CRUISE REPORT

JR 244

RRS *JAMES CLARK ROSS*

Marine geoscience and physical oceanography

Southern Weddell Sea and South Orkney continental shelf

January – March 2011

BAS Ref.: JR244

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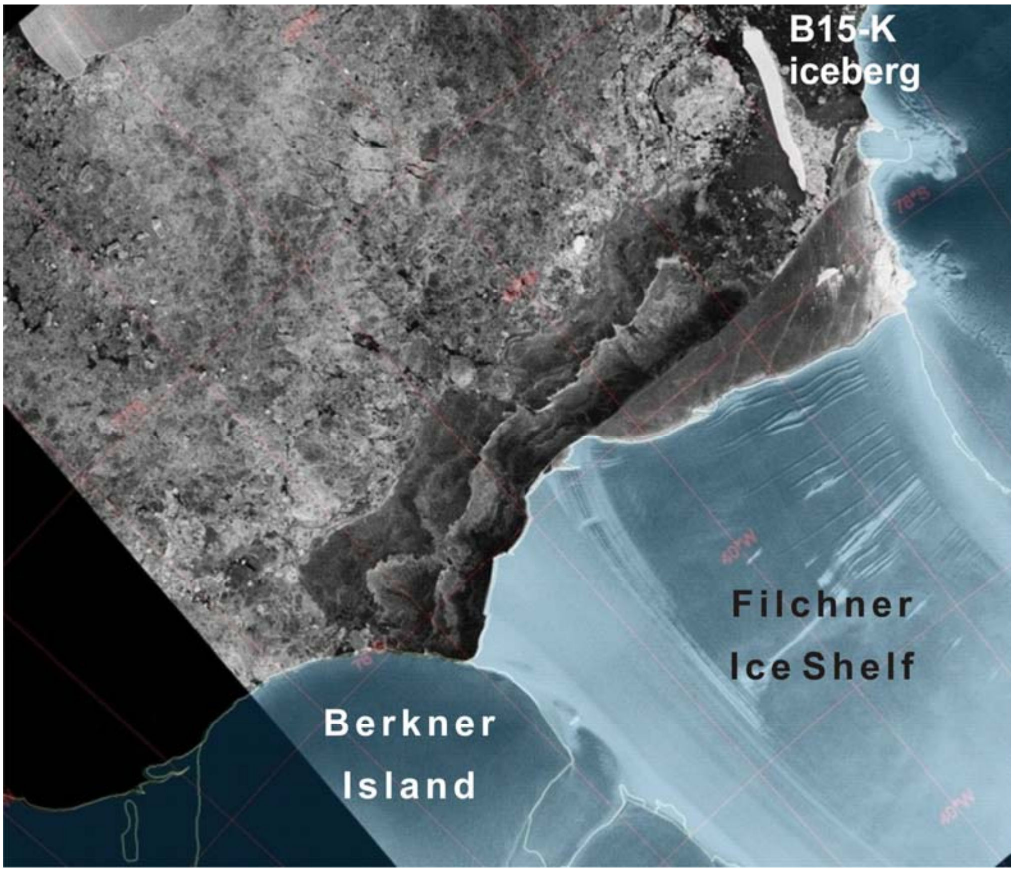
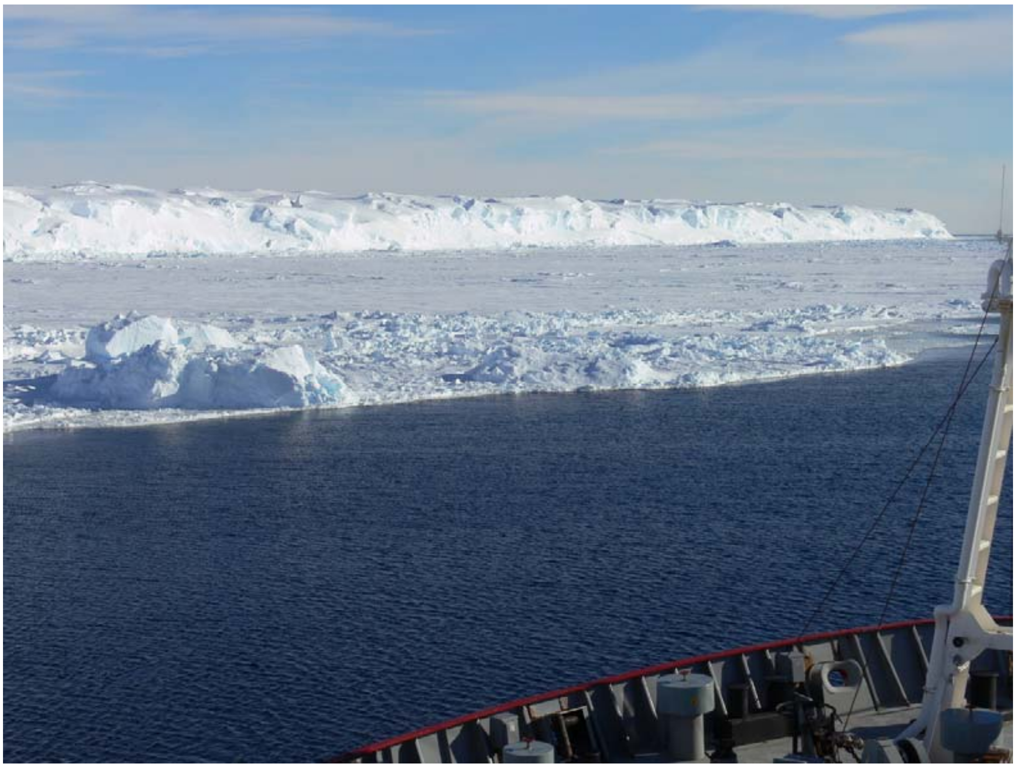
R.D. Larter, C.S. Allen, J.A. Gales, A.G.C. Graham, C.-D. Hillenbrand, D.A. Hodgson, S. Østerhus, V.L. Peck, M.O. Preston, M.W. Robinson, J.P. Robst, M. Ruhnau, J.A. Smith, D. Sprenk and J. Wagner





Frontispiece. An Envisat ASAR image showing the Filchner Shelf Ice front region early on 21st February (top) and a view of part of the ice shelf front, with an area of fast ice in the foreground, viewed across the foredeck of RRS *James Clark Ross* on **20th February.**

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1. Summary

On cruise JR244 a programme of marine geological and geophysical work was carried out around the South Orkney Islands and in the southern Weddell Sea for two BAS programmes. In addition, three oceanographic moorings were recovered from the outer continental shelf and slope in the southern Weddell Sea for a University of Bergen-BAS collaborative project. The cruise was combined with BAS logistic activities, which involved uplifting 27 people from Halley Station and a field party of four people from James Ross Island. In view of the long passage necessary to reach the southern Weddell Sea, it was clear that many days of ship time could be saved through combining different activities within a single expedition. During the cruise RRS *James Clark Ross* ventured further south the ever before, reaching the Filchner Ice Shelf front and carrying out significant research work in that area.

The data and samples collected on the cruise will provide new constraints on the maximum extent of glacial ice around the South Orkney Islands and in the southern Weddell Sea during the late Quaternary, the dynamic behaviour of the expanded ice cap and ice sheet, the history of glacial retreat in these areas since the last major advance, and variations in palaeoclimatic and palaeoceanographic conditions in the same areas. Data from the oceanographic moorings that were recovered extend a long-term dataset that has monitored an important input to Antarctic Bottom Water production over a period of more than 30 years.

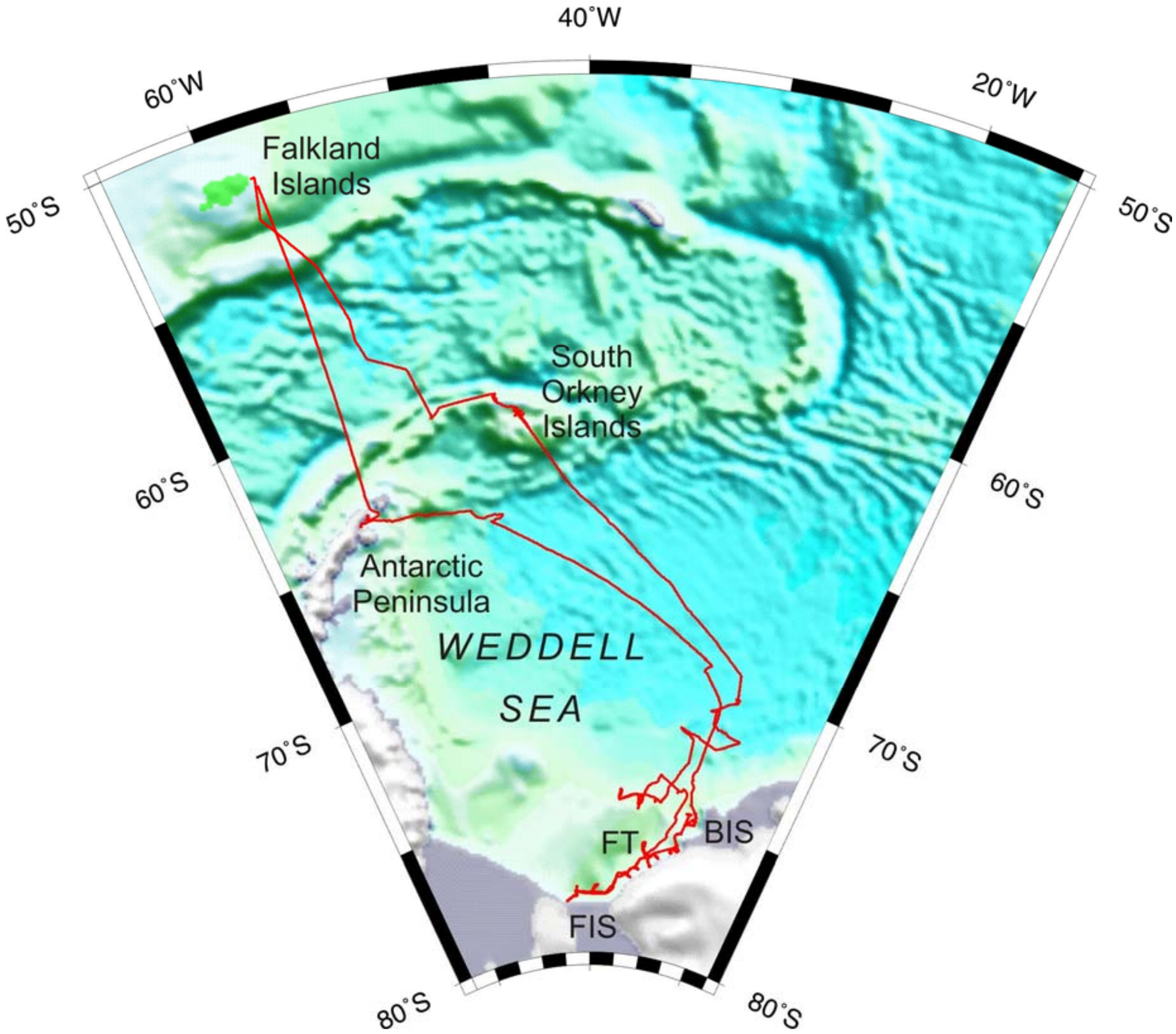


Figure 1. Track of RRS *James Clark Ross* during cruise JR244 (red) overlaid on shaded-relief display of predicted bathymetry of Smith & Sandwell (north of 72°S; Science, 277, 1956–1962, 1997). Bathymetry south of 72°S is from ETOPO5 global elevation database (http://www.ngdc.noaa.gov/mgg/global/global.html) and Antarctic topographic data is from the Antarctic Digital Database (http://www.add.scar.org). BIS is Brunt Ice Shelf; FIS is Filchner Ice Shelf; FT is Filchner Trough. A larger scale track chart is included as a fold out at the back of this report.

2. List of Personnel

2.1 Scientific and Technical (16)

R.D. Larter	BAS	Chief Scientist/Palaeo-Ice Sheets WPM
D.A. Hodgson	BAS	Quaternary Sediments WPM
C.-D. Hillenbrand	BAS	Marine Geologist
C.S. Allen	BAS	Micropalaeontologist/Palaeoceanographer
A.G.C. Graham	BAS	Geophysicist/Geomorphologist
V.L. Peck	BAS	Micropalaeontologist/Palaeoceanographer
J.A. Smith	BAS	Sedimentologist
J.A. Gales	BAS	PhD student (Geomorphologist)
S. Østerhus	University of Bergen	Oceanographer
M. Ruhnau	University of Hamburg	Geophysicist
D. Sprenk	University of Cologne	PhD student (Marine Geologist)
J. Wagner	University of Hamburg	Geophysicist
M.O. Preston	BAS	AME (Electronic Engineer)
M.W. Robinson	BAS	AME (Mechanical Engineer)
J.P. Robst	BAS	ICT (Computing Engineer)
F.E. Colgan	BASMU	Doctor

BAS = British Antarctic Survey; AME = BAS Antarctic & Marine Engineering Section; BASMU = BAS Medical Unit; ICT = BAS Information Communications Technology Section; WPM = Workpackage Manager

2.2 Ship's Company (28)

G.P. Chapman	Master
T.S. Page	Chief Officer
S.D. Evans	2nd Officer
P.J. Rosewall	3rd Officer
J.W. Summers	Deck Officer
D.J. Cutting	Chief Engineer
G. Collard	2nd Engineer
J.C. Ditchfield	3rd Engineer
S.J. Eadie	4th Engineer
C.A. Waddicor	Radio Officer
S.A. Wright	Deck Engineer
N.J. Dunbar	Electrical Engineer
J.S. Gibson	Purser
G.M. Stewart	Bosun
D.G. Jenkins	Bosun's Mate
C. Mullaney	Seaman
C. Leggett	Seaman
J.P. O'Duffy	Seaman
J.J. McGowan	Seaman
P.J. Inglis	Seaman
M.A. Robinshaw	Motorman
I.P. Herbert	Motorman
K.A. Walker	Chief Cook
B.D. Hoult	2nd Cook
K. Weston	Senior Steward
J. Newall	Steward
D.W. Lee	Steward
T.R. Patterson	Steward

Figure 2. JR244 shipboard scientific party at Creek 3, Brunt Ice Shelf.
Back row: R.D. Larter, D.A. Hodgson, J.A. Smith, A.G.C. Graham, C.S. Allen, J.P. Robst, M.W. Robinson, C.-D. Hillenbrand, M. Ruhnau, M.O. Preston, S. Østerhus.
Front row: D. Sprenk, J.A. Gales, V.L. Peck, J.Wagner

3. Timetable of Events

January 2011

22 Embarkation of scientific party at 1400 local time.

23 Unpacking boxes from Scientific Hold. Sunday, so no dockside activity on FIPASS.

24 Mobilisation of gravity corer and University of Hamburg seismic equipment.

25-27 Engineering maintenance. Visit by class from Stanley school on 26th.

28 RRS *James Clark Ross* departed from FIPASS at 0800 local time (1100Z). Multibeam echo sounder and TOPAS logging started. Coring on slope south of Falkland Islands. Trial deployment of magnetometer.

29 Crossing Drake Passage, collecting multibeam echo sounding and TOPAS data in transit.

30 Completed Drake Passage crossing. Second trial deployment of magnetometer. TOPAS survey in Hesperides Trough.

31 CTD cast and coring in Hesperides Trough. Passage to South Orkney Islands. Initial multibeam echo sounding and TOPAS survey of trough NW of Coronation Island.

February 2011

1 Coring and CTD cast in trough NW of Coronation Island, then additional survey. Transit to trough SE of Coronation Island, then initial multibeam and TOPAS survey there.

2 Completed initial survey for trough SE of Coronation Island. Coring in trough.

3 Seismic profiling along trough SE of Coronation Island. Coring in trough.

4 Passage to southern Weddell Sea, collecting multibeam echo sounding and TOPAS data in transit. Magnetometer deployed.

5 Continued passage.

6 Completed passage to southern Weddell Sea. Recovered magnetometer. TOPAS survey to select core site on Deutschland Canyon levee.

7 Completed TOPAS survey. Coring and CTD cast on levee. Transit to next station, further up-canyon on same levee, then TOPAS survey there.

8 CTD cast and coring on levee. EM120 roll and pitch calibration. STCM started. Start of transit to next station, again further up-canyon on same levee.

9 Continued transit to next station. Slow progress due to ice conditions.

10 CTD cast and coring on levee. Transit to shelf edge region.

11 Multibeam and TOPAS survey along shelf edge. CTD cast and box core on flank of Filchner Trough.

12 Multibeam and TOPAS survey in outer part of Filchner Trough. One mooring recovered. Two other mooring sites visited.

13. Gravity core in outer part of Filchner Trough. Multibeam and TOPAS survey in outer part of trough and along shelf edge.

14 Two moorings recovered. CTD cast at deepest mooring site.

15 Multibeam and TOPAS survey along shelf edge and in outer part of Filchner Trough. Coring in trough.

16 Multibeam and TOPAS survey in outer part of Filchner Trough. Coring in trough. Searched for BAS mooring, unsuccessfully.

17 Multibeam and TOPAS survey in outer part of Filchner Trough. Gravity core in trough. Transit to station on slope. Coring and CTD cast on slope.

18 Passage towards Luitpold Coast, collecting multibeam and TOPAS data in transit.

19 Multibeam and TOPAS surveys along Hoffman Trough and trough south of Albert Bank. Coring and CTD cast in latter.

20 Transit to front of Filchner Ice Shelf. Multibeam and TOPAS survey along ice front. Coring and CTD cast in Gould Bay. Coring along transect at 650 m depth on west flank of Filchner Trough.

21 CTD casts along 650 m transect on west flank of Filchner Trough. Multibeam and TOPAS survey along front of Filchner Ice Shelf.

22 Coring along front of Filchner Ice Shelf, collecting additional multibeam and TOPAS data between stations.

23 Multibeam and TOPAS survey along transect at 1050 m depth on west flank of Filchner Trough. Coring and CTD casts along transect.

24 Coring along front of Filchner Ice Shelf, collecting additional multibeam and TOPAS data between stations.

25 Transit to mouth of trough south of Albert Bank. Coring, then multibeam and TOPAS survey at mouth of trough.

26 Multibeam and TOPAS survey, coring and CTD cast in Möller Trough.

27 Multibeam and TOPAS survey, coring and CTD cast in Lichte Trough. Transit to mid-shelf part of Filchner Trough. Coring in Filchner Trough.

28 Multibeam and TOPAS survey over mid-shelf part of Filchner Trough and eastern trough flank. Seismic gear deployed, but no data collected. Coring in Filchner Trough. Coring offshore from Möller and Lichte troughs.

March 2011

1 Multibeam and TOPAS survey, coring and CTD cast in Caird Trough. Transit to Creek 3. Embarked 27 people ex-Halley. Transit back to Caird Trough.

2 Multibeam and TOPAS survey, coring and seismic profile in Caird Trough.

3 Multibeam and TOPAS survey in Dawson–Lambton Trough. Transit to shelf north of Halley, then multibeam and TOPAS survey there.

4 Multibeam and TOPAS survey, then coring, on shelf north of Halley and in Brunt Basin.

5-9 Passage to James Ross Island, collecting multibeam echo sounding and TOPAS data in transit. Magnetometer deployed on 6th March and recovered on 9th March.

10 Completed passage to Brandy Bay, James Ross Island. Uplifted some field party equipment.

11 Uplifted field party of four people. Multibeam and TOPAS survey, coring and CTD in Duse Bay.

12 Multibeam survey of caldera between Beak and Eagle islands. Started passage to Stanley, via Antarctic Sound.

13-14 Passage to Falkland Islands.

15 Gravity corer handling system dismantled in Port William. At anchor overnight.

16 RRS *James Clark Ross* arrived at FIPASS at 0810 local time (1110Z).

4. Introduction

JR244 was conceived as a multidisciplinary cruise to the southern Weddell Sea that would serve three BAS core programmes. The fact that these programmes all had important objectives in the region meshed well with the logistic requirement for RRS *James Clark Ross* to uplift people who had been involved in building Halley VI. The potential to achieve a range of scientific objectives in addition to an essential logistic function justified the large investment of passage time necessary for the ship to go to and from the southern Weddell Sea. Such efficient strategic planning will become more difficult in the future with the projected decline in BAS National Capability funding, and therefore the ratio of scientific achievement to passage on cruises to remote locations is likely to be poorer.

The objectives of two of the programmes involved in planning the cruise were in the field of marine geoscience (Palaeo-Ice Sheets Workpackage within the IceSheets Programme and Quaternary Sediments Workpackage within the Chemistry and Past Climate Programme). The objectives of the third programme (Evolutionary History of the Polar Regions Workpackage within the Environmental Change and Evolution Programme) involved study of benthic biological communities. Unfortunately the work planned by scientists in this programme had to be cancelled after the stern gantry was damaged shortly before the ship sailed from the UK. It was decided that the gantry could not be repaired and returned to the ship at reasonable cost until she returns to the UK in summer 2011. Without the gantry it became impossible to deploy the trawling equipment that was essential to achieving the objectives of the biological programme.

After the cancellation of the planned biological work, the scheduled duration of the cruise was shortened and recovery of some oceanographic moorings for a University of Bergen-BAS collaborative project was incorporated as an additional objective. One further change was that uplift of a field party from James Ross Island was inserted into the itinerary at a late stage.

It was recognized from the outset of cruise planning that many of the scientific objectives were vulnerable to sea ice conditions in the primary target areas, which vary considerably from year to year but commonly make marine research in the region difficult. In view of this risk, contingency objectives that would provide opportunities for each programme had been identified in the South Orkney region.

The new IceSheets/Chemistry and Past Climate gravity coring system was used for the first time on this cruise. The corer was the main sea-floor sampling device used on the cruise and a large number of cores were recovered. The core barrels and liners are of a larger diameter (130 mm and 110 mm, respectively) than those used with most gravity corers, as core diameter is thought to be a significant factor affecting recovery in glacial sediments. This system now provides BAS with the means to recover sea-floor sediment cores with minimal recurrent costs, compared to the tens of thousands of pounds it would cost to source coring equipment and associated technical support from another NERC Research Centre.

A high-resolution airgun seismic reflection profiling system was made available for use on the cruise through an agreement with the Institute for Geophysics, University of Hamburg, Germany. Recent BAS work has highlighted the importance of combining multibeam bathymetry with high-resolution seismic data when inferring palaeo-ice flow regimes from sea-floor morphology.

Despite that fact that sea ice conditions made some intended working areas inaccessible and others difficult to operate in, the cruise was successful in achieving a range of scientific objectives. These achievements are listed below, organized according to the programme that will lead post cruise analysis of each data and sample set collected.

Achievements – IceSheets Programme to lead post-cruise work:

- First comprehensive multibeam bathymetry and sub-bottom acoustic profiler surveys of glacial troughs on the South Orkney continental shelf; high-resolution seismic profile collected along one trough.
- Transects of sediment cores collected along glacial troughs on the South Orkney shelf to constrain their chronology of deglaciation
- Multibeam bathymetry survey defining the shelf edge at the mouth of the Filchner Trough and revealing the morphology of the upper part of the continental slope.
- First systematic multibeam bathymetry and sub-bottom acoustic profiler surveys in the Filchner Trough, revealing details of the sea-floor morphology in inner, middle and outer parts of the trough, with implications for its glacial history.
- Sediment cores collected from the inner, middle and outer parts of the Filchner Trough to constrain its chronology of deglaciation.
- Multibeam bathymetry data, sub-bottom acoustic profiles and sediment cores collected from the shelf north of the Brunt Ice Shelf to constrain pattern and processes of past glacial flow and chronology of deglaciation.

Achievements – Chem. and Past Climate Programme to lead post-cruise work:

- Sediment cores collected from a possible high-resolution drift site on the southern part of the Falkland Plateau.
- Sediment core collected from high-resolution drift site in Hesperides Trough (to extend previous core record further back in time by sampling a more condensed section).
- Sediment cores collected from possible high-resolution sites in South Orkney troughs.
- Carbonate-bearing sediment cores collected from channel levee on the Crary Fan to study glacial-interglacial changes in climate and palaeoceanography.
- Sediment cores collected from the outer part of the Filchner Trough and mid-slope on the Crary Fan to study post-glacial environmental changes.
- Transects of sediment cores collected north of Filchner Ice Shelf front to study post-glacial environmental changes.
- Multibeam bathymetry data, sub-bottom acoustic profiler and sediment cores collected from glacial troughs along the Caird and Luitpold coasts to constrain pattern and processes of past glacial flow, deglacial history and post-glacial environmental changes; high-resolution seismic profile collected in one trough.

Achievement - University of Bergen-BAS collaborative oceanography project:

- Three moorings recovered, one from the outer part of the Filchner Trough and two from the continental slope to its west.

5. Activity Reports

5.1. TOPAS and swath bathymetry surveys

Ali Graham, Jenny Gales and Rob Larter

5.1.1. Objectives

The principle objectives of marine geophysical work on cruise JR244 were: (1) to provide detailed **characterisation of bathymetry** and **sub-sea-bed geology**, including the **mapping of sea-floor geomorphology**, and the **imaging of sub-bottom sedimentary architecture**; (2) to use these data to **identify potential sites for strategic coring** and reflection-seismic surveys; and (3) to **provide important geological context for sediment cores**, and the potential ice, climate, and oceanic records contained therein.

Shipborne geophysical data collection consisted of sea-floor mapping using a hull-mounted Kongsberg-Simrad EM120 multibeam echo sounder, and sub-bottom profiling using a hull-mounted TOPAS parametric echo sounder.

The TOPAS and EM120 systems were run simultaneously at all times while surveying, and thus can be considered as a single geophysical survey. The main sites in which marine geophysical data were collected comprised (in operational order): (i) the Falklands Plateau, (ii) the Hesperides Trough, Antarctic Peninsula (iii) the northern and southern South Orkney shelf, (iv) Filchner Trough Slope, (v) Filchner Trough Outer shelf, (vi) Filchner Trough Inner shelf, (vii) Filchner Trough Middle shelf, (viii) a series of southeastern Weddell Sea outlet glacier troughs, east of the Filchner Trough, (ix) the Brunt Basin shelf, and (x) bays flanking Prince Gustav Channel (Figure 3).

Prior to the cruise, limited existing data were compiled for the South Orkney region, where older multibeam swath bathymetry and hand-drawn contour maps based on seismic reflection profiles had already revealed a number of deep cross-shelf troughs. In contrast, few publicly-available swath bathymetry data existed for the southern Weddell/Filchner slope and shelf region prior to this cruise, although the tracks of Alfred Wegener Institute (AWI) multibeam data were obtained for planning purposes. Some information on the nature of the seabed and substrate was known from published seismic profiles in the Filchner Trough region. These, together with regional topographic compilations (e.g. ALBMAP v.1; Le Brocq et al., 2010) and the AWI Weddell Sea bathymetric chart (1996) were used as principle forms of planning, navigation, and survey design.

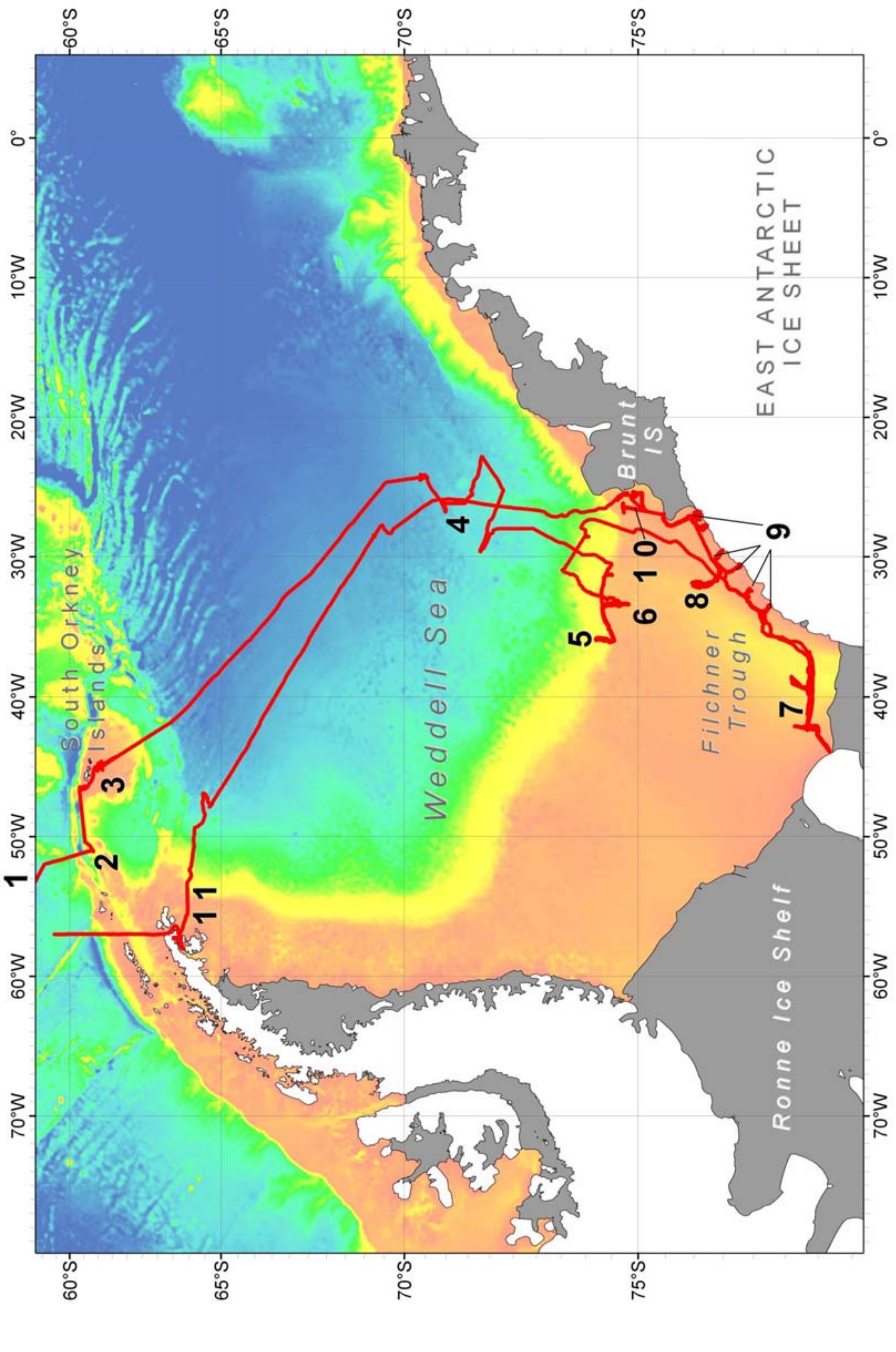


Figure 3. Cruise JR244 location map showing main working areas (numbered): (1) the Falklands Plateau (off map), (2) the Hesperides Trough, Antarctic Peninsula (3) the northern and southern South Orkney shelf, (4) Channel-levee systems on the lower Crary Fan, (5) Crary Fan slope, (6) Filchner Trough outer shelf, (7) Filchner Trough Inner shelf, (8) Filchner Trough middle shelf, (9) a series of southeastern Weddell Sea outlet glacier troughs, east of the Filchner Trough, (10) the Brunt Basin shelf, and (11) bays flanking Prince Gustav Channel.

5.1.2. Work at sea

The JCR's hull-mounted Kongsberg Simrad EM120 multibeam echo sounder was used near-continuously for the duration of the cruise. The EM120 system emits 191 beams (at 1 degree resolution) with frequencies of 11.25-12.75 kHz, providing a practical spatial resolution between ~10-70 m (dependent on water depth), and a swath width of up to a maximum of ~5 times the survey water depth (c. 68 degree beam angles, both port and starboard of the ship). Beam raypaths and seafloor depths were calculated in near-real-time using sound velocity profiles (SVP's) derived from conductivity-temperature-depth (CTD) and expendable bathythermograph (XBT) casts collected both prior to JR244, and during cruise operations (see Table of SVP's used during cruise; Table 1).

Table 1. Summary table of Sound Velocity Profiles (SVPs) used on JR244, as recorded in the EM120 cruise underway log.

File name (SVP)	CTD/XBT	Latitude active	Longitude active	Date-time collected	Date-time active (Jday)
FI_SHELF_T500001_ed.asvp	XBT	-52.20358	57.80844	23:40:54 04/30/2002	028/17:05 52
jr104_xbt2_T500005.asvp	XBT	-55.41823	-55.60695	13:23:14 01/24/2004	029/16:28 29
jr104_xbt3_T500006.asvp	XBT	-59.45748	-51.78583	11:25:01 01/25/2004	030/16:17 28
jr244_ctd01_ed.asvp	CTD	-60.81312	-50.95797	03:03:00 31/01/2011	031/10:05 28
jr244_ctd02_ed.asvp	CTD	-60.69070	-46.26004	16:31:00 01/02/2011	032/18:21 03
jr97_xbt09_t7_00019_ed.asvp	XBT	-65.56071	-36.67427	10:54:54 02/08/2005	036/15:29 27
jr97_xbt10_t7_00020_ed.asvp	XBT	-69.33167	-25.42656	10:54:45 02/09/2005	037/20:41 22
jr244_ctd003_ed.asvp	CTD	-70.53587	-24.31786	15:45:00 07/02/2011	038/18:23 38
jr244_ctd04_ed.asvp	CTD	-70.90750	-26.12024	04:22:00 08/02/2011	039/09:59:36
jr244_ctd005_ed.asvp	CTD	-71.79510	-29.60798	05:09:00 10/02/2011	041/09:11 11
jr244_ctd006_ed.asvp	CTD	-74.51684	-31.31674	16:55:00 11/02/2011	042/17:39 16
jr244_ctd007_ed.asvp	CTD	-74.21175	-35.99159	15:40:00 14/02/2011	045/16:19 26
jr244_ctd006_ed.asvp	CTD	-74.36941	-33.56537	16:36:00 11/02/2011	046/19:34 49
jr244_ctd008_ed.asvp	CTD	-74.06942	-32.53167	20:55:00 17/02/2011	048/21:56 30
jr244_ctd009_ed.svp	CTD	-77.85441	-41.44392	20:15:00 19/02/2011	051/11:09 20
jr244_ctd010_ed.asvp	CTD	-78.13057	-43.67812	20:49:00	051/21:24 45

				20/02/2011	
JR244_CTD10_ed.svp (reloaded after system crash)	CTD	-77.87290	-42.11298	20:49:00 20/02/2011	052/03:31 10
jr244_ctd012_ed.asvp	CTD	-77.71373	-42.15922	10:18:00 21/02/2011	052/11:07 02
Jr244_ctd010_ed.asvp	CTD	-77.65011	-42.10085	20:49:00 20/02/2011	052/13:07 45
jr244_ctd013_ed.asvp	CTD	-77.99774	-42.11458	22:42:00 21/02/2011	052/23:46 28
JR244_CTD_10_ed.asvp	CTD	-77.87543	-39.44250	20:49:00 20/02/2011	053/04:40 18
jr244_ctd014_ed.asvp	CTD	-77.88639	-41.37952	21:02:00 23/02/2011	055/13:33:41
FI_SHELF_T500001_ed.asvp (Mistake due to power failure)	XBT	-76.79581	-30.58517	23:40:54 04/30/2002	057/18:28 00
JR244_CTD015.svp	CTD	-76.39003	-30.41719	01:15:00 24/02/2011	058/02:47 40
FI_SHELF_T500001_ed.asvp (Mistake due to power failure)	XBT	Approx. -76.42913	Approx. -29.82278	23:40:54 04/30/2002	058/ Approx. 12:20 00
jr244_ctd015_ed.asvp	CTD	-76.42913	-29.82278	01:15:00 24/02/2011	058/12:22 31
jr244_ctd018_ed.asvp	CTD	-76.45007	-29.84968	16:37:00 27/02/2011	058/17:13 19
jr244_ctd015_ed.asvp (Mistake due to power failure)	CTD	-76.39003	-30.41719	01:15:00 24/02/2011	060/13:00 00
jr244_ctd019_ed.asvp	CTD	-75.97417	-27.18858	15:14:00 01/03/2011	060/16:03 00
jr244_ctd005_ed.asvp	CTD	-74.02519	-26.78624	05:09:00 10/02/2011	064/09:15 33
jr244_ctd03_ed.asvp	CTD	-71.66192	-26.12348	15:45:00 07/02/2011	065/00:47 41
jr71_xbt32_t7_00086_ed.asvp	XBT	-63.97129	-55.34847		069/09:58:19
jr244_ctd020_ed.asvp	CTD	-63.56895	-57.29119	23:36:00 11/03/2011	071/00:26:45
jr244_ctd001_ed.asvp	CTD	-62.30866	-56.99980	03:03:00 31/01/2011	071/22:37:43
jr104_xbt3_t500006_ed.asvp	XBT	-60.41407	-57.00051	11:25:01 01/25/2004	072/10:32:04
jr104_xbt2_t500005_ed.asvp	XBT	-56.10132	-57.15996	13:23:14 01/24/2004	073/11:38:22
FI_SHELF_T500001_ed.asvp	XBT	-53.85027	-57.41342	23:40:54 04/30/2002	074/02:10:03

**For latitude and longitude of CTD stations see CTD station list*

Multibeam swath bathymetry and TOPAS surveys were focused at each of the target locations shown in Figure 5.1. Where features or targets of interest were identified, blocks of the seafloor, normally involving multiple overlapping swaths, were mapped out. Elsewhere, individual lines were recorded routinely on transit to and from survey areas, as well as on passage to and from Stanley. In the following sections, Figures 4 through 7 illustrate the coverage of our survey data, by working area. Table 2 lists the different multibeam surveys recorded during the cruise, along with start/end times, number of lines collected, and a brief description of the working locality.

Table 2. EM120 surveys.

Survey name	Name of survey area	Start time	Start time of last file	No. of lines
JR244_a	Falkland Is. to S. Orkney Is. Reloaded:	028/17:05 43 072/10:28:46	032/17:49 34 074/12:08:17	90 52
jr244_b	SE South Orkney shelf	032/18:07 37	035/14:50 04	72
jr244_d	Passage across Weddell Sea Reloaded:	035/15:23 33 066/09:04:37	037/20:28 13 068/19:10:50	56 60
jr244_e	Channel-levee system II (north) Reloaded:	037/20:40 36 065/02:51:51	039/15:23 34 066/08:54:00	28 32
jr244_f	Channel-levee system II (south) Reloaded:	039/16:22 52 064/06:31:06	042/08:03 43 065/02:37:14	56 22
jr244_g	Northern Weddell Sea slope/ shelf	042/09:02 16	049/00:37 42	186
jr244_i	Southern Weddell Sea shelf	049/06:23 03	064/05:42 05	374
jr244_j	Northern Antarctic Peninsula	068/19:45:05	072/09:36:15	61

In total, approximately 13,200 line-kilometres of swath bathymetric data were collected. TOPAS data were collected simultaneously, except for during the passage back to the Falkland Islands from the northern Antarctic Peninsula. The process of ping-editing to remove anomalous depths was begun whilst onboard, using the MB-system in Unix, and will be completed on return to BAS Cambridge.

5.1.3. Rationale, approach, and preliminary observations by working area

(1) Falkland Plateau

Rationale and Approach: The aim was to survey for potential core sites in an area believed to possess a high-resolution Holocene sequence with high accumulation rates.

Preliminary observations: A suitable core site was identified based primarily on TOPAS survey data, and pre-existing site survey information.

(2) Hesperides Trough

Rationale and Approach: To conduct survey to identify a site to recover further expanded sedimentary sequences in a drift body in the Hesperides Trough. TOPAS data were used to survey across and subsequently pinpoint a suitable site for coring. The data also provided acoustic stratigraphic ties to an existing sediment core in the area.

