

Chlorophyll *a* concentration of phytoplankton during a cruise of the 45th Japanese Antarctic Research Expedition in 2003–2004

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1. Introduction

This is a report on the phytoplankton chlorophyll *a* concentration on a cruise of the icebreaker *Shirase* during the 45th Japanese Antarctic Research Expedition (JARE) in 2003–2004 austral summer. Chlorophyll *a* concentration of phytoplankton was measured in two series: (1) spatial variation of chlorophyll *a* in the surface water along the cruise track, and (2) vertical profile of chlorophyll *a* in the Indian Ocean sector of the Southern Ocean.

2. Materials and methods

Surface seawater was sampled usually two or three times a day by pumping up through the hull. Subsurface water was collected with a Niskin bottle attached to the Rosette multi-sampler on a CTD or Van-Dorn bottle. Seawater samples of 200–300 ml were filtered onto a glass fiber filter (Whatman, GF/F). The filter was immediately soaked in *N,N*-dimethylformamide (Suzuki and Ishimaru, 1990), and pigments were extracted. The concentration of chlorophyll *a* and pheopigments were determined fluorometrically (Parsons *et al.*, 1984) with a fluorometer (Turner Design, 10-AU). The fluorometer was calibrated against a chlorophyll *a* standard (Sigma Chemical Co.) using a spectrophotometer and the value of specific absorption coefficient obtained by Porra *et al.* (1989).

3. Data

Map of the sampling stations during JARE-45 cruise is illustrated in Fig. 1. Chlorophyll *a* and pheopigments concentration in sea surface and subsurface water are shown in Tables 1 and 2, respectively. The data in this report are available on digital media.

4. Scientists on board

Sampling and analysis were carried out by M. Iida, M. Matsuzaki and S. Kudoh.

5. Data policy

Before using the data for publication or presentation, please request permission in writing. Inquiries should be addressed to:

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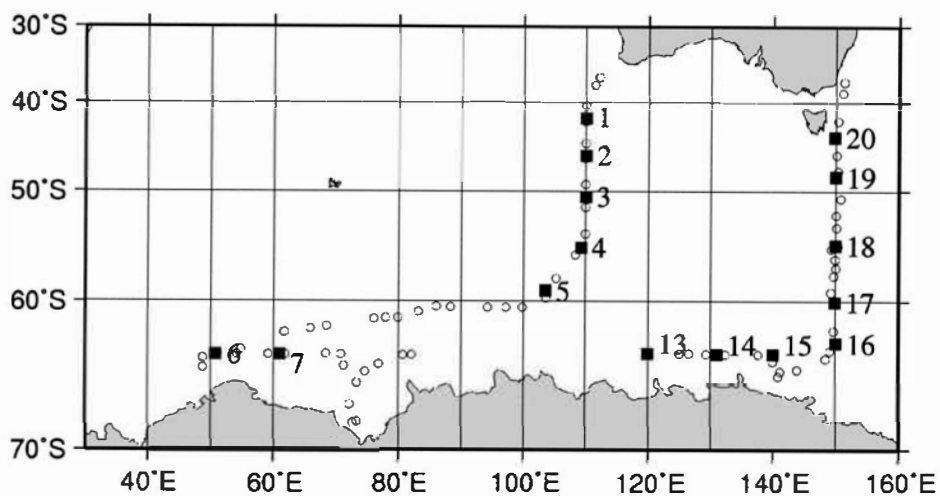


Fig. 1. Map showing the sites of sampling stations during JARE-45 in 2003/04. Open circles indicate surface water sampling by pump. Solid squares are stations for vertical water sampling.

Table 1. Chlorophyll *a* and pheopigments concentration of surface water pumped up from hull during JARE-45.

