Supplementary Material

Methods

Supplementary Figures (2)

Data Tables (4)

References

Methods

Sample preparation and mass spectrometry

Belemnites of Jurassic to Cretaceous age were cleaned of any matrix material and fractured to expose clean surfaces, from which ~1–3 mg of calcite was sampled with a low-speed, handheld drill. Modern carbonate samples were also drilled or fragmented, and crushed with a mortar and pestle. Carbonate powders were then dissolved in distilled 2N HCl in preparation for ion-exchange chemistry. Column chromatography was used to separate Ca from other cations in a two-stage process, first separating Ca and Sr from the rest of the matrix using BioRad AG50W-X12 resin, and then removing Sr with Triskem Sr-specific resin (Chu et al., 2006; Reynard et al., 2010). Samples were collected and dried in Teflon beakers and reconstituted in distilled 2% HNO_3.

Mass spectrometry was performed on 10 ppm Ca solutions with a Nu Instruments MC-ICP-MS, using sample–standard bracketing with a reference material (NIST SRM915a) to derive $\delta^{44/42}$Ca values (Blättler et al., 2011). Samples are introduced into a DSN-100 desolvator at a rate of 75 μL/min, and the aerosol is then carried into the plasma (RF power = 1300 W) with a sample gas flow rate of ~3 L/min. Ca-ion beam intensities are measured at mass 42, 43, and 44, and double-charged Sr is measured at mass 43.5 to correct for direct interferences on the three Ca beams. A triple isotope plot of $\delta^{44/43}$Ca vs. $\delta^{44/42}$Ca ensured mass-dependent fractionation, and uncertainties were quantified by multiple measurements (3–8) of each sample solution as well as repeated measurements of an in-house standard throughout an instrumental run. Precision on $\delta^{44/42}$Ca measurements is 0.06–0.08 (2 SE). Values of $\delta^{44/42}$Ca can be converted to $\delta^{44/40}$Ca by multiplying by $(1/m_{40} - 1/m_{44}) / (1/m_{42} - 1/m_{44}) = 2.10$ (where m_A is the precise atomic mass for the Ca isotope of mass number A).

Supplementary Figures

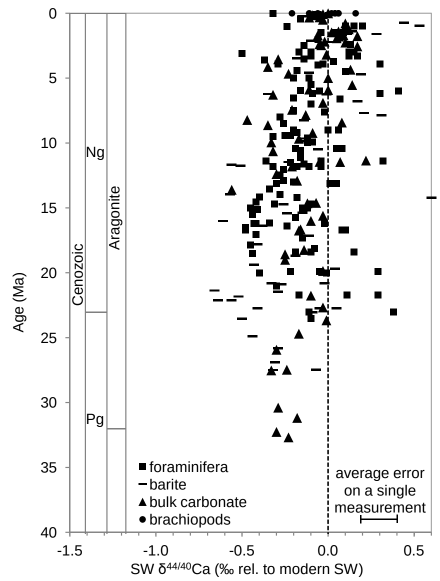

Figure DR1: An expanded version of Figure 1 from the main text, showing only data from 0–40Ma.

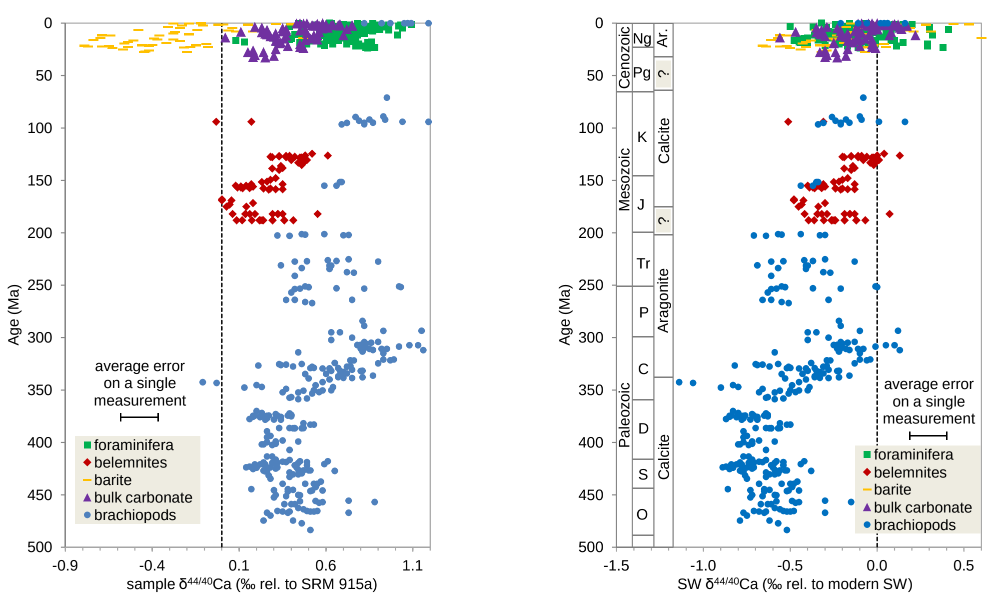

Figure DR2: Data from Figure 1 in the main text shown as raw Ca-isotope values measured against the carbonate standard SRM915a (left), and seawater Ca-isotope values reconstructed by applying constant offsets for each fossil phase used (right).

Data Tables

Table DR1: Model budget and calculations

Carbonate budget calculations for the modern ocean and estimates for past oceans. Habitats and percent carbonate removal are from Milliman (1993). Predominant types of carbonate and group percentages are estimated from several sources (Neumann and Land, 1975; Wefer, 1980; Hubbard et al., 1990; Milliman, 1993; Milliman et al., 1993; Riding, 2002; Schiebel, 2002; Kiessling et al., 2003). Proposed compositions of the carbonate sink for hypothetical past oceans are approximate and used to illustrate the mass-balance model.

Table DR2: Reconstructed seawater Ca-isotope data

Reconstructed Ca-isotope ratios of seawater over time, including data from this study and compiled from the literature (Fantle and DePaolo, 2005; Heuser et al., 2005; Fantle and DePaolo, 2007; Farkaš et al., 2007a; Farkaš et al., 2007b; Sime et al., 2007; Griffith et al., 2008a). Timescale is based on Ogg et al. (2008). Stratigraphy for Pliensbachian and Toarcian belemnites (this study) from Weedon and Jenkyns (1999) and Hesselbo and Jenkyns (1995). Seawater Ca-isotope values are reconstructed using calibrated fractionation factors for the analyzed fossil/phase. The calibration for fossil belemnites and brachiopods is from Farkaš et al. (2007b). For other phases, calibrations were performed by comparison with modern samples (see individual references). Data from phosphates are omitted due to poor calibrations. The difference in $\delta^{44/40}$Ca between SRM915a and modern seawater is taken to be 1.88‰ (Hippler et al., 2003).

Table DR3: Original Ca-isotope measurements of modern marine carbonates

Measurements from this study of a range of modern carbonates. Temperature estimates are from the World Ocean Atlas 2005 (Locarnini et al., 2006). Conversions from $\delta^{44/42}$Ca to $\delta^{44/40}$Ca use the formula $\delta^{44/42}\text{Ca} = \delta^{44/40}\text{Ca} \times (1/m_{42} - 1/m_{44}) / (1/m_{40} - 1/m_{44})$ where m_A is the atomic mass of the calcium isotope with mass number *A*. Temperature normalizations used the relationship of +0.02‰ per °C (see main text).

Table DR4: Compiled Ca-isotope data for modern marine carbonates

Ca-isotope measurements of modern carbonates compiled from this study and several other sources (Russell et al., 1978; Skulan et al., 1997; Zhu and Macdougall, 1998; Gussone et al., 2003; Schmitt et al., 2003; Fantle and DePaolo, 2005; Gussone et al., 2005; Heuser et al., 2005; Sime et al., 2005; Gussone et al., 2006; Steuber and Buhl, 2006; Fantle and DePaolo, 2007; Farkaš et al., 2007b; Langer et al., 2007; Sime et al., 2007; Griffith et al., 2008b; Heinemann et al., 2008; Kasemann et al., 2008; von Allmen et al., 2010; Holmden et al., 2012). Further details about the samples can be found in the respective sources; details of the deep sea corals analyzed in this study are from A. Thomas (personal communication) and Case et al. (2010). Temperature estimates are from the World Ocean Atlas 2005 (Locarnini et al., 2006) or measured data from the reference. Temperature normalizations used the relationship of +0.02‰ per °C (see main text).

TABLE DR1

Habitat	% carbonate removal	Predominant types of carbonate	% group 1, −1.5‰ (aragonite)	% group 2, −0.9‰ (calcite)	% group 3, −1.3‰ (calcite)	carbonate $\delta^{44/40}$Ca (‰)
MODERN OCEANS						
SHALLOW						
coral reef complex	22%	corals, red/green algae, forams, cement	90%	5%	5%	-1.46
banks/bays	6%	red/green algae, mollusks, forams, ooids	33%	33%	33%	-1.22
non-carbonate shelves	3%	forams, mollusks, echinoderms	10%	50%	40%	-1.12
carbonate shelves	9%	red algae, forams, echinoderms, mollusks	33%	33%	33%	-1.22
Halimeda bioherms	5%	green algae	95%	5%	0%	-1.47
DEEP						
slopes	12%	forams, mollusks, echinoderms	0%	10%	90%	-1.26
imported to slopes	6%	detrital shelf material	10%	10%	80%	-1.28
enclosed basins	3%	coccoliths, planktic forams	10%	10%	80%	-1.28
deep sea	34%	coccoliths, planktic forams	0%	0%	100%	-1.30
TOTAL	100%		30%	10%	60%	-1.32
accounting for T						-1.23
PAST OCEANS						
Pleistocene average		aragonitic shallow-water sink, larger deep-sea sink	15%	5%	80%	-1.31
Cretaceous calcite sea		calcitic shallow-water sink, larger deep-sea sink	5%	15%	80%	-1.25
Paleozoic aragonite sea		aragonitic shallow-water sink, no deep-sea sink	80%	20%	0%	-1.38
Paleozoic calcite sea		calcitic shallow-water sink, no deep-sea sink	10%	90%	0%	-0.96

TABLE DR2

source	location	depth (m)	age (Ma)	material	raw $\delta^{44/40}$Ca	±	raw $\delta^{44/42}$Ca	±	relative to standard	$\delta^{44/40}$Ca of ancient SW relative to SRM 915a	$\delta^{44/40}$Ca of ancient SW relative to modern SW
this study	Belemnite Bed, Dorset, UK	---	188	belemnite			0.15	0.08	SRM 915a	1.69	-0.19
	Belemnite Bed, Dorset, UK	---	188	belemnite			0.09	0.08	SRM 915a	1.57	-0.31
	Belemnite Bed, Dorset, UK	---	188	belemnite			0.15	0.08	SRM 915a	1.69	-0.19
	Belemnite Bed, Dorset, UK	---	188	belemnite			0.18	0.08	SRM 915a	1.76	-0.12
	Belemnite Bed, Dorset, UK	---	188	belemnite			0.11	0.08	SRM 915a	1.62	-0.26
	Belemnite Bed, Dorset, UK	---	188	belemnite			0.18	0.08	SRM 915a	1.76	-0.12
	Belemnite Bed, Dorset, UK	---	188	belemnite			0.06	0.08	SRM 915a	1.52	-0.36
	Belemnite Bed, Dorset, UK	---	188	belemnite			0.04	0.10	SRM 915a	1.49	-0.39
	Belemnite Bed, Dorset, UK	---	188	belemnite			0.21	0.10	SRM 915a	1.81	-0.07
	Belemnite Stone, Dorset, UK	---	188	belemnite			0.11	0.05	SRM 915a	1.62	-0.26
	Belemnite Stone, Dorset, UK	---	188	belemnite			0.12	0.05	SRM 915a	1.64	-0.24
	Belemnite Stone, Dorset, UK	---	188	belemnite			0.12	0.05	SRM 915a	1.63	-0.25
	Junction Bed, Dorset, UK	---	182	belemnite			0.08	0.09	SRM 915a	1.56	-0.32
	Junction Bed, Dorset, UK	---	182	belemnite			0.10	0.09	SRM 915a	1.59	-0.29
	Junction Bed, Dorset, UK	---	182	belemnite			0.07	0.09	SRM 915a	1.54	-0.34
	Junction Bed, Dorset, UK	---	182	belemnite			0.03	0.09	SRM 915a	1.46	-0.42
	Junction Bed, Dorset, UK	---	182	belemnite			0.16	0.09	SRM 915a	1.72	-0.16
	Junction Bed, Dorset, UK	---	182	belemnite			0.18	0.09	SRM 915a	1.75	-0.13
	Junction Bed, Dorset, UK	---	182	belemnite			0.16	0.09	SRM 915a	1.72	-0.16
	Junction Bed, Dorset, UK	---	182	belemnite			0.15	0.11	SRM 915a	1.69	-0.19
	Junction Bed, Dorset, UK	---	182	belemnite			0.28	0.09	SRM 915a	1.95	0.07
	Junction Bed, Dorset, UK	---	182	belemnite			0.07	0.11	SRM 915a	1.54	-0.34
	Burton Bradstock, Dorset, UK	---	175	belemnite			0.01	0.05	SRM 915a	1.43	-0.45
	Burton Bradstock, Dorset, UK	---	168	belemnite			0.00	0.05	SRM 915a	1.40	-0.48
	Burton Bradstock, Dorset, UK	---	169	belemnite			0.00	0.05	SRM 915a	1.40	-0.48
	Burton Bradstock, Dorset, UK	---	169	belemnite			0.03	0.05	SRM 915a	1.46	-0.42
	Burton Bradstock, Dorset, UK	---	173	belemnite			0.02	0.05	SRM 915a	1.45	-0.43
	Burton Bradstock, Dorset, UK	---	171.6	belemnite			0.09	0.05	SRM 915a	1.58	-0.30
	Burton Bradstock, Dorset, UK	---	175	belemnite			0.07	0.06	SRM 915a	1.54	-0.34
	Mangyshlak Mts., W. Kazakhstan	---	94	belemnite			-0.02	0.04	SRM 915a	1.37	-0.51
	Holywell, Eastbourne, Sussex, UK	---	94	belemnite			0.09	0.04	SRM 915a	1.57	-0.31
Sime et al., 2007	ODP Site 925, Ceara Rise (040N 043W)	1.83	0.02	*Globigerinoides trilobus*			0.31	0.04	SRM 915a	1.56	-0.32
	ODP Site 925, Ceara Rise (040N 043W)	16.04	0.45	*Globigerinoides trilobus*			0.39	0.02	SRM 915a	1.72	-0.16
	ODP Site 925, Ceara Rise (040N 043W)	32.03	1.01	*Globigerinoides trilobus*			0.35	0.03	SRM 915a	1.64	-0.24
	ODP Site 925, Ceara Rise (040N 043W)	45.93	1.50	*Globigerinoides trilobus*			0.45	0.04	SRM 915a	1.84	-0.04
	ODP Site 925, Ceara Rise (040N 043W)	60.29	2.01	*Globigerinoides trilobus*			0.44	0.03	SRM 915a	1.82	-0.06
	ODP Site 925, Ceara Rise (040N 043W)	74.28	2.49	*Globigerinoides trilobus*			0.40	0.03	SRM 915a	1.74	-0.14
	ODP Site 925, Ceara Rise (040N 043W)	89.34	2.98	*Globigerinoides trilobus*			0.42	0.04	SRM 915a	1.78	-0.10
	ODP Site 925, Ceara Rise (040N 043W)	103.93	3.52	*Globigerinoides trilobus*			0.40	0.04	SRM 915a	1.74	-0.14
	ODP Site 925, Ceara Rise (040N 043W)	115.63	3.97	*Globigerinoides trilobus*			0.44	0.03	SRM 915a	1.82	-0.06
	ODP Site 925, Ceara Rise (040N 043W)	128.14	4.48	*Globigerinoides trilobus*			0.52	0.02	SRM 915a	1.98	0.10
	ODP Site 925, Ceara Rise (040N 043W)	141.77	5.00	*Globigerinoides trilobus*			0.37	0.03	SRM 915a	1.68	-0.20
	ODP Site 925, Ceara Rise (040N 043W)	152.18	5.50	*Globigerinoides trilobus*			0.42	0.02	SRM 915a	1.78	-0.10
	ODP Site 925, Ceara Rise (040N 043W)	161.30	5.96	*Globigerinoides trilobus*			0.39	0.03	SRM 915a	1.72	-0.16
	ODP Site 925, Ceara Rise (040N 043W)	176.90	6.51	*Globigerinoides trilobus*			0.37	0.04	SRM 915a	1.68	-0.20
	ODP Site 925, Ceara Rise (040N 043W)	192.39	6.98	*Globigerinoides trilobus*			0.42	0.06	SRM 915a	1.78	-0.10
	ODP Site 925, Ceara Rise (040N 043W)	200.69	7.50	*Globigerinoides trilobus*			0.37	0.05	SRM 915a	1.68	-0.20
	ODP Site 925, Ceara Rise (040N 043W)	208.94	7.99	*Globigerinoides trilobus*			0.33	0.04	SRM 915a	1.60	-0.28
	ODP Site 925, Ceara Rise (040N 043W)	226.24	8.51	*Globigerinoides trilobus*			0.34	0.04	SRM 915a	1.62	-0.26
	ODP Site 925, Ceara Rise (040N 043W)	234.57	9.02	*Globigerinoides trilobus*			0.37	0.05	SRM 915a	1.68	-0.20
	ODP Site 925, Ceara Rise (040N 043W)	240.72	9.50	*Globigerinoides trilobus*			0.31	0.05	SRM 915a	1.56	-0.32
	ODP Site 925, Ceara Rise (040N 043W)	247.64	9.95	*Globigerinoides trilobus*			0.41	0.03	SRM 915a	1.76	-0.12
	ODP Site 925, Ceara Rise (040N 043W)	261.89	10.59	*Globigerinoides trilobus*			0.39	0.02	SRM 915a	1.72	-0.16
	ODP Site 925, Ceara Rise (040N 043W)	269.67	11.11	*Globigerinoides trilobus*			0.39	0.03	SRM 915a	1.72	-0.16

