OCEANOGRAPHICAL OBSERVATIONS
IN THE INDIAN OCEAN IN 1963
H.M.A.S. *GASCOYNE*
Cruise G 2/63

OCEANOGRAPHICAL CRUISE REPORT NO. 22

DIVISION OF FISHERIES AND OCEANOGRAPHY
COMMONWEALTH SCIENTIFIC AND INDUSTRIAL
RESEARCH ORGANIZATION, AUSTRALIA 1967

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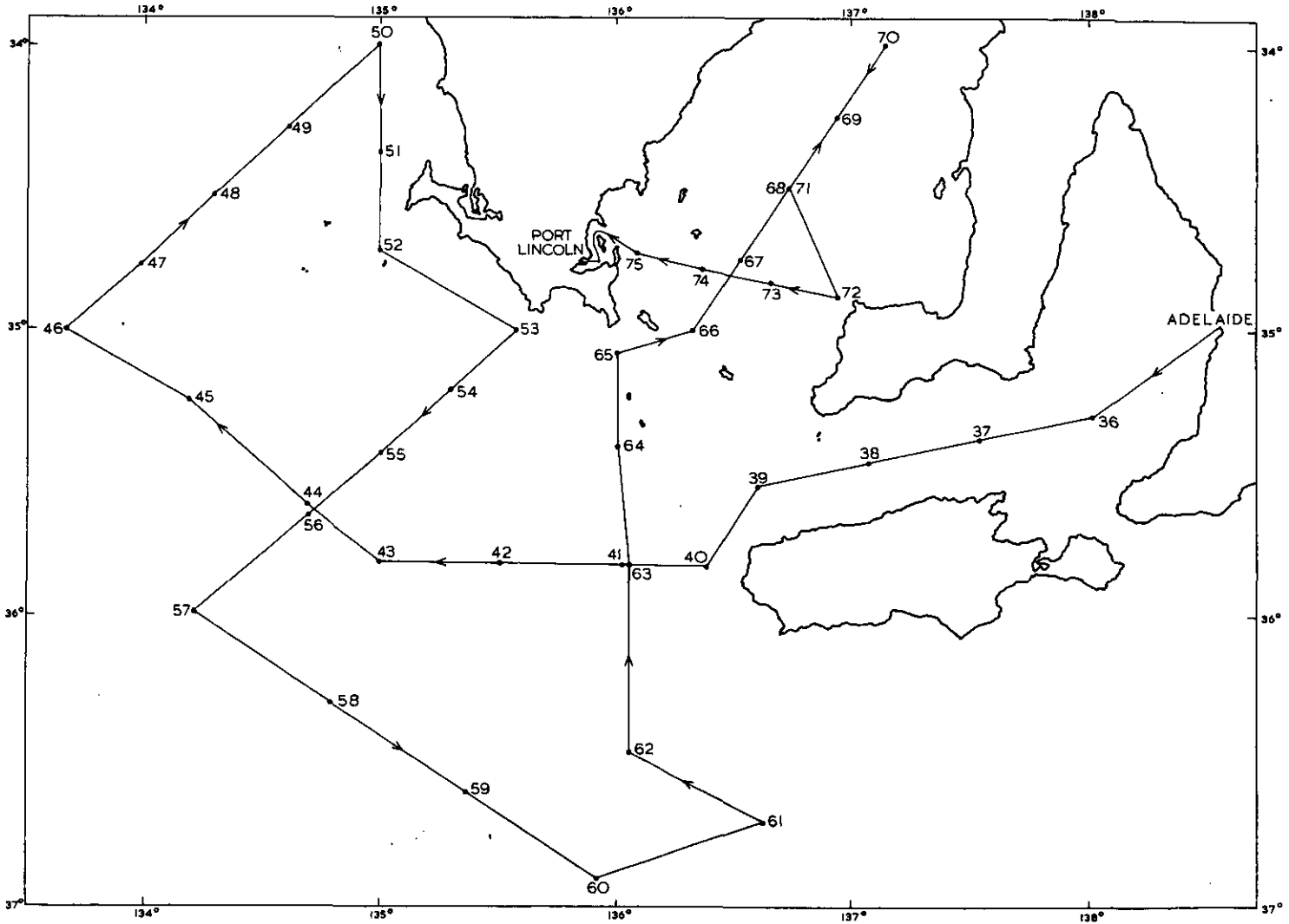
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OCEANOGRAPHICAL CRUISE REPORT

No. 22

OCEANOGRAPHICAL OBSERVATIONS IN THE INDIAN OCEAN IN 1963

H.M.A.S. Gascoyne

Cruise G2/63

March 4-9, 1963

I. INTRODUCTION

This report records the data for the second cruise in 1963 of H.M.A.S. Gascoyne, Royal Australian Navy oceanographical frigate, in the Indian Ocean.

Objective

To examine the chemical and physical environment during the South Australian tuna season.

Itinerary

The cruise began at Adelaide on March 4, proceeded through Investigator Strait to the continental shelf and adjacent areas off Cape Catastrophe and Spencer Gulf, and ended at Port Lincoln on March 9.

Scientific Personnel

D. Vaux (Cruise Leader)
R. Bradley
K. Fleming
L. Olsen
J. Prothero

Salinity, oxygen, and inorganic phosphate determinations were done in the ship's laboratory by K. Fleming and J. Prothero. The data were processed under the direction of W. Hedge, with computer programmes designed by A.D. Crooks. Accuracy of cruise data is the responsibility of the cruise leader, D. Vaux.

II. WORK ACCOMPLISHED

Forty stations were worked (G2/36/63 - G2/75/63). Surface and subsurface hydrology samples were collected at all stations.

