

OCEANOGRAPHICAL OBSERVATIONS  
IN THE PACIFIC OCEAN IN 1963  
H.M.A.S. *GASCOYNE*  
Cruise G 4/63

OCEANOGRAPHICAL CRUISE REPORT  
NO. 29

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. No. 29

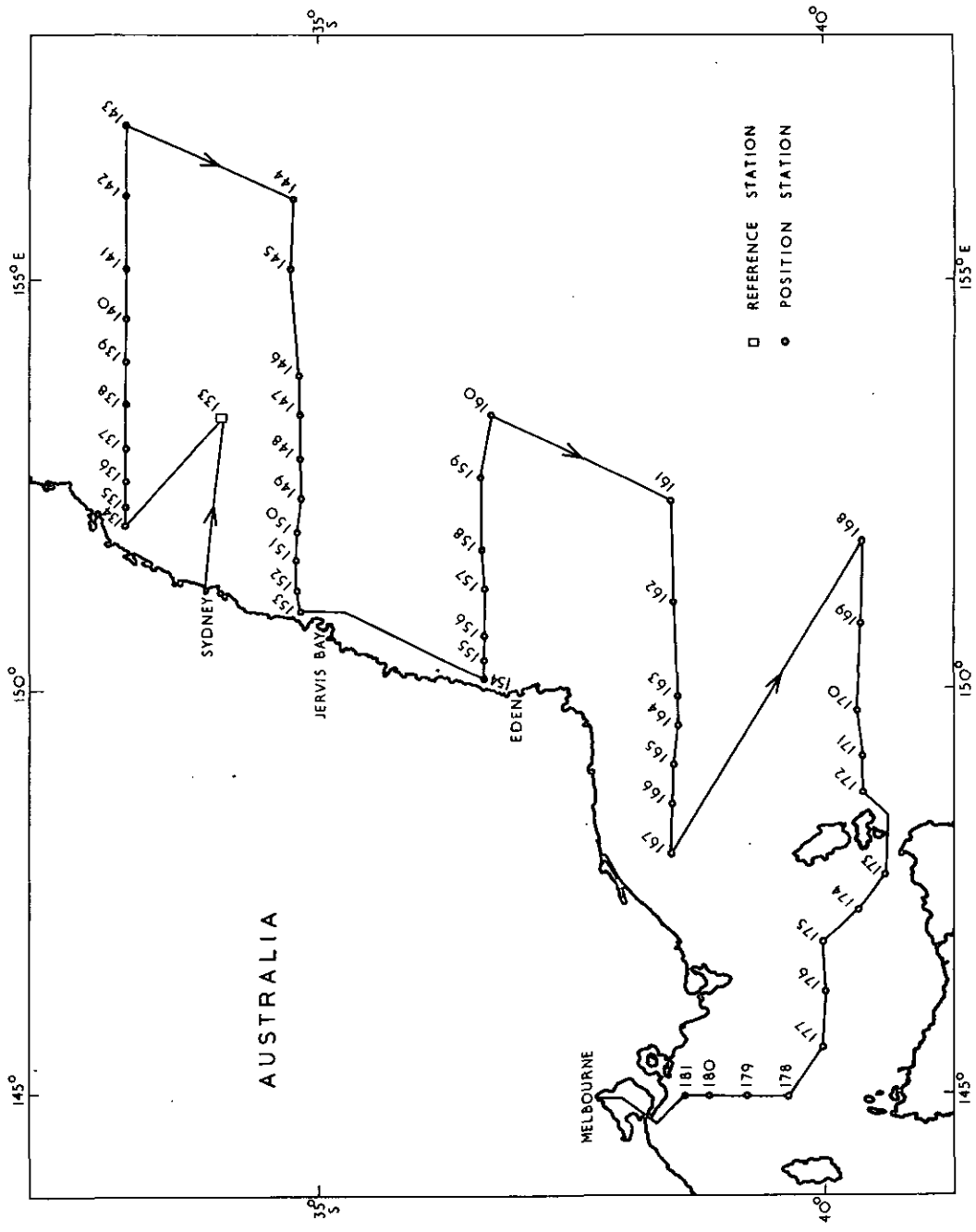


Fig.1 Track chart

# OCEANOGRAPHICAL CRUISE REPORT

No. 29

Oceanographical Observations in the Pacific Ocean in 1963

H.M.A.S. Gascoyne

Cruise G4/63

September 9 - 18, 1963

## I. INTRODUCTION

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

### Objectives

These were - to examine the hydrological environment at the beginning of the tuna season on the east coast of Australia, in particular the distribution of cold and warm waters known to mix on these fishing grounds; to examine the structure of the East Australian Current system off the New South Wales coast; and to examine, for comparison with previous measurements, the structure of the water column along sections in Bass Strait.

### Itinerary

The cruise began at Sydney on September 9, worked the Reference Station at 34°S., 153°20'E. then a series of stations off the New South Wales, Victorian, and Tasmanian coasts, arriving in Melbourne on September 18 (Fig. 1).

### Scientific Personnel

D. Vaux (Cruise Leader)  
R. Bradley  
F. de Castillejo  
K. Fleming  
L. Olsen

Salinity, oxygen, inorganic phosphate, and total phosphorus determinations were done in the ship's laboratory by K. Fleming and R. Bradley. Nitrate determinations were done at Cronulla by J. Klye. The data were processed, under the direction of W. Hedge, using computer programmes designed by A.D. Crooks. The track chart was prepared by R. Breach.

Accuracy of cruise data is the responsibility of the cruise leader, D. Vaux.

## II. WORK ACCOMPLISHED

Forty-nine stations were worked (G4/133/63 - G4/181/63). 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)
133	4000	158	1300
134	100	159	1400
135	50	160	1500
136	160	161	1500
137	1500	162	1400
138	1500	163	1400
139	1400	164	1500
140	1500	165	1500
141	1500	166	275
142	1400	167	50
143	1400	168	1500
144	1500	169	1500
145	1500	170	1500
146	1500	171	1500
147	1500	172	35
148	1500	173	29
149	1500	174	55
150	1500	175	65
151	1500	176	75
152	700	177	75
153	70	178	50
154	110	179	60
155	1100	180	65
156	1500	181	65
157	1300		

## 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 six Nansen water bottles. Differences between corrected protected thermometer readings were generally less than 0.03 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  $\pm 5$  m at depths less than 200 m,  $\pm 10$  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 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 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, given as ml/l, were calculated, by computer, using the simpler of the equations given by Richards and Corwin (1956) -

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

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% v/v stock solution in hydro-

chloric acid, which was kept under paraffin. The reagents were automatically dispensed by 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 commenced 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  $\pm 10\%$  for values less than 0.5 µg-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% 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<sub>2</sub>. Nitrate was determined at Cronulla by the strychnidine method (Rochford 1947). The reagent was prepared by adding 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 hours. 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 artificial seawater-sulphuric acid mixture before reading. Results are given in µg-atom/l.



