Oceanographic Data of the 14th Japanese Antarctic Research Expedition 1972–1973

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第14次南極地域観測隊海洋部門報告

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要旨：第14次南極地域観測において，定常観測（1972–1973）として，海上保安庁水路部の担当した表面観測，バシサーモグラフ（BT）観測，温度－塩分－深度記録計（STD）による観測，および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 14th Japanese Antarctic Research Expedition in 1972–1973. The track chart of the cruise is shown in Fig.1. The locations of the Salinity-Temperature-Depth (STD) recorder observation, the serial vertical observation stations of and the bathythermograph (BT) observation in the Southern Ocean are given in Fig. 2.

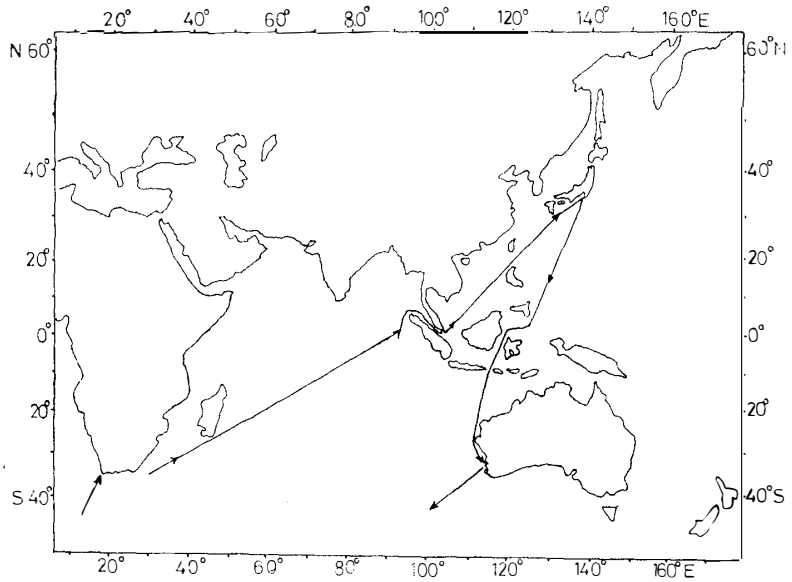

Fig. 1. Track of JARE–14 cruise 1972–73.

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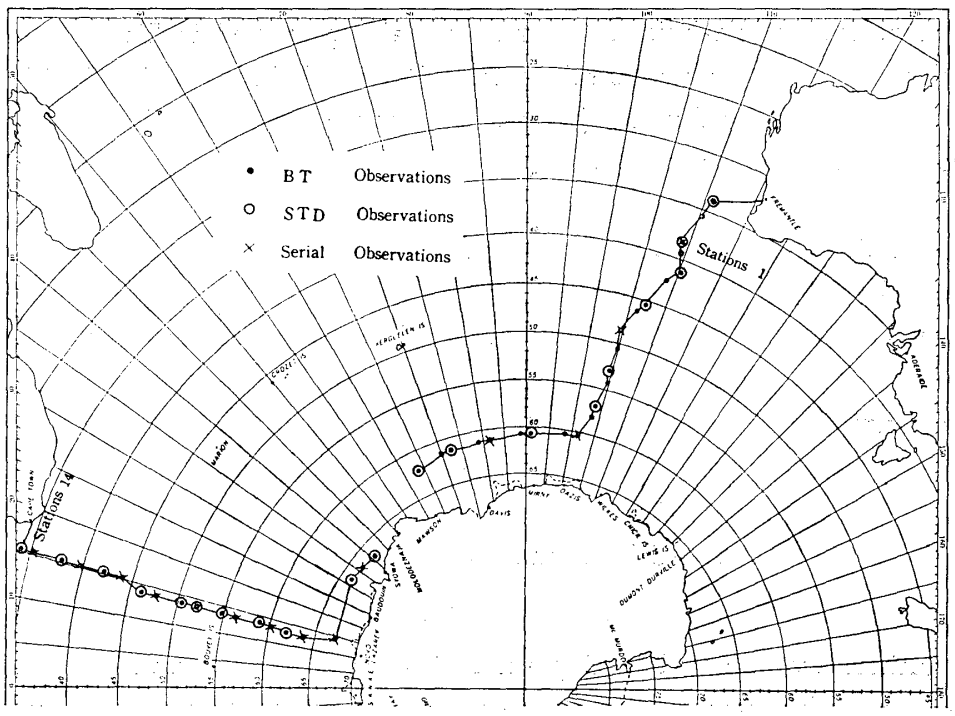


Fig. 2. Track of JARE-14 cruise and oceanographic station.

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

Current measurement : Measurements of surface current were made by Geomagnetic Electrokinetograpn (GEK) through the cruise except in the magnetic equator region and in the pack ice area. The results are also shown in Table 1.

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

STD recorder observation: The vertical distribution of temperature and salinity was measured at 20 stations in the Southern Ocean along the track from Fremantle to Cape Town through Syowa Station. The results are shown in Fig. 3.

Serial observation: The observations were made at 14 stations in the Southern Ocean along the track from Fremantle 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 by the electronic computer at the Hydrographic Department.

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

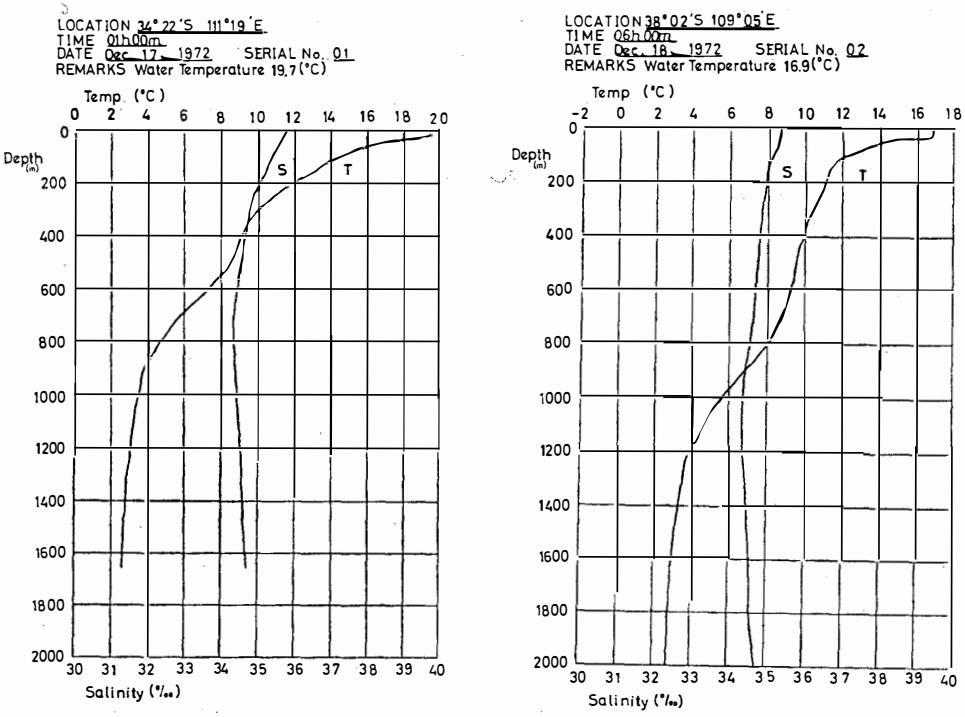
Salinity	Inductive salinometer (Auto-Lab Model 601 MK III)
pH	pH meter (KPH-51B Yokogawa Electric Works Inc.)
Dissolved oxygen	Winkler's Method
Phosphate-P	Molybdenum blue method*
Reactive silicate-Si	Molybdenum yellow method*
Nitrate-N	Modified Morris and Riley method
Nitrite-N	Sulphanilamide and N-(1-naphtyl)-ethylene-diamine 2 HCl were used as reagent*.
Ammonium-N	Indophenol method
Alkalinity	After 15.00 m*l* of N/100 HCl was added to 50.0 m*l* sample, pH of the sample was measured and alkalinity was calculated by STRICKLAND's table*.

Acknowledgements

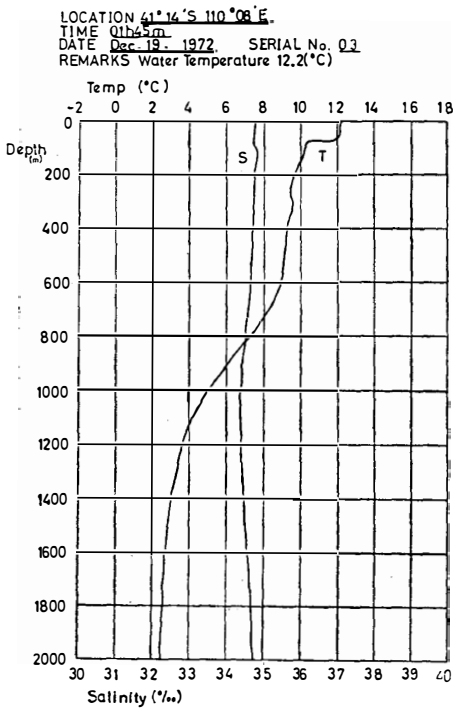
The authors are indebted to Captain F. MAEDA of the icebreaker FUJI and his officers and crew for their co-operation which made these observations possible.

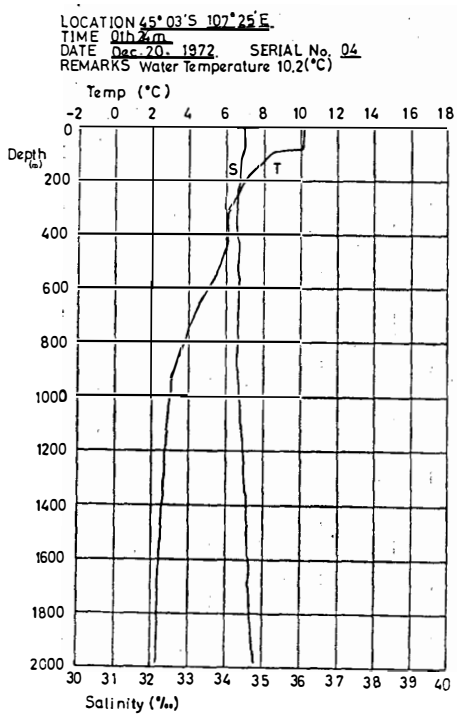
(*Received July 19, 1973*)

Fig. 3. The results of STD observation.



* STRICKLAND, J. D. H. and T. R. PARSONS (1960): A manual of sea water analysis. Bull. Fish. Res. Bd. Canada, **125**, 185pp.


LOCATION 41°14'S 110°08'E.
TIME 01h45m
DATE Dec. 19, 1972. SERIAL No. 03
REMARKS Water Temperature 12.2(°C)
Temp (°C)
Depth (m)
S
T
Salinity (‰)


LOCATION 45°03'S 107°25'E.
TIME 01h24m
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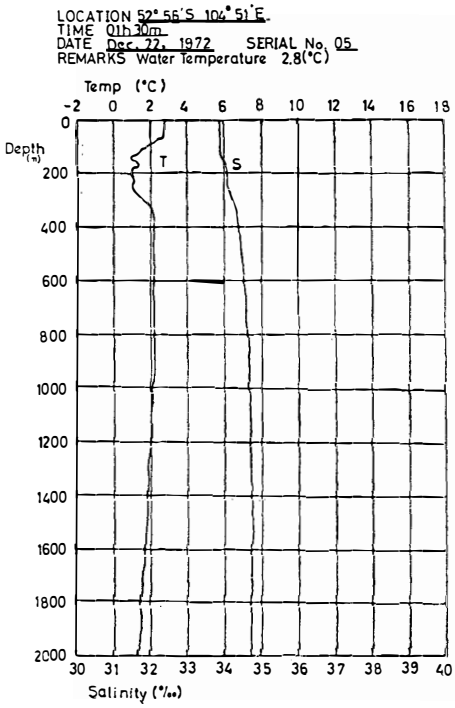
REMARKS Water Temperature 10.2(°C)
Temp (°C)
Depth (m)
S
T
Salinity (‰)


LOCATION 52°56'S 104°51'E.
TIME 01h30m
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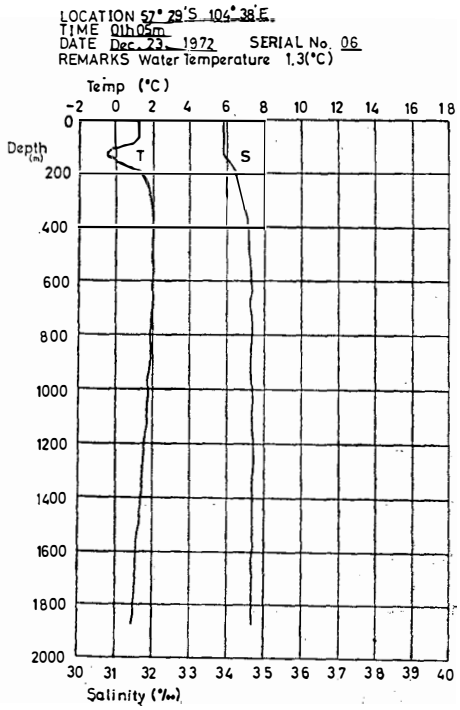
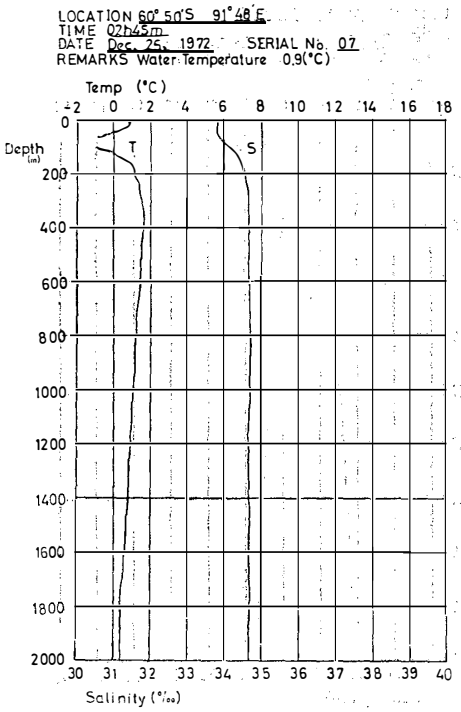
REMARKS Water Temperature 2.8(°C)
Temp (°C)
Depth (m)
T
S
Salinity (‰)


LOCATION 57°29'S 104°38'E.
TIME 01h05m
DATE Dec. 23, 1972 SERIAL No. 06
REMARKS Water Temperature 1.3(°C)
Temp (°C)
Depth (m)
T
S
Salinity (‰)