Sample #	Date (GMT)	Time (GMT)	Latitude		Longitude		Chl. <i>a</i> (mg m ⁻³)	Pheo. (mg m ⁻³)		
			Degrees	Minutes	Degrees	Minutes				
Fremantle, Australia										
45FS01	2003/12/4	6:30	36	52.76	S	112	4.52	E	0.44	0.09
45FS02	2003/12/4	11:00	37	50.67	S	111	26.62	E	0.44	0.06
45FS03	2003/12/4	23:10	40	24.44	S	110	0.02	E	0.35	0.06
45FS04	2003/12/5	5:00	41	42.21	S	110	0.51	E	0.32	0.02
45FS05	2003/12/5	12:00	42	11.75	S	109	59.98	E	0.32	-0.01
45FS06	2003/12/5	23:15	44	47.16	S	110	0.67	E	0.48	0.07
45FS07	2003/12/6	5:00	46	0.64	S	110	0.38	E	1.20	0.17
45FS08	2003/12/6	12:00	46	27.70	S	110	0.10	E	1.09	0.16
45FS09	2003/12/6	23:45	49	17.57	S	110	0.43	E	0.37	0.04
45FS10	2003/12/7	5:00	50	29.07	S	110	0.66	E	0.66	0.26
45FS11	2003/12/7	12:00	51	37.98	S	110	0.36	E	0.27	0.03
45FS12	2003/12/7	23:30	54	12.72	S	109	59.59	E	0.43	0.06
45FS13	2003/12/8	5:00	55	20.93	S	109	29.27	E	0.49	0.07
45FS14	2003/12/8	12:00	56	7.15	S	108	20.28	E	0.34	0.11
45FS15	2003/12/8	23:30	58	6.63	S	105	15.82	E	0.33	0.01
45FS16	2003/12/9	5:00	59	2.48	S	103	46.61	E	0.48	0.03
45FS17	2003/12/9	12:00	59	45.22	S	103	40.81	E	0.33	0.03
45FS18	2003/12/9	23:00	60	29.99	S	99	51.29	E	0.67	0.28
45FS19	2003/12/10	5:00	60	28.99	S	97	13.48	E	0.86	0.24
45FS20	2003/12/10	12:00	60	29.81	S	94	14.93	E	0.65	0.07
45FS21	2003/12/11	1:00	60	27.72	S	88	19.19	E	0.51	0.03
45FS22	2003/12/11	6:00	60	25.71	S	86	1.60	E	1.51	0.12
45FS23	2003/12/11	13:00	60	48.03	S	83	9.23	E	0.28	0.05
45FS24	2003/12/12	0:51	61	17.62	S	79	55.80	E	0.66	0.04
45FS25	2003/12/12	8:50	61	20.79	S	77	47.52	E	0.52	0.03
45FS26	2003/12/12	13:00	61	24.08	S	75	53.85	E	0.49	0.03
45FS27	2003/12/13	2:20	61	56.56	S	68	24.53	E	0.52	0.04
45FS28	2003/12/13	7:00	62	7.72	S	65	42.04	E	0.27	0.00
45FS29	2003/12/13	14:00	62	24.59	S	61	36.87	E	0.19	0.01
45FS30	2003/12/14	2:00	63	41.23	S	54	43.49	E	0.24	0.00
Syowa Station, Antarctica										
45SS01	2004/2/22	12:32	64	58.29	S	48	39.94	E	0.43	0.04
45SS02	2004/2/22	16:00	64	16.59	S	48	39.94	E	0.19	0.01
45SS03	2004/2/23	3:50	64	0.26	S	50	38.36	E	0.24	0.04
45SS04	2004/2/23	9:00	63	56.51	S	51	9.06	E	0.13	-0.03
45SS05	2004/2/23	16:00	63	59.99	S	54	3.02	E	0.11	0.01
45SS06	2004/2/24	4:00	64	0.01	S	59	1.88	E	0.34	0.04
45SS07	2004/2/24	8:00	63	59.78	S	60	42.77	E	0.47	0.07
45SS08	2004/2/24	15:00	63	59.93	S	61	52.81	E	0.39	0.05
45SS09	2004/2/25	3:00	64	0.06	S	68	12.56	E	0.28	0.04
45SS10	2004/2/25	8:00	63	59.89	S	70	40.63	E	0.24	0.05
45SS11	2004/2/25	15:00	64	47.80	S	71	5.82	E	0.27	0.03
45SS12	2004/2/26	2:00	67	20.04	S	72	3.68	E	3.93	0.35
45SS13	2004/2/26	7:00	68	26.51	S	72	30.31	E	3.41	0.57
45SS14	2004/2/26	14:00	68	21.48	S	73	8.57	E	3.73	0.76
45SS15	2004/2/27	2:00	65	57.85	S	73	6.54	E	1.22	0.28
45SS16	2004/2/27	7:00	65	12.99	S	74	28.46	E	0.57	0.05

Table 1. Continued.

