

The following supplement accompanies the article

Photoacclimation and non-photochemical quenching under *in situ* irradiance in natural phytoplankton assemblages from the Amundsen Sea, Antarctica

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Supplement. Surface irradiance exposure experiments

Table S1. Initial data, photosynthetically active radiation (PAR) during surface irradiance exposure (SIE), and mean \pm SD of quenching analysis of triplicate SIE experiments with surface (S) and subsurface (D) phytoplankton assemblages from the sea ice zone (SIZ), Pine Island Bay (PIB), Pine Island Glacier (PIG), Pine Island Polynya (PIP), Amundsen Polynya (AP), and Antarctic Circumpolar Current (ACC). Effects of lincomycin addition and sampling depth on the recovery of the maximum efficiency of Photosystem II (F_v/F_m) after SIE were tested with repeated-measures ANOVA and were not significant (ns) or significant at * $p < 0.05$, ** $p < 0.01$, or *** $p < 0.001$. DD: diadinoxanthin; DT: diatoxanthin; E_{UML} : mean PAR in the upper mixed layer; na: no data available; *P. antarctica*: *Phaeocystis Antarctica*; qN : non-photochemical quenching; qI : slow-relaxing photoinhibitory quenching; qE : fast-relaxing quenching; z_{UML} : depth of the upper mixed layer