	ODP Site 925, Ceara Rise (040N 043W)	276.31	11.49	*Globigerinoides trilobus*			0.36	0.05	SRM 915a	1.66	-0.22
	ODP Site 925, Ceara Rise (040N 043W)	282.22	12.02	*Globigerinoides trilobus*			0.34	0.03	SRM 915a	1.62	-0.26
	ODP Site 925, Ceara Rise (040N 043W)	289.66	12.47	*Globigerinoides trilobus*			0.33	0.04	SRM 915a	1.60	-0.28
	ODP Site 925, Ceara Rise (040N 043W)	298.07	13.00	*Globigerinoides trilobus*			0.37	0.01	SRM 915a	1.68	-0.20
	ODP Site 925, Ceara Rise (040N 043W)	304.74	13.55	*Globigerinoides trilobus*			0.30	0.04	SRM 915a	1.54	-0.34
	ODP Site 925, Ceara Rise (040N 043W)	315.93	13.98	*Globigerinoides trilobus*			0.33	0.04	SRM 915a	1.60	-0.28
	ODP Site 925, Ceara Rise (040N 043W)	314.69	14.14	*Globigerinoides trilobus*			0.27	0.03	SRM 915a	1.48	-0.40
	ODP Site 925, Ceara Rise (040N 043W)	323.36	14.56	*Globigerinoides trilobus*			0.26	0.01	SRM 915a	1.46	-0.42
	ODP Site 925, Ceara Rise (040N 043W)	342.84	15.51	*Globigerinoides trilobus*			0.25	0.03	SRM 915a	1.44	-0.44
	ODP Site 925, Ceara Rise (040N 043W)	357.85	16.15	*Globigerinoides trilobus*			0.30	0.02	SRM 915a	1.54	-0.34
	ODP Site 925, Ceara Rise (040N 043W)	369.39	16.52	*Globigerinoides trilobus*			0.23	0.05	SRM 915a	1.40	-0.48
	ODP Site 925, Ceara Rise (040N 043W)	381.69	17.06	*Globigerinoides trilobus*			0.26	0.03	SRM 915a	1.46	-0.42
	ODP Site 925, Ceara Rise (040N 043W)	411.03	18.11	*Globigerinoides trilobus*			0.43	0.03	SRM 915a	1.80	-0.08
Fantle and DePaolo, 2007	ODP Site 807, Ontong Java Plateau (040N 157E)	0.95	0.06	deep sea carbonate ooze	-0.49	0.11			bulk Earth	1.85	-0.03
	ODP Site 807, Ontong Java Plateau (040N 157E)	4.64	0.31	deep sea carbonate ooze	-0.51	0.13			bulk Earth	1.83	-0.05
	ODP Site 807, Ontong Java Plateau (040N 157E)	18.55	1.23	deep sea carbonate ooze	-0.34	0.08			bulk Earth	2.00	0.12
	ODP Site 807, Ontong Java Plateau (040N 157E)	78.73	3.54	deep sea carbonate ooze	-0.75	0.20			bulk Earth	1.59	-0.29
	ODP Site 807, Ontong Java Plateau (040N 157E)	104.97	4.35	deep sea carbonate ooze	-0.33	0.04			bulk Earth	2.01	0.13
	ODP Site 807, Ontong Java Plateau (040N 157E)	164.64	5.88	deep sea carbonate ooze	-0.57	0.18			bulk Earth	1.77	-0.11
	ODP Site 807, Ontong Java Plateau (040N 157E)	166.14	5.91	deep sea carbonate ooze	-0.46	0.28			bulk Earth	1.88	0.00
	ODP Site 807, Ontong Java Plateau (040N 157E)	209.49	6.90	deep sea carbonate ooze	-0.49	0.30			bulk Earth	1.85	-0.03
	ODP Site 807, Ontong Java Plateau (040N 157E)	250.49	7.84	deep sea carbonate ooze	-0.59	0.03			bulk Earth	1.75	-0.13
	ODP Site 807, Ontong Java Plateau (040N 157E)	275.86	8.42	deep sea carbonate ooze	-0.38	0.08			bulk Earth	1.96	0.08
	ODP Site 807, Ontong Java Plateau (040N 157E)	305.15	9.67	deep sea carbonate ooze	-0.63	0.06			bulk Earth	1.71	-0.17
	ODP Site 807, Ontong Java Plateau (040N 157E)	334.97	11.35	deep sea carbonate ooze	-0.24	0.16			bulk Earth	2.10	0.22
	ODP Site 807, Ontong Java Plateau (040N 157E)	336.75	11.46	deep sea carbonate ooze	-0.39	0.05			bulk Earth	1.95	0.07
	ODP Site 807, Ontong Java Plateau (040N 157E)	362.31	12.90	deep sea carbonate ooze	-0.64	0.08			bulk Earth	1.70	-0.18
	ODP Site 807, Ontong Java Plateau (040N 157E)	391.72	14.64	deep sea carbonate ooze	-0.58	0.07			bulk Earth	1.76	-0.12
	ODP Site 807, Ontong Java Plateau (040N 157E)	424.87	16.65	deep sea carbonate ooze	-0.62	0.13			bulk Earth	1.72	-0.16
	ODP Site 807, Ontong Java Plateau (040N 157E)	426.45	16.74	deep sea carbonate ooze	-0.63	0.07			bulk Earth	1.71	-0.17
	ODP Site 807, Ontong Java Plateau (040N 157E)	451.11	18.24	deep sea carbonate ooze	-0.60	0.21			bulk Earth	1.74	-0.14
	ODP Site 807, Ontong Java Plateau (040N 157E)	478.00	19.86	deep sea carbonate ooze	-0.49	0.10			bulk Earth	1.85	-0.03
	ODP Site 807, Ontong Java Plateau (040N 157E)	509.24	21.76	deep sea carbonate ooze	-0.56	0.16			bulk Earth	1.78	-0.10
	ODP Site 807, Ontong Java Plateau (040N 157E)	536.06	22.67	deep sea carbonate ooze	-0.49	0.04			bulk Earth	1.85	-0.03
	ODP Site 807, Ontong Java Plateau (040N 157E)	565.98	23.66	deep sea carbonate ooze	-0.47	0.08			bulk Earth	1.87	-0.01
	ODP Site 807, Ontong Java Plateau (040N 157E)	596.69	24.69	deep sea carbonate ooze	-0.63	0.08			bulk Earth	1.71	-0.17
	ODP Site 807, Ontong Java Plateau (040N 157E)	634.22	25.93	deep sea carbonate ooze	-0.76	0.07			bulk Earth	1.58	-0.30
	ODP Site 807, Ontong Java Plateau (040N 157E)	680.36	27.47	deep sea carbonate ooze	-0.70	0.04			bulk Earth	1.64	-0.24
	ODP Site 807, Ontong Java Plateau (040N 157E)	681.98	27.52	deep sea carbonate ooze	-0.79	0.03			bulk Earth	1.55	-0.33
	ODP Site 807, Ontong Java Plateau (040N 157E)	709.56	30.39	deep sea carbonate ooze	-0.75	0.07			bulk Earth	1.59	-0.29
	ODP Site 807, Ontong Java Plateau (040N 157E)	738.58	31.18	deep sea carbonate ooze	-0.64	0.06			bulk Earth	1.70	-0.18
	ODP Site 807, Ontong Java Plateau (040N 157E)	778.59	32.26	deep sea carbonate ooze	-0.76	0.11			bulk Earth	1.58	-0.30
	ODP Site 807, Ontong Java Plateau (040N 157E)	794.38	32.68	deep sea carbonate ooze	-0.69	0.21			bulk Earth	1.65	-0.23
Fantle and DePaolo, 2005	Holocene average		0.00	carbonate sediment	-0.36	0.15			bulk Earth	1.88	0.00
	DSDP Site 590, Lord Howe Rise (031S 163 E)	0.08	0.15	carbonate sediment	-0.45	0.10			bulk Earth	1.79	-0.09
	DSDP Site 590, Lord Howe Rise (031S 163 E)	3.00	0.33	carbonate sediment	-0.47	0.10			bulk Earth	1.77	-0.11
	DSDP Site 590, Lord Howe Rise (031S 163 E)	5.80	0.50	carbonate sediment	-0.39	0.10			bulk Earth	1.85	-0.03
	DSDP Site 590, Lord Howe Rise (031S 163 E)	10.46	0.78	carbonate sediment	-0.26	0.10			bulk Earth	1.98	0.10
	DSDP Site 590, Lord Howe Rise (031S 163 E)	22.15	1.40	carbonate sediment	-0.30	0.10			bulk Earth	1.94	0.06
	DSDP Site 590, Lord Howe Rise (031S 163 E)	23.66	1.47	carbonate sediment	-0.34	0.20			bulk Earth	1.90	0.02
	DSDP Site 590, Lord Howe Rise (031S 163 E)	28.15	1.69	carbonate sediment	-0.42	0.23			bulk Earth	1.82	-0.06
	DSDP Site 590, Lord Howe Rise (031S 163 E)	28.40	1.70	carbonate sediment	-0.27	0.20			bulk Earth	1.97	0.09
	DSDP Site 590, Lord Howe Rise (031S 163 E)	29.65	1.76	carbonate sediment	-0.19	0.10			bulk Earth	2.05	0.17
	DSDP Site 590, Lord Howe Rise (031S 163 E)	33.25	1.92	carbonate sediment	-0.31	0.16			bulk Earth	1.93	0.05
	DSDP Site 590, Lord Howe Rise (031S 163 E)	39.25	2.18	carbonate sediment	-0.38	0.10			bulk Earth	1.86	-0.02
	DSDP Site 590, Lord Howe Rise (031S 163 E)	41.36	2.26	carbonate sediment	-0.26	0.10			bulk Earth	1.98	0.10
	DSDP Site 590, Lord Howe Rise (031S 163 E)	44.35	2.38	carbonate sediment	-0.41	0.10			bulk Earth	1.83	-0.05
	DSDP Site 590, Lord Howe Rise (031S 163 E)	46.30	2.46	carbonate sediment	-0.40	0.25			bulk Earth	1.84	-0.04
	DSDP Site 590, Lord Howe Rise (031S 163 E)	48.85	2.55	carbonate sediment	-0.19	0.10			bulk Earth	2.05	0.17
	DSDP Site 590, Lord Howe Rise (031S 163 E)	68.01	3.19	carbonate sediment	-0.37	0.40			bulk Earth	1.87	-0.01

	DSDP Site 590, Lord Howe Rise (031S 163 E)	106.45	4.14	carbonate sediment	-0.71	0.20	bulk Earth	1.53	-0.35
	DSDP Site 590, Lord Howe Rise (031S 163 E)	133.75	4.66	carbonate sediment	-0.59	0.13	bulk Earth	1.65	-0.23
	DSDP Site 590, Lord Howe Rise (031S 163 E)	152.96	4.99	carbonate sediment	-0.36	0.27	bulk Earth	1.88	0.00
	DSDP Site 590, Lord Howe Rise (031S 163 E)	152.96	4.99	foraminifera	-0.47	0.10	bulk Earth	1.77	-0.11
	DSDP Site 590, Lord Howe Rise (031S 163 E)	184.76	5.53	carbonate sediment	-0.22	0.10	bulk Earth	2.02	0.14
	DSDP Site 590, Lord Howe Rise (031S 163 E)	223.71	6.28	carbonate sediment	-0.68	0.16	bulk Earth	1.56	-0.32
	DSDP Site 590, Lord Howe Rise (031S 163 E)	272.52	7.44	carbonate sediment	-0.57	0.10	bulk Earth	1.67	-0.21
	DSDP Site 590, Lord Howe Rise (031S 163 E)	299.75	8.22	carbonate sediment	-0.83	0.13	bulk Earth	1.41	-0.47
	DSDP Site 590, Lord Howe Rise (031S 163 E)	313.00	8.62	carbonate sediment	-0.71	0.19	bulk Earth	1.53	-0.35
	DSDP Site 590, Lord Howe Rise (031S 163 E)	331.60	9.22	carbonate sediment	-0.45	0.10	bulk Earth	1.79	-0.09
	DSDP Site 590, Lord Howe Rise (031S 163 E)	353.60	9.95	carbonate sediment	-0.69	0.10	bulk Earth	1.55	-0.33
	DSDP Site 590, Lord Howe Rise (031S 163 E)	373.70	10.63	carbonate sediment	-0.68	0.10	bulk Earth	1.56	-0.32
	DSDP Site 590, Lord Howe Rise (031S 163 E)	373.70	10.63	foraminifera	-0.52	0.16	bulk Earth	1.72	-0.16
	DSDP Site 590, Lord Howe Rise (031S 163 E)	398.80	11.45	carbonate sediment	-0.41	0.10	bulk Earth	1.83	-0.05
	DSDP Site 590, Lord Howe Rise (031S 163 E)	409.90	11.80	carbonate sediment	-0.57	0.48	bulk Earth	1.67	-0.21
	DSDP Site 590, Lord Howe Rise (031S 163 E)	430.60	12.39	carbonate sediment	-0.66	0.16	bulk Earth	1.58	-0.30
	DSDP Site 590, Lord Howe Rise (031S 163 E)	435.60	13.60	carbonate sediment	-0.92	0.21	bulk Earth	1.32	-0.56
	DSDP Site 590, Lord Howe Rise (031S 163 E)	448.30	14.61	carbonate sediment	-0.43	0.13	bulk Earth	1.81	-0.07
	DSDP Site 590, Lord Howe Rise (031S 163 E)	461.30	15.60	carbonate sediment	-0.39	0.10	bulk Earth	1.85	-0.03
	Graves Creek 15	---	15.75	foraminifera	-0.55	0.15	bulk Earth	1.69	-0.19
	DSDP Site 590, Lord Howe Rise (031S 163 E)	462.6	16.00	carbonate sediment	-0.46	0.19	bulk Earth	1.78	-0.10
	Graves Creek 14	---	17.85	foraminifera	-0.81	0.11	bulk Earth	1.43	-0.45
	DSDP Site 590, Lord Howe Rise (031S 163 E)	477	18.57	carbonate sediment	-0.61	0.10	bulk Earth	1.63	-0.25
	DSDP Site 590, Lord Howe Rise (031S 163 E)	487.3	19.00	carbonate sediment	-0.61	0.13	bulk Earth	1.63	-0.25
	DSDP Site 400	---	20.00	foraminifera	-0.37	0.15	bulk Earth	1.87	-0.01
Griffith et al.,2008	Holocene coretops		0.00	barite	-2.01	0.15	SW	1.89	0.01
	ODP Site 572 (001N 134W)	3.85	0.24	barite	-2.17	0.13	SW	1.73	-0.15
	ODP Site 572 (001N 134W)	6.30	0.41	barite	-2.08		SW	1.82	-0.06
	ODP Site 572 (001N 134W)	10.93	0.72	barite	-1.58	0.04	SW	2.32	0.44
	ODP Site 572 (001N 134W)	14.15	0.94	barite	-1.49	0.37	SW	2.41	0.53
	ODP Site 572 (001N 134W)	20.75	1.39	barite	-1.88		SW	2.02	0.14
	ODP Site 572 (001N 134W)	23.84	1.60	barite	-1.91	0.39	SW	1.99	0.11
	ODP Site 572 (001N 134W)	23.84	1.60	barite	-1.74		SW	2.16	0.28
	ODP Site 572 (001N 134W)	32.72	2.20	barite	-2.00		SW	1.90	0.02
	ODP Site 572 (001N 134W)	67.63	4.71	barite	-1.83	0.21	SW	2.07	0.19
	ODP Site 572 (001N 134W)	140.62	6.23	barite	-2.37	0.18	SW	1.53	-0.35
	ODP Site 572 (001N 134W)	209.92	7.84	barite	-1.71	0.29	SW	2.19	0.31
	ODP Site 572 (001N 134W)	229.55	8.26	barite	-2.16	0.09	SW	1.74	-0.14
	ODP Site 572 (001N 134W)	314.20	11.69	barite	-2.58	0.10	SW	1.32	-0.56
	ODP Site 573 (001N 133W)	170.77	9.86	barite	-2.17	0.18	SW	1.73	-0.15
	ODP Site 573 (001N 133W)	188.73	11.45	barite	-2.25	0.13	SW	1.65	-0.23
	ODP Site 573 (001N 133W)	303.50	21.47	barite	-2.31	0.00	SW	1.59	-0.29
	ODP Site 573 (001N 133W)	311.61	21.82	barite	-2.54		SW	1.36	-0.52
	ODP Site 574 (004N 113W)	10.30	2.12	barite	-2.12	0.22	SW	1.78	-0.10
	ODP Site 574 (004N 113W)	19.50	3.46	barite	-2.20		SW	1.70	-0.18
	ODP Site 574 (004N 113W)	27.34	4.60	barite	-2.13		SW	1.77	-0.11
	ODP Site 574 (004N 113W)	39.92	6.25	barite	-2.03		SW	1.87	-0.01
	ODP Site 574 (004N 113W)	45.47	6.77	barite	-1.85		SW	2.05	0.17
	ODP Site 574 (004N 113W)	55.32	7.70	barite	-1.81		SW	2.09	0.21
	ODP Site 574 (004N 113W)	77.52	9.64	barite	-2.17	0.32	SW	1.73	-0.15
	ODP Site 574 (004N 113W)	150.55	13.94	barite	-2.59	0.21	SW	1.31	-0.57
	ODP Site 574 (004N 113W)	198.08	16.02	barite	-2.63		SW	1.27	-0.61
	ODP Site 574 (004N 113W)	224.00	17.15	barite	-2.13	0.19	SW	1.77	-0.11
	ODP Site 574 (004N 113W)	238.50	17.78	barite	-2.43	0.15	SW	1.47	-0.41
	ODP Site 574 (004N 113W)	260.45	18.68	barite	-2.21	0.10	SW	1.69	-0.19
	ODP Site 574 (004N 113W)	313.21	20.82	barite	-2.35		SW	1.55	-0.33
	ODP Site 574 (004N 113W)	313.21	20.82	barite	-2.04		SW	1.86	-0.02
	ODP Site 574 (004N 113W)	314.50	20.89	barite	-2.29		SW	1.61	-0.27
	ODP Site 574 (004N 113W)	336.45	22.13	barite	-2.66		SW	1.24	-0.64
	ODP Site 574 (004N 113W)	336.45	22.13	barite	-2.58		SW	1.32	-0.56
	ODP Site 574 (004N 113W)	346.80	22.71	barite	-2.43	0.52	SW	1.47	-0.41

