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Planktic foraminifer census data and $\delta^{18}O$ and $\delta^{13}C$ analyses of *Globigerinoides ruber*from Marine Isotope Stage 11 sediments from Ocean Drilling Program (ODP) Site 1002

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Introduction

This report contains microfossil and stable isotope data from Marine Isotope Stage 11 (MIS 11) *sediments* recovered at ODP Site 1002 in the Cariaco Basin off of Venezuela (fig. 1). The coring site was located in the saddle between the two sub-basins of the Cariaco Basin (fig. 1) at a depth of ~900m. A total of 5 holes were drilled at Site 1002. Two holes were mudline cores for geochemical studies. The other three holes were continuously cored to between 164 and 170m subbottom. Sediments recovered vary from dark green to light green and gray silty clay with persistent but varying amounts of nannofossils and foraminifers and occasional diatoms. Laminated intervals representing periodic development of anoxic bottom conditions occur throughout the recovered section (see Shipboard Scientific Party, 1997). Preliminary studies (Peterson and others, in press) indicated a relatively complete and high-accumulation rate section of MIS 11 was recovered from the Cariaco Basin. As part of our effort to study climate change and variability of

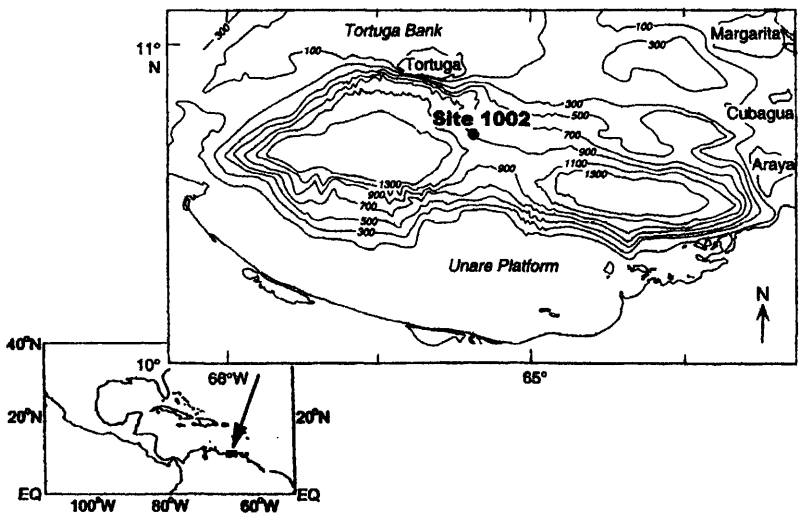

Figure 1. Map showing location of Ocean Drilling Program (ODP) Site 1002 in the Cariaco Basin.

key Pleistocene interglacials we selected samples of the MIS 11 section of Hole 1002C to generate a multiproxy record.

Materials and Methods

We obtained a series samples from cores 11 through 13 of ODP Hole 1002C. We used the oxygen isotope record of Peterson and others, (in press) to design a sampling plan that covered the entire MIS 11 interval with emphasis on obtaining a high-density record of the peak warm interval at the beginning of the interglacial. Depth values for the samples are from the ODP subbottom depth scale that is adjusted for displacement of sediment within cored intervals due to gas expansion.

Samples for foraminifer and isotope analyses were dried at <50°C, disaggregated in deionized water and wet sieved at 63μm. The >63μm fraction was dried at <50°C and then sieved into 63-150 and >150 μm fractions. The >150μm fraction was mechanically split to obtain subsamples of ~ 300 planktic specimens for faunal census. Foraminifer taxa identified are listed below in the data section. Specimens in the subsamples were identified and counted and used to calculate per cent abundance data.

Oxygen and carbon isotope analyses were done on 4-6 individuals of *Globigerinoides ruber* (white variety) from the 212-250μm size fraction. Analyses were done at the Woods Hole Oceanographic Institution using a Finnigan MAT252 mass spectrometer equipped with a 'Kiel" automated carbonate analytical device containing two parallel extraction lines. Isotopic values are reported relative to the Vienna Pee Dee Belemnite (VPDB) scale in delta notation and expressed in per mil using the intermediate standard NBS19. The precision of 2,200 NBS19 analyses run during the interval between March 1993 and June 1998 (for all sizes from 10 to 300 ug) is ± 0.07 for ^{18}O and ± 0.03 for ^{13}C. Small sample (10-20ug and under all laboratory conditions) precision is 0.14 for ^{18}O and 0.06 for ^{13}C (Ostermann and Curry, 2000).

Chronology

A chronology was constructed by correlating key features in the depth plot of the Hole 1002C isotopic record (fig. 2) to the standard late Pleistocene global $\delta^{18}O$ record (SPECMAP) (Imbrie and others, 1984; Prell and others, 1986). Constant accumulation rates were assumed between the key correlation points to convert the Hole 1002C depth scale to a time scale (fig. 2). The resulting age model indicates our sampling

interval between 412 ka and 395 ka is ~ 150 years. The sampling interval for the remainder of the record varies from 1 to 3 kyr.

Data

Isotopic data and faunal counts and percent data are included in tables 1-3. Taxa identified in our samples include the following.

Globigerina bulloides d'Orbigny

G. falconensis Blow

G. rubescens Hofker

G. calida (Parker)

Globigerinella aequilateralis (Brady)

Globigerinita glutinata (Egger)

Globigerinoides conglobatus (Brady)

Gl. ruber (d'Orbigny)

Gl. sacculifer (Brady)

Gl. tenellus Parker

Globorotalia crassaformis (Galloway & Wissler)

Gr. hirsuta (d'Orbigny)

Gr. inflata (d'Orbigny)

Gr. menardii (Parker, Jones, and Brady)

Gr. scitula (Brady)

Gr. truncatulinoides (d'Orbigny)

Gr. tumida (Brady)

Gr. ungulata Bermudez

Neogloboquadrina dutertrei (d'Orbigny)

N. pachyderma (Ehrenberg)

N. pachyderma was separated into left-coiling and right-coiling categories. Additionally, specimens with >4 chambers in the last whorl that were transitional to large typical forms of *N. dutertrei* were counted under the informal category of "dupac." and considered to be transitional forms between *N. dutertrei* and *N. pachyderma*.

Sphaeroidinella dehiscens (Parker and Jones)

Digital versions of the tables 1-3 can be found at

http://chht-ntsrv.er.usgs.gov/warmclimates/products.html

Acknowledgements:

We thank H. Dowsett and L. Osterman for constructive comments on this report. We thank C. Tracey for assistance in preparing the text and L. Peterson for access to data and reports in press. The Ocean Drilling Program provided samples.

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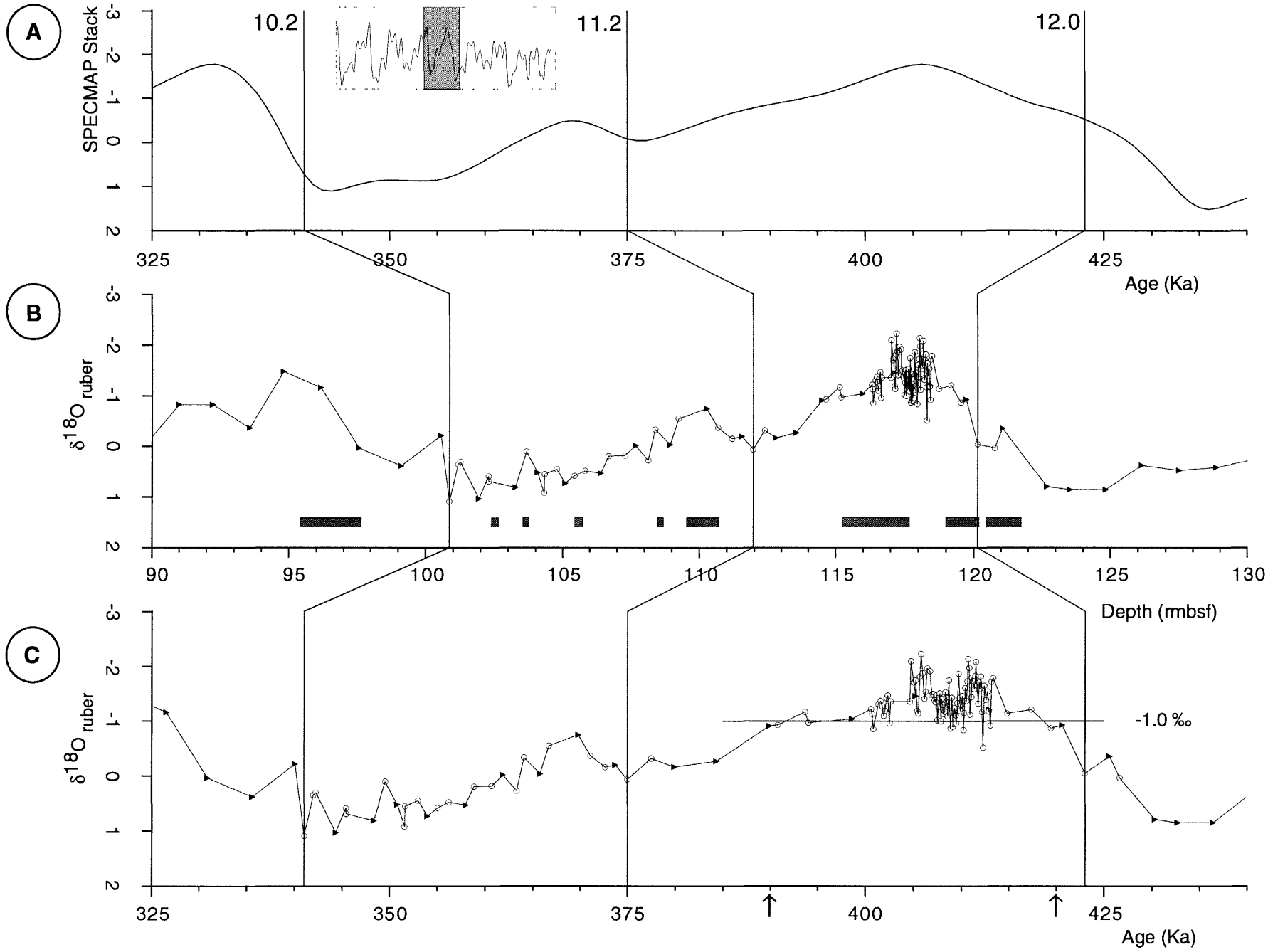

