JR 136/137 Cruise report

15/2 – 17/2/06
RRS James Clark Ross, Marguerite Bay, Antarctica

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Summary

The objectives of this cruise on the RRS *James Clark Ross* was to recover two moorings previously deployed during cruise JR 112/113 (24/1/05- 24/1/05) and also redeploy the two moorings at the same locations. The locations were, as before, one 'deep' mooring 22 miles from Rothera research station with a ~840m water column depth and one 'shallow' mooring at Ryder Bay Rothera Biogeochemical Times Series site (RaTS) 2 miles from Rothera with a ~500 m water column depth. CTDs were also taken at the mooring sites immediately prior to mooring retrieval. A 10 station CTD transect was also taken . This involved 6 CTDs across the northern entrance to Marguerite Bay between Adelaide and Alexander Island and 4 CTDs across the entrance to Marguerite Bay running away from the moorings along the Faure Passage. All mooring were recovered, had their data recorded and screened, and redeployed successfully and the recommended CTD sections sampled fully.

This research cruise had been delayed from late December 2005 and was originally scheduled to coincide with the relief of Rothera by the RRS JCR. Although relief of base was achieved, the sea ice conditions in Marguerite Bay resulted in a delay to this cruise. We are therefore especially grateful to BAS Operations for rescheduling this cruise at such short notice and the AFI co-ordinator Dr Martin Miller for his excellent help in facilitating this dialogue. As always we are grateful to the Master, Officers and Crew of the RRS James Clark Ross for making this a successful cruise and fully supporting all of our requirements.

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2. Narrative

All times throughout this report are GMT

15/02/06

The RRS *James Clark Ross* docked briefly at Biscoe Wharf at ~1100. After a period of cargo movements and clearing the aft deck she headed for the shallow mooring (Rothera Biogeochemical Time Series site (RaTS)) where a CTD was carried out at 1619, immeadiatley followed by the shallow mooring recovery by 1820. We then headed to the deep mooring site where a CTD was undertaken at 2038 and the deep mooring was successfully recovered. We then headed to the first station of the CTD survey between Adelaide and Alexander Island

16/2/06

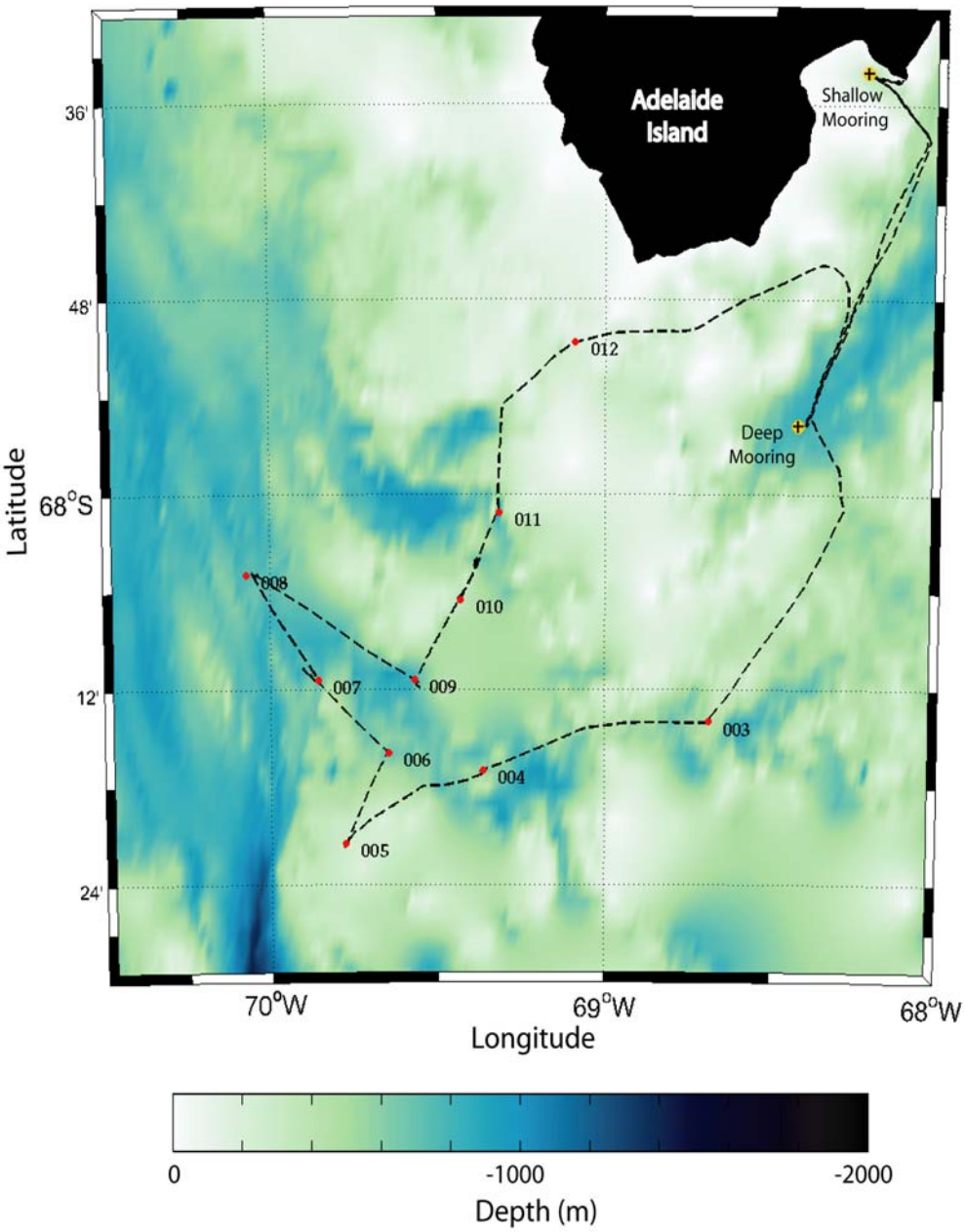
The first CTD station of the transect was started at 0123. We then followed a route leading offshore out of Marguerite Bay and then along a section spanning the northern end of the entrance to Marguerite Bay, finishing the final station, close to Adelaide Island at 21:37. The planned CTD transect prior to the cruise from Adelaide to Alexander Island in the southernmost region was found to be inaccessible due to sea ice (as suspected from observations during the passage to Rothera prior to this cruise). A series of 4 stations E-W along the Faure Passage was therefore substituted for the original most southerly station. After the transect was completed the RRS JCR sailed to the deep mooring site and remained in position overnight.

