"Geochemical record of the Panama Basin during the last glacial maximum carbon event shows the glacial ocean was not suboxic" by Yong-Liang Yang, Henry Elderfield, Thomas F. Pedersen, Miro Ivanovich

The succeeding 10 pages list the data used in Figure 1 of this paper.

All fluxes were calculated using the equations F = C x ρ x s; C = concentration, ρ = the dry bulk density of the sediment, estimated as ρ = [1- (0.83-0.36 x %CaCO$_3$/100]/[4.207-(3.395 x %CaCO$_3$/100)] and s is the sedimentation rate.

The total ^{230}Th (or ^{231}Pa) measured in the samples consists of three parts:

(i) unsupported $^{230}Th_{ex}$ (or $^{231}Pa_{ex}$) scavenged from the water column (subscript ex = excess);
(ii) supported ^{230}Th (or ^{231}Pa) in secular equilibrium with $^{238}U_D$ (or $^{235}U_D$) in detrital aluminosilicates (subscript D = detrital); and
(iii) $^{230}Th_A$ (or $^{231}Pa_A$) derived from authigenic uranium (see below) following deposition (subscript A = authigenic).

Thus, $[^{230}Th_{ex}] = [^{230}Th_M] - [^{232}Th_M] - 1.14 \times [^{238}U] \times (1 - \exp(-\lambda230t)$; and $[^{231}Pa_{ex}] = [^{231}Pa_M] - [^{232}Th_M] - 0.046 \times [^{238}U_A] \times (1 - \exp(-\lambda231t)$; subscript M = measured, 0.046 = activity ratio of $^{235}U/^{238}U$ in natural material; λ = appropriate decay constant, and t = time elapsed since the sediment was deposited.

Authigenic uranium, $[U]_A$, was calculated as $[U]_A = [U]_T - [U]_D$ where $[U]_T$ is the measured total uranium content and $[U]_D$ the detrital uranium of the samples which is given by $[^{238}U_D] = [^{238}U/^{232}Th]_D \times [^{232}Th]_M$ and $[^{235}U_D] = 0.046 \times [^{238}U/^{232}Th]_D \times [^{232}Th]_M$ where $[^{238}U/^{232}Th]_D$ is the detrital U/Th ratio (assumed to be 1.0 in this study) and $[^{232}Th]_M$ is the measured activity of ^{232}Th in the sediment samples.

The depth of the U redox boundary was calculated from Fick's First Law of diffusion $z_U = D_U \times \Delta[U]/F_U$ where D_U is the diffusion coefficient of uranium (1.1 x 10-6 cm^2/s, Ku et al., 1977*), $\Delta[U]$ is the difference between the uranium concentration in seawater and that of the porewater at the depth of z_U which is assumed to have [U] = 0; and F_U is the flux of uranium.

*Ku, T.-L., Knauss, K.G. and Mathieu, G.G., 1977, Uranium in open ocean: concentration and isotopic composition: Deep-Sea Research, v. 24, p. 1005-1007.

