RV Pelagia Shipboard Report:

Cruise 64PE216, Project CLIVARNET Atlantic Monitoring Programme (CAMP)

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Chief Scientist

CAMP 2003

Royal NIOZ, Texel, 2003

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The research reported here is part of the Royal NIOZ contribution to the Dutch Clivar programme and also contributes to the Dutch LOCO programme, which received funding from the Netherlands Foundation for Scientific Research (NWO). Additional funding for the bio-geochemical contribution came from the Foundation for Earth and Life Sciences (ALW), a subsidiary of NWO.

1 Cruise Narrative

1.1 Highlights

a: Goals: The re-survey of WOCE Hydrographic Program Repeat Section A1/AR7E between Ireland and Greenland as part of the CAMP programme and the deployment of long term moorings in the Irminger Sea for the LOCO programme.

b: Expedition Designation (EXPOCODE): 64PE216

c:

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d: Ship: RV Pelagia, Call Sign: PGRQ, Captain: Mr. John Ellen
length 66 m.
beam 12.8 m
draft 4 m
maximum speed 11 knots

e: Ports of Call: Galway to Galway

f: Cruise dates: August 22, 2003 to September 10, 2003

1.2 Cruise Summary Information

Summary

Shortly after noon, Friday 22 August 2003, RV Pelagia left Galway and set course to the position in the Irminger Sea where the first current meter mooring should be deployed. After leaving port the underway recording system for navigational, meteorological and sea surface data was activated. Underway the plankton pump was switched on and every 6 to 12 hours samples were taken from the plankton-sampling sieve during the whole cruise. The first two current meter moorings of an internal wave array on the western flank of the Reykjanes Ridge were deployed on 26 August. On that day also a successful shake down with the CTD-system was performed. Near both mooring positions echo sounder surveys were performed. The following day two more current meter moorings were deployed over the lower reaches of the western Reykjanes Ridge. Near the position of the third mooring the bathymetry was also surveyed with the 3.5 kHz echosounder. After the fourth mooring a CTD-Rosette cast to ~3000 m was carried out to obtain deep water for the preparation of the sediment trap cups. The first profiling mooring was deployed in the morning of 28 August after an echo sounder survey during the preceding night. The deployment planned for the afternoon was cancelled because of the malfunctioning of the McLane profiler. Instead an echo sounder survey was carried out until the following morning when a sediment trap mooring was deployed over the lower continental rise of Greenland. In the evening of that day the problems with the McLane profiler were solved, and the second profiling mooring was deployed in the morning of 30 August. Then course was set to the continental shelf of Greenland near Cape Farewell. In the morning of 31 August RV Pelagia sailed along a section to within 3 miles of the Greenland coast to observe a reported shallow low salinity current with ADCP and thermo-salinograph. Shortly before 10:00 UTC CTD observations were carried out at the first station on the A1E section towards Ireland. Due to favourable wind and wave conditions, mainly westerly winds, the survey of this line took less time than anticipated and was finished in the morning of 8 September over the Irish continental shelf. From there course was set to the beginning of an additional hydrographic section further south. This line was surveyed from the central Rockall Channel to the continental shelf near the northern Porcupine Bank. In the evening of 9 September the survey of this line was finished, after which course was set towards Galway. In the afternoon of 10 September RV Pelagia moored in Galway harbour.

Cruise Track

The cruise was carried out in the North Atlantic Ocean. The cruise track is shown in figure 1

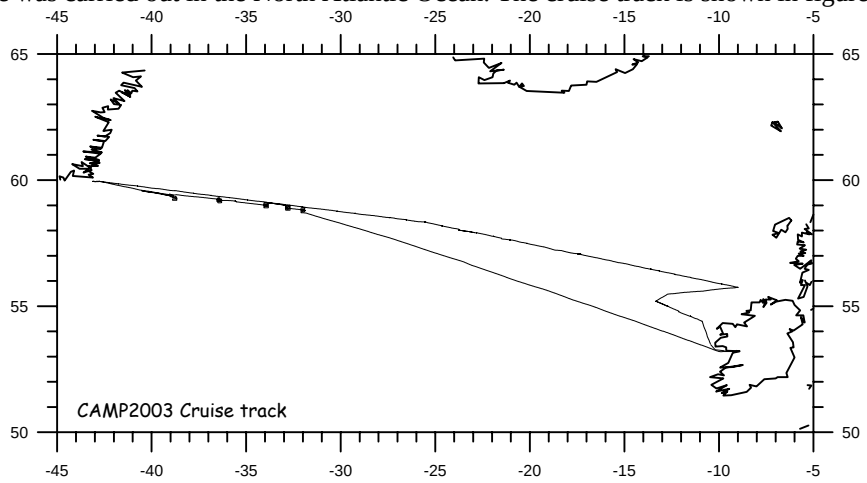

Figure 1. The cruise track of RV Pelagia during cruise 64PE216.

Mooring Deployments

At seven positions a mooring was deployed (see Figure 2). Moorings LOCO 02-1 and LOCO 03-1 were profiling moorings, fitted with a McLane/FSI CTD profiler, two RDI Long Ranger ADCPs and an SBE Seacat CTD. They were deployed at a depth of about 3000 m. Mooring IRM-1 was fitted with a Kiel type (HDW) sediment trap and a data logger in a bottom frame and another such sediment trap with data logger at ~250 m. This mooring was deployed at short distance from mooring LOCO 02-1. Moorings LOCO 15-1 to LOCO 18-1 form a current meter array over the western flank of the Reykjanes Ridge. They were deployed at positions with intended bottom depths of 3000, 2500, 2000 and 1500 m and contain a variety of current meters. The top of these moorings is at a depth of about 1000 m.

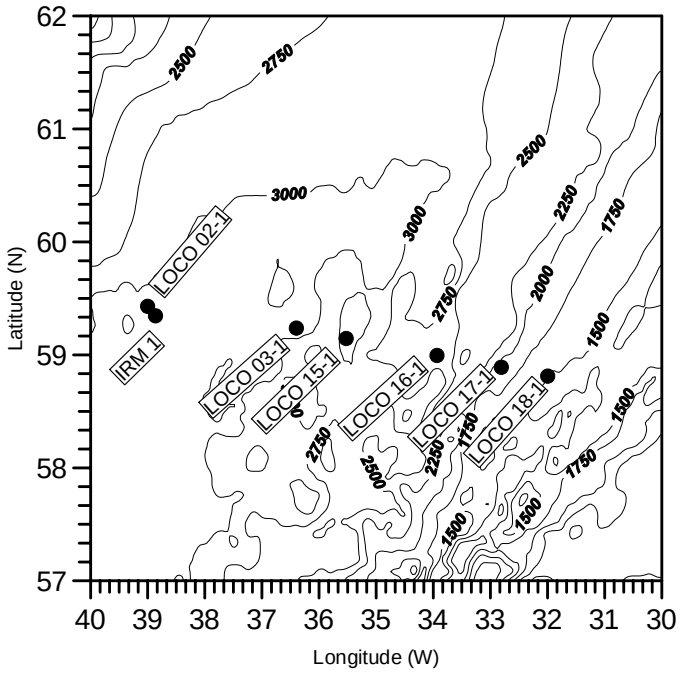

Figure 2. Positions of the moorings, deployed during Pelagia Cruise 64PE216. Further details of the mooring configuration are given in Appendix B.

Number of Hydrographic Stations

A total of 50 CTD casts were performed of which 42 were located along the former WOCE A1E section and 7 along the additional section B. The location of these casts is shown in figure 3. Further information on the time, location and samples taken during these casts can be found in the Cruise Summary File (Appendix A).

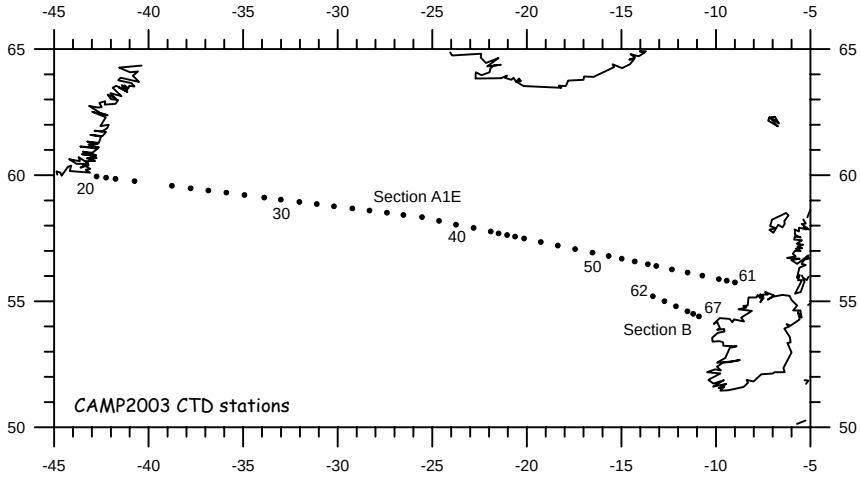

Figure 3. Position of the CTD casts along the former WOCE A1E section and the additional section B. Station numbers are indicated in the figure.

