Supporting Online Material for

Isotopic Evidence for Glaciation During the Cretaceous Supergreenhouse

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Material: Ocean Drilling Program (ODP) Leg 207 was drilled on Demerara Rise (DR), a NW-SE oriented prominent submarine plateau in the western equatorial Atlantic Ocean offshore Suriname and French Guyana. ODP Site 1259 (9°18.0'N, 54°12.0'W, water depth 2354 mbsf) is situated ~380 km north of Suriname on the gently dipping (~1°) north-facing slope (*S1*). During the mid- and Late Cretaceous DR was located in the tropics (*S1*) and depositional water-depth has been estimated to be >1500 m (*S2*).

At ODP Site 1259 a 40-m-thick C_{org}-rich, laminated marlstone succession (black shales) of Turonian to Santonian age was recovered. A spliced sequence between the three holes A, B and C were studied (Fig. S1). Sample spacing is about 5 cm, which yields a maximal temporal resolution of ~10 ky (see linear sedimentation rates below). The average resolution is somewhat lower, because intercalated limestone beds and intervals with C_{org} peak values do not contain foraminiferal tests that are sufficiently well preserved for geochemical analyses.

Stratigraphy and linear sedimentation rates (LSRs): Calcareous nannofossil biostratigraphy is based on a study of 42 samples. Simple smear slides were examined using a polarizing light microscope at a magnification of x1250. For each sample, three transverses of the slide were studied (>200 fields of view = FOV) to identify stratigraphic marker species of calcareous nannofossils. Samples studied have been assigned to Turonian-Santonian age and to the calcareous nannofossil zones CC11 to CC15 (*S3–S5*), respectively (Fig. S1). The applied biostratigraphic schemes (*S3–S5*) have previously been incorporated into an integrated stratigraphic framework and correlated to absolute ages (*S6*, *S7*). This allows us to calculate LSRs between the Cenomanian-Turonian stage boundary [as defined by the correlation between the $\delta^{13}C_{org}$ records of Pueblo (GSSP) (*S8*) and DR (*S9*)] and base CC12, base CC12 and base CC13, base CC13 and base CC14, base CC14 and base CC15, and base CC15 and base CC16 nannofossil zone boundaries, assuming a continuous sedimentation without hiati during the study interval. The latter boundary, which is represented by the hiatus between the CC15b–CC18 nannofossil zones (*S1*, Fig. S1) has been approximated with the top of CC15b (= base CC16) in order to obtain a further age tie point. Based on the given LSRs (Table S1) we estimate the duration of the Turonian peak interval across the CC11–CC12 boundary of ~200 ky. This is in agreement with the 200–300 ky calculated by (*S10*) based on their calibration of the $\delta^{13}C$ stratigraphy within the ammonite zonation against an absolute timescale.

Table S1: Biostratigraphic boundaries, corresponding absolute ages and calculated LSRs.

ODP Site 1259	*mcd [m]*	*Age [Myr] (S6, S7)*	*LSR [cm/kyr]*	*Comment:*
base Turonian	549.1	93.50	n/a	based on $\delta^{13}C_{org}$ correlation between Pueblo (GSSP) (*S8*) and DR (*S9*)
base CC12	521.51	91.22	1.21	this study
base CC13	512.45	89.62	0.57	this study
base CC14	501.2	86.98	0.43	this study
base CC15	499.3	85.85	0.17	this study
top CC15 = base CC18	495.59	84.95	0.41	this study (= unconformity,+/- Santonian/Campanian boundary)

In addition to the calcareous nannofossil biostratigraphy we tied our planktic foraminiferal $\delta^{13}C$ record (Table S2) to the bulk-rock based $\delta^{13}C$ reference curve from England (*S11*; Fig. S2). This correlation allows us to better constrain our positive $\delta^{18}O$ excursion with extensively studied on-shore sections in NW Europe. Based on the general long-term trend in $\delta^{13}C$ we assume that our $\delta^{18}O$ peak interval corresponds to the Pewsey Event in NW Europe (*S12*), which is also characterized by both slightly heavier $\delta^{13}C$ and lighter $\delta^{18}O$ values (*S10*).

Sea-surface temperature (SST) reconstruction based on $\delta^{18}O$ of planktic foraminiferal tests. Stable isotope measurements (Table S2) were performed on monospecific samples (5–50 individuals). Only exceptionally well preserved foraminiferal specimens free of secondary calcite chamber infillings were analyzed. The samples were reacted under vacuum with 100% orthophosphoric acid at 90°C using a Caroussel-48 automatic carbonate preparation device coupled to a Finnigan MAT 252 mass spectrometer at the Scripps Institution of Oceanography. The analytical precision (1σ) based on the NBS-19 standard was better than 0.09‰ and 0.04‰ for $\delta^{18}O$ and $\delta^{13}C$, respectively.

We estimated paleotemperatures by applying an equation for non-photosymbiotic *Orbulina universa* (*S13*): $T[°C]=16.5–4.8*(\delta^{18}O–\delta_W)$. δ_W is the $\delta^{18}O$ of the ambient Cretaceous seawater which is estimated of (**A**) –1‰ (VSMOW) (*S14*) for a Late Cretaceous world lacking of substantial amounts of continental ice sheets. δ_W of modern oceanic surface waters is highly variable due to latitude depending evaporation and precipitation rates. Therefore, we adjusted the Cretaceous mean value to account for latitudinal changes in precipitation minus evaporation (*S15–S17*):

(**B**) local δ_W off-set = $0.576+0.041*L–0.0017*L^2+0.0000135*L^3$ (‰, VSMOW) (*S17*), whereas L is the paleolatitude of DR (~5°N) (*S18*). A recent paleomagnetic study (*S19*) proposed a paleolatitude between 3.6°N (Campanian/Maastrichtian) and 15°N (Albian), using a linear interpolation a Turonian paleolatitude of 10.2°N is suggested. Such a paleolatitude is at odds with numerous paleogeographic reconstructions and causes only 0.44°C higher temperatures than a conservatively assumed paleolatitude of 5°N.

Based on these assumptions the local δ_W for DR can be calculated as:

local δ_W = (**A**) + (**B**) = –1.0 + 0.74 = –0.26 (‰, VSMOW).

This is equivalent to –0.53 (‰, VPDB) for CO_2 equilibration with this water (*S13*).

We consider the calculated SSTs employing the above technique to be conservative estimates, because we have not adjusted our SSTs to a variety of other factors: (I) Recent modeling studies suggested that an enhanced hydrological cycle under Cretaceous greenhouse conditions causes elevated latent heat and moisture transport to higher latitudes (*S20*), which influences the δ_W value causing an SST underestimation by 1 to 1.7°C in the tropics (*S21*). (II) Lower seawater pH due to high Cretaceous pCO_2 levels could increase absolute SST estimates by up to 4°C (*S22*). (III) Minor bias to cooler temperatures caused by a decrease of CO_2^{2-} ion concentration due to a lower pH (*S23*) and (IV) uptake of ^{18}O during the process of basalt weathering (*S24*), likely an important process in an era of high sea floor spreading (*S25*). This decision reflects the large uncertainties associated with estimating local pCO_2 levels, which would have been influenced by the atmospheric pCO_2 and the prevailing paleoceanographic conditions (primary productivity, stratification, upwelling). All these potential adjustments are based on several further assumptions or

large uncertainties; in aggregate, these adjustments, if taken together, suggest that our estimates of temperature are conservative.

An additional consideration in estimating paleotemperatures from foraminifer data is the ecology of the species used in the analysis. Here we present 541 measurements of nine different planktic foraminiferal species, because no single species was present in sufficient numbers to generate a continuous record. From these data four species (*Hedbergella delrioensis, Heterohelix globulosa, Marginotruncana sinuosa, Whiteinella baltica*) made up 88% of all analyses. These species have been studied in detail by (*S26*). According to this study all of these species show a very low variability in their $\delta^{18}O$ and $\delta^{13}C$ data (<0.2‰), a small interspecific difference and no significant size-depending trends. The only exception is *Heterohelix globulosa* which shows a significant increase (up to 1.5‰) in $\delta^{13}C$ with size, which explains the large scatter visible in the $\delta^{13}C$ data for this taxon (Fig. S2). These observations let us conclude that these species inhabited a similar surface water depth and that our $\delta^{18}O$ record is thereby not biased by employing a multi-species record.

Finally, changes in freshwater input can also affect temperature estimates based on $\delta^{18}O$. Today seawater at DR is influenced by the freshwater outflow of the Amazon River, but because the drainage system of the Amazon was not developed in pre-Miocene times (*S27*) we assume that surface waters did not receive significant amounts of ^{18}O depleted runoff. Moreover, the water-depth was >1500 m (*S2*) and DR was too far offshore to have been affected by low-salinity slope waters transported along the shelf edge (*S28*). This view is also supported by our highly stable $\delta^{18}O$ record from planktic foraminifera and the BIT index (*S29*) (Table S3), which has been analyzed for all samples studied with respect to TEX_{86}. The BIT values range from 0.03 to 0.08, suggesting thereby an open-marine environment with a relatively low contribution of terrestrial organic matter (*S29*).

$\delta^{18}O$ measurements on benthic foraminifera: Stable isotope measurements on benthic foraminifera were performed on monospecific samples (Table S4). Given the small size of benthic foraminiferal tests 30 to 100 individuals were needed for each measurement. Subsequently, $\delta^{13}C$ and $\delta^{18}O$ isotopic data were generated on a Fisons Prism III isotope ratio mass spectrometer (IRMS) at the University of California – Santa Cruz. Samples were reacted in orthophosphoric acid (specific gravity 1.91 g/cm^3 at 25°C) at 90°C using a common acid bath automated carbonate device. The generated CO_2 gas is cryogenically dried and separated from non-condensable gases prior to introduction into the IRMS. Long term precision of in-house standards is 0.03‰ for $\delta^{13}C$ and 0.06‰ for $\delta^{18}O$.

$\delta^{18}O$/sea surface salinity relationship: In modern oceans the $\delta^{18}O$/salinity relationship is variable and shows mostly a range between 0.15‰/p.s.u. (New York Bight, *S30*) and ~0.5‰/p.s.u. (Walvis Ridge, *S31*; Greenland, *S32*). Data for low latitudinal sites like the Red Sea and the eastern Caribbean Sea show a moderate $\delta^{18}O$/salinity gradient of 0.3‰/ p.s.u. (*S33*). We assume that the latter value might be also representative for DR because of the smaller size of the Turonian Atlantic and its tropical position.

SST reconstruction based on TEX_{86}: Biomarker analyses were conducted on approximately 2 g of freeze-dried and homogenized sample material following standard

laboratory procedures. Samples were extracted with a DIONEX Accelerated Solvent Extractor, ASE (temperature: 100°C; pressure: $7.6*10^6$ Pa; solvent: dichloromethane (DCM):methanol (MeOH): 9:1 v/v). After evaporation of the solvents, extracts were purified and separated by column chromatography (Al_2O_3) into an apolar, tetraether, and a polar fraction by elution of *n*-hexane/DCM (9:1 v/v), DCM/MeOH (95:5 v/v), and DCM/MeOH (1:1v/v), respectively. The dried tetraether fraction was redissolved in HPLC-grade *n*-hexane:isopropanol (99:1 v/v) at a concentration of 2 mg/ml, and filtered through a 0.45 μm PTFE filter. Separation, identification, and quantification of glycerol dialkyl glycerol tetraether lipids (GDGTs) were conducted on Agilent 1100 series HPLC-MSD equipped with Chemstation chromatography manager software (*S34*). Separation was achieved on a Prevail Cyano column (2.1 * 150 mm, 3 μm), injection volume was 10 μl. Peaks were detected by single ion monitoring of m/z 1302, 1300, 1298, 1296, and 1292 for the different GDGT isomers. The TEX_{86} index is defined as:

TEX_{86} = ([1298] + [1296] + [1292']) / ([1300] + [1298] + [1296] + [1292'])

Replicate measurements were performed on every fourth sample revealing that the maximum analytical error in TEX_{86} values is ± 0.005.

The TEX_{86} paleo-SST proxy (*S35*) is based on a positive correlation between annual mean SSTs and variations in the composition of cell membranes of marine Crenarchaeota. A positive linear relationship between SSTs and distributions of GDGTs is observed in a wide variety of recent to Holocene marine settings and core top material (*S35*, *S36*). Salinity changes, nutrient availability and diagenetic alteration have been shown to have no major influence on the TEX_{86} (*S35*, *S36*). As sediment trap and core top studies in present-day upwelling zones (i.e. Arabian Sea) have shown the TEX_{86} temperatures typically do not reflect the period of seasonal upwelling, but an annual average SST (*S38*). Further, the analysis of particulate organic matter (POM) in different marine settings suggest that the TEX_{86} signal inferred from surface sediments is derived from the upper 100 m of the water column (*S37*, *S38*). Based on these observations it is reasonable to assume that the TEX_{86} proxy represents annual average SSTs unaffected by seasonal upwelling.

