5706

BIOLOGICAL OCEANOGRAPHY CRUISE REPORT

6-8 May 1996

PERSONNEL

I Heaney	(SIC) DANI
C Gibson	DANI
M McAliskey	DANI
M Dring	QUB
J Burgess	QUB
J Batchellor	QUB
A Kuwata	Visitor - University of Barcelona

OBJECTIVES

This is a short experimental seed-corn cruise to better quantify physical and biological factors and rate processes determining the metabolism and fisheries of the Irish Sea. In doing so it brought together relevant experience from within and without DANI.

Specific objectives were:

i. To describe the physical (light, stratification), chemical (salinity, nutrients) and biological (chlorophyll *a*, plankton) structure of nearshore and offshore regions of the Western Irish Sea with particular reference to anomalous data collected from the same areas during mid-April 1996.

ii. To make measurements of algal growth rates and nitrate reductase of phytoplankton from samples collected at the deep chlorophyll maximum offshore. These samples provided material fro Dr Kuwata to examine resting stages of phytoplankton.

iii. To collect fish larvae for determining growth rates by image analysis of dividing muscle cells.

CRUISE NARRATIVE

Monday, 6 May 1996

Scientific crew assembled on board by 20.00 h. A comprehensive talk on ship safety and demonstration of life saving equipment was given before departure from Belfast at 21.22 h for station 45 under calm conditions. The scientific personnel gathered in the evening for a discussion and planning of the work to be undertaken.

Tuesday, 7 May 1996

The ship arrived at station 45 in the early morning where a report of the disappearance of the DANI instrument mooring was confirmed. The nearby MAFF buoy was still in position.

CTD and light profiles were made at c. 10.00 h. The plankton was dominated by large *Thallasiosira* cells (c. 300 µm diameter) and small picoplankter cells (c. 1-2 µm diameter).

Position was moved to station 45 into shallower c. 50 m deep water in Dundalk Bay. The CTD/chlorophyll *a* profiles showed well developed stratification with little chlorophyll in the upper layers but a large maximum at about 21 m depth and high biomass in deeper layers. The phytoplankton at the chlorophyll maximum showed a much higher biodiversity than at Station 46.

Water samples were collected from 21 m depth and subsamples incubated on the deck of the Lough Foyle in water baths covered with netting to reduce the light penetration by c. 80%. Measurements were made at 3 hourly intervals for the following 24 h for algal growth and changes in chlorophyll *a*, particulate nitrogen and nitrate reductase activity.

Bongo net sub samples were also obtained to obtain young fish larvae.

The 'Lough Foyle' steamed nearer the Irish coast to station 47 where large amounts of *Phaeocystis* in the non-flagellated stage were observed and which blocked the nets.

The ship returned to station 45 via station 46 where we were joined by the RV Prince Madock.

Wednesday, 8 May 1996

The Lough Foyle proceeded in the early ours in a southerly direction following observations of the sighting of an 'unknown' buoy in the recent DANI *Nephrops* cruise. This was the 'lost' DANI mooring buoy, some 7 miles distant from its original deployment. The mooring and all instrument was recovered intact and without damage, a remarkable piece of good fortune.

Samples for light, CTD and phytoplankton were collected at station 45.

The ship docked in Belfast at 17.10 h.

Summary of results

Information on light and CTD measurements is attached. Further information on nutrient concentrations and growth rates and nitrate reductase will follow after analysis.

The noteworthy observations were the marked differences of water quality nearshore and offshore over relatively small distances. The data from this cruise and that during mid-April will give valuable information on the factors influencing interannual change in the Irish Sea not heretofore appreciated.

Moored Water Sampler

It is to the great credit of the crew of the 'Lough Foyle' that this was located and retrieved without appreciable damage so far from its position of deployment. It seems most likely that a warp from a fishing boat snagged a temperature sensor attached to the mooring line. Modifications will be made so that such snagging cannot happen again.

cknowledgements

I am grateful to the visitors, Drs Dring, Kuwata and Burgess for their participation in the cruise and for the value they added to the DANI programme.

I am also deeply indebted to the crew of the ship for their fulsome help and cooperation at all times but in particular for the recovery of the lost mooring.

