

Oceanographic Data of the 10 th Japanese Antarctic Research Expedition 1968-1969

Ryoji HIGANO* and Ryoki SARUWATARI*

第10次南極地域観測隊海洋部門報告

日向野 良 治*・猿 渡 了 己*

要 旨

第10次南極地域観測において、定常観測
(1968-1969) として行なった表面観測、バン

サーモグラフ観測および垂直(各層)観測の結果を報告する。

This report deals with the data of the oceanographic observations made on board the icebreaker FUJI during the summer mission of the 10 th Japanese Antarctic Research Expedition in 1968-1969. The track chart of the cruise shown in Fig. 1, and the locations of the vertical (serial) observation stations and the bathythermo-

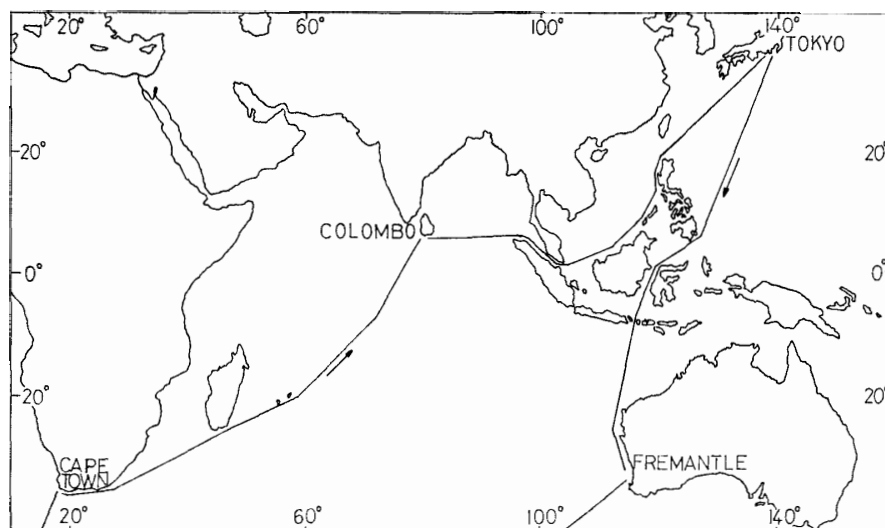


Fig. 1. Track of JARE-10 cruise 1968-69.

* 海上保安庁水路部. Hydrographic Division, Maritime Safety Agency, Tsukiji 5-chome, Chuo-ku, Tokyo.

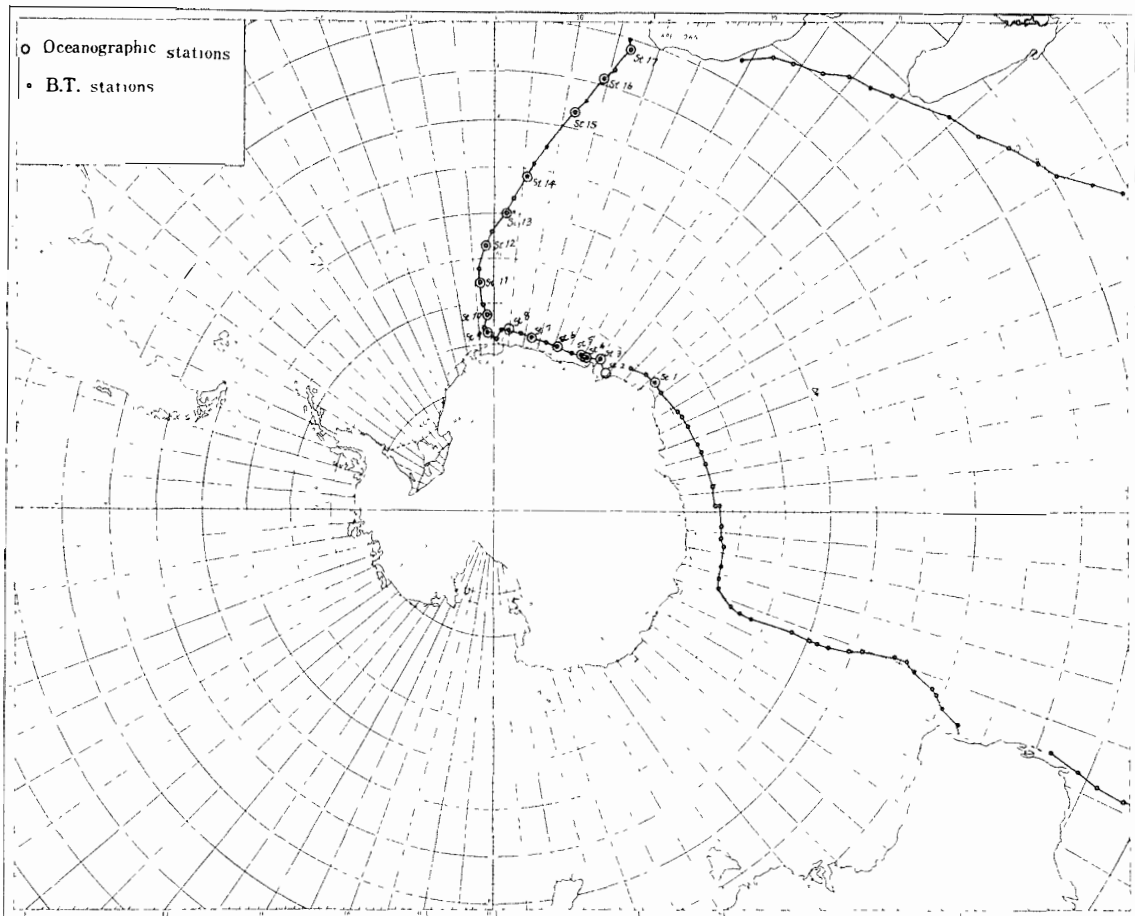


Fig. 2. Track of JARE-10 cruise and oceanographic stations.

graph (BT) observation stations in the southern ocean are given in Fig. 2.

Surface observations: Surface temperature measurements and surface water samplings for chemical analyses were made three times a day from Fremantle to Syowa Station and twice a day for the rest of the cruise, so far as the circumstances permitted. The results are given in Table 1.

Current measurements: Measurements of surface currents were made by GEK twice a day except the region near the magnetic equator and in the pack ice area. The results are also given in Table 1.

Bathythermograph observation: Water temperature in the upper layer (surface to about 250 metres depth) was measured with bathythermograph (BT) at almost the same frequency as the surface observations. The results are given in Table 2.

Vertical (serial) observation: The observations were made at 17 stations in the Southern ocean along the track of the cruise from Syowa Station to Cape Town (Fig. 2).

The observed data are shown in Table 3 with relevant meteorological data. The interpolated and computed values (temperature, salinity, sigma-t and dynamic depth anomalies) at standard depths are also included in Table 3. These values were calculated using electronic computer facilities available at the Japanese Oceanographic Data Center of the Hydrographic Division.

Chemical analyses of sea water: The following are the elements and the methods (or instrument) of analyses. The results are also presented in Table 3.

Salinity	Inductive salinometer (Auto-Lab-Model 401 MK III)
pH	pH meter (KPH-51 B Yokokawa Electric Works Inc.)
Dissolved oxygen	Winkler's method
Phosphate-P	Molybdenum blue method*
Reactive silicate-Si	Molybdenum yellow method and reduction method**
Nitrate-N	Cadmium column method*
Nitrite-N	Sulphanylamide and N-(1-naphtyl)-ethylenediamine·2HCl were used as a reagent*.
Ammonium-N	Indophenol method
Alkalinity	15.00 ml of N/100 HCl was added to 50.0 ml of sample, then pH of the sample was measured and alkalinity was calculated by Strickland's table*.

Acknowledgements

The authors are indebted to Captain S. MATSUSHIMA of the icebreaker FUJI and his officers and crew for their co-operation which enabled these observations.

(Received December 4, 1969)

* Manual of Sea Water Analysis (Fisheries Research Board of Canada).

** Silicate determination was done by the molybdenum yellow method for higher silicate concentration samples, and the reduction method using methol-hyposulfite solution as a reductant was adopted for the majority of the samples of lower silicate concentration.

Table 1. Surface observation data.

Date	Time		Position		Air temp.	Water temp.	S	pH	O	Phos- phate-P	Silica- te-Si	Nitri- te-N	Nitra- te-N	Ammo- nium-N	Alka- linity	Current	
	GMT	LMT	Lat.	Long.	°C	‰	cc/L		µg-at/L							Dir.	kt. Speed
1968																	
Dec. 1	2300*	0800	32-15N	238-28E	18.0	20.9	34.711	8.26	5.00	0.38		0.03	0.1			180	1.1
	1000	1900	29-54	137-13	20.2	22.4	34.764	8.28	4.97	0.10		0.10	0.1			210	0.6
2	2300*	0800	27-01	135-44	21.8	23.9	34.816	8.28	4.83	0.06		0.10	0.1			165	0.5
	1000	1900	25-26	134-29	24.2	25.2	34.536	8.26	7.74	0.04		0.03	0.0			134	1.0
3	2300*	0800	22-49	133-16	24.8	25.3	34.609	8.27	4.73	0.00		0.02	0.0			186	1.5
	1000	1900	20-43	132-16	25.0	26.2	34.528	8.32	4.67	0.04		0.02	0.0			169	0.5
4	2300*	0800	18-10	131-02	25.8	25.7	34.495	8.27	4.68	0.04		0.02	0.0				
	1000	1900	15-50	130-08	26.2	26.3	34.427	8.29	4.68	0.04	2	0.01	0.0				
5	2300*	0800	13-10	129-09	27.0	27.5	34.253	8.27	4.60	0.04	1	0.02	0.1				
	1000	1900	10-56	128-04	25.9	27.6	34.118	8.28	4.58	0.02	2	0.01	0.0				
6	2300*	0800	08-27	127-07	27.2	26.8	34.226	8.27	4.63	0.02	3	0.02	0.0				
	1000	1900	05-53	126-20	27.7	27.1	34.223	8.26	4.65	0.04	2	0.02	0.1	1.0			
7	0000	0800	03-45	123-35	28.5	28.6	34.311	8.25	4.56	0.02	4	0.03	0.0	0.4			
	1100	1900	02-22	121-34	28.0	29.0	33.786	8.25	4.55	0.02	6	0.02	0.1	0.2			
8	0000	0800	00-19	119-24	27.5	28.4	33.557	8.25	4.58	0.04	6	0.04	0.1	0.2			
	1100	1900	01-47S	118-47	28.6	30.6	33.237	8.26	4.47	0.00	7	0.02	0.0	0.1			
9	0000	0800	04-36	118-42	27.6	30.0	33.666	8.23	4.63	0.02	3	0.02	0.0	0.3			
	1100	1900	06-38	117-54	26.2	29.8	34.008	8.22	4.49	0.00	6	0.02	0.1	0.2			
10	0000	0800	08-44	115-44	28.0	29.9	34.074	8.20	4.46	0.02	6	0.04	0.1	0.3			
	1100	1900	11-14	115-15	29.3	29.8	34.316	8.22	4.50	0.08	6	0.02	0.0	0.3			
11	0000	0800	14-06	114-39	28.6	29.2	34.513	8.22	4.51	0.06	4	0.03	0.1	0.3		11	1.4
	1100	1900	16-27	114-24	28.4	29.4	34.549	8.23	4.48	0.08	8	0.01	0.1	0.3		277	0.4
12	0000	0800	19-11	114-02	27.0	27.6	34.737	8.26	4.58	0.13	6	0.03	0.1	0.2		40	0.7
	1100	1900	21-08	113-38	25.0	24.9	34.945	8.30	4.80	0.08	7	0.01	0.0	0.3		10	0.1

