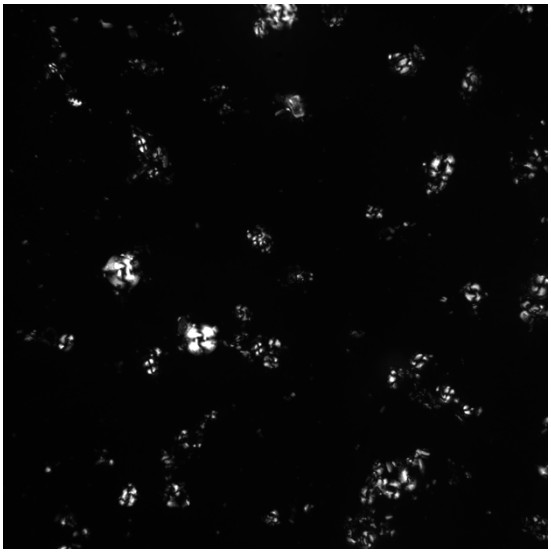
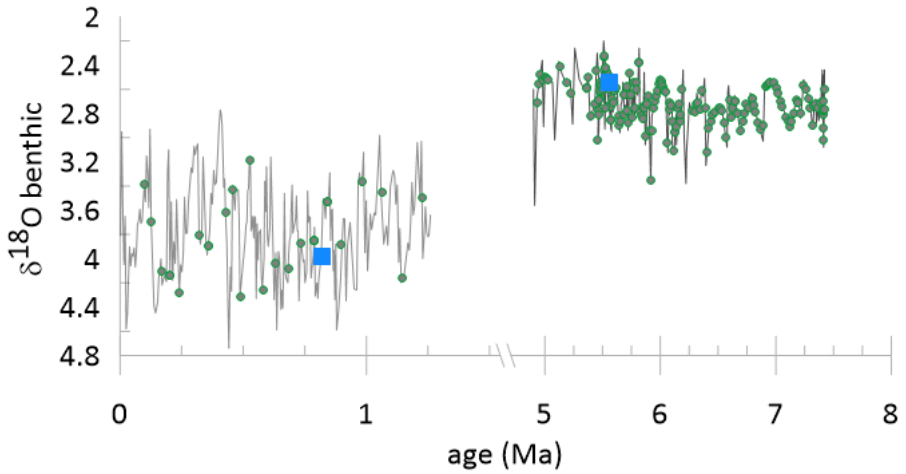
Supplementary Figure S1. Polarized light microscopy images of the separated coccoliths from Site 1090. Scale bar is 10 µm.

1090D 2h4 39-40 	1090D2h4 57-58 
1090D 3h4 56-57 	1090D 3h5 41-42 
1090D 6h4 37-39 	1090E 6h3 15-17 

1088B 4h1 67.5 2-5µm 	1088B 6h1 81 2-5µm 
1088B 9h6 22 2-5µm 	1088B 13h1 75 2-5µm 
1088C 13h7 10 2-5µm 	1088C 13h7 10 6-9µm 

Supplementary Figure S2(preceding page). Polarized light microscopy images of the separated coccoliths from Site 1088. Each image has dimensions of 131x131 µm.



Supplementary Figure S2. For Site 1088, position of samples for Δ47 coccolith (blue squares) and for Uk'37 (green circles) relative to glacial-interglacial variability as manifest in benthic d18O from the Pleistocene(Hodell et al., 2003) and Late Miocene (Billups et al., 2008).

Supplementary Table 1. Coccolith assemblages and Δ_{47} temperature results from Site 1088.

