

OCEANOGRAPHICAL OBSERVATIONS  
IN THE INDIAN AND PACIFIC OCEANS IN 1964  
H.M.A.S. *GASCOYNE*  
Cruise G 3/64

OCEANOGRAPHICAL CRUISE REPORT  
NO. 35

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

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MELBOURNE, 1967

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When citing this report, abbreviate as follows:  
CSIRO Aust. Oceanogr. Cruise Rep. 35

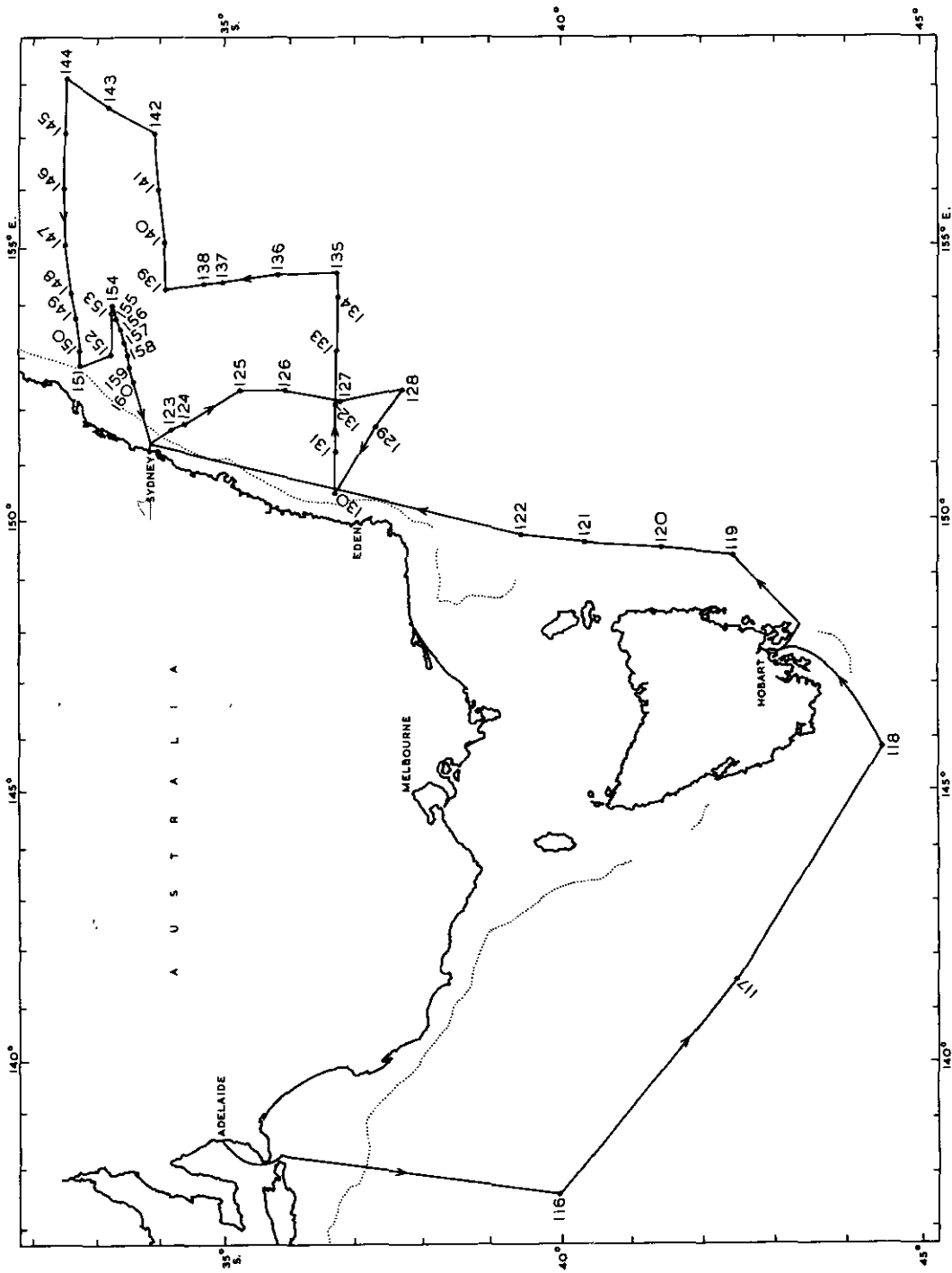


Fig. 1- Track chart

# OCEANOGRAPHICAL CRUISE REPORT

No. 35

## OCEANOGRAPHICAL OBSERVATIONS IN THE INDIAN AND PACIFIC OCEANS IN 1964

H.M.A.S. GASCOYNE

Cruise G3/64

March 5-25, 1964

### I. INTRODUCTION

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

#### Objectives

This cruise was initially planned as a repeat of Cruise G1/64, to find out how much change in circulation had occurred in two months. There was not sufficient time to do this, so the objectives were restricted to relocating the eddy that had been found off Jervis Bay on Cruise G1/64, and studying changes in circulation between  $32^{\circ}30'S.$  and  $34^{\circ}S.$

#### Itinerary

The cruise began at Adelaide on March 5, and worked three stations to Hobart. From Hobart on March 11 a series of stations was worked north to Sydney. The cruise re-commenced at Sydney on March 18 and worked a series of east-west and north-south sections to  $158^{\circ}E.$  off New South Wales (Fig. 1).

#### Scientific Personnel

B. Hamon (Cruise Leader)  
R. Bradley (March 11-25)  
F. de Castillejo  
K. Fleming

The analyses of hydrological samples were done in the ship's laboratory by Messrs Bradley and Fleming. Nitrate analyses were done at Cronulla by Mr Prothero. G.E.K. observations were made on board by Mr Hamon.

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

Forty-five stations were worked (G3/116/64-G3/160/64). Bathythermograph casts were made at 34 stations. Surface hydrology samples were collected at 18 stations, and surface and subsurface at 25 stations. A GEK zero check was made at 34 stations.

