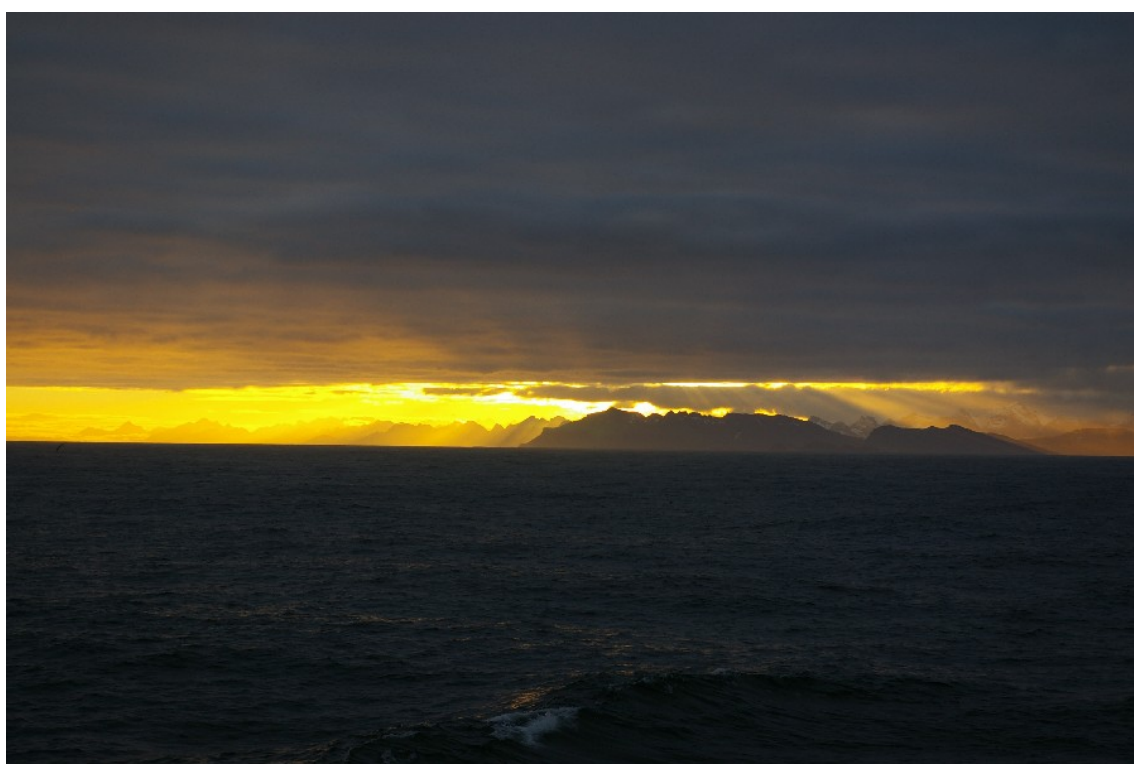


Cruise Report
JR188 (29 December 2008 – 6 January 2009)

Western Core Box acoustic survey and
Continuous Plankton Recorder

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Cruise Outline

JR188 took place between the 29th December 2008 and 6th January 2009. The aims of the cruise were to run the Western Core Box acoustic survey for the only time during the 2008/09 Antarctic Season and to deploy the Continuous Plankton Recorder (CPR) at two locations: between the South Orkneys and South Georgia, and again between South Georgia and the Falkland Islands. All timings are given in GMT (local time = GMT – 3)

Continuous Plankton Recorder (CPR)

The CPR is an instrument that filters plankton from the water over long distances (up to 500 nautical miles) on a moving filter band of silk (270 micron mesh size). The filter silk band is wound through the CPR on rollers turned by gears, which are powered by an impeller. Once in the laboratory the silk is divided into blocks of 10 nautical miles of towing, and an analysis of the presence and abundance of phytoplankton and zooplankton is made.