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- LA FOND, E.C. (1951).- Processing oceanographic data. U.S. Navy Hydrogr. Off. Publ. No. 614.
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- THOMPSON, T.G., and ROBINSON, R.J. (1939).- Notes on the determination of dissolved oxygen in seawater. 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 section 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, G4/133/63 signifies the 133rd station worked by <u>Gascoyne</u> in 1963, on her 9th 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)
WEA.	Weather is coded using Table 1 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 NUMBER	STATION NUMBER	YR.	MTH.	DAY	TIME	Z	LATITUDE	LONGITUDE	TEMP.	SALINITY	WIND DN. AMT.	SEA		SHELL DN. AMT.	WEA.	VIS.	BAROM.
												DN. AMT.	DN. AMT.				
4	133	63	9	9	2330	K 34	00 S 153	20 E 16.6	35.54	00	0	00	0	17	1	6	1019.7
4	134	63	9	10	0915	K 33	00 S 152	00 E 16.9	35.47	31	2	31	2	00	0	01	1017.8
4	135	63	9	10	1205	K 33	00 S 152	30 E 17.0	35.53	33	3	33	3	00	0	01	1016.7
4	136	63	9	10	1415	K 33	00 S 152	54 E 18.9	35.55	01	3	33	3	00	0	01	1015.2
4	137	63	9	10	1415	K 33	00 S 152	54 E 18.9	35.54	01	4	00	3	00	1	01	1013.4
4	138	63	9	10	1730	K 33	01 S 153	27 E 18.5	35.55	01	4	00	3	00	1	01	1013.0
4	139	63	9	10	2130	K 33	01 S 154	00 E 19.4	35.57	01	4	00	3	00	1	01	1014.0
4	140	63	9	10	2335	K 33	01 S 154	32 E 17.1	35.55	01	5	01	4	00	1	01	1012.7
4	141	63	9	11	0300	K 33	02 S 155	09 E 18.0	35.53	00	3	00	2	35	4	03	1010.9
4	142	63	9	11	0715	K 33	00 S 156	01 E 19.7	35.56	33	4	33	3	32	4	05	1012.3
4	143	63	9	11	1125	K 32	59 S 156	53 E 17.5	35.53	34	4	34	3	34	1	01	1010.8
4	144	63	9	11	2130	K 34	46 S 156	00 E 16.2	35.49	33	7	33	3	32	4	01	1013.5
4	145	63	9	12	0245	K 34	44 S 155	09 E 16.2	35.47	34	3	34	3	34	1	01	999.0
4	146	63	9	12	0910	K 34	40 S 153	51 E 16.4	35.52	32	5	32	3	33	1	01	1000.1
4	147	63	9	12	1235	K 34	50 S 153	21 E 15.6	35.47	30	3	31	2	29	1	01	999.5
4	148	63	9	12	1545	K 34	50 S 152	51 E 16.3	35.52	26	3	26	2	33	1	01	1000.1
4	149	63	9	12	1840	K 34	50 S 152	18 E 15.6	35.47	25	3	25	4	25	4	01	1003.8
4	150	63	9	12	2135	K 34	49 S 151	56 E 15.4	35.46	26	4	27	3	27	1	01	1006.2
4	151	63	9	13	0040	K 34	48 S 151	35 E 15.8	35.47	25	6	25	3	30	1	01	1007.5
4	152	63	9	13	0315	K 34	48 S 151	15 E 16.4	35.53	26	7	26	4	32	1	01	1009.0
4	153	63	9	13	0525	K 34	50 S 150	57 E 16.7	35.51	25	7	24	3	00	0	01	1009.5
4	154	63	9	13	1500	K 36	40 S 150	10 E 13.7	35.42	03	2	01	3	00	0	01	1009.8
4	155	63	9	13	1610	K 36	40 S 150	23 E 15.6	35.45	04	2	04	3	00	1	01	1009.8
4	156	63	9	13	1810	K 36	40 S 150	42 E 16.4	35.54	32	4	32	3	01	1	01	1010.0
4	157	63	9	13	2100	K 36	39 S 151	15 E 17.2	35.57	30	3	30	2	35	1	01	1012.3
4	158	63	9	14	0001	K 36	38 S 151	45 E 17.2	35.56	30	3	30	2	35	1	03	1012.1
4	159	63	9	14	0300	K 36	38 S 152	34 E 15.6	35.48	31	3	30	2	35	1	01	1012.1
4	160	63	9	14	0700	K 36	45 S 153	22 E 15.0	35.47	31	3	30	0	99	0	01	1014.0
4	161	63	9	14	1745	K 38	30 S 152	16 E 16.6	35.55	35	3	35	3	33	1	01	1003.1
4	162	63	9	14	2255	K 38	32 S 151	05 E 16.3	35.55	25	5	25	3	33	1	01	1010.8
4	163	63	9	15	0415	K 38	35 S 149	55 E 14.7	35.46	27	6	27	3	28	4	7	1010.3
4	164	63	9	15	0635	K 38	35 S 149	36 E 14.6	35.46	27	7	27	3	26	4	7	1012.2
4	165	63	9	15	1005	K 38	30 S 149	04 E 14.0	35.45	25	5	25	2	27	1	8	1014.0
4	166	63	9	15	1315	K 38	30 S 148	32 E 13.8	35.41	24	2	24	2	25	1	7	1013.5
4	167	63	9	15	1530	K 38	30 S 148	00 E 12.5	35.60	09	2	00	0	25	1	7	1011.0
4	168	63	9	16	0830	K 40	20 S 151	52 E 13.5	35.38	03	6	03	3	06	1	6	1001.8
4	169	63	9	16	1340	K 40	19 S 150	48 E 12.9	35.35	32	7	32	3	02	1	7	998.0
4	170	63	9	16	1900	K 40	15 S 149	47 E 13.5	35.39	30	6	30	4	01	1	6	998.3
4	171	63	9	16	2220	K 40	20 S 149	11 E 13.2	35.39	29	5	29	3	35	1	7	996.0
4	172	63	9	17	0115	K 40	20 S 148	45 E 11.4	35.28	42	1	00	0	35	1	8	996.0

CRUISE NUMBER	STATION NUMBER	YR.	MTH.	DAY	TIME	Z	LATITUDE	LONGITUDE	TEMP.	SALINITY	WIND DN., AMT.	SEA DN., AMT.	SWELL DN., AMT.	WEA.	VIS.	BAROM.	
4	173	63	9	17	0530	K 40	35 S	147 45 E	11.5	35.44	23	4	24	2	33	1	1014.0
4	174	63	9	17	0802	K 40	18 S	147 20 E	11.7	35.55	22	3	23	2	28	1	1009.3
4	175	63	9	17	1038	K 40	00 S	146 58 E	12.8	35.62	27	8	27	3	27	1	1012.0
4	176	63	9	17	1330	K 40	01 S	146 17 E	12.5	35.51	27	7	27	3	27	1	1013.8
4	177	63	9	17	1640	K 40	00 S	145 34 E	12.5	35.48	23	6	23	3	24	1	1015.4
4	178	63	9	17	1945	K 39	40 S	145 00 E	13.0	35.58	25	4	25	2	27	1	1018.0
4	179	63	9	17	2140	K 39	17 S	145 00 E	13.5	35.63	22	3	22	3	21	1	1018.0
4	180	63	9	17	2340	K 38	54 S	145 00 E	13.3	35.67	21	2	21	2	21	1	1018.4
4	181	63	9	18	0055	K 38	40 S	145 00 E	13.0	35.68	22	3	22	2	22	1	1018.0

DATA  
PART 2  
HYDROLOGY  
SUBSURFACE SAMPLES

STATION G 4/ 133/63 DATE 9/ 9/63 TIME 2330 K LATITUDE 34 00 S LONGITUDE 153 20 E

SONIC AIR TEMP. WIND ANEH. CLOUD VIS. SEA SWEIL. ATMOS. WIRE ANGLES  
 DEPTH WET DRY DIR. SP. HEIGHT TYPE AMT. DIR. AMT. DIR. AMT. PRESSURE CAST1 CAST2 CAST3  
 4718 12.2 15.0 00 0 11 \* 0 6 00 0 17 1 1019.7 0 0 0

CST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
3	0	16.57	35.540	26.05	5.41	102	0.28	0.25	2.0
3	25	16.56	35.539	26.05	5.36	101	0.32	***	1.8
3	50	15.83	35.463	26.16	4.96	92	0.47	0.56	4.0
3	75	15.57	35.438	26.20	5.08	93	0.47	***	3.7
3	100	14.82	35.350	26.30	4.43	80	0.71	0.77	7.1
3	150	13.50	35.237	26.49	4.46	78	0.82	***	9.8
3	200	12.84	35.192	26.59	4.57	79	0.82	0.95	9.5
2	250	11.70	35.066	26.72	4.57	77	0.87	***	12.5
2	300	11.08	34.970	26.76	4.65	77	0.99	1.08	13.0
2	400	9.29	34.727	26.88	4.96	79	1.07	***	16.3
2	500	8.48	34.624	26.93	4.73	74	1.28	1.43	20.3
2	700	6.66	34.495	27.09	4.29	64	1.62	1.71	24.7
2	900	5.45	34.465	27.22	4.12	60	1.67	1.74	29.6
2	1100	4.25	34.496	27.38	3.84	54	1.96	1.95	31.1
1	1300	3.53	34.539	27.49	3.60	50	1.99	2.11	***
1	1500	2.91	34.596	27.59	3.50	48	2.07	2.09	34.4
1	2000	2.31	34.681	27.71	3.86	52	2.09	2.07	35.3
1	2500	1.95	34.724	27.78	4.12	54	1.89	1.95	32.0
1	2995	1.56	34.731	27.81	4.34	57	1.93	1.99	30.9
1	3490	1.22	34.724	27.83	4.36	56	1.88	1.97	32.0
1	3987	1.16	34.718	27.83	4.45	58	1.95	2.04	31.2



STATION 5 4/ 134/63 DATE 10/ 9/63 TIME 0915 K LATITUDE 33 00 S LONGITUDE 152 00 E

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

110 12.8 16.1 31 2 11 \* 0 0 0 0 0 1017.8 0 \* \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	16.88	35.475	25.92	5.66	107	0.17	***	***
1	10	16.91	35.478	25.92	5.64	107	0.19	***	***
1	20	16.92	35.493	25.93	5.54	105	0.24	***	***
1	30	16.95	35.518	25.94	5.48	104	0.55	***	***
1	40	16.97	35.533	25.95	5.41	102	0.29	***	***
1	50	16.98	35.533	25.95	5.30	100	0.29	***	***
1	75	16.36	35.473	24.05	5.08	95	0.40	***	***
1	100	15.81	35.388	24.11	4.81	89	0.55	***	***

STATION G 4/135/63 DATE 10/9/63 TIME 1025 K LATITUDE 33 00 S LONGITUDE 152 12 E

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

137 12.2 16.1 33 3 11 \* 0 \* 33 3 00 0 1016.7 0 \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P.	TOTAL P.	NIIRATE
1	0	16.98	35.527	25.94	5.47	104	0.26	***	***
1	10	16.86	35.528	25.97	5.47	103	0.27	***	***
1	20	16.85	35.529	25.97	5.47	103	0.34	***	***
1	30	16.79	35.525	25.98	5.44	103	0.30	***	***
1	40	16.76	35.524	25.99	5.44	103	0.30	***	***
1	50	16.77	35.525	25.99	5.43	102	0.29	***	***

STATION DATE TIME LATITUDE LONGITUDE  
 G 4/ 136/63 10/ 9/63 1205 K 33 00 S 152 30 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

