

# **SUPPLEMENT TO:**

## **The relative stability of planktic foraminifer thermal preferences over the past 3 million years**

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**Figure S1.** Relative abundance of species

**Figure S2.** Distribution of Pliocene SST estimates by core site

**Table S1.** Summary SST statistics for localities

**Table S2.** Summary SST statistics for taxa

**Table S3.** Pliocene sites shown in Figure S1

**Table S4.** Faunal census data from ODP Site 642

**Taxonomy**

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**Figure S1. Relative abundance of species.**

Maps show mean relative abundance in North Atlantic of mid-Piacenzian species (red dots; See Table S3) on a background of coretop abundances (blue dots) from the ForCenS database. Scale at lower right is the same for all plots and shows 100%, 75%, 50%, and 25% relative abundance.

Box plots showing distribution of Pliocene SST's within each core and range of temperatures between cores.

Table S1. Summary SST statistics (localities)								
Site	lat (°N)	lon (°E)	n samples	min SST (°C)	max SST (°C)	mean SST (°C)	$\sigma$	
552	56.04	-23.23	15	14.0	19.4	16.9	1.51	
603	35.50	-70.03	9	21.7	23.6	22.5	0.67	
606	37.34	-35.50	25	20.2	24.4	22.6	1.07	
607	41.00	-32.96	12	20.1	22.5	21.3	0.91	
609	49.88	-24.24	23	15.5	20.2	17.9	1.24	
625	28.83	-87.16	24	26.1	27.7	27.1	0.39	
642*	67.22	2.93	13	11.5	14.4	12.9	0.88	
662	-1.39	-11.74	16	26.9	27.4	27.2	0.14	
925	4.20	-43.49	23	27.0	29.0	28.6	0.46	
951	32.03	-24.87	21	23.0	25.8	24.2	0.96	
958	24.00	-20.00	24	23.2	26.0	24.6	0.87	
982	57.52	-15.87	28	13.4	20.6	17.5	2.00	
999	12.74	-78.74	6	27.5	27.9	27.7	0.16	
1006	24.40	-79.46	5	28.0	28.7	28.4	0.31	
1062	28.25	-74.41	9	22.7	23.9	23.6	0.41	
1063	33.69	-57.62	23	21.3	23.6	22.7	0.54	
1115	-9.19	151.57	23	28.7	29.0	28.9	0.09	
1308	49.88	-24.24	37	15.8	19.7	18.1	1.05	
1313	41.00	-32.96	16	17.8	21.4	19.2	1.23	
*Alkenone data from Bachem et al. (2016).								

**Table S2. Summary SST statistics for taxa.** Columns list species, number of samples each species occurs in within the 341 sample Pliocene data set, minimum SST, maximum SST, mean SST, standard deviation, and qualitative temperature preference.

	Table S2. Summary SST statistics ( Pliocene taxa)							
	species	n sample s	min SST (°C)	max SST (°C)	mean SST (°C)	$\sigma$	Dowsett et al. (2021)	
	<i>Dentoglobigerina altispira</i>	199	17.4	29.0	25.0	3.21	warm	
	<i>Globigerina bulloides</i>	355	5.2	29.0	21.5	5.53	transitional	
	<i>Globigerinita glutinata</i>	358	6.3	29.0	21.5	5.48	warm-transitional	
	<i>Globoconella puncticulata</i>	260	13.8	29.0	21.6	3.81	transitional	
	<i>Globorotalia menardii</i>	188	16.9	29.0	25.7	2.66	warm	
	<i>Neogloboquadrina atlantica</i> (s)	128	5.2	27.7	16.1	4.48	cool-transitional	
	<i>Neogloboquadrina dutertrei</i>	91	13.8	29.0	25.2	4.54	warm-transitional	
	<i>Neogloboquadrina incompta</i>	288	6.3	29.0	21.7	5.60	transitional	
	<i>Neogloboquadrina pachyderma</i>	195	6.3	29.0	19.9	5.82	cool	
	<i>Trilobatus sacculifer</i>	230	17.0	29.0	24.8	3.23	warm	

