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NATURAL ENVIRONMENT RESEARCH COUNCIL

National Oceanography Centre

Cruise Report No. 19

RV *Ronald H. Brown* Cruise RB1201

15 FEB - 05 MAR 2012

RAPID moorings cruise report

Principal Scientists
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2012

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ABSTRACT

This report describes the UK mooring operations conducted during RV *Ronald H. Brown* cruise RB1201 between 15 February and 5 March 2012.

These mooring operations were completed as part of the United Kingdom Natural Environment Research Council (NERC) funded RAPID-WATCH Programme to monitor the Atlantic Meridional Overturning Circulation (MOC) at 26.5°N.

This cruise was a joint cruise between staff from the NERC and staff from the US National Oceanic and Atmospheric Administration (NOAA)'s Atlantic Oceanographic and Meterological Laboratory (AOML) in Miami. The primary purpose on this cruise for the UK team was to service the RAPID Western Boundary moorings while the US team worked on the NOAA Western Boundary Time Series project.

Cruise RB1201 was from Charleston, South Carolina, USA to Charleston, South Carolina, USA and covered the Western Boundary moorings deployed on cruise KN200-4 in 2011 and landers deployed on cruise OC459 in 2010. This cruise was the ninth refurbishment (following initial deployment in 2004) of the Western Boundary section of an array of moorings deployed across the Atlantic in order to continuously observe the MOC. This array will be further refined and refurbished during subsequent years.

The instruments deployed on the array consist of a variety of current meters, bottom pressure recorders, and CTD loggers, which, combined with time series measurements of the Florida Straits Current and wind stress estimates, will be used to determine the strength and structure of the MOC at 26.5°N.

(http://www.noc.soton.ac.uk/rapid)

KEYWORDS

26.5°N, Atlantic Ocean, bottom pressure recorder, BPR, CTD, current meter, Meridional overturning circulation, MicroCAT, MOC, mooring array, Moorings, North Atlantic, RAPID-WATCH, RAPID, RAPIDMOC, RB1201, *Ronald H. Brown*, THC, thermohaline circulation, Western Boundary

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1. Scientific and Ship's Personnel

Molly Baringer	Chief Scientist, AOML, NOAA
Andy Stefanick	Watch Leader, AOML, NOAA
Pedro Pena	CTD Operations, AOML, NOAA
Kyle Seaton	Oxygen Analyst, AOML, NOAA
Jay Hooper	CTD Calibration, AOML, NOAA
Adam Houk	LADCP Oepration, RSMAS, Uni. Miami
Wes Struble	Teacher at Sea & CTD Console
Dave Grant	Teacher at Sea & CTD Console
Darren Rayner	UK Science Lead, NOC
Gerard McCarthy	NOC Scientist
Aurelié Duchez	NOC Scientist
Shane Elipot	NOC Scientist
Rob McLachlan	UK Moorings Lead, NOC
Jason Scott	Mooring Technician & TLO, NOC
Chris Crowe	Mooring Technician, NOC
Colin Hutton	Mooring Technician, NOC
Tom Roberts	Mooring Technician, NOC

(17 persons)

Table 1.2: Science Party

CAPT Mark Pickett	Commanding Officer
LCDR Elizabeth Jones	Executive Officer
LT James Brinkley	Operations Officer
LT Christian Rathke	Medical Officer
ENS Aaron Colohan	Navigation Officer
3rd Mate Dave Owen	Junior Officer
ENS Jesse Milton	Junior Officer
ENS Paul Chamberlain	Junior Officer
Frank Dunlop	Chief Marine Engineer
Gordon Gardipe	1st Assistant Engineer
Jake DeMello	2nd Assistant Engineer
Ray Zarzycki	3rd Assistant Engineer
Reggie Glover	Junior Engineer
Danny Torchio	Junior Engineer
Lyonel Bakley	Wiper
Bruce Cowden	Chief Bosun
Reggie Williams	Bosun Group Leader
Victoria Carpenter	Deck Utilityman

Chris Massey	Able Body Seaman
Robert Truex	Ordinary Seaman
Daniel Hauerland	Ordinary Seaman
Leslie Allen	Ordinary Seaman
Shaina Floyd	General Vessle Assistant (Deck)
Michael Smith	Chief Steward
Moses Martinez	Chief Cook
Orcino Tan	2nd Cook
Deana Jackson	General Vessel Assistant (Galley)
Jonathan Shannahoff	Chief Survey Technician
Laurie Roy	Survey Technician
Clay Norfleet	Lead Electronics Technician

(30 persons)

Table 1.2: Ship's Crew

2. Itinerary

Cruise RB1201 aboard the R.V. Ronald H. Brown sailed from Charleston, South Carolina, USA on Wednseday 15th February 2012 and arrived back in the same port on Monday the 5th March 2012.

3. Introduction

This cruise report is for cruise RB1201 conducted aboard the US Research Vessel *Ronald H. Brown* in Spring 2012. The cruise was lead by Molly Baringer from the National Oceanic and Atmospheric Administration (NOAA) Atlantic Oceanography and Meteorology Laboratory (AOML) in Miami, USA. The two primary purposes of the cruise were to complete a regularly occupied hydrography section from the Bahamas to approximately 70°W as part of the AOML Western Boundary Time Series (WBTS) project, and to service the UK-operated moorings deployed in the same region. The UK moorings work was lead by Darren Rayner. This report describes the mooring work only.

The Atlantic Meridional Overturning Circulation (AMOC) at 26.5°N carries a north-ward heat flux of 1.3 PW. Northward of 26.5°N over the Gulf Stream and its extension much of this heat is transferred to the atmosphere and subsequently is responsible for maintaining UK climate about 5°C warmer than the zonal average at this latitude. Previous sparse observations did not resolve the temporal variability of the AMOC and so it is unknown whether it is slowing in response to global warming as suggested by recent model results (Bindo et al., 2007). In 2004 NERC, NSF and NOAA funded a system of observations in the Atlantic at 26.5°N to observe on a daily basis the strength and structure of the AMOC. Two papers (Cunningham et al., 2007; Kanzow et al., 2007) demonstrated

that not only does the system of observations achieve a mass balance for the AMOC, it reveals dramatic and unexpected richness of variability. In the first year the AMOC mean strength and variability is 18.7±5.6 Sv. From estimates of the degrees-of-freedom the year-long mean AMOC is determined with a resolution of around 1.5Sv so abrupt changes would be readily identified and long-term changes will be measured relative to the 2004-2005 average.

The NERC contribution to the first four years of continuous AMOC observations was funded under the directed programme RAPID Climate Change. Following an international review NERC will continue funding to 2014 under the programme RAPID-WATCH.

The NSF and NOAA have also continued funding and commitments so that the system can continue operating at the same level of activity to 2014.

The objectives of RAPID-WATCH are: To deliver a decade-long time series of calibrated and quality-controlled measurements of the Atlantic MOC from the RAPID-WATCH array and; To exploit the data from the RAPID-WATCH array and elsewhere to determine and interpret recent changes in the Atlantic MOC, assess the risk of rapid climate change, and investigate the potential for predictions of the MOC and its impacts on climate.

3.1 The AMOC system

The Atlantic at 26.5°N is separated into two regions: a western boundary region, where the Gulf Stream flows through the narrow (80km), shallow (800m) Florida Straits between Florida and the Bahamas, and a transatlantic mid-ocean region, extending from the Bahamas at about 77°W to Africa at about 15°W (Figure 1). Variability in Gulf Stream flow is derived from cable voltage measurements across the Florida Straits, and variability in wind-driven surface-layer Ekman transport across 26.5°N is derived from satellite-based observations. To monitor the mid-ocean flow we deployed an array of moored instruments along the 26.5°N section. The basic principle of the array is to estimate the zonally integrated geostrophic profile of northward velocity on a daily basis from time-series measurements of temperature and salinity throughout the water column at the eastern and western boundaries. Inshore of the most westerly measurement of temperature and salinity, the transports of the Antilles current and deep western boundary current are monitored by direct velocity measurements.

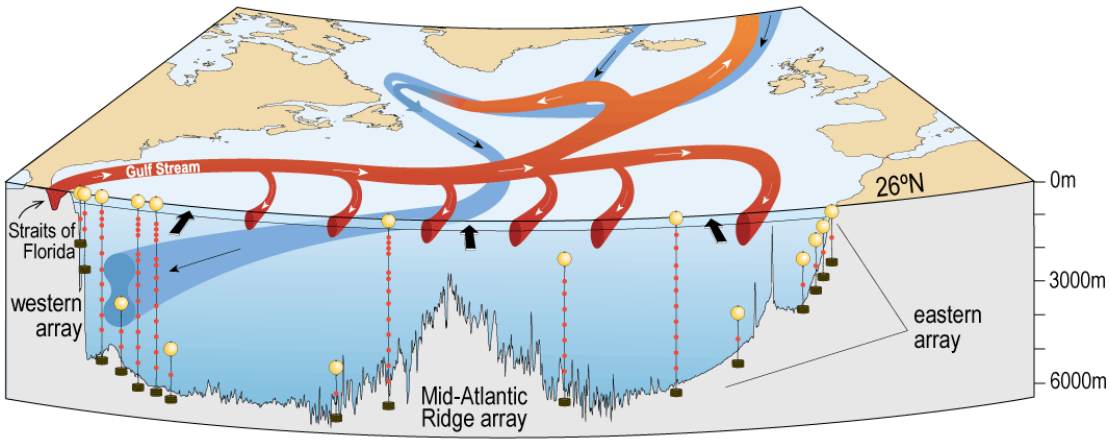

Figure 3.1: Schematic of the principal currents of the Atlantic meridional

overturning circulation. The vertical lines across the Atlantic at 26.5°N indicate moorings instrumented to measure the vertical density profiles. The Gulf Stream (red) transport is measured by a submarine cable in the Straits of Florida and the western boundary array includes current meters to directly measure transports of the shallow and deep western boundary currents (blue). Bottom pressure recorders are located at several sites across the Atlantic to measure depth-independent fluctuations of the basin-wide circulation.

3.2 Array Specification

The NERC contribution to the array as deployed in 2012-2013 consists of a total of 17 moorings, 16 landers and a single inverted echo sounder. Figure 2 shows the western boundary moorings as deployed on cruise RB1201. The eastern boundary moorings (Figure 3) and the mid-Atlantic ridge moorings (Figure 4) were serviced in the Autumn of 2011 during cruise JC064. All moorings will be serviced
again in Autumn 2012 from the RRS *Discovery*. Moorings are named in three sub-arrays. Western boundary WB with mooring number increasing to the east; Mid-Atlantic Ridge MAR; Eastern Boundary EB. The letter H is a historical reference to moorings originally intended to be HOMER profilers. Bottom landers instrumented with pressure recorders are indicated by L in the name. ADCP indicates an Acoustic Doppler Current Profiler mooring.

3.2.1 Western Boundary Sub-array

At the western boundary, WB2 is the pivotal mooring and provides a full depth density profile very close to the western boundary wall. As deployed on this cruise, WB2 comprises sixteen CTDs and eight current meters. Inshore of WB2 is mooring WB1 which is equipped with fifteen CTDs and four current meters. Further inshore there is WBADCP (sometimes referred to as WBA) that comprises a Longranger ADCP at a depth of 600m to measure the shallow Antilles current. East of WB2 is WBH2 consisting of three CTDs and five current meters. At the normal offshore extent of the Deep Western Boundary Current (DWBC) is WB4, which comprises fifteen CTDs and nine current meters. Further offshore is WB6 comprising five CTDs and two bottom pressure recorders, which combined with MAR0 (see section 3.2.3) measures the contribution to the MOC of deep water below 5200m including the AABW.

There are four landers in this sub-array; two at the site of WB2 (two BPRs each); and two at the site of WB4 (one BPR each). The landers are serviced in alternate years so that each recovery provides a two-year record with a year overlap with the previous lander to remove instrument drift.

In addition to the moorings listed above, the western boundary sub-array also contains three full depth moorings and four landers from the University of Miami, that were last serviced on KN200-4 in Spring 2011, and that will be serviced again in Autumn 2012. WB0 comprises four CTDs and current meters and an upward looking ADCP. WB3 is 22 km east of WB2 and so acts as a critical backup in case of loss of WB2. WB3 consists of seven CTDs and current meters. Combined with the other inshore moorings it provides the thermal-wind shear and measured velocities from the core of the DWBC. WB5 is located 500 km

offshore and is instrumented with seventeen CTDs and provides the thermal-wind shear across the full width of the boundary currents including any recirculation.

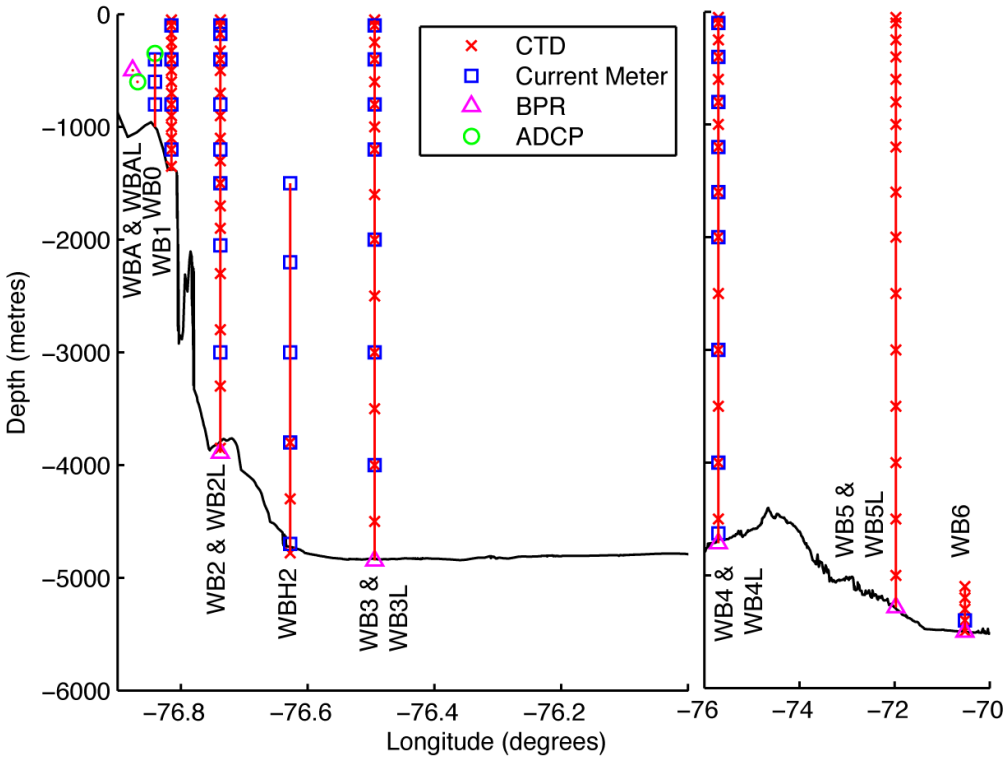

Figure 3.2: The Western Boundary sub-array as deployed after this cruise. NB moorings WB0, WB3 and WB5 along with associate landers are maintained by the Rosenstiel School of Marine and Atmospheric Science (RSMAS) with NSF funding.

3.2.2 Eastern Boundary Sub-array

The Eastern Boundary sub-array currently consists of one tall mooring EB1, consisting of eighteen CTDs and two current meters, and a series of shorter CTD moorings EBHi, EBH1, EBH2, EBH3, EBH4, and EBH5 that step up the slope reducing the influence of bottom triangles when combined with the more offshore EB1 mooring. EBH4 and EBH5 are co-located and together they construct a single full depth density profile. Finally the Eastern sub-array includes six bottom pressure landers; two at the site of EB1, comprising two bottom pressure recorders (BPRS) each, two at the site of EBH1, comprising one bottom pressure recorder each and two at the site of EBH4/EBH5. EBH4L was deployed close to the site of EBH4/EBH5 as a replacement for the Inverted Echo Sounder with a pressure sensor (PIES) instrument that could not be redeployed during cruise JC064.

There is currently one PIES deployed in the eastern boundary sub-array, EBP2, which was last serviced on D359.

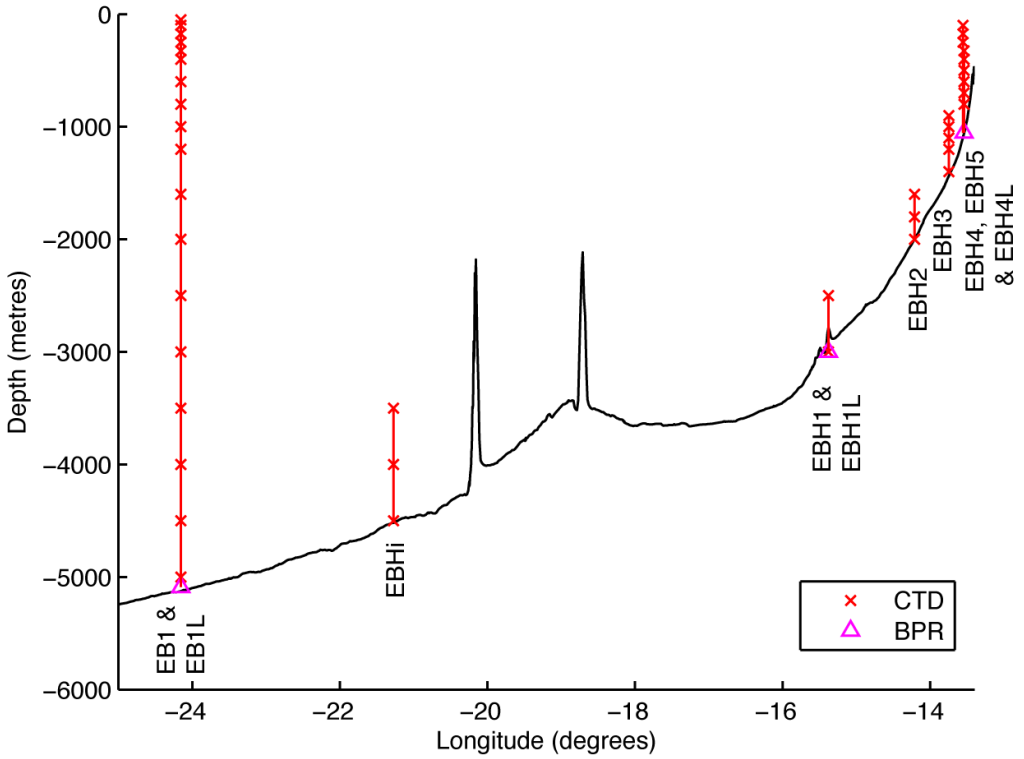

Figure 3.3: Eastern boundary sub-array as deployed after January 2011.

3.2.3 Mid-Atlantic Ridge Sub-array

The sub-array at the Mid-Atlantic Ridge consists of one full depth mooring (MAR1), three shorter moorings (MAR0, MAR2 and MAR3), and four landers (two at the site of MAR1, and two at the site of MAR3). MAR0 consists of five CTDs, one current meter and a BPR to capture the Antarctic Bottom Water (AABW) contribution to the MOC to the west of the ridge. MAR1 provides a full depth density profile through eighteen CTDs, with MAR2 acting as a backup to 1000m on the west of the ridge. MAR3 is sited to the east of the ridge and allows separation of the eastern and western basin MOC contributions. The landers are deployed as per those for the Eastern Boundary, with two at the site of MAR1, and two at the site of MAR3.

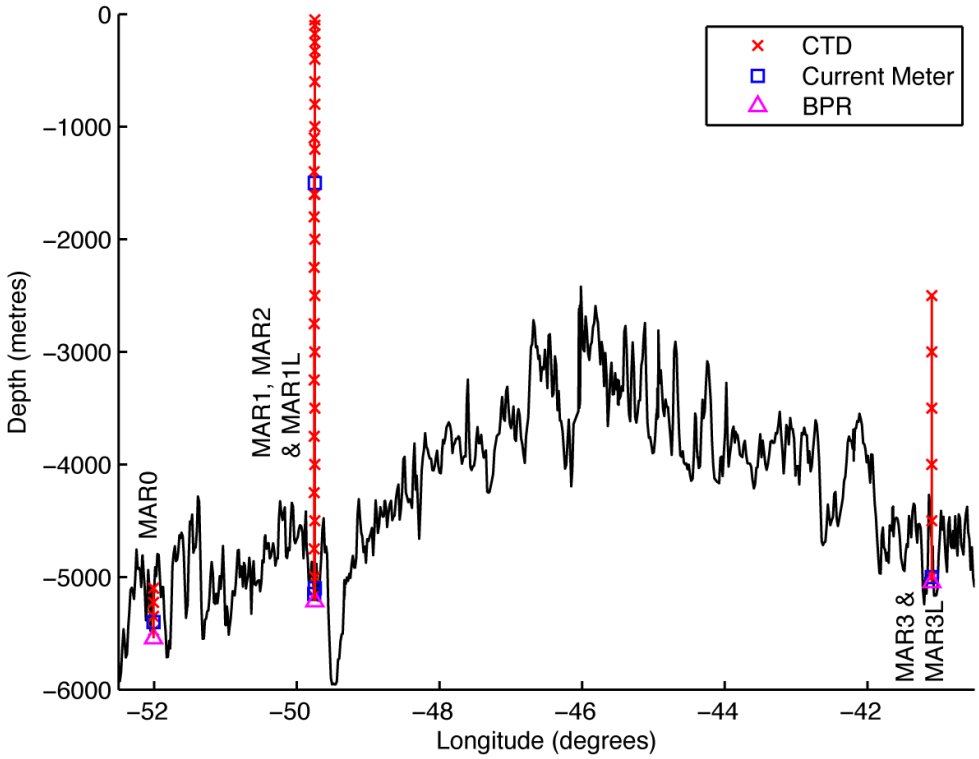

Figure 3.4: The Mid-Atlantic Ridge sub-array as deployed after January 2011.

3.3 Results and Data Policy

All data and data products from this programme are freely available. The NERC data policy may be found at http://www.bodc.ac.uk/projects/uk/rapid/data policy/. Access to data and data products can be obtained via http://www.noc.soton.ac.uk/rapidmoc/ and http://www.rsmas.miami.edu/users/mocha/index.htm). Data may also be obtained directly from http://www.bodc.ac.uk/.

3.4 Previous RAPID-MOC Cruises

Table 3.1 details the previous cruises completed as part of the RAPID-MOC project with information on the relevant cruise reports for reference.