Hydrographic Sampling

During the up-cast of several deep CTD/rosette stations water samples were taken. The samples were analysed for salinity and stored for carbon and oxygen isotope measurements. Additionally calibration control measurements of pressure were made for each closed bottle.

Number of Plankton Pump Samples

During the cruise 54 plankton samples were taken with the 100 µm plankton sieve, connected to the plankton pump. These were numbered PE216-P1 to PE216-P54. With each sieve sample also a water sample was taken for the determination of nutrients and stable isotopes. Preceding the filtration period for sample PE216-P1 a water sample PE216-P0 was collected.

1.3 List of principal Investigators

Name	Responsibility	Affiliation
Dr. H.M. van Aken	Ocean hydrography & climate	Royal NIOZ/Texel
Dr. G.-J. A. Brummer	Bio-geochemistry	Royal NIOZ/Texel

1.4 Scientific Programme and Methods

The dual goal of the research carried out during the cruise was to establish the hydrography along a zonal section between Ireland and Greenland and to deploy seven instrumented moorings in the Irminger Sea.

The zonal section is the former A1E/AR7E section of the WOCE Hydrographic Programme, which has been surveyed near-annually since 1990. The re-survey of this section is carried out in order to determine climate related inter-annual changes of the hydrographic structure in the North Atlantic Ocean. This survey has been planned in co-ordination with IfMH, Hamburg and BSH, Hamburg. These institutes are involved in the regular surveys of the A1E and A2 sections in the North Atlantic.

The CTD-rosette frame was fitted with weights in order to secure a fast enough falling rate. This package was lowered with a velocity of about 1 m/s, except in the lowest 100 m where the veering velocity was reduced. Measurements during the down-cast went on to within 10 m from the bottom, until the bottom switch indicated the proximity of the bottom. Over the Reykjanes Ridge the bottom switch wire was lengthened to 25 m. During the up-cast water samples where taken at prescribed depths, when the CTD winch was stopped. After each cast the CTD/rosette frame was placed on deck. Subsequently water samples were drawn for the determination of salinity and isotope composition of carbon and oxygen, and the readings of the reversing electronic pressure sensors were recorded. The CTD frame was also fitted with an LADCP which measured velocity profiles.

The moorings which were deployed form part of the Dutch Long-term Ocean Climate Observations programme (LOCO). This programme aims at the establishment of a monitoring system which records climate relevant oceanographic parameters. Two of the moorings (LOCO2-1 and LOCO3-1) contain a profiling CTD which will record on a daily basis profiles of temperature and salinity between ~2200 and 100 m depth. Additionally ADCPs will record the velocity profiles in the upper and lower 600 m. It is intended to maintain these moorings for at least 5 years in the Irminger Sea, extended with a third profiling mooring in 2004. Moorings LOCO15-1 to 18-1 will record for one year the internal and near inertial wave field over the rough western flank of the Reykjanes Ridge.

The additional mooring IRM-1 will record for one year the particle flux at 238 m above the bottom and at 2 m near the ocean bottom in 19 days time bins. This configuration allows for assessing the coupling between physical forcing and particulate export production, bottom deposition and sediment re-suspension, as well advection through a well-defined volume transport field profiled by the nearby LOCO2-1 mooring. Prior to mooring, acid-cleaned sample bottles were filled with a biocide ($HgCl_2$, nominal 1 g l^{-1}) and a pH buffer ($Na_2B_4O_7 \cdot 10H_2O$, nominal 2 g l^{-1} to pH~8.4) solution in seawater collected from ambient depth and brought to ambient density by adding milliQ. It is intended to maintain such a sediment trap mooring in the Irminger Sea for at least 5 years, concurrent with the LOCO moorings.

An additional programme was the collection of sieve samples of skeletal (zoo)plankton, in particular planktonic foraminifera, in order to calibrate faunal properties (species assemblages and carbonate stable isotope composition) to surface water properties (temperature, salinity, and stable isotope composition). Results will be combined with the time-series fluxes from the deep-moored sediment traps deployed during this cruise, to eventually improve the reconstruction of the thermohaline circulation during the last deglaciation in the Irminger Basin. Samples were collected with the plankton (membrane) pump system which continuously pumped water from 2 m depth through a 100 μm mesh size sieve, every 12 hours. from Galway to Cape Farewell and every 6 hours from Cape Farewell to Galway. In between each sieve sample surface water samples were collected for the determination of nutrients and the isotope composition of carbon and oxygen.

In support of the CTD observations and the surface plankton sampling the sea surface temperature and salinity were recorded continuously as well as particle fluorimetry and back-scattering, and several meteorological parameters.

1.5 Lists of Cruise Participants

Scientific crew

person	responsibility	Institute
H.M. van Aken	Chief Scientist	NIOZ
S. Ober	CTD system, VMADCP, Hydrowatch	NIOZ
M.A. Hiehle	Salinometer, data management, hydrowatch	NIOZ
M.Th.J. Hillebrand	Mooring design & instrumentation, LADCP	NIOZ
R.L. Groenewegen	Electronic engineering, hydrowatch	NIOZ
L.M Wuis	Mooring construction & engineering	NIOZ
G.-J. A Brummer	sediment traps & plankton sieving	NIOZ
M.J. de Haij	student physical oceanography, hydrowatch	IMAU
M.F. de Jong	student oceanography, hydrowatch	IMAU
J. Hazewinkel	student oceanography, hydrowatch	IMAU
S. Jonkers	student oceanography, hydrowatch	IMAU
R.M. Schippers	student oceanography, hydrowatch	IMAU
A. Struijk	student oceanography, hydrowatch	IMAU
D.J. van Leverink	student paleo-oceanography, plankton sieving	FALW

NIOZ: Royal Netherlands Institute for Sea Research, Texe

IMAU Institute for Marine and Atmospheric Research, Utrecht University.

FALW Faculty of Earth and Life Sciences, Free University Amterdam

Ships crew

J.C. Ellen	Captain
M.D. van Duijn	First Mate
I. Onnes	Second Mate
K.C. Kikkert	Chief Engineer
M.D. de Kleine	Second Engineer
G.L.J. Bestsema	Ships Technician
J.A. Israel Vitoria	Ships Technician
N. Meijer	Ships Technician
C. Stevens	Ships Technician
J. Dresken	Cook

2 Underway Measurements

2.1 Navigation

A differential GPS receiver was used for the determination of the position. The data from the GPS receiver and the gyro compass were recorded every ten seconds in the underway data logging system. After removal of a few spikes and application of a 5 min. running mean these data were sub-sampled every five minutes. An additional Thales Aquarius^2 dual antenna GPS receiver also determined the ship's heading. The heading, used for the VMADCP measurements.

2.2 Echo Sounding

The 3.5 kHz echo sounder was used on board to determine the water depth. The uncorrected depths from this echo sounder were recorded in the underway data logging system. At most mooring sites a small echo sounder survey was carried out in order to determine the depth and bottom slope in the surroundings of the mooring.

2.3 Thermo-Salinograph Measurements

The Sea Surface Temperature, Salinity, Fluorescence and Optical Back-Scatter were measured continuously with the thermo-salinograph system with the water intake at a depth of about 3 m. For the calibration of the salinity sensor, water samples were taken three times per day.

2.4 Meteorological data

Air temperature and humidity, relative wind velocity and direction as well as air pressure and solar radiation were measured and recorded by the underway logging system.

3 Hydrographic measurements - Descriptions, Techniques, and Calibrations

3.1 Rosette Sampler and Sampler Bottles

A 22 position rosette sampler was used, fitted with 10 litre NOEX sampler bottles. A multi-valve system, developed at NIOZ, allowed closing the sampler bottles by computer command from the CTD operator.

3.2 Temperature Measurements (S. Ober)

Mounted on the CTD-rack was a high precision SBE35 reference temperature sensor, which recorded the temperature every time a sampler was closed. Due to malfunctioning of the SBE35 data communication this instrument could not be used for the control and/or the calibration of the CTD temperature sensor SN 032211.

3.3 Pressure Measurements (S. Ober)

On sampler bottles 2, 4, and 6 thermometer racks were mounted, fitted with SIS reversing electronic pressure sensors. On deck, prior to the CTD cast, these pressure sensors corrected internally for zero pressure. The readings of these sensors are used to control, and if necessary to correct the calibration of the CTD pressure sensor.

