Report on Phytoplankton Pigments measured during the JARE-36~-39 Cruises to Syowa Station, Antarctica in 1994–1998

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This is a report on the phytoplankton pigments measured on the icebreaker SHIRASE during the JARE 36-39 cruises to and from Syowa Station, Antarctica in 1994-1998. Concentrations of phytoplankton pigments were measured in two series: (1) geographical variations of chlorophyll *a* in the surface water along the course of the cruise, and (2) vertical profiles of chlorophyll *a* in the Indian sector of the Southern Ocean.

Surface water was sampled two or three times a day by the continuously pumping up from hull (see Fukuchi and Hattori, 1987). Subsurface water was collected by a Niskin bottle attached to the CTD profiling system (conductivity, temperature and depth, see Oikawa and Iwamoto, 1999; Oikawa and Miura, 1999; Yoritaka and Namiki, 1999). For the determination of chlorophyll *a* and phaeopigments, each water sample was filtered onto a glass fiber filter. The filter was immediately soaked in 90% acetone (Parsons *et al.*, 1984) during JARE-36 and soaked in N, N-dimethylformamide (Suzuki and Ishimaru, 1990) during JARE-37, 38 and 39, and pigments were extracted. The concentrations of chlorophyll *a* and phaeopigments were determined fluorometrically with a Turner Designs model 10R fluorometer (Parsons *et al.*, 1984). The fluorometer was calibrated with a spectrophotometer using the pure value of chlorophyll *a* (SIGMA) specific absorption coefficient in N, N-dimethylformamide (Porra *et al.*, 1989).

Tables 1, 2, 3 and 4 show the data of the geographical variations of chlorophyll *a* and phaeopigments in the surface water. Vertical profiles of the chlorophyll *a* and phaeopigments were measured at 21, 16, 12 and 14 stations during JARE-36, 37, 38 and 39 cruises, respectively, in the Indian sector of the Southern Ocean (Tables 5, 6, 7 and 8). Figures 1, 2, 3 and 4 show the sites of sampling stations during JARE-36, 37, 38 and 39 cruises, respectively.

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Yoritaka, H. and Namiki, M. (1999): Oceanographic data of the 36th Japanese Antarctic Research Expedition from November 1994 to March 1995. JARE Data Rep., **244** (Oceanography 19), 54 p.

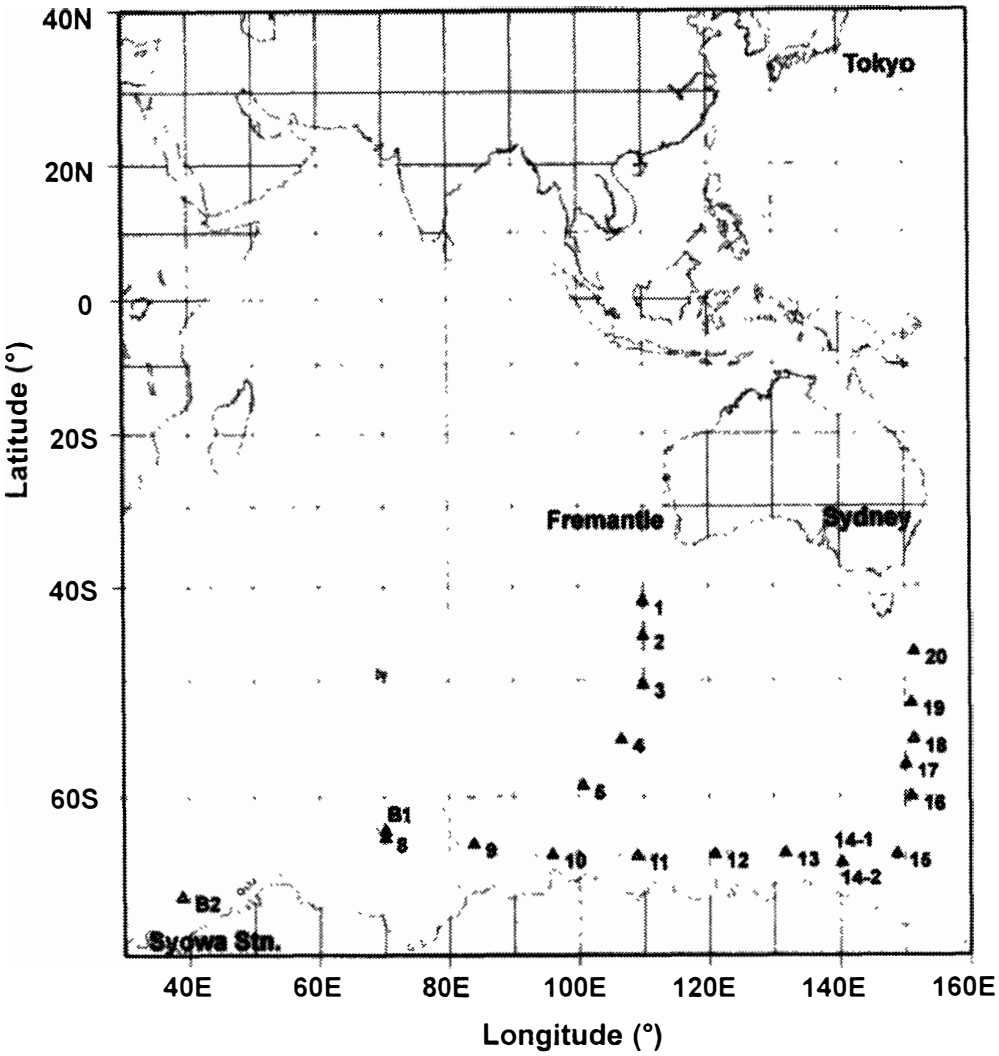

Fig. 1. The sites of sampling stations during JARE-36 in 1994/95. Open circles indicate surface water sampling stations and solid triangles indicate vertical water sampling stations.

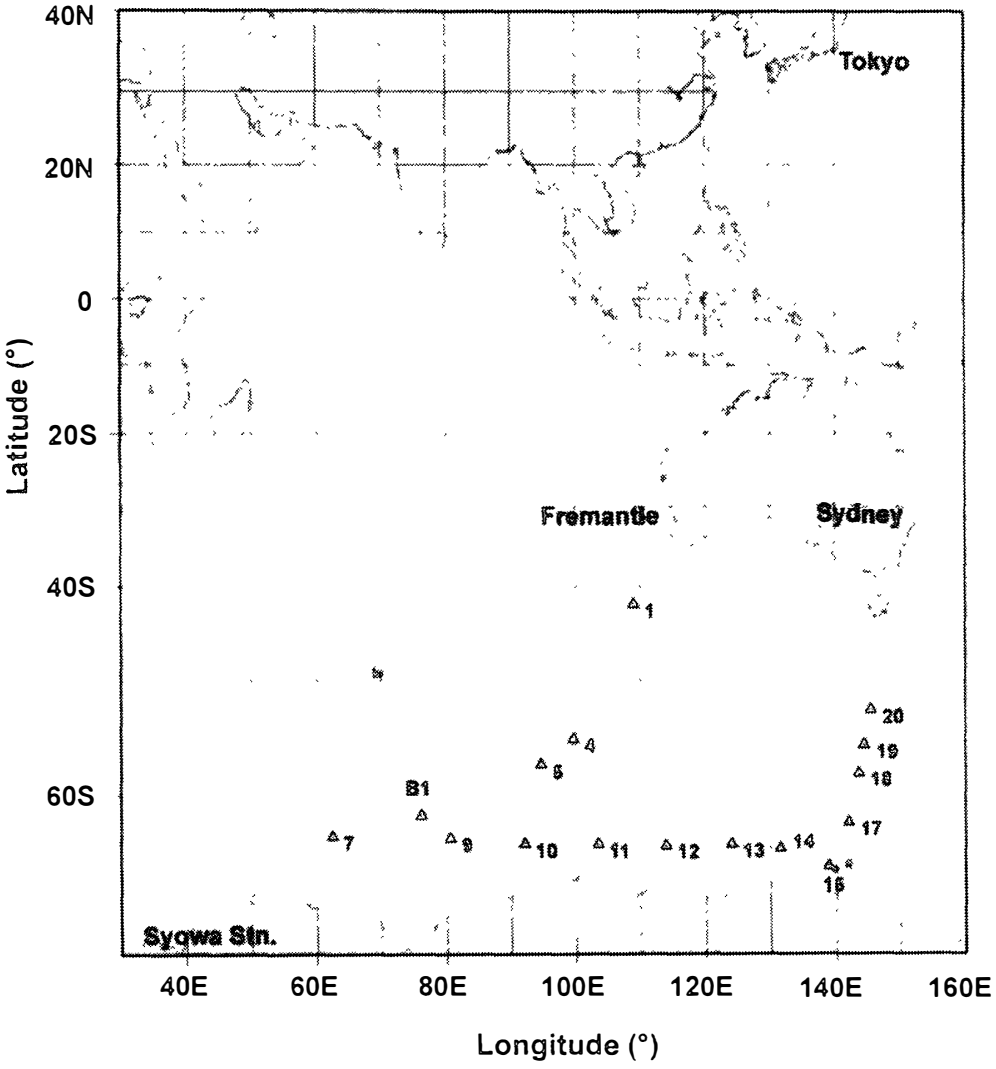

Fig. 2. As Fig. 1, but during JARE-37 in 1995/96.

