OCEANOGRAPHICAL OBSERVATIONS
IN THE INDIAN OCEAN IN 1964
H.M.A.S. *DIAMANTINA*
Cruise Dm4/64

OCEANOGRAPHICAL CRUISE REPORT NO. 38

DIVISION OF FISHERIES AND OCEANOGRAPHY
COMMONWEALTH SCIENTIFIC AND INDUSTRIAL
RESEARCH ORGANIZATION, AUSTRALIA 1969

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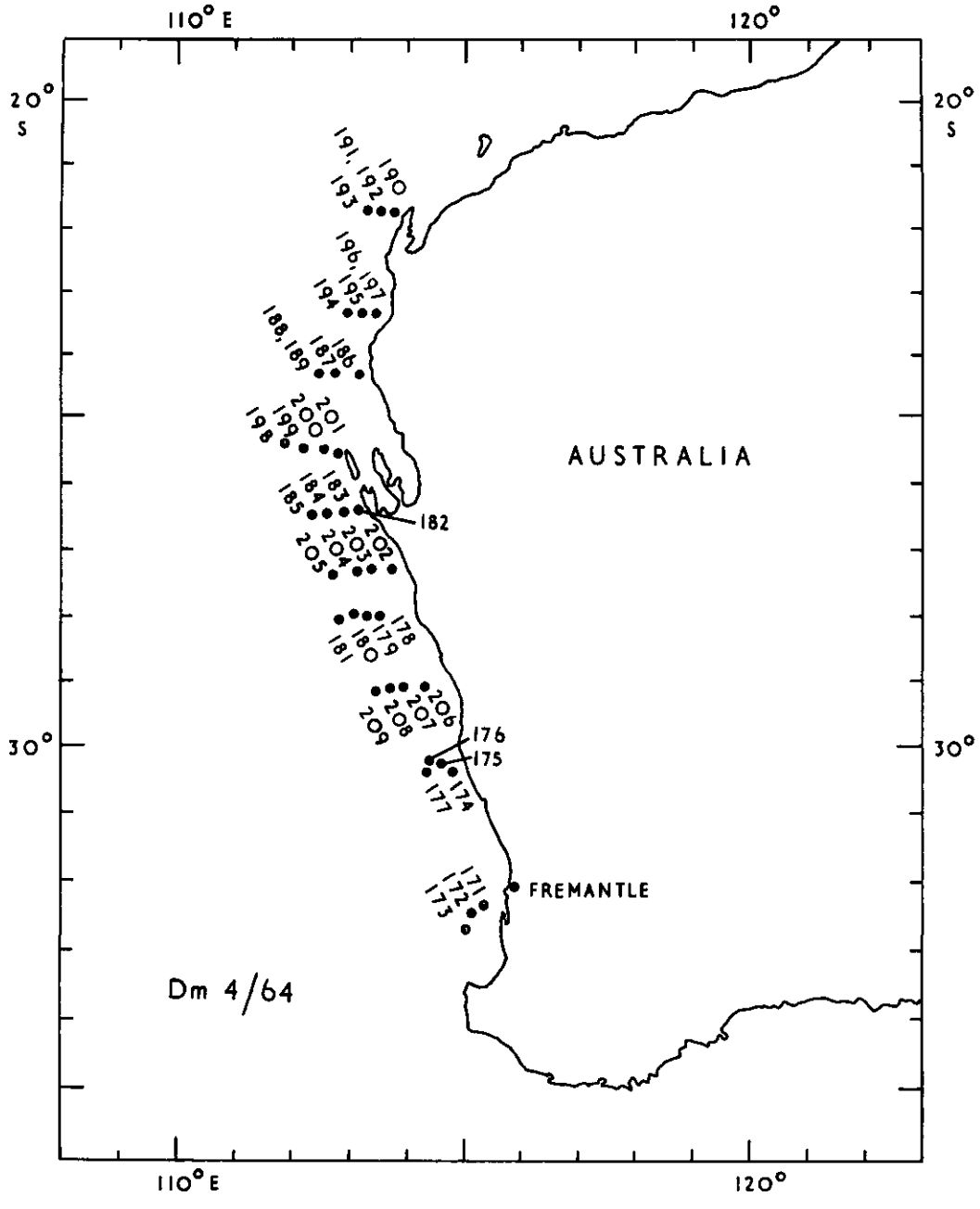

Fig. 1.- Track Chart

OCEANOGRAPHICAL CRUISE REPORT

No. 38

Oceanographical Observations in the Indian Ocean in 1964

H.M.A.S. Diamantina

Cruise Dm4/64

July 20-29, 1964

I. INTRODUCTION

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

Objectives

To study the distribution and growth of larval stages of the western crayfish (Panulirus longipes cygnus).
To sample sediments on the continental shelf.
To examine hydrological conditions on and adjacent to the continental shelf.

Itinerary

The cruise began at Fremantle and worked six east-west traverses north to about 21°40'S., then four east-west traverses south to Fremantle where the cruise ended (Fig. 1).

Scientific Personnel

T.R. Cowper (Cruise Leader)
J. Klye
L.R. Thomas
C. Sanders, University of Western Australia

Water samples were collected and analysed in the ship's laboratory by J. Klye. Zooplankton and micronekton samples were collected by L.R. Thomas. Bottom samples were collected by C. Sanders. Bottom photographs were taken by L.R. Thomas.
The data were processed under the direction of W. Hedge, using computer programmes designed by A.D. Crooks. The track chart was prepared for publication by R. Breach.

II. WORK ACCOMPLISHED

Thirty-nine stations were worked (Dm4/171/64-Dm4/209/64). Surface and subsurface hydrology samples were collected at all stations. Zooplankton and micronekton samples were collected at 7 stations. Sediments were sampled at 29 stations, bottom dredging was done at 7 stations, and bottom photographs were taken at 10 stations.

TABLE 1

WORK DONE AT EACH STATION

Stn No.	Hydrology Surface to Depth (m)	Micro-nekton	Zoo-plankton 1	Zoo-plankton 2	Sedi-ments	Bottom Photo-graphs	Bottom Dredge
171	50				+		
172	100				+	+	+
173	150				+		
174	50				+		
175	75				+	+	+
176	150				+		
177	450						
178	50				+		
179	100				+	+	+
180	150				+		
181	500	+	+	+			
182	50				+		
183	100				+	+	+
184	150				+		
185	500	+	+	+			
186	50				+		
187	100				+	+	+
188	150				+		
189	500	+	+	+			
190	50				+		
191	100				+	+	+
192	150				+		
193	500	+	+	+			
194	500	+	+	+			
195	150				+		
196	100				+	+	
197	50				+		
198	500	+	+	+			
199	150				+		

Stn No.	Hydrology Surface to Depth (m)	Micro-nekton	Zoo-plankton 1	Zoo-plankton 2	Sedi-ments	Bottom Photo-graphs	Bottom Dredge
200	100				+	+	+
201	40				+		
202	50				+		
203	100				+	+	
204	150						
205	500	+	+	+			
206	40				+	+	
207	100				+		
208	150						
209	450						

Zooplankton 1 Indian Ocean Standard Net, vertical haul
2 Surface plankton net tow

III. METHOD OF COLLECTION AND ANALYSIS OF SAMPLES

1. Physics

Temperature.—Water temperatures were taken with deep-sea reversing thermometer: protected thermometers with a range of -2° to 30°C, and unprotected thermometers with a range of either -2° to 30°C or -4° to 60°C. Temperatures are considered accurate to ±0.03 degC.