3.4 Salinity Measurements (M. Hiehle)

Water samples for the salinity determination were collected at dept of 2000 m and deeper. After 3 times rinsing water was drawn from the samplers into a 0.25 litre glass sample bottle for the salinity determination. The sample bottles had a stopper as well as a screw lid. The salinity of water samples was determined by means of a Guildline Autosal 8400B salinometer. The salinometer was installed in a laboratory container, fitted with an air conditioning system. This kept the surrounding air temperature constant within 1°C. The salinity data will be used to check the calibration of the CTD conductivity sensor (SN 041046).

3.5 CTD Data Collection and Processing (M.A. Hiehle)

For the data collection the new Seasave software for Windows (V 5.28c), produced by SBE, was used. The CTD data were recorded with a frequency of 24 data cycles per second. After each CTD cast the data were copied to a hard disk of the ship's computer network, and a daily back-up copy was made.

On board the up-cast data files were sub-sampled to produce files with CTD data corresponding to each water sample, taken with the rosette sampler. The CTD data were processed with the preliminary calibration data, and reduced to 1 dbar average ASCII files. These were used for the preliminary analysis of the data. Full data processing with the final calibration values will be completed at Royal NIOZ, Texel.

3.6 LADCP Data Collection and Processing (M.T.J. Hillebrand)

Current velocity and direction data from the entire water column were measured with one downlooking 300 kHz ADCP mounted on the CTD frame. Data collection took place during the up and down cast of the CTD. The data were stored in solid state memory.

The LDACP data collection was started a few minutes before the deployment of the CTD and was stopped immediately after the CTD was back on deck. Then the data were transferred from the internal solid state memory to the dedicated service computer, and subsequently copied in the appropriate directory on the ships computer network.

A MATLAB master script file developed by Martin Visbeck (LDEO) and adapted by Kees Veth (Royal NIOZ) has been used for data processing, data reduction and calculations of the current velocity and direction profiles. For the processing also the CTD data records were used. Problems were encountered with several data files. Therefore the LADCP data will be reprocessed at Royal NIOZ, Texel.

3.7 VMADCP Data Collection and Processing (S. Ober)

The VMADCP data were collected with a dedicated service computer, together with the appropriate navigational data. Daily these data were transferred to the appropriate directory of the ships computer

network. For the determination of the alignment of the VMADCP relative to the newly installed dual GPS antennas bottom tracking data were collected over the continental shelves if Ireland and Greenland. On board the first phase of VMADCP data processing took place. A number of bottom tracking sections was used to determine the alignment of the VMADCP and the Aquarius^2 antennas. Final data processing will take place at NIOZ after the cruise.

3.8 Plankton Sieve Processing (G.-J.A. Brummer and D. van Leverink)

Plankton pump samples collected during this cruise were washed with fresh water over a 100 μm sieve in the laboratory container to remove the salts, transferred to a polyethylene bag and frozen at –80ºC. Further analysis will be carried out at the Free University of Amsterdam and include freeze drying and low-temperature ashing to remove the organic matter and concentrate the calcareous skeletons of planktonic foraminifera. Selected samples will be analysed for the species assemblage of planktonic foraminifera, as well for the stable isotope ratios of oxygen and carbon. Selection will be based on the surface water properties as measured shipboard by the Aquaflow system, notably temperature, salinity, fluorescence and optical back scattering. Additional criteria will be provided by the dissolved nutrient concentrations, following the analysis of the surface water samples by Royal NIOZ. At the Free University Amsterdam, analysis will be carried out to determine the isotope composition of the concurrent surface water samples, i.e. the $\delta^{18}O$ of the sea water and the $\delta^{13}C$ of the dissolved inorganic carbon.

Nutrient samples were drawn from the plankton pump into a single 100 ml poly-ethylene bottle after 3 times rinsing. A syringe with an Acrodisc 0.4 μm filter was used to transfer the water sample into two 6 ml poly-ethylene vials, which were stored at 4ºC and –20ºC, for the analysis of silica, and phosphate, nitrite and nitrate, respectively.

Stable isotope samples were drawn from the plankton pump at the same time into two 35 ml glass bottles after 3 times rinsing and closed airtight by a rubber septum. One of the samples will be used to determine the $\delta^{18}O$, the other was poisoned with 2 ml of a saturated solution of HgC_{l2} in ultra-pure water, injected through the septum. Bottles were stored separately at 4ºC.

3.9 Data Management (M.A. Hiehle)

All raw data were copied to a cruise directory on the network computer in different groups of sub-directories. Subsequent processed data, final products, documents and figures were copied to separate sub-directories within the cruise directory. Back ups of the network disks were made on a daily basis. At the end of the cruise copies of the whole cruise directory have been made on CD-ROM and a portable hard-disk. By help of paper measurement forms and computerized data inventory files all data were tracked. A final overview of the mooring activities, hydrographic stations, water samples, and the available raw data and samples was made in a cruise summary file (Appendix A).

4. Preliminary results

At the end of the cruise the data were available in raw form and in partially processed form, but without final calibrations applied. From these data preliminary sections of potential temperature and salinity were plotted (Figures 4 and 5). The potential temperature and salinity at a pressure of 500 dbar can be compared with the results for the CAMP survey in the summer of 2000 (Figure 6).

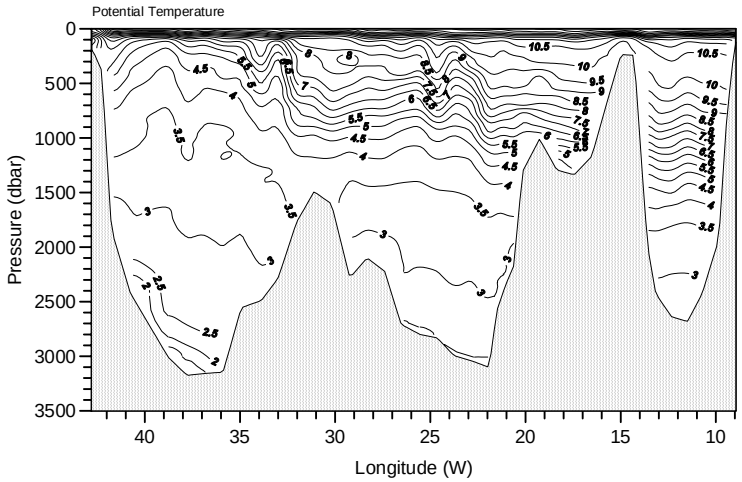

Figure 4. The vertical distribution of the potential temperature along the former WOCE A1E section observed during the CAMP survey in 2003.

The distribution of the potential temperature along the A1E section (Figure 4) shows the customary picture with the main mass of warm water in the eastern half of the Atlantic ocean. At ~32ºW a front is encountered in the upper 1000 dbar, which separates the water of the Irminger Current from the colder waters in the centre of the Irminger Basin. At approximately 23ºW the Sub-Arctic front is encountered which forms the western boundary of the North Atlantic Current in the Iceland Basin. In the deep layers the cold overflow water from Denmark Strait is found over the continental slope off Greenland ($\theta < 1.5$ºC). In the Iceland Basin the overflow water originating from the sills between Iceland and Scotland can be observed over the eastern slope of the Reykjanes Ridge ($\theta < 2.5$ºC)

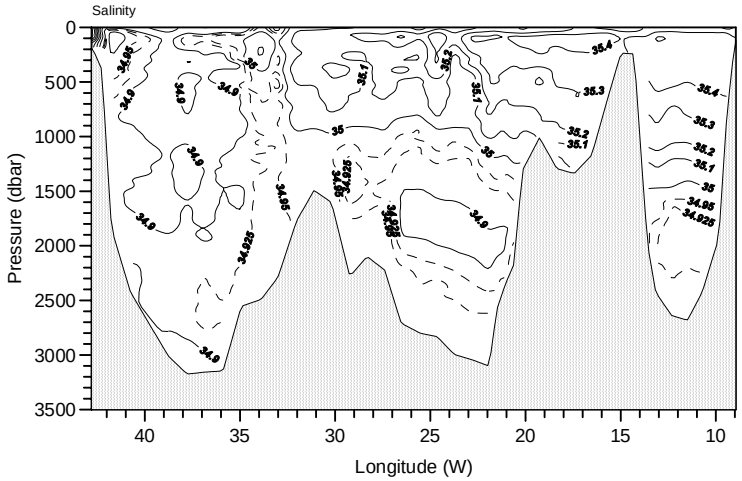

Figure 5. The vertical distribution of the salinity along the former WOCE A1E section as observed during the CAMP survey in 2003

The distribution of the salinity along the A1E section (Figure 5) shows that in the upper 1000 dbar the temperature fronts, mentioned above, coincide with salinity fronts. In the Irminger Basin at intermediate levels the two low salinity cores of “Labrador Sea Water” near 800 and 1600 dbar, also encountered in 2000 are still present. However their salinity seems to have increased since then, and an isolated body of saline water (S > 34.90) probably originating from a meso-scale eddy, is found in the centre of the Basin. The Labrador Sea water in the Iceland Basin and the Rockall Channel still show a single low salinity core near respectively 1800 and 2000 dbar.