Date	Time		Position		Air temp.	Water temp.	S	pH	O	Phos- phate-P	Silica- te-Si	Nitri- te-N	Nitra- te-N	Ammo- nium-N	Alka- linity	Current	
	GMT	LMT	Lat.	Long.	°C	‰	cc/L		µg-at/L					Dir.	kt. Speed		
13	0000	0800	23-33S	112-51E	23.0	23.7	35.144	8.26	4.86	0.10	6	0.03	0.1	0.2		5	0.9
	1100	1900	25-16	112-39	20.9	23.0	35.211	8.29	4.95	0.17	6	0.01	0.0	0.1			
14	0000	0800	27-10	112-46	19.8	21.0	35.400	8.26	5.03	0.13	7	0.03	0.1	0.2			
	1100	1900	29-29	113-49	18.5	20.4	35.692	8.25		0.13	6	0.02	0.1	0.1			
15			Arrive	in Fre-													
21			Leave	mantle Freman- tle													
21	1100	1900	32-49	114-25	17.1	19.3	35.808	8.27	5.28	0.10	5	0.02	0.1	0.1		198	0.4
22	0000	0800	34-40	113-01	16.0	18.4	35.854	8.26	5.47	0.10	5	0.03	0.0	0.3			
	0600	1400	35-29	112-17	15.8	16.8	35.746		5.60								
	1100	1900	36-07	111-47	15.9	16.6	35.748	8.21	5.59	0.13	6	0.01	0.0	0.2			
23	0100	0800	38-12	110-07	14.0	15.1	35.425	8.22	5.84	0.32	8	0.06	2.0	0.4		118	0.9
	0700	1400	39-18	109-50	15.5	13.6	34.839		6.07								
	1200	1900	40-25	109-51	14.0	13.3	35.129	8.26	6.10	0.46	5	0.11	4.4	0.4			
24	0100	0800	42-54	110-06	12.1	10.8	34.626	8.19	6.43	0.88	6	0.24	12	0.6			
	0700	1400	44-03	110-37	13.0	10.7	34.550		6.46								
	1200	1900	45-03	111-05	11.0	10.2	34.359	8.19	6.33	0.90	2	0.28	13	0.5			
25	0100	0800	47-39	111-42	10.4	8.8	34.356	8.17	6.70	1.07	5	0.24	17	0.4			
	0700	1400	48-42	111-45	10.0	6.7	34.029		6.94								
	1200	1900	49-37	111-46	9.0	6.0	33.939	8.12	6.98	1.47	7	0.24	20	0.4			
26	0100	0800	52-00	111-46	6.6	3.2	33.867	8.20	10.28	1.49	5	0.32	24	0.4			
	0700	1400	53-06	111-54	5.0	2.4	33.864		7.63								
	1200	1900	54-01	112-16	5.0	1.5	33.899	8.10	7.69	1.79	30	0.30	27	0.5			
27	0100	0800	56-41	112-31	4.2	1.3	33.893	8.19	7.76	1.79	28	0.29	26	0.5			
	0700	0400	57-50	112-06	3.3	1.1	33.800		7.87								
	1200	1900	58-52	111-28	1.8	1.2	33.798	8.11	7.88	1.75	28	0.30	24	0.6			

Date	Time		Position		Air temp.	Water temp.	S	pH	O	Phos- phate-P	Silica- te-Si	Nitri- te-N	Nitra- te-N	Ammo- nium-N	Alka- linity	Current		
	GMT	LMT	Lat.	Long.	°C	‰	cc/L		µg-at/L							Dir.	kt. Speed	
22	0800	1000	68-47S	31-37E	- 4.0	- 0.9	33.497		8.10									
26	1700	1900	68-46	26-16	- 1.1	0.2	33.712	8.21	7.83	3.00	98	0.37	17	0.5		270	0.1	
27	1700	1900	68-44	17-13	- 1.3	- 0.2	33.402	8.30	8.26	2.73	42	0.30	17	0.2		76	0.4	
28	1700	1900	68-11	08-12	- 2.6	0.6	34.012		7.75	1.53	56	0.23	22			295	0.4	
Mar. 1	1700	1900	68-09	02-26	0.2	1.1	34.157	8.34	7.64	1.11	(138)	0.23	12	0.3		281	0.2	
2	0600	0800	69-09	00-45	- 3.0	0.2	34.482	8.12	8.00	1.96	60	0.31	28	0.5		248	0.3	
3	1700	1900	67-58	02-10W	0.0	1.2	34.149	8.23	7.22	3.12	97	0.19	16	0.0		252	0.1	
4	1700	1900	65-14	02-52	1.1	2.3	34.141		7.47	1.51	37	0.34	14	0.5		301	0.4	
5	1700	1900	61-21	03-27	1.3	2.6	33.591	8.24	7.46	1.57	72	0.20	20	0.7		2	0.4	
6	1800	1900	57-14	00-17	1.5	2.5	33.934	8.19	7.60	1.47	52	0.23	22	0.6	2.40	343	0.4	
7	1800	1900	53-25	03-49E	3.9	2.2	33.853	8.20	7.61	1.55	38	0.33		0.1		90	0.2	
8	1800	1900	49-35	06-42	4.4	4.8	33.791	8.20	7.15	1.47	9	0.25	20	0.4		317	0.5	
9	0700	0800	47-13	08-31	5.6	6.3	33.840	8.15	7.41	1.51	7	0.28	21	0.4		356	0.2	
	1800	1900	45-25	10-21	8.1	9.2	34.208	8.26	6.50	1.03	2	0.21	13	0.1		239	0.6	
10	1800	1900	41-51	12-55	11.2	13.6	35.214	8.17	5.76	0.52	14	0.44	0.4	0.0	2.39	234	0.5	
11	1800	1900	38-14	15-35	14.2	19.7	35.505	8.31	5.29	0.19	12	0.01	0.2	0.1	2.36			
12	1800	1900	35-21	16-20	19.8	20.7	35.500		5.20	0.23	4	0.01	0.1	0.3	2.37			
13			Arrive in Cape town															
20			Leave Capetown															
20	1700	1900	34-47	19-04	18.8	18.5	35.350	8.29	5.57	0.29	4	0.04	0.3	0.2	2.40			
21	0600	0800	34-38	21-50	19.9	21.2	35.502	8.29	5.12	0.17	4	0.03	0.0	0.1	2.40			
	1700	1900	34-39	24-43	20.5	20.1	35.281	8.29	5.51	0.17	3	0.01	0.1	0.1	2.40			
22	0600	0800	33-52	27-16	22.6	25.0	35.236	8.28	4.74	0.06	11	0.02	0.0	0.2				
	1700	1900	32-59	29-09	22.5	24.7	35.557	8.26	4.84	0.02	2.3	0.01	0.0	0.0	2.40	220	1.2	
23	0600	0800	31-47	31-46	23.3	24.8	35.572	8.28	4.87	0.06	3.3	0.03	0.0	0.0	2.41	265	0.5	
	1700	1900	30-46	34-15	24.0	26.8	35.254	8.28	4.66	0.13	2.3	0.01	0.0	0.0	2.38	155	0.1	

Date	Time		Position		Air temp.	Water temp.	S	pH	O	Phosphate-P	Silicate-Si	Nitrite-N	Nitrate-N	Ammonium-N	Alkalinity	Current	
	GMT	LMT	Lat.	Long.	°C	‰	cc/L		µg-at/L								Dir.
24	0600	0800	29-36S	37-14E	24.0	25.7	35.230	8.30	4.71	0.10	2.2	0.01	0.0	0.0	2.38	69	0.7
	1700	1900	28-34	39-40	24.7	27.5	35.243	8.27	4.57	0.08	2.8	0.02	0.0	0.1	2.37	89	1.0
25	0500	0800	27-41	42-01	24.0	26.1	35.140	8.28	4.74	0.10	2.4	0.02	0.0	0.1	2.37	277	0.6
	1600	1900	26-31	44-16	24.8	26.0	35.064	8.27	4.71	0.08	2.9	0.03	0.0	0.1	2.40	320	0.7
26	0500	0800	25-24	47-03	25.4	27.4	34.933	8.25	4.56	0.15	2.8	0.02	0.0	0.1	2.40		
	1600	1900	24-16	49-28	25.1	26.9	35.127	8.27	4.54	0.17	2.5	0.05	0.1	0.0	2.39	22	2.3
27	0500	0800	23-09	52-42	27.1	27.9	35.266	8.27	4.53	0.13	2.7	0.03	0.0	0.0	2.40	311	0.4
	1600	1900	21-56	55-05	27.2	28.3	35.118	8.25	4.45	0.13	2.7	0.04	0.0	0.1	2.39	352	0.9
28	0500	0800	20-42	57-48	27.8	28.4	35.256	8.23	4.49	0.13	2.4	0.02	0.0	0.0	2.39	325	0.6
	1600	1900	19-07	59-38	28.0	28.6	34.701	8.26	4.50	0.17	2.6	0.03	0.0	0.0	2.37	311	0.7
29	0400	0800	17-25	61-40	28.0	28.3	34.976	8.26	4.49	0.13	2.9	0.01	0.0	0.0	2.39	42	0.4
	1500	1900	15-51	63-34	27.9	28.5	34.485	8.27	4.47	0.15	2.4	0.01	0.0	0.0	2.32	343	0.7
30	0400	0800	13-54	65-49	28.3	28.8	34.471	8.27	4.51	0.17	2.4	0.01	0.0	0.0	2.35	317	0.6
	1500	1900	12-23	67-35	28.1	29.4	34.522	8.28	4.48	0.17	3.9	0.01	0.0	0.0	2.36	317	0.6
31	0400	0800	10-31	69-45	28.5	28.9	34.273	8.35	4.49	0.15	3.9	0.01	0.0	0.0	2.33	36	0.5
	1500	1900	08-57	71-27	28.3	29.4	34.505	8.28	4.47	0.19	3.6	0.01	0.0	0.0	2.34	332	0.7
Apr. 1	0300	0800	07-17	73-18	28.1	29.3	34.295	8.23	4.45	0.17	4.4	0.01	0.0	0.0	2.32		
	1400	1900	04-55	74-27	28.0	29.2	34.812	8.25	4.49	0.15	3.0	0.01	0.0	0.0	2.35		
2	0300	0800	03-24	75-36	28.9	28.8	34.911	8.26	4.47	0.17	3.9	0.01	0.0	0.0	2.36		
	1400	1900	00-12N	76-42	28.9	29.9	34.822	8.27	4.41	0.17	3.1	0.01	0.0	0.0	2.39		
3	0300	0800	02-54	78-01	29.1	29.6	34.861	8.25	4.42	0.17	2.7	0.01	0.0	0.0	2.41		
	1400	1900	04-49	78-38	29.0	29.9	33.920	8.27	4.44	0.08	2.5	0.02	0.0	0.1	2.34		
4			Arrive in	Colombo													
9			Leave	Colombo													
10	0230	0800	05-49	83-30	27.0	29.7	33.948	8.23	4.45	0.08	3.2	0.05	0.0	0.0	2.30		
	1330	1900	05-53	86-02	27.5	29.3	33.602	8.26	4.50	0.10	3.0	0.03	0.0	0.0	2.28		

Date	Time		Position		Air temp.	Water temp.	S	pH	O	Phosphate-P	Silicate-Si	Nitrite-N	Nitrate-N	Ammonium-N	Alkalinity	Current	
	GMT	LMT	Lat.	Long.	°C	‰	cc/L		µg-at/L								Dir.
11	0200	0800	05-54N	88-55E	29.0	29.8	34.173	8.26	4.44	0.10	3.6	0.03	0.0	0.0	2.33		
	1300	1900	05-58	91-26	29.2	29.8	33.820	8.25	4.49	0.08	2.8	0.03	0.0	0.1	2.33		
12	0200	0800	06-13	94-28	29.1	29.8	34.488	8.26	4.47	0.13	2.7	0.01	0.0		2.37		
	1300	1900	05-48	96-37	29.3	29.9	33.345	8.25	4.49	0.08	3.9	0.02	0.0		2.30		
13	0100	0800	04-44	98-36	29.3	29.8	33.840	8.23	4.49	0.08	7.6	0.02	0.0	0.1	2.28		
	1200	1900	03-23	100-17	29.1	31.6	31.415	8.21	4.47	0.08	9.1	0.02	0.0	0.0	2.18		
14	0100	0800	01-55	102-24	27.5	29.5	32.178	8.21	4.40	0.04	13	0.04	0.1	0.0	2.23		
	1200	1900	01-26	104-29	28.7	29.8	32.748	8.21	4.49	0.08	7.3	0.03	0.0	0.0	2.23		
15	0100	0800	03-57	105-58	28.8	29.0	33.498	8.25	4.53	0.02	5.7	0.02	0.0	0.0	2.27		
	1200	1900	05-49	107-29	28.1	30.2	33.774	8.20	4.49	0.02	5.0	0.01	0.0	0.0	2.30		
16	0100	0800	08-06	109-29	28.2	28.6	33.962	8.23	4.52	0.04	6.0	0.01	0.0	0.0	2.30		
	1200	1900	10-05	111-06	28.0	29.2	33.775	8.23	4.54	0.00	5.5	0.01	0.0	0.0	2.28		
17	0100	0800	12-14	112-57	28.2	28.0	33.677	8.22	4.59	0.00	8.4	0.01	0.0	0.1	2.28		
	1200	1900	13-51	114-46	28.0	28.6	33.923	8.23	4.57	0.00	2.7	0.01	0.0	0.1	2.28		
18	0000	0800	15-44	116-47	27.0	28.1	33.700	8.22	4.60	0.00	2.9	0.01	0.0	0.0	2.27		
	1100	1900	17-08	118-38	27.0	27.1	34.102	8.23	4.70	0.00	2.8	0.03	0.0	0.1	2.32		
19	0000	0800	19-18	120-55	26.2	27.0	33.951	8.22	4.68	0.00	3.7	0.03	0.0	0.0	2.31		
	1100	1900	20-53	122-44	25.0	25.5	34.688	8.26	4.78	0.02	1.7	0.01	0.0	0.1	2.34	162	0.5
20	0000	0800	22-52	124-45	23.8	24.2	34.781	8.26	4.89	0.02	1.8	0.01	0.0	0.0	2.35	237	1.1
	1100	1900	24-36	126-30	23.8	24.4	34.755	8.25	4.86	0.06	1.9	0.02	0.0	0.1	2.35	152	1.7
21	2300*	0800	26-33	128-39	23.2	23.0	34.808	8.27	4.88	0.00	2.5	0.03	0.0	0.0	2.35	90	0.4
	1000	1900	28-20	130-31	21.1	21.2	34.843	8.27	5.12	0.06	4	0.04	0.0			150	0.9
22	2300*	0800	30-14	132-43	19.5	19.9	34.839	8.27	5.18				0.0			200	0.7
	1000	1900	32-19	135-05	20.0	20.8	34.827						0.0			125	1.5

* The time of the date of the preceding day.