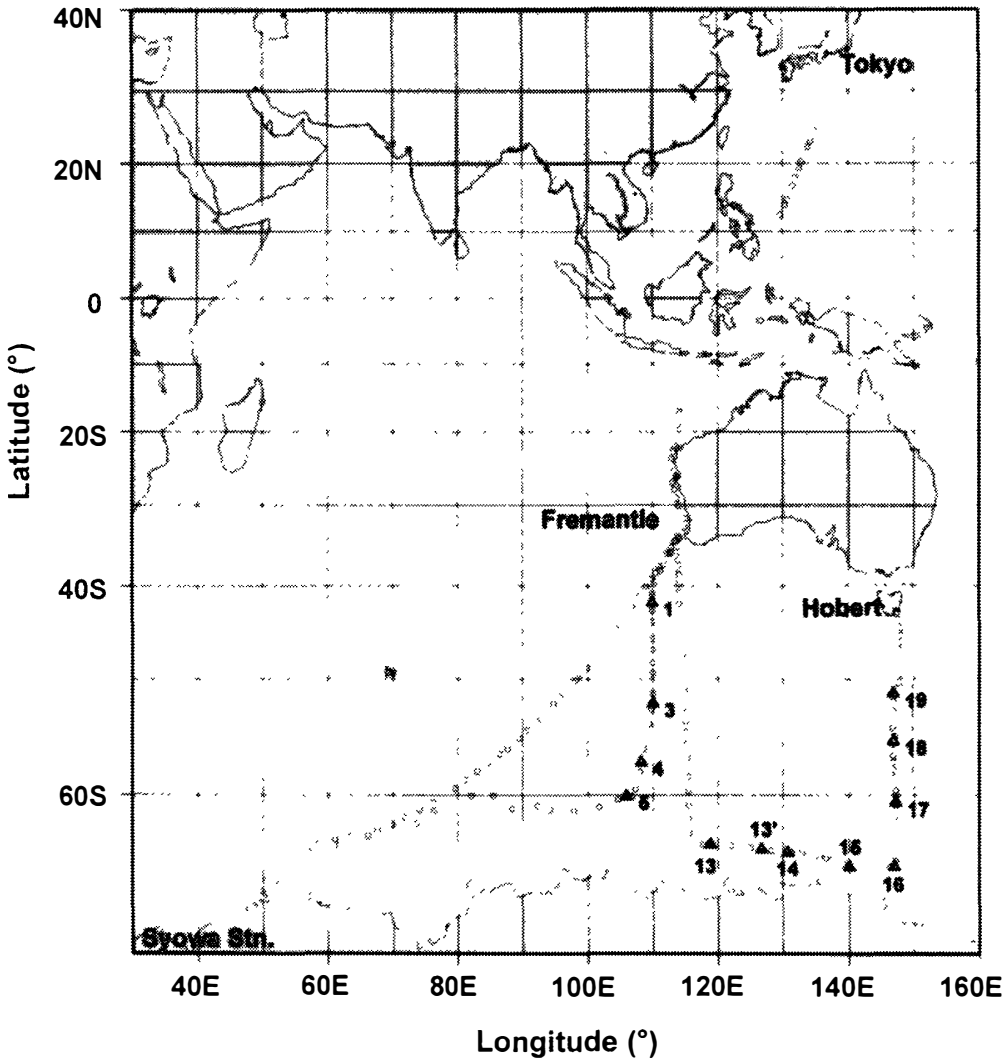

Fig. 3. As Fig. 1, but during JARE-38 in 1996/97.

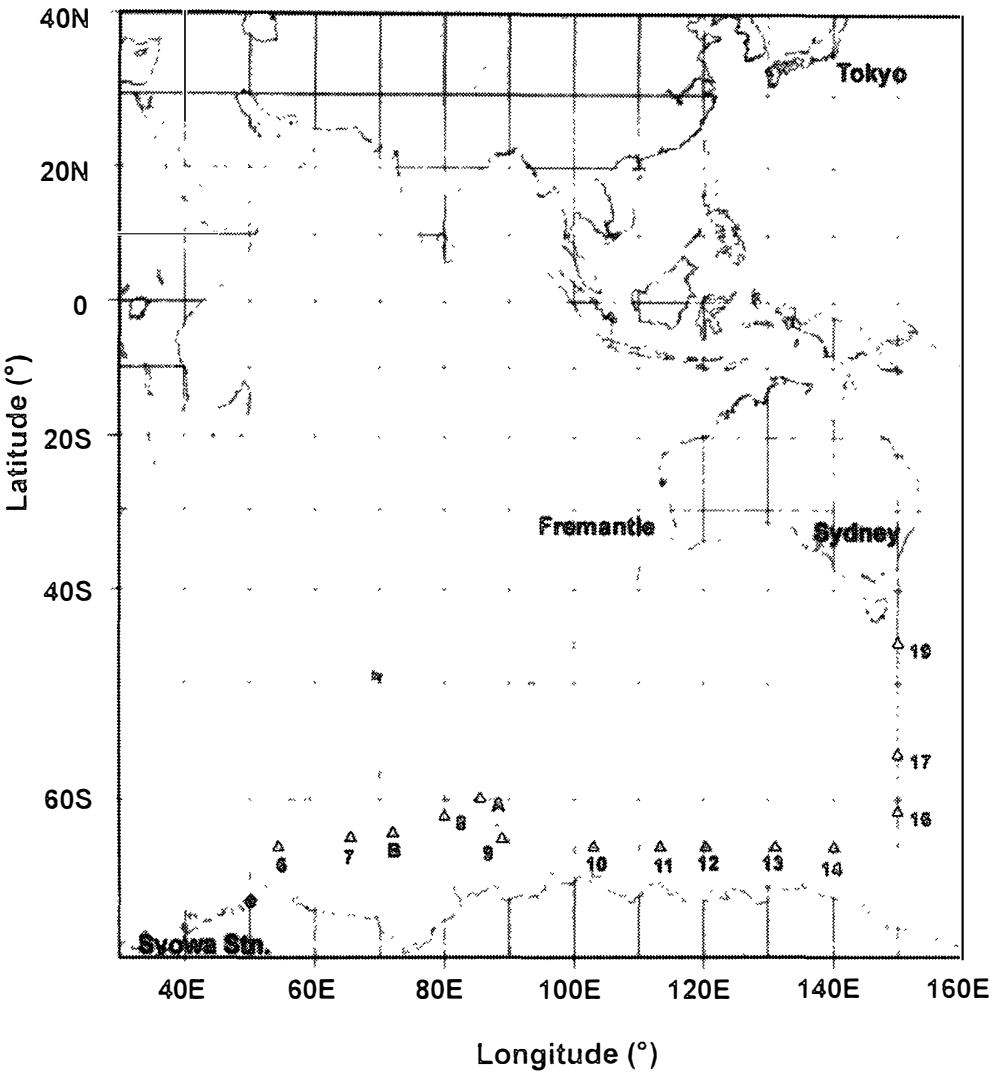

Fig. 4. As Fig. 1, but during JARE-39 in 1997/98.

Table 1. Surface chlorophyll *a* concentrations and phaeopigments and associated data collected during the JARE-36 cruise of the icebreaker SHIRASE in 1994/95.

Sample #	GMT Year / Month / Day	Time	Latitude Degrees	minutes		Longitude Degrees	minutes		Chl. *a* (μg/L)	Phaeo. (μg/L)
36M001	1994/11/14	23:00	31	10.0	N	137	46.8	E	0.041	0 025
2	1994/11/15	8:00	29	5.4	N	136	46.4	E	0.035	0.023
3	1994/11/15	23:00	25	40.5	N	135	3.9	E	0.045	0.023
4	1994/11/16	8:00	23	42.0	N	134	7.6	E	0.007	0.005
5	1994/11/16	23:00	20	13.7	N	132	44.4	E	0.030	0.016
6	1994/11/17	8:00	18	10.6	N	131	51.4	E	0 020	0.012
7	1994/11/17	23:00	14	40.0	N	130	13.8	E	0.025	0.016
8	1994/11/18	8:00	12	29.5	N	129	19 0	E	0.026	0.015
9	1994/11/18	23:00	8	58.4	N	127	50.0	E	0.031	0.015
10	1994/11/19	8:00	6	44.3	N	126	54.9	E	0.016	0 013
11	1994/11/19	23:00	3	55.3	N	123	50.1	E	0.058	0.017
12	1994/11/20	8:00	2	33.1	N	121	48.1	E	0.030	0 008
13	1994/11/20	23:00	0	13.3	S	119	16.5	E	0.122	0.044
14	1994/11/21	7:30	2	29.0	S	118	39.3	E	0 074	0.018
15	1994/11/21	23:00	5	54.9	S	116	52.3	E	0.078	0.027
16	1994/11/22	8:00	8	5.0	S	115	58.4	E	0.052	0.021
17	1994/11/22	23:00	11	42.1	S	115	9.0	E	0.049	0.025
18	1994/11/23	8:00	13	51.1	S	114	45.0	E	0.033	0.018
19	1994/11/23	23:00	17	24.1	S	114	7.9	E	0.020	0.012
20	1994/11/24	8:00	19	20.5	S	113	45.5	E	0.019	0.014
21	1994/11/24	23:00	22	44.3	S	113	6.8	E	0.045	0.019
22	1994/11/25	8:00	24	44.6	S	112	43.2	E	0.043	0.015
23	1994/11/25	23:00	27	57.7	S	113	7.3	E	0.043	0.021
24	1994/11/26	8:00	29	35.0	S	113	44.0	E	0.037	0 014
25	1994/11/26	23:00	31	42.6	S	115	14.1	E	0.052	0.026
26	1994/12/3	8:00	32	48.0	S	114	56.2	E	0.040	0 014
27	1994/12/3	23:30	36	17.8	S	112	57.8	E	0.077	0 035
28	1994/12/4	13.00	38	43.0	S	111	22.3	E	0.069	0.027
29	1994/12/4	23:30	40	44.1	S	110	17.8	E	0.068	0.028
30	1994/12/5	13:00	41	57.0	S	110	0.0	E	0.067	0 034
31	1994/12/5	23:30	44	22.7	S	110	0.6	E	0.116	0.053
32	1994/12/6	13:00	46	31.9	S	109	54.2	E	0.155	0.067
33	1994/12/6	23:30	49	7.7	S	109	58.2	E	0.157	0.069
34	1994/12/7	13.00	51	48.6	S	109	8.6	E	0.608	0 169
35	1994/12/7	23:30	54	12.3	S	107	31.6	E	0 315	0 107
36	1994/12/8	13.00	56	14.4	S	105	15.6	E	0.179	0.053
37	1994/12/8	23:30	58	13.7	S	102	8.4	E	0.249	0.055
38	1994/12/9	13:00	59	15.8	S	98	22.4	E	0.386	0.149
39	1994/12/9	23:00	59	26.0	S	94	10.3	E	0.275	0 096
40	1994/12/10	13:00	59	41.7	S	87	54.1	E	0.174	0 052
41	1994/12/11	0:30	59	52.6	S	83	30.4	E	0.081	0 021
42	1994/12/11	14:00	60	54.5	S	78	39.5	E	0.258	0.057
43	1994/12/12	1:30	61	52.2	S	73	29.7	E	0.181	0 034
44	1994/12/12	15·00	62	30.0	S	68	42.0	E	0.266	0 058
45	1994/12/13	1:30	62	31.4	S	63	4 8	E	0.253	0 066
46	1994/12/13	15:00	62	35.1	S	56	7.1	E	0 058	0 017
47	1994/12/14	2:30	64	7.6	S	51	18.1	E	0.071	0.020

