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See also Report for
Parts 1 & 2 from
K. Brander.

CRUISE REPORT: PML/MAFF/1/88 (ROSIMER 88)

VESSEL: RV CIROLANA

CRUISE PERIOD: 9-21 April 1988 4/88 part 1.

PERSONNEL:	PML	D Conway	MAFF	K Brander (SIC)
		A Lindley		C Hood
		N Collins		R Flatt
		M Jordan		S Milligan
		A Pomroy		
		N Halliday		
		I Firkin		

ITINERARY

9 April	1400 GMT	Cirolana docked Plymouth. PML equipment loaded and secured.
	1700	Departed Plymouth and set course for Irish Sea.
10 April	0906	Shakedown trials for rosette sampler and MIK net operations.
	1300	UOR depth calibration trials.
	2225	Commenced UOR and rosette transect from Anglesey to Dundalk Bay.
11 April	1153	Completed transect.
	1457	HSTN grid off Dundalk Bay.
	2329	At position 53°47'N 05°49'W DLHPR and rosette sampling.
12 April	0731	Production and light rigs deployed. Rosette and DLHPR sampling. HSTN line and 2 m ring net sampling.
13 April	0656	Production and light rigs deployed.
	0906	2 m ring net sampling. Rosette sampling.
14 April	0741	Line of HSTN stations out to deeper water. 53°50'N 05°32'W.
	1034	Rosette and DLHPR sampling.
	1600	Two UOR transects north and south of the above position.
15 April	0807	Production and light rig launched late due to fog.
	1157	HSTN grid round rig.
	1935	2 m ring netting. Rosette and DLHPR sampling.
16 April	0104	2 m ring netting and rosette sampling.
	0130	Steamed east to frontal area. 53°44'N 05°09'W.
	0604	Unfavourable weather for launch of production and light rig.
	1206	Commenced UOR transect towards Holyhead where C.Hood was disembarked.
	1951	At position off Anglesey 58°41'N 03°59'W. Ring netting and rosette sampling.
17 April	0639	Deployed production and light rig. Ring netting, HSTN, DLHPR and rosette sampling.
	1419	HSTN sampling north along English coast.
18 April	0748	Commenced UOR and rosette transect from Anglesey to Dundalk Bay.
	2055	End of transect.

19 April	0654	Inshore in Dundalk Bay 53°55'N 06°05'W. Ring netting and rosette sampling.
	1424	At offshore position 53°52'N 06°00'W. Ring netting rosette and HSTN sampling.
	2314	Completed sampling and steamed to deeper water position 53°50'N 05°32'W.
20 April	0652	Ring netting and rosette and HSTN sampling.
	2000	Line of HSTN stations towards Welsh coast for MAFF as a pre-cursor of work to be done on the second leg.
21 April	0930	Docked Holyhead. Unloaded PLM equipment and returned to Plymouth.

OBJECTIVES

- (1) To determine the rates and processes of primary and secondary production in different regions of the Irish Sea.
- (2) To assess the vertical and horizontal availability of food for fish larvae in relation to hydrographic conditions.
- (3) To determine the nutritional status of fish larvae in relation to feeding conditions.
- (4) To determine particle size distribution in relation to hydrography and larval feeding.
- (5) To construct a C/N budget of the production transformation and fate of biogenic particulates.

METHODS:

