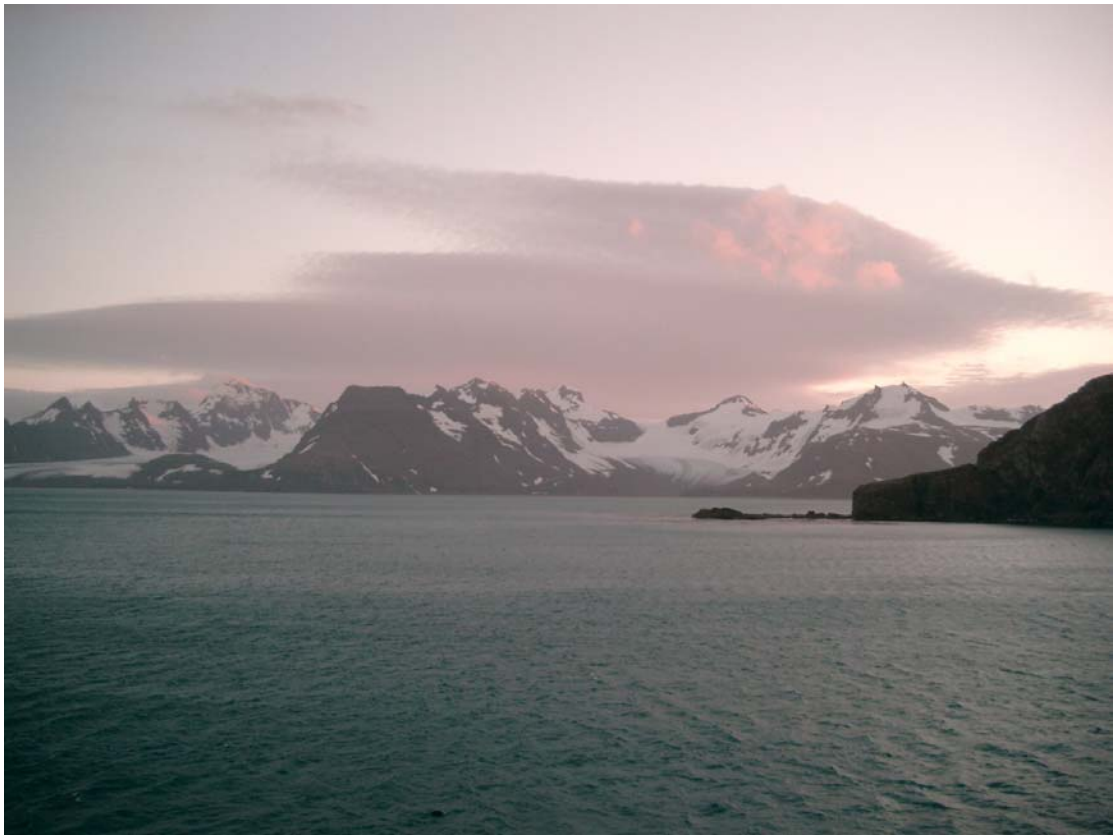
JR103

Cruise Report

Peter Morris



JR103 Cruise Report

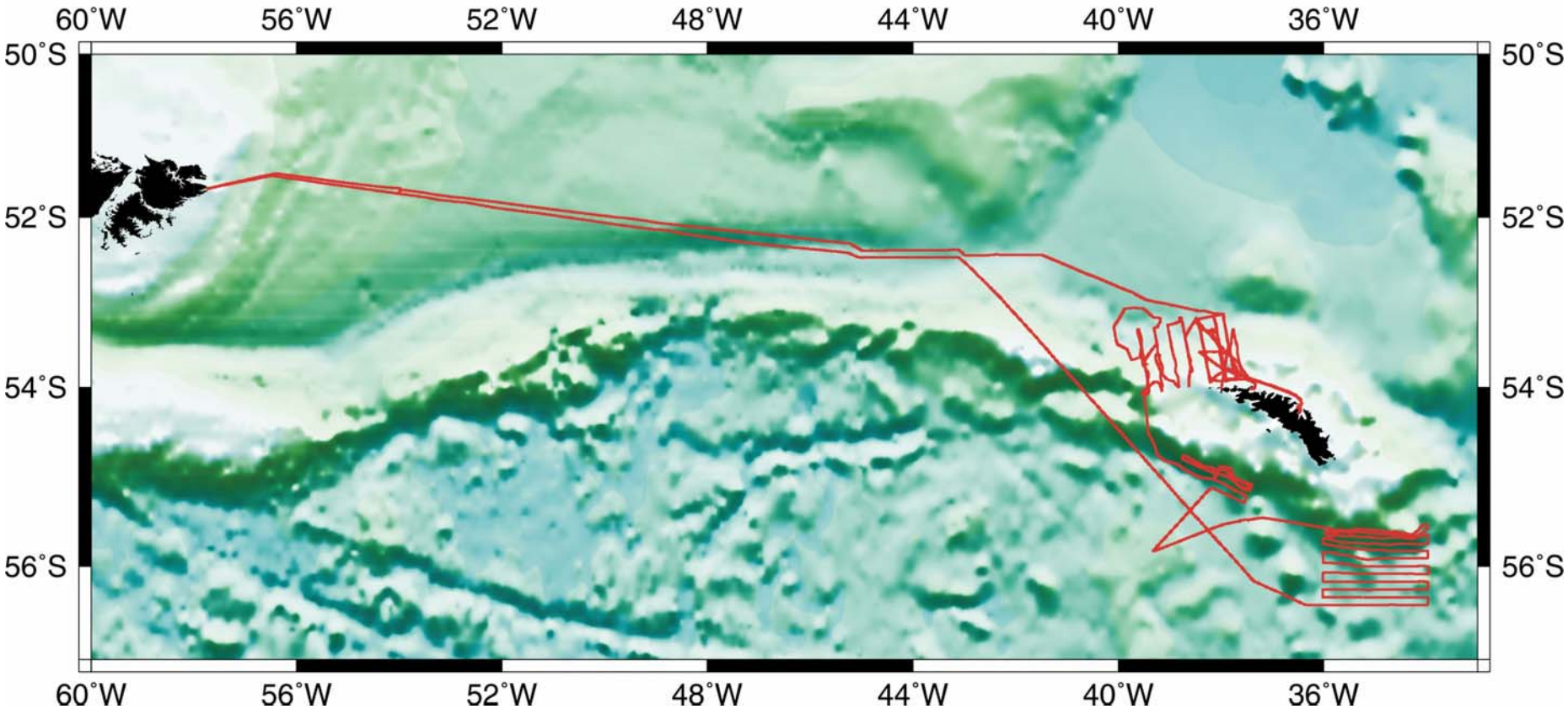
Project Title: GSCM **Programme ADGPS**

Introduction

JR103 was a cruise using science time originally allocated on RRS Ernest Shackleton but transferred to the RRS James Clark Ross for operational reasons.. The cruise was combined with Bioscience cruise JR96 in the South Georgia region and to minimise losing time in transit it was decided to carry out swath bathymetry and magnetic surveys along the southern and western margins of the South Georgia microcontinent.. This zone is active from a tectonic point of view with several large earthquakes having taken place in recent years .It was hoped that evidence of recent volcanic activity, such as fresh fault scarps would be visible on the swath data which could give insight into the nature of the deformation taking place. The survey also covers an area formed in the earliest