



Supplement of

Pliocene evolution of the tropical Atlantic thermocline depth

Carolien M. H. van der Weijst et al.

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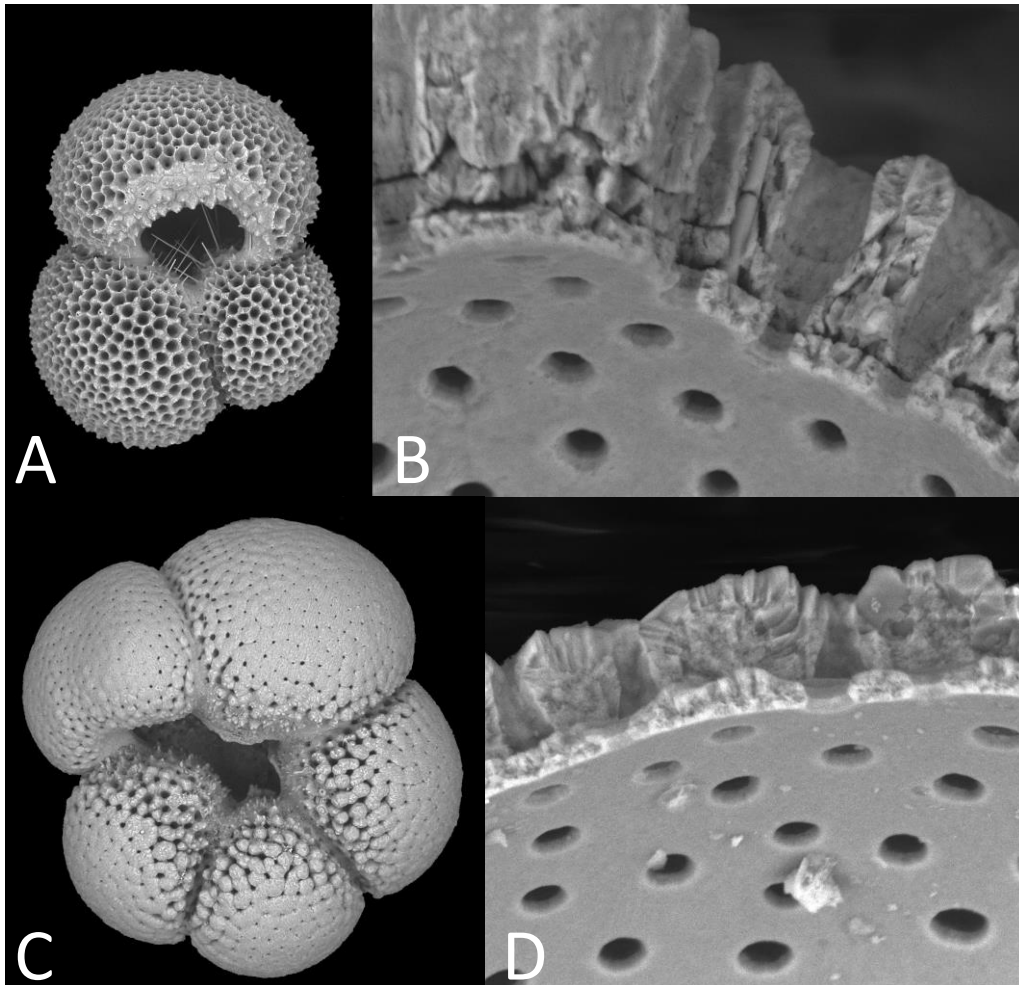


Figure S1. Scanning Electron Microscope pictures of *G. ruber* (panel A and B; sample ODP959C 6H-4, 19-21) and *N. dutertrei* (panel C and D; sample ODP959C 6H-2, 102-104) tests from the late Pliocene interval of ODP Site 959. Whole test photographs taken at 250 \times magnification and cross sections at 2500 \times .