- (1) Primary production measurements for assessment of regional productivity in relation to different light regimes and hydrographic conditions.
- (2) Undulator tows to determine regional hydrographic conditions; concurrent high-frequency echo sounding, surface temperature, salinity, chlorophyll a fluorescence, plankton size fractionation, nutrient and particle size analyses.
- (3) Depth stratified and integrated net tows for distribution of fish larvae (specifically sprat and sole) in relation to available food.
- (4) Net sampling at specific depths determined from CTD/fluorescence and particulate profiles to provide larvae for nutritional/age analyses.
- (5) Selection of larvae for nutritional analyses using techniques of RNA/DNA, amino acid, vitamin, CHN, lipid and microscope gut contents analysis.
- (6) Night and day tows of the double Longhurst-Hardy Plankton Recorder (DLHPR) (20 and 200 μ mesh) to be taken at three selected sites together with rosette profiles to determine C and N in the size fractions $>1 \mu\text{m}$, $>20 \mu\text{m}$, $>200 \mu\text{m}$. Water samples to be filtered onto pre-ashed GFF filters. The $>20 \mu\text{m}$ DLHPR samples to be split, one half filtered onto pre-ashed pre-weighed GFC and the other half split again to give a quarter for Coulter Counting and a quarter for preservation for taxonomic examination. The $>200 \mu\text{m}$ DLHPR samples to be sorted into the larger taxa and dried. The smallest

organism fractions to be preserved in formaldehyde.

RESULTS

- (1) Fifteen UOR tows were completed along 5 transects (Table 1, Fig. 1). There were considerable differences in hydrography, chemistry and production between the time the initial Anglesey to Dundalk Bay transect was done on the 10/11 April and when it was repeated eight days later indicating the start of the spring bloom. The dual frequency echo integrator system was run on all except the last UOR transect. Rosette casts were taken before and after each tow. Salinity and temperature was measured and water samples taken for chlorophyll a and carbon analysis and particle counting. Only small volumes of water could be filtered (generally 0.5 l) because of the high particulate loading. Surface fluorescence, salinity, temperature and nutrients (nitrate, nitrite, phosphate and silicate) were measured continuously (nutrients only on the long UOR transects).

At the end of each UOR tow 20 litres of water was fractionated using the filter rig (Table 2) (22, 100 and 200 μ filters). Half the material collected was filtered onto GFC papers for chlorophyll a and carbon analysis and the other half preserved for taxonomic identification.

- (2) Seven DLHPR hauls were taken with the double net system (20 and 200 μ) (Table 3, Fig. 1), with rosette casts for environmental information taken before and after. Clogging of the nets by Phaeocystis was severe off Anglesey.
- (3) Samples of sprat were collected, mainly by 2 m ring net, from three different sites (Table 4) for lipid, DNA/RNA, vitamin, amino acid, HPLC, CHN and gut content analysis. Plankton sampling, particulate collection and particle counting were carried out simultaneously to estimate the amount and quality of food available. As well as comparing different areas, attempts were made to collect stratified samples. No larval sole were sampled.
- (4) The free floating buoy system supporting the recording light meter array and primary production experiments was deployed on four occasions. On the last occasion the equipment was damaged by a fishing vessel.

On eight days samples were taken from nine depths for measurement of the spectral absorption of the dissolved total particulate and detrital particulate fractions. Samples were also taken for subsequent HPLC analysis for the phytoplankton pigments.

Size fractionated primary production measurements at nine depths were successfully carried out on three occasions till the rig was damaged. On nine occasions other measurements taken included laboratory ^{14}C experiments to determine production against incident light, heterotrophic bacterial activity at different depths, nutrients, chlorophyll a, size fractionated chlorophyll and bacteria, protozoan and phytoplankton numbers.

- (5) High speed tow-net (HSTN) grids and lines were carried out to establish distribution of sprat larvae round positions being sampled for nutritional studies.

- (6) Samples of water, sediments and organisms were taken for radioactivity studies.

EQUIPMENT AND OPERATIONAL PROBLEMS

Deck reading fluorometer measurements could not be taken with the rosette sampler but this deficiency was remedied by securing the PLM recording fluorometer to the rosette frame.

The transmissometer on the rosette sampler failed near the beginning of the cruise.

One DLHPR haul had to be repeated because of jamming in the 200 μ cod-end caused by a large crustacean. Jamming problems were encountered with the 20 μ cod-end and one night haul was not obtained.

Trials with the MAFF LHPR deck command system were unsuccessful because of what was subsequently found to be a faulty cod-end motor.

