The Croker Carbonate Slabs - massive methane-derived authigenic carbonate in the Irish Sea: nature, origin and environmental significance.
Geo-Marine Letters

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Supplementary Material - Tables 1, 2 and 3

Table 1: Carbon and oxygen isotopes of carbonate minerals. Samples were sub-sampled for these analyses; missing sub-sample numbers represent failed analyses.

Sample/ sub-sample*	$\delta^{13}C_{VPDB}$ ‰	$\delta^{18}O_{VPDB}$‰ Mg-calcite	$\delta^{18}O_{VPDB}$‰ Aragonite	Carbonate Mineral
GT004/1	-42.60	+2.85		Mg-calcite
GT004/2	-43.86	+3.34		Mg-calcite
GT004/3	-39.57	+2.87		Mg-calcite
GT004/4	-41.53	+2.58		Mg-calcite
GT004/5	-42.14	+3.04		Mg-calcite
GT005/1	-26.46	+1.13		Mg-calcite + significant bioclasts
GT005/2	-29.62	+1.51		Mg-calcite + significant bioclasts
GT005/3	-29.08	+0.36		Mg-calcite + significant bioclasts
GT005/4	-37.20	+2.24		Mg-calcite + minor bioclasts
GT005/5	-34.18	+2.16		Mg-calcite + minor bioclasts
GT007/1	-44.99	+3.46		Mg-calcite
GT007/2	-45.24	+2.92		Mg-calcite
GT007/3	-43.40	+3.15		Mg-calcite
GT007/4	-39.72	+2.58		Mg-calcite
GT007/5	-42.45	+3.05		Mg-calcite
GT009/2	-39.33	+2.41		Mg-calcite
GT009/3	-42.34	+2.15		Mg-calcite
GT009/4	-43.93	+3.13		Mg-calcite
GT009/5	-47.32	+3.31		Mg-calcite
GT012/1	-0.75	+2.19		Calcite (Bryozoan)
GT012/2	-39.61		+1.83	Aragonite
GT012/3	-43.43	+2.53	+2.69	Aragonite + Mg-calcite
GT012/4	-41.47	+2.28	+2.43	Aragonite + Mg-calcite
GT012/5	-39.31		+2.51	Aragonite + minor Mg-calcite
GT014/1	-43.94	+2.95		Predominantly Mg-calcite
GT014/2	-40.28	+2.92		Predominantly Mg-calcite
GT014/3	-42.64	+2.98		Predominantly Mg-calcite
GT014/4	-41.45	+3.13		Predominantly Mg-calcite
GT014/5	-42.91	+3.36		Predominantly Mg-calcite
GT015/1	-45.88	+1.82		Mg-calcite + minor bioclasts
GT015/2	-41.59	-1.92		Mg-calcite
GT015/3	-43.60	+1.90		Mg-calcite + minor bioclasts
GT015/4	-46.86	+2.41		Mg-calcite
GT015/5	-40.09	+2.54		Mg-calcite
GT024/1	-41.36	+1.21		Mg-calcite + minor bioclasts

GT024/2	-40.17	+2.44		Mg-calcite
GT024/3	-44.26	-1.45		Mg-calcite + bioclasts
GT024/4	-42.11	+2.92		Mg-calcite
GT025/2	-33.97	-0.39		Mg-calcite + minor aragonite
GT025/3	-32.49	+1.87		Mg-calcite + detrital limestone
GT025/4	-34.45	+1.85		Mg-calcite + detrital limestone
GT025/5	-34.48	+1.63		Mg-calcite + detrital limestone + trace bioclasts
GT025/6	-0.90	+1.33		Calcite (Serpulid casing)
GT025/7	-12.88		+0.71	Calcite (Serpulid casing) on aragonite
GT039/1	-28.27	+1.51		Mg-calcite + abundant microfossil detritus
GT050/1	-48.68	+2.47		Mg-calcite
GT050/2	-50.00	+3.32		Mg-calcite
GT050/3	-50.94	+1.28		Mg-calcite
GT050/4	-49.31	+3.65		Mg-calcite
GT050/5	-50.01	+3.59		Mg-calcite
GT055/1	-41.50	+3.07		Mg-calcite
GT055/2	-36.66	+1.36		Mg-calcite + significant microfossil detritus
GT055/3	-35.90	+2.48		Mg-calcite + significant microfossil detritus
GT055/4	-40.67	+2.56		Mg-calcite
GT055/5	-39.36	+2.64		Mg-calcite
GT066/1	-49.99		+1.89	Aragonite
GT066/3	-50.36		+2.16	Aragonite
GT066/4	-45.32		+1.75	Aragonite
GT066/5	-52.66		+1.04	Aragonite
GT066/6	-41.23		+1.29	Aragonite
GT071/2	-30.76	+2.45		Mg-calcite + microfossil detritus
GT071/3	-28.00	+1.34		Mg-calcite + abundant microfossil detritus
GT071/4	-28.29	+0.95		Mg-calcite + abundant microfossil detritus
GT071/5	-27.23	+0.74		Mg-calcite + abundant microfossil detritus
GT076/1	-37.25	+3.02		Mg-calcite
GT076/2	-39.28	-2.78		Mg-calcite
GT076/3	-40.27	+2.20	+2.36	Mixed aragonite and Mg-calcite
GT076/4	-39.54	+3.34		Mg-calcite
GT076/5	-31.81	+2.18	+2.34	Mixed aragonite and Mg-calcite
GT104/1	-14.18	+1.11		Calcite (Bivalve shell) with Mg-calcite coating
GT104/2	-33.02		+1.63	Aragonite
GT104/3	-47.16		+0.30	Aragonite
GT104/4	-34.26		+0.43	Aragonite
GT104/5	-30.60		-1.81	Aragonite
GT106/1	+1.39	+1.16		Calcite (shell)
GT106/2	-1.46	+0.86		Calcite (shell)
GT106/3	-52.44		+1.78	Aragonite
GT106/4	-54.02		+1.52	Aragonite
GT106/5	-47.76		+1.78	Aragonite
GT108/1	-31.04	+0.81		Mg-calcite
GT108/2	-41.33	+2.87		Mg-calcite
GT108/3	-42.90	+3.36		Mg-calcite + trace bioclasts
GT108/4	-40.53	+2.77		Mg-calcite + trace bioclasts
GT108/5	-39.61	+2.79		Mg-calcite + trace bioclasts
GT110/1	-45.20		+1.86	Aragonite
GT110/2	-44.32		+1.62	Aragonite
GT110/3	-49.26		+2.20	Aragonite
GT110/4	-48.34		+2.08	Aragonite
GT112/1	+0.16	+0.93		Calcite (Bryozoan)
GT112/5	-37.61			Mg-calcite with minor bioclastic detritus
GT116/1	-42.80		+0.37	Aragonite
GT116/2	-40.98		+0.77	Aragonite