Uncertainties in the absolute SST estimates from TEX_{86} analysis lie mainly in the calibration of TEX_{86} to SST. The current calibration for marine settings is based on Holocene core top material for the TEX_{86} range between 0.3 and 0.7. Hence the values reported here (>0.7) require further extrapolation of this calibration to convert our TEX_{86} data into SSTs (*S39*). Cretaceous paleo-SSTs were estimated from TEX_{86} by utilizing only data from Holocene marine surface sediments with annual mean SSTs > 20°C (Table S3), resulting in the following equation: $TEX_{86}=0.027*T–0.016$ (*S39*). This will inevitably introduce some uncertainty, but even if the absolute temperature remains imprecise other studies suggest that the relative change in TEX_{86} through our record should at least indicate reliable temporal trends in temperature (*S40–S42*). Furthermore, recent mesocosm experiments have shown that Crenarchaeota can live and still adjust their membrane lipid composition to temperatures up to 40°C (*S44*). Finally, high Cretaceous SSTs as obtained in this and other studies (*S39–S43*) are therefore in agreement with the existence of biota in such a high temperature range.

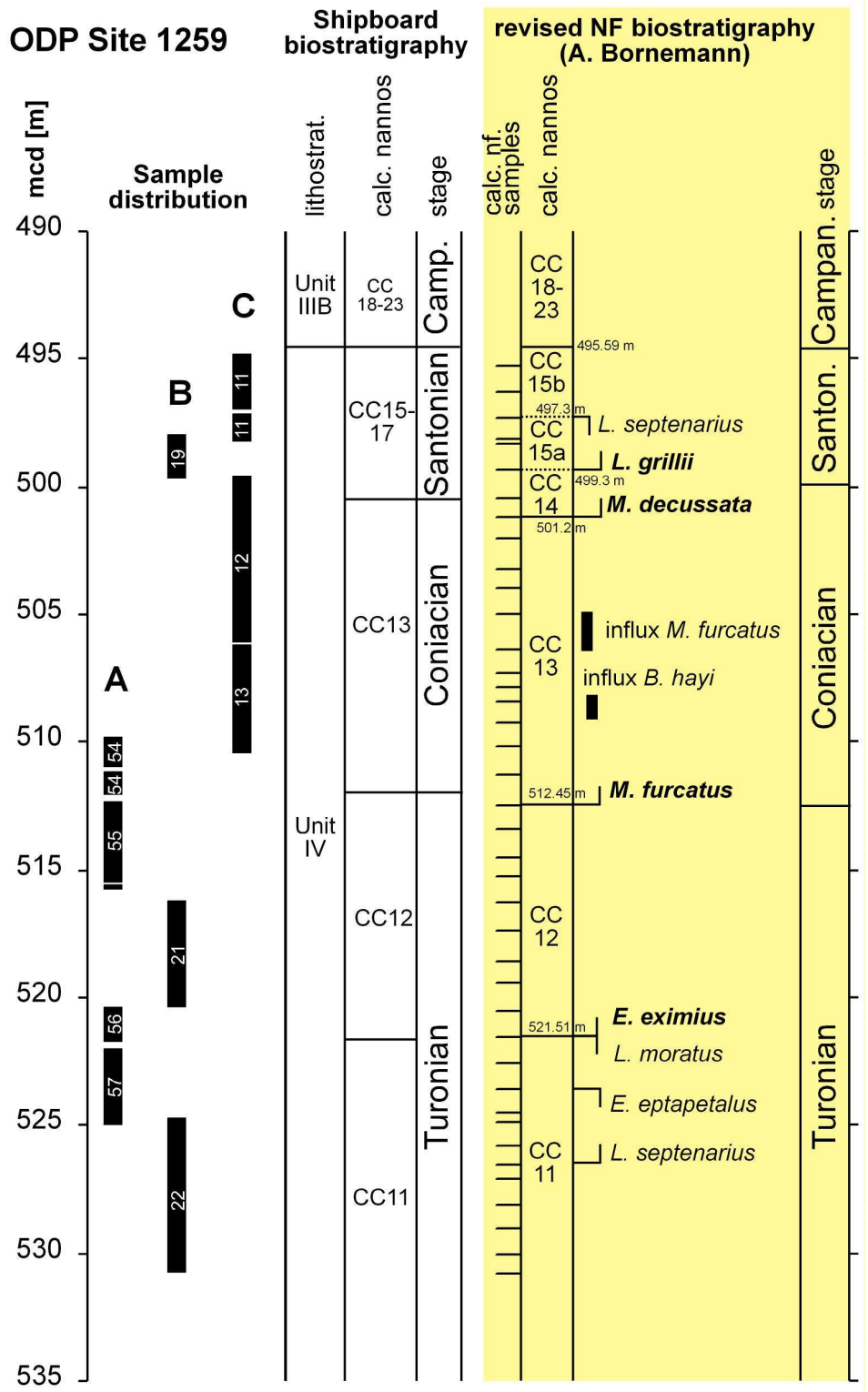

Fig. S1: Calcareous nannofossil biostratigraphy of ODP Site 1259 (results (*S1*) and this study). "Sample distribution" shows the distribution of sediments studied in Holes 1259A-C and the core numbers for each hole.

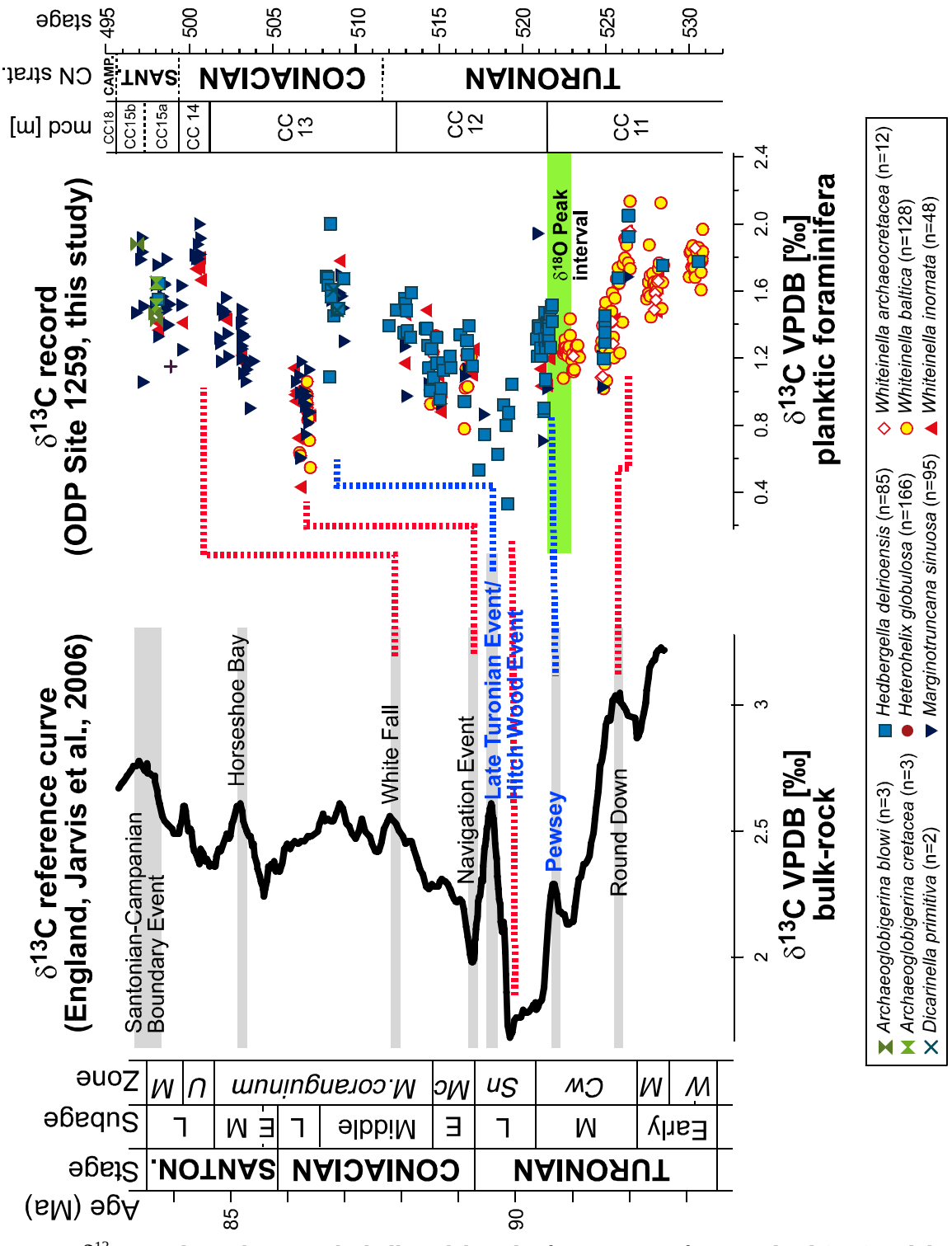

Fig. S2: $\delta^{13}C$ correlation between the bulk-rock based reference curve from England (*S11*) and the planktic foraminiferal record from ODP Site 1259. Based on the apparent similarity of both long-term trends we assume that our $\delta^{18}O$ peak interval is synchronous with the Pewsey Event in Western Europe.

Table S2. Oxygen and carbon stable isotope data - planktic foraminifera (page 1).

