

**Cruise report:**

**Cruise ID: PHiXT1**

Ship: RV Prince Madog

Master: Capt. Eric Lloyd

Location: Liverpool Bay, Eastern Irish Sea.

Cruise dates: 1<sup>st</sup>-3<sup>rd</sup> May 2009

**Scientific personnel:**

Matthew Palmer (PSO, POL)

Oliver Way (UoBangor)

Jeff Polton (POL)

Anouska Bailey (UoLiverpool)

Shane Elipot (POL)

Anne Hammerstain (UoBangor)

Sarah Reynolds (BODC)

Peter Hughes (UoBangor)

Clare Davis (UoLiverpool)

Lucy Abram (UoLiverpool)

Emmer Litt (PML)

**Project description:**

**PHiXT: nutrient PatHways from carbon fluX through the Trophic cascade**

This cruise is the first of five multidisciplinary cruises during 2009/10 involving scientists from POL, PML and the Universities of Liverpool and Bangor. The majority of work is centered around water samples collected during 25 hour CTD stations at two sites; site A (53° 32' N 3° 21.8' W, 24m) which is the main mooring site of POL's Irish Sea Observatory, and an offshore site 30 (53° 37.2' N 3° 55.2' W, 44m). In addition, a single deployment of Liverpool's Stand Alone Pump System (SAPS) will be made at each station for ~30 minutes, deployed from the ships stern via the 'A' frame. During the May cruises the work will include 12.5 hour continuous profiling with POL's MSS turbulence profiler running concurrently with CTD, operated from the ship's stern. The preference is for work to be conducted whilst at anchor, thus permitting safe concurrent deployment of the MSS and CTD. Throughout the cruise period the ship's flowthrough system will be active. This system includes PML's autonomous pCO<sub>2</sub> measuring equipment and will contribute to a spatial and temporal picture on the behaviour of CO<sub>2</sub> surface fluxes in the Liverpool Bay region, which is a key part of this study.

The aims of the cruises are to provide data for a variety of individual projects;

1. "Temporal variability of CO<sub>2</sub> flux estimates in contrasting shelf sea regimes" and the "CARBON-OPS NERC KT Project" - Emmer Litt, CASIX PhD Project.
2. "How does pulsed stratification alter coastal primary and secondary production? A case study in Liverpool Bay". NERC SOFI PhD project – Anouska Bailey
3. "Phosphorus Dynamics in Liverpool Bay" – NERC PhD student Claire Davies

4. “Trophic dynamics and carbon flow in shelf seas”. Ocean Sciences PhD student Lucy Abram.

The combination of these individual studies with the inclusion of measurements of turbulent mixing rates provided by the POL MSS team and other measurements provided by POL’s Coastal Observatory will enable a greater understanding of nutrient and carbon pathways in the coastal environment.

### **Schedule:**

To conduct 25 hour long surveys at,

1. A near-shore station, site A, 53° 32′ N, 3° 21.8′ W.
2. An off-shore station, site B, 53° 37.2′ N, 3° 55.2′ W.

Each survey to consist of;

- Hourly CTD profiles and discrete water sample collection at a variety of depths.
- Conduct 12.5 hour long time series of turbulent microstructure using the MSS profiler.
- Conduct high volume filtering using SAPS (Stand Alone Pumping System).
- Conduct a short series of CTD profiles from 5NM west to 5NM east of site A with 5NM resolution.

Also, to continue the annual sediment study undertaken by POL’s coastal observatory a 12.5 hour time series of suspended sediment load was collected at near bed and near surface by filtration of water samples collected during CTD profiles.

### **Narrative (GMT):**

#### **1<sup>st</sup> May 2009:**

All equipment was loaded onto the ship by 1300. The ship left Menai Bridge at 1400, destination site B. At Puffin Island the ship’s ADCP, flowthrough and pCO<sub>2</sub> systems were turned on. Wind was force 4-5 from the west with slight seas and low swell.

