Paleoceanography and Paleoclimatology

Supporting Information for

Nitrogen isotope variations in the northern South China Sea since marine isotopic stage 3: reconstructed from foraminifera-bound and bulk sedimentary nitrogen

Tingting Wang[a], Ana Christina Ravelo[b], Haojia Ren[c], Haowen Dang[a], Haiyan Jin[a], Jingjing Liu[a], Zhimin Jian[a, *]

a. State Key Laboratory of Marine Geology, Tongji University, Shanghai

b. Ocean Sciences Department, University of California, Santa Cruz, CA

c. Department of Geosciences, National Taiwan University, Taipei

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Introduction

This supporting information document contains the data of AMS ^{14}C dates, $\delta^{15}N$ of planktonic foraminifera (FB-$\delta^{15}N$) and bulk sediment ($\delta^{15}N_{bulk}$), C:N ratios, $\delta^{13}C$ of organic matter ($\delta^{13}C_{org}$), TOC and TN content for core MD12-3433. Sea surface temperature (SST) and the thermocline water temperature (TWT) derived from Mg/Ca of planktonic foraminifera for core MD12-3432 are also provided.

Depth (cm)	AMS ^{14}C conventional age (yr B.P.)	Calendar age （yr B.P.） (a)	± σ S.D (b)
0-1	1110 ± 30	1006	37
18-19	3120 ± 30	3350	27
36-37	4960 ± 30	5675	35
54-55	7020 ± 30	7857	38
66-67	8080 ± 30	9008	21
80-81	8970 ± 50	10160	71
100-101	10680 ± 30	12624	38
120-121	12040 ± 40	13840	55
142-143	12470 ± 50	14419	134
190-191	17360 ± 70	20525	97
340-341	20570 ± 90	24484	132
496-497	29460 ± 180	34883	223
556-557	33310 ± 250	38703	289
662-663	36920 ± 380	42066	372

Table S1. AMS ^{14}C dates for core MD12-3433. (a). Calendar ages were calculated by Fairbanks0107: http://radiocarbon.ldeo.columbia.edu/research/radcarbcal.htm . (b). One σ standard deviations for the calendar ages.

Species	Depth (cm)	Age (ka)	$\delta^{15}N$ (‰)	N content (%)	blank/total N
G. ruber	24-25	3.87	1.65	3.78	0.10
G. ruber	48-49	6.05	4.65	3.81	0.11
G. ruber	80-81	8.97	5.23	3.88	0.10
G. ruber	96-97	9.87	5.88	5.01	0.04
G. ruber	120-121	11.23	5.48	4.06	0.07
G. ruber	160-161	14.30	6.48	4.12	0.14
G. ruber	248-249	18.60	5.78	5.72	0.14
G. ruber	360-361	21.71	5.49	4.58	0.12
G. ruber	400-401	23.99	6.44	6.35	0.12
G. ruber	424-425	25.36	4.41	4.67	0.05
G. ruber	664-665	35.99	5.14	3.95	0.08
G. sacculifer	48-49	6.05	5.27	4.46	0.12
G. sacculifer	96-97	9.87	4.70	3.46	0.11
G. sacculifer	120-121	11.23	6.07	4.96	0.07
G. sacculifer	160-161	14.30	6.41	6.22	0.11
G. sacculifer	184-185	16.75	7.74	4.95	0.06
G. sacculifer	360-361	21.71	6.47	4.71	0.08
G. sacculifer	400-401	23.99	6.82	4.82	0.10
G. sacculifer	664-665	36.99	5.84	6.75	0.12
O. universa	24-25	3.87	5.35	2.84	0.22
O. universa	48-49	6.05	5.02	3.83	0.17
O. universa	80-81	8.97	6.31	3.67	0.14
O. universa	96-97	9.87	6.43	3.73	0.04
O. universa	120-121	11.23	7.03	3.10	0.09
O. universa	160-161	14.30	7.46	4.19	0.12
O. universa	184-185	16.75	7.18	3.20	0.03
O. universa	360-361	21.71	8.37	4.55	0.12
O. universa	400-401	23.99	8.57	4.11	0.11
O. universa	568-569	33.72	4.86	3.71	0.13
O. universa	664-665	35.99	6.05	3.23	0.07

Table S2. FB-$\delta^{15}N$ of core MD12-3433.