TABLE 1

### WORK DONE AT EACH STATION

Stn No.	BT	Hydrology 1	2	GEK Zero	Stn No.	BT	Hydrology 1	2	GEK Zero
116	+		5000		139	+		4500	+
117	+		4300		140	+		1400	+
118	+		1500		141	+		1400	+
119	+	+			142	+		1500	+
120	+	+			143	+			+
121	+				144	+		1500	+
122	+	+			145	+		1500	+
123	+	+		+	146	+		1400	+
124			1500	+	147	+		1500	+
125			1500	+	148	+		1500	+
126			1500	+	149	+	+		+
127			1500	+	150	+		1200	+
128			1300	+	151	+	+		+
129	+	+		+	152	+	+		+
130			1500	+	153	+	+		+
131			1500	+	154	+		1500	+
132	+	+		+	155	+	+		
133			1500	+	156	+	+		
134			1500	+	157	+	+		
135	+	+		+	158	+	+		+
136			1500	+	159	+	+		
137			1400	+	160	+	+		+
138	+	+		+					

BT                    Bathythermograms  
 Hydrology        1 Surface  
                          2 Surface to depth (m)  
 GEK                Geomagnetic electrokinetograph

## 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  $-2^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ , and unprotected thermometers with a range of  $-2^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ , or  $-4^{\circ}\text{C}$  to  $60^{\circ}\text{C}$ . The accuracy of the temperatures is considered to be  $\pm 0.03$  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  $\pm 15$  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 sea-water 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) -

$$\text{O}_2 (\% \text{ Satn.}) = \frac{\text{O}_2 (\text{mL/l}) \times (33.5 + T^{\circ}\text{C}) \times 100}{332.4 - (1.854 \times S\text{‰})}$$

**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  $\mu\text{g-atom/l}$  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  $\mu\text{g-atom/l}$ . Results are given as  $\mu\text{g-atom/l}$  without any correction for salt error and are precise to  $\pm 10\%$  for values less than 0.5  $\mu\text{g-atom/l}$  and  $\pm 5\%$  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  $\mu\text{g-atom/l}$ , 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  $\text{HgCl}_2$ . 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  $\text{m}\mu$  using a 5 mm cell. Samples with an



absorbance greater than that of the standard corresponding to 14.4  $\mu\text{g-atom/l}$  were diluted with artificial seawater - sulphuric acid mixture before reading. Results are given in  $\mu\text{g-atom/l}$

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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 HEADINGSParts 1 and 2Hydrology

STATION	Gives the station identification. For example, G3/116/64 signifies the 116th station worked by <u>Gascoyne</u> 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 Times during the cruise were Central Australian Standard Time, G.M.T. + 9½ hr, Code J, and 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

CRUISE STATION NUMBER	YR.	MTH.	DAY	TIME Z	LATITUDE	LONGITUDE	TEMP.	SALINITY	WIND DN. AMT.	SEA DN. AMT.	SWELL DN. AMT.	WEA.	VIS.	BAROM.
3	64	3	6	1520	J 40	00 S	137	35.48	18	2	22	1	8	1025.4
3	64	3	7	1253	K 42	29 S	141	34.93	00	0	23	1	8	1028.5
3	64	3	8	0945	K 44	29 S	145	34.99	32	2	26	4	8	1024.8
3	64	3	11	2020	K 42	30 S	149	35.58	36	7	14	1	8	1002.0
3	64	3	12	0830	K 41	25 S	149	35.44	27	7	04	1	8	1007.0
3	64	3	12	1435	K 39	25 S	149	35.42	26	5	08	1	7	1011.0
3	64	3	18	1815	K 34	09 S	151	35.63	26	2	04	1	7	1015.5
3	64	3	18	1947	K 34	22 S	151	35.66	06	1	08	1	8	1016.0
3	64	3	19	0150	K 35	14 S	152	35.36	36	3	06	1	7	1014.0
3	64	3	19	0642	K 35	57 S	152	35.57	36	4	36	4	8	1008.0
3	64	3	19	1125	K 36	43 S	152	35.63	36	4	01	1	7	1005.5
3	64	3	19	1720	K 37	42 S	152	35.68	21	4	22	4	8	1010.0
3	64	3	20	0019	K 37	18 S	151	35.78	22	6	15	4	7	1009.5
3	64	3	20	0814	K 36	42 S	150	35.65	21	6	20	4	8	1015.5
3	64	3	20	1254	K 36	40 S	151	35.69	19	4	18	4	8	1019.5
3	64	3	20	1815	K 36	43 S	152	35.65	16	4	16	4	8	1020.5
3	64	3	20	2300	K 36	43 S	153	35.65	11	2	19	1	8	1021.0
3	64	3	21	0443	K 36	43 S	154	35.66	10	2	19	1	8	1021.0
3	64	3	21	0745	K 36	43 S	154	35.66	10	3	13	1	8	1020.5
3	64	3	21	1847	K 34	57 S	154	35.44	09	4	19	1	7	1020.0
3	64	3	21	2115	K 34	40 S	154	35.30	06	3	13	1	8	1019.5
3	64	3	22	0125	K 34	05 S	154	35.43	04	5	11	1	8	1020.5
3	64	3	22	0752	K 34	02 S	155	35.42	03	3	05	1	8	1021.0
3	64	3	22	1254	K 33	58 S	156	35.38	10	3	05	1	8	1021.5
3	64	3	22	1756	K 33	54 S	157	35.47	07	2	08	1	8	1020.7
3	64	3	22	2325	K 33	17 S	157	35.46	08	3	10	1	8	1021.5
3	64	3	23	0406	K 32	30 S	158	35.35	10	2	10	1	8	1019.0
3	64	3	23	0938	K 32	29 S	157	35.46	02	3	09	1	8	1020.0
3	64	3	23	1504	K 32	29 S	156	35.54	05	1	09	1	8	1016.0
3	64	3	23	2049	K 32	31 S	155	35.57	36	6	02	1	8	1013.0
3	64	3	24	0215	K 32	36 S	154	35.44	34	6	36	4	8	1007.0
3	64	3	24	0615	K 32	39 S	153	35.36	34	7	34	5	7	1006.0
3	64	3	24	1052	K 32	45 S	152	35.42	23	6	21	4	8	1008.0
3	64	3	24	1400	K 32	44 S	152	35.35	19	8	20	5	8	1009.5
3	64	3	24	1658	K 33	16 S	153	35.42	18	3	19	6	8	1011.0
3	64	3	24	2118	K 33	15 S	153	35.38	18	3	18	2	8	1014.5
3	64	3	24	2220	K 33	15 S	153	35.36	17	4	17	3	8	1015.0
3	64	3	25	0100	K 33	18 S	153	35.38	14	6	16	4	7	1015.5

CRUISE NUMBER	STATION NUMBER	YR.	MTH.	DAY	TIME	Z	LATITUDE	LONGITUDE	TEMP.	SALINITY	WIND DN, AMT.	SEA DN, AMT.	SMELL DN, AMT.	WEA.	VIS.	BAROM.			
3	156	64	3	25	0200	K 33	22 S	153	25 E	26.4	35.36	15	6	17	5	7	1015.0		
3	157	64	3	25	0300	K 33	25 S	153	11 E	26.0	35.37	16	7	17	6	7	1015.0		
3	158	64	3	25	0430	K 33	28 S	152	57 E	25.4	35.41	17	6	17	3	21	4	7	1017.0
3	159	64	3	25	0600	K 33	31 S	152	44 E	22.3	35.44	17	5	17	3	21	4	8	1018.0
3	160	64	3	25	0730	K 33	35 S	152	29 E	22.6	35.44	17	5	17	2	20	4	8	1019.5

