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accompanying manuscript G21466 (MacLeod et al.)

Biostratigraphic, magnetostratigraphic, and Sr isotopic data and the construction of age models for the Maastrichtian at ODP Sites 1049 (= DSDP Site 390), 1050, and 1052.

Age models for the Maastrichtian at the three Blake Nose sites are based on sediment accumulation rates (compacted) calculated using linear fits to available chronostratigraphic data. A number of biostratigraphic and paleomagnetic datums as well as strontium isotopic data are available at each of the sites. We calculated average sedimentation rates across relatively long stratigraphic intervals rather than multiple segments constrained by a few datums because

1) in these sections coring gaps and sampling resolution introduce considerable uncertainty in the precise depth of datums,
2) individual Sr-based "ages" have greater uncertainty than biostratigraphic or paleomagnetic datums (that is, trends in Sr data are more informative than any individual points), and
3) there is no sedimentological support for large changes in pelagic sedimentation rates as implied in age models constructed by connecting adjacent chronostratigraphic data points.

However, the age models did incorporate estimates of missing time across major lithologic breaks in the sections (see MacLeod et al., 2003) as described below. Most importantly, conclusions regarding stable isotopic trends through the section are not dependent on the age model. That is, an interval of regional warming spanning much of the Maastrichtian is indicated regardless of the age model employed.

Table 1: Biostratigraphic and Paleomagnetic data

Datum	Age	ref.	1049C		1050C		1052E	
			Min. Depth	Max. Depth	Min. Depth	Max. Depth	Min. Depth	Max. Depth
K/T boundary	65.0	1	113.07	113.07	405.97[#]	405.97[#]	302.18[*]	302.18[*]
FO *P. hariaensis*	66.8	2	124.01	125.08	427.49	427.92	328.88	330.32
base C30N	67.6	3					335.62	338.71
FO *M. murus*	68.5	4			446.30	448.20	367.90	377.10
FO *A. mayaroensis*	68.8	5	125.47[*]	125.47[*]	451.67		368.85	377.10
base C31N	68.8	3			452.47	453.03	386.26	386.73
LO *R. levis*	69.4	4					415.60	418.50
FO *R. fructicosa*	69.6	5	125.56	126.54	463.63		424.22	425.22
LO *T. phacelosus*	71.6	4			475.20	478.20		
LO *A. parcus*	74.6	4			478.20	478.90		
LO *R. calcarata*	75.2	5	130.20	130.7	478.15	478.86		
FO *R. calcarata*	76.4	5	132.33	132.40	478.86	481.69		

[*] datum falls at a significant hiatus and is therefore not included in calculation of sedimentation rates

[#] age of 65.05 is used for K/T boundary in Hole 1050C based on an apparent minor hiatus calculated to span ~50,000 years by Wilf et al., (2003).

Foraminiferal datums from Tur and Huber (2002 and unpublished data); nannofossil datums from Self-Trail (2001); paleomagnetic datums from Ogg and Bardot (2001). The level in which the datum was observed and the superjacent or subjacent sample examined are given in meters below sea floor (mbsf). The midpoint between these samples is used to constrain the age model. Age estimates are from 1- Cande and Kent (1995), 2- Li and Keller, 1998; 3-Ogg and Bardot, 2001; 4-Erba et al, 1995, 5- Robaszynski and Caron, 1995. An age of 65.0 Ma (Cande and Kent, 1995) is used for the K/T boundary instead of the more recent estimate of 65.5 Ma (Hicks et al., 2002) because the Maastrichtian and Campanian datums and the Sr/age curve have not been recalibrated using this revised K/T age estimate.