period of spreading on the currently active East Scotia Ridge system and there was a possibility that E-W magnetic profiles across the zone could provide information on this process.

A third objective was to try and image an unusual zone of large mudwaves at the eastern end of the South Falkland Trough. These had been identified and even cored on earlier cruises but the existing data were inadequate to properly define the nature of the wave field.

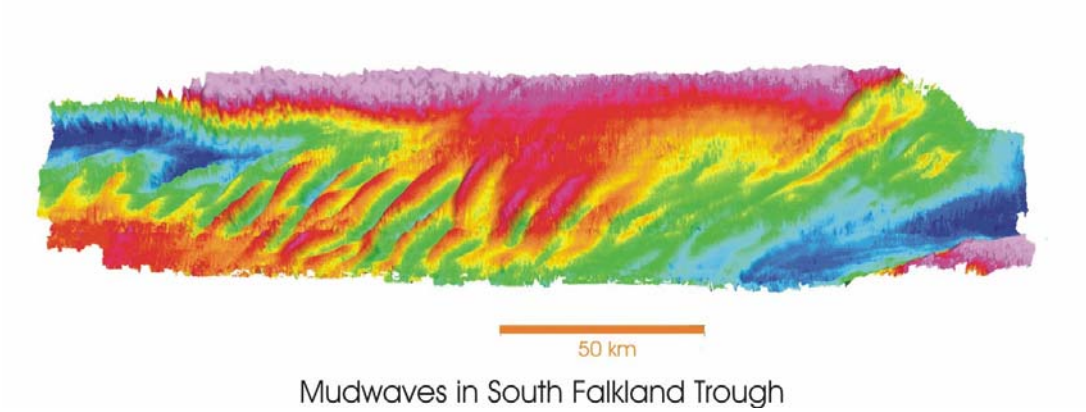
JR103/JR96



Brief Narrative.

The JR103 / JR96 party left Cambridge on the evening of Saturday 27th December 2003. Flight schedules had been disrupted somewhat by the Christmas break so the first night was spent in Brize Norton Gateway Hotel awaiting a morning departure and a second night was spent on Ascension Island. We therefore reached Stanley on the afternoon of December 29th. There being very little mobilisation required the ship sailed at 1600hrs (GMT) on the next day.