**Table S3. Pliocene sites shown in Figure S1.**

Table S3. Pliocene sites shown in Figure S1.							
Site	lat (°N)	lon (°E)	Faunal data	Site	lat (°N)	lon (°E)	Faunal data
111	50.43	-46.37	Dowsett et al. (2015)	659	18.08	-21.03	Dowsett et al. (2015)
396	22.48	-43.52	Dowsett et al. (2015)	661	9.45	-19.39	Dowsett et al. (2015)
410	45.51	-29.48	Dowsett et al. (2015)	662	-1.39	-11.74	Dowsett et al. (2019)
502	11.49	-79.38	Dowsett et al. (2015)	667	4.57	-21.91	Dowsett et al. (2015)
546	33.78	-9.56	Dowsett et al. (2015)	672	15.54	-58.64	Dowsett et al. (2015)
548	48.92	-12.16	Loubere and Moss (1986)	925	4.20	-43.49	Dowsett et al. (2015)
552	56.04	-23.23	Dowsett et al. (2015)	951	32.03	-24.87	Dowsett et al. (2015)
603	35.50	-70.03	Dowsett et al. (2015)	958	24.00	-20.00	Dowsett et al. (2015)
606	37.34	-35.50	Dowsett et al. (2015)	981	55.48	-14.65	Dowsett et al. (2015)
607	41.00	-32.96	Dowsett et al. (2015)	982	57.52	-15.87	Dowsett et al. (2019)
608	42.84	-23.09	Dowsett et al. (2015)	999	12.74	-78.74	Dowsett et al. (2019)
609	49.88	-24.24	Dowsett et al. (2015)	1006	24.40	-79.46	Dowsett et al. (2015)
610	53.22	-18.89	Dowsett et al. (2015)	1062	28.25	-74.41	Dowsett et al. (2015)
625	28.83	-87.16	Dowsett et al. (2015)	1063	33.69	-57.62	Dowsett et al. (2015)
642	67.23	2.93	Andersson, unpublished	1308	49.88	-24.24	Dowsett et al. (2019)
646	58.21	-48.37	Dowsett et al. (2015)	1313	41.00	-32.96	Dowsett et al. (2019)

**Table S4. Faunal census data from ODP Site 642.**

Table S4. Relative faunal abundances at ODP Site 642B										
Depth (m)	<i>D. altispira</i>	<i>G. bulloides</i>	<i>Gt. glutinata</i>	<i>T. sacculifer</i>	<i>Gt. punctulata</i>	<i>Gt. menardii</i>	<i>N. atlantica[s]</i>	<i>N. incompta</i>	<i>N. pachyderma</i>	
67.18	0.0000	0.0690	0.0320	0.0000	0.0000	0.0000	0.8450	0.0000	0.0000	
67.19	0.0000	0.0180	0.0240	0.0000	0.0000	0.0000	0.8440	0.0000	0.0000	
67.40	0.0000	0.0100	0.0700	0.0000	0.0000	0.0000	0.8580	0.0020	0.0050	
67.46	0.0000	0.0160	0.0290	0.0000	0.0000	0.0000	0.8880	0.0000	0.0000	
67.52	0.0000	0.0170	0.0030	0.0000	0.0000	0.0000	0.9240	0.0000	0.0166	
67.56	0.0000	0.0090	0.0020	0.0000	0.0000	0.0000	0.9550	0.0000	0.0000	
67.61	0.0000	0.0000	0.0020	0.0000	0.0000	0.0000	0.9670	0.0000	0.0045	
67.65	0.0000	0.0040	0.0830	0.0000	0.0000	0.0000	0.4380	0.1400	0.2562	
67.66	0.0000	0.0280	0.0060	0.0000	0.0000	0.0000	0.9340	0.0000	0.0000	
67.71	0.0000	0.0040	0.0090	0.0000	0.0000	0.0000	0.9550	0.0000	0.0000	
67.76	0.0000	0.0500	0.0170	0.0000	0.0000	0.0000	0.9090	0.0000	0.0000	
67.81	0.0000	0.0120	0.0080	0.0000	0.0000	0.0000	0.9450	0.0000	0.0000	
67.85	0.0000	0.0280	0.0130	0.0000	0.0000	0.0000	0.9120	0.0000	0.0026	

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## Taxonomy

### ***Dentoglobigerina altispira*** (Cushman & Jarvis, 1936)

Cushman, J. A. & Jarvis, P. W. (1936). Three new foraminifera from the Miocene Bowden Marl of Jamaica. *Contributions from the Cushman Laboratory for Foraminiferal Research*. **12**(1): 3-5.