TABLE 1

WORK DONE AT EACH STATION

Stn No.	Hydrology Surface to Depth (m)	Stn No.	Hydrology Surface to Depth (m)
36	25	56	1500
37	28	57	1500
38	30	58	1500
39	60	59	1500
40	90	60	1500
41	120	61	1500
42	500	62	650
43	1100	63	100
44	1500	64	80
45	1200	65	60
46	500	66	40
47	75	67	30
48	80	68	30
49	70	69	33
50	56	70	15
51	50	71	35
52	60	72	40
53	70	73	40
54	90	74	35
55	100	75	18

III. METHOD OF COLLECTION AND ANALYSIS OF SAMPLES

1. Physics

Temperature.- Water temperatures were taken with deep-sea reversing thermometers. Two protected thermometers were used at each depth, together with an unprotected thermometer on all but the upper five Nansen water bottles. Differences between corrected protected thermometer readings were generally less than 0.04 deg C, and the mean values listed in this cruise report are considered accurate to $\pm$ 0.03 deg C.

Thermometric Depth.- Depth calculations were made by the second method described by La Fond (1951), plotting thermometric depth against the difference between thermometric and wire depths. Depths are considered accurate to ± 5 metres at depths less than 200 m, ± 10 m at depths between about 200 and 400 m, and about 2% at depths from 400 to 1500 m.

Sigma-t.- Sigma-t values were calculated, by computer, from temperature and salinity, using the equations of Knudsen (La Fond 1951).

2. Chemistry

Salinity.- Salinity was measured on board using an inductive salinometer (Brown and Hamon 1961).

Dissolved Oxygen.- A version of the standard Winkler method was used to determine the amount of dissolved oxygen in the seawater samples. The version used is a modification of that described by Thompson and Robinson (1939) and differs in some respects from the revision by Jacobsen, Robinson and Thompson (1950). Potassium iodate was used as the iodometric standard, and the reagents necessary to fix the oxygen in solution were used at different concentrations. Duplicate titrations were made on approximately every tenth sample. Saturation values were calculated by computer using the simpler of the equations given by Richards and Corwin (1956) -

$$O_2\ (\%\ \text{Satn.}) = \frac{O_2\ (\text{ml/l}) \times (33.5 + T^\circ C) \times 100}{332.4 - (1.854 \times S‰)}$$

Inorganic Phosphate.- The method of Atkins (1923) was used with 1 ml molybdate reagent (300 ml 10% w/v ammonium molybdate and 100 ml 50% v/v sulphuric acid) and 0.1 ml 1% w/v stannous chloride diluted afresh from a 40% stock solution in hydrochloric acid, which was kept under paraffin. The reagents were automatically dispensed by a piston dispenser.

Standard phosphate solutions were made up in distilled water. At air temperatures less than 25°C analyses were carried out in batches of 10; readings were begun within 10 minutes of adding reagents, and completed within 10 minutes. At air temperatures greater than 25°C batches of 6 were analysed; readings were commenced within 5 minutes of adding reagents and completed within 7 minutes. Each batch was compared with a distilled water blank and a 0.65 µg-atom/l standard in a Hilger Spekker absorptiometer using 4 cm cells and Ilford 608 filters.

Each day a complete calibration was made using standards up to 3.25 µg-atom/l. Results are given as µg-atom/l without any correction for salt error and are precise to ± 10% for values less than 0.5 µg-atom/l and ± 5% for higher values. To correct for salt effects the results given can be multiplied by 1.15.

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Richards, F.A., and Corwin, N. (1956).- Some oceanographic applications of the solubility of oxygen in seawater. Limnol. Oceanogr. 1: 263-7

Thompson, T.G., and Robinson, R.J. (1939).- Notes on the determination of dissolved oxygen in sea water. J. mar. Res. 2: 1-8

U.S. Navy Hydrographic Office (1955).- Instruction manual for oceanographic observations. Publ. No. 607

IV. DATA SHEETS

The data were processed in a C.D.C. 3600 Computer. An explanation of the headings for each part is given at the beginning of the surface hydrology listing.

DATA

PART 1

HYDROLOGY

SURFACE SAMPLING

EXPLANATION OF HEADINGS

Parts 1 and 2	Hydrology
STATION	Gives the station identification, for example, G2/36/63 signifies the 36th station worked by Gascoyne in 1964, on her 2nd cruise for that year
DATE	Given as day/month/year
TIME	Given in Zone Time, and is the time at the beginning of the first cast. Zone Time throughout the cruise was Code J, Central Australian Time, G.M.T. + $9\frac{1}{2}$ hours
LATITUDE LONGITUDE	Given in degrees and minutes
SONIC DEPTH	Given in metres, measured at standard sound velocity of 800 fm (1463 m) per second
AIR TEMP. WET DRY	Air temperatures recorded from wet and dry bulb thermometers in °C
WIND DIR. SP.	Wind direction and speed are coded using Tables 8 and 9 in U.S. Hydrogr. Office (1955)
ANEM. HEIGHT	The average height of the anemometer above sea level, given in metres
CLOUD TYPE AMT.	Cloud type and amount are coded using Tables 2 and 3 in U.S. Hydrogr. Office (1955)
VIS.	Visibility is coded using Table 4 in U.S. Hydrogr. Office (1955)
SEA DIR. AMT.	Sea direction and amount are coded using Tables 5 and 8 in U.S. Hydrogr. Office (1955)
SWELL DIR. AMT.	Sea swell direction and amount are coded using Tables 6 and 8 in U.S. Hydrogr. Office (1955)