Swath and Topas recording was started soon after leaving Port William and the SeaSpy towed magnetometer was deployed an hour or so later. We then steamed directly to the mudwave area at about 44°W near the mouth of the South Falkland trough and at about 07.30 on January 1st started on a west – east swath line immediately north of one recorded a month or so earlier on JR92..

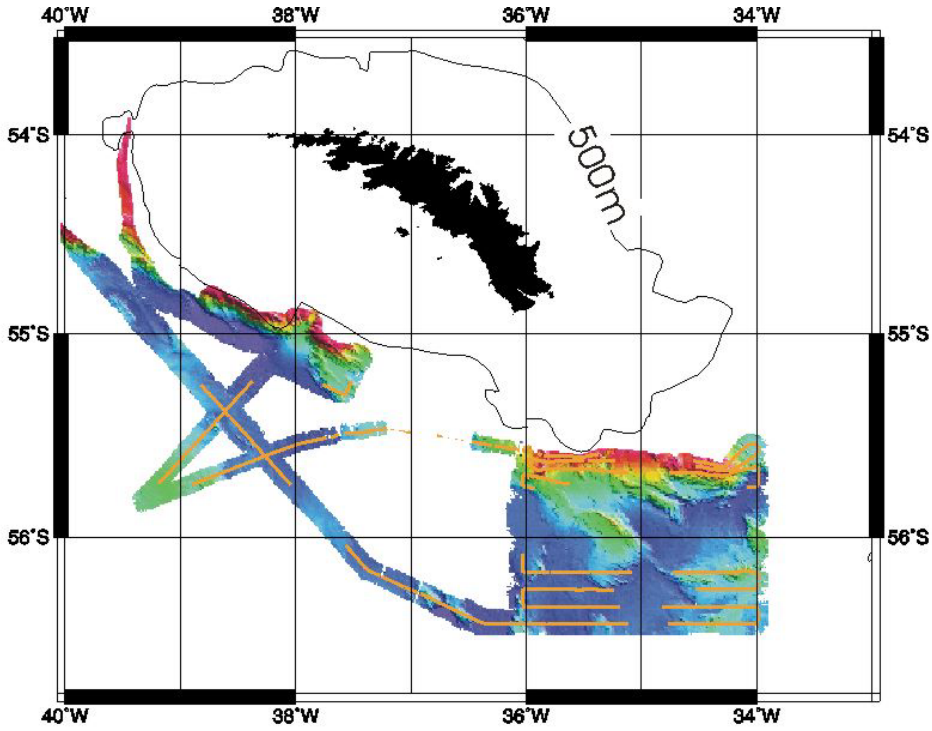


Mudwaves in South Falkland Trough

There had been some discussion as to whether the JR96 or JR103 part of the cruise should be carried out first. It was decided that because the ship was scheduled to pick up people from Bird Island and KEP at the end of the cruise it would be preferable to do the JR96 part last as it was closer to the bases and it would be easier to break off work and make a quick pickup if there were only limited weather windows when this could be done.

Therefore at the end of the mudwave line we turned south east and proceeded to the south East corner of the main survey area south of South Georgia.. Two tests of the undulator, to be used later on the bioscience traverses, were made during the course of this transit. We turned onto the first survey line at about 1700hrs on January 2nd and over the next 3 ½ days proceeded to run a series of 12 east west traverses moving north onto the edge of the South Georgia continental margin. The lines started at about 5' apart in the deep water but became ever closer together (and more serpentine) as the water shallowed. On the night of a severe storm started building up and by the early hours of the next morning it was impossible to record swath data. We thus sailed WNW on a comfortable orientation to a position of 55° 50'S 49°20'W retuning from there along a course of 42°. This line is of little interest from a swath point of view but filled in a significant gap in our regional magnetic coverage whilst waiting for better weather.. By the afternoon the storm had abated sufficiently for swath operations to resume but it was obvious that no further work would be possible in the southern area if we were to have time to obtain any significant data from our second target zone. We thus started our final day's survey in area2, along the south western margin of the South Georgia block.

Poor visibility and the presence of a large grounded iceberg limited operations to some extent but sufficient coverage was obtained to gain a good understanding of the nature of the margin.



Swath Bathymetry Surveys around South Georgia

With the five days allotted for JR103 used up the JR96 portion of the cruise now commenced. This was planned as a series of acoustic traverses using the EK60 echo sounder and undulator by day followed by CTDs and Nets along the same profiles by night. Unfortunately the area of interest, to the NW of the island, was thickly infested with icebergs (there were virtually none to the south). The weather was also very poor, wiping out a lot of the EK60 record and in fact on Saturday 10th January we found sanctuary in Rosita harbour where an EK60 calibration was carried out Transects continued until Tuesday 13th when we moved to pick up two moorings. The first one (shallow) refused to surface when called and so it was necessary to go fishing for it by sailing round the site on a circular track with a grapnel on the end of a cable and then sailing so as to tighten the loop around what was hoped to be the vertical mooring cable. The operation successfully dislodged the mooring which was recovered complete and then redeployed after the data it contained had been downloaded.

