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U.S. PROGRAM IN BIOLOGY

INTERNATIONAL INDIAN OCEAN EXPEDITION

FINAL CRUISE REPORT
ANTON BRUUN CRUISE 3

OCEANOGRAPHIC DATA

BATHYTHERMOGRAPH POSITIONS

STATION LISTS for BIOLOGICAL COLLECTIONS

INTERNATIONAL INDIAN OCEAN EXPEDITION

WOODS HOLE OCEANOGRAPHIC INSTITUTION

JANUARY, 1965

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Woods Hole Oceanographic Institution
ATLAS - GAZETTEER COLLECTION

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[series]
Cruise 3

U. S. PROGRAM IN BIOLOGY

INTERNATIONAL INDIAN OCEAN EXPEDITION

Final Report: R/V ANTON BRUUN, Cruise 3

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MBL/WHOI
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U. S. PROGRAM IN BIOLOGY

INTERNATIONAL INDIAN OCEAN EXPEDITION

Final Report: R/V ANTON BRUUN, Cruise 3

INTRODUCTION

Cruise 3 of the R/V ANTON BRUUN, originating from Bombay on August 8 and terminating at Port Louis, Mauritius on September 20, 1963, was the first of two cruises on which a special effort was made to sample the meso- and bathypelagic fauna of the western Indian Ocean. Collections were made with a 10-ft. Isaacs-Kidd midwater trawl at 17 stations from 11°56'N. latitude to 40°54'S latitude, along the 60°E. meridian. In addition to the midwater trawl collections, the basic program of hydrography, biological oceanography, and primary production was continued.

Presented in this report are the reduced oceanographic, chemical, and biological data, station lists of plankton, midwater trawl, and miscellaneous biological collections, and bathythermograph positions for Cruise 3. A narrative report of Cruise 3 was issued as News Bulletin No. 4 of the U. S. Program in Biology, IIOE, dated February, 1964.