Figure 2. Chronology for ODP 1002 stage 11 interval. A. Standard global $\delta^{18}O$ SPECMAP stack (Imbrie and others, 1984, Prell and others, 1986) spanning MIS 12 to MIS 9 (shading in inset shows portion of SPECMAP stack plotted). B. ODP 1002 $\delta^{18}O_{ruber}$ data scaled to depth with approximate occurrence of laminations (gray bar). Open circles are from this study; filled triangles are from Peterson and others (in press). C. $\delta^{18}O_{ruber}$ scaled to age based on correlation to SPECMAP stack (vertical lines). Horizontal line on $\delta^{18}O_{ruber}$ plot is at -1.0 ‰. Values < -1.0 indicate climate conditions as warm or warmer than modern.

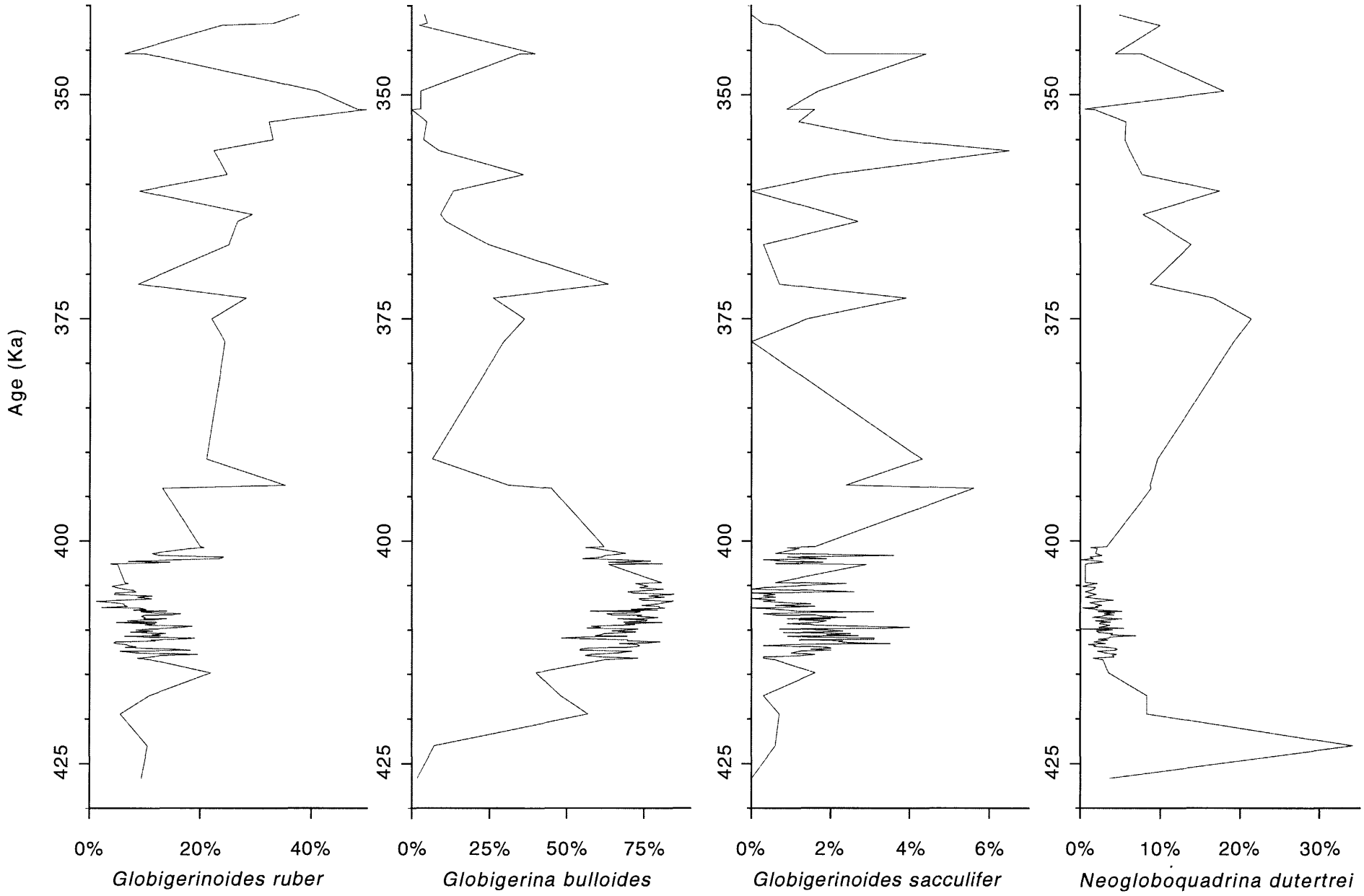

Figure 3. Abundance variations of selected taxa in MIS 11 interval of ODP 1002C.

Core	Sct	Top (cm)	Bot (cm)	ODP Depth(mbsf)	Revised Depth(rmbsf)	Age (Ka)
11 H	6	111	113	101.60	100.87	341.000
11 H	6	147	149	101.96	101.19	341.981
11 H	7	3	5	102.05	101.27	342.226
11 H	7	116	118	103.18	102.30	345.384
11 H	7	118	120	103.20	102.31	345.415
12 H	1	39	41	103.79	103.67	349.584
12 H	1	108	110	104.48	104.32	351.577
12 H	1	110	112	104.50	104.34	351.638
12 H	2	36	38	105.03	104.79	353.018
12 H	2	113	115	105.80	105.44	355.011
12 H	3	10	12	106.27	105.84	356.237
12 H	3	112	114	107.29	106.70	358.874
12 H	4	33	35	108.00	107.30	360.713
12 H	4	133	135	109.00	108.15	363.319
12 H	5	13	15	109.30	108.40	364.086
12 H	5	113	115	110.30	109.25	366.692
12 H	6	127	129	112.00	110.69	371.106
12 H	7	37	39	112.60	111.20	372.670
12 H	7	127	129	113.50	111.96	375.000
12 H	8	28	30	114.01	112.39	377.520
13 H	2	89	91	114.90	114.65	390.766
13 H	2	146	148	115.47	115.15	393.696
13 H	3	3	5	115.54	115.21	394.048
13 H	3	131	133	116.82	116.33	400.612
13 H	3	133	135	116.84	116.35	400.729
13 H	3	136	138	116.87	116.37	400.846
13 H	3	146	148	116.97	116.46	401.374
13 H	4	1	2	117.02	116.50	401.608
13 H	4	4	5	117.05	116.53	401.784
13 H	4	7	8	117.08	116.56	401.960
13 H	4	10	11	117.11	116.58	402.077
13 H	4	13	14	117.14	116.61	402.253
13 H	4	16	17	117.17	116.63	402.370
13 H	4	19	20	117.20	116.66	402.546
13 H	4	21	22	117.22	116.68	402.663
13 H	4	60	61	117.61	117.02	404.656
13 H	4	63	64	117.64	117.04	404.773
13 H	4	69	70	117.70	117.09	405.066
13 H	4	72	73	117.73	117.12	405.242
13 H	4	75	76	117.76	117.15	405.418
13 H	4	78	79	117.79	117.17	405.535
13 H	4	81	82	117.82	117.20	405.711
13 H	4	84	85	117.85	117.22	405.828
13 H	4	87	88	117.88	117.25	406.004
13 H	4	90	91	117.91	117.28	406.179
13 H	4	93	94	117.94	117.30	406.297
13 H	4	96	97	117.97	117.33	406.473
13 H	4	99	100	118.00	117.36	406.648
13 H	4	102	103	118.03	117.38	406.766
13 H	4	105	106	118.06	117.41	406.941
13 H	4	108	109	118.09	117.43	407.059
13 H	4	111	112	118.12	117.46	407.234
13 H	4	113	114	118.14	117.48	407.352
13 H	4	115	116	118.16	117.50	407.469
13 H	4	117	118	118.18	117.51	407.527
13 H	4	119	120	118.20	117.53	407.645
13 H	4	121	122	118.22	117.55	407.762
13 H	4	123	124	118.24	117.57	407.879
13 H	4	125	126	118.26	117.58	407.938
13 H	4	127	128	118.28	117.60	408.055
13 H	4	129	130	118.30	117.62	408.172
13 H	4	131	132	118.32	117.64	408.289
13 H	4	133	134	118.34	117.65	408.348
13 H	4	135	136	118.36	117.67	408.465
13 H	4	137	138	118.38	117.69	408.582
13 H	4	139	140	118.40	117.71	408.700
13 H	4	141	142	118.42	117.72	408.758
13 H	4	143	144	118.44	117.74	408.875
13 H	4	145	146	118.46	117.76	408.993
13 H	4	147	148	118.48	117.78	409.110
13 H	4	149	150	118.50	117.79	409.168
13 H	5	1	2	118.52	117.81	409.286
13 H	5	3	4	118.54	117.83	409.403
13 H	5	5	6	118.56	117.84	409.462
13 H	5	7	8	118.58	117.86	409.579
13 H	5	9	10	118.60	117.88	409.696
13 H	5	11	12	118.62	117.90	409.813
13 H	5	13	14	118.64	117.91	409.872
13 H	5	15	16	118.66	117.93	409.989
13 H	5	17	18	118.68	117.95	410.106
13 H	5	19	20	118.70	117.97	410.223
13 H	5	21	22	118.72	117.98	410.282
13 H	5	23	24	118.74	118.00	410.399
13 H	5	25	26	118.76	118.02	410.516
13 H	5	27	28	118.78	118.04	410.634
13 H	5	29	30	118.80	118.05	410.692
13 H	5	31	32	118.82	118.07	410.810
13 H	5	33	34	118.84	118.09	410.927
13 H	5	35	36	118.86	118.11	411.044
13 H	5	37	38	118.88	118.12	411.103
13 H	5	39	40	118.90	118.14	411.220
13 H	5	41	42	118.92	118.16	411.337
13 H	5	43	44	118.94	118.18	411.454
13 H	5	45	46	118.96	118.19	411.513
13 H	5	47	48	118.98	118.21	411.630
13 H	5	49	50	119.00	118.23	411.747
13 H	5	51	52	119.02	118.25	411.864
13 H	5	53	54	119.04	118.26	411.923
13 H	5	55	56	119.06	118.28	412.040
13 H	5	57	58	119.08	118.30	412.158
13 H	5	59	60	119.10	118.32	412.275
13 H	5	62	63	119.13	118.34	412.392
13 H	5	65	66	119.16	118.37	412.568
13 H	5	68	69	119.19	118.40	412.744
13 H	5	71	72	119.22	118.42	412.861
13 H	5	74	75	119.25	118.45	413.037
13 H	5	77	78	119.28	118.47	413.154
13 H	5	80	81	119.31	118.50	413.330
13 H	5	109	110	119.60	118.75	414.795
13 H	6	9	11	120.10	119.19	417.374
13 H	6	49	51	120.50	119.54	419.425
13 H	6	119	121	121.20	120.15	423.000
13 H	7	39	41	121.90	120.77	426.634

