RRS JAMES CLARK ROSS

Marine Science Cruises JR257 and JR254e

March - April 2012

BAS Ref.: JR257

CRUISE REPORT

Marine Science Cruise: JR257

Collecting records of past oceanographic conditions and calibrating new proxies in the Polar Front Zone of the SW Atlantic (Falkland Plateau, Shag Rocks and South Georgia)

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DECLARATION

This unpublished report contains initial observations and conclusions, designed to give an overview of cruise activities and include observations that are potentially useful to both current and future shipboard scientific staff. The other members of the JR257 shipboard scientists should be made aware of and given the opportunity to be involved in any work involving cruise samples or data. No samples or data from the cruise should be analysed, published or otherwise presented without the express permission of the relevant lead scientist(s) (see Table below) and PSO (Claire Allen).

Core areas/samples sources	**Deployments**	**Lead Scientist**
Falkland Plateau	GC 641, GC 642 BC 643, BC 644	VLP, VLP VLP, VLP
Shag Rocks	BC 645, GC 646 BC 647 BC 649, GC 650 BC 651, GC 652, CTD 24	VLP, VLP VLP VLP, VLP VLP, VLP, VLP
NW South Georgia Slope	BC 653	VLP
Church Bay Trough (ChBT), NW South Georgia	BC 655, BC 656, GC 657 GC 658 GC 659, BC 660, GC 661 GC 662, CTD 25	VLP, VLP, VLP VLP VLP, VLP, VLP VLP, VLP
Royal Bay (RB), SE South Georgia	GC 663, GC 664 GC 665 GC 666, BC 667 GC 668	AG, AG AG AG, VLP AG
Cumberland Bay (CB), E South Georgia	CTD 38, BC 671, GC 672, GC 673	VLP, VLP, VLP, VLP
USS - Biomarker Filters (0.7 μm)	13 Samples	EM
CTD - Biomarker Filters (0.7 μm)	30 Samples	EM
USS - Diatom filters (0.2 μm)	48 Samples	CA
USS - Foraminfera (125 μm Sieve)	14 Samples	VLP
TOPAS and SWATH data	Underway and survey data	CA & AG

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1. Introduction (CA)

Cruise Overview

JR257 was conceived to fulfil two important requirements of the marine component of the Quaternary Sediments group within the Chemistry and Past Climate (CPC) Programme. Primarily, the need for marine cores containing carbonate material suitable for geochemical and isotopic analyses, and secondly, to recover expanded sediment records from the Polar Front Zone (PFZ), an under-represented area of the BAS marine core archive. As such, the BAS box and gravity corers were the two main sampling devices used on the cruise whilst the EM 122 swath bathymetry system and TOPAS (topographic parasound sensor) sub-bottom profiler were used to survey potential coring locations and to assess the thickness and acoustic character of sediment pockets in order to identify the most promising core sites.

Two additional opportunistic science projects were also included into the cruise during the planning stages…1) Pro-glacial coring in Royal Bay to constrain the ice cap history of the region; and 2) Water sampling for biomarkers in the Scotia Sea to address the paucity of low temperature/Southern Ocean proxy calibration dataset (Grant #: CGS????). These collaborative ventures complement the BAS science objectives and increase the scope and efficacy of the cruise. Additional opportunistic samples of the uncontaminated seawater supply (USS) were collected throughout the cruise to assess the modern austral autumn diatom flora and Foraminifera assemblages using a 0.02um filter and >125um sieve respectively.

Despite originally requesting that the cruise take place during austral summer, scheduling limitations meant that from the outset the cruise was timetabled to start in late March (austral autumn). It was recognised from the outset that weather during autumn in the Southern Ocean could provide serious constraints on coring with the recently acquired IceSheets/Chemistry and Past Climate gravity coring system. In view of this risk, several potential coring areas were identified from the Southern Falkland Plateau in the west to north of the NE Georgia Rise in the east. Further timing constraints led to the cruise being combined first with science cruises JR272 (PI Hugh Venables) and JR254b (PI Margaret Yelland) and secondly with the final base calls at Bird Island and King Edward Point (KEP), South Georgia. Unfortunately, the addition of base calls to our cruise itinerary greatly reduced our flexibility and the area in which we could work making several of our contingency coring sites unfeasible. Although many of the potential working areas became untenable and others had to be excluded

because of bad weather, the cruise was successful in achieving the majority of its scientific objectives and realizing all of the aims of the two collaborative ventures. The main objectives and achievements of the cruise are summarised below.

Coring Objectives:	**Achievements:**
- To recover marine sediment cores from the Polar Front Zone of the SW Atlantic.	>120 m of marine sediments recovered
- To recover carbonate-bearing sediment cores for geochemical and isotopic proxy work to allow more quantitative palaeoceanographic reconstructions.	>140 gravity core sections, 27 box core sub cores many of them containing some carbonate material
- To recover sediment cores that complement the existing marine core archive	~6000 line-km of previously unsurveyed sea floor and sub-surface were mapped on this cruise and all cores were collected from new sites in areas not currently represented in the BAS core archive
- To recover sediment cores that offer the potential to reconstruct Southern Ocean watermasses, circulation and production in the Polar Front Zone of the SW Atlantic in order to better understand the role of the SW Atlantic in past and modern climate change	Cores from Shag Rocks, NW South Georgia are suitably located to capture changes in various watermass characteristics, circulation patterns and productivity within the modern day Polar Front Zone
- To recover marine cores that offer the potential to carry out detailed regional climate reconstructions in combination with existing lake and ice core records	Cores from Church Bay Trough, Royal Bay and Cumberland Bay are all suitably located to yield a detailed record of regional changes in ice and ocean conditions and complement existing and planned CPC palaeoclimatic lacustrine records
- To recover a suite of cores spanning the continental shelf of South Georgia to reconstruct the local glaciological history and determine the limit of former grounded ice caps, and to resolve the deglacial history	5 sediment cores were successfully collected along a transect from Royal Bay to the outer continental block, recovering sediments suitable for constraining past changes in ice and climate.
Water sampling objectives:	
- To collect new surface water samples from the Polar Front Zone in association with sediment coring in the Falkland Plateau, Shag Rocks and South Georgia regions in order to better constrain the taphonomy of biogenic proxies (specifically diatoms, foraminfera and biomarkers).	A selection of filtered and sieved samples collected at coring sites ensure that direct comparison can be made between the surface water and the sediment assemblages for the best opportunity to advance our understanding of the taphonomy of the diatom, foraminifera and biomarker assemblages

- To collect samples during transit utilising the USS to examine the composition of diatom, foraminifera and biomarker assemblages in austral autumn and CTD samples from the mixed layer and base of the thermocline to improve the low-temperature calibration of various biomarker proxies.	>100 samples of filter and sieved water samples were collected during JR257. The samples cover a wide spatial and temperature range and include approximately 30 samples from the mixed layer and thermocline to capture the significance of temperature and depth for different biomarker proxies.

Cruise track

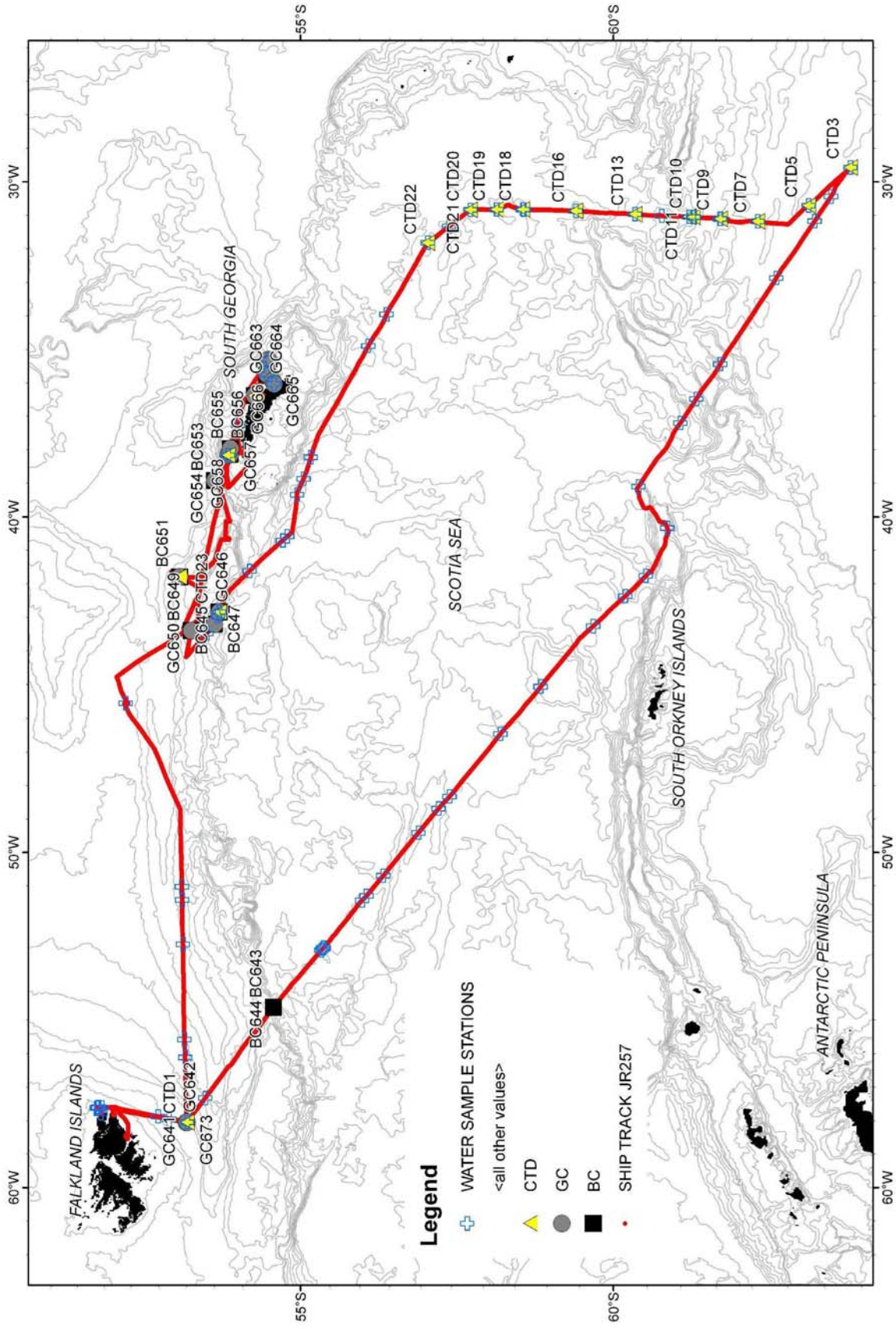

Figure 1: Map of cruise track and stations

Cruise Stations

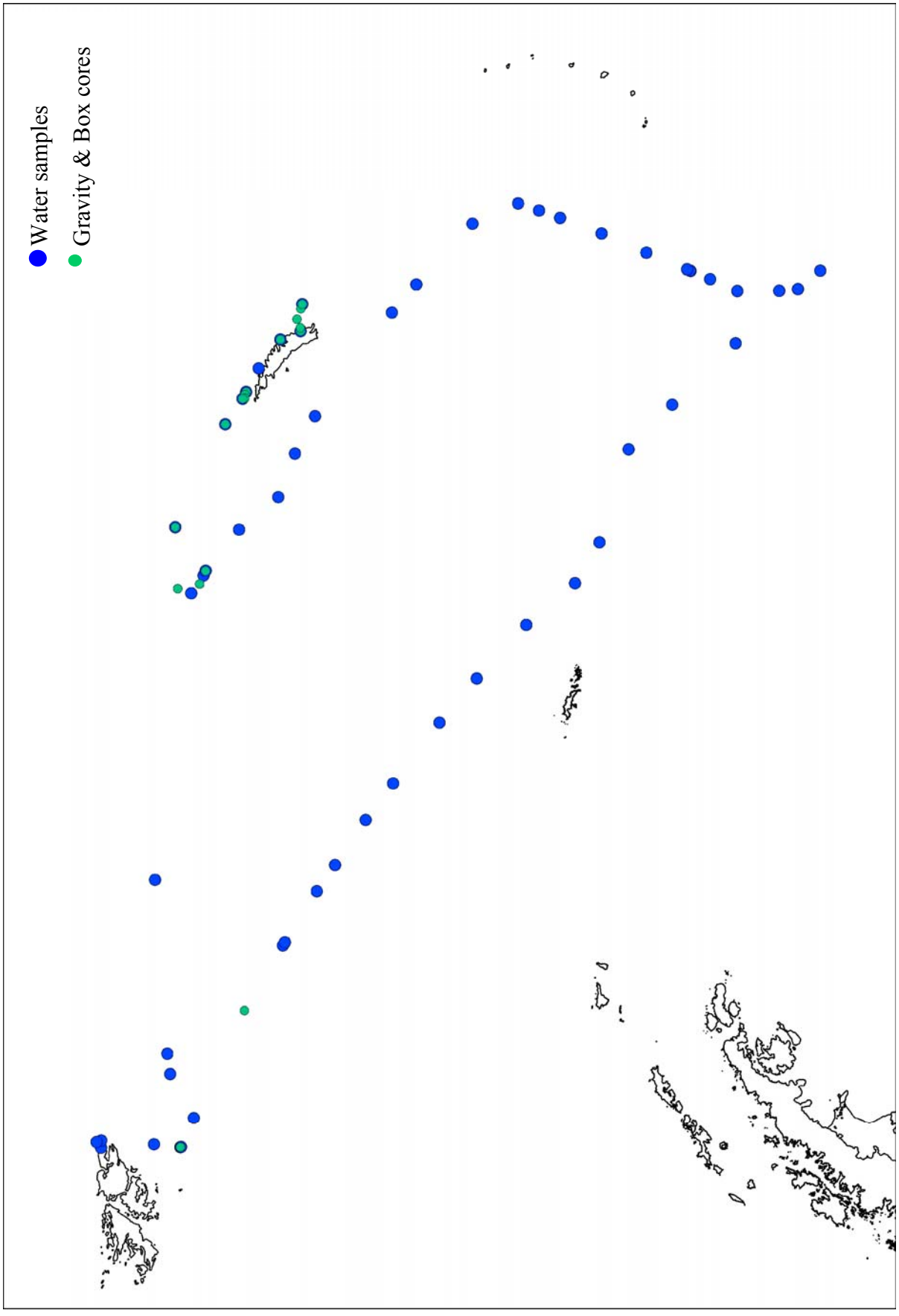

Figure 2: Map showing location of water samples and core sites.

Cruise participants:

Science Party (by Project):

Claire S Allen (JR257)

Victoria Peck (JR257)

Alastair Graham (JR257)

Hilary Blagbrough (JR257)

Mark Robinson (JR257)

Erin McClymont (JR257/CGS 82)

Hugh Venables (JR272)

Povl D Abrahamsen (JR272)

Karen Assmann (JR272)

Joana Beja (JR272)

Fred Wobus (JR272)

Margaret Yelland (JR254e)

Robin Pascal (JR254e)

Ian Brooks (JR254e)

Helen Czerski (JR254e)

Johnnie Edmonston (ITS)

Seth Thomas (AME)

Ships Complement:

Michael JS Burgan (Captain)

Timothy S Page (Chief Officer)

Wendy A O'Donnell (2nd Officer)

Alexander K White (3rd Officer)

Michael EP Gloistein (ETO Comms)

David J Peck (Do'Sci'Ops)

Duncan E Anderson (Chief Engineer)

Colin S Pickard (2nd Engineer)

Bobby L Slater (3rd Engineer)

Gareth M Wale (Deck Engineer)

Sean C Fuller (ETO)

Richard J Turner (Purser)

Albert Martin Bowen (Bosun)

Ian Raper (Bosun's Mate)

George A Dale (SG1A)

David A Phillips (SG1B)

Seamus MacNeil (SG1B)

James S Shearer (SG1A)

Mark S Walley (SG1A)

Matthew B Ashworth (MG1)

Francisco J Hernandez (MG1)

Ashley A Huntley (Chief Cook)

Jamie E Lee (2nd Cook)

Lee J Jones (Sr Steward)

Nicholas R Greenwood (Steward)

Graham Raworth (Steward)

Glyndor N Henry (Steward)

Timeline of cruise activities

21st March	Depart Brize Norton, UK
22nd March	Isle of Ascension stopover (14 hours)
23rd March	Arrive at Mount Pleasant, Falkland Islands
25th March	Arrive at Mare Harbour to join the RRS James Clark Ross
27th March	Depart Mare Harbour - boat drills, mobilise corer cradle and passage to JR254e site for short fetch buoy work
28th March	Continued JR254e buoy work off NE coast of Falkland Islands
29th March	Continued JR254e Buoy work off NE coast of Falkland Islands
30th March	Passage to JR257 Site 1 Falkland Plateau (Area 1), CTD 1, GC 641 and GC 642
31st March	Passage to JR257 Site 2 Falkland Plateau, (Area 6), TOPAS survey, BC 643 and BC 644; Passage to JR272 mooring site, east of South Orkneys
2nd April	Deployment of JR272 OP6 mooring buoy, JR254e buoy work, JR272 CTD 2. Passage to JR272 CTD transect
4th April	JR272 CTD 3 & 4; JR254e buoy work
5th April	JR272 CTD 5, 6, 7 & 8; JR254e buoy work
6th April	JR272 CTD 9, 10, 11, 12 & 13; JR254e buoy work
7th April	JR272 CTD 14, 15, 16 & 17; JR254e buoy work
8th April	JR272 CTD 18, 19, 20 & 21
9th April	JR272 CTD 22; Passage to JR257 Site 3 Shag Rocks (Area 30)
11th April	JR257 Site 3 Shag Rocks Area 30 TOPAS survey, CTD 23, BC 645 and GC 646; passage to Site 4, Shag Rocks Area 30 BC 647 and GC 648; JR254e buoy work; passage to Site 5 Shag Rocks Area 29
12th April	JR257 Site 5 Shag Rocks Area 29 TOPAS survey, BC 649, GC 650; JR254e buoy work; passage to Site 6 Shag Rocks Area 35/36
13th April	JR257 Site 6 Shag Rocks Area 35/36 TOPAS survey, BC 651, GC 652 & CTD 24; passage to Site 7 South Georgia Slope Area 38
14th April	JR257 Site 7 South Georgia Slope Area 38 TOPAS survey, BC 653, GC 654; continued TOPAS survey; passage to Bird Island
15th April	Bird Island Base Call; JR257 Church Trough, South Georgia Shelf TOPAS survey,

16th April	JR257 Site 8 Church Bay Trough, South Georgia Shelf BC 655, BC 656, GC 657; Site 9 GC 658; Site 10 GC 659, BC 660, GC 661; Site 11 GC 662, CTD 25; JR254e buoy work; JR257 passage to Royal Bay, South Georgia Shelf
17th April	JR257 Site 12 (Royal Bay Station 1a) GC 663 & GC 664; Site 13 (Royal Bay Station 1a) GC 665; Site 14 (Royal Bay Station 2) GC 666 & BC 667; Site 15 (Royal Bay Station 4) GC 668; Site 16 (Royal Bay Site 5) GC 669 & GC 670; JR254e buoy work; Passage to Cumberland Bay Trough, South Georgia Shelf, TOPAS survey
18th April	JR257 Cumberland Bay Trough TOPAS survey cont.; JR272 Cumberland Bay CTD transect; JR257 Site 16 Cumberland Bay Trough CTD 38 & BC 671; JR254e buoy work; passage to Bird Island
19th April	Bird Island Passenger Pick up; passage to Site 16 Cumberland Bay Trough, JR257 GC 672 & GC 673.
20th April	King Edward Point Base Call; passage to JR257 Falkland Plateau Area 17 survey
21st April	Passage to JR257 Falkland Plateau Area 17 survey
22nd April	JR254e buoy work; Passage to JR257 Falkland Plateau Area 17 survey
23rd April	Passage to JR257 Site 1 Falkland Plateau
24th April	Passage to JR257 Site 1 Falkland Plateau, GC 674 & GC 675; passage to Stanley; Arrive at FIPASS, Stanley.

2. Cruise Activities (CA, VP, AG, EM, HB, MR)

Swath Bathymetry and TOPAS surveys (AG)

The Kongsberg EM122 multibeam echosounder was used in conjunction with the Kongsberg TOPAS PS18 parametric sub-bottom profiler, during cruise JR257, to map out new areas of sea-floor bathymetry and to survey the geology of the shallow sub-surface.

Both sonars were operated near-continuously during periods of work, and whilst on passage between stations. The main use of the EM122 was to obtain detailed swath bathymetry in areas proposed for coring, to identify geological features that would provide a context for recovered sediments. The TOPAS profiler was used to survey and subsequently pin-point suitable sites for deploying the BAS gravity and box corers.

2.1. Summary of surveys

EM122 swath bathymetry data were recorded to 4 individual surveys during cruise JR257. These comprise lines of data collected in similar working areas that should make future interrogation and gridding of the data simpler. The surveys are summarised as follows:

jr257_a	Passage from FI – Falklands Plateau – Passage to South Orkney Deep/Weddell Sea Lines of data acquired: 125
jr257_b	End of CTD transect – Shag Rocks – main coring initiative Lines of data acquired: 122
jr257_c	South Georgia shelf working areas (activated, stopped) Lines of data acquired: 107
jr257_d	Passage from South Georgia – FI Lines of data acquired: 72

Alongside EM122 data, TOPAS surveys were recorded simultaneously to individual time-stamped files set to increment every hour. TOPAS profiler data were collected routinely in all working areas. However, data were only logged intermittently for the initial passage from FI to the South Orkney Deep, to allow time for training and for

cruise participants to become familiar with software operation. In total, we collected 267 lines of raw TOPAS data.

2.2. EM122 - Sound Velocity profiles

EM122 swath bathymetry data were depth-converted in the SIS software using sound velocity profiles obtained from CTD casts and existing CTD/XBT deployments, implemented via the built in SVP Editor and applied via the SIS 'Runtime Parameters' tear-off screen. SVP's were switched frequently appropriate to the working area and to the water masses therein. A table of all profiles loaded during the cruise is given in the table below.

