Table S1: **^{238}U and total ^{234}Th activities in dpm L^{-1} and resulting $^{234}Th/^{238}U$ ratios. ^{238}U activity is derived from salinity (see text).**

Station	Depth	Temperature	Salinity	^{238}U			^{234}Th			$^{234}Th/^{238}U$
#	m	°C	psu	dpm.L^{-1}			dpm.L^{-1}			
#1 40.3°N / -10.0 °E 20/05/2014	19	15.89	35.27	2.46	±	0.05	1.83	±	0.06	0.74
	39	14.93	35.55	2.48	±	0.05	1.69	±	0.05	0.68
	60	13.81	35.68	2.49	±	0.05	2.11	±	0.07	0.85
	79	13.44	35.71	2.49	±	0.05	2.39	±	0.07	0.96
	98	13.21	35.74	2.49	±	0.05	2.55	±	0.08	1.02
	119	13.02	35.73	2.49	±	0.05	2.50	±	0.08	1.00
	137	12.88	35.73	2.49	±	0.05	2.34	±	0.07	0.94
	158	12.73	35.71	2.49	±	0.05	2.44	±	0.08	0.98
	199	12.55	35.71	2.49	±	0.05	2.54	±	0.08	1.02
	246	12.29	35.69	2.49	±	0.05	2.60	±	0.08	1.05
	298	12.08	35.68	2.49	±	0.05	2.67	±	0.08	1.07
	396	11.69	35.65	2.49	±	0.05	2.59	±	0.08	1.04
	496	11.43	35.67	2.49	±	0.05	2.43	±	0.07	0.98
	589	11.41	35.77	2.50	±	0.05	2.61	±	0.08	1.05
	695	11.60	35.94	2.51	±	0.05	2.58	±	0.08	1.03
	791	11.72	36.07	2.52	±	0.05	2.90	±	0.09	1.15
	989	11.34	36.15	2.53	±	0.05	2.68	±	0.08	1.06
#13 41.4°N / -13.9 °E 25/05/2014	20	15.49	35.85	2.50	±	0.05	1.75	±	0.05	0.70
	40	14.86	35.81	2.50	±	0.05	1.83	±	0.05	0.73
	60	13.30	35.76	2.50	±	0.05	2.23	±	0.07	0.90
	78	13.14	35.76	2.50	±	0.05	2.31	±	0.06	0.93
	99	12.99	35.75	2.49	±	0.05	2.26	±	0.07	0.91
	119	12.93	35.75	2.49	±	0.05	2.63	±	0.08	1.05
	139	12.88	35.75	2.49	±	0.05	2.82	±	0.07	1.13
	159	12.83	35.74	2.49	±	0.05	2.64	±	0.07	1.06
	197	12.64	35.71	2.49	±	0.05	2.52	±	0.07	1.01
	248	12.38	35.68	2.49	±	0.05	2.65	±	0.07	1.06
	298	12.20	35.66	2.49	±	0.05	2.50	±	0.07	1.00
	398	11.82	35.62	2.48	±	0.05	2.52	±	0.07	1.01
	496	11.59	35.62	2.48	±	0.05	2.66	±	0.08	1.07
	594	11.23	35.61	2.48	±	0.05	2.61	±	0.07	1.05
	693	10.66	35.57	2.48	±	0.05	2.55	±	0.08	1.03
	792	10.55	35.68	2.49	±	0.05	2.35	±	0.06	0.95
	990	9.33	35.65	2.49	±	0.05	2.63	±	0.08	1.06
