5691

Simon
This seems to have been an excellent cruise. Thank you for all the help & support you gave Valeport. It is good to know that their work was so successful. The hope will be for the future.
Ivan H 12/1

BIOLOGICAL OCEANOGRAPHY CRUISE REPORT

Date 21 - 24 November 1994

PERSONNEL

B Stewart	(SIC), SSO DANI
P Elliott	SO, DANI
M Livingstone	SO, DANI
S Bloomfield	ASO, DANI
R Anderson	Student, Coventry University
L Blee	Student, University of Ulster
J Nicholson	Valeport Ltd.
R McInley	Valeport Ltd.

CRUISE OBJECTIVES

i. To assess autumn temperature, salinity and nutrient distributions in the north western Irish sea.

ii. To assess the denitrification potential of sediments at selected sites in the north western Irish sea.

iii. To develop an operational protocol for the Acoustic Doppler Current Profiling (ADCP) system.

iv. To field test the Valeport Ltd. Plankton Sampling Mechanism (PSM) against the standard Continuous Plankton Recorder (CPR).

v. To field test and validate the software used to control the undulating UTOW (Valeport's updated CPR).

CRUISE NARRATIVE

Sun. 20th - Mon. 21st November 1994

The RV Lough Foyle departed Belfast 2145 hrs Sunday 20th November 1994. Overnight the Valeport personnel took advantage of the calm sea and prepared their computer equipment for use. The CPR was prepared and on Monday 0200 hrs was deployed off the starboard rear of the ship and flow rates tested by having the vessel move at a range of speeds (5, 7, 9 and 10 knots) for 30 minute periods. The vessel arrived on station 36 north of Dundalk Bay (see attached sampling grid) at 0820 hrs. The weather was dry and bright with only light winds. The vessel proceeded south along a grid of coastal sampling stations to arrive on station 59 at 1300 hrs. The open sea sampling commenced with station 62 at 1520 hrs and proceeded north along a grid

to finish on station 45 at 1940 hrs. In a strong force 6 - 7 wind, an attempt to sample station 46 was abandoned. The DANI work was completed at 2030 hrs and the vessel was used overnight by the Valeport personnel for further sea trials of the UTOW and CPR.

Mon. 21st - Tue. 22nd November 1994

The UTOW was deployed Monday 21 November at 2200 hrs to assess how it flew behind the ship in preparation for when both UTOW and CPR would be deployed together. Later in the evening when the UTOW and CPR were simultaneously deployed, the UTOW chose to fly close to the CPR. This was remedied by fitting a 30 degree adjustment fin to the UTOW which caused it to fly 4 - 5 metres right of its previous position, well away from the CPR. The remainder of this trial period was occupied by testing flow characteristics of three different sized aperatures fitted to the CPR. Each aperature was tested for 15 minutes at ship speeds 5, 7, 9 and 10 knots. The DANI survey continued from station 24 at 0710 hrs and departed in a south easterly direction to sample stations 33, 38 and 46. At station 38 strong southerly winds caused the ship to drift quickly off position which prevented the sediment corer from operating properly. With winds increasing to gale force and no imminent improvement in the weather forecast, the DANI survey was concluded for the day (Tues.) at 1530 hrs.

Tues. 22nd - Wed. 23rd November 1994

Undaunted by the gale force winds the Valeport personnel continued with their sea trials from 1830 hrs on Tues with a repeat of the tests carried out during the previous night. The CPR and UTOW fitted with the PSM were also deployed together, (the CPR over the starboard rear and the UTOW over the port rear), and towed for 5 hours.
The DANI survey work commenced on Wed. 23rd in a strong force 6 -7 southerly wind at 1030 hrs on station 26 and continued through stations 22, 21, 16, 15, 14, 6 to station 4 where the survey finished at 1930 hrs.

Wed. 23rd - Thurs. 24th November 1994

The final stage of the Valeport sea trials commenced Wed. at 2030 hrs and was devoted to testing and validating the undulation feedback software. The software was designed to force the UTOW to follow a user predetermined triangular waveform under the water. After extensive tests, software corrections were made that gave complete control of the UTOWs undulating abilities. This concluded the instrument sea trials and as a result of success obtained during the trials a demonstration was arranged for Thurs. afternoon. The vessel drifted overnight in Bangor Bay and sailed to dock in Belfast at 0900 hrs.
DANI scientists and students disembarked at 1000 hrs. Professor C Gibson and W Clarke (both DANI) joined the ship for a short cruise to see the UTOWs undulating

abilities demonstrated. Following a successful demonstration the vessel returned to dock in Belfast at 1600 hrs.