S I Heaney

Lough Foyle cruise, 6-8 May 1996 Light readings

St 45: 7.5.96, 0955-1030 h Hazy sun Bottom: 105 m

Techtum: spectral irradiance @ 550 nm:

Depth (m)	Irrad (Q/ m2/s/nm)	k (calc. fro last depth)	50% depth	1% depth
2	1100			
3	1000	0.09531	7.27254	48.3177
5	600	0.25541	2.71383	18.0303
10	350	0.1078	6.42998	42.7199
15	135	0.19053	3.63796	24.1701
20	50	0.19865	3.48928	23.1823
Means:		0.16954		27.1626

LiCor: downwelling and upwelling irradiance (µmol/m2/s)

Depth (m)	Down-welling	k (calc. fro last depth)	Up-welling	UW/DW (%)
5	275		12.7	4.61818
10	89	0.22563	5.3	5.95506
15	38.5	0.1676	2.48	6.44156
20	14	0.20232	0.9	6.42857
		0.19851		5.86084

Station 46: 7.5.96, 1340-1410 h Full sun Bottom: 50 m

Techtum: spectral irradiance @ 550 nm:

Depth (m)	Irrad (Q/ m2/s/nm)	k (calc. fro last depth)	50% depth	1% depth
5	1250			
10	775	0.09561	7.24995	48.1676
15	450	0.10872	6.37534	42.3569
20	235	0.12993	5.33467	35.4428
25	180	0.05333	12.9984	86.3592
Means:		0.0969		47.5264

LiCor: downwelling and upwelling irradiance (µmol/m2/s)

Depth (m)	Down-welling	k (calc. fro last depth)	Up-welling	UW/DW (%)
5	575		7.8	1.35652
10	280	0.14392	4.7	1.67857
15	145	0.13161	3.6	2.48276
20	68.5	0.14998	2.4	3.50365
25	57	0.03676	2.2	3.85965
		0.11557		2.57623

Station 47: 7.5.96, 1545-1600 h Full sun Bottom: 20 m

Techtum: spectral irradiance @ 550 nm:

Depth (m)	Irrad (Q/ m2/s/nm)	k (calc. fro last depth)	50% depth	1% depth
5	650			
10	250	0.1911	3.6271	24.0979
15	110	0.1642	4.22146	28.0468
17	80	0.15923	4.3532	28.9221
12	160	0.13863	5	33.2193
7	450	0.20681	3.35154	22.2671
5	750	0.25541	2.71383	18.0303
Means:		0.1859		24.7727

LiCor: downwelling and upwelling irradiance (µmol/m2/s)

Depth (m)	Down-welling	k (calc. fro last depth)	Up-welling	UW/DW (%)
5	290		7.5	2.58621
10	85	0.24545	3	3.52941
15	33	0.18923	1.7	5.15152
17	25	0.13882	1.3	5.2
12	53	0.15028	2.1	3.96226
7	200	0.26561	5.6	2.8
5	350	0.27981	9	2.57143
		0.21153		3.68583

Station 50: 8.5.96, 0815-0830 h Full sun Bottom: 100 m

Techtum: spectral irradiance @ 550 nm:

Depth (m)	Irrad (Q/ m2/s/nm)	k (calc. fro last depth)	50% depth	1% depth
Surface	1200			
5	380			
10	160	0.173	4.00664	26.6196
15	87	0.12185	5.68838	37.7928
20	33	0.19388	3.57513	23.7527
Means:		0.16291		28.268

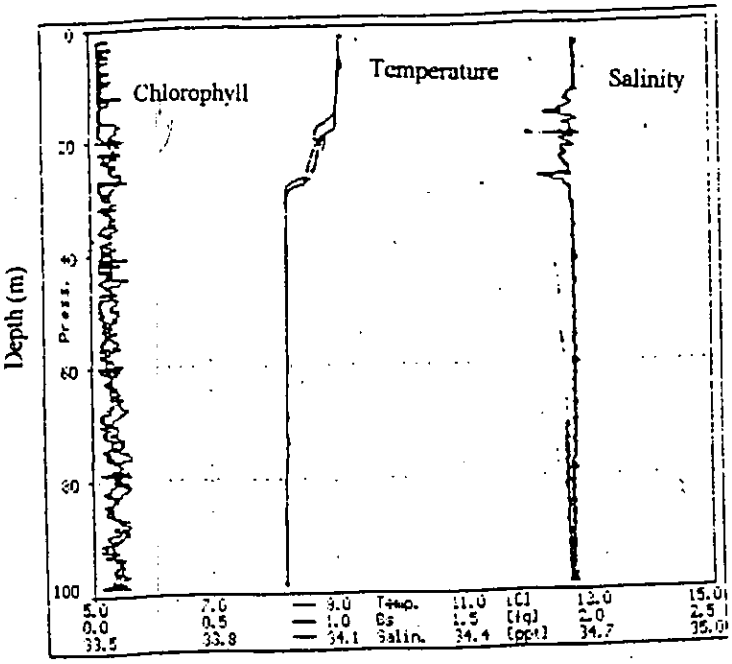
LiCor: downwelling and upwelling irradiance (µmol/m2/s)