Thermometric Depth.—Depth calculations were made by the method described by Pollak (1950) and are considered accurate to ±15 m at depths greater than 100 m, and to 1% at depths less than 1000 m.

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

2. Chemistry

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

Dissolved Oxygen.—A version of the standard Winkler method was used to determine the amount of dissolved oxygen in the 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 (Rochford 1963). Duplicate titrations were made on approximately every tenth sample. Saturation values were computed using the simpler of the equations given by Richards and Corwin (1956) -

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

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

Standard phosphate solutions were made up in distilled water. At air temperatures less than 25°C, analyses were carried out in batches of 10; readings were begun within 10 min of adding reagents, and completed within 10 min. At air temperatures greater than 25°C, batches of 6 were analysed; readings were begun within 5 min of adding reagents and completed within 7 min. Each batch was compared with a distilled water blank and a 0.65 µg-atom/l standard in a Hilger Spekker absorptiometer using 4 cm cells and Ilford 608 filters. Each day a complete calibration was made using standards up to 3.25 µg-atom/l. Results are given as µg-atom/l with no correction for salt error and are precise to ±10% for values less than 0.5 µg-atom/l and ±5% for higher values. To correct for salt effects the results given should be multiplied by 1.15.

3. Zooplankton

Vertical Hauls 200-0 m.—The Indian Ocean Standard Net (IOSN) was used in the standard manner (Currie 1963), except that a heavier weight (100 lb) was attached to keep the net under control; this was replaced by a 30 lb weight during washing operations. No flowmeter was used. Wire angle averaged 20° from vertical and never exceeded 40°. The length of wire paid out to place the net at 200 m was 200-260 m, with a mean of 214 m.

Samples were removed from the net in the following manner. The plankton bucket was detached, the contents were poured into a larger container, and the bucket was replaced. The net was lowered into the water up to the ring and raised again and

the washings collected; remnants still adhering to the cod-end were washed into the bucket by splashing water onto the outside. Finally the net was lowered into the water and washed through without the bucket attached.

Samples were concentrated in the ship's laboratory and stored in neutralized 10% formalin in plastic bottles, and sent to the Indian Ocean Biological Centre, Cochin, India, for taxonomic studies.

Surface Tows.—An N70 plankton net was towed at the surface for 30 min at 3 kt at each of the IOSN stations. The samples were concentrated and stored as for IOSN samples and examined for crayfish larvae at Perth.

4. Micronekton

Oblique tows were made through the upper 200 m with a 5-ft Isaacs-Kidd midwater trawl, a scaled-down version of the 6-ft trawl (King and Iversen 1962; Aron 1960).

No flowmeter was used. The trawl was fitted with a depth recorder (Hamon, Tranter, and Heron 1963) and lowered from the stern while the ship's speed was 2 kt. When the trawl was clear of the ship, speed was increased to 5 kt and the wire paid out at 40-50 m/min under a constant and minimum tension. After 600 m of wire had been paid out the ship's speed was reduced to 3 kt and further adjusted according to the reading of a tension gauge. A final 100 m was then paid out. After 5 min the wire was retrieved at a winch speed of 9 m/min. Hauls were made at approx. 2200 h. The paying-out period averaged 15 min, and the retrieval period 80 min.

The net was washed from outside into the bucket, which was then removed from the net. The net was checked for organisms caught in the meshes (e.g. leptocephali), and these were removed. Samples were stored in neutralized 10% formalin in plastic bottles; large organisms were stored separately. At Perth, samples were examined for crayfish larvae.

5. Benthos

A triangle dredge (1 m sides) was towed on the sea floor at 2-3 kt for periods ranging from 45-80 min.

Benthic material was sorted on board; crayfish and crayfish larvae were removed and the remainder of the samples was sorted into phyla and sent to the Western Australian Museum.

6. Geology

Bottom Photographs.—Bottom photographs were taken using the Ewing suspended camera as described in CSIRO Aust. (1967).

Sediment Sampling.—Bottom sediments were sampled with the Van Veen grab. The samples were sent to the Geology Department, University of Western Australia.

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IV. DATA

Hydrology data were processed in a C.D.C. 3600 Computer. An explanation of headings used is given at the beginning of the relevant part.

DATA

PART 1

HYDROLOGY

SURFACE SAMPLES

EXPLANATION OF HEADINGS

Parts 1 and 2	Hydrology
STATION	Gives the station identification. For example, Dm4/171/64 signifies the 171st station worked by Diamantina in 1964, on her 4th 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. The code letter for the time zone follows the time. Zone Time throughout the cruise was Western Australian Standard Time, GMT +8 hr, Code H
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. Navy 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. Navy Hydrogr. Office (1955)
WEA.	Weather is coded using Table 1 in U.S. Navy Hydrogr. Office (1955)
VIS.	Visibility is coded using Table 4 in U.S. Navy Hydrogr. Office (1955)
SEA DIR. AMT.	Sea direction and amount are coded using Tables 5 and 8 in U.S. Navy Hydrogr. Office (1955)

SWELL DIR. AMT.	Sea swell direction and amount are coded using Tables 6 and 8 in U.S. Navy Hydrogr. Office (1955)
BAROM. or ATMOS. PRESSURE	Atmospheric pressure given in millibars
WIRE ANGLES CAST1 CAST2 CAST3	Wire angles are measured at the surface and expressed in degrees for each cast
CAST	Gives the cast number
DEPTH	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	Inorganic phosphorus, given in µg-atom P/l