Leg	Site/Hole	Core	Sect	Half	Interval Top cm	Interval Bottom cm	mcd top (m)	mcd bottom (m)	Age Ma	Coccolith fraction analysed	Coccolith assemblage composition in analyzed fraction	oxidation	Δ47 cocco. Temp (°C) (Clark calib)	68%ci from D47 mean (°C)
177	1088B	2H	4	W	4	5	10.0	10.1	0.82	2b	very small reticulofenestrids (<3 µm) (mainly *Gephyrocapsa spp.*)	5h	4.6	1.8
177	1088B	2H	4	W	4	5	10.0	10.1	0.82	2b	very small reticulofenestrids (<3 µm) (mainly *Gephyrocapsa spp.*)	overnight	6.8	1.8
177	1088B	4H	1	W	67.5	68.5	25.2	25.2	2.77	2b	very small (<3 µm) and medium (3-5 µm) reticulofenestrids (*mainly Reticulofenestra spp.*)	5h	8.4	1.6
177	1088B	4H	1	W	67.5	68.5	25.2	25.2	2.77	2b	Small and medium (2-5 µm) reticulofenestrids (*mainly Reticulofenestra spp.*)	overnight	8.4	2.0
177	1088B	5H	1	W	117	118	35.2	35.2	3.76	2b	Dominated by medium (3-5 µm) reticulofenestrids (*Reticulofenestra* spp.), smaller contributions from large *Reticulofenestra* , *Coccolithus pelagicus* , *Calcidiscus leptoporus, Helicosphaera carteri.*	5h	10.0	2.4
177	1088B	5H	1	W	117	118	35.2	35.2	3.76	2b	Dominated by medium (3-5 µm) reticulofenestrids (*Reticulofenestra* spp.), smaller contributions from *Coccolithus pelagicus* , *Calcidiscus leptoporus, Helicosphaera carteri.*	overnight	9.7	1.7
177	1088B	6H	6	W	81	82	51.8	51.8	5.56	2b	Small (<3 µm), Medium (3-5 µm) and large (5-7 µm) reticulofenestrids (Reticulofenestra spp.). V. minor contributions from *C. pelagicus* and *C. leptoporus.*	5h	7.6	1.6
177	1088B	9H	6	W	22	23	79.7	79.7	7.72	2b	Small (<3 µm) and Medium (3-5 µm) reticulofenestrids (Reticulofenestra spp.). Minor contributions from and large (5-7 µm) reticulofenestrids, *C. pelagicus,* and *C. leptoporus.*	5h	10.7	2.1
177	1088B	13H	1	W	75	76	110.8	110.8	9.53	2b	Medium (3-5 µm) and large (5-7 µm) reticulofenestrids (Reticulofenestra spp.), minor contributions from *C. pelagicus* and *C. leptoporus* .	5h	9.2	1.1
177	1088C	5H	5	W	76	77	157.7	157.7	10.73	2b	Medium (3-5 µm) and large (5-7 µm) reticulofenestrids (Reticulofenestra spp.)	5h	11.8	2.6
177	1088C	11X	4	W	10	11	207.1	207.2	12.67	2b	Medium (3-5 µm) and large (5-7 µm) reticulofenestrids (Reticulofenestra spp.)	5h	10.3	1.4
177	1088C	13X	7	W	10	11	230.9	231.0	14.82	2b	Medium (3-5 µm) reticulofenestrids (Reticulofenestra spp.), minor contributions from *C. pelagicus*	5h	14.6	1.9
177	1088C	13X	7	W	10	11	230.9	231.0	14.82	4b	Medium (3-5 µm) and large (5-10 µm) reticulofenestrids (Reticulofenestra spp., *Cyclicargolithus floridanus*), common *C. pelagicus* and *Helicosphaera carteri.*	5h	15.6	1.2
177	1088C	13X	7	W	10	11	230.9	231.0	14.82	4b	Medium (3-5 µm) and large (5-10 µm) reticulofenestrids (Reticulofenestra spp., *Cyclicargolithus floridanus*), common *C. pelagicus* and *Helicosphaera carteri.*	overnight	18.6	1.1

Supplementary Table 2. Coccolith assemblages and Δ_{47} temperature results from Site 1090.

Site/Hole	Core	Section	Top	Bottom	Age (ka)	Size fraction analyzed	Coccolith assemblage composition in analyzed fraction	detrital carbonate	Δ47 coccolith temperature (Clark calibration) (ºC)	68% clumped uncert (ºC)
1090D	2	4	39	40	473.66	<5 µm	very small (<3 µm) and medium (3-5 µm) reticulofenestrids (mainly *Gephyrocapsa spp.*)	<5% of carbonate	6.99	0.54
1090D	2	4	57	58	477.40	<5 µm	very small (<3 µm) and medium (3-5 µm) reticulofenestrids (mainly *Gephyrocapsa spp.*)	<5% of carbonate	9.32	1.53
1090D	3	4	56	57	784.67	<8 µm	very small reticulofenestrids (<3 µm) (mainly *Gephyrocapsa spp.*)	negligible	4.91	1.82
1090D	3	5	41	42	807.18	<5 µm	very small reticulofenestrids (<3 µm) (mainly *Gephyrocapsa spp.*)	5 to 10% of carbonate	8.07	1.19
1090D	6	4	37	39	2697.50	<10 µm	dominantly *Coccolithus pelagicus* with more minor contributions from *Calcidiscus leptoporus* and medium reticulofenestrids (mainly *Reticulofenestra spp.*).	negligible	8.47	1.48
1090E	6	3	15	17	2970.66	<8 µm	Dominated by very small (<3 µm) and medium (3-5 µm) reticulofenestrids (*mainly Reticuofenestra spp.*); contribution from *C. pelagicus (~10%)*	negligible	5.17	1.02

Billups, K., Kelly, C., and Pierce, E.: The late Miocene to early Pliocene climate transition in the Southern Ocean, Palaeogeography, Palaeoclimatology, Palaeoecology, 267, 31-40, 2008.

Hodell, D. A., Charles, C. D., Curtis, J. H., Mortyn, P. G., Ninnemann, U. S., and Venz, K. A.: Data report: Oxygen isotope stratigraphy of ODP Leg 177 Sites 1088, 1089, 1090, 1093, and 1094, Proc. Ocean Drill. Program Sci. Results, 1-26,