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PLANKTOLOGICAL DATA FROM THE CENTRAL RED SEA AND THE GULF OF ADEN

(R. V. "Meteor", cruise No. 5/2, January - March 1987)

by

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Abstract

This volume presents planktological data obtained during cruise No. 5, leg 2 of the German research vessel "Meteor" to the Red Sea and the Gulf of Aden in February / March 1987. The following parameters were measured: seston, particulate organic carbon and nitrogen; chlorophyll a; primary production; abundance of pelagic bacteria, heterotrophic nanoflagellates and the blue-green alga *Synechococcus* spp.; growth and grazing of bacteria and nanoflagellates; respiration, nutrient excretion, standing stock and chemical composition of the plankton community in three different size classes (< 20 µm, 20 - 200 µm, > 100 µm) within the euphotic zone; biomass of zooplankton > 100 µm sampled at 5 depth intervals down to 500 m.

Zusammenfassung

Dieser Band enthält die planktologischen Daten, die während der Reise Nr. 5, 2. Fahrtabschnitt (Expedition "Mindik") mit dem Forschungsschiff "Meteor" im Roten Meer und Golf von Aden im Februar / März 1987 gesammelt wurden. Folgende Paramater wurden gemessen: Seston, partikulärer organischer Kohlenstoff und Stickstoff; Chlorophyll a; Primärproduktion; Abundanz der pelagischen Bakterien, der heterotrophen Nanoflagellaten und der Blaualge *Synechococcus* spp; Wachstum und Wegfraß von Bakterien und Nanoflagellaten; Wegfraß von Phytoplankton durch Mikrozooplankton; Respiration, Nährstoffexkretion, Bestand und chemische Zusammensetzung des Planktons in drei verschiedenen Größenklassen (< 20 µm, 20 - 200 µm, > 100 µm) innerhalb der euphotischen Zone; Biomasse des Zooplanktons > 100 µm in 5 Tiefenintervallen bis 500 m.

Contents

Foreword

During leg 2 of the research programme "Mindik" the German research vessel "Meteor" worked in the Red Sea and Gulf of Aden in February and March 1987.

The Red Sea is a unique marine ecosystem because of its high salinity and high bottom temperature and is therefore hardly comparable with other systems. Our knowledge about the Red Sea plankton ecology is still comparatively scarce as generally only a few samples were taken by passing expeditions on their way to the Indian Ocean.

Therefore, our biological programme aimed at obtaining a comprehensive insight into the ecosystem of the central Red Sea, the Bab el Mandeb transition zone and the Gulf of Aden during the winter season.

In order to learn as much as possible about this system, the types of organisms investigated ranged from bacteria and blue-green pico-plankton algae to the mesozooplankton size class. Classical methods as well as more recent techniques were employed: the classical ^{14}C method for primary production, respiration and nutrient excretion measurements of different size fractions of the plankton community represent the former, while the more recent inhibitor and dilution techniques for measuring growth and grazing rates of bacteria, heterotrophic flagellates and other microorganisms represent the latter. The data obtained during our investigation are presented in this volume and will form the basis for publication of the results and future comparative studies.

We wish to thank all those who helped us in preparing the expedition, carrying out the measurements, processing the data and presenting them in the data sheets of this volume. Our special thanks go to Prof. W. Nellen, the coordinator of the expedition, to Prof. H. Thiel, cruise leader of leg 2, to S. Burchert, N. Verch, M. Petzold, as well as to the captain, officers and crew of R.V. "Meteor".

We also gratefully acknowledge the financial support from the "DEUTSCHE FORSCHUNGSGEMEINSCHAFT" for the expedition and subsequent data processing.

MAPS AND STATION LISTS

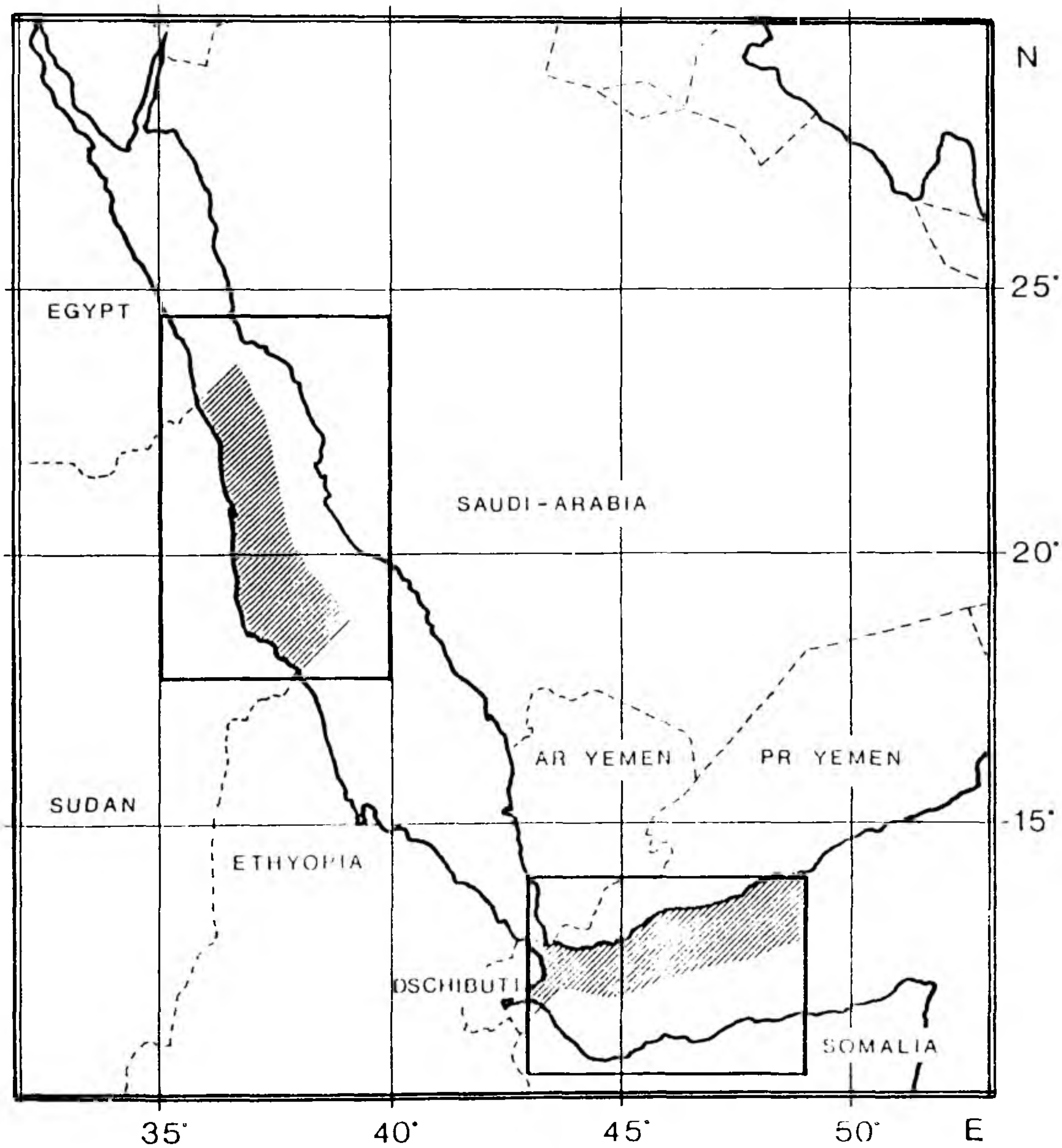


Fig. 1: Research areas of Meteor cruise 5, leg 2 in the Red Sea, the Bab el Mandeb transition zone and the Gulf of Aden (after Thiel et al., 1987).

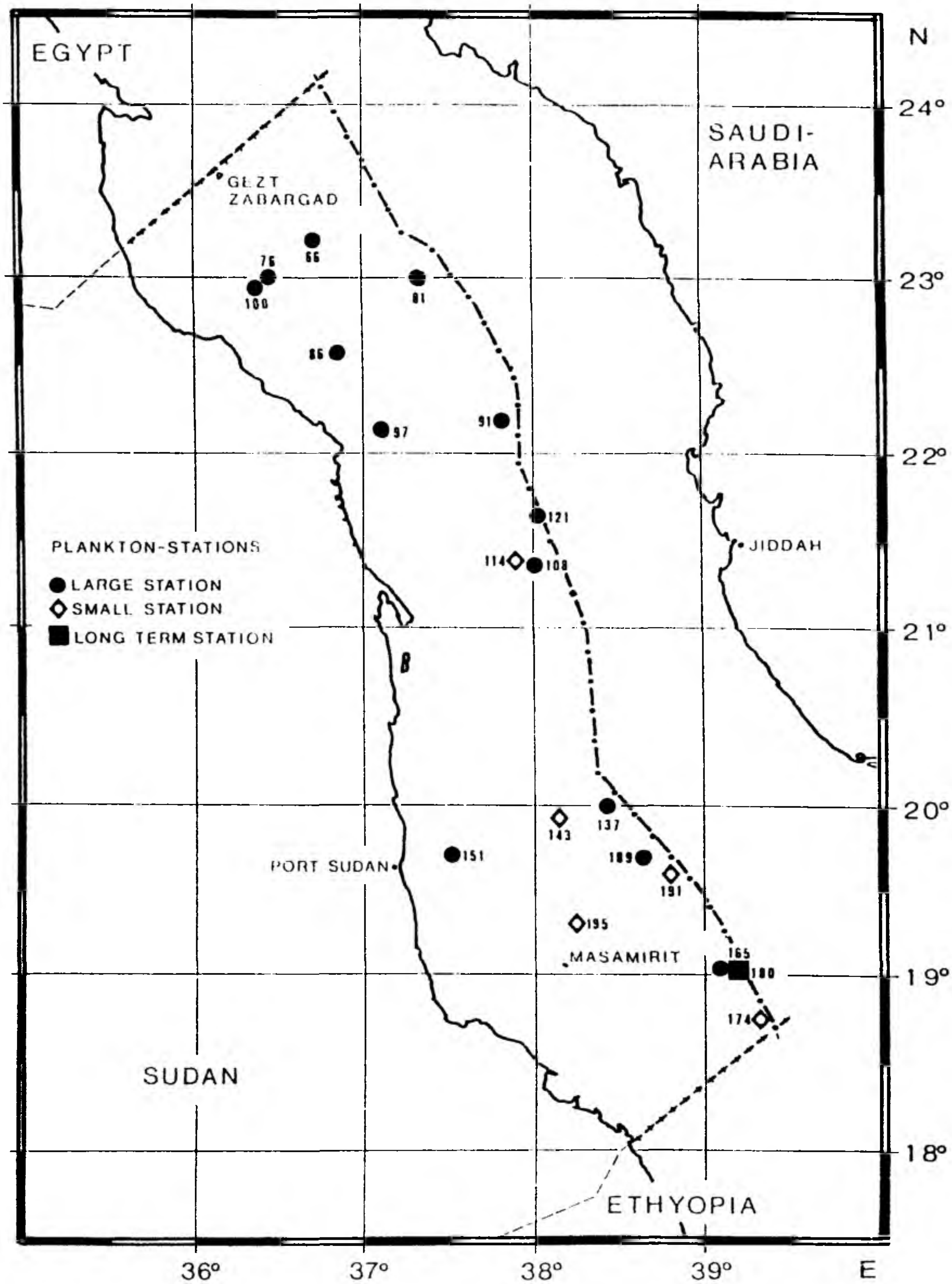


Fig. 2: Sudanese region (= Central Red Sea) indicating large plankton stations with a broad spectrum of gear employed and small stations with a smaller spectrum of gear employed (after Thiel et al., 1987, modified).

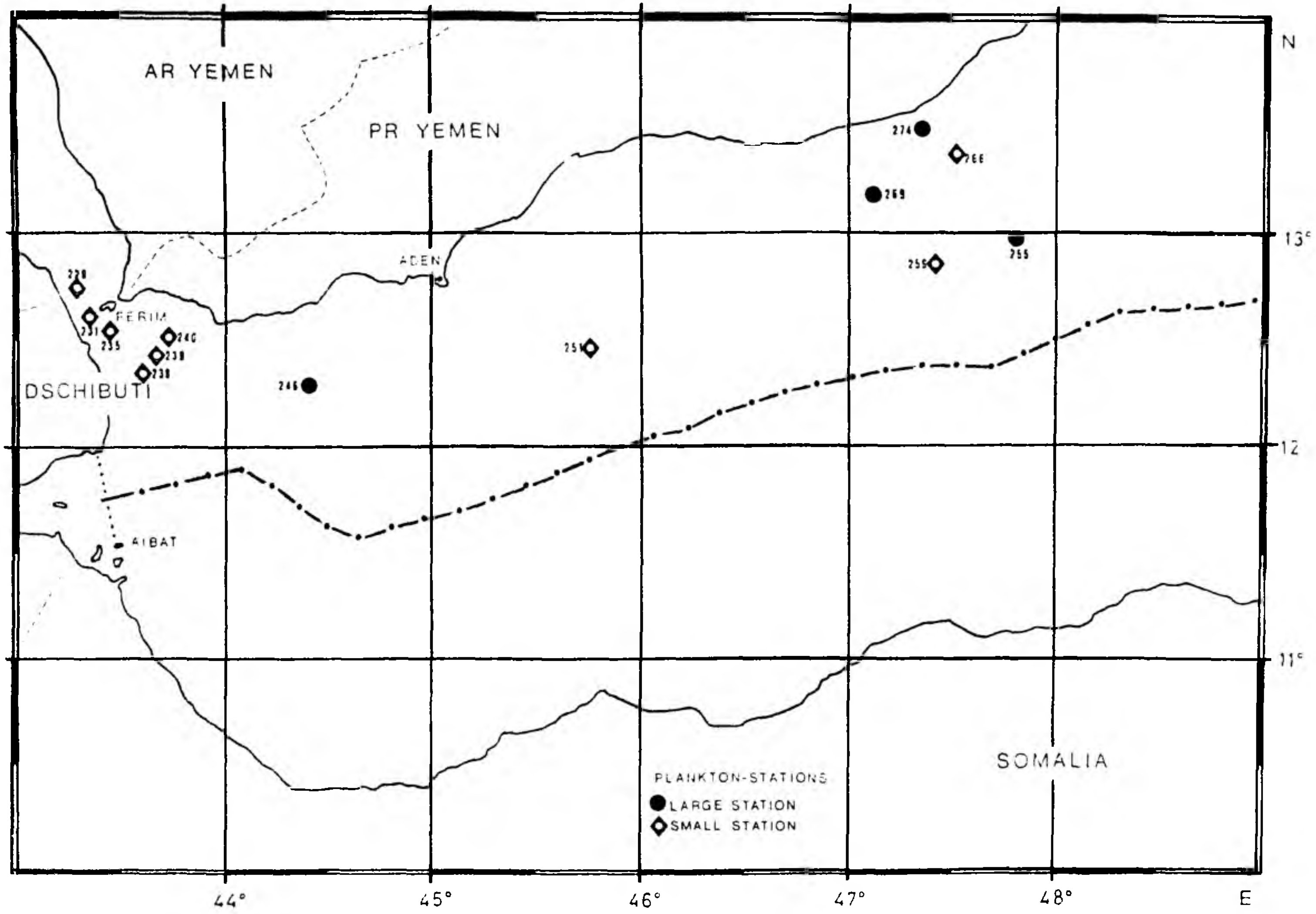


Fig. 3: Djiboutian and PR Yemenitic region (= Gulf of Aden) indicating large plankton stations with a broad spectrum of gear employed and small stations with a smaller spectrum of gear employed (after Thiel et al., 1987, modified).

Station list

Acronyms of gear

MS/RO	-	Multisonde (CTD) with rosette water sampler, 11 x 10 l
QM	-	Quantameter
SD	-	Secchi disc
RO (30)	-	Rosette water sampler, 6 x 30 l
BO	-	Bongo net
MU	-	Multiple opening-closing net
PLA	-	Plankton net (Apstein net)
KTI	-	Constant depth incubator
TI	-	Turbulence incubator
KP	-	Centrifugal pump
in w.	-	in water
on b.	-	on board

Literature

Thiel, H. and cruise participants, 1987: Cruise report, Meteor cruise 5, leg 2. Institut für Hydrobiologie und Fischereiwissenschaft der Universität Hamburg, Hamburg

Station No.	Date 1987	Time UTC + 2	Position °N	°E	Gear
66	03.2.	07.38	23 14.3	36 40.1	
66	03.2.	08.43			MU
66	03.2.	09.30			SD
66	03.2.	09.43			QM
66	03.2.	10.08			RO (30)
66	03.2.	10.27			RO (30)
66	03.2.	10.45			BO
76	05.2.	09.45	22 59.9	36 26.9	MS/RO
76	05.2.	10.23			QM
76	05.2.	10.48			SD
76	05.2.	11.03			RO (30)
81	06.2.	06.40	22 59.2	37 20.1	MS/RO
81	06.2.	07.30			MU
81	06.2.	08.25			QM
81	06.2.	08.55			SD
81	06.2.	09.13			RO (30)
81	06.2.	09.58			BO
86	07.2.	08.54	22 34.7	36 46.0	MS/RO
86	07.2.	09.47			MU
86	07.2.	10.34			SD
86	07.2.	10.45			QM
86	07.2.	11.06			RO (30)
86	07.2.	11.20			BO
91	08.2.	08.37	22 09.0	37 48.5	MS/RO
91	08.2.	09.37			MU
91	08.2.	10.20			KTI in w.
91	08.2.	10.23			SD
91	08.2.	10.43			QM
91	08.2.	11.00			RO (30)
91	08.2.	11.13			BO
91	08.2.	13.00			KTI on b.

Station No.	Date 1987	Time UTC + 2	Position °N	°E	Gear
97	09.2.	07.06	22 06.2	37 08.1	MS/RO
97	09.2.	07.47			MU
97	09.2.	08.25			SD
97	09.2.	08.55			RO (30)
97	09.2.	09.06			BO
100	10.2.	11.07	22 59.0	36 27.9	MS/RO
100	10.2.	12.00			QM
100	10.2.	13.30			KTI in w.
100	10.2.	15.03			MU
100	10.2.	16.14			MU
100	10.2.	17.00			MU
100	10.2.	17.30			KTI on b.
100	10.2.	17.50			MS/RO
100	10.2.	18.29			RO (30)
100	10.2.	18.38			MU
100	10.2.	19.21			MU
100	10.2.	20.10			MU
100	10.2.	23.53			MS/RO
108	12.2.	09.00	21 23.9	38 01.0	MS/RO
108	12.2.	09.46			QM
108	12.2.	10.05			SD
108	12.2.	10.15			RO (30)
108	12.2.	10.25			BO
108	12.2.	10.38			KTI in w.
108	12.2.	10.50			BO
108	12.2.	13.01			MU
108	12.2.	14.30			KTI on b.
114	13.2.	08.36	21 25.5	37 58.7	RO (30)
114	13.2.	10.04			KTI in w.
114	13.2.	10.10			TI in w.
114	13.2	13.45			TI on b.
114	13.2.	13.55			KTI on b.

Station No.	Date 1987	Time UTC + 2	Position °N	°E	Gear
121	14.2.	09.57	21 37.3	38 03.6	MS/RO
121	14.2.	10.39			QM
121	14.2.	11.06			RO (30)
121	14.2.	11.18			KTI in w.
121	14.2.	11.34			BO
121	14.2.	11.45			BO
121	14.2.	13.26			MU
121	14.2.	14.35			KTI on b.
137	18.2.	07.06	19 59.2	38 27.6	PLA
137	18.2.	07.24			MS/RO
137	18.2.	07.57			MU
137	18.2.	08.39			SD
137	18.2.	08.58			QM
137	18.2.	09.14			RO (30)
137	18.2.	09.30			KTI in w.
137	18.2.	09.42			BO
137	18.2.	11.10			MU
137	18.2.	12.30			KTI on b.
143	19.2.	08.32	19 58.0	38 07.6	MS/RO
143	19.2.	09.18			QM
143	19.2.	09.43			SD
143	19.2.	10.20			KTI in w.
143	19.2.	13.40			KTI on b.
151	20.2.	07.17	19 40.8	37 28.6	MS/RO
151	20.2.	08.00			PLA
151	20.2.	09.12			KTI in w.
151	20.2.	09.29			QM
151	20.2.	10.05			SD
151	20.2.	10.15			RO (30)
151	20.2.	10.27			BO
151	20.2.	11.00			MU
151	20.2.	12.03			KTI on b.

Station No.	Date	Time	Position		Gear
	1987	UTC + 2	° N	° E	
165	22.2.	09.01	10 03.2	39 07.4	MS/RO
165	22.2.	09.33			PLA
165	22.2.	09.49			QM
165	22.2.	10.11			SD
165	22.2.	10.21			RO (30)
165	22.2.	10.35			BO
165	22.2.	10.45			KTI in w.
165	22.2.	10.57			BO
165	22.2.	12.11			MU
165	22.2.	13.30			KTI on b.
174	23.2.	11.59	18 45.6	39 21.3	MS/RO
174	23.2.	12.24			BO
174	23.2.	12.40			QM
174	23.2.	12.55			SD
174	23.2.	14.00			KTI in w.
174	23.2.	14.03			TI in w.
174	23.2.	16.12			TI on b.
174	23.2.	16.15			KTI on b.
180	24.2.	10.12	19 03.7	39 07.5	MS/RO
180	24.2.	10.47			QM
180	24.2.	11.24			SD
180	24.2.	11.34			KTI in w.
180	24.2.	11.46			BO
180	24.2.	12.09			PLA
180	24.2.	12.28			RO (30)
180	24.2.	12.40			MU
180	24.2.	13.20			PLA
180	24.2.	13.36			RO (30)
180	24.2.	13.39	19 04.1	39 08.1	MS/RO
180	24.2.	14.45			KTI on b.
180	24.2.	15.30			KTI in w.
180	24.2.	15.45	19 03.3	39 07.7	MS/RO
180	24.2.	17.01			KTI on b.
180	24.2.	17.51			MU

Station No.	Date 1987	Time UTC + 2	Position °N	°E	Gear
180	24.2.	22.26			BO
180	24.2.	22.55			RO (30)
180	24.2.	23.30	19 03.6	39 07.6	MS/RO
180	25.2.	00.06			PLA
180	25.2.	00.25			MU
180	25.2.	01.30	19 03.5	39 07.5	MS/RO
180	25.2.	03.31	19 03.2	39 07.8	MS/RO
180	25.2.	05.30	19 03.1	39 08.0	MS/RO
180	25.2.	06.20			KTI in w.
180	25.2.	06.39			RO (30)
180	25.2.	06.46			Mu
180	25.2.	07.30	19 02.3	39 09.4	MS/RO
180	25.2.	08.12			QM
180	25.2.	08.30			SD
180	25.2.	10.00			PLA
180	25.2.	10.30	19 01.7	39 10.4	MS/RO
180	25.2.	11.05			SD
180	25.2.	11.15			MU
180	25.2.	12.25			KTI on b.
189	27.2.	08.22	19 39.2	38 36.6	MS/RO
189	27.2.	09.38			QM
189	27.2.	10.00			KTI in w.
189	27.2.	10.08			SD
189	27.2.	10.20			BO
189	27.2.	10.45			PLA
189	27.2.	10.57			RO (30)
189	27.2.	11.10			MU
189	27.2.	12.00			KTI on b.
191	27.2.	15.44	19 27.7	38 43.8	MU
191	27.2.	16.25			MU
191	27.2.	17.29			MU
191	27.2.	18.09			MU
191	27.2.	18.49			MS/RO
191	27.2.	19.15			MU

Station No.	Date 1987	Time UTC + 2	Position °N	°E	Gear
195	28.2.	09.07	19 19.5	38 14.0	MS/RO
195	28.2.	09.42			PLA
195	28.2.	10.03			QM
195	28.2.	10.14			SD
195	28.2.	10.50			KTI in w.
195	28.2.	11.51			TI in w.
195	28.2.	11.58			MU
195	28.2.	12.50			KTI on b.
195	28.2.	13.10			TI on b.
202	04.3.	12.00	17 52.2	40 00.8	KP
203	04.3.	13.00	17 24.8	40 20.3	KP
204	04.3.	14.00	17 14.0	40 28.9	KP
205	04.3.	15.00	17 03.3	40 37.0	KP
206	04.3.	16.00	16 57.1	40 42.4	KP
207	04.3.	17.00	16 50.6	40 46.0	KP
208	04.3.	18.00	16 39.4	40 52.9	KP
209	04.3.	19.00	16 28.3	41 00.6	KP
210	04.3.	20.00	16 17.7	41 08.4	KP
211	04.3.	21.00	16 10.2	41 13.4	KP
212	04.3.	22.00	15 59.5	41 21.0	KP
213	04.3.	23.00	15 48.6	41 28.9	KP
214	05.3.	00.00	15 37.2	41 36.6	KP
215	05.3.	01.00	15 26.9	41 44.8	KP

Station No.	Date 1987	Time UTC + 2	Position °N	°E	Gear
216	05.3	02.00	15 15.6	41 51.7	KP
217	05.3.	03.00	15 04.6	41 59.1	KP
218	05.3.	04.00	14 54.7	42 07.7	KP
219	05.3.	05.00	14 45.0	42 16.9	KP
220	05.3.	06.00	14 35.5	42 25.7	KP
221	05.3.	07.00	14 25.5	42 33.7	KP
222	05.3.	08.00	14 15.8	42 42.4	KP
223	05.3.	09.00	14 06.6	42 51.3	KP
224	05.3.	10.00	13 54.2	42 54.9	KP
225	05.3.	11.00	13 40.1	42 58.6	KP
226	05.3.	12.00	13 28.0	43 02.1	KP
227	05.3.	13.00	13 16.2	43 05.2	KP
228	05.3.	14.00	13 04.7	43 08.6	KP

Station No.	Date 1987	Time UTC + 3	Position °N	°E	Gear
229	05.3.	16.16	12 46.3	43 13.9	MS/RO
229	05.3.	16.47			CM
229	05.3.	16.57			SD
229	05.3.	17.05			MU
229	05.3.	17.34			MU
231	05.3.	22.47	12 34.5	43 18.9	MS/RO
231	05.3.	23.27			MU
235	06.3.	09.59	12 30.9	43 25.6	MS/RO
235	06.3.	10.29			CM
235	06.3.	11.24			MU
238	06.3.	16.01	12 22.6	43 30.5	MS/RO
238	06.3.	16.31			MU
239	06.3.	17.59	12 26.7	43 34.0	MS/RO
239	06.3.	19.06			MU
240	06.3.	19.58	12 29.9	43 36.6	MS/RO
240	06.3.	21.45			MU
246	07.3.	09.30	12 20.0	44 21.0	MS/RO
246	07.3.	10.02			CM
246	07.3.	10.16			SD
246	07.3.	10.32			BO
246	07.3.	11.02			RO (30)
246	07.3.	11.15			KTI in w.
246	07.3.	11.20			TI in w.
246	07.3.	12.38			MU
246	07.3.	13.30			TI lost
246	07.3.	13.42			KTI on b.

Station No.	Date 1987	Time UTC + 3	Position ° N	° E	Gear
251	09.3.	10.56	12 30.5	45 41.1	MS/RO
251	09.3.	11.30			CM
251	09.3.	11.46			SD
251	09.3.	12.50			KTI in w.
251	09.3.	15.08			KTI on b.
255	10.3.	08.38	12 58.7	47 50.2	MS/RO
255	10.3.	09.08			CM
255	10.3.	09.24			SD
255	10.3.	09.32			BO
255	10.3.	09.56			KTI in w.
255	10.3.	10.07			RO (30)
255	10.3.	13.15			KTI on b.
255	10.3.	13.24			MU
266	12.3.	14.41	13 19.7	47 29.4	MU
266	12.3.	15.30			MU
266	12.3.	16.10			MU
266	12.3.	16.49			MU
266	12.3.	17.30			MU
266	12.3.	18.12			MU
269	13.3.	08.27	13 09.8	47 05.4	MS/RO
269	13.3.	09.47			CM
269	13.3.	10.05			SD
269	13.3.	10.14			BO
269	13.3.	10.45			KTI in w.
269	13.3.	10.55			RO (30)
269	13.3.	11.08			MU
269	13.3.	12.50			KTI on b.

Station No.	Date 1987	Time UTC + 3	Position °N	°E	Gear
274	14.3.	10.26	13 27.8	47 19.9	MS/RO
274	14.3.	10.56			OM
274	14.3.	11.11			SD
274	14.3.	11.15			RO
274	14.3.	11.42			RO (30)
274	14.3.	11.50			MU

CHLOROPHYLL A, TOTAL PARTICULATE MATTER AND PARTICULATE ORGANIC CARBON AND NITROGEN

Chlorophyll a, total particulate matter and particulate organic carbon and nitrogen

(T. Pillen)

Description of methods

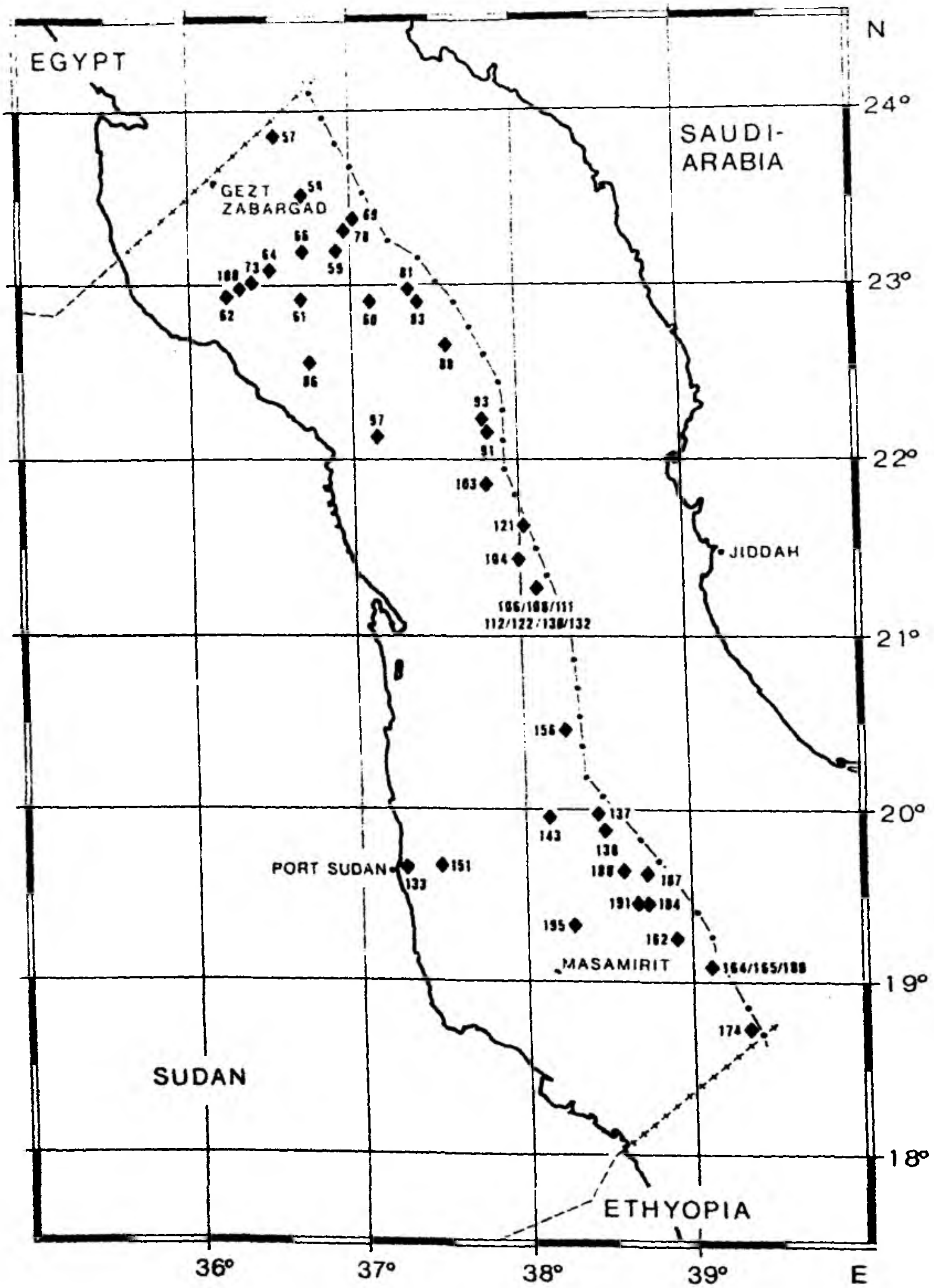
At 59 oceanographical (Figs. 4 & 5), 15 biological stations (Figs. 2 & 3) and 27 stations during a transect from 17° 30' N to 12° 00' N (Fig. 6) 1014 samples for chlorophyll a determination and 241 samples for the analysis of particulate organic matter were taken.
1 - 2 litre water samples were filtered through Whatman GF/F glass-fibre filters.
After extraction in 90 % acetone the chlorophyll a content was fluorometrically measured with a Turner filter fluorometer, model 112. The fluorometer was calibrated using a chlorophyll a standard by Sigma. A highly significant correlation (r = 0.9997) between chloro-phyll a content and the fluorometer readings were obtained. After acidification the amount of phaeopigments was calculated according to Parsons et al. (1985).
Filters for measurements of total particulate matter as well as carbon and nitrogen determinations were deep frozen for analysis at home.
After drying at 60° C total particulate matter was determined according to Lenz (1971). The filters for C and N analysis were combusted in a Perkin Elmer CHN Analyzer, 240 C.

Literature

Parsons, T. R., Maita, Y. & Lalli, C. M., 1985. A manual of chemical and biological methods of seawater analysis - Pergamon Press, Oxford, 173 p.