Table 1. ODP Hole 1002C samples, sample depths in meters below sea-floor (mbsf), and sample ages. ODP mbsf include correction for major gas expansion voids. Revised ODP mbsf follows Peterson and others (in press). Sample ages are based on model shown in figure 2.

Core	Sct	Top (cm)	Bot (cm)	Depth (rmbsf)	age (kyrs)	Orbulina	Gl. ruber	Gl. conglobatus	Gl. sacculifer	Sphaeroidinella	Gn. aequilateralis	G. bulloides	G. falconensis	G. rubescens	T. quinqueloba	N. pachyderma (s)	N. pachyderma (d)	N. dutertrei	Gr. inflata	Gr. crassiformis	N. "dupac"	Gr. hirsuta	Gr. scitula	Gr. menardii	Gr. tumida	Gr. truncatulinoides	Ga. glutinata	G. digitata	other	G. tenellus	Gr. ungulata	Gn. cálida	G. cf woodi	Pulleniatina	Total planktics	Benthic Forams	Total forams
11	6	111	113	100.87	341.000	0	119	0	0	0	2	13	2	10	1	0	0	15	3	0	0	0	0	0	0	0	65	0	2	76	0	7	0	0	315	13	328
11	6	147	149	101.19	341.981	0	100	1	1	0	5	15	0	11	3	0	0	27	6	0	0	0	0	0	0	0	28	1	5	91	0	9	0	0	303	12	315
11	7	3	5	101.27	342.226	0	69	0	2	0	4	7	0	0	1	0	0	29	10	0	1	0	1	0	0	0	31	0	6	127	0	2	0	0	290	0	290
11	7	116	118	102.30	345.384	2	20	0	6	0	0	125	0	0	11	3	0	14	0	0	1	0	0	0	0	0	116	0	14	0	0	3	0	0	315	0	315
11	7	118	120	102.31	345.415	8	30	0	13	0	1	103	4	0	13	0	0	23	0	0	1	0	0	0	0	0	92	0	3	0	0	6	0	0	297	3	300
12	1	39	41	103.67	349.584	2	144	0	6	0	13	10	4	4	2	0	0	63	0	0	0	0	0	0	0	0	73	1	1	14	0	7	0	0	350	9	359
12	1	108	110	104.32	351.577	22	160	0	3	0	28	10	0	1	0	0	0	2	28	0	0	0	0	0	0	3	52	3	3	1	0	15	0	0	331	21	352
12	1	110	112	104.34	351.638	14	192	2	6	0	30	0	1	2	0	0	0	7	44	0	0	0	1	0	0	3	56	2	7	4	0	12	0	0	383	35	418
12	2	36	38	104.79	353.018	73	108	0	4	0	19	16	5	6	0	0	0	19	32	0	0	0	0	0	0	3	4	5	6	12	0	22	0	0	334	10	344
12	2	113	115	105.44	355.011	9	113	5	12	0	19	13	4	6	0	0	0	19	93	0	2	0	0	0	1	16	7	1	5	4	0	13	0	0	342	25	367
12	3	10	12	105.84	356.237	17	72	1	21	0	14	28	6	17	0	0	0	20	43	0	0	0	1	0	0	8	6	2	6	53	0	7	0	0	322	0	322
12	3	112	114	106.70	358.874	3	74	0	6	0	6	107	11	2	0	0	0	23	38	0	0	0	1	0	1	8	3	0	7	1	0	7	0	0	298	1	299
12	4	33	35	107.30	360.713	10	29	0	0	0	0	43	0	3	0	116	0	56	17	2	4	0	2	0	4	9	13	0	7	0	0	6	0	0	321	6	327
12	4	133	135	108.15	363.319	25	98	2	7	0	9	31	4	2	0	4	0	26	78	0	7	0	5	0	0	6	11	1	4	2	0	13	0	0	335	27	362
12	5	13	15	108.40	364.086	4	88	1	9	0	14	36	2	6	0	0	0	31	87	0	0	0	1	0	0	15	13	2	3	6	0	12	0	0	330	6	336
12	5	113	115	109.25	366.692	2	89	1	1	0	0	87	2	5	0	17	0	49	37	1	18	0	5	5	2	2	15	1	9	0	1	5	0	0	354	9	363
12	6	127	129	110.69	371.106	8	26	0	2	0	3	190	1	1	1	12	1	26	1	2	4	0	4	0	1	0	9	0	5	3	0	0	0	0	300	24	324
12	7	37	39	111.20	372.670	8	87	1	12	0	7	80	2	5	2	1	0	51	0	1	5	0	2	0	1	4	17	1	6	7	0	8	0	0	308	2	310
12	7	127	129	111.96	375.000	11	76	0	5	0	5	125	4	3	2	1	0	74	1	2	14	0	0	0	1	4	12	0	2	1	0	2	0	0	345	4	349
12	8	28	30	112.39	377.520	16	84	0	0	0	8	101	5	2	0	1	1	66	0	2	20	0	1	1	0	8	8	0	12	0	0	8	0	0	344	2	346
13	2	89	91	114.65	390.766	18	64	0	13	0	11	20	0	6	0	0	0	29	0	0	0	0	1	3	1	64	23	3	2	3	1	21	0	20	303	1	304
13	2	146	148	115.15	393.696	0	118	0	8	0	10	104	5	2	0	1	0	29	0	8	0	0	1	1	5	10	12	0	9	0	0	10	0	2	335	0	335
13	3	3	5	115.21	394.048	1	45	3	19	0	8	153	4	5	0	0	0	30	0	19	0	0	3	1	3	2	17	0	15	0	0	12	0	0	340	0	340
13	3	131	133	116.33	400.612	1	61	3	5	0	2	189	2	5	1	0	0	10	0	0	0	0	1	2	0	3	6	0	3	0	1	10	0	0	305	0	305
13	3	133	135	116.35	400.729	2	66	1	3	0	0	179	2	3	3	0	0	4	0	1	0	0	9	1	10	1	14	2	5	0	4	7	0	2	319	0	319
13	3	136	138	116.37	400.846	1	62	0	4	0	5	203	3	0	4	0	0	7	0	0	0	0	3	11	1	5	17	0	3	0	0	10	0	2	341	1	342
13	3	146	148	116.46	401.374	5	35	1	2	0	0	214	3	2	2	0	0	6	0	2	0	0	0	4	6	0	18	0	6	0	0	4	0	0	310	0	310
13	4	1	2	116.50	401.608	0	42	1	12	0	2	206	3	5	0	0	0	9	0	1	0	0	0	4	6	0	13	0	12	0	3	11	0	0	330	0	330
13	4	4	5	116.53	401.784	0	79	0	3	0	12	200	0	0	0	0	0	4	0	0	0	0	0	0	6	0	11	1	4	0	2	3	0	2	327	0	327
13	4	7	8	116.56	401.960	1	74	4	6	0	4	174	4	1	0	0	0	5	0	1	0	0	1	3	10	0	7	0	4	5	2	10	0	0	316	0	316
13	4	10	11	116.58	402.077	0	50	5	1	0	1	199	5	2	0	0	0	0	0	1	0	0	0	5	1	1	13	0	10	4	0	2	0	1	301	0	301
13	4	13	14	116.61	402.253	6	23	1	3	0	2	253	4	2	0	0	0	8	0	0	0	0	1	3	4	0	11	0	3	3	0	1	0	0	328	0	328
13	4	16	17	116.63	402.370	3	49	0	6	0	2	215	1	7	3	0	0	10	0	1	0	0	1	0	0	0	14	0	3	13	1	9	0	1	339	0	339
13	4	19	20	116.66	402.546	0	13	0	2	0	5	274	3	5	0	0	0	3	0	2	0	0	0	0	3	0	14	0	8	4	0	3	0	0	339	0	339
13	4	21	22	116.68	402.663	1	16	0	9	0	4	198	6	5	0	0	0	2	0	1	0	0	0	0	3	0	26	0	12	14	0	14	0	1	312	0	312
13	4	60	61	117.02	404.656	0	22	1	2	0	3	279	1	5	0	0	0	2	0	0	0	0	0	2	4	0	11	0	4	0	2	5	0	3	346	0	346
13	4	63	64	117.04	404.773	0	23	2	8	0	6	238	3	6	1	0	0	7	0	0	0	0	0	3	1	0	12	0	6	6	2	4	0	1	329	0	329
13	4	69	70	117.09	405.066	0	13	1	3	0	10	243	0	6	0	0	1	1	0	0	0	0	4	4	2	0	7	0	13	5	0	4	0	2	319	0	319
13	4	72	73	117.12	405.242	3	16	1	1	0	4	237	9	9	0	0	0	6	0	0	0	0	0	2	5	0	9	0	10	7	0	1	0	2	322	0	322