LOCATION 60°50'S 91°48'E
TIME 02h45m
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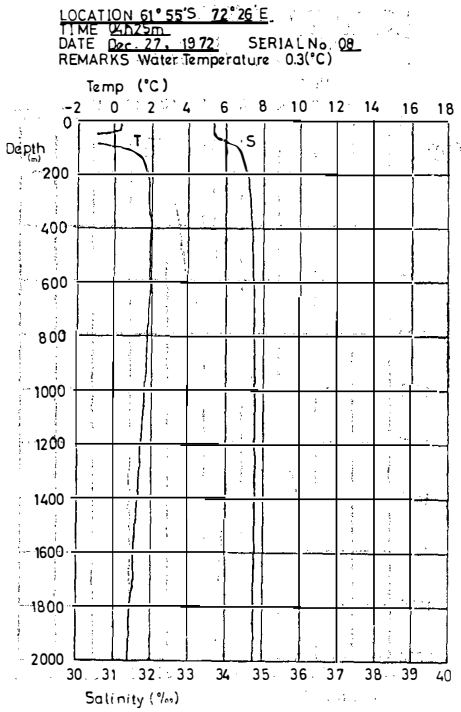
REMARKS Water Temperature 0.9(°C)
Temp (°C)
Depth (m)
T
S
Salinity (‰)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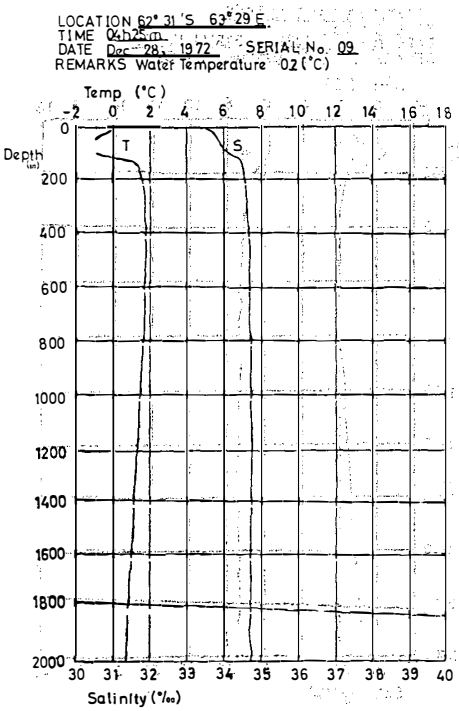
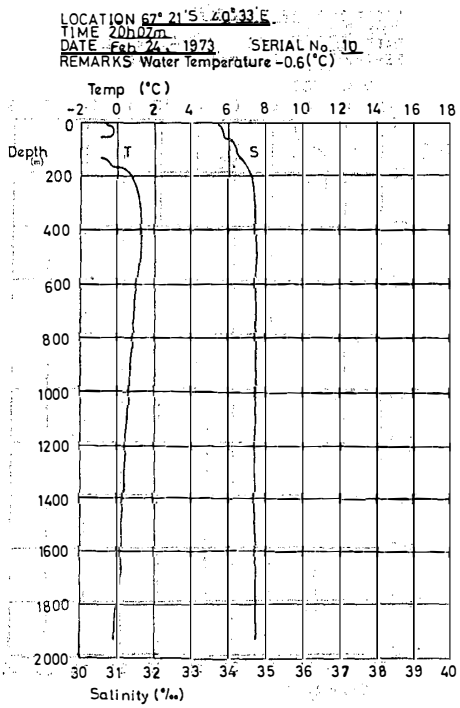
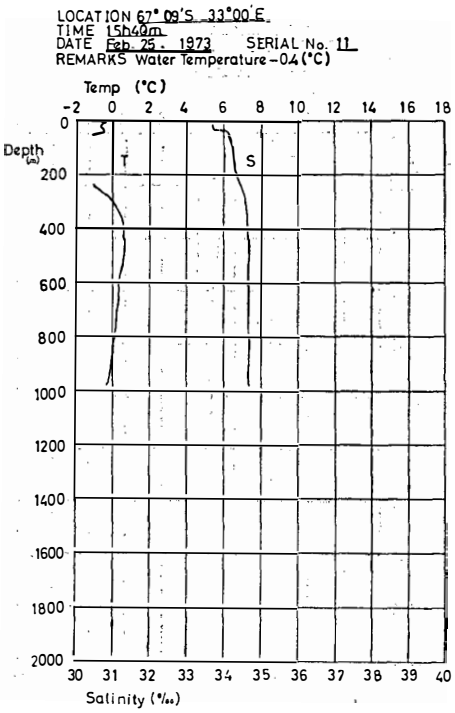
TIME 04h25m
DATE Dec. 27, 1972 SERIAL No. 08
REMARKS Water Temperature 0.3(°C)
Temp (°C)
Depth (m)
T
S
Salinity (‰)


LOCATION 62°31'S 63°29'E
TIME 04h25m
DATE Dec. 28, 1972 SERIAL No. 09
REMARKS Water Temperature 0.2(°C)
Temp (°C)
Depth (m)
T
S
Salinity (‰)


LOCATION 67°21'S 40°33'E
TIME 20h07m
DATE Feb. 24, 1973 SERIAL No. 10
REMARKS Water Temperature -0.6(°C)
Temp (°C)
Depth (m)
T
S
Salinity (‰)


LOCATION 67° 09'S 33°00'E
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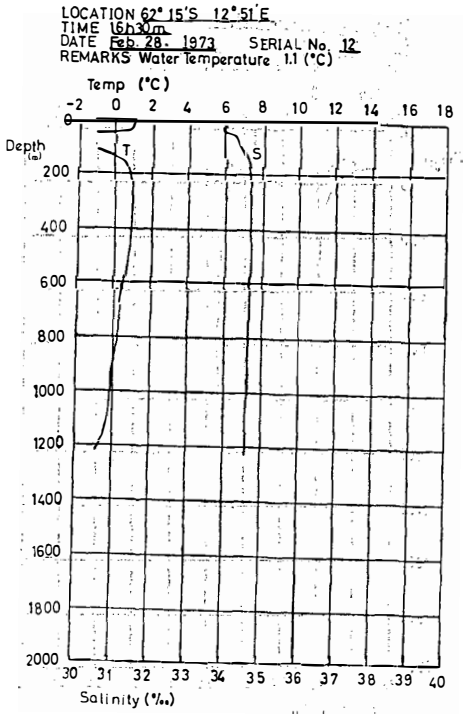
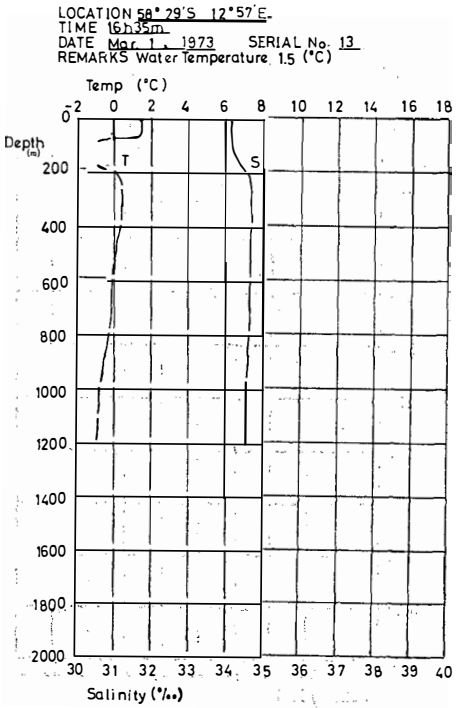
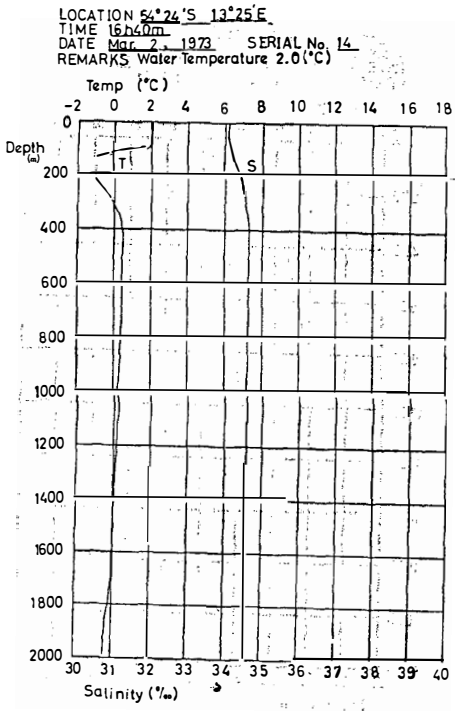
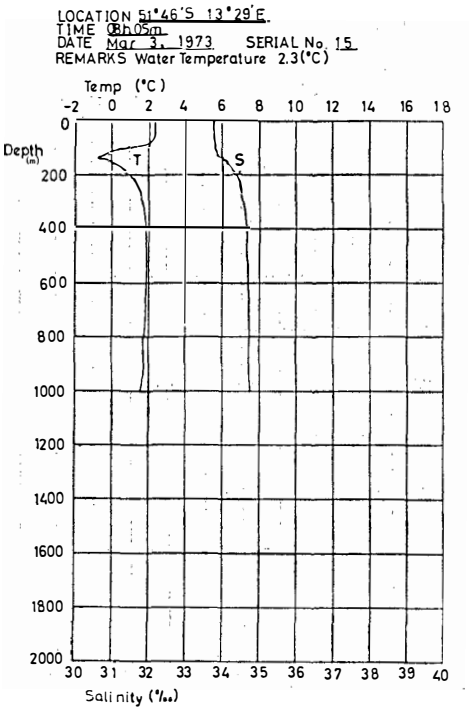
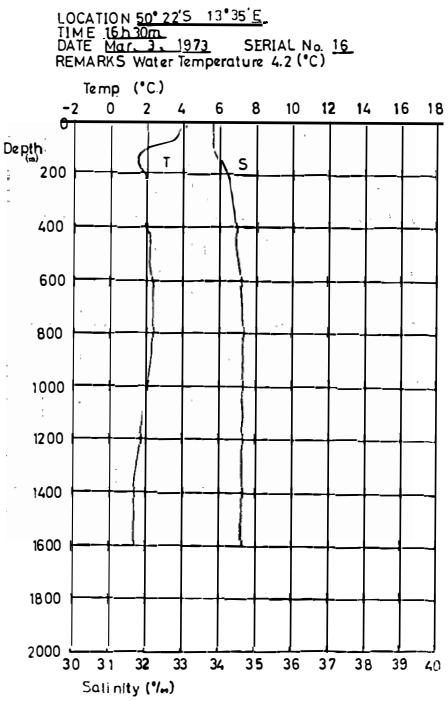
DATE Feb. 25. 1973 SERIAL No. 11
REMARKS Water Temperature -0.4 (°C)
Temp (°C)
Depth (m)
T
S
Salinity (‰)

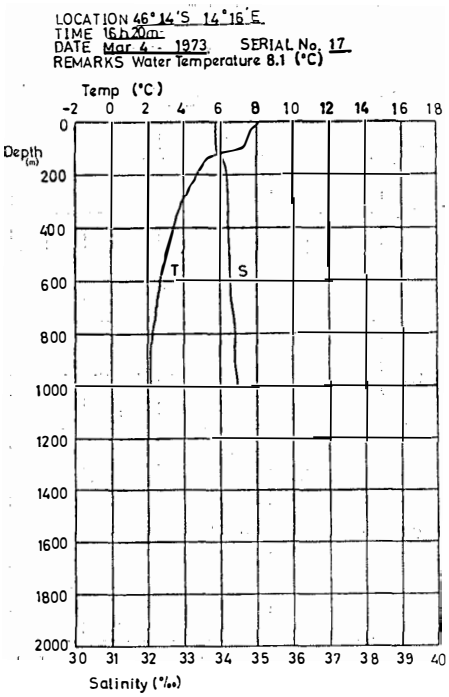

LOCATION 62° 15'S 12°51'E
TIME 16h30m
DATE Feb. 28. 1973 SERIAL No. 12
REMARKS Water Temperature 1.1 (°C)
Temp (°C)
Depth (m)
T
S
Salinity (‰)

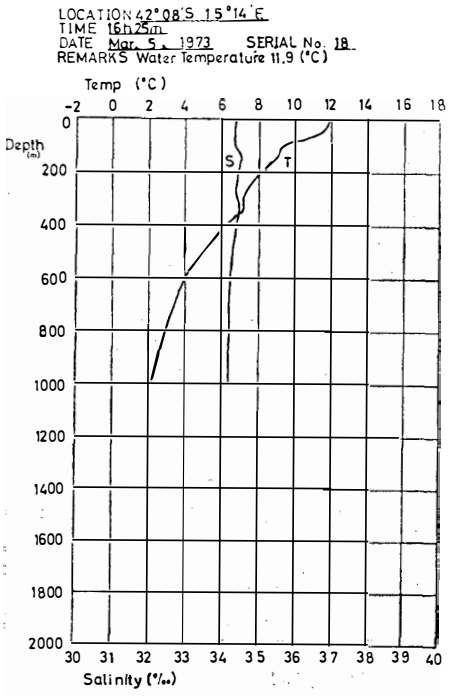

LOCATION 58° 29'S 12°57'E
TIME 16h35m
DATE Mar. 1. 1973 SERIAL No. 13
REMARKS Water Temperature 1.5 (°C)
Temp (°C)
Depth (m)
T
S
Salinity (‰)

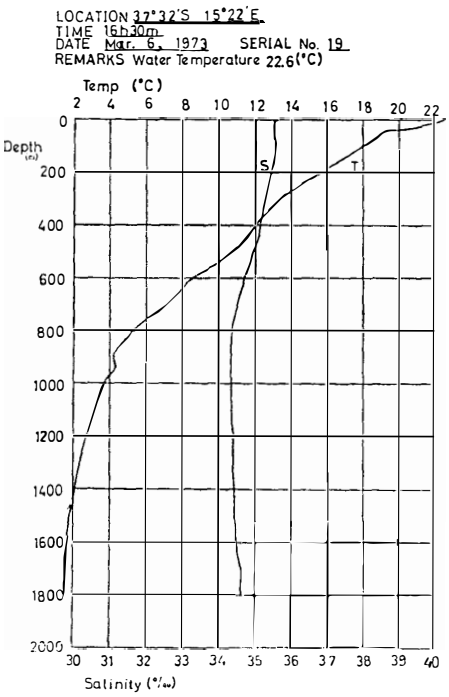

LOCATION 54°24'S 13°25'E
TIME 16h40m
DATE Mar. 2. 1973 SERIAL No. 14
REMARKS Water Temperature 2.0 (°C)
Temp (°C)
Depth (m)
T
S
Salinity (‰)


LOCATION 51°46'S 13°29'E
TIME 08h05m
DATE Mar 3, 1973 SERIAL No. 15
REMARKS Water Temperature 2.3(°C)
Temp (°C)
Depth (m)
T
S
Salinity (‰)


LOCATION 50°22'S 13°35'E
TIME 16h30m
DATE Mar. 3, 1973 SERIAL No. 16
REMARKS Water Temperature 4.2 (°C)
Temp (°C)
Depth (m)
T
S
Salinity (‰)


LOCATION 46°14'S 14°16'E
TIME 16h20m
DATE Mar 4, 1973 SERIAL No. 17
REMARKS Water Temperature 8.1 (°C)
Temp (°C)
Depth (m)
T
S
Salinity (‰)


LOCATION 42°08'S 15°14'E
TIME 16h25m
DATE Mar. 5, 1973 SERIAL No. 18
REMARKS Water Temperature 11.9 (°C)
Temp (°C)
Depth (m)
S
T
Salinity (‰)


LOCATION 37°32'S 15°22'E
TIME 16h30m
DATE Mar. 6, 1973 SERIAL No. 19
REMARKS Water Temperature 22.6(°C)
Temp (°C)
Depth (m)
S
T
Salinity (‰)

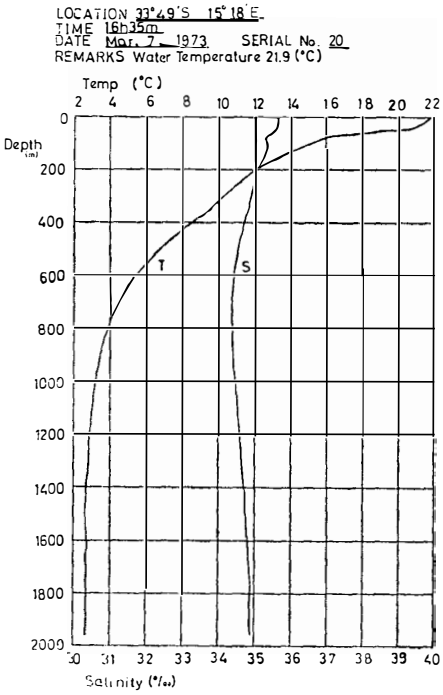

LOCATION 33°49'S 15°18'E
TIME 16h35m
DATE Mar. 7, 1973 SERIAL No. 20
REMARKS Water Temperature 21.9 (°C)
Temp (°C)
Depth (m)
T
S
Salinity (‰)

Table 1. Surface observation data.

