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Chlorophyll *a* concentration of phytoplankton during a cruise of the 52nd Japanese Antarctic Research Expedition in 2010–2011

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1. Introduction

This report documents the phytoplankton chlorophyll *a* concentration in seawater at depths less than 200 m measured during a cruise by the icebreaker *Shirase* during the 52nd Japanese Antarctic Research Expedition (JARE-52) in the austral summer of 2010–2011. The chlorophyll *a* concentration was measured in two series: (1) spatial variations in chlorophyll *a* within the surface water along the cruise track, and (2) vertical profiles of chlorophyll *a* in the Indian sector of the Southern Ocean.

2. Materials and methods

Surface seawater was collected manually two or four times per day during the cruise from water that was continuously pumped through the vessel from an intake in the hull. Water samples through the water column were obtained along north–south transects (40°S–63°S) at 110°E (December 2010) and 150°E (March 2011) (Fig. 1 and Table 1). At stations where water-column water sampling was performed, surface seawater was collected in a plastic bucket. Water samples were collected over the water column in Niskin bottles attached to a multi-sampler (SBE 55 ECO, Sea-Bird Electronics, Bellevue, Washington, USA) with attached conductivity-temperature-depth (CTD) sensor. Seawater

samples (300 mL) were filtered onto glass-fiber filters (Whatman, GF/F). The filters were immediately soaked in N,N-dimethylformamide (Suzuki and Ishimaru, 1990) and pigments were extracted. The samples were stored in a freezer (–18°C) until analysis on board. Concentrations of chlorophyll *a* were determined fluorometrically (Parsons *et al*., 1984) with an on-board fluorometer (10-AU; Turner Design, Sunnyvale, California, USA). The fluorometer was calibrated against a chlorophyll *a* standard (Wako Chemical Co.) at a laboratory on land prior to the cruise, using a spectrophotometer and the specific absorption coefficient of chlorophyll *a* (Porra *et al*., 1989).

3. Data

Figure 1 is a map showing the sampling stations for the JARE-52 cruise. Table 1 lists the sampling locations and chlorophyll *a* concentrations at the sea surface and in subsurface water. Underway water-sampling information and results are shown in Table 2.

4. Data archive

The data presented in this report are archived and available from the online Science Database of the National Institute of Polar Research (http://scidbase.nipr.ac.jp/?ml_lang=en). Permission to use these data for publication or presentation should be obtained in writing. Inquiries about details of the data record should be addressed to:

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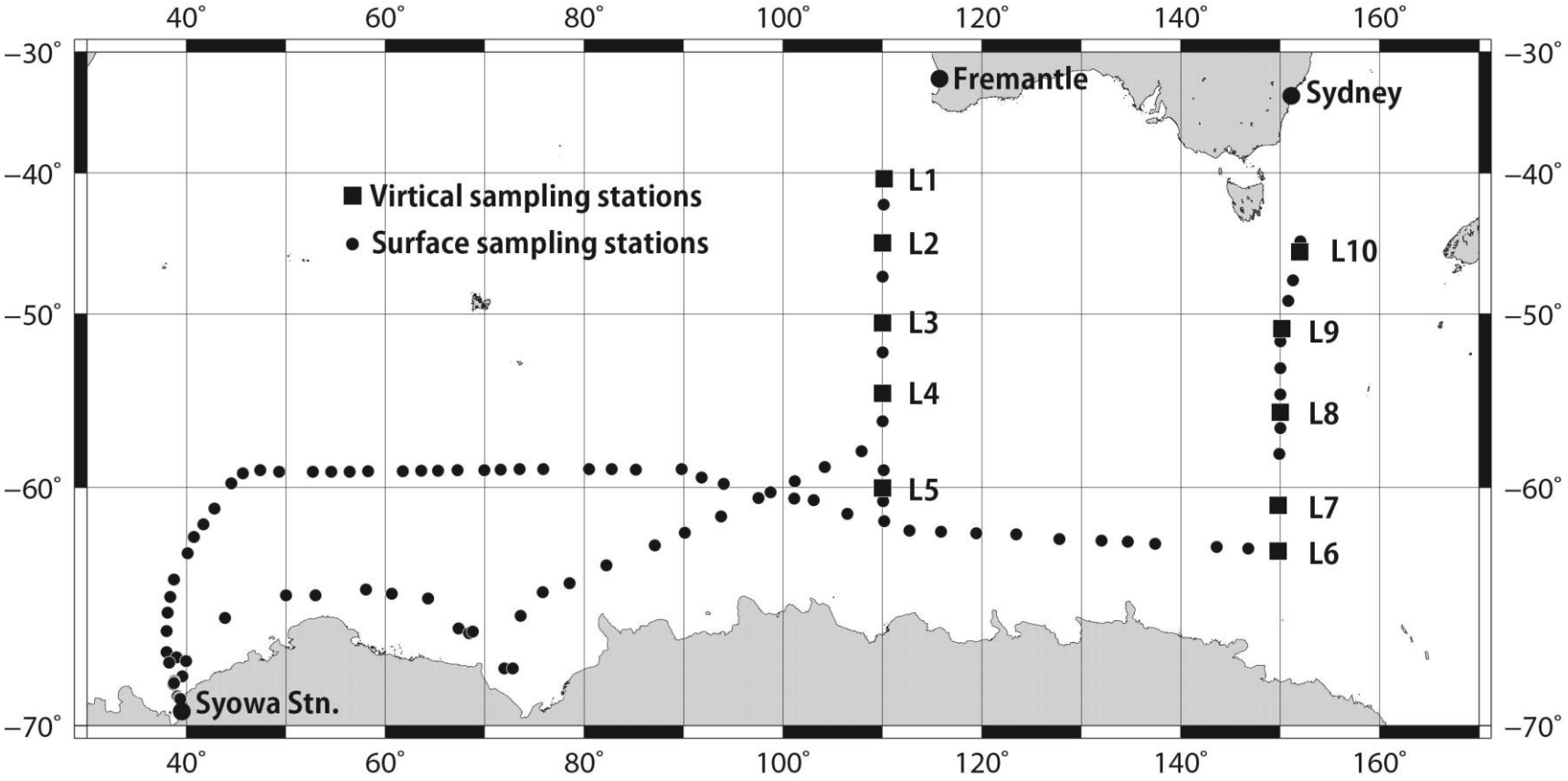

Fig. 1. Locations of sampling stations during the JARE-52 cruise. Solid circles indicate underway surface-water sampling points. Solid squares indicate vertical profile sampling stations.

Table 1. Sampling date, time, position, and chlorophyll *a* concentrations for stations L1–L10.

Station	L1		L2		L3		L4	
Date (UTC)	2010-12-02		2010-12-03		2010-12-04		2010-12-05	
Latitude (°S)	40°26.0′		45°12.1′		50°35.5′		54°53.5′	
Longitude (°E)	110°11.6′		110°00.3′		110°00.9′		109°59.9′	
	Depth (dbar)	Chl *a* (μg/L)	Depth (dbar)	Chl *a* (μg/L)	Depth (dbar)	Chl *a* (μg/L)	Depth (dbar)	Chl *a* (μg/L)
	0	0.27	0	0.48	0	0.31	0	0.59
	20	0.26	20	0.45	20	0.31	20	0.71
	49	0.26	49	0.44	50	0.33	49	0.70
	74	0.17	74	0.45	73	0.42	74	0.60
	99	0.11	99	0.43	99	0.32	98	0.49
	197	0.03	198	0.02	198	0.04	199	0.04

Station	L5		L6		L7		L8	
Date (UTC)	2010-12-06		2011-03-10		2011-03-11		2011-03-12	
Latitude (°S)	58°24.6′		63°02.7′		60°53.3′		55°58.5′	
Longitude (°E)	110°00.3′		149°47.3′		149°48.7′		150°01.4′	
	Depth (dbar)	Chl *a* (μg/L)	Depth (dbar)	Chl *a* (μg/L)	Depth (dbar)	Chl *a* (μg/L)	Depth (dbar)	Chl *a* (μg/L)
	0	0.50	0	0.98	0	0.39	0	0.14
	20	0.48	20	0.79	20	0.36	19	0.12
	49	0.64	49	0.46	49	0.48	49	0.15
	74	0.63	74	0.33	74	0.51	72	0.33
	99	0.56	100	0.09	98	0.20	98	0.18
	198	0.06	199	N.D.	198	0.05	199	0.01

