

Evaluation of the Particulate Inorganic Carbon Export Efficiency in the Global Ocean

Supplementary materials

5

Table S1: Satellite products merged in the analyses. AV = Simple average method; AVW = Weighted average method; SWF = Sea-Viewing Wide Field of View Sensor (SeaWiFS); MOD = Moderate Resolution Imaging Spectrometer (MODIS); VIR = Visible Infrared Imaging Radiometer Suite (VIIRS); MER = Medium Resolution Imaging Spectrometer (MERIS); OLA = Ocean and Land Colour Instruments (Sentinel-3A); Vj1 = VIIRS aboard JPSS-1 (Joint Polar Satellite System); OLB = Ocean and Land Colour Instruments (Sentinel-3B).

Periods	Monthly PIC concentration	Monthly SST	Monthly PAR	Monthly Kd _{490nm}
	mol C m ⁻³	°C	mol photons m ⁻² d ⁻¹	m ⁻¹
Sept 1997- April 2002	AV-SWF	ESA SST CCI and C3S and C3S reprocessed SST	AV-SWF	AV-SWF
May 2002- June 2002	AV-SWF	ESA SST CCI and C3S reprocessed SST	AV-SWF	AVW-MERSWF
July - 2002 - Dec 2010	AVW-MODSWF	MODIS	AVW-MODSWF	AVW-MERMODSWF
Jan- 2011 - Jan 2012	AV-MOD	MODIS	AV-MOD	AVW-MERMOD
Febr - 2012 - Apr 2012	AVW-MODVIR	MODIS	AVW-MODVIR	AVW-MERMODVIR
May - 2012 - Apr 2016	AVW-MODVIR	MODIS	AVW-MODVIR	AVW-MODVIR
May 2016 - Nov 2017	AVW-MODVIR	MODIS	AVW-MODVIR	AVW-MODVIR
Dec 2017 - Mar 2019	AVW-MODVIR	MODIS	AVW-MODVIR	AVW-MODVIR
Apr 2019 - Oct 2023	AVW-MODVIR	MODIS	AVW-MODVIR	AVW-MODVIR

Table S2: PIC flux dataset compilation.

Data sets	Reference
https://doi.org/10.1594/PANGAEA.855600	Mouw et al., 2016
https://doi.org/10.1594/PANGAEA.807946	Torres Valdés et al., 2014
Supplementary material: https://agupubs.onlinelibrary.wiley.com/doi/10.1002/2014GL061678	Le Moigne et al., 2014
https://doi.org/10.1594/PANGAEA.934361	Fischer et al., 2016
https://doi.org/10.1594/PANGAEA.867116	Romero et al., 2016
https://doi.org/10.1594/PANGAEA.863969	Rosengard et al., 2015
Table 2	Neukermans et al., 2023
Table 1	

10

Table S3: Number of observations per RECCAP2 biogeochemical regions and layer of depth used in the analysis.

Regions	Number of PIC observation	Number of stations	Depth layer	Number of PIC observation
---------	---------------------------	--------------------	-------------	---------------------------

Arctic (Ar)	83	4	0-100m	1
			100-500m	62
			1000-2000m	20
North Atlantic (NA)	1170	79	0-100m	39
			100-500m	172
			1000-2000m	202
			2000-3000m	444
			3000-4000m	78
			500-1000m	143
			> 4000m	92
North Pacific (NP)	963	17	0-100m	3
			100-500m	229
			1000-2000m	135
			2000-3000m	89
			3000-4000m	169
			500-1000m	104
			> 4000m	234
North Subtropics Atlantic (NSTA)	670	12	0-100m	7
			1000-2000m	173
			2000-3000m	240
			3000-4000m	22
			500-1000m	156
			> 4000m	72
North Subtropics Pacific (NSTP)	662	11	100-500m	342
			1000-2000m	103
			2000-3000m	102
			3000-4000m	36
			> 4000m	79
North Indian (NI)	939	16	1000-2000m	150
			2000-3000m	197
			3000-4000m	201
			500-1000m	391
Equatorial Atlantic (EA)	41	3	0-100m	2
			3000-4000m	19
			500-1000m	20
Equatorial Pacific (EP)	329	8	1000-2000m	63
			2000-3000m	125
			3000-4000m	78
			500-1000m	42
			> 4000m	21
South Subtropics Atlantic (SSTA)	180	12	0-100m	4
			1000-2000m	96
			2000-3000m	20
			500-1000m	60
South Subtropics Pacific (SSTP)	337	9	1000-2000m	106
			2000-3000m	132
			3000-4000m	78
			> 4000m	21

Subantarctic (SAZ)	21	21	0-100m	9
			100-500m	12
Antarctic (AAZ)	608	62	0-100m	24
			100-500m	179
			1000-2000m	106
			2000-3000m	56
			3000-4000m	49
			500-1000m	140
			> 4000m	54

Table S4: Statistical parameter associated with the linear regression between EZ PIC production and log₁₀ transformed PIC flux for each layer of depth and per RECCAP2 biogeochemical regions.