The ship was anchored close to site B at 1656 (53° 37.073′ N, 3° 55.55′ W) in 47.4m of water. The CTD survey commenced at 1714, following which 25 further CTD profiles were made on the hour until 2/05/09 1800.

#### **2<sup>nd</sup> May 2009:**

During the CTD survey 197 profiles were made with the MSS from 0400 until 1633.

Following recovery of the ship’s anchor, CTD profiles and water samples were taken at 53° 32′ N, 3° 30.2′ W, site A and 53° 31.85′ N, 3° 16.0′ W.

The ship was repositioned and anchored close to site A at 2145 (53° 32.32′ N, 3° 20.27′ W) in 19.0m of water. The wind had increased to force 5 from the west, moderate to rough seas, The CTD survey commenced at 2200, following which 25 further CTD profiles were made on the

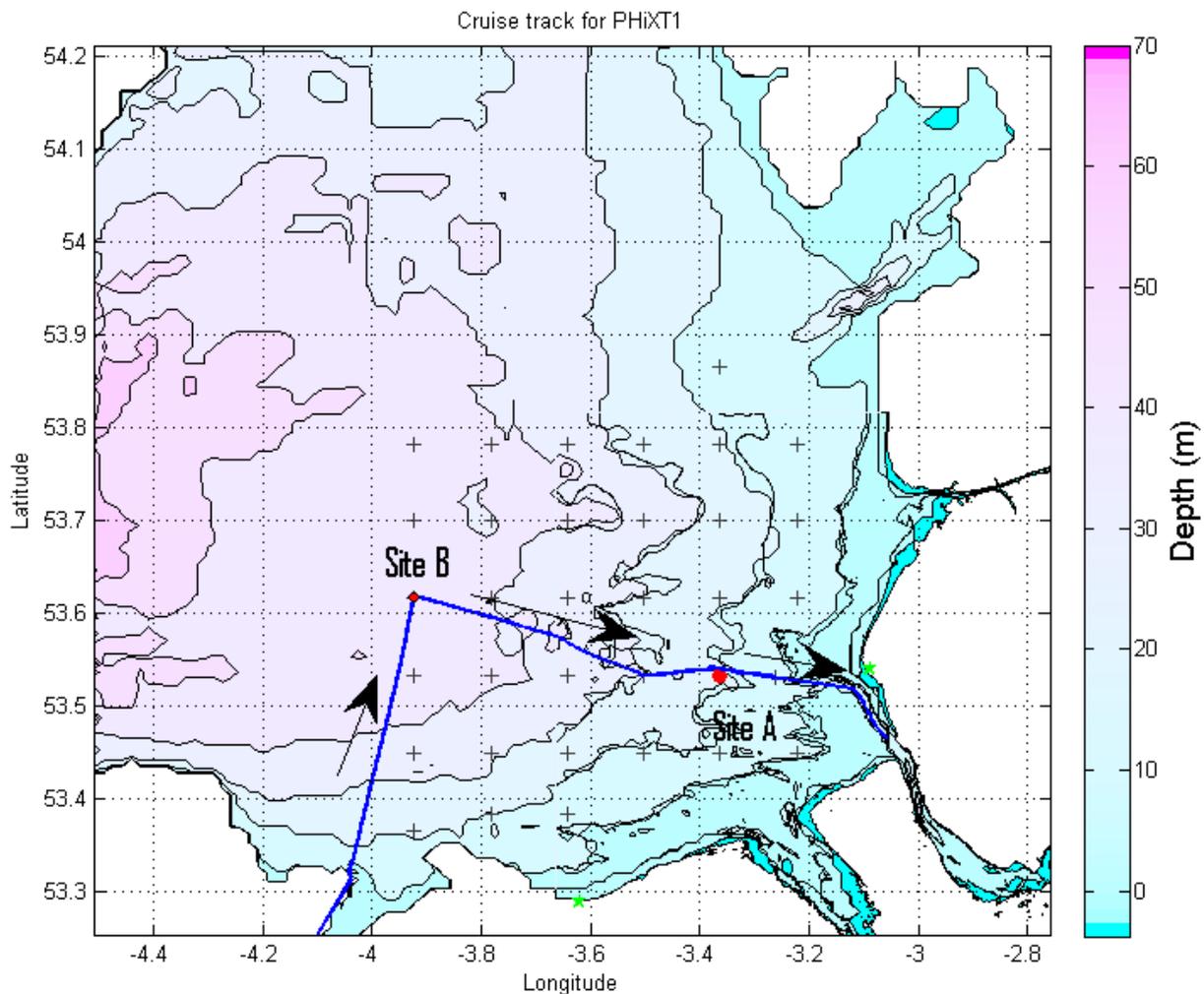
hour until 3/05/09 2300. Water samples were filtered for suspended sediment concentration between 2200 and 1000 inclusively.