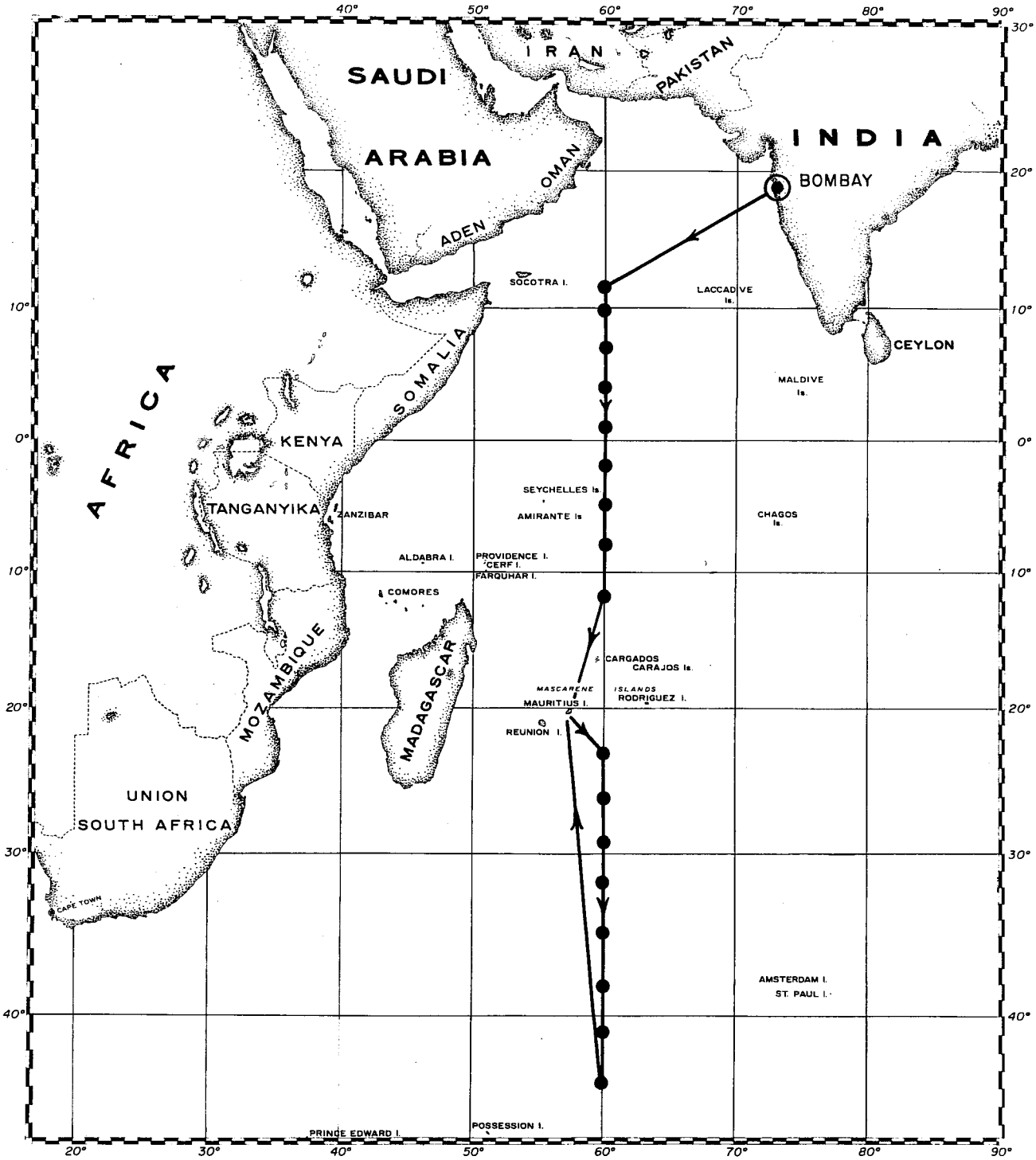

Fig. 1. Cruise track, R/V ANTON BRUUN, Cruise 3

Table 1. Itinerary, Cruise 3

August 8, 1964	Departed Bombay, India.
August 13-25	Completed series of stations from 12° N. to 12° S. latitude along 60° E. longitude.
August 29	Arrived Port Louis, Mauritius.
September 3	Departed Port Louis.
September 4-13	Completed series of stations from 23° S. to 44° S. latitude along 60° E. longitude.
September 20	Arrived Port Louis - end of Cruise 3.

Table 2 Key to Abbreviations

A. PLANKTON NETS AND TYPES OF TOWS

IOSN:	Indian Ocean Standard Net 113 cm diameter 0.33 mm mesh aperture
75M25:	75 cm diameter 0.064 mm mesh aperture (No. 25 mesh)
BE-3:	Bé multiple plankton sampler 70.7 cm X 70.7 cm (square opening) 0.333 mm mesh aperture (No. 3 mesh)
M-O:	1 meter diameter 0.6 mm mesh aperture (No. 0 mesh)
V:	Vertical
H:	Horizontal
Q:	Oblique

B. OTHER SAMPLING GEAR

RR:	Rod and reel

C. INSTITUTIONS & INDIVIDUALS

SOSC:	Smithsonian Oceanographic Sorting Center U. S. National Museum Washington, D. C.
IOBC:	Indian Ocean Biological Center Ernakulam Cochin, India
POFI:	Bureau of Commercial Fisheries U. S. Fish & Wildlife Service Honolulu, Hawaii
WHOI:	Woods Hole Oceanographic Institution Woods Hole, Massachusetts (R. H. Backus)
AWHB:	Lamont Geological Observatory Columbia University Palisades, New York (A. W. H. Bé)
UCSB:	University of California at Santa Barbara Goleta, California (A. W. Ebeling)

Table 3- Summary of activities, exclusive of midwater trawl hauls, Cruise 3

Sta.	Date	Position Latitude	Position Longitude	Hydro Cast	Prim. Prod.	Plankton Tows 75M25	Plankton Tows IOSN	Plankton Tows BE-3	Plankton Tows M-O
145	13 Aug.	11°56'N	60°53'E	x	x		x		x
146	15 Aug.	10°12'N	60°04'E	x	x		x	x	
147	16 Aug.	07°13'N	59°57'E	x	x	x	x	x	
148	17 Aug.	04°05'N	59°58'E	x	x	x	x	x	x
149	19 Aug.	01°16'N	60°08'E	x	x	x	x	x	
150	20 Aug.	02°00'S	59°59'E	x	x	x	x	x	x
151	22 Aug.	05°04'S	60°03'E	x	x		x	x	x
152	24 Aug.	07°21'S	59°44'E	x	x		x	x	
152A	25 Aug.	10°23'S	60°08'E						x
153	25 Aug.	11°39'S	58°02'E	x	x		x	x	
153A	28 Aug.	16°40'S	56°54'E			x			x
154	4 Sept.	22°58'S	59°45'E	x	x	x	x	x	
155	5 Sept.	25°55'S	60°01'E	x	x	x	x		x
156	6 Sept.	29°24'S	60°05'E	x	x	x	x	x	x
157	7 Sept.	31°58'S	59°51'E	x	x	x	x		
157A	8 Sept.	32°28'S	59°52'E						x
158	9 Sept.	34°57'S	60°05'E	x	x	x	x	x	
159	10 Sept.	38°22'S	59°51'E	x	x	x	x		x
160	12 Sept.	40°54'S	60°01'E	x	x	x	x		x

REDUCED DATA

U. S. - PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 145
CRUISE NO. 3
VESSEL R/V ANTON BRUUN
DATE 13-VIII-63
RELIABILITY OF DEPTH