ATMOS. PRESSURE BAROMETER	Atmospheric pressure given in millibars
WIRE ANGLES CAST 1 CAST 2 CAST 3	Wire angles are measured at the surface and expressed in degrees for each cast.
CAST	The cast number corresponding to the wire angle is shown
DEPTH	Actual sampling depth, given in metres
TEMP.	Sea temperatures recorded in °C
SALINITY	Given in parts per thousand
SIGMA-T	Sigma-t to 2 decimal places
OXYGEN	Given in ml/l
OXYGEN % SAT.	Oxygen percentage saturation
INORG. P	Given in µg-atom/l

A blank indicates no data available

VESSEL	CRUISE	STATION NUMBER	YR.	MTH.	DAY	TIME	Z	LATITUDE			LONGITUDE			TEMP.	SALINITY	WIND DIR.	WIND SP.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	VISIBILITY	BAROMETER
20	2	36	63	3	4	1950	J	35	18	S	138	00	E	20.5	36.87	20	2	20	2			6	1013.1
20	2	37	63	3	4	2155	J	35	23	S	137	32	E	19.7	36.30	00	0					6	1013.7
20	2	38	63	3	4	2350	J	35	28	S	137	04	E	20.2	36.53	00	0					6	1014.5
20	2	39	63	3	5	0156	J	35	33	S	136	36	E	18.0	35.92	00	0					6	1014.1
20	2	40	63	3	5	0346	J	35	50	S	136	23	E	18.3	35.93	00	0					6	1013.7
20	2	41	63	3	5	0540	J	35	50	S	136	01	E	17.9	35.63	23	1	23	1	16	1	6	1014.3
20	2	42	63	3	5	0812	J	35	50	S	135	30	E	18.6	35.34	23	2	23	1	16	1	6	1015.4
20	2	43	63	3	5	1041	J	35	49	S	135	00	E	18.7	35.69	25	2	25	2	15	1	6	1016.4
20	2	44	63	3	5	1330	J	35	37	S	134	42	E	18.5	35.59	23	2	23	1	16	2	6	1016.8
20	2	45	63	3	5	1655	J	35	15	S	134	11	E	19.2	35.88	18	5	18	2	18	4	6	1019.0
20	2	46	63	3	5	2045	J	35	00	S	133	40	E	19.0	35.83	17	6	17	4	17	6	6	1022.0
20	2	47	63	3	5	2300	J	34	46	S	133	59	E	18.8	35.80	16	6	16	4	16	6	6	1022.4
20	2	48	63	3	6	0100	J	34	32	S	134	18	E	18.3	35.80	16	5	16	5	16	6	6	1022.0
20	2	49	63	3	6	0305	J	34	17	S	134	37	E	17.3	35.63	16	5	16	4	16	5	5	1021.5
20	2	50	63	3	6	0540	J	34	00	S	135	00	E	17.1	35.56	16	4	16	2	20	3	5	1022.1
20	2	51	63	3	6	0800	J	34	22	S	135	00	E	17.1	35.59	13	4	13	3	19	4	6	1023.5
20	2	52	63	3	6	1030	J	34	44	S	135	00	E	16.0	35.57	14	4	14	2	18	4	7	1023.8
20	2	53	63	3	6	1400	J	35	00	S	135	34	E	16.4	35.78	15	4	15	2	22	6	6	1024.5
20	2	54	63	3	6	1550	J	35	13	S	135	18	E	18.0	36.05	15	4	15	2	22	7	6	1024.5
20	2	55	63	3	6	1750	J	35	26	S	135	00	E	18.5	35.76	16	4	16	3	22	6		1024.1
20	2	56	63	3	6	2000	J	35	39	S	134	42	E	18.5	35.70	14	3	14	2	20	6	6	1025.0
20	2	57	63	3	6	2235	J	35	59	S	134	13	E	18.2	35.60	12	4	12	2	20	4	6	1027.0
20	2	58	63	3	7	0400	J	36	18	S	134	48	E	17.7	35.52	13	4	13	2	20	5	6	1025.0
20	2	59	63	3	7	0910	J	36	36	S	135	22	E	17.9	35.59	11	4	11	3	21	5	6	1026.0
20	2	60	63	3	7	1312	J	36	54	S	135	55	E	17.0	35.31	11	3	11	2	21	4	6	1024.2
20	2	61	63	3	7	1712	J	36	42	S	136	37	E	17.4	35.51	12	4	12	2	22	4	6	1022.9
20	2	62	63	3	7	1942	J	36	28	S	136	03	E	17.4	35.50	13	4	13	2	22	4	6	1022.9
20	2	63	63	3	7	2320	J	35	50	S	136	02	E	17.7	35.77	10	4	10	4	22	4	8	1020.2
20	2	64	63	3	8	0145	J	35	25	S	136	00	E	17.7	35.87	14	3	18	3			8	1018.0
20	2	65	63	3	8	0400	J	35	05	S	136	00	E	17.1	36.03	11	3	11	2			6	1018.0
20	2	66	63	3	8	0610	J	35	00	S	136	20	E	17.8	36.07	10	3	10	3	18	1	6	1017.5
20	2	67	63	3	8	0757	J	34	45	S	136	32	E	20.8	37.30	07	3	07	3			6	1017.2
20	2	68	63	3	8	0945	J	34	30	S	136	44	E	21.3	37.78	10	4	09	2			6	
20	2	69	63	3	8	1130	J	34	15	S	136	56	E	21.5	37.63	04	3	07	1			6	1015.8
20	2	70	63	3	8	1310	J	34	00	S	137	08	E	21.6	38.14	00	0	00	0	00	0	8	1014.0
20	2	71	63	3	8	1608	J	34	30	S	136	44	E	21.8	37.51	10	1					6	1012.0
20	2	72	63	3	8	1820	J	34	53	S	136	56	E	20.5		09	1					6	1012.0
20	2	73	63	3	8	1943	J	34	50	S	136	39	E	20.6	37.05							6	1012.6
20	2	74	63	3	8	2100	J	34	47	S	136	22	E	21.0	37.20							6	
20	2	75	63	3	8	2220	J	34	44	S	136	05	E	20.6								7	1013.0