One UOR tow was lost due to battery failure.

The production and light meter rigs were twice picked up by fishing vessels and relatively minor articles removed. The second time the rig was picked up, probably after it had been run down, was in perfect weather conditions. One of the light sensors was damaged and the rig could not be used again during the cruise.

Prepared by: D V P Conway

Approved by: *J. Bayne*

Date: 10th August 1988

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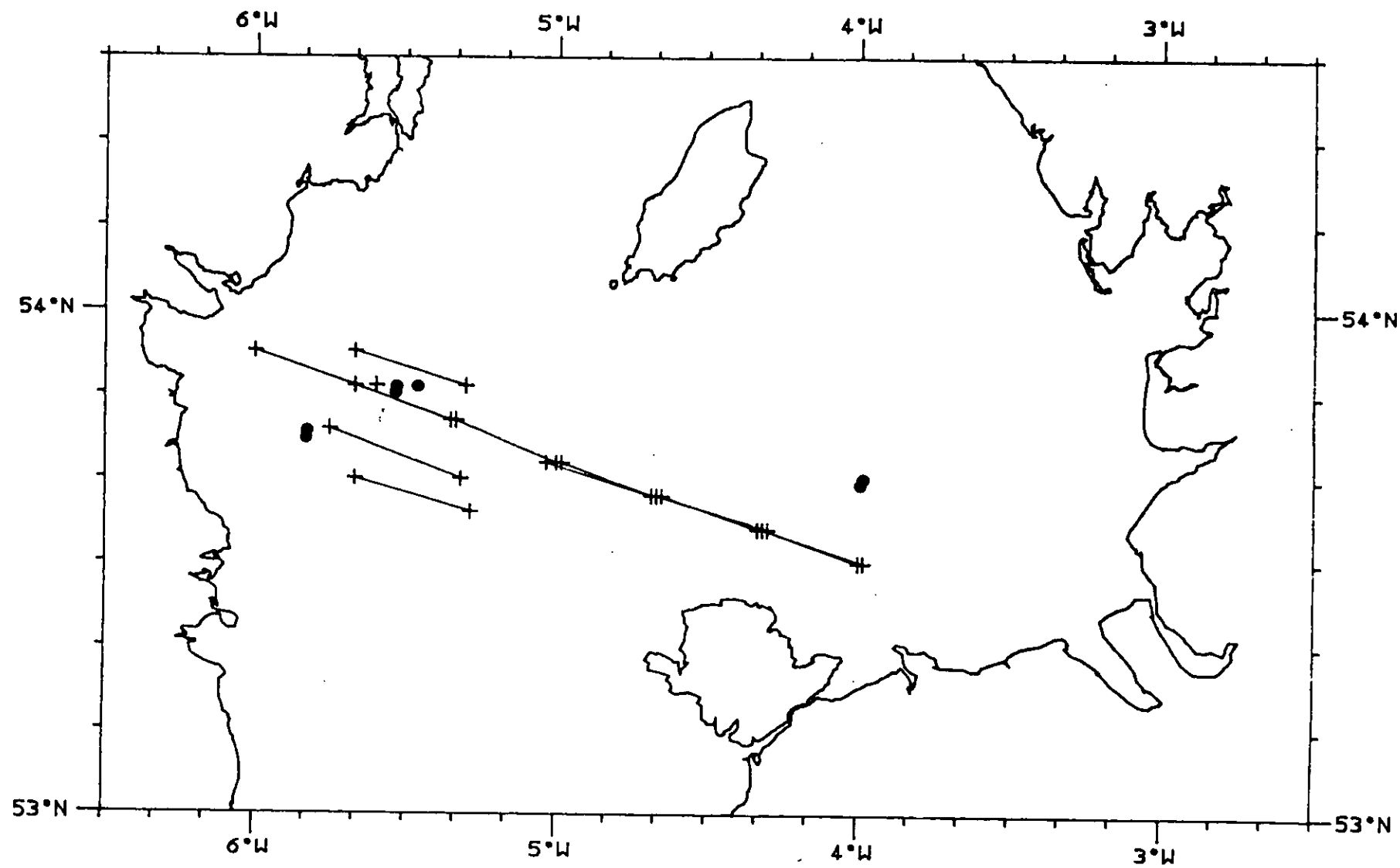