The second (deep) mooring was recovered and redeployed without problems. The final days in the South Georgia area saw us picking up two passengers from Bird Island and another from KEP. Conditions at KEP in particular were excellent, calm and sunny, and it was possible to go ashore for three hours.

Following the KEP visit a couple of further transits were made before we headed back to Stanley on a course immediately to the north of the outbound run. This allowed another traverse of the mudwave region which is now almost completely mapped. The remainder of the transit home was uneventful. As there was time to

spare the opportunity was taken to test whether there was any heading effect apparent when using the towed magnetometer 200m behind the ship. A gale picked up as we approached the Falklands so we anchored in Port William overnight before moving alongside FIPASS at 10am (GMT) on January 20th.

Instrument Reports

SSU

When running a series of different acoustic instruments together it is important to initiate the firing sequence correctly so that they do not interfere with each other. Since its installation the SSU, which performs this function, has never seemed to have worked correctly. How much of this was due to operator inexperience and how much was genuine instrument faults was always a bit uncertain. On this cruise, for the first time ever, all the problems seemed to have been cured. Jim Fox has spent a lot of time investigating this instrument and getting its hardware and software sorted out and the results of this hard work were obvious.

EM120 Swath Bathymetry System

The EM120 behaved impeccably. The latest software upgrade has made a noticeable improvement to the stability of the whole system. We do not know exactly what was changed but the impression gained when visiting Simrad recently was that there were some quite significant changes including some at a fairly basic level with regard to beam forming, for example. One annoying bug that does seem to have been pretty well fixed is the failure to close a line file and open a new one every hour. This now works well.. It failed on only one occasion and wrote a double length , two hour file. When the line number incremented as this file was closed it jumped by two rather than by one as would have been anticipated..

The instrument recorded reasonable data in quite extreme conditions, up to about force 9 on one occasion. Fortunately the ship was headed straight into the wind at the time.

Two XBTs were run to obtain sound velocity profiles.

JR103_1 51 53.5' S 52 04.9' W 11:15hrs 31/12/2003

JR103_2 55 59.9' S 37 38.3' W 12:30hrs 02/01/2004

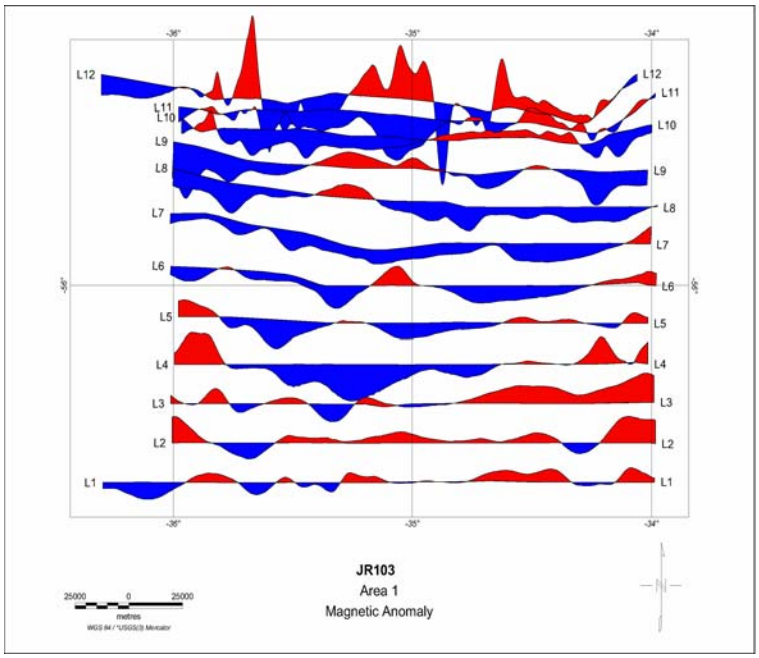
Topas

Topas was run on most swath lines but always in sequence governed by the SSU rather than free running. This meant that in deep water pings were rather infrequent.
Whilst not ideal for detailed sedimentary studies this nevertheless provided some useful information on sediment distribution and thickness. For most of the time the acquisition time delay was set to 'external' ie derived from the EM120 centre beam depth. When this depth was reasonably reliable and did not change too rapidly, as was the case for most of the survey, the system worked well with the time delays changing in a quite acceptable fashion.

The EPC plotter providing a direct print out to paper of the Topas record had no simple method of annotating the plot with times or other information. Jim Fox was able to use an old spare laptop computer to take SCS time and depth strings and plot them on the record. This works well except that the printed time is always somewhat after the true time shown by the 5 minute timing lines on the paper plot which are derived from a circuit closure controlled by the radiocode clock in the UIC. With this information printed on the record the need to annotate it manually is much reduced. The actual recorded topas files contain the time and acquisition delay in their header record so it is always possible to find this information should the need arise.