Cruise	Vessel	Date	Objectives	Cruise Report
D277	RRS *Discovery*	Feb - Mar 2004	Initial Deployment of Eastern Boundary and Mid-Atlantic Ridge moorings	RRS *Discovery* Cruise D277 and D278. Southampton Oceanography Centre Cruise Report, No 53, 2005
D278	RRS *Discovery*	Mar 2004	Initial Deployment of UK and US Western Boundary Moorings	RRS *Discovery* Cruise D277 and D278. Southampton Oceanography Centre Cruise Report, No 53, 2005
D279	RRS *Discovery*	4 Apr – 10 May	Transatlantic hydrography (125 CTD stations)	RRS *Discovery* Cruise D279, Southampton Oceanography Centre, Cruise Report, No 54, 2005
P319	RV *Poseidon*	9th – 17th Dec 2004	Emergency deployment of replacement EB2 following loss	Appendix in RRS *Charles Darwin* Cruise CD170 and RV *Knorr* Cruise KN182-2. National Oceanography Centre Southampton Cruise Report, No. 2, 2006
CD170	RRS *Charles*	Apr 2005	Service and redeployment of Eastern Boundary and Mid-Atlantic Ridge	RRS *Charles Darwin* Cruise CD170 and RV *Knorr* Cruise KN182-2. National

	Darwin		moorings	Oceanography Centre Southampton Cruise Report, No. 2, 2006
KN182-2	RV *Knorr*	May 2005	Service and redeployment of UK and US Western Boundary Moorings and Western Boundary Time Series (WBTS) hydrography section	RRS *Charles Darwin* Cruise CD170 and RV *Knorr* Cruise KN182-2. National Oceanography Centre Southampton Cruise Report, No. 2, 2006
CD177	RRS *Charles Darwin*	Nov 2005	Service and redeployment of key Eastern Boundary moorings	RRS *Charles Darwin* Cruise CD177. National Oceanography Centre Southampton Cruise Report, No. 5, 2006
WS05018	RV *F.G. Walton Smith*	Nov 2005	Emergency recovery of drifting WB1 mooring	No report published
RB0602	RV *Ronald H. Brown*	Mar 2006	Service and redeployment of UK Western Boundary moorings and WBTS hydrography section	RV *Ronald H. Brown* Cruise RB0602 and RRS *Discovery* Cruise D304. National Oceanography Centre Southampton Cruise Report, No. 16, 2007
D304	RRS *Discovery*	May - Jun 2006	Service and redeployment of Eastern Boundary and Mid-Atlantic Ridge moorings	RV *Ronald H. Brown* Cruise RB0602 and RRS *Discovery* Cruise D304. National Oceanography Centre Southampton Cruise Report, No. 16, 2007
P343	RV *Poseidon*	4th – 17th Oct 2006	Service and redeployment of key Eastern Boundary moorings	RS *Poseidon* Cruises P343 and P345. National Oceanography Centre Southampton Cruise Report No. 28, 2008.
P345	RV *Poseidon*	28th Nov – 7th Dec 2006	Emergency redeployment of EB1 and EB2 following problems on P343	RS *Poseidon* Cruises P343 and P345. National Oceanography Centre Southampton Cruise Report No. 28, 2008.
SJ06	RV *Seward Johnson*	Sep – Oct 2006	Recovery and redeployment of WB2 and US Western Boundary moorings, and WBTS hydrography section	Appendix G in RV *Ronald H. Brown* Cruise RB0701. National Oceanography Centre, Southampton Cruise Report, No 29
RB0701	RV *Ronald H. Brown*	Mar - Apr 2007	Service and redeployment of UK Western Boundary moorings and WBTS hydrography section	RV *Ronald H. Brown* Cruise RB0701. National Oceanography Centre, Southampton Cruise Report, No 29
D324	RRS *Discovery*	Oct – Nov 2007	Service and redeployment of Eastern Boundary and Mid-Atlantic Ridge moorings	RRS *Discovery* Cruise D324, National Oceanography Centre, Southampton Cruise Report, No 34
SJ0803	RV *Seward Johnson*	April 2008	Service and redeployment of the Western Boundary moorings	RV *Seward Johnson* Cruise SJ0803, National Oceanography Centre, Southampton Cruise Report, No 37
D334	RRS *Discovery*	Oct-Nov 2008	Service and redeployment of the Eastern Boundary and Mid-Atlantic Ridge moorings	RRS *Discovery* D334, National Oceanography Centre, Southampton, Cruise Report No. 38, 2009
RB0901	RV *Ronald H. Brown*	April – May 2009	Service and redeployment of the UK and US Western Boundary moorings and the WBTS hydrography section	RV *Ronald H. Brown* Cruise RB0901, National Oceanography Centre, Southampton Cruise Report, No 39, 2009
D344	RRS *Discovery*	Oct – Nov 2009	Service and redeployment of the Eastern Boundary and Mid-Atlantic Ridge moorings	RRS *Discovery* D344, National Oceanography Centre, Southampton, Cruise Report No. 51, 2010
D345	RRS *Discovery*	21 Nov – 6 Dec 2009	Recovery and redeployment of US Western Boundary moorings, and WBTS hydrography section	RAPID/MOCHA Program Report (W. Johns, RSMAS).
D346	RRS *Discovery*	5 Jan – 19 Feb 2010	Transatlantic hydrography (135 CTD stations)	*Not published yet*
OC459	RV *Oceanus*	Mar – Apr 2010	Service and redeployment of the Western Boundary moorings	RV *Oceanus* Cruise OC459-1, National Oceanography Centre Cruise Report, No 01, 2010
RB1009	RV *Ronald H. Brown*	28 Nov – 1 Dec 2010	Recovery of WB4 and WB3L3. Redeployment of WB4.	Appendix in: RV *Oceanus* Cruise OC459-1, National Oceanography Centre Cruise Report, No -01, 2010
D359	RRS *Discovery*	17 Dec 2010– 15 Jan 2011	Service and redeployment of the Eastern Boundary and Mid-Atlantic Ridge moorings	RRS *Discovery* Cruise D359, National Oceanography Centre Crusie Report, No. 09, 2011
KN200-4	RV *Knorr*	13 Apr – 4 May 2011	Service and redeployment of Western Boundary Moorings and WBTS hydrography section	*RV Knorr* Cruise KN200-4, National Oceanography Centre Cruise Report, No 07, 2011
JC064	RRS *James Cook*	10 Sep – 9 Oct 2011	Service and redeployment of the Eastern Boundary and Mid-Atlantic Ridge moorings	RRS *James Cook* Cruise JC064, National Oceanography Cruise Report, No. 14, 2012
RB1201	RV *Ronald H. Brown*	15 Feb – 5 Mar 2012	Service and redeployment of Western Boundary Moorings and WBTS hydrography section	This report

Table 3.1: Cruises conducted as part of the RAPID-MOC project, or otherwise relevant

4. Cruise Diary

Darren Rayner

Sunday 12th February
Science party travel out to Charleston

Monday 13th February
Headed down to the ship about 09:30 after obtaining the necessary passes from the FLETC visitors centre. Moorings team already present and started loading.

Tuesday 14th February
Checked out of hotel and headed to the ship at 08:30. Finished setting up the labs and computers. Problems with getting Matlab standalone licenses to work on the Mac minis. Headed into town in the evening for dinner and returned the hire car to the airport at 22:00.

Wednesday 15th February
Sailed at 10am. Matlab problems resolved as a new license file was generated for the alternate MAC address to that which was first given. Welcome to the ship briefing at 13:30 with muster drills immediately following. The weather was very favourable with winds less than 15 kts and forecasted to drop.

Thursday 16th February
Continued steaming to easternmost CTD station. Test cast to 1400m early afternoon with 6 releases attached for the inshore moorings. 5 out of 6 releases fired ok. Tried using the portable capstan for hauling the superducer, but it's not straight forward and still requires 4 people (1 for the capstan and feeding the rope onto it correctly, one for coiling the rope into the basket, one for pulling in the superducer cable, and one for reeling the superducer cable). This was later reduced to just 2 people when needed with the safety rope removed and the superducer just held by the cable it was supplied with. One person guided the superducer and the 2nd operated the capstan. The cable was spooled onto the deck and reeled onto the storage drum after the transducer was inboard.

Friday 17th February
Continued steaming.

Saturday 18th February
First CTD station at 00:30. 6 releases and 8 MicroCATs attached ready for WB6 (with some spares in case of problems on the cal dip). All 6 releases fired ok. CTD back on deck about 05:00. A second CTD on the WBTS line, then positioned for recovery of WB6. Recovery commenced at 14:15 and after initial difficulties in communicating, the release was fired at 14:25. The mooring was spotted on the surface (in the sun glint) at 15:35 and grapnelled 13 minutes later. The mooring came in quite tangled, but otherwise very well. Two MicroCATs were in a

different order to that expected - on checking the deployment log sheet they were recorded in the wrong order which could have been due to someone reading the instruments in the wrong order when they were prepared in the fish baskets for the previous deployment. Recovery was complete at 16:25 and after a turnaround of the equipment on the deck, deployment commenced on the replacement WB6 at 17:24. The mooring needed to be towed for 20 minutes as the ship had positioned further away than requested (0.5 miles instead of 0.25 miles), but it is better that these type of issue are ironed out prior to the WB1 and WB2 moorings. Mooring deployed at 18:18 and then back to the CTD section.

Sunday 19th February
Continuing CTD section. We attached 12 MicroCATs to a CTD cast starting at 07:30, but otherwise continued working in the lab.

Monday 20th February
Continued CTD section.

Tuesday 21st February
Continued CTD section with one cast used to dip MicroCATs at the same time.

Wednesday 22nd February
Continued CTD section with one cast again used to dip MicroCATs.

Thursday 23rd February
Continued CTD section. No MicroCATs calibrated.

Friday 24th February
Steamed overnight to the WB4 deployment site. The ship setup approximately 4.5 miles away due west with a 0.7kt surface current running. But the wind was having more of an effect (10-15kts from SSE) so the ship positioned to the north with a 4.5 mile run in. Just as we were about to start deployment (approx 08:00) the bridge radioed down to say they were going to adjust position slightly more to the west. Started deployment at 08:45. Finished at 13:28. Slightly overshot the planned drop site as the ship had to speed up during the streaming as they were struggling to maintain the heading. Not a problem as the depth is pretty consistent. WB4 was falling at 220m/min initially, and was on the seabed in 25 minutes. Deployed WB4L at 14:30 and watched it down. A much more sedate descent rate, but not accurately measured as we'd moved off position ready for the first triangulation. Triangulated both WB4 and WB4L. WB4L actually fell back further than WB4 so it possibly skied on the way down (328m as compared to WB4's 308m). Evening CTD cast just for release test. No MicroCATs.

Saturday 25th February
Repositioned overnight ready for WB4L recovery. Fired the releases at 07:05 and all on board by 09:00. There was no point firing them any earlier as the site after the next operation (WB4 recovery) was 49 miles away so we would have been unlikely to have got there in time for a third mooring operation before dark. Repositioned for WB4 recovery. WB4 started talking happily enough at the first attempt, but despite a confirmed release response it didn't start rising until the

2nd release was fired. Spotted on the surface almost immediately and waited till all of the mooring was on the surface prior to commencing approach.
Chris caught a fish! (It's only taken about four years of trying on RAPID trips). Mooring all inboard at 16:15. Repositioned for a cal-dip CTD at the IES C site (cal-dip – calibration of moored MicroCAT CTDs through lowering on the shipboard CTD rosette). Chris's fish (believed to have been a Florida Pompano) was converted to sushi by Rob and shared by several of the science party.

Sunday 26th February

Arrived overnight for the WBH2 recovery. Releases were fired ok at about 06:15. The ship began manoeuvring for pick up at about 07:40 (a long wait as apparently the deck crew don't start till 07:30!). I was under the impression that we would be able to start earlier, but apparently not. On approach it was noted that the pick up line was not visible and the Billings float was only just breaking the surface. The main pack of 14 glass was hooked and then the Billings went under the ship (from starboard to port and back). It got hooked around the starboard prop and cut the wire line and polyprop above and below the 14-pack. The 14-pack and Nortek current meter were recovered and the main line below the cut was somehow still hooked around the pick up line which was just visible below the surface. This was hooked and hauled aboard by the winch till there was enough wire in reach to put on a carpenter's block. The wire was secured and attached to the winch whilst the line to the Billings was secured to the other side of the ship. The ship then deployed divers to check the prop and see if they could free it. The port prop was seen to be ok so the ship proceeded with the mooring recovery on one prop. Winds were approximately 25 knots. The Billings float came loose during the mooring recovery, but it was still uncertain if there was some wire remaining around the prop. The captain was happy to do a deployment with just the port prop and bow thruster so we deployed WBH2 prior to heading to the lee side of Abaco so they could put in divers again early in the morning.

Monday 27th February

The divers inspected the starboard prop in the morning and recovered several metres of wire from it. They also inspected the port propeller for damage. The engineers were happy that the props were ok and we began the 70 mile transit back to the site of mooring operations at approximately 08:30. We fired the releases at WB2 without any problems and the mooring was spotted on the surface almost immediately. Recovery was complete by about 19:10 and we repositioned for a CTD cal dip.

Tuesday 28th February

Recovered the WB2L lander which was all inboard by 09:40. We had to wait to fire it because a ship was in the way. Repositioned for WB2 deployment. All streamed ok. Overshot the drop mark slightly as the bridge was going 0.5 miles past the target site rather than the 0.3 asked for. Depth was decreasing , but fallback should put the anchor in the right depth. Repositioned for WBADCP recovery whilst the back deck was sorted and the WB2L lander built. Recovered WBADCP and deployed the replacement, then headed back to the WB2L site to deploy the lander. Deployed the lander and repositioned for triangulation of both

WB2 and WB2L at the same time. Once complete a cal dip CTD was performed at 20:30.

Wednesday 29th February
Repositioned overnight to WB1 ready for recovery. The release was fired at about 07:00 with the mooring hooked on at 08:00, and all inboard by 09:30. We repositioned for the WB1 deployment and sorted the deck ready for deployment, which began after lunch at 11:30. There was a slight northwards surface current running at 0.4kts which pushed the mooring off to port on streaming as the ship was heading into the wind at about 95 degrees from North. The fallback should therefore be slightly northwards of the deployment track. Repositioned for recovery of WBAL which took 4 approaches, then deployed the replacement and headed for the WB1 triangulation sites. The last CTD cal dip was conducted that evening - unfortunately one MicroCAT didn't log data (which was not discovered until the next day) and there were no more deep CTD casts scheduled for the cruise.

Thursday 1st March
Headed round the south of Abacao and Grand Bahama. The small boat was sent to clear customs in Port Lucaya whilst we began the North West Providence Channel CTD section. The vessels rendezvoused again after 4 hours and we finished the section and proceeded to the first Florida Straits section.

Friday 2nd March
Finished the first Florida Straits section and headed north for the 2nd.

Saturday 3rd March
Finished the 2nd Florida Straits section with a nice pod of about 10 pilot whales swimming with us off the port bow. Science ended and we headed home.

Sunday 4th March
Packed up the lab and continued home.

Monday 5th March
Docked and the science party disembarked, with demobilisation occurring on the 5th and 6th March.

5. Computing

Darren Rayner

Two Mac minis were setup in the main lab along with the Macbooks belonging to Darren and Gerard. These were all connected to the ship's network by Ethernet cable. The MAC addresses of the computers to go on the network needed to be given to the ship's computer technician to allow access.

There were problems with getting the machines to see the rest of the network, including printers and the rbscs1 machine where it is possible to access underway data. But the Ethernet cables were connected to a different switch and this resolved the problem.

The Mac mini called hydrosea5 was used as the central data hub with the rpdmoc backup from NOCS copied to an RB1201 folder on the desktop. This RB1201 folder was set as a shared folder so that it could be accessed by the other Macs when connecting with the hydrosea5 account over the network. All data were copied to hydrosea5 and Time Machine used to provide an ongoing backup of the cruise and instrument data.

The Mac mini "Topaz" was setup to run RAPID-WIDGIT in a background screen (log in to survey, start a VNC server and then log in as a different user for day-to-day use). The background screen can be accessed from other computers through use of a VNC viewer so anyone could access the RAPID-WIDGIT screen and leave it running continuously.

The moorings team laptops and instrument download laptops were initially set to connect to the ship's wireless network, but this wireless network was also separate from the main network access and so they could not see the Mac mini network or the internet.

To overcome this, the Mac mini hydrosea5 was setup to share its network connection wirelessly using the following procedure:

1. set up standard 128-bit WEP-protected WiFi internet sharing on Mac with a 13 character password (for this cruise 1234567654321)
2. on the Windows machine go to Wireless Network Connection Properties/Wireless Networks
3. add new WiFi network
4. enter network name matching your Mac access point (for this cruise hydrosea5-temp)
5. set Network Authentication: Shared
6. set Data Encryption: WEP
7. uncheck "The key is provided automatically" option and enter (and repeat) your 13 character password under "Network key" uncheck "Enable IEEE 802.1x authentication ..." under Authentication tab

The laptops were then able to see hydrosea5 and use its internet connection, but not able to see the rest of the ship's network.

Folders for the cruise data were made on the respective desktop environments of the laptops and shortcuts to the command prompt window set to open directly to this folder when launching a command terminal. Two scripts were installed in the c:\windows directory (c:\windows.0 for Darren's old Ergo mercury 3 laptop) called hydrosea5.bat and hydrosea5.script. The hydrosea5.bat file contained the following line of code and calls the ftp script hydrosea5.script.

```
ftp -s:"c:\windows\hydrosea5.script
```

The hydrosea5.script file contained the following lines of code:

```
open 10.0.2.1
hydrosea5
hydrosea5
cd /Users/hydrosea5/Desktop/RB1201/rapid/data/moor/raw/rb1201
```

pwd

which opened a connection to hydrosea5 (via the ip address 10.0.2.1 which was assigned when we set up the ad-hoc shared wireless network on hydrosea5), entered the username and password and changed to the central cruise raw data directory. The instrument data could then be ftp'd to the central data directory.

5.1 Data report tools

The data report tools have now been copied to the main rapid exec directory so that they can be archived with each cruise and be used by anyone. For this cruise they consist of the following routines which read in the rodb .use format files:

`pressure_overlay.m`
Produces a single axis figure with all the pressure records from the mooring overlaid on each other

`conductivity_overlay.m`
As above but for conductivity

`temperature_overlay.m`
As above but for temperature

`salinity_overlay.m`
As above but for salinity

`currents_overlay.m`
Produces two figures of overlaid currents, one for direction and the other for magnitude – these can be a little crowded so may not always be much use

`currents_stacked.m`
Produces four figures with individual axes per current meter on each figure. The shallowest instrument at the top, and the deepest at the bottom. The four figures are for the four current variables, magnitude, direction, east-component (u) and north-component (v).

`stick_plot.m`
Produces a single figure with individual axes per current meter. Each axis is a vector plot of the currents with time. The data are averaged to produce less records per day for ease of visualization. The current value is set to two records per day (so 12-hour averages), but this can be changed as required.

`progressive_vector.m`
Produces a single figure with a progressive vector plot of each current meter record.

`stats_table.m`
Saves an ascii file in the directory from which the routine is called, with basic statistics of the .use files

Each function is called with a required variable '*moor*' which is the complete mooring name of the mooring to be inspected. If the routines are being run from non-standard paths then the '*procpath*' optional input will also need to be given with the path to the rpdmoc/rapid/data/moor/proc/ specified. The routines have been setup to deduce procpath from the relative path of the data_report_tools directory.

5.2 RAPID-WIDGIT

The RAPID-WIDGIT routines were set to run on one of the Mac minis so that anyone could look at it, but it could also be run on individual's Matlab sessions if required. The file RB1201_pos.txt was created from KN200_4_pos.txt as used on the previous western boundary cruise, and modified for the updated mooring positions. The subroutine *plot_etopo2_plot_gps.m* was modified to have options for different ships that could be toggled depending on where the programs are to be used in the future. There are currently options for *RRS Discovery/RRS James Cook* – which both use the TECHSAS logging system, and separate options for the *RV Oceanus, RV Knorr* and now the *RV Ronald H. Brown* – which all make use of files that are logged to the network to obtain the GPS position.

For this cruise a connection was made to the *rbscs1* machine using the *scientist* login. From there the LOG40 folder was mounted to the Mac mini. The files
*WIN-TSG_***.elg* (where *** is a sequential number from 001 incrementing when a new file is created) from the resulting path
/Volumes/LOG40/EventData/AB1202/ were used as the source file for the GPS positions. These files are updated only every 30 seconds, but is adequate for this trip.

5.3 Depth Data

Depth data were available from the repeater displays around the ship, but data were logged to the network and stored in the files *Bathy-MSG_yyyymmdd-HHMMSS.Raw* (where yyyy=year, mm=month, dd=day, HH=hour, MM=minute and SS=second at which the file starts).

6. CTD Data

Gerard McCarthy

CTD data from the cal-dips were available on the network in SeaBird .cnv files. These were copied to our local system before use. The uncalibrated, 1Hz data was read in using *parse_cnv.m,* which is in the cruise *exec* directory under the *calibration* directory.

The MicroCAT calibration dips were utilised to decide preferential choice of temperature sensor on the shipboard CTD. A temperature difference of 0.001ºC was noted between the two temperature sensors early in the cruise. Following comparison with the MicroCATs from a number of casts, it was decided that the second temperature sensor was the most accurate.

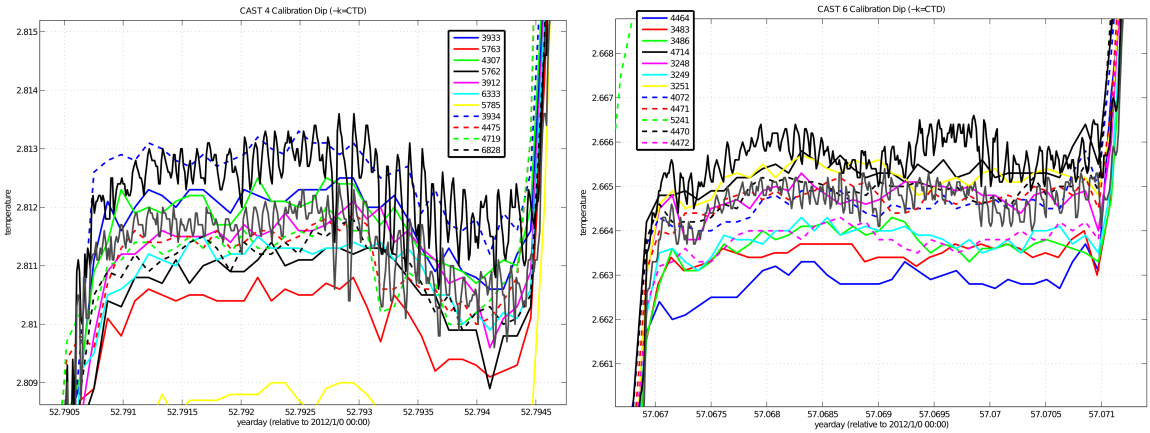

Figure 6.1: Microcats (colour), CTD temperature 1 (black) and temperature 2 (grey) for casts 4 (left) and 6 (right)

The accuracy of the MicroCATs is less than the CTD temperature sensor. However, the MicroCATs offer increased effective precision as there is up to 12 (or more) on each cast. Figure 6.1 shows that the MicroCATs agreed better with the second CTD temperature sensor. The original primary temperature sensor was replaced around CTD 33.

For calibration of the MicroCATs the second conductivity sensor on the CTD should be used as it is paired with the second temperature sensor. This is in spite of the fact that the primary conductivity sensor was the preferred sensor of the AOML CTD group.

The CTD group indicated that there was an error of up to 0.008 in the conductivity sensors. In spite of the inaccuracy of the conductivity sensors, it should be possible to calibrate accurately. The Autosal was stable throughout the cruise and calibrated relative to standard seawater at least every two crates. The pressure sensor performed well.

The CTD conductivity and temperature sensors were new from SeaBird. The CTD group were unhappy with the calibration of the sensors and intended on sending them back to SeaBird before completing the calibration of the dataset. It was anticipated that this would take four weeks.

7. Moorings operations

7.1 Summary

Darren Rayner

In total six moorings and three landers were recovered and redeployed for the UK Rapid-MOC project. Positions of the mooring recoveries and deployments are given in the two tables below (NB: all dates are in UK format dd/mm/yyyy, and all times are in GMT).

Instrumentation recovered from the moorings consisted of 55 SeaBird SBE37 MicroCAT CTDs, five SeaBird SBE53 Bottom Pressure Recorders (BPRs), 1 SeaBird SBE26 BPR, five Aanderaa RCM11 current meters, 22 Nortek Aquadopp current meters and one RDI 75kHz Longranger ADCP. Of these instruments all had complete records except for one which was recovered flooded so yielded no

data. The replacement moorings consisted of the same with the exception of three less RCM11s, and three more Norteks..

One mooring recovery was complicated by the upper marker float becoming tangled round the starboard propeller. All the mooring was recovered but the tangle had to be investigated first. This is why the time taken to recover WBH2 is so long in the table below.

