Prince Madog cruise 35/06
POL Coastal Observatory cruise 40
1-2 November 2006

1. Objectives

1. At 53º 32´ N 3º 21.8´ W, half a mile west of the Mersey Bar Light Vessel (site A)
To recover
a) A sea bed frame for a 600 kHz ADCP (waves ADCP) to measure the mean current profile, pressures and directional waves. A Sea-Bird SBE 16*plus* with pumped conductivity sensor, digiquartz pressure sensor and a SeaPoint turbidity sensor were fitted to the frame.
b) A CEFAS SmartBuoy (with cellulose bags) in a single point mooring with Sea-Bird MicroCAT temperature, conductivity loggers at 5m and 10m below the surface.

To deploy
d) A sea bed frame for a 600 kHz ADCP (waves ADCP) to measure the mean current profile, pressures and directional waves. A Sea-Bird SBE 16*plus* with pumped conductivity sensor, digiquartz pressure sensor and a SeaPoint turbidity sensor were fitted to the frame. The frame is fitted with a SonTek ADV.
e) A CEFAS SmartBuoy (with cellulose bags) in a single point mooring with Sea-Bird MicroCAT temperature, conductivity loggers at 5m and 10m below the surface.

2. At 53º 27´ N 3º 38.6´ W (site 21, second site, B)
To recover
f) A sea bed frame for a 600 kHz ADCP (waves ADCP) to measure the mean current profile, pressures and directional waves. A Sea-Bird SBE 16*plus* with pumped conductivity sensor, digiquartz pressure sensor and a SeaPoint turbidity sensor are fitted to the frame. A 1.2 MHz telemetry ADCP was fitted to the frame.
g) A CEFAS SmartBuoy (with cellulose bags) in a single point mooring.

To deploy
h) A sea bed frame for a 600 kHz ADCP (waves ADCP) to measure the mean current profile, pressures and directional waves. A Sea-Bird SBE 16*plus* with pumped conductivity sensor, digiquartz pressure sensor and a SeaPoint turbidity sensor were fitted to the frame. A 1.2 MHz telemetry ADCP was fitted to the frame.
i) A CEFAS SmartBuoy (with cellulose bags) in a single point mooring.

3. To conduct a CTD / LISST survey of 34 sites 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 salinity, transmittance, suspended sediment and for chlorophyll at selected stations. To obtain near surface and bed water samples for nutrient and suspended sediment determination.

3. Collect 10 vertical net hauls at mooring site A.

2.1 Scientific personnel

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Andy Lane
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Mike Burke
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Dave Pearce (CEFAS)
Neil Needham (CEFAS)
Anne Hammerstein (School of Ocean Sciences)

2.2 Ship's officers and crew

Steve Duckworth (Master)
Jim Darwin (Chief Officer)
Alan Thompson (Chief Engineer)
Les Black (Second Engineer)
Phil Jones (A.B.)
Dave Leigh (A.B.)
Hefin Griffiths (A.B.)
Terry Gordon (Cook)

3. Narrative (times in GMT)

The SmartBuoy, anchor chain clumps, two sea-bed frames and instrumentation were loaded onto RV Prince Madog on the morning of 31 October 2006. Loading was completed by 9:00. The ADCP frames were set up on the afterdeck and the tower and instruments fitted to the SmartBuoy toroid.

Prince Madog left Menai Bridge at 08:00 on 1 November 2006. Surface sampling and the ship's ADCP were switched on at 09:06, by Puffin Island.

The Mersey Bar site was reached at 12:31 and the first CTD profile recorded. Conditions were marginal for deployments and recoveries. There was a moderate swell with wind speeds averaging 20 knots from a northerly direction. While waiting for the sea state to calm down zooplankton net hauls were carried out between 12:53 – 13.43. The ADCP was recovered at 14:03 with the weights on board by 14:20. The replacement ADCP was deployed at 14:38. It was decided to leave the SmartBuoy deployment/recovery until the morning.

Meanwhile the CTD survey commenced starting with stations 10, 25, 2-8, 14-17, 28-31, 26-27, 18-19, 25, 20, 13. After arriving at site A on the morning of 2 November 2006, the SmartBuoy was deployed at 08:15 and the previous SmartBuoy recovered, 08:25 – 08:31. A CTD was then carried out (site A, site 9, also known as site 1). The CTD survey was then re-started, with stations 11-12, 22-24 and 21. At site B the SmartBuoy was deployed and the previous SmartBuoy recovered, 13:15-13:28. The ADCP was recovered at 13:15 with the weights on board by 13:28. The replacement ADCP was deployed at 14:43. After the mooring work an additional CTD was carried out at site 21 before finishing off the CTD survey with sites 32, 33 and 34.

