5726

BIOLOGICAL OCEANOGRAPHY CRUISE REPORT

LF 20/98

10 - 13 May 1998

PERSONNEL

B Stewart	(SIC), SSO, DANI.
P Elliott	SO, DANI.
J McGinley	Student, Univ. Ulster
C Watson	Student, Univ. Ulster
M Trimmer	Res. Assist. Univ. Essex

OBJECTIVES

i. To investigate the effect of tidal current on nutrient concentrations in the immediate environment of the moored water sampler.

ii. To assess the possibility of a nutrient rich environment around the moored water sampler.

iii. To assess temperature, salinity and nutrient distributions over depth at stations 38A and 47.

iv. To assess oxygen consumption and denitrification at sediment-water interface at station 38A. (M Trimmer: Univ. Essex)

CRUISE NARRATIVE

Sunday 10 May 1998

In preparation for the cruise, all DANI scientific crew were onboard by 2000 hrs when mooring instrumentation was programmed, tested and confirmed to be functioning properly. Following a talk on ship safety and a demonstration of personal life saving equipment, the RV Lough Foyle departed Belfast at 2100 hrs and sailed overnight in a light easterly wind to station 38A, the DANI mooring site.

Monday 11 May 1998

The ship arrived on station 38A at 0600 hrs. With a strong south easterly wind all mooring and instrument deployments were postponed and the ship sailed to the coastal station 47 in Dundalk Bay where the CTD/water sampler was successfully deployed. As the wind began to ease the ship slowly returned to station 38A at 1540 hrs where the box corer was deployed to acquire sediment for oxygen consumption and denitrification experiments. The sediment cores were then prepared for incubation and

① Prof Raine
② Dr M Murray

This report continues our investigations with in situ samplers and this with other related data we are now getting a much clearer picture how this important area of the Irish Sea functions. The PO4 time series is interesting in that the spikes of P are not seen in winter & it is likely that these reflect regeneration activity at time of the spring bloom.

Jim H 29/5

the remainder of the experimental work was continued by M Trimmer (Univ. Essex). Following deployment of the rosette water sampler and zooplankton net, work for the day finished at 2030 hrs. The vessel drifted overnight at the mooring site.

Tuesday 12 May 1998

In a moderate to fresh easterly breeze, preparation for mooring recovery commenced at 0630 hrs. The instrument mooring and buoy (id No.3) was recovered to shipdeck at 0715 hrs. The McLane water samplers were serviced, thermistors down loaded and reprogrammed, mooring components inspected for corrosion and replaced where necessary. The mooring was then successfully redeployed at 1420 hrs on position 53^0 47^1.00N 5^0 38^1.08W. The guard buoy mooring (id No 1) was then successfully recovered to shipdeck at 1445 hrs. This mooring was upgraded to a full instrument mooring by the addition of a ground line, additional anchor and an instrument leg that included a McLane water sampler. The mooring was finally checked and deployed at 1920 hrs on position 53^0 46^1.81N 05^0 37^1.99W. The Irish Marine Emergency Service was informed of the change in position of the moorings and requested to modify their navigation warning broadcasts accordingly.
Work completed at 2000 hrs the vessel sailed to dock in Belfast next morning at 0220 hrs.

Wednesday 13 May 1998

Work commenced at 0830 hrs when scientific cruise equipment was dismantled and removed from the ship. The scientific crew disembarked at 1100 hrs.

PARAMETERS MONITORED

The CTD/rosette water sampler was deployed at station 38A and 47 to acquire nutrient, chlorophyll a, temperature and salinity data from the depth profile.
The box corer was deployed at station 38A where sediment samples were subsampled for carbon & nitrogen, chlorophyll *a*.

Sediment oxygen consumption & denitrification experiments
The box corer was successfully deployed at station 38A to acquire samples for the oxygen consumption and denitrification experiments. Following sample preparation procedures the rates of oxygen consumption and denitrification by the sediment were determined as described in Cruise Report LF 1498 (30 March - 3 April 1998).

Study of possible factors effecting nutrient concentrations in the immediate environment of the moored water samplers
The moored samplers have been extensively tested and validated to be contamination free. In the laboratory and under closely controlled conditions, the sampler faithfully produces the results obtained by other methods. However, in the sea, the samples frequently contain anomalously high concentrations of both phosphorus and ammonia. The concentrations encountered are considerably higher than normal so that upwelling or advection are not tenable explanations. Possible explanations are that they arise

from the excretion of animals during the diel migration of zooplankton or from the excretion of fish being attracted the shelter of the sampler package.
To investigate these possibilities, one water sampler was programmed to sample alternate days at minimum and maximum tidal current. At maximum current the tidal flush should remove any excretion products from the area around the sampler.
A second water sampler was programmed to sample at slack tide but with an extended sample intake tube so that the sample was taken at least 3 metres remote from the sampler package and the effect of sheltering fish.
The study is set to run for 5 - 6 weeks and results will not be available until after mooring recovery scheduled for late June 1998.