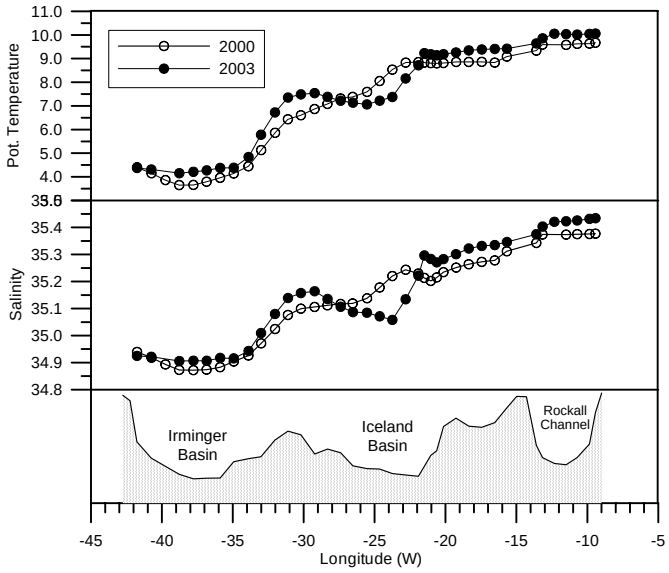

Figure 6. The zonally smoothed potential temperature and salinity at a pressure of 500 dbar along the A1E section from the CAMP survey of 2000 (open symbols) and of 2003 (black symbols). For reference the depth profile is shown in the lowest panel,

In the Rockall Channel and the eastern Iceland Basin the temperature at 500 dbar (Figure 6, upper panel) has risen since 2000 with about 0.5ºC, coincident with a slight increase in salinity. The temperature and salinity decrease since 2000 in the western Iceland Basin can probably be attributed to a relatively eastward position of the Sub-Arctic Front in 2003. In the central Irminger Basin an increase of potential temperature with nearly 0.5ºC is accompanied by an increase in salinity at 500 dbar. Possibly this change is connected with a change in winter convection in the Labrador Sea or in the Irminger Basin.

5 Acknowledgements

The hydrographic research reported here is part of the Royal NIOZ contribution to the Dutch CLIVAR programme (CLIVARNET). The LOCO moorings were funded by NWO via the large investments funding programme. The sediment trap mooring and plankton research received a grant from ALW.

I thank the ships captain and crew for their professional support and active participation in the preparation and execution of the research programme during this cruise. Especially the smooth and efficient way in which the moorings were deployed by the deck crew and NIOZ technicians under the guidance of the first mate, Marco van Duijn, should be mentioned. The contributions of the colleagues from the NIOZ department of Physical Oceanography and from the supporting engineering and administrative departments are highly acknowledged. Jan Blom of DZT was busy for several months to produce a large series of special instrument racks to be mounted in the LOCO moorings.

11 September 2003
Hendrik M. van Aken
Chief Scientist

Appendix A Cruise Summary File

PPS = Plankton Pump Sample	BE = Begin
CTD = CTD cast no samples	BO = Bottom
ROS = CTD Rosette Cast	EN = End
MOR = mooring	DE = Deployment

Salt = Salinity
Iso = O and/or C isotopes
Nut = Nutrients
Pl = Plankton sieve sample

STN NBR	CAST NO	CAST TYPE	DATE	TIME	EVENT CODE	LATITUDE Deg.	Min.	H	LONGITUDE Deg.	Min.	H	NAV	UNC DEPTH	SAMPLES	COMMENTS	Plankton Sample	CTD DATA file	LADCP DATA file
001	1	PPS	22-Aug-2003	20:00	BE	53	25.86	N	10	49.86	W	GPS		Nut, Iso	water sample at start	PE216-P0		
001	1	PPS	23-Aug-2003	07:34	EN	54	10.74	N	13	36.73	W	GPS	2950	Nut, Iso, Pl		PE216-P1		
002	1	PPS	23-Aug-2003	07:50	BE	54	11.86	N	13	40.83	W	GPS	1033					
002	1	PPS	23-Aug-2003	20:19	EN	55	04.39	N	16	59.35	W	GPS	1031	Nut, Iso, Pl		PE216-P2		
003	1	PPS	23-Aug-2003	20:39	BE	55	05.52	N	17	04.30	W	GPS	937					
003	1	PPS	24-Aug-2003	08:19	EN	55	53.07	N	20	12.68	W	GPS	1620	Nut, Iso, Pl		PE216-P3		
004	1	PPS	24-Aug-2003	08:39	BE	55	54.59	N	20	18.55	W	GPS	1584					
004	1	PPS	24-Aug-2003	20:18	EN	56	48.87	N	23	44.48	W	GPS	3050	Nut, Iso, Pl		PE216-P4		
005	1	PPS	24-Aug-2003	20:32	BE	56	49.82	N	23	48.59	W	GPS	3034					
005	1	PPS	25-Aug-2003	08:21	EN	57	39.79	N	27	13.41	W	GPS	2631	Nut, Iso, Pl		PE216-P5		
006	1	PPS	25-Aug-2003	08:32	BE	57	40.57	N	27	16.70	W	GPS	2586					
006	1	PPS	25-Aug-2003	20:19	EN	58	27.45	N	30	48.82	W	GPS	1041	Nut, Iso, Pl		PE216-P6		
007	1	PPS	25-Aug-2003	20:29	BE	58	28.07	N	30	51.60	W	GPS	1531					
007	1	PPS	26-Aug-2003	08:19	EN	58	49.23	N	32	02.91	W	GPS	1453	Nut, Iso, Pl		PE216-P7		
008	1	PPS	26-Aug-2003	08:31	BE	58	49.25	N	32	02.97	W	GPS	1444					
009	1	MOR	26-Aug-2003	09:46	DE	58	48.72	N	31	59.80	W	GPS	1517		LOCO 18-1			
010	1	CTD	26-Aug-2003	11:01	BE	58	48.84	N	31	59.84	W	GPS	1529					
010	1	CTD	26-Aug-2003	11:02	BO	58	48.87	N	31	59.84	W	GPS	1532		test to 50 m		C0310C1	
010	1	CTD	26-Aug-2003	11:12	EN	58	48.81	N	31	59.78	W	GPS	1514					
011	1	MOR	26-Aug-2003	15:37	DE	58	53.36	N	32	48.49	W	GPS	2023		LOCO 17-1			
008	1	PPS	26-Aug-2003	20:17	EN	58	52.73	N	32	40.57	W	GPS	1962	Nut, Iso, Pl		PE216-P8		
012	1	PPS	26-Aug-2003	20:33	BE	58	50.34	N	32	40.50	W	GPS	1789					
012	1	PPS	27-Aug-2003	08:18	EN	59	00.86	N	34	00.15	W	GPS	2905	Nut, Iso, Pl		PE216-P9		
013	1	PPS	27-Aug-2003	08:30	BE	59	01.03	N	34	00.39	W	GPS	2845					
014	1	MOR	27-Aug-2003	10:27	DE	58	59.67	N	33	56.12	W	GPS	2544		LOCO 16-1			
015	1	MOR	27-Aug-2003	17:05	DE	59	08.70	N	35	31.53	W	GPS	3044		LOCO 15.1			
016	1	ROS	27-Aug-2003	19:01	BE	59	10.08	N	35	33.96	W	GPS	3086					

