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DISTRIBUTION OF TEMPERATURE AND SALINITY IN THE BEAUFORT SEA DURING THE CANADIAN ARCTIC SHELF EXCHANGE STUDY SAMPLING EXPEDITIONS 2002-2004

By

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SEPTEMBER 2010

CORRECT CITATION FOR THIS PUBLICATION :

Simard, A., M.E. Rail and Y. Gratton. 2010. Distribution of temperature and salinity in the Beaufort Sea during the Canadian Arctic Shelf Exchange Study sampling expeditions 2002-2004. Report No R1187, INRS-ETE, Québec (Qc): vii + 128 p.

ISBN : 978-2-89146-742-1

ABSTRACT

This report presents the CTD (Conductivity, Temperature and Depth) data obtained during the Canadian Arctic Shelf Exchange Study (CASES) expeditions held between 2002 and 2004 in the Beaufort Sea. The report also contains information about data obtained by the Moving Vessel Profiler (MVP), moorings and ship mounted Acoustic Doppler Current Profiler (SM-ADCP) which was recorded during the same expeditions. Detailed maps of sampling sites in the Beaufort Sea and Mackenzie Shelf are included. CTD temperature and salinity data are presented as contour plots following West-East or South-North sections. Stick diagrams of moored ADCP's data are also included.

RÉSUMÉ

Ce rapport présente les données de CTD (conductivité, température et profondeur) recueillies au cours des différentes missions du programme «*Canadian Arctic Shelf Exchange Study*» (CASES) qui se sont déroulées dans la mer de Beaufort entre 2002 et 2004. Il présente également de l'information sur les données de Moving Vessel Profiler (MVP), du profileur de courant (ADCP) fixé sous la coque et des données de mouillage enregistrées au cours des mêmes missions. Des cartes détaillées montrant les sites d'échantillonnage dans la mer de Beaufort et le long de la marge continentale du Mackenzie y sont incluses. Les données de température et de salinité du CTD et du MVP y sont présentées sous forme de contours le long de sections ouest-est ou sud-nord. Les données enregistrées par les ADCP des mouillages sont présentées sous forme de diagrammes en bâtons.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

FOREWORD: CANADIAN ARCTIC SHELF EXCHANGE STUDY

Funded by the Natural Sciences and Engineering Research Council of Canada (NSERC), the Canadian Arctic Shelf Exchange Study (CASES) Research Network is an international effort under Canadian leadership to understand the biogeochemical and ecological consequences of sea ice variability and change on the Mackenzie Shelf. The CASES Research Network brought together Canadian and foreign expertises in Arctic oceanography. The Canadian contribution included 42 researchers coming from ten universities, four Federal Departments and the Canadian Museum of Nature. Thirty Arctic experts coming from nine foreign countries (USA, Japan, UK, Denmark, Russia, Poland, Norway, Belgium and Spain) were associated with the CASES Network.

The Canadian contribution was to assess the dynamical aspects of the Mackenzie Shelf ecosystem. The scientific program is focussing on a central hypothesis which states that the atmospheric, oceanic and hydrologic forcing of sea ice variability dictates the nature and magnitude of biogeochemical carbon fluxes on and at the edge of the Mackenzie Shelf. The Canadian-led projects studied: 1) Atmospheric and sea ice forcing of coastal circulation; 2) Ice-atmosphere interactions and biological linkages; 3) Light, nutrients, primary and export production in ice-free waters; 4) Microbial communities and heterotrophy; 5) Pelagic food web: structure, function and contaminants; 6) Organic and inorganic fluxes; 7) Benthic processes and carbon cycling; 8) Millennial-decadal variability in sea ice and carbon fluxes; 9) Coupled bio-physical models of the carbon flows on the Canadian Arctic Shelf.

1. INTRODUCTION

The CASES program was carried out from September 2002 to August 2004. The objective of the CASES field expeditions was to perform an extensive sampling of the Southern Beaufort Sea and the Amundsen Gulf coastal shelves (from ≈ 67°N to 76°N and from ≈ 120°W to 41°W) (see Fig. 1). Two different expeditions were held. The first expedition was conducted on board the CCGS Pierre Radisson between September 20th and October 14th, 2002 and was identified as leg 0. The second expedition was conducted on board the CCGS Amundsen between September 8th, 2003, and August 26th, 2004. This last expedition was divided into nine periods of six weeks (four weeks for leg 9) designated legs 1 to 9 (see Table 1).