Depth down core (cm)	Age (ka)	$CaCO_3$ (wt%)	Si (wt%)	MAR[a,b]	C_{org} (wt%)	C_{org} accum rate[b]	Al (wt%)	Si/Al (wt ratio)	Al flux[b]	Mn (ppm)	excess Mn (ppm)	excess Mn accum rate[b]	Mn/Al (wt. ratio)	total ^{238}U (dpm//g)	total ^{234}U (dpm//g)
9	6.45	58.2	11.6	1.66	0.97	16.1	3.26	37.8	54.1	1021	658.8	1.09	0.033		
11	7.02	58.5	11.9	1.66	1.00	16.6	3.23	38.4	53.6	1131	772.1	1.28	0.037	4.62	5.21
13	7.59	60.2	11.3	1.70	1.10	18.7	3.01	34.0	51.2	1339	1005	1.71	0.040		
15	8.16	59.8	10.0	1.70	1.05	17.9	2.69	27.0	45.9	1564	1265	2.16	0.042		
17	8.73	63.6	10.5	1.81	1.15	20.8	2.78	29.1	50.3	2112	1803	3.26	0.059		
19	9.30	66.1	10.1	1.89	1.00	18.9	2.73	27.6	51.6	1563	1260	2.38	0.043		
21	9.87	66.0	9.75	1.88	1.19	22.4	2.67	26.0	50.3	1550	1253	2.36	0.041	6.20	6.67
23	10.45	65.3	10.1	1.85	1.10	20.3	2.76	27.9	50.9	1592	1285	2.37	0.044		
25	11.02	66.6	9.65	1.88	1.11	20.9	2.63	25.4	49.5	1625	1333	2.51	0.043		
27	11.59	62.9	10.6	1.77	1.20	21.3	2.79	29.5	49.5	2134	1824	3.24	0.060		
29	12.17	64.6	10.1	1.85	1.34	24.8	2.68	27.0	49.6	1750	1452	2.69	0.047		
31	12.74	62.4	10.4	1.78	1.78	31.6	2.82	29.4	50.1	2044	1731	3.07	0.058	8.37	9.20
33	13.31	63.0	10.3	1.77	1.77	31.4	2.77	28.5	49.1	2033	1725	3.06	0.056		
35	13.89	63.2	10.1	1.81	2.09	37.9	2.74	27.8	49.7	2270	1966	3.56	0.062		
37	14.14	62.6	9.75	1.77	2.16	38.3	2.67	26.0	47.3	2751	2454	4.35	0.073		
39	14.70	63.7	9.93	1.76	1.82	32.1	2.77	27.5	48.9	1735	1427	2.52	0.048		
41	15.25	62.9	9.78	1.73	2.01	34.7	2.78	27.2	48.0	2087	1778	3.07	0.058	6.20	7.16
43	15.81	63.8	9.92	1.76	2.11	37.2	2.66	26.4	46.9	2186	1890	3.33	0.058		
45	16.36	64.5	9.97	1.80	2.37	42.6	2.73	27.2	49.1	2472	2169	3.90	0.067		

Depth down core (cm)	$\frac{^{234}U}{^{238}U}$ activity ratio	authigenic ^{234}U (dpm/g)	^{234}U flux[c]	U redox boundary depth (cm)	^{232}Th (dpm/g)	^{232}Th flux[c]	age corrected excess ^{230}Th (dpm/g)	age corrected excess ^{230}Th flux[c]	*F/P* ratio[d] for ^{230}Th	age corrected excess ^{231}Pa (dpm/g)	age corrected excess ^{231}Pa flux[c]	*F/P* ratio[d] for ^{231}Pa	$\frac{^{230}Th}{^{231}Pa}$ activity ratio	$\frac{^{230}Th}{Al}$ flux ratio
9														
11	1.13	4.93	7.69	11.3	0.28	0.465	7.00	11.70	1.44	1.97	3.28	4.15	3.55	0.217
13														
15														
17														
19														
21	1.08	6.45	11.7	7.42	0.22	0.586	5.62	10.60	1.31	1.32	2.49	3.15	4.26	0.211
23														
25														
27														
29														
31	1.10	8.90	14.9	5.84	0.30	1.69	4.96	8.80	1.09					0.176
33														
35														
37														
39														
41	1.15	6.85	10.7	8.11	0.31	2.16	5.3	9.15	1.13	1.88	3.25	4.11	2.82	0.191
43														
45														