LAT. 11° 56' N
LONG. 60° 53' E
DEPTH 4355
TIME 1015
WIND

PRIMARY PROD. 0.5 g C /m²/day
EXT. COEFF. (k) 0.07
RADIATION 407 gcal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 4.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.			DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d.	C^{14}-1000 fc µgC/l./d.	
1	26.63	36.115	4.77	0.31	1.8	0.19	1.7			1	0.10	12.2	47.3	
25	26.62	36.120	4.84	0.30	1.7	0.17	1.6			11	0.18	11.6	38.6	
50	26.61	36.113	4.70	0.28	1.1	0.19	1.7			22	0.11	10.7	38.8	
74	26.58	36.114	4.87	0.27	1.2	0.18	1.7			34	--	8.0	38.0	
99	26.56	36.116	4.82	0.29	0.5	0.01	1.3			69	0.15	1.5	26.6	
124	26.57	36.116	4.75	0.34	1.1	0.20	1.6							
149	--	36.128	4.83	0.28	0.8	0.08	1.3							
199	21.01	35.752	1.09	1.65	26.4	0.08	11.5							
298	14.53	35.475	0.28	2.24	31.7	0.03	19.7							
397	12.37	35.412	0.80	2.31	39.2	0.04	31.2							
497	11.36	35.441	0.51	2.48	39.4	0.07	37.6							
596	11.19	35.512	0.51	2.69	37.2	0.05	45.9							
695	10.53	35.468	0.34	2.74	35.8	0.06	55.1							
794	9.70	35.390	0.25	2.75	38.8	0.16	62.3							
894	8.93	35.333	0.30	2.83	40.7	0.05	68.1							
993	8.17	35.256	0.51	2.89	47.5	0.43	78.7							
978	8.19	35.250	0.40	2.92	50.3	u	72.6							
1176	6.82	35.145	0.46	2.91	41.5	0.02	85.3							
1373	5.53	35.031	1.14	2.90	48.2	0.04	98.4							
1673	4.16	34.925	1.79	2.82	42.8	0.14	117.8							
1972	3.03	34.843	2.35	2.73	37.3	0.26	124.2							

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 146
CRUISE NO. 3
VESSEL R/V ANTON BRUUN
DATE 14-VIII-63
RELIABILITY OF DEPTH

LAT. 10° 12' N
LONG. 60° 04' E
DEPTH 4151
TIME 2327
WIND

PRIMARY PROD. 0.5 g C /m²/day
EXT. COEFF. (k) 0.09
RADIATION 414 gcal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 11.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.							
1	26.65	35.939	5.27	0.31	2.6	0.17	1.7							
25	26.70	35.952	5.32	0.31	1.7	0.15	2.6							
50	26.90	36.079	5.32	0.28	0.5	0.17	1.9							
75	26.13	35.925	4.93	0.40	4.6	0.56	2.6							
100	25.54	35.835	5.40	0.48	5.1	0.37	2.5							
125	24.77	35.654	3.72	0.76	8.2	0.07	4.3							
149	21.98	35.643	2.27	1.34	22.3	0.06	9.6							
199	17.34	35.455	1.25	1.95	29.7	0.04	18.9							
299	13.34	35.363	0.96	2.16	35.3	0.04	26.0							
398	11.92	35.293	0.70	2.35	20.1	0.02	31.3							
498	11.37	35.345	0.54	2.48	36.8	0.04	38.0							
598	10.81	35.389	0.34	2.59	32.7	0.01	46.4							
697	10.20	35.397	0.40	2.72	--	u	54.5							
797	9.68	35.418	0.40	2.79	37.3	0.02	61.0							
896	8.86	35.334	0.53	2.78	29.9	0.03	69.1							
996	8.13	35.269	0.56	2.88	33.5	0.06	77.6							
973	8.32	35.280	0.50	2.85	42.2	0.10	70.6							
1170	7.09	35.200	0.75	2.89	36.8	0.12	83.7							
1369	5.41	35.020	1.29	2.88	45.6	0.01	99.4							
1668	3.90	34.888	1.98	2.79	36.8	0.12	111.3							
1968	2.94	34.827	2.62	2.68	38.5	0.01	122.4							

DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d.	C^{14}-1000fc µgC/l./d.	
1	0.15	16.1	13.2	
8	0.20	15.3	9.9	
16	0.13	13.4	11.0	
28	0.16	8.4	9.7	
55	0.06	1.8	7.2	

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 147
CRUISE NO. 3
VESSEL R/V ANTON BRUUN
DATE 16-VIII-63
RELIABILITY OF DEPTH

LAT. 07° 13' N
LONG. 59° 57' E
DEPTH 2049
TIME 0948
WIND

PRIMARY PROD. 0.6 g C /m²/day
EXT. COEFF. (k) 0.09
RADIATION 368 g.cal./cm.²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 10.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.		
1	26.52	35.831	5.45	0.44	2.5	0.14	2.4		
25	26.46	35.834	5.10	0.43	2.2	0.15	2.6		
49	26.41	35.832	5.51	0.42	2.6	0.18	2.9		
74	25.89	35.805	4.97	0.47	2.6	0.56	3.4		
99	24.67	35.585	4.62	0.63	5.6	0.94	5.1		
123	22.65	35.535	3.44	0.98	11.2	0.03	7.2		
148	19.05	35.561	1.42	1.85	20.9	0.07	16.8		
197	14.20	35.297	1.14	2.00	26.9	0.02	22.3		
296	12.18	35.199	1.70	1.99	28.5	0.02	25.2		
394	10.98	35.173	1.40	2.25	28.9	0.02	32.5		
494	10.43	35.181	0.85	2.55	29.7	0.01	41.5		
593	10.08	35.261	0.90	2.66	27.6	0.01	48.8		
692	9.46	35.221	0.73	2.77	36.7	0.01	54.8		
792	8.85	35.218	0.63	2.88	33.9	0.01	64.9		
892	8.58	35.236	0.66	2.88	37.0	0.01	69.0		
992	7.97	35.187	0.76	2.93	35.4	u	76.8		
982	8.04	35.206	0.76	2.12	33.3	u	73.6		
1178	6.50	35.062	1.14	2.89	35.4	0.02	87.3		
1376	5.50	34.996	1.35	2.94	40.2	0.02	98.4		
1673	3.90	34.886	2.08	2.86	35.8	0.01	111.3		
1971	2.77	34.816	2.75	2.76	33.1	u	122.4		

DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d.	C^{14}-1000 fc µgC/l./d.	
1	0.17	22.9	54.0	
8	0.19	17.0	43.5	
16	0.22	13.7	46.6	
28	0.33	8.8	55.5	
55	0.32	0.7	32.6	

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 148
CRUISE NO. 3
VESSEL *R/V ANTON BRUUN*
DATE 17-VIII-63
RELIABILITY OF DEPTH

LAT. 04005' N
LONG. 59° 58' E
DEPTH 4250
TIME 2225
WIND

PRIMARY PROD. 0.9 g C /m²/day
EXT. COEFF. (k) 0.07
RADIATION 282 gcal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 15.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.			DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d.	C^{14}-1000 fc µgC/l./d.	
1	27.25	35.756	5.56	0.17	0.6	u	2.6			1	0.10	24.6	21.2	
25	27.19	35.778	5.68	0.34	0.3	0.01	2.2			10	0.13	24.9	0.7	
50	26.62	35.851	5.45	0.26	1.3	0.26	3.2			20	0.17	25.6	16.3	
74	25.78	35.454	3.99	0.55	6.5	0.02	5.8			33	0.16	9.7	19.7	
99	21.51	35.434	2.47	1.25	17.8	0.23	11.9			66	0.10	0.8	1.3	
124	17.72	35.319	1.30	1.71	26.3	0.11	18.6							
149	15.80	35.260	1.53	1.68	24.9	0.12	20.7							
199	13.45	35.222	2.19	1.63	26.6	0.14	21.7							
298	11.30	35.132	2.18	1.85	28.8	0.07	26.5							
398	10.42	35.085	1.85	2.07	31.6	0.03	32.3							
497	10.05	35.134	1.52	2.25	34.5	0.02	39.3							
597	9.89	35.175	1.20	2.37	31.8	0.01	44.8							
697	9.28	35.199	0.90	2.49	35.0	0.01	55.4							
796	8.62	35.184	0.79	2.69	39.7	0.02	65.1							
896	8.20	35.159	0.89	2.70	42.7	0.06	69.5							
996	7.57	35.114	0.90	2.74	36.2	0.05	77.0							
994	7.46	35.116	0.94	2.67	37.1	0.07	75.2							
1193	6.23	35.016	1.22	2.75	38.6	0.15	86.0							
1392	4.84	34.923	1.75	2.73	39.5	0.01	99.4							
1695	3.74	34.855	2.28	2.66	39.3	0.01	110.4							
1994	2.72	34.806	2.86	2.57	33.3	0.01	118.7							

REDUCED DATA

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STATION NO. 149
CRUISE NO. 3
VESSEL R/V ANTON BRUUN
DATE 19-VIII-63
RELIABILITY OF DEPTH

LAT. 01o 16' N
LONG. 60° 08' E
DEPTH 4385
TIME 0924
WIND

PRIMARY PROD. 0.2 g C /m²/day
EXT. COEFF. (k) 0.05
RADIATION 391 gcal./cm.²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 10.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.		
1	28.08	35.166	5.40	0.17	0.4	0.02	2.4		
25	28.06	35.177	4.90	0.17	0.1	0.03	2.8		
49	27.76	35.443	4.92	0.20	0.3	0.02	2.1		
74	27.56	35.603	4.27	0.23	0.4	0.05	2.7		
98	21.75	35.322	2.98	0.95	16.9	0.14	10.1		
123	18.48	35.285	2.08	---	24.0	0.06	13.8		
147	15.93	35.235	2.02	---	24.4	0.07	16.4		
196	14.39	35.228	1.97	---	32.1	0.05	20.5		
294	11.46	35.093	2.19	1.84	32.8	0.05	24.5		
392	10.33	35.011	2.03	2.06	35.6	0.05	29.8		
491	9.93	35.008	1.81	2.23	33.0	0.02	35.5		
589	9.60	35.082	1.42	2.44	36.7	0.03	44.2		
687	8.67	35.031	1.18	2.62	43.1	0.03	56.4		
786	8.12	35.052	1.04	2.77	38.6	0.04	64.8		
885	7.67	35.031	1.01	2.77	45.1	0.05	70.3		
984	7.49	35.089	0.99	2.85	38.7	0.06	77.3		

DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d.	C^{14}-1000 fc µgC/l./d.	
1	0.05	4.1	12.7	
13	0.05	3.5	7.7	
27	0.04	2.8	10.6	
42	0.04	1.6	7.1	
83	0.05	0.3	5.3	

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 150 (pg. 1 of 2)
CRUISE NO. 3
VESSEL R/V ANTON BRUUN
DATE 20-VIII-63
RELIABILITY OF DEPTH

LAT. 02° 00' S
LONG. 59° 59' E
DEPTH 4315
TIME 2115
WIND

PRIMARY PROD. 0.3 g C /m²/day
EXT. COEFF. (k) 0.05
RADIATION 124 g.cal./cm.²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 8.5 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.
1	28.12	34.816	6.61	0.17	0.2	0.01	3.3
25	27.83	35.000	6.14	0.17	0.3	0.01	3.4
50	27.56	35.039	6.69	0.18	u	0.03	3.8
75	26.26	35.242	5.86	0.33	3.7	0.28	4.9
100	19.46	35.258	3.87	1.00	16.9	0.13	12.2
125	16.35	35.211	3.66	1.27	19.6	0.04	16.0
150	15.62	35.199	3.59	1.35	20.3	0.02	17.4
200	13.93	35.178	4.04	1.42	27.0	0.03	18.2
299	11.58	35.059	4.04	1.52	28.0	0.02	20.6
399	10.29	34.998	3.44	1.87	35.9	0.02	28.5
499	9.71	34.961	2.93	--	--	0.02	37.5
599	9.24	35.006	2.79	2.30	33.6	0.02	43.3
699	8.55	34.986	2.21	2.43	--	0.03	63.7
798	8.03	35.031	1.88	2.49	38.4	0.01	61.8
898	7.59	35.003	2.27	2.61	6.49	0.04	70.6
998	6.87	34.976	2.28	2.78	37.4	0.02	79.7

DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d.	C^{14}-1000 fc µgC/l./d.
1	0.04	8.5	6.4
14	0.01	6.3	4.5
28	0.02	3.8	3.2
47	0.04	3.1	1.3
94	0.07	0.4	0.4

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 150 (pg. 2 of 2)
CRUISE NO.
VESSEL R/V ANTON BRUUN
DATE
RELIABILITY OF DEPTH

LAT.
LONG.
DEPTH
TIME
WIND

PRIMARY PROD. g C /m²/day
EXT. COEFF. (k)
RADIATION g.cal./cm.²/day
ZOOPLANKTON VOL.
IOSN STD. TOW ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.			DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d.	C^{14}-1000 fc µgC/l./d.	
1196	5.80	34.922	2.21	2.73	35.9	0.02	90.2							
1396	4.46	34.823	2.88	2.79	39.0	0.02	102.1							
1695	3.29	34.784	3.49	2.60	44.7	0.03	109.5							
1994	2.60	34.769	3.94	2.51	40.6	0.13	120.5							
2493	1.98	34.756	4.29	2.45	47.1	0.01	127.9							
2991	1.78	34.748	4.31	2.47	40.0	u	129.7							
3490	1.60	34.738	5.12	2.39	41.6	0.01	128.8							
3988	1.47	34.738	4.05	2.34	44.6	0.05	131.6							
4287	1.40	34.736	4.14	2.31	39.1	0.04	132.5							

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 151
CRUISE NO. 3
VESSEL R/V ANTON BRUUN
DATE 22-VIII-63
RELIABILITY OF DEPTH

LAT. 05° 04' S
LONG. 60° 03' E
DEPTH 3950
TIME 1838
WIND

PRIMARY PROD. 0.3 g C /m²/day
EXT. COEFF. (k) 0.06
RADIATION 389 g.cal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 8.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.
1	27.42	35.042	6.44	0.21	2.9	0.06	2.8
22	27.46	35.058	5.88	0.19	-	0.05	2.4
45	27.60	35.055	6.80	0.21	1.8	0.06	2.4
67	27.44	35.063	6.07	0.18	-	0.05	2.0
90	21.85	35.195	5.04	0.71	10.9	0.78	7.7
112	18.50	35.234	3.77	1.10	20.0	0.09	12.0
135	17.11	35.183	3.50	1.32	23.9	0.04	15.8
180	14.52	35.101	2.56	1.64	31.1	0.03	20.3
269	12.09	35.018	2.54	1.81	33.8	0.02	23.6
359	10.43	34.933	2.66	1.94	40.5	0.02	27.8
449	9.56	34.868	2.97	1.97	35.0	0.04	30.4
539	8.75	34.855	2.83	2.26	39.1	0.05	40.4
629	8.02	34.839	2.44	2.42	40.8	0.02	52.4
692	7.71	34.831	2.42	2.56	40.3	0.03	60.3
792	7.27	34.865	2.13	2.68	40.1	0.03	69.2
891	6.63	34.852	2.11	2.71	43.2	0.06	78.3
990	6.21	34.858	2.28	2.78	40.8	0.07	80.6
1189	5.20	34.817	2.36	2.79	40.8	0.07	89.7
1387	4.17	34.802	2.64	2.76	43.7	0.02	--
1686	3.21	34.773	3.11	2.64	39.5	0.05	110.4
1984	2.51	34.767	3.77	2.54	38.0	0.04	116.8

DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d.	C^{14}-1000 fc µgC/l./d.
1	0.06	3.8	8.3
13	0.03	6.8	3.0
27	0.05	3.9	7.1
42	0.04	3.1	5.9
83	0.11	1.1	4.0

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 152
CRUISE NO. 3
VESSEL *R/V ANTON BRUUN*
DATE 24-VIII-63
RELIABILITY OF DEPTH

LAT. 07° 21' S
LONG. 59° 44' E
DEPTH 2926
TIME 1126
WIND

PRIMARY PROD. 0.2 g C /m²/day
EXT. COEFF. (k) 0.07
RADIATION 151 gcal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 3.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.		
1	26.71	35.055	6.63	0.19	u	0.05	2.9		
25	26.71	35.052	6.62	0.19	0.1	0.02	3.0		
50	26.71	35.056	6.85	0.17	1.1	0.01	3.0		
75	24.43	35.151	5.80	0.40	1.4	0.41	5.5		
100	17.78	35.215	4.52	1.04	34.3	0.06	12.6		
125	15.16	35.193	3.78	1.28	39.3	0.07	15.6		
150	13.84	35.128	3.90	1.45	39.0	0.07	18.4		
199	12.40	35.072	3.97	1.54	37.0	0.03	19.7		
299	11.06	34.961	4.01	1.71	43.0	0.03	22.6		
399	10.24	34.925	3.91	1.81	33.3	0.03	24.7		
499	9.26	34.843	3.23	2.00	43.7	0.02	31.5		
598	8.50	34.801	2.51	2.24	33.5	0.03	41.2		
698	8.09	34.833	2.95	2.47	33.7	0.03	57.6		
798	7.34	34.818	2.25	2.58	31.1	0.03	63.2		
897	6.89	34.828	2.62	2.66	29.1	0.03	69.5		
997	6.39	34.839	1.95	2.79	27.5	0.03	79.8		
1192	5.41	34.802	2.71	2.75	26.5	0.08	86.7		
1390	4.41	34.779	3.13	2.76	27.0	0.02	110.4		
1688	3.20	34.764	3.74	2.69	19.1	0.02	105.8		
1986	2.56	34.759	4.35	2.64	15.6	0.02	113.2		

DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d.	C^{14}-1000 fc µgC/l./d.	
1	0.06	3.7	11.3	
10	0.04	4.1	8.0	
19	0.04	2.1	9.2	
31	0.09	0.8	11.0	
63	0.04	3.6	9.9	

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 153
CRUISE NO. 3
VESSEL *R/V ANTON BRUUN*
DATE 26-VIII-63
RELIABILITY OF DEPTH

LAT. 11° 39' S
LONG. 58° 02' E
DEPTH 4133
TIME 2246
WIND

PRIMARY PROD. 0.4 g C /m²/day
EXT. COEFF. (k) 0.07
RADIATION 290 g.cal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 8.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.			DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d.	C^{14}-1000 fc µgC/l./d.	
1	23.91	35.142	6.26	0.18	0.7	0.07	3.5			1	0.15	13.1	14.6	
25	23.94	35.142	6.52	0.18	2.4	0.06	4.6			11	0.15	10.3	12.0	
49	24.19	35.138	6.24	0.18	u	0.08	3.9			22	0.13	12.6	11.1	
74	23.35	35.165	5.89	0.25	4.1	0.20	4.5			35	0.16	5.5	12.3	
99	19.48	35.202	4.17	0.76	9.3	0.14	11.9			69	0.17	0.6	12.1	
124	17.56	35.157	3.86	1.01	20.3	0.05	15.5							
149	16.15	35.153	3.70	1.08	18.8	0.02	18.5							
198	13.84	35.083	3.52	1.33	22.1	0.02	20.6							
297	11.56	35.050	4.92	1.10	21.5	0.01	13.4							
396	9.61	34.846	4.42	1.47	29.1	0.02	20.7							
496	8.63	34.774	4.07	1.78	26.5	0.01	29.6							
595	7.62	34.744	3.62	2.10	28.4	0.02	44.6							
694	6.89	34.743	3.04	2.34	33.2	0.01	59.4							
793	6.26	34.742	2.69	2.42	35.9	0.01	65.9							
887	6.01	34.739	2.96	2.44	42.0	0.02	71.8							
986	5.35	34.745	3.51	2.51	35.6	0.04	79.9							
1184	4.53	34.741	3.23	2.49	31.7	0.04	90.5							
1384	3.77	34.746	2.95	2.52	34.2	0.01	98.4							

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 154
CRUISE NO. 3
VESSEL R/V ANTON BRUUN
DATE 4-IX-63
RELIABILITY OF DEPTH