Depth (cm)	Age (ka)	$\delta^{15}N_{bulk}$ (‰)	$\delta^{13}C_{org}$ (‰)	C:N ratio	TOC wt%	TN wt%
0	1.01	5.26	-21.12	6.09	0.84	0.138
8	2.05	5.20	-21.16	6.02	0.86	0.142
16	3.09	5.27	-21.20	6.47	0.89	0.137
24	4.13	5.40	-20.53	7.14	0.77	0.108
32	5.16	5.53	-21.42	7.15	0.82	0.115
40	6.16	5.66	-21.22	7.05	0.78	0.111
48	7.13	5.68	-21.39	6.87	0.86	0.125
56	8.05	5.51	-21.41	6.93	0.78	0.112
64	8.82	5.50	-21.35	7.26	0.87	0.120
72	9.50	5.45	-21.46	7.56	0.92	0.121
80	10.16	5.60	-21.36	7.50	1.00	0.133
88	11.15	5.48	-21.35	7.90	0.91	0.116
96	12.13	5.18	-21.22	7.84	1.23	0.158
104	12.87	5.40	-21.14	8.30	1.37	0.165
112	13.35	5.36	-20.87	8.51	1.66	0.195
120	13.84	5.35	-20.94	8.44	1.65	0.195
128	14.05	5.01	-20.99	8.80	1.88	0.214
136	14.26	5.06	-20.86	8.86	1.44	0.163
144	14.67	5.14	-20.91	8.78	1.71	0.194
152	15.69	4.91	-20.23	7.97	1.47	0.184
160	16.71	4.91	-20.20	8.20	1.44	0.175
168	17.73	5.20	-20.41	8.37	1.63	0.194
176	18.74	4.81	-20.46	8.26	1.51	0.182
184	19.76	5.10	-20.53	8.18	1.63	0.199
192	20.58	5.23	-20.52	8.37	1.69	0.202
200	20.79	5.12	-20.30	8.39	1.39	0.166
208	21.00	5.25	-20.45	8.41	1.67	0.198
216	21.21	5.34	-20.56	7.82	1.59	0.203
224	21.42	5.22	-20.75	8.22	1.70	0.207
232	21.63	5.31	-20.61	8.62	1.78	0.206
240	21.84	5.23	-20.55	8.68	1.73	0.199
248	22.06	5.19	-20.54	9.16	1.88	0.205
256	22.27	5.24	-20.64	8.57	1.74	0.202
264	22.48	5.18	-20.55	8.35	1.68	0.201
272	22.69	5.23	-20.58	9.42	1.96	0.209
280	22.90	5.08	-20.89	8.10	1.62	0.200
288	23.11	5.19	-20.75	8.81	1.75	0.199
296	23.32	5.12	-20.87	9.11	1.93	0.211
304	23.53	4.93	-20.40	8.95	1.65	0.184
312	23.74	5.30	-20.25	8.95	1.68	0.187
320	23.96	5.16	-20.23	9.02	1.99	0.221
328	24.17	5.07	-20.17	8.90	1.64	0.185
336	24.38	4.96	-20.50	9.41	1.81	0.192
344	24.75	5.05	-20.31	8.97	1.61	0.179
352	25.28	5.06	-20.07	9.18	1.89	0.206
360	25.82	5.03	-20.42	9.11	1.76	0.193
368	26.35	4.88	-20.57	7.41	1.76	0.237

376	26.88	5.02	-20.30	7.35	1.42	0.193
384	27.42	5.19	-20.11	9.02	1.61	0.179
392	27.95	5.15	-21.25	7.49	1.17	0.129
400	28.48	5.17	-20.81	7.25	1.52	0.210
408	29.02	5.23	-20.44	7.27	1.39	0.192
416	29.55	5.13	-20.47	7.38	1.47	0.199
424	30.08	5.18	-20.63	7.47	1.48	0.198
432	30.62	4.91	-20.91	6.70	1.52	0.227
440	31.15	5.10	-20.38	8.32	1.25	0.150
448	31.68	5.30	-20.03	8.79	1.59	0.181
456	32.22	4.71	-20.56	6.97	1.41	0.203
464	32.75	4.88	-20.47	6.53	1.28	0.196
472	33.28	5.34	-20.12	6.62	1.32	0.199
480	33.82	5.23	-20.60	6.50	1.46	0.224
488	34.35	5.16	-20.42	6.38	1.45	0.227
496	34.88	5.01	-20.61	6.63	1.48	0.224
504	35.39	4.96	-20.91	6.54	1.46	0.224
512	35.90	5.22	-20.54	6.64	1.38	0.208
520	36.41	5.20	-20.87	6.19	1.03	0.166
528	36.92	5.11	-20.70	6.85	1.15	0.168
536	37.43	5.02	-20.68	6.37	1.05	0.165
544	37.94	5.35	-20.75	6.62	1.22	0.184
552	38.45	5.23	-20.77	6.40	1.38	0.215
560	38.83	4.86	-21.02	6.68	1.22	0.182
568	39.08	4.82	-21.02	7.08	1.46	0.206
576	39.34	4.70	-20.80	7.19	1.46	0.202
584	39.59	4.84	-20.58	6.97	1.50	0.214
592	39.85	4.89	-20.62	6.57	1.45	0.221
600	40.10	4.97	-20.62	7.25	1.56	0.215
608	40.35	5.31	-20.68	6.24	1.39	0.223
616	40.61	5.24	-20.85	6.21	1.26	0.202
624	40.86	5.06	-20.54	6.23	1.34	0.215
632	41.11	5.30	-20.66	6.64	1.25	0.189
640	41.37	4.96	-20.54	6.11	1.23	0.202
648	41.62	5.11	-20.82	5.95	1.00	0.168
656	41.88	5.12	-21.01	5.53	1.05	0.190
664	42.13	5.35	-21.41	5.69	0.94	0.164
672	42.38	5.28	-21.10	6.70	1.07	0.160
680	42.64	4.98	-21.71	5.34	0.62	0.364
688	42.89	4.89	-21.36	6.34	1.24	0.196
696	43.14	4.94	-20.99	6.32	1.28	0.202
704	43.40	4.83	-21.03	6.07	1.17	0.193
712	43.65	4.79	-20.94	6.36	1.15	0.181
720	43.91	4.91	-21.19	6.13	1.15	0.187
728	44.16	5.26	-21.37	5.59	0.98	0.175
736	44.41	4.95	-21.47	6.22	1.20	0.193
744	44.67	5.44	-21.52	6.10	1.14	0.186
752	44.92	5.43	-21.60	5.69	1.09	0.191
760	45.17	5.40	-21.71	4.99	1.02	0.204