Depth down core (cm)	Age (ka)	$CaCO_3$ (wt%)	Si (wt%)	MAR[a,b]	C_{org} (wt%)	C_{org} accum rate[b]	Al (wt%)	Si/Al (wt ratio)	Al flux[b]	Mn (ppm)	excess Mn (ppm)	excess Mn accum rate[b]	Mn/Al (wt. ratio)	total ^{238}U (dpm//g)	total ^{234}U (dpm//g)
47	16.92	66.1	9.57	1.84	2.26	41.5	2.58	24.7	47.4	2175	1888	3.47	0.056		
49	17.22	61.2	10.1	3.16	2.24	70.7	2.72	27.5	85.8	2593	2291	7.23	0.071		
51	17.52	60.3	10.6	3.09	2.31	71.3	2.93	31.0	90.4	2029	1703	5.26	0.059	7.49	8.02
53	17.81	60.0	10.6	3.09	2.15	66.4	2.96	31.5	91.4	2017	1688	5.21	0.060		
55	18.11	60.7	10.7	3.15	2.02	63.7	2.77	29.7	87.4	2020	1712	5.40	0.056		
57	18.41	61.0	10.6	3.15	2.08	65.6	2.81	29.9	88.6	2342	2030	6.40	0.066		
59	18.63	59.6	10.9	4.10	2.05	84.2	2.84	30.9	117.0	2283	1967	8.07	0.065		
61	18.85	59.3	10.8	4.10	1.91	78.4	2.85	30.8	117.0	3246	2929	12.02	0.093	7.02	7.74
63	19.08	60.2	10.9	4.11	2.04	83.8	2.92	31.8	120.0	2885	2561	10.52	0.084		
65	19.30	59.7	11.2	4.02	1.96	78.8	2.85	31.8	115.0	3311	2994	12.04	0.094		
67	19.53	58.3	11.4	4.02	1.96	78.8	3.00	34.1	121.0	3601	3268	13.14	0.108		
69	19.75	58.4	11.0	4.02	1.85	74.3	3.00	32.9	120.0	2920	2587	10.39	0.088		
71	19.98	58.0	11.3	4.02	1.75	70.3	3.00	34.0	121.0	3322	2989	12.01	0.100	6.05	6.70
73	20.20	56.7	11.5	3.93	1.91	75.0	3.05	35.1	120.0	4192	3853	15.13	0.128		
75	20.43	58.2	11.4	4.02	1.80	72.3	3.03	34.7	122.0	2606	2269	9.12	0.079		
77	20.65	57.1	11.4	3.93	1.61	63.3	3.17	36.3	125.0	2458	2106	8.28	0.078		
79	20.91	56.5	11.6	3.35	1.58	52.9	3.16	36.7	106.0	2377	2026	6.78	0.075		
81	21.18	56.8	11.5	3.35	1.50	50.2	3.21	36.8	107.0	2610	2253	7.54	0.084	6.42	7.23
83	21.44	56.2	12.2	3.27	1.75	57.2	3.25	39.6	106.0	2746	2385	7.80	0.089		

Depth down core (cm)	$\frac{^{234}U}{^{238}U}$ activity ratio	authigenic ^{234}U (dpm/g)	^{234}U flux[c]	U redox boundary depth (cm)	^{232}Th (dpm/g)	^{232}Th flux[c]	age corrected excess ^{230}Th (dpm/g)	age corrected excess ^{230}Th flux[c]	*F/P* ratio[d] for ^{230}Th	age corrected excess ^{231}Pa (dpm/g)	age corrected excess ^{231}Pa flux[c]	*F/P* ratio[d] for ^{231}Pa	$\frac{^{230}Th}{^{231}Pa}$ activity ratio	$\frac{^{230}Th}{Al}$ flux ratio
47														
49														
51	1.07	7.72	23.1	3.75	0.30	4.94	5.49	16.90	2.09	1.10	3.40	4.30	4.99	0.187
53														
55														
57														
59														
61	1.10	7.43	28.8	3.01	0.31	4.64	5.71	23.50	2.90	1.15	4.72	5.98	4.97	0.201
63														
65														
67														
69														
71	1.11	6.37	24.3	3.57	0.33	4.06	5.84	23.50	2.90	0.98	3.94	4.99	5.96	0.195
73														
75														
77														
79														
81	1.13	6.93	21.5	4.04	0.30	2.26	5.62	18.80	2.32	1.30	4.35	5.50	4.32	0.175
83														