	1485	6.73	35.45	2.47	±	0.05	2.48	±	0.07	1.00

Station	Depth	Temperature	Salinity	^{238}U			^{234}Th			$^{234}Th/^{238}U$
#	m	°C	psu	dpm.L^{-1}			dpm.L^{-1}			
#21 46.5°N / -19.7°E 31/05/2014	10	14.44	35.68	2.49	±	0.05	1.41	±	0.05	0.57
	20	13.65	35.66	2.49	±	0.05	1.69	±	0.05	0.68
	39	12.79	35.64	2.49	±	0.05	1.79	±	0.05	0.72
	59	12.71	35.65	2.49	±	0.05	1.80	±	0.05	0.72
	76	12.63	35.67	2.49	±	0.05	2.07	±	0.06	0.83
	100	12.45	35.69	2.49	±	0.05	2.36	±	0.07	0.95
	119	12.36	35.68	2.49	±	0.05	2.62	±	0.07	1.05
	158	12.23	35.66	2.49	±	0.05	2.53	±	0.07	1.02
	198	12.08	35.64	2.49	±	0.05	2.70	±	0.07	1.09
	296	11.80	35.60	2.48	±	0.05	2.83	±	0.07	1.14
	396	11.38	35.55	2.48	±	0.05	2.61	±	0.07	1.05
	495	11.01	35.50	2.48	±	0.05	2.65	±	0.08	1.07
	594	10.74	35.47	2.47	±	0.05	2.52	±	0.07	1.02
	693	9.78	35.32	2.46	±	0.05	2.56	±	0.07	1.04
	792	8.77	35.29	2.46	±	0.05	2.69	±	0.08	1.09
	989	7.47	35.32	2.46	±	0.05	2.58	±	0.07	1.05
	1189	6.17	35.21	2.45	±	0.05	2.36	±	0.07	0.96
#26 50.3°N / -22.6°E 04/06/2014	20	11.69	35.34	2.46	±	0.05	1.90	±	0.06	0.77
	49	9.77	35.19	2.45	±	0.05	1.90	±	0.06	0.77
	74	9.65	35.19	2.45	±	0.05	1.96	±	0.06	0.80
	99	9.40	35.16	2.45	±	0.05	2.07	±	0.07	0.85
	199	8.88	35.17	2.45	±	0.05	2.46	±	0.08	1.00
	297	8.17	35.07	2.44	±	0.05	2.36	±	0.07	0.97
	397	7.18	34.95	2.43	±	0.05	2.47	±	0.08	1.01
	593	5.97	35.00	2.44	±	0.05	2.59	±	0.08	1.07
	792	5.23	35.03	2.44	±	0.05	2.60	±	0.08	1.07
#32 55.5°N / -26.7°E 08/06/2014	11	10.51	35.13	2.45	±	0.05	1.63	±	0.08	0.67
	20	10.48	35.13	2.45	±	0.05	1.58	±	0.06	0.65
	40	8.89	35.07	2.44	±	0.05	1.88	±	0.06	0.77
	60	8.60	35.08	2.44	±	0.05	1.87	±	0.05	0.77
	99	8.67	35.13	2.45	±	0.05	1.64	±	0.05	0.67
	119	8.08	35.04	2.44	±	0.05	2.32	±	0.06	0.95
	139	7.88	35.03	2.44	±	0.05	2.59	±	0.08	1.06
	160	8.23	35.12	2.45	±	0.05	2.48	±	0.07	1.01
	199	7.99	35.09	2.44	±	0.05	2.42	±	0.07	0.99
	298	7.05	34.98	2.43	±	0.05	2.48	±	0.07	1.02