1/6 12.2 18.3 01 3 11 \* 0 6 33 3 00 0 1019.2 0 0 \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	17.12	35.555	25.93	5.36	102	0.26	***	***
1	25	16.79	35.514	25.98	5.39	102	0.26	***	***
1	50	16.57	35.506	26.02	5.29	99	0.29	***	***
1	75	16.44	35.494	26.04	5.36	100	0.29	***	***
2	100	16.39	35.483	26.05	5.39	101	0.31	***	***
2	160	14.64	35.361	26.35	4.66	84	0.56	***	***

STATION 6 4 157/63 DATE 10/ 9/63 TIME 1415 K LATITUDE 33 00 S LONGITUDE 152 54 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

2414 14.4 18.9 01 4 11 \* 0 \* 0 8 00 3 00 1 1013.4 0 0 \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN X SAT.	INORG. P	TOTAL P	NITRATE
2	0	18.92	35.544	25.48	4.97	98	0.30	***	***
2	25	18.49	35.540	25.58	5.06	99	0.28	***	***
2	50	17.34	35.540	25.86	5.13	98	0.29	***	***
2	75	17.19	35.555	25.91	5.13	98	0.29	***	***
2	100	17.13	35.551	25.92	5.13	97	0.36	***	***
2	150	16.61	35.502	26.01	4.73	89	0.38	***	***
2	200	15.83	35.416	26.12	4.96	92	0.43	***	***
2	300	12.24	35.161	26.69	4.62	79	0.75	***	***
1	500	9.26	34.728	26.88	4.48	71	1.09	***	***
1	700	7.24	34.540	27.04	4.18	63	1.48	***	***
1	900	5.57	34.467	27.21	4.06	59	1.63	***	***
1	1100	4.35	34.497	27.37	3.78	53	1.80	***	***
1	1300	3.44	34.553	27.51	3.50	48	1.89	***	***
1	1500	2.90	34.600	27.60	3.38	46	2.01	***	***

STATION G 4/ 138/63 DATE 10/ 9/63 TIME 1730 K LATITUDE 43 01 S LONGITUDE 153 2/ E

SONIC ALTH 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 CASTS

4755 13.9 16.1 01 4 11 \* 0 8 00 3 00 1 1013.0 10 15 \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	14.47	35.551	25.60	5.17	101	***	***	***
2	25	14.36	35.549	25.62	5.04	98	***	***	***
2	50	17.93	35.542	25.72	5.14	99	***	***	***
2	75	16.89	35.563	25.99	5.11	97	***	***	***
2	100	16.68	35.541	26.02	5.14	97	***	***	***
2	150	16.16	35.474	26.09	4.69	87	***	***	***
1	485	10.34	34.889	26.83	4.58	75	***	***	***
1	680	7.89	34.588	26.99	4.36	67	***	***	***
1	876	5.98	34.473	27.16	4.08	60	***	***	***
1	1074	4.80	34.475	27.30	3.85	55	***	***	***
1	1273	3.79	34.532	27.46	3.59	50	***	***	***
1	1470	3.16	34.577	27.55	3.39	46	***	***	***

STATION DATE TIME LATITUDE LONGITUDE  
 G 4/ 139/63 10/ 9/63 2130 K 33 01 S 154 00 E

SONIC AIR TEMP. WIND ANEM. CLOUD SWELL ATMOS. WIRE ANGLES  
 DEPTH MET DRY DIR, SP. HEIGHT TYPE AMT. VIS. DIR. AMT. DIR. AMT. PRESSURE CAST1 CAST2 CAST3  
 4572 13.9 17.2 01 4 11 \* 0 \* 0 0 0 3 00 1 1014.0 20 10 \*

CST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	19.43	35.570	25.37	5.03	100	***	***	***
2	19	19.43	35.580	25.37	5.03	100	***	***	***
2	36	19.21	35.572	25.42	4.87	96	***	***	***
2	54	18.83	35.569	25.52	5.00	98	***	***	***
2	72	17.98	35.540	25.71	4.36	84	***	***	***
2	108	17.43	35.574	25.87	5.03	96	***	***	***
2	144	17.41	35.576	25.88	5.04	96	***	***	***
2	216	16.83	35.532	25.98	4.81	91	***	***	***
1	447	11.74	35.079	26.72	4.52	76	***	***	***
1	624	8.91	34.680	26.90	4.69	74	***	***	***
1	816	7.06	34.521	27.05	4.17	63	***	***	***
1	1002	5.48	34.465	27.22	4.05	59	***	***	***
1	1197	4.30	34.500	27.38	3.77	53	***	***	***
1	1392	3.46	34.549	27.50	3.47	48	***	***	***

STATION G 4/ 140/63 DATE 10/ 9/63 TIME 2335 K LATITUDE 33 01 S LONGITUDE 154 32 E

SONIC AIR TEMP. WIND ANEM. CLOUD VIS. SEA ATMOS. WIRE ANGLES  
 DEPTH KFT DRY DIR. SP. HEIGHT TYPE AMT. DIR. AMT. DIR. AMT. PRESSURE CAS11 CAST2 CAST3

4572 13.9 16.7 01 5 11 \* 0 7 01 4 00 1 1012.7 35 10 \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRA E
2	0	17.06	35.552	25.94	5.25	100	***	***	***
2	50	16.47	35.527	26.06	5.24	98	***	***	***
2	75	16.49	35.497	26.03	5.14	96	***	***	***
2	100	16.07	35.481	26.12	5.15	96	***	***	***
2	150	15.73	35.465	26.18	5.19	96	***	***	***
2	200	15.00	35.354	26.26	4.36	79	***	***	***
2	300	13.04	35.238	26.59	4.36	76	***	***	***
2	500	10.23	34.901	26.85	4.87	80	***	***	***
1	684	7.88	34.579	26.98	4.36	67	***	***	***
1	852	6.22	34.477	27.13	4.14	61	***	***	***
1	1023	5.16	34.469	27.25	3.91	56	***	***	***
1	1193	4.21	34.500	27.39	3.69	52	***	***	***
1	1364	3.67*	34.543	27.48	3.53	49	***	***	***
1	1534	3.12	34.593	27.57	3.39	46	***	***	***

\* PROPERTY INTERPOLATED

STATION DATE TIME LATITUDE LONGITUDE  
 G 4/ 141/63 11/ 9/63 0300 K 33 02 S 155 09 E

SONIC AIR TEMP. WIND ANEM. CLOUD SEA SWELL ATMOS. WIRE ANGLES  
 DEPTH MET DRY DIR, SP. HEIGHT TYPE AMT. DIR, AMT, DIR, AMT, PRESSURE CAST1 CAST2 CAST3  
 4590 17.2 18.9 00 3 11 4 1 8 00 2 55 4 1010.9 10 0 \*

CAS1	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	CXYGEN % SAT.	INORG. P	TOTAL P	NIRA E
2	0	18.00	35.535	25.70	4.91	95	***	***	***
2	25	18.00	35.537	25.70	4.89	94	***	***	***
2	50	17.02	35.499	25.91	4.33	82	***	***	***
2	75	16.62	35.502	26.01	4.79	90	***	***	***
2	100	16.33	35.475	26.06	4.69	88	***	***	***
2	150	15.71	35.448	26.18	4.69	87	***	***	***
2	200	14.38	35.296	26.35	4.24	76	***	***	***
2	300	12.24	35.070	26.62	4.24	73	***	***	***
1	490	10.07	34.850	26.84	4.65	76	***	***	***
1	685	7.88	34.592	26.99	4.30	66	***	***	***
1	877	6.19	34.484	27.14	4.13	61	***	***	***
1	1074	4.97	34.475	27.28	3.94	56	***	***	***
1	1271	4.01	34.518	27.42	3.69	52	***	***	***
1	1463	3.31	34.567	27.53	3.46	47	***	***	***



STATION G 4/142/63 DATE 11/9/63 TIME 0715 K LATITUDE 33 00 S LONGITUDE 156 01 E

SONIC AIR TEMP. WIND ANEM. CLOUD VIS. SEA SWELL ATMOS. WIRE ANGLES  
 DEPTH WET DRY DIR, SP. HEIGHT TYPE AMT. DIR, AMT. PRESSURE CAS11 CAS12 CASTS

3146 17.2 20.0 33 4 11 \* 0 6 33 3 32 4 1012.3 10 0 \*

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG, P	TOTAL P	NITRATE
2	0	19.71	35.562	25.28	4.94	99	0.17	***	***
2	25	19.69	35.563	25.29	4.94	99	0.24	***	***
2	50	19.41	35.553	25.36	4.91	97	0.23	***	***
2	75	19.27	35.560	25.40	4.86	96	0.23	***	***
2	100	19.26	35.565	25.40	4.83	96	0.29	***	***
2	150	18.55	35.590	25.60	4.40	86	0.65	***	***
2	200	17.11	35.517	25.90	3.98	76	0.63	***	***
2	300	15.69	35.457	26.19	5.29	98	0.40	***	***
1	447	12.55	35.171	26.63	4.48	77	0.78	***	***
1	634	9.30	34.734	26.88	4.33	69	1.15	***	***
1	821	6.86	34.513	27.08	4.19	63	1.45	***	***
1	1013	5.28	34.467	27.24	4.05	58	1.72	***	***
1	1210	4.39	34.491	27.36	3.79	53	1.89	***	***
1	1407	3.78	34.525	27.45	3.74	52	1.98	***	***

