OCEANOGRAPHICAL OBSERVATIONS
IN THE PACIFIC OCEAN IN 1964
H.M.A.S. *GASCOYNE*
Cruise G 4/64

OCEANOGRAPHICAL CRUISE REPORT NO. 39

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

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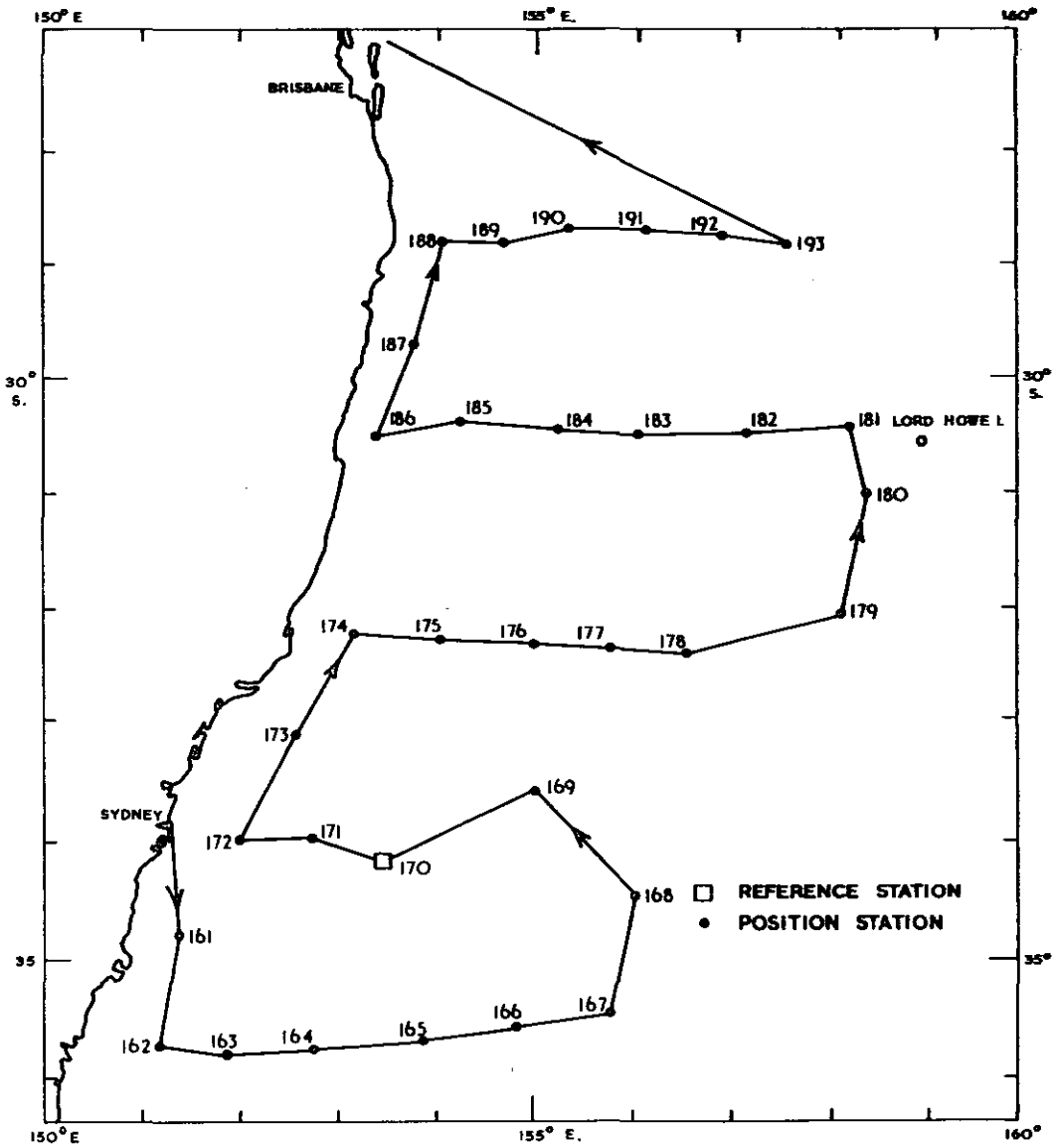

Fig. 1.- Track chart

OCEANOGRAPHICAL CRUISE REPORT

No. 39

Oceanographical Observations in the Pacific Ocean in 1964

H.M.A.S. Gascoyne

Cruise G4/64

August 3-13, 1964

I. INTRODUCTION

This report records the data collected during the fourth cruise in 1964 of H.M.A.S. Gascoyne, Royal Australian Navy oceanographical frigate.

Objective

To study the physical and chemical structure of the water in the East Australian Current system.

Itinerary

The cruise began at Sydney on August 3, worked two stations south to about 34°S., then five east-west sections north to Brisbane where the cruise ended on August 13 (Fig. 1).

Scientific Personnel

F. de Castillejo (Cruise Leader)
G. Agafonoff
N. Dyson
K. Fleming
J. Kerr, Division of Mathematical Statistics
A. Stark, Division of Mathematical Statistics

The analyses of hydrological samples were done in the ship's laboratory by Messrs Dyson and Fleming. Nitrate analyses were done at Cronulla by Mr Prothero. GEK observations were made aboard by Messrs Castillejo and Agafonoff.

The data were processed, under the direction of Mr Hedge, by Mrs Bailey, Miss Hammond, Mrs Sander, and Miss Wanstall. The track chart was prepared by Mr Breach.

II. WORK ACCOMPLISHED

Thirty-three stations were worked (G4/161/64-G4/193/64). Bathythermograph casts were made at 32 stations. Surface hydrology samples were collected at 7 stations, and surface and subsurface samples at 26 stations. A GEK zero check was made at 31 stations.

TABLE 1

WORK DONE AT EACH STATION

Station Number	BT	Hydrology		GEK Zero
		Surface	Surface to Depth (m)	
161	+	+		+
162	+		2400	+
163	+		2500	+
164	+		2200	+
165	+		2500	+
166	+	+		+
167	+		2400	
168	+	+		
169	+		2500	+
170	+		4500	+
171	+		2500	+
172	+		1500	+
173	+	+		+
174	+		2000	+
175	+		2500	+
176	+		2400	+
177	+		2500	+
178	+		2500	+
179	+		2200	+
180	+	+		+
181	+		2000	+
182	+		2500	+
183	+		2500	+
184	+		2200	+
185	+		2500	+
186	+		1300	+
187	+	+		+
188	+		2300	+
189	+		2500	+
190	+	+		+
191	+		2500	+
192			1500	+
193	+		2500	+

III. METHOD OF COLLECTION AND ANALYSIS OF SAMPLES

1. Physics

Temperature.- Water temperatures were taken with deep-sea reversing thermometers; protected thermometers with a range of -2° to 30°C, and unprotected thermometers with a range of -2° to 30°C or -4° to 60°C. The accuracy of the temperatures is considered to be ± 0.03 degC.