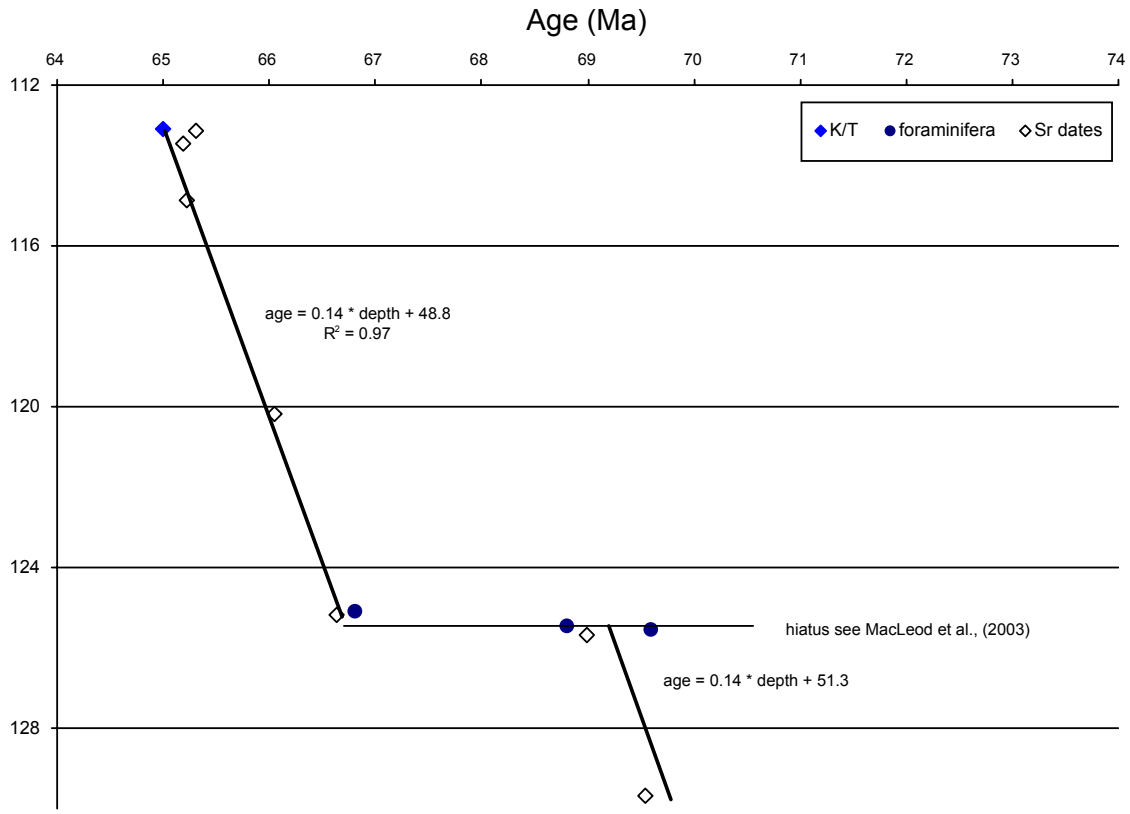
Table 2: Strontium isotopic data

Sample	depth (mbsf)	measured $^{87}Sr/^{86}Sr$	adjusted $^{87}Sr/^{86}Sr$	estimated age
1049C-8X-5, 105 cm	113.15	0.707848	0.707831	65.3
1049C-8X-5, 135 cm	113.45	0.707851	0.707833	65.18
1049C-8X-6, 45 cm	114.05	0.707864	0.707847	*
1049C-8X-6, 125 cm	114.85	0.707849	0.707832	65.22
1049C-8X-7, 20 cm	115.30	0.707875	0.707858	*
1049C-9X-2, 50 cm	117.70	0.707855	0.707838	*
1049C-9X-CC	120.18	0.707839	0.707822	66.04
1049C-10H-2, 50 cm	122.20	0.707852	0.707835	*
1049C-10H-4, 50 cm	125.20	0.707824	0.707807	66.64
1049C-10H-4, 100 cm	125.70	0.707791	0.707774	68.99
1049C-10X-CC	129.70	0.707783	0.707765	69.55
1049C-11X-2, 113 cm	132.33	0.707760	0.707743	70.74
1050C-11-1, 42.5 cm	409.13	0.707866	0.707848	*
1050C-13R, 65 cm	423.95	0.707840	0.707823	65.99
1050C-13R, 65 cm	429.95	0.707819	0.707802	66.92
1050C-15R-1, 82 cm	443.42	0.707825	0.707808	66.59
1050C-15-6, 35 cm	450.45	0.707793	0.707775	68.92
1050C-17R-1, 37 cm	462.17	0.707796	0.707779	68.64
1050C-17-2, 25 cm	463.55	0.707801	0.707784	68.29
1050C-17-2, 27 cm	463.57	0.707791	0.707773	69.05
1050C-17-2, 30 cm	463.60	0.707774	0.707757	70.04
1050C-17-2, 33 cm	463.63	0.707778	0.707761	69.80
1050C-17-2, 35 cm	463.65	0.707794	0.707777	68.78
1050C-18-1, 0 cm	471.40	0.707765	0.707748	70.50
1050C-18-1, 3 cm	471.43	0.707774	0.707756	70.10
1050C-18R, 5 cm	471.45	0.707759	0.707742	70.78
1050C-18-1, 7 cm	471.47	0.707775	0.707758	69.98
1050C-18-1, 10 cm	471.50	0.707764	0.707746	70.60
1050C-18-1, 34 cm	471.74	0.707779	0.707762	69.74
1050C-18-1, 37 cm	471.77	0.707786	0.707769	69.31
1050C-18-1, 39 cm	471.79	0.707753	0.707736	71.04
1050C-18R, 42 cm	471.82	0.707769	0.707752	70.31
1050C-18-1, 44 cm	471.84	0.707772	0.707755	70.15
1050C-18R, 78 cm	475.18	0.707751	0.707734	71.12
1052E-18R-2, 48 cm	302.08	0.708042	0.708025	65.90

1052E-18R-2, 54 cm	302.14	0.707842	0.707825	65.90
1052E-20R-1, 74 cm	320.04	0.707825	0.707808	66.59
1052E-21R-2, 57 cm	330.97	0.707817	0.707800	67.05
1052E-23R-2, 36 cm	350.16	0.707821	0.707804	66.79
1052E-24R-1, 64 cm	358.54	0.707799	0.707782	68.43
1052E-25R-1, 45 cm	367.95	0.707794	0.707776	68.85
1052E-26R-2, 56 cm	379.16	0.707803	0.707786	68.13
1052E-27R-2, 1 cm	388.21	0.707800	0.707783	68.36
1052E-27R-2, 25 cm	388.45	0.707791	0.707774	68.99
1052E-27R-2, 27 cm	388.47	0.707786	0.707769	69.31
1052E-27R-2, 30 cm	388.5	0.707810	0.707793	67.58
1052E-27R-2, 34 cm	388.54	0.707803	0.707786	68.13
1052E-27R-2, 36 cm	388.56	0.707796	0.707779	68.64
1052E-27R-2, 64 cm	388.84	0.707737	0.707720	71.64
1052E-27R-3, 137 cm	391.07	0.707756	0.707739	70.91
1052E-27R-4, 107 cm	392.27	0.707761	0.707744	70.69
1052E-27R-4, 111 cm	392.31	0.707781	0.707764	69.61
1052E-27R-4, 115 cm	392.35	0.707769	0.707752	70.31
1052E-27R-4, 118 cm	392.38	0.707762	0.707745	70.64
1052E-27R-4, 122 cm	392.42	0.707759	0.707742	70.78
1052E-29R-2, 13 cm	407.53	0.707760	0.707743	70.74
1052E-31R-2, 9 cm	426.69	0.707771	0.707754	70.21
1052E-33R-1, 92 cm	445.22	0.707758	0.707741	70.82
1052E-35R-4, 17 cm	468.27	0.707735	0.707718	71.70

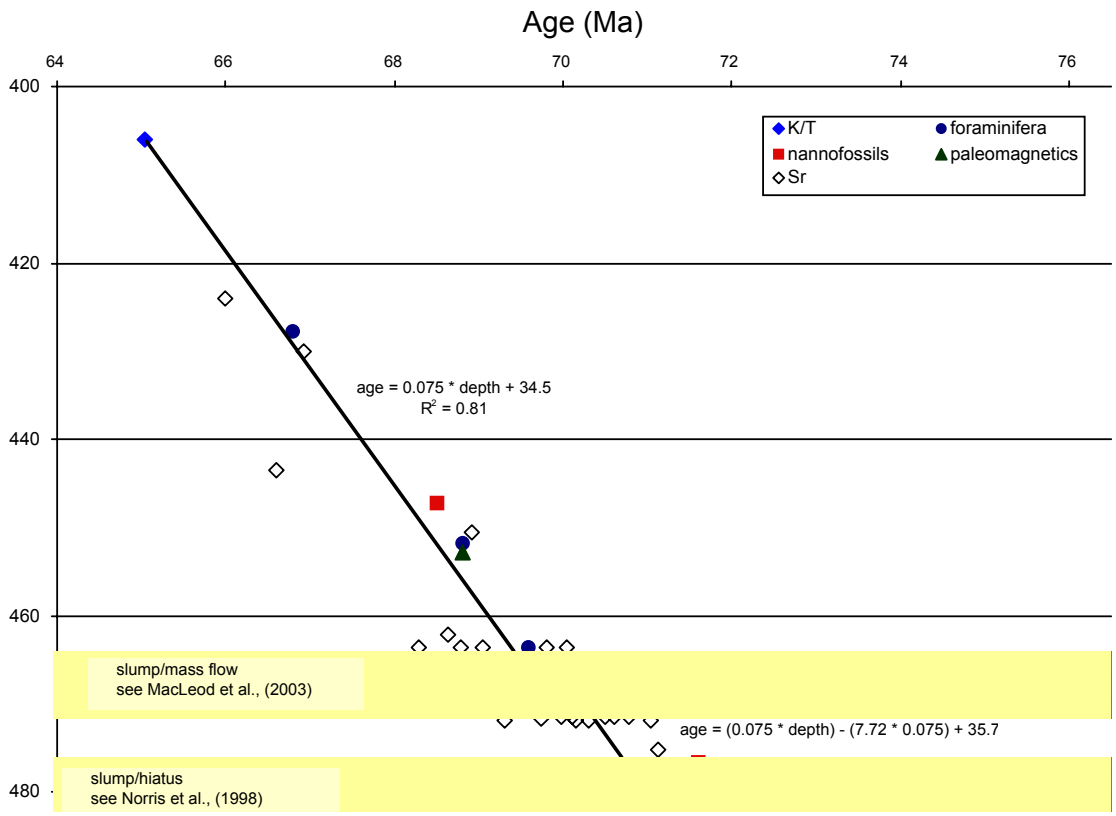
Estimated ages based on $^{86}Sr/^{87}Sr$ ratios reported in MacLeod et al. (2003). Values were adjusted by -0.0000175, an empirical correction for interlaboratory differences (MacLeod et al., 2003), and converted to age using tables from McArthur et al., (2001). * indicate samples with values that fell outside the error range of LOWESS curve. This lack of correspondence reflects the fact that the late Maastrichtian is a local maximum in the seawater $^{87}Sr/^{86}Sr$ curve and that error on the LOWESS curve is much less than analytical error on individual points.