### 3<sup>rd</sup> May 2009:

During the CTD survey 324 profiles were made with the MSS from 0749 until 1810. High winds, force 5-6, and wind-against-tide made deployment difficult particularly during a turning tide. The instrument cable was caught on the ship's rudder twice during these times and successfully disentangled. Poor weather eventually made the MSS inoperable.

### 4<sup>th</sup> May 2009:

Following recovery of the anchor the ship sailed for Birkenhead. ADCP, flowthrough and pCO<sub>2</sub> systems were turned off at the Mersey radar tower. The ship was in Alfred Lock at 0510 and unloaded at Vittoria Dock by 0630.



**Samples Collected and contact:**

Appendix A: Total Alkalinity (TA) and dissolved inorganic carbon (DIC) – Emmer Litt (PML) [emmta@pml.ac.uk](mailto:emmta@pml.ac.uk)

Appendix B: Stand Alone Pumping System filtration – Lucy Abram (UoLiverpool) [L.Abram@liverpool.ac.uk](mailto:L.Abram@liverpool.ac.uk)

Appendix C: MSS turbulence profiles – Matthew Palmer (POL) [rolm@pol.ac.uk](mailto:rolm@pol.ac.uk)

Appendix D: Nutrient, zooplankton and phytoplankton samples – Claire Mahaffey (UoLiverpool) [Claire.Mahaffey@liverpool.ac.uk](mailto:Claire.Mahaffey@liverpool.ac.uk) & Anouska Bailey (UoLiverpool) [Anouska.Bailey@liverpool.ac.uk](mailto:Anouska.Bailey@liverpool.ac.uk)

Appendix E: Ships underway measurements – Matthew Palmer (POL) [rolm@pol.ac.uk](mailto:rolm@pol.ac.uk)

Appendix F: CTD profiles – Matthew Palmer (POL) [rolm@pol.ac.uk](mailto:rolm@pol.ac.uk)

Appendix G: Suspended sediment log and results – Matthew Palmer (POL) [rolm@pol.ac.uk](mailto:rolm@pol.ac.uk)

**Appendix A:**

Two 25 hour stations were selected; an offshore (53.617N, 3.914W) and inshore (53.537 N, 3.363 W) location. The aim was to parameterise the inorganic carbon dynamics over a diurnal period at the two stations, with a multidisciplinary approach of hydrodynamics and biogeochemistry to analyse the temporal variability and geographical extent of a known tidal signal in the pCO<sub>2</sub> data.

Water samples of TA and DIC were collected from surface (S) and bottom (B) water every hour over a 25 hour period at both an offshore and inshore location. pCO<sub>2</sub> was measured autonomously for 20 hours every 30 minutes at the offshore location before an unfortunate equipment malfunction which disabled measurements for the rest of the cruise.