Preliminary observations: Survey identified suitable sediments for coring and provided useful profiles of the regional sedimentary architecture for interpretation and context. Waypoints along the passage track towards Hesperides Trough were picked so as to add systematically to previous swath bathymetry coverage, with minimal deviation from the most direct route. The swath bathymetry data collected expanded coverage of fracture zones and spreading fabric generated by Miocene sea-floor spreading in the western Scotia Sea and also revealed a number of previously unreported seamounts.

(3) South Orkney Shelf (Fig. 4)

Rationale: The extent of the last glacial maximum (LGM) ice cap on the South Orkney shelf is unknown. Early studies of the onshore glacial geomorphology led Sugden and Clapperton (1977) to propose a limited LGM ice extent, restricted to the 200 m isobath around the South Orkney Islands. Subsequently, Herron and Anderson (1990) proposed that glaciation was more extensive, reaching at least the 300 m isobath. The aim of geophysical surveys was to test these hypotheses by mapping two known cross-shelf troughs (one to the NW and one to the SE of the islands) to provide evidence for LGM and/or earlier glacial limits, sub- or marginal-glacial features formed during ice maxima and/or retreat, and to provide site locations for gravity cores. The existence of troughs of a glacial origin on the NW and SE shelf of the South Orkney Plateau was already known from earlier published bathymetric data (e.g. King and Barker, 1988).

Approach: Two main glacial troughs were mapped, focusing survey along their main axes and out beyond the trough margins. Our objective was to map the geographical extent of the troughs, characterise their geomorphology and decipher their origin, as well as image the sediments within them.

Preliminary observations:

- Both troughs have overdeepened inner basins shoaling seawards to shallower outer shelves, typical of troughs formed by other (but much larger) outlet glaciers along the northern and western Antarctic Peninsula margins.
- Former ice grounding is evident in both troughs by the presence of bedforms, though

the nature and age of these is unclear at present. Often, the glacially-scoured surface is obscured by subsequent sedimentary infill, particularly in the deep inner shelf regions, or has been removed by scouring or winnowing at shallower levels.

- Evidence for one or more terminal limits of the palaeo-ice cap was discovered in the trough to the south of the South Orkney Islands.
- Subtle features of ice retreat were mapped along the northern flank of the inner basin in the southeastern trough.
- The TOPAS profiles revealed a thick sedimentary sequence of postglacial sediments in the deepest parts of the northern trough. Profiles from the southern trough revealed an even thicker sequence within an enclosed basin at the northern end of the trough. The sequence can be separated into a semi-transparent upper unit and a well stratified lower unit. Both units pinch out against the trough flanks and the northern and southern boundary of the deep basin.
- Multibeam data for the southern basin will require significant amounts of further post-acquisition editing because the main return from the inner EM120 beams often coincided with the sharp boundary between soft overlying sediments and the underlying till/rock surface, rather than the sea bed itself.

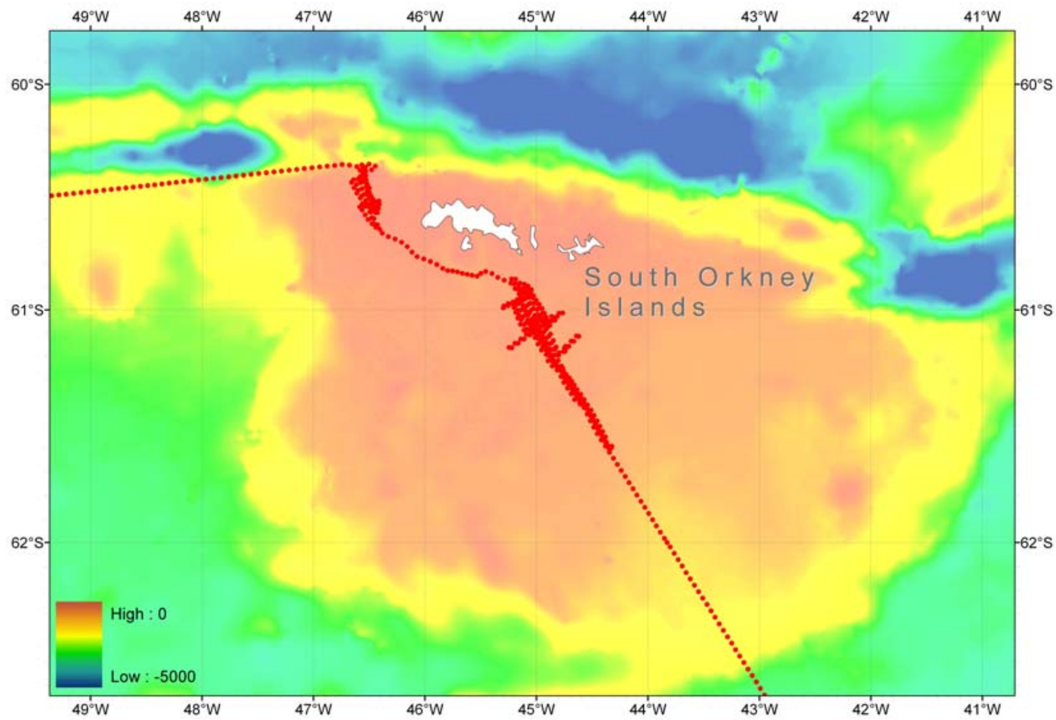


Figure 4. Survey coverage in the vicinity of the South Orkney Islands. Mercator projection.

(4) Channel-Levee Systems on the Lower Crary Fan

Rationale and Approach: To conduct survey to identify levee sites with the highest accumulation rates, so as to recover sedimentary sequences providing improved resolution of the late Quaternary (see section 5.3.5 for further details).

Preliminary observations: Survey identified suitable sediments for coring and provided useful profiles of the regional sedimentary architecture for interpretation and context. Multibeam data reveal small-scale mass wasting on the flanks of one channel and pock marks similar to ones attributed to gas escape in the axis of another.

(5) Crary Fan Slope (Fig. 5)

Rationale: The aim was to characterise the geomorphology of the upper-to-lower continental slope at the mouth and margins of the Filchner Trough. We aimed to determine the extent of down-slope gullying, which could provide insights into formational mechanisms with a particular emphasis on assessing the erosional impact (if any) of cold dense bottom water overspilling the Filchner Trough at the shelf edge.

Approach: Multibeam and TOPAS surveys were carried out across a broad sector of the outer shelf and upper slope, from east to west. The swath operator guided the ship ensuring that the shelf break was kept in the swath coverage at all times. Reciprocal lines west-east then provided extra coverage of the slope in areas of particular interest.

Preliminary observations:

- Numerous gullies were mapped, many with small “amphitheatre” or “cauliflower-shaped” gully heads that cut back into the upper slope and shelf edge. These are characteristic of small-scale slumping.
- Large v-shaped gullies, like those observed along the Pacific margin of West Antarctica, were rarely observed.

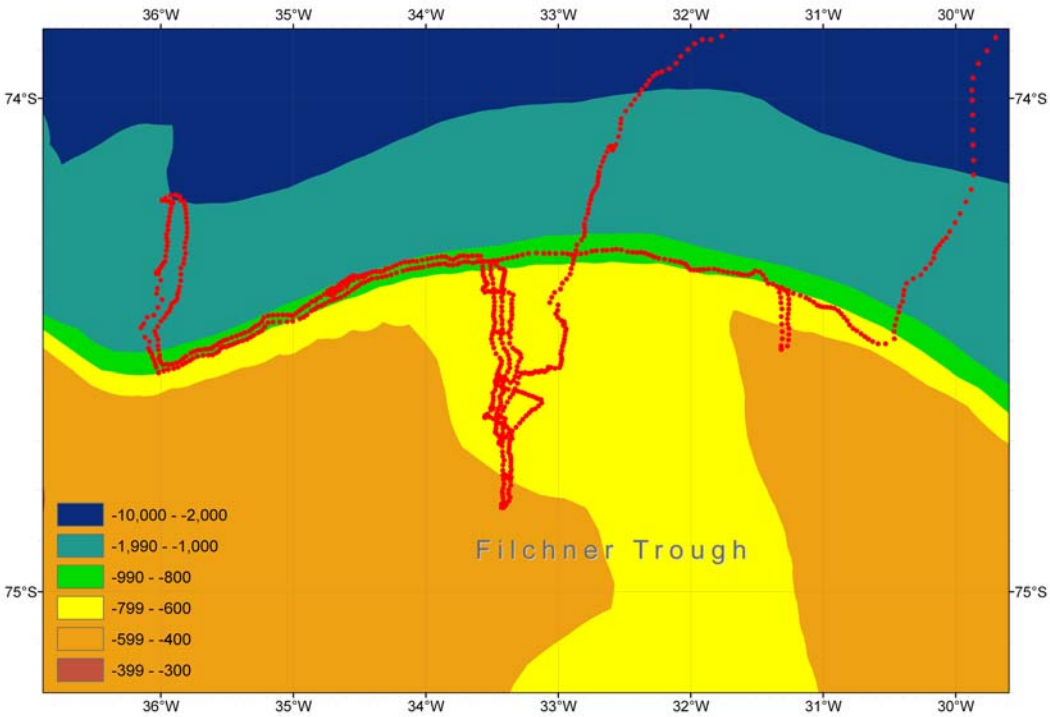


Figure 5. Survey coverage on the Filchner Trough slope and outer shelf. Mercator projection.

(6) Filchner Trough Outer Shelf (Fig. 5)

Rationale: Recent results from modelling and cosmogenic exposure dating studies have argued that ice did not ground along the extent of the Filchner Trough during the Last Glacial Maximum, and indeed, may not have grounded there at all since the Miocene. Although existing data from cores suggest extensive LGM grounding, there are still questions over the timing and interpretation of such an event. Furthermore, no bedform data confirming grounded ice flow in the trough have been recorded. Since constraining the extent and thickness of ice on the Weddell Sea shelf is critical for refining LGM ice sheet models, further marine data is required to test whether and when ice last grounded in the troughs, what the extent and configuration of that ice was, and how it last retreated. The aim was to survey the outer shelf, to map the geomorphology of the floor of the Filchner Trough, and to identify suitable targets for coring glacigenic sequences.

Approach: Multibeam and TOPAS surveys were carried out south to north across the outer shelf west of the trough's main axis in water depths of ~500-700 metres. Progress was slow and data quality impaired at times due to heavy sea ice. Return lines increased the coverage in the west, and a final line was acquired eastwards into the centre of the trough and north to the shelf break along the central trough axis.

Preliminary observations:

The morphology of the outer shelf was mapped out successfully. The stratigraphy of the shelf as observed on sub-bottom profiles is complicated compared to other, similar palaeo-ice stream troughs on the West Antarctic continental margin.

(7) Filchner Trough Inner Shelf (Fig. 6)

Rationale: The Filchner Trough was undoubtedly originally carved out and formed by ice streams that extended to the shelf break. The question is, when did these ice streams last extend across the shelf? No bedform data exist which confirm, unequivocally, that palaeo-ice sheets grounded in the Filchner Trough along its entire length, during any of the recent (Quaternary) glaciations including at the LGM. Therefore, the aim of this survey was to map the deepest part of the Filchner Trough, on the inner shelf (~1000-1150 metres), to establish whether a relatively thick ice sheet had grounded in the basin in the recent past, and to identify any suitable targets for coring glacigenic sequences which could help to answer this question.

Approach: Multibeam and TOPAS surveys were carried out on multiple west-east overlapping lines across the inner shelf, mostly in a lead of open water along the Filchner Ice Shelf front, and stretching across its the entire breadth. Poor or no sub-bottom sonar returns were recorded as a result of signal attenuation, and problems with the EM120 phase picking were also noted, in areas where we encountered water covered by a thin yet continuous cover of freshly-formed sea-ice. Despite some poor quality returns, the majority of the survey was completed successfully. Several short north-south lines branching away from the west-east coverage were also completed, while on transit to recover box cores and to carry out CTD casts along 650 m and 1050 m water depth transects.

Preliminary observations: The results of the multibeam and TOPAS surveys allowed us to answer the question whether ice had grounded in the Filchner Trough in the relatively recent past.

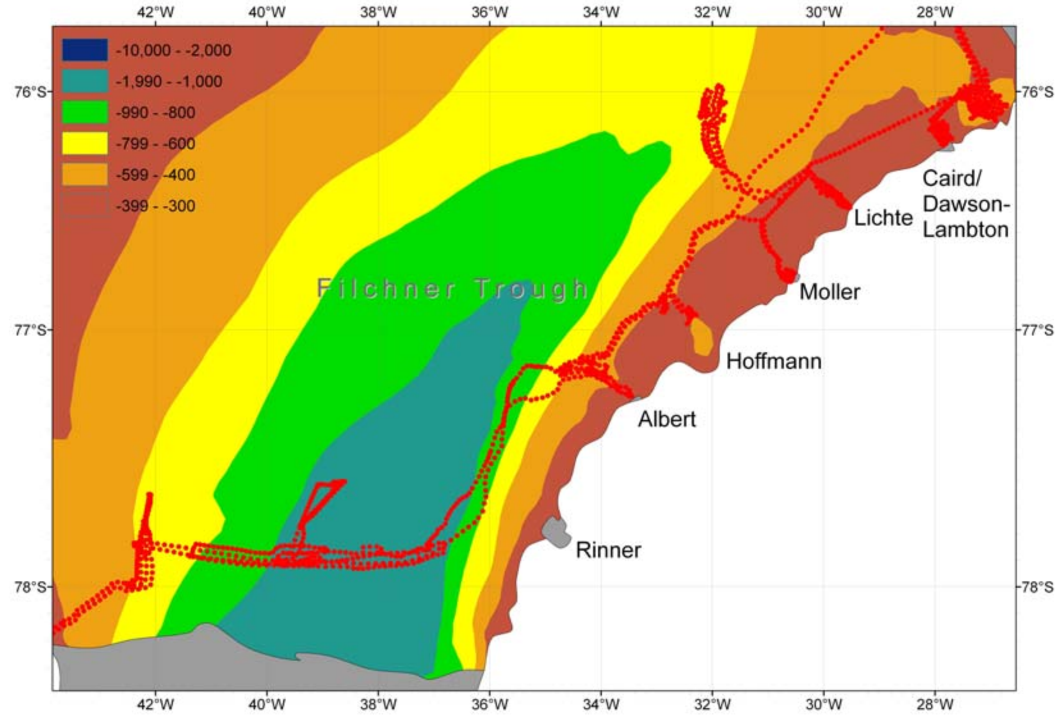


Figure 6. Survey coverage on the Filchner Trough inner to mid shelf, and along the western margin of the Caird Coast. Names are given adjacent to the individual troughs surveyed along the coastline. Mercator projection.

(8) Filchner Trough Middle Shelf (Fig. 6)

Rationale: As above, the aim of this survey was to map part of the Filchner Trough, on its middle shelf to establish whether a relatively thick ice sheet had grounded in the centre of the trough in the recent past. Survey was also carried out to identify any suitable targets for coring glacigenic sequences.

Approach: Multibeam and TOPAS surveys were carried out on passage between the outer and inner shelf working areas, running obliquely to the trough margin and crossing the trough flank at several points, collecting important data on the sea-floor and sub-surface at the trough edges. A foray west into the centre of the trough on the middle shelf was undertaken to map the geomorphology and collect cores at the floor of the trough. A small area of the eastern trough bed was mapped during this package of work.

Preliminary observations: The results of the multibeam and TOPAS surveys allowed us to answer questions about the nature of ice grounding in the Filchner Trough in the recent past.

(9) South-Eastern Weddell Sea Outlet Glaciers (Fig. 6; see also section 5.3).

Rationale: In the southeastern Weddell Sea, the East Antarctic Ice Sheet margin is drained by a series of small outlet glaciers that flow into the heads of short, shallow (~400 m) to moderately deep (~800 m) troughs at the eastern flank of the Filchner Trough. The geomorphic record left behind by these outlet glaciers, since their last retreat, may reveal information about ice dynamic changes on the East Antarctic coastline related to the local evolution of the ice sheet and possibly to the Filchner Ice Shelf itself. The aim was to survey the geomorphology of the troughs, define their geographical extent, and to identify possible sites for coring.

Approach: Swath bathymetry and TOPAS surveys were conducted along the long axes of each individual trough to identify deep basins and sediment sequences.

Preliminary observations: See section 5.3.

(10) Brunt Basin

Rationale: The aim was to survey the geomorphology and recover sediment cores from the Brunt Basin, to the north and northwest of the Brunt Ice Shelf, in order to assess the history of ice-sheet and ice-shelf change in this region during the Late Quaternary.

Approach: Multibeam swath bathymetry and TOPAS surveys were conducted over an area where 'moraines' had previously been identified (source: Gerhard Kuhn). After an initial reconnaissance survey, mapping was focused firstly on obvious moraine ridges, and secondly, on the deeper parts of the Brunt Basin Trough.

Preliminary observations: We mapped a range of interesting glacial geomorphology in the Brunt Basin, which will allow us to piece together a local story regarding ice-sheet deglaciation and ice-shelf changes, since the Last Glacial Maximum.

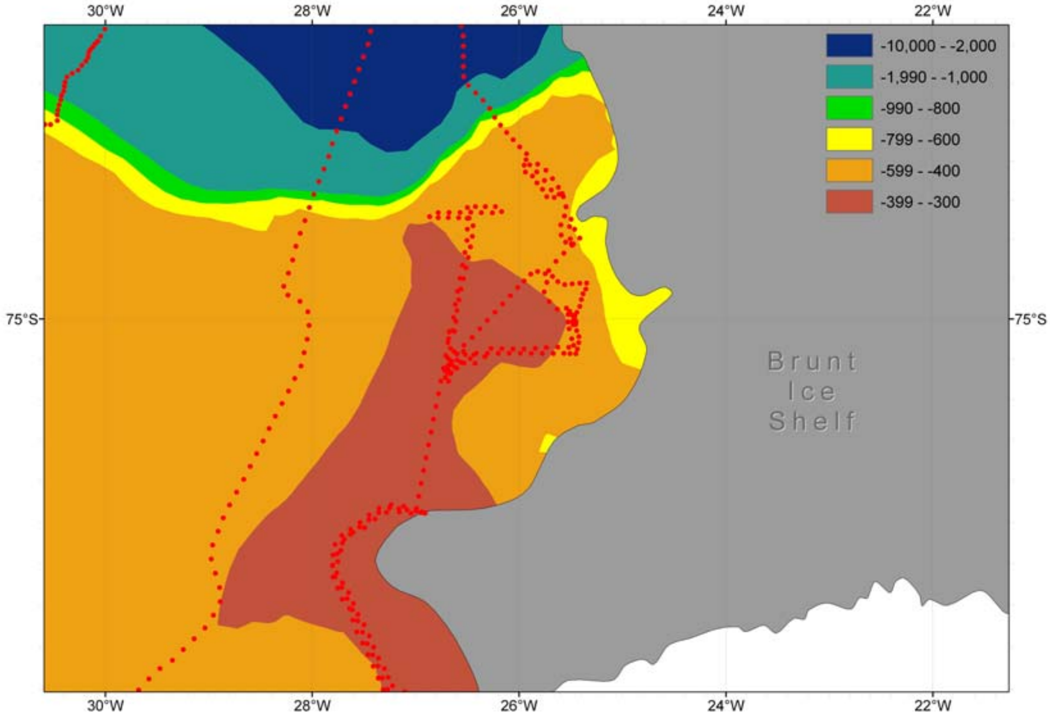


Figure 7. Survey coverage at the edge of the Brunt Basin, west of the Brunt Ice Shelf. Mercator projection.

(11) Bays flanking Prince Gustav Channel

Rationale: An opportunistic survey was carried out in Brandy Bay, James Ross Island, while waiting to uplift a field party from this location. After uplifting the field party multibeam swath bathymetry and TOPAS surveys were carried out in Duse Bay in order to locate a high accumulation rate core site. Finally, a multibeam swath bathymetry survey was carried out to confirm the submarine continuation of the caldera rim observed on Beak Island and Eagle Island and to investigate the internal morphology of the caldera.

Approach: In addition to the passage lines into and out of Brandy Bay, two looping survey tracks were steamed out towards Prince Gustsav Channel and back into the bay to extend the multbeam bathymetry data coverage. In Duse Bay multibeam data collected on the RV *Nataniel B Palmer* already existed, and a flat sea floor in the deepest part of the bay suggested the presence of ponded sediments. Therefore the main purpose of the survey in Duse Bay was to collect TOPAS data to locate a high-accumulation rate core site. The Admiralty chart for the area indicated that most of the Beak Island caldera was unsurveyed, so a multibeam swath bathymetry line was collected along the NE-SW trending line marking the limit of previous surveys and then additional survey lines were added to the north of this by following the edge of the swath collected on the previous line.

Preliminary observations: The survey in Brandy Bay revealed that the bay shoals continuously from Prince Gustav Channel towards the shore, with water depths around 40 m in the inner part of the bay. Neither any moaraine banks nor any streamlined bedforms were observed. In contrast, the multibeam swath bathymetry data from Duse Bay show well-defined streamlined bedforms that extend down to the deepest part of the bay and converge towards its mouth. TOPAS data revealed flat-lying sediments >30 m thick in the deepest part of the Bay. The profiles show two particularly strong reflections in the lower part of the succession that we interpret as tephra layers (see section 5.3.9). Immediately landward of the deepest part of the bay, multibeam data show an abrupt change in morphological style, with a rougher sea floor on the landward side of this boundary. A similar boundary is observed further south along parts of Prince Gustav Channel and other parts of the east coast of the Antarctic Peninsula. We interpret this boundary as marking a change in geological substrate, which probably occurs along a fault zone separating Palaeozoic Trinity Peninsula Group rocks from Mesozoic-Cenozoic sedimentary and volcanic rocks in the Larsen Basin. The multibeam bathymetry survey of the Beak Island caldera confirmed a continuation of the caldera rim to the southwest of Beak Island and showed that the northern part of the caldera shoals to <100 m water depth, probably as a result of post-collapse volcanic activity (see section 5.3.9).

References

Bathymetric Chart of the Weddell Sea, Antarctica, 1:1 000 000 at 76°S (AWI BCWS 567, Filchner Trough) 1996. Alfred-Wegener-Institut, Bremerhaven.

HERRON, M., & ANDERSON, J. 1990. Late Quaternary glacial history of the South Orkney Plateau. *Quaternary Research*, 33, 265–275.

KING, E.C., & BARKER, P.F. 1988. The margins of the South Orkney microcontinent. *J. Geol. Soc. London*, 145, 317-331.

LE BROCQ, A.M, PAYNE, A.J., & VIELI, A. 2010. An improved Antarctic dataset for high resolution numerical ice sheet models (ALBMAP v1), *Earth Syst. Sci. Data*, 2, 247-260, 2010. doi:10.5194/essd-2-247-2010.

SUGDEN, D., & CLAPPERTON, C. 1977. The maximum ice extent on island groups in the Scotia Sea. *Quaternary Research*, 7, 268–282.

5.2 Coring for ice sheet history

Claus-Dieter Hillenbrand, James A. Smith, Alastair G.C. Graham

5.2.1 Objectives

The objectives of gravity and box coring for ice sheet history (*Palaeo-Ice Sheets* work package) on cruise JR244 were:

- Recovery of sedimentary sequences from the South Orkney shelf for reconstructing i) maximum ice-sheet advance at the Last Glacial Maximum (LGM) and ii) timing of grounding-line retreat since the LGM.
- Recovery of sedimentary sequences from the outer to inner shelf of the southern Weddell Sea along a transect in Filchner Trough for investigating i) the maximum ice-sheet extent across the continental shelf at the LGM, ii) the maximum water depth of ice-sheet grounding at the LGM, iii) the lithology, sedimentology and physical properties characterising the substrate of (sub-)glacial bedforms that were observed in the EM120 multibeam swath bathymetry and TOPAS acoustic sub-bottom profiler surveys (see section 5.1), and iv) the timing of grounding-line retreat since the LGM.
- Recovery of sedimentary sequences from glacier outlets along the Coats Land coast and the Brunt Basin (a glacial trough north of the Brunt Ice Shelf that extends across the shelf in a NNW direction) for setting the results from Filchner Trough into a regional East Antarctic context.

5.2.2 Work at sea

Long sedimentary sequences were recovered using the BAS gravity corer (Fig. 8) while surface sediment samples were collected with the BAS box corer (Fig. 9). The coring for ice sheet history involved deployments of 3 m-, 6 m- and 9 m-long gravity corers. In addition, coring for the reconstruction of climate history and palaeoceanography (see section 5.3) involved the deployment of 12 m-long gravity cores. If the post-cruise analysis of the sequences recovered with the 12 m cores on the South Orkney shelf provides age constraints for ice-sheet retreat, these results will also be used for reconstructing the glacial history of the South Orkney Plateau (in close collaboration between the *Palaeo-Ice Sheets* and the *Quaternary Sediments* work packages at BAS). All core sites for the reconstruction of ice sheet history were selected on the basis of the EM120 multibeam swath bathymetry and

TOPAS acoustic subbottom profiler data (see section 5.1).

Cores GC534/BC535 (“X/Y” indicates cores from the same site) were successfully recovered in a glacial trough that is located NW of Coronation Island and extends northwards across the South Orkney shelf. The main work for ice-sheet reconstruction on the South Orkney shelf, however, focused on a glacial trough that extends SE of Coronation Island in a SE-direction. A total of eight gravity cores and one box core (GC536/BC537/GC538, GC539, GC540, GC544, GC545, GC546, GC547) were successfully recovered from seven sites on the trough floor and at its flanks. The cores targeted particular glacial bedforms and/or pinch-outs of semi-transparent acoustic layers observed in TOPAS profiles. These semi-transparent layers are assumed to be of post-glacial age and to overly subglacial tills.

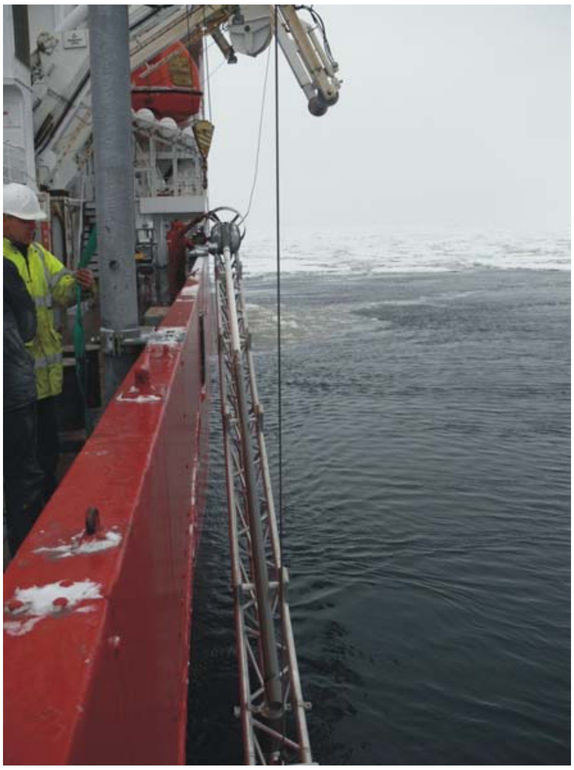


Figure. 8. Recovery of the BAS gravity corer on JR244. (Photo: R. Larter)

Figure. 9. Recovery of the BAS box corer. (Photo: unknown)

The coring work for ice-sheet reconstruction in Filchner Trough was carried out in three areas: outer shelf, eastern trough flank and inner part of the trough (directly north of the Filchner Ice Shelf front). Five gravity and two box cores (GC555, GC556, GC557/BC558, GC559, GC560/BC561) were recovered from five stations along a N-S transect along the western part of outer Filchner Trough and an additional gravity core (GC563) was collected from the outer shelf on a N-S oriented swath bathymetry transect near the trough centre. Apart from BC561, all these deployments, which targeted specific subglacial bedforms (such as linear and wedge-shaped features), were successful. Cores GC581/BC582/GC600, GC583/BC584/GC599, GC585 and GC586/GC588/GC598 were collected from four sites targeting glacial bedforms on the inner shelf part of Filchner Trough, but core GC586 failed to recover a sedimentary sequence and retrieved just a small bulk sediment sample. Gravity core GC596 was deployed for characterising the sediments of current-scoured or drumlinoid features in the western Filchner Trough, but failed to retrieve any sediment, while core GC601 was successfully recovered from the western edge of a drumlin field located at the eastern flank of the trough. Cores GC592 and GC595 were opportunistically collected for glacial history reconstructions along a 1050 m water depth core transect along the western side of the inner shelf part of Filchner Trough. The 1050 m water depth core transect was carried out for climate history and palaeoceanographic studies (see section 5.3). Operations on the eastern flank of Filchner Trough comprised the deployments of core GC616 that probably recovered an iceberg turbate, cores GC617/GC618 that were recovered from a seafloor area characterised by glacial lineations or grooves, and cores GC619 and GC620/BC621, which were collected from locations where pinch-outs of acoustically transparent units were observed in the corresponding TOPAS records.

In order to set the results from Filchner Trough into a wider regional context, additional sediment cores for reconstructing LGM ice-sheet extent and post-LGM grounding-line retreat were recovered from the Coats Land coast and along the Brunt Ice Shelf front. Moraines offshore from the mouth of Albert Trough (western Coats Land) were targeted for coring (GC602 and GC603/BC604/BC605) following multibeam swath bathymetry and acoustic sub-bottom profiler surveys and will be worked on in collaboration with members from the *Quaternary Sediments* work package (see section 5.3). Unfortunately, only cores GC603/BC605 retrieved sediments. On the shelf west of the Brunt Basin, gravity cores GC631, GC632 and GC633 were deployed on a possible ice-shelf moraine and the seabed directly to the north it, respectively, but all failed to recover sediment sequences. Core GC631 did recover a handful of medium to coarse angular gravel, but this sample was not retained. The failure to recover sediment at these sites may be explained by a very hard seabed in this area (either compacted or winnowed sediments), although the corresponding TOPAS profiles indicated a several metre thick sediment layer. Cores GC634 and GC635 were collected from linear bedforms on the inner shelf part of the Brunt Basin, core GC636 at the transition from middle to outer shelf, and core GC637 from linear features on top of a till sheet on the outer shelf part of this glacial trough. All gravity corer deployments in Brunt Basin were successful, although the 3m-long gravity corer at site GC637 over-penetrated. Time constraints prevented the re-deployment of a 6m-long corer at this site.

5.2.3 Preliminary results

It was decided that the cores recovered for the reconstruction of ice-sheet history will be analysed for P-wave velocity, magnetic susceptibility, wet-bulk density and electrical resistivity with a multi-sensor core logger at the British Ocean Sediment Core Research Facility (BOSCORF, NOC Southampton) before opening. Therefore, none of the sediment cores were split onboard and only very limited conclusions regarding the lithological composition of the cored sedimentary sequences can be drawn.

The sediments recovered in the cores from the South Orkney shelf consist of greyish-green muds and sands, with core GC545 recovering stiffer sediments (shear strength: 22 kPa) at its base and core GC544 recovering gravelly sediments at its base. The basal deposits cored at sites GC546 and GC547 were characterised by a pronounced smell (H_2S).

Sediment cores deployed on the outer shelf of Filchner Trough recovered consolidated muds, pebbly muds, gravelly sandy muds and muddy diamictons. Core GC556 from the northern edge of linear features retrieved a muddy diamicton with a shear strength of 14 kPa at its base. Such a shear strength value is consistent with the interpretation of the diamicton as either a soft till or an iceberg turbate. At site GC560 from the southernmost part of a wedge-like feature, a relatively stiff, basal diamicton with a shear strength of 26 kPa was cored suggesting that this diamicton is a stiff till. The sea-floor surface sediments in outer Filchner Trough that were collected with box cores consist of pebbly sandy muds with dropstones. Directly in front of the Filchner Ice Shelf and on the eastern flank of Filchner Trough, gravity cores retrieved brownish, greenish and greyish muds, gravelly muds, pebbly sandy muds, muddy diamictons and diamictons with shear strength values between 12 and 50 kPa. The diamictons with the high shear strength values may be stiff tills or fossil tills deposited during the early part of the Quaternary (or even earlier), while those with the low shear strength values may be glaciomarine diamictons (i.e. proximal sub-ice shelf diamictons, glaciogenic debris flows, iceberg-rafted diamictons, iceberg turbates, etc.) or soft deformation tills. However, in the absence of detailed sedimentological information it remains unclear which cores recovered subglacial sediments. However, even glaciomarine diamictons and pebbly to gravelly muds must have been deposited in proximity to a grounded ice sheet. Therefore, radiocarbon dates that will be obtained from the transition between postglacial sediments and subglacial/proximal grounding-line deposits will provide ages constraining the timing of grounding-line retreat in Filchner Trough.

The cores deployed on the moraines offshore from Albert Trough and north of the Brunt Ice Shelf either failed to recover any sediment or retrieved dark grey to brownish muds, gravelly muds, muddy diamictons and diamictons at their bases, with shear strength values ranging from 18 to 55 kPa. These results indicate hard seabeds in those two areas, which may be caused by consolidated subglacial tills or overcompacted glaciomarine sediments cropping out at the sea-floor surface.

5.3 Quaternary sediment records of glaciation, oceanography and climate

Dominic Hodgson, Claire Allen, Vicky Peck

5.3.1 Cruise Objectives:

The principal aim was to identify and recover high-resolution marine sediments spanning the Quaternary, with a particular focus on sediments covering the last glacial cycle and Holocene. Target areas included the Falkland Plateau, Hesperides Trough, South Orkney Plateau and sites in the south eastern Weddell Sea including the channel levee systems, transects from the Filchner Ice Shelf front, and the east coast fjords. Records from these locations will be compared with new data from BAS ice cores at Berkner Island (situated in the southern Weddell Sea between the Ronne and Filchner Ice Shelves) and James Ross Island (situated in the north western Weddell Sea).

Research on these sediments is related to the following wider BAS programme goals:

- How did sea ice respond to past climate change; how did this feedback on the atmosphere and on thermohaline circulation?
- How has sea ice evolved in different regions of the Antarctic over the late Quaternary?
- How has the climate of the polar regions and Southern Ocean changed in the last ~40000 years, and what have been the consequences of these changes?
- What was the signal on climate and ice sheet evolution of the last termination and the preceding millennial scale events in the Weddell Sea; what does this tell us about causes, and what have been the consequences of these changes?
- What role does the Southern Ocean (SO) play in regulating changes in atmospheric CO_2 today, and what was its role in the past 800,000 years?

5.3.2 Falkland Plateau

Rationale: The aim was to survey and a potential core site based on reports from BHP Billiton that there is a high-resolution sequence with high accumulation rates in the area.

Actions: A site was identified based on swath bathymetry and TOPAS surveys

Outcomes: A box core (BC527) and two gravity cores of 7.9 m (GC528) and 5.06 m (GC526) were recovered. Initial observations are that planktonic and benthic foraminifera are present in the surface sediments. A different assemblage of benthic foraminifera only is present in the base. Some IRD was also observed at the base of the core.

Smear Slides: BC - Forams are common (both benthic and planktonics, calcareous and agglutinated, were identified) in surface sediments. Diatoms are common but the assemblage is not very diverse in surface sediments (at x40). Terrigenous grains are common. CC – Terrigenous-rich with only occassional diatom and diatom fragments. Benthic foraminifera are present

5.3.3 Hesperides Trough

Rationale: Previous work by Claire Allen and Hilary Blagbrough on a core from this site has provided an excellent record of past sea ice extent dating back to Marine Isotope Stage (MIS) 3 (JR149 - PC461). The aim of revisiting the site was to carry out swath bathymetry and TOPAS surveys to identify a more condensed section in the trough and attempt to recover an extended record back to MIS 5. A CTD was also deployed to identify the dominant surface and deeper water masses of the basin. Given the paucity of biogenic-rich records this close to the APIS any record dating back to pre-MIS 3 will be very important for reconstructing regional sea ice history.

Actions: Two gravity cores were recovered GC529 (5.065 m) and GC530 (7.895 m) – the difference in penetration depth is considered to be due to a slower veer due to the ship rolling on the first deployment.

Outcomes: Smear slide of core catcher material (diatom-rich sediment) doesn't reveal any of the distinctive diatoms of MIS 6 and indicates the sediments are younger than MIS 6, but does not help us determine whether we have recovered MIS 5 sediments.

5.3.4 South Orkney Islands Quaternary sediment cores from glacial troughs

Rationale: The aim was to survey the two main 'glacial' troughs (one to the NW and one to the SE of the islands) inferred from previous BAS surveys and hydrographic charts and look for evidence of depositional basins that might contain Quaternary or Holocene sediment records.

Actions: Comprehensive swath bathymetry and TOPAS surveys were carried out primarily along the main axis of the troughs. Coring was carried out at in the deepest part of the troughs in the most expanded sediment deposits.

Outcomes: In the NW trough multibeam-swath bathymetry and TOPAS acoustic subbottom profiling revealed a classic polar glacial trough morphology; shallow at the shelf edge and deepening inshore. Deep basins were identified at both sites and cores (GC531 & GC532) were taken from the deepest part of the trough to determine if the sediments are Holocene, or span one or more glacial interglacial cycles. In the SE trough the TOPAS profiles revealed a landward-dipping profile, which is consistent with the erosion of the trough by grounded ice-sheet flow towards the outer shelf. A thick sedimentary sequence of postglacial sediments was found within the enclosed basin at the northern end of the trough. The sequence can be separated into a semi-transparent upper unit and a well-stratified lower unit. Both units pinch out against the trough flanks and the northern and southern boundary of the deep basin. Two gravity cores (GC541 and GC543) and a box core (BC542) from the same site targeted the most expanded sequences of this postglacial infill and recovered sediments from the upper part of the semi-transparent unit. At the moment, it is unclear, if the recovered sediment cores comprise just the (late) Holocene or the Late Quaternary.

5.3.5 South eastern Weddell Sea – Channel-Levee System II

Rationale: Previous reports from this region have documented sediments with intervals of high foraminifera concentration during the last 400 kyrs. Sediment cores from the continental rise and slope in the Weddell Sea contain a varying number of horizons rich in calcareous planktonic and benthic foraminifera, dating from the recent to MIS 3 (Anderson and Andrews, 1999). These foram-rich horizons represent the periodic occurrence of seasonally open waters, polynyas, above the individual sites and carbonate preservation in intermediate and deep water masses. As polynyas facilitate deep/intermediate water formation, they play an important role in global ocean circulation. To date the paucity of cores documenting the occurrence of these polynyas limits our ability to interpret the size, extent, frequency and distribution of seasonally open water in the Weddell Sea (implications for deep water formation, sea ice production. Furthermore, these foram-bearing sediments could potentially provide a geochemical record of oceanographic changes in the Weddell Sea..

Objective: The aim was to carry out detailed multibeam-swath bathymetry and TOPAS acoustic sub-bottom profiling to identify sites with the highest accumulation rates, to get improved resolution of the late Quaternary. We aim to increase the spatial resolution of these records by coring a number of sites along the continental slope and rise. In addition to mapping the extent of seasonally open waters through space and time, we will exploit the carbonate-rich horizons to better characterise surface ocean conditions and the physical and chemical properties of the deep waters.