Date	Time		Position		Air temp.	Water temp.	S	pH	O_2	Phosphate-P	Silicate-Si	Nitrite-N	Nitrate-N	Ammonia-N	Alkalinity	Current	
	GMT	LMT	Lat.	Long.	℃		‰		cc/L	μg-atoms/L					meq/L	Dir.	Speed (kt)
1972																	
Nov. 25			Leave	Tokyo													
26	2300*	0800	32-03 N	137-50E	14.5	22.7	34.618		4.85							134	1.6
	0900	1800	30-03	136-30	17.0	23.3	34.578		4.92							120	0.1
27	2300*	0800	27-15	135-03	18.9	23.8	34.725		4.78	0.02	3					125	0.7
	0900	1800	25-13	134-05	21.1	24.5	34.632		4.72	0.00	3					203	0.1
28	2300*	0800	22-24	132-43	24.6	26.4	34.745	8.29	4.72	0.00	3				2.40	5	0.5
	0900	1800	20-23	131-50	26.8	26.4	34.778	8.31	4.61	0.00	1				2.46	87	0.4
29	2300*	0800	17-31	130-25	27.2	27.6	34.704	8.34	4.60	0.00	2				2.48		
	0900	1800	15-32	129-27	26.3	28.0	34.811	8.35	4.57	0.02	1	0.03	0.0	0.1	2.49		
30	2300*	0800	12-45	128-09	27.9	28.0	34.719	8.35	4.57	0.06	4	0.04	0.0	0.0	2.46		
	1000	1900	10-13	127-25	25.8	28.3	34.578	8.33	4.55	0.02	2	0.02	0.0	0.1	2.47		
Dec. 1	0100	0900	6-27	126-33	29.0	28.2	34.598	8.37	4.55	0.08	1	0.02	0.0	0.2	2.48		
	1000	1800	4-41	125-00	28.0	28.2	34.466	8.33	4.62	0.06	2	0.01	0.0	0.2	2.39		
2	0000	0800	2-36	122-36	28.5	28.6	34.143	8.34	4.59	0.12	4	0.04	0.1	0.2	2.30		
	1000	1800	1-12	120-16	27.7	29.3	34.435	8.33	4.56	0.06	3	0.02	0.0	0.0	2.36		
3	0000	0800	1-36S	118-55	28.0	29.5	33.454	8.35	4.57	0.02	8	0.02	0.0	0.0	2.28		
	1000	1800	3-45	118-38	27.0	29.3	33.997	8.35	4.59	0.04	3	0.02	0.0	0.2	2.34		
4	0000	0800	7-03	117-09	29.0	30.0	34.176	8.34	4.57	0.00	4	0.04	0.1	0.0	2.37		
	1000	1800	8-49	115-42	28.3	29.7	34.466	8.35	4.63	0.04	4	0.03	0.0	0.2	2.37		
5	2300*	0700	11-51	115-02	28.3	29.0	34.551	8.37	4.57	0.10	4	0.02	0.0	0.0	2.34	356	1.8
	1000	1800	14-08	114-34	27.6	29.2	34.620	8.33	4.54	0.12	2	0.02	0.1	0.0	2.42	342	1.7
6	2300*	0700	16-41	114-00	25.5	26.5	34.820	8.24	4.70	0.08	3	0.01	0.0	0.0	2.20	344	1.2
	1000	1800	19-06	113-34	25.0	26.3	34.880	8.30	4.71	0.10	4	0.02	0.0	0.1	2.39	318	0.9
7	2300*	0700	21-40	113-10	23.6	24.8	35.016	8.30	4.68	0.10	3	0.03	0.0	0.5	2.37	354	0.8

Date	Time		Position		Air temp.	Water temp.	S	pH	O_2	Phosphate-P	Silicate-Si	Nitrite-N	Nitrate-N	Ammonia-N	Alkalinity	Current	
	GMT	LMT	Lat.	Long.	℃		‰		cc/L	μg-atoms/L					meq/L	Dir.	Speed (kt)
7	1000	1800	24-00S	112-43E	24.0	24.0	35.216	8.30	4.92	0.12	3	0.03	0.0	0.1	2.41	0	0.4
8	2300*	0700	26-40	112-36	23.0	22.6	35.258	8.32	5.00	0.10	4	0.02	0.0	0.2	2.41	359	0.8
	1000	1800	29-04	113-26	24.0	23.0	35.521	8.27	5.05	0.14	3	0.01	0.0	0.0	2.46	59	1.1
9	2300*	0700	31-33	115-05	23.0	20.9	35.669	8.32	5.20	0.08	2	0.03	0.0	0.1	2.48		
Dec. 10			Arrive in Fremantle														
16			Leave Fremantle														
17	0030	0730	34-16	111-28	18.7	19.7	35.789	8.37	5.33	0.08	4	0.06	0.1	0.1	2.60	355	0.8
	0600	1300	34-48	110-26	19.1	19.5	35.710	8.25	5.37	0.16	2	0.01	0.0		2.47		
	1100	1800	35-47	110-00	18.8	19.4	35.773	8.21	5.48	0.11	2	0.03	0.0		2.39	10	1.0
18	0100	0800	37-58	109-09	15.4	16.3	35.182	8.34	5.76	0.40	12	0.12	3.4	0.2	2.24	345	0.2
	1100	1800	38-42	108-52	14.9	15.2	34.996	8.23	5.78	0.57	4	0.13	5.4	0.1	2.40	10	0.7
19	0100	0800	41-14	110-08	13.3	12.2	34.769	8.24	6.22	0.72	4	0.20	8.8	0.2	2.42	349	0.5
	0600	1300	42-28	110-05	12.6	12.7	34.544	8.18	6.07	0.67	8	0.14	8.4	0.2	2.25		
	1100	1800	42-46	109-11	9.4	11.6	34.708	8.16	6.26	0.88	3	0.19	9.4	0.7	2.23	0	1.2
20	0100	0800	45-03	107-25	8.3	10.2	34.528	8.20	6.43	1.00	5	0.23	13.	0.3	2.48	0	0.7
	0600	1300	45-38	106-59	8.4	9.0	34.333	8.12	6.60	1.11	2	0.38	15.	0.2	2.38		
	1100	1800	46-30	106-36	8.2	8.6	34.302	8.23	6.68	1.13	4	0.25	15.	0.5	2.45	13	0.7
21	0100	0800	48-51	104-47	3.6	5.5	33.936	8.28	7.08	1.44	6	0.29	21.	0.3	2.31	308	0.6
	1100	1800	50-14	104-49	4.7	5.1	33.954	8.21	7.24	1.46	0	0.29	20.	0.7		320	0.3
22	0100	0800	52-56	104-51	2.0	2.8	33.961	8.10	7.74	1.58	1	0.33	22.	0.8	2.31	310	0.2
	0600	1300	53-38	104-57	1.9	2.6	33.965	8.14	7.75	1.60	1	0.31	23.	0.4	2.17		
	1100	1800	54-33	104-41	2.0	2.1	33.954	8.06	7.91	1.64	3	0.35	24.	0.4	2.32	309	0.4
23	0130	0830	57-29	104-38	-0.3	1.2	33.929	8.05	8.07	1.64	6	0.37	24.	0.1	2.31	45	0.1
	1100	1800	59-08	104-41	0.5	0.1	33.836	8.16	8.22	1.74	28	0.33	27.	0.1	2.36	346	0.2
24	0100	0800	60-29	101-03	0.2	0.4	33.842	8.15	8.16	1.66	35	0.26	24.	0.0		328	0.4

Date	Time		Position		Air temp.	Water temp.	S	pH	O_2	Phosphate-P	Silicate-Si	Nitrite-N	Nitrate-N	Ammonia-N	Alkalinity	Current	
	GMT	LMT	Lat.	Long.	°C		‰		cc/L	μg-atoms/L					meq/L	Dir.	Speed (kt)
Dec. 24	1100	1800	60–33S	98–10E	0.5	0.3	33.359	7.96	7.88	1.64	35	0.30	24.	0.3			
25	0200	0800	60–50	91–48	−0.1	0.9	33.893	8.00	8.07	1.60	27	0.29	24.	0.1		260	0.7
	0630	1230	60–52	91–10	−0.1	1.4	33.877	8.01	8.06	1.41	19	0.34	22.	0.1			
	1200	1800	61–01	88–22	0.3	1.0	33.903	7.92	8.33	1.33	34	0.23	22.	0.2		225	0.2
26	0300	0800	61–27	81–58	−0.2	1.1	33.804	8.18	7.96	1.28	45	0.24	25.	0.1		265	0.7
	1300	1800	61–30	78–58	0.0	0.5	33.810	7.90	8.10	1.46	33	0.31	23.	0.4		252	0.5
27	0400	0800	61–55	72–26	−0.1	0.2	33.744	7.97	8.09	1.60	30	0.25	23.	1.2		297	0.6
	1400	1800	62–09	68–58	−0.1	−0.3	33.249	8.07	8.09	1.70	39	0.28	23.	0.8		325	0.4
28	0400	0800	62–31	63–29	−0.7	0.0	33.523	8.09	8.14	1.70	35	0.29	25.	0.3		314	0.4
	0900	1300	62–50	62–08	−0.2	−0.1	33.883	8.07	7.99	1.74	31	0.20	24.	0.8			
	1400	1800	63–24	60–17	−0.6	−0.2	33.748	8.01	8.03	1.82	43	0.29	27.	0.8			
29	0400	0800	64–54	56–11	−1.9	−1.7	33.545	7.96	7.78	1.95	62	0.26	27.	0.4			
30	0500	0800	64–54	48–36	−1.6	−1.1	33.884	8.02	8.07	1.89	56	0.29	27.	0.2			
	1000	1300	65–18	46–45	−1.8	−1.3	33.679	8.09	7.98	1.91	62	0.30	27.	0.1			
	1500	1800	65–51	44–11	−1.7	−1.4	33.403	7.99	7.88	1.91	63	0.32	28.	0.1			
31	0500	0800	67–09	42–14	−2.2	−1.9	33.807	7.98	7.39	1.76	65	0.30	27.	0.3			
1973			Arrive at Ongul Island														
			Leave Ongul Island														
Feb. 23	0525	0825	67–22	40–55												272	0.6
24	2000	2300	67–20	40–32	−7.8	−0.5	33.799	8.11	7.87	1.95	59	0.32	28.	0.4	2.40		
25	0500	0800	67–07	36–37	−0.9	−0.6	33.683	8.17	7.91	2.01	60	0.29	28.	0.6	1.99	349	0.5
	1500	1800	67–09	33–00	−0.1	−0.6	33.736	8.07	8.07	1.80	49	0.20	26.	0.3	2.08	315	1.0
26	1600	1800	67–13	20–10	0.0	−0.2	34.075	8.12	7.78	1.82	61	0.28	27.	0.5	2.35		
27	0600	0800	67–05	13–57	−4.0	−0.9	34.123	8.14	7.81	1.89	60	0.10	25.	0.1	2.35	315	0.4
28	0600	0800	63–21	12–37	1.0	1.0	34.088	8.20	7.63	1.62	42	0.19	23.	0.4	2.32	346	0.4

Date	Time		Position		Air temp.	Water temp.	S	pH	O_2	Phosphate-P	Silicate-Si	Nitrite-N	Nitrate-N	Ammonia-N	Alkalinity	Current	
	GMT	LMT	Lat.	Long.	°C		‰		cc/L	μg-atoms/L					meq/L	Dir.	Speed (kt)
28	1600	1800	62-15S	12-51E	1.1	1.0	34.010	8.20	7.70	1.54	39	0.26	22.	0.1	2.34	341	0.6
Mar. 1	0600	0800	59-55	12-53	1.5	1.5	33.950	8.28	7.60	1.64	44	0.16	21.	0.4	2.43	328	0.4
	1600	1800	58-29	12-57	1.8	1.4	34.167	8.09	7.76	1.68	44	0.23	23.	0.0	2.32	315	0.4
2	0600	0800	55-49	13-07	1.6	1.7	34.102	8.24	7.71	1.68	34	0.33	23.	0.6	2.32	320	0.7
	1600	1800	54-24	13-25	2.0	2.0	34.125	8.08	7.65	1.70	44	0.33	25.		2.38	326	0.4
3	0600	0800	51-46	13-29	2.3	2.2	33.789	8.23	7.70	1.52	25	0.29	21.	0.8	2.35	333	0.4
	1600	1800	50-22	13-35	4.2	4.1	33.829	8.21	7.41	1.46	2	0.31	21.	0.1	2.36	315	0.3
4	0600	0800	47-37	13-43	6.1	6.8	33.838	8.23	6.97	1.48	10	0.31	19.	0.7	2.36	324	0.6
	1600	1800	46-14	14-16	8.1	8.0	33.857	8.17	6.86	1.27	3	0.29	18.	0.1	2.33	297	0.2
5	0600	0800	43-34	15-14	9.1	11.9	34.436	8.15	6.28	0.78	11	0.18	7.7	0.0	2.36	348	0.6
	1500	1700	42-08	15-19	12.6	11.9	34.383	8.23	6.39	0.78	0	0.18	8.6	0.2	2.30	353	1.0
6	0600	0800	39-13	15-24	19.8	21.9	35.433	8.40	5.02	0.21	12	0.03	0.0	0.6	2.48	315	1.0
	1600	1800	37-32	15-22	21.1	21.8	35.543	8.33	5.11	0.10	1	0.02	0.0	0.4	2.47	45	1.0
7	0600	0800	35-10	15-14	20.5	21.4	35.601	8.37	5.16	0.16	13	0.02	0.0	0.5	2.49	38	0.6
	1600	1800	33-49	15-18	21.5	21.7	35.623	8.29	5.14	0.10	0	0.01	0.0	0.9	2.47	336	1.2
9			Arrive in Cape Town														
15			Leave Cape Town														
16	0600	0800	34-54	22-17	17.7	18.7	35.330	8.29	5.48	0.14	2	0.07	0.3	0.0	2.39	244	0.7
	1700	1900	34-41	24-36	20.0	19.6	35.381	8.31	5.36	0.18	1	0.06	0.9	0.4	2.43	330	0.8
17	0600	0800	33-48	27-30	22.6	24.8	35.519	8.36	4.78	0.10	2	0.03	0.2	0.1	2.44	232	1.8
	1700	1900	33-05	29-23	23.5	22.9	35.592	8.33	5.02	0.06	1	0.02	0.0	0.1	2.46	214	0.8
18	0600	0800	32-14	31-38	24.7	24.1	35.557	8.36	4.87	0.04	1	0.02	0.0		2.45	344	1.0
	1700	1900	31-26	34-04	25.8	26.3	35.422	8.33	4.69	0.08	1	0.01	0.0	0.0	2.46	309	0.2
19	0500	0800	30-14	36-41	25.1	24.6	35.522	8.32	4.85	0.06	1	0.02	0.0		2.45	34	1.4
	1600	1900	29-09	39-04	25.1	25.8	35.486	8.30	4.78	0.10	1	0.02	0.0	0.0	2.40	354	1.3

