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GULF OF MEXICO PLANKTIC FORAMINIFER CORE-TOP CALIBRATION DATA SET: RAW DATA

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INTRODUCTION AND BACKGROUND

Paleoceanographers use the distribution of planktic foraminifers in sediment samples to estimate past oceanographic and paleoclimatic conditions (see Murray, 1995 for review). Analysis of climate and environmental variability on the decadal to millenial scale requires a taxonomically stable and well-dated core-top calibration data set. Databases used in global reconstructions of the last glacial maximum (Cline and Hays, 1976; CLIMAP, 1976; 1981), last interglacial (CLIMAP, 1984), and middle Pliocene (Dowsett et al., 1999) do not always meet these requirements. In this report we present planktic foraminifer faunal census data and AMS ^{14}C data which can be be used in investigations of climate variability in the Gulf of Mexico region (eg. Poore et al., in review). More comprehensive interpretation and analysis of these data, aimed at

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developing a temporally and taxonomically stable data set will follow in other publications (see Dowsett et al., 2002).

MATERIALS & METHODS

Core-top samples included in this report were originally retreived during Gulf of Mexico cruises of the *RV Vema* and *RV Robert Conrad* (Lamont Doherty Earth Observatory, LDEO), *RV Trident* (University of Rhode Island, URI), *RV Gyre* (Texas A&M University, TAMU), *RV Knorr* (Woods Hole Oceanographic Institute, WHOI), *RV Ida Green* (University of Texas Marine Science Institute) and the *RV Marion-Dufresne* (French Polar Institute), dating as far back as 1954. Samples are from piston cores, trigger weight cores or gravity cores. Core sites selected for this study represent a range of depth and environment and are distributed througout the Gulf of Mexico (Figure 1 and Appendix 1).

The faunal data assembled here are a combination of planktic foraminifer counts from Gulf of Mexico core-top samples processed by the U.S. Geological Survey (USGS), URI, and Brown University (under the direction of Nilva Kipp). The processing technique is standard but differences between the labs are noted below. Additional information regarding methodology can be found in Imbrie & Kipp (1971), Brunner and Cooley (1976), Brunner (1979, 1982), and Dowsett & Poore (2001). Careful attention was paid to the taxonomic concepts of the various authors so that the resulting data set is internally taxonomically-consistent.

Raw samples aquired by the USGS were processed by first oven drying (≤50°C) and then soaking in dilute Calgon or H_2O_2 solution for several hours to disaggregate the sediment. Disaggregated sediment was washed through a 63μm mesh and oven dried at ≤50°C. Dry residue was then dry-sieved at 150μm with the >150μm fraction reserved for faunal analysis. When necessary (>300 individuals in the >150μm fraction) samples were split using a CARPCO or OTTO microsplitter to obtain a representative sample of 300 specimens. Next (for samples analyzed at the USGS), individuals were fixed on a standard 60-square micropaleontological slide based upon their designation as species. Samples analyzed at URI were counted directly from a strew on a tray.