PARAMETERS MONITORED

At all stations on the sampling grid the CTD/rosette water sampler was deployed to acquire nutrient, chlorophyll a, temperature, salinity and fluorescence data from the depth profile. Daylight permitting Secchi disc readings were taken at all stations. Underwater light measurements were made using a multi spectral light meter at stations 16, 26, 36, 47 and 62. Algal samples were taken at stations 45, 47 and 38 and stored frozen for carbon/nitrogen analysis. The Bowers & Connelly sediment corer was successfully deployed at station 47 where sediment samples were acquired and stored for C/N and chlorophyll a analysis with a further sample stored preserved with formalin for benthic assessment. Due to strong winds at stations 38 and 45, the repeated deployment of the corer was unsuccessful in acquiring cores.

SUMMARY OF RESULTS

From the acquired nutrient and CTD profile data the entire survey area was found to be mixed from surface to bottom with a typical temperature and salinity of 12.6 °C and 34.20 ppt for the open sea; 11.0 °C and 34.0 ppt for the coastal area south of Dundalk Bay and 11.5 °C and 33.9 ppt respectively for the county Down coastal area. In general temperatures were 1 - 2 °C lower than monitored in October 1994. Nutrient concentrations were fairly constant throughout the open sea, North Channel and and northern coastal regions with typical inorganic nitrogen values ranging 7.0 - 8.0 micromoles $N\ l^{-1}$. The concentrations show a 1 - 2 micromole increase over October 1994 values but are similar to concentrations monotored in October 1992/93. Significant freshwater influence was observed at stations 47 and 36 in Dundalk Bay where a steep salinity and temperature gradient existed in the top 10 metres of the depth profile. Typical surface temperature and salinity was 10.4 °C and 33.4 ppt wheras at 10 metres, 11.0 °C and 33.80 ppt respectively. Increased nutrient concentrations in this area, typical nitrate 11.0 micromloes N, gave further evidence of the River Boyne influence in Dundalk Bay.

ACOUSTIC DOPPLER CURRENT PROFILER

The ADCP system was used to monitor water movement during 5 separate transects on the cruise grid. Data totalling 40 mb of computer memory was recorded while monitoring in the "velocity, magnitude and direction" mode. The data will be examined at a later date when an operational procedure will be discussed and decided.

CPR and UTOW SEA TRIALS (Valeport Ltd)

From Valeport's point of view their sea trials were a success. Especially the results obtained from the simultaneous deployment of the CPR and UTOW. Previously it had not been possible to deploy the CPR and UTOW together so no absolute comparison could be made. The 5 hour tow carried out on the Lough Foyle has now rectified this situation. For the undulating trials, the value of controlling the ship's speed and operating depth was immeasurable in testing and characterising the software/hardware

interface. The characterisation results obtained would not have been possible without this control. The facilities supplied by DANI allowed the software to be assessed modified and optimised in a mutually accepted environment.

PROBLEMS ENCOUNTERED

Light Meter

Light intensity at certain wavelengths, recorded during depth profiling, was found to jump around in an erratic manner.

CTD Software

Salinity, temperature, fluorescence and depth was recorded during profile descent but the system had to be rebooted to allow bottle closure during profile ascent.

Hand held communication radios

I was informed by the ship's master that the Lough Foyle's hand held radios were considered as ship's safety equipment and as such would no longer be available to scientists for deck to plotroom communication. W Clarke to arrange the provision of hand held radios for future cruises.