Leg	Site	H	Cor	T	Sc	Top	Bot	mbsf	mcd	NF zone	Age (Ogg et al., 2004)	Species	$\delta^{13}C$	$\delta^{18}O$
207	1259	C	11	R	4	125	126.5	494.71	496.95	CC15	85.280	*A. blowi*	1.879	-4.234
207	1259	C	11	R	4	125	126.5	494.71	496.95	CC15	85.280	*H. globulosa*	1.538	-4.137
207	1259	C	11	R	4	125	126.5	494.71	496.95	CC15	85.280	*M. sinuosa*	1.469	-3.796
207	1259	C	11	R	5	0	1.5	494.96	497.2	CC15	85.341	*M. sinuosa*	1.785	-4.021
207	1259	C	11	R	5	10	11.5	495.06	497.3	CC15	85.365	*H. globulosa*	1.455	-3.825
207	1259	C	11	R	5	10	11.5	495.06	497.3	CC15	85.365	*M. sinuosa*	1.831	-4.132
207	1259	C	11	R	5	10	11.5	495.06	497.3	CC15	85.365	*M. sinuosa*	1.916	-4.163
207	1259	C	11	R	5	15	16.5	495.11	497.35	CC15	85.377	*M. sinuosa*	1.056	-3.721
207	1259	C	11	R	5	20	21.5	495.16	497.4	CC15	85.389	*M. sinuosa*	1.507	-3.931
207	1259	C	11	R	5	75	76.5	495.71	497.95	CC15	85.522	*H. globulosa*	1.048	-3.861
207	1259	C	11	R	5	80	81.5	495.76	498	CC15	85.535	*A. blowi*	1.466	-4.219
207	1259	C	11	R	5	80	81.5	495.76	498	CC15	85.535	*H. globulosa*	1.238	-4.368
207	1259	B	19	R	2	5	6.5	497.05	498.05	CC15	85.547	*H. globulosa*	1.369	-4.102
207	1259	B	19	R	2	5	6.5	497.05	498.05	CC15	85.547	*M. sinuosa*	1.525	-3.820
207	1259	B	19	R	2	5	6.5	497.05	498.05	CC15	85.547	*W. inornata*	1.558	-4.090
207	1259	C	11	R	5	90	91.5	495.86	498.1	CC15	85.559	*A. blowi*	1.426	-4.338
207	1259	C	11	R	5	90	91.5	495.86	498.1	CC15	85.559	*M. sinuosa*	1.651	-4.378
207	1259	B	19	R	2	10	11.5	497.1	498.1	CC15	85.559	*A. cretacea*	1.516	-3.653
207	1259	B	19	R	2	10	11.5	497.1	498.1	CC15	85.559	*A. cretacea*	1.649	-3.929
207	1259	B	19	R	2	10	11.5	497.1	498.1	CC15	85.559	*M. sinuosa*	1.637	-3.973
207	1259	C	11	R	5	100	101.5	495.96	498.2	CC15	85.583	*H. delrioensis*	1.550	-4.251
207	1259	C	11	R	5	100	101.5	495.96	498.2	CC15	85.583	*H. globulosa*	1.485	-4.318
207	1259	C	11	R	5	100	101.5	495.96	498.2	CC15	85.583	*M. sinuosa*	1.754	-4.409
207	1259	C	11	R	5	100	101.5	495.96	498.2	CC15	85.583	*W. inornata*	1.366	-4.111
207	1259	C	11	R	5	105	106.5	496.01	498.25	CC15	85.595	*H. delrioensis*	1.643	-4.251
207	1259	C	11	R	5	105	106.5	496.01	498.25	CC15	85.595	*H. globulosa*	1.927	-4.173
207	1259	C	11	R	5	105	106.5	496.01	498.25	CC15	85.595	*M. sinuosa*	1.328	-4.254
207	1259	C	11	R	5	105	106.5	496.01	498.25	CC15	85.595	*W. inornata*	1.406	-4.230
207	1259	B	19	R	2	50	51.5	497.5	498.5	CC15	85.656	*M. sinuosa*	1.564	-4.032
207	1259	B	19	R	2	60	61.5	497.6	498.6	CC15	85.680	*H. globulosa*	1.977	-4.074
207	1259	B	19	R	2	60	61.5	497.6	498.6	CC15	85.680	*H. globulosa*	2.192	-3.813
207	1259	B	19	R	2	60	61.5	497.6	498.6	CC15	85.680	*M. sinuosa*	1.643	-4.174
207	1259	B	19	R	2	65	66.5	497.65	498.65	CC15	85.692	*H. globulosa*	1.963	-4.051
207	1259	B	19	R	2	65	66.5	497.65	498.65	CC15	85.692	*M. sinuosa*	1.635	-4.151
207	1259	B	19	R	2	70	71.5	497.7	498.7	CC15	85.704	*H. globulosa*	1.723	-4.092
207	1259	B	19	R	2	70	71.5	497.7	498.7	CC15	85.704	*M. sinuosa*	1.488	-4.051
207	1259	B	19	R	2	75	76.5	497.75	498.75	CC15	85.717	*M. sinuosa*	1.789	-4.104
207	1259	B	19	R	2	85	86.5	497.85	498.85	CC15	85.741	*M. sinuosa*	1.396	-4.088
207	1259	B	19	R	2	95	96.5	497.95	498.95	CC15	85.765	*D. concavata*	1.148	-3.847
207	1259	B	19	R	2	95	96.5	497.95	498.95	CC15	85.765	*H. globulosa*	1.331	-3.955
207	1259	B	19	R	2	95	96.5	497.95	498.95	CC15	85.765	*M. sinuosa*	1.519	-3.900
207	1259	C	12	R	1	0	1.5	495.4	499.65	CC14	86.058	*H. globulosa*	1.794	-3.998
207	1259	C	12	R	1	0	1.5	495.4	499.65	CC14	86.058	*M. sinuosa*	1.515	-3.896
207	1259	C	12	R	1	0	1.5	495.4	499.65	CC14	86.058	*M. sinuosa*	1.631	-3.733
207	1259	C	12	R	1	0	1.5	495.4	499.65	CC14	86.058	*W. inornata*	1.410	-3.970
207	1259	C	12	R	1	5	6.5	495.45	499.7	CC14	86.088	*H. globulosa*	1.649	-4.051
207	1259	C	12	R	1	5	6.5	495.45	499.7	CC14	86.088	*M.sinuosa*	1.249	-4.112
207	1259	C	12	R	1	80	81.5	496.2	500.45	CC14	86.534	*H. globulosa*	1.551	-4.090
207	1259	C	12	R	1	80	81.5	496.2	500.45	CC14	86.534	*M.sinuosa*	1.814	-4.201
207	1259	C	12	R	1	80	81.5	496.2	500.45	CC14	86.534	*W. inornata*	1.731	-4.189
207	1259	C	12	R	1	85	86.5	496.25	500.5	CC14	86.564	*M.sinuosa*	1.792	-4.037
207	1259	C	12	R	1	95	96.5	496.35	500.6	CC14	86.623	*H. globulosa*	1.650	-4.115
207	1259	C	12	R	1	95	96.5	496.35	500.6	CC14	86.623	*M.sinuosa*	1.875	-4.026
207	1259	C	12	R	1	95	96.5	496.35	500.6	CC14	86.623	*W. inornata*	1.764	-4.142
207	1259	C	12	R	1	100	101.5	496.4	500.65	CC14	86.653	*H. globulosa*	1.939	-4.060
207	1259	C	12	R	1	100	101.5	496.4	500.65	CC14	86.653	*M.sinuosa*	1.790	-4.074
207	1259	C	12	R	1	100	101.5	496.4	500.65	CC14	86.653	*W. inornata*	1.737	-4.064
207	1259	C	12	R	1	105	106.5	496.45	500.7	CC14	86.683	*H. globulosa*	2.252	-3.983
207	1259	C	12	R	1	105	106.5	496.45	500.7	CC14	86.683	*H. globulosa*	2.371	-4.044
207	1259	C	12	R	1	105	106.5	496.45	500.7	CC14	86.683	*M.sinuosa*	1.997	-4.093
207	1259	C	12	R	1	105	106.5	496.45	500.7	CC14	86.683	*W. inornata*	1.797	-4.031
207	1259	C	12	R	1	110	111.5	496.5	500.75	CC14	86.712	*H. globulosa*	2.268	-4.029
207	1259	C	12	R	1	110	111.5	496.5	500.75	CC14	86.712	*M.sinuosa*	1.818	-3.679
207	1259	C	12	R	1	110	111.5	496.5	500.75	CC14	86.712	*M.sinuosa*	1.913	-3.993
207	1259	C	12	R	1	110	111.5	496.5	500.75	CC14	86.712	*W. inornata*	1.665	-3.957
207	1259	C	12	R	2	75	76.5	497.65	501.9	CC13	87.144	*H. globulosa*	1.177	-4.287
207	1259	C	12	R	2	75	76.5	497.65	501.9	CC13	87.144	*M.sinuosa*	1.319	-4.200
207	1259	C	12	R	2	80	81.5	497.7	501.95	CC13	87.156	*M. sinuosa*	1.287	-4.191
207	1259	C	12	R	2	85	86.5	497.75	502	CC13	87.168	*H. globulosa*	0.785	-4.076
207	1259	C	12	R	2	85	86.5	497.75	502	CC13	87.168	*M.sinuosa*	1.179	-3.932
207	1259	C	12	R	2	90	91.5	497.8	502.05	CC13	87.179	*M. sinuosa*	1.493	-4.126

Table S2. Oxygen and carbon stable isotope data - planktic foraminifera (page 2).

207	1259	C	12	R	2	100	101.5	497.9	502.15	CC13	87.203	*M.sinuosa*	1.458	-4.105
207	1259	C	12	R	2	110	111.5	498	502.25	CC13	87.226	*H. globulosa*	1.411	-4.179
207	1259	C	12	R	2	110	111.5	498	502.25	CC13	87.226	*M.sinuosa*	1.476	-4.099
207	1259	C	12	R	2	110	111.5	498	502.25	CC13	87.226	*W. inornata*	1.431	-4.111
207	1259	C	12	R	2	115	116.5	498.05	502.3	CC13	87.238	*H. globulosa*	1.431	-4.084
207	1259	C	12	R	2	115	116.5	498.05	502.3	CC13	87.238	*M.sinuosa*	1.558	-3.973
207	1259	C	12	R	2	115	116.5	498.05	502.3	CC13	87.238	*W. inornata*	1.426	-4.132
207	1259	C	12	R	2	125	126.5	498.15	502.4	CC13	87.262	*H. globulosa*	1.409	-4.078
207	1259	C	12	R	2	125	126.5	498.15	502.4	CC13	87.262	*M.sinuosa*	1.344	-4.042
207	1259	C	12	R	2	130	131.5	498.2	502.45	CC13	87.273	*M.sinuosa*	1.208	-3.767
207	1259	C	12	R	3	53.5	55	498.94	503.19	CC13	87.446	*H. globulosa*	1.549	-4.181
207	1259	C	12	R	3	53.5	55	498.94	503.19	CC13	87.446	*M.sinuosa*	1.407	-4.204
207	1259	C	12	R	3	53.5	55	498.94	503.19	CC13	87.446	*W. inornata*	1.215	-4.033
207	1259	C	12	R	3	60	61.5	499	503.25	CC13	87.461	*H. globulosa*	0.974	-4.037
207	1259	C	12	R	3	60	61.5	499	503.25	CC13	87.461	*H. globulosa*	1.265	-4.128
207	1259	C	12	R	3	60	61.5	499	503.25	CC13	87.461	*H. globulosa*	1.395	-3.999
207	1259	C	12	R	3	60	61.5	499	503.25	CC13	87.461	*H. globulosa*	1.568	-4.295
207	1259	C	12	R	3	60	61.5	499	503.25	CC13	87.461	*M. sinuosa*	1.193	-4.022
207	1259	C	12	R	3	60	61.5	499	503.25	CC13	87.461	*M. sinuosa*	1.253	-4.052
207	1259	C	12	R	3	60	61.5	499	503.25	CC13	87.461	*M. sinuosa*	1.271	-4.100
207	1259	C	12	R	3	60	61.5	499	503.25	CC13	87.461	*M. sinuosa*	1.317	-4.006
207	1259	C	12	R	3	60	61.5	499	503.25	CC13	87.461	*M. sinuosa*	1.338	-4.038
207	1259	C	12	R	3	60	61.5	499	503.25	CC13	87.461	*M. sinuosa*	1.341	-3.941
207	1259	C	12	R	3	60	61.5	499	503.25	CC13	87.461	*M. sinuosa*	1.341	-4.012
207	1259	C	12	R	3	60	61.5	499	503.25	CC13	87.461	*M. sinuosa*	1.343	-3.975
207	1259	C	12	R	3	60	61.5	499	503.25	CC13	87.461	*M. sinuosa*	1.434	-4.095
207	1259	C	12	R	3	60	61.5	499	503.25	CC13	87.461	*M. sinuosa*	1.488	-3.737
207	1259	C	12	R	3	65	66.5	499.05	503.3	CC13	87.473	*H. globulosa*	1.604	-3.863
207	1259	C	12	R	3	65	66.5	499.05	503.3	CC13	87.473	*M. sinuosa*	1.202	-4.122
207	1259	C	12	R	3	70	71.5	499.1	503.35	CC13	87.485	*M. sinuosa*	1.107	-3.965
207	1259	C	12	R	3	75	76.5	499.15	503.4	CC13	87.496	*H. globulosa*	1.078	-4.092
207	1259	C	12	R	3	75	76.5	499.15	503.4	CC13	87.496	*M. sinuosa*	1.327	-3.799
207	1259	C	12	R	3	75	76.5	499.15	503.4	CC13	87.496	*W. inornata*	1.167	-4.039
207	1259	C	12	R	3	85	86.5	499.25	503.5	CC13	87.520	*H. globulosa*	1.246	-4.016
207	1259	C	12	R	3	85	86.5	499.25	503.5	CC13	87.520	*M. sinuosa*	1.061	-4.302
207	1259	C	12	R	3	90	91.5	499.3	503.55	CC13	87.531	*H. globulosa*	1.240	-4.020
207	1259	C	12	R	3	90	91.5	499.3	503.55	CC13	87.531	*M. sinuosa*	1.130	-4.246
207	1259	C	12	R	3	100	101.5	499.4	503.65	CC13	87.555	*H. globulosa*	1.122	-4.362
207	1259	C	12	R	3	100	101.5	499.4	503.65	CC13	87.555	*M. sinuosa*	1.170	-4.308
207	1259	C	12	R	3	105	106.5	499.45	503.7	CC13	87.567	*H. globulosa*	1.138	-4.177
207	1259	C	12	R	3	105	106.5	499.45	503.7	CC13	87.567	*M. sinuosa*	1.178	-4.239
207	1259	C	12	R	3	110	111.5	499.5	503.75	CC13	87.578	*H. globulosa*	0.844	-4.069
207	1259	C	12	R	3	110	111.5	499.5	503.75	CC13	87.578	*M. sinuosa*	0.900	-3.953
207	1259	C	12	R	3	130	131.5	499.7	503.95	CC13	87.625	*H. globulosa*	1.170	-4.085
207	1259	C	12	R	3	130	131.5	499.7	503.95	CC13	87.625	*M. sinuosa*	1.179	-4.266
207	1259	C	13	R	1	5	6.5	501.65	506.31	CC13	88.179	*H. globulosa*	1.270	-3.982
207	1259	C	13	R	1	5	6.5	501.65	506.31	CC13	88.179	*H. globulosa*	1.334	-3.906
207	1259	C	13	R	1	5	6.5	501.65	506.31	CC13	88.179	*W. inornata*	1.138	-4.162
207	1259	C	13	R	1	10	11.5	501.7	506.36	CC13	88.191	*H. globulosa*	1.139	-4.035
207	1259	C	13	R	1	10	11.5	501.7	506.36	CC13	88.191	*W. inornata*	0.980	-4.143
207	1259	C	13	R	1	15	16.5	501.75	506.41	CC13	88.203	*H. globulosa*	1.265	-4.153
207	1259	C	13	R	1	15	16.5	501.75	506.41	CC13	88.203	*W. inornata*	0.942	-4.238
207	1259	C	13	R	1	20	21.5	501.8	506.46	CC13	88.214	*H. globulosa*	1.225	-4.187
207	1259	C	13	R	1	20	21.5	501.8	506.46	CC13	88.214	*M. sinuosa*	1.058	-4.193
207	1259	C	13	R	1	20	21.5	501.8	506.46	CC13	88.214	*W. inornata*	1.001	-4.130
207	1259	C	13	R	1	30	31.5	501.9	506.56	CC13	88.238	*H. globulosa*	1.101	-4.002
207	1259	C	13	R	1	30	31.5	501.9	506.56	CC13	88.238	*W. inornata*	0.722	-4.061
207	1259	C	13	R	1	35	36.5	501.95	506.61	CC13	88.250	*H. globulosa*	0.927	-4.070
207	1259	C	13	R	1	40	41.5	502	506.66	CC13	88.261	*H. globulosa*	1.214	-4.177
207	1259	C	13	R	1	40	41.5	502	506.66	CC13	88.261	*M. sinuosa*	1.095	-4.021
207	1259	C	13	R	1	40	41.5	502	506.66	CC13	88.261	*W. baltica*	0.635	-4.122
207	1259	C	13	R	1	45	46.5	502.05	506.71	CC13	88.273	*H. globulosa*	1.027	-4.074
207	1259	C	13	R	1	45	46.5	502.05	506.71	CC13	88.273	*M. sinuosa*	0.990	-4.272
207	1259	C	13	R	1	45	46.5	502.05	506.71	CC13	88.273	*W. baltica*	0.617	-4.330
207	1259	C	13	R	1	45	46.5	502.05	506.71	CC13	88.273	*W. inornata*	0.430	-4.307
207	1259	C	13	R	1	50	51.5	502.1	506.76	CC13	88.285	*H. globulosa*	0.791	-3.956
207	1259	C	13	R	1	50	51.5	502.1	506.76	CC13	88.285	*M. sinuosa*	0.604	-3.960
207	1259	C	13	R	1	55	56.5	502.15	506.81	CC13	88.296	*H. globulosa*	1.143	-4.017
207	1259	C	13	R	1	55	56.5	502.15	506.81	CC13	88.296	*M. sinuosa*	1.176	-4.211
207	1259	C	13	R	1	65	66.5	502.25	506.91	CC13	88.320	*H. globulosa*	1.479	-4.170
207	1259	C	13	R	1	65	66.5	502.25	506.91	CC13	88.320	*M. sinuosa*	0.961	-4.235
207	1259	C	13	R	1	70	71.5	502.3	506.96	CC13	88.332	*H. globulosa*	1.189	-4.004
207	1259	C	13	R	1	70	71.5	502.3	506.96	CC13	88.332	*M. sinuosa*	0.999	-4.149