GEK.- The circuit and method of use were the same as given in CSIRO Aust. (1963). A course change lasting 4 min was made every hour, to obtain the total surface current.

Bathythermograms.- A 900 ft bathythermograph was used at each of the stations indicated in Table 1. Slides were digitized according to the method of the U.S. National Oceanographic Data Centre (1964) and the results transferred to punched cards.

Thermometric Depth.- Depth calculations were made by the method described by Pollak (1950), and are considered accurate to ± 15 m at depths greater than 1000 m, and to 1% above that depth.

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

2. Chemistry

Salinity.- Salinity was measured on board with 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 version by Jacobsen, Robinson, and Thompson (1950). Potassium iodate was used at 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) -

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

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 min of adding reagents, and completed within 10 min. At air temperatures greater than 25°C, batches of 6 were analysed; readings were begun within 5 min of adding reagents and completed within 7 min. 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.

Total Phosphorus.- 100 ml samples were drawn from the Nansen bottles into 150 ml Pyrex conical flasks, 0.2 ml of 72% v/v perchloric acid was added and digestion at 200°-250°C carried out immediately on a sand tray. After evaporation of water, heating was continued until fuming of the salt residue commenced. The samples were then allowed to cool and 100 ml of distilled water and 2 drops of 2% w/v phenolphthalein were added. If alkaline, perchloric acid was added until a slight acidity persisted. The flasks were allowed to stand for about 24 hr to allow the salts to dissolve. Phosphate was then determined as described above for inorganic phosphate. Results are given as µg-atom/l, without salt correction. To correct for salt effects, the results given can be multiplied by 1.15.

Nitrate.- After collection, water samples were stored in plastic bottles and preserved with 2 drops of saturated $HgCl_2$. Nitrate was determined at Cronulla by the strychnidine method (Rochford 1947). The reagent was prepared by the addition of 0.64 g strychnidine to a litre of nitrate-free sulphuric acid. 5 ml of this reagent were added, with minimum agitation, to 5 ml seawater or standard nitrate solution. The standards were made up in a mixture of equal volumes of artificial seawater and nitrate-free sulphuric acid. The standards and samples were shaken to distribute the reagent, and the colour developed for 2 hr. The solutions were read in a Unicam SP 600 spectrophotometer at a wavelength of 530 mµ using a 5 mm cell. Samples with

an absorbance greater than that of the standard corresponding to 14.4 µg-atom/l were diluted with artifical seawater - sulphuric acid mixture before reading. Results are given in µg-atom/l.

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IV. DATA SHEETS

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

DATA

PART 1

HYDROLOGY

SURFACE SAMPLES

EXPLANATION OF HEADINGS

Parts 1 and 2	Hydrology
STATION	Gives the station identification. For example, G3/116/64 signifies the 116th station worked by Gascoyne in 1964, on her 3rd 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 Eastern Australian Standard Time, G.M.T. + 10 hr, Code K.
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)

BAROM., and ATMOS. PRESSURE	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, TOTAL P, and NITRATE	Given in µg-atom/l
* and ***	Indicate no data available

VESSEL	CRUISE	STATION NUMBER	YR.	MTH.	DAY	TIME Z	LATITUDE	LONGITUDE	TEMP.	SALINITY	WIND DN.	WIND AMT.	SEA DN.	SEA AMT.	SWELL DN.	SWELL AMT.	WEA.	VIS.	BAROM.
20	4	161	64	8	3	1900	K 34 50	S 151 24	E		30	5	28	4	27	1	01	7	1015.1
20	4	162	64	8	4	0040	K 35 45	S 151 10	E 16.9	35,60	29	5	29	3	24	1	01	8	1013.5
20	4	163	64	8	4	0606	K 35 48	S 151 52	E 17.8	35.63	19	3	19	2	18	4	01	8	1016.0
20	4	164	64	8	4	1350	K 35 46	S 152 43	E 17.3	35.62	36	4	00	2	18	4	01	8	1013.5
20	4	165	64	8	4	2115	K 35 42	S 153 52	E 16.3	35,55	33	4	31	3	30	1	01	7	1010.5
20	4	166	64	8	5	0350	K 35 35	S 154 49	E		31	4	31	3	34	1	01	8	1009.5
20	4	167	64	8	5	1000	K 35 27	S 155 46	E 15.8	35.52	31	7	30	5	32	4	00	8	1014.0
20	4	168	64	8	5	1546	K 34 31	S 156 03	E		31	8	31	4	31	4	00	7	999.0
20	4	169	64	8	6	0600	K 33 35	S 155 01	E 19.0	35.59	21	7	21	3	24	4	02	7	1011.5
20	4	170	64	8	6	1657	K 34 10	S 153 29	E 18.1	35,61	19	2	19	2	21	4	01	8	1015.5
20	4	171	64	8	7	0100	K 33 59	S 152 44	E 19.4	35.59	00	0			20	1	00	8	1018.0
20	4	172	64	8	7	0645	K 34 00	S 152 00	E 16.5	35,63	15	2	15	2	13	1	01	7	1018.0
20	4	173	64	8	7	1330	K 33 07	S 152 33	E		28	2	28	2	17	1		8	1017.0
20	4	174	64	8	7	1935	K 32 15	S 153 12	E 20.2	35,56	34	4	34	2	20	1	01	7	1017.0
20	4	175	64	8	8	0038	K 32 17	S 154 05	E 20.6	35.57	36	3	00	2	19	1	03	7	1016.0
20	4	176	64	8	8	0700	K 32 20	S 155 02	E 19.8	35.59	35	1	00	2	03	1	03	7	1014.0
20	4	177	64	8	8	1140	K 32 21	S 155 49	E 19.8	35.60	25	2	28	2	35	1	00	7	1013.5
20	4	178	64	8	8	1728	K 32 24	S 156 37	E 19.5	35,60	31	2	31	2	34	1	01	8	1014.0
20	4	179	64	8	9	0100	K 32 04	S 158 11	E 17.5	35.57	31	3	31	3	35	1	00	8	1008.0
20	4	180	64	8	9	0715	K 31 02	S 158 27	E		32	6	32	4			00	8	1009.0
20	4	181	64	8	9	1042	K 30 27	S 158 19	E 19.2	35.58	33	6	33	3	33	4		8	1008.4
20	4	182	64	8	9	1711	K 30 29	S 157 13	E 19.9	35.61	23	7	23	5	27	4	00	7	1010.0
20	4	183	64	8	10	0230	K 30 29	S 156 06	E 19.8	35.63	25	8	24	5	23	4	01	8	1014.0
20	4	184	64	8	10	0645	K 30 28	S 155 19	E 20.5	35.58	24	3	24	2	21	4	01	8	1016.0
20	4	185	64	8	10	1235	K 30 24	S 154 19	E 20.6	35.58	23	2	24	2	22	4	00	8	1016.5
20	4	186	64	8	10	1815	K 30 32	S 153 26	E 19.5	35.54	36	4	10	3	18	4	00	8	1014.0
20	4	187	64	8	11	0133	K 29 43	S 153 49	E		25	3	25	2	18	1		7	1015.0
20	4	188	64	8	11	0730	K 28 49	S 154 06	E 21.2	35.51	23	5	23	3	19	4	01	9	1015.0
20	4	189	64	8	11	1245	K 28 49	S 154 44	E 20.8	35,55	26	4	25	2	22	1	00	8	1012.0
20	4	190	64	8	11	1730	K 28 41	S 155 27	E		30	2	23	2	22	1	00	8	1012.0
20	4	191	64	8	11	2115	K 28 42	S 156 14	E 19.0	35.59	26	4	25	3	24	1	01	8	1012.5
20	4	192	64	8	12	0130	K 28 46	S 157 00	E 19.0	35.61	27	7	26	4	24	4	01	8	1010.5
20	4	193	64	8	12	0500	K 28 49	S 157 41	E 18.7	35.60	24	8	23	4	22	4	00	8	1011.0