Depth (m)	Down-welling	k (calc. fro last depth)	Up-welling	UW/DW (%)
Surface	750			
5	165		8.3	5.0303
10	64	0.18941	4.2	6.5625
15	31.5	0.14178	3.1	9.84127
20	13.7	0.16652	1.4	10.219
		0.1659		7.91326

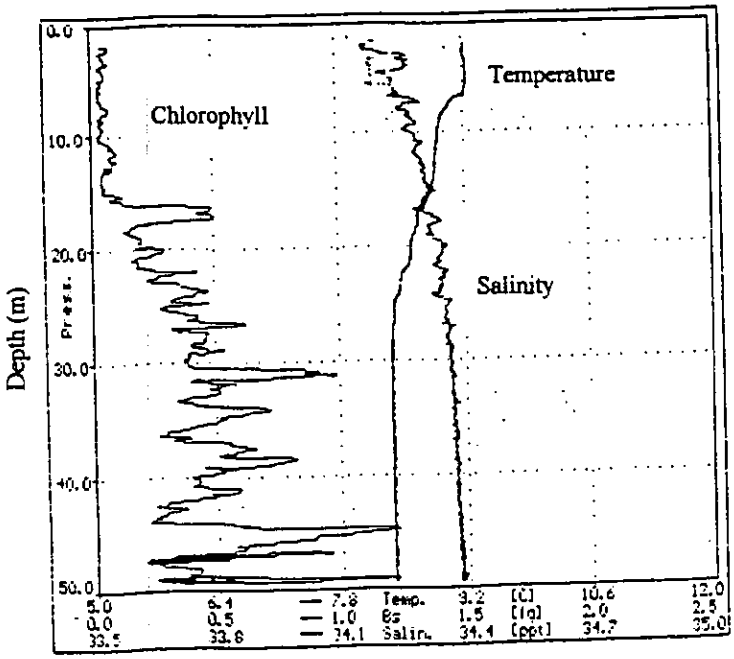
Techtum: spectral irradiance at different depths (Q/m2/s/nm)

Depth	400 nm	450 nm	500 nm	550 nm	600 nm	650 nm	700 nm	750 nm
Surface	470	850	1100	1200	1250	1400	1410	1390
5	85	250	380	380	130	45	7.5	-
10	23.5	95	175	160	25	3.2	-	-
15	5.5	47	105	87	7.7	-	-	-
20	0.25	16.5	45	33	1	-	-	-
k (5-10)	0.25713	0.19352	0.15508	0.173	0.32973	0.5287	-	-
k(10-15)	0.29045	0.14075	0.10217	0.12185	0.23553	-	-	-
k(15-20)	0.61821	0.20936	0.16946	0.19388	0.40824	-	-	-
Means:	0.3886	0.18121	0.14223	0.16291	0.3245	-	-	-

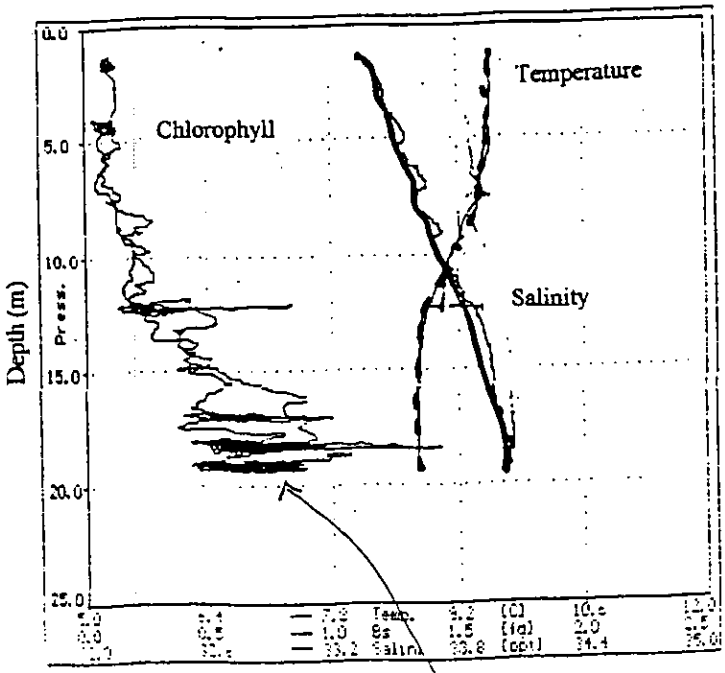
Profiles from stations working inshore from Station 45



Station 45 (100m depth)



Station 46 (50m depth)



Station 47 (20m depth)