Table S2. Oxygen and carbon stable isotope data - planktic foraminifera (page 3).

207	1259	C	13	R	1	75	76.5	502.35	507.01	CC13	88.343	*H. globulosa*	0.783	-3.999
207	1259	C	13	R	1	75	76.5	502.35	507.01	CC13	88.343	*M. sinuosa*	0.912	-3.946
207	1259	C	13	R	1	80	81.5	502.4	507.06	CC13	88.355	*H. globulosa*	0.711	-3.906
207	1259	C	13	R	1	80	81.5	502.4	507.06	CC13	88.355	*M. sinuosa*	0.743	-3.880
207	1259	C	13	R	1	80	81.5	502.4	507.06	CC13	88.355	*W. baltica*	0.940	-4.086
207	1259	C	13	R	1	80	81.5	502.4	507.06	CC13	88.355	*W. inornata*	0.911	-4.064
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*H. globulosa*	0.425	-4.095
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*H. globulosa*	0.928	-4.177
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*H. globulosa*	0.929	-4.207
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*H. globulosa*	1.181	-4.388
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*H. globulosa*	1.234	-4.318
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*H. globulosa*	1.242	-4.150
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*H. globulosa*	1.376	-4.362
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*M. sinuosa*	0.923	-4.313
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*M. sinuosa*	0.974	-4.241
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*W. baltica*	0.888	-4.223
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*W. baltica*	0.901	-4.313
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*W. baltica*	0.903	-4.239
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*W. baltica*	0.919	-4.295
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*W. baltica*	0.931	-4.338
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*W. baltica*	0.971	-4.323
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*W. baltica*	0.983	-4.190
207	1259	C	13	R	1	85	86.5	502.45	507.11	CC13	88.367	*W. baltica*	1.058	-4.460
207	1259	C	13	R	1	90	91.5	502.5	507.16	CC13	88.379	*H. globulosa*	1.162	-4.081
207	1259	C	13	R	1	90	91.5	502.5	507.16	CC13	88.379	*M. sinuosa*	0.870	-4.179
207	1259	C	13	R	1	90	91.5	502.5	507.16	CC13	88.379	*W. baltica*	0.830	-4.239
207	1259	C	13	R	1	95	96.5	502.55	507.21	CC13	88.390	*H. globulosa*	1.284	-4.025
207	1259	C	13	R	1	95	96.5	502.55	507.21	CC13	88.390	*M. sinuosa*	0.812	-4.007
207	1259	C	13	R	1	95	96.5	502.55	507.21	CC13	88.390	*W. baltica*	0.841	-4.115
207	1259	C	13	R	1	100	101.5	502.6	507.26	CC13	88.402	*H. globulosa*	1.175	-4.128
207	1259	C	13	R	1	100	101.5	502.6	507.26	CC13	88.402	*M. sinuosa*	1.129	-4.171
207	1259	C	13	R	1	100	101.5	502.6	507.26	CC13	88.402	*W. baltica*	0.708	-4.136
207	1259	C	13	R	1	105	106.5	502.65	507.31	CC13	88.414	*H. globulosa*	1.264	-4.221
207	1259	C	13	R	1	105	106.5	502.65	507.31	CC13	88.414	*M. sinuosa*	0.876	-4.266
207	1259	C	13	R	1	105	106.5	502.65	507.31	CC13	88.414	*W. baltica*	0.546	-4.171
207	1259	C	13	R	1	105	106.5	502.65	507.31	CC13	88.414	*W. inornata*	0.857	-4.238
207	1259	C	13	R	2	50	51.5	503.6	508.26	CC13	88.637	*H. delrioensis*	1.685	-4.119
207	1259	C	13	R	2	60	61.5	503.7	508.36	CC13	88.660	*H. delrioensis*	1.633	-4.188
207	1259	C	13	R	2	60	61.5	503.7	508.36	CC13	88.660	*H. delrioensis*	1.679	-3.922
207	1259	C	13	R	2	60	61.5	503.7	508.36	CC13	88.660	*H. globulosa*	1.653	-4.093
207	1259	C	13	R	2	65	66.5	503.75	508.41	CC13	88.672	*H. globulosa*	1.659	-4.325
207	1259	C	13	R	2	65	66.5	503.75	508.41	CC13	88.672	*H. globulosa*	1.693	-4.120
207	1259	C	13	R	2	70	71.5	503.8	508.46	CC13	88.684	*H. delrioensis*	1.086	-4.474
207	1259	C	13	R	2	75	76.5	503.85	508.51	CC13	88.695	*H. delrioensis*	2.000	-4.255
207	1259	C	13	R	2	75	76.5	503.85	508.51	CC13	88.695	*H. globulosa*	2.211	-4.121
207	1259	C	13	R	2	80	81.5	503.9	508.56	CC13	88.707	*H. delrioensis*	1.567	-4.013
207	1259	C	13	R	2	80	81.5	503.9	508.56	CC13	88.707	*H. delrioensis*	1.610	-3.889
207	1259	C	13	R	2	80	81.5	503.9	508.56	CC13	88.707	*H. globulosa*	1.539	-4.010
207	1259	C	13	R	2	80	81.5	503.9	508.56	CC13	88.707	*H. globulosa*	1.587	-4.159
207	1259	C	13	R	2	85	86.5	503.95	508.61	CC13	88.719	*H. globulosa*	1.159	-3.999
207	1259	C	13	R	2	85	86.5	503.95	508.61	CC13	88.719	*M. sinuosa*	1.544	-3.976
207	1259	C	13	R	2	95	96.5	504.05	508.71	CC13	88.742	*D. primitiva*	1.602	-4.149
207	1259	C	13	R	2	95	96.5	504.05	508.71	CC13	88.742	*H. delrioensis*	1.452	-3.929
207	1259	C	13	R	2	95	96.5	504.05	508.71	CC13	88.742	*H. globulosa*	1.308	-3.947
207	1259	C	13	R	2	115	116.5	504.25	508.91	CC13	88.789	*D. primitiva*	1.484	-4.334
207	1259	C	13	R	2	115	116.5	504.25	508.91	CC13	88.789	*H. delrioensis*	1.485	-4.018
207	1259	C	13	R	2	115	116.5	504.25	508.91	CC13	88.789	*H. globulosa*	0.870	-4.306
207	1259	C	13	R	2	125	126.5	504.35	509.01	CC13	88.813	*H. delrioensis*	1.495	-4.063
207	1259	C	13	R	2	130	131.5	504.4	509.06	CC13	88.824	*H. globulosa*	0.963	-4.339
207	1259	C	13	R	2	130	131.5	504.4	509.06	CC13	88.824	*W. inornata*	1.779	-4.425
207	1259	C	13	R	2	135	136.5	504.45	509.11	CC13	88.836	*H. globulosa*	0.757	-4.390
207	1259	C	13	R	2	135	136.5	504.45	509.11	CC13	88.836	*M. sinuosa*	1.586	-4.293
207	1259	C	13	R	2	140	141.5	504.5	509.16	CC13	88.848	*M. sinuosa*	1.694	-4.262
207	1259	C	13	R	2	145	146.5	504.55	509.21	CC13	88.860	*M. sinuosa*	1.568	-4.302
207	1259	C	13	R	3	5	6.5	504.65	509.31	CC13	88.883	*H. delrioensis*	1.672	-4.060
207	1259	C	13	R	3	5	6.5	504.65	509.31	CC13	88.883	*M. sinuosa*	1.498	-4.175
207	1259	C	13	R	3	10	11.5	504.7	509.36	CC13	88.895	*M. sinuosa*	1.299	-4.220
207	1259	A	54	R	CC	5	6.5	510.26	512.01	CC13	89.517	*H. delrioensis*	1.394	-4.328
207	1259	A	54	R	CC	5	6.5	510.26	512.01	CC13	89.517	*H. globulosa*	0.951	-4.507
207	1259	A	55	R	1	10	11.5	510.7	512.45	CC13	89.620	*H. delrioensis*	1.487	-4.528
207	1259	A	55	R	1	10	11.5	510.7	512.45	CC13	89.620	*H. globulosa*	0.670	-4.504
207	1259	A	55	R	1	55	56.5	511.15	512.9	CC12	89.699	*H. delrioensis*	1.350	-4.572
207	1259	A	55	R	1	55	56.5	511.15	512.9	CC12	89.699	*H. globulosa*	0.833	-4.428

Table S2. Oxygen and carbon stable isotope data - planktic foraminifera (page 4).

