CRUISE REPORT 11/98

CONTENTS:

Scientific Staff:

Dr. W.E.N. Austin	University of Durham
G.A. Scott	University of Durham
H. Dunsford	University of Durham
B.T. Long	University of Wales, Bangor
A. Hammerstein	University of Wales, Bangor
P. Morgan	University of Wales Bangor

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	10.30	16.11.98
Arrived at first station	20.35	16.11.98
Left last station	20.30	18.11.98
Arrived at Menai Bridge	15.30	19.7.98

1. Abstract

This cruise was the second in the series of cruises in support of the NERC funded project 'Holocene palaeoceanography of shelf seas: long-term (10^3-10^4 years) seasonal stratification'. The objectives of this cruise were to sample at those sites in the Celtic Sea identified during the reconnaissance cruise 7/98. Grab-samples and the multicorer were deployed at 7 sites. CTD data was also collected through the water column at these sites, as were bottom water samples for oxygen isotope and oxygen concentration measurements. In addition, a single surface and several water-column plankton tows were carried out. Sites were selected on the suitability of the sediments for multicoring as evidenced by a shipek grab-sample. The longest multicore at each station was subsampled for foraminifera, grainsize and organic carbon analyses at the surface and for foraminifera in the remainder of the core. A second core was subsampled at the surface for foraminifera.

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 second set of multicores from the sites already selected during cruise 7/98. These sites are to be examined for changes in the seasonal vertical distribution of benthic foraminifera and for seasonal variability of environmental conditions at each site. An additional aim was to collect plankton samples from the surface waters at these sites for dinoflagellate analysis and throughout the water column for planktonic foraminiferal analysis.

c. Narrative of cruise

The R.V. Prince Madog sailed from Menai Bridge at 10.30 on 16.11.98 in cold but sunny conditions. Weather conditions deteriorated gradually during the journey to the study area. However, it was sufficiently good to allow sampling at the first site, site 9, also known as Muddy Hollow, at around 20.35 that evening. This site lies south of the Llyen Peninsula some distance from the remaining sites. As the winds increased the ship was forced to spend that evening and the next 24 hours in shelter at Millport and then Brides Bay. The journey was resumed at 05.30 on the 18/11/98 and Site 9 was reached at 08.57.

The CTD was the first instrument deployed. This was fitted with a rosette system for water collection triggered to close at the point at which the CTD was closest to the seabed. Water collected in this way was subsampled for calibration of the CTD oxygen concentration and oxygen isotope measurements. A large plankton net was attached to the bottom of the CTD which was drawn through most of the water column at the station. The water collected was funnelled in to a collection bottle for foraminiferal analysis. A smaller net was filled with surface water using the ships pumped water. This sample was then stored for dinoflagellate analysis.

A day grab was successfully deployed and the sediment found to be suitable for the multicorer. This was sampled for meiofauna and simply stored. A multicore was then attempted but returned empty. A second attempt was made and the cores returned empty excepting one broken core containing a large rock. This indicated that the drift experienced by the ship between arrival on station and deployment of the multicorer had delivered it to any area of unsuitably coarse sediments. The ship steamed back to the original location and the multicore was successfully deployed. Cores were extruded using a purpose-built stand. The first was sliced to 0.5 cms and then at 1 cm intervals to the end. Each sliced was halved and one half stained with rose Bengal and preserved in ethanol. The remaining halves were quartered for grainsize analysis and organic carbon measurements. The latter samples were

frozen. The second and third cores were sampled for the first 0.5 cm only and these were stored in rose Bengal and ethanol for foraminiferal analysis.

The second station, site 8, was reached at 08.57 on the 18/11/98. There sampling was carried out in the way described above. However, the small plankton net had been lost overboard during the night. The multicorer was deployed four times before a successful coring was made. The cores were sampled in the way described above.

At the subsequent sites 6, 7, 5 and 4 sampling was carried out in the way described above but weather conditions had begun to deteriorate again and so it was deemed best to leave site 3 and carry on to site 2. The CTD was successfully deployed here but the grab was unsuccessful three times. The multicorer was deployed but was also unsuccessful and several cores were damaged. It was noted that in the course of sampling the ships drift had brought the boat into dramatically shallower waters and thus coarser substrates. The ship steamed back along the drift path for half a mile but as a further grab was returned empty and bad weather was expected, sampling was abandoned and the ship began the return journey.