ODP Code	Depth (rMCD; Vallé et al., 2016)	Age (ka; van der Weijst et al., 2020)	<i>G. ruber</i> $\delta^{18}\text{O}$ (‰)	<i>G. ruber</i> $\delta^{13}\text{C}$ (‰)	<i>N. dutertrei</i> $\delta^{18}\text{O}$ (‰)	<i>N. dutertrei</i> $\delta^{13}\text{C}$ (‰)
ODP9595C 5H-2, 77-79	35.77	2799.3	-1.38	1.70		
ODP9595C 5H-2, 97-99	35.97	2810.7	-1.49	1.11	-0.74	1.45
ODP9595C 5H-2, 117-119	36.17	2822.0	-1.72	1.24	-1.05	1.39
ODP9595C 5H-2, 137-139	36.37	2832.3			-1.06	0.53
ODP9595C 5H-3, 7-9	36.58	2840.4	-1.91	1.64	-0.50	1.25
ODP9595C 5H-3, 27-29	36.78	2848.1	-1.53	1.19	-0.78	1.29
ODP9595C 5H-3, 47-49	36.98	2856.3	-1.57	1.30	-0.74	1.20
ODP9595C 5H-3, 67-69	37.18	2864.6	-1.92	1.76	-0.87	1.34
ODP9595C 5H-3, 87-89	37.38	2872.9	-1.78	1.73	-0.93	1.25
ODP9595C 5H-3, 107-109	37.58	2881.3	-1.77	1.40	-0.76	1.12
ODP9595C 5H-3, 127-129	37.77	2889.5	-1.67	1.45	-0.74	1.35
ODP9595C 5H-3, 147-149	37.96	2899.2	-1.83	1.04	-0.88	1.24
ODP9595C 5H-4, 2-4	38.00	2901.5	-1.84	1.68		
ODP9595C 5H-4, 27-29	38.24	2915.3	-1.42	0.80	-0.74	1.23
ODP9595C 5H-4, 47-49	38.42	2925.6			-0.77	0.79
ODP9595C 5H-4, 67-69	38.58	2934.5	-1.95	1.71	-0.54	1.07
ODP9595C 5H-4, 107-109	38.91	2951.4	-1.48	1.91	-0.48	1.35
ODP9595C 5H-4, 147-149	39.29	2971.8	-1.87	1.59	-0.76	1.15
ODP9595C 5H-5, 47-49	39.88	3006.8	-1.11	1.00	-0.84	0.80
ODP9595C 5H-5, 67-69	40.11	3018.3	-1.56	1.70		
ODP9595C 5H-5, 87-89	40.30	3027.6	-1.59	1.00	-0.90	0.98
ODP9595C 5H-5, 107-109	40.50	3038.3	-1.94	1.24	-1.02	0.97
ODP9595C 5H-5, 127-129	40.70	3049.3			-0.81	0.64
ODP9595C 5H-5, 147-149	40.9	3060.3			-1.27	0.93
ODP9595C 5H-6, 27-29	41.20	3076.9	-1.94	1.64	-0.95	1.03
ODP9595C 5H-6, 32-34	41.25	3079.6	-1.86	1.49	-0.98	0.86
ODP9595C 5H-6, 47-49	41.40	3087.9	-1.66	1.79	-1.16	0.76
ODP9595C 5H-6, 52-54	41.45	3090.7	-1.67	1.69	-0.91	0.91
ODP9595C 5H-6, 67-69	41.61	3099.5	-2.30	1.02	-0.82	1.19
ODP9595C 5H-6, 87-89	41.81	3111.5	-2.21	1.60	-1.19	0.34
ODP9595C 5H-6, 107-109	42.01	3124.6	-1.73	1.42		
ODP9595C 5H-6, 127-129	42.21	3136.6	-1.73	1.12	-0.83	1.03
ODP9595C 5H-6, 147-149	42.41	3144.6	-1.24	0.86	-0.89	0.34
ODP9595C 5H-7, 7-9	42.52	3149.0	-1.42	1.05	-0.80	0.56
ODP9595C 5H-7, 12-14	42.57	3151.0	-1.83	1.42	-1.03	0.84
ODP9595C 5H-7, 22-24	42.67	3155.0	-2.15	1.62	-1.39	0.30
ODP9595C 5H-7, 27-29	42.72	3157.0	-2.21	2.05	-1.11	0.68
ODP9595C 5H-7, 37-39	42.83	3161.3	-1.75	1.56		
ODP9595C 5H-7, 40-42	42.84	3161.7	-1.77	1.59	-0.45	1.23
ODP9595C 5H-7, 47-49	42.93	3165.2	-1.93	1.28	-0.53	1.03
ODP9595C 5H-7, 62-64	43.07	3170.7	-1.85	1.72		