DATA

PART 2

HYDROLOGY

SUBSURFACE SAMPLING

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/36/63	4/3/63	1950 J	35 18 S	138 00 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
29	20.0	22.0	20	2	16			6	20	2			1013.1	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	20.54	36.872	26.06	5.10	104	0.03		
1	10	20.03	36.812	26.15	5.10	103	0.03		
1	25	20.09	36.894	26.20	5.09	103	0.03		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/37/63	4/3/63	2155 J	35 23 S	137 32 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
33	19.0	20.0	00	0	16		0	6					1013.7	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	19.74	36.302	25.84	5.12	103	0.04		
1	8	19.74	36.300	25.84	5.16	104	0.06		
1	18	19.48	36.324	25.93	5.21	104	0.07		
1	28	19.47	36.338	25.94	5.15	103	0.10		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/38/63	4/3/63	2350 J	35 28 S	137 04 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
37	18.0	19.0	00	0	16		0	6					1014.5	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	20.22	36.535	25.89	4.99	101	0.03		
1	10	20.05	36.536	25.94	5.10	103	0.04		
1	20	19.87	36.550	26.00	5.08	102	0.06		
1	30	19.87	36.554	26.00	5.03	101	0.06		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/39/63	5/3/63	0156 J	35 33 S	136 36 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
70	17.0	18.0	00	0	16		0	6					1014.1	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	18.01	35.920	25.99	5.39	104	0.05		
1	10	17.93	35.908	26.00	5.38	104	0.07		
1	20	17.79	35.903	26.03	5.39	104	0.11		
1	30	16.55	35.805	26.26	5.68	107	0.11		
1	40	13.58	35.400	26.60	5.33	94	0.19		
1	50	13.11	35.327	26.64	5.14	90	0.25		
1	60	13.10	35.323	26.64	5.20	91	0.31		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/40/63	5/3/63	0346 J	35 50 S	136 23 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
97	17.0	18.0	00	0	16			6					1013.7	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	18.29	35.932	25.93	5.33	104	0.04		
1	25	18.12	35.937	25.98	5.42	105	0.06		
1	50	13.94	35.398	26.53	5.68	101	0.17		
1	75	13.49	35.358	26.59	5.39	95	0.30		
1	90	13.39	35.350	26.60	5.39	95	0.30		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/41/63	5/3/63	0540 J	35 50 S	136 01 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
134	16.0	18.0	23	1	16		0	6	23	1	16	1	1014.3	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	17.95	35.625	25.78	5.33	103	0.03		
1	25	17.84	35.655	25.83	5.42	105	0.06		
1	50	17.05	35.787	26.12	5.51	105	0.12		
1	75	14.03	35.263	26.40	5.74	102	0.22		
1	100	13.71	35.353	26.54	5.40	96	0.26		
1	120	13.54	35.352	26.57	5.33	94	0.29		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/42/63	5/3/63	0812 J	35 50 S	135 30 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
487	16.0	18.0	23	2	16	6	7	6	23	1	16	1	1015.4	5		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	18.59	35.341	25.40	5.34	104	0.05		
1	25	18.52	35.727	25.72	5.27	103	0.05		
1	50	18.38	35.758	25.77	5.32	104	0.11		
1	75	16.66	35.577	26.06	5.51	104	0.13		
1	100	14.73	35.472	26.41	5.48	99	0.29		
1	150	14.21	35.427	26.49	5.34	96	0.29		
1	200	13.95	35.391	26.52	5.36	95	0.32		
1	300	12.75	35.265	26.67	5.41	94	0.50		
1	500	9.35	34.723	26.86	5.46	87	0.89		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/43/63	5/3/63	1041 J	35 49 S	135 00 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
2195	18.0	19.0	25	2	16	6	8	6	25	2	15	1	1016.4	0	0	

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	18.68	35.690	25.65	5.24	103	0.05		
2	25	18.54	35.702	25.69	5.29	103	0.05		
2	50	18.64	35.749	25.70	5.29	104	0.08		
2	75	15.16	35.370	26.24	5.85	107	0.16		
2	100	13.90	35.348	26.49	5.58	99	0.24		
2	150	13.52	35.347	26.57	5.37	95	0.31		
2	200	13.14	35.326	26.63	5.48	96	0.35		
2	300	11.71	35.092	26.73	5.43	92	0.53		
1	500	8.93	34.660	26.88	5.49	87	1.01		
1	700	7.77	34.527	26.96	4.99	77	1.43		
1	900	5.47	34.408	27.17	4.38	64	1.70		
1	1100	3.70	34.415	27.37	4.15	57	1.83		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/44/63	5/3/63	1330 J	35 37 S	134 42 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
1957	17.0	19.0	23	2	16	6	4	6	23	1	16	2	1016.8	0	0	