DATA  
PART 2  
HYDROLOGY  
DEEP STATIONS



STATION	DATE	TIME	LATITUDE	LONGITUDE					
B 3/ 116/64	6/ 3/64	1520 J	40 00 S	137 30 E					
4938	12.9 15.0 18 2 11 1 1	8 18 2 22 1	1025.4	5 0 *					
	SUNIC AIR TEMP, WIND ANEM, CLOUD SWELL ATMOS, WIRE ANGLES DEPTH WET DRY DIR, SP, HEIGHT TYPE AMT, VIS, DIR, AMT, DIR, AMT, PRESSURE CAST1 CAST2 CAST3								
CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	15.96	35.477	26.14	5.54	103	0.32	0.31	***
2	25	15.92	35.477	26.15	5.59	104	0.26	***	***
2	50	15.94	35.475	26.14	5.55	103	0.26	0.30	***
2	75	15.69	35.460	26.19	5.61	103	0.27	***	***
2	100	12.71	35.271	26.68	5.55	96	0.52	0.57	***
2	150	12.44	35.273	26.73	5.52	95	0.59	***	***
2	200	11.68	35.150	26.78	5.58	94	0.67	0.64	***
2	300	10.48	34.944	26.84	5.64	93	0.90	0.78	***
2	500	8.67	34.639	26.91	5.58	88	1.21	1.20	***
2	700	7.20	34.506	27.02	4.79	73	1.61	1.45	***
2	900	4.91	34.418	27.25	4.42	63	1.92	1.91	***
2	1100	3.45	34.571	27.52	4.42	61	1.82	1.80	***
1	1296	2.89	34.532	27.54	3.84	52	2.21	2.08	***
1	1495	2.61	34.603	27.63	3.79	51	2.12	2.04	***
1	1993	2.21	34.719	27.75	3.88	52	2.13	2.03	***
1	2490	1.90	34.743	27.80	4.08	54	2.10	1.78	***
1	2988	1.61	34.743	27.82	4.27	56	2.05	1.87	***
1	3485	1.36	34.735	27.83	4.41	57	1.99	1.84	***
1	3983	1.22	34.731	27.84	4.49	58	2.19	2.01	***
1	4481	1.02	34.720	27.84	4.66	60	2.09	1.83	***
1	4971	0.92	34.711	27.84	4.72	61	2.12	1.98	***



STATION G 3/ 116/64 DATE 8/ 3/64 TIME 0945 K LATITUDE 44 29 S LONGITUDE 145 44 E

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

1920 12.8 15.0 32 3 11 2 8 9 32 2 26 4 1024.8 5 0 \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	13.57	34.990	26.29	6.05	106	0.35	0.52	***
2	25	13.23	35.010	26.37	6.16	108	0.33	***	***
2	50	13.16	35.010	26.39	6.08	106	0.37	0.52	***
2	75	13.23	35.124	26.46	5.70	100	0.38	***	***
2	100	12.48	35.074	26.57	5.64	97	0.55	0.63	***
2	150	10.80	34.929	26.77	5.65	94	0.79	***	***
2	200	10.71	34.961	26.82	5.67	94	0.80	0.84	***
2	300	9.75	34.817	26.87	5.70	92	0.89	0.99	***
2	500	8.27	34.561	26.91	6.20	97	1.03	1.06	***
2	700	7.85	34.548	26.96	5.19	80	1.28	1.37	***
2	900	6.29	34.469	27.12	4.43	66	1.52	1.63	***
1	1100	4.57	34.401	27.27	4.43	63	1.81	1.86	***
1	1300	3.75	34.499	27.44	3.87	54	1.88	1.94	***
1	1500	3.10	34.573	27.56	3.69	50	1.99	1.97	***

STATION	DATE	TIME	LATITUDE	LONGITUDE	SOVIC AIR TEMP.	WIND DIR.	SP. DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	AMT.	VIS.	SEA DIR.	AMT.	SWELL DIR.	AMT.	ATMOS. PRESSURE	CAST1	CAST2	CAST3	WIRE ANGLES	
G 3/ 124/64	18/ 3/64	1947 K	34 22 S	151 41 E													1016.0	5	*	*	*	
1774	21.7	22.2	06	1	11	*	*	8	06	2	08	1	1016.0	5	*	*	*	*	*	*	*	*
CST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE													
1	0	21.75	35.619	24.78	5.00	104	0.12	***	***													
1	24	21.43	35.611	24.86	5.05	104	0.11	***	***													
1	48	20.68	35.587	25.05	5.05	103	0.16	***	***													
1	72	17.34	35.488	25.83	4.21	80	0.72	***	***													
1	96	15.50	35.407	26.19	4.36	80	0.63	***	***													
1	144	13.80	35.259	26.45	4.29	76	0.74	***	***													
1	192	12.87	35.165	26.57	4.33	75	0.85	***	***													
1	289	10.60	34.910	26.80	4.39	72	1.01	***	***													
1	483	8.14	34.617	26.97	4.48	70	1.73	***	***													
1	679	6.49	34.494	27.11	4.29	64	1.59	***	***													
1	877	5.23	34.470	27.25	4.10	59	1.79	***	***													
1	1077	4.22	34.497	27.38	3.85	54	1.86	***	***													
1	1277	3.46	34.548	27.50	3.48	48	1.99	***	***													
1	1477	2.82	34.607	27.61	3.48	47	1.97	***	***													

STATION 03/125/64 DATE 19/3/64 TIME 0150 K LATITUDE 35 14 S LONGITUDE 152 15 E

SONIC AIR TEMP. WIND ANEM. CLOUD VIS. SEA SWELL ATMOS. WIRE ANGLES  
 DEPTH WFT DRY SP. HEIGHT TYPE AMT. DIR. AMT. DIR. AMT. PRESSURE CAST1 CAST2 CAST3

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE							
4755	22.9	23.9	36	3	11	*	0	7	01	2	06	1	1014.0	5	*	*
1	0	23.20	35.363	24.17	4.77	101	0.17	***	***							
1	24	23.04	35.386	24.23	4.78	101	0.16	***	***							
1	49	21.31	35.555	24.85	5.01	103	0.16	***	***							
1	73	18.24	35.542	25.64	4.39	85	0.37	***	***							
1	97	16.59	35.462	25.98	4.23	79	0.54	***	***							
1	146	14.80	35.356	26.31	4.29	78	0.65	***	***							
1	194	13.53	35.223	26.48	4.26	75	0.84	***	***							
1	292	11.70	35.066	26.72	4.47	76	0.91	***	***							
1	487	8.92	34.685	26.90	4.47	71	1.27	***	***							
1	585	6.91	34.517	27.07	4.27	64	1.62	***	***							
1	885	5.40	34.470	27.23	4.05	59	1.76	***	***							
1	1085	4.36	34.492	27.37	3.79	53	1.89	***	***							
1	1285	3.58	34.539	27.48	3.57	49	2.02	***	***							
1	1485	2.97	34.595	27.59	3.50	48	2.11	***	***							