SeaSpy Magnetometer

The Marine Magnetics 'SeaSpy' towed Overhauser magnetometer was deployed on the transits to and from South Georgia and throughout the 'JR 103' portion of the cruise. The instrument behaved very well whenever it was deployed delivering low noise, virtually error free, magnetic data in all sea conditions. Profiles obtained in Area 1 are shown below.



A heading correction test was run during the homeward voyage and an analysis of the results from this suggest that with 200m of cable 'in the water' the maximum anomaly due to the vessel, when sailing in any orientation, is never greater than about 2nT. This is certainly acceptably small for most surveys conducted by BAS.

One serious problem did arise however with logging the magnetic data. When the magnetometer was deployed for the homeward run it appeared to be logging normally, with field values being displayed on the SCS screen in the UIC room. When the logged stream was played back some days later however it was found that the first days worth of magnetometer readings had not actually been recorded on disk. In fact recording only started because the SCS system locked up completely and had to be restarted. From this point on the magnetometer logged normally. When the magnetometer is deployed it is obviously important not to rely solely on the SCS display to check whether all is well. A portion of the data should be played back (using 'listit' for example) to make sure that it is being written to disk.

Cruise Data Record

Position, Water Depth and Magnetic data were combined into an MGD77 record. The magnetic data was of very high quality and required virtually no editing. The depth record was derived from the em120 centre beam whilst the swath system was operating and the bridge echo sounder when it was not. This needed considerable editing to remove spurious values, (particularly during rough weather periods) before interpolation at 1 minute intervals.

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Scientists

JR103

P.Morris (PSO)

JR96

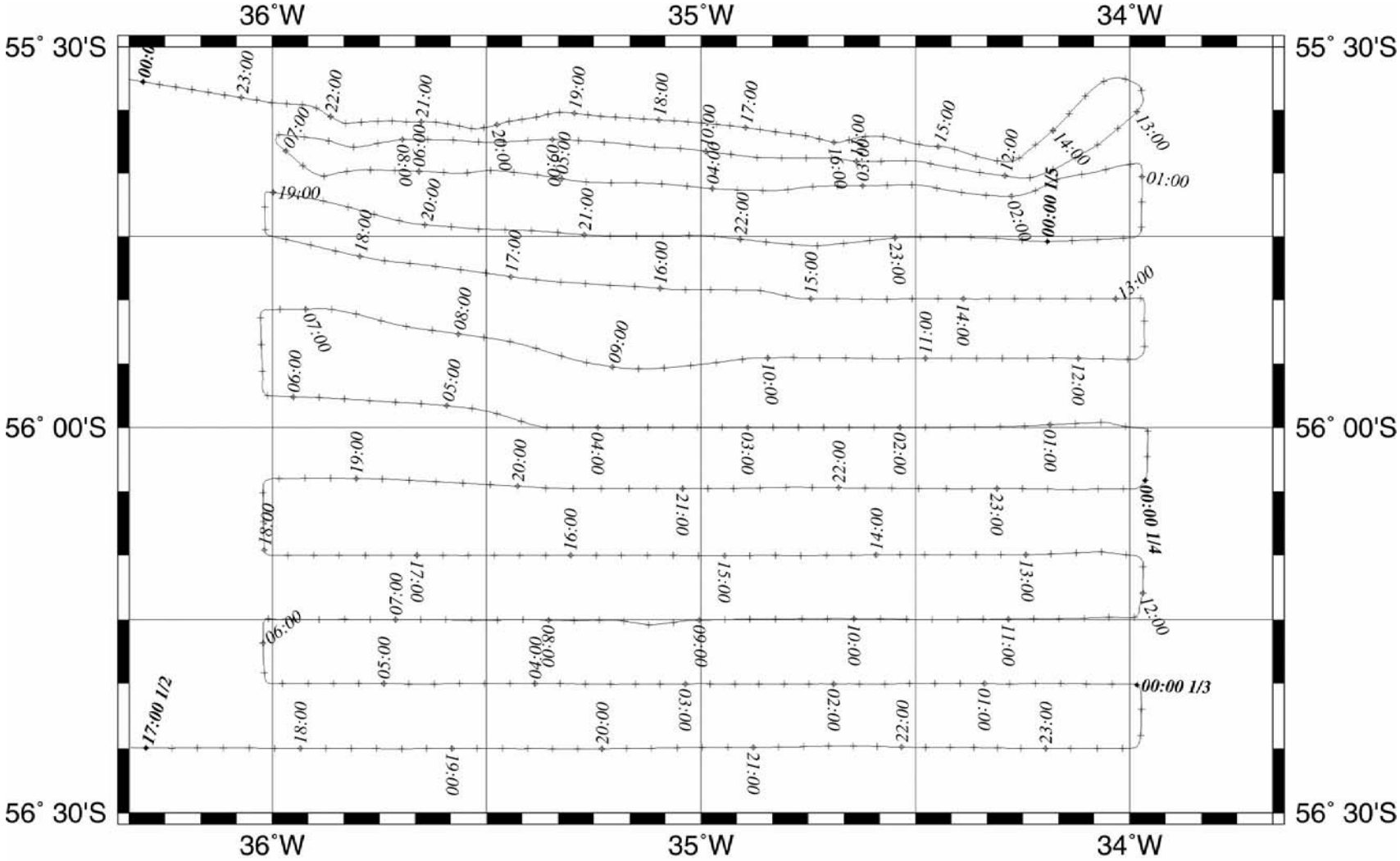
J.Watkins (PSO)
D.Bone
M.Brandon
N.Cunningham
P.Enderlein
S.Hardy