Depth down core (cm)	Age (ka)	$CaCO_3$ (wt%)	Si (wt%)	MAR[a,b]	C_{org} (wt%)	C_{org} accum rate[b]	Al (wt%)	Si/Al (wt ratio)	Al flux[b]	Mn (ppm)	excess Mn (ppm)	excess Mn accum rate[b]	Mn/Al (wt. ratio)	total ^{238}U (dpm//g)	total ^{234}U (dpm//g)
85	21.70	54.7	11.9	3.27	1.71	55.9	3.18	37.8	104.0	2201	1848	6.04	0.070		
87	21.97	54.9	12.2	3.27	1.66	54.3	3.32	40.4	109.0	2295	1926	6.30	0.076		
89	22.23	56.0	12.0	3.27	1.32	43.2	3.20	38.3	105.0	2297	1941	6.35	0.074		
91	22.49	56.6	11.9	3.35	1.36	45.5	3.21	38.3	107.0	2351	1994	6.67	0.075	6.42	7.14
93	22.75	58.0	11.5	3.43	1.27	43.5	3.19	36.6	109.0	2414	2060	7.05	0.077		
95	23.02	58.1	11.5	3.42	1.32	45.2	3.15	36.2	108.0	3059	2709	9.28	0.096		
97	23.28	60.6	10.9	3.57	1.22	43.6	3.02	32.9	108.0	2157	1821	6.51	0.065		
99	23.54	58.2	11.5	3.42	1.35	46.2	3.20	36.7	110.0	2213	1857	6.36	0.071		
101	23.81	58.7	11.5	3.42	1.25	42.8	3.08	35.3	105.0	2185	1843	6.31	0.067	7.46	7.54
103	24.07	57.1	11.7	3.35	1.30	43.5	3.16	37.0	106.0	2459	2108	7.05	0.078		
105	24.33	58.4	11.6	3.42	1.48	50.6	3.08	35.8	105.0	2326	1984	6.78	0.072		
107	24.60	60.0	11.4	3.50	1.48	51.8	2.98	33.9	104.0	2816	2485	8.70	0.084		
109	24.86	59.1	11.1	3.42	1.33	45.5	2.99	33.3	102.0	2151	1819	6.22	0.064		
111	25.12	58.1	11.8	3.42	1.12	38.3	3.15	37.1	108.0	2295	1945	6.65	0.072	5.71	6.12
113	25.38	59.7	11.4	3.50	1.27	44.4	3.14	35.9	110.0	2158	1809	6.32	0.068		
115	25.65	59.0	11.5	3.45	1.20	41.4	3.19	36.8	110.0	2266	1912	6.59	0.072		
117	25.91	58.9	11.4	3.42	1.25	42.8	3.10	35.4	106.0	2271	1927	6.60	0.070		
119	26.96	58.7	11.2	0.854	1.30	11.1	3.06	34.2	26.1	2623	2283	1.95	0.080		
121	28.01	59.8	11.0	0.876	1.29	11.3	2.93	32.3	25.7	2243	1917	1.68	0.066	5.10	5.82