STATION	DATE	TIME	LATITUDE	LONGITUDE									
6 3/ 126/64	19/ 3/64	0642 K	35 57 S	152 16 E									
SOVIC AIR TEMP.	WIND	ANEM.	CLOUD	VIS.	SEA	SWELL	ATMOS.	WIRE ANGLES					
DEPTH	DIR.	SP.	DIR.	SP.	DIR.	DIR.	DIR.	DIR.					
5029	22.2	23.3	36	5	11	*	1	36	1	1012.5	0	*	*
CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE				
1	0	21.78	35.575	24.73	4.95	103	0.09	***	***				
1	25	21.18	35.628	24.94	4.99	102	0.13	***	***				
1	50	21.02	35.633	24.99	4.99	102	0.13	***	***				
1	75	18.62	35.537	25.55	4.94	97	0.22	***	***				
1	100	17.54	35.520	25.80	4.49	86	0.37	***	***				
1	150	15.52	35.416	26.20	4.44	82	0.54	***	***				
1	200	14.49	35.373	26.39	4.66	84	0.56	***	***				
1	300	12.61	35.183	26.63	4.56	79	0.77	***	***				
1	500	9.43	34.762	26.88	4.49	72	1.15	***	***				
1	700	7.51	34.556	27.02	4.28	65	1.48	***	***				
1	900	5.91	34.471	27.17	4.14	61	1.71	***	***				
1	1100	4.79	34.473	27.30	3.94	56	1.87	***	***				
1	1300	3.92	34.517	27.43	3.69	51	2.00	***	***				
1	1500	3.27	34.559	27.53	3.49	48	2.09	***	***				

STATION	DATE	TIME	LATITUDE	LONGITUDE						
G 3/ 127/64	19/ 3/64	1125 K	36 43 S	152 08 E						
SONIC DEPTH	AIR TEMP, WIND DIR, SP. DRY	WIND DIR, SP. DRY	ANEM. HEIGHT	CLOUD TYPE	AMT.	VIS. DIR, AMT.	SEA DIR, AMT.	SWELL DIR, AMT.	ATMOS. PRESSURE	WIRE ANGLES
4663	21.7 23.9 34 5	11	*	*	8	34 4	36 4	1008.0	0	*
CST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRATE	
1	0	21.48	35.659	24.88	4.89	101	0.18	***	***	
1	25	21.41	35.659	24.90	4.92	101	0.21	***	***	
1	50	21.33	35.656	24.92	4.94	102	0.23	***	***	
1	75	21.26	35.655	24.94	4.91	101	0.22	***	***	
1	100	19.52	35.576	25.34	4.47	89	0.38	***	***	
1	150	19.07	35.569	25.46	4.77	94	0.36	***	***	
1	200	18.69	35.575	25.56	4.55	89	0.48	***	***	
1	300	17.30	35.555	25.89	4.83	92	0.47	***	***	
1	500	13.32	35.230	26.52	4.54	80	0.79	***	***	
1	700	9.90	34.814	26.84	4.55	74	1.14	***	***	
1	900	7.34	34.544	27.03	4.33	66	1.51	***	***	
1	1100	5.69	34.466	27.19	4.17	61	1.74	***	***	
1	1300	4.46	34.483	27.35	3.90	55	1.98	***	***	
1	1500	3.60	34.534	27.48	3.64	50	2.12	***	***	

STATION G 3/ 128/64 DATE 19/ 3/64 TIME 1720 K LATITUDE 37 42 S LONGITUDE 152 20 E

SONIC AIR TEMP, WIND, ANEM, SWELL ATMOS, WIRE ANGLES  
 DEPTH WET DRY DIR, SP, HEIGHT TYPE AMT, VIS, SEA DIR, AMT, DIR, AMT, PRESSURE CAST1 CAST2 CAST3

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRATE							
4627	21.1	23.9	36	4	11	*	0	7	36	3	01	1	1005.5	20	10	*
2	0	21.56	35.625	24.83	4.99	103	0.12	***	***							
2	25	20.83	35.630	25.04	5.08	104	0.12	***	***							
2	50	19.10	35.647	25.51	5.26	104	0.11	***	***							
2	75	18.53	35.646	25.65	5.15	101	0.32	***	***							
2	100	17.19	35.501	25.87	4.54	86	0.38	***	***							
2	150	15.07	35.408	26.29	4.64	84	0.54	***	***							
2	200	13.72	35.260	26.46	4.42	78	0.75	***	***							
2	300	11.18	35.003	26.76	4.58	76	0.96	***	***							
1	435	8.78	34.679	26.92	4.68	74	1.22	***	***							
1	608	7.26	34.531	27.03	4.35	66	1.49	***	***							
1	788	5.93	34.472	27.17	4.20	62	1.71	***	***							
1	956	4.87	34.469	27.29	3.98	57	1.84	***	***							
1	1130	4.02	34.503	27.41	3.79	53	1.98	***	***							
1	1306	3.40	34.547	27.51	3.57	49	2.07	***	***							



STATION	DATE	TIME	LATITUDE	LONGITUDE								
5 3/ 130/64	20/ 3/64	0814 K	36 42 S	150 26 E								
SONIC AIR TEMP.	WIND DIR. SP.	WIND DIR. SP.	ANEM. HEIGHT	CLOUD TYPE AMT.	VIS.	SEA DIR. AMT.	SWELL DIR. AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1 CAST2 CAST3			
1737	16.7	20.0	22 6	11	8	15	4	22 4	1010.0	5	5	*
CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE			
2	0	21.48	35.783	24.98	5.00	103	0.15	***	***			
2	25	21.48	35.783	24.98	5.01	104	0.12	***	***			
2	50	19.13	35.700	25.54	5.17	102	0.18	***	***			
2	75	17.32	35.661	25.96	4.25	81	0.52	***	***			
2	100	15.87	35.578	26.24	4.27	79	0.63	***	***			
2	150	14.41	35.465	26.48	4.25	76	0.75	***	***			
2	200	13.11	35.370	26.68	4.37	76	0.84	***	***			
2	300	11.20	35.130	26.86	4.43	74	0.98	***	***			
1	500	8.71	34.827	27.05	4.47	70	1.26	***	***			
1	700	7.02	34.670	27.18	4.30	65	1.54	***	***			
1	900	5.73	34.482	27.20	4.14	60	1.75	***	***			
1	1100	4.44	34.484	27.35	3.85	54	1.85	***	***			
1	1300	3.44	34.548	27.50	3.58	49	2.07	***	***			
1	1500	2.72	34.606	27.62	3.57	48	2.07	***	***			