As the project is moving to an 18-month service interval with both all eastern boundary, mid-Atlantic ridge and western boundary moorings being serviced from the same cruise, the moorings are due for recovery in Autumn 2012 along with the landers deployed the previous year. The landers deployed on this cruise will be due for recovery in Spring 2014.

Mooring operations were conducted from the stern with a double barrel winch and dual reeler system used in conjunction with a floating block raised and lowered from the A-frame through use of the ship's air-tuggers. The ship's crane was used for the lighter anchor deployments, and the trawl winch and A-frame used for the heavier anchors.

Six of the moorings were triangulated after deployment to accurately determine their seabed position. This is important for those moorings that are likely to have fallen back a significant distance along the deployment track or at the sites that have a small landing area (WB2 and WB1 especially). Plots of the deployment tracks, anchor drop locations and triangulated seabed positions (where applicable) are given in Appendix E.

Prior to deployment cross calibrations of the MicroCAT CTDs were completed by lowering the instruments on the shipboard CTD frame with five-minute bottle stops to allow the slower responding MicroCAT sensors time to stabilize relative to the shipboard CTD. Five casts with up to twelve instruments were combined with the WBTS section, and a further four casts with up to 17 instruments completed during the nights of the mooring operations. One additional CTD cast in the Florida Straits section was used to post-calibrate one shallowly-deployed MicroCAT CTD that did not log data correctly on the first cast it was on. Acoustic releases were also lowered on the frame during the CTD test cast, the 1st CTD station and one of the overnight casts during the mooring work. These were to test the releases at depth prior to their use on moorings. Details of the MicroCATs lowered on each CTD cast are given in Appendix D.

	Anchor drop		Anchor seabed					
Mooring	Latitude N	Longitude W	Latitude N	Longitude W	Corrected depth at anchor launch (m)	date	Time (GMT)	Duration (from top float to anchor including any towing)
WB6	26° 29.698'	70° 31.339'			5490.4	17/02/2012	23:18	00:38
WB4L8	26° 28.94'	75° 42.04'	26° 28.932'	75° 42.240'		23/02/2012	19:30	00:06
WB4	26° 28.707'	75° 41.983'	26° 28.692'	75° 42.168'	4687	23/02/2012	18:29	00:06
WBH2	26° 28.906'	76° 37.441'	26° 28.938'	76° 37.656'	4729	25/02/2012	21:57	02:27
WB2	26° 30.721'	76° 43.981'	26° 30.816'	76° 44.274'	3849	27/02/2012	19:21	04:08
WB2L8	26° 30.594'	76° 44.784'	26° 30.594'	76° 44.784'	3884	27/02/2012	23:00	00:03
WB1	26° 29.972'	76° 44.821'	26° 30.072'	76° 48.894'	1387	28/02/2012	18:52	02:19

WBADCP	26° 31.494'	76° 52.080'			608	27/02/2012	22:05	00:12
WBAL3	26° 31.340'	76° 52.559'			496	28/02/2012	21:31	00:03

Table 7.1: Summary of mooring deployment operations.

Mooring	Mooring Anchor Position		Release date	Release time	Duration (including ship manoeuvring after firing releases)
	Latitude (N)	Longitude (W)			
WB6	26° 29.58'	70° 31.53'	18/02/2012	19:25	02:00
WB4	26° 29.21'	75° 48.56'	25/02/2012	15:41	05:33
WB4L6	26° 21.78'	75° 42.42'	25/02/2012	12:05	01:37
WBH2	26° 28.61'	76° 37.32'	26/02/2012	11:19	05:54
WB2	26° 30.92'	76° 44.57'	27/02/2012	19:42	04:00
WB2L6	26° 30.52'	76° 44.70'	28/02/2012	12:00	01:57
WB1	26° 30.19'	76° 48.91'	29/02/2012	12:06	02:26
WBADCP	26° 31.497'	76° 52.080'	28/02/2012	20:49	00:34
WBAL1	26° 31.50'	76° 52.563'	29/02/2012	19:39	01:25

Table 7.2: Summary of mooring recovery operations

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Diagrams of the moorings and landers deployed on this cruise are given in Appendix A.

Mooring	NMFD mooring number
WB6	2012/01
WB4L8	2012/03
WB4	2012/02
WBH2	2012/04
WB2	2012/05
WB2L8	2012/07
WB1	2012/08
WBADCP	2012/06
WBAL3	2012/09

Table 7.3: NMFD Mooring Numbers

8. Moored instrumentation

A summary of the instrument setup details for those instruments deployed on this cruise is given in Appendix B. Appendix C gives the instrument record lengths of the instruments recovered on this cruise.

8.1 SeaBird MicroCats

Gerard McCarthy

8.1.1 Introduction

A total of 56 SeaBird SMP-37/IMP-37 MicroCAT CTDs were recovered from 5 moorings. Only one of these had flooded (S/N 6837) and two had short records ending on 15th September 2011: S/N 7681 & 6817 due to battery depletion.

The two instrument types (SMP/IMP) differ in their communication modes for programming and data retrieval being serial and inductive respectively. These are pumped CTDs with a temperature specification (initial accuracy:stability:resolution) of 2m°C:0.02m°C/month:0.01m°C; conductivity specification 0.003mS/c:0.003mS/cm/month:0.0001mS/cm and; Pressure specification of 0.1% full-scale:0.05% of full scale range per year:0.002% of full scale range.

The CTD instruments are fitted with one of three types of pressure sensor: Druck; Paine or Kistler. The pressure sensors differ in their characteristics and the order of quality is Kistler, Druck and Paine.

Each instrument on recovery is downloaded using Sea-Bird SeaTerm software appropriate to the firmware version of the SMPs. RB1201 saw the first IMP with V2 software. These are processed using SeaTerm V2 by selecting the IM option. The older firmware IMPs may be downloaded in HEX using our own software that allows multiple downloading of IMP instruments and is considerably quicker than the Sea-Bird software: the HEX files are subsequently converted to ascii format.

For mooring deployments the MicroCATS sample once every 30 minutes and for calibration cast once every 10 seconds (their highest sampling rate). Raw ascii MicroCAT data are collected together on a the cross-mounted disk, RB1201, for subsequent processing.

8.1.2 Processing

The RAPID-MOC/MOCHA project uses instruments from a number of different manufacturers and measurements utilised by three science teams within the project. At the outset we adopted a common data format, to which we ensure all instrument data conform. The format is ASCII and is referred to as RODB and the processing software is MATLAB. The programmes utilised are:

- mc_call_2_rb1201.m : Performs stage 1 processing, converting microCAT raw ascii data to the common RODB format.
- microcat_raw2use_003.m : Performs stage 2 processing, eliminating data at mooring launch and recovery; interpolates data gaps; saves file; creates diagnostic plots.
- mc_call_caldip_rb1201.m : Plots all microCAT data from one CTD cast with the CTD data. Used during the cruise for a function check of the micoCATS, and a qualitative assessment of sensor performance and post cruise provides quantified calibration information. One improvement was made to this programme from previous versions. The application of the legend on the plots of all microcats plus CTD was amended so that, even if not all microcats listed in the info.dat file were available, the legend would still be accurate. This is an improvement on previous iterations whose legend was inaccurate if the number of microcats available didn't match that listed in the info.dat file.

8.1.3 AutoSBE Modifications

AutoSBE is a suite of six programs used for automating the programming of Sea-Bird MicroCATs developed on JC064. Two modifications were needed for RB1201:

- The python command time.time was not working as intended. This led to the programmes crashing when trying to open a capture file (saved with a name defined by time.time) and the programmes failing to rename the capture files. This was solved by replacing these commands with a time.gmtime command, which produced the necessary output. It is important that the computer used has the clock set to GMTTIME, the time zone set to GMTTIME and the daylight savings time option not ticked.

- RB1201 saw the first inductive MicroCAT with firmware requiring the V2 software. The source code was modified to combine the inductive modem functionality with the V2 commands. The compiled output is stored in the executable run_seatermV2_IM_caldip.exe and run_seatermV2_IM_moor.exe.

The details of running AutoSBE are the same as in the JC064 Cruise Report. The compilation was ran on both Chris Crowe's laptop and Paul Wright's old laptop.

8.2 Current Meter Processing

Aurelié Duchez

Current meter data were processed simply with the available scripts.

Stage 0 is when downloading the data from the instruments, converting into a Matlab-readable format, and transferring it to the computer system. Files for Aanderaa RCM11 current meters (current meters on moorings WB2 and WB6) are found in `rcm/` directories; those for Nortek Aquadopp current meters are found in `nor/` or `nortek/.`

The routines used are listed in Table 8.1 for each stage with any noteworthy comments.

RCM11		

Stage 1	`process_rcms_rb1201.m`
	
	`rcm2rodb_05.m`
		The first program calls the function `rcm2rodb_05` for stage 1;

Stage 2	`rcm11raw2use.m`	And then calls this second function for stage 2.
Nortek		
Stage 1	`process_nors_rb1201.m` `nortek2rodb_01.m`	The first program calls the function `nortekrodb_01.m` during stage 1,
Stage 2	`nortek_raw2use_01.m`	And this second function during stage 2.

Table 8.1: Routines used during current meter processing

Table 8.2 details what current meters were on each mooring that was recovered.

WBADCP	
ADCP (1)	10311
WB1	
NORTEK (4)	5831
	5896
	6765
	5899
WB2	
NORTEK (4)	9204
	9210
	9213
	5893
RCM11 (4)	428
	518
	519
	520
WBH2	
NORTEK (5)	6723
	6083
	6805
	8052
	8120
WB4	
NORTEK (9)	5490
	5590
	5611
	5955
	6049
	6050
	6088
	6516
	6534
WB6	
RCM11 (1)	515

Table 8.2: Current meter types and serial numbers from recovered moorings

8.3 ADCP processing

Files for the ADCP are found in `adp/` directories (Matlab programs are found in an `adcp/` fodler in the cruise `exec/` directory).

The program `process_adcps_zbs_rb1201.m` is used for this processing and calls the function `adcp2rodb_01.m` during stage 1 and the function `adcp_raw2use_01.m` during stage 2.

8.4 BPR processing

Shane Elipot

For this cruise, stages 0 and 1 of the BPR processing for moorings WBAL1, WB2L6, WB4L6, and WB6 were mostly left unchanged from the previous cruises. Stages 2 and 3 were re-written in order to

(i) Apply a de-tiding procedure excluding annual, semi-annual, monthly and fortnightly tidal components (SA,SSA, MSM, MM, MSF, MF), then compute the exponential-linear or linear trend estimates (rather than 2-day low pass filtering which inherently suffer from edge effects, and removing tides with periods longer than 2 days a posteriori) (stage 2)

(ii) Then filter to retain periods longer than 2 days and sampled with a 12h interval. As was done before, a fit to monthly and fortnightly components are drawn for reference on the output plots.

For this I added the version 1.3 of the t_tide Matlab package in the executable directory for RB1201. This is available at http://www.eos.ubc.ca/~rich/ and the theoretical basis is explained in the paper by Pawlowicz, R., B. Beardsley, and S. Lentz, "Classical Tidal Harmonic Analysis Including Error Estimates in MATLAB using T_TIDE", Computers and Geosciences, 28, 929-937 (2002).

The Matlab codes used for the processing, along with previous codes, can be found in:

[basedirectory]/rapid/data/moor/exec/rb1201/

The processing was applied to pressure records of the moorings with the following ids wb6_5_201117, wb4l6_6_201002, wb2l6_6_201005, and wbal1_1_201007.

8.4.1 Stage 0

Raw instrument data is downloaded from the BPR using SeaBird's software and saved as .hex files. These are converted to ASCII .tid files using the same software. After downloading, the files are transferred to

[basedirectory]/rapid/data/moor/raw/rb1201 /seagauge/

with filenames based on the serial number of the instrument recovered.

8.4.2 Stage 1

Stage 1 processing takes the ASCII .tid file, reads the info.dat file containing information about the mooring location, start and end times, and outputs the bottom pressure data to RDB format. The units are converted from psi to dbar. If there has been a clock offset recorded, then this is applied at this point (not applied on RB1201). The end and start times in the info file were adjusted by visually examining the records. For the mooring WB6 which had additional instruments and not only BPRs, this was done in consultation with the persons processing the other data.

The code is found in

[basedirectory]/rapid/data/exec/rb1201/stage1/bpr/seagauge2rdb_003.m

The RDB output is saved as

[basedirectory]/rapid/data/moor/proc/[mooring]/seagauge/[mooring]_[instrument].raw

If the data was "wrapped", this was fixed at this point; on RB1201, the two SBE pressure records recovered on wb4l6_6_201002 had to be unwrapped because they were originally deployed at a deeper pressure than their nominal range.

Finally, a postscript graph is created of the raw data:

[basedirectory]/rapid/data/moor/proc/[mooring]/seagauge/[mooring]_[instrument].raw.eps

A log file is created that records the options chosen by the processing operator:

*[basedirectory]/rapid/data/moor/proc/[mooring]/seagauge/*stage1_log.

8.4.3 Stage 2

This stage presents a significant change from the previous processing. First, a tidal prediction is computed with the t_tide software package and is output as the new RODB variable PTIDE (code 92). This prediction excludes the annual and semi-annual components (SA, SSA), and the monthly and fortnightly components (MSM,MM,MSF,MF). The monthly and fortnightly components (MSM,MM,MSF,MF) are nevertheless estimated with the same code, and output as well in the .use file as another new RODB variable called PTIDEM (code 93). Note that the t_tide software recommends not feeding time series longer than one year into the estimation. Therefore, in this code, if the time series is longer than one year but less than two years, it is divided in two one-year segments with an overlap period, which is eventually blended linearly between the two estimates. The code cannot handle time series longer than two years. Then the classic exponential-linear and linear trend estimates are obtained from the de-tided time series of pressure.

The code with the looping on the instruments is

[basedirectory]/rapid/data/exec/rb1201/stage2/bpr_processing/seagauge_processing_004.m

and the subroutine called to remove tides and apply the exponential-linear and linear fit is

[basedirectory]/rapid/data/exec/rb1201/stage2/bpr_processing/purge_bp_004.m

The user is prompted to subjectively choose which of the two trends is the best fit, which will be stored with the data in the output .use file located in the moor/proc/seagauge directory:

[basedirectory]/rapid/data/moor/proc/[mooring]/seagauge/[mooring]_[instrument].use

Three postscript graphs are created of the processed data, including a graph of the tidal and spectral analyses for extra checks:

[basedirectory]/rapid/data/moor/proc/[mooring]/seagauge/[mooring]_[instrument].use.tides.eps

[basedirectory]/rapid/data/moor/proc/[mooring]/seagauge/[mooring]_[instrument].use.1.eps

[basedirectory]/rapid/data/moor/proc/[mooring]/seagauge/[mooring]_[instrument].use.2.eps

A log file is created that records the options chosen by the processing operator:

*[basedirectory]/rapid/data/moor/proc/[mooring]/seagauge/*stage2_log.

Figure 8.5 is an example of the processing applied to wbal1 showing the successful removal of the diurnal tides:

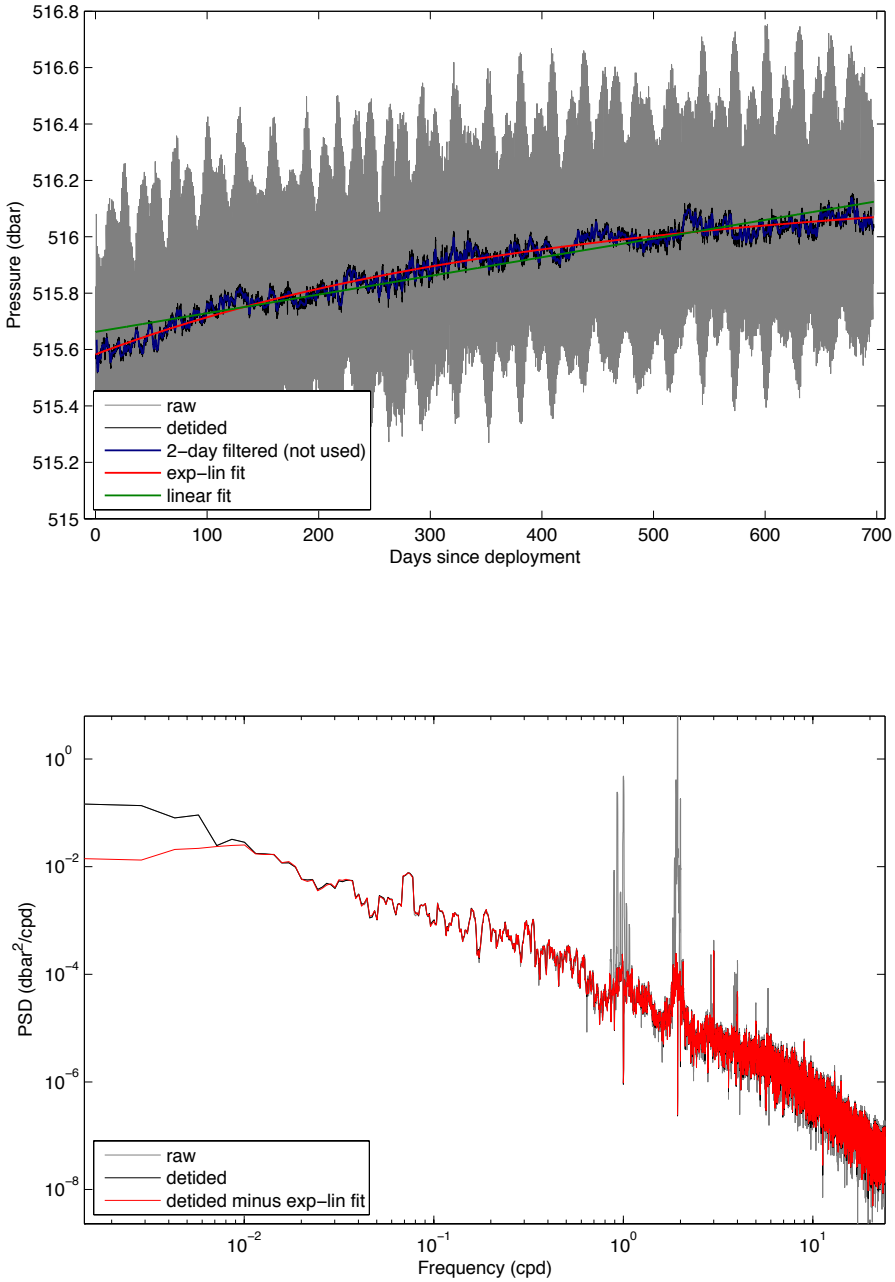


Figure 8.5: Example processing of BPR from WBAL1 showing the successful removal of the diurnal tides

8.4.4 Stage 3

At this stage, the trend and the tidal prediction are subtracted from the original pressure time series, which is then two-day low-pass filtered, and finally interpolated onto a 12-hour grid. With the tradition of having a code per cruise, the script is here called

[basedirectory]/rapid/data/exec/rb1201/stage3/bpr_processing/bp_stage3_rb1201.m

and actually can loop through all the pressure records recovered during cruise RB1201, while the processing itself is in

[basedirectory]/rapid/data/exec/rb1201/stage3/bpr_processing/bottom_pressure_grid_rb1201.m

The output file is a .seagauge file located in the moor/proc/seagauge directory, e.g.

[basedirectory]/rapid/data/moor/proc/[mooring]/seagauge/[mooring]_[instrument].seagauge

This code produce a plot that displays the monthly and semi-monthly tides estimates for reference:

[basedirectory]/rapid/data/moor/proc/[mooring]/seagauge/[mooring]_[instrument].seagauge.eps

A log file is created that records the Matlab routines applied:

*[basedirectory]/rapid/data/moor/proc/[mooring]/seagauge/*stage3_log.

8.5 Instrument problems

Darren Rayner

BPR 0391 was dropped in the lab whilst the battery pack was being inserted (fell from end-on to sideways). Communications were checked and were fine but unable to check the Digiquartz pressure sensor. It was switched from WB6 onto WB4L where not only is it paired with another BPR, but there is also an overlapping lander. WB6 does not have an overlapping lander.

Some new inductive MicroCATs (IMPs) have newer firmware (S/Ns. 7361, 7362 and 7470 are all firmware 3.0b or above). This firmware works with XML tags, and different commands to the earlier IMP firmware – much as the newer SMP firmware does. I looked into whether the IMP_download routines could be modified to handle the new firmware, but the newer firmware doesn't have the hexadecimal output format so there's no point in modifying IMP_download as it won't be any quicker.

One Argos beacon was lost from the small syntactic float on the recovered WB2. The light was present, but the Argos beacon wasn't.

MicroCAT 5241 had two dip tests and was bad for temperature both times (+0.01 deg C at the bottom of the cast). This has come straight from Seabird's calibration lab so this needs to be sent back.

MicroCAT 6837 was flooded on WB1.

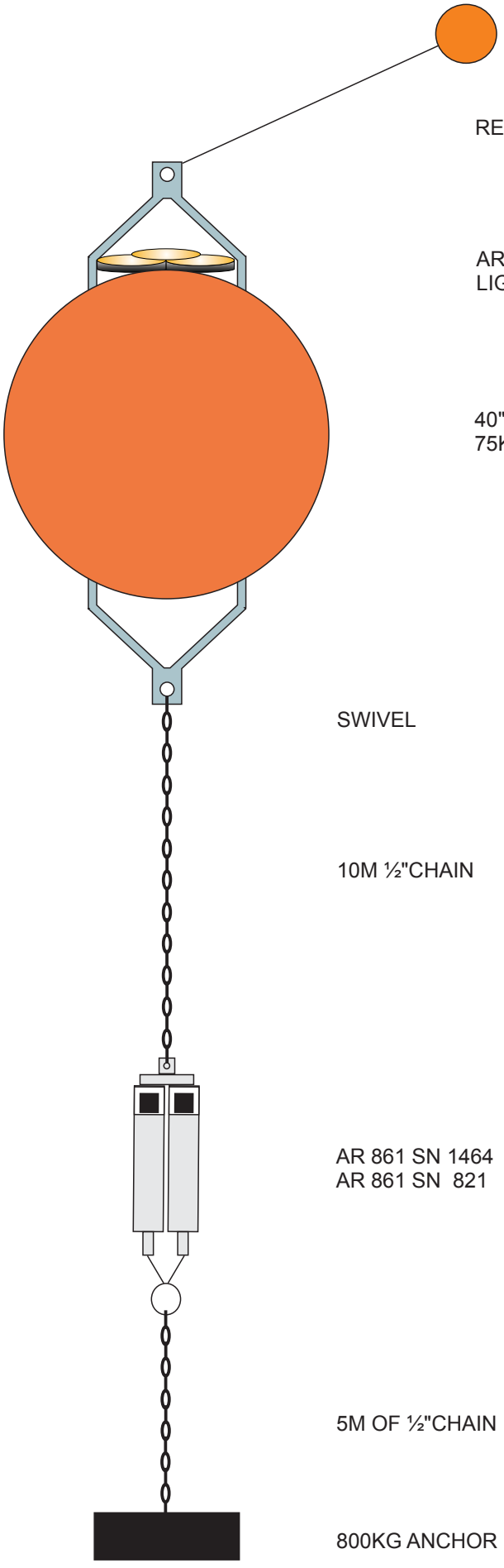
There were problems with MicroCATs being set up on the 29th February to start on the 1st of March. They were instead insisting they were going to start on the 30th February. This might be caused by the automated MicroCAT setup routine, but as we were unsure if they would start we set the date to the 2nd of February (or similar) and set them to start on the 3rd February. The dates will therefore be incorrect for cast 9.

MicroCAT 6838 didn't log any data on the cal-dip due to a low battery. It was re-dipped on one of the Florida Straits CTDs as there were no other deep ones – this is not ideal, but the instrument was recovered from a nominal depth of 500m on WB1 so a cal-dip in the Florida Straights section could at least reach this depth.