FIG.1 CIR088 UOR TOWS +

LHPR TOWS •

Table 1

UOR shooting and hauling information

Number	Date	Shooting Position	Time (GMT)	Hauling Position	Time (GMT)
1	10/11.4.88	53°30'N 04°00'W	1306	53°34'N 04°19'W	0034
2	11.4.88	53°34'N 04°20'W	0110	53°38'N 04°39'W	0250
3	11.4.88	53°38'N 04°41'W	0320	53°42'N 04°59'W	0459
4	11.4.88	53°42'N 05°00'W	0521	53°47'N 05°20'W	0700
5	11.4.88	53°47'N 05°21'W	0758	53°51'N 05°40'W	0932
6	11.4.88	53°51'N 05°40'W	1005	53°55'N 06°00'W	1135
7	14.4.88	53°46'N 05°45'W	1600	53°40'N 05°19'W	1745
8	14.4.88	53°51'N 05°18'W	1905	53°55'N 05°40'W	2050
9	16.4.88	53°40'N 05°40'W	1210	53°36'N 05°17'W	1350
10	18.4.88	53°30'N 03°59'W	0806	53°34'N 04°19'W	1014
11	18.4.88	53°34'N 04°18'W	1045	53°38'N 04°40'W	1235
12	18.4.88	53°38'N 05°41'W	1305	53°42'N 05°02'W	1440
13	18.4.88	53°42'N 05°00'W	1522	53°47'N 05°20'W	1649
14	18.4.88	53°47'N 05°21'W	1718	53°51'N 05°40'W	1850
15	18.4.88	53°51'N 05°40'W	1915	53°55'N 06°00'W	2045

Haul number 1 was invalidated due to battery failure.

Table 2

CIROLANA CRUISE

APRIL 9 - APRIL 21 1988

IRISH SEA

FILTER RIG

FILTERED 20L THROUGH 200, 100, 22 u

SPLIT: Half into formalin, half filtered onto 4.7 um GFC & frozen.