768	45.43	5.39	-21.41	6.00	0.92	0.154
776	45.68	5.33	-21.54	5.35	0.98	0.182
784	45.94	5.29	-21.58	5.04	0.94	0.187
792	46.19	5.14	-21.14	6.23	1.32	0.211
800	46.44	5.21	-21.37	5.66	1.00	0.176
808	46.70	5.34	-21.38	5.30	0.88	0.166
816	46.95	5.38	-21.74	5.25	0.98	0.187

Table S3. $\delta^{15}N_{bulk}$, $\delta^{13}C_{org}$, C:N ratio, TOC and TN content of core MD12-3433.

Depth (cm)	Age (ka)	Mg/Ca of *G. ruber* (mmol/mol)	SST (ºC) (a)	Mg/Ca of *P. obliquiloculata* (mmol/mol)	TWT (ºC) (b)	ΔT (ºC)
0	1.69	1.41	27.68	3.75	16.20	11.49
20	3.28	1.66	27.37	3.64	18.02	9.35
40	4.87	1.76	29.01	4.22	18.68	10.32
60	6.47	2.09	27.09	3.55	20.56	6.53
80	8.06	1.77	27.52	3.69	18.71	8.82
100	9.60	1.72	26.91	3.49	18.41	8.50
120	10.16	1.67	27.59	3.71	18.07	9.52
140	10.71	1.73	26.77	3.45	18.48	8.28
160	11.27	1.71	27.44	3.66	18.37	9.08
180	11.82	1.56	26.91	3.49	17.31	9.59
200	12.38	2.16	25.02	2.95	20.94	4.08
260	14.92	2.37	24.94	2.93	21.98	2.96
280	15.84	1.52	23.80	2.64	17.03	6.78
300	16.75	1.61	23.49	2.57	17.70	5.79
320	17.67	1.59	23.84	2.65	17.55	6.29
340	18.58	1.62	23.36	2.54	17.76	5.60
360	19.50	1.54	22.82	2.42	17.21	5.61
400	20.61	1.72	23.23	2.51	18.39	4.84
420	21.72	1.71	24.53	2.82	18.33	6.19
440	22.83	1.48	24.87	2.91	16.74	8.14
460	23.94	1.64	24.13	2.72	17.89	6.24
480	25.05	1.58	24.60	2.84	17.50	7.10
500	26.16	1.56	24.34	2.77	17.33	7.01
520	27.27	1.54	23.32	2.53	17.21	6.11
540	28.38	1.48	23.95	2.67	16.74	7.20
560	29.49	1.59	23.44	2.56	17.54	5.90
600	30.60	1.94	25.03	2.95	19.75	5.28
620	32.82	1.69	24.46	2.80	18.19	6.27
640	33.93	1.43	24.63	2.84	16.38	8.25
660	35.04	1.58	23.72	2.62	17.44	6.29
680	36.15	1.50	23.89	2.66	16.90	6.99
700	37.26	1.62	24.26	2.75	17.77	6.49
720	38.37	1.47	24.77	2.88	16.65	8.12
740	39.48	1.23	23.20	2.50	14.66	8.54
760	40.59	1.25	24.25	2.75	14.86	9.39

Table S4. SST, TWT and △T (SST-TWT) of core MD12-3432.