Lenz, J., 1971. Zur Methode der Sestonbestimmung. - Kieler Meeresforsch., 27, 180 - 193

Fig. 4: Hydrographic stations in the central Red Sea (after Thiel et al. 1987)



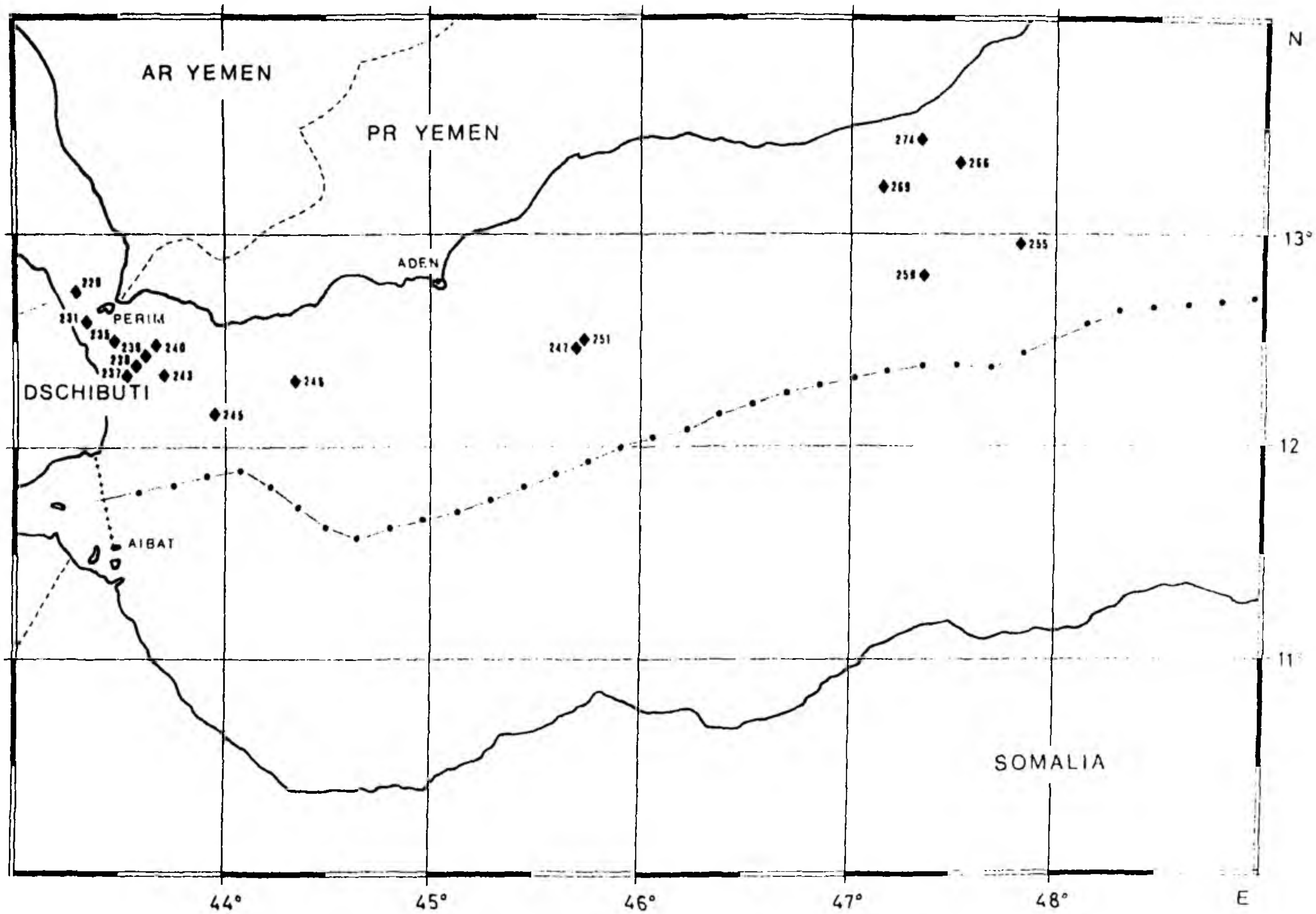
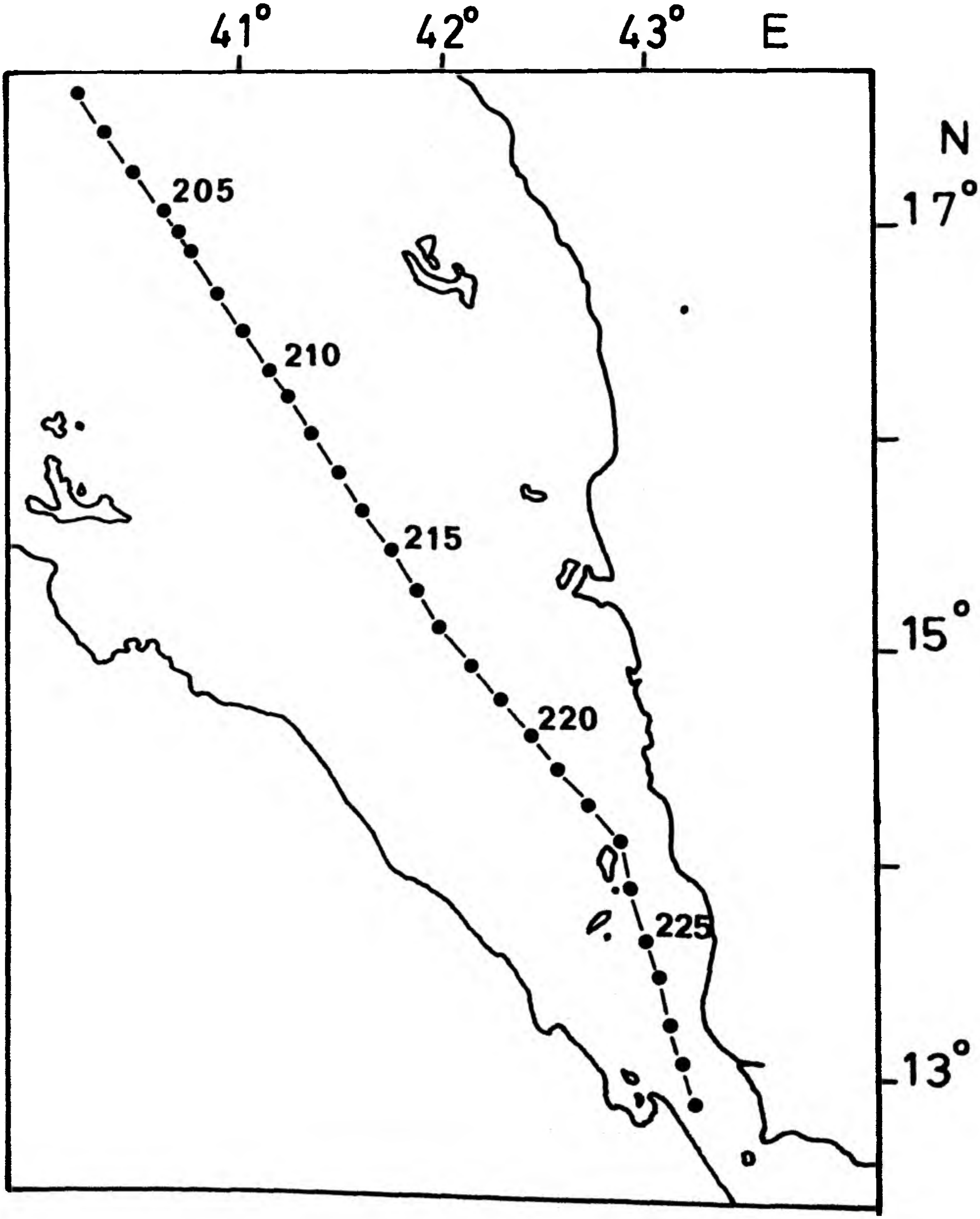


Fig. 5: Hydrographic stations in the Gulf of Aden (after Thiel et al. 1987)

Fig. 6: Transect stations during the passage from the central Red Sea to the Bab el Mandeb transition zone and the Gulf of Aden



D A T A S H E E T S

Part 1

Total particulate matter and particulate organic carbon and nitrogen

All positions and times are given on a decimal basis

Positions: 25, 5000 N = 25° 30' N

Times: 9, 50 = 9^{30}

STATION	NORTH	EAST	DATE	TIME
66	23.2533	36.6706	03-Feb-87	9.63

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
0	(2.03)	139	36	3.93	4.59
10	0.97	107	41	2.59	3.02
20	1.00	89	15	6.01	7.01
35	1.03	131	18	7.44	8.68
50	1.19	123	10	(12.22)	(14.26)
80	0.76	91	3	(34.26)	(39.97)

STATION	NORTH	EAST	DATE	TIME
81	22.9881	37.3361	06-Feb-87	8.67

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
2	0.82	125	7	(17.31)	(20.20)
10	0.84	140	8	(17.28)	(20.16)
20	0.76	91	1	(130.24)	(151.95)
30	0.85	94	1	(75.34)	(87.90)
50	0.68	140	21	6.53	7.62
75	(0.98)	56	12	4.83	5.64

STATION	NORTH	EAST	DATE	TIME
86	22.5861	36.7769	07-Feb-87	10.90

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
2	1.09	94	7	(12.68)	(14.79)
10	0.90	155	22	6.98	8.14
20	0.87	109	11	(10.00)	(11.67)
35	1.21	120	8	(15.07)	(17.58)
60	(1.59)	82	4	(18.90)	(22.05)
85	(2.35)	103	6	(18.51)	(21.60)

STATION	NORTH	EAST	DATE	TIME
91	22.1506	37.8136	08-Feb-87	10.62

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
2	1.76	178	22	8.14	9.50
8	0.50	133	15	(9.00)	(10.50)
15	0.70	101	11	(8.96)	(10.45)
25	0.91	127	15	8.46	9.87
45	0.99	114	10	(10.95)	(12.77)
60	0.85	130	9	(14.40)	(16.80)

STATION	NORTH	EAST	DATE	TIME
97	22.1053	37.1361	09-Feb-87	9.10

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
2	-	-	-	-	-
8	0.74	80	6	(12.79)	(14.92)
15	0.72	88	12	7.31	8.53
25	0.88	78	8	(9.71)	(11.33)
45	(2.23)	86	8	(10.47)	(12.22)
8	(1.29)	54	6	(9.25)	(10.79)

STATION	NORTH	EAST	DATE	TIME
108	21.4092	38.0169	12-Feb-87	11.00

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
1	0.64	166	29	5.76	6.72
5	0.72	184	41	4.46	5.20
10	0.65	107	18	6.02	7.02
25	(2.53)	112	19	5.96	6.95
45	0.99	131	23	5.74	6.70
60	1.49	268	59	4.57	5.33

STATION	NORTH	EAST	DATE	TIME
121	21.6247	38.0647	14-Feb-87	11.98

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
3	0.97	179	23	7.69	8.97
10	2.58	329	33	(10.02)	(11.69)
25	5.06	487	34	(14.35)	(16.74)
45	(5.64)	273	53	5.17	6.03
60	1.75	162	27	6.03	7.04
70	0.80	130	18	7.35	8.58

STATION	NORTH	EAST	DATE	TIME
137	19.9883	38.4669	18-Feb-87	9.40

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
2	1.02	109	8	(12.88)	(15.03)
5	(2.06)	154	18	8.33	9.72
15	1.66	179	20	(8.96)	(10.45)
28	0.87	133	15	(8.79)	(10.25)
50	0.85	119	15	8.23	9.60
75	0.58	114	11	(9.88)	(11.53)

STATION	NORTH	EAST	DATE	TIME
151	19.6881	37.4833	20-Feb-87	9.28

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
1	0.79	160	18	(9.07)	(10.58)
10	1.49	145	16	(8.90)	(10.38)
15	0.81	122	12	(9.92)	(11.57)
25	(5.05)	158	21	7.66	8.94
36	1.51	114	10	(10.91)	(12.73)
48	2.33	142	15	(9.34)	(10.90)

STATION	NORTH	EAST	DATE	TIME
165	19.0564	39.1269	22-Feb-87	11.02

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
2	0.75	144	13	(10.71)	(12.50)
5	(2.19)	154	13	(12.10)	(14.12)
12	(1.82)	130	10	(12.66)	(14.77)
32	1.34	164	22	7.31	8.53
49	1.32	147	18	8.15	9.51
68	1.21	127	13	(9.79)	(11.42)

STATION	NORTH	EAST	DATE	TIME
189	19.6439	38.6203	27-Feb-87	10.38

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
3	0.79	131	23	5.69	6.64
13	(1.25)	92	16	5.90	6.88
25	0.98	93	17	5.57	6.50
37	0.95	107	17	6.18	7.21
56	0.82	95	16	5.88	6.86
70	0.97	98	14	6.90	8.05

STATION	NORTH	EAST	DATE	TIME
246	12.3344	44.3511	07-Mar-87	11.50

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
5	0.69	157	23	6.73	7.85
11	0.68	183	35	5.29	6.17
20	1.36	235	41	5.67	6.62
30	1.29	169	28	6.05	7.06
44	0.93	143	21	6.91	8.06
60	1.09	184	31	5.97	6.97

STATION	NORTH	EAST	DATE	TIME
255	12.9847	47.8389	10-Mar-87	10.65

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
2	0.58	132	14	(9.47)	(11.05)
7	1.24	163	20	8.16	9.52
12	0.74	72	3	(26.40)	(30.80)
27	1.76	176	20	(8.83)	(10.30)
40	0.42	115	11	(11.10)	(12.95)
57	0.49	108	7	(15.40)	(17.97)

STATION	NORTH	EAST	DATE	TIME
269	13.1722	47.0981	13-Mar-87	10.45

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
2	1.07	247	25	(9.75)	(11.38)
7	1.02	289	25	(11.48)	(13.39)
15	1.41	324	31	(10.56)	(12.32)
34	1.27	247	30	8.29	9.67
48	2.99	402	57	7.12	8.31
63	1.99	521	64	8.12	9.47

STATION	NORTH	EAST	DATE	TIME
274	13.4813	47.3267	14-Mar-87	12.43

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
2	0.77	160	31	5.18	6.04
10	0.54	121	27	4.55	5.31
20	0.57	141	31	4.59	5.35
29	0.88	173	36	4.83	5.64
42	0.91	160	34	4.67	5.45
65	1.02	230	45	5.12	5.97

STATION	NORTH	EAST	DATE	TIME
180,01	19,0681	39,1317	24-Feb-87	12,20

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
0	2,62	431	77	5,58	6,51
10	1,21	189	28	6,66	7,77
20	0,94	149	25	5,86	6,84
30	0,83	114	18	6,31	7,36
40	1,03	134	23	5,82	6,79
50	1,40	177	29	6,03	7,04
60	1,39	181	31	5,78	6,74
70	1,27	134	22	6,12	7,14
80	1,19	164	27	6,10	7,12
90	0,89	186	30	6,24	7,28
100	1,01	150	26	5,77	6,73

STATION	NORTH	EAST	DATE	TIME
180,02	19,0681	39,1347	24-Feb-87	15,65

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
0	1,16	124	24	5,18	6,04
10	1,05	90	16	5,47	6,38
20	1,56	130	27	4,84	5,65
30	1,16	116	20	5,94	6,93
40	0,86	150	27	5,62	6,56
50	0,86	149	28	5,35	6,24
60	1,01	120	24	4,92	5,74
70	(1,11)	88	19	4,59	5,35
80	1,46	137	28	4,95	5,78
90	(1,06)	83	17	4,94	5,76
100	0,86	65	11	5,82	6,79

STATION	NORTH	EAST	DATE	TIME
180,03	19,0606	39,1369	24-Feb-87	17,75

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
0	1,11	151	26	5,89	6,87
10	0,99	99	22	4,58	5,34
20	1,26	154	32	4,75	5,54
30	0,85	84	18	4,80	5,60
40	1,07	93	21	4,33	5,05
50	1,13	100	20	4,92	5,74
60	1,41	131	28	4,60	5,37
70	0,97	90	19	4,78	5,58
80	1,51	126	24	5,26	6,14
90	(1,44)	94	17	5,41	6,31
100	(1,33)	65	14	4,68	5,46

STATION	NORTH	EAST	DATE	TIME
180,04	19,0603	39,1333	24-Feb-87	20,50

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
0	0,94	97	19	5,02	5,86
10	1,09	98	21	4,71	5,50
20	1,10	140	30	4,72	5,51
30	1,00	100	21	4,79	5,59
40	1,09	117	24	4,78	5,58
50	1,37	125	26	4,85	5,66
60	1,57	141	28	5,09	5,94
70	1,53	98	23	4,30	5,02
80	(1,08)	79	17	4,56	5,32
90	(1,03)	77	18	4,37	5,10
100	1,03	103	21	4,81	5,61

STATION	NORTH	EAST	DATE	TIME
180,05	19,0603	39,1378	24-Feb-87	22,97

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
0	1,12	173	30	5,73	6,69
10	1,21	107	18	5,86	6,84
20	1,10	103	18	5,71	6,66
30	1,16	102	20	5,00	5,83
40	1,19	106	21	4,99	5,82
50	1,44	134	29	4,64	5,41
60	(1,30)	90	22	4,09	4,77
70	(1,48)	86	16	5,25	6,13
80	1,06	88	17	5,30	6,18
90	(0,73)	53	11	4,79	5,59
100	(1,09)	63	10	6,14	7,16

STATION	NORTH	EAST	DATE	TIME
180,06	19,0669	39,1331	25-Feb-87	1,50

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
0	1,02	158	24	6,47	7,55
10	(0,67)	53	11	4,87	5,68
20	0,97	99	19	5,21	6,08
30	(0,96)	65	14	4,55	5,31
40	1,01	92	20	4,59	5,35
50	(0,98)	71	18	4,04	4,71
60	1,37	114	26	4,43	5,17
70	(1,06)	80	20	4,03	4,70
80	0,78	80	18	4,55	5,31
90	(1,19)	63	11	5,65	6,59
100	(1,17)	89	17	5,28	6,16

STATION	NORTH	EAST	DATE	TIME
180,07	19,0631	39,1306	25-Feb-87	3,50

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
0	1,41	167	36	4,61	5,38
10	(0,88)	69	13	5,36	6,25
20	0,87	74	15	4,85	5,66
30	0,73	90	18	5,06	5,90
40	0,98	97	21	4,61	5,38
50	(1,17)	90	17	5,18	6,04
60	1,02	96	20	4,94	5,76
70	(1,38)	75	16	4,76	5,55
80	(1,11)	83	18	4,67	5,45
90	(1,11)	81	10	7,96	9,29
100	1,12	101	16	6,32	7,37

STATION	NORTH	EAST	DATE	TIME
180,08	19,0561	39,1378	25-Feb-87	5,50

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
0	1,42	119	17	6,91	8,06
10	(1,20)	86	15	5,57	6,50
20	(1,66)	85	16	5,27	6,15
30	-	-	-	-	-
40	1,19	106	23	4,64	5,41
50	1,13	119	19	6,12	7,14
60	1,08	111	18	6,21	7,25
70	(1,13)	88	17	5,04	5,88
80	(1,99)	100	19	5,41	6,31
90	-	-	-	-	-
100	(1,18)	58	16	3,55	4,14

STATION	NORTH	EAST	DATE	TIME
180,09	19,0522	39,1436	25-Feb-87	7,50

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
0	1,32	151	29	5,26	6,14
10	1,20	124	28	4,45	5,19
20	1,18	185	37	5,04	5,88
30	1,14	127	23	5,49	6,41
40	1,20	152	31	4,86	5,67
50	1,26	176	38	4,70	5,48
60	1,26	117	21	5,63	6,57
70	(1,26)	99	21	4,74	5,53
80	1,13	108	22	4,87	5,68
90	(1,09)	64	15	4,21	4,91
100	1,15	101	15	6,91	8,06

STATION	NORTH	EAST	DATE	TIME
180,10	19,0414	39,1622	25-Feb-87	9,50

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
0	1,63	295	47	6,29	7,34
10	0,93	118	21	5,69	6,64
20	0,94	102	18	5,52	6,44
30	0,93	139	26	5,32	6,21
40	1,38	170	33	5,13	5,99
50	0,91	126	20	6,39	7,46
60	0,99	120	20	6,15	7,18
70	0,90	104	18	5,80	6,77
80	(0,87)	66	8	8,08	9,43
90	(1,77)	56	10	5,43	6,34
100	-	-	-	-	-

STATION	NORTH	EAST	DATE	TIME
180,11	19,0367	39,1800	25-Feb-87	12,50

DEPTH m	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
0	1,53	264	53	4,98	5,81
10	(1,53)	105	18	5,76	6,72
20	0,92	97	17	5,79	6,76
30	0,61	87	15	5,65	6,59
40	0,83	91	14	6,55	7,64
50	1,01	108	17	6,39	7,46
60	1,06	94	16	5,78	6,74
70	0,95	82	15	5,66	6,60
80	(1,28)	89	16	5,47	6,38
90	0,46	95	18	5,43	6,34
100	1,32	148	23	6,44	7,51

TRANSSECT-STATIONS SESTON, POC:PON, C:N

STATION	SESTON mg/l	POC µg/l	PON µg/l	RATIO POC:PON	RATIO C : N
202	0,81	139	22	6,20	7,23
203	0,87	100	18	5,66	6,60
204	0,50	85	17	5,11	5,96
205	1,28	102	19	5,41	6,31
206	1,19	146	21	7,08	8,26
207	(6,44)	88	8	(10,78)	(12,58)
208	0,83	99	9	(10,64)	(12,41)
209	1,09	132	17	7,61	8,88
210	0,51	127	13	(9,92)	(11,57)
211	0,87	110	11	(9,69)	(11,31)
212	0,35	120	15	8,24	9,61
213	1,29	170	14	(12,23)	(14,27)
214	0,78	130	15	(8,79)	(10,25)
215	0,76	198	20	(9,97)	(11,63)
216	1,09	147	17	(8,69)	(10,14)
217	1,65	247	29	8,55	9,98
218	0,77	83	3	(24,03)	(28,04)
219	0,77	117	11	(10,53)	(12,29)
220	1,32	230	26	(8,92)	(10,41)
221	0,96	108	8	(14,21)	(16,58)
222	0,47	100	9	(10,71)	(12,50)
223	1,53	272	30	(9,19)	(10,72)
224	0,83	112	8	(13,94)	(16,26)
225	0,77	138	15	(9,20)	(10,73)
226	0,93	127	11	(11,29)	(13,17)
227	1,14	176	22	8,05	9,39
228	0,25	148	16	(9,20)	(10,73)
229	2,53	241	21	(11,35)	(13,24)
231	0,42	165	10	(16,98)	(19,81)
235	1,29	182	14	(12,72)	(14,84)
239	0,77	200	13	(15,66)	(18,27)
243	0,67	135	6	(21,09)	(24,61)
246	0,69	157	23	6,73	7,85
255	0,36	-	-	-	-
259	(5,71)	-	-	-	-

Part 2

Chlorophyll *a* content

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
57	23,9056	36,4861	02-Feb-87	9,63

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	75	68	14	90,7%
5	65	41	45	63,1%
10	67	62	9	92,5%
20	67	56	20	83,6%
30	84	69	30	82,1%
40	155	119	72	76,8%
50	151	117	69	77,5%
75	171	99	140	57,9%
100	70	49	40	70,0%
150	79	67	24	84,8%
200	7	2	9	28,6%

STATION	NORTH	EAST	DATE	TIME
58	23,6006	36,7058	02-Feb-87	14,25

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	65	31	66	47,7%
5	41	27	26	65,9%
10	87	80	15	92,0%
20	121	89	64	73,6%
30	-	-	-	-
40	192	145	95	75,5%
50	207	167	77	80,7%
75	181	132	96	72,9%
100	206	102	201	49,5%
150	-	-	-	-
200	-	-	-	-

STATION	NORTH	EAST	DATE	TIME
59	23,3258	36,9461	02-Feb-87	18,27

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	74	65	18	87,8%
5	71	58	24	81,7%
10	64	52	24	81,3%
20	-	-	-	-
30	270	166	199	61,5%
40	310	206	197	66,5%
50	239	143	185	59,8%
75	80	43	71	53,8%
100	115	47	132	40,9%
150	8	3	9	37,5%
200	5	1	9	20,0%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
60	22,9381	37,0844	02-Feb-87	21,88

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	64	55	17	85,9%
5	73	56	33	76,7%
10	77	59	35	76,6%
20	93	62	67	66,7%
30	206	131	146	63,6%
40	253	149	201	58,9%
50	253	154	189	60,9%
75	126	75	102	59,5%
100	23	12	20	52,2%
150	15	7	14	46,7%
200	3	1	6	33,3%

STATION	NORTH	EAST	DATE	TIME
61	22,9364	36,7308	03-Feb-87	0,83

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	79	65	28	82,3%
5	72	59	27	81,9%
10	71	61	21	85,9%
20	69	56	25	81,2%
30	77	61	30	79,2%
40	81	58	44	71,6%
50	103	69	69	67,0%
75	295	160	259	54,2%
100	79	43	75	54,4%
150	20	11	14	55,0%
200	7	4	7	57,1%

STATION	NORTH	EAST	DATE	TIME
62	22,9425	36,3925	03-Feb-87	3,25

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	107	83	47	77,6%
5	101	78	45	77,2%
10	102	77	47	75,5%
20	106	86	40	81,1%
30	150	107	84	71,3%
40	190	153	76	80,5%
50	225	170	110	75,6%
75	191	137	106	71,7%
100	61	42	37	68,9%
150	16	9	13	56,3%
200	-	-	-	-

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
64	23,0928	36,5303	03-Feb-87	6,33

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	84	67	34	79,8%
5	83	67	32	80,7%
10	80	68	25	85,0%
20	82	65	33	79,3%
30	-	-	-	-
40	116	90	51	77,6%
50	157	119	74	75,8%
75	125	86	77	68,8%
100	84	55	56	65,5%
150	20	11	15	55,0%
200	-	-	-	-

STATION	NORTH	EAST	DATE	TIME
66	23,2533	36,6706	03-Feb-87	9,63

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	93	77	32	82,8%
5	89	68	40	76,4%
10	90	70	39	77,8%
20	97	77	40	79,4%
30	-	-	-	-
40	106	84	43	79,2%
50	117	91	51	77,8%
75	217	125	179	57,6%
100	112	50	118	44,6%
150	10	5	10	50,0%
200				

STATION	NORTH	EAST	DATE	TIME
76	22,9833	36,4667	05-Feb-87	19,50

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	99	76	46	76,8%
5	98	74	46	75,5%
10	99	72	53	72,7%
20	103	80	47	77,7%
30	155	121	68	78,1%
40	139	102	72	73,4%
50	161	118	83	73,3%
75	245	147	187	60,0%
100	117	78	76	66,7%
150	-	-	-	-
200	9	3	10	33,3%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
81	22,9881	37,3361	06-Feb-87	8,67

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	135	114	43	84,4%
5	136	112	47	82,4%
10	102	84	36	82,4%
20	99	80	37	80,8%
30	106	94	24	88,7%
40	137	113	46	82,5%
50	166	133	67	80,1%
75	222	157	128	70,7%
100	104	74	59	71,2%
150	12	6	11	50,0%
200	4	1	7	25,0%

STATION	NORTH	EAST	DATE	TIME
86	22,5861	36,7769	07-Feb-87	10,90

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	86	73	27	84,9%
5	95	77	35	81,1%
10	99	81	35	81,8%
20	113	95	35	84,1%
30	135	114	43	84,4%
40	131	106	49	80,9%
50	126	102	48	81,0%
75	263	180	158	68,4%
100	194	138	109	71,1%
150	33	24	16	72,7%
200	21	12	17	57,1%

STATION	NORTH	EAST	DATE	TIME
88	22,6703	37,5553	07-Feb-87	21,22

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	99	82	34	82,8%
5	102	87	30	85,3%
10	100	85	30	85,0%
20	218	181	76	83,0%
30	255	188	126	73,7%
40	298	207	172	69,5%
50	415	279	257	67,2%
75	264	153	213	58,0%
100	160	91	134	56,9%
150	29	19	17	65,5%
200	-	-	-	-

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
91	22,1506	37,8136	08-Feb-87	10,62

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	93	82	22	88,2%
5	89	83	14	93,3%
10	90	73	33	81,1%
20	99	80	37	80,8%
30	139	109	59	78,4%
40	557	377	335	67,7%
50	319	170	287	53,3%
75	55	35	32	63,6%
100	24	11	20	45,8%
150	3	1	7	33,3%
200	3	1	7	33,3%

STATION	NORTH	EAST	DATE	TIME
97	22,1053	37,1361	09-Feb-87	9,10

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	105	81	47	77,1%
5	101	79	43	78,2%
10	106	81	49	76,4%
20	106	83	44	78,3%
30	271	179	176	66,1%
40	338	195	272	57,7%
50	216	158	112	73,1%
75	149	127	45	85,2%
100	182	153	60	84,1%
150	104	74	58	71,2%
200	13	6	13	46,2%

STATION	NORTH	EAST	DATE	TIME
100	22,9942	36,4736	10-Feb-87	13,12

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	83	69	26	83,1%
5	83	64	38	77,1%
10	84	70	27	83,3%
20	89	73	36	82,0%
30	96	72	47	75,0%
40	131	98	67	74,8%
50	196	148	96	75,5%
75	215	95	232	44,2%
100	82	39	81	47,6%
150	22	11	18	50,0%
200	5	2	7	40,0%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
103	22,9564	36,5275	11-Feb-87	17,77

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	71	58	25	81,7%
5	-	-	-	-
10	75	61	28	81,3%
20	79	64	30	81,0%
30	136	87	95	64,0%
40	298	198	190	66,4%
50	422	250	325	59,2%
75	70	37	63	52,9%
100	22	13	14	59,1%
150	13	7	11	53,8%
200	4	2	7	50,0%

STATION	NORTH	EAST	DATE	TIME
108	21,4092	38,0169	12-Feb-87	11,00

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	220	160	114	72,7%
5	209	162	92	77,5%
10	-	-	-	-
20	229	172	108	75,1%
30	195	157	74	80,5%
40	196	152	85	77,6%
50	205	160	86	78,0%
75	406	274	248	67,5%
100	205	156	99	76,1%
150	20	12	13	60,0%
200	5	2	7	40,0%

STATION	NORTH	EAST	DATE	TIME
121	21,6247	38,0647	14-Feb-87	11,98

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	103	89	29	86,4%
5	106	90	32	84,9%
10	103	84	38	81,6%
20	110	93	33	84,5%
30	148	117	61	79,1%
40	177	141	71	79,7%
50	214	138	148	64,5%
75	345	188	300	54,5%
100	59	34	41	57,6%
150	9	4	9	44,4%
200	4	2	6	50,0%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
130	21,4369	37,9900	16-Feb-87	13,88

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	118	96	45	81,4%
5	87	79	17	90,8%
10	92	82	19	89,1%
20	113	95	36	84,1%
30	-	-	-	-
40	156	131	51	84,0%
50	174	141	66	81,0%
75	169	92	149	54,4%
100	79	37	79	46,8%
150	8	4	8	50,0%
200	3	1	5	33,3%

STATION	NORTH	EAST	DATE	TIME
133	19,6233	37,2581	17-Feb-87	11,02

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	243	208	64	85,6%
5	228	191	70	83,8%
10	351	283	124	80,6%
20	385	302	153	78,4%
30	337	248	137	73,6%
40	267	184	159	68,9%
50	198	107	178	54,0%
75	73	46	51	63,0%
100	-	-	-	-
150	10	5	9	50,0%
200	21	15	11	71,4%

STATION	NORTH	EAST	DATE	TIME
137	19,9883	38,4669	18-Feb-87	9,40

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	102	93	18	91,2%
5	94	82	23	87,2%
10	98	89	20	90,8%
20	129	107	44	82,9%
30	137	114	46	83,2%
40	203	166	75	81,8%
50	247	176	138	71,3%
75	262	180	157	68,7%
100	-	-	-	-
150	28	21	9	75,0%
200	11	7	8	63,6%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
143	19,9878	38,1328	19-Feb-87	10,53

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	139	119	41	85,6%
5	136	118	36	86,8%
10	136	118	36	86,8%
20	145	128	35	88,3%
30	153	139	28	90,8%
40	219	181	71	82,6%
50	217	173	84	79,7%
75	201	153	92	76,1%
100	61	45	24	73,8%
150	15	8	12	53,3%
200	6	3	6	50,0%

STATION	NORTH	EAST	DATE	TIME
151	19,6881	37,4833	20-Feb-87	9,28

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	197	154	82	78,2%
5	225	186	74	82,7%
10	220	188	81	85,5%
20	267	201	125	75,3%
30	399	269	245	67,4%
40	307	200	203	65,1%
50	201	109	180	54,2%
75	65	38	50	58,5%
100	41	28	22	68,3%
150	11	3	14	27,3%
200	5	1	10	20,0%

STATION	NORTH	EAST	DATE	TIME
156	20,5094	38,2500	21-Feb-87	3,65

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	149	122	55	81,9%
5	-	-	-	-
10	151	127	49	84,1%
20	148	122	54	82,4%
30	151	128	49	84,8%
40	157	129	56	82,2%
50	181	146	72	80,7%
75	138	81	108	58,7%
100	64	43	40	67,2%
150	45	26	33	57,8%
200	11	3	14	27,3%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
162	19,2531	38,9192	21-Feb-87	22,03

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	87	70	33	80,5%
5				
10	93	77	31	82,8%
20	114	94	38	82,5%
30	127	109	36	85,8%
40	218	173	90	79,4%
50	386	261	236	67,6%
75	204	138	129	67,6%
100	69	43	50	62,3%
150	8	4	9	50,0%
200	5	1	9	20,0%

STATION	NORTH	EAST	DATE	TIME
165	19,0564	39,1269	22-Feb-87	11,02

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	105	92	28	87,6%
5	104	91	26	87,5%
10	106	90	33	84,9%
20	118	100	36	84,7%
30	167	133	68	79,6%
40	228	164	123	71,9%
50	318	210	207	66,0%
75	185	107	153	57,8%
100	72	39	63	54,2%
150	6	2	9	33,3%
200	3	1	6	33,3%

STATION	NORTH	EAST	DATE	TIME
174	18,7656	39,3583	23-Feb-87	13,98

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	130	119	22	91,5%
5	125	119	13	95,2%
10	134	119	31	88,8%
20	183	162	42	88,5%
30	274	245	61	89,4%
40	242	212	63	87,6%
50	253	219	70	86,6%
75	247	168	155	68,0%
100	30	23	13	76,7%
150	14	8	11	57,1%
200	5	3	7	60,0%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
180,01	19,0681	39,1317	24-Feb-87	12,20

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	93	82	21	88,2%
10	117	105	22	89,7%
20	145	122	45	84,1%
30	177	150	55	84,7%
40	310	246	127	79,4%
50	410	329	162	80,2%
60	288	209	155	72,6%
70	271	187	165	69,0%
80	96	62	63	64,6%
90	112	70	69	62,5%
100	111	61	83	55,0%

STATION	NORTH	EAST	DATE	TIME
180,02	19,0681	39,1347	24-Feb-87	15,65

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	88	76	22	86,4%
10	86	77	17	89,5%
20	103	90	25	87,4%
30	129	108	40	83,7%
40	-	-	-	-
50	446	286	312	64,1%
60	255	192	128	75,3%
70	156	123	64	78,8%
80	97	66	58	68,0%
90	70	43	46	61,4%
100	102	58	74	56,9%

STATION	NORTH	EAST	DATE	TIME
180,03	19,0606	39,1369	24-Feb-87	17,75

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	61	55	10	90,2%
10	83	73	15	88,0%
20	103	91	16	88,3%
30	127	110	23	86,6%
40	275	191	163	69,5%
50	386	277	214	71,8%
60	279	198	159	71,0%
70	153	107	87	69,9%
80	78	46	59	59,0%
90	50	28	38	56,0%
100	86	49	63	57,0%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
180,04	19,0603	39,1333	24-Feb-87	20,50

