Prince Madog cruise 31/03
24, 25 July 2003
POL Coastal Observatory cruise 10
REPORT

1. Objectives

1. At 53º 32´ N 3º 21.8´ W, half a mile west of the Mersey Bar Light Vessel –

To recover
a) A sea bed frame for a 600 kHz ADCP to measure the mean current profile, pressures and directional waves. A pressure recorder, a transmissometer / conductivity / temperature logger and a SeaBird MicroCat are fitted to the frame.
b) A CEFAS SmartBuoy in a single point mooring with an Aanderaa temperature and conductivity logger at 10 m below the surface.

To deploy
c) A sea bed frame for a 600 kHz ADCP to measure the mean current profile, pressures and directional waves. A pressure recorder, a transmissometer / conductivity / temperature logger and a SeaBird MicroCat are also fitted to the frame.
d) A CEFAS SmartBuoy in a single point mooring with an Aanderaa temperature and conductivity logger at 10 m below the surface.

2. To conduct a CTD / LISST survey of 34 stations every 5 miles covering the eastern Irish Sea between the North Wales coast and Blackpool and the Lancashire coast and the Great Orme, to determine the effects of the rivers Dee, Mersey and Ribble on Liverpool Bay. To obtain calibration samples for suspended sediment at all stations and for chlorophyll at selected stations.

2.1 Scientific personnel
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A. Lane
M.J. Smithson
D. Sivyer (CEFAS)
A. Hammerstein (School of Ocean Sciences)
E. Bray (School of Ocean Sciences)

2.2 Ship's officers and crew
S. Duckworth (Master)
I. Bosworth (Chief Officer)
P. Jones (Bosun)
D.D Williams (A.B.)
M. Downey (A.B.)
E. Pritchard (Cook)

3. Narrative (times in GMT)

The SmartBuoy and mooring, sea-bed frame and instrumentation were loaded onto RV Prince Madog at Menai Bridge on the afternoon of 23 July. (The SmartBuoy toroid was

rolled down the walkway.) The ADCP frame was set up on the afterdeck and the tower fitted to the SmartBuoy toroid.

RV Prince Madog left Menai Bridge at 07.15 on 24 July and recording of surface sampling switched on at 08:08, and the ship's ADCP switched on at 08.09, near Puffin Island, section 6. The sea was moderate with a Force 4 wind from the WSW direction.

The mooring site, 53º 32´ N 3º 21.8´ W, was reached at 10.44. A calibration CTD was carried out for the transmissometer and MicroCat due to be deployed on the ADCP frame.

A release on the mean ADCP frame was fired at 11:27 after the ship had been manoeuvred over the frame. The ADCP surfaced soon after release and was grappled and on board by 11:39. At this point an attempt was made to recover the ADCP ballast weights using the spooler rope. However, when almost at the surface, the line snapped when it went under the stern during an episode of large swell, and thus the ballast was lost.

The Coastal Observatory ADCP was deployed at 11:58 and the SmartBuoy at 12:39 (anchor released). The preceding SmartBuoy was recovered at 12:51 (on deck).

Three samples were taken with the Shipek grab between 13:19 and 13:26

A CTD profile (CTD 2, station1) was recorded at 13:30 and bottom water samples taken for Stan van den Berg (Liverpool) to supplement the grab samples. The CTD survey was then started with station 10, followed by 2 – 9, 11 – 27 and 30 – 34, finishing at 12:20 on 25 July. Stations 28 and 29 were missed out because R.V. Prince Madog was required back at Menai Bridge early due to the Anglesey yacht race requiring the quay side.

The underway and ADCP measurements were stopped at Puffin Island, at 12:48. The vessel docked at 13:48.

All of the mooring objectives were achieved; 32 out of 34 CTD sites visited and 3 grab samples obtained, in moderate weather – Winds ranged from Force 2 to Force 5.

4. Moorings (times in GMT)

4.1 The set up of the recovered instruments was as follows:

a) Mean ADCP 600 kHz RDI 3644.
Mode 1: 100 pings every 10 minutes (velocity standard deviation 0.007 m s^{-1}).
35 x 1 m bins (2.65 – 36.65 m above the bed).
Beam co-ordinates - speeds, correlation, echo intensity, % good.
Sound velocity calculated from temperature, depth and salinity of 32.
Fitted with a pressure sensor and 2 x 512 Mb memory (CF1); hourly wave recording enabled.
Clock set at 15:30 on 23 June; delayed start at 08:00 on 25 June, 2003.
Switched off at 12:09 on 24 July, 2003.

