5715

Biological Oceanography Cruise : LF1597

Cruise Report

(April 05 - April 11)

Personnel

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Cruise Objectives

The two objectives of this cruise were to study the coupling between primary and secondary production at the start of the spring phytoplankton bloom and quantify the flux of particulate organic carbon to the benthos. Detailed objectives were to:

1. quantify phytoplankton production in two size fractions (whole and < 5.0 μm).
2. quantify the impact of zooplankton grazing on the phytoplankton community.
3. collect samples of phytoplankton and zooplankton for later identification and enumeration.
4. collect sediment samples for the determination of sediment pigment concentration.
5. collect water samples for the determination of particulate aluminium and dissolved inorganic nutrients.
6. service the DANI moorings.

Cruise Narrative

R.V. Lough Foyle departed Belfast at 1900 h on Friday April 04 and sailed overnight for station 47 in Dundalk Bay (Figure 1). Beginning at 0530 h on Saturday April 05, zooplankton (to estimate copepod gut pigment) were collected by vertical net haul every three hours. Water samples for primary production were collected at 0630 h. Copepod grazing experiments were conducted over 24 h periods. The DANI moorings (Figure 1) were serviced on Sunday April 06. Production and grazing studies at the mooring station were carried out during Monday and Tuesday April 07/08. Additional stations were sampled in the vicinity of the DANI mooring before the ship sailed for Liverpool Bay. Sampling over 24 h at the Liverpool Bay process site commenced at 1830 h on Tuesday April 08 and process studies were undertaken on Wednesday April 9, before Lough Foyle departed for Belfast. The ship docked in Belfast at 0830 on Thursday April 10.

Preliminary Results

All of the planned stations were worked and the experimental work was completed. The sediment trap mooring was retrieved and the trap material retained for later analysis. The trap mooring was successfully redeployed.

Selected nutrient data are presented in Table 1A. Depletion of nitrate (+nitrite) phosphate and silicate relative to winter concentrations was evident at S47 (Dundalk Bay). Nutrient concentrations at S38A (mooring site) were closer to winter levels. Concentrations of all three nutrients were substantially higher at LBP (Liverpool Bay) and compared to the other two sites near surface waters at LBP had higher concentrations of nitrate relative to phosphate and silicate.

At station 47 and LBP the spring bloom of phytoplankton was well underway with near surface chlorophyll concentrations of 3.8 and 5.9 mg m^{-3} respectively (Table 1B). There was however a difference in the proportion of the chlorophyll biomass in the < 5.0 μm fraction. At LBP less than 1% of the chlorophyll was associated with the < 5.0 μm fraction compared to 21% at S47. In contrast to the two coastal sites, chlorophyll concentrations in the upper 20 m of the water column at S38A were less than 1.0 mg m^{-3}, indicating that the spring bloom had not started at this offshore station. Furthermore, 44% of the chlorophyll was associated with the < 5.0 μm fraction (Table 1B).

The colonial flagellate *Phaeocyctis pouchetii* was observed in water samples from Dundalk bay and Liverpool Bay. The mesozooplankton was dominated by the copepod *Temora longicornis*, although *Pseudocalanus elongatus* and *Centropages hamatus* were also present in net hauls. *Acartia* spp. and *Calanus* spp. was rare at the time of sampling.

Acknowledgements

I would like to thank the captain, officers and crew of the R.V. Lough Foyle for their assistance during the cruise.

R.J. Gowen

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Figure 1.

A map of the Irish Sea showing the positions of the three process stations. The DANI mooring is located at station 38A

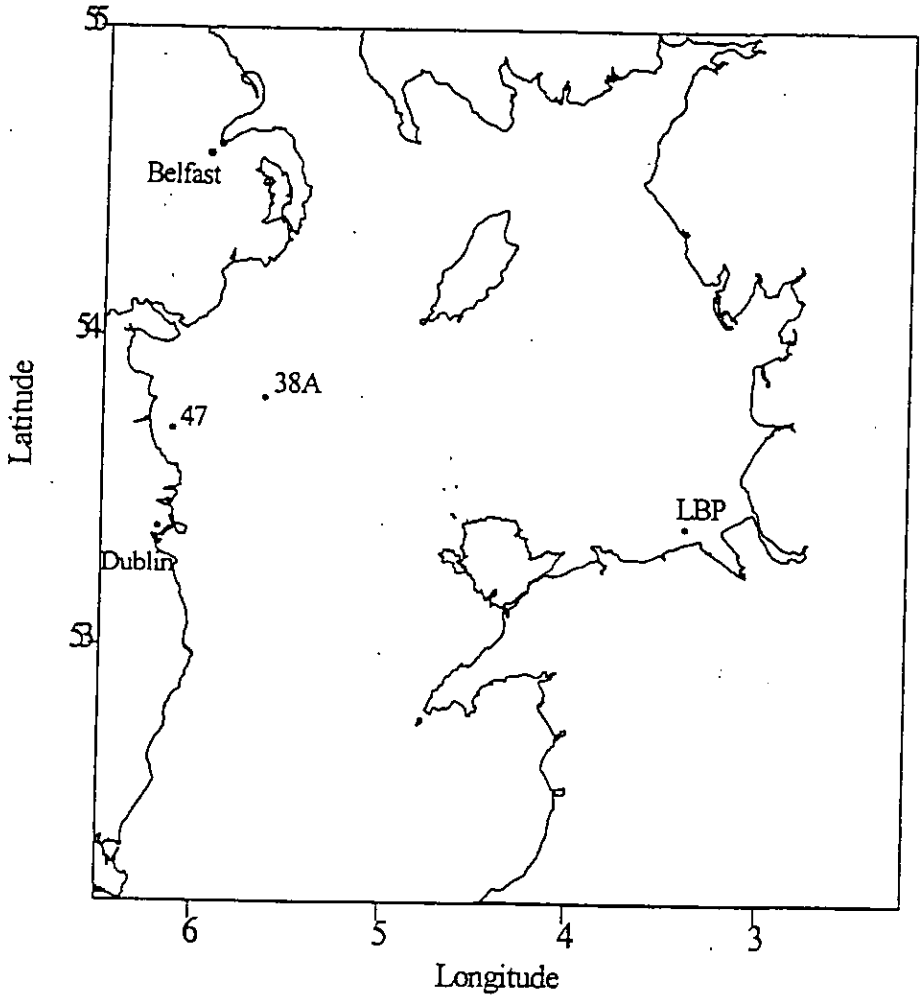

Table 1A. Concentrations of nitrate (+ nitrite) phosphate and silicate (mmol m^{-3}) in near surface waters at the three process stations in the Irish Sea during April 05-09 1997.

Station	Nutrient concentration (mmol m^{-3})		
	Nitrate (+nitrite)	Phosphate	Silicate
47	1.55	0.50	1.96
38A	8.55	0.85	5.86
LBP	25.57	1.65	6.45

Table 1B. Concentrations of chlorophyll (mg m^{-3}) in near surface waters of the three process stations during April 05-09 1997.

Station	Chlorophyll concentration (mg m^{-3})		5.0 μm fraction as % of total chlorophyll biomass
	Whole sample	< 5.0 μm fraction	
47	3.8	0.8	21%
38A	0.9	0.4	44%
LBP	5.9	0.03	0.5%