17/2/06

The deep mooring was redeployed at 1051. The RRS JCR then steamed to the shallow mooring site and the shallow mooring was redeployed at 1356. After the successful deployment RRS *James Clark Ross* returned to dock at Biscoe Wharf and returned DC, KH, PM and KW to Rothera with the remaining scientists returning to Stanley.

A full cruise track along with the locations of the moorings and CTD stations is shown in Figure 1.

Figure 1. Cruise track of JR136/137. The CTD stations are red circles and the orange crossed circles are the sites of the moorings. The CTD station numbers are given except for CTD's 001 and 002 which are at the mooring sites. Bathymetry used from the SO GLOBEC 1 minute resolution data set.



3. Moorings

After recovering the deep mooring, pressure data taken from 6 instruments showed that the polyester rope had stretched while the mooring was originally being deployed. The shallowest CTD which had been tied to be at 200 m deep was in fact 123 m deep. The new mooring deployed was rigged with plastic coated steel wire to prevent this from re-occurring. The deep mooring plan is shown in figure 2.
The moorings were essentially identical to those deployed on JR112/113 with the exception of additional Aquadopp or Nortek current meters and the use of plastic coated steel wire.

3.1 Deep mooring

For the deep mooring the ship was on station 0910. The deep mooring was deployed at 1051, 17 February 2006, at a water column depth of 835m. The location of the deep mooring was 67^{o} 55.41'S, 68^{o} 24.11'W

The serial numbers and timings of the deep mooring were:

Acoustic release RT661 B2S: 222
Aanderaa current meters: 11675 and 9603
Nortek Aquadopp current meter: A6L1168
TDR recorders: 11765, 1766 and 11767
TR recorders: 11406, 11408, 11409
CTDs: 10819, 10820 and 10821
Sediment traps: 11262-04 and 11262-07

Instrument deployment times

Instrument	***Time in water***
450kg cast iron sinker	09:23
Acoustic release RT661 s/n 222	09:36
RCM7 with CTD s/n 11675	09:40
Nortek current meter s/n A6L1168	09:40
Sediment trap s/n 11262-07	09:40
6 x 17'' benthos	09:47
TDR 11767	09:54
TR 11409	09:58
CTD 10821	10:01
TDR 11766	10:06
TR 11408	10:10
CTD 10820	10:14
TDR 11765	10:18
TR 11406	10:22
RDM7 with CTD s/n 9603	10:36
Sediment trap s/n 11262-04	10:36
75kHz ADCP 5125 with CTD s/n 10819	10:50
Deployed	**10:51**