Date/Time (GMT)	Lat	Lon	CTD or XBT profile used
30/03/2012 03:48	-51.38823	-57.63675	JR259_T5_0001.asvp
30/03/2012 16:55	-52.97448	-58.02522	JR272_CTD001_thinned.asvp
01/04/2012 01:36	-55.53856	-52.52596	JR259_T5_0002.asvp
02/04/2012 11:14	-60.56454	-41.63705	ES31_ctd115 (Orkney Passage).asvp
04/04/2012 00:12	-62.06086	-33.79073	JR239_CTD070_thinned.asvp
08/04/2012 22:42	-57.45823	-31.32713	JR272_CTD020_thinned.asvp
09/04/2012 05:44	-57.0861	-31.91294	JR272_CTD021_thinned.asvp
12/04/2012 00:12	-53.17745	-43.8316	JR272_CTD023_thinned.asvp
13/04/2012 19:25	-53.29695	-41.61773	JR272_CTD024_thinned.asvp
14/04/2012 18:44	-53.52889	-38.92328	JR272_CTD024_thinned.asvp reactivated
21/04/2012 09:37	-53.60233	-39.39012	JR272_CTD023_thinned.asvp reactivated
22/04/2012 17:17	-51.89299	-45.53947	JR260b_T5_00002_thinned.asvp
23/04/2012 11:20	-52.90672	-49.98793	JR259_T5_0001.asvp reactivated

Table 1. Sound velocity profiles used with the EM122 multibeam echo sounder on cruise JR257. Time applied and ship's position also given.

2.3. Survey Narrative

A narrative of JR257 geophysical surveys is best described in terms of work plans at each (or each set of) coring stations. Detailed objectives for surveys/sites are given in the cruise introductory material and are not repeated in full here. About a week of buoy work around the Falkland Islands followed initial departure from FI, before our passage South. The EM122 and TOPAS were not pinging or logging while near-shore, as the ADCP was needed for short-fetch work. We headed South and sonars were started on JD90 (30/3/2012) at 0408Z. Summary of areas surveyed for coring sites during cruise JR257:

Falkland Plateau
Shag Rocks
NW South Georgia slope
Church Bay Trough, NW South Georgia
Royal Bay, NE South Georgia
Cumberland Bay, South Georgia

Most of these areas were identified during pre-cruise research as locations containing sedimentary units. The table below gives the surveyed areas and their corresponding pre-cruise location ID's.

Area		**Pre-Cruise Location IDs**
Falkland Plateau	Central Southern	Area 1 Area 6
Shag Rocks	Southern Western Northern Eastern	Area 30 Area 29 Area 35/36 None
NW South Georgia Slope		Area 38
Church Bay Trough, NW South Georgia		None
Royal Bay, NE South Georgia	Fjord 1 Fjord 2 Inner shelf Mid-outer shelf Outer-shelf	Station 1a Station 1b Station 2 Station 4 Station 5
Cumberland Bay, South Georgia	Inner shelf	None

Table 2: Details of coring areas – with pre-cruise planning identifiers and cruise references

i) Falkland Platean (Area 1)

Our first site was reached within half a day of leaving the JR 254e work in the Falklands region. This was a repeat station of a site cored on cruise JR244, to the Weddell Sea, in 2011. No extra survey was carried out at this site, apart from a TOPAS line through the waypoint, which was used to provide precise positions for gravity coring. We also revisited this station on final passage back towards Stanley.

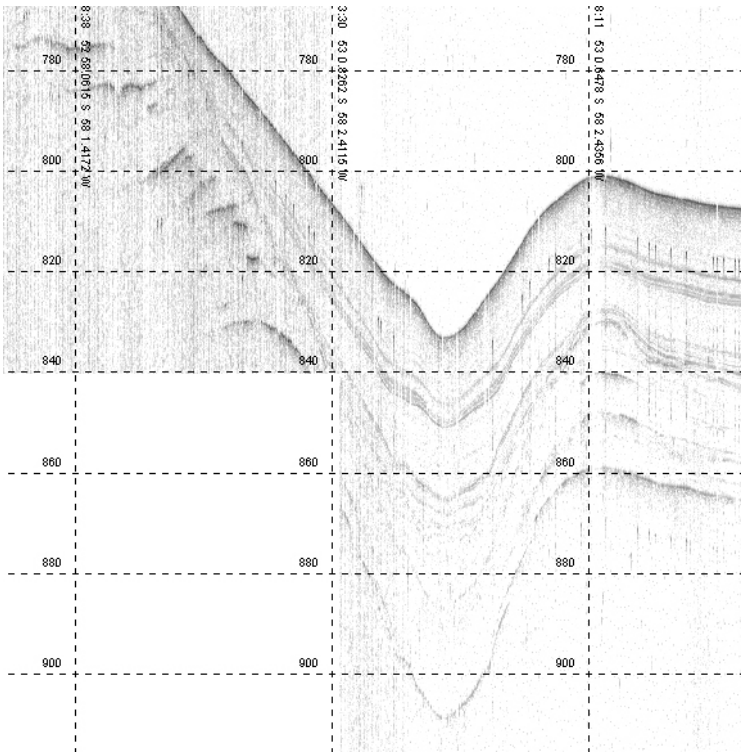

Figure 3. TOPAS profile from Site 1.

ii) Falkland Plateau (Area 6)

Site 2 is situated to the SE of Site 1, and was already known to be underlain by sediments, based on previous geophysical survey data obtained prior to the cruise and referenced as 'Area 6'. TOPAS surveys at Site 2 were conducted in a 'box' configuration around the site, to improve understanding of the 3D geometry of the sub-surface. Data confirmed a thick sedimentary deposit in the region. The sea-floor was highly penetrative on TOPAS, however, deployment of a BC indicated a sand-dominated sea bed. Sand composed of ~90% foraminifera, 10% terrigeous grains with very little matrix accounting for the deep acoustic penetration. A decision was made not to attempt GC recovery at the station.

Passage to the South Orkney Deep to deploy a mooring followed, running the EM122 routinely as before, pinging continuously with TOPAS but in this case logging only intermittently. TOPAS and EM122 were turned off for the entire CTD transect across the East Scotia Sea, towards South Georgia to minimise interference on the oceanographers ADCP transducer. Sonars were turned on again during approach passage to the next survey area around Shag Rocks.

iii) Shag Rocks (Area 30)

Our third and fourth coring stations were located on the southern flank of Shag Rocks and referred to as 'Area 30', identified from existing sub-bottom profiler data collected by RRS *Discovery* in 1987 (D172). With only minimal existing SWATH and TOPAS cover, the site offered an opportunity to collect new swath bathymetry and sub-bottom data, in an area not previously visited by BAS ships. We conducted TOPAS survey in a 'box' configuration around the site, aiming to follow bathymetric contours and the more extensive flatter parts of the slope, in order to acquire the best possible sub-bottom information. Survey started at 0400z on JD 102 (11/4/2012).

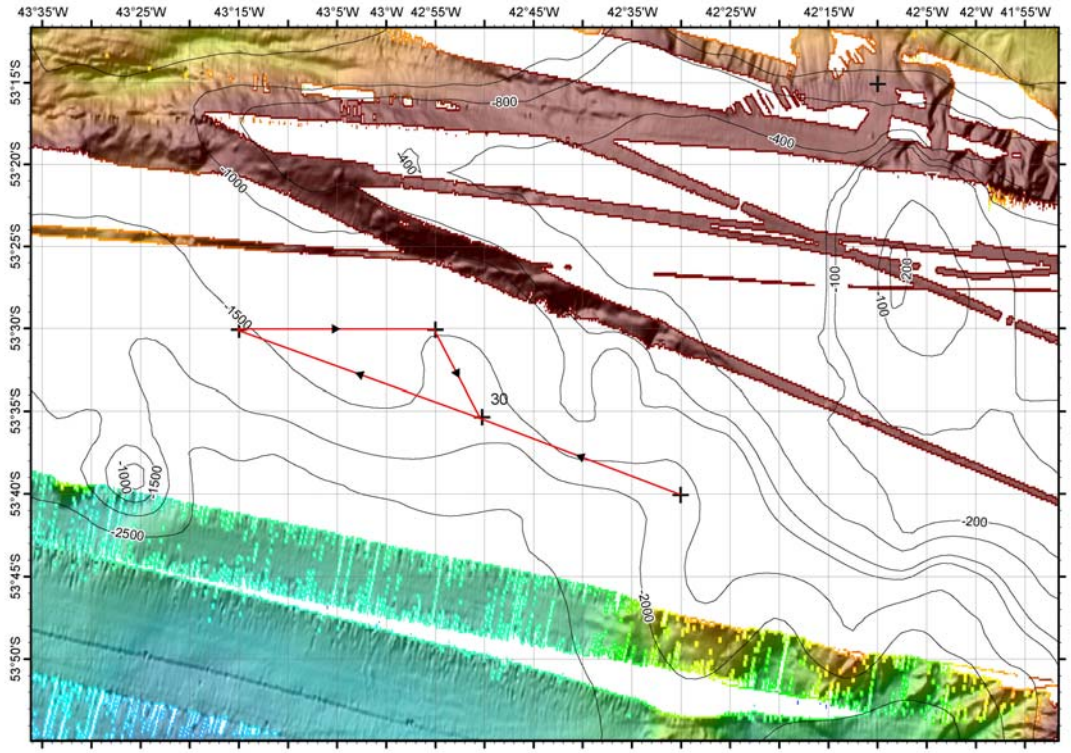

Figure 4 (above): Waypoints planned for survey of the southern flank of Shag Rocks (Area 30), with existing swath bathymetry data

Thick, previously unresolved sedimentary packages were found to characterise the southern flank of Shag Rocks slope. TOPAS penetration of up to 200ms was achieved in some parts.

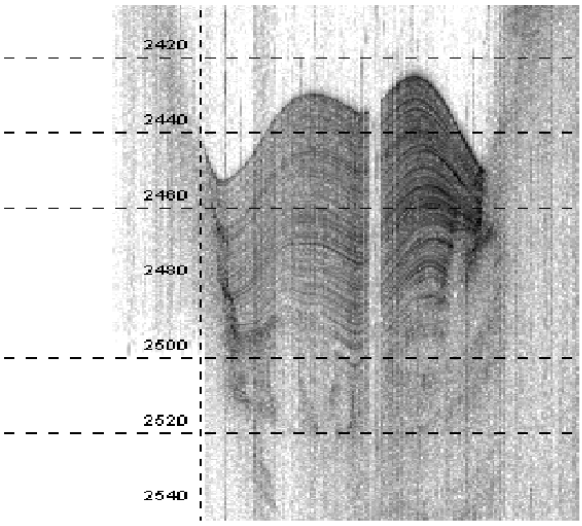

Figure 5 (left): Portion of TOPAS profile acquired at Site 3 (Shag Rocks Area 30) where BC 645 and GC 646 were recovered.

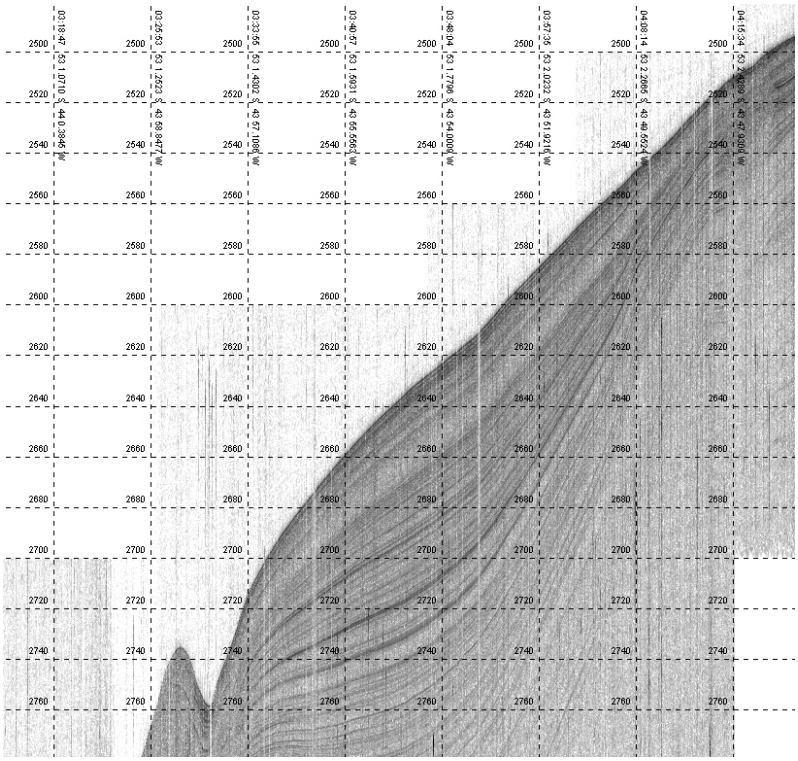

Figure 6 (left): Impressive slope sediments, west of Shag Rocks, near Area 29. Vertical gridlines are 10 minute intervals, horizontal lines are 20 ms intervals (twtt).

iv) Shag Rocks (Area 29)

Area '29', our fifth coring site was west of Shag Rocks, TOPAS imaging revealed further impressive sedimentary sequences on the slope. We noted that the sea-floor in

areas 29 and 30 was more reflective than at previous sites, but excellent penetration of the sedimentary stack suggested that a large proportion of the stratigraphy comprised sediments that were relatively unconsolidated, and potentially coreable. A bent core barrel at one site (GC648) confirmed that the near-sea-floor may be particularly sandy and winnowed on the western flank of Shag Rocks. However, there were mitigating circumstances to the deployment (see section 2.2.2ii) that undoubtedly contributed to the barrel damage and suggest that future coring efforts in this region may prove successful.

v) Shag Rocks (Area 35/36)

Areas 35 and 36 were located to the north of Shag Rocks. Here, we carried out further TOPAS surveys across two potential waypoints, terminating the survey line in deeper water to return to an identified coring station (Site 36) at shallower depths. Sedimentary packages characterise the northern flank of Shag Rocks, from which cores were successfully recovered. However, these units appear less extensive than to the south and west.

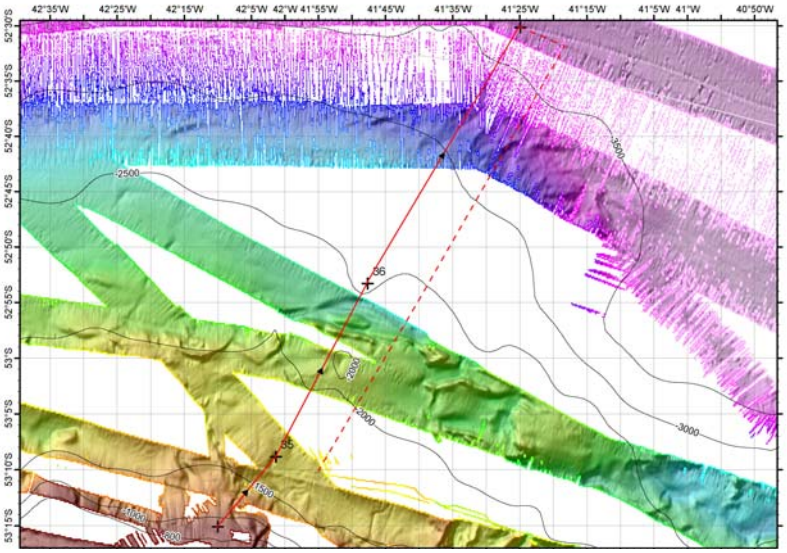

Figure 7 (left): TOPAS survey lines for sites 35 and 36, north of Shag Rocks.

vi) Shallow eastern flank of Shag Rocks

We surveyed the north-eastern flanks of Shag Rocks in a back and forth pattern, but found no sediment cover, after several (?) hours of survey, the decision was made to terminate the survey early and to head East to the NW South Georgia slope to the next pre-identified region of sediments in search of suitable sediments for coring.

vii) NW South Georgia slope (Area 38)

In nearly all parts, the sea bed was impenetrable on TOPAS, and thus likely rock-floored (see Figure below). Planned surveys across one site (Area 38) revealed some sedimentary fill, which were cored but resulted in a bent barrel and recovery of approximately 2 m of unconsolidated sandy mud with occasional gravelly layers, most likely pocket fill derived from down-slope processes.

Further TOPAS surveys were conducted up and across the slope, and then across the outermost shelf, to find sediments. The survey was cut short in order to make passage to Bird Island for base call and cargo work but had revealed no sediments along the survey lines.

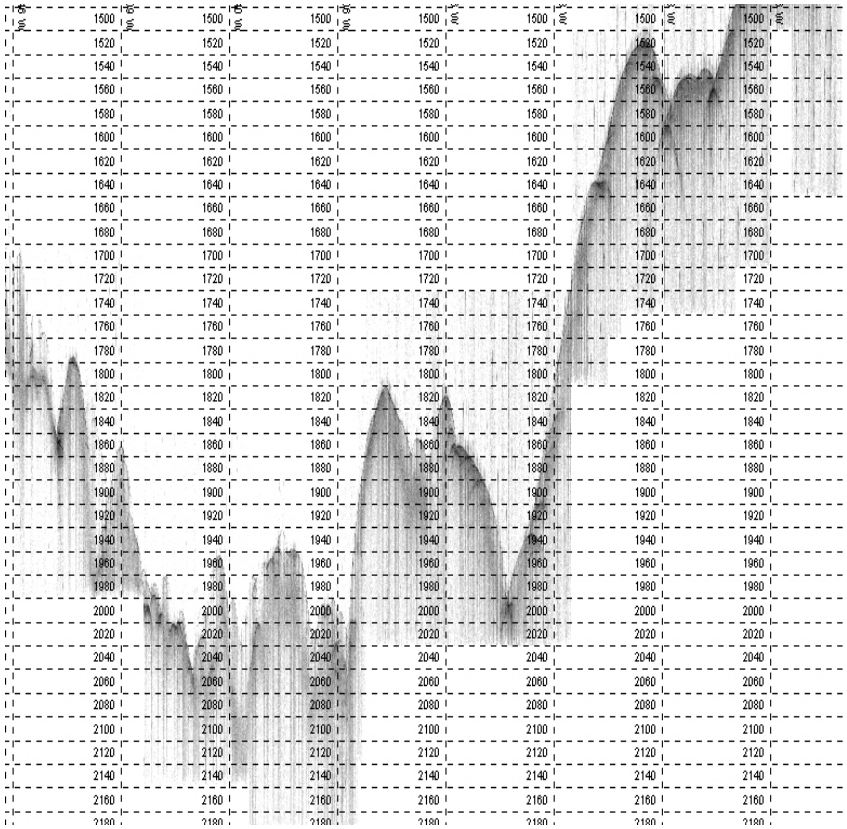

Figure 8 (left): Rock-floored seabed on the NW South Georgia slope. Vertical gridlines spaced at 7 minute intervals, horizontal lines are 20 ms intervals (twtt).

viii) Church Bay Trough, NW South Georgia shelf

Having been unsuccessful in surveying for sediments on the outermost shelf and slope NW of South Georgia, we made for an area of the South Georgia shelf where sediments were already known, from previous TOPAS surveys conducted opportunistically on cruise JR224. These existing surveys were limited to single crossings of a known trough that incises the continental block, termed herein as Church Trough (because it is

the seaward extension of the fjord that cuts through Church Bay). In order to achieve a better spatial coverage of the sediments that fill this trough, we devised a gridded survey pattern across the main trough trunk and two of its tributaries.

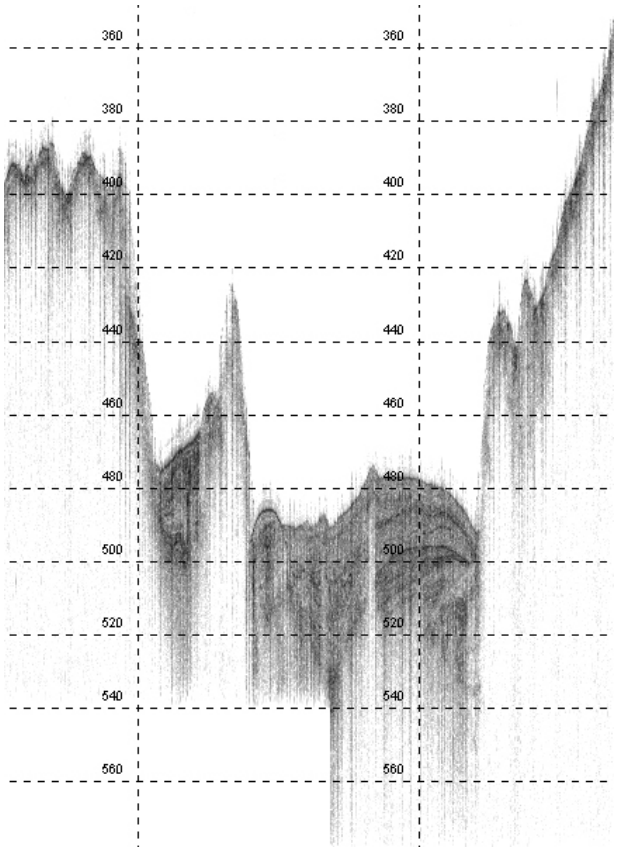

Figure 9 (left): TOPAS profile from Church Bay Trough on the NW South Georgia shelf (Sites 8-11), showing infill of sediments within the troughs and absence of material on intervening flanks. Vertical gridlines have a 10 minute spacing, horizontal lines are plotted at 20 ms intervals (twtt).

Thick sediments infill the floor of the trough and appear to thin out away from the coast. Their internal stratigraphy is mainly stratified but sometimes complex and occasionally disturbed. Sites were chosen in areas where the internal layering appeared coherent and conformable. One core site was chosen in the expanded part of the section, while a second targeted a more condensed part of the sequence. Sediments are largely absent outside of the trough (a pattern that we would later find repeated across the entire northern side of the South Georgia shelf – see Figure below).

ix) Royal Bay, South Georgia shelf

We transited to Royal Bay, on the north-eastern coast of South Georgia, where we planned to collect a series of 5 gravity cores along a 60-km long transect, from Royal Bay (East of South Georgia, on the island's northern coast) out across the South Georgia shelf, to look at the record of changes in the island's ice cap and climate

through time. The transect began at a priority site behind a large loop moraine in Royal Bay itself and proceeded to sites of decreasing priority away from the coast.
We acquired TOPAS data on the passage and approach into Royal Bay, following positions that would obtain new profiler data on the infill of the fjord and the character of the fjord-mouth moraine. We anticipated a thick sequence of sediments in the embayment, suitable for long-core recovery (similar to sites cored in inner shelf basins around the Antarctic margin and, for example, in the Norwegian/Svalbard fjords), and sure enough, discovered an expanded sequence of glacial and marine sediments, about 2-miles from the glacier front. We cored at a site on the seaward side of the moraine, based on new TOPAS data, then proceeded directly to a series of additional sites farther offshore, already identified from previous BAS-JCR geophysical survey lines. As well as obtaining 5 sediment cores in the 12-hour work period, we were able to obtain a continuous TOPAS profile from the glacier margin to the shelf edge, which will form a key piece of data for future study into the shallow stratigraphy of the eastern South Georgia shelf.