Over the two day cruise the weather gradually improved, starting with northerly winds of Force 6 with moderate swells, to variable winds of Force 3 with slight swells. All the moorings work was successfully accomplished and the full CTD survey completed. Nutrient samples were taken at all the sites, however due to a shortage of standard bottles other containers were used for the bottom samples at the outer sites (There was some concern that the non-standard plastic bottles may contaminate the samples).

Surface logging and the ship's ADCP were stopped at 16:58, near Puffin Island, and RV Prince Madog berthed at Menai Bridge at 17:50 on 2 November.

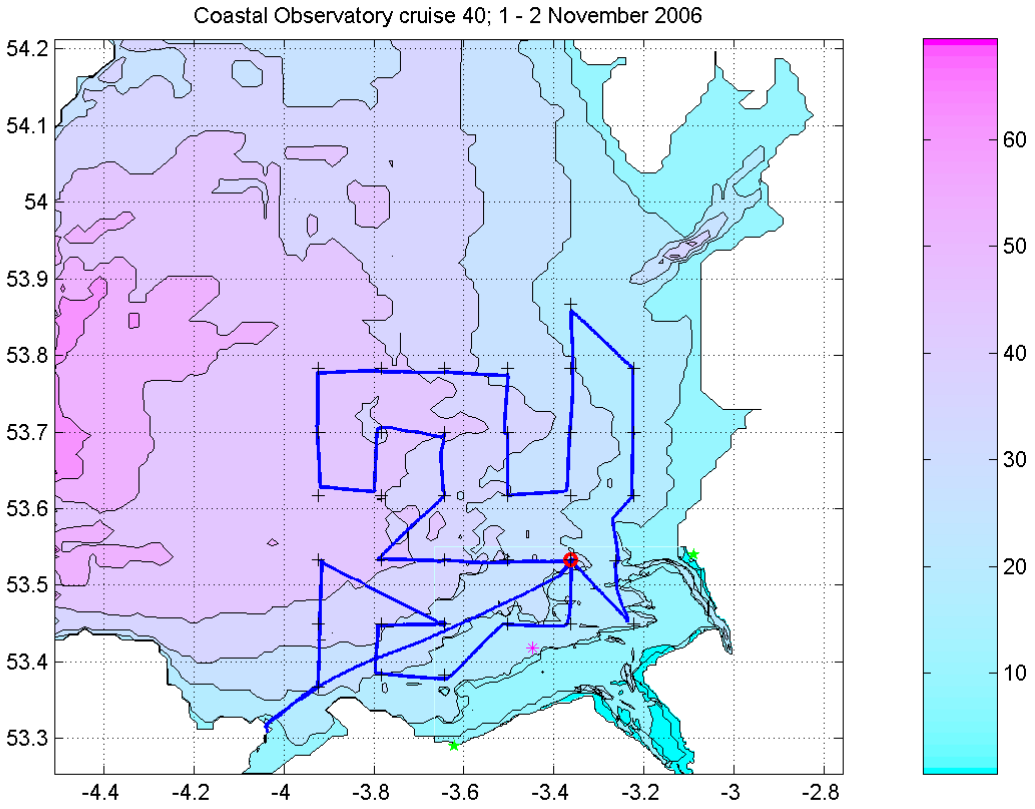

Figure 1. Cruise track.

4. **Moorings** (times in GMT)

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

Site A

a) Waves ADCP 600 kHz RDI 5806**.**
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 1 Gbyte PCMCIA memory; hourly wave recording enabled.
Clock reset at 12:50:30 GMT on 20 September; delayed start 06:00:00 on 21 September 2006. Stopped at 23:07:10 on 1 November 2006. Last ensemble at 22:40:00 on 1 November 2006.

Sea-Bird 16plus S/N 4737 on base of frame with pumped conductivity sensor underneath. SeaPoint turbidity sensor S/N 10489 taped to roll bar; set up for 0 - 125 FTU range.
Sample interval 600 s; pump 0.5s, 1 s delay.
Clock set at 12:22:50 on 20 September 2006; delayed start at 07:00:00 on 21 September 2006. Stopped at 00:11:15 on 2 November 2006. Clock 2 seconds fast.