DATA

PART 2

HYDROLOGY

DEEP STATIONS

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 162/64	4/ 8/64	0040 K	35 45 S	151 10 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
4755	12.5	16.1	29	5	11	6	7	8	29	3	24	1	1013.5	5	5	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	16.91	35.597	26.01	5.14	97	0.33	***	***
2	24	16.92	35.598	26.01	5.13	97	0.36	***	***
2	48	16.92	35.599	26.01	5.14	97	0.34	***	***
2	71	16.91	35.597	26.01	5.13	97	0.33	***	***
2	95	16.88	35.595	26.02	5.17	98	0.36	***	***
2	191	16.11	35.561	26.17	5.03	94	0.37	***	***
2	286	14.30	35.327	26.39	4.44	80	0.67	***	***
2	477	10.62	34.905	26.79	4.43	73	1.01	***	***
2	667	8.26	34.618	26.96	4.46	69	1.35	***	***
1	830	7.30	34.537	27.03	4.31	66	1.55	***	***
1	1015	5.76	34.470	27.19	4.19	61	1.70	***	***
1	1201	4.54	34.486	27.34	3.90	55	1.79	***	***
1	1388	3.75	34.526	27.46	3.67	51	1.87	***	***
1	1869	2.57	34.642	27.66	3.66	49	2.01	***	***
1	2354	2.09	34.712	27.76	4.01	53	1.81	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 163/64	4/ 8/64	0606 K	35 48 S	151 52 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
4682	13.9	16.7	19	3	11	4	5	8	19	2	18	4	1016.0	5	5	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	17.77	35.628	25.83	5.13	99	0.35	***	***
2	25	17.75	35.626	25.83	5.13	99	0.33	***	***
2	50	17.80	35.626	25.82	5.13	99	0.36	***	***
2	75	17.79	35.627	25.82	5.08	98	0.35	***	***
2	100	17.80	35.627	25.82	5.08	98	0.31	***	***
2	150	17.80	35.628	25.82	5.08	98	0.35	***	***
2	200	17.82	35.626	25.81	5.10	98	0.31	***	***
2	300	17.14	35.559	25.93	4.77	91	0.39	***	***
2	500	11.93	35.126	26.72	4.72	80	0.81	***	***
1	656	9.93	34.820	26.84	4.67	76	1.02	***	***
1	850	7.17	34.528	27.04	4.30	65	1.51	***	***
1	1047	5.59	34.469	27.21	4.19	61	1.79	***	***
1	1244	4.41	34.490	27.36	3.84	54	1.86	***	***
1	1443	3.45	34.555	27.51	3.60	50	***	***	***
1	1939	2.37	34.673	27.70	3.78	51	1.99	***	***
1	2442	2.05	34.718	27.76	4.10	54	1.95	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 154/64	4/ 8/64	1350 K	35 46 S	152 43 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
4718	17.2	18.3	36	4	11	0	3	8	00	2	18	4	1013.5	*	5	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	17.32	35.624	25.93	5.20	99	0.29	***	***
2	24	17.27	35.620	25.94	5.19	99	0.31	***	***
2	47	17.29	35.620	25.94	5.20	99	0.29	***	***
2	71	17.26	35.617	25.94	5.17	99	0.32	***	***
2	94	17.20	35.614	25.96	5.20	99	0.31	***	***
2	131	16.34	35.518	26.08	4.74	89	0.42	***	***
2	179	15.39	35.452	26.25	4.72	87	0.52	***	***
2	264	13.88	35.381	26.52	5.07	90	0.54	***	***
2	446	12.68	35.332	26.73	5.08	88	0.60	***	***
1	550	11.75	35.193	26.80	5.03	85	0.70	***	***
1	723	8.36	34.627	26.95	5.13	80	1.24	***	***
1	903	6.59	34.492	27.10	4.25	63	1.64	***	***
1	1086	5.14	34.463	27.26	4.00	58	1.66	***	***
1	1271	4.15	34.499	27.39	3.81	53	1.88	***	***
1	1738	2.68	34.629	27.64	3.66	49	2.02	***	***
1	2213	2.16	34.709	27.75	4.02	53	1.88	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 165/64	4/ 8/64	2115 K	35 42 S	153 52 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
4755	14.2	17.2	33	4	11	0	8	7	31	3	30	1	1010.5	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	16.29	35.546	26.12	5.13	96	0.45	***	***
2	25	16.29	35.547	26.12	5.14	96	0.44	***	***
2	50	16.30	35.554	26.12	5.11	95	0.43	***	***
2	75	15.60	35.471	26.22	4.81	89	0.48	***	***
2	100	15.60	35.522	26.26	5.25	97	0.42	***	***
2	150	14.96	35.433	26.33	4.89	89	0.49	***	***
2	200	13.65	35.268	26.49	4.67	82	0.70	***	***
2	300	11.84	35.096	26.71	4.67	79	0.83	***	***
2	500	8.99	34.701	26.90	4.52	72	1.23	***	***
1	700	7.10	34.528	27.05	4.33	65	1.51	***	***
1	900	5.63	34.477	27.21	4.13	60	1.76	***	***
1	1100	4.52	34.481	27.34	3.96	56	1.85	***	***
1	1300	3.62	34.530	27.47	3.66	51	1.93	***	***
1	1500	3.04	34.590	27.58	3.56	48	2.04	***	***
1	2000	2.32	34.679	27.71	3.84	51	1.96	***	***
1	2500	1.97	34.725	27.78	4.19	55	1.87	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 167/64	5/ 8/64	1000 K	35 27 S	155 46 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
4673	13.9	17.2	31	7	11	*	0	8	30	5	32	4	1014.0	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	15.83	35.522	26.21	5.42	100	0.28	***	***
2	24	15.83	35.522	26.21	5.39	100	0.31	***	***
2	48	15.84	35.520	26.20	5.32	98	0.31	***	***
2	72	15.72	35.511	26.22	5.33	98	0.33	***	***
2	96	15.63	35.504	26.24	5.37	99	0.33	***	***
2	144	15.43	35.472	26.26	5.24	96	0.39	***	***
2	192	13.50	35.242	26.50	4.38	77	0.74	***	***
2	288	11.43	35.018	26.73	4.43	74	0.96	***	***
2	480	8.82	34.674	26.91	4.59	72	1.33	***	***
1	667	7.43	34.549	27.02	4.37	67	1.51	***	***
1	858	5.95	34.476	27.17	4.20	62	1.81	***	***
1	1048	4.68	34.471	27.31	3.99	57	1.93	***	***
1	1239	3.72	34.520	27.46	3.66	51	1.73	***	***
1	1430	3.14	34.577	27.56	3.45	47	2.20	***	***
1	1907	2.37	34.668	27.70	3.16	42	2.02	***	***
1	2383	1.99	34.721	27.77	4.13	55	1.99	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 169/64	6/ 8/64	0600 K	33 35 S	155 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
4755	12.8	17.2	21	7	11	8	5	7	21	3	24	4	1011.5	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	19.01	35.586	25.49	4.83	95	0.25	***	***
1	25	19.02	35.594	25.49	4.94	97	0.23	***	***
1	50	19.03	35.590	25.48	4.93	97	0.22	***	***
1	75	19.03	35.593	25.49	4.90	97	0.21	***	***
1	100	19.03	35.589	25.48	4.99	98	0.24	***	***
1	150	19.02	35.589	25.48	4.84	95	0.20	***	***
1	200	19.02	35.589	25.48	5.02	99	0.23	***	***
1	300	18.95	35.584	25.50	4.73	93	0.25	***	***
1	500	14.92	35.348	26.28	4.03	73	0.63	***	***
2	700	10.09	34.839	26.83	4.40	72	0.96	***	***
2	900	7.53	34.564	27.02	4.24	65	1.41	***	***
2	1100	5.97	34.482	27.17	4.12	61	1.67	***	***
2	1300	4.71	34.483	27.32	3.85	55	1.77	***	***
2	1500	3.70	34.532	27.47	3.59	50	2.03	***	***
2	2000	2.48	34.658	27.68	3.76	50	1.99	***	***
2	2500	2.05	34.709	27.76	4.04	54	1.92	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 170/64	6/ 6/64	1657 K	34 10 S	153 29 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
4709	13.3	14.4	19	2	11	6	2	8	19	2	21	4	1015.5	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
3	0	18.05	35.612	25.75	5.07	98	0.30	0.44	1.9
3	25	17.10	35.615	25.98	5.25	100	0.27	***	2.0
3	50	16.90	35.617	26.03	5.27	100	0.28	0.43	2.8
3	75	16.84	35.613	26.04	5.30	100	0.32	***	1.9
3	100	16.75	35.614	26.06	5.28	100	0.31	0.46	2.0
2	150	16.65	35.607	26.08	5.24	99	0.33	***	1.7
2	200	16.63	35.603	26.08	5.29	100	0.33	0.51	2.4
2	300	13.98	35.306	26.44	4.54	81	0.68	0.79	6.0
2	500	10.34	34.893	26.83	4.86	80	0.94	1.14	14.1
2	700	7.90	34.580	26.98	4.41	68	1.46	1.48	22.2
2	900	6.28	34.477	27.13	4.26	63	1.65	2.28	26.5
2	1100	4.98	34.466	27.28	4.04	58	1.78	2.22	29.3
1	1300	3.96	34.520	27.43	3.64	51	1.94	2.11	32.2
1	1500	3.24	34.568	27.54	3.53	48	2.11	2.24	32.4
1	2000	2.38	34.675	27.70	3.77	50	2.00	2.24	32.4
1	2500	1.98	34.725	27.77	4.07	54	1.92	2.08	32.4
1	3000	1.59	34.740	27.82	4.33	57	2.03	2.30	31.5
1	3485	1.27	34.727	27.83	4.39	57	2.01	2.21	31.5
1	3980	1.17	34.725	27.83	4.44	57	2.00	2.10	31.1
1	4475	1.16	34.721	27.83	4.56	59	1.91	2.25	33.1