Sample #	GMT Year / Month / Day	Time	Latitude Degrees	minutes	Longitude Degrees	minutes	Chl *a* (μg/L)	Phaeo (μg/L)
48	1995/2/20	3.30	67	22.9 S	36	21.4 E	0 400	0.141
49	1995/2/20	16.40	66	39.1 S	41	16.3 E	0 072	0.023
50	1995/2/21	3·30	66	20.6 S	47	46.7 E	0.337	0 105
51	1995/2/21	16:40	66	45 6 S	46	7 6 E	0 364	0 146
52	1995/2/22	3:30	66	22.5 S	47	48.9 E	0 342	0 163
53	1995/2/22	16·30	66	0.6 S	48	55 9 E	0.404	0 152
54	1995/2/23	3·30	66	19 0 S	48	40 5 E	0 342	0.194
55	1995/3/1	16.30	65	45.8 S	49	28.8 E	0.141	0 060
56	1995/3/2	3:30	65	15.1 S	50	57.3 E	0.154	0.059
57	1995/3/2	16:30	65	17.7 S	54	20.2 E	0.091	0 041
58	1995/3/3	2.30	64	55 1 S	59	9.7 E	0 070	0 031
59	1995/3/3	15:30	63	44.4 S	64	30 5 E	0 157	0 045
60	1995/3/4	2:30	63	1 5 S	70	0 5 E	0 070	0 021
61	1995/3/4	15·30	63	9 7 S	75	10 2 E	0 098	0 030
62	1995/3/5	1.30	63	24.7 S	81	1.0 E	0.132	0 045
63	1995/3/5	14·30	63	56.2 S	87	20.3 E	0.080	0 023
64	1995/3/6	0:30	64	5.4 S	93	3 3 E	0 189	0 048
65	1995/3/6	13:30	64	5.0 S	99	54.7 E	0 154	0 033
66	1995/3/6	23·30	64	7 0 S	105	45.9 E	0.039	0 013
67	1995/3/7	12:30	64	12.4 S	111	35.4 E	0 130	0 024
68	1995/3/7	23·30	64	10 2 S	118	1 7 E	0 071	0 018
69	1995/3/8	12 30	64	2 5 S	123	2.5 E	0 071	0 015
70	1995/3/8	22.30	63	56.3 S	128	40.9 E	0 078	0.021
71	1995/3/9	11·30	64	20.2 S	134	23 3 E	0 111	0 032
72	1995/3/9	21 30	64	36.6 S	138	31 5 E	0 062	0 014
73	1995/3/10	10:30	64	45.2 S	140	14.7 E	0 063	0.020
74	1995/3/10	21·30	64	18.5 S	145	50.7 E	0 060	0.018
75	1995/3/11	10:30	64	17.1 S	148	38.4 E	0 104	0 013
76	1995/3/11	20.30	64	14.3 S	148	37 9 E	0 094	0.028
77	1995/3/12	9·30	62	10 4 S	148	42.8 E	0 045	0 019
78	1995/3/12	20:30	60	31.1 S	150	13.8 E	0 051	0 023
79	1995/3/13	9·30	59	39 7 S	150	38 9 E	0 061	0 018
80	1995/3/13	20 30	57	44.6 S	149	52 4 E	0 070	0 031
81	1995/3/14	9 30	56	43.1 S	150	18 2 E	0 044	0 019
82	1995/3/14	20·30	55	16.1 S	151	39 6 E	0.057	0 025
83	1995/3/15	9.30	55	22.1 S	151	22 6 E	0 027	0 011
84	1995/3/15	20·30	53	22.1 S	151	17.7 E	0.083	0 038
85	1995/3/16	9·30	51	8 3 S	150	24 2 E	0 155	0 067
86	1995/3/16	20.30	48	34.7 S	151	10 0 E	0 162	0 094
87	1995/3/17	9:30	45	49 3 S	151	35 1 E	0.258	0 108
88	1995/3/17	20.30	42	45 5 S	151	35 3 E	0 404	0 018
89	1995/3/18	9·30	39	30 8 S	152	8 1 E	0 151	0 075
90	1995/3/18	20 30	37	15 7 S	153	20 7 E	0 085	0 036
91	1995/3/19	9·30	34	47.2 S	153	23 8 E	0.141	0 071
92	1995/3/19	20·30	33	47.9 S	151	58.6 E	0.078	0 039

Table 2. Surface chlorophyll *a* concentrations and phaeopigments and associated data collected during the JARE-37 cruise of the icebreaker SHIRASE in 1995/96.

Sample #	GMT Year/Month/Day	Time	Latitude Degrees	minutes		Longitude Degrees	minutes		Chl.*a* (μg / L)	Pheo. (μg / L)
37TF01	1995/11/16	10:20	23	9.70	N	133	59.00	E	0.13	0.06
2	1995/11/16	22:10	20	15.30	N	132	41.80	E	0.15	0.07
3	1995/11/17	10:43	17	25.70	N	131	28.30	E	0.07	0.02
4	1995/11/17	22:55	14	21.50	N	130	13.70	E	0.18	0.04
5	1995/11/18	14:01	11	0.50	N	128	42.10	E	0.15	0.08
6	1995/11/18	22:55	8	51.90	N	127	48.40	E	0.21	0.06
7	1995/11/19	10:27	6	6.30	N	126	37.80	E	0.07	0.03
8	1995/11/19	23:00	3	54.20	N	123	52.10	E	0.07	0.03
9	1995/11/20	10:40	2	12.90	N	121	18.30	E	0.15	0.05
10	1995/11/20	22:55	0	1.10	S	119	15.80	E	0.12	0.03
11	1995/11/21	10:50	2	44.10	S	118	35.00	E	0.53	-0.16
12	1995/11/21	22:55	5	22.50	S	117	9.60	E	0.38	0.06
13	1995/11/22	10:50	8	10.10	S	115	57.60	E	0.25	0.06
14	1995/11/22	22:55	10	45.60	S	115	19.90	E	0.18	0.04
15	1995/11/23	10:40	13	31.40	S	114	50.60	E	0.09	0.03
16	1995/11/23	22:55	16	21.50	S	114	21.50	E	0.08	0.03
17	1995/11/24	10:45	18	51.70	S	113	54.00	E	0.07	0.02
18	1995/11/24	22:55	21	33.80	S	113	22.20	E	0.18	0.08
19	1995/11/25	10:40	24	11.30	S	112	50.90	E	0.09	0.02
20	1995/11/25	23:00	27	2.00	S	112	59.40	E	0.16	0.03
21	1995/11/26	11:10	29	37.80	S	113	41.70	E	0.07	0.02
22	1995/11/26	22:45	31	33.00	S	115	5.50	E	0.15	0.03
37FS01	1995/12/3	11:40	33	33.60	S	114	22.80	E	0.10	0.02
2	1995/12/03	23:55	36	4.60	S	112	43.10	E	0.21	0.10
3	1995/12/04	11:35	38	30.40	S	111	3.50	E	0.19	0.06
4	1995/12/05	0:55	41	21.00	S	109	15.50	E	0.37	0.11
5	1995/12/05	12:50	43	6.90	S	108	19.10	E	0.66	0.09
6	1995/12/06	0:55	45	38.90	S	106	55.30	E	0.48	0.15
7	1995/12/06	12:45	47	47.50	S	105	34.10	E	0.41	0.05
8	1995/12/07	0:55	50	14.00	S	104	8.30	E	0.32	0.06
9	1995/12/07	12:45	52	15.50	S	102	35.00	E	0.86	0.07
10	1995/12/08	1:00	54	15.00	S	100	41.70	E	0.99	0.05
11	1995/12/08	12:50	55	47.20	S	99	9.80	E	0.83	0.02
12	1995/12/09	0:55	57	22.90	S	95	55.40	E	0.85	0.06
13	1995/12/09	12:50	57	55.70	S	92	37.30	E	0.94	0.05
14	1995/12/10	1:55	58	49.20	S	87	17.80	E	1.18	-0.01
15	1995/12/10	14:00	59	32.10	S	83	54.80	E	1.47	0.02
16	1995/12/11	2:00	60	21.00	S	81	19.80	E	1.25	-0.01
17	1995/12/11	13:15	61	8.00	S	77	6.90	E	0.91	-0.02
18	1995/12/12	2:40	61	55.20	S	71	4.40	E	0.45	-0.01
37SS12	1996/03/03	1:55	63	30.00	S	101	22.80	E	1.39	-0.02
13	1996/03/03	13:15	63	28.10	S	106	0.10	E	1.58	0.00
14	1996/03/04	0:20	63	29.90	S	112	5.70	E	0.34	-0.01

Sample #	GMT Year/Month/Day	Time	Latitude Degrees	minutes		Longitude Degrees	minutes		Chl.*a* (µg / L)	Pheo. (µg / L)
15	1996/03/04	12:35	63	19.90	S	115	58.10	E	0.43	-0.01
16	1996/03/04	23:55	63	29.20	S	121	49.40	E	1.18	0.04
17	1996/03/05	11:15	63	30.00	S	125	28.50	E	1.14	-0.05
18	1996/03/05	23:55	63	31.00	S	130	5.80	E	0.11	0.00
19	1996/03/06	11:25	64	2.00	S	133	21.00	E	0.14	0.00
20	1996/03/06	22:55	64	40.50	S	137	19.40	E	0.15	0.00
21	1996/03/07	10:35	65	11.40	S	139	52.80	E	0.35	0.00
22	1996/03/07	22:20	65	8.40	S	139	54.60	E	0.02	0.00
23	1996/03/08	10:35	65	4.20	S	139	48.00	E	0.32	0.00
24	1996/03/09	0:20	65	9.60	S	139	56.40	E	0.03	0.00
25	1996/03/09	12:28	64	41.40	S	142	16.80	E	0.02	0.00
26	1996/03/09	22:10	65	0.60	S	142	1.20	E	0.03	0.00
27	1996/03/10	10:45	64	47.00	S	141	54.30	E	0.02	0.00
28	1996/03/10	21:55	65	5.10	S	141	51.50	E	0.34	0.03
29	1996/03/11	10:16	64	40.20	S	142	3.80	E	0.33	-0.01
30	1996/03/11	21:55	62	48.40	S	141	49.80	E	0.01	0.00
31	1996/03/12	10:20	61	9.60	S	142	29.50	E	0.01	0.00
32	1996/03/12	21:52	58	55.40	S	143	23.30	E	0.01	0.00
33	1996/03/13	9:25	56	53.90	S	144	7.90	E	0.03	0.00
34	1996/03/13	21:45	56	0.00	S	144	24.40	E	0.31	0.02
35	1996/03/14	9:55	55	31.40	S	144	34.40	E	0.02	0.00
36	1996/03/14	21:15	53	11.30	S	145	22.60	E	0.02	0.00

Table 3. Surface chlorophyll *a* concentrations and phaeopigments and associated data collected during the JARE-38 cruise of the icebreaker SHIRASE in 1996/97.