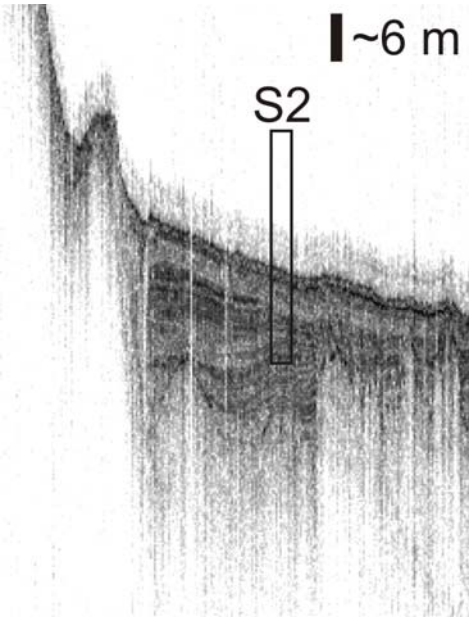

Figure 10 (above): Example of existing TOPAS profile over Royal Bay station 2 (Site 14) where GC666 was collected and recovered ~8 metres of sediment. Data from cruise JR224 (2009)

x) Cumberland Bay, South Georgia shelf

After the second base call at Bird Island and prior to cargo work at KEP, we focused overnight survey on the fjord mouth and inner shelf parts of Cumberland Bay. We collected various N-S TOPAS lines across the trough parallel to its axis, and at least one cross-line across the trough width. As with other troughs around South Georgia, we

found that 10's of metres of sediment infills the outer bay and an expanded part of this sequence was subsequently chosen for coring. This core will serve primarily as a record of climate and oceanographic change, but may also help constrain glacial history, if it can be reliably dated.

Sonars were turned off passage across the Falkland Islands Shelf, on JD 115 (24/4/2012), approximately 2 hours from port.

Gravity Coring (VP, CA, AG, MR)

The gravity corer was built in 2010 by P. Smit, Netherlands for the *Palaeo-Ice Sheets* and *Quaternary Sediments* Workpackages and was used for the first time in the Antarctic on JR244, Jan-March 2011 following a successful North Sea trials cruise during the summer of 2010. On JR244 the gravity corer and gantry was set up to deploy barrel lengths of 3, 6, 9 and 12 m. During refit in 2011 reinforcement of the rail and repositioning of the davit winch enabled an additional 6 m length of corer cradle to be added enabling the gravity corer to be built to 18 m barrel length. Three additional 6 m barrels and a spare bomb were purchased for JR257.

2.4. Gravity Corer Set up

The 18m long corer cradle (aluminium framework), core bucket and davit winch were installed outboard of the ships rail on the starboard side of the vessel using the ship's crane. The rack for the corer barrels and liners, and handling trestles was installed on the aft deck and on the starboard deck respectively. The BAS gravity corer utilises a combination of 3 m- and 6 m-long steel barrels together, the top end of which is nailed to a bomb weight. 3 m, 6 m, 9 m, 12 m and 18 m barrel configurations were all deployed during JR257. Inside the barrels pre-marked core liners (taped together for deployments >6 m and with arrows pointing up and labelled from A1-6, B1-6, C1-6 depending on the configuration and length of the barrels deployed) [*note: the liners had to be cut significantly shorter than the corresponding barrels, e.g. only a ca. 2.70 m-long liner fits into a 3m barrel and only a ca. 5.40 m long liner fits into a 6m-barrel, etc.*], were inserted followed by a core catcher with a polythene bag liner (inside the base of the bottom liner) and a retaining valve (inserted at the top of the liner closest to the bomb). The steel valve was modified between sites GC652 and GC654 by the addition of a tapered attachment inside the top of the liner with the rationale that 'funnelling' water out of the liner through the valve may increase the speed/efficiency with which water can escape the liner, allowing more sediment to be recovered. See further discussion on this below. Core catchers G, H and I (J, same rating as I; overall rating A to K with K being the stiffest) were used. G became partially inverted at GC646 (?) and I became the preferred catcher for the relatively soft sediments encountered on JR257. A polythene bag with the bottom cut off was wrapped around the outside of the catcher to minimise sediment wash-out on all deployments.

2.5. Deployment and recovery

The complete corer assembly was lowered to the vertical position using the electric winch mounted on a davit, which is attached to the aft end of the corer cradle. The bomb weight retaining pin was removed and the corer was then lifted out of the bucket with the crane. The corer was then transferred by crane to the core docking bracket mounted on the deck beneath the midship winch. From here the winch cable was attached to the bomb and the corer was lowered to the sea floor. On recovery, the corer was placed back in the docking bracket for the winch cable to be removed and the crane was then used to transfer the corer back onto the corer cradle. Once the bomb was safely in the bucket with the retaining pin replaced, the framework was then pulled back up to its horizontal position with the davit winch. The uppermost barrel was then disconnected from the bomb weight manually, using a wooden beam to support the weight and allow the adjoining barrel to slide off the collar of the bomb more easily. The barrels were then transferred to the trestles for the liner to be recovered and cut into 1 m sections. End caps were placed on the base of each section and sections were then transferred to the wet lab where they were cleaned and a sample was collected from the top of each section by scraping a spatula across the top of the exposed sediment. End caps were then placed on section tops and both end caps were thoroughly taped prior to all sections being labelled and stored in the cool store prior to magnetic susceptibility measurement.

Areas	**Pre-Cruise Location ID**	**JR257 Site ID**	**Deployments**
Falkland Plateau	Area 1 Area 6	Site 1 Site 2	GC 641, GC 642 BC 643, BC 644
Shag Rocks	Area 30 Area 30 Area 29 Area 35/36	Site 3 Site 4 Site 5 Site 6	BC 645, GC 646 BC 647, GC 648 BC 649, GC 650 BC 651, GC 652, CTD 24
NW South Georgia Slope	Area 38	Site 7	BC 653, GC 654
Church Bay Trough, NW South Georgia	None	Site 8 Site 9 Site 10 Site 11	BC 655, BC 656, GC 657 GC 658 GC 659, BC 660, GC 661 GC 662, CTD 25
Royal Bay,	Station 1a	Site 12	GC 663, GC 664

SE South Georgia	Station 1b Station 2 Station 4 Station 5	Site 13 Site 14 Site 15 Site 16	GC 665 GC 666, BC 667 GC 668 GC 669, GC 670
Cumberland Bay, South Georgia	None	Site 17	CTD 38, BC 671, GC 672, GC 673

Table 3: Pre- and post-cruise references for each deployment location.

i) Falkland Plateau (Sites 1 & 2)

Re-coring at site 1 with an 18 m barrel recovered the same ~7.3 m length of core (GC 641) as recovered on JR244 using a 12 m barrel length. We moved up slope by ~20 m water depth to where the sediment sequence was more condensed and redeployed the 18 m barrel (GC 642). Although on board analyses showed that we had penetrated considerably older sediments in GC 642, the recovery was 7.35 m of sediment.
The gravity corer was not deployed at Site 2 on the southern flank of the Falkland Plateau/Burdwood Bank owing to unsuitable sediments (see box coring section - BC 644).

ii) Shag Rocks/eastern North Scotia Ridge (Sites 3, 4, 5 &6)

GC 646 (Area 30). TOPAS at the site (1780 m water depth) displayed a soft surface reflector and underlying sediment layers could be identified to ~100 m. BC 645 confirmed soft surface sediments consisting of foraminifera-bearing diatom ooze. The 18 m deployment recovered 9.7 m of diatomaceous mud which was found to contain planktonic foraminifera in all section top samples.
GC 648 (Area 30). Upslope from GC464 at 1400 m water depth the 18 m corer was deployed following the recovery of similar surface sediments (BC 647) to BC 645/GC 646. However, the lower of the three 6 m barrels was recovered bent beyond repair. We suspect that a strong surface reflector in the sub-bottom profile may have been generated by a coarse sand/gravel layer within the upper few 10s of cm of the sediment. This deployment was likely also affected by a brief loss of winch traction control and an accelerated veer of the corer immediately above the sea floor and we suspect that had the normal veer speed been maintained that the core barrel may not have been so damaged.

GC 650 (Area 29). Another package of sediments of several 10s of m deep was identified in the TOPAS at 1800 m water depth. Recovery of foraminifera-bearing diatom ooze in BC649 preceded deployment of an18 m gravity core in which 11.56 m of sediment was recovered. GC 652 (Area 36). An expanded sediment sequence identified in the TOPAS at 2500 m water depth. BC651 recovered diatom ooze with very few calcareous foraminifera. A 12 m corer was deployment which recovered 9.88 m. Few foraminifera were identified in the section-top samples of the diatom muds recovered at this site.

iii) NW South Georgia Slope (Site 7)

GC 654 (Area 38). A small sediment package trapped behind a ridge on the NW South Georgia slope at 2700 m water depth was the deepest site on JR257. BC 653 recovered diatom ooze devoid of planktonic or benthic foraminifera. A 12 m barrel was deployed but the lower 6 m barrel was recovered bent beyond repair. The sediment recovered from the lower barrel was discarded as it was not known to be stratigraphically intact. More expanded sediments up slope of this site were identified on the transit back to Stanley which may make more successful coring targets.

iv) Church Bay Trough (Sites 8, 9, 10 & 11)

GC 657 and GC 658, 6 m and 12 m respectively. GC 657 recovered 5.23 m and GC 658 recovered 5.13 m. Moved to the west for GC 659, a 12 m deployment which recovered 5.23 m of sediment. GC 661, 18 m deployment recovering 7.65 m of sediment. GC 662 6 m deployment in pinch out, recovered 5.19 m of sediment.

v) Royal Bay Transect (Sites 12, 13, 14, 15 & 16)

GC 663 and GC 664 (the first a 6-m deployment, the second a 12-m attempt) were recovered from Site 12, where a thick sediment package had been identified within the inner fjord, closest to the modern glacier front. The two deployments recovered cores of 5.165 m and 4.625 m length respectively and comprised grey, terrigenous-rich mud. GC 665 was recovered seaward of the inner basin moraine, recovering 2.47 m from a 9-m deployment. GC666 recovered 8.13 m from the outer fjord mouth, from a further 12-m deployment, and GC668, from the middle shelf, recovered 1.77 m from a 3-m deployment. Several attempts to core on the outermost shelf yielded no recovery, with gravel in the core catcher.

vi) Cumberland Bay (Site 17)

GC 672 and CG 673, 9 and 15 m respectively. GC 672 recovered 6.17 m and GC 673 recovered 8.84 m of sediment.

vii) Return to Falkland Plateau (Site 1)

GC 674. A 9 m corer was veered into the sediment the site of GC642 at 20 m/min with the modified valve. Only 6.63 m of sediment was recovered, less than previous deployments at this site without the modified valve but those had been deployed at 35 m/min which consistently recovered ~7.3 m. It was considered that 20 m/min was too slow and the winch trace suggested that the cable may have restrained the corer, preventing it from penetrating the sediment in one motion. The 9 m corer was redeployed at 35 m/min. The trace suggested a clean penetration in to sea floor but only 6.08 m of sediment was recovered. The corer conundrum continues!

Box Coring (VP, CA, AG)

2.6. Box core sampling

When water had not drained off prior to sampling, the three core liners (~1 m in length and 57 mm diameter) were inserted into the sediment before the BC was drained so that the surface sediment would remain undisturbed in the liners while the water was drained. Instead of siphoning the water with several long plastic tubes (use of a special tool nicknamed “octopus”), the spades were opened slightly and a hole was pushed through the recovered sediment with a hollow pipe and water was allowed to drain from the top of the core. Usually, this technique allowed the drainage of the excessive seawater with only a very minor disturbance of the sediment surface. Once excess water had been removed, a photograph was taken of the sediment surface. With the sub-core liners in place and excess water removed a hoe was used to collect the sediment surface (upper ~2 cm) and transfer to 2 or 3 sample bags depending on how much undisturbed sediment surface could be collected. The spades were then opened slowly until the central sub-core liner could be pushed through the opening. The sub-core was capped at the base as soon as the liner emerged through the spades and then pushed back up through the box corer. This process was repeated for all 3 sub-cores. Each sub-core was stored in an upright position in the lab to allow sediment to settle, prior to excess water within the liner being gently decanted off.

We consider sub-core sampling using three 57 mm diameter transparent liners to have been a quicker, more practical and safer method than the use of the 110 mm GC liners on JR244 which allowed only two sub-cores to be collected, where the hinge always needed to be removed to get the liners into the ‘box’ and getting the end caps on the wider, heavier samples was more difficult and made recovery of the sub-cores more problematic also. The transparency of the tubing also allowed those involved in collecting the sub-cores a better visual of the sample and the amount of core recovered. Once any excess water water was decanted off, all the sub-cores were frozen to prevent any disturbance/loss of sediment when the liner was cut down to size using a handheld vibrosaw. The subcores were then thoroughly tapped and labelled X, Y, Z, longest to shortest. Subcore X was stowed in the +4 °C store. Subcore Y was sliced into 1 cm sections while frozen and each section was individually bagged and stowed in the +4 °C store. Subcore Z was stowed in the -20 °C. A sub sample of the surface sample was

sieved in sea water through a 63 mm sieve and left in a 1 g:1 l Rose Bengal:sea water solution for 24 hours before rinsing in seawater until the water ran clear and then finally rinsed in MilliQ water before being dried at <40 °C.

2.7. Box Coring Narrative

We box cored at each new area to assess the suitability of the sediment for gravity coring and to recover intact surface sediment samples to allow proxy calibration with modern/recent conditions.

The box corer was not used at site 1 (GC641 and GC642) as this site had been box and gravity cored during JR244 and because we were familiar with the sediments at this site we were happy to deploy the GC straight away at this site. The BC was deployed for the first time during JR257 at site 6. In this instance the BC (BC643) failed to trigger, most likely due to the box corer reaching the sediment surface at an angle due to strong bottom currents (see equipment performance section). The second deployment of the BC at site 6, BC644 successfully recovered a foraminifera-sand (~90% foraminifera, 10% terrigenous) with very little matrix suggesting that the strong bottom current was winnowing the sediment Due to the sandy nature of the sediment and the apparent strength of the bottom current the GC was not deployed at this site.

The BC was used again at the Shag Rocks/eastern North Scotia Ridge0. to recover foraminifer-bearing (planktonic and benthic) diatom ooze at sites BC645, 647, 649, all at water depths <1800 m. BC651 recovered diatom ooze from 2540 m that did not bare any foraminfera. BC653 from the NW South Georgia slope, ~2700 m water depth, also recovered diatom ooze devoid of foraminifera.

On the South Georgia shelf, clay-rich sediments bearing diatoms, planktonic and benthic foraminifera and terrgienous material ranging from fine sand to gravel/cm-sized drop stones were recovered from a series of glacial trough deposits. BC655 failed to trigger once again (see below) whilst BC656 and BC660 recovered surface sediments upto 0.19 m thick from the Church Bay Trough (ChBT) on the NW South Georgia shelf. BC667 was deployed at site 2 of the Royal Bay trough transect and recovered surface sediment 0.18 m thick. BC671 recovered 0.25 m thick surface sediments from the trough at the entrance to Cumberland Bay.

Water Sampling (EM, VP, CA)

Water samples were collected throughout the cruise for the analysis of surface water phytoplankton and zooplankton assemblages and for organic geochemistry proxy calibrations. Water was collected from the uncontaminated sea water supply (USS; intake at 6 m water depth) during transit and at selected coring locations. Organic geochemistry samples were also collected from 'CTD' casts.

i) Uncontaminated Seawater Supply (USS)

All USS samples were taken from the sink in the radiation lab which is closest to the inlet valve of the USS and where the ocean logger analysers are located. When sampling during transit, either 1 litre (diatoms) or 30 litres (3 x 10 jerry cans, biomarkers) was collected and logged according to the time at the start of sampling. Bottles were rinsed with the flowing USS before filling with the next sample. For biomarker samples it could take up to 15 minutes to fill the three jerry cans; the start time was entered into the logs. For foraminifera analysis, a 63 μm sieve was hung beneath the USS supply for at least 1 hr whilst on station. During transit, samples were collected at regularly spaced intervals or where changes to sea surface properties could be detected from the oceanlogger.

At coring stations where a CTD was not deployed, the USS was sampled to gain insight into surface water properties at the site of interest. Bottles were rinsed with the flowing USS before being filled with the new sample, and logged as above.

Since organic geochemistry analysis (biomarkers) requires the detection of very low abundances of compounds in waters or sediments, it was also important to constrain background levels of organics or plastics within the USS sampling procedure. On two occasions during the cruise 30 litres of de-ionised water from the ships supply was collected in the jerry cans and filtered following the standard procedures described below. The filter papers will be treated as samples and analysed by the same laboratory methods in Durham University.

ii) CTD

A Conductivity-Temperature-Depth (CTD) unit and 24 bottle rosette was used to vertically profile the water column and collect water for organic geochemistry analysis. Beyond the three coring stations for JR257 (CTD sites 1, 24, 25) CTD deployment was

planned and administered by scientists on JR272 (see Report JR272), traversing the Scotia Sea between the northern Weddell Sea and South Georgia. The majority of the JR 257 CTD samples are focused along this transect of sites, collecting samples from every second or third CTD deployed by JR272. JR257 utilised water from 15 deployments by JR272; in total 25 CTD casts were deployed during the full cruise schedule (see Figures 1 & 2 and Annex 6.4 for sites).

The CTD also included a fluorometer, an oxygen sensor, a photosynthetically active radiation (PAR) sensor, a transmissometer and an altimeter. Water samples were collected in the 10 L capacity Niskin bottles. The depth of collection for the organic geochemistry analyses depended on the expression of the mixed layer and seasonal thermocline as observed with each deployment. At all stations, a "mixed layer" sample (ranging from 10 – 40 m depth) and a thermocline sample (ranging from 60 - 110 m depth) was collected. 3 x Niskin bottles (i.e. ~30 litres) of water was collected for each of the mixed layer and thermocline samples.

2.8. Phytoplankton assemblage and concentration studies.

250 ml of each USS water sample was filtered using 0.2 µm Whatman Anodisc Filter Membranes on a fritted glass filter manifold and drained into a carboy reservoir using a vacuum pump system. To prevent excess salt from crystalising on the filters each sample was filter-rinsed with 100ml of de-ionised water. Filters were placed in clean, annotated, 50 mm plastic Petri dishes for protection and storage. Samples will be analysed using a light microscope or Scanning Electron Microscope.

Figure 11: Example of organic rich filter

2.9. Zooplankton assemblage studies.

A 125 µm sieve was placed under the USS outlet to collect diatoms and other plankton. The sieve was rinsed with de-ionised water, and the residue was then transferred to a plastic petri dish and dried in the oven at 38 °C. Planktonic foraminifera and pteropods were picked from the dried sample into specimen slides.

2.10. Organic geochemistry proxy calibrations.

For each USS or CTD sample, up to 30 litres of sea water were filtered through 3 pre-furnaced (450 °C) 0.7 μm glass fibre filters. Filters were rinsed with ~100 ml of de-ionised water, folded into clean aluminium foil, and placed into labelled 50 mm petri dishes. Each petri dish was individually sealed and stored in the -20 °C freezer. In total, 11 USS filters, 15 CTD mixed layer and 15 CTD thermocline samples were obtained during the cruise (Annex 6.5). Samples will be freeze-dried, solvent-extracted, and the lipids analysed by gas chromatography and liquid chromatography. This will characterise and quantify plankton- and microbially-sourced organic matter in the surface waters. There were noticeable visual differences in sample colour and the material collected on the organic geochemistry filters during the cruise; these included very organic-rich samples close to South Georgia (Figure 11) and small krill and worms collected in the CTD water samples (Figure 12). The collected samples span a measured sea-surface temperature range of -1.4 to 9.0°C.

Figure 12: Example of filter of CTD water containing a small marine invertebrate

3. Equipment performance

3.1. EM122 multibeam echosounder

The EM122 performed well during the cruise. There is a continuing problem with noise leading to 'rails' in the outer beams of the swath, that was noted previously on JRtri006 during equipment trials, and for which recommendations have already been made. Occasional individual or groups of 2 or more missed pings were also noticed during the cruise, leading to gaps in the swath coverage along-track. The gaps may have stemmed from missed triggers in the SSU, but the source of the problem was not discovered on the cruise. We experienced several crashes of the EM122 unit during the cruise, but these were certainly less frequent than in the older EM120 system, and were easily resolved with manual reboot of the sonar and control interface.

3.2. TOPAS sub-bottom parametric profiler

The TOPAS sub-bottom profiler, with a new top-end and interface, performed well. The thermal plotter linked to the TOPAS unit is now out-dated and requires replacing with a suitable reliable plotter. Frequently, we were unable to produce a hard-copy of the TOPAS raw data, which is an essential first-order backup in case of digital data loss.

3.3. Gravity Corer

During JR257 a total of >120 m of sediment was recovered from 23 gravity corer deployments.
However, similarly to JR244, the core recoveries during JR257 were frequently relatively low when compared to the penetration of the corer, especially with 12 m and longer barrel lengths. 6 m barrel lengths recovered >80 % recovery on 3 of the 4 deployments, 9 m barrels achieved >70% receovery on 2 of the 3 deployments.
The recovery rate, i.e. the ratio between core recovery and penetration depth for the BAS gravity corer cannot be calculated for many depolyments as often there was no sediment on the outside of the barrels to indicate penetration depth. On the South Georgia shelf a dirty bomb on 6m and 9 m deployments indicated full penetration and on these occasions the corer achieved xx % recovery. Deployment of a 12 m barrel at the same sites also resulted in a dirty bomb, indicating full penetration, but a similar

core length to that achieved from the 6 m barrels was recovered. Core recovery during JR244 was 47.8% [*note: the recovery rate was only calculated for sites, where a) the penetration depth was recorded, b) the recorded penetration depth was >0 m, and c) the recorded penetration depth is reliable; the shorter length of the liners in respect to the deployed barrels for the BAS corer used on JR244 was also taken into account*].

Changes to coring set up since JR244

i) Docking bracket:

Use of docking bracket to hold corer during transfer from crane to winch. Slower than union purchase Also union purchase keeps bomb lower, less likely to get shipside of restraining cable (at least with the longer core barrels)?

ii) Transparent core liners:

Better visual on recovery but become brittle at low temperature (at and below freezing) NB. box core liner material much more durable in cold conditions (can with stand freezing without going brittle)

iii) USBL/Beacon:

Used and lost during gravity corer deployment… The consensus was that the USBL unit hooked onto the cradle retaining cable on deployment. Purpose? Ship to change position before/after GC penetrates sea floor or will ship reposition only if high pull out experienced? Ensure corer does not get ship side of the restraining cable – amend coring procedure

iv) Modifications to bomb:

On JR244 the shoulder on the bomb flight was tapered to prevent the cable from becoming trapped around the bomb when the GC was hauled out of the sea floor. This modification and the insertion of a set to the top of the pin on the bomb (so that the shackle to the winch cable will sit vertically) were requested when the second bomb was ordered from Smit. Smit made neither of these modifications to the new bomb and the flight has not been modified during JR257 since it was not required to be used. Also a USBL mounting plate has been added to the new bomb which protrudes beneath the flight and may also be considered to be a snagging hazard for the winch cable.