The CPR was initially deployed to the north of the South Orkney Islands (59.05° S; 43.23° W) on 29th December 2008 at 11:35. It was towed for a distance of 316 nautical miles, and recovered to the south of South Georgia (54.38° S; 38.62° W) at 14:33 on 30th December 2008 (Figure 1; Table 1). A second deployment began to the west of South Georgia (53.42° S; 40.66° W) on 4th January 2009 at 12:00. The CPR was recovered to the east of the Falkland Islands (51.79° S; 55.83° W) at 11:13 on 6th January 2009, after a 566 mile tow (Figure 1; Table 1). The samples taken were preserved in formalin (as required for further analysis by the Sir Alistair Hardy Foundation for Ocean Science), and the CPR was reloaded.

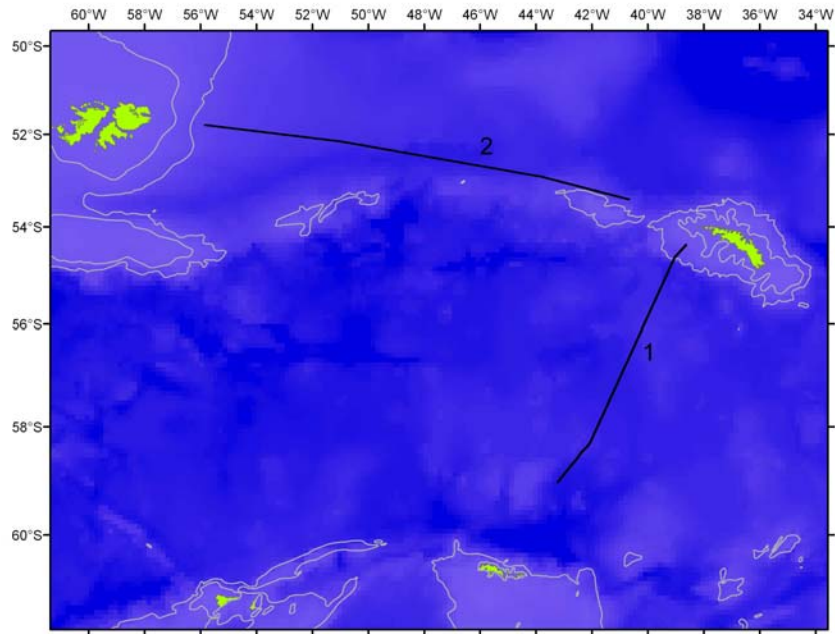


Figure 1: Continuous Plankton Recorder transects: (1) South Orkneys to South Georgia (2) South Georgia to the Falkland Islands.

Western Core Box acoustics

The Western Core Box acoustic survey takes place in waters to the north of South Georgia and consists of eight semi-randomly spaced transects running in a north-south direction (Figure 2). The survey provides an estimation of krill biomass and has been running since 1994. In addition to the acoustic survey, water profiles are taken at regular intervals using a combination of expendable bathy-thermograph (XBT) and Conductivity Temperature and Depth (CTD) casts (Figure 2).