Technical Support

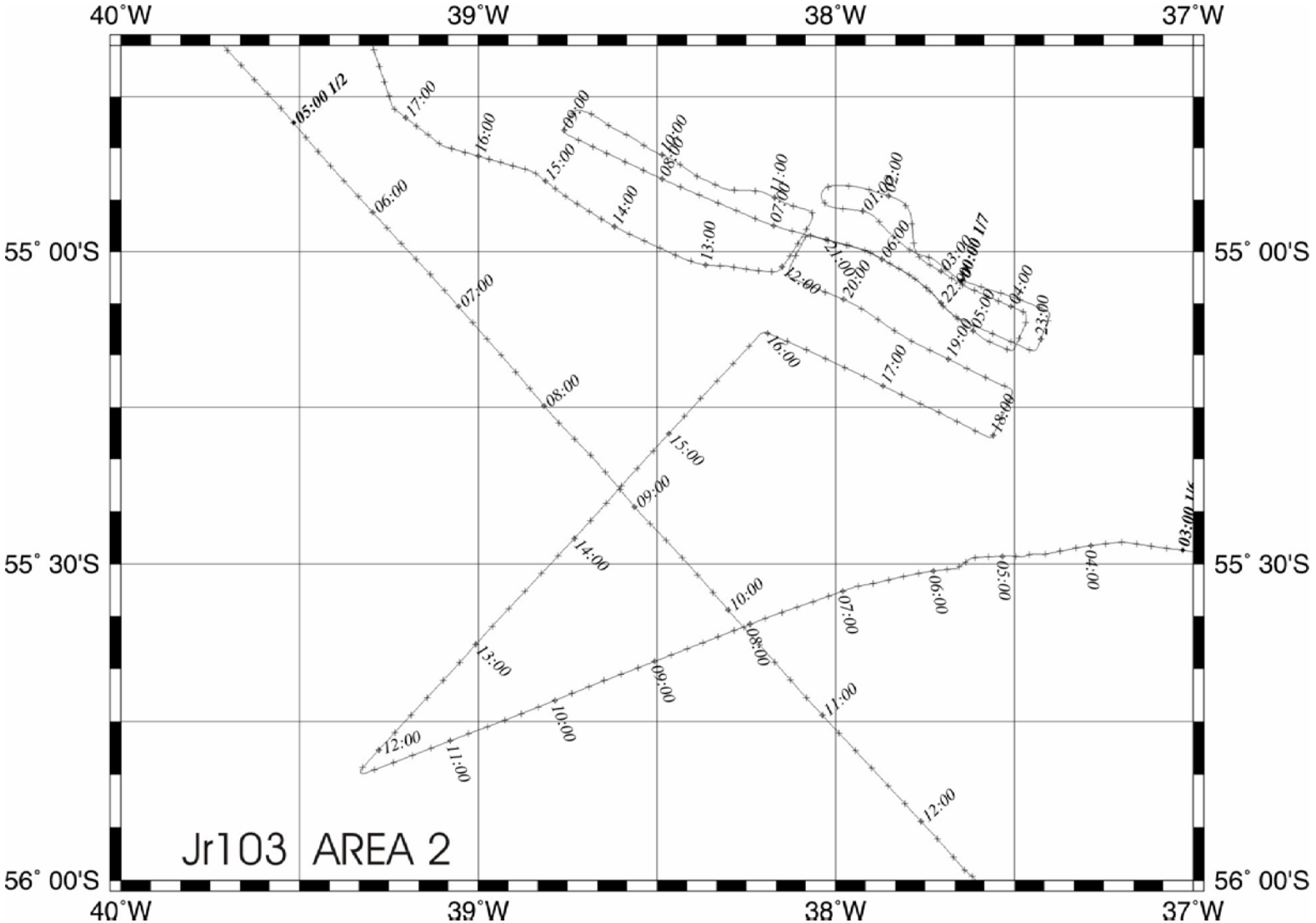
J.Fox ETS
J.Robst ITS
E.Wilson Doctor

Ship's Officers
R. Paterson Master
A.Liddell Ch/Off
D.King 2nd/Off
J.Cox 3rd/Off
C.Waddicor ETO
D.Cutting Ch/Eng
G.Armour 2nd/Eng
A.Poole 3rd/Eng
S.Eadie 4th/Eng
S.Wright Deck/Eng
N.Dunbar ETO
J.Gibson Purser