ODP9595C 6H-1, 7-9	43.11	3172.3	-1.69	1.54	-0.66	1.01
ODP9595C 6H-1, 12-14	43.16	3174.3	-1.67	1.62	-0.70	1.11
ODP9595C 6H-1, 22-24	43.26	3178.2	-1.68	1.56	-0.90	1.09
ODP9595C 6H-1, 37-39	43.41	3184.1	-1.61	1.50	-0.60	1.30
ODP9595C 6H-1, 42-44	43.46	3186.1	-1.91	2.14	-0.44	1.33
ODP9595C 6H-1, 47-49	43.51	3188.0	-1.84	1.66	-0.50	1.32
ODP9595C 6H-1, 57-59	43.61	3192.1	-2.19	1.65	-0.64	1.22
ODP9595C 6H-1, 60-62	43.63	3192.9	-1.60	2.03	-0.49	1.35
ODP9595C 6H-1, 62-64	43.66	3194.1	-1.62	2.09	-0.49	1.21
ODP9595C 6H-1, 67-69	43.71	3196.2	-1.46	1.99	-0.58	1.14
ODP9595C 6H-1, 82-84	43.86	3202.4	-1.71	1.86	-0.71	1.24
ODP9595C 6H-1, 102-104	44.06	3210.6	-1.65	1.88	-0.35	1.12
ODP9595C 6H-1, 107-109	44.11	3212.6	-1.66	1.74	-0.44	1.25
ODP9595C 6H-1, 117-119	44.21	3216.8	-1.29	2.13	-0.56	1.09
ODP9595C 6H-1, 122-124	44.26	3218.8	-1.90	1.86	-0.55	1.27
ODP9595C 6H-1, 127-129	44.31	3220.9	-1.58	1.50		
ODP9595C 6H-1, 132-134	44.36	3222.9	-1.48	1.99		
ODP9595C 6H-1, 142-144	44.46	3227.9			-0.61	1.27
ODP9595C 6H-2, 7-9	44.61	3236.4	-1.76	1.48	-0.64	1.04
ODP9595C 6H-2, 12-14	44.66	3239.3	-1.94	1.88	-0.59	1.09
ODP9595C 6H-2, 17-19	44.71	3242.1			-0.24	1.05
ODP9595C 6H-2, 22-24	44.76	3245.0	-1.93	1.65	-0.24	1.26
ODP9595C 6H-2, 32-34	44.86	3258.3	-1.84	1.75	-0.75	0.89
ODP9595C 6H-2, 37-39	44.91	3265.0	-1.67	1.61	-0.52	1.22
ODP9595C 6H-2, 45-47	44.98	3267.3	-1.75	1.39	-0.48	1.13
ODP9595C 6H-2, 52-54	45.06	3270.0	-1.60	1.81	-0.68	1.15
ODP9595C 6H-2, 60-62	45.16	3273.3	-1.67	1.44	-0.43	1.20
ODP9595C 6H-2, 62-64	45.21	3275.0	-1.75	1.61	-0.10	1.12
ODP9595C 6H-2, 67-69	45.26	3276.7	-1.90	1.84	-0.45	1.30
ODP9595C 6H-2, 77-79	45.31	3278.3	-1.71	1.79	-0.72	1.07
ODP9595C 6H-2, 82-84	45.36	3280.0	-1.65	1.58	-0.27	1.40
ODP9595C 6H-2, 92-94	45.46	3287.3	-1.45	1.53	-0.50	0.99
ODP9595C 6H-2, 102-104	45.56	3294.5	-1.53	1.19		
ODP9595C 6H-2, 107-109	45.61	3298.2	-1.43	1.20		
ODP9595C 6H-2, 112-114	45.66	3301.8	-1.59	1.56	-0.27	0.76
ODP9595C 6H-2, 117-119	45.71	3305.5	-1.55	1.25		
ODP9595C 6H-2, 120-122	45.73	3306.9	-1.58	1.23	-0.30	0.90
ODP9595C 6H-2, 122-124	45.76	3309.1	-2.18	1.46	-0.63	0.90
ODP9595C 6H-2, 127-129	45.81	3312.7	-1.82	1.48	-0.26	0.95
ODP9595C 6H-2, 132-134	45.86	3316.4	-1.96	1.67	-0.19	1.12
ODP9595C 6H-2, 137-139	45.91	3320.0	-1.76	1.64	-0.40	1.19
ODP9595C 6H-2, 142-144	45.96	3321.9	-1.84	1.41	-0.45	1.04
ODP9595C 6H-2, 147-149	46.01	3323.7	-1.54	1.29	-0.71	0.75
ODP9595C 6H-3, 6-8	46.10	3327.0	-1.78	1.68	-0.55	0.95