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	66	58	14	87,9%
10	71	60	18	84,5%
20	86	72	22	83,7%
30	121	100	31	82,6%
40	311	229	162	73,6%
50	374	267	210	71,4%
60	275	191	163	69,5%
70	181	114	128	63,0%
80	90	48	77	53,3%
90	61	35	46	57,4%
100	63	39	42	61,9%

STATION	NORTH	EAST	DATE	TIME
180,05	19,0603	39,1378	24-Feb-87	22,97

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	72	62	16	86,1%
10	68	59	14	86,8%
20	79	67	19	84,8%
30	122	103	26	84,4%
40	216	166	97	76,9%
50	266	193	143	72,6%
60	252	178	144	70,6%
70	207	141	128	68,1%
80	79	57	40	72,2%
90	57	35	37	61,4%
100	64	42	39	65,6%

STATION	NORTH	EAST	DATE	TIME
180,06	19,0669	39,1331	25-Feb-87	1,50

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	73	65	13	89,0%
10	70	58	19	82,9%
20	87	70	26	80,5%
30	98	77	34	78,6%
40	159	112	91	70,4%
50	292	205	170	70,2%
60	239	168	137	70,3%
70	197	131	127	66,5%
80	72	44	51	61,1%
90	53	32	37	60,4%
100	-	-	-	-

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
180,07	19,0631	39,1306	25-Feb-87	3,50

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	76	67	13	88,2%
10	72	64	13	88,9%
20	74	65	15	87,8%
30	85	74	17	87,1%
40	137	103	66	75,2%
50	326	214	219	65,6%
60	246	165	158	67,1%
70	193	122	137	63,2%
80	75	38	69	50,7%
90	55	23	49	41,8%
100	53	31	40	58,5%

STATION	NORTH	EAST	DATE	TIME
180,08	19,0561	39,1378	25-Feb-87	5,50

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	87	77	15	88,5%
10	77	66	17	85,7%
20	82	69	20	84,1%
30	-	-	-	-
40	137	112	49	81,8%
50	297	220	152	74,1%
60	255	185	137	72,5%
70	212	154	113	72,6%
80	103	68	66	66,0%
90	61	38	40	62,3%
100	67	42	41	62,7%

STATION	NORTH	EAST	DATE	TIME
180,09	19,0522	39,1436	25-Feb-87	7,50

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	120	113	6	94,2%
10	102	96	7	94,1%
20	100	92	11	92,0%
30	108	95	19	88,0%
40	273	207	131	75,8%
50	405	299	211	73,8%
60	292	222	138	76,0%
70	257	191	131	74,3%
80	193	127	128	65,8%
90	56	36	35	64,3%
100	78	49	50	62,8%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
180,10	19,0414	39,1622	25-Feb-87	9,50

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	119	111	9	93,3%
10	-	-	-	-
20	97	88	13	90,7%
30	122	112	12	91,8%
40	187	146	79	78,1%
50	378	279	195	73,8%
60	269	196	143	72,9%
70	241	177	125	73,4%
80	163	105	109	64,4%
90	58	39	33	67,2%
100	72	45	46	62,5%

STATION	NORTH	EAST	DATE	TIME
180,11	19,0367	39,1800	25-Feb-87	12,50

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	86	81	5	94,2%
10	99	95	4	96,0%
20	102	92	13	90,2%
30	125	115	11	92,0%
40	293	230	125	78,5%
50	297	226	140	76,1%
60	269	210	117	78,1%
70	225	161	124	71,6%
80	101	77	46	76,2%
90	58	36	38	62,1%
100	78	45	56	57,7%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
189	19,6439	38,6203	27-Feb-87	10,38

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	85	61	46	71,8%
5	90	72	37	80,0%
10	88	68	37	77,3%
20	88	64	46	72,7%
30	93	69	46	74,2%
40	96	71	48	74,0%
50	107	77	60	72,0%
75	297	184	217	62,0%
100	111	43	131	38,7%
150	27	18	17	66,7%
200	10	4	12	40,0%

STATION	NORTH	EAST	DATE	TIME
195	19,3300	38,2344	28-Feb-87	11,12

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	106	92	30	86,8%
5	115	96	39	83,5%
10	117	101	32	86,3%
20	107	86	43	80,4%
30	128	103	51	80,5%
40	146	114	62	78,1%
50	232	153	152	65,9%
75	154	82	140	53,2%
100	41	26	28	63,4%
150	7	3	8	42,9%
200	5	0	9	0,0%

STATION	NORTH	EAST	DATE	TIME
229	12,7756	43,2403	05-Mar-87	16,27

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	401	339	126	84,5%
5	359	297	126	82,7%
10	367	294	147	80,1%
20	418	345	148	82,5%
30	408	327	163	80,1%
40	329	250	157	76,0%
50	319	250	137	78,4%
75	244	189	110	77,5%
100	64	16	83	25,0%
150	67	29	66	43,3%
200	63	30	57	47,6%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
231	12,5797	43,3250	06-Mär-87	0,78

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	234	188	92	80,3%
5	257	216	81	84,0%
10	253	215	76	85,0%
20	255	216	79	84,7%
30	276	232	88	84,1%
40	324	272	106	84,0%
50	308	253	109	82,1%
75	208	166	82	79,8%
100	182	143	75	78,6%
150	132	92	75	69,7%
200	80	47	57	58,8%

STATION	NORTH	EAST	DATE	TIME
235	12,5258	43,4325	06-Mär-87	11,98

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	205	172	66	83,9%
5	213	172	81	80,8%
10	228	190	77	83,3%
20	255	208	94	81,6%
30	233	184	96	79,0%
40	135	110	48	81,5%
50	125	103	42	82,4%
75	126	99	52	78,6%
100	117	88	55	75,2%
150	123	89	64	72,4%
200	85	51	57	60,0%

STATION	NORTH	EAST	DATE	TIME
237	12,3561	43,4886	06-Mär-87	17,17

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	89	80	12	89,9%
5	109	99	12	90,8%
10	114	103	22	90,4%
20	163	144	37	88,3%
30	225	198	56	88,0%
40	318	254	127	79,9%
50	184	149	69	81,0%
75	54	35	34	64,8%
100	73	49	40	67,1%
148	78	53	42	67,9%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
238	12,3839	43,5136	06-Mär-87	18,02

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	95	87	11	91,6%
5	93	88	6	94,6%
10	94	85	11	90,4%
20	127	117	18	92,1%
30	138	120	35	87,0%
40	227	184	85	81,1%
50	329	278	103	84,5%
75	132	107	48	81,1%
100	85	64	33	75,3%
150	47	27	37	57,4%
200	43	21	40	48,8%

STATION	NORTH	EAST	DATE	TIME
239	12,4528	43,5667	06-Mär-87	19,98

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	116	92	46	79,3%
5	124	104	37	83,9%
10	133	111	42	83,5%
20	165	135	59	81,8%
30	230	180	97	78,3%
40	269	197	141	73,2%
50	216	163	104	75,5%
75	129	95	65	73,6%
100	90	51	72	56,7%
150	52	31	36	59,6%
200	66	37	49	56,1%

STATION	NORTH	EAST	DATE	TIME
240	12,5089	43,6161	06-Mär-87	21,97

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	159	137	43	86,2%
5	147	129	35	87,8%
10	146	123	45	84,2%
20	158	132	50	83,5%
30	174	149	50	85,6%
40	281	230	103	81,9%
50	305	238	133	78,0%
75	234	174	117	74,4%
100	140	100	76	71,4%
150	100	68	60	68,0%
200	80	47	61	58,8%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
243	12,3397	43,6706	07-Mär-87	4,05

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	136	118	35	86,8%
5	133	121	23	91,0%
10	136	120	30	88,2%
20	154	127	53	82,5%
30	315	269	95	85,4%
40	344	276	137	80,2%
50	225	173	103	76,9%
75	105	78	51	74,3%
100	55	37	32	67,3%
150	47	29	33	61,7%
200	46	24	39	52,2%

STATION	NORTH	EAST	DATE	TIME
245	12,1692	44,0100	07-Mär-87	8,70

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	121	106	29	87,6%
5	-	-	-	-
10	-	-	-	-
20	-	-	-	-
30	190	146	86	76,8%
40	267	212	110	79,4%
50	248	200	96	80,6%
75	144	122	44	84,7%
100	34	31	8	91,2%
150	10	4	14	40,0%
200	8	3	13	37,5%

STATION	NORTH	EAST	DATE	TIME
246	12,3344	44,3511	07-Mär-87	11,50

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	101	81	37	80,2%
5	113	96	33	85,0%
10	113	95	34	84,1%
20	134	106	49	79,1%
30	198	159	77	80,3%
40	263	204	117	77,6%
50	323	253	138	78,3%
75	220	170	99	77,3%
100	89	74	23	83,1%
150	13	6	16	46,2%
200	8	2	15	25,0%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
251	12,5144	45,6856	09-Mär-87	12,93

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	112	92	36	82,1%
5	120	104	29	86,7%
10	131	119	24	90,8%
20	146	128	37	87,7%
30	192	175	35	91,1%
40	266	225	83	84,6%
50	393	333	123	84,7%
75	252	213	79	84,5%
100	118	96	41	81,4%
150	14	4	20	28,6%
200	10	4	14	40,0%

STATION	NORTH	EAST	DATE	TIME
255	12,9847	47,8389	10-Mär-87	10,65

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	137	116	41	84,7%
5	136	111	48	81,6%
10	159	129	60	81,1%
20	299	240	117	80,3%
30	376	302	148	80,3%
40	362	288	150	79,6%
50	222	165	113	74,3%
75	86	48	71	55,8%
100	40	27	20	67,5%
150	13	4	19	30,8%
200	11	3	18	27,3%

STATION	NORTH	EAST	DATE	TIME
259	12,8681	47,4203	11-Mär-87	13,92

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	76	60	28	78,9
5	76	61	27	80,3%
10	83	66	32	79,5%
20	101	80	38	79,2%
30	154	118	69	76,6%
40	369	284	170	77,0%
50	235	169	128	71,9%
75	88	65	42	73,9%
100	27	18	17	66,7%
150	10	4	13	40,0%
200	6	3	10	50,0%

HYDROGRAPHICAL STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
269	13,1722	47,0981	13-Mär-87	10,45

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	100	92	15	92,0%
5	-	-	-	-
10	99	86	23	86,9%
20	115	103	23	89,6%
30	179	156	46	87,2%
40	350	296	111	84,6%
50	312	259	107	83,0%
75	-	-	-	-
100	35	23	19	65,7%
150	10	3	16	30,0%
200	8	2	13	25,0%

STATION	NORTH	EAST	DATE	TIME
274	13,4813	47,3267	14-Mär-87	12,43

DEPTH m	CHL A-REGR. ng / l	CHL A-ACID. ng / l	PHAEOPIGM. ng / l	PERCENTAGE ACID/REGR
0	121	103	35	85,1%
5	130	112	35	86,2%
10	130	101	56	77,7%
20	170	129	79	75,9%
30	294	220	145	74,8%
40	417	303	224	72,7%
50	330	238	182	72,1%
75	83	48	65	57,8%
100	38	25	21	65,8%
150	11	3	16	27,3%
200	10	3	16	30,0%

STATION	NORTH	EAST	DATE	TIME
66,00	23,2533	36,6706	03-Feb-87	9,63

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION
0	total	88	60	51	>20
	<20	88	61	49	2<20
	<2	69	46	41	<2
10	total	94	65	54	>20
	<20	94	65	54	2<20
	<2	68	47	38	<2
20	total	98	72	50	>20
	<20	101	81	37	2<20
	<2	-	-	-	<2
35	total	120	94	50	>20
	<20	95	73	41	2<20
	<2	78	55	41	<2
50	total	169	117	100	>20
	<20	173	105	130	2<20
	<2	125	97	53	<2
80	total	283	168	221	>20
	<20	242	140	197	2<20
	<2	245	131	218	<2

STATION	NORTH	EAST	DATE	TIME
81,00	22,9881	37,3361	06-Feb-87	8,67

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION
2	total	109	97	17	>20
	<20	91	80	17	2<20
	<2	60	53	11	<2
10	total	90	77	20	>20
	<20	86	72	22	2<20
	<2	60	55	8	<2
20	total	93	77	25	>20
	<20	91	79	18	2<20
	<2	59	50	15	<2
30	total	121	101	38	>20
	<20	120	106	25	2<20
	<2	73	60	24	<2
50	total	197	134	117	>20
	<20	191	140	100	2<20
	<2	137	111	51	<2
75	total	215	134	156	>20
	<20	231	206	51	2<20
	<2	167	110	107	<2

987
SIZE-FRACTIONS

Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
0	0	2	0%
19	15	8	22%
69	46	41	78%
0	0	0	0%
26	18	16	28%
68	47	38	72%
-	-	-	-
-	-	-	-
-	-	-	-
25	21	9	21%
17	18	0	14%
78	55	41	65%
0	12	0	0%
48	8	77	28%
125	97	53	72%
38	28	3	14%
0	9	0	0%
245	131	218	86%

Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
18	17	0	17%
31	27	6	28%
60	53	11	55%
4	5	0	4%
26	17	14	29%
60	55	8	67%
2	0	7	2%
32	29	3	34%
59	50	15	64%
1	0	13	1%
47	46	1	41%
73	60	24	58%
6	0	17	3%
54	29	49	27%
137	111	51	70%
0	0	49	0%
64	96	0	28%
167	110	107	72%

METEOR 5/2 RED SEA 1987
BIOLOGICAL STATIONS CHLOROPHYLL IN SIZE-FRACTIONS

STATION	NORTH	EAST	DATE	TIME
86,00	22,5861	36,7769	07-Feb-87	10,90

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
2	total	87	80	9	>20	10	8	2	11%
	<20	77	72	7	2<20	32	27	7	37%
	<2	45	45	0	<2	45	45	0	52%
10	total	84	75	13	>20	0	0	0	0%
	<20	84	75	14	2<20	32	26	9	38%
	<2	52	49	5	<2	52	49	5	62%
20	total	104	96	10	>20	9	11	0	9%
	<20	95	85	13	2<20	36	29	7	35%
	<2	59	56	6	<2	59	56	6	56%
35	total	146	123	45	>20	7	6	4	5%
	<20	139	117	41	2<20	50	39	20	34%
	<2	89	78	21	<2	89	78	21	61%
60	total	166	131	67	>20	0	0	0	0%
	<20	172	135	72	2<20	75	52	46	44%
	<2	97	83	26	<2	97	83	26	56%
85	total	213	159	101	>20	11	0	17	5%
	<20	202	159	84	2<20	64	46	36	30%
	<2	138	113	48	<2	138	113	48	65%

STATION	NORTH	EAST	DATE	TIME
91,00	22,1506	37,8136	08-Feb-87	10,62

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
2	total	115	113	0	>20				
	<20	95	86	12	2<20				
	<2	-	-	-	<2				
8	total	111	104	8	>20	10	10	0	9%
	<20	101	94	9	2<20	47	43	3	42%
	<2	54	51	6	<2	54	51	6	49%
15	total	127	112	20	>20	6	0	8	5%
	<20	121	115	6	2<20	50	52	0	39%
	<2	71	63	12	<2	71	63	12	56%
25	total	235	174	120	>20	29	11	34	12%
	<20	206	163	86	2<20	75	57	38	32%
	<2	131	106	48	<2	131	106	48	56%
45	total	569	358	405	>20	101	65	66	18%
	<20	468	293	339	2<20	144	73	134	25%
	<2	324	220	205	<2	324	220	205	57%
60	total	374	231	278	>20	19	11	15	5%
	<20	355	220	263	2<20	105	54	100	28%
	<2	250	166	163	<2	250	166	163	67%

METEOR 5/2 RED SEA 1987
BIOLOGICAL STATIONS CHLOROPHYLL IN SIZE-FRACTIONS

STATION	NORTH	EAST	DATE	TIME
97,00	22,1053	37,1361	09-Feb-87	9,10

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
2	total	121	101	29	>20	0	0	7	0%
	<20	126	110	22	2<20	62	55	8	49%
	<2	64	55	14	<2	64	55	14	51%
8	total	130	100	58	>20	0	2	0	0%
	<20	133	98	67	2<20	47	28	38	35%
	<2	86	70	29	<2	86	70	29	65%
15	total	266	177	173	>20	21	14	14	8%
	<20	245	163	159	2<20	71	54	36	27%
	<2	174	109	123	<2	174	109	123	65%
25	total	183	135	93	>20	4	3	2	2%
	<20	179	132	91	2<20	90	62	56	49%
	<2	89	70	35	<2	89	70	35	49%
45	total	175	135	77	>20	18	4	27	10%
	<20	157	131	50	2<20	46	37	18	26%
	<2	111	94	32	<2	111	94	32	63%
60	total	176	145	61	>20	9	5	7	5%
	<20	167	140	54	2<20	49	33	33	28%
	<2	118	107	21	<2	118	107	21	67%

STATION	NORTH	EAST	DATE	TIME
108,00	21,4092	38,0169	12-Feb-87	11,00

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
1	total	214	184	61	>20	1	3	0	0%
	<20	213	181	65	2<20	49	44	10	23%
	<2	164	137	55	<2	164	137	55	77%
5	total	213	175	77	>20	1	0	14	0%
	<20	212	181	63	2<20	65	50	31	31%
	<2	147	131	32	<2	147	131	32	69%
10	total	188	154	69	>20	17	4	26	9%
	<20	171	150	43	2<20	59	52	16	31%
	<2	112	98	27	<2	112	98	27	60%
25	total	203	156	92	>20	2	2	0	1%
	<20	201	154	92	2<20	74	49	49	36%
	<2	127	105	43	<2	127	105	43	63%
45	total	237	166	138	>20	8	0	18	3%
	<20	229	167	120	2<20	80	61	38	34%
	<2	149	106	82	<2	149	106	82	63%
60	total	202	145	111	>20	7	0	21	3%
	<20	195	149	90	2<20	58	45	26	29%
	<2	137	104	64	<2	137	104	64	68%

METEOR 5/2 RED SEA 1987
BIOLOGICAL STATIONS CHLOROPHYLL IN SIZE-FRACTIONS

STATION	NORTH	EAST	DATE	TIME
121,00	21,6247	38,0647	14-Feb-87	11,98

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
3	total	-	-	-	>20	-	-	-	-
	<20	92	81	16	2<20	-	-	-	-
	<2	62	58	7	<2	-	-	-	-
10	total	110	96	20	>20	0	2	0	0%
	<20	110	94	23	2<20	44	37	9	40%
	<2	66	57	14	<2	66	57	14	60%
25	total	175	111	123	>20	4	11	0	2%
	<20	171	100	135	2<20	62	20	81	35%
	<2	109	80	54	<2	109	80	54	62%
45	total	287	178	213	>20	29	17	25	10%
	<20	258	161	188	2<20	70	42	55	24%
	<2	188	119	133	<2	188	119	133	66%
60	total	263	166	188	>20	26	23	8	10%
	<20	237	143	180	2<20	60	29	60	23%
	<2	177	114	120	<2	177	114	120	67%
70	total	88	77	16	>20	2	5	0	2%
	<20	86	72	21	2<20	30	22	11	34%
	<2	56	50	10	<2	56	50	10	64%

STATION	NORTH	EAST	DATE	TIME
137,00	19,9883	38,4669	18-Feb-87	9,40

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
2	total	104	70	56	>20	5	0	39	5%
	<20	99	87	17	2<20	11	6	6	11%
	<2	88	81	11	<2	88	81	11	85%
5	total	122	106	21	>20	0	0	5	0%
	<20	124	112	16	2<20	14	13	1	11%
	<2	110	99	15	<2	110	99	15	89%
15	total	144	130	28	>20	3	4	0	2%
	<20	141	126	30	2<20	47	45	7	33%
	<2	94	81	23	<2	94	81	23	65%
28	total	297	231	132	>20	16	15	2	5%
	<20	281	216	130	2<20	57	41	33	19%
	<2	224	175	97	<2	224	175	97	75%
50	total	279	199	157	>20	23	4	37	8%
	<20	256	195	120	2<20	37	24	26	13%
	<2	219	171	94	<2	219	171	94	78%
75	total	106	96	13	>20	0	1	0	0%
	<20	106	95	14	2<20	34	30	4	32%
	<2	72	65	10	<2	72	65	10	68%

METEOR 5/2 RED SEA 1987
BIOLOGICAL STATIONS CHLOROPHYLL IN SIZE-FRACTIONS

STATION	NORTH	EAST	DATE	TIME
151,00	19,6881	37,4833	20-Feb-87	9,28

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
1	total	207	170	74	>20	9	3	12	4%
	<20	198	167	62	2<20	35	24	22	17%
	<2	163	143	40	<2	163	143	40	79%
10	total	206	169	73	>20	0	0	5	0%
	<20	208	174	68	2<20	54	49	12	26%
	<2	154	125	56	<2	154	125	56	74%
15	total	318	264	111	>20	3	1	4	1%
	<20	315	263	107	2<20	72	71	7	23%
	<2	243	192	100	<2	243	192	100	76%
25	total	550	379	327	>20	18	9	18	3%
	<20	532	370	309	2<20	42	14	52	8%
	<2	490	356	257	<2	490	356	257	89%
36	total	455	341	223	>20	30	16	23	7%
	<20	425	325	200	2<20	17	15	4	4%
	<2	408	310	196	<2	408	310	196	90%
48	total	217	172	88	>20	10	6	7	5%
	<20	207	166	81	2<20	29	24	11	13%
	<2	178	142	70	<2	178	142	70	82%

STATION	NORTH	EAST	DATE	TIME
165,00	19,0564	39,1269	22-Feb-87	11,02

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
2	total	110	98	16	>20	3	3	0	3%
	<20	107	95	17	2<20	15	12	3	14%
	<2	92	83	14	<2	92	83	14	84%
5	total	121	105	22	>20	6	4	4	5%
	<20	115	101	18	2<20	30	23	8	25%
	<2	85	78	10	<2	85	78	10	70%
12	total	249	188	120	>20	19	14	9	8%
	<20	230	174	111	2<20	48	45	10	19%
	<2	182	129	101	<2	182	129	101	73%
32	total	301	198	200	>20	15	6	18	5%
	<20	286	192	182	2<20	55	29	49	18%
	<2	231	163	133	<2	231	163	133	77%
49	total	217	133	161	>20	15	2	24	7%
	<20	202	131	137	2<20	31	17	28	14%
	<2	171	114	109	<2	171	114	109	79%
68	total	122	110	15	>20	10	8	3	8%
	<20	112	102	12	2<20	36	32	4	30%
	<2	76	70	8	<2	76	70	8	62%

METEOR 5/2 RED SEA 1987
BIOLOGICAL STATIONS CHLOROPHYLL IN SIZE-FRACTIONS

STATION	NORTH	EAST	DATE	TIME
180,01	19,0681	39,1317	24-Feb-87	12,20

DEPTH in m	FRACTION	Chl a-Regr. in ng / I	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
0	total	93	82	21	>20	0	2	0	0%
	<20	96	80	30	2<20	18	6	26	19%
	<2	78	74	4	<2	78	74	4	81%
10	total	117	105	22	>20	4	0	7	3%
	<20	113	105	15	2<20	28	25	9	24%
	<2	85	80	6	<2	85	80	6	73%
20	total	145	122	45	>20	0	0	1	0%
	<20	147	125	44	2<20	23	9	35	16%
	<2	124	116	9	<2	124	116	9	84%
30	total	177	150	55	>20	3	0	6	2%
	<20	174	150	49	2<20	59	50	21	33%
	<2	115	100	28	<2	115	100	28	65%
40	total	310	246	127	>20	17	16	2	5%
	<20	293	230	125	2<20	104	91	27	34%
	<2	189	139	98	<2	189	139	98	61%
50	total	410	329	162	>20	52	52	0	13%
	<20	358	277	163	2<20	102	78	50	25%
	<2	256	199	113	<2	256	199	113	62%
60	total	288	209	155	>20	0	0	7	0%
	<20	302	227	148	2<20	73	63	21	25%
	<2	229	164	127	<2	229	164	127	75%
70	total	271	187	165	>20	35	32	9	13%
	<20	236	155	156	2<20	67	43	46	25%
	<2	169	112	110	<2	169	112	110	62%
80	total	96	62	63	>20	16	15	2	17%
	<20	80	47	61	2<20	22	10	25	23%
	<2	58	37	36	<2	58	37	36	60%
90	total	112	70	69	>20	21	17	6	19%
	<20	91	53	63	2<20	23	19	5	20%
	<2	68	34	58	<2	68	34	58	61%
100	total	111	61	83	>20	13	4	16	12%
	<20	98	57	67	2<20	27	18	13	24%
	<2	71	39	54	<2	71	39	54	64%

METEOR 5/2 RED SEA 1987
BIOLOGICAL STATIONS CHLOROPHYLL IN SIZE-FRACTIONS

STATION	NORTH	EAST	DATE	TIME
180,10	19,0414	39,1622	25-Feb-87	9,50

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
0	total	119	111	9	>20	34	37	0	28%
	<20	85	74	15	2<20	21	21	0	18%
	<2	64	53	18	<2	64	53	18	54%
10	total	-	-	-	>20	-	-	-	-
	<20	-	-	-	2<20	-	-	-	-
	<2	-	-	-	<2	-	-	-	-
20	total	97	88	13	>20	12	17	0	12%
	<20	85	71	21	2<20	31	28	1	32%
	<2	54	43	20	<2	54	43	20	56%
30	total	122	112	12	>20	23	29	0	19%
	<20	99	83	23	2<20	29	27	0	24%
	<2	70	56	23	<2	70	56	23	57%
40	total	187	146	79	>20	21	30	0	11%
	<20	166	116	96	2<20	49	23	60	26%
	<2	117	93	36	<2	117	93	36	63%
50	total	378	279	195	>20	52	52	3	14%
	<20	326	227	192	2<20	61	42	37	16%
	<2	265	185	155	<2	265	185	155	70%
60	total	269	196	143	>20	33	29	10	12%
	<20	236	167	133	2<20	31	27	7	12%
	<2	205	140	126	<2	205	140	126	76%
70	total	241	177	125	>20	27	23	8	11%
	<20	214	154	117	2<20	32	30	6	13%
	<2	182	124	111	<2	182	124	111	76%
80	total	163	105	109	>20	19	16	3	12%
	<20	144	89	106	2<20	13	5	18	8%
	<2	131	84	88	<2	131	84	88	80%
90	total	58	39	33	>20	6	8	0	10%
	<20	52	31	37	2<20	8	2	9	14%
	<2	44	29	28	<2	44	29	28	76%
100	total	72	45	46	>20	11	12	0	15%
	<20	61	33	49	2<20	8	0	12	11%
	<2	53	33	37	<2	53	33	37	74%

METEOR 5/2 RED SEA 1987
BIOLOGICAL STATIONS CHLOROPHYLL IN SIZE-FRACTIONS

STATION	NORTH	EAST	DATE	TIME
189,00	19,6439	38,6203	27-Feb-87	10,38

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
3	total	108	97	15	>20	0	3	0	0%
	<20	110	94	23	2<20	36	30	6	33%
	<2	74	64	17	<2	74	64	17	67%
13	total	187	128	115	>20	3	2	3	2%
	<20	184	126	112	2<20	17	18	0	9%
	<2	167	108	112	<2	167	108	112	89%
25	total	259	176	161	>20	7	17	0	3%
	<20	252	159	180	2<20	65	37	56	25%
	<2	187	122	124	<2	187	122	124	72%
37	total	87	69	29	>20	0	0	0	0%
	<20	92	73	30	2<20	20	23	10	22%
	<2	72	50	20	<2	72	50	20	78%
56	total	100	86	20	>20	3	5	0	3%
	<20	97	81	24	2<20	26	22	5	26%
	<2	71	59	19	<2	71	59	19	71%
70	total	97	81	25	>20	0	2	0	0%
	<20	97	79	29	2<20	30	25	7	31%
	<2	67	54	22	<2	67	54	22	69%

STATION	NORTH	EAST	DATE	TIME
246,00	12,3344	44,3511	07-Mär-87	11,50

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
5	total	116	102	27	>20	7	5	5	6%
	<20	109	97	22	2<20	19	15	8	16%
	<2	90	82	14	<2	90	82	14	78%
11	total	123	112	21	>20	11	8	0	9%
	<20	112	104	14	2<20	23	29	0	19%
	<2	89	75	26	<2	89	75	26	72%
20	total	155	130	47	>20	2	0	9	1%
	<20	153	134	38	2<20	23	13	21	15%
	<2	130	121	17	<2	130	121	17	84%
30	total	219	181	75	>20	17	9	15	8%
	<20	202	172	60	2<20	28	23	11	13%
	<2	174	149	49	<2	174	149	49	79%
44	total	286	231	110	>20	27	12	28	9%
	<20	259	219	82	2<20	44	35	19	15%
	<2	215	184	63	<2	215	184	63	75%
60	total	300	256	89	>20	63	65	0	21%
	<20	237	191	90	2<20	22	15	12	7%
	<2	215	176	78	<2	215	176	78	72%

STATION	NORTH	EAST	DATE	TIME
255,00	12,9847	47,8389	10-Mär-87	10,65

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION
2	total	136	114	43	>20
	<20	122	104	36	2<20
	<2	97	75	41	<2
7	total	154	123	60	>20
	<20	135	117	36	2<20
	<2	115	99	31	<2
12	total	214	170	86	>20
	<20	185	149	72	2<20
	<2	161	139	45	<2
27	total	366	295	143	>20
	<20	320	255	130	2<20
	<2	287	236	104	<2
40	total	264	203	120	>20
	<20	239	186	105	2<20
	<2	201	159	81	<2
57	total	185	134	99	>20
	<20	162	129	63	2<20
	<2	145	116	57	<2

STATION	NORTH	EAST	DATE	TIME
269,00	13,1722	47,0981	13-Mär-87	10,45

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION
2	total	85	71	25	>20
	<20	75	63	22	2<20
	<2	62	54	14	<2
7	total	95	83	21	>20
	<20	89	81	14	2<20
	<2	58	44	24	<2
15	total	113	92	39	>20
	<20	110	97	24	2<20
	<2	84	68	31	<2
34	total	277	232	91	>20
	<20	246	204	84	2<20
	<2	206	168	75	<2
48	total	279	216	123	>20
	<20	238	183	107	2<20
	<2	217	175	83	<2
63	total	139	103	70	>20
	<20	131	107	46	2<20
	<2	103	80	43	<2

987
SIZE-FRACTIONS

Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
14	10	2	10%
25	29	0	18%
97	75	41	72%
19	6	24	12%
20	18	5	13%
115	99	31	75%
29	21	14	14%
24	10	27	11%
161	139	45	75%
46	40	13	13%
33	19	26	9%
287	236	104	78%
25	17	15	9%
38	27	24	14%
201	159	81	77%
23	5	36	12%
17	13	6	9%
145	116	57	78%

Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
10	8	3	12%
13	9	8	15%
62	54	14	73%
6	2	0	6%
31	37	0	33%
58	44	24	61%
3	-5	8	3%
26	29	0	23%
84	68	31	74%
31	28	7	11%
40	36	9	14%
206	168	75	75%
41	33	16	15%
21	8	24	8%
217	175	83	78%
8	0	24	6%
28	27	3	20%
103	80	43	74%

METEOR 5/2 RED SEA 1987
BIOLOGICAL STATIONS CHLOROPHYLL IN SIZE-FRACTIONS

STATION	NORTH	EAST	DATE	TIME
274,00	13,4813	47,3267	14-Mar-87	12,43

DEPTH in m	FRACTION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	DIVISION	Chl a-Regr. in ng / l	Chl a-Acid. in ng / l	PHAEOPIGM. in ng / l	%-CONTENT DIVISION
2	total	134	118	30	>20	8	6	0	6%
	<20	126	112	28	2<20	37	40	0	28%
	<2	89	72	31	<2	89	72	31	66%
10	total	137	118	36	>20	14	9	9	10%
	<20	123	109	27	2<20	31	27	9	23%
	<2	92	82	18	<2	92	82	18	67%
20	total	162	128	48	>20	12	8	0	7%
	<20	150	120	58	2<20	37	17	38	23%
	<2	113	103	20	<2	113	103	20	70%
29	total	243	188	109	>20	26	24	4	11%
	<20	217	164	105	2<20	32	23	21	13%
	<2	185	141	84	<2	185	141	84	76%
42	total	394	306	176	>20	60	45	30	15%
	<20	334	261	146	2<20	41	35	13	10%
	<2	293	226	133	<2	293	226	133	75%
55	total	330	243	171	>20	39	25	28	12%
	<20	291	218	143	2<20	61	43	35	18%
	<2	230	175	108	<2	230	175	108	70%

METEOR 5/2 RED SEA 1987
TRANSSECT-STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
202	17,6031	40,1986	04-Mär-87	12,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	117	112	3	>20	2	3	0	2%
<20	115	109	5	2<20	5	5	0	4%
<2	110	104	5	<2	110	104	5	94%

STATION	NORTH	EAST	DATE	TIME
203	17,4233	40,3423	04-Mär-87	13,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	131	117	27	>20	1	0	2	1%
<20	130	117	25	2<20	11	1	18	8%
<2	119	116	7	<2	119	116	7	91%

STATION	NORTH	EAST	DATE	TIME
204	17,2335	40,4911	04-Mär-87	14,38

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	147	130	32	>20	0	0	0	0%
<20	150	132	36	2<20	8	3	8	5%
<2	142	129	28	<2	142	129	28	95%

METEOR 5/2 RED SEA 1987
TRANSSECT-STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
205	17,0585	40,6170	04-Mär-87	15,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	131	116	29	>20	3	6	0	2%
<20	128	110	34	2<20	15	10	8	11%
<2	113	100	26	<2	113	100	26	87%

STATION	NORTH	EAST	DATE	TIME
206	16,9522	40,7119	04-Mär-87	16,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	134	117	32	>20	2	1	0	1%
<20	132	116	32	2<20	8	15	0	6%
<2	124	101	43	<2	124	101	43	93%

STATION	NORTH	EAST	DATE	TIME
207	16,8489	40,7767	04-Mär-87	17,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	128	112	32	>20	2	0	7	2%
<20	126	117	18	2<20	15	19	0	13%
<2	111	98	25	<2	111	98	25	86%

METEOR 5/2 RED SEA 1987
TRANSSECT-STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
208	16,6596	40,8921	04-Mär-87	18,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	103	88	21	>20	3	0	4	3%
<20	100	88	17	2<20	18	14	5	17%
<2	82	74	12	<2	82	74	12	80%

STATION	NORTH	EAST	DATE	TIME
209	16,4753	41,0160	04-Mär-87	19,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	141	117	46	>20	0	4	0	0%
<20	141	113	53	2<20	13	10	4	9%
<2	128	103	49	<2	128	103	49	91%

