Cruise Report
RRS Discovery D331T

Ecosystem of the Mid-Atlantic Ridge at the Sub-Polar Front and Charlie Gibbs Fracture Zone

24th July – 15th August 2008

Principal Scientist
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Contents

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Andrew Dale	SAMS
Paul Provost (TLO)	NMF Sea Systems
Steve Whittle	NMF Sea Systems
Martin Bridger	NMF Sea Systems
Christian Crowe	NMF Sea Systems
Benjamin Poole	NMF Sea Systems

SHIP'S PERSONNEL

Peter Newton	Master
John Mitchell	First Officer
Mike Hood	Second Officer
Aimee Oakham	Third Officer
Robin Why	Deck Cadet
David Hartshorne	PCO
George Parkinson	Chief Engineer
Andrej Murovjov	Second Engineer
Ian Collin	Third Engineer
Edin Silajdzic	Third Engineer
Robert Masters	ETO
John Smyth	Motorman
Martin Harrison	CPO(S)
Andrew Mclean	CPO(D)
Stephen Day	PO(D)
Ian Cantlie	Seaman
Lee Stephens	Seaman
Robert Cumming	Seaman
Neil Kennedy	Seaman
John Haughton	Chef
Walter Link	Assistant Chef
Steward	Jeffrey Orsborn

CRUISE TRACK

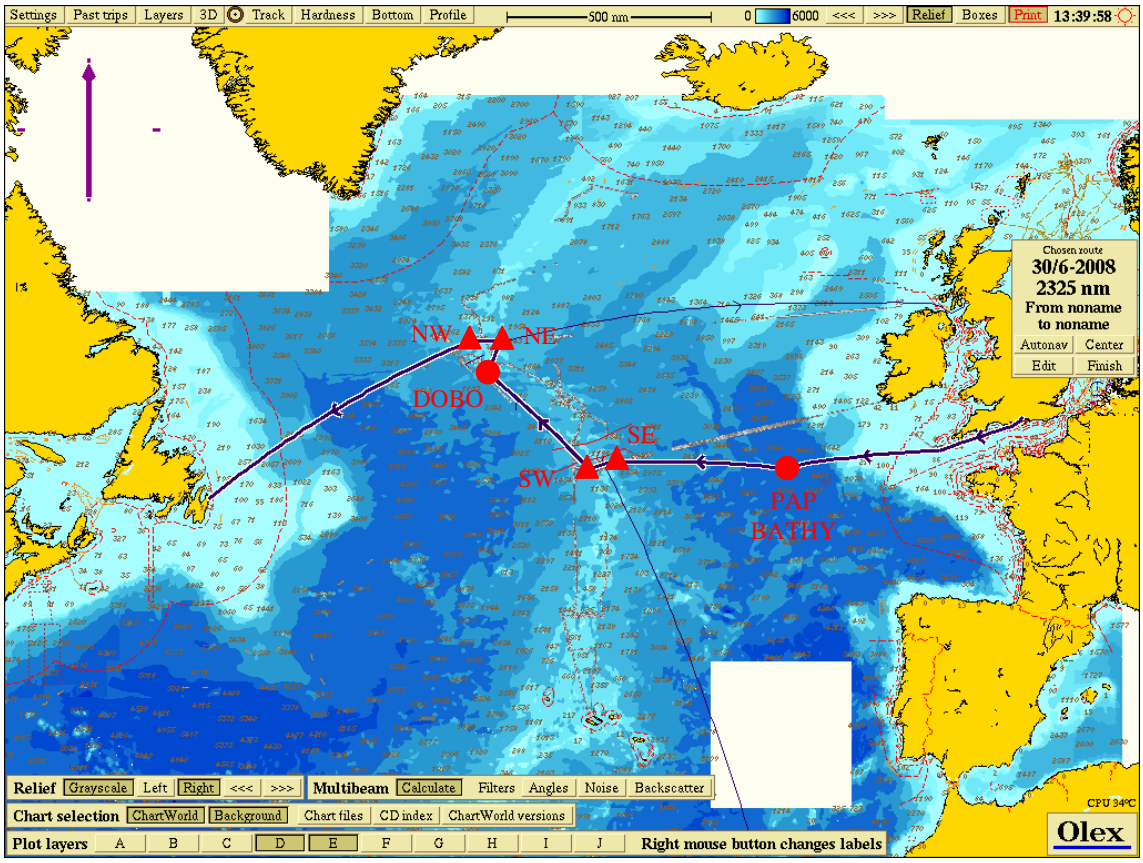


Figure 1: Olex display of proposed cruise track showing the locations of moorings and Landers.

ITENERARY

The work plan for the D331T trials cruise was:

- Depart Portland, England (24th July 2008);
- Recover PAP Bathsnap (Porcupine Abyssal Plain);
- Winch trials;
- Recover, service, and redeploy SE mooring;
- Recover, service, and redeploy SW mooring;
- Winch trials;
- Recover DOBO lander and service;
- Recover, service, and redeploy NE mooring;
- Deploy NE Whale bone
- Deploy DOBO Lander
- Recover, service, and redeploy WW mooring;
- Deploy NW Whale bone;
- Recover and redeploy ECOMAR Bathysnap.
- Arrive St Johns, Newfoundland, Canada (15th August 2008).

OBJECTIVES

This was the second cruise undertaken to the Mid-Atlantic Ridge as part of the NERC-funded consortium project (NE/C512961/1) entitled **ECOMAR - Ecosystem of the Mid-Atlantic Ridge at the Sub-Polar Front and Charlie Gibbs Fracture Zone. ECOMAR – Ecosystem of the Mid-Atlantic Ridge at the Sub-Polar Front and Charlie Gibbs Fracture Zone.** (http://www.oceanlab.abdn.ac.uk/ecomar/index.php)

ECOMAR forms part of the Census of Marine Life MAR-ECO project which is an international study of life in the northern mid-Atlantic Ocean with scientists from 16 nations participating in research of the waters around the mid-Atlantic Ridge from Iceland to the Azores (http://www.mar-eco.no). ECOMAR is focussed on patterns and processes in an area approximately half way between Iceland and the Azores in the vicinity of the Charlie-Gibbs Fracture Zone. The fracture zone represents a major discontinuity in the structure of the ridge but is also the latitude at which the north Atlantic current crosses the ridge from west to east delineating the position of the sub-polar front with cooler productive waters to the north and warmer more oligotrophic to the south. A voyage of the *RV GO Sars* in 2004 had indicated important differences in fauna across this boundary.

The first cruise in the ECOMAR series (JC 11) established a detailed bathymetric survey of the 4 sites, deployed long-term moorings at each ECOMAR site, and carried out a series of scientific surveys to build up an understanding of the physical, chemical, and biological characteristics of the area.

The second cruise (D331) in the ECOMAR series was meant to continue the detailed scientific survey work and recover, service and redeploy each of the long-term moorings. However, due to the Discovery's extended refit the second cruise was reduced to a trials cruise (D331T) with the specific objectives of:

- Recovering, servicing, and redeploying each of the four ECOMAR moorings situated at SE, SW, NE, & NW mooring sites;
- Recover, service and redeploy the DOBO Lander;
- Recover, and redeploy the ECOMAR Bathysnap Lander;
- Recover the PAP Bathysnap Lander;
- Perform winch trials.

Due to the reduction of D331 to a trials cruise, the remaining ECOMAR cruise programme will be altered to allow research cruises in summer 2009 (*RRS James Cooke*), and a further cruise in 2010 with the ISIS ROV (*RRS James Cooke*).

CRUISE NARRATIVE

Wednesday 23 July 2008

RRS Discovery located at Outer Coaling dock, Portland port.
Aft Starboard crane not working, 2nd officer not present. All mooring and scientific equipment aboard and stowed.

Thursday 24 July 2008

14:00 2nd Officer on board
15:00 Scientific safety briefing
18:00 Depart Portland dock for PAP Bathysnap site.
20:30 Nav data to ships ADCP not working

Friday 25th July 2008

Continue steaming towards PAP Bathysnap site.
09:00 NMF staff preparing mooring instruments and mooring lines for mooring turn round.
10:00 Location data to ships ADCP now not reporting errors however no overground speed is being calculated. Raw data is correct and being logged
16:15 Boat drill

Saturday 26th July 2008

Continue steaming towards PAP Bathysnap site.
09:30 Olex connected to NMEA Nav data
10:30 Deployed PES fish
Clocks changed to GMT (retarded one hour).
All times GMT hereafter

Sunday 27th July 2008

05:00 Recovery of Bathysnap
Interrogated Bathysnap through Discovery fish, and port transducers. No response from Bathysnap using TT800 series, TT300 series IXSEA deck units, or Oceanlab ARCADE (first release command issues at 05:00). Used external dunking transducer – no response. Continued to interrogate via the external dunking transducer and IXSEA TT300 series deck unit periodically until 08:00. A lookout was posted on the bridge should the Bathysnap surface. At 08:00 after 3 hours of interrogation with no response from the Bathysnap and no visual sign of the Bathysnap on the surface, Bathysnap recovery was abandoned. Conditions were good, calm sea, wind speed 10m/s, bright sunshine, visibility excellent. During the observation period a single 10inch pellet float was observed and recovered. However, this was an abandoned fishing float covered with goose barnacles.

During this process the performance of the Discovery tow fish single element was suspect. Tests determined the fish single element was not connected to the main lab Plessey connector. NMF staff currently fault finding.

08:30 Winch trials - Core wire streaming to 6500m
Core winch spooling mechanism not spooling correctly at one end of reel. Required manual assistance during haul
15:30 Steam towards ECOMAR SE mooring site
18:00 Winch trials - 24h CTD winch trial (water depth 4700m)

Monday 28th July 2008

18:00 Winch trials – CTD winch trials successful. Core wire streaming whilst steaming towards ECOMAR SE station. Only one core winch stream completed. Successfully spooled without manual assistance. Twelve hours of winch trials remain.

Tuesday 29th July 2008

00:00 Steam remaining distance to ECOMAR SE mooring site

08:30 Steaming at only 8.5 to 9 knots. Motor speed 150 revs, requested 10 knots and motor speed increase to 160 revs agreed.

Wednesday 30th July 2008

Continue steaming toward ECOMAR SE mooring site. Weather increasing, current force 7/8

18:30 Arrive ECOMAR SE mooring. Force 8, Science suspended until weather improves

Thursday 31st July 2008

10:45 CTD started but depth too shallow. Recovered

11:50 CTD & NMF Acoustic release wire test. **Sta. 16436, (49° 02.391'N 27° 43.109'W) Depth 2518m.**
During acoustic release tests it was noted that PES fish single element still does not work. Port transducer works but poorly. Starboard transducer does not work. Acoustic releases operated via dunking transducer.

14:30 CTD recovered and on board

14:40 ECOMAR SE mooring released

15:03 Surface

16:06 On deck

19:00 ECOMAR SE mooring Deployment
Start streaming mooring

20:22 Ballast Release ECOMAR SE mooring **Sta. 16437 (49° 02.60'N 27° 43.48'W) Depth 2503m**

21:00 Steam towards ECPMAR SW mooring

Friday 1st August 2008

08:15 ECOMAR SW mooring released

08:35 Surface

09:36 On board

10:30 CTD & Oceanlab acoustic release wire test.
At approximately 950m CTD conducting cable termination failed. Recovered CTD to surface

15:30 ECOMAR SW mooring deployment start

16:43 Ballast released ECOMAR SW mooring **Sta. 16438 (48° 46.80'N 28° 38.43'W) Depth 2501m**

19:00 CTD re-terminated and load tested

19:55 CTD **Sta. 16439 (48° 47.245'N 28° 38.503'W) Depth 2446m**

21:00 Oceanlab releases wire test at 2390m, all ok

22:00 CTD termination failed at 174m on return to surface. Cast aborted and CTD recovered. Down cast was successful and water bottles filled.

22:20 Steam towards DOBO site

Saturday 2nd August 2008

08:00 Winch trials:- stream core warp

12:00 Successful core warp trial, repeat core warp stream.

15:30 Successful second core warp trial, all inboard

16:00 Continue steam towards DOBO site

00:00 Clocks go back one hour to GMT-1. All times in this document will remain in GMT.

Sunday 3rd August 2008

08:00 We arrived on station and acoustically interrogated DOBO successfully. Both releases operated correctly. Diagnostics showed DOBO was vertical and the RT had a good battery voltage. However, DOBO remained on the sea bed. We continued to issue release commands without success. We then triangulated the position of DOBO to produce a more accurate fix.

13:35 Commenced dragging operations.
The first drag was to use the technique of steaming close to the port side of the DOBO position with 6000m of core warp and a further 1000m of 13mm wire with Gifford grapples. At the end of the core warp was a 1000kg weight. A further 500kg weigh was also located at the end of the 1000m grapple wire. When we were sure the 1000kg weigh had passed the DOBO location we would turn 90 degrees to starboard.

17:35 During the approach to the DOBO location (streaming 5800m of core warp plus 1000m of drag wire and grapples), the grapples snagged on the sea bed. The ship stopped steaming and the ship was immediately pulled backwards at 2.5 knots. Once the ship became stable we slowly hauled in the winch. As we approached the sea bed snag location the winch tension increased to 6.5 tonnes (limit 9 tonnes), at which point the winch malfunctioned and we were unable to either haul or veer. Winch control was regained when the winch tension reduced to approximately 6 tonnes. After discussing options (including a call to NOC to request permission to cut the core wire) core warp was paid out whilst turning the ship about. Eventually under a slow winch haul the snag was released and the core warp and all the 1000m grapple line were retrieved.