Hole 1049C (= 390A)-



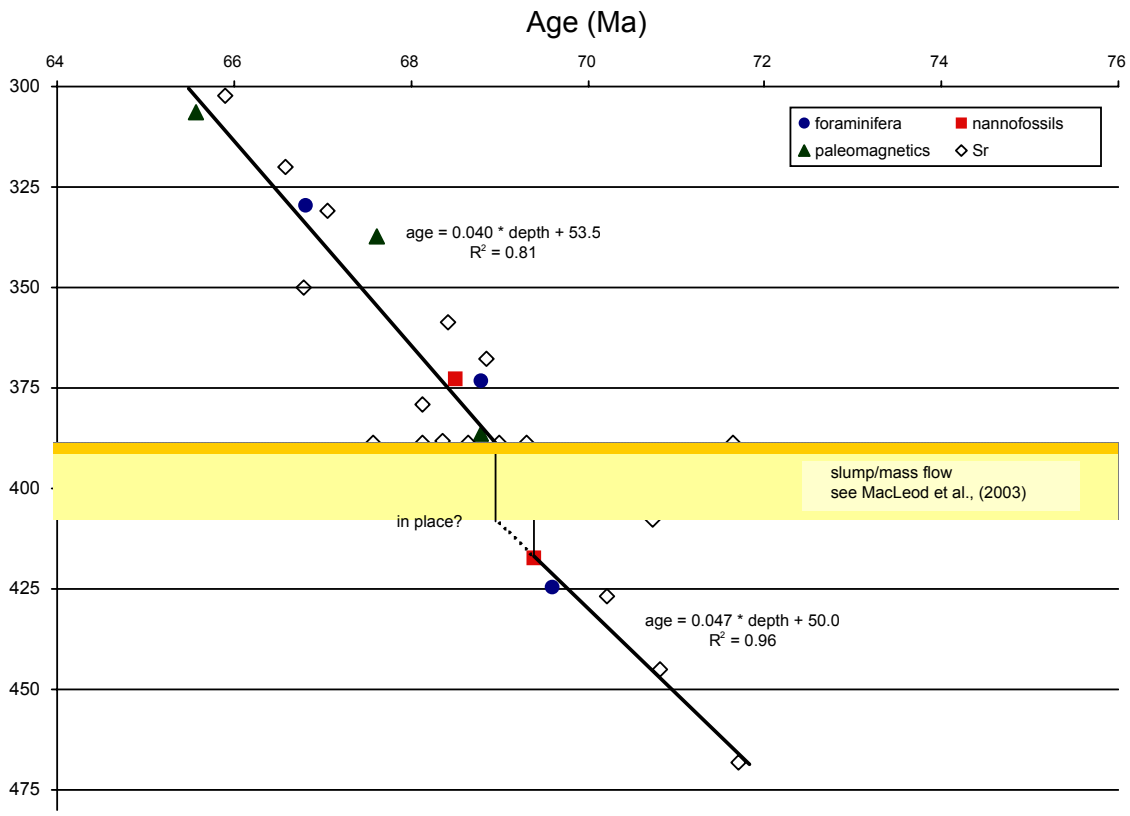
Age/depth relationships for Hole 1049C (= 390A). These two holes were drilled at the same site, and we used the color change that marks a hiatus within the Maastrichtian (e.g., Norris et al., 1998; MacLeod et al., 2003) as a lithologic tie point between them. That is, 125.63 mbsf in Hole 1049C is equivalent to 125.47 mbsf in Hole 390A, and 0.17 m should be added to the depth when using the equations shown for Hole 390A. The age/depth curve was anchored in time at the well constrained K/T boundary in Hole 1049C and is based on a best fit to the data from between the boundary and the color change. We assumed sedimentation rate was the same below the hiatus as above and estimated that the hiatus spanned ~2.5 million years based on the FO of *R. fructicosa* a short distance below the color change and on Sr-based age estimates.

Hole 1050C:



Age/depth relationships used for Hole 1050C. Similar to Hole 1049C (=390A) the age/depth curve was anchored in time at the well constrained K/T boundary. Calculated sedimentation rate is based on a best fit to the data from between the boundary and a mass flow deposit present at ~470 mbsf (Norris et al., 1998; MacLeod et al., 2003). We assume 1.2 million years is missing within the 7.72 m occupied by the mass flow deposit (after MacLeod et al., 2003) and that sedimentation rate was the same below the hiatus as above.

Hole 1052E:



Age/depth relationships used for Hole 1052E. Age/depth curves are based on linear fits to the available data for the intervals above and below a mass flow deposit present at ~390 mbsf (Norris et al., 1998; MacLeod et al., 2003). No stable isotopic data were reported for 390-405 mbsf because of uncertainty in stratigraphic relationships in this interval, but the data from this interval are consistent with trends through the section.

References:

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Erba, E., Premoli Silva, I., and Watkins, D. K., 1995, Cretaceous calcareous plankton biostratigraphy of Sites 872 through 879: College Station, Texas, Ocean Drilling Program, vol. 144, p. 157-169.

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MacLeod, K. G., P. D. Fullagar, and B. T. Huber, 2003, $^{87}Sr/^{86}Sr$ test of the degree of impact induced slope failure in the Maastrichtian of the western North Atlantic, Geology, v. 31, p. 311-314.

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Norris, R.D., Kroon, D., Klaus, A.., et al., 1998, Proceedings of the Ocean Drilling Program, Initial reports, Volume 171B: College Station, Texas, Ocean Drilling Program, 749 p.

Ogg, J.G., and Bardot, L., 2001, Aptian through Eocene magnetostratigraphic correlation of the Blake Nose transect (Leg 171B), Florida continental margin, *in* Kroon, D., et al., eds., Proceedings of the Ocean Drilling Program, Scientific results, Volume 171B: College Station, Texas, Ocean Drilling Program, p. 1–59 [CD-ROM].

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Wilf, P., Johnson, K. R., and Huber, B. T., 2003, Correlated terrestrial and marine evidence for global climate changes before mass extinction at the Cretaceous-Paleogene boundary: Proceedings of the National Academy of Sciences, v. 100, p. 599-604.

Table DR1- Oxygen isotope data for planktonic and benthic foraminifera from DSDP Hole 390A.
Average values plotted for replicates from the same sample.

entries in *blue italics* from

MacLeod, K.G., Huber, B.T., and Ducharme, M.L., 2000, in Huber, B.T., MacLeod, K.G., and Wing, S.L., eds., Warm Climates in Earth History, p. 241-