TA and DIC water samples:

*Offshore:*

Date	Time	Station	CTD cast	Bottle no.	S/B	Depth (m)
01/05/2009	17:11	1 OFF-1	001	017	B	43.6
			001	002	S	1.72
	18:00	1 OFF-2	002	005	B	42.89
			002	051	S	1.09
	19:00	1 OFF-3	003	030	B	42.63
			003	056	S	1.80

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	20:01	1 OFF-4	004	001	B	39.58
			004	057	S	1.91
	21:02	1 OFF-5	005	015	B	39.51
			005	016	S	1.37
	22:02	1 OFF-6	006	006	B	39.08
			006	020	S	1.92
	23:05	1 OFF-7	007	063	B	40.54
			007	018	S	1.57
02/05/2009	00:04	1 OFF-8	008	007	B	41.4
			008	050	S	1.6
	01:05	1 OFF-9	009	066	S	1.7
			009	032	B	42.5
	02:04	1 OFF-10	010	067	S	1.6
			010	065	B	43.6
	03:04	1 OFF-11	011	053	S	1.8
			011	068	B	44.1
	04:04	1 OFF-12	012	019	S	1.53
			012	052	B	44.32
	05:00	1 OFF-13	013	022	S	1.57
			013	077	B	43.19
	06:00	1 OFF-14	014	064	S	1.25
			014	021	B	42.91
	07:07	1 OFF-15	015	076	S	1.74
			015	034	B	41.87
	08:01	1 OFF-16	016	096	S	1.07
			016	029	B	41.11
	09:00	1 OFF-17	017	049	S	1.39
			017	027	B	39.99
	10:02	1 OFF-18	018	031	S	1.05
			018	079	B	39.17
	11:03	1 OFF-19	019	089	S	1.50
			019	035	B	39.58
	12:04	1 OFF-20	020	080	S	1.22
			020	044	B	40.28
	13:02	1 OFF-21	021	062	S	1.08
			021	082	B	40.85
	14:04	1 OFF-22	022	041	S	0.95
			022	072	B	41.83
	15:03	1 OFF-23	023	100	S	1.51
			023	092	B	42.43
	16:03	1 OFF-24	024	094	S	1.59
			024	088	B	43.61
	17:00	1 OFF-25	025	091	S	1.07
			025	095	B	42.71

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Date	Time	Station	CTD cast	Bottle no.	S/B	Depth (m)
02/05/2009	22:00	1 IN-1	030	017	S	1.44
			030	002	B	14.76
	23:02	1 IN -2	031	005	S	2.7
			031	051	B	14.57
03/05/2009	00:04	1 IN -3	032	030	S	2.18
			032	056	B	14.03
	01:04	1 IN -4	033	001	S	2.6
			033	057	B	15.32
	02:04	1 IN -5	034	015	S	2.43
			034	016	B	16.95
	03:03	1 IN -6	035	006	S	1.58
			035	020	B	17.32
	04:04	1 IN -7	036	063	S	3.24
			036	018	B	19.01
	05:02	1 IN -8	037	007	S	2.09
			037	050	B	17.74
	06:02	1 IN -9	038	066	S	2.40
			038	032	B	19.85
	07:04	1 IN -10	039	067	S	2.11
			039	065	B	18.54
	08:03	1 IN -11	040	053	S	2.01
			040	068	B	17.36
	09:03	1 IN -12	041	019	S	2.04
			041	052	B	15.37
	10:02	1 IN -13	042	022	S	1.93
			042	077	B	14.35
	11:03	1 IN -14	043	064	S	1.48
			043	021	B	14.98
	12:05	1 IN -15	044	076	S	2.18
			044	034	B	15.23
	13:05	1 IN -16	045	096	S	2.80
			045	029	B	13.93
	14:05	1 IN -17	046	049	S	1.74
			046	027	B	14.33
	15:04	1 IN -18	047	031	S	2.43
			047	079	B	16.26
	16:04	1 IN -19	048	089	S	1.23
			048	035	B	17.69
	17:00	1 IN -20	049	080	S	1.58
			049	044	B	17.46
	18:01	1 IN -21	050	062	S	1.76
			050	082	B	18.81