LAT. 22° 58' S
LONG. 59° 45' E
DEPTH 4243
TIME 1152
WIND

PRIMARY PROD. .04 g C /m²/day
EXT. COEFF. (k) 0.06
RADIATION 365 gcal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 1.3 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3Si µgA/l.			DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d.	C^{14}-1000fc µgC/l./d.	
1	20.75	35.575	5.59	0.07	0.8	0.06	2.9			1	0.02	1.0	4.2	
25	20.71	35.573	5.52	0.09	0.6	0.02	4.2			13	0.03	1.0	4.8	
49	20.71	35.575	5.58	0.13	0.1	0.01	2.7			27	0.03	1.2	4.3	
74	20.57	35.653	5.55	0.10	0.2	0.02	3.0			42	0.01	0.5	4.2	
99	20.34	35.654	5.31	0.10	0.5	0.02	3.2			83	0.05	u	4.7	
124	19.01	35.645	4.94	0.23	2.5	0.09	3.4							
148	17.82	35.610	4.92	0.32	4.4	0.02	4.2							
198	16.22	35.571	5.17	0.41	6.1	0.03	4.2							
182	16.70	35.582	4.96	0.36	5.0	0.04	4.3							
273	14.45	35.436	5.31	0.52	7.6	0.02	4.5							
365	12.90	35.252	5.54	0.67	10.8	0.03	4.6							
457	11.93	35.118	5.47	0.77	13.7	0.04	5.1							
548	11.13	35.000	5.46	0.91	17.0	0.03	5.5							
641	10.18	34.879	5.55	1.03	19.5	0.04	5.8							
733	8.90	34.720	5.36	1.23	22.7	0.03	8.8							
825	7.11	34.554	4.85	1.70	18.5	0.03	18.9							

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 155
CRUISE NO. 3
VESSEL R/V ANTON BRUUN
DATE 5-IX-63
RELIABILITY OF DEPTH

LAT. 25° 55' S
LONG. 60° 01' E
DEPTH 4846
TIME 2036
WIND

PRIMARY PROD. .10 g C /m²/day
EXT. COEFF. (k) 0.05
RADIATION 164 g.cal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 4.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.			DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d.	C^{14}-1000 fc µgC/l./d.	
1	21.16	35.410	5.44	0.13	0.5	0.01	3.4			1	0.07	3.1	3.6	
24	20.97	35.418	5.33	0.12	0.3	0.01	3.7			14	0.01	1.6	2.0	
48	20.56	35.498	5.67	0.12	0.2	0.01	3.5			29	0.05	0.2	2.3	
73	20.37	35.523	5.47	0.11	0.2	u	3.7			49	0.10	1.4	6.4	
97	20.40	35.547	5.49	0.20	u	u	3.3			99	0.10	0.1	5.6	
121	20.34	35.650	5.28	0.13	0.1	0.01	3.5							
145	19.59	35.652	5.20	0.20	0.8	0.09	3.3							
193	17.80	35.666	5.00	0.30	1.7	0.03	3.4							
290	15.00	35.511	5.27	0.48	4.8	0.01	4.2							
388	13.52	35.342	5.43	0.65	6.8	0.02	4.3							
486	12.39	35.193	5.39	0.72	10.0	0.02	5.1							
583	11.34	35.036	5.24	0.85	11.3	0.02	6.2							
680	10.28	34.892	5.23	0.99	13.8	0.02	5.4							
777	9.32	34.758	5.55	1.12	17.4	0.07	7.4							
874	8.12	34.618	5.05	1.34	19.6	0.17	12.6							
971	6.77	34.526	4.66	1.68	24.7	0.18	22.0							
1165	4.63	34.460	4.00	2.19	30.1	0.15	48.0							
1359	3.69	34.524	3.61	2.31	33.5	0.11	67.3							
1651	2.80	34.645	3.82	2.29	32.2	0.04	80.4							

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 156
CRUISE NO. 3
VESSEL R/V ANTON BRUUN
DATE 7-IX-63
RELIABILITY OF DEPTH

LAT. 29° 24' S
LONG. 60° 05' E
DEPTH 4627 M
TIME 0953
WIND

PRIMARY PROD. 0.3 g C/m²/day
EXT. COEFF. (k) 0.05
RADIATION 322 gcal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 14.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.		
1	17.06	35.624	5.44	0.19	0.2	0.02	2.0		
25	17.00	35.625	5.45	0.17	0.3	0.02	2.7		
50	16.91	35.610	5.50	0.18	0.4	0.03	2.2		
75	16.80	35.605	5.48	0.18	0.2	0.03	2.2		
100	16.57	35.557	5.29	0.25	1.6	0.13	3.2		
125	15.65	35.494	5.13	0.38	3.2	0.17	3.0		
150	14.89	35.446	5.16	0.48	5.6	0.10	3.7		
200	13.94	35.375	5.16	0.59	8.9	0.05	4.6		
299	13.21	35.279	5.22	0.68	9.0	0.03	4.5		
397	12.38	35.169	5.22	0.75	11.3	0.06	5.1		
496	11.63	35.060	5.11	0.88	16.1	0.06	6.2		
595	10.72	34.930	5.11	1.01	16.3	0.08	7.4		
694	9.80	34.800	5.00	1.19	18.9	0.06	7.7		
794	8.34	34.640	4.77	1.44	23.6	0.07	13.0		
893	6.73	34.513	4.61	1.70	30.2	0.07	21.3		
992	5.52	34.442	4.50	1.95	30.8	0.07	29.5		
1190	4.12	34.436	4.16	2.25	35.3	0.05	46.5		
1389	3.34	34.521	3.89	2.35	36.0	0.06	63.6		
1686	2.73	34.630	3.89	2.34	33.6	0.05	79.1		
1984	2.31	34.705	3.90	2.29	35.2	0.04	95.7		

DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d.	C^{14}-1000 fc µgC/l./d.	
1	0.01	4.1	10.8	
15	0.05	3.9	16.7	
30	0.23	5.5	16.6	
50	0.04	2.5	13.8	
100	0.10	0.3	4.4	

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 157
CRUISE NO. 3
VESSEL R/V ANTON BRUUN
DATE 8-IX-63
RELIABILITY OF DEPTH

LAT. 31° 58' S
LONG. 59° 51' E
DEPTH 4792
TIME 0944
WIND

PRIMARY PROD. 0.4 g C /m²/day
EXT. COEFF. (k) 0.07
RADIATION 286 gcal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 6.5 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.
1	15.85	35.573	5.58	0.19	1.1	0.02	2.4
24	15.96	35.583	5.61	0.21	1.3	0.02	2.1
48	15.89	35.579	5.65	0.20	0.6	0.02	1.6
73	15.67	35.542	5.62	0.24	1.6	0.04	1.6
97	15.45	35.528	5.56	0.28	2.2	0.11	2.2
121	14.94	35.466	5.46	0.35	4.3	0.22	2.5
145	14.76	35.450	5.45	0.39	5.3	0.21	2.6
193	14.10	35.378	5.23	0.62	10.0	0.01	3.7
290	13.36	35.307	5.33	0.65	12.0	u	3.4
363	12.95	---	5.40	0.66	11.3	0.02	3.7
454	12.13	35.123	5.29	0.79	16.1	0.01	4.0
545	11.37	35.018	5.23	0.90	18.3	0.02	4.7
636	10.64	34.911	5.23	1.02	19.0	0.01	5.3
726	9.73	34.798	5.23	1.20	25.7	0.01	7.2
816	8.64	34.674	4.94	1.30	28.8	0.05	10.9
911	7.50	34.575	4.73	1.57	35.0	u	15.6
1094	5.13	34.417	4.57	2.04	43.4	0.01	29.3
1278	3.79	34.417	4.40	2.24	47.2	0.02	45.1
1556	3.01	34.566	4.00	2.40	42.2	0.01	66.5
1834	2.60	---	--	--	--	0.04	--

DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d.	C^{14}-1000 fc µgC/l./d.
1	0.13	7.6	32.7
10	0.09	11.1	32.9
20	0.05	10.0	32.8
32	0.14	7.0	31.3
63	0.17	0.5	17.6

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 158
CRUISE NO. 3
VESSEL *R/V ANTON BRUUN*
DATE 9-IX-63
RELIABILITY OF DEPTH

LAT. 34° 57' S
LONG. 60° 05' E
DEPTH 4828
TIME 1713
WIND

PRIMARY PROD. 0.3 g C /m²/day
EXT. COEFF. (k) 0.06
RADIATION 282 g.cal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 2.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.				DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l/d.	C^{14}-1000 fc µgC/l/d.	
1	14.11	35.400	5.62	0.39	5.3	0.17	4.3				1	0.10	11.2	25.9	
25	13.90	35.400	5.68	0.38	5.1	0.15	3.4				12	0.09	8.8	25.6	
49	13.91	35.382	5.68	0.40	5.2	0.18	3.2				24	0.11	8.8	24.4	
74	14.03	35.380	5.68	0.38	5.1	0.17	4.2				38	0.10	5.9	30.6	
99	13.92	35.382	5.62	0.42	5.6	0.21	3.9				75	0.09	0.3	21.0	
123	13.92	35.381	5.62	0.43	6.2	0.19	3.5								
148	13.94	35.379	5.62	0.40	5.2	0.28	4.2								
197	13.76	35.342	5.40	0.50	6.8	0.11	4.3								
296	13.06	35.267	5.29	0.68	9.2	0.01	4.3								
391	12.53	35.175	5.29	0.71	12.4	0.04	4.6								
488	11.93	35.097	5.28	0.79	11.9	0.03	5.6								
586	11.12	34.974	5.15	0.92	16.6	0.05	6.3								
683	10.01	34.827	4.95	1.14	18.8	0.02	9.2								
780	8.89	34.697	4.78	1.35	22.7	0.03	13.3								
878	7.46	34.567	4.62	1.59	25.6	0.03	19.3								
975	6.29	34.480	4.62	1.78	27.8	0.02	22.2								
1169	4.39	34.396	4.61	2.08	33.9	0.03	35.9								
1364	3.40	34.463	4.07	2.29	38.2	0.03	54.2								
1656	2.86	34.587	3.90	2.33	32.3	0.03	70.2								
1948	2.50	34.681	4.01	2.25	37.2	0.07	80.1								