Aanderaa pressure recorder BPR 445 / DSU 8117: 10 minute sampling. Clock reset at 19:46 on 23 June; started at 19:50 on 23 June; first scan at 19:50:46 on 23 June, 2003. Last reading at 02:10:47 on 25 July, 2003.

25 cm Sea-Tech Transmissometer, ST556, recording in Aanderaa logger (RCM7 11814 / DSU 3994) fitted with temperature and conductivity sensors: 10 minute sampling. Clock reset at 12:48 on 25 June; started at 10:10 on 26 June, 2003. Last reading at 02:10:11 on 25 July, 2003.

SeaBird MicroCat temperature, conductivity, pressure recorder (37IM29828-2506 – ID03). The clock was reset at 07:30 on 24 June.
Pre-deployment calibration: 10 second sampling started at 08:00:00 on 24 June for CTD cast 22 (off Holyhead).
10 minute sampling started at 12:00 on 26 June, 2003.
Stopped at 22:40:20 on 24 July (4097 records) clock is 8 seconds fast – run time error (like last time) therefore downloading manually.

The frame, D1, was fitted with two Benthos releases, 4B, 4A, and a spooler with 200 m of rope for recovery of the ballast weight.

b) SmartBuoy mooring. Aanderaa current meter RCM7 9959 / DSU 1310 without fin at 10 m below the surface to log temperature (low range) and conductivity: 10 minute samples. Clock reset at 09:52 on 24 June; started at 10:20 on 24 June, 2003. Last reading 02:20:13 on 25 July 2003.

The single point mooring was composed mainly of ½" long link chain, marked by a 1.8 m diameter toroid and anchored by a 0.5 tonne clump of scrap chain.

Table 1. Recovered mooring positions and times, in 2003.

	Latitude (N)	Longitude (W)	Water Depth (m)	Recovery Time	Recovery Date
SmartBuoy	53º 32.305′	3º 22.202′	24	12:50	24/07/03
Mean ADCP	53º 32.198′	3º 21.947′	23	11:27	24/07/03

4.2 The set up of the deployed instruments was as follows:

a) Mean ADCP 600 kHz RDI 2390.
Set up 10-minute average plus waves
Memory erased, 512Mb free.
35 x 1 m bins (2.65 – 36.65 m above the bed).
Beam co-ordinates - speeds, correlation, echo intensity, % good.
Sound velocity calculated from temperature, depth and salinity of 32.
Clock set at 13:36 on 21 July 2003; delayed start at 08:00 on 24 July, 2003. – started ok.

Aanderaa pressure recorder BPR 1357, 10 minute sampling. Clock reset at 22:19:30 on 22 July; started at 22:30 on 22 July; first scan at 22:30:49 on 22 July, 2003.

25 cm Sea-Tech Transmissometer, ST637, recording in Aanderaa logger (RCM7 11820 / DSU 3735) fitted with temperature and conductivity sensors: 10 minute sampling. Clock reset at 19:57:15 on 22 July 2003; started at 20:00:00 on 22 July, 2003. On CTD (CTD1, station1) calibration points at 11:00 and 11:10 on 24 July, 2003.
Low temperature setting used.

SeaBird MicroCat temperature, conductivity, pressure recorder (2081 – ID02). The clock was reset at 07:56 on 24 July.
Calibration set at 10 second sampling. Delayed start at 10:50 on 24 July, 2003.
On CTD (CTD1, station1), into water at 10:52, calibration points at 11:00 and 11:10 on 24 July, 2003.

The frame, D3, was fitted with two Benthos releases, 5A, 3A, and a spooler with 200 m of rope for recovery of the ballast weight.

b) SmartBuoy mooring. Aanderaa current meter RCM7 9631 / DSU 3925 without fin at 10 m below the surface to log temperature (low range) and conductivity: 10 minute samples. Clock reset at 16:51:10 on 23 July; started at 17:10 on 23 July, 2003.

The single point mooring was composed mainly of ½" long link chain, marked by a 1.8 m diameter toroid and anchored by a 0.5 tonne clump of scrap chain.

Table 2. Deployed mooring positions and times, in 2003.