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 171/64	7/ 8/64	0100 K	33 59 S	152 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
4709	13.9	15.6	00	0	11	*	0	8	*	*	20	1	1018.0	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	19.38	35.590	25.39	5.01	99	0.23	***	***
2	25	19.34	35.590	25.40	5.02	100	0.23	***	***
2	50	19.29	35.590	25.41	5.01	99	0.23	***	***
2	75	19.17	35.598	25.45	4.90	97	0.24	***	***
2	100	19.07	35.622	25.50	4.91	97	0.24	***	***
2	150	17.90	35.555	25.74	4.22	81	0.46	***	***
2	200	16.53	35.461	26.00	4.15	78	0.60	***	***
2	300	14.09	35.249	26.38	4.20	75	0.79	***	***
2	500	10.12	34.832	26.82	4.38	71	1.16	***	***
1	700	8.03	34.592	26.97	4.48	69	1.45	***	***
1	900	6.47	34.492	27.11	4.30	64	1.67	***	***
1	1100	4.92	34.470	27.29	4.02	58	1.85	***	***
1	1300	3.92	34.509	27.43	3.65	51	1.87	***	***
1	1500	3.28	34.562	27.53	3.53	48	2.15	***	***
1	2000	2.38	34.666	27.70	3.73	50	2.05	***	***
1	2500	1.96	34.722	27.77	4.10	54	1.95	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 172/64	7/ 8/64	0645 K	34 00 S	152 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
1866	14.4	16.7	15	2	11	4	3	7	15	2	13	1	1018.0	5	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	16.52	35.625	26.13	5.36	101	0.24	***	***
1	25	16.33	35.601	26.15	5.41	101	0.28	***	***
1	50	15.99	35.560	26.20	5.36	100	0.34	***	***
1	75	15.85	35.543	26.22	5.34	99	0.34	***	***
1	100	15.51	35.497	26.26	5.40	99	0.35	***	***
1	150	14.82	35.501	26.42	5.30	96	0.40	***	***
1	200	14.27	35.473	26.51	5.40	97	0.44	***	***
1	300	11.54	35.020	26.71	4.42	74	0.93	***	***
1	500	8.78	34.671	26.92	4.61	73	1.26	***	***
1	700	7.25	34.531	27.04	4.32	66	1.55	***	***
1	900	6.10	34.476	27.15	4.23	62	1.70	***	***
1	1100	4.92	34.470	27.29	3.99	57	1.78	***	***
1	1300	3.81	34.521	27.45	3.67	51	1.92	***	***
1	1500	3.14	34.576	27.56	3.55	48	2.13	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 174/64	7/ 8/64	1935 K	32 15 S	153 12 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
2268	11.1	17.8	34	4	11	8	2	7	34	2	20	1	1017.0	5	5	*

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRATE
2	0	20.15	35.565	25.17	5.04	101	0.27	***	***
2	25	20.07	35.573	25.20	4.97	100	0.27	***	***
2	50	18.71	35.555	25.54	4.53	89	0.39	***	***
2	75	17.70	35.544	25.78	4.10	79	0.53	***	***
2	100	17.01	35.508	25.92	4.16	79	0.60	***	***
2	150	14.96	35.335	26.26	4.21	76	0.69	***	***
2	200	13.63	35.224	26.45	4.28	76	0.78	***	***
2	300	11.93	35.045	26.66	4.38	74	0.97	***	***
2	500	9.11	34.718	26.90	4.55	72	1.25	***	***
1	700	7.30	34.540	27.03	4.38	67	1.45	***	***
1	900	5.80	34.475	27.18	4.27	63	1.73	***	***
1	1100	4.58	34.486	27.34	3.90	55	1.88	***	***
1	1300	3.74	34.532	27.46	3.61	50	2.04	***	***
1	1500	3.04	34.586	27.57	3.53	48	2.08	***	***
1	2000	2.31	34.679	27.71	3.87	52	1.99	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 175/64	8/ 8/64	0038 K	32 17 S	154 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
4636	13.3	18.3	36	3	11	6	8	7	00	2	19	1	1016.0	*	*	*

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRATE
2	0	20.56	35.572	25.07	4.83	98	0.24	***	***
2	25	20.56	35.591	25.08	4.99	101	0.21	***	***
2	50	20.59	35.589	25.07	4.93	100	0.25	***	***
2	75	20.57	35.591	25.08	4.90	99	0.25	***	***
2	100	20.56	35.586	25.08	4.87	99	0.24	***	***
2	150	19.19	35.593	25.44	4.29	85	0.38	***	***
2	200	18.37	35.585	25.64	4.30	84	0.45	***	***
2	300	16.52	35.473	26.01	4.18	78	0.57	***	***
2	500	11.18	34.951	26.72	4.29	72	1.01	***	***
1	700	8.47	34.638	26.94	4.31	67	1.41	***	***
1	900	6.58	34.503	27.11	4.26	64	1.63	***	***
1	1100	5.16	34.470	27.26	3.95	57	1.70	***	***
1	1300	4.13	34.506	27.40	3.74	52	1.95	***	***
1	1500	3.39	34.558	27.52	3.49	48	2.05	***	***
1	2000	2.44	34.654	27.68	3.59	48	2.05	***	***
1	2500	2.00	34.712	27.76	4.06	54	1.96	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 176/64	8/ 8/64	0700 K	32 20 S	155 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
4755	10.6	16.7	35	1	11	6	8	7	00	2	03	1	1014.0	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	19.84	35.589	25.27	4.98	100	0.26	***	***
2	25	19.74	35.626	25.33	4.99	100	0.24	***	***
2	50	19.45	35.619	25.40	5.04	100	0.24	***	***
2	75	19.36	35.608	25.41	5.04	100	0.23	***	***
2	100	19.22	35.611	25.45	4.98	99	0.24	***	***
2	150	18.93	35.593	25.51	4.49	88	0.33	***	***
2	200	18.20	35.565	25.67	4.32	84	0.45	***	***
2	300	15.93	35.408	26.09	4.14	77	0.66	***	***
2	500	11.14	34.964	26.74	4.39	73	1.00	***	***
1	648	9.68	34.778	26.85	4.35	70	1.20	***	***
1	837	7.46	34.560	27.03	4.25	65	1.54	***	***
1	1027	5.88	34.479	27.18	4.04	59	1.81	***	***
1	1220	4.72	34.482	27.32	3.88	55	1.98	***	***
1	1405	3.86	34.527	27.45	3.65	51	2.05	***	***
1	1907	2.57	34.645	27.66	3.59	48	2.10	***	***
1	2404	2.10	34.701	27.75	3.95	52	1.91	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 177/64	8/ 8/64	1140 K	32 21 S	155 49 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
4645	11.7	17.8	25	2	11	*	*	7	28	2	35	1	1013.5	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	19.83	35.604	25.28	4.98	100	0.22	***	***
2	25	19.83	35.618	25.30	4.93	99	0.21	***	***
2	50	19.86	35.621	25.29	4.93	99	0.20	***	***
2	75	19.82	35.619	25.30	4.89	98	0.21	***	***
2	100	19.75	35.608	25.31	4.87	97	0.23	***	***
2	150	19.71	35.601	25.31	4.77	95	0.23	***	***
2	200	19.14	35.594	25.46	4.41	87	0.37	***	***
2	300	17.03	35.503	25.91	4.12	78	0.57	***	***
2	500	12.49	35.117	26.60	4.35	75	0.89	***	***
1	700	10.09	34.830	26.82	4.40	72	1.23	***	***
1	900	7.59	34.560	27.01	4.29	66	1.51	***	***
1	1100	5.85	34.478	27.18	4.13	61	1.78	***	***
1	1300	4.54	34.481	27.34	4.44	63	1.95	***	***
1	1500	3.73	34.527	27.46	3.60	50	2.06	***	***
1	2000	2.52	34.647	27.67	3.61	48	2.08	***	***
1	2500	2.07	34.711	27.76	3.99	53	2.06	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 178/64	8/ 8/64	1728 K	32 24 S	156 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
4459	9.4	14.4	31	2	11	8	1	8	31	2	34	1	1014.0	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	19.47	35.601	25.38	4.98	99	0.29	***	***
2	25	19.30	35.595	25.42	4.99	99	0.29	***	***
2	50	19.16	35.588	25.45	4.93	97	0.33	***	***
2	75	19.07	35.584	25.47	4.87	96	0.31	***	***
2	100	19.06	35.587	25.47	4.93	97	0.31	***	***
2	150	18.98	35.587	25.49	4.91	97	0.31	***	***
2	200	18.81	35.588	25.54	4.70	92	0.37	***	***
2	300	17.41	35.539	25.85	4.24	81	0.55	***	***
2	500	12.92	35.156	26.55	4.34	75	0.88	***	***
1	700	9.57	34.758	26.86	4.45	72	1.23	***	***
1	900	7.46	34.551	27.02	4.35	66	1.57	***	***
1	1100	5.84	34.474	27.18	4.18	61	1.77	***	***
1	1300	4.51	34.488	27.35	3.89	55	1.96	***	***
1	1500	3.65	34.534	27.47	3.61	50	2.13	***	***
1	2000	2.44	34.660	27.68	3.60	48	2.12	***	***
1	2500	2.01	34.718	27.77	4.05	54	2.00	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 179/64	9/ 8/64	0100 K	32 04 S	158 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
3942	8.3	15.0	31	3	11	*	0	8	31	3	35	1	1008.0	*	*	*