	ODP Site 574 (004N 113W)	346.95	22.72	barite	-1.97		SW	1.93	0.05
	ODP Site 574 (004N 113W)	346.95	22.72	barite	-2.07		SW	1.83	-0.05
	ODP Site 574 (004N 113W)	349.80	23.05	barite	-2.11	0.15	SW	1.79	-0.09
	ODP Site 574 (004N 113W)	353.70	23.56	barite	-2.52	0.03	SW	1.38	-0.50
	ODP Site 574 (004N 113W)	367.02	24.89	barite	-2.46	0.01	SW	1.44	-0.44
	ODP Site 574 (004N 113W)	377.51	25.81	barite	-2.31	0.00	SW	1.59	-0.29
	ODP Site 574 (004N 113W)	390.00	26.88	barite	-2.33		SW	1.57	-0.31
	ODP Site 574 (004N 113W)	397.17	27.49	barite	-2.09	0.17	SW	1.81	-0.07
	ODP Site 574 (004N 113W)	417.70	27.49	barite	-2.34	0.09	SW	1.56	-0.32
	ODP Site 575 (006N 135W)	38.41	10.46	barite	-2.08		SW	1.82	-0.06
	ODP Site 575 (006N 135W)	47.20	11.77	barite	-2.53		SW	1.37	-0.51
	ODP Site 575 (006N 135W)	83.50	14.20	barite	-1.42	0.41	SW	2.48	0.60
	ODP Site 575 (006N 135W)	92.50	14.72	barite	-2.28		SW	1.62	-0.26
	ODP Site 575 (006N 135W)	102.04	15.36	barite	-2.17		SW	1.73	-0.15
	ODP Site 575 (006N 135W)	118.65	16.36	barite	-2.40		SW	1.50	-0.38
	ODP Site 575 (006N 135W)	167.20	19.39	barite	-2.45		SW	1.45	-0.43
	ODP Site 575 (006N 135W)	196.10	21.36	barite	-2.68		SW	1.22	-0.66
	ODP Site 1218 (009N 135W)	66.54	19.67	barite	-1.98		SW	1.92	0.04
	ODP Site 1219 (008N 142W)	21.45	15.40	barite	-2.26	0.12	SW	1.64	-0.24
Heuser et al., 2005	ODP Site 871, Limalok Guyot (006N 172E)	1H-1, 124-126	0.10	*Globigerinoides trilobus*	0.87	0.05	SRM 915a	1.81	-0.07
	ODP Site 871, Limalok Guyot (006N 172E)	2H-1, 59-61	1.00	*Globigerinoides trilobus*	1.09	0.03	SRM 915a	2.03	0.15
	ODP Site 871, Limalok Guyot (006N 172E)	2H-6, 59-61	1.50	*Globigerinoides trilobus*	1.03	0.11	SRM 915a	1.97	0.09
	ODP Site 871, Limalok Guyot (006N 172E)	3H-2, 123-125	3.00	*Globigerinoides trilobus*	0.77	0.13	SRM 915a	1.71	-0.17
	ODP Site 872, Lo-En Guyot (010N 163E)	3H02, 59-61	3.30	*Globigerinoides trilobus*	0.84	0.14	SRM 915a	1.78	-0.10
	ODP Site 872, Lo-En Guyot (010N 163E)	3H-5, 118-120	3.90	*Globigerinoides trilobus*	0.65	0.03	SRM 915a	1.59	-0.29
	ODP Site 871, Limalok Guyot (006N 172E)	3H-5, 60-62	6.00	*Globigerinoides trilobus*	0.89	0.10	SRM 915a	1.83	-0.05
	ODP Site 871, Limalok Guyot (006N 172E)	3H-5, 123-125	6.20	*Globigerinoides trilobus*	0.85	0.15	SRM 915a	1.79	-0.09
	ODP Site 872, Lo-En Guyot (010N 163E)	5H-2, 14-16	9.00	*Globigerinoides trilobus*	0.74	0.10	SRM 915a	1.68	-0.20
	ODP Site 872, Lo-En Guyot (010N 163E)	5H-6, 59-61	10.40	*Globigerinoides trilobus*	0.75	0.10	SRM 915a	1.69	-0.19
	ODP Site 872, Lo-En Guyot (010N 163E)	6H-5, 20-22	11.40	*Globigerinoides trilobus*	0.58	0.15	SRM 915a	1.52	-0.36
	ODP Site 871, Limalok Guyot (006N 172E)	4H-5, 59-61	11.80	*Globigerinoides trilobus*	0.62	0.15	SRM 915a	1.56	-0.32
	ODP Site 871, Limalok Guyot (006N 172E)	6H-6, 60-62	13.10	*Globigerinoides trilobus*	0.64	0.16	SRM 915a	1.58	-0.30
	ODP Site 871, Limalok Guyot (006N 172E)	7H-2, 124-126	14.70	*Globigerinoides trilobus*	0.63	0.14	SRM 915a	1.57	-0.31
	ODP Site 871, Limalok Guyot (006N 172E)	7H-5, 59-61	15.00	*Globigerinoides trilobus*	0.49	0.15	SRM 915a	1.43	-0.45
	ODP Site 871, Limalok Guyot (006N 172E)	8H-2, 59-63	16.20	*Globigerinoides trilobus*	0.51	0.18	SRM 915a	1.45	-0.43
	ODP Site 872, Lo-En Guyot (010N 163E)	11H-1, 20-22	16.70	*Globigerinoides trilobus*	0.46	0.19	SRM 915a	1.40	-0.48
	ODP Site 872, Lo-En Guyot (010N 163E)	11H-6, 20-22	18.40	*Globigerinoides trilobus*	0.84	0.07	SRM 915a	1.78	-0.10
	ODP Site 872, Lo-En Guyot (010N 163E)	12H-2, 78-80	19.90	*Globigerinoides trilobus*	0.72	0.18	SRM 915a	1.66	-0.22
	ODP Site 872, Lo-En Guyot (010N 163E)	13H-3, 20-22	21.70	*Globigerinoides trilobus*	0.77	0.09	SRM 915a	1.71	-0.17
	ODP Site 872, Lo-En Guyot (010N 163E)	13H-5, 20-22	23.00	*Globigerinoides trilobus*	0.83	0.22	SRM 915a	1.77	-0.11
	ODP Site 872, Lo-En Guyot (010N 163E)	14H-4, 20-22	23.50	*Globigerinoides trilobus*	0.84	0.17	SRM 915a	1.78	-0.10
Heuser et al., 2005	ODP Site 871, Limalok Guyot (006N 172E)	1H-1, 124-126	0.10	*Globigerinoides ruber*	0.63	0.05	SRM 915a	1.82	-0.06
	ODP Site 871, Limalok Guyot (006N 172E)	2H-2, 59-61	1.00	*Globigerinoides ruber*	0.79	0.15	SRM 915a	1.98	0.10
	ODP Site 871, Limalok Guyot (006N 172E)	2H-6, 59-61	1.50	*Globigerinoides ruber*	0.73	0.19	SRM 915a	1.92	0.04
	ODP Site 871, Limalok Guyot (006N 172E)	3H-2, 123-125	3.00	*Globigerinoides ruber*	0.81	0.30	SRM 915a	2.00	0.12
	ODP Site 872, Lo-En Guyot (010N 163E)	3H-2,59-61	3.30	*Globigerinoides ruber*	0.86	0.16	SRM 915a	2.05	0.17
	ODP Site 872, Lo-En Guyot (010N 163E)	2H-5, 118-120	3.90	*Globigerinoides ruber*	0.66	0.19	SRM 915a	1.85	-0.03
	ODP Site 872, Lo-En Guyot (010N 163E)	5H-2, 14-16	9.00	*Globigerinoides ruber*	0.69	0.09	SRM 915a	1.88	0.00
	ODP Site 872, Lo-En Guyot (010N 163E)	5H-6, 59-61	10.40	*Globigerinoides ruber*	0.74	0.11	SRM 915a	1.93	0.05
	ODP Site 872, Lo-En Guyot (010N 163E)	6H-5, 20-22	11.40	*Globigerinoides ruber*	1.01	0.20	SRM 915a	2.20	0.32
	ODP Site 871, Limalok Guyot (006N 172E)	4H-5, 59-61	11.80	*Globigerinoides ruber*	0.58	0.08	SRM 915a	1.77	-0.11
	ODP Site 871, Limalok Guyot (006N 172E)	6H-6, 60-62	13.10	*Globigerinoides ruber*	0.70	0.29	SRM 915a	1.89	0.01
	ODP Site 871, Limalok Guyot (006N 172E)	7H-5, 59-61	15.00	*Globigerinoides ruber*	0.54	0.20	SRM 915a	1.73	-0.15
	ODP Site 871, Limalok Guyot (006N 172E)	8H-2, 59-63	16.20	*Globigerinoides ruber*	0.67	0.12	SRM 915a	1.86	-0.02
	ODP Site 872, Lo-En Guyot (010N 163E)	11H-1, 20-22	16.70	*Globigerinoides ruber*	0.77	0.21	SRM 915a	1.96	0.08
	ODP Site 872, Lo-En Guyot (010N 163E)	11H-6, 20-22	18.40	*Globigerinoides ruber*	0.84	0.06	SRM 915a	2.03	0.15
	ODP Site 872, Lo-En Guyot (010N 163E)	12H-2, 78-80	19.90	*Globigerinoides ruber*	0.64	0.03	SRM 915a	1.83	-0.05
	ODP Site 872, Lo-En Guyot (010N 163E)	13H-3, 20-22	21.70	*Globigerinoides ruber*	0.80	0.20	SRM 915a	1.99	0.11
Heuser et al., 2005	ODP Site 871, Limalok Guyot (006N 172E)	1H-1, 124-626	0.10	*Globigerinella spp*	0.44	0.13	SRM 915a	1.82	-0.06

	ODP Site 871, Limalok Guyot (006N 172E)	2H-2, 59-61	1.00	*Globigerinella spp*	0.70	0.23	SRM 915a	2.08	0.20
	ODP Site 871, Limalok Guyot (006N 172E)	2H-6, 59-61	1.50	*Globigerinella spp*	0.54	0.27	SRM 915a	1.92	0.04
	ODP Site 871, Limalok Guyot (006N 172E)	3H-2, 123-125	3.00	*Globigerinella spp*	0.65	0.10	SRM 915a	2.03	0.15
	ODP Site 872, Lo-En Guyot (010N 163E)	3H-2, 59-61	3.30	*Globigerinella spp*	0.62	0.21	SRM 915a	2.00	0.12
	ODP Site 872, Lo-En Guyot (010N 163E)	3H-5, 118-120	3.90	*Globigerinella spp*	0.80	0.14	SRM 915a	2.18	0.30
	ODP Site 871, Limalok Guyot (006N 172E)	3H-5, 60-62	6.00	*Globigerinella spp*	0.91	0.13	SRM 915a	2.29	0.41
	ODP Site 871, Limalok Guyot (006N 172E)	3H-5, 123-125	6.20	*Globigerinella spp*	0.80	0.25	SRM 915a	2.18	0.30
	ODP Site 872, Lo-En Guyot (010N 163E)	5H-2, 14-16	9.00	*Globigerinella spp*	0.56	0.16	SRM 915a	1.94	0.06
	ODP Site 872, Lo-En Guyot (010N 163E)	5H-6, 59-61	10.40	*Globigerinella spp*	0.58	0.21	SRM 915a	1.96	0.08
	ODP Site 872, Lo-En Guyot (010N 163E)	6H-5, 20-22	11.40	*Globigerinella spp*	0.46	0.20	SRM 915a	1.84	-0.04
	ODP Site 871, Limalok Guyot (006N 172E)	4H-5, 59-61	11.80	*Globigerinella spp*	0.46	0.16	SRM 915a	1.84	-0.04
	ODP Site 871, Limalok Guyot (006N 172E)	6H-6, 60-62	13.10	*Globigerinella spp*	0.55	0.25	SRM 915a	1.93	0.05
	ODP Site 871, Limalok Guyot (006N 172E)	7H-2, 124-126	14.70	*Globigerinella spp*	0.40	0.04	SRM 915a	1.78	-0.10
	ODP Site 871, Limalok Guyot (006N 172E)	7H-5, 59-61	15.00	*Globigerinella spp*	0.38	0.24	SRM 915a	1.76	-0.12
	ODP Site 871, Limalok Guyot (006N 172E)	8H-2, 59-63	16.20	*Globigerinella spp*	0.08	0.06	SRM 915a	1.46	-0.42
	ODP Site 872, Lo-En Guyot (010N 163E)	11H-1, 20-22	16.70	*Globigerinella spp*	0.60	0.24	SRM 915a	1.98	0.10
	ODP Site 872, Lo-En Guyot (010N 163E)	11H-6, 20-22	18.40	*Globigerinella spp*	0.31	0.10	SRM 915a	1.69	-0.19
	ODP Site 872, Lo-En Guyot (010N 163E)	12H-2, 78-80	19.90	*Globigerinella spp*	0.79	0.10	SRM 915a	2.17	0.29
	ODP Site 872, Lo-En Guyot (010N 163E)	13H-3, 20-22	21.70	*Globigerinella spp*	0.79	0.25	SRM 915a	2.17	0.29
	ODP Site 872, Lo-En Guyot (010N 163E)	13H-5, 20-22	23.00	*Globigerinella spp*	0.88	0.29	SRM 915a	2.26	0.38
Heuser et al., 2005	ODP Site 1138, S Indian Ocean (054S 076E)	57.67	1.90	*Globigerina bulloides*	0.96	0.04	SRM 915a	1.95	0.07
	ODP Site 1138, S Indian Ocean (054S 076E)	67.92	2.40	*Globigerina bulloides*	1.02	0.05	SRM 915a	2.01	0.13
	ODP Site 1138, S Indian Ocean (054S 076E)	76.00	3.10	*Globigerina bulloides*	0.39	0.11	SRM 915a	1.38	-0.50
	ODP Site 1138, S Indian Ocean (054S 076E)	87.00	3.60	*Globigerina bulloides*	0.52	0.09	SRM 915a	1.51	-0.37
	ODP Site 1138, S Indian Ocean (054S 076E)	93.34	3.70	*Globigerina bulloides*	0.92	0.07	SRM 915a	1.91	0.03
	ODP Site 1138, S Indian Ocean (054S 076E)	104.10	4.40	*Globigerina bulloides*	0.71	0.13	SRM 915a	1.70	-0.18
	ODP Site 1138, S Indian Ocean (054S 076E)	112.94	6.60	*Globigerina bulloides*	0.96	0.13	SRM 915a	1.95	0.07
	ODP Site 1138, S Indian Ocean (054S 076E)	117.38	7.60	*Globigerina bulloides*	0.87	0.15	SRM 915a	1.86	-0.02
	ODP Site 1138, S Indian Ocean (054S 076E)	123.78	9.20	*Globigerina bulloides*	0.71	0.11	SRM 915a	1.70	-0.18
	ODP Site 1138, S Indian Ocean (054S 076E)	133.00	9.40	*Globigerina bulloides*	0.64	0.06	SRM 915a	1.63	-0.25
	ODP Site 1138, S Indian Ocean (054S 076E)	134.00	9.40	*Globigerina bulloides*	0.67	0.06	SRM 915a	1.66	-0.22
	ODP Site 1138, S Indian Ocean (054S 076E)	144.60	9.60	*Globigerina bulloides*	0.77	0.18	SRM 915a	1.76	-0.12
	ODP Site 1138, S Indian Ocean (054S 076E)	157.12	9.90	*Globigerina bulloides*	0.80	0.04	SRM 915a	1.79	-0.09
	ODP Site 1138, S Indian Ocean (054S 076E)	169.80	11.60	*Globigerina bulloides*	0.75	0.13	SRM 915a	1.74	-0.14
	ODP Site 1138, S Indian Ocean (054S 076E)	174.30	11.80	*Globigerina bulloides*	0.71	0.08	SRM 915a	1.70	-0.18
	ODP Site 1138, S Indian Ocean (054S 076E)	180.98	12.90	*Globigerina bulloides*	0.63	0.12	SRM 915a	1.62	-0.26
	ODP Site 1138, S Indian Ocean (054S 076E)	190.59	14.20	*Globigerina bulloides*	0.71	0.18	SRM 915a	1.70	-0.18
	ODP Site 1138, S Indian Ocean (054S 076E)	199.50	15.10	*Globigerina bulloides*	0.48	0.06	SRM 915a	1.47	-0.41
	ODP Site 1138, S Indian Ocean (054S 076E)	209.11	16.40	*Globigerina bulloides*	0.65	0.08	SRM 915a	1.64	-0.24
	ODP Site 1138, S Indian Ocean (054S 076E)	217.90	17.30	*Globigerina bulloides*	0.74	0.16	SRM 915a	1.73	-0.15
	ODP Site 1138, S Indian Ocean (054S 076E)	227.50	18.50	*Globigerina bulloides*	0.45	0.14	SRM 915a	1.44	-0.44
	ODP Site 1138, S Indian Ocean (054S 076E)	237.12	20.00	*Globigerina bulloides*	0.49	0.13	SRM 915a	1.48	-0.40
	ODP Site 1138, S Indian Ocean (054S 076E)	248.22	21.00	*Globigerina bulloides*	0.59	0.11	SRM 915a	1.58	-0.30
Farkaš et al., 2007 (EPSL)	Russia		158.40	belemnite	0.35		SRM 915a	1.75	-0.13
	Russia		157.70	belemnite	0.28		SRM 915a	1.68	-0.20
	Russia		157.40	belemnite	0.12		SRM 915a	1.52	-0.36
	Russia		156.70	belemnite	0.09		SRM 915a	1.49	-0.39
	Russia		155.70	belemnite	0.11		SRM 915a	1.51	-0.37
	New Zealand		153.60	belemnite	0.17		SRM 915a	1.57	-0.31
	New Zealand		151.10	belemnite	0.26		SRM 915a	1.66	-0.22
	Russia		149.40	belemnite	0.28		SRM 915a	1.68	-0.20
	Russia		147.80	belemnite	0.31		SRM 915a	1.71	-0.17
	Germany		140.00	belemnite	0.33		SRM 915a	1.73	-0.15
	Germany		138.60	belemnite	0.29		SRM 915a	1.69	-0.19
	Germany		138.10	belemnite	0.35		SRM 915a	1.75	-0.13
	Germany		136.20	belemnite	0.34		SRM 915a	1.74	-0.14
	Germany		135.20	belemnite	0.46		SRM 915a	1.86	-0.02
	Germany		133.10	belemnite	0.47		SRM 915a	1.87	-0.01
	Great Britain		130.50	belemnite	0.49		SRM 915a	1.89	0.01
	Great Britain		128.20	belemnite	0.46		SRM 915a	1.86	-0.02