016	1	ROS	27-Aug-2003	19:50	BO	59	10.06 N	35	33.96 W	GPS	3086	Iso	SIS pressure		C0316C1	C161M000
013	1	PPS	27-Aug-2003	20:22	EN	58	59.67 N	33	56.24 W	GPS	2558	Nut, Iso, Pl		PE216-P10		
016	2	PPS	27-Aug-2003	20:30	BE	59	10.06 N	35	33.89 W	GPS						
016	1	ROS	27-Aug-2003	21:13	EN	59	10.05 N	35	33.91 W	GPS	3053					
016	2	PPS	28-Aug-2003	08:23	EN	59	14.00 N	36	30.19 W	GPS		Nut, Iso, Pl		PE216-P11		
016	3	PPS	28-Aug-2003	08:34	BE	59	14.10 N	36	30.30 W	GPS						
017	1	MOR	28-Aug-2003	12:53	DE	59	14.21 N	36	23.84 W	GPS	3021		LOCO 03-1			
016	3	PPS	28-Aug-2003	20:22	EN	59	25.21 N	38	39.87 W	GPS		Nut, Iso, Pl		PE216-P12		
017	2	PPS	28-Aug-2003	20:31	BE	59	25.23 N	38	40.23 W	GPS						
017	2	PPS	29-Aug-2003	09:26	EN	59	20.26 N	38	51.29 W	GPS		Nut, Iso, Pl		PE216-P13		
017	3	PPS	29-Aug-2003	09:36	BE	59	20.48 N	38	51.44 W	GPS						
018	1	MOR	29-Aug-2003	11:55	DE	59	20.74 N	38	51.82 W	GPS	3039		IRM 1			
017	3	PPS	29-Aug-2003	20:22	EN	59	34.64 N	40	30.33 W	GPS		Nut, Iso, Pl		PE216-P14		
018	2	PPS	29-Aug-2003	20:30	BE	59	34.47 N	40	29.21 W	GPS						
018	2	PPS	30-Aug-2003	08:19	EN	59	26.15 N	39	03.17 W	GPS		Nut, Iso, Pl		PE216-P15		
018	3	PPS	30-Aug-2003	08:30	BE	59	26.35 N	39	03.46 W	GPS						
019	1	MOR	30-Aug-2003	11:00	DE	59	25.78 N	39	00.09 W	GPS	3000		LOCO 02-1			
018	3	PPS	30-Aug-2003	20:17	EN	59	35.61 N	40	29.49 W	GPS		Nut, Iso, Pl		PE216-P16		
019	2	PPS	30-Aug-2003	20:28	BE	59	35.85 N	40	31.77 W	GPS						
019	2	PPS	31-Aug-2003	06:54	EN	59	56.72 N	42	44.01 W	GPS		Nut, Iso, Pl		PE216-P17		
019	3	PPS	31-Aug-2003	07:05	BE	59	56.84 N	42	46.45 W	GPS						
020	1	ROS	31-Aug-2003	09:51	BE	59	56.90 N	42	45.11 W	GPS	198					
020	1	ROS	31-Aug-2003	09:54	BO	59	56.88 N	42	45.11 W	GPS	197	Iso	SIS pressure		C0320C1	C201M000
019	3	PPS	31-Aug-2003	10:01	EN	59	56.88 N	42	45.10 W	GPS		Nut, Iso, Pl		PE216-P18		
020	1	ROS	31-Aug-2003	10:01	EN	59	56.88 N	42	45.09 W	GPS	196					
020	2	PPS	31-Aug-2003	10:09	BE	59	56.80 N	42	44.72 W	GPS						
021	1	ROS	31-Aug-2003	11:43	BE	59	54.05 N	42	15.04 W	GPS	393					
021	1	ROS	31-Aug-2003	11:50	BO	59	54.05 N	42	15.11 W	GPS	391	Iso	SIS pressure		C0321C1	-
021	1	ROS	31-Aug-2003	12:01	EN	59	54.06 N	42	15.18 W	GPS	391					
022	1	ROS	31-Aug-2003	13:44	BE	59	51.22 N	41	45.06 W	GPS	1843					
022	1	ROS	31-Aug-2003	14:16	BO	59	51.20 N	41	45.25 W	GPS	1843	Iso	SIS pressure		C0322C1	C221M000
022	1	ROS	31-Aug-2003	14:51	EN	59	51.18 N	41	45.32 W	GPS	1838					
020	2	PPS	31-Aug-2003	15:59	EN	59	49.40 N	41	27.15 W	GPS		Nut, Iso, Pl		PE216-P19		
022	2	PPS	31-Aug-2003	16:11	BE	59	49.05 N	41	23.39 W	GPS						
023	1	ROS	31-Aug-2003	18:21	BE	59	45.66 N	40	44.67 W	GPS	2415					
023	1	ROS	31-Aug-2003	19:04	BO	59	45.82 N	40	44.70 W	GPS	2415	Salt, Iso	SIS pressure		C0323C1	C231M000
023	1	ROS	31-Aug-2003	19:54	EN	59	45.68 N	40	44.50 W	GPS	2420					
022	2	PPS	31-Aug-2003	21:59	EN	59	41.71 N	40	06.73 W	GPS		Nut, Iso, Pl		PE216-P20		
023	2	PPS	31-Aug-2003	22:07	BE	59	41.39 N	40	04.25 W	GPS						
024	1	ROS	01-Sep-2003	02:58	BE	59	34.69 N	38	46.10 W	GPS	2984					
023	2	PPS	01-Sep-2003	03:56	EN	59	34.81 N	38	46.30 W	GPS		Nut, Iso, Pl		PE216-P21		

024	1	ROS	01-Sep-2003	04:01	BO	59	34.82 N	38	46.25 W	GPS	2984	Salt, Iso	SIS pressure			C0324C1	C241M000
024	2	PPS	01-Sep-2003	04:05	BE	59	34.83 N	38	46.29 W	GPS							
024	1	ROS	01-Sep-2003	05:10	EN	59	34.88 N	38	45.11 W	GPS	2989						
025	1	ROS	01-Sep-2003	08:39	BE	59	28.80 N	37	46.76 W	GPS	3142						
025	1	ROS	01-Sep-2003	09:34	BO	59	28.73 N	37	46.68 W	GPS	3142	Salt	SIS pressure			C0325C1	C251M000
024	2	PPS	01-Sep-2003	09:58	EN	59	28.63 N	37	46.66 W	GPS		Nut, Iso, Pl		PE216-P22			
025	2	PPS	01-Sep-2003	10:12	BE	59	28.57 N	37	46.92 W	GPS							
025	1	ROS	01-Sep-2003	10:39	EN	59	28.53 N	37	47.11 W	GPS	3147						
026	1	ROS	01-Sep-2003	14:26	BE	59	23.58 N	36	50.88 W	GPS	3122						
026	1	ROS	01-Sep-2003	15:21	BO	59	23.61 N	36	50.45 W	GPS	3122	Salt, Iso	SIS pressure			C0326C1	C261M000
025	2	PPS	01-Sep-2003	15:58	EN	59	23.52 N	36	50.47 W	GPS		Nut, Iso, Pl		PE216-P23			
026	2	PPS	01-Sep-2003	16:08	BE	59	23.52 N	36	50.51 W	GPS							
026	1	ROS	01-Sep-2003	16:24	EN	59	23.43 N	36	50.08 W	GPS	3137						
027	1	ROS	01-Sep-2003	19:30	BE	59	18.37 N	35	53.71 W	GPS	3117						
027	1	ROS	01-Sep-2003	20:29	BO	59	18.47 N	35	53.43 W	GPS	3117	Salt	SIS pressure			C0327C1	C271M000
027	1	ROS	01-Sep-2003	21:30	EN	59	18.39 N	35	53.66 W	GPS	3117						
026	2	PPS	01-Sep-2003	21:59	EN	59	17.74 N	35	46.04 W	GPS		Nut, Iso, Pl		PE216-P24			
027	2	PPS	01-Sep-2003	22:07	BE	59	17.52 N	35	43.52 W	GPS							
028	1	ROS	02-Sep-2003	00:43	BE	59	12.87 N	34	56.01 W	GPS	2535						
028	1	ROS	02-Sep-2003	01:29	BO	59	12.93 N	34	56.02 W	GPS	2540	Salt	SIS pressure			C0328C1	C281M000
028	1	ROS	02-Sep-2003	02:23	EN	59	13.00 N	34	56.01 W	GPS	2540						
027	2	PPS	02-Sep-2003	04:04	EN	59	10.04 N	34	27.48 W	GPS				PE216-P25			
028	2	PPS	02-Sep-2003	04:16	BE	59	09.76 N	34	23.77 W	GPS							
029	1	ROS	02-Sep-2003	05:59	BE	59	07.01 N	33	53.72 W	GPS	2576						
029	1	ROS	02-Sep-2003	06:51	BO	59	06.75 N	33	53.18 W	GPS	2433	Salt, Iso	SIS pressure			C0329C1	C291M000
029	1	ROS	02-Sep-2003	07:41	EN	59	06.21 N	33	53.07 W	GPS	2438						
028	2	PPS	02-Sep-2003	10:25	EN	59	02.37 N	33	03.02 W	GPS		Nut, Iso, Pl		PE216-P26			
029	2	PPS	02-Sep-2003	10:37	BE	59	01.95 N	33	00.08 W	GPS							
030	1	CTD	02-Sep-2003	10:42	BE	59	01.95 N	33	00.10 W	GPS	2233						
030	1	CTD	02-Sep-2003	11:27	BO	59	01.81 N	33	00.62 W	GPS	2367					C0330C1	C301M000
030	1	CTD	02-Sep-2003	12:09	EN	59	01.95 N	33	00.96 W	GPS	2356						
031	1	CTD	02-Sep-2003	15:29	BE	58	56.46 N	32	01.59 W	GPS	1761						
031	1	CTD	02-Sep-2003	15:58	BO	58	56.33 N	32	01.67 W	GPS	1780					C0331C1	C311M000
029	2	PPS	02-Sep-2003	16:00	EN	58	56.34 N	32	01.67 W	GPS		Nut, Iso, Pl		PE216-P27			
031	2	PPS	02-Sep-2003	16:12	BE	58	56.38 N	32	01.85 W	GPS							
031	1	CTD	02-Sep-2003	16:35	EN	58	56.34 N	32	02.07 W	GPS	1780						
032	1	CTD	02-Sep-2003	19:31	BE	58	51.36 N	31	06.64 W	GPS	1462						
032	1	CTD	02-Sep-2003	19:57	BO	58	51.35 N	31	06.55 W	GPS	1462					C0332C1	C321M000
032	1	CTD	02-Sep-2003	20:29	EN	58	51.40 N	31	06.63 W	GPS	1456						
031	2	PPS	02-Sep-2003	21:55	EN	58	49.18 N	30	42.43 W	GPS		Nut, Iso, Pl		PE216-P28			
032	2	PPS	02-Sep-2003	22:05	BE	58	48.89 N	30	39.32 W	GPS							