*, ***, or a blank indicate no data available

CRUISE	STATION NUMBER	YR.	MTH.	DAY	TIME	LATITUDE	LONGITUDE	TEMP.	SALINITY	WIND DN.	WIND AMT.	SEA DN.	SEA AMT.	SWELL DN.	SWELL AMT.	WEA.	VIS.	BAROM.
4	171	64	7	20	1900	H 32 19 S	115 20 E	19.9	35.51	34	6	34	2	34	1	00	7	1009.0
4	172	64	7	20	2005	H 32 26 S	115 14 E	20.0	35.53	34	6	34	3	34	1	50	8	1010.5
4	173	64	7	20	2315	H 32 31 S	115 01 E	19.6	35.59	33	6	33	3	33	4	50	7	1010.0
4	174	64	7	21	1655	H 30 21 S	114 47 E	19.9	35.39	30	7	30	3	26	4	03	7	1009.0
4	175	64	7	21	1742	H 30 20 S	114 43 E	20.5	35.41	30	7	30	3	26	4	03	7	1009.0
4	176	64	7	21	2000	H 30 20 S	114 35 E	20.4	35.44	29	7	28	3	27	4	53	6	1009.1
4	177	64	7	21	2110	H 30 23 S	114 30 E	20.3	35.55	25	8	25	3	27	4	50	7	1009.8
4	178	64	7	22	1145	H 28 00 S	113 31 E	21.3	35.37	23	6	23	3	25	1	50	8	1016.0
4	179	64	7	22	1240	H 28 00 S	113 21 E	21.9	35.38	23	6	23	3	24	4	03	8	1016.0
4	180	64	7	22	1450	H 27 58 S	113 11 E	21.9	35.38	24	4	24	3	24	4	00	7	
4	181	64	7	22	1550	H 27 59 S	112 58 E	21.8	35.38	24	4	24	3	24	1	00	7	1017.5
4	182	64	7	23	0800	H 26 20 S	113 15 E	22.6	35.34	04	2	27	2	21	1	03	7	1021.6
4	183	64	7	23	0845	H 26 21 S	113 07 E	22.6	35.35	20	2	20	2	22	1	00	7	1020.5
4	184	64	7	23	1440	H 26 20 S	112 27 E	21.8	35.43	22	2	22	2	22	4	01	7	1018.3
4	185	64	7	23	1600	H 26 20 S	112 17 E	21.0	35.54	21	1		1	23	1	00	8	1017.5
4	186	64	7	24	0800	H 24 20 S	113 16 E	22.7	35.30	11	2	15	2	19	1	00	8	1020.5
4	187	64	7	24	1020	H 24 20 S	112 46 E	23.2	35.22	11	2	11	1	22	1	00	8	1021.2
4	188	64	7	24	1250	H 24 20 S	112 33 E	23.1	35.27	21	1	21	1	21	1	00	7	1014.6
4	189	64	7	24	1420	H 24 20 S	112 33 E	22.2	35.40	23	2	23	1	23	1	00	7	1014.2
4	190	64	7	25	1545	H 21 49 S	113 57 E	23.7	35.24	22	2	23	2	23	1	00	8	1013.9
4	191	64	7	25	1630	H 21 48 S	113 53 E	23.8	35.23	22	2	22	2	22	1	00	8	1014.0
4	192	64	7	25	1805	H 21 49 S	113 52 E	23.7	35.22	23	2	23	2	21	1	00	8	1015.3
4	193	64	7	25	1900	H 21 49 S	113 49 E	23.8	35.20	21	1	21	1	23	1	00	8	1015.4
4	194	64	7	26	0335	H 23 19 S	113 07 E	23.3	35.27	22	4	22	2	24	1	50	7	1015.8
4	195	64	7	26	0515	H 23 20 S	113 13 E	23.0	35.14	26	2	26	2	22	1	00	8	1015.5
4	196	64	7	26	0700	H 23 20 S	113 25 E	23.6	35.25	26	2	26	2	22	1	00	8	1015.0
4	197	64	7	26	0835	H 23 22 S	113 25 E	22.9	35.30	24	3	24	2	24	1	00		1014.8
4	198	64	7	27	0130	H 25 20 S	111 58 E	22.1	35.36	21	4	21	2	20	1	00	8	1014.5
4	199	64	7	27	0300	H 25 25 S	112 13 E	22.9	35.24	20	2	20	2	20	1	00	8	1015.6
4	200	64	7	27	0730	H 25 27 S	112 48 E	22.7	35.30	20	2	20	2	22	1	03		1016.1
4	201	64	7	27	0845	H 25 30 S	112 53 E	22.6	35.33	21	2	21	2	22	1	01	7	1015.0
4	202	64	7	27	1745	H 27 20 S	113 48 E	21.3	35.36	22	1	22	2	25	4	01	7	1018.2
4	203	64	7	27	2025	H 27 20 S	113 14 E	22.5	35.35	27	4	25	2	25	1	52	7	1015.1
4	204	64	7	27	2230	H 27 21 S	113 02 E	22.4	35.38	27	2	24	2	25	1	01	7	1014.2
4	205	64	7	28	0140	H 27 25 S	112 43 E	22.1	35.39	30	3	30	1	21	1	00	8	1013.6
4	206	64	7	28	1225	H 29 05 S	114 17 E	20.9	35.42	29	6	30	2	31	1	00	7	1008.6
4	207	64	7	28	1430	H 29 06 S	113 56 E	21.5	35.43	29	6	29	2	26	1	52	7	1007.1
4	208	64	7	28	1620	H 29 08 S	113 47 E	20.8	35.51	31	6	31	3	28	4	03	7	1009.6
4	209	64	7	28	1715	H 29 06 S	113 43 E	20.9	35.49	26	7	24	3	28	4	03	7	1007.4

DATA

PART 2

HYDROLOGY

DEEP STATIONS

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 171/64	20/ 7/64	1900 H	32 19 S	115 20 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
54	15,6	18,3	34	6	16	4	5	7	34	2	34	1	1009,0	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	19,89	35,509	25,20	5,23	105	0,27	***	***
1	10	19,92	35,506	25,19	5,28	106	0,23	***	***
1	20	19,90	35,507	25,19	5,20	104	0,23	***	***
1	30	19,87	35,511	25,20	5,19	104	0,23	***	***
1	40	19,64	35,506	25,26	5,21	104	0,25	***	***
1	50	19,37	35,486	25,32	5,18	103	0,26	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 172/64	20/ 7/64	2005 H	32 26 S	115 14 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
104	18,3	19,4	34	6	16	8	4	8	34	3	34	1	1010,5	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	20,01	35,526	25,18	5,13	103	0,25	***	***
1	25	20,02	35,527	25,18	5,11	103	0,22	***	***
1	50	20,00	35,526	25,18	5,11	103	0,21	***	***
1	75	19,97	35,522	25,19	5,11	103	0,22	***	***
1	100	19,92	35,519	25,20	5,13	103	0,25	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 173/64	20/ 7/64	2315 H	32 31 S	115 01 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
185	17,8	18,3	33	6	16	6	6	7	33	3	33	4	1010,0	10	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	19,63	35,590	25,33	5,25	105	0,21	***	***
1	25	19,57	35,590	25,34	5,18	103	0,19	***	***
1	50	19,45	35,608	25,39	5,20	103	0,20	***	***
1	75	19,46	35,625	25,40	5,20	103	0,20	***	***
1	100	19,36	35,656	25,45	5,25	104	0,21	***	***
1	150	19,11	35,731	25,57	5,29	105	0,22	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 174/64	21/ 7/64	1655 H	30 21 S	114 47 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
55	11.1	17.8	30	7	16	8	6	7	30	3	26	4	1009.0	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	19.88	35.387	25.11	5.10	102	0.21	***	***
1	10	19.87	35.382	25.11	5.11	102	0.21	***	***
1	20	19.84	35.379	25.11	5.12	102	0.20	***	***
1	30	19.82	35.387	25.12	5.11	102	0.18	***	***
1	40	19.78	35.378	25.13	5.09	102	0.21	***	***
1	50	19.77	35.386	25.13	5.10	102	0.20	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 175/64	21/ 7/64	1742 H	30 20 S	114 43 E