Table 2. Bathythermograph observation data.

St. No.	Date			Time		Position		Temperature (°C) at indicated depth(m)										
	Day	Month	Year	GMT	LMT	Lat.	Long.	0	10	20	30	50	75	100	125	150	200	250
1	1	Dec.	1968	2300*	0800	32-15N	138-28E	20.9	20.9	20.7	20.7	20.6	20.6	20.5	18.4	17.8		
2	1			1000	1900	29-54	137-13	22.4	26.4	26.4	26.4	26.4	26.4	26.4	23.8	23.1	22.1	
3	2			2300*	0800	27-01	135-44	23.9	23.9	23.9	23.8	23.5	22.9	22.9	21.4	19.6	17.9	
4	2			1000	1900	25-26	134-29	25.2	25.2	25.2	25.2	25.2	25.1	23.9				
5	3			2300*	0800	22-49	133-16	25.3	25.3	25.2	25.2	25.2	25.2	24.9	24.7	23.1	20.3	18.6
6	3			1000	1900	20-43	132-16	26.2	26.2	26.2	26.2	26.1	26.1	25.1	24.6	23.2	20.8	
7	4			2300*	0800	18-10	131-02	25.7	25.7	25.6	25.6	24.3	22.0	20.5	19.4	18.7	17.2	
8	4			1000	1900	15-50	130-08	26.3	26.2	26.2	26.2	26.0	25.1	24.2	21.2	19.8	16.7	19.5
9	5			2300*	0800	13-10	129-09	27.5	27.3	27.3	27.3	25.8	23.4	21.4	19.4	17.8	14.7	
10	5			1000	1900	10-56	128-04	27.6	27.6	27.4	27.4	26.1	23.2	20.8	19.1	17.8	13.9	11.6
11	6			2300*	0800	8-27	127-07	26.8	26.7	26.6	26.5	26.2	24.4	21.8	19.9	17.7	15.7	12.3
12	6			1000	1900	5-53	126-20	27.1	27.0	26.8	26.5	26.0	24.5	21.3	19.1	17.4	14.0	
13	7			0000	0800	3-45	123-35	28.6	28.6	27.6	27.0	26.4	25.2	24.2	21.0	17.6	15.3	12.3
14	7			1100	1900	2-22	121-34	29.0	29.0	29.0	29.0	28.3	25.1	22.5	21.1	20.3	14.9	12.4
15	8			0000	0800	0-19	119-24	28.4	28.4	28.4	28.0	27.3	25.9	24.1	22.1	19.4	16.6	13.9
16	8			1100	1900	1-47S	118-47	30.6	30.6	30.6	30.5	28.6	25.8	23.1	21.1	20.6	17.5	15.8
17	9			0000	0800	4-36	118-42	30.0	30.0	29.5	29.0	28.3	27.5	24.5	25.9	17.6	15.2	14.0
18	9			1100	1900	6-38	117-54	29.8	29.3	28.7	28.4	27.7	24.9	23.3	20.7	19.0	14.7	
19	10			0000	0800	8-44	115-44	29.9	29.5	27.7	26.1	24.9	23.1	19.2	18.0	15.6	14.3	11.5
20	10			1100	1900	11-14	115-15	23.8	29.3	28.7	27.7	26.0	24.0	21.7	19.9	18.1	14.6	12.8
21	11			0000	0800	14-06	114-39	29.2	29.1	28.9	28.2	26.8	24.7	23.9	22.0	20.1	17.9	14.7
22	11			1100	1900	16-27	114-24	29.4	29.2	28.6	27.5	26.4	25.2	24.1	23.3	22.3	18.8	15.8
23	12			0000	0800	19-11	114-07	27.6	27.3	26.1	25.8	25.2	24.1	22.9	22.2	21.6	20.5	17.5
24	12			1100	1900	21-08	113-38	24.9	24.5	24.2	23.6	22.3	21.2	20.3	20.0	19.4	18.6	17.7
25	13			0000	0800	23-33	112-51	23.7	23.7	23.7	23.7	23.7	23.5	22.1	21.3	20.8	19.5	18.5

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[附圖資料]

St. No.	Date			Time		Position		Temperature (°C) at indicated depth(m)										
	Day	Month	Year	GMT	LMT	Lat.	Long.	0	10	20	30	50	75	100	125	150	200	250
26	21	Dec.	1968	1100	1900	32-49S	114-25E	19.3	19.3	19.3	19.3	19.0	18.9	17.9	16.9	16.4	14.6	13.3
27	22			0000	0800	34-40	113-01	18.4	18.4	18.4	18.4	17.9	16.8	16.0	15.3	14.9	14.0	13.4
28	22			0600	1400	35-29	112-17	16.8	16.7	16.7	16.7	16.3	15.2	14.2	14.1	13.6	12.0	11.4
29	22			1100	1900	36-07	111-47	16.6	16.6	16.4	16.2	14.2	13.6	13.2	12.8	12.3	11.8	11.1
30	23			0100	0800	38-12	110-07	15.1	15.1	15.1	15.1	15.2	14.2	12.9	11.9	11.7	11.3	10.9
31	23			0700	1400	39-18	109-50	13.6	13.6	13.6	13.6	11.4	11.5	11.2	10.9	10.7	10.5	10.3
32	23			1200	1900	40-25	109-51	15.1	14.9	14.6	14.6	14.6	13.5	13.5	13.4	13.3	13.4	13.0
33	24			0700	1400	44-03	110-37	10.7	10.6	10.6	10.6	10.5	9.8	9.9	9.6	9.5	9.6	9.8
34	24			1200	1900	45-03	111-05	10.2	10.2	10.2	10.2	10.1	10.0	9.9	9.8	9.9	10.1	
35	25			0100	0800	47-39	111-46	8.8	8.8	8.8	8.8	8.7	8.7	8.7	8.1	7.9	8.1	7.7
36	25			0700	1400	48-42	111-45	6.7	6.7	6.7	6.7	6.5	6.4	6.3	6.5	6.7	6.1	5.8
37	25			1200	1900	49-37	111-46	6.0	6.0	5.8	5.7	5.3	5.1	4.8	4.6	4.2	4.3	4.5
38	26			0100	0800	52-00	111-46	3.2	3.2	3.2	3.2	3.0	2.9	2.4	1.9	1.3	1.6	2.3
39	27			0100	0800	56-41	112-31	1.3	1.3	1.3	1.3	1.2	0.3	0.0	-0.3	0.5	1.9	
40	27			0700	1400	57-50	112-06	1.1	1.1	1.1	1.1	0.7	-0.7	-1.0	-0.6	0.5	1.8	2.2
41	27			1200	1900	58-52	111-28	1.2	1.2	1.2	1.2	0.5	-0.4	-0.9	-0.5	0.8	2.1	2.4
42	28			0100	0800	61-01	108-41	0.6	0.6	0.6	-0.6	-0.6	-1.2	-0.9	-0.2	0.9	1.6	1.7
43	28			0700	1400	61-09	106-31	1.1	1.1	1.2	1.9	0.9	0.5	0.8	1.6	2.3	2.8	3.3
44	28			1200	1900	61-22	104-19	0.7	0.6	0.5	0.5	-0.1	-1.1	-1.0	-0.5	0.2	0.8	1.2
45	29			0100	0800	61-50	98-46	0.3	0.2	0.0	-0.1	-0.8	-1.1	-0.2	0.8	1.1	1.3	1.6
46	29			0700	1400	62-03	96-18	0.4	0.3	0.3	0.2	-0.5	-1.6	-0.9	-0.3	0.2	0.8	1.2
47	29			1200	1900	62-14	94-15	0.4	0.3	0.3	0.3	0.2	-1.6	-1.3	-0.5	0.0	0.5	0.9
48	30			0200	0800	62-38	88-14	-0.2	-0.3	-0.3	-0.3	-0.6	-1.7	-1.4	-1.1	-0.8	0.1	
49	30			0800	1400	62-51	88-36	-0.2	-0.2	-0.3	-0.3	-1.3	-1.4	-1.1	-0.4	0.2	0.8	1.3
50	30			1300	1900	63-06	83-14	0.0	0.0	-0.1	-0.1	-1.7	-0.8	0.9	1.4	1.7	1.7	

St. No.	Date			Time		Position		Temperature (°C) at indicated depth(m)										
	Day	Month	Year	GMT	LMT	Lat.	Long.	0	10	20	30	50	75	100	125	150	200	250
51	31	Dec.	1968	0200	0800	63-28S	77-17E	-0.1	-0.2	-0.2	-0.2	-0.4	-0.9	0.6	1.6	1.7	1.7	
52	31			0800	1400	63-37	74-41	0.0	0.1	0.1	0.1	-1.1	-0.3	1.1	1.2	1.5	1.8	
53	31			1300	1900	63-47	72-22	0.0	-0.3	-0.5	-0.6	-1.7	-0.6	0.8	1.6	1.7	1.7	1.7
54	1	Jan.	1969	0300	0800	64-15	65-51	-0.6	-0.7	-1.1	-1.2	-1.3	0.2	1.2	1.6	1.7	1.7	
55	1			0900	1400	64-07	63-57	0.8	0.0	-0.3	-0.5	-1.3	-1.1	1.5	1.9	1.9	2.0	2.1
56	1			1400	1900	64-20	61-30	0.5	0.8	0.9	0.0	-0.8	0.2	1.9	2.2	2.3	2.4	2.5
57	2			0400	0800	65-00	54-59	0.1	0.1	0.0	-0.1	-0.8	-0.3	1.0	1.4	1.6	1.6	
58	2			1400	1800	64-54	51-48	-1.0	-1.0	-1.2	-1.2	-1.0	-1.4	-1.9	-1.8	-1.7	-2.0	
59	3			0400	0800	65-03	17-43	-1.2	-0.9	-1.7	-1.5	-1.8	-1.9	-1.7	-1.7	-1.8	-1.7	-1.3
60	3			1500	1900	66-07	44-05	-0.3	-0.4	-0.6	-0.1	-1.4	-1.9	-2.1	-1.8	-1.8	-1.6	
61	21	Feb.	1969	0500	0800	68-05	35-13	-1.0	-1.0	-0.9	-0.7	-1.6	-1.6	-1.6	-1.5	-1.5	-1.4	
62	22			0700	1000	68-47	31-37	-0.9	-0.9	-0.7	-0.5	-0.5	-1.0	-1.5	-1.5			
63	23			0500	0800	68-45	31-13	-0.7	-0.7	-0.6	-0.5	-0.9	-1.4	-1.8	-1.8	-1.8	-1.8	-1.7
64	26			0600	0800	68-34	29-45	-0.5	-0.3	-0.2	-0.2	-0.2	-1.5	-1.9	-2.0	-1.9	-1.9	
65	26			1700	1900	68-46	26-16	0.2	-1.5	-2.3	-2.4	-2.3	-2.0	-1.5	-1.2	-0.9		
66	27			0600	0800	68-46	20-38	0.3	0.3	0.3	-0.3	-1.6	-1.5	-1.6	-1.5	-1.0		
67	27			1700	1900	68-44	17-13	-0.2	-0.2	0.2	-0.4	-1.4	-1.3	-1.1	-1.4	-1.0		
68	28			0600	0800	68-31	12-11	0.1	0.1	0.1	-1.3	-1.9	-1.9	-1.8	-1.6	-1.6	-1.4	-0.6
69	28			1700	1900	68-11	08-12	0.6	0.5	0.5	-0.6	-1.7	-1.7	-1.6	-1.5	-1.2	-0.1	
70	1	Mar.	1969	0600	0800	68-02	04-07	1.3	1.3	1.3	0.7	-1.1	-1.1	-0.7	-0.1	0.4	1.0	
71	1			1700	1900	68-09	02-26	1.1	1.1	1.1	0.6	-1.4	-1.3	-0.7	-0.1	0.3	0.8	
72	2			0600	0800	69-09	00-45	0.2	0.2	0.3	0.2	-1.0	-1.6	-1.5	-1.3	-1.3	-1.0	0.0
73	3			0600	0800	68-35	01-58W	0.9	0.9	0.9	0.9	-0.6	-1.1	-0.9	-0.3	-0.5	0.9	1.2
74	3			1700	1900	67-58	02-10	1.2	1.2	1.2	1.1	-0.8	-1.1	-0.5	0.6	0.9	1.0	
75	4			0600	0800	66-25	01-53	1.6	1.6	1.6	1.6	1.6	-1.2	-0.8	-1.1	-1.1	0.6	1.0