SUMMARY OF RESULTS

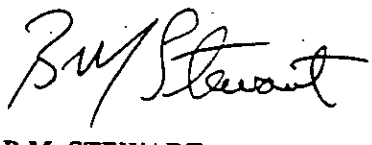
The CTD profile from station 38A showed a well defined thermocline at 30 metres with surface and bottom temperature and salinity 10.3 °C / 34.19 ppt and 9.1 °C / 34.49 ppt respectively. The "spring bloom" was evident with values of 0.4 fluorescence units recorded to a depth of 30 metres. (Fig. 1.)
More evidence of the "spring bloom" was evident with inorganic nitrogen values depleted to 1 - 3 micromoles N l^{-1} and zero silica concentrations above the thermocline. These results are consistent with nutrient data acquired from daily samples taken and preserved by the *in situ* moored sampler (Fig. 3). Below the thermocline values of 7 - 9 micromoles N l^{-1} and 3 - 6 micromoles SiO_2 l^{-1} were recorded.
In Dundalk Bay at Station 47 the profile was mixed with temperature and salinity 10.6 °C and 33.81 ppt respectively but fluorscence values ranging 0.6 - 0.8 indicated major plankton activity throughout the water column. (Fig. 2.). Trace levels of inorganic nitrogen (0.2 - 0.4 micromoles N l^{-1}) and zero silica concentration suggested substantial nutrient uptake by both dinoflagellates and diatoms.

HOTEL REPORT & OPERATIONAL ASPECTS OF THE SHIP

During the cruise the A-frame, main trawl winches, both hydrographic winches and the ship's clean sea-water supply were used. No problems were encountered with any of the ship's equipment nor indeed with any of the scientific equipment. The hotel and catering service was of the usual high standard and there was a good working relationship between the scientists and the ship's crew. Prior to the ship departing Belfast a comprehensive and detailed safety briefing was delivered to the scientific crew.

ACKNOWLEDGEMENTS

I am indebted the deck crew of the RV Lough Foyle for their co-operation and assistance during the mooring recovery and deployment operation. The ship's master, officers, engineers and catering staff are also thanked for their co-operation during this cruise.