13	4	75	76	117.15	405.418	3	23	0	0	0	1	289	0	2	2	0	0	6	0	0	0	0	0	3	2	0	8	0	9	2	0	5	0	1	356	0	356
13	4	78	79	117.17	405.535	2	28	0	5	0	1	268	1	6	0	0	0	5	0	0	0	0	0	5	2	0	1	0	12	10	0	1	0	3	350	0	350
13	4	81	82	117.20	405.711	3	29	3	9	0	7	241	5	14	0	0	0	2	0	1	0	0	1	0	6	0	4	1	7	5	2	6	0	0	346	0	346
13	4	84	85	117.22	405.828	0	16	2	0	0	13	243	1	8	1	0	0	4	0	0	0	0	0	7	5	0	6	0	10	10	0	13	0	1	340	0	340
13	4	87	88	117.25	406.004	2	16	0	2	0	5	301	0	1	0	0	0	7	0	0	0	0	0	5	0	0	6	0	2	1	1	5	0	2	356	0	356
13	4	90	91	117.28	406.179	2	39	0	1	0	4	264	1	3	0	0	0	4	0	0	0	0	1	3	5	0	8	0	5	0	2	1	0	2	345	0	345
13	4	93	94	117.30	406.297	2	29	0	2	0	0	273	0	1	0	0	0	2	0	0	0	0	0	0	1	0	10	0	2	3	6	3	0	1	335	0	335
13	4	96	97	117.33	406.473	5	35	0	0	0	0	229	2	0	1	0	0	7	0	0	0	0	2	5	4	0	6	0	11	0	0	4	0	2	313	0	313
13	4	99	100	117.36	406.648	3	18	0	2	0	8	237	2	2	0	0	0	13	0	1	0	0	1	4	0	0	16	0	2	1	4	4	0	0	318	0	318
13	4	102	103	117.38	406.766	0	4	2	1	0	3	293	0	2	1	0	0	9	0	0	0	0	1	0	7	0	8	0	9	0	0	5	0	2	347	0	347
13	4	105	106	117.41	406.941	1	16	1	3	0	3	282	0	1	0	0	0	4	0	0	0	0	0	0	0	0	18	0	8	0	3	7	0	0	347	0	347
13	4	108	109	117.43	407.059	0	21	1	5	0	0	263	0	3	0	0	0	6	0	0	0	0	1	6	3	0	7	0	12	0	0	3	0	0	331	0	331
13	4	111	112	117.46	407.234	1	21	1	2	0	2	248	5	0	2	0	0	9	0	1	0	0	0	3	5	0	22	0	5	0	0	7	0	0	334	0	334
13	4	113	114	117.48	407.352	0	22	0	5	0	0	254	3	0	0	0	0	6	0	1	0	0	0	7	0	0	6	0	7	0	0	7	0	0	318	0	318
13	4	115	116	117.50	407.469	2	7	0	2	0	3	254	5	9	0	0	0	7	0	0	0	0	0	0	3	0	10	0	8	3	0	5	0	0	318	0	318
13	4	117	118	117.51	407.527	0	28	0	0	0	2	255	0	0	0	0	0	1	0	0	0	0	0	6	1	0	5	0	10	0	0	4	0	0	312	0	312
13	4	119	120	117.53	407.645	1	33	2	2	0	3	230	6	0	0	0	0	6	0	1	0	0	3	2	2	0	26	0	5	0	0	3	0	0	325	0	325
13	4	121	122	117.55	407.762	0	25	0	3	0	0	251	0	2	0	0	0	7	0	0	0	0	0	2	1	0	15	0	9	0	0	1	0	0	316	0	316
13	4	123	124	117.57	407.879	0	46	3	4	0	2	189	3	0	1	0	0	17	0	0	0	0	6	9	6	0	27	0	7	1	3	4	0	0	328	1	329
13	4	125	126	117.58	407.938	1	30	2	10	0	3	239	3	2	1	0	0	7	0	0	0	0	1	0	1	0	10	0	5	0	6	3	0	0	324	0	324
13	4	127	128	117.60	408.055	0	41	1	4	0	1	252	0	0	0	0	0	15	0	1	0	0	0	12	4	0	9	0	6	1	0	3	0	1	351	0	351
13	4	129	130	117.62	408.172	5	49	1	1	0	3	187	2	0	0	0	0	9	0	0	0	0	4	8	1	0	4	0	14	0	0	8	0	1	297	0	297
13	4	131	132	117.64	408.289	1	49	2	2	0	6	213	1	1	0	0	0	14	0	0	0	0	2	2	3	0	16	0	10	0	0	9	0	0	331	0	331
13	4	133	134	117.65	408.348	2	31	1	5	0	0	230	1	1	0	0	0	10	0	0	0	0	0	6	2	0	9	0	5	0	0	6	0	1	310	0	310
13	4	135	136	117.67	408.465	3	31	1	6	0	4	241	3	1	1	0	0	9	0	0	0	0	2	8	2	0	8	0	6	0	0	4	0	1	331	0	331
13	4	137	138	117.69	408.582	1	33	0	8	0	0	260	2	0	0	0	0	5	0	1	0	0	1	5	1	0	4	0	3	1	0	1	0	1	327	0	327
13	4	139	140	117.71	408.700	1	34	0	3	0	1	260	0	0	0	0	0	16	0	0	0	0	2	3	2	0	10	0	5	3	0	7	0	0	347	0	347
13	4	141	142	117.72	408.758	1	43	0	6	0	1	204	3	1	2	0	0	16	0	0	0	0	1	0	4	0	7	0	10	2	0	5	0	1	307	0	307
13	4	143	144	117.74	408.875	2	30	0	4	0	7	248	0	1	1	0	0	10	0	0	0	0	0	3	1	0	2	0	5	4	1	7	0	0	326	0	326
13	4	145	146	117.76	408.993	2	25	1	7	0	0	272	4	1	4	0	0	7	0	0	0	0	5	0	5	0	12	0	6	0	3	6	0	0	360	0	360
13	4	147	148	117.78	409.110	4	42	0	6	0	1	236	2	10	2	0	0	13	0	0	0	0	0	0	8	0	13	0	3	4	1	0	0	0	345	0	345
13	4	149	150	117.79	409.168	2	17	1	6	0	0	278	2	2	0	0	0	9	0	0	0	0	0	4	3	0	11	0	4	1	0	4	0	0	344	0	344
13	5	1	2	117.81	409.286	1	39	0	3	0	0	227	2	8	11	0	0	8	0	0	0	0	0	3	7	0	6	0	3	3	0	7	0	1	329	0	329
13	5	3	4	117.83	409.403	0	33	1	5	0	4	235	4	3	1	0	0	10	0	0	0	0	2	1	3	0	7	0	8	2	0	7	0	0	326	0	326
13	5	5	6	117.84	409.462	0	36	0	5	0	5	215	1	6	7	0	0	12	0	2	0	0	1	2	2	0	11	0	6	3	0	8	0	0	322	0	322
13	5	7	8	117.86	409.579	0	55	0	8	0	1	171	4	8	1	0	0	9	0	0	0	0	1	1	8	0	9	0	7	6	0	5	0	1	295	0	295
13	5	9	10	117.88	409.696	1	50	0	12	0	1	184	0	5	3	0	0	7	0	0	0	0	3	7	6	0	9	0	5	6	0	3	0	0	302	0	302
13	5	11	12	117.90	409.813	0	41	0	10	0	3	166	4	4	1	0	0	16	0	0	0	0	1	0	3	0	24	0	11	5	2	3	0	0	294	2	296
13	5	13	14	117.91	409.872	2	33	0	2	0	5	224	0	6	1	0	0	0	0	0	0	0	1	3	4	0	11	0	5	3	0	7	0	0	307	0	307
13	5	15	16	117.93	409.989	1	27	2	6	0	5	229	1	1	5	0	0	13	0	0	0	0	0	1	0	0	9	0	2	11	1	9	0	0	323	0	323
13	5	17	18	117.95	410.106	2	40	0	8	0	4	225	4	4	2	0	0	7	0	0	1	1	1	4	2	0	24	0	6	10	0	4	0	0	349	0	349
13	5	19	20	117.97	410.223	2	24	1	6	0	4	235	1	3	1	0	0	7	0	2	1	0	3	1	2	0	16	0	8	2	0	5	0	1	325	0	325
13	5	21	22	117.98	410.282	2	34	1	3	0	5	249	6	3	4	0	0	8	0	0	0	0	0	5	0	0	19	0	5	9	0	6	0	0	359	0	359
13	5	23	24	118.00	410.399	1	44	0	8	0	2	200	0	14	2	0	0	13	0	1	0	0	0	1	3	0	18	0	7	3	0	5	0	0	322	0	322
13	5	25	26	118.02	410.516	2	36	0	6	0	6	194	2	4	0	0	0	12	0	2	1	0	1	0	9	0	24	0	5	3	2	8	0	1	318	0	318
13	5	27	28	118.04	410.634	9	43	1	9	0	1	198	4	5	3	0	0	23	0	0	2	0	1	0	3	0	15	0	3	5	2	8	0	0	335	0	335
13	5	29	30	118.05	410.692	8	20	0	3	0	1	222	0	4	6	0	0	17	0	0	0	0	2	0	3	0	11	0	8	5	3	7	0	0	320	0	320