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	18.53	35.586	25.61	5.28	103	0.10		
2	25	18.19	35.576	25.68	5.32	103	0.12		
2	50	17.49	35.508	25.80	5.43	104	0.14		
2	75	14.99	35.393	26.29	5.89	107	0.19		
2	100	14.13	35.390	26.48	5.72	102	0.24		
2	150	13.43	35.344	26.59	5.37	94	0.35		
2	200	12.92	35.309	26.67	5.44	95	0.38		
2	300	11.04	35.003	26.79	5.42	90	0.67		
1	500	8.82	34.648	26.89	5.43	86	0.93		
1	700	7.76	34.538	26.97	4.94	76	1.32		
1	900	5.44	34.419	27.18	4.36	63	1.64		
1	1100	3.74	34.432	27.38	4.17	58	1.83		
1	1300	3.05	34.512	27.51	3.76	51	1.85		
1	1500	2.69	34.591	27.61	3.72	50	1.97		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/45/63	5/3/63	1655 J	35 15 S	134 11 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
1307	18.0	20.0	18	5	16	6	8	6	18	2	18	4	1019.0	5	0	

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	19.16	35.880	25.67	5.26	104	0.08		
2	25	19.13	35.883	25.68	5.32	105	0.08		
2	50	18.98	35.878	25.71	5.24	103	0.12		
2	75	16.57	35.528	26.04	5.62	106	0.16		
2	100	14.08	35.308	26.43	5.80	103	0.22		
2	150	13.46	35.340	26.58	5.37	94	0.34		
2	200	13.01	35.316	26.65	5.38	94	0.37		
2	300	11.77	35.105	26.73	5.39	91	0.52		
1	495	9.02	34.683	26.89	5.41	86	0.94		
1	693	7.98	34.565	26.96	5.14	79	1.17		
1	891	5.09	34.422	27.23	4.43	64	1.57		
1	1089	3.82	34.417	27.36	4.09	57	1.82		
1	1188	3.38	34.462	27.44	3.90	54	1.85		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/46/63	5/3/63	2045 J	35 00 S	133 40 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
104	13.9	16.7	17	6	16	8	7	6	17	4	17	6	1022.0	20		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	19.00	35.834	25.68	5.24	103	0.06		
1	25	19.02	35.829	25.67	5.23	103	0.10		
1	50	18.98	35.831	25.68	5.18	102	0.14		
1	75	18.93	35.837	25.70	5.10	101	0.14		
1	100	16.53	35.495	26.02	5.66	106	0.21		
1	150	13.92	35.335	26.48	5.61	100	0.23		
1	200	13.16	35.252	26.57	5.41	95	0.34		
1	300	11.77	35.061	26.70	5.35	91	0.53		
1	500	9.07	34.687	26.88	5.41	86	0.99		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/47/63	5/3/63	2300 J	34 46 S	133 59 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
112	14.4	20.0	16	6	16	6	5	6	16	4	16	6	1022.4	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	18.78	35.799	25.71	5.35	105	0.10		
1	25	18.78	35.803	25.71	5.35	105	0.07		
1	50	18.72	35.807	25.73	5.31	104	0.13		
1	75	17.18	35.667	26.00	5.46	104	0.16		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/48/63	6/3/63	0100 J	34 32 S	134 18 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
93	13.9	17.2	16	5	16	6	5	6	16	5	16	6	1022.0	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	18.28	35.797	25.83	5.35	104	0.08		
1	25	18.26	35.796	25.84	5.35	104	0.12		
1	50	17.43	35.778	26.03	5.41	104	0.20		
1	80	16.36	35.666	26.19	5.59	105	0.20		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/49/63	6/3/63	0305 J	34 17 S	134 37 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
79	13.3	16.7	16	5	16	6	5	5	16	4	16	5	1021.5	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	17.31	35.625	25.94	5.58	106	0.12		
1	25	17.03	35.641	26.02	5.55	105	0.16		
1	50	14.39	35.438	26.46	5.51	99	0.23		
1	70	14.31	35.449	26.49	5.36	96	0.30		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/50/63	6/3/63	0540 J	34 00 S	135 00 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
64	13.9	16.7	16	4	16	6	8	5	16	2	20	3	1022.1	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	17.07	35.556	25.94	5.54	105	0.20		
1	25	16.98	35.579	25.98	5.64	107	0.19		
1	50	14.32	35.459	26.49	5.29	95	0.30		
1	56	14.29	35.458	26.50	5.19	93	0.35		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/51/63	6/3/63	0800 J	34 22 S	135 00 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
59	12.8	16.1	13	4	16	6	7	6	13	3	19	4	1023.5	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	17.15	35.588	25.95	5.69	108	0.11		
1	10	17.14	35.587	25.95	5.62	107	0.12		
1	20	14.45	35.453	26.46	5.52	99	0.23		
1	30	14.28	35.452	26.49	5.32	95	0.30		
1	40	14.18	35.483	26.54	5.00	89	0.34		
1	50	14.13	35.449	26.53	4.91	88	0.42		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/52/63	6/3/63	1030 J	34 44 S	135 00 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
64	13.0	16.0	14	4	16	6	8	7	14	2	18	4	1023.8	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	16.01	35.573	26.20	5.61	104	0.30		
1	25	15.77	35.566	26.25	5.62	104	0.22		
1	50	14.35	35.456	26.48	5.06	91	0.35		
1	60	14.34	35.456	26.48	5.02	90	0.38		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/53/63	6/3/63	1400 J	35 00 S	135 34 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
77	13.3	17.8	15	4	16	6	6	6	15	2	22	6	1024.5	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	16.38	35.779	26.28	5.59	105	0.12		
1	25	15.85	35.668	26.31	5.82	108	0.17		
1	50	14.32	35.450	26.48	5.44	98	0.27		
1	70	13.98	35.406	26.52	5.28	94	0.35		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/54/63	6/3/63	1550 J	35 13 S	135 18 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
97	13.3	17.8	15	4	16	5	7	6	15	2	22	7	1024.5	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	18.01	36.052	26.09	5.44	106	0.10		
1	25	18.01	36.058	26.10	5.29	103	0.13		
1	50	17.74	36.034	26.15	5.49	106	0.13		
1	70	14.45	35.444	26.45	5.64	101	0.23		
1	90	13.68	35.370	26.56	5.41	96	0.30		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/55/63	6/3/63	1750 J	35 26 S	135 00 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
115	13.0	19.0	16	4	16	8	4		16	3	22	6	1024.1	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	18.52	35.756	25.74	5.34	104	0.09		
1	25	18.51	35.760	25.74	5.36	105	0.11		
1	50	18.39	35.748	25.76	5.48	107	0.13		
1	75	15.39	35.446	26.25	5.67	104	0.14		
1	100	14.64	35.421	26.39	5.54	100	0.24		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/56/63	6/3/63	2000 J	35 39 S	134 42 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
2140	13.9	17.2	14	3	16	6	8	6	14	2	20	6	1025.0	0	0	