033	1	CTD	02-Sep-2003	23:40	BE	58	46.04 N	30	11.62 W	GPS	1619						
033	1	CTD	03-Sep-2003	00:09	BO	58	46.02 N	30	11.87 W	GPS	1594		SIS pressure			C0333C1	C331M000
033	1	CTD	03-Sep-2003	00:46	EN	58	46.06 N	30	11.86 W	GPS	1585						
032	2	PPS	03-Sep-2003	04:04	EN	58	40.78 N	29	13.71 W	GPS		Nut, Iso, Pl		PE216-P29			
034	1	CTD	03-Sep-2003	04:04	BE	58	40.80 N	29	13.74 W	GPS	2267						
034	2	PPS	03-Sep-2003	04:14	BE	58	40.79 N	29	13.70 W	GPS							
034	1	CTD	03-Sep-2003	04:47	BO	58	40.81 N	29	13.71 W	GPS	2270		SIS pressure			C0334C1	C341M000
034	1	CTD	03-Sep-2003	05:37	EN	58	40.76 N	29	13.89 W	GPS	2261						
035	1	CTD	03-Sep-2003	09:05	BE	58	35.66 N	28	19.60 W	GPS	2098						
035	1	CTD	03-Sep-2003	09:42	BO	58	35.84 N	28	19.23 W	GPS	2095		SIS pressure			C0335C1	C351M000
034	2	PPS	03-Sep-2003	10:01	EN	58	35.88 N	28	18.84 W	GPS		Nut, Iso, Pl		PE216-P30			
035	2	PPS	03-Sep-2003	10:10	BE	58	35.83 N	28	18.70 W	GPS							
035	1	CTD	03-Sep-2003	10:26	EN	58	35.83 N	28	18.56 W	GPS	2095						
036	1	CTD	03-Sep-2003	14:14	BE	58	30.53 N	27	24.20 W	GPS	2222						
036	1	CTD	03-Sep-2003	14:57	BO	58	30.69 N	27	23.89 W	GPS	2222		Sis pressure			C0336C1	C361M000
035	2	PPS	03-Sep-2003	15:50	EN	58	30.90 N	27	23.42 W	GPS		Nut, Iso, Pl		PE216-P31			
036	1	CTD	03-Sep-2003	15:53	EN	58	30.92 N	27	23.41 W	GPS	2206						
036	2	PPS	03-Sep-2003	15:57	BE	58	30.87 N	27	23.38 W	GPS							
037	1	ROS	03-Sep-2003	19:30	BE	58	25.62 N	26	32.51 W	GPS	2686						
037	1	ROS	03-Sep-2003	20:24	BO	58	25.29 N	26	31.80 W	GPS	2686	Salt	SIS pressure			C0337C1	C371M000
037	1	ROS	03-Sep-2003	21:23	EN	58	25.27 N	26	32.58 W	GPS	2690						
036	2	PPS	03-Sep-2003	21:24	EN	58	25.27 N	26	32.58 W	GPS		Nut, Iso, Pl		PE216-P32			
037	2	PPS	03-Sep-2003	21:30	BE	58	25.38 N	26	32.45 W	GPS							
038	1	ROS	04-Sep-2003	02:20	BE	58	20.19 N	25	32.34 W	GPS	2785						
038	1	ROS	04-Sep-2003	03:16	BO	58	20.22 N	25	32.65 W	GPS	2785	Salt	SIS pressure			C0338C1	C381M000
037	2	PPS	04-Sep-2003	03:43	EN	58	20.28 N	25	32.41 W	GPS		Nut, Iso, Pl		PE216-P33			
038	2	PPS	04-Sep-2003	03:50	BE	58	20.30 N	25	32.57 W	GPS							
038	1	ROS	04-Sep-2003	04:15	EN	58	20.50 N	25	32.95 W	GPS	2785						
039	1	ROS	04-Sep-2003	08:24	BE	58	11.44 N	24	38.18 W	GPS	2798						
039	1	ROS	04-Sep-2003	09:21	BO	58	11.27 N	24	38.59 W	GPS	2798	Salt	SIS pressure			C0339C1	
038	2	PPS	04-Sep-2003	10:06	EN	58	11.06 N	24	38.51 W	GPS		Nut, Iso, Pl		PE216-P34			
039	2	PPS	04-Sep-2003	10:13	BE	58	11.03 N	24	38.34 W	GPS							
039	1	ROS	04-Sep-2003	10:25	EN	58	11.02 N	24	38.34 W	GPS	2810						
040	1	ROS	04-Sep-2003	13:52	BE	58	02.94 N	23	44.94 W	GPS	2964						
040	1	ROS	04-Sep-2003	14:55	BO	58	02.29 N	23	44.96 W	GPS	2961	Salt	SIS pressure			C0340C1	
039	2	PPS	04-Sep-2003	15:50	EN	58	02.14 N	23	44.53 W	GPS		Nut, Iso, Pl		PE216-P35			
040	2	PPS	04-Sep-2003	15:55	BE	58	02.10 N	23	44.54 W	GPS							
040	1	ROS	04-Sep-2003	16:06	EN	58	01.98 N	23	44.62 W	GPS	2961						
041	1	ROS	04-Sep-2003	19:39	BE	57	54.41 N	22	49.25 W	GPS	3007						
041	1	ROS	04-Sep-2003	20:35	BO	57	54.57 N	22	48.98 W	GPS	3006	Salt	SIS pressure			C0341C1	C411M000
040	2	PPS	04-Sep-2003	21:34	EN	57	54.59 N	22	49.14 W	GPS				PE216-P36			