00:00 Remain on DOBO station overnight

Monday 4th August 2008

08:00 Further acoustic interrogation confirm DOBO is still on sea bed at the same location

10:40 Stream drag gear for second drag attempt.

The second drag attempt took into account the difficult dragging topography found in the mid Atlantic ridge, and the suspect performance of the winch at high loads. The same drag setup was used, however the Gifford grapples were removed from the 1000m of 13mm diameter drag line. The 500kg weight was laid 2 cables to the south and 1 cable to the west of the DOBO location. The ship steamed north at 1 knot while the winch veered the core warp. A pinger 200m above the 1000kg weight indicated when the 1000kg weigh had landed on the sea floor (4 cables north past the DOBO location). At this point the ship turned 90 degrees to starboard (east)

and steamed for approximately 5 cables. We then turned a further 120 degrees to starboard (south west) and steamed until the pinger indicated the 1000kg weight was lifting off the sea bed. We then heaved too and hauled the winch at 10m/min.

17:00 Core warp and 1000m of 13mm drag wire had been recovered. Position fixing on the DOBO location indicated the DOBO was still in the same location and still vertical.

18:00 Steam towards NE mooring location

Tuesday 5th August 2008

09:00 Acoustic interrogation of NE mooring release. No response. Alternate deck unit and transducer tried with the same result. Previously (last month) iridium transmissions from the mooring were received indicating some or all of the mooring was on the surface.

10:00 Commence acoustic survey of area. The sea floor topography is a basin with 200m sides to the south, east, and west. The length of the mooring would result in the top buoy being on the surface if the mooring has moved in any of these directions. Acoustic survey concentrated in the northern direction. Every 2 nm the ship heaved too and the NE mooring acoustic release was interrogated

10:30 TLO called base to confirm last known position of NE mooring from iridium satellite data.

13:00 Last know Iridium satellite position transmitted to ship (53^{o} 55.345'N 34^{o} 20.917'W). Steaming to location.

15:00 No response from acoustic release, steam a further 5nm on same bearing

15:30 No response. Newer Iridium location obtained from base steam to new location (north east)

16:30 No response, acoustic search abandoned. Plan to recover and redeploy NW mooring before deploying a new NW mooring. This will allow the us to confirm the NW mooring is still in its deployed location and turn around the NW mooring before committing all spare instrumentation to the potentially lost NE mooring. After redeployment of NW mooring we will return to NE mooring continuing acoustic search on passage.

16:35 Engine oil leak reported, standing too until situation resolved.

17:15 Resume steam to NE whale bone deployment site

18:56 Deployed NE whale bone **Sta. 16440 (54^{o} 01.471'N 34^{o} 10.637'W) Depth 2435m**

19:00 Steam to NW mooring site. Remain on site until mooring.

Wednesday 6th August 2008

09:26 NW Mooring released

09:30 First float package on surface

09:55 6 float packages on surface

10:35 Floating line grappled, start recovery

10:45 Second current meter from surface mooring twisted, probably occurred during recovery process.

11:15 Bottom sediment trap and two acoustic releases twisted and recovered on deck. Bottom sediment trap recovered upside down. However, it appeared not to leak.

11:40 Top sediment trap recovered

12:55 All in board.
13:00 Hydraulic leak on port aft crane.
13:40 NW CTD **Sta. 16441 (53^{o} 59.355'N 36^{o} 07.543'W) Depth 2882**
18:10 NE Whale bone lander deployed. **Sta. 16442 (53^{o} 59.339'N 36^{o} 11.662'W) depth 2498m**
18:30 Stay on station until morning to prepare instrumentation for NW mooring deployment

Thursday 7th August 2008

09:25 NW mooring deployment.:- started streaming mooring (2.5 nm from station)
11:38 NW mooring released **Sta. 16443 (53^{o} 59.330'N 36^{o} 07.380'W) Depth 2505m**
13:11 Bathysnap released, rising at approx. 42m/min
14:10 Surface, Dense fog, visibility 150m
14:30 Commence acoustic search for Bathysnap. Triangulate position using dunking transducer to ascertain position from slant ranges. Initial triangulation attempts produced poor results. Triangulation results did not match actual acoustic ranges. From acoustic range information, drift of Bathysnap was estimated as 22m/min and in a north easterly direction. New triangulation points spaced at 1nm were used. Utilising these new data with previous trig. points the estimated drift bearing was confirmed. We headed towards the new location.
(Thanks to Paul Provost (TLO) for his assistance)
19:00 Bathysnap sighted
(Thanks to Wally Link for his keen eyesight)
19:20 Bathysnap inboard and secure
19:30 Northern transect ADCP acoustic survey – steam to DOBO location running ADCP to make up the northern transect of the south north route required by Jane Reid NOC.

Friday 8th August 2008

03:30 Steam towards NE mooring location.
08:00 Continue acoustic search for lost NE mooring on steam to NE mooring site. Historic Sub surface current direction suggested the NE mooring would drift towards the DOBO location, Acoustic interrogation of NE mooring release continued throughout steam from DOBO location to NE mooring site.
13:00 No response from lost NE mooring, acoustic search abandoned.
13:30 New NE Mooring:- Start streaming mooring astern (2.5nm from station)
15:00 Mooring deployed on surface, ready for release
15:48 On station, NE mooring deployed Sta, 16444 (54^{o} 00.034'N 34^{o} 10.622'W) Depth 2503m
16:45 Boat drill
18:30 NE CTD Sta. 16445 (54^{o} 01.107'N 34^{o} 10.665'W) Depth 2474m
20:30 Steam to DOBO location performing an acoustic search for the lost NE mooring. A full data set of Iridium locations has now been obtained confirming the mooring was drifting SW . Iridium data is 2 months old, however the Iridium data are consistent with the deep water current flow. Therefore the steam to DOBO should follow the predicted drift of the NE mooring and there is a small possibility that

acoustic interrogations may locate the NE mooring.

Saturday 9th August 2008

00:30 Bad weather, Steam to DOBO suspended, hove too

Sunday 10th August 2008

Bad weather

Monday 11th August 2008

10:00 NE mooring acoustic search abandoned, old NE mooring lost.

10:50 Start streaming drag gear. Set up as before, but including a Gifford grapple at the end of the drag line just in front of the 500kg weight.

11:40 Core warp attached to 1000m drag wire

16:18 Drag complete, hauled in so that all drag gear off sea bed and steamed over DOBO location. DOBO still there.

17:00 Start streaming drag gear for a second attempt

18:46 DOBO still on sea floor, and vertical. Drag abandoned

21:30 All drag gear on board, end of science programme. Steam to St Johns

Tuesday 12th August

Continue steam to St Johns

Clocks go back an hour (GMT -2), all times hereafter are still GMT

Wednesday 13th August

Continue steam to St Johns

20:00 RPC

Clocks go back half hour (GMT -2:30), all times hereafter are still GMT

Thursday 14th August

Continue steam to St Johns

Friday 15th August

10:30 Pilot on board

11:30 Dock in St Johns

DESCRIPTIONS OF WORK

D331T Moorings Instrument Report.

All rcm`s were set up to sample on the hour .
Ctd`s and Adcp half hour sampling starting on the hour.
All set to gmt .
Recovered rcm data was processed using aanderaa 5059 data reading program using the calibration coefficiants supplied and handed over prior to leaving ship.
All rcm`s had produced data sets and seemed to be good .
Rcm 9447 has a problem with the temperature sensor , it reads 21.3293 all through the data set.
The dsu`s have all been packed into alloy box to come back to noc (not to be erased until later date).

South east mooring

Sediment trap set ups

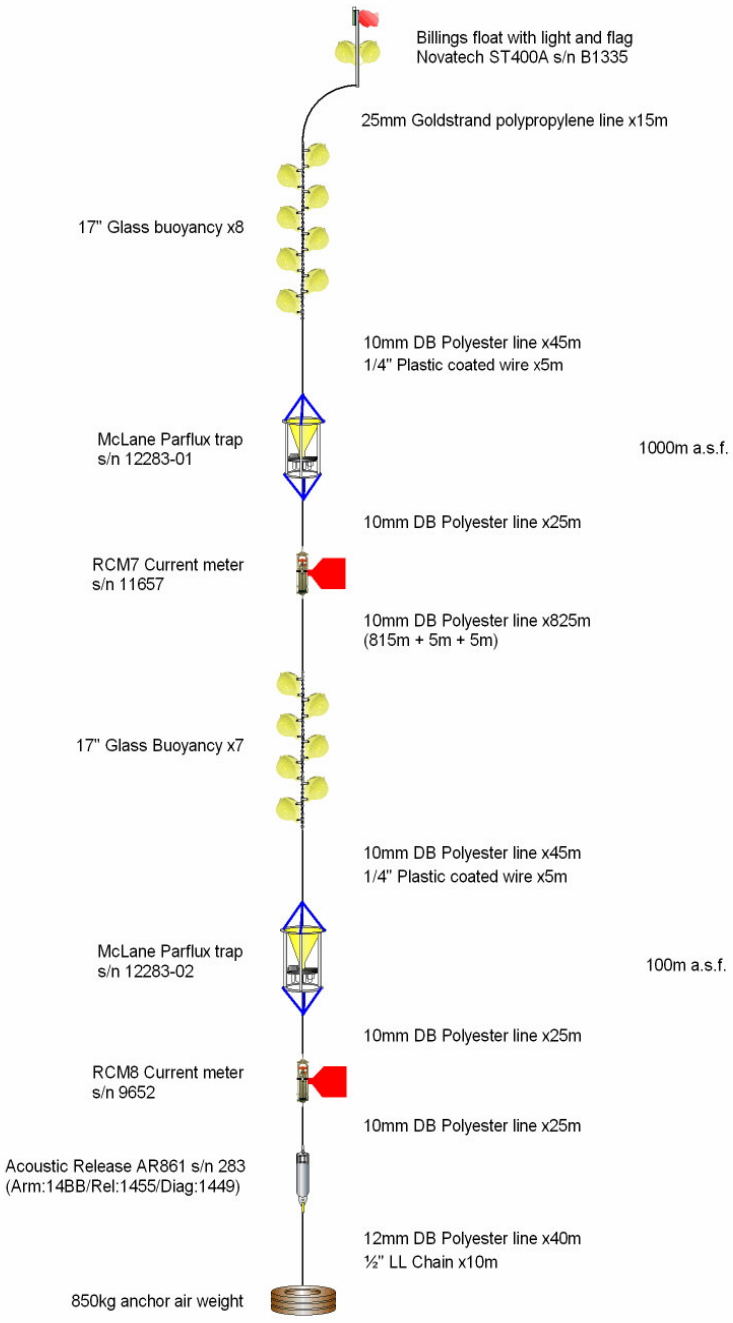
12283_01 (SE TOP) and 12283_02 (SE BOTTOM) identically set up.
Deployed with 500 ml sample bottles
Event 1 of 22 = 08/16/2008 00:00:00
Event 2 of 22 = 09/01/2008 00:00:00
Event 3 of 22 = 10/01/2008 00:00:00
Event 4 of 22 = 11/01/2008 00:00:00
Event 5 of 22 = 12/01/2008 00:00:00
Event 6 of 22 = 01/01/2009 00:00:00
Event 7 of 22 = 02/01/2009 00:00:00
Event 8 of 22 = 03/01/2009 00:00:00
Event 9 of 22 = 03/16/2009 00:00:00
Event 10 of 22 = 04/01/2009 00:00:00
Event 11 of 22 = 04/16/2009 00:00:00
Event 12 of 22 = 05/01/2009 00:00:00
Event 13 of 22 = 05/16/2009 00:00:00
Event 14 of 22 = 06/01/2009 00:00:00
Event 15 of 22 = 06/16/2009 00:00:00
Event 16 of 22 = 07/01/2009 00:00:00
Event 17 of 22 = 07/16/2009 00:00:00
Event 18 of 22 = 08/01/2009 00:00:00
Event 19 of 22 = 08/16/2009 00:00:00
Event 20 of 22 = 09/01/2009 00:00:00
Event 21 of 22 = 09/16/2009 00:00:00
Event 22 of 22 = 10/01/2009 00:00:00

Recording current meter set ups

Rcm 7 sn : 11657
Ref : 339
Temp : low
Cond : yes
Pressure : 0-3000Psi
Dsu batt. Date: 12/10/04
Dsu sn: 14400
Sampling : 60min
Started: 27/07/08 1400(gmt)

Rcm 8 sn : 9652
Ref : 383
Temp: low
Cond: yes
pressure: no
Dsu batt. Date: 12/12/02
Dsu sn: 9466
Sampling: 60min
Started: 27/07/08 1400(gmt)

South East Mooring
Deployed: 31 July 2008, 20:22 (z)
Depth: 2503m
Position: 49°02.60'N, 27°43.48'W