SONIC DEPTH	AIR TEMP, WET	AIR TEMP, DRY	WIND DIR,	WIND SP,	ANEM, HEIGHT	CLOUD TYPE	CLOUD AMT,	VIS,	SEA DIR,	SEA AMT,	SWELL DIR,	SWELL AMT,	ATMOS, PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
110	16,7	10,6	30	7	16	8	7	7	30	3	26	4	1009,0	*	*	*

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG, P	TOTAL P	NITRATE
1	0	20,48	35,411	24,97	5,09	103	0,18	***	***
1	25	20,42	35,394	24,97	5,02	101	0,18	***	***
1	50	20,34	35,394	24,99	5,09	103	0,21	***	***
1	75	20,13	35,383	25,04	5,03	101	0,22	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 176/64	21/ 7/64	2000 H	30 20 S	114 35 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
185	13,9	17,2	29	7	16	8	8	6	28	3	27	4	1009,1	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	20,40	35,441	25,01	5,04	102	0,27	***	***
1	25	20,41	35,452	25,02	5,03	102	0,23	***	***
1	50	20,59	35,542	25,04	5,05	102	0,18	***	***
1	75	20,52	35,539	25,05	5,04	102	0,17	***	***
1	100	20,43	35,609	25,13	5,06	102	0,15	***	***
1	150	20,26	35,634	25,19	5,04	102	0,16	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 177/64	21/ 7/64	2110 H	30 23 S	114 30 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
558	12,8	15,6	25	8	16	6	7	7	25	3	27	4	1009,8	15	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	20,31	35,550	25,12	5,13	104	0,16	***	***
1	22	20,30	35,535	25,11	5,09	103	0,12	***	***
1	45	20,31	35,548	25,12	5,11	103	0,12	***	***
1	67	20,23	35,548	25,14	5,11	103	0,14	***	***
1	89	20,34	35,583	25,13	5,08	103	0,16	***	***
1	144	20,29	35,584	25,15	5,16	104	0,16	***	***
1	179	20,32	35,621	25,17	5,11	103	0,18	***	***
1	268	18,91	35,802	25,68	5,04	99	0,25	***	***
1	446	9,33	34,689	26,84	5,47	87	1,01	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 178/64	22/ 7/64	1145 H	28 00 S	113 31 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
55	14,7	18,1	23	6	16	8	4	8	23	3	25	1	1016,0	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	21,30	35,369	24,71	5,08	104	0,23	***	***
1	10	21,26	35,367	24,72	5,08	104	0,20	***	***
1	20	21,26	35,370	24,72	5,13	105	0,20	***	***
1	30	21,24	35,368	24,73	5,07	104	0,19	***	***
1	40	20,85	35,391	24,85	4,99	102	0,23	***	***
1	50	20,75	35,370	24,86	5,01	102	0,25	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 179/64	22/ 7/64	1240 H	28 00 S	113 21 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
110	15,3	18,9	23	6	16	8	4	8	23	3	24	4	1016,0	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	21,89	35,378	24,56	4,98	103	0,19	***	***
1	25	21,86	35,386	24,57	4,93	102	0,18	***	***
1	50	21,85	35,375	24,56	4,94	102	0,18	***	***
1	75	21,77	35,381	24,59	4,95	103	0,18	***	***
1	100	21,68	35,380	24,62	4,92	102	0,19	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 180/64	22/ 7/64	1450 H	27 58 S	113 11 E

SONIC DEPTH	AIR TEMP, WET	AIR TEMP, DRY	WIND DIR,	WIND SP,	ANEM, HEIGHT	CLOUD TYPE	CLOUD AMT,	VIS,	SEA DIR,	SEA AMT,	SWELL DIR,	SWELL AMT,	ATMOS, PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
183	13,9	19,4	24	4	16	8	4	7	24	3	24	4	*	*	*	*

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG, P	TOTAL P	NITRATE
1	0	21,91	35,376	24,55	4,91	102	0,20	***	***
1	25	21,84	35,372	24,56	4,92	102	0,20	***	***
1	50	21,81	35,371	24,57	4,94	102	0,23	***	***
1	75	21,79	35,368	24,57	4,91	102	0,23	***	***
1	100	21,76	35,371	24,59	4,95	103	0,20	***	***
1	150	21,21	35,444	24,79	4,86	100	0,19	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 181/64	22/ 7/64	1550 H	27 59 S	112 58 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
521	13,9	18,9	24	4	16	8	4	7	24	3	24	1	1017,5	10	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	21,84	35,384	24,57	4,97	103	0,18	***	***
1	24	21,79	35,378	24,58	4,91	102	0,18	***	***
1	48	21,78	35,376	24,58	4,94	102	0,20	***	***
1	72	21,76	35,369	24,58	4,97	103	0,19	***	***
1	96	21,76	35,377	24,59	4,94	102	0,19	***	***
1	144	21,75	35,377	24,59	4,92	102	0,20	***	***
1	192	20,31	35,646	25,19	4,96	100	0,20	***	***
1	288	14,61	35,492	26,45	5,30	96	0,43	***	***
1	480	8,54	34,640	26,93	5,39	84	1,07	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 182/64	23/ 7/64	0800 H	26 20 S	113 15 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
79	15,0	17,8	04	2	16	8	7	7	27	2	21	1	1021,6	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	22,58	35,343	24,33	4,93	104	0,17	***	***
1	10	22,54	35,342	24,35	4,92	103	0,14	***	***
1	20	22,54	35,341	24,34	4,92	103	0,14	***	***
1	30	22,54	35,341	24,34	4,94	104	0,16	***	***
1	40	22,53	35,341	24,35	4,90	103	0,17	***	***
1	50	22,54	35,340	24,34	4,91	103	0,17	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 183/64	23/ 7/64	0845 H	26 21 S	113 07 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
110	14,4	19,4	20	2	16	6	8	7	20	2	22	1	1020,5	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	22,57	35,349	24,34	4,89	103	0,14	***	***
1	25	22,53	35,351	24,35	4,87	102	0,14	***	***
1	50	22,52	35,350	24,36	4,85	102	0,24	***	***
1	75	22,48	35,352	24,37	4,88	102	0,17	***	***
1	100	22,46	35,360	24,38	4,88	102	0,17	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 184/64	23/ 7/64	1440 H	26 20 S	112 27 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
192	15,0	20,6	22	2	16	4	5	7	22	2	22	4	1018,3	*	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	21,78	35,435	24,63	5,00	104	0,16	***	***
1	25	21,62	35,439	24,68	5,00	103	0,17	***	***
1	50	21,16	35,515	24,86	4,47	92	0,31	***	***
1	75	20,80	35,572	25,00	4,56	93	0,32	***	***
1	100	20,26	35,632	25,19	4,50	91	0,33	***	***
1	150	19,56	35,805	25,51	4,97	99	0,22	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 185/64	23/ 7/64	1600 H	26 20 S	112 17 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
521	14,4	20,0	21	1	16	8	6	8	*	1	23	1	1017,5	10	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	21,04	35,536	24,91	5,10	104	0,20	***	***
1	25	20,83	35,533	24,96	5,08	104	0,17	***	***
1	50	20,61	35,562	25,05	5,04	102	0,17	***	***
1	75	20,48	35,636	25,14	5,04	102	0,16	***	***
1	100	20,01	35,697	25,31	5,10	103	0,19	***	***
1	150	19,70	35,756	25,44	5,02	100	0,18	***	***
1	200	19,02	35,826	25,67	4,94	98	0,23	***	***
1	300	15,19	35,590	26,40	5,22	95	0,37	***	***
1	500	7,93	34,604	26,99	5,16	80	1,27	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 186/64	24/ 7/64	0800 H	24 20 S	113 16 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
55	14,4	17,2	11	2	16	*	0	8	15	2	19	1	1020,5	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	22,70	35,305	24,27	4,80	101	0,21	***	***
1	10	22,62	35,300	24,29	4,77	100	0,21	***	***
1	20	22,62	35,301	24,29	4,78	100	0,25	***	***
1	30	22,61	35,304	24,30	4,79	101	0,24	***	***
1	40	22,59	35,306	24,30	4,80	101	0,31	***	***
1	50	19,69	35,304	25,09	4,80	96	0,24	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 187/64	24/ 7/64	1020 H	24 20 S	112 46 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
112	16,7	21,7	11	2	16	*	0	8	11	1	22	1	1021,2	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	23,17	35,224	24,07	4,80	102	0,19	***	***
1	25	23,09	35,225	24,10	4,79	101	0,17	***	***
1	50	22,71	35,283	24,25	4,71	99	0,17	***	***
1	75	22,52	35,300	24,32	4,65	98	0,19	***	***
1	100	22,53	35,289	24,31	4,63	97	0,19	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 188/64	24/ 7/64	1250 H	24 20 S	112 33 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
220	22,8	17,2	21	1	16	8	1	7	21	1	21	1	1014,6	0	*	*