The ship arrived at Menai Bridge at 15.30 on the 19/11/98.

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 7 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 overfill until three times its capacity of water has passed through it then the tubing was slowly lifted out and the cap screwed on. The 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

Both a day-grab and a shipek grab were carried on board but only the shipek was used to collect surface samples. These samples were stored for meiofaunal analysis. They were also examined visually for grainsize to determined whether the site was sufficiently fine grained to deploy the multicorer.

The multicorer system consists of four core tube, 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 0.5 then 1 cm intervals down to the end. Each circular section, as it was extracted, was halved then one half quartered. The half section was stored in a 250 ml sampling bottle with an equal quantity of ethanol and approximately 10 - 20 ml of rose Bengal solution. The quarter sections were stored in plastic bags, one for grainsize and the other for organic analyses. The latter samples were frozen.

A second core and third core from each site was sampled at the 0-0.5 cm interval. These were stored in rose Bengal and ethanol and for subsequent foraminiferal analysis.

5. Plankton samples

A large plankton net was attached to the underside of the CTD so that water collected would come from the entire length of the water column at each site, excepting the last few metres. These samples were stored for undergraduate practicals at Ocean Sciences, Bangor.

A smaller plankton net was washed through for a couple of minutes with surface water pumped by the ship and the sample stored. This was carried out at the first site only.

6. Equipment problems

Four core tubes were broken during the cruise, the primary cause being the coring of unsuitable sediments because of the ships drift away from the preselected sites between grab and multicore sampling. One tube was broken on deck when a piece of the ships equipment worked itself lose in the bad weather and fell on it.

Several problems were experienced with the multicorer itself; the corer failed to trigger because of loose components but these were tightened and the problem was resolved.

7. Station log

Station no.	Sampling	Date	Time	Latitude	Longitude	Depth	Comments
Site 9	CTD	16.11.98	20.35	52 44.92	04 28.24	31	
	Grab		20.43	52 44.91	04 28.45	31	
	MultiC		20.48	52 44.91	04 28.62	31	N/S
	MultiC		20.55	52 44.91	04 28.85	19	N/S
	MultiC		21.05	52 44.83	04 28.33	31	
Site 8	CTD	17.11.98	08.57	51 30.63	05 49.88	88	
	Grab		09.10	51 30.87	05 50.02	89	
	MultiC		09.16	51 31.02	05 50.02	89	N/S
	MultiC		09.23	51 13.13	05 50.21	89	
	MultiC		09.42	51.30.71	05.50.05	88	N/S
	MultiC		10.01	51.30.88	05.50.43	89	
Site 6	CTD		12.07	51.15.18	05.54.03	89	
	Grab		12.15	51.15.18	05.54.05	89	
	MultiC		12.18	51.15.17	05.54.10	89	
Site 7	CTD		13.25	51.17.17	06.04.14	98	
	Grab		13.36	51.17.78	06.04.22	98	
	MultiC		13.46	51.17.84	06.04.19	98	
Site 5	CTD		14.34	51.13.19	06.09.13	102	
	Grab		14.44	51.13.34	06.09.08	102	
	MultiC		14.50	51.13.45	06.09.68	102	
Site 4	CTD		16.52	51.21.92	06.30.11	89	
	Grab		17.00	51.22.06	06.30.08	89	
	MultiC		17.07	51.22.17	06.30.01	89	
Site 2	CTD		19.31	51.39.61	06.11.92	106	
	Grab		19.40	51.39.85	06.11.83	106	N/S
	Grab		19.46	51.40.05	06.11.82	106	N/S
	Grab		19.57	51.40.29	06.11.67	108	N/S
	MultiC		20.05	51.40.50	06.11.60	105	N/S
	Grab		20.29	51.40.21	06.11.14	112	N/S

Several dolphin sightings - north of Anglesey and between sites 7 and 5.