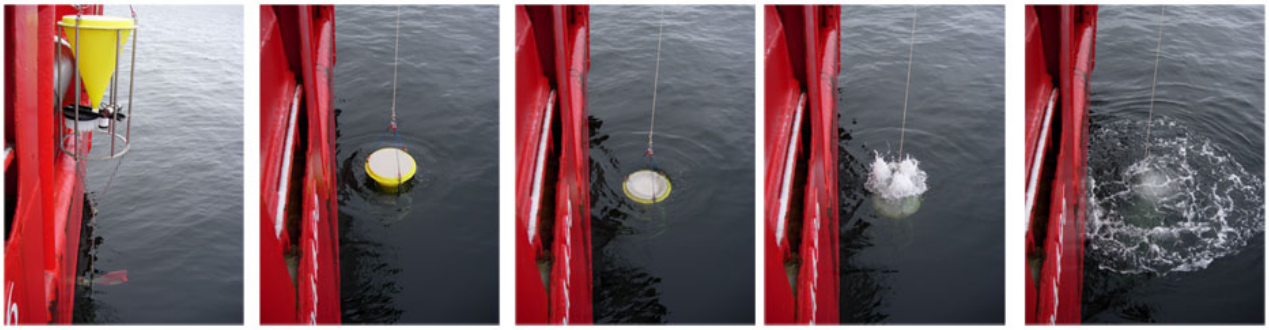
JR112/113 Cruise report

Collated by Mark Brandon (The Open University).

24-25 January 2005

Marguerite Bay, Antarctica



Mooring deployment, 25 January 2005

Purpose and summary

The purpose of this mini-cruise on the RRS James Clark Ross was to deploy two moorings and take box cores in support of two AFI funded research projects working in Marguerite Bay. In a 36 hour period 2 moorings were deployed: one 22 miles from Rothera in 841 m of water, the other in Ryder Bay 2 miles from Rothera in 503 m of water. The moorings will stay in place until next season when they will be recovered and then re-deployed in the same location. In support of these instruments 4 box cores and 2 CTD's were taken. The cruise was entirely successful.

Acknowledgements

We sincerely thank the Master, Officers and Crew of the RRS James Clark Ross for making our work go so smoothly and successfully. We would also thank the BAS Operations Office and the AFI Office for rescheduling our work so soon after the attempt that failed due to sea ice conditions in December 2004.