St. No.	Date			Time		Position		Temperature (°C) at indicated depth(m)										
	Day	Month	Year	GMT	LMT	Lat.	Long.	0	10	20	30	50	75	100	125	150	200	250
76	4	Mar.	1969	1700	1900	65-14S	02-52W	2.3	2.3	2.3	2.3	-0.9	-1.4	-1.4	-0.4	0.7	1.4	
77	5			0600	0800	62-52	03-28	2.7	2.7	2.7	0.8	-1.4	-1.4	-1.4	-1.6	1.6	1.3	
78	5			1700	1900	61-21	03-27	2.6	2.6	2.6	2.6	0.2	-1.5	-1.5	-1.2	-0.6	0.6	0.9
79	6			0700	0800	58-43	01-36	2.5	2.5	2.5	2.5	1.0	-1.2	-1.4	-1.3	-0.9	0.1	0.8
80	6			1800	1900	57-14	00-17	2.5	2.5	2.5	2.5	0.0	-1.0	-1.0	-0.5	-0.2	0.5	1.1
81	7			0700	0800	55-00	02-36E	2.4	2.4	2.5	2.5	2.5	0.1	-0.7	-0.4	0.1	1.3	
82	7			1800	1900	53-25	03-49	2.2	2.2	2.2	2.2	2.2	2.1	0.0	-0.5	-0.3	0.7	
83	8			0700	0800	50-55	05-45	4.9	4.9	4.9	4.9	4.9	5.0	2.4	1.9	1.9	2.0	
84	8			1800	1900	49-35	06-42	4.8	4.8	4.8	4.8	4.8	3.1	2.1	2.0	2.0	2.1	
85	9			0700	0800	47-13	08-31	6.3	6.3	6.3	6.3	6.4	6.5	6.6	5.6	4.4	3.9	3.5
86	10			0700	0800	43-10	11-51	10.1	10.1	10.1	10.1	10.2	10.2	10.2	9.3	9.5	8.7	8.1
87	10			1800	1900	41-50	12-55	13.6	13.6	13.7	13.6	13.7	13.7	13.7	13.8	13.8	13.8	
88	11			0700	0800	39-39	14-27	17.7	17.7	17.7	17.7	17.7	15.0	14.1	14.1	13.8	12.2	11.9
89	11			1800	1900	38-14	15-35	19.7	19.5	19.2	19.2	19.1	17.6	15.9	15.7	14.9	14.1	
90	12			0700	0800	36-26	16-58	20.0	20.0	20.0	19.8	19.4	17.7	15.1	15.0	13.9	12.8	
91	12			1800	1900	35-21	16-20	20.7	20.7	20.4	19.6	19.3	18.0	15.5	14.1	14.1	13.2	12.2
92	22			1700	1900	32-59	29-09	24.7	24.7	24.7	24.6	22.4	19.3	17.7	16.9	16.4	15.9	15.2
93	23			0600	0800	31-47	31-46	24.8	24.8	24.8	24.7	22.7	20.0	18.3	17.7	17.2	16.8	
94	23			1700	1900	30-46	34-15	26.8	26.8	26.8	26.8	26.8	25.3	24.0	23.1	22.2	20.0	
95	24			0600	0800	29-36	37-14	25.7	25.6	25.6	25.5	22.5	21.0	19.3	17.8	17.1	16.5	
96	24			1700	1900	28-34	39-40	27.5	27.5	27.5	27.5	27.4	23.6	22.2	20.8	19.7		
97	25			0500	0800	27-41	42-01	26.1	26.1	26.1	26.1	26.1	23.4	22.5	21.7	20.3	17.6	16.0
98	25			1600	1900	26-31	44-16	26.0	26.0	25.8	25.8	23.8	22.1	19.6	18.7	17.8	16.7	15.0
99	26			1600	1900	24-16	49-28	26.9	26.9	26.8	26.6	26.3	24.1	20.9	18.8	17.7	16.3	
100	27			0500	0800	23-09	52-42	27.9	28.0	28.0	27.9	26.8	24.5	23.3	22.3	21.3	19.5	

St. No	Date			Time		Position		Temperature (°C) at indicated depth(m)										
	Day	Month	Year	GMT	LMT	Lat.	Long.	0	10	20	30	50	75	100	125	150	200	250
101	27	Mar.	1969	1600	1900	21-56S	55-05E	28.3	28.1	28.1	28.1	28.1	24.3	23.0	22.4	21.2	19.5	
102	28			0500	0800	20-42	57-48	28.4	28.2	28.1	28.0	26.1	24.0	23.0	22.1	21.4	19.9	
103	28			1600	1900	19-07	59-38	28.6	28.6	28.3	28.2	27.7	25.4	24.1	23.0	22.2	22.7	17.8
104	29			0400	0800	17-25	61-40	28.3	28.2	27.9	27.8	25.9	22.8	22.4	21.7	20.5	18.1	
105	29			1500	1900	15-51	63-34	28.5	28.5	28.5	28.5	26.9	24.4	23.0	22.4	21.8	19.8	
106	30			0400	0800	13-54	65-49	28.8	28.8	28.8	28.6	25.4	23.1	21.6	19.9	19.3	16.7	
107	30			1500	1900	12-23	67-35	29.4	29.2	28.6	27.3	24.2	22.2	20.1	18.6	17.2	13.8	
108	31			0400	0800	10-31	69-46	28.9	28.9	27.8	25.1	20.6	18.9	17.2	15.0	13.6	12.1	
109	31	1500	1900	08-57	71-27	29.4	28.9	24.0	22.5	17.9	15.8	14.6	13.7	12.8	12.0			
110	1	Apr.	1969	0300	0800	07-17	73-18	29.3	29.1	28.4	25.7	19.8	17.3	15.4	14.5	13.4	12.0	
111	1			1400	1900	04-55	74-27	29.2	29.1	29.1	26.9	23.1	20.1	16.4	15.6	14.5	13.1	
112	2			0300	0800	02-24	75-36	28.8	28.8	28.7	28.3	26.6	22.8	20.0	17.2	16.1	12.9	
113	2			1400	1900	00-12N	76-42	29.9	29.9	29.8	29.8	24.0	22.8	21.2	19.6	15.0	14.0	
114	3			0300	0800	02-54	78-01	29.6	29.5	29.0	28.9	28.7	25.1	19.0	15.3	14.4	12.8	
115	3			1400	1900	04-49	78-38	29.9	29.8	29.5	29.1	27.3	24.5	21.0	17.4	15.8	13.8	
116	10			0230	0800	05-49	83-28	29.7	29.7	29.7	29.5	28.8	23.1	20.2	17.5	15.9	12.9	
117	10			1330	1900	05-53	86-02	29.3	29.4	29.5	29.3	27.7	22.1	18.1	15.6	14.3	12.5	
118	11			0200	0800	05-54	88-55	29.8	29.8	29.8	29.7	27.9	24.7	21.7	17.3	15.1	13.4	
119	11			1300	1900	05-58	91-26	29.8	29.7	29.6	29.3	26.6	23.7	19.7	16.6	15.5	13.4	
120	12			0200	0800	06-13	94-28	29.8	29.8	29.7	29.6	28.5	26.9	23.4	19.9	17.3	13.8	

St. No.	Date			Time		Position		Temperature (°C) at indicated depth(m)										
	Day	Month	Year	GMT	LMT	Lat.	Long.	0	10	20	30	50	75	100	125	150	200	250
121	12	Apr.	1969	1300	1900	05-48N	96-37E	29.9	30.0	30.0	29.9	29.1	25.5	22.6	18.8	17.1	13.8	
122	16			0100	0800	08-06	109-29	28.6	28.2	28.1	28.1	27.8	25.6	21.0	17.8	16.0	13.9	
123	16			1200	1900	10-05	111-06	29.2	29.2	28.9	28.7	28.6	25.2	21.9	19.9	18.5	16.2	
124	17			0100	0800	12-14	112-57	28.0	28.0	27.8	27.8	27.5	23.9	21.8	19.1	17.9	14.7	
125	17			1200	1900	13-51	114-46	28.6	28.4	28.2	28.1	25.4	23.9	21.0	18.6	17.5	15.0	
126	18			0000	0800	15-44	116-47	28.1	28.1	27.6	27.6	26.4	22.9	20.2	18.5	17.0	14.6	
127	18			1100	1900	17-08	118-38	27.1	27.5	24.8	24.1	21.7	20.1	18.2	17.3	16.0	14.0	
128	19			0000	0800	19-18	120-55	27.0	26.6	26.4	26.1	23.1	21.4	20.3	19.2	17.5	15.3	13.9
129	19			1100	1900	20-53	122-44	25.5	25.2	24.1	23.8	23.4	23.2	23.0	22.7	21.3	19.3	
130	20			0000	0800	22-52	124-45	24.2	24.2	24.2	24.1	23.6	23.5	23.1	23.0	22.6	21.5	
131	20			1100	1900	24-36	126-30	24.4	24.3	24.2	24.0	23.6	23.1	22.9	22.1	21.4	19.7	
132	21			2300*	0800	26-33	128-39	23.0	23.0	21.9	21.7	21.3	20.8	20.8	20.6	20.5	19.9	
133	21			1000	1900	28-20	130-31	21.2	21.2	21.2	21.2	21.0	20.8	20.3	19.8	19.4	18.6	
134	22			2300*	0800	30-14	132-43	19.9	19.8	19.6	19.6	19.2	18.9	18.5	18.5	18.5	18.5	
135	22			1000	1900	32-19	135-05	20.8	20.8	20.8	20.8	20.5	20.1	19.8	19.4	19.0	18.0	
136	23			2300*	0800	33-56	137-34	19.9	19.8	19.1	19.1	18.8	18.6	18.6	18.5	18.4	17.5	

* The time of the date of the preceding day.

Table 3 Vertical observation data.