PROPERTY DOUBTFUL

STATION G 4/ 143/63 DATE 11/ 9/63 TIME 1125 K LATITUDE 32 59 S LONGITUDE 156 53 E

SONIC AIR TEMP. WIND DIR, SP. ANEM. HEIGHT CLOUD TYPE AMT. VIS. DIR, AMT. SEA DIR, AMT. SWELL DIR, AMT. ATMOS. PRESSURE. WIRE ANGLES  
 DEPTH WET DRY 34 4 11 8 3 7 34 3 34 1 1010.8 0 0 \*

3566 15.6 18.9 34 4 11 8 3 7 34 3 34 1 1010.8 0 0 \*

CST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	17.50	35.534	25.82	5.00	96	0.33	***	***
2	25	17.39	35.530	25.85	4.95	95	0.32	***	***
2	50	17.14	35.520	25.90	4.90	93	0.34	***	***
2	75	16.82	35.520	25.97	5.20	98	0.34	***	***
2	100	16.50	35.513	26.04	5.35	100	0.33	***	***
2	150	15.99	35.474	26.13	5.12	95	0.40	***	***
1	480	10.17	34.849	26.82	4.50	73	0.97	***	***
1	670	7.34	34.548	27.04	4.34	66	1.43	***	***
1	861	6.00	34.474	27.16	4.20	62	1.64	***	***
1	1050	4.68	34.478	27.32	3.92	56	1.83	***	***
1	1241	3.89	34.519	27.44	3.68	51	1.79	***	***
1	1431	3.25	34.564	27.54	3.49	48	1.75	***	***

STATION 6 4/ 144/63 DATE 11/ 9/63 TIME 2130 K LATITUDE 34 46 S LONGITUDE 156 00 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

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE					
4444	16.1	17.2	33	7	15	* 0	33	3	32	4	1003.5	10	0	*
2	0	16.17	35.489	26.10	5.44	101	0.19	***	***	***	***	***	***	***
2	25	16.17	35.489	26.10	5.46	102	0.26	***	***	***	***	***	***	***
2	50	16.15	35.491	26.11	5.35	100	0.24	***	***	***	***	***	***	***
2	75	16.02	35.476	26.13	***	***	0.29	***	***	***	***	***	***	***
2	100	16.01	35.480	26.13	5.35	99	0.26	***	***	***	***	***	***	***
2	150	15.20	35.439	26.28	4.78	87	0.40	***	***	***	***	***	***	***
2	200	13.75	35.289	26.48	***	***	0.64	***	***	***	***	***	***	***
2	300	12.00	35.123	26.70	4.68	80	0.74	***	***	***	***	***	***	***
1	492	8.89	34.679	26.91	4.49	71	1.15	***	***	***	***	***	***	***
1	690	7.25	34.533	27.04	4.37	66	1.48	***	***	***	***	***	***	***
1	888	5.65	34.461	27.19	4.17	61	1.66	***	***	***	***	***	***	***
1	1086	4.35	34.481	27.36	3.91	55	1.91	***	***	***	***	***	***	***
1	1281	3.55	34.538	27.49	3.65	50	1.95	***	***	***	***	***	***	***
1	1478	2.96	34.597	27.59	3.47	47	1.92	***	***	***	***	***	***	***

STATION G 4/ 145/63 DATE 12/ 9/63 TIME 0245 K LATITUDE 34 44 S LONGITUDE 155 09 E

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

4755 16.1 17.2 34 3 11 \* 0 7 34 3 34 1 999.0 15 10 \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	16.18	35.475	26.09	5.36	100	0.27	***	***
2	25	16.19	35.475	26.09	5.35	100	0.29	***	***
2	50	16.08	35.468	26.11	5.27	98	0.28	***	***
2	75	16.00	35.467	26.12	5.41	100	0.28	***	***
2	100	15.91	35.478	26.15	5.05	94	0.30	***	***
2	150	14.77	35.392	26.34	4.60	83	0.50	***	***
2	198	14.02	35.328	26.45	4.63	82	0.56	***	***
2	294	12.03	35.115	26.69	4.60	78	0.75	***	***
1	475	9.14	34.706	26.88	4.89	78	1.07	***	***
1	672	7.31	34.539	27.03	4.32	66	1.38	***	***
1	870	5.90	34.472	27.17	4.16	61	1.41	***	***
1	1070	4.64	34.478	27.32	3.91	56	1.64	***	***
1	1270	3.64	34.529	27.47	3.68	51	1.85	***	***
1	1470	3.03	34.575	27.56	3.52	48	1.91	***	***

STATION G 4/ 146/63 DATE 12/ 9/63 TIME 0910 K LATITUDE 34 50 S LONGITUDE 153 51 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

4663	15.6	18.3	32	5	11	4	6	6	32	3	33	1	1000.1	10	0	*
CAST	DEPTH	TEMP.	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE					
2	0	16.42	16.41	35.524	26.07	5.48	103		0.26	***	***					
2	25	16.41	16.41	35.520	26.07	5.41	101		0.25	***	***					
2	50	16.11	16.11	35.496	26.12	5.27	98		0.28	***	***					
2	75	15.64	15.64	35.481	26.17	5.12	95		0.37	***	***					
2	100	15.31	15.31	35.432	26.25	4.96	91		0.41	***	***					
2	150	14.25	14.25	35.381	26.45	5.17	93		0.48	***	***					
2	200	13.10	13.10	35.238	26.58	4.72	82		0.72	***	***					
2	300	10.92	10.92	34.909	26.74	4.35	72		1.00	***	***					
1	500	8.63	8.63	34.653	26.92	4.44	70		1.19	***	***					
1	700	6.75	6.75	34.500	27.08	4.32	65		1.48	***	***					
1	500	5.43	5.43	34.465	27.22	4.15	60		***	***	***					
1	1100	4.36	4.36	34.490	27.36	3.83	54		1.85	***	***					
1	1300	3.52	3.52	34.546	27.50	3.58	49		1.81	***	***					
1	1500	2.94	2.94	34.599	27.59	3.48	47		1.93	***	***					



STATION                      DATE                      TIME                      LATITUDE                      LONGITUDE

G 4/ 148/63                      12/ 9/63                      1545 K                      34 50 S                      152 51 E

SONIC AIR TEMP.                      WIND                      ANEM.                      CLOUD                      VIS,                      SEA                      SWELL                      ATMOS.                      WIRE ANGLES.

DEPTH WET DRY DIR, SP,                      HEIGHT                      TYPE AMT.                      DIR, AMT.                      PRESSURE                      CAST1                      CAST2                      CAST3

4663                      14.4 18.9 26 2 11 4 1 6 26 2 33 1 1000.1 0 0 \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	14.26	35.516	26.10	5.58	104	0.25	***	***
1	25	14.13	35.501	26.12	5.59	104	0.26	***	***
1	50	14.08	35.473	26.11	5.47	102	0.26	***	***
1	75	15.81	35.477	26.18	5.09	94	0.36	***	***
1	100	15.08	35.414	26.29	4.83	88	0.46	***	***
1	150	13.63	35.243	26.47	4.26	75	0.75	***	***
1	200	12.51	35.141	26.62	4.37	75	0.73	***	***
1	300	11.13	35.002	26.77	4.87	81	0.83	***	***
2	500	8.47	34.634	26.94	4.49	70	1.20	***	***
2	700	6.86	34.507	27.07	4.25	64	1.49	***	***
2	900	5.33	34.461	27.23	4.09	59	1.62	***	***
2	1100	4.27	34.491	27.37	3.86	54	1.83	***	***
2	1300	3.52	34.539	27.49	3.58	49	1.85	***	***
2	1500	2.94	34.593	27.59	3.52	48	1.96	***	***

STATION G 4/ 149/63 DATE 12/ 9/63 TIME 1840 K LATITUDE 34 50 S LONGITUDE 152 18 E

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

4682	12,2	16,1	25	8	11	*	*	8	25	4	25	4	1003.8	15	10	*
CAST	DEPTH	TEMP.	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRAIE					
2	0	15.58	26.22	35.472	26.22	5.61	103	0.27	0.27	***	***					
2	25	15.58	26.22	35.468	26.22	5.58	103	0.28	0.28	***	***					
2	50	15.22	26.27	35.428	26.27	5.41	99	0.30	0.30	***	***					
2	75	14.85	26.33	35.397	26.33	5.07	92	0.37	0.37	***	***					
2	100	14.34	26.41	35.357	26.41	4.85	87	0.50	0.50	***	***					
2	150	13.43	26.53	35.268	26.53	4.63	81	0.59	0.59	***	***					
2	200	12.57	26.65	35.199	26.65	4.73	82	0.59	0.59	***	***					
2	300	10.52	26.80	34.901	26.80	4.57	75	0.95	0.95	***	***					
1	488	8.26	26.95	34.615	26.95	4.39	68	1.23	1.23	***	***					
1	686	6.58	27.10	34.495	27.10	4.25	63	1.29	1.29	***	***					
1	882	5.35	27.23	34.460	27.23	4.04	58	1.65	1.65	***	***					
1	1080	4.32	27.37	34.489	27.37	3.82	54	1.79	1.79	***	***					
1	1278	3.51	27.50	34.550	27.50	3.56	49	1.76	1.76	***	***					
1	1475	2.92	27.59	34.595	27.59	3.44	47	1.85	1.85	***	***					