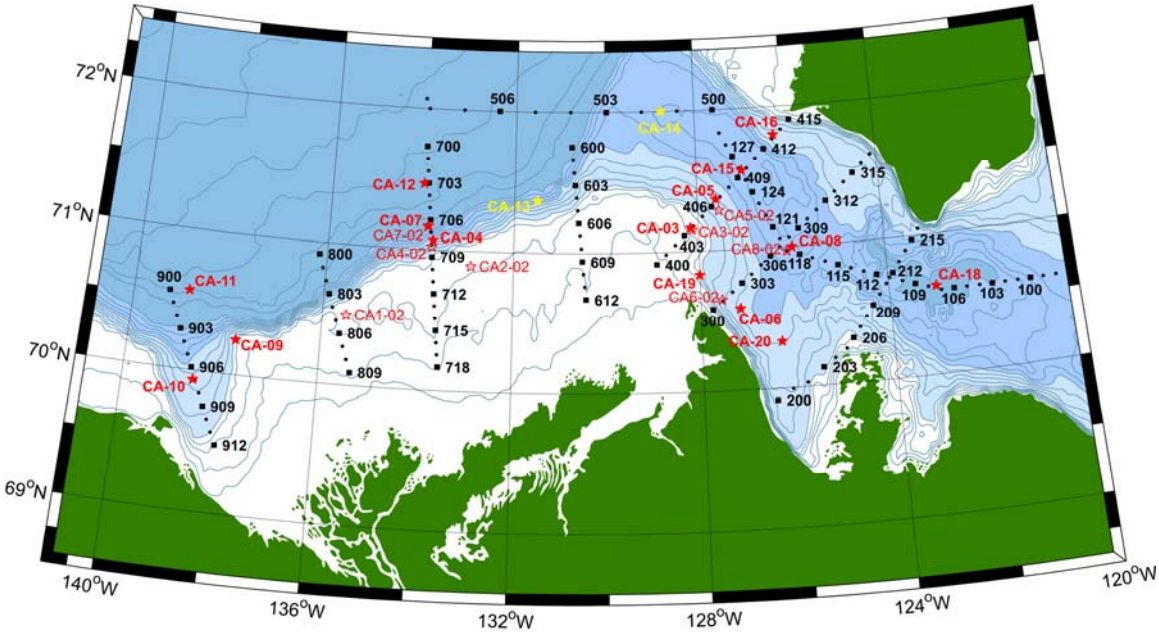

FIGURE 1. CASES study region. The CTD–Rosette sampling stations are identified by black squares or dots, and the mooring sites with yellow and red stars.

This report provides the CASES community with a synthesis of the available physical data recorded during this 13-month sampling campaign. The data set includes 983 Rosette-CTD (Conductivity Temperature Depth) casts and 1924 MVP (Moving Vessel Profiler) profiles. Also included are information about the 2002-2003 and 2003-2004 data recorded by 81 different instruments deployed on 24 (recuperated) mooring lines, and current data recorded along the ship track by a ship mounted ADCP (Acoustic Doppler Current Profiler).

Related Studies

A significant amount of published studies and scientific papers have reported on the physical oceanographic processes in the Canadian Arctic. The Beaufort Sea and Amundsen Gulf are the Canadian Arctic regions that have been studied the most extensively over the years, especially during the Canadian Arctic Shelf Exchange Study program and subsequently during ArcticNet expeditions. In 2008, the Journal of Geophysical Research published eleven papers from the CASES program in a special issue (volume 113, number C3). The same year, a book containing a synthesis of the work performed in every main research subject of the program was edited by L. Fortier, D. Barber and J. Michaud. It was titled: *On thin Ice*. The oceanography of the Beaufort Sea was also discussed by Ingram *et al.* in an issue of «The Sea» (volume 14, part A, 2005). Two thesis present information related to the polynya observations: Galley (2009) and Lanos (2009). The former focuses on ice processes and the latter on water column processes.

2. SAMPLING PROGRAM

Rosette

During CASES expeditions, the rosette was equipped with 24 «Niskin» 12 L bottles, a SeaBird 911+ CTD with eight independent sensors (see Table 2 for sensors specifications). Few sensors were changed during the expeditions. No altimeter was used during the first leg in 2002. At that time, the sea-bed proximity was detected with a weight attached to a line. The nitrates sensor was only installed on the rosette at the beginning of leg 3 (expedition 0305). Lastly, the PAR (light sensor) was removed for the winter lightless time period from the middle of leg 3 (expedition 0305) to the middle of leg 7 (expedition 0404).