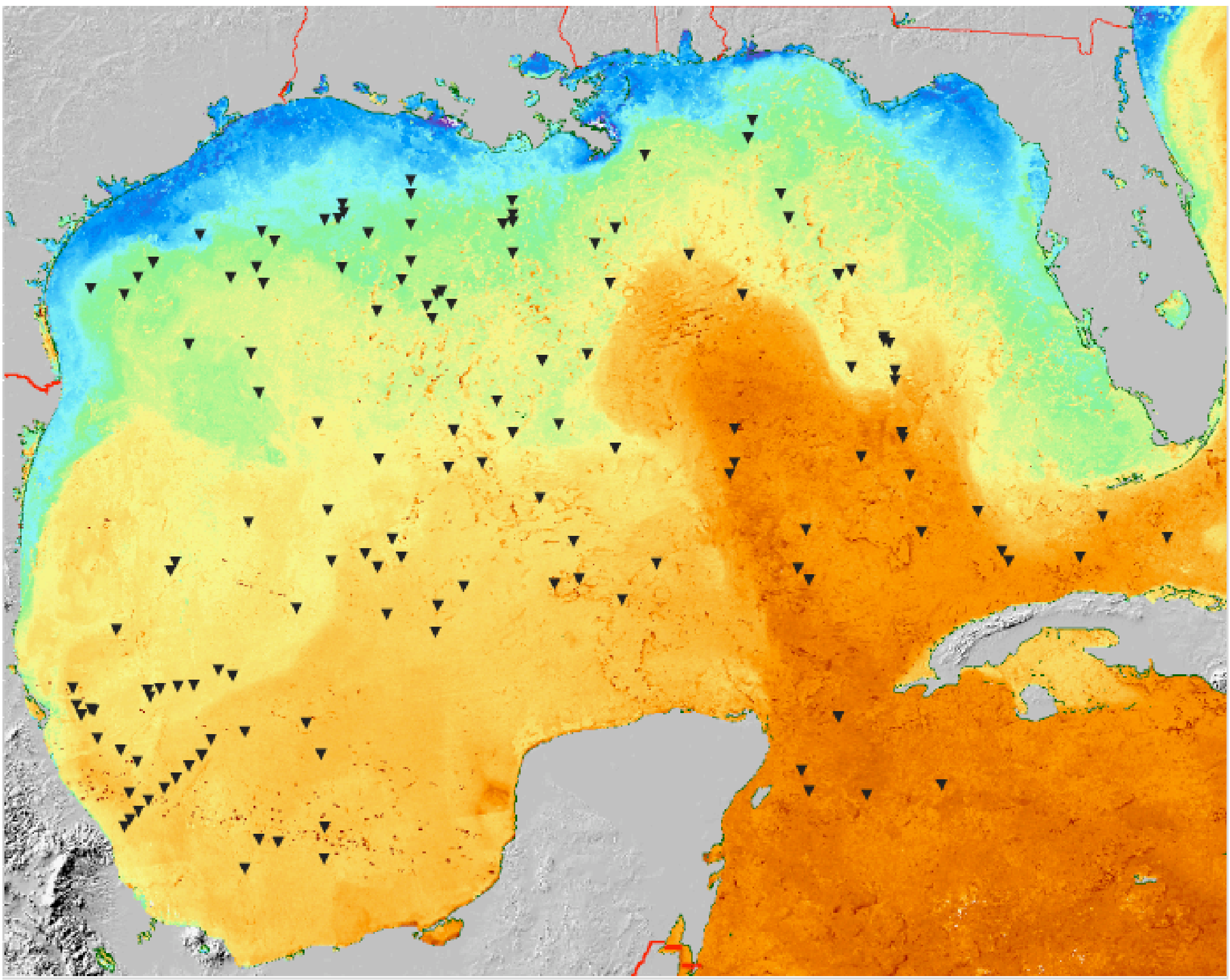

Figure 1. Distribution of samples within the Gulf of Mexico displayed on January 2001 mean sea-surface temperature (SST) map. Orange colors represent warmest SST and highlite the advection of warm water into the Gulf of Mexico from the Caribbean and the position of the Loop Current. (SST map provided by Space Oceanography Group, Johns Hopkins University Applied Physics Laboratory)

FAUNAL DATA

The taxonomies of Parker (1962, 1967), Blow (1969), Kennett and Srinivasan (1983), and informal notes of Nilva Kipp, were employed for identification. Faunal census data are reported here using the following taxonomic categories:

Orbulina universa d'Orbigny

Globigerinoides conglobatus (Brady)

Globigerinoides ruber (d'Orbigny). White and pink varieties of this species are tallied together.

Globigerinoides tenellus Parker

Globigerinoides sacculifer (Brady). We include in this category specimens assignable to *Globigerinoides quadrilobatus* (d'Orbigny) and *Globigerinoides trilobus* (Reuss).

Sphaeroidinella dehiscens (Parker & Jones)

Globigerinella aequilateralis (Brady)

Globigerinella calida (Parker)

Globigerina bulloides d'Orbigny

Globigerina falconensis Blow

Globigerina digitata Brady

Globigerina rubescens Hofker

Turborotalita quinqueloba (Natland)

Neogloboquadrina pachyderma (Ehrenberg). Right and left coiling varieties are counted separately in this report.

Neogloboquadrina dutertrei (d'Orbigny)

Globorotaloides hexagona (Natland)

Pulleniatina obliquiloculata Parker & Jones

Globorotalia inflata (d'Orbigny)

Globorotalia truncatulinoides (d'Orbigny). Right and left coiling varieties are counted separately in this report.

Globorotalia crassaformis (Galloway & Wissler)

Neogloboquadrina pachyderma - Neogloboquadrina dutertrei (P - D) intergrade. Specimens of right-coiling *Neogloboquadrina* with more than four chambers in the final whorl, transitional between *Neogloboquadrina pachyderma* (Ehrenberg) and *Neogloboquadrina dutertrei* (d'Orbigny).

Globorotalia hirsuta (d'Orbigny)

Globorotalia scitula (Brady)

Globorotalia menardii (Parker, Jones, and Brady) s.l. Our *Gl. menardii* complex includes *Gl. menardii*, *Globorotalia tumida* (Brady) s.l. and *Globorotalia ungulata* Bermudez.

Candeina nitida d'Orbigny

Globigerinita glutinata (Egger) s.l.