The frame D6 was fitted with two Benthos releases 72863 – Rx 13.5 kHz, Tx 12.0 kHz, release A and 71922 – Rx 11.5 kHz, Tx 12.0 kHz, release A both with a fizz link, and a spooler with 200m of rope for recovery of the ballast weight.

b) SmartBuoy Mooring.
Sea-Bird MicroCAT temperature and conductivity recorder Serial number 2991 at 5m below the surface. Sample interval 600s. Reference pressure = 25dB.
Clock set at 12:50:00 on 20 September 2006. Delayed start 07:00:00 on 21 September 2006. Stopped at 12:03:15 on 2 November 2006. Clock 12s fast.

Sea-Bird MicroCAT temperature and conductivity recorder Serial number 2506 at 10m below the surface. Sample interval 600s. Reference pressure = 25dB.
Clock set at 12:58:00 on 20 September 2006. Delayed start 07:00:00 on 21 September 2006. Stopped at 10:35:10 on 2 November 2006. Clock 13s fast.

The CEFAS SmartBuoy is fitted with one surface CTD, light sensors at 1 and 2 m below the surface, a water sampler which obtains water samples once per day for laboratory nutrient (TOXN and silicate; no filtration therefore no phosphate), fluorometer (SeaPoint), oxygen (Aanderaa Optode) and chlorophyll determination and an in situ NAS2E nutrient analyser. The CTD and light data are transmitted back to CEFAS via Orbcomm. The frame was fitted with cellulose bags for the determination of bacterial degradation.

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

Site B
a) Waves ADCP 600 kHz RDI 5807.
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 1Gbyte PCMCIA memory; hourly wave recording enabled.
Time set at 15:08:00 on 20 September 2006, delayed start at 23:00:00 on 21 September 2006.
Stopped at 15:58 on 2 November 2006. Clock 59s fast.

Telemetry ADCP 1200 kHz RDI 3052.
Mode 1: 100 pings every 10 minutes (velocity standard deviation 0.003 m s^{-1}).
30 x 1 m bins (2.15 – 31.15 m above the bed).

Earth co-ordinates - speeds, correlation, echo intensity, % good.
Sound velocity calculated from temperature, depth and salinity of 32.
Time set at 15:12:00 on 20 September 2006.
Delayed start at 23:00:00 on 20 September 2006.
LinkQuest acoustic modem set for transmission of ADCP data every hour.
Stopped at 15:58 on 2 November 2006. Clock 34s fast.

Sea-Bird 16plus S/N 4597 on base of frame with pumped conductivity sensor underneath. SeaPoint turbidity sensor taped to roll bar S/N 10471; set up for 0 - 125 FTU range.
Sample interval 600 s; digiquartz integration time 40s, range 400; run pump 0.5s, 1 s delay.
Clock set at 12:30:00 on 20 September 2006; delayed start at 07:00:00 on 21 September 2006. Stopped at 17:30:30 on 2 November 2006. Clock 3s slow.

The frame D5 was fitted with two Benthos releases 72858 – Rx 14.5 kHz, Tx 12.0 kHz, release A and 67679 – Rx 12.0 kHz, Tx 11.5 kHz, release B both with a fizz link, and a spooler with 200m of rope for recovery of the ballast weight.

b) SmartBuoy Mooring.
The CEFAS SmartBuoy is fitted with a surface CTD (including turbidity and fluorescence sensors). The frame was fitted with cellulose bags for the determination of bacterial degradation.

No other instrumentation was fitted to the mooring.

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

Table 1. Recovered mooring positions and times.

	Latitude (N)	Longitude (W)	Water Depth	Recovered Time	Date
Waves ADCP (Site A)	53º 32.030´	3º 21.520´	26.1	14:03	01/11/06
SmartBuoy (Site A)	53º 32.036´	3º 21.594´	25.4	08:25	02/11/06
Waves ADCP (Site B)	53º 27.000´	3º 38.635´	27.9	13:15	02/11/06
Smart Buoy (Site B)	53º 26.908´	3º 38.823´	27.3	12:57	02/11/06

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

Site A

a) Waves 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 1 Gbyte PCMCIA memory; hourly wave recording enabled.

Clock set at 09:33:00 GMT on 31 October; delayed start 07:00:00 on 1 November 2006.