	Germany	127.80	belemnite	0.37	SRM 915a	1.77	-0.11
	Great Britain	127.40	belemnite	0.42	SRM 915a	1.82	-0.06
	Germany	126.60	belemnite	0.37	SRM 915a	1.77	-0.11
	Great Britain	126.30	belemnite	0.61	SRM 915a	2.01	0.13
	Great Britain	126.20	belemnite	0.48	SRM 915a	1.88	0.00
	Germany	124.50	belemnite	0.52	SRM 915a	1.92	0.04
Farkaš et al., 2007 (EPSL)	Russia	158.70	belemnite	0.27	SRM 915a	1.67	-0.21
	Russia	158.40	belemnite	0.31	SRM 915a	1.71	-0.17
	Russia	157.70	belemnite	0.24	SRM 915a	1.64	-0.24
	Russia	157.40	belemnite	0.24	SRM 915a	1.64	-0.24
	Russia	157.30	belemnite	0.16	SRM 915a	1.56	-0.32
	Russia	156.70	belemnite	0.11	SRM 915a	1.51	-0.37
	Russia	155.90	belemnite	0.18	SRM 915a	1.58	-0.30
	Russia	155.70	belemnite	0.17	SRM 915a	1.57	-0.31
	New Zealand	153.60	belemnite	0.35	SRM 915a	1.75	-0.13
	Germany	133.10	belemnite	0.44	SRM 915a	1.84	-0.04
	Great Britain	130.50	belemnite	0.40	SRM 915a	1.80	-0.08
	Germany	128.30	belemnite	0.45	SRM 915a	1.85	-0.03
	Great Britain	128.20	belemnite	0.45	SRM 915a	1.85	-0.03
	Germany	127.80	belemnite	0.29	SRM 915a	1.69	-0.19
	Great Britain	127.40	belemnite	0.28	SRM 915a	1.68	-0.20
	Germany	127.10	belemnite	0.33	SRM 915a	1.73	-0.15
	Germany	126.70	belemnite	0.33	SRM 915a	1.73	-0.15
	Germany	126.60	belemnite	0.39	SRM 915a	1.79	-0.09
Farkaš et al., 2007 (EPSL)	San Juan Island, WA, USA	0.00	brachiopod	1.07	SRM 915a	1.92	0.04
	San Juan Island, WA, USA	0.00	brachiopod	1.09	SRM 915a	1.94	0.06
	Ursental, Germany	151.50	belemnite	0.23	SRM 915a	1.63	-0.25
	Geisingen, Germany	155.00	belemnite	0.14	SRM 915a	1.54	-0.34
	Geisingen, Germany	155.00	belemnite	0.08	SRM 915a	1.48	-0.40
Farkaš et al., 2007 (GCA)	San Juan Island, WA, USA	0.00	brachiopod	1.07	SRM 915a	1.92	0.04
	San Juan Island, WA, USA	0.00	brachiopod	1.09	SRM 915a	1.94	0.06
	San Juan Island, WA, USA	0.00	brachiopod	0.92	SRM 915a	1.77	-0.11
	San Juan Island, WA, USA	0.00	brachiopod	0.97	SRM 915a	1.82	-0.06
	Madeira, Spain	0.00	brachiopod	1.05	SRM 915a	1.90	0.02
	South Island, New Zealand	0.00	brachiopod	0.82	SRM 915a	1.67	-0.21
	Osprey Reef, Coral Sea, Australia	0.00	brachiopod	1.19	SRM 915a	2.04	0.16
	Kronsmoor, Germany	71.00	brachiopod	0.95	SRM 915a	1.80	-0.08
	St. Margarets, Great Britain	89.00	brachiopod	0.93	SRM 915a	1.78	-0.10
	Lewes, Shoreham, Great Britain	89.50	brachiopod	0.77	SRM 915a	1.62	-0.26
	Lewes, New Pit, Great Britain	91.90	brachiopod	0.85	SRM 915a	1.70	-0.18
	Glyndebourne, Great Britain	92.00	brachiopod	0.94	SRM 915a	1.79	-0.09
	Eastbourne, Great Britain	93.00	brachiopod	0.79	SRM 915a	1.64	-0.24
	Eastbourne, Great Britain	94.00	brachiopod	1.04	SRM 915a	1.89	0.01
	Eastbourne, Great Britain	94.10	brachiopod	1.19	SRM 915a	2.04	0.16
	Dover, Great Britain	94.90	brachiopod	0.87	SRM 915a	1.72	-0.16
	Southerham, Great Britain	95.00	brachiopod	0.82	SRM 915a	1.67	-0.21
	Southerham, Great Britain	95.10	brachiopod	0.72	SRM 915a	1.57	-0.31
	Southerham, Great Britain	96.40	brachiopod	0.82	SRM 915a	1.67	-0.21
	Southerham, Great Britain	96.50	brachiopod	0.69	SRM 915a	1.54	-0.34
	Ursental, Germany	151.50	brachiopod	0.68	SRM 915a	1.53	-0.35
	Ursental, Germany	151.50	brachiopod	0.69	SRM 915a	1.54	-0.34
	Geisingen, Germany	155.00	brachiopod	0.66	SRM 915a	1.51	-0.37
	Geisingen, Germany	155.00	brachiopod	0.59	SRM 915a	1.44	-0.44
	Weissloferbach, Austria	201.20	brachiopod	0.46	SRM 915a	1.31	-0.57
	Weissloferbach, Austria	201.20	brachiopod	0.59	SRM 915a	1.44	-0.44
	Weissloferbach, Austria	201.70	brachiopod	0.48	SRM 915a	1.33	-0.55
	Weissloferbach, Austria	202.00	brachiopod	0.73	SRM 915a	1.58	-0.30
	Weissloferbach, Austria	202.30	brachiopod	0.70	SRM 915a	1.55	-0.33
	Weissloferbach, Austria	202.50	brachiopod	0.32	SRM 915a	1.17	-0.71

Weissloferbach, Austria	202.80	brachiopod	0.39	SRM 915a	1.24	-0.64
St. Cassian / Cortina d'Ampezzo, Italy	225.20	brachiopod	0.73	SRM 915a	1.58	-0.30
St. Cassian / Cortina d'Ampezzo, Italy	226.10	brachiopod	0.61	SRM 915a	1.46	-0.42
St. Cassian / Cortina d'Ampezzo, Italy	226.80	brachiopod	0.66	SRM 915a	1.51	-0.37
St. Cassian / Cortina d'Ampezzo, Italy	227.10	brachiopod	0.49	SRM 915a	1.34	-0.54
Köveskál, Hungary	227.40	brachiopod	0.90	SRM 915a	1.75	-0.13
St. Cassian / Cortina d'Ampezzo, Italy	227.40	brachiopod	0.42	SRM 915a	1.27	-0.61
Gähnheim, Germany	231.00	brachiopod	0.34	SRM 915a	1.19	-0.69
Gerichtstetten, Germany	231.20	brachiopod	0.62	SRM 915a	1.47	-0.41
Gähnheim, Germany	231.20	brachiopod	0.63	SRM 915a	1.48	-0.40
Zwingelhausen (Backnang), Germany	233.60	brachiopod	0.46	SRM 915a	1.31	-0.57
Gähnheim, Germany	234.40	brachiopod	0.62	SRM 915a	1.47	-0.41
Neidenfels, Germany	237.50	brachiopod	0.72	SRM 915a	1.57	-0.31
Neidenfels, Germany	238.00	brachiopod	0.76	SRM 915a	1.61	-0.27
Laibach, Germany	241.00	brachiopod	0.42	SRM 915a	1.27	-0.61
Chongquing Zhongliang Section, China	251.10	brachiopod	1.02	SRM 915a	1.87	-0.01
Chongquing Zhongliang Section, China	251.10	brachiopod	0.48	SRM 915a	1.33	-0.55
Chejiaba near Guangyuan, China	251.70	brachiopod	1.03	SRM 915a	1.88	0.00
Meishan D, China	251.80	brachiopod	0.50	SRM 915a	1.35	-0.53
Chongquing Zhongliang Section, China	252.90	brachiopod	0.66	SRM 915a	1.51	-0.37
Chongquing Zhongliang Section, China	253.20	brachiopod	0.45	SRM 915a	1.30	-0.58
Chongquing Zhongliang Section, China	253.20	brachiopod	0.82	SRM 915a	1.67	-0.21
Chongquing Zhongliang Section, China	253.60	brachiopod	0.42	SRM 915a	1.27	-0.61
Shangsi Section near Guangyuan, China	256.90	brachiopod	0.40	SRM 915a	1.25	-0.63
Laibin, Guanxi Province, China	263.90	brachiopod	0.75	SRM 915a	1.60	-0.28
Tonkeng, Xinshao County / Hunan, China	263.90	brachiopod	0.42	SRM 915a	1.27	-0.61
Laibin 4, China	264.00	brachiopod	0.37	SRM 915a	1.22	-0.66
Xiangliangbei village, Jian county, China	266.00	brachiopod	0.48	SRM 915a	1.33	-0.55
Laibin 3, China	267.00	brachiopod	0.52	SRM 915a	1.37	-0.51
Longyin Puan Country / Guizhou, China	284.00	brachiopod	0.81	SRM 915a	1.66	-0.22
Laibin, Guanxi Province, China	288.70	brachiopod	0.82	SRM 915a	1.67	-0.21
Usolka, Russia	293.40	brachiopod	1.15	SRM 915a	2.00	0.12
Guanjiayu, Dongshan, Taiyuan, China	293.50	brachiopod	0.93	SRM 915a	1.78	-0.10
Longyin Puan Country / Guizhou, China	294.90	brachiopod	0.63	SRM 915a	1.48	-0.40
Longyin Puan Country / Guizhou, China	294.90	brachiopod	0.68	SRM 915a	1.53	-0.35
Moscow Basin, Russia	300.00	brachiopod	0.75	SRM 915a	1.60	-0.28
Moscow Basin, Russia	302.20	brachiopod	0.63	SRM 915a	1.48	-0.40
Moscow Basin, Russia	304.00	brachiopod	0.90	SRM 915a	1.75	-0.13
Moscow Basin, Russia	304.20	brachiopod	0.82	SRM 915a	1.67	-0.21
Moscow Basin, Russia	304.80	brachiopod	0.86	SRM 915a	1.71	-0.17
Moscow Basin, Russia	305.70	brachiopod	0.83	SRM 915a	1.68	-0.20
Moscow Basin, Russia	306.80	brachiopod	0.80	SRM 915a	1.65	-0.23
Moscow Basin, Russia	307.00	brachiopod	0.78	SRM 915a	1.63	-0.25
Moscow Basin, Russia	307.20	brachiopod	1.08	SRM 915a	1.93	0.05
Moscow Basin, Russia	307.20	brachiopod	1.13	SRM 915a	1.98	0.10
Moscow Basin, Russia	307.50	brachiopod	0.80	SRM 915a	1.65	-0.23
Moscow Basin, Russia	308.20	brachiopod	0.82	SRM 915a	1.67	-0.21
Moscow Basin, Russia	308.50	brachiopod	1.02	SRM 915a	1.87	-0.01
Moscow Basin, Russia	310.10	brachiopod	0.82	SRM 915a	1.67	-0.21
Moscow Basin, Russia	310.50	brachiopod	0.80	SRM 915a	1.65	-0.23
Moscow Basin, Russia	310.70	brachiopod	0.92	SRM 915a	1.77	-0.11
Moscow Basin, Russia	310.70	brachiopod	0.85	SRM 915a	1.70	-0.18
Moscow Basin, Russia	310.70	brachiopod	0.95	SRM 915a	1.80	-0.08
Moscow Basin, Russia	311.70	brachiopod	0.87	SRM 915a	1.72	-0.16
Donetsk Basin, Ukraine	311.90	brachiopod	1.16	SRM 915a	2.01	0.13
Donetsk Basin, Ukraine	313.30	brachiopod	0.81	SRM 915a	1.66	-0.22
Donetsk Basin, Ukraine	314.00	brachiopod	0.44	SRM 915a	1.29	-0.59
Donetsk Basin, Ukraine	314.90	brachiopod	0.93	SRM 915a	1.78	-0.10
Donetsk Basin, Ukraine	320.80	brachiopod	0.99	SRM 915a	1.84	-0.04
Donetsk Basin, Ukraine	320.90	brachiopod	0.93	SRM 915a	1.78	-0.10
Donetsk Basin, Ukraine	321.60	brachiopod	0.97	SRM 915a	1.82	-0.06
Donetsk Basin, Ukraine	321.60	brachiopod	0.74	SRM 915a	1.59	-0.29