Pliocene census data include specimens of *Dentoglobigerina globosa* (Bolli, 1957) that have slightly more rounded chambers.

### ***Globigerina bulloides*** d'Orbigny, 1826

d'Orbigny, A. (1826). Tableau methodique de la Classe de Cephalopodes. *Annales des Sciences Naturelles, Paris*. **7**: 245-314.

### ***Trilobatus sacculifer*** (Brady, 1877)

Brady, H. B. (1877). Supplementary note on the foraminifera of the Chalk (?) of the New Britain group. *Geological Magazine*. **4**(12): 534-536.

Pliocene assemblages include specimens of *Trilobatus quadrilobatus* (d'Orbigny, 1846), *Trilobatus immaturus* (LeRoy, 1939), and *Trilobatus trilobus* (Reuss, 1850), thus the equatorial periphery ranges from triangular to subquadrate to lobate, and the degree of chamber embracing and coil tightness is variable. *Globigerinoidesella fistulosa* (Schubert, 1910) is not included. ForCenS data include *Trilobatus trilobus* (Reuss, 1850).

### ***Globigerinita glutinata*** (Egger, 1893)

Egger, J. G. (1893). Foraminiferen aus Meeresgrundproben, gelothet von 1874 bis 1876 von S. M. Sch. Gazelle. *Abhandlugen der königlichen bayerischen Akademie Wissenschaften zu München, mathematische - naturwissenschaftliche Klasse*. **18**(2): 195-457.

This Pliocene category includes any rare specimens of with supplementary apertures along spiral sutures and *Globigerinita uvula* (Ehrenberg, 1862) with high trochospiral coiling. We commonly recognized specimens both with and without a bulla.

### ***Globoconella puncticulata*** (Deshayes, 1832)

Deshayes, G. P. (1832). *Encyclopedie methodique: Histoire Naturelle des Vers., Tome 2.* Agasse Imprimeur, Paris. 1-594.

Pliocene census data include any specimens attributable to *Globoconella conomiozea* (Kennett, 1966) with *G. puncticulata*.

***Globoconella inflata*** (d'Orbigny, 1839)

d'Orbigny, A. (1839). Foraminifères des Iles Canaries. In, Barker-Webb, P. & Berthelot, S. (eds) *Histoire naturelle des Iles Canaries*. 120-146.

***Globorotalia menardii*** (Parker, Jones & Brady, 1865 after d'Orbigny, 1826 nomen nudum)

Parker, W. K., Jones, T. R. & Brady, H. B. (1865). On the nomenclature of the foraminifera. X cont: The Species enumerated by d'Orbigny in the 'Annales des Sciences Naturelles', vol. 7, 1826 (The Species illustrated by Models. *Annals and Magazine of Natural History*. **3**(16): 15-41.

d'Orbigny, A. (1826). Tableau methodique de la Classe de Cephalopodes. *Annales des Sciences Naturelles, Paris*. **7**: 245-314.

Pliocene census data include these other species from the *Globorotalia menardii* lineage: *Globorotalia limbata* (Fornasini, 1902) with "hockey-stick" shaped dorsal intercameral sutures, *Globorotalia miocenica* Palmer (1945) with its circular outline, *Globorotalia pseudomiocenica* Bolli & Bermudez (1965) with its strongly biconvex test, and thinner and more delicate *Globorotalia exilis* Blow (1969) and *Globorotalia pertenuis* Beard (1969).