Crew
G.Stewart Bosun
D.Williams B'Mate
D. Jenkins SG1
M.Blaby SG1
C.Mullaney SG1
H Villalon-Corona SG2
G McGill SG2
M Robinshaw MG1
S. Smith MG1
D.Macintyre Ch Cook
R.Collins 2nd Cook
C.Pratley Stwd
J.Newall Stwd
K.Weston Stwd



Jr103 AREA 1


40˚W
39˚W
38˚W
37˚W
55˚ 00'S
55˚ 30'S
56˚ 00'S
Jr103 AREA 2

Cruise JR103/96 Diary of events taken from ship's daily Position Reports

2200 local time Tuesday 30/12/03

51 degrees 36 minutes South 55 degrees 18 minutes West

Course 098T Speed 12 knots

Ship departed FIPASS at 1300.

1435 - 1515 RAF Rescue Sea King XZ 587 exercise. 3 personnel winched to and from port side of after deck while on passage.

1551 Magnetometer deployed.

2200 local time Wednesday 31/12/03

52 degrees 18 minutes South 47 degrees 21 minutes West

Course 098T Speed 13 knots

Wind SW 4, slight sea, low swell. Overcast.

2200 local time Thursday 01/01/04

54 degrees 11 minutes South 40 degrees 28 minutes West

Course 138T Speed 11 knots

Wind S 5, moderate sea, low swell. Overcast. Isolated bergs.

Proceeding to 57 degrees South, 36 degrees West to commence swath survey.

2200 local time Friday 02/01/04

56 degrees 20 minutes South 34 degrees 41 minutes West

Course 270T Speed 11.5 knots

Continue JR103 swath box survey in east/west directions.

Wind W 5, moderate sea, low swell. Overcast. Snow showers.
Isolated bergs.

0937-1114 local time, UOR deployed for trials.
1400 local time, commence swath survey in position 56 degrees 25 minutes South, 36 degrees 17 minutes West.

2200 local time Saturday 03/01/04

56 degrees 00 minutes South 34 degrees 12 minutes West

Course 270T Speed 12.0 knots

Continue JR103 swath box survey in east/west directions.

Wind W x S 4/5, moderate sea, low swell. Mainly overcast with breaks. Snow showers.
Isolated bergs.

2200 local time Sunday 04/01/04

55 degrees 41 minutes South 33 degrees 58 minutes West

Course 270T Speed 12 knots

Continue JR103 swath box survey in east/west directions between longitudes 34 and 36 degrees West

Wind W 6, rough sea, moderate swell. Overcast. Snow showers.
Isolated bergs.

2200 local time Monday 05/01/04

55 degrees 31 minutes South 36 degrees 32 minutes West

Course 289T Speed 7.5 knots

1st. JR103 survey box completed. In transit to 55 degrees 26 minutes South, 37 degrees 40 minutes West to commence swath survey in WNWly direction, if conditions allow, for 26 miles. Thence ESE.

Wind W gale 8 moderating and backing to SW x W 6.
Rough sea, becoming confused. Heavy swell.
Occasional snow showers. Isolated bergs.

2215 local time Tuesday 06/01/04

54 degrees 56 minutes South 38 degrees 01 minutes West

Course 290T Speed 11 knots

Continuing JR103 survey of area around line 54 degrees 54 minutes South, 38 degrees 00 minutes West to 55 degrees 03 minutes South, 37 degrees 23 minutes West

Wind WNW 4. Slight sea and low swell.
Overcast. Occasional snow flurries.
Many bergs to the north.

2230 local time Wednesday 07/01/04

53 degrees 33 minutes South 39 degrees 51 minutes West

Course 295T Speed 9 knots

JR103 completed.

Intend scouting western edge of JR96 core box overnight prior to first run tomorrow, due to start at 0600 local time.

Dense berg concentration means the most westerly transect, at least, will be impossible to achieve.

Wind NW 6/7. Light rain. Moderate sea and swell. Conditions deteriorating.

2200 local time Thursday 08/01/04

53 degrees 43 minutes South 39 degrees 31 minutes West

Course 033T Speed 6.5 knots

2 modified transects and one RMT net completed. UOR deployed when ice conditions allow.
Ship encountered impenetrable concentrations of bergs in places, mainly to the south and east of track.

Wind W x S 3/4. Slight sea. Low swell. Fog.

Proceeding to 53 29 South 39 09 West for CTD and RMT net.

2220 local time Friday 09/01/04

53 degrees 36 minutes South 38 degrees 38 minutes West

Course 350T Speed 6 knots

Core box transects 2.1 and 2.2 completed.
3 CTDs and 2 RMT trawls. UOR deployed when ice conditions allow.
Dense concentration of bergs, bergy bits and growlers at lower end of transect 2.1.
Ice conditions improved slightly for 2.2

Wind NNW 5. Moderate sea. Low swell. Fog.