STATION	DATE	TIME	LATITUDE	LONGITUDE												
G 3/ 131/64	20/ 3/64	1254 K	36 40 S	151 11 E												
SONIC AIR TEMP.	WIND	ANEM.	CLOUD	VIS.	SEA	SWELL	ATMOS.	WIRE ANGLES								
DEPTH MET	DIR. SP.	HEIGHT	TYPE	DIR. AMT.	DIR. AMT.	DIR. AMT.	PRESSURE	CAS11 CAS12 CAS13								
4572	16.1	19.4	21	6	11	6	7	7	20	3	22	4	1009.5	5	5	*
CAS1	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE							
2	0	21.13	35.654	24.97	4.94	101	0.17	***	***							
2	25	20.89	35.655	25.04	5.04	103	0.18	***	***							
2	50	19.24	35.580	25.42	4.79	95	0.29	***	***							
2	75	18.08	35.545	25.69	4.78	93	0.30	***	***							
2	100	17.23	35.534	25.89	4.66	89	0.35	***	***							
2	150	15.51	35.412	26.19	4.44	82	0.63	***	***							
2	200	14.31	35.343	26.40	4.66	83	0.65	***	***							
2	300	12.33	35.185	26.69	5.01	86	0.75	***	***							
1	491	9.81	34.820	26.86	4.91	79	0.99	***	***							
1	688	7.81	34.574	26.99	4.43	68	1.28	***	***							
1	885	6.22	34.480	27.13	4.24	63	1.26	***	***							
1	1081	4.94	34.469	27.27	4.00	57	1.84	***	***							
1	1278	3.99	34.507	27.42	3.76	53	1.87	***	***							
1	1474	2.98	34.559	27.56	3.55	48	1.94	***	***							

STATION	DATE	TIME	LATITUDE	LONGITUDE					
G 3/ 133/64	20/ 3/64	2300 K	36 43 S	153 03 E					
SOVIC AIR TEMP, WIND ANEM. CLOUD VIS. SEA SWELL ATMOS. WIRE ANGLES DEPTH WET DRY DIR, SP. HEIGHT TYPE AMT, DIR, AMT, DIR, AMT, PRESSURE CAST1 CAST2 CAST3									
4682	14.4 19.4	16 4 11	0 3 8 16 3 16 4	5 * *					
CST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRATE
1	0	21.40	35.653	24.90	4.95	102	0.15	***	***
1	25	21.34	35.649	24.91	4.91	101	0.13	***	***
1	50	21.36	35.648	24.91	4.95	102	0.17	***	***
1	75	21.35	35.646	24.91	4.94	102	0.16	***	***
1	100	21.19	35.639	24.95	4.89	100	0.24	***	***
1	150	19.21	35.575	25.42	4.59	91	0.29	***	***
1	200	19.00	35.577	25.48	4.72	93	0.35	***	***
1	300	17.33	35.526	25.86	4.22	80	0.47	***	***
1	500	12.67	35.179	26.62	4.54	78	0.81	***	***
1	700	9.33	34.742	26.88	4.60	74	1.16	***	***
1	900	7.23	34.538	27.04	4.36	66	1.47	***	***
1	1100	5.67	34.468	27.20	4.22	62	1.61	***	***
1	1300	4.45	34.483	27.35	3.90	55	1.82	***	***
1	1500	3.60	34.537	27.48	3.65	50	1.94	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE				
G 3/ 134/64	21/ 3/64	0443 K	36	43 S	154	02 E			
4316	17.9 20.0	11 2	11	8 00 0	19 4	1020.5 5 *			
SONIC AIR TEMP.	WIND	ANEM.	CLOUD	VIS.	SEA	SWELL	ATMOS.	WIRE ANGLES	
DEPTH WET DRY	DIR. SP.	HEIGHT	TYPE	DIR. AMT.	DIR. AMT.	DIR. AMT.	PRESSURE	CAS11 CAS12 CAS13	
CST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	21.11	35.649	24.98	4.83	99	0.13	***	***
1	25	21.13	35.651	24.97	4.94	101	0.11	***	***
1	49	21.17	35.651	24.96	4.95	102	0.14	***	***
1	74	20.97	35.637	25.01	4.91	100	0.13	***	***
1	99	18.81	35.568	25.52	4.60	90	0.30	***	***
1	148	17.01	35.514	25.92	4.39	83	0.49	***	***
1	197	15.69	35.421	26.16	4.35	80	0.57	***	***
1	296	13.12	35.224	26.56	4.37	76	0.66	***	***
1	494	10.03	34.842	26.84	4.54	74	0.94	***	***
1	591	8.32	34.626	26.95	4.49	70	1.21	***	***
1	889	6.63	34.499	27.10	4.27	64	1.37	***	***
1	1086	5.18	34.467	27.25	4.05	58	1.71	***	***
1	1284	4.18	34.498	27.39	3.79	53	1.86	***	***
1	1481	3.45	34.547	27.50	3.59	49	2.01	***	***

STATION G 3/ 136/64 DATE 21/ 3/64 TIME 1301 K LATITUDE 35 49 S LONGITUDE 154 24 E

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

4938 16.7 20.0 10 3 11 6 8 8 09 2 19 1 1021.0 10 \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	21.36	35.664	24.92	5.00	103	0.21	***	***
1	24	21.35	35.664	24.92	4.98	103	0.18	***	***
1	49	21.06	35.651	24.99	5.01	103	0.21	***	***
1	73	19.04	35.579	25.47	4.49	89	0.44	***	***
1	97	18.26	35.560	25.65	4.38	85	0.53	***	***
1	146	16.82	35.501	25.96	4.32	82	0.60	***	***
1	195	15.69	35.432	26.17	4.50	83	0.66	***	***
1	293	14.67	35.429	26.39	4.78	86	1.30	***	***
1	489	11.81	35.108	26.73	4.78	81	0.93	***	***
1	685	8.81	34.680	26.92	4.59	72	1.35	***	***
1	880	6.97	34.523	27.07	4.32	65	1.62	***	***
1	1076	5.44	34.469	27.22	4.14	60	1.92	***	***
1	1272	4.42	34.490	27.36	3.86	55	1.98	***	***
1	1468	3.50	34.536	27.49	3.61	50	2.18	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE				
G 3/ 137/64	21/ 3/64	1847 K	34	57 S	154	15 E			
SONIC AIR TEMP.	WIND DIR. SP.	WIND DIR. SP.	WIND DIR. SP.	WIND DIR. SP.	WIND DIR. SP.	WIND DIR. SP.			
DEPTH WET DRY	ANEM. HEIGHT	CLOUD TYPE AMT.	VIS. DIR. AMT.	SEA DIR. AMT.	SWELL DIR. AMT.	ATMOS. PRESSURE			
4462	19.4 21.7 09 4 11	8 5 8 09 3 13 1	1020.5	20	*	*			
CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	22.51	35.443	24.43	4.83	101	0.16	***	***
1	24	22.33	35.489	24.52	4.88	102	0.16	***	***
1	47	20.78	35.566	25.00	4.95	101	0.13	***	***
1	71	17.72	35.500	25.74	3.99	77	0.53	***	***
1	95	16.59	35.414	25.95	3.79	71	0.70	***	***
1	142	15.60	35.323	26.11	3.80	70	0.73	***	***
1	190	13.72	35.151	26.38	3.97	70	0.91	***	***
1	285	11.64	34.972	26.66	4.12	70	0.96	***	***
1	474	9.40	34.745	26.87	4.74	76	1.11	***	***
1	664	7.79	34.578	26.99	4.36	67	1.46	***	***
1	854	6.18	34.483	27.14	3.89*	57	1.63	***	***
1	1044	4.92	34.466	27.28	3.98	57	1.79	***	***
1	1234	3.98	34.503	27.41	3.75	52	1.91	***	***
1	1424	3.29	34.561	27.53	3.54	49	2.02	***	***