Modifications to prevent snagging of the winch cable should be considered prior to deployment of this bomb in the future.

Addressing the issue of penetration> recovery…. The 'hydraulic lock'

i) Valve modification

It is considered that the relatively small aperture of the valve in relation to the cross sectional area of the liners limits the speed with which water is able to escape the liner, restricting the amount of sediment that the corer can recover. While we are unable modify the valves aperture size onboard, Mark Robinson fashioned a tapered attachment for the value (from one of the nylon plunger heads) to act as a funnel, minimising turbulence and resistance to water escaping out of the liners.

ii) Veering speed

Continued consideration of the necessity to displace the water occupying the liners to allow improved sediment recovery led to experimenting with slower veering speeds, giving the water more time to escape the liners and reducing the turbulence that an higher impact speed would generate around the valve. On JR244 the GC was typically deployed at ~50 m/min. On JR257 a veering speed of ~20 m/min was favoured. Revisting site 1 and using the valve attachment and 20 m/min veer still only achieved a recovery of 7.3 m.

iii) Dwell Time

Once the drop in cable tension indicated that the GC had reached the sea floor and excess cable was let out, the GC was left to 'settle' within the sediment for at least 2 minutes before hauling.

Problems

i) Bent barrels

Two 6 m barrels were bent beyond repair on JR257. The lowest of the three 6 m barrels (all new) was bent on the deployment of GC648. Coarse sand/gravel was recovered in the core catcher suggesting the presence of a shallow sandy horizon within the sediment. In addition the winch lost traction as the GC approached the sea floor increasing the veer speed to >70 m/min immediately prior to impact with the sea floor.

The upper 2 barrels were not damaged and remained in action. An angle grinder was used to cut the bent barrel into two.
At GC654 the lower of the two 6 m barrels was bent. On this occasion the GC was veered in at 22 m/min. An angle grinder was used to cut the bent barrel into three sections and recover the liner. Over 1 m of unexpectedly stiff sediment had been recovered however, not knowing if this sediment was stratigraphically sound (wash out, inversions etc.) this sediment was discarded.

ii) Barrels not fitting together

Barrels used on JR244 were problematic to fit together at the beginning of the cruise. Cleaning the inside and outside of the joins was essential and testing them on the spare male and female barrel ends. The three new barrels fitted easily together and were used most frequently in combinations until two of them were bent beyond repair.

iii) Weather and the crane (waves versus wind)

Weather initially prevented deploying the gravity corer in Area 29 and Cumberland Bay … we were able to collect cores from both of these sites later in the day once the weather had cleared trough.

3.4. Box Coring

The BAS box corer (BC; box dimensions: 30 cm x 30 cm x 95.5-97.5 cm) was used during cruise JR257 to recover undisturbed surface sediments.. The BC had been deployed on earlier cruises JR104, JR141, JR179 and JR244 (see related cruise reports), where it had proven to be a reliable corer. During cruise JR257 the BC was deployed at 12 sites and recovered a total of >29 meters of sediment. In general, the BC performance was satisfactory.

i) Water drainage

Although no obvious obstructions preventing the BC spades to fully close were observed, on several occasions the water above the sediment within the box core drained out through the spades prior to sampling suggesting that the spades did not make a water tight seal. In the past the box would usually remain filled with water above the sediment and need to be drained prior to sampling. The evacuation of water

in an uncontrolled manner may reduce the quality of surface preservation at some sites where surficial sediments are only loosely consolidated.

ii) Trigger failure

The BC failed to trigger at BC643 and BC655. At BC643 the tension on the winch cable dropped indicating that the BC was on the bottom, however when the BC was hauled up there was little pull out noted on the winch trace and at the surface it was discovered that the BC had failed to trigger. Due the strong bottom currents in at this site it was considered that the BC may not have reached the sea floor in an upright position. For the redeployment, BC644, an acoustic positioning beacon was attached to the winch cable to monitor the position of the BC relative to the ship. The beacon suggested the BC was located ~250m down current of the ship when it reached the sediment surface. An additional 25 m of cable was let out upon the second deployment. This time the BC triggered and ~5 cm of winnowed IRD-bearing foraminifera-sand was recovered. The likelihood of poor recovery and/or potential damage to the GC prevented any further deployments at this site.

At BC 655 the trigger mechanism failed because the trigger hook was jammed by one of the two shackles due to an incorrect assembly. This was noticed by Dave Peck (from the winch room) and rectified prior to redeployment (BC 656).

Figure 13: Photo showing correct configuration of shackles for attaching the box core yoke hook to the axle.

3.5. Filtering/Filtering gear

i) CTD

Minor problems with the CTD were encountered, including a mis-functioning altimeter and two damaged bottles during bad weather conditions. For full details of the

performance and modifications to the CTD deployments please refer to the cruise report for JR272.

ii) Uncontaminated Seawater Supply (USS)

Stopped running for the same intervals as the ocean logger due to ice conditions and filter clogging by krill.

iii) Oceanlogger:

The oceanlogger was used throughout the cruise to record changing surface water properties (e.g. sea surface temperature, salinity, fluoresence). The oceanlogger was offline on 27th and 28th March 2012 during transit to the first JR254e (WAGES) site. Poor weather conditions caused disruption to the flow of the USS used by the oceanlogger during the overnight transits of the 22nd-23rd and 23rd-24th April 2012 in the Falkland Trough. Because the down time was during the return trip along the Falkland Trough, an area for which there are many equivalent cruise tracks

For a more detailed and technical summary of the ocean logger performance please refer to JR272 Cruise Report and the leg report by Seth Thomas (AME).

4. Recommendations

- To replace the wooden brackets that support the upright glassware in the filtering gear housing as getting loose and rusty.
- To check the fit of the box corer doors during the off season and repair as necessary
- To purchase a second bomb frame/housing for the spare bomb
- To purchase an additional valve and have it modified with the tapered interior
- To procure a whiteboard for the main lab to help communications between shifts, to exist as a live-update board so that work requirements or reminders for station preparation are kept up to date and easily confirm what work is to be done by subsequent shifts
- Make note that the USS supply in the Chemistry and main labs are heavily contaminated and carry their own unique sample of Antarctic diatom algae in their pipes that several minutes of flushing does not alter or remove. Recommend that these units be thoroughly cleaned and only used a source of sea water - not as a representative sample of the inflow of the USS.

5. Acknowledgements

The personnel of JR257 would like to extend their thanks to the officers and crew of the JCR for their expertise and help in achieving our cruise objectives and for making the cruise an enjoyable one. We would also like to thank Margaret Yelland and Hugh Venables (PI's of JR254e and JR272) for their flexibility and support in organizing the cruise activities. In particular, we wish to express thanks to the science party of JR272 for running CTD deployments for the water filtering and to the CGS scheme for funding participation and logistical support for Erin McClymont to join us.
JR257 was funded as part of Chemistry and Past Climate's Core Science within the British Antarctic Survey's strategic framework of 'Polar Science for Planet Earth' (2009-2014).

6. ANNEXES

6.1. Core Summary

Table 4: Summary of coring activities

Time	Gear	Station	Latitude	Longitude	Depth (m)	Wind Direction (')	Wind Speed (knots)	Deployed length (m)	Max Tension	Penetration (m)	Core Length (m)	Veer speed (m/min)	Cable Out (m)	Core Catcher
30/03/2012 14:30	GC	641	-53.01307	-58.04044	593	55	3.0	18	4.24	~14.0	7.31			G
30/03/2012 18:39	GC	642	-53.00002	-58.04644	578	136	11.9	18	4	~12.0	7.35			H
31/03/2012 13:01	BC	643	-54.53478	-54.61517	2719	312	6.9	box (91 cm)	3.18	Not triggered	-	23-24	2744	n/a
31/03/2012 14:50	BC	644	-54.53391	-54.61442	2700	279	7.7	box	4.6	-	0.01	23-24	2780	n/a
11/04/2012 12:10	BC	645	-53.58515	-42.83653	1787	124	10.8	box	2.46	~0.30	0.27	27	1805	n/a
11/04/2012 13:08	GC	646	-53.58515	-42.8365	1787	136	14.4	18	4.72	~10.0	9.705	31	1790	H
11/04/2012 16:33	BC	647	-53.49993	-43.20165	1461	4	22.8	box	2	~0.2	14.5	25	1465	n/a
11/04/2012 18:32	GC	648	-53.49998	-43.20114	1451	5	14.1	18	3.08	~2.0	-		1470	H
12/04/2012 17:25	BC	649	-53.08662	-43.38883	1811	0	15.6	box	2.31	~0.2	13	24	1815	n/a
12/04/2012 20:14	GC	650	-53.08809	-43.38876	1803	45	17.8	18	5.28	~11.0	11.565	34	1804	H
13/04/2012 09:57	BC	651	-52.88049	-41.78696	2541	335	18.4	box	3.27	~0.35	0.302	24	2553	n/a
13/04/2012 12:12	GC	652	-52.8805	-41.78696	2542	350	13.6	12	5.51	~10.0	9.885	20	2542	H
14/04/2012 13:08	BC	653	-53.50802	-38.90949	2708	342	10.8	box	3.31	~0.25	0.21	24	2709	n/a
14/04/2012 16:13	GC	654	-53.50809	-38.90951	2706	85	9.5	12	5.2	-	-	22	2700	H
16/04/2012 11:05	BC	655	-53.78168	-37.95857	296	359	12.3	box	1.31	-	-	23-24	304	n/a
16/04/2012 11:29	BC	656	-53.78168	-37.95855	303	15	12.9	box	1.23	~0.2	0.19	23-24	304	n/a
16/04/2012 12:20	GC	657	-53.78169	-37.95858	292	10	14.2	6	3.76	full (dirty bomb)	5.23	20		I
16/04/2012 13:38	GC	658	-53.78166	-37.95857	297	357	13.9	12	3.7	full (dirty bomb)	5.13	20	306	J
16/04/2012 15:30	GC	659	-53.77003	-38.03477	326	2	13.7	12?	2.93	~9	5.23	20	326	I
16/04/2012 16:54	BC	660	-53.78188	-38.12847	354	336	15.2	box	1.46	~0.2	0.175	24	364	n/a
16/04/2012 18:14	GC	661	-53.78189	-38.1285	358	340	15.3	18	4.64	~12	7.655	20	362	I
16/04/2012 20:06	GC	662	-53.74324	-38.15473	387	352	11.5	6	3.39	appeared full	5.19	20	400	I
17/04/2012 12:17	GC	663	-54.54439	-36.02516	135	15	6.2	6	2.73	appeared full	5.165	20	145	I
17/04/2012 13:17	GC	664	-54.54442	-36.02524	135	351	12.8	12	3.05	appeared full	462.5	20	142	I
17/04/2012 14:48	GC	665	-54.52443	-35.94047	170	4	20.7	12	2.36	~7	2.465	15	175	I
17/04/2012 17:01	GC	666	-54.4206	-35.74148	254	0	19.3	12	2.93	appeared full	8.125	20	255	I
17/04/2012 17:37	BC	667	-54.42063	-35.74152	252	0	14.8	box	0.92	~0.2	0.18	25	256	n/a
17/04/2012 20:01	GC	668	-54.44035	-35.44062	283	8	25.3	6	2.46	appeared full	176.5	20	288	I
17/04/2012 21:11	GC	669	-54.44637	-35.30999	245	0	20.0	3	1.5	0	0	30	-	I
17/04/2012 21:50	GC	670	-54.44634	-35.31005	241	4	22.0	3	1.54	0	0	50	-	I
18/04/2012 18:27	BC	671	-54.20237	-36.37451	239	347	31.9	box	1.85	~0.3	0.25	24	243?	n/a
19/04/2012 20:00	GC	672	-54.20225	-36.37444	233	339	8.7	9	3.16	full (dirty bomb)	6.175	20	242	I
19/04/2012 21:13	GC	673	-53.00011	-58.04637	577	358	10.2	15	3.7	~12	8.84	20	242	I
24/04/2012 10:12	GC	674	-53.00009	-58.04639	577	7	12.3	9	3.54	~9	6.635	20	592	I
24/04/2012 11:41	GC	675	-53.00011	-58.04636	578	6	10.6	9	3.8	full (dirty bomb)	6.085	35	592	I

Table 5: Summary of gravity and box core sections

Time	Gear	Station	Latitude	Longitude	Depth (m)	Comment
30/03/2012 14:30	GC	641	-53.01307	-58.04044	593	8 sections; 1 bagged 'surface' sample from top of core liner; CC and CN bagged samples.
30/03/2012 18:39	GC	642	-53.00002	-58.04644	578	8 sections; CC & CN boxed samples; CC and CN bagged samples.
31/03/2012 13:01	BC	643	-54.53478	-54.61517	2719	Not Triggered. Cable out 2744 is much greater than depth - could indicate that box core has been pulled quite away from under the ship - strong westward current at site.
31/03/2012 14:50	BC	644	-54.53391	-54.61442	2700	Recovery of small amount of foram sand and one drop stone.
11/04/2012 12:10	BC	645	-53.58515	-42.83653	1787	3 subcores (x=27cm; y=23.5cm; z=20cm) same site as CTD 23.
11/04/2012 13:08	GC	646	-53.58515	-42.8365	1787	11 sections; CC bagged sample.
11/04/2012 16:33	BC	647	-53.49993	-43.20165	1461	3 subcores (x=14.5cm; y=13.5cm; z=10cm)
11/04/2012 18:32	GC	648	-53.49998	-43.20114	1451	Bent core barrel with evidence of sandy gravel in the recovered liner. Also faster veer into the sediment than ideal becuase of problems with the winch.
12/04/2012 17:25	BC	649	-53.08662	-43.38883	1811	3 sub-cores (x=13.0cm; y=13.0cm; z=14.5cm)
12/04/2012 20:14	GC	650	-53.08809	-43.38876	1803	12 sections; CC bagged sample.
13/04/2012 09:57	BC	651	-52.88049	-41.78696	2541	3 subcores (x=30.2cm; y=24.5cm; z=21cm) same site as CTD 24 and GC 652
13/04/2012 12:12	GC	652	-52.8805	-41.78696	2542	10 sections; CC boxed samples and CN bagged sample.
14/04/2012 13:08	BC	653	-53.50802	-38.90949	2708	3 subcores (x=21.0cm; y=21.0cm; z=20cm) same site as GC 654.
14/04/2012 16:13	GC	654	-53.50809	-38.90951	2706	Recovered bent. Using modified valve.
16/04/2012 11:05	BC	655	-53.78168	-37.95857	296	Not Triggered
16/04/2012 11:29	BC	656	-53.78168	-37.95855	303	3 subcores (x=19.0cm; y=16.0cm; z=18cm)
16/04/2012 12:20	GC	657	-53.78169	-37.95858	292	6 sections recovered; Valve bagged sample.
16/04/2012 13:38	GC	658	-53.78166	-37.95857	297	6 sections recovered; core top and CC bagged samples.
16/04/2012 15:30	GC	659	-53.77003	-38.03477	326	6 sections recovered; Valve and CC bagged samples.
16/04/2012 16:54	BC	660	-53.78188	-38.12847	354	3 sub-cores (x=17.5cm ; y=14cm ; z =13cm)
16/04/2012 18:14	GC	661	-53.78189	-38.1285	358	9 sections recovered; CC bagged sample.
16/04/2012 20:06	GC	662	-53.74324	-38.15473	387	6 sections recovered; Valve and CC bagged samples.
17/04/2012 12:17	GC	663	-54.54439	-36.02516	135	6 sections recovered; CC bagged sample. Station 1a
17/04/2012 13:17	GC	664	-54.54442	-36.02524	135	6 sections recovered; CC & CN bagged samples. Redeployment at Station 1a
17/04/2012 14:48	GC	665	-54.52443	-35.94047	170	4 sections recovered; CC and CN bagged samples. Station 1b
17/04/2012 17:01	GC	666	-54.4206	-35.74148	254	9 sections recovered; CC and CN bagged samples. Station 2.
17/04/2012 17:37	BC	667	-54.42063	-35.74152	252	3 subcores (x=18cm ; y=14cm ; z=13.5cm) Station 2
17/04/2012 20:01	GC	668	-54.44035	-35.44062	283	3 sections recovered; CC bagged sample. Station 4.
17/04/2012 21:11	GC	669	-54.44637	-35.30999	245	No recovery and sand in catcher, core probably bounced and fell. Station 5.
17/04/2012 21:50	GC	670	-54.44634	-35.31005	241	No recovery; Corer bounced and fell again. Station 5.
18/04/2012 18:27	BC	671	-54.20237	-36.37451	239	3 sub-cores (x=25cm ; y=24cm ; z=22cm)
19/04/2012 20:00	GC	672	-54.20225	-36.37444	233	8 sections recovered; CC bagged sample.
19/04/2012 21:13	GC	673	-53.00011	-58.04637	577	11 sections recovered; CC boxes and bagged samples. Odd winch record - pull out showed additional drop off in tension after corer lifted off the bottom - considered that core catched may have inverted but normal recovery and no apparant problem with any of the coring equipment - possibly problem with the winch
24/04/2012 10:12	GC	674	-53.00009	-58.04639	577	10 sections recovered; CC boxed and bagged samples.
24/04/2012 11:41	GC	675	-53.00011	-58.04636	578	7 sections recovebed; CC boxed and bagged samples.

6.2. Magnetic Susceptibility

These were done using a Bartington Instruments® 125mm loop sensor. Readings were taken at 2cm intervals down each core. The readings were then plotted to show trends and for comparison with readings obtained from cores collected in the past.

The cores measured were:

GC 641

GC 642

GC 646

GC 650

GC 652

GC 658

GC 659

GC 661

GC 662

GC 668

GC 672

GC 673

6.3. Smear slide and sieved sediment analyses

Smear slides were made for each core section and for each box core surface sample as summarized in Table 5.

Smear slide analysis was carried out at x200 magnification (x20 optic, x10 eyepieces) on an Olympus binocular microscope (BAS #40). Information provided includes terrigenous grain content, diatom species, diatom setae, sponge spiccules, silicoflagellate and radiolarian abundance. Information on Foraminifera assemblages was provided by analysing the >63μm sieved sediment.

The following scale of abundance was used for describing the content of the smear slides:

Abundant	Lots in every Field of View
Common	1-2 in every Field of View
Present	1+ in most Fields of View
Occasional	More than 5 on slide
Rare	1 or 2 seen on slide
Barren	None seen on slide

6.4. Filtered water samples

Samples of sea water were taken throughout the duration of JR257. The locations and depths sampled and the amounts filtered are indicated in Tables 6, 7 & 8.

The 48 diatom samples obtained from the onboard USS (uncontaminated seawater supply) were passed through 0.2 μm Anodisc Membrane filters using a Whatman glass vacuum filtering array.

The organic geochemistry samples were obtained at two different depths, primarily from the CTD (30 samples) but also from the onboard USS (15 samples). These were processed over glass-fibre filters, using the filtering array and vacuum pump.

15 Foraminifera samples were obtained by filtering onboard USS through a 125um brass sieve. The actual volume of water processed in this manner has not been recorded.

Table 6: Samples for biomarker studies (EM)

Date/Time	SAMPLE ID	Latitude	Longitude	Depth (m)	Source (USS/CTD)	Volume Filtered (l)
29/03/2012 17:00	“Blank"	-51.39688	-57.58914	64.37	Milli-Q Supply	30.00
06/04/2012 17:00	"Blank 2F"	-60.71373	-31.01068	1343.81	Milli-Q Supply	30.00
05/04/2012 01:22	Sample #10F	-62.7842	-30.70597	4802.05	CTD (20m)	30.00
05/04/2012 01:22	Sample #11F	-62.7842	-30.70598	4802.05	CTD (70m)	30.00
05/04/2012 12:55	Sample #12F	-62.08358	-31.17406	4835.67	CTD (40m)	30.00
05/04/2012 12:55	Sample #13F	-62.08358	-31.17407	4835.15	CTD (75m)	30.00
06/04/2012 09:19	Sample #14F	-61.17066	-31.04544	3467.79	CTD (30m)	30.00
06/04/2012 09:19	Sample #15F	-61.17066	-31.04544	3473.85	CTD (80m)	30.00
06/04/2012 20:59	Sample #16F	-60.31947	-30.96087	2823.5	CTD (30m)	30.00
06/04/2012 20:59	Sample #17F	-60.31947	-30.96087	2817.25	CTD (65 m)	30.00
07/04/2012 10:33	Sample #18F	-59.43578	-30.86104	3437.35	CTD (20m)	30.00
07/04/2012 10:33	Sample #19F	-59.43578	-30.86104	3437.35	CTD (70m)	30.00
29/03/2012 18:30	Sample #1F	-51.3803	-57.60104	73.98	USS	30.00
07/04/2012 23:59	Sample #20F	-57.80281	-30.83016	3528.64	CTD (20 m)	30.00
07/04/2012 23:59	Sample #21F	-58.62372	-30.82106	3592.65	CTD (90 m)	30.00
08/04/2012 09:12	Sample #22F	-58.21344	-30.82215	3856.62	CTD (20 m)	30.00
08/04/2012 09:12	Sample #23F	-58.21344	-30.82216	3759.37	CTD (80 m)	30.00
08/04/2012 14:33	Sample #24F	-57.80284	-30.83012	3519.47	CTD (30 m)	30.00
08/04/2012 14:33	Sample #25F	-57.80283	-30.83012	3522.41	CTD (110 m)	30.00
08/04/2012 20:19	Sample #26	-57.4585	-31.32681	3750.56	CTD (30m)	30.00
08/04/2012 20:19	Sample #27F	-57.4585	-31.3268	3747.18	CTD (110 m)	30.00
09/04/2012 02:37	Sample #28F	-57.11863	-31.81527	3431.12	CTD (30m)	30.00
09/04/2012 02:37	Sample #29F	-57.11863	-31.81523	3434.38	CTD (110 m)	30.00
30/03/2012 13:35	Sample #2F	-53.01293	-58.04041	599.98	CTD 15 m	30.00
10/04/2012 11:45	Sample #30F	-55.05327	-38.85449	3534.61	USS	30.00
10/04/2012 20:08	Sample #31F	-54.69617	-40.69789	3434.59	USS	30.00
11/04/2012 09:42	Sample #32F	-53.5856	-42.8352	1811.38	CTD (20m)	30.00
11/04/2012 09:42	Sample #33F	-53.5856	-42.8352	1811.38	CTD (100m)	30.00
13/04/2012 13:30	Sample #34F	-52.88045	-41.78688	2699	CTD (15m)	30.00
13/04/2012 13:30	Sample #35F	-52.88045	-41.78688	2699	CTD (80m)	30.00
16/04/2012 21:03	Sample #36F	-53.74315	-38.15479	393.84	CTD (10m)	20.00
16/04/2012 21:03	Sample #37F	-53.74315	-38.15478	393.51	CTD (80m)	20.00
17/04/2012 16:35	Sample #38F	-54.42142	-35.73845	33.67	USS	20.00
17/04/2012 21:02	Sample #39F	-54.44636	-35.30957	248.74	USS	20.00
30/03/2012 13:35	Sample #3F	-53.01294	-58.04041	599.3	CTD 100m	30.00
22/04/2012 17:00	Sample #40F	-51.89585	-45.53736	2938.82	USS	30.00
23/04/2012 15:30	Sample #41F	-52.92329	-51.41056	2831.01	USS	30.00
23/04/2012 19:16	Sample #42F	-52.94031	-52.73799	3142.98	USS	30.00
24/04/2012 14:05	Sample #43F	-52.6884	-57.95485	529.02	USS	30.00
31/03/2012 17:06	Sample #4F	-55.37931	-52.86417	4099.34	USS	30.00
01/04/2012 17:05	sample #5F	-57.29206	-48.68557	3707.61	USS	30.00
02/04/2012 16:06	Sample #6F	-60.17778	-42.36056	3559.88	USS	30.00
03/04/2012 16:09	Sample #7F	-61.21382	-36.47628	2381.27	USS	30.00
04/04/2012 13:59	Sample #8F	-63.34628	-29.56928	4707.67	CTD (20 m)	30.00
04/04/2012 13:59	Sample #9F	-63.34628	-29.56928	4707.67	CTD (60m)	30.00