Four of the BPRs could not provide an estimate of their clock drift as the time values in the DS response become scrambled after the instrument is stopped. This is true for SNs 389 and 398 on WB2L6 recovery, and 399 and 400 on WB4L6. Even when looking at the DS response prior to stopping the instruments there is clearly an error as the date is given as 04/01/10 (1st Apr 2010) for the WB2L6 BPRs when it should be 29th Feb 2012. Therefore no simple correction for clock drift can be made for these instruments.

Appendix A: Mooring diagrams for those moorings deployed on RB1201

WB ADCP
AS DEPLOYED
BROWN 2012



RECOVERY LINE

ARGOS SN Z02-004 ID 53129
LIGHT SN Z02-020

40" SYNTACTIC
75KHZ ADCP SN 5817

SWIVEL

10M ½"CHAIN

AR 861 SN 1464
AR 861 SN 821

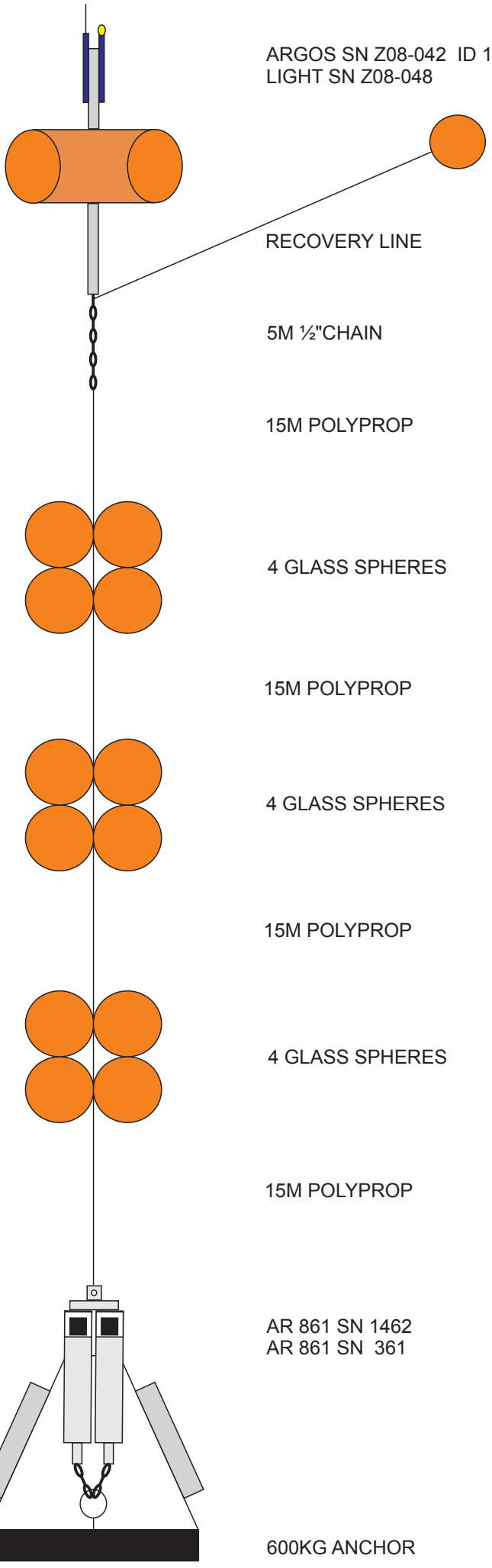
5M OF ½"CHAIN

800KG ANCHOR

WATER DEPTH
617M

RAPID WATCH

WBAL3
AS DEPLOYED
BROWN 2012



ARGOS SN Z08-042 ID 111849
LIGHT SN Z08-048

RECOVERY LINE

5M ½"CHAIN

15M POLYPROP

4 GLASS SPHERES

15M POLYPROP

4 GLASS SPHERES

15M POLYPROP

4 GLASS SPHERES

15M POLYPROP

AR 861 SN 1462
AR 861 SN 361

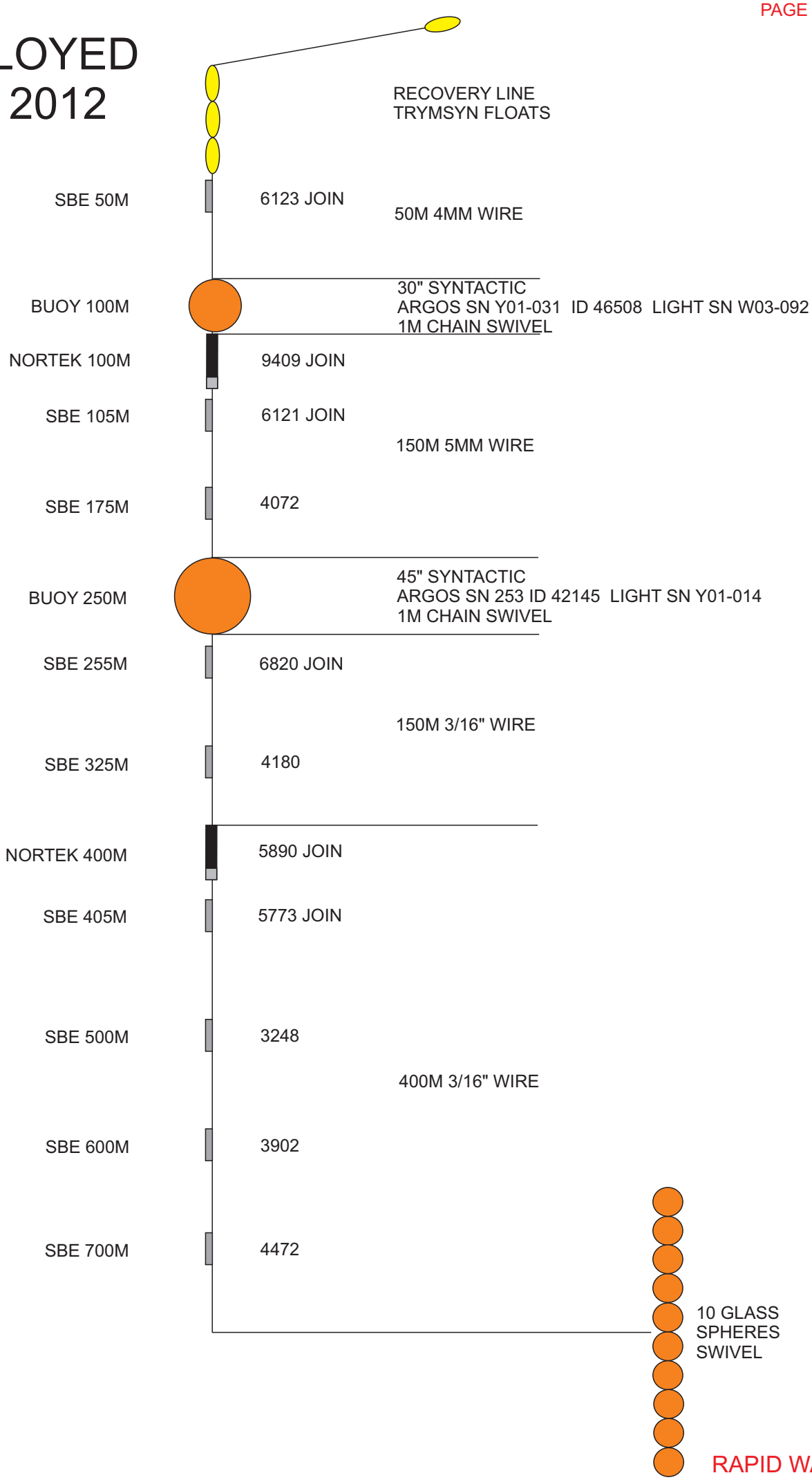
2 OFF BPR'S
SN 395
SN 419

600KG ANCHOR

WATER DEPTH
500M

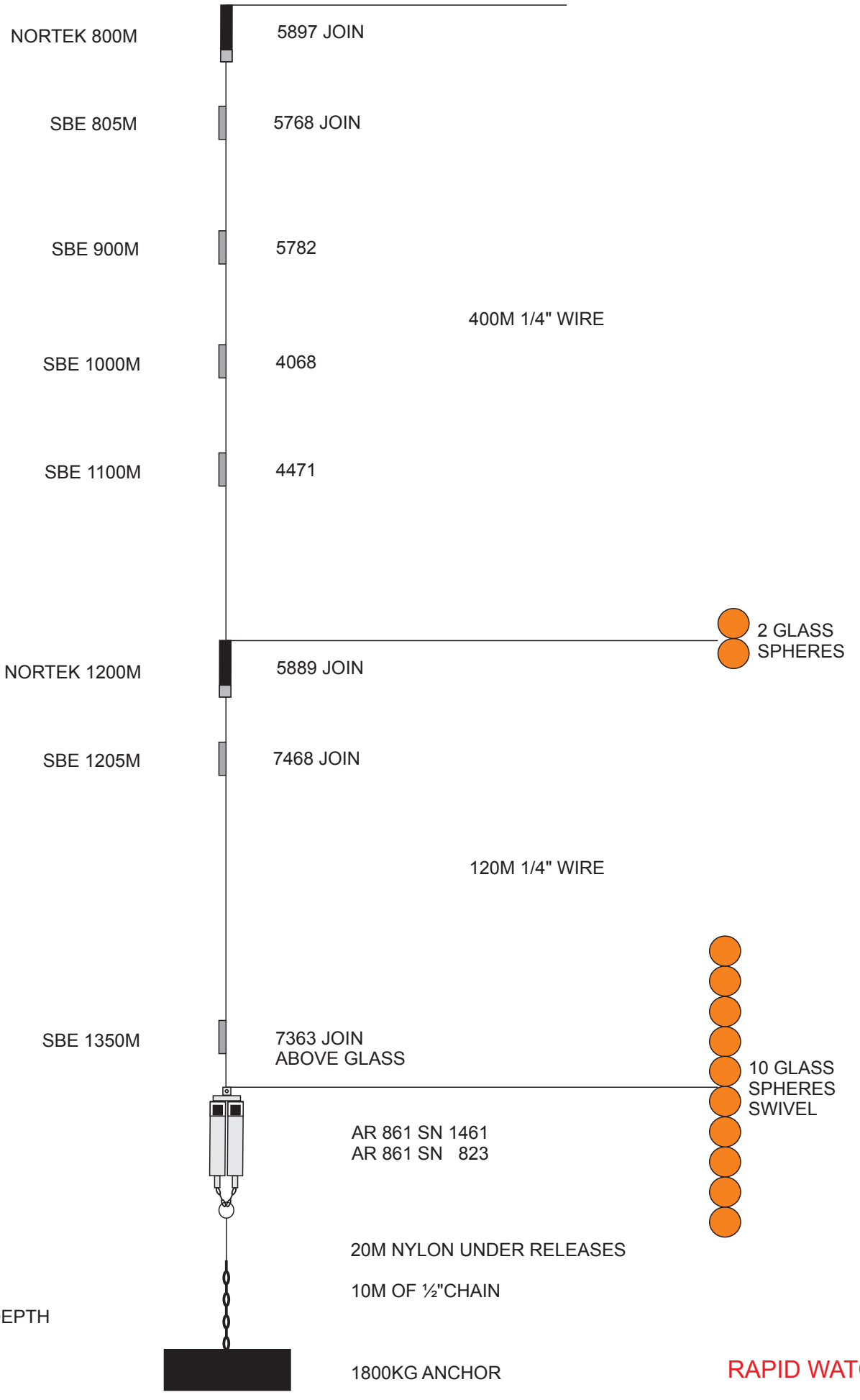
RAPID WATCH

WB 1
AS DEPLOYED
BROWN 2012



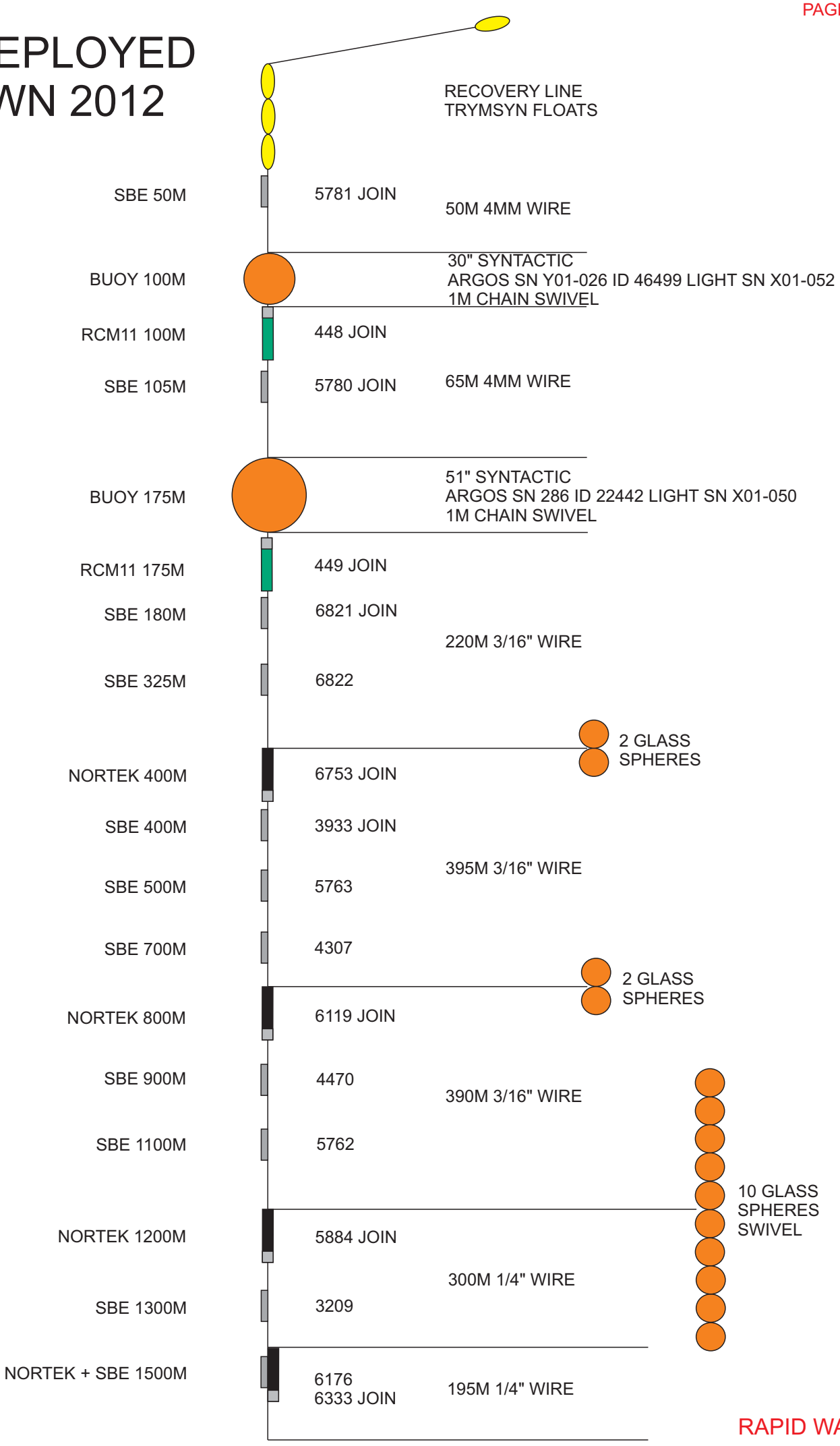
RAPID WATCH

WB 1
AS DEPLOYED
BROWN 2012



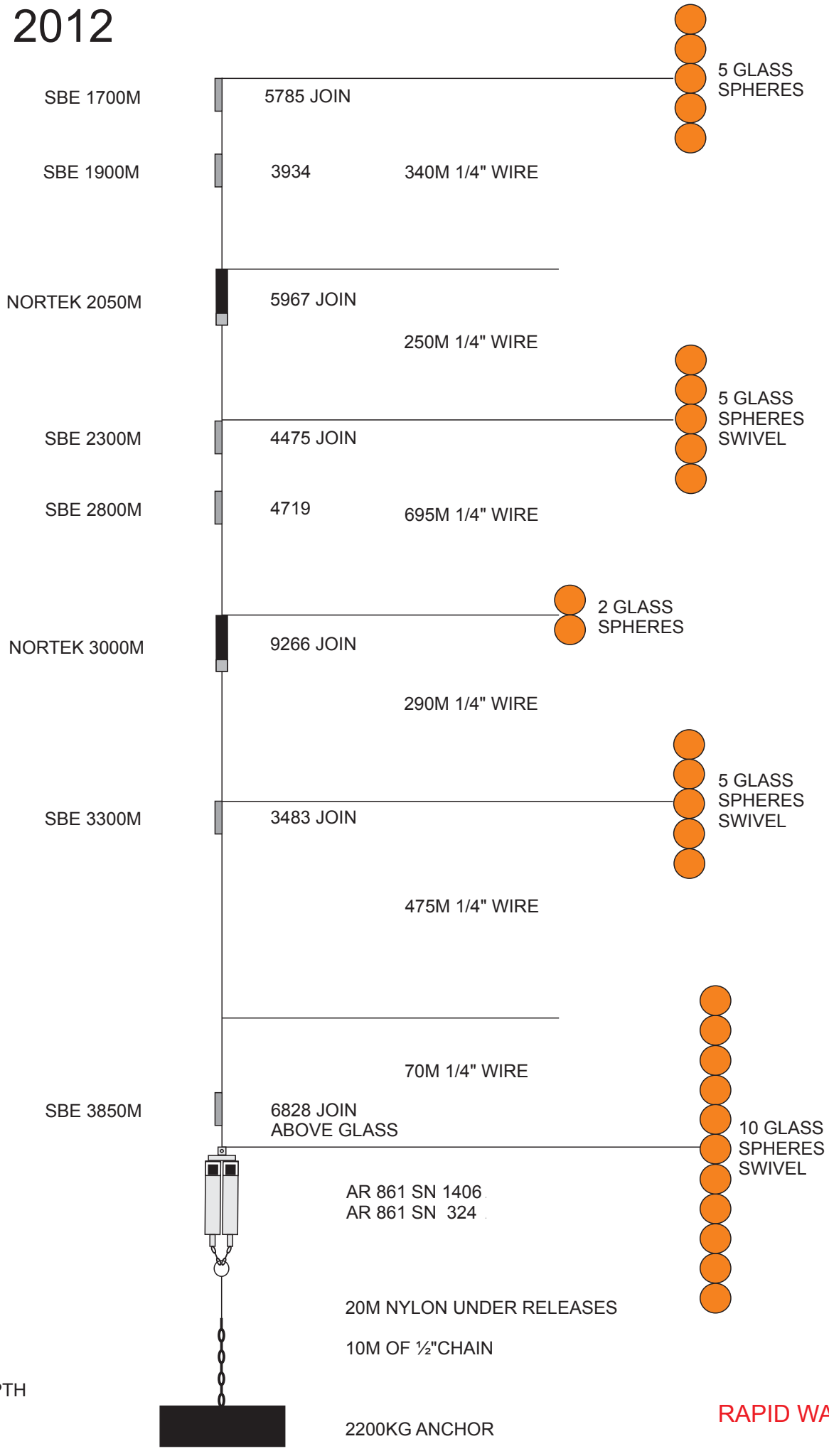
RAPID WATCH

WB 2
AS DEPLOYED
BROWN 2012



RAPID WATCH

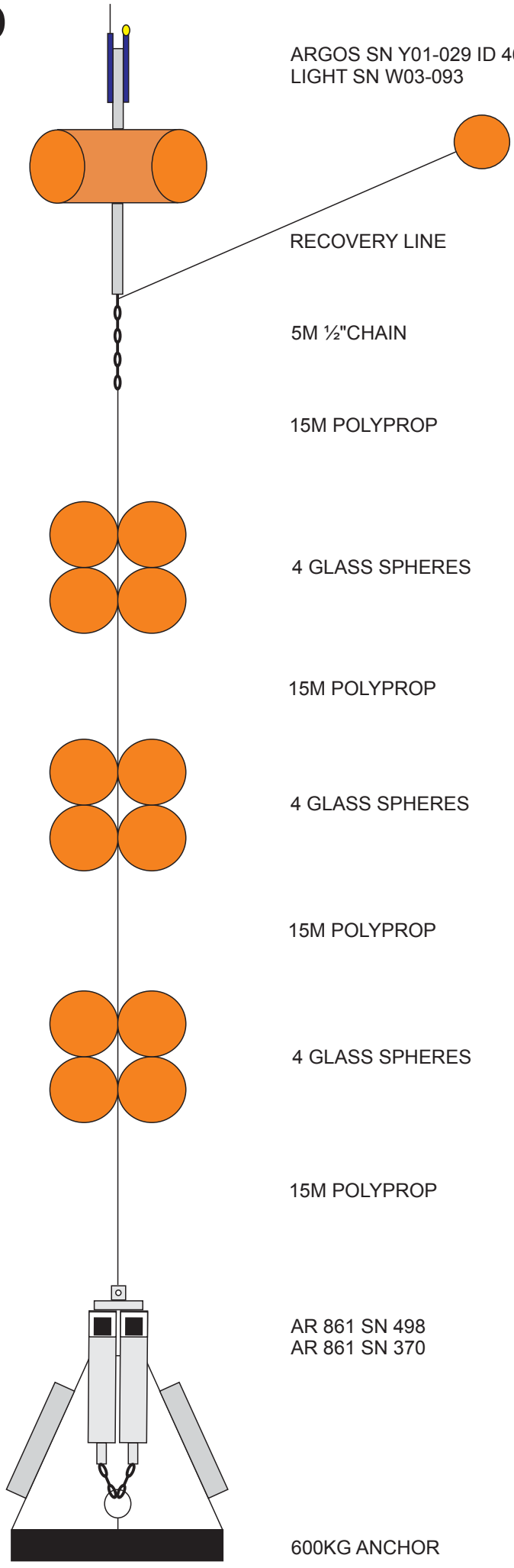
WB 2
AS DEPLOYED
BROWN 2012



WATER DEPTH
3890M

RAPID WATCH

WB2L8
AS DEPLOYED
BROWN 2012



ARGOS SN Y01-029 ID 46502
LIGHT SN W03-093

RECOVERY LINE

5M ½"CHAIN

15M POLYPROP

4 GLASS SPHERES

15M POLYPROP

4 GLASS SPHERES

15M POLYPROP

4 GLASS SPHERES

15M POLYPROP

AR 861 SN 498
AR 861 SN 370

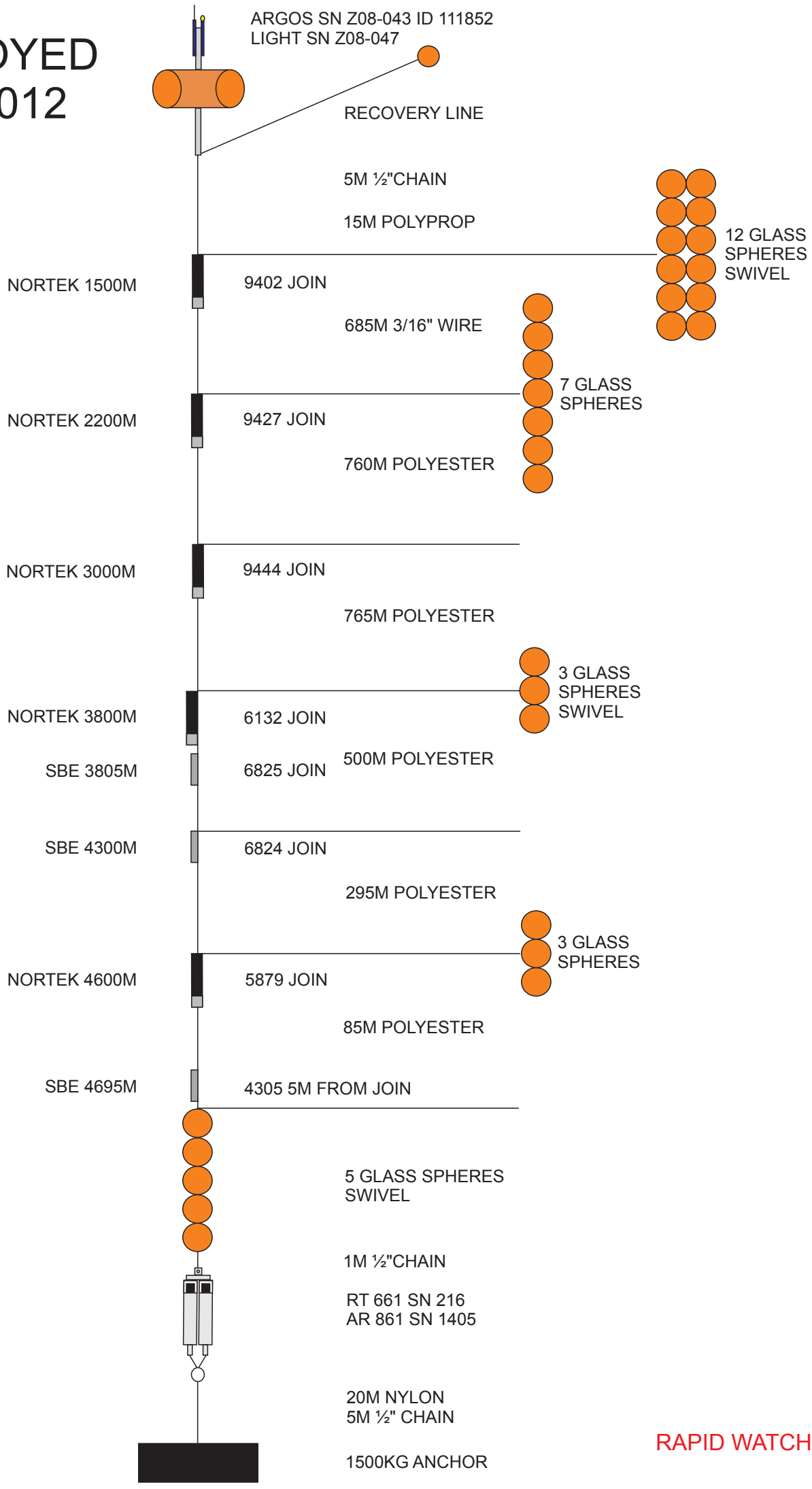
2 OFF BPR'S
SN 0414
SN 0030

600KG ANCHOR

WATER DEPTH
3890M

RAPID WATCH

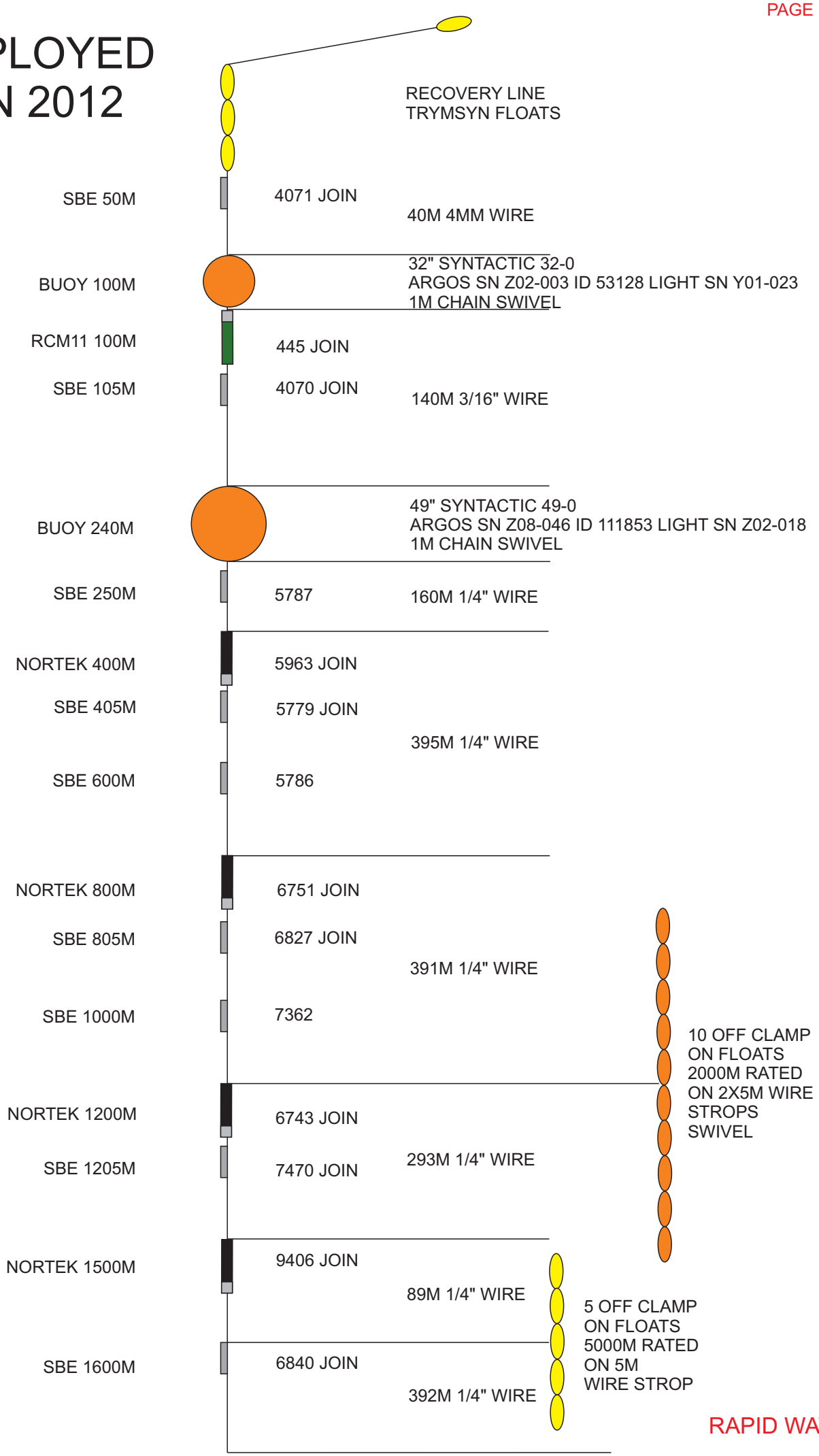
WBH 2
AS DEPLOYED
BROWN 2012



WATER DEPTH
4735M

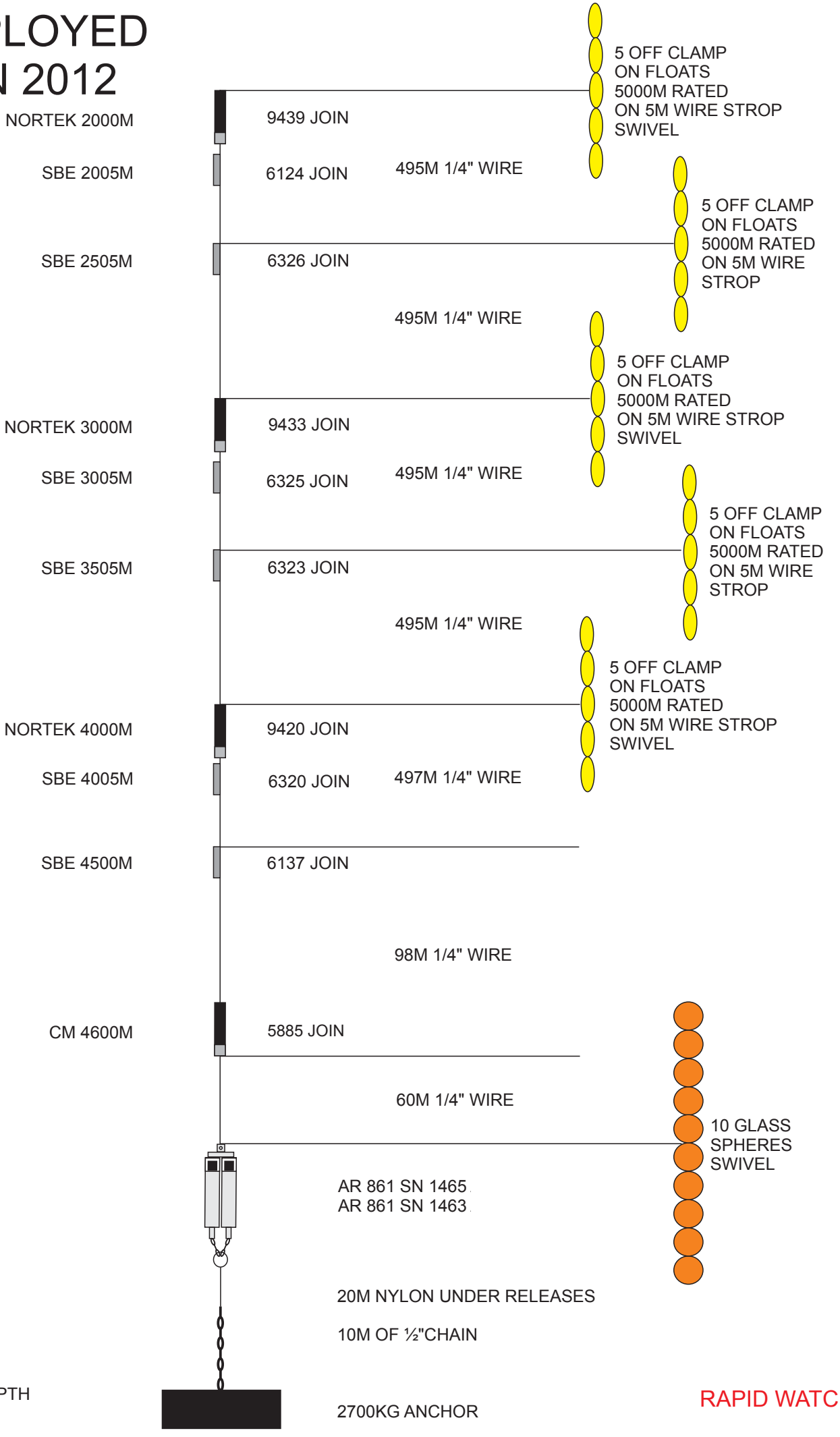
RAPID WATCH

WB 4
AS DEPLOYED
BROWN 2012



RAPID WATCH

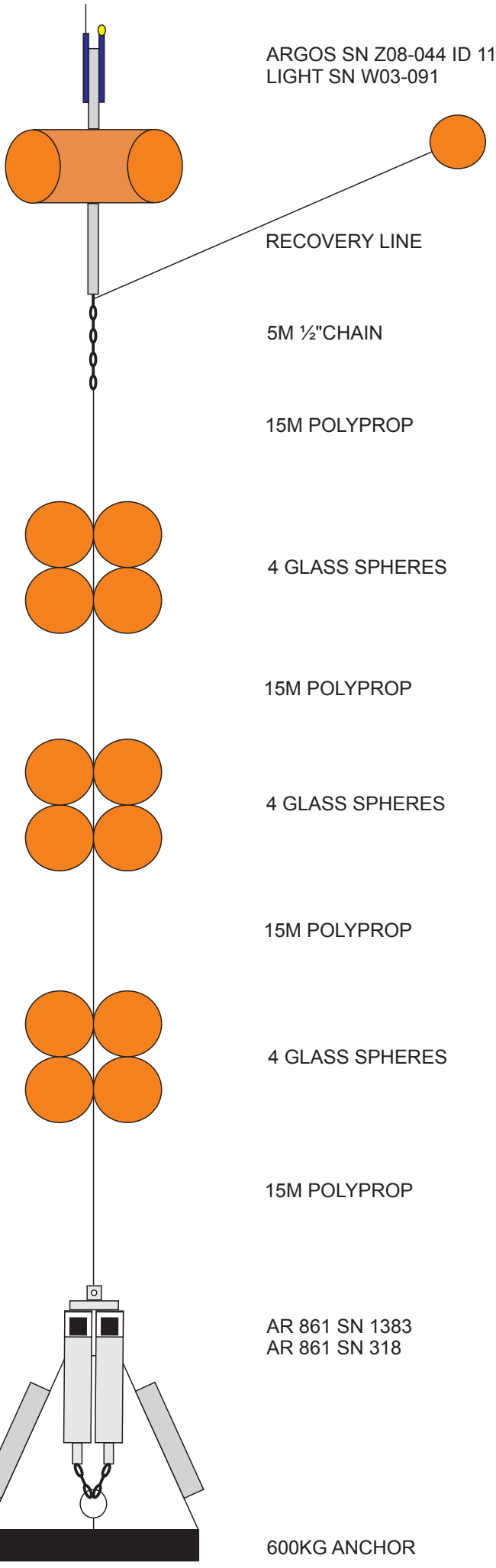
WB 4
AS DEPLOYED
BROWN 2012



WATER DEPTH
4704M

RAPID WATCH

WB4L8
AS DEPLOYED
BROWN 2012



ARGOS SN Z08-044 ID 111850
LIGHT SN W03-091

RECOVERY LINE

5M ½"CHAIN

15M POLYPROP

4 GLASS SPHERES

15M POLYPROP

4 GLASS SPHERES

15M POLYPROP

4 GLASS SPHERES

15M POLYPROP

AR 861 SN 1383
AR 861 SN 318

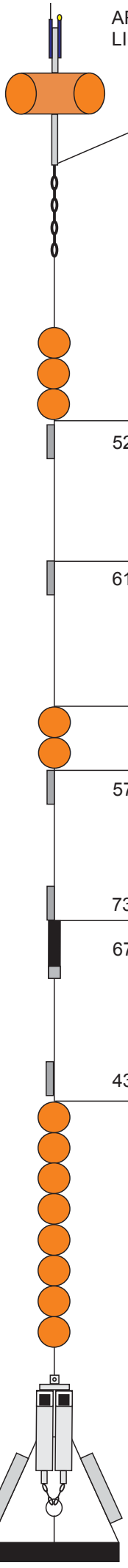
2 OFF BPR'S
SN 0038
SN 0391

600KG ANCHOR

WATER DEPTH
4700M

RAPID WATCH

WB 6
AS DEPLOYED
BROWN 2012



ARGOS SN Z08-045 ID 111851
LIGHT SN S01-191

RECOVERY LINE

5M ½"CHAIN

15M POLYPROP

3 GLASS SPHERES
SWIVEL

SBE 5100M

5240 JOIN

100M POLYESTER

SBE 5200M

6128 JOIN

100M POLYESTER

2 GLASS SPHERES

SBE 5300M

5767 JOIN

100M POLYESTER

SBE 5400M

7361 JOIN

NORTEK 5400M

6747 JOIN

90M POLYESTER

SBE 5491M

4306 JOIN

8 GLASS SPHERES
SWIVEL

1M ½"CHAIN

AR 861 SN 1201
AR 861 SN 910

2 OFF BPR'S
SN 390
SN 0040

600KG ANCHOR

WATER DEPTH
5490M CORR

RAPID WATCH

Appendix B: Instrument setup details

Nortek Aquadopp Setups

All were set with the following:
Measurement interval = 1800 seconds
Average interval = 30 seconds
Blanking distance = 1.5m
Diagnostic interval = 720 minutes
Diagnostic samples = 20
Compass update rate = 10 seconds
Coordinate system = ENU
Speed of sound = measured
Salinity = 35
Deployment name = *serial number*
Specific to each instrument are the following start times:

Serial number	Start date/time
5879	21/2/12 20:30
5884	21/2/12 20:00
5885	21/2/12 19:00
5889	21/2/12 19:30
5890	21/2/12 19:30
5897	21/2/12 19:30
5963	21/2/12 19:30
5967	21/2/12 20:00
6119	21/2/12 20:00
6132	21/2/12 20:30
6176	21/2/12 20:00
6743	21/2/12 19:00
6751	21/2/12 19:00
6753	21/2/12 19:30
9266	21/2/12 20:30
9402	21/2/12 18:00
9406	21/2/12 18:30
9409	21/2/12 18:30
9420	21/2/12 18:00
9427	21/2/12 18:30
9433	21/2/12 18:30
9435	21/2/12 19:00
9439	21/2/12 18:30
9444	21/2/12 19:00

Table B.1: Nortek Aquadopp start times

SeaBird MicroCAT Setups

Serial Number	Sample Interval	Start Date	Start Time
6825	1800	26/02/2012	21:30
6824	1800	26/02/2012	21:30
4305	1800	26/02/2012	21:30
5787	1800	24/02/2012	18:00
5779	1800	24/02/2012	18:00
5786	1800	24/02/2012	18:00
6827	1800	24/02/2012	18:00
6840	1800	24/02/2012	18:00
6124	1800	24/02/2012	18:00
6326	1800	24/02/2012	18:00
6325	1800	24/02/2012	18:00
6323	1800	24/02/2012	18:00
6320	1800	24/02/2012	18:00
6137	1800	24/02/2012	18:00
4071	1800	24/02/2012	18:00
4070	1800	24/02/2012	18:00
7362	1800	24/02/2012	18:00