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRATE
2	0	17.50	35,570	25,85	5.16	99	0.34	***	***
2	24	17.20	35,575	25,92	5.17	98	0.34	***	***
2	49	16.47	35,555	26,08	5.16	97	0.39	***	***
2	73	16.35	35,536	26,10	5.06	95	0.38	***	***
2	97	16.28	35,537	26,11	5.00	93	0.39	***	***
2	145	15.77	35,530	26,22	5.36	99	0.36	***	***
2	196	14.79	35,334	26,29	4.29	78	0.67	***	***
2	294	13.57	35,276	26,51	4,55	80	0,73	***	***
2	490	10.57	34.919	26,81	4,83	80	0.96	***	***
1	596	8.90	34,672	26,90	4,99	79	1.17	***	***
1	769	7.39	34,539	27,02	4,44	68	1,52	***	***
1	940	5.96	34,473	27,16	4,18	61	1,71	***	***
1	1116	4,81	34,474	27,30	4,02	57	1,82	***	***
1	1293	3.97	34,513	27,42	3,66	51	1,92	***	***
1	1726	2.65	34,632	27,65	3,60	49	2,02	***	***
1	2220	2.16	34,698	27,74	4,01	53	1,91	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 181/64	9/ 8/64	1042 K	30 27 S	158 19 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
***	15.6	16.7	33	6	11	4	2	8	33	3	33	4	1008.4	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	19.19	35.578	25.43	4.99	99	0.27	***	***
2	25	19.19	35.599	25.45	5.00	99	0.30	***	***
2	50	19.19	35.597	25.45	4.95	98	0.31	***	***
2	75	19.18	35.593	25.45	4.93	97	0.31	***	***
2	100	19.17	35.591	25.45	4.97	98	0.28	***	***
2	150	18.90	35.599	25.52	4.96	98	0.31	***	***
2	200	18.72	35.603	25.57	4.99	98	0.31	***	***
2	300	16.31	35.460	26.05	4.31	81	0.60	***	***
2	500	11.66	35.046	26.71	4.48	76	0.96	***	***
1	690	8.57	34.648	26.93	4.57	72	1.31	***	***
1	887	6.69	34.501	27.09	4.24	63	1.65	***	***
1	1085	5.08	34.475	27.27	3.96	57	2.00	***	***
1	1282	4.19	34.515	27.40	3.78	53	2.00	***	***
1	1479	3.35	34.570	27.53	3.54	49	2.21	***	***
1	1972	2.45	34.658	27.68	3.55	48	2.13	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 182/64	9/ 8/64	1711 K	30 29 S	157 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
2871	8.9	17.8	23	7	11	*	0	7	23	5	27	4	1010.0	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	19.90	35.614	25.27	5.05	101	0.26	***	***
2	25	19.92	35.626	25.28	4.98	100	0.22	***	***
2	50	19.91	35.621	25.28	5.04	101	0.23	***	***
2	75	19.89	35.621	25.28	4.96	99	0.21	***	***
2	100	19.80	35.590	25.28	4.94	99	0.22	***	***
2	150	19.08	35.579	25.46	4.79	95	0.30	***	***
2	200	18.58	35.564	25.58	4.47	87	0.42	***	***
2	300	16.83	***	***	5.00	***	0.39	***	***
2	500	12.99	***	***	4.37	***	0.91	***	***
1	700	9.25	34.728	26.88	4.38	70	1.29	***	***
1	900	7.08	34.535	27.06	4.33	65	1.59	***	***
1	1100	5.42	34.471	27.23	4.12	60	1.70	***	***
1	1300	4.30	34.502	27.38	3.78	53	1.97	***	***
1	1500	3.54	34.555	27.50	3.60	50	2.15	***	***
1	2000	2.42	34.666	27.69	3.69	49	2.16	***	***
1	2500	2.08	34.711	27.76	4.05	54	2.06	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 183/64	10/ 8/64	0230 K	30 29 S	156 06 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
2642	7.8	11.1	25	8	11	6	6	8	24	5	23	4	1014.0	*	*	*