St. 1

											Meteorological observation				
Date : Jan. 2, 1969					Time (GMT) : 1400			Wind dir. : NW							
Time (GMT) : 1400-1430					(LMT) : 1800			vel. : 6 kt							
(LMT) : 1800-1830					Weather : Snow			Humidity : 81%							
Lat. : 64-54S					Air temp. : -0.2°C			Sea : ?							
Long. : 51-48E					Atm. press. : 996.1 mb			Swell : W 1							
Observed											Interpolated				
Depth (m)	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₂ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N	Alkalinity	Depth (m)	T (°C)	S (‰)	σ _t	JD
					μg-atoms/L										
0	-0.90	33.482	8.12	8.00	1.96	60	0.31	28	0.5	2.26	0	-0.90	33.482	26.94	0.000
9	-0.78	33.656	8.11	7.90	1.93	58	0.30	33	0.5	1.92	10	-0.78	33.659	27.08	0.011
19	-0.84	33.682	8.09	7.90	1.98	58	0.31	42	0.7	1.61	20	-0.84	33.697	27.11	0.020
28	-0.88	33.836	8.09	7.89	1.96	58	0.29	33	0.4	2.17	30	-0.83	33.860	27.24	0.029
47	-0.52	33.988	8.10	8.06	1.91	55	0.30	28	0.6	2.30	50	-0.56	33.995	27.34	0.045
71	-1.15	34.025	8.09	8.45	1.96	58	0.21	33	0.6	2.15	75	-1.30	34.044	27.41	0.063
95	-1.87	34.147	8.05	8.07	2.12	67	0.25	31	0.2	2.32	100	-1.84	34.165	27.52	0.078
118	-1.63	34.217	8.03	8.22	2.16	71	0.24	34	0.1	2.21	125	-1.60	34.236	27.57	0.092
140	-1.58	34.271	8.01	8.04	2.16	74	0.18	33		2.30	150	-1.60	34.288	27.62	0.104
187	-1.73	34.331	8.03	7.96	2.20	74	0.04	33	0.2	2.30	200	-1.72	34.344	27.66	0.127
282	-1.26	34.394	8.01		2.19	77	0.31	33	0.6		250	-1.53	34.381	27.69	0.147

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St. 2

Meteorological observation

Date : Feb. 20, 1969	Time (GMT) : 0800	Wind dir. : NE
Time (GMT) : 0730-0810	(LMT) : 1100	vel. : 10 kt
(LMT) : 1030-1110	Weather : Clear	Humidity : 53%
Lat. : 69-01S	Air temp. : -1.6°C	Sea : 0
Long. : 39-16E	Atm. press. : 990.0 mb	Swell : 0

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Observed											Interpolated				
Depth (m)	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N	Alkali- nity	Depth (m)	T (°C)	S (‰)	σ_t	ΔD
					$\mu\text{g-atoms/L}$										
0	-0.60		8.35	9.20	0.82	33	0.19	13	1.1		0	-0.60			
10	-1.49	34.174	8.09	6.76	2.18	76	0.13	32	0.3		10	-1.49	34.174		
25	-1.52	34.138	8.08	6.70	2.16	78	0.17	32	0.2		20	-1.59	34.149		
50	-1.53	34.098	8.09	6.72	2.16	74	0.17		0.3		30	-1.52	34.128		
75	-1.51	34.073	8.09	6.84	2.18	75	0.14	30	0.6		50	-1.53	34.098		
100	-1.14	33.843	8.09	8.19	1.59	71	0.17	23	0.1		75	-1.51	34.073		
150	-0.68	32.307	8.22	9.14	0.82	34	0.14	13	0.3		100	-1.14	33.843		
											125	-0.86	33.254		
											150	-0.68	32.307		

St. 3

Meteorological observation

Date : Feb. 21, 1969
 Time (GMT) : 0630-1045
 (LMT) : 0930-1345
 Lat. : 68-06S
 Long. : 35 08E

Time (GMT) : 0700 Wind dir. : SE
 (LMT) : 1000 vel. : 31 kt
 Weather : Cloudy Humidity : 74%
 Air temp. : -5.3°C Sea : 2
 Atm. press. : 984.0 mb Swell : ENE 3

Depth (m)	T (°C)	S (‰)	pH	O ₂ (cc/L)	Observed					Alkali- nity	Interpolated				
					PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N		Depth (m)	T (°C)	S (‰)	σ_t	JD
					$\mu\text{g-atoms/L}$										
0	-1.00	33.016	8.24	8.37	1.34	37	0.15	18	0.4		0	-1.00	33.016	26.57	0.000
9	-0.67		8.24	8.15	1.47	40	0.15	19	1.0		10	-0.65	33.160	26.67	0.014
17	-0.60	33.243	8.24	8.09	1.51	40	0.18	20	0.9		20	-0.56	33.269	26.76	0.028
26	-0.53	33.320	8.22	7.95	1.66	46	0.21	21	1.3		30	-0.60	33.365	26.84	0.040
43	-1.00	33.520	8.18	7.73	1.89	55	0.18	24	1.4		50	-1.25	33.584	27.04	0.063
65	-1.71	33.728	8.12	7.42	2.02	68	0.17	29	0.5		75	-1.76	33.873	27.28	0.086
86	-1.73	34.010	8.12	7.38	2.04	67	0.18	29	0.5		100	-1.72	34.044	27.42	0.104
108	-1.72	34.039	8.12	7.35	2.04	66	0.17	29	0.3		125	-1.73	34.059	27.43	0.120
237	-1.78	34.137	8.11	7.40	2.10	69	0.19	31	0.2		150	-1.75	34.084	27.45	0.136
512	-0.60		8.02	8.32	2.27	98	0.08	32	0.1		200	-1.77	34.121	27.49	0.167
											250	-1.76			
											300	-1.66			
											400	-1.29			
											500	-0.68			

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St. 4

Date : Feb. 23, 1969
 Time (GMT) : 0630-0720
 (LMT) : 0930-1020
 Lat. : 68-47S
 Long. : 31-36E

Meteorological observation

Time (GMT) : 0700 Wind dir. : ENE
 (LMT) : 1000 vel. : 4 kt
 Weather : Fine Humidity : 62%
 Air temp. : -5.2°C Sea : 1
 Atm. press. : 983.8 mb Swell : N 1

Depth (m)	Observed										Interpolated				
	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N	Alkali- nity	Depth (m)	T (°C)	S (‰)	σ _t	ΔD
					μg-atoms/L										
0	-0.40	34.609	8.15	8.10	1.66	50	0.15	22	0.3		0	-0.40	34.609	27.83	0.000
10	-0.41	33.822	8.19	8.09	1.68	51	0.15	23	0.3		10	-0.41	33.822	27.20	0.006
20	-0.33	33.780	8.22	8.14	1.66	49	0.14	23	0.1		20	-0.33	33.780	27.16	0.015
30	-0.39	33.792	8.24	8.06	1.66	49	0.13	24	0.2		30	-0.39	33.792	27.17	0.024
49	-0.57	33.859	8.22	7.87	1.79	53	0.13	25	0.2		50	-0.56	33.868	27.24	0.041
74	-0.53	34.075	8.18	7.50	2.08	66	0.13	29	0.0		75	-0.57	34.079	27.41	0.060
99	-1.64	34.132	8.19	7.48	2.10	69	0.14	30	0.1		100	-1.65	34.134	27.49	0.076
123	-1.68	34.186	8.15	7.43	2.12	71	0.15	31	0.1		125	-1.68	34.189	27.54	0.090
147	-1.68	34.213	8.16	7.31	2.12	71	0.15	31	0.2		150	-1.68	34.217	27.56	0.104
195	-1.71	34.279	8.16	7.36	2.12	72	0.06	31	0.2		200	-1.69	34.285	27.62	0.129
243	-1.48	34.323	8.13	7.43	2.25	76	0.06	32	0.1						

Meteorological observation

Date : Feb. 26, 1969 Time (GMT) : 0700 Wind dir. : S
 Time (GMT) : 0615-0825 (LMT) : 0900 vel. : 14 kt
 (LMT) : 0815-1025 Weather : Cloudy Humidity : 57%
 Lat. : 68-34S Air temp. : -2.2°C Sea : 1
 Long. : 29-42E Atm. press. : 985.8 mb Swell : N 1

Observed											Interpolated				
Depth (m)	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N	Alkali- nity	Depth (m)	T (°C)	S (‰)	σ_t	ΔD
0	-0.30	33.870	8.18	7.96	1.70	49	0.13	24	0.4	2.33	0	-0.30	33.870	27.23	0.000
10	-0.19	33.868	8.20	7.98	1.68	52	0.14	24	0.3		10	-0.19	33.868	27.22	0.009
20	-0.05	33.904	8.20	8.02	1.72	54	0.12	24	0.3	2.34	20	-0.05	33.904	27.25	0.017
30	-0.09	33.945	8.21	7.97	1.83	55	0.12	24	0.6		30	-0.09	33.945	27.28	0.025
49	-0.25	33.992	8.20	7.82	1.87	62	0.12	25	0.6	2.35	50	-0.23	33.995	27.33	0.041
76	-0.16	34.078	8.20	7.79	1.87	65	0.15	25	0.5		75	-0.14	34.075	27.39	0.059
99	-1.61	34.149	8.16	7.56	1.98	68	0.13	28	0.2	2.35	100	-1.63	34.152	27.51	0.075
123	-1.73	34.203	8.13	7.48	2.14	71	0.11	31	0.2		125	-1.73	34.206	27.55	0.089
149	-1.74	34.238	8.12	7.38	2.18	72	0.07	31	0.2	2.36	150	-1.74	34.239	27.58	0.102
199	-1.79	34.270	8.12	7.46	2.12	74	0.06	31	0.2		200	-1.78	34.271	27.61	0.127
298	-1.02	34.382	8.08	6.68	2.18	84	0.01	31	0.0		250	-1.53	34.316	27.64	0.150
398	0.85	34.624	8.01	4.78	2.31	101	0.00	34	0.2	2.39	300	-0.98	34.387	27.68	0.171
498	1.00	34.679	8.02	4.64	2.31	105	0.00	33	0.0		400	0.86	34.626	27.78	0.209
598	0.98	34.695	8.04	4.69	2.29	107	0.00	33	0.0	2.40	500	1.00	34.680	27.81	0.242
907	0.60	84.649	8.04	4.98	2.27		0.01	33	0.1		600	0.97	34.695	27.82	0.272
1105	0.44	34.682	8.00	4.89	2.33	119	0.01	33	0.1		700	0.87	34.681	27.82	0.302
1303	0.26	34.674	8.00	5.03	2.35	123		33	0.0	2.40	800	0.75	34.666	27.81	0.333
1600	0.07	34.669	8.00	5.22	2.33	123	0.01	33	0.1		1000	0.52	34.664	27.83	0.393
2096	-0.13	34.665	7.99	5.43	2.33	125	0.01	33	0.2		1200	0.35	34.680	27.85	0.448
2591	-0.19	34.658	7.99	5.49	3.35	123	0.01	33	0.5		1500	0.12	34.670	27.85	0.527
											2000	-0.10	34.666	27.86	0.649
											2500	-0.18	34.659	27.86	0.763

St. 6

Meteorological observation

Date : Feb. 27, 1969	Time (GMT) : 0700	Wind dir. : ESE
Time (GMT) : 0630-0917	(LMT) : 0900	vel. : 27 kt
(LMT) : 0830-1117	Weather : Snow	Humidity : 88%
Lat. : 68-45S	Air temp. : -1.8°C	Sea : 3
Long. : 20-26E	Atm. press. : 987.8 mb	Swell : ENE 1

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Observed											Interpolated				
Depth (m)	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N	Alkali- nity	Depth (m)	T (°C)	S (‰)	σ_t	ΔD
					$\mu\text{g-atoms/L}$										
0	0.40	33.720	8.15	7.75	1.85	74	0.37	27	0.2	2.30	0	0.40	33.720	27.07	0.000
9	0.58	33.716	8.15	7.81	1.87	74	0.37	27	0.1		10	0.58	33.716	27.06	0.010
17	0.58	33.718	8.17	7.79	1.89	73	0.37	27	0.1	2.30	20	0.58	33.714	27.06	0.020
26	0.57	33.722	8.16	7.81	1.89	71	0.37	27	0.1		30	0.47	33.762	27.10	0.030
43	-0.05	33.961		7.94	1.89	71	0.21	27	0.1	2.32	50	-0.50	34.112	27.43	0.046
64	-1.32	34.331	8.16	7.38	1.97	78	0.10	28	0.1		75	-1.47	34.225	27.56	0.061
85	-1.47	34.119	8.18	7.50	1.91	71	0.29	27	0.1	2.32	100	-1.56	34.308	27.63	0.073
106	-1.58	34.402	8.12	6.80	2.11	77	0.15	30	0.1		125	-1.37	34.440	27.73	0.084
128	-1.32	34.437	8.10	6.56	2.14	81	0.06	32	0.1		150	-0.75	34.475	27.74	0.093
170	-0.18	54.511	8.07	5.68	2.16	89	0.06	32	0.1	2.35	200	0.35	34.567	27.76	0.111
256	0.91	34.653	8.02	4.66	2.27	104	0.03	33	0.1		250	0.87	34.645	27.79	0.128
341	0.98	34.686	8.05	4.59	2.27	107	0.03	34	0.1	2.38	300	1.01	34.679	27.81	0.143
430	0.87	34.688	8.08	4.67	2.27	111	0.03	33	0.1		400	0.91	34.689	27.82	0.174
526	0.77	34.691	8.06	4.86	2.31	111	0.03	33	0.1	2.38	500	0.79	34.690	27.83	0.203
747	0.57	34.688	8.05	4.82	2.31	113	0.03	34	0.1		600	0.69	34.691	27.84	0.231
919	0.46	34.683	8.04	4.79	2.31	117	0.03	34	0.1	2.39	700	0.60	34.689	27.84	0.259
1090	0.33	34.680	8.04	4.89	2.35	119	0.03	34	0.1		800	0.53	34.686	27.84	0.287
1356	0.17	34.673	8.04	4.99	2.35	123	0.03	34	0.1	2.39	1000	0.39	34.681	27.85	0.341
1818	-0.03	34.664	8.03	5.18	2.33	123	0.02	34	0.1	2.39	1200	0.25	34.677	27.85	0.394
2285	-0.17	34.660	8.03	5.31	2.27	123	0.03	34	0.3		1500	0.09	34.670	27.85	0.471
2750	-0.25	34.655	8.03	5.55	2.31	121	0.03	34	0.2	2.39	2000	-0.09	34.662	27.86	0.594
3215	-0.30	34.653	8.03	5.64	2.29	119	0.03	34	1.5		2500	-0.21	34.658	27.86	0.711
											3000	-0.28	34.654	27.86	0.820

