JR 174 Cruise Report

9th April 2007, Marguerite Bay, Adelaide Island, Antarctica
RRS *James Clark Ross* – Master - Graham Chapman

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Contents

1. Summary

The principal objective of this cruise on the RRS *James Clark Ross* was to recover a mooring previously deployed during cruise JR 155 (15-17/12/06) in Ryder Bay off Rothera Research Station. Full depth CTDs were also carried out at both the Ryder Bay Rothera Biogeochemical Times Series site (RaTS) 2 miles from Rothera with a ~500 m water column depth and one 'deep' site 22 miles from Rothera research station with a ~840m water column depth. The mooring was successfully recovered and the majority of data downloaded from the mooring equipment array.

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 to the usual excellent standard.

2. Personnel

The scientific personnel on board for JR174 (from cruise JR165)

Mark Brandon (OU)
Karel Castro-Morales (UEA)
Deb Shoosmith (BAS)
Steve Harangozo (BAS)
Paul Holland (BAS)
Pete Lens (BAS)
Ted Maksym (BAS)
Mark Preston (BAS)
Angelika Renner (UEA)
Mags Wallace (BAS)

From Rothera

Richard Hall (BAS)
Alison Massey (BAS)
Bergit Obermuller (BAS)
Keith Weston (UEA)

3. Narrative

All times throughout this report are GMT

9th April 2007

Prior to arrival at Rothera full depth CTD was carried out (as part of cruise JR 165 D Shoosmith PSO) at 0713 by the scientific crew of JR165 at the deep mooring site (67.92 S, 68.39 W). The RRS *James Clark Ross* pulled alongside Biscoe Wharf at ~1230 and picked up the scientific personnel from the base. The ship arrived at the RaTS site (67.57S 68.23W) at ~1330. We had two positions for the location of the shallow mooring. One was from the narrative of the Jickells cruise report (65.56558 S 68.22871W), and one was in the bridge log of the deployment showing (67.5668S 68.2334W). These two positions were approximately 240m apart (0.13 Nm). We assumed the latter position was more accurate but took the other position as being a measure of the uncertainty, hence we stayed 200m away from the locations. We had two acoustic release units available to us: a TT300 series and a newer TT800 series. Both units were fully charged prior to the release attempts, and were used plugged into a mains supply. Once on site the older model TT300 was powered up and the hydrophone deployed. When the hydrophone was connected we noted that the outer metal casing of the socket that plugs into the unit was missing, and the cable appeared superficially damaged. The hydrophone was lowered and 'window' signal to arm the release was sent. There was no acknowledgement from the mooring as would be indicated by the Received LED on the unit and also no range was indicated. We carried on sending just this signal for approximately 10 minutes with no response.

The newer TT800 unit was then powered up and its hydrophone deployed. This unit is different in that is sends the arm code (82C1), and then the release code (8285) about 10 seconds afterwards automatically if a response from the acoustic release if received. Immediately after the first signal response the digital display on the unit read 431m range, but then after the second signal the digital display read "no response from beacon" therefore the release code was not automatically sent by this unit. This exact response with the same range happened on about 20-30 successive occasions with the hydrophone deployed at a series of increasing depths.

We deduced that the mooring was there and responding, but not releasing. To confirm this we decided to move the ship 50 m nearer and try again with the two signals from unit TT800. This time the range to the mooring was 411m, but again we got the "no response from beacon" on the second signal. The ETS engineer (Mark Preston) checked the damaged cable on the other unit but kept sending the arm / release command from the newer unit. The range was consistently 411 m with no response to the second signal.

We moved the ship a third time and again sent several arm / release commands. This time the range was consistently 401/2 m and with no response to the latter signal. The TT300

unit was powered up again and the 82C1 window signal sent with again no response. We decided to send several release signals from this unit (8285), despite no received signal registering on this unit but had no response.

An alternate strategy was then decided upon with the TT800 unit used to send the arm code with the release code sent using the TT300 (which the TT800 unit could not send as it had 'no response from the beacon'). Immediately after this was started the range of the mooring was 308m - very different to the previous consistent value. We confirmed the ship had not moved and continued sending arm and release signals. The range was now 270 m. We deduced/hoped the mooring had been released and was ascending. The next arm/release signal gave a range of 235 m. Before we could inform the bridge that we believed it was on the way up, the mooring was sighted on the beam at a range of approximately 100-150 m from the ship at 14:40. In total this took approximately 1hour 10 minutes from first attempt through to sighting on the surface.

Recovery of the mooring to deck was accomplished by the ship's crew quickly and efficiently by 1520. This was followed by a full depth CTD at the RaTS site at 1525. Mooring electronic equipment was immediately checked for signs of flooding and none was found. Both RCM7 current meters were switched off at 1705 on 9/4/07.
We then returned to the Biscoe wharf and moored at 1840.

Samples from sediment traps and water and particulate samples collected from the CTDs were stored after appropriate stabilisation at either $+4^{o}$C with formalin (trap samples) or stored frozen (-20^{o}C) for nutrients and particulates from CTD. These will be shipped back to the UK on the RRS *James Clark Ross*.

