

**Supplementary Table 1.** Data from Ross Sea expedition NBP1302 (2013) on which regressions in Figure 4 are based. Location = four regions in the Ross Sea), Lat = latitude in decimal degrees, Lon = longitude in decimal degrees, sExport200 = Carbon export based on the mass balance model in DeJong et al. (2017), Total particle volume = sum of particle volumes per frame determined by the video particle profiler mounted on the CTD rosette, POC = particulate organic carbon from Niskin bottle samples, CC = Coulter Counter measurements from Niskin bottle samples, Fluor = fluorescence as determined by a fluorometer mounted on the CTD rosette.

Location	Station (cast)	Lat	Lon	Julian Day 2013	sExport <sub>200</sub>	Total particle volume @ 200 - 300 m	POC @ 200 - 300 m	CC (particles/ml) @ 200-300 m	Fluor (RFU) @ 200 - 300 m
-	number	deg	deg	day	mol C m <sup>-2</sup>	µm <sup>3</sup> frame <sup>-1</sup>	µg C L <sup>-1</sup>	particles ml <sup>-1</sup>	relative fluorescence units
south	17	-75.75	169.00	48.82	0.48				
south	24	-75.75	169.00	49.99	-0.79	116	24.55	1089	0.00435
south	80	-75.75	169.00	61.87	1.21	501.00	15.76	924	0
south	81	-75.78	169.13	62.13	1.27				
south	82	-75.77	169.05	62.32	-0.06	823.00	17.06	750	0.000305
south	85	-75.75	168.76	62.82	0.06	495.00		745	0
south	86	-75.76	168.60	62.99	0.96				
south	88	-75.78	168.56	63.17	1.80	361.00	15.67	541	0
south	89	-75.78	168.50	63.31		563.00	16.33	812	0
south	92	-75.76	168.24	63.82		549.00	17.82	1044	0.0133
south	93	-75.74	168.17	63.98	0.91	499.00	17.99	920	0.0025
south	95	-75.77	168.25	64.25	0.43				
south	107	-75.75	169.00	66.78	2.25	425.00			0
south	108	-75.75	168.99	66.98	0.57	530.00		939	0
south	109	-75.77	168.92	67.16	2.06				
south	110	-75.76	168.93	67.33	0.81	410.00		1057	0
south	113	-75.74	168.82	67.83	1.27	359.00		890	0.0004594
south	114	-75.72	168.80	67.98	2.66				
south	115	-75.71	168.74	68.17	2.04	410.00	21.82	889	0.000617
TNB	27	-75.15	164.93	50.88	-1.15	841.00	22.45		0.0455
TNB	28	-74.95	164.22	51.33	1.30	983.00	31.5	906	0.039
TNB	29	-74.83	164.48	51.80	4.49	1260.00	23.67	676	0.172
TNB	30	-75.20	164.23	52.04	3.67	712.00	33.64	1021	0.1522
TNB	33	-75.20	164.23	52.77	3.40				
TNB	34	-75.19	163.98	53.42	2.66	797.00	21.2		0.026
TNB	37	-75.11	163.91	53.79	1.73	847.00	17.53	686	0.0084
TNB	39	-75.06	164.05	54.12		1101.00	14.16	602	0.012
TNB	40	-75.20	164.21	54.30	1.83	454.00	18.66	944	0.0072
TNB	44	-75.20	164.21	54.80	2.38	1636.00	22.74	690	0.0835
TNB	48	-75.20	164.24	55.30	1.51	1703.00	27.24	786	0.0833
TNB	99	-75.20	164.19	64.85	7.20	5824.00	39.9		0.16
TNB	100	-75.20	164.18	64.97	6.72	4752.00	37.94		0.181
TNB	101	-74.96	164.22	65.13	8.61	2019.00	23.46	1241	0.103
TNB	102	-74.83	164.48	65.32	6.66	6896.00	30.18	1056	0.1928
north	55	-74.18	169.55	56.78	0.48	1283.00	19.03	756	0.0382
north	56	-73.92	170.44	57.06	-0.88	1185.00	17.39	645	0.041
north	57	-74.17	170.42	57.29	0.24	851.00	19.41	518	0.1028
north	58	-74.16	169.82	57.78		969.00	14.42	1496	0.025
north	63	-74.16	169.50	58.17	1.23	104.00	19.67		0.1736
north	66	-74.05	169.69	58.82	-0.38	2081.00	12.32	880	0.1099
north	67	-74.01	169.78	58.99	0.40	313.00	14.47	1210	0.114
north	68	-73.95	169.96	59.16	-1.50	382.00	19.14	839	0.0656
north	70	-73.91	170.18	59.34	-0.98	346.00	20.37	880	0.1
north	73	-73.86	170.37	59.82	0.54	745.00	14.03	985	0.0885
north	74	-74.18	169.86	60.16	2.50	2502.00	16.19	740	0.0617
north	75	-74.17	169.61	60.26	2.69				
north	103	-74.27	168.94	65.84	3.02	2141.00	21.99		0.1324
north	104	-74.19	169.55	65.98	2.81	4468.00	18.6	770	0.1174
north	106	-74.17	170.42	66.23	1.95	1661.00	13.67	489	0.0215
transect	119	-76.50	170.01	68.95	2.31	945.00	22.61	656	0.0188
transect	120	-76.50	172.04	69.11	3.08	229.00	20.91	648	0.0131
transect	121	-76.50	174.00	69.28	3.50	725.00	24.14	828.00	0.04
transect	122	-76.50	176.00	69.77	3.34	538.00	24.75	1428	0.0307
transect	123	-76.50	178.02	69.96	4.76				
transect	124	-76.50	180.01	70.16	3.35				