	376	5.99	34.89	2.43	±	0.05	2.52	±	0.07	1.04
	446	6.36	35.04	2.44	±	0.05	2.47	±	0.07	1.01
	494	5.70	34.98	2.43	±	0.05	2.50	±	0.07	1.03
	593	5.15	34.98	2.43	±	0.05	2.52	±	0.08	1.04
	693	4.78	34.96	2.43	±	0.05	2.45	±	0.07	1.01
	792	4.48	34.94	2.43	±	0.05	2.29	±	0.06	0.94

Station	Depth	Temperature	Salinity	^{238}U			^{234}Th			$^{234}Th/^{238}U$
#	m	°C	psu	dpm.L^{-1}			dpm.L^{-1}			
#38 58.8°N / -31.3°E 11/06/2014	10	9.30	35.06	2.44	±	0.05	1.23	±	0.04	0.50
	19	9.18	35.06	2.44	±	0.05	1.48	±	0.05	0.61
	39	8.22	35.08	2.44	±	0.05	2.12	±	0.07	0.87
	60	8.00	35.11	2.44	±	0.05	2.38	±	0.07	0.97
	78	7.73	35.11	2.44	±	0.05	2.45	±	0.07	1.00
	99	7.73	35.13	2.45	±	0.05	2.61	±	0.08	1.07
	118	7.68	35.14	2.45	±	0.05	2.61	±	0.08	1.07
	138	7.67	35.14	2.45	±	0.05	2.41	±	0.07	0.99
	158	7.62	35.14	2.45	±	0.05	2.43	±	0.07	0.99
	178	7.59	35.14	2.45	±	0.05	2.51	±	0.07	1.02
	198	7.60	35.15	2.45	±	0.05	2.46	±	0.07	1.01
	298	7.41	35.14	2.45	±	0.05	2.40	±	0.08	0.98
	396	7.21	35.13	2.45	±	0.05	2.50	±	0.09	1.02
	494	6.86	35.11	2.44	±	0.05	2.45	±	0.09	1.00
	593	6.32	35.09	2.44	±	0.05	2.48	±	0.08	1.01
	693	5.68	35.05	2.44	±	0.05	2.54	±	0.09	1.04
	791	5.00	35.01	2.44	±	0.05	2.51	±	0.09	1.03
#44 59.6°N / -38.9°E 14/06/2014	9	6.83	34.85	2.42	±	0.05	1.91	±	0.06	0.79
	20	6.80	34.85	2.42	±	0.05	2.18	±	0.06	0.90
	40	5.07	34.89	2.43	±	0.05	2.42	±	0.07	1.00
	59	4.49	34.87	2.43	±	0.05	2.46	±	0.07	1.01
	79	4.33	34.90	2.43	±	0.05	2.31	±	0.06	0.95
	99	4.28	34.91	2.43	±	0.05	2.40	±	0.06	0.99
	118	4.12	34.89	2.43	±	0.05	2.44	±	0.07	1.00
	138	4.03	34.89	2.43	±	0.05	2.23	±	0.05	0.92
	158	4.04	34.89	2.43	±	0.05	2.42	±	0.07	1.00
	198	4.00	34.89	2.43	±	0.05	2.35	±	0.06	0.97
	297	3.92	34.89	2.43	±	0.05	2.56	±	0.06	1.05
	396	3.88	34.89	2.43	±	0.05	2.56	±	0.07	1.05
	495	3.79	34.88	2.43	±	0.05	2.38	±	0.06	0.98
	594	3.73	34.88	2.43	±	0.05	2.35	±	0.05	0.97
	692	3.63	34.87	2.43	±	0.05	2.62	±	0.06	1.08
	792	3.61	34.87	2.43	±	0.05	2.23	±	0.06	0.92