South west mooring

Sediment trap set ups

520 (SW TOP)13way
Deployed with 250 ml sample bottles

Event 01 of 14 = 08/16/08 00:00:00
Event 02 of 14 = 09/01/08 00:00:00
Event 03 of 14 = 10/01/08 00:00:00
Event 04 of 14 = 11/01/08 00:00:00
Event 05 of 14 = 12/01/08 00:00:00
Event 06 of 14 = 01/01/09 00:00:00
Event 07 of 14 = 02/01/09 00:00:00
Event 08 of 14 = 03/01/09 00:00:00
Event 09 of 14 = 04/01/09 00:00:00
Event 10 of 14 = 05/01/09 00:00:00
Event 11 of 14 = 06/01/09 00:00:00
Event 12 of 14 = 07/01/09 00:00:00
Event 13 of 14 = 08/01/09 00:00:00
Event 14 of 14 = 09/01/09 00:00:00

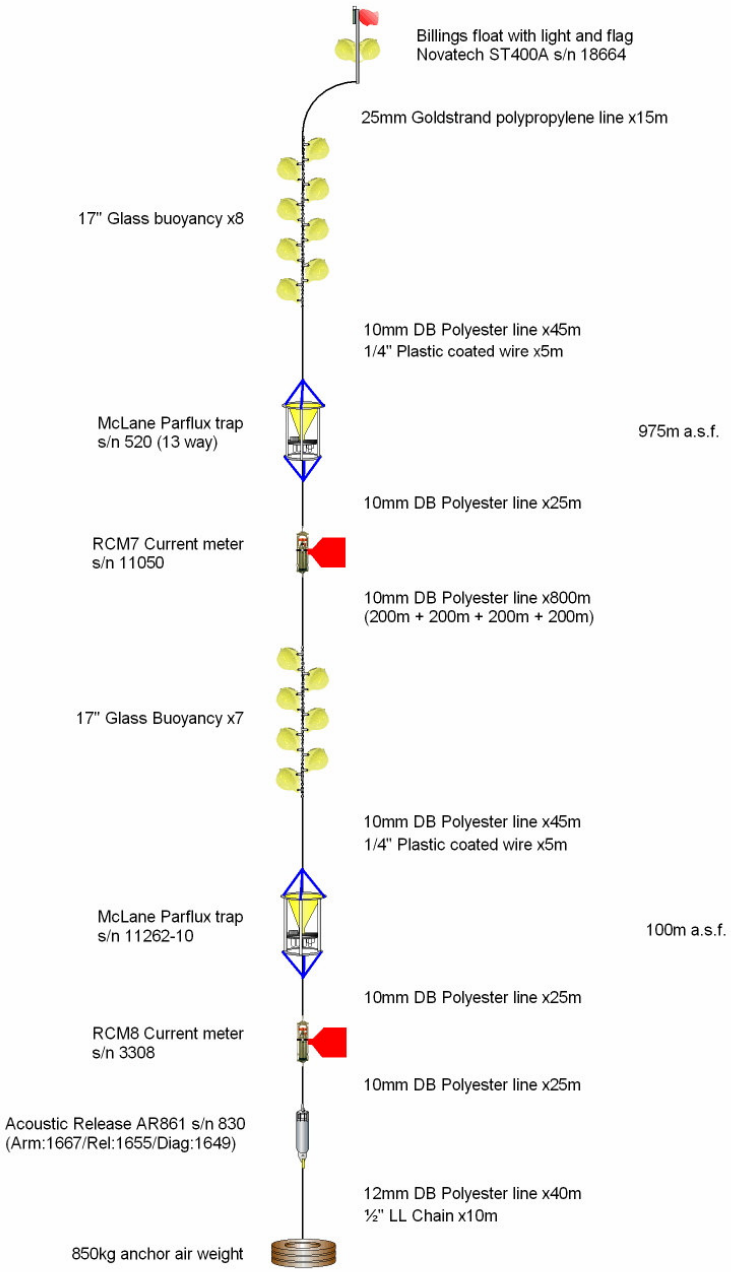
11262-10 (SW BOTTOM) same as other 21 bottle trap schedules.

Recording current meter set ups

Rcm 7 sn:	11050
Ref:	470
Temp:	low
Cond:	no
Pressure:	no
Dsu batt date:	?
Dsu sn:	14408
Sampling:	60min
Started:	27/07/08 1400(gmt)

Rcm 8 sn:	3308
Ref:	774
Temp:	low
Cond:	no
pressure:	no
Dsu batt date:	01/09/04
Dsu sn:	2378E
Sampling:	60min
Started:	27/07/08 1400(gmt)

South West Mooring
Deployed: 01 August 2008, 16:43 (z)
Depth: 2501m
Position: 48°46.80'N, 28°38.43'W



North west mooring

Sediment trap set ups

11262-09 (NW TOP) and 11804-03 (NW BOTTOM)
Deployed with 250 ml sample bottles
Same schedules as other 21 bottle traps

Recording current meter set ups

Rcm 7 sn : 11821
Ref : 412
Temp : low
Cond : yes
Pressure : 0-1000Psi
Dsu batt. Date :02/06/03
Dsu sn : 13861
Sampling : 60min
Started: 27/07/08 1400(gmt)

Rcm 7 : 11054
Ref : 475
low : low
cond : yes
pressure : 0-1000Psi
Dsu batt. Date : 06/08/04
Dsu : 14309
Sampling : 60min
Started: 27/07/08 1400(gmt)

Rcm 7 sn : 10465
Ref : 885
Temp : low
Cond : yes
Pressure : 0-1000Psi
Dsu batt. Date :06/08/04
Dsu sn : 14313
Sampling : 60min
Started: 27/07/08 1400(gmt)

Rcm 7 sn : 10862
Ref : 487
Temp : low
Cond : yes
Pressure : 0-1000Psi (capped)
Dsu batt. Date : 12/10/04
Dsu : 14401
Sampling : 60min
Started: 27/07/08 1400(gmt)

Rcm 11 sn : 644
Ref : ?
Temp : wide
Cond : yes
Pressure : 0-60kPa
Dsu batt. Date :05/07/07
Dsu sn : 15725
Sampling : 60min
Started : 04/08/08 1000(gmt)
Tilt : yes
Signal strength: no

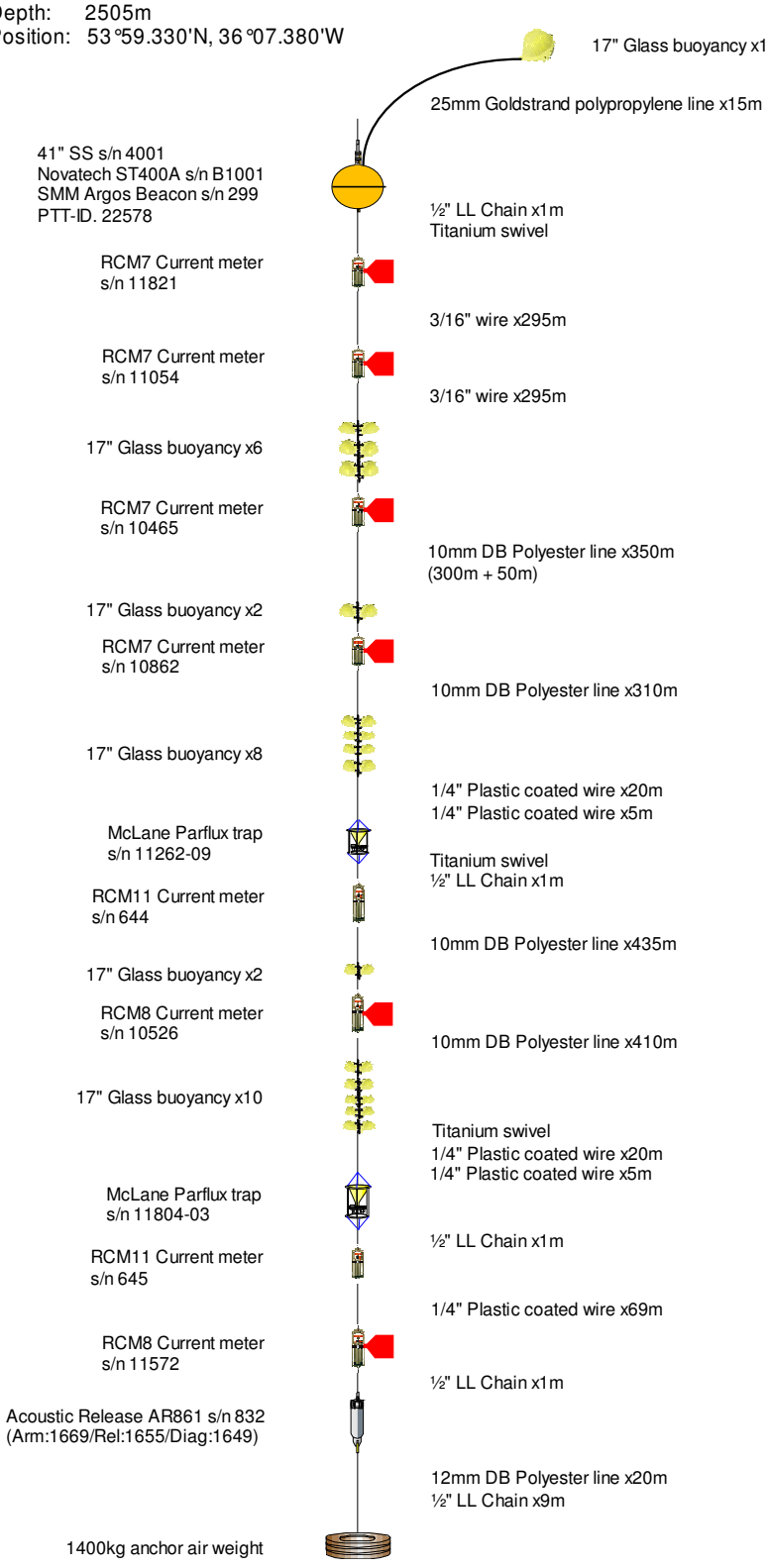
Rcm 8 sn : 10526
Ref : 617
Temp : low
Cond : yes
Pressure : 0-3000Psi
Dsu batt. Date :01/04/02
Dsu sn : 8184
Sampling : 60min
Started : 27/07/08 1400(gmt)

Rcm 11 sn : 645
Ref : ?
Temp : wide
Cond : yes
Pressure : 0-60kPa
Dsu batt. Date :05/07/07
Dsu sn : 15726
Sampling : 60min
Started : 04/08/08 1000(gmt)

Rcm 8 sn : 11572
Ref : 196
Temp : low
cond : no
pressure : no
Dsu batt. Date : 24/06/04
Dsu sn : 2110
Sampling : 60min
Started : 27/07/08 1400(gmt)

Tilt : yes
Signal strength: no

North West Mooring
Deployed: 07 August 2008, 11:38 (z)
Depth: 2505m
Position: 53°59.330'N, 36°07.380'W



North east mooring

Sediment trap set ups

11804_04 (NE TOP) and 11804_06 (NE BOTTOM)
Deployed with 500 ml sample bottles
Identical deployment shedules as other 21way sediment traps.

Recording current meter set ups

Rcm 7 sn :	11677
Ref :	457
Temp :	low
Cond :	yes
Pressure :	0-1000Psi
Dsu batt. Date :	12/12/02
Dsu sn :	8332
Sampling :	60min
Started :	27/07/08 1400(gmt)

Rcm 7 sn :	9959
Ref :	768
Temp :	low
Cond :	yes
Pressure :	no
Dsu batt. Date :	12/12/02
Dsu sn :	5487
sampling :	60min
Started :	27/07/08 1400(gmt)

Rcm 11 sn :	400
Ref :	941
Temp :	low
Cond :	yes
Pressure :	0-60kPa
Dsu batt. Date :	?
Dsu sn :	?
Sampling :	60min
Started :	08/08/08 1000(gmt)
Tilt :	yes
Signal strength:	yes

Rcm 8 sn :	10529
Ref :	631
Temp :	low
Cond :	yes
Pressure :	0-3000Psi
Dsu batt. Date :	06/08/04
Dsu sn :	14305
Sampling :	60min
Started :	27/07/08 1400(gmt)

Rcm 11 sn :	646
Ref :	941
Temp :	wide
Cond :	yes
Pressure :	0-60kPa
Dsu batt. Date :	05/07/07
Dsu sn :	15727
Sampling :	60min
Start :	08/08/08 1000(gmt)
Tilt :	yes
Signal strength :	yes

Rcm 8 sn :	9686
Ref :	774
Temp :	low
Cond :	yes
Pressure :	no
Dsu batt. Date :	06/08/04
Dsu sn :	14306
Sampling :	60min
Start :	27/07/08 1400(gmt)

Rbr xr420 ctd set ups

Rbr sn :	15178
Sampling :	30min
Started :	03/08/08 2100(gmt)