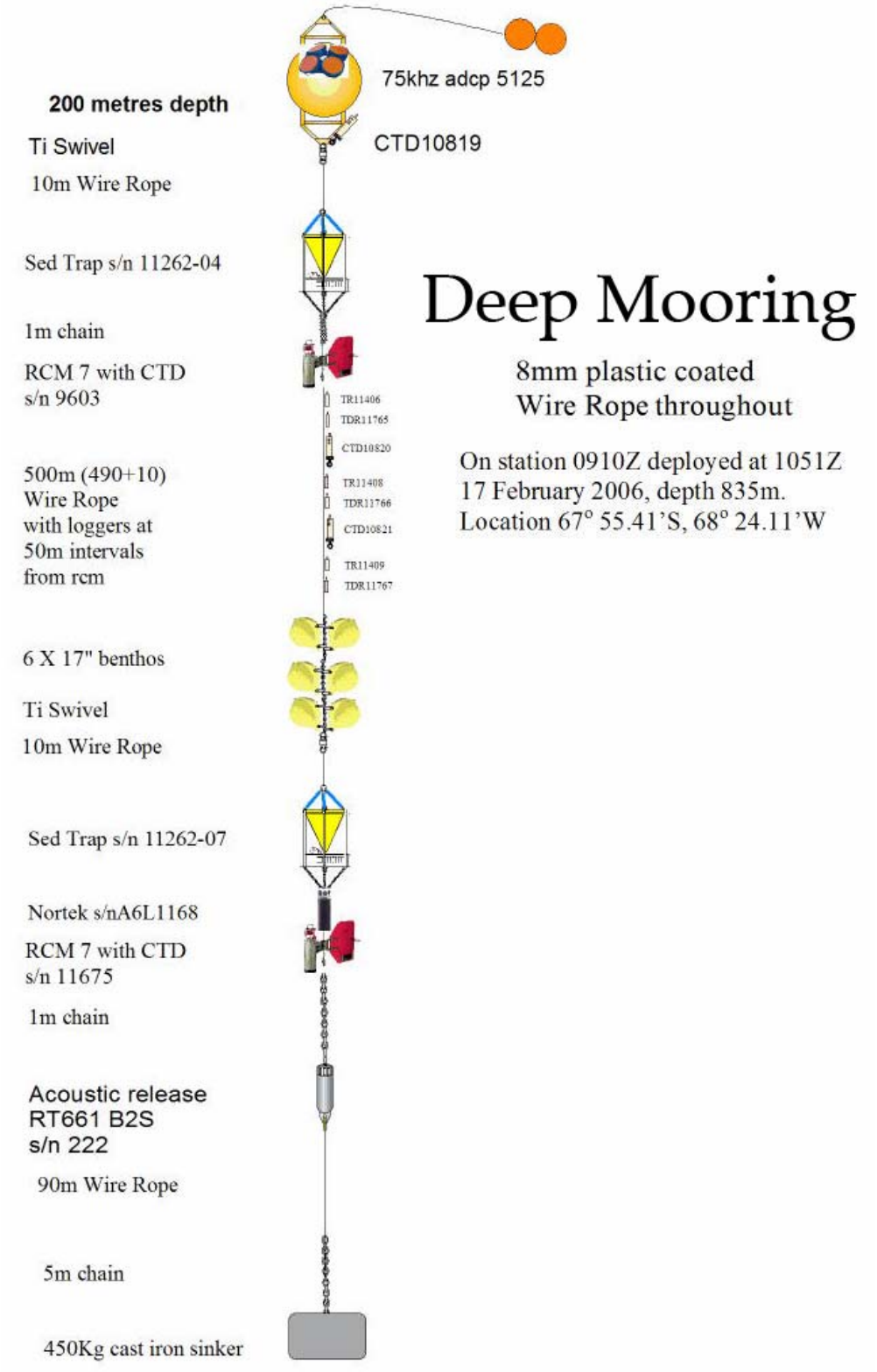


Figure 2. The deep mooring schematic showing the instruments and construct, and detailing the location, times, depth and serial numbers

3.2 Shallow mooring deployment

Unfortunately the deepest Aanderaa RCM7 with CTD (SN: 11821) from the recovered shallow mooring failed completely, with physical signs of electrical breakdown. Although the malfunction can not be properly diagnosed until its return to UKORS, it looked very likely that water had penetrated into the unit very shortly, if not immediately after being deployed. Every other instrument recorded data successfully. The plan for the new deployed shallow mooring is shown in figure 3.

For the shallow mooring the ship was on station at 1255. The shallow mooring was deployed at 1356, 17 February 2006, at a water column depth of 522m.
The location of the deep mooring was 67^{o} 34.00'S, 68^{o} 14.00'W

The serial numbers of the instruments on the shallow mooring were:

Acoustic release RT661 B2S: 230
Aanderaa current meters: 11657 and 11677
Sontek current meter: 37SI-3S115-3364
TDR recorders: 11768
TR recorders: 11410
CTDs: 10822 and 10862
Sediment traps: 11262-01 and 11262-10

Instrument deployment times (All times GMT)

Instrument	***Time in water***
450kg cast iron sinker	13:04
Acoustic release RT661 s/n 230	13:15
RCM7 with CTD s/n 11677	13:23
Sontek current meter s/n 37SI-3S115-3364	13:23
Sediment trap s/n 11262-10	13:28
6 x 17'' benthos	13:35
CTD 10824	13:35
TDR 11768	13:37
CTD 10823	13:39
TR 11410	13:42
RDM7 with CTD s/n 11657	13:53
Sediment trap s/n 11262-01	13:53
75kHz ADCP 5600 with CTD s/n 10822	13:56
Deployed	**13:56**