041	2	PPS	04-Sep-2003	21:39	BE	57	54.56 N	22	49.22 W	GPS						
041	1	ROS	04-Sep-2003	21:43	EN	57	54.64 N	22	49.20 W	GPS	3006					
042	1	ROS	05-Sep-2003	01:15	BE	57	46.02 N	21	54.72 W	GPS	3053					
042	1	ROS	05-Sep-2003	02:11	BO	57	45.94 N	21	54.62 W	GPS	3056	Salt	SIS pressure		C0342C1	C421M000
041	2	PPS	05-Sep-2003	03:02	EN	57	45.97 N	21	54.55 W	GPS				PE216-P37		
042	2	PPS	05-Sep-2003	03:12	BE	57	45.98 N	21	54.69 W	GPS						
042	1	ROS	05-Sep-2003	03:14	EN	57	45.97 N	21	54.80 W	GPS	3056					
043	1	CTD	05-Sep-2003	05:15	BE	57	41.91 N	21	30.40 W	GPS	2707					
043	1	CTD	05-Sep-2003	06:07	BO	57	41.36 N	21	29.73 W	GPS	2707		SIS pressure		C0343C1	
043	1	CTD	05-Sep-2003	07:02	EN	57	40.40 N	21	29.58 W	GPS	2451					
044	1	CTD	05-Sep-2003	08:44	BE	57	37.69 N	21	02.20 W	GPS	2318					
044	1	CTD	05-Sep-2003	09:30	BO	57	37.57 N	21	02.65 W	GPS	2321		SIS pressure		C0344C1	
042	2	PPS	05-Sep-2003	10:00	EN	57	37.61 N	21	02.60 W	GPS				PE216-P38		
044	2	PPS	05-Sep-2003	10:12	BE	57	37.50 N	21	02.54 W	GPS						
044	1	CTD	05-Sep-2003	10:25	EN	57	37.62 N	21	02.47 W	GPS	2318					
045	1	CTD	05-Sep-2003	12:01	BE	57	33.77 N	20	37.44 W	GPS	2154					
045	1	CTD	05-Sep-2003	12:44	BO	57	33.80 N	20	37.32 W	GPS	2154		SIS pressure		C0345C1	
045	1	CTD	05-Sep-2003	13:30	EN	57	33.57 N	20	37.07 W	GPS	2154					
046	1	CTD	05-Sep-2003	15:25	BE	57	29.34 N	20	08.95 W	GPS	1296					
046	1	CTD	05-Sep-2003	15:50	BO	57	29.40 N	20	08.72 W	GPS	1296				C0346C1	
044	2	PPS	05-Sep-2003	16:01	EN	57	29.40 N	20	08.71 W	GPS				PE216-P39		
046	2	PPS	05-Sep-2003	16:10	BE	57	29.42 N	20	08.59 W	GPS						
046	1	CTD	05-Sep-2003	16:15	EN	57	29.38 N	20	08.57 W	GPS	1293					
047	1	CTD	05-Sep-2003	19:22	BE	57	20.99 N	19	15.88 W	GPS	1003					
047	1	CTD	05-Sep-2003	19:32	BO	57	20.87 N	19	15.77 W	GPS	1006				C0347C1	
047	1	CTD	05-Sep-2003	19:50	EN	57	20.71 N	19	15.49 W	GPS	1009					
046	2	PPS	05-Sep-2003	21:59	EN	57	13.17 N	18	36.81 W	GPS				PE216-P40		
047	2	PPS	05-Sep-2003	22:10	BE	57	12.98 N	18	33.11 W	GPS						
048	1	CTD	05-Sep-2003	22:47	BE	57	12.52 N	18	21.71 W	GPS	1286					
048	1	CTD	05-Sep-2003	23:09	BO	57	12.50 N	18	21.74 W	GPS	1286				C0348C1	
048	1	CTD	05-Sep-2003	23:32	EN	57	12.54 N	18	21.74 W	GPS	1289					
047	2	PPS	06-Sep-2003	04:09	EN	57	05.58 N	17	39.53 W	GPS				PE216-P41		
048	2	PPS	06-Sep-2003	04:21	BE	57	05.42 N	17	37.70 W	GPS						
049	1	CTD	06-Sep-2003	08:03	BE	57	04.13 N	17	26.94 W	GPS	1329					
049	1	CTD	06-Sep-2003	08:28	BO	57	04.07 N	17	26.89 W	GPS	1329				C0349C1	
049	1	CTD	06-Sep-2003	08:57	EN	57	04.22 N	17	26.89 W	GPS	1329					
048	2	PPS	06-Sep-2003	10:01	EN	57	01.36 N	17	09.06 W	GPS		Nut, Iso, Pl		PE216-P42		
049	2	PPS	06-Sep-2003	10:13	BE	57	00.78 N	17	05.44 W	GPS						
050	1	CTD	06-Sep-2003	12:10	BE	56	55.56 N	16	31.98 W	GPS	1162					
050	1	CTD	06-Sep-2003	12:31	BO	56	55.63 N	16	31.83 W	GPS	1162				C0350C1	
050	1	CTD	06-Sep-2003	13:02	EN	56	55.65 N	16	31.92 W	GPS	1162					

051	1	CTD	06-Sep-2003	16:13	BE	56	47.66 N	15	40.60 W	GPS	642				
049	2	PPS	06-Sep-2003	16:16	EN	56	47.66 N	15	40.55 W	GPS		Nut, Iso, Pl		PE216-P43	
051	2	PPS	06-Sep-2003	16:25	BE	56	47.65 N	15	40.47 W	GPS					
051	1	CTD	06-Sep-2003	16:26	BO	56	47.63 N	15	40.44 W	GPS	640				C0351C1
051	1	CTD	06-Sep-2003	16:40	EN	56	47.60 N	15	40.44 W	GPS	640				
052	1	CTD	06-Sep-2003	19:40	BE	56	41.18 N	14	59.01 W	GPS	237				
052	1	CTD	06-Sep-2003	19:45	BO	56	41.18 N	14	58.98 W	GPS	237				C0352C1
052	1	CTD	06-Sep-2003	19:53	EN	56	41.25 N	14	58.89 W	GPS	237				
053	1	CTD	06-Sep-2003	22:37	BE	56	34.56 N	14	17.67 W	GPS	245				
051	2	PPS	06-Sep-2003	22:40	EN	56	34.59 N	14	17.66 W	GPS		Nut, Iso, Pl		PE216-P44	
053	1	CTD	06-Sep-2003	22:43	BO	56	34.61 N	14	17.64 W	GPS	246				C0353C1
053	1	CTD	06-Sep-2003	22:49	EN	56	34.66 N	14	17.65 W	GPS	247				
053	2	PPS	06-Sep-2003	22:51	BE	56	34.67 N	14	17.66 W	GPS					
054	1	CTD	07-Sep-2003	01:34	BE	56	27.96 N	13	35.78 W	GPS	1972				
054	1	CTD	07-Sep-2003	02:09	BO	56	28.10 N	13	35.97 W	GPS	1963				C0354C1
053	2	PPS	07-Sep-2003	02:23	EN	56	28.03 N	13	35.90 W	GPS		Nut, Iso, Pl		PE216-P45	
054	2	PPS	07-Sep-2003	02:33	BE	56	28.07 N	13	35.91 W	GPS					
054	1	CTD	07-Sep-2003	02:45	EN	56	28.02 N	13	35.92 W	GPS	1968				
055	1	CTD	07-Sep-2003	04:33	BE	56	23.90 N	13	09.48 W	GPS	2405				
055	1	CTD	07-Sep-2003	05:18	BO	56	23.94 N	13	09.41 W	GPS	2400				C0355C1
055	1	CTD	07-Sep-2003	06:06	EN	56	23.86 N	13	09.47 W	GPS	2400				
056	1	CTD	07-Sep-2003	09:03	BE	56	15.95 N	12	19.75 W	GPS	2600				
056	1	CTD	07-Sep-2003	09:47	BO	56	15.71 N	12	19.87 W	GPS	2605		Conductivity sensor defect		C0356C1
054	2	PPS	07-Sep-2003	10:22	EN	56	15.51 N	12	20.35 W	GPS		Nut, Iso, Pl		PE216-P46	
056	1	CTD	07-Sep-2003	10:35	EN	56	15.56 N	12	20.49 W	GPS	2610				
056	2	PPS	07-Sep-2003	11:07	BE	56	14.44 N	12	12.30 W	GPS					
057	1	ROS	07-Sep-2003	13:41	BE	56	08.31 N	11	29.95 W	GPS	2650				
057	1	ROS	07-Sep-2003	14:28	BO	56	08.27 N	11	30.00 W	GPS	2650	Salt	Newconductivity sensor		C0357C1
057	1	ROS	07-Sep-2003	15:19	EN	56	08.00 N	11	29.90 W	GPS	2655				
056	2	PPS	07-Sep-2003	15:54	EN	56	06.42 N	11	20.95 W	GPS		Nut, Iso, Pl		PE216-P47	
057	2	PPS	07-Sep-2003	16:02	BE	56	06.09 N	11	18.54 W	GPS					
058	1	ROS	07-Sep-2003	18:38	BE	56	00.99 N	10	43.30 W	GPS	2396				
058	1	ROS	07-Sep-2003	19:20	BO	56	00.93 N	10	43.12 W	GPS	2390	Salt			C0358C1
058	1	ROS	07-Sep-2003	20:09	EN	56	00.95 N	10	42.76 W	GPS	2391				
057	2	PPS	07-Sep-2003	22:06	EN	55	55.08 N	10	09.18 W	GPS				PE216-P48	
058	2	PPS	07-Sep-2003	22:18	BE	55	54.61 N	10	05.56 W	GPS					
059	1	CTD	07-Sep-2003	23:10	BE	55	52.97 N	09	51.16 W	GPS	1914				
059	1	CTD	07-Sep-2003	23:42	BO	55	52.91 N	09	51.21 W	GPS	1914				C0359C1
059	1	CTD	08-Sep-2003	00:18	EN	55	52.62 N	09	50.82 W	GPS	1887				
060	1	CTD	08-Sep-2003	01:47	BE	55	48.95 N	09	25.82 W	GPS	812				
060	1	CTD	08-Sep-2003	02:02	BO	55	49.00 N	09	25.76 W	GPS	812				C0360C1