	19:00	1 IN -22	051	041	S	1.38
			051	072	B	18.25
	20:02	1 IN -23	052	100	S	2.16
			052	092	B	17.64
	21:02	1 IN -24	053	094	S	1.67
			053	088	B	16.76
	22:01	1 IN -25	054	091	S	2.78
			054	095	B	15.29

### **Appendix B:**

The SAPS was deployed on 4 occasions. All deployments filtered near bed seawater for 30 mins:

1. 1/5/09 to 30m on the offshore site (low tide)
2. 2/5/09 to 30m on the offshore site (high tide)
3. 3/5/09 at 6m on the inshore site (low tide)
4. 3/5/09 at 7m on the inshore site (high tide)

These filters are currently being prepared for lipid extraction and analysis, C and N analysis, isotope analysis and pigment analysis.

### **Appendix C:**

The MSS90L microstructure profiler is a free-falling instrument deployed from the stern of the vessel operated manually using a small electric hydrographic winch and neutrally buoyant conductive tether. The instrument collects data during descent measuring shear, temperature and conductivity microstructure, and temperature and conductivity profiles. Additional sensors measure pressure and lateral acceleration to determine fall speed, depth and verticality. During the cruise 197 near continuous profiles were made at the offshore station between 0400 until 1633 on the 2<sup>nd</sup> May and 324 profiles were made at the near-shore station between 0749 until 1810 on the 3<sup>rd</sup> May 2009.

## Appendix D:

Near-shore site A: Nutrient and phyto/zooplankton samples 2-3<sup>rd</sup> May 2009:

- Size-fractionated chlorophyll *a* – fixed volumes of seawater are filtered through 0.2 $\mu$ m, 2 $\mu$ m, and 10 $\mu$ m polycarbonate filters under low vacuum pressures. The filters are stored frozen at -80°C until analysis in the laboratory where chlorophyll *a* is extracted from the filter by sonicating the filter in 5ml 90% acetone for 10 minutes. Fluorometric analysis of the raw extract as well as the extract post-acidification allows for correction for phaeopigments.
- Nutrients – sea water samples are stored in 125ml polycarbonate bottles (acid-washed and triple-rinsed with sample water) prior to analysis with Quattro nutrient analyser onboard.
- Dissolved organic carbon (DOC) – seawater samples are filtered through combusted GF/F filters in a glass filter assembly. 20ml of filtrate is pipette into an acid-washed, combusted glass vial pre-filled with 50 $\mu$ l 50% (v/v) hydrochloric acid. Samples are stored in laboratory refrigerator for analysis on Shimadzu TOC-V.
- Bacterial abundance – 50 ml of seawater from designated Niskin is emptied into a sterile centrifuge tube pre-filled with formaldehyde (final concentration 2%). Samples are stored in cold room before DAPI staining and enumeration under epifluorescence microscope.
- Phytoplankton and microzooplankton abundance – 100ml of seawater is measured into amber glass jar pre-filled with acid Lugol's solution (final concentration 2%) and stored in cold-room. Abundances, biovolumes, and community composition are measured under inverted microscope.
- Particulate organic nutrients – fixed volumes of seawater are filtered through combusted GF/F (PC/PN), combusted acid-washed GF/F (PP) or 0.8 $\mu$ m polycarbonate (PSi) and the filters frozen prior to analysis in laboratory.
- Net community production - estimated by determining the change in dissolved oxygen concentration in seawater samples in 125 ml glass bottles stored under a 16:8 hour light: dark cycle ('light') or in the dark over a 24-hour incubation period in comparison to a Tzero O<sub>2</sub> concentration. Net community production ( $\mu$ mol O<sub>2</sub> l<sup>-1</sup> day<sup>-1</sup>) is calculated by subtracting the mean Tzero oxygen concentration from the mean O<sub>2</sub> concentration in the 'light' bottles.