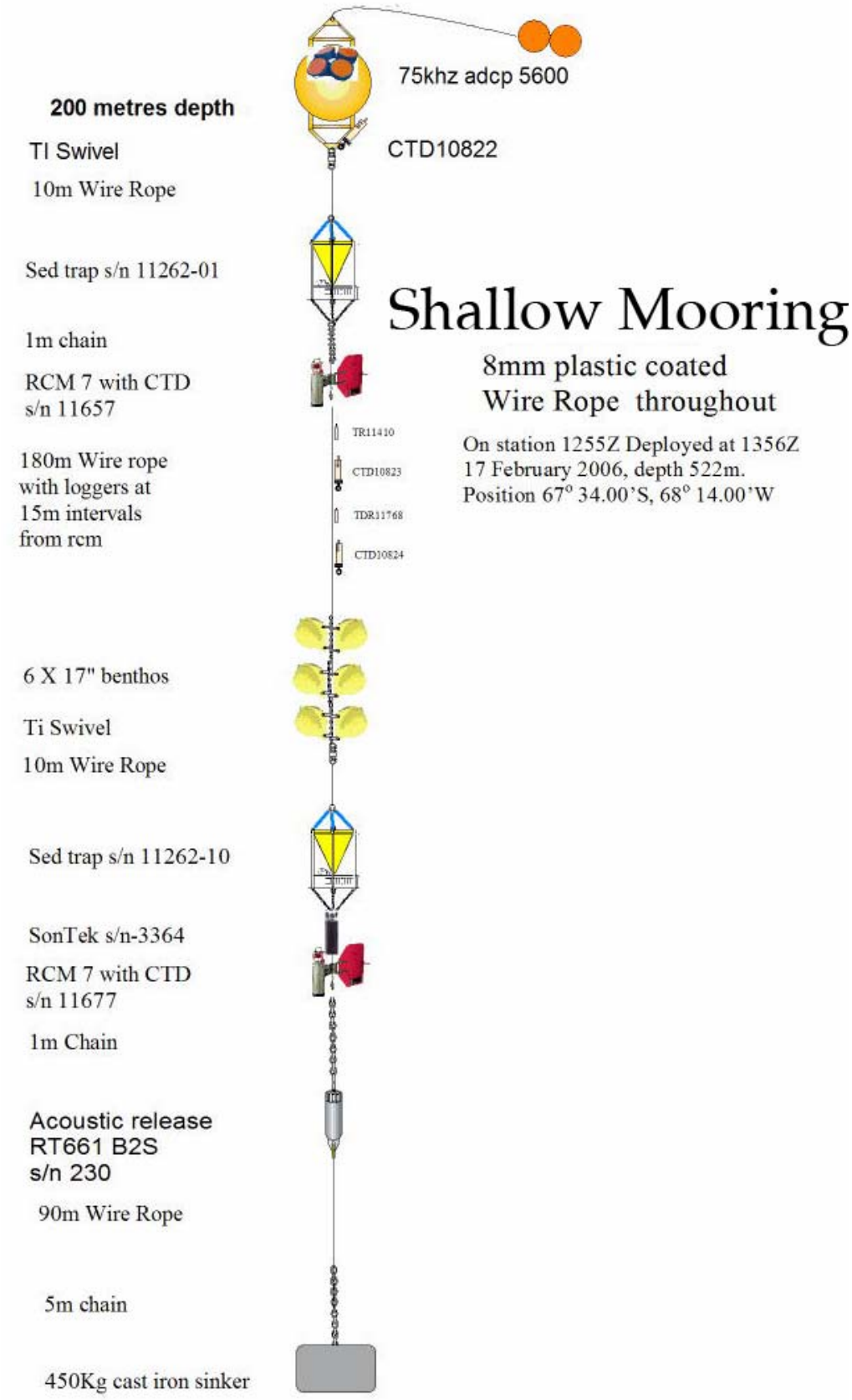


Figure 3. The shallow mooring schematic showing the instruments and construct, and detailing the location, times, depth and serial numbers

3.3 Sensor sampling programming

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

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

3.3.3 TR Recorders
These were set to record temperature once per hour.

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

3.3.5 ADCPs
The ADCPs on both moorings were set up in the same way. The key parameters of the deployment are in Table 1.

Table 1: 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

3.3.6 Sediment traps

Sediment trap bottle recovery
All sediment trap bottles from recovered sediment traps were spiked with additional 5ml of fresh 2% buffered formalin solution before sample storage at +4^{o}C.

Sediment trap programming

Four series of bottles were arbitrarily labelled for the sediment traps as follows
A Lower shallow mooring trap
B Upper deep mooring trap
C Lower deep mooring trap
D Upper shallow mooring trap

All four sediment traps were programmed with the same opening/closing dates as detailed in table 2. The first bottle therefore moved into position the day after trap deployment.

Table 2: Sediment trap timings

Bottle number	Bottle open	Bottle close
1	18/2/06	3/3/06
2	3/3/06	17/3/06
3	17/3/06	31/3/06
4	31/3/06	1/5/06
5	1/5/06	1/6/06
6	1/6/06	1/7/06
7	1/7/06	1/8/06
8	1/8/06	1/9/06
9	1/9/06	1/10/06
10	1/10/06	1/11/06
11	1/11/06	15/11/06
12	15/11/06	1/12/06
13	1/12/06	10/12/06
14	10/12/06	17/12/06
15	17/12/06	24/12/06
16	24/12/06	7/1/07
17	7/1/07	20/1/07
18	20/1/07	1/2/07
19	1/2/07	21/2/07
20	21/2/07	8/3/07
21	8/3/07	1/4/07

4. CTDs

4.1 The CTD setup

The CTD unit used for the measurement program was a Sea-Bird 911-plus with dual temperature and conductivity sensors, an altimeter, an SBE 43 oxygen sensor and a Chelsea Instruments transmissometer. The configuration and serial numbers of the sensors used are in table 3 below. A copy of the full calibration coefficients for the CTD is in the appendix. Please note that the configuration (".con" file) was setup to record the ITS-90 temperature and hence the primary and secondary temperature data use this scale.

Table 3: CTD configuration throughout JR136/137.

CTD sensor	**Serial Number**	**date last calibrated**
Digiquartz pressure transducer	89973-0707	3 June 2005
Primary SBE3 temperature (ITS-90)	2705	4 January 2006
Primary SBE 4C conductivity	2248	23 June 2005
Secondary SBE3 temperature (ITS-90)	32709	23 June 2005
Secondary SBE 4C conductivity	42255	23 June 2005
Altimeter	213026993	Unknown
SBE 43 oxygen sensor	0242	31 May 2005
Chelsea transmissometer	CST-846DR	29 March 2005

One full depth CTD was taken at each mooring site and a further 10 full depth CTD's were taken during the survey at the entrance to Marguerite Bay (figure 1). The locations and maximum depths of all the CTD's are given in table 4.

Date	Time (GMT)	CTD number	Lat (decimal)	Lon (decimal)	Lat (dm)	Lon (dm)	Depth (ea600) (m)
15-02-06	16:20	001	-67.5688	-68.2315	67° 34.13 S	68° 13.89 W	518
15-02-06	20:38	002	-67.9283	-68.4047	67° 55.70 S	68° 24.28 W	839
16-02-06	01:24	003	-68.2330	-68.6873	68° 13.98 S	68° 41.24 W	454
16-02-06	04:07	004	-68.2828	-69.3648	68° 16.97 S	69° 21.89 W	598
16-02-06	06:20	005	-68.3575	-69.7787	68° 21.45 S	69° 46.72 W	302
16-02-06	07:50	006	-68.2648	-69.6487	68° 15.89 S	69° 38.92 W	696
16-02-06	10:04	007	-68.1907	-69.8582	68° 11.44 S	69° 51.49 W	750
16-02-06	12:02	008	-68.0823	-70.0720	68° 04.94 S	70° 04.32 W	815
16-02-06	14:32	009	-68.1903	-69.5698	68° 11.42 S	69° 34.19 W	925
16-02-06	17:13	010	-68.1080	-69.4318	68° 06.48 S	69° 25.91 W	284
16-02-06	18:39	011	-68.0190	-69.3158	68° 01.14 S	69° 18.95 W	762
16-02-06	21:11	012	-67.8443	-69.0883	67° 50.66 S	69° 05.30 W	249

Table 4. The CTD locations.