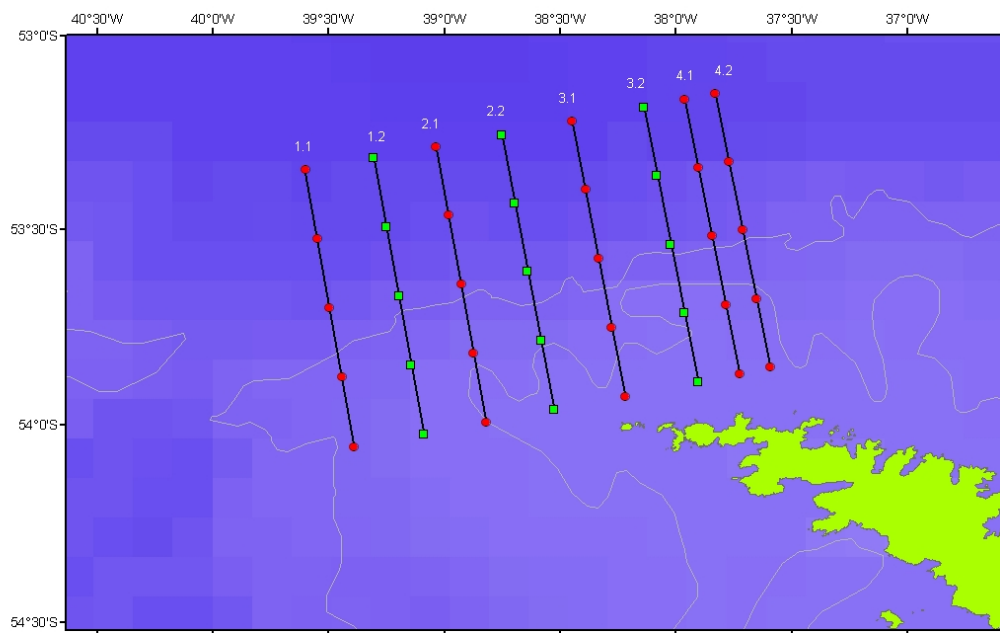


Figure 2: Location of standard western core box acoustics survey transects. Red circles show locations of expendable bathy-thermograph (XBT) deployments ($n = 25$) and green squares show locations of Conductivity Temperature and Depth (CTD) deployments ($n = 15$). In addition to these, five extra XBT deployments were made along transect 2.2 at the same locations as the CTD stations; see text for details.

During the western core box survey the ship usually travelled at 10 knots, apart from during XBT deployments, which were made at a speed of six knots. CTD casts were made to depths of 1000 m in deep waters or 10 m above the seabed in shallow waters.

The acoustic survey began at 09:00 on 31 December 2008, commencing at the north-western end of the survey box (W1.1N), in calm but overcast conditions. XBTs were deployed along transect 1.1 ($n = 5$; Table 2) at 10 mile intervals. Transect 1.1 was completed at 13:46 and transect 1.2 began at 14:55 running from south to north and ending at 19:15. Some deviation from the preferred route was made at the southern end of the transect in order to avoid the fishing vessel *Insung Ho* (see Appendix II; Figure 3). CTD casts were made at the first four stations on transect 1.2 (Figure 2), beginning at the northern end of the transect (Table 3). However, during the deployment of the final CTD of transect 1.2 (no 5; Table 3) the wire jumped off one sheave (at a depth of 132 m), resulting in abandonment of the deployment and hauling in of the CTD for repairs to the wire.

Transect 2.1 began at 09:00 on 1st January 2009, at the southern end of the survey. Initially overcast, the day was bright and sunny, with calm seas. XBTs were deployed at 10 mile intervals ($n = 5$; Table 2) and transect 2.1 was completed by 13:41. Transect 2.2 began at 14:59, with XBTs again deployed at 10 mile intervals ($n = 5$; Table 2). This was done as a contingency measure in order to obtain temperature depth profiles at the CTD stations in case that the CTD could not be repaired in time for later deployment. Transect 2.2. was completed by 19:15, after which 200 m of wire was removed from the CTD cable and the cable termination successfully replaced. Five CTD casts were then made at 10 mile intervals along the transect, running from south to north (Figure 2; Table 3).

Transect 3.1 began at 09:00 on 2nd January 2009 at the northern end of the transect, again in calm conditions, with rain at first and fog later on during the day. XBTs were deployed at 10 mile intervals ($n = 5$; Figure 2; Table 2), and transect 3.1 was completed at 13:45. Transect 3.2 began at 14:45 and was completed by 19:06. CTD casts were then made at 10 mile intervals ($n = 5$) running north to south (Table 3).

In order to complete logistical operations on time, transect 4.1 began at 06:30 on 3rd January 2009 (sunrise at 06:15) at the southern end of the survey, with the vessel proceeding at 12 knots (due to a misunderstanding of the Captain's night orders, however this did not affect the quality of acoustic data) for the acoustic survey and 6 knots for XBT deployments. Weather was good with calm seas. Transect 4.1 was

completed by 10:25 and Transect 4.2 began at 11:01, running north to south, and travelling at 10 knots. XBTs were deployed along both legs of transect 4 at 10 mile intervals ($n = 10$; Figure 2; Table 2).

The Western Core Box was completed by 15:43 on 3rd January 2009 (Figure 3) and a course set for King Edward Point, South Georgia.