Table 7: Water filter samples for diatom studies (CA)

Date/Time	SAMPLE ID	Latitude	Longitude	Depth (m)	Source (USS/CTD)	Volume Filtered (l)
28/03/2012 12:33	WS 694	-51.43425	-57.78063	40.8	USS	0.25
29/03/2012 12:13	WS 695	-51.45742	-57.60038	70.79	USS	0.40
29/03/2012 20:12	WS 696	-51.36303	-57.61862	71.29	USS	0.40
30/03/2012 09:50	WS 697	-52.49138	-57.8726	378.71	USS	0.40
30/03/2012 22:43	WS 698	-53.33719	-57.32419	2047.87	USS	0.40
31/03/2012 16:32	WS 699	-55.35365	-52.9143	4035.26	USS	0.25
01/04/2012 00:21	WS 700	-55.39677	-52.82958	4068.06	USS	0.25
01/04/2012 06:55	WS 701	-56.04023	-51.42363	4122.05	USS	0.25
01/04/2012 10:20	WS 702	-56.38902	-50.68947	4018.8	USS	0.25
01/04/2012 14:45	WS 703	-56.96762	-49.40334	4019.29	USS	0.25
01/04/2012 18:19	WS 704	-57.46924	-48.32665	3145.92	USS	0.25
02/04/2012 01:05	WS 705	-58.27647	-46.45332	2967.43	USS	0.25
02/04/2012 06:52	WS 706	-58.90128	-45.04985	2049.54	USS	0.25
02/04/2012 13:02	WS 707	-59.69979	-43.25426	4337.63	USS	0.25
02/04/2012 18:05	WS 708	-60.48068	-41.75675	2911.66	USS	0.25
03/04/2012 03:23	WS 709	-60.9854	-37.19198	1039.08	USS	0.25
03/04/2012 08:51	WS 710	-60.79592	-40.32492	5660.51	USS	0.25
03/04/2012 14:13	WS 711	-61.55532	-35.43751	2594.56	USS	0.25
03/04/2012 20:49	WS 712	-62.33972	-32.86498	4382.22	USS	0.25
04/04/2012 03:23	WS 713	-62.33972	-32.86498	4382.22	USS	0.25
04/04/2012 08:56	WS 714	-63.08719	-30.43718	4813.1	USS	0.25
04/04/2012 15:16	WS 715	-63.34678	-29.56799	4701.57	USS	0.25
05/04/2012 01:32	WS 716	-62.78411	-30.70548	4802.17	USS	0.25
05/04/2012 13:13	WS 717	-62.08359	-31.17404	4835.89	USS	0.25
06/04/2012 09:02	WS 718	-61.17965	-31.05145	3516.96	USS	0.25
06/04/2012 22:21	WS 719	-60.31947	-30.96095	2814.09	USS	0.25
07/04/2012 11:20	WS 720	-59.4358	-30.86095	3437.24	USS	0.25
07/04/2012 23:45	WS 721	-58.62381	-30.82101	3592.45	USS	0.25
08/04/2012 09:15	WS 722	-57.80281	-30.83012	3540.57	USS	0.25
08/04/2012 16:00	WS 723	-61.10876	-31.04067	2428.7	USS	0.25
08/04/2012 22:00	WS 724	-57.80281	-30.83012	3540.57	USS	0.25
09/04/2012 13:27	WS 725	-56.44544	-33.95008	3300.5	USS	0.25
09/04/2012 17:19	WS 726	-56.14285	-34.8949	3610.5	USS	0.25
10/04/2012 02:06	WS 727	-54.94141	-39.328	5110.86	USS	0.25
10/04/2012 08:50	WS 728	-55.17716	-38.2143	1817.4	USS	0.25
10/04/2012 19:39	WS 729	-54.77362	-40.5779	3419.31	USS	0.25
10/04/2012 23:59	WS 730	-54.11947	-41.61102	2796.22	USS	0.25
11/04/2012 15:33	WS 731	-53.36232	-43.46845	1294.56	USS	0.25
13/04/2012 12:36	WS 732	-53.55702	-42.96611	1792.94	USS	0.25
14/04/2012 13:18	WS 733	-53.50801	-38.90945	2710.95	USS	0.25
16/04/2012 11:29	WS 734	-53.78164	-37.95863	302.23	USS	0.25
17/04/2012 12:08	WS 735	-54.54477	-36.02694	139.87	USS	0.40
17/04/2012 21:00	WS 736	-54.4463	-35.30965	279.29	USS	0.25
19/04/2012 03:22	WS 737	-53.91672	-37.2556	280.89	USS	0.25
23/04/2012 14:20	WS 738	-52.91962	-51.01868	2608.37	USS	0.25
24/04/2012 03:13	WS 739	-52.96365	-55.57177	2033.16	USS	0.25
24/04/2012 04:41	WS 740	-52.97898	-56.1067	2036.74	USS	0.25
24/04/2012 13:00	WS 741	-53.00006	-58.04631	532.29	USS	0.25

Table 8: Water filter samples for foraminifera studies (VP)

Date/Time	Latitude	Longitude	Depth (m)	Comment
31/03/2012 13:25	-56.11142	-51.29199	3001.93	125um sieve started at site BC 644 from 13:25 until 17:00 GMT
03/04/2012 08:52	-60.37383	-39.08847	2223.87	125 micron sieve started
04/04/2012 09:01	-62.86711	-31.16843	3431.97	125 um sieve started
06/04/2012 00:36	-61.55143	-31.10407	4017.22	125um sieve started at site CTD 9 (Site 77)
06/04/2012 06:07	-61.55781	-31.09907	4166.99	Stopped sieving 125um USS sample at CTD 9 station
06/04/2012 09:02	-61.17929	-31.05136	3507.53	125 sieve under USS for CTD 10 (site 78)
06/04/2012 12:15	-61.10876	-31.04067	2428.7	125um Sieve under USS (CTD 11 site 79)
06/04/2012 22:22	-60.31949	-30.96096	2784.09	125 um sieve in USS (CTD 13 site 81) from 22:22 until 22:51 ish?
07/04/2012 10:57	-59.43584	-30.86096	3465.07	125um sieve in USS (CTD 16 site 85)
07/04/2012 21:17	-58.63559	-30.82445	3488.89	125um sieve in USS (CTD 18 site 87)
08/04/2012 09:15	-58.21344	-30.82215	3850.85	125 sieve on at CTD 19 site 88
10/04/2012 08:52	-55.17617	-38.22041	1814.32	125 sieve under USS. Turned off 11.40 GMT
14/04/2012 13:18	-53.50801	-38.90945	2711.04	125um sieve under USS same site as BC 653
17/04/2012 21:02	-54.44636	-35.30957	248.66	125um sieve under USS same site as GC 669/GC 670.

6.5. Event Log of Cruise Activities

Time	Latitude	Longitude	Depth (m)	Gear Type	Station #	Comments
27/03/2012 19:00	-51.9341	-58.53258	20.99			Carrying out tests and practicing deployment with various bits of WAGES kit (Buoys, Cables etc.)
27/03/2012 20:24	-51.7827	-57.76938	58.30			Vessel off DP and proceeding to WAGES site.
27/03/2012 22:55	-51.7847	-57.78153	59.93			On DP at WAGES site
27/03/2012 22:59	-51.7846	-57.78151	60.06	Drifter Buoy	1	Buoy off deck.
27/03/2012 23:16	-51.7845	-57.78032	60.70	Drifter Buoy	1	Buoy deployment complete and cable out 200m.
27/03/2012 23:51	-51.7835	-57.7743	60.24			Vessel all stopped on DP
28/03/2012 01:19	-51.7827	-57.76938	58.30	Drifter Buoy	1	Commence recovery of WAGES buoy
28/03/2012 01:24	-51.7827	-57.76972	56.74	Drifter Buoy	1	Buoy recovered and on deck
28/03/2012 01:30	-51.4341	-57.77694	40.88			En route to WAGES site (Off Volunteer Point)
28/03/2012 11:53	-51.4341	-57.77694	40.88			Vessel on DP at WAGES site (Off Volunteer Point)
28/03/2012 11:57	-51.4341	-57.77701	40.95	Drifter Buoy	2	Commence deployment of WAGES buoys
28/03/2012 11:58	-51.4341	-57.777	40.81	Drifter Buoy	2	Buoy in water and released
28/03/2012 16:03	-51.4301	-57.79477	39.08	Drifter Buoy	2	Commence recovery of buoy
28/03/2012 16:17	-51.4301	-57.7948	39.05	Drifter Buoy	2	Buoy on Deck.
28/03/2012 16:21	-51.4293	-57.79708	38.72			Vessel off DP
28/03/2012 16:31	-51.4413	-57.78784	37.42			Vessel on DP
28/03/2012 16:46	-51.4412	-57.78738	37.38	Drifter Buoy	3	Buoy deployed

28/03/2012 18:36	-51.4369	-57.787	38.22	Drifter Buoy	3	Vessel tracking buoys
28/03/2012 21:05	-51.4412	-57.78738	37.38	Drifter Buoy	3	Commenced recovery of buoy
28/03/2012 21:13	-51.4353	-57.77699	39.84	Drifter Buoy	3	Buoy on deck. Awaiting instructions from UIC
28/03/2012 21:34	-51.4412	-57.78736	37.65			Vessel off DP. Repositioning for next WAGES buoy deployment
28/03/2012 22:07	-51.4478	-57.679	49.49			Vessel on DP
28/03/2012 22:17	-51.4479	-57.67934	49.82	Drifter Buoy	4	Buoy in water and released
28/03/2012 22:28	-51.4481	-57.6814	49.21	Drifter Buoy	4	Buoy fully deployed and vessel stopped
28/03/2012 22:38	-51.4481	-57.68158	49.34	Drifter Buoy	4	Vessel tracking buoy
29/03/2012 13:05	-51.4345	-57.60198	65.23	Drifter Buoy	4	Recovering buoy
29/03/2012 13:20	-51.4574	-57.60038	70.79			Vessel moving off. Repositing for next WAGES buoy deployment
29/03/2012 13:38	-51.422	-57.57686	74.12	Bubble Buoy	2	WAGES buoy being deployed farther offshore than previous
29/03/2012 14:18	-51.4212	-57.57683	73.86	Bubble Buoy	2	Vessel on DP. Buoy in water
29/03/2012 16:10	-51.4008	-57.58731	65.98	Bubble Buoy	2	Buoy recovered and adjusted for redeploymnet
29/03/2012 16:30	-51.4088	-57.59074	64.17	Bubble Buoy	3	Buoy deployed and vessel tracking
29/03/2012 21:02	-51.4008	-57.58731	65.98	Bubble Buoy	3	Commenced recovery of buoy
29/03/2012 21:09	-51.3552	-57.63076	69.25	Bubble	3	Buoy on deck

				Buoy		
29/03/2012 21:10	-51.3552	-57.63075	69.53			Vessel off DP. Moving to new buoy site.
29/03/2012 21:49	-51.4231	-57.5767	74.40			Vessel on station for WAGES buoy deployment
29/03/2012 21:50	-51.4231	-57.57681	74.80	Drifter Buoy	5	Buoy deployed
30/03/2012 03:33	-51.3882	-57.63675	63.55	Drifter Buoy	5	Buoy out of water. Waiting to move off.
30/03/2012 03:50	-51.3893	-57.63839	62.83			Heading south to begin coring at site 1
30/03/2012 12:46	-53.0238	-58.04486	611.06			Coming onto JR257 Station (CTD 1 and GC 641)
30/03/2012 13:10	-53.0138	-58.04025	600.29			On station for CTD 1 and GC 641
30/03/2012 13:15	-53.0134	-58.04067	599.82	CTD	1	CTD 1 deployed
30/03/2012 13:35	-53.0131	-58.04045	600.37	CTD	1	CTD stopped @ 586m wire Depth 599m
30/03/2012 13:55	-53.013	-58.04046	599.85	CTD	1	CTD on deck
30/03/2012 14:31	-53.0131	-58.04044	599.97	GC	641	Barrels attached to bomb
30/03/2012 14:40	-53.0131	-58.0404	599.40	GC	641	Wire being attached for pulling frame vertical in cradle. Corer being lowered into vertical position.
30/03/2012 14:45	-53.0131	-58.04039	599.70	GC	641	Corer attached to crane to be hoisted into deck cradle
30/03/2012 14:52	-53.013	-58.04041	599.97	GC	641	Winch wire attached in cradle ready for deployment
30/03/2012 14:56	-53.0131	-58.04043	600.32	GC	641	Corer clear of vessel in water. Start of wire out.
30/03/2012 15:11	-53.013	-58.04043	599.64	GC	641	Corer at sea floor
30/03/2012 15:13	-53.013	-58.04043	599.35	GC	641	Max tension 4.24t
30/03/2012 15:28	-53.013	-58.04046	599.55	GC	641	Corer clear of water and off winch.
30/03/2012 15:34	-53.013	-58.04045	599.25	GC	641	Corer in cradle ready to be hoisted horizontal.
30/03/2012 15:45	-53.013	-58.04045		GC	641	Core barrel clear of bomb and being winched onboard.
30/03/2012 17:30	-52.9577	-58.03934	527.33			Site chosen for second test deployment - Test site 2. proceeding to station.
30/03/2012 18:05	-53	-58.04651		GC	642	On station for test site 2.

30/03/2012 18:07	-53	-58.04652	582.36	GC	642	Preparing corer
30/03/2012 18:17	-53.0163	-58.02012	612.68	GC	642	GC on crane
30/03/2012 18:21	-53.0181	-58.01599	616.83	GC	642	GC on winch
30/03/2012 18:23	-53	-58.0465	582.53	GC	642	GC in water
30/03/2012 18:28	-53	-58.04651	582.19	GC	642	USBL pinger attached to wire at 100 m
30/03/2012 18:39	-53	-58.04644	582.58	GC	642	Corer at sea floor
30/03/2012 18:44	-53.0001	-58.04645	582.43	GC	642	Off bottom
30/03/2012 19:54	-53.0019	-58.05061	650.24			Off station GC642 and underway to next site (6 on map).
31/03/2012 06:30	-54.1836	-55.4246	1628.01			Approaching survey area
31/03/2012 12:59	-54.5356	-54.61456	3308.73			Coming onto JR257 station for BC 643 and potentially GC and CTD also.
31/03/2012 13:07	-54.5339	-54.61433	3343.89			On site for BC 643
31/03/2012 13:09	-54.534	-54.61441	0.00	BC	643	Box core ready for deployment
31/03/2012 13:12	-54.5342	-54.61447		BC	643	Box core in water
31/03/2012 14:01	-54.5339	-54.61443	3007.87	BC	643	On bottom. Max tension 3:23. 23m/min veer into sediment
31/03/2012 14:35	-54.5339	-54.61442	3010.40	BC	643	On deck. Failed to trigger - no recovery. Re-deploy
31/03/2012 14:50	-54.5339	-54.61442	3025.61	BC	644	Box Corer in water with USBP (location pinger)
31/03/2012 15:23	-54.5338	-54.61441	3097.08	BC	644	On bottom (approx. 200m aft). Max tension 3:23.
31/03/2012 16:38	-54.5339	-54.61442	2682.17	BC	644	Box corer on deck. Minimal recovery. off station and on way to mooring site.
31/03/2012 16:54	-56.0968	-51.32051	2682.17			Surface sediments recovered are well sorted medium to coarse sand. Preparing to move on to Povl's mooring site
31/03/2012 17:15	-54.5544	-54.58108	2981.57			Ali turned off topas until get to flatter ground.
31/03/2012 18:01	-54.6548	-54.35602	4205.31			Moving off station to OP6 mooring site
01/04/2012 06:20	-55.985	-51.53115	4034.54			Amazing feature in the swath bathymetry - some sort of edifice with a caldera/collapse crater on top.

01/04/2012 07:31	-56.0968	-51.32051	4010.56			A second round feature seen on swath cf. earlier feature but not collapsed in the centre.
02/04/2012 06:52	-58.9017	-45.04848	2046.56			AG collected a water sample for CA to filter for diatoms
02/04/2012 18:37	-60.5514	-41.60921		OP6 mooring		On site for mooring buoy release
02/04/2012 19:10	-60.5601	-41.62655	2314.43	OP6 mooring		Mooring deployment underway
02/04/2012 19:32	-60.5633	-41.63412	2332.50	OP6 mooring		Mooring anchor released
02/04/2012 20:01	-60.5657	-41.62937	0.00	OP6 mooring		Mooring on seabed - hydrophone recovered. moving to deploy buoy
02/04/2012 20:10	-60.5655	-41.62992	0.00	Bubble Buoy	4	Buoy in water and released
02/04/2012 20:16	-60.5652	-41.63146	0.00	Bubble Buoy	4	Buoy fully deployed and moving slowly to CTD deployment site
02/04/2012 20:22	-60.5649	-41.63271	2327.01	CTD	2	Vessel in position and CTD off deck
02/04/2012 20:24	-60.5649	-41.63271	2326.51	CTD	2	CTD in water
02/04/2012 20:35	-60.5649	-41.6327	2327.17	CTD	2	USBL pole fully extended
02/04/2012 21:07	-60.5649	-41.63272	2327.20	CTD	2	CTD at bottom - commencing haul
02/04/2012 21:25	-60.5831	-41.55149	2235.25	Bubble Buoy	4	Commenced recovery of buoy prior to CTD recovery
02/04/2012 21:33	-60.5649	-41.63272	2613.79	Bubble Buoy	4	Buoy on deck
02/04/2012 21:57	-60.5649	-41.63269	3059.93	CTD	2	CTD on deck... completing recovery
02/04/2012 22:03	-60.5649	-41.63271	2970.86			USBL pole fully retracted
02/04/2012 23:01	-60.5793	-41.56772	2362.21			Moving off station having completed triangulating position of mooring
03/04/2012 04:08	-60.7382	-40.15594	0.00			Tracking an ice edge NE. moving steadily off planned route. Waiting for first light before

						moving through it.
03/04/2012 08:28	-62.8042	-31.37542	4869.72			Back on track towards beginning of CTD transect. ETA ~11 am on 4.4.12
04/04/2012 13:22	-63.3389	-29.57931	4779.01			Coming onto station for CTD 3 (Site 71)
04/04/2012 13:35	-63.3444	-29.57162	4819.65			On station for CTD 3 and buoy deployment
04/04/2012 13:44	-63.3467	-29.56773	4704.64	Drifter Buoy	5	WAGES Buoy deployed
04/04/2012 14:00	-63.3463	-29.56892	4707.65	CTD	3	CTD on winch and ready in the water
04/04/2012 15:19	-63.3467	-29.56773	4701.56	CTD	3	At bottom (4715m cable out).
04/04/2012 16:42	-63.3467	-29.56772	4701.69	Drifter Buoy	5	WAGES Buoy recovered and on deck
04/04/2012 16:57	-63.3467	-29.56774	4701.61	CTD	3	CTD at surface
04/04/2012 16:59	-63.3467	-29.56774	4701.91	CTD	3	CTD on deck. USBL pole being retracted.
04/04/2012 17:06	-63.3467	-29.56775	4704.90	CTD	3	CTD recovered. Moving off DP for passage to next site
04/04/2012 19:04	-63.0715	-30.11899	4865.81			On station for CTD 4 and buoy deployment
04/04/2012 19:15	-63.073	-30.11093	4856.75	Drifter Buoy	6	WAGES buoy in the water and fully deployed
04/04/2012 19:25	-63.0727	-30.11517	4859.67	CTD	4	CTD off deck and deployed.
04/04/2012 20:51	-63.0728	-30.11346	4859.69	CTD	4	At bottom (4850 m cable out)
04/04/2012 21:27	-63.073	-30.11093	4856.75	Drifter Buoy	6	Buoy recovered and on deck
04/04/2012 22:29	-63.073	-30.11089	4856.36	CTD	4	CTD on Deck.
05/04/2012 01:05	-62.7835	-30.70241	4808.22			Arriving on station for CTD 5
05/04/2012 01:22	-62.4089	-31.24579	4516.15	CTD	5	CTD off deck and deployed
05/04/2012 02:47	-62.7831	-30.70223	4804.97	CTD	5	At bottom (4793 m cable out)
05/04/2012 04:25	-62.7831	-30.70215	4808.10	CTD	5	CTD recovered and on deck
05/04/2012 04:42	-62.7816	-30.70151	4807.26			Moving off station
05/04/2012 07:15	-62.4914	-31.26321	4744.34			Arriving on station for CTD 6 (Site 74)