207	1259	A	55	R	1	60	61.5	511.2	512.95	CC12	89.708	*H. delrioensis*	1.555	-4.672
207	1259	A	55	R	1	60	61.5	511.2	512.95	CC12	89.708	*H. globulosa*	1.049	-4.603
207	1259	A	55	R	1	60	61.5	511.2	512.95	CC12	89.708	*W. inornata*	1.168	-4.504
207	1259	A	55	R	1	65	66.5	511.25	513	CC12	89.717	*H. delrioensis*	1.526	-4.600
207	1259	A	55	R	1	65	66.5	511.25	513	CC12	89.717	*H. globulosa*	1.124	-4.540
207	1259	A	55	R	1	65	66.5	511.25	513	CC12	89.717	*M. sinuosa*	1.269	-4.542
207	1259	A	55	R	1	65	66.5	511.25	513	CC12	89.717	*W. inornata*	1.460	-4.698
207	1259	A	55	R	1	70	71.5	511.3	513.05	CC12	89.726	*H. delrioensis*	1.484	-4.446
207	1259	A	55	R	1	70	71.5	511.3	513.05	CC12	89.726	*M. sinuosa*	1.301	-4.593
207	1259	A	55	R	1	75	76.5	511.35	513.1	CC12	89.735	*H. delrioensis*	1.360	-4.436
207	1259	A	55	R	1	75	76.5	511.35	513.1	CC12	89.735	*H. globulosa*	0.717	-4.395
207	1259	A	55	R	1	75	76.5	511.35	513.1	CC12	89.735	*M. sinuosa*	0.972	-4.422
207	1259	A	55	R	1	95	96.5	511.55	513.3	CC12	89.770	*H. delrioensis*	1.324	-4.396
207	1259	A	55	R	1	100	101.5	511.6	513.35	CC12	89.779	*H. delrioensis*	1.589	-4.720
207	1259	A	55	R	1	110	111.5	511.7	513.45	CC12	89.797	*H. globulosa*	0.440	-4.256
207	1259	A	55	R	2	40	41.5	512.45	514.2	CC12	89.929	*H. delrioensis*	1.376	-4.628
207	1259	A	55	R	2	40	41.5	512.45	514.2	CC12	89.929	*H. globulosa*	1.470	-4.579
207	1259	A	55	R	2	45	46.5	512.5	514.25	CC12	89.938	*H. delrioensis*	1.375	-4.610
207	1259	A	55	R	2	45	46.5	512.5	514.25	CC12	89.938	*H. globulosa*	1.019	-4.659
207	1259	A	55	R	2	45	46.5	512.5	514.25	CC12	89.938	*W. inornata*	1.484	-4.602
207	1259	A	55	R	2	55	56.5	512.6	514.35	CC12	89.956	*H. delrioensis*	1.275	-4.476
207	1259	A	55	R	2	60	61.5	512.65	514.4	CC12	89.964	*H. delrioensis*	1.140	-4.325
207	1259	A	55	R	2	60	61.5	512.65	514.4	CC12	89.964	*H. globulosa*	0.794	-4.475
207	1259	A	55	R	2	60	61.5	512.65	514.4	CC12	89.964	*M.sinuosa*	1.046	-4.228
207	1259	A	55	R	2	60	61.5	512.65	514.4	CC12	89.964	*W. inornata*	1.159	-4.327
207	1259	A	55	R	2	70	71.5	512.75	514.5	CC12	89.982	*H. delrioensis*	1.005	-4.333
207	1259	A	55	R	2	70	71.5	512.75	514.5	CC12	89.982	*W. baltica*	0.925	-4.334
207	1259	A	55	R	2	75	76.5	512.8	514.55	CC12	89.991	*H. delrioensis*	1.253	-4.476
207	1259	A	55	R	2	75	76.5	512.8	514.55	CC12	89.991	*H. globulosa*	0.714	-4.533
207	1259	A	55	R	2	85	86.5	512.9	514.65	CC12	90.009	*H. delrioensis*	1.082	-4.200
207	1259	A	55	R	2	85	86.5	512.9	514.65	CC12	90.009	*H. globulosa*	0.742	-4.617
207	1259	A	55	R	2	85	86.5	512.9	514.65	CC12	90.009	*W. baltica*	1.233	-4.582
207	1259	A	55	R	2	90	91.5	512.95	514.7	CC12	90.017	*M. sinuosa*	1.097	-4.486
207	1259	A	55	R	2	90	91.5	512.95	514.7	CC12	90.017	*W. baltica*	1.141	-4.553
207	1259	A	55	R	3	0	1.5	513.01	514.76	CC12	90.028	*H. globulosa*	1.151	-4.511
207	1259	A	55	R	3	0	1.5	513.01	514.76	CC12	90.028	*W. baltica*	1.019	-4.604
207	1259	A	55	R	3	5	6.5	513.06	514.81	CC12	90.037	*H. globulosa*	0.645	-4.592
207	1259	A	55	R	3	5	6.5	513.06	514.81	CC12	90.037	*W. baltica*	1.333	-4.580
207	1259	A	55	R	3	9	10.5	513.1	514.85	CC12	90.044	*H. delrioensis*	1.169	-4.531
207	1259	A	55	R	3	9	10.5	513.1	514.85	CC12	90.044	*H. delrioensis*	1.324	-4.355
207	1259	A	55	R	3	9	10.5	513.1	514.85	CC12	90.044	*H. globulosa*	0.935	-4.614
207	1259	A	55	R	3	9	10.5	513.1	514.85	CC12	90.044	*W. baltica*	1.111	-4.593
207	1259	A	55	R	3	20	21.5	513.21	514.96	CC12	90.063	*H. globulosa*	0.813	-4.357
207	1259	A	55	R	3	20	21.5	513.21	514.96	CC12	90.063	*W. baltica*	0.929	-4.301
207	1259	A	55	R	3	20	21.5	513.21	514.96	CC12	90.063	*W. inornata*	1.096	-4.300
207	1259	A	55	R	3	25	26.5	513.26	515.01	CC12	90.072	*W. inornata*	0.963	-4.356
207	1259	A	55	R	3	30	31.5	513.31	515.06	CC12	90.081	*H. delrioensis*	0.958	-4.418
207	1259	A	55	R	3	35	36.5	513.36	515.11	CC12	90.090	*H. delrioensis*	1.017	-4.276
207	1259	A	55	R	3	35	36.5	513.36	515.11	CC12	90.090	*W. inornata*	0.879	-4.300
207	1259	A	55	R	3	40	41.5	513.41	515.16	CC12	90.099	*H. globulosa*	0.717	-4.363
207	1259	A	55	R	3	40	41.5	513.41	515.16	CC12	90.099	*M. sinuosa*	0.926	-4.347
207	1259	A	55	R	3	40	41.5	513.41	515.16	CC12	90.099	*W. inornata*	1.001	-4.496
207	1259	A	55	R	3	45	46.5	513.46	515.21	CC12	90.107	*H. delrioensis*	1.168	-4.316
207	1259	A	55	R	3	45	46.5	513.46	515.21	CC12	90.107	*H. globulosa*	0.700	-4.321
207	1259	A	55	R	3	45	46.5	513.46	515.21	CC12	90.107	*M. sinuosa*	1.158	-4.468
207	1259	A	55	R	3	45	46.5	513.46	515.21	CC12	90.107	*W. inornata*	1.139	-4.525
207	1259	A	55	R	3	50	51.5	513.51	515.26	CC12	90.116	*H. delrioensis*	1.125	-4.291
207	1259	A	55	R	3	50	51.5	513.51	515.26	CC12	90.116	*H. globulosa*	0.989	-4.334
207	1259	A	55	R	3	50	51.5	513.51	515.26	CC12	90.116	*M. sinuosa*	1.130	-4.367
207	1259	A	55	R	3	75	76.5	513.76	515.51	CC12	90.160	*H. globulosa*	1.099	-4.509
207	1259	A	55	R	CC	10	11.5	513.92	515.67	CC12	90.189	*H. delrioensis*	1.208	-4.557
207	1259	A	55	R	CC	10	11.5	513.92	515.67	CC12	90.189	*H. globulosa*	0.800	-4.670
207	1259	A	55	R	CC	14	15.5	513.96	515.71	CC12	90.196	*H. delrioensis*	1.142	-4.526
207	1259	A	55	R	CC	14	15.5	513.96	515.71	CC12	90.196	*H. globulosa*	0.918	-4.721
207	1259	B	21	R	1	0	1.5	514.8	516.27	CC12	90.295	*H. delrioensis*	1.337	-4.620
207	1259	B	21	R	1	25	26.5	515.05	516.52	CC12	90.339	*H. delrioensis*	0.941	-4.224
207	1259	B	21	R	1	25	26.5	515.05	516.52	CC12	90.339	*W. baltica*	0.777	-4.227
207	1259	B	21	R	1	30	31.5	515.1	516.57	CC12	90.348	*M.sinuosa*	1.092	-4.461
207	1259	B	21	R	1	30	31.5	515.1	516.57	CC12	90.348	*W. baltica*	1.020	-4.336
207	1259	B	21	R	1	35	36.5	515.15	516.62	CC12	90.356	*H. globulosa*	0.762	-4.559
207	1259	B	21	R	1	35	36.5	515.15	516.62	CC12	90.356	*H. globulosa*	0.841	-4.668
207	1259	B	21	R	1	35	36.5	515.15	516.62	CC12	90.356	*W. baltica*	1.135	-4.535
207	1259	B	21	R	1	40	41.5	515.2	516.67	CC12	90.365	*H. delrioensis*	1.304	-4.566

Table S2. Oxygen and carbon stable isotope data - planktic foraminifera (page 5).

207	1259	B	21	R	1	40	41.5	515.2	516.67	CC12	90.365	*H. globulosa*	0.679	-4.638
207	1259	B	21	R	1	40	41.5	515.2	516.67	CC12	90.365	*W. baltica*	1.214	-4.553
207	1259	B	21	R	1	45	46.5	515.25	516.72	CC12	90.374	*H. delrioensis*	1.218	-4.414
207	1259	B	21	R	1	45	46.5	515.25	516.72	CC12	90.374	*H. globulosa*	1.041	-4.509
207	1259	B	21	R	1	45	46.5	515.25	516.72	CC12	90.374	*M.sinuosa*	1.132	-4.374
207	1259	B	21	R	1	45	46.5	515.25	516.72	CC12	90.374	*W. baltica*	1.028	-4.494
207	1259	B	21	R	1	50	51.5	515.3	516.77	CC12	90.383	*H. delrioensis*	1.391	-4.499
207	1259	B	21	R	1	50	51.5	515.3	516.77	CC12	90.383	*H. globulosa*	0.930	-4.455
207	1259	B	21	R	1	50	51.5	515.3	516.77	CC12	90.383	*W. baltica*	1.256	-4.588
207	1259	B	21	R	1	65	66.5	515.45	516.92	CC12	90.409	*H. globulosa*	0.683	-4.377
207	1259	B	21	R	1	65	66.5	515.45	516.92	CC12	90.409	*W. baltica*	1.206	-4.337
207	1259	B	21	R	1	70	71.5	515.5	516.97	CC12	90.418	*H. delrioensis*	1.151	-4.286
207	1259	B	21	R	1	70	71.5	515.5	516.97	CC12	90.418	*H. globulosa*	0.632	-4.374
207	1259	B	21	R	1	70	71.5	515.5	516.97	CC12	90.418	*W. inornata*	1.099	-4.327
207	1259	B	21	R	1	80	81.5	515.6	517.07	CC12	90.436	*W. inornata*	1.251	-4.451
207	1259	B	21	R	1	110	111.5	515.9	517.37	CC12	90.489	*H. delrioensis*	0.533	-4.729
207	1259	B	21	R	1	110	111.5	515.9	517.37	CC12	90.489	*H. globulosa*	0.845	-4.512
207	1259	B	21	R	1	110	111.5	515.9	517.37	CC12	90.489	*H. globulosa*	1.074	-4.406
207	1259	B	21	R	1	110	111.5	515.9	517.37	CC12	90.489	*H. globulosa*	1.166	-4.602
207	1259	B	21	R	1	115	116.5	515.95	517.42	CC12	90.498	*H. globulosa*	1.211	-4.807
207	1259	B	21	R	1	125	126.5	516.05	517.52	CC12	90.515	*H. globulosa*	1.082	-4.727
207	1259	B	21	R	1	140	141.5	516.2	517.67	CC12	90.542	*H. globulosa*	1.177	-4.565
207	1259	B	21	R	1	145	146.5	516.25	517.72	CC12	90.551	*H. delrioensis*	0.745	-4.518
207	1259	B	21	R	1	145	146.5	516.25	517.72	CC12	90.551	*H. globulosa*	1.087	-4.568
207	1259	B	21	R	1	145	146.5	516.25	517.72	CC12	90.551	*M. sinuosa*	0.862	-4.579
207	1259	B	21	R	2	75	76.5	517.05	518.52	CC12	90.692	*H. delrioensis*	0.627	-4.656
207	1259	B	21	R	2	100	101.5	517.3	518.77	CC12	90.736	*H. globulosa*	0.731	-4.300
207	1259	B	21	R	2	110	111.5	517.4	518.87	CC12	90.754	*H. delrioensis*	0.923	-4.352
207	1259	B	21	R	2	110	111.5	517.4	518.87	CC12	90.754	*H. globulosa*	0.321	-4.398
207	1259	B	21	R	2	125	126.5	517.55	519.02	CC12	90.780	*H. delrioensis*	0.797	-4.442
207	1259	B	21	R	2	125	126.5	517.55	519.02	CC12	90.780	*H. globulosa*	0.199	-4.369
207	1259	B	21	R	2	130	131.5	517.6	519.07	CC12	90.789	*H. globulosa*	0.220	-4.602
207	1259	B	21	R	2	135	136.5	517.65	519.12	CC12	90.798	*H. delrioensis*	0.330	-4.558
207	1259	B	21	R	2	140	141.5	517.7	519.17	CC12	90.807	*H. delrioensis*	0.874	-4.331
207	1259	B	21	R	2	140	141.5	517.7	519.17	CC12	90.807	*H. globulosa*	0.238	-4.485
207	1259	B	21	R	3	10	11.5	517.9	519.37	CC12	90.842	*H. delrioensis*	1.042	-4.463
207	1259	B	21	R	3	10	11.5	517.9	519.37	CC12	90.842	*H. globulosa*	1.109	-4.477
207	1259	A	56	R	3	50	51.5	519.11	520.86	CC12	91.105	*H. delrioensis*	1.312	-4.476
207	1259	A	56	R	3	55	56.5	519.16	520.91	CC12	91.114	*H. delrioensis*	1.210	-4.487
207	1259	A	56	R	3	55	56.5	519.16	520.91	CC12	91.114	*H. globulosa*	0.786	-4.605
207	1259	A	56	R	3	60	61.5	519.21	520.96	CC12	91.123	*H. delrioensis*	1.390	-4.490
207	1259	A	56	R	3	60	61.5	519.21	520.96	CC12	91.123	*H. globulosa*	0.974	-4.502
207	1259	A	56	R	3	60	61.5	519.21	520.96	CC12	91.123	*M. sinuosa*	1.942	-4.166
207	1259	A	56	R	3	70	71.5	519.31	521.06	CC12	91.141	*H. delrioensis*	1.379	-4.368
207	1259	A	56	R	3	70	71.5	519.31	521.06	CC12	91.141	*W. inornata*	1.134	-4.420
207	1259	A	56	R	3	75	76.5	519.36	521.11	CC12	91.149	*H. delrioensis*	1.213	-4.207
207	1259	A	56	R	3	75	76.5	519.36	521.11	CC12	91.149	*H. delrioensis*	1.260	-4.295
207	1259	A	56	R	3	75	76.5	519.36	521.11	CC12	91.149	*W. inornata*	1.032	-4.260
207	1259	A	56	R	3	90	91.5	519.51	521.26	CC12	91.176	*H. delrioensis*	0.880	-3.835
207	1259	A	56	R	3	90	91.5	519.51	521.26	CC12	91.176	*H. delrioensis*	0.901	-3.940
207	1259	A	56	R	3	90	91.5	519.51	521.26	CC12	91.176	*H. delrioensis*	0.901	-3.782
207	1259	A	56	R	3	90	91.5	519.51	521.26	CC12	91.176	*H. globulosa*	0.361	-4.007
207	1259	A	56	R	3	90	91.5	519.51	521.26	CC12	91.176	*M. sinuosa*	0.706	-3.931
207	1259	A	56	R	3	95	96.5	519.56	521.31	CC12	91.185	*H. delrioensis*	1.311	-3.932
207	1259	A	56	R	3	95	96.5	519.56	521.31	CC12	91.185	*H. delrioensis*	1.472	-4.022
207	1259	A	56	R	3	95	96.5	519.56	521.31	CC12	91.185	*H. globulosa*	0.565	-4.360
207	1259	A	56	R	3	95	96.5	519.56	521.31	CC12	91.185	*W. inornata*	1.401	-4.145
207	1259	A	56	R	3	102	103	519.63	521.38	CC12	91.196	*H. delrioensis*	1.070	-4.195
207	1259	A	56	R	3	102	103	519.63	521.38	CC12	91.196	*H. delrioensis*	1.258	-4.148
207	1259	A	56	R	3	105	106.5	519.66	521.41	CC12	91.202	*H. delrioensis*	1.386	-4.208
207	1259	A	56	R	3	110	111.5	519.71	521.46	CC12	91.211	*H. delrioensis*	1.413	-4.036
207	1259	A	56	R	3	110	111.5	519.71	521.46	CC12	91.211	*W. inornata*	1.036	-4.404
207	1259	A	56	R	3	115	116.5	519.76	521.51	CC12	91.220	*H. delrioensis*	1.305	-4.134
207	1259	A	56	R	3	115	116.5	519.76	521.51	CC12	91.220	*M. sinuosa*	1.018	-4.351
207	1259	A	56	R	3	120	121.5	519.81	521.56	CC11	91.224	*H. delrioensis*	1.304	-4.287
207	1259	A	56	R	3	120	121.5	519.81	521.56	CC11	91.224	*H. delrioensis*	1.371	-4.238
207	1259	A	56	R	3	120	121.5	519.81	521.56	CC11	91.224	*H. delrioensis*	1.404	-4.176
207	1259	A	56	R	3	120	121.5	519.81	521.56	CC11	91.224	*W. inornata*	1.328	-4.495
207	1259	A	56	R	3	125	126.5	519.86	521.61	CC11	91.228	*H. delrioensis*	1.463	-4.137
207	1259	A	56	R	3	125	126.5	519.86	521.61	CC11	91.228	*W. inornata*	1.196	-4.493
207	1259	A	56	R	3	130	131.5	519.91	521.66	CC11	91.232	*H. delrioensis*	1.262	-4.306
207	1259	A	56	R	3	135	136.5	519.96	521.71	CC11	91.237	*H. delrioensis*	1.503	-4.208
207	1259	A	56	R	3	140	141.5	520.01	521.76	CC11	91.241	*H. delrioensis*	1.419	-4.251