Table 2. Hole 1002C foraminifer census data, raw counts

Core	Sct	Top (cm)	Bot (cm)	Depth (rmbsf)	age (kyrs)	Orbulina	Gl. ruber	Gl. conglobatus	Gl. sacculifer	Sphaeroidinella	Gn. aequilateralis	G. bulloides	G. falconensis	G. rubescens	T. quinqueloba	N. pachyderma (s)	N. pachyderma (d)	N. dutertrei	Gr. inflata	Gr. crassiformis	N. 'dupac''	Gr. hirsuta	Gr. scitula	Gr. menardii	Gr. tumida	Gr. truncatulinoides	Ga. giutinata	G. digitata	other	G. tenellus	Gr. ungulata	Gn. calida	G. cf woodi	Pullenialina	Total planktics	Benthic Forams	Total forams
13	5	31	32	118.07	410.810	5	32	0	4	0	10	164	3	11	2	0	0	11	0	0	0	0	1	2	8	0	13	0	2	17	0	9	0	0	294	0	294
13	5	33	34	118.09	410.927	2	43	2	7	0	3	109	1	7	1	0	0	8	0	0	0	0	4	0	5	0	9	1	4	7	5	6	0	2	226	0	226
13	5	35	36	118.11	411.044	3	49	0	10	0	4	200	3	2	6	0	0	7	0	0	0	0	2	0	3	0	8	0	4	3	6	8	0	0	318	1	319
13	5	37	38	118.12	411.103	4	36	0	4	0	3	225	0	0	4	0	0	11	0	0	0	0	4	0	4	0	15	1	3	0	2	7	0	0	323	0	323
13	5	39	40	118.14	411.220	7	37	0	7	0	2	216	7	0	2	0	0	8	0	0	0	0	0	7	0	0	12	0	1	0	0	4	0	1	311	0	311
13	5	41	42	118.16	411.337	0	17	0	8	0	7	290	1	3	3	0	0	6	0	0	0	0	4	0	4	0	8	0	4	1	0	5	0	1	362	0	362
13	5	43	44	118.18	411.454	3	15	0	9	0	2	257	6	0	5	0	0	8	0	0	0	0	2	1	3	0	16	0	6	5	0	2	0	0	340	0	340
13	5	45	46	118.19	411.513	6	16	2	11	0	0	213	4	0	2	0	0	10	0	18	0	0	1	5	0	0	20	0	2	3	0	5	0	0	318	0	318
13	5	47	48	118.21	411.630	8	20	1	3	0	0	218	5	0	1	0	0	3	0	7	0	0	1	0	2	0	19	0	6	2	0	4	0	0	300	0	300
13	5	49	50	118.23	411.747	2	22	0	1	0	2	227	0	0	0	0	0	6	0	9	0	0	7	4	0	0	10	0	7	7	2	3	0	0	309	0	309
13	5	51	52	118.25	411.864	1	25	1	4	0	1	215	0	1	3	0	0	5	0	8	0	0	0	4	2	0	9	0	12	1	1	2	0	1	296	0	296
13	5	53	54	118.26	411.923	6	20	1	6	0	1	214	2	1	0	0	0	10	0	18	0	0	0	1	2	0	11	0	9	0	4	2	0	0	308	0	308
13	5	55	56	118.28	412.040	0	31	1	6	0	15	172	0	4	1	0	0	13	0	18	0	0	0	2	4	0	13	1	6	7	4	5	0	0	303	0	303
13	5	57	58	118.30	412.158	1	51	0	5	0	12	177	7	1	1	0	0	15	0	20	0	0	0	0	5	0	11	1	9	0	6	4	0	0	326	0	326
13	5	59	60	118.32	412.275	3	64	0	7	0	14	190	2	0	2	0	0	15	0	12	0	0	0	0	4	0	14	0	12	2	6	4	0	0	351	0	351
13	5	62	63	118.34	412.392	0	18	0	4	0	11	231	10	2	0	0	0	7	0	7	0	0	0	0	0	0	14	0	12	1	5	4	0	0	326	0	326
13	5	65	66	118.37	412.568	0	28	0	3	0	6	204	6	0	0	0	0	10	0	15	0	0	4	0	5	0	13	0	10	0	0	4	0	0	308	0	308
13	5	68	69	118.40	412.744	0	61	1	5	0	4	181	4	0	0	0	0	14	0	13	0	0	2	2	0	0	17	0	7	0	0	2	0	0	313	1	314
13	5	71	72	118.42	412.861	8	38	0	4	0	3	167	0	0	5	0	0	12	0	18	0	0	0	0	6	0	21	0	8	0	2	7	0	0	299	0	299
13	5	74	75	118.45	413.037	4	34	0	1	0	1	189	4	1	1	0	0	13	0	18	0	0	0	0	4	0	22	0	11	0	1	5	0	0	309	0	309
13	5	77	78	118.47	413.154	2	27	0	1	0	0	226	1	0	0	0	0	5	0	15	0	0	0	3	0	0	20	0	7	0	0	3	0	0	310	0	310
13	5	80	81	118.50	413.330	1	36	2	2	0	8	201	8	1	5	0	0	9	0	17	0	0	0	2	0	0	18	0	6	2	0	5	0	0	323	0	323
13	5	109	110	118.75	414.795	1	69	0	5	0	22	126	1	4	0	0	0	11	0	0	6	0	22	1	0	0	22	0	10	0	0	15	0	0	315	0	315
13	6	9	11	119.19	417.374	0	34	3	1	0	1	151	11	0	0	2	17	26	0	6	19	0	4	1	0	0	20	1	9	3	0	6	0	0	315	0	315
13	6	49	51	119.54	419.425	2	17	0	2	0	5	171	10	1	2	0	0	25	0	23	7	0	2	0	0	0	10	2	13	0	0	9	0	0	301	0	301
13	6	119	121	120.15	423.000	2	35	0	2	0	15	24	0	1	4	2	16	114	0	20	77	0	3	0	0	1	8	0	2	2	0	5	0	0	333	0	333
13	7	39	41	120.77	426.634	33	28	0	0	0	15	5	2	0	99	0	0	11	8	0	0	0	0	0	0	0	82	0	0	0	0	16	0	0	299	0	299