7470	1800	24/02/2012	18:00
5240	1800	18/02/2012	22:00
5767	1800	18/02/2012	22:00
6128	1800	18/02/2012	22:00
4306	1800	18/02/2012	22:00
7361	1800	18/02/2012	22:00
5781	1800	28/02/2012	20:00
5780	1800	28/02/2012	20:00
6821	1800	28/02/2012	20:00
6822	1800	28/02/2012	20:00
3933	1800	28/02/2012	20:00
5763	1800	28/02/2012	20:00
4307	1800	28/02/2012	20:00
5762	1800	28/02/2012	20:00
3209	1800	28/02/2012	20:00
6333	1800	28/02/2012	20:00
5785	1800	28/02/2012	20:00
3934	1800	28/02/2012	20:00
6828	1800	28/02/2012	20:00
3483	1800	28/02/2012	20:00
4470	1800	28/02/2012	20:00
4475	1800	28/02/2012	20:00
4719	1800	28/02/2012	20:00
6123	1800	29/02/2012	16:00

6121	1800	29/02/2012	16:00
4072	1800	29/02/2012	16:00
6820	1800	29/02/2012	16:00
4180	1800	29/02/2012	16:00
5773	1800	29/02/2012	16:00
3248	1800	29/02/2012	16:00
3902	1800	29/02/2012	16:00
4472	1800	29/02/2012	16:00
5768	1800	29/02/2012	16:00
5782	1800	29/02/2012	16:00
4471	1800	29/02/2012	16:00
4068	1800	29/02/2012	16:00
7468	1800	29/02/2012	16:00
7363	1800	29/02/2012	16:00

Table B.2: SeaBird MicroCAT setups

Serial Number	DSU serial number	Pings per ensemble	Temp. Range	Cond. Range (mS/cm)	Recording Interval (mins)	No. of channels	Mode	Start date/time
445	13887	600	High	47-58	30	8	Burst	23/2/12 23:30
448	14570	600	High	45-57	30	8	Burst	28/2/12 14:00
449	14573	600	High	45-57	30	8	Burst	28/2/12 14:00

Table B.3: Aanderaa RCM11 setups

The 75kHz ADCP for the wbadcp mooring was setup as follows:

RDI Longranger

75 kHz Workhorse ADCP s/n:	**5817**
System frequency:	**76.8 kHz**
Beam angle:	**20 degrees**
Water salinity:	**36**
Depth of transducer:	**600 m**
Heading alignment:	**0**
Heading bias:	**0**
Depth cell size:	**1600 cm**
Number of depth cells:	**40**
Blank after transmit:	**0704**
Pings per ensemble:	**00010**
Ambiguity velocity:	**175 cm/s radial**
Time per ensemble:	**01:00:00**
Start date:	**27/2/12 16:30:00**

Appendix C: Instrument record lengths

Mooring	Depth (nominal)	Instrument	Serial Number	Start	End	Comment
WB6	5100	337	3209	21/04/2011 03:00	18/02/2012 18:30	
	5200	337	6840			
	5300	337	6820			
	5400	310	515			
	5400	337	6822			
	5495	337	6821			LESS "HAIRY" THAN THE OTHERS; COND SPIKE
	5500	465	59			
	5500	465	53			
WB4	50	337	4464	25/04/2011 02:00	25/02/2012 15:00	LARGE KNOCKDOWN ALL M/CATS
	100	370	5490			Large knockdown around Sep. 2011 in temp., pressure, zonal and mer. velocities.
	100	337	3483			
	250	337	3486			
	400	370	5590			Large knockdown around Sep 2011 in temp., pressure, zonal and mer. velocities.
	400	337	4714			
	600	337	3248			
	800	370	5611			High frequency variability at the same time as the knockdown on the previous instruments.
	800	337	3249			
	950	337	3251			
	1200	370	5955			
	1200	337	3252			
	1600	370	6049			
	1600	337	3253			
	2000	370	6050			
	2000	337	5788			
	2500	337	3259			
	3000	370	6088			
	3000	337	3484			
	3500	337	3268			
	4000	370	6516			
	4000	337	5238			
	4500	337	3207			
	4620	370	6534			
WB4L6	4707	465	399	30/03/2010 04:00	25/02/2012 11:30	wrapped data (corrected)
	4707	465	400			wrapped data (corrected)
WBH2	1500	370	6723	27/04/2011 20:30	26/02/2012 11:00	
	2200	370	6083			
	3000	370	6805			Large 20- day-downwelling in

						Aug. 2011 (seen in vert. and mer. velocities)
	3800	370	8052			
	3800	337	3214			
	4300	337	3213			
	4600	370	8120			
	4780	337	3212			
WB2	50	337	3220	28/04/2011 20:00	27/02/2012 19:30	LARGE KNOCKDOWN ALL BAR LAST M/CAT
	100	370	9204			
	100	337	5242			
	100	337	4619			MIAMI SEABIRD; UNPUMPED; FOULING AROUND DAY 50; QUESTIONABLE TOWARDS END ALSO
	175	370	9210			
	175	337	5765			
	325	337	3903			LARGE BIOFOULING TOWARDS THE END
	400	370	9213			
	500	337	3904			
	700	337	3910			
	800	310	428			
	900	337	4066			
	1100	337	4461			
	1200	310	518			
	1300	337	3916			
	1500	337	3216			
	1500	370	5893			
	1700	337	6823			
	1900	337	3900			SALINITY SPIKE
	2050	310	519			
	2300	337	3901			SALINITY SPIKE
	2800	337	6839			
	3000	310	520			
	3300	337	6798			
	3850	337	3247			
WB2L6	3882	465	389	02/04/2010 03:30	28/02/2012 11:30	
	3882	465	398			
WB1	50	337	3284	29/04/2011 20:00	29/02/2012 12:00	LARGE KNOCKDOWN ALL M/CATS; FOULING EVENT AROUND DAY 250
	100	370	5831			
	100	337	3264			
	175	337	3257			MAJOR FOULING POST DAY 240
	250	337	7681			
	325	337	6841			
	400	337	6816			
	400	370	5896			

	500	337	6838			
	600	337	6837			FLOODED
	700	337	6834			
	800	370	6765			
	800	337	6833			
	900	337	6832			
	1000	337	6831			
	1100	337	6829			
	1200	370	5899			
	1200	337	6817			SALINITY SPIKE.
	1380	337	6818			
WBADCP	614	324	10311	01 1	20 12	
WBAL1	4707	465	31	03/04/2010 01:00	29/02/2012 19:00	
	4707	465	37			