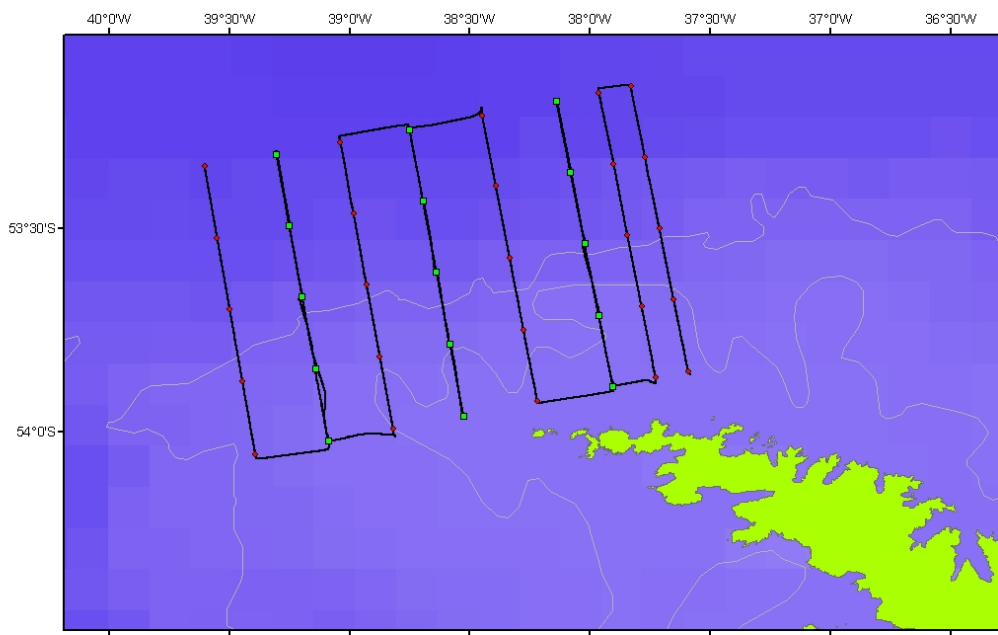


Fig 3: Cruise track JR162 (0900 31st December 2008 to 15:43 3rd January 2009). Red dots indicate location of XBT deployments; green squares indicate locations of CTD deployments.

Acknowledgements

Many thanks to Captain Gerry Burgan and his team onboard RRS James Clark Ross. Thanks also to Julian Klepacki and Doug Willis who provided AMS and ITS support respectively during the cruise.

Table 1: Continuous Plankton Recorder (CPR) Log

Time	Event	Lat	Lon	Comment
29/12/2008 11:35	CPR 1	-59.05	-43.23	CPR Deployed (1st deployment)
29/12/2008 16:13	CPR 1	-58.31	-42.06	Alter Course to 024 deg. true
30/12/2008 12:45	CPR 1	-54.44	-38.71	Alter course to 042 deg. true
30/12/2008 14:30	CPR 1	-54.36	-38.59	Start recovery of CPR
30/12/2008 14:33	CPR 1	-54.38	-38.62	CPR recovered on deck (316 mile tow)
04/01/2009 12:00	CPR 2	-53.42	-40.66	CPR deployed (2nd deployment)
06/01/2009 11:13	CPR 2	-51.79	-55.83	CPR recovered (566 mile tow)