Outcome: Surveys revealed that the core site in the previous study is located on Channel Levee System II (Michels et al., 2002). The channels are on the surface of the Crary Fan, offshore from the mouth of the Filchner Trough. A new core was taken on the crest of the channel levee where the section was more expanded. A box core (BC549), gravity core (GC548), CTD and water samples were collected from this site. Surveys then proceeded along the long axis of the levee trending south-west to identify if other expanded sections were present. A core site was selected on this traverse and a box core (BC551), gravity core (GC550), CTD and water samples were collected. Further southwest along Channel-Levee system II, we traversed the western levee following a profile very similar in character to the seismic data in Fig. 4 of Michels et al. (2002) (traversing east to west). At the top of the western levee we encountered an expanded section. Tracking further across the levee and south along the ridge confirmed a uniform thickness of this sediment so the CTD, GC (GC552) and BC553 were deployed.

5.3.6 Survey of the continental shelf break of the Filchner Trough

Rationale: Sediment cores were collected from the outer part of the Filchner Trough and mid-slope on the Crary Fan to study post-glacial environmental changes and to attempt to characterise the faunal and geochemical proxy expression of bottom water masses flowing around the slope (Weddell Gyre) and through the Filchner Trough (Ice Shelf Water).

Actions: A box core (BC554) and CTD were taken at John Anderson’s G1 site on the western bank of the outermost part of the Filchner Trough. A BC (BC562) was recovered at mooring site S2 (unfortunately heavy sea ice conditions prevented depolyment of a GC). A mooring documenting the varying intensity of ISW flow along the sea floor was recovered from this site . GC (GC563) and BC (BC564) were recovered from the Crary Trough Mouth Fan, an area that is influenced by the Weddell Gyre, but may have also periodically experienced an overflow of ice shelf water from the Filchner Trough.

Outcome: Rose bengal staining of a 30 ml surface samples allows observations of living and dead benthic foraminifera assemblage at the sea floor. Comparisons will be made of foraminifera assemblages from the different sites/water masses which may be used to infer relative changes of water mass influences in down core records, e.g. GC563.

5.3.7 Transects north from Filcher Ice Shelf at c. 650 m and 1050 m water depth

Rationale: Surface samples, gravity cores and CTD from two N-S transects from the Filchner Ice Shelf were selected at 650 m and 1050 m water depth. The 650 m water depth transect experienced the core of the ISW flowing from beneath the ice shelf and along the western flank of the Filchner Trough, passing through the S2 mooring sites and BC562 further downstream. Station 2 on this transect coincides with John Anderson's G13 site which was cored at the then edge of the ice shelf in 1970. The 1050 m water depth transect was selected for comparison, at the margin of the ISW flow.

Actions:

Filchner Trough – western 650 m water depth N-S transect

Table 3. Cores, CTD's and water samples on Filchner Trough 650 m water depth transect

Site	BC	GC	CTD	H_20	H_20 125µm
1 (ice shelf)	BC574	GC573	CTD11		✓
2	BC576	GC575	CTD12	30L x 0.7µm δ18O	✓
3	BC580	GC579*	CTD13		✓
4 (most northerly)	BC577	GC578*	**		✓

*no recovery

**excessive sea ice

Filchner Trough – 1050 m water depth N-S transect

Table 4. Cores, CTD's and water samples on Filchner Trough 1050 m water depth transect

Site	BC	GC	CTD	H_20	H_20 125µm
1	BC587	GC597	CTD16		✓
2	BC591	GC593	CTD15		✓
3	BC589	GC5??	CTD14		✓

Outcomes: Surface samples of 10 to 30 ml were collected from all box cores, sieved and submerged in rose bengal for\18-24 hours. Recently dead planktonic and benthic foraminifera stained pink. Comparisons of benthic assemblage, calcite chemistry and planktonic foraminifera (and pteropods) collected from the water column and in the surface sediments will follow.

5.3.8 Eastern Weddell Sea Fjords – postglacial sediments and glacial geomorphology

Rationale: Fjords along the Antarctic margin typically contain evidence of past glacial configurations in their submarine glacial geomorphology and can accumulate Quaternary sediments in their deeper basins that are undisturbed by iceberg scouring. The Caird Coast and Prinzeregent-Luitpold-Land / Coats Land includes a series of c. 7 major outlet glaciers that discharge into the eastern margin of the Weddell Sea through deeply incised fjords/troughs. These extend c. 25-40 km from the coast towards the Filchner Trough. The configuration of these outlet glaciers in the past has likely been determined by the presence, then southward migration of the Filchner Ice Shelf front, changing geometries of the ice margin, ice depth and discharge rates. The aim was to survey the submarine glacial geomorphology of these fjords, define their geographical extent, identify past changes in ice-sheet extent through bedforms, determine if any sediments were present in their deeper basins, and to sample the sediments.

Actions: Swath bathymetry and TOPAS surveys were carried out along the long axes of the troughs to identify potential deep basins and expanded sediment accumulations. Sediments were sampled by BC and GC (where present) and water column properties by CTD.

Outcomes:

Hoffmann Trough

The first fjord surveyed was the Hoffmann Trough. Access to the head of the trough was restricted by fast ice. Surveys of the outer part of the trough identified a series of arcuate moraines. The trough over deepened to >600 m. The base of the trough was predominantly ice-moulded bedrock and only a few minor sediment packages were found.

‘Albert Trough’

We then proceeded around Albert Bank into next Fjord (un-named) - managed to navigate between icebergs and sea-ice along the full axis of the trough. The trough has several moraines marking former ice limits. A post-glacial sediment drape was found in the deepest part of the trough (>900 m). The box core (BC566) recovered revealed a *biogenic* surface with frequent dropstones overlying a gravelly mud unit below. Clumps of two distinctive diatom mats were caught on the side of the BC, the first comprising a *Corethron* ooze and the second (more prolific) *Chaetoceros* spp. mixed with sponge spiccules. The mats were mixed with sediment indicating that they had been on the sea floor and not collected from the water column. They were distinctly slug-shaped suggesting post-depositional activity – rolling – slope or current controlled perhaps? Gravity core deployed here was unsuccessful (GC 567). Moved 0.5 m from the ice from then deployed 2 gravity cores (GC 568 and GC 569), both of which retrieved biogenic-rich sediments. Some water samples were collected (125 μm sieved sample, d180 sample, 250 ml sample (diatom assemblage sample), 0.7 μm filtered sample). Smear Slides reveal biogenic rich sediments comprising monospecific *Corethron* and *Chaetoceros* oozes as well as highly terrigenous silty-muds with only rare microfossils or fragments present. Sponge spiccules, Foraminifera and Silicoflagellates also present.

Möller Trough

Swath bathymetry and TOPAS surveys were carried out along the long axis of the trough. A deep spot was identified. BC deployed at this site recovered cobbles. A second site was selected in the trough. BC recovered c. 40 cm diatomaceous ooze, with high water content (BC608). Two GC deployments failed to recover any sediments, which suggests that the diatom ooze is a thin layer overlying bedrock. Box cores were taken at sites offshore from Möller Trough (BC622-623) at the c. 400 m contour. BC622 contained a mixture of sponges, bryzoans and a brittle star. BC623 contained a thin layer of sediment with a rich and diverse benthic fauna dominated by bryozoans.

Lichte Trough

Swath bathymetry and TOPAS surveys were carried out along the long axis of the trough. The trough was sinusoidal in shape and two prominent over deepened sections were identified. The inner of these had a cross profile which included two distinct terraces; possibly a wide glacial trough over deepened by two successive glacial stages. The last of these was a very narrow canyon-like trough. The outer over-deepened section had a wider steep sided morphology and was surveyed to look for sediment accumulations. No deep sediment deposits were identified on TOPAS. BC614 retrieved a large sponge and a rich benthic fauna with only a thin layer of surface sediment. BC615 recovered a slightly thicker sediment layer but not suitable for a sub-core.

A box core was taken on the outer shelf of Licht Trough (BC624) at the c. 300 m contour. BC624 contained a thin layer of sediment with a rich and diverse benthic fauna.

'Caird Trough'

The 'Caird Trough' lies near the intersection of the Brunt Ice Shelf and the Caird Coast. It occupies a small embayment fed by a glacier, which beyond the grounding line becomes a small floating glacier tongue. Marked differences in the configuration of this glacier tongue can be seen when comparing various Admiralty Charts and other maps of the Eastern Weddell Sea margin – so we assume that there is a reasonably high discharge from this glacier. Two potential outlet troughs are seen in the AWI bathymetric chart but neither of these was clearly resolved. Instead there was a deep area of bedrock in front of the glacier and then a large sediment wedge extending offshore. Beyond this there were a series of deeper basins which then gave way to glacially moulded bedrock. A small looping recessional moraine was resolved to the south east of the glacier front. A seismic line was collected across the sediment wedge confirming its sedimentary origin. Cores were taken just offshore of the wedge (GC625, GC626 & BC627), on the top of the wedge (GC630) and in a deeper basin to the north (BC628 & GC629). The latter had up to 70 m of sediments based on the seismic profile, but due to a hard surface layer less than one metre was recovered by the gravity corer. The wedge may be analogous to the sediment morphology under the current Brunt Ice Shelf front around the creeks – where the shelf is raised and grounded (on the MacDonald Bank?). This is evident as the shelf has tidal undercutting at its front – which is absent in floating ice shelves.

Dawson-Lambton Ice Stream Trough

Surveys of the outer trough were initially hampered by poor weather conditions. We therefore focussed on the inner trough where there was glacially moulded bedrock and a deep spot near the present day ice front. A series of glacial bed forms was identified in the middle to outer trough.

5.3.9 Brandy Bay, Duse Bay and Beak Island Caldera

Whilst waiting for a field party to be picked up from James Ross Island we took the opportunity to carry out a swath bathymetric survey of Brandy Bay. The objective was to see if there was an over-deepened section in the inner bay, similar to some of the fjords surveyed earlier in the voyage. This proved not to be the case. The bay sloped gradually away from the shoreline. Many icebergs were also grounded in the bay. There was evidence for iceberg grounding in the swath bathymetry, making it a poor location for sediment coring.

After the field party uplift we headed northeast to Duse Bay, which is located between Beak Island and View Point (on Trinity Peninsula). A swath bathymetric compilation of previous surveys showed there that was a deep spot (1050 m) in this bay, with a flat sediment surface. The objective was therefore to carry out a TOPAS survey of this trough to determine if there were any deep sediment deposits present, and if there were, to collect a sediment core. The outcome was that TOPAS surveys identified an accumulation of sediments that was >30 m thick, with a series of strong reflectors which we interpreted as tephra layers (based on evidence from an ice core from James Ross Island and a lake sediment core from adjacent Beak Island. Either side of the deep spot were a series of streamlined glacial bedforms. The 12 m gravity corer was deployed and penetrated up to the bomb. The sediment core (GC638) was compressed to <8 m. The box corer and CTD (CTD 20) were also deployed. The Box corer collected an undisturbed surface sediment, and two sub-cores were retrieved (BC639A, B).

Due to inclement weather in Drake Passage, we remained in the vicinity of Duse Bay and carried out swath bathymetry and TOPAS surveys to the south of Beak Island. The objective was to determine if the southern side of the caldera was evident in the seafloor topography and to determine if there was a deep basin within the caldera that could be a target for future sediment coring. The outcome was that the survey showed the southern side of the caldera was present. A deep basin was absent, and water depths within the caldera decreased from about 400 m in the south to <100 m in the north. Our interpretation is that the northern part of the caldera was infilled by extrusive volcanic material (probably hyaloclastite) at a later date, with Tongue Rocks (in the middle of the caldera) being part of a lava flow that capped the effusive pile. We also observed a small crater on the side of Scree Peak on Eagle Island, inclined towards the caldera, with fresh-looking morphology and a short, thick lava flow at its base. We interpret this as an explosion crater and subsequent silicic lava extrusion. The fresh morphology of the explosion crater and lava flow suggests that they formed since the last deglaciation, and the fact that Tongue Rocks are very close to modern sea-level (i.e. not uplifted by glacial isostatic adjustment) may indicate that the caldera infill is also postglacial in age. A small Adelie Penguin colony (c. 200 pairs) was also observed on the south eastern extremity of Beak island, facing Eagle Island. A general observation at this site is that Beak

Island appears to be one of a string of volcanoes situated along the northern margin of Prince Gustav Channel. It is possible that these are orientated along a SW-NE trending fault zone that separates the Palaeozoic Trinity Peninsula Group from the Mesozoic-Cenozoic James Ross Basin. Changes in sea-floor morphological style observed in swath bathymetry data from Duse Bay and parts of Prince Gustav Channel are consistent with this interpretation.

5.3.10 Other activities

Water filtering

Sample	Julian Day	Start time	End Time	125 μm	Diatom Assemblage	d18O H2O	Comments
A	038	11:41	12:51	✓	✓	✓	
B	039	07:15	08:33	✓	✓	✓	
C	039	17:25	18:39	✓	✓	✓	
D	041	-	-	✓	✓	✓	CTD sample at site BC 553
E	050	13:50	15:28	✓	✓	✓	At site BC 566
F	051	20:15	20:55	✓	✓	✓	At site BC 571
G	057	19:20	22:00	✓	✓	✓	At site BC 608
H	060	13:00	15:29	✓	✓	✓	At site GC 625
I	063	09:51	10:07	✓	✓	✓	

Preliminary lab work

Cores that have had their magnetic susceptibility measured:

GC	526	GC	548	GC	569
BC	527	BC	549	GC	575
GC	528	GC	550	GC	593
GC	529	BC	551	GC	597
GC	530	GC	552	GC	626
GC	531	BC	553	GC	629
GC	541	BC	562	GC	630
BC	542	GC	565		
GC	543	GC	568		

Cores that have been split, logged and sampled:

GC	528	GC	565	GC	575
GC	550	GC	548	GC	593
GC	552	GC	569	GC	597

References:

ANDERSON, J.B., & ANDREWS, J.T. 1999. Radiocarbon constraints on ice sheet advance and retreat in the Weddell Sea, Antarctica. *Geology,* 27(2), 179-182.

MICHELS, K.H., KUHN, G., HILLENBRAND, C.-D., DIEKMANN, B., FÜTTERER, D.K., GROBE, H., & UENZELMANN-NEBEN, G. 2002. The southern Weddell Sea: combined contourite-turbidite sedimentation at the southeastern margin of the Weddell Gyre. In STOW, D.A.V., PUDSEY, C.J., HOWE, J.A., FAUGÈRES, J.-C., & VIANA, A.R. *eds. Deep- Water Contourite Systems: Modem Drifts and Ancient Series, Seismic and Sedimentary Characteristics.* Geological Society, London, Memoirs, Geological Society of London, 22, 305-323.

5.4 Water Sampling

Vicky Peck

Water samples were collected at selected sites throughout the cruise to analyse surface water phytoplankton and zooplankton assemblages and concentrations, sea water $\delta^{18}O$-diatom $\delta^{18}O$ calibration and organic geochemical proxy calibrations. Water was collected either by timed intervals from the uncontaminated sea water supply (USS; intake at 6 m water depth) while in transit and on station in sea ice free areas or in 12 of the 12 L niskin bottles on the CTD when the USS was not running due to excessive sea ice (water collected at 6 m water depth).

For phytoplankton assemblage and concentration studies, 250 ml of each 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 500ml 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.

For seawater $\delta^{18}O$-diatom $\delta^{18}O$ studies and zooplankton. A 125 µm sieve was placed under the USS outlet or water collected from the CTD. Diatoms and other plankton were collected in the sieve, rinsed with de-ionised water and transferred in 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. For seawater $\delta^{18}O$ measurements 50 ml glass vials were filled, sealed and stored in the fridge.

For organic geochemical proxy calibrations. Up to 10 L of seawater were filtered through up to 3 pre-furnaced 0.7 µm glass fibre filters for each sample. Filters were then briefly air-dried, placed in aluminium foil-lined petri-dishes, sealed and stored in the -20 °C freezer.

Table 5. Water samples collected and filtered.

Sample	Julian Day	Start time	End Time	125 μm sieved	0.2 μm filtered	$\delta^{18}O$ H_2O	0.7 μm filtered	Comments
1	036	14:21	14:45		✓	✓	✓	Test Sample (Underway)
A	038	11:41	12:51	✓	✓	✓	✓	BC 549
B	039	07:15	08:33	✓	✓	✓	✓	BC 551
C	039	17:25	18:39	✓	✓	✓	✓	Sea-ice edge
D	041	-	-	✓	✓	✓	✓	CTD water at site BC 553
E	050	13:50	15:28	✓	✓	✓	✓	BC 566
F	051	20:15	20:55	✓	✓	✓	✓	BC 571
CTD 11	052	-	-	✓			✓	BC 574, GC 573
CTD 14	054	-	-	✓				BC 590, GC 594, GC 595
CTD 15	055	-	-	✓				BC 591, GC 592, GC 593
CTD 16	055	-	-	✓				BC 587, GC 597, GC 598
G	057	19:20	22:00	✓	✓	✓		BC 608
USS 1	058	16:30	16:59	✓				At CTD 18, BC 614
H	060	13:00	15:29	✓	✓	✓		GC 625
I	063	09:51	10:07	✓	✓	✓		(Underway)
J	065	23:40	23:50	✓	✓	✓		(Underway)
K	11/3/11	20:00	22:40	✓	✓	✓	✓	BC639, GC638

5.5 Seismic reflection profiling

Rob Larter

5.5.1 Objectives

High-resolution seismic reflection data is of great value for eliminating ambiguity between the influence of substrate and glacial dynamic processes in interpretation of glacial bedforms observed in multibeam bathymetry data. For example, the presence of drumlinoid features has often been interpreted as characterstic of intermediate glacial flow rates, but recent work has shown that such features can persist in areas where there has been fast (ice stream) flow over hard substrates. High-resolution seismic data is also essential in order to be certain of interpretations of glacial depositional features such as grounding zone wedges, which are widely interpreted as marking significant stillstands or readvances of grounding lines. In the absence of seismic reflection data there is often uncertainty about whether a bathymetric feature is a depositional body or formed by erosion around a resistant body or bed.

For these reasons, an arrangement was made with Dr. Christian Hübscher of the Institute for Geophysics at the University of Hamburg to provide a lightweight seismic reflection profiling system for use on this cruise. A specific objective was to collect profiles along and across different parts of the Filchner Trough in areas where multibeam bathymetry surveys were conducted, in order to constrain the nature of the substrate, the origin of any positive relief features, and to determine whether the position of the trough is constrained by the underlying geological structure. Another objective was to collect profiles along the upper slope on the Crary Fan to determine whether the present upper slope morphology has changed as a result of recent erosion or deposition.

5.5.2 Work at sea

Approximately three days work were carried out near the South Orkney Islands during the early part of the cruise, as information about the sea ice distribution in the southern Weddell Sea indicated that conditions there would make work difficult. Multibeam bathymetry data collected over a glacial trough to the southeast of Coronation Island presented one of the common dilemmas faced in interpreting such data. The trough shallowed towards its mouth, but it was unclear if this morphology was the result of glacial erosion into hard bedrock or deposition of glacial sediments at the mouth of the trough. A 67 km-long line was shot along the axis of the trough to answer this question, and to constrain the maximum extent of glaciation.

The sea ice concentration over the outer Filchner Trough and the upper slope precluded deployment of seismic equipment in that area. During work along the front of the Filchner Ice Shelf there was a brief period around 22nd February when it would have been possible to deploy seismic equipment, but it was important to carry out some reconnaissance multibeam bathymetry and TOPAS survey first. When the ship returned a couple of days later through the area where a seismic profile across the flank of the Filchner Trough would have been very useful, the sea had started to freeze and conditions were unsuitable for seismic work.

On 27th February JCR reached a mid-shelf part of the Filchner Trough having passed through only loose first-year ice. Conditions were marginal for seismic work but it was decided to attempt shooting a line. The streamer and airgun were deployed, but unfortunately a technical problem with the trigger unit prevented collection of any data (see section 7.9 for details).

There was a final opportunity to collect some seismic data in the southern Weddell Sea in the "Caird" trough on 2nd March. Multibeam bathymetry survey over the trough had revealed an area of fairly smooth sea floor that shoaled seawards in the inner part of the trough. Further offshore the sea floor was much rougher, probably indicating scoured and gouged hard bedrock in this area. From the multibeam data alone it was not clear whether the area of smooth sea floor was the surface of a glacially-deposited body or bedrock that had been planed by intense glacial activity. As a strong NE wind was blowing it was only possible to shoot a line heading into the wind, so an 11.4 km long line was shot perpendicular to the trend of the trough across the area of smooth sea-floor.

5.5.3 Preliminary observations

Seismic line BAS101-s115, along the axis of the trough SE of Coronation Island, showed that the shallow bank at the mouth of the trough is a compound depositional unit. The bank is underlain by an extensive prograded sequence which overlies a thick succession of nearly flat-lying, regularly layered strata. The regularly layered strata probably represent pre-glacial deposition, and the prograded sequence probably advanced seaward in stages as additional forest deposits accumulated during successive glaciations. The prograded sequence pinches out towards the SE end of the profile through downlap of its foreset reflections onto the surface of the underlying layered strata. The depositional break at the top of the most seaward foreset deposits is interpreted as marking the maximum extent of glaciation along the trough. Overlying the prograded sequence there are two units that lack any internal acoustic structure. These are interpreted as consisting of diamictons deposited during more recent glacial advances, or during glacial retreat. The upper of these two units takes the form of two moraine banks.

Seismic line BAS101-s116, across the area of smooth sea floor in the “Caird” trough, showed that the smooth area corresponds to the surface of a depositional body. The overall morphology of the body, with a gently dipping upstream side and a much steeper downstream side, combined with the seismic evidence, indicates that this is a typical grounding zone wedge (GZW), i.e. deposited by a seaward-thinning glacier that had a thickness already near to floatation as it approached the grounding line. Dipping reflections towards the SW margin of the GZW indicate that it had grown in size by lateral progradation, in addition to presumably prograding along the trough. The close correspondence between the extent of the GZW the area of smooth sea-floor morphology provides an excellent demonstration of the influence of substrate on subglacial morphology.

5.6 Moorings and physical oceanography

Svein Østerhus

University of Bergen, Norway has since 1968 operated moorings equipped with current meters, temperature and salinity sensors on the Filchner sill and on the continental slope in the southern Weddell Sea. The objectives are to monitor the transport of Ice Shelf Water (ISW) from the Filchner-Ronne Ice Shelf cavity to the deep Weddell Sea, and related mixing processes. Our activities during the JR244 cruise are an extension to the Norwegian IPY project Bipolar Atlantic Thermohaline Circulation (BIAC, www.bccr.no/biac) and are carried out in cooperation with BAS. The working area is limited to the Filchner sill and the continental slope (Figure 10), and the main work during the JR244 cruise was to recover moorings deployed from RRS *Ernest Shackleton* (ES052) in February 2010. Figure 11 shows positions for current meter moorings recovered.

Nineteen CTD casts were carried out at selected Gravity Core and Box Core sites, and one additional CTD was carried out near the site of mooring WIF3 after it had been recovered. Two casts were in the South Orkney Is. region, seventeen were in the southern Weddell Sea (see Figure 12) and one was near the northern part of the Antarctic Peninsula.

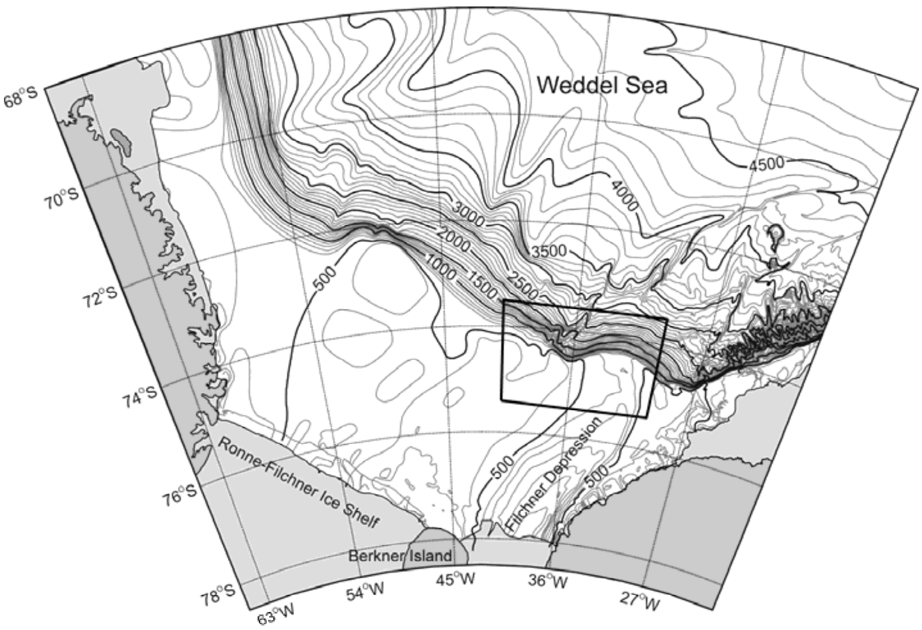


Figure 10. Bathymetric map of the southern Weddell Sea. The region identified with the black frame shows the moorings working area.

5.6.1 Mooring work

Four moorings were deployed in February 2010 during the Norwegian Barter cruise with

RRS *Ernest Shackleton* (Figure 11). Three of the moorings (WIF1-3) were deployed on the Crary Fan slope in the ISW branches to study the dynamics of the plume. Moorings WIF2 and 3 were successfully recovered but the sea ice conditions prohibited recovery of WIF1 this season. The WIF2 mooring was deployed at 1465 m depth and equipped with one Longranger and one 300 kHz RDI ADCPs, two Aanderaa RCM 7 current meters, and eight Sea Bird SBE37/39 instruments for temperature, conductivity and pressure measurements. This mooring was successfully recovered and all instruments have recorded for the whole deployment period.

The WIF3 is a 300 m long mooring line and was deployed at 1879 m depth in the deepest branch of the ISW overflow. This mooring was instrumented with a downward looking RDI 300kHz ADCP at 300 m.a.b., a upward looking AADI RDCP600 at 250 m.a.b., an AADI SeaGuard RCM at 25 m.a.b. and an Aanderaa RCM7 current meter at 90 m.a.b. In addition the mooring was equipped with seven SeaBird SBE37/39 instruments for temperature and conductivity measurements. This mooring was successfully recovered and the instruments have recorded during the whole deployment period.

The long-term monitoring mooring S2 was deployed at the Filchner sill at 600 m depth. This mooring carried three Aanderaa RCM7 and three SeaBird SBE37 instruments at 25, 100 and 175 m.a.b. This mooring was successfully recovered and all instruments have recorded for the whole deployment period.

Attempts to locate the S2-2005 mooring deployed from JCR in February 2005 were carried out through attempting to interrogate it by means of the Acoustic releaser and using the echo sounder to survey the deployment area. No contact was established with the acoustic release and there was no sign of the mooring on the EA600 echo sounder dsiplay.

The plan for dredging for the S2 BIAC bottom mounted frame deployed in 2009 was cancelled due to difficult sea ice conditions, but interrogation with the acoustic release system confirmed that the BIAC frame was at the site and in upright position.

5.6.2 CTD work

Figure 12 shows the positions for the seventeen CTD casts obtained in the southern Weddell Sea, in addition two casts were carried out in the South Orkney Is. region and one was carried out near the northern part of the Antarctic Peninsula.

No water samples were taken for salinity calibration but the two conductivity sensors gave identical values for all depths and for all casts. The primary and secondary temperature sensors show a systematic difference of about 2 mK. It is believed that the accuracy for the conductivity is better than 0.003 and the temperature better 3 mK.

Figure 13 shows the water mass distributions for all the CTD casts.

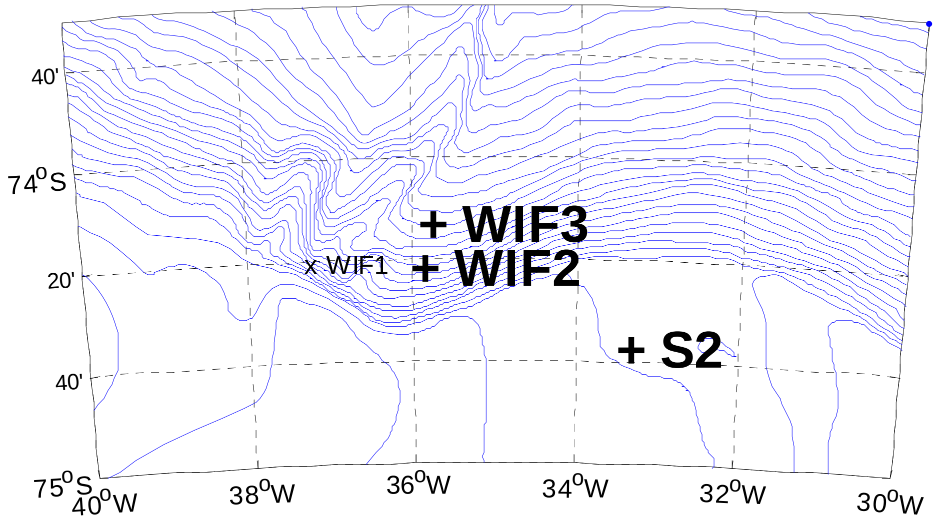


Figure 11. Mooring positions.

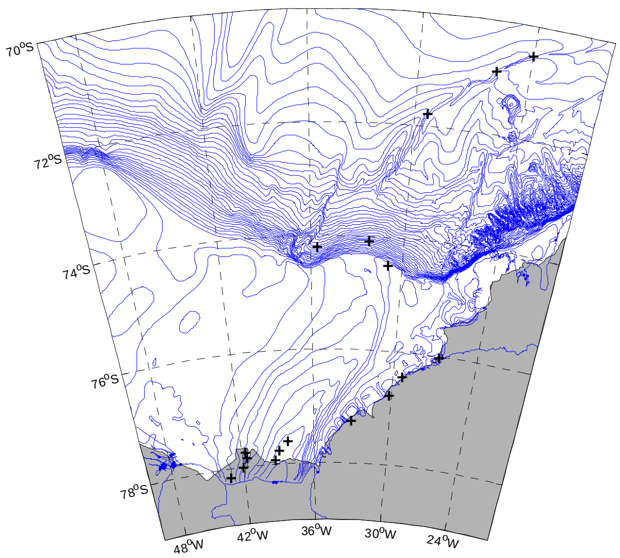


Figure 12. CTD stations in the southern Weddell Sea. The limit of the grey area indicates the pre-1987 coast line.

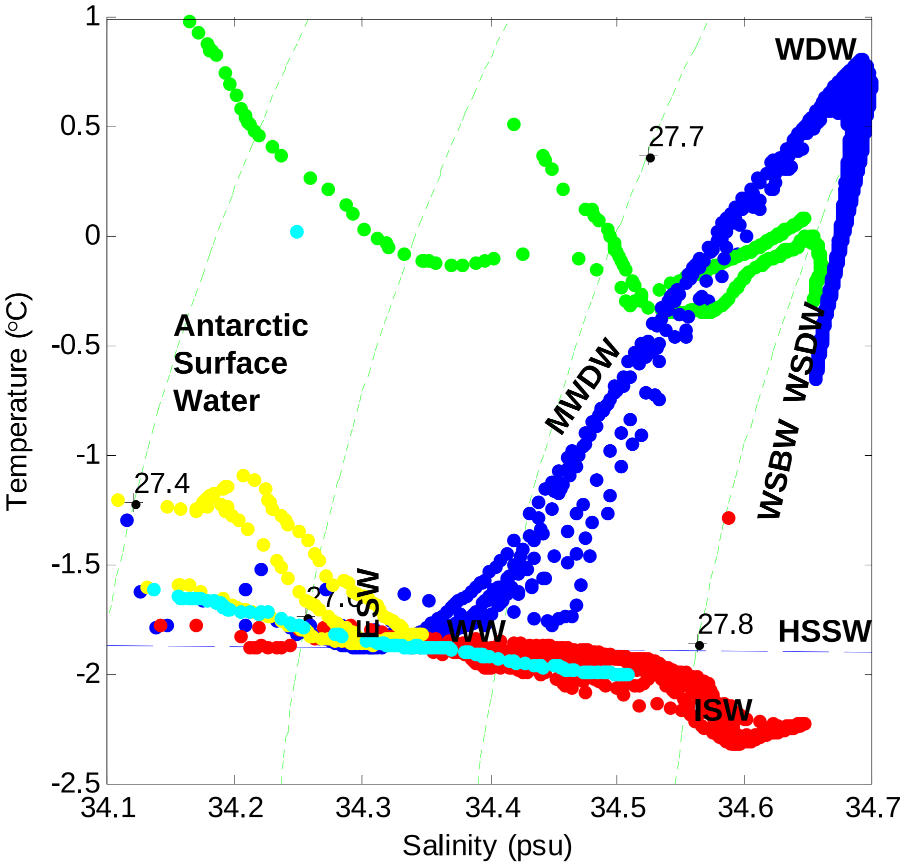


Figure 13. Temperature (Potential) – Salinity diagram of all CTD casts. The South Orkney Is. (Green, CTD#1-2), the Weddell Sea (blue, CTD#3-8), the Albert Trough (light blue, CTD#9). The Filchner Trough (red, CTD#10-16), the Möller, Lichte and Caird Trough (yellow, CTD#17-19). The surface freezing point line is marked by the blue dashed line. Typical water masses: WDW-Weddell Deep Water (also named Modified Circumpolar Deep Water (CDW)), MWDW-Modified WDW, ESW-Eastern Shelf Water, WW-Winter Water, ISW-Ice Shelf Water, HSSW-High Salinity Shelf Water, WSBW/WSDW-Wedell Sea Bottom/Deep Water

6. List of Scientific Equipment Used

6.1 Echo Sounders

Kongsberg Simrad EM120 multibeam echo sounder

Kongsberg Simrad TOPAS PS018 sub-bottom profiler

Kongsberg Simrad EA600 (Bridge navigational echo sounder)

Kongsberg Simrad EK60 echo sounder

Kongsberg Simrad sonar synchronisation unit (SSU)

6.2 Oceanographic instruments

Seabird Conductivity-Temperature-Depth (CTD) system, also including oxygen sensor, fluorometer, transmissometer, PAR sensor and altimeter

BAS Oceanlogger, including thermosalinograph, fluorometer, uncontaminated seawater intake thermometer, air temperature thermometer, anemometer, barometer, humidity sensor, PAR sensor and TIR sensor

6.3 Winches and wire monitoring

30-tonne traction winch, ship's conducting cable and CLAM wire monitoring system

Hydrographic wire, 10-tonne traction winch and CLAM wire monitoring system

6.4 Coring equipment

IceSheets/Chemistry and Past Climate gravity coring system

BAS Box corer (manufactured by Duncan & Associates; 300 mm square box)

6.5 Seismic profiling equipment

Hamworthy seismic air compressors

Following equipment provided by the Institute for Geophysics, University of Hamburg:

Generator-Injector airgun (45 in^3 generator, 105 in^3 injector)

Hydrophone streamer with 100 m-long active section (16 x 6.25 m groups)

Strataview data recording system

SureShot triggering system

6.6 Potential Field Equipment

Shipboard three-component magnetometer (STCM) with Bartington fluxgate sensors

SeaSpy towed Overhauser magnetometer

6.7 Navigation

Seatex Seapath 200 (input to EM120 and TOPAS)

Furuno GP-32 GPS receiver

Ashtech GG24 GPS+GLONASS receiver

Ashtech GDU-5 3D GPS receiver

TSS300 heave, roll and pitch sensor

Chernikeeff Aquaprobe Mk5 electromagnetic speed log

Sperry Doppler speed log

Gyro

Sonardyne ultra-short baseline (USBL) acoustic navigation system

6.8 Data Logging

NOAA Scientific Computer System (SCS) system

7. Equipment performance

7.1 EM120 Multibeam echo sounder

Ali Graham and Rob Larter

Logging of EM120 data was initiated at 1705Z on Julian day 028, south of the Falkland Islands. The system was operated at virtually all times when the vessel was in motion, until logging was stopped at 1304Z on Julian day 074, once again south of the Falkland Islands.

7.1.1 Standard settings

For the majority of the cruise, the EM120 was synchronised with the EA600 through the SSU with a calculated ping cycle based on the working water depth. The width of the swath was set to a level appropriate for the water depth and weather conditions. Under favourable conditions, beam angles were set as wide as 66º, but were reduced if the outer beams became discordant or noisy, or if the EM120 had problems fixing the bottom. Minimum and maximum depths were set as appropriate for the regional bathymetry. Occasionally, the maximum depth was fixed near to the actual water depth in an attempt to stop the EM120 from picking spurious multiple seafloor reflectors. Sound velocity profiles, derived from XBT casts carried out on previous JCR cruises, and CTD casts during this cruise, were changed as necessary to be appropriate for the water structure of the survey area (see Table 1).

7.1.2 Problems encountered

Several minor problems were encountered with the EM120 during the cruise:

1. On initial power up the light on the blue “remote control” box on the bulkhead behind the operator station in the UIC room flickered. Mark Preston went down to examine the transceiver units on the Tween Deck and heard a clicking coming from them at a similar frequency to the flickering observed on the light. He powered cycled the units. Once they were fully powered up (several minutes) the operator interface was restarted and the system worked normally.

2. On day 039 a significant offset was observed between depths measured on the outer port and starboard beams where we crossed a swath of data collected a few hours earlier. This suggested a roll calibration error. Roll and pitch calibration runs were carried out.

Analysis of the data from these runs indicated a roll calibration error of +0.43° and a pitch calibration error of +0.25°. These values were added to those in the Installation parameters menu on the operator workstation. The previous calibration values were +0.6° for roll and 0.0° for pitch, so the new values are +1.03° for roll and 0.25° for pitch.

3. On day 045 at about 2100Z the 'Survey' display on the operator workstation crashed. The operator station was rebooted to overcome this problem. A new survey was created because the people on watch noticed that the line number had reverted to '1' and were concerned about the possibility of overwriting files (this could not happen because the full file names include the date and time). After a few minutes the active survey was changed back to the previous one with the line number forced to be one greater than the number of lines recorded previously. However, the system reboot had loaded a sound velocity profile from the Falkland Islands shelf. The sound velocity profile was switched back to the most recent one from the working area after a few minutes, but some data collected after the reboot will require correction of sound velocity profile information in post processing.

4. On day 046 at about 0800Z the EM120 stopped pinging. It was only revived by powering the system down from the switch on the blue "remote control" box on the bulkhead behind the operator station, powering it up again and then restarting the operator interface.

5. On day 048, two further instances of the problem described above, followed by further occurrences of the same error on day 049, 050, 052 and 057. Each time the terminal cited a communication error between the EM120 launchpad and the PU.

6. On day 057 at 1828Z, the ship suffered a 'brown out', which meant complete loss of power to the sonar units. They were restarted successfully when the power came back online. A similar event occurred several days later, at 1220Z on day 060.

7.2 TOPAS sub-bottom profiler

Ali Graham and Rob Larter

Logging was started at 1705Z on Julian day 028, and used near-continuously during the cruise until 1754Z on Julian day 071 (i.e. when departing from the northern Antarctic

Peninsula region). During the northbound crossing of Drake Passage TOPAS logging was restarted with the system set up to look for structure in the upper water column at 1538Z on Julian day 072. Logging was stopped for the final time at 1019Z on day 073.

7.2.1 Standard settings

Typical parameter settings on the control workstation are listed in Appendix A5. In shelf water depths, the TOPAS trigger was generally operated in a synchronized mode with an external trigger from the SSU. In deep water (>1500 m), TOPAS was sometimes operated with an internal trigger to output more frequent pings. In these situations, care was taken to select a trigger interval that the EM120 ping cycle time was not an exact multiple of, which is known to cause unwanted interference to the EM120 data. The TOPAS system was operated almost entirely using a chirp source throughout the cruise, with a signal strength of 90-95%. A burst source was used just for the first few hours of operation after leaving Stanley and for a few minutes on day 048 while searching for one of the oceanographic moorings. A time-variable gain (TVG) and small gain adjustments were used to improve imaging of the seafloor on the screen display and on the analogue (to paper) plotter.