Table C.1: Summary of instrument record lengths

Appendix D: Cal-dip details

CAST NO.	EQUIVALENT CTD	MOORING (normal = for, bold = from)	MICROCAT S/N	COMMENT
CAST 1	CTD 1	WB6	5240	
		WB6	6128	
		WB6	5767	
		WB6	7361	
		WB6	4306	
		WB4	4071	
		WB4	4070	
		WB4	5787	
CAST 2	CTD 5	WB4	5779	
		WB4	5786	
		WB4	6827	EDITED BY HAND TO REMOVE SPURIOUS DATA
		WB4	6320	
		WB4	6137	
		WB4	7470	
		FAIL	6129	EDITED BY HAND TO REMOVE SPURIOUS DATA; PRESSURE -20dbar@5500; COND +0.005@5500
		WB6	**3209**	
		WB6	**6820**	**EDITED BY HAND TO REMOVE SPURIOUS DATA**
		WB6	**6821**	**EDITED BY HAND TO REMOVE SPURIOUS DATA**
		WB6	**6822**	**EDITED BY HAND TO REMOVE SPURIOUS DATA**
		WB6	**6840**	**EDITED BY HAND TO REMOVE SPURIOUS DATA**
CAST 3	CTD 10	WBH2	6825	EDITED BY HAND TO REMOVE SPURIOUS DATA
		WBH2	6824	
		WBH2	4305	
		WB4	6124	
		WB4	6326	
		WB4	6325	
		WB4	6323	
		WB4	7362	DATA IN .CNV FILE NOT .ASC
		FAIL	3270	PRESSURE SPIKE AT BEGINNING, SETTLED AFTERWARDS
		WB2	5781	
		WB2	5780	
		FAIL	5775	DODGY COND, PUMP?
CAST 4	CTD 14	WB2	3933	
		WB2	5763	

		WB2	4307	
		WB2	5762	
		WB2	3912	20 DBAR OUT AT BOTTOM; 10 DBAR AT 1600M
		WB2	6333	
		WB2	5785	
		WB2	3934	
		WB2	4475	
		WB2	4719	
		WB2	6828	SAMPLENUM NOT ZEROED; OLD CALDIP AND MOORING DATA IN FILE
CAST 5	CTD 19	WB1	6123	
		WB1	6121	
		WB1	7363	
		FAIL	6332	+50DBAR AT 4800 DBAR; +40DBAR AT 1380DBAR
		WB1	4180	
		WB1	5773	
		RETRY	5241	+.01C AT 4800 DBAR, REDIP AS STRAIGHT FROM SEABIRD
		WB1	3902	
		WB1	7468	
		WB1	5768	
		WB1	5782	
		WB1	4068	
CAST 6	CTD 30	**WB4**	**4464**	**CONDUCTIVITY VERY BAD. -0.5 mS/cm @ BOTTOM**
		WB4	**3483**	
		WB4	**3486**	
		WB4	**4714**	
		WB4	**3248**	
		WB4	**3249**	
		WB4	**3251**	
		WB1	4072	
		WB1	4471	
		WB1	5241	BAD TEMPERATURE 0.01C OUT AT BOTTOM; CONSISTENTLY BAD THROUGH CAST (AGAIN)
		WB2	4470	
		WB1	4472	
CAST 7	CTD 31	**WB4**	**3252**	**SPREAD IN CONDUCTIVITY AND PRESSURE FOR ALL MCs**
		WB4	**3253**	
		WB4	**5788**	
		WB4	**3259**	
		WB4	**3484**	
		WB4	**3268**	

		WB4	**5238**	
		WB4	**3207**	
		WBH2	**3212**	
		WBH2	**3213**	
		WBH2	**3214**	
CAST 8	CTD 32	**WB2**	**3220**	
		WB2	**5242**	
		WB2	**4619**	
		WB2	**5765**	
		WB2	**3903**	
		WB2	**3904**	
		WB2	**3910**	
		WB2	**4066**	
		WB2	**4461**	
		WB2	**3916**	
		WB2	**3216**	
		WB2	**6823**	
		WB2	**3900**	
		WB2	**3901**	
		WB2	**6839**	
		WB2	**6798**	
		WB2	**3247**	
CAST 9	CTD 33	**WB1**	**3284**	ALL M/CATS OFFSET BY 28 DAYS - LEAP YEAR PROBLEM
		WB1	**3264**	
		WB1	**3257**	
		WB1	**7681**	
		WB1	**6841**	
		WB1	**6816**	
		WB1	**6838**	**DEAD BATTERY: REDIP**
		WB1	**6834**	
		WB1	**6833**	
		WB1	**6832**	
		WB1	**6831**	
		WB1	**6829**	
		WB1	**6817**	
		WB1	**6818**	
CAST 10	CTD 45	**WB1**	**6838**	CAST ONLY TO 600M

Table D.1: Details of instruments lowered on cal-dips. NB: Bold indicates a post-deployment cal-dip, red denotes rejected MicroCATs.

Appendix E: Mooring deployment tracks and triangulated seabed locations

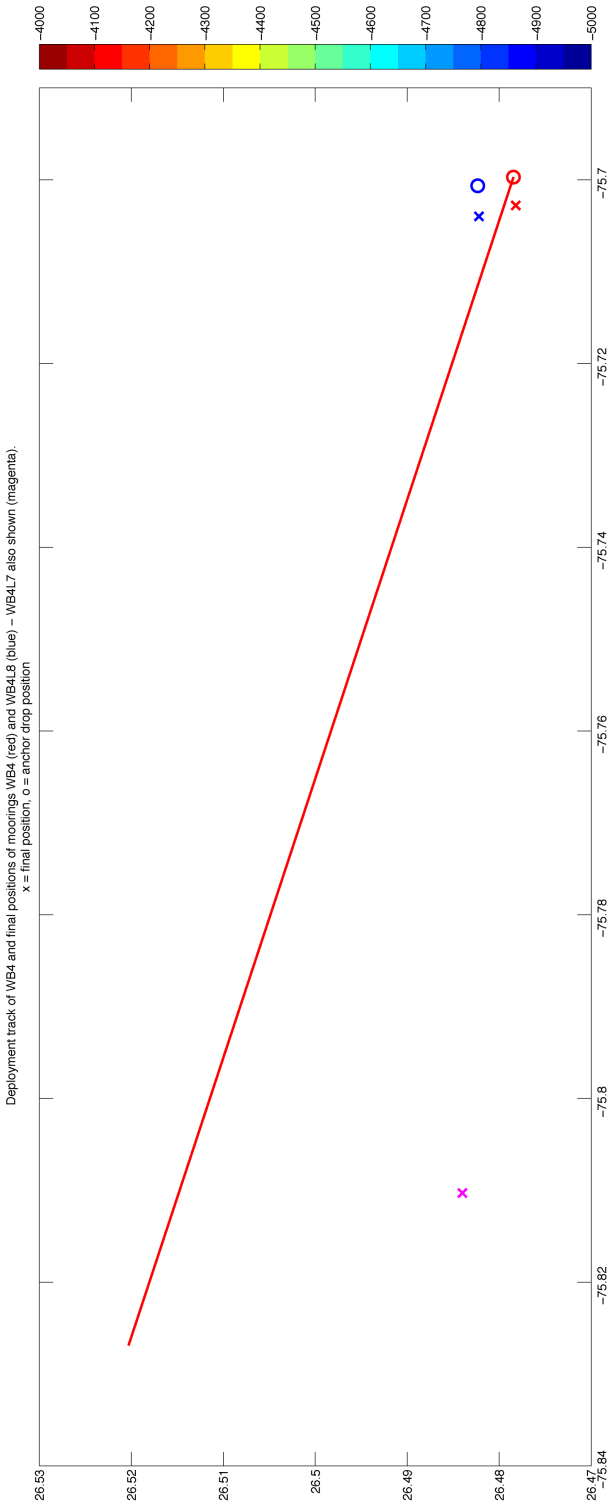


Figure E.1: Idealised deployment track and anchor seabed positions of WB4 (red) and WB4L8 (blue). WB4L7 deployed in 2011 also shown (magenta). X = triangulated anchor position (if relevant) and O = anchor drop position.

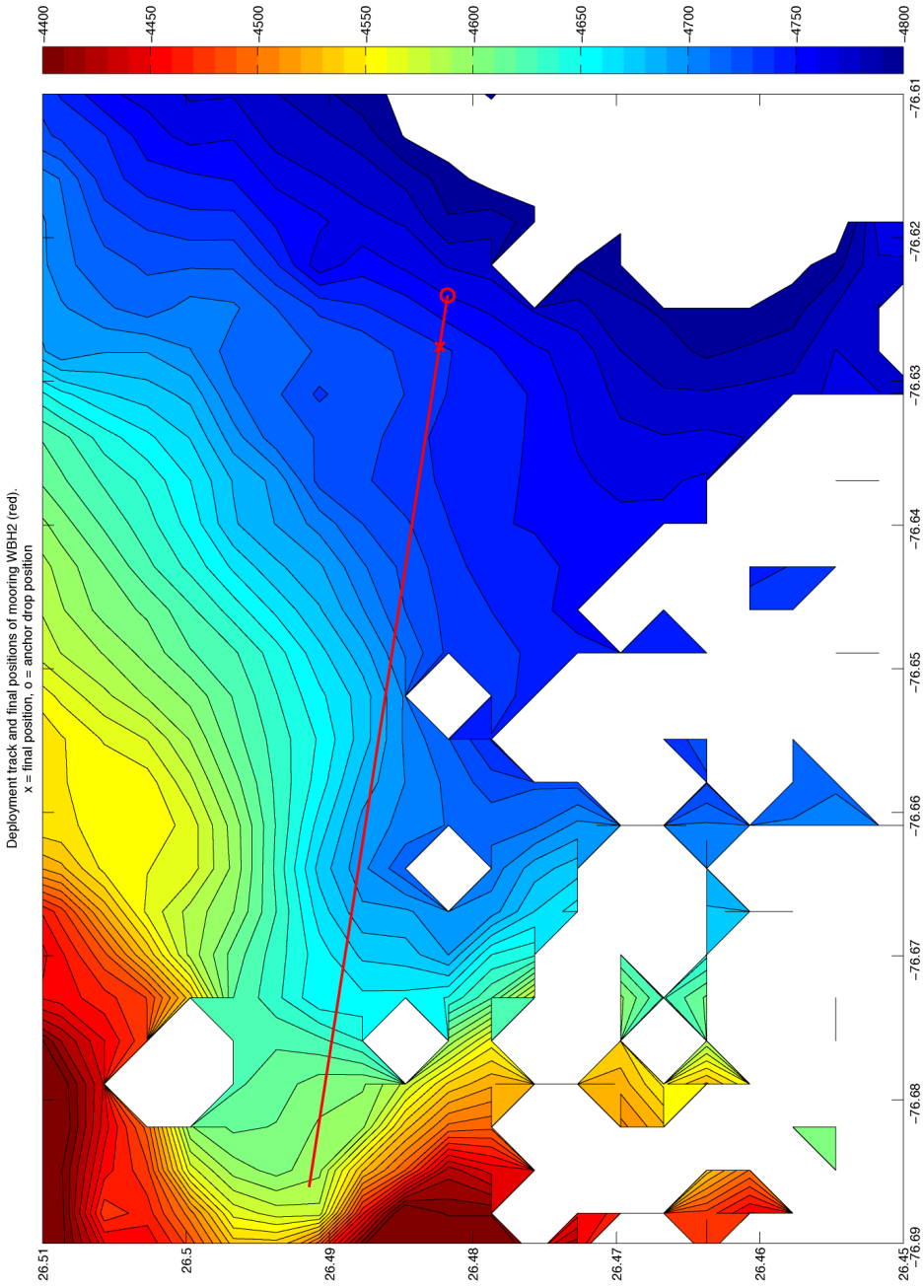


Figure E.2: Idealised deployment track and anchor seabed positions of WBH2 (red). X = triangulated anchor position (if relevant) and O = anchor drop position.

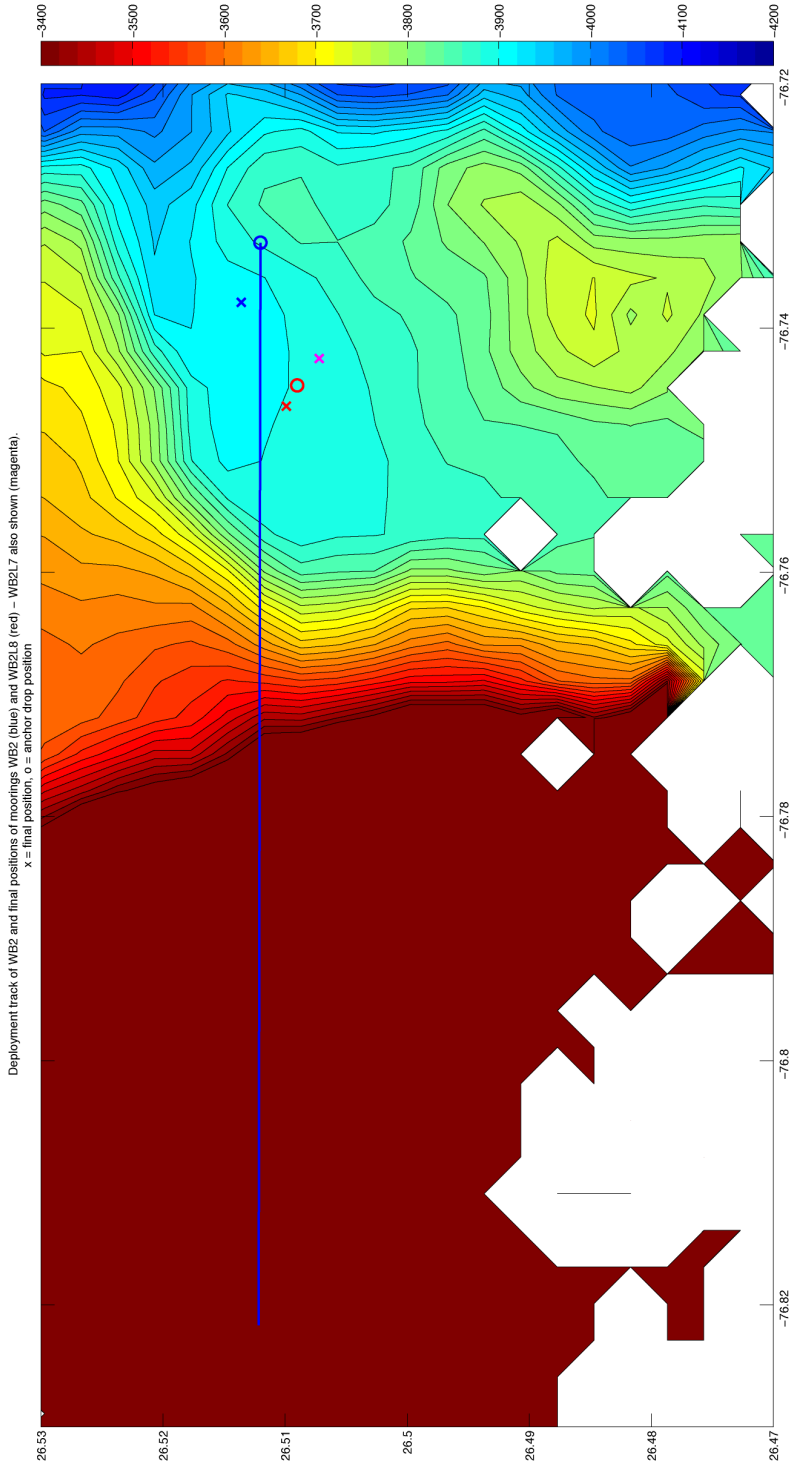


Figure E.3: Idealised deployment track and anchor seabed positions of WB2 (blue) and WB2L8 (red). WB2L7 deployed in 2011 also shown (magenta). X = triangulated anchor position (if relevant) and O = anchor drop position.

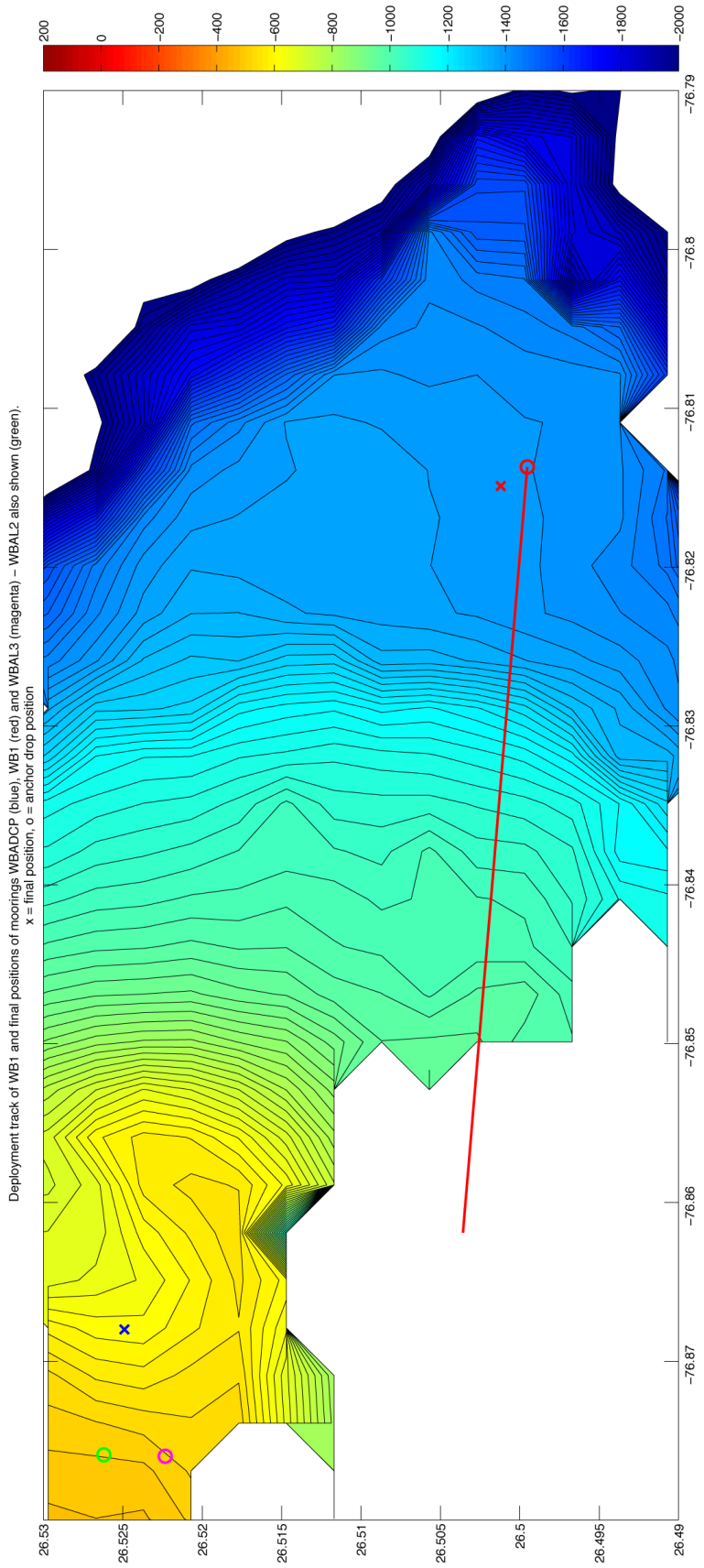


Figure E.4: Idealised deployment track and anchor seabed positions of WB1 (red), WBADCP (blue) and WBAL3 (magenta). WBAL2 deployed in 2011 also shown (green). X = triangulated anchor position (if relevant) and O = anchor drop position.

Appendix F: Mooring recovery and deployment logsheets

RAPID-WATCH MOORING LOGSHEET RECOVERY

Mooring **WBAL1** Cruise **RB1201**

NB: all times recorded in GMT

Date 29/2/12 **Site arrival time** _____

Time of first ranging 19:36

Time of release ~~1924~~ 15:39

Latitude _____ **Longitude** _____

(record positions at time of pickup only if likely to be very different from deployment position)

ON SURFACE 19:46

ITEM	SER NO	2nd APPROACH COMMENT	TIME
17" glass		HOOKED 20:16 — FELL OFF - RE-APPROACHING	20:54
Recovery line		SHIP TEMPORARILY LOST POSITION KMS TO FIX POS.	"
Billings Float with ARGOS	Y01-028	ID 46501 3rd APPROACH STARTED 20:40	2059
Light	S01-185	HOOKED + LOST 20:46	"
2 m of 3/8" chain		HOOKED AGAIN 20:50	"
15m polyprop			"
4 x 17" glass			20:57
15m polyprop			"
4 x 17" glass			20:58
15m polyprop			"
BPR #1 in tripod	0031	moderate fouling	21:04
BPR #2 in tripod	0037	" "	"
Release #1 in tripod	365		"
Release #2 in tripod	246		"

Ascent rate

Time at end of recovery 21:04

Ranging

Time	Range 1	Range 2	Command /comment
193645	—	—	Arm + Arm
19:37:30	667	669	
19:38:00	667	667	
19:38:25	—	667	
19:39:00	668	668	REL OK Arm + REL.
19:39:37	648	644	
19:40:17	617	613	

RAPID-WATCH MOORING LOGSHEET RECOVERY

Mooring **WBADCP** Cruise **RB1201**

NB: all times recorded in GMT

Date 28/2/12 **Site arrival time** _____

Time of first ranging 20:47

Time of release 20:49 SPOTTED 20:55

Latitude _____ **Longitude** _____

(record positions at time of pickup only if likely to be very different from deployment position)

hooked @ 21.15

ITEM	SER NO	COMMENT	TIME
1 x glass			21.15
15m POLYPROP 24mm			—
SYNTACTIC ADCP BUOY			21.18
75 KHZ ADCP	10311		21.18
ARGOS BEACON	Y01-031		"
LIGHT	Y01-020		"
Titanium swivel			"
10m 5/8" chain			"
Release #1	1351		21.23
Release #2	1353		"
5m 5/8" chain			"
Anchor 850 kg			n/a

Ascent rate _____

Time at end of recovery 16.23

Ranging

s/n 1353
ARM
Rel
~~~~~
S/N

| Time | Range 1 | Range 2 | Command /comment |
|---|---|---|---|
| | | | |
| 20:47:30 | [illegible] | | |
| | — | 734.6 | Ranging |
| 20:49:00 | 739 | 738 | OK } 60 m/min |
| 205000 | 679 | 679 | } 70 m/min + slope |
| 205200 | 542 | 536 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

~~~~~
S/N 1351
ARM
Rel

RAPID-WATCH MOORING LOGSHEET RECOVERY

Mooring **WB1** Cruise **RB1201**

NB: all times recorded in GMT

Date 29/2/12 **Site arrival time** OVERNIGHT

Time of first ranging 12:01

Time of release 12:06

Latitude _____ **Longitude** _____

(record positions at time of pickup only if likely to be very different from deployment position)

MOORING BOTTOM SINKER NEXT TO TOP - LIKELY TANGLED

ITEM	SER NO	COMMENT	TIME
Recovery line		HOOKED 12:59	
3 TRYMSYN floats			13:06
SBE37 Microcat	3284 √	heavy bio fouling	13:06
30" SYNTACTIC			13:10
ARGOS			
Light			
1m chain and swivel			
NORTEK	5831 √	heavy bio fouling	13:10
SBE37 Microcat	3264 √	bio fouling	13:16
SBE37 Microcat	3257 √	bio fouling	13:20
45" syntactic buoy			13:25
ARGOS			
LIGHT			
1m chain and swivel			
SBE37 Microcat	7681 √		13:32
SBE37 Microcat	6841 √		13:35
NORTEK in frame	5896 √		13:37
SBE37 Microcat	6816 √		13:40
SBE37 Microcat	6838 √		13:44
SBE37 Microcat	6837 √	FLOODED	13:46
SBE37 Microcat	6834 √		13:50
10 x 17" glass		tangled	13:55
NORTEK in frame	6765 √		14:12
SBE37 Microcat	6833 √		14:23
SBE37 Microcat	6832 √		14:27
SBE37 Microcat	6831 √		14:24
SBE37 Microcat	6829 √		1422
2 x 17" glass			14:16
NORTEK in frame	5899 √		14:16
SBE37 Microcat	6817 √		14:15
SBE37 Microcat	6818 √		14:00
10 x 17" glass		tangled	~~14:06~~ 14:32