Contents

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2. Narrative

24 January

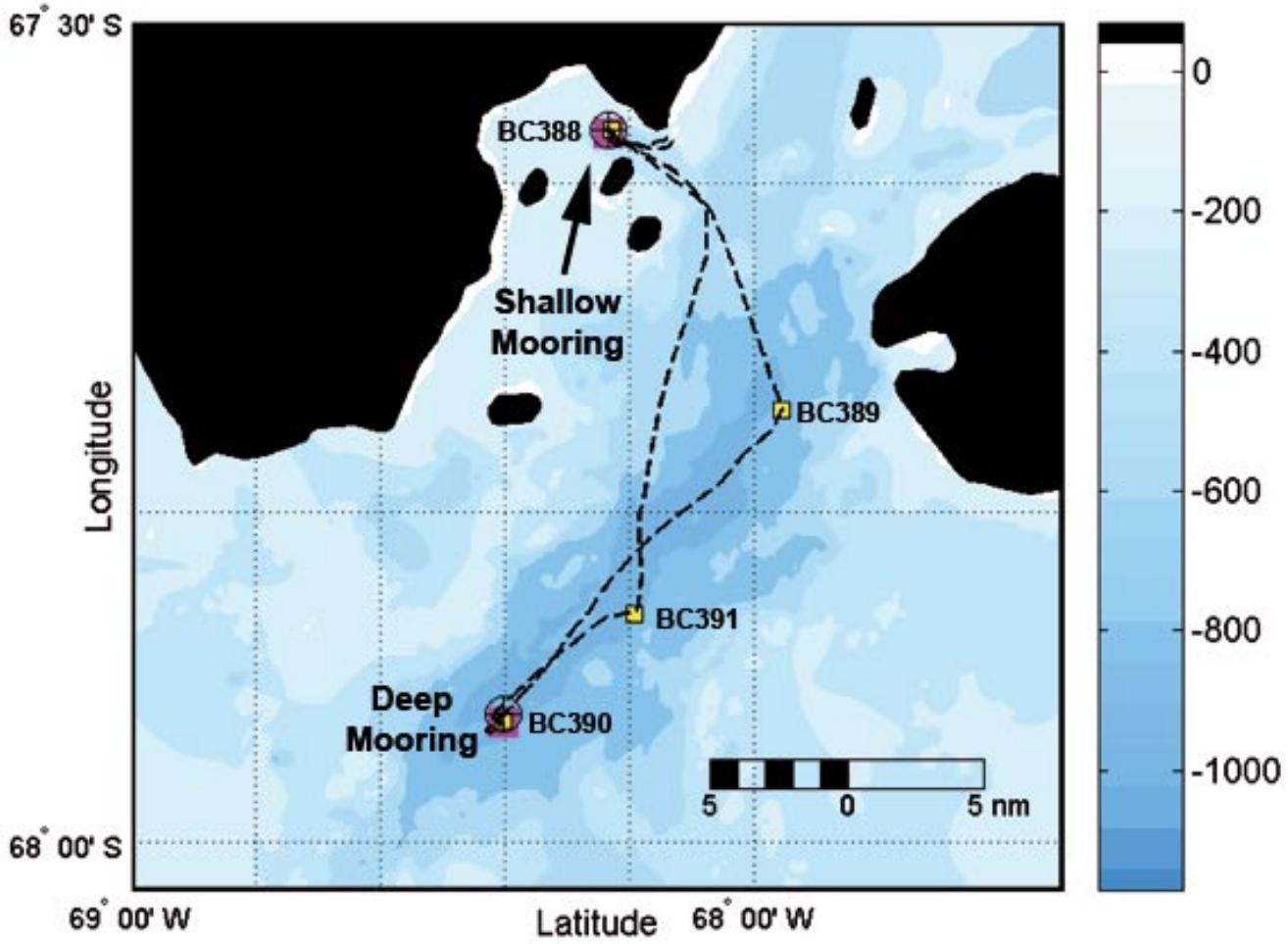
The RRS James Clark Ross sailed from Biscoe Wharf, Rothera Station just after 0800 and headed out to the Rothera Time Series Study (RaTS) site to do a box core in 505 m of water. The ship then sailed to a second box core site with 768 m of water en-route to the deep mooring site. We arrived at the location for the deep mooring at 1622 but found our original choice of site was on the edge of a small seamount. To avoid this we headed back north east along the track and over level sea bed with water depth 841 m. The mooring was successfully deployed by 1847 and the ship then relocated 500m away from this for a full depth CTD, and then a box core. We held station at the mooring overnight for a shipboard (downward looking) ADCP – mooring (upward looking) ADCP data comparison.

25 January

We started deck operations at 0700 with a box core in 842 m of water. We then relocated to Ryder Bay to arrive at the mooring site at 0949. The mooring was deployed by 1101 in 503 m of water and the ship relocated 200 m away to do a full depth CTD station for the end of scientific operations. The JCR was alongside the Biscoe wharf by 1230. The locations of the moorings were given to the Radio Officer for transmission to relevant authorities.

A full cruise track along with the locations of the CTD stations, box cores and CTD's is shown in Figure 1.

Figure 1 Cruise track of JR112. The cores are yellow boxes, the CTD stations are purple squares and the crossed circles are the sites of the moorings. Bathymetry in this map is from the Globec 15 second resolution data set.