ODP9595C 6H-3, 21-23	46.25	3332.6	-1.82	1.39	-0.12	1.17
ODP9595C 6H-3, 41-43	46.45	3340.0	-1.69	0.97	-0.77	1.02
ODP9595C 6H-3, 61-63	46.65	3360.0	-1.68	1.53	-0.54	0.94
ODP9595C 6H-3, 81-83	46.85	3371.4	-1.82	0.80	-0.53	0.90
ODP9595C 6H-3, 101-103	47.05	3384.5			-0.42	0.82
ODP9595C 6H-3, 121-123	47.25	3402.5	-1.80	1.37	-0.54	0.90
ODP9595C 6H-3, 141-143	47.45	3420.5	-1.81	1.31	-0.43	0.62
ODP9595C 6H-4, 19-21	47.73	3440.0	-1.95	1.65	-0.67	0.97
ODP9595C 6H-4, 24-26	47.78	3442.9	-2.09	1.64	-0.83	0.84
ODP9595C 6H-4, 29-31	47.83	3445.7	-1.91	1.74	-0.86	1.20
ODP9595C 6H-4, 30-32	47.84	3446.3	-1.80	1.66	-0.91	1.10
ODP9595C 6H-4, 59-61	48.13	3462.9	-1.87	1.34	-0.48	0.90
ODP9595C 6H-4, 79-81	48.33	3474.3	-1.81	0.83		
ODP9595C 6H-4, 99-101	48.53	3484.9	-1.99	1.41	-0.66	1.20
ODP9595C 6H-4, 119-121	48.73	3494.6	-1.87	1.50	-1.03	1.20