4.2 CTD water sampling

For CTD bottle sampling details the deepest Niskin fired is always bottle # 1 with remaining bottles fired sequentially as the CTD returns to the surface.

The order of sampling direct from Niskin at all stations was as follows:

1. δDIC
2. Salinity
3. $\delta^{18}O$
4. Bulk sample for remaining analyses

Table 5 shows the sampling depths for all CTDs.

CTD001	Bottle #	1	2	3	4	5	6	7	8	9	10	11	12
	Pressure (db)	505	354	304	251	203	152	102	77	51	26	16	1.5
CTD002	Bottle #	1	2	3	4	5	6	7	8	9	10	11	12
	Pressure (db)	823	761	508	407	306	204	104	78	53	28	18	2.6
CTD003	Bottle #	1	2	3	4	5	6	7	8	9	10	11	12
	Pressure (db)	456	355	304	253	203	152	102	77	51	26	16	1.6
CTD004	Bottle #	1	2	3	4	5	6	7	8	9	10	11	12
	Pressure (db)	585	506	405	304	203	152	102	76	51	26	16	1.4
CTD005	Bottle #	1	2	3	4	5	6	7	8	9	10	11	12
	Pressure (db)	312	312	312	254	203	153	102	77	51	26	16	1.6
CTD006	Bottle #	1	2	3	4	5	6	7	8	9	10	11	12
	Pressure (db)	705	507	405	304	203	153	102	76	51	26	16	1.8
CTD007	Bottle #	1	2	3	4	5	6	7	8	9	10	11	12
	Pressure (db)	736	609	507	406	305	205	103	78	52	28	17	1.8
CTD008	Bottle #	1	2	3	4	5	6	7	8	9	10	11	12
	Pressure (db)	867	709	507	405	304	203	103	77	52	27	17	1.4
CTD009	Bottle #	1	2	3	4	5	6	7	8	9	10	11	12
	Pressure (db)	915	862	507	406	305	204	103	78	52	27	17	2
CTD010	Bottle #	1	2	3	4	5	6	7	8	9	10	11	12
	Pressure (db)	333	254	203	152	102	76	51	26	16	3.8	n/a	n/a
CTD011	Bottle #	1	2	3	4	5	6	7	8	9	10	11	12
	Pressure (db)	788	609	506	405	304	203	101	77	52	26	17	1.8
CTD012	Bottle #	1	2	3	4	5	6	7	8	9	10	11	12
	Pressure (db)	255	255	255	255	203	152	102	77	51	26	16	1.2

Table 5. Niskin bottle depths for all CTD's.

4.2.1 Mooring site CTDs

One full depth CTD was taken at each mooring site immediately prior to mooring release and retrieval.

Shallow mooring cast

The location of the shallow mooring (CTD001) was at 67^{o} 34.12S 68^{o} 13.89W (RaTS site). The cast commenced at 1619 to a depth of 500m and was sampled as shown below

Depth/m	0	15	25	50	75	100	150	200	250	300	350	500	For
Salinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
$\delta^{18}O$	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
δDIC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DC
Nutrients	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KW
NH_4^+	✓	✓	✓	✓	×	✓	×	×	✓	×	×	✓	PM
Silicic acid	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KH
DOC & DON	✓	✓	×	✓	×	✓	×	×	✓	×	×	✓	KW
Biogenic silica	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KW
POC & PON	✓	✓	×	✓	×	✓	✓	×	✓	×	✓	✓	KW
Chl *a*	×	✓	×	×	×	✓	×	×	×	×	×	×	PM
δNO_3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DC
Iodine	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	RC
XRF	✓	✓	×	✓	×	✓	✓	×	✓	×	×	✓	DC
Dissolved Ba	✓	✓	×	✓	×	✓	✓	×	✓	×	✓	✓	DC

Deep mooring CTD cast

The location of the deep mooring cast (CTD002) was 67^{o} 55.69 S and 68^{o} 24.27 W. The cast commenced at 2038 to a depth of 810m and was sampled as shown below

Depth/m	0	15	25	50	75	100	200	300	400	500	750	810	For
Salinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
$\delta^{18}O$	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
δDIC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DC
Nutrients	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KW
NH_4^+	✓	✓	×	✓	×	✓	×	×	×	✓	×	✓	PM
Silicic acid	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KH
DOC & DON	✓	✓	×	✓	×	✓	×	×	×	✓	×	✓	KW
Biogenic silica	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KW
POC & PON	✓	✓	×	✓	×	✓	✓	×	✓	×	✓	✓	KW
Chl *a*	×	✓	×	×	×	✓	×	×	×	×	×	×	PM
δNO_3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DC
Iodine	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	RC
XRF	✓	✓	×	✓	×	✓	✓	×	×	×	×	✓	DC
Dissolved Ba	✓	✓	×	✓	×	✓	✓	×	✓	×	✓	✓	DC

4.2.2 CTD transect

The CTDs were sampled for the following parameters:

CTD003

Depth/m	0	15	25	50	75	100	150	200	250	300	350	452	For
Salinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
$\delta^{18}O$	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
δDIC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DC
Nutrients	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KW
NH_4^+	×	×	×	×	×	×	×	×	×	×	×	×	PM
DOC & DON	✓	×	×	✓	×	✓	×	×	✓	×	×	✓	KW
Biogenic silica	×	×	×	×	×	×	×	×	×	×	×	×	KW
POC & PON	✓	×	×	✓	×	✓	×	×	✓	×	×	✓	KW
Chl *a*	×	✓	×	×	×	✓	×	×	×	×	×	×	PM
δNO_3	×	×	×	×	×	×	×	×	×	×	×	×	DC
Iodine	✓	✓	×	×	×	×	×	×	×	×	×	×	RC