7.2.2 Problems encountered

On several cruises over the past five years, 100 Hz noise has been reported in the raw TOPAS data, particularly when using the system in 'burst' transmission modes. We noted similar evidence for the noise problem on the raw trace display during this cruise, although as a chirp transmission was used almost exclusively during the cruise, the chirp correlation greatly suppressed the noise in the processed data output to the profile display on the screen and the EPC plotter. The noise was particularly notable in the southern Weddell Sea (i.e. a colder environment). No other problems were reported.

7.3 EA600 Echo Sounder

The Kongsberg EA600 12 kHz echo sounder, the control console for which is located on the Bridge, was used for navigational purposes. Depths recorded by the system were all calculated using a constant assumed acoustic velocity of 1500 ms^{-1} and were logged on the NOAA SCS logging system. The calculated depths were unreliable when the TOPAS system was being used with an internal trigger, as the TOPAS signal confuses the automatic depth picking process. For most of the cruise the EA600 was triggered by the SSU, synchronized with the EM120, and operated in 'passive' mode, with the EA600 calculating its depth from the EM120's first return. When the Bridge required the EA600 for navigation (e.g., in shallower water), the EA600 was switched to 'active' mode and internal trigger.

7.4 EK60 echo sounder

The EK60 was operated near the South Orkney Islands between 1740Z on day 032 and 1200Z on day 034. Features interpreted as "gas chimneys" had previously been reported in sub-bottom acoustic profiler data over a trough south of Signy Island, so the EK60 was operated to look for indications of gas venting into the water column. No clear evidence of any such activity was observed.

7.5. Gravity corer

James A. Smith, Claus-Dieter Hillenbrand, Claire Allen, Vicky Peck, Dominic Hodgson

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 following a successful trials cruise during the summer of 2010.

7.5.1. Brief notes on the trials cruise

A trials cruise, involving the BAS science staff in the JR244 scientific party together with Steve Bremner (AME) and Jack Schilling, was undertaken between Portsmouth and Immingham in the summer of 2010 (1st-4th September). The primary objective of the cruise was to fully rig and deploy the coring system at sea. The trials cruise allowed the *JCR* crew to familiarise themselves with transferring the assembled gravity corer from the outboard bucket to the midships gantry using the ships crane, via a union purchase. The gravity corer was successfully deployed at one site, recovering some sandy sediments. It was noted during trials that the fine control of the ships crane was not sensitive enough to pull the barrels together safely, using the pulley system supplied by Smit. During JR244 the barrels were usually connected outboard in the corer frame, using the ships crane to support the weight of the barrel. If necessary, a wooden beam was used to raise the barrel to the correct height to connect the barrels to the bomb or to one another. For 9 m and 12 m deployments the barrels were either connected on the corer trestles, and then the whole 9 m and 12 m configuration hoisted onto the cradle, or built directly onto the bomb.

7.5.2. Set up and deployment

7.5.2.1. Set up

The 12m long aluminium framework and core bucket was installed outboard of the ships rail on the starboard side of the vessel immediately after leaving FIPASS using the ship's crane. It was not possible to install the frame whilst alongside FIPASS due to lack of clearance between the ship's rail and the wharf. Prior to sailing, the davit winch was installed on the starboard rail. The rack for the corer barrels and liners, and handling trestles was installed on the aft deck and on the starboard deck respectively. Feet had to be welded to the barrel rack before it could be fitted to the ships matrix. The framework for holding the bomb was also installed on the aft deck.

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 and 12 m barrel configurations were all deployed during JR244. Inside the barrels pre-marked core liners (taped together for deployments >6 m and with arrows pointing up and labelled from A1-6, B-1-6 etc 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 (inserted at 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 used throughout JR244, providing a closer seal than the (spare) synthetic valve. We trialled a variety of core catchers of various 'stiffness' throughout the expedition (A to K, with K being stiffest) depending on what type of sediment we anticipated to encounter at the seafloor (e.g., stiff subglacial or soupy postglacial sediment). Where we anticipated recovering 'soupy sediment a plastic bag with the bottom cut off was wrapped around the outside of the catcher to minimise sediment wash-out.

7.5.2.2. 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 aluminium framework. Once the bomb weight retaining pin is removed, the corer was then lifted out of the bucket with the crane. The corer was then transferred by crane to the main coring wire running over a block on the midships gantry using a union purchase.

On recovery, the crane was connected to the bomb, and the corer manoeuvred back into the bucket using two ropes attached to the top of the bomb to help guide it. In addition, a sling was wrapped round the barrel and pulled from behind to land it carefully in the bucket. To further control the corer, particularly if it was swinging, a piece of wood (with v-shape cut in one end) was used to guide the barrel into the frame. After the bomb was safely in the bucket with the retaining pin replaced, the framework was then pulled back up to its horizontal position.

Depending on the conditions, the uppermost barrel was disconnected from the bomb weight manually, with minor assistance from the crane or using a wooden beam to support the weight and allow the adjoining barrel to slide off the collar of the bomb and/or uppermost barrel more easily. If conditions would allow it, the liner was removed outboard and sectioned into 1 m sections on the trestles or in the wet lab. Alternatively, in severe conditions, barrels were taken into the wet lab and the liner was removed and sectioned there. Generally for 12 m deployments the complete barrel assembly was lifted inboard with the crane and placed on trestles. To avoid taped liner sections from splitting, the liners were pushed out with a spare piece of liner from the top. For most short cores (<6 m) the liner was removed from the barrel whilst outboard and handled manually by 4-6 persons. This improved turn-around time, particularly when stations were close together.

7.5.3. Overall performance

During JR244 a total of 161.8 m of sediment was recovered from 73 gravity corer stations. However, the core recoveries during JR244 were relatively low when compared to the good penetration depths of the corer, although two over-penetration recoveries (GC526, GC606) did occur. The recovery rate, i.e. the ratio between core recovery and penetration depth for the BAS gravity corer was on average 47.8% compared to 54.3-69.9% for similar gravity corer systems used on previous expeditions coring similar sediments (e.g. Duncan gravity corer from BAS used on JR104 [54.3%], Driscoll-type gravity corer from NMF used on JR179 [69.9%], Kiel-type gravity corer from AWI used on ANT-XXIII/4 [67.0%] and ANT-XXVI/3 [64.6%]) [*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*]. In an attempt to improve recovery, veer speed was varied at various sites (e.g., cores GC533/GC534), both 3m and 6m deployments attempted (e.g., cores GC585/GC586/GC588), and deployments with and without valves (e.g., cores GC531/GC532) or with and without bagged core catchers (e.g., cores GC541/GC543) were carried out. Unfortunately, none of these measures appeared to improve recovery. However, it was later discovered that at several sites in the southernmost Filchner Trough ice had built up inside the bomb, forming a plug, which prevented seawater from escaping during the penetration of the corer into the seabed which in turn probably prevented sediment from entering the liner. Because of this problem, the sites in the southernmost Filchner Trough were revisited resulting in improved recovery (cf. GC586 vs. GC597, GC581 vs GC600 and GC583 vs GC599 with improved recoveries from 0 m to 2.665 m, ~0.3 m to 2.095 m and 0.945 m to 2.115 m, respectively). To prevent the blockage of the bomb by ice or sediment, the bomb was regularly checked and any ice build up or mud was cleared before the corer was deployed.

The GC was typically veered into the seabed at 54 m/min, although slower (20, 25 and 40 m/min) and faster speeds (up to 84 m/min) were trialled at various stations. In areas of till some success was achieved by veering the corer in at faster speed (e.g., GC617 and GC620) although these latter speeds are not recommended as they caused a slight bending of the 3m-barrels. To further improve core recovery, one cutter nose was modified towards the end of the expedition, shortening the overall length and sharpening the cutter's edges. The new cutter nose was only used at six stations. The average recovery rate at these stations was 70.1%, but it remains unclear whether these modifications improved recovery.

7.5.4. Problems encountered

7.5.4.1. Bent barrels

Although generally very robust, we did slightly bend one 3 m barrel (core site GC578) and heavily bend one 6 m barrel (GC603). At core site GC578 the corer was veered at 83 m/min and this, in combination with potentially stiff sediment, probably caused the barrel to bend [*note: bending of 3m-barrels is unusual for gravity corers, but the current unavailability of high-quality steel at a reasonable price on the world market may have forced the use of cheaper steel of lower quality, when the barrels were manufactured*]. At core site GC603, the 6 m-long corer was deployed at 54m/min and penetrated ~3 m of stiff sandy sediment before the barrel was bent.

7.5.4.2. Cable tangles and bomb modifications

During routine deployment of the GC (GC555) the winch cable became wrapped around the bomb, a scenario that was identified by CDH as a potential problem on the trials cruise, but considered to be unlikely by J. Schilling. As a result, the bomb and corer surfaced at an angle of about 15 degrees from vertical. Previous experience has shown that rapid unwinding of the cable from its trapping point beneath the bomb can lead to a shock load on the cable, cable failure and loss of the corer (e.g. 15m Kiel-type gravity corer from AWI lost at station PS2818-1 on cruise ANT-XIV/3 in 1997). Careful handling and rapid transfer of the load from the winch to the crane prevented this from occurring. It was also noted that significant drift within sea ice during the deployment of the corer may have contributed to the cable becoming trapped. To prevent this occurring again, the base of the bomb fins was cut away to remove the cable-trapping surface. Furthermore, an increased awareness is required to ensure that either the cable remains vertical during deployment or, if this is not possible (as on station GC555), less wire is paid out after the initial penetration of the corer into the seafloor.

7.5.4.3. Unstable handling in rough seas

The deck crew expressed concerns that in rough seas the corer became unstable once it had been hoisted out of the water. Initially it was recommended that only >6 m deployments were to be undertaken in rough seas, since a longer barrel would remain stabilised by the water column for longer. However, through improvements in landing, using a combination of guiding ropes on the bomb and a sling around the barrels, no significant problems in landing the corer were encountered.

7.5.4.4. Cold weather handling

The cold air temperatures of the southern Weddell Sea caused the liner and/or cutter nose to freeze immediately in the barrel when the corer was hoisted out of the water. When this occurred, the whole barrel and liner was carried into the wet lab and dealt with inside.

7.5.4.5 Davit motor water ingress

At the end of the trials cruise it was discovered that water had leaked into the davit motor junction box, raising concern that water may also have entered the motor itself. On checking the specification it was found that the motor was only IP55-rated (moderate dust and rain shower protection). As a precaution a spare IP66-rated (the normal dust and water-tight security for electrical equipment used on deck) motor was ordered and sent to the Falkland Islands by commercial freight. When the equipment was mobilised it was found that the original davit motor had indeed sustained damage from water ingress, and the spare motor was installed and used throughout the cruise. The damaged motor may be repairable so that it can be kept as a spare.

7.5.4.6 Barrels not fitting well together

Minor modifications had been carried out on the barrel adapters during the trials cruise to ensure that any two barrels can be easily connected. A frequent problem encountered on cruise JR244, however, was that only 3-4 nails could be driven into the connected adapters of any two 6m-barrels during 12m deployments. Often the only solution to this problem was either to swap the barrels or to replace one of them.

7.6 Box corer

Claus-Dieter Hillenbrand, James A. Smith, Claire Allen, Vicky Peck, Dominic Hodgson

The BAS box corer (BC; box dimensions: 30 cm x 30 cm x 95.5-97.5 cm) was used during cruise JR244 to recover undisturbed surface sediments from the Antarctic continental shelf and the deep sea. The BC had been deployed on earlier cruises JR104, JR141 and JR179 (see related cruise reports), where it had proven to be a reliable corer. During cruise JR244 the BC was deployed at 41 sites and recovered a total of 8.7 meters of sediment. In general, the BC performance was satisfactory, but not as successful as during previous cruises.

The BC failed to recover any sediment at site BC606 and did not trigger at sites BC604 and BC611. At least in the latter case, the trigger mechanism had failed because the trigger hook was jammed by one of the two shackles due to an incorrect assembly. A common problem on cruise JR244 was the loss of sediment because the spades had not fully closed. In two instances (BC582, BC605) cobbles were jammed between the spades, while at two other deployments (BC612, BC622) large sponges trapped between the spades had prevented their closure. During seven deployments (BC561, BC574, BC576, BC580, BC584, BC589 and BC621) the spades had only partially closed because pebbly sediment or sticky diamicton trapped between one spade and the box had prevented their complete closure. This problem or a very hard seafloor surface may also explain the very low core recoveries (≤4 cm) at sites BC571, BC607, BC614, BC615 and BC623, where the spades may have fully closed only after the BC had become free of the seabed (i.e. during the hauling through the water column and after most of the sediment had already been lost). Another problem encountered during

JR244 (and during previous cruises) was that the BC occasionally fell over when reaching the seafloor. In that case, the recovered sediment surface was heavily inclined, but usually intact (e.g. at site BC587, Fig. 14). At all the other sites, however, the surface of the core was only slightly inclined or even, which documents the recovery of an undisturbed surface (e.g. at site BC562, Fig. 15).

The sampling of the BC during cruise JR244 was more difficult than during previous cruises. The height of the box and its small area make it difficult to access the sediment surface, in particular when the core recovery is low. The increased diameter of the gravity core liner is also less suitable for recovering sub cores from the box as they are too large to fit through the 'lid' without unlatching the top bracket and yield much less frictional/vacuum support to aid retention of sediments in the liner. An additional problem on cruise JR244 was the very cold air temperatures encountered north of the Filchner Ice Shelf. In order to prevent rapid freezing of the excessive seawater above the cored sediment, the water had to be drained quickly. 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 capped hollow pipe with drainage holes drilled across its axis in its top 30 cm. Once inserted through the gap between the spades the cap was removed and the water drained from the top of the core. Usually, this technique allowed the fast drainage of the excessive seawater with only a very minor disturbance of the sediment surface. However, this method proved to be unsuitable for draining the water above very soupy sediments (e.g. diatomaceous ooze recovered at site BC608), because it would have caused too much disturbance.

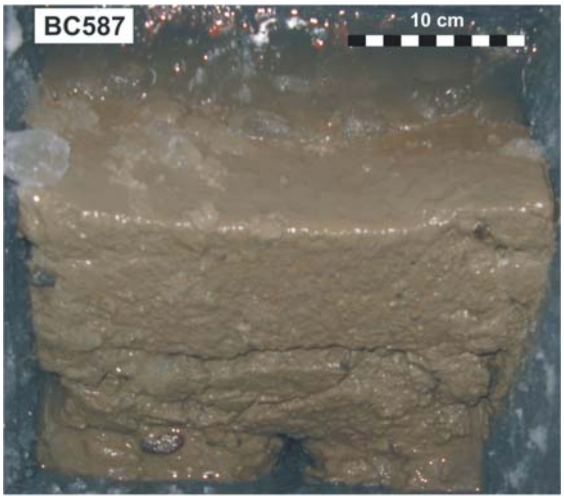


Figure. 14. Heavily inclined seafloor surface (lower part of the photo) in box core BC587. (Photo: C.-D. Hillenbrand)

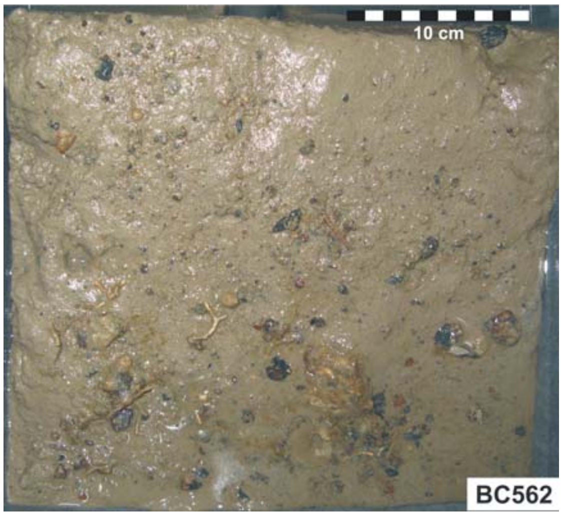


Figure 15. Undisturbed, slightly inclined seafloor surface in box core BC562. (Photo: J.A. Smith)

The following two techniques were applied to recover subcores from the box:

1) An empty liner segment was pushed into the sediment within the box and closed tightly with an end cap. Then the subcore was pulled out.

2) A liner segment was pushed into the BC and closed with an end cap. The spades were opened and the subcore was pushed downwards through the box. As soon as the base of the liner segment appeared below the box, it was closed with another end cap.

Both methods provided satisfactory results on cruise JR244, but were difficult to apply. In the long term, an improved technique for the recovery of subcores needs to be developed.

7.7 Cable Logging and Monitoring (CLAM) system

The CLAM system was used for monitoring the amount of wire out, hauling and veering rates and wire tension during gravity corer, box corer and CTD deployments. The system performed well throughout the cruise.

7.8 CTD performance

Vicky Peck and Claire Allen

A Conductivity-Temperature-Depth (CTD) unit and 24 bottle rosette was used to vertically profile the water column and collect water. Nineteen casts were carried out in total.

CTD positions are included in Appendix 2. Additional measurements on JR244 included a fluorometer, an oxygen sensor, a photosynthetically active radiation (PAR) sensor, a transmissometer and an altimeter. Water samples were collected in the 12 L capacity Niskin bottles at 6 m water depth on 4 of the deployments, when sea ice conditions were too heavy for the USS to be in operation.

7.8.1 Problems encountered

The initial deployment of CTD08 was abandoned after the pumps failed to start. It was determined that the water bottle annex door had been open too long prior to deployment, causing the CTD to freeze. The CTD was brought back on deck and defrosted before a successful redeployment.

7.9 Seismic reflection equipment

M. Ruhnau & J. Wagner

It had been envisaged that up to three days of reflection seismic data collection would take place on cruise JR244, but opportunities for collecting data were restricted by difficult sea ice conditions in the main working areas. Collection of data on three reflection seismic lines was attempted during the cruise but due to technical issues just two of them were shot.

A single GI-Gun, firing in true GI mode with generator and injector volumes of 45 and 105 in^3 respectively, producing a signal of 100 Hz main frequency, was used as the seismic source. It was towed from a position offset 1.5 m to starboard from the centre line at a distance of 20 m from the stern of the ship and at a depth of about 3 m. A 16-channel streamer with a channel spacing of 6.25 m, and thus an active section of 100 m, was used for recording the data. It was towed from a position offset 4 m to port from the centre line with the front of the first active section at a distance of 70 m from the stern of the ship.

For each line data have been stored in SEG-Y format with a sample interval of 1 ms and a record length of 4 s.

7.9.1 Seismic lines

Table 6. Seismic line start and end times and positions.

Line (BAS101-)	JD	Start			End		
		Time (UTC)	Latitude	Longitude	Time (UTC)	Latitude	Longitude
s115	**31**	**12:47**	**61° 04.90’ S**	**45° 00.38’ W**	**21:00**	**61° 35.86’ S**	**44° 21.07’ W**
s116	**61**	**16:30**	**76° 05.68’ S**	**27° 13.72’ W**	**17:53**	**76° 01.61’ S**	**26° 54.51’ W**

Line s115 was collected with a shot interval of 5 s and thus a shot spacing of approximately 12.5 m, resulting in a fold of coverage of about 4. The absence of sea-ice made deployment of the streamer's tail-buoy possible.

Due to problems with the trigger unit, line s116 was collected with a shot interval of 10 s and thus a shot spacing of approximately 25 m, resulting in a fold of coverage of about 2. As there were patches of sea-ice in the area where this line was shot, the streamer was operated without the tail-buoy but with a couple of shackles attached to its end as an extra weight to ensure a less risky deployment within sea-ice. As a result the appearance of the sea-surface ghost signal is more delayed than on line s115.

7.9.2 Onboard data processing

Onboard processing of the seismic data was done using Seismic Unix. Shell scripts, C- as well as FORTRAN-Codes that were created at the University of Bremen and subsequently modified at the University of Hamburg were used.

Static correction (15 ms due to time delay between trigger signal and actual valve response), bandpass filtering (10,20,200,300 Hz), georeferencing and binning (bin distance 6.25 m and bin radius 12.5 m) were carried out, followed by a brute stack and a simple migration in T-K domain, assuming a constant velocity of 1500 m/s throughout the whole section.

Finally the data was imported into the Kingdom Suite interpretation software and major structures such as horizons and faults were identified.

7.9.3 Problems encountered

The line that should have been shot as the second line had to be cancelled due to problems with the triggering of the gun. The SureShot trigger unit did not trigger the Generator and Injector synchronously, as the Generator shot with a delay of about 6 s after the Injector already triggered according to the selected aiming point. The trigger power box's light at the main switch should glow for just a short time during triggering, but actually it glows for the mentioned 6 s and does not trigger the Generator until this period has elapsed. As all the possible connections and valves have been tested and/or replaced by spare parts, the issue seems to be related to the SureShot. For line s116 a workaround was developed that enabled a proper triggering while shooting with intervals longer than the Generator's delay of 6 s. Shooting with two GI-Guns was simulated and the operating GI-Gun's Generator and Injector connections were plugged into channels 3 and 4 of the trigger power box. The lights on the power box still indicated that the problem was not solved, but the triggering worked properly apart from the fact that the GI-Gun's shot signal could not be observed on the screen. Therefore fixed parameters were chosen for the triggering time delay between Generator and Injector.

Throughout the whole scientific cruise setting up the LongShot backup trigger unit did not work in the desired way. It was not possible to get the gun shooting at a constant aiming point, as in manual mode even with a delay of 0 the signal would occur later than the desired aiming point, while in automatic mode the signal would be shifted to the line marking the end of the pulse window instead of the aiming point. This issue might be related to setup-parameters like the "peak look method" and will require further testing.

7.10 Oceanlogger

The Oceanlogger was used during the cruise to monitor changes in surface water properties that could affect sound propagation, and hence indicate when it might be necessary to change the SVP being used by the EM120 multibeam echo sounder.

The flow of uncontaminated sea water that is required by the Oceanlogger was frequently interrupted in the southern Weddell Sea when the filters became clogged by ice. The water properties logged on the SCS system and included in the General Science and EM120 weblogs during these periods are unreliable.

7.11 Magnetometers

Rob Larter

Two magnetometer systems were operated during the cruise:

7.11.1 SeaSpy Overhauser Magnetometer

The SeaSpy magnetometer was deployed over the port quarter, mainly on long passages between working areas. Data were logged to the SCS. No useful data were recorded during the first trail deployment on day 029. On inspection after the magnetometer had been recovered it was found that several of the brass screws that connect the nose cone and tail fin to the pressure case had sheared, allowing ingress of a small amount of water. As the screws sit outside the O-ring seals, the decision was taken to drill new screw holes and reassemble the instrument using stainless steel screws (no brass screws of the appropriate size were available on board).

The magnetometer was redeployed at 1715Z on day 030 and recovered at 2330Z the same day. Inspection of the data revealed that the new shipboard computing system was logging the wrong fields from the magnetometer data string. The signal strength measurement was being logged as the magnetic field value, while null values were being logged as signal strength. Jeremy Robst corrected the logging system code in a matter of minutes and the data logged subsequently showed typical long wavelength marine anomalies with low levels of noise.

Subsequent periods when the magnetometer was towed were between 1412Z on day 035 and 2228Z on day 037, and between 1228Z on day 065 and 2151Z on day 068.

7.11.2 Shipboard Three-Component Magnetometer (STCM)

The STCM was not switched on until day 039. For several years the STCM has been operated continuously, so it did not occur to anyone that it might have been switched off, until a check that the z-component measurement had not reached the limit of its range revealed that the system was not powered up. The STCM was operated continuously from day 039 until the end of the cruise. There is still no data feed from the STCM to the SCS, so data had to be downloaded separately from the PC that controls the system.

On day 052 it was noticed that the z-component measurement had reached its upper limit. On day 053 Mark Preston adjusted the position of magnets in the sensor case to shift the z-conponent reading into the measurable range.

STCM calibration turns were carried out between 1903Z and 2007Z on day 065, near 69° 15' S, 28° 30' W.

7.12 Navigation Systems

Rob Larter

7.12.1 Seapath System

This combined GPS and motion reference unit provides navigational data for the Kongsberg EM120 multibeam and TOPAS sub-bottom profiler systems. In some previous seasons differential corrections were obtained from a Racal Skyfix unit via an Inmarsat feed and applied in real time by the GPS receiver. However, the subscription to the Skyfix service has been discontinued, so differential GPS data were not available during this cruise. Data from this unit were logged onto both the Kongsberg EM120 system and the NOAA Scientific Computing System (SCS), and were also used for geometry input in processing the seismic reflection data collected during the cruise.

The Seatex GPS receiver, which is a component of the Seapath system, hung up at 0235Z on day 064. It was rebooted and started generating positional data again at 0326Z. Fortunately the ship was on station for coring from 0251Z, so the consequences for collection of underway data were limited. The cause of this failure has not been determined.

7.12.2 Furuno GP-32 GPS Receiver

This GPS receiver is located on the Bridge and used primarily by the deck officers. The position fixes from the unit were logged to the NOAA SCS.

7.12.3 Ashtech GG24 GPS/GLONASS Receiver

This was operated throughout the cruise and position fixes calculated by this system were logged to the NOAA SCS.

7.12.4 Ashtech G12 GPS System

This dual redundant GPS unit is used by the ship's dynamic positioning system.

7.12.5 Ashtech GDU-5 3D GPS and TSS300 Systems

These instruments provide heading, pitch, roll and heave information. Data from both systems were logged to the NOAA SCS. The 3D GPS system regularly (approx. every 5 days) stopped outputting heading information and required power cycling (see ICT report, section 8).

7.12.6 Sonardyne Ultra-Short Baseline (USBL) Acoustic Navigation System

We planned to use the USBL system to provide information on the position of the grapnel if any dragging was done to try to recover moorings that failed to release. In the event no dragging was attempted since ice conditions were difficult, one of the moorings that did not release could survive for several more years, and no evidence could be found that another was still present.

A 4000 m-rated USBL beacon was mounted on the CTD frame during deployment of CTD006 on day 042 for a trial of the system. The beacon was lost. The reason for this loss is suspected to be that the padding material used to cushion pressure from the brackets enclosing the beacon was more compressible than had been expected. The mounting brackets used for this deployment were ones designed for a standard 10 kHz pinger. Bespoke mounting brackets for the USBL beacons were subsequently located in the cage in the scientific hold, but no-one in the scientific party on board had known that these brackets existed.

7.13 NOAA Shipboard Computing System

Since the summer of 2000, the main shipboard data logging system on *JCR* has been a Windows-based system provided by the U.S. National Oceanic and Atmospheric Administration (NOAA), called the Scientific Computer System (SCS). The SCS program allows data to be logged centrally on a server featuring RAID disk tolerance. Time stamping of data is achieved by synchronising to a GPS receiver. The SCS is also a NTP server which allows other machines onboard to synchronise their time.

Data on the SCS system is stored in two formats:

RAW data written to disk in exactly the same format it was sent from the instrument.

ACO ASCII Comma Delimited, data is stored in plain ASCII text.

Once the data has been logged to disk the ACO files are exported to the Level C of the former ABC data logging system using NFS. A process on the Level C reads the data in and writes to the Level C database. The Level C continues to be used to allow scientists to use existing routines to extract data.

The following data streams were logged to the SCS during JR224:

Stream name	Data Source
gps_glos	Ashtech GG24 GPS/GLONASS Receiver
gps_ash	Ashtech 3D GPS
gps_nmea	Furuno GP-32 GPS Receiver
anemom	Anemometer
tsshrp	TSS300 heave, roll and pitch sensor
oceanlog	Oceanlogger
em_log	Chernikeeff Aquaprobe Mk5 electromagnetic speed log
dop_log	Sperry doppler speed log (water speed)
sim500	Kongsberg Simrad EA600 single-beam echo sounder (12 kHz)
em120	Kongsberg Simrad EM120 multibeam echo sounder (12 kHz)
winch	Cable Logging and Monitoring (CLAM) System
seatex	Seapath combined differential GPS and motion reference unit
seaspy	SeaSpy towed Overhauser magnetometer
gyro	Gyro

8. ICT and AME reports

8.1 ICT Report

Jeremy Robst

Table 7. JR244 Data Logging Events

Time (GMT)	Event
2011/01/19 01:13:48	Start of new leg 20011019
2011/02/26 ~18:25 – ~18:45	Ship brownout, SCS server stayed up on UPS, central servers (jrlb, jrna) rebooted. UIC (Oceanlogger, EM120, TOPAS) lost power.
2011/02/26 19:11:13 – 19:11:47	No logging of any underway data - SCS software restarted after ship brownout in an attempt to restore backup logging drive.
2011/02/26 19:13:38 – 19:16:38	No logging of any underway data – SCS server rebooted to restore backup logging drive.
2011/02/27 11:58:21 – 12:11:13	Ship brownout. SCS server stayed up on UPS, central servers also stayed up on UPS. UIC (Oceanlogger, EM120, TOPAS) lost power.
2011/03/01 12:20:28 – 12:30:20	Ship brownout. SCS server stayed up on UPS, central servers (jrlb, jrna) rebooted. UIC (Oceanlogger, EM120, TOPAS) lost power.
2011/03/01 12:51::26 – 12:56:30	No logging of any underway data – SCS server rebooted to restore backup logging drive.
2011/03/05 02:35:00 – 03:26	Seatex GPS giving out invalid positions, was rebooted to restore correct GPS information.
2011/03/16	Leg 20110119 finished, new leg 20110316 started.

8.1.1 SCS / Underway data streams

The SCS performed without any major problems. It had a sufficient UPS to keep it running during the 3 brownouts (the longest of which was approximately 20 minutes). However after the 2 brownouts where the Samba server (JRLB) rebooted, the SCS server needed a reboot to ensure the SCS software correctly wrote data to the backup U: drive.

The underway data loggers also performed without problems, apart from the Ashtech GDU-5 GPS which required rebooting approximately every 5 days to restore the heading information. It also often reported an incorrect heading of +/-999 degrees. AME have been informed with the suggestion the unit is replaced.

The Seatex GPS also stopped producing a valid GPS fix at one point, as shown in the table above. Since this GPS is used as the main or only input to several systems it needs to be monitored and the problem resolved if it occurs again.

8.1.2 EM120 / TOPAS

The EM120 and TOPAS were used heavily on the cruise. The EM120 DSP required restarting several times (more information in the EM120 report, section 7.1), though the EM120 computer and software operated normally.

8.1.3 ADCP

The ADCP was not used during the cruise.

8.1.4 EK60

The EK60 was used for a brief period (see section 7.4 for details) and worked without problems.

8.1.5 XBT

The XBT machine was not used during the cruise.

8.1.6 CTD

The CTD machine was used several times without problems, except for one occasion when the pumps failed to start in very cold temperatures (see section 7.8).

8.1.7 Netware

The main Netware server (JRNA) ran without problems during the cruise.

8.1.8 Unix

There were no major problems with the central unix server (JRLB) or the unix workstations.

8.1.9 ESX servers / UPS

During 2 of the ship brownouts the ESX servers rebooted, though the exact cause it not known – during the other brownout the ESX servers stayed running throughout. It appears there is enough UPS battery life to sustain the servers for at least 30 minutes, and the brownouts lasted no more than 20 minutes.

The systems don’t cleanly restart after a reboot – DNS on JRLA starts but needs restarting before it responds correctly and this prevents a lot of the other servers from starting up correctly. However there is a planned upgrade in the summer, which should resolve this.

8.2 AME Report

Cruise:JR244 Start date: 22/01/2011 Finish date: 15/03/2011

Name of AME engineer: Mark Preston
Name of principle scientist (PSO): Rob Larter

Instrument	Used ?	Comments
XBT (aft UIC) (PC, I/F box, handgun)		
Scintillation counter (prep lab)		
AutoSal (labs on upper deck) S/N 68959		
AutoSal (labs on upper deck) S/N 65763		
AutoSal (labs on upper deck) S/N 68533		
Portasal S/N 68164		
Magnetometer STCM1 (aft UIC)	Y	Magnet on sensor had to be moved as sensor o o range at southerly latitudes
AME workshop PC	Y	Cordless keyboard died.

GPS, MRU, Gyro

GPS Furuno GP32 (bridge – port side)	Y	
DGPS Ashtec ADU5 (bridge – port side)	Y	
DGPS, MRU Seatex Seapath (UIC – swath suite)	Y	
DGPS Ashtec Glonass GG24 (bridge – starboard side)	Y	
Gyro synchro to RS232 Navitron NT925HDI (UIC – aft)	Y	
TSS HRP (UIC repeater)	Y	

ACOUSTIC

Instrument	Used ?	Comments
ADCP (aft UIC)		
PES (aft UIC)		
EM120 (for'd UIC)	Y	Monitor needs replacing with dual input for Bridge Display? Early in the cruise it was noticed that the light on the remote power on/off switch was flashing (circa 1Hz) Investigation in tween deck located an electrical buzz/click at the same rate. Sounded like a SMPSU going into over current. Powered whole system down immediately. On power up problem not present. Didn't re-occur all trip.
TOPAS (for'd UIC)	Y	
EPC plotter (used with TOPAS)	Y	
EK60 (mid UIC)	Y	
HP deskjet 1 (used with EK)		
HP deskjet 2 (used with EK)		
SSU (for'd UIC)	Y	
SVP S/N3298 (cage when unused)		
SVP S/N3314 (cage when unused)		
10kHz IOS pinger		
Benthos 12kHz pinger S/N 1316 + bracket		
Benthos 12kHz pinger S/N 1317 + bracket		
MORS 10kHz transponder		
Sonardyne USBL (aft UIC)	Y	
Sonardyne 7970 SSM Beacon Tape room (blue case)		
Sonardyne 7971 SSM Beacon Cupboard 709 (by PES)		
Sonardyne 7970 SSM Beacon Taperoom (Blue Case)	Y	Beacon lost on trial deployment.

OCEANLOGGER

Instrument	Used ?	Comments
Main logging PC hardware and software	Y	
Barometer (back of logger rack) #V145002 (7/03)	Y	
Barometer #V145003 (7/03)	Y	
Barometer #Y2610005		
Barometer #W4620001		
Air humidity & temp (for'd mast) #15619015	Y	Faulty
Air humidity & temp #60000120	Y	It has been reported that the secondary sensors have also displayed -40C on occasions.
Air humidity & temp #28552023 (HT1, 7/03)		
Air humidity & temp #18109036 (HT2, 7/03)		Please note that I have not been up the mast and cannot confirm that these serial # are correct
Thermosalinograph SBE45 (prep lab) #4524698-0016	Y	
Thermosalinograph SBE45 # 4532920-0072		
Thermosalinograph SBE45 #4524698-0018 (7/04)		
Fluorometer (prep lab)	Y	
TIR sensor (pyranometer) (for'd mast) #990684	Y	
TIR sensor #32374 (TIR1, 7/03)		
TIR sensor #990685		
TIR sensor #011403 (TIR2, 7/03)		
PAR sensor (for'd mast) #990069	Y	
PAR sensor #990070		
PAR sensor #30335 (PAR1, 7/03)		
PAR sensor # 010224 (PAR2, 7/03)		

OCEAN LOGGER Continued

Flow meter (prep room) #45/59462	Y	

Uncontaminated seawater temp (transducer space)	Y	

CTD (all kept in cage/ sci hold when not in use)

Instrument	**Used ?**	**Comments**
Deck unit 1 SBE11plus S/N 11P15759-0458		
Deck unit 2 SBE11plus S/N 11P20391-0502	Y	
Underwater unit SBE9plus #09P15759-0480 Press #67241		
Underwater unit SBE9plus #09P20391-0541 Press #75429		
Underwater unit SBE9plus #09P30856-0707 Press #89973	Y	
Underwater unit SBE9plus #09P35716-0771 Press #93686		
Carousel & pylon SBE32 #3215759-0173		
Carousel & pylon SBE32 #0248		
Carousel & pylon 24 Bottle	Y	
CTD swivel linkage	Y	
CTD swivel S/N196115		
CTD swivel S/N196111	Y	

CTD contd – C & T & pumps – please state which primary and secondary

Temp sensor SBE3plus #03P5042		
Temp sensor SBE3plus #03P5043		
Temp sensor SBE3plus #03P2307		
Temp sensor SBE3plus #03P4472		
Temp sensor SBE3plus #03P2705		
Temp sensor SBE3plus #03P2709		
Temp sensor SBE3plus #03P4235	Y	sec
Temp sensor SBE3plus #03P4302	Y	pri
Cond sensor SBE4C #043491		
Cond sensor SBE4C #043488		
Cond sensor SBE4C #042222		
Cond sensor SBE4C #042248	Y	pri
Cond sensor SBE4C #042255		
Cond sensor SBE4C #041913		
Cond sensor SBE4C #042813	Y	sec
Cond sensor SBE4C #042875		
Pump SBE5T # 54488		
Pump SBE5T # 51813		
Pump SBE5T # 52371	Y	pri
Pump SBE5T # 52395	Y	sec
Pump SBE5T # 52400		
Pump SBE5T # 53415		

CTD contd

Instrument	Used ?	Comments
Fluorometer Aquatracka MkIII #088216	Y	
Fluorometer Aquatracka MkIII #088249		
Standards Thermometer SBE35 #3515759-0005		
Standards Thermometer SBE35 # 3527735-0024		
Standards Thermometer SBE35 # 51	Y	
Altimeter PA200 #163162		
Altimeter PA200 #27002	Y	
Transmissometer C-Star #CST-396DR		
Transmissometer C-Star #CST-527DR	Y	
Transmissometer C-Star CST 846DR		
Oxygen sensor SBE43 #0242		
Oxygen sensor SBE43 #0245		
Oxygen sensor SBE43 #0620		
Oxygen sensor SBE43 #0676	Y	
PAR sensor #7235		
PAR sensor #7252	Y	
PAR sensor #7274		
PAR sensor #7275		

Notes on any other part of CTD e.g. faulty cables, wire drum slip ring, bottles, swivel, frame, tubing etc.		See additional notes.

AME UNSUPPORTED INSTRUMENTS BUT LOGGED

Instrument	Used ?	Comments
EA600 (bridge and UIC remote)	Y	
Anemometer	Y	
Gyro	Y	
DopplerLog	Y	
EMLog		
CLAM winch monitoring system	Y	see additional notes

Intake fan cleaning:

Instrument	Cleaned?
Oceanlogger	Y
EM120, TOPAS, NEPTUNE UPSs	N
Seatex Seapath	Y
Topas tweendeck	Y
EM120 Tween deck	Y

Additional notes and recommendations for change / future work

Sea spy magnetometer was not in a good state at the start of the cruise, it should be returned to the manufacturer for service

9. Acknowledgements

We thank Captain Chapman, the officers and crew of the RRS *James Clark Ross* for helping to make this a successful and enjoyable cruise. Once again, the quality of support for the scientific programme from all of the ship's company was second-to-none. We are grateful to Captain Chapman for indulging our ambition to work in areas renowned for persistent ice cover. Charlie Waddicor succeeded in maintaining our communication links to the outside world despite the fact that the satellite BAS uses for internet communications was very low on the horizon for much of the cruise. The Engineers enabled the cruise to get underway in the first place after intensive work on the main shaft and bow thruster in Stanley. Later during the cruise they managed to restore power quickly after each of a series of "brown outs", and succeeded in tracing the cause of these events.

We thank Hamish and the Galley crew for keeping everyone well fed, adapting to our shift system, and helping to make several birthdays and other significant events special.