Sea-Bird 16plus S/N 4596 on base of frame with pumped conductivity sensor underneath. SeaPoint turbidity sensor S/N 10487 taped to roll bar; set up for 0 - 125 FTU range.
Sample interval 600 s; pump 0.5s, 1 s delay.
Clock set at 09:13:00 on 31 October 2006; delayed start at 08:00:00 on 1 November 2006.

SonTek ADV (Acoustic Doppler Velocimeter): ADV Logger G458, sensor A823. Sensor height to the point of intercept of the three probes was 1.470m. The red mark on one of the probes pointed away from the frame across one of the shortest sides (red mark aligned with beam 3 from the ADCP). 1 Gbyte of memory for 101.08 days of operation. Time set at 10:07:0 on 31 October 2006; delayed start at 08:00:00 on 1 November 2006.

The frame D3 was fitted with two Benthos releases 70358 – Rx 11.0 kHz, Tx 12.0 kHz, release A and 71904 – Rx 10.0 kHz, Tx 12.0 kHz, release C both with a fizz link, and a spooler with 100m of rope for recovery of the ballast weight.

b) SmartBuoy Mooring.
Sea-Bird MicroCAT temperature and conductivity recorder Serial number 2010 at 5m below the surface. Sample interval 600s. Reference pressure = 25dB.
Clock set at 09:41:10 on 31 October 2006. Delayed start 08:00:00 on 1 November 2006.

Sea-Bird MicroCAT temperature and conductivity recorder Serial number 2081 at 10m below the surface. Sample interval 600s. Reference pressure = 25dB.
Clock set at 09:33:45 on 31 October 2006. Delayed start 08:00:00 on 1 November 2006.

The CEFAS SmartBuoy is fitted with one surface CTD, light sensors at 1 and 2 m below the surface, a water sampler which obtains water samples once per day for laboratory nutrient (TOXN and silicate; no filtration therefore no phosphate), fluorometer (SeaPoint), oxygen (Aanderaa Optode) and chlorophyll determination and an in situ NAS2E nutrient analyser. The CTD and light data are transmitted back to CEFAS via Orbcomm. The frame was fitted with cellulose bags for the determination of bacterial degradation.

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

Site B
a) Waves ADCP 600 kHz RDI 2391.
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 1Gbyte PCMCIA memory; hourly wave recording enabled.
Time set at 09:46:00 on 31 October 2006, delayed start at 07:00:00 on 1 November 2006.

Telemetry ADCP 1200 kHz RDI 572**.**
Mode 1: 100 pings every 10 minutes (velocity standard deviation 0.003 m s^{-1}).
30 x 1 m bins (2.15 – 31.15 m above the bed).
Earth co-ordinates - speeds, correlation, echo intensity, % good.
Sound velocity calculated from temperature, depth and salinity of 32.

Time set at 10:23:00 on 31 October 2006.
Delayed start at 07:00:00 on 1 November 2006.
LinkQuest acoustic modem set for transmission of ADCP data every hour.

Sea-Bird 16plus S/N 4736 on base of frame with pumped conductivity sensor underneath. SeaPoint turbidity sensor taped to roll bar S/N 10490; set up for 0 - 125 FTU range.
Sample interval 600 s; digiquartz integration time 40s, range 400; run pump 0.5s, 1 s delay.
Clock set at 09:17:00 on 31 October 2006; delayed start at 08:00:00 on 1 November 2006.

The frame was fitted with two Benthos releases 72382 – Rx 10.0 kHz, Tx 12.0 kHz, release A and 72850 – Rx 11.5 kHz, Tx 12.0 kHz, release C both with a fizz link, and a spooler with 100m of rope for recovery of the ballast weight.

b) SmartBuoy Mooring.
The CEFAS SmartBuoy is fitted with a surface CTD (including turbidity and fluorescence sensors). The frame was fitted with cellulose bags for the determination of bacterial degradation.

No other instrumentation was fitted to the mooring.

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

Table 2. Deployed mooring positions and times.