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	18.51	35.705	25.70	5.30	104	0.07		
2	25	18.46	35.708	25.72	5.30	103	0.06		
2	50	17.78	35.584	25.79	5.36	103	0.09		
2	75	15.03	35.355	26.26	5.87	107	0.11		
2	100	13.96	35.354	26.49	5.65	100	0.17		
2	150	13.44	35.343	26.59	5.65	99	0.24		
2	200	12.91	35.340	26.69	5.36	93	0.26		
2	300	11.01	35.283*	27.01	5.34	89	0.36		
1	500	8.84	34.650	26.89	4.90	77	0.89		
1	700	7.76	34.537	26.97	5.41	83	1.27		
1	900	5.58	34.426	27.17	4.39	64	1.64		
1	1100	3.73	34.424	27.38	4.06	56	1.71		
1	1300	3.03	34.507	27.51	3.82	52	1.77		
1	1500	2.71	34.577	27.60	3.73	50	1.76		

* PROPERTY DOUBTFUL

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/57/63	6/3/63	2235 J	35 59 S	134 13 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
3177	13.0	16.0	12	4	16	6	5	6	12	2	20	4	1027.0	5	15	

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	18.22	35.600	25.69	5.13	100	0.08		
2	25	18.21	35.602	25.70	5.30	103	0.08		
2	48	18.20	35.608	25.71	5.22	101	0.11		
2	71	15.79	35.365	26.09	5.61	104	0.13		
2	94	14.13	35.279	26.39	5.79	103	0.22		
2	141	13.16	35.261	26.58	5.38	94	0.28		
2	188	12.89	35.273	26.65	5.31	92	0.31		
2	282	11.48	35.057	26.75	5.38	91	0.46		
1	500	8.90	34.655	26.88	5.37	85	0.89		
1	700	7.84	34.548	26.96	4.90	75	1.09		
1	900	5.58	34.414	27.16	4.33	63	1.49		
1	1100	3.76	34.421	27.37	4.00	55	1.67		
1	1300	3.03	34.503	27.51	3.77	51	1.76		
1	1500	2.69	34.578	27.60	3.75	51	1.81		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/58/63	7/3/63	0400 J	36 18 S	134 48 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
4124	12.2	15.6	13	4	16	6	8	6	13	2	20	5	1025.0	0	0	

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	17.71	35.519	25.76	5.23	100	0.03		
2	25	17.70	35.525	25.77	5.30	102	0.11		
2	48	17.68	35.525	25.77	5.24	101	0.10		
2	72	15.91	35.322	26.03	5.86	108	0.12		
2	95	13.73	35.316	26.51	5.64	100	0.21		
2	188	13.27	35.393	26.66	5.37	94	0.28		
2	280	11.52	35.072	26.76	5.41	91	0.52		
1	497	8.90	34.674	26.90	5.36	85	0.87		
1	695	7.97	34.572	26.96	5.02	78	1.12		
1	893	5.88	34.453	27.16	4.34	64	1.45		
1	1092	3.97	34.433	27.36	4.33	60	1.69		
1	1290	3.11			3.76		1.89		
1	1488	2.73	34.592	27.61	3.62	49	1.76		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/59/63	7/3/63	0910 J	36 36 S	135 22 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
4506	16.1	17.8	11	4	16	6	5	6	11	3	21	5	1026.0	10	5	

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	17.90	35.591	25.77	5.20	100	0.06		
2	25	17.85	35.600	25.79	5.26	101	0.09		
2	50	17.83	35.590	25.78	5.30	102	0.13		
2	75	15.56	35.432	26.20	5.75	106	0.14		
2	100	13.97	35.342	26.48	5.87	104	0.17		
2	150	13.00	35.264	26.62	5.41	94	0.41		
2	198	12.71	35.270	26.68	5.41	94	0.40		
2	295	11.39	35.063	26.77	5.41	91	0.55		
1	482	9.04	34.654	26.86	5.37	85	0.95		
1	673	8.27	34.587	26.93	5.13	80	1.12		
1	865	6.46	34.468	27.09	4.39	65	1.33		
1	1056	4.36	34.411	27.30	4.16	59	1.54		
1	1250	3.34	34.476	27.46	3.86	53	1.79		
1	1443	2.78	34.572	27.59	3.66	49	2.01		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/60/63	7/3/63	1312 J	36 54 S	135 55 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
5121	13.0	17.0	11	3	16	6	8	6	11	2	21	4	1024.2	10	5	