The deck crew and John Summers applied expert seamanship to the deployment and recovery of the corers, the CTD and seismic equipment, sometimes in very unpleasant conditions.

Simon Wright ensured that compressed air was available when we needed it for seismic work and fought the ice in the uncontaminated sea water supply filters to restore its flow whenever we emerged into open water. Simon also produced excellent certificates for the crossing of the Antarctic Circle.

We thank the BAS technicians for working flexibly to enable the scientific programme to run smoothly and for responding quickly when called outside their regular working hours.

Thanks are also due to many in the BAS Operations, Logistics and Personnel Sections, and to Pauline in the Stanley office, for arranging for people and equipment to be in the right places at the right time and making sure all of the scientific party were well prepared.

10. Acronyms

ADCP	Acoustic Doppler Current Profiler
AME	BAS Antarctic Marine Engineering Section
AWI	Alfred Wegener Institute for Marine and Polar Research, Germany
BAS	British Antarctic Survey
BC	Box corer
CC	Core catcher
CLAM	Cable Logging and Monitoring system
CTD	Conductivity-Temperature-Depth
ETS	BAS Engineering Technology Section
FIPASS	Falklands Interim Port And Storage System
GC	Gravity corer
GPS	Global Positioning System
GZW	Grounding zone wedge
ICT	BAS Information and Computing Technology Section
IRD	Ice-rafted debris
JCR	RRS *James Clark Ross*
LGM	Last Glacial Maximum
MSGL	Mega-Scale Glacial Lineations
NMF	National Marine Facilities
NOAA	U.S. National Oceanic and Atmospheric Administration
NOCS	National Oceanography Centre, Southampton
SCS	Shipboard Computing System
SSU	Simrad Sequencing Unit
STCM	Shipboard Three-Component Magnetometer
SVP	Sound Velocity Profile
TOPAS	TOpographic PArametric Sonar
TVG	Time variable gain
UIC	Underway Instrumentation and Control room
USBL	Ultra-short baseline acoustic navigation system
USS	Uncontaminated seawater supply
WAIS	West Antarctic Ice Sheet
XBT	Expendable Bathythermograph

11. Recommendations

1. The new large-diameter gravity corer proved its worth. The fact that there is presently no spare core headstock ("bomb") represents a significant risk to the success of future coring cruises, so consideration should be given to purchasing one. Consideration should also be given to installing an additional mounting point further aft for the davit and extending the length of the cradle, so that it is possible to deploy the corer with a greater length of barrels.

2. During the first part of this cruise it was discovered that the EM120 roll and pitch calibration settings were incorrect. These calibrations should be carried out at least annually and should be given a high priority whenever time is allocated for scientific trials activities. About five hours ship time is required in areas with suitable sea-floor topography (flat for roll calibration and a steep slope or step for pitch calibration).

3. The TOPAS EPC plotter does not reproduce the quality of image shown in the PROC trace window on the workstation. Higher quality real-time plotting devices must be available. The TOPAS shipboard monitor is a vital aid in selecting core sites, so the quality of the image is important.

4. A more reliable system for providing annotation messages to the TOPAS plotter is needed. The annotations sometimes stopped without warning and the only way we could find to restart them was to reboot the ancient Windows98-based laptop that feeds them to the plotter. It would also be helpful if there were a simple way of synchronising the annotations with the time lines that are marked on the record every 5 minutes.

5. The SeaSpy Overhauser magnetometer needs to be returned to Cambridge so that the sheared-off tips of the brass screws that secured the nose cone and tail fin to the pressure casing can be removed from the threaded holes. Alternatively, new threaded holes need to be created. The manufacturers of the magnetometer must be asked to justify why brass screws are used. If stainless steel screws are not an acceptable alternative, several dozen of the right size of brass screws should to be obtained and the screws holding the magnetometer together should be replaced after each season.

6. Planning discussions between the Bridge and scientists watching the EM120 and TOPAS systems would be greatly facilitated if a repeater screen from the Microplot system could be located in the forward part of the UIC room.

7. The mounting brackets for USBL beacons should be stored with the beacons.

Appendix 1. Bridge Science Log

Time	Event	Lat	Lon	Comment
12/03/2011 11:30	Eagle/Beak Isle SWATH	-63.65865	-57.34367	Finish swath survey FAOP to Stanley
12/03/2011 10:55	Eagle/Beak Isle SWATH	-63.63811	-57.33329	Turning to port to run westward
12/03/2011 10:44	Eagle/Beak Isle SWATH	-63.64765	-57.34494	Making round turn to port to run up south western edge of Beak Island
12/03/2011 10:32	Eagle/Beak Isle SWATH	-63.64017	-57.34658	Turning to starboard to fill in south western part of Beak Island
12/03/2011 10:09	Eagle/Beak Isle SWATH	-63.661	-57.40394	Turning to port to commence fourth line (towards the east)
12/03/2011 09:46	Eagle/Beak Isle SWATH	-63.64582	-57.34625	Turning to port to commence third line (towards the west)
12/03/2011 09:26	Eagle/Beak Isle SWATH	-63.6638	-57.40105	Turning to starboard to commence the second line (towards the east)
12/03/2011 09:10	Eagle/Beak Isle SWATH	-63.64811	-57.33458	Commenced first line along 237
12/03/2011 00:24		-63.56822	-57.28954	Vessel off D.P
12/03/2011 00:15	CTD 20	-63.56818	-57.28953	CTD on deck
11/03/2011 23:54	CTD 20	-63.56821	-57.28952	CTD at depth. Wire out 1040m. Commenced recovery
11/03/2011 23:36	CTD 20	-63.56819	-57.28951	CTD veering to near bottom. EA 600 depth 1079m
11/03/2011 23:34	CTD 20	-63.56817	-57.28954	CTD deployed and soaking
11/03/2011 23:30	CTD 20	-63.56819	-57.28954	Commence deploying CTD
11/03/2011 22:56	BC 40	-63.5682	-57.28953	Box Corer on deck
11/03/2011 22:55	BC 40	-63.5682	-57.28953	Box Corer at the surface
11/03/2011 22:38	BC 40	-63.5682	-57.28954	Commenced recovery
11/03/2011 22:37	BC 40	-63.5682	-57.28954	Box corer on the seabed wire out 1054m
11/03/2011 22:19	BC 40	-63.56827	-57.29029	Box Corer deployed
11/03/2011 22:18	BC 40	-63.56828	-57.29046	Box Core off the deck
11/03/2011 21:41	Core 69	-63.56762	-57.29452	Corer lifted to deck level
11/03/2011 21:38	Core 69	-63.5677	-57.29369	Corer transferred back to corer gantry
11/03/2011 21:35	Core 69	-63.56783	-57.29276	Corer at the surface
11/03/2011 21:21	Core 69	-63.56829	-57.28945	Corer clear of the seabed. Moving vessel clear of ice
11/03/2011 21:19	Core 69	-63.56829	-57.28944	Commenced recovery. Break out tension 4.0 tonnes
11/03/2011 21:18	Core 69	-63.56829	-57.28944	Corer on the seabed wire out 1059m
11/03/2011 20:58	Core 69	-63.56825	-57.28945	Corer transferred to core warp. Commenced veering. EA600 water depth 1049m
11/03/2011 20:54	Core 69	-63.56825	-57.28944	Commenced corer deployment
11/03/2011 20:36	Core 69	-63.56822	-57.28947	Vessel on station
11/03/2011 20:11	Core 69	-63.56875	-57.29275	Requested to back vessel up along station approach line to find better seabed conditions
11/03/2011 20:09	Core 69	-63.56883	-57.2926	Vessel set up on station in DP
11/03/2011 17:52		-63.7457	-57.45331	Cease passage. Vessel proceeding into Duse Bay whilst surveying
10/03/2011 18:54		-63.84687	-57.98992	Vessel stopped on D.P
10/03/2011 16:15		-63.75116	-57.84958	Waiting on weather for field party. Commence surveying
09/03/2011 21:56		-64.09527	-51.95428	Maggy recovered to deck. Increasing to passage speed
09/03/2011 21:51		-64.09678	-51.93386	Commenced Maggy recovery
09/03/2011 21:49		-64.0975	-51.92219	Commenced reducing speed to 5kts for maggy recovery
06/03/2011 20:06	STCM calib.	-69.25255	-28.51491	Completed STCM calibration. Resuming passage.
06/03/2011 19:36	STCM calib	-69.25428	-28.51522	Completed round turn to starboard. Commencing round turn to port

Time	Event	Lat	Lon	Comment
06/03/2011 19:03	STCM calib.	-69.26221	-28.49875	Commenced STCM calibration. Turning to starboard.
06/03/2011 12:12		-69.97859	-27.52491	Maggy Deployed and on passage
05/03/2011 05:18		-74.58447	-25.91264	End of science. Vessel proceeding to James Ross Island
05/03/2011 03:42		-74.68458	-25.58941	Gantry and deck all secure. Vessel off D.P proceeding with survey
05/03/2011 03:22	Core 68	-74.68376	-25.58187	Corer in the cradle and lifted horizontal clear of the water
05/03/2011 03:19	Core 68	-74.68376	-25.58184	Weight transferred from core wire to the crane
05/03/2011 03:18	Core 68	-74.68379	-25.58186	Corer at the surface
05/03/2011 03:07	Core 68	-74.68376	-25.5818	Corer on the seabed Wire out 597m hauling
05/03/2011 02:55	Core 68	-74.68379	-25.58179	Corer deployed Veering EA 600 depth 597m
05/03/2011 02:54	Core 68	-74.68378	-25.58184	Commence deploying corer
05/03/2011 02:52		-74.68378	-25.5818	Vessel on D.P for coreing
05/03/2011 02:51		-74.68382	-25.58184	Vessel in DP
05/03/2011 00:00		-74.81184	-25.47673	Vessel off D.P
04/03/2011 23:56	Core 67	-74.81181	-25.47568	Corer on board
04/03/2011 23:51	Core 67	-74.8118	-25.47569	Corer at the surface
04/03/2011 23:42	Core 67	-74.81181	-25.47567	Corer clear of the seabed
04/03/2011 23:41	Core 67	-74.81181	-25.47566	Corer on the seabed wire out 637m
04/03/2011 23:28	Core 67	-74.81181	-25.47572	Corer deployed Veering EA 600 depth 648m
04/03/2011 23:26	Core 67	-74.81182	-25.47569	Commence deploying corer
04/03/2011 23:18	Core 67	-74.81251	-25.47796	Vessel in DP
04/03/2011 20:24	Core 66	-74.99166	-25.46364	Vessel off D.P proceeding with survey
04/03/2011 20:12	Core 66	-74.99167	-25.46364	Corer lifted to deck level.
04/03/2011 20:10	Core 66	-74.99167	-25.46363	Corer transferred back to corer gantry
04/03/2011 20:06	Core 66	-74.99166	-25.4636	Corer at the surface
04/03/2011 19:58	Core 66	-74.99166	-25.46361	Commenced recovery. Break out tension 2.25 tonnes
04/03/2011 19:57	Core 66	-74.99167	-25.4636	Corer on the seabed wire out 503m
04/03/2011 19:47	Core 66	-74.99169	-25.46379	Corer transferred to core warp. Commenced veering. EA600 water depth 494m.
04/03/2011 19:43	Core 66	-74.99173	-25.46438	Vessel on station in DP. Commenced corer deployment.
04/03/2011 18:50		-75.00695	-25.45198	Gantry and deck all secure. Vessel off D.P proceeding to core site
04/03/2011 18:33	Core 65	-75.007	-25.4495	Corer in the cradle and lifted horizontal clear of the water
04/03/2011 18:29	Core 65	-75.007	-25.44948	Weight transferred from core wire to the crane
04/03/2011 18:28	Core 65	-75.00702	-25.44954	Corer at the surface
04/03/2011 18:20	Core 65	-75.00701	-25.44949	Corer on the seabed Wire out 512m hauling
04/03/2011 18:10	Core 65	-75.00701	-25.4495	Corer deployed Veering EA 600 depth 512m
04/03/2011 18:09	Core 65	-75.00701	-25.44949	Weight transferred from crane to core wire
04/03/2011 18:05	Core 65	-75.00701	-25.44952	Commence deploying corer
04/03/2011 17:57		-75.00708	-25.44949	Vessel on D.P for coreing
04/03/2011 14:54		-75.12757	-26.69061	Vessel off D.P
04/03/2011 14:40	Core 64	-75.10556	-26.65709	Corer on board
04/03/2011 14:36	Core 64	-75.10557	-26.65709	Corer at the surface
04/03/2011 14:31	Core 64	-75.10557	-26.65708	Corer clear of the seabed
04/03/2011 14:30	Core 64	-75.10557	-26.65709	Corer on the seabed Wire out 316m
04/03/2011 14:22	Core 64	-75.10557	-26.65709	Corer deployed Veering EA 600 depth 324m
04/03/2011 14:20	Core 64	-75.10556	-26.65709	Commence deploying corer
04/03/2011 14:15		-75.10554	-26.65758	Vessel on D.P
04/03/2011 13:54		-75.12757	-26.69061	Vessel off D.P proceeding to next site
04/03/2011 13:44	Core 63	-75.12759	-26.69218	Corer on board
04/03/2011 13:43	Core 63	-75.1276	-26.69217	Corer at the surface
04/03/2011 13:39	Core 63	-75.12759	-26.69219	Corer clear of the seabed
04/03/2011 13:37	Core 63	-75.12759	-26.69221	Corer on the seabed wire out 267m
04/03/2011 13:32	Core 63	-75.12759	-26.69221	Corer deployed Veering EA 600 depth 264m
04/03/2011 13:29	Core 63	-75.12759	-26.69218	Commence deploying corer
04/03/2011 12:56	Core 62	-75.12375	-26.69216	Corer on board
04/03/2011 12:50	Core 62	-75.12374	-26.69219	Corer at the surface
04/03/2011 12:46	Core 62	-75.12374	-26.69218	Corer clear of the seabed
04/03/2011 12:45	Core 62	-75.12374	-26.69217	Corer on the seabed wire out 257m
04/03/2011 12:39	Core 62	-75.12373	-26.69218	Corer deployed Veering EA 600 depth 269m
04/03/2011 12:35	Core 62	-75.12373	-26.69221	Commence deploying corer

Time	Event	Lat	Lon	Comment
04/03/2011 12:20		-75.12174	-26.69968	Vessel on D.P
02/03/2011 18:23		-76.02176	-26.8555	Vessel off D.P proceeding with survey
02/03/2011 18:21		-76.02176	-26.8555	Deck all secure
02/03/2011 18:11		-76.02192	-26.86024	Vessel on D.P
02/03/2011 18:06	Seis 03	-76.02335	-26.87554	Streamer recovered on deck
02/03/2011 18:03	Seis 03	-76.02407	-26.88406	Commence recovery of streamer
02/03/2011 18:00	Seis 03	-76.02447	-26.89073	Air gun recovered on deck
02/03/2011 17:57	Seis 03	-76.02535	-26.89766	Commence recovery of the air gun speed 2.5Kts
02/03/2011 17:53	Seis 03	-76.02687	-26.90873	Reduce speed fro recovery
02/03/2011 16:33	Seis 03	-76.09249	-27.21827	Seis equipment confirmed to be working
02/03/2011 16:14	Seis 03	-76.10797	-27.29375	Air gun confirmed to be firing
02/03/2011 16:07	Seis 03	-76.11308	-27.31791	Air gun fully deployed both air gun and streamer secure. Increasing speed to 4.5Kts
02/03/2011 16:05	Seis 03	-76.11404	-27.32167	Streamer fully deployed approx 150m. Commence deploying air gun
02/03/2011 15:57	Seis 03	-76.11806	-27.33879	Commence deployment of the streamer Hdg 051 C.O.G 045 STW 3.2Kts S.O.G 2.6Kts
02/03/2011 15:54		-76.11958	-27.34775	Vessel completed turn heading 055 for Seis run
02/03/2011 15:50		-76.11606	-27.35554	Vessel turning to port to head N.E for Seis run.
02/03/2011 14:37		-76.05848	-27.06177	Vessel off D.P
02/03/2011 14:17	Core 61	-76.05847	-27.06175	Corer on board
02/03/2011 14:15	Core 61	-76.05848	-27.06175	Corer at the surface
02/03/2011 14:08	Core 61	-76.05848	-27.06176	Corer on the seabed wire out 477m
02/03/2011 13:58	Core 61	-76.05847	-27.06177	Corer deployed Veering EA 600 depth 490m
02/03/2011 13:55	Core 61	-76.05849	-27.06175	Commence deploying corer
02/03/2011 13:51		-76.05849	-27.06176	Vessel on D.P
02/03/2011 13:10		-76.02869	-26.91369	Vessel off D.P proceeding to next site
02/03/2011 12:51	Core 60	-76.02868	-26.91369	Corer on Board
02/03/2011 12:49	Core 60	-76.02868	-26.91369	Corer at the surface
02/03/2011 12:39	Core 60	-76.02866	-26.91363	Corer clear of the seabed
02/03/2011 12:38	Core 60	-76.02868	-26.91367	Corer on the seabed Wire out 584m hauling
02/03/2011 12:26	Core 60	-76.02869	-26.9137	Corer deployed Veering EA 600 depth 596m
02/03/2011 12:22	Core 60	-76.02868	-26.91372	Commence deploying corer
02/03/2011 12:16	BC 39	-76.02869	-26.91366	BCr on deck.
02/03/2011 12:15	BC 39	-76.02869	-26.91367	BCr at the surface
02/03/2011 12:06	BC 39	-76.02871	-26.91366	BC clear of the seabed
02/03/2011 12:05	BC 39	-76.0287	26.91368	Corer on the seabed Wire out 580m
02/03/2011 11:58	BC 39	-76.02873	-26.91367	BCr deployed veering EA 600 depth 596m
02/03/2011 11:56	BC 39	-76.02875	-26.91356	BCr off the deck
02/03/2011 11:35		-76.02873	-26.91355	Vessel on D.P
02/03/2011 03:30		-76.04066	-27.08543	Resume science proceeding with survey
01/03/2011 15:30		-76.04915	-27.15401	Gantry and deck all secure vessel proceeding to Halley
01/03/2011 15:26	CTD 19	-76.04915	-27.15405	CTD recovered on deck
01/03/2011 15:25	CTD 19	-76.04914	-27.15406	CTD at the surface
01/03/2011 15:14	CTD 19	-76.04916	-27.15407	Wire out 563m commence hauling
01/03/2011 15:02	CTD 19	-76.04915	-27.15404	CTD veering to near bottom EA 600 depth 593m
01/03/2011 14:59	CTD 19	-76.04914	-27.15406	CTD Soaking
01/03/2011 14:58	CTD 19	-76.04915	-27.15405	Commence deploying CTD
01/03/2011 14:42	BC 38	-76.04915	-27.1541	BCr on deck.
01/03/2011 14:41	BC 38	-76.04916	-27.15407	BCr at the surface
01/03/2011 14:33	BC 38	-76.04917	-27.15405	BC clear of the seabed
01/03/2011 14:31	BC 38	-76.04917	-27.15405	BC on the seabed. Wire out 576m
01/03/2011 14:21	BC 38	-76.04915	-27.15405	BC deployed veering 586m
01/03/2011 14:10	Core 59	-76.04915	-27.15402	Corer on board
01/03/2011 14:08	Core 59	-76.04916	-27.15401	Corer at the surface
01/03/2011 13:57	Core 59	-76.04916	-27.15401	Corer on the seabed Wire out 579m hauling
01/03/2011 13:45	Core 59	-76.04916	-27.15403	Corer deployed Veering EA 600 depth 587m
01/03/2011 13:35	Core 59	-76.04917	-27.15404	Commence deploying corer
01/03/2011 13:16	Core 58	-76.04916	-27.15403	Corer on board
01/03/2011 13:15	Core 58	-76.04916	-27.15404	Corer at the surface
01/03/2011 13:07	Core 58	-76.04914	-27.15404	Corer clear of the seabed
01/03/2011 13:06	Core 58	-76.04914	-27.15402	Corer on the seabed Wire out 579m hauling
01/03/2011 12:55	Core 58	-76.04914	-27.15403	Corer deployed Veering EA 600 depth 590m
01/03/2011 12:53	Core 58	-76.04914	-27.15403	Commence deploying corer

Time	Event	Lat	Lon	Comment
01/03/2011 12:41		-76.04915	-27.15436	Vessel in DP
01/03/2011 12:38		-76.04923	-27.15423	Power Restored
01/03/2011 12:21		-76.04934	-27.15432	Brown out
01/03/2011 02:25	BC 37	-76.33611	-30.28106	BCr on deck.
01/03/2011 02:18	BC 37	-76.33612	-30.28106	BC clear of the seabed
01/03/2011 02:17	BC 37	-76.33612	-30.28106	BC on the seabed. Wire out 348m.
01/03/2011 02:09	BC 37	-76.33613	-30.28106	BC deployed veering 355m
01/03/2011 02:07	BC 37	-76.33609	-30.2812	Commence deploying BCr
01/03/2011 02:05		-76.33606	-30.28135	Vessel in DP
01/03/2011 00:13	BC 36	-76.47016	-31.12682	Vessel off DP and proceeding to next ste.
01/03/2011 00:05	BC 36	-76.47021	-31.12632	BC onboard
28/02/2011 23:56	BC 36	-76.47021	-31.12627	BC clear on the seabed. Wire out 396m
28/02/2011 23:46	BC 36	-76.4702	-31.12634	Commence deploying BCr
28/02/2011 23:46	BC 36	-76.4702	-31.12634	BCr deployed veering EA 600 depth 400m
28/02/2011 23:26	BC 35	-76.46999	-31.12461	BC onboard
28/02/2011 23:19	BC 35	-76.46999	-31.12461	BC clear on the seabed
28/02/2011 23:18	BC 35	-76.46999	-31.12455	BCr on the seabed wire out 395m commence hauling
28/02/2011 23:07	BC 35	-76.47001	-31.12458	BCr deployed veering EA 600 depth 400m
28/02/2011 22:58	BC 35	-76.46993	-31.12365	Vessel on station in DP
28/02/2011 19:32	BC 34	-76.14624	-32.03817	Decks secure. Vessel off DP and proceeding with SWATH survey.
28/02/2011 19:23	BC 34	-76.14622	-32.03814	BCr on deck.
28/02/2011 19:22	BC 34	-76.14622	-32.03814	BCr at the surface
28/02/2011 19:11	BC 34	-76.14622	-32.03816	Commenced recovery
28/02/2011 19:10	BC 34	-76.14622	-32.03816	BCr on the seabed. 705m Wire out
28/02/2011 18:58	BC 34	-76.14622	-32.03816	BCr deployed veering EA 600 depth 728m
28/02/2011 18:57	BC 34	-76.14622	-32.03816	Commence deploying BCr
28/02/2011 18:44	Core 57	-76.14623	-32.03814	Corer in the cradle and lifted horizontal clear of the water
28/02/2011 18:40	Core 57	-76.14622	-32.0381	Weight transferred from core wire to the crane
28/02/2011 18:39	Core 57	-76.14622	-32.03809	Corer at the surface
28/02/2011 18:27	Core 57	-76.14623	-32.03813	Corer on the seabed Wire out 713m hauling
28/02/2011 18:14	Core 57	-76.14622	-32.03814	Corer deployed Veering EA 600 depth 728m
28/02/2011 18:13	Core 57	-76.14622	-32.03812	Weight transferred from crane to core wire
28/02/2011 18:09	Core 57	-76.14622	-32.03819	Commence deployment of Corer
28/02/2011 18:09	Core 57	-76.14622	-32.03819	Vessel in Position
28/02/2011 17:40		-76.14791	-32.01	Vessel on D.P fine tuneing core position
28/02/2011 14:07		-76.32097	-31.84434	Vessel off D.P proceeding to next site
28/02/2011 13:46	Core 56	-76.32096	-31.84431	Corer on board
28/02/2011 13:43	Core 56	-76.32097	-31.84434	Corer at the surface
28/02/2011 13:36	Core 56	-76.32097	-31.84432	Corer clear of the seabed
28/02/2011 13:34	Core 56	-76.32097	-31.84432	Corer on the seabed wire out 541m
28/02/2011 13:23	Core 56	-76.32097	-31.84431	Corer deployed Veering EA 600 depth 556m
28/02/2011 13:19	Core 56	-76.32096	-31.84432	Commence deploying corer
28/02/2011 13:11		-76.32096	-31.84433	Vessel in DP
28/02/2011 07:10	Seis 02	-76.09915	-32.09377	Completed recovery of the streamer. All gear clear of the water. Resumed SWATH survey.
28/02/2011 07:03	Seis 02	-76.09625	-32.10228	Commenced recovery of the streamer
28/02/2011 07:00	Seis 02	-76.09494	-32.10594	Air gun recovered on deck
28/02/2011 06:57	Seis 02	-76.09354	-32.10961	Commence recovery of air gun due to problems with firing
28/02/2011 06:30	Seis 02	-76.07357	-32.15303	Reduce speed to 3Kts due to problems with air gun firing
28/02/2011 06:15	Seis 02	-76.05524	-32.16674	Air gun firing completed deployment Increase speed to 4.5kts (STW)
28/02/2011 06:07	Seis 02	-76.04789	-32.16522	Air gun fully deployed and secured
28/02/2011 06:03	Seis 02	-76.04402	-32.16413	Air gun in the water
28/02/2011 06:00	Seis 02	-76.0411	-32.16353	Streamer fully deployed and secured
28/02/2011 05:51	Seis 02	-76.03384	-32.16122	Streamer in the water
28/02/2011 05:50	Seis 02	-76.03295	-32.16099	Commence deployment Vessel Hdg 190 C.M.G 183 Speed 2.7Kts STW
28/02/2011 05:41		-76.0326	-32.15822	Vessel turning to head 180 ready for deployment of Seis gear

Time	Event	Lat	Lon	Comment
28/02/2011 04:55		-76.1034	-32.14983	Vessel proceeding to start position for deploying Seismic equipment
28/02/2011 03:35		-76.03325	-32.09004	Vessel off D.P proceeding with survey
28/02/2011 03:33		-76.03324	-32.09005	Gantry and deck all secure
28/02/2011 03:15	Core 55	-76.03324	-32.0901	Corer in the cradle and lifted horizontal clear of the water
28/02/2011 03:11	Core 55	-76.03321	-32.09007	Weight transferred from core wire to the crane
28/02/2011 03:10	Core 55	-76.03322	-32.09011	Corer at the surface
28/02/2011 03:00	Core 55	-76.03329	-32.08988	Corer clear of the seabed
28/02/2011 02:57	Core 55	-76.0333	-32.08988	Corer on the seabed wire out 752m
28/02/2011 02:44	Core 55	-76.0333	-32.08984	Corer deployed Veering EA 600 depth 765m
28/02/2011 02:40	Core 55	-76.03336	-32.08981	Commence deploying corer
28/02/2011 02:11	Core 55	-76.03337	-32.08979	Corer on board
28/02/2011 02:10	Core 55	-76.03337	-32.0898	Corer at the surface
28/02/2011 01:59	Core 55	-76.03334	-32.08983	Corer clear of the seabed
28/02/2011 01:57	Core 55	-76.03335	-32.08982	Corer on the seabed
28/02/2011 01:43	Core 55	-76.03334	-32.08983	Corer deployed Veering EA 600 depth 765m
28/02/2011 01:41	Core 55	-76.03334	-32.08985	Commence deployment
28/02/2011 01:38		-76.03332	-32.08978	Vessel in DP
28/02/2011 00:46		-76.06251	-32.16978	Vessel off DP and proceeding to next ste.
28/02/2011 00:32	Core 54	-76.06251	-32.16979	Corer on board
28/02/2011 00:29	Core 54	-76.06252	-32.16978	Corer at the surface
28/02/2011 00:18	Core 54	-76.06252	-32.16978	Corer clear of the seabed
28/02/2011 00:16	Core 54	-76.06253	-32.16983	Corer on the seabed wire out 758m
28/02/2011 00:02	Core 54	-76.06252	-32.1698	Corer deployed Veering EA 600 depth 774m
28/02/2011 00:00	Core 54	-76.06252	-32.16977	Commence deploying corer
27/02/2011 23:55		-76.0625	-32.1701	Vessel in DP
27/02/2011 16:56		-76.45123	-29.70146	Vessel off D.P proceeding to next site
27/02/2011 16:54		-76.45124	-29.70149	Gantry and deck all secure
27/02/2011 16:48	CTD 18	-76.45122	-29.70149	CTD recovered on deck
27/02/2011 16:46	CTD 18	-76.45122	-29.70149	CTD at the surface
27/02/2011 16:37	CTD 18	-76.45122	-29.70147	Wire out 542m commence hauling
27/02/2011 16:26	CTD 18	-76.45124	-29.70148	CTD veering to near bottom EA 600 depth 576m
27/02/2011 16:24	CTD 18	-76.45123	-29.70146	CTD Soaking
27/02/2011 16:22	CTD 18	-76.45129	-29.70196	Commence deploying CTD
27/02/2011 16:19		-76.45133	-29.70287	Vessel on D.P
27/02/2011 15:58	BC 33	-76.47047	-29.68856	BCr recovered on deck
27/02/2011 15:57	BC 33	-76.47047	-29.68858	BCr at the surface
27/02/2011 15:50	BC 33	-76.47047	-29.68858	BCr on the seabed wire out 413m hauling
27/02/2011 15:41	BC 33	-76.47049	-29.6885	BCr deployed veering EA 600 depth 416m
27/02/2011 15:39	BC 33	-76.47054	-29.68882	Commence deploying BCr
27/02/2011 15:36		-76.47084	-29.6894	Vessel on D.P
27/02/2011 15:15		-76.45133	-29.7012	Vessel off D.P proceeding to next site
27/02/2011 15:07	BC 32	-76.45132	-29.70122	BCr recovered on deck
27/02/2011 15:05	BC 32	-76.45133	-29.70122	BCr at the surface
27/02/2011 14:57	BC 32	-76.45134	-29.70126	BC clear on the seabed
27/02/2011 14:56	BC 32	-76.45135	-29.70127	BC on the seabed. Wire out 559m. Commence hauling
27/02/2011 14:46	BC 32	-76.45137	-29.70141	BC deployed veering 570m
27/02/2011 14:44	BC 32	-76.45138	-29.70187	Commence deploying BCr
27/02/2011 14:41		-76.45145	-29.70242	Vessel in DP
27/02/2011 14:11		-76.42545	-29.81407	Vessel off D.P
27/02/2011 13:50	Core 53	-76.42545	-29.8141	Corer on board
27/02/2011 13:49	Core 53	-76.42545	-29.81409	Corer at the surface
27/02/2011 13:41	Core 53	-76.42547	-29.8141	Corer clear of the seabed hauling
27/02/2011 13:39	Core 53	-76.42546	-29.8141	Corer on the seabed wire out 393m
27/02/2011 13:32	Core 53	-76.42544	-29.8141	Corer deployed Veering EA 600 depth 394m
27/02/2011 13:29	Core 53	-76.42545	-29.81411	Commence deploying corer
27/02/2011 13:18	BC 31	-76.42545	-29.8141	BC onboard
27/02/2011 13:11	BC 31	-76.42544	-29.81411	BC on the seabed. Wire out 390m
27/02/2011 13:02	BC 31	-76.42543	-29.81412	BC deployed veering 394m
27/02/2011 13:01	BC 31	-76.42543	-29.81411	Commence deploying BCr
27/02/2011 12:56	BC 30	-76.42543	-29.81411	BCr on deck.
27/02/2011 12:54	BC 30	-76.42544	-29.81409	BCr at the surface not triggered.
27/02/2011 12:49	BC 30	-76.42546	-29.81411	BC clear on the seabed
27/02/2011 12:48	BC 30	-76.42544	-29.81411	BC on the seabed

Time	Event	Lat	Lon	Comment
27/02/2011 12:39	BC 30	-76.42545	-29.81418	BC deployed veering 394m
27/02/2011 12:36	BC 30	-76.42548	-29.81438	Commence deploying BCr
27/02/2011 12:30	BC 30	-76.42548	-29.81508	Vessel in DP
27/02/2011 12:04		-76.42785	-29.81737	Power Restored
27/02/2011 11:59		-76.42569	-29.8163	Brown out
27/02/2011 11:58		-76.42551	-29.81584	Vessel in DP
26/02/2011 22:01		-76.79344	-30.5738	Decks secure. Vessel off DP and proceeding with SWATH
26/02/2011 21:54	CTD 17	-76.79344	-30.57383	CTD on deck.
26/02/2011 21:53	CTD 17	-76.79343	-30.57383	CTD at the surface
26/02/2011 21:45	CTD 17	-76.79344	-30.57383	CTD at depth 404m wire out. Commence recovery.
26/02/2011 21:34	CTD 17	-76.79342	-30.57381	CTD deployed
26/02/2011 21:32	CTD 17	-76.79341	-30.5738	CTD off the deck
26/02/2011 21:16	Core 52	-76.79341	-30.57377	Corer lifted to deck level.
26/02/2011 21:14	Core 52	-76.79353	-30.57329	Corer transferred back to corer frame
26/02/2011 21:10	Core 52	-76.79365	-30.57269	Corer at the surface
26/02/2011 21:02	Core 52	-76.79365	-30.5727	Commenced recovery
26/02/2011 21:01	Core 52	-76.79365	-30.57269	Corer on the seabed wire out 422m
26/02/2011 20:54	Core 52	-76.79365	-30.57271	Corer transferred from cradle to core warp and lowered away.
26/02/2011 20:49	Core 52	-76.79364	-30.57275	Commenced corer deployment
26/02/2011 20:36	Core 51	-76.79365	-30.57274	Corer lifted to deck level.
26/02/2011 20:35	Core 51	-76.79365	-30.57271	Corer transferred back to corer gantry
26/02/2011 20:31	Core 51	-76.79364	-30.57278	Corer at the surface
26/02/2011 20:24	Core 51	-76.79364	-30.57274	Commenced recovery.
26/02/2011 20:22	Core 51	-76.79365	-30.57272	Corer on the seabed wire out 411m
26/02/2011 20:14	Core 51	-76.79365	-30.5727	Corer transferred from cradle to core warp and lowered away.
26/02/2011 20:09	Core 51	-76.79366	-30.57271	Commenced corer deployment
26/02/2011 19:43	BC 29	-76.79363	-30.57265	BCr on deck.
26/02/2011 19:41	BC 29	-76.79363	-30.57267	BCr at the surface
26/02/2011 19:34	BC 29	-76.79363	-30.57266	Commenced recovery
26/02/2011 19:33	BC 29	-76.79362	-30.57265	BCr on the seabed. Wire out 420m
26/02/2011 19:24	BC 29	-76.79363	-30.57267	BCr deployed. EA600 Depth 423m.
26/02/2011 19:23	BC 29	-76.79363	-30.57266	BCr off the deck.
26/02/2011 19:06	BC 29	-76.79413	-30.56836	Vessel moved 130 degrees 297m at UIC's request.
26/02/2011 19:03	BC 29	-76.79411	-30.56835	Vessel on station in DP Power restored and equipment reset from Brown out
26/02/2011 18:28		-76.79581	-30.58517	Brown out
26/02/2011 16:46		-76.79457	-30.56716	Vessel off D.P proceeding with survey
26/02/2011 16:38		-76.79456	-30.56715	Gantry and deck all secure
26/02/2011 16:26	BC 28	-76.79458	-30.56717	BCr recovered on deck
26/02/2011 16:25	BC 28	-76.79458	-30.56718	BCr at the surface
26/02/2011 16:17	BC 28	-76.79459	-30.56718	BC on the seabed. Wire out 408m. Commence hauling
26/02/2011 16:01	BC 28	-76.79458	-30.56708	BCr deployed veering EA 600 depth 425m
26/02/2011 15:59	BC 28	-76.79449	-30.56726	Commence deploying BCr
26/02/2011 15:57		-76.79434	-30.56805	Vessel on D.P for coreing
26/02/2011 15:30		-76.77092	-30.64435	Gantry and deck all secure. Vessel off D.P proceeding to core site
26/02/2011 15:24	BC 27	-76.7709	-30.64444	BCr recovered on deck
26/02/2011 15:23	BC 27	-76.77091	-30.64444	BCr at the surface
26/02/2011 15:14	BC 27	-76.77092	-30.64447	BC on the seabed. Wire out 561m. Commence hauling
26/02/2011 15:02	BC 27	-76.77092	-30.64449	BCr deployed veering EA 600 depth 572m
26/02/2011 15:01	BC 27	-76.77089	-30.64455	Commence deploying BCr
26/02/2011 14:53	BC 27	-76.7714	-30.64476	Vessel in DP
25/02/2011 20:14	BC 26	-77.17952	-34.17009	Decks secure. Vessel off DP and proceeding with SWATH survey.
25/02/2011 20:12	BC 26	-77.17914	-34.16767	BCr on deck.
25/02/2011 20:11	BC 26	-77.17897	-34.16655	BCr at the surface
25/02/2011 20:03	BC 26	-77.17827	-34.16077	Commenced recovery. Resumed drifting with ice.
25/02/2011 20:02	BC 26	-77.17826	-34.16076	BC on the seabed. Wire out 465m.
25/02/2011 19:54	BC 26	-77.17824	-34.16074	BCr at the surface. Not fired. Moving ship clear of ice for re-deployment.
25/02/2011 19:54	BC 26	-77.17824	-34.16074	BCr redeployed.
25/02/2011 19:38	BC 26	-77.17683	-34.15362	Commenced recovery. Vessel drifting with ice