GT116/4	-37.81		+1.67	Aragonite with minor Mg-calcite
GT117/1	-45.49	+2.96		Mg-calcite
GT117/2	-45.15	+3.50		Mg-calcite
GT117/3	-44.95	+3.01		Mg-calcite
GT117/4	-47.78	+3.20		Mg-calcite
GT117/5	-47.53	+3.04		Mg-calcite
GT120/4	-46.30		+1.47	Aragonite
GT120/5	-47.15		+1.53	Aragonite
GT121/3	-26.04		+0.93	Aragonite + abundant bioclastic detritus
GT121/4	-38.89		+1.99	Aragonite
GT121/5	-38.48		+1.47	Aragonite
GT123/1	-40.01	+2.79		Mg-calcite
GT123/2	-41.74	+3.67		Mg-calcite
GT123/3	-44.90	-0.01		Mg-calcite
GT123/4	-42.66	+1.08		Mg-calcite
GT126/1	-46.22	+3.42		Mg-calcite
GT126/2	-43.83	+3.66		Mg-calcite
GT126/3	-49.24	+4.76		Mg-calcite
GT129/1	-44.21	+3.84		Mg-calcite
GT129/2	-44.27	+3.99		Mg-calcite
GT129/3	-42.79	+3.42		Mg-calcite
GT129/4	-38.91	+2.88		Mg-calcite
GT129/5	-41.48	+2.24		Mg-calcite
GT141/1	-48.27		+2.55	Aragonite
GT141/2	-48.39		+2.23	Aragonite
GT141/3	-50.05		+1.22	Aragonite
GT141/4	-47.66		-0.80	Aragonite
GT141/5	-50.77		+2.31	Aragonite
GT143/1	-49.79		+1.86	Aragonite + minor Mg-calcite
GT143/2	-47.45		+2.35	Aragonite + minor Mg-calcite
GT143/4	-47.83		+2.60	Aragonite ?+ minor Mg-calcite
GT150/1	+1.02		+1.45	Calcite (Bryozoan)

Table 2: Strontium isotope ratios ($^{87}Sr/^{86}Sr$)
Data from Field *et al.*, 2017.

Sample	Material	$^{87}Sr/^{86}Sr$*	± 2SE	Mean
GT141	Aragonite	0.709204	± 0.000006	
GT 104	Aragonite	0.709192	± 0.000005	
GT 066	Aragonite	0.709199	± 0.000008	**0.709202** ± 0.000012
GT106	Aragonite	0.709192	± 0.000007	
GT 120	Aragonite	0.709221	± 0.000005	
GT 025-1	Shell fragments	0.709198	± 0.000006	
GT 025-2	Shell fragments	0.709182	± 0.000007	**0.709192**
GT 039	Shell fragments	0.709192	± 0.000007	± 0.000007
GT 117	Serpulid casing	0.709194	± 0.000005	
	Seawater standard	0.709177	± 0.000005	
	Seawater standard	0.709181	± 0.000005	
	Seawater standard	0.709179	± 0.000004	**0.7091788** ± 0.000007
	Seawater standard	0.709173	± 0.000007	
	Seawater standard	0.709184	± 0.000004	
Mokadem *et al.*, 2015	**Present-day seawater**	**0.709179**	**± 0.0000025**	
Elderfield, 1986	**Present-day seawater**	**0.709211 to 0.709241**	**± 0.000037 ± 0.000032**	

*measured value normalised to a value of 0.710250 for NBS987

Table 3: U-Th age dates (in ka BCE) obtained from aragonite.

N.B. all $^{234}U/^{238}U$ ratios are consistent with sample precipitation from seawater

Sample/ Sub-sample	U ppm	Th ppm	Age ka (*)	Single or Double**
GT106a	3.93	0.05	4.8 (0.2)	single
GT106b	4.06	0.34	5.4 (1.5)	single
GT106c	4.41	0.35	5.7 (1.5)	single
GT120a	1.46	2.31	4.1 (0.2)	double
GT120b	1.20	2.59		
GT141c	1.55	0.23	12.2 (3.0)	single
GT141d	1.63	0.41	17.0 (5.5)	single
GT141e	1.35	0.78	16.1 (0.7)	double
GT141f	0.93	1.35		

* Uncertainties quoted at 95% confidence level.
__Single__ point age calculation or **Double (two-point) age modelling.