Near-shore site A: Nutrient and phyto/zooplankton samples 2-3<sup>rd</sup> May 2009:

Time	Chlorophyll a	Dissolved nutrients	DOC	Bacterial abundance	Phytoplankton abundance/ID	Microzooplankton abundance/ID	Particulate C/N	Particulate P	Particulate Si	NCP
04:00	Y	Y	Y							
05:00	Y	Y	Y							
06:00	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
07:00	Y	Y	Y							
08:00	Y	Y	Y							
09:00	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
10:00	Y	Y	Y							
11:00	Y	Y	Y							
12:00	Y	Y	Y	Y	Y	Y	Y	Y	Y	
13:00	Y	Y	Y							
14:00	Y	Y	Y							
15:00	Y	Y	Y	Y	Y	Y	Y	Y	Y	
16:00	Y	Y	Y							
17:00	Y	Y	Y							
18:00	Y	Y	Y	Y	Y	Y	Y	Y	Y	
19:00	Y	Y	Y							
20:00	Y	Y	Y							
21:00	Y	Y	Y	Y	Y	Y	Y	Y	Y	
22:00	Y	Y	Y							
23:00	Y	Y	Y							
00:00	Y	Y	Y	Y	Y	Y	Y	Y	Y	
01:00	Y	Y	Y							
02:00	Y	Y	Y							
03:00	Y	Y	Y	Y	Y	Y	Y	Y	Y	
04:00	Y	Y	Y							
05:00	Y	Y	Y							

**Appendix E: Ship's underway measurements:**

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, Transmissance, Hull Temperature (°C), Barometric Pressure (mbar), Fluorescence, Oxygen concentration, Turbidity, Salinity, Conductivity sensor water temperature (°C). Sea surface temperature, salinity and transmittance were calibrated against the CTD by BODC. In addition a pCO<sub>2</sub> sensor is incorporated into the surface sampling system.

Met package measures and records Barometric pressure (mbar), Solar Radiation (W m<sup>-2</sup>), PAR (µmols / m<sup>2</sup>s), Air Temperature (°C), Relative Humidity, Relative Wind Speed (m s<sup>-1</sup>), Relative Wind Direction (°) – zero indicates wind on the bow, Minimum Air Temp (°C), Maximum Air Temp (°C), Wind Gust (m s<sup>-1</sup>).

Underway data, pCO<sub>2</sub> and ships ADCP data were recorded every minute. The ship was fitted with a 300 kHz ADCP set to record 50 x 1m bins, every 30 seconds with 24 pings / ensemble. The systems ran continually beyond the Mersey radio tower between 1/5/09 1458 and 4/5/09 0434.

**Appendix F:**

The Sea-Bird 911 CTD recorded downwelling PAR light levels, temperature, conductivity, oxygen concentration, transmittance and fluorescence at 24 Hz. The frame was fitted with an altimeter. The CTD temperature data was checked against a Sea-Bird SBE35 precision thermometer. Water samples were taken from a near bed (3mab) bottle for calibration of the CTD salinity data by Anne Forbes-Brook (University of Bangor). A LISST-100X particle sizer with internal logging was attached to the CTD frame. A LISST-25 particle sizer was fitted to the CTD and its data logged on the Sea-Bird data logging system.

CTD log:

Cast sequence	Cast ID	time	Latitude (N)	Longitude (W)
1	1off-1	May 01 2009 17:14	53deg 37.135'	03deg 55.483'
2	1off-2	May 01 2009 18:03	53deg 37.152'	03deg 55.596'
3	1off-3	May 01 2009 19:00	53deg 36.990'	03deg 55.733'
4	1off-4	May 01 2009 20:02	53deg 36.991'	03deg 55.732'
5	1off-5	May 01 2009 21:02	53deg 36.994'	03deg 55.728'
6	1off-6	May 01 2009 22:02	53deg 37.047'	03deg 55.675'
7	1off-7	May 01 2009 23:06	53deg 37.098'	03deg 55.413'
8	1off-8	May 02 2009 00:04	53deg 37.058'	03deg 55.315'
9	1off-9	May 02 2009 01:04	53deg 37.059'	03deg 55.315'
10	1off-10	May 02 2009 02:04	53deg 37.066'	03deg 55.317'
11	1off-11	May 02 2009 03:05	53deg 37.050'	03deg 55.315'
12	1off-12	May 02 2009 04:04	53deg 37.057'	03deg 55.316'
13	1off-13	May 02 2009 05:00	53deg 37.039'	03deg 55.319'