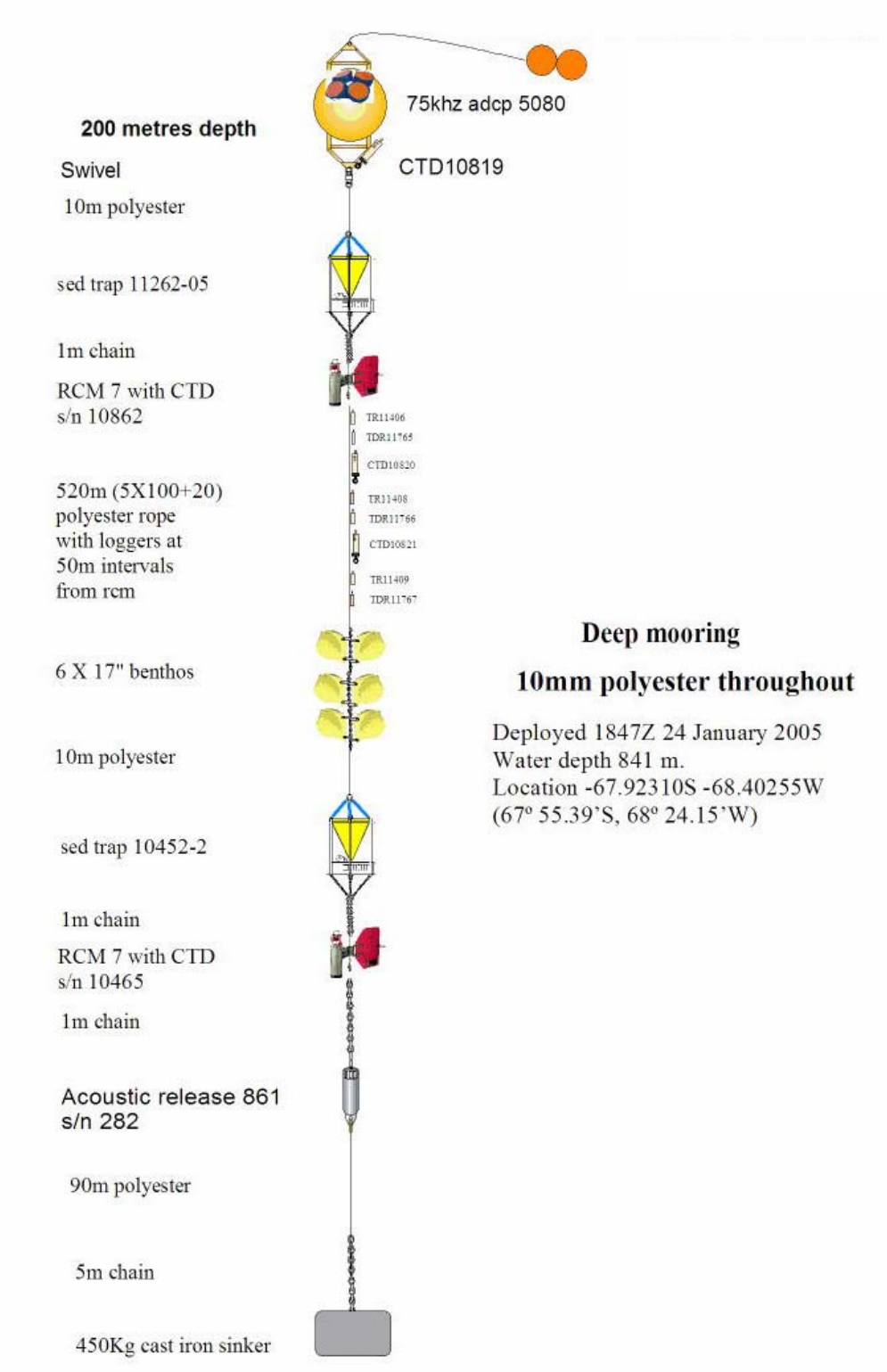


3. Moorings

3.1 The deep mooring.

The deep mooring plan is shown in figure 2.

Figure 2: The deep mooring deployed 1847Z 24 January 2005, depth 841 m. Location -67.92310 S -68.40255 W (67º 55.39'S, 68º 24.15'W)



The serial numbers of instruments on the deep mooring were:

Acoustic release 861: 282
Aanderaa Current meters: 10465 and 10862.
TDR Recorders: 11765, 11766, 11767
TR Recorders: 11406, 11408, 11409
CTD's: 10819, 10820, 10821.
Sediment traps: 10452-2, 11262-05.
75 kHz ADCP: 5080.