	Latitude (N)	Longitude (W)	Water Depth (m)	Deployed Time	Deployed Date
Waves ADCP (Site A)	53º 32.037´	3º 21.472´	22.0	14:38	01/11/06
SmartBuoy (Site A)	53º 32.024´	3º 21.794´	26.7	08:15	02/11/06
Waves ADCP (Site B)	53º 27.007´	3º 38.644´	23.2	13:43	02/11/06
Smart Buoy (Site B)	53º 27.049´	3º 38.446´	23.4	12:43	02/11/06

5. CTD

The Sea-Bird 911 CTD recorded downwelling PAR light levels (CEFAS light sensor), temperature, conductivity, transmittance, oxygen (no calibration samples) and fluorescence at 24 Hz. The frame was fitted with an altimeter, which was not totally reliable, so that measurements were taken to within an estimated 3 m above the bed. The rosette will take twelve 10 l water bottles although the capacity is reduced by one (for the LISST-25). One/two water bottles were fired near bed and one/two/three near the surface, when needed. The CTD temperature data was checked against a Sea-Bird SBE35 precision thermometer. Water samples were taken from a near bed bottle for calibration of the CTD salinity data. Water samples were taken from the near surface and near bed bottles and frozen for nutrient analysis by NOC (nitrate, phosphate, silicate), and also were filtered to determine suspended sediment load and calibrate the CTD transmissometer, by the School of Ocean Sciences. Water samples from the second near surface bottle from stations 1 and 21 were filtered for chlorophyll and suspended sediment determination and some filtrate was preserved with

mercuric chloride for nutrient determination by CEFAS, (in addition samples at station 1 were taken for oxygen analysis). A LISST-100C particle sizer with internal logging was also attached to the CTD frame and its data periodically downloaded for analysis by SOS. Copies of the Sea-Bird binary files were taken off for processing and calibration at BODC / POL.

Not present due to a fault (A LISST-25 particle sizer was fitted to the CTD and its data logged on the Sea-Bird data logging system).

Table 3. Nominal CTD positions. (Ss – Suspended sediments, Nu – Nutrients)

Site	Latitude (N)	Longitude (W)	Visited on this cruise	Cefas Chlorophyll & Nu & Ss	POL Nu	POL Ss
1	53º 32′	3º 21.8′	(Samples only taken once: see site 9)			
2	53º 37′	3º 13.4′	yes		yes	yes
3	53º 42′	3º 13.4′	yes		yes	yes
4	53º 47′	3º 13.4′	yes		yes	yes
5	53º 52′	3º 21.8′	yes	yes	yes	yes
6	53º 47′	3º 21.8′	yes	yes	yes	yes
7	53º 42′	3º 21.8′	yes	yes	yes	yes
8	53º 37′	3º 21.8′	yes	yes	yes	yes
9	53º 32′	3º 21.8′	yes	yes	yes	yes
10	53º 27′	3º 13.4′	yes		yes	yes
11	53º 27′	3º 21.8′	yes	yes	yes	yes
12	53º 27′	3º 30.2′	yes		yes	yes
13	53º 32′	3º 30.2′	yes		yes	yes
14	53º 37′	3º 30.2′	yes		yes	yes
15	53º 42′	3º 30.2′	yes		yes	yes
16	53º 47′	3º 30.2′	yes		yes	yes
17	53º 47′	3º 38.6′	yes		yes	yes
18	53º 42′	3º 38.6′	yes		yes	yes
19	53º 37′	3º 38.6′	yes		yes	yes
20	53º 32′	3º 38.6′	yes		yes	yes
21	53º 27′	3º 38.6′	yes	yes	yes	yes
22	53º 23′	3º 38.6′	yes		yes	yes
23	53º 23′	3º 47.0′	yes		yes	yes
24	53º 27′	3º 47.0′	yes		yes	yes
25	53º 32′	3º 47.0′	yes		yes	yes
26	53º 37′	3º 47.0′	yes		yes	yes
27	53º 42′	3º 47.0′	yes		yes	yes
28	53º 47′	3º 47.0′	yes		yes	yes
29	53º 47′	3º 55.4′	yes		yes	yes
30	53º 42	3º 55.4′	yes		yes	yes
31	53º 37′	3º 55.4′	yes		yes	yes
32	53º 32′	3º 55.4′	yes		yes	yes
33	53º 27′	3º 55.4′	yes		yes	yes
34	53º 22′	3º 55.4′	yes		yes	yes
35	53º 32′	3º 15.9′	yes		yes	yes

Table 4. Surface and bottom parameters from CTD, noted in log book.