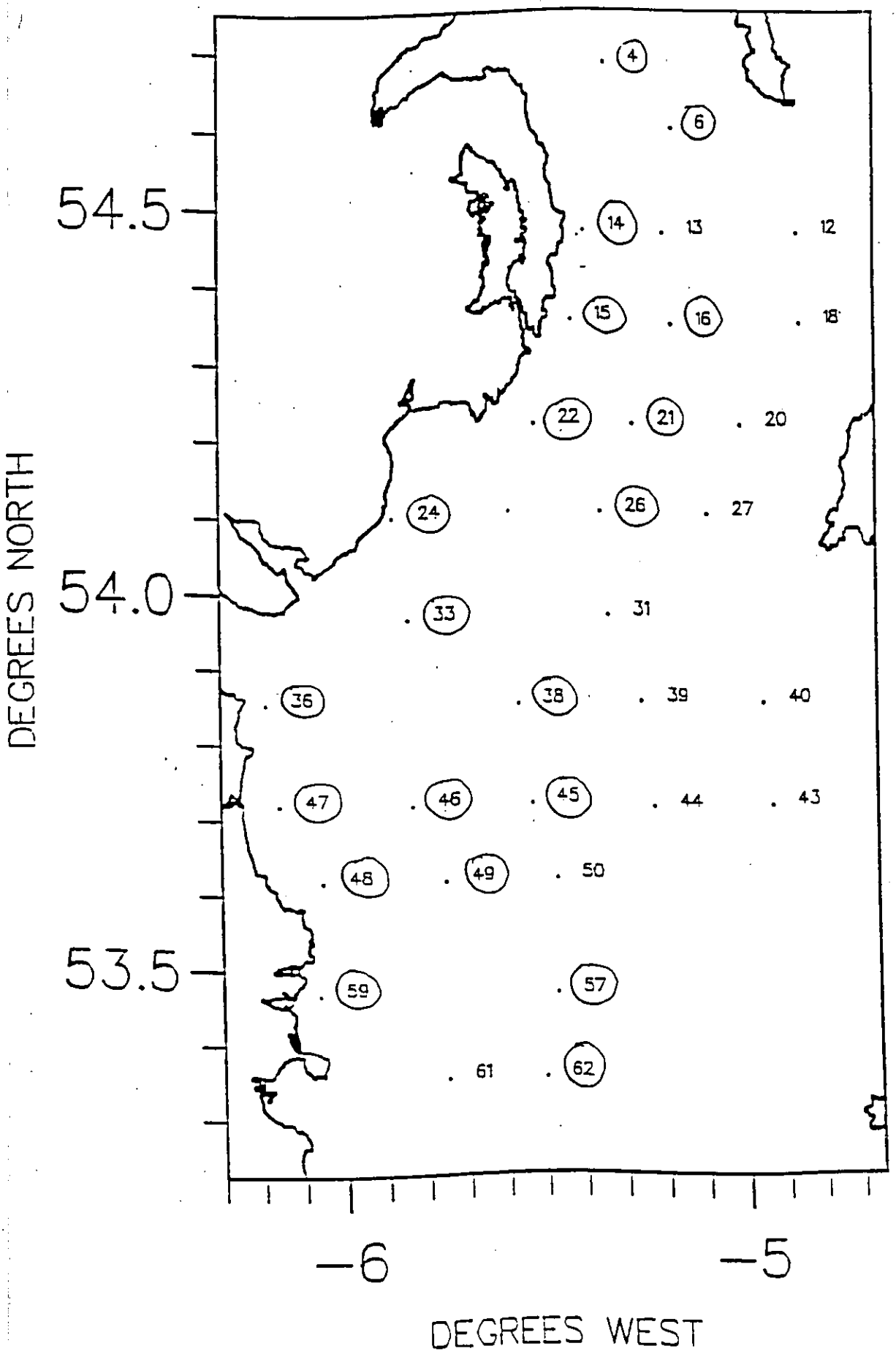
ACKNOWLEDGEMENTS

The ship's master, officers, engineers, catering staff and crew are thanked for their cooperation during this cruise.

BM STEWART

9 December 1994

21-25 November 1994



It is proposed to sample and monitor at enclosed stations only.

BIOLOGICAL OCEANOGRAPHY CRUISE LF 29/94, 21 - 25 November 1994

PROPOSED WORK SCHEDULE

STATION	Lat.	Long.	Activity
36	53 51	06 11	CTD, Secchi, light, susp. solids.
47	53 43	06 09	CTD, Secchi, light, corer + sediment C/N & Chl a.
48	53 37	06 03	CTD, Secchi.
59	53 28	06 03	CTD, Secchi.
62	53 21	05 30	CTD, Secchi, light, susp. solids.
57	53 28	05 28	CTD, Secchi.
49	53 37	05 45	CTD, Secchi.
46	53 43	05 50	CTD, Secchi.
45	53 43	05 32	CTD, Secchi, light, susp. solids.
38	53 51	05 34	CTD, Secchi, light, corer + sediment C/N & Chl a.
4	54 41	05 20	CTD, Secchi, light, susp. solids.
6	54 36	05 10	CTD, Secchi.
16	54 21	05 10	CTD, Secchi.
21	54 13	05 16	CTD, Secchi.
26	54 06	05 21	CTD, Secchi.
33	53 58	05 50	CTD, Secchi.
24	54 06	05 52	CTD, Secchi, light, susp. solids.
22	54 13	05 31	CTD, Secchi.
15	54 21	05 25	CTD, Secchi, light, susp. solids.
14	54 28	05 23	CTD, Secchi.