Table 2. *continued*

Core	Sct	Top (cm)	Bot (cm)	Depth (rmbsf)	age (kyrs)	Orbulina	Gl. ruber	Gl. conglobatus	Gl. sacculifer	Sphaeroidinella	Gn. aequilateralis	G. bulloides	G. falconensis	G. rubescens	T. quinqueloba	N. pachyderma (s)	N. pachyderma (d)	N. dutertrei	G. inflata	Gr. crassiformis	N. "dupac"	Gr. hirsuta	Gr. scitula	Gr. menardii	Gr. tumida	Gr. truncatulinoides	Ga. glutinata	G. digitata	other	G. tenellus	Gr. ungulata	Gn. calida	G. cf woodi	Pulleniatina	Benthic Forams
11	6	111	113	100.87	341.000	0	38	0	0	0	1	4	1	3	0	0	0	5	1	0	0	0	0	0	0	0	21	0	1	24	0	2	0	0	3.96
11	6	147	149	101.19	341.981	0	33	0	0	0	2	5	0	4	1	0	0	9	2	0	0	0	0	0	0	0	9	0	2	30	0	3	0	0	3.81
11	7	3	5	101.27	342.226	0	24	0	1	0	1	2	0	0	0	0	0	10	3	0	0	0	0	0	0	0	11	0	2	44	0	1	0	0	0.00
11	7	116	118	102.30	345.384	1	6	0	2	0	0	40	0	0	3	1	0	4	0	0	0	0	0	0	0	0	37	0	4	0	0	1	0	0	0.00
11	7	118	120	102.31	345.415	3	10	0	4	0	0	35	1	0	4	0	0	8	0	0	0	0	0	0	0	0	31	0	1	0	0	2	0	0	1.00
12	1	39	41	103.67	349.584	1	41	0	2	0	4	3	1	1	1	0	0	18	0	0	0	0	0	0	0	2	21	0	0	4	0	2	0	0	2.51
12	1	108	110	104.32	351.577	7	48	0	1	0	8	3	0	0	0	0	0	1	8	0	0	0	0	0	0	1	16	1	1	0	0	5	0	0	5.97
12	1	110	112	104.34	351.638	4	50	1	2	0	8	0	0	1	0	0	0	2	11	0	0	0	0	0	0	1	15	1	2	1	0	3	0	0	8.37
12	2	36	38	104.79	353.018	22	32	0	1	0	6	5	1	2	0	0	0	6	10	0	0	0	0	0	0	1	1	1	2	4	0	7	0	0	2.91
12	2	113	115	105.44	355.011	3	33	1	4	0	6	4	1	2	0	0	0	6	27	0	1	0	0	0	0	5	2	0	1	1	0	4	0	0	6.81
12	3	10	12	105.84	356.237	5	22	0	7	0	4	9	2	5	0	0	0	6	13	0	0	0	0	0	0	2	2	1	2	16	0	2	0	0	0.00
12	3	112	114	106.70	358.874	1	25	0	2	0	2	36	4	1	0	0	0	8	13	0	0	0	0	0	0	3	1	0	2	0	0	2	0	0	0.33
12	4	33	35	107.30	360.713	3	9	0	0	0	0	13	0	1	0	36	0	17	5	1	1	0	1	0	1	3	4	0	2	0	0	2	0	0	1.83
12	4	133	135	108.15	363.319	7	29	1	2	0	3	9	1	1	0	1	0	8	23	0	2	0	1	0	0	2	3	0	1	1	0	4	0	0	7.46
12	5	13	15	108.40	364.086	1	27	0	3	0	4	11	1	2	0	0	0	9	26	0	0	0	0	0	0	5	4	1	1	2	0	4	0	0	1.79
12	5	113	115	109.25	366.692	1	25	0	0	0	0	25	1	1	0	5	0	14	10	0	5	0	1	1	1	1	4	0	3	0	0	1	0	0	2.48
12	6	127	129	110.69	371.106	3	9	0	1	0	1	63	0	0	0	4	0	9	0	1	1	0	1	0	0	0	3	0	2	1	0	0	0	0	7.41
12	7	37	39	111.20	372.670	3	28	0	4	0	2	26	1	2	1	0	0	17	0	0	2	0	1	0	0	1	6	0	2	2	0	3	0	0	0.65
12	7	127	129	111.96	375.000	3	22	0	1	0	1	36	1	1	1	0	0	21	0	1	4	0	0	0	0	1	3	0	1	0	0	1	0	0	1.15
12	8	28	30	112.39	377.520	5	24	0	0	0	2	29	1	1	0	0	0	19	0	1	6	0	0	0	0	2	2	0	3	0	0	2	0	0	0.58
13	2	89	91	114.65	390.766	6	21	0	4	0	4	7	0	2	0	0	0	10	0	0	0	0	0	1	0	21	8	1	1	1	0	7	0	7	0.33
13	2	146	148	115.15	393.696	0	35	0	2	0	3	31	1	1	0	0	0	9	0	2	0	0	0	0	1	3	4	0	3	0	0	3	0	1	0.00
13	3	3	5	115.21	394.048	0	13	1	6	0	2	45	1	1	0	0	0	9	0	6	0	0	1	0	1	1	5	0	4	0	0	4	0	0	0.00
13	3	131	133	116.33	400.612	0	20	1	2	0	1	62	1	2	0	0	0	3	0	0	0	0	0	1	0	1	2	0	1	0	0	3	0	0	0.00
13	3	133	135	116.35	400.729	1	21	0	1	0	0	56	1	1	1	0	0	1	0	0	0	0	3	0	3	0	4	1	2	0	1	2	0	1	0.00
13	3	136	138	116.37	400.846	0	18	0	1	0	1	60	1	0	1	0	0	2	0	0	0	0	1	3	0	1	5	0	1	0	0	3	0	1	0.29
13	3	146	148	116.46	401.374	2	11	0	1	0	0	69	1	1	1	0	0	2	0	1	0	0	0	1	2	0	6	0	2	0	0	1	0	0	0.00
13	4	1	2	116.50	401.608	0	13	0	4	0	1	62	1	2	0	0	0	3	0	0	0	0	0	1	2	0	4	0	4	0	1	3	0	0	0.00
13	4	4	5	116.53	401.784	0	24	0	1	0	4	61	0	0	0	0	0	1	0	0	0	0	0	0	2	0	3	0	1	0	1	1	0	1	0.00
13	4	7	8	116.56	401.960	0	23	1	2	0	1	55	1	0	0	0	0	2	0	0	0	0	0	1	3	0	2	0	1	2	1	3	0	0	0.00
13	4	10	11	116.58	402.077	0	17	2	0	0	0	66	2	1	0	0	0	0	0	0	0	0	0	2	0	0	4	0	3	1	0	1	0	0	0.00
13	4	13	14	116.61	402.253	2	7	0	1	0	1	77	1	1	0	0	0	2	0	0	0	0	0	1	1	0	3	0	1	1	0	0	0	0	0.00
13	4	16	17	116.63	402.370	1	14	0	2	0	1	63	0	2	1	0	0	3	0	0	0	0	0	0	0	0	4	0	1	4	0	3	0	0	0.00
13	4	19	20	116.66	402.546	0	4	0	1	0	1	81	1	1	0	0	0	1	0	1	0	0	0	0	1	0	4	0	2	1	0	1	0	0	0.00
13	4	21	22	116.68	402.663	0	5	0	3	0	1	63	2	2	0	0	0	1	0	0	0	0	0	0	1	0	8	0	4	4	0	4	0	0	0.00
13	4	60	61	117.02	404.656	0	6	0	1	0	1	81	0	1	0	0	0	1	0	0	0	0	0	1	1	0	3	0	1	0	1	1	0	1	0.00
13	4	63	64	117.04	404.773	0	7	1	2	0	2	72	1	2	0	0	0	2	0	0	0	0	0	1	0	0	4	0	2	2	1	1	0	0	0.00
13	4	69	70	117.09	405.066	0	4	0	1	0	3	76	0	2	0	0	0	0	0	0	0	0	1	1	1	0	2	0	4	2	0	1	0	1	0.00
13	4	72	73	117.12	405.242	1	5	0	0	0	1	74	3	3	0	0	0	2	0	0	0	0	0	1	2	0	3	0	3	2	0	0	0	1	0.00
13	4	75	76	117.15	405.418	1	6	0	0	0	0	81	0	1	1	0	0	2	0	0	0	0	0	1	1	0	2	0	3	1	0	1	0	0	0.00
13	4	78	79	117.17	405.535	1	8	0	1	0	0	77	0	2	0	0	0	1	0	0	0	0	0	1	1	0	0	0	3	3	0	0	0	1	0.00
13	4	81	82	117.20	405.711	1	8	1	3	0	2	70	1	4	0	0	0	1	0	0	0	0	0	0	2	0	1	0	2	1	1	2	0	0	0.00
13	4	84	85	117.22	405.828	0	5	1	0	0	4	71	0	2	0	0	0	1	0	0	0	0	0	2	1	0	2	0	3	3	0	4	0	0	0.00
13	4	87	88	117.25	406.004	1	4	0	1	0	1	85	0	0	0	0	0	2	0	0	0	0	0	1	0	0	2	0	1	0	0	1	0	1	0.00
13	4	90	91	117.28	406.179	1	11	0	0	0	1	77	0	1	0	0	0	1	0	0	0	0	0	1	1	0	2	0	1	0	1	0	0	1	0.00
13	4	93	94	117.30	406.297	1	9	0	1	0	0	81	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0	1	1	2	1	0	0	0.00
13	4	96	97	117.33	406.473	2	11	0	0	0	0	73	1	0	0	0	0	2	0	0	0	0	1	2	1	0	2	0	4	0	0	1	0	1	0.00
13	4	99	100	117.36	406.648	1	6	0	1	0	3	75	1	1	0	0	0	4	0	0	0	0	0	1	0	0	5	0	1	0	1	1	0	0	0.00
13	4	102	103	117.38	406.766	0	1	1	0	0	1	84	0	1	0	0	0	3	0	0	0	0	0	0	2	0	2	0	3	0	0	1	0	1	0.00
13	4	105	106	117.41	406.941	0	5	0	1	0	1	81	0	0	0	0	0	1	0	0	0	0	0	0	0	0	5	0	2	0	1	2	0	0	0.00
13	4	108	109	117.43	407.059	0	6	0	2	0	0	79	0	1	0	0	0	2	0	0	0	0	0	2	1	0	2	0	4	0	0	1	0	0	0.00
13	4	111	112	117.46	407.234	0	6	0	1	0	1	74	1	0	1	0	0	3	0	0	0	0	0	1	1	0	7	0	1	0	0	2	0	0	0.00
13	4	113	114	117.48	407.352	0	7	0	2	0	0	80	1	0	0	0	0	2	0	0	0	0	0	2	0	0	2	0	2	0	0	2	0	0	0.00
13	4	115	116	117.50	407.469	1	2	0	1	0	1	80	2	3	0	0	0	2	0	0	0	0	0	0	1	0	3	0	3	1	0	2	0	0	0.00
13	4	117	118	117.51	407.527	0	9	0	0	0	1	82	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	3	0	0	1	0	0	0.00
13	4	119	120	117.53	407.645	0	10	1	1	0	1	71	2	0	0	0	0	2	0	0	0	0	1	1	1	0	8	0	2	0	0	1	0	0	0.00
13	4	121	122	117.55	407.762	0	8	0	1	0	0	79	0	1	0	0	0	2	0	0	0	0	0	1	0	0	5	0	3	0	0	0	0	0	0.00
13	4	123	124	117.57	407.879	0	14	1	1	0	1	58	1	0	0	0	0	5	0	0	0	0	2	3	2	0	8	0	2	0	1	1	0	0	0.30
13	4	125	126	117.58	407.938	0	9	1	3	0	1	74	1	1	0	0	0	2	0	0	0	0	0	0	0	0	3	0	2	0	2	1	0	0	0.00
13	4	127	128	117.60	408.055	0	12	0	1	0	0	72	0	0	0	0	0	4	0	0	0	0	0	3	1	0	3	0	2	0	0	1	0	0	0.00
13	4	129	130	117.62	408.172	2	16	0	0	0	1	63	1	0	0	0	0	3	0	0	0	0	1	3	0	0	1	0	5	0	0	3	0	0	0.00
13	4	131	132	117.64	408.289	0	15	1	1	0	2	64	0	0	0	0	0	4	0	0	0	0	1	1	1	0	5	0	3	0	0	3	0	0	0.00

Table 3. ODP Hole 1002C foraminifer census data, percent assemblage. Planktic foraminifer percentages are calculated as percent of total planktic foraminifer assemblage. Benthic foraminifer percentages are calculated as percent of total foraminifer assemblage.