05/04/2012 07:21	-62.4915	-31.26291	4744.02	CTD	6	CTD deployed
05/04/2012 08:45	-62.4915	-31.26241	4741.62	CTD	6	CTD at bottom (4738 m cable out)
05/04/2012 10:25	-62.4915	-31.26235	4741.03	CTD	6	CTD recovered and on deck
05/04/2012 10:31	-62.4915	-31.26242	4741.36			Moving off station
05/04/2012 13:00	-62.0835	-31.17421	4834.88			Arriving on station for CTD 7 (Site 75)
05/04/2012 13:05	-62.0835	-31.1742	4835.39	CTD	7	CTD deployed and being lowered
05/04/2012 14:20	-62.0834	-31.1742	4838.86	CTD	7	At bottom (4825 m Cable out)
05/04/2012 15:57	-62.0834	-31.1742	4835.08	CTD	7	CTD recovered and on deck
05/04/2012 16:11	-62.0834	-31.17382	4835.02			Moving off station
05/04/2012 18:48	-61.6612	-31.11084	3358.36			Arriving on station for CTD 8 (Site 76)
05/04/2012 18:56	-61.6615	-31.11175	3382.82	Bubble Buoy	5	Bubble Buoy ready for deployment
05/04/2012 19:06	-61.6611	-31.1109	3391.82	Bubble Buoy	5	Fully deployed
05/04/2012 19:15	-61.6611	-31.11091	3376.75	CTD	8	CTD deployed and being lowered
05/04/2012 20:16	-61.6611	-31.11089	3367.78	CTD	8	At bottom (3396 m Cable out)
05/04/2012 21:16	-61.6612	-31.11086	3364.30	CTD	8	Recovered and on deck
05/04/2012 21:33	-61.6612	-31.11102	3358.11	Bubble Buoy	5	Tracking bubble buoy during extended deployment
05/04/2012 22:44	-61.666	-31.11577	3218.60	Bubble Buoy	5	Buoy recovered and on deck
05/04/2012 22:54	-61.6661	-31.11583	3215.71			moving off on passage to CTD 9 (site 77)
06/04/2012 00:12	-61.5522	-31.10343	4053.93	Drifter Buoy	7	Arrived at site. tethered buoy deployed but CTD deployment postponed until further notice
06/04/2012 02:59	-61.5577	-31.09872	4160.50	CTD	9	CTD deployed and being lowered
06/04/2012 04:23	-61.5577	-31.09919	4148.49	CTD	9	CTD at depth - cable 4173 - sea depth 4189m
06/04/2012 05:51	-61.5578	-31.09927	4154.44	CTD	9	CTD 09 at the surface and recovered
06/04/2012 06:18	-61.5549	-31.09379	4170.74			moving off on passage to CTD 10 (site 78)
06/04/2012 09:19	-61.1705	-31.0456	3467.34	CTD	10	CTD deployed and being lowered
06/04/2012 10:24	-61.1707	-31.04604	3464.83	CTD	10	At bottom (3456 m Cable out)

06/04/2012 11:40	-61.1707	-31.04609	3464.78	CTD	10	CTD recovered and on deck
06/04/2012 11:42	-61.1707	-31.0461	3464.55			Moving off on passage to site 79
06/04/2012 12:15	-61.1707	-31.0461	3464.55	CTD	11	On station for CTD 11 (Site 79)
06/04/2012 12:20	-61.1087	-31.04053	2449.47	CTD	11	CTD11 deployed and being lowered.
06/04/2012 13:25	-61.1087	-31.04053	2449.47	CTD	11	Reached limit of wire at 2550m (from bridge log)
06/04/2012 14:19	-61.1087	-31.04051	2434.07	CTD	11	CTD recovered on deck
06/04/2012 14:30	-60.6989	-31.0038	1668.52			Off DP and on passage to CTD12
06/04/2012 17:00	-60.7132	-31.01108	1347.44	CTD	12	On station for CTD deployment
06/04/2012 17:20	-60.6995	-31.00854	1586.52	CTD	12	CTD deployed and being lowered
06/04/2012 18:31	-60.6995	-31.00857	1583.61	CTD	12	CTD 12 back on deck
06/04/2012 18:45	-60.6989	-31.0038	1668.52			Off DP and on passage to CTD13
06/04/2012 20:56	-60.3193	-30.96096	2814.04	CTD	13	On station
06/04/2012 21:03	-60.3193	-30.96097	2792.88	CTD	13	CTD deployed.
06/04/2012 21:59	-60.3193	-30.96098	2814.34	CTD	13	wire out 2780m
07/04/2012 00:15	-60.1533	-30.94017	1859.78	CTD	13	CTD on deck. On transit to CTD 14.
07/04/2012 01:34	-59.9936	-30.92547	3014.96	CTD	14	CTD deployed.
07/04/2012 02:33	-59.9936	-30.92548	3015.40	CTD	14	Cable out at 2975 m
07/04/2012 04:08	-59.9659	-30.91739	3103.00			CTD 14 (site 82) on deck. sampling.
07/04/2012 04:10	-59.4357	-30.86124	3437.26			Off station. on route to CTD 15 site 83
07/04/2012 06:56	-59.7694	-30.9063	3801.90	CTD	15	3771 m wire out
07/04/2012 08:22	-59.7695	-30.90617	3808.08	CTD	15	CTD recovered and on deck
07/04/2012 08:31	-59.4357	-30.86126	3376.72	CTD	15	Moving off station on route to CTD 16, site 85
07/04/2012 10:29	-59.4357	-30.86126	3376.72			On station for CTD 16, site 85
07/04/2012 10:34	-59.4357	-30.86124	3443.48	CTD	16	CTD depolyed and being lowered
07/04/2012 11:36	-59.4357	-30.86124	3437.26	CTD	16	At bottom. Cable out 3443m
07/04/2012 12:54	-59.4357	-30.86126	3449.02	CTD	16	CTD16 back on deck
07/04/2012 15:28	-59.0512	-30.83474	3136.46	Drifter Buoy	8	On DP for WAGES tethered buoy deployment
07/04/2012 15:50	-59.0504	-30.83297	3139.57	CTD	17	CTD17 deployed
07/04/2012 17:50	-59.0504	-30.83283	3140.37	CTD	17	CTD17 back on board

07/04/2012 18:06	-59.05	-30.83356	3136.78			Moving off station on route to CTD18 site 87
07/04/2012 21:04	-58.6355	-30.82465	3488.94			On DP at site 87
07/04/2012 21:28	-58.6236	-30.82119	3583.96	Bubble Buoy	6	WAGES bubble buoy deployed
07/04/2012 23:09	-58.6236	-30.82119	3583.96	Bubble Buoy	6	WAGES bubble buoy recovered and on deck
07/04/2012 23:29	-58.6236	-30.82116	3592.23	CTD	18	CTD18 being deployed. It's blowing a hoolie.
08/04/2012 00:40	-58.6237	-30.82124	3592.29	CTD	18	CTD at bottom. Max cable 3564m.
08/04/2012 02:25	-58.6172	-30.8083	3546.70	CTD	18	CTD on deck. Heavy sea so transit slowly to CTD 19.
08/04/2012 09:05	-58.2134	-30.82246	3811.08	CTD	19	On DP to deploy CTD19
08/04/2012 12:10	-58.2134	-30.82246	3811.08	CTD	19	CTD19 back on deck
08/04/2012 14:33	-57.8028	-30.83047	3519.47	CTD	20	CTD 20 deployed (site 89)
08/04/2012 17:14	-57.8028	-30.83045	3546.87	CTD	20	CTD 20 recovered and on deck
08/04/2012 20:18	-57.4585	-31.3271	3747.32	CTD	21	On station for CTD 21
08/04/2012 22:55	-57.4582	-31.32737	3744.62	CTD	21	CTD on deck.
09/04/2012 02:36	-57.1187	-31.81551	3431.12	CTD	22	On station for CTD 22. CTD deployed.
09/04/2012 04:49	-57.1187	-31.81553	3431.32	CTD	22	CTD recovered and on deck
09/04/2012 05:12	-57.1187	-31.81557	3434.25			Off station. transit to coring stations nr Shag Rocks
11/04/2012 04:00	-53.6582	-42.53426	3943.59			Start of Area 30 TOPAS survey
11/04/2012 07:57	-53.514	-43.18356	1537.49			identified coring station at 5.25 GMT. surveying to station
11/04/2012 09:38	-53.5857	-42.83507	1798.87	CTD	23	arrived on site
11/04/2012 09:43	-53.5857	-42.83507	1798.87	CTD	23	CTD deployed and being lowered
11/04/2012 10:18	-53.5855	-42.83577	1820.92	CTD	23	at bottom with 1780 m cable out
11/04/2012 10:58	-53.5852	-42.83652	0.00	CTD	23	CTD on deck. water samples collected at 20 m and 100 m
11/04/2012 11:27	-53.5851	-42.8365	0.00	BC	645	On way down
11/04/2012 12:01	-53.5851	-42.83653	1795.00	BC	645	On bottom. 1805 Cable out. Max tension 2.46
11/04/2012 12:35	-53.5852	-42.83653	1795.00	BC	645	BC recovered and on deck

11/04/2012 13:01	-53.5852	-42.83651	0.00	GC	646	18m deployed
11/04/2012 13:43	-53.5852	-42.83654	1795.00	GC	646	On Bottom. Veered into sediment at 31m/min. 1790 cable out.
11/04/2012 14:16	-53.5851	-42.83652	1795.00	GC	646	Recovered and attached to deck cradle
11/04/2012 15:04	-53.5879	-42.83892	1829.28			Moving off station to area 30 site 2 for BC 647
11/04/2012 16:26	-53.5007	-43.20087	1513.43			Coming onto area 30 site 2 for BC 647
11/04/2012 16:38	-53.5	-43.20105	1510.86	BC	647	Deployed and lowered
11/04/2012 17:05	-53.5	-43.20105	1516.11	BC	647	On bottom. Veered in at 25m/min. 1465m Cable out.
11/04/2012 20:26	-53.4984	-43.2045	1473.35			Moving off station to transit to Area 29 over night.
12/04/2012 02:39	-53.0025	-44.15078				Start of Area 29 Survey. 100* bearing 8 knots
12/04/2012 05:00	-53.0592	-43.63234	0.00			We will extend the survey East by 7 nm returning to site 29 on a reciprocal course in order to arrive on a suitable station by c. 6am ship time
12/04/2012 08:00	-53.057	-43.32578	1860.31			on route to selected site. Winds exceeding 30 knots and captain has postponed a 0600 (shiptime/0900GMT)start and will reassess working conditions at 0800 (shiptime/1100GMT)
12/04/2012 11:11	-52.9811	-43.37327	2000.11			Almost hove to ready for buoy deployment
12/04/2012 11:55	-52.9813	-43.37348	1999.47	Free Drifter buoy	1	Ship moving free of drifting buoy and deploying bubble buoy
12/04/2012 14:05	-52.9773	-43.37411				stopped logging topas and swath until moving off again.
12/04/2012 15:52	-52.976	-43.36747	2014.74			started SWATH and TOPAS as we are moving off.
12/04/2012 16:54	-53.0866	-43.38877	1826.66	BC	649	On station and box core deployed
12/04/2012 17:25	-53.0866	-43.38883	1826.24	BC	649	On bottom. 1809m on winch.
12/04/2012 18:35	-53.0866	-43.3888	1826.61	GC	650	On station and GC deployed
12/04/2012 19:08	-53.0866	-43.38879	1828.81	GC	650	On bottom. 28 m/min entry speed. 1804 m cable out.

12/04/2012 20:22	-53.0903	-43.38921	1818.27	Free Drifter buoy	1	Moving off station to collect drifter buoy. SWATH on and TOPAS on (TOPAS saving into /raw directory)
12/04/2012 21:14	-52.8804	-41.78697	0.00	Free Drifter buoy	1	Arriving on site to collect drifter buoy
12/04/2012 21:59	-52.9497	-43.31677	2048.93	Free Drifter buoy	area 29	WAGES drifter buoy recovered. Moving off
13/04/2012 02:53	-53.2468	-42.16365	1063.85			Start of survey for area 35/36. Sediments on Topas as we start transect.
13/04/2012 07:31	-52.7297	-41.63813	3100.00	BC	651	Site selected for BC651. Returning to this site with eta 6:00 ship time. Will return to 04:30(ship time) position to continue depth transe ct survey after coring.
13/04/2012 09:15	-52.8805	-41.78685	2550.00	BC	651	deployed
13/04/2012 09:57	-52.8805	-41.78695	0.00	BC	651	at bottom. 2553m cable out. 3:27t max tension
13/04/2012 10:40	-52.8805	-41.78697	0.00	BC	651	box corer on deck
13/04/2012 11:14	-52.8805	-41.78696	0.00	GC	652	gravity corer being deployed
13/04/2012 12:12	-52.8805	-41.78696	0.00	GC	652	gravity core on bottom. 2542m cable out. 5:51t max tension.run in at 20m/min left for 2 minutes.
13/04/2012 13:10	-52.8805	-41.78692	0.00	GC	652	on deck. ~10m recovered.
13/04/2012 13:30	-53.5988	-40.78403	0.00	CTD	24	deployed. Water sample taken at 15 m and 80 m for EM
13/04/2012 14:19	-52.8805	-41.78694	0.00	CTD	24	at depth. 2521m cable out.
13/04/2012 15:15	-52.8804	-41.78697	0.00	CTD	24	Recovered and on deck
13/04/2012 15:29	-52.8867	-41.7933	0.00			underway to survey another part of area 35/36
14/04/2012 00:38	-53.6273	-40.66506	0.00			Survey start. 1st waypoint on transit south.
14/04/2012 05:27	-53.7783	-40.12605				After 5 hours of survey no sediments found - not even a drape. Steered ship south through WP 9 and WP 12. still just bare rock. Decided to abandon TOPAS survey here and head towards Area 38

						surveying along way.
14/04/2012 06:15	-53.7427	-39.95442				At 1300m wd still. and still no sediments anywhere on NE and E part of Shag Rocks
14/04/2012 13:09	-53.508	-38.90949				On station for BC 653
14/04/2012 13:14	-53.508	-38.90949	2710.83	BC	653	BC being deployed
14/04/2012 13:18	-53.508	-38.90952	2711.04	BC	653	being deployed
14/04/2012 14:03	-53.508	-38.90951	2710.95	BC	653	On Bottom. Veered at 24m/min. Cable out 2709. Max pull out tension 3.31.
14/04/2012 14:46	-53.508	-38.9095	2716.54	BC	653	Recovered and on deck
14/04/2012 15:14	-53.5081	-38.90948	2717.68	GC	654	Ready to deploy
14/04/2012 15:20	-53.5081	-38.90951	2716.91	GC	654	Being deployed/in water
14/04/2012 15:28	-53.5081	-38.90954	2712.90	GC	654	Pinger being attached to cable
14/04/2012 16:13	-53.5081	-38.90954	2712.90	GC	654	On bottom. Veered in at 22m/min. Left in 2 minutes. 2700m cable out. Max tension 5.20.Possible bounce on penetration.
14/04/2012 16:59	-53.508	-38.9095	2717.35	GC	654	Corer attached to winch. Barrel 2 bent.
14/04/2012 17:35	-53.5081	-38.90952	2719.76	GC	654	Bent barrel and straight barrel on deck. Commence removal of gantry in preparation for Bird Island call tomorrow.
14/04/2012 18:30	-53.5111	-38.91301	2677.97			moving off slowly
15/04/2012 21:40	-53.8863	-38.11343	33.28			Started NW South Georgia survey
16/04/2012 13:38	-53.7817	-37.95857	301.42	GC	658	being deployed
16/04/2012 13:47	-53.7817	-37.95859	301.97	GC	658	On Bottom. Veered at 20m/min 2 min wait. Cable out 306. Max pull out tension 3.70.
16/04/2012 13:58	-53.7817	-37.95857	301.08	GC	658	Recovered and on deck. Muddy bomb.
16/04/2012 14:29	-53.7856	-37.96752	311.48			Moved off to second site.
16/04/2012 15:30	-53.77	-38.03478	330.81	GC	659	Being deployed

16/04/2012 15:38	-53.77	-38.03481	321.09	GC	659	On Bottom. Veered at 20m/min. 2 min wait. Cable out 326m. Max pull out tension 2.93
16/04/2012 15:49	-53.77	-38.03479	319.43	GC	659	Recovered and on deck
16/04/2012 16:52	-53.7819	-38.12844	359.23			Arrived on site 3 for BC 660.
16/04/2012 16:54	-53.7819	-38.12848	358.94	BC	660	Being deployed
16/04/2012 17:06	-53.7819	-38.12842	360.29	BC	660	On Bottom. Veered at 24m/min. Cable out 364m. Max pull out tension 1.46
16/04/2012 17:14	-53.7819	-38.12846	358.94	BC	660	Recovered and on deck
16/04/2012 18:14	-53.7819	-38.12849	359.24	GC	661	Being deployed
16/04/2012 18:23	-53.7819	-38.12848	359.53	GC	661	On Bottom. Veered at 20m/min. Cable out 362. Max pull out tension 4.64.
16/04/2012 18:34	-53.7819	-38.12846	359.92	GC	661	Recovered and on deck
16/04/2012 19:04	-53.7819	-38.12846	358.80			Moving off to next core site
16/04/2012 19:32	-53.7406	-38.15063	382.76			Free drifter buoy 02 being deployed
16/04/2012 19:38	-53.7406	-38.15063	382.76			Drifter buoy 10 deployed
16/04/2012 20:06	-53.7432	-38.15474	393.94	GC	662	Being deployed
16/04/2012 20:14	-53.7432	-38.15475	395.42	GC	662	On Bottom. Veered at 20m/min. Cable out 400m. Max pull out tension 3.39.
16/04/2012 20:34	-53.7433	-38.15472	393.44	GC	662	Recovered and on deck
16/04/2012 21:03	-53.7433	-38.15472	393.73	CTD	25	Deployed. Water samples taken for EM at 10m and 80m water depths.
16/04/2012 21:28	-53.7433	-38.15474	393.74	CTD	25	Back on deck
16/04/2012 21:32	-53.7433	-38.1547	393.62			Drifter buoy 10 being towed
16/04/2012 22:38	-53.7472	-38.16082	389.46			Drifter buoy 10 recovered
16/04/2012 22:49	-53.7329	-38.14906	349.69			Commence recovery of free drifter buoy 2
17/04/2012 11:00	-54.4841	-35.90918	195.05			Arrived Royal Bay for coring work - started with TOPAS survey into Bay. followed by coring stations 1a (2 GCs). 1b(GC) 2 (GC+BC) 4 (GC) and 5 (no recovery at 5). Station 3 was skipped. 45 minutes of buoy work at station 2.

17/04/2012 22:30	-54.4427	-35.31348	252.66			Left Royal Bay work area for survey overnight to Cumberland Bay
18/04/2012 02:34	-54.133	-36.15274	33.94			Start of Cumberland Bay survey. Speed 7-8 knots confirmed with Bridge.
18/04/2012 06:30	-54.1237	-36.27141	279.30			SWATH data very intermittent on the plot - waterfall looks complete so not sure if it is just a display issue or not. TOPAS still cutting out occassionally for a few pings then back agaian. Seems to be worse at corners then other times. On the plus side t
18/04/2012 17:48	-54.2023	-36.37441	238.84	CTD	26	Deployed and being lowered into water
18/04/2012 17:55	-54.2024	-36.37449	237.82	CTD	26	On bottom. cable out 243 m
18/04/2012 18:06	-54.2023	-36.37456	239.61	CTD	26	Recovered and on deck
18/04/2012 18:27	-54.2024	-36.3745	238.07	BC	671	Deployed and lowered
18/04/2012 18:35	-54.2023	-36.37454	239.05	BC	671	On Bottom. Max Tension - 1.85
18/04/2012 18:46	-54.2024	-36.37452	238.52	BC	671	Recovered and on deck
18/04/2012 19:44	-54.1274	-36.44494	112.78			BC complete but no GC. weather picked up. gusting to 40. heading off to do buoy work
19/04/2012 20:00	-54.2023	-36.37444	238.15	GC	672	Corer deployed
19/04/2012 20:05	-54.2023	-36.37441	238.61	GC	672	Corer at bottom. Veered @ 20t. 242m cable out. Max tention 3.16
19/04/2012 20:23	-54.2023	-36.37444	238.09	GC	672	Corer recovered on deck. Muddy bomb. 8 sections?
19/04/2012 21:07	-54.2784	-36.4435	242.16	GC	673	Deployed
19/04/2012 21:13	-54.2023	-36.37443	238.70	GC	673	On Bottom
19/04/2012 21:32	-54.2023	-36.37445	238.45	GC	673	Recovered and on deck
21/04/2012 23:34	-53.119	-43.19836	1779.58			On passage about to pass over most easterly point of area 29 survey. Sediments on un-swathed areas continue onto area 29 tip. Print screens taken.
22/04/2012 18:51	-51.8748	-45.55617	2936.85	Drifter		Being retrieved

				Buoy	
24/04/2012 19:54	-51.6916	-57.82315	0.00		Alongside the jetty, Falklands!

BAS Ref.: JR254e

CRUISE REPORT

Marine Science Cruise: JR254e

(WAGES)

Margaret Yelland, Robin Pascal, Ian Brooks, Helen Czerski

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"WAGES" cruise JR254E

M J Yelland, R W Pascal, I M Brooks, H Czerski

In conjunction with the hydrographic and geology cruises, a "Waves Aerosol and Gas Exchange Study" (WAGES) cruise JR245E was also carried out. The overall aim of WAGES is to improve the parameterisations of the air-sea turbulent fluxes and to understand the dependence of the fluxes on sea-state, wave breaking and whitecap fraction. As part of WAGES the JCR was instrumented in the summer of 2010 with: the autonomous air-sea interaction system "AutoFlux" (Yelland et al., 2009) to measure the air-sea fluxes of CO_2, sea-spray aerosol, momentum and sensible and latent heat; a WAVEX directional wave radar system; a webcam mounted on the bridge to capture whitecap fraction. In addition to the continuous measurements, a number of intensive observation periods (IOPs) have been carried out by WAGES staff on board the ship (JR254A through D in 2010/11). These involve deployments of a spar buoy (Pascal et al., 2011) to measure wave breaking and, when conditions permit, an aerial camera system to measure whitecap fraction. The aim of the IOPs is to deploy the buoy and aerial camera systems in a wide range of wind speeds and sea states, and in both short fetch and open-ocean conditions.

JR254E had 4 days of dedicated ship time, some of which was used to perform short-fetch studies off the coast of the Falkland Islands at the start of the cruise, and some was used for simultaneous deployments of both a drifting and a tethered buoy in the open ocean in a range of conditions. In addition to the dedicated WAGES deployments the buoys were also deployed during the deeper CTD stations and during the geology coring work whenever conditions allowed. During JR254E no balloon flights were made since conditions were either too turbulent, or there was too much low cloud/fog/mist to make flights worth while.

The table below summarises the buoy deployments made during the cruise. Jday is Julian day, where 1200 GMT on the 1st January is jday 1.5. Three types of deployment were made: the standard spar buoy was attached to the ship using a 200 m long tether (deployment ID of T*); a second standard spar buoy was sometimes deployed un-tethered and allowed to drift freely before being recovered (ID of D*); a modified version of the spar buoy was also deployed on a 200 m long tether (ID of B*, for "bubble buoy"). This third buoy had been strengthened and lengthened slightly in order to carry acoustic resonators that measure sub-surface bubble populations. The

resonators were deployed as part of a collaboration with Helen Czerski of the University of Southampton.

Extracts from the ship's scientific log are given in the Appendix: note that the name and number of the buoy deployments given in the log have been altered to correspond with the name/number system used in the table.