IODP Code	Depth (rMCD; Vallé et al., 2016)	Age (ka; van der Weijst et al., 2020)	Mg/Ca (<i>G. ruber</i> ; mmol/mol)	Mg/Ca (<i>N. dutertrei</i> ; mmol/mol)	SST (<i>G. ruber</i> ; °C)	SubST (<i>N. dutertrei</i> ; °C)
959C/5H-2/77-79	35.77	2799.8	3.17	1.97	27.0	23.1
959C/5H-2/97-99	35.97	2810.7	3.08	2.03	26.6	23.4
959C/5H-2/117-119	36.17	2822.0	3.28	2.30	27.3	25.0
959C/5H-2/137-139	36.37	2832.3	3.47	2.23	28.0	24.6
959C/5H-3/7-9	36.58	2840.4	3.16	2.05	26.9	23.6
959C/5H-3/27-29	36.78	2848.1	3.31	2.36	27.4	25.4
959C/5H-3/47-49	36.98	2856.3	3.44	2.04	27.9	23.5
959C/5H-3/67-69	37.18	2864.6	3.46	2.13	27.9	24.0
959C/5H-3/87-89	37.38	2872.9	3.47	1.99	28.0	23.2
959C/5H-3/107-109	37.58	2881.3	3.45	1.99	27.9	23.2
959C/5H-3/127-129	37.77	2889.5	3.65	2.46	28.5	25.9
959C/5H-3/147-149	37.96	2899.2	3.24	2.07	27.2	23.7
959C/5H-4/27-29	38.23	2914.7	3.07	2.12	26.6	24.0
959C/5H-4/47-49	38.42	2925.6	3.28	2.38	27.3	25.5
959C/5H-4/67-69	38.58	2934.5	3.41	1.92	27.8	22.8
959C/5H-4/107-109	38.91	2951.4	3.25	1.98	27.2	23.2
959C/5H-4/147-149	39.29	2971.8	3.41	1.97	27.8	23.1
959C/5H-5/42-44	39.83	3004.1	3.35	2.17	27.6	24.3
959C/5H-5/47-49	39.89	3007.3	3.29		27.4	
959C/5H-5/57-59	40.00	3012.9	3.40	1.99	27.7	23.2
959C/5H-5/67-69	40.11	3018.3	3.33	1.90	27.5	22.6
959C/5H-5/72-74	40.16	3020.7	3.25	2.28	27.2	24.9
959C/5H-5/87-89	40.30	3027.6	3.90	2.26	29.3	24.8
959C/5H-5/92-94	40.34	3029.5		1.58		20.3
959C/5H-5/107-109	40.50	3038.3	3.53	2.08	28.1	23.8
959C/5H-5/122-124	40.65	3046.5		1.89		22.6
959C/5H-5/127-129	40.70	3049.3	3.42	1.98	27.8	23.2
959C/5H-5/147-149	40.90	3060.3	3.51	2.40	28.1	25.6
959C/5H-6/27-29	41.20	3076.9	3.62	2.29	28.4	25.0
959C/5H-6/32-34	41.25	3079.6	3.55	2.06	28.2	23.6
959C/5H-6/47-49	41.40	3087.9	3.37	2.06	27.6	23.6
959C/5H-6/52-54	41.45	3090.7	3.41		27.8	
959C/5H-6/67-69	41.61	3099.5	3.19	2.02	27.0	23.4
959C/5H-6/87-89	41.81	3111.5	3.57	1.98	28.3	23.1
959C/5H-6/107-109	42.01	3124.6	3.42	2.06	27.8	23.6
959C/5H-6/127-129	42.21	3136.6	3.24	1.76	27.2	21.7
959C/5H-6/147-149	42.41	3144.6	3.29	2.04	27.4	23.5
959C/5H-7/7-9	42.52	3149.0	3.65	1.90	28.5	22.7
959C/5H-7/12-14	42.57	3151.0	3.54	1.97	28.2	23.1
959C/5H-7/22-24	42.67	3155.0	3.90	1.95	29.3	22.9
959C/5H-7/27-29	42.72	3157.0	3.81	2.05	29.0	23.6