	1087	3.70	34.89	2.43	±	0.05	2.43	±	0.07	1.00

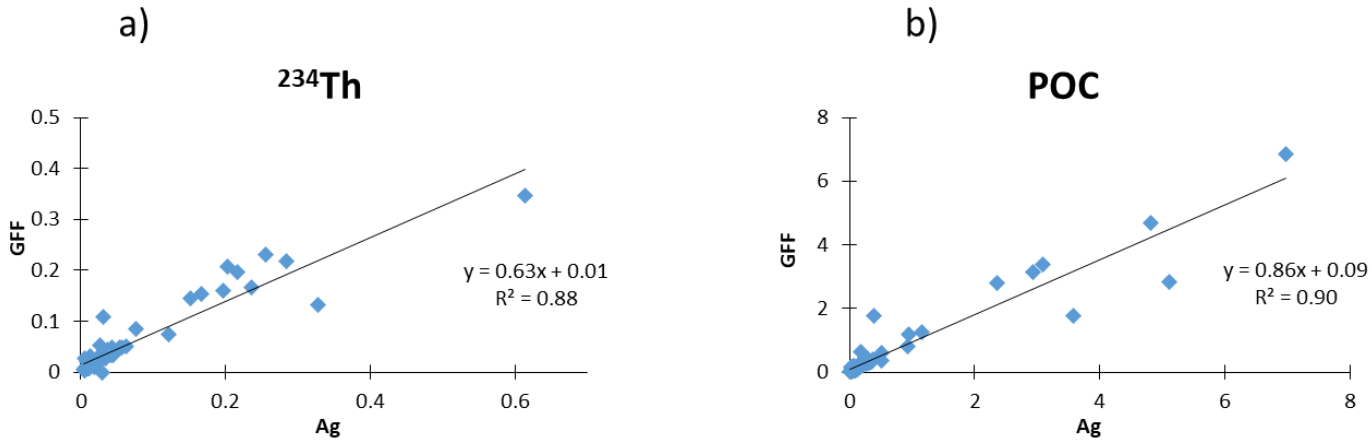
Station	Depth	Temperature	Salinity	^{238}U			^{234}Th			$^{234}Th/^{238}U$
#	m	°C	psu	dpm.L^{-1}			dpm.L^{-1}			
#51 59.8°N / -42.0°E 18/06/2014	11	6.76	34.87	2.43	±	0.05	1.92	±	0.06	0.79
	19	6.65	34.88	2.43	±	0.05	1.89	±	0.05	0.78
	40	6.18	34.95	2.43	±	0.05	2.18	±	0.07	0.90
	60	5.96	34.97	2.43	±	0.05	2.07	±	0.06	0.85
	79	5.58	34.95	2.43	±	0.05	2.20	±	0.06	0.91
	100	5.51	34.95	2.43	±	0.05	2.44	±	0.07	1.00
	119	5.27	34.93	2.43	±	0.05	2.58	±	0.07	1.06
	139	5.13	34.92	2.43	±	0.05	2.42	±	0.07	1.00
	159	5.16	34.94	2.43	±	0.05	2.31	±	0.06	0.95
	178	4.93	34.92	2.43	±	0.05	2.44	±	0.07	1.01
	199	4.99	34.94	2.43	±	0.05	2.53	±	0.07	1.04
	298	4.97	34.96	2.43	±	0.05	2.51	±	0.07	1.03
	396	4.66	34.95	2.43	±	0.05	2.41	±	0.07	0.99
	495	4.51	34.94	2.43	±	0.05	2.26	±	0.06	0.93
	593	4.17	34.92	2.43	±	0.05	2.30	±	0.06	0.94
	692	4.05	34.91	2.43	±	0.05	2.49	±	0.07	1.02
	791	4.01	34.92	2.43	±	0.05	2.46	±	0.07	1.01
#53 59.9°N / -43.1°E 16/06/2014	10	-0.73	31.91	2.19	±	0.05	1.75	±	0.06	0.80
	20	-1.21	32.14	2.21	±	0.05	2.08	±	0.10	0.94
	40	-1.24	32.80	2.26	±	0.05	2.02	±	0.06	0.89
	59	-1.47	33.05	2.28	±	0.05	2.20	±	0.07	0.96
	79	-1.31	33.16	2.29	±	0.05	2.21	±	0.07	0.96
	99	-0.79	33.36	2.31	±	0.05	2.08	±	0.07	0.90
	119	0.84	33.56	2.32	±	0.05	2.03	±	0.06	0.87
	138	-0.08	33.59	2.33	±	0.05	1.91	±	0.06	0.82
#64 59.1°N / -46.1°E 20/06/2014	9	6.55	34.80	2.42	±	0.05	1.89	±	0.10	0.78
	20	6.04	34.85	2.42	±	0.05	2.00	±	0.07	0.83
	40	5.93	34.87	2.43	±	0.05	1.88	±	0.07	0.78
	79	5.37	34.95	2.43	±	0.05	2.46	±	0.09	1.01
	99	5.35	34.96	2.43	±	0.05	2.57	±	0.09	1.06
	139	5.17	34.96	2.43	±	0.05	2.43	±	0.09	1.00
	159	4.92	34.94	2.43	±	0.05	2.43	±	0.09	1.00
	197	4.78	34.93	2.43	±	0.05	2.31	±	0.08	0.95
	297	4.51	34.93	2.43	±	0.05	2.33	±	0.09	0.96
	396	4.35	34.93	2.43	±	0.05	2.45	±	0.09	1.01
	494	4.10	34.91	2.43	±	0.05	2.54	±	0.09	1.04