Table S2. Oxygen and carbon stable isotope data - planktic foraminifera (page 6).

207	1259	A	56	R	3	140	141.5	520.01	521.76	CC11	91.241	*H. delrioensis*	1.514	-4.217
207	1259	A	57	R	1	40	41.5	520.7	522.45	CC11	91.298	*H. globulosa*	1.256	-4.500
207	1259	A	57	R	1	40	41.5	520.7	522.45	CC11	91.298	*W. baltica*	1.079	-4.578
207	1259	A	57	R	1	40	41.5	520.7	522.45	CC11	91.298	*W. baltica*	1.226	-4.567
207	1259	A	57	R	1	45	46.5	520.75	522.5	CC11	91.302	*H. globulosa*	1.234	-4.606
207	1259	A	57	R	1	45	46.5	520.75	522.5	CC11	91.302	*H. globulosa*	1.462	-4.519
207	1259	A	57	R	1	45	46.5	520.75	522.5	CC11	91.302	*W. baltica*	1.240	-4.575
207	1259	A	57	R	1	45	46.5	520.75	522.5	CC11	91.302	*W. baltica*	1.253	-4.655
207	1259	A	57	R	1	45	46.5	520.75	522.5	CC11	91.302	*W. baltica*	1.265	-4.775
207	1259	A	57	R	1	50	51.5	520.8	522.55	CC11	91.306	*H. globulosa*	1.266	-4.628
207	1259	A	57	R	1	50	51.5	520.8	522.55	CC11	91.306	*W. baltica*	1.273	-4.341
207	1259	A	57	R	1	50	51.5	520.8	522.55	CC11	91.306	*W. baltica*	1.309	-4.690
207	1259	A	57	R	1	50	51.5	520.8	522.55	CC11	91.306	*W. inornata*	1.223	-4.626
207	1259	A	57	R	1	55	56.5	520.85	522.6	CC11	91.310	*H. globulosa*	1.262	-4.621
207	1259	A	57	R	1	55	56.5	520.85	522.6	CC11	91.310	*W. baltica*	1.262	-4.758
207	1259	A	57	R	1	55	56.5	520.85	522.6	CC11	91.310	*W. inornata*	1.252	-4.483
207	1259	A	57	R	1	60	61.5	520.9	522.65	CC11	91.314	*W. baltica*	1.237	-4.667
207	1259	A	57	R	1	65	66.5	520.95	522.7	CC11	91.318	*W. baltica*	1.213	-4.735
207	1259	A	57	R	1	70	71.5	521	522.75	CC11	91.322	*W. baltica*	1.254	-4.588
207	1259	A	57	R	1	75	76.5	521.05	522.8	CC11	91.327	*W. baltica*	1.267	-4.745
207	1259	A	57	R	1	80	81.5	521.1	522.85	CC11	91.331	*W. baltica*	1.335	-4.563
207	1259	A	57	R	1	80	81.5	521.1	522.85	CC11	91.331	*W. baltica*	1.433	-4.911
207	1259	A	57	R	1	90	91.5	521.2	522.95	CC11	91.339	*H. globulosa*	1.131	-4.739
207	1259	A	57	R	1	90	91.5	521.2	522.95	CC11	91.339	*W. baltica*	1.189	-4.920
207	1259	A	57	R	1	95	96.5	521.25	523	CC11	91.343	*W. baltica*	1.127	-4.873
207	1259	A	57	R	1	95	96.5	521.25	523	CC11	91.343	*W. baltica*	1.222	-4.510
207	1259	A	57	R	1	100	101.5	521.3	523.05	CC11	91.347	*W. archaeocretacea*	1.211	-4.801
207	1259	A	57	R	1	100	101.5	521.3	523.05	CC11	91.347	*W. baltica*	1.118	-4.753
207	1259	A	57	R	1	105	106.5	521.35	523.1	CC11	91.351	*W. baltica*	1.130	-4.792
207	1259	A	57	R	1	115	116.5	521.45	523.2	CC11	91.360	*H. globulosa*	1.311	-4.677
207	1259	A	57	R	1	115	116.5	521.45	523.2	CC11	91.360	*W. baltica*	1.266	-4.849
207	1259	A	57	R	1	120	121.5	521.5	523.25	CC11	91.364	*W. baltica*	1.228	-4.648
207	1259	A	57	R	1	125	126.5	521.55	523.3	CC11	91.368	*W. baltica*	1.275	-4.587
207	1259	A	57	R	1	135	136.5	521.65	523.4	CC11	91.376	*W. baltica*	1.204	-4.653
207	1259	A	57	R	2	115	116.5	522.95	524.7	CC11	91.401	*W. archaeocretacea*	1.083	-4.468
207	1259	A	57	R	2	115	116.5	522.95	524.7	CC11	91.401	*W. baltica*	1.257	-4.264
207	1259	A	57	R	2	120	121.5	523	524.75	CC11	91.405	*W. baltica*	1.299	-4.792
207	1259	A	57	R	2	125	126.5	523.05	524.8	CC11	91.492	*M. cf. sinuosa*	1.208	-4.536
207	1259	A	57	R	2	125	126.5	523.05	524.8	CC11	91.492	*W. archaeocretacea*	1.089	-4.532
207	1259	A	57	R	2	125	126.5	523.05	524.8	CC11	91.492	*W. baltica*	1.392	-4.679
207	1259	A	57	R	2	125	126.5	523.05	524.8	CC11	91.492	*W. inornata*	1.273	-4.435
207	1259	A	57	R	2	130	131.5	523.1	524.85	CC11	91.496	*H. delrioensis*	1.195	-4.180
207	1259	A	57	R	2	130	131.5	523.1	524.85	CC11	91.496	*M. cf. sinuosa*	1.025	-4.137
207	1259	A	57	R	2	130	131.5	523.1	524.85	CC11	91.496	*W. baltica*	1.016	-4.442
207	1259	B	22	R	1	5	6.5	524.45	524.88	CC11	91.498	*H. globulosa*	1.180	-4.650
207	1259	B	22	R	1	5	6.5	524.45	524.88	CC11	91.498	*W. baltica*	1.281	-4.611
207	1259	B	22	R	1	10	11.5	524.5	524.93	CC11	91.503	*H. cf. delrioensis*	1.294	-4.471
207	1259	B	22	R	1	10	11.5	524.5	524.93	CC11	91.503	*H. cf. delrioensis*	1.403	-4.466
207	1259	B	22	R	1	10	11.5	524.5	524.93	CC11	91.503	*H. delrioensis*	1.352	-4.275
207	1259	B	22	R	1	10	11.5	524.5	524.93	CC11	91.503	*H. delrioensis*	1.453	-4.244
207	1259	B	22	R	1	10	11.5	524.5	524.93	CC11	91.503	*H. globulosa*	1.205	-4.495
207	1259	B	22	R	1	10	11.5	524.5	524.93	CC11	91.503	*W. baltica*	1.163	-4.294
207	1259	B	22	R	1	10	11.5	524.5	524.93	CC11	91.503	*W. baltica*	1.239	-4.530
207	1259	B	22	R	1	10	11.5	524.5	524.93	CC11	91.503	*W. baltica*	1.331	-4.487
207	1259	B	22	R	1	10	11.5	524.5	524.93	CC11	91.503	*W. baltica*	1.368	-4.567
207	1259	B	22	R	1	10	11.5	524.5	524.93	CC11	91.503	*W. baltica*	1.384	-4.531
207	1259	B	22	R	1	10	11.5	524.5	524.93	CC11	91.503	*W. baltica*	1.425	-4.526
207	1259	B	22	R	1	10	11.5	524.5	524.93	CC11	91.503	*W. baltica*	1.434	-4.408
207	1259	B	22	R	1	10	11.5	524.5	524.93	CC11	91.503	*W. baltica*	1.441	-4.497
207	1259	B	22	R	1	10	11.5	524.5	524.93	CC11	91.503	*W. baltica*	1.481	-4.438
207	1259	B	22	R	1	15	16.5	524.55	524.98	CC11	91.507	*H. globulosa*	1.064	-4.346
207	1259	B	22	R	1	15	16.5	524.55	524.98	CC11	91.507	*H. globulosa*	1.326	-4.348
207	1259	B	22	R	1	15	16.5	524.55	524.98	CC11	91.507	*W. baltica*	1.311	-4.520
207	1259	B	22	R	1	15	16.5	524.55	524.98	CC11	91.507	*W. baltica*	1.530	-4.203
207	1259	B	22	R	1	20	21.5	524.6	525.03	CC11	91.511	*W. baltica*	1.066	-4.394
207	1259	B	22	R	1	40	41.5	524.8	525.23	CC11	91.527	*H. globulosa*	1.186	-4.401
207	1259	B	22	R	1	40	41.5	524.8	525.23	CC11	91.527	*H. globulosa*	1.199	-4.448
207	1259	B	22	R	1	40	41.5	524.8	525.23	CC11	91.527	*W. baltica*	1.227	-4.310
207	1259	B	22	R	1	40	41.5	524.8	525.23	CC11	91.527	*W. baltica*	1.411	-4.521
207	1259	B	22	R	1	50	51.5	524.9	525.33	CC11	91.536	*H. globulosa*	1.104	-4.421
207	1259	B	22	R	1	50	51.5	524.9	525.33	CC11	91.536	*W. baltica*	1.478	-4.494
207	1259	B	22	R	1	55	56.5	524.95	525.38	CC11	91.540	*H. globulosa*	1.178	-4.351
207	1259	B	22	R	1	55	56.5	524.95	525.38	CC11	91.540	*W. archaeocretacea*	1.416	-4.647

Table S2. Oxygen and carbon stable isotope data - planktic foraminifera (page 7).