Core	Sct	Top (cm)	Bot (cm)	Depth (rmbsf)	age (kyrs)	Orbulina	Gl. ruber	Gl. conglobatus	Gl. sacculifer	Sphaeroidinella	Gn. aequilateralis	G. bulloides	G. falconensis	G. rubescens	T. quinqueloba	N. pachyderma (s)	N. pachyderma (d)	N. dutertrei	Gr. inflata	Gr. crassiformis	N. "dupac"	Gr. hirsuta	Gr. scitula	Gr. menardii	Gr. tumida	Gr. truncatulinoides	Ga. glutinata	G. digitata	other	G. tenellus	Gr. ungulata	Gn. calida	G. cf woodi	Pulleniatina	Benthic Forams
13	4	133	134	117.65	408.348	1	10	0	2	0	0	74	0	0	0	0	0	3	0	0	0	0	0	2	1	0	3	0	2	0	0	2	0	0	0.00
13	4	135	136	117.67	408.465	1	9	0	2	0	1	73	1	0	0	0	0	3	0	0	0	0	1	2	1	0	2	0	2	0	0	1	0	0	0.00
13	4	137	138	117.69	408.582	0	10	0	2	0	0	80	1	0	0	0	0	2	0	0	0	0	0	2	0	0	1	0	1	0	0	0	0	0	0.00
13	4	139	140	117.71	408.700	0	10	0	1	0	0	75	0	0	0	0	0	5	0	0	0	0	1	1	1	0	3	0	1	1	0	2	0	0	0.00
13	4	141	142	117.72	408.758	0	14	0	2	0	0	66	1	0	1	0	0	5	0	0	0	0	0	0	1	0	2	0	3	1	0	2	0	0	0.00
13	4	143	144	117.74	408.875	1	9	0	1	0	2	76	0	0	0	0	0	3	0	0	0	0	0	1	0	0	1	0	2	1	0	2	0	0	0.00
13	4	145	146	117.76	408.993	1	7	0	2	0	0	76	1	0	1	0	0	2	0	0	0	0	1	0	1	0	3	0	2	0	1	2	0	0	0.00
13	4	147	148	117.78	409.110	1	12	0	2	0	0	68	1	3	1	0	0	4	0	0	0	0	0	0	2	0	4	0	1	1	0	0	0	0	0.00
13	4	149	150	117.79	409.168	1	5	0	2	0	0	81	1	1	0	0	0	3	0	0	0	0	0	1	1	0	3	0	1	0	0	1	0	0	0.00
13	5	1	2	117.81	409.286	0	12	0	1	0	0	69	1	2	3	0	0	2	0	0	0	0	0	1	2	0	2	0	1	1	0	2	0	0	0.00
13	5	3	4	117.83	409.403	0	10	0	2	0	1	72	1	1	0	0	0	3	0	0	0	0	1	0	1	0	2	0	2	1	0	2	0	0	0.00
13	5	5	6	117.84	409.462	0	11	0	2	0	2	67	0	2	2	0	0	4	0	1	0	0	0	1	1	0	3	0	2	1	0	2	0	0	0.00
13	5	7	8	117.86	409.579	0	19	0	3	0	0	58	1	3	0	0	0	3	0	0	0	0	0	0	3	0	3	0	2	2	0	2	0	0	0.00
13	5	9	10	117.88	409.696	0	17	0	4	0	0	61	0	2	1	0	0	2	0	0	0	0	1	2	2	0	3	0	2	2	0	1	0	0	0.00
13	5	11	12	117.90	409.813	0	14	0	3	0	1	56	1	1	0	0	0	5	0	0	0	0	0	0	1	0	8	0	4	2	1	1	0	0	0.68
13	5	13	14	117.91	409.872	1	11	0	1	0	2	73	0	2	0	0	0	0	0	0	0	0	0	1	1	0	4	0	2	1	0	2	0	0	0.00
13	5	15	16	117.93	409.989	0	8	1	2	0	2	71	0	0	2	0	0	4	0	0	0	0	0	0	0	0	3	0	1	3	0	3	0	0	0.00
13	5	17	18	117.95	410.106	1	11	0	2	0	1	64	1	1	1	0	0	2	0	0	0	0	0	1	1	0	7	0	2	3	0	1	0	0	0.00
13	5	19	20	117.97	410.223	1	7	0	2	0	1	72	0	1	0	0	0	2	0	1	0	0	1	0	1	0	5	0	2	1	0	2	0	0	0.00
13	5	21	22	117.98	410.282	1	9	0	1	0	1	69	2	1	1	0	0	2	0	0	0	0	0	1	0	0	5	0	1	3	0	2	0	0	0.00
13	5	23	24	118.00	410.399	0	14	0	2	0	1	62	0	4	1	0	0	4	0	0	0	0	0	0	1	0	6	0	2	1	0	2	0	0	0.00
13	5	25	26	118.02	410.516	1	11	0	2	0	2	61	1	1	0	0	0	4	0	1	0	0	0	0	3	0	8	0	2	1	1	3	0	0	0.00
13	5	27	28	118.04	410.634	3	13	0	3	0	0	59	1	1	1	0	0	7	0	0	1	0	0	0	1	0	4	0	1	1	1	2	0	0	0.00
13	5	29	30	118.05	410.692	3	6	0	1	0	0	69	0	1	2	0	0	5	0	0	0	0	1	0	1	0	3	0	3	2	1	2	0	0	0.00
13	5	31	32	118.07	410.810	2	11	0	1	0	3	56	1	4	1	0	0	4	0	0	0	0	0	1	3	0	4	0	1	6	0	3	0	0	0.00
13	5	33	34	118.09	410.927	1	19	1	3	0	1	48	0	3	0	0	0	4	0	0	0	0	2	0	2	0	4	0	2	3	2	3	0	1	0.00
13	5	35	36	118.11	411.044	1	15	0	3	0	1	63	1	1	2	0	0	2	0	0	0	0	1	0	1	0	3	0	1	1	2	3	0	0	0.31
13	5	37	38	118.12	411.103	1	11	0	1	0	1	70	0	0	1	0	0	3	0	0	0	0	1	0	1	0	5	0	1	0	1	2	0	0	0.00
13	5	39	40	118.14	411.220	2	12	0	2	0	1	69	2	0	1	0	0	3	0	0	0	0	0	2	0	0	4	0	0	0	0	1	0	0	0.00
13	5	41	42	118.16	411.337	0	5	0	2	0	2	80	0	1	1	0	0	2	0	0	0	0	1	0	1	0	2	0	1	0	0	1	0	0	0.00
13	5	43	44	118.18	411.454	1	4	0	3	0	1	76	2	0	1	0	0	2	0	0	0	0	1	0	1	0	5	0	2	1	0	1	0	0	0.00
13	5	45	46	118.19	411.513	2	5	1	3	0	0	67	1	0	1	0	0	3	0	6	0	0	0	2	0	0	6	0	1	1	0	2	0	0	0.00
13	5	47	48	118.21	411.630	3	7	0	1	0	0	73	2	0	0	0	0	1	0	2	0	0	0	0	1	0	6	0	2	1	0	1	0	0	0.00
13	5	49	50	118.23	411.747	1	7	0	0	0	1	73	0	0	0	0	0	2	0	3	0	0	2	1	0	0	3	0	2	2	1	1	0	0	0.00
13	5	51	52	118.25	411.864	0	8	0	1	0	0	73	0	0	1	0	0	2	0	3	0	0	0	1	1	0	3	0	4	0	0	1	0	0	0.00
13	5	53	54	118.26	411.923	2	6	0	2	0	0	69	1	0	0	0	0	3	0	6	0	0	0	0	1	0	4	0	3	0	1	1	0	0	0.00
13	5	55	56	118.28	412.040	0	10	0	2	0	5	57	0	1	0	0	0	4	0	6	0	0	0	1	1	0	4	0	2	2	1	2	0	0	0.00
13	5	57	58	118.30	412.158	0	16	0	2	0	4	54	2	0	0	0	0	5	0	6	0	0	0	0	2	0	3	0	3	0	2	1	0	0	0.00
13	5	59	60	118.32	412.275	1	18	0	2	0	4	54	1	0	1	0	0	4	0	3	0	0	0	0	1	0	4	0	3	1	2	1	0	0	0.00
13	5	62	63	118.34	412.392	0	6	0	1	0	3	71	3	1	0	0	0	2	0	2	0	0	0	0	0	0	4	0	4	0	2	1	0	0	0.00
13	5	65	66	118.37	412.568	0	9	0	1	0	2	66	2	0	0	0	0	3	0	5	0	0	1	0	2	0	4	0	3	0	0	1	0	0	0.00
13	5	68	69	118.40	412.744	0	19	0	2	0	1	58	1	0	0	0	0	4	0	4	0	0	1	1	0	0	5	0	2	0	0	1	0	0	0.32
13	5	71	72	118.42	412.861	3	13	0	1	0	1	56	0	0	2	0	0	4	0	6	0	0	0	0	2	0	7	0	3	0	1	2	0	0	0.00
13	5	74	75	118.45	413.037	1	11	0	0	0	0	61	1	0	0	0	0	4	0	6	0	0	0	0	1	0	7	0	4	0	0	2	0	0	0.00
13	5	77	78	118.47	413.154	1	9	0	0	0	0	73	0	0	0	0	0	2	0	5	0	0	0	1	0	0	6	0	2	0	0	1	0	0	0.00
13	5	80	81	118.50	413.330	0	11	1	1	0	2	62	2	0	2	0	0	3	0	5	0	0	0	1	0	0	6	0	2	1	0	2	0	0	0.00
13	5	109	110	118.75	414.795	0	22	0	2	0	7	40	0	1	0	0	0	3	0	0	2	0	7	0	0	0	7	0	3	0	0	5	0	0	0.00
13	6	9	11	119.19	417.374	0	11	1	0	0	0	48	3	0	0	1	5	8	0	2	6	0	1	0	0	0	6	0	3	1	0	2	0	0	0.00
13	6	49	51	119.54	419.425	1	6	0	1	0	2	57	3	0	1	0	0	8	0	8	2	0	1	0	0	0	3	1	4	0	0	3	0	0	0.00
13	6	119	121	120.15	423.000	1	11	0	1	0	5	7	0	0	1	1	5	34	0	6	23	0	1	0	0	0	2	0	1	1	0	2	0	0	0.00
13	7	39	41	120.77	426.634	11	9	0	0	0	5	2	1	0	33	0	0	4	3	0	0	0	0	0	0	0	27	0	0	0	0	5	0	0	0.00