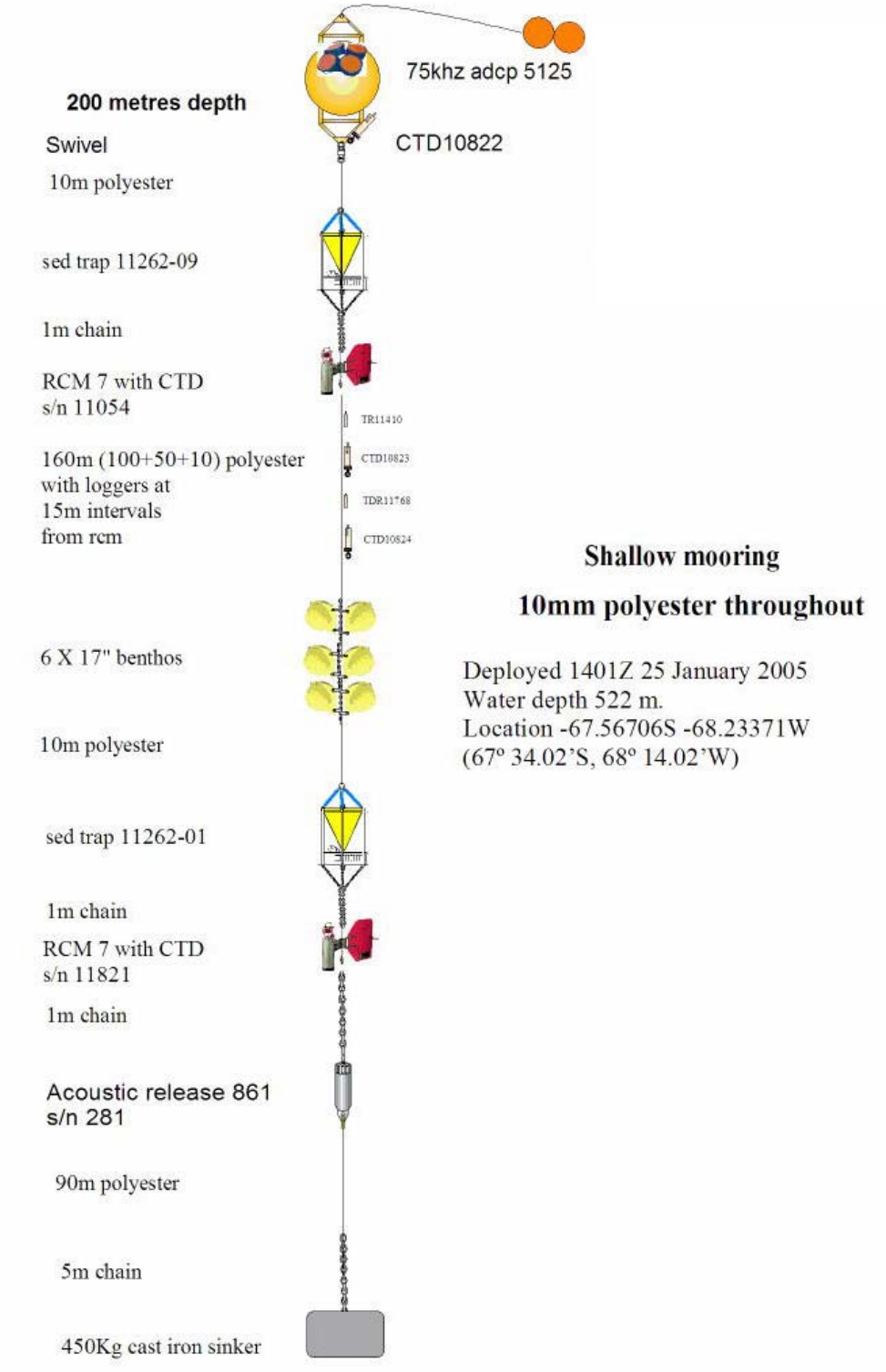
Instrument deployment times (all times GMT)

Instrument	Time in water
Acoustic release 861 s/n 282	17:00
RCM7 with CTD s/n 10465	17:00
Sediment trap 10452-2	17:04
6 X 17" benthos	17:07
TDR11767	17:31
TR11409	17:35
CTD10821	17:46
TDR11766	17:50
TR11408	17:57
CTD10820	18:03
TDR11765	18:09
TR11406	18:15
RCM7 with CTD s/n 10862	18:27
Sediment trap 11262-05	18:30
75kHz ADCP5080 + CTD10819	18:47

3.2 The shallow **mooring**.

This was deployed in Ryder Bay and the plan is shown in figure 3.

Figure 3: The shallow mooring deployed 1401Z 25 January 2005 depth 522 m. Location -67.56706S -68.23371W (67º 34.02'S, 68º 14.02'W)



The serial numbers of instruments on the shallow mooring were:

Acoustic release 861: 281
Aanderaa Current meters: 11821 and 11054.
TDR Recorders: 11768
TR Recorders: 11410
CTD's: 10824, 10823, 10822.
Sediment traps: 11262-09, 11262-01
75 kHz ADCP: 5080.