Hole	Core	Sec.	cm	Depth (mbsf)	Age	*Globotruncana arca*		*Rugoglobigerina* spp.		*Globigerinelloides subcarinatus*		*Heterohelix globulosa*		Benthic	
						$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$
390A	12	3	61	118.06	65.35	1.63	-1.08	2.24	-1.35	1.68	-0.70	1.64	-1.00		
390A	12	3	61	118.06		*1.62*	*-1.10*	*2.22*	*-1.38*	*1.62*	*-0.86*	*1.67*	*-0.90*		
390A	12	3	61	118.06		1.63	-1.06	2.26	-1.32	1.74	-0.54	1.60	-1.09		
390A	12	4	37	119.32	65.53	2.12	-0.81					1.98	-0.80	1.74	0.33
390A	12	4	37	119.32		*2.12*	*-0.81*					*1.99*	*-0.78*	*1.72*	*0.29*
390A	12	4	37	119.32		2.12	-0.81					1.98	-0.82	1.76	0.38
390A	12	5	111	121.56	65.84	1.73	-0.86	2.42	-1.32	1.93	-0.53	1.72	-1.05	1.58	0.49
390A	12	5	111	121.56		*1.73*	*-0.88*	*2.41*	*-1.32*	*1.85*	*-0.64*	*1.70*	*-1.08*	*1.56*	*0.44*
390A	12	5	111	121.56		1.74	-0.84	2.44	-1.32	2.01	-0.42	1.74	-1.02	1.61	0.54
390A	12	6	112	123.07	66.05	2.02	-0.84	2.82	-1.12	1.82	-0.98	1.72	-1.21	1.72	0.59
390A	12	6	112	123.07		*2.02*	*-0.88*	*2.82*	*-1.14*	*1.85*	*-0.98*	*1.77*	*-1.13*	*1.65*	*0.46*
390A	12	6	112	123.07		2.03	-0.80	2.82	-1.10	1.80	-0.99	1.68	-1.30	1.80	0.71
390A	13	1	47	124.37	66.24	2.10	-0.89	2.61	-1.44	2.21	-0.02	1.59	-0.77	1.61	0.51
390A	13	1	47	124.37		*2.08*	*-0.91*	*2.60*	*-1.44*	*2.17*	*0.00*	*1.61*	*-0.77*	*1.60*	*0.49*
390A	13	1	47	124.37		2.11	-0.88	2.63	-1.44	2.25	-0.04	1.57	-0.77	1.62	0.54
390A	13	1	111	125.01	66.33	1.92	-0.79	2.52	-1.39	2.00	-0.48	1.88	-0.98	1.68	0.64
390A	13	1	111	125.01		*1.90*	*-0.78*	*2.50*	*-1.43*	*1.94*	*-0.61*	*1.90*	*-0.93*	*1.66*	*0.66*
390A	13	1	111	125.01		1.94	-0.79	2.54	-1.36	2.07	-0.35	1.86	-1.03	1.69	0.62
390A	13	2	96	126.36	69.01	2.12	-0.65			2.08	-0.21	2.10	-0.48	0.78	0.38
390A	13	2	96	126.36		*2.12*	*-0.65*			*2.05*	*-0.26*	*2.13*	*-0.44*	*0.74*	*0.31*
390A	13	2	96	126.36		2.11	-0.65			2.11	-0.15	2.07	-0.53	0.83	0.45
390A	13	4	113	129.53	69.46	2.24	-0.51	2.14	-0.78	2.13	-0.20	1.98	-0.42	1.99	0.73
390A	13	4	113	129.53		*2.24*	*-0.51*	*2.13*	*-0.81*	*2.08*	*-0.30*	*1.99*	*-0.41*	*1.91*	*0.56*
390A	13	4	113	129.53		2.23	-0.51	2.16	-0.76	2.19	-0.10	1.98	-0.44	2.06	0.89
390A	13	6	35	131.75	69.77	1.98	-0.54	2.00	-0.54	2.09	-0.37	1.89	-0.57	1.57	0.21
390A	13	6	35	131.75		*2.00*	*-0.55*	*1.97*	*-0.58*	*2.03*	*-0.44*	*1.90*	*-0.58*	*1.57*	*0.21*
390A	13	6	35	131.75		1.97	-0.54	2.03	-0.50	2.14	-0.30	1.89	-0.56		

table DR2- Oxygen isotope data for planktonic and benthic foraminifera and bulk carbonate from ODP Hole 1050C.
Average values plotted for replicates from the same sample and for high resolution samples from Core-section 13R-5 and 16R-2

entries in *blue italics* from

MacLeod, K.G., and Huber, B.T., 2001, Geological Society, London, Special Publications, v. 183, p. 111-130.

entries in *green italics* from

MacLeod, K.G., Huber, B.T., Pletsch, T., Röhl, U., and Kucera, M., 2001, Paleoceanography, v. 16, p. 133-154.

Site	Hole	Core		Sec.	cm	mbsf	Age	Bulk/fine carbonates		*Heterohelix globulosa*		*Globigeri-nelloides subcarinatus*		*Pseudo-geumbelina palpebra*		*Rugoglobigeri* spp.	
								$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$
1050	C	10	R	2	70	406.30	65.07	2.41	-0.81			2.09	-1.15			2.42	-2.26
1050	C	10	R	2	70	406.30		2.41	-0.75			2.09	-1.15			2.42	-2.26
1050	C	10	R	2	70	406.30		2.40	-0.86								
1050	C	11	R	1	22	408.92	65.27	2.62	-0.81			2.30	-1.17	3.15	-1.95	2.99	-1.83
1050	C	11	R	1	22	408.92		2.62	-0.81			2.30	-1.17	3.15	-1.95	3.08	-1.63
1050	C	11	R	1	22	408.92										2.91	-2.03
1050	C	11	R	1	42.5	409.12	65.29	2.53	-0.97	2.07	-1.60	2.25	-1.05			2.65	-1.97
1050	C	11	R	1	75	409.45	65.31	2.42	-0.79								
1050	C	11	R	1	127	409.97	65.35	2.42	-0.93								
1050	C	11	R	1	146	410.16	65.37					1.99	-1.42	1.99	-1.97	2.48	-2.11
1050	C	11	R	2	2	410.22	65.37	2.35	-0.94								
1050	C	11	R	2	100	411.20	65.44	1.91	-1.36								
1050	C	11	R	2	102	411.22	65.44	2.18	-1.17								
1050	C	11	R	2	123	411.43	65.46	2.04	-1.24								
1050	C	11	R	3	2	411.72	65.48	2.13	-1.29								
1050	C	11	R	3	52	412.22	65.52	2.16	-1.00								
1050	C	11	R	3	80	412.50	65.54	2.03	-1.28	1.61	-2.22	1.50	-1.64			2.24	-2.36
1050	C	11	R	3	80	412.50		2.03	-1.28	*1.61*	*-2.22*	*1.50*	*-1.64*			*2.24*	*-2.36*
1050	C	11	R	3	80	412.50											
1050	C	11	R	3	80	412.50											
1050	C	12	R	1	0	413.70	65.63	2.22	-1.20			1.90	-1.96	2.50	-1.98	1.96	-2.28
1050	C	13	R	1	12	423.42	66.36	2.22	-0.78								
1050	C	13	R	1	65	423.95	66.40	2.26	-0.84	*1.52*	*-1.66*	*1.84*	*-1.14*			*2.22*	*-1.77*
1050	C	13	R	1	110	424.40	66.44	2.26	-0.96								
1050	C	13	R	2	65	425.45	66.52	2.25	-0.78								

table DR2- Oxygen isotope data for planktonic and benthic foraminifera and bulk carbonate from ODP Hole 1050C.
Average values plotted for replicates from the same sample and for high resolution samples from Core-section 13R-5 and 16R-2