	GMT		Latitude		Longitude		Chl. *a*	Phaeo.
Sample #	Year / Month / Day	Time	Degrees	minutes	Degrees	minutes	(μg/L)	(μg/L)
001	1996/11/16	4:21	24	32.3 N	134	56.3 E	0.171	0.132
002	1996/11/16	9:40	23	9.2 N	134	20 4 E	0 135	0.066
003	1996/11/16	13:18	22	18.4 N	133	52.6 E	0.130	0.058
004	1996/11/16	22:48	20	15.5 N	132	55.5 E	0.109	0.048
005	1996/11/17	3:05	19	21.5 N	132	31.8 E	0.101	0.037
006	1996/11/17	9:08	18	2.0 N	131	59.6 E	0.087	0 030
007	1996/11/17	14:08	16	49.7 N	131	31.3 E	0.075	0.030
008	1996/11/17	22:20	14	52.1 N	130	41.4 E	0.071	0 024
009	1996/11/18	2:31	13	57.5 N	130	19.9 E	0 066	0.021
010	1996/11/18	8:59	12	28.9 N	129	40.8 E	0.050	0 010
031	1996/11/23	7:58	12	46.7 S	114	56.9 E	0.090	0 043
032	1996/11/23	13:47	14	6.6 S	114	40.6 E	0.087	0 048
033	1996/11/23	23:18	16	21.7 S	114	16.1 E	0.076	0 045
034	1996/11/24	3:00	17	14.9 S	114	8.8 E	0.075	0.036
035	1996/11/24	10:48	19	5.0 S	113	49.9 E	0.061	0.022
036	1996/11/24	22:53	21	47.3 S	113	19.2 E	0.094	0.033
037	1996/11/25	3:30	22	44.1 S	113	7 9 E	0 083	0.030
038	1996/11/25	8:00	23	44.1 S	112	56 6 E	0.274	0.123
039	1996/11/25	14:30	25	9.4 S	112	38.4 E	0.269	0.115
040	1996/11/25	23:10	27	0.7 S	113	3.6 E	0.163	0 089
041	1996/11/26	3:21	27	56.2 S	113	20 4 E	0.254	0 112
042	1996/11/26	8:43	29	6.5 S	113	43.6 E	0.130	0.070
043	1996/11/26	13:18	30	5.4 S	114	3.4 E	0.097	0.036
044	1996/11/26	23:30	31	43.3 S	115	13.7 E	0.182	0.058
045	1996/12/3	16:18	34	34.9 S	113	41.2 E	0.087	0.026
046	1996/12/3	23:05	35	53.1 S	112	48.5 E	0.113	0.020
047	1996/12/3	23:53	36	2.6 S	112	42.2 E	0.429	0 131
048	1996/12/4	6:35	37	24.1 S	111	46.7 E	0 357	0 122
049	1996/12/4	10:25	38	9.1 S	111	15.4 E	0.279	0 098
050	1996/12/4	16:35	39	21.8 S	110	26.6 E	0.310	0.137
051	1996/12/5	0:04	40	53.4 S	109	59 4 E	0.212	0.071
052	1996/12/5	4:24	41	48.7 S	109	58.1 E	0.243	0.059
053	1996/12/5	11:04	42	47.6 S	109	59 9 E	0.279	0.073
054	1996/12/5	16:25	44	2.0 S	110	0 3 E	0 393	0.123
055	1996/12/5	23:58	45	51.5 S	109	59 6 E	0 491	0.189
056	1996/12/6	5:07	46	57.8 S	110	0.9 E	0.476	0 192
057	1996/12/6	11:20	48	22.1 S	110	1 2 E	0.404	0 163
058	1996/12/6	15:52	49	21.7 S	109	58.8 E	0 341	0.125
059	1996/12/7	0:25	51	24.1 S	110	3 8 E	0.409	0 089
060	1996/12/7	10:29	52	53.5 S	109	49.6 E	0.497	0 114
061	1996/12/7	15:44	54	10.1 S	109	24 5 E	0.466	0 063
062	1996/12/8	0:20	56	18.8 S	108	38.5 E	0.667	0.095
063	1996/12/8	4:29	57	20.6 S	108	13 6 E	0.300	0 053
064	1996/12/8	10:20	58	12.9 S	107	58 9 E	0.316	0 069
065	1996/12/8	15:34	59	31.9 S	107	21 8 E	0.222	0 086

Sample #	GMT Year / Month / Day	Time	Latitude Degrees	minutes	Longitude Degrees	minutes	Chl. *a* (μg/L)	Phaeo (μg/L)
066	1996/12/8	23:17	60	5 5 S	106	44 5 E	0.151	0 017
067	1996/12/9	5.58	60	18.6 S	104	40.5 E	0 135	0 030
068	1996/12/9	12.00	60	51.8 S	101	47.9 E	0 066	0 019
069	1996/12/9	19:26	61	9.2 S	97	54.4 E	0.471	0 046
070	1996/12/10	4·49	61	5.0 S	94	8.9 E	0.269	0 065
071	1996/12/10	13:02	60	48.5 S	92	19 0 E	0 285	0 068
072	1996/12/10	20:40	61	1 2 S	88	22 0 E	1 177	0 170
073	1996/12/11	4.50	60	2 6 S	85	30 9 E	2 669	0.508
074	1996/12/11	12.46	60	2 8 S	82	11 5 E	2 338	0 532
075	1996/12/12	0·52	61	9 9 S	76	17 2 E	1 609	0 169
076	1996/12/12	7.16	62	6 1 S	73	28.7 E	2.073	0 310
077	1996/12/13	2 14	62	57.0 S	66	5 8 E	0 440	0.089
078	1996/12/13	11.01	63	36.4 S	61	36 8 E	1 393	0 169
079	1997/2/19	12.35	66	28 1 S	49	37 5 E	0.501	0 174
080	1997/2/19	16 02	65	47 9 S	50	32 5 E	0 421	0 151
081	1997/2/19	20 32	65	17 8 S	51	47 0 E	0 333	0 105
082	1997/2/20	4.22	64	31.2 S	54	41.7 E	0 288	0 063
083	1997/2/20	8.40	63	56.2 S	56	50.4 E	0 217	0 035
084	1997/2/20	11.19	63	29.8 S	58	4.9 E	0 186	0 039
085	1997/2/20	16·19	63	10.7 S	61	2.4 E	0 199	0 034
086	1997/2/20	20 00	63	0.5 S	63	19.1 E	0.337	0 084
087	1997/2/21	3:00	62	33 2 S	67	35 8 E	0 435	0 094
088	1997/2/21	6 53	62	10 0 S	69	49 9 E	0 417	0 074
089	1997/2/21	10.41	61	39 3 S	71	51 3 E	0 853	0 168
090	1997/2/21	15.00	61	5.1 S	74	7.5 E	0 545	0 113
091	1997/2/21	19 02	60	31.7 S	76	10 8 E	0 235	0 056
092	1997/2/22	2 01	59	30 0 S	79	37 6 E	0 435	0 143
093	1997/2/22	5 43	58	51 4 S	81	14 5 E	0 202	0 042
094	1997/2/22	9 52	58	10 3 S	83	3.5 E	0 550	0 195
095	1997/2/22	13:40	57	32 3 S	84	41 1 E	0 381	0 099
096	1997/2/22	18:17	56	47 1 S	86	39 3 E	0 231	0 072
097	1997/2/22	20 47	56	19 9 S	87	41 4 E	0 244	0 107
098	1997/2/23	1·39	55	23 9 S	89	33 1 E	0 175	0 051
099	1997/2/23	5 07	54	42 2 S	90	47 9 E	0 215	0 056
100	1997/2/23	9.05	53	54.4 S	92	10 4 E	0 355	0 163
101	1997/2/23	12 42	53	10.7 S	93	21 6 E	0.386	0 154
102	1997/2/23	17 05	52	21 1 S	94	46 5 E	0.350	0 184
103	1997/2/23	20.32	51	41.6 S	95	45 7 E	0 315	0 106
104	1997/2/24	1 04	50	50.5 S	97	1 1 E	0 341	0 112
105	1997/2/24	5 09	50	3 8 S	98	10 7 E	0 364	0 133
106	1997/2/24	8 15	49	30 2 S	98	59 9 E	0 302	0 130
107	1997/2/24	11 40	48	51.2 S	99	58.0 E	0 231	0 088
108	1997/2/24	15 05	48	7 3 S	100	48 7 E	0 175	0 055
109	1997/2/24	20·21	46	57 6 S	102	1 2 E	0 172	0 063
110	1997/2/25	1·29	45	49 4 S	103	14.6 E	0 193	0 073
111	1997/2/25	6 18	44	46 6 S	104	18 9 E	0 183	0 066
112	1997/2/25	10·19	43	56 6 S	105	10 9 E	0 372	0 151