Date	Time		Position		Air temp.	Water temp.	S	pH	O_2	Phosphate-P	Silicate-Si	Nitrite-N	Nitrate-N	Ammonia-N	Alkalinity	Current	
	GMT	LMT	Lat.	Long.	°C		‰		cc/L	μg-atoms/L					meq/L	Dir.	Speed (kt)
Mar. 20	0500	0800	28–02S	41–45E	25.6	25.7	35.242	8.35	4.75	0.10	2	0.02	0.0	0.3	2.40	271	0.2
	1600	1900	26–50	43–34	25.1	25.7	35.233	8.34	4.74	0.10	1	0.01	0.0	0.1	2.40	9	0.4
21	0500	0800	25–52	45–58	24.8	24.9	34.870	8.33	4.78	0.14	1	0.02	0.0	0.1	2.44	268	0.7
	1600	1900	25–05	48–05	25.9	27.5	34.902	8.36	4.61	0.08	3	0.02	0.0	0.2	2.41	70	0.7
22	0400	0800	24–01	50–49	26.1	27.1	35.030	8.36	4.62	0.10	3	0.02	0.0	0.0	2.40	20	0.9
	1500	1900	23–00	53–28	26.0	27.1	35.121	8.35	4.65	0.10	3	0.02	0.0	0.4	2.44	213	0.2
23	0400	0800	21–26	56–04	26.7	28.2	34.920	8.37	4.53	0.08	1	0.02	0.0	0.1	2.42	84	0.4
	1500	1900	20–17	58–21	27.1	27.3	35.139	8.34	4.65	0.10	1	0.01	0.0	0.0	2.44	354	0.7
24	0400	0800	18–45	61–12	27.8	28.2	34.964	8.34	4.56	0.10	1	0.02	0.0	1.0	2.38	338	1.4
	1500	1900	17–16	63–09	28.2	28.8	34.599	8.38	4.54	0.12	3	0.02	0.0	1.0	2.38	320	0.6
25	0400	0800	15–33	65–13	27.9	28.5	34.656	8.41	4.57	0.18	3	0.01	0.0	0.1	2.40	339	0.9
	1500	1900	14–06	67–09	27.9	28.3	34.453	8.37	4.57	0.04	3	0.02	0.0	0.2	2.36	3	0.4
26	0300	0800	12–47	69–16	27.5	28.6	34.459	8.39	4.52	0.10	2	0.01	0.0	0.8	2.36	344	0.7
	1400	1900	11–23	71–01	28.0	30.0	34.325	8.39	4.51	0.14	2	0.03	0.0	0.0	2.39	330	0.7
27	0300	0800	9–38	73–15	28.8	29.0	34.311	8.41	4.53	0.12	2	0.00	0.0	0.4	2.35		
	1400	1900	7–57	75–20	28.5	30.0	33.829	8.35	4.54	0.12	2	0.03	0.0	0.0			
28	0300	0800	6–02	77–52	27.1	28.6	33.894	8.42	4.56	0.14	4	0.03	0.0	0.0	2.34		
	1400	1900	4–41	79–59	26.9	29.0	34.200	8.38	4.59	0.10	2	0.02	0.0	0.1	2.40		
29	0300	0800	2–49	83–06	28.6	29.0	34.133	8.40	4.49	0.06	2	0.01	0.0	0.0	2.39		
	1300	1800	1–17	85–21	28.0	29.0	34.188	8.39	4.51	0.10	6	0.02	0.0	0.0	2.39		
30	0200	0800	0–20N	87–42	28.6	29.4	34.044	8.41	4.48	0.08	2	0.02	0.0	0.1	2.37		
	1300	1900	1–45	89–41	27.0	30.2	34.179	8.38	4.47	0.10	2	0.02	0.0	0.0	2.38		
31	0200	0800	3–28	91–59	28.2	29.4	34.171	8.43	4.52	0.08	1	0.01	0.0	0.0	2.37		
	1300	1900	4–56	93–37	28.3	29.6	33.874	8.42	4.50	0.08	1	0.01	0.0	0.0	2.38		
Apr. 1	0200	0800	6–02	95–44	29.0	29.6	32.917	8.42	4.57	0.10	1	0.01	0.0	0.7	2.32		

Date	Time		Position		Air temp.	Water temp.	S	pH	O_2	Phosphate-P	Silicate-Si	Nitrite-N	Nitrate-N	Ammonia-N	Alkalinity	Current	
	GMT	LMT	Lat.	Long.	°C		‰		cc/L	μg-atoms/L					meq/L	Dir.	Speed (kt)
1	1300	1900	5-19N	97-52E	29.0	29.9	32.287	8.37	4.55	0.10	6	0.02	0.0	0.0	2.28		
2	0200	0800	3-55	99-55	26.7	29.5	31.199	8.38	4.52	0.12	9	0.02	0.0	0.6	2.21		
	1300	1900	2-27	101-37	28.4	29.6	31.322	8.30	4.59	0.21	8	0.02	0.0	0.0	2.26		
4	Arrive in Singapore																
9	Leave Singapore																
10	0000	0800	4-47	106-20	28.1	29.1	33.565	8.37	4.61	0.04	6	0.02	0.0	0.3	2.27		
	1000	1800	6-38	107-32	29.0	30.1	33.641	8.39	4.57	0.00	5	0.02	0.0	0.3	2.40		
11	0000	0800	9-27	109-11	27.6	28.9	33.628	8.42	4.58	0.00	2	0.02	0.0	0.0	2.35		
	1100	1900	11-17	110-51	27.9	28.6	33.732	8.38	4.63	0.04	2	0.02	0.0	0.0	2.37		
12	0000	0800	13-08	113-11	27.1	28.2	33.643	8.39	4.63	0.04	4	0.03	0.0	0.0	2.32		
	1000	1800	14-42	114-57	28.0	28.8	33.694	8.39	4.61	0.00	3	0.00	0.0	0.0	2.35		
13	0000	0800	16-25	117-22	27.4	27.8	33.940	8.41	4.67	0.02	3	0.02	0.0	0.0	2.39		
	1000	1800	17-38	118-49	28.3	28.2	33.902	8.39	4.65	0.04	1	0.02	0.0	0.5	2.39		
14	0000	0800	18-31	121-02	26.0	27.2	33.869	8.41	4.71	0.00	1	0.02	0.0	0.0	2.51		
	1000	1800	20-34	122-30	25.8	26.0	34.929	8.40	4.78	0.00	1	0.02	0.0	0.7	2.45		
15	0000	0800	22-29	124-29	25.9	26.0	34.939	8.40	4.74	0.02	1	0.01	0.0	0.1	2.39		
	1000	1800	23-53	126-06	24.1	24.4	34.756	8.38	4.96	0.02	3	0.02	0.0	0.0	2.39		

* The time of the date of the preceding day.

Table 2. Bathythermograph observation data.

St. No.	Date			Time		Position		Temperature (℃) at indicated depth (m)										
	Day	Month	Year	GMT	LMT	Lat.	Long.	0	10	20	30	50	75	100	125	150	200	250
1	25	Nov.	1972	2300*	0800	32-03N	137-50E	22.7	22.7	22.7	22.7	22.7	22.7	22.4	20.2	19.0	18.3	
2	26			0900	1800	30-03	136-30	23.3	23.3	23.3	23.3	23.3	23.1	20.6	19.2	18.5	17.6	
3	26			2300*	0800	27-15	135-03	23.8	23.8	23.8	23.8	23.8	22.6	21.9	19.7	19.2	17.4	
4	27			0900	1800	25-13	134-05	24.5	24.5	24.5	24.5	24.4	22.7	21.0	19.4	18.7	18.0	
5	27			2300*	0800	22-24	132-43	26.4	26.4	26.4	26.4	26.4	25.3	22.0	20.9	19.7	17.4	
6	28			0900	1800	20-23	131-50	26.4	26.4	26.4	26.4	26.4	26.4	24.9	22.5	20.6	17.9	
7	28			2300*	0800	17-31	130-25	27.6	27.6	27.6	27.6	27.6	27.6	24.1	22.0	20.6	18.2	
8	29			0900	1800	15-32	129-27	28.0	28.0	28.0	28.0	28.0	26.2	24.9	23.0	21.5	18.2	
9	29			2300*	0800	12-45	128-09	28.0	28.0	28.0	28.0	28.0	26.3	23.9	21.9	19.3	15.3	
10	30			1000	1900	10-13	127-25	28.3	28.3	28.2	28.2	28.2	25.8	23.3	20.5	18.0	12.7	
11	1	Dec.		0100	0900	6-27	126-33	28.2	28.2	28.2	27.9	26.5	24.3	22.1	19.2	18.0	14.2	
12	1			1000	1800	4-41	125-00	28.2	28.2	28.0	27.3	24.5	22.6	22.3	20.4	16.9	15.2	
13	4			2300*	0700	11-47S	115-02	30.0	30.0	30.0	30.0	27.4	25.3	24.0	21.5	19.6	16.9	
14	5			1000	1800	14-05	114-38	29.2	29.2	29.1	29.0	29.0	24.6	23.5	21.8	20.2	16.9	
15	5			2300*	0700	16-41	114-00	26.5	26.5	26.5	26.5	25.5	24.5	23.6	22.4	21.6	18.4	15.9
16	6			1000	1800	19-06	113-34	26.3	26.3	26.3	26.1	23.6	22.5	21.6	20.8	20.0	17.8	
17	6			2300*	0700	21-40	113-10	24.8	24.8	24.8	24.8	23.1	21.6	20.8	20.0	19.6	18.8	
18	7			1000	1800	24-00	112-43	24.0	23.6	23.5	23.4	23.0	21.6	21.3	21.1	20.2	18.3	
19	8			1000	1800	29-04	113-26	23.0	23.0	22.6	22.5	20.8	19.8	19.3	18.5	17.9	16.6	
20	17			0000	0700	34-18	111-19	19.7	19.5	19.2	18.4	16.5	15.1	14.3	13.7	13.1	12.0	
21	17			1100	1800	35-36	110-02	18.4	18.4	17.8	17.7	16.1	15.1	14.4	14.0	13.5	12.2	
22	18			0100	0800	37-58	109-09	16.3	16.3	16.3	13.9	12.8	12.4	11.4	11.1	10.9	10.8	
23	18			1100	1800	38-42	108-52	15.2	15.2	15.2	12.7	11.6	11.3	10.9	10.7	10.6	10.4	
24	19			0100	0800	41-14	110-08	12.2	12.2	12.2	12.2	12.2	10.3	10.5	10.2	10.0	9.9	
25	19			1100	1800	42-46	109-11	11.6	11.6	11.6	11.6	11.6	10.3	9.9	9.8	9.8	9.8	

St. No.	Date			Time		Position		Temperature (℃) at indicated depth (m)										
	Day	Month	Year	GMT	LMT	Lat.	Long.	0	10	20	30	50	75	100	125	150	200	250
26	20	Dec.	1972	0100	0800	45-03S	107-25E	10.2	10.2	10.2	10.2	10.2	10.2	8.5	8.3	7.9	7.2	
27	20			1100	1800	46-30	106-36	8.6	8.6	8.5	8.5	8.4	8.5	9.0	8.8	8.7	8.1	
28	21			0100	0800	48-51	104-41	5.5	5.5	5.5	5.5	5.5	4.3	3.4	3.2	2.8	2.7	
29	21			1100	1800	50-14	104-49	5.1	5.1	4.9	4.3	4.3	4.2	3.0	2.7	2.7	2.2	
30	22			0100	0800	52-56	104-51	2.8	2.8	2.8	2.8	2.7	2.3	1.7	1.4	1.4		
31	22			1100	1800	54-33	104-41	2.1	2.1	2.0	1.6	1.5	0.7	0.2	-0.1	-0.3	1.5	
32	23			0100	0800	57-29	104-38	1.2	1.2	1.2	1.2	1.1	0.8	1.1	0.0	0.0	1.6	
33	23			1100	1800	59-08	104-41	0.1	0.1	0.1	0.1	-0.1	-0.4	-1.1	-0.6	0.9	1.8	
34	24			0100	0800	60-29	101-03	0.4	0.3	0.2	0.0	-0.8	-1.3	-1.5	0.5	1.3	1.6	
35	24			1100	1800	60-33	98-10	0.3	-0.1	-0.5	-0.9	-1.5	-1.3	-1.0	-0.4	0.6		
36	25			0200	0800	60-50	91-48	0.9	0.9	0.9	0.7	-0.2	-1.0	-1.0	0.0	0.6	1.4	
37	25			1200	1800	61-01	88-22	1.0	1.1	0.5	0.3	-1.6	-1.7	-1.7	-1.1	-0.5	0.2	
38	26			0300	0800	61-27	81-58	1.1	1.1	0.6	0.6	-1.1	-1.4	0.8	1.3	1.6	1.7	
39	26			1300	1800	61-30	78-58	0.5	0.5	0.0	0.1	-1.7	-1.7	-0.4	1.1	1.7		
40	27			0400	0800	61-55	72-26	0.2	0.2	0.2	0.2	-1.4	-1.8	-0.6	1.1	1.6		
41	27			1400	1800	62-09	68-58	-0.3	-0.3	-0.4	-0.9	-0.3	-1.5	-1.2	0.5	1.4		
42	28			0400	0800	62-31	63-29	0.0	0.0	-0.3	-0.7	-1.1	-1.7	-1.7	0.4	1.3		
43	23	Feb.	1973	0500	1800	67-25	40-48	-0.5	-0.4	-0.4	-0.4	-0.9	-1.7	-1.7	-1.8	-1.6		
44	25			0500	0800	67-07	36-37	-0.6	-0.6	-0.6	-0.6	-1.5	-1.8	-1.8				
45	25			1500	1800	67-09	33-00	-0.6	-0.7	-0.8	-0.8	-1.8	-1.8					
46	27			0600	0800	67-05	13-57	-0.9	-0.9	-0.9	-0.9	-0.9	-1.9	-1.9				
47	28			0600	0800	63-21	12-37	1.0	1.0	1.0	1.0	-1.8	-1.8	-0.4	0.8	1.0	1.2	
48	28			1600	1800	62-15	12-51	1.0	1.0	1.0	1.0	-1.3	-1.8	-1.3	0.0	0.7	1.1	
49	1	Mar.		0600	0800	59-55	12-53	1.5	1.5	1.5	1.5	1.5	-1.8	-1.8	-1.5			
50	1			1600	1800	58-29	12-57	1.4	1.4	1.4	1.5	1.4	0.2	-1.7	-1.6	-1.3		