Proceeding to 53 26 South 38 42 West for CTD and RMT net.

2220 local time Saturday 10/01/04

Anchored in Rosita Harbour

1 CTD and 1 RMT net completed overnight.
0615 - attempted acoustic run in morning abandoned because of rough sea conditions. Ship taken to Rosita Harbour.
1209 to 1914 local time - scientific calibration on DP.
1952 Anchored for night.

Intend sailing at 0500 approx. to assess conditions offshore.

Wind in Rosita - W6.

2220 local time Sunday 11/01/04

53 degrees 21 minutes South 38 degrees 06 minutes West

RMT net deployed.

0520 Departed Rosita Harbour. Wind W force 4.
0844 Commenced transect 3.1 northbound. UOR deployed.
1137 Transect abandoned. Poor data quality. Wind N x W force 8. Hove to in very rough sea.
1844 Weather moderating. Resume transect from north.
1913 Transect abandoned.
2030 CTD deployed on line 3.2. Wind NW x W force 6.
2124 CTD recovered. RMT net rigged and deployed.

During the morning a dense concentration of bergs, bergy bits and growlers in a band about 3 miles wide was noted on the coast immediately to the north of Bird and Willis Islands.

2220 local time Monday 12/01/04

53 degrees 36 minutes South 37 degrees 54 minutes West

Hove to in westerly force 9. Very rough to high sea.
Course 282T Speed 2 knots.

RMT and CTD completed overnight.
0544 Commenced transect 3.2, towing UOR.
1007 Completed 3.2.
1053 Commenced 4.1
1516 Completed 4.1
1530 Commenced 4.2
1904 Abandoned 4.2. UOR recovered. Proceeding towards shallow mooring site.
2100 Hove to.

Weather throughout day mainly too poor for good quality acoustic data.
Severe gale forecast for Tuesday.

2220 local time Tuesday 13/01/04

53 degrees 47 minutes South 37 degrees 56 minutes West

On station above shallow mooring. Acoustics.

Hove to until 0530.
0725 On station above shallow mooring. Acoustics.
1100 Release signal sent. Failed to surface. Grapnel rigged.
1344 Grapnel deployed.
1548 Buoy surfaced.
1721 Mooring recovered intact.
2138 Mooring relaid.

Wind N force 3. Light snow. Slight sea. Low swell.

2220 local time Wednesday 14/01/04

53 degrees 45 minutes South 37 degrees 57 minutes West

RMT trawl in vicinity of shallow mooring.
0400 Commence recovery of deep mooring.
0545 Deep mooring recovered.
0613 Grapnel deployed for acoustic release lost in trawler incident.
1052 2 attempts completed without success.
1106 CTD
1234 Deploying deep mooring.
1325 Deployment complete.
1340 Transit to Bird Island.
1640 On DP off Cardno Point. Launch in via Bird Sound.
1945 Departed BI for shallow mooring site. Dave Molyneaux and Jauma Forcada embarked.

Light winds. Slight sea. Mod. swell.

2300 local time Thursday 15/01/04

53 degrees 49 minutes South 37 degrees 58 minutes West

Completing RMT trawl in vicinity of shallow mooring.

0400 Commence transit to KEP.
1020 Alongside berth. Waste, mail, and small cargo items transferred.
1058 Clear of berth. Set up on DP outside cove.
1130 Small boat training and recreational walks. Andy Cope embarked.
1555 Transit to shallow mooring site.
2207 RMT net deployed.
2300 RMT net recovered.

SW force 4. Slight sea. Low swell. Clear.

2200 local time Friday 16/01/04

53 degrees 05 minutes South 38 degrees 41 minutes West

Course 281T. Speed 8 to 9 knots approx.

On passage to Stanley, towing magnetometer, swath running.

0410 Resumed acoustic runs. Towing UOR.
1400 UOR recovered.
1915 Completed repeat runs of transects 3.1, 3.2, and 4.1
1920 Magnetometer deployed.
1927 Set course for Stanley - route determined by previous swath coverage.

Wind NW x N force 7. Rough sea. Frequent bergs and growlers.

2200 local time Saturday 17/01/04

52 degrees 24 minutes South 44 degrees 02 minutes West

Course 270T. Speed 10 knots.

On passage to Stanley, towing magnetometer, swath running.

Wind WNW force 6, freshening. Rough sea. Clear.

2200 local time Sunday 18/01/04

51 degrees 56 minutes South 50 degrees 40 minutes West

Course 277T. Speed 11 knots.

On passage to Stanley, towing magnetometer, swath running.
ETA am 20th.

Wind WSW force 5. Moderate sea. Clear.

2150 Anchored in Port William.

Wind N force 7, gusting locally to 9. Mist and rain.

Tuesday 20th. January 2004

0629 Commence weighing anchor.
0722 All fast middle berth FIPASS.

Regards, RCP
Master