207	1259	B	22	R	1	55	56.5	524.95	525.38	CC11	91.540	*W. baltica*	1.586	-4.404
207	1259	B	22	R	1	60	61.5	525	525.43	CC11	91.544	*H. globulosa*	1.218	-4.338
207	1259	B	22	R	1	60	61.5	525	525.43	CC11	91.544	*W. archaeocretacea*	1.285	-4.383
207	1259	B	22	R	1	60	61.5	525	525.43	CC11	91.544	*W. baltica*	1.324	-4.330
207	1259	B	22	R	1	65	66.5	525.05	525.48	CC11	91.548	*H. globulosa*	1.097	-4.254
207	1259	B	22	R	1	65	66.5	525.05	525.48	CC11	91.548	*W. baltica*	1.200	-4.342
207	1259	B	22	R	1	70	71.5	525.1	525.53	CC11	91.552	*H. globulosa*	1.336	-4.362
207	1259	B	22	R	1	70	71.5	525.1	525.53	CC11	91.552	*W. baltica*	1.556	-4.367
207	1259	B	22	R	1	70	71.5	525.1	525.53	CC11	91.552	*W. inornata*	1.430	-4.242
207	1259	B	22	R	1	80	81.5	525.2	525.63	CC11	91.560	*H. globulosa*	1.315	-4.474
207	1259	B	22	R	1	80	81.5	525.2	525.63	CC11	91.560	*W. baltica*	1.671	-4.466
207	1259	B	22	R	1	90	91.5	525.3	525.73	CC11	91.569	*H. delrioensis*	1.679	-4.403
207	1259	B	22	R	1	90	91.5	525.3	525.73	CC11	91.569	*H. globulosa*	1.388	-4.416
207	1259	B	22	R	1	90	91.5	525.3	525.73	CC11	91.569	*W. baltica*	1.643	-4.564
207	1259	B	22	R	1	90	91.5	525.3	525.73	CC11	91.569	*W. baltica*	1.738	-4.493
207	1259	B	22	R	1	95	96.5	525.35	525.78	CC11	91.573	*H. globulosa*	1.249	-4.353
207	1259	B	22	R	1	95	96.5	525.35	525.78	CC11	91.573	*W. baltica*	1.647	-4.378
207	1259	B	22	R	1	100	101.5	525.4	525.83	CC11	91.577	*W. baltica*	1.229	-4.548
207	1259	B	22	R	1	115	116.5	525.55	525.98	CC11	91.589	*H. globulosa*	1.203	-4.236
207	1259	B	22	R	1	115	116.5	525.55	525.98	CC11	91.589	*W. baltica*	1.413	-4.359
207	1259	B	22	R	1	120	121.5	525.6	526.03	CC11	91.594	*H. globulosa*	1.469	-4.392
207	1259	B	22	R	1	120	121.5	525.6	526.03	CC11	91.594	*W. baltica*	1.759	-4.437
207	1259	B	22	R	1	130	131.5	525.7	526.13	CC11	91.602	*H. globulosa*	1.923	-4.360
207	1259	B	22	R	1	130	131.5	525.7	526.13	CC11	91.602	*W. baltica*	1.795	-4.605
207	1259	B	22	R	1	130	131.5	525.7	526.13	CC11	91.602	*W. baltica*	1.910	-4.664
207	1259	B	22	R	1	135	136.5	525.75	526.18	CC11	91.606	*H. globulosa*	1.438	-4.518
207	1259	B	22	R	1	135	136.5	525.75	526.18	CC11	91.606	*W. baltica*	1.899	-4.465
207	1259	B	22	R	1	140	141.5	525.8	526.23	CC11	91.610	*W. archaeocretacea*	1.930	-4.384
207	1259	B	22	R	1	140	141.5	525.8	526.23	CC11	91.610	*W. baltica*	1.872	-4.429
207	1259	B	22	R	1	140	141.5	525.8	526.23	CC11	91.610	*W. inornata*	1.898	-4.153
207	1259	B	22	R	1	140	141.5	525.8	526.23	CC11	91.610	*W. inornata*	1.957	-4.237
207	1259	B	22	R	2	0	1.5	525.9	526.33	CC11	91.618	*H. delrioensis*	1.923	-4.106
207	1259	B	22	R	2	0	1.5	525.9	526.33	CC11	91.618	*H. delrioensis*	2.050	-4.245
207	1259	B	22	R	2	0	1.5	525.9	526.33	CC11	91.618	*H. globulosa*	2.061	-4.285
207	1259	B	22	R	2	0	1.5	525.9	526.33	CC11	91.618	*M. cf. sinuosa*	1.683	-4.252
207	1259	B	22	R	2	0	1.5	525.9	526.33	CC11	91.618	*W. baltica*	1.767	-4.267
207	1259	B	22	R	2	10	11.5	526	526.43	CC11	91.627	*H. globulosa*	1.424	-4.391
207	1259	B	22	R	2	10	11.5	526	526.43	CC11	91.627	*W. archaeocretacea*	1.954	-4.372
207	1259	B	22	R	2	10	11.5	526	526.43	CC11	91.627	*W. baltica*	1.732	-4.515
207	1259	B	22	R	2	10	11.5	526	526.43	CC11	91.627	*W. baltica*	2.134	-4.472
207	1259	B	22	R	2	110	113	527	527.43	CC11	91.709	*W. baltica*	1.552	-4.378
207	1259	B	22	R	2	120	121.5	527.1	527.53	CC11	91.717	*H. globulosa*	0.728	-4.606
207	1259	B	22	R	2	120	121.5	527.1	527.53	CC11	91.717	*H. globulosa*	1.002	-4.515
207	1259	B	22	R	2	120	121.5	527.1	527.53	CC11	91.717	*W. baltica*	1.584	-4.653
207	1259	B	22	R	2	120	121.5	527.1	527.53	CC11	91.717	*W. baltica*	1.652	-4.501
207	1259	B	22	R	2	125	126.5	527.15	527.58	CC11	91.722	*W. baltica*	1.874	-4.544
207	1259	B	22	R	2	130	131.5	527.2	527.63	CC11	91.726	*H. globulosa*	1.056	-4.426
207	1259	B	22	R	2	130	131.5	527.2	527.63	CC11	91.726	*W. baltica*	1.569	-4.326
207	1259	B	22	R	2	130	131.5	527.2	527.63	CC11	91.726	*W. baltica*	1.689	-4.384
207	1259	B	22	R	2	135	136.5	527.25	527.68	CC11	91.730	*W. baltica*	1.444	-4.355
207	1259	B	22	R	2	145	146.5	527.35	527.78	CC11	91.738	*W. baltica*	1.703	-4.320
207	1259	B	22	R	3	0	1.5	527.4	527.83	CC11	91.742	*W. baltica*	1.642	-4.390
207	1259	B	22	R	3	5	6.5	527.45	527.88	CC11	91.746	*W. archaeocretacea*	1.488	-4.382
207	1259	B	22	R	3	5	6.5	527.45	527.88	CC11	91.746	*W. baltica*	1.652	-4.467
207	1259	B	22	R	3	10	11.5	527.5	527.93	CC11	91.751	*W. archaeocretacea*	1.585	-4.341
207	1259	B	22	R	3	10	11.5	527.5	527.93	CC11	91.751	*W. baltica*	1.590	-4.276
207	1259	B	22	R	3	15	16.5	527.55	527.98	CC11	91.755	*W. archaeocretacea*	1.546	-4.448
207	1259	B	22	R	3	15	16.5	527.55	527.98	CC11	91.755	*W. baltica*	1.629	-4.359
207	1259	B	22	R	3	20	21.5	527.6	528.03	CC11	91.759	*W. baltica*	1.598	-4.368
207	1259	B	22	R	3	20	21.5	527.6	528.03	CC11	91.759	*W. inornata*	1.475	-4.257
207	1259	B	22	R	3	25	26.5	527.65	528.08	CC11	91.763	*W. baltica*	1.657	-4.367
207	1259	B	22	R	3	25	26.5	527.65	528.08	CC11	91.763	*W. inornata*	1.619	-4.241
207	1259	B	22	R	3	30	31.5	527.7	528.13	CC11	91.767	*W. archaeocretacea*	1.660	-4.335
207	1259	B	22	R	3	30	31.5	527.7	528.13	CC11	91.767	*W. baltica*	1.733	-4.364
207	1259	B	22	R	3	30	31.5	527.7	528.13	CC11	91.767	*W. inornata*	1.719	-4.272
207	1259	B	22	R	3	35	36.5	527.75	528.18	CC11	91.771	*W. baltica*	1.765	-4.375
207	1259	B	22	R	3	45	46.5	527.85	528.28	CC11	91.779	*W. baltica*	2.124	-4.468
207	1259	B	22	R	3	50	51.5	527.9	528.33	CC11	91.784	*H. globulosa*	0.509	-4.667
207	1259	B	22	R	3	50	51.5	527.9	528.33	CC11	91.784	*W. baltica*	1.494	-4.685
207	1259	B	22	R	3	55	56.5	527.95	528.38	CC11	91.788	*H. delrioensis*	1.751	-4.501
207	1259	B	22	R	3	55	56.5	527.95	528.38	CC11	91.788	*W. baltica*	1.651	-4.529
207	1259	B	22	R	3	60	61.5	528	528.43	CC11	91.792	*W. baltica*	1.754	-4.333
207	1259	B	22	R	4	65	66.5	529.55	529.98	CC11	91.920	*W. baltica*	1.683	-4.485

Table S2. Oxygen and carbon stable isotope data - planktic foraminifera (page 8).

207	1259	B	22	R	4	70	71.5	529.6	530.03	CC11	91.924	*H. globulosa*	1.852	-4.269
207	1259	B	22	R	4	70	71.5	529.6	530.03	CC11	91.924	*W. baltica*	1.829	-4.608
207	1259	B	22	R	4	75	76.5	529.65	530.08	CC11	91.928	*H. globulosa*	1.698	-4.589
207	1259	B	22	R	4	75	76.5	529.65	530.08	CC11	91.928	*W. baltica*	1.839	-4.717
207	1259	B	22	R	4	80	81.5	529.7	530.13	CC11	91.932	*H. globulosa*	1.790	-4.520
207	1259	B	22	R	4	80	81.5	529.7	530.13	CC11	91.932	*W. baltica*	1.743	-4.676
207	1259	B	22	R	4	85	86.5	529.75	530.18	CC11	91.936	*H. globulosa*	1.793	-4.326
207	1259	B	22	R	4	85	86.5	529.75	530.18	CC11	91.936	*W. baltica*	1.868	-4.460
207	1259	B	22	R	4	90	91.5	529.8	530.23	CC11	91.941	*W. baltica*	1.754	-4.308
207	1259	B	22	R	4	90	91.5	529.8	530.23	CC11	91.941	*W. baltica*	1.786	-4.512
207	1259	B	22	R	4	95	96.5	529.85	530.28	CC11	91.945	*H. globulosa*	1.661	-4.440
207	1259	B	22	R	4	95	96.5	529.85	530.28	CC11	91.945	*W. baltica*	1.717	-4.276
207	1259	B	22	R	4	95	96.5	529.85	530.28	CC11	91.945	*W. baltica*	1.738	-4.421
207	1259	B	22	R	4	100	101.5	529.9	530.33	CC11	91.949	*H. globulosa*	2.018	-4.254
207	1259	B	22	R	4	100	101.5	529.9	530.33	CC11	91.949	*W. archaeocretacea*	1.855	-4.461
207	1259	B	22	R	4	100	101.5	529.9	530.33	CC11	91.949	*W. baltica*	1.680	-4.230
207	1259	B	22	R	4	110	111.5	530	530.43	CC11	91.957	*H. globulosa*	1.398	-4.299
207	1259	B	22	R	4	110	111.5	530	530.43	CC11	91.957	*H. globulosa*	1.514	-4.337
207	1259	B	22	R	4	110	111.5	530	530.43	CC11	91.957	*W. baltica*	1.828	-4.519
207	1259	B	22	R	4	120	121.5	530.1	530.53	CC11	91.965	*H. delrioensis*	1.777	-4.604
207	1259	B	22	R	4	120	121.5	530.1	530.53	CC11	91.965	*H. globulosa*	1.608	-4.457
207	1259	B	22	R	4	120	121.5	530.1	530.53	CC11	91.965	*W. baltica*	1.857	-4.529
207	1259	B	22	R	4	135	136.5	530.25	530.68	CC11	91.978	*H. globulosa*	1.157	-4.326
207	1259	B	22	R	4	135	136.5	530.25	530.68	CC11	91.978	*W. baltica*	1.606	-4.384
207	1259	B	22	R	4	135	136.5	530.25	530.68	CC11	91.978	*W. baltica*	1.711	-4.428
207	1259	B	22	R	4	140	141.5	530.3	530.73	CC11	91.982	*H. globulosa*	1.280	-4.421
207	1259	B	22	R	4	140	141.5	530.3	530.73	CC11	91.982	*H. globulosa*	1.393	-4.457
207	1259	B	22	R	4	140	141.5	530.3	530.73	CC11	91.982	*W. baltica*	1.778	-4.498
207	1259	B	22	R	4	140	141.5	530.3	530.73	CC11	91.982	*W. baltica*	1.791	-4.516
207	1259	B	22	R	4	145	146.5	530.35	530.78	CC11	91.986	*H. globulosa*	1.809	-4.553
207	1259	B	22	R	4	145	146.5	530.35	530.78	CC11	91.986	*H. globulosa*	1.870	-4.321
207	1259	B	22	R	4	145	146.5	530.35	530.78	CC11	91.986	*W. baltica*	1.833	-4.645
207	1259	B	22	R	4	145	146.5	530.35	530.78	CC11	91.986	*W. baltica*	1.967	-4.697