St. No.	Date			Time		Position		Temperature (℃) at indicated depth (m)										
	Day	Month	Year	GMT	LMT	Lat.	Long.	0	10	20	30	50	75	100	125	150	200	250
51	2	Mar.	1973	0600	0800	55-49S	13-07E	1.7	1.7	1.7	1.7	1.7	1.6	-0.3	-1.0	-1.0	-0.2	0.9
52	2			1600	1800	54-24	13-25	2.0	2.0	2.0	2.0	2.0	1.8	0.3	-1.3	-1.4	-0.9	-0.3
53	3			0600	0800	51-46	13-29	2.2	2.2	2.2	2.2	2.1	2.1	1.1	-0.7			
54	3			1600	1800	50-22	13-35	4.1	4.0	3.9	3.6	3.6	3.5	2.1	1.5	1.4		
55	4			0600	0800	47-37	13-43	6.8	6.8	6.8	6.8	6.5	6.5	4.8	4.3	3.8	3.9	
56	4			1600	1800	46-14	14-16	8.0	7.6	7.5	7.5	7.5	7.5	7.1	5.5	5.3	4.7	
57	5			0600	0800	43-34	15-14	11.9	11.9	11.9	11.7	11.4	11.0	10.6	10.1	9.8		
58	5			1600	1800	42-08	15-19	11.9	11.9	11.7	11.6	11.4	10.3	9.7	9.1	9.1	8.4	
59	6			0600	0800	39-13	15-24	21.9	21.9	21.8	21.7	21.4	20.7	19.6	18.6	17.8	17.1	
60	6			1600	1800	37-32	15-22	21.8	21.6	20.9	20.4	19.1	18.5	17.8	17.4	17.1	15.8	
61	7			0600	0800	35-10	15-14	21.4	21.4	21.4	21.3	21.3	19.3	15.0	12.5	11.4		
62	7			1900	1800	33-49	15-18	21.7	21.7	21.5	21.4	21.0	17.3	15.3	14.7	13.9	12.5	
63	17			0600	0800	33-48	27-30	24.8	24.8	24.7	24.6	20.5	18.4	17.3	16.8	16.5	15.1	
64	17			1700	1900	33-05	29-23	22.9	22.9	22.9	22.7	20.1	18.7	18.1	17.6	17.5	17.1	16.5
65	18			0600	0800	32-14	31-38	24.1	24.1	24.1	24.1	24.1	21.9	20.2	18.7	17.9	16.5	15.2
66	18			1700	1900	31-26	34-04	26.3	26.3	26.3	26.3	26.3	26.2	24.4	22.1	20.6	18.0	16.6
67	19			0500	0800	30-14	36-41	24.6	24.5	24.0	24.0	22.9	20.3	19.2	19.2	17.2	16.2	14.7
68	19			1600	1900	29-09	39-04	25.8	25.6	25.5	25.4	24.0	21.6	19.6	18.5	17.9	16.9	
69	20			0500	0800	28-02	41-45	25.7	25.7	25.7	25.7	25.7	23.5	22.3	21.1	19.9	17.8	15.9
70	20			1600	1900	26-50	43-34	25.7	25.7	25.7	25.7	24.0	21.8	20.4	18.5	16.8	14.4	12.9
71	21			1600	1900	25-05	48-05	27.5	27.5	27.5	27.5	25.5	24.0	23.0	21.4	20.3	17.9	
72	22			0400	0800	24-01	50-49	27.1	27.1	27.1	27.1	25.3	23.7	22.5	21.4	20.4	18.6	
73	22			1500	1900	23-00	53-28	27.1	27.1	27.1	27.1	27.1	25.1	23.5	22.5	21.5	19.4	
74	23			0400	0800	21-26	56-04	28.2	28.2	28.2	28.2	28.2	25.1	23.2	22.1	21.4	19.6	
75	23			1500	1900	20-17	58-21	27.3	27.3	27.2	26.9	26.7	26.0	22.2	21.3	20.3	18.9	

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	24	Mar.	1973	0400	0800	18-45S	61-12E	28.2	28.2	28.2	28.0	26.4	24.7	23.5	22.0	21.3	18.9	
77	24			1500	1900	17-16	63-09	28.8	28.8	28.8	28.8	28.1	26.4	24.2	22.0	20.7	18.2	
78	25			0400	0800	15-33	65-13	28.5	28.5	28.5	28.5	27.7	26.7	24.1	22.0	21.3	19.2	
79	25			1500	1900	14-06	67-09	28.3	28.3	28.3	28.0	26.8	21.6	19.6	18.8	18.6	17.7	
80	26			0300	0800	12-47	69-16	28.6	28.6	28.6	28.6	28.1	25.0	22.9	21.1	19.1	15.8	
81	26			1400	1800	11-23	71-01	30.0	29.7	29.4	29.0	27.0	24.3	22.2	19.4	17.2	15.0	12.8
82	27			0300	0800	09-38	73-15	29.0	29.0	28.9	28.6	25.8	22.4	18.5	16.0	14.1	12.6	
83	27			1400	1900	7-57	75-20	30.0	29.7	29.0	27.2	23.7	20.9	18.8	16.8	14.9		
84	28			0300	0800	6-02	77-52	28.6	28.6	28.5	28.4	22.5	18.4	15.3	13.1	12.1	11.7	
85	28			1400	1900	4-41	79-59	29.0	28.5	28.5	28.5	23.7	19.4	16.2	14.3	13.6	12.0	
86	29			0300	0800	2-49	83-06	29.0	29.0	29.0	28.5	25.5	23.0	18.9	17.7	16.3	13.0	
87	29			1300	1800	1-17	85-21	29.0	29.0	29.0	29.0	28.3	24.4	19.5	18.5	16.8	13.8	11.9
88	30			0200	0800	0-20N	87-42	29.4	29.4	29.4	29.4	28.6	21.4	20.4	18.4	15.9	13.1	
89	30			1300	1900	1-45	89-41				29.7	28.6	22.2	21.1	18.6	15.6	13.6	
90	31			0200	0800	3-28	91-59	29.4	29.4	29.4	29.4	28.0	22.8	19.9	17.4	14.6	13.0	11.4
91	14	Apr.		1000	1800	20-34	122-30	26.0	26.0	25.6	25.2	24.0	23.1	22.4	21.3	20.6	18.5	
92	15			0000	0800	22-29	124-29	26.0	26.0	26.0	25.9	25.8	25.6	24.4	22.7	22.1	18.7	17.7
93	15			1000	1800	23-53	126-06	24.1	23.3	22.3	22.2	21.9	21.7	21.5	21.3	20.8	19.1	
94	16			2200*	0600	25-25	127-35	23.2	23.2	23.0	23.0	22.5	22.1	21.8	21.6	21.3	19.9	
95	16			0900	1800	26-49	129-17	22.2	21.4	21.0	20.8	20.8	20.6	20.4	20.0	19.7	18.5	
96	17			2300*	0800	28-53	131-26	23.1	23.1	23.1	23.1	22.8	22.2	21.4	21.0	20.7	19.2	

Table. 3. Vertical observation data.

St. 1

Date : Dec. 18, 1972
Time(GMT) : 0115–0520
(LMT) : 0815–1220
Lat. : 38–02S
Long. : 109–05E

Meteorological observation

Time(GMT) : 0100
(LMT) : 0800
Weather : Cloudy(broken)
Air temperature(℃) : 15.9
Atm. pressure(mb) : 1004.7
Wind direction : WNW
velocitty(kt) : 20
Humidity(%) : 68
Sea : 3
Swell : WNW/3

Observed											Interpolated				
Depth (m)	T(℃)	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(℃)	S(‰)	σt	ΔD
					(μg-atoms/L)										
0	16.30	35.182	8.34	5.76	0.40	12	0.12	3.4	0.2	2.24	0	16.30	35.182	25.84	0.000
6	16.52	35.207	8.33	5.75	0.62	4	0.12	3.3	0.3	2.27	10	16.51	35.205	25.81	0.022
14	16.49	35.203	8.34	5.69	0.53	4	0.09	3.2	0.1	2.25	20	16.50	35.205	25.81	0.044
20	16.50	35.205	8.34	5.75	0.51	3	0.11	3.1	0.2	2.25	30	16.50	35.209	25.81	0.066
32	16.43	35.211	8.33	5.77	0.53	4	0.12	3.3	0.2	2.26	50	13.78	35.241	26.44	0.104
49	13.83	35.241	8.34	6.28	0.35	3	0.12	1.9	0.9	2.26	75	12.87	35.195	26.59	0.143
66	13.38	35.234	8.32	5.97	0.47	3	0.18	3.4	0.4	2.27	100	11.63	35.056	26.72	0.178
82	12.43	35.155	8.31	6.01	0.57	4	0.23	5.3		2.24	125	11.61	35.062	26.73	0.212
98	11.66	35.055	8.30	5.86	0.70	7	0.21	7.3	0.4	2.24	150	11.58	35.088	26.75	0.246
129	11.60	35.072	8.30	5.89	0.72	4	0.21	7.9	0.4	2.23	200	11.28	35.039	26.77	0.312
165	11.55	35.091	8.31	5.78	0.72	4	0.06	7.4	0.4	2.23	250	10.67	34.917	26.79	0.379
197	11.32	35.047	8.34	5.59	0.80	4	0.06	8.1	0.3	2.23	300	10.37	34.869	26.81	0.445
258	10.57	34.898	8.29	5.93	0.82	4	0.08	10.	0.4	2.23	400	9.92	34.795	26.82	0.577
320	10.31	34.863	8.30	5.97	0.86	4	0.20	10.		2.24	500	9.54	34.737	26.84	0.708
382	10.00	34.808	8.28	6.27	0.96	5	0.07	12.	0.4	2.24	600	9.21	34.700	26.87	0.840
503	9.53	34.736	8.26	5.75	1.03	6	0.07	14.	0.3	2.22	700	8.71	34.639	26.90	0.970
633	9.08	34.687	8.24	5.41	1.25	6	0.09	17.	0.3	2.22	800	7.94	34.557	26.96	1.097
788	8.08	34.568	8.16	5.18	1.46	10	0.07	21.	0.4	2.20	1000	5.65	34.419	27.16	1.325
1128	4.21	34.366	8.07	4.54	2.13	35	0.05	33.	0.3	2.22	1200	3.83	34.379	27.33	1.514
1501	3.02	34.508	7.99	3.83	2.42	65	0.06	34.	0.4	2.29	1500	3.02	34.507	27.51	1.744
1881	2.62	34.644	7.95	3.77	2.42	83	0.08	35.	0.3	2.27	2000	2.51	34.669	27.69	2.047
2294	2.27	34.710	8.00	4.01	2.30	90	0.10	34.		2.31	2500	2.12	34.730	27.77	2.293
2717	1.96	34.741	7.97	4.45	2.13	90	0.04	33.	0.5	2.29	3000	1.68	34.737	27.81	2.509
3173	1.48	34.735	7.98	4.61	2.17	101	0.07	33.	0.6	2.21					

St. 2

Date : Dec. 21, 1972
Time(GMT) : 0120–0405
(LMT) : 0820–1105
Lat. : 48–51S
Long. : 104–47E

Meteorological observation

Time(GMT) : 0100
(LMT) : 0800
Weather : Cloudy
Air temperature(°C) : 3.6
Atm. pressure(mb) : 995.2
Wind direction : WNW
velocity(kt) : 18
Humidity(%) : 83
Sea : 4
Swell : W/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	Alkalinity	Depth (m)	T(°C)	S(‰)	σt	ΔD
					(μg-atoms/L)										
0	5.50	33.936	8.28	7.08	1.44	6	0.29	21.	0.3	2.31	0	5.50	33.936	26.80	0.000
9	5.73	33.935	8.26	7.10	1.54	2	0.31	20.	0.5	2.28	10	5.73	33.935	26.77	0.013
18	5.69	33.937	8.25	7.09	1.41	3	0.25	21.	0.5	2.29	20	5.69	33.938	26.77	0.026
26	5.70	33.940	8.23	7.10	1.48	2	0.33	21.	0.4	2.30	30	5.70	33.940	26.77	0.038
44	5.67	33.937	8.22	7.15	1.46	2	0.78	21.	0.5	2.30	50	5.63	33.937	26.78	0.064
66	5.53	33.937	8.21	7.12	1.52	3	0.33	21.	0.5	2.28	75	4.93	33.957	26.88	0.095
88	4.00	33.988	8.14	7.14	1.70	4	0.24	23.	1.0	2.29	100	3.57	33.995	27.05	0.123
110	3.35	33.996	8.13	7.22	1.82	11	0.34	24.	1.0	2.33	125	3.12	34.000	27.10	0.148
133	3.04	34.002	8.14	7.12	1.87	12	0.31	26.	0.8	2.32	150	2.94	34.010	27.12	0.172
180	2.89	34.024	8.11	6.95	1.89	16	0.30	28.	0.3	2.32	200	2.89	34.026	27.14	0.220
228		34.039	8.11	6.86	1.89	17	0.05	27.	0.5	2.35	250	2.90	34.074	27.18	0.266
272	2.90	34.114	8.08	6.18	1.95	24	0.05	30.	0.3	2.35	300	2.86	34.148	27.24	0.310
364	2.76	34.209	8.02	5.52	2.19	32	0.07	33.	0.2	2.34	400	2.73	34.240	27.33	0.392
456	2.68	34.284	7.99	5.07	2.34	40	0.09	34.	0.3	2.36	500	2.62	34.317	27.40	0.467
548	2.56	34.352	7.97	4.72	2.46	49	0.03	34.	0.2	2.36	600	2.52	34.393	27.47	0.536
732	2.46	34.489	7.93	4.23	2.44	62	0.02	35.	0.2	2.40	700	2.47	34.467	27.53	0.600
917	2.40	34.578	7.96	4.08	2.40	67	0.02	36.	0.3		800	2.44	34.525	27.58	0.658
1100	2.34	34.651	7.94	4.17	2.34	70	0.03	34.	0.2		1000	2.37	34.614	27.65	0.764
1415	2.19	34.721	8.04	4.39	2.17	71	0.02	34.	0.2	2.39	1200	2.30	34.679	27.71	0.860
1867	1.86	34.745	8.04	4.62	2.13	82	0.03	31.	0.2	2.41	1500	2.14	34.730	27.77	0.990
2315	1.36	34.732	8.03	4.70	2.17	98	0.03	33.	0.1	2.40	2000	1.72	34.743	27.81	1.188
2764	0.95	34.711	8.02	4.83	2.21	111	0.04	32.	0.3	2.42	2500	1.18	34.724	27.83	1.366