B M STEWART
26 May 1998

Station 38H - Mooring site

11 May 1988

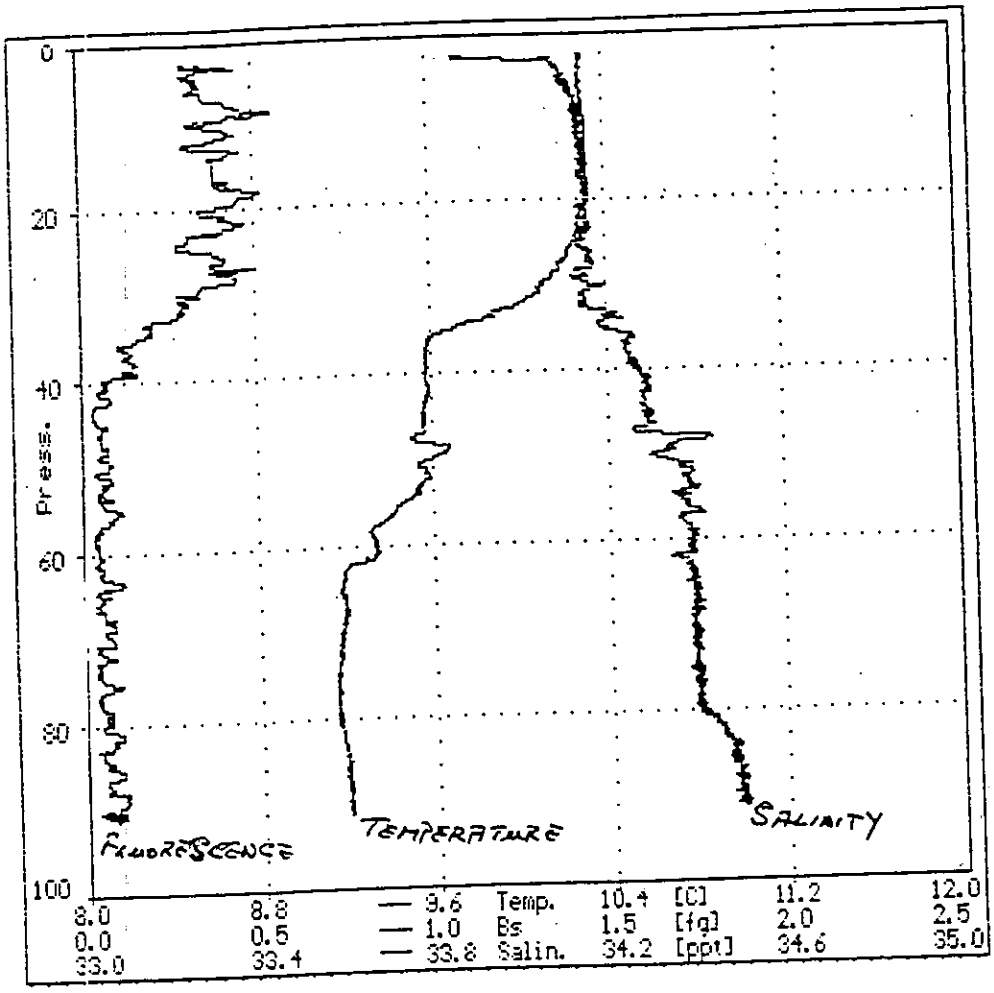


Figure 1.

Station 47 - Dundalk Bay
11 May 1998

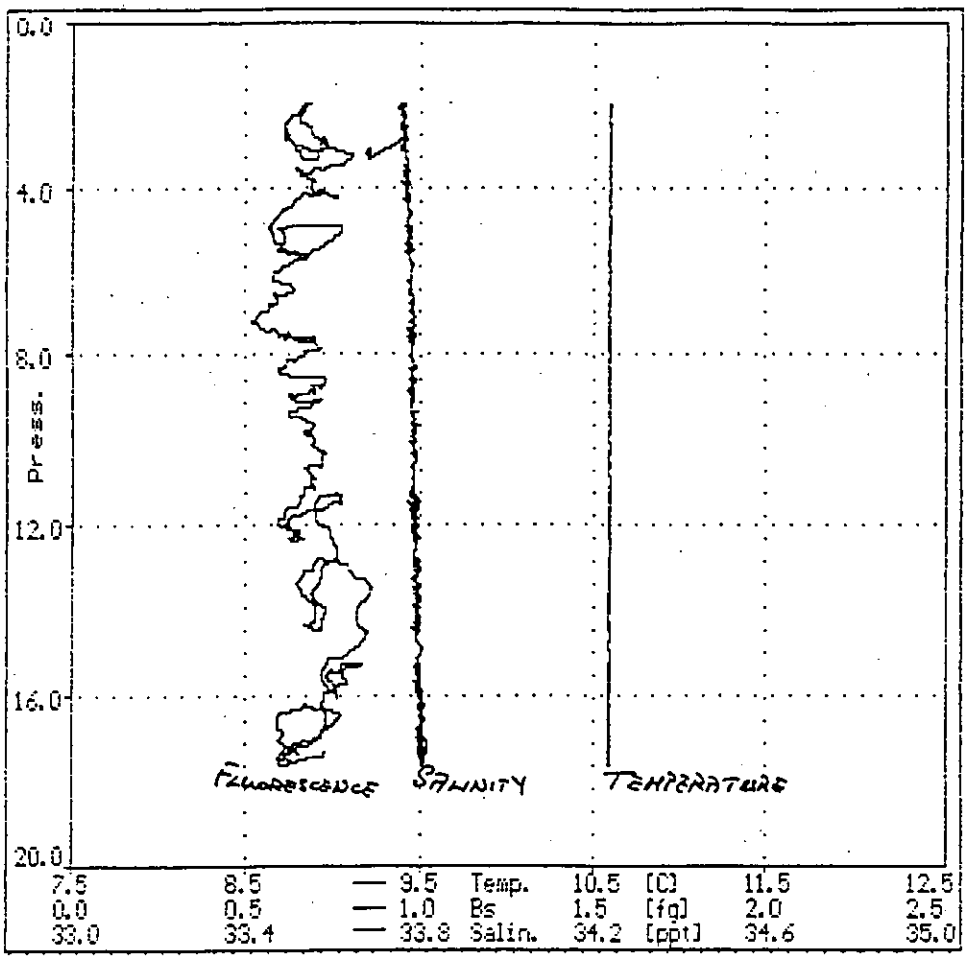
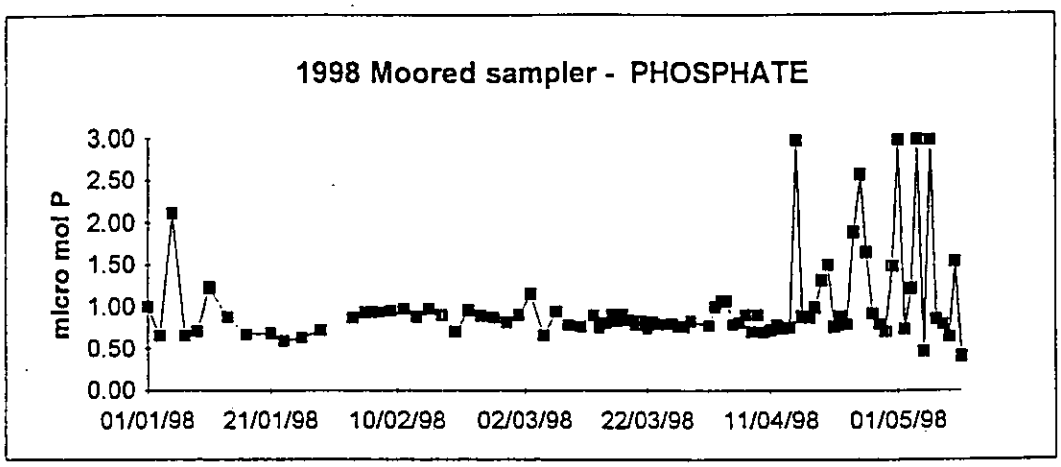
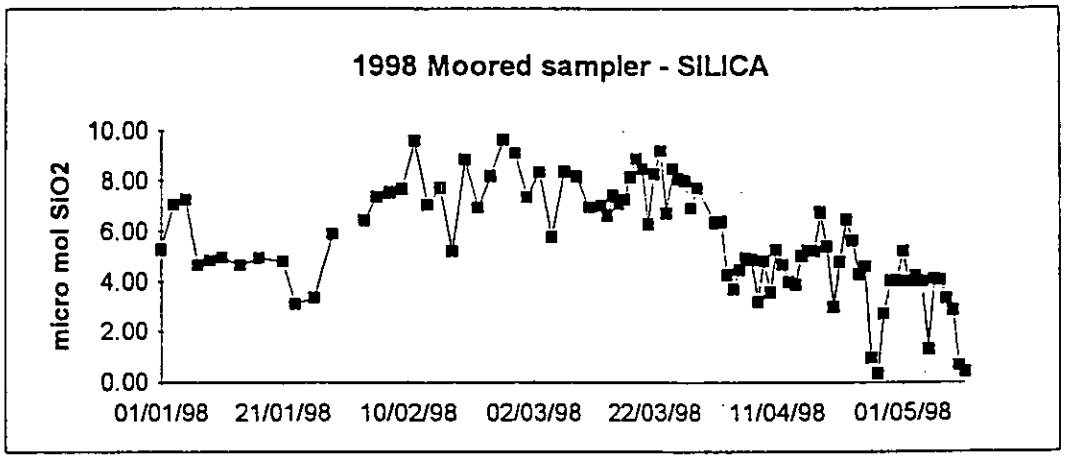


