CRUISE REPORT 07/99

CONTENTS:

Scientific Staff:

Dr. J.R. Evans	University of Durham
Dr. W.E.N. Austin	University of Durham
B.T. Long	University of Wales, Bangor
A. Hammerstein	University of Wales, Bangor
P. Dyda	University of Wales, Bangor
C. Binding	University of Wales, Bangor
Dr. S. Papadimitruou	University of Wales, Bangor
J. Greenwood	University of Oxford

R.V. Prince Madog:

S. Duckworth	Captain
A. Price	First Mate
A. Williams	Chief Engineer
H. Owen	Second Engineer
P. Jones	Bosun
T. Roberts	Able Seaman
P.D. Williams	Able Seaman/Steward

Time Breakdown:

Sailed from Menai Bridge	09.20	12.07.99
Arrived at first station	22.29	12.07.99
Left last station	21.20	13.07.99
Arrived at Menai Bridge	09.10	14.07.99

1. Abstract

The sixth in the series of cruises supporting the NERC funded 'Holocene palaeoceanography of shelf seas: long-term (10^3-10^4 years) seasonal stratification', the objectives of this cruise were to again sample at those sites in the Celtic Sea identified during the reconnaissance cruise, 7/98. The shipek grab-sampler and multicorer were deployed at 7 sites, with sediment successfully cored at all stations. CTD data was also collected through the water column and bottom water samples obtained at all sites. The suitability of the sediments for multicoring was determined by examination of the contents of the shipek grab-sample. The longest multicore at each station was subsampled for foraminifera. A second core was sampled for dinoflagellates, organic carbon and grain size at the surface. The top 0-0.5 cm was sampled in a third and fourth core where possible for benthic foraminifera. Pore water analyses were performed by S. Papadimitruou at some stations.

2. Introduction

a. Scientific aims of project

This cruise was run as part of a NERC funded project entitled 'Holocene palaeoceanography of shelf seas: long-term (10^3 - 10^4 years) seasonal stratification dynamics. The aim of this

project is to generate a record of environmental change relating to development of seasonally stratified water in the Celtic Sea during the Holocene.

b. Specific cruise objectives

The aim of this cruise was to collect a further, 'post-bloom', set of multicores from the sites already identified during cruise 7/98. These sites are to be examined for changes in the seasonal vertical distribution of benthic foraminifera and for seasonal variability in the environmental conditions at each site. Additional aims were to collect samples from the seabed at these sites for dinoflagellate, grain size, organic carbon and pore water analysis.

c. Narrative of cruise

The R.V. Prince Madog sailed from Menai Bridge at 09.20 on 12.07.99 in calm conditions. The first site, site 8, was reached at 22.29 (12.07.99) and the CTD was the first instrument deployed. The attached rosette water sampler fired successfully and a bottom water sample taken (Bottle No. 1). The CTD successfully collected temperature, salinity and oxygen data from throughout the watercolumn. The grab sampler was deployed and the sample returned confirming the suitability of sediment at this site for coring. One sediment sample was taken from the grab sampler and stored. Multicorer was deployed, retrieving three cores.

The second site, site 6, was reached by 00.35 (13.07.99). The CTD was successfully deployed. Grab sampler was deployed, and a sample taken. The multicorer returned four sediment cores, the longest core was sampled at 0.5 cm then 1 cm intervals down to 26.5 cm for foraminiferal analysis. A second core was sampled at the surface for dinoflagellates, grain size and organic carbon. The top 0-0.5 cm of a third core was sampled for benthic foraminifera. The foraminiferal samples were stained using rose Bengal and stored in ethanol while the dinoflagellate samples were simply kept cool. The grain size samples were untreated and the organic carbon samples were frozen.

Sampling was carried out in this way at sites 7, 5, 4, 3 and 9 (Muddy Hollow), in that order, with the following differences:

- the grab sampler was deployed twice at site 4 and sample retrieved second time.
- pore water analyses were performed at Sites 8, 7, 3, and 9.
- optical instruments were deployed for C. Binding at Site 3.
- the foraminifera cores were sampled to different depths depending on core length as follows:

Core 1

Site 8, 7, 5 and 3	0 - 20.5cm,	Site 6 and 9	0 - 26.5cm,
Site 4	0 - 16.5cm.		

Core 3

Site 6, 4, 3 and 9	0 - 0.5cm.

Core 4

Site 4	0 - 0.5 cm.

The ship arrived back at Menai Bridge at 09.10 on the 14.07.99.