Table 3. *continued*

Core	Sct	Top (cm)	Bot (cm)	Depth (rmbsf)	Age (Ka)	δO18 ruber	δC13 ruber
11 H	6	111	113	100.87	341.000	1.09	0.13
11 H	6	147	149	101.19	341.981	0.35	-0.07
11 H	7	3	5	101.27	342.226	0.30	0.29
11 H	7	116	118	102.30	345.384	0.59	0.47
11 H	7	118	120	102.31	345.415	0.69	0.25
12 H	1	39	41	103.67	349.584	0.10	0.51
12 H	1	108	110	104.32	351.577	0.92	0.23
12 H	1	110	112	104.34	351.638	0.55	0.42
12 H	2	36	38	104.79	353.018	0.45	0.45
12 H	2	113	115	105.44	355.011	0.58	0.39
12 H	3	10	12	105.84	356.237	0.48	0.65
12 H	3	112	114	106.70	358.874	0.19	0.68
12 H	4	33	35	107.30	360.713	0.18	0.57
12 H	4	133	135	108.15	363.319	0.27	0.35
12 H	5	13	15	108.40	364.086	-0.34	-0.781 **
12 H	5	113	115	109.25	366.692	-0.55	1.14
12 H	8	127	129	110.69	371.106	-0.37	0.88
12 H	7	37	39	111.20	372.670	-0.16	0.99
12 H	7	127	129	111.96	375.000	0.06	1.08
12 H	8	28	30	112.39	377.520	-0.32	0.87
13 H	2	89	91	114.65	390.766	-0.93	1.35
13 H	2	146	148	115.15	393.696	-1.17	1.16
13 H	3	3	5	115.21	394.048	-0.97	1.07
13 H	3	131	133	116.33	400.612	-1.22	1.03
13 H	3	133	135	116.35	400.729	-1.13	1.17
13 H	3	136	138	116.37	400.846	-0.86	0.90
13 H	3	146	148	116.46	401.374	-1.31	1.47
13 H	4	1	2	116.50	401.608	-1.37	0.80
13 H	4	4	5	116.53	401.784	-1.27	0.89
13 H	4	7	8	116.56	401.960	-1.10	1.03
13 H	4	10	11	116.58	402.077	-1.19	0.98
13 H	4	13	14	116.61	402.253	-1.42	0.60
13 H	4	16	17	116.63	402.370	-1.47	1.22
13 H	4	19	20	116.66	402.546	-0.96	0.93
13 H	4	21	22	116.68	402.663	-1.36	1.22
13 H	4	60	61	117.02	404.656	-1.36	0.47
13 H	4	63	64	117.04	404.773	-2.10	1.45
13 H	4	69	70	117.09	405.066	-1.71	0.74
13 H	4	72	73	117.12	405.242	-1.75	0.82
13 H	4	75	76	117.15	405.418	-1.19	0.84
13 H	4	78	79	117.17	405.535	-1.14	0.96
13 H	4	81	82	117.20	405.711	-1.82	1.14
13 H	4	84	85	117.22	405.828	-2.23	1.28
13 H	4	87	88	117.25	406.004	-1.88	1.34
13 H	4	90	91	117.28	406.179	-1.41	1.13
13 H	4	93	94	117.30	406.297	-1.54	0.99
13 H	4	96	97	117.33	406.473	-1.97	1.03
13 H	4	99	100	117.36	406.648		
13 H	4	102	103	117.38	406.766	-1.92	1.21
13 H	4	105	106	117.41	406.941	-1.48	1.38
13 H	4	108	109	117.43	407.059	-1.50	0.89
13 H	4	111	112	117.46	407.234	-1.38	1.15
13 H	4	113	114	117.48	407.352	-1.35	1.34
13 H	4	115	116	117.50	407.469	-1.48	1.20
13 H	4	117	118	117.51	407.527	-1.02	0.92
13 H	4	119	120	117.53	407.645	-1.26	0.78
13 H	4	121	122	117.55	407.762	-1.51	0.93

Core	Sct	Top (cm)	Bot (cm)	Depth (rmbsf)	Age (Ka)	δO18 ruber	δC13 ruber
13 H	4	123	124	117.57	407.879	-1.00	1.14
13 H	4	125	126	117.58	407.938	-1.41	1.11
13 H	4	127	128	117.60	408.055	-1.30	1.14
13 H	4	129	130	117.62	408.172	-1.13	0.93
13 H	4	131	132	117.64	408.289	-1.18	0.92
13 H	4	133	134	117.65	408.348	-1.53	1.02
13 H	4	135	136	117.67	408.465	-1.43	1.48
13 H	4	137	138	117.69	408.582	-1.09	0.52
13 H	4	139	140	117.71	408.700	-1.75	1.39
13 H	4	141	142	117.72	408.758	-1.36	0.79
13 H	4	143	144	117.74	408.875	-0.87	0.96
13 H	4	145	146	117.76	408.993	-1.43	1.12
13 H	4	147	148	117.78	409.110	-0.90	1.14
13 H	4	149	150	117.79	409.168	-0.95	1.03
13 H	5	1	2	117.81	409.286	-1.24	1.12
13 H	5	3	4	117.83	409.403	-1.11	0.88
13 H	5	5	6	117.84	409.462	-0.96	0.70
13 H	5	7	8	117.86	409.579	-1.33	1.27
13 H	5	9	10	117.88	409.696	-1.87	1.64
13 H	5	11	12	117.90	409.813	-1.43	1.08
13 H	5	13	14	117.91	409.872	-1.19	1.27
13 H	5	15	16	117.93	409.989	-1.30	0.74
13 H	5	17	18	117.95	410.106	-1.46	0.91
13 H	5	19	20	117.97	410.223	-0.84	0.71
13 H	5	21	22	117.98	410.282	-1.15	0.49
13 H	5	23	24	118.00	410.399	-1.61	1.09
13 H	5	25	26	118.02	410.516	-1.37	1.05
13 H	5	27	28	118.04	410.634	-1.73	1.22
13 H	5	29	30	118.05	410.692	-2.14	1.18
13 H	5	31	32	118.07	410.810	-1.98	1.15
13 H	5	33	34	118.09	410.927	-1.12	0.68
13 H	5	35	36	118.11	411.044	-1.44	0.96
13 H	5	37	38	118.12	411.103	-1.80	0.42
13 H	5	39	40	118.14	411.220	-1.73	1.08
13 H	5	41	42	118.16	411.337	-1.59	1.21
13 H	5	43	44	118.18	411.454	-1.83	1.33
13 H	5	45	46	118.19	411.513	-2.09	1.15
13 H	5	47	48	118.21	411.630	-1.65	1.09
13 H	5	49	50	118.23	411.747	-1.32	1.07
13 H	5	51	52	118.25	411.864	-1.71	0.81
13 H	5	53	54	118.26	411.923	-1.59	0.88
13 H	5	55	56	118.28	412.040	-1.82	1.33
13 H	5	57	58	118.30	412.158	-1.17	1.13
13 H	5	59	60	118.32	412.275	-0.52	-0.956 **
13 H	5	62	63	118.34	412.392	-1.65	0.89
13 H	5	65	66	118.37	412.568	-1.39	0.99
13 H	5	68	69	118.40	412.744	-1.54	1.21
13 H	5	71	72	118.42	412.861	-1.18	0.99
13 H	5	74	75	118.45	413.037	-0.92	0.84
13 H	5	77	78	118.47	413.154	-1.72	0.91
13 H	5	80	81	118.50	413.330	-1.79	1.01
13 H	5	109	110	118.75	414.795	-1.14	1.17
13 H	6	9	11	119.19	417.374	-1.21	0.66
13 H	6	49	51	119.54	419.425	-0.87	0.72
13 H	6	119	121	120.15	423.000	-0.05	0.29
13 H	7	39	41	120.77	426.634	0.03	0.01

Table 4. ODP 1002C *Globigerinoides ruber* (white variety) stable isotope measurements. Negative $\delta^{13}C$ marked with an asterisk are suspect.