CAST	DEPTH /	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	23,08	35,274	24,14	4,93	104	0,17	***	***
1	25	22,81	35,293	24,23	4,88	103	0,18	***	***
1	50	22,19	35,368	24,46	4,82	101	0,20	***	***
1	75	21,86	35,446	24,62	4,90	102	0,19	***	***
1	100	21,63	35,536	24,75	4,73	98	0,19	***	***
1	150	20,81	35,667	25,15	4,70	95	0,28	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 189/64	24/ 7/64	1420 H	24 20 S	112 33 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
558	16,4	21,7	23	2	16	8	1	7	23	1	23	1	1014,2	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	22,16	35,400	24,50	4,98	104	0,24	***	***
1	25	21,95	35,406	24,56	4,92	102	0,21	***	***
1	50	21,83	35,475	24,65	4,84	100	0,19	***	***
1	75	21,65	35,498	24,71	4,94	102	0,20	***	***
1	100	21,21	35,570	24,89	4,64	95	0,24	***	***
1	150	19,91	35,717	25,35	4,66	94	0,27	***	***
1	200	18,22	35,715	25,78	4,67	91	0,34	***	***
1	300	14,08	35,498	26,57	5,36	96	0,40	***	***
1	500	8,64	34,655	26,93	5,37	84	1,18	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 190/64	25/ 7/64	1545 H	21 49 S	113 57 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
71	18,9	23,3	22	2	16	*	0	8	23	2	23	1	1013,9	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	23,71	35,238	23,93	4,88	105	0,15	***	***
1	10	23,59	35,241	23,97	4,92	105	0,16	***	***
1	20	23,54	35,243	23,98	4,90	105	0,16	***	***
1	30	23,53	35,241	23,98	4,90	105	0,17	***	***
1	40	23,51	35,236	23,99	4,87	104	0,22	***	***
1	50	23,49	35,244	24,00	4,87	104	0,22	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 191/64	29/ 7/64	1630 H	21 48 S	113 53 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
110	18,9	23,9	22	2	16	*	0	8	22	2	22	1	1014,0	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	23,79	35,226	23,89	4,90	105	0,13	***	***
1	25	23,59	35,231	23,96	4,87	104	0,13	***	***
1	50	23,55	35,235	23,97	4,82	103	0,18	***	***
1	75	23,45	35,253	24,01	4,78	102	0,16	***	***
1	100	23,43	35,235	24,01	4,82	103	0,15	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 192/64	25/ 7/64	1805 H	21 49 S	113 52 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
110	16,1	22,8	23	2	16	*	0	8	23	2	21	1	1015,3	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	23,70	35,222	23,92	4,88	105	0,13	***	***
1	25	23,64	35,215	23,93	4,86	104	0,12	***	***
1	50	23,55	35,231	23,97	4,76	102	0,12	***	***
1	75	23,37	35,265	24,05	4,85	103	0,32	***	***
1	100	23,16	35,309	24,14	4,78	101	0,18	***	***
1	150	22,27	35,351	24,43	4,46	93	0,38	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 193/64	25/ 7/64	1900 H	21 49 S	113 49 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
558	16,1	22,2	21	1	16	*	0	8	21	1	23	1	1015,4	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	23,77	35,202	23,88	4,82	103	0,15	***	***
1	25	23,64	35,192	23,91	4,75	102	0,13	***	***
1	50	23,61	35,191	23,92	4,72	101	0,16	***	***
1	75	23,58	35,197	23,93	4,65	99	0,17	***	***
1	100	23,47	35,289	24,04	4,62	99	0,17	***	***
1	150	22,32	35,287	24,36	4,21	88	0,34	***	***
1	200	19,96	35,482	25,16	4,27	86	0,40	***	***
1	300	15,91	35,686	26,31	5,06	94	0,32	***	***
1	500	8,13	34,673	27,02	4,63	72	1,33	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 194/64	26/ 7/64	0335 H	23 19 S	113 07 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
512	18,9	21,7	22	4	16	6	7	7	22	2	24	1	1015,8	10	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	23,33	35,271	24,06	4,84	103	0,19	***	***
1	25	23,29	35,270	24,07	4,80	102	0,16	***	***
1	50	23,27	35,267	24,08	4,81	102	0,19	***	***
1	75	23,22	35,254	24,08	4,82	102	0,18	***	***
1	100	22,82	35,293	24,23	4,67	99	0,22	***	***
1	150	21,90	35,422	24,58	4,94	103	0,16	***	***
1	200	21,48	35,548	24,80	4,70	97	0,23	***	***
1	300	16,75	35,716	26,14	4,86	92	0,62	***	***
1	500	8,77	34,696	26,94	5,22	82	1,28	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 195/64	26/ 7/64	0515 H	23 20 S	113 13 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
183	18,3	21,1	26	2	16	8	3	8	26	2	22	1	1015,5	10	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	23,01	35,137	24,05	4,94	104	0,17	***	***
1	25	22,95	35,145	24,08	4,90	104	0,18	***	***
1	50	22,97	35,167	24,09	4,87	103	0,18	***	***
1	75	23,06	35,227	24,11	4,84	102	0,19	***	***
1	100	22,86	35,278	24,20	4,64	98	0,23	***	***
1	150	21,91	35,372	24,55	4,93	102	0,18	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 196/64	26/ 7/64	0700 H	23 20 S	113 25 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
110	15,6	21,1	26	2	16	8	2	8	26	2	22	1	1015,0	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	23,56	35,247	23,98	4,88	104	0,23	***	***
1	25	23,37	35,238	24,03	4,87	104	0,19	***	***
1	50	23,32	35,248	24,05	4,84	103	0,19	***	***
1	75	23,23	***	***	4,73	***	0,23	***	***
1	100	23,07	35,274	24,14	4,87	103	0,19	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 197/64	26/ 7/64	0835 H	23 22 S	113 25 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
58	19,4	21,1	24	3	16	3	1	*	24	2	24	1	1014,8	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	22,85	35,300	24,22	4,93	104	0,18	***	***
1	10	22,75	35,323	24,27	4,93	104	0,26	***	***
1	20	22,75	35,305	24,26	4,92	104	0,22	***	***
1	30	22,72	35,297	24,26	4,91	103	0,24	***	***
1	40	22,64	35,309	24,29	4,81	101	0,19	***	***
1	50	22,37	35,313	24,37	4,91	103	0,19	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 198/64	27/ 7/64	0130 H	25 20 S	111 58 E