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	16.97	35.315	25.78	5.45	103	0.09		
2	25	16.92	35.310	25.79	5.51	104	0.19		
2	50	16.91	35.347	25.82	5.54	105	0.18		
2	75	14.59	35.289	26.30	5.84	105	0.23		
2	100	13.41	35.216	26.49	5.50	97	0.33		
2	150	12.51	35.148	26.62	5.47	94	0.42		
2	200	11.75	35.062	26.70	5.54	94	0.53		
2	300	10.59	35.062	26.92	5.38	89	0.67		
1	490	8.94	34.661	26.88	5.52	87	0.97		
1	687	8.26	34.579	26.92	5.32	83	1.08		
1	882	6.52	34.467	27.09	4.45	66	1.45		
1	1077	4.29	34.408	27.31	4.18	59	1.72		
1	1270	3.26	34.475	27.46	3.92	54	1.85		
1	1457	2.77	34.561	27.58	3.74	51	1.97		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/61/63	7/3/63	1712 J	36 42 S	136 37 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
1771	13.0	16.0	12	4	16	6	5	6	12	2	22	4	1022.9	5	0	

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	17.37	35.512	25.84	5.55	106	0.11		
1	25	17.30	35.506	25.85	5.55	106	0.13		
1	50	16.91	35.505	25.94	5.45	103	0.31		
1	75	14.64	35.385	26.36	5.73	103	0.25		
1	100	13.96	35.389	26.51	5.50	98	0.30		
1	150	13.19	35.313	26.61	5.43	95	0.34		
1	200	12.97	35.319	26.66	5.50	96	0.36		
1	300	11.71	35.122	26.76	5.52	93	0.48		
2	495	9.15	34.697	26.88	5.49	87	1.18		
2	694	7.92	34.693	27.07	5.54	86	1.22		
2	892	5.74	34.549	27.25	5.10	75	1.59		
2	1090	3.81			4.15		1.80		
2	1286	3.00	34.521	27.52	3.82	52	1.84		
2	1482	2.69	34.591	27.61	3.70	50	1.91		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/62/63	7/3/63	1942 J	36 28 S	136 03 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
657	16.0	18.0	13	4	16	6	8	6	13	2	22	4	1022.9	10		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	17.45	35.499	25.81	5.40	103	0.06		
1	25	17.42	35.494	25.81	5.41	103	0.12		
1	50	16.96	35.510	25.93	5.47	104	0.14		
1	75	14.87	35.366	26.30	5.84	106	0.22		
1	100	13.93	35.346	26.49	5.61	100	0.24		
1	150	13.29	35.309	26.59	5.44	95	0.28		
1	200	13.15	35.334	26.64	5.41	95	0.37		
1	300	12.54	35.249	26.70	5.61	97	0.42		
1	500	9.06	34.683	26.88	5.41	86	0.91		
1	650	8.11	34.575	26.94	5.21	81	1.10		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/63/63	7/3/63	2320 J	35 50 S	136 02 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
117	14.4	16.7	10	4	16	8		8	10	4	22	4	1020.2	5		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	17.74	35.770	25.94	5.37	103	0.05		
1	25	17.76	35.799	25.96	5.32	103	0.12		
1	50	17.66	35.858	26.03	5.43	104	0.13		
1	60	17.58	35.846	26.04	5.44	104	0.14		
1	75	17.27	35.835	26.11	5.48	105	0.14		
1	100	14.30	35.448	26.49	5.45	98	0.21		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/64/63	8/3/63	0145 J	35 25 S	136 00 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
91	15.0	17.0	14	3	16		0	8	18	3			1018.0	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	17.73	35.867	26.02	5.30	102	0.05		
1	25	17.72	35.870	26.02	5.29	102	0.06		
1	50	15.03	35.485	26.36	5.58	102	0.12		
1	65	14.38	35.422	26.45	5.50	99	0.14		
1	80	13.71	35.366	26.55	5.35	95	0.14		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/65/63	8/3/63	0400 J	35 05 S	136 00 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
79	15.0	17.0	11	3	16			6	11	2			1018.0	5		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	17.07	36.026	26.30	5.38	102	0.04		
1	25	17.07	36.034	26.31	5.44	104	0.10		
1	50	14.73	35.608	26.52	5.24	95	0.25		
1	60	14.27	35.519	26.55	5.22	94	0.31		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/66/63	8/3/63	0610 J	35 00 S	136 20 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
44	16.0	17.0	10	3	16			6	10	3	18	1	1017.5	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	17.76	36.068	26.17	5.38	104	0.10		
1	10	17.75	36.077	26.18	5.58	108	0.05		
1	20	17.74	36.093	26.19	5.58	108	0.05		
1	30	17.88	36.124	26.18	5.38	104	0.12		
1	40	17.91	36.159	26.20	5.28	102	0.09		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/67/63	8/3/63	0757 J	34 45 S	136 32 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
40	16.0	19.0	07	3	16			6	07	3			1017.2	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	20.79	37.300	26.32	5.15	106	0.03		
1	10	20.78	37.318	26.34	5.32	110	0.04		
1	20	20.77	37.321	26.34	5.08	105	0.04		
1	30	20.77	37.321	26.34	4.86	100	0.05		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/68/63	8/3/63	0945 J	34 30 S	136 44 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
38			10	4	16		0	6	09	2				0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	21.34	37.779	26.53	4.79	100	0.03		
1	10	21.30	37.808	26.57	4.80	100	0.03		
1	20	20.31	37.811	26.84	5.06	104	0.03		
1	30	20.32	37.810	26.84	5.08	104	0.03		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/69/63	8/3/63	1130 J	34 15 S	136 56 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
35	16.7	20.0	04	3	16		0	6	07	1			1015.8	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	21.49	37.633	26.38	4.92	103	0.02		
1	10	21.38	37.631	26.41	4.92	103	0.02		
1	20	21.45	37.633	26.39	4.98	104	0.02		
1	33	21.45	37.752	26.48	4.74	99	0.02		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/70/63	8/3/63	1310 J	34 00 S	137 08 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
16	17.2	21.1	00	0	16		0	8	00	0	00	0	1014.0	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	21.61	38.144	26.74	4.83	102	0.02		
1	10	21.40	38.151	26.80	4.90	103	0.02		
1	15	21.44	38.153	26.79	4.88	102	0.02		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/71/63	8/3/63	1608 J	34 30 S	136 44 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
38	18.0	22.0	10	1	16			6					1012.0	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	21.80	37.514	26.20	5.10	107	0.03		
1	10	21.22	37.612	26.44	5.21	109	0.03		
1	20	21.19	37.697	26.51	5.00	104	0.03		
1	35	21.31	37.817	26.57	4.98	104	0.04		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/72/63	8/3/63	1820 J	34 53 S	136 56 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
48	20.0	21.0	09	1	16			6					1012.0	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	20.49			5.28		0.02		
1	10	19.78			5.21		0.02		
1	20	19.78			5.14		0.02		
1	30	19.81			5.00		0.02		
1	40	19.79			5.00		0.04		