St. 7

Meteorological observation

Date : Feb. 28, 1969
 Time (GMT) : 0630-0945
 (LMT) : 0830-0945
 Lat. : 68-31S
 Long. : 12-11E

Time (GMT) : 0700
 (LMT) : 0900
 Weather : Cloudy
 Air temp. : -3.1°C
 Atm. press. : 996.3 mb

Wind dir. : S
 vel. : 19 kt
 Humidity : 75%
 Sea : 2
 Swell : E 1

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〔南 海 資料〕

Observed											Interpolated				
Depth (m)	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N	Alkali- nity	Depth (m)	T (°C)	S (‰)	σ _t	ΔD
					μg-atoms/L										
0	0.40	33.814	8.26	7.77	1.38	36	0.13	19	0.5	2.35	0	0.40	33.814	27.15	0.000
10	0.47	33.799	8.27	7.83	1.38	39	0.12	20	0.4		10	0.47	33.799	27.13	0.009
20	0.46	33.802	8.29	7.80	1.37	37	0.10	20	0.4	2.36	20	0.46	33.802	27.14	0.019
30	0.46	33.806	8.29	7.79	1.37	38	0.10	20	0.4		30	0.46	33.806	27.14	0.028
49	-1.63	34.241	8.14	7.32	2.10	73	0.15	30	0.2	2.38	50	-1.66	34.250	27.59	0.042
74	-1.66	34.314	8.11	7.19	2.10	77	0.13	30	0.2		75	-1.66	34.315	27.64	0.055
99	-1.70	34.334	8.12	7.04	2.10	75	0.13	30	0.1	2.39	100	-1.70	34.335	27.66	0.066
122	-1.69	34.361	8.10	6.91	2.12	77	0.10	31	0.1		125	-1.68	34.363	27.68	0.076
146	-1.67	34.374	8.10	6.88	2.12	80	0.06	31	0.1		150	-1.66	34.375	27.69	0.087
194	-1.49	34.398	8.10	6.72	2.10	77	0.06	30	0.2	2.39	200	-1.39	34.407	27.71	0.107
288	0.19	34.560	8.05	5.32	2.25	97	0.01	32	0.1		250	-0.53	34.489	27.74	0.125
381	0.85	34.661	8.04	4.75	2.27	108	0.01	34	0.1	2.41	300	0.32	34.577	27.77	0.143
476	0.86	34.678	8.04	4.68	2.27	108	0.01	33	0.1		400	0.88	34.668	27.81	0.175
570	0.78	34.682	8.08	4.84	2.25	104	0.03	33	0.1	2.41	500	0.84	34.680	27.82	0.206
763	0.58										600	0.75	34.682	27.83	0.235
956	0.41	34.667	8.03	4.93	2.29	119	0.01	33	0.1	2.42	700	0.64	34.67	27.83	0.264
1251	0.20	34.661	8.01	4.99	2.31	123	0.01	32	0.1	2.42	800	0.54	34.67	27.83	0.293
											1000	0.37	34.666	27.84	0.349
											1200	0.23	34.662	27.84	0.404

St. 8

Meteorological observation

Date : Mar. 1, 1969	Time (GMT) : 0700	Wind dir. : ENE
Time (GMT) : 0635-0925	(LMT) : 0900	vel. : 35 kt
(LMT) : 0835-1125	Weather : Cloudy	Humidity : 69%
Lat. : 68-01S	Air temp. : -0.3°C	Sea : 3
Long. : 04-04E	Atm. press. : 994.7 mb	Swell : ENE 3

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Oceanographic Data of the 10th JARE

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Observed											Interpolated				
Depth (m)	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N	Alkali- nity	Depth (m)	T (°C)	S (‰)	σ_t	ΔD
					$\mu\text{g-atoms/L}$										
0	1.40	33.907	8.16	7.61	1.43	74	0.34	24	0.1	2.29	0	1.40	33.907	27.16	0.000
9	1.39	34.008	8.17	7.65	1.45	72	0.32	24	0.1		10	1.39	34.010	27.25	0.009
18	1.39	34.008	8.19	7.65	1.45	71	0.31	24	0.1	2.31	20	1.43	34.006	27.24	0.017
27	1.39	34.019	8.21	7.68	1.47	71	0.31	24	0.1		30	1.06	34.058	27.31	0.025
40	-0.25	34.216	8.16	7.46	1.85	82	0.20	27	0.1	2.32	50	-0.88	34.304	27.60	0.038
67	-1.20	34.390	8.11	6.71	2.08	91	0.15	29	0.1		75	-1.13	34.423	27.71	0.049
89	-0.84	34.470	8.08	6.12	2.14	95	0.17	31	0.1	2.33	100	-0.61	34.503	27.75	0.058
109	-0.44	34.525	8.07	5.45	2.18	98	0.19	32	0.0		125	-0.26	34.548	27.78	0.067
131	-0.20	34.556	8.07	5.46	2.18	101	0.12	32	0.0		150	0.12	34.596	27.79	0.075
174	0.56	34.648	8.04	4.83	2.20	106	0.04	34	0.0	2.35	200	0.75	34.672	27.82	0.090
349	0.78	34.684	8.03	4.75	2.23	114	0.02	34	0.0	2.36	250	0.97	34.699	27.83	0.105
439	0.68	34.688	8.03	4.65	2.23	113	0.02	33	0.0		300	0.97	34.703	27.83	0.119
533	0.59	34.683	8.03	4.64	2.25	113	0.02	34	0.0	2.36	400	0.73	34.687	27.83	0.148
712	0.61	34.693	8.01	4.66	2.25	120	0.01	34	0.0		500	0.61	34.685	27.84	0.176
880	0.52	34.685	8.03	4.61	2.27	121	0.01	34	0.0	2.37	600	0.59	34.686	27.84	0.204
1047	0.41	34.681	8.04	4.68	2.27	120	0.02		0.0		700	0.60	34.692	27.84	0.231
1305	0.34	34.680	8.03	4.78	2.29	127	0.03	34	0.0	2.37	800	0.57	34.690	27.84	0.259
1765	0.11	34.671	8.03	5.08	2.27	128	0.02	34	0.0	2.35	1000	0.43	34.682	27.85	0.313
2231	-0.05	34.668	8.02	5.20	2.20	129	0.01	34	0.0		1200	0.36	34.680	27.85	0.368
2696	-0.19	34.660	8.03	5.41	2.20	126	0.01	33	0.0	2.38	1500	0.24	34.676	27.85	0.447
3162	-0.26	34.654	8.01	5.51	2.20	125	0.02	33	0.0		2000	0.02	34.669	27.86	0.573
3635	-0.30	34.655	8.00	5.58	2.20		0.00	33	0.0	2.38	2500	-0.13	34.664	27.86	0.690
											3000	-0.24	34.656	27.86	0.801
											3500	-0.29	34.654	27.86	0.906

St. 9

Date : Mar. 3, 1969
 Time (LMT) : 0615-0850
 (LMT) : 0815-1050
 Lat. : 68-36S
 Long. : 01-43W

Meteorological observation

Time (GMT) : 0700 Wind dir. : ENE
 (LMT) : 0900 vel. : 19 kt
 Weather : Cloudy Humidity : 77%
 Air temp. : 0.0°C Sea : 3
 Atm. press. : 990.0 mb Swell : ENE 1

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Ryoji Higano and Ryoki Saruwatari

〔南極資料〕

Depth (m)	Observed										Interpolated				
	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N	Alkalinity	Depth (m)	T (°C)	S (‰)	σ _t	ΔD
					μg-atoms/L										
0	0.90	34.117	8.20	7.72	1.55	77	0.27	24	0.0	2.36	0	0.90	34.117	27.36	0.000
9	0.93	34.103	8.20	7.76	1.57	77	0.27	25	0.0		10	0.93	34.103	27.35	0.007
18	0.94	34.108	8.20	7.75	1.57	76	0.26	25	0.1	2.36	20	0.96	34.110	27.35	0.015
27	0.98	34.128	8.21	7.76	1.57	77	0.26	25	0.0		30	0.82	34.149	27.39	0.022
45	-0.29	34.272	8.17	7.26	1.93	84	0.20	28	0.1	2.37	50	-0.62	34.306	27.60	0.034
68	-1.49	34.398	8.13	6.82	2.10	84	0.15	30	0.1		75	-1.55	34.414	27.72	0.045
90	-1.45	34.435	8.12	6.58	2.14	84	0.14	31	0.0	2.38	100	-1.31	34.450	27.74	0.054
113	-1.06	34.473	8.11	6.18	2.18	88	0.13	32	0.0		125	-0.74	34.506	27.76	0.063
135	-0.50	34.533	8.09	5.58	2.25	98	0.13	33	0.0		150	-0.38	34.553	27.78	0.071
179	-0.34	34.574	8.08	5.50	2.25	99	0.05	33	0.0	2.39	200	-0.11	34.599	27.81	0.087
271	0.64	34.668	8.03	4.73	2.31	108		33	0.0		250	0.42	34.650	27.82	0.101
364	0.65	34.676		4.75	2.33	121	0.04				300	0.69	34.675	27.83	0.116
456	0.73	34.684	8.05	4.61	2.33	115	0.02	33	0.0		400	0.68	34.680	27.83	0.145
548	0.64	34.679	8.05	4.65	2.31	113	0.02	33	0.0	2.41	500	0.69	34.682	27.83	0.173
672	0.63	34.692	8.08	4.66	2.31	116	0.01	34	0.0		600	0.63	34.684	27.84	0.202
840	0.48		7.99	4.79	2.31	119	0.01	34	0.0	2.41	700	0.60	34.692	27.84	0.229
1010	0.39	34.681	7.99	4.86	2.33	121	0.02	34	0.0		800	0.52	34.690	27.85	0.257
1276	0.26	34.677	7.97	4.92	2.33	124	0.01	34	0.0	2.41	1000	0.39	34.682	27.85	0.311
1729	0.07	34.669	7.99	5.11	2.33	129	0.04	34	0.0	2.41	1200	0.29	34.678	27.85	0.364
2195	-0.10	34.662	7.98	5.32	2.29	130	0.03	34	0.0		1500	0.16	34.673	27.85	0.442
2658	-0.20	34.659	7.97	5.41	2.31	127	0.03	33	0.0	2.41	2000	-0.03	34.665	27.86	0.566
3122	-0.26	34.659	7.96	5.55	2.31	126	0.04	34	0.0		2500	-0.17	34.660	27.86	0.682
3406	-0.28	34.658	7.99	5.58	2.33	130	0.04	34	0.0	2.42	3000	-0.24	34.659	27.86	0.792

St. 10

Meteorological observation

Date : Mar. 4, 1969	Time (GMT) : 0700	Wind dir. : ESE
Time (GMT) : 0625-1010	(LMT) : 0900	vel. : 41 kt
(LMT) : 0825-1210	Weather : Cloudy	Humidity : 73%
Lat. : 66-20S	Air temp. : 0.0°C	Sea : 4
Long. : 02-01W	Atm. press. : 985.7 mb	Swell : ENE 4

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Oceanographic Data of the 10th JARE