Region	Depth	Slope	Slope σ	Intercept	Intercept σ	Pearson R coefficient	Pearson R coefficient σ	R ²	P-value	n
Arctic Ar	na	na	na	na	na	na	na	na	na	na
North Atlantic (NA)	0-100m	0.109	0.574	44.591	13.233	0.03	0.152	0.001	0.85	43
	100-500m	1.042	0.084	-0.838	0.492	0.785	0.039	0.616	<0.001	97
	500-1000m	0.412	0.065	0.295	0.618	0.591	0.075	0.35	<0.001	76
	1000-2000m	0.218	0.046	1.678	0.556	0.423	0.08	0.179	<0.001	105
	2000-3000m	0.237	0.026	1.857	0.332	0.448	0.044	0.201	<0.001	334
	3000-4000m	0.515	0.033	-1.01	0.428	0.874	0.027	0.763	<0.001	78
	>4000m	0.222	0.049	2.851	0.793	0.43	0.085	0.185	<0.001	92
North Pacific (NP)	0-100m	-0.501	1.481	1.222	0.356	-0.959	0.046	0.92	0.183	3
	100-500m	0.246	0.089	8.747	0.826	0.199	0.07	0.04	0.006	188
	500-1000m	0.007	0.029	2.133	0.332	0.029	0.115	0.001	0.803	76
	1000-2000m	0.068	0.036	3.696	0.513	0.219	0.112	0.048	0.064	72
	2000-3000m	-0.007	0.048	4.354	0.569	-0.02	0.136	0	0.887	54
	3000-4000m	-0.036	0.035	3.453	0.294	-0.102	0.099	0.011	0.313	99
	>4000m	0.004	0.014	3.342	0.202	0.023	0.07	0.001	0.744	206
North Subtropics Atlantic (NSTA)	0-100m	3.124	2.968	-33.919	51.986	0.466	0.32	0.217	0.352	6
	500-1000m	-0.452	0.088	12.683	1.521	-0.384	0.068	0.148	<0.001	155
	1000-2000m	-0.199	0.033	8.747	0.67	-0.431	0.065	0.186	<0.001	158
	2000-3000m	-0.257	0.047	10.387	0.895	-0.336	0.057	0.113	<0.001	240
	3000-4000m	-0.069	0.048	10.64	1.04	-0.304	0.194	0.092	0.169	22
	>4000m	-0.098	0.027	6.649	0.683	-0.399	0.099	0.159	0.001	72
North Subtropics Pacific (NSTP)	100-500m	-0.269	0.042	8.707	0.649	-0.338	0.049	0.114	<0.001	324
	1000-2000m	0.155	0.056	2.418	0.803	0.267	0.093	0.071	0.007	100
	2000-3000m	-0.052	0.045	3.206	0.715	-0.116	0.098	0.014	0.244	102
	3000-4000m	-0.175	0.08	5.611	1.318	-0.354	0.148	0.125	0.037	35
	>4000m	0.096	0.063	0.992	0.803	0.171	0.109	0.029	0.132	79
North Indian (NI)	500-1000m	0.543	0.061	4.623	0.58	0.417	0.043	0.174	<0.001	377
	1000-2000m	0.683	0.12	4.964	1.124	0.425	0.067	0.181	<0.001	150
	2000-3000m	0.395	0.087	5.895	0.678	0.31	0.065	0.096	<0.001	196
	3000-4000m	0.419	0.078	5.367	0.666	0.358	0.062	0.128	<0.001	200
Equatorial Atlantic (EA)	500-1000m	-0.127	0.197	5.808	1.813	-0.15	0.219	0.022	0.528	20
	3000-4000m	-0.269	0.225	8.937	2.111	-0.278	0.212	0.077	0.249	19

Equatorial Pacific (EP)	500-1000m	-0.227	0.354	9.358	3.872	-0.101	0.153	0.01	0.525	42
	1000-2000m	0.129	0.065	3.277	0.743	0.248	0.12	0.062	0.054	61
	2000-3000m	-0.195	0.106	8.882	1.301	-0.164	0.087	0.027	0.068	125
	3000-4000m	-0.178	0.17	8.657	1.885	-0.119	0.112	0.014	0.299	78
	>4000m	0.253	0.361	2.152	1.309	0.159	0.213	0.025	0.492	21
South Subtropics Atlantic (SSTA)	0-100m	0.14	0.344	4.308	7.683	0.276	0.462	0.076	0.724	4
	500-1000m	0.046	0.032	8.906	1.213	0.189	0.124	0.036	0.148	60
	1000-2000m	-0.004	0.03	7.724	0.829	-0.013	0.102	0	0.9	96
	2000-3000m	0.021	0.086	6.638	1.794	0.057	0.223	0.003	0.81	20
South Subtropics Pacific (SSTP)	1000-2000m	-0.187	0.043	5.587	0.501	-0.392	0.082	0.153	<0.001	106
	2000-3000m	0	0.042	4.918	0.545	0	0.087	0	0.998	132
	3000-4000m	-0.116	0.049	5.29	0.722	-0.266	0.107	0.071	0.02	76
	>4000m	0.71	1.146	1.457	4.037	0.141	0.214	0.02	0.543	21
South Indian Ocean (SI)		n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	0
Subantarctic (SAZ)	0-100m	-0.272	0.775	41.71	23.086	-0.132	0.328	0.017	0.736	9
	100-500m	-0.229	0.474	21.056	15.639	-0.151	0.282	0.023	0.64	12
Antarctic (AAZ)	0-100m	2.689	6.401	78.012	46.542	0.101	0.227	0.01	0.68	19
	100-500m	1.456	0.585	4.13	5.71	0.54	0.172	0.292	0.025	17
	500-1000m	-0.085	0.09	4.607	0.948	-0.115	0.121	0.013	0.353	67
	1000-2000m	0.916	0.286	2.955	2.711	0.505	0.132	0.255	0.003	32
	3000-4000m	0.667	0.377	0.655	2.035	0.416	0.201	0.173	0.097	17
	>4000m	0.308	0.164	2.719	1.208	0.295	0.146	0.087	0.069	39