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/73/63	8/3/63	1943 J	34 50 S	136 39 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
46	18.0	20.0			16	5	6	6					1012.6	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	20.65	37.052	26.17	5.08	104	0.09		
1	10	20.14	37.011	26.27	5.09	104	0.09		
1	20	20.19	37.049	26.29	5.04	103	0.11		
1	30	20.25	37.085	26.30	4.97	101	0.12		
1	40	20.40	37.180	26.33	4.97	102	0.14		

STATION	DATE	TIME	LATITUDE	LONGITUDE
02/74/63	8/3/63	2100 J	34 47 S	136 22 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
40					16	5	5	6						0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	21.02	37.197	26.18	4.99	103			
1	10	20.57	37.216	26.32	5.07	104			
1	20	20.58	37.286	26.37	4.93	101			
1	35	20.63	37.337	26.39	4.92	101			

STATION	DATE	TIME	LATITUDE	LONGITUDE
G2/75/63	8/3/63	2220 J	34 44 S	136 05 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
20	18.0	20.0			16	5	1	7					1013.0	0		

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	20.65			5.10				
1	18	20.28			4.97				

OCEANOGRAPHICAL CRUISE REPORTS

1. Oceanographical observations in the Indian Ocean in 1959. H.M.A.S. *Diamantina* Cruises Dm1/59 and Dm2/59.
2. Oceanographical observations in the Indian Ocean in 1960. H.M.A.S. *Diamantina* Cruise Dm1/60.
3. Oceanographical observations in the Indian Ocean in 1960. H.M.A.S. *Diamantina* Cruise Dm2/60.
4. Oceanographical observations in the Indian Ocean in 1960. H.M.A.S. *Diamantina* Cruise Dm3/60.
5. Oceanographical observations in the Pacific Ocean in 1960. H.M.A.S. *Gascoyne* Cruises G1/60 and G2/60.
6. Oceanographical observations in the Pacific Ocean in 1960. H.M.A.S. *Gascoyne* Cruise G3/60.
7. Oceanographical observations in the Indian Ocean in 1961. H.M.A.S. *Diamantina* Cruise Dm1/61.
8. Oceanographical observations in the Pacific Ocean in 1961. H.M.A.S. *Gascoyne* Cruise G1/61.
9. Oceanographical observations in the Indian Ocean in 1961. H.M.A.S. *Diamantina* Cruise Dm2/61.
10. Oceanographical observations in the Indian and Pacific Oceans in 1961. H.M.A.S. *Gascoyne* Cruise G2/61.
11. Oceanographical observations in the Indian Ocean in 1961. H.M.A.S. *Diamantina* Cruise Dm3/61.
14. Oceanographical observations in the Indian Ocean in 1962. H.M.A.S. *Diamantina* Cruise Dm1/62.
15. Oceanographical observations in the Indian Ocean in 1962. H.M.A.S. *Diamantina* Cruise Dm2/62.
17. Oceanographical observations in the Indian Ocean in 1962. H.M.A.S. *Gascoyne* Cruise G4/62.
18. Oceanographical observations in the Indian Ocean in 1962. H.M.A.S. *Diamantina* Cruise Dm3/62.
19. Oceanographical observations in the Pacific Ocean in 1962. H.M.A.S. *Gascoyne* Cruise G5/62.
20. Oceanographical observations in the Indian Ocean in 1962. H.M.A.S. *Diamantina* Cruise Dm4/62.
21. Oceanographical observations in the Indian Ocean in 1963. H.M.A.S. *Gascoyne* Cruise G1/63.
22. Oceanographical observations in the Indian Ocean in 1963. H.M.A.S. *Gascoyne* Cruise G2/63.
23. Oceanographical observations in the Indian Ocean in 1963. H.M.A.S. *Diamantina* Cruise Dm1/63.
24. Oceanographical observations in the Indian Ocean in 1963. H.M.A.S. *Diamantina* Cruise Dm2/63.
25. Oceanographical observations in the Indian Ocean in 1963. H.M.A.S. *Diamantina* Cruise Dm3/63.