Depth down core (cm)	$\frac{^{234}U}{^{238}U}$ activity ratio	authigenic ^{234}U (dpm/g)	^{234}U flux[c]	U redox boundary depth (cm)	^{232}Th (dpm/g)	^{232}Th flux[c]	age corrected excess ^{230}Th (dpm/g)	age corrected excess ^{230}Th flux[c]	*F/P* ratio[d] for ^{230}Th	age corrected excess ^{231}Pa (dpm/g)	age corrected excess ^{231}Pa flux[c]	*F/P* ratio[d] for ^{231}Pa	$\frac{^{230}Th}{^{231}Pa}$ activity ratio	$\frac{^{230}Th}{Al}$ flux ratio
85														
87														
89														
91	1.11	6.82	21.5	4.04	0.32	1.98	5.57	18.60	2.30					0.173
93														
95														
97														
99														
101	1.01	7.27	25.5	3.40	0.27	1.44	5.53	18.90	2.33					0.179
103														
105														
107														
109														
111	1.07	5.85	19.5	4.44	0.27	1.16	5.30	18.10	2.24					0.168
113														
115														
117														
119														
121	1.14	5.52	4.48	19.4	0.30	0.437	5.89	5.17	0.638					0.201

Depth down core (cm)	Age (ka)	$CaCO_3$ (wt%)	Si (wt%)	MAR[a,b]	C_{org} (wt%)	C_{org} accum rate[b]	Al (wt%)	Si/Al (wt ratio)	Al flux[b]	Mn (ppm)	Mn excess (ppm)	Mn excess accum rate[b]	Mn/Al (wt. ratio)	total ^{238}U (dpm//g)	total ^{234}U (dpm//g)
123	29.06	60.1	11.4	0.874	1.19	10.4	2.95	33.8	25.8	2340	2012	1.76	0.069		
125	30.11	59.1	11.5	0.860	1.21	10.4	3.00	34.6	25.8	2483	2150	1.85	0.074		
127	31.16	61.5	11.1	0.892	1.30	11.6	2.97	32.8	26.5	2675	2345	2.09	0.079		
129	32.21	60.7	11.4	0.894	1.13	10.1	2.76	31.4	24.7	2507	2200	1.97	0.069		
131	33.26	60.2	11.3	0.879	1.40	12.3	2.93	33.2	25.7	2154	1828	1.61	0.063	5.41	6.05
133	34.31	60.8	11.2	0.893	1.40	12.5	2.91	32.6	26.0	2192	1869	1.67	0.064		
135	35.36	57.7	11.6	0.836	1.34	11.2	3.01	34.8	25.2	2184	1850	1.55	0.066		
137	36.41	54.5	12.4	0.804	1.07	8.6	3.16	39.1	25.4	2225	1874	1.51	0.070		
139	37.45	52.3	12.5	0.781	1.05	8.2	3.36	41.9	26.2	2622	2249	1.76	0.088		
141	38.50	48.4	13.7	0.744	1.25	9.3	3.63	49.7	27.0	2064	1661	1.24	0.075	5.50	6.12
143	39.55	53.0	13.1	0.796	1.13	9.0	3.48	45.7	27.7	2199	1812	1.44	0.077		
145	40.60	53.5	12.7	0.802	1.06	8.5	3.30	41.8	26.5	2271	1904	1.53	0.075		
147	41.65	48.6	13.5	0.743	1.13	8.4	3.58	48.2	26.6	2516	2118	1.57	0.090		
149	42.70	43.8	14.8	0.704	1.25	8.8	3.89	57.5	27.4	2443	2011	1.42	0.095		
151	43.75	45.4	14.3	0.726	1.35	9.8	3.76	53.8	27.3	2989	2571	1.87	0.112	5.18	5.63
153	44.80	45.0	14.5	0.707	1.23	8.7	3.89	56.6	27.5	2362	1930	1.36	0.092		
155	45.85	45.0	16.3	0.707	1.23	8.7	4.21	68.5	29.8	2171	1703	1.20	0.091		
157	46.90	34.3	17.1	0.631	1.30	8.2	4.48	76.6	28.3	2231	1733	1.09	0.100		
159	47.95	33.4	17.1	0.627	1.50	9.4	4.45	76.1	27.9	2222	1728	1.08	0.099		