STATION G 4/ 150/63 DATE 12/ 9/63 TIME 2135 K LATITUDE 34 49 S LONGITUDE 151 56 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 CAS12 CAST3

4663 11.1 15.6 26 4 11 5 5 8 27 3 27 1 1006.2 15 10 0

CST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	CKYGFN	% SAT.	INORG. P	TOTAL P	NITRA E
2	0	15.41	35.463	26.25	5.58	102		0.23	***	***
2	25	15.42	35.458	26.25	5.61	103		0.23	***	***
2	50	14.78	35.397	26.35	5.29	96		0.35	***	***
2	75	14.06	35.368	26.48	5.08	91		0.39	***	***
2	100	13.60	35.317	26.53	4.90	86		0.50	***	***
2	150	12.54	35.183	26.64	4.66	80		0.66	***	***
3	200	11.97	35.123	26.71	4.70	80		0.74	***	***
3	300	10.62	34.924	26.80	4.68	77		0.85	***	***
3	500	8.31	34.608	26.94	4.61	72		1.29	***	***
1	700	6.44	34.483	27.11	4.21	63		1.49	***	***
1	900	5.18	34.461	27.25	4.04	58		1.64	***	***
1	1100	4.12	34.488	27.39	3.76	53		1.85	***	***
1	1300	3.38	34.554	27.52	3.52	48		1.93	***	***
1	1500	2.89	34.594	27.59	3.47	47		1.93	***	***

33

STATION G 4/ 151/63 DATE 13/ 9/63 TIME 0040 K LATITUDE 34 48 S LONGITUDE 151 35 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 CAST11 CAST2 CAST3

4663 13.9 15.6 25 6 11 4 1 6 25 3 30 1 1007.5 10 0 \*

CST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	15.76	35.473	26.18	5.33	98	0.24	***	***
2	25	15.78	35.472	26.18	5.41	100	0.27	***	***
2	50	15.50	35.446	26.22	5.41	99	0.24	***	***
2	75	15.14	35.417	26.28	5.16	94	0.34	***	***
2	100	14.54	35.376	26.38	4.81	87	0.48	***	***
2	150	13.54	35.306	26.54	4.90	86	0.52	***	***
2	200	12.56	35.199	26.65	4.73	82	0.62	***	***
2	300	10.91	34.953	26.77	4.44	74	0.85	***	***
1	488	8.74	34.652	26.91	4.71	74	***	***	***
1	687	6.88	34.507	27.07	4.26	64	1.48	***	***
1	886	5.47	34.463	27.22	3.99	58	1.51	***	***
1	1085	4.29	34.486	27.37	3.76	53	1.80	***	***
1	1284	3.53	34.536	27.49	3.58	49	1.90	***	***
1	1482	2.93	34.589	27.59	3.48	47	1.96	***	***

STATION G 4/ 152/63 DATE 13/ 9/63 TIME 0315 K LONGITUDE 151 15 E  
 LATITUDE 34 48 S

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

805 8.9 13.9 26 7 11 \* 0 \* 26 4 32 1 1009.0 0 \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	16.39	35.527	26.08	5.24	98	0.27	***	***
1	25	16.42	35.528	26.07	5.29	99	0.29	***	***
1	50	16.34	35.507	26.08	5.31	99	0.27	***	***
1	75	15.97	35.478	26.14	5.16	96	0.31	***	***
1	100	15.43	35.411	26.21	4.61	85	0.50	***	***
1	150	13.94	35.268	26.42	4.18	74	0.64	***	***
1	200	13.11	35.213	26.55	4.47	78	0.68	***	***
1	300	11.97	35.113	26.70	4.61	78	0.77	***	***
1	494	9.32	34.744	26.89	4.67	75	1.06	***	***
1	690	7.30	34.537	27.03	4.29	65	1.41	***	***

STATION DATE TIME LATITUDE LONGITUDE  
 G 4/ 15J/63 13/ 9/63 0525 K 34 50 S 150 57 E

SONIC AIR TEMP. WIND ANEM. CLOUD VIS. SEA ATMOS. WIRE ANGLES  
 DEPTH WET DRY DIR, SP. HEIGHT TYPE AMT. DIR, AMT. DIR, AMT. PRESSURE CAST1 CAST2 CAST3  
 82 8.9 13.3 25 7 11 \* 1 8 24 3 00 0 1009.5 0 \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	16.72	35.508	25.99	5.41	102	0.21	***	***
1	10	16.71	35.516	26.00	5.43	102	0.21	***	***
1	20	16.71	35.518	26.00	5.41	102	0.19	***	***
1	30	16.70	35.520	26.00	5.44	102	0.21	***	***
1	40	16.70	35.518	26.00	5.37	101	0.21	***	***
1	50	16.69	35.517	26.00	5.18	98	0.21	***	***
1	60	16.65	35.514	26.01	5.40	102	0.22	***	***
1	70	16.31	35.480	26.06	5.06	95	0.35	***	***

STATION G 4/ 154/63 DATE 13/ 9/63 TIME 1500 K LATITUDE 36 40 S LONGITUDE 150 10 E

SONIC AIR TEMP. WIND ANEM. CLOUD SWELL ATMOS. WIRE ANGLES  
 WET DRY DIR. SP. HEIGHT TYPE AMT. VIS. SEA DIR. AMT. DIR. AMT. PRESSURE CAS11 CAST2 CAST3

124 13.5 18.3 03 2 11 \* 0 7 01 3 00 0 1009.9 0 \* \*

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRATE
1	0	13.74	35.423	26.59	5.77	102	***	***	***
1	10	13.75	35.420	26.58	5.69	101	***	***	***
1	20	13.74	35.422	26.58	5.70	101	***	***	***
1	30	13.70	35.419	26.59	5.70	101	***	***	***
1	40	13.70	35.420	26.59	5.59	99	***	***	***
1	50	13.67	35.418	26.60	5.69	101	***	***	***
1	75	12.94	35.390	26.72	5.70	99	***	***	***
1	110	12.96	35.389	26.72	5.68	99	***	***	***

STATION DATE TIME LATITUDE LONGITUDE  
 G 4/ 155/63 13/ 9/63 1610 K 36 40 S 150 23 E

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

1372 13.5 18.3 04 2 11 \* 0 6 04 3 00 1 1009.8 10 0 \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN X SAT.	INORG. P	TOTAL P	NITRATE
2	0	15.61	35.449	26.20	5.64	104	0.27	***	***
2	25	15.44	35.449	26.24	5.47	100	0.26	***	***
2	50	14.78	35.444	26.38	5.46	99	0.30	***	***
2	75	13.56	35.281	26.51	4.61	81	0.62	***	***
2	100	13.35	35.293	26.57	4.86	85	0.62	***	***
2	150	12.92	35.279	26.64	4.92	86	0.63	***	***
2	200	12.41	35.213	26.69	4.96	85	0.64	***	***
2	300	11.42	35.064	26.77	4.91	82	0.79	***	***
1	500	9.89	34.814	26.84	4.73	77	1.05	***	***
1	700	8.98	34.741	26.94	4.84	77	1.12	***	***
1	900	6.37	34.495	27.13	4.26	63	1.59	***	***
1	1100	4.42	34.489	27.36	3.95	56	1.89	***	***

STATION G 4/ 156/63 DATE 13/ 9/63 TIME 1810 K LATITUDE 36 40 S LONGITUDE 150 42 E

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

4188	13.9	17.2	32	4	11	*	0	6	32	3	01	1	1010.0	15	5	*
CST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN	% SAT.	INORG. P	TOTAL P	NITRA E						
2	0	16.42	35.540	26.08	5.38	101		0.23	***	***						
2	25	16.46	35.539	26.07	5.42	102		0.27	***	***						
2	50	16.43	35.535	26.08	5.38	101		0.28	***	***						
2	75	16.32	35.485	26.07	5.40	101		0.28	***	***						
2	100	15.72	35.450	26.18	5.10	94		0.37	***	***						
2	150	15.22	35.263	26.14	5.21	95		0.40	***	***						
2	200	13.41	35.057	26.37	4.59	81		0.63	***	***						
2	300	11.46	***	***	4.70	***		0.77	***	***						
1	500	11.40	34.674	26.47	5.21	87		0.72	***	***						
1	700	8.41	34.478	26.82	4.53	71		1.27	***	***						
1	900	6.14	34.472	27.14	4.18	62		1.67	***	***						
1	1100	4.63	34.534	27.37	3.96	56		1.90	***	***						
1	1300	3.68	34.586	27.51	3.63	50		1.94	***	***						
1	1500	3.03	34.584	27.57	3.45	47		2.06	***	***						