Station	L9		L10	
Date (UTC)	2011-03-13		2011-03-14	
Latitude (°S)	50°57.7′		45°48.4′	
Longitude (°E)	150°10.4′		151°58.1′	
	Depth (dbar)	Chl *a* (μg/L)	Depth (dbar)	Chl *a* (μg/L)
	0	0.31	0	0.43
	20	0.33	19	0.39
	50	0.35	49	0.38
	75	0.26	74	0.32
	99	0.24	97	0.21
	198	0.04	198	0.02

Table 2. Sampling date, time, position, and chlorophyll *a* concentrations for underway surface-water samplings.

Station	Date (UTC)	Time (UTC)	Lat (°S)	Long (°E)	Chl *a* (μg/L)
S001	2010-12-02	11:56	42-23.33	110-06.89	0.71
S002	2010-12-03	11:42	47-30.89	110-00.56	0.98
S003	2010-12-04	11:53	52-25.86	109-59.45	0.35
S004	2010-12-05	11:42	56-28.43	110-00.01	0.28
S005	2010-12-07	11:56	61-16.51	106-28.73	0.66
S006	2010-12-07	23:28	60-36.51	103-03.58	0.86
S007	2010-12-08	05:15	60-31.79	101-05.96	0.66
S008	2010-12-08	11:26	60-13.14	98-44.03	0.68
S009	2010-12-08	23:11	59-48.77	94-01.22	0.80
S010	2010-12-09	05:28	59-29.11	91-47.67	1.11
S011	2010-12-09	11:38	59-02.95	89-47.40	1.08
S012	2010-12-09	23:37	59-03.75	85-11.75	1.59
S013	2010-12-10	06:11	59-03.04	82-45.81	0.62
S014	2010-12-10	12:36	59-03.42	80-27.43	3.04
S015	2010-12-11	00:46	59-03.14	75-54.00	0.52
S016	2010-12-11	07:16	59-03.06	73-29.38	1.53
S017	2010-12-11	12:15	59-04.95	71-34.85	0.59
S018	2010-12-11	16:56	59-06.73	69-56.81	0.81
S019	2010-12-12	00:40	59-06.73	67-14.01	1.31
S020	2010-12-12	06:11	59-07.84	65-18.88	1.08
S021	2010-12-12	11:02	59-08.32	63-34.84	0.95
S022	2010-12-12	16:05	59-08.82	61-46.53	1.27
S023	2010-12-13	02:02	59-10.03	58-16.80	1.23
S024	2010-12-13	07:04	59-11.27	56-25.60	1.71
S025	2010-12-13	12:08	59-11.59	54-31.77	1.72
S026	2010-12-13	17:00	59-10.52	52-41.68	2.06
S027	2010-12-14	01:49	59-10.60	49-20.03	1.82
S028	2010-12-14	07:08	59-06.36	47-24.58	0.99
S029	2010-12-14	12:08	59-15.42	45-41.33	1.01
S030	2010-12-14	17:18	59-45.77	44-28.76	0.32
S031	2010-12-15	03:08	61-02.48	42-46.79	0.44
S032	2010-12-15	08:56	61-47.01	41-42.82	0.32
S033	2010-12-15	13:37	62-22.99	40-45.50	0.22
S034	2010-12-15	18:41	63-08.45	40-05.10	0.46
S035	2010-12-16	02:41	64-19.09	38-44.39	0.22
S036	2010-12-16	07:43	65-03.65	38-20.17	0.46
S037	2010-12-16	12:51	65-42.93	38-05.42	0.31
S038	2010-12-16	17:54	66-28.64	38-00.82	0.44
S039	2010-12-17	07:17	67-17.67	37-59.59	0.18
S040	2010-12-17	15:49	67-30.37	38-59.47	0.31
S041	2010-12-18	10:22	67-39.46	39-58.00	0.22
S042	2010-12-18	17:33	68-14.12	39-35.26	0.04
S043	2010-12-19	09:10	68-24.40	38-43.26	0.14