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14	1off-14	May 02 2009 06:00	53deg 37.000'	03deg 55.397'
15	1off-15	May 02 2009 07:07	53deg 36.966'	03deg 55.706'
16	1off-16	May 02 2009 08:01	53deg 36.935'	03deg 55.645'
17	1off-17	May 02 2009 09:00	53deg 36.945'	03deg 55.668'
18	1off-18	May 02 2009 10:02	53deg 36.937'	03deg 55.583'
19	1off-19	May 02 2009 11:03	53deg 36.936'	03deg 55.496'
20	1off-20	May 02 2009 12:04	53deg 37.011'	03deg 55.334'
21	1off-21	May 02 2009 13:03	53deg 37.024'	03deg 55.312'
22	1off-22	May 02 2009 14:04	53deg 37.053'	03deg 55.313'
23	1off-23	May 02 2009 15:03	53deg 37.062'	03deg 55.317'
24	1off-24	May 02 2009 16:03	53deg 37.038'	03deg 55.316'
25	1off-25	May 02 2009 17:02	53deg 37.061'	03deg 55.323'
26	1off-26	May 02 2009 18:01	53deg 37.132'	03deg 55.390'
27	T1	May 02 2009 20:05	53deg 31.956'	03deg 30.300'
28	TR2	May 02 2009 20:46	53deg 32.370'	03deg 22.793'
29	TR3	May 02 2009 21:25	53deg 31.865'	03deg 15.951'
30	1in-1	May 02 2009 22:00	53deg 32.316'	03deg 20.270'
31	1in-2	May 02 2009 23:02	53deg 32.317'	03deg 20.210'
32	1in-3	May 03 2009 00:05	53deg 32.307'	03deg 20.154'
33	1in-4	May 03 2009 01:04	53deg 32.283'	03deg 20.112'
34	1in-5	May 03 2009 02:03	53deg 32.236'	03deg 20.109'
35	1in-6	May 03 2009 03:03	53deg 32.242'	03deg 20.106'
36	1in-7	May 03 2009 04:04	53deg 32.229'	03deg 20.113'
37	1in-8	May 03 2009 05:02	53deg 32.217'	03deg 20.126'
38	1in-9	May 03 2009 06:02	53deg 32.228'	03deg 20.115'
39	1in10	May 03 2009 07:04	53deg 32.231'	03deg 20.113'
40	1in-11	May 03 2009 08:03	53deg 32.204'	03deg 20.151'
41	1in-12	May 03 2009 09:03	53deg 32.198'	03deg 20.207'
42	1in-13	May 03 2009 10:02	53deg 32.234'	03deg 20.260'
43	1in-14	May 03 2009 11:04	53deg 32.215'	03deg 20.241'
44	1in-15	May 03 2009 12:05	53deg 32.240'	03deg 20.112'
45	1in-16	May 03 2009 13:05	53deg 32.253'	03deg 20.106'
46	1in-17	May 03 2009 14:05	53deg 32.253'	03deg 20.106'
47	1in-18	May 03 2009 15:04	53deg 32.245'	03deg 20.104'
48	1in-19	May 03 2009 16:04	53deg 32.242'	03deg 20.107'
49	1in-20	May 03 2009 17:00	53deg 32.236'	03deg 20.108'
50	1in-21	May 03 2009 18:01	53deg 32.240'	03deg 20.108'
51	1in-22	May 03 2009 19:00	53deg 32.246'	03deg 20.108'
52	1in-23	May 03 2009 20:02	53deg 32.261'	03deg 20.114'
53	1in-24	May 03 2009 21:02	53deg 32.277'	03deg 20.129'
54	1in-25	May 03 2009 22:01	53deg 32.285'	03deg 20.139'
55	1in-26	May 03 2009 23:01	53deg 32.281'	03deg 20.125'

