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BIOLOGICAL OCEANOGRAPHY CRUISE REPORT

LF 14/98

29 - 31 March 1998

PERSONNEL

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

(2) Dr McManus

This cruise is a joint DANI/JO Cruise continuing our high time and resolution in situ moorin technology and the DETR/MAFF funded nutrient cycling study. It should be noted that of the 6 scientific personnel only two are DANI staff. We now have hig difficulties in maintaining the wor due to staff attrition for various reasons.

Jean H 26/5

OBJECTIVES

i. To recover, service and redeploy instrument mooring at station 38A.

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

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

CRUISE NARRATIVE

Sunday 29 March 1998

In preparation for the cruise, all DANI scientific crew were onboard by 1830 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 2200 hrs and sailed overnight in a strong southerly wind to station 38A, the DANI mooring site.

Monday 30 March 1998

The ship arrived on station 38A at 0600 hrs. The weather was dry with a fresh south easterly wind. Work commenced at 0800 hrs when the box corer was deployed to acquire sediment for oxygen consumption and denitrification experiments. The rosette water sampler was then deployed to collect a bulk sample for the experiment. The sediment cores were then prepared for incubation and the remainder of the experimental work was continued by M Trimmer (Univ. Essex).
Preparation for mooring recovery commenced at 0900 hrs. Despite difficulties arising from strong tidal currents, the instrument buoy (id No. 2) was recovered, slightly

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OBJECTIVES

i. To recover, service and redeploy instrument mooring at station 38A.

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

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

CRUISE NARRATIVE

Sunday 29 March 1998

In preparation for the cruise, all DANI scientific crew were onboard by 1830 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 2200 hrs and sailed overnight in a strong southerly wind to station 38A, the DANI mooring site.

Monday 30 March 1998

The ship arrived on station 38A at 0600 hrs. The weather was dry with a fresh south easterly wind. Work commenced at 0800 hrs when the box corer was deployed to acquire sediment for oxygen consumption and denitrification experiments. The rosette water sampler was then deployed to collect a bulk sample for the experiment. The sediment cores were then prepared for incubation and the remainder of the experimental work was continued by M Trimmer (Univ. Essex).
Preparation for mooring recovery commenced at 0900 hrs. Despite difficulties arising from strong tidal currents, the instrument buoy (id No. 2) was recovered, slightly

damaged, to shipdeck at 1030 hrs. The McLane water samplers were serviced, thermistors down loaded and reprogrammed, mooring components inspected for corrosion and following replacement of the damaged buoy with buoy No. 3, the mooring was successfully redeployed at 1530 hrs on position 53^0 47^1.05N 05^0 38^1.04W. The guard buoy mooring (id No 1) was then successfully recovered to shipdeck at 1600 hrs. Mooring components were checked and serviced and the mooring successfully deployed at 1730 hrs on position 53^0 46^1.78N 05^0 38^1.08W. The Irish Marine Emergency Service was informed of the change in position of the moorings and requested to modify their navigation warning broadcasts accordingly. Following deployment of the rosette water sampler, sediment corer and zooplankton net, work for the day finished at 2045 hrs. The vessel sailed to anchor overnight at station 47 in Dundalk Bay.

Tuesday 31 March 1998

Work commenced at 0630 hrs with deployment of the rosette water sampler and zooplankton net. After sampling the vessel sailed to dock in Belfast at 1500 hrs. The scientific crew disembarked at 1530 hrs.

Wednesday 1 April 1998

Scientific crew returned to the vessel at 0930 hrs when cruise equipment was dismantled and removed from the ship.

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 Bowers & Connelly mini-corer was successfully 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 38 to acquire samples for the oxygen consumption and denitrification experiments. Subsamples were taken using Perspex core tubes (50 cm x 80 cm) and (20 cm x 4 cm). Water was collected from the bottom using the rosette water sampler and then carefully reintroduced over the sediment in each core. The cores were then placed in aerated water baths in site water at *in situ* temperature and allowed to re-equilibrate for 2 hours.
Three of the large cores were then used to determine the rate of oxygen consumption by the sediment using dissolved oxygen electrodes and data logging equipment. The measurements will be used to calculate the organic carbon and organically bound nitrogen that is mineralised aerobically.
Three separate large cores were then capped and their overlying water gently aerated. Water samples (20 ml) were collected every 2 hours in order to measure the rate of exchange of nutrients (nitrate, nitrite, silicate, phosphate, ammonium and urea) between the sediment and the overlying water.
Nine of the smaller cores were used to determine the rate of denitrification using a $^{15}N\text{-}NO_3^-$ isotope pairing technique. This will enable the amount of (primarily)

mineralised nitrogen that is subsequently lost via denitrification and not available as new nitrogen for primary production, to be calculated.
Four separate small cores were used to measure the rate of sulphate reduction using a $^{35}S\text{-}SO_2^{2-}$ radio-isotope technique. The measurements will be used to calculate the organic carbon and organically bound nitrogen in the sediment that is mineralised anaerobically.