\* PROPERTY DOUBTFUL  
 + PROPERTY INTERPOLATED

STATION	DATE	TIME	LATITUDE		LONGITUDE											
G 3/ 139/64	22/ 3/64	0125 K	34	05 S	154	05 E										
SONIC AIR TEMP.	WIND DIR. SP.	WIND ANEM. HEIGHT	CLOUD TYPE	AMT.	VIS. DIR. AMT.	SEA DIR. AMT.	SWELL DIR. AMT.	ATMOS. PRESSURE	CAST1	CAST2	CAST3	WIRE ANGLES				
DEPTH	WET	DRY	SP.	AMT.	AMT.	AMT.	AMT.	AMT.	AMT.	AMT.	AMT.	AMT.				
4718	21.7	23.9	04	5	11	*	0	8	05	4	11	1	1019.5	10	5	*
CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE							
2	0	25.57	35.428	23.51	4.54	101	0.18	0.35	0.1							
2	25	25.56	35.423	23.51	4.59	102	0.15	***	0.4							
2	50	23.61	35.573	24.21	4.80	103	0.15	0.29	0.3							
2	74	23.55	35.563	24.22	4.77	102	0.16	***	0.0							
2	99	21.62	35.571	24.78	4.43	92	0.30	0.39	0.8							
2	149	20.05	35.596	25.22	4.36	88	0.33	***	1.8							
2	198	18.95	35.595	25.51	4.36	86	0.39	0.41	2.7							
2	298	16.62	35.433	25.95	3.90	73	0.69	0.71	6.1							
2	496	11.83	35.001	26.64	4.22	72	0.98	0.98	20.1							
2	693	8.44	34.635	26.94	4.35	68	1.39	1.19	36.5							
2	887	6.50	34.486	27.10	4.08*	61	1.56	1.50	43.8							
2	1075	5.15	34.472	27.26	4.08	59	1.80	1.64	50.6							
2	1259	4.37	34.492	27.36	3.72	52	1.92	1.78	47.7							
2	1439	3.57	34.546	27.49	3.49	48	2.04	1.87	67.4							
1	1929	2.50	34.648	27.67	3.60	48	2.03	1.94	60.4							
1	2415	2.07	34.714	27.76	3.95	52	1.85	1.84	58.4							
1	2901	1.65	34.733	27.81	4.17	55	1.80	1.75	59.7							
1	3390	1.31	34.727	27.83	4.33	56	1.94	1.75	61.9							
1	3879	1.17	34.719	27.83	4.36	56	1.94	1.83	61.2							
1	4369	1.16	34.720	27.83	4.38	57	1.90	1.77	57.0							

\* PROPERTY DOUBTFUL  
+ PROPERTY INTERPOLATED

STATION G 3/ 140/64 DATE 22/ 3/64 TIME 0752 K LONGITUDE 155 02 E  
 LATITUDE 34 02 S

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

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE					
4737	22.2	24.4	03	3	11	8	03	2	05	1	1021.0	5	*	*
1	0	24.61	35.424	23.80	4.67	102	0.19	***	***	***				
1	24	24.61	35.423	23.80	4.66	102	0.15	***	***	***				
1	48	24.54	35.432	23.83	4.65	101	0.19	***	***	***				
1	72	23.95	35.529	24.08	4.63	100	0.16	***	***	***				
1	96	23.26	35.556	24.30	4.56	97	0.20	***	***	***				
1	144	20.48	35.596	25.11	4.36	88	0.35	***	***	***				
1	191	19.74	35.596	25.30	4.30	86	0.38	***	***	***				
1	287	18.15	35.567	25.69	4.07	79	0.51	***	***	***				
1	479	12.84	35.068	26.50	4.01	69	0.98	***	***	***				
1	670	8.94	34.682	26.90	4.30	68	1.28	***	***	***				
1	861	6.67	34.506	27.10	4.30	64	1.63	***	***	***				
1	1053	5.67	34.472	27.20	4.19	61	1.75	***	***	***				
1	1244	4.46	34.485	27.35	3.78	53	1.90	***	***	***				
1	1436	3.70	34.528	27.46	3.63	50	2.00	***	***	***				



STATION G 3/ 141/64 DATE 22/ 3/64 TIME 1254 K LATITUDE 33 58 S LONGITUDE 156 00 E

SOVIC AIR TEMP. WIND ANEM. CLOUD VIS. SEA SWELL ATMOS. WIRE ANGLES  
 WET DRY DIR, SP. HEIGHT TYPE AMT. DIR, AMT. DIR, AMT. PRESSURE CAST1 CAST2 CAST3

4517 22.2 25.0 10 3 11 8 3 8 10 3 05 1 1021.5 10 \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	26.35	35.380	23.23	4.53	102	0.12	***	***
1	23	26.24	35.370	23.26	4.51	101	0.14	***	***
1	45	25.03	35.459	23.70	4.65	102	0.15	***	***
1	68	23.64	35.534	24.17	4.58	98	0.26	***	***
1	90	21.71	35.561	24.74	3.64	75	0.49	***	***
1	135	20.33	35.600	25.15	4.30	87	0.40	***	***
1	180	19.06	35.585	25.47	4.30	85	0.42	***	***
1	270	17.11	35.514	25.90	3.95	75	0.56	***	***
1	450	11.43	34.983	26.70	4.19	70	1.01	***	***
1	630	8.85	34.684	26.92	4.51	71	1.30	***	***
1	810	7.05	34.524	27.06	4.31	65	1.51	***	***
1	990	5.73	34.468	27.19	4.19	61	1.74	***	***
1	1170	4.66	34.476	27.32	3.94	56	1.86	***	***
1	1350	3.77	34.524	27.45	3.65	51	2.03	***	***