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Site	Hole	Core		Sec.	cm	mbsf	Age	Bulk/fine carbonates		*Heterohelix globulosa*		*Globigeri-nelloides subcarinatus*		*Pseudo-geumbelina palpebra*		*Rugoglobigeri* spp.	
								$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$
1050	C	13	R	2	110	425.90	66.55	2.18	-0.93								
1050	C	13	R	3	11	426.41	66.59	2.38	-0.99								
1050	C	13	R	3	65	426.95	66.63	2.30	-0.81	1.56	-1.73	1.84	-1.10	2.41	-1.94	2.56	-1.64
1050	C	13	R	4	65	428.45	66.74	2.41	-0.89								
1050	C	13	R	4	110	428.90	66.77	2.41	-0.88								
rage 13R-5						430.11	66.87	2.38	-1.05	1.81	-1.70	2.29	-1.37	2.67	-1.97	2.77	-1.76
1050	C	13	R	5	25	429.55		2.35	-1.20								
1050	C	13	R	5	30	429.60		2.40	-1.25								
1050	C	13	R	5	35	429.65		2.38	-0.95					2.65	-1.95	2.74	-1.77
1050	C	13	R	5	35	429.65										2.90	-1.89
1050	C	13	R	5	40	429.70		2.41	-1.25	1.74	-1.82			2.54	-1.94	2.78	-1.71
1050	C	13	R	5	40	429.70										2.76	-1.80
1050	C	13	R	5	45	429.75		2.41	-1.03								
1050	C	13	R	5	50	429.80		2.39	-0.92								
1050	C	13	R	5	55	429.85		2.36	-0.73					2.81	-1.96	2.86	-1.61
1050	C	13	R	5	55	429.85										2.78	-1.71
1050	C	13	R	5	60	429.90		2.33	-1.10								
1050	C	13	R	5	65	429.95		2.28	-0.69	*1.79*	*-1.50*	*2.29*	*-1.37*	*2.35*	*-1.83*		
1050	C	13	R	5	65	429.95		2.43	-0.81								
1050	C	13	R	5	70	430.00		2.32	-1.29								
1050	C	13	R	5	80	430.10		2.42	-1.25								
1050	C	13	R	5	85	430.15		2.41	-1.19								
1050	C	13	R	5	90	430.20		2.42	-1.20	1.91	-1.77			2.67	-2.00	2.69	-1.85
1050	C	13	R	5	90	430.20								2.76	-2.08		
1050	C	13	R	5	90	430.20											

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Average values plotted for replicates from the same sample and for high resolution samples from Core-section 13R-5 and 16R-2

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Site	Hole	Core		Sec.	cm	mbsf	Age	Bulk/fine carbonates		*Heterohelix globulosa*		*Globigeri-nelloides subcarinatus*		*Pseudo-geumbelina palpebra*		*Rugoglobigeri* spp.	
								$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$
1050	C	13	R	5	95	430.25		2.40	-0.89								
1050	C	13	R	5	100	430.30		2.42	-1.05					2.86	-1.91		
1050	C	13	R	5	105	430.35		2.33	-1.06								
1050	C	13	R	5	110	430.40		2.37	-1.02								
1050	C	13	R	5	115	430.45		2.38	-0.81								
1050	C	13	R	5	120	430.50		2.36	-1.27								
1050	C	13	R	5	125	430.55		2.39	-1.25	1.99	-1.66			2.83	-1.97		
1050	C	13	R	5	125	430.55								2.58	-2.09		
1050	C	13	R	6	65	431.45	66.97	2.41	-0.72								
1050	C	13	R	6	110	431.90	67.00	2.44	-0.80								
1050	C	15	R	1	82	443.42	67.87	2.56	-0.57								
1050	C	15	R	2	61	444.71	67.96	2.53	-0.35								
1050	C	15	R	3	71	446.31	68.08	2.48	-0.26	*1.80*	*-1.17*	*2.02*	*-1.28*	*2.39*	*-1.58*		
1050	C	15	R	4	112	448.22	68.23	2.38	-0.46								
1050	C	15	R	5	17	448.77	68.27	2.47	-0.33	*1.95*	*-1.10*	*2.34*	*-0.73*	*2.35*	*-1.39*		
1050	C	15	R	5	55	449.15	68.30									2.67	-1.73
1050	C	15	R	6	35	450.45	68.40	2.38	-0.27	*2.00*	*-1.58*	*2.25*	*-0.97*	*2.58*	*-1.90*		
1050	C	15	R	7	23	451.83	68.50	2.50	-0.74								
1050	C	15	R	7	55	452.15	68.52	2.36	-0.38								
1050	C	16	R	1	30	452.50	68.55	2.35	-0.57	*1.76*	*-1.38*	*2.30*	*-0.91*	*2.50*	*-1.38*		
1050	C	16	R	1	83	453.03	68.59	2.31	-0.51	*1.67*	*-1.44*	*2.27*	*-1.39*	*2.56*	*-1.56*		
average 16R-2						454.47	68.70	2.36	-0.52	1.68	-1.42	2.17	-0.96	2.30	-1.59	2.29	-1.45
1050	C	16	R	2	25	453.95		2.24	-0.78								
1050	C	16	R	2	25	453.95		*2.12*	*-0.79*	*1.58*	*-1.55*	*2.16*	*-1.08*	*2.21*	*-1.61*		
1050	C	16	R	2	30	454.00		2.32	-0.50								

table DR2- Oxygen isotope data for planktonic and benthic foraminifera and bulk carbonate from ODP Hole 1050C.
Average values plotted for replicates from the same sample and for high resolution samples from Core-section 13R-5 and 16R-2

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Site	Hole	Core		Sec.	cm	mbsf	Age	Bulk/fine carbonates		*Heterohelix globulosa*		*Globigeri-nelloides subcarinatus*		*Pseudo-geumbelina palpebra*		*Rugoglobigeri* spp.	
								$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$
1050	C	16	R	2	30	454.00		*2.32*	*-0.51*								
1050	C	16	R	2	30	454.00		*2.41*	*-0.38*	*1.77*	*-1.33*	*2.13*	*-0.99*	*2.19*	*-1.72*		
1050	C	16	R	2	35	454.05		2.40	-0.31								
1050	C	16	R	2	35	454.05		*2.43*	*-0.48*								
1050	C	16	R	2	35	454.05		*2.46*	*-0.41*	*1.96*	*-1.03*	*2.21*	*-0.61*	*2.41*	*-1.46*		
1050	C	16	R	2	40	454.10		2.41	-0.42								
1050	C	16	R	2	40	454.10		*2.45*	*-0.43*								
1050	C	16	R	2	40	454.10		*2.46*	*-0.41*	*1.84*	*-1.15*	*2.22*	*-0.84*	*2.54*	*-1.43*	2.41	-1.29
1050	C	16	R	2	45	454.15		2.42	-0.51								
1050	C	16	R	2	45	454.15		*2.47*	*-0.43*	*1.63*	*-1.39*	*2.23*	*-0.77*	*2.46*	*-1.41*		
1050	C	16	R	2	50	454.20		2.27	-0.83								
1050	C	16	R	2	50	454.20		*2.25*	*-0.84*	*1.63*	*-1.61*	*2.21*	*-1.20*	*2.29*	*-1.67*		
1050	C	16	R	2	55	454.25		2.30	-0.65								
1050	C	16	R	2	55	454.25		*2.24*	*-0.59*	*1.62*	*-1.50*	*2.15*	*-1.22*	*2.08*	*-1.85*		
1050	C	16	R	2	60	454.30		2.35	-0.53								
1050	C	16	R	2	60	454.30		*2.41*	*-0.50*	*1.69*	*-1.44*	*2.18*	*-0.98*	*2.21*	*-1.85*		
1050	C	16	R	2	65	454.35		2.12	-1.05								
1050	C	16	R	2	65	454.35		*2.44*	*-0.59*	*1.88*	*-1.19*	*2.27*	*-0.65*	*2.42*	*-1.34*		
1050	C	16	R	2	70	454.40		2.47	-0.34								
1050	C	16	R	2	70	454.40		*2.42*	*-0.35*	*1.80*	*-1.22*	*2.31*	*-0.74*	*2.41*	*-1.40*		
1050	C	16	R	2	75	454.45		2.56	-0.58								
1050	C	16	R	2	75	454.45		*2.36*	*-0.67*	*1.75*	*-1.43*	*2.25*	*-0.95*	*2.40*	*-1.52*		
1050	C	16	R	2	80	454.50		2.38	-0.66								
1050	C	16	R	2	80	454.50		*2.28*	*-0.78*	*1.50*	*-1.65*	*2.29*	*-1.25*	*2.34*	*-1.54*		
1050	C	16	R	2	83	454.53		*2.24*	*-0.71*	*1.45*	*-1.73*	*2.08*	*-1.10*	*2.18*	*-1.97*	2.18	-1.62

table DR2- Oxygen isotope data for planktonic and benthic foraminifera and bulk carbonate from ODP Hole 1050C.
Average values plotted for replicates from the same sample and for high resolution samples from Core-section 13R-5 and 16R-2