Instrument deployment times (all times GMT)

Instrument	Time in water
450kg cast iron sinker	12:56
Acoustic release 861 s/n 281	13:07
RCM7 with CTD s/n 11821	13:07
Sediment trap 11262-09	13:10
6 X 17" benthos	13:16
CTD10824	13:27
TDR11768	13:28
CTD10823	13:31
TR11410	13:36
RCM7 with CTD s/n 11054	13:43 (initially entered water)
	13:47 (removed from water)
	13:49 (entered water again)
	13:49 (removed from water)
	13:50 (finally entered water)
Sediment trap 11262-01	13:46 (initially entered water)
	13:47 (removed from water)
	13:50 (finally entered water)
75kHz ADCP5125 + CTD10822	14:01

3.3 Sensor sampling Programming.

3.3.1 The sediment traps

All four sediment traps were programmed to close as per the dates in Table 1

Table 1: Sediment trap closure dates

Trap	Dates
1	26/01/05 - 07/02/05
2	07/02/05 - 21/02/05
3	21/02/05 - 01/03/05
4	01/03/05 - 01/04/05
5	01/04/05 - 01/05/05
6	01/05/05 - 01/06/05
7	01/06/05 - 15/07/05
8	15/07/05 - 01/09/05
9	01/09/05 - 01/10/05
10	01/10/05 - 01/11/05
11	01/11/05 - 15/11/05
12	15/11/05 - 29/11/05

13	29/11/05 - 06/12/05
14	06/12/05 - 13/12/05
15	13/12/05 - 20/12/05
16	20/12/05 - 27/12/05
17	27/12/05 - 03/01/06
18	03/01/06 - 18/01/06
19	18/01/06 - 01/02/06
20	01/02/06 - 01/03/06
21	01/03/06 - 01/04/06

3.3.3 The CTDs
These were set to record pressure, temperature and conductivity once per hour.

3.3.3 The TDR recorders
These were set to record pressure and temperature once per hour.

3.3.4 The TR Recorders
These were set to record temperature once per hour

3.3.5 The Aandaaraa Current meters
These were set to record current velocity, pressure, temperature and conductivity once per hour.

3.3.6. The ADCPs.
The ADCPs on both moorings were set up in the same way. The key parameters of the deployment are in Table 2.

Table 2 Deployment parameters of the upward looking ADCPs

Deployment duration	365 days
Ensemble period	15 minutes
Number of pings	18
Number of depth cells	55
Depth cell side	4 m
Temperature	0
Salinity	35

4. Cores

Four box cores were taken on this cruise using the BAS box corer. All four deployments were successful on their first attempt. The corer was deployed from the mid-ships gantry using the coring wire and we decided not to use the 10 kHz pinger because the depths were so shallow. Table 3 lists the locations of box cores taken on this cruise.

Table 3 Core locations on cruise JR112/113

Core	Event	date	Time (Z)	Latitude (S)	Longitude (W)	depth	sub-cores	notes
BC388	1	24/01/05	12:01	-67.57046	-68.22844	505	4	Shallow mooring site
BC389	2	24/01/05	14:26	-67.73792	-67.95454	768	5	

BC390	5	24/01/05	20:28	-67.92747	-68.40335	810	5	Deep mooring site
BC391	6	25/01/05	10:22	-67.86257	-68.19036	842	5	

Box core samples have been taken to be analysed for carbon and nitrogen isotopes, barium, aluminium and uranium and other lithogenic dust by D. Carson.

5. CTDs

One full depth CTD was taken at each mooring site. The locations and maximum depths are given in Table 4.

Table 4: The locations of the two CTD stations

TIME	EVENT	LAT (decimal)	LONG (decimal)	Lat (deg)	Lat (min)	Lon (deg)	Long (min)	MAX DEPTH (m)
24/01/2005 19:30	4	-67.9275	-68.4033	-67	55.65	-68	24.198	809
25/01/2005 14:28	8	-67.5688	-68.2321	-67	34.128	-68	13.926	503

Each CTD station was intensively sampled for chemical and physical properties at set depths throughout the water column.