CTD004

Depth/m	0	15	25	50	75	100	150	200	300	400	500	580	For
Salinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
$\delta^{18}O$	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
δDIC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DC
Nutrients	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KW
NH_4^+	✓	×	×	✓	×	✓	×	×	×	×	×	×	PM
DOC & DON	✓	×	×	✓	×	✓	×	×	✓	×	×	✓	KW
Biogenic silica	✓	×	×	✓	×	✓	×	×	×	×	×	×	KW
POC & PON	✓	×	×	✓	×	✓	×	×	✓	×	×	✓	KW
Chl *a*	×	✓	×	×	×	×	✓	×	×	×	×	×	PM
δNO_3	✓	×	×	✓	×	✓	×	✓	✓	✓	✓	✓	DC
Iodine	✓	✓	×	×	×	×	×	×	×	×	×	×	RC

CTD005

Depth/m	0	15	25	50	75	100	150	200	250	300	300	300	For
Salinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
$\delta^{18}O$	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	✓	✓	DW & DS
δDIC	✓	✓	✓	✓		✓	✓	×	✓	✓	×	×	DC
Nutrients	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×	KW
NH_4^+	×	×	×	×	×	×	×	×	×	×	×	×	PM
DOC & DON	✓	×	×	✓	×	✓	×	×	×	✓	×	×	KW
Biogenic silica	×	×	×	×	×	×	×	×	×	×	×	×	KW
POC & PON	✓	×	×	✓	×	✓	×	×	×	✓	×	×	KW
Chl *a*	×	✓	×	×	×	✓	×	×	×	×	×	×	PM
δNO_3	×	×	×	×	×	×	×	×	×	×	×	×	DC
Iodine	✓	✓	×	×	×	×	×	×	×	×	×	×	RC

CTD006

Depth/m	0	15	25	50	75	100	150	200	300	400	500	696	For
Salinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
$\delta^{18}O$	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
δDIC	✓	✓	×	✓	×	✓	×	✓	✓	✓	×	✓	DC
Nutrients	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KW
NH_4^+	✓	×	×	✓	×	✓	×	×	×	×	✓	✓	PM
DOC & DON	✓	×	×	✓	×	✓	×	×	×	×	✓	✓	KW
Biogenic silica	✓	×	×	✓	×	✓	×	×	×	×	✓	✓	KW
POC & PON	✓	×	×	✓	×	✓	×	×	×	×	✓	✓	KW
Chl *a*	×	✓	×	×	×	✓	×	×	×	×	×	×	PM
δNO_3	✓	×	×	✓	×	✓	×	✓	✓	✓	✓	✓	DC
Iodine	✓	✓	×	×	×	×	×	×	×	×	×	×	RC

CTD007

Depth/m	0	15	25	50	75	100	200	300	400	500	600	750	For
Salinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
$\delta^{18}O$	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
δDIC	✓	✓	×	✓	×	✓	×	✓	✓	✓	×	✓	DC
Nutrients	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KW
NH_4^+	×	×	×	×	×	×	×	×	×	×	×	×	PM
DOC & DON	✓	×	×	✓	×	✓	×	×	×	✓	×	✓	KW
Biogenic silica	×	×	×	×	×	×	×	×	×	×	×	×	KW
POC & PON	✓	×	×	✓	×	✓	×	×	×	✓	×	✓	KW
Chl *a*	×	✓	×	×	×	✓	×	×	×	×	×	×	PM
δNO_3	×	×	×	×	×	×	×	×	×	×	×	×	DC
Iodine	✓	✓	×	×	×	×	×	×	×	×	×	×	RC

CTD008

Depth/m	0	15	25	50	75	100	200	300	400	500	700	800	For
Salinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
$\delta^{18}O$	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
δDIC	✓	✓	×	✓	×	✓	×	✓	×	✓	✓	✓	DC
Nutrients	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KW
NH_4^+	✓	×	×	✓	×	✓	×	×	×	×	×	×	PM
DOC & DON	✓	×	×	✓	×	✓	×	×	×	✓	×	✓	KW
Biogenic silica	✓	×	×	✓	×	✓	×	×	×	×	×	×	KW
POC & PON	✓	×	×	✓	×	✓	×	×	×	✓	×	✓	KW
Chl *a*	×	✓	×	×	×	✓	×	×	×	×	×	×	PM
δNO_3	✓	×	×	✓	×	✓	✓	×	✓	✓	✓	✓	DC
Iodine	✓	✓	×	×	×	×	×	×	×	×	×	×	RC

CTD009

Depth/m	0	15	25	50	75	100	200	300	400	500	850	915	For
Salinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
$\delta^{18}O$	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
δDIC	✓	✓	×	✓	×	✓	×	✓	×	✓	✓	✓	DC
Nutrients	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KW
NH_4^+	×	×	×	×	×	×	×	×	×	×	×	×	PM
DOC & DON	✓	×	×	✓	×	✓	×	×	×	✓	×	✓	KW
Biogenic silica	×	×	×	×	×	×	×	×	×	×	×	×	KW
POC & PON	✓	×	×	✓	×	✓	×	×	×	✓	×	✓	KW
Chl *a*	×	✓	×	×	×	✓	×	×	×	×	×	×	PM
δNO_3	×	×	×	×	×	×	×	×	×	×	×	×	DC
Iodine	✓	✓	×	×	×	×	×	×	×	×	×	×	RC