Hastigerina pelagica (d'Orbigny)

Other. Unidentified specimens or specimens that are rare within the Gulf of Mexico assemblages.

Raw counts of planktic foraminifers in each of 135 samples are provided in Appendix 1.

AMS ^{14}C DATA

Archival core-top material from many of the cores shown on Figure 1 and listed in Appendix 1, is no longer available. Therefore, direct dating of core-top assemblages is for the most part, impossible. In many cases, we were able to obtain samples close to the core-top and estimate core-top ages by extrapolation. Several numerical techniques were devised to determine the probability of assemblages representing "modern" core-top conditions and will be discussed elsewhere (see also Dowsett et al., 2002).

Samples selected for Accelerator Mass Spectrometry (AMS) ^{14}C dating were processed as indicated above. Unless indicated otherwise (Table 1), dates were obtained from mixed planktic foraminifers hand picked from the >150μm washed residue. Graphite targets for AMS dating were made at the USGS in Reston, Virginia. The carbon from these samples was captured as CO_2 by acidification of the entire sample with 85% phosphoric acid (H_2PO_4) in a vacuum chamber. The CO_2 was then dried by forcing the gas through a bath cooled (using alcohol and dry ice) to approximately -80°C. The dried CO_2 was converted to pure carbon in the form of graphite by placing a measured volume (equivalent to 1mg carbon) in a chamber with iron powder, hydrogen, and zinc as a catalyst at 575°C for ten hours. The sample carbon (precipitated on the iron) was pressed into aluminum targets for AMS analysis.

Dating was done at the Lawrence Livermore Laboratory Center for Accelerator Mass Spectrometry (CAMS) in Livermore, CA (Roberts et al., 1997). Ages were reported in radiocarbon years (BP) using the Libby half-life of 5568 years. AMS ^{14}C dates were converted to calendar years (BP) by calibration to the INTCAL98 database (Stuiver et al., 1998) and a estimated marine reservoir correction of 400 years.

Table 1 lists results of AMS ^{14}C dating.. An initial analysis of some of the data presented here can be found in Dowsett et al. (2002).

Table 1. AMS ^{14}C results. Samples composed of mixed planktics unless otherwise noted.

CORE	INTERVAL(CM)	AGE(BP)□	±(YRS)	CALYR(BP)[b,c]	COMMENTS
RC09-17	8-10	1595	40	725	
RC09-17	20	4210	45	3736	
RC10-262	10-12	2930	40	2176	
RC10-262	30-32	7100	35	7235	
RC10-262TW	0-1	3515	35	2870	
RC10-263	9-11	3500	30	2856	
RC10-263	34-36	6270	30	6279	
RC10-264	17-19	18185	50	20570	
RC10-264	38-40	27640	120	--	too old to be converted
RC10-265	15-17	1855	40	981	
RC10-265	34-36	4590	40	4266	
RC10-268	13-15	2950	40	2246	
RC10-268	34-36	4740	35	4443	

RC10-270	10-12	3295	40	2702	
RC10-270	31-33	3085	40	2343	
RC12-09	15-17	2290	30	1417	
RC12-09	36-38	3815	30	3306	
RC12-05	10-12	2435	40	1593	
RC12-05	30-32	3700	40	3150	
RC12-07	18-20	1455	40	633	
RC12-07	37-39	2635	40	1832	
RC12-07TW	0-1	1680	35	824	
RC12-10	0-2	940	35	167	
RC12-10	16-18	1390	30	557	
RC12-10	50-51	3185	60	2489	
RC12-10	100-101	5325	60	5276	
RC12-10	134-136	6985	50	7139	
RC12-10	172-174	9350	40	9528	
RC12-10	210-212	12085	45	13153	
RC12-10	254-256	15710	45	17722	
RC12-11	50-51	5470	200	5442	
RC12-11	100-101	9595	75	9826	
RC12-11TW	0-1	1280	35	500	
VM03-32	18-20	6255	40	6272	
VM03-32	108-110	9395	40	9613	
VM03-35	8-10	4080	35	3584	
VM03-42	10-12	6325	40	6311	
VM03-42	46-48	4835	30	4574	
VM03-45	10-12	6400	40	6402	
VM03-45	35-37	9630	35	9835	
VM03-49	39-41	8845	50	8932	
VM03-49	89-91	3875	40	3351	
VM03-69	47-48	3430	65	2774	
VM03-69	97-98	5460	120	5437	
VM03-96	15	1755	40	910	
VM03-96	30	3955	40	3438	
VM03-123	5	9465	40	9786	
VM03-123	23	26590	90	--	too old to be converted
VM03-146	8-10	22580	70	--	too old to be converted
VM03-146	30-32	32430	160	--	too old to be converted
VM24-22	9-11	1880	35	1030	
VM24-22	34-36	7385	120	7473	
VM24-22TW	0-1	2640	35	1842	
VM26-142	0-1	1860	40	987	
VM26-142	30-32	4400	40	3985	
GY97-06PC20	11-12	830	30	--	
GY97-06PC20	40	2340	40	1501	
GY97-06PC20	77-78	3540	30	2914	