	GMT		Latitude		Longitude		Chl. *a*	Phaeo.
Sample #	Year / Month / Day	Time	Degrees	minutes	Degrees	minutes	(μg/L)	(μg/L)
113	1997/2/25	14:05	43	8.4 S	105	59.3 E	0.248	0.086
114	1997/2/25	18:08	42	19.2 S	106	51.9 E	0.279	0.120
115	1997/2/25	23:35	41	9.4 S	107	59.4 E	0 266	0.123
116	1997/2/26	4:39	40	4.8 S	109	0.7 E	0.297	0.194
117	1997/2/26	8:42	39	13.7 S	109	49.8 E	0 293	0 172
118	1997/2/26	12:10	38	28.4 S	110	29.5 E	0.346	0.188
119	1997/2/26	15:47	37	42.5 S	111	6.3 E	0.439	0 268
120	1997/2/26	23:08	36	7.1 S	112	16.7 E	0.169	0.134
121	1997/2/27	3:05	35	21.4 S	112	53.2 E	0.159	0 073
122	1997/2/27	7:04	34	38.0 S	113	23.8 E	0.150	0 042
123	1997/2/27	11:04	34	1.8 S	113	52.6 E	0 146	0 062
124	1997/2/28	10:27	32	52.7 S	114	54.1 E	0.253	0 120
125	1997/2/28	15:56	34	10.8 S	114	9.1 E	0.191	0 106
126	1997/2/28	22:29	35	52.5 S	113	59.5 E	0 175	0.082
127	1997/3/1	2:33	36	55.6 S	113	58 9 E	0.104	0 039
128	1997/3/1	6:46	38	1.3 S	114	3.2 E	0.162	0.073
129	1997/3/1	9:27	38	42.4 S	114	5.2 E	0.399	0.238
130	1997/3/1	13:29	39	44.4 S	114	6.9 E	0 288	0 149
131	1997/3/1	17:30	40	44.3 S	114	7.4 E	0 310	0 165
132	1997/3/1	22:54	41	59.2 S	114	10.0 E	0 337	0 235
133	1997/3/2	3:58	43	7.9 S	114	13 8 E	0 337	0 143
134	1997/3/2	9:08	44	16.4 S	114	17.9 E	0.293	0.145
135	1997/3/2	13:17	45	13.6 S	114	21.4 E	0.364	0.155
136	1997/3/2	17:33	46	12.4 S	114	25 5 E	0.239	0.144
137	1997/3/2	23:48	47	38.7 S	114	31.2 E	0.293	0 155
138	1997/3/3	3:37	48	25.3 S	114	37.9 E	0.244	0.107
139	1997/3/3	8:35	49	26.9 S	114	43.2 E	0.275	0.151
140	1997/3/3	15·59	51	7.2 S	114	55.1 E	0 302	0 092
141	1997/3/3	22:40	52	41.4 S	114	59.6 E	0 279	0.109
142	1997/3/4	3:45	53	55.2 S	115	4.7 E	0 306	0 137
143	1997/3/4	7:37	54	50.4 S	115	9.5 E	0 217	0.080
144	1997/3/4	12:01	55	53.4 S	115	12.9 E	0.181	0 061
145	1997/3/4	16:48	57	3.8 S	115	18.5 E	0 244	0.085
146	1997/3/4	22:54	58	33.4 S	115	26.1 E	0 197	0.061
147	1997/3/5	3·46	59	42.0 S	115	28 0 E	0.231	0 077
148	1997/3/5	8:01	60	43 1 S	115	31.1 E	0.175	0 039
149	1997/3/5	12:17	61	45.9 S	115	34 4 E	0 074	0 028
150	1997/3/5	16:21	62	44.6 S	115	38.4 E	0 146	0.031
151	1997/3/6	0·48	63	30.3 S	117	47.4 E	0.479	0 131
152	1997/3/6	7:46	63	32.0 S	119	7.1 E	0.435	0 105
153	1997/3/6	16.00	63	36.7 S	121	59 3 E	0.739	0 232
154	1997/3/7	0:21	63	43.3 S	125	1.7 E	0.952	0 236
155	1997/3/7	7:55	63	49.6 S	126	46.1 E	0 545	0 108
156	1997/3/7	16 23	63	54.9 S	128	13.2 E	0.523	0 124
157	1997/3/8	3.51	64	2.6 S	130	24.0 E	0 554	0 137
158	1997/3/8	10:45	64	3.8 S	131	17.2 E	0.483	0 116
159	1997/3/8	18:09	64	2.7 S	132	52 0 E	0.670	0 194
160	1997/3/9	0:52	64	11.7 S	134	15.5 E	0.952	0.186

Sample #	GMT Year / Month / Day	Time	Latitude Degrees	minutes	Longitude Degrees	minutes	Chl. *a* (μg/L)	Phaeo (μg/L)
161	1997/3/9	7:06	64	18.8 S	135	33 1 E	0.768	0 136
162	1997/3/9	11:59	64	24 4 S	136	32.5 E	1 123	0 216
163	1997/3/9	17:00	64	30 1 S	137	33 0 E	0.981	0 174
164	1997/3/10	0:57	64	49.8 S	139	21.1 E	0.910	0 195
165	1997/3/10	10:02	65	22 3 S	141	39 4 E	1 094	0 211
166	1997/3/10	15·35	65	4 2 S	143	13.1 E	1 009	0.179
167	1997/3/11	1·40	64	59.5 S	146	16.9 E	0 541	0 134
168	1997/3/11	11:17	64	34.4 S	147	9.1 E	0 630	0 142
169	1997/3/11	17 15	63	57 8 S	147	0.3 E	1 535	0 306
170	1997/3/12	3 27	63	4.0 S	147	3.6 E	0.212	0 024
171	1997/3/12	9·35	62	29 8 S	147	0.4 E	0 231	0 050
172	1997/3/12	15·52	61	49.1 S	147	0 1 E	0 152	0 011
173	1997/3/13	0.57	60	47.8 S	147	6.2 E	0 134	0 010
174	1997/3/13	11:40	60	7.5 S	147	13 0 E	0.117	0 011
175	1997/3/13	15 57	59	39.0 S	147	7.2 E	0 108	0 016
176	1997/3/14	0:07	58	43 6 S	147	4.0 E	0 126	0 021
177	1997/3/14	5 48	58	7 1 S	147	1.5 E	0.128	0.026
178	1997/3/14	11.20	57	29 6 S	147	1 7 E	0 117	0 023
179	1997/3/14	16:04	56	59 3 S	146	59 2 E	0 113	0 010
180	1997/3/15	0:45	56	0 5 S	147	4.8 E	0.110	0.020
181	1997/3/15	11:52	55	21.3 S	147	20.1 E	0 457	0 148
182	1997/3/15	15·38	54	36.8 S	146	56.6 E	0 137	0 036
183	1997/3/15	21 36	53	6 7 S	147	4 7 E	0 368	0 177
184	1997/3/16	0 58	52	15.9 S	147	2.2 E	0 217	0 101
185	1997/3/16	7:03	51	26.3 S	147	9 5 E	0 271	0.178
186	1997/3/16	11 25	50	33.1 S	147	51 8 E	0.408	0 251
187	1997/3/16	15·33	49	30.7 S	147	49 8 E	0 895	0 393
188	1997/3/16	21:03	48	7 3 S	147	48.9 E	0 417	0.258
189	1997/3/17	1.46	46	59.6 S	147	48 9 E	0 479	0 331
190	1997/3/17	15 09	46	17.8 S	147	48 8 E	0 568	0 312
191	1997/3/17	9·19	45	31 8 S	147	50 4 E	0 537	0 305
192	1997/3/17	14 17	44	46 9 S	147	51 4 E	0 537	0 305
193	1997/3/17	19 54	43	56.6 S	147	49 4 E	1 009	0 430
194	1997/3/18	0·43	43	15 8 S	147	38 3 E	1 620	0 807

Table 4. Surface chlorophyll *a* concentrations and phaeopigments and associated data collected during the JARE-39 cruise of the icebreaker SHIRASE in 1997/98.

Sample #	GMT Year / Month / Day	GMT Time	Latitude Degrees	Latitude minutes		Longitude Degrees	Longitude minutes		Chl. *a* (μg/L)	Phaeo. (μg/L)
TF1	1997/11/17	3:40	19	7.9	N	132	15.7	E	0.056	0.019
TF2	1997/11/17	7:00	18	20.7	N	131	56.6	E	0.067	0 014
TF3	1997/11/17	23·00	14	39.3	N	130	19.6	E	0.083	0.027
TF4	1997/11/18	7·00	12	32.3	N	129	32.3	E	0.066	0.017
TF14	1997/11/23	7:00	13	27 9	N	114	52 3	E	0 092	0 016
TF15	1997/11/24	1:00	17	45.6	S	114	1.6	E	0.078	0 016
TF16	1997/11/24	7 00	18	56.6	S	113	50.7	E	0.076	0.015
TF17	1997/11/24	23:00	22	27.4	S	113	12.0	E	0.122	0 022
TF18	1997/11/25	7:00	24	21.5	S	112	48.6	E	0.106	0.019
TF19	1997/11/25	23:00	27	53.5	S	113	21.0	E	0.135	0 018
TF20	1997/11/26	7:00	29	19.2	S	113	49.0	E	0 090	0 010
TF21	1997/11/26	23:00	31	40.7	S	115	11.3	E	0.191	0 017
FS1	1997/12/4	0:00	36	23.5	S	111	35.0	E	0.389	0 073
FS2	1997/12/4	5:00	37	27.4	S	110	35.4	E	0.228	0.035
FS3	1997/12/4	10:00	38	29 1	S	109	27.2	E	0.335	0.019
FS4	1997/12/4	14:00	39	18.5	S	108	30.8	E	0.509	0.030
FS5	1997/12/5	1:00	41	32.0	S	105	45.3	E	0.556	0.038
FS6	1997/12/5	6:00	42	29.2	S	104	39.4	E	0.596	0.038
FS7	1997/12/5	11:00	43	27 8	S	103	27.1	E	0.794	0.065
FS8	1997/12/5	15:00	44	12.1	S	102	28.4	E	0.611	0.070
FS9	1997/12/6	1:00	46	3.5	S	100	8.4	E	0 883	0.101
FS10	1997/12/6	6:00	46	55.0	S	98	46.6	E	0 635	0 082
FS11	1997/12/6	11:00	47	42.9	S	97	15 2	E	0.673	0.040
FS12	1997/12/6	15:00	48	24.0	S	96	4.3	E	0.443	0 052
FS13	1997/12/7	2:00	50	5.1	S	93	30.8	E	0.572	0 128
FS14	1997/12/7	7:00	50	48.6	S	92	38.8	E	0.333	0 031
FS15	1997/12/7	12:00	51	35.1	S	91	46.1	E	0.849	0.118
FS16	1997/12/7	16:00	52	13.9	S	91	0.7	E	1.318	0.026
FS17	1997/12/8	2:00	53	42.4	S	89	0.9	E	2.732	0 075
FS18	1997/12/8	7:00	54	29.3	S	87	44.0	E	1.111	0 179
FS19	1997/12/8	12.00	55	8.0	S	86	12.3	E	1.566	0 085
FS20	1997/12/8	16:00	55	24.2	S	84	46 4	E	1 290	0 110
FS21	1997/12/9	2:00	56	2.8	S	81	11 4	E	1 097	0 062
FS22	1997/12/9	7:00	56	24.8	S	78	47.3	E	0 959	0 050
FS23	1997/12/9	12:00	56	49.3	S	76	51.6	E	1.104	0 055
FS24	1997/12/9	16:00	57	9.7	S	75	5.3	E	0.727	0.021
FS25	1997/12/10	3:00	58	7.7	S	70	13 4	E	0.460	0 001
FS26	1997/12/10	8:16	58	33.6	S	67	50 9	E	0.370	0 000
FS27	1997/12/10	13:00	58	57.3	S	65	46.6	E	0 402	0.000
FS28	1997/12/10	17 00	59	19.1	S	63	55 5	E	0 304	0 009
FS29	1997/12/11	4 00	59	59.4	S	58	51 0	E	0.075	0 003
FS30	1997/12/11	9:00	60	12.8	S	56	29.3	E	0.080	0.002
FS31	1997/12/11	14:00	60	53.6	S	54	10 1	E	0.075	0 003
FS32	1997/12/11	17:57	61	27.4	S	52	8.9	E	0.081	0 000