Time	Event	Lat	Lon	Comment
25/02/2011 19:37	BC 26	-77.17677	-34.15351	BCr on the seabed wire out 465m.
25/02/2011 19:27	BC 26	-77.17677	-34.15356	BCr deployed. EA600 Depth 473m.
25/02/2011 19:26	BC 26	-77.17676	-34.15356	BCr off the deck
25/02/2011 19:01	Core 51	-77.17679	-34.15359	Corer lifted to deck level. Core barrel bend...slightly...ish.
25/02/2011 18:55	Core 51	-77.17678	-34.15357	Weight transferred from core wire to the crane
25/02/2011 18:54	Core 51	-77.17678	-34.15356	Corer at the surface
25/02/2011 18:46	Core 51	-77.17678	-34.15353	Corer on the seabed Wire out 469m hauling
25/02/2011 18:37	Core 51	-77.17679	-34.15352	Corer deployed Veering EA 600 depth 475m
25/02/2011 18:36	Core 51	-77.17679	-34.15353	Weight transferred from crane to core wire
25/02/2011 18:32	Core 51	-77.17677	-34.15342	Commence deploying corer
25/02/2011 18:24		-77.17642	-34.15123	Vessel on D.P for coreing
25/02/2011 18:10		-77.18123	-34.10634	Vessel proceeding to next core site
25/02/2011 18:00	Core 50	-77.18186	-34.10456	Corer in the cradle and lifted horizontal clear of the water
25/02/2011 17:55	Core 50	-77.18184	-34.10457	Weight transferred from core wire to the crane
25/02/2011 17:54	Core 50	-77.18184	-34.10453	Corer at the surface
25/02/2011 17:46	Core 50	-77.18188	-34.1045	Corer on the seabed Wire out 470m hauling
25/02/2011 17:37	Core 50	-77.18188	-34.10457	Corer deployed Veering EA 600 depth 480m
25/02/2011 17:36	Core 50	-77.18188	-34.10452	Weight transferred from crane to core wire
25/02/2011 17:32	Core 50	-77.18188	-34.10452	Commence deploying corer
25/02/2011 17:18		-77.18135	-34.09342	Vessel on D.P for coreing
25/02/2011 05:39		-77.84046	-37.12917	Gantry and deck all secure vessel proceeding
25/02/2011 05:30		-77.84121	-37.12054	Vessel off D.P holding position while securing the deck
25/02/2011 05:25	Core 49	-77.84099	-37.11608	Corer in the cradle and lifted horizontal clear of the water
25/02/2011 05:21	Core 49	-77.84083	-37.11211	Weight transferred from core wire to the crane
25/02/2011 05:20	Core 49	-77.84079	-37.11154	Corer at the surface
25/02/2011 05:05	Core 49	-77.84034	-37.10406	Corer clear of the seabed
25/02/2011 05:02	Core 49	-77.84034	-37.10401	Corer on the seabed Wire out 1120m hauling
25/02/2011 04:41	Core 49	-77.83838	-37.07881	Corer deployed Veering EA 600 depth 1207m
25/02/2011 04:40	Core 49	-77.83833	-37.07825	Weight transferred from crane to core wire
25/02/2011 04:37	Core 49	-77.83826	-37.07734	Commence deploying corer
25/02/2011 04:28		-77.8393	-37.08062	Vessel on D.P for coreing
25/02/2011 02:05	Core 48	-77.8741	-38.0083	Vessel off D.P proceeding to next site
25/02/2011 01:48	Core 48	-77.87314	-37.99961	corer on board
25/02/2011 01:46	Core 48	-77.87312	-37.99879	Corer at the surface
25/02/2011 01:31	Core 48	-77.87249	-37.99234	Corer clear of the seabed hauling
25/02/2011 01:28	Core 48	-77.8726	-37.99147	Corer on the seabed Wire out 1163m hauling
25/02/2011 01:04	Core 48	-77.87214	-37.98475	Corer deployed Veering EA 600 depth 1157m
25/02/2011 01:01	Core 48	-77.87225	-37.98326	Commence deploying corer
25/02/2011 00:58	Core 48	-77.87238	-37.98164	Vessel in DP
24/02/2011 22:13	Core 47	-77.91032	-39.16099	Deck secured. Vessel proceeding to next site.
24/02/2011 21:57	Core 47	-77.91055	-39.1718	Corer lifted to deck level.
24/02/2011 21:54	Core 47	-77.91039	-39.17123	Corer transferred back to corer gantry
24/02/2011 21:51	Core 47	-77.91018	-39.17068	Corer at the surface
24/02/2011 21:34	Core 47	-77.90923	-39.16773	Commenced recovery. Break out tension 3.45 tonnes
24/02/2011 21:33	Core 47	-77.90925	-39.16767	Corer on the seabed wire out 1145m
24/02/2011 21:12	Corer 47	-77.90623	-39.16042	Corer transferred to core warp. Commenced veering.
24/02/2011 21:04	Core 47	-77.90606	-39.16139	Commenced deploying corer
24/02/2011 20:45	Core 47	-77.91247	-39.14962	Vessel in open lead in DP auto head.
24/02/2011 19:02	Core 46	-77.91928	-39.69282	Deck secured. Vessel proceeding to next site.
24/02/2011 18:43	Core 46	-77.9197	-39.69517	Corer in the cradle and lifted horizontal clear of the water
24/02/2011 18:38	Core 46	-77.91966	-39.695	Weight transferred from core wire to the crane
24/02/2011 18:36	Core 46	-77.91959	-39.6946	Corer at the surface
24/02/2011 18:20	Core 46	-77.91965	-39.69385	Corer on the seabed Wire out 1079m hauling
24/02/2011 18:00	Core 46	-77.9192	-39.69236	Corer deployed Veering EA 600 depth 1147m
24/02/2011 17:59	Core 46	-77.9192	-39.69226	Weight transferred from crane to core wire
24/02/2011 17:55	Core 46	-77.91923	-39.69162	Commence deploying corer
24/02/2011 17:53		-77.91938	-39.6918	Vessel stopped in D.P for core sample
24/02/2011 17:32		-77.92045	-39.69711	Vessel re-positioning for core sample
24/02/2011 17:24	Core 45	-77.92034	-39.69495	Corer in the cradle and lifted horizontal clear of the water

Time	Event	Lat	Lon	Comment
24/02/2011 17:20	Core 45	-77.9204	-39.6945	Weight transferred from core wire to the crane
24/02/2011 17:18	Core 45	-77.92039	-39.6944	Corer at the surface
24/02/2011 17:02	Core 45	-77.92036	-39.69402	Wire out 1083m commence hauling
24/02/2011 16:42	Core 45	-77.92046	-39.69372	Corer deployed Veering EA 600 depth 1177m
24/02/2011 16:41	Core 45	-77.92049	-39.69371	Weight transferred from crane to core wire
24/02/2011 16:37	Core 45	-77.92045	-39.69374	Commence deploying corer
24/02/2011 16:26		-77.92015	-39.69096	Vessel on D.P for coreing
24/02/2011 13:28	Core 44	-77.90748	-40.39149	Vessel off D.P proceeding to next site
24/02/2011 13:08	Core 44	-77.88404	-41.37237	corer on board
24/02/2011 13:04	Core 44	-77.88375	-41.3705	Corer at the surface
24/02/2011 12:51	Core 44	-77.88331	-41.36563	Corer on the seabed Wire out 838m hauling
24/02/2011 12:37	Core 44	-77.88351	-41.36423	Corer deployed Veering EA 600 depth 862m
24/02/2011 12:32	Core 44	-77.88329	-41.36195	Commence deploying corer
24/02/2011 12:26	Core 44	-77.88306	-41.35966	Vessel on D.P
24/02/2011 05:18		-77.92044	-39.69311	Gantry and deck all secure. Vessel off D.P proceeding with survey
24/02/2011 05:08	CTD 16	-77.92048	-39.69319	CTD recovered on deck
24/02/2011 05:05	CTD 16	-77.92047	-39.69318	CTD at the surface
24/02/2011 04:42	CTD 16	-77.92047	-39.69311	Wire out 1059m commence hauling
24/02/2011 04:23	CTD 16	-77.92037	-39.69313	CTD veering to near bottom EA 600 depth 1166m
24/02/2011 04:21	CTD 16	-77.92032	-39.69321	CTD soaking
24/02/2011 04:18	CTD 16	-77.9203	-39.69311	Commence deploying CTD
24/02/2011 03:35		-77.91973	-39.69108	Vessel waiting due to CTD bottles frozen
24/02/2011 03:32		-77.91898	-39.68918	Vessel on D.P
24/02/2011 01:51	CTD 15	-77.77118	-39.35859	Vessel off D.P proceeding to next site
24/02/2011 01:41	CTD 15	-77.77087	-39.362	CTD on deck.
24/02/2011 01:15	CTD 15	-77.77006	-39.37251	CTD @ depth wire out 1040m depth 1145m
24/02/2011 00:56	CTD 15	-77.76949	-39.37988	CTD veering to near bottom
24/02/2011 00:54	CTD 15	-77.76942	-39.38064	CTD deployed and soaking
24/02/2011 00:47	CTD 15	-77.7692	-39.38355	Commence deploying CTD
24/02/2011 00:10	CTD 15	-77.76818	-39.39406	Vessel in DP
23/02/2011 21:32	CTD 14	-77.60042	-38.59849	Deck secured. Vessel proceeding to next site.
23/02/2011 21:25	CTD 14	-77.60028	-38.60414	CTD on deck.
23/02/2011 21:24	CTD 14	-77.60025	-38.60529	CTD at the surface
23/02/2011 21:02	CTD 14	-77.60028	-38.61554	CTD at depth. Wire out 1 042m. Commenced recovery.
23/02/2011 20:39	CTD 14	-77.59977	-38.63115	CTD deployed
23/02/2011 20:37	CTD 14	-77.59979	-38.63206	CTD off the deck
23/02/2011 20:13	Core 43	-77.60002	-38.64318	Corer lifted to deck level.
23/02/2011 20:11	Core 43	-77.59995	-38.64482	Corer transferred back to corer gantry
23/02/2011 20:07	Core 43	-77.59992	-38.64659	Corer at the surface
23/02/2011 19:51	Core 43	-77.59976	-38.6541	Commenced recovery. Break out tension 3.6 tonnes
23/02/2011 19:50	Core 43	-77.59976	-38.65421	Corer on the seabed wire out 1048m
23/02/2011 19:31	Core 43	-77.59992	-38.66433	Corer transferred to core warp. Commenced veering. EA600 water depth 1 217m.
23/02/2011 19:27	Core 43	-77.59989	-38.66802	Commenced corer deployment
23/02/2011 19:25	Core 43	-77.5999	-38.66927	Vessel repositioned and set up in auto head DP
23/02/2011 19:15	Core 42	-77.60244	-38.67117	Vessel off DP and repositioning to a bigger puddle 100m to the north.
23/02/2011 18:55	Core 42	-77.60261	-38.68084	Corer in the cradle and lifted horizontal clear of the water
23/02/2011 18:52	Core 42	-77.60264	-38.68208	Weight transferred from core wire to the crane
23/02/2011 18:50	Core 42	-77.60266	-38.68301	Corer at the surface
23/02/2011 18:35	Core 42	-77.60274	-38.68953	Corer clear of the seabed hauling
23/02/2011 18:34	Core 42	-77.60276	-38.6896	Corer on the seabed Wire out 1047m hauling
23/02/2011 18:32	Core 42	-77.60279	-38.68979	Corer just above the seabed vessel stopped
23/02/2011 18:14	Core 42	-77.60261	-38.69874	Corer deployed Veering EA 600 depth 1076m
23/02/2011 18:08	Core 42	-77.60258	-38.70086	Commence deploying corer
23/02/2011 17:48		-77.60267	-38.70631	Vessel on D.P for coreing
23/02/2011 15:36		-77.77019	-39.38993	Gantry and deck all secure. Vessel off D.P proceeding to core site
23/02/2011 15:13	Core 41	-77.7689	-39.39141	Corer in the cradle and lifted horizontal clear of the water
23/02/2011 15:08	Corer 41	-77.76879	-39.39181	Weight transferred from core wire to the crane
23/02/2011 15:07	Core 41	-77.76878	-39.39192	Corer at the surface

Time	Event	Lat	Lon	Comment
23/02/2011 14:53	Core 41	-77.76871	-39.39256	Corer clear of the seabed hauling
23/02/2011 14:52	Core 41	-77.76872	-39.39251	Corer on the seabed wire out 1052m
23/02/2011 14:32	Core 41	-77.76839	-39.39311	Corer deployed Veering EA 600 depth 1130m
23/02/2011 14:28	Core 41	-77.76829	-39.39354	Commence deploying corer
23/02/2011 14:02	Core 40	-77.76815	-39.39419	corer on board
23/02/2011 13:57	Core 40	-77.76806	-39.39462	Corer at the surface
23/02/2011 13:44	Core 40	-77.76795	-39.39545	Corer clear of the seabed hauling
23/02/2011 13:42	Core 40	-77.76794	-39.39552	Corer on the seabed
23/02/2011 13:23	Core 40	-77.76769	-39.39698	Corer deployed Veering EA 600 depth 1171m
23/02/2011 13:12	Core 40	-77.7676	-39.39796	Commence deploying corer
23/02/2011 12:25	BC 25	-77.76743	-39.3992	BC onboard
23/02/2011 12:24	BC 25	-77.76743	-39.39917	BCr at the surface
23/02/2011 12:09	BC 25	-77.76745	-39.39913	BC clear on the seabed
23/02/2011 12:07	BC 25	-77.76744	-39.39911	Corer on the seabed wire out 1046m
23/02/2011 11:49	BC 25	-77.76755	-39.39931	BCr deployed veering EA 600 depth 1147m
23/02/2011 11:47	BC 25	-77.76765	-39.39954	Commence deploying BCr
23/02/2011 11:42	BC 25	-77.76781	-39.39992	Vessel in DP
23/02/2011 09:00	BC 24	-77.60196	-38.7067	Deck secured. Vessel proceeding to next site.
23/02/2011 08:49	BC 24	-77.60301	-38.7097	BCr on deck.
23/02/2011 08:48	BC 24	-77.60313	-38.71008	BCr at the surface
23/02/2011 08:32	BC 24	-77.60462	-38.71558	Commenced recovery. Vessel moving with ice.
23/02/2011 08:31	BC 24	-77.60464	-38.71568	Vessel stopped. BCr on the seabed. Wire out 1040m
23/02/2011 08:06	BCr24	-77.60711	-38.72468	BCr deployed. Vessel moving with ice. EA 600 depth 1126m.
23/02/2011 08:05	BC 24	-77.60715	-38.72508	BCr off the deck
23/02/2011 08:00	BC 24	-77.6068	-38.72617	Vessel on station in auto head DP.
23/02/2011 07:24	BC 23	-77.60192	-38.79649	Deck secured. Vessel proceeding to next site.
23/02/2011 07:04	BC 23	-77.60457	-38.80494	BCr on deck.
23/02/2011 07:03	BC 23	-77.6048	-38.80546	BCr at the surface
23/02/2011 06:47	BC 23	-77.60748	-38.81341	BC clear on the seabed
23/02/2011 06:46	BC 23	-77.60748	-38.81378	BCr on the seabed wire out 1032m hauling
23/02/2011 06:43	BC 23	-77.60758	-38.81428	BCr just above the seabed
23/02/2011 06:23	BC 23	-77.61047	-38.82419	BCr deployed veering EA 600 depth 1128m
23/02/2011 06:21	BC 23	-77.61094	-38.82485	Commence deploying BCr
23/02/2011 06:05		-77.61301	-38.83101	Vessel on D.P
23/02/2011 01:34	Core 39	-77.92035	-39.69303	Vessel off D.P. Continuing SWATH survey on route to next core site.
23/02/2011 01:19	Core 39	-77.92035	-39.69303	corer on board
23/02/2011 01:16	Core 39	-77.92036	-39.69301	Corer at the surface
23/02/2011 01:01	Core 39	-77.92034	-39.69293	Corer clear of the seabed hauling
23/02/2011 00:59	Core 39	-77.92035	-39.69294	Corer on the seabed wire out 1082m
23/02/2011 00:38	Core 39	-77.92035	-39.69298	Corer deployed Veering EA 600 depth 1164m
23/02/2011 00:34	Core 39	-77.92034	-39.69297	Commence deploying corer
23/02/2011 00:02	BC 22	-77.92035	-39.69299	BCr on deck.
23/02/2011 00:00	BC 22	-77.92034	-39.693	BCr at the surface
22/02/2011 23:44	BC 22	-77.92035	-39.69296	BCr clear of seabed hauling
22/02/2011 23:42	BC 22	-77.92034	-39.69296	Corer on the seabed
22/02/2011 23:19	BC 22	-77.92035	-39.69297	Deploy BCr EA 600 Depth 1164m
22/02/2011 23:05	Core 38	-77.92035	-39.69296	corer on board
22/02/2011 22:59	Core 38	-77.92035	-39.69298	Corer at the surface
22/02/2011 22:43	Core 38	-77.92034	-39.69293	Commenced recovery . Breakout tension 3.9tonnes
22/02/2011 22:42	Core 38	-77.92035	-39.69293	Corer on the seabed wire out 1080m
22/02/2011 22:22	Core 38	-77.92036	-39.69298	Corer transferred to core warp. Commenced veering. EA600 water depth 1 161m.
22/02/2011 22:18	Core 38	-77.92036	-39.693	Commenced deploying corer
22/02/2011 21:58	Core 37	-77.92036	-39.69302	Corer lifted to deck level.
22/02/2011 21:55	Core 37	-77.92036	-39.69301	Corer transferred back to corer gantry
22/02/2011 21:52	Core 37	-77.92034	-39.69297	Corer at the surface
22/02/2011 21:36	Core 37	-77.92035	-39.69299	Commenced recovery. Break out tension 3.3 tonnes
22/02/2011 21:35	Core 37	-77.92035	-39.69297	Corer on the seabed wire out 1161m
22/02/2011 21:14	Core 37	-77.92035	-39.69299	Corer transferred to core warp. Commenced veering. EA600 water depth 1 161m.
22/02/2011 21:09	Core 37	-77.92035	-39.69298	Commenced deploying corer
22/02/2011 21:00		-77.92031	-39.69248	Vessel on station in DP

Time	Event	Lat	Lon	Comment
22/02/2011 19:01	BC 21	-77.91277	-39.14798	Decks secure. Vessel off DP and proceeding to next site.
22/02/2011 18:53	BC 21	-77.91276	-39.14798	BCr recovered on deck
22/02/2011 18:51	BC 21	-77.91275	-39.14799	BCr at the surface
22/02/2011 18:33	BC 21	-77.91276	-39.14803	BCr on the seabed wire out 1151m hauling
22/02/2011 18:14	BC 21	-77.91274	-39.14802	BCr deployed
22/02/2011 18:12	BC 21	-77.91274	-39.14801	Commence deploying BCr
22/02/2011 18:08	Core 36	-77.91273	-39.14802	Corer in the cradle and lifted horizontal clear of the water
22/02/2011 18:05	Core 36	-77.91273	-39.14803	Weight transferred from core wire to the crane
22/02/2011 18:03	Core 36	-77.91274	-39.148	Corer at the surface
22/02/2011 17:46	Core 36	-77.91275	-39.14802	Corer on the seabed Wire out 1161m hauling
22/02/2011 17:23	Core 36	-77.91263	-39.14796	Corer deployed Veering EA 600 depth 1210m
22/02/2011 17:22	Core 36	-77.9126	-39.14796	Weight transferred from crane to core wire
22/02/2011 17:17	Core 36	-77.91236	-39.14793	Commence deploying corer
22/02/2011 17:06		-77.91189	-39.15074	Vessel on D.P for coreing
22/02/2011 15:00	BC 20	-77.87561	-37.95508	Vessel off D.P proceeding to next site
22/02/2011 14:48	BC 20	-77.8756	-37.95497	BC onboard
22/02/2011 14:29	BC 20	-77.87559	-37.95496	BCr on the seabed wire out 1160m commence hauling
22/02/2011 14:11	BC 20	-77.87551	-37.9554	Deploy BCr EA 600 Depth 1243m
22/02/2011 13:56	Core 35	-77.87559	-37.95606	corer on board
22/02/2011 13:37	Core 35	-77.87572	-37.95466	Corer clear of the seabed hauling
22/02/2011 13:36	Core 35	-77.87571	-37.95467	Corer on the seabed wire out 1168m
22/02/2011 13:14	Core 35	-77.87572	-37.95497	Corer deployed Veering EA 600 depth 1248m
22/02/2011 13:08	Core 35	-77.87574	-37.9564	Commence deploying corer
22/02/2011 13:00	Core 35	-77.87579	-37.95927	Vessel in DP
21/02/2011 22:59	CTD 13	-78	-42.49933	Deck secure. Vessel off DP and proceeding with SWATH survey
21/02/2011 22:55	CTD 13	-78.00001	-42.49928	CTD on deck.
21/02/2011 22:53	CTD 13	-78.00001	-42.4993	CTD at the surface
21/02/2011 22:42	CTD 13	-78	-42.49929	CTD at depth. 636m wire out. Commenced recovery.
21/02/2011 22:25	CTD 13	-77.99996	-42.49885	CTD deployed
21/02/2011 22:22	CTD 13	-77.99992	-42.49849	CTD off the deck
21/02/2011 22:04	CTD 13	-77.99995	-42.49865	Vessel on station in DP. Making hole in ice for CTD deployment.
21/02/2011 17:47	BC 19	-77.73189	-42.16302	Vessel off D.P proceeding to next site
21/02/2011 17:43	BC 19	-77.73201	-42.16311	Gantry and deck all secure
21/02/2011 17:35	BC 19	-77.73217	-42.16282	BCr recovered on deck
21/02/2011 17:33	BC 19	-77.73224	-42.16331	BCr at the surface
21/02/2011 17:22	BC 19	-77.73289	-42.16439	Wire out 656m BCr on the seabed commence hauling
21/02/2011 17:09	BC 19	-77.73295	-42.16469	BCr deployed
21/02/2011 17:06	BC 19	-77.73281	-42.16496	Commence deploying BCr
21/02/2011 17:00	Core 34	-77.73294	-42.16522	Corer in the cradle and lifted horizontal clear of the water
21/02/2011 16:56	Core 34	-77.73303	-42.1653	Weight transferred from core wire to the crane
21/02/2011 16:53	Core 34	-77.73311	-42.16565	Core at the surface
21/02/2011 16:42	Core 34	-77.7332	-42.1657	Wire out 669m commence hauling
21/02/2011 16:30	Core 34	-77.73322	-42.16614	Corer deployed Veering EA 600 depth 678m
21/02/2011 16:28	Core 34	-77.73322	-42.16614	Weight transferred from crane to core wire
21/02/2011 16:24	Core 34	-77.73321	-42.16565	Commence deploying corer
21/02/2011 16:16		-77.73351	-42.16618	Vessel on D.P for coreing
21/02/2011 14:48	Core 33	-77.64906	-42.10387	Vessel off D.P proceeding to next site
21/02/2011 14:46	Core 33	-77.64909	-42.1044	Deck Secured
21/02/2011 14:34	Core 33	-77.64939	-42.1032	corer on board
21/02/2011 14:29	Core 33	-77.6495	-42.10164	Corer at the surface
21/02/2011 14:18	Core 33	-77.64977	-42.10035	Corer clear of the seabed hauling
21/02/2011 14:17	Core 33	-77.6498	-42.10037	Corer on the seabed wire out 627m
21/02/2011 14:05	Core 33	-77.64994	-42.10049	Corer deployed Veering EA 600 depth 626m
21/02/2011 13:56	Core 33	-77.65002	-42.10063	Commence deploying corer
21/02/2011 13:33	BC 18	-77.65001	-42.10073	BC onboard
21/02/2011 13:32	BC 18	-77.65002	-42.10076	BCr at the surface
21/02/2011 13:23	BC 18	-77.65	-42.10066	BCr clear of seabed hauling
21/02/2011 13:22	BC 18	-77.65	-42.10073	Corer on the seabed wire out 626m

Time	Event	Lat	Lon	Comment
21/02/2011 13:11	BC 18	-77.65006	-42.10059	BCr deployed veering EA 600 depth 638m
21/02/2011 13:09	BC 18	-77.65013	-42.10081	Commence deploying BCr
21/02/2011 12:55	BC 18	-77.65006	-42.10094	Vessel in DP
21/02/2011 10:41	CTD 12	-77.73251	-42.18149	Vessel off DP and proceeding to next ste.
21/02/2011 10:32	CTD 12	-77.73299	-42.17756	CTD on deck.
21/02/2011 10:30	CTD 12	-77.73299	-42.17704	CTD at the surface
21/02/2011 10:18	CTD 12	-77.73283	-42.17509	CTD at depth 641m wire out 287. Commence recovery.
21/02/2011 09:58	CTD 12	-77.73292	-42.17057	CTD deployed
21/02/2011 09:56	CTD 12	-77.73298	-42.16986	CTD off the deck
21/02/2011 09:49	CTD 12	-77.7331	-42.16779	Vessel unable to hold station. Commenced drifting with ice in Auto Head mode.
21/02/2011 09:08	CTD 12	-77.73261	-42.16487	Vessel on station in DP
21/02/2011 08:51	CTD 12	-77.73321	-42.16749	Vessel unable to maintain position. Off DP and repositioning.
21/02/2011 08:30	CTD 12	-77.73333	-42.16749	Vessel on station in DP
21/02/2011 06:48		-77.83332	-42.0831	Vessel off D.P proceeding to next site
21/02/2011 06:41		-77.83337	-42.08291	Gantry and deck all secure
21/02/2011 06:33	CTD 11	-77.83341	-42.0828	CTD recovered on deck
21/02/2011 06:31	CTD 11	-77.83341	-42.08278	CTD at the surface
21/02/2011 06:11	CTD 11	-77.8334	-42.08281	Wire out 659m commence hauling
21/02/2011 05:57	CTD 11	-77.83339	-42.08285	CTD veering to near bottom
21/02/2011 05:54	CTD 11	-77.83337	-42.08282	CTD soaking
21/02/2011 05:49	CTD 11	-77.83355	-42.08345	Commence deploying CTD
21/02/2011 05:20	BC 17	-77.83322	-42.08324	BCr recovered on deck
21/02/2011 05:17	BC 17	-77.83323	-42.0835	BCr at the surface
21/02/2011 05:06	BC 17	-77.83331	-42.08372	Wire out 669m commence hauling
21/02/2011 04:50	BC 17	-77.83327	-42.08391	BCr deployed veering EA 600 depth 690m
21/02/2011 04:48	BC 17	-77.83326	-42.08382	Commence deploying BCr
21/02/2011 04:43	Core 32	-77.83344	-42.08379	Corer in the cradle and lifted horizontal clear of the water
21/02/2011 04:40	Core 32	-77.83345	-42.08371	Weight transferred from core wire to the crane
21/02/2011 04:38	Core 32	-77.83346	-42.08366	Corer at the surface
21/02/2011 04:25	Core 32	-77.83342	-42.08341	Corer on the seabed wire out 648m hauling
21/02/2011 04:12	Core 32	-77.83343	-42.08324	Corer deployed Veering EA 600 depth 690m
21/02/2011 04:11	Core 32	-77.83344	-42.0832	Weight transferred from crane to core wire
21/02/2011 04:07	Core 32	-77.83347	-42.08323	Commence deploying corer
21/02/2011 01:37	BC 16	-77.99993	-42.50007	Vessel off D.P proceeding to next site
21/02/2011 01:28	BC 16	-77.99992	-42.5	BC onboard
21/02/2011 01:11	BC 16	-77.99992	-42.49998	BCr clear of seabed
21/02/2011 01:10	BC 16	-77.99993	-42.49996	BCr on the seabed wire out 649m commence hauling
21/02/2011 00:55	BC 16	-77.99992	-42.5	Commence deploying BCr
21/02/2011 00:45	Core 31	-77.99993	-42.50001	corer on board
21/02/2011 00:38	Core 31	-77.99993	-42.50004	Core at the surface
21/02/2011 00:29	Core 31	-77.99992	-42.49993	Corer clear of the seabed hauling
21/02/2011 00:28	Core 31	-77.99993	-42.49993	Corer on the seabed wire out 636m
21/02/2011 00:15	Core 31	-77.99992	-42.50002	Corer deployed Veering EA 600 depth 671m
21/02/2011 00:10	Core 31	-77.99992	-42.49999	Commence deploying corer
20/02/2011 23:48	Core 31	-77.99993	-42.50038	Vessel in DP
20/02/2011 21:08	CTD 10	-78.14543	-43.64593	Deck secured. Vessel proceeding to next site.
20/02/2011 20:58	CTD 10	-78.14543	-43.64594	CTD on deck.
20/02/2011 20:57	CTD 10	-78.14543	-43.64598	CTD at the surface
20/02/2011 20:49	CTD 10	-78.14544	-43.64593	CTD at depth. 423m wire out. Commenced recovery.
20/02/2011 20:37	CTD 10	-78.14544	-43.64594	CTD deployed
20/02/2011 20:35	CTD 10	-78.14545	-43.64587	CTD off the deck
20/02/2011 20:20	Core 30	-78.14545	-43.6459	Corer lifted to deck level.
20/02/2011 20:18	Core 30	-78.14546	-43.64597	Corer transferred back to corer gantry
20/02/2011 20:15	Core 30	-78.14546	-43.64597	Core at the surface
20/02/2011 20:08	Core 30	-78.14544	-43.64599	Commenced recovery.
20/02/2011 20:07	Core 30	-78.14544	-43.64601	Corer on the seabed wire out 437m
20/02/2011 19:58	Core 30	-78.14543	-43.64599	Corer transferred from cradle to core warp and lowered away.
20/02/2011 19:54	Core 30	-78.14543	-43.64597	Commenced corer deployment
20/02/2011 19:41	BC 15	-78.14543	-43.64592	BCr on deck

Time	Event	Lat	Lon	Comment
20/02/2011 19:40	BC 15	-78.14543	-43.64597	BCr at the surface
20/02/2011 19:33	BC 15	-78.14544	-43.64596	Commenced recovery
20/02/2011 19:32	BC 15	-78.14544	-43.64597	BCr on the seabed. 435m Wire out
20/02/2011 19:24	BCr 15	-78.14544	-43.64602	BCr deployed
20/02/2011 19:23	BC 15	-78.14542	-43.64601	BCr off the deck
20/02/2011 19:15	BC 15	-78.14508	-43.64396	Vessel on station in DP
19/02/2011 20:37	CTD 09	-77.26655	-33.44955	Deck all secure vessel proceeding with surveying
19/02/2011 20:32	CTD 09	-77.26656	-33.4495	CTD on deck.
19/02/2011 20:31	CTD 09	-77.26656	-33.44949	CTD at the surface
19/02/2011 20:15	CTD 09	-77.26655	-33.44935	CTD at depth. 935m wire out. Commenced recovery.
19/02/2011 19:54	CTD 09	-77.26652	-33.4497	CTD deployed
19/02/2011 19:52	CTD 09	-77.26651	-33.44969	Vessel on station. CTD off the deck
19/02/2011 19:18	BC 14	-77.26348	-33.46483	Vessel positioning to CTD site in DP
19/02/2011 19:13	BC 14	-77.26347	-33.46487	BCr on deck.
19/02/2011 19:12	BC 14	-77.26347	-33.46486	BCr at the surface
19/02/2011 18:57	BC 14	-77.26348	-33.46488	BCr on the seabed wire out 927m commence hauling
19/02/2011 18:41	BC 14	-77.26347	-33.46489	BCr deployed
19/02/2011 18:39	BC 14	-77.26349	-33.46484	Commence deploying BCr
19/02/2011 18:03	Core 29	-77.26337	-33.46521	Corer in the cradle and lifted horizontal clear of the water
19/02/2011 17:58	Core 29	-77.26337	-33.46521	Weight transferred from core wire to the crane
19/02/2011 17:55	Core 29	-77.26338	-33.46522	Corer at the surface
19/02/2011 17:41	Core 29	-77.26339	-33.4652	Corer on the seabed wire out 928m hauling
19/02/2011 17:24	Core 29	-77.26338	-33.46522	Corer deployed Veering EA 600 depth 950m
19/02/2011 17:22	Core 29	-77.26339	-33.46522	Weight transferred from crane to core wire
19/02/2011 17:17	Core 29	-77.26339	-33.4652	Commence deploying corer
19/02/2011 16:42	Core 28	-77.26339	-33.46527	Corer in the cradle and lifted horizontal clear of the water
19/02/2011 16:38	Core 28	-77.26339	-33.46519	Weight transferred from core wire to the crane
19/02/2011 16:35	Core 28	-77.26338	-33.4652	Corer at the surface
19/02/2011 16:20	Core 28	-77.26339	-33.46515	Corer on the seabed Wire out 934m commence hauling
19/02/2011 16:03	Core 28	-77.26339	-33.46517	Corer deployed Veering EA 600 depth 950m
19/02/2011 16:01	Core 28	-77.26339	-33.46516	Weight transferred from crane to core wire
19/02/2011 15:57	Core 28	-77.26339	-33.46517	Commence deploying corer
19/02/2011 15:46		-77.26343	-33.46501	Vessel stopped on D.P in new core site
19/02/2011 15:24		-77.26653	-33.44972	Vessel re-positioning for core sample
19/02/2011 15:12	Core 27	-77.2666	-33.44955	Corer in the cradle and lifted horizontal clear of the water
19/02/2011 15:07	Core 27	-77.26659	-33.44961	Weight transferred from core wire to the crane
19/02/2011 15:05	Core 27	-77.26658	-33.44957	Core at the surface
19/02/2011 14:51	Core 27	-77.26659	-33.44954	Corer clear of the seabed hauling
19/02/2011 14:49	Core 27	-77.26659	-33.44955	Corer on the seabed wire out 954m
19/02/2011 14:32	Core 27	-77.26658	-33.44951	Corer deployed Veering EA 600 depth 974m
19/02/2011 14:27	Core 27	-77.26658	-33.44951	Commence deploying corer
19/02/2011 14:08	BC 13	-77.26659	-33.44953	BCr recovered on deck
19/02/2011 14:06	BC 13	-77.26658	-33.44956	BCr at the surface
19/02/2011 13:51	BC 13	-77.26661	-33.44951	BCr on the seabed wire out 938m commence hauling
19/02/2011 13:31	BC 13	-77.2666	-33.44929	Commence BC veering EA600 depth 977m
19/02/2011 13:22	BC 13	-77.26662	-33.44947	Vessel in DP
17/02/2011 21:26	CTD 08	-74.1075	-32.59482	All secure on deck. Vessel off DP and proceeding.
17/02/2011 21:21	CTD 08	-74.1071	-32.59439	CTD on deck.
17/02/2011 21:19	CTD 08	-74.10695	-32.59422	CTD at the surface
17/02/2011 20:55	CTD 08	-74.1054	-32.58825	CTD at depth. Wire out 1459m. Commenced recovery
17/02/2011 20:24	CTD 08	-74.10354	-32.581	Vessel on station in DP. CTD off the deck.
17/02/2011 20:22	CTD 08	-74.10351	-32.58099	CTD deployed
17/02/2011 20:11	Core 26	-74.10062	-32.60082	Vessel off DP and repositioning for CTD deployment
17/02/2011 19:49	Core 26	-74.09998	-32.60034	Corer lifted to deck level.
17/02/2011 19:47	Core 26	-74.09997	-32.60033	Corer transferred back to corer gantry
17/02/2011 19:43	Core 26	-74.09999	-32.60035	Corer at the surface
17/02/2011 19:22	Core 26	-74.09994	-32.60021	Commenced recovery. Break out tension 4.2 tonnes
17/02/2011 19:21	Core 26	-74.09993	-32.60022	Corer on the seabed wire out 1 493m
17/02/2011 18:53	Core 26	-74.09993	-32.60021	Corer deployed veering

Time	Event	Lat	Lon	Comment
17/02/2011 18:52	Core 26	-74.09992	-32.60019	Weight transferred from crane to core wire
17/02/2011 18:46	Core 26	-74.09992	-32.60024	Commence deploying corer
17/02/2011 18:23	CTD 08	-74.09976	-32.60061	CTD recovered on deck
17/02/2011 18:21	CTD 08	-74.09976	-32.60062	CTD at the surface
17/02/2011 18:20	CTD 08	-74.09975	-32.60063	Recovering CTD due to problem with pumps
17/02/2011 18:16	CTD 08	-74.09975	-32.60055	CTD Soaking
17/02/2011 18:14	CTD 08	-74.09976	-32.60052	Commence deploying CTD
17/02/2011 18:03	BC 12	-74.09992	-32.60136	BCr recovered on deck
17/02/2011 18:00	BC 12	-74.1	-32.60186	BCr at the surface
17/02/2011 17:38	BC 12	-74.10032	-32.60348	Wire out 1488m BCr on the seabed commence hauling
17/02/2011 17:12	BC 12	-74.10036	-32.60578	BCr deployed veering EA 600 depth 1528m
17/02/2011 17:10	BC 12	-74.10034	-32.6057	Commence deploying BCr
17/02/2011 17:00		-74.10021	-32.60288	Vessel on D.P
17/02/2011 09:45	Core 25	-74.46437	-32.95227	Midships gantry 10 tonne Crane and Core Frame secured. Vessel off DP and proceeding to next core site
17/02/2011 09:20	Core 25	-74.46713	-32.95793	Corer lifted to deck level.
17/02/2011 09:17	Core 25	-74.46738	-32.95816	Corer transferred back to corer frame
17/02/2011 09:14	Core 25	-74.46742	-32.95869	Corer at the surface
17/02/2011 09:04	Core 25	-74.46748	-32.95938	Commenced recovery. Break out tension 3.2 tonnes
17/02/2011 09:03	Core 25	-74.46748	-32.95938	Corer on the seabed wire out 645m
17/02/2011 08:51	Core 25	-74.46721	-32.96098	Commenced lowering away. EA600 depth 652m
17/02/2011 08:50	Core 25	-74.4672	-32.96104	Corer transferred from cradle to core warp.
17/02/2011 08:47	Core 25	-74.4672	-32.96104	Commenced deployment
17/02/2011 08:34	Core 25	-74.46753	-32.96176	Vessel on station in D.P. Midships gantry 10 tonne crane and core gantry unlashed.
17/02/2011 02:15	BC 11	-74.65317	-33.46565	Vessel off D.P proceeding on passage
17/02/2011 02:07	BC 11	-74.65456	-33.46536	BCr on deck.
17/02/2011 02:03	BC 11	-74.65518	-33.46489	BCr at the surface
17/02/2011 01:49	BC 11	-74.65559	-33.46154	BCr on the seabed wire out 593m commence hauling
17/02/2011 01:32	BC 11	-74.65628	-33.46079	Deploy BCr EA 600 Depth 608m
17/02/2011 01:16	BC 11	-74.65809	-33.46061	Vessel in DP
17/02/2011 01:06	Mooring S2.3	-74.65979	-33.46241	No responce from mooring. Hydrophone recovered.
16/02/2011 23:12	Mooring S2.3	-74.66196	-33.45851	Vessel on site over mooring station.
16/02/2011 19:03		-74.77163	-33.41	Gantry and deck all secure. Vessel off D.P proceeding to mooring whilst surveying
16/02/2011 18:48	BC 10	-74.77069	-33.41418	BCr recovered on deck
16/02/2011 18:46	BC 10	-74.7706	-33.41387	BCr at the surface
16/02/2011 18:36	BC 10	-74.77034	-33.41337	BCr on the seabed wire out 574m commence hauling
16/02/2011 18:24	BC 10	-74.77042	-33.41386	BCr deployed
16/02/2011 18:23	BC 10	-74.7704	-33.41389	Commence deploying BCr
16/02/2011 18:03	Core 24	-74.77024	-33.41511	Corer in the cradle and lifted horizontal clear of the water
16/02/2011 17:58	Core 24	-74.77012	-33.41503	Weight transferred from core wire to the crane
16/02/2011 17:56	Core 24	-74.77005	-33.41499	Corer at the surface
16/02/2011 17:46	Core 24	-74.76989	-33.41484	Corer on the seabed wire out 574m hauling
16/02/2011 17:36	Core 24	-74.76967	-33.41516	Corer deployed Veering EA 600 depth 589m
16/02/2011 17:35	Core 24	-74.76968	-33.41516	Weight transferred from crane to core wire
16/02/2011 17:27	Core 24	-74.76968	-33.41515	Commence deploying corer
16/02/2011 17:13		-74.76949	-33.41614	Vessel on D.P for coreing
16/02/2011 08:31	Core 23	-74.56747	-33.45941	Midships gantry 10 tonne Crane and Core Frame secured. Vessel off DP and proceeding
16/02/2011 08:14	Core 23	-74.56733	-33.46135	Corer lifted to deck level.
16/02/2011 08:12	Core 23	-74.56729	-33.46125	Corer transferred back to corer frame
16/02/2011 08:09	Core 23	-74.56718	-33.4608	Corer at the surface
16/02/2011 07:59	Core 23	-74.56717	-33.46058	Commenced recovery. Break out tension 3.3 tonnes
16/02/2011 07:58	Core 23	-74.56717	-33.46057	Corer on the seabed. Wire out 633m
16/02/2011 07:47	Core 23	-74.56716	-33.46056	Commenced lowering away. EA600 depth 647m
16/02/2011 07:45	Core 23	-74.56715	-33.46057	Corer transferred from cradle to core warp.
16/02/2011 07:42	Core 23	-74.56716	-33.46056	Commenced deploying corer