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Observed											Interpolated				
Depth (m)	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N	Alkali- nity	Depth (m)	T (°C)	S (‰)	σ_t	ΔD
					$\mu\text{g-atoms/L}$										
0	1.60	34.178	8.20	7.62	1.36	42	0.23	21	0.1	2.31	0	1.60	34.178	27.37	0.000
8	1.65	34.170	8.21	7.68	1.34	43	0.23	21	0.1		10	1.65	34.170	27.36	0.007
16	1.66	34.171	8.21	7.69	1.32	46	0.21	21	0.1	2.31	20	1.65	34.169	27.35	0.015
24	1.65	34.167	8.23	7.69	1.34	38	0.23	21	0.1		30	1.67	34.166	27.35	0.022
40	1.67	34.169		7.52	1.36	42	0.24	23	0.1	2.32	50	1.57	34.176	27.37	0.036
59	1.21	34.202	8.20	6.65	1.68	64	0.24	24	0.3		75	-0.80	34.348	27.64	0.051
79	-1.27	34.387	8.10	6.19	2.22	86	0.19	30	0.3	2.32	100	-1.14	34.464	27.74	0.061
96	-1.19	34.454	8.07	6.18	2.22	88	0.17	31	0.0		125	-0.96	34.503	27.77	0.070
113	-1.01	34.489	8.10	5.85	2.22	92	0.16	30	0.0		150	-0.84	34.526	27.78	0.078
149	-0.86	34.524	8.08	4.67	2.22	94	0.05	31	0.0	2.33	200	0.09	34.616	27.81	0.094
225	0.58	34.659	8.01	4.55	2.33	106	0.03	32	0.0		250	0.73	34.675	27.82	0.108
300	0.80	34.686	8.04	4.58	2.33	110	0.01	34	0.0	2.35	300	0.80	34.686	27.83	0.123
374	0.80	34.688	8.04	4.56	2.33	112	0.00	34	0.0		400	0.77	34.689	27.83	0.152
449	0.71	34.690	8.03	4.55	2.40	115	0.01	32	0.0	2.36	500	0.66	34.688	27.84	0.180
621	0.58	34.683	8.01	4.60	2.42	119	0.00	32	0.0		600	0.59	34.684	27.84	0.208
736	0.54	34.689	8.03	4.66	2.40	126	0.00	33	0.0	2.36	700	0.55	34.687	27.84	0.235
868	0.46	34.686	8.03	4.67		128	0.01	34	0.0		800	0.50	34.688	27.85	0.263
1065	0.36	34.684	8.02	4.56	2.33	128	0.00	34	0.0	2.36	1000	0.39	34.684	27.85	0.317

Meteorological observation

Date : Mar. 5, 196'
 Time (GMT) : 0615-0920
 (LMT) : 0815-1120
 Lat. : 62-51S
 Long. : 03-29W

Time (GMT) : 0700
 (LMT) : 0900
 Weather : Cloudy
 Air temp. : 1.3°C
 Atm. press. : 985.1 mb

Wind dir. : ESE
 vel. : 39 kt
 Humidity : 79%
 Sea : 4
 Swell : S 3

Depth (m)	Observed										Interpolated				
	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N	Alkalinity	Depth (m)	T (°C)	S (‰)	σ _t	JD
					μg-atoms/L										
0	2.70	34.096	8.21	7.36	1.26	52	0.16	18	0.4	2.36	0	2.70	34.096	27.21	0.000
8	2.84	34.074	8.24	7.42	1.26	52	0.15	17	0.5		10	2.85	34.072	27.18	0.009
16	2.87	34.071	8.25	7.36	1.26	55	0.13	17	0.5	2.40	20	2.93	34.067	27.17	0.018
24	2.86	34.071	8.25	7.35	1.26	45	0.13	17	0.6		30	1.83	34.125	27.31	0.026
39	-0.04	34.227	8.17	7.09	1.93	72	0.20	24	0.5	2.40	50	-1.15	34.300	27.61	0.039
59	-1.59	34.339	8.08	7.10	2.14	93	0.26	29	0.4		75	-1.68	34.368	27.68	0.050
78	-1.64	34.371	8.07	6.90	2.16	86	0.24	30	0.2	2.40	100	-1.53	34.407	27.71	0.060
97	-1.54	34.404	8.06	6.71	2.16	86	0.13	30	0.1		125	-1.06	34.460	27.74	0.070
115	-1.44	34.425	8.05	6.58	2.16	91	0.07	30	0.0		150	0.04	34.560	27.77	0.078
153	0.19	34.573	7.98	5.06	2.27	105	0.07	33	0.0	2.42	200	0.88	34.661	27.80	0.095
229	0.90	34.681	7.95	4.54	2.31	115	0.04	33	0.0		250	0.89	34.686	27.82	0.110
305	0.73	34.682	7.95	4.44	2.33	115	0.03	33	0.0	2.42	300	0.75	34.683	27.83	0.124
380	0.66	34.687	7.96	4.55	2.33	120	0.03	34	0.0		400	0.64	34.686	27.84	0.152
454	0.59	34.684	7.95	4.49	2.38	135	0.03	34	0.0	2.43	500	0.54	34.683	27.84	0.180
627	0.46	34.679	7.96	4.52	2.40	129	0.02	34	0.0		600	0.46	34.682	27.84	0.207
640	0.43	34.682	7.95	4.55	2.40	129	0.02	34	0.0	2.43	700	0.39	34.682	27.85	0.234
958	0.28	34.681	7.99	4.69	2.37	135	0.01	33	0.0	2.43	800	0.34	34.682	27.85	0.261
1207	0.17	34.673	7.98	4.85	2.35	139	0.01	33	0.0		1000	0.26	34.680	27.85	0.313
1495	0.07	34.669	8.00	4.94	2.33	139	0.01	33	0.0	2.44	1200	0.17	34.673	27.85	0.365
1774	-0.04	34.667	8.00	5.15	2.31	135	0.00	33	0.0		1500	0.06	34.669	27.86	0.441
2067	-0.13	34.660	7.97	5.27	2.29	136	0.00	33	0.0	2.44	2000	-0.11	34.661	27.86	0.562
2342	-0.20	34.660	7.97	5.34	2.29	137	0.00	33	0.0		2500	-0.22	34.654	27.86	0.677
2629	-0.25	34.649	7.96	5.45	2.29	135	0.00	32	0.0	2.44					
2920	-0.30	34.655	7.95	5.50	9.29	133	0.00		0.0						

St. 12

Date : Mar. 6, 1969
 Time (GMT) : 0815-0910
 (LMT) : 0815-1110
 Lat. : 58-44S
 Long. : 01-37W

Meteorological observation

Time (GMT) : 0700 Wind dir. : S
 (LMT) : 0900 vel. : 27 kt
 Weather : Cloudy Humidity : 75%
 Air temp. : 0.9°C Sea : 3
 Atm. press. : 994.5 mb Swell : S 3

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Oceanographic Data of the 10th JARE

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Depth (m)	Observed										Interpolated				
	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N	Alkali- nity	Depth (m)	T (°C)	S (‰)	σ_t	ΔD
					$\mu\text{g-atoms/L}$										
0	2.50	33.957	8.19	7.41	1.47	69	0.22	20	0.8	2.39	0	2.50	33.957	27.12	0.000
9	2.47	33.948	8.19	7.41	1.47	68	0.23	20	0.4		10	2.47	33.948	27.11	0.010
18	2.48	33.951	8.20	7.36	1.47	68	0.23	20	0.4	2.40	20	2.49	33.948	27.11	0.019
27	2.47	33.944	8.21	7.38	1.47	68	0.23	20	0.5		30	2.35	33.956	27.13	0.029
44	1.38	34.051	8.19	7.43	1.70	78	0.22	23	0.5	2.40	50	0.63	34.110	27.37	0.045
66	-1.21	34.255	8.12	7.35	2.04	92	0.24	28	0.5		75	-1.52	34.291	27.62	0.060
89	-1.60	34.320	8.09	7.13	2.14	90	0.25	29	0.3	2.41	100	-1.63	34.341	27.66	0.072
110	-1.61	34.357	8.09	6.93	2.14	90	0.24	30	0.2		125	-1.48	34.381	27.69	0.082
133	-1.38	34.395	8.07	6.60	2.18	97	0.13	31	0.0		150	-1.06	34.442	27.72	0.092
177	-0.51	34.521	8.03	5.54	2.27	109	0.02	33	0.0	2.43	200	-0.19	34.566	27.79	0.109
268	0.36	34.649	7.98	4.63	2.35	119	0.02	33	0.0		250	0.26	34.635	27.82	0.125
361	0.49	34.681	7.98	4.61	2.35	119	0.01	32	0.0	2.45	300	0.44	34.667	27.83	0.139
455	0.66	34.682	7.97	4.54	2.40	122	0.01	34	0.0		400	0.58	34.683	27.84	0.167
549	0.46	34.683	7.96	4.46	2.38	128	0.01	34	0.0	2.45	500	0.58	34.683	27.84	0.194
740	0.36	34.678	7.93	4.59	2.38	128	0.01	34	0.0		600	0.41	34.682	27.85	0.222
915	0.31	34.681	7.94	4.63	2.38	132	0.00	34	0.0	2.45	700	0.36	34.679	27.85	0.248
1090	0.23	34.681	7.95	4.75	2.38	136	0.01	34	0.0		800	0.34	34.679	27.85	0.275
1358	0.10	34.673	7.96	4.99	2.35	132	0.01	33	0.0	2.45	1000	0.27	34.681	27.85	0.327
1810	-0.10	34.663	7.97	5.21	2.33	133	0.00	33	0.0	2.46	1200	0.17	34.678	27.86	0.379
2267	-0.25	34.652	7.98	5.49	2.27	134	0.01	33	0.0		1500	0.03	34.670	27.86	0.454
2720	-0.31	34.658	7.97	5.56	2.29	132	0.00	33	0.0	2.46	2000	-0.17	34.657	27.86	0.575
3185	-0.37	34.655	7.95	5.65	2.29	130	0.00	33	0.0		2500	-0.28	34.655	27.86	0.687
3656	-0.42	34.655	7.95	5.68	2.29	130	0.01	33	0.0	2.45	3000	-0.34	34.657	27.87	0.791
											3500	-0.40	34.655	27.87	0.889

St. 13

Meteorological observation

Date : Mar. 7, 1969
 Time (GMT) : 0705-0925
 (LMT) : 0805-1025
 Lat. : 54-59S
 Long. : 02-37E

Time (GMT) : 0800 Wind dir. : S
 (LMT) : 0900 vel. : 35 kt
 Weather : Cloudy Humidity : 73%
 Air temp. : 2.7°C Sea : 3
 Atm. press. : 1007.0 mb Swell : S 3

Depth (m)	Observed										Interpolated				
	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N	Alkali- nity	Depth (m)	T (°C)	S (‰)	σ_t	ΔD
										$\mu\text{g-atoms/L}$					
0	2.40	33.802	8.15	7.49	1.49	44	0.28	21	0.4	2.36	0	2.40	33.802	27.00	0.000
9	2.43	33.783	8.16	7.45	1.49	42	0.29	21	0.4		10	2.43	33.782	26.98	0.011
18	2.44	33.781	8.16	7.45	1.49	44	0.30	21	0.4	2.38	20	2.43	33.780	26.98	0.022
27	2.43	33.779	8.16	7.44	1.49	39	0.29	21	0.4		30	2.46	33.777	26.98	0.032
45	2.44	33.780	8.16	7.47	1.49	48	0.30	21	0.4	2.38	50	2.25	33.791	27.01	0.054
68	1.18	33.856	8.15	7.66	1.68	52	0.30	23	0.4		75	0.56	33.888	27.20	0.078
90	-0.61	33.962	8.12	7.65	1.93	58	0.32	26	0.4	2.38	100	-0.87	34.010	27.37	0.098
113	-0.90	34.071	8.07	7.26	2.08	69	0.34	29	0.3		125	-0.77	34.128	27.46	0.115
135	-0.59	34.174	8.04	6.67	2.14	77	0.15	31	0.0		150	-0.30	34.236	27.53	0.130
180	0.30	34.344	7.99	5.55	2.29	87	0.01	33	0.0	2.41	200	0.63	34.407	27.61	0.156
271	1.46	34.568	7.93	4.51	2.35	95	0.00	33	0.0		250	1.27	34.530	27.67	0.179
362	1.59	34.635	7.94	4.33	2.33	94	0.00	33	0.0	2.43	300	1.56	34.600	27.71	0.200
456	1.62	34.671	7.95	4.26	3.31	97	0.00	33	0.0		400	1.61	34.653	27.74	0.240
549	1.58	34.688	7.97	4.36	2.25	104	0.00	33	0.0	2.43	500	1.60	34.681	27.77	0.276
727	1.32	34.703	7.94	4.50	2.23	107	0.00	32	0.0		600	1.50	34.694	27.79	0.311
897	1.24	34.716	7.96	4.56	2.20	111	0.00	32	0.0	2.45	700	1.36	34.701	27.80	0.345
1068	1.02	34.711	7.95	4.61	2.23	118	0.01	32	0.0		800	1.28	34.710	27.81	0.377
1337	0.76	34.705	7.95	4.74	2.25	122	0.01	33	0.0	2.46	1000	1.11	34.714	27.83	0.440
1802	0.44	34.691	7.94	4.82	2.31	130	0.00	34	0.0	2.45	1200	0.88	34.708	27.84	0.500
2265	0.22	34.681	7.95	4.97	2.31	131	0.00	33	0.0		1500	0.63	34.700	27.85	0.586
											2000	0.33	34.686	27.86	0.722