Sample #	GMT Year / Month / Day	Time	Latitude Degrees	minutes		Longitude Degrees	minutes		Chl *a* (μg/L)	Phaeo (μg/L)
FS33	1997/12/12	4:00	63	0.3	S	47	23 3	E	0 335	0 000
FS34	1997/12/12	9:36	64	11 8	S	46	44 5	E	0 604	0 023
FS35	1997/12/12	14 00	64	50.8	S	46	13 8	E	0.980	0 045
FS36	1997/12/12	18:00	65	23 3	S	45	6.0	E	0 814	0 038
FS37	1997/12/13	5 00	66	48 6	S	42	3.3	E	0 598	0 096
FS38	1997/12/13	10·30	67	35 2	S	40	34.3	E	2 277	0 036
FS39	1997/12/13	15:10	68	16 2	S	39	22 7	E	5 313	0 249
SS1	1998/2/15	15 08	67	47.1	S	40	28 2	E	0 200	0 027
SS2	1998/2/16	10.00	67	40 5	S	42	5 4	E	0 459	0 060
SS3	1998/2/16	18.10	67	50 1	S	41	19 1	E	0 399	0 015
SS4	1998/2/17	9 55	68	20 1	S	40	7 6	E	0 524	0 194
SS5	1998/2/17	17 45	68	29 6	S	40	8 4	E	0 522	0 230
SS6	1998/2/18	10:15	67	50.2	S	43	34.8	E	2 594	0 028
SS7	1998/2/18	20:10	67	30.4	S	45	31 6	E	4 217	0 025
SS8	1998/2/19	9·30	66	56.8	S	46	47 7	E	4 067	0 180
SS9	1998/2/19	20:45	66	50.0	S	49	58 0	E	0 166	0 066
SS10	1998/2/20	16:10	66	42.1	S	50	0.9	E	1 387	0 118
SS11	1998/2/21	10·43	66	59 0	S	50	3 0	E	1.014	0 113
SS12	1998/2/21	20.08	67	1 9	S	50	4 1	E	0 598	0 132
SS13	1998/2/22	16·00	66	50 3	S	50	13 6	E	1 139	0 216
SS14	1998/2/23	7·15	66	47.7	S	50	29.8	E	1.773	0 228
SS15	1998/2/23	19.00	67	0 8	S	50	14 2	E	0 418	0 036
SS16	1998/2/24	10:16	67	0 6	S	49	52 7	E	0 897	0 113
SS17	1998/2/24	19:00	66	56.1	S	50	9 6	E	1 248	0 170
SS18	1998/2/25	10·25	67	2.4	S	50	0 7	E	0.451	0.104
SS19	1998/2/25	18.55	66	45.2	S	49	50 8	E	0 437	0 078
SS20	1998/2/26	9 00	66	58 0	S	49	54 0	E	0.683	0 129
SS21	1998/2/27	10.10	66	58 5	S	49	51.9	E	0 314	0 084
SS22	1998/2/28	19·15	65	21.7	S	49	41 8	E	0 092	0 364
SS23	1998/3/1	5 40	63	28.2	S	52	3 5	E	0.185	0 021
SS24	1998/3/1	16:40	63	25 5	S	56	7 2	E	0 146	0 012
SS25	1998/3/2	4:26	63	3 8	S	63	0 5	E	0 085	0 010
SS26	1998/3/2	16·15	62	44.7	S	68	8.1	E	0 056	0 010
SS27	1998/3/3	16·40	62	10 6	S	74	44 3	E	0 097	0 012
SS28	1998/3/4	14·40	59	56.2	S	80	18 0	E	0 444	0 000
SS29	1998/3/5	14·30	61	40 1	S	88	15 2	E	1.248	0 069
SS30	1998/3/6	2.27	62	9 9	S	88	5 5	E	0.398	0 003
SS31	1998/3/6	15 50	63	45 2	S	90	43 8	E	0.376	0 001
SS32	1998/3/7	2.10	63	44.6	S	96	50 0	E	0 549	0.050
SS33	1998/3/8	1 00	63	36 0	S	100	20 8	E	0 485	0 021
SS34	1998/3/8	11:50	63	26 3	S	105	11.7	E	0 388	0 021
SS35	1998/3/9	1 06	63	29 4	S	110	28 8	E	0 349	0 021
SS36	1998/3/9	13 08	63	27 1	S	115	9 0	E	0 456	0 010
SS37	1998/3/10	0 20	63	30 0	S	118	24 1	E	0 584	0 002
SS38	1998/3/10	11 45	63	27 8	S	122	41 5	E	0 354	0 018
SS39	1998/3/11	0 12	63	28 3	S	128	31.8	E	---	---
SS40	1998/3/11	10 55	63	38 3	S	132	16 7	E	0 564	0 010

Sample #	GMT Year / Month / Day	Time	Latitude Degrees	minutes		Longitude Degrees	minutes		Chl. *a* (μg/L)	Phaeo (μg/L)
SS41	1998/3/12	11:10	63	37.9	S	141	48.4	E	0.354	0.004
SS42	1998/3/12	5:10	63	8.5	S	147	27.4	E	0.147	0.005
SS43	1998/3/13	12:52	63	31.1	S	150	0.1	E	0.159	0.008
SS44	1998/3/13	15:35	63	1.5	S	150	1.5	E	0.137	0.000
SS45	1998/3/13	22:05	61	47.3	S	150	0.3	E	0.116	0 012
SS46	1998/3/14	5:07	60	53.1	S	149	57.4	E	0.128	0 009
SS47	1998/3/14	9·55	60	0.0	S	150	0.6	E	0 151	0.006
SS48	1998/3/14	13:54	59	0.0	S	149	54.8	E	0.163	0 005
SS49	1998/3/14	18:01	58	1.1	S	149	58.9	E	0.159	0 000
SS50	1998/3/14	22:12	57	2.6	S	149	59.1	E	0.190	0 003
SS51	1998/3/15	5:14	56	27.3	S	150	12.0	E	0 216	0 015
SS52	1998/3/15	9:00	56	0.9	S	150	28.2	E	0.196	0.035
SS53	1998/3/15	14:03	55	0.1	S	150	16.3	E	0.207	0.022
SS54	1998/3/15	18:29	54	0.1	S	150	5 3	E	0.272	0 067
SS55	1998/3/15	22:14	53	7.3	S	150	1.6	E	0.431	0 147
SS56	1998/3/16	3:15	51	54.4	S	149	49.5	E	0.398	0.125
SS57	1998/3/16	6:55	51	0.1	S	150	2.2	E	0.425	0 114
SS58	1998/3/16	10:47	50	0.2	S	150	4.5	E	0.323	0.072
SS59	1998/3/16	14:37	49	0.4	S	150	0.0	E	0.483	0.274
SS60	1998/3/16	18:24	48	0.9	S	150	0.2	E	0.638	0.208
SS61	1998/3/16	22:19	47	0.3	S	150	0.1	E	0 700	0.240
SS62	1998/3/17	4:43	45	55.6	S	150	4.6	E	0.481	0 196
SS63	1998/3/17	10:05	44	58.8	S	149	59.1	E	0 708	0.232
SS64	1998/3/17	13:45	43	57.4	S	149	59.4	E	1.819	0 543
SS65	1998/3/18	4:50	43	0.0	S	149	58.9	E	1.336	0 274
SS66	1998/3/18	8:39	41	59.6	S	150	0.5	E	0.500	0.137
SS67	1998/3/18	12:22	40	59.9	S	150	0.8	E	0.502	0 186
SS68	1998/3/18	15:52	40	0.8	S	150	0.1	E	0.781	0.260
SS69	1998/3/18	19:48	39	0.3	S	150	20.3	E	0.725	0 262
SS70	1998/3/18	23.39	38	0.3	S	150	40.6	E	0 853	0 298
SS71	1998/3/19	4:05	37	0.4	S	151	8.4	E	0.234	0 036
SS72	1998/3/19	9:15	36	0.5	S	151	25 0	E	0 131	0.035
SS73	1998/3/19	14.45	35	0.5	S	151	38.8	E	0.331	0 040

Table 5. Vertical profiles of chlorophyll *a* and phaeopigments and associated data collected during the JARE-36 cruise of the icebreaker SHIRASE in 1994/95.

Station number			Depth (m)	Chl. *a* (μg/L)	Phaeo. (μg/L)
1	Year / Month / Day	1994/12/5	0	0.099	0.031
	Latitude	41-43.5S	10	0.073	0.030
	Longitude	109-55.2E	20	0.072	0.028
			30	0.075	0.033
			50	0.075	0.046
			75	0.069	0.040
			100	0.091	0 069
			125	0 075	0.056
			150	0.036	0 031
			200	0.005	0.017
			250	0.002	0.014
2	Year / Month / Day	1994/12/6	0	0.181	0.063
	Latitude	45-27.9S	10	0.163	0.059
	Longitude	109-54.1E	20	---	---
			30	0.178	0.074
			50	0 200	0.045
			75	0.176	0.082
			100	0.161	0.079
			125	0.163	0.079
			150	0 060	0.047
			200	---	---
			250	0.003	0.025
3	Year / Month / Day	1994/12/7	0	0.444	0.102
	Latitude	50-23 2S			
	Longitude	109-55.1E			
4	Year / Month / Day	1994/12/8	0	0.400	0 048
	Latitude	55-23 2S	10	0.284	0 174
	Longitude	106-32.8E	20	0.382	0 113
			30	0.355	0.103
			50	0.440	0.153
			75	0.404	0.147
			100	0.364	0.156
			125	0.144	0 112
			150	0 048	0.074
			200	0 034	0 071
			250	0.011	0 031

Station number			Depth (m)	Chl. *a* (μg/L)	Phaeo. (μg/L)
5	Year / Month / Day	1994/12/9	0	0.355	0.093
	Latitude	59-10.6S			
	Longitude	100-40.8E			
B1	Year / Month / Day	1994/12/12	0	0.253	0.066
	Latitude	62-32.3S	10	0.271	0.079
	Longitude	70-14.1E	20	0.244	0.060
			30	0.369	0.085
			50	0.369	0.121
			75	0.218	0.122
			100	0.120	0.094
			125	0.049	0.048
			150	0.029	0.031
			200	0.004	0.019
			250	0.004	0.020
B2	Year / Month / Day	1995/2/20	0	0.231	0.088
	Latitude	66-44.5S	10	0.178	0 100
	Longitude	38-57.1E	20	0.172	0.075
			30	0.172	0.089
			50	0.078	0.050
			75	0.235	0.130
			100	0.077	0.059
			125	0.056	0.041
			150	0.033	0.038
			200	0.008	0.016
			250	0.003	0.014
8	Year / Month / Day	1995/3/4	0	0.080	0.026
	Latitude	62-59.5S	10	0.070	0.021
	Longitude	70-11.9E	20	0.067	0.032
			30	0.067	0.023
			50	0.084	0.033
			75	0.122	0.076
			100	0.106	0.080
			125	0.042	0.048
			150	0.008	0.018
			200	0.010	0.038
			250	0.002	0.013