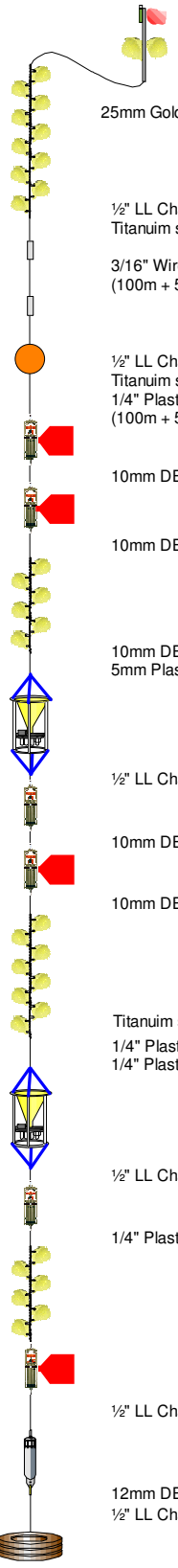
Rbr sn :	15179
Sampling :	30min
Started :	03/08/08 2100(gmt)

Rdi 75khz long ranger adcp

Adcp sn : 1644
CR1
CQ255
CF11101
EA0
EB0
ED0
ES35
EX11111
EZ1111111
WA50
WB1
WD111100000
WF704
WN74
WP19
WS800
WV175
TE00:30:00.00
TP01:34.73
TF08/07/30 12:00:00
CK
CS
;
;Instrument = Workhorse Long Ranger
;Frequency = 76800
;Water Profile = YES
;Bottom Track = NO
;High Res. Modes = NO
;High Rate Pinging = NO
;Shallow Bottom Mode= NO
;Wave Gauge = NO
;Lowered ADCP = NO
;Beam angle = 20
;Temperature = 5.00
;Deployment hours = 9600.00
;Battery packs = 4
;Automatic TP = YES
;Memory size [MB] = 1024
;Saved Screen = 2
;
;Consequences generated by PlanADCP version 2.02:
;First cell range = 16.52 m
;Last cell range = 600.52 m
;Max range = 563.27 m
;Standard deviation = 2.88 cm/s
;Ensemble size = 1628 bytes
;Storage required = 29.81 MB (31257600 bytes)

```
;Power usage        = 1792.37 Wh
;Battery usage      = 4.0
;
; WARNINGS AND CAUTIONS:
; Advanced settings has been changed.
```

North East Mooring
Deployed: 08 August 2008, 15:48 (z)
Depth: 2503m
Position: 54°00.034'N, 34°10.622'W



Billings float with light
Novatech ST400A s/n W06-005
SMM Argos beacon s/n 298
PTT-ID. 22568

25mm Goldstrand polypropylene line x15m

17" Glass buoyancy x10

½" LL Chain x1m
Titanuim swivel

RBR CTD s/n 15178

3/16" Wire x600m
(100m + 500m)

RBR CTD s/n 15179

TRDI 75kHz LR ADCP s/n 1644
45" FloTech Buoy s/n 3974-02
SMM Argos beacon s/n 288
PTT-ID. 22449

½" LL Chain x1m
Titanuim swivel
1/4" Plastic coated wire x200m
(100m + 50m + 50m)

RCM7 Current meter
s/n 11677

10mm DB Polyester line x235m

RCM7 Current meter
s/n 9959

10mm DB Polyester line x210m

17" Glass buoyancy x6

10mm DB Polyester line x20m (15m + 5m)
5mm Plastic coated wire x5m

McLane Parflux trap
s/n 11804-04

½" LL Chain x1m with Titanuim swivel

RCM11 Current meter
s/n 400

10mm DB Polyester line x415m

RCM8 Current meter
s/n 10529

10mm DB Polyester line x385m

17" Glass buoyancy x8

Titanuim swivel
1/4" Plastic coated wire x20m
1/4" Plastic coated wire x5m

McLane Parflux trap
s/n 11804-06

½" LL Chain x1m

RCM11 Current meter
s/n 646

1/4" Plastic coated wire x69m

17" Glass buoyancy x6

RCM8 Current meter
s/n 9686

½" LL Chain x1m

Acoustic Release AR861 s/n 831
(Arm:1668/Rel:1655/Diag:1649)

12mm DB Polyester line x20m
½" LL Chain x9m

1400kg anchor air weight

Profiling CTD report

Paul Provost
Sensors and Moorings Group
National Marine Facilities Sea Systems
National Oceanography Centre, Southampton

1. CTD Operations

A total of 6 CTD profiles were carried out.

1.1. Stainless Steel CTD Frame

The stainless steel frame configuration was as follows:

- Sea-Bird 9/11 *plus* CTD System with dual TC pairs
- 24 by 10L Ocean Test Equipment External Spring Water Samplers
- Sea-Bird 43 Oxygen Sensor
- Chelsea MKIII Aquatracka Fluorometer
- Chelsea MKII Alphatracka 25cm path Transmissometer
- OED LADCP Pressure Case Battery Pack
- RD Instruments Workhorse 300 KHz Lowered ADCP (downward-looking master configuration)
- RD Instruments Workhorse 300 KHz Lowered ADCP (upward-looking slave configuration)
- Benthos Altimeter
- Wetlabs BBRTD backscatter sensor

The pressure sensor is located 30cm from the bottom of the water samplers, and 119cm from the top of the water samplers. The primary temperature and conductivity sensors were mounted beside the pressure sensor within the frame. The secondary temperature and conductivity sensors were mounted outboard on the frame on a fin 75cm horizontal distance from the pressure sensor.

1.1.1 Stainless Steel CTD Frame sesnor Configuration

The Sea-Bird CTD configuration can be found in the relevant con files NO_PAR_0869.con

1.1.2. Stainless Steel CTD Frame Deployment Notes

Frame was used throughout the cruise.

27 July 2008
Terminated CTD cable, load tested as per termination proceedure.

31 July 2008
CTD 001 (SE1_3107.dat), ECOMAR South East station. 5 IxSea acoustic releases attached for testing. Cast stopped at 98m because ship drifted into shallow water of insufficient depth for release test.

CTD 002 (SE2_3107.dat), ECOMAR South East station. 5 IxSea acoustic releases attached for testing (NMEP, s/n 283, 369, 830, 831, 832). All releases ok. Maximum depth 2496m. Torque on termination checked after deployment.

1 August 2008

CTD 003 (SW1_0108.dat), ECOMAR South West station. Error at 905m, all communications lost. CTD recovered to deck. Investigations lead to leak in termination, confirmed by inspection. CTD cable reterminated, load tested as per termination procedure.

CTD 004 (SW2_0108.dat), ECOMAR South West station. 2 Ixsea acoustic releases attached for testing (OceanLab, s/n 488, 497). Maximum depth 2395m. Error during ascent at 190m, all communications lost. CTD recovered to deck. Investigations lead to leak in termination, confirmed by inspection.

2 August 2008
CTD cable reterminated, load tested as per termination procedure.

6 August 2008
CTD 005 (NW1_0608), ECOMAR North West station. Maximum depth 2470m.
Torque on termination checked after deployment.

8 August 2008
CTD 006 (NE1_0808), ECOMAR North East station. Maximum depth 2449m.
Torque on termination checked after deployment.

2.0 LADCP Operations

Upward looking slave: # 4908 (downwelling)
Downward looking master: #4275 (upwelling)
LADCP fitted in the master and slave configuration for the duration of science. Generally appear to have performed well.

Script files

Master	Slave
PS0	PS0
CR1	CR1
CF11101	CF11101
EA00000	EA00000
EB00000	EB00000
ED00000	ED00000
ES35	ES35
EX11111	EX11111
EZ0011111	EZ0011111
TE00:00:01.00	TE00:00:01.00
TP00:01.00	TP00:01.00
LD111100000	LD111100000
LF0500	LF0500
LN016	LN016
LP00001	LP00001
LS1000	LS1000
LV250	LV250
LJ1	LJ1
LW1	LW1
LZ30,220	LZ30,220
SM1	SM2
SA001	SA001
SW05000	ST0
CK	CK
CS	CS

3.0 Sensor Information

SENSOR / SYSTEM TYPE	SERIAL No	Service / Cal	Cruise Notes
WH-LADCP	4275		Master (upwelling)
WH-LADCP	4908		Slave (downwelling)
SBE3 Temperature	2674	04/03/08 + 6mths	Primary (frame)
SBE3 Temperature	4593	29/05/08 + 6mths	Secondary (fin mounted)
SBE4 Conductivity	2164	29/05/08 + 6mths	Secondary (fin mounted)
SBE4 Conductivity	2231	22/02/08 + 6mths	Primary (frame)
SBE43 Oxygen	621	26/11/07	Primary (frame), A/D voltage 0
SBE5 Pump	3090		Secondary (fin mounted)
SBE5 Pump	3195		Primary (frame)
SBE9+	869		Main (frame)
Digiquartz pressure sensor	(0869) 100898	19/02/07 + 3 yrs	Main (frame)
SBE11+ deck unit	24680-0587		Main
SBE32 carosel	3219817-0243		Main
Salinometer	65764	25/09/07 + 1 yrs	Main
BOB	BO19106		Main
Altimeter - Benthos PSA/916T	874		Main, A/D voltage 2
Sonardyne beacon	234002 002	06/03/08	Main
Pinger 10kHz	B7		Main
Transmissometer, Chelsea Alpha Mk2	2642-002		Main, A/D voltage 7
Fluorometer, Chelsea Aqua 3	88163	20/03/08	Main, A/D voltage 3
24x 10l OTE water bottles	1A-24A		Main
WetLabs BBRTD	168	10/10/06 + 2yrs	Main, A/D voltage 6

4.0 Salinometer

Serial number 65764, 8400B used throughout. Sampling was carried out in the chemistry lab, temperature fairly stable at around 23°C. A total of 17 CTD salinity samples were analysed.

Sediment traps

Andy Dale, The Scottish Association for Marine Science, Dunstaffnage Marine Laboratory, Oban, Argyll, PA37 1QA. E-mail: andrew.dale@sams.ac.uk

Christian Crowe, Nikki King, Phil Bagley

Recovery of sediment traps from JC011 moorings

During the 2007 ECOMAR cruise JC011, two McLane sediment traps were deployed at each of four mooring sites (SW, SE, NW and NE). Nominally the traps were positioned 100 m and 1000 m above the sea floor respectively in a total water depth of 2500 m. Each trap was paired with an Anderaa current meter. Precise locations, water depth and mooring composition can be found in the JC011 moorings report

Mooring recovery

Recoveries proceeded smoothly with minimal bottle leakage. The NW mooring was tangled on recovery, and the lower trap was brought on board upside down. Again, however, there was minimal leakage, although the bottle that was currently open drained completely. Unfortunately the NE mooring could not be located during this cruise.

The serial numbers of recovered sediment traps and their paired current meters follow:

SE mooring:	Deployed	19 July 2007
	Recovered	31 July 2008
	100 m ASF	McLane 21-way, SN 11804-06
		Anderaa RCM8, SN 9440
	1000 m ASF	McLane 21-way, SN 11262-10
		Anderaa RCM7, SN 11050
SW mooring:	Deployed	26 July 2007
	Recovered	01 August 2008
	100 m ASF	McLane 21-way, SN 11804-04
		Anderaa RCM8, SN 11571
	1000 m ASF	McLane 13-way, SN 520
		Anderaa RCM7, SN 9069
NW mooring:	Deployed	01 August 2007
	Recovered	07 August 2008
	100 m ASF	McLane 21-way, SN 11804-03
		Anderaa RCM11, SN 398
	1000 m ASF	McLane 21-way, SN 11262-09
		Anderaa RCM11, SN 400

Procedure for recovered sediment traps

On recovery, activity logs were downloaded from each trap before changing batteries. All schedules (see JC011 moorings report) had been executed correctly and traps were open at the expected bottle at the time of recovery, although the 13-way trap reported misalignment of the rotor (see later note). Once the funnel had drained, the sample bottles were removed and capped. To each 500 ml sample bottle was added approximately 1 ml of 37% formaldehyde solution (proportionally less was added to 250 ml bottles). Used sample bottles, the currently-open sample bottle, and unused bottles were all treated in an identical manner. Bottle caps were sealed with parafilm and the bottles stored at 4˚C.

Preliminary results

Line-up photographs (Figures 1-3) provide an indication of the relative quantity of material collected during each sample period by each trap. Some bottles represent a full month of collection, while others represent a half month (date labels in grey on the photographs represent half-month samples). All traps were in low-current environments, with the mean instantaneous current speed being less than 5 cm/s (Table 1). This largely represented oscillatory tidal flow. Current speeds were rarely higher than 10 cm/s.

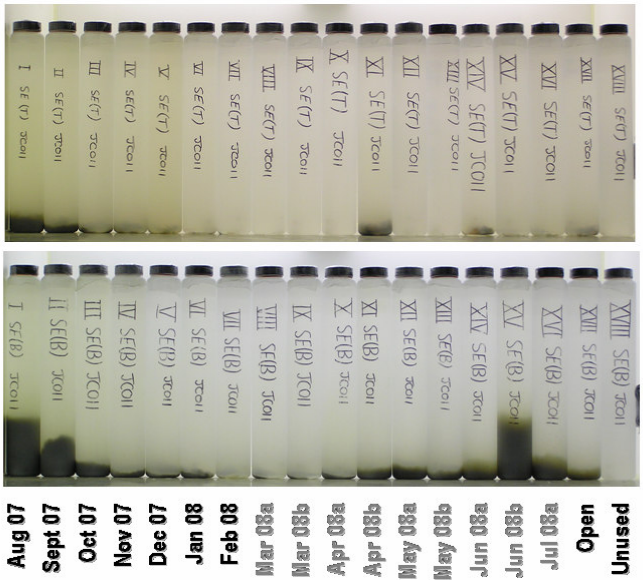


Figure 1. Recovered sample bottles from the SE mooring (upper and lower). Periods labeled in grey represent half-months, whereas those in black represent full months.