Depth down core (cm)	$\frac{^{234}U}{^{238}U}$ activity ratio	authigenic ^{234}U (dpm/g)	^{234}U flux[c]	U redox boundary depth (cm)	^{232}Th (dpm/g)	^{232}Th flux[c]	age corrected excess ^{230}Th (dpm/g)	age corrected excess ^{230}Th flux[c]	*F/P* ratio[d] for ^{230}Th	age corrected excess ^{231}Pa (dpm/g)	age corrected excess ^{231}Pa flux[c]	*F/P* ratio[d] for ^{231}Pa	$\frac{^{230}Th}{^{231}Pa}$ activity ratio	$\frac{^{230}Th}{Al}$ flux ratio
123														
125														
127														
129														
131	1.12	5.74	4.75	18.3	0.31	0.534	4.89	4.30	0.531	2.17	1.91	2.41	2.25	0.167
133														
135														
137														
139														
141	1.11	5.81	4.10	21.2	0.31	0.36	5.55	4.13	0.510					0.153
143														
145														
147														
149														
151	1.09	5.29	3.76	23.1	0.34	0.45	5.45	3.95	0.488					0.145
153														
155														
157														
159														

Depth down core (cm)	Age (ka)	$CaCO_3$ (wt%)	Si (wt%)	MAR[a,b]	C_{org} (wt%)	C_{org} accum rate[b]	Al (wt%)	Si/Al (wt ratio)	Al flux[b]	Mn (ppm)	excess Mn (ppm)	excess Mn accum rate[b]	Mn/Al (wt. ratio)	total ^{238}U (dpm//g)	total ^{234}U (dpm//g)
161	49.00	31.3	17.5	0.61	1.23	7.5	4.64	81.1	28.3	1863	1347	0.82	0.086	4.55	5.08
163	50.05	32.4	17.6	0.607	1.40	8.5	4.45	78.2	27.0	1933	1439	0.87	0.086		
165	51.10	32.0	17.7	0.609	1.10	6.7	4.52	80.0	27.5	1983	1481	0.90	0.090		
167	52.15	33.9	17.5	0.625	0.96	6.0	4.42	77.3	27.6	2488	1997	1.25	0.110		
169	53.20	36.5	17.1	0.65	1.00	6.5	4.34	74.2	28.2	2343	1861	1.21	0.102		
171	53.65	37.7	17.3	0.542	0.72	3.9	4.73	81.6	25.6	1678	1152	0.62	0.079		
173	54.25	32.7	19.4	0.723	0.65	4.7	4.32	83.8	31.2	2000	1520	1.10	0.086	5.87	6.39
175	55.30	26.5	21.1	0.588	0.68	4.0	4.56	96.4	26.8	1743	1236	0.73	0.079		
177	57.39	29.9	19.9	0.596	0.89	5.3	4.69	93.1	27.9	1951	1430	0.85	0.092		

Depth down core (cm)	$\frac{^{234}U}{^{238}U}$ activity ratio	authigenic ^{234}U (dpm/g)	^{234}U flux[c]	U redox boundary depth (cm)	^{232}Th (dpm/g)	^{232}Th flux[c]	age corrected excess ^{230}Th (dpm/g)	age corrected excess ^{230}Th flux[c]	*F/P* ratio[d] for ^{230}Th	age corrected excess ^{231}Pa (dpm/g)	age corrected excess ^{231}Pa flux[c]	*F/P* ratio[d] for ^{231}Pa	$\frac{^{230}Th}{^{231}Pa}$ activity ratio	$\frac{^{230}Th}{Al}$ flux ratio
161	1.12	4.61	2.78	31.2	0.47	0.434	6.55	4.00	0.494					0.141
163														
165														
167														
169														
171														
173	1.09	5.87	3.81	22.8	0.52	0.159	5.21	3.38	0.417	3.40	2.21	2.79	1.53	0.108
175														
177														

[a]MAR= mass accumulation rate; [b]units: mg/cm^2ka; [c]units: dpm/cm^2ka; [d]F/P = flux to production ratio