Donetsk Basin, Ukraine	321.70	brachiopod	0.76	SRM 915a	1.61	-0.27
Moscow Basin, Russia	324.10	brachiopod	0.65	SRM 915a	1.50	-0.38
Donetsk Basin, Ukraine	324.50	brachiopod	0.90	SRM 915a	1.75	-0.13
Moscow Basin, Russia	325.10	brachiopod	0.46	SRM 915a	1.31	-0.57
Moscow Basin, Russia	325.30	brachiopod	0.33	SRM 915a	1.18	-0.70
Donetsk Basin, Ukraine	325.70	brachiopod	0.37	SRM 915a	1.22	-0.66
Donetsk Basin, Ukraine	326.10	brachiopod	0.34	SRM 915a	1.19	-0.69
Donetsk Basin, Ukraine	326.60	brachiopod	0.21	SRM 915a	1.06	-0.82
Donetsk Basin, Ukraine	327.00	brachiopod	0.74	SRM 915a	1.59	-0.29
Donetsk Basin, Ukraine	327.50	brachiopod	0.41	SRM 915a	1.26	-0.62
Donetsk Basin, Ukraine	327.70	brachiopod	0.72	SRM 915a	1.57	-0.31
Donetsk Basin, Ukraine	327.80	brachiopod	0.52	SRM 915a	1.37	-0.51
Turnhout, Belgium	328.80	brachiopod	0.53	SRM 915a	1.38	-0.50
Gravenvoeren, Belgium	329.00	brachiopod	0.67	SRM 915a	1.52	-0.36
Moscow Basin, Russia	329.00	brachiopod	0.51	SRM 915a	1.36	-0.52
Gravenvoeren, Belgium	329.30	brachiopod	0.62	SRM 915a	1.47	-0.41
Halen, Belgium	329.40	brachiopod	0.58	SRM 915a	1.43	-0.45
Turnhout, Belgium	330.60	brachiopod	0.75	SRM 915a	1.60	-0.28
Gravenvoeren, Belgium	331.50	brachiopod	0.68	SRM 915a	1.53	-0.35
Halen, Belgium	331.60	brachiopod	0.63	SRM 915a	1.48	-0.40
Halen, Belgium	331.60	brachiopod	0.81	SRM 915a	1.66	-0.22
Halen, Belgium	331.80	brachiopod	0.80	SRM 915a	1.65	-0.23
Donetsk Basin, Ukraine	332.80	brachiopod	0.70	SRM 915a	1.55	-0.33
Moscow Basin, Russia	333.40	brachiopod	0.69	SRM 915a	1.54	-0.34
Sligo-Ireland, Ireland	334.10	brachiopod	0.72	SRM 915a	1.57	-0.31
E Sagard 1/70, Belgium	334.50	brachiopod	0.60	SRM 915a	1.45	-0.43
Gravenvoeren, Belgium	334.70	brachiopod	0.48	SRM 915a	1.33	-0.55
Gravenvoeren, Belgium	336.20	brachiopod	0.87	SRM 915a	1.72	-0.16
Lives, Belgium	336.80	brachiopod	0.67	SRM 915a	1.52	-0.36
Halen, Belgium	337.70	brachiopod	0.67	SRM 915a	1.52	-0.36
Halen, Belgium	337.80	brachiopod	0.81	SRM 915a	1.66	-0.22
Gravenvoeren, Belgium	338.30	brachiopod	0.70	SRM 915a	1.55	-0.33
Halen, Belgium	338.50	brachiopod	0.75	SRM 915a	1.60	-0.28
Salet, Belgium	338.90	brachiopod	0.50	SRM 915a	1.35	-0.53
Turnhout, Belgium	339.90	brachiopod	0.62	SRM 915a	1.47	-0.41
Turnhout, Belgium	342.40	brachiopod	0.58	SRM 915a	1.43	-0.45
E Sagard 1/70, Belgium	342.50	brachiopod	-0.11	SRM 915a	0.74	-1.14
E Sagard 1/70, Belgium	343.20	brachiopod	-0.03	SRM 915a	0.82	-1.06
E Sagard 1/70, Belgium	345.20	brachiopod	0.20	SRM 915a	1.05	-0.83
Tournais 1, Belgium	345.40	brachiopod	0.54	SRM 915a	1.39	-0.49
Tournais 2, Belgium	347.00	brachiopod	0.23	SRM 915a	1.08	-0.80
Tournais 2, Belgium	347.20	brachiopod	0.64	SRM 915a	1.49	-0.39
Tournais 2, Belgium	347.60	brachiopod	0.13	SRM 915a	0.98	-0.90
Yvoir, Belgium	348.90	brachiopod	0.37	SRM 915a	1.22	-0.66
E Sagard 1/70, Belgium	350.10	brachiopod	0.53	SRM 915a	1.38	-0.50
E Sagard 1/70, Belgium	350.20	brachiopod	0.63	SRM 915a	1.48	-0.40
E Sagard 1/70, Belgium	350.30	brachiopod	0.58	SRM 915a	1.43	-0.45
Yvoir, Belgium	350.60	brachiopod	0.47	SRM 915a	1.32	-0.56
Rocher Bayard, Belgium	351.90	brachiopod	0.56	SRM 915a	1.41	-0.47
Rocher Bayard, Belgium	352.10	brachiopod	0.35	SRM 915a	1.20	-0.68
E Dranske 2/70, Germany	352.30	brachiopod	0.44	SRM 915a	1.29	-0.59
Cardiff, Great Britain	353.30	brachiopod	0.52	SRM 915a	1.37	-0.51
Aneseremme, Belgium	356.70	brachiopod	0.40	SRM 915a	1.25	-0.63
Aneseremme, Belgium	357.30	brachiopod	0.39	SRM 915a	1.24	-0.64
Aneseremme, Belgium	358.00	brachiopod	0.49	SRM 915a	1.34	-0.54
Aneseremme, Belgium	358.70	brachiopod	0.44	SRM 915a	1.29	-0.59
Neuenkirchen, Germany	372.20	brachiopod	0.39	SRM 915a	1.24	-0.64
Sagard, Germany	372.90	brachiopod	0.31	SRM 915a	1.16	-0.72
Sagard, Germany	373.60	brachiopod	0.40	SRM 915a	1.25	-0.63
Aachen, Germany	373.90	brachiopod	0.40	SRM 915a	1.25	-0.63
Aachen, Germany	374.30	brachiopod	0.38	SRM 915a	1.23	-0.65
Sagard, Germany	375.00	brachiopod	0.40	SRM 915a	1.25	-0.63

Aachen, Germany	375.60	brachiopod	0.34	SRM 915a	1.19	-0.69
Aachen, Germany	375.80	brachiopod	0.22	SRM 915a	1.07	-0.81
Siberia, Russia	370.00	brachiopod	0.20	SRM 915a	1.05	-0.83
South China	371.80	brachiopod	0.23	SRM 915a	1.08	-0.80
Siberia, Russia	373.90	brachiopod	0.23	SRM 915a	1.08	-0.80
Siberia, Russia	374.30	brachiopod	0.19	SRM 915a	1.04	-0.84
Siberia, Russia	374.30	brachiopod	0.27	SRM 915a	1.12	-0.76
Siberia, Russia	374.30	brachiopod	0.32	SRM 915a	1.17	-0.71
Siberia, Russia	374.60	brachiopod	0.24	SRM 915a	1.09	-0.79
Siberia, Russia	374.60	brachiopod	0.18	SRM 915a	1.03	-0.85
Siberia, Russia	374.60	brachiopod	0.26	SRM 915a	1.11	-0.77
Siberia, Russia	375.30	brachiopod	0.22	SRM 915a	1.07	-0.81
Siberia, Russia	375.50	brachiopod	0.18	SRM 915a	1.03	-0.85
Iowa, USA	376.90	brachiopod	0.26	SRM 915a	1.11	-0.77
Iowa, USA	377.60	brachiopod	0.16	SRM 915a	1.01	-0.87
Iowa, USA	378.10	brachiopod	0.30	SRM 915a	1.15	-0.73
Iowa, USA	378.20	brachiopod	0.34	SRM 915a	1.19	-0.69
Iowa, USA	378.20	brachiopod	0.25	SRM 915a	1.10	-0.78
Iowa, USA	381.60	brachiopod	0.47	SRM 915a	1.32	-0.56
Iowa, USA	382.90	brachiopod	0.53	SRM 915a	1.38	-0.50
Iowa, USA	383.00	brachiopod	0.51	SRM 915a	1.36	-0.52
Iowa, USA	386.20	brachiopod	0.47	SRM 915a	1.32	-0.56
Iowa, USA	386.20	brachiopod	0.47	SRM 915a	1.32	-0.56
Iowa, USA	386.20	brachiopod	0.39	SRM 915a	1.24	-0.64
Iowa, USA	386.20	brachiopod	0.33	SRM 915a	1.18	-0.70
Iowa, USA	386.40	brachiopod	0.46	SRM 915a	1.31	-0.57
Iowa, USA	386.40	brachiopod	0.42	SRM 915a	1.27	-0.61
Iowa, USA	386.40	brachiopod	0.41	SRM 915a	1.26	-0.62
Iowa, USA	386.40	brachiopod	0.42	SRM 915a	1.27	-0.61
Anti-Atlas, Morocco	389.30	brachiopod	0.26	SRM 915a	1.11	-0.77
Anti-Atlas, Morocco	393.70	brachiopod	0.28	SRM 915a	1.13	-0.75
Eifel Mountains, Germany	395.00	brachiopod	0.26	SRM 915a	1.11	-0.77
Cantabrian Mountains, Spain	398.10	brachiopod	0.35	SRM 915a	1.20	-0.68
Anti-Atlas, Morocco	399.00	brachiopod	0.31	SRM 915a	1.16	-0.72
Anti-Atlas, Morocco	399.10	brachiopod	0.44	SRM 915a	1.29	-0.59
Anti-Atlas, Morocco	399.70	brachiopod	0.26	SRM 915a	1.11	-0.77
Anti-Atlas, Morocco	401.20	brachiopod	0.31	SRM 915a	1.16	-0.72
Anti-Atlas, Morocco	401.80	brachiopod	0.23	SRM 915a	1.08	-0.80
Anti-Atlas, Morocco	401.80	brachiopod	0.24	SRM 915a	1.09	-0.79
Anti-Atlas, Morocco	402.40	brachiopod	0.29	SRM 915a	1.14	-0.74
Siberia, Russia	407.10	brachiopod	0.39	SRM 915a	1.24	-0.64
Cantabrian Mountains, Spain	413.30	brachiopod	0.26	SRM 915a	1.11	-0.77
Cantabrian Mountains, Spain	413.40	brachiopod	0.29	SRM 915a	1.14	-0.74
Podolia, Ukraine	416.30	brachiopod	0.31	SRM 915a	1.16	-0.72
Podolia, Ukraine	416.70	brachiopod	0.39	SRM 915a	1.24	-0.64
Taurage-11, Lithuania	417.90	brachiopod	0.61	SRM 915a	1.46	-0.42
Taurage-11, Lithuania	417.90	brachiopod	0.45	SRM 915a	1.30	-0.58
Kolka 54, Latvia	418.30	brachiopod	0.35	SRM 915a	1.20	-0.68
Kolka 54, Latvia	418.70	brachiopod	0.37	SRM 915a	1.22	-0.66
Podolia, Ukraine	418.70	brachiopod	0.49	SRM 915a	1.34	-0.54
Gotland, Sweden	419.50	brachiopod	0.44	SRM 915a	1.29	-0.59
Gotland, Sweden	420.20	brachiopod	0.31	SRM 915a	1.16	-0.72
Gotland, Sweden	420.60	brachiopod	0.59	SRM 915a	1.44	-0.44
Gotland, Sweden	421.70	brachiopod	0.42	SRM 915a	1.27	-0.61
Gotland, Sweden	421.70	brachiopod	0.49	SRM 915a	1.34	-0.54
Much Wenlock, Great Britain	423.80	brachiopod	0.43	SRM 915a	1.28	-0.60
Gotland, Sweden	423.80	brachiopod	0.32	SRM 915a	1.17	-0.71
Gotland, Sweden	423.80	brachiopod	0.28	SRM 915a	1.13	-0.75
Gotland, Sweden	423.80	brachiopod	0.26	SRM 915a	1.11	-0.77
Gotland, Sweden	424.90	brachiopod	0.31	SRM 915a	1.16	-0.72
Grauzai-105, Lithuania	426.00	brachiopod	0.44	SRM 915a	1.29	-0.59
Gotland, Sweden	426.60	brachiopod	0.50	SRM 915a	1.35	-0.53

Gotland, Sweden	426.60	brachiopod	0.51	SRM 915a	1.36	-0.52
Gotland, Sweden	426.60	brachiopod	0.47	SRM 915a	1.32	-0.56
Gotland, Sweden	427.10	brachiopod	0.65	SRM 915a	1.50	-0.38
Gotland, Sweden	428.60	brachiopod	0.39	SRM 915a	1.24	-0.64
Anticosti Island, Canada	429.50	brachiopod	0.46	SRM 915a	1.31	-0.57
Anticosti Island, Canada	430.40	brachiopod	0.44	SRM 915a	1.29	-0.59
Anticosti Island, Canada	430.40	brachiopod	0.41	SRM 915a	1.26	-0.62
Anticosti Island, Canada	431.50	brachiopod	0.27	SRM 915a	1.12	-0.76
Anticosti Island, Canada	432.80	brachiopod	0.39	SRM 915a	1.24	-0.64
Anticosti Island, Canada	434.50	brachiopod	0.28	SRM 915a	1.13	-0.75
Anticosti Island, Canada	437.30	brachiopod	0.57	SRM 915a	1.42	-0.46
Anticosti Island, Canada	439.40	brachiopod	0.48	SRM 915a	1.33	-0.55
Anticosti Island, Canada	439.40	brachiopod	0.35	SRM 915a	1.20	-0.68
Anticosti Island, Canada	439.40	brachiopod	0.53	SRM 915a	1.38	-0.50
Anticosti Island, Canada	439.40	brachiopod	0.55	SRM 915a	1.40	-0.48
Anticosti Island, Canada	442.50	brachiopod	0.54	SRM 915a	1.39	-0.49
Gotland, Sweden	419.20	brachiopod	0.24	SRM 915a	1.09	-0.79
Gotland, Sweden	419.20	brachiopod	0.32	SRM 915a	1.17	-0.71
Gotland, Sweden	419.20	brachiopod	0.24	SRM 915a	1.09	-0.79
Gotland, Sweden	419.40	brachiopod	0.29	SRM 915a	1.14	-0.74
Gotland, Sweden	420.90	brachiopod	0.24	SRM 915a	1.09	-0.79
Gotland, Sweden	420.90	brachiopod	0.22	SRM 915a	1.07	-0.81
Gotland, Sweden	420.90	brachiopod	0.25	SRM 915a	1.10	-0.78
Gotland, Sweden	420.90	brachiopod	0.19	SRM 915a	1.04	-0.84
Gotland, Sweden	423.00	brachiopod	0.16	SRM 915a	1.01	-0.87
Gotland, Sweden	423.70	brachiopod	0.14	SRM 915a	0.99	-0.89
Gotland, Sweden	424.10	brachiopod	0.20	SRM 915a	1.05	-0.83
Gotland, Sweden	425.30	brachiopod	0.18	SRM 915a	1.03	-0.85
Gotland, Sweden	425.30	brachiopod	0.25	SRM 915a	1.10	-0.78
Gotland, Sweden	426.90	brachiopod	0.24	SRM 915a	1.09	-0.79
Gotland, Sweden	427.60	brachiopod	0.26	SRM 915a	1.11	-0.77
Gotland, Sweden	427.60	brachiopod	0.25	SRM 915a	1.10	-0.78
South China	444.50	brachiopod	0.38	SRM 915a	1.23	-0.65
South China	444.50	brachiopod	0.17	SRM 915a	1.02	-0.86
Cincinnati, USA	445.20	brachiopod	0.41	SRM 915a	1.26	-0.62
South China	445.50	brachiopod	0.30	SRM 915a	1.15	-0.73
Cincinnati, USA	445.80	brachiopod	0.58	SRM 915a	1.43	-0.45
Cincinnati, USA	445.80	brachiopod	0.52	SRM 915a	1.37	-0.51
Cincinnati, USA	446.30	brachiopod	0.51	SRM 915a	1.36	-0.52
Cincinnati, USA	446.70	brachiopod	0.38	SRM 915a	1.23	-0.65
Cincinnati, USA	450.10	brachiopod	0.44	SRM 915a	1.29	-0.59
Cincinnati, USA	450.10	brachiopod	0.31	SRM 915a	1.16	-0.72
Cincinnati, USA	450.30	brachiopod	0.45	SRM 915a	1.30	-0.58
Cincinnati, USA	451.20	brachiopod	0.37	SRM 915a	1.22	-0.66
Lexington, USA	452.40	brachiopod	0.30	SRM 915a	1.15	-0.73
St. Louis, USA	455.50	brachiopod	0.73	SRM 915a	1.58	-0.30
St. Louis, USA	455.80	brachiopod	0.54	SRM 915a	1.39	-0.49
St. Louis, USA	456.10	brachiopod	0.45	SRM 915a	1.30	-0.58
Lexington, USA	456.80	brachiopod	0.88	SRM 915a	1.73	-0.15
Lexington, USA	456.90	brachiopod	0.58	SRM 915a	1.43	-0.45
St. Louis, USA	457.50	brachiopod	0.56	SRM 915a	1.41	-0.47
Arbuckle Mountains, USA	458.80	brachiopod	0.36	SRM 915a	1.21	-0.67
Arbuckle Mountains, USA	458.80	brachiopod	0.40	SRM 915a	1.25	-0.63
Arbuckle Mountains, USA	458.80	brachiopod	0.42	SRM 915a	1.27	-0.61
Arbuckle Mountains, USA	462.50	brachiopod	0.44	SRM 915a	1.29	-0.59
South China	463.70	brachiopod	0.47	SRM 915a	1.32	-0.56
Arbuckle Mountains, USA	465.30	brachiopod	0.49	SRM 915a	1.34	-0.54
Arbuckle Mountains, USA	465.30	brachiopod	0.32	SRM 915a	1.17	-0.71
Arbuckle Mountains, USA	465.30	brachiopod	0.55	SRM 915a	1.40	-0.48
South China	465.90	brachiopod	0.39	SRM 915a	1.24	-0.64
South China	465.90	brachiopod	0.51	SRM 915a	1.36	-0.52
South China	465.90	brachiopod	0.35	SRM 915a	1.20	-0.68