STATION G 4/ 157/63 DATE 13/ 9/63 TIME 2100 K LATITUDE 36 39 S LONGITUDE 151 15 E

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

4590 13.9 16.1 30 3 11 \* 0 \* 7 30 2 35 1 1012.3 25 5 \*

CST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	17.17	35.572	25.93	5.16	98	0.28	***	***
2	25	17.20	35.573	25.92	5.18	99	0.28	***	***
2	50	17.20	35.573	25.92	5.16	98	0.30	***	***
2	75	17.18	35.571	25.93	5.15	98	0.29	***	***
2	100	17.19	35.572	25.92	4.99	95	0.30	***	***
2	150	17.19	35.570	25.92	5.07	96	0.31	***	***
2	200	16.00	35.477	26.13	4.92	91	0.40	***	***
2	300	13.87	35.315	26.48	4.65	83	0.61	***	***
1	409	11.14	34.968	26.74	4.53	76	0.97	***	***
1	582	9.09	34.711	26.90	4.47	71	1.19	***	***
1	768	7.38	34.545	27.03	4.25	65	1.50	***	***
1	954	5.93	34.472	27.17	4.14	61	1.68	***	***
1	1150	4.82	34.478	27.30	3.96	57	1.89	***	***
1	1349	3.85	34.521	27.44	3.63	51	2.08	***	***



STATION 6 4 158/63 DATE 14/ 9/63 TIME 0001 K LATITUDE 36 39 S LONGITUDE 151 45 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 CAS11 CAS12 CASTS

4665 13.9 16.1 30 3 11 \* 0 \* 8 29 2 35 1 1012.1 10 0 \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRA E
2	0	17.24	35.561	25.91	5.10	97	0.28	***	***
2	25	17.27	35.571	25.91	5.15	98	0.29	***	***
2	50	17.26	35.579	25.91	5.04	96	0.28	***	***
2	75	17.24	35.573	25.91	5.16	98	0.30	***	***
2	100	17.25	35.578	25.91	5.11	97	0.29	***	***
2	150	17.27	35.571	25.91	5.09	97	0.31	***	***
2	200	16.67	35.518	26.01	4.43	83	0.45	***	***
2	300	13.67	35.283	26.49	4.59	81	0.63	***	***
1	453	10.81	34.945	26.79	4.53	75	0.99	***	***
1	620	8.69	34.668	26.93	4.43	70	1.25	***	***
1	799	7.39	34.562	27.04	4.34	66	1.42	***	***
1	974	5.83	34.471	27.18	4.11	60	1.70	***	***
1	1153	4.60	34.475	27.33	3.97	56	1.75	***	***
1	1347	3.69	34.521	27.46	3.65	51	2.01	***	***

STATION G 4/ 159/63 DATE 14/ 9/63 TIME 0.300 K LATITUDE 36 38 S LONGITUDE 152 34 E

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

4663 10.6 17.8 31 3 11 \* 0 7 30 2 35 1 1012.1 10 0 \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INDRG. P	TOTAL P	NITRA. E
2	0	15.56	35.477	26.23	5.45	100	0.21	***	***
2	25	15.57	35.474	26.23	5.49	101	0.19	***	***
2	50	15.56	35.472	26.23	5.41	100	0.26	***	***
2	75	15.38	35.460	26.26	5.44	100	0.26	***	***
2	100	14.25	35.393	26.45	5.18	93	0.40	***	***
2	150	13.17	35.258	26.58	4.17	73	0.63	***	***
2	200	13.10	35.316	26.63	5.06	88	0.58	***	***
2	300	11.32	35.020	26.75	4.53	76	0.84	***	***
1	458	9.04	34.706	26.90	4.64	74	1.08	***	***
1	635	7.50	34.561	27.02	4.31	66	1.35	***	***
1	815	6.21	34.479	27.14	4.14	61	1.45	***	***
1	1000	4.99	34.463	27.27	4.02	58	1.80	***	***
1	1184	4.08	34.515	27.41	3.79	53	1.84	***	***
1	1373	3.27	34.572	27.54	3.45	47	1.99	***	***

STATION G 4/ 160/63 DATE 14/ 9/63 TIME 0700 K LATITUDE 36 45 S LONGITUDE 153 22 E

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

4535	14.4	17.2	13	2	11	*	0	H	*	0	99	9	1014.0	0	0	*
CST	DEPTH	TEMP.	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRAIE					
2	0	15.02	26.35	35.470	5.46	99	0.29	***	***	***	***					
2	25	15.03	26.34	35.468	5.50	100	0.30	***	***	***	***					
2	50	14.55	26.41	35.424	5.33	96	0.37	***	***	***	***					
2	75	13.96	26.50	35.370	5.11	91	0.50	***	***	***	***					
2	100	13.42	26.58	35.326	4.89	86	0.55	***	***	***	***					
2	150	11.98	26.68	35.093	4.43	75	0.84	***	***	***	***					
2	200	11.44	26.72	35.011	4.40	74	0.91	***	***	***	***					
2	300	10.26	26.82	34.858	4.36	71	1.05	***	***	***	***					
1	500	8.75	26.93	34.688	4.65	73	1.21	***	***	***	***					
1	700	7.04	27.06	34.525	4.30	65	1.49	***	***	***	***					
1	900	5.69	27.20	34.472	4.14	60	1.68	***	***	***	***					
1	1100	4.52	27.34	34.487	3.90	55	1.84	***	***	***	***					
1	1300	3.58	27.49	34.540	3.67	51	1.89	***	***	***	***					
1	1500	3.01	27.58	34.591	3.44	47	1.89	***	***	***	***					

STATION G 4/ 161/63 DATE 14/ 9/63 TIME 1745 K LATITUDE 38 30 S LONGITUDE 152 16 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 CAS11 CAST2 CAST3

4535 10.6 16.7 35 4 11 7 6 H 35 3 33 1 1003.1 0 8 \*

CAS1	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRATE
2	0	16.61	35.551	26.05	5.24	99	0.28	***	***
2	25	16.65	35.554	26.04	5.27	99	0.27	***	***
2	50	16.63	35.553	26.04	5.21	98	0.27	***	***
2	75	16.62	35.552	26.04	5.24	99	0.36	***	***
2	100	16.62	35.552	26.04	5.21	98	0.37	***	***
2	150	16.58	35.551	26.05	5.23	98	0.36	***	***
2	200	16.53	35.549	26.06	5.28	99	0.39	***	***
2	300	14.22	35.323	26.41	4.53	81	0.62	***	***
1	500	11.81	35.169	26.78	4.94	84	0.75	***	***
1	700	A.72	34.666	26.92	***	***	1.32	***	***
1	900	6.68	34.500	27.09	4.25	64	1.57	***	***
1	1100	5.27	34.469	27.24	4.07	59	1.80	***	***
1	1300	4.24	34.505	27.39	3.78	53	1.86	***	***
1	1500	3.35	34.545	27.51	3.57	49	2.08	***	***

STATION 6 4/162/63 DATE 14/9/63 TIME 2255 K LATITUDE 38 32 S LONGITUDE 151 05 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

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRA TE
4426	11,7 14,4 25 5 11 5 8 7 25 5 33 1						1010.8	30	20
2	0	14.32	35.547	26.11	5.36	100	0.30	***	***
2	25	16.35	35.547	26.11	5.36	100	0.27	***	***
2	50	16.28	35.549	26.12	5.33	100	0.28	***	***
2	75	15.48	35.507	26.27	5.38	99	0.36	***	***
2	100	15.22	35.468	26.30	5.24	96	0.39	***	***
2	150	14.06	35.363	26.47	5.04	90	0.57	***	***
2	195	13.67	35.344	26.54	5.08	90	0.60	***	***
2	294	11.92	35.108	26.71	4.67	79	0.83	***	***
1	476	9.08	34.708	26.90	5.07	81	1.04	***	***
1	658	7.60	34.561	27.01	4.47	68	1.41	***	***
1	842	6.20	34.477	27.14	4.21	62	1.54	***	***
1	1032	4.92	34.467	27.28	4.09	59	1.85	***	***
1	1228	3.96	34.515	27.43	3.74	52	1.90	***	***
1	1426	3.25	34.560	27.53	3.55	49	2.10	***	***

STATION DATE TIME LATITUDE LONGITUDE

G 4/ 163/63 15/ 9/63 0415 K 38 35 S 149 55 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

3146 11,7 14,4 27 6 11 \* 0 7 27 3 28 4 1010,3 25 5 \*

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRATE
2	0	14.69	35.462	26.41	5.53	100	0.31	***	***
2	25	14.68	35.460	26.42	5.55	100	0.34	***	***
2	50	14.66	35.457	26.42	5.57	101	0.32	***	***
2	75	14.44	35.443	26.45	5.55	100	0.36	***	***
2	100	14.22	35.427	26.49	5.53	99	0.39	***	***
2	150	13.15	35.299	26.61	5.04	88	0.66	***	***
2	200	12.24	35.156	26.68	4.78	82	0.75	***	***
2	300	11.48	35.150	26.82	5.01	84	0.73	***	***
1	484	9.56	34.839	26.92	4.74	76	1.10	***	***
1	677	7.36	34.547	27.03	4.33	66	1.51	***	***
1	870	5.79	34.469	27.18	4.17	61	1.74	***	***
1	1067	4.54	34.471	27.33	4.04	57	1.84	***	***
1	1255	3.77	34.526	27.46	3.67	51	2.00	***	***
1	1448	3.60	34.568	27.50	3.53	49	1.95	***	***