Time	Event	Lat	Lon	Comment
16/02/2011 06:59	Core 23	-74.56711	-33.46014	Vessel on station in D.P. Midships gantry 10 tonne crane and core gantry unlashed.
16/02/2011 03:34		-74.48068	-33.49328	Gantry and deck all secure. Vessel off D.P proceeding to next core site whilst surveying
16/02/2011 03:24	BC 9	-74.48134	-33.49092	BCr recovered on deck
16/02/2011 03:23	BC 9	-74.4814	-33.49073	BCr at the surface
16/02/2011 03:12	BC 9	-74.48147	-33.48838	BCr on the seabed wire out 625m commence hauling
16/02/2011 02:59	BC 9	-74.48156	-33.48652	Deploy BCr EA 600 Depth 638m
16/02/2011 02:54	Core 22	-74.48155	-33.48633	corer on board
16/02/2011 02:50	Core 22	-74.48155	-33.48629	Corer at the surface
16/02/2011 02:38	Core 22	-74.48153	-33.48633	Corer on the seabed wire out 628m
16/02/2011 02:28	Core 22	-74.48157	-33.48626	Corer deployed Veering EA 600 depth 640m
16/02/2011 02:21	core 22	-74.48153	-33.48644	Commence deploying corer
16/02/2011 02:10	Core 22	-74.48134	-33.48493	Vessel in DP
16/02/2011 02:00	Core 22	-74.48226	-33.49252	Vessel on location
15/02/2011 22:59	Core 21	-74.39833	-33.46677	Midships gantry 10 tonne Crane and Core Frame secured. Vessel off DP and proceeding to next core site
15/02/2011 22:37	Core 21	-74.39938	-33.46885	Corer lifted to deck level.
15/02/2011 22:35	Core 21	-74.39951	-33.46924	Corer transferred back to corer gantry
15/02/2011 22:31	Core 21	-74.39971	-33.46949	Corer at the surface
15/02/2011 22:21	Core 21	-74.39982	-33.46956	Commenced recovery. Break out tension 3.2 tonnes
15/02/2011 22:20	Core 21	-74.39982	-33.46953	Corer on the seabed wire out 630m
15/02/2011 22:08	Core 21	-74.39978	-33.46963	Lowering away. EA600 depth 643m
15/02/2011 22:07	Core 21	-74.39979	-33.4697	Corer transferred from cradle to core warp.
15/02/2011 22:03	Core 21	-74.39981	-33.46969	Commenced deploying corer
15/02/2011 21:28	Core 21	-74.40011	-33.46956	Vessel on station in D.P. Midships gantry 10 tonne crane and core gantry unlashed.
14/02/2011 16:24		-74.21175	-35.99338	Deck all secure vessel proceeding with surveying
14/02/2011 16:13	CTD 07	-74.21178	-35.98881	CTD recovered on deck
14/02/2011 16:11	CTD 07	-74.21181	-35.98799	CTD clear of the water
14/02/2011 15:40	Core 07	-74.21188	-35.97485	Wire out 1844m commence hauling
14/02/2011 15:07	CTD 07	-74.21228	-35.96096	CTD veering to near bottom
14/02/2011 15:03	CTD 07	-74.21234	-35.95924	CTD in the water soaking EA 600 depth 1889m
14/02/2011 15:01	CTD 07	-74.21237	-35.95837	Commence deploying CTD
14/02/2011 14:30	WIF-3	-74.21319	-35.94513	Mooring fully recovered on deck
14/02/2011 13:28	WIF-3	-74.21727	-35.92548	Commence recovery of buoy
14/02/2011 13:14	WIF-3	-74.21288	-35.94946	Vessel off D.P
14/02/2011 13:12	WIF-3	-74.21513	-35.90844	Buoy sighted
14/02/2011 12:52	WIF-3	-74.21663	-35.90664	Mooring Released
14/02/2011 12:50	WIF-3	-74.21661	-35.90655	Accoustic release deployed
14/02/2011 12:48	Mooring WIF-3	-74.21664	-35.90653	Vessel in DP
14/02/2011 10:15	Mooring WIF-2	-74.33904	-35.9759	Deck secured. Vessel moving off towards mooring site WIF-3
14/02/2011 09:42	Mooring WIF-2	-74.34653	-35.99327	Buoy rig recovered to deck
14/02/2011 08:45	Mooring WIF-2	-74.35981	-36.01663	Commenced recovery of the mooring to deck.
14/02/2011 08:34	Mooring WIF-2	-74.35983	-36.01648	Top buoy grapnelled.
14/02/2011 08:15	Mooring WIF-2	-74.36302	-36.03132	Moorong top buoy sighted on the surface. Repositioning vessel for recovery.
14/02/2011 08:14	Mooring WIF-2	-74.36292	-36.03193	Hydrophone recovered. Moving vessel to new location
14/02/2011 08:06	Mooring WIF-2	-74.36285	-36.03295	Release signal resent. No responce from buoy.
14/02/2011 07:57	Mooring WIF-2	-74.36297	-36.03362	Release signal sent. No confirmation
14/02/2011 07:55	Mooring WIF-2	-74.36296	-36.03362	Permission to send release signal
14/02/2011 07:53	Mooring WIF-2	-74.36296	-36.03362	Hydrophone deloyed.
14/02/2011 07:43	Mooring WIF-2	-74.36297	-36.03369	Range to buoy 1571m. Hydrophone recovered
14/02/2011 07:41	Mooring WIF-2	-74.36297	-36.03364	Ships acoustics shut down. Hydrophone deployed.
14/02/2011 07:25	Mooring WIF-2	-74.36296	-36.03366	Vessel stopped on DP 460m upwind of mooring site to assess ice conditions

Time	Event	Lat	Lon	Comment
14/02/2011 07:12	Mooring WIF-2	-74.36213	-36.02034	Vessel arrived on station over mooring. Nothing sighted on the EA600
14/02/2011 03:56		-74.5607	-36.00222	Completed acoustic survey proceeding to WIF2 mooring
13/02/2011 07:05	Core 20	-74.57974	-33.47328	Deck all secure vessel proceeding with surveying
13/02/2011 06:46	Core 20	-74.58442	-33.47303	Corer in the cradle and lifted horizontal clear of the water
13/02/2011 06:39	Core 20	-74.58434	-33.47242	Weight transferred from core wire to the crane
13/02/2011 06:34	Core 20	-74.58433	-33.47245	Corer at the surface
13/02/2011 06:25	Core 20	-74.58394	-33.47187	Corer clear of the seabed hauling
13/02/2011 06:23	Core 20	-74.58406	-33.47201	Wire stopped at 630m hauling
13/02/2011 06:21	Core 20	-74.58411	-33.47196	Veering onto the seabed to take core
13/02/2011 06:16	Core 20	-74.58377	-33.47201	Wire out 542m stopped just above the seabed
13/02/2011 06:07	Core 20	-74.58472	-33.47171	Corer deployed Veering EA 600 depth 643m
13/02/2011 06:06	Core 20	-74.58476	-33.47167	Weight transferred from crane to core wire
13/02/2011 06:01	Core 20	-74.58499	-33.47172	Commence deploying corer
13/02/2011 04:45		-74.58576	-33.46769	Vessel on D.P
12/02/2011 22:10	Mooring S2.3	-74.65818	-33.45986	All secure. Resumed acoustic survey along track 180.
12/02/2011 22:04	Mooring S2.3	-74.65959	-33.46458	No responce from mooring. Hydrophone recovered.
12/02/2011 22:00	Mooring S2.3	-74.66028	-33.46566	Vessel stopped and drifting. Hydrophone deployed.
12/02/2011 21:10	Mooring S2.3	-74.66002	-33.46179	Vessel on site over mooring station.
12/02/2011 20:38	Mooring S2.2	-74.64841	-33.54354	Vessel proceeding to Mooring Site S2.3
12/02/2011 20:34	Mooring S2.2	-74.64961	-33.54669	Hydrophone recovered.
12/02/2011 20:32	Mooring S2.2	-74.65017	-33.54834	Hydrophone deployed. Lander still on the seabed and put to sleep.
12/02/2011 20:27	Mooring S2.2	-74.65116	-33.5522	Vessel off DP and drifting.
12/02/2011 20:16	Mooring S2.2	-74.65132	-33.55226	No responce from lander
12/02/2011 20:07	Mooring S2.2	-74.65137	-33.55218	Hydrophone deployed.
12/02/2011 19:56	Mooring S2.2	-74.65132	-33.55406	Vessel stopped on D.P
12/02/2011 19:03	Mooring S2.2	-74.64992	-33.54246	Vessel off DP to clear ice from mooring site.
12/02/2011 18:58	Mooring S2.2	-74.65044	-33.54513	Communication established with mooring range 714m. Hydrophone recovered
12/02/2011 18:55	Mooring S2.2	-74.65056	-33.54545	Hydrophone deployed.
12/02/2011 18:43	Mooring S2.2	-74.65038	-33.54491	Vessel on D.P
12/02/2011 18:17	Mooring S2.2	-74.65216	-33.55319	Vessel at mooring site attempting to clear a open pool
12/02/2011 17:50	Mooring S2.1	-74.63388	-33.48947	Gantry and deck all secure vessel proceeding to next mooring site
12/02/2011 17:31	Mooring S2.1	-74.63415	-33.49762	Mooring fully recovered on deck
12/02/2011 17:17	Mooring S2.1	-74.63415	-33.497	Hydrophone recovered.
12/02/2011 17:13	Mooring S2.1	-74.63443	-33.49832	Commence recovering the mooring
12/02/2011 17:03	Mooring S2.1	-74.63404	-33.50109	Grappled mooring float
12/02/2011 16:53	Mooring S2.1	-74.63375	-33.49811	Hydrophone recovered vessel proceeding to recover mooring
12/02/2011 16:52	Mooring S2.1	-74.63375	-33.4981	Mooring sighted at the surface
12/02/2011 16:47	Mooring S2.1	-74.63375	-33.49807	Release signal sent
12/02/2011 16:45	Mooring S2.1	-74.6338	-33.49857	Hydrophone deployed.
12/02/2011 16:27	Mooring S2.1	-74.63425	-33.49926	Vessel on D.P
12/02/2011 15:54	Mooring S2.1	-74.6341	-33.50281	Vessel off D.P trying to make an open pool ready for releasing the mooring
12/02/2011 15:51	Mooring S2.1	-74.63412	-33.5028	Hydrophone recovered.
12/02/2011 15:50	Mooring S2.1	-74.63411	-33.50276	Established communication with release unit
12/02/2011 15:47	Mooring S2.1	-74.63412	-33.50281	Hydrophone deloyed.
12/02/2011 15:35	Mooring S2.1	-74.6341	-33.50276	Vessel on D.P
12/02/2011 15:16	Mooring S2.11	-74.63431	-33.50334	Vessel off D.P
12/02/2011 14:59	Mooring S2.1	-74.63437	-33.49742	Release signal failed Vessel moving over mooring
12/02/2011 14:41	Mooring S2.1	-74.63442	-33.49744	Hydrophone deployed and release signal sent to the mooring
12/02/2011 14:25	Mooring S2.1	-74.63461	-33.49731	Vessel in DP

Time	Event	Lat	Lon	Comment
12/02/2011 13:34		-74.63427	-33.50295	Arrival at Mooring site S2 commence Ice breaking to clear area.
11/02/2011 18:18	BC 8	-74.51685	-31.31676	Gantry and deck all secure. Vessel off D.P
11/02/2011 18:08	BC 8	-74.51684	-31.31669	BCr recovered on deck
11/02/2011 17:58	BC 8	-74.51686	-31.31669	BCr clear of seabed hauling
11/02/2011 17:56	BC 8	-74.51686	-31.31668	BCr on the seabed. 539m Wire out
11/02/2011 17:40	BC 8	-74.51684	-31.31673	BCr deployed
11/02/2011 17:38	BC 8	-74.51684	-31.31674	Commence deploying BCr
11/02/2011 17:23	CTD 06	-74.51685	-31.31674	CTD recovered on deck
11/02/2011 17:20	CTD 06	-74.51685	-31.31676	CTD clear of the water
11/02/2011 17:11	CTD 06	-74.51685	-31.31672	CTD wire out 527m commence hauling
11/02/2011 16:55	CTD 06	-74.51681	-31.31667	CTD stopped at wire out 522m
11/02/2011 16:43	CTD 06	-74.51685	-31.31664	CTD veering to near bottom
11/02/2011 16:38	CTD 06	-74.51683	-31.31665	CTD in the water soaking EA 600 depth 552m
11/02/2011 16:36	CTD 06	-74.51685	-31.31666	Commence deploying CTD
11/02/2011 16:00		-74.51782	-31.31513	Vessel on D.P
10/02/2011 11:54		-71.79514	-29.60866	Vessel off DP and proceeding
10/02/2011 11:42	BC 7	-71.79512	-29.60853	BCr on deck.
10/02/2011 11:39	BC 7	-71.79511	-29.60854	BCr at the surface
10/02/2011 10:44	BC 7	-71.79513	-29.60854	Commenced recovering the BCr
10/02/2011 10:42	BC 7	-71.79513	-29.60853	BCr on the seabed. 3 778m Wire out
10/02/2011 09:33	BC 7	-71.79504	-29.60849	BCr deployed
10/02/2011 09:32	BC 7	-71.79503	-29.60848	BCr off the deck
10/02/2011 09:19	Core 19	-71.79494	-29.60812	Corer gantry lifted back to deck level.
10/02/2011 09:17	Core 19	-71.79497	-29.60811	Corer transferred back to corer gantry
10/02/2011 09:13	Core 19	-71.79507	-29.608	Corer at the surface
10/02/2011 08:14	Core 19	-71.79503	-29.60805	Commenced recovery. Break out tension 4.98 tonnes
10/02/2011 08:13	Core 19	-71.79503	-29.60806	Corer on the seabed wire out 3 779m
10/02/2011 07:03	Core 19	-71.7949	-29.60785	Commenced veering. EA600 water depth 3 883m
10/02/2011 07:01	Core 19	-71.7949	-29.60784	Corer transferred from cradle to core warp.
10/02/2011 06:57	Core 19	-71.79491	-29.60793	Commence deploying corer
10/02/2011 06:25	CTD 05	-71.79493	-29.60793	CTD recovered on deck
10/02/2011 06:22	CTD 05	-71.79492	-29.60794	CTD clear of the water
10/02/2011 05:09	CTD 05	-71.79492	-29.60794	CTD wire out 3776m commence hauling
10/02/2011 03:52	CTD 05	-71.79491	-29.60797	CTD veering to near bottom
10/02/2011 03:48	CTD 05	-71.79492	-29.60794	CTD in the water soaking EA 600 depth 3831m
10/02/2011 03:43	CTD 05	-71.79491	-29.60796	Commence deploying CTD
10/02/2011 02:48		-71.79498	-29.60847	Vessel on D.P
10/02/2011 02:05		-71.78321	-29.55287	Commence TOPAS survey
08/02/2011 11:59		-70.90863	-26.11848	Vessel off DP and proceeding
08/02/2011 11:43	BC 6	-70.9075	-26.12022	corer on board
08/02/2011 10:37	BC 6	-70.90749	-26.12023	Commenced recovery of the BCr
08/02/2011 10:35	BC 6	-70.90755	-26.12025	BCr on the seabed. 4 200m Wire out
08/02/2011 09:18	BC 6	-70.90748	-26.12024	BCr deployed
08/02/2011 09:17	BC 6	-70.90749	-26.12028	BCr off the deck
08/02/2011 08:55	Core 18	-70.90747	-26.1202	Corer gantry lifted back to deck level.
08/02/2011 08:52	Core 18	-70.90749	-26.12026	Corer transferred back to corer gantry
08/02/2011 08:45	Core 18	-70.90748	-26.12021	Corer at the surface
08/02/2011 07:38	Core 18	-70.90748	-26.12021	Commenced recovery. Break out tension 6.3tonnes
08/02/2011 07:36	Core 18	-70.90748	-26.12027	Corer on the seabed wire out 4189m
08/02/2011 06:17	Core 18	-70.90748	-26.12025	Corer deployed veering
08/02/2011 06:15	Core 18	-70.90748	-26.12028	Weight transferred from crane to core wire
08/02/2011 06:12	Core 18	-70.9075	-26.12023	Commence deploying corer
08/02/2011 05:36	CTD 04	-70.90749	-26.1202	CTD recovered on deck
08/02/2011 05:33	CTD 04	-70.90748	-26.12022	CTD clear of the water
08/02/2011 04:22	CTD 04	-70.90749	-26.12018	CTD wire out 4175m commence hauling
08/02/2011 03:11	CTD 04	-70.90747	-26.12023	CTD veering to near bottom
08/02/2011 03:08	CTD 04	-70.90749	-26.12026	CTD in the water soaking EA 600 depth 4287m
08/02/2011 03:03	CTD 04	-70.90744	-26.1202	Commence deploying CTD
08/02/2011 03:00		-70.90764	-26.12004	Vessel on D.P
07/02/2011 20:05	BC 5	-70.53586	-24.31776	Midships gantry 10 tonne Crane and Core Frame secured. Vessel off DP and proceeding.
07/02/2011 19:54	BC 5	-70.53587	-24.31775	BCr on deck.
07/02/2011 19:52	BC 5	-70.53588	-24.31775	BCr at the surface

Time	Event	Lat	Lon	Comment
07/02/2011 18:47	BC 5	-70.53587	-24.31777	Wire out 4303m BCr on the seabed commence hauling
07/02/2011 17:27	BC 5	-70.53586	-24.31773	BCr deployed
07/02/2011 17:26	BC 5	-70.53586	-24.31766	Commence deploying BCr
07/02/2011 17:00	CTD 03	-70.53587	-24.31772	CTD recovered on deck
07/02/2011 16:57	CTD 03	-70.53587	-24.31776	CTD clear of the water
07/02/2011 15:45	CTD 03	-70.53587	-24.31778	Wire out 4257m commence hauling
07/02/2011 14:33	CTD 03	-70.53584	-24.31781	CTD veering to near bottom
07/02/2011 14:29	CTD 03	-70.53585	-24.31779	CTD in the water soaking EA 600 depth 4333m
07/02/2011 14:28	CTD 03	-70.53587	-24.31777	Commence deploying CTD
07/02/2011 13:57	Core 17	-70.53588	-24.31776	corer on board
07/02/2011 13:54	Core 17	-70.53588	-24.31776	Corer at the surface
07/02/2011 12:48	Core 17	-70.53587	-24.31771	Corer clear of the seabed hauling
07/02/2011 12:45	Core 17	-70.53586	-24.31777	Corer on the seabed wire out 4267m
07/02/2011 11:25	Core 17	-70.53587	-24.31767	Corer deployed Veering. EA 600 depth 4360m
07/02/2011 11:19	Core 17	-70.53587	-24.31774	Commence deploying corer
07/02/2011 10:52	Core 17	-70.53558	-24.31699	Vessel on station in D.P. Midships gantry 10 tonne crane and core gantry unlashed.
06/02/2011 22:32		-69.56604	-24.66496	Maggy recovered to deck. Increasing to 8kts for Topaz survey.
06/02/2011 22:26		-69.55601	-24.67312	Commenced maggy recovery.
06/02/2011 22:21		-69.5432	-24.6919	Reducing speed to 5kts for maggy recovery.
04/02/2011 14:07		-61.99665	-43.83246	Deploy Maggy
04/02/2011 06:40		-60.96489	-45.18241	Gantry and deck all secure. Vessel off D.P
04/02/2011 06:18	Core 16	-60.96488	-45.18243	Corer in the cradle and lifted horizontal clear of the water
04/02/2011 06:12	Core 16	-60.96488	-45.18243	Corer at the surface
04/02/2011 06:07	Core 16	-60.96485	-45.18243	corer clear of seabed
04/02/2011 06:05	Core 16	-60.96486	-45.18241	Corer on the seabed wire out 334m
04/02/2011 05:59	Core 16	-60.96485	-45.18243	Corer deployed Veering EA 600 depth 332m
04/02/2011 05:58	Core 16	-60.96484	-45.18248	Weight transferred from crane to core wire
04/02/2011 05:55	Core 16	-60.96484	-45.18236	Corer lifted out of the cradle
04/02/2011 05:53	Core 16	-60.96481	-45.18235	Commence deploying corer
04/02/2011 05:45		-60.96489	-45.18108	Vessel on D.P for coreing
04/02/2011 02:48	Core 15	-61.25414	-44.76685	Vessel off D.P proceeding to next site
04/02/2011 02:20	Core 15	-61.25466	-44.76372	corer on board
04/02/2011 02:19	Core 15	-61.25465	-44.76371	Corer at the surface
04/02/2011 02:13	Core 15	-61.25466	-44.76373	Corer clear of the seabed hauling
04/02/2011 02:11	Core 15	-61.25466	-44.76373	Corer on the seabed wire out 331m
04/02/2011 02:03	Core 15	-61.25469	-44.76385	Corer deployed Veering. EA 600 depth 326m
04/02/2011 02:00	Core 15	-61.25475	-44.76394	Commence deploying corer
04/02/2011 01:55	Core 15	-61.25486	-44.76413	Vessel on D.P
03/02/2011 23:00	Core 14	-61.5851	-44.36626	Midships gantry 10 tonne Crane and Core Frame secured. Vessel off DP and proceeding to next core site
03/02/2011 22:42	Core 14	-61.58513	-44.36623	Corer gantry lifted back to deck level.
03/02/2011 22:39	Core 14	-61.58513	-44.36623	Corer transferred back to corer frame
03/02/2011 22:34	Core 14	-61.58512	-44.36625	Corer at the surface
03/02/2011 22:27	Core 14	-61.58513	-44.36628	Commenced recovery. Break out tension 3.93tonnes
03/02/2011 22:26	Core 14	-61.58512	-44.3663	Corer on the seabed wire out 400m
03/02/2011 22:18	Core 14	-61.58514	-44.36625	Commenced veering. EA600 water depth 405m
03/02/2011 22:17	Core 14	-61.58512	-44.36626	Corer transferred from cradle to core warp.
03/02/2011 22:14	Core 14	-61.58512	-44.36628	Commenced deploying corer
03/02/2011 21:53	Core 14	-61.58489	-44.36653	Midships gantry 10 tonne crane and corer frame unlashed.
03/02/2011 21:48	Core 14	-61.58467	-44.36686	Vessel on station in DP
03/02/2011 21:28	Seis 01	-61.5917	-44.32245	Streamer recovered. All clear after. Repositioning vessel for Core Site No14
03/02/2011 21:20	Seis 01	-61.59551	-44.32695	Commenced recovery of the streamer
03/02/2011 21:17	Seis 01	-61.5969	-44.32884	Sparker recovered
03/02/2011 21:15	Seis 01	-61.59771	-44.32999	Commenced recovering the sparker
03/02/2011 21:00	Seis 01	-61.59742	-44.35136	Completed Seis survey. Turning into the wind (027 degrees) and reducing to 2kts for equipment recovery
03/02/2011 12:48	Seis 01	-61.08252	-45.00529	Restart Seis 01
03/02/2011 12:00	Seis 01	-61.08184	-45.00604	Commence Seis survey

Time	Event	Lat	Lon	Comment
03/02/2011 10:29	Seis 01	-61.07466	-45.01813	Sparker deploy to 20m. Awaiting confirmation all ready to commenced survey run.
03/02/2011 10:13	Seis 01	-61.08158	-45.02974	Commenced deployment of the sparker
03/02/2011 10:09	Seis 01	-61.08302	-45.03317	Streamer deployed to 100m
03/02/2011 09:59	Seis 01	-61.08638	-45.04202	Vessel head to wind at 2kts. Commenced deployment of the streamer.
03/02/2011 01:04	Core 13	-60.91432	-45.15529	Vessel off DP and proceeding
03/02/2011 00:38	Core 13	-60.91474	-45.155	corer on board
03/02/2011 00:32	Core 13	-60.91474	-45.155	Corer at the surface
03/02/2011 00:26	Core 13	-60.91473	-45.15502	Corer clear of the seabed hauling
03/02/2011 00:24	Core 13	-60.91473	-45.15502	Corer on the seabed wire out 315m
03/02/2011 00:18	Core 13	-60.91474	-45.15499	Corer deployed Veering. EA 600 depth 312m
03/02/2011 00:12	Core 13	-60.91474	-45.15501	Commence deploying corer
02/02/2011 23:56	Core 13	-60.91463	-45.15474	Vessel on station in DP
02/02/2011 22:28	Core 12	-61.03924	-44.99421	Vessel off D.P. Continuing SWATH survey on route to next core site.
02/02/2011 22:27	Core 12	-61.03708	-45.00218	Midships gantry 10 tonne Crane and Core Frame secured.
02/02/2011 22:11	Core 12	-61.03708	-45.00217	Corer gantry lifted back to deck level.
02/02/2011 22:08	Core 12	-61.03709	-45.00217	Corer transferred back to corer gantry
02/02/2011 21:58	Core 12	-61.03708	-45.00218	Corer at the surface
02/02/2011 21:51	Core 12	-61.03708	-45.00216	Commenced recovery. Break out tension 2.62 tonnes
02/02/2011 21:50	Core 12	-61.03708	-45.00218	Corer on the seabed wire out 397m
02/02/2011 21:41	Core 12	-61.03709	-45.00221	Commenced veering. EA600 water depth 403m
02/02/2011 21:40	Core 12	-61.03708	-45.00222	Corer transferred from cradle to core warp.
02/02/2011 21:36	Core 12	-61.0371	-45.00222	Commenced deploying corer
02/02/2011 20:39	BC 4	-61.03707	-45.00213	BCr on deck.
02/02/2011 20:37	BC 4	-61.03707	-45.00215	BCr at the surface
02/02/2011 20:29	BC 4	-61.03706	-45.00215	Commenced recovery of the BCr
02/02/2011 20:27	BC 4	-61.03706	-45.00216	BCr on the seabed. 400m Wire out
02/02/2011 20:17	BC 4	-61.03707	-45.00213	BCr deployed
02/02/2011 20:16	BC 4	-61.03706	-45.00213	BCr off the deck
02/02/2011 20:02	Core 11	-61.03706	-45.00215	Corer gantry lifted back to deck level.
02/02/2011 19:59	Core 11	-61.03706	-45.00216	Corer transferred back to corer frame
02/02/2011 19:50	Core 11	-61.03705	-45.00214	Corer at the surface
02/02/2011 19:42	Core 11	-61.03707	-45.00216	Commenced recovery. Break out tension 3.5 tonnes
02/02/2011 19:41	Core 11	-61.03706	-45.00214	Corer on the seabed wire out 405m
02/02/2011 19:33	Core 11	-61.03709	-45.00217	Commenced veering. EA600 water depth 403m
02/02/2011 19:32	Core 11	-61.03709	-45.00217	Corer transferred from cradle to core warp.
02/02/2011 19:28	Core 11	-61.03707	-45.00218	Commenced corer deployment
02/02/2011 19:02	Core 11	-61.03718	-45.00202	Midships gantry 10 tonne crane and corer frame unlashed.
02/02/2011 19:00		-61.03727	-45.00199	Vessel on D.P for coreing
02/02/2011 18:27		-61.04932	-44.89791	Gantry and deck all secure. Vessel off D.P proceeding to core site
02/02/2011 18:16	Core 10	-61.04939	-44.89751	Corer in the cradle and lifted horizontal clear of the water
02/02/2011 18:09	Core 10	-61.04938	-44.89748	Core at the surface
02/02/2011 18:04	Core 10	-61.04938	-44.89752	Corer clear of the seabed hauling
02/02/2011 18:02	Core 10	-61.04939	-44.89751	Corer on the seabed wire out 315m
02/02/2011 17:56	Core 10	-61.04938	-44.8975	Corer deployed Veering. EA 600 depth 313m
02/02/2011 17:55	Core 10	-61.04939	-44.89754	Weight transferred from crane to core wire
02/02/2011 17:51	Core 10	-61.04942	-44.89762	Commence deploying corer
02/02/2011 17:35		-61.05133	-44.8923	Vessel on D.P for coreing
02/02/2011 17:23		-61.06049	-44.9262	Gantry and deck all secure. Vessel off D.P proceeding to core site
02/02/2011 17:07	Core 9	-61.06078	-44.92687	Corer in the cradle and lifted horizontal clear of the water
02/02/2011 17:01	Core 9	-61.06079	-44.92688	Weight transferred from core wire to the crane
02/02/2011 16:59	Core 9	-61.06077	-44.92685	Core at the surface
02/02/2011 16:53	Core 9	-61.06079	-44.92689	Corer clear of the seabed hauling
02/02/2011 16:52	Core 9	-61.06078	-44.9269	Corer on the seabed wire out 357m
02/02/2011 16:44	Core 9	-61.06081	-44.92691	Corer deployed Veering. EA 600 depth 359m
02/02/2011 16:43	Core 9	-61.0608	-44.92694	Weight transferred from crane to core wire
02/02/2011 16:37	Core 9	-61.06082	-44.927	Commence deploying corer

Time	Event	Lat	Lon	Comment
02/02/2011 16:17		-61.06158	-44.92615	Vessel on D.P for coreing
02/02/2011 14:10		-61.18187	-44.75392	Gantry and deck all secure. Vessel off D.P
02/02/2011 13:52	Core 8	-61.18187	-44.75393	corer on board
02/02/2011 13:47	Core 8	-61.18188	-44.7539	Corer at the surface
02/02/2011 13:41	Core 8	-61.18189	-44.7539	Corer clear of the seabed hauling
02/02/2011 13:39	Core 8	-61.1819	-44.75394	Corer on the seabed. Wire out 334m
02/02/2011 13:32	Core 8	-61.1819	-44.75395	Corer deployed Veering. EA 600 depth 336m
02/02/2011 13:24	Core 8	-61.18183	-44.75382	Commence deploying corer
02/02/2011 13:15	BC 3	-61.18158	-44.75329	BCr on deck.
02/02/2011 13:07	BC 3	-61.18157	-44.75328	BCr clear of seabed
02/02/2011 13:05	BC 3	-61.18157	-44.75327	BCr on the seabed. 333m Wire out
02/02/2011 12:56	BC 3	-61.18158	-44.75329	Deploy BCr EA 600 Depth 336m
02/02/2011 12:48	Core 7	-61.18157	-44.75325	corer on board
02/02/2011 12:38	Core 7	-61.18158	-44.75325	Corer at the surface
02/02/2011 12:31	Core 7	-61.18158	-44.75324	corer clear of seabed
02/02/2011 12:30	Core 7	-61.18158	-44.75324	Corer on the seabed. Wire out 334m
02/02/2011 12:23	Core 7	-61.18158	-44.75323	Corer deployed Veering. EA 600 depth 336m
02/02/2011 12:15	Core 7	-61.18159	-44.75327	Commence deploying corer
02/02/2011 11:50	Core 7	-61.1816	-44.75383	Vessel in DP
01/02/2011 17:04	CTD 02	-60.54212	-46.51571	Vessel off D.P proceeding on passage
01/02/2011 16:55	CTD 02	-60.5421	-46.51572	Gantry and deck all secure
01/02/2011 16:47	CTD 02	-60.54212	-46.51575	CTD recovered on deck
01/02/2011 16:44	CTD 02	-60.54214	-46.51579	CTD out of the water
01/02/2011 16:31	CTD 02	-60.54213	-46.51574	CTD wire out 783m commence hauling
01/02/2011 16:15	CTD02	-60.54211	-46.51572	CTD veering to near bottom
01/02/2011 16:12	CTD 02	-60.54214	-46.51566	CTD in the water soaking EA 600 depth 813m
01/02/2011 16:07	CTD 02	-60.54234	-46.51544	Commence deploying CTD
01/02/2011 16:02		-60.54304	-46.51433	Vessel on D.P
01/02/2011 15:01		-60.42356	-46.57734	Vessel off D.P proceeding to next site
01/02/2011 14:44	BC 2	-60.42354	-46.57732	BCr on deck.
01/02/2011 14:41	BC 2	-60.42355	-46.57734	BCr at the surface
01/02/2011 14:32	BC 2	-60.42354	-46.57734	BCr clear of seabed
01/02/2011 14:30	BC 2	-60.42353	-46.57742	BCr on the seabed. Wire out 506m
01/02/2011 14:18	BC 2	-60.42351	-46.57743	Deploy BCr
01/02/2011 14:05	core 6	-60.42356	-46.57737	corer on board
01/02/2011 13:53	core 6	-60.42357	-46.57738	Corer at the surface
01/02/2011 13:45	core 6	-60.42357	-46.57733	Corer clear of the seabed hauling
01/02/2011 13:44	core 6	-60.42357	-46.57737	Corer on the seabed. Wire out 509m
01/02/2011 13:33	core 6	-60.42371	-46.57734	Corer deployed Veering. EA 600 depth 522m
01/02/2011 13:27	core 6	-60.42367	-46.57744	Commence deploying corer
01/02/2011 13:09	Core 5	-60.424	-46.57739	corer on board
01/02/2011 12:56	Core 5	-60.42401	-46.57736	Corer at the surface
01/02/2011 12:48	Core 5	-60.42401	-46.57732	Corer clear of the seabed hauling
01/02/2011 12:46	Core 5	-60.424	-46.57735	Corer on the seabed. Wire out 509m
01/02/2011 12:36	Core 5	-60.424	-46.57731	Corer deployed Veering. EA 600 depth 522m
01/02/2011 12:26	Core 5	-60.42401	-46.57733	Commence deploying corer
01/02/2011 12:16	Core 5	-60.42398	-46.57733	In Position
01/02/2011 11:32		-60.43455	-46.66319	End of Swath heading to core site 5
01/02/2011 10:43		-60.54642	-46.54618	Resumed SWATH survet along line 332 degrees
01/02/2011 10:33	Core 4	-60.54217	-46.51588	Vessel off DP and proceeding
01/02/2011 10:11	Core 4	-60.54219	-46.51592	Midships gantry 10 tonne Crane and Core Frame secured.
01/02/2011 09:57	Core 4	-60.54219	-46.51591	Corer gantry lifted back to deck level.
01/02/2011 09:56	Core 4	-60.5422	-46.51587	Corer transferred back to corer gantry
01/02/2011 09:51	Core 4	-60.54219	-46.51587	Corer at the surface
01/02/2011 09:38	Core 4	-60.54218	-46.51585	Commenced recovery. Break out tension 3.50 tonnes
01/02/2011 09:37	Core 4	-60.54218	-46.51587	Corer on the seabed. Wire out 813m
01/02/2011 09:21	Core 4	-60.54217	-46.51588	Commenced veering. EA600 water depth 815m
01/02/2011 09:20	Core 4	-60.54218	-46.51588	Corer transferred from cradle to core warp.
01/02/2011 09:16	Core 4	-60.54217	-46.51588	Commenced deploying corer
01/02/2011 08:22	Core 3	-60.54216	-46.51589	Corer gantry lifted back to deck level
01/02/2011 08:20	Core 3	-60.54218	-46.51588	Corer transferred back to corer gantry
01/02/2011 08:15	Core 3	-60.54214	-46.51588	Corer at the surface
01/02/2011 08:02	Core 3	-60.54216	-46.51589	Commenced recovery. Break out tension 3.56 tonnes
01/02/2011 08:00	Core 3	-60.54216	-46.51588	Corer on the seabed. Wire out 804m

Time	Event	Lat	Lon	Comment
01/02/2011 07:40	Core 3	-60.54217	-46.51591	Commenced veering. EA600 water depth 815m
01/02/2011 07:38	Core 3	-60.54219	-46.51589	Corer transferred from cradle to core warp.
01/02/2011 07:35	Core 3	-60.5422	-46.51587	Commenced corer deployment
01/02/2011 07:11	Core 3	-60.5422	-46.51588	Midships gantry 10 tonne crane and corer frame unlashed.
01/02/2011 07:03	Core 3	-60.54215	-46.51576	Vessel on station in DP
01/02/2011 06:28		-60.5666	-46.43489	End of TOPAS survey proceeding to core site
31/01/2011 22:31		-60.36202	-46.56977	Commence TOPAS survey
31/01/2011 09:55	Core 2	-60.8204	-50.98076	Vessel off DP and proceeding
31/01/2011 09:40	Core 2	-60.82035	-50.98081	Midships gantry 10 tonne Crane and Core Frame secured.
31/01/2011 09:18	Core 2	-60.8204	-50.9808	Corer gantry lifted back to deck level.
31/01/2011 09:15	Core 2	-60.82038	-50.98081	Corer transferred back to corer gantry
31/01/2011 09:12	Core 2	-60.8204	-50.98076	Corer at the surface
31/01/2011 08:35	Core 2	-60.82037	-50.98082	Commenced recovery. Pull out tension 5.00t
31/01/2011 08:34	Core 2	-60.82037	-50.98084	Corer on the seabed. Wire out 2 483m
31/01/2011 07:47	Core 2	-60.82037	-50.98083	Commenced veering. EA600 water depth 2 600m
31/01/2011 07:46	Core 2	-60.82039	-50.9808	Corer transferred from cradle to core warp.
31/01/2011 07:42	Core 2	-60.82039	-50.98083	Commenced deploying corer
31/01/2011 07:17	Core 1	-60.8204	-50.98081	Core found to be of insufficient length. Rigging for a second deployment.
31/01/2011 06:43	Core 1	-60.82039	-50.98078	Corer in the cradle and lifted horizontal clear of the water
31/01/2011 06:39	Core 1	-60.82038	-50.98077	Weight transferred from core wire to the crane
31/01/2011 06:37	Core 1	-60.82037	-50.98076	Corer at the surface
31/01/2011 06:00	Core 1	-60.82038	-50.98077	Corer clear of the seabed hauling
31/01/2011 05:57	Core 1	-60.82035	-50.98076	Corer on the seabed wire out 2485m
31/01/2011 05:07	Core 1	-60.82028	-50.98104	Corer deployed Veering. EA 600 depth 2604m
31/01/2011 05:06	Core 1	-60.82028	-50.98108	Weight transferred from crane to core wire
31/01/2011 05:04	Core 1	-60.82029	-50.9811	Corer lifted out of thecradle
31/01/2011 05:00	Core 1	-60.82023	-50.98126	Commence deploying corer
31/01/2011 04:40	Core 1	-60.82052	-50.98147	Vessel on D.P for coreing
31/01/2011 04:04	CTD 01	-60.77572	-51.00516	Gantry and deck all secure. Vessel off D.P proceeding to core site
31/01/2011 03:56	CTD 01	-60.77572	-51.00521	CTD recovered on deck
31/01/2011 03:53	CTD 01	-60.77573	-51.00521	CTD clear of the water
31/01/2011 03:03	CTD 01	-60.77574	-51.00517	CTD wire out 2789m commence hauling
31/01/2011 02:15	CTD 01	-60.77453	-51.0061	CTD Veering
31/01/2011 02:08	CTD 01	-60.77452	-51.00615	CTD Soaking
31/01/2011 02:04	CTD 01	-60.77454	-51.00611	Deploy CTD EA 600 depth 2864m
31/01/2011 01:46	CTD 01	-60.77404	-51.00653	In Position
30/01/2011 23:42	Magnetometer 2	-60.74692	-51.02297	Maggy On Board commence Topaz survey
30/01/2011 23:30	Magnetometer 2	-60.73004	-51.03372	Commence maggy recovery
30/01/2011 17:21	Magnetometer 2	-59.64639	-51.70452	Magnetometer deployed increaseing power to resume passage
30/01/2011 17:13	Magnetometer 2	-59.6355	-51.70943	Commence deploying Magnetometer
30/01/2011 17:09	Magnetometer 2	-59.62633	-51.71329	Commence slowing down to 5knots to deploy the Magnetometer
29/01/2011 15:38	Magnetometer 1	-55.24579	-55.70046	Magnetometer recovered on deck increasing speed to resume passage
29/01/2011 15:34	Magnetometer 1	-55.23838	-55.70512	Commence recovering magnetometer
29/01/2011 15:31	Magnetometer 1	-55.23009	-55.70988	Commence slowing down to 5knots to recover the Magnetometer
29/01/2011 02:30	Magnetometer 1	-53.0267	-58.03725	Maggy Deployed and on passage
29/01/2011 02:22	Magnetometer 1	-53.01321	-58.03779	Deploy Maggy
29/01/2011 02:18		-53.01222	-58.04028	Off station finished corer test
29/01/2011 01:08	corer test 2	-53.0131	-58.04049	Stbd gantry stowed
29/01/2011 01:04	corer test 2	-53.01308	-58.04049	Corer transferred back to corer frame
29/01/2011 00:51	corer test 2	-53.01307	-58.0405	corer clear of seabed
29/01/2011 00:49	corer test 2	-53.01307	-58.04046	Corer on the seabed. Wire out 602m
29/01/2011 00:36	corer test 2	-53.01307	-58.04052	Corer deployed
29/01/2011 00:35	corer test 2	-53.01306	-58.0405	Corer gantry lowered
28/01/2011 22:58	BCr 01	-53.01307	-58.04049	BCr on deck.
28/01/2011 22:56	BCr 01	-53.01307	-58.04043	BCr at the surface
28/01/2011 22:45	BCr 01	-53.0131	-58.04047	Commenced recovery of the BCr

Time	Event	Lat	Lon	Comment
28/01/2011 22:43	BCr 01	-53.01308	-58.04048	BCr on the seabed. Wire out 605m
28/01/2011 22:29	BCr 01	-53.01308	-58.04047	BCr deployed
28/01/2011 22:28	BCr 01	-53.01308	-58.04047	BCr off the deck
28/01/2011 22:10	Test Core 1	-53.01309	-58.04047	Corer gantry lifted back to deck level.
28/01/2011 22:09	Test Core 1	-53.0131	-58.04046	Corer transferred back to corer gantry
28/01/2011 22:03	Test Core 1	-53.01308	-58.04047	Corer at the surface
28/01/2011 21:49	Test Core 1	-53.01308	-58.04049	Commenced recovery. Break out tension 2.73tonnes
28/01/2011 21:47	Test Core 1	-53.01308	-58.0405	Corer on the seabed. Wire out 606m
28/01/2011 21:33	Test Core 1	-53.01305	-58.04048	Corer deployed
28/01/2011 21:32	Test Core 1	-53.01307	-58.0405	Corer transferred to midship gantry
28/01/2011 21:27	Test Core 1	-53.01309	-58.04046	Corer gantry lowered
28/01/2011 21:05	Test Core 1	-53.01256	-58.04053	Vessel set up on station in DP

Appendix 2. Coring station table (see chapters 5.2 and 5.3). GC: gravity corer, BC: box corer.