CTD010

Depth/m	x	x	0	15	25	50	75	100	150	200	250	328	For
Salinity	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
$\delta^{18}O$	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
δDIC	-	-											DC
Nutrients	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KW
NH_4^+	-	-	×	×	×	×	×	×	×	×	×	×	PM
DOC & DON	-	-	✓	×	×	✓	×	✓	×	×	×	✓	KW
Biogenic silica	-	-	×	×	×	×	×	×	×	×	×	×	KW
POC & PON	-	-	✓	×	×	✓	×	✓	×	×	×	✓	KW
Chl *a*	-	-	×	×	×	✓	×	×	×	×	×	×	PM
δNO_3	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DC
Iodine	-	-	×	×	×	×	×	×	×	×	×	×	RC

CTD011

Depth/m	0	15	25	50	75	100	200	300	400	500	600	778	For
Salinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
$\delta^{18}O$	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
δDIC	✓	✓	×	✓	×	✓	×	✓	×	✓	✓	✓	DC
Nutrients	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KW
NH_4^+	✓	×	×	✓	×	✓	×	×	×	✓	×	✓	PM
DOC & DON	✓	×	×	✓	×	✓	×	×	×	✓	×	✓	KW
Biogenic silica	×	×	×	×	×	×	×	×	×	×	×	×	KW
POC & PON	✓	×	×	✓	×	✓	×	×	×	✓	×	✓	KW
Chl *a*	×	✓	×	×	×	✓	×	×	×	×	×	×	PM
δNO_3	✓	×	×	✓	×	✓	✓	✓	✓	✓	×	✓	DC
Iodine	✓	✓	×	×	×	×	×	×	×	×	×	×	RC

CTD012

Depth/m	0	15	25	50	75	100	150	200	250	250	250	250	For
Salinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
$\delta^{18}O$	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DW & DS
δDIC	✓	✓	✓	✓	✓	×	✓	✓	×	×	×	×	DC
Nutrients	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KW
NH_4^+	✓	×	×	✓	×	✓	×	×	×	×	×	×	PM
DOC & DON	✓	×	×	✓	×	✓	×	×	✓	×	×	×	KW
Biogenic silica	✓	×	×	✓	×	✓	×	×	×	×	×	×	KW
POC & PON	✓	×	×	✓	×	✓	×	×	×	×	×	✓	KW
Chl *a*	×	✓	×	×	×	✓	×	×	×	×	×	×	PM
δNO_3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DC
Iodine	✓	✓	×	×	×	×	×	×	×	×	×	×	RC

Appendix A - Event log for the JR136/137 cruise

Date/Time	CTD #	Lat	Lon	Comments
15/02/2006 15:42		-67.56888	-68.23141	Vsl stopped on station
15/02/2006 16:20	001	-67.56884	-68.23150	CTD deployed
15/02/2006 16:37		-67.56891	-68.23143	CTD @ depth - 499m
15/02/2006 16:59		-67.56907	-68.23152	CTD recovered - moving to mooring recovery
15/02/2006 17:17		-67.56486	-68.24153	V/L ready to release shallow mooring
15/02/2006 17:21		-67.56489	-68.24150	Mooring released
15/02/2006 17:23		-67.56492	-68.24153	Mooring on surface - approaching
15/02/2006 17:30		-67.56660	-68.23192	Begin recovery
15/02/2006 18:20		-67.56762	-68.22816	Mooring recovered
15/02/2006 18:23		-67.56762	-68.22814	V/L moving off towards deep mooring stn
15/02/2006 20:31		-67.92820	-68.40431	v/l on station
15/02/2006 20:35	002	-67.92822	-68.40435	CTD deployed
15/02/2006 21:29		-67.92834	-68.40464	CTD recovered 839m
15/02/2006 21:37		-67.92834	-68.40471	deep mooring released and sighted
15/02/2006 21:56		-67.92275	-68.40030	Commence mooring recovery - main buoy on deck
15/02/2006 22:46		-67.92162	-68.39582	Mooring recovered
15/02/2006 22:48		-67.92164	-68.39585	V/L moving off station
16/02/2006 00:50		-68.23299	-68.68713	V/L on station for CTD A
16/02/2006 01:23	003	-68.23299	-68.68700	CTD deployed
16/02/2006 01:36		-68.23299	-68.68705	CTD @ depth - 451m
16/02/2006 01:57		-68.23300	-68.68708	CTD recovered
16/02/2006 02:07		-68.23300	-68.68771	V/L moving off station
16/02/2006 04:03		-68.28287	-69.36481	V/L on station for ctd
16/02/2006 04:08	004	-68.28294	-69.36466	CTD deployed
16/02/2006 04:23		-68.28296	-69.36472	CTD @ depth - 577m
16/02/2006 04:45		-68.28299	-69.36480	CTD recovered
16/02/2006 04:48		-68.28298	-69.36478	V/L moving off station
16/02/2006 06:15		-68.35751	-69.77850	V/L on station for ctd
16/02/2006 06:20	005	-68.35752	-69.77851	CTD deployed
16/02/2006 06:28		-68.35753	-69.77862	CTD @ depth - 308 m
16/02/2006 06:46		-68.35757	-69.77857	CTD recovered
16/02/2006 06:48		-68.35756	-69.77859	V/L moving off station
16/02/2006 07:41		-68.26483	-69.64821	v/l on station
16/02/2006 07:51	006	-68.26504	-69.64880	CTD deployed
16/02/2006 08:34		-68.26504	-69.64883	CTD recovered 696m
16/02/2006 08:38		-68.26506	-69.64883	V/L moving off station
16/02/2006 09:47		-68.19069	-69.85813	v/l on station
16/02/2006 10:03	007	-68.19064	-69.85804	CTD deployed
16/02/2006 10:47		-68.19066	-69.85801	CTD recovered 750m
16/02/2006 10:50		-68.16220	-69.90852	V/L moving off station
16/02/2006 11:57		-68.08221	-70.05540	V/L on station
16/02/2006 12:01	008	-68.08219	-70.05529	CTD deployed
16/02/2006 12:24		-68.08218	-70.05509	CTD @ depth - 855m
16/02/2006 12:54		-68.08222	-70.05517	CTD recovered
16/02/2006 12:55		-68.08221	-70.05514	V/L moving off station
16/02/2006 14:28		-68.19032	-69.57000	v/l on station
16/02/2006 14:32	009	-68.19031	-69.56992	CTD deployed
16/02/2006 14:55		-68.19048	-69.56967	CTD @ depth - 902 m