STATION	DATE	TIME	LATITUDE		LONGITUDE											
G 3/ 142/64	22/ 3/64	1756 K	33	54 S	157	01 E										
SONIC AIR TEMP.	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	AMT.	VIS. DIR.	SEA DIR.	AMT.	SWELL DIR.	AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3		
4663	21.7	24.4	07	2	11	*	0	8	08	3	08	1	1020.7	0	*	*
CST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE							
1	0	23.93	35.470	24.04	4.77	103	0.20	***	***							
1	25	22.97	35.512	24.35	4.88	103	0.17	***	***							
1	50	21.95	35.555	24.67	4.90	102	0.22	***	***							
1	75	19.22	35.549	25.40	4.13	82	0.46	***	***							
1	100	17.36	35.506	25.83	4.42	84	0.49	***	***							
1	150	15.15	35.374	26.24	4.38	80	0.66	***	***							
1	200	13.65	35.219	26.45	4.23	75	0.85	***	***							
1	300	12.04	35.084	26.67	4.42	75	0.90	***	***							
1	500	8.84	34.691	26.92	4.43	70	1.29	***	***							
1	700	6.86	34.516	27.08	4.26	64	1.63	***	***							
1	900	5.37	34.461	27.23	4.11	59	1.76	***	***							
1	1100	4.34	34.484	27.36	3.83	54	1.91	***	***							
1	1300	3.52	34.543	27.49	3.54	49	2.03	***	***							
1	1500	2.99	34.592	27.58	3.46	47	2.10	***	***							

STATION DATE TIME LATITUDE LONGITUDE  
 G 3/ 144/64 23/ 3/64 0406 K 32 30 S 158 00 E

SONIC AIR TEMP. WIND ANFM. CLOUD SWELL ATMOS. WIRE ANGLES  
 DEPTH WET DRY DIR. SP. HEIGHT TYPE AMT. VIS. DIR. AMT. DIR. AMT. PRESSURE CAST1 CAST2 CAST3

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRATE			
3475	22.2	22.8	10	2	11	*	0	1	1019.0	0	*	*
1	0	25.40	35.348	23.50	4.48	99	0.23	***	***	***		
1	25	25.43	35.345	23.49	4.54	100	0.21	***	***	***		
1	50	25.35	35.344	23.51	4.51	99	0.23	***	***	***		
1	74	24.35	35.436	23.89	4.50	98	0.16	***	***	***		
1	99	23.62	35.448	24.11	4.11	88	0.33	***	***	***		
1	149	21.27	35.564	24.87	4.54	93	0.32	***	***	***		
1	198	19.99	35.584	25.23	4.37	88	0.33	***	***	***		
1	298	17.99	35.556	25.72	4.17	81	0.52	***	***	***		
1	496	13.11	35.198	26.54	4.14	72	0.85	***	***	***		
1	694	9.50	34.760	26.87	4.46	72	1.22	***	***	***		
1	893	7.38	34.545	27.03	4.25	65	1.44	***	***	***		
1	1091	5.72	34.466	27.19	4.11	60	1.71	***	***	***		
1	1289	4.51	34.478	27.34	3.85	54	1.83	***	***	***		
1	1488	3.65	34.523	27.46	3.56	49	2.07	***	***	***		

STATION G 3/ 145/64 DATE 23/ 3/64 TIME 0938 K LATITUDE 32 29 S LONGITUDE 157 00 E

SONIC AIR TEMP, WIND ANEM. CLOUD VIS. SEA SWELL ATMOS. WIRE ANGLES  
 DEPTH MET DRY DIR. SP. HEIGHT TYPE AMT. DIR. AMT. DIR. AMT. PRESSURE CAST1 CAST2 CAST3

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE						
4114	19.4	23.9	05	2	11	*	8	05	1	09	1	1020.0	0	*	*
1	0	24.66	35.465	23.81	4.65	101	0.21	***	***						
1	25	23.71	35.474	24.11	4.60	99	0.21	***	***						
1	50	23.00	35.571	24.39	4.83	102	0.21	***	***						
1	75	22.67	35.579	24.49	4.83	102	0.23	***	***						
1	100	22.14	35.553	24.62	4.94	103	0.17	***	***						
1	150	19.82	35.583	25.27	4.38	88	0.34	***	***						
1	200	18.57	35.574	25.59	4.25	83	0.45	***	***						
1	300	16.44	35.468	26.02	4.28	80	0.60	***	***						
1	500	12.53	35.149	26.62	4.44	76	0.83	***	***						
1	700	9.18	34.716	26.89	4.43	71	1.24	***	***						
1	900	7.05	34.522	27.06	4.30	65	1.54	***	***						
1	1100	5.55	34.463	27.21	4.12	60	1.67	***	***						
1	1300	4.36	34.482	27.36	3.79	53	1.93	***	***						
1	1500	3.43	***	***	3.56	***	1.95	***	***						

STATION	DATE	TIME	LATITUDE	LONGITUDE													
G 3/ 146/64	23/ 3/64	1504 K	32 29 S	156 00 E													
SOVIC DEPTH	AIR TEMP.	WIND DIR.	SP.	ANEM. HEIGHT	CLOUD TYPE	AMT.	VIS.	SEA DIR.	AMT.	SWELL DIR.	AMT.	ATMOS. PRESSURE	CAST1	CAST2	CAST3	WIRE ANGLES	
3292	20.0	24.4	02	3	11	6	2	8	01	3	03	1	1016.0	25	*	*	*
CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INDRG. P	TOTAL P	NITRATE								
1	0	24.24	35.540	24.00	4.72	102	0.11	***	***								
1	24	23.75	35.604	24.19	4.77	103	0.13	***	***								
1	47	23.63	35.604	24.23	4.77	102	0.11	***	***								
1	71	23.58	35.612	24.25	4.77	102	0.12	***	***								
1	95	21.65	35.576	24.77	4.90	101	0.18	***	***								
1	142	19.86	35.580	25.26	4.41	88	0.31	***	***								
1	190	19.22	35.584	25.43	4.43	88	0.33	***	***								
1	284	18.01	35.562	25.72	4.20	81	0.47	***	***								
1	472	13.88	35.254	26.43	4.25	75	0.74	***	***								
1	661	11.01	34.947	26.75	4.37	73	1.03	***	***								
1	853	7.93	34.594	26.99	4.32	67	1.42	***	***								
1	1048	6.32	34.481	27.12	4.27	63	1.64	***	***								
1	1244	4.99	34.472	27.28	3.97	57	1.78	***	***								
1	1441	3.94	34.521	27.43	3.63	51	1.95	***	***								