***Neogloboquadrina pachyderma*** (Ehrenberg, 1861)

Ehrenberg, C. G. (1862). Elemente des tiefen Meeresgrundes in Mexikanischen Golfstrome bei Florida: Ober die Tiefgrund-Verhältnisse des Oceans am Eingange der Davisstrasse und bei Island. *Monatsberichte der Koniglichen Preussische Akademie der Wissenschaften zu Berlin*. **1861**: 222-240-275-315.

***Neogloboquadrina incompta*** (Cifelli, 1961)

Cifelli, R. (1961). *Globigerina incompta*, a new species of pelagic foraminifera from the North Atlantic. *Contributions from the Cushman Foundation for Foraminiferal Research*. **12**: 83-86.

***Neogloboquadrina atlantica*** (Berggren, 1972)

Berggren, W. A. (1972). Cenozoic biostratigraphy and paleobiogeography of the North Atlantic. *Initial Reports of the Deep Sea Drilling Project*. **12**: 965-1001.

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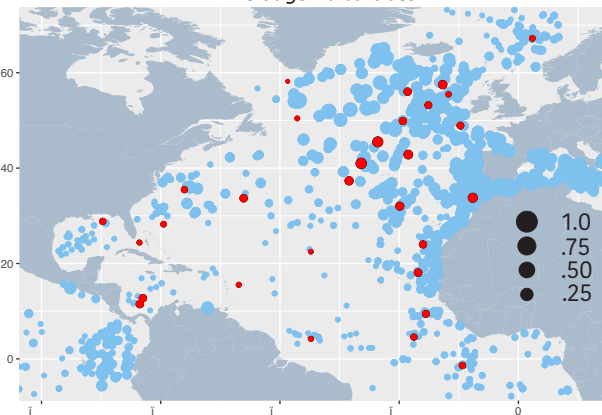
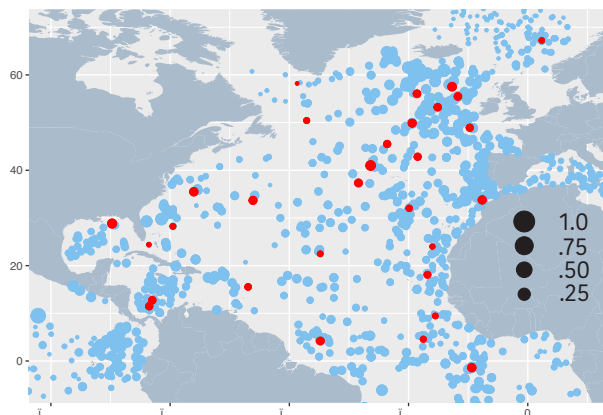
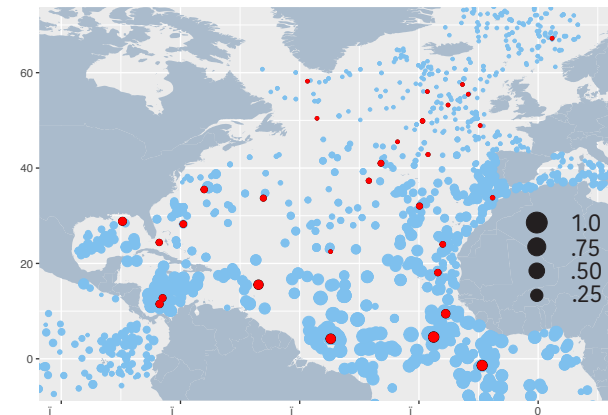
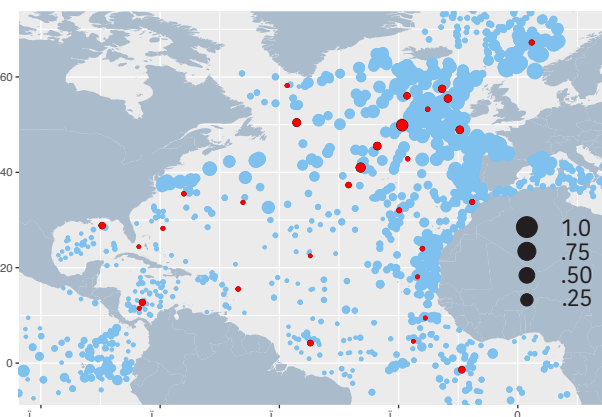
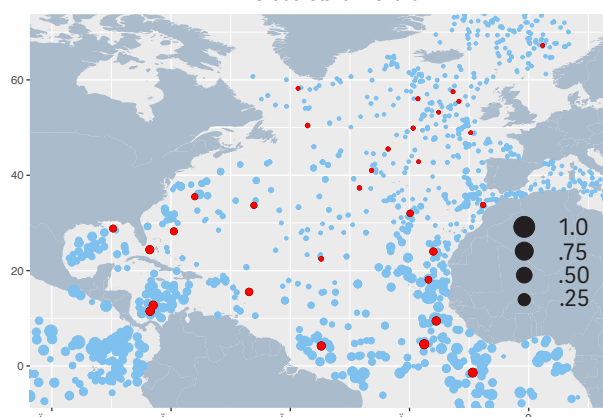
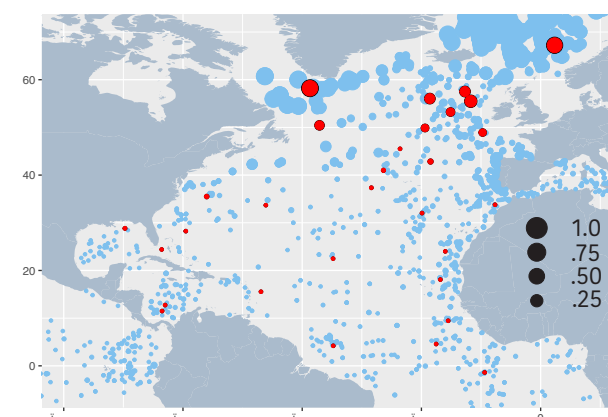
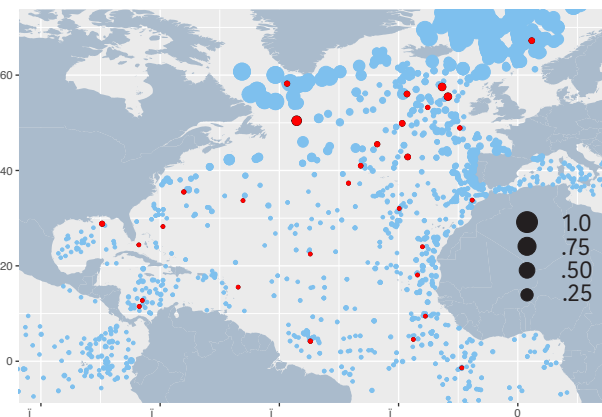
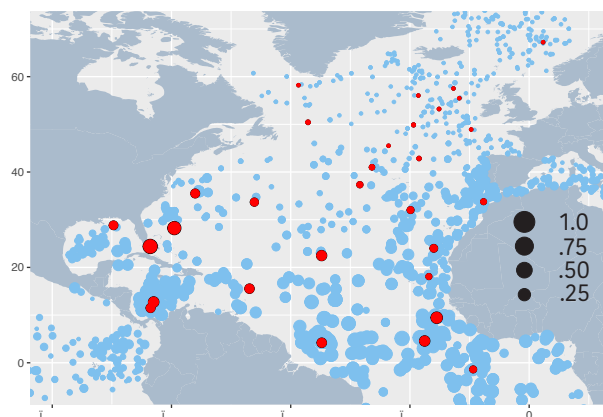
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*Globigerina bulloides**Globigerinita glutinata**Dentoglobigerina altispira* [Pliocene] • *Trilobatus sacculifer* [Modern]*Neogloboquadrina incompta**Globorotalia menardii**Neogloboquadrina atlantica* [Pliocene] • *Neogloboquadrina pachyderma* [Modern]*Neogloboquadrina pachyderma**Trilobatus sacculifer**Globoconella puncticulata* [Pliocene] *Globoconella inflata* [Modern]