SONIC DEPTH	AIR TEMP, WET	AIR TEMP, DRY	WIND DIR,	WIND SP,	ANEM, HEIGHT	CLOUD TYPE	CLOUD AMT,	VIS,	SEA DIR,	SEA AMT,	SWELL DIR,	SWELL AMT,	ATMOS, PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
521	15,6	19,7	21	4	16	8	2	8	21	2	20	1	1014,5	20	*	*

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG, P	TOTAL P	NITRATE
1	0	22,10	35,364	24,49	4,99	104	0,17	***	***
1	24	21,92	35,382	24,55	4,95	103	0,13	***	***
1	49	21,76	35,444	24,64	4,96	103	0,16	***	***
1	73	21,21	35,496	24,83	4,96	102	0,18	***	***
1	98	21,07	35,533	24,90	4,96	102	0,18	***	***
1	147	20,43	35,696	25,20	4,92	100	0,20	***	***
1	196	19,23	35,795	25,59	4,81	95	0,21	***	***
1	294	14,66	35,549	26,49	5,29	96	0,40	***	***
1	490	8,30	34,615	26,95	5,25	82	1,22	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 199/64	27/ 7/64	0300 H	25 25 S	112 13 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
188	15,3	19,4	20	2	16	8	2	8	20	2	20	1	1015,6	10	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	22,88	35,239	24,17	4,92	104	0,19	***	***
1	25	22,84	35,247	24,19	4,90	103	0,18	***	***
1	50	***	35,280	***	4,93	***	0,16	***	***
1	75	22,25	35,336	24,42	4,92	103	0,18	***	***
1	100	21,78	35,447	24,64	4,96	103	0,15	***	***
1	150	20,83	35,586	25,00	4,81	98	0,22	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 200/64	27/ 7/64	0730 H	25 27 S	112 48 E

SONIC DEPTH	AIR TEMP, WET	AIR TEMP, DRY	WIND, DIR,	WIND, SP,	ANEM, HEIGHT	CLOUD TYPE	CLOUD AMT,	VIS,	SEA DIR,	SEA AMT,	SWELL DIR,	SWELL AMT,	ATMOS, PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
110	15,0	20,0	20	2	16	4	8	*	20	2	22	1	1016,1	0	*	*

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG, P	TOTAL P	NITRATE
1	0	22,72	35,303	24,26	5,07	107	0,22	***	***
1	25	22,66	35,299	24,28	5,00	105	0,18	***	***
1	50	22,67	35,301	24,28	5,02	106	0,21	***	***
1	75	22,56	35,334	24,33	5,01	105	0,29	***	***
1	100	22,53	35,341	24,35	4,93	104	0,21	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 201/64	27/ 7/64	0845 H	25 30 S	112 53 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
59	15,6	20,6	21	2	16	4	7	7	21	2	22	1	1015,0	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	22,55	35,331	24,33	4,99	105	0,20	***	***
1	10	22,52	35,349	24,35	4,93	103	0,18	***	***
1	20	22,54	35,331	24,34	4,92	103	0,18	***	***
1	30	22,52	35,333	24,34	4,99	105	0,19	***	***
1	40	22,50	35,331	24,35	4,97	104	0,18	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 202/64	27/ 7/64	1745 H	27 20 S	113 48 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
57	15,0	18,9	22	1	16	8	7	7	22	2	25	4	1018,2	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	21,29	35,360	24,71	5,16	106	0,22	***	***
1	10	21,10	35,344	24,75	5,14	105	0,20	***	***
1	20	21,05	35,345	24,76	5,13	105	0,19	***	***
1	30	21,02	35,344	24,77	5,11	104	0,28	***	***
1	40	20,99	35,344	24,78	5,08	104	0,24	***	***
1	50	21,00	35,343	24,77	5,07	104	0,25	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 203/64	27/ 7/64	2025 H	27 20 S	113 14 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
117	13,3	20,0	27	4	16	8	7	7	25	2	25	1	1015,1	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	22,48	35,353	24,37	4,96	104	0,19	***	***
1	25	22,46	35,359	24,38	4,93	103	0,35	***	***
1	50	22,43	35,359	24,39	4,91	103	0,24	***	***
1	75	22,37	35,360	24,41	4,89	102	0,17	***	***
1	100	22,29	35,358	24,43	4,84	101	0,22	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 204/64	27/ 7/64	2230 H	27 21 S	113 02 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
183	12,8	18,9	27	2	16	8	6	7	24	2	25	1	1014,2	5	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	22,37	35,378	24,42	4,94	103	0,17	***	***
1	25	22,32	35,365	24,42	4,94	103	0,16	***	***
1	50	22,22	***	***	***	***	***	***	***
1	75	22,19	35,378	24,47	4,97	104	0,18	***	***
1	100	21,68	35,439	24,66	4,92	102	0,19	***	***
1	150	21,02	35,516	24,90	4,98	102	0,19	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 205/64	28/ 7/64	0140 H	27 25 S	112 43 E

SONIC DEPTH	AIR TEMP, WET	AIR TEMP, DRY	WIND DIR,	WIND SP,	ANEM, HEIGHT	CLOUD TYPE	CLOUD AMT,	VIS,	SEA DIR,	SEA AMT,	SWELL DIR,	SWELL AMT,	ATMOS, PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
512	16,1	19,4	30	3	16	6	7	8	30	1	21	1	1013,6	10	*	*