St. 3

Date : Dec. 24, 1972
Time(GMT) : 0120–0420
(LMT) : 0820–1120
Lat. : 60–26S
Long. : 101–57E

Meteorological observation

Time(GMT) : 0100
(LMT) : 0800
Weather : Cloudy
Air temperature(℃) : 0.2
Atm. pressure(mb) : 981.3
Wind direction : ENE
velocity(kt) : 12
Humidity(%) : 95
Sea : 2
Swell : WNW/1

Observed											Interpolated				
Depth (m)	T(℃)	S(‰)	pH	O_2 (cc/L)	PO_4-P	Si_3O-Si	NO_2-N	NO_3-N	NH_4-N	Alkalinity	Depth (m)	T(℃)	S(‰)	σt	ΔD
					(μg-atoms/L)										
0	0.40	33.842	8.15	8.16	1.66	35	0.26	24.	0.0		0	0.40	33.842	27.17	0.000
9	0.50	33.832	8.15	8.24	1.64	30	0.24	25.	0.0		10	0.50	33.832	27.16	0.009
18	0.43	33.834	8.15	8.26	1.62	31	0.18	25.	0.2		20	0.42	33.834	27.17	0.018
27	0.39	33.839	8.14	8.28	1.64	31	0.25	25.	0.2		30	0.22	33.846	27.19	0.027
44	−0.74	33.887	8.10	8.13	1.91	37	0.55	28.	0.4		50	−0.93	33.898	27.28	0.044
68	−1.16	33.943	8.06	7.72	2.01	44	0.27	28.	0.6		75	−1.14	33.981	27.35	0.063
91	−1.09										100	−0.72	34.145	27.47	0.080
115	0.09	34.266	7.97	5.86	2.28	56	0.12	33.	0.3		125	0.66	34.346	27.56	0.095
138	1.32	34.441	7.91	4.77	2.38	65	0.07	33.	0.1		150	1.59	34.487	27.61	0.107
185	1.74	34.545	7.88	4.39	2.44	71	0.04	34.	0.0		200	1.74	34.561	27.66	0.131
231	1.65	34.581	7.88	4.35	2.26	75	0.01	34.	0.1		250	1.61	34.593	27.70	0.152
276	1.56	34.609	7.89	4.40	2.17	77	0.01	34.	0.0		300	1.57	34.623	27.72	0.172
364	1.66	34.658	7.88	4.38	2.34	78	0.03	33.	0.0		400	1.70	34.674	27.76	0.210
456	1.76	34.694	7.90	4.55	2.23	78	0.07	33.	0.1		500	1.76	34.705	27.78	0.246
552	1.77	34.715	7.90	4.56	2.26	81	0.03	32.	0.1		600	1.74	34.719	27.79	0.281
745	1.60	34.721	7.90	4.53	2.19	85	0.02	32.	0.0		700	1.65	34.720	27.80	0.315
938	1.43	34.728	7.93	4.58	2.15	90	0.01	31.	0.3		800	1.55	34.723	27.81	0.349
1130	1.26	34.725	7.88	4.68	2.15	93	0.02	31.	0.2		1000	1.37	34.728	27.82	0.414
1670		34.703	7.87	4.78	2.28	105	0.01	33.	0.1		1200	1.20	34.723	27.83	0.477
2116	0.48	34.686	7.87	4.88	2.26	114	0.01	33.	0.3		1500	0.94	34.711	27.84	0.569
2567	0.21	34.672	7.86	5.09	2.36	119	0.02	33.	0.1		2000	0.56	34.690	27.85	0.715
3031	0.05	34.671	7.87	5.23	2.26	121	0.03	33.	0.3		2500	0.24	34.674	27.85	0.852
3497	−0.11	34.667	7.84	5.42	2.28	119	0.02	33.	0.1		3000	0.06	34.671	27.86	0.979
3974	−0.12	34.667	7.84	5.43	2.26	118	0.02	32.	0.3		3500	−0.11	34.667	27.86	1.095

St. 4

Date : Dec. 26, 1972
Time(GMT) : 0355–0542
(LMT) : 0855–1042
Lat. : 61–25S
Long. : 81–51E

Meteorological observation

Time(GMT) : 0300
(LMT) : 0800
Weather : Cloudy
Air temperature(℃) : −0.2
Atm. pressure(mb) : 989.2
Wind direction : ESE
velocity(kt) : 8
Humidity(%) : 81
Sea : 2
Swell : NW/1

Observed											Interpolated				
Depth (m)	T(℃)	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(℃)	S(‰)	σt	ΔD
					(μg-atoms/L)										
0	1.10	33.804	8.18	7.96	1.60	45	0.24	25.	0.1		0	1.10	33.804	27.10	0.000
10	1.45	33.798	8.16	8.03	1.54	40	0.24	25.	0.0		10	1.45	33.798	27.07	0.010
20	0.77	33.805	8.15	8.29	1.62	41	0.19	25.	0.3		20	0.77	33.805	27.12	0.020
30	0.61	33.810	8.14	8.03	1.64	41	0.20	26.	0.3		30	0.61	33.810	27.13	0.029
48	−0.80	34.100	8.01	6.60	2.28	61	0.23	32.	0.9		50	−0.74	34.119	27.45	0.045
72	−0.06	34.276	7.93	5.59	2.34	69	0.17	32.	0.5		75	0.07	34.300	27.56	0.060
95	0.89	34.442	7.89	4.71	2.38	74	0.08	35.	0.0		100	1.01	34.462	27.63	0.072
118	1.32	34.512	7.84	4.43	2.42	77	0.08	35.	0.0		125	1.43	34.529	27.66	0.084
141	1.63	34.563	7.83	4.22	2.42	79	0.05	34.	0.0		150	1.70	34.576	27.68	0.094
187	1.85	34.611	7.82	4.18	2.44	83	0.03	35.	0.0		200	1.87	34.622	27.70	0.116
236	1.87	34.647	7.85	4.08	2.28	83	0.01	34.	0.1		250	1.86	34.653	27.73	0.136
284	1.84	34.664	7.87	4.07	2.26	84	0.02	33.	0.5		300	1.84	34.669	27.74	0.155
378	1.86	34.688	7.85	4.22	2.28	84	0.02	34.	0.0		400	1.87	34.694	27.76	0.192
471	1.88	34.712	7.86	4.34	2.19	83	0.03	31.	0.0		500	1.87	34.718	27.78	0.228
564	1.84	34.728	7.86	4.40	2.21	84	0.02	31.	0.0		600	1.81	34.730	27.79	0.263
755	1.68	34.733	7.86	4.47	2.17	86	0.02	32.	0.0		700	1.73	34.732	27.80	0.297
941	1.53	34.736	7.89	4.61	2.13	91	0.02	32.	0.1		800	1.65	34.734	27.81	0.330
1124	1.33	34.731	7.87	4.67	2.15	95	0.02	31.	0.0		1000	1.47	34.735	27.82	0.395
1405	1.01	34.714	7.87	4.69	2.21	106	0.01	32.	0.0		1200	1.24	34.727	27.83	0.459
1878	0.69	34.697	7.86	4.76	2.28	122	0.01	33.	0.2		1500	0.92	34.709	27.84	0.551

St. 5

Date : Feb. 25, 1973
Time(GMT) : 0530–0843
(LMT) : 0830–1143
Lat. : 67–07S
Long. : 36–37E

Meteorological observation

Time(GMT) : 0500
(LMT) : 0800
Weather : Cloudy(broken)
Air temperature(℃) : −0.9
Atm. pressure(mb) : 988.4
Wind direction : NNW
velocity(kt) : 10
Humidity(%) : 84
Sea : 2
Swell : NW/3

Observed											Interpolated				
Depth (m)	T(℃)	S(‰)	pH	O_2 (cc/L)	PO_4–P (μg-atoms/L)	SiO_3–Si (μg-atoms/L)	NO_2–N (μg-atoms/L)	NO_3–N (μg-atoms/L)	NH_4–N (μg-atoms/L)	Alkalinity	Depth (m)	T(℃)	S(‰)	σt	ΔD
0	−0.60	33.683	8.17	7.91	2.01	60	0.29	28.	0.6	1.99	0	−0.60	33.683	27.09	0.000
9	−0.57	33.680	8.16	7.89	2.03	62	0.29	27.	0.7	2.01	10	−0.57	33.681	27.09	0.010
19	−0.56	33.690	8.16	7.87	1.85	60	0.21	28.	0.5	2.01	20	−0.56	33.691	27.10	0.020
28	−0.55	33.702	8.15	7.92	2.05	60	0.33	28.	0.6	2.01	30	−0.55	33.733	27.13	0.029
46	−0.56	34.012	8.13	7.53	2.09	60	0.29	30.	0.6	2.05	50	−0.75	34.027	27.38	0.046
70	−1.72	34.048	8.09	7.12	2.19	64	0.17	31.	0.1	2.07	75	−1.79	34.092	27.46	0.062
93	−1.81	34.247	8.07	7.00	2.03	64	0.08	31.	0.5	2.08	100	−1.82	34.264	27.60	0.076
116	−1.83	34.270	8.07	6.99	2.19	64	0.08	31.	0.6	2.09	125	−1.83	34.276	27.61	0.088
140	−1.83	34.284	8.05	7.00	2.21	64	0.10	32.	0.3	2.09	150	−1.83	34.290	27.62	0.100
186	−1.70	34.321	8.05	6.98	2.21	65	0.06	32.	0.1	2.09	200	−1.54	34.333	27.65	0.123
233	−1.06	34.397	8.02	6.55	2.17	69	0.07	33.	0.2		250	−0.78	34.484	27.75	0.143
278		34.629	7.94	5.00	2.30	88	0.06	34.	0.3	2.16	300	−0.01	34.634	27.83	0.158
372	0.91	34.649	7.93	4.81	2.32	87	0.06	34.	0.1	2.14	400	1.09	34.666	27.79	0.189
465	1.30	34.705	7.93	4.54	2.34	90	0.07	33.	0.2	2.14	500	1.29	34.713	27.82	0.220
558	1.28	34.719	7.93	4.55	2.32	95	0.06	33.	0.4	2.15	600	1.24	34.719	27.82	0.251
744	1.06	34.718	7.92	4.60	2.34	101	0.06	33.	0.2	2.15	700	1.12	34.718	27.83	0.281
930	0.89	34.709	7.94	4.66	2.26	106	0.03	33.	0.4		800	1.01	34.716	27.84	0.310
1116	0.72	34.703	7.90	4.70	2.38	110	0.04	34.	0.4	2.16	1000	0.83	34.707	27.84	0.368
1460	0.45	34.694	7.90	4.76	2.42	115	0.02	34.	0.5	2.16	1200	0.65	34.701	27.85	0.424
1934	0.13	34.672	7.92	5.11	2.34	115	0.04	32.	0.1	2.16	1500	0.42	34.692	27.86	0.505
2391	−0.04	34.663	7.90	5.27	2.38	118	0.06	34.	0.3	2.16	2000	0.10	34.670	27.86	0.634
2854	−0.19	34.660	7.91	5.40	2.36	117	0.05	33.	0.8	2.16	2500	−0.08	34.662	27.86	0.756
3320	−0.22	34.663	7.89	5.55	2.34	114	0.03	34.	0.3	2.14	3000	−0.21	34.661	27.86	0.869
3786	−0.24	34.663	7.90	5.53	2.30	117	0.03	33.	0.4	2.16	3500	−0.23	34.663	27.87	0.976

St. 6

Date : Feb. 27, 1973
Time(GMT) : 0635–1000
(LMT) : 0835–1200
Lat. : 67–05S
Long. : 13–43E

Meteorological observation

Time(GMT) : 0600
(LMT) : 0800
Weather : Cloudy
Air temperature(℃) : −4.0
Atm. pressure(mb) : 965.0
Wind direction : S
velocity(kt) : 24
Humidity(%) : 83
Sea : 4
Swell : SE/3

Observed											Interpolated				
Depth (m)	T(℃)	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(℃)	S(‰)	σt	ΔD
					(μg-atoms/L)										
0	−0.90	34.123	8.14	7.81	1.89	60	0.10	25.	0.1	2.35	0	−0.90	34.123	27.46	0.000
7	−0.81										10	−0.80	34.123	27.46	0.006
14	−0.80	34.123	8.17	7.76	1.83	61	0.09	26.	0.1	2.35	20	−0.80	34.122	27.45	0.013
20	−0.80	34.122	8.15	7.77	1.93	60	0.11	27.	0.0	2.33	30	−0.81	34.123	27.46	0.019
35	−0.82	34.124	8.15	7.78	1.91	61	0.14	27.	0.1	2.32	50	−0.84	34.124	27.46	0.032
52	−0.84	34.130	8.13	7.74	1.91	60	0.12	25.	0.1	2.32	75	−1.78	34.355	27.67	0.045
69	−1.80	34.332	8.08	6.93	2.03	66	0.11	31.	0.0	2.35	100	−1.69	34.387	27.70	0.055
86	−1.74	34.368	8.06	6.85	2.19	66	0.16	32.	0.0	2.33	125	−1.71	34.400	27.71	0.065
104	−1.68	34.391	8.06	6.76	2.23	66	0.06	31.	0.0	2.34	150	−1.72	34.409	27.72	0.075
138	−1.73	34.403	8.05	6.88	2.19	66	0.04	31.	0.1	2.33	200	−1.54	34.445	27.74	0.093
171	−1.66	34.422	8.06	6.79	2.15	67	0.02	32.	0.1	2.35	250	−0.36	34.540	27.77	0.110
200	−1.54	34.445	8.07	6.59	2.15	69	0.03	32.	0.0	2.36	300	0.50	34.619	27.79	0.126
262	−0.03	34.565	7.98	5.45	2.30	80	0.03	33.	0.0	2.35					
324	0.68	34.645	7.95	4.81	2.34	88	0.03	34.	0.0	2.37					
1182	0.25	34.681	7.93	4.92	2.36	110	0.02	34.	0.0	2.37					
1578	0.07	34.674	7.94	5.08	2.30	113	0.02	32.	0.1	2.38					
1987	−0.06	34.666	7.93	5.24	2.32	114	0.02	34.	0.0	2.37					
2409	−0.16	34.664	7.96	5.35	2.28	114	0.02	33.	0.0	2.40					

St. 7

Date : Feb. 28, 1973
Time(GMT) : 0700–1045
(LMT) : 0900–1245
Lat. : 63–21S
Long. : 12–37E

Meteorological observation

Time(GMT) : 0700
(LMT) : 0900
Weather : Cloudy
Air temperature(℃) : 1.0
Atm. pressure(mb) : 989.1
Wind direction : W
velocity(kt) : 17
Humidity(%) : 60
Sea : 4
Swell : S/3