STATION	NORTH	EAST	DATE	TIME
210	16,3041	41,1453	04-Mär-87	20,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	139	117	44	>20	5	2	7	4%
<20	134	115	37	2<20	8	7	2	6%
<2	126	108	35	<2	126	108	35	90%

METEOR 5/2 RED SEA 1987
TRANSSECT-STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
211	16,1733	41,2275	04-Mär-87	21,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	131	115	32	>20	4	7	0	3%
<20	127	108	37	2<20	8	7	2	6%
<2	119	101	35	<2	119	101	35	91%

STATION	NORTH	EAST	DATE	TIME
212	15,9962	41,3506	04-Mär-87	22,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	170	136	66	>20	28	15	21	16%
<20	142	121	40	2<20	34	37	0	20%
<2	108	84	45	<2	108	84	45	64%

STATION	NORTH	EAST	DATE	TIME
213	15,8161	41,4904	04-Mär-87	23,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	288	225	126	>20	44	34	22	15%
<20	244	191	104	2<20	40	37	5	[illegible]4
<2	204	154	99	<2	204	154	99	[illegible]1

METEOR 5/2 RED SEA 1987
TRANSSECT-STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
214	15,6224	41,6161	05-Mär-87	0,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	277	200	151	>20	54	44	21	19%
<20	223	156	130	2<20	27	12	29	10%
<2	196	144	101	<2	196	144	101	71%

STATION	NORTH	EAST	DATE	TIME
215	15,4571	41,7550	05-Mär-87	1,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	-	-	-	>20	-	-	-	-
<20	-	-	-	2<20	-	-	-	-
<2	-	-	-	<2	-	-	-	-

STATION	NORTH	EAST	DATE	TIME
216	15,2671	41,8704	05-Mär-87	2,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	271	202	136	>20	38	35	9	14%
<20	233	167	127	2<20	110	76	65	41%
<2	123	91	62	<2	123	91	62	45%

METEOR 5/2 RED SEA 1987
TRANSSECT-STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
217	15,0333	41,9850	05-Mär-87	3,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	194	143	98	>20	18	14	6	9%
<20	176	129	92	2<20	20	14	13	10%
<2	156	115	79	<2	156	115	79	81%

STATION	NORTH	EAST	DATE	TIME
218	14,9204	42,1366	05-Mär-87	4,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	226	182	87	>20	1	0	11	0%
<20	225	187	76	2<20	28	28	2	12%
<2	197	159	74	<2	197	159	74	88%

STATION	NORTH	EAST	DATE	TIME
219	14,7599	42,2917	05-Mär-87	5,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	276	220	111	>20	4	5	0	1%
<20	272	215	115	2<20	39	33	14	14%
<2	233	182	101	<2	233	182	101	85%

METEOR 5/2 RED SEA 1987
TRANSSECT-STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
220	14,5961	42,4372	05-Mär-87	6,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	343	285	118	>20	9	0	24	3%
<20	334	289	94	2<20	63	57	16	18%
<2	271	232	78	<2	271	232	78	79%

STATION	NORTH	EAST	DATE	TIME
221	14,4310	42,5687	05-Mär-87	7,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	233	177	110	>20	0	0	24	0%
<20	236	193	86	2<20	41	32	18	17%
<2	195	161	68	<2	195	161	68	83%

STATION	NORTH	EAST	DATE	TIME
222	14,2734	42,7109	05-Mar-87	8,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	179	145	66	>20	14	13	3	8%
<20	165	132	63	2<20	39	29	18	22%
<2	126	103	45	<2	126	103	45	70%

METEOR 5/2 RED SEA 1987
TRANSSECT-STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
223	14,1153	42,8591	05-Mär-87	9,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	323	266	114	>20	60	45	26	19%
<20	263	221	85	2<20	52	55	0	16%
<2	211	166	88	<2	211	166	88	65%

STATION	NORTH	EAST	DATE	TIME
224	13,9060	42,9264	05-Mär-87	10,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	226	170	109	>20	25	7	33	11%
<20	201	163	76	2<20	36	37	4	16%
<2	165	126	72	<2	165	126	72	73%

STATION	NORTH	EAST	DATE	TIME
225	13,6696	42,9830	05-Mär-87	11,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	296	255	81	>20	9	10	0	3%
<20	287	245	86	2<20	30	34	0	10%
<2	257	211	90	<2	257	211	90	87%

METEOR 5/2 RED SEA 1987
TRANSSECT-STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
226	13,4677	43,0353	05-Mär-87	12,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	321	290	66	>20	4	24	0	1%
<20	317	267	101	2<20	5	0	28	2%
<2	312	276	73	<2	312	276	73	97%

STATION	NORTH	EAST	DATE	TIME
227	13,2730	43,0893	05-Mär-87	13,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	382	351	68	>20	13	25	0	3%
<20	369	326	91	2<20	104	103	5	27%
<2	265	223	86	<2	265	223	86	70%

STATION	NORTH	EAST	DATE	TIME
228	13,0864	43,1501	05-Mär-87	14,00

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	327	268	108	>20	6	1	0	0%
<20	321	267	108	2<20	93	27	27	12%
<2	228	240	81	<2	228	240	81	88%

METEOR 5/2 RED SEA 1987
TRANSSECT-STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
229	12,7756	43,2403	05-Mär-87	16,27

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	359	297	126	>20	23	28	0	6%
<20	336	269	135	2<20	34	19	34	9%
<2	302	250	101	<2	302	250	101	85%

STATION	NORTH	EAST	DATE	TIME
231	12,5797	43,3250	06-Mär-87	0,78

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	257	216	81	>20	46	41	10	18%
<20	211	175	71	2<20	55	46	25	21%
<2	156	129	46	<2	156	129	46	61%

STATION	NORTH	EAST	DATE	TIME
235	12,5258	43,4325	06-Mär-87	11,98

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	213	172	81	>20	36	22	22	17
<20	177	150	54	2<20	30	35	10	14
<2	147	115	59	<2	147	115	59	6[illegible]

METEOR 5/2 RED SEA 1987
TRANSSECT-STATIONS CHLOROPHYLL

STATION	NORTH	EAST	DATE	TIME
239	12,4528	43,5667	06-Mär-87	19,98

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	124	104	37	>20	17	14	4	13%
<20	107	90	33	2<20	9	9	7	7%
<2	98	81	26	<2	98	81	26	79%

STATION	NORTH	EAST	DATE	TIME
243	12,3397	43,6706	07-Mär-87	4,05

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	133	121	23	>20	3	4	0	2%
<20	130	117	24	2<20	39	36	10	29%
<2	91	81	14	<2	91	81	14	69%

STATION	NORTH	EAST	DATE	TIME
246	12,3344	44,3511	07-Mär-87	11,50

FRACTION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	DIVISION	CHLa-REGR in ng / l	CHLa-ACID in ng / l	PHAEOPIGM in ng / l	%-CONTENT DIVISION
total	116	102	27	>20	7	5	5	6%
<20	109	97	22	2<20	19	15	8	16%
<2	90	82	14	<2	90	82	14	78%

PRIMARY PRODUCTION MEASUREMENTS

Primary production measurements

(A. Moigis)
(P. Fritsche)

Description of methods

1. In-situ method

Primary production (mg C m^{-3} d^{-1}) was measured with the radiocarbon method by Steeman Nielsen (1952) every 10 m from the surface down to 100 m depth. Water samples were taken from standard depths by the CTD rosette sampler. Water samples incubated between the surface and 50 m depth originated from the corresponding incubation depth. For the 60 m incubation depth, however, the water was taken from the 50 m water bottle, for the 70 and 80 m incubation depth from the 75 m water bottle and for the 90 and 100 m incubation from the 100 m water bottle With a multipipette 13.1 µ Ci ^{14} C bicarbonate was added to each of the 100 ml Jena-glass bottles. At each incubation depth two transparent and one dark bottle were attached by means of special holders to the rope of the buoy with the longitudinal axis of the bottles parallel to the sea surface. After retrieval of the bottles -the incubation period around noon ranged between 2 to 4 hours - incubation was terminated by putting the bottles in absolute darkness. They were filtered immediately after. The membrane filters (Sartorius cellulose acetate 0.45 µm pore size) were put after filtration (0.2 -0.3 kp cm^{-2}) for approx. 3 minutes into fuming HCL (in a desiccator) to remove the inorganic radiocarbon. They were then put into scintillation vials with Lumagel and each measured for 10 minutes in a Packard Scintillation Counter (model TRI-CARB 1500) over night. The efficiency of the cpm measurements was determined by means of a toluene ^{14} C standard. 94 % efficiency was measured. Primary production was calculated according to the manual of Parsons et al (1985). Total CO_2 was determined by measuring the pH after adding HCL as described in the manual of Grasshoff (1976). For the integration of the data over the water column the trapezoid method was employed. The daily production was calculated by two different methods: by multiplying the hourly production with the day length in hours (method 1), which tends to overestimate the daily production, and by relating the irradiance during the incubation period to total irradiance of the day (method 2).

2. simulated in-situ method (on deck)

250 ml Jena-glass bottles were covered with two dark cloths of different transparency to simulate the in-situ light intensities. Light transmission through the cloth covers were measured in the following way: the spherical sensor (395 - 725 nm) of a Licor quantameter (LI-185 B) was put into an opaque tube under water with the cloth cover on top of the tube. Measured light intensities with and without the cloths were compared with each other. The 100 % light intensity was measured twice before and after the transparency measurement to ensure that light conditions did not change during the measurement procedure. The tube was used to avoid disturbance by lateral light. The following transparency combinations were obtained: 80, 64, 51, 30, 9, 3 and 1 %. For light intensities between 100 and 50 %, water samples were taken from 2 m depth, for the lower light intensities the in-situ light depths were sampled. The in-situ light depths were calculated from a profile taken with the same quantameter mentioned above.
At each transparency level, two transparent and one dark bottle (250 ml volume) were incubated (26.3 μ Ci bicarbonate / bottle), and placed in a water bath with running seawater to keep the samples at sea-surface temperature. As mentioned before, incubation was terminated by putting the samples into absolute darkness. Immediately afterwards, they were filtered. From each bottle three 75 ml subsamples were taken with a "Kippautomat". One subsample was filtered directly, the second was prefractionated with a 20 μm gauze and the third was prefractionated with a 2-3 μm gauze (the latter is new in the market and its mesh size was confirmed by us through a scanning electron microscope). Thus we obtained from each bottle by size fractionation and subsequent substraction the following size fractions: $<$ 2-3 μm, 2 - 20 μm and $>$ 20 μm. The same procedure was employed for the dark bottles. The gauzes were renewed after a certain number of fractionating

procedures. The filters were processed after filtration in the same way as mentioned before.

3. Incubator method

As third method for measuring the integrated daily production, a constant light incubator (100 % light intensity = 816 $\mu E\ m^{-2}\ s^{-1}$) was used to establish a photosynthesis (normalized for chlorophyll) versus light curve. Therefore 100 ml Jena-glass bottles were covered with the same pieces of material described before. 13.1 μ Ci activity was added to each bottle. At each light level, two transparent and one dark bottle were incubated. The experiment was carried out at the same water temperature as in the deck method. Calculation of integrated daily production followed the ICES procedure by K. Richardson (1985).

4. Turbulence incubator experiments

Several experiments were carried out with a so-called "turbulence incubator" in order to simulate the changing light supply to phytoplankton cells on their way up and down in a turbulent mixed suface layer (0 - 8.5 m) by circulating sample bottles at a vertical speed of approximately 1 cm/s. To compare the results of this method with the traditional in-situ incubation, additional bottles were exposed at constant depths (0, 1, 2, 3, 4, 5, 6, 7, and 8.5 m) and processed as described in the first part of this chapter.

Literature

Grasshoff, K., 1976. Methods of seawater analysis. - Verlag Chemie, Weinheim, 317 p.

Parsons, T. R., Maita, Y. & Lalli, C. M., 1985. A manual of chemical and biological methods of seawater analysis. - Pergamon Press, Oxford, 173 p.

Richardson, K., 1985. Guidelines for the measurement by ^{14}C incorporation of primary production. - ICES working group on the methodology of primary production.

Steemann Nielsen, E., 1952. The use of radioactive carbon (C^{14}) for measuring organic production in the sea. - J. Cons. Int. Explor. Mer, 18, 117 - 140

D A T A S H E E T S

Part 1

Integrated daily primary production according to the different methods employed

STATION	DATE	INSITU Method 1	INSITU Method 2	SIMULATED Method 1 mgC/m2/d	SIMULATED Method 2	INCUBATOR
76	05-Feb-87	-	-	-	-	(7)
81	06-Feb-87	61	143	30	70	35
86	07-Feb-87	-	-	173	119	51
91	08-Feb-87	286	152	83	44	84
97	09-Feb-87	-	-	-	-	46
100	10-Feb-87	165	129	78	61	38
108	12-Feb-87	903	659	154	112	230
121	14-Feb-87	311	212	135	92	71
130	16-Feb-87	-	-	26	26	40
133	17-Feb-87	-	-	107	69	481
137	18-Feb-87	262	140	64	34	(2)
143	19-Feb-87	159	99	(5)	(3)	33
151	20-Feb-87	1085	603	241	134	102
165	22-Feb-87	331	179	205	111	34
174	23-Feb-87	236	264	127	142	28
180/1	24-Feb-87	249	180	50	36	19
180/10	25-Feb-87	201	142	120	84	81
189	27-Feb-87	255	138	77	42	47
195	28-Feb-87	164	135	229	188	30
229	05-Mar-87	-	-	-	-	120
235	06-Mar-87	-	-	238	161	102
246	07-Mar-87	421	243	-	-	104
251	09-Mar-87	293	237	71	57	101
255	10-Mar-87	174	108	-	-	121
259	11-Mar-87	205	236	88	101	70
269	13-Mar-87	381	218	253	144	77
271	14-Mar-87	-	-	238	(878)	54

INSITU 1 and 2 integrated from 0 to 100 m, SIUMULATED 1 and 2 and INCUBATOR integrated between 100 % and 1 % light level

Part 2

In-situ and turbulence incubator method

I.

Primary production, chlorophyll a content, production index and light measurements

STATION :81 DATE: 06-FEB-87 SECCH DEPTH: 33m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,01	0,114	0,09	850	100,0
10	0,07	0,084	0,83	280	32,9
20	0,07	0,081	0,86	130	15,3
30	0,09	0,094	0,96	85	10,0
40	0,10	0,113	0,88	60	7,1
50	0,08	0,133	0,60	37	4,4
60	0,03	0,133	0,23	21	2,5
70	0,04	0,133	0,30		
80	0,03	0,133	0,23		
90	0,02	0,133	0,15		
100	0,02	0,133	0,15		

STATION :91 DATE: 08-FEB-87 SECCH DEPTH: 29m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,58	0,082	7,07	1600	100,0
10	0,29	0,073	3,97	400	25,0
20	0,21	0,080	2,62	180	11,2
30	0,02	0,111	0,18	100	6,2
40	0,32	0,377	0,85	60	3,8
50	0,71	0,170	4,18	35	2,2
60	-	0,170	-	15	0,9
70	0,22	0,025	8,80		
80	0,01	0,011	0,91		
90	0,00	0,011	0,00		
100	0,01	0,011	0,91		

STATION :100 DATE: 10-FEB-87 SECCH DEPTH: 27m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,22	0,069	3,19	1500	100,0
10	0,13	0,070	1,86	450	30,0
20	0,19	0,073	2,60	320	21,3
30	0,05	0,072	0,69	185	12,3
40	0,17	0,098	1,74	105	7,0
50	0,05	0,148	0,34	55	3,7
60	0,30	0,148	2,03	28	1,9
70	0,23	0,095	2,42		
80	0,15	0,095	1,58		
90	0,09	0,039	2,31		
100	0,00	0,039	0,00		

STATION :108 DATE: 12-FEB-87 SECCH -DEPTH: 25m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	2,11	0,162	13,03	1300	100,0
10	2,30	0,162	14,20	350	26,9
20	1,48	0,172	8,61	160	12,3
30	0,59	0,157	3,76	78	6,0
40	0,57	0,152	3,75	45	3,5
50	0,38	0,160	2,38	28	2,2
60	0,61	0,274	2,23	18	1,4
70	0,49	0,274	1,79		
80	0,32	0,274	1,17		
90	0,16	0,156	1,03		
100	0,10	0,156	0,64		

STATION :114 DATE: 13-FEB-87 SECCHI-DEPTH: 19m

DEPTH (m)	PRODUCTION (mgC/m3/h)	TURBULENCE = (AVERAGE) (mgC/m3/h)
0	0,21	0.60 + 0,17
1	0,25	0 - 8,5m = 5mgC/m2/h
2	0,32	
3	0,34	
4	0,41	
5	0,47	
7	0,47	
8,5	0,45	

0 - 8,5m= 3,29 mgC/m2/h

STATION :121 DATE: 14-FEB-87 SECCH DEPTH: 35m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,92	0.900	1,02	1500	100,0
10	0,21	0,084	2,50	450	30,0
20	0,31	0,093	3,33	220	14,7
30	0,28	0,117	2,39	105	7,0
40	0,29	0,141	2,06	56	3,7
50	0,16	0,138	1,16	36	2,4
60	0,53	0,188	2,82	24	1,6
70	0,32	0,188	1,70		
80	0,19	0,188	1,01		
90	0,03	0,034	0,88		
100	0,00	0.034	0,00		

STATION :137 DATE: 18-FEB-87 SECCH DEPTH: 25m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,45	0,093	4,84	400	100,0
10	0,22	0,089	2,47	85	21,3
20	0,44	0,107	4,11	51	12,8
30	0,14	0,114	1,23	33	8,3
40	0,17	0,166	1,02	22	5,5
50	0,22	0,176	1,25	13	3,3
60	0,41	0,180	2,28	8	2,0
70	0,08	0,180	0,44		
80	0,02	0,180	0,11		
90	0,39	0,094	4.17		
100	0,02	0,093	0,21		

STATION :143 DATE: 19-FEB-87 SECCH DEPTH: 25m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,12	0,119	1,01	1400	100,0
10	0,05	0,118	0,42	520	37,1
20	0,31	0,128	2,42	265	18,9
30	0,09	0,131	0,69	130	9,3
40	0,08	0,181	0,44	83	5,9
50	0,52	0,173	3,01	45	3,2
60	0,28	0,173	1,62	21	1,5
70	0,02	0,153	0,13		
80	0,03	0,153	0,20		
90	0,00	0,045	0,00		
100	0,00	0,045	0,00		

STATION :151 DATE: 20-FEB-87 SECCH DEPTH: 17m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	1,58	0,186	8,50	1500	100,0
10	0,78	0,188	4,15	440	29,3
20	1,29	0,201	6,42	185	12,3
30	0,31	0,269	1,15	77	5,1
40	0,23	0,200	1,15	29	1,9
50	0,08	0,108	0,74	12	0,8
60	0,00	0,108	0,00	6	0,4
70	0,01	0,038	0,26		
80	0,00	0,038	0,00		
90	0,01	0,028	0,36		
100	0,00	0,028	0,00		

STATION :165 DATE: 22-FEB-87 SECCH DEPTH: 26m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,96	0,092	10,44	880	100,0
10	0,49	0,090	5,44	300	34,1
20	0,32	0,100	3,20	160	18,2
30	0,35	0,133	2.63	90	10,2
40	0,67	0,164	4,09	52	5,9
50	0,31	0,210	1,48	23	2,6
60	0,29	0,210	1,38	13	1,5
70	0,02	0,107	0,19		
80	0,04	0,107	0,37		
90	0,00	0,039	0,00		
100	0,03	0,039	0,77		

STATION :174 DATE: 23-FEB-87 SECCH DEPTH: 23m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,33	0,119	2,77	340	100,0
1	0,32	0,119	2,69	TURBULENCE 0-8.5m =	
2	0,31	0,119	2.61	4,13 mgC/m2/h	
3	0,41	0,119	3,45	IN SITU 0-8.5m =	
4	0,35	0,119	2,94	2,96 mgC/m2/h	
5	0,41	0,119	3,45	145	42,6
7	0,34	0,119	2,86		
8,5	0,30	0,119	2,52		
10	0,20	0,119	1,68	83	24.4
20	0,43	0,162	2,65	37	10,9
30	0,62	0,245	2,53	20	5,9
40	0.25	0,212	1,18	10	3,1
50	0,06	0.219	0,27	6	1,8
60	0.22	0,219	1,01	4	1,1
70	0,09	0.168	0,54		
80	0,09	0,168	0,54		
90	0,00	0,023	0,00		
100	0,01	0,023	0,44		

STATION :180/1 DATE: 24-FEB-87 SECCH DEPTH: 26m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,60	0,082	7,32	1800	100,0
10	0,76	0,105	7,24	680	37,8
20	0,22	0,122	1,80	370	20,6
30	0,27	0,150	1,80	200	11,1
40	0,24	0,246	0,98	100	5,6
50	0,13	0,329	0,40	63	3,5
60	0,21	0,209	1,01	25	1,4
70	0,09	0,187	0,48		
80	0,00	0,062	0,00		
90	0,01	0,070	0,14		
100	0,02	0,061	0,33		

STATION :180/10 DATE: 25-FEB-87 SECCH DEPTH: 31m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,06	0,111	0,54	900	100,0
10	0,07	0,100	0,70	300	33,3
20	0,27	0,088	3,07	150	16,7
30	0,15	0,112	1,34	82	9,1
40	0,27	0,146	1,85	43	4,8
50	0,47	0,279	1,69	20	2,2
60	0,26	0,196	1,33	11	1,3
70	0,20	0,177	1,13		
80	0,06	0,105	0,57		
90	0,01	0,039	0,26		
100	0,01	0,045	0,22		

STATION :189 DATE: 27-FEB-87 SECCH DEPTH: 30m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,35	0,072	4,86	900	100,0
10	0,26	0,068	3,82	350	38,9
20	0,17	0,064	2,66	190	21,1
30	0,27	0,069	3,91	120	13,3
40	0,26	0,071	3,66	65	7,2
50	0,22	0,077	2,86	38	4,2
60	0,15	0,077	1,95	20	2,2
70	0,51	0,184	2,77		
80	0,17	0,184	0,92		
90	0,07	0,043	1,63		
100	0,05	0,043	1,16		

STATION :195 DATE: 28-FEB-87 SECCH DEPTH: 29m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,24	0,096	2,50	500	100,0
1	0,67	0,096	6,98	TURBULENCE 0 - 8,5m	
2	0,61	0,096	6,35	4.97 mgC/m2/h	
3	0,71	0,096	7,40	IN SITU 0-8,5m	
4	0,74	0,096	7,71	5,20 mgC/m2/h	
5	0,64	0,096	6,67	250	50,0
7	0,54	0,096	5,63		
8,5	0,68	0,097	7,01		
10	0,28	0,101	2,77	155	31,0
20	0,14	0,086	1,63	80	16,0
30	0,16	0,103	1,55	48	9,5
40	0,07	0,114	0,61	30	6,0
50	0,20	0,153	1,31	18	3,6
60	0,09	0,153	0,59	10	1,9
70	0,05	0,082	0,61		
80	0,02	0,082	0,24		
90	0,01	0,026	0,39		
100	0,01	0,026	0,39		

STATION :246 DATE: 07-MAR-87 SECCH DEPTH: 22m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,83	0,081	10,25	1700	100,0
1	0,96	0,096	10,00		
2	0,81	0,096	8,44		
3	1,06	0,096	11,04		
4	0,96	0,096	10,00		
5	0,83	0,096	8,65	870	51,2
7	1,57	0,096	16,35		
8,5	1,23	0,096	12,81		
10	0,63	0,095	6,63	550	32,4
20	0,72	0,106	6,80	290	17,1
30	0,53	0,159	3,33	150	8,8
40	0,18	0,204	0,88	72	4,2
50	0,18	0,253	0,71	33	1,9
60	0,24	0,253	0,95	16	0,9
70	0,07	0,170	0,41		
80	0,05	0,170	0,29		
90	0,07	0,074	0,95		
100	0,04	0,074	0,54		

STATION :251 DATE: 09-MAR-87 SECCH DEPTH: 25m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,67	0,093	7,24	1600	100,0
10	0,37	0,119	3,11	550	34,4
20	0,41	0,128	3,20	300	18,8
30	0,31	0,175	1,77	170	10,6
40	0,29	0,225	1,29	93	5,8
50	0,31	0,333	0,93	45	2,8
60	0,22	0,333	0,66	21	1,3
70	0,07	0,213	0,33		
80	0,03	0,213	0,14		
90	0,03	0,096	0,31		
100	0,01	0,096	0,10		

STATION :255 DATE: 10-MAR-87 SECCH DEPTH: 20m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,96	0,116	8,28	1500	100,0
10	0,22	0,129	1,71	530	35,3
20	0,13	0,240	0,54	250	16,7
30	0,28	0,302	0,93	105	7,0
40	0,15	0,288	0,52	46	3,1
50	0,06	0,165	0,36	24	1,6
60	0,07	0,165	0,42	13	0,9
70	0,03	0,048	0,63		
80	0,01	0,048	0,21		
90	0,01	0,027	0,37		
100	0,02	0,027	0,74		

STATION :259 DATE: 11-MAR-87 SECCH DEPTH: 26m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,83	0,060	13,83	1900	100,0
10	0,28	0,066	4,24	650	34,2
20	0,29	0,080	3,63	340	17,9
30	0,19	0,118	1,61	190	10,0
40	0,33	0,284	1,16	95	5,0
50	0,06	0,169	0,36	37	1,9
60	0,08	0,169	0,47	17	0,9
70	0,03	0,065	0,46		
80	0,03	0,065	0,46		
90	0,02	0,018	1,11		
100	0,03	0,018	1,67		

STATION :269 DATE: 13-MAR-87 SECCH DEPTH: 24m

DEPTH (m)	PRODUCTION (mgC/m3/h)	CHLOROPHYLL (mg/m3)	PRODUCTION INDEX (mgC/mgChl/h)	LIGHT (uE/m2/s)	% LIGHT
0	0,53	0,092	5,76	1600	100,0
10	0,56	0,086	6,51	620	38,8
20	0,59	0,103	5,73	330	20,6
30	0,50	0,156	3,21	190	11,9
40	0,50	0,296	1,69	93	5,8
50	0,11	0,259	0,43	38	2,4
60	0,51	0,259	1,97	19	1,2
70	0,02	0,260	0,08		
80	0,07	0,023	3,04		
90	0,06	0,023	2,61		
100	0,05	0,023	2,17		

In-situ and turbulence incubator method

II.

Scintillation counts in light and dark bottles

cpm = counts per minute

STATION:81 INCUBATION TIME: 13.66-17.16 INCUBATION PERIOD:3,5 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	116	99	54
10	377	-	87
20	343	356	-
30	435	430	66
40	367	385	64
50	442	365	47
60	279	163	58
70	271	249	45
80	217	203	59
90	155	151	181
100	146	112	66

STATION:91 INCUBATION TIME: 10.50-13.00 INCUBATION PERIOD:2,5 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	1795	2151	375
10	1076	1081	258
20	889	801	253
30	388	244	262
40	1188	1204	304
50	2180	2037	153
70	952	975	353
80	252	258	225
90	210	303	262
100	176	255	182

STATION:100 INCUBATION TIME: 13.50-16.16 INCUBATION PERIOD:2,66 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	1253	1396	697
10	1101	726	551
20	1126	610	297
30	1002	640	674
40	1123	1209	677
50	940	918	788
60	1372	1490	596
70	1227	982	429
80	703	1024	423
90	677	683	-
100	521	496	570

STATION:108 INCUBATION TIME: 10.75-14.42 INCUBATION PERIOD:3,66 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	9448	7942	319
10	9933	9504	366
20	5767	6371	181
30	1960	3107	180
40	2947	1963	180
50	1631	1745	180
60	2391	2826	180
70	2191	2274	290
80	1299	1515	122
90	744	848	174
100	580	486	[illegible]

STATION:121 INCUBATION TIME: 11.42-14.50 INCUBATION PERIOD:3,08 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	3970	3101	504
10	1146	1263	504
20	1725	1297	468
30	1045	1248	223
40	1263	1244	284
50	1432	1380	344
60	1931	1995	189
70	1306	1310	254
80	832	813	196
90	249	183	140
100	225	200	258

STATION:137 INCUBATION-TIME: 9.63-12.50 INCUBATIONS-PERIOD:2,86 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	1305	1673	25
10	587	952	63
20	1833	1145	78
30	607	643	162
40	570	666	72
50	807	-	81
60	1465	1370	84
70	284	380	58
80	137	116	66
90	1667	2271	194
100	101	115	45

STATION:143 INCUBATION TIME: 10.50-13.58 INCUBATION PERIOD:3,1 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	1363	1396	975
10	319	290	129
20	1619	747	107
30	399	452	360
40	446	273	74
50	1805	2414	301
60	1142	1095	149
70	179	163	88
80	166	161	74
90	509	112	380
100	59	38	59

STATION:151 INCUBATION TIME: 9.33-11.93 INCUBATION PERIOD:2,26 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	4696	4686	867
10	3000	1456	325
20	2815	3621	88
30	875	842	111
40	605	646	73
50	189	361	94
60	223	214	304
70	94	95	62
80	71	81	87
90	380	-	348

STATION:165 INCUBATION TIME: 10.70-13.36 INCUBATION PERIOD:2,66 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	3036	2821	191
10	1457	1503	98
20	1098	1057	161
30	1066	1094	90
40	1976	-	134
50	1471	811	264
60	1046	1946	187
70	482	438	354
80	547	477	260
90	602	636	662
100	362	263	234

STATION:174 INCUBATION TIME: 14.21-16.13 INCUBATION PERIOD:1,92 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	867	943	246
10	622	588	198
20	1085	975	151
30	1282	1568	159
40	611	601	100
50	838	657	631
60	470	492	179
70	286	662	184
80	517	229	188
90	154	226	408
100	202	211	194

STATION:180/1 INCUBATION TIME: 11.66-14.75 INCUBATION PERIOD:3,08 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	2347	2491	421
10	2528	3075	271
20	978	759	146
30	1111	1023	168
40	832	1265	147
50	1010	888	514
60	1021	596	120
70	738	763	441
80	306	293	342
90	316	354	314
100	207	193	141

STATION:180/10 INCUBATION TIME: 9.45-12.50 INCUBATION PERIOD:3,05 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	1132	1357	1053
10	1539	1659	1380
20	1109	1122	219
30	725	781	269
40	1209	1185	299
50	2105	1716	371
60	833	1030	78
70	808	879	174
80	410	411	198
90	420	420	374
100	149	137	127

STATION:189 INCUBATION TIME: 9.96-12.76 INCUBATION PERIOD:2,8 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	1513	1358	359
10	1502	1754	821
20	785	924	330
30	1064	1338	374
40	1131	888	218
50	892	936	250
60	845	700	300
70	1472	1974	167
80	1012	1365	652
90	451	447	238
100	433	437	298

STATION:195 INCUBATION TIME: 11.00-13.08 INCUBATION PERIOD:2,07 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	1092	938	468
10	885	752	-
20	506	497	192
30	511	590	190
40	426	463	276
50	477	658	109
60	352	296	108
70	300	250	166
80	277	234	220
90	163	160	156
100	135	111	103

STATION:246 INCUBATION TIME: 11.50-13.50 INCUBATION PERIOD:2 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	2807	2777	839
10	2021	2108	-
20	2058	2203	458
30	1454	2062	507
40	1309	1348	902
50	706	972	426
60	870	959	353
70	392	676	377
80	401	289	236
90	487	708	465
100	376	396	300

STATION:251 INCUBATION TIME: 12.75-15.05 INCUBATION PERIOD:2,3 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	2947	2381	648
10	1563	1954	764
20	1811	1820	728
30	1451	1359	538
40	1451	1367	624
50	1279	1355	498
60	814	860	251
70	508	481	321
80	232	299	182
90	350	218	216

STATION:255 INCUBATION TIME: 10.00-13.16 INCUBATION PERIOD 3,17 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	4607	3516	571
10	1346	1317	546
20	734	1219	522
30	968	1658	298
40	1107	1034	531
50	668	640	449
60	520	424	226
70	367	250	206
80	159	157	140
90	160	144	143
100	302	185	162

STATION:259 INCUBATION TIME: 13.25-16.50 INCUBATION PERIOD:3,28 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	3284	3285	330
10	1388	1348	365
20	1302	1591	400
30	1403	1103	586
40	1614	1490	383
50	606	723	457
60	420	633	241
70	352	281	211
80	307	369	208
90	271	243	184
100	349	170	143

STATION:269 INCUBATION TIME: 10.83-12.91 INCUBATION PERIOD:2,08 h

DEPTH	CPM LIGHT-1	CPM LIGHT-2	CPM DARK
0	2029	1521	543
10	2671	2392	1233
20	1679	1362	154
30	1619	1191	297
40	1430	1450	292
50	792	739	505
60	1477	-	309
70	483	-	442
80	348	304	173
90	296	-	161
100	303	297	176

STATION: 114 DATE: 13.02.87 CO2: 25,50 mgC/1

TURBULENCE TIME: 3,5 h			IN SITU TIME: 3,58 h		
CPM-LIGHT	CPM-DARK	DEPTH	CPM-LIGHT	CPM-LIGHT	CPM-DARK
1913	562	0	1538	1294	837
3865		1	1625	1511	967
2047		2	1700	2019	1258
2363		3	1926	-	1325
2303		4	2301	2089	1594
2273		5	2588	2274	1830
3021		7	2397	2453	1824
2576		8,5	2286	2400	1742

STATION: 174 DATE: 23.02.87 CO2: 25,72 mgC/1

TURBULENCE TIME: 2,2 h			IN SITU TIME: 1,92 h		
CPM-LIGHT	CPM-DARK	DEPTH	CPM-LIGHT	CPM-LIGHT	CPM-DARK
1231	138	0	867	943	659
1338		1	1007	966	767
1716		2	788	1004	730
1174		3	1218	1064	982
1336		4	906	1065	838
1193		5	1244	1023	979
1212		7	1099	1073	901
1160		8,5	980	761	713

STATION: 195 DATE: 28.02.87 CO2: 25,06 mgC/1

TURBULENCE TIME:2,31 h			IN SITU TIME: 2,07 h		
CPM-LIGHT	CPM-DARK	DEPTH	CPM-LIGHT	CPM-LIGHT	CPM-DARK
1645	275	0	1092	938	468
1549		1	1816	1718	272
1230		2	1351	1667	146
1539		3	1715	1767	136
1900		4	1920	1695	138
1720		5	1596	1494	122
1583		7	1627	1442	293
1669		8,5	1625	1682	110