	594	3.97	34.90	2.43	±	0.05	2.52	±	0.09	1.04
	692	3.88	34.89	2.43	±	0.05	2.42	±	0.09	1.00
	792	3.71	34.88	2.43	±	0.05	2.46	±	0.09	1.01
	890	3.64	34.87	2.43	±	0.05	2.46	±	0.09	1.02

Station	Depth	Temperature	Salinity	^{238}U			^{234}Th			$^{234}Th/^{238}U$
#	m	°C	psu	dpm.L^{-1}			dpm.L^{-1}			
#69 55.8°N / -48.1°E 23/06/2014	11	6.23	34.61	2.41	±	0.05	1.58	±	0.05	0.66
	20	6.15	34.61	2.41	±	0.05	1.84	±	0.05	0.77
	59	3.73	34.77	2.42	±	0.05	2.58	±	0.09	1.07
	80	3.92	34.83	2.42	±	0.05	2.52	±	0.08	1.04
	99	3.83	34.82	2.42	±	0.05	2.62	±	0.08	1.08
	119	3.95	34.85	2.42	±	0.05	2.55	±	0.08	1.05
	139	3.91	34.86	2.42	±	0.05	2.45	±	0.08	1.01
	159	3.83	34.86	2.42	±	0.05	2.41	±	0.07	0.99
	199	3.58	34.84	2.42	±	0.05	2.61	±	0.08	1.08
	298	3.54	34.85	2.42	±	0.05	2.56	±	0.08	1.05
	496	3.51	34.85	2.42	±	0.05	2.33	±	0.07	0.96
	595	3.48	34.85	2.42	±	0.05	2.50	±	0.08	1.03
	693	3.47	34.85	2.42	±	0.05	2.37	±	0.07	0.98
	792	3.48	34.85	2.42	±	0.05	2.53	±	0.08	1.04
	890	3.48	34.85	2.42	±	0.05	2.32	±	0.08	0.96
	990	3.46	34.85	2.42	±	0.05	2.36	±	0.07	0.98
#77 53.0°N / -51.1°E 26/06/2014	10	6.92	34.49	2.40	±	0.05	1.80	±	0.07	0.75
	20	6.27	34.56	2.40	±	0.05	1.76	±	0.07	0.73
	39	5.11	34.64	2.41	±	0.05	2.12	±	0.08	0.88
	59	4.09	34.71	2.41	±	0.05	2.39	±	0.10	0.99
	79	3.60	34.74	2.42	±	0.05	2.27	±	0.07	0.94
	100	3.49	34.76	2.42	±	0.05	2.64	±	0.08	1.09
	119	3.44	34.77	2.42	±	0.05	2.52	±	0.08	1.04
	139	3.41	34.79	2.42	±	0.05	2.57	±	0.08	1.06
	159	3.43	34.81	2.42	±	0.05	2.64	±	0.08	1.09
	199	3.46	34.83	2.42	±	0.05	2.36	±	0.08	0.97
	298	3.53	34.85	2.42	±	0.05	2.57	±	0.09	1.06
	397	3.57	34.86	2.42	±	0.05	2.67	±	0.09	1.10
	495	3.52	34.86	2.42	±	0.05	2.60	±	0.09	1.07
	595	3.56	34.87	2.43	±	0.05	2.49	±	0.08	1.03
	693	3.49	34.86	2.43	±	0.05	2.69	±	0.08	1.11

Table S2: Particulate ^{234}Th activities and POC concentrations in the small (SSF; 1-53 µm) and large size fraction (LSF; >53 µm).