Station number			Depth (m)	Chl. *a* (μg/L)	Phaeo. (μg/L)
9	Year / Month / Day	1995/3/5	0	0.222	0 046
	Latitude	63-23.6S	10	0.146	0.030
	Longitude	83-51.5E	20	0.102	0.024
			30	0.115	0.049
			50	0.164	0.083
			75	0.134	0.101
			100	0.085	0.079
			125	0.055	0.057
			150	0.030	0 037
			200	0.009	0.020
			250	0.005	0.016
10	Year / Month / Day	1995/3/6	0	0.125	0.025
	Latitude	64-07.6S	10	0.125	0.025
	Longitude	95-56.2E	20	0.120	0.023
			30	0.153	0.037
			50	0.297	0.073
			75	0.097	0.071
			100	0.069	0.052
			125	0 014	0.021
			150	0.006	0.015
			200	0 003	0.013
			250	0.003	0.012
11	Year / Month / Day	1995/3/7	0	0.064	0.011
	Latitude	64-13.2S	10	0.066	0.009
	Longitude	108-55.6E	20	0.070	0.015
			30	0 061	0.013
			50	0.074	0 017
			75	0.176	0.069
			100	0.118	0.084
			125	0 057	0.045
			150	0 007	0.007
			200	0.002	0.014
			250	0.001	0 012

Station number			Depth (m)	Chl. *a* (μg/L)	Phaeo. (μg/L)
12	Year / Month / Day	1995/3/8	0	0.070	0.006
	Latitude	64-07.3S	10	0.085	0.014
	Longitude	120-53.7E	20	0.087	0.012
			30	0.090	0.011
			50	0.143	0.055
			75	0.280	0.013
			100	0.081	0.102
			125	0.070	0.088
			150	0.026	0.036
			200	0.004	0.018
			250	0.002	0.014
13	Year / Month / Day	1995/3/9	0	0.080	0.013
	Latitude	64-03.7S	10	0.099	0.016
	Longitude	131-40.9E	20	0.090	0.019
			30	0.074	0.020
			50	0.181	0.078
			75	0.136	0.077
			100	0.048	0.029
			125	0.027	0.022
			150	0.015	0.016
			200	0.005	0.014
			250	0.003	0.012
14,1	Year / Month / Day	1995/3/10	0	0.063	0.014
	Latitude	64-41.0S	10	0.070	0.017
	Longitude	140-19.2E			
14,2	Year / Month / Day	1995/3/10	0	0.071	0.014
	Latitude	64-41.0S	10	0.061	0.015
	Longitude	140-19.2E	20	0.055	0.014
			30	0.077	0.032
			50	0.176	0.088
			75	0.085	0.062
			100	0.044	0.038
			125	0.017	0.018
			150	0.009	0.015
			200	0.005	0.010
			250	0.002	0.014

Station number			Depth (m)	Chl. *a* (μg/L)	Phaeo. (μg/L)
15	Year / Month / Day	1995/3/11	0	0.102	0.021
	Latitude	64-07.5S	10	0.129	0.032
	Longitude	148-45.6E	20	0.102	0.029
			30	0.091	0.036
			50	0.139	0.022
			75	0.297	0.073
			100	0.123	0.067
			125	0.116	0.067
			150	0.069	0 066
			200	0.090	0 053
			250	0.012	0 023
16	Year / Month / Day	1995/3/13	0	0.098	-0.014
	Latitude	60-04.2S			
	Longitude	151-02.0E			
17	Year / Month / Day	1995/3/14	0	0.061	0.022
	Latitude	57-31.3S	10	0.046	0.019
	Longitude	150-06.5E	20	0.044	0.020
			30	0.043	0.019
			50	0.052	0 022
			75	0.064	0.031
			100	0.062	0.029
			125	0 027	0.018
			150	0.005	0.007
			200	0.008	0.018
			250	0.002	0 014
18	Year / Month / Day	1995/3/15	0	0.036	0.014
	Latitude	55-24.0S			
	Longitude	151-19 0E			

Station number			Depth (m)	Chl. *a* (μg/L)	Phaeo. (μg/L)
19	Year / Month / Day	1995/3/16	0	0.196	0.074
	Latitude	52-08.4S	10	0.162	0.076
	Longitude	150-58.4E	20	0.222	0.097
			30	0.213	0.065
			50	0.240	0.095
			75	0.218	0.086
			100	0.026	0.029
			125	0.015	0.020
			150	0.014	0.019
			200	0.005	0.016
			250	0.006	0.014
20	Year / Month / Day	1995/3/17	0	0.240	0.085
	Latitude	47-06.2S	10	0.178	0.102
	Longitude	151-22.9E	20	0.178	0.069
			30	0.153	0.080
			50	0.186	0.082
			75	0.179	0.090
			100	0.045	0.040
			125	0.020	0.023
			150	0.007	0.017
			200	0.002	0.016
			250	0.001	0.017

Table 6. Vertical profiles of chlorophyll *a* and phaeopigments and associated data collected during the JARE-37 cruise of the icebreaker SHIRASE in 1995/96.

Station Number			Depth (m)	Chl.*a* (μg / L)	Phaeo (μg / L)
1	Year/Month/Day	1995/12/5	0	0.37	0.06
	Latitude	42-01.9S	10	0.35	0.02
	Longitude	108-50.9E	20	0.31	0.02
			30	0.38	0.01
			50	0.17	0.04
			75	0.45	0.10
			100	0.40	0.15
			125	0.16	0.09
			150	0.04	0.04
			200	0.01	0.02
4	Year/Month/Day	1995/12/8	0	0.99	0.01
	Latitude	55-23.3S	10	1.10	0.01
	Longitude	99-38.5E	20	0.76	0.04
			30	0.74	0.02
			50	0.80	0.06
			75	0.75	0.04
			100	0.25	0.13
			125	0.19	0.12
			150	0.15	0.12
			200	0.04	0.07
5	Year/Month/Day	1995/12/9	0	0.60	0.09
	Latitude	57-33.5S	10	0.91	0.14
	Longitude	94-34.2E	20	0.61	0.04
			30	0.55	0.03
			50	0.60	0.07
			75	0.52	0.09
			100	0.14	0.10
			125	0.10	0.08
			150	0.05	0.06
			200	0.03	0.06

Station Number			Depth (m)	Chl.*a* (μg / L)	Phaeo (μg / L)
B1	Year/Month/Day	1995/12/12	0	0.44	-0.02
	Latitude	61-28.0S	10	0.18	0.05
	Longitude	76-10.2E	20	0.41	-0.02
			30	0.40	0.01
			50	0.52	-0.02
			75	0.56	0.11
			100	0.22	0.09
			125	0.09	0.07
			150	0.04	0.05
			200	0.02	0.05
7	Year/Month/Day	1996/2/28	0	0.26	0.01
	Latitude	62-54.2S	10	0.28	0.01
	Longitude	62-21.1E	20	0.28	0.00
			30	0.30	0.01
			50	0.27	0.01
			75	0.21	0.08
			100	0.09	0.04
			125	0.04	0.03
			150	0.01	0.02
			200	0.01	0.03
9	Year/Month/Day	1996/3/1	0	0.89	0.03
	Latitude	63-03.0S	10	0.74	0.01
	Longitude	80-38.3E	20	0.71	0.10
			30	0.74	0.05
			50	0.63	0.09
			75	0.18	0.09
			100	0.09	0.06
			125	0.06	0.05
			150	0.02	0.04
			200	0.06	0.05

Station Number			Depth (m)	Chl.*a* (μg / L)	Phaeo (μg / L)
10	Year/Month/Day	1996/3/2	0	1.02	-0.02
	Latitude	63-27.7S	10	1.18	-0.01
	Longitude	92-10.3E	20	1.08	-0.05
			30	0.91	0.04
			50	1.09	0.02
			75	0.24	0.12
			100	0.10	0.07
			125	0.06	0.06
			150	0.05	0.08
			200	0.04	0.06
11	Year/Month/Day	1996/3/3	0	0.34	0.02
	Latitude	63-27.6S	10	0.40	0.02
	Longitude	103-22.2E	20	0.39	0.03
			30	0.50	0.00
			50	0.78	0.07
			75	0.42	0.07
			100	0.08	0.05
			125	0.05	0.04
			150	0.02	0.03
			200	0.01	0.02
12	Year/Month/Day	1996/3/4	0	0.31	0.01
	Latitude	63-32.8S	10	0.34	-0.02
	Longitude	113-52.3E	20	0.51	0.00
			30	0.47	0.00
			50	0.79	0.06
			75	0.38	0.09
			100	0.10	0.04
			125	0.05	0.04
			150	0.02	0.03
			200	0.01	0.02

Station Number			Depth (m)	Chl.*a* (μg / L)	Phaeo (μg / L)
13	Year/Month/Day	1996/3/5	0	1.09	-0.07
	Latitude	63-27.7S	10	1.07	0.01
	Longitude	123-57.1E	20	1.20	-0.06
			30	0.53	0.10
			50	0.37	0.12
			75	0.14	0.07
			100	0.04	0.03
			125	0.03	0.03
			150	0.02	0.03
			200	0.00	0.02
14	Year/Month/Day	1996/3/6	0	1.01	-0.02
	Latitude	63-44.8S	10	1.08	-0.09
	Longitude	131-27.1E	20	0.74	0.00
			30	1.07	-0.02
			50	0.30	0.09
			75	0.20	0.07
			100	0.03	0.03
			125	0.01	0.02
			150	0.01	0.02
			200	0.00	0.02
15	Year/Month/Day	1996/3/7	0	0.40	-0.01
	Latitude	64-55.4S	10	0.29	0.00
	Longitude	138-55.6E	20	0.24	0.01
			30	0.32	0.00
			50	0.71	-0.01
			75	0.44	0.04
			100	0.14	0.05
			125	0.51	0.35
			150	0.60	0.29
			200	0.30	0.26

Station Number			Depth (m)	Chl.*a* (μg / L)	Phaeo (μg / L)
17	Year/Month/Day	1996/3/12	0	0.07	0.01
	Latitude	61-58.1S	10	0.08	0.00
	Longitude	142-03.0E	20	0.08	0.01
			30	0.07	0.01
			50	0.06	0.01
			75	0.11	0.01
			100	0.23	0.03
			125	0.13	0.02
			150	0.06	0.02
			200	0.01	0.01
18	Year/Month/Day	1996/3/13	0	0.15	0.01
	Latitude	58-13.9S	10	0.14	0.01
	Longitude	143-36.3E	20	0.15	0.01
			30	0.11	0.03
			50	0.14	0.01
			75	0.18	0.01
			100	0.37	0.04
			125	0.15	0.09
			150	0.09	0.13
			200	0.01	0.02
19	Year/Month/Day	1996/3/14	0	0.32	0.01
	Latitude	55.56.0S	10	0.32	0.04
	Longitude	144-31.0E	20	0.21	0.01
			30	0.25	0.02
			50	0.23	0.03
			75	0.90	0.20
			100	0.17	0.08
			125	0.09	0.08
			150	0.04	0.04
			200	0.01	0.02
20	Year/Month/Day	1996/3/15	0	0.19	0.02
	Latitude	52-47.6S	10	0.19	0.02
	Longitude	145-29.2E	20	0.15	0.02

Table 7. Vertical profiles of chlorophyll *a* and phaeopigments and associated data collected during the JARE-38 cruise of the icebreaker SHIRASE in 1996/97.