STATION: 246 DATE: 7.3.87 CO2: 24,85 mgC/1

TURBULENCE TIME:lost			IN SITU TIME: 2,0 h		
CPM-LIGHT	CPM-DARK	DEPTH	CPM-LIGHT	CPM-LIGHT	CPM-DARK
		0	2807	2777	839
		1	3045	2586	657
lost		2	1909	3048	350
		3	3189	2922	491
		4	2339	2788	309
		5	3021	3010	913
		7	4017	4480	253
		8,5	3289	3605	1087

Part 3

Simulated in-situ method

Scintillation counts and primary production of 3 plankton size classes

(< 2 µm, 2 - 20 µm, > 20 µm)

STATION: 81 DATE: 6-2-87 INCUBATION TIME: 10,58-14,07 CO2:24,30 mgC/l
(26,3uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
		(Subsample 75 of 250 ml)					
100%	light	69 - 82	60 - 85	55 - 20	0,00	0,00	0,00
(= 0m)	dark	149	110	105			
80%	light	64 - 58	64 - 71	55 - 211	0,00	0,00	0,00
(= 1m)	dark	80	82	70			
64%	light	66 - 70	68 - 73	56 - 55	0,00	0,00	0,00
(= 2m)	dark	74	72	67			
51%	light	48 - 52	45 - 61	49 - 54	0,00	0,00	0,00
(= 4m)	dark	69	76	71			
30%	light	155 -185	149 -197	137 -164	0,00	0,01	0,12
(= 11m)	dark	96	108	85			
9%	light	500 -529	548 -527	355 -457	0,00	0,03	0,08
(= 33m)	dark	209	204	168			
3%	light	170 -126	154 -129	145 -99	0,00	0,00	0,01
(= 55m)	dark	144	134	112			
1%	light	106 -143	105 -124	87 -113	0,00	0,01	0,00
(= 77m)	dark	134	134	113			
INTEGRATED					0,00	0,69	1,96

STATION: 86 DATE: 7-2-87 INCUBATION TIME: 11,88-14,70 CO2:24,6 mgC/l
(26,3uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
		(Subsample 75 of 250 ml)					
100%	light	357-382	330-295	243-241	0,03	0,01	0,08
(= 0m)	dark	114	118	91			
80%	light	784-1027	624-974	568-728	0,06	0,07	0,29
(= 2m)	dark	98	100	90			
64%	light	1179-1187	1101-1058	894-871	0,04	0,10	0,43
(= 4m)	dark	116	93	77			
51%	light	1132-1146	1004-1096	907-899	0,04	0,07	0,44
(= 5m)	dark	91	86	73			
30%	light	802-794	733-758	602-613	0,03	0,06	0,28
(= 10m)	dark	96	108	81			
9%	light	614-502	618-246	459-440	0,00	0,03	0,14
(= 35m)	dark	233	246	179			
3%	light	275-337	277-354	205-297	0,02	0,00	0,07
(= 60m)	dark	143	140	120			
1%	light	235-161	234-162	188-125	0,00	0,01	0,01
(= 85m)	dark	192	198	151			

STATION: 91 DATE: 8-2-87 INCUBATION TIME: 12,00-14,62 CO2:26,0mgC/1
(26,3uCi added)

LIGHT	DEPTH	COUNTS PER MINUTE TOTAL (Subsample 75 of 250 ml)	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
100%	light	579-491	551-469	459-372	0,02	0,04	0,17
(= 0m)	dark	167	179	135			
80%	light	994-609	- - 767	532-641	0,02	0,10	0,29
(= 1m)	dark	112	107	91			
64%	light	905-788	856-900	641-621	0,00	0,11	0,30
(= 2m)	dark	160	150	126			
51%	light	820-1008	808-744	695-621	0,08	0,06	0,32
(= 3m)	dark	128	143	109			
30%	light	232-288	242-280	185-211	0,00	0,02	0,07
(= 8m)	dark	106	120	83			
9%	light	289-292	264-280	191-199	0,01	0,03	0,06
(= 25m)	dark	116	108	85			
3%	light	276-270	225-229	170-168	0,03	0,03	0,06
(= 45m)	dark	85	92	71			
1%	light	249-213	252-241	225-175	0,00	0,01	0,03
(= 60m)	dark	197	188	158			
INTEGRATED					0,88	1,73	4,81

STATION: 97 DATE: 9-2-87 INCUBATION TIME: 10,17-12,54 CO2:24,7mgC/1
(26,3uCi added)

LIGHT	DEPTH	COUNTS PER MINUTE TOTAL (Subsample 75 of 250 ml)	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
100%	light	146-130	127-145	114-106	0,01	0,01	0,01
(= 0m)	dark	108	130	137			
80%	light	371-306	295-296	280-251	0,02	0,02	0,10
(= 1m)	dark	89	94	94			
64%	light	430-425	349-330	283-336	0,04	0,03	0,10
(= 2m)	dark	92	85	72			
51%	light	453-429	375-406	368-275	0,03	0,04	0,12
(= 3m)	dark	104	115	104			
30%	light	481-457	414-473	399-378	0,01	0,02	0,10
(= 8m)	dark	119	136	99			
9%	light	224-186	214-203	197-155	0,00	0,01	0,06
(= 25m)	dark	91	88	70			
3%	light	143-143	164-148	122-130	0,00	0,01	0,02
(= 45m)	dark	98	130	94			
1%	light	112-128	117-131	93-114	0,00	0,00	0,00
(= 60m)	dark	129	130	108			
INTEGRATED					0,31	0,62	3,03

STATION: 100 DATE: 10-2-8 INCUBATION TIME: 13,62-16,42 CO2:25,6mgC/1
(26,3uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL (Subsample 75 of 250 ml)	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
100%	light	823-890	570-771	486-572	0,10	0,08	0,23
(= 0m)	dark	99	119	100			
80%	light	1042-1250	953-842	649-723	0,14	0,11	0,33
(= 1m)	dark	106	134	90			
64%	light	283-302	249-258	165-202	0,02	0,03	0,04
(= 3m)	dark	101	113	94			
51%	light	342-239	274-195	257-183	0,03	0,01	0,09
(= 4m)	dark	65	90	57			
30%	light	291-290	216-258	192-247	0,03	0,01	0,09
(= 10m)	dark	71	78	54			
9%	light	297-222	246-233	249-229	0,01	0,00	0,08
(= 34m)	dark	100	129	96			
3%	light	246-346	201-346	182-300	0,01	0,01	0,07
(= 55m)	dark	128	123	104			
1%	light	142-84	139-152	120-140	0,00	0,00	0,00
(= 67m)	dark	128	137	114			
INTEGRATED					1,26	0,38	5,33

STATION: 108 DATE:12-2-87 INCUBATION TIME: 11,20-13,20 CO2:25.7mgC/1
(26,3uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL (Subsample 75 of 250 ml)	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
100%	light	483-731	485-764	467-383	0,00	0,13	0,22
(= 0m)	dark	158	323	139			
80%	light	1790-971	1794-956	1655-845	0,01	0,09	0,89
(= 1m)	dark	91	129	88			
64%	light	1958-1844	1939-1739	1728-1651	0,04	0,06	1,23
(= 2m)	dark	155	165	120			
51%	light	1445-1245	1431-1241	1262-1108	0,01	0,12	0,75
(= 4m)	dark	188	183	197			
30%	light	550-588	554-614	495-493	0,00	0,04	0,28
(= 9m)	dark	148	139	126			
9%	light	288-341	284-369	239-267	0,00	0,04	0,10
(= 24m)	dark	96	94	75			
3%	light	214-236	211-232	157-171	0,00	0,01	0,07
(= 45m)	dark	111	101	70			
1%	light	126-157	135-159	110-130	0,00	0,00	0,01
(= 60m)	dark	138	124	108			
INTEGRATED					[illegible]	[illegible]	[illegible]

STATION: 121 DATE:14-2-87 INCUBATION TIME: 12,00-13,95 CO2:26,00mgC/l
(26,3uCi added)

LIGHT	DEPTH	COUNTS PER MINUTE TOTAL (Subsample 75 of 250 ml)	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
100%	light	158-112	218-157	168-128	0,00	0,00	0,04
(= 0m)	dark	101	127	106			
80%	light	441-368	431-372	380-237	0,01	0,07	0,18
(= 1m)	dark	91	109	83			
64%	light	480-670	454-607	362-469	0,00	0,09	0,27
(= 3m)	dark	111	122	110			
51%	light	522-448	478-505	421-318	0,00	0,08	0,23
(= 5m)	dark	104	122	83			
30%	light	313-320	304-305	189-229	0,01	0,08	0,08
(= 10m)	dark	107	118	113			
9%	light	451-487	381-410	290-309	0,02	0,04	0,21
(= 27m)	dark	185	151	120			
3%	light	323-329	312-291	234-242	0,02	0,02	0,11
(= 45m)	dark	132	133	96			
1%	light	131-128	120-135	88-103	0,01	0,01	0,00
(= 71m)	dark	133	137	103			
INTEGRATED					0,1	2,54	8,63

STATION: 130 DATE:16-2-87 INCUBATION TIME: 13,07-15,75 CO2:25,0mgC/l
(13,1uCi added)

LIGHT	DEPTH	COUNTS PER MINUTE TOTAL	PRODUCTION in mgC/m3/h TOTAL
100%	light	1743	0,42
(= 0m)	dark	410	
80%	light	2240	0,55
(= 1m)	dark	563	
64%	light	620	0,10
(= 3m)	dark	321	
51%	light	291	0,04
(= 5m)	dark	175	
30%	light	378	0,05
(= 10m)	dark	203	
9%	light	229	0,00
(= 27m)	dark	256	
3%	light	385	0,02
(= 45m)	dark	338	
1%	light	139	0,00
(= 71m)	dark	236	

STATION: 133 DATE:17-2-87 INCUBATION TIME: 10,58-13,58 CO2:26,01mgC/l
(13,1uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL	PRODUCTION in mgC/m3/h TOTAL
100%	light	1184 from 0m	0,18
(= 0m)	dark	608	
80%	light	5577 from 0m	1,54
(= 1m)	dark	628	
64%	light	661 from 5m	0,06
(= 3m)	dark	472	
51%	light	914 from 5m	0,14
(= 5m)	dark	452	
30%	light	2397 from 10m	0,56
(= 10m)	dark	573	
9%	light	380 from 40m	0,04
(= 24m)	dark	730	
3%	light	? from 50m	-
(= 36m)	dark	677	
1%	light	? from 50m	-
(= 50m)	dark	446	
INTEGRATED			9,55

STATION: 137 DATE:18-2-87 INCUBATION TIME: 10,25-14,00 CO2:24,75mgC/l
(26,3uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL (Subsample 75 of 250 ml)	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
100%	light	583-664	576-672	567-632	0,00	0,01	0,17
(= 0m)	dark	191	237	174			
80%	light	930-874	849-942	703-700	0,01	0,06	0,23
(= 1m)	dark	150	162	114			
64%	light	971-1020	882-1122	692-795	0,00	0,09	0,24
(= 2m)	dark	164	203	140			
51%	light	954-928	926-957	728-811	0,00	0,05	0,24
(= 3m)	dark	229	227	168			
30%	light	395-308	291-457	272-220	0,00	0,02	0,05
(= 5m)	dark	176	181	130			
9%	light	325-354	291-381	257-289	0,00	0,03	0,07
(= 28m)	dark	105	89	89			
3%	light	278-279	238-449	236-225	0,00	0,01	0,05
(= 52m)	dark	139	125	107			
1%	light	208-182	154-223	118-154	0,00	0,00	0,01
(= 75m)	dark	189	177	128			
INTEGRATED					0	1,29	[illegible]

STATION: 143 DATE:19-2-87 INCUBATION TIME: 10,25-13,90 CO2:24,7mgC/l

LIGHT DEPTH (13,1uCi added)		COUNTS PER MINUTE TOTAL	PRODUCTION in mgC/m3/h TOTAL
100%	light	489	0,08
(= 0m)	dark	lost d from 80% light depth	
80%	light	896	0,18
(= 1m)	dark	160	
64%	light	588	0,01
(= 3m)	dark	569	
51%	light	648	0,04
(= 4m)	dark	516	
30%	light	665	0,00
(= 13m)	dark	739	
9%	light	987	0,00
(= 30m)	dark	(1222)	
3%	light	1312	0,00
(= 50m)	dark	(1273)	
1%	light	826	0,00
(= 65m)	dark	(1518)	
INTEGRATED			0,49

STATION: 151 DATE:20-2-87 INCUBATION TIME: 10,95-14,03 CO2:25,9mgC/l

(26,3uCi added)		COUNTS PER MINUTE			PRODUCTION in mgC/m3/h		
LIGHT DEPTH		TOTAL	< 20 um	< 2 um	> 20 um	20 - 2 um	< 2 um
		(Subsample 75 of 250 ml)					
100%	light	664-271	621-345	615-385	0,00	9,00	0,16
(= 0m)	dark	236	201	176			
80%	light	2570-1270	2133-1189	1915-1098	0,10	0,07	0,61
(= 1m)	dark	193	167	169			
64%	light	2976-2570	2530-2151	2346-2060	0,22	0,06	1,01
(= 3m)	dark	204	208	195			
51%	light	3983-3692	3710-3279	3123-3127	0,17	0,16	1,45
(= 5m)	dark	300	324	250			
30%	light	1326-1555	1144-1547	1066-1302	0,04	0,06	0,47
(= 10m)	dark	302	280	242			
9%	light	762-659	667-655	623-537	0,02	0,01	0,22
(= 24m)	dark	187	193	158			
3%	light	639-514	586-485	528-455	0,02	0,02	0,17
(= 36m)	dark	161	158	145			
1%	light	251-330	263-349	240-258	0,04	0,01	0,03
(= 48m)	dark	230	211	184			
INTEGRATED					2,11	1,77	17,65

STATION: 165 DATE:22-2-87 INCUBATION TIME: 11,17-14,53 CO2:26,0mgC/1
(26,3uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
		(Subsample 75 of 250 ml)					
100%	light	1042-1030	1025-1077	838-837	0,00	0,09	0,31
(= 0m)	dark	160	187	209			
80%	light	1601-2786	1656-2671	1210-2177	0,01	0,21	0,72
(= 1m)	dark	150	130	119			
64%	light	1745-1875	1697-1948	1388-1519	0,00	0,13	0,61
(= 3m)	dark	200	208	123			
51%	light	434-1642	418-1138	397-1354	0,00	0,05	0,34
(= 5m)	dark	219	233	144			
30%	light	1845-1397	1633-1762	1533-1518	0,00	0,02	0,61
(= 12m)	dark	267	249	188			
9%	light	541-568	523-554	460-468	0,00	0,01	0,17
(= 32m)	dark	192	159	110			
3%	light	412-298	310-284	254-235	0,03	0,01	0,05
(= 49m)	dark	151	165	119			
1%	light	196-248	197-248	161-176	0,00	0,01	0,01
(= 68m)	dark	200	180	153			
INTEGRATED					0,46	1,64	16,28

STATION: 174 DATE:23-2-87 INCUBATION TIME: 14,11-16,11 CO2:26,0mgC/1
(13,1uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL		PRODUCTION in mgC/m3/h TOTAL
100%	light	2299		0,61
(= 0m)	dark	(1485)	(d:1032:mean d from 0 and 1m)	
80%	light	2479		0,70
(= 1m)	dark	579	(d:1032)	
64%	light	785		0,05
(= 3m)	dark	(1514)	(d:668:mean of the 3 lowest d values)	
51%	light	891		0,11
(= 4m)	dark	(1047)	(d:668)	
30%	light	777		0,05
(= 8m)	dark	550	(d:668)	
9%	light	1890		0,59
(= 23m)	dark	876	(d:668)	
3%	light	500		0,00
(= 40m)	dark	(1521)	(d:668)	
1%	light	489		0,00
(= 60m)	dark	(1357)	(d:668)	
INTEGRATED				11,34

STATION:180-1 DATE:24-2-87 INCUBATION TIME: 13,18-16,42 CO2:25,7mgC/1
(26,3uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
		(Subsample 75 of 250 ml)					
100%	light	138-147	236-190	141-127	0,00	0,00	0,00
(= 0m)	dark	224	253	169			
80%	light	296-268	309-321	269-211	0,00	0,01	0,05
(= 1m)	dark	170	200	138			
64%	light	396-461	425-444	310-271	0,00	0,05	0,08
(= 2m)	dark	147	155	122			
51%	light	388-473	427-504	287-358	0,00	0,04	0,10
(= 4m)	dark	131	215	105			
30%	light	347-300	369-314	276-250	0,00	0,01	0,08
(= 10m)	dark	129	153	95			
9%	light	307-333	331-319	253-224	0,00	0,02	0,06
(= 30m)	dark	144	153	105			
3%	light	324-215	321-249	251-188	0,00	0,00	0,05
(= 50m)	dark	173	164	106			
1%	light	135-171	158-170	99-101	0,00	0,00	0,00
(= 60m)	dark	153	203	125			
INTEGRATED					0	0,82	3,68

STATION:180/10 DATE:25-2-87 INCUBATION TIME: 9,85-12,68 CO2:25,7mgC/1
(26,3uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
		(Subsample 75 of 250 ml)					
100%	light	1219-1298	1098-1212	744-619	0,06	0,21	0,22
(= 0m)	dark	359	391	268			
80%	light	1585-1496	1523-1483	1202-1125	0,01	0,13	0,24
(= 1m)	dark	826	809	717			
64%	light	1434-1652	1378-1596	1143-1419	0,00	0,03	0,38
(= 3m)	dark	771	723	573			
51%	light	1948-1790	1720-1745	1482-1359	0,05	0,11	0,52
(= 5m)	dark	606	561	457			
30%	light	1268-1419	1093-1311	935-1027	0,08	0,00	0,08
(= 12m)	dark	(1103)	(1070)	837			
9%	light	435-330	371-353	319-264	0,01	0,04	0,09
(= 30m)	dark	129	189	123			
3%	light	297-255	307-270	246-235	0,00	0,00	0,06
(= 46m)	dark	158	172	123			
1%	light	331-182	386-170	306-126	0,00	0,01	0,05
(= 65m)	dark	155	170	129			
INTEGRATED					1,46	1,61	7,66

STATION: 189 DATE:27-2-87 INCUBATION TIME: 11,58-14,58 CO2:25,4mgC/1
(26,3uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
		(Subsample 75 of 250 ml)					
100%	light	160-122	348-229	159-158	0,00	0,00	0,01
(= 0m)	dark	155	201	147			
80%	light	506-786	525-879	363-589	0,00	0,06	0,16
(= 1m)	dark	208	290	162			
64%	light	1101-941	1102-922	785-648	0,01	0,29	0,29
(= 3m)	dark	192	217	148			
51%	light	1438-1330	1369-1268	990-903	0,03	0,35	0,38
(= 5m)	dark	233	245	164			
30%	light	535-205	523-278	398-198	0,00	0,01	0,08
(= 13m)	dark	219	229	151			
9%	light	265-216	266-325	207-165	0,00	0,02	0,05
(= 37m)	dark	107	118	90			
3%	light	173-159	167-198	131-145	0,00	0,01	0,01
(= 56m)	dark	113	128	90			
1%	light	132-179	160-197	126-152	0,00	0,00	0,02
(= 70m)	dark	127	143	106			
INTEGRATED					0,18	1,21	5,51

STATION: 195 DATE:28-2-87 INCUBATION TIME: 10,08-13,28 CO2:25,1mgC/1
(13,1uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL	PRODUCTION in mgC/m3/h TOTAL
100%	light	4466-3508	0,85
(= 0m)	dark	958	
80%	light	5555-4529	1,13
(= 2m)	dark	(1026)	
64%	light	2833-2298	0,57
(= 3m)	dark	535	
51%	light	3779-3388	0,89
(= 5m)	dark	391	
30%	light	3023-2690	0,71
(= 10m)	dark	337	
9%	light	1564-1027	0,21
(= 31m)	dark	537	
3%	light	733-274	0,01
(= 53m)	dark	459	
1%	light	579-192	0,00
(= 69m)	dark	387	
INTEGRATED			20,47

STATION: 235 DATE: 6-3-87 INCUBATION TIME: 11,27-14,10 CO2:25,1mgC/1
(13,1uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL	PRODUCTION in mgC/m3/h TOTAL
100%	light	832	0,13
(= 0m)	dark	435	
80%	light	1422	0,34
(= 1m)	dark	351	
64%	light	7092	2,19
(= 3m)	dark	250	
51%	light	7941	2,47
(= 4m)	dark	259	
30%	light	1236	0,31
(= 9m)	dark	295	
9%	light	1000	0,24
(= 24m)	dark	255	
3%	light	546	0,09
(= 41m)	dark	41	
1%	light	376	0,04
(= 60m)	dark	245	
INTEGRATED			24,01

STATION: 246 DATE: 7-3-87 INCUBATION TIME: 11,72-14,67 CO2:24,8mgC/1
(26,3uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
		(Subsample 75 of 250 ml)					
100%	light	76-71	130-142	116-83	0,00	0,00	0,00
(= 0m)	dark	114	131	110			
80%	light	119-146	139-163	125-129	0,00	0,01	0,02
(= 2m)	dark	110	131	241			
64%	light	252-386	267-425	347-346	0,00	0,00	0,10
(= 3m)	dark	126	165	113			
51%	light	486-487	484-518	462-451	0,00	0,01	0,14
(= 5m)	dark	199	195	177			
30%	light	516-803	487-777	421-677	0,01	0,02	0,19
(= 11m)	dark	197	221	151			
9%	light	504-1100	476-400	437-548	0,13	0,01	0,19
(= 30m)	dark	140	151	114			
3%	light	313-203	330-236	269-181	0,00	0,01	0,04
(= 44m)	dark	142	155	133			
1%	light	267-217	270-229	199-174	0,00	0,00	0,00
(= 60m)	dark	298	292	191			
INTEGRATED	(Sampler sequence was wrong!!!)				2,23	0,52	6,92

STATION: 251 DATE: 9-3-87 INCUBATION TIME: 12,75-16,05 CO2:25,1mgC/1
(13,1uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL	PRODUCTION in mgC/m3/h TOTAL
100%	light	1052	0,18
(= 0m)	dark	394	
80%	light	1797	0,37
(= 2m)	dark	448	
64%	light	508	0,01
(= 4m)	dark	474	
51%	light	652	0,03
(= 6m)	dark	558	
30%	light	366	0,01
(= 12m)	dark	353	
9%	light	605	0,07
(= 33m)	dark	370	
3%	light	1303	0,22
(= 49m)	dark	496	
1%	light	498	0,03
(= 64m)	dark	403	
INTEGRATED			6,01

STATION: 255 DATE:10.3.87 INCUBATION TIME: 10,97-13,50 CO2:25,3mgC/1
(26,3uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
		(Subsample 75 of 250 ml)					
100%	light	-183	188-223	197-255	0,00	0,00	0,00
(= 0m)	dark	233	321	273			
80%	light	374-624	412-629	343-535	0,00	0,04	0,16
(= 2m)	dark	127	170	170			
64%	light	689-817	656-766	577-771	0,00	0,03	0,32
(= 4m)	dark	180	162	131			
51%	light	318-391	291-405	290-309	0,00	0,02	0,11
(= 7m)	dark	147	148	123			
30%	light	238-194	211-217	171-204	0,00	0,01	0,05
(= 12m)	dark	112	155	107			
9%	light	358-511	311-484	284-400	0,02	0,02	0,11
(= 27m)	dark	178	193	155			
3%	light	225-179	209-241	164-194	0,00	0,01	0,03
(= 40m)	dark	140	166	132			
1%	light	253-153	273-154	210-123	0,00	0,02	0,04
(= 57m)	dark	110	129	102			
INTEGRATED	(Sampler sequence was wrong!!!)				0,28	0,94	4.32

STATION: 259 DATE:11-3-87 INCUBATION TIME: 13,13-16,13 CO2:25,6mgC/l
(13,1uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL	PRODUCTION in mgC/m3/h TOTAL
100%	light	1929	0,50
(= 0m)	dark	307	
80%	light	2604	0,74
(= 1m)	dark	225	
64%	light	360	0,02
(= 3m)	dark	300	
51%	light	282	0,01
(= 5m)	dark	253	
30%	light	369	0,01
(= 12m)	dark	332	
9%	light	475	0,07
(= 32m)	dark	258	
3%	light	1407	0,35
(= 45m)	dark	279	
1%	light	143	0,00
(= 59m)	dark	228	
INTEGRATED			7,47

STATION: 269 DATE:13-3-87 INCUBATION TIME: 11,63-14,67 CO2:25,1mgC/l
(26,3uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL (Subsample 75 of 250 ml)	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
100%	light	619-539	670-582	548-480	0,00	0,00	0,19
(= 0m)	dark	251	251	134			
80%	light	571-808	577-788	491-705	0,01	0,04	0,19
(= 2m)	dark	167	228	210			
64%	light	1307-1359	1263-1326	1116-1136	0,02	0,05	5,50
(= 4m)	dark	197	194	196			
51%	light	1145-1154	1070-1130	988-997	0,00	0,01	0,25
(= 7m)	dark	614	581	479			
30%	light	881-1013	830-1054	776-920	0,00	0,03	0,32
(= 15m)	dark	249	278	210			
9%	light	1467-1739	1365-1671	1260-1541	0,04	0,04	0,55
(= 34m)	dark	339	332	294			
3%	light	524-505	516-527	452-442	0,00	0,02	0,15
(= 48m)	dark	222	161	143			
1%	light	174-192	212-239	133-164	0,00	0,00	0,01
(= 63m)	dark	188	187	141			
INTEGRATED					0,76	1,8	18,85

STATION: 271 DATE:14-3-87 INCUBATION TIME: 12,67-14,75 CO2:25,2mgC/1
(26,3uCi added)

LIGHT DEPTH		COUNTS PER MINUTE TOTAL (Subsample 75 of 250 ml)	< 20 um	< 2 um	PRODUCTION in mgC/m3/h > 20 um	20 - 2 um	< 2 um
100%	light	2676-2582	2298-2152	1942-1881	0,29	0,18	1,25
(= 0m)	dark	260	274	194			
80%	light	2805-2836	2192-2228	1844-2082	0,39	0,14	1,21
(= 1m)	dark	427	353	300			
64%	light	2099-2175	1775-1823	1536-1619	0,08	0,14	1,13
(= 3m)	dark	255	218	189			
51%	light	1973-1875	1644-1529	1387-1270	0,25	0,18	0,82
(= 4m)	dark	214	274	200			
30%	light	989-796	904-703	729-643	0,06	0,05	0,35
(= 10m)	dark	240	250	205			
9%	light	487-409	491-456	391-330	0,00	0,07	0,14
(= 29m)	dark	173	185	144			
3%	light	324-314	332-341	260-238	0,00	0,05	0,05
(= 42m)	dark	174	181	176			
1%	light	219-174	248-199	159-125	0,00	0,00	0,01
(= 55m)	dark	196	187	143			
INTEGRATED					2,47	3,51	14,19

RELATIVE CONTRIBUTION OF THE SIZE FRACTIONS
TO THE TOTAL PRODUCTION (IN PERCENTAGE)

STATION	> 20 um	(2 - 20) um	< 2um
81	0,0	25,4	74,5
86	7,9	14,3	77,8
91	11,8	23,7	64,5
97	7,6	15,7	76,7
100	20,7	5,4	76,4
108	1,4	14,7	83,9
121	7,7	21,0	71,3
137	0,0	22,5	77,5
151	9,8	8,2	82,0
165	2,5	8,9	88,6
180/01	0,0	18,2	81,8
180/02	13,5	15,0	71,5
189	2,7	20,2	79,8
246	23,1	5,4	71,5
255	5,3	16,9	77,7
269	3,6	8,4	88,2
AVERAGE	7,7	15,1	77,2
STANDARD DESVIATION	7,1	6,9	6,4

Part 4

Daily light regime in the water column

The attenuation of seawater was determined from the light measurements given in part 2 / I. of the data sheets. The light regime was then calculated by relating the attenuation values to the hourly irradiance values measured by the meteorological station of "Meteor".

Depth - 1 = 1 m above sea surface

Hour 1 = 7^{00} h

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3
81	06-Feb-87	-1	84	947	1522
		0	26	295	474
		10	9	97	156
		20	4	45	73
		30	3	30	48
		40	2	21	34
		50	2	21	34
		75	0	3	5

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3
86	07-Feb-87	-1	85	735	1120
		0	63	547	833
		10	20	171	261
		20	13	112	170
		30	8	69	106
		40	5	39	60
		50	3	26	39
		75	0	10	15

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3
91	08-Feb-87	-1	90	893	1510
		0	60	595	1006
		10	16	149	252
		20	7	67	114
		30	4	37	63
		40	2	23	38
		50	1	13	22
		75	0	3	6

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3
97	09-Feb-87	-1	60	211	1406
		0	40	141	937
		10	10	35	235
		20	5	16	106
		30	3	9	59
		40	2	7	36
		50	1	4	21
		75	0	0	7

HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
	(µE.m-2.s-1)						
2022	2408	2113	2573	2293	1795	1211	332
630	751	659	802	717	560	377	103
208	247	217	264	236	185	124	34
97	115	101	123	110	86	58	16
63	75	66	80	72	56	38	10
45	53	47	57	51	40	27	7
45	53	47	35	31	24	16	4
7	8	7	9	8	6	4	1

HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
	(µE.m-2.s-1)						
2016	2365	2570	2533	2309	1880	1248	430
1500	1760	1913	1885	1718	1399	929	320
470	552	606	597	544	443	294	101
306	359	394	390	354	288	191	66
188	221	243	209	218	177	118	41
108	127	139	177	125	102	68	23
71	83	91	116	82	67	44	15
27	32	35	45	31	26	17	6

HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
	(µE.m-2.s-1)						
2016	2213	2327	2407	2087	1179	1199	377
1343	1474	1550	1603	1390	785	799	251
336	369	388	401	348	197	200	63
152	167	175	181	157	89	90	28
85	93	98	101	88	49	50	16
51	56	59	61	53	30	30	10
30	33	35	36	31	17	18	6
7	8	8	8	8	4	4	1

HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
	(µE.m-2.s-1)						
2112	2542	1742	1198	977	1086	1123	359
1408	1695	1161	799	651	724	749	239
351	422	289	199	162	180	187	60
158	190	130	89	73	81	84	27
87	105	72	50	40	36	49	15
70	84	58	40	32	16	29	12
41	49	34	23	19	7	12	7
7	9	6	4	3	1	2	1

TATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4
100	10-Feb-87	-1	65	819	1285	2175
		0	46	585	917	1553
		10	13	176	276	467
		20	10	125	196	332
		30	6	73	114	194
		40	3	41	65	109
		50	2	21	34	58
		75	0	6	8	15

TATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4
108	12-Feb-87	-1	30	835	1553	2200
		0	19	517	961	1362
		10	5	139	259	367
		20	2	64	119	168
		30	1	31	58	82
		40	0	18	33	47
		50	0	11	21	29
		75	0	5	9	13

TATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4
121	14-Feb-87	-1	115	1000	1602	2091
		0	78	682	1092	1426
		10	23	205	329	430
		20	11	100	161	210
		30	5	48	77	100
		40	3	26	41	53
		50	2	16	26	34
		75	0	8	12	15

130 16-Feb-87 NO LIGHT MEASUREMENTS AS 121

133 17-Feb-87 NO LIGHT MEASUREMENTS AS 151

HOUR-5 (µE.m-2.s-1)	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
2514	2722	2691	2168	145	1251	326
1795	1944	1922	1548	819	893	232
540	585	579	466	246	269	70
384	416	412	331	175	191	49
224	242	240	193	102	111	29
126	137	135	109	57	63	16
67	72	72	58	30	33	8
17	19	19	15	7	8	2

HOUR-5 (µE.m-2.s-1)	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
2374	2790	2579	2160	1802	1236	520
1470	1727	1596	1337	1115	765	322
397	466	431	361	301	206	87
182	214	197	165	138	95	40
89	104	96	80	67	46	19
51	60	55	46	39	27	11
32	37	34	29	24	17	7
14	16	15	12	10	7	3

HOUR-5 (µE.m-2.s-1)	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
2038	2433	1783	2252	1736	1152	409
1390	1659	1216	1535	1183	785	278
419	500	366	462	356	236	64
205	244	179	226	174	116	41
98	117	85	108	83	55	[illegible]
52	62	45	58	44	29	[illegible]
33	40	29	37	29	[illegible]	[illegible]
15	18	13	16	13	6	[illegible]

s-1)

HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
687	688	599	373	266	32
146	146	127	79	56	19
88	88	76	47	34	12
57	57	49	31	22	[illegible]
38	38	33	20	15	5
22	22	19	12	9	3
14	14	12	7	5	[illegible]
8	8	7	5	3	1

s-1)

HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
2899	2787	2504	2035	1419	651
1505	1446	1300	1056	736	338
559	537	483	392	273	126
285	274	246	200	139	64
140	134	121	98	68	31
89	85	77	63	44	[illegible]
48	46	42	34	24	11
14	13	12	10	7	3

s-1)

HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
2987	2987	2660	2141	1590	644
1756	1756	1564	1259	935	[illegible]
513	513	457	368	273	111
216	216	192	155	115	47
90	90	80	64	48	19
34	34	30	24	18	[illegible]
14	14	12	10	7	3
4	4	4	3	2	1

s-1)

HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
2290	1845	1805	1519	1124	[illegible]
1221	983	962	810	539	[illegible]
416	335	328	276	204	[illegible]
222	179	175	147	109	[illegible]
125	101	98	83	61	[illegible]
72	53	57	43	35	[illegible]
[illegible]	[illegible]	25	21	[illegible]	[illegible]
10	[illegible]	8	[illegible]	[illegible]	[illegible]

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (µE.m-2.
137	18-Feb-87	-1	1	110	190	315	583
		0	0	23	40	67	124
		10	0	14	24	40	74
		20	0	9	16	26	48
		30	0	6	10	17	32
		40	0	4	6	10	19
		50	0	2	4	6	12
		75	0	0	2	4	7

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (µE.m-2.
143	19-Feb-87	-1	69	825	1593	2265	2461
		0	36	426	827	1176	1277
		10	13	159	307	437	475
		20	7	81	157	223	242
		30	3	40	77	109	119
		40	2	25	49	70	76
		50	1	14	27	38	41
		75	0	4	8	11	12

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (µE.m-2.
151	20-Feb-87	-1	239	1171	1805	2433	2611
		0	140	688	1061	1430	1535
		10	41	201	310	418	449
		20	17	85	130	176	189
		30	7	35	54	73	79
		40	3	13	20	28	30
		50	1	5	8	11	12
		75	0	2	2	3	4

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (µE.m-2.
165	22-Feb-87	-1	83	547	1164	1777	2315
		0	44	292	620	947	1234
		10	15	100	211	323	421
		20	8	53	113	172	224
		30	4	30	63	97	126
		40	3	17	37	56	73
		50	1	8	16	25	32
		75	[illegible]	2	5	8	10

ATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (µE.m-2.
174	23-Feb-87	-1	390	1208	1631	2352	2707
		0	204	632	853	1230	1416
		10	50	154	208	300	346
		20	22	69	93	134	154
		30	12	37	50	72	83
		40	6	20	26	38	44
		50	4	12	16	22	26
		75	1	5	6	9	10

ATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (µE.m-2.
180-1	24-Feb-87	-1	607	1211	1864	2247	2576
		0	390	779	1199	1445	1656
		10	147	294	453	546	626
		20	80	160	246	297	340
		30	43	87	133	161	184
		40	22	43	67	80	92
		50	14	27	42	51	57
		75	2	4	[illegible]	8	9

TATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (µE.m-2.
[illegible]	25-Feb-87	-1	[illegible]	[illegible]	[illegible]	2247	[illegible]
		0	[illegible]	[illegible]	882	1225	1482
		10	[illegible]	[illegible]	[illegible]	408	493
		20	31	[illegible]	[illegible]	205	[illegible]
		30	[illegible]	[illegible]	81	[illegible]	[illegible]
		40	[illegible]	31	[illegible]	[illegible]	[illegible]
		50	4	14	[illegible]	[illegible]	[illegible]
		75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (µE.m-2.
[illegible]	[illegible]	-1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
#-1)						
	1687	965	745	1367	1153	534
	882	505	390	715	603	279
	215	123	95	175	147	68
	96	55	42	78	66	30
	52	30	23	42	35	16
	27	16	12	22	19	9
	16	9	7	13	11	5
	6	4	3	5	4	2

	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
#-1)						
	2443	2570	2275	1830	1273	543
	1571	1653	1463	1177	819	349
	593	624	553	445	309	132
	323	340	301	242	168	72
	175	184	163	131	91	39
	87	92	81	65	45	19
	55	58	51	41	29	12
	9	9	8	6	5	2

	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
#-1)						
	[illegible]	2003	2191	[illegible]	1214	[illegible]
	1582	1528	1194	1040	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	546	[illegible]	[illegible]
	264	[illegible]	193	174	111	[illegible]
	[illegible]	[illegible]	109	95	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	34	[illegible]	23	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]						
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]			[illegible]	[illegible]	
	[illegible]	[illegible]		[illegible]	[illegible]	
		[illegible]	[illegible]		[illegible]	
	[illegible]			[illegible]		

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (µE.m-2.
195	28-Feb-87	-1	575	1335	1276	1273	1105
		0	320	742	709	708	614
		10	99	230	220	220	191
		20	51	119	114	114	98
		30	31	71	68	68	59
		40	19	45	43	43	37
		50	12	27	26	26	22
		75	3	7	7	7	6

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (µE.m-2.
229	05-Mär-87	-1	143	819	1830	2318	2614
		0	74	422	942	1194	1346
		10	19	109	244	310	349
		20	9	50	111	140	158
		30	4	26	56	71	80
		40	2	13	29	37	41
		50	1	7	16	21	23
		75	0	2	5	7	8

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (µE.m-2.
235	06-Mär-87	-1	598	584	1140	1351	1279
		0	308	301	587	696	659
		10	80	78	152	180	171
		20	36	35	69	82	78
		30	18	18	35	41	39
		40	9	9	18	21	20
		50	5	5	10	12	11
		75	2	2	3	4	4

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (µE.m-2.
246	07-Mär-87	-1	717	1382	2166	2775	3068
		0	508	978	1533	1965	2172
		10	164	316	496	636	703
		20	87	167	262	335	371
		30	45	86	135	173	192
		40	22	41	65	83	92
		50	10	19	30	38	42
		75	2	4	7	9	10

HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
s-1)					
837	515	124	340	175	64
465	286	69	189	97	36
144	89	21	59	30	11
75	46	11	30	16	6
45	28	7	18	9	3
28	17	4	11	6	2
17	10	2	7	4	1
5	3	1	2	1	0

HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
s-1)					
2903	2747	2387	1842	1095	313
1495	1415	1229	949	564	161
388	367	319	246	146	42
176	166	145	112	66	19
89	84	73	57	34	10
46	44	38	29	17	5
26	25	21	17	10	3
9	8	7	6	3	1

HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
s-1)					
1836	2094	2044	1967	1223	317
946	1078	1053	1013	630	163
245	279	273	263	163	42
111	127	124	119	74	19
56	64	63	60	38	10
29	33	32	31	19	5
16	19	18	18	11	3
5	6	6	6	4	1

HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUP-10	HOUR-11
s-1)					
3046	2878	2492	1849	1202	275
2156	2038	1764	1309	851	202
698	659	571	424	275	65
368	348	301	223	145	34
190	180	156	115	75	18
91	86	75	55	36	9
42	40	34	25	17	4
10	9	8	6	4	1

ATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (μE.m-2.
251	09-Mar-87	-1	515	1422	2072	2514	2710
		0	334	921	1343	1629	1756
		10	116	319	465	564	608
		20	64	175	255	310	334
		30	36	99	144	175	189
		40	20	54	79	96	104
		50	10	26	39	47	50
		75	2	6	8	10	11

TATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (μE.m-2.
255	10-Mar-87	-1	1205	1796	2331	2794	3133
		0	804	1198	1555	1864	2090
		10	284	423	550	659	739
		20	134	200	259	311	348
		30	56	84	109	131	146
		40	25	37	48	57	64
		50	13	19	25	30	33
		75	4	6	7	9	10

TATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (μE.m-2.
259	11-Mar-87	-1	515	1422	2971	3158	3114
		0	403	1122	2323	2470	2435
		10	138	385	797	847	835
		20	72	201	416	442	436
		30	40	112	233	248	244
		40	20	56	117	124	122
		50	8	22	46	49	48
		75	2	5	10	10	10

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 (μE.m-2.
269	13-Mar-87	-1	846	819	1808	2825	3040
		0	548	531	1172	1831	1970
		10	212	205	453	708	762
		20	113	109	241	377	406
		30	65	63	139	217	233
		40	32	31	68	106	114
		50	13	13	28	43	47
		75	3	3	7	11	12

s-1)

HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
3074	2946	2483	1920	1199	308
1992	1909	1609	1244	777	200
690	661	557	431	269	69
379	363	306	237	148	38
214	205	173	134	84	22
118	113	95	73	46	12
57	55	46	36	22	6
13	12	10	8	5	1

s-1)

HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
3005	2875	2371	1674	1024	156
2004	1918	1581	1117	683	104
708	678	559	395	241	37
334	320	264	186	114	17
140	134	111	78	48	7
61	59	49	34	21	3
32	31	25	18	11	2
9	9	7	5	3	0

s-1)

HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
2884	2523	1737	1121	156	0
2255	1973	1358	877	122	0
773	677	466	301	42	0
404	353	243	157	22	0
226	198	136	88	12	0
113	99	68	44	6	0
44	39	27	17	2	0
9	8	6	4	1	0

,s-1)

HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
3002	2769	2377	1799	1080	138
1945	1794	1540	1166	700	89
752	694	596	451	271	34
400	369	317	240	144	18
231	213	183	138	83	11
113	104	89	68	41	5
46	43	37	23	17	2
12	11	9	7	4	1

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3
271	14-Mar-87	-1	1030	1615	2272
		0	554	868	1222
		10	164	256	361
		20	90	141	198
		30	46	72	101
		40	20	31	43
		50	8	12	17
		75	2	4	5

HOUR-4	HOUR-5 (µE.m-2.s-1)	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11
2197	575	2	350	1237	989	538	74
1182	309	1	188	127	532	289	40
349	91	0	56	37	157	85	12
191	50	0	30	21	86	47	6
98	26	0	16	11	44	24	3
42	11	0	7	4	19	10	1
17	4	0	3	2	8	4	1
5	1	0	1	1	2	1	0

Part 5

Incubator method

I.

Photosynthesis versus light values (P/I relation)

PP = Primary production in mg C / m^3 / h

CHL = Chlorophyll a content in mg / m^3

PI = Production index in mg C / mg Chl. a / h

100 % light = 816 µE m^{-2} s^{-1}

STATION	PP-100%	CHL-100%	PI-100%	PP-80%	CHL-80%	PI-80%	PP-64%	CHL-64%	PI-64%	PP-51%	CHL-51%	PI-51%
81	0,12	0,114	1,1	0,12	0,114	1,1	0,37	0,112	3,3	0,42	0,112	3,8
86	0,08	0,073	1,1	0,07	0,073	1,0	0,36	0,077	4,7	0,33	0,077	4,3
91	0,15	0,082	1,8	0,14	0,082	1,8	0,54	0,109	4,9	0,34	0,109	3,1
97	0,63	0,081	7,8	0,38	0,081	0,4	0,08	0,079	1,0	0,11	0,079	1,4
100	0,51	0,069	7,4	0,51	0,069	7,4	0,12	0,064	1,8	0,07	0,064	1,1
108	1,35	0,160	8,5	1,76	0,160	11,0	1,56	0,162	9,6	1,22	0,162	7,5
121	0,59	0,089	6,6	0,59	0,089	6,6	0,62	0,089	6,9	0,50	0,089	5,6
130	0,64	0,095	6,7	0,44	0,095	4,6	0,09	0,081	1,1	0,10	0,081	1,2
134	1,89	0,208	9,1	1,83	0,208	9,6	0,00	0,191	0,0	1,59	0,191	8,3
137	0,76	0,093	8,2	0,64	0,093	6,4	0,07	0,082	0,8	0,15	0,082	1,8
143	0,53	0,119	4,4	0,45	0,119	3,8	0,06	0,118	0,5	0,06	0,118	0,5
151	0,24	0,154	1,6	0,21	0,154	1,1	0,38	0,186	2,0	0,61	0,186	3,3
165	0,55	0,092	6,0	0,35	0,092	3,8	0,22	0,091	2,4	0,16	0,091	2,0
174	0,44	0,119	3,7	0,69	0,119	5,8	0,07	0,119	0,6	0,09	0,119	0,7
180/01	0,05	0,082	0,6	0,10	0,082	1,2	0,14	0,105	1,7	0,10	0,105	1,2
180/10	0,33	0,111	3,4	1,23	0,111	11,1	0,37	0,111	3,3	0,56	0,111	5,0
189	0,83	0,061	14.4	0,28	0,061	4,6	0,11	0,072	1,5	0,24	0,072	3,3
195	0,91	0,092	9,9	0,53	0,092	5,7	0,24	0,096	2,5	0,59	0,096	6,1
229	2,00	0,339	5,9	1,87	0,339	5,5	0,51	0,294	1,7	0,18	0,294	0,6
235	0,53	0,172	3,4	0,47	0,172	2,7	1,59	0,172	9,2	1,36	0,172	7,8
246	0,33	0,081	4,7	0,31	0,081	3,8	0,66	0,096	6,9	0,75	0,096	7,8
251	0,79	0,092	8,6	0,79	0,092	8,6	0,11	0,104	1,1	0,08	0,104	0,8
255	1,25	0,116	10,8	0,78	0,116	6,7	0,09	0,129	0,7	0,10	0,129	0,8
259	0,57	0,060	9.5	0,07	0,060	1,1	0,18	0,061	2,5	0,03	0,061	0,4
269	0,30	0,092	3.2	0,34	0,092	3,7	0,22	0,092	2,4	0,48	0,092	5,6
271	1,13	0,103	11,4	1,08	0,103	10,5	0,83	0,112	7,4	0,69	0,112	6,1

PP-30%	CHL-30%	PI-30%	PP-9%	CHL-9%	PI-9%	PP-3%	CHL-3%	PI-3%	P-1%	CHL-1%	PI-1%
0,03	0,084	0,3	0,03	0,094	0,3	0,03	0,139	0,2	0,03	0,157	0,1
0,03	0,081	0,4	0,02	0,106	0,2	0,00	0,102	0,0	0,02	0,180	0,1
0,00	0,000	0,0	0,26	0,377	0,7	0,08	0,170	0,5	0,06	0,095	1,7
0,09	0,081	1,1	0,16	0,195	0,8	0,12	0,158	0,1	0,00	0,127	0,0
0,02	0,070	0,3	0,03	0,072	0,4	0,06	0,148	0,4	0,00	0,075	0,0
0,07	0,102	0,7	0,08	0,172	0,5	0,02	0,160	0,1	0,03	0,274	0,1
0,06	0,086	0,7	0,05	0,166	0,3	0,01	0,100	0,1	0,04	0,200	[illegible]
0,03	0,075	0,4	0,02	0,200	0,1	0,00	0,141	0,0	0,00	0,141	0,0
1,58	0,283	5,6	0,05	0,184	0,2	0,10	0,107	0,9	0,07	0,107	0,6
0,13	0,107	1,2	0,00	0,166	0,0	0,00	0,176	0,0	0,00	0,130	0,0
0,08	0,118	0,7	0,00	0,181	0,0	0,00	0,181	0,0	0,00	0,158	0,0
0,00	0,188	0,0	0,29	0,201	1,5	0,00	0,109	0,0	0,00	0,038	0,0
0,00	0,090	0,0	0,00	0,100	0,0	0,00	0,210	0,0	0,00	0,107	0,0
0,00	0,119	0,0	0,00	0,212	0,0	0,00	0,219	0,0	0,00	0,168	0,0
0,02	0,122	0,2	0,00	0,150	0,0	0,00	0,329	0,0	0,00	0,209	0,0
0,05	0,111	0,4	0,00	0,112	0,0	0,00	0,146	0,0	0,00	[illegible]	0,0
0,01	0,068	0,1	0,00	0,071	0,0	0,00	0,077	0,0	0,00	0,134	0,0
0,21	0,101	2,1	0,06	0,114	0,5	0,03	0,153	0,2	0,01	0,082	0,1
0,31	0,345	0,9	0,24	0,250	0,9	0,05	0,250	0,2	0,00	0,139	0,0
0,24	0,190	1,3	0,02	0,110	0,2	0,03	0,103	0,3	0,00	0,049	0,0
0,05	0,095	0,5	0,06	0,204	0,3	0,03	0,253	0,1	0,00	0,170	0,0
0,06	0,119	0,5	0,05	0,225	0,2	0,06	0,333	0,2	0,01	0,213	[illegible]
0,09	0,240	0,4	0,04	0,288	0,1	0,00	0,165	0,0	0,00	0,048	0,0
0,00	0,080	0,0	0,19	0,284	0,7	0,03	0,169	0,2	0,00	0,065	0,0
0,02	0,103	0,2	0,05	0,156	0,3	0,00	0,259	0,0	0,00	0,259	0,0
0,10	0,101	1,0	0,00	0,303	0,0	0,07	0,236	0,3	0,00	0,048	[illegible]

Incubator method

II.

Primary production index and total primary production for different depths and hours using light values of part 4 and the P/I relation obtained

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP mgC.mgChl-1.h-1	x CHLOROPHYLL= mg.m-3	TOTAL mgC.m-3.d
81	06-Feb-87	0	0,0	2,7	3,4	1,2	1,2	1,2	1,2	1,2	2,0	3,2	0,8	18,1	0,114	2,06
		10	0,0	0,7	1,2	1,8	2,2	1,9	2,4	2,1	1,6	1,0	0,1	14,1	0,084	1,18
		20	0,0	0,2	0,5	0,7	0,9	0,7	1,0	0,8	0,6	0,3	0,0	5,7	0,080	0,45
		30	0,0	0,1	0,2	0,4	0,3	0,4	0,5	0,5	0,3	0,1	0,0	2,8	0,094	0,26
		40	0,0	0,0	0,1	0,2	0,1	0,2	0,3	0,2	0,1	0,0	0,0	1,2	0,113	0,13
		50	0,0	0,0	0,0	0,1	0,0	0,1	0,1	0,0	0,0	0,0	0,0	0,3	0,133	0,04
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,157	0,00

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP mgC.mgChl-1.h-1	x CHLOROPHYLL= mg.m-3	TOTAL mgC.m-3.d
86	07-Feb-87	0	0,3	4,4	1,1	0,9	0,6	0,5	0,5	0,5	0,5	1,0	2,2	12,5	0,075	0,94
		10	0,1	0,5	1,5	4,5	3,0	1,3	1,2	1,5	4,6	2,4	0,4	21,0	0,081	1,70
		20	0,1	0,4	0,5	1,8	3,2	4,2	4,3	4,3	2,0	0,5	0,2	21,5	0,095	2,04
		30	0,0	0,3	0,4	0,5	0,5	0,5	0,6	0,6	0,5	0,4	0,1	4,9	0,114	0,55
		40	0,0	0,2	0,3	0,3	0,4	0,3	0,3	0,3	0,3	0,2	0,1	2,7	0,106	0,28
		50	0,0	0,1	0,2	0,2	0,2	0,2	0,1	0,1	0,2	0,1	0,0	1,4	0,102	0,14
		75	0,0	0,0	0,1	0,1	0,1	0,1	0,2	0,1	0,1	0,0	0,0	0,8	0,180	0,14

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP mgC.mgChl-1.h-1	x CHLOROPHYLL= mg.m-3	TOTAL mgC.m-3.d
91	08-Feb-87	0	0,9	2,3	1,9	1,9	1,9	1,9	1,4	1,4	1,8	1,8	1,8	27,1	0,082	2,22
		10	0,5	1,1	2,0	2,4	2,7	3,0	3,2	2,6	1,5	1,4	0,6	21,0	0,073	1,53
		20	0,4	0,5	0,8	1,3	1,0	1,3	1,4	1,3	0,8	0,9	0,3	10,0	0,080	0,80
		30	0,3	0,4	0,5	0,5	0,8	0,8	0,9	0,9	0,5	0,5	0,2	6,3	0,109	0,69
		40	0,2	0,2	0,4	0,4	0,5	0,6	0,6	0,5	0,3	0,3	0,1	4,1	0,377	1,55
		50	0,1	0,1	0,3	0,3	0,3	0,3	0,3	0,3	0,2	0,2	0,1	2,5	0,170	0,43
		75	0,0	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	1,0	0,035	0,35

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP mgC.mgChl-1.h-1	x CHLOROPHYLL= mg.m-3	TOTAL mgC.m-3.d
97	09-Feb-87	0	0,5	0,7	8,1	8,4	8,5	8,5	7,0	5,0	6,0	6,2	1,1	60,0	0,081	4,86
		10	0,2	1,0	1,0	1,3	2,0	1,2	0,9	0,8	0,8	0,9	0,3	9,4	0,081	0,76
		20	0,1	0,5	0,5	0,5	0,9	0,6	0,5	0,4	0,4	0,5	0,2	4,9	0,079	0,38
		30	0,0	0,2	0,2	0,4	0,5	0,4	0,4	0,3	0,3	0,2	0,1	3,1	0,079	0,24
		40	0,0	0,1	0,3	0,5	0,5	0,4	0,4	0,3	0,2	0,3	0,1	3,1	0,081	0,25
		50	0,0	0,0	0,2	0,3	0,3	0,3	0,2	0,2	0,1	0,1	0,1	1.8	0,195	0,35
		75	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,1	0,0	0.0	0,0	0,4	0,127	0,05

STATION	DATE	DEPTH	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP x	CHLOROPHYLL=	TOTAL
		(m)					mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
100	10-Feb-87	0	0,4	3,2	7,5	7,5	6,0	6,0	6,0	6,0	7,5	7,5	0,4	58,0	0,069	4,00
		10	0,4	0,4	0,4	1,4	2,5	3,0	3,0	1,3	0,4	0,4	0,3	13,5	0,070	0,94
		20	0,2	0,4	0,3	0,6	0,8	1,1	1,1	0,6	0,3	0,3	0,2	5,9	0,073	0,43
		30	0,1	0,3	0,3	0,4	0,4	0,4	0,4	0,4	0,1	0,1	0,1	3,0	0,072	0,21
		40	0,0	0,1	0,2	0,3	0,3	0,3	0,3	0,3	0,0	0,0	0,0	1,8	0,098	0,17
		50	0,0	0,0	0,1	0,2	0,1	0,1	0,1	0,1	0,0	0,0	0,0	0,7	0,148	0,10
		75	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,095	0,01

STATION	DATE	DEPTH	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP x	CHLOROPHYLL=	TOTAL
		(m)					mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
108	12-Feb-87	0	0,2	8,5	6,5	4,0	3,5	2,0	3,0	4,0	6,0	11,1	6,2	55,0	0,160	8,80
		10	0,1	2,1	4,2	6,0	7,2	8,0	8,0	6,2	5,8	4,0	0,9	52,5	0,160	8,40
		20	0,1	0,8	1,8	2,1	3,2	4,0	3,5	2,9	2,0	0,9	0,4	21,7	0,172	3,73
		30	0,1	0,3	0,6	0,8	0,9	1,8	0,9	0,8	0,7	0,4	0,2	8,4	0,157	1,32
		40	0,0	0,1	0,3	0,5	0,5	0,6	0,6	0,4	0,4	0,3	0,1	3,8	0,152	0,57
		50	0,0	0,1	0,2	0,3	0,3	0,4	0,3	0,3	0,2	0,2	0,0	2,3	0,160	0,36
		75	0,0	0,0	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,0	0,0	0,7	0,274	0,19

STATION	DATE	DEPTH	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP x	CHLOROPHYLL=	TOTAL
		(m)					mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
121	14-Feb-87	0	0,4	6,5	6,0	5,0	5,0	4,0	5,0	4,0	4,0	6,5	0,8	47,2	0,089	4,20
		10	0,1	0,7	2,0	6,0	5,6	6,8	4,0	6,5	3,5	0,8	0,4	37,4	0,084	3,14
		20	0,0	0,4	0,7	0,8	0,8	1,0	0,7	0,8	0,8	0,4	0,2	6,6	0,093	0,61
		30	0,0	0,2	0,4	0,4	0,4	0,5	0,4	0,4	0,4	0,2	0,1	3,4	0,117	0,39
		40	0,0	0,1	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,1	0,0	1,6	0,138	0,22
		50	0,0	0,0	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,0	0,0	0,7	0,138	0,11
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,188	0,00

STATION	DATE	DEPTH	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP x	CHLOROPHYLL=	TOTAL
		(m)					mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
130	16-Feb-87	0	0,2	5,0	7,0	5,0	5,0	4,0	4,0	4,0	7,0	6,5	0,5	52,7	0,096	5,06
		10	0,1	0,5	0,7	1,2	1,1	1,9	1,0	1,5	0,8	0,5	0,4	9,7	0,082	0,79
		20	0,0	0,2	0,3	0,4	0,4	0,5	0,4	0,5	0,4	0,4	0,2	9,7	0,095	0,92
		30	0,0	0,1	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,1	1,8	0,095	0,17
		40	0,0	0,0	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,0	0,8	0,131	0,10
		50	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,141	0,00
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,092	0,00

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP x	CHLOROPHYLL=	TOTAL
							mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
133	17-Feb-87	0	0,5	9,0	6,0	4,0	3,0	4,0	3,0	3,0	4,0	8,0	8,8	53,3	0,208	11,10
		10	0,4	9,2	8,5	7,0	6,0	8,0	6,0	6,4	8,0	9,2	6,4	75,1	0,283	21,20
		20	0,2	3,5	6,0	7,8	8,2	6,5	8,4	8,2	6,6	5,0	0,8	61,2	0,302	18,50
		30	0,1	0,5	3,0	4,0	4,5	3,3	4,8	4,2	3,2	0,9	0,4	26,2	0,248	6,49
		40	0,0	0,4	0,5	0,6	0,7	0,6	0,8	0,7	0,6	0,4	0,1	6,0	0,184	1,10
		50	0,0	0,4	0,5	0,6	0,7	0,6	0,8	0,7	0,6	0,4	0,1	2,0	0,107	0,21
		75	0,0	0,1	0,1	0,1	0,1	0,1	0,0	0,1	0,1	0,1	0,0	0,8	0,046	0,04

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP x	CHLOROPHYLL=	TOTAL
							mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
137	18-Feb-87	0	0	0,1	0,1	0,5	0,5	0,5	0,4	0,1	0	0	0	2,2	0,093	0,20
		10	0	0	0	0,4	0,4	0,4	0,2	0	0	0	0	1,4	0,089	0,10
		20	0	0	0	0,1	0,1	0,1	0,1	0	0	0	0	0,4	0,107	0,03
		30	0	0	0	0	0	0	0	0	0	0	0	0	0,114	0
		40	0	0	0	0	0	0	0	0	0	0	0	0	0,166	0
		50	0	0	0	0	0	0	0	0	0	0	0	0	0,176	0
		75	0	0	0	0	0	0	0	0	0	0	0	0	0,181	0

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP x	CHLOROPHYLL=	TOTAL
							mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
143	19-Feb-87	0	0,1	0,5	4,4	4,5	4,5	4,4	4,4	4,3	4,4	4,0	0,5	36,0	0,119	4,28
		10	0,0	0,2	0,5	0,6	0,6	1,0	1,0	1,0	0,4	0,5	0,4	6,2	0,118	0,73
		20	0,0	0,1	0,0	0,3	0,3	0,4	0,4	0,4	0,1	0,1	0,1	2,2	0,128	0,28
		30	0,0	0,0	0,0	0,1	0,1	0,1	0,1	0,1	0,0	0,0	0,0	0,5	0,139	0,07
		40	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,181	0,00
		50	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,173	0,00
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,153	0,00

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP x	CHLOROPHYLL=	TOTAL
							mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
151	20-Feb-87	0	1,2	1,5	1,5	1,5	1,4	1,3	1,3	1,3	1,3	1,3	2,9	16,5	0,154	2,54
		10	0,5	2,0	2,5	3,3	3,3	2,0	2,0	3,3	3,3	2,2	1,6	26,0	0,188	4,89
		20	0,0	1,0	1,5	1,8	2,0	2,0	2,0	2,0	1,7	1,6	0,5	17,1	0,201	3,43
		30	0,0	0,3	0,5	0,7	0,7	0,9	0,9	0,8	0,6	0,5	0,2	6,1	0,269	1,64
		40	0,0	0,1	0,2	0,3	0,3	0,4	0,4	0,3	0,2	0,1	0,1	2,5	0,201	0,70
		50	0,0	0,0	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,0	0,8	0,109	0,09
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,038	0,00

STATION	DATE	DEPTH	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP x	CHLOROPHYLL=	TOTAL
		(m)					mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
165	22-Feb-87	0	0,0	1,1	3,5	6,0	6,0	6,0	6,0	6,0	6,0	3,1	0,9	45,4	0,092	4,17
		10	0,0	0,1	0,7	1,2	2,0	2,0	1,3	1,3	1,0	0,6	0,1	10,3	0,090	0,93
		20	0,0	0,0	0,1	0,4	0,8	0,7	0,5	0,5	0,4	0,1	0,0	3,5	0,100	0,35
		30	0,0	0,0	0,0	0,0	0,3	0,4	0,1	0,1	0,1	0,0	0,0	1,0	0,133	0,13
		40	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,210	0,02
		50	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,210	0,00
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,107	0,00

STATION	DATE	DEPTH	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP x	CHLOROPHYLL=	TOTAL
		(m)					mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
174	23-Feb-87	0	0,0	5,8	3,2	3,2	3,2	3,5	1,2	0,5	5,0	5,8	0,2	31,6	0,119	3,76
		10	0,0	0,1	0,2	0,5	0,5	0,2	0,1	0,0	0,1	0,1	0,0	1,8	0,119	0,21
		20	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,162	0,00
		30	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,245	0,00
		40	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,212	0,00
		50	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,219	0,00
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,168	0,00

STATION	DATE	DEPTH	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP x	CHLOROPHYLL=	TOTAL
		(m)					mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
180	24-Feb-87	0	1,2	0,6	0,4	0,3	0,2	0,2	0,2	0,2	0,2	0,8	0,8	5,1	0,082	0,42
		10	0,2	0,6	1,2	1,6	1,2	1,2	1,2	1,4	1,4	0,6	0,1	10,7	0,105	1,12
		20	0,1	0,1	0,3	0,4	1,1	0,7	1,1	0,7	0,1	0,2	0,0	4,9	0,122	0,60
		30	0,0	0,0	0,1	0,2	0,1	0,2	0,1	0,1	0,0	0,1	0,0	0,9	0,150	0,13
		40	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,246	0,00
		50	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,329	0,00
		70	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,187	0,00

STATION	DATE	DEPTH	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP x	CHLOROPHYLL=	TOTAL
		(m)					mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
181	25-Feb-87	0	0,1	7,5	3,0	2,0	3,0	3,0	3,0	3,0	3,0	11,0	1,0	39,6	0,111	4,39
		10	0,1	0,4	2,5	3,5	6,0	5,5	6,0	3,0	2,0	0,5	0,4	29,9	0,111	3,32
		20	0,0	0,1	0,1	0,1	0,5	1,0	0,1	0,1	0,0	0,1	2,1	0,0	0,088	0,18
		30	0,0	0,0	0.0	0,0	0,1	0,1	0,1	0,0	0,0	0,0	0,0	0,3	0,112	0,03
		40	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,146	0,00
		50	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,279	0,00
		70	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0.0	0.0	0,0	0,0	0.0	0,177	0,00

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP	x CHLOROPHYLL=	TOTAL
							mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
189	27-Feb-87	0	0,0	2,0	7,0	16,0	16,0	16,0	16,0	15,0	15,0	5,0	0,5	108,5	0,061	6,61
		10	0,0	0,0	0,2	3,0	3,0	3,1	3,0	2,0	1,8	0,5	0,0	16,6	0,068	1,13
		20	0,0	0,0	0,0	0,0	0,8	0,9	0,8	0,0	0,0	0,0	0,0	2,5	0,064	0,16
		30	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,069	0,00
		40	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,071	0,00
		50	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,077	0,00
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,184	0,00

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP	x CHLOROPHYLL=	TOTAL
							mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
195	28-Feb-87	0	2,0	10,0	8,0	8,0	5,0	2,2	1,7	0,3	1,0	0,5	0,2	38,9	0,092	3,58
		10	0,5	2,0	1,5	1,5	1,0	0,7	0,4	0,1	0,3	0,1	0,1	8,2	0,101	0,82
		20	0,2	0,5	0,5	0,5	0,5	0,4	0,2	0,1	0,1	0,1	0,0	3,1	0,086	0,27
		30	0,1	0,3	0,3	0,3	0,3	0,2	0,1	0,0	0,1	0,0	0,0	1,7	0,103	0,17
		40	0,0	0,2	0,2	0,2	0,2	0,1	0,1	0,0	0,0	0,0	0,0	1,0	0,114	0,11
		50	0,0	0,1	0,1	0,1	0,1	0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,000	0,00
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,082	0

TATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP	x CHLOROPHYLL=	TOTAL
							mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
229	05-Mär-87	0	0,3	1,1	5,9	6,0	6,0	6,0	6,0	6,0	6,0	2,0	0,5	15,8	0,339	5,50
		10	0,1	0,4	0,8	1,0	1,0	1,0	1,0	1,0	1,0	0,5	0,2	7,5	0,294	2,20
		20	0,0	0,2	0,4	0,5	0,5	0,5	0,5	0,5	0,5	0,2	0,1	3,8	0,345	1,30
		30	0,0	0,1	0,1	0,2	0,2	0,2	0,2	0,2	0,2	0,1	0,0	2,0	0,327	0,60
		40	0,0	0,0	0,0	0,1	0,2	0,1	0,1	0,1	0,1	0,0	0,0	0,7	0,250	0,17
		50	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,250	0,00
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,189	0,00

ATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP	x CHLOROPHYLL=	TOTAL
							mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
235	06-Mär-87	0	2,7	2,4	4,5	3,1	3,1	3,0	3,0	3,0	3,0	3,0	0,4	31,2	0,172	5.36
		10	0,4	0,4	0,5	1,0	1,0	1,5	1,8	2,0	1,6	0,4	0,2	10,4	0,190	1,97
		20	0,2	0,2	0,3	0,4	0,4	0,5	0,6	0,4	0,4	0,2	0,1	3,7	0,208	0,77
		30	0,1	0,1	0,1	0,2	0,2	0,2	0,3	0,2	0,2	0,1	0,0	1,7	0,184	0,31
		40	0,0	0,0	0,0	0,1	0,1	0,1	0,1	0,1	0,1	0,0	0,0	0,6	0,110	0,07
		50	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,103	0,00
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,099	0,00

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 mgC.mgChl-1.h-1	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP	x CHLOROPHYLL= mg.m-3	TOTAL mgC.m-3.d
246	07-Mär-87	0	7,5	3,5	3,0	2,5	2,5	2,5	2,5	2,5	2,5	3,5	0,5	33,0	0,081	2,67
		10	0,5	4,0	7,5	4,1	4,0	4,0	4,2	7,0	7,0	2,0	0,3	44,6	0,095	4,24
		20	0,4	2,0	1,0	3,5	5,0	5,0	4,5	2,0	0,5	0,5	0,2	24,6	0,106	2,61
		30	0,2	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,4	0,4	0,1	4,6	0,159	0,73
		40	0,1	0,4	0,3	0,4	0,4	0,4	0,4	0,4	0,2	0,2	0,0	3,2	0,204	0,65
		50	0,0	0,2	0,1	0,2	0,2	0,2	0,2	0,2	0,1	0,1	0,0	1,5	0,253	0,38
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,170	0,00

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 mgC.mgChl-1.h-1	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP	x CHLOROPHYLL= mg.m-3	TOTAL mgC.m-3.d
251	09-Mär-87	0	0,7	8,6	8,6	7,0	6,0	6,0	6,0	7,0	8,8	8,8	0,4	67,9	0,092	6,25
		10	0,3	0,7	1,0	3,0	8,8	8,8	8,8	3,0	0,9	0,5	0,3	36,1	0,119	4,30
		20	0,2	0,4	0,5	0,6	0,8	0,8	0,8	0,6	0,5	0,4	0,2	5,8	0,128	0,74
		30	0,0	0,3	0,3	0,4	0,5	0,4	0,4	0,4	0,4	0,3	0,1	3,5	0,175	0,61
		40	0,0	0,1	0,2	0,3	0,3	0,3	0,3	0,3	0,3	0,2	0,0	2,4	0,225	0,54
		50	0,0	0,0	0,1	0,2	0,2	0,2	0,2	0,2	0,2	0,1	0,0	1,4	0,333	0,47
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,213	0,00

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 mgC.mgChl-1.h-1	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP	x CHLOROPHYLL= mg.m-3	TOTAL mgC.m-3.d
255	10-Mär-87	0	10,8	11,0	11,0	10,0	10,0	10,0	10,0	11,0	11,0	7,5	0,2	102,5	0,116	11,89
		10	0,5	0,8	1,0	6,7	9,0	8,2	6,5	2,0	0,7	0,4	0,1	35,9	0,129	4,63
		20	0,1	0,2	0,4	0,5	0,4	0,6	0,6	0,4	0,4	0,2	0,0	3,8	0,240	0,91
		30	0,0	0,1	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,1	0,0	1,6	0,302	0,48
		40	0,0	0,0	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,0	0,0	0,7	0,288	0,20
		50	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,165	0,00
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,048	0,00