STATION 6 4/ 164/63 DATE 15/ 9/63 TIME 0635 K LATITUDE 38 35 S LONGITUDE 149 36 E

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

1646 11.1 13.3 27 7 11 \* 0 7 27 3 26 4 1012.2 10 0 \*

CST DEPTH TEMP, SALINITY SIGMA-T OXYGEN OXYGEN % SAT, INORG. P TOTAL P NITRATE

2 0 14.60 35.461 26.43 5.58 101 \*\*\* \*\*

2 25 14.57 35.456 26.44 5.58 101 \*\*\* \*\*\*

2 50 14.57 35.454 26.43 5.59 101 \*\*\* \*\*\*

2 75 14.57 35.456 26.44 5.59 101 \*\*\* \*\*\*

2 100 14.58 35.471 26.44 5.57 100 \*\*\* \*\*\*

2 150 14.56 35.452 26.43 5.58 101 \*\*\* \*\*\*

2 200 13.09 35.269 26.60 4.89 85 \*\*\* \*\*\*

2 200 11.46 35.052 26.75 4.70 79 \*\*\* \*\*\*

1 489 8.84 34.677 26.91 4.39 69 \*\*\* \*\*\*

1 686 7.00 34.527 27.07 4.36 66 \*\*\* \*\*\*

1 883 5.70 34.463 27.19 4.21 61 \*\*\* \*\*\*

1 1083 4.17 34.488 27.38 3.86 54 \*\*\* \*\*\*

1 1283 3.46 34.539 27.50 3.64 50 \*\*\* \*\*\*

1 1485 2.85 34.595 27.60 3.57 48 \*\*\* \*\*\*

STATION 6 4/ 165/63 DATE 15/ 9/63 TIME 1005 K LATITUDE 38 30 S LONGITUDE 149 04 E

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

2232 11,4 15.0 25 5 11 \* 0 8 25 2 27 1 1014.0 10 0 \*

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG. P	TOTAL P	NITRATE
2	0	14.03	35.450	26.55	5.52	98	0.31	***	***
2	25	14.01	35.448	26.55	5.58	99	0.39	***	***
2	50	14.01	35.444	26.55	5.57	99	0.41	***	***
2	75	14.01	35.444	26.55	5.58	99	0.40	***	***
2	100	14.01	35.451	26.55	5.57	99	0.41	***	***
2	150	13.61	35.394	26.59	5.59	99	0.50	***	***
2	200	13.17	35.329	26.63	5.29	93	0.59	***	***
2	300	12.14	35.196	26.73	5.66	92	0.69	***	***
1	486	9.74	34.825	26.88	5.07	82	1.04	***	***
1	678	7.60	34.557	27.01	4.47	68	1.50	***	***
1	869	6.18	34.472	27.13	4.28	63	1.66	***	***
1	1061	4.72	34.465	27.31	4.04	58	1.95	***	***
1	1257	3.65	34.523	27.46	3.70	51	1.95	***	***
1	1428	2.94	34.583	27.58	3.53	48	2.13	***	***



STATION G 4/ 166/63 DATE 15/ 9/63 TIME 1315 K LATITUDE 38 30 S LONGITUDE 148 32 E

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

302	11,1	15,6	24	2	11	1	3	7	24	2	25	1	1013,5	0	*	*
CASI	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE							
1	0	13.80	35.411	26.56	5.75	102	***	***	***							
1	25	13.76	35.409	26.57	5.69	101	***	***	***							
1	50	13.72	35.412	26.58	5.69	101	***	***	***							
1	75	13.72	35.411	26.58	5.65	100	***	***	***							
1	100	12.89	35.330	26.69	5.41	94	***	***	***							
1	150	12.29	35.291	26.78	5.32	91	***	***	***							
1	200	12.21	35.350	26.84	5.47	94	***	***	***							
1	275	12.17	35.379	26.87	5.54	95	***	***	***							

STATION DATE TIME LATITUDE LONGITUDE  
 G 4/ 167/63 15/ 9/63 1530 K 38 30 S 148 00 E

SONIC ATR 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  
 55 10.6 13.3 09 2 11 1 5 7 00 0 25 1 1011.0 0 \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	12.54	35.597	26.96	5.99	104	0.26	***	***
1	10	12.46	35.601	26.98	6.00	104	0.28	***	***
1	20	12.33	35.604	27.01	5.95	102	0.27	***	***
1	30	12.33	35.606	27.01	5.95	102	0.28	***	***
1	40	12.33	35.609	27.02	5.98	103	0.27	***	***
1	50	12.33	35.605	27.01	5.95	102	0.26	***	***

STATION 6 4/ 168/63 DATE 16/ 9/63 TIME 0830 K LATITUDE 40 20 S LONGITUDE 151 52 E

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

4572 14.4 15.6 03 6 11 6 6 6 3 06 1 1001.8 0 5 \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	13.54	35.378	26.59	5.85	103	0.37	***	***
2	25	13.55	35.374	26.59	5.86	103	0.40	***	***
2	50	13.53	35.372	26.59	5.87	103	0.42	***	***
2	75	13.53	35.372	26.59	5.70	100	0.51	***	***
2	100	13.51	35.378	26.60	5.87	103	0.56	***	***
2	150	13.19	35.344	26.64	5.54	97	0.56	***	***
2	200	11.35	35.036	26.76	4.61	77	0.99	***	***
2	300	9.21	34.728	26.89	4.56	73	1.19	***	***
1	492	7.10	34.527	27.05	4.40	67	1.48	***	***
1	690	5.63	34.445	27.18	4.35	63	1.62	***	***
1	888	4.67	34.469	27.31	4.10	58	1.68	***	***
1	1086	3.89	34.504	27.43	3.85	54	1.87	***	***
1	1286	3.23	34.557	27.53	3.75	51	1.96	***	***
1	1490	2.77	34.605	27.61	3.59	49	2.01	***	***

STATION G 4/ 169/63 DATE 16/ 9/63 TIME 1340 K LATITUDE 40 19 S LONGITUDE 150 48 E

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

4499 11.1 13.3 32 7 11 5 8 7 32 3 02 1 998.0 5 0 \*

CASI	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
2	0	12.89	35.355	26.71	5.71	99	0.49	***	***
2	25	12.87	35.279 -	26.65	5.59	97	0.50	***	***
2	50	12.82	35.321	26.70	5.54	96	0.49	***	***
2	75	12.58	35.315	26.74	5.46	94	0.64	***	***
2	100	12.52	35.289	26.73	5.53	95	0.62	***	***
2	150	11.69	35.108	26.75	5.02	85	0.83	***	***
2	200	11.08	35.008	26.79	4.89	81	0.85	***	***
2	300	10.14	34.852	26.83	4.86	79	1.02	***	***
1	500	8.51	34.615	26.91	4.93	77	1.26	***	***
1	700	7.18	34.525	27.04	4.32	65	1.57	***	***
1	900	5.71	34.464	27.19	4.13	60	1.76	***	***
1	1100	4.62	34.473	27.32	3.90	55	1.90	***	***
1	1300	3.71	34.514	27.45	3.68	51	1.86	***	***
1	1500	3.08	34.568	27.56	3.49	48	1.99	***	***

- PROPERTY DOUBTFUL

STATION DATE TIME LATITUDE LONGITUDE  
 G 4/ 170/63 16/ 9/63 1900 K 40 15 S 149 47 E

SONIC AIR TEMP. WIND ANEM. CLOUD SEA SWELL ATMOS. WIRE ANGLES  
 DEPTH WFT DRY DIR, SP. HEIGHT TYPE AMT. DIR, AMT. DIR, AMT. PRESSURE CAST1 CAST2 CAST3  
 4060 10.0 13.3 30 6 11 \* 0 \* 01 1 998.3 5 5 \*

CST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG, P	TOTAL P	NITRATE
2	0	13.51	35.392	26.61	5.60	99	0.43	***	***
2	25	13.53	35.391	26.61	5.54	98	0.43	***	***
2	50	13.31	35.373	26.64	5.61	98	0.45	***	***
2	75	13.23	35.371	26.65	5.54	97	0.43	***	***
2	100	13.00	35.349	26.68	5.54	97	0.45	***	***
2	150	12.77	35.313	26.70	5.37	93	0.49	***	***
2	200	12.58	35.308	26.73	5.41	93	0.49	***	***
2	300	11.76	35.208	26.81	5.20	88	0.67	***	***
1	500	10.53	35.027	26.90	5.16	85	0.71	***	***
1	700	7.43	34.547	27.02	4.35	66	1.49	***	***
1	900	5.91	34.470	27.17	4.15	61	1.59	***	***
1	1100	4.43	34.477	27.35	3.87	55	1.93	***	***
1	1300	3.62	34.524	27.47	3.62	50	1.91	***	***
1	1500	2.94	34.585	27.58	3.50	48	1.99	***	***

STATION DATE TIME LATITUDE LONGITUDE  
 G 4/ 171/63 16/ 9/63 2220 K 40 20 S 149 11 E

SONIC ATR 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  
 2195 10,0 12,8 29 5 11 \* 0 \* 7 29 3 35 1 996.0 10 5 \*