GY97-06PC20	100	4900	40	4698	
GY97-06PC20	140	6870	40	6950	
GY97-06PC20	160	8300	40	8357	
GY97-06PC20	185-186	10050	35	10310	
IG19-3-35	20-21	3570	40	2946	
IG19-3-35	60-61	7710	40	7752	
TR126-10	118-120	26100	90	--	too old to be converted
TR126-10	118-120	29910	130	--	*Globorotalia truncatulinoides* (too old)
TR126-10	118-120	34380	340	--	*Neogloboquadrina dutertrei* (too old)
TR126-10	200-202	49100	1100	--	too old to be converted
TR126-10	400-402	49100	1100	--	too old to be converted
TR126-10	700-702	49300	1200	--	too old to be converted
TR126-11	100-102	30600	140	--	too old to be converted
TR126-11	350-352	46580	890	--	too old to be converted
TR126-23	0-1	1910	35	1053	
TR126-30	0-1	4865	35	4625	
TR126-33	0-1	4920	50	4743	*Globigerinoides ruber* and *G. sacculifer*
KN159JPC6TW	0-1	2210	40	1338	
KN159JPC6	0-1	940	35	167	
KN159JPC6	5	730	35	--	too young to be converted
KN159JPC6	20	1145	40	410	
KN159JPC6	49-50	1820	35	951	
KN159JPC6	100-101	2610	35	1813	
KN159JPC6	128-129	3460	35	2811	
KN159JPC31-1-1	3-4	1510	40	658	
KN159JPC31-1-3	0-1	6100	30	6111	
KN159JPC33	0-1	730	30	--	too young to be converted
KN159JPC33	60-61	2290	40	1417	
KN159JPC34	2-3	610	40	--	too young to be converted
KN159JPC34	81-82	3630	40	3039	
KN159JPC35	5	900	40	123	
KN159JPC35	20	1495	40	651	
GY94H2GC2	11-13	540	50	--	too young to be converted
GY94H2GC2	11-13	940	50	167	benthics
GY94H2GC2	13-14.5	580	40	--	too young to be converted
GY94H2GC2	46-48	1330	50	524	
GY94H2GC2	46-48	1520	40	662	benthics
GY94H2GC2	48-50	1320	30	518	
GY94H2GC2	48-50	1510	30	658	benthics
GY94H8GC8	14-16	470	60	--	too young to be converted
GY94H8GC8	46-48	760	50	--	too young to be converted
GY94H17GC16	10-12	400	60	--	too young to be converted
GY94H17GC16	10-12	630	50	--	benthics (too young)
GY94H17GC16	12-14	390	40	--	too young to be converted
GY94H17GC16	12-14	620	30	--	benthics (too young)

GY94H17GC16	49-51	790	40	--	too young to be converted
GY94H17GC16	49-51	940	50	167	benthics
GY94H17GC16	51-53	870	40	66	
GY94H17GC16	51-53	1160	40	421	benthics
GY94H23GC23	11-13	610	40	--	too young to be converted
GY94H23GC23	11-13	640	50	--	benthics (too young)
GY94H23GC23	48-49	1140	50	404	
GY94H23GC23	48-49	1390	50	557	benthics
GY94H39GC36	12-14	1300	50	509	benthics
GY94H39GC36	30-32	1860	50	987	benthics
GY94H50GC43	10-12	1590	40	721	
GY94H50GC43	40-42	3700	50	3150	
GY94H50GC43	40-42	4640	40	4351	benthics
GY94H114GC81	6-8	1610	40	736	
GY94H114GC81	6-8	2360	50	1515	benthics
GY94H114GC81	16-18	1790	40	928	
GY94H114GC81	16-18	2800	40	2020	benthics
GY94H121GC88	10-12	610	40	--	too young to be converted
GY94H121GC88	42-44	1300	40	509	
GY94H121GC88	42-44	1650	30	781	benthics
MD02-2553	5-6	605	40	--	too young to be converted
MD02-2553	100-101	3265	40	2685	
MD02-2553	200-201	5155	40	4987	
MD02-2553	300-301	8520	45	8582	

[a] radiocarbon years
[b] calendar years (Stuiver et al., 1998)
[c] samples with no entry in this column are too young/old to be calibrated

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