

CRUISE REPORT 06/99

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SCIENTIFIC STAFF

RV PRINCE MADOG: CREW

TIME BREAKDOWN

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R.V. Prince Madog:

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Time Breakdown:

Sailed from Menai Bridge	19.00	14.06.99
Arrived at Dale	11.00	15.06.99
Arrived at first station	14.09	15.06.99
Left last station	20.27	16.06.99
Arrived at Menai Bridge	11.00	17.06.99

1. Abstract

The fifth 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 and Caesium analysis at intervals through the core.

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 Caesium analysis.

c. Narrative of cruise

The R.V. Prince Madog sailed from Menai Bridge at 19.00 on 14.06.99 in slight conditions. The first site, site 8, was reached at 14.09 (15.06.99) and the CTD was the first instrument deployed. The attached rosette water sampler fired successfully and a bottom water sample taken. The CTD successfully collected temperature, salinity and oxygen data from throughout the watercolumn. Optical instruments were deployed for C. Binding. 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.

The second site, site 3, was reached by 17.55 (15.06.99). The CTD was successfully deployed. Grab sampler was deployed twice, the second time only returning sediment. The multicorer returned two sediment cores, the longest core was sampled at 0.5 cm then 1 cm intervals down to 20.5 cm for foraminiferal analysis. A second core was sampled at the surface for dinoflagellates, grain size and organic carbon. Samples were taken through the second core every 5 cm for Caesium analysis. 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 4, 5, 7, 6 and 9 (Muddy Hollow), in that order, with the following differences:

- the grab sampler was deployed four times at site 4 and no sample was returned
- the Caesium cores were sampled to different depths depending on core length as follows:

Site 8 >22.5cm,	Site 3 >9.5cm,	Site 4 >16.5cm,
Site 5 >23.5cm,	Site 7 >30.5cm,	Site 9 >23.5cm.

- only one core was returned at site 6, i.e. no Caesium core available for sampling.
- the foraminifera cores were sampled to different depths depending on core length as follows:

Site 8, 3 and 4	0 - 20.5cm,	Site 7 and 6	0 - 30.5cm,
Site 5	0 - 33.5cm,	Site 9	0 - 31.5cm.

The ship arrived back at Menai Bridge at 11.00 on the 17.06.99.

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 9 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 cm³ 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 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 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 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 grain size and the other quarter for organic analyses. The latter sample was frozen. Samples were collected from the second core in 2cm sections from 0.5 cm, with a gap of 5cm between sections. Two samples were bagged at each 2cm section e.g. one sample taken at 0.5 - 1.5cm and another at 1.5 - 2.5cm, then 7.5 - 8.5 cm and so on.

5. Equipment problems

The rosette sampler system on the CTD triggered one too many sampling bottles at sites 4 and 5. This was overcome at site 5 by firing each cast in turn just below the surface and removing the problematic cast once identified. One of the sampling triggers on the multicorer

consistently did not work throughout the cruise and one sediment catching tray was slightly damaged following return to the surface at site 3.

6. Station log

Station no.	Sampling	Date	Time	Latitude	Longitude	Depth	Comment
Site 8	CTD/grab /optics	15.06.99	14.09	51 30.60	05 49.94	86	
	MultiC		15.46	51 30.60	05 49.95	86	3 cores
Site 3	CTD	15.06.99	17.57	51 38.23	06 12.66	102	
	Grab		18.12	51 38.11	06 12.50	103	N/S
	Grab		18.18	51 38.08	06 12.41	103	
	MultiC		18.21	51 38.06	06 12.38	103	2 cores
Site 4	CTD	15.06.99	20.42	51 21.94	06 30.21	88	
	Grab		20.58	51 22.11	06 30.01	89	N/S x2
	Grab		21.04	51 22.18	06 29.95	89	N/S
	Grab		21.09	51 22.23	06 29.89	89	N/S
	MultiC		21.18	51 22.32	06 29.78	88	2 cores
Site 5	CTD/grab	15.06.99	23.12	51 13.11	06 09.42	101	
	Grab		23.26	51 13.14	06 09.62	101	
	MultiC		23.26	51 13.15	06 09.63	101	3 cores
Site 7	CTD	16.06.99	00.23	51 17.87	06 04.00	98	
	Grab		00.37	51 17.80	06 04.21	98	
	MultiC		00.50	51 17.83	06 04.33	98	2 cores
	CTD		00.58	51 17.81	06 04.42	98	
Site 6	CTD		01.57	51 75.05	05 54.00	88	
	Grab		02.09	51 14.99	05 54.16	87	
	MultiC		02.20	51 14.92	05 54.17	88	1 core
	Hauling*	16.06.99	03.25 - 04.20	51 22.52 - 51 23.55	05 52.51 - 05 52.63	85 - 87	Shot beam trawl and Hauled B/T (x3)
Cardigan Bay	CTD Optics	16.06.99	11.35	52 28.24	04 49.73	58	
	Hauling*	16.06.99	11.58 - 14.19	52 27.00 - 52 42.84	04 49.18 - 04 30.25	56 - 60	Shot beam trawl and Hauled B/T (x2)
Site 9	CTD	16.06.99	14.40	52 42.84	04 30.25	30	
"Muddy Hollow"	Grab		14.49	52 44.96	04 28.05	30	
	MultiC		14.53	52 45.02	04 28.16	30	
	Dredging*	16.06.99	18.56 - 20.27	53 00.20 - 53 00.06	04 59.10 - 04 58.59	72	Deploy and hauled Tjarno dredge (x6)
Moelfre, Red Wharf, Dinmoor.	Hauling*	17.06.99	08.06 - 10.14	53 21.13 - 53 19.58	04 12.98 - 04 03.00	13 - 9	Shot beam trawl and Hauled B/T (x7)

*= See Captain's Station Log for details.

Dolphins at Station 8.