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jday	Dep ID	Logger start GMT	In water GMT	Out of water GMT	mins in water	True wind speed m/s (10 min average)	True wind direction	Fetch km	Lat.(deg N) at dep	Long. (deg E) at dep
87	T1	22:43:41	23:00 ~	01:22 *	142	11-15	350	8-9	-51.7959	-57.7971
88	T2	11:47:16	11:57:06	16:15	258	6-10	270	5-6	-51.4341	-57.7769
88	T3	22:13:35	22:16:35	13:14 *	898	6-14	250-300	10-1	-51.4478	-57.679

								4		
89	T4	21:47:35	21:51:20	03:27 *	336	8-12	270	19	-51.4231	-57.5765
95	T5	13:24:05	13:34:27	16:44 ~	190	9-10	130	long	-63.3406	-29.5768
95	T6	19:03:34	19:07:07	21:25	138	6-7	130	long	-63.0716	-30.1193
97	T7	00:30:58	00:37:30	02:38	121	13-20	50	long	-61.5517	-31.1054
98	T8	15:21:28	15:36:10	17:38	122	12-13	30	long	-59.0551	-30.8361
103	T9	18:53:15	18:56:52	20:13:00	6		300	long	-53.0866	-43.3888
106	T10	19:35:21	19:38:40	22:38:23	179	3-6	210-270	long	-53.7407	-38.1508
113	T11	14:14:10	14:19:40	18:21:15	241	9-14	200	long	-51.9251	-45.5297
88	B1	16:39:30	16:45:25 17:27 [1]	21:10:45	223	6-10	250-300	5-6	-51.4353	-57.777
89	B2	14:02:00	14:13:25 16:30[2]	16:10 21:08	395	9-11	250	19	-51.4217	-57.5769
93	B3	19:37:40	20:08	21:37	89	2-3	150	lon	-60.564	-41.636

								g	5	7
96	B4	18:51:20	19:01:04	22:44 ~	223	15-17	50	l o n g	-61.6619	-31.1125
98	B5	21:25:22	21:30 ~	23:09 ~	99	14-15	30	l o n g	-58.6354	-30.8247
103	B6	12:10:45	12:16:00	15:37:00	201	10	290	long	-52.9802	-43.3768
108	B7	16:00:00	16:25:00	18:32:15	127	6-10	320	long	-54.4225	-35.7358
109	B8	20:15:30	20:18:35	21:52:00	93	7-15	290	25-long	-54.097	-36.4766
113	B9	11:24:00	11:29:15	13:48:45	139	9-12	200	long	-51.9458	-45.5437
103	D1	11:40:10	11:56:00	21:38:00	582	5-11	300	long	-52.9812	-43.3735
106	D2	19:18:20	19:33:45	23:10:00	216	3-6	200-280	long	-53.7400	-38.1497
113	D3	14:02:10	14:07:00	18:55:00	288	9-13	200	long	-51.9241	-45.5276

NOC spar buoy deployments during JR254E : March/April 2012

NOTES

T = Tethered spar, B = Bubble spar, D = Free drifting spar buoy.

* NB recovery on following JDAY.

~ indicates that the time (GMT) is approximate

Appendix: Extracts from the ship's scientific log for WAGES buoy deployments.

NOTE that the name and number of the buoy deployments have been changed for consistency with those given in the table.

Date and time (GMT)	Event	Lat	Lon	Comment
27/03/2012 19:07	Tethered buoy Test	-51.93382	-58.53321	Drifter Buoy 1 Test no 1: Buoy off the deck. Vessel moving ahead at 0.3kt.
27/03/2012 19:09	Tethered buoy Test	-51.93379	-58.53323	Buoy in the water and released.
27/03/2012 19:15	Tethered buoy Test	-51.93353	-58.53366	Buoy fully deployed. Vessel stopped.
27/03/2012 19:16	Tethered buoy Test	-51.93352	-58.53368	Commenced recovery.
27/03/2012 19:19	Tethered buoy Test	-51.93348	-58.5337	Buoy clear of the water.
27/03/2012 19:20	Tethered buoy test	-51.93349	-58.53369	Buoy on the deck for ballast adjustment.
27/03/2012 19:21	Bubble buoy test	-51.93351	-58.5337	Drifter Buoy no 2 test 01: Buoy off the deck.

8				
27/0	Bubble buoy	-	-	Buoy in the water and released.
3/20	test	51.	58.	
12		933	533	
19:3		53	67	
0				
27/0	Bubble buoy	-	-	Commenced recovery.
3/20	test	51.	58.	
12		933	533	
19:3		52	68	
8				
27/0	Bubble buoy	-	-	Buoy clear of the water.
3/20	test	51.	58.	
12		933	533	
19:4		52	68	
1				
27/0	Bubble buoy	-	-	Buoy on deck for ballast adjustment.
3/20	test	51.	58.	
12		933	533	
19:4		52	68	
2				
27/0	Bubble buoy	-	-	Buoy off the deck.
3/20	test	51.	58.	
12		933	533	
19:4		52	68	
7				
27/0	Bubble buoy	-	-	Drifter buoy in the water and released.
3/20	test	51.	58.	
12		933	533	
19:4		51	68	
8				
27/0	Bubble buoy	-	-	Commenced recovery.
3/20	test	51.	58.	
12		933	533	
20:0		53	7	
5				
27/0	Bubble buoy	-	-	Buoy clear of the water.
3/20	test	51.	58.	
12		933	533	
20:0		52	7	
6				
27/0	Bubble buoy	-	-	Buoy on deck for ballast adjustment.
3/20	test	51.	58.	
12		933	533	
20:0		53	7	

7				
27/0	Bubble buoy	-	-	Drifter Buoy 2 test 03: Buoy off the deck.
3/20	test	51.	58.	
12		933	533	
20:1		52	7	
4				
27/0	Bubble buoy	-	-	Buoy in the water and released.
3/20	test	51.	58.	
12		933	533	
20:1		52	7	
6				
27/0	Bubble buoy	-	-	Commenced recovery.
3/20	test	51.	58.	
12		933	533	
20:2		52	68	
0				
27/0	Bubble buoy	-	-	Buoy clear of the water.
3/20	test	51.	58.	
12		933	533	
20:2		52	69	
2				
27/0	Bubble buoy	-	-	Buoy on deck.
3/20	test	51.	58.	
12		933	533	
20:2		52	67	
3				
27/0		-	-	Vessel off DP and proceeding to first job site.
3/20		51.	58.	
12		933	533	
20:2		51	7	
4				
27/0		-	-	Vessel on station in D.P
3/20		51.	57.	
12		784	781	
22:5		63	45	
5				
27/0	Tethered	-	-	Drift Buoy 01 - Buoy off the deck.
3/20	buoy 1	51.	57.	
12		784	781	
22:5		62	39	
9				
27/0	Tethered	-	-	In the water and released
3/20	buoy 1	51.	57.	
12		784	781	
23:0		62	42	

2				
27/0	Tethered	-	-	Completed deployment. Cable out 200m.
3/20	buoy 1	51.	57.	
12		784	780	
23:1		45	31	
6				
27/0	Tethered	-	-	Vessel all stoped on D.P.
3/20	buoy 1	51.	57.	
12		783	774	
23:5		46	21	
1				
27/0	Tethered	-	-	Sway control off vessel drifting up wind of
3/20	buoy 1	51.	57.	bouy
12		783	774	
23:5		47	21	
6				
28/0	Tethered	-	-	Commence recovery of drifter bouy
3/20	buoy 1	51.	57.	
12		782	769	
01:1		66	29	
9				
28/0	Tethered	-	-	Drifter bouy onboard
3/20	buoy 1	51.	57.	
12		782	769	
01:2		71	62	
4				
28/0	Tethered	-	-	Ship heading changed to 280 full auto D.P
3/20	Buoy 02	51.	57.	
12		434	776	
11:5		02	94	
4				
28/0	Tethered	-	-	Sway control turned off
3/20	Buoy 02	51.	57.	
12		434	776	
11:5		01	94	
5				
28/0	Tethered	-	-	Drifter Buoy 2 - Commence deployment of
3/20	Buoy 02	51.	57.	drifter bouy
12		434	776	
11:5		03	94	
7				
28/0	Tethered	-	-	Drifter bouy away and in water
3/20	Buoy 02	51.	57.	
12		434	776	
11:5		07	95	

8				
28/0	Tethered	-	-	Vessel moving ahead in joystick mode
3/20	Buoy 02	51.	57.	
12		434	777	
12:0		51	4	
5				
28/0	Tethered	-	-	Vsl in full DP auto
3/20	Buoy 02	51.	57.	
12		434	780	
12:1		3	71	
1				
28/0	Tethered	-	-	Sea water temp obtained by sea bucket 9.6
3/20	Buoy 02	51.	57.	
12		434	781	
12:4		29	5	
4				
28/0	Tethered	-	-	Ships heading changed to 290 full D.P auto
3/20	Buoy 02	51.	57.	
12		434	782	
12:5		27	89	
2				
28/0	Tethered	-	-	Ships head changed to 270 full DP auto.
3/20	Buoy 02	51.	57.	
12		434	783	
12:5		14	03	
9				
28/0	Tethered	-	-	Vsl moving ahead to keep distance from bouy
3/20	Buoy 02	51.	57.	
12		429	789	
14:2		34	21	
1				
28/0	Tethered	-	-	Commence Recovery
3/20	Buoy 02	51.	57.	
12		430	794	
16:0		09	72	
3				
28/0	Tethered	-	-	Buoy onboard
3/20	Buoy 02	51.	57.	
12		430	794	
16:1		06	76	
7				
28/0	Tethered	-	-	rain shower 16:20-16:23 GMT
3/20	Buoy 02	51.	57.	
12		430	795	
16:2		2	5	

28/03/2012 16:20		-51.429062	-57.796792	DP disengaged
28/03/2012 16:21		-51.429062	-57.796792	DP engaged
28/03/2012 16:36	Bubble buoy 1	-51.435021	-57.776994	Bubble buoy 1 - Buoy deployed
28/03/2012 16:46	Bubble buoy 1	-51.435215	-57.779443	Buoy recovered to adjust weights
28/03/2012 16:56	Bubble buoy 1	-51.435215	-57.779443	Buoy re-deployed
28/03/2012 17:00	Bubble buoy 1	-51.436073	-57.780855	Recovered to adjust ballast
28/03/2012 17:07	Bubble buoy 1	-51.436073	-57.780855	Buoy re-deployed
28/03/2012 17:15	Bubble buoy 1	-51.436073	-57.781414	Bubble buoy 01 fully deployed. Ships heading 272 degrees
28/03/2012 17:27	Bubble buoy 1	-51.436093	-57.782004	Turmidity Deployed
28/03/2012 17:39	Bubble buoy 1	-51.436093	-57.782044	

2				
28/0	Bubble buoy	-	-	Ships head changed to 290
3/20	1	51.	57.	
12		436	782	
17:4		93	45	
0				
28/0	Bubble buoy	-	-	Turmidity Recovered
3/20	1	51.	57.	
12		436	782	
17:4		89	45	
2				
28/0	Bubble buoy	-	-	Commenced tracking 180 at 0.1kts.
3/20	1	51.	57.	
12		436	786	
18:3		89	83	
6				
28/0	Bubble buoy	-	-	Ships head changed from 250
3/20	1	51.	57.	
12		437	786	
18:4		31	93	
8				
28/0	Bubble buoy	-	-	Commenced tracking 215 at 0.1kts
3/20	1	51.	57.	
12		440	786	
20:4		7	98	
3				
28/0	Bubble buoy	-	-	Commenced recovery. Ship stopped.
3/20	1	51.	57.	
12		441	787	
21:0		14	39	
5				
28/0	Bubble buoy	-	-	Buoy clear of the water.
3/20	1	51.	57.	
12		441	787	
21:1		15	39	
1				
28/0	Bubble buoy	-	-	Bubble buoy on deck. Awaiting instructions
3/20	1	51.	57.	from the UIC.
12		441	787	
21:1		13	38	
3				
28/0	Bubble buoy	-	-	Vessel off DP and repositioning for next
3/20	1	51.	57.	deployment.
12		441	787	
21:3		26	76	

4				
28/0	Tethered	-	-	Vessel on station in D.P.
3/20	buoy 3	51.	57.	
12		447	679	
22:0		76	01	
7				
28/0	Tethered	-	-	Buoy off the deck. Vessel moving ahead at
3/20	buoy 3	51.	57.	0.3kts.
12		447	678	
22:1		77	98	
5				
28/0	Tethered	-	-	Tethered buoy 03 in the water and released.
3/20	buoy 3	51.	57.	
12		447	679	
22:1		79	24	
7				
28/0	Tethered	-	-	Tethered buoy 03 fully deployed. vessel
3/20	buoy 3	51.	57.	stopped.
12		448	681	
22:2		02	31	
8				
28/0	Tethered	-	-	Commenced tracking along 320 at 0.2kt.
3/20	buoy 3	51.	57.	
12		448	681	
22:3		03	58	
8				
28/0	Tethered	-	-	Commenced tracking 300 at 0.4kts.
3/20	buoy 3	51.	57.	
12		447	683	
23:0		1	41	
0				
28/0	Tethered	-	-	Tethered buoy 03 vessel tracking astern @ 0.3
3/20	buoy 3	51.	57.	knots to parrallel buoy
12		446	684	
23:0		6	72	
9				
29/0	Tethered	-	-	Tethered buoy 03 vessel heading change to 270
3/20	buoy 3	51.	57.	
12		444	698	
01:0		23	11	
0				
29/0	Tethered	-	-	Tethered buoy 03 vessel tracking astern 0.8
3/20	buoy 3	51.	57.	knots
12		448	695	
02:1		9	52	

2				
29/0	Tethered	-	-	Tethered bouy 03 decrease astern speed to 0.6
3/20	buoy 3	51.	57.	knots
12		449	695	
02:1		17	13	
4				
29/0	Tethered	-	-	Tide starting to turn. Adjusting track and speed
3/20	buoy 3	51.	57.	to match drift.
12		502	631	
07:0		7	26	
0				
29/0	Tethered	-	-	Vessel tracking 080 at 0.4kts.
3/20	buoy 3	51.	57.	
12		504	620	
08:0		03	8	
0				
29/0	Tethered	-	-	Vessel tracking 030 at 0.6kts.
3/20	buoy 3	51.	57.	
12		5	609	
09:0			43	
0				
29/0	Tethered	-	-	Vessel tracking 010 at 0.7kts.
3/20	buoy 3	51.	57.	
12		491	603	
10:0		35	37	
0				
29/0	Tethered	-	-	Tethered buoy3 vessel tracking 270 @ 0.7
3/20	buoy 3	51.	57.	knots
12		461	598	
12:0		35	99	
0				
29/0	Tethered	-	-	Tethered 3 commence recovery of buoy
3/20	buoy 3	51.	57.	
12		446	604	
13:0		25	55	
0				
29/0	Tethered	-	-	Tethered 3 drifter buoy onboard
3/20	buoy 3	51.	57.	
12		421	576	
13:1		4	9	
2				
29/0	Bubble	-	-	vessel proceeding to new station.
3/20	Buoy 2	51.	57.	
12		421	576	
13:1		25	87	

5				
29/0	Bubble	-	-	Bubble buoy 2 bouy in water.
3/20	Buoy 2	51.	57.	
12		420	576	
14:1		84	75	
8				
29/0	Bubble	-	-	Bubble buoy 2 vessel on station in full D.P
3/20	Buoy 2	51.	57.	auto deploying bubble boy.
12		421	576	
14:1		1	84	
9				
29/0	Bubble	-	-	Bubble buoy 2 fully deployed ships head 235.
3/20	Buoy 2	51.	57.	vsl in full auto D.P
12		420	576	
14:2		67	71	
2				
29/0	Bubble	-	-	Commence temporary recovery of buoy ti fit
3/20	Buoy 2	51.	57.	current meter
12		401	586	
16:0		89	39	
5				
29/0	Bubble	-	-	Buoy on deck.
3/20	Buoy 2	51.	57.	
12		400	587	
16:1		79	25	
0				
29/0	Bubble	-	-	Buoy re-deployed (still bubble buoy 2)
3/20	Buoy 2	51.	57.	
12		400	587	
16:3		66	38	
0				
29/0	Bubble	-	-	Vessel tracking 320 at 0.8kts.
3/20	Buoy 2	51.	57.	
12		365	615	
20:0		23	73	
0				
29/0	Bubble	-	-	Vessel tracking 315 at 0.8kts.
3/20	Buoy 2	51.	57.	
12		356	629	
21:0		04	81	
0				
29/0	Bubble	-	-	Commenced recovery of the buoy. Vessel
3/20	Buoy 2	51.	57.	stopped.
12		355	630	
21:0		73	34	

2				
29/0	Bubble	-	-	Buoy clear of the water.
3/20	Buoy 2	51.	57.	
12		355	630	
21:0		27	74	
9				
29/0	Bubble	-	-	Buoy on deck.
3/20	Buoy 2	51.	57.	
12		355	630	
21:1		15	76	
0				
29/0	Bubble	-	-	Vessel off D.P and proceeding to next site.
3/20	Buoy 2	51.	57.	
12		354	630	
21:1		76	58	
2				
29/0	Tethered	-	-	Tethered buoy 04. Vessel on station in D.P. for
3/20	buoy 4	51.	57.	buoy deployment.
12		423	576	
21:4		05	67	
8				
29/0	Tethered	-	-	Buoy off the deck. Vessel moving ahead at
3/20	buoy 4	51.	57.	0.5kts.
12		423	576	
21:5		01	71	
0				
29/0	Tethered	-	-	Buoy in the water and released.
3/20	buoy 4	51.	57.	
12		423	576	
21:5		03	91	
1				
29/0	Tethered	-	-	Buoy fully deployed. Moving vessel to follow
3/20	buoy 4	51.	57.	drift.
12		423	579	
22:0		19	63	
1				
29/0	Tethered	-	-	Vessel tracking 335 at 0.8kts.
3/20	buoy 4	51.	57.	
12		410	587	
23:0		69	72	
0				
30/0	Tethered	-	-	Vessel tracking 320 at 0.8kts.
3/20	buoy 4	51.	57.	
12		399	605	
00:2		82	59	

3				
30/0	Tethered	-	-	Ships heading changed to 270 tracking 320 @
3/20	buoy 4	51.	57.	0.5 knots
12		391	625	
02:0		08	15	
0				
30/0	Tethered	-	-	Ships heading changed to 280 vsl track 290 @
3/20	buoy 4	51.	57.	0.4 knots.
12		388	632	
02:3		92	26	
0				
30/0	Tethered	-	-	Commence Recovery
3/20	buoy 4	51.	57.	
12		388	635	
03:0		31	76	
9				
30/0	Tethered	-	-	Buoy recovered to deck
3/20	buoy 4	51.	57.	
12		388	636	
03:2		2	62	
8				
30/0		-	-	DP disengaged vessel on passage to test site
3/20		51.	57.	
12		388	636	
03:4		12	99	
8				
02/0	OP6 Buoy	-	-	OP6 buoy on the seabed. Hyrophone
4/20		60.	41.	recovered. Vessel stopped and turning to
12		565	629	commence Bubble Buoy deployment.
20:0		58	79	
1				
02/0	Bubble buoy	-	-	Bubble Buoy - Buoy off the deck. Vessel
4/20	3	60.	41.	moving ahead at 0.5kts.
12		565	628	
20:0		58	98	
7				
02/0	Bubble buoy	-	-	Buoy in the water and released.
4/20	3	60.	41.	
12		565	629	
20:0		52	47	
9				
02/0	Bubble buoy	-	-	Buoy fully deployed. Vessel moving slowly to
4/20	3	60.	41.	CTD deployment position.
12		565	631	
20:1		16	31	

6				
02/04/2012 20:22	CTD 02	-60.564 91	-41.632 65	CTD 02 - Vessel in position and stopped. CTD off the deck.
02/04/2012 20:24	CTD 02	-60.564 89	-41.632 61	CTD deployed
4				
02/04/2012 20:35	CTD 02	-60.564 91	-41.632 61	USBL pole fully extended.
5				
02/04/2012 21:07	CTD 02	-60.564 88	-41.632 61	CTD at depth. Wire out 2288m. Commenced recovery.
7				
02/04/2012 21:25	Bubble buoy 3	-60.564 91	-41.632 6	Commenced recovery of the buoy.
5				
02/04/2012 21:32	Bubble buoy 3	-60.564 89	-41.632 58	Buoy clear of the water.
2				
02/04/2012 21:33	Bubble buoy 3	-60.564 89	-41.632 58	Buoy on deck.
3				
02/04/2012 21:57	CTD 02	-60.564 9	-41.632 61	CTD at the surface.
7				
02/04/2012 21:59	CTD 02	-60.564 9	-41.632 61	CTD on deck.