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5 mgC.mgChl-1.h-1	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP	x CHLOROPHYLL= mg.m-3	TOTAL mgC.m-3.d
259	11-Mär-87	0	1,4	9,9	8,0	8,0	8,0	8,0	8,0	9,8	9,6	0,4	0,0	71,1	0,060	4,27
		10	0,4	1,3	9,0	9,8	9,8	9,8	5,5	1,5	1,0	0,2	0,0	48,3	0,066	3,19
		20	0,2	0,5	1,3	1,2	1,2	1,2	1,0	0,8	0,4	0,1	0,0	7,9	0,080	0,63
		30	0,1	0,2	0,5	0,7	0,7	0,7	0,5	0,4	0,2	0,0	0,0	4,0	0,118	0,47
		40	0,0	0,1	0,2	0,2	0,2	0,2	0,2	0,2	0,1	0,0	0,0	1,4	0,284	0,39
		50	0,0	0,0	0,1	0,1	0,1	0,1	0,1	0,1	0,0	0,0	0,0	0,6	0,159	0,10
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,065	0,00

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP	x CHLOROPHYLL=	TOTAL
							mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
269	13-Mär-87	0	3,3	3,3	3,0	3,0	3,0	2,5	2,5	2,7	2,6	3,0	0,2	29,1	0,092	2,67
		10	0,5	0,5	5,5	3,0	3,0	3,0	3,0	3,1	5,5	1,0	0,1	28,2	0,086	2,42
		20	0,2	0,2	0,5	4,0	4,2	4,0	2,5	1,5	0,6	0,5	0,0	22,2	0,103	2,28
		30	0,1	0,1	0,2	0,5	0,5	0,5	2,0	0,5	0,3	0,2	0,0	4,9	0,156	0,76
		40	0,0	0,0	0,1	0,2	0,2	0,2	0,5	0,2	0,1	0,1	0,0	1,6	0,296	0,47
		50	0,0	0,0	0,0	0,1	0,1	0,1	0,2	0,1	0,0	0,0	0,0	0,6	0,259	0,15
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,0	0,1	0,023	0,01

STATION	DATE	DEPTH (m)	HOUR-1	HOUR-2	HOUR-3	HOUR-4	HOUR-5	HOUR-6	HOUR-7	HOUR-8	HOUR-9	HOUR-10	HOUR-11	TOTAL-PP	x CHLOROPHYLL=	TOTAL
							mgC.mgChl-1.h-1								mg.m-3	mgC.m-3.d
271	14-Mär-87	0	7,8	11,5	11,4	11,4	2,0	0,0	0,8	0,4	8,0	2,0	0,2	55,5	0,103	5,71
		10	0,8	1,0	4,5	4,5	0,4	0,0	0,4	0,2	0,5	0,4	0,1	12,8	0,101	1,29
		20	0,4	0,8	0,8	0,8	0,2	0,0	0,2	0,1	0,2	0,2	0,0	3,7	0,129	0,48
		30	0,2	0,4	0,4	0,4	0,1	0,0	0,1	0,0	0,1	0,1	0,0	1,8	0,220	0,40
		40	0,1	0,2	0,2	0,2	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,7	0,303	0,21
		50	0,0	0,1	0,1	0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,3	0,238	0,07
		75	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,048	0,00

ABUNDANCE OF BACTERIA, CYANOBACTERIA AND HETEROTROPHIC NANOFLAGELLATES, AND GROWTH AND GRAZING OF BACTERIA AND HETEROTROPHIC NANOFLAGELLATES

Abundance of bacteria, cyanobacteria and heterotrophic nanoflagellates, and growth and grazing of bacteria and heterotrophic nanoflagellates

(Thomas Weisse)
(Rolf Gradinger)

Description of methods

Experiments were conducted at 11 stations in the central Red Sea and at 6 stations in the Gulf of Aden. Natural assemblages of pelagic bacteria and protozoans were taken with a 10 l rosette water sampler in 10 standard depths: 0, 5, 10, 20, 30, 40, 50, 75, 100, 200 m. Bacteria and heterotrophic nanoflagellates (HNF) were counted after DAPI staining by epifluorescence microscopy (Porter & Feig, 1980). The water was mixed immediately after sampling and filtered through 200 µm mesh gauze in order to exclude larger zooplankton. Experiments were conducted in triplicate in 200 ml glass bottles in the dark at the mean in-situ temperature of the upper 100 m of the water column (± 1.5° C). Incubation started within 10 to 20 minutes after sampling and lasted for 3 h. Results reported are mean values. Metabolic inhibitors which selectively affect either bacteria or eukaryotic grazers (Fuhrman & McManus, 1984) were used to estimate rates of bacterial growth and cropping. If cell growth or reproduction is prevented by specific prokaryote inhibitors, the decrease in bacterial abundance is a direct measurement of grazing. If grazing is eliminated by specific eukaryotic inhibitors, bacterial abundance increases according to continuous growth. A mixture of vancomycin (final concentration 200 mg l^{-1}), an inhibitor of prokaryotic 70 s ribosome function, and penicillin / streptomycin (100 units ml^{-1} / 100 mg l^{-1}) which inhibit cell wall synthesis was used to prevent bacterial growth. A mixture of cycloheximide (200 mg l^{-1}), an inhibitor of eukaryote 80 s function, and colchicin (100 mg l^{-1}) which inhibits microtubulus formation was used to eliminate eukaryote grazing. These antibiotics have been found by Sherr et al. (1986) to be the most specific agents out of 10 different metabolic inhibitors or mixtures of inhibitors used. We confirmed their findings in experiments with freshwater plankton (Weisse, unpubl.). A preliminary experiment showed that the inhibition was effective during the 3 h of incubation. Experimental bottles containing both pro-and eukaryote inhibitors were used as control for inhibitor-induced cell lysis. Changes in bacterial concentrations in this control were subtracted from the rate of decrease in the samples containing only prokaryote antibiotics. Cell lysis was generally of minor importance (below 10 % of initial bacterial abundance during the 3 h incubation). Untreated samples served as control for the efficiency of the inhibition technique. Change in bacterial concentrations in these controls yielded net population growth rates (μ).

Theoretically, this change should equal the observed changes in prokaryotic minus eukaryotic inhibition treatments, as $\mu = k - g$ (k is gross population growth rate, g is the grazing rate).

Growth and grazing rates were determined from the exponential model of population growth:

$$N_t = N_0 e^{rt}$$

where N_t and N_0 are final and initial bacterial concentrations in the experimental bottles, r is the instantaneous growth rate and t is the time period.

Literature

Fuhrman, J. A., McManus, G. B., 1984. Do bacteria-sized marine eukaryotes consume significant bacterial production? - Science, 224, 1257 - 1260

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D A T A   S H E E T S

Part 1

Abundance of bacteria, cyanobacteria and heterotrophic nanoflagellates

Abundance of autotrophic and heterotrophic nanoplankton

Station: 66

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / m l
0	4.88	4.20	4.90
5	-	-	-
10	5.34	7.40	7.63
20	5.55	5.20	8.23
30	-	-	-
40	-	-	-
50	4.90	7.00	11.14
75	4.29	7.74	10.23
100	-	-	-
150	-	-	-
200	-	-	-

Station: 76

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / ml
0	4.36	17.00	9.32
5	3.94	16.60	6.66
10	4.88	16.80	6.78
20	5.58	19.60	11.56
30	4.62	16.40	10.11
40	4.84	20.50	10.35
50	3.61	19.50	7.14
75	2.86	14.90	4.30
100	1.60	3.90	2.54
150	-	-	-
200	1.00	0.40	2.18

Abundance of autotrophic and heterotrophic nanoplankton

Station: 81

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / m l
0	4.54	9.53	14.20
5	-	-	-
10	5.18	12.34	15.76
20	4.06	3.12	10.80
30	3.89	2.64	16.62
40	4.81	5.05	10.80
50	5.97	11.54	16.22
75	-	-	-
100	3.21	1.36	6.75
150	-	-	-
200	-	-	-

Station: 86

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / ml
0	4.70	1.92	11.26
5	6.79	2.28	13.68
10	6.59	10.21	14.11
20	7.76	46.98	11.69
30	8.94	6.01	10.65
40	3.65	24.00	9.01
50	4.04	30.40	8.02
75	3.49	16.30	7.56
100	2.05	8.30	5.31
150	-	-	-
200	1.52	2.60	3.12

Abundance of autotrophic and heterotrophic nanoplankton

Station: 91

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / m l
0	6.91	35.32	20.18
5	9.13	20.94	15.02
10	7.49	6.88	8.96
20	7.30	0.63	9.12
30	6.75	0.94	7.67
40	5.39	4.85	9.20
50	4.37	1.41	6.94
75	2.80	0.31	5.25
100	2.02	0.00	3.39
150	-	-	-
200	1.27	0.31	3.55

Station: 97

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / ml
0	6.67	14.85	13.16
5	8.56	3.75	10.17
10	7.15	11.10	6.62
20	7.35	3.59	7.59
30	6.91	10.94	7.34
40	3.50	4.06	5.41
50	4.79	5.78	4.92
75	4.36	6.25	5.65
100	3.58	3.28	4.20
150	-	-	-
200	2.44	0.16	0.00

Abundance of autotrophic and heterotrophic nanoplankton

Station: 100

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / m l
0	7.57	0.96	6.23
5	9.97	0.96	8.37
10	6.42	2.16	8.49
20	8.73	6.09	10.51
30	6.23	3.36	10.28
40	5.48	17.30	7.39
50	4.23	8.97	8.43
75	3.41	2.80	5.77
100	2.75	1.76	4.62
150	-	-	-
200	2.32	0.40	3.35

Station: 103

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / ml
0	4.29	6.49	9.18
5	5.35	9.05	19.92
10	5.80	12.82	13.22
20	4.38	9,53	15.99
30	4.80	17.70	11.03
40	4.62	16.42	10.10
50	3.81	2.08	8.08
75	3.17	3.28	6.70
100	-	-	-
150	-	-	-
200	-	-	-

Abundance of autotrophic and heterotrophic nanoplankton

Station: 108

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / m l
0	5.81	137.50	11.71
5	6.25	139.00	13.00
10	6.15	61.60	10.17
20	5.07	103.60	7.83
30	5.56	37.80	6.30
40	3.90	14.50	9.04
50	6.40	4.10	8.07
75	4.55	6.90	3.07
100	4.22	2.70	3.47
150	-	-	-
200	1.22	0.00	1.78

Station: 121

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / ml
0	4.30	10.42	12.30
5	4.29	8.25	15.76
10	4.18	21.15	13.22
20	4.14	20.51	14.38
30	4.49	27.40	12.53
40	4.87	25.39	9.87
50	4.44	26.92	10.56
75	3.67	4.65	10.16
100	1.49	1.36	4.44
150	-	-	-
200	1.25	0.96	3.35

Abundance of autotrophic and heterotrophic nanoplankton

Station: 130

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / m l
0	6.34	10.17	12.49
5	6.38	3.77	9.06
10	6.59	0.56	9.58
20	4.15	2.08	9.17
30	-	-	-
40	5.87	0.42	9.64
50	4.09	25.80	13.33
75	1.94	0.80	6.98
100	1.66	0.08	5.08
150	-	-	-
200	1.08	0.08	4.62

Station: 133

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / ml
0	10.89	0.78	23.65
5	9.15	0.00	16.06
10	8.42	2.97	7.67
20	6.73	2.81	4.60
30	6.88	4.53	6.22
40	4.80	13.60	6.30
50	3.61	3.13	4.20
75	3.28	0.16	3.47
100	-	-	-
150	2.06	0.00	2.66
200	2.59	0.16	1.78

Abundance of autotrophic and heterotrophic nanoplankton

Station: 137

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / m l
0	5.35	16.18	16.62
5	5.05	19.07	13.16
10	5.15	19.07	13.33
20	5.61	27.48	14.84
30	4.97	28.20	14.14
40	5.59	15.78	10.62
50	4.15	12.98	12.06
75	5.26	14.42	10.51
100	-	-	-
150	-	-	-
200	2.56	0.56	4.50

Station: 143

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / ml
0	4.92	9.69	10.62
5	5.82	5.61	13.33
10	5.23	6.41	13.16
20	5.85	9.29	17.72
30	6.84	5.13	13.74
40	5.09	39.82	11.89
50	4.57	27.24	12.12
75	3.63	4.09	8.43
100	2.33	0.08	6.18
150	-	-	-
200	1.40	0.32	5.08

Abundance of autotrophic and heterotrophic nanoplankton

Station: 151

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / m l
0	9.69	43.50	14.89
5	9.60	18.91	15.07
10	10.23	28.36	14.89
20	9.77	89.18	13.97
30	6.47	42.24	12.24
40	3.93	40.83	10.68
50	2.73	6.09	9.81
75	1.97	0.72	7.74
100	1.85	0.56	5.02
150	-	-	-
200	1.12	0.00	2.48

Station: 165

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / ml
0	7.57	34.00	21.19
5	8.29	5.16	17.92
10	9.31	1.88	19.37
20	9.01	1.17	14.05
30	8.19	4.45	12.71
40	6.46	32.82	9.04
50	5.50	17.51	6.54
75	4.53	5.63	3.47
100	2.57	0.47	3.22
150	-	-	-
200	2.14	0.00	1.53

Abundance of autotrophic and heterotrophic nanoplankton

Station: 180/1

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / m l
0	7.98	56.32	15.59
10	6.62	60.55	19.22
20	5.89	46.62	18.10
30	5.27	35.21	18.88
40	5.38	39.05	19.05
50	4.34	19.83	14.72
60	0.00	0.00	0.00
70	3.32	5.89	10.48
80	-	-	-
90	-	-	-
100	2.47	1.09	6.49

Station: 180/6

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / ml
0	5.96	55.85	22.22
10	6.35	47.40	19.34
20	6.43	37.08	16.68
30	6.74	50.22	15.24
40	6.09	57.26	19.40
50	4.19	40.83	14.66
60	-	-	-
70	3.07	14.08	7.68
80	-	-	-
90	-	-	-
100	1.83	0.64	6.29

Abundance of autotrophic and heterotrophic nanoplankton

Station: 180/11

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / m l
0	6.22	91.52	25.72
10	5.93	70.40	23.98
20	5.66	20.42	17.84
30	5.21	32.39	19.40
40	4.46	33.79	17.06
50	3.72	17.60	15.41
60	-	-	-
70	2.49	7.33	6.15
80	-	-	-
90	-	-	-
100	1.63	0.24	5.02

Station: 229

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / ml
0	11.22	162.63	28.75
5	10.88	164.74	29.70
10	11.62	78.15	25.63
20	12.57	71.11	23.98
30	12.63	77.44	18.62
40	11.56	85.19	22.51
50	11.72	104.90	20.69
75	9.06	49.99	20.43
100	4.29	2.52	10.56
150	-	-	-
200	4.14	0.84	6.93

Abundance of autotrophic and heterotrophic nanoplankton

Station: 235

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / m l
0	9.50	8.89	23.90
5	9.74	9.13	16.28
10	8.29	7.21	20.61
20	11.31	6.01	23.90
30	8.67	22.35	25.11
40	6.25	29.56	21.99
50	5.90	25.48	21.47
75	4.82	29.32	19.48
100	5.32	27.52	13.60
150	-	-	-
200	3.27	9.25	7.62

Station: 246

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / ml
0	9.66	156.29	35.67
5	7.62	160.52	34.81
10	7.96	202.76	36.71
20	8.52	177.41	35.67
30	9.35	171.78	30.13
40	6.55	153.48	22.34
50	4.97	41.40	17.84
75	5.84	4.57	11.78
100	3.87	0.60	7.62
150	-	-	-
200	1.57	0.72	5.11

Abundance of autotrophic and heterotrophic nanoplankton

Station: 255

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / m l
0	5.94	62.01	26.15
5	6.51	58.40	20.78
10	7.05	67.77	28.25
20	6.08	60.80	21.99
30	4.25	50.47	22.69
40	3.80	33.05	14.46
50	2.91	12.62	8.40
75	3.54	4.93	6.67
100	2.21	2.16	5.89
150	-	-	-
200	1.97	2.76	5.89

Station: 269

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / ml
0	12.19	124.25	23.00
5	-	-	-
10	8.10	100.70	24.94
20	10.72	98.78	31.17
30	10.46	130.26	26.67
40	7.12	96.61	23.90
50	7.46	26.92	12.99
75	-	-	-
100	3.40	0.48	11.60
150	-	-	-
200	1.93	0.48	3.98

Abundance of autotrophic and heterotrophic nanoplankton

Station: 274

Depth (m)	Bacteria 10^5 / ml	Cyanobacteria 10^3 / ml	Flagellates 10^2 / m l
0	8.90	367.70	26.50
5	10.33	6.97	20.95
10	10.70	38.21	36.02
20	10.83	49.27	24.07
30	10.18	62.97	25.98
40	8.76	47.83	21.30
50	8.29	23.31	14.20
75	5.13	7.21	9.52
100	4.04	1.92	8.49
150	-	-	-
200	1.99	0.36	4.68

D A T A S H E E T S

Part 2

Growth and grazing of bacteria and heterotrophic nanoflagellates

Mean in situ temperatures, abundance of bacteria and HNF, and grazing rates obtained during the experiments

Central Red Sea

Station	T (°C)	Bacteria abundance (10^5 cells ml^{-1})	HNF abundance (10^2 cells ml^{-1})	Clearance rate (nl HNF^{-1} h^{-1})	Population grazing rate (10^4 bacteria ml^{-1} h^{-1})	Bacteria consumed (HNF^{-1} h^{-1})
66	23.3	5.42	6.63	56.1	2.01	30.4
76	22.9	5.19	6.79	93.6	3.30	48.6
86	23.0	5.55	2.27	64.5	2.60	35.8
97	24.2	5.46	6.15	89.4	3.00	48.8
100	23.1	6.52	6.75	88.7	3.90	57.8
114	-	5.89	8.79	59.8	3.09	35.2
121	24.1	6.21	7.52	63.4	2.96	39.4
130	24.2	5.69	6.65	48.3	1.83	27.5
137	25.9	5.77	9.89	50.8	2.90	29.3
165	25.9	6.59	9.15	48.1	2.90	31.7
180	25.9	6.40	8.58	65.8	3.61	42.1
mean ± sd		5.88 ± 0.48	7.63 ± 1.26	66.2 ± 16.1	2.9 ± 0.6	38.9 ± 9.9

Mean in situ temperatures, abundance of bacteria and HNF, and grazing rates obtained during the experiments (continued)

Bab el Mandeb and Gulf of Aden

Station	T (°C)	Bacteria abundance (10^5 cells ml^{-1})	HNF abundance (10^2 cells ml^{-1})	Clearance rate (nl HNF^{-1} h^{-1})	Population grazing rate (10^4 bacteria ml^{-1} h^{-1})	Bacteria consumed (HNF^{-1} h^{-1})
229	25.5	8.80	10.40	41.1	3.79	36.4
235	25.6	7.48	7.99	68.6	4.10	51.3
246	25.3	7.55	12.40	57.4	5.37	43.3
255	24.3	6.44	7.95	75.6	3.87	48.2
269	24.6	7.76	10.48	42.7	3.52	33.6
274	24.8	5.91	8.84	35.9	1.87	21.2
mean ± sd		7.34 ± 1.03	9.68 ± 1.74	53.6 ± 16.2	3.75 ± 1.13	39.0 ± 11.1

Growth characteristics of pelagic bacteria during the experiments (k = gross growth, g = grazing loss, μ_c = net growth calculated as $\mu_c = k - g$, μ_m = net growth measured in untreated bottles, G = doubling time

Station	k (h^{-1})	g (h^{-1})	μ_c (h^{-1})	μ_m (h^{-1})	G (h)
Central Red Sea					
66	0.033	0.108	- 0.075	-	21.3
76	0.047	0.079	- 0.032	-	14.8
86	0.028	0.033	- 0.005	+ 0.055	24.9
97	0.043	0.095	- 0.053	- 0.066	16.3
114	0.097	0.010	+ 0.087	+ 0.102	7.2
121	0.045	0.048	- 0.003	- 0.005	15.5
130	0.091	0.030	+ 0.061	+ 0.063	7.6
137	0.096	0.038	+ 0.058	+ 0.061	7.2
165	0.068	0.042	+ 0.026	+ 0.025	10.2
180	0.087	0.069	+ 0.018	+ 0.015	8.0
Bab el Mandeb and Gulf of Aden					
229	0.038	0.043	- 0.005	+ 0.024	18.2
235	0.022	0.060	- 0.038	- 0.057	31.5
246	0.021	0.085	- 0.064	- 0.020	33.0
255	0.014	0.069	- 0.055	- 0.062	49.7
269	0.025	0.052	- 0.024	- 0.073	24.8
274	0.050	0.033	+ 0.017	+ 0.029	13.9

GRAZING OF MICROZOOPLANKTON AND GROWTH OF PHYTOPLANKTON

Grazing of microzooplankton and growth of Phytoplankton

(A. Moigis)

Description of methods

Experiments for measuring the grazing rate of microzooplankton were performed on deck of "Meteor". These experiments followed the dilution technique introduced by Landry and Hasset (1982). The experiments were carried out with water from the sea surface. Following levels of initial concentration were chosen: 100, 20, 10 and 5 %. Surface water was filtered through Whatman GF/F filters: Chlorophyll a was chosen as biomass parameter. It was measured with a Turner filter fluorometer (type 112). Control measurements of the filtered water did not show any chlorophyll fluorescence. The initial chlorophyll concentration was measured 3 to 4 times. Six 2.2 l bottles containing 2.1 l of the diluted plankton concentrations and the control (100 %) were placed in a water bath cooled by running sea water. The experiment location was a shady place on deck to avoid light inhibition, which was observed during the first experiment in the Mediterranean Sea. It was necessary to choose dilution levels as high as the observed critical food concentration for the microzooplankton, since the method works only at concentrations below this level. At the high dilution levels (10 and 5 %) two bottles were incubated parallely. After incubation (3 - 4 h) the filtration procedure for the chlorophyll a measurement was as follows: From the bottle with 100 % of the initial plankton concentration 2 filtrations of 1 l each were carried out and of the diluted samples 2 l were filtered from each bottle.
The apparent growth rate of the phytoplankton was calculated and its actual growth rate was obtained by simply extrapolating the apparent rate from 10 % to 0 %. The grazing rate was calculated by taking the difference between the actual growth rate and the apparent growth rate at the 100 % concentration level.

Literature

Landry, M. R., Hasset, R. P., 1982. Estimating the grazing impact of marine micro-zooplankton. - Mar. Biol., 67, 283 - 288.

D A T A   S H E E T S

TATION	DATE	100%	50%	20%	20%	10%	10%	5%	5%	Growth-rate	Grazing rate
		Growth rate at the indicated dilution step in 1/h									
-	03-Feb-87	-0,04	-0,02	-0,08	-0,10	0	0	-	-	0,05	0,10
-	04-Feb-87	0,05	0,03	0,01	-0,02	0,13	0,08	-	-	0,18	0,15
76	05-Feb-87	-0,00	-0,04	-0,02	-0,02	0,07	-0,09	-	-	?	?
100	10-Feb-87	0,01	0,02	0,02	-0,02	0,08	0,08	-	-	0,11	0,10
-	11-Feb-87	-0,04	-0,04	-0,05	-0,08	-0,03	-0,03	-	-	?	?
108	12-Feb-87	0,06	0,03	0,00	0,05	0,06	0,06	-	-	?	?
-	13-Feb-87	-0,04	-	0,05	-	0,04	0,10	0,15	0,18	0,18	0,22
121	14-Feb-87	0,04	-	0,03	-	0,00	0,00	0,02	0,05	0,09	0,05
130	16-Feb-87	0,01	-	0,03	-	0,11	0,11	0,21	0,22	0,26	0,25
133	17-Feb-87	0,03	-	-0,02	-	0,02	0,03	0,15	0,13	0,23	0,20
137	18-Feb-87	0,04	-	0,04	-	0,04	0,04	0,27	0,15	0,39	0,35
143	19-Feb-87	0,04	-	0,06	-	0,12	0,14	0,15	0,15	0,18	0,13
151	20-Feb-87	0,02	-	0,07	-	0,03	0,10	0,08	0,03	?	?
165	22-Feb-87	-0,02	-	-0,06	-	-0,03	-0,03	0,07	0,06	0,17	0,38
174	23-Feb-87	0,05	-	0,04	-	0,05	0,04	0,08	0,08	0,13	0,38
180/01	24-Feb-87	0,01	-	0,10	-	0,08	0,03	0,09	0,09	?	?
180/10	25-Feb-87	-0,03	-	0,06	-	0,07	0,04	0,05	0,05	?	?
189	27-Feb-87	-0,02	-	0,04	-	0,03	0,03	0,22	0,17	0,32	0,33
195	28-Feb-87	-0,03	-	0,02	-	0,11	0,06	0,26	0,16	0,32	0,34
235	06-Mar-87	-0,01	-	0,05	-	0,04	0,06	0,06	0,08	0,09	0,10
246	07-Mar-87	0,01	-	0,07	-	0,09	0,07	0,07	0,12	0,09	0,01
251	09-Mar-87	-0,02	-	0,02	-	0,00	0,01	0,11	0,11	0,21	0,23
255	10-Mar-87	0,01	-	0,05	-	0,05	0,05	0,08	0,12	0,15	0,14
259	11-Mar-87	0,01	-	-0,01	-	0,01	0,00	0,09	0,07	0,15	0,14
269	13-Mar-87	0,00	-	0,01	-	0,01	0,02	0,07	0,04	0,12	0,09

STANDING STOCK AND COMMUNITY METABOLISM OF PLANKTON SUBDIVIDED INTO THREE SIZE CLASSES

Standing stock and community metabolism of plankton subdivided into three size classes

(Gerald Schneider)

Description of methods

Sampling procedure

Meso- and macrozooplankton was sampled with a 100 µm Bongo net towed vertically through the euphotic zone. The depth of the latter was defined as the 1 % light level measured with a quantum meter (LI-COR with spherical sensor LI - 193 SB, range 400 - 700 nm, µE/s/m²). For sampling the layer below the euphotic zone (200 m to 1 % light level), the net was operated by means of a Nansen closing device. Hauling speed was generally 0.5 m/s. The catch of one net bag was used for standing stock analyses and the other one for measuring community metabolism. The smaller plankton size-fractions were collected with a rosette sampler consisting of six 30 l Niskin bottles from 6 depth representative for the euphotic zone.

Concentration of water samples

Prior to the measurements of standing stock and metabolism of ultra- and microplankton the samples had to be concentrated. From each Niskin bottle about 22 l were prefiltered through a 200 µm gauze to exclude meso- and macroplankton. The mixed samples were then very gently concentrated by means of a Millipore tangential filtration system. A large piece of 20 µm gauze was mounted at the front of the filtration system to separate micro- and ultraplankton organisms. The filtration chamber consisted of a 0.45 µm pore membrane filter and determined the lower size limit of the concentrated ultraplankton. Generally, ultraplankton was concentrated down to a volume of five liters, whereas the final volume of the microplankton was 10 liters. The size classes obtained and measured were as follows:

0.45 - 20 µm	ultraplankton	(Niskin bottles)
20 - 200 µm	microplankton	(Niskin bottles)
> 100 µm	meso- and macroplankton	(Bongo net)

Standing stock measurements

Subsamples of the three plankton size classes were filtered through Whatman GF/C and GF/F glass-fiber filters. The latter were used for the ultraplankton < 20 µm.
Protein content was determined aboard according to the method by Lowry et al. (1951) with a bovine albumen standard.
The other filters were deep frozen for further analysis at home.
Lipid content was measured according to Zöllner und Kirsch (1962) with a linolic acid standard and the analyses of particulate carbon and nitrogen were carried out in a CHN elemental analyzer by Perkin-Elmer, model 240 C.

Metabolism measurements

Respiration and excretion experiments were performed in the dark at in situ temperatures (± 0.5° C). Plankton was incubated in 1.2 l glass bottles. They were placed into two incubators for 3 to 7 hours (3 h for the zooplankton > 100 µm but 6 - 7 h for the two other size classes). For both of the two smaller size classes three parallels were run per experiment, whereas only two parallels were run for the larger zooplankton. Respiration was measured using the Winkler titration technique, whereas in the nutrient excretion experiments ammonia - N and inorganic phosphate - P were determined according to the methods by Grasshoff (1976). The results of the metabolism experiments obtained were corrected by means of 2 control bottles measured at the beginning and end of experiments.

Literature

Grasshoff, K., 1976. Methods of Seawater Analysis. - Verlag Chemie, Weinheim, New York, 317 pp.

Lowry, O.H., Rosebrough, N.J., Farr, A.L. & Randall, R.J., 1951. Protein measurements with the folinphenol reagent. - J. Biol. Chem., 193, 265 - 275.

Zöllner, N. & Kirsch, K., 1962. Über die quantitative Bestimmung von Lipoiden (Mikromethode) mittels der vielen Lipoiden (allen bekannten Plasma-Lipoiden) gemeinsamen Sulfo-Phospho-Vanilin-Reaktion. - Z. ges. exp. Med. 135, 545 - 561.

D A T A S H E E T S

Concentration factors of water samples (ultra- and microplankton) and list of Bongo net hauls (meso- and macroplankton)

		WATER SAMPLES				BONGO NET HAULS	
Station	Volume sampled (l)	Volume concentrated (l) 0.45 - 20 µm	Volume concentrated (l) 20 - 200 µm	Concentration factor 0.45 - 20 µm	Concentration factor 20 - 200 µm	Depth range (m)	Volume filtered (m^3)
66	145	5	10	29.0	14.5	0 - 80	19.7
76	150	5	10	30.0	15.0		
81	132	5	10	26.4	13.2	0 - 80 80 - 200	19.7 29.6
86	132	6	10	22.0	13.2	0 - 85 85 - 200	20.9 28.3
91	132	5	10	26.4	13.2	0 - 60 60 - 200	14.8 34.5
97	132	5	10	26.4	13.2	0 - 60 60 - 200	14.8 34.5
108	132	5	10	26.4	13.2	0 - 60 60 - 200	14.8 34.5
21	132	5	10	26.4	13.2	0 - 70 70 - 200	17.2 32.0
37	132	5	10	26.4	13.2	0 - 75 75 - 200	18.5 30.8
51	132	5	10	26.4	13.2	0 - 48 48 - 200	11.8 37.4
65	132	5	10	26.4	13.2	0 - 68 68 - 200	16.7 32.5

Concentration factors of water samples (ultra- and microplankton) and list of Bongo net hauls (meso- and macroplankton)

	WATER SAMPLES					BONGO NET HAULS	
Station	Volume sampled (l)	Volume concentrated (l) 0.45 - 20 µm	Volume concentrated (l) 20 - 200 µm	Concentration factor 0.45 - 20 µm	Concentration factor 20 - 200 µm	Depth range (m)	Volume filtered (m³)
180 Day	132	5	10	26.4	13.2	0 - 65	16.0
						65 - 200	33.3
180 Night	132	5	10	26.4	13.2	0 - 65	16.0
						65 - 200	33.3
189	132	5	10	26.4	13.2	0 - 70	17.2
						70 - 200	32.0
246	132	5	10	26.4	13.2	0 - 60	14.8
						60 - 200	34.5
255	132	5	10	26.4	13.2	0 - 57	14.0
						57 - 200	35.2
269	132	5	7	26.4	18.9	0 - 63	15.5
						63 - 200	33.7
274	132	5	10	26.4	13.2	0 - 55	13.5
						55 - 200	35.7

Standing stock in terms of carbon (mg m^{-3})

Station	Size fractions < 20 µm	20 - 200 µm	> 100 µm euphotic zone	> 100 µm below euphotic zone
Central Red Sea				
66	3.88	53.00	1.21	-
76	-	75.50	-	-
81	8.07	82.40	2.20	0.96
86	10.70	98.30	2.13	-
91	10.00	71.80	3.23	0.93
97	6.79	69.10	-	-
108	9.36	75.70	-	1.19
121	13.10	40.20	2.80	1.04
137	7.13	57.70	4.07	1.11
151	21.50	86.30	8.26	1.41
165	16.70	38.90	4.60	1.07
180 day	12.00	84.00	5.55	1.37
180 night	22.00	49.40	5.35	1.56
189	13.10	99.20	4.50	0.63
Gulf of Aden				
246	14.60	90.20	9.91	-
255	16.00	111.00	10.20	1.24
269	20.80	68.50	12.10	3.93
274	19.80	99.50	8.99	19.90

Standing stock in terms of nitrogen (mg m^{-3})

Station	Size fractions			
	< 20 µm	20 - 200 µm	> 100 µm euphotic zone	> 100 µm below euphotic zone
Central Red Sea				
66	0.49	5.95	0.40	-
76	-	10.70	-	-
81	0.83	8.91	0.53	0.23
86	1.20	13.90	0.51	-
91	1.50	12.70	0.95	0.23
97	0.57	11.20	-	-
108	1.02	11.10	-	0.28
121	1.10	6.44	0.79	0.23
137	0.93	7.73	0.91	0.24
151	3.79	15.50	2.10	0.34
165	1.14	6.36	1.10	0.24
180 day	1.24	19.20	1.13	0.29
180 night	3.26	8.11	1.29	0.35
189	1.55	15.60	1.03	0.14
Gulf of Aden				
246	1.69	17.10	1.99	-
255	2.48	22.00	2.32	0.24
269	2.70	12.90	2.73	0.66
274	3.30	19.70	2.06	2.45

Standing stock in terms of proteins (mg m^{-3})

Station	Size fractions < 20 µm	20 - 200 µm	> 100 µm euphotic zone	> 100 µm below euphotic zone
Central Red Sea				
66	1.83	32.40	0.79	-
76	0.12	39.70	-	-
81	7.19	42.30	1.27	0.37
86	3.20	39.90	1.04	-
91	5.24	63.40	1.80	0.43
97	5.34	46.00	-	-
108	7.90	43.40	4.26	0.57
121	5.92	84.00	1.82	0.64
137	4.14	42.10	3.25	1.14
151	12.10	68.60	5.82	0.94
165	8.11	44.40	3.62	0.99
180 day	8.53	74.40	3.18	0.98
180 night	9.45	50.80	3.80	0.88
189	8.84	94.30	3.10	0.64
Gulf of Aden				
246	13.3	73.20	8.16	-
255	13.4	96.50	7.77	0.83

Standing stock in terms of lipids (mg m^{-3})

Station	Size fractions < 20 µm	20 - 200 µm	> 100 µm euphotic zone	> 100 µm below euphotic zone
Central Red Sea				
66	1.30	17.20	0.53	-
76	-	23.70	-	-
81	3.72	18.00	0.39	0.12
86	3.52	11.10	0.34	-
91	3.15	22.50	0.70	-
97	2.35	24.80	-	-
108	4.22	10.70	3.13	0.23
121	2.98	12.80	0.91	0.19
137	2.66	14.00	0.69	0.26
151	4.22	24.90	1.66	0.28
165	7.01	8.30	0.71	0.16
180 day	3.45	18.30	0.63	0.20
180 night	3.37	-	1.33	0.20
189	-	27.80	-	0.15
Gulf of Aden				
246	4.16	23.40	1.66	-
255	4.57	37.80	1.99	0.32

Respiration in mg O_2 m^{-3} d^{-1}

Station	Size fractions < 20 µm	20 - 200 µm	> 100 µm euphotic zone	> 100 µm below euphotic zone
Central Red Sea				
66	27.20	56.20	0.92	-
76	18.50	40.00	-	-
81	12.60	54.60	-	0.17
86	48.10	55.60	1.33	-
91	24.00	53.30	2.26	0.25
97	10.20	51.50	3.30	0.72
108	-	-	3.84	0.24
121	39.60	47.30	1.54	0.17
137	52.70	19.90	2.78	0.24
151	32.20	92.60	4.65	0.47
165	29.50	23.70	2.20	0.22
180 day	23.90	47.30	1.93	0.32
180 night	26.50	51.70	3.22	0.49
189	30.10	95.40	2.08	0.29
Gulf of Aden				
246	32.40	29.10	3.16	-
255	23.60	50.90	4.24	0.21
269	26.60	49.50	3.56	0.30
274	14.50	71.70	4.43	1.97

Ammonia excretion in µMol NH_4 - N m^{-3} d^{-1}

Station	Size fractions < 20 µm	20 - 200 µm	> 100 µm euphotic zone	> 100 µm below euphotic zone
Central Red Sea				
66	- 30.20	- 29.80	1.96	-
76	- 0.60	- 82.20	-	-
81	2.70	40.60	-	1.22
86	14.90	117.40	5.31	-
91	0.60	36.40	0.96	0.07
97	93.60	- 63.20	2.13	0.42
108	9.80	- 52.80	3.79	0.58
121	- 16.20	- 29.20	1.82	0.31
137	- 5.50	- 71.30	1.96	0.08
151	- 5.40	- 17.10	4.44	0.76
165	- 11.50	- 2.40	2.23	0.09
180 day	6.10	49.60	2.34	0.41
180 night	7.30	10.60	3.00	0.65
189	- 1.80	140.60	2.08	0.28
Gulf of Aden				
255	- 14.60	29.10	4.00	0.17

Inorganic phosphate excretion in µMol PO_4 - P m^{-3} d^{-1}

Station	Size fractions < 20 µm	20 - 200 µm	> 100 µm euphotic zone	> 100 µm below euphotic zone
Central Red Sea				
66	-	-	-	-
76	5.00	- 28.70	-	-
81	6.70	7.30	-	-
86	21.30	2.60	- 0.16	-
91	1.20	10.00	1.10	0.07
97	9.10	- 6.90	- 0.10	- 0.19
108	- 7.30	- 16.60	2.92	0.07
121	6.30	14.60	0.60	0.00
137	3.60	4.80	1.04	0.10
151	3.60	50.90	6.12	0.32
165	4.90	- 5.60	1.10	0.04
180 day	1.50	2.80	1.10	0.18
180 night	-	15.80	3.36	0.41
189	2.50	- 7.30	1.44	0.24
Gulf of Aden				
255	- 4.80	- 24.90	2.36	0.12

Z O O P L A N K T O N   S T A N D I N G   S T O C K

Zooplankton standing stock

(Manfred Rolke)

Description of methods

Sampling procedure

The aim of the investigation is a comparison of the importance of zooplankton in the food web of the central Red Sea, the Bab el Mandeb transition zone and the Gulf of Aden.
The data belong to vertical hauls taken during a basic programme (12 hauls in the central Red Sea, 5 hauls near Bab el Mandeb and 4 hauls in the Gulf of Aden). In order to maintain comparability with the other planktological investigations the samples were collected in the morning. Five additional net hauls, sampled in a six hour rhythm during a permanent station, give an idea of the differences between day- and night-time distributions.
Zooplankton samples were taken with a multiple opening and closing net manufactured by Hydrobios, Kiel. Function and dimensions of the net are described by Weikert and John (1981). The net, equipped with an opening of 50 by 50 cm, collects 5 separate samples at a single haul. The mesh size used was 100 µm. The opening / closing mechanism was operated alternatively automatically in-situ or manual from deck. Samples were usually taken in a standard haul from 500 m to the surface dividing the water column into 5 depth intervals as follows: 500 - 200 m, 200 - 100 m, 100 - 50 m, 50 - 25 m and 25 - 0 m. In accord with the standard depth intervals samples were taken in closer distances at shallower stations. Missing results at single stations are due to improper working of the net equipment. The towing speed was approximately 0.5 m / s. Depth was continuously controlled with a depth meter as well as by the cable length. Filtration efficiency was assumed to be 100 %. Clogging of the net was no danger due to the sparse content of plankton. The bulk of the catch was composed of copepods.