During legs 0, 1, 2, the second half of 7, 8 and 9, the ship was sailing in open water and the rosette was deployed from the ship boat deck and lowered into the water at a rate of 1 m s^{-1}. However, during legs 3, 4, 5, 6 and the first half of 7, the ship remained ice bound at its over-wintering station (Winter 1: 70°02.73'N and 126°18.07'W, see Fig. 2 and Appendix 1 and 2). For this period, the rosette was deployed from the Moon Pool, a 4 feet by 4 feet opening in the middle of the Amundsen's hull giving access to the water underneath.

CTD profiles were carried out in the Southern Beaufort Sea and Amundsen Gulf along sections (see Fig. 2 and Appendix 2). A summary of the sampling effort is presented in Tables 3a and 4. In open water, the rosette was deployed as often as possible. At the over-wintering station, the sampling schedule was simpler: the Rosette was

deployed at least twice a day, usually 12 hours apart. The CTD spatial coverage from legs 0303 and 0406 is poor because those legs were dedicated to mooring deployment and/or coring.

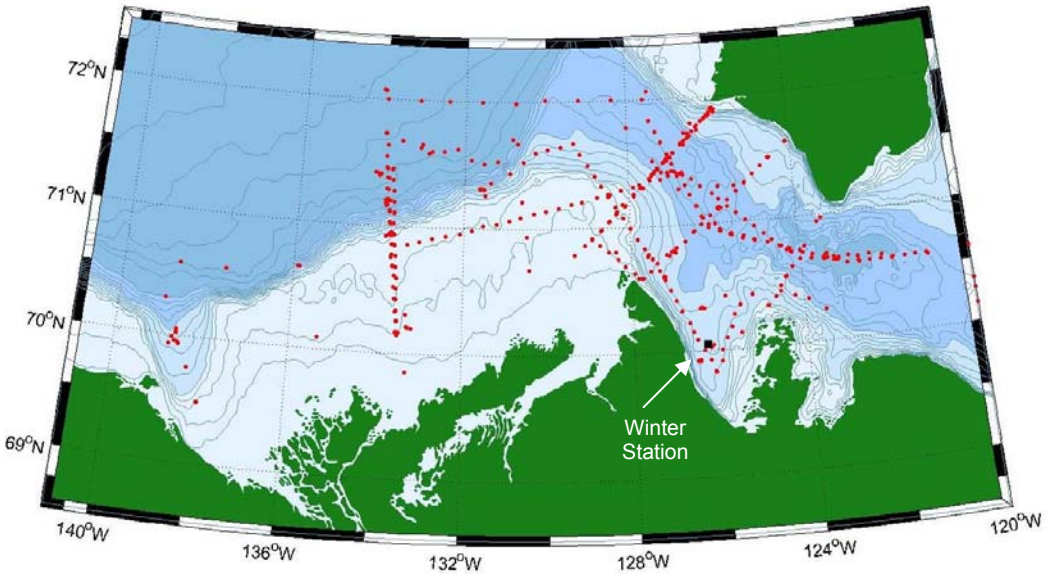

FIGURE 2. CASES Rosette sampling sites. The Winter station is identified by a black square in Franklin Bay (70° 02.71'N, 126° 18.06'W).

The logbooks of the CTD profiles are presented in Appendix 3. A summary of the CTD processing and quality control is presented in Section 3 of this report, and contour plots of salinity and potential temperature along some sampling sections are presented in Appendices 5 to 8. During the over-wintering months other CASES teams carried out CTD profiles through ice holes using a SBE 19 instrument. Most of those profiles were performed at the following ice "permanent" stations: Dukuduku, Titicaca, Takatuk and Angaguk. The locations of the stations with respect to the ship are shown in Appendix 1. Unfortunately, we don't have a copy of all that CTD data set. A summary of the information on the available ice CTD profiles is presented in Appendix 4. The interested reader should contact the other CASES teams directly.

CTD data are hosted on the Integrated Service Data Management (ISDM) website and are available to the international community.

Moving Vessel Profiler (MVP)

The Moving Vehicle Profiler is a towed CTD with fluorescence and dissolved oxygen sensors. It is used in automatic mode. The "fish" (right, picture credit: CASES Website) freefalls at ~ 5 m s^{-1} and is automatically winched back to 10 m under the surface after each cast. We are unable to sample the first 10 and last 10 meters of the water column. The instrument is a MVP 300-1700 model, meaning that it is equipped with 1700 m of cable and can profile down to 300 m at 12 knots. The slower the cruising speed the deeper the MVP can reach.

This MVP profiler was equipped with sensors similar to the Rosette (see Table 2 for sensors specifications). The MVP was mostly used during legs 0404 and 0405 and only once during leg 0406 between stations 200 and 124. One