TIMES GMT

RIG NUMBER	DATE	TIME	POSITION		VOLUME FILTERED		VOLUME FILTERED		BEFORE	SLIDE NUMBERS				NOTES
			LATIT	LONGIT	CHLORO BEFORE	CARBON BEFORE	CHLORO AFTER	CARBON AFTER		>200u	>100u	>22u	AFTER	
FR 1	10-Apr	2219	N 53 30	W 04 00	1.00	1.00	1.00	0.50	D 735	D 730	D 731	D 733	D 805	ST'T UOR1
FR 2	11-Apr	44	N 53 34	W 04 20	0.50	0.50	0.50	0.50	D 812	D 806	D 807	D 809	D 815	END UOR 1
FR 3	11-Apr	258	N 53 38	W 04 39	0.50	0.50	0.50	0.50	D 822	D 820	D 823	D 827	D 826	END UOR 2
FR 4	11-Apr	305	N 53 42	W 05 00	0.50	0.50	0.50	0.50	D 831	D 830	D 833		D 837	END UOR 3
FR 5	11-Apr	739	N 53 47	W 05 20	1.00	0.70	0.70	0.70	D 845	D 839	D 840	D 842	D 848	END UOR 4
FR 6	11-Apr	945	N 53 51	W 05 40	0.50	0.50	0.50	0.50	D 850	D 852	D 853	D 854	D 857	END UOR 5
FR 7	11-Apr	1145	N 53 55	W 06 00	0.50	0.50	0.50	0.50	D 862	D 864	D 865	D 867	D 868	END UOR 6
FR 8	14-Apr	1553	N 53 45	W 05 45	0.70	0.70	0.70	0.70	D 3142	D 3139	D 3143	D 3144	MISSING	ST'T UOR7
FR 9	14-Apr	1752	N 53 40	W 05 19	0.50	0.50	0.50	0.50	D 3230	D 3223	D 3226	D 3227	D 3231	END UOR 7
FR 10	14-Apr	1907	N 53 51	W 05 18	0.50	0.50	0.50	0.50	D 3235	D 3232	D 3233	D 3234	D 3236	ST'T UOR8
FR 11	14-Apr	2049	N 53 55	W 05 40	0.50	0.50	0.50	0.50	D 3237	D 3241	D 3240	D 3242	D 3238	END UOR 8
FR 12	16-Apr	1148	N 53 40	W 05 40	0.50	0.55	0.50	0.50	D 1089	D 3270	D 3272	D 3273	D 888	ST'T UOR9
FR 13	16-Apr	1353	N 53 36	W 05 16	0.50	0.50	0.50	0.50	D 890	D 918	D 920	D 922	D 893	END UOR 9
FR 14	18-Apr	750	N 53 30	W 04 00	0.50	0.50	0.50	0.50	D 993	D 995	D 997	D 999	D 1001	ST UOR 10
FR 15	18-Apr	1027	N 53 34	W 04 19	0.50	0.50	0.50	0.50	D 1011	D 1015	D 1018	D 1020	D 1022	END UOR10
FR 16	18-Apr	1246	N 53 38	W 04 40	0.50	0.50	0.50	0.50	D 1063	D 1065	D 1078	D 2487	D 2489	END UOR11
FR 17	18-Apr	1454	N 53 42	W 05 01	0.50	0.50	0.50	0.50	D 2508	D 2510	D 2512	D 2515	D 2518	END UOR12
FR 18	18-Apr	1654	N 53 47	W 05 20	0.50	0.20	0.20	0.20	D 2537	D 2538	D 2542	D 2543	D 2545	END UOR13
FR 19	18-Apr	1852	N 53 51	W 05 40	0.20	0.20	0.30	0.20	D 2560	D 2566	D 2568	D 2562	D 2570	END UOR14
FR 20	18-Apr	2049	N 53 55	W 06 00	0.30	0.20	0.50	0.30	D 2593	D 2595	D 2597	D 2599	D 2900	END UOR15

Table 3

Cirolana 9-21 April 1988. DLHPR Haul details

Haul No	Date	Time (GMT)	Position	Number of Samples	
				20 μ	200 μ
IS 18	11.4.88	2329	53°47'N 05°49'W	16	14
19	12.4.88	1156	53°45'N 05°50'W	19	12
20	14.4.88	1209	53°50'N 05°32'W	25	27
21	14.4.88	2322	53°51'N 05°32'W	-	29
22	15.4.88	2323	53°51'N 05°32'W	-	24
23	17.4.88	1223	53°41'N 03°59'W	15	14
24	17.4.88	2259	53°40'N 04°00'W	12	13

Haul 21 was repeated when the 20 μ cod-end jammed but it still gave problems in Haul 22 and was not repeated again.

Table 4

Cirolana 9-21 April 1988. Number of sprat larvae taken at each position for analysis

Date	Position	Lipids	DNA/RNA	Vitamins	Amino Acids	HPLC	CHN
13.4.88	53°55'N 06°05'W	11	18	22	23	128	23
15/16.4.88	53°50'N 05°32'W	20	20	20	20	30	20
19.4.88	53°55'N 06°05'W	28	24	12	12	14	20
19.4.88	53°52'N 06°00'W	12	13	12	26	12	10
20.4.88	53°50'N 05°32'W	20	24	25	22	21	20
20.4.88	53°50'N 05°32'W	9	15	10	4	3	-
Total larvae		100	114	101	107	208	93