Deep mooring site CTD sampling

Samples were taken at the depths listed in Table 5. These will be analysed for salinity and ^{18}O (Brandon and Wallace), nitrate, silicate, phosphate and ammonium (Weston), and dissolved organic carbon (DOC) and dissolved organic nitrogen (DON) (Carson)

Table 5: Deep mooring site CTD bottle depths

Bottle	1	2	3	4	5	6	7	8	9	10	11	12
Pressure	820	659	507	355	203	102	51	27	17	12	6	0.5

Shallow mooring site CTD sampling

Samples were taken at the depths listed in Table 5. These will be analysed for salinity and ^{18}O (Brandon and Wallace), nitrate, silicate, phosphate and ammonium (Weston). As this station is at the RaTS site, as well as taking samples for DOC and PON, Carson took samples for particulate organic carbon (PON) and particulate organic nitrogen (PON) isotopes, barium, aluminium and uranium and other lithogenic dust. He also took samples at bottle 8 (15 m) for PH, alkalinity, and total chlorophyll.

Table 5: Shallow mooring site CTD bottle depths (RaTS Site).

Bottle	1	2	3	4	5	6	7	8	9	10	11	12
Pressure	509	405	303	202	101	50	25	15	10	5	0.5	

6. SWATH

The swath data for the two day period was gridded into a file with 20 m resolution.

APPENDIX

Full Event Log for the cruise (all times GMT)

Time	Event	Lat	Lon	Comment
24/01/2005 11:35	1	-67.57045	-68.22847	Vessel on station at first coring site in Ryder bay
24/01/2005 11:47		-67.57044	-68.22847	Box corer deployed
24/01/2005 12:01		-67.57046	-68.22844	Box corer on sea bed
24/01/2005 12:21		-67.5704	-68.22774	Box corer recovered
24/01/2005 12:56		-67.57031	-68.22751	Sampling complete moving off station
24/01/2005 13:58		-67.73802	-67.95405	Vessel on station CS 3
24/01/2005 14:03	2	-67.73813	-67.95402	Box corer deployed
24/01/2005 14:26		-67.73792	-67.95454	Box corer on sea bed
24/01/2005 14:49		-67.73703	-67.95387	Box corer recovered
24/01/2005 15:10		-67.92307	-68.40261	Moving off station
24/01/2005 16:22		-67.92308	-68.40261	Passing over mooring site, look for flatter sea bed
24/01/2005 16:40		-67.92308	-68.4026	On station for mooring deployment
24/01/2005 16:47	3	-67.92307	-68.4026	Commence mooring deployment, weights deployed
24/01/2005 17:00		-67.92306	-68.40265	Sediment trap deployed
24/01/2005 18:46		-67.9231	-68.40255	Buoy released
24/01/2005 19:05		-67.92753	-68.40334	Vessel relocated 500m from mooring for CTD
24/01/2005 19:13	4	-67.92755	-68.40331	CTD deployed
24/01/2005 19:30		-67.92753	-68.40328	CTD @ 809m
24/01/2005 19:56		-67.92754	-68.40332	CTD Recovered
24/01/2005 20:11	5	-67.92749	-68.40333	Box corer deployed
24/01/2005 20:28		-67.92747	-68.40335	Box corer on seabed
24/01/2005 20:50		-67.92745	-68.40336	Box corer recovered
24/01/2005 20:56		-67.92752	-68.40334	Remaining on station for ADCP
25/01/2005 09:10		-67.86256	-68.19026	Vsl off station
25/01/2005 09:49		-67.86203	-68.19138	Vsl on station for box coring
25/01/2005 10:03	6	-67.86262	-68.19038	Box corer deployed
25/01/2005 10:22		-67.86257	-68.19036	Box corer on seabed
25/01/2005 10:47		-67.86257	-68.19036	Box corer recovered
25/01/2005 11:10		-67.86235	-68.19003	Sampling complete moving off station
25/01/2005 12:49		-67.56712	-68.23377	V/L on station at shallow mooring site for deployment
25/01/2005 12:52	7	-67.56712	-68.23376	Commence deployment of shallow mooring
25/01/2005 12:54		-67.56708	-68.23374	Weight deployed
25/01/2005 13:09		-67.5671	-68.23372	Sediment trap deployed
25/01/2005 13:13		-67.56709	-68.2337	Spheres deployed
25/01/2005 13:43		-67.56709	-68.23373	Sediment trap deployed
25/01/2005 14:01		-67.56706	-68.23371	Buoy deployed - Mooring deployment complete
25/01/2005 14:05		-67.56873	-68.23208	Moving 200m ahead - clear of mooring
25/01/2005 14:14	8	-67.56876	-68.23208	CTD deployed
25/01/2005 14:28		-67.56877	-68.23209	CTD @depth 503m
25/01/2005 14:47		-67.56872	-68.23206	CTD recovered - moving off station