Gear	Station	Date	Start (UTC)	At Seafloor (UTC)	End (UTC)	Location	Latitude (°S)	Longitude (°W)	Water depth (m)	Recovery (m)
GC (3m)	526	28/01/2011	21:33	21:47	22:10	Southern Falkland Plateau	53° 00'.78	58° 02'.42	598	2.47
BC	527	28/01/2011	22:28	22:43	22:58	Southern Falkland Plateau	53° 00'.78	58° 02'.42	598	0.255
GC (12m)	528	29/01/2011	00:33	00:49	01:08	Southern Falkland Plateau	53° 00'.78	58° 02'.43	598	7.13
GC (12m)	529	31/01/2011	05:07	05:57	06:43	Basin in vicinity of Hesperides Trough	60°49'.22	50°58'.84	2505	5.065
GC (12m)	530	31/01/2011	07:48	08:32	09:25	Basin in vicinity of Hesperides Trough	60°49'.22	50°58'.85	2597	7.895
GC (12m)	531	01/02/2011	07:40	08:00	08:22	Trough NW' of Coronation Island	60°32'.53	46°30'.95	796	6.735
GC (12m)	532	01/02/2011	09:21	09:36	09:57	Trough NW' of Coronation Island	60°32'.53	46°30'.96	795	6.58
GC (6m)	533	01/02/2011	12:34	12:46	13:09	Trough NW' of Coronation Island	60°25'.44	46°34'.65	505	-
GC (6m)	534	01/02/2011	13:33	13:43	14:05	Trough NW' of Coronation Island	60°25'.42	46°34'.64	503	2.875
BC	535	01/02/2011	14:15	14:30	14:43	Trough NW' of Coronation Island	60°25'.41	46°34'.65	503	0.23
GC (6m)	536	02/02/2011	12:15	12:30	12:48	Trough SE' of Coronation Island	61°10'.89	44°45'.20	329	1.345
BC	537	02/02/2011	12:55	13:04	13:14	Trough SE' of Coronation Island	61°10'.89	44°45'.20	329	0.335
GC (6m)	538	02/02/2011	13:24	13:39	13:53	Trough SE' of Coronation Island	61°10'.91	44°45'.24	329	1.405
GC (6m)	539	02/02/2011	16:44	16:51	17:07	Trough SE' of Coronation Island	61°03'.64	44°55'.62	352	3.10
GC (6m)	540	02/02/2011	17:56	18:02	18:17	Trough SE' of Coronation Island	61°02'.96	44°53'.85	305	1.76
GC (12m)	541	02/02/2011	19:32	19:40	19:49	Trough SE' of Coronation Island	61°02'.22	45°00'.13	393	5.625
BC	542	02/02/2011	20:17	20:28	20:38	Trough SE' of Coronation Island	61°02'.22	45°00'.13	400	0.39
GC (12m)	543	02/02/2011	21:40	21:50	22:11	Trough SE' of Coronation Island	61°02'.22	45°00'.13	393	5.645
GC (6m)	544	03/02/2011	00:14	00:25	00:37	Trough SE' of Coronation Island	60°54'.88	45°09'.31	305	3.79
GC (6m)	545	03/02/2011	22:17	22:26	22:42	Trough SE' of Coronation Island	61°35'.11	44°21'.97	394	1.50
GC (6m)	546	04/02/2011	02:04	02:12	02:25	Trough SE' of Coronation Island	61°15'.28	44°45'.83	320	2.985
GC (6m)	547	04/02/2011	05:58	06:05	06:14	Trough SE' of Coronation Island	60°57'.89	45°10'.95	326	3.875
GC (12m)	548	07/02/2011	11:25	12:45	13:55	S' Weddell Sea continental rise	70°32'.09	24°19'.03	4286	7.435
BC	549	07/02/2011	17:27	18:46	19:53	S' Weddell Sea continental rise	70°32'.15	24°19'.06	4276	0.405
GC (12m)	550	08/02/2011	06:10	07:37	08:57	S' Weddell Sea continental rise	70°54'.45	26°07'.20	4198	5.875
BC	551	08/02/2011	09:18	10:35	11:43	S' Weddell Sea continental rise	70°54'.45	26°07'.20	4200	0.430
GC (12m)	552	10/02/2011	07:00	08:13	09:18	S' Weddell Sea continental rise	71°47'.70	29°36'.48	3791	4.805
BC	553	10/02/2011	09:32	10:42	11:39	S' Weddell Sea continental rise	71°47'.71	29°36'.51	3791	0.425
BC	554	11/02/2011	17:40	17:55	18:07	S' Weddell Sea outer shelf, E' bank of Filchner Trough	74°31'.01	31°18'.99	539	0.265

Gear	Station	Date	Start (UTC)	At Seafloor (UTC)	End (UTC)	Location	Latitude (°S)	Longitude (°W)	Water depth (m)	Recovery (m)
GC (6m)	555	13/02/2011	06:06	06:23	06:46	S' Weddell Sea outer shelf, W' Filchner Trough	74°35'.04	33°28'.32	620	3.42
GC (6m)	556	15/02/2011	22:08	22:20	22:37	S' Weddell Sea outer shelf, W' Filchner Trough	74°23'.99	33°28'.18	623	3.42
GC (6m)	557	16/02/2011	02:26	02:38	02:49	S' Weddell Sea outer shelf, W' Filchner Trough	74°28'.89	33°29'.19	616	3.435
BC	558	16/02/2011	02:58	03:12	03:24	S' Weddell Sea outer shelf, W' Filchner Trough	74°28'.89	33°29'.31	616	0.395
GC (9m)	559	16/02/2011	07:46	08:00	08:10	S' Weddell Sea outer shelf, W' Filchner Trough	74°34'.03	33°27'.65	622	4.315
GC (6m)	560	16/02/2011	17:35	17:46	17:56	S' Weddell Sea outer shelf, W' Filchner Trough	74°46'.20	33°24'.88	569	0.76
BC	561	16/02/2011	18:23	18:34	18:47	S' Weddell Sea outer shelf, W' Filchner Trough	74°46'.22	33°24'.79	569	-
BC	562	17/02/2011	01:34	01:48	02:04	S' Weddell Sea outer shelf, W' Filchner Trough	74°39'.34	33°27'.69	586	0.355
GC (9m)	563	17/02/2011	08:50	09:04	09:20	S' Weddell Sea outer shelf, Filchner Trough	74°28'.02	32°57'.38	639	4.695
BC	564	17/02/2011	17:10	17:37	18:00	Crary Trough Mounth Fan	74°06'.01	32°36'.16	1483	0.335
GC (9m)	565	17/02/2011	18:53	19:20	19:43	Crary Trough Mounth Fan	74°06'.00	32°36'.01	1485	2.80
BC	566	19/02/2011	13:33	13:51	14:06	Albert Trough, Coats Land coast	77°16'.00	33°26'.98	946	0.225
GC (6m)	567	19/02/2011	14:32	14:50	15:06	Albert Trough, Coats Land coast	77°16'.00	33°26'.97	945	-
GC (6m)	568	19/02/2011	16:02	16:20	16:36	Albert Trough, Coats Land coast	77°15'.80	33°27'.93	922	2.87
GC (12m)	569	19/02/2011	17:22	17:41	17:55	Albert Trough, Coats Land coast	77°15'.80	33°27'.93	922	4.09
BC	570	19/02/2011	18:39	18:56	19:12	Albert Trough, Coats Land coast	77°15'.81	33°27'.90	925	0.295
BC	571	20/02/2011	19:23	19:32	19:40	Shelf NE of Berkner Island	78°08'.73	43°38'.75	442	0.04
GC (6m)	572	20/02/2011	19:58	20:07	20:19	Shelf NE of Berkner Island	78°08'.73	43°38'.76	445	-
GC (6m)	573	21/02/2011	00:14	00:27	00:39	W' Filchner Trough flank, inner shelf	78°00'.00	42°30'.01	644	0.465
BC	574	21/02/2011	00:57	01:10	01:22	W' Filchner Trough flank, inner shelf	78°00'.00	42°30'.01	643	0.195
GC (6m)	575	21/02/2011	04:12	04:24	04:39	W' Filchner Trough flank, inner shelf	77°50'.00	42°05'.02	666	1.165
BC	576	21/02/2011	04:50	05:05	05:18	W' Filchner Trough flank, inner shelf	77°50'.00	42°05'.04	666	0.295
BC	577	21/02/2011	13:10	13:22	13:34	W' Filchner Trough flank, inner shelf	77°39'.00	42°06'.03	620	0.16
GC (3m)	578	21/02/2011	14:05	14:16	14:34	W' Filchner Trough flank, inner shelf	77°38'.99	42°06'.01	620	-
GC (3m)	579	21/02/2011	16:29	16:41	17:00	W' Filchner Trough flank, inner shelf	77°43'.99	42°09'.96	652	-
BC	580	21/02/2011	17:06	17:20	17:33	W' Filchner Trough flank, inner shelf	77°43'.99	42°09'.90	650	0.225
GC (3m)	581	22/02/2011	13:13	13:35	13:53	Filchner Trough, inner shelf	77°52'.54	37°57'.29	1154	0.245
BC	582	22/02/2011	14:09	14:29	14:47	Filchner Trough, inner shelf	77°52'.54	37°57'.30	1154	-
GC (3m)	583	22/02/2011	17:23	17:44	18:08	Filchner Trough, inner shelf	77°54'.77	39°08'.89	1146	0.945

Gear	Station	Date	Start (UTC)	At Seafloor (UTC)	End (UTC)	Location	Latitude (°S)	Longitude (°W)	Water depth (m)	Recovery (m)
BC	584	22/02/2011	18:13	18:32	18:51	Filchner Trough, inner shelf	77°54'.77	39°08'.89	1148	0.245
GC (3m)	585	22/02/2011	21:14	21:34	21:57	W' Filchner Trough, inner shelf	77°55'.22	39°41'.59	1072	0.495
GC (6m)	586	22/02/2011	22:22	22:42	23:05	W' Filchner Trough, inner shelf	77°55'.23	39°41'.58	1073	-
BC	587	22/02/2011-23/02/2011	23:19	23:43	00:02	W' Filchner Trough, inner shelf	77°55'.22	39°41'.59	1073	0.395
GC (3m)	588	23/02/2011	00:39	00:59	01:18	W' Filchner Trough, inner shelf	77°55'.22	39°41'.60	1075	0.440
BC	589	23/02/2011	06:23	06:45	07:04	Filchner Trough, inner shelf	77°36'.45	38°48'.83	1031	0.10
BC	590	23/02/2011	08:06	08:31	08:50	Filchner Trough, inner shelf	77°36'.32	38°43'.17	1040	0.215
BC	591	23/02/2011	11:47	12:06	12:25	Filchner Trough, inner shelf	77°46'.03	39°23'.57	1046	0.285
GC (3m)	592	23/02/2011	13:22	13:42	14:02	Filchner Trough, inner shelf	77°46'.08	39°23'.75	1046	2.125
GC (6m)	593	23/02/2011	14:28	14:52	15:13	Filchner Trough, inner shelf	77°46'.12	39°23'.56	1046	2.625
GC (3m)	594	23/02/2011	18:13	18:33	18:50	Filchner Trough, inner shelf	77°36'.16	38°41'.38	1040	0.935
GC (6m)	595	23/02/2011	19:30	19:50	20:13	Filchner Trough, inner shelf	77°35'.99	38°39'.25	1048	0.275
GC (3m)	596	24/02/2011	12:36	12:49	13:10	W' Filchner Trough, inner shelf	77°53'.00	41°21'.93	830	-
GC (6m)	597	24/02/2011	16:41	17:01	17:24	W' Filchner Trough, inner shelf	77°55'.22	39°41'.63	1072	2.665
GC (6m)	598	24/02/2011	17:59	18:19	18:43	W' Filchner Trough, inner shelf	77°55'.18	39°41'.62	1072	2.275
GC (6m)	599	24/02/2011	21:10	21:33	21:52	Filchner Trough, inner shelf	77°54'.55	39°10'.05	1138	2.115
GC (6m)	600	25/02/2011	01:04	01:28	01:51	Filchner Trough, inner shelf	77°52'.35	37°59'.49	1159	2.095
GC (6m)	601	25/02/2011	04:41	05:02	05:25	E' flank of Filchner Trough	77°50'.42	37°06'.23	1103	0.47
GC (6m)	602	25/02/2011	17:36	17:45	17:59	Offshore mouth of Albert Trough	77°10'.91	34°06'.25	461	-
GC (6m)	603	25/02/2011	18:37	18:46	19:01	Offshore mouth of Albert Trough	77°10'.61	34°09'.19	458	1.645
BC	604	25/02/2011	19:27	19:37	19:47	Offshore mouth of Albert Trough	77°10'.61	34°09'.19	458	-
BC	605	25/02/2011	19:54	20:02	20:11	Offshore mouth of Albert Trough	77°10'.69	34°09'.63	470	0.295
BC	606	26/02/2011	15:02	15:13	15:25	Moeller Trough, Coats Land coast	76°46'.25	30°38'.65	556	-
BC	607	26/02/2011	16:01	16:17	16:26	Moeller Trough, Coats Land coast	76°47'.67	30°34'.02	424	0.025
BC	608	26/02/2011	19:24	19:33	19:42	Moeller Trough, Coats Land coast	76°47'.62	30°34'.36	423	0.585
GC (6m)	609	26/02/2011	20:14	20:22	20:37	Moeller Trough, Coats Land coast	76°47'.62	30°34'.36	425	-
GC (6m)	610	26/02/2011	20:49	21:01	21:12	Moeller Trough, Coats Land coast	76°47'.62	30°34'.36	419	-
BC	611	27/02/2011	12:36	12:46	12:55	Lichte Trough, Coats Land coast	76°25'.31	29°48'.50	383	-

Gear	Station	Date	Start (UTC)	At Seafloor (UTC)	End (UTC)	Location	Latitude (°S)	Longitude (°W)	Water depth (m)	Recovery (m)
BC	612	27/02/2011	13:02	13:09	13:18	Lichte Trough, Coats Land coast	76°25'.31	29°48'.50	383	0.01
GC (6m)	613	27/02/2011	13:31	13:39	13:52	Lichte Trough, Coats Land coast	76°25'.53	29°48'.83	382	0.47
BC	614	27/02/2011	14:45	14:56	15:07	Lichte Trough, Coats Land coast	76°27'.08	29°42'.08	552	0.01
BC	615	27/02/2011	15:41	15:49	15:59	Lichte Trough, Coats Land coast	76°28'.23	29°41'.30	403	0.01
GC (6m)	616	28/02/2011	00:02	00:16	00:34	E' flank of Filchner Trough, mid-shelf S' Weddell Sea	76°03'.75	32°10'.18	744	1.225
GC	617	28/02/2011	01:42	01:57	02:11	E' flank of Filchner Trough, mid-shelf S' Weddell Sea	76°02'.00	32°05'.37	739	1.70
GC (6m)	618	28/02/2011	02:43	02:57	03:15	E' flank of Filchner Trough, mid-shelf S' Weddell Sea	76°02'.00	32°05'.38	739	0.46
GC (6m)	619	28/02/2011	13:22	13:35	13:43	E' flank of Filchner Trough, mid-shelf S' Weddell Sea	76°19'.26	31°50'.67	533	0.875
GC (3m)	620	28/02/2011	18:14	18:27	18:39	E' flank of Filchner Trough, mid-shelf S' Weddell Sea	76°08'.77	32°02'.31	700	1.385
BC	621	28/02/2011	18:57	19:10	19:22	E' flank of Filchner Trough, mid-shelf S' Weddell Sea	76°08'.77	32°02'.30	700	0.265
BC	622	28/02/2011	23:07	23:18	23:26	E' flank of Filchner Trough, mid-shelf S' Weddell Sea	76°28'.20	31°07'.44	389	-
BC	623	28/02/2011-01/03/2011	23:45	23:55	00:03	E' flank of Filchner Trough, mid-shelf S' Weddell Sea	76°28'.21	31°07'.59	385	0.01
BC	624	01/03/2011	02:09	02:17	02:25	E' flank of Filchner Trough, mid-shelf S' Weddell Sea	76°20'.17	30°16'.87	346	0.225
GC (6m)	625	01/03/2011	12:54	13:05	13:15	Caird Trough, Coats Land coast	76°02'.95	27°09'.25	570	0.565
GC (3m)	626	01/03/2011	13:45	13:56	14:06	Caird Trough, Coats Land coast	76°02'.95	27°09'.25	571	0.905
BC	627	01/03/2011	14:19	14:30	14:42	Caird Trough, Coats Land coast	76°02'.95	27°09'.25	571	0.215
BC	628	02/03/2011	11:54	12:05	12:16	Caird Trough, Coats Land coast	76°01'.43	26°54'.49	573	0.13
GC (3m)	629	02/03/2011	12:26	12:37	12:48	Caird Trough, Coats Land coast	76°01'.43	26°54'.49	575	1.025
GC (3m)	630	02/03/2011	13:58	14:07	14:21	Caird Trough, Coats Land coast	76°03'.51	27°03'.69	472	1.53
GC (3m)	631	04/03/2011	12:39	12:44	12:55	Offshore Brunt Ice Shelf, S' Weddell Sea shelf	75°07'.43	26°41'.51	261	-
GC (3m)	632	04/03/2011	13:32	13:37	13:47	Offshore Brunt Ice Shelf, S' Weddell Sea shelf	75°07'.66	26°41'.52	256	-
GC (3m)	633	04/03/2011	14:23	14:29	14:41	Offshore Brunt Ice Shelf, S' Weddell Sea shelf	75°06'.33	26°39'.41	314	-
GC (3m)	634	04/03/2011	18:08	18:19	18:28	Brunt Basin, S' Weddell Sea shelf	75°00'.42	25°26'.96	500	0.145
GC (3m)	635	04/03/2011	19:47	19:57	20:12	Brunt Basin, S' Weddell Sea shelf	74°59'.50	25°27'.81	494	1.17
GC (3m)	636	04/03/2011	23:29	23:48	23:58	Brunt Basin, S' Weddell Sea shelf	74°48'.71	25°28'.53	626	1.77
GC (3m)	637	05/03/2011	02:56	03:06	03:22	Brunt Basin, S' Weddell Sea shelf	74°41'.03	25°34'.90	606	2.70
GC (12m)	638	11/03/2011	20:58	21:18	21:35	Druse Bay, NE' Antarctic Peninsula shelf	63°34'.10	57°17'.37	1050	7.135
BC	639	11/03/2011	22:20	22:37	22:55	Druse Bay, NE' Antarctic Peninsula shelf	63°34'.09	57°17'.38	1079	0.415

Appendix 3. CTD station table

	DAY	TIME	LAT (S)	LONG (W)	CORING STATION	LOCATION
CTD 1	31	02:11:45	60° 46.47’	51 00.37’		Hesperides Trough (deepest part)
CTD 2	32	16:15:09	60° 32.53’	46° 30.94’	GC531 GC532	Trough NW of Coronation Island
CTD 3	38	14:28:38	70° 32.15’	24° 19.07’	BC549 GC548	Channel Levee System
CTD 4	39	03:07:59	70° 54.45’	26° 07.22’	BC551 GC550	Channel Levee System
CTD 5	41	03:51:05	71° 47.69’	29° 36.48’	BC553 GC552	Channel Levee System
CTD 6	42	16:42:34	74° 31.01’	31° 19.00’	BC554	Eastern bank of Filchner Trough at shelf edge/John Anderson site G1
CTD 7	45	15:03:45	74° 12.74’	35° 57.58’	mooring recovery only	S3 mooring site
CTD 8	48	20:24:26	74° 06.21’	32° 34.86’	BC564 GC565	Crary Trough Mouth Fan
CTD 9	50	19:54:29	77° 15.99’	33° 26.98’	BC566 GC568 GC569 BC570	Albert Trough
CTD 10	51	20:37:00	78° 8.72’	43° 38.75’	BC571	Shelf NE of Berkner Island
CTD 11	52	05:53:30	77° 50.00’	42° 04.97’	BC574 GC573	650 m Filchner Trough transect station 1
CTD 12	52	09:57:56	77° 43.97’	42° 10.23’	BC576 GC575	650 m Filchner Trough transect station 2
CTD 13	52	22:26:03	78° 00.00’	42° 29.94’	BC580	650 m Filchner Trough transect station 3
CTD 14	54	20:38:48	77° 35.99’	38° 37.88’	BC590 GC594 GC595	1050 m Filchner Trough transect station 3
CTD 15	55	00:50:10	77° 46.16’	39° 22.93’	BC591 GC592 GC593	1050 m Filchner Trough transect station 2
CTD 16	55	04:20:30	77° 55.22’	39° 41.59’	BC587 GC597 GC598	1050 m Filchner Trough transect station 1
CTD 17	57	21:34:51	76° 47.60’	30° 34.43’	GC609 GC610	Moller Trough
CTD 18	58	16:24:12	76° 27.07’	29° 42.09’	BC614	Lichte Trough
CTD 19	60	15:00:23	76° 02.95’	27° 09.25’	BC627 GC625 GC626	Caird Trough
CTD20	70	23:34:00	63° 30.09’	57° 17.37’	BC639 GC638	Duse Bay

Appendix 4. Smear slide list

Gear	Station	Latitude	Longitude	Water depth (m)	Core Recovery (m)	Location in core
BC	527	-53.013	-58.0403	598	0.255	Surface
GC	528	-53.013	-58.0405	598	7.13	cc
GC	529	-60.8203	-58.9807	2505	5.065	cc
GC	530	-60.8204	-50.9808	2597	7.895	cc
GC	532	-60.5422	-46.516	795	6.58	cc
GC	534	-60.4237	-46.5773	503	2.875	cc
BC	535	-60.4235	-46.5775	503	0.23	Surface
BC	537	-61.1815	-44.7533	329	0.335	Surface
BC	542	-61.037	-45.0022	400	0.39	Surface
GC	548	-70.5348	-24.3172	4286	7.435	Top of sections & cc
BC	549	-70.5358	-24.3177	4276	0.405	Surface
GC	550	-70.9075	-26.12	4198	5.875	Top of sections & cc
GC	555	-74.584	-33.472	620	3.42	Top (surface?)
BC	566	-77.2667	-33.4497	946	0.225	Surface
GC	568	-77.2633	-33.4655	922	2.87	Top of sections & cc
GC	569	-77.2633	-33.4655	922	4.09	cc
BC	576	-77.8333	-42.084	666	0.295	Surface
BC	590	-77.6053	-38.7195	40	0.215	Surface
BC	605	-77.1782	-34.1605	470	0.295	Surface
BC	608	-76.79362	-30.57265	423	0.585	Surface
BC	612	-76.4218	-29.8083	383	0.01	Surface
BC	615	-76.4705	-29.6883	403	0.01	Surface
BC	627	-76.0492	-27.1542	571	0.215	Surface
BC	628	-76.0492	-26.9082	573	0.13	Surface
GC	630	-76.0585	-27.0615	472	1.53	Surface
GC	638	-63.5683	-57.2895	1050	7.135	Surface & cc
BC	639	-63.5682	-57.2897	1079	0.415	Surface

Appendix 5. Sieved sediment sample list

Gear	Station	Date	Location	Water depth	samples taken	Sample volume (ml)	Rose Bengal*
GC	526	28/01/11	Southern Falkland Plateau	598	core top	x	
BC	527	28/01/11	Southern Falkland Plateau (GC526)	598	surface	30	
GC	529	31/01/11	Basin in vicinity of Hesperides Trough	2505	cc	x	
GC	531	01/02/11	Trough NW' of Coronation Island	796	cc	x	
GC	532	01/02/11	Trough NW' of Coronation Island (GC531)	795	cc	x	
BC	553	10/02/11	Southern Weddell Sea, western levee of Channel-Levee System II (GC552)	3791	surface	x	
BC	554	11/02/11	Outermost shelf in southern Weddell Sea, eastern bank of Filchner Trough	539	surface	30	yes
GC	555	13/02/11	Southern Weddell Sea outer shelf, western Filchner Trough, northernmost part of wedge	620	catcher	x	
GC	556	15/02/11	Southern Weddell Sea outer shelf, western Filchner Trough, northern edge of lineations	623	cutter	x	
BC	562	17/02/11	Southern Weddell Sea outer shelf, western Filchner Trough, near mooring site S2	586	surface	30	yes
BC	564	17/02/11	Crary Trough Mounth Fan	1483	surface	30	yes
BC	566	19/02/11	Glacier trough SW of Albert Bank; basin near glacier front	946	surface	20	yes
GC	568	19/02/11	Glacier trough SW of Albert Bank; basin near glacier front (0.5 nm offshore from site GC567)	922	catcher	x	
BC	571	20/02/11	Shelf NE of Berkner Island, directly north of Filchner Ice Shelf front	442	surface	30	yes
GC	573	21/02/11	Western Filchner Trough flank (inner shelf), 650 m transect station 1	644	core top	10	yes
BC	574	21/02/11	Western Filchner Trough flank (inner shelf), 650 m transect station 1 (GC573)	643	surface	20	yes
BC	576	21/02/11	Western Filchner Trough flank (inner shelf), 650 m transect station 2 (G13, Anderson) (GC575)	666	surface	20	yes
BC	577	21/02/11	Western Filchner Trough flank (inner shelf), 650 m transect station 4	620	surface	x	yes
BC	580	21/02/11	Western Filchner Trough flank (inner shelf), 650 m transect station 3 (GC579)	650	surface	30	yes
BC	582	22/02/11	Western Filchner Trough, area of lineations (inner shelf)	1154	surface	30	yes

Gear	Station	Date	Location	Water depth	samples taken	Sample volume (ml)	Rose Bengal
BC	584	22/02/11	Western Filchner Trough, area of lineations (inner shelf) (same site as GC583)	1148	surface	30	yes
BC	587	22/02/11 to 23/02/2011	Western Filchner Trough, area of lineations (inner shelf), 1050 m transect station 1 (GC586)	1073	surface	20	yes
BC	589	23/02/2011	Filchner Trough (inner shelf), 1050m transect station 3	1031	surface	20	yes
BC	590	23/02/2011	Filchner Trough (inner shelf), 1050m transect station 3, ca. 1.5 km east of site BC589	1040	surface	20	yes
BC	591	23/02/2011	Filchner Trough (inner shelf), 1050m transect station 2	1046	surface	30	yes
GC	596	24/02/2011	Western Filchner Trough (inner shelf, just to the east of drumlinoid/current-induced features)	830	surface	20	yes
BC	605	25/02/2011	Outer part of Albert Trough, offshore of outer moraine, southern Weddell Sea shelf (sams site as BC604)	470	surface	20	yes
BC	607	26/02/2011	Moeller Trough, southern Weddell Sea shelf	424	surface	30	yes
BC	612	27/02/2011	Lichte Trough, southern Weddell Sea shelf (BC611)	383	surface	20	yes
BC	614	27/02/2011	Lichte Trough, southern Weddell Sea shelf	552	surface	10	yes
BC	615	27/02/2011	Lichte Trough, southern Weddell Sea shelf	403	surface	30	yes
BC	621	28/02/2011	Eastern flank of Filchner Trough, mid-shelf southern Weddell Sea, pinch out of thick transparent unit (GC620)	700	surface	<10	yes
BC	623	28/02/2011 to 01/03/2011	Eastern flank of Filchner Trough, mid-shelf southern Weddell Sea, offshore Moeller Trough (400m transect) (near BC622)	385	surface	20	yes
BC	624	01/03/2011	Eastern flank of Filchner Trough, mid-shelf southern Weddell Sea, offshore Lichte Trough	346	surface	20	yes
BC	627	01/03/2011	Caird Trough, southern Weddell Sea shelf (GC626)	571	surface	20	yes
BC	628	02/03/2011	Caird Trough, southern Weddell Sea shelf	573	surface	30	yes
GC	629	02/03/2011	Caird Trough, southern Weddell Sea shelf (BC628)	575	cc	x	
GC	630	02/03/2011	Caird Trough, southern Weddell Sea shelf	472	cc	x	

***Rose Bengal procedure.**

Bulk sediment samples were collecting using a 50 ml open ended plastic syringe. Samples were sieved through 150 and 63 μm sieves with deionised water. Each size fraction (>63, <150 μm and >150 μm) was transfered into a clean, plastic petri dish and excess water removed. A solution of 1 g/1 L Rose Bengal:seawater was added to each petru dish to fully submerge the samples. The samples were aggitated several times over an interval of 18-24 hours. The samples were then combined and rinsed with deionised water through the 63μm sieve until the water ran completely clear. The samples were then dried out in the oven at 38 °C.

Appendix 6. Typical sonar system parameter settings

A6.1 EM120 Acquisition Parameters

MBES screen, "EM120 Runtime Menu"

Ping Mode: Auto (but also sometimes set to a fixed depth mode)
Sector Coverage
  Max Port Angle: 45–66°
  Max Starboard Angle: 45–66°
  Angular Coverage: Auto
  Beam Spacing: Equidistant
Pitch stabilization: On
Yaw stabilization: On , in 'Re Filtered Heading' mode
Min Depth: used to constrain depth when in ice or using TOPAS chirp Tx on fixed cycle
Max Depth: used to constrain depth when in ice or using TOPAS chirp Tx on fixed cycle

Sound Speed Profile
  Current Sound Profile: jr244_ctd???_ed.asvp
Sound Speed at Transducer:
  From: Profile
  Sensor Offset: 0.0 m/s
  Filter: 60 s

Filtering
  Spike Filter Strength: Medium
  Aeration: On
  Sector Tracking: On
  Slope: On
  Interference: Off
  Range Gate: Normal
Absorption Coefficient
  Absorption (dB/km): 1.00
Seabed Imaging
  TVG Crossover (deg) 6

A6.2 TOPAS Acquisition Parameters

TOPAS was used almost entirely in 'chirp' transmission mode during the cruise because this suppresses much of the persistent 100 Hz noise, which is evident in the raw trace display and has been a problem in data collected using 'burst' transmission mode on previous cruises.

Parasource Menu
Level: 90%
Ping interval: 0 ms (enables external, SSU trigger) or 4000 – 7500 ms
Pulseform: Chirp
  Chirp start frequency (Hz): 1300

Chirp stop frequency (Hz):	5000
Length (ms):	10 or 15

Acquisition Menu

Ch_no:	0	
Speed of sound (m/s):	1520	
Sample rate:	20000 Hz	
Trace length (ms):	400	
Gain:	16 – 30 dB	
Filter:	1.00 kHz	
Delay:	Manual	(but Tracking also used when unattended)

Processing Menu

Channel no: 0

Filter: ON

Low stop:	1200	Low pass:	4500
High pass:	1600	High stop:	5100

Processing (deconvolution): DECONV

Filter factor (ppm): 1

Swell: ON

Threshold: 12%

traces: 1

TVG: MAN

Slope: 40 – 60 dB

Start point: Manual or Tracking or External at different times

Dereverb: OFF

Stacking: OFF

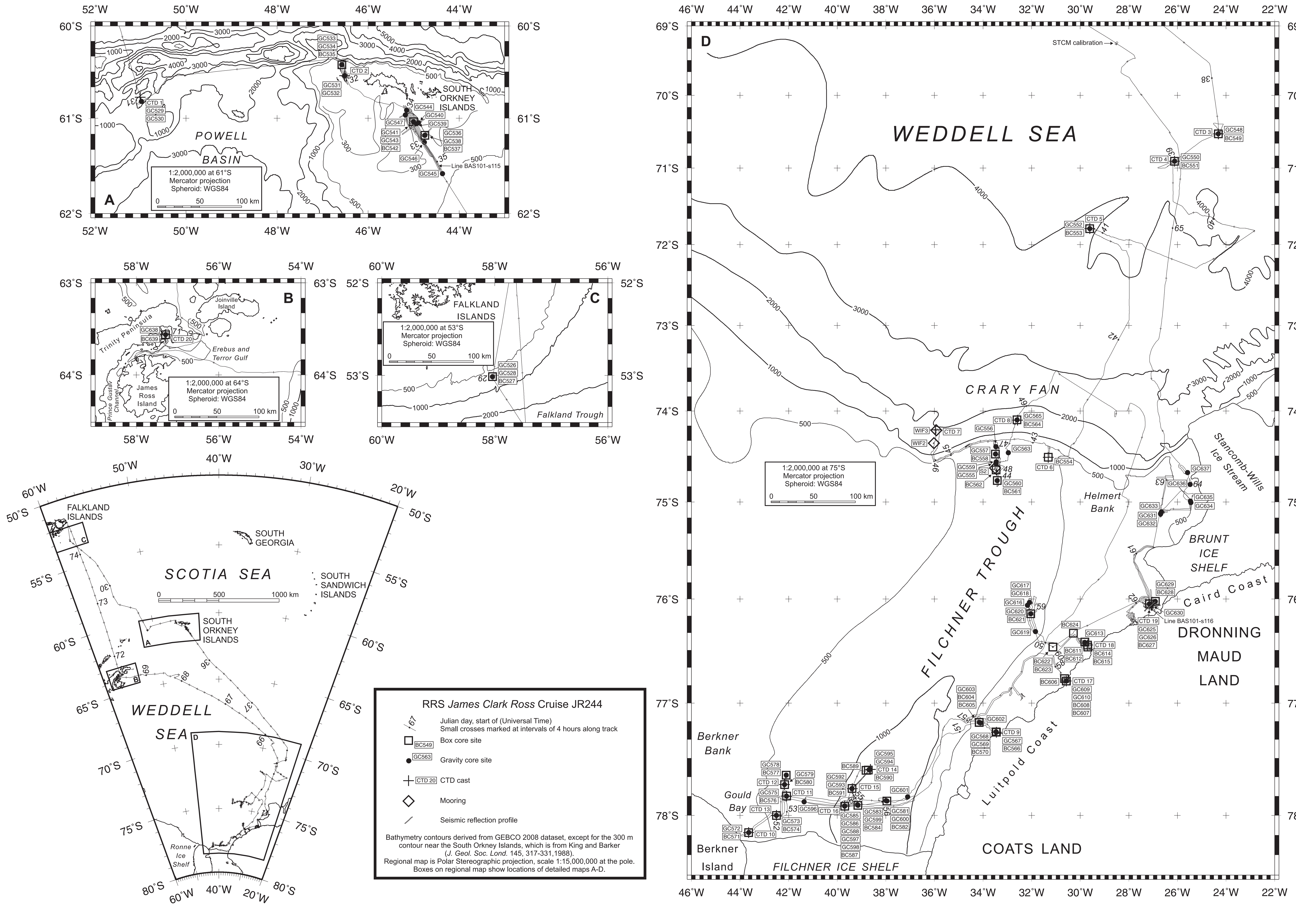
AVC: OFF

Scale (%): 400

Attribute: INST.AMP

LOG/Replay Menu

Medium:	DISK
Rate (ms):	1000
Channel:	0
File size (Mb)	10



A
POWELL
BASIN
SOUTH
ORKNEY
ISLANDS
1:2,000,000 at 61°S
Mercator projection
Spheroid: WGS84
0 50 100 km
Line BAS101-s115
B
Joinville
Island
Trinity Peninsula
Erebus and
Terror Gulf
James
Ross
Island
Prince Gustav
Channel
1:2,000,000 at 64°S
Mercator projection
Spheroid: WGS84
0 50 100 km
C
FALKLAND
ISLANDS
1:2,000,000 at 53°S
Mercator projection
Spheroid: WGS84
0 50 100 km
Falkland Trough
FALKLAND
ISLANDS
SOUTH
GEORGIA
SCOTIA SEA
SOUTH
SANDWICH
ISLANDS
0 500 1000 km
SOUTH
ORKNEY
ISLANDS
WEDDELL
SEA
Ronne
Ice
Shelf
D
WEDDELL SEA
STCM calibration
CRARY FAN
1:2,000,000 at 75°S
Mercator projection
Spheroid: WGS84
0 50 100 km
Stancomb-Wills
Ice Stream
Helmert
Bank
BRUNT
ICE
SHELF
FILCHNER TROUGH
Caird Coast
Line BAS101-s116
DRONNING
MAUD
LAND
Luitpold Coast
Berkner
Bank
Gould
Bay
Berkner
Island
FILCHNER ICE SHELF
COATS LAND
RRS James Clark Ross Cruise JR244
Julian day, start of (Universal Time)
Small crosses marked at intervals of 4 hours along track
Box core site
Gravity core site
CTD cast
Mooring
Seismic reflection profile
Bathymetry contours derived from GEBCO 2008 dataset, except for the 300 m contour near the South Orkney Islands, which is from King and Barker (J. Geol. Soc. Lond. 145, 317-331,1988).
Regional map is Polar Stereographic projection, scale 1:15,000,000 at the pole.
Boxes on regional map show locations of detailed maps A-D.

“Sea smoke” produced by cold air from the Filchner Ice Shelf blowing across the lead adjacent to the ice front in a southerly gale on 22nd February, viewed from the Bridge of RRS *James Clark Ross* while on station at site of GC585.