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG, P	TOTAL P	NITRATE
1	0	22,12	35,394	24,50	4,93	103	0,19	***	***
1	25	21,94	35,410	24,56	4,91	102	0,18	***	***
1	49	21,66	35,465	24,68	4,85	100	0,18	***	***
1	74	21,60	35,479	24,71	4,82	100	0,19	***	***
1	98	20,85	35,578	24,99	4,90	100	0,21	***	***
1	147	20,30	35,711	25,24	4,97	100	0,20	***	***
1	196	19,80	35,754	25,41	4,93	99	0,21	***	***
1	293	15,22	35,626	26,42	5,13	94	0,42	***	***
1	489	8,23	34,612	26,95	5,27	82	1,26	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 206/64	28/ 7/64	1225 H	29 05 S	114 17 E

SONIC DEPTH	AIR TEMP, WET	AIR TEMP, DRY	WIND DIR,	WIND SP,	ANEM, HEIGHT	CLOUD TYPE	CLOUD AMT,	VIS,	SEA DIR,	SEA AMT,	SWELL DIR,	SWELL AMT,	ATMOS, PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
53	16,1	21,1	29	6	16	8	3	7	30	2	31	1	1008,6	10	*	*

CAST	DEPTH	TEMP,	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT,	INORG, P	TOTAL P	NITRATE
1	0	20,94	35,424	24,85	5,13	105	0,19	***	***
1	10	20,92	35,434	24,87	5,13	105	0,17	***	***
1	20	20,89	35,438	24,88	5,12	104	0,24	***	***
1	30	20,81	35,439	24,90	5,10	104	0,19	***	***
1	40	20,79	35,445	24,91	5,08	103	0,19	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 207/64	28/ 7/64	1430 H	29 06 S	113 56 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
115	16,7	20,0	29	6	16	6	8	7	29	2	26	1	1007,1	10	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	21,48	35,434	24,71	5,01	103	0,20	***	***
1	25	21,45	35,439	24,72	5,01	103	0,17	***	***
1	50	21,18	35,460	24,81	5,05	104	0,17	***	***
1	75	20,73	35,515	24,98	5,07	103	0,16	***	***
1	100	20,53	35,573	25,08	5,06	103	0,19	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 208/64	28/ 7/64	1620 H	29 08 S	113 47 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
185	16,1	18,9	31	6	16	8	6	7	31	3	28	4	1009,6	0	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	20,79	35,506	24,96	5,10	104	0,15	***	***
1	25	20,79	35,505	24,95	5,10	104	0,17	***	***
1	50	20,45	35,561	25,09	5,06	102	0,17	***	***
1	75	20,34	35,577	25,13	5,07	102	0,19	***	***
1	100	20,26	35,576	25,15	5,07	102	0,17	***	***
1	150	20,20	35,585	25,17	5,08	102	0,17	***	***

STATION	DATE	TIME	LATITUDE	LONGITUDE
DM 4/ 209/64	28/ 7/64	1715 H	29 06 S	113 43 E

SONIC DEPTH	AIR TEMP. WET	AIR TEMP. DRY	WIND DIR.	WIND SP.	ANEM. HEIGHT	CLOUD TYPE	CLOUD AMT.	VIS.	SEA DIR.	SEA AMT.	SWELL DIR.	SWELL AMT.	ATMOS. PRESSURE	WIRE ANGLES CAST1	CAST2	CAST3
556	17.2	15.0	26	7	16	8	7	7	24	3	28	4	1007.4	20	*	*

CAST	DEPTH	TEMP.	SALINITY	SIGMA-T	OXYGEN	OXYGEN % SAT.	INORG. P	TOTAL P	NITRATE
1	0	20.90	35.486	24.91	5.10	104	0.19	***	***
1	23	20.88	***	***	5.16	***	0.17	***	***
1	46	20.79	35.510	24.96	5.06	103	0.16	***	***
1	69	20.55	35.550	25.05	5.04	102	0.17	***	***
1	91	20.51	35.560	25.07	5.04	102	0.17	***	***
1	137	20.43	35.563	25.10	5.06	102	0.18	***	***
1	183	20.31	35.564	25.13	5.07	102	0.23	***	***
1	274	14.71	35.553	26.48	5.27	95	0.44	***	***
1	456	8.77	34.666	26.91	5.51	87	1.13	***	***

DATA

PART 3

CRAYFISH LARVAE

EXPLANATION OF HEADINGS

Part 3	Crayfish Larvae
STN	Gives the station number
DATE	Given as day/month/year
LATITUDE LONGITUDE	Given in degrees, minutes, and seconds
TIME	Given in Zone Time, and is the time at the beginning of the tow. The code letter for the time zone follows the time. Zone Time throughout the cruise was Western Australian Standard Time, GMT +8 hr, Code H
DURATION	Duration of tow given in minutes
DEPTH	Sampling depth given in metres

A blank indicates no crayfish larvae in sample
* indicates no data available

MIDWATER TRAWL SAMPLES

STN	DATE	LATITUDE	LONGITUDE	TIME	DURATION	DEPTH	PHYLLOSOMA			PUERULUS
							Panulirus longipes cygnus Stage I	Other panulirids	Other genera	Panulirus longipes
181	22/7/64	27 58 5 S.	112 58 2 E.	2140 H	*	200-0			2	
185	23/7/64	26 20 0 S.	112 16 5 E.	2010 H	105	200-0			1	
189	24/7/64	24 20 0 S.	112 33 0 E.	1927 H	71	200-0				
193	25/7/64	21 48 0 S.	113 49 4 E.	2000 H	85	200-0			15	
194	26/7/64	23 18 5 S.	113 07 0 E.	0200 H	125	200-0	1		3	1
198	26/7/64	25 20 0 S.	111 58 0 E.	2320 H	140	200-0				
205	27/7/64	27 24 5 S.	112 43 0 E.	2345 H	135	200-0			2	

IOSN SAMPLES

STN	DATE	LATITUDE	LONGITUDE	TIME	DURATION	DEPTH	PHYLLOSOMA			PUERULUS
							Panulirus lõñgipes cygnus Stage I	Other Panulirids	Other genera	Panulirus longipes
181	22/7/64	27 58 5 S.	112 58 2 E.	1620 H	*	200-0			1	
185	23/7/64	26 20 0 S.	112 16 5 E.	1640 H	*	200-0				
189	24/7/64	24 20 0 S.	112 33 0 E.	1850 H	*	200-0				
193	25/7/64	21 48 5 S.	113 49 4 E.	1850 H	*	200-0				
194	26/7/64	23 18 5 S.	113 07 0 E.	0404 H	*	200-0				
198	26/7/64	25 20 0 S.	111 58 0 E.	0220 H	*	200-0				
205	27/7/64	27 24 5 S.	112 43 0 E.	0215 H	*	200-0				