## Appendix G: Suspended sediment log and results

date	time	station	cast	bottle	depth	filter no.	volume litre	pre-weight gms	post-weight gms	total spm mg/l	salinity
02/05/2009	22:00	11n-1	30	4	14.94	A419	1	0.12781	0.13481	7.00	32.4685
02/05/2009	22:00	11n-1	30	9	1.56	A422	1	0.12912	0.13494	5.82	31.4667
02/05/2009	23:02	11n-2	31	4	14.64	A421	1	0.13040	0.13679	6.39	32.3165
02/05/2009	23:02	11n-2	31	8	2.5	A423	1	0.12989	0.13466	4.77	31.6443
03/05/2009	00:04	11n-3	32	4	14.11	A416	1	0.12862	0.13607	7.45	32.2850
03/05/2009	00:04	11n-3	32	9	2.4	A430	1	0.13006	0.13349	3.43	31.8019
03/05/2009	01:04	11n-4	33	4	15.34	A414	1	0.12900	0.13561	6.61	32.2390
03/05/2009	01:04	11n-4	33	9	2.14	A429	1	0.12956	0.13314	3.58	31.7678
03/05/2009	02:04	11n-5	34	4	17.02	A424	1	0.13031	0.13928	8.97	32.3126
03/05/2009	02:04	11n-5	34	9	2.5	A437	1	0.13018	0.13130	1.12	31.7806
03/05/2009	03:03	11n-6	35	4	17.32	A425	1	0.12956	0.13834	8.78	32.4419
03/05/2009	03:03	11n-6	35	9	1.81	A435	1	0.12778	0.12884	1.06	31.9664
03/05/2009	04:04	11n-7	36	4	19.32	A432	1	0.12866	0.13912	10.46	32.5724
03/05/2009	04:04	11n-7	36	9	3.13	A420	1	0.12836	0.12969	1.33	32.1990
03/05/2009	05:02	11n-8	37	4	17.94	A417	1	0.12903	0.13519	6.16	32.6391
03/05/2009	05:02	11n-8	37	9	1.98	A409	1	0.12929	0.13081	1.52	32.2178
03/05/2009	06:02	11n-9	38	4	20.14	A415	1	0.12918	0.13368	4.50	32.6588
03/05/2009	06:02	11n-9	38	9	2.36	A410	1	0.12881	0.13313	4.32	32.2356
03/05/2009	07:04	11n-10	39	4	18.54	A431	1	0.12978	0.13552	5.74	32.6398
03/05/2009	07:04	11n-10	39	9	2.25	A412	1	0.12949	0.13452	5.03	32.0617
03/05/2009	08:03	11n-11	40	4	17.34	A411	1	0.13027	0.13583	5.56	32.5713
03/05/2009	08:03	11n-11	40	4	17.34	A404	1	0.12925	0.13350	4.25	blank
03/05/2009	08:03	11n-11	40	9	1.94	A405	1	0.12849	0.13369	5.20	31.9281
03/05/2009	08:03	11n-11	40	9	1.94	A406	1	0.12945	0.13382	4.37	blank
03/05/2009	09:03	11n-12	41	4	16.11	A418	1	0.12916	0.13564	6.48	32.5234
03/05/2009	09:03	11n-12	41	9	2.05	A408	1	0.12792	0.13340	5.48	31.8530
03/05/2009	10:00	11n-13	42	4	14.84	A413	1	0.12822	0.13424	6.02	32.2433
03/05/2009	10:00	11n-13	42	9	1.86	A403	1	0.12832	0.13342	5.10	31.6058

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