South China	465.90	brachiopod	0.53	SRM 915a	1.38	-0.50
Amadeus Basin, Australia	467.00	brachiopod	0.26	SRM 915a	1.11	-0.77
Amadeus Basin, Australia	467.00	brachiopod	0.38	SRM 915a	1.23	-0.65
St. Petersburg, Russia	467.00	brachiopod	0.73	SRM 915a	1.58	-0.30
South China	469.70	brachiopod	0.28	SRM 915a	1.13	-0.75
South China	474.50	brachiopod	0.24	SRM 915a	1.09	-0.79
South China	474.50	brachiopod	0.41	SRM 915a	1.26	-0.62
South China	477.10	brachiopod	0.46	SRM 915a	1.31	-0.57
South China	483.50	brachiopod	0.51	SRM 915a	1.36	-0.52

TABLE DR3

Common name	Binomen	phylum or division	subtaxon	location	sample name	Mineralogy	$\delta^{44/42}$Ca rel. to SRM915a	2 SE	$\delta^{44/40}$Ca rel. to SW	T (℃)	$\delta^{44/40}$Ca normalized to 15 ℃
MODERN SAMPLES											
bivalve fragment	unknown	mollusca	bivalvia	Skye, Scotland	BIV1	possibly mixed	0.36	0.04	-1.16	10.4	-1.07
bivalve fragment	unknown	mollusca	bivalvia	Skye, Scotland	BIV2	possibly mixed	0.46	0.05	-0.96	10.4	-0.87
snail fragments	unknown	mollusca	gastropoda	Skye, Scotland	GAS1	possibly mixed	0.20	0.06	-1.48	10.4	-1.39
snail fragments	unknown	mollusca	gastropoda	Skye, Scotland	GAS2	possibly mixed	0.31	0.06	-1.26	10.4	-1.17
encrusting foram	*Homotrema*	protozoa	foraminiferida	Bermuda	HOM1A	high-Mg calcite	0.30	0.06	-1.28	23.1	-1.44
encrusting foram	*Homotrema*	protozoa	foraminiferida	Bermuda	HOM1B	high-Mg calcite	0.34	0.06	-1.21	23.1	-1.37
encrusting foram	*Homotrema*	protozoa	foraminiferida	Bermuda	HOM2A	high-Mg calcite	0.35	0.06	-1.17	23.1	-1.33
encrusting foram	*Homotrema*	protozoa	foraminiferida	Bermuda	HOM2B	high-Mg calcite	0.40	0.06	-1.08	23.1	-1.24
sea urchin	unknown	echinodermata	echinoidea	Arran, Scotland	X1A-S	high-Mg calcite	0.21	0.05	-1.47	10.6	-1.38
sea urchin	unknown	echinodermata	echinoidea	Arran, Scotland	X2A-S	high-Mg calcite	0.23	0.06	-1.42	10.6	-1.33
sea urchin	unknown	echinodermata	echinoidea	Skye, Scotland	X3A	high-Mg calcite	0.30	0.07	-1.29	10.4	-1.20
sea urchin	unknown	echinodermata	echinoidea	Skye, Scotland	X3B	high-Mg calcite	0.26	0.07	-1.36	10.4	-1.27
red algae fragments	unknown	rhodophyta	-	Abu Dhabi	CSAD1	high-Mg calcite	0.70	0.05	-0.47	28.0	-0.73
red algae fragments	unknown	rhodophyta	-	Abu Dhabi	CSAD2	high-Mg calcite	0.57	0.05	-0.74	28.0	-1.00
red algae nodule	unknown	rhodophyta	-	Bermuda	ALG	high-Mg calcite	0.38	0.07	-1.12	23.1	-1.28
red algae fragments	unknown	rhodophyta	-	Skye, Scotland	SKYE1	high-Mg calcite	0.62	0.05	-0.65	10.4	-0.56
red algae fragments	unknown	rhodophyta	-	Skye, Scotland	SKYE2	high-Mg calcite	0.60	0.05	-0.68	10.4	-0.59
thicket algae	*Galaxaura*	rhodophyta	-	Bahamas	TH ALG	high-Mg calcite	0.42	0.08	-1.04	26.4	-1.27
red algae	unknown	rhodophyta	-	Arran, Scotland	ARR1	high-Mg calcite	0.40	0.05	-1.08	10.6	-0.99
red algae	unknown	rhodophyta	-	Arran, Scotland	ARR2	high-Mg calcite	0.42	0.05	-1.05	10.6	-0.96
coral	*Acropora (coral)*	cnidaria	scleractinia	Bora Bora	ACR1-2	aragonite	0.44	0.07	-1.00	28.0	-1.26
coral	*Porites (coral)*	cnidaria	scleractinia	Bermuda	POR1-2	aragonite	0.42	0.05	-1.05	23.1	-1.21
coral	*Diploria (coral)*	cnidaria	scleractinia	Bermuda	DIP1-2	aragonite	0.23	0.06	-1.41	23.1	-1.57
coral	unknown (pebble)	cnidaria	scleractinia	Barbados	COR1	aragonite	0.31	0.07	-1.26	27.4	-1.51
coral	unknown (pebble)	cnidaria	scleractinia	Barbados	COR2	aragonite	0.24	0.07	-1.40	27.4	-1.65
coral	unknown (pebble)	cnidaria	scleractinia	Barbados	COR3	aragonite	0.27	0.07	-1.34	27.4	-1.59
staghorn coral	*Acropora cervicornis*	cnidaria	scleractinia	Bahamas	STAG	aragonite	0.23	0.08	-1.41	26.4	-1.64
staghorn coral	*Acropora cervicornis*	cnidaria	scleractinia	Bahamas	BAH B17	aragonite	0.40	0.05	-1.08	26.4	-1.31
golfball coral	*Favia*	cnidaria	scleractinia	Bahamas	GOLF	aragonite	0.27	0.08	-1.33	26.4	-1.56
coral	*Acropora palmata*	cnidaria	scleractinia	Bahamas	ACR	aragonite	0.18	0.08	-1.52	26.4	-1.75
coral	*Porites*	cnidaria	scleractinia	Bahamas	POR4	aragonite	0.24	0.08	-1.41	26.4	-1.64
coral	*Porites*	cnidaria	scleractinia	Bahamas	POR5	aragonite	0.21	0.08	-1.45	26.4	-1.68
fire coral	*Millepora*	cnidaria	hydrozoa	Bermuda	MIL1,2	aragonite	0.15	0.06	-1.57	23.1	-1.73
fire coral	*Millepora*	cnidaria	hydrozoa	Bahamas	FIRE1	aragonite	0.30	0.08	-1.29	26.4	-1.52
fire coral	*Millepora*	cnidaria	hydrozoa	Bahamas	FIRE2	aragonite	0.30	0.08	-1.29	26.4	-1.52
fire coral	*Millepora*	cnidaria	hydrozoa	Bahamas	BAH B12	aragonite	0.41	0.05	-1.06	26.4	-1.29
deep sea coral	*Desmophyllum dianthus*	cnidaria	scleractinia	deep South Atlantic	DSC H1	aragonite	0.39	0.05	-1.09	3.1	-0.85
deep sea coral	*Desmophyllum dianthus*	cnidaria	scleractinia	deep North Atlantic	DSC H2	aragonite	0.24	0.05	-1.37	3.8	-1.15
deep sea coral	*Madrepora oculata*	cnidaria	scleractinia	deep sea, Queensland Trough	DSC 548	aragonite	0.25	0.05	-1.38	4.0	-1.16
deep sea coral	*Enallopsammia rostrata*	cnidaria	scleractinia	deep sea, Queensland Trough	DSC 549	aragonite	0.19	0.05	-1.50	4.0	-1.28
ooid	-	-	-	Norman Reef Cay, Bahamas	OOID1	aragonite	0.14	0.08	-1.61	26.4	-1.84
ooid	-	-	-	Norman Reef Cay, Bahamas	OOID2	aragonite	0.15	0.08	-1.58	26.4	-1.81
green algae	*Penicillus*	chlorophyta	-	Bahamas	PEN1	aragonite	0.18	0.07	-1.51	26.4	-1.74
green algae	*Penicillus*	chlorophyta	-	Bahamas	PEN2	aragonite	0.26	0.06	-1.37	26.4	-1.60
green algae	*Penicillus*	chlorophyta	-	Bahamas	PEN3	aragonite	0.14	0.07	-1.59	26.4	-1.82
green algae	*Halimeda monile*	chlorophyta	-	Bahamas	HMON	aragonite	0.30	0.07	-1.28	26.4	-1.51
green algae	*Halimeda tuna*	chlorophyta	-	Big Point, Bahamas	HTUN	aragonite	0.18	0.07	-1.52	26.4	-1.75
green algae	*Halimeda discoidea*	chlorophyta	-	Bahamas	HDIS1	aragonite	0.26	0.07	-1.37	26.4	-1.60
green algae	*Halimeda discoidea*	chlorophyta	-	Bahamas	HDIS2	aragonite	0.22	0.07	-1.44	26.4	-1.67
green algae	*Halimeda incrassata*	chlorophyta	-	Bahamas	HINC1	aragonite	0.19	0.07	-1.50	26.4	-1.73
green algae	*Halimeda incrassata*	chlorophyta	-	Bahamas	HINC2	aragonite	0.22	0.07	-1.44	26.4	-1.67

ANCIENT SAMPLES

belemnite	unknown	mollusca	cephalopoda	Belemnite Bed, Dorset, UK	BB2	calcite	0.15	0.08	-1.59
belemnite	unknown	mollusca	cephalopoda	Belemnite Bed, Dorset, UK	BB3	calcite	0.09	0.08	-1.71
belemnite	unknown	mollusca	cephalopoda	Belemnite Bed, Dorset, UK	BB4	calcite	0.15	0.08	-1.59
belemnite	unknown	mollusca	cephalopoda	Belemnite Bed, Dorset, UK	BB5	calcite	0.18	0.08	-1.52
belemnite	unknown	mollusca	cephalopoda	Belemnite Bed, Dorset, UK	BB6	calcite	0.11	0.08	-1.66
belemnite	unknown	mollusca	cephalopoda	Belemnite Bed, Dorset, UK	BB7	calcite	0.18	0.08	-1.52
belemnite	unknown	mollusca	cephalopoda	Belemnite Bed, Dorset, UK	BB8	calcite	0.06	0.08	-1.76
belemnite	unknown	mollusca	cephalopoda	Belemnite Bed, Dorset, UK	BB9	calcite	0.04	0.10	-1.79
belemnite	unknown	mollusca	cephalopoda	Belemnite Bed, Dorset, UK	BB10	calcite	0.21	0.10	-1.47
belemnite	unknown	mollusca	cephalopoda	Belemnite Stone, Dorset, UK	BS1	calcite	0.11	0.05	-1.66
belemnite	unknown	mollusca	cephalopoda	Belemnite Stone, Dorset, UK	BS3	calcite	0.12	0.05	-1.64
belemnite	unknown	mollusca	cephalopoda	Belemnite Stone, Dorset, UK	BS4	calcite	0.12	0.05	-1.65
belemnite	unknown	mollusca	cephalopoda	Junction Bed, Dorset, UK	JB2	calcite	0.08	0.09	-1.72
belemnite	unknown	mollusca	cephalopoda	Junction Bed, Dorset, UK	JB3	calcite	0.10	0.09	-1.69
belemnite	unknown	mollusca	cephalopoda	Junction Bed, Dorset, UK	JB4	calcite	0.07	0.09	-1.74
belemnite	unknown	mollusca	cephalopoda	Junction Bed, Dorset, UK	JB5	calcite	0.03	0.09	-1.82
belemnite	unknown	mollusca	cephalopoda	Junction Bed, Dorset, UK	JB6	calcite	0.16	0.09	-1.56
belemnite	unknown	mollusca	cephalopoda	Junction Bed, Dorset, UK	JB7	calcite	0.18	0.09	-1.53
belemnite	unknown	mollusca	cephalopoda	Junction Bed, Dorset, UK	JB8	calcite	0.16	0.09	-1.56
belemnite	unknown	mollusca	cephalopoda	Junction Bed, Dorset, UK	JB9	calcite	0.15	0.11	-1.59
belemnite	unknown	mollusca	cephalopoda	Junction Bed, Dorset, UK	JB10	calcite	0.28	0.09	-1.33
belemnite	unknown	mollusca	cephalopoda	Junction Bed, Dorset, UK	JB11	calcite	0.07	0.11	-1.74
belemnite	unknown	mollusca	cephalopoda	Burton Bradstock, Dorset, UK	BED1	calcite	0.01	0.05	-1.85
belemnite	unknown	mollusca	cephalopoda	Burton Bradstock, Dorset, UK	BED15	calcite	0.00	0.05	-1.88
belemnite	unknown	mollusca	cephalopoda	Burton Bradstock, Dorset, UK	BED12	calcite	0.00	0.05	-1.88
belemnite	unknown	mollusca	cephalopoda	Burton Bradstock, Dorset, UK	BED11	calcite	0.03	0.05	-1.82
belemnite	unknown	mollusca	cephalopoda	Burton Bradstock, Dorset, UK	BED6	calcite	0.02	0.05	-1.83
belemnite	unknown	mollusca	cephalopoda	Burton Bradstock, Dorset, UK	BED8	calcite	0.09	0.05	-1.70
belemnite	unknown	mollusca	cephalopoda	Burton Bradstock, Dorset, UK	BED1B	calcite	0.07	0.06	-1.74
belemnite	unknown	mollusca	cephalopoda	W. Kazakhstan	KAZ	calcite	-0.02	0.04	-1.91
belemnite	unknown	mollusca	cephalopoda	Eastbourne, Sussex, UK	HOL	calcite	0.09	0.04	-1.71