Table 2: Expendable Bathy-Thermograph (XBT) Log

Time	Serial No.	File No	Lat	Lon	Salinity	Successful?	Comment
31/12/2008 09:06	326760	T5_0003	-53.53	-39.55	33.79	Yes	XBT 1 start of transect 1.1 (N)
31/12/2008 10:14	326764	T5_0004	-53.53	-39.55	33.79	Yes	XBT 2 transect 1.1
31/12/2008 11:16	326764	-	-53.70	-39.50	33.79	No	Failed - "bad resistance" error
31/12/2008 11:37	326767	T5_0005	-53.73	-39.49	33.80	Yes	XBT 3 transect 1.1
31/12/2008 12:37	326758	T5_0006	-53.89	-39.44	33.82	Yes	XBT 4 transect 1.1
31/12/2008 13:47	326762	T5_0007	-54.06	-39.39	33.88	Yes	XBT 5 southern end of transect 1.1
01/01/2009 09:05	326757	T5_0008	-53.99	-38.82	33.85	Yes	XBT 6 start of transect 2.1 (southern end)
01/01/2009 10:09	326761	T5_0009	-53.82	-38.87	33.78	Yes	XBT 7 transect 2.1
01/01/2009 11:23	326766	T5_0010	-53.63	-38.93	33.74	Yes	XBT 8 transect 2.1
01/01/2009 12:33	326765	T5_0011	-53.46	-38.99	33.84	Yes	XBT 9 transect 2.1
01/01/2009 13:41	322282	T5_0012	-53.28	-39.04	33.84	Yes	XBT 10 transect 2.1 (N)
01/01/2009 14:54	326759	T5_0013	-53.26	-38.75	33.84	Yes	XBT 11 transect 2.2 (N). Extra XBTs run on transect 2.2 as contingency as CTD is undergoing repair
01/01/2009 16:03	322283	T5_0014	-53.44	-38.69	33.86	Yes	XBT 12 transect 2.2
01/01/2009 17:14	322284	T5_0015	-53.62	-38.64	33.75	Yes	XBT 13 transect 2.2
01/01/2009 18:23	322281	T5_0016	-53.79	-38.58	33.79	Yes	XBT 14 transect 2.2
01/01/2009 19:31	326960	T5_0017	-53.97	-38.52	33.83	Yes	XBT 15 south end of transect 2.2
02/01/2009 09:04	322288	T5_0019	-53.40	-38.39	33.74	Yes	XBT 16 north end of transect 3.1
02/01/2009 10:12	322287	T5_0019	-53.40	-38.39	33.74	Yes	XBT 17 transect 3.1
02/01/2009 11:22	322286	T5_0020	-53.58	-38.33	33.63	Yes	XBT 18 transect 3.1
02/01/2009 12:32	322285	T5_0021	-53.76	-38.28	33.75	Yes	XBT 19 transect 3.1
02/01/2009 13:41	322292	T5_0022	-53.93	-38.22	33.83	Yes	XBT 20 transect 3.1
03/01/2009 06:35	322291	T5_0023	-53.86	-37.73	33.70	Yes	XBT 21 start of transect 4.1 (south end)
03/01/2009 07:30	322290	T5_0024	-53.69	-37.79	33.59	Yes	XBT 22 transect 4.1
03/01/2009 08:30	322289	T5_0025	-53.51	-37.85	33.62	Yes	XBT 23 transect 4.1
03/01/2009 09:31	326959	T5_0026	-53.33	-37.91	33.79	Yes	XBT 24 transect 4.1
03/01/2009 10:30	326958	T5_0027	-53.16	-37.97	33.78	Yes	XBT 25 Transect 4.1
03/01/2009 11:06	326949	T5_0028	-53.16	-37.83	33.84	Yes	XBT 26 transect 4.2
03/01/2009 12:15	326781	T5_0029	-53.33	-37.77	33.82	Yes	XBT 27 transect 4.2
03/01/2009 13:25	326782	T5_0030	-53.51	-37.71	33.65	Yes	XBT 28 transect 4.2
03/01/2009 14:35	326783	T05_0031	-53.69	-37.65	33.60	Yes	XBT 29 transect 4.2
03/01/2009 15:43	326784	T5_0032	-53.86	-37.59	33.64	Yes	XBT 30 transect 4.2. Off to KEP...

Table 3: CTD Log

Time	Latitude	Longitude	Depth	Comment
31/12/2008 20:18	-53.32	-39.30	1000m	ctd001
31/12/2008 21:51	-53.49	-39.25	1000m	ctd002
01/01/2009 00:15	-53.67	-39.20	1000m	ctd003
01/01/2009 02:49	-53.85	-39.14	275m	ctd004
01/01/2009 04:37	-54.02	-39.09	132m	ctd005 winch cable dislocated at 132m. Cable relocated and ctd aborted.
01/01/2009 20:40	-53.96	-38.53	140m	ctd006
01/01/2009 22:20	-53.79	-38.58	190m	ctd007
02/01/2009 00:25	-53.61	-38.64	1000m	ctd008
02/01/2009 02:37	-53.43	-38.69	1000m	ctd009
02/01/2009 04:51	-53.26	-38.75	1000m	ctd010
02/01/2009 20:09	-53.19	-38.14	1000m	ctd011
02/01/2009 22:10	-53.36	-38.08	1000m	ctd012
03/01/2009 00:14	-53.54	-38.03	1000m	ctd013
03/01/2009 02:01	-53.71	-37.97	125m	ctd014
03/01/2009 03:48	-53.89	-37.90	133m	ctd015