Observed											Interpolated				
Depth (m)	T(℃)	S(‰)	pH	O_2 (cc/L)	PO_4–P (μg-atoms/L)	SiO_3–Si (μg-atoms/L)	NO_2–N (μg-atoms/L)	NO_3–N (μg-atoms/L)	NH_4–N (μg-atoms/L)	Alkalinity	Depth (m)	T(℃)	S(‰)	σt	ΔD
0	1.00	34.088	8.20	7.63	1.62	42	0.19	23.	0.4	2.22	0	1.00	34.088	27.33	0.000
8	1.03	34.110	8.20	7.63	1.64	44	0.16	22.	0.2	2.27	10	1.03	34.110	27.35	0.007
15	1.03	34.110	8.21		1.58	43	0.11	23.	0.3	2.27	20	1.02	34.109	27.35	0.015
22	1.01	34.108	8.19	7.62	1.64	43	0.16	23	0.3	2.25	30	1.00	34.110	27.35	0.022
36	0.99	34.112	8.16	7.63	1.64	41	0.18	23.	0.3	2.25	50	−1.07	34.299	27.61	0.034
54	−1.69	34.356	8.06	7.09	2.19	61	0.30	28.	0.5		75	−1.74	34.384	27.70	0.045
74	−1.75	34.383	8.05	7.02	2.11	63	0.28	30.	0.4	2.29	100	−0.68	34.481	27.74	0.055
91	−1.27	34.422	8.01	6.59	2.23	65	0.22	31.	0.0	2.27	125	0.56	34.605	27.78	0.064
109	−0.06	34.544	7.95	5.31	2.38	80	0.09	34.	0.0	2.28	150	0.99	34.655	27.79	0.072
142	0.91	34.642	7.90	4.38	2.42	90	0.06	35.	0.0	2.30	200	1.08	34.686	27.81	0.088
178	1.08	34.680	7.92	4.39	2.34	93	0.02	35.	0.2	2.33	250	1.08	34.693	27.81	0.103
213		34.687	7.92	4.36	2.34	95	0.02	34.	0.2	2.35	300	1.07	34.700	27.82	0.118
283	1.08	34.698	7.89	4.42	2.42	97	0.02	34.	0.1	2.33	400	0.99	34.705	27.83	0.147
354	1.03	34.704	7.90	4.48	2.38	98	0.02	34.	0.1	2.34	500	0.89	34.704	27.84	0.176
426	0.97	34.705	7.90	4.50	2.38	100	0.02	35.	0.1	2.34	600	0.77	34.702	27.84	0.204
566	0.81	34.703	7.91	4.57	2.40	105	0.02	34.	0.1	2.34	700	0.67	34.699	27.85	0.231
704	0.67	34.699	7.90	4.58	2.36	109	0.00	35.	0.2	2.36	800	0.62	34.696	27.85	0.259
860	0.59	34.695	7.89	4.64	2.36	111	0.02	34.	0.0	2.33	1000	0.52	34.692	27.85	0.313
1570	0.23	34.681	7.89	4.88	2.42	117	0.02	35.	0.0	2.34	1200	0.41	34.688	27.85	0.367
2033	0.04	34.672	7.89	5.10	2.38	118	0.02	32.	0.1	2.34	1500	0.26	34.682	27.86	0.445
2474	−0.17	34.664	7.87	5.34	2.40	118	0.05	34.	0.1	2.32	2000	0.05	34.673	27.86	0.571

St. 8

Date : Mar. 1, 197[illegible]
Time(GMT) : 0630–0935
(LMT) : 0830–1135
Lat. : 59–52S
Long. : 12–53E

Meteorological observation

Time(GMT)	: 0600	Wind direction	: NW
(LMT)	: 0800	velocity(kt)	: 25
Weather	: Cloudy	Humidity(%)	: 90
Air temperature(°C)	: 1.5	Sea	: 4
Atm. pressure(mb)	: 989.5	Swell	: NNW/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	Alkalinity	Depth (m)	T(°C)	S(‰)	σt	ΔD
					(μg-atoms/L)										
0	1.50	33.950	8.28	7.60	1.64	44	0.16	21.	0.4	2.43	0	1.50	33.950	27.19	0.000
7	1.57	33.949	8.28	7.60	1.62	44	0.15	20.	0.3	2.35	10	1.57	33.950	27.19	0.009
14	1.55	33.951	8.28	7.57	1.54	42	0.12	21.	0.7	2.36	20	1.55	33.951	27.19	0.018
21	1.55	33.951	8.27	7.60	1.62	41	0.14	21.	0.4	2.35	30	1.53	33.954	27.19	0.027
36	1.52	33.956	8.26	7.59	1.62	41	0.16	21.	0.4	2.35	50	0.46	34.092	27.37	0.043
53	0.16	34.127	8.20	7.57	1.93	56	0.22	25.	0.4	2.36	75	-1.73	34.288	27.62	0.058
72	-1.73	34.280	8.15	7.49	2.05	74	0.27	30.	0.5	2.37	100	-1.74	34.311	27.64	0.069
89	-1.75	34.300	8.13	7.43	2.21	76	0.35	31.	0.5	2.38	125	-1.50	34.348	27.66	0.080
107	-1.71	34.319	8.12	7.34	2.23	78	0.33	31.	0.1	2.39	150	-0.89	34.438	27.71	0.091
144	-1.10	34.403	8.06	6.56	2.28	86	0.12	33.	0.0	2.40	200	0.32	34.657	27.83	0.107
180	0.08	34.610	7.99	4.77	2.40	111	0.06	36.	0.0	2.42	250	0.41	34.682	27.85	0.121
217	0.40	34.676	7.98	4.26	2.50	118	0.02	36.	0.0	2.43	300	0.41	34.689	27.85	0.134
290	0.42	34.689	7.93	4.24	2.56	119	0.04	37.	0.2	2.43	400	0.36	34.688	27.86	0.160
364	0.37	34.689	7.93	4.29	2.54	119	0.04	37.	0.0	2.44	500	0.32	34.686	27.86	0.186
436	0.35	34.687	7.94	4.30	2.54	122	0.02	37.	0.0	2.44	600	0.26	34.685	27.86	0.211
577	0.27	34.685	7.95	4.52	2.54	122	0.02	36.	0.0	2.44	700	0.22	34.683	27.86	0.237
731	0.21	34.682	7.96	4.60	2.44	123	0.02	35.	0.0	2.46	800	0.18	34.680	27.86	0.262
895	0.14	34.678	7.96	4.78	2.44	123	0.02	34.	0.0	2.44	1000	0.10	34.676	27.86	0.312
1419	-0.06	34.672	7.96	5.08	2.44	119	0.02	35.	0.0	2.44	1200	0.02	34.674	27.86	0.361
1842	-0.20	34.667	7.97	5.27	2.38	119	0.02	32.	0.0	2.44	1500	-0.09	34.671	27.87	0.433
2270	-0.29	34.662	7.96	5.42	2.40	119	0.02	34.	0.0	2.43	2000	-0.23	34.665	27.87	0.548
2707	-0.42	34.661	7.98	5.52	2.34	118	0.02	33.	0.0	2.45	2500	-0.35	34.661	27.87	0.654

St. 9

Date : Mar. 2, 1973
Time(GMT) : 0630–0915
(LMT) : 0830–1115
Lat. : 55–49S
Long. : 13–07E

Meteorological observation

Time(GMT) : 0600
(LMT) : 0800
Weather : Cloudy
Air temperature(℃) : 1.6
Atm. pressure(mb) : 1007.2
Wind direction : NW
velocity(kt) : 26
Humidity(%) : 90
Sea : 3
Swell : NW/3

Observed											Interpolated				
Depth (m)	T(℃)	S(‰)	pH	O_2 (cc/L)	PO_4-P (μg-atoms/L)	SiO_3-Si (μg-atoms/L)	NO_2-N (μg-atoms/L)	NO_3-N (μg-atoms/L)	NH_4-N (μg-atoms/L)	Alkalinity	Depth (m)	T(℃)	S(‰)	σt	ΔD
0	1.70	34.102	8.24	7.71	1.68	34	0.33	23.	0.6	2.32	0	1.70	34.102	27.30	0.000
8	1.73	34.105	8.24	7.68	1.68	36	0.34	23.	0.3	2.29	10	1.72	34.103	27.30	0.008
14	1.69	34.100	8.23	7.68	1.68	34	0.28	24.	0.6	2.31	20	1.69	34.101	27.30	0.016
21	1.69	34.102	8.23	7.70	1.72	34	0.35	24.	0.5	2.35	30	1.68	34.102	27.30	0.024
35	1.67	34.102	8.23	7.69	1.72	34	0.33	25.	0.4	2.33	50	1.55	34.102	27.31	0.039
52	1.53	34.102	8.21	7.73	1.72	34	0.35	24.	0.8	2.32	75	0.49	34.167	27.43	0.057
69	1.23	34.127	8.20	7.59	1.74	41	0.27	24.	0.9	2.32	100	-1.00	34.283	27.59	0.072
86	-0.90	34.244	8.11	7.32	2.21	67	0.28	29.	1.1	2.33	125	-1.01	34.340	27.64	0.084
113	-1.10	34.303	8.09	7.02	2.21	73	0.20	31.	0.5	2.35	150	-0.70	34.412	27.68	0.095
140	-0.83	34.387	8.06	6.53	2.23	78	0.04	32.	0.2	2.35	200	0.03	34.521	27.74	0.114
177	-0.31	34.471	8.03	5.89	2.26	83	0.02	33.	0.3	2.37	250	0.59	34.609	27.78	0.131
214	0.23	34.550	8.01	5.26	2.28	88	0.02	33.	0.2	2.38	300	0.83	34.660	27.80	0.147
287	0.80	34.652	7.97	4.73	2.36	96	0.02	34.	0.2	2.39	400	0.83	34.687	27.83	0.177
359	0.84	34.680	7.96	4.69	2.36	98	0.02	34.	0.1	2.40	500	0.73	34.690	27.84	0.206
430	0.81	34.689	7.96	4.67	2.36	102	0.02	34.	0.1	2.41	600	0.60	34.691	27.84	0.234
570	0.63	34.691	7.96	4.69	2.40	108	0.02	34.	0.1		700	0.54	34.692	27.85	0.261
732	0.52	34.692	7.95	4.66	2.40	110	0.02	34.	0.2	2.40	800	0.49	34.691	27.85	0.288
896	0.45	34.689	7.94	4.69	2.42	114	0.02	34.	0.4	2.39	1000	0.39	34.687	27.85	0.341
1378	0.18	34.681	7.94	4.90	2.40	117	0.02	34.	0.1	2.38	1200	0.28	34.684	27.86	0.393
1803	0.02	34.675	7.94	5.09	2.36	118	0.02	32.	0.1	2.38	1500	0.13	34.679	27.86	0.469
2237	-0.12	34.669	7.94	5.27	2.40	121	0.03	34.	0.1	2.39	2000	-0.05	34.672	27.86	0.590
2684	-0.24	34.670	7.96	5.43	2.36	118	0.02	34.	0.3	2.40	2500	-0.19	34.670	27.87	0.703

St. 10

Date : Mar. 3, 1973
Time(GMT): 0620–0805
(LMT): 0820–1005
Lat. : 51–46S
Long. : 13–29E

Meteorological observation

Time(GMT) : 0600
(LMT) : 0800
Weather : Cloudy
Air temperature(℃) : 2.5
Atm. pressure(mb) : 1013.1
Wind direction : WNW
velocity(kt) : 14
Humidity(%) : 99
Sea : 3
Swell : WSW/3

Observed											Interpolated				
Depth (m)	T(℃)	S(‰)	pH	O_2 (cc/L)	PO_4–P (μg-atoms/L)	SiO_3–Si (μg-atoms/L)	NO_2–N (μg-atoms/L)	NO_3–N (μg-atoms/L)	NH_4–N (μg-atoms/L)	Alkalinity	Depth (m)	T(℃)	S(‰)	σt	ΔD
0	2.20	33.789	8.23	7.70	1.52	25	0.29	21.	0.8	2.35	0	2.20	33.789	27.01	0.000
8	2.34	33.780	8.24	7.70	1.54	24	0.29	21.	0.5	2.33	10	2.34	33.780	26.99	0.011
17	2.32	33.782	8.22	7.70	1.48	22	0.23	21.	0.5	2.33	20	2.32	33.781	26.99	0.021
25	2.31	33.779	8.22	7.70	1.54	22	0.29	22.	0.5	2.32	30	2.30	33.779	26.99	0.032
42	2.28	33.781	8.20	7.68	1.52	21	0.29	21.	0.5	2.32	50	2.26	33.781	27.00	0.054
63	2.20	33.781	8.19	7.69	1.52	21	0.29	21.	0.5	2.32	75	2.20	33.786	27.01	0.080
84	2.04	33.798	8.20	7.66	1.50	24	0.24	21.	0.6	2.33	100	0.89	33.858	27.16	0.105
105	0.48	33.880	8.14	7.61	1.91	35	0.27	25.	0.8	2.32	125	−0.59	33.957	27.31	0.126
126	−0.63	33.961	8.11	7.48	2.11	44	0.21	29.	0.7	2.32	150	−0.43	34.078	27.40	0.144
170	0.23	34.180	8.03	6.19	2.34	56	0.09	33.	0.3	2.34	200	0.83	34.318	27.53	0.175
213	1.06	34.370	7.98	5.04	2.42	65	0.02	35.	0.3	2.37	250	1.40	34.468	27.61	0.202
257	1.44	34.482	7.94	4.44	2.44	71	0.02	37.	0.3	2.39	300	1.65	34.546	27.66	0.226
344	1.77	34.585	7.91	4.11	2.52	78	0.02	37.	0.2	2.40	400	1.84	34.620	27.70	0.269
430	1.85	34.634	7.90	4.06	2.50	80	0.01	35.	0.2	2.41	500	1.89	34.671	27.74	0.310
516	1.89	34.678	7.92	4.13	2.44	81	0.01	34.	0.3	2.41	600	1.89	34.702	27.76	0.348
684	1.86	34.715	7.93	4.27	2.36	82	0.02	33.	0.3	2.41	700	1.85	34.717	27.78	0.384
860	1.74	34.730	7.96	4.40	2.30	85	0.02	32.	0.2	2.42	800	1.78	34.727	27.79	0.420
1033	1.64	34.739	7.94	4.52	2.30	87	0.02	32.	0.0	2.41	1000	1.66	34.738	27.81	0.488
1299	1.33	34.735	7.95	4.62	2.28	95	0.02	33.	0.2	2.42	1200	1.45	34.738	27.82	0.555
1748	0.92	34.717	7.94	4.76	2.30	106	0.01	33.	0.2	2.42	1500	1.13	34.729	27.84	0.650

St. 11

Date : Mar. 4, 1973
Time(GMT) : 0630–0938
(LMT) : 0830–1138
Lat. : 47–37S
Long. : 13–43E

Meteorological observation

Time(GMT) : 0600
(LMT) : 0800
Weather : Cloudy
Air temperature(℃) : 6.1
Atm. pressure(mb) : 1013.7
Wind direction : W
velocity(kt) : 10
Humidity(%) : 83
Sea : 2
Swell : WSW/1