Sample #	Date (GMT)	Time (GMT)	Latitude			Longitude		Chl. <i>a</i> (mg m ⁻³)	Pheo. (mg m ⁻³)	
			Degrees	Minutes		Degrees	Minutes			
45SS17	2004/2/27	14:00	64	41.09	S	76	40.58	E	0.26	0.04
45SS18	2004/2/28	2:00	64	1.53	S	80	41.37	E	0.26	0.01
45SS19	2004/2/28	7:00	64	0.03	S	82	7.51	E	0.39	0.06
45SS40	2004/3/6	5:00	63	59.84	S	124	55.51	E	0.04	0.00
45SS41	2004/3/6	11:00	63	59.61	S	126	27.90	E	0.07	0.01
45SS42	2004/3/6	23:00	63	59.69	S	129	20.79	E	0.12	0.00
45SS43	2004/3/7	4:00	64	0.11	S	130	56.93	E	0.13	0.02
45SS44	2004/3/7	11:00	64	0.03	S	132	24.67	E	0.07	-0.01
45SS45	2004/3/7	22:00	63	59.97	S	137	40.63	E	0.04	0.00
45SS46	2004/3/8	3:00	63	59.75	S	139	49.22	E	0.03	0.00
45SS47	2004/3/8	10:00	64	30.05	S	140	0.22	E	0.04	0.01
45SS48	2004/3/8	22:00	65	31.21	S	140	53.76	E	0.13	0.01
45SS49	2004/3/9	3:00	65	9.97	S	141	9.03	E	0.13	0.02
45SS50	2004/3/9	10:00	65	3.60	S	143	54.24	E	0.07	0.01
45SS51	2004/3/9	21:00	64	16.75	S	148	24.49	E	0.06	0.00
45SS52	2004/3/10	2:00	63	45.31	S	149	5.27	E	0.05	0.01
45SS53	2004/3/10	9:00	63	20.09	S	149	43.85	E	0.07	0.01
45SS54	2004/3/10	21:00	63	11.60	S	150	0.20	E	0.06	0.02
45SS55	2004/3/11	9:00	62	16.37	S	149	40.25	E	0.13	0.01
45SS56	2004/3/11	21:00	60	9.13	S	149	53.85	E	0.10	0.02
45SS57	2004/3/12	2:00	59	59.51	S	150	2.36	E	0.10	0.01
45SS58	2004/3/12	9:00	59	17.00	S	149	13.00	E	0.09	0.00
45SS59	2004/3/12	20:50	57	52.98	S	149	40.49	E	0.06	0.03
45SS60	2004/3/13	2:00	57	13.71	S	150	2.82	E	0.10	0.03
45SS61	2004/3/13	9:00	56	30.26	S	149	52.89	E	0.07	0.00
45SS62	2004/3/13	21:00	55	34.53	S	149	19.49	E	0.25	0.06
45SS63	2004/3/14	2:00	55	18.71	S	149	52.19	E	0.11	0.00
45SS64	2004/3/14	9:00	55	20.91	S	150	20.76	E	0.12	-0.01
45SS65	2004/3/14	21:00	53	36.43	S	150	8.35	E	0.35	0.10
45SS66	2004/3/15	2:00	52	24.72	S	150	2.91	E	0.33	0.09
45SS67	2004/3/15	9:00	50	44.28	S	150	47.15	E	0.60	0.15
45SS68	2004/3/15	20:45	48	31.98	S	150	1.35	E	0.33	0.19
45SS69	2004/3/16	2:50	47	51.74	S	150	20.36	E	0.74	0.16
45SS70	2004/3/16	9:00	46	8.67	S	150	8.00	E	0.55	0.07
45SS71	2004/3/16	20:45	44	6.01	S	149	55.94	E	2.15	-0.17
45SS72	2004/3/17	3:00	43	54.89	S	149	56.75	E	1.23	0.15
45SS73	2004/3/17	9:00	42	12.52	S	150	20.73	E	0.29	0.09
45SS74	2004/3/17	21:00	38	46.60	S	151	4.33	E	0.25	0.06
45SS75	2004/3/18	2:00	37	22.63	S	151	18.41	E	0.28	0.15

Sydney, Australia

Table 2. Vertical profile of chlorophyll *a* and pheopigments concentration during JARE-45. ND indicates no data.