Acoustic release #1	1354		14:32
Acoustic release #2	368		14:32

Ascent rate
Time at end of recovery 14:32

Ranging

Time	Range 1	Range 2	Command /comment
12:01:52	—	1397	ARM + ARM
	1396	1397	
		1398	ARM + ARM
	1398	1398	
12:06:00	1398	1398	ARM + REL UNCONFIRMED
12:06:35	1344	1331	
07:06	1273	1260	

RAPID-WATCH MOORING LOGSHEET RECOVERY

Mooring **WB2** Cruise **RB1201**

NB: all times recorded in GMT

Date 27/2/12 **Site arrival time** 19:34

Time of first ranging _____

Time of release _____

Latitude _____ **Longitude** _____

(record positions at time of pickup only if likely to be very different from deployment position) @ hook 20:54

ITEM	SER NO	COMMENT	TIME
Recovery line			20:56
3 x TRYMSYN floats			20:56
SBE 37 MicroCAT	3220 ✓	biofouling	20:57
30" SYNTACTIC			21:05
ARGOS beacon	Y01-030 ✗	Record Argos ID 46503 no beacon!	
Light	X01-052 ✓		
1m chain and swivel			
NORTEK	9204 ✓	bio-fouling	21:05
SBE 37 MicroCAT	5242 ✓	"	21:10
SBE 37 MicroCAT	4619 ✓	~~Miami~~ "	21:10
51" syntactic buoy			21:18
Argos	286 ✓	Record Argos ID 22442	
Light	X01-050 ✓		
1m chain with swivel			
NORTEK	9210 ✓		21:18
SBE 37 MicroCAT	5765 ✓		21:27
SBE 37 MicroCAT	3903 ✓		21:32
2 x 17" glass			21:34
NORTEK	9213 ✓		21:35
SBE 37 MicroCAT	3904 ✓		21:40
SBE 37 MicroCAT	3910 ✓		21:47
2 x 17" glass	✓		21:50
RCM11	428 ✓		21:50
SBE 37 MicroCAT	4066 ✓		21:56
SBE 37 MicroCAT	4461 ✓		22:00
10 x 17" glass			
Swivel			22:06
RCM11	518 ✓	tangled with glass spheres	22:24
SBE 37 MicroCAT	3916 ✓		22:28
NORTEK in frame	5893 ✓		22:35
SBE 37 MicroCAT	3216 ✓	Paired with CM above	
5 x 17" glass			22:41

SBE 37 MicroCAT	6823 ✓		22:44
SBE 37 MicroCAT	3900 ✓		22:49
RCM11	519 ✓		22:54
5 x 17" glass			23:01
SBE 37 MicroCAT	3901 ✓		23:04
SBE 37 MicroCAT	6839 ✓		23:17
2 x 17" glass			23:23
RCM11	520 ✓		23:25
5 x 17" glass		Changed barrell @ 23:30	23:46
SBE 37 MicroCAT	6798 ✓		22:49
SBE 37 MicroCAT	3247 ✓		00:05
11 x 17" glass			00:08
Swivel			
Release #1	1345		00:08
Release #2	1347		00:08

Ascent rate
Time at end of recovery 00:08

Ranging

Time	Range 1	Range 2	Command /comment
19:38:40	—	3877	ARM + ARM
19:39:00	—	—	↓
19:39:37	3876	3878	
19:40:15	—	3875	
19:40:45	3876	3875	
19:42:00	—	—	ARM + REL
19:42:45	3826	1353 ×	
19:43:05	—	—	
19:43:45	3713	3701	

RAPID-WATCH MOORING LOGSHEET RECOVERY

Mooring **WB2L6** Cruise **RB1201**

NB: all times recorded in GMT

Date 20/2/12 **Site arrival time** 11:53

Time of first ranging 11:56

Time of release 12:00 SPOTTED 12:30

Latitude _____ **Longitude** _____

(record positions at time of pickup only if likely to be very different from deployment position)

MISSED GRAPNEL 1ST GOING ROUND AGAIN

ITEM	SER NO	COMMENT	TIME
17" glass		PICK UP FLOAT TANGLED WITH BILLINGS	13:22
Recovery line		HOOKED AT 13:17	
Billings Float with ARGOS	Y01-029	ID 46502 AERIAL SNAPPED OFF.	
Light	W03-092		
2 m of 3/8" chain			13:24
15m polyprop			
4 x 17" glass			
15m polyprop			
4 x 17" glass			13:30
15m polyprop			
BPR #1 in tripod	0389		
BPR #2 in tripod	0398		13:37
Release #1 in tripod	265		
Release #2 in tripod	251		
~~Anchor 500 kg~~			

Ascent rate 80 m/min

Time at end of recovery 13:37

Ranging

Time	Range 1	Range 2	Command /comment
11:56:10	✓	✓	ARM + ARM
11:56:48	✓	✓	
11:57:25	✓	✓	
11:58:33	✓	3921	
11:59:17	3920	3920	
12:00:00	3921	3921	ARM + RELEASE REL. OK
12:00:40	3886	3876	
12:01:40	3806	3796	
12:02:40	3726	3717	80 m/min

RAPID-WATCH MOORING LOGSHEET RECOVERY

Mooring **WBH2** Cruise **RB1201**

NB: all times recorded in GMT

Date 26/2/12 **Site arrival time** OVERNIGHT

Time of first ranging ~~12:57~~ 11:07

Time of release 11:19

SPOTTED 11:44
2ND PACK OF GLASS 11:50

Latitude _____ **Longitude** _____

(record positions at time of pickup only if likely to be very different from deployment position)

hooked @ 7.55, billings float under ship

ITEM	SER NO	COMMENT	TIME
1 x 12" glass		NOT VISIBLE ON SURFACE	
Recovery line			13:50
Billings float with beacons		ONLY JUST BREAKING THE SURFACE	15 55
ARGOS beacon	X02-056	ID 93792	
Light	X01-051		
5 m chain			
14 x 17" glass			13·13
Swivel			"
NORTEK	6723 ✓		"
7 x 17" glass		Recovery recommenced 15:18	15 46
NORTEK	6083 ✓	Tangled with biorganacy. lens damaged.	"
NORTEK	6805 ✓		16 19
3 x 17" glass		tangled wire before	16:43
Swivel			
NORTEK	8052 ✓		16:50
SBE37 Microcat	3214 ✓	tangled together	16:45
SBE37 Microcat at join	3213 ✓		16:45
3 x 17" glass		tangled wire before	~~16:50~~ 17:01
NORTEK	8120 ✓		~~16:~~ 17:01
SBE37 Microcat	3212 ✓		17:09
5 x 17" glass			17:10
Swivel			
Release #1	1348		17:10
Release #2	1350		17:10
20 m nylon			
5 m ½" chain			
Anchor 1400 kg			

wire a

Ascent rate 105 m/min

Time at end of recovery 17:10

" tangle in a long line also.

CAPTAIN "DOESN'T WANT" TO PICK UP TILL 7:45 ! (LOCAL) (12:45 GMT)

- APPARENTLY BECAUSE THE DECK CREW START AT 07:30. (LOCAL)

SPOTTED ALL ON SURFACE ≈ 12:30. STARTED APPROACH AT 12:40.

MAIN LINE + PUMP ABOVE + BELOW 14 SPHERES

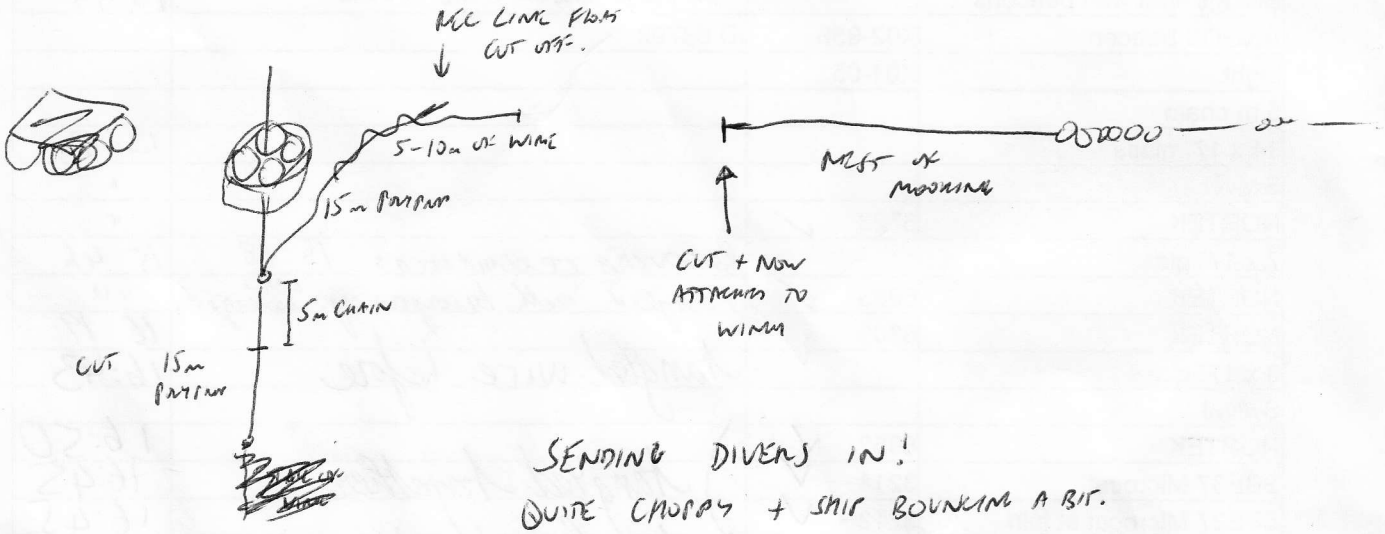
BILLINGS + CHAIN CAUGHT AROUND STBD PROP.

PICK UP FLOAT HELD UNDER WATER – PROBABLY BY THE LONGLINE.

PICK UP FLOAT HOOKED WITH LARGE GRAPNEL AND HAULED UP BY WINCH WITH MAINLINE TAILED ROUND IT.

STOPPERED OFF WITH CARRICKBEND BLOCK AND CUT AND BULLDOG GRIPPED.

MAIN MOORING LINE ~~SPLICE~~ NOW HOOKED ONTO RECOVERY WINCH

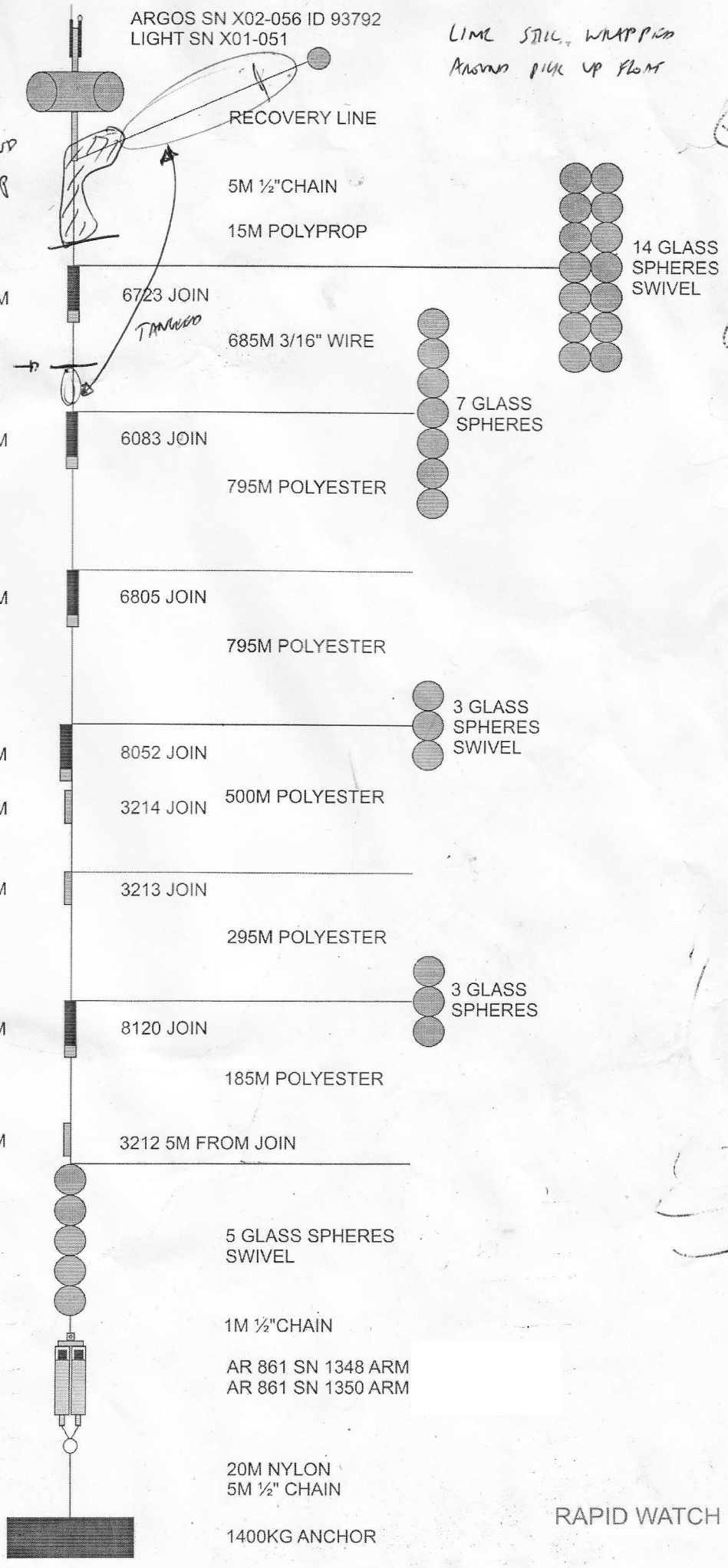


SENDING DIVERS IN!

QUITE CHOPPY + SHIP BOUNCING A BIT.

Divers ashore, going to recover wbh2, go to shore to sort props.

WBH 2
AS DEPLOYED
KNORR 2011



WATER DEPTH
4763M

RAPID WATCH

RAPID-WATCH MOORING LOGSHEET RECOVERY

Mooring **WB4** Cruise **RB1201**

NB: all times recorded in GMT

Date 25/2/12 **Site arrival time** 15:24 0.56 miles SE.

Time of first ranging 15:31

Time of release _____

Latitude _____ **Longitude** _____

(record positions at time of pickup only if likely to be very different from deployment position)

hook time 17:21

ITEM	SER NO		COMMENT	TIME
Recovery line				17:21
3 TRYMSYN floats				17:24
SBE37 Microcat	4464	✓	heavy fouling	17:28
32" syntactic buoy		✓		17:34
ARGOS				
LIGHT				
1m Chain and swivel				
NORTEK in frame	5490	✓	fouling	17:36
SBE37 Microcat	3483	✓	fouling	17:46
49" syntactic buoy		✓		18:00
ARGOS				
LIGHT				
1m chain and swivel				
SBE37 Microcat	3486	✓?	clean	18:06
NORTEK in frame	5590	✓?	clean	18:12
SBE37 Microcat	4714	✓	clean, (coral, bryozoa inside)	18:14
SBE37 Microcat	3248	✓		18:20
NORTEK in frame	5611	✓		18:25
SBE37 Microcat	3249	✓		18:28
SBE37 Microcat	3251	✓		18:34
10x 2000m rated rugby floats				18:51
NORTEK in frame	5955	✓		18:51
SBE37 Microcat	3252	✓		18:58
5x 5000m rated rugby floats				19:12
NORTEK	6049	✓		19:13
SBE37 Microcat	3253	✓	clean	19:15
5x 5000m rated rugby floats				19:30
NORTEK in frame	6050	✓		19:30
SBE37 Microcat	5788	✓		19:32
5x 5000m rated rugby floats			(change drum @ 19:49)	19:45
SBE37 Microcat	3259	✓		20:00

Mark ~~no instrument~~ @ 17-06

MARK BUT NO INSTRUMENT

5x 5000m rated rugby floats			20:16
NORTEK in frame	6088 ✓		20:16
SBE37 Microcat	3484 ✓		20:18
5x 5000m rated rugby floats			20:33
SBE37 Microcat	3268 ✓		20:35
5x 5000m rated rugby floats			20:48
NORTEK in frame	6516 ✓		20:50
SBE37 Microcat	5238 ✓	not @ join, slipped down wire	21:01
SBE37 Microcat	3207 ✓		2102
NORTEK	6534 ✓		21:10
10x Benthos glass			21:13
Acoustic release #1	825 ✓		21:14
Acoustic release #2	1346 ✓		21:14

Ascent rate
Time at end of recovery

SURFACED BEFORE MEASURED.
21:15

Ranging

Time	Range 1	Range 2	Command /comment	
15:31:30	/	/	ARM + ARM	
32:15	4777	4778	ARM + ARM	
15:34:55	4777	4777	ARM + REL	OK
15:35:35	4777	4776	REL OK	
15:36:10	4778	/		
15:36:45	/	4779		NOT RISING
15:37:40	/	4779		
38:45	/	/	ARM + DIAG	
39:08	4779	/	"	
39:40	/	/	"	
40:20	/	/	"	
41:43	/	/	ARM + REL 2ND RELEASE	
42:25	/	/		PUT XDCR DEEPER
44:30	3977	1128	ARM + REL	
44:50	4981	568	"	
45:25	4392	4379	"	
46:25			SPOTTED ON STBD BEAM	

RAPID-WATCH MOORING LOGSHEET RECOVERY

Mooring **WB4L6** Cruise **RB1201**

NB: all times recorded in GMT

Date 25/2/12 **Site arrival time** OVERNIGHT

Time of first ranging 12:03

Time of release 12:05:52

Latitude _____ **Longitude** _____

(record positions at time of pickup only if likely to be very different from deployment position)

hooked @ 13:27

ITEM	SER NO	COMMENT	TIME
17" glass		Tangled @ top.	13:~~37~~
Billings float with ARGOS	Y01-026	ID 46499	13:34
Light	Y01-014		13:34
5 m 3/8" chain			
Recovery line			13:37
4 x 17" glass			13:31
15m polyprop			
4 x 17" glass			13:38
15m polyprop			
BPR #1 in tripod	0400		13:42
BPR #2 in tripod	0399		13:42
Release #1 in tripod	907		13:42
Release #2 in tripod	320		13:42

Ascent rate 75m/min

Time at end of recovery 13:43

Ranging

Time	Range 1	Range 2	Command /comment
12:03	4847	–	~~4852~~ Arm + Arm [redacted]
12:03:38	1982	–	
12:04:06	4244	–	
12:04:53	7117	4692	Arm + Arm [redacted]
12:05:20	1503	1782	
12:05:52	4692	4692	Arm + REL OK.
12:07:00	4624	4614	
12:08:00	–	–	
12:09:00	–	4469	
12:10:00	4397	4387	
12:11:00	–	–	
12:13:00	4177	–	

221m in 3min
76 m/min
220m
73m/min

eta @ 13:10 UTC.

SPOTTED 13:06 ~300m OFF STBD BEAM
WAS EXPECTING ~200m OFF PORT BEAM. (WSW)

RAPID-WATCH MOORING LOGSHEET RECOVERY

Mooring **WB6** Cruise **RB1201**

NB: all times recorded in GMT

Date 18/2/12 **Site arrival time** 19:14

Time of first ranging 19:16

Time of release 19:25:20

Latitude _____ **Longitude** _____

(record positions at time of pickup only if likely to be very different from deployment position)

SPOTTED 20:35

ITEM	SER NO	COMMENT	TIME
Pick Up float		20:48 GRAPPLED. MAIN RACK UNDER SHIP.	20:50
15m polyprop			
Billing float with beacons		TANGLED	20:55
Argos beacon	Z02-003	ID 53128	↓
light	Z02-018		
5 m chain			
15 m polyprop			20:56
2 x 17" glass			20:56
Microcat below join	3209 ✓		20:56
100m polyester			
Microcat about halfway	6840		21:04
100m polyester			
2 x 17" glass			21:09
Microcat below join	6820 ✓	TANGLED	21:09
100m polyester			
Microcat about halfway	6821 x 6822	- WRONG ORDER	21:17
RCM11	515		21:18
100m polyester			
Microcat above join	6822 ~~X~~	6821 - WRONG ORDER.	~~21:17~~ 21:20
8 x 17" glass			21:24
BPR #1 on tripod	0059 ✓		21:25
BPR #2 on tripod	0053 ✓		
Release #1 in tripod	498		
Release #2 in tripod	324		

Ascent rate 81 m/min

Time at end of recovery 21:25

9

Ranging

Time	Range 1	Range 2	Command /comment
19:16:05	—	—	498 - Arm + Arm
19:16:45	—	—	"
19:17:24	—	—	"
19:18:28	—	—	324 Arm + Arm
	—	—	"
19:19:49	—	—	
	5[illegible]	5449	498
19:23:36	5451	5450	324 Arm + Arm
	5448·9	NOISE	
19:24:26	5451	—	498 Arm + Arm
19:25:20	—	—	498 Arm + RELEASE
19:25:51	—	—	"
19:26:32	—	—	"
19:27	—	—	324 Arm + Arm
19:28:13	—		"
19:39:05	4309	—	498 Arm + Arm
19:40:05	4224] 85 m/min	4213	"
19:41:05	—	—	"
19:42:05	—	4039	"
19:43:05	—	3958] 81 m/min	

0-34 miles off

¼ mile off

ESTIMATE 43 MINUTES TO SUNRISE FROM 19:43 = 20:26

RAPID-WATCH MOORING LOGSHEET DEPLOYMENT

Mooring **WBAL2** Cruise **RB1201**

NB: all times recorded in GMT

Date 29/02/2012 **Site arrival time** 21:22

Start time 21:28 **End time** 21:31

ITEM	SER NO	COMMENT	TIME
1 x Trymsyn pick up float	—		21:28
Recovery line	—		"
ARGOS		5m beneath shackle	"
LIGHT	208-048		"
5 m ½ " chain	—		"
15m polyprop	—		"
4 x 17" glass	—		21:29
15m polyprop	—		"
4 x 17" glass	—		"
15m polyprop	—		"
4 x 17" glass	—		"
15m polyprop	—		"
BPR #1 in tripod	419		21:31 34
BPR #2 in tripod	395		"
Release #1 in tripod	~~[illegible]~~	361	"
Release #2 in tripod	1462		"
Anchor 600 KG	—		"

Argos beacon #1 ID (PTT) beneath shackle.

Release #1 arm code [redacted]

Release #1 release code

Release #2 arm code

Release #2 release code

Anchor Drop Position

Latitude 26°31.3396'N **Longitude** 76°52.559°W

Uncorrected water depth 8m south (at anchor launch)

Corrected water depth 496 (at anchor launch)

RAPID-WATCH MOORING LOGSHEET DEPLOYMENT

Mooring **WBADCP** Cruise **RB1201**

NB: all times recorded in GMT

Date 28/02/2012 **Site arrival time** 21:41
Start time 21:51 **End time** 22:05:08

ITEM	SER NO	COMMENT	TIME
1 x 12" glass pickup float	—		2152
Recovery line	—		"
ARGOS	702-004, id 53129.		"
Light	702-020		"
40 " syntactic			"
75 KHZ ADCP			"
swivel			"
10m 1/8" chain			"
Acoustic Release #1	821	[redacted]	2158
Acoustic Release #2	1464		"
5m 1/8" chain			"
Anchor 800 KG			22:05:08

Argos beacon #1 ID _____
Release #1 arm code _____
Release #1 release code _____
Release #2 arm code _____
Release #2 release code _____

Anchor Drop Position
Latitude 26.52492°N **Longitude** 76.86803°W
Uncorrected water depth not recorded. (at anchor launch) Bathymetry OFF.
Corrected water depth _____ (at anchor launch)

RAPID-WATCH MOORING LOGSHEET DEPLOYMENT

Mooring **WB1** Cruise **RB1201**

NB: all times recorded in GMT

Date 29/2/12 **Site arrival time** 15:40 - TOOK WAIT TILL AFTER LUNCH!