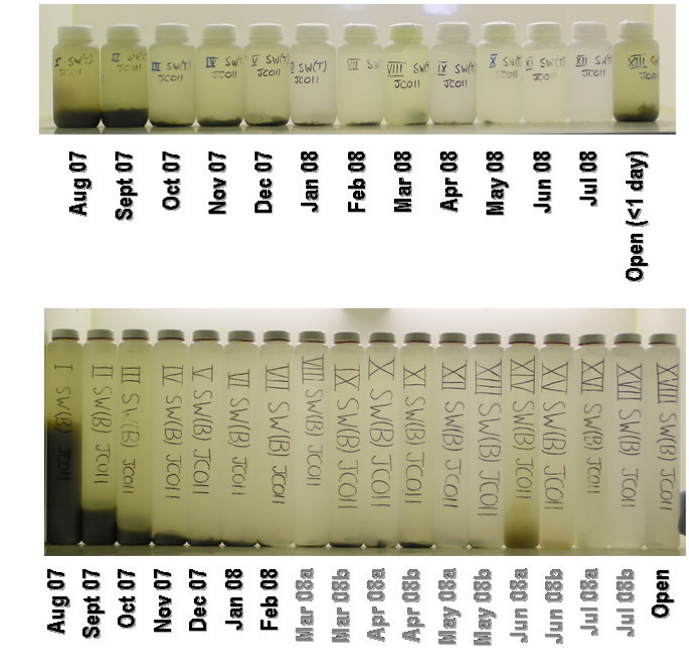


Figure 2. Recovered sample bottles from the SW mooring (upper and lower). Periods labeled in grey represent half-months, whereas those in black represent full months.

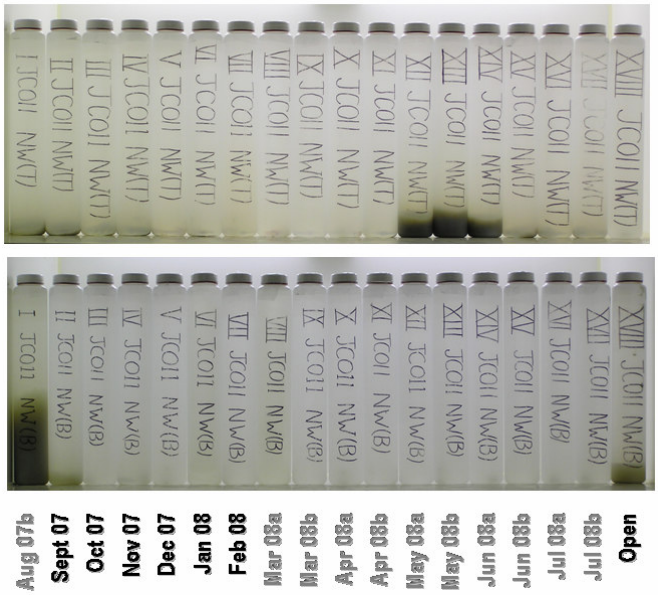


Figure 3. Recovered sample bottles from the NW mooring (upper and lower). Periods labeled in grey represent half-months, whereas those in black represent full months.

	Mean amplitude (cm/s)	95th percentile amplitude (cm/s)	Residual amplitude (cm/s)	Residual direction (° vs magnetic N)	M2 tide principal axis (cm/s)

SE - lower	3.27	7.78	0.61	315	2.61
SE - upper	3.93	9.53	0.60	031	1.76
SW - lower	2.87	7.49	0.35	348	2.38
SW - upper	4.33	9.23	2.22	346	2.44
NW - lower	3.75	7.33	2.08	048	2.86
NW - upper	3.89	7.92	0.70	357	2.05

Table 1: Current statistics at the sediment traps. The mean and 95th percentile are of the instantaneous current speed (direction not considered). The residual amplitude and direction describe the vector mean current over the entire deployment. The M2 principal axis is the maximal M2 tidal flow based on a tidal analysis. M2 was the dominant tidal constituent.

Deployment of sediment traps

Sample bottle Preparation

Sample bottles were filled to within a few cm of the top with deep water from near the SE mooring site. To this was added 5 mg of salt and 25 ml of a 37% formaldehyde solution (half of these quantities for 250 ml bottles). Bottles were then loaded onto the trap rotor and topped up with additional deep water using the 'fill bottles' function. Traps were deployed on their side and there was some bottle leakage but this did not appear substantial. All bottles were labeled with a permanent marker and etched in the form 'D331 NW (TOP) ##' where '##' is the bottle sequence number.

Traps deployed

The following traps were deployed:

SE mooring:

Deployed	31 July 2008
100 m ASF	McLane 21-way, SN 12283-02
	500 ml sample bottles
1000 m ASF	McLane 21-way, SN 12283-01
	500 ml sample bottles

SW mooring:

Deployed	01 August 2008
100 m ASF	McLane 21-way, SN 11262-10
	250 ml sample bottles
1000 m ASF	McLane 13-way, SN 520
	250 ml sample bottles

NE mooring:

Deployed	08 August 2008
100 m ASF	McLane 21-way, SN 11804-06
	500 ml sample bottles
1000 m ASF	McLane 21-way, SN 11804-04
	500 ml sample bottles

NW mooring:

Deployed:	06 August 2008
100 m ASF	McLane 21-way, SN 11804-03
	250 ml sample bottles
1000 m ASF	McLane 21-way, SN 11262-09
	250 ml sample bottles

Sampling schedules

All of the 21-way traps deployed during D331T are programmed to sample according to the following schedule (the first event represents the beginning of collection in the first bottle and subsequent events represent advance to the next bottle):

```
Event   1 of  22 = 08/16/2008 00:00:00
Event   2 of  22 = 09/01/2008 00:00:00
Event   3 of  22 = 10/01/2008 00:00:00
Event   4 of  22 = 11/01/2008 00:00:00
Event   5 of  22 = 12/01/2008 00:00:00
Event   6 of  22 = 01/01/2009 00:00:00
Event   7 of  22 = 02/01/2009 00:00:00
Event   8 of  22 = 03/01/2009 00:00:00
Event   9 of  22 = 03/16/2009 00:00:00
Event  10 of  22 = 04/01/2009 00:00:00
Event  11 of  22 = 04/16/2009 00:00:00
Event  12 of  22 = 05/01/2009 00:00:00
Event  13 of  22 = 05/16/2009 00:00:00
Event  14 of  22 = 06/01/2009 00:00:00
Event  15 of  22 = 06/16/2009 00:00:00
Event  16 of  22 = 07/01/2009 00:00:00
Event  17 of  22 = 07/16/2009 00:00:00
Event  18 of  22 = 08/01/2009 00:00:00
Event  19 of  22 = 08/16/2009 00:00:00
Event  20 of  22 = 09/01/2009 00:00:00
Event  21 of  22 = 09/16/2009 00:00:00
Event  22 of  22 = 10/01/2009 00:00:00
```

The single 13-way trap (SW mooring) is programmed to sample according to the following schedule:

```
Event  01 of 14 = 08/16/08  00:00:00
Event  02 of 14 = 09/01/08  00:00:00
Event  03 of 14 = 10/01/08  00:00:00
Event  04 of 14 = 11/01/08  00:00:00
Event  05 of 14 = 12/01/08  00:00:00
Event  06 of 14 = 01/01/09  00:00:00
Event  07 of 14 = 02/01/09  00:00:00
Event  08 of 14 = 03/01/09  00:00:00
Event  09 of 14 = 04/01/09  00:00:00
Event  10 of 14 = 05/01/09  00:00:00
Event  11 of 14 = 06/01/09  00:00:00
Event  12 of 14 = 07/01/09  00:00:00
Event  13 of 14 = 08/01/09  00:00:00
Event  14 of 14 = 09/01/09  00:00:00
```

The 13-way trap reported a problem with bottle alignment. Prior to deployment, alignment to the bottle-free hole was set manually by turning the rotor using the 'fill bottles' function and stopping it when in alignment by hitting Ctrl-C. A test using a short deployment schedule

suggested that the rotor would then correctly advance to each bottle despite not being able to sense the alignment. ***Careful attention should be paid to the alignment and the location of the open bottle on recovery***

DOBO LANDER

The DOBO Lander was located but was not recovered:
We arrived on station and acoustically interrogated DOBO successfully. Both releases operated correctly. Diagnostics showed DOBO was vertical and the RT had a good battery voltage. However, DOBO remained on the sea bed. We continued to issue release commands without success. We then triangulated the position of DOBO to produce a more accurate fix. Dragging operations were then started.

Drag attempt 1 (3rd August 2008):
The first drag was to use the technique of steaming close to the port side of the DOBO position with 6000m of core warp and a further 1000m of 13mm wire with Gifford grapples. At the end of the core warp was a 1000kg weight. A further 500kg weigh was also located at the end of the 1000m grapple wire. When we were sure the 1000kg weigh had passed the DOBO location we would turn 90 degrees to starboard.

During the approach to the DOBO location (streaming 5800m of core warp plus 1000m of drag wire and grapples), the grapples snagged on the sea bed. The ship stopped steaming and the ship was immediately pulled backwards at 2.5 knots. Once the ship became stable we slowly hauled in the winch. As we approached the sea bed snag location the winch tension increased to 6.5 tonnes (limit 9 tonnes), at which point the winch malfunctioned and we were unable to either haul or veer. Winch control was regained when the winch tension reduced to approximately 6 tonnes. After discussing options (including a call to NOC to request permission to cut the core wire) core warp was paid out whilst turning the ship about. Eventually under a slow winch haul the snag was released and the core warp and all the 1000m grapple line were retrieved. Further acoustic interrogation confirm DOBO is still on sea bed at the same location.

Drag attempt 2 (4th August 2008):
The second drag attempt took into account the difficult dragging topography found in the mid Atlantic ridge, and the suspect performance of the winch at high loads. The same drag setup was used, however the Gifford grapples were removed from the 1000m of 13mm diameter drag line. The 500kg weight was laid 2 cables to the south and 1 cable to the west of the DOBO location. The ship steamed north at 1 knot while the winch veered the core warp. A pinger 200m above the 1000kg weight indicated when the 1000kg weigh had landed on the sea floor (4 cables north past the DOBO location). At this point the ship turned 90 degrees to starboard (east) and steamed for approximately 5 cables. We then turned a further 120 degrees to starboard (south west) and steamed until the pinger indicated the 1000kg weight was lifting off the sea bed. We then heaved too and hauled the winch at 10m/min. The core warp and 1000m of 13mm drag wire were recovered. Position fixing on the DOBO location indicated the DOBO was still in the same location and still vertical.

Drag attempt 3 (11 August 2008):
Drag gear setup similar to before but this time with one Gifford grapple at the end of the 1000m drag wire. Due to the difficult topography a similar L shaped path was performed by the ship past the DOBO location from a different direction, however without success.

Drag attempt 4 (11 August 2008):
Same setup and manoeuvre as attempt 3 however from a different approach direction. All drag attempts were unable to recover the DOBO. The triangulated position of DOBO is:

52° 41.352'N 35° 04.554'W

BATHYSNAP

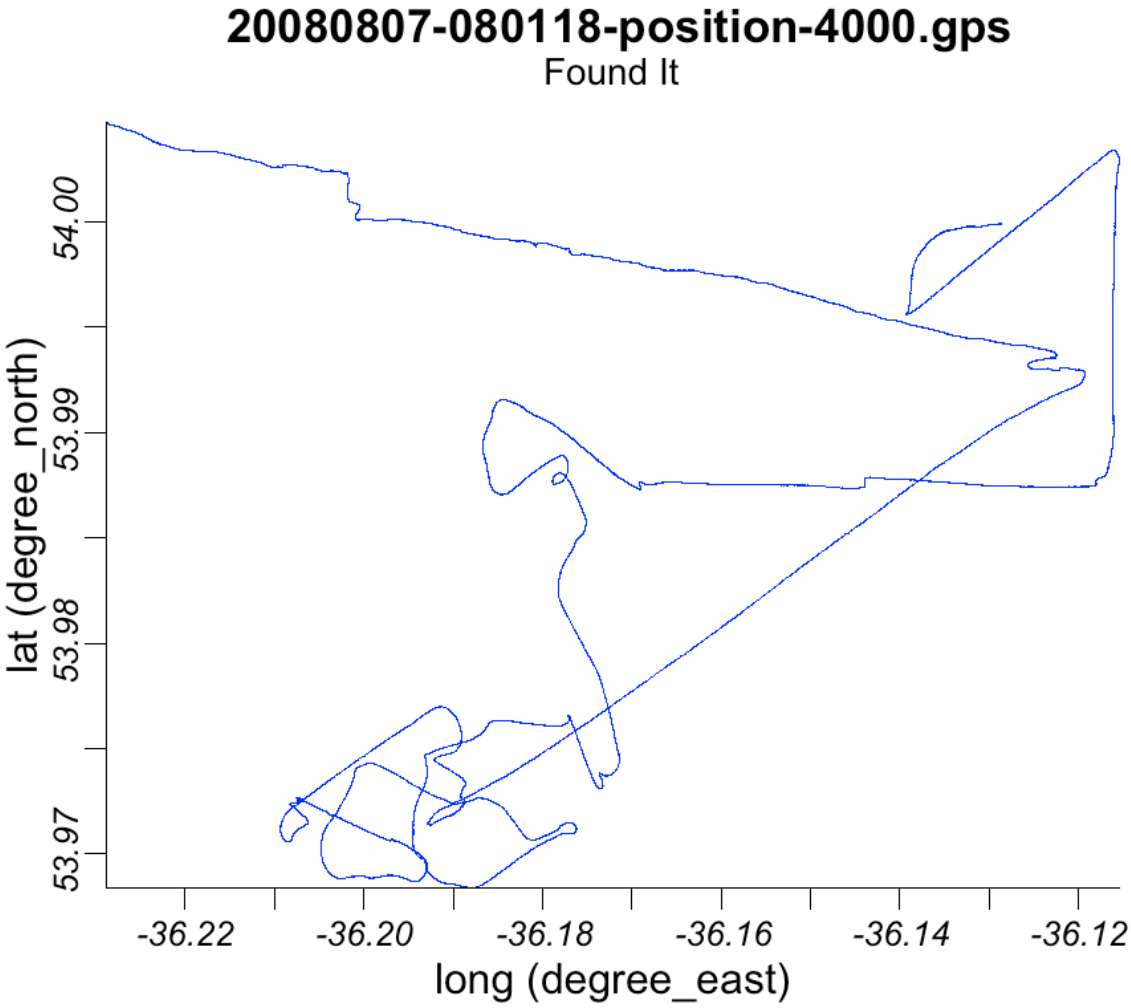
The PAP Bathysnap was not located:
Interrogated Bathysnap through Discovery fish, and port transducers. No response from Bathysnap using TT800 series, TT300 series IXSEA deck units, or Oceanlab ARCADE (first release command issues at 05:00 Sunday 27th July). Used external dunking transducer – no response. Continued to interrogate via the external dunking transducer and IXSEA TT300 series deck unit periodically until 08:00. A lookout was posted on the bridge should the Bathysnap surface. At 08:00 after 3 hours of interrogation with no response from the Bathysnap and no visual sign of the Bathysnap on the surface, Bathysnap recovery was abandoned. Conditions were good, calm sea, wind speed 10m/s, bright sunshine, visibility excellent. During the observation period a single 10inch pellet float was observed and recovered. However, this was an abandoned fishing float covered with goose barnacles.

During this process the performance of the Discovery tow fish single element was suspect. Tests determined the fish single element was not connected to the main lab Plessey connector. NMF staff investigated the problem, replaced corroded cables and junction box, however the PES tow fish single element did not operate for the duration of the cruise.

ECOMAR Bathysnap

Bathysnap was released successfully with an accent rate of approximately $42ms^{-1}$. After release the weather worsened and by the time the Bathysnap was estimated to be on the surface there was dense fog with a visibility of 150m (surface estimated at 14:10, 7th August 2008). Commenced acoustic search for Bathysnap. Triangulate position using dunking transducer to ascertain position from slant ranges. Initial triangulation attempts produced poor results. Triangulation results did not match actual acoustic ranges. From acoustic range information, drift of Bathysnap was estimated as 22m/min and in a north easterly direction. New triangulation points spaced at 1nm were used. Utilising these new data with previous trig. points the estimated drift bearing was confirmed. We headed towards the new location. Bathysnap was sighted by Wally Link at 19:00. Bathysnap in board and secure at 19:20.

The assistance of Paul Provost (TLO) with triangulation and drift estimation was key to the location of Bathysnap and his help was greatly appreciated.


20080807-080118-position-4000.gps
Found It
lat (degree_north)
54.00
53.99
53.98
53.97
-36.22
-36.20
-36.18
-36.16
-36.14
-36.12
long (degree_east)

Whale bone mooring deployments

Dr Nicola King and Dr Phil Bagley

Oceanlab, University of Aberdeen

Two whale bone moorings were deployed; one at each of the NE and NW sites respectively. The purpose of the whale bone deployments is to return with the ROV Isis on the 2010 cruise to look at settlement of organisms, and also whether the organisms inhabiting the whale bone are bioluminescent. The whale bones were deployed on behalf of Dr Alan Jamieson and Jessica Craig (also of Oceanlab) and will be left for approximately 24 months before recovery.

The logsheets listing details of each deployment are below.

Whale bone mooring log sheet D331Trials cruise: Whale bone mooring 1

Date: 5th August 2008

Time: 18:56 GMT

Position: NE ECOMAR study site
54º 01.471'N
34º 10.637'W

Depth: 2435 m

Weight of bones: 18 kg (3 vertebrae) with 5 ballast weights.

Colour of line attaching ballast: blue

Colour of line attaching bones: green and white

Image taken?: yes

Distance and bearing from reference mooring: 1.44 nm (2667 m), 179º

Figure 1 The whale bone and ballast clump of the whale bone mooring deployed at the NE ECOMAR study site.

Whale bone mooring log sheet D331Trials cruise: Whale bone mooring 2

Date: 6th August 2008

Time: 18:10 GMT

Position: NW ECOMAR study site
53º 59.339'N
36º 11.662'W

Depth: 2498 m

Weight of bones: 12 kg (2 vertebrae) with 5 ballast weights.

Colour of line attaching ballast: green and white

Colour of line attaching bones: pink and white

Image taken?: yes

Distance and bearing from reference mooring: 2.52 nm (4667 m), 90º

Figure 2 The whale bone and ballast clump of the whale bone mooring deployed at the NW ECOMAR study site.

APPENDIX 1:- MOORING ACOUSTIC RELEASE BUILD SHEETS

Appendix 1A:- Serial number 830

Appendix 1B:- Serial number 831

Appendix 1C:- Serial number 832

Appendix 1D:- Serial number 861-283

3 BUILD SHEET

Type	:	**OCEANO 2500 S-Universal**	Date of Manufacture	:	**21/09/07**
S/N	:	**830**	Customer	:	**NOC UK**
P/N	:	**392 9100**	Representative	:	
Function	:	**Acoustic Release**	Job file	:	**7B000080**
Modification	:		Customer Approval	:	**30/08/07**

TECHNICAL SPECIFICATIONS

ELECTRONIC BOARD

Reference	Rev	Function	S/N
392 2001	**3.4**	**AR 8x1 board**	**830**
		Firmware:	
		PROM (U6) - ET8_V2.2	
		FPGA (U38) - REC_V1.0/3.3V	
		PROM (U32) - EM_V1.0	
		FPGA (U33) - EM_V1.0/3.3V	

ELECTRONIC SPECIFICATIONS

Transmit width : **10** ms
Transmit level : **191** ± 4 dB ref 1µPa at 1 m
Pinger rate : **2 s**
Pinger duration after release : **3** mn

FR0 = **09.0** kHz ⇒ BIT_0 = **02**
FR1 = **11.5** kHz ⇒ BIT_1 = **07**
CAF = **12.0** kHz
PFR = **12.0** kHz

FUNCTIONAL SPECIFICATIONS

Function / Code	TT301/TT701/TT801	TT201	Sequence
ARM / RANGING	**1667**	**BIT_0 + BIT_1 + 67**	⇒ CAF Lock-out time = 4s Active time = 20s
The following acoustic codes must be preceded by an ARM code			
RELEASE	**1655**	**BIT_0 + BIT_1 + 55**	⇒ CAF ⇒ CAF
RELEASE WITH PINGER	**1656**	**BIT_0 + BIT_1 + 56**	⇒ CAF ⇒ CAF ⇒ PFR
PINGER ON	**1647**	**BIT_0 + BIT_1 + 47**	⇒ CAF ⇒ PFR
PINGER OFF	**1648**	**BIT_0 + BIT_1 + 48**	⇒ CAF
DIAGNOSTIC	**1649**	**BIT_0 + BIT_1 + 49**	⇒ CAF_1 ⇒ CAF_2

OTHER SPECIFICATIONS				
Power configuration	:	**3** banks of **6** serie LR20 cells		**ALKALINE**
		1 bank of **1** 6LR61 cell		**ALKALINE**
Power distribution	:	**3** banks of **6** LR20 cells	:	standby-power-motor
		1 bank of **1** 6LR61 cell	:	motor safety
Option	:	**xxxxx**		
DIAGNOSTIC (s)	=	$t(CAF_2)$ - $t(CAF_1)$ - **3** s (**13** s with horizontal position) with **t** in seconds		
Cells Voltage (V)	=	DIAGNOSTIC (s) × 4.1		

SUB-ASSEMBLIES & PART NUMBERS

SUB-ASSEMBLY	QUANTITY	P/N	REV
OCEANO 2500 S-UNIVERSAL	1	392 9100	1
LOWER END-PLATE	1	312 9401	2.4
RELEASE HOOK	1	257 9601	1
TRANSDUCER ON UNS UPPER END-PLATE	1	200 1111	2.1
INTERNAL STRUCTURE	1	201 9301	2
ELECTRONIC BOARD	1	392 2001	3.4

4 INSTRUMENT SERVICE RECORD

DATE	OBSERVATIONS	WORK CARRIED OUT	AUTHOR

5 FACTORY ACCEPTANCE CERTIFICATE

CUSTOMER	CONTRACT	VARIATION	LOT
NOC UK Job file : **7B000080**	**NOC003932**		

OBJECT OF ACCEPTANCE :

Acoustic Release : OCEANO 2500 S-Universal

Serial Number : 830

Information particular to the delivered supplies, notably the number of the approved engineering departures :

We certify that subject to the exceptions and engineering departures above-mentioned, the present supply has been manufactured to the technical specifications of customer contract, order or sub-order, and that, after completion of all inspections and tests, it complies **IN EVERY RESPECT** with the particular specifications which are there attached, with the drawings and also the relative standards and regulations in force.

	FACTORY ACCEPTANCE	*CUSTOMER ACCEPTANCE*	
ORGANIZATION	***IXSEA***		
NAME OF REPRESENTATIVE	***P.F. ADAM***		
DATE	September 27, 2007		
SIGNATURE			

3 BUILD SHEET

Type	:	**OCEANO 2500 S-Universal**	Date of Manufacture	:	**21/09/07**
S/N	:	**831**	Customer	:	**NOC UK**
P/N	:	**392 9100**	Representative	:	
Function	:	**Acoustic Release**	Job file	:	**7B000080**
Modification	:		Customer Approval	:	**30/08/07**

TECHNICAL SPECIFICATIONS

ELECTRONIC BOARD

Reference	Rev	Function	S/N
392 2001	3.4	**AR 8x1 board**	831
		Firmware:	
		PROM (U6) - ET8_V2.2	
		FPGA (U38) - REC_V1.0/3.3V	
		PROM (U32) - EM_V1.0	
		FPGA (U33) - EM_V1.0/3.3V	

ELECTRONIC SPECIFICATIONS

Transmit width : **10** ms
Transmit level : **191** ± 4 dB ref 1µPa at 1 m
Pinger rate : **2** s
Pinger duration after release : **3** mn

FR0 = **09.0** kHz ⇒ BIT_0 = **02**
FR1 = **11.5** kHz ⇒ BIT_1 = **07**
CAF = **12.0** kHz
PFR = **12.0** kHz

FUNCTIONAL SPECIFICATIONS

Function / Code	TT301/TT701/TT801	TT201	Sequence
ARM / RANGING	**1668**	**BIT_0 + BIT_1 + 68**	⇒ CAF Lock-out time = 4s Active time = 20s
The following acoustic codes must be preceded by an ARM code			
RELEASE	**1655**	**BIT_0 + BIT_1 + 55**	⇒ CAF ⇒ CAF
RELEASE WITH PINGER	**1656**	**BIT_0 + BIT_1 + 56**	⇒ CAF ⇒ CAF ⇒ PFR
PINGER ON	**1647**	**BIT_0 + BIT_1 + 47**	⇒ CAF ⇒ PFR
PINGER OFF	**1648**	**BIT_0 + BIT_1 + 48**	⇒ CAF
DIAGNOSTIC	**1649**	**BIT_0 + BIT_1 + 49**	⇒ CAF_1 ⇒ CAF_2

OTHER SPECIFICATIONS				
Power configuration	:	**3** banks of **6** serie LR20 cells		**ALKALINE**
		1 bank of **1** 6LR61 cell		**ALKALINE**
Power distribution	:	**3** banks of **6** LR20 cells	:	standby-power-motor
		1 bank of **1** 6LR61 cell	:	motor safety
Option	:	**xxxxx**		
DIAGNOSTIC (s)	=	$t(CAF_2)$ - $t(CAF_1)$ - **3** s (**13** s with horizontal position) with **t** in seconds		
Cells Voltage (V)	=	DIAGNOSTIC (s) × 4.1		

SUB-ASSEMBLIES & PART NUMBERS

SUB-ASSEMBLY	QUANTITY	P/N	REV
OCEANO 2500 S-UNIVERSAL	1	392 9100	1
LOWER END-PLATE	1	312 9401	2.4
RELEASE HOOK	1	257 9601	1
TRANSDUCER ON UNS UPPER END-PLATE	1	200 1111	2.1
INTERNAL STRUCTURE	1	201 9301	2
ELECTRONIC BOARD	1	392 2001	3.4

4 INSTRUMENT SERVICE RECORD

DATE	OBSERVATIONS	WORK CARRIED OUT	AUTHOR

5 FACTORY ACCEPTANCE CERTIFICATE

CUSTOMER	CONTRACT	VARIATION	LOT
NOC UK Job file : **7B000080**	**NOC003932**		

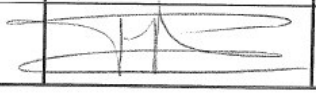
OBJECT OF ACCEPTANCE :

Acoustic Release : OCEANO 2500 S-Universal

Serial Number : 831

Information particular to the delivered supplies, notably the number of the approved engineering departures :

We certify that subject to the exceptions and engineering departures above-mentioned, the present supply has been manufactured to the technical specifications of customer contract, order or sub-order, and that, after completion of all inspections and tests, it complies **IN EVERY RESPECT** with the particular specifications which are there attached, with the drawings and also the relative standards and regulations in force.