Table S3: TEX_{86} and BIT data.

Site	H	Cor	Sc	Top	Bot	mcd	Age (Ogg et al., 2004)	TEX_{86}	TK (℃)	BIT-Index	Samples used for anomaly plot in Fig. 2
1259	C	11	5	30	31.5	497.50	85.413	0.889	33.50	0.07	
1259	C	11	5	50	51.5	497.70	85.462	0.905	34.12	0.04	
1259	C	11	5	50	51.5	497.70	85.462	0.903	34.05	0.04	
1259	C	12	1	80	81.5	500.45	86.534	0.904	34.08	0.04	
1259	C	12	3	60	61.5	503.25	87.461	0.902	33.99	0.06	
1259	C	12	5	50	51.5	505.75	88.048	0.918	34.58	0.04	
1259	C	13	1	85	86.5	507.11	88.367	0.914	34.43	0.04	
1259	C	13	3	90	91.5	510.16	89.083	0.905	34.12	0.06	
1259	A	54	2	140	141.5	511.25	89.338	0.916	34.53	0.06	
1259	A	55	1	75	76.5	513.1	89.735	0.912	34.37	0.05	
1259	A	55	3	20	21.5	514.96	90.063	0.912	34.36	0.06	
1259	B	21	1	115	116.5	517.42	90.498	0.937	35.29	0.04	x
1259	B	21	3	50	51.5	519.77	90.913	0.934	35.18	0.04	
1259	B	21	3	50	51.5	519.77	90.913	0.934	35.18	0.04	
1259	B	21	3	70	71.5	519.97	90.948	0.928	34.98	0.05	
1259	B	21	3	70	71.5	519.97	90.948	0.928	34.98	0.05	
1259	B	21	CC	5	6.5	520.19	90.987	0.913	34.41	0.06	
1259	A	56	3	10	11.5	520.46	91.035	0.913	34.39	0.07	
1259	A	56	3	10	11.5	520.46	91.035	0.912	34.37	0.07	
1259	A	56	3	35	36.5	520.71	91.079	0.934	35.20	0.05	
1259	A	56	3	55	56.5	520.91	91.114	0.937	35.30	0.05	x
1259	A	56	3	70	71.5	521.06	91.141	0.923	34.79	0.06	x
1259	A	56	3	70	71.5	521.06	91.141	0.928	34.98	0.05	x
1259	A	56	3	75	76.5	521.11	91.149	0.914	34.45	0.06	x
1259	A	56	3	75	76.5	521.11	91.149	0.915	34.50	0.06	x
1259	A	56	3	85	86.5	521.21	91.167	0.907	34.18	0.07	x
1259	A	56	3	90	91.5	521.26	91.176	0.906	34.16	0.07	x
1259	A	56	3	90	91.5	521.26	91.176	0.905	34.12	0.07	x
1259	A	56	3	95	96.5	521.31	91.185	0.914	34.45	0.06	x
1259	A	56	3	101.5	103	521.38	91.196	0.921	34.72	0.06	x
1259	A	56	3	105	106.5	521.41	91.202	0.918	34.61	0.05	x
1259	A	56	3	115	116.5	521.51	91.220	0.921	34.70	0.06	
1259	A	56	3	115	116.5	521.51	91.220	0.920	34.66	0.06	x
1259	A	56	3	130	131.5	521.66	91.232	0.920	34.65	0.06	x
1259	A	56	3	140	141.5	521.76	91.241	0.914	34.43	0.07	x
1259	A	57	1	0	1.5	522.05	91.265	0.933	35.17	0.06	
1259	A	57	1	15	16.5	522.20	91.277	0.926	34.90	0.06	
1259	A	57	1	40	41.5	522.45	91.298	0.940	35.40	0.05	
1259	A	57	1	40	41.5	522.45	91.298	0.940	35.40	0.05	x
1259	A	57	1	45	46.5	522.50	91.302	0.939	35.36	0.05	x
1259	A	57	1	60	61.5	522.65	91.314	0.917	34.56	0.07	x
1259	A	57	1	70	71.5	522.75	91.322	0.928	34.96	0.06	x
1259	A	57	1	75	76.5	522.80	91.327	0.932	35.11	0.06	x
1259	A	57	1	80	81.5	522.85	91.331	0.937	35.31	0.06	x
1259	A	57	1	90	91.5	522.95	91.339	0.941	35.45	0.05	x
1259	A	57	1	95	96.5	523.00	91.343	0.939	35.37	0.06	x
1259	A	57	1	100	101.5	523.05	91.347	0.939	35.38	0.06	x
1259	A	57	1	105	106.5	523.10	91.351	0.938	35.35	0.06	x
1259	A	57	1	105	106.5	523.10	91.351	0.939	35.37	0.06	
1259	A	57	1	115	116.5	523.20	91.360	0.931	35.07	0.06	x
1259	A	57	1	125	126.5	523.30	91.368	0.922	34.75	0.07	x
1259	A	57	1	135	136.5	523.40	91.376	0.936	35.24	0.06	x
1259	A	57	2	10	11.5	523.65	91.397	0.940	35.42	0.05	
1259	A	57	2	10	11.5	523.65	91.397	0.940	35.40	0.05	
1259	A	57	2	35	36.5	523.90	91.418	0.939	35.38	0.05	
1259	A	57	2	60	61.5	524.15	91.438	0.942	35.47	0.04	
1259	A	57	2	90	91.5	524.45	91.463	0.935	35.22	0.05	
1259	A	57	2	115	116.5	524.70	91.484	0.924	34.82	0.06	
1259	B	22	1	5	6.5	524.88	91.498	0.939	35.35	0.06	
1259	B	22	1	5	6.5	524.88	91.498	0.939	35.35	0.06	x
1259	B	22	1	20	21.5	525.03	91.511	0.921	34.70	0.08	x
1259	B	22	2	10	11.5	526.43	91.627	0.931	35.08	0.03	x
1259	B	22	3	45	46.5	528.28	91.779	0.913	34.40	0.04	x
1259	B	22	4	75	76.5	530.08	91.928	0.946	35.62	0.03	x

Table S4: Oxygen and carbon stable isotope data - benthic foraminifera (page 1).

Species	mcd	Age (Ogg et al., 2004)	$\delta^{13}C$	$\delta^{18}O$
Bolivina anambra	518.52	90.692	-0.27	-1.79
Bolivina anambra	518.67	90.718	-0.84	-1.53
Bolivina anambra	518.72	90.727	-0.69	-1.55
Bolivina anambra	518.77	90.736	-0.4	-1.62
Bolivina anambra	518.82	90.745	-0.45	-1.51
Lingulogavelinella	518.92	90.763	-0.86	-1.52
Bolivina anambra	519.27	90.824	-0.56	-1.57
Bolivina anambra	519.37	90.842	-0.53	-1.74
Lingulogavelinella	520.86	91.105	-0.85	-2.01
Bolivina anambra	520.86	91.105	-0.74	-2.09
Lingulogavelinella	520.91	91.114	-0.86	-1.57
Bolivina anambra	520.91	91.114	-0.77	-1.86
Lingulogavelinella	521.06	91.141	-0.99	-1.74
Bolivina anambra	521.06	91.141	-0.52	-1.54
Lingulogavelinella	521.11	91.149	-1.09	-1.4
Bolivina anambra	521.11	91.149	-0.61	-1.53
Lingulogavelinella	521.16	91.158	-0.91	-1.33
Lingulogavelinella	521.21	91.167	-1.75	-1.27
Bolivina anambra	521.21	91.167	-0.89	-1.3
Lingulogavelinella	521.26	91.176	-1.07	-1.21
Bolivina anambra	521.26	91.176	-0.64	-1.18
Lingulogavelinella	521.31	91.185	-0.83	-1.36
Bolivina anambra	521.31	91.185	-0.11	-1.34
Lingulogavelinella	521.375	91.196	-0.91	-1.29
Lingulogavelinella	521.41	91.202	-0.59	-1.41
Bolivina anambra	521.41	91.202	-0.05	-1.38
Lingulogavelinella	521.46	91.211	-1.27	-1.72
Lingulogavelinella	521.51	91.220	-0.65	-1.32
Lingulogavelinella	521.66	91.232	-0.72	-1.41
Bolivina anambra	521.66	91.232	-0.23	-1.46
Lingulogavelinella	521.71	91.237	-1.08	-1.41
Bolivina anambra	521.71	91.237	-0.72	-1.62
Lingulogavelinella	521.76	91.241	-0.6	-1.44
Lingulogavelinella	522.5	91.302	-0.8	-1.65
Lingulogavelinella	522.55	91.306	-0.44	-1.92
Bolivina anambra	522.55	91.306	-0.62	-1.92
Bolivina anambra	522.65	91.314	-0.28	-1.73
Bolivina anambra	523.3	91.368	-0.2	-1.77
Bolivina anambra	523.35	91.372	-0.48	-1.7
Bolivina anambra	524.7	91.484	-0.48	-1.75
Lingulogavelinella	524.75	91.488	-0.96	-1.74
Bolivina anambra	524.75	91.488	-0.47	-1.63
Bolivina anambra	524.8	91.492	-0.64	-1.78
Bolivina anambra	525.03	91.511	-0.87	-1.82
Lingulogavelinella	525.23	91.527	-0.56	-1.73
Bolivina anambra	525.23	91.527	-0.63	-1.88
Lingulogavelinella	525.33	91.536	-0.47	-1.84
Bolivina anambra	525.33	91.536	-0.68	-1.51
Lingulogavelinella	525.38	91.540	-0.8	-1.75
Bolivina anambra	525.43	91.544	-0.54	-1.7
Bolivina anambra	525.48	91.548	-0.4	-1.76
Lingulogavelinella	525.53	91.552	-0.64	-1.63
Bolivina anambra	525.53	91.552	-1.24	-1.7
Lingulogavelinella	525.58	91.556	-0.68	-1.71

Table S4: Oxygen and carbon stable isotope data - benthic foraminifera (page 2).

Bolivina anambra	525.58	91.556	-0.38	-1.71
Lingulogavelinella	525.63	91.560	-0.4	-1.8
Bolivina anambra	525.63	91.560	-0.31	-1.67
Lingulogavelinella	525.73	91.569	-0.56	-2.03
Bolivina anambra	525.73	91.569	-0.11	-1.71
Bolivina anambra	525.83	91.577	-0.07	-1.68
Bolivina anambra	525.93	91.585	-0.33	-1.61
Lingulogavelinella	525.98	91.589	0.42	-1.47
Bolivina anambra	525.98	91.589	-1.23	-1.48
Bolivina anambra	526.33	91.618	0.05	-1.62
Bolivina anambra	527.68	91.730	0.11	-1.53
Bolivina anambra	527.68	91.730	0.01	-1.55
Bolivina anambra	527.78	91.738	-0.06	-1.54
Bolivina anambra	527.88	91.746	0.05	-1.51
Bolivina anambra	527.98	91.755	0.21	-1.48
Bolivina anambra	530.48	91.961	-0.04	-1.54

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