Appendices

I. EK60 settings (31 December 2008)

Frequency	kHz	38 kHz	120 kHz	200 kHz
Transducer type		ES38	ES120-7	ES200-7
Transducer serial no				
GPT serial no		009072033fa5	00907203422d	009072033f91
Trans draft		0	0	0
Comments				
Environmental parameters				
Water temperature	°C	5	5	5
Salinity	psu	34	34	34
Sound velocity*	m/s	1471	1471	1474
Absorption coefficient*	dB/km	10.07	30.802	43.908
Echosounder parameters				
Ping rate	Sec	2-2.5	2-2.5	2-2.5
Transmit power	W	2000	500	300
Pulse length	msec	1.024	1.024	1.024
Bandwidth	kHz	2.425	3.026	3.088
Sample interval	m	256	256	256
Transducer gain	dB	22.03	21.38	22.03
Sa Correction	dB	-0.31	-0.39	-0.31
2-way Beam Angle	°	19.6	-20.7	-19.6
3 dB Athwart Beam Angle	°	6.43	7.48	6.43
3 dB Along Beam Angle	°	6.44	7.48	6.44
Athw offset angle	°	-0.24	-0.07	-0.24
Along offset angle	°	0.17	-0.12	0.17
		Unknown	Unknown	Unknown

II Acoustics Log

Time	Lat	Lon	Event	Comment
31/12/2008 08:59	-53.35	-39.60	Start of transect 1.1 (north end)	
31/12/2008 12:13	-53.83	-39.46		mark on seabed (700m) on 38 kHz
31/12/2008 12:28	-53.87	-39.45		long band on 120 kHz (270m) close to seabed
31/12/2008 13:04	-53.96	-39.42		mark at 120m
31/12/2008 13:16	-53.99	-39.41		Long mark at 200m
31/12/2008 13:46	-54.06	-39.39	End of transect 1.1 (south end)	
31/12/2008 14:55	-54.02	-39.09	Start of transect 1.2 (south end)	
31/12/2008 15:15	-53.97	-39.11		alteration to course to avoid longliner (Insung Ho)
31/12/2008 16:54	-53.70	-39.19		ribbon of biomass at about 200m descending to 1000m about 17:26
31/12/2008 19:15	-53.31	-39.31	End of transect 1.2 (north end)	
01/01/2009 09:03	-53.28	-39.04	Start of transect 2.1 (south end)	recording of echosounder began at 08:50
01/01/2009 10:07	-53.82	-38.87		biomass at 50m to 10:10 (lots of seals and giant petrels)
01/01/2009 11:50	-53.56	-38.95		Mark at 50m descending to 1000m by 12:10
01/01/2009 13:41	-53.28	-39.04	End of transect 2.1 (north end)	
01/01/2009 14:59	-53.28	-38.74	Start of transect 2.2 (north end)	
01/01/2009 19:30	-53.22	-38.45	End of transect 2.2 (south end)	
02/01/2009 09:00	-53.22	-38.45	Start of transect 3.1 (north end)	
02/01/2009 13:45	-53.18	-38.14	End of Transect 3.1 (south end)	
02/01/2009 14:45	-53.89	-37.91	Start of transect 3.2 (south end)	
02/01/2009 19:06	-53.18	-38.14	End of transect 3.2 (north end)	
03/01/2009 06:30	-53.15	-37.83		Vessel to proceed at 12 knots for T4.1 unless interference seen in echosounder data
03/01/2009 10:25	-53.16	-37.96	End of transect 4.1 (north end)	
03/01/2009 11:01	-53.15	-37.83	Start of transect 4.2 (north end)	Vessel to proceed at 10 knots (12 knots on last transect due to misunderstanding in night orders)
03/01/2009 14:08	-53.62	-37.67		large mark at 70m coincident with shelf break (and whale off starboard side)
03/01/2009 15:43	-53.86	-37.59	End of transect 4.2 (south end)	