Figure 2.


1998 Moored sampler - PHOSPHATE
micro mol P
3.00
2.50
2.00
1.50
1.00
0.50
0.00
01/01/98
21/01/98
10/02/98
02/03/98
22/03/98
11/04/98
01/05/98


1998 Moored sampler - SILICA
micro mol SiO2
10.00
8.00
6.00
4.00
2.00
0.00
01/01/98
21/01/98
10/02/98
02/03/98
22/03/98
11/04/98
01/05/98

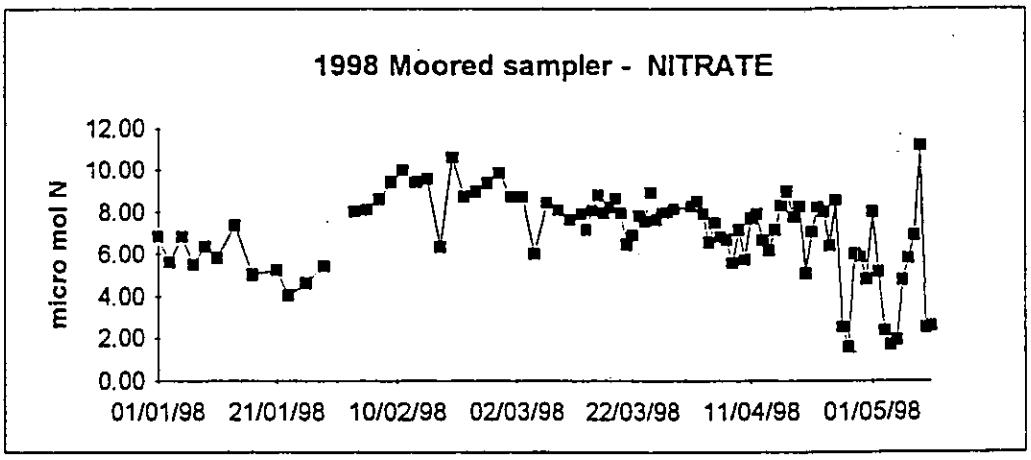

1998 Moored sampler - NITRATE
micro mol N
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/01/98
21/01/98
10/02/98
02/03/98
22/03/98
11/04/98
01/05/98

Figure 3.