			Nominal positions.				
CTD no	Site	Nuts	Latitude (N)	Longitude (W)	Water depth (m)	Temp (deg)	Salinity
		T/ B				T / B	T / B
2	10	71/68	53º 27′	3º 13.4′	16	12.3 / 12.6	30.9 / 31.6
3	35	45/46	53º 31.9′	3º 15.9′	13	12.2 / 12.6	30.8 / 31.5
4	2	43/44	53º 37′	3º 13.4′	15	12.7 / 13.0	31.4 / 31.7
5	3	51/52	53º 42′	3º 13.4′	20	12.8 / 13.4	31.6 / 32.2
6	4	55/56	53º 47′	3º 13.4′	20	12.9 / 13.0	31.8 / 31.9
7	5	41/42	53º 52′	3º 21.8′	19	13.4 / 13.4	32.3 / 32.3
8	6	61/54	53º 47′	3º 21.8′	24	13.1 / 13.6	32.1 / 32.5
9	7	39/40	53º 42′	3º 21.8′	27	13.0 / 14.2	31.9 / 33.2
10	8	59/63	53º 37′	3º 21.8′	28	13.0 / 13.8	32.0 / 32.9
11	14	67/72	53º 37′	3º 30.2′	32	13.3 / 13.8	32.8 / 33.2
12	15	65/12	53º 42′	3º 30.2′	38	13.0 / 14.3	32.2 / 33.3
13	16	60/ 8	53º 47′	3º 30.2′	26	13.2 / 13.9	32.4 / 32.8
14	17	69/ 6	53º 47′	3º 38.6′	36	13.2 / 14.3	32.6 / 33.4
15	28	66/ 9	53º 47′	3º 47.0′	39	13.8 / 14.2	33.4 / 33.7
16	29	70/ 1	53º 47′	3º 55.4′	41	14.2 / 14.2	33.8 / 33.8
17	30	57/13	53º 42	3º 55.4′	40	14.1 / 14.2	33.7 / 33.7
18	31	58/14	53º 37′	3º 55.4′	45	14.1 / 14.1	33.9 / 33.9
19	26	49/ 7	53º 37′	3º 47.0′	39	13.9 / 14.1	33.6/ 33.7
20	27	53/ 5	53º 42′	3º 47.0′	38	13.9 / 14.3	33.4 / 33.7
21	18	50/ 4	53º 42′	3º 38.6′	39	13.0 / 14.3	32.5 / 33.5
22	19	64/11	53º 37′	3º 38.6′	32	14.0 / 14.0	33.5 / 33.5
23	25	38/ 3	53º 32′	3º 47.0′	44	14.1 / 14.1	33.8 / 33.8
24	20	48/ 2	53º 32′	3º 38.6′	36	13.4 / 14.0	33.3 / 33.5
25	13	37/47	53º 32′	3º 30.2′	33	12.6 / 13.7	33.1 / 33.1
26	9	27/28	53º 32′	3º 21.8′	26	12.0 / 13.4	33.4 / 32.6
27	11	24/25	53º 27′	3º 21.8′	20	12.4 / 13.2	31.8 / 32.5
28	12	26/29	53º 27′	3º 30.2′	20	13.1 / 13.1	32.7 / 32.8
29	22	23/20	53º 23′	3º 38.6′	14	13.0 / 13.0	32.9 / 32.9
30	23	30/17	53º 23′	3º 47.0′	17	13.1 / 13.1	33.0 / 33.0
31	24	31/19	53º 27′	3º 47.0′	32	13.8 / 13.8	33.6 / 33.6
33	21	*36,21/16	53º 27′	3º 38.6′	22	12.7 / 13.4	32.6 / 33.1
34	32	33/10	53º 32′	3º 55.4′	43	14.1 / 14.1	33.8 / 33.8
35	33	32/15	53º 27′	3º 55.4′	38	13.9 / 14.0	33.7 / 33.7
36	34	34/35	53º 22′	3º 55.4′	23	13.4 / 13.5	33.3 / 33.3

Notes: * Two samples were taken at the surface for station 21; one in an old type bottle (36) and one in a new type bottle (21).

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). Sea surface temperature, salinity and transmittance were calibrated against the CTD by BODC.

Underway data were recorded every minute from 09:06 on 1 November until 16:58 on 2 November 2006. The Relative Humidity data, all values about -24.7, are wrong. 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 29 pings / ensemble. Data were recorded from 09:06 on 1 November until 16:58 on 2 November 2006 starting and ending at Puffin Island.

Acknowledgements
The assistance of the master, officers, and crew contributed greatly to the success and safety of the cruise.