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG, P	TOTAL P	NITRATE
2	0	19.76	35,630	25,32	4,94	99	0,24	***	***
2	25	19.78	35,639	25,33	5,00	100	0,22	***	***
2	50	19.79	35,627	25,31	5,00	100	0,23	***	***
2	75	19.78	35,626	25,32	5,07	101	0,22	***	***
2	100	19.78	35,626	25,32	5,06	101	0,22	***	***
2	150	19.79	35,624	25,31	4,94	99	0,21	***	***
2	200	18.90	35,591	25,52	4,48	88	0,38	***	***
2	300	16.07	35,432	26,08	4,20	78	0,64	***	***
2	500	12.05	35,052	26,64	4,38	75	0,97	***	***
1	682	8.93	34,680	26,90	4,44	70	1,28	***	***
1	878	6.82	34,502	27,07	4,31	65	1,65	***	***
1	1076	5.32	34,462	27,23	4.13	60	1.81	***	***
1	1274	4.29	34,487	27,37	3,84	54	1,94	***	***
1	1472	3.45	34,549	27,50	3,56	49	2,09	***	***
1	1967	2.48	34,650	27,67	3.74	50	2,07	***	***
1	2464	2.03	34,653	27,71	3,96	52	2,00	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 184/64	10/ 8/64	0645 K	30 28 S	155 19 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
4572	7.8	15.6	24	3	11	4	3	8	24	2	21	4	1016.0	15	10	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	20.51	35.578	25.08	4.89	99	0.24	***	***
2	23	20.47	35.593	25.11	4.92	100	0.24	***	***
2	45	20.51	35.593	25.10	4.91	100	0.25	***	***
2	67	20.50	35.592	25.10	4.72	96	0.23	***	***
2	90	20.48	35.595	25.10	4.91	99	0.20	***	***
2	135	20.50	35.593	25.10	4.87	99	0.23	***	***
2	180	19.28	35.602	25.43	4.33	86	0.37	***	***
2	270	18.26	35.571	25.66	4.63	90	0.37	***	***
2	450	13.06	35.158	26.52	4.26	74	0.89	***	***
1	594	10.35	34.868	26.81	4.38	72	1.13	***	***
1	764	7.99	34.597	26.98	4.32	67	1.46	***	***
1	936	6.44	34.491	27.12	4.21	63	1.66	***	***
1	1110	5.14	34.468	27.26	3.93	57	1.81	***	***
1	1286	4.29	34.495	27.38	3.86	54	1.93	***	***
1	1737	2.77	34.636	27.64	3.58	48	2.05	***	***
1	2210	2.23	***	***	3.92	***	2.10	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 185/64	10/ 8/64	1235 K	30 24 S	154 19 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
4448	8.9	18.3	23	2	11	*	0	8	24	2	22	4	1016.5	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	20.59	35.578	25.06	4.97	101	0.20	***	***
2	25	20.58	35.587	25.07	5.02	102	0.20	***	***
2	50	20.60	35.584	25.07	4.95	101	0.22	***	***
2	75	20.56	35.587	25.08	4.95	100	0.23	***	***
2	100	20.55	35.587	25.08	4.94	100	0.21	***	***
2	150	20.55	35.587	25.08	4.91	100	0.21	***	***
2	200	20.56	35.586	25.08	4.94	100	0.22	***	***
2	300	18.01	35.557	25.71	4.13	80	0.52	***	***
1	690	9.04	34.709	26.90	3.76	60	1.23	***	***
1	887	6.75	34.503	27.08	3.58	54	1.62	***	***
1	1084	5.33	34.467	27.24	3.75	54	1.85	***	***
1	1281	4.32	34.499	27.38	4.14	58	1.98	***	***
1	1478	3.53	34.545	27.49	4.44	61	2.09	***	***
1	1971	2.39	34.664	27.69	4.35	58	2.09	***	***
1	2463	2.00	34.721	27.77	4.10	54	1.97	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 186/64	10/ 8/64	1815 K	30 32 S	153 26 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
1463	6.7	12.8	36	4	11	*	0	8	10	3	18	4	1014.0	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	19.50	35.545	25.33	4.86	97	0.25	***	***
1	25	19.51	35.555	25.33	4.86	97	0.24	***	***
1	50	18.06	35.504	25.66	4.42	85	0.45	***	***
1	75	16.29	35.452	26.04	4.17	78	0.58	***	***
1	100	15.72	35.407	26.14	4.27	79	0.62	***	***
1	150	14.22	35.298	26.39	4.33	77	0.71	***	***
1	200	13.78	35.256	26.45	4.38	78	0.69	***	***
1	300	11.55	35.032	26.72	4.50	76	0.90	***	***
1	500	9.95	34.819	26.84	4.50	73	1.14	***	***
1	700	8.00	34.597	26.98	4.39	68	1.44	***	***
1	900	6.40	34.482	27.11	4.34	65	1.65	***	***
1	1100	5.04	34.469	27.27	4.04	58	1.80	***	***
1	1300	3.86	34.520	27.44	3.74	52	1.92	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 188/64	11/ 8/64	0730 K	28 49 S	154 06 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
2816	7.2	16.1	23	6	11	4	2	9	23	3	19	4	1015.0	15	10	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	21.16	35.509	24.86	4.91	101	0.20	***	***
2	25	21.16	35.520	24.86	4.87	100	0.23	***	***
2	50	21.16	35.521	24.87	4.90	100	0.20	***	***
2	75	20.57	35.609	25.09	4.95	100	0.16	***	***
2	100	20.53	35.611	25.11	4.99	101	0.13	***	***
2	150	19.17	35.594	25.45	4.21	83	0.41	***	***
2	200	17.80	35.510	25.73	3.91	75	0.61	***	***
2	300	15.74	35.408	26.14	4.22	78	0.63	***	***