Station	Depth	1-53 µm (SSF)						>53 µm (LSF)					
		^{234}Th			POC			^{234}Th			POC		
#	m	dpm L^{-1}			µmol L^{-1}			dpm L^{-1}			µmol L^{-1}		
#1 40.3°N -10.0 °E	30	0.163	±	0.005	2.639	±	0.099	0.021	±	0.001	0.651	±	0.009
	80	0.086	±	0.003	0.208	±	0.017	0.022	±	0.001	0.357	±	0.005
	120	0.188	±	0.006	0.567	±	0.035	0.021	±	0.001	0.105	±	0.005
	250	0.171	±	0.004	0.428	±	0.019	0.038	±	0.001	0.068	±	0.006
	550	0.123	±	0.004	0.217	±	0.016	0.014	±	0.000	0.023	±	0.002
	800	0.068	±	0.003	0.035	±	0.032	0.011	±	0.001	0.024	±	0.005
#13 41.4°N -13.9 °E	30	0.456	±	0.004	2.160	±	0.035	0.028	±	0.001	0.196	±	0.005
	80	0.529	±	0.004	1.170	±	0.027	0.030	±	0.001	0.080	±	0.004
	120	0.431	±	0.004		±		0.032	±	0.001	0.039	±	0.005
	250	0.210	±	0.002	0.366	±	0.021	0.020	±	0.001	0.027	±	0.003
	450	0.133	±	0.001	0.266	±	0.016	0.009	±	0.000	0.018	±	0.002
#21 46.5°N -19.7°E	15	0.280	±	0.009	6.053	±	0.068	0.161	±	0.003	4.747	±	0.020
	60	0.775	±	0.017	4.064	±	0.105	0.243	±	0.005	1.201	±	0.031
	100	0.225	±	0.005	0.545	±	0.023	0.052	±	0.001	0.133	±	0.007
	200	0.122	±	0.003	0.360	±	0.021	0.038	±	0.001	0.046	±	0.002
	450	0.114	±	0.003	0.234	±	0.016	0.022	±	0.000	0.023	±	0.002
	800	0.108	±	0.002	0.158	±	0.013	0.014	±	0.000	0.017	±	0.001
#26 50.3°N -22.6°E	30	0.279	±	0.008	4.792	±	0.059	0.206	±	0.004	2.572	±	0.017
	83	0.225	±	0.005	0.848	±	0.022	0.201	±	0.002	0.877	±	0.007
	153	0.131	±	0.003	0.400	±	0.021	0.030	±	0.001	0.123	±	0.003
	400	0.111	±	0.005	0.240	±	0.049	0.012	±	0.001	0.035	±	0.007
#32 55.5°N -26.7°E	30	0.109	±	0.003	5.830	±	0.097	0.045	±	0.002	0.292	±	0.014
	60	0.359	±	0.007	1.565	±	0.027	0.027	±	0.001	0.124	±	0.004
	100	0.224	±	0.005	0.887	±	0.024	0.080	±	0.002	0.338	±	0.007
	200	0.121	±	0.004	0.467	±	0.022	0.010	±	0.000	0.046	±	0.003
	450	0.078	±	0.002	0.240	±	0.017	0.012	±	0.000	0.037	±	0.002
	800	0.084	±	0.002	0.203	±	0.015	0.010	±	0.000	0.066	±	0.002
#38 58.8°N -31.3°E	20	0.239	±	0.006	2.231	±	0.041	0.028	±	0.001	0.156	±	0.004
	60	0.290	±	0.006	1.273	±	0.028	0.037	±	0.001	0.128	±	0.004
	109	0.143	±	0.003	0.621	±	0.018	0.043	±	0.001	0.156	±	0.005
	396	0.133	±	0.004	0.292	±	0.036	0.009	±	0.000	0.030	±	0.005