Station number			Depth (m)	Chl. *a* (μg/L)	Phaeo. (μg/L)
1	Year / Month / Day	1996/12/5	0	0.259	0.056
	Latitude	41-56.4S	10	0.316	0.075
	Longitude	109-58.1E	20	0.300	0.065
			30	0.212	0.078
			50	---	---
			75	0.367	0.155
			100	0.228	0.150
			125	0.269	0.159
			150	0.114	0.079
			200	0.026	0.021
3	Year / Month / Day	1996/12/7	0	0.367	0.118
	Latitude	52-19.4S	10	0.321	0.076
	Longitude	110-01.5E	20	0.347	0.069
			30	0.316	0.087
			50	0.321	0.082
			75	0.352	0.083
			100	0.336	0.105
			125	0.347	0.094
			150	0.045	0.064
			200	0.018	0.038
4	Year / Month / Day	1996/12/8	0	0.274	0.053
	Latitude	57-27.6S	10	0.254	0.055
	Longitude	108-12.9E	20	0.212	0.078
			30	0.254	0.068
			50	---	---
			75	0.352	0.228
			100	0.212	0.172
			125	0.068	0.065
			150	0.036	0.035
			200	0.007	0.023

Station number			Depth (m)	Chl. *a* (μg/L)	Phaeo. (μg/L)
5	Year / Month / Day	1996/12/9	0	0.097	0.014
	Latitude	60-05.1S	10	0.101	0.012
	Longitude	105-57.7E	20	0.104	0.015
			30	0.135	0.012
			50	0.189	0.035
			75	0.159	0.060
			100	0.285	0.238
			125	0.165	0.104
			150	---	---
			200	0.005	0.009
13	Year / Month / Day	1997/3/6	0	0.041	0.006
	Latitude	63-30.3S	10	0.023	0.002
	Longitude	118-49.7E	20	0.023	0.002
			30	0.026	0.004
			50	0.056	0.040
			75	---	---
			100	0.018	0.020
13'	Year / Month / Day	1997/3/7	0	0.031	0.006
	Latitude	63-50.1S	10	0.030	0.006
	Longitude	126-41.9E	20	0.029	0.003
			30	0.035	0 009
			50	0.076	0.037
			75	---	---
			100	0.022	0 017
14	Year / Month / Day	1997/3/8	0	0.038	0.005
	Latitude	64-04.4S	10	0.036	0.006
	Longitude	130-36.3E	20	0 040	0.005
			30	0.035	0.007
			50	0.042	0.008
			75	0 104	0 077
			100	0.068	0 044

Station number			Depth (m)	Chl. a (μg/L)	Phaeo. (μg/L)
15	Year / Month / Day	1997/3/10	0	0.056	0.007
	Latitude	64-59.7S	10	0.056	0.018
	Longitude	140-05.8E	20	0.049	0.007
			30	0.052	0.007
			40	0.056	0.007
			50	0.082	0.034
			75	0.088	0.059
			100	0.049	0.025
16	Year / Month / Day	1997/3/11	0	0.053	0.007
	Latitude	64-58.4S	10	0.045	0 006
	Longitude	146-57.9E	20	0.046	0.005
			30	0.045	0.006
			50	0.056	0.013
			75	0.076	0.030
			100	0.070	0.051
17	Year / Month / Day	1997/3/13	0	0.031	0.001
	Latitude	60-34.7S	10	0.026	0.004
	Longitude	147-09.3E	20	0.026	0.004
			30	0.032	0.002
			50	0.036	0.004
			75	0.088	0.026
			100	0.068	0.035
18	Year / Month / Day	1997/3/15	0	0.041	0.005
	Latitude	55-46.7S	10	0.040	0.005
	Longitude	147-01.9E	20	0.037	0.006
			30	0.052	0.007
			40	0.045	0.005
			50	0.054	0.005
			75	0.053	0.003
			100	0.080	0.034
19	Year / Month / Day	1997/3/16	0	0.110	0.040
	Latitude	51-29.9S	10	0.107	0.038
	Longitude	146-59.7E	20	0.100	0.032
			30	0.114	0.057
			40	0.122	0.053
			50	0.126	0.062
			75	0.135	0.067
			100	0.126	0 034

Table 8. Vertical profiles of chlorophyll *a* and phaeopigments and associated data collected during the JARE-39 cruise of the icebreaker SHIRASE in 1997/98.

Station number			Depth (m)	Chl. *a* (μg/L)	Phaeo. (μg/L)
6	Year / Month / Day	1998/3/1	0	0.095	0.001
	Latitude	63-28.7S	10	0.062	0.005
	Longitude	54-23.3E	20	0.065	0 006
			30	0 068	0.007
			50	---	---
			75	0.365	0.105
			100	0.370	0.120
			125	0.257	0.150
			150	0.074	0 029
7	Year / Month / Day	1998/3/2	0	0 072	0.008
	Latitude	62-53 1S	10	0 071	0.000
	Longitude	65-34.7E	20	0.073	0.008
			30	0.073	0.008
			50	0 064	0.007
			75	0.126	0.022
			100	0.178	0.092
			125	0.297	0.105
			150	0.155	0.092
			200	0.006	0.012
B	Year / Month / Day	1998/3/3	0	0.080	0.008
	Latitude	62-34.7S	10	0.078	0.009
	Longitude	72-09.0E	20	0.078	0.004
			30	---	---
			50	0.089	0 017
			75	0.124	0.028
			100	0 229	0 095
			125	0.180	0.084
			150	0.065	0 027
			200	0 009	0 025

Station number			Depth (m)	Chl. *a* (μg/L)	Phaeo. (μg/L)
8	Year / Month / Day	1998/3/4	0	0.065	0.001
	Latitude	61-18.5S	10	0.058	0.003
	Longitude	79-59.2E	20	0.057	0.004
			30	0.059	0.002
			50	0.069	0.006
			75	0.098	0.038
			100	0.163	0.070
			125	0.131	0.049
			150	0.059	0.024
			200	0.007	0.021
A	Year / Month / Day	1998/3/5	0	0.563	0.000
	Latitude	59-56.2S	10	0.524	0.012
	Longitude	85-28.6E	20	0.749	0.034
			30	0.770	0.037
			50	0.998	0.144
			75	0.910	0.233
			100	0.373	0.161
			125	0.190	0.140
			150	0.108	0.089
			200	0.065	0.065
9	Year / Month / Day	1998/3/6	0	0.398	0.010
	Latitude	62-54.3S	10	0.351	0.002
	Longitude	88-54.4E	20	0.353	0.016
			30	0.366	0.014
			50	0.815	0.078
			75	0.821	0.239
			100	0.325	0.142
			125	---	---
			150	0.089	0.055
			200	0.023	0.030

Station number			Depth (m)	Chl. *a* (μg/L)	Phaeo. (μg/L)
10	Year / Month / Day	1998/3/8	0	0 317	0 005
	Latitude	63-27.6S	10	0.267	0.024
	Longitude	103-01.9E	20	0.262	0.030
			30	0.299	0.013
			50	0.279	0.033
			75	0.656	0.206
			100	0.287	0.168
			125	0.147	0.107
			150	0.048	0.036
			200	0.018	0.024
11	Year / Month / Day	1998/3/9	0	0.487	0 008
	Latitude	63-29 9S	10	0.458	0.000
	Longitude	113-22.0E	20	0.479	0.000
			30	0.444	0.028
			50	1.224	0.213
			75	---	---
			100	0.211	0.107
			125	---	---
			150	0 044	0 043
			200	0.018	0 025
12	Year / Month / Day	1998/3/10	0	0.441	0.000
	Latitude	63-30.2S	10	0 448	0.000
	Longitude	120-21.1E	20	0.414	0.013
			30	0.391	0.016
			50	0.693	0.086
			75	0.781	0.233
			100	0 338	0.128
			125	0.101	0.051
			150	0.041	0.039
			200	0.017	0 029

Station number			Depth (m)	Chl. *a* (μg/L)	Phaeo. (μg/L)
13	Year / Month / Day	1998/3/11	0	0.578	0.000
	Latitude	63-29.8S	10	0.528	0.003
	Longitude	131-04.8E	20	0.609	0.022
			30	0.569	0.000
			50	0.356	0.058
			75	0.431	0.156
			100	0.178	0.116
			125	0.089	0.067
			150	0.060	0.040
			200	0.015	0.024
14	Year / Month / Day	1998/3/12	0	0.321	0.000
	Latitude	63-31.3S	10	0.284	0.024
	Longitude	140-05.5E	20	0.242	0.007
			30	0.452	0.018
			50	0.483	0.090
			75	0.534	0.266
			100	0.151	0.100
			125	0.063	0.055
			150	0.031	0.034
			200	0.012	0.025
16	Year / Month / Day	1998/3/14	0	0.126	0.003
	Latitude	60-57.2S	10	0.102	0.005
	Longitude	149-59.8E	20	0.097	0.008
			30	0.129	0.009
			50	0.123	0.011
			75	0.175	0.000
			100	0.283	0.062
			125	0.202	0.053
			150	0.032	0.014
			200	0.003	0 016

Station number			Depth (m)	Chl. *a* (μg/L)	Phaeo. (μg/L)
17	Year / Month / Day	1998/3/15	0	0.178	0.028
	Latitude	56-25.3S	10	0.167	0.021
	Longitude	150-00.6E	20	0.169	0.026
			30	0.177	0.023
			50	0.192	0.031
			75	0.309	0.083
			100	0.081	0 055
			125	0.027	0.045
			150	0.018	0 030
			200	0.008	0.025
19	Year / Month / Day	1998/3/17	0	0.482	0.211
	Latitude	45-56.8S	10	0.545	0.223
	Longitude	150-01.0E	20	0.543	0.226
			30	0.530	0 210
			50	0.546	0 240
			75	0.194	0.176
			100	0.057	0.091
			125	0.035	0.078
			150	0.024	0 058
			200	0.009	0.034