Setup distance 2.5 miles to drop site **End time** 18:52

Start time 16·33

Start Position

Latitude 26° 30·2148 N **Longitude** 76° 57·7148 W

ITEM	SER NO	COMMENT	TIME
1 x Trimsyn pick up float	—		16·33
3 Trymsyn floats	—		"
SBE37 MicoCAT	6123		16·34
30" SYNTACTIC		TURNED AROUND FROM WB1 - SLIGHTLY FASTER.	16·42
ARGOS	~~WB~~ ~~WB3-09~~	Y01-031 PTT 46508	"
Light	WB3-092		"
1m chain and swivel			"
NORTEK	9409		"
SBE37 MicoCAT	6121		"
SBE37 MicoCAT	4072		16·48
45" syntactic			16·56
ARGOS	253	PTT 42145	"
LIGHT	Y01-014		"
1m chain and swivel			"
SBE37 MicoCAT	6820		17:05
SBE37 MicoCAT	4180		17 09
NORTEK	~~3756~~	5890	17·16
SBE37 MicoCAT	5713		"
SBE37 MicoCAT	3248		17:20
SBE37 MicoCAT	3902		17:25
SBE37 MicoCAT	4672		17:27
10 x 17" glass spheres	—		17:34
SWIVEL	—		"
NORTEK	5897		17:40
SBE37 MicoCAT	5768		"
SBE37 MicoCAT	5782		~~17:44~~
SBE37 MicoCAT	~~4471~~		~~17:46~~
SBE37 MicoCAT	4068		~~17:51~~
2 x 17" glass			~~17:57~~
NORTEK	5889		
SBE37 MicoCAT	7468		~~17:59~~
SBE37 MicoCAT (above glass)	7363		18:07
10 x 17" glass			

SWIVEL			
Acoustic release #1	823		18:15
Acoustic release #2	1461		
20m NYLON under releases			
10m ½" chain			
Anchor 1800kg			18:52

TOWING

Release #1 arm code [redacted]
Release #1 release code
Release #2 arm code
Release #2 release code

Anchor Drop Position

Latitude 26°29.965 N **Longitude** 76°48.735 W
26.49953 N 76.81369 W — From NAV DATA

Uncorrected water depth — (at anchor launch)

Corrected water depth 1387 (at anchor launch) from swath,

@ 18:18, 0.9 nm from drop site, set up to tow

RAPID-WATCH MOORING LOGSHEET **DEPLOYMENT**

Mooring **WB2** Cruise **RB1201**

NB: all times recorded in GMT

Date 28/2/12 **Site arrival time** 14:45 – WAIT FOR DECK TO BE SORTED.

Setup distance 4½ MILES

Start time ~~9~~ 15:12 **End time** _____

Start Position

Latitude 26°30.73 **Longitude** 76°49.30

ITEM	SER NO	COMMENT	TIME
1 x Trymsyn pickup float			
3 x Trymsyn floats			
SBE 37 MicroCAT	5781		15:13
30" SYNTACTIC			
ARGOS			
Light			
1m chain and swivel			
~~Nortek~~ RCM 11	448		15:25
SBE 37 MicroCAT	5780		15:27
51" syntactic			
ARGOS			
Light			15:46
1m chain ~~with swivel~~			
swivel ~~Nortek~~ RCM 11	449		
SBE 37 MicroCAT	6821		
SBE 37 MicroCAT	6822		15:54
2 x 17" glass			
Nortek	6753	together after the glass at 400 m	16:03
SBE 37 MicroCAT	3933		16:05
SBE 37 MicroCAT	5763	at 500m at 700m	16:09
SBE 4307 2 x 17" glass			at 16:2
Nortek	6119		16:27
SBE 37 MicroCAT	~~4307~~	4470	?
SBE 37 MicroCAT	~~4470~~	5762	16:46
10 x 17" glass			16:55
Swivel			
Nortek	5884		17:00
SBE 37 MicroCAT	3209		17:04
NORTEK	6176	ships speed over ground 1.4 knts	17:14
SBE37 MicroCAT	6333		~~17:23~~
5 x 17" glass			17:23
SBE 37 MicroCAT	5785		17:23
SBE 37 MicroCAT	3934		17:30
Nortek	5967		17:40

5 x 17" glass			17:49
Swivel			
SBE 37 MicroCAT	4475		17:53
SBE 37 MicroCAT	4719		18:05
2 x 17" glass spheres			
Nortek	9266		18:14
5 x 17" glass spheres			18:24
swivel			
SBE 37 MicroCAT	3483		18:26
SBE 37 MicroCAT above glass	6828		18:53
10 x 17" glass spheres			18:53
Swivel			18:59
Release #1	324		18:59
Release #2	1406		18:59
20M nylon under releases			
10M 1/2" chain			
Anchor 2200 KG			19:21:

Release #1 arm code [redacted]
Release #1 release code
Release #2 arm code
Release #2 release code
Argos beacon #1 ID
Argos beacon #2 ID
Anchor Drop Position
Latitude 26°51.202°N **Longitude** 76°73.302°W
Uncorrected water depth 3830 (at anchor launch)
Corrected water depth 3849 (at anchor launch)

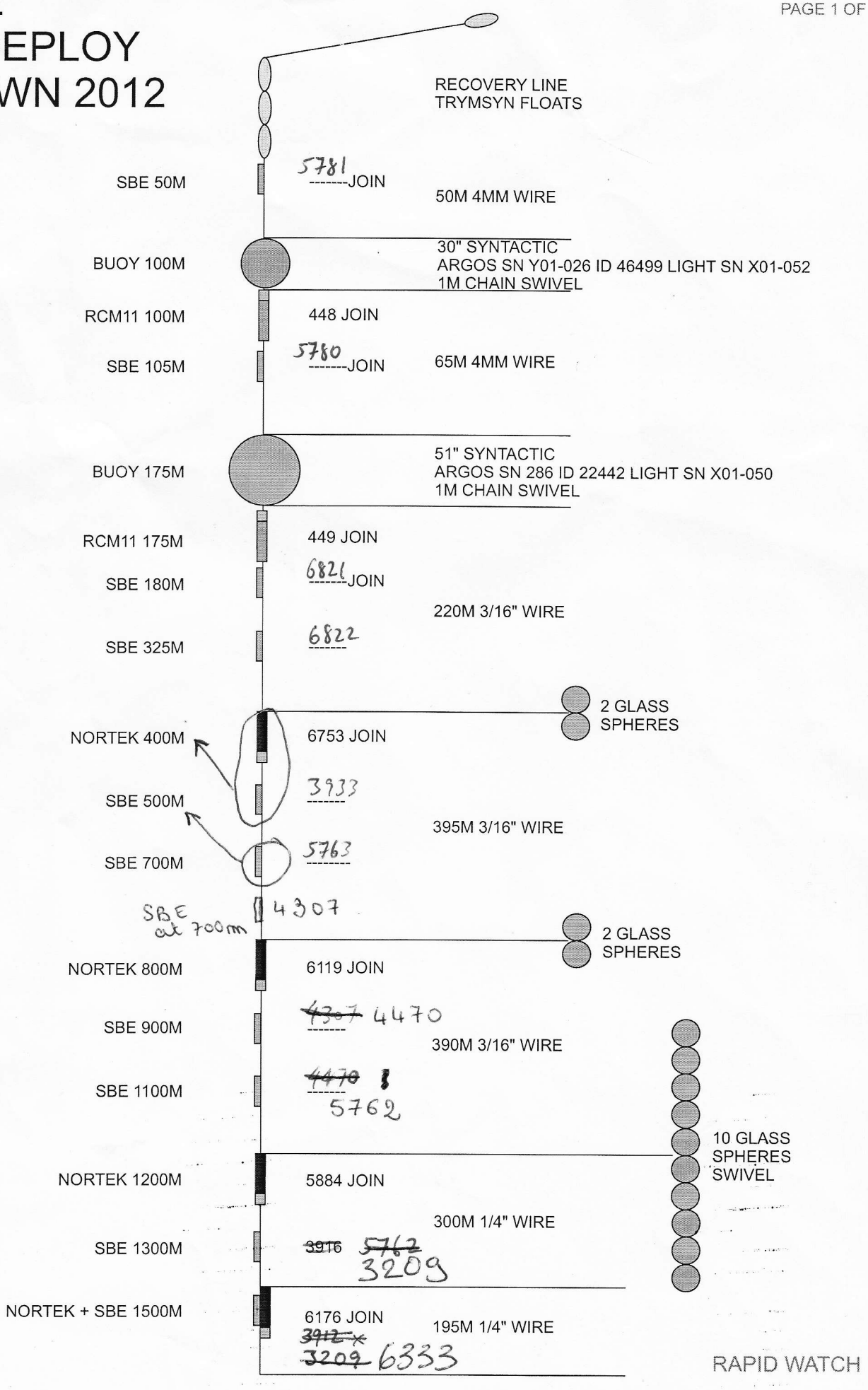
EXPECT IT TO BE ≈ 3850 ON MONK AT ANCHOR RELEASE POSITION.

= 3869 m CORR.

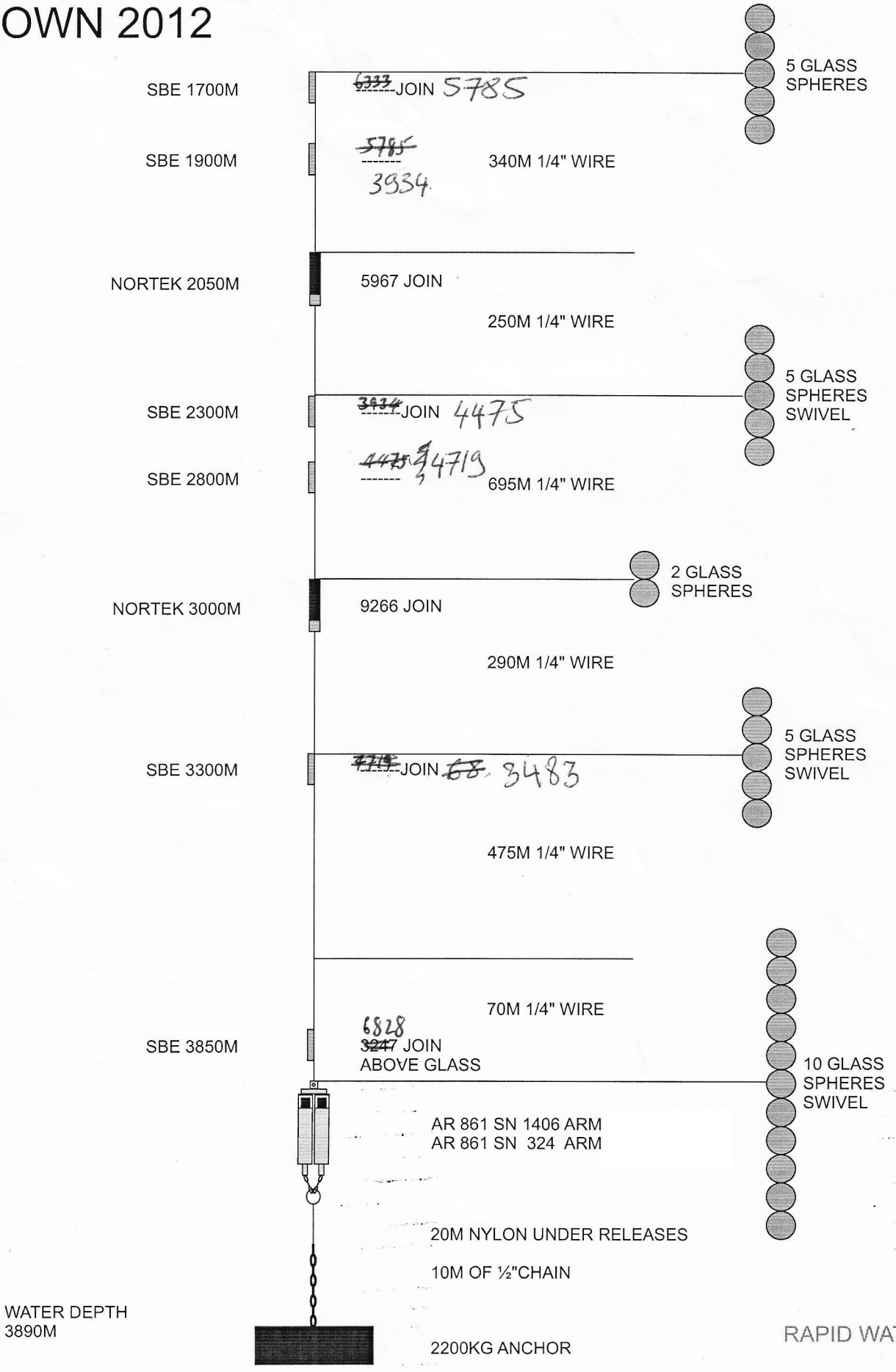
SLIGHTLY SHALLOW BUT NOT TOO BAD.

NOTHING SPOTTED ON SURFACE AFTER DEPLOYMENT.

WB 2
TO DEPLOY
BROWN 2012



WB 2
TO DEPLOY
BROWN 2012



RAPID-WATCH MOORING LOGSHEET DEPLOYMENT

Mooring **WB2L8** Cruise **RB1201**

NB: all times recorded in GMT

Date 28/2/12 **Site arrival time** –

Start time 22:57 **End time** 23:00

ITEM	SER NO	COMMENT	TIME
1 x Trymsyn pickup float	–		22:57
Recovery line	–		"
ARGOS			"
LIGHT			"
5 m ½ " chain	–		"
15m polyprop	–		"
4 x 17" glass	–		"
15m polyprop	–		"
4 x 17" glass	–		"
15m polyprop	–		"
4 x 17" glass	–		"
15m polyprop	–		"
BPR #1 in tripod	0414		23:00:57
BPR #2 in tripod	0030		"
Release #1 in tripod	498		"
Release #2 in tripod	370		"
Anchor 600 KG	–		"

Argos beacon #1 ID (PTT) [redacted]

Release #1 arm code

Release #1 release code

Release #2 arm code

Release #2 release code

Anchor Drop Position

Latitude 26·509°N **Longitude** 76·7447°W

Uncorrected water depth 3865 (at anchor launch)

Corrected water depth 3884 (at anchor launch)

Actual Anchor ~~drop~~ SENSED: 26·5099°N, 76·7464°W

RAPID-WATCH MOORING LOGSHEET DEPLOYMENT

Mooring **WBH2** Cruise **RB1201**

NB: all times recorded in GMT

Date 26/Feb/2012 **Site arrival time** _____

Setup distance 35 miles

Start Position

Latitude 26.49142° N **Longitude** -76.68607° E

Start time 19:30 **End time** 21:57

ITEM	SER NO	COMMENT	TIME
1 x Trymsyn pickup float			19:30
Recovery line			
ARGOS			
Light			
5m ½ " chain			
12x 17" glass			19:36
Swivel			
NORTEK	9402	[redacted]	19:41
7 x 17" glass			20:00
NORTEK	9427		20:03
NORTEK	9444		20:25
3 x 17" glass			20:46
Swivel			
NORTEK	6132		20:49
SBE37 Microcat	6825		20:51
SBE37 Microcat	6824		21:06
3 x 17" glass			21:18
NORTEK	5879		21:18
SBE37 Microcat	4305		21:30
5 x 17" glass			21:31
Swivel			
1 m ½ " chain			
Release #1	1405		21:36
Release #2	216		21:36
20m Nylon			
5m ½" chain			
Anchor 1500kg			21:57

Release #1 arm code [redacted]

Release #1 release code

Release #2 arm code

Release #2 release code

Anchor Drop Position

Latitude 26°28.889 N **Longitude** 76°37.356 W

From log: 26.48176° N -76.62401° E

Uncorrected water depth 4692 m (at anchor launch)
Corrected water depth 4729 m (at anchor launch)

WATCHING ANCHOR DOWN

22:12:45	2723	2736	]	149 m/min
22:13:45	2872	2887	]	136 m/min
22:14:45	3018	3033		
22:15:45	3162	3174	}	144 m/min
22:17:45	3434	3449		136 m/min
~~22:19:45~~				
22:20:45	—	—	}	130
22:21:45	3960	3975		
22:22:45	4088	4104	-	1205
22:24:45	—	4382	-	140
22:25:45	—	—		
22:26:45	—	—		

13-07 Repositioning due to currents.

RAPID-WATCH MOORING LOGSHEET DEPLOYMENT

Mooring **WB4** Cruise **RB1201**

NB: all times recorded in GMT

Date 24/02/12 **Site arrival time** 13·00 (After drift test.)

Setup distance 4·5 mi 13·45 (After repositioning)

Start time _____ **End time** _____

Start Position

Latitude _____ **Longitude** _____

ITEM	SER NO	COMMENT	TIME
1 x Trimsyn pickup float			13 45
3 TRYMSYN floats			"
SBE37 Microcat	4071		"
32" syntactic			13 56
ARGOS	Z02-003	ID 53128 - From ROB	"
LIGHT	Y01-023		"
1m Chain and swivel			"
~~NORTEK~~ RCM 11	445	Pointing up	"
SBE37 Microcat	4070	100 m wire after.	1400
49" syntactic			1414
ARGOS	Z08-046	ID 111853 - From ROB	"
LIGHT	Z02-018		"
1m chain and swivel			"
SBE37 Microcat	5787	150 m wire after	1417
NORTEK Pointing down	5963		1431
SBE37 Microcat	5779		1431
SBE37 Microcat	5786		1439
NORTEK 6751	[illegible]	pointing down	1449
SBE37 Microcat	6827		1449
SBE37 Microcat	7362		1455
10 off clamp on floats 2000 m rated on 2x 5m wire strops swivel		orange first at:	1507
NORTEK	6743	pointing down	1516
SBE37 Microcat	7470	5m from the join	1518
NORTEK	9406	pointing down	1530
5 off clamp on floats 5000 m rated on 5 m wire strop		yellow first at	1537
SBE37 Microcat	6840		1540
5 off clamp on floats 5000 m rated on 5 m wire strop		yellow 1ST at	1556
Swivel			
NORTEK	9439	pointing down	1600
SBE37 Microcat	6124		1601
5 off clamp on floats 5000 m rated on 5 m wire strop		yellow (1ST)	1615

SBE37 Microcat	6326		1621
5 off clamp on floats 5000 m rated on 5 m wire strop			16 36
Swivel			"
NORTEK	9433		16 39
SBE37 Microcat	6325		16 42
5 off clamp on floats 5000 m rated on 5 m wire strop			16:57
SBE37 Microcat	6323		17.02
5 off clamp on floats 5000 m rated on 5 m wire strop			17.18
Swivel			
NORTEK	9420		17.19
SBE37 Microcat	6320		17.20
SBE37 Microcat	6137		17.40
CM NORTEK	35885		17.47
10x glass spheres			1757
Swivel			
Acoustic release #1	1465	ARM code [redacted]	1806
Acoustic release #2	1463		"
20m nylon under releases			
10m 1/2" chain			
Anchor 2700 KG			18:28:59

Release #1 arm code [redacted]
Release #1 release code
Release #2 arm code
Release #2 release code
Argos beacon #1 ID 53128 } FROM ROB
Argos beacon #2 ID 111853

Anchor Drop Position
Latitude 26° 28.77' **Longitude** 75°W 41.96

Uncorrected water depth 4651 (at anchor launch)
Corrected water depth 4687 (at anchor launch)

26°.47845 N } From SHIP'S
-75.69972 E } FILES ON NETWORK

ARM [redacted]
1465

18.37.40	2677	2022
39 10	2112	2134
38 40	2221	2244
43 40	3276	3297

≈220 m/min

[redacted]
1463

18:46:00		3795
18:46:40	3872	3894
18:50:10	4524	4549
18:51:10	4628	4627
18:52:50	4626	4627

≈200 m/MIN
78 m/min
ON SEABED

[redacted] + [redacted] DIAGNOSTIC
4626 4626 VERTICAL 9.2V

RAPID-WATCH MOORING LOGSHEET DEPLOYMENT

Mooring **WB4L7** Cruise **RB1201**

NB: all times recorded in GMT

Date 24/2/12 **Site arrival time** 19:24

Start time 19:24 **End time** 19:30

ITEM	SER NO	COMMENT	TIME
1 x Trymsyn pickup float			19:24
Recovery line			
ARGOS	208-044	ID 111850 } + BILLING FLOAT	↑ 19:26
LIGHT	W03-091		↓
5 m ½ " chain			
15m polyprop			
4 x 17" glass			19:27
15m polyprop			
4 x 17" glass			19:28
15m polyprop			
4 x 17" glass			19:29
15m polyprop			
BPR #1 in tripod	0038	~~0038~~	↑
BPR #2 in tripod	0391		
Release #1 in tripod	1383		19:30
Release #2 in tripod	318		
Anchor 600 KG			↓

Argos beacon #1 ID (PTT) 111850

Release #1 arm code 4

Release #1 release code [redacted] } NOT RECORDED, SO GET FROM ~~SEA~~ SEA-NUM.

Release #2 arm code

Release #2 release code

Anchor Drop Position

Latitude 26·48239' N **Longitude** ~~W~~ 75·70071' W — FROM NETWORK FILE.

Uncorrected water depth ECHOSOUNDER OFF (at anchor launch)

Corrected water depth _____ (at anchor launch)

⊗ × +

Mooring **WB6** Cruise **RB1201**

NB: all times recorded in GMT

Date 18/2/2012 **Site arrival time** 22.20

Setup distance 0.5 (0.25 requested)

Start time ~~22.40~~ **End time** 23.18

Start Position

Latitude 26° 27' N **Longitude** 70° 31' W

ITEM	SER NO	COMMENT	TIME
1 x Trymsyn pickup float			22.40
Recovery line			
Argos	208-045	PTT 111851 —From NOC	
Light (WORKING)	501-191	From NOC	
5m ½ " chain			
15m polyprop			
3 x 17" glass			
Swivel			
SBE MicroCAT	5240		22.44
100m polyester			
SBE MicroCAT at halfway	6128		22.45
100m polyester			
2 x 17" glass			
SBE MicroCAT	5767		2246
100m polyester			
Nortek			22 49
SBE MicroCAT	7361		22 49
90m polyester			
SBE MicroCAT	4306		23.09 — STOPPED OFF AS STILL ½ M from moorin site.
8 x 17" glass			23 10
Swivel			
1 m ½ " chain			
BPR #1 on tripod	00396		
BPR #2 on tripod	0040		
Release #1 in tripod	1201		
Release #2 in tripod	910~~7~~		
Anchor 600 KG			23:18:37

Slipped position (By Rob)

Argos beacon #1 ID (PTT) _____

Release #1 arm code _____

Release #1 release code _____

Release #2 arm code _____

Release #2 release code _____

0.2 nm @ 23.09

Anchor Drop Position

Latitude 26°29.698°N **Longitude** 70° 31.339°W

FROM NAV FILE: 26°29.7042 N 70° 31.3242 W

Uncorrected water depth 5431.2 (at anchor launch)

Corrected water depth 5490.4 (at anchor launch)