16/02/2006 15:32		-68.19051	-69.56965	CTD recovered
16/02/2006 15:36		-68.10468	-69.42829	vsl off station
16/02/2006 16:35		-68.06497	-69.37998	V/L on station for ctd
16/02/2006 16:42		-68.06428	-69.37786	ASked to move back along track - off DP
16/02/2006 17:08		-68.10800	-69.43181	vsl on station
16/02/2006 17:13	010	-68.10801	-69.43170	CTD deployed
16/02/2006 17:26		-68.10799	-69.43174	CTD @ depth - 333 m
16/02/2006 17:46		-68.10800	-69.43176	CTD recovered
16/02/2006 17:50		-68.10801	-69.43177	V/L moving off station
16/02/2006 18:34	011	-68.01903	-69.31576	v/l on station
16/02/2006 18:39		-68.01908	-69.31578	CTD deployed
16/02/2006 18:59		-68.01909	-69.31566	CTD @ depth - 778 m
16/02/2006 19:29		-68.01909	-69.31570	CTD recovered
16/02/2006 19:32		-67.84439	-69.08841	V/L moving off station
16/02/2006 21:06		-67.84439	-69.08841	v/l on station
16/02/2006 21:11	012	-67.84439	-69.08843	CTD deployed
16/02/2006 21:20		-67.84439	-69.08843	CTD @ depth - 251 m
16/02/2006 21:37		-67.84439	-69.08841	CTD recovered
16/02/2006 21:40		-67.84441	-69.08837	V/L moving off station
17/02/2006 00:44		-67.92402	-68.40001	v/l on station for deep water mooring
17/02/2006 09:23		-67.92327	-68.40126	commence deploying deep mooring
17/02/2006 10:51		-67.92310	-68.40080	Mooring released
17/02/2006 10:54		-67.90903	-68.38219	V/L moving off station
17/02/2006 13:02		-67.56583	-68.23463	v/l on station commence deploying shallow mooring
17/02/2006 13:56		-67.56623	-68.23437	Shallow mooring deployed 67 34S 068 14W
17/02/2006 14:04		-67.56621	-68.23420	V/l off station - Proceed to Rothera

Appendix B – CTD calibration coefficients

The CTD configuration (".con") file used for JR136/137

Date: 02/22/2006

ASCII file: D:\data\Jr137\jr137.con

Configuration report for SBE 911/917 plus CTD

Frequency channels suppressed : 0
Voltage words suppressed : 0
Computer interface : RS-232C
Scans to average : 1
Surface PAR voltage added : No
NMEA position data added : No
Scan time added : No

1) Frequency, Temperature

Serial number : 2705
Calibrated on : 4 January 2006
G : 4.39116570e-003
H : 6.55180780e-004
I : 2.66756260e-005
J : 2.79799280e-006
F0 : 1000.000
Slope : 1.00000000
Offset : 0.0000

2) Frequency, Conductivity

Serial number : 2248
Calibrated on : 23 June 2005
G : -1.04528000e+001
H : 1.42350000e+000
I : 1.40363000e-005
J : 9.88784000e-005
CTcor : 3.2500e-006
CPcor : -9.57000000e-008
Slope : 1.00000000
Offset : 0.00000

3) Frequency, Pressure, Digiquartz with TC

Serial number : 89973-0707
Calibrated on : 03-June-05
C1 : -4.925971e+004

C2 : -2.136250e-001
C3 : 9.435710e-003
D1 : 3.900400e-002
D2 : 0.000000e+000
T1 : 2.983458e+001
T2 : -3.883229e-004
T3 : 3.262440e-006
T4 : 3.429810e-009
T5 : 0.000000e+000
Slope : 1.00012000
Offset : -0.85200
AD590M : 1.277500e-002
AD590B : -9.391460e+000

4) Frequency, Temperature, 2

Serial number : 32709
Calibrated on : 23 June 2005
G : 4.34975000e-003
H : 6.45646000e-004
I : 2.31166000e-005
J : 2.14499000e-006
F0 : 1000.000
Slope : 1.00000000
Offset : 0.0000

5) Frequency, Conductivity, 2

Serial number : 42255
Calibrated on : 23 June 2005
G : -1.03015500e+001
H : 1.41606900e+000
I : -3.05972000e-003
J : 2.99775900e-004
CTcor : 3.2500e-006
CPcor : -9.57000000e-008
Slope : 1.00000000
Offset : 0.00000

6) A/D voltage 0, Altimeter

Serial number : 213026993
Calibrated on : 28 Jan 00
Scale factor : 15.000
Offset : 0.000

7) A/D voltage 1, Free

8) A/D voltage 2, Oxygen, SBE 43

Serial number : 0242
Calibrated on : 31 May 2005
Soc : 3.8740e-001
Boc : 0.0000
Offset : -0.4865
Tcor : 0.0011
Pcor : 1.35e-004
Tau : 0.0

9) A/D voltage 3, Free

10) A/D voltage 4, Transmissometer, Chelsea/Seatech/Wetlab CStar

Serial number : CST-846DR
Calibrated on : 29 March 2005
M : 20.0000
B : 0.0000
Path length : 0.250

11) A/D voltage 5, Free

12) A/D voltage 6, Free

13) A/D voltage 7, Free