Station	Date	Position	Depth (m)	Chl. <i>a</i> (mg m ⁻³)	Pheo. (mg m ⁻³)	Station	Date	Position	Depth (m)	Chl. <i>a</i> (mg m ⁻³)	Pheo. (mg m ⁻³)
1	2003/12/5	41 - 51 S 110 - 0 E	0	0.27	0.06	6	2004/2/23	64 - 0 S 50 - 49 E	0	0.05	0.00
			10	0.28	0.10				10	0.05	-0.01
		20	0.30	0.08	20			0.04	-0.01		
		30	0.34	0.12	30			0.04	0.00		
		50	0.37	0.17	50			0.04	-0.01		
		75	0.35	0.22	75			ND	ND		
		100	0.07	0.06	100			0.12	0.05		
		125	0.01	0.02	125			0.04	0.01		
		150	0.00	0.01	150			ND	ND		
		200	0.00	0.01	200			0.02	0.01		
2	2003/12/6	46 - 10 S 110 - 2 E	0	0.98	0.17	7	2004/2/24	64 - 0 S 60 - 56 E	0	0.10	0.00
			10	1.01	0.22				10	0.08	-0.01
		20	0.91	0.34	20			0.10	0.00		
		30	0.85	0.13	30			0.10	0.00		
		50	0.63	0.30	50			0.12	-0.01		
		75	0.53	0.24	75			0.16	0.03		
		100	0.51	0.27	100			0.14	0.06		
		125	0.37	0.17	125			0.07	0.05		
		150	0.21	0.16	150			0.03	0.01		
		200	0.03	0.06	200			0.00	0.00		
3	2003/12/7	50 - 35 S 110 - 2 E	0	0.42	0.10	13	2004/3/5	63 - 56 S 119 - 55 E	0	0.60	-0.04
			10	0.41	0.06				10	0.60	0.04
		20	0.52	0.04	20			0.62	0.04		
		30	0.52	0.06	30			0.67	0.04		
		50	ND	ND	50			0.71	0.14		
		75	ND	ND	75			0.35	0.10		
		100	ND	ND	100			0.12	0.05		
		125	ND	ND	125			0.11	0.04		
		150	ND	ND	150			0.07	0.06		
		200	ND	ND	200			0.05	0.02		
4	2003/12/8	55 - 28 S 109 - 18 E	0	0.77	0.04	14	2004/3/7	64 - 0 S 131 - 5 E	0	0.26	-0.02
			10	0.71	0.05				10	0.27	0.01
		20	0.79	0.05	20			0.25	0.01		
		30	0.72	0.08	30			0.27	-0.02		
		50	1.33	0.16	50			0.24	0.00		
		75	0.45	0.12	75			0.39	0.16		
		100	0.33	0.12	100			0.12	0.05		
		125	ND	ND	125			0.07	0.03		
		150	ND	ND	150			0.03	0.03		
		200	ND	ND	200			0.01	0.02		
5	2003/12/9	59 - 9 S 103 - 33 E	0	0.29	0.03	15	2004/3/8	63 - 59 S 140 - 1 E	0	0.16	0.00
			10	0.26	0.03				10	0.16	0.01
		20	0.29	0.01	20			0.15	0.04		
		30	0.25	0.02	30			0.15	0.00		
		50	0.27	0.05	50			0.15	-0.01		
		75	0.35	0.06	75			0.49	0.09		
		100	0.34	0.10	100			0.28	0.14		
		125	0.18	0.08	125			0.06	0.04		
		150	0.03	0.02	150			0.08	0.02		
		200	0.01	0.02	200			0.01	0.02		

Table 2. Continued.

Station	Date	Position	Depth (m)	Chl. <i>a</i> (mg m ⁻³)	Pheo. (mg m ⁻³)	
16	2004/3/10	63 - 12 S 150 - 2 E	0	0.11	0.01	
			10	0.14	-0.01	
				20	0.12	-0.01
				30	0.13	-0.02
				50	0.20	0.01
				75	0.46	0.06
				100	0.06	0.03
				125	0.04	0.02
				150	0.01	0.02
				200	0.00	0.02
17	2004/3/11	60 - 3 S 149 - 51 E	0	0.11	0.01	
			10	0.09	0.01	
				20	0.08	0.02
				30	0.07	0.01
				50	0.09	0.01
				75	0.17	0.00
				100	0.25	0.13
				125	0.06	0.00
				150	0.02	0.02
				200	0.01	0.02
18	2004/3/14	55 - 16 S 149 - 56 E	0	0.10	0.00	
			10	0.11	0.00	
				20	0.10	0.01
				30	0.11	0.01
				50	0.10	0.01
				75	0.17	-0.01
				100	0.20	0.07
				125	0.10	0.04
				150	0.07	0.05
				200	0.04	0.03
19	2004/3/15	48 - 29 S 149 - 57 E	0	0.40	0.13	
			10	0.45	0.16	
				20	0.46	0.19
				30	0.35	0.18
				50	0.80	0.18
				75	0.54	0.19
				100	0.25	0.16
				125	0.03	0.03
				150	0.01	0.04
				200	0.01	0.03
20	2004/3/16	44 - 6 S 149 - 47 E	0	1.34	0.14	
			10	1.44	0.15	
				20	1.21	0.30
				30	1.69	0.21
				50	0.91	0.14
				75	0.09	0.02
				100	0.04	0.03
				125	0.05	0.04
				150	0.05	0.04
				200	0.00	0.02