Standing stock determinations

Immediately after the haul, the samples were first divided by means of a Folsom splitter. Depending on the amount of plankton organisms usually one quarter of each sample served for the quantitative determination of organic matter. The subsamples were filtered through Whatman GF/C glass-fiber filters of 5.5 cm diameter.
The pre-weighed filters were thoroughly rinsed with destilled water and thereafter dried at 60° C and then stored air-tight for further analysis at home. There they were dried again at 60° C before weighing, weighed and then ignited at 550° C in an oven for measuring the content of organic matter by weight loss of the filter.

Literature

Weikert, H. & John, H.- C., 1981. Experiences with a modified Bé multiple opening - closing plankton net. - J. Plankton Res. 3, 167 - 176

DATA SHEETS

Key to the data sheets

Column 1	- Station No.	=	Station number
Column 2	- Depth / m	=	Depths in meter giving the upper and the lower boundary of the 5 depth layers sampled
Column 3	- Seston mg/m³	=	Dry weight (seston) in mg/m³, mean values for each depth layer
Column 4	- OM mg/m³	=	Organic matter in mg/m³, mean values for each depth layer
Column 5	- Seston mg/m²	=	Dry weight (seston) in mg/m², integrated values for each depth layer
Column 6	- OM mg/m²	=	Organic matter in mg/m², integrated values for each depth layer
Column 7	- OM %	=	Percentage of organic matter in seston (dry weight)

Station No.	Depth m	Seston mg / m³	OM mg / m³	Seston mg / m²	OM mg / m²	OM %
66	0 - 25	17.00	10.00	727.2	250.2	59
	25 - 50	8.34	7.24	209.2	180.9	87
	50 - 100	4.60	3.45	230.0	172.7	75
	100 - 200	1.78	1.25	177.9	125.3	70
	200 - 500	1.62	1.08	485.6	322.6	67
81	0 - 25	9.83	6.83	245.8	170.6	70
	25 - 50	7.89	4.59	197.1	114.7	58
	50 - 100	2.01	1.33	100.2	66.2	66
	100 - 200	2.01	1.36	201.4	135.6	68
	200 - 500	1.70	1.33	511.3	399.0	78
86	0 - 25	9.40	7.30	235.0	182.5	78
	25 - 50	7.65	6.32	191.1	157.9	83
	50 - 100	7.70	6.16	385.0	308.0	80
	100 - 200	1.16	0.80	115.5	80.0	66
	200 - 500	2.04	1.51	612.3	451.5	74
91	0 - 25	13.64	9.43	341.0	235.7	69
	25 - 50	11.44	8.15	286.1	203.8	71
	50 - 100	3.32	2.16	165.9	108.0	65
	100 - 200	0.95	0.52	94.6	52.3	55
	200 - 500	1.67	1.34	500.5	400.8	80
97	0 - 25	13.77	9.84	344.3	246.1	72
	25 - 50	10.54	8.46	263.5	211.5	80
	50 - 100	4.20	3.47	209.9	173.3	83
	100 - 200	1.70	1.19	170.6	119.0	70
	200 - 500	1.35	1.02	405.1	305.6	76
108	0 - 25	45.87	34.78	1146.7	869.6	76
	25 - 50	11.46	8.13	286.6	203.2	71
	50 - 100	7.72	5.35	385.9	267.4	69
	100 - 200	1.59	0.93	159.2	92.6	59
	200 - 500	1.04	0.57	313.0	169.8	55

Station No.	Depth m	Seston mg / m³	OM mg / m³	Seston mg / m²	OM mg / m²	OM %
121	0 - 25	16.17	10.71	404.2	267.7	66
	25 - 50	14.56	9.72	864.0	242.9	67
	50 - 100	8.01	4.46	400.5	232.0	58
	100 - 200	3.80	2.38	379.7	238.4	63
	200 - 500	1.38	1.02	414.9	305.0	74
137	0 - 25	20.86	15.72	521.6	393.0	75
	25 - 50	17.23	12.05	430.4	301.3	70
	50 - 100	4.07	2.46	203.4	123.0	60
	100 - 200	0.71	0.26	71.4	26.4	37
	200 - 500	2.85	2.08	854.9	625.3	73
151	0 - 25	37.12	29.82	927.7	745.6	80
	25 - 50	18.82	15.57	470.4	389.1	83
	50 - 100	3.07	2.04	153.4	102.1	67
	100 - 200	2.96	2.16	295.5	215.7	73
	200 - 500	1.95	1.55	583.7	464.5	80
165	0 - 25	27.33	23.34	683.2	583.5	85
	25 - 50	13.48	10.56	337.0	264.0	78
	50 - 100	5.42	4.08	270.9	204.2	75
	100 - 200	3.03	1.97	303.4	197.1	65
	200 - 500	2.18	1.54	653.9	461.9	71
180/1	100 - 200	5.83	4.38	1166.9	876.6	75
	200 - 500	2.15	1.38	643.9	419.3	64
180/2	50 - 100	4.99	3.64	249.3	181.8	73
	100 - 200	3.93	2.97	393.0	297.4	76
	200 - 500	1.24	3.64	370.5	283.0	76
180/3	0 - 25	22.07	16.68	551.7	416.9	76
	25 - 50	15.30	11.75	382.6	293.7	77
	50 - 100	10.03	7.96	501.6	397.8	79
	100 - 200	2.62	2.00	261.6	200.3	76
	200 - 500	0.85	0.64	256.2	192.2	75

Station No.	Depth m	Seston mg / m³	OM mg / m³	Seston mg / m²	OM mg / m²	OM %
180/4	0 - 25	23.71	18.44	592.6	461.0	78
	25 - 50	9.33	7.20	233.4	180.1	77
	50 - 100	4.72	3.43	236.1	171.7	73
	100 - 200	1.68	1.25	167.5	124.8	74
	200 - 500	2.14	1.72	642.5	514.6	80
180/5	0 - 25	15.58	12.92	389.5	323.0	83
	25 - 50	12.63	9.94	315.8	248.4	79
	50 - 100	4.52	3.40	226.0	169.8	75
	100 - 200	0.87	0.63	86.6	63.2	72
	200 - 500	2.07	1.53	619.6	460.0	74
189	0 - 25	18.43	13.33	460.8	333.3	72
	25 - 50	12.88	8.75	321.9	218.9	68
	50 - 100	8.17	5.90	408.5	294.9	72
	100 - 200	1.95	1.25	195.2	125.0	64
	200 - 500	2.85	2.25	855.2	674.1	79
195	25 - 50	9.77	7.78	488.5	388.8	80
	50 - 100	3.54	2.57	177.0	128.6	73
	100 - 200	2.69	1.88	269.1	188.3	70
	200 - 500	2.07	1.69	622.1	507.5	82
229	0 - 25	55.10	44.87	1377.4	1121.8	81
	25 - 50	25.30	19.53	632.5	488.2	77
	50 - 75	50.42	38.87	1260.5	971.7	77
	75 - 100	18.81	15.12	470.2	378.1	80
	100 - 150	22.16	18.29	1108.0	914.6	83
235	0 - 25	41.61	30.68	1040.3	767.0	74
	25 - 50	38.71	29.35	967.7	733.8	76
	50 - 125	46.98	33.14	1174.4	828.5	71
	125 - 150	68.16	45.58	1704.0	1139.5	67
	150 - 250	26.73	15.16	2673.0	1515.5	57

Station No.	Depth m	Seston mg / m³	OM mg / m³	Seston mg / m²	OM mg / m²	OM %
238	0 - 25	33.34	21.38	833.6	534.5	64
	25 - 50	28.38	22.42	709.6	560.5	79
	50 - 100	16.32	12.66	816.0	633.0	78
	100 - 150	12.26	8.00	612.8	400.0	65
	150 - 200	19.24	13.25	961.8	662.4	69
239	0 - 25	44.03	29.24	1100.8	730.9	66
	25 - 50	37.13	30.32	928.3	758.1	82
	50 - 100	16.42	12.83	820.8	641.3	78
	100 - 150	6.53	5.02	326.7	250.9	77
240	0 - 25	72.74	61.67	1818.6	1539.2	85
	25 - 50	47.65	38.05	1191.4	951.4	80
	50 - 100	48.88	34.78	2444.2	1738.9	71
	100 - 200	21.29	16.49	2129.0	1649.0	78
	200 - 350	8.18	3.89	1226.9	583.4	48
246	0 - 25	26.11	21.20	652.8	529.9	81
	25 - 50	12.19	9.10	304.6	227.5	75
	50 - 100	8.18	4.35	409.0	217.6	53
	100 - 200	8.93	6.91	893.1	690.9	77
	200 - 260	11.91	8.22	714.6	493.4	69
255	0 - 25	37.06	28.90	925.4	722.6	78
	25 - 50	31.16	25.87	778.9	646.7	83
	50 - 100	14.82	11.81	740.8	590.7	80
	100 - 200	4.65	3.17	464.6	316.8	68
	200 - 500	4.99	4.00	1497.3	1199.0	80
269	0 - 25	24.54	19.72	613.4	493.1	80
	25 - 50	18.51	13.67	462.7	341.8	74
	50 - 100	21.43	17.51	1071.4	875.5	82
	100 - 200	3.20	2.07	319.7	207.0	65
	200 - 500	6.65	5.52	1995.8	1656.6	83

Station No.	Depth m	Seston mg / m³	OM mg / m³	Seston mg / m²	OM mg / m²	OM %
274	0 - 25	28.93	23.97	723.2	599.4	83
	25 - 50	17.87	14.12	446.7	353.0	79
	50 - 100	18.73	15.18	936.6	759.0	81
	100 - 200	5.73	4.35	572.8	435.2	76
	200- 300	8.28	6.12	827.8	612.5	74

L I S T O F P H Y T O P L A N K T O N S P E C I E S R E C O R D E D I N T H E S U D A N E S E O P E N W A T E R S

by

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List of phytoplankton species recorded in the Sudanese open waters

Description of methods

During a stay as guest researcher from 15. 2. 1987 - 1. 3. 1987 on R. V. "Meteor" phytoplankton could be sampled along three transects. The northernmost transect extended from Port Sudan harbour to Volcano Deep (water depth about 2000 m) in north-easterly direction passing Sanganeb Reef. The second transect was situated near the Sudanese-Ethiopian boundary. The third one lies between the two other transects and passes the Suakin Deep (water depth about 2800 m). Along these transects samples for the quantitative analysis of phytoplankton from various depths were collected from a large number of stations (Utermöhl bottles). The qualitative data presented in this volume were derived from samples collected out with an 20 µm "Apstein - Net" in vertical hauls from 100 m to the surface at ten stations.

Apart from Silicoflagellates which were not analyzed for species, a total of 142 phytoplankton species was recorded. About 60 % of these number was contributed by Dinoflagellates(84 species), whereas Diatoms exhibited 54 species. Only 4 species of Cyanophycea were recorded.

D A T A   S H E E T S

Species	Station	130	133	137
A. D I N O F L A G E L L A T E S				
Ceratium boehmii		+	-	+
Ceratium breve		+	+	+
Ceratium candelabrum		-	-	+
Ceratium carriense		+	+	+
Ceratium declinatum		+	+	+
Ceratium deflexum		-	-	-
Ceratium dens		-	+	-
Ceratium egyptiacum		+	+	-
Ceratium extensum		-	+	-
Ceratium furca		+	+	+
Ceratium fusus		+	+	-
Ceratium kofoidii		+	+	+
Ceratium macroceros		+	-	-
Ceratium massiliense		+	+	+
Ceratium pulchellum		-	-	+
Ceratium steinaii		-	+	-

+ = present, - = not recorded

143	151	164	174	180	189	195
+	+	−	−	+	−	−
+	+	+	+	+	+	+
+	−	+	+	+	−	−
+	+	+	+	+	+	+
+	+	+	+	+	+	+
−	−	+	+	+	+	−
+	−	−	+	+	−	−
+	−	−	−	−	−	−
−	+	−	+	+	−	−
+	+	+	+	+	+	+
−	+	+	−	+	−	−
+	+	+	+	+	+	+
+	−	+	−	+	−	−
−	−	+	+	+	+	−
+	−	−	+	−	+	−
−	−	−	+	+	−	−

Species	Station	130	133	137
<u>Ceratium</u> <u>teres</u>		+	-	-
<u>Ceratium</u> <u>trichoceros</u>		+	+	+
<u>Ceratium</u> <u>tripos</u> var. <u>pulchellum</u>		+	-	-
<u>Ceratium</u> <u>tripos</u> var. <u>indica</u>		-	-	-
<u>Ceratium</u> <u>vultur</u>		-	-	+
<u>Ceratocorys</u> <u>horrida</u>		+	+	-
<u>Dinophysis</u> <u>caudata</u>		-	+	-
<u>Dinophysis</u> <u>circumsutum</u>		-	-	+
<u>Dinophysis</u> <u>hastata</u>		+	+	+
<u>Dinophysis</u> <u>miles</u>		-	+	-
<u>Dinophysis</u> <u>ovatum</u>		-	-	-
<u>Dinophysis</u> <u>ovum</u>		+	+	-
<u>Dinophysis</u> <u>swezyae</u>		-	-	-
<u>Dissodinium</u> <u>spp.</u>		+	-	-
<u>Goniodoma</u> <u>polyedricum</u>		-	-	-
<u>Goniodoma</u> <u>sphaericum</u>		-	+	-
<u>Gonyaulax</u> <u>digitale</u>		+	-	-
<u>Gonyaulax</u> <u>monacantha</u>		+	-	-

143	151	164	174	180	189	195
-	+	+	+	+	+	-
+	+	+	+	+	+	+
+	+	+	+	+	+	+
-	-	+	-	+	-	-
-	-	-	-	+	-	-
-	-	+	-	-	-	-
+	-	-	-	-	-	-
-	+	-	-	-	-	-
-	+	+	-	+	+	+
-	+	+	-	-	-	-
+	+	-	+	-	-	-
+	+	+	-	+	-	-
-	-	-	+	-	-	+
-	-	-	+	-	-	+
+	-	+	+	+	+	+
-	-		+	-	-	-
-	-	-	+	-	-	+
-	+	+	+	+	-	-

Species	Station	130	133	137
Gonyaulax orientalis		-	+	-
Gonyaulax pacifica		-	-	-
Gonyaulax polyedra		-	-	+
Gonyaulax polygramma		+	-	-
Gonyaulax spinifera		+	-	-
Gonyaulax scripsae		-	-	-
Gonyaulax turbyni		+	-	+
Gymnodinium spec.		+	+	-
Heterodinium spec.		-	-	-
Histoneis bippoperiodes		+	-	-
Ornithocercus heteroponus		+	-	-
Ornithocercus quadiratus		-	-	+
Ornithocercus steinii		-	-	-
Oxytoxum scolopax		-	-	-
Oxytoxum subdulatum		+	-	-
Peridiniopsis asymmetrica		-	-	+
Peridinium abei		-	-	-
Peridinium africanoides		+	-	-

143	151	164	174	180	189	195
-	-	+	+	-	+	-
-	-	-	+	+	+	+
+	-	+	-	-	+	-
+	-	-	+	+	-	+
-	-	+	+	+	-	+
-	+	-	+	+	+	+
-	+	+	+	+	-	-
+	-	+	+	+	+	+
-	-	-	+	+	+	-
+	-	+	-	+	-	-
-	-	+	-	+	-	-
-	+	-	-	-	-	+
-	-	+	-	+	-	-
-	-	+	+	+	-	+
+	+	-	+	+	-	-
+	+	+	+	+	-	-
-	-	+	-	+	+	-
-	-	+	+	+	-	-

Species	Station	130	133	137
Peridinium brochii		+	-	-
Peridinium claudicans		-	-	-
Peridinium conicum		-	-	-
Peridinium crassipes		+	-	-
Peridinium depressum		+	-	-
Peridinium divergens		-	-	-
Peridinium exiquipes		-	-	-
Peridinium globulas quarnerense		+	+	+
Peridinium grande		-	-	-
Peridinium granii		+	-	-
Peridinium heteracanthum		-	-	-
Peridinium hirobis		+	-	+
Peridinium inflatum		-	-	+
Peridinium minutum		+	+	+
Peridinium nipponicum		+	-	-
Peridinium oceanicum		+	-	-
Peridinium pallidum		-	-	-
Peridinium pedunculatum		-	-	-

143	151	164	174	180	189	195
+	-	-	-	+	-	-
-	+	-	+	-	-	-
+	+	+	+	-	-	-
+	-	+	+	+	-	-
+	+	+	+	-	-	-
-	+	+	+	+	-	-
+	-	+	+	-	-	-
+	-	+	+	+	-	-
-	-	+	+	+	-	-
+	-	-	+	-	-	-
+	-	+	+	+	-	-
-	-	+	+	+	-	-
-	-	-	+	-	-	-
+	-	-	+	+	+	-
+	-	-	+	-	-	-
-	-	+	+	+	-	-
+	-	-	+	-	-	-
+	-	-	+	-	-	-

Species	Station	130	133	137
Peridinium ovum		+	+	+
Peridinium pyriforme		+	-	-
Peridinium sinaicum		+	+	+
Phalacroma ovatum		+	-	-
Prorocentrum cordatum		+	-	-
Prorocentrum gracile		-	+	+
Prorocentrum micans		+	+	+
Prorocentrum minimum		-	-	-
Pyrocystis noctiluca		-	-	-
Pyrodinium schilleri		+	-	-
Pyrophocus horologicum		+	+	-
Podolampas bipes		-	-	+
Podolampas elegans		+	+	+
Podolampas palmipes		-	-	+
B. DIATOMS				
Amphisolenia spec.		-	-	+
Asterionella notata		-	+	+

143	151	164	174	180	189	195
+	+	+	+	+	+	+
−	−	+	+	+	−	−
+	+	−	+	+	+	−
+	+	−	−	+	−	−
+	−	+	−	−	−	−
−	−	+	−	+	−	−
+	+	+	+	+	+	+
−	−	+	−	+	−	−
+	+	+	−	+	−	−
−	−	−	+	+	+	−
−	−	+	+	+	−	−
+	+	−	−	+	−	−
−	−	+	−	−	−	−
+	+	+	−	+	−	+
−	−	+	+	+	−	−
−	−	+	−	+	−	−

Species	Station	130	133	137
Asterumphalus flabellatus		-	-	-
Bacteriastrum delecatulum		+	-	-
Bacteriastrum comosum		+	-	+
Biddulphia sinensis		+	-	-
Chaetoceros affinis		-	-	-
Chaetoceros borealis		+	-	-
Chaetoceros coarctatum		+	-	+
Chaetoceros curvisetum		-	-	-
Chaetoceros decipiens		+	-	-
Chaetoceros indicum		+	-	+
Chaetoceros lorenzianum		+	-	+
Chaetoceros peruvianum		-	-	-
Chaetoceros pseudocurvisetum		-	-	-
Chaetoceros teres		+	-	-
Climacodium frauenfeldianum		+	+	+
Coscinodiscus spp.		+	+	+
Detonula moseleyana		-	-	+
Eucampia spec.		-	+	+

143	151	164	174	180	189	195
-	-	+	+	+	-	-
-	-	+	+	+	-	+
-	-	+	+	+	+	+
-	-	-	+	+	-	+
-	-	-	+	+	-	-
-	-	-	+	-	-	-
+	+	+	-	+	-	+
-	-	+	+	+	+	+
-	-	-	-	+	+	+
-	-	-	+	+	-	-
-	-	+	-	+	-	+
-	-	-	+	+	-	-
-	-	+	+	-	-	-
-	-	-	+	+	-	-
+	+	+	+	+	+	+
+	+	+	+	+	+	+
-	-	-	+	-	-	+
-	-	-	+	-	+	-

Species	Station	130	133	137
Guinardia flaccida		+	-	+
Gyrosigma hippocampas		-	-	+
Hemiaulus hauckii		+	-	+
Hemiaulus membranaceus		+	-	+
Lauderia annulate		+	+	+
Leptocylindrus danicus		+	+	-
Licmospheria sp.		+	+	-
Navicula lyroides		+	-	-
Nitzschia closterium		+	+	+
Nitzschia longissima		+	-	+
Nitzschia seriata		+	+	+
Planktoniella sol		+	-	+
Pleurosigma elongatum		+	-	-
Rhizosolenia alata f. Gran		+	-	+
Rhizosolenia alata f. indica		+	-	+
Rhizosolenia bergonii		+	-	+
Rhizosolenia calcar - avis		+	-	+
Rhizosolenia clevei		+	-	+

143	151	164	174	180	189	195
-	-	-	-	-	-	-
-	-	-	+	-	-	-
-	-	+	+	+	-	-
-	-	-	+	+	-	-
-	-	-	+	+	-	+
-	+	-	+	-	-	-
-	-	-	+	+	-	-
-	-	+	-	+	-	+
+	+	+	+	+	+	+
+	-	+	+	-	+	+
+	+	+	+	+	+	+
+	-	+	+	+	+	+
-	-	+	+	-	-	+
+	+	+	-	+	-	+
	+	-	+	+	+	-
-	-	-	-	+	+	-
-	-	-	+	+	-	+
-	-	-	+	-	+	+

Species	Station	130	133	137
Rhizosolenia cochlea		+	-	+
Rhizosolenia delicatula		+	+	+
Rhizosolenia fragilissima		-	-	+
Rhizosolenia hebetata		+	-	-
Rhizosolenia imbricata		-	+	-
Rhizosolenia imbricata var. Shrubsolei		+	-	+
Rhizosolenia robusta		-	-	-
Rhizosolenia shrubsolei		+	+	+
Rhizosolenia stolterfothii		+	-	+
Rhizosolenia styliformis		-	-	-
Schroderella delicatula		-	-	+
Stephanopyxis turris		-	-	+
Surirella spec.		+	-	-
Thalassionema nitzschioides		+	+	+
Thalssiothrix frauenfeldii		+	-	+

143	151	164	174	180	189	195
-	-	-	+	-	+	+
-	+	+	+	+	-	-
-	+	+	+	+	-	-
+	-	+	+	-	-	-
+	-	+	+	-	-	-
+	-	+	-	+	-	-
-	-	-	+	-	-	+
-	-	-	+	+	-	+
+	-	-	+	+	-	+
-	-	+	+	+	-	+
-	-	-	+	+	-	+
-	-	+	+	+	-	-
-	-	+	+	-	-	+
-	-	+	+	+	-	+
-	-	-	+	+	-	+

Species	Station	130	133	137
C. C Y A N O P H Y C E A E				
Richelia intracellularis		-	-	-
Spirulina spec.		-	-	-
Trichodesmium erythraeum		+	-	+
Trichodesmium spec.		+	-	+
D. S I L I C O F L A G E L L A T E S		+	-	+

143	151	164	174	180	189	195
–	–	–	+	+	–	–
–	–	+	+	+	–	–
+	+	+	+	+	+	+
–	+	–	+	+	+	–
–	–	+	+	+	+	+

BERICHTE AUS DEM INSTITUT FÜR MEERESKUNDE

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1 (1973)	FECHNER, H.	Orthogonale Vektorfunktionen zur stetigen Darstellung von meteorologischen Feldern auf der Kugeloberfläche
2 (1974)	SPETH, P.	Mittlere Meridionalschnitte der verfügbaren potentiellen Energie für jeden Januar und Juli aus dem Zeitraum 1967 bis 1972
3 (1974)	SPETH, P.	Mittlere Horizontalverteilungen der Temperatur und der verfügbaren potentiellen Energie und mittlere Meridionalschnitte der Temperatur für jeden Januar und Juli aus dem Zeitraum 1967 bis 1972
4 (1974)	DEFANT, Fr.	Das Anfangstadium der Entwicklung einer baroklinen Wellenstörung in einem baroklinen Grundstrom
5 (1974)	FECHNER, H.	Darstellung des Geopotentials der 500 mb-Fläche der winterlichen Nordhalbkugel durch natürliche Orthogonalfunktionen
7 (1974)	SPETH, P.	Die Veränderlichkeit der atmosphärischen Zirkulation, dargestellt mit Hilfe energetischer Größen
8 (1975)	SKADE, H.	Eine aerologische Klimatologie der Ostsee. Teil I - Textband
9 (1975)	SKADE, H.	Eine aerologische Klimatologie der Ostsee. Teil II - Abbildungsband
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11 (1975)	KEUNECKE, K.H., KOHN, H., KRAUSS, W., MIOSGA, G., SCHOTT, F., SPETH, P., WILLEBRAND, J., ZENK, W.	Baltic 75 - Physikalischer Teil Messungen des IfM, der FWG und der DFVLR
13 (1975)	RUMOHR, H.	Der Einfluß von Temperatur und Salinität auf das Wachstum und die Geschlechtsreife von nutzbaren Knochenfischen (Eine Literaturstudie)
14 (1975)	PULS, K.E., MEINCKE, J.	General Atmospheric Circulation and Weather Conditions in the Greenland-Scotland Area for August and September 1973
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17 (1976)	BEHR, H.D.	Untersuchungen zum Jahresgang des atmosphärischen Wärmehaushalts für das Gebiet der Ostsee. Teil I - Textband
18 (1976)	BEHR, H.D.	Untersuchungen zum Jahresgang des atmosphärischen Wärmehaushalts für das Gebiet der Ostsee. Teil II - Abbildungsband
19 (1976)	BROCKMANN, Ch., MEINCKE, J., PETERS, H., SIEDLER, G., ZENK, W.	GATE - Oceanographic Activities on FRG-Research Vessels
20a (1977) 20b	WILLEBRAND, J., MÜLLER, P., OLBERS, D.J.	Inverse Analysis of the Trimoored Internal Wave Experiment (IWEX) Part 1 Part 2
21 (1976)	MÖLLER, H.	Die Biologie des Flachwassers vor der westdeutschen Ostseeküste und ihre Beeinflussung durch die Temperatur - eine Literaturstudie
22 (1976)	PETERS, H.	GATE - CTD Data measured on the F.R.G. Ships Shipboard Operations-Calibration-Editing
23 (1976)	KOLTERMANN, K.P., MEINCKE, J., MÜLLER, T.	Overflow '73 - Data Report 'Meteor' and 'Meerkatze 2'
24 (1976)	LIEBING, H.	Grundlagen zur objektiven Ermittlung eines Bodenluftdruckfeldes für ein begrenztes Gebiet (Ostsee)
25 (1976)	SIMONS, T.J.	Topographic and Baroclinic Circulations in the Southwest Baltic
26 (1976)	KIELMANN, J., HOLTORFF, J., REIMER, U.	Data Report Baltic '75
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29	(1977)	MEINCKE, J.	Measurements of Currents and Strafication by FRV "Anton Dohrn" during the GATE Equatorial Experiment
30	(1977)	SANFORD, Th.	Design Concepts for a Shallow Water Velocity Profiler and a Discussion of a Profiler Based on the Principles of Geomagnetic Induction
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32	(1977)	BROCKMANN, Ch., HUGHES, P., TOMCZAK, M.	Data Report on Currents, Winds and Stratification in the NW African Upwelling Region during early 1975
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35	(1977)	KAMINSKI, U.	Klassifikation der Wetterlagen über dem Wetterschiff - C - durch vertikale natürliche Orthogonalfunktionen
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38	(1977)	KIRK, E.	Objektive Analysen meteorologischer Parameter über der Kieler Bucht
40	(1978)	OSTHAUS, A., SPETH, P.	Large-scale horizontal fluxes of sensible energy and of momentum caused by mean standing eddies for each January and July of the period 1967 until 1976
41	(1978)	SPETH, P.	Mean meridional cross-sections of the available potential energy for each January and July of the period 1973 until 1976
42	(1978)	SPETH, P.	Mean meridional cross-sections of the available potential energy for each April and October of the period 1967 until 1976
43	(1978)	SPETH, P.	Mean horizontal fields of temperature available potential energy and mean meridional cross-sections of temperature for each January and July of the period 1967 until 1976
44	(1978)	FECHNER, H.	Darstellung meteorologischer Felder mit endlichem Definitionsgebiet durch Reihen orthogonaler Funktionen
45	(1978)	RIECKE, W.	In der Meteorologie benutzte objektive horizontale Analysenverfahren im Hinblick auf die Anwendung bei wissenschaftlichen Untersuchungen
46	(1978)	OSTHAUS, A.	Die Struktur der stehenden Temperatur- und Geopotentialwellen im Januar und Juli und die durch sie hervorgerufenen Transporte von sensibler Energie und Drehimpuls
47	(1978)	CORNUS, H.-P.	Untersuchungen zu Deckschichtänderungen und zur Anwendbarkeit eindimensionaler Deckschichtmodelle im äquatorialen Atlantik während GATE 1974
48	(1978)	WÖRNER, F.G., KOHN, A.	Liste der Mikronekton- und Zooplanktonfänge der Deutschen Antarktis-Expedition 1975/76
49	(1978)	DETLEFSEN, H.	Wasseroberflächentemperaturen und Luftdruckdifferenzen im Auftriebsgebiet vor Nordwest-Afrika von 1969-1976
50	(1978)	MENGELKAMP, H.-T.	Wind-, Temperatur- und Feuchteprofile über der Ostsee während des Meßprojektes "Kieler Bucht" 1976
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53	(1978)	SPETH, P.	Mean horizontal fields of temperature and geopotential height for each January, April, July and October for the period 1967 - 1976
54	(1978)	KREY, J.(+), BABENERD, B., LENZ, J.	Beobachtungen zur Produktionsbiologie des Planktons in der Kieler Bucht: 1957-1975 - 1. Datenband
55	(1978)	PAULY, D.	A preliminary compilation of fish length growth parameters
56	(1978)	WITTSTOCK, R.-R.	Vergleich der aus Temperatur- und Dichtefluktuationen berechneten Vertikalgeschwindigkeit im GATE-Gebiet

57	(1978)	STRUVE, S.	Transport und Vermischung einer passiven Beimengung in einem Medium mit einem vorgegebenen Geschwindigkeitsfeld
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68	(1979)	KNOLL, M.	Zur Wärmebilanz der ozeanischen Deckschicht im GATE-Gebiet
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