959C/5H-7/37-39	42.83	3161.3	3.56	2.16	28.2	24.2
959C/5H-7/40-42	42.84	3161.7	3.77	2.03	28.9	23.5
959C/5H-7/47-49	42.93	3165.2	3.78	2.01	28.9	23.3
959C/5H-7/62-64	43.07	3170.7	3.71	2.29	28.7	25.0
959C/6H-1/7-9	43.11	3172.3	3.35	1.87	27.6	22.4
959C/6H-1/12-14	43.16	3174.3	3.56	1.91	28.2	22.7
959C/6H-1/22-24	43.26	3178.2	3.42	1.72	27.8	21.4
959C/6H-1/37-39	43.41	3184.1	3.65	2.02	28.5	23.4
959C/6H-1/42-44	43.46	3186.1	3.25	2.21	27.2	24.5
959C/6H-1/47-49	43.51	3188.0	3.48	1.90	28.0	22.6
959C/6H-1/57-59	43.61	3192.1	3.51	1.87	28.1	22.4
959C/6H-1/60-62	43.63	3192.9	3.66	2.05	28.6	23.6
959C/6H-1/62-64	43.66	3194.1	3.58	1.90	28.3	22.6
959C/6H-1/67-69	43.71	3196.2	3.15	1.99	26.9	23.2
959C/6H-1/82-84	43.86	3202.4	3.32	1.93	27.5	22.8
959C/6H-1/102-104	44.06	3210.6	3.56	1.80	28.2	21.9
959C/6H-1/107-109	44.11	3212.6	3.46	1.59	27.9	20.4
959C/6H-1/117-119	44.21	3216.8	3.16	1.80	26.9	22.0
959C/6H-1/122-124	44.26	3218.8	3.59	1.80	28.3	21.9
959C/6H-1/127-129	44.31	3220.9	3.29		27.4	
959C/6H-1/132-134	44.36	3222.9	3.52	2.09	28.1	23.8
959C/6H-1/142-144	44.46	3227.9	3.51		28.1	
959C/6H-2/7-9	44.61	3236.4	3.22	1.98	27.1	23.2
959C/6H-2/12-14	44.66	3239.3	2.89	2.18	25.9	24.3
959C/6H-2/17-19	44.71	3242.1	3.75	1.94	28.8	22.9
959C/6H-2/22-24	44.76	3245.0	3.32	1.95	27.5	22.9
959C/6H-2/32-34	44.86	3258.3	3.34	1.94	27.5	22.9
959C/6H-2/37-39	44.91	3265.0	3.37	1.84	27.6	22.2
959C/6H-2/45-47	44.98	3267.3	3.39	1.76	27.7	21.6
959C/6H-2/52-54	45.06	3270.0	3.48	1.95	28.0	23.0
959C/6H-2/60-62	45.16	3273.3	3.48	2.04	28.0	23.5
959C/6H-2/62-64	45.21	3275.0	3.40	1.85	27.7	22.3
959C/6H-2/67-69	45.26	3276.7	3.66	1.74	28.6	21.5
959C/6H-2/77-79	45.31	3278.3	3.47	1.99	28.0	23.2
959C/6H-2/82-84	45.36	3280.0	3.35		27.6	
959C/6H-2/92-94	45.46	3287.3	3.21	2.03	27.1	23.5
959C/6H-2/102-104	45.56	3294.5	3.04	2.02	26.5	23.4
959C/6H-2/107-109	45.61	3298.2		1.79		21.9
959C/6H-2/112-114	45.66	3301.8		1.90		22.6
959C/6H-2/117-119	45.71	3305.5		1.73		21.5
"Bulk M2 sample" (959C/6H-2/102-104 959C/6H-2/107-109 959C/6H-2/112-114 959C/6H-2/117-119)	45.64	3300.0	3.23		27.2	
959C/6H-2/107-109	45.73	3306.9	3.35	1.74	27.6	21.5

959C/6H-2/112-114	45.76	3309.1	3.40	1.69	27.7	21.2
959C/6H-2/117-119)	45.81	3312.7	3.24	1.83	27.2	22.2
959C/6H-2/132-134	45.86	3316.4	3.53	2.01	28.2	23.3
959C/6H-2/137-139	45.91	3320.0	3.56	2.01	28.2	23.3
959C/6H-2/142-144	45.96	3321.9	3.47	2.07	28.0	23.7
959C/6H-2/147-149	46.01	3323.7	3.28	1.91	27.3	22.7
959C/6H-3/6-8	46.10	3327.0	3.36	2.18	27.6	24.4
959C/6H-3/21-23	46.25	3332.6	3.32	1.82	27.5	22.1
959C/6H-3/41-43	46.45	3340.0	3.44	2.10	27.9	23.9
959C/6H-3/61-63	46.65	3360.0	3.20	1.99	27.1	23.2
959C/6H-3/81-83	46.85	3371.4	3.37	2.41	27.6	25.6
959C/6H-3/101-103	47.05	3384.5	3.08		26.6	
959C/6H-3/121-123	47.25	3402.5	3.24	1.72	27.2	21.4
959C/6H-3/141-143	47.45	3420.5	3.36	1.83	27.6	22.2
959C/6H-4/19-21	47.73	3440.0	3.50	1.96	28.1	23.0
959C/6H-4/24-26	47.78	3442.9	3.54		28.2	
959C/6H-4/29-31	47.83	3445.7		2.05		23.6
959C/6H-4/30-32	47.84	3446.3	3.45	2.01	27.9	23.3
959C/6H-4/59-61	48.13	3462.9	3.61	2.05	28.4	23.6
959C/6H-4/69-71	48.23	3468.6	3.29		27.4	
959C/6H-4/79-81	48.33	3474.3	3.59	2.35	28.3	25.3
959C/6H-4/99-101	48.53	3484.9	3.52	1.84	28.1	22.2
959C/6H-4/119-121	48.73	3494.6	3.12	1.86	26.8	22.3