CASI	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRAIE
2	0	13.20	35.386	26.67	5.59	98	0.43	***	***
2	25	13.23	35.383	26.66	5.51	97	0.48	***	***
2	50	13.22	35.380	26.66	5.58	98	0.47	***	***
2	75	12.96	35.349	26.69	5.45	95	0.51	***	***
2	100	12.91	35.345	26.70	5.54	96	0.51	***	***
2	150	12.81	35.332	26.71	5.55	96	0.53	***	***
2	200	12.58	35.295	26.72	5.53	95	0.58	***	***
2	300	11.55	35.107	26.78	5.28	89	0.72	***	***
1	498	9.49	34.767	26.88	5.10	82	0.93	***	***
1	695	8.12	34.622	26.98	4.52	70	1.19	***	***
1	890	6.46	34.485	27.11	4.21	63	1.42	***	***
1	1090	4.66	34.462	27.31	3.98	57	1.74	***	***
1	1290	3.80	34.516	27.44	3.74	52	1.86	***	***
1	1490	3.05	34.575	27.56	3.55	48	1.95	***	***

STATION G 4/ 172/63 DATE 17/ 9/63 TIME 0115 K LATITUDE 40 20 S LONGITUDE 148 45 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

44 10.0 12.8 29 1 11 \* 0 8 00 0 35 1 996.0 0 \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	11.42	35.277	26.93	6.00	101	0.27	***	***
1	10	11.44	35.288	26.94	6.02	101	0.26	***	***
1	20	11.41	35.301	26.95	6.06	102	0.27	***	***
1	35	11.35	35.434	27.07	5.92	100	0.28	***	***

STATION DATE TIME LATITUDE LONGITUDE  
 G 4/ 173/63 17/ 9/63 0530 K 40 35 S 147 45 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  
 40 8.9 12.2 23 4 11 \* 0 \* 0 8 24 2 33 1 1014.0 0 \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	11.46	35.445	27.05	5.82	98	0.24	***	***
1	4	11.51	35.443	27.04	5.85	99	0.20	***	***
1	14	11.50	35.447	27.05	5.93	100	0.25	***	***
1	29	11.49	35.442	27.05	5.93	100	0.28	***	***



STATION                      DATE                      TIME                      LATITUDE                      LONGITUDE

G 4/ 174/63                      17/ 9/63                      0802 K                      40 18 S                      147 20 E

SONIC AIR TEMP.                      WIND                      ANEM.                      CLOUD                      VIS.                      SEA                      SWEIL                      ATMOS.                      WIRE ANGLES

DEPTH WET 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		
64	11.1	13.3	22	3	11	*	0	1009.3	0	*	*
1	0	11.66	35.551	27.10	5.89	100	0.19	***	***	***	
1	10	11.68	35.551	27.10	5.91	100	0.19	***	***	***	
1	20	11.67	35.552	27.10	5.93	101	0.24	***	***	***	
1	30	11.66	35.555	27.10	5.95	101	0.25	***	***	***	
1	40	11.68	35.556	27.10	5.96	101	0.25	***	***	***	
1	55	11.70	35.565	27.10	5.98	101	0.22	***	***	***	

STATION DATE TIME LATITUDE LONGITUDE  
 G 4/ 175/63 1038 K 40 00 S 146 58 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

82 11.1 13.9 27 8 11 \* 0 7 27 3 27 1 1012.0 0 \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN X SAT.	INORG. P	TOTAL P	NITRATE
1	0	12.76	35.624	26.94	5.77	100	0.25	***	***
1	10	12.76	35.626	26.94	5.74	100	0.27	***	***
1	20	12.74	35.624	26.95	5.71	99	0.24	***	***
1	30	12.72	35.627	26.95	5.72	99	0.25	***	***
1	40	12.72	35.628	26.95	5.71	99	0.25	***	***
1	50	12.73	35.626	26.95	5.64	98	0.25	***	***
1	65	12.71	35.625	26.95	5.70	99	0.24	***	***

58

4

STATION DATE TIME LATITUDE LONGITUDE  
 G 4/ 176/63 17/ 9/63 1330 K 40 01 S 146 17 E

SONIC AIR TEMP. WIND. ANEM. CLOUD SEA SWELL ATMOS. WIRE ANGLES  
 NET DRY DIR. SP. HEIGHT TYPE AMT. VIS. DIR. AMT. DIR. AMT. PRESSURE CAST1 CAST2 CAST3  
 81 10.6 13.9 27 7 11 0 0 7 27 3 27 1 1013.8 0 \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE.
1	0	12.47	35.514	26.92	5.82	100	0.24	***	***
1	10	12.52	35.515	26.91	5.93	102	0.25	***	***
1	20	12.48	35.514	26.91	5.91	102	0.25	***	***
1	30	12.46	35.509	26.91	5.82	100	0.26	***	***
1	40	12.46	35.514	26.92	5.82	100	0.22	***	***
1	50	12.46	35.510	26.91	5.85	101	0.21	***	***
1	60	12.39	35.508	26.93	5.94	102	0.22	***	***
1	75	12.44	35.508	26.92	5.93	102	0.25	***	***

STATION G 4/ 177/63 DATE 17/ 9/63 TIME 1640 K LATITUDE 40 00 S LONGITUDE 145 36 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  
 DEPTH WET DRY 23 6 11 5 1 7 23 3 24 1 1015.6 10 \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	12.47	35.480	26.89	5.83	101	0.16	***	***
1	10	12.49	35.480	26.88	5.82	100	0.25	***	***
1	20	12.49	35.478	26.88	5.87	101	0.25	***	***
1	30	12.47	35.478	26.89	5.82	100	0.24	***	***
1	40	12.45	35.478	26.89	5.82	100	0.25	***	***
1	50	12.45	35.479	26.89	5.83	100	0.25	***	***
1	75	12.42	35.476	26.89	5.86	101	0.24	***	***

STATION G 4/ 178/63 DATE 17/ 9/63 TIME 1945 K LATITUDE 39 40 S LONGITUDE 145 00 E

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

62 13.9 14.4 25 4 11 \* 0 7 25 2 27 1 1018.0 0 \* \*  
 CAST DEPTH TEMP. SALINITY SIGMA-T OXYGEN OXYGEN % SAT. INORG. P TOTAL P NIIRAE  
 1 0 12.98 35.584 26.87 5.82 102 0.18 \*\*\*  
 1 10 12.98 35.585 26.87 5.74 100 0.19 \*\*\*  
 1 20 12.99 35.585 26.87 5.84 102 0.19 \*\*\*  
 1 30 12.97 35.584 26.87 5.87 102 0.18 \*\*\*  
 1 40 12.97 35.588 26.87 5.76 100 0.18 \*\*\*  
 1 50 12.97 35.585 26.87 5.84 102 0.20 \*\*\*

STATION G 4/ 179/63 DATE 17/ 9/63 TIME 2140 K LATITUDE 39 17 S LONGITUDE 145 00 E

SONIC AIR TEMP. WIND DIR, SP. ANEM. HEIGHT CLOUD TYPE AMT. VIS. SEA DIR. AMT. SWELL DIR. AMT. ATMOS. PRESSURE WIRE ANGLES  
 DEPTH WET DRY DIR, SP. HEIGHT TYPE AMT. \* 0 6 22 3 21 1 1018.0 0 \* \*

73 12.8 13.9 22 3 11 \* 0 6 22 3 21 1 1018.0 0 \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	13.45	35.626	26.80	5.84	103	0.24	***	***
1	10	13.45	35.627	26.80	5.76	102	0.25	***	***
1	20	13.47	35.626	26.80	5.76	102	0.26	***	***
1	30	13.45	35.627	26.80	5.77	102	0.24	***	***
1	40	13.47	35.628	26.80	5.78	102	0.22	***	***
1	50	13.47	35.626	26.80	5.71	101	0.25	***	***
1	60	13.45	35.627	26.80	5.79	102	0.25	***	***

STATION G 4/ 180/63 DATE 17/ 9/63 TIME 2340 K LATITUDE 38 54 S LONGITUDE 145 00 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

75 11.1 12.8 21 2 11 5 7 6 21 2 21 1 1018.8 0 \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	13.29	35.672	26.87	5.76	101	0.22	***	***
1	10	13.28	35.673	26.87	5.78	102	0.22	***	***
1	20	13.29	35.672	26.87	5.76	101	0.21	***	***
1	30	13.26	35.671	26.88	5.77	101	0.24	***	***
1	40	13.29	35.671	26.87	5.76	101	0.22	***	***
1	50	13.29	35.672	26.87	5.77	101	0.21	***	***
1	65	13.25	35.672	26.88	5.68	100	0.21	***	***

STATION DATE TIME LATITUDE LONGITUDE  
 G 4/ 181/63 18/ 9/63 0055 K 38 40 S 145 00 E

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

77 10.6 12.8 22 3 11 0 8 6 22 2 22 1 1018.0 0 \* \*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	13.03	35.684	26.93	5.81	102	0.20	***	***
1	10	13.05	35.683	26.93	5.81	102	0.18	***	***
1	20	13.01	35.683	26.94	5.81	101	0.20	***	***
1	30	13.00	35.679	26.94	5.76	101	0.19	***	***
1	40	12.96	35.683	26.95	5.72	100	0.18	***	***
1	50	12.94	35.682	26.95	5.76	100	0.21	***	***
1	65	12.82	35.683	26.98	5.76	100	0.22	***	***



## 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.
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.
46. Oceanographical observations in the Indian Ocean in 1965. H.M.A.S. *Gascoyne* Cruise G5/65.