2	500	11.07	34.966	26.76	4.49	75	1.02	***	***
1	655	8.62	34.662	26.93	4.35	68	1.39	***	***
1	841	7.08	34.555	27.08	4.33	65	1.62	***	***
1	1027	5.14	34.468	27.26	4.10	59	1.85	***	***
1	1215	4.17	34.502	27.39	3.67	51	1.93	***	***
1	1401	3.41	34.560	27.52	3.57	49	2.13	***	***
1	1868	2.45	34.661	27.69	3.63	49	2.12	***	***
1	2335	2.07	34.709	27.76	4.13	55	2.01	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 189/64	11/ 8/64	1245 K	28 49 S	154 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
4480	7.8	16.1	26	4	11	*	0	8	25	2	22	1	1012.0	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	20.83	35.548	24.98	4.86	99	0.29	***	***
2	25	20.83	35.564	24.99	4.87	99	0.28	***	***
2	50	20.83	35.569	24.99	4.91	100	0.22	***	***
2	75	20.82	35.565	24.99	4.86	99	0.25	***	***
2	100	20.81	35.567	25.00	4.91	100	0.23	***	***
2	150	20.82	35.563	24.99	4.89	100	0.22	***	***
2	200	20.84	35.564	24.98	4.88	100	0.20	***	***
2	300	19.51	35.591	25.36	4.23	84	0.40	***	***
2	500	13.93	35.219	26.39	4.18	74	0.84	***	***
1	700	9.49	34.748	26.86	4.39	70	1.31	***	***
1	900	6.76	34.502	27.08	4.32	65	1.67	***	***
1	1100	5.18	34.463	27.25	4.04	58	1.88	***	***
1	1300	4.19	34.499	27.39	3.74	53	2.05	***	***
1	1500	3.41	34.552	27.51	3.52	48	2.12	***	***
1	2000	2.38	34.665	27.69	3.73	50	2.13	***	***
1	2500	1.92	34.721	27.78	4.16	55	1.97	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 191/64	11/ 8/64	2115 K	28 42 S	156 14 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
4680	15.0	17.8	26	4	11	8	2	8	25	3	24	1	1012.5	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	19.04	35.595	25.48	5.03	99	0.24	***	***
2	25	19.06	35.610	25.49	4.97	98	0.28	***	***
2	50	19.02	35.602	25.49	4.94	97	0.27	***	***
2	75	18.81	35.589	25.54	4.79	94	0.30	***	***
2	100	18.60	35.600	25.60	4.84	95	0.27	***	***
2	150	17.81	35.546	25.75	4.15	80	0.50	***	***
2	200	15.99	35.420	26.09	4.19	78	0.68	***	***
2	300	13.21	35.181	26.51	4.33	76	0.80	***	***
2	500	9.79	34.796	26.85	4.42	71	1.16	***	***
1	668	7.74	34.571	27.00	4.33	67	1.41	***	***
1	859	5.96	34.470	27.16	4.21	62	1.68	***	***
1	1050	4.68	34.476	27.32	3.96	56	1.86	***	***
1	1244	3.76	34.525	27.46	3.63	50	1.96	***	***
1	1440	3.18	34.570	27.55	3.50	48	2.06	***	***
1	1934	2.32	34.675	27.71	3.79	51	2.01	***	***
1	2434	1.92	34.715	27.77	4.12	54	1.92	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 192/64	12/ 8/64	0130 K	28 46 S	157 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
4444	9.4	17,8	27	7	11	8	1	8	26	4	24	4	1010.5	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	18.97	35.606	25.51	***	***	***	***	***
1	25	18.99	35.614	25.51	***	***	***	***	***
1	50	19.02	35.617	25,50	***	***	***	***	***
1	75	18.69	35.596	25,57	***	***	***	***	***
1	100	18.59	35,598	25,60	***	***	***	***	***
1	150	17.14	35,502	25,88	***	***	***	***	***
1	200	15.49	35,384	26,18	***	***	***	***	***
1	300	12.95	35,148	26,54	***	***	***	***	***
1	500	9.13	34,715	26,89	***	***	***	***	***
1	700	6.89	34,514	27,07	***	***	***	***	***
1	900	5.35	34,466	27,23	***	***	***	***	***
1	1100	4.26	34,495	27,38	***	***	***	***	***
1	1300	3.50	34,546	27,50	***	***	***	***	***
1	1500	2.95	34,595	27,59	***	***	***	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
G 4/ 193/64	12/ 8/64	0500 K	28 49 S	157 41 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
4170	***	***	24	8	11	*	0	8	23	4	22	4	1011.0	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	18.75	35.603	25.56	5.14	101	0.23	***	***
2	25	18.74	35.603	25.57	5.03	99	0.22	***	***
2	50	18.76	35.596	25.55	5.09	100	0.24	***	***
2	75	18.76	35.604	25.56	5.09	100	0.21	***	***
2	100	18.75	35.603	25.56	5.15	101	0.22	***	***
2	150	18.34	35.578	25.65	4.63	90	0.35	***	***
2	200	15.47	35.462	26.24	4.14	76	0.57	***	***
2	300	13.83	35.219	26.41	4.12	73	0.78	***	***
2	500	10.07	34.824	26.82	4.45	72	1.07	***	***
1	700	7.49	34.550	27.02	4.39	67	1.41	***	***
1	900	5.66	34.465	27.19	4.21	61	1.63	***	***
1	1100	4.51	34.481	27.34	3.91	55	1.81	***	***
1	1300	3.64	34.532	27.47	3.62	50	1.85	***	***
1	1500	3.03	34.587	27.57	3.51	48	1.94	***	***
1	2000	2.31	34.669	27.70	3.76	50	1.87	***	***
1	2500	1.90	34.717	27.77	4.11	54	1.82	***	***