Stn	Depth (m)	Region	Dominant phytoplankton (fraction of chl <i>a</i>)	2nd dominant phytoplankton (fraction of chl <i>a</i>)	F_v/F_m	z_{UML} (m)	E_{UML} ($\mu\text{mol photons m}^{-2} \text{ s}^{-1}$)	Chl <i>a</i> (mg m^{-3})	(DD + DT)/chl <i>a</i>	SIE PAR ($\mu\text{mol photons m}^{-2} \text{ s}^{-1}$)	qN	qE	qI	Lincomycin	Depth
5	10	SIZ	diatoms (0.45)	<i>P. antarctica</i> (0.31)	0.58	25	128	0.38	0.17	1577	0.95 ± 0.02	0.80 ± 0.01	0.15 ± 0.01	***	
7	S (10)	SIZ	<i>P. antarctica</i> (0.61)	diatoms (0.25)	0.54	12	77	1.81	0.10	1991	0.91 ± 0.08	0.52 ± 0.08	0.39 ± 0.02	**	***
	S (20)		<i>P. antarctica</i> (0.59)	diatoms (0.34)	0.56			1.98	0.05		0.99 ± 0.01	0.12 ± 0.05	0.87 ± 0.04		
10	10	SIZ	<i>P. antarctica</i> (0.86)	diatoms (0.12)	0.48	10	83	9.25	0.10	1148	0.92 ± 0.07	0.64 ± 0.02	0.27 ± 0.09	***	
11	S (10)	SIZ	<i>P. antarctica</i> (0.84)	diatoms (0.12)	0.54	12	164	6.57	0.07	166	0.12 ± 0.08	0.17 ± 0.09	-0.05 ± 0.02	***	**
	D (40)		<i>P. antarctica</i> (0.73)	diatoms (0.25)	0.56			4.92	0.03		0.38 ± 0.07	0.20 ± 0.09	0.18 ± 0.04		
13	S (10)	PIP	<i>P. antarctica</i> (0.97)	diatoms (0.03)	0.40	10	159	13.74	0.12	284	0.50 ± 0.41	0.54 ± 0.15	-0.04 ± 0.04	ns	ns
	D (20)		<i>P. antarctica</i> (0.94)	diatoms (0.06)	0.46			9.77	0.07		0.41 ± 0.20	0.36 ± 0.23	0.05 ± 0.03		
14	S (10)	PIP	<i>P. antarctica</i> (0.52)	diatoms (0.46)	0.55	32	92	4.28	0.04	482	0.40 ± 0.02	0.35 ± 0.05	0.06 ± 0.03	***	***
	D (50)		<i>P. antarctica</i> (0.53)	diatoms (0.45)	0.58			4.28	0.04		0.61 ± 0.04	0.44 ± 0.14	0.17 ± 0.11		
17	S (10)	PIG	<i>P. antarctica</i> (0.68)	diatoms (0.30)	0.52	104	44	1.11	0.06	1171	0.67 ± 0.21	0.54 ± 0.21	0.12 ± 0.03	ns	**
	D (25)		<i>P. antarctica</i> (0.86)	diatoms (0.14)	0.61			2.04	0.03		0.61 ± 0.12	0.38 ± 0.09	0.22 ± 0.03		
36	S (10)	PIB	<i>P. antarctica</i> (0.94)	diatoms (0.06)	0.41	25	89	2.71	0.14	1287	0.82 ± 0.10	0.87 ± 0.10	-0.05 ± 0.00	***	*
	D (25)		<i>P. antarctica</i> (0.83)	diatoms (0.16)	0.55			1.80	0.04		0.93 ± 0.07	0.44 ± 0.13	0.48 ± 0.10		
37	10	PIB	<i>P. antarctica</i> (0.87)	diatoms (0.13)	0.46	22	82	6.71	0.11	1706	0.31 ± 0.01	0.21 ± 0.26	0.10 ± 0.02	**	
46	S (10)	PIB	<i>P. antarctica</i> (0.96)	diatoms (0.04)	0.44	14	267	7.94	0.09	1930	0.93 ± 0.12	0.53 ± 0.16	0.39 ± 0.04	**	***
	D (50)		<i>P. antarctica</i> (0.93)	diatoms (0.07)	0.55			4.61	0.04		0.99 ± 0.01	-0.04 ± 0.11	1.03 ± 0.09		
47	10	PIB	<i>P. antarctica</i> (0.94)	diatoms (0.06)	0.49	25	73	4.49	0.11	1584	0.62 ± 0.10	0.56 ± 0.12	0.06 ± 0.05	*	
89	S (10)	PIB	<i>P. antarctica</i> (0.98)	diatoms (0.02)	0.44	16	123	4.70	0.12	391	0.51 ± 0.13	0.52 ± 0.11	0.00 ± 0.03	***	ns
	D (25)		<i>P. antarctica</i> (0.88)	diatoms (0.12)	0.50			2.79	0.06		0.72 ± 0.14	0.61 ± 0.08	0.12 ± 0.11		
91	S (10)	PIP	<i>P. antarctica</i> (0.93)	diatoms (0.07)	0.39	14	81	13.97	0.12	1490	0.80 ± 0.01	0.63 ± 0.13	0.17 ± 0.14	***	***
	D (25)		<i>P. antarctica</i> (0.79)	diatoms (0.21)	0.49			5.65	0.04		0.98 ± 0.02	0.19 ± 0.08	0.79 ± 0.06		
94	10	PIB	<i>P. antarctica</i> (0.81)	diatoms (0.19)	0.45	13	175	3.71	0.10	1400	0.81 ± 0.01	0.62 ± 0.06	0.19 ± 0.05	**	
99	S (10)	PIB	<i>P. antarctica</i> (0.87)	diatoms (0.13)	0.46	27	114	2.99	0.12	1759	0.99 ± 0.02	0.58 ± 0.21	0.41 ± 0.21	***	**
	D (25)		<i>P. antarctica</i> (0.92)	diatoms (0.08)	0.49			3.59	0.10		0.99 ± 0.01	0.29 ± 0.02	0.71 ± 0.03		
102	S (10)	PIP	<i>P. antarctica</i> (0.79)	diatoms (0.21)	0.39	18	108	4.30	0.17	1616	0.83 ± 0.06	0.76 ± 0.05	0.07 ± 0.01	**	*
	D (20)		<i>P. antarctica</i> (0.68)	diatoms (0.31)	0.50			3.21	na		0.99 ± 0.00	0.47 ± 0.02	0.52 ± 0.02		
104	S (10)	PIP	<i>P. antarctica</i> (0.85)	diatoms (0.15)	0.44	19	131	6.28	0.09	1855	0.99 ± 0.02	0.72 ± 0.02	0.27 ± 0.03	***	***
	D (20)		<i>P. antarctica</i> (0.81)	diatoms (0.18)	0.46			6.11	0.05		0.98 ± 0.01	0.45 ± 0.07	0.53 ± 0.08		