060	1	CTD	08-Sep-2003	02:19	EN	55	48.99 N	09	25.65 W	GPS	806		
061	1	CTD	08-Sep-2003	03:50	BE	55	44.94 N	08	59.93 W	GPS	124		
058	2	PPS	08-Sep-2003	03:51	EN	55	44.93 N	08	59.92 W	GPS		PE216-P49	
061	1	CTD	08-Sep-2003	03:54	BO	55	44.88 N	08	59.81 W	GPS	123		C0361C1
061	1	CTD	08-Sep-2003	03:56	EN	55	44.85 N	08	59.75 W	GPS	123		
061	2	PPS	08-Sep-2003	04:01	BE	55	44.75 N	08	59.62 W	GPS			
061	2	PPS	08-Sep-2003	15:56	EN	55	32.58 N	11	52.35 W	GPS		PE216-P50	
061	3	PPS	08-Sep-2003	16:06	BE	55	32.41 N	11	54.43 W	GPS			
062	1	ROS	08-Sep-2003	23:23	BE	55	11.88 N	13	19.70 W	GPS	2831		
061	3	PPS	08-Sep-2003	23:52	EN	55	11.71 N	13	19.67 W	GPS		PE216-P51	
062	2	PPS	09-Sep-2003	00:03	BE	55	11.76 N	13	19.75 W	GPS			
062	1	ROS	09-Sep-2003	00:14	BO	55	11.65 N	13	19.78 W	GPS	2834		C0362C1
062	1	ROS	09-Sep-2003	01:22	EN	55	11.49 N	13	19.38 W	GPS	2837		
063	1	CTD	09-Sep-2003	03:45	BE	54	59.89 N	12	43.10 W	GPS	2892		
063	1	CTD	09-Sep-2003	04:40	BO	55	00.14 N	12	42.67 W	GPS	2892		C0363C1
063	1	CTD	09-Sep-2003	05:35	EN	55	00.04 N	12	42.30 W	GPS	2892		
064	1	CTD	09-Sep-2003	07:58	BE	54	47.88 N	12	07.08 W	GPS	2867		
064	1	CTD	09-Sep-2003	08:51	BO	54	47.30 N	12	07.53 W	GPS	2870		C0364C1
064	1	CTD	09-Sep-2003	09:44	EN	54	46.96 N	12	08.15 W	GPS	2870		
062	2	PPS	09-Sep-2003	09:57	EN	54	45.98 N	12	05.89 W	GPS		PE216-P52	
064	2	PPS	09-Sep-2003	10:09	BE	54	44.93 N	12	02.74 W	GPS			
065	1	CTD	09-Sep-2003	12:12	BE	54	36.00 N	11	30.33 W	GPS	2599		
065	1	CTD	09-Sep-2003	12:56	BO	54	35.93 N	11	30.30 W	GPS	2593		C0365C1
065	1	CTD	09-Sep-2003	13:40	EN	54	35.87 N	11	29.89 W	GPS	2581		
066	1	CTD	09-Sep-2003	14:57	BE	54	30.05 N	11	12.02 W	GPS	750		
066	1	CTD	09-Sep-2003	15:12	BO	54	30.25 N	11	11.53 W	GPS	742		C0366C1
066	1	CTD	09-Sep-2003	15:27	EN	54	30.32 N	11	11.57 W	GPS	750		
064	2	PPS	09-Sep-2003	16:03	EN	54	27.71 N	11	04.07 W	GPS		PE216-P53	
066	2	PPS	09-Sep-2003	16:11	BE	54	27.03 N	11	02.30 W	GPS			
067	1	CTD	09-Sep-2003	16:51	BE	54	24.08 N	10	54.00 W	GPS	336		
067	1	CTD	09-Sep-2003	16:59	BO	54	24.02 N	10	53.85 W	GPS	332		C0367C1
067	1	CTD	09-Sep-2003	17:06	EN	54	24.09 N	10	53.75 W	GPS	331		
066	2	PPS	09-Sep-2003	22:07	EN	53	42.85 N	10	33.94 W	GPS		PE216-P54	

Appendix B Mooring Summary File

mooring ID	declon	declat	UNC DEPTH	CORR DEPTH	instrument type	instrument serial number	height above bottom (m)	instrument depth m	sample interval min	deployment date&time
LOCO 02-1	-39.0015	59.4297	3000	2975	SEACAT	2675	10	2990	4	30/Aug/03 11:00
LOCO 02-1	-39.0015	59.4297	3000	2975	ADCP	3700	582	2418	15	30/Aug/03 11:00
LOCO 02-1	-39.0015	59.4297	3000	2975	MMP profiler	11564-01			1 day	30/Aug/03 11:00
LOCO 02-1	-39.0015	59.4297	3000	2975	ADCP	3550	2892	108	15	30/Aug/03 11:00
LOCO 03-1	-36.3973	59.2368	3021	3003	SEACAT	2676	10	2993	4	28/Aug/03 12:53
LOCO 03-1	-36.3973	59.2368	3021	3003	ADCP	3597	579	2424	15	28/Aug/03 12:53
LOCO 03-1	-36.3973	59.2368	3021	3003	MMP profier	11564-02			1 day	28/Aug/03 12:53
LOCO 03-1	-36.3973	59.2368	3021	3003	ADCP	3616	2888	115	15	28/Aug/03 12:53
LOCO 15-1	-35.5255	59.1450	3044	3026	Aquadopp	286-6/02	11	3015	7.5	27/Aug/03 17:05
LOCO 15-1	-35.5255	59.1450	3044	3026	RCM 11	48	511	2515	20	27/Aug/03 17:05
LOCO 15-1	-35.5255	59.1450	3044	3026	RCM 11	35	1011	2015	60	27/Aug/03 17:05
LOCO 15-1	-35.5255	59.1450	3044	3026	RCM 9	341	1508	1518	20	27/Aug/03 17:05
LOCO 15-1	-35.5255	59.1450	3044	3026	Valeport	20640	2000	1026	5	27/Aug/03 17:05
LOCO 16-1	-33.9353	58.9945	2544	2523	RCM 11	49	8	2515	20	27/Aug/03 10:27
LOCO 16-1	-33.9353	58.9945	2544	2523	Aquadop	286-7/02	383	2140	7.5	27/Aug/03 10:27
LOCO 16-1	-33.9353	58.9945	2544	2523	RCM 11	36	759	1764	60	27/Aug/03 10:27
LOCO 16-1	-33.9353	58.9945	2544	2523	RCM 9	350	1135	1388	20	27/Aug/03 10:27
LOCO 16-1	-33.9353	58.9945	2544	2523	Valeport	20641	1506	1018	5	27/Aug/03 10:27
LOCO 17-1	-32.8082	58.8893	2023	2002	RCM 11	123	19	1983	60	26/Aug/03 15:37
LOCO 17-1	-32.8082	58.8893	2023	2002	RCM 11	44	270	1732	60	26/Aug/03 15:37
LOCO 17-1	-32.8082	58.8893	2023	2002	Aquadop	286-8/02	521	1481	7.5	26/Aug/03 15:37
LOCO 17-1	-32.8082	58.8893	2023	2002	RCM 9	351	770	1232	60	26/Aug/03 15:37
LOCO 17-1	-32.8082	58.8893	2023	2002	Valeport	20642	1017	985	5	26/Aug/03 15:37
LOCO 18-1	-31.9967	58.8120	1517	1498	RCM 11	132	18	1480	60	26/Aug/03 09:46
LOCO 18-1	-31.9967	58.8120	1517	1498	RCM 11	130	144	1354	60	26/Aug/03 09:46
LOCO 18-1	-31.9967	58.8120	1517	1498	RCM 11	45	270	1228	60	26/Aug/03 09:46
LOCO 18-1	-31.9967	58.8120	1517	1498	RCM 9	411	395	1103	60	26/Aug/03 09:46
LOCO 18-1	-31.9967	58.8120	1517	1498	Valeport	20643	520	979	5	26/Aug/03 09:46
LOCO 18-1	-31.9967	58.8120	1517	1498	ADCP	3552	527	972	15	26/Aug/03 09:46
IRM 1	-38.8637	59.3457	3039	3014	Sediment trap	860027	2	3012	19 days	29/Aug/03 11:55
IRM 1	-38.8637	59.3457	3039	3014	datalogger	OBS-B1	2	3012	8	29/Aug/03 11:55
IRM 1	-38.8637	59.3457	3039	3014	Sediment trap	860028	236	2778	19 days	29/Aug/03 11:55
IRM 1	-38.8637	59.3457	3039	3014	datalogger	OBS-A9	236	2778	8	29/Aug/03 11:55