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St. 14

				Meteorological observation			
Date	: Mar. 8, 1969	Time (GMT)	: 0800	Wind dir.	: SW		
Time (GMT)	: 0720-1130	(LMT)	: 0900	vel	: 16 kt		
	(LMT): 0820-1230	Weather	: Cloudy	Humidity	: 68%		
Lat.	: 50-54S	Air temp.	: 3.6°C	Sea	: 4		
Long.	: 05-45E	Atm. press.	: 1021.1 mb	Swell	: SSW 3		

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Observed											Interpolated				
Depth (m)	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -O	NH ₄ -N	Alkalinity	Depth (m)	T (°C)	S (‰)	σ _t	ΔD
					μg-atoms/L										
0	4.90	33.792	8.19	7.10	1.40	14	0.25	19	0.4	2.38	0	4.90	33.792	26.75	0.000
8	4.88	33.781	8.21	7.09	1.42	12	0.25	19	0.3		10	4.88	33.780	26.74	0.013
16	4.90	33.779	8.23	7.08	1.40	14	0.25	19	0.2	2.38	20	4.89	33.779	26.74	0.026
24	4.88	33.780	8.22	7.12	1.40	11	0.25	19	0.2		30	4.88	33.781	26.75	0.039
39	4.89	33.782	8.23	7.11	1.40	17	0.25	19	0.3	2.38	50	4.99	33.777	36.73	0.066
59	4.88	33.781	8.23	7.10	1.40	18	0.25	20	0.3		75	3.57	33.838	26.93	0.097
78	3.28	33.851	8.19	7.11	1.79	18	0.33	22	1.0	2.37	100	1.89	33.915	27.13	0.123
96	2.00	33.908	8.16	7.16	1.93	24	0.29	24	0.7		125	1.68	33.957	27.18	0.146
116	1.73	33.938	8.16	7.02	1.98	30	0.17	26	0.4		150	1.66	34.016	27.23	0.168
148	1.66	34.011	8.14	6.71	2.04	37	0.07	28	0.1	2.39	200	1.82	34.138	27.32	0.208
213	1.88	34.166	8.07	5.93	2.20	44	0.06	31	0.0		250	1.92	34.214	27.37	0.246
277	1.93	34.230	8.02	5.50	2.33	46	0.04	32	0.1	2.40					

St. 15

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Meteorological observation

Date : Mar. 10, 1969
 Time (GMT) : 0715-1050
 (LMT) : 0815-1150
 Lat. : 43-10S
 Long. : 11-51E

Time (GML) : 0800
 (LMT) : 0900
 Weather : Cloudy
 Air temp. : 8.2°C
 Atm. press. : 1023.9 mb

Wind dir. : W
 vel. : 21 kt
 Humidity : 70%
 Sea : 4
 Swell : S, SW 4

Depth (m)	Observed										Interpolated				
	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N	Alkali- nity	Depth (m)	T (°C)	S (‰)	σ_t	ΔD
	$\mu\text{g-atoms/L}$														
0	10.10	34.322	8.24	6.82	1.00	16	0.22	12	0.1	2.35	0	10.10	34.322	26.43	0.000
9	9.97	34.283	8.25	6.38	0.98	14	0.23	12	0.1		10	9.96	34.282	26.42	0.016
17	9.97	34.282	8.27	6.37	1.00	17	0.23	12	0.1	2.36	20	9.96	34.282	26.42	0.032
26	9.95	34.282	8.27	6.36	1.00	13	0.23	12	0.2		30	9.95	34.282	26.42	0.049
42	9.97	34.283	8.27	6.34	1.00	20	0.23	12	0.2	2.36	50	9.97	34.282	26.42	0.081
65	9.98	34.281	8.27	6.31	1.00	19	0.23	12	0.2		75	10.02	34.272	26.40	0.122
86	9.96	34.282	8.27	6.36	1.00	15	0.23	12	0.2	2.36	100	9.45	34.374	26.57	0.161
103	9.35	34.397	8.23	5.96	1.11	18	0.17	14	0.3		125	9.38	34.504	26.69	0.197
121	9.36	34.484	8.22	5.78	1.13	19	0.03	15	0.0		150	9.50	34.605	26.75	0.231
158	9.52	34.629	8.19	5.42	1.17	21	0.03	16	0.0	2.37	200	8.82	34.582	26.84	0.296
232	8.12	34.497	8.18	6.09	1.38	21	0.02	18	0.0		250	7.93	34.486	26.90	0.358
311	7.42	34.474	8.15	5.26	1.57	17	0.03	21		2.37	300	7.49	34.473	26.95	0.417
387	6.57	34.454	8.10	5.00	1.74	24	0.02	25	0.0		400	6.30	34.426	27.08	0.527
419	5.92	34.384	8.09	5.15	1.80	32	0.01	26	0.0	2.38	500	5.14	34.348	27.16	0.628
541	5.23	34.407	8.05	4.77	2.02	40	0.00	29	0.0	2.39					

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St. 16

Meteorological observation

Date : Mar. 11, 1969
 Time (GMT) : 0715-1015
 (LMT) : 0815-1115
 Lat. : 39-34S
 Long. : 14-35E

Time (GMT) : 0800 Wind dir. : NW
 (LMT) : 0900 vel. : 8 kt
 Weather : Cloudy Humidity : 56%
 Air temp. : 15.0°C Sea : 2
 Atm. press. : 1027.2 mb Swell : SSW 3

Observed											Interpolated				
Depth (m)	T (°C)	S (‰)	pH	O ₂ (cc/L)	PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N	Alkali- nity	Depth (m)	T (°C)	S (‰)	σ_t	ΔD
0	17.70	35.385	8.27	5.49	0.27	12	0.08	0.1	0.0	2.39	0	17.70	35.385	25.66	0.000
9	17.82	35.413	8.33	5.42	0.27	21	0.08	0.2	0.0		10	17.82	35.413	25.65	0.023
19	17.82	35.410	8.35	5.37	0.27	20	0.10	0.3	0.0	2.40	20	17.83	35.412	25.65	0.047
48	17.87	35.432	8.35	5.37	0.27	23	0.18	0.2	0.0	2.41	30	17.91	35.424	25.64	0.071
97	14.77	35.134	8.25	5.38	0.59	19	0.33	5	0.0		50	17.75	35.418	25.67	0.118
120	14.34	35.203	8.24	5.35	0.59	21	0.10	5	0.1		75	16.22	35.256	25.91	0.174
143	14.29	35.260	8.25	5.50	0.54	21	0.04	5	0.0		100	14.68	35.140	26.17	0.224
191	12.93	35.050	8.24	5.46	0.65	22	0.01	6	0.0	2.39	125	14.33	35.220	26.31	0.269
285	11.98	35.006	8.19	5.20	0.88	21	0.00	10	0.0		150	14.12	35.239	26.36	0.313
382	10.79	34.896	8.16	5.10	1.09	14	0.01	14	0.0		200	12.79	35.037	26.48	0.396
478	9.73	34.798	8.11	4.86	1.36	18	0.00	18	0.0		250	12.21	34.998	26.56	0.475
606	7.57	34.567	8.04	4.73	1.70	28	0.00	23	0.0		300	11.79	34.991	26.64	0.550
745	4.81	34.369	8.06	5.17	1.89	31	0.00	26	0.0	2.37	400	10.60	34.880	26.77	0.693
879	4.09	34.285	8.04	5.37	2.08	40	0.01	28	0.0		500	9.40	34.761	26.89	0.825
1072	3.16	34.308	8.01	5.08	2.31	50	0.00	31	0.0	2.39	600	7.68	34.579	27.01	0.946
1406	2.94	34.541	7.96	4.10	2.41	80	0.00	33	0.0	2.42	700	5.61	34.424	27.17	1.055
1743	2.74	34.720	7.99	4.42	2.14	77	0.00	30	0.0		800	4.39	34.323	27.23	1.151
2091	2.61	34.811	8.00	4.88	1.95	70	0.00	27	0.0	2.42	1000	3.46	34.285	27.29	1.332
2468	2.49	34.838	8.05	5.08	1.85	70	0.00	25	0.0		1200	2.97	34.386	27.42	1.493
2858	2.34	34.845	8.03	5.21	1.85	74	0.00	25	0.0	2.44	1500	2.87	34.598	27.60	1.694
3272	2.06	34.835	8.01	5.23	1.85	82	0.00	25	0.1	2.44	2000	2.63	34.795	27.78	1.956
											2500	2.48	34.839	27.82	2.177
											3000	2.25	34.844	27.85	2.385

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St. 17

Meteorological observation

Date : Mar. 12, 1969
 Time (GMT) : 0720-1030
 (LMT) : 0820-1130
 Lat. : 36-25S
 Long. : 16-54E

Time (GMT) : 0800 Wind dir. : ESE
 (LMT) : 0900 vel. : 12 kt
 Weather : Cloudy Humidity : 81%
 Air temp. : 19.2°C Sea : 3
 Atm. press. : 1023.6 mb Swell : E 1

Depth (m)	T (°C)	S (‰)	pH	O ₂ (cc/L)	Observed					Alkalinity	Interpolated				
					PO ₄ -P	SiO ₃ -Si	NO ₂ -N	NO ₃ -N	NH ₄ -N		Depth (m)	T (°C)	S (‰)	σ _t	JD
					μg-atoms/L										
0	22.00	35.600	8.27		0.19	10	0.04	0.0	0.3	2.38	0	20.00	35.600	25.24	0.000
9	20.09	35.563	8.28	5.22	0.19	21	0.03	0.0	0.1		10	20.09	35.562	25.18	0.028
18	20.10	35.565	8.29	5.21	0.21	20	0.03	0.1	0.1	2.39	20	20.10	35.565	25.18	0.056
26	20.10	35.564	8.29	5.01	0.21	20	0.01	0.1	0.1		30	20.07	35.565	25.19	0.084
44	19.84	35.557	8.29	5.41	0.23	23	0.05	0.0	0.2	2.38	50	19.69	35.543	25.27	0.139
66	18.93	35.484	8.26	4.94	0.34	21	0.23	1.3	0.1		75	18.02	35.437	25.62	0.203
87	16.72	35.373	8.25	4.99	0.46	16	0.17	2.1	0.1	2.37	100	15.62	35.321	26.10	0.257
106	15.23	35.301	8.22	4.80	0.65	24	0.05	6	0.2		125	14.58	35.247	26.27	0.304
125	14.58	35.247	8.21	4.68	0.73	24	0.06	8	0.1		150	14.07	35.226	26.36	0.348
164	13.85	35.221	8.21	5.02	0.73	25	0.06	7	0.1	2.37	200	13.04	35.149	26.52	0.430
242	12.10	35.049	8.28	4.95	0.98	25	0.05	12	0.0		250	11.94	35.035	26.64	0.507
326	10.55	34.902	8.16	4.72	1.28	19	0.03	16	0.1	2.35	300	11.02	34.947	26.75	0.578
414	8.73	34.712	8.06	4.65	1.55	23	0.03	20	0.1		400	9.01	34.743	26.93	0.707
502	7.16	34.536	8.05	4.73	1.81	37	0.03	23	0.4	2.35	500	7.19	34.540	27.05	0.823
759	4.34	34.373	8.00	4.88	2.18	45	0.02	25	0.1	2.36	600	5.80	34.428	27.15	0.928
926	3.67	34.404	7.98	4.49	2.33	56	0.01	31	0.1		700	4.77	34.376	27.23	1.024
1085	3.23	34.478	7.94	4.19	2.44	73	0.01	32	0.3		800	4.12	34.373	27.30	1.113
1330	2.95	34.621	7.95	3.99	2.40	78	0.01	31	0.0	2.40	1000	3.44	34.435	27.41	1.273
1755	2.68	34.782	7.99	4.69	2.02	74	0.02	26	0.0	2.40	1200	3.06	34.545	27.54	1.412
2183	2.53	34.838	8.02	5.05	1.87	72	0.02	24	0.0		1500	2.81	34.698	27.68	1.587
2629	2.33	34.847	8.01	5.22	1.83	70	0.00	24	0.1	2.40	2000	2.58	34.823	27.80	1.825
3080	2.15	34.842	8.02	5.19	1.83	77	0.01	24	0.1		2500	2.38	34.848	27.84	2.037
3528	1.57	34.786	7.99	5.07	2.04	100	0.00	27	0.2	2.42	3000	2.19	34.845	27.85	2.243
3976	1.09	34.747	7.94	5.02	2.20	115	0.01	29	0.5	2.43	3500	1.61	34.790	27.85	2.440

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