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Site	Hole	Core		Sec.	cm	mbsf	Age	Bulk/fine carbonates		*Heterohelix globulosa*		*Globigeri-nelloides subcarinatus*		*Pseudo-geumbelina palpebra*		*Rugoglobigeri* spp.	
								$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$
1050	C	16	R	2	83	454.53		*2.30*	*-0.59*								
1050	C	16	R	2	83	454.53		2.26	-0.77								
1050	C	16	R	2	85	454.55		2.39	-0.61								
1050	C	16	R	2	85	454.55		*2.23*	*-0.67*								
1050	C	16	R	2	85	454.55		*2.23*	*-0.71*	*1.59*	*-1.68*	*2.15*	*-1.11*	*2.31*	*-1.58*		
1050	C	16	R	2	90	454.60		2.39	-0.47								
1050	C	16	R	2	90	454.60		*2.35*	*-0.41*	*1.58*	*-1.60*	*2.22*	*-1.11*	*2.16*	*-1.80*		
1050	C	16	R	2	95	454.65		2.38	-0.36								
1050	C	16	R	2	95	454.65		*2.34*	*-0.35*	*1.72*	*-1.42*	*2.16*	*-1.03*	*2.33*	*-1.68*		
1050	C	16	R	2	100	454.70		2.44	-0.31								
1050	C	16	R	2	100	454.70		*2.43*	*-0.26*	*1.65*	*-1.48*	*2.14*	*-0.86*	*2.31*	*-1.61*		
1050	C	16	R	2	105	454.75		2.43	-0.30								
1050	C	16	R	2	105	454.75		*2.36*	*-0.37*	*1.68*	*-1.30*	*1.88*	*-1.34*	*2.32*	*-1.30*		
1050	C	16	R	2	110	454.80		2.43	-0.26								
1050	C	16	R	2	110	454.80		*2.38*	*-0.24*	*1.69*	*-1.22*	*2.15*	*-0.69*	*2.25*	*-1.36*		
1050	C	16	R	2	115	454.85		2.49	-0.36								
1050	C	16	R	2	115	454.85		*2.41*	*-0.48*	*1.74*	*-1.36*	*2.21*	*-0.79*	*2.36*	*-1.66*		
1050	C	16	R	2	120	454.90		2.47	-0.39								
1050	C	16	R	2	120	454.90		*2.36*	*-0.48*	*1.56*	*-1.45*	*2.09*	*-1.01*	*2.29*	*-1.52*		
1050	C	16	R	2	125	454.95		2.39	-0.43								
1050	C	16	R	2	125	454.95		*2.23*	*-0.54*								
1050	C	16	R	2	125	454.95		*2.38*	*-0.59*	*1.60*	*-1.41*	*2.14*	*-0.87*	*2.05*	*-1.73*		
1050	C	16	R	3	15	455.35	68.76	2.42	-0.22	*1.86*	*-1.03*	*2.22*	*-0.66*	2.08	-1.56		
1050	C	16	R	3	15	455.35				1.86	-1.03	2.22	-0.66	2.08	-1.56		
1050	C	16	R	3	15	455.35											

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Site	Hole	Core		Sec.	cm	mbsf	Age	Bulk/fine carbonates		*Heterohelix globulosa*		*Globigeri-nelloides subcarinatus*		*Pseudo-geumbelina palpebra*		*Rugoglobigeri* spp.	
								$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$
1050	C	16	R	3	111	456.31	68.84			*1.84*	*-0.97*	*2.21*	*-0.72*	*2.44*	*-1.46*		
1050	C	17	R	1	37	462.17	69.28	2.57	-0.30	2.31	-1.08	*2.29*	*-0.80*	*2.31*	*-0.81*		
1050	C	18	R	1	66	472.06	70.64	2.44	0.14	2.10	-0.86	2.06	-0.32	2.17	-0.84	2.30	-0.90
1050	C	18	R	2	55	473.45	70.75	2.43	0.28								
1050	C	18	R	3	78	475.18	70.88	2.41	0.01	1.98	-0.84	1.93	-0.32	2.18	-1.04	2.35	-1.20
1050	C	18	R	3	78	475.18		2.41	0.01	*2.19*	*-0.80*	*1.89*	*-0.16*	2.18	-1.04	*2.35*	*-1.42*
1050	C	18	R	3	78	475.18				1.76	-0.88	1.96	-0.49			2.34	-0.98
1050	C	18	R	4	65	476.55	70.98	2.41	0.16								
1050	C	18	R	5	75	478.15	71.10	2.22	-0.01								

Table DR3- Oxygen isotope data for planktonic and benthic foraminifera and bulk carbonate from ODP Hole 1052E.
Average values plotted for replicates and for high resolution samples from Core-section 21R-2 & 21R-3

entries in *blue italics* from
MacLeod, K.G., and Huber, B.T., 2001, Geological Society, London, Special Publications, v. 183, p. 111-130.