SUMMARY OF RESULTS

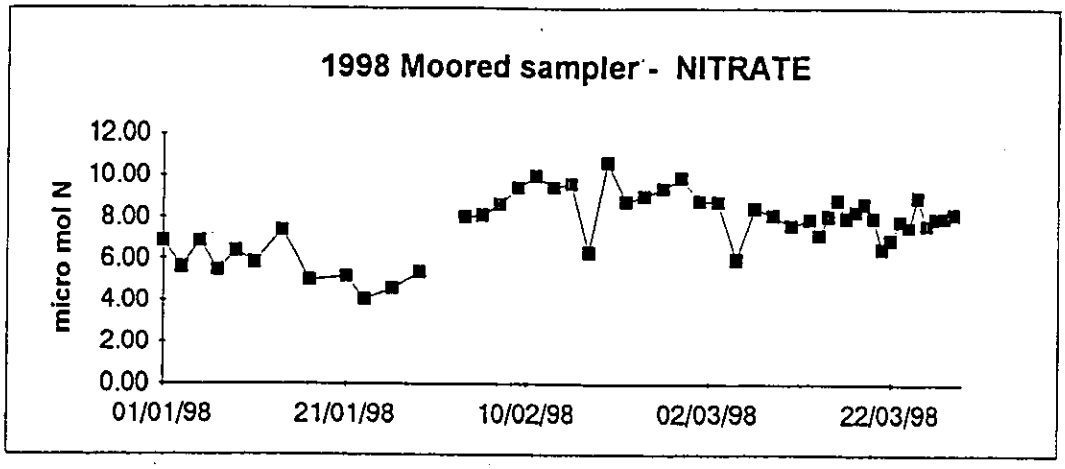
The CTD profile from station 38A showed a well mixed profile with temperature and salinity 9.2 °C and 34.15 ppt respectively. The temperature is approximately 1 °C lower than previously recorded during February. In Dundalk Bay Station 47 exhibited a freshwater influence from the river Boyne with surface temperature and salinity 9.1 °C and 33.20 ppt respectively and bottom temperature and salinity 9.2 °C and 34.00 ppt respectively.
At 38A, inorganic nitrogen values have probably reached their expected winter maximum at 8 - 10 micromoles N l^{-1} recorded throughout the depth profile. These results are consistent with nutrient data acquired from daily samples taken and preserved by the *in situ* moored sampler (*Fig. 1*).

ACKNOWLEDGEMENTS

I am indebted the deck crew of the MV 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

18 May 1998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01/01/98
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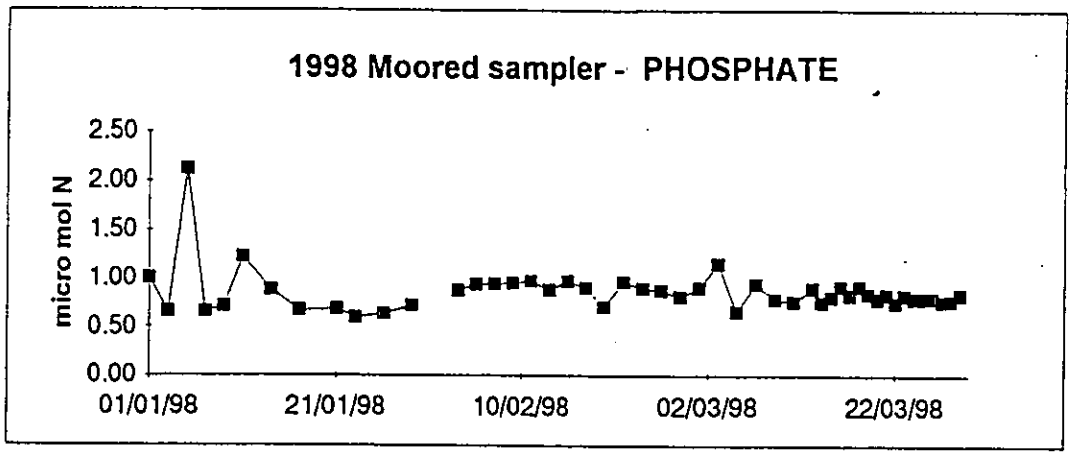
10/02/98
02/03/98
22/03/98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0.50
0.00
01/01/98
21/01/98
10/02/98
02/03/98
22/03/98

Fig. 1.