	FACTORY ACCEPTANCE	*CUSTOMER ACCEPTANCE*	
ORGANIZATION	***IXSEA***		
NAME OF REPRESENTATIVE	***P.F. ADAM***		
DATE	September 27, 2007		
SIGNATURE			

3 BUILD SHEET

Type	:	**OCEANO 2500 S-Universal**	Date of Manufacture	:	**21/09/07**
S/N	:	**832**	Customer	:	**NOC UK**
P/N	:	**392 9100**	Representative	:	
Function	:	**Acoustic Release**	Job file	:	**7B000080**
Modification	:		Customer Approval	:	**30/08/07**

TECHNICAL SPECIFICATIONS

ELECTRONIC BOARD

Reference	Rev	Function	S/N
392 2001	**3.4**	**AR 8x1 board**	**832**
		Firmware:	
		PROM (U6) - ET8_V2.2	
		FPGA (U38) - REC_V1.0/3.3V	
		PROM (U32) - EM_V1.0	
		FPGA (U33) - EM_V1.0/3.3V	

ELECTRONIC SPECIFICATIONS

Transmit width : **10** ms
Transmit level : **191** ± 4 dB ref 1µPa at 1 m
Pinger rate : **2** s
Pinger duration after release : **3** mn

FR0 = **09.0** kHz ⇒ BIT_0 = **02**
FR1 = **11.5** kHz ⇒ BIT_1 = **07**
CAF = **12.0** kHz
PFR = **12.0** kHz

FUNCTIONAL SPECIFICATIONS

Function / Code	TT301/TT701/TT801	TT201	Sequence
ARM / RANGING	**1669**	**BIT_0 + BIT_1 + 69**	⇒ CAF Lock-out time = 4s Active time = 20s
<u>The following acoustic codes must be preceded by an ARM code</u>			
RELEASE	**1655**	**BIT_0 + BIT_1 + 55**	⇒ CAF ⇒ CAF
RELEASE WITH PINGER	**1656**	**BIT_0 + BIT_1 + 56**	⇒ CAF ⇒ CAF ⇒ PFR
PINGER ON	**1647**	**BIT_0 + BIT_1 + 47**	⇒ CAF ⇒ PFR
PINGER OFF	**1648**	**BIT_0 + BIT_1 + 48**	⇒ CAF
DIAGNOSTIC	**1649**	**BIT_0 + BIT_1 + 49**	⇒ CAF_1 ⇒ CAF_2

OTHER SPECIFICATIONS				
Power configuration	:	**3** banksof **6** serie LR20 cells		**ALKALINE**
		1 bank of **1** 6LR61 cell		**ALKALINE**
Power distribution	:	**3** banksof **6** LR20 cells	:	standby-power-motor
		1 bank of **1** 6LR61 cell	:	motor safety
Option	:	**xxxxx**		
DIAGNOSTIC (s)	=	**t**(CAF_2) - **t**(CAF_1) - **3** s (**13** s with horizontal position) with **t** in seconds		
Cells Voltage (V)	=	DIAGNOSTIC (s) × 4.1		

SUB-ASSEMBLIES & PART NUMBERS			
SUB-ASSEMBLY	QUANTITY	P/N	REV
OCEANO 2500 S-UNIVERSAL	1	392 9100	1
LOWER END-PLATE	1	312 9401	2.4
RELEASE HOOK	1	257 9601	1
TRANSDUCER ON UNS UPPER END-PLATE	1	200 1111	2.1
INTERNAL STRUCTURE	1	201 9301	2
ELECTRONIC BOARD	1	392 2001	3.4

4 INSTRUMENT SERVICE RECORD

DATE	OBSERVATIONS	WORK CARRIED OUT	AUTHOR

5 FACTORY ACCEPTANCE CERTIFICATE

CUSTOMER	CONTRACT	VARIATION	LOT
NOC UK Job file : **7B000080**	**NOC003932**		

OBJECT OF ACCEPTANCE :

Acoustic Release : OCEANO 2500 S-Universal

Serial Number : 832

Information particular to the delivered supplies, notably the number of the approved engineering departures :

We certify that subject to the exceptions and engineering departures above-mentioned, the present supply has been manufactured to the technical specifications of customer contract, order or sub-order, and that, after completion of all inspections and tests, it complies **IN EVERY RESPECT** with the particular specifications which are there attached, with the drawings and also the relative standards and regulations in force.

	FACTORY ACCEPTANCE	*CUSTOMER ACCEPTANCE*	
ORGANIZATION	***IXSEA***		
NAME OF REPRESENTATIVE	***P.F. ADAM***		
DATE	September 27, 2007		
SIGNATURE			

BUILD SHEET

TYPE	:	**AR 861 B2S**	Date of Manufacture	:	
S/N	:	**283**	Customer	:	**SOC**
P/N	:	**392 9100**	Representative	:	
Function	:	**Acoustic Release**	Job file	:	**4P000012**
Modification	:		Customer approval	:	

TECHNICAL SPECIFICATIONS

ELECTRONIC BOARD

Reference	Rev	Function	S/N
392 2001	**3.0**	AR 8x1 Board Firmware: PROM (U6) - ET8_V2.2 FPGA (U38) - REC_V1.0/3.3V PROM (U32) - EM_V1.0 FPGA (U33) - EM_V1.0/3.3V	**283**

ELECTRONIC SPECIFICATIONS

Transmit width : **10** ms
Transmit level : **191** ± 4 dB ref 1µPa at 1 m
Pinger rate : **5** s
Pinger duration after release : **3** mn

FR0 = **09.0** kHz
FR1 = **10.5** kHz

CAF = **12.0** kHz
PINGER = **12.0** kHz

FUNCTIONAL SPECIFICATIONS

Function / Code	TT801/ TT701/ TT301	TT201	Sequence
ARM	**14BB**	**N.A.**	⇒ CAF Lock-Out time = 4s Active time = 20s
The following acoustic codes must be preceded by an ARM code			
RELEASE	**1455**	**N.A.**	⇒ CAF ⇒ CAF
RELEASE WITH PINGER	**1456**	**N.A.**	⇒ CAF ⇒ CAF ⇒ PINGER
PINGER ON	**1447**	**N.A.**	⇒ CAF ⇒ PINGER
PINGER OFF	**1448**	**N.A.**	⇒ CAF
DIAGNOSTIC	**1449**	**N.A.**	⇒ CAF_1 ⇒ CAF_2

N.A. : Not applicable

OTHER SPECIFICATIONS

Power configuration : **3** banks of **6** serie LR20 cells **ALKALINE**
1 bank of **1** 6LR61 cell **ALKALINE**

Power distribution : **3** banks of **6** LR20 cells : standby-power-motor
1 bank of **1** 6LR61 cell : motor safety

Option : **xxxx**

DIAGNOSTIC Measure (s) : **t**(CAF_2) **- t**(CAF_1) **- 3**s (**13**s with horizontal position) with **t** in second

Cells Voltage (V) : DIAGNOSTIC Measure x 4.1

SUB-ASSEMBLIES and PART NUMBERS

SUB-ASSEMBLY	P/N	REV
AR 861 B2S	**392 9100**	**1**
LOWER END-PLATE	**312 9401**	**2**
RELEASE HOOK	**257 9601**	**1**
TRANSDUCER ON UNS END-PLATE	**200 1111**	**1**
INTERNAL STRUCTURE	**201 9301**	**2**
ELECTRONIC BOARD	**385 2010F**	**3.0**

INSTRUMENT SERVICE RECORD

DATE	OBSERVATIONS	WORK CARRIED OUT	AUTHOR
01/06		New Batteries and service	IW/PK
10/05/06	Bench test on Discovery. Release OK; Diagnostic: Horizontal, V=9.6 Deployed on EBH5		
13/05/06	Recovered from EBH5		
04/06/06		No new work – essentially ready to go but needs wire test to appropriate depth	PK

APPENDIX 2:- CTD LOG SHEETS

Sea-Bird 24 - Way C.T.D. Log Sheet

Cruise 7331 Julian day/ Date 213 / 31/8/08

Station No SC 1 Cast Number 001

file Sel_3107.

	Time	Latitude	Longtitude	Water Depth	Altimeter Height
In Water	1047	49° 01' 53 04N	27° 44' 46.51W	1983 m	98-7
At Bottom					
On Deck	1104	49°01'46 N	27° 44' 54 W	2000	

CAST Stopped @ 98m. water depth not sufficient to test release

Firing Order	Bottle No	Depth	Fired	Time	Sample Bottle	Comments Reduced to 3 ft
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						

Aux Chan	Sensor Type	Serial Number	Aux Chan	Sensor Type	Serial Number
0			4		
1			5		
2			6		
3			7		
	CTD			Carousel	

All information as last cast (tick) ..... Initials .....

CTD CAST	301	Date:	31/7/08	JDAY	213
Lat:	49°02'07.6 N	Long:	27°44'4000	Depth:	1942

LADCP Deployment / Recovery Log Sheet

Pre-Deployment (Comms. and Charge leads should be in place)

In BBTALK: <End>

	MASTER	SLAVE
1. Log file name (F3)	310708m1.txt	310851.txt
2. Time check (TS?) and time correction if necessary	10 :19 00	10 :21 :15
3. Memory unused (RS?) and erase if necessary (RE ErAsE)	092 Mb	091 Mb
4. Run tests (PA, PT200)	✓✓	

5. Battery Voltage: 55V. V. (max. 58V) Measure across charger

Deployment

	MASTER	SLAVE
6. Deploy (F2)		
7. Deployment time, from GPS/vessel clock:	10 : 23 : 22	10 : 24 : 04
8. Stop Log file (F3)	✓	✓

Recovery

In BBTALK : <End>

9. Time of logging stopped: MASTER 11 :08 :23 SLAVE 11 :08 : 34

10. Battery Voltage: 50 V Measure across charger

Data Transfer

In BBTALK	MASTER	SLAVE
11. Number of deployments (RA?)	1	3
12. Default filename	-RDI- 000 .000	-RDI- 002 .000
13. Renamed file	310708m1.000	310851.000

In BBLIST	MASTER	SLAVE
14. File size	959 Kb	944 Kb
15. Number of ensembles		

16. Comments

Sea-Bird 24 - Way C.T.D. Log Sheet

Cruise D331 Julian day/ Date 213 31/7/08

Station No SC 2 Cast Number 002

	Time	Latitude	Longtitude	Water Depth	Altimeter Height
In Water	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
At Bottom	[illegible]	[illegible] 10	27 43 05 [illegible]	2514	[illegible]
On Deck	14 [illegible]	41 02' 06 [illegible] N	27 43 07 [illegible]		[illegible]

[illegible] for [illegible] TESTED

Aural started @ 1313
Fish & winch trans - not working.

Firing Order	Bottle No	Depth	Fired	Time	Sample Bottle	Comments
1	1	[illegible]	✓	1256		Fluorimeter [illegible]
2	2	2496	✓	1256		[illegible]
3	3		✓			Trans - [illegible] @ 1010
4	4	2490	✓	1257		
5	[illegible]	[illegible]	✓	[illegible]		
6	6	[illegible]	✓	[illegible]		
7	[illegible]	[illegible]	✓	[illegible]		
8	[illegible]		✓		000	
9	9	20[illegible]				[illegible]
10	10	[illegible]	✓	[illegible]	001	
11	11	1200	✓	1340		
12	12	1200				
13	[illegible]	50			002	
14	-	[illegible]	✓			
15	15	[illegible]	✓	1401		
16	16	[illegible]	✓	1401	003	
17	17	100	✓	140[illegible]		
18	18	100	✓	[illegible]		
19	19	50	✓	[illegible]	004	
20	20	50	✓	[illegible]		
21	21	10	✓	[illegible]	005	
22	22	10	✓	[illegible]		
23	23	10	✓	[illegible]		
24	24	10	✓	14[illegible]		

Aux Chan	Sensor Type	Serial Number	Aux Chan	Sensor Type	Serial Number
0			4		
1			5		
2			6		
3			7		
	CTD	[illegible]		Carousel	

All information as last cast (tick) .... Initials ....