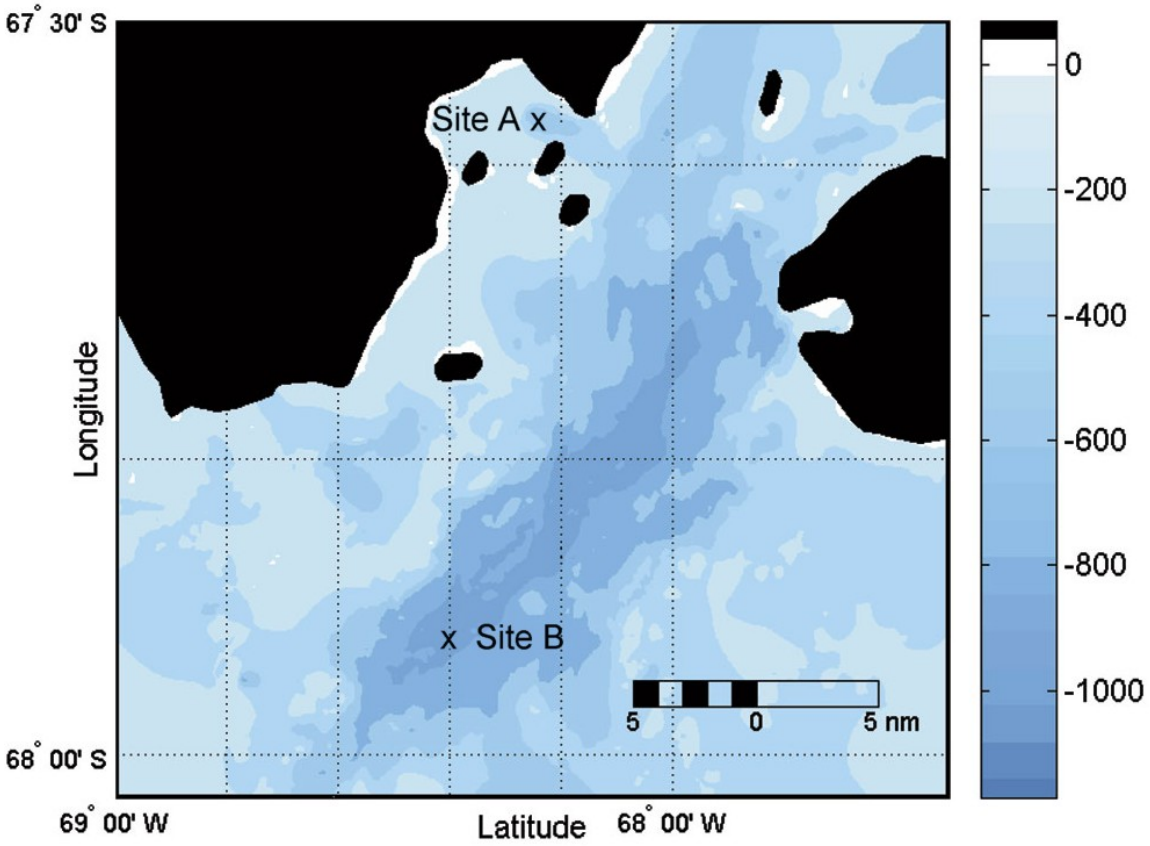
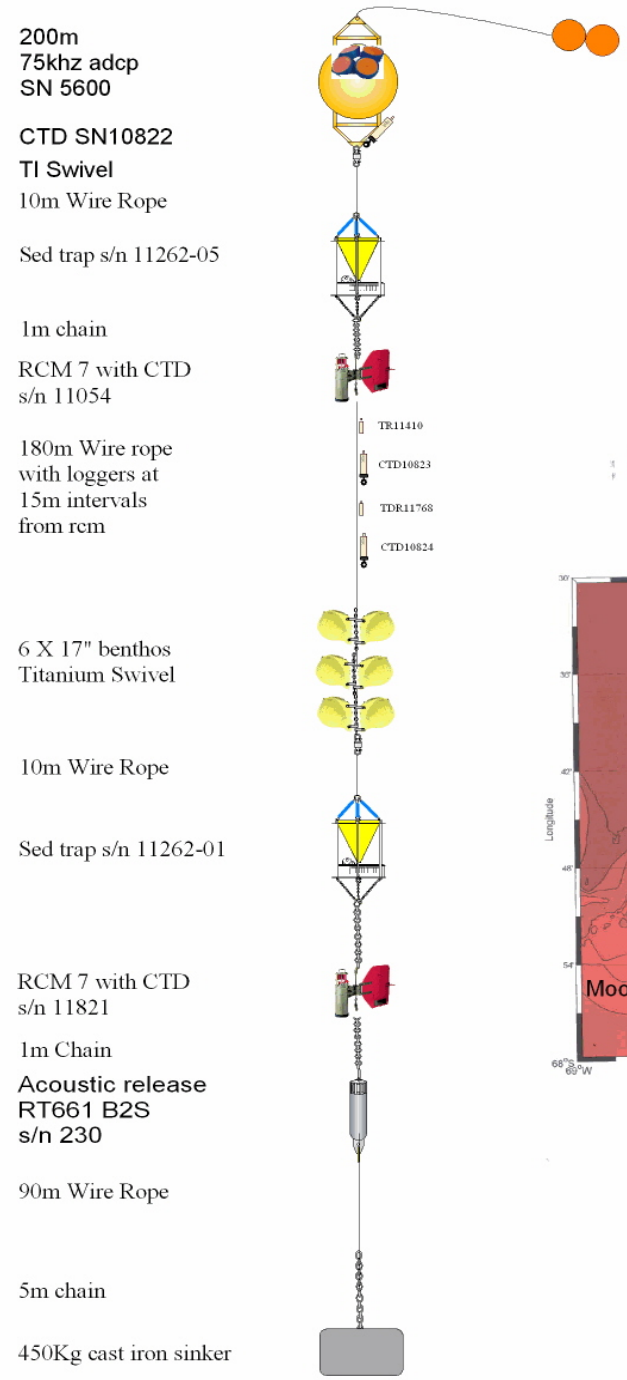