S044	2010-12-22	07:00	68-57.28	39-03.38	0.04
S045	2010-12-24	06:34	68-57.65	39-05.28	0.01
S046	2010-12-28	05:17	69-00.62	39-14.08	0.05
S047	2010-12-29	17:56	69-01.97	39-17.16	0.07
S089	2011-02-09	14:51	69-03.04	39-20.56	0.34
S090	2011-02-18	09:36	68-31.41	38-41.38	0.16
S091	2011-02-20	11:00	68-26.65	38-43.18	0.23
S092	2011-02-21	09:49	68-28.76	38-45.43	0.17
S093	2011-02-23	19:15	67-42.52	38-14.91	0.29
S094	2011-02-24	19:50	65-56.60	43-51.90	0.18
S095	2011-02-25	09:23	65-00.10	50-05.17	0.50
S096	2011-02-25	15:46	64-59.54	52-59.05	0.65
S097	2011-02-26	02:30	64-44.42	58-03.05	0.52
S098	2011-02-26	08:01	64-55.53	60-38.57	0.58
S099	2011-02-26	15:03	65-07.79	64-15.89	0.31
S100	2011-02-27	02:53	66-22.41	67-20.69	0.51
S101	2011-02-27	15:24	66-33.65	68-24.83	0.54
S102	2011-02-28	15:40	66-29.90	68-47.01	0.58
S103	2011-03-01	01:36	67-55.21	71-57.35	1.34
S104	2011-03-01	07:36	67-55.19	72-49.71	1.25
S105	2011-03-01	16:14	65-51.17	73-35.83	0.82
S106	2011-03-02	01:37	64-51.17	75-50.63	0.89
S107	2011-03-02	07:45	64-27.97	78-30.39	0.81
S108	2011-03-02	15:42	63-41.57	82-15.07	1.07
S109	2011-03-03	01:36	62-47.03	87-04.78	0.57
S110	2011-03-03	07:57	62-11.29	90-05.85	0.30
S111	2011-03-03	15:35	61-24.65	93-44.81	0.24
S112	2011-03-03	23:41	60-31.30	97-29.72	0.28
S113	2011-03-04	07:36	59-40.65	101-09.88	0.23
S114	2011-03-04	14:18	58-56.09	104-12.22	0.26
S115	2011-03-04	23:38	58-06.59	107-53.78	0.24
S116	2011-03-05	14:05	59-06.40	110-08.03	0.41
S117	2011-03-06	05:44	60-40.47	110-05.15	0.40
S118	2011-03-06	14:39	61-38.64	110-09.75	1.32
S119	2011-03-07	07:37	62-05.86	112-42.45	0.65
S120	2011-03-07	13:36	62-08.32	115-52.15	0.86
S121	2011-03-07	20:47	62-12.73	119-26.40	0.98
S122	2011-03-08	04:52	62-15.96	123-26.18	0.89
S123	2011-03-08	13:43	62-29.68	127-47.82	0.53
S124	2011-03-08	22:29	62-33.71	132-01.38	0.35
S125	2011-03-09	04:45	62-36.76	134-41.36	0.31
S126	2011-03-09	11:18	62-41.92	137-25.50	0.47
S127	2011-03-10	03:42	62-50.69	143-36.46	0.37
S128	2011-03-10	11:15	62-55.94	146-47.91	0.20
S129	2011-03-11	19:41	58-14.70	149-55.40	0.24
S130	2011-03-12	02:32	56-51.22	150-00.34	0.20
S131	2011-03-12	14:15	54-57.37	150-01.03	0.26
S132	2011-03-12	19:56	53-24.13	150-01.30	0.19
S133	2011-03-13	01:58	51-45.73	150-02.16	0.32
S134	2011-03-13	13:55	49-09.86	150-49.76	0.26
S135	2011-03-13	19:54	47-47.65	151-18.59	0.54
S136	2011-03-14	10:30	45-04.87	152-00.00	0.72