#44 59.6°N -38.9°E	20	1.188	±	0.020	16.736	±	0.102	0.480	±	0.007	3.965	±	0.020
	40	0.474	±	0.010	3.550	±	0.056	0.041	±	0.001	0.133	±	0.013
	80	1.060	±	0.028	6.736	±	0.213	0.098	±	0.004	0.306	±	0.046
	150	0.116	±	0.004	0.392	±	0.041	0.005	±	0.000	0.026	±	0.009
	300	0.092	±	0.003	0.334	±	0.022	0.004	±	0.000	0.022	±	0.005
	500	0.067	±	0.002	0.187	±	0.016	0.005	±	0.000	0.016	±	0.004
#51 59.8°N -42.0°E	8	0.183	±	0.007	4.109	±	0.064	0.230	±	0.005	2.664	±	0.017
	20	0.958	±	0.025	8.974	±	0.111						
	60	0.366	±	0.009	2.154	±	0.036	0.148	±	0.003	0.554	±	0.010
	70	0.451	±	0.009	2.375	±	0.034						
	100	0.179	±	0.006	0.832	±	0.032	0.052	±	0.002	0.153	±	0.007
	150	0.193	±	0.006	0.747	±	0.039						
	250	0.088	±	0.003	0.328	±	0.021	0.017	±	0.001	0.076	±	0.005

Station	Depth	1-53 µm (SSF)		>53 µm (LSF)	
		^{234}Th	POC	^{234}Th	POC
#	m	dpm L^{-1}	µmol L^{-1}	dpm L^{-1}	µmol L^{-1}
	30	0.024 ± 0.001	0.418 ± 0.009	0.026 ± 0.001	0.373 ± 0.002
#64	60	0.174 ± 0.007	1.726 ± 0.054	0.015 ± 0.001	0.154 ± 0.012
59.1°N	100	0.162 ± 0.004	1.968 ± 0.028	0.030 ± 0.001	0.267 ± 0.006
-46.1°E	150	0.118 ± 0.005	0.189 ± 0.046	0.035 ± 0.002	0.208 ± 0.007
	400	0.113 ± 0.003	0.309 ± 0.019	0.010 ± 0.000	0.054 ± 0.004
	30	0.206 ± 0.007	4.130 ± 0.052	0.070 ± 0.002	1.077 ± 0.013
#69	60	0.159 ± 0.005	1.958 ± 0.040	0.015 ± 0.001	0.172 ± 0.009
55.8°N	100	0.124 ± 0.004	1.655 ± 0.028	0.030 ± 0.001	0.299 ± 0.007
-48.1°E	150	0.097 ± 0.004	0.895 ± 0.039	0.010 ± 0.001	0.083 ± 0.009
	410	0.069 ± 0.002	0.313 ± 0.022	0.006 ± 0.000	0.075 ± 0.005
	10	0.313 ± 0.011	11.182 ± 0.098	0.206 ± 0.006	3.039 ± 0.021
#77	50	0.447 ± 0.012	5.488 ± 0.067	0.057 ± 0.002	0.425 ± 0.016
53.0°N	80	0.150 ± 0.004	2.347 ± 0.028	0.039 ± 0.001	0.339 ± 0.007
-51.1°E	200	0.100 ± 0.004	0.533 ± 0.040	0.009 ± 0.000	0.081 ± 0.008
	460	0.069 ± 0.003	0.167 ± 0.017	0.011 ± 0.000	0.060 ± 0.004



<u>Figure S1:</u> Comparison between a) ^{234}Th activities and b) POC concentrations determined on GF/F and silver (Ag) filters.

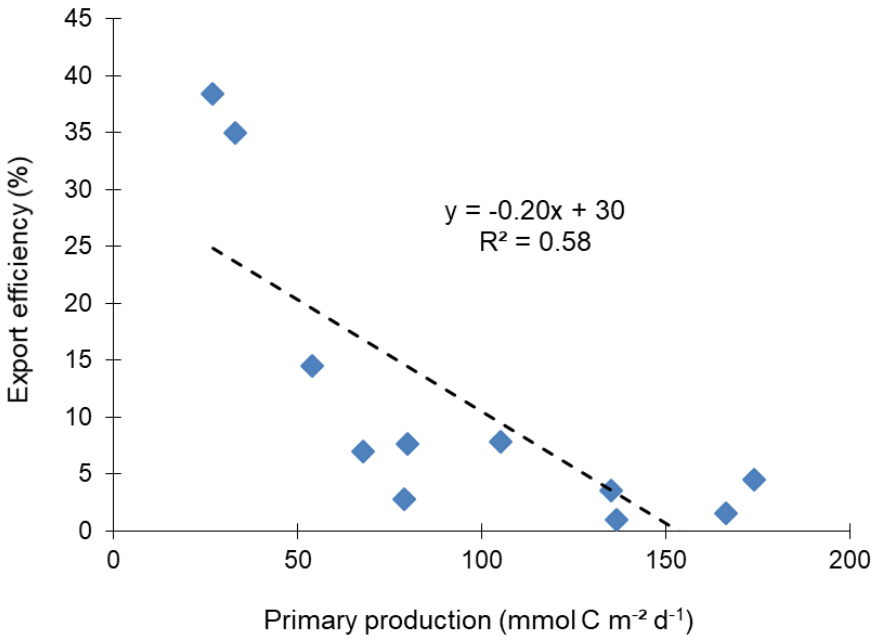


Figure S2: **Export efficiency (in %) in function of the primary production (mmol C m^{-2} d^{-1}).**