CTD CAST	002	Date:	3/7/08	JDAY	213
Lat:		Long:		Depth:	

LADCP Deployment / Recovery Log Sheet

Pre-Deployment (Comms. and Charge leads should be in place)

In BBTALK: <End>

	MASTER	SLAVE
1. Log file name (F3)	310708m2.txt	310708s2.txt
2. Time check (TS?) and time correction if necessary	✓ : :	✓ : :
3. Memory unused (RS?) and erase if necessary (RE ErAsE)	091 Mb	091 Mb
4. Run tests (PA, PT200)	✓✓	✓✓

5. Battery Voltage: 52 V . (max. 58V) Measure across charger

Deployment

	MASTER	SLAVE
6. Deploy (F2)		
7. Deployment time, from GPS/vessel clock:	11 :29 :38	11 :30 :04
8. Stop Log file (F3)	✓	✓

Recovery

In BBTALK : <End>

9. Time of logging stopped: MASTER 14 : 31 : 37 SLAVE 14 : 31 : 30

10. Battery Voltage: 50 V Measure across charger

Data Transfer

In BBTALK	MASTER	SLAVE
11. Number of deployments (RA?)	3	5
12. Default filename	-RDI-001 .000	-RDI-003 .000
13. Renamed file	310708m2 m.000	310708s2 s.000

In BBLIST	MASTER	SLAVE
14. File size	3883 Kb	3874 Kb
15. Number of ensembles		

16. Comments: M RDI002, S RDI 004 jobs restarted because ADCPs Restarted as operator disturbed during download.

Sea-Bird 24 - Way C.T.D. Log Sheet

Cruise D331 Julian day/ Date 214 / 1/8/08

Station No SC21 Cast Number 003

File: SC21-0P06

	Time	Latitude	Longtitude	Water Depth	Altimeter Height
In Water	1034	48°46' 43.55 N	2° 3' 20.56 W	2499.	96.7.
At Bottom	1111.	48 43.37 17 N	2° 38' 3.42 W	CTD recovered	957m. cont.
On Deck	1132	48°46' 32 27 N	2° 38' 32.45 W	2308.	

Error @ 965 m. - winch stopped. 1104

Firing Order	Bottle No	Depth	Fired	Time	Sample Bottle	Comments
1						
2						Fuse blown - replaced. & blew
3						
4						again
5						CTD Recovered to surface.
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						

Aux Chan	Sensor Type	Serial Number	Aux Chan	Sensor Type	Serial Number
0			4		
1			5		
2			6		
3			7		
	CTD			Carousel	

All information as last cast (tick) .... Initials ....

CTD CAST	003	Date:	01/08/08	JDAY	214
Lat:		Long:		Depth:	2485.

LADCP Deployment / Recovery Log Sheet

Pre-Deployment (Comms. and Charge leads should be in place)

In BBTALK: <End>

	MASTER	SLAVE
1. Log file name (F3)	010808m1.txt	010808s1.txt
2. Time check (TS?) and time correction if necessary	- : :02	- : :01
3. Memory unused (RS?) and erase if necessary (RE ErAsE)	027 Mb	027 Mb
4. Run tests (PA, PT200)	✓✓	✓✓

5. Battery Voltage: 51 V . (max. 58V) Measure across charger

Deployment

	MASTER	SLAVE
6. Deploy (F2)		
7. Deployment time, from GPS/vessel clock:	10 : 17 : 39	10 : 18 : 27
8. Stop Log file (F3)	✓	✓

Recovery

In BBTALK : <End>

9. Time of logging stopped: MASTER 11 : 33 : 26 SLAVE 11 : 33 : 43

10. Battery Voltage: 50 V Measure across charger

Data Transfer

In BBTALK	MASTER	SLAVE
11. Number of deployments (RA?)	4	6
12. Default filename	-RDI- 003 .000	-RDI- 003 .000
13. Renamed file	010808m1 m.000	010808s1 s.000

In BBLIST	MASTER	SLAVE
14. File size	Kb	Kb
15. Number of ensembles		

16. Comments

Sea-Bird 24 - Way C.T.D. Log Sheet

Cruise ...JC31... Julian day/ Date ...214 1/8/08...

Station No ...SW 2... Cast Number ...004...

JC SW2_0108

	Time	Latitude	Longtitude	Water Depth	Altimeter Height
In Water	1951	48°47'14.9 N	023° 38' 30.1 W	2443	98.7
At Bottom	2050	48°47'29.5 N	023° 38' 33.9 W	2420	30 dropped to 25
On Deck	2155.	"	"		

2 ocean lab release tested.

Firing Order	Bottle No	Depth	Fired	Time	Sample Bottle	Comments
1	1	2350	✓	2051		
2	2	2350	✓	2052		
3	3	2350	✓	2052		CTD faulted @ 1374.
4	4	2350	✓	2052		Fuse blown on
5	5	2350	✓	2053		cable - possible termination
6	6	2350	✓	2053		problem
7	7	2350	✓	2053		
8	8	2350	✓	2053	9986	
9	9	1200	✓	2120		Recovered to deck.
10	10	1200	✓	2120	9987	
11	11	500	✓	2135		
12	12	500	✓	2135	9988	
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						

1200 500. 50 3

Aux Chan	Sensor Type	Serial Number	Aux Chan	Sensor Type	Serial Number
0			4		
1			5		
2			6		
3			7		
	CTD			Carousel	

All information as last cast (tick) .... Initials ....

CTD CAST	004	Date:	1/8/08	JDAY	214
Lat:	48°47'1813N	Long:	23°35'2366W	Depth:	2430

LADCP Deployment / Recovery Log Sheet

Pre-Deployment (Comms. and Charge leads should be in place)

In BBTALK: <End>

	MASTER	SLAVE
1. Log file name (F3)	010808M2 .txt	010808S2 .txt
2. Time check (TS?) and time correction if necessary	00 : 00 : 00	– : 00 : 02
3. Memory unused (RS?) and erase if necessary (RE ErAsE)	085 Mb	035 Mb
4. Run tests (PA, PT200)	✓✓	✓✓

5. Battery Voltage 55 V (max. 58V) Measure across charger

Deployment

	MASTER	SLAVE
6. Deploy (F2)		
7. Deployment time, from GPS/vessel clock:	19 : 49 : 04	19 : 49 : 35
8. Stop Log file (F3)	✓	✓

Recovery

In BBTALK : <End>

9. Time of logging stopped: MASTER 22 : 05 : 10 SLAVE 22 : 05 : 51

10. Battery Voltage 51 V Measure across charger

Data Transfer

In BBTALK	MASTER	SLAVE
11. Number of deployments (RA?)	5	7
12. Default filename	-RDI- 004 .000	-RDI- 006 .000
13. Renamed file	010808M2m.000	010808S2s.000

In BBLIST	MASTER	SLAVE
14. File size	Kb	Kb
15. Number of ensembles		

16. Comments

Sea-Birid 24 - Way C.T.D. Log Sheet

Cruise D331 Julian day/ Date 06/03/08 (62?)

Station No NW1 Cast Number 005.

	Time	Latitude	Longtitude	Water Depth	Altimeter Height
In Water	~~13:~~ 13 31	53° 59' 22.76N	036° 07' 24.42W	2487	[illegible]
At Bottom	14 52	53' 59 21.82N	036 07' 26.99W	"	6
On Deck	15.57	53' 59" 25.90N	036' 07 29.14W	2522	

Firing Order	Bottle No	Depth	Fired	Time	Sample Bottle	Comments
1	1	2470	✓	14.54	[illegible]	
2	2	2470	✓	14.54		
3	3	1208	✓	15.22		
4	4	1208	✓	15.22		
5	5	103	✓	15.47	"	
6	6	103	✓	15.47		
7	7	13	✓	15.51	"	
8	8	13	✓	15.51	[illegible]	
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						

2550 2470 1200 100 10

Aux Chan	Sensor Type	Serial Number	Aux Chan	Sensor Type	Serial Number
0			4		
1			5		
2			6		
3			7		
	CTD			Carousel	

All information as last cast (tick) .... Initials ....

CTD CAST	005	Date:	06 08 08	JDAY	219
Lat:	56 59' 20.48N	Long:	36° 07' 26.83W	Depth:	2472.

LADCP Deployment / Recovery Log Sheet

Pre-Deployment (Comms. and Charge leads should be in place)

In BBTALK: <End>

	MASTER	SLAVE
1. Log file name (F3)	060808m1.txt	060808s1 .txt
2. Time check (TS?) and time correction if necessary	00:00:00	00:00:00
3. Memory unused (RS?) and erase if necessary (RE ErAsE)	82 Mb	82 Mb
4. Run tests (PA, PT200)	✓	✓

5. Battery Voltage: 51 V. (max. 58V) Measure across charger

Deployment

	MASTER	SLAVE
6. Deploy (F2)		
7. Deployment time, from GPS/vessel clock:	13:29:14	13:29:54
8. Stop Log file (F3)	✓	✓

Recovery

In BBTALK : <End>

9. Time of logging stopped: MASTER 16:01:24 SLAVE 16:01:40

10. Battery Voltage: 49 V Measure across charger

Data Transfer

In BBTALK	MASTER	SLAVE
11. Number of deployments (RA?)	6	8
12. Default filename	-RDI- 005.000	-RDI- 007.000
13. Renamed file	060808 m:000	060808 s.000

In BBLIST	MASTER	SLAVE
14. File size	Kb	Kb
15. Number of ensembles		

16. Comments

Sea-Bird 24 - Way C.T.D. Log Sheet

Cruise D331 Julian day/ Date 08.08.08 221

Station No [redacted] NE Cast Number 06

	Time	Latitude	Longtitude	Water Depth	Altimeter Height
In Water	18.39	54 01' 05.46N	034 10' 40.06W	2475	48.7
At Bottom	19.30	54 01' 05.30N	034 10' 41.45W	2474	27m.
On Deck	20:36	54 00 51.06N	034 10' 40.30W	2496	

Firing Order	Bottle No	Depth	Fired	Time	Sample Bottle	Comments
1	1	2449	✓	19.32	3 B	
2	2	2449	✓	19.32		
3	3	1004	✓	19.59	3 4	
4	4	1004	✓	20 00		
5	5	304	✓	20:15	3 5	
6	6	304	✓	20:16		
7	7	55	✓	20.24	3 6	
8	8	53	✓	20.24		
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						

2450, 1000 300

Aux Chan	Sensor Type	Serial Number	Aux Chan	Sensor Type	Serial Number
0			4		
1			5		
2			6		
3			7		
	CTD			Carousel	

All information as last cast (tick) ..... Initials .....

CTD CAST	06	Date:	08-08-08	JDAY	221
Lat:	54°10.60'N	Long:	034°10'41.45W	Depth:	2474

LADCP Deployment / Recovery Log Sheet

Pre-Deployment (Comms. and Charge leads should be in place)

In BBTALK: <End>

	MASTER	SLAVE
1. Log file name (F3)	080808m1.txt	080808s1.txt
2. Time check (TS?) and time correction if necessary	+07sec	+01 sec
3. Memory unused (RS?) and erase if necessary (RE ErAsE)	79 Mb	79 Mb
4. Run tests (PA, PT200)	✓✓	✓✓

5. Battery Voltage: 50 V. (max. 58V) Measure across charger

Deployment

	MASTER	SLAVE
6. Deploy (F2)		
7. Deployment time, from GPS/vessel clock:	18:00:41	18:01:00
8. Stop Log file (F3)	✓	✓

Recovery

In BBTALK : <End>

9. Time of logging stopped: MASTER 20:38:46 SLAVE 20:39:01

10. Battery Voltage: 30 V Measure across charger

Data Transfer

In BBTALK	MASTER	SLAVE
11. Number of deployments (RA?)	7	9
12. Default filename	-RDI- .000	-RDI- .000
13. Renamed file	080808m1000	080808s1000

In BBLIST	MASTER	SLAVE
14. File size	Kb	Kb
15. Number of ensembles		

16. Comments

APPENDIX 3 D331(T) STATION LIST

Station #	Date	Time GMT	Latitude	Longitude	Gear	Depth	Remarks
16436	31/07/2008	11:50	49° 02.391'N	27° 43.109'W	SE CTD	2518	Plus NMF acoustic releases
16437	31/07/2008	20:22	49° 02.60'N	27° 43.48'W	SE Mooring	2503	
16438	01/07/2008	16:43	48° 46.80'N	28° 38.43'W	SW Mooring	2501	Top sediment trap lost some preservative during deployment
16439	01/07/2008	19:55	48° 47.245'N	28° 38.503'W	SW CTD	2446	Plus Oceanlab acoustic releases, CTD cable termination failed on upcast at 174m
16440	05/08/2008	18:56	54° 01.471'N	34° 10.637'W	NE Whale bone	2435	Very smelly
16441	06/08/2008	13:40	53° 59.355'N	36° 07.543'W	NW CTD	2482	
16442	06/08/2008	18:10	53° 59.339'N	36° 11.662'W	NW Whale bone	2498	Still very smelly
16443	07/08/2008	11:38	53° 59.330'N	36° 07.380'W	NW Mooring	2505	
16444	08/08/2008	15:48	54° 00.034'N	34° 10.622'W	NE Mooring	2503	
16445	08/08/2008	18:30	54° 01.107'N	34° 10.665'W	NE CTD	2474	