	Latitude (N)	Longitude (W)	Water Depth (m)	Deployment Time	Deployment Date
SmartBuoy	53º 32.216′	3º 22.037′	24	12:39	24/07/03
Mean ADCP	53º 32.169′	3º 21.963′	22	12:00	24/07/03

5. CTD

The Sea-Bird 911 CTD recorded temperature, conductivity, transmittance and fluorescence at 24 Hz and was fitted with an altimeter. Up to three water bottles were fired near the bed and one or two near the surface. Near bed and near surface water samples were filtered for suspended sediment determination by the School of Ocean Sciences. The other near bed bottle was used for reversing thermometer readings and a water sample for salinity determination back at the School of Ocean Sciences. Water samples from the second near surface bottle were filtered for chlorophyll and suspended sediment determination at CEFAS, and some filtrate was preserved with mercuric chloride for nutrient determination. A LISST-25 particle sizer was fitted to the CTD and its data logged on the Sea-Bird data logging system. Copies of the Sea-Bird binary files were taken off for processing at BODC / POL.

Table 3. Nominal CTD positions.

Site	Latitude (N)	Longitude (W)	Visited on this cruise	Chlorophyll (C), SPM & nutrients (N)
1	53º 32′	3º 21.8′	yes	C, SPM, N - yes
2	53º 37′	3º 13.4′	yes	C, SPM - yes
3	53º 42′	3º 13.4′	yes	C, SPM - yes
4	53º 47′	3º 13.4′	yes	C, SPM - yes
5	53º 52′	3º 21.8′	yes	C, SPM, N - yes
6	53º 47′	3º 21.8′	yes	C, SPM, N - yes
7	53º 42′	3º 21.8′	yes	C, SPM, N - yes
8	53º 37′	3º 21.8′	yes	C, SPM, N - yes
9	53º 32′	3º 21.8′	yes	C, SPM, N - yes
10	53º 27′	3º 13.4′	yes	C, SPM - yes
11	53º 27′	3º 21.8′	yes	C, SPM, N - yes
12	53º 27′	3º 30.2′	yes	C, SPM -yes
13	53º 32′	3º 30.2′	yes	C, SPM -yes
14	53º 37′	3º 30.2′	yes	C, SPM -yes
15	53º 42′	3º 30.2′	yes	C, SPM -yes
16	53º 47′	3º 30.2′	yes	C, SPM -yes
17	53º 47′	3º 38.6′	yes	C, SPM -yes
18	53º 42′	3º 38.6′	yes	C, SPM –yes #1
19	53º 37′	3º 38.6′	yes	C, SPM –yes #1
20	53º 32′	3º 38.6′	yes	C, SPM –yes #1
21	53º 27′	3º 38.6′	yes	C, SPM –yes #1
22	53º 23′	3º 38.6′	yes	C, SPM –yes #1
23	53º 23′	3º 47.0′	yes	C, SPM –yes #1
24	53º 27′	3º 47.0′	yes	C, SPM –yes #1
25	53º 32′	3º 47.0′	yes	no
26	53º 37′	3º 47.0′	yes	no
27	53º 42′	3º 47.0′	yes	no
28	53º 47′	3º 47.0′	no	
29	53º 47′	3º 55.4′	no	
30	53º 42	3º 55.4′	yes	no
31	53º 37′	3º 55.4′	yes	no
32	53º 32′	3º 55.4′	yes	no
33	53º 27′	3º 55.4′	yes	no
34	53º 22′	3º 55.4′	yes	no

#1 Ran out of filter papers during this shift, no note of which ones are missing!

6. Surface sampling

The intake for the surface sampling system is located underneath RV Prince Madog, at about 3 m below sea level. The parameters recorded every minute by the WS Oceans system are: Date, Solar Radiation (W m^{-2}), PAR (µmols / m^2s), Air Temperature (ºC), Relative Humidity, Relative Wind Speed (m s^{-1}), Relative Wind Direction (º) – zero indicates wind on the bow, Transmissance, Hull Temperature (ºC), Barometric Pressure (mbar), Fluorescence, Turbidity, Salinity, Minimum Air Temp (ºC), Maximum Air Temp (ºC), Wind Gust (m s^{-1}), GPS Time,

Latitude, Longitude, Barometric Pressure Minimum (mbar), Barometric Pressure Maximum (mbar), Conductivity sensor water temperature (ºC).

Copies of the data were taken off the ship as an Excel file, along with a copy of the ship's navigation data.

The ship was fitted with a 300 kHz ADCP set to record 25 x 2m bins, the bin nearest the surface was at 5.1 m depth, every 30 seconds with 28 pings / ensemble.

No wind speed and direction data, sensor broken.

Acknowledgements

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