N-70 PLANKTON NET SAMPLES

STN	DATE	LATITUDE	LONGITUDE	TIME	DURATION	DEPTH	PHYLLOSOMA			PUERULUS
							Panulirus longipes cygnus Stage I	Other Panulirids	Other genera	Panulirus longipes
181	22/7/64	27 58 5 S.	112 58 2 E.	2140 H	30	0			2	
185	23/7/64	26 20 0 S.	112 16 5 E.	2010 H	30	0		1		
189	24/7/64	24 20 0 S.	112 33 0 E.	1927 H	30	0				
193	25/7/64	21 48 5 S.	113 49 4 E.	2000 H	30	0		2	9	
194	26/7/64	23 18 5 S.	113 07 0 E.	0210 H	30	0			2	
198	26/7/64	25 20 0 S.	111 58 0 E.	0030 H	30	0			1	
205	27/7/64	27 24 5 S.	112 43 0 E.	0120 H	30	0			1	

DREDGE SAMPLES

STN	DATE	LATITUDE	LONGITUDE	TIME	DURATION	DEPTH	PHYLLOSOMA			PUERULUS
							Panulirus longipes cygnus Stage I	Other panulirids	Other genera	Panulirus longipes
172	20/7/64	32 25 5 S.	115 14 0 E.	2000 H	45	106				
179	22/7/64	27 59 8 S.	113 21 0 E.	1330 H	*	117				
183	23/7/64	26 20 5 S.	113 07 2 E.	0940 H	40	110				
187	24/7/64	24 19 8 S.	112 46 2 E.	*	*	112				
191	25/7/64	21 48 0 S.	113 52 8 E.	1725 H	*	110				
200	27/7/64	25 27 0 S.	112 48 0 E.	0600 H	25	112				

DATA

PART 4

SEDIMENTS

EXPLANATION OF HEADINGS

Part 4	Sediments
STATION	Gives the station identification. For example, Dm4/171/64 signifies the 171st station worked by Diamantina in 1964, on her 4th cruise for that year
LATITUDE LONGITUDE	Given in degrees and minutes
SONIC DEPTH	Given in metres, measured at standard sound velocity of 800 fm (1463 m) per second

SEDIMENT SAMPLES

STATION	LATITUDE	LONGITUDE	SONIC DEPTH	SAMPLING METHOD	DESCRIPTION OF SEDIMENT
Dm4/171/64	32 19 S.	115 20 E.	54	Van Veen Grab	Coarse, calcareous sand with shell detritus
Dm4/172/64	32 26 S.	115 14 E.	104	Van Veen Grab	Fine, calcareous sand and shell detritus
Dm4/173/64	32 31 S.	115 01 E.	185	Van Veen Grab	Fine, calcareous sand and debris
Dm4/174/64	30 21 S.	114 47 E.	55	Van Veen Grab	Medium, calcareous sand with coralline algae and debris
Dm4/175/64	30 20 S.	114 43 E.	110	Van Veen Grab	Medium to fine, calcareous sand with coralline algae and debris
Dm4/178/64	28 00 S.	113 31 E.	55	Van Veen Grab	Medium to coarse, well-rounded, carbonate grains and shell debris
Dm4/179/64	28 00 S.	113 21 E.	110	Van Veen Grab	Fine, carbonate sand with bryozoan and shell debris
Dm4/182/64	26 20 S.	113 15 E.	79	Van Veen Grab	Fine, calcareous sand
Dm4/183/64	26 21 S.	113 07 E.	110	Van Veen Grab	Coarse, fragmented, skeletal debris
Dm4/184/64	26 20 S.	112 27 E.	192	Van Veen Grab	Fine, calcareous sand and shell
Dm4/186/64	24 20 S.	113 16 E.	55	Van Veen Grab	Medium to fine, calcareous sand, well-rounded, and with shell debris

SEDIMENT SAMPLES

STATION	LATITUDE	LONGITUDE	SONIC DEPTH	SAMPLING METHOD	DESCRIPTION OF SEDIMENT
Dm4/187/64	24 20 S.	112 46 E.	112	Van Veen Grab	Medium-fine, calcareous sand with shell detritus
Dm4/188/64	24 20 S.	112 33 E.	220	Van Veen Grab	Medium to fine, calcareous sand with shell detritus and large foraminifera
Dm4/190/64	21 49 S.	113 57 E.	71	Van Veen Grab	Medium-grained, rounded, calcareous, quartzose sand
Dm4/191/64	21 48 S.	113 53 E.	110	Van Veen Grab	Fine-grained, rounded, calcareous, quartzose sand
Dm4/192/64	21 49 S.	113 52 E.	110	Van Veen Grab	Very fine, poorly rounded, calcareous, quartzose sand with organic darker grains
Dm4/195/64	23 20 S.	113 13 E.	183	Van Veen Grab	Medium-grained, calcareous sand with shell detritus
Dm4/196/64	23 20 S.	113 25 E.	110	Van Veen Grab	Medium- to fine-grained, calcareous sand and shell debris
Dm4/197/64	23 22 S.	113 25 E.	58	Van Veen Grab	Medium-grained, calcareous sand and shell debris
Dm4/199/64	25 25 S.	112 13 E.	188	Van Veen Grab	Fine, calcareous sand
Dm4/200/64	25 27 S.	112 48 E.	110	Van Veen Grab	Grit/sand composed of shell detritus and rounded, carbonate grains

SEDIMENT SAMPLES

STATION	LATITUDE	LONGITUDE	SONIC DEPTH	SAMPLING METHOD	DESCRIPTION OF SEDIMENT
Dm4/201/64	25 30 S.	112 53 E.	59	Van Veen Grab	Fine, calcareous sand
Dm4/202/64	27 20 S.	113 48 E.	57	Van Veen Grab	Gritty shell debris
Dm4/203/64	27 20 S.	113 14 E.	117	Van Veen Grab	Fine sand and shell debris
Dm4/204/64	27 21 S.	113 02 E.	183	Van Veen Grab	Fine, calcareous sand
Dm4/206/64	29 05 S.	114 17 E.	53	Van Veen Grab	Medium-grained, calcareous sand with heavy minerals
Dm4/207/64	29 06 S.	113 56 E.	115	Van Veen Grab	Fine sand and shell debris

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.
26. Oceanographical observations in the Pacific Ocean in 1963. H.M.A.S. *Gascoyne* Cruise G3/63.
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.

OCEANOGRAPHICAL CRUISE REPORTS

(Continued)

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.
38. Oceanographical observations in the Indian Ocean in 1964. H.M.A.S. *Diamantina* Cruise Dm4/64.
39. Oceanographical observations in the Pacific Ocean in 1964. H.M.A.S. *Gascoyne* Cruise G4/64.
40. Oceanographical observations in the Indian Ocean in 1964. H.M.A.S. *Diamantina* Cruise Dm5/64.
41. Oceanographical observations in the Indian Ocean in 1964. H.M.A.S. *Gascoyne* Cruise G5/64.
42. Oceanographical observations in the Pacific Ocean in 1964. H.M.A.S. *Gascoyne* Cruise G6/64.
43. Oceanographical observations in the Indian Ocean in 1965. H.M.A.S. *Gascoyne* Cruise G2/65.
46. Oceanographical observations in the Indian Ocean in 1965. H.M.A.S. *Gascoyne* Cruise G5/65.