TABLE DR4

Common name	Binomen	phylum or division	subtaxon	location	Mineralogy	Source	$\delta^{44/40}$Ca rel. to SW	T (℃)	$\delta^{44/40}$Ca normalized to 15 ℃
Holocene ooze	---	deep-sea average		DSDP 590B	deep-sea average (calcite)	Skulan et al., 1997	-0.90	21.5	-0.90
nannofossil ooze	---	deep-sea average		DSDP 590	deep-sea average (calcite)	Fantle and DePaolo, 2005	-1.31	21.5	-1.31
nannofossil ooze	---	deep-sea average		ODP 807A	deep-sea average (calcite)	Fantle and DePaolo, 2007	-1.29	29.2	-1.29
deep-sea bulk carbonate	---	deep-sea average		various	deep-sea average (calcite)	De La Rocha and DePaolo., 2000	-1.30	18.0	-1.30
deep-sea bulk carbonate	---	deep-sea average		various	deep-sea average (calcite)	Schmitt et al., 2003	-1.20	18.0	-1.20
non-foraminiferal bulk	---	deep-sea average		various	deep-sea average (calcite)	Sime et al., 2007	-1.35	18.0	-1.35
blue mussel	*Mytilus edulis*	mollusca	bivalvia	North Sea	calcite (prismatic)	Heinemann et al., 2008	-0.77	9.6	-0.66
blue mussel	*Mytilus edulis*	mollusca	bivalvia	North Sea	calcite (prismatic)	Heinemann et al., 2008	-0.83	9.6	-0.72
blue mussel	*Mytilus edulis*	mollusca	bivalvia	North Sea	calcite (prismatic)	Heinemann et al., 2008	-1.10	9.6	-0.99
blue mussel	*Mytilus edulis*	mollusca	bivalvia	San Fransisco Bay, USA	possibly mixed	Skulan and DePaolo, 1999	-0.66	13.0	-0.62
oyster	*Ostrea*	mollusca	bivalvia	San Fransisco Bay, USA	possibly mixed	Skulan and DePaolo, 1999	-1.19	13.0	-1.15
oyster	*Ostrea*	mollusca	bivalvia	North Sea	possibly mixed	Steuber and Buhl 2006	-1.44	9.6	-1.33
oyster	*Ostrea*	mollusca	bivalvia	North Sea	possibly mixed	Steuber and Buhl 2006	-1.42	9.6	-1.31
giant clam	*Tridacna*	mollusca	bivalvia	Enewetak, tropical Pacific	possibly mixed	Steuber and Buhl 2006	-1.06	28.0	-1.32
bivalve fragment	---	mollusca	bivalvia	Skye, Scotland	possibly mixed	this study	-1.16	10.4	-1.07
bivalve fragment	---	mollusca	bivalvia	Skye, Scotland	possibly mixed	this study	-0.96	10.4	-0.87
chiton	*Polyplacophora*	mollusca	polyplacophora	North Atlantic	possibly mixed	Steuber and Buhl 2006	-1.14	10.0	-1.04
cone snail	*Conus puncticulatus*	mollusca	gastropoda	unknown (shallow, tropical)	possibly mixed	Skulan et al., 1997	-1.35	27.0	-1.59
limpet	*Bathyacmaea*	mollusca	gastropoda	unknown (deep ocean)	possibly mixed	Skulan et al., 1997	-1.32	2.0	-1.06
sea snail fragment	unknown	mollusca	gastropoda	Skye, Scotland	possibly mixed	this study	-1.48	10.4	-1.39
sea snail fragment	unknown	mollusca	gastropoda	Skye, Scotland	possibly mixed	this study	-1.26	10.4	-1.17
brachiopod	*Anakinetica*	brachiopoda		Australian shelf	low-Mg calcite	Steuber and Buhl 2006	-0.94	20.0	-1.04
brachiopod	*Terebratulina septentrionalis*	brachiopoda		Bay of Fundy	low-Mg calcite	von Allmen et al., 2010	-0.80	7.0	-0.64
brachiopod	*Terebratulina septentrionalis*	brachiopoda		Bay of Fundy	low-Mg calcite	von Allmen et al., 2010	-0.86	7.0	-0.70
brachiopod	*Gryphus vitreus*	brachiopoda		Mediterranean	low-Mg calcite	von Allmen et al., 2010	-0.56	20.5	-0.67
brachiopod	*Thecidellina*	brachiopoda		Osprey Reef, Coral Sea	low-Mg calcite	Gussone et al., 2005	-0.69	26.9	-0.93
brachiopod	unknown	brachiopoda		Madeira	low-Mg calcite	Gussone et al., 2005	-0.83	29.0	-1.11
brachiopod	*Waltonoia inconspicua*	brachiopoda		South New Zealand	low-Mg calcite	Gussone et al., 2005	-1.06	14.0	-1.04
brachiopod	*Terebratalia transversa*	brachiopoda		San Juan Islands, WA, USA	low-Mg calcite	Gussone et al., 2005	-0.96	10.0	-0.86
brachiopod	*Terebratalia transversa*	brachiopoda		San Juan Islands, WA, USA	low-Mg calcite	Gussone et al., 2005	-0.91	10.0	-0.81
brachiopod	*Terebratalia transversa*	brachiopoda		San Juan Islands, WA, USA	low-Mg calcite	Farkaš et al., 2007, EPSL	-0.81	11.9	-0.75
brachiopod	*Terebratalia transversa*	brachiopoda		San Juan Islands, WA, USA	low-Mg calcite	Farkaš et al., 2007, EPSL	-0.79	11.9	-0.73
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	De La Rocha and DePaolo, 2000	-1.30	16.0	-1.32
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Langer et al., 2007	-1.29	17.0	-1.33
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Langer et al., 2007	-1.23	17.0	-1.27
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Langer et al., 2007	-1.26	17.0	-1.30
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Langer et al., 2007	-1.29	17.0	-1.33
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Langer et al., 2007	-1.29	17.0	-1.33
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Langer et al., 2007	-1.05	17.0	-1.09
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Langer et al., 2007	-1.28	17.0	-1.32
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Langer et al., 2007	-1.35	17.0	-1.39
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Langer et al., 2007	-1.49	17.0	-1.53
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Langer et al., 2007	-1.55	17.0	-1.59
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Langer et al., 2007	-1.44	17.0	-1.48
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.49	5	-1.29
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.53	5	-1.33
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.58	5	-1.38
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.63	5	-1.43
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.64	5	-1.44
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.30	11	-1.22
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.30	11	-1.22
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.35	11	-1.27
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.44	11	-1.36
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.47	11	-1.39
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.17	15	-1.17

coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.25	15	-1.25
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.25	15	-1.25
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.29	15	-1.29
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.23	20	-1.33
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.20	20	-1.30
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.19	20	-1.29
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.11	20	-1.21
coccolithophore	*Emiliania huxleyi*	haptophyta		laboratory culture	low-Mg calcite	Gussone et al., 2006	-1.10	20	-1.20
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.75	18.3	-1.82
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.16	18.2	-1.22
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.34	18.6	-1.41
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.39	23.4	-1.56
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.26	24.3	-1.45
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.38	31.2	-1.70
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.28	31.4	-1.61
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-0.98	24.4	-1.17
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.23	28.3	-1.50
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.13	26.8	-1.37
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.43	25.7	-1.64
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.28	30.3	-1.59
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.58	30.8	-1.90
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.41	30.4	-1.72
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.38	31.1	-1.70
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-0.98	27.8	-1.24
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.02	28.8	-1.30
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-0.81	30.4	-1.12
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.16	30.8	-1.48
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.38	31.1	-1.70
planktic foraminifera	*Neogloboquadrina dutertrei*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.30	18.3	-1.37
planktic foraminifera	*Neogloboquadrina dutertrei*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.37	18.6	-1.44
planktic foraminifera	*Neogloboquadrina dutertrei*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.37	20.6	-1.48
planktic foraminifera	*Neogloboquadrina dutertrei*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.52	21.3	-1.65
planktic foraminifera	*Neogloboquadrina dutertrei*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.43	27.3	-1.68
planktic foraminifera	*Neogloboquadrina dutertrei*	protozoa	foraminiferida	Guyamas Basin, Gulf of California	calcite	Griffith et al., 2008, EPSL	-1.24	28.8	-1.52
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.14	26.6	-1.37
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.16	27.2	-1.40
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.02	27.7	-1.27
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.04	28.3	-1.31
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.19	28.5	-1.46
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.24	28.9	-1.52
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.21	25.8	-1.43
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.14	25.9	-1.36
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.15	26.1	-1.37
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.21	26.8	-1.45
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.08	26.9	-1.32
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.08	27.1	-1.32
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.08	20.1	-1.18
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.15	23.9	-1.33
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.18	24.0	-1.36
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-0.98	24.9	-1.18
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.30	25.3	-1.51
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.13	18.6	-1.20
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.00	23.7	-1.17
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-0.97	24.1	-1.15
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-0.92	24.3	-1.11
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.25	24.6	-1.44
planktic foraminifera	*Globorotalia inflata*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.28	15.3	-1.29
planktic foraminifera	*Globorotalia inflata*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.21	20.9	-1.33
planktic foraminifera	*Globorotalia inflata*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.04	21.1	-1.16
planktic foraminifera	*Globorotalia truncatulinoides*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.51	11.0	-1.43

planktic foraminifera	*Globorotalia truncatulinoides*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-0.92	12.5	-0.87
planktic foraminifera	*Globorotalia truncatulinoides*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.56	14.4	-1.55
planktic foraminifera	*Globorotalia truncatulinoides*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.42	14.8	-1.42
planktic foraminifera	*Globorotalia truncatulinoides*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.16	18.4	-1.23
planktic foraminifera	*Globorotalia tumida*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.21	14.4	-1.20
planktic foraminifera	*Globorotalia tumida*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.25	17.0	-1.29
planktic foraminifera	*Globorotalia tumida*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.34	18.2	-1.40
planktic foraminifera	*Globorotalia tumida*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.28	26.4	-1.51
planktic foraminifera	*Globorotalia tumida*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.30	26.4	-1.53
planktic foraminifera	*Globorotalia tumida*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.29	26.4	-1.52
planktic foraminifera	*Neogloboquadrina dutertrei*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.21	19.5	-1.30
planktic foraminifera	*Neogloboquadrina dutertrei*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.34	20.0	-1.44
planktic foraminifera	*Neogloboquadrina dutertrei*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.20	20.1	-1.30
planktic foraminifera	*Neogloboquadrina dutertrei*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.22	21.4	-1.35
planktic foraminifera	*Neogloboquadrina dutertrei*	protozoa	foraminiferida	equatorial Atlantic	calcite	Griffith et al., 2008, EPSL	-1.19	21.8	-1.33
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	north Atlantic	calcite	Griffith et al., 2008, EPSL	-1.39	2.3	-1.14
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	north Atlantic	calcite	Griffith et al., 2008, EPSL	-1.56	2.8	-1.32
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	north Atlantic	calcite	Griffith et al., 2008, EPSL	-1.47	7.3	-1.32
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	north Atlantic	calcite	Griffith et al., 2008, EPSL	-1.30	7.3	-1.15
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	north Atlantic	calcite	Griffith et al., 2008, EPSL	-1.34	8.9	-1.22
planktic foraminifera	*Turborotalia quinqueloba*	protozoa	foraminiferida	Norwegian Sea, N Atlantic	low-Mg calcite	Gussone et al., 2005	-1.38	10.0	-1.28
planktic foraminifera	*Turborotalia quinqueloba*	protozoa	foraminiferida	Norwegian Sea, N Atlantic	low-Mg calcite	Gussone et al., 2005	-1.44	10.0	-1.34
planktic foraminifera	*Turborotalia quinqueloba*	protozoa	foraminiferida	Norwegian Sea, N Atlantic	low-Mg calcite	Gussone et al., 2005	-1.36	10.0	-1.26
planktic foraminifera	*Turborotalia quinqueloba*	protozoa	foraminiferida	Norwegian Sea, N Atlantic	low-Mg calcite	Gussone et al., 2005	-1.47	10.0	-1.37
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.28	10.5	-1.19
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.06	12.0	-1.00
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.12	13.1	-1.08
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.22	13.6	-1.19
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.20	24.4	-1.39
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.18	21.6	-1.31
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.24	15.4	-1.25
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.46	15.6	-1.47
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.16	15.5	-1.17
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.28	17.2	-1.32
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.16	18.1	-1.22
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.20	21.2	-1.32
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.10	28.0	-1.36
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.16	25.1	-1.36
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.20	16.7	-1.23
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.32	19.3	-1.41
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.16	25.1	-1.36
planktic foraminifera	*Globigerinoides trilobus*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.14	16.5	-1.17
planktic foraminifera	*Globigerinoides trilobus*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.22	20.6	-1.33
planktic foraminifera	*Globigerinoides trilobus*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.16	26.2	-1.38
planktic foraminifera	*Globigerinoides trilobus*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.24	24.0	-1.42
planktic foraminifera	*Globigerinella aequilateris*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.26	12.0	-1.20
planktic foraminifera	*Globigerinella aequilateris*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.32	12.1	-1.26
planktic foraminifera	*Globigerinella aequilateris*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.34	14.0	-1.32
planktic foraminifera	*Globigerinella aequilateris*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.22	23.3	-1.39
planktic foraminifera	*Globigerinella aequilateris*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.32	22.9	-1.48
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.24	11.8	-1.18
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.32	13.7	-1.29
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.20	13.6	-1.17
planktic foraminifera	*Globigerina bulloides*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.16	15.1	-1.16
planktic foraminifera	*Neogloboquadrina pachyderma*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.28	9.3	-1.17
planktic foraminifera	*Neogloboquadrina pachyderma*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.10	12.1	-1.04
planktic foraminifera	*Neogloboquadrina pachyderma*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.30	12.5	-1.25
planktic foraminifera	*Neogloboquadrina pachyderma*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.18	12.7	-1.13
planktic foraminifera	*Neogloboquadrina pachyderma*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.18	13.3	-1.15
planktic foraminifera	*Neogloboquadrina pachyderma*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.16	15.5	-1.17

planktic foraminifera	*Neogloboquadrina pachyderma*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.10	14.7	-1.09
planktic foraminifera	*Neogloboquadrina pachyderma*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.20	19.9	-1.30
planktic foraminifera	*Neogloboquadrina pachyderma*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.36	21.0	-1.48
planktic foraminifera	*Neogloboquadrina pachyderma*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.20	20.1	-1.30
planktic foraminifera	*Neogloboquadrina dutertrei*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.34	17.8	-1.40
planktic foraminifera	*Neogloboquadrina dutertrei*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.34	22.7	-1.49
planktic foraminifera	*Neogloboquadrina dutertrei*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.22	20.6	-1.33
planktic foraminifera	*Pulleniatina obliquiloculata*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.18	21.3	-1.31
planktic foraminifera	*Pulleniatina obliquiloculata*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.18	19.4	-1.27
planktic foraminifera	*Globorotalia inflata*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.24	11.8	-1.18
planktic foraminifera	*Globorotalia inflata*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.24	11.8	-1.18
planktic foraminifera	*Globorotalia inflata*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.24	11.8	-1.18
planktic foraminifera	*Globorotalia inflata*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.24	11.8	-1.18
planktic foraminifera	*Globorotalia inflata*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.24	11.8	-1.18
planktic foraminifera	*Globorotalia inflata*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.24	11.8	-1.18
planktic foraminifera	*Globorotalia truncatulinoides*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.30	9.4	-1.19
planktic foraminifera	*Globorotalia truncatulinoides*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-1.34	10.4	-1.25
planktic foraminifera	*Globorotalia truncatulinoides*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-0.80	9.4	-0.69
planktic foraminifera	*Globorotalia truncatulinoides*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-0.72	9.5	-0.61
planktic foraminifera	*Globorotalia truncatulinoides*	protozoa	foraminiferida	North Atlantic	calcite	Sime et al., 2005	-0.64	11.2	-0.56
planktic foraminifera	*Globorotalia truncatulinoides*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-0.82	11.4	-0.75
planktic foraminifera	*Globorotalia truncatulinoides*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.26	16.3	-1.29
planktic foraminifera	*Globorotalia scitula*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-0.94	11.5	-0.87
planktic foraminifera	*Globorotalia scitula*	protozoa	foraminiferida	West Indian Ocean	calcite	Sime et al., 2005	-1.36	7.3	-1.21
planktic foraminifera	*Globigerinoides trilobus*	protozoa	foraminiferida	ODP Site 925, equatorial Atlantic	calcite	Sime et al., 2007	-1.26	27.4	-1.51
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	ODP Site 925, equatorial Atlantic	calcite	Sime et al., 2007	-1.16	27.4	-1.41
planktic foraminifera	*Globigerinoides trilobus*	protozoa	foraminiferida	ODP Site 871, equatorial Pacific	calcite	Heuser et al., 2005	-1.01	28.5	-1.28
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	ODP Site 871, equatorial Pacific	calcite	Heuser et al., 2005	-1.25	28.5	-1.52
planktic foraminifera	*Globigerinella*	protozoa	foraminiferida	ODP Site 871, equatorial Pacific	calcite	Heuser et al., 2005	-1.44	28.5	-1.71
benthic foraminifera	*Glabratella ornatissima*	protozoa	foraminiferida	Bodega Bay, CA, USA	calcite	De La Rocha and DePaolo, 2000	-1.20	12.7	-1.15
planktic foraminifera	*Globorotalia menardii*	protozoa	foraminiferida	West equatorial Pacific, intermediate	calcite	Kasemann et al., 2008	-1.19	25.1	-1.39
planktic foraminifera	*Globorotalia tumida*	protozoa	foraminiferida	West equatorial Pacific, intermediate	calcite	Kasemann et al., 2008	-1.12	17.6	-1.17
planktic foraminifera	*Sphaeroidinella dehiscens*	protozoa	foraminiferida	West equatorial Pacific, mixed layer	calcite	Kasemann et al., 2008	-1.23	25.6	-1.44
planktic foraminifera	*Globigerinoides conglobatus*	protozoa	foraminiferida	West equatorial Pacific, mixed layer	calcite	Kasemann et al., 2008	-1.19	26.0	-1.41
planktic foraminifera	*Pulleniatina obliquiloculata*	protozoa	foraminiferida	West equatorial Pacific, mixed layer	calcite	Kasemann et al., 2008	-1.09	23.5	-1.26
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	West equatorial Pacific, mixed layer	calcite	Kasemann et al., 2008	-1.09	29.2	-1.37
planktic foraminifera	*Globigerinella siphonifera*	protozoa	foraminiferida	West equatorial Pacific, mixed layer	calcite	Kasemann et al., 2008	-1.02	25.8	-1.24
planktic foraminifera	*Globigerinoides ruber*	protozoa	foraminiferida	West equatorial Pacific, mixed layer	calcite	Kasemann et al., 2008	-1.12	30.2	-1.42
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	West equatorial Pacific, mixed layer	calcite	Kasemann et al., 2008	-0.93	30.0	-1.23
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.14	10.5	-1.05
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.16	10.5	-1.07
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.12	12.9	-1.08
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.17	12.9	-1.13
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.15	16.2	-1.17
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.06	18.0	-1.12
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.08	18.0	-1.14
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.01	21.0	-1.13
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.12	21.0	-1.24
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.00	22.0	-1.14
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-0.99	23.3	-1.16
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-0.89	23.3	-1.06
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-0.87	27.0	-1.11
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-0.83	27.0	-1.07
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-0.88	27.0	-1.12
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.07	29.2	-1.35
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-0.76	29.3	-1.05
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-0.79	29.3	-1.08
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-0.84	29.3	-1.13
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-0.89	29.3	-1.18
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-0.86	29.3	-1.15

planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-0.97	22.0	-1.11
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.01	22.0	-1.15
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.07	22.0	-1.21
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.13	22.0	-1.27
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-0.89	22.0	-1.03
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-0.97	22.0	-1.11
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.01	22.0	-1.15
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-1.08	22.0	-1.22
planktic foraminifera	*Orbulina universa*	protozoa	foraminiferida	laboratory culture	calcite	Gussone et al., 2003	-0.98	22.0	-1.12
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	Western equatorial Pacific	calcite	Zhu and Macdougall, 1998	-0.86	25.0	-1.06
planktic foraminifera	*Globigerinoides sacculifer*	protozoa	foraminiferida	Western equatorial Pacific	calcite	Zhu and Macdougall, 1998	-1.45	25.0	-1.65
planktic foraminifera	*Neogloboquadrina pachyderma*	protozoa	foraminiferida	South Atlantic	calcite	Zhu and Macdougall, 1998	-0.86	18.0	-0.92
planktic foraminifera	*Neogloboquadrina pachyderma*	protozoa	foraminiferida	South Atlantic	calcite	Zhu and Macdougall, 1998	-1.37	18.0	-1.43
benthic foraminifera	*Cibicides kullenbergi*	protozoa	foraminiferida	South Pacific	calcite	Zhu and Macdougall, 1998	-0.57	18.0	-0.63
benthic foraminifera	*Cibicides kullenbergi*	protozoa	foraminiferida	South Pacific	calcite	Zhu and Macdougall, 1998	-1.00	18.0	-1.06
benthic foraminifera	*Alveolinella*	protozoa	foraminiferida	unknown (shalllow, warm water)	calcite	Skulan et al., 1997	-0.43	27.0	-0.67
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33

perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
perforate foraminifera	various	protozoa	foraminiferida	various	calcite	Chang et al., 2004*	-1.20	21.6	-1.33
planktic foraminifera	unknown	protozoa	foraminiferida	Punta Maroma, Mexico	calcite	Holmden et al., 2012	-1.09	27.5	-1.34
encrusting foraminifera	*Homotrema*	protozoa	foraminiferida	Bermuda	high-Mg calcite	this study	-1.28	23.1	-1.44
encrusting foraminifera	*Homotrema*	protozoa	foraminiferida	Bermuda	high-Mg calcite	this study	-1.21	23.1	-1.37
encrusting foraminifera	*Homotrema*	protozoa	foraminiferida	Bermuda	high-Mg calcite	this study	-1.17	23.1	-1.33
encrusting foraminifera	*Homotrema*	protozoa	foraminiferida	Bermuda	high-Mg calcite	this study	-1.08	23.1	-1.24
sea urchin	unknown	echinodermata	echinoid	Arran, Scotland	high-Mg calcite	this study	-1.47	10.6	-1.38
sea urchin	unknown	echinodermata	echinoid	Arran, Scotland	high-Mg calcite	this study	-1.42	10.6	-1.33
sea urchin	unknown	echinodermata	echinoid	Skye, Scotland	high-Mg calcite	this study	-1.29	10.4	-1.20
sea urchin	unknown	echinodermata	echinoid	Skye, Scotland	high-Mg calcite	this study	-1.36	10.4	-1.27
echinoid spine	unknown	echinodermata	echinoid	Punta Maroma, Mexico	high-Mg calcite	Holmden et al., 2012	-1.12	27.5	-1.37
starfish	*Pisaster ochraceus*	echinodermata	asteroid	Big Sur, CA, USA	high-Mg calcite	Skulan et al., 1997	-0.79	12.9	-0.75
sclerosponge	*Acanthochaetetes wellsi*	porifera		Mactan, Cebu	high-Mg calcite	Gussone et al., 2005	-0.86	27.6	-1.11
sclerosponge	*Acanthochaetetes wellsi*	porifera		New Caledonia, Coral Sea	high-Mg calcite	Gussone et al., 2005	-0.67	24.0	-0.85
sclerosponge	*Acanthochaetetes wellsi*	porifera		Lizard Island, Great Barrier Reef	high-Mg calcite	Gussone et al., 2005	-0.70	26.0	-0.92
coralline red algae	unknown	rhodophyta		Monterey Bay, CA, USA	high-Mg calcite	Gussone et al., 2005	-0.83	14.0	-0.81
red algae	*Amphiroa tribulus*	rhodophyta		Punta Maroma, Mexico	high-Mg calcite	Holmden et al., 2012	-0.81	27.5	-1.06
red algae	*Porolithon pachydermum*	rhodophyta		Punta Maroma, Mexico	high-Mg calcite	Holmden et al., 2012	-0.91	27.5	-1.16
red algae	unknown	rhodophyta		Abu Dhabi	high-Mg calcite	this study	-0.47	28.0	-0.73
red algae	unknown	rhodophyta		Abu Dhabi	high-Mg calcite	this study	-0.74	28.0	-1.00
red algae nodule	unknown	rhodophyta		Bermuda	high-Mg calcite	this study	-1.12	23.1	-1.28
red algae	unknown	rhodophyta		Skye, Scotland	high-Mg calcite	this study	-0.65	10.4	-0.56
red algae	unknown	rhodophyta		Skye, Scotland	high-Mg calcite	this study	-0.68	10.4	-0.59
thicket algae	*Galaxaura*	rhodophyta		Bahamas	high-Mg calcite	this study	-1.04	26.4	-1.27
red algae	unknown	rhodophyta		Arran, Scotland	high-Mg calcite	this study	-1.08	10.6	-0.99
red algae	unknown	rhodophyta		Arran, Scotland	high-Mg calcite	this study	-1.05	10.6	-0.96

coral	unknown	cnidaria	scleractinia	unknown (tropical)	aragonite	Zhu and Macdougall, 1998	-1.84	27.0	-2.08
coral	*Acropora, Pocillopora*	cnidaria	scleractinia	Barbados, Mauritius, Red Sea	aragonite	Chang et al., 2004**	-1.24	25.0	-1.44
coral	*Acropora, Pocillopora*	cnidaria	scleractinia	Barbados, Mauritius, Red Sea	aragonite	Chang et al., 2004**	-1.24	25.0	-1.44
coral	*Acropora, Pocillopora*	cnidaria	scleractinia	Barbados, Mauritius, Red Sea	aragonite	Chang et al., 2004**	-1.24	25.0	-1.44
coral	*Acropora, Pocillopora*	cnidaria	scleractinia	Barbados, Mauritius, Red Sea	aragonite	Chang et al., 2004**	-1.24	25.0	-1.44
coral	*Acropora, Pocillopora*	cnidaria	scleractinia	Barbados, Mauritius, Red Sea	aragonite	Chang et al., 2004**	-1.24	25.0	-1.44
coral	*Pavona clavus*	cnidaria	scleractinia	Galapagos Islands	aragonite	Böhm et al., 2006	-1.08	24.4	-1.27
coral	*Porites*	cnidaria	scleractinia	Red Sea	aragonite	Böhm et al., 2006	-1.03	26.0	-1.25
coral	*Porites*	cnidaria	scleractinia	Red Sea	aragonite	Böhm et al., 2006	-0.98	28.0	-1.24
coral	*Porites*	cnidaria	scleractinia	Red Sea	aragonite	Böhm et al., 2006	-1.02	29.0	-1.30
coral	*Dendrogyra cylindricus*	cnidaria	scleractinia	Punta Maroma, Mexico	aragonite	Holmden et al., 2012	-1.05	27.5	-1.30
coral	*Monastrea annularis*	cnidaria	scleractinia	Punta Maroma, Mexico	aragonite	Holmden et al., 2012	-1.06	27.5	-1.31
coral	*Colpophylia natans*	cnidaria	scleractinia	Punta Maroma, Mexico	aragonite	Holmden et al., 2012	-1.14	27.5	-1.39
coral	*Porites furcata*	cnidaria	scleractinia	Punta Maroma, Mexico	aragonite	Holmden et al., 2012	-1.05	27.5	-1.30
coral	*Porites astreoides*	cnidaria	scleractinia	Punta Maroma, Mexico	aragonite	Holmden et al., 2012	-1.08	27.5	-1.33
coral	*Acropora*	cnidaria	scleractinia	Bora Bora	aragonite	this study	-1.00	28.0	-1.26
coral	*Porites*	cnidaria	scleractinia	Bermuda	aragonite	this study	-1.05	23.1	-1.21
coral	*Diploria*	cnidaria	scleractinia	Bermuda	aragonite	this study	-1.41	23.1	-1.57
coral	unknown (pebble)	cnidaria	scleractinia	Barbados	aragonite	this study	-1.26	27.4	-1.51
coral	unknown (pebble)	cnidaria	scleractinia	Barbados	aragonite	this study	-1.40	27.4	-1.65
coral	unknown (pebble)	cnidaria	scleractinia	Barbados	aragonite	this study	-1.34	27.4	-1.59
coral	*Acropora palmata*	cnidaria	scleractinia	Bahamas	aragonite	this study	-1.52	26.4	-1.75
coral	*Porites*	cnidaria	scleractinia	Bahamas	aragonite	this study	-1.41	26.4	-1.64
coral	*Porites*	cnidaria	scleractinia	Bahamas	aragonite	this study	-1.45	26.4	-1.68
staghorn coral	*Acropora cervicornis*	cnidaria	scleractinia	Bahamas	aragonite	this study	-1.41	26.4	-1.64

staghorn coral	*Acropora cervicornis*	cnidaria	scleractinia	Bahamas	aragonite	this study	-1.08	26.4	-1.31
golfball coral	*Favia*	cnidaria	scleractinia	Bahamas	aragonite	this study	-1.33	26.4	-1.56
fire coral	*Millepora complanata*	cnidaria	hydrozoa	Punta Maroma, Mexico	aragonite	Holmden et al., 2012	-1.02	27.5	-1.27
fire coral	*Millepora*	cnidaria	hydrozoa	Bermuda	aragonite	this study	-1.57	23.1	-1.73
fire coral	*Millepora*	cnidaria	hydrozoa	Bahamas	aragonite	this study	-1.29	26.4	-1.52
fire coral	*Millepora*	cnidaria	hydrozoa	Bahamas	aragonite	this study	-1.29	26.4	-1.52
fire coral	*Millepora*	cnidaria	hydrozoa	Bahamas	aragonite	this study	-1.06	26.4	-1.29
deep sea coral	*Desmophyllum dianthus*	cnidaria	scleractinia	deep South Atlantic	aragonite	this study***	-1.09	3.1	-0.85
deep sea coral	*Desmophyllum dianthus*	cnidaria	scleractinia	deep North Atlantic	aragonite	this study***	-1.37	3.8	-1.15
deep sea coral	*Madrepora oculata*	cnidaria	scleractinia	deep sea, Queensland Trough	aragonite	this study****	-1.38	4.0	-1.16
deep sea coral	*Enallopsammia rostrata*	cnidaria	scleractinia	deep sea, Queensland Trough	aragonite	this study****	-1.50	4.0	-1.28
ooid	---	---		Norman Reef Cay, Bahamas	aragonite	this study	-1.61	26.4	-1.84
ooid	---	---		Norman Reef Cay, Bahamas	aragonite	this study	-1.58	26.4	-1.81
ooid	---	---		Joulters Cay, Bahamas	aragonite	Steuber and Buhl 2006	-1.48	27.0	-1.72
ooid	---	---		Tolon, Greece	aragonite	Steuber and Buhl 2006	-1.42	19.0	-1.50
ooid	---	---		Neapolis, Greece	aragonite	Steuber and Buhl 2006	-0.84	19.0	-0.92
sclerosponge	*Vacelatia*	porifera		Lifou, New Caledonia	aragonite	Gussone et al., 2005	-1.54	16.2	-1.56
sclerosponge	*Vacelatia*	porifera		Wallis and Futuma, South Pacific	aragonite	Gussone et al., 2005	-1.49	23.0	-1.65
sclerosponge	*Vacelatia*	porifera		Norfolk Ridge, New Caledonia	aragonite	Gussone et al., 2005	-1.65	17.1	-1.69
sclerosponge	*Vacelatia crypta*	porifera		Astrolabe Reef, Fiji	aragonite	Gussone et al., 2005	-1.42	26.4	-1.65
sclerosponge	*Vacelatia crypta*	porifera		Lizard Island, Great Barrier Reef	aragonite	Gussone et al., 2005	-1.45	26.8	-1.69
sclerosponge	*Ceratoporella nicholsonia*	porifera		Jamaica	aragonite	Gussone et al., 2005	-1.37	27.1	-1.61
sclerosponge	*Ceratoporella nicholsonia*	porifera		Jamaica	aragonite	Gussone et al., 2005	-1.47	27.1	-1.71
sclerosponge	*Ceratoporella nicholsonia*	porifera		Pedro Bank, Caribbean	aragonite	Gussone et al., 2005	-1.46	25.7	-1.67
sclerosponge	*Astrosclera willeyana*	porifera		Gulf of Aqaba, Red Sea	aragonite	Gussone et al., 2005	-1.46	26.1	-1.68
green algae	*Penicillus*	chlorophyta		Bahamas	aragonite	this study	-1.51	26.4	-1.74
green algae	*Penicillus*	chlorophyta		Bahamas	aragonite	this study	-1.37	26.4	-1.60
green algae	*Penicillus*	chlorophyta		Bahamas	aragonite	this study	-1.59	26.4	-1.82
green algae	*Rhipocephalus phoenix*	chlorophyta		Punta Maroma, Mexico	aragonite	Holmden et al., 2012	-1.24	27.5	-1.49
green algae	*Udotea flabellum*	chlorophyta		Punta Maroma, Mexico	aragonite	Holmden et al., 2012	-1.20	27.5	-1.45
green algae	*Halimeda opuntia*	chlorophyta		Punta Maroma, Mexico	aragonite	Holmden et al., 2012	-1.22	27.5	-1.47
green algae	*Halimeda tuna*	chlorophyta		Punta Maroma, Mexico	aragonite	Holmden et al., 2012	-1.22	27.5	-1.47
green algae	*Halimeda incrassata*	chlorophyta		Punta Maroma, Mexico	aragonite	Holmden et al., 2012	-1.11	27.5	-1.36
green algae	*Halimeda monile*	chlorophyta		Bahamas	aragonite	this study	-1.28	26.4	-1.51
green algae	*Halimeda tuna*	chlorophyta		Big Point, Bahamas	aragonite	this study	-1.52	26.4	-1.75
green algae	*Halimeda discoidea*	chlorophyta		Bahamas	aragonite	this study	-1.37	26.4	-1.60
green algae	*Halimeda discoidea*	chlorophyta		Bahamas	aragonite	this study	-1.44	26.4	-1.67
green algae	*Halimeda incrassata*	chlorophyta		Bahamas	aragonite	this study	-1.50	26.4	-1.73
green algae	*Halimeda incrassata*	chlorophyta		Bahamas	aragonite	this study	-1.44	26.4	-1.67
pteropod	unknown	mollusca	gastropoda	Caribbean	aragonite	Gussone et al., 2005	-1.39	27.5	-1.64
pteropod	unknown	mollusca	gastropoda	Caribbean	aragonite	Gussone et al., 2005	-1.44	27.5	-1.69
pteropod	unknown	mollusca	gastropoda	Caribbean	aragonite	Gussone et al., 2005	-1.44	27.5	-1.69
conch	*Strombus*	mollusca	gastropoda	unknown	aragonite	Russell et al., 1978	-1.20	15.0	-1.20
blue mussel	*Mytilus edulis*	mollusca	bivalvia	North Sea	aragonite (nacre)	Heinemann et al., 2008	-1.01	10.0	-0.91
blue mussel	*Mytilus edulis*	mollusca	bivalvia	North Sea	aragonite (nacre)	Heinemann et al., 2008	-1.14	10.0	-1.04
blue mussel	*Mytilus edulis*	mollusca	bivalvia	North Sea	aragonite (nacre)	Heinemann et al., 2008	-1.24	10.0	-1.14

* average of 49 individual measurements, planktonic and benthonic foraminifera
** average of 5 individual measurements
*** sample details from Case et al., 2010.
**** samples from A. Thomas

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