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.
12. Oceanographical observations in the Pacific Ocean in 1961. H.M.A.S. *Gascoyne* Cruise G3/61.
13. Oceanographical observations in the Pacific Ocean in 1962. H.M.A.S. *Gascoyne* Cruise G1/62.
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.
16. Oceanographical observations in the Pacific and Indian Oceans in 1962. H.M.A.S. *Gascoyne* Cruises G2/62 and G3/62.
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.

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25. Oceanographical observations in the Indian Ocean in 1963. H.M.A.S. *Diamantina* Cruise Dm3/63.
29. Oceanographical observations in the Pacific Ocean in 1963. H.M.A.S. *Gascoyne* Cruise G4/63.
31. Oceanographical observations in the Pacific Ocean in 1963. H.M.A.S. *Gascoyne* Cruise G5/63.
32. Oceanographical observations in the Pacific Ocean in 1964. H.M.A.S. *Gascoyne* Cruise G1/64.
34. Oceanographical observations in the Indian Ocean in 1964. H.M.A.S. *Gascoyne* Cruise G2/64.
35. Oceanographical observations in the Indian and Pacific Oceans in 1964. H.M.A.S. *Gascoyne* Cruise G3/64.
36. Oceanographical observations in the Indian Ocean in 1964. H.M.A.S. *Diamantina* Cruise Dm2/64.
39. Oceanographical observations in the Pacific Ocean in 1964. H.M.A.S. *Gascoyne* Cruise G4/64.
46. Oceanographical observations in the Indian Ocean in 1965. H.M.A.S. *Gascoyne* Cruise G5/65.