SAMPLE ID	depth (mbsf)	Age	Bulk/fine		*Heterohelix globulosa*		*Rugoglobi-gerina rugosa*		*Globigeri-nelloides subcarinatus*		*Nuttalides truempyi*		*Gavelinella beccarii- formis*		*Gavellinella* spp.	
			$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$
1052E-18R-2, 59-60	302.19	65.59					2.66	-1.93			1.81	-0.16				
1052E-18R-3, 8-11	302.29	65.59			1.78	-2.08	2.73	-1.97	1.89	-1.58	1.36	-0.30	1.31	-0.74		
1052E-18R-3, 17-20	302.38	65.60			1.87	-1.88	2.83	-1.96	1.98	-1.32	1.37	-0.23	1.29	-0.62		
1052E-18R-3, 17-20	302.38				1.77	-1.89	2.74	-2.01	1.98	-1.32	1.37	-0.23	1.29	-0.62		
1052E-18R-3, 17-20	302.38				1.96	-1.87	2.91	-1.92								
1052E-18R-3, 27-30	302.48	65.60			1.96	-1.99	2.79	-2.10	2.01	-1.43			1.31	-0.63		
1052E-18R-3, 40-43	302.63	65.61			1.78	-1.95	2.32	-1.94	1.97	-1.43	1.45	-0.10	1.35	-0.62		
1052E-18R-3, 52-55	302.73	65.61			1.96	-1.97	2.14	-1.78	1.87	-1.46	1.42	-0.42	1.21	-0.62		
1052E-18R-CC	302.79	65.61			1.37	-1.93							1.20	-0.36		
1052E-19R-1, 10-13	309.80	65.89			1.41	-2.18	1.92	-1.80	1.69	-1.48						
1052E-19R-1, 24-27	309.94	65.90			1.25	-1.85			1.70	-1.37			0.97	-0.11		
1052E-19R-1, 53-56	310.23	65.91			1.24	-2.04	2.67	-2.15	1.73	-1.52						
1052E-19R-1, 69-72	310.39	65.92			1.36	-2.01	2.55	-1.71	1.69	-1.45						
1052E-19R-1, 84-87	310.54	65.92			1.50	-1.94	2.40	-1.86	1.67	-1.58	1.06	0.02				
1052E-19R-1, 115-118	310.82	65.93			1.38	-1.91			1.59	-1.52						
1052E-19R-1, 131-134	310.98	65.94			1.47	-1.90			1.61	-1.53						
1052E-19R-1, 145-148	311.15	65.95			1.23	-1.94										
1052E-19R-2, 10-13	311.30	65.95			1.59	-2.01			1.76	-1.55	1.03	-0.01				
1052E-19R-2, 25-28	311.45	65.96					2.23	-1.65								
1052E-19R-2, 40-43	311.60	65.96							1.43	-1.44						
1052E-19R-CC	311.76	65.97			1.36	-2.00	2.44	-1.58	1.65	-1.44						
1052E-19R-CC	311.76				1.36	-2.00	2.78	-1.30	1.67	-1.43						
1052E-19R-CC	311.76						2.09	-1.87	1.63	-1.45						
1052E-20R-1, 74-77	320.04	66.30									1.00	0.32				
1052E-20R-1, 100	320.30	66.31	2.04	-1.08												
1052E-20R-1, 100	320.30		*2.04*	*-1.17*												
1052E-20R-1, 100	320.30		2.04	-1.00												
1052E-20R-1, 100	320.30		2.03	-1.06												
1052E-20R-1, 74-77	320.40	66.32	2.12	-0.82												
1052E-20R-2, 48-51	321.28	66.35	2.13	-1.41					1.46	-1.31						
1052E-20R-2, 48-51	321.28		2.21	-1.42					1.46	-1.31						
1052E-20R-2, 48-51	321.28		2.05	-1.40												
1052E-20R-2, 122	322.02	66.38	2.20	-1.02												
1052E-20R-2, 122	322.02		*2.18*	*-1.14*												
1052E-20R-2, 122	322.02		2.23	-0.94												
1052E-20R-2, 122	322.02		2.18	-0.97												
1052E-20R-3, 65-68	322.84	66.41							1.77	-1.21						
1052E-20R-3, 96	323.15	66.43	2.14	-1.13												
1052E-20R-3, 96	323.15		*2.12*	*-1.20*												
1052E-20R-3, 96	323.15		2.15	-1.07												
1052E-20R-4, 77-80	324.42	66.48	2.22	-0.73												
1052E-20R-4, 111	324.76	66.49	2.31	-1.10												
1052E-20R-4, 111	324.76		*2.29*	*-1.14*												
1052E-20R-4, 111	324.76		2.33	-1.07												
1052E-20R-5, 72-75	326.02	66.54	2.23	-0.78												
1052E-20R-5, 116	326.46	66.56	2.46	-1.01												
1052E-20R-5, 116	326.46		*2.44*	*-1.07*												
1052E-20R-5, 116	326.46		2.49	-0.95												

Table DR3- Oxygen isotope data for planktonic and benthic foraminifera and bulk carbonate from ODP Hole 1052E.
Average values plotted for replicates and for high resolution samples from Core-section 21R-2 & 21R-3

entries in *blue italics* from
MacLeod, K.G., and Huber, B.T., 2001, Geological Society, London, Special Publications, v. 183, p. 111-130.

SAMPLE ID	depth (mbsf)	Age	Bulk/fine		*Heterohelix globulosa*		*Rugoglobi-gerina rugosa*		*Globigeri-nelloides subcarinatus*		*Nuttalides truempyi*		*Gavelinella beccarii- formis*		*Gavellinella* spp.	
			$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$
1052E-20R-6, 93	327.73	66.61	2.21	-1.02												
1052E-20R-6, 93	327.73		*2.18*	*-1.15*												
1052E-20R-6, 93	327.73		2.23	-0.88												
1052E-21R-1, 65	329.54	66.68	2.20	-0.69												
1052E-21R-1, 142 -146	330.32	66.71	2.26	-0.64			2.49	-1.61	1.89	-1.03	1.54	0.27				
average 21R-2 & 21R-3	331.71	66.77	2.24	-0.83			2.48	-1.79			1.37	0.26				
1052E-21R-2, 25	330.65		2.26	-0.77												
1052E-21R-2, 45	330.85		2.23	-0.81												
1052E-21R-2, 55	330.95		2.23	-0.85												
1052E-21R-2, 57-60	331.02		2.28	-0.83			2.48	-1.79			1.37	0.26				
1052E-21R-2, 65	331.05		2.27	-0.77												
1052E-21R-2, 75	331.15		2.16	-0.99												
1052E-21R-2, 85	331.25		2.22	-0.92												
1052E-21R-2, 95	331.35		2.21	-0.81												
1052E-21R-2, 105	331.45		2.31	-0.82												
1052E-21R-2, 115	331.55		2.27	-0.85												
1052E-21R-2, 125	331.65		2.25	-0.74												
1052E-21R-2, 135	331.75		2.22	-0.77												
1052E-21R-2, 145	331.85		2.20	-0.80												
1052E-21R-3, 5	331.95		2.21	-0.75												
1052E-21R-3, 15	332.05		2.18	-0.71												
1052E-21R-3, 21	332.11		2.22	-0.77												
1052E-21R-3, 35	332.25		2.20	-0.85												
1052E-21R-3, 45	332.35		2.24	-0.90												
1052E-21R-3, 55	332.45		2.23	-0.87												
1052E-21R-3, 65	332.55		2.26	-0.95												
1052E-21R-3, 75	332.65		2.31	-0.91												
1052E-21R-3, 85	332.75		2.25	-0.89												
1052E-21R-3, 114-118	333.04	66.82	2.25	-0.94			2.39	-1.80	2.11	-1.30						
1052E-21R-5, 30-34	335.20	66.91	2.21	-0.87												
1052E-21R-5, 100-104	335.90	66.94					2.10	-1.39	1.84	-1.05						
1052E-22R-1, 112	339.72	67.09	2.29	-1.05												
1052E-22R-1, 112	339.72		*2.25*	*-1.18*												
1052E-22R-1, 112	339.72		2.33	-0.92												
1052E-22R-2, 71-75	340.81	67.13	2.28	-0.90			2.41	-1.85	1.92	-1.39	1.34	0.31				
1052E-22R-2, 71-75	340.81		2.28	-0.91			2.41	-1.85	1.92	-1.39	1.34	0.31				
1052E-22R-2, 71-75	340.81		2.28	-0.88												
1052E-22R-3, 32-33	341.92	67.18	2.30	-0.76												
1052E-22R-4, 46-47	343.56	67.24					2.49	-1.96	2.08	-1.32						
1052E-23R-1, 99-102	349.29	67.47	2.21	-0.69	1.46	-1.55			2.13	-1.20						
1052E-23R-2, 36-39	350.16	67.51	2.26	-0.99			2.45	-1.80	2.13	-1.41	1.56	0.04				
1052E-23R-2, 40-43	350.20	67.51	2.24	-1.23												
1052E-23R-2, 117	350.97	67.54	2.29	-1.21												
1052E-23R-2, 117	350.97		*2.22*	*-1.26*												
1052E-23R-2, 117	350.97		2.36	-1.16												
1052E-23R-5, 11	354.41	67.68	2.27	-0.87					2.31	-1.54						
1052E-24R-1, 64-68	358.54	67.84	2.30	-0.83												