Observed											Interpolated				
Depth (m)	T(℃)	S(‰)	pH	O_2 (cc/L)	PO_4–P (μg-atoms/L)	SiO_3–Si (μg-atoms/L)	NO_2–N (μg-atoms/L)	NO_3–N (μg-atoms/L)	NH_4–N (μg-atoms/L)	Alkalinity	Depth (m)	T(℃)	S(‰)	σt	ΔD
0	6.80	33.838	8.23	6.97	1.48	10	0.31	19.	0.7	2.36	0	6.80	33.838	26.55	0.000
9	6.84	33.827	8.23	6.97	1.48	7	0.31	19.	0.6	2.32	10	6.84	33.827	26.54	0.015
19	6.81	33.826	8.23	6.96	1.41	4	0.27	19.	0.8	2.31	20	6.81	33.826	26.54	0.030
28	6.80	33.826	8.22	6.97	1.48	6	0.30	20.	0.7	2.30	30	6.77	33.826	26.55	0.045
46	6.51	33.827	8.21	7.02	1.62	4	0.31	19.	0.8	2.32	50	6.47	33.829	26.59	0.075
70	6.28	33.836	8.19	6.97	1.54	5	0.38	20.	0.7	2.32	75	5.98	33.847	26.67	0.110
93	4.77	33.888	8.17	6.97	1.58	6	0.98	22.	0.4	2.32	100	4.52	33.897	26.88	0.143
116		33.910	8.16	7.07	1.70	8	0.06	22.	0.5	2.32	125	3.96	33.911	26.95	0.172
140	3.88	33.916	8.15	7.09	1.72	10	0.03	23.	0.4	2.32	150	3.83	33.936	26.98	0.200
186	3.80	34.029	8.11	6.68	1.85	13	0.03	26.	0.6	2.33	200	3.75	34.063	27.09	0.252
231	3.62	34.124	8.07	6.25	1.93	16	0.02	29.	0.3	2.34	250	3.54	34.139	27.17	0.300
276	3.42	34.148	8.06	6.06	1.99	19	0.01	30.	0.4	2.36	300	3.32	34.156	27.20	0.346
368	3.05	34.176	8.02	5.85	2.15	25	0.01	31.	0.3	2.36	400	2.95	34.188	27.26	0.432
458	2.80	34.213	8.00	5.56	2.26	29	0.01	33.	0.4	2.38	500	2.69	34.235	27.32	0.514
550	2.57	34.262	7.97	5.25	2.36	38	0.02	34.	0.3	2.39	600	2.47	34.287	27.38	0.590
733	2.32	34.358	7.93	4.75	2.46	50	0.02	36.	0.3	2.40	700	2.34	34.340	27.44	0.661
914	2.38	34.477	7.92	4.31	2.42	60	0.01	36.	0.4	2.43	800	2.33	34.402	27.49	0.727
1098	2.43	34.578	7.89	4.22	2.42	66	0.02	35.	0.3	2.40	1000	2.41	34.527	27.58	0.849
1381	2.44	34.680	7.91	4.24	2.32	67	0.01	33.	0.6	2.41	1200	2.43	34.620	27.65	0.957
1800	2.35	34.778	7.94	4.70	2.13	65	0.02	29.	0.3	2.41	1500	2.44	34.716	27.73	1.103
2235	1.96	34.779	7.93	4.77	2.09	77	0.02	31.	0.5	2.41	2000	2.19	34.778	27.80	1.319
2681	1.63	34.773	7.95	4.87	2.15	84	0.02	30.	0.4	2.43	2500	1.76	34.777	27.83	1.515
3130	1.26	34.745	7.92	4.90	2.26	95	0.01	31.	0.0	2.45	3000	1.37	34.754	27.84	1.697
3572	0.93	34.719	7.93	4.82	2.05	112	0.01	33.	0.3	2.48	3500	0.98	34.723	27.85	1.868

St. 12

Date : Mar. 5, 1973
Time(GMT) : 0630–0925
(LMT) : 0830–1125
Lat. : 43–34S
Long. : 15–14E

Meteorological observation

Time(GMT) : 0600
(LMT) : 0800
Weather : Cloudy
Air temperature(℃) : 9.1
Atm. pressure(mb) : 1015.3
Wind direction : ENE
velocity(kt) : 17
Humidity(%) : 79
Sea : 2
Swell : SW/1

Observed											Interpolated				
Depth (m)	T(℃)	S(‰)	pH	O_2 (cc/L)	PO_4-P (μg-atoms/L)	SiO_3-Si (μg-atoms/L)	NO_2-N (μg-atoms/L)	NO_3-N (μg-atoms/L)	NH_4-N (μg-atoms/L)	Alkalinity	Depth (m)	T(℃)	S(‰)	σt	ΔD
0	11.90	34.436	8.15	6.28	0.78	11	0.18	7.7	0.0	2.36	0	11.90	34.436	26.19	0.000
9	11.96	34.441	8.20	6.29	0.82	8	0.16	7.7	0.1	2.31	10	11.96	34.441	26.18	0.018
19	11.93	34.443	8.24	6.30	0.82	4	0.11	7.6	0.4	2.32	20	11.91	34.443	26.19	0.037
28	11.75	34.446	8.23	6.37	0.84	6	0.18	7.9	0.1	2.30	30	11.73	34.447	26.23	0.055
46	11.62	34.452	8.23	6.26	0.88	3	0.20	8.0	0.8	2.30	50	11.59	34.457	26.26	0.091
70	11.27	34.464	8.22	6.23	0.88	6	0.22	8.4	0.5	2.30	75	11.09	34.443	26.35	0.134
93	10.44	34.394	8.21	6.29	0.98	4	0.24	11.	0.7	2.30	100	10.33	34.426	26.47	0.176
116	10.18	34.528	8.18	6.07	1.05	6	0.59	11.	0.2	2.30	125	10.10	34.569	26.62	0.214
140	9.96	34.618	8.18	5.92	1.07	7	0.06	12.	0.1	2.30	150	9.83	34.611	26.70	0.249
186	9.27	34.588	8.17	6.10	1.21	8	0.03	14.	0.1	2.32	200	9.03	34.564	26.79	0.316
232	8.53	34.509	8.17	6.05	1.23	6	0.02	15.	0.2	2.31	250	8.35	34.495	26.84	0.381
279	8.10	34.481	8.14	5.76	1.33	8	0.01	18.	0.3	2.32	300	7.92	34.477	26.90	0.442
372	7.15	34.455	8.07	5.24	1.66	13	0.02	23.	0.3	2.33	400	6.70	34.423	27.03	0.558
465	5.64	34.339	8.06	5.37	1.87	16	0.02	27.	0.2	2.32	500	5.19	34.300	27.12	0.664
558	4.57	34.250	8.05	5.67	1.97	19	0.01	28.	0.3	2.31	600	4.29	34.250	27.18	0.762
744	3.74	34.249	8.01	5.50	2.09	27	0.02	31.	0.3	2.34	700	3.84	34.249	27.23	0.855
930	3.25	34.333	8.00	4.90	2.19	39	0.02	33.	0.3	2.36	800	3.57	34.270	27.27	0.944
1116	2.89	34.414	7.94	4.58	2.40	53	0.02	34.	0.0	2.36	1000	3.10	34.363	27.39	1.108
1394	2.72	34.568	7.93	4.16	2.38	63	0.01	34.	0.2	2.37	1200	2.81	34.461	27.49	1.251
1854	2.60	34.733	7.96	4.51	2.11	63	0.02	31.	0.1	2.39	1500	2.68	34.615	27.63	1.436
2314	2.47	34.808	7.97	4.98	1.97	61	0.02	28.	0.1	2.39	2000	2.56	34.764	27.76	1.693
2774	2.26	34.834	8.02	5.12	1.85	60	0.00	26.	0.2	2.42	2500	2.39	34.824	27.82	1.916

St. 13

Date : Mar. 6, 1973
Time(GMT) : 0625–0825
(LMT) : 0825–1025
Lat. : 39–33S
Long. : 15–23E

Meteorological observation

Time(GMT) : 0600
(LMT) : 0800
Weather : Cloudy
Air temperature(℃) : 19.8
Atm. pressure(mb) : 1013.8
Wind direction : NW
velocity(kt) : 6
Humidity(%) : 72
Sea : 1
Swell : NE/1

Observed											Interpolated				
Depth (m)	T(℃)	S(‰)	pH	O_2 (cc/L)	PO_4-P (μg-atoms/L)	SiO_3-Si (μg-atoms/L)	NO_2-N (μg-atoms/L)	NO_3-N (μg-atoms/L)	NH_4-N (μg-atoms/L)	Alkalinity	Depth (m)	T(℃)	S(‰)	σt	ΔD
0	21.90	35.433	8.40	5.02	0.21	12	0.03	0.0	0.6	2.48	0	21.90	35.433	24.59	0.000
9	22.07	35.423	8.39	4.98	0.18	11	0.02	0.0	0.7	2.48	10	22.07	35.424	24.54	0.034
18	22.00	35.433	8.41	4.90	0.21	6	0.02	0.0	0.8	2.52	20	21.99	35.435	24.57	0.068
27	21.95	35.443	8.38	5.00	0.21	9	0.02	0.0	0.7	2.47	30	21.93	35.447	24.60	0.101
46	21.81	35.452	8.39	5.01	0.23	6	0.03	0.0	0.7	2.47	50	21.66	35.438	24.66	0.168
69	20.78	35.374	8.31	4.45	0.41	11	0.30	2.7	0.4	2.47	75	20.54	35.374	24.92	0.248
93	19.84	35.410	8.31	4.21	0.49	7	0.04	4.5	0.5	2.48	100	19.57	35.441	25.23	0.321
116	18.99	35.506	8.31	4.72	0.45	9	0.05	2.8	0.5	2.47	125	18.73	35.506	25.50	0.387
139	18.36	35.506	8.31	4.63	0.51	10	0.02	3.8	0.5	2.48	150	18.08	35.509	25.66	0.449
186	17.32	35.518	8.32	4.97	0.45	7	0.02	3.7	0.7	2.48	200	17.14	35.520	25.90	0.563
232	16.86	35.520	8.35	4.89	0.53	5	0.02	4.0	0.9	2.50	250	16.77	35.518	25.98	0.670
279	16.57	35.507	8.33	4.76	0.59	5	0.01	4.7	0.4	2.51	300	16.16	35.481	26.10	0.774
373	14.57	35.375	8.25	4.71	0.78	12	0.01	8.0	0.6	2.48	400	14.27	35.353	26.42	0.961
466	13.65	35.296	8.24	4.86	0.84	8	0.01	9.4	0.7	2.49	500	13.16	35.243	26.57	1.128
557	12.32	35.148	8.23	5.04	0.98	10	0.01	11.	0.6	2.48	600	11.88	35.095	26.70	1.284
738	10.58	34.935	8.20	5.09	1.19	11	0.02	15.	0.6	2.48	700	10.93	34.977	26.79	1.430
918	8.14	34.676	8.16	4.40	1.68	20	0.01	23.	0.3	2.49	800	9.82	34.849	26.88	1.568
1099	5.02	34.409	8.08	4.25	2.13	33	0.02	30.	0.6	2.47	1000	6.66	34.540	27.12	1.812
1368	3.57	34.474	8.01	4.19	2.40	53	0.02	34.	0.4	2.49	1200	4.21	34.433	27.34	2.008
1820	2.79	34.689	8.02	4.25	2.23	64	0.01	32.	0.4	2.52	1500	3.13	34.523	27.51	2.239

St. 14

Date : Mar. 7, 1973
Time(GMT) : 0620–1030
(LMT) : 0820–1230
Lat. : 35–10S
Long. : 15–14E

Meteorological observation

Time(GMT) : 0600
(LMT) : 0800
Weather : Cloudy
Air temperature(℃) : 20.5
Atm. pressure(mb) : 1012.0
Wind direction : S
velocity(kt) : 8
Humidity(%) : 83
Sea : 3
Swell : ESE/1

Observed											Interpolated				
Depth (m)	T(℃)	S(‰)	pH	O_2 (cc/L)	PO_4–P (μg-atoms/L)	SiO_3–Si (μg-atoms/L)	NO_2–N (μg-atoms/L)	NO_3–N (μg-atoms/L)	NH_4–N (μg-atoms/L)	Alkalinity	Depth (m)	T(℃)	S(‰)	σt	ΔD
0	21.40	35.601	8.37	5.16	0.16	13	0.02	0.0	0.5	2.49	0	21.40	35.601	24.86	0.000
9	21.57	35.603	8.36	5.12	0.18	13	0.02	0.0	0.4	2.47	10	21.57	35.603	24.81	0.031
17	21.57	35.603	8.38	4.97	0.18	6	0.01	0.0	0.5	2.48	20	21.57	35.604	24.82	0.063
26	21.57	35.606	8.36	5.11	0.21	11	0.02	0.0	0.4	2.47	30	21.55	35.603	24.82	0.094
45	21.42	35.588	8.35	5.13	0.23	8	0.02	0.0	0.3	2.47	50	21.39	35.589	24.86	0.157
68	21.26	35.591	8.33	5.08	0.23	12	0.04	0.0	0.0	2.47	75	20.93	35.553	24.95	0.234
87	19.67	35.457	8.32	4.87	0.39	4	0.50	1.	0.1	2.47	100	16.54	35.311	25.88	0.299
105	15.28	35.257	8.33	4.24	0.90	13	0.10	10.	0.2	2.45	125	12.75	35.145	26.57	0.345
122	13.01	35.162	8.20	4.34	1.11	14	0.05	13.	0.1	2.45	150	11.25	35.013	26.76	0.380
160	10.97	34.967	8.17	4.48	1.33	17	0.02	16.	0.2	2.44	200	9.97	34.859	26.87	0.445
200	9.97	34.859	8.16	4.31	1.44	15	0.01	19.	0.2	2.46	250	8.99	34.751	26.94	0.505
237	9.23	34.776	8.15	4.20	1.54	18	0.01	21.	0.5	2.47	300	8.08	34.654	27.01	0.562
314	7.82	34.628	8.13	4.46	1.78	26	0.02	24.	0.3	2.44	400	6.12	34.449	27.12	0.667
390	6.25	34.460	8.09	4.79	1.93	23	0.02	27.	0.4	2.44	500	5.09	34.391	27.20	0.764
473	5.36	34.404	8.07	4.89	2.03	28	0.01	29.		2.44	600	4.23	34.366	27.28	0.853
625	4.06	34.365	8.04	4.81	2.26	38	0.02	32.	0.5	2.44	700	3.75	34.380	27.34	0.936
790	3.51	34.413	8.02	4.43	2.34	48	0.02	33.	0.0	2.46	800	3.48	34.415	27.40	1.014
960	3.00	34.478	7.98	4.28	2.44	60	0.01	34.	0.1	2.46	1000	2.91	34.517	27.53	1.153
1065	2.80	34.584	7.98	4.12	2.38	61	0.01	33.	0.0	2.47	1200	2.71	34.666	27.67	1.267
1474	2.71	34.750	8.03	4.51	2.09	58	0.00	29.	0.0	2.48	1500	2.70	34.757	27.74	1.412
1902	2.60	34.822	8.03	4.94	1.95	53	0.04	27.	0.1	2.47	2000	2.56	34.831	27.81	1.631
2334	2.40	34.846	8.10	5.07	1.80	55	0.00	26.	0.1	2.50	2500	2.36	34.847	27.84	1.836
2773	2.26	34.848	8.07	5.17	1.78	59	0.01	25.	0.0	2.50	3000	2.10	34.838	27.86	2.036
3212	1.89	34.821	8.09	4.99	1.80	77	0.01	27.	0.1	2.53					