8				
02/0	CTD 02	-	-	USBL fully retracted.
4/20		60.	41.	
12		564	632	
22:0		91	6	
3				
02/0	CTD 02	-	-	Midships gantry and deck secure. Vessel off
4/20		60.	41.	DP and proceeding to 1st ranging position.
12		564	632	
22:0		91	6	
4				
02/0	OP6	-	-	Vessel at 1st ranging position. Hydrophone
4/20	mooring	60.	41.	deployed.
12		566	645	
22:1		62	64	
3				
02/0	OP6	-	-	Hydrophone recovered (range 2
4/20	mooring	60.	41.	
12		566	645	
22:1		67	71	
5				
02/0	OP6	-	-	Vessel on DP at Ranging position 2.
4/20	mooring	60.	41.	Hydrophone deployed.
12		555	627	
22:2		08	68	
7				
02/0	OP6	-	-	Hydrophone recovered (range 2
4/20	mooring	60.	41.	
12		555	627	
22:2		08	66	
8				
02/0	OP6	-	-	Vessel on DP at ranging position 3.
4/20	mooring	60.	41.	Hydrophone deployed.
12		566	618	
22:4		1	57	
4				
02/0	OP6	-	-	Hydrophone recovered (range 2
4/20	mooring	60.	41.	
12		566	618	
22:4		11	56	
6				
04/0	Tethered	-	-	Vsl on station at wave buoy deployment site.
4/20	buoy 5	63.	29.	
12		344	571	
13:3		42	73	

5				
04/0	Tethered	-	-	Wave bouy deployed.
4/20	buoy 5	63.	29.	
12		345	570	
13:4		08	66	
5				
04/0	Tethered	-	-	Turp - disc in water.
4/20	buoy 5	63.	29.	
12		346	567	
13:5		73	83	
1				
04/0	Tethered	-	-	Turp disc on deck.
4/20	buoy 5	63.	29.	
12		346	569	
13:5		02	41	
5				
04/0	Tethered	-	-	Vsl on station at CTD deployment site.
4/20	buoy 5	63.	29.	
12		346	569	
13:5		2	16	
9				
04/0	Tethered	-	-	CTD in the water. vsl in full DP auto.
4/20	buoy 5	63.	29.	
12		346	569	
14:0		25	09	
0				
04/0	Tethered	-	-	CTD at depth - cable 4715m - sea depth 4730m
4/20	buoy 5	63.	29.	
12		346	567	
15:1		73	84	
9				
04/0	Tethered	-	-	Commence recovery of wave buoy
4/20	buoy 5	63.	29.	
12		346	567	
16:3		74	86	
2				
04/0	Tethered	-	-	Buoy recovered on deck
4/20	buoy 5	63.	29.	
12		346	567	
16:4		72	84	
2				
04/0	CTD 03	-	-	CTD at the surface
4/20		63.	29.	
12		346	567	
16:5		76	86	

7				
04/0	CTD 03	-	-	CTD on deck - retracting USBL
4/20		63.	29.	
12		346	567	
16:5		76	87	
9				
04/0		-	-	Deck Secure - DP disengaged
4/20		63.	29.	
12		346	567	
17:0		75	87	
6				
04/0	CTD 04 /	-	-	Vessel on station in DP
4/20	Tethered	63.	30.	
12	buoy 06	071	119	
19:0		55	14	
4				
04/0	Tethered	-	-	Drifter Bouy 06 off the deck. Vessel moving
4/20	buoy 6	63.	30.	ahead at 0.5kts
12		071	118	
19:0		56	97	
6				
04/0	Tethered	-	-	Buoy in the water and released.
4/20	buoy 6	63.	30.	
12		071	118	
19:0		63	77	
7				
04/0	Tethered	-	-	Buoy fully deployed.
4/20	buoy 6	63.	30.	
12		072	116	
19:1		26	68	
5				
04/0	CTD 04	-	-	CTD 04 off the deck.
4/20		63.	30.	
12		072	115	
19:2		71	32	
4				
04/0	CTD 04	-	-	CTD 04 deployed.
4/20		63.	30.	
12		072	115	
19:2		73	32	
5				
04/0	Tethered	-	-	Buoy moving forward and closing on the ship.
4/20	buoy 6	63.	30.	Commenced tracking 100 at 0.2kts
12		072	115	
20:3		78	1	

7				
04/0	CTD 04	-	-	CTD 06 at depth. Wire out 4850m.
4/20		63.	30.	Commenced recovery.
12		072	113	
20:5		83	61	
1				
04/0	Tethered	-	-	Vessel tracking 100 at 0.1kt.
4/20	buoy 6	63.	30.	
12		072	113	
21:0		88	06	
0				
04/0	Tethered	-	-	Drifter Buoy closing on ships side. vessel
4/20	buoy 6	63.	30.	stopped. Commenced recovery of the buoy.
12		073	111	
21:2		05	09	
2				
04/0	Tethered	-	-	Buoy clear of the water.
4/20	buoy 6	63.	30.	
12		073	111	
21:2		08		
6				
04/0	Tethered	-	-	Buoy on deck.
4/20	buoy 6	63.	30.	
12		073	111	
21:2		07	01	
7				
04/0	CTD 04	-	-	CTD at the surface.
4/20		63.	30.	
12		073	111	
22:2		04		
7				
04/0	CTD 04	-	-	CTD on deck.
4/20		63.	30.	
12		073	111	
22:2		04	01	
9				
04/0	CTD 04	-	-	All secure on deck. Vessel off DP and
4/20		63.	30.	proceeding to next site.
12		073	111	
22:3		04		
3				
05/0	CTD 07	-	-	DP disengaged
4/20		62.	31.	
08		083	173	
16:1		45	9	

1				
05/0	Bubble buoy	-	-	DP Engaged
4/20	4	61.	31.	
08		662	112	
18:4		12	84	
8				
05/0	Bubble buoy	-	-	Bubble Buoy 04 - Commence deployment
4/20	4	61.	31.	
08		661	111	
18:5		58	76	
6				
05/0	Bubble buoy	-	-	Buoy fully deployed. Vessel stopped.
4/20	4	61.	31.	
08		661	110	
19:0		17	84	
6				
05/0	CTD 08	-	-	CTD 08 - Off the deck.
4/20		61.	31.	
08		661	110	
19:1		16	83	
2				
05/0	CTD 08	-	-	CTD on deck.
4/20		61.	31.	
08		661	110	
21:2		19	81	
6				
05/0	CTD 08	-	-	Midships Gantry secured.
4/20		61.	31.	
08		661	110	
21:3		17	85	
1				
05/0	Bubble buoy	-	-	Commenced tracking 200 at 0.5kts.
4/20	4	61.	31.	
08		661	110	
21:3		19	82	
3				
05/0	Bubble buoy	-	-	Tracking 190 at 0.3kts.
4/20	4	61.	31.	
08		663	112	
22:0		37	44	
0				
05/0	Bubble buoy	-	-	Vessel stopped. Commenced recovery of the
4/20	4	61.	31.	buoy.
08		665	115	
22:3		86	1	

6				
05/0	Bubble buoy	-	-	Buoy clear of the water.
4/20	4	61.	31.	
08		665	115	
22:4		96	28	
3				
05/0	Bubble buoy	-	-	Buoy on deck.
4/20	4	61.	31.	
08		666	115	
22:4		09	67	
4				
05/0	Bubble buoy	-	-	All secure on deck.
4/20	4	61.	31.	
08		666	115	
22:5		13	76	
2				
05/0	Bubble buoy	-	-	Vessel off DP and proceeding to next site.
4/20	4	61.	31.	
08		666	115	
22:5		15	81	
4				
06/0	Tethered	-	-	Vsl on station in full DP auto.
4/20	buoy 7	61.	31.	
08		551	104	
00:1		42	35	
0				
06/0	Tethered	-	-	Drifter bouy in the water and streaming.
4/20	buoy 7	61.	31.	
08		551	103	
00:3		12	52	
5				
06/0	Tethered	-	-	Fully deployed.
4/20	buoy 7	61.	31.	
08		550	102	
00:4		88	75	
3				
06/0	Tethered	-	-	Vsl head to wind 045. drifting with drifter
4/20	buoy 7	61.	31.	bouy.
08		556	099	
02:0		91	97	
7				
06/0	Tethered	-	-	commence recovery of drifter bouy.
4/20	buoy 7	61.	31.	
08		557	098	
02:2		81	61	

5				
06/0	Tethered	-	-	drifter bouy on deck.
4/20	buoy 7	61.	31.	
08		557	098	
02:4		83	68	
1				
06/0	CTD 09	-	-	CTD 09
4/20		61.	31.	
08		557	098	
03:0		79	68	
2				
06/0	CTD 12	-	-	CTD on deck
4/20		60.	31.	
08		699	008	
18:3		52	55	
7				
07/0	CTD 16	-	-	CTD 16
4/20		59.	30.	
12		435	861	
12:5		71	18	
4				
07/0	CTD 17	-	-	DP engaged - moving slowly in DP for Drifter
4/20		59.	30.	Buoy deployment
12		051	834	
15:2		29	68	
8				
07/0	Tethered	-	-	Drifter Buoy 08 - Commence Deployment -
4/20	buoy 8	59.	30.	heading 030 degrees
12		051	834	
15:3		05	05	
7				
07/0	Tethered	-	-	Drifter Buoy 08 deployed
4/20	buoy 8	59.	30.	
12		050	832	
15:4		43	92	
4				
07/0	Tethered	-	-	CTD 17 - CTD off the deck
4/20	buoy 8	59.	30.	
12		050	832	
15:5		42	89	
0				
07/0	Tethered	-	-	CTD 17 - deployed
4/20	buoy 8	59.	30.	
12		050	832	
15:5		42	87	

4				
07/0	Tethered	-	-	CTD 17 - at depth
4/20	buoy 8	59.	30.	
12		050	832	
16:4		37	76	
8				
07/0	Tethered	-	-	Commence recovery of Drifter Buoy 08
4/20	buoy 8	59.	30.	
12		050	832	
17:3		47	77	
0				
07/0	Tethered	-	-	Drifter Buoy on deck
4/20	buoy 8	59.	30.	
12		050	832	
17:3		42	8	
9				
07/0	CTD 17	-	-	CTD 17 at the surface for recovery
4/20		59.	30.	
12		050	832	
17:5		45	76	
5				
07/0	CTD 17	-	-	CTD 17 on deck
4/20		59.	30.	
12		050	832	
17:5		47	79	
8				
07/0	CTD 17	-	-	Gantry Lashed - DP disengaged - moving to
4/20		59.	30.	CTD 18 site
12		050	832	
18:0		6	98	
5				
07/0	Bubble buoy	-	-	Vessel on station in D.P.
4/20	5	58.	30.	
12		635	824	
21:0		48	61	
4				
07/0	Bubble buoy	-	-	Bubble Buoy 6 - off the deck.
4/20	5	58.	30.	
12		635	824	
21:2		49	57	
8				
07/0	Bubble buoy	-	-	Bubble buoy in the water and released. Vessl
4/20	5	58.	30.	moving ahead at 0.5kts.
12		635	824	
21:3		5	58	

07/04/2012 21:37	Bubble buoy 5	- 58.634 74	- 30.823 75	Buoy fully deployed. Vessel stopped.
07/04/2012 21:42	Bubble buoy 5	- 58.634 72	- 30.823 69	Coimmenced tracking vessel along 350 at 0.2kts.
07/04/2012 22:00	Bubble buoy 5	- 58.632 45	- 30.823 6	Vessel tracking along 020 at 0.4kts.
07/04/2012 23:00	Bubble buoy 5	- 58.623 99	- 30.820 28	Vessel tracking 020 at 0.6kts.
07/04/2012 23:02	Bubble buoy 5	- 58.623 72	- 30.821 12	Commence B.buoy recovery.
07/04/2012 23:07	Bubble buoy 5	- 58.623 42	- 30.820 19	Bubble buoy on deck.
07/04/2012 23:39	CTD 18	- 58.623 67	- 30.821 17	CTD 18 CTD in water.
11/04/2012 19:09	Gravity Core 04	- 53.499 97	- 43.201 02	Corer lifted to deck level.
11/04/2012 20:09	Drifter Ballast Check	- 53.499 98	- 43.201 02	Drifter Buoy off the deck.

0				
11/0	Drifter	-	-	Buoy in the water.
4/20	Ballast	53.	43.	
12	Check	499	201	
20:0		96	02	
1				
11/0	Drifter	-	-	Buoy clear of the water.
4/20	Ballast	53.	43.	
12	Check	499	201	
20:1		97	03	
2				
11/0	Drifter	-	-	Buoy on deck.
4/20	Ballast	53.	43.	
12	Check	499	201	
20:1		98	02	
3				
11/0		-	-	Deck secure. vessel off D.P. and proceeding to
4/20		53.	43.	next survey site.
12		499	201	
20:2		94	03	
2				
12/0	Free Drifter	-	-	Drifter buoy 1 away vsl tracking ahead 295.
4/20	Bouy 01	52.	43.	
12		981	373	
11:5		24	27	
5				
12/0	bubble buoy	-	-	Bubble Bouy in the water and deployed.
4/20	06	52.	43.	
12		980	376	
12:1		15	69	
6				
12/0	bubble buoy	-	-	Vsl in DP tracking close to bubble bouy
4/20	06	52.	43.	heading 295.
12		978	375	
12:5		87	77	
9				
12/0	bubble buoy	-	-	Commence Recovery
4/20	06	52.	43.	
12		977	365	
15:3		05	09	
1				
12/0	bubble buoy	-	-	Bubble Buoy recovery to deck
4/20	06	52.	43.	
12		977	363	
15:3		39	92	

9				
12/0		-	-	DP disengaged
4/20		52.	43.	
12		977	363	
15:4		40	88	
8				
12/0		-	-	DP engaged at core site
4/20		53.	43.	
12		086	387	
16:4		72	74	
6				
12/0	Box Core 05	-	-	Box Core 05 deployed
4/20		53.	43.	
12		086	388	
16:5		58	75	
8				
12/0	Gravity Core	-	-	Gravity Core 05 - deployed
4/20	05	53.	43.	
12		086	388	
18:3		57	77	
5				
12/0	Tethered	-	-	Drifter Buoy 09 Deployed
4/20	buoy 9	53.	43.	
12		086	388	
18:5		58	78	
7				
12/0	Gravity Core	-	-	Corer on the seabed. Wire out 1804
4/20	08	53.	43.	
12		086	388	
19:0		58	75	
8				
12/0	Gravity Core	-	-	Commenced recovery. Pull out tension 5.4
4/20	08	53.	43.	tonnes
12		086	388	
19:1		58	80	
0				
12/0	Tethered	-	-	Buoy fully deployed.
4/20	buoy 9	53.	43.	
12		086	388	
19:2		59	73	
6				
12/0	Gravity Core	-	-	Corer at the surface
4/20	08	53.	43.	
12		086	388	
19:3		57	77	

9				
12/0	Gravity Core	-	-	Corer lifted to deck level.
4/20	08	53.	43.	
12		086	388	
19:5		58	79	
1				
12/0	Tethered	-	-	Commenced recovery.
4/20	buoy 9	53.	43.	
12		086	388	
20:0		58	78	
2				
12/0	Tethered	-	-	Buoy clear of the water.
4/20	buoy 9	53.	43.	
12		087	388	
20:1		66	75	
3				
12/0	Tethered	-	-	Buoy on deck.
4/20	buoy 9	53.	43.	
12		087	388	
20:1		93	75	
4				
12/0		-	-	Deck secure. Vessel off DP and proceeding to
4/20		53.	43.	next site.
12		089	388	
20:2		87	72	
1				
12/0	Free Drifter	-	-	Approaching buoy. In DP JSAH.
4/20	Buoy 01	52.	43.	
12		955	308	
21:1		34	23	
4				
12/0	Free Drifter	-	-	Buoy hooked.
4/20	Buoy 01	52.	43.	
12		950	309	
21:3		39	02	
7				
12/0	Free Drifter	-	-	Buoy clear of the water.
4/20	Buoy 01	52.	43.	
12		950	309	
21:3		45	03	
8				
12/0	Free Drifter	-	-	Buoy on deck. Vessel stopped on station in
4/20	Buoy 01	52.	43.	D.P.
12		950	309	
21:3		51	03	

9				
12/0		-	-	Deck secured. Vessel off DP and proceeding to
4/20		52.	43.	next survey site
12		950	309	
21:5		64	06	
3				
16/0		-	-	Vessel off D.P. and proceeding to next core
4/20		53.	38.	site.
08		781	128	
19:0		85	5	
4				
16/0		-	-	Vessel on D.P. Driving ahead at 0.7 knots for
4/20		53.	38.	Drifter Buoy deployment.
08		739	149	
19:3		87	49	
0				
16/0	Free Drifter	-	-	Free Drifter Buoy 02 - off the deck.
4/20	Buoy 02	53.	38.	
08		739	149	
19:3		75	47	
2				
16/0	Free Drifter	-	-	Buoy in the water and released.
4/20	Buoy 02	53.	38.	
08		739	149	
19:3		99	78	
4				
16/0	Tethered	-	-	Drifter Buoy 10 - off the deck.
4/20	buoy 10	53.	38.	
08		740	150	
19:3		59	7	
8				
16/0	Tethered	-	-	Buoy in the water and released.
4/20	buoy 10	53.	38.	
08		740	151	
19:4		87	16	
0				
16/0	Tethered	-	-	Buoy fully deployed.
4/20	buoy 10	53.	38.	
08		741	152	
19:4		71	48	
6				
16/0	Gravity Core	-	-	Gravity Core 15 - Commenced lowering core
4/20	15	53.	38.	frame.
08		743	154	
19:5		15	69	

7				
16/0	Gravity Core	-	-	Core frame lifted to deck level.
4/20	15	53.	38.	
08		743	154	
20:3		21	77	
4				
16/0	CTD 25	-	-	CTD 25 - off the deck.
4/20		53.	38.	
08		743	154	
21:0		22	78	
1				
16/0	CTD 25	-	-	CTD on deck
4/20		53.	38.	
08		743	154	
21:2		23	77	
8				
16/0	Tethered	-	-	Deck secure. Commenced towing drifter buoy
4/20	buoy 10	53.	38.	230 at 0.1kts.
08		743	154	
21:3		21	75	
2				
16/0	Tethered	-	-	Increased speed to 0.2 kts tracking along 185
4/20	buoy 10	53.	38.	
08		743	155	
21:4		46	01	
4				
16/0	Tethered	-	-	Increased speed to 0.4 kts tracking along 203
4/20	buoy 10	53.	38.	
08		743	155	
21:5		97	35	
4				
16/0	Tethered	-	-	Increased speed to 0.6kts. tracking around to
4/20	buoy 10	53.	38.	240
08		745	156	
22:0		46	55	
9				
16/0	Tethered	-	-	Vessel stopped.
4/20	buoy 10	53.	38.	
08		747	160	
22:2		15	82	
8				
16/0	Tethered	-	-	Commenced recovery.
4/20	buoy 10	53.	38.	
08		747	160	
22:2		14	82	

9				
16/0	Tethered	-	-	Buoy clear of the water.
4/20	buoy 10	53.	38.	
08		747	160	
22:3		14	81	
7				
16/0	Tethered	-	-	Buoy on deck. Vessel off DP and proceeding to
4/20	buoy 10	53.	38.	pick up Free drifter Buoy.
08		747	160	
22:3		13	82	
8				
16/0	Free Drifter	-	-	Approaching Buoy
4/20	Buoy 02	53.	38.	
08		733	149	
22:4		55	63	
9				
16/0	Free Drifter	-	-	Vessel in DP JSAH
4/20	Buoy 02	53.	38.	
08		730	148	
22:5		37	77	
3				
17/0	Core Site 2	-	-	DP Engaged
4/20		54.	35.	
08		421	739	
16:1		24	25	
9				
17/0	Bubble buoy	-	-	Bubble Buoy 08 - fully deployed
4/20	07	54.	35.	
08		422	735	
16:2		45	72	
5				
17/0	Bubble buoy	-	-	Bubble Buoy 08 - in the water
4/20	07	54.	35.	
08		422	737	
16:3		04	03	
0				
17/0	Gravity Core	-	-	Gravity Core 19 ready in horizontal position
4/20	19	54.	35.	
08		420	741	
16:5		59	39	
0				
17/0	Box Core 10	-	-	Box Core 10 - on deck
4/20		54.	35.	
08		420	741	
17:5		61	39	

1				
17/04/2008 17:55	Bubble buoy 07	-54.420 61	-35.741 38	Moving in DP for Bubble Buoy
17/04/2008 18:30	Bubble buoy 07	-54.421 89	-35.737 57	Commence Recovery
17/04/2008 18:35	Bubble buoy 07	-54.421 88	-35.737 57	Bubble Buoy 10 on deck
17/04/2008 18:44		-54.421 86	-35.737 59	DP Disengaged - moving to core site no 4
18/04/2008 19:18	Box Core 11	-54.199 16	-36.375 61	Deck secure. Vessel off D.P. and proceeding to drifter buoy deployment site.
18/04/2008 20:00	Bubble buoy 08	-54.097 11	-36.477 21	Vessel on station in D.P.
18/04/2008 20:17	Bubble buoy 08	-54.096 98	-36.477 25	Buoy off the deck. Vessel moving ahead at 0.5 kts.
18/04/2008 20:19	Bubble buoy 08	-54.097	-36.477 6	Buoy in the water and released.
18/04/2008 20:2	Bubble buoy 08	-54.096 95	-36.479 13	Buoy fully deployed. vessel stopped.

3				
18/0	Bubble buoy	-	-	Commenced tracking along 280 at 0.2kts to
4/20	08	54.	36.	follow buoy.
08		096	479	
20:3		93	16	
0				
18/0	Bubble buoy	-	-	Vessel tracking along 305 at 0.3 kts.
4/20	08	54.	36.	
08		095	482	
21:0		97	45	
0				
18/0	Bubble buoy	-	-	Commenced recovery.
4/20	08	54.	36.	
08		094	485	
21:4		97	46	
7				
18/0	Bubble buoy	-	-	Buoy clear of the water.
4/20	08	54.	36.	
08		094	485	
21:5		83	64	
1				
18/0	Bubble buoy	-	-	Buoy on deck.
4/20	08	54.	36.	
08		094	485	
21:5		89	24	
2				
18/0	Bubble buoy	-	-	Deck secure. Vessel off D.P. and proceeding.
4/20	08	54.	36.	
08		095	479	
21:5		62	88	
9				
19/0	Gravity Core	-	-	Vessel on station in D.P.
4/20	23	54.	36.	
12		202	374	
19:4		27	28	
9				
19/0	Gravity Core	-	-	Vessel off D.P. and proceeding into
4/20	24	54.	36.	Cumberland Bay.
12		202	374	
21:5		21	35	
7				
22/0	Final Buoy	-	-	Commenced slowing down for station
4/20	Station!	51.	45.	
12		938	536	
10:5		83	14	

0				
22/0	Final Buoy	-	-	Vessel on station in D.P.
4/20	Station!	51.	45.	
12		946	544	
10:5		19	39	
9				
22/0	Bubble buoy	-	-	Bubble buoy in the water.
4/20	9	51.	45.	
12		946	544	
11:2		54	49	
9				
22/0	Bubble buoy	-	-	Bubble buoy deployed.
4/20	9	51.	45.	
12		947	544	
11:3		04	7	
2				
22/0	Bubble buoy	-	-	Vsl tracking with bubble buoy in DP.
4/20	9	51.	45.	
12		939	536	
12:2		63	96	
4				
22/0	Bubble buoy	-	-	Commence recovery on bubble buoy.
4/20	9	51.	45.	
12		923	528	
13:4		51	14	
6				
22/0	Bubble buoy	-	-	Buoy on deck.
4/20	9	51.	45.	
12		922	527	
13:5		4	29	
1				
22/0	Drfiting	-	-	Drifter buoy deployed
4/20	buoy 3	51.	45.	
12		923	528	
14:0		76	18	
7				
22/0	Tethered	-	-	Buoy deployed.
4/20	buoy 11	51.	45.	
12		925	529	
14:2		76	68	
0				
22/0	Tethered	-	-	Last T.D.Buoy - commence recovery
4/20	buoy 11	51.	45.	
12		885	543	
18:1		42	44	

5				
22/0	Tethered	-	-	Last T.Drifter Buoy Recovered to deck
4/20	buoy 11	51.	45.	
12		884	543	
18:2		16	55	
3				
22/0	Drfiting	-	-	Drifter buoy recovered on deck
4/20	buoy 3	51.	45.	
12		875	558	
18:5		3	53	
8				
22/0	Final Buoy	-	-	Vessel off D.P. and proceeding towards the
4/20	Station!	51.	45.	sunset.
12		875	558	
19:0		35	54	
7