Table DR3- Oxygen isotope data for planktonic and benthic foraminifera and bulk carbonate from ODP Hole 1052E.
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SAMPLE ID	depth (mbsf)	Age	Bulk/fine		*Heterohelix globulosa*		*Rugoglobi-gerina rugosa*		*Globigeri-nelloides subcarinatus*		*Nuttalides truempyi*		*Gavelinella beccarii- formis*		*Gavellinella* spp.	
			$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$
1052E-24R-1, 109	358.99	67.86	2.23	-1.02												
1052E-24R-1, 109	358.99		*2.25*	*-1.04*												
1052E-24R-1, 109	358.99		2.21	-0.99												
1052E-24R-2, 64-67	360.04	67.90	2.23	-0.93									1.48	-0.03		
1052E-24R-3, 64-68	361.54	67.96	2.32	-0.80												
1052E-25R-1, 45-48	367.95	68.22	2.20	-0.86									1.82	0.35		
1052E-25R-1, 113	368.63	68.25	2.21	-0.90												
1052E-25R-1, 113	368.63		*2.15*	*-1.01*												
1052E-25R-1, 113	368.63		2.23	-0.82												
1052E-25R-1, 113	368.63		2.24	-0.86												
1052E-26R-1, 0-3	377.10	68.58	2.20	-0.63												
1052E-26R-1, 138	378.48	68.64	2.15	-0.97												
1052E-26R-1, 138	378.48		*2.12*	*-1.18*												
1052E-26R-1, 138	378.48		2.18	-0.82												
1052E-26R-1, 138	378.48		2.14	-0.91												
1052E-26R-2, 56-59	379.16	68.67	2.21	-0.70												
1052E-26R-3, 29-33	380.39	68.72	2.13	-0.83												
1052E-26R-4, 16-18	381.76	68.77	2.20	-0.81												
1052E-26R-5, 62-64	383.72	68.85	2.23	-1.13												
1052E-26R-6, 40-43	385.00	68.90	2.22	-0.79												
1052E-26R-7, 35-38	386.45	68.96	2.21	-0.78												
1052E-27R-1, 0-1	386.70	68.97	2.22	-0.74												
1052E-27R-1, 98	387.68	69.01	2.15	-0.95												
1052E-27R-1, 98	387.68		*2.14*	*-1.02*												
1052E-27R-1, 98	387.68		2.17	-0.88												
1052E-27R-2, 1-2	388.21	69.03	2.11	-1.07			2.60	-2.12			1.75	-0.14	1.72	-0.35		
1052E-27R-2, 1-2	388.21		2.11	-1.07			2.63	-2.22			1.61	-0.16	1.80	-0.31		
1052E-27R-2, 1-2	388.21						2.57	-2.03			1.88	-0.12	1.64	-0.38		
1052E-27R-3, 20-22	389.90		2.18	-0.27												
1052E-27R-5, 39-41	393.09		2.22	-0.76												
1052E-27R-6, 6	394.26		2.18	-0.71									1.26	-0.17		
1052E28R-1, 38-40	396.68		2.18	-0.29												
1052E-28R-1, 145	397.75		*2.04*	*-0.86*												
1052E-28R-1, 145	397.75		2.12	-0.57												
1052E-28R-2, 62	398.42		2.14	-0.83												
1052E-29R-1, 121	407.11	69.13	2.27	-0.50												
1052E-29R-1, 121	407.11		*2.25*	*-0.47*												
1052E-29R-1, 121	407.11		*2.29*	*-0.54*												
1052E-29R-3, 15-19	409.05	69.23	2.32	-0.24												
1052E-29R-4, 39-43	410.79	69.31	2.25	-0.46												
1052E-29R-5, 9	411.99	69.36			1.87	-1.73										
1052E-30R-1, 14-16	415.64	69.54	2.27	-0.63												
1052E-30R-1, 102	416.52	69.58	2.24	-0.62												
1052E-30R-1, 102	416.52		*2.19*	*-0.85*												
1052E-30R-1, 102	416.52		2.26	-0.53												
1052E-30R-1, 102	416.52		2.26	-0.49												
1052E-30R-2, 3-5	417.03	69.60	2.28	-0.51									1.51	0.04		

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SAMPLE ID	depth (mbsf)	Age	Bulk/fine		*Heterohelix globulosa*		*Rugoglobi-gerina rugosa*		*Globigeri-nelloides subcarinatus*		*Nuttalides truempyi*		*Gavelinella beccarii- formis*		*Gavellinella* spp.	
			$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$	$\delta^{13}C$	$\delta^{18}O$
1052E-30R-5, 0-2	421.50	69.81	2.29	-0.49	1.79	-1.68			2.23	-1.09						
1052E-30R-5, 0-2	421.50		2.30	-0.63	1.79	-1.68			2.23	-1.09						
1052E-30R-5, 0-2	421.50		2.28	-0.35												
1052E-31R-1, 12-15	425.22	69.99	2.19	-0.53												
1052E-31R-1, 116	426.26	70.03	2.21	-0.40												
1052E-31R-1, 116	426.26		2.20	-0.42												
1052E-31R-1, 116	426.26		2.22	-0.37												
1052E-31R-2, 100.5-102.5	427.71	70.10	2.10	-0.65												
1052E-31R-3, 82-84	429.02	70.16	2.30	-0.65												
1052E-31R-4, 11	429.81	70.20	2.33	-0.21												
1052E-31R-4, 100	430.70	70.24	2.27	-0.21												
1052E-31R-5, 83-85	431.93	70.30	2.27	-0.18												
1052E-31R-6, 8-12	432.68	70.34			1.78	-1.50			2.12	-1.08			1.27	0.26		
1052E-31R-7, 8	434.18	70.41			1.53	-1.57										
1052E-31R-CC	434.77	70.43	2.15	-0.57												
1052E-31R-CC	434.77		*2.15*	*-0.50*												
1052E-31R-CC	434.77		2.15	-0.64												
1052E-33R-1, 134	445.64	70.95	2.16	-0.42												
1052E-33R-1, 134	445.64		*2.13*	*-0.36*												
1052E-33R-1, 134	445.64		2.19	-0.47												
1052E-34R-1, 74	454.64	71.37	2.16	-0.45												
1052E-34R-1, 74	454.64		*2.15*	*-0.40*												
1052E-34R-1, 74	454.64		2.17	-0.50												
1052E-34R-1, 138-140	455.28	71.40			1.99	-1.46									1.51	0.13
1052E-34R-2, 37-39	455.77	71.42	2.24	-0.53	2.34	-1.46									1.55	0.26
1052E-35R-1-20	463.80	71.80	2.34	-0.31												
1052E-35R-1, 110	464.70	71.84	2.30	-0.57												
1052E-35R-1, 110	464.70		*2.30*	*-0.48*												
1052E-35R-1, 110	464.70		2.30	-0.62												
1052E-35R-1, 110	464.70		2.31	-0.60												
1052E-35R-2, 2	465.12	71.86	2.27	-0.45	1.98	-1.50			2.10	-0.96						
1052E-35R-3, 25-28	466.85	71.94									1.61	0.47				
1052E-35R-4, 17-20	468.27	72.01			1.89	-1.57										