Figure 1 showing the location of the deep CTD site (Site B) and the RaTS mooring/CTD site (Site A)

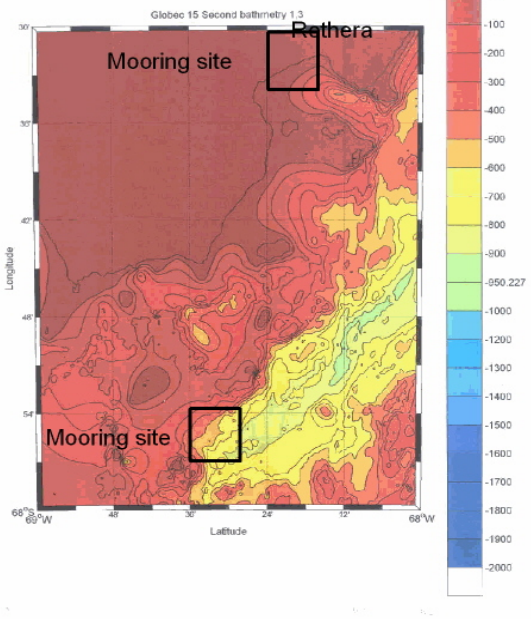
4. RaTS Mooring layout



Shallow mooring
Deployed on 17th
December 2006

8mm plastic coated
Wire Rope throughout

Topography at Mooring sites



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ANTARCTIC PENINSULA

Figure 2 showing the layout and serial numbers of the mooring equipment. Serial numbers were checked and confirmed on recovery. Data recovered from the mooring is detailed below

Instrument	Parameter Recorded	Number Data Cycles	Start Time	End Time
CTD10822	Cond Temp Pres	2770	18/12/06 0000	12/04/07 1054
CTD 10823	Cond Temp Pres	2771	18/12/06 0000	12/04/07 1105
CTD 10824	Cond Temp Pres	2771	18/12/06 0000	12/04/07 1111
RBR 11410	Temp	2757	18/12/06 0000	11/04/07 2153
RBR 11768	Temp	2770	18/12/06 0000	12/04/07 0931
Shallow ADCP	Water Velocity	11221	17/12/06 1357	13/04/07 1057

Table1 showing data recovered

5. CTD Stations

'Deep CTD' - Station 165-252/ JR174 -01 (Start 67^{o} 55.42S 68^{o} 24.59W) 9/4/07 Depth 815m
Time Start 0651, bottom 0712, end 0743
Samples collected for $\delta^{18}O$, nutrients, particulates and biogenic Si (BSi)

Nominal Depth/m	Wire Out
Bottom	815
750	750
500	500
400	400
300	300
200	200
100	100
75	75
50	50
25	25
15	15
0 (surface)	0

Dissolved inorganic nutrients and dissolved organic nitrogen/carbon (DON/C) samples filtered from all depths.
Dissolved ammonium analysed from 0, 15, 50, 100, 500m and bottom.
Particulate organic carbon/nitrogen (POC/N) from all depths - 1000ml filtered
BSi from all depths - 2000ml filtered
$\delta^{18}O$ from all depths

'RaTS CTD' - Station 165-253/ JR174 -02 (Start lat 67^o 34.01S, 68^o 14.01W) 9/4/07
Depth 840m
Time Start 1525 bottom 1541, end 1606
Samples collected for salinity (CTD calibration), $\delta^{18}O$, nutrients, particulates and BSi

Nominal Depth/m	Wire Out
Bottom	503
350	350
300	300
250	250
200	200
150	150
100	100
75	75
50	50
25	25
15	15
0 (surface)	0

Salinity samples Bottom – 200m and 50 – 15m.
Dissolved inorganic nutrient and DON/DOC samples filtered from all depths.
Dissolved ammonium from 0, 15, 50, 100, 250m and bottom.
POC from all depths - 2000ml filtered.
BSi from all depths - 2000ml filtered.
$\delta^{18}O$ from all depths