3. CTD Operations

The CTD, a Neil Brown system, was used to collect data on salinity, temperature and pressure. All the sensors appeared to work well. A total of 8 CTD casts were made.

The CTD system was fitted with a rosette water sampling system and this was triggered to collect at the deepest point of the drop, usually 10 m from the sea bed. The water collected was used for calibration of the CTD and for oxygen isotope and oxygen concentration measurements. The calibration bottles for the CTD were rinsed out in the collected water and then filled to the neck. The bottles for oxygen isotope measurements were filled using a piece of tubing inserted into the bottle right to the bottom. The bottle was allowed to fill from the bottom, while swirling the tube around to remove as many air bubbles as possible. The bottle was allowed to overfill until three times its capacity of water has passed through it then the tubing was slowly lifted out and the cap screwed on. This was carried out at each site and bottles were stored in the fridge. The oxygen concentration bottles were filled in the way described for oxygen isotopes. To fix the samples in preparation for, Winkler titration, to be carried out on land, a 1 cm^3 volume of both manganese sulphate and alkaline sodium iodide was delivered by pipette to the sample.

4. Sediment collection

A shipek grab was carried on board to collect surface samples. These samples were stored for dinoflagellate analysis. They were also examined visually for grain size to determine whether the site was sufficiently fine grained to deploy the multicorer.

The multicorer system consists of four core tubes, core catchers and a hydraulic coring system mounted in a bell-shaped frame. After attaching the cores, catchers and additional weights and priming the system on deck, the core was winched overboard and dropped to the seabed where the cores slowly enter the sediment taking a relatively undisturbed core with a good sediment-water contact. Once the corer was back on deck the core catchers were removed and the cores bunged. The cores were taken out of their holds and placed in a cradle to await further sampling.

Of the returned cores the longest was sectioned at 1 cm intervals to the end of the core. Each circular section, as it was extracted, was stored in a 250 ml sampling bottle with an equal quantity of ethanol and approximately 10 - 20 ml of rose Bengal solution.

A second core from each site was sampled at the 0-0.5 cm interval. Half of the circular section was stored for dinoflagellate analysis, and one quarter for grainsize and the other quarter for organic analyses. The latter sample was frozen.

Where sediment properties were suitable, pore water analyses were performed by S. Papadimitruou on third core. This involved sampling the core at 1 cm intervals and centrifuging the sediment to obtain the pore water. The water was then sealed in glass ampoules for further analyses in the laboratory.

5. Equipment problems

No equipment problems were encountered during the cruise.

6. Station log

Station no.	Sampling	Date	Time	Latitude	Longitude	Depth	Comment
Site 8	CTD	12.07.99	22.29	51 30.62	05 49.94	88	
	Grab		22.45	51 30.56	05 50.01	87	
	MultiC		23.52	51 30.51	05 50.09	86	3 cores
Site 6	CTD	13.07.99	00.35	51 15.11	05 54.12	88	
	Grab		00.50	51 14.93	05 54.21	88	
	MultiC		00.55	51 14.77	05 54.22	88	4 core
Site 7	CTD	13.07.99	01.49	51 17.83	06 04.15	98	
	Grab		02.00	51 17.65	06 04.09	97	
	MultiC		02.09	51 17.50	06 04.08	98	3 cores
Site 5	CTD	13.07.99	02.50	51 13.13	06 09.30	101	
	Grab		03.02	51 12.98	06 09.28	101	
	MultiC		03.08	51 12.92	06 09.26	101	3 cores
Site 4	CTD	13.07.99	05.06	51 21.85	06 30.22	87	
	Grab		05.14	51 21.87	06 30.17	87	N/S
	Grab		05.18	51 21.88	06 30.14	87	
	MultiC		05.24	51 21.89	06 30.08	87	4 cores
Site 3	CTD	13.07.99	08.14	51 38.35	06 12.50	102	
	Grab		08.24	51 38.20	06 12.58	101	
	MultiC		08.34	51 38.39	06 12.50	101	3 cores
	Grab		08.53	51 38.19	06 11.93	105	
	CTD		09.44	51 38.94	06 10.54	112	Optics
	Optics		10.10	51 39.28	06 09.92	112	Optics
Site 9	CTD	13.07.99	21.05	52 44.87	04 28.18	33	
"Muddy	Grab		21.10	52 44.87	04 28.19	33	
Hollow"	MultiC		21.16	52 44.89	04 28.21	33	