STATION	DATE	TIME	LATITUDE		LONGITUDE				
G 3/ 147/64	23/ 3/64	2040 K	32	31 S	155	01 E			
SONIC AIR TEMP, WIND	ANEM, CLOUD	VIS, SEA	SMELL	ATMOS,	WIRE ANGLÉS				
DEPTH WET DRY DIR, SP,	HEIGHT TYPE AMT,	DIR, AMT, DIR, AMT,	DIR, AMT,	PRESSURE	CAST1 CAST2 CAST3				
4078 20.5 24.4 36 6 11 8 3 8 36 3 02 1 1013.0 0 * *									
CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRATE
1	0	24.20	35.569	24.03	4.73	102	0.15	***	***
1	24	24.02	35.571	24.09	4.71	102	0.12	***	***
1	47	23.77	35.562	24.15	4.74	102	0.12	***	***
1	71	23.44	35.590	24.27	4.74	101	0.18	***	***
1	95	21.68	35.590	24.78	4.86	101	0.18	***	***
1	142	20.12	35.594	25.20	4.40	89	0.31	***	***
1	190	19.08	35.588	25.47	4.44	88	0.34	***	***
1	287	17.63	35.552	25.80	4.13	79	0.49	***	***
1	483	13.73	35.233	26.44	4.24	75	0.82	***	***
1	681	10.23	34.852	26.82	4.40	72	1.07	***	***
1	880	7.50	34.957	27.02	4.31	66	1.46	***	***
1	1079	5.87	34.469	27.17	4.14	61	1.66	***	***
1	1279	4.64	34.488	27.33	3.85	55	1.83	***	***
1	1479	3.78	34.523	27.45	3.63	50	1.94	***	***

STATION G 3/ 148/64 DATE 24/ 3/64 TIME 0215 K LATITUDE 32 36 S LONGITUDE 154 08 E

SUVIC AIR TEMP. WIND ANEM. CLOUD SWELL ATMS. WIRE ANGLES  
 DEPTH WET DRY DIR, SP. HEIGHT TYPE AMT. DIR, AMT. PRESSURE CAST1 CAST2 CAST3

4590 21.7 24.4 34 6 11 \* 0 8 36 3 36 4 1007.0 10 10 \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	***	35.441	***	4.48	***	0.14	***	***
2	25	25.11	35.446	23.66	4.60	101	0.18	***	***
2	50	24.39	35.509	23.93	4.75	103	0.15	***	***
2	75	23.41	35.537	24.24	4.55	97	0.20	***	***
2	100	21.71	35.584	24.76	4.54	94	0.28	***	***
2	150	20.01	35.595	25.23	4.48	90	0.32	***	***
2	200	19.16	35.594	25.45	4.48	89	0.36	***	***
2	300	17.52	35.542	25.82	4.20	80	0.54	***	***
1	500	13.50	35.221	26.48	4.27	75	0.88	***	***
1	700	9.74	34.787	26.85	4.40	71	1.20	***	***
1	900	7.41	34.552	27.03	4.27	65	1.48	***	***
1	1100	5.71	34.466	27.19	4.14	60	1.76	***	***
1	1300	4.54	34.482	27.34	3.85	55	1.90	***	***
1	1500	3.64	34.533	27.47	3.56	49	1.97	***	***

STATION G 3/ 150/64 DATE 24/ 3/64 TIME 1052 K LATITUDE 32 45 S LONGITUDE 152 59 E

SOVIC AIR TEMP. WIND ANEM. CLOUD SWELL ATMOS. WIRE ANGLES  
 DEPTH WET DRY DIR. SP. HEIGHT TYPE AMT. DIR. AMT. DIR. AMT. PRESSURE CAST1 CAST2 CAST3

1829	16.1	21.7	23	6	11	*	*	8	21	4	*	*	1008.0	30	*	*
CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE							
2	0	26.15	35.417	23.32	4.41	99	0.14	***	***							
2	25	26.11	35.431	23.35	4.47	100	0.15	***	***							
2	50	24.22	35.452	23.94	3.95	85	0.39	***	***							
2	75	21.56	35.623	24.83	3.18	66	0.61	***	***							
2	100	19.65	35.513	25.26	3.55	71	0.65	***	***							
2	150	16.64	35.401	25.92	3.73	70	0.71	***	***							
2	200	14.53	35.218	26.26	3.92	70	0.85	***	***							
2	300	11.39	34.926	26.67	4.05	68	1.07	***	***							
1	397	8.96	34.684	26.90	4.25	67	1.28	***	***							
1	556	7.74	34.567	26.99	4.33	67	1.51	***	***							
1	714	6.67	34.497	27.09	4.26	64	1.65	***	***							
1	873	5.28	34.467	27.24	4.09	59	1.76	***	***							
1	1031	4.28	34.487	27.37	3.81	54	1.71	***	***							
1	1190	3.66	34.526	27.47	3.61	50	1.78	***	***							



STATION	DATE	TIME	LATITUDE	LONGITUDE					
G 3/ 154/64	24/ 3/64	2220 K	33 15 S	153 52 E					
SONIC A/R TEMP.	WIND DIR. SP.	WIND DIR. SP.	SWELL DIR. AMT.	ATMOS. PRESSURE	WIRE ANGLES				
DEPTH WET DRY	ANEM. HEIGHT	CLOUD TYPE	AMT.	CAST1 CAST2 CAST3					
4645 15.6 21.7	17 4	11 6 6	8 17 3 18 4	1015.0	15 15 *				
CST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	26.02	35.361	23.32	4.40	98	0.20	***	***
1	25	26.02	35.356	23.32	4.58	102	0.19	***	***
1	50	26.00	35.363	23.33	4.47	100	0.20	***	***
1	75	24.50	35.466	23.87	4.58	100	0.15	***	***
1	100	23.87	35.567	24.13	4.70	101	0.15	***	***
1	150	20.59	35.590	25.07	4.12	84	0.39	***	***
1	200	19.38	35.589	25.39	4.35	86	0.37	***	***
1	300	17.57	35.543	25.81	4.09	78	0.52	***	***
2	491	13.52	35.211	26.47	4.18	74	0.95	***	***
2	687	9.34	34.719	26.86	4.24	68	1.35	***	***
2	884	7.18	34.527	27.04	4.24	64	1.38	***	***
2	1080	5.61	34.457	27.19	4.17	61	1.57	***	***
2	1277	4.52	34.484	27.34	3.76	53	1.65	***	***
2	1473	3.68	34.524	27.46	3.55	49	1.72	***	***

## 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.

## OCEANOGRAPHICAL CRUISE REPORTS

(Continued)

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.