105	10	PIP	<i>P. antarctica</i> (0.93)	diatoms (0.07)	0.34	18	108	11.14	0.15	845	0.56 ± 0.03	0.50 ± 0.05	0.06 ± 0.02	**
118	10	AP	<i>P. antarctica</i> (0.74)	diatoms (0.26)	0.49	32	48	6.89	0.09	450	0.49 ± 0.06	0.25 ± 0.05	0.25 ± 0.02	ns
119	S (10)	AP	diatoms (0.59)	<i>P. Antarctica</i> (0.41)	0.59	45	55	3.50	0.10	1358	0.91 ± 0.08	0.70 ± 0.12	0.21 ± 0.08	** *
	D (25)		<i>P. antarctica</i> (0.63)	diatoms (0.37)	0.61			1.48	0.06		0.96 ± 0.03	0.61 ± 0.02	0.36 ± 0.03	
127	S (10)	SIZ	<i>P. antarctica</i> (0.68)	diatoms (0.32)	0.42	10	113	5.82	0.12	698	0.21 ± 0.10	0.13 ± 0.11	0.08 ± 0.03	** ***
	D (25)		<i>P. antarctica</i> (0.74)	diatoms (0.26)	0.56			4.30	0.04		0.25 ± 0.10	0.25 ± 0.10	0.00 ± 0.01	
129	10	PIP	<i>P. antarctica</i> (0.64)	diatoms (0.30)	0.48	19	97	4.63	0.12	404	0.30 ± 0.01	0.21 ± 0.03	0.10 ± 0.02	**
131	S (10)	SIZ	diatoms (0.38)	<i>P. antarctica</i> (0.35)	0.63	10	92	1.19	0.06	1236	0.93 ± 0.06	0.69 ± 0.03	0.24 ± 0.06	*** **
	D (25)		diatoms (0.45)	<i>P. antarctica</i> (0.20)	0.57			0.80	0.06		0.97 ± 0.05	0.67 ± 0.07	0.30 ± 0.03	
133	S (10)	SIZ	diatoms (0.78)	<i>P. antarctica</i> (0.13)	0.37	18	140	1.17	0.19	335	0.50 ± 0.05	0.51 ± 0.04	0.00 ± 0.06	** ns
	D (50)		<i>P. antarctica</i> (0.52)	diatoms (0.32)	0.46			0.67	0.04		0.59 ± 0.04	0.42 ± 0.05	0.17 ± 0.02	
135	10	SIZ	diatoms (0.62)	<i>P. antarctica</i> (0.38)	0.39	10	151	1.20	0.16	1866	0.93 ± 0.01	0.52 ± 0.10	0.41 ± 0.10	**
140	S (10)	SIZ	<i>P. antarctica</i> (0.59)	diatoms (0.41)	0.44	27	19	7.05	0.10	579	0.51 ± 0.09	0.48 ± 0.10	0.04 ± 0.02	*** *
	D (25)		<i>P. antarctica</i> (0.59)	diatoms (0.41)	0.46			9.52	0.08		0.76 ± 0.21	0.69 ± 0.26	0.07 ± 0.08	
148	10	AP	<i>P. antarctica</i> (0.57)	diatoms (0.43)	0.38	24	151	0.56	0.14	1778	0.90 ± 0.04	0.78 ± 0.05	0.12 ± 0.05	***
153	10	AP	<i>P. antarctica</i> (0.72)	diatoms (0.27)	0.49	23	123	1.27	0.06	1778	0.95 ± 0.07	0.21 ± 0.10	0.74 ± 0.13	***
158	10	SIZ	<i>P. antarctica</i> (0.81)	diatoms (0.18)	0.42	15	64	3.61	0.12	1386	0.93 ± 0.02	0.79 ± 0.06	0.13 ± 0.09	ns
160	10	ACC	diatoms (0.85)	<i>P. antarctica</i> (0.15)		37	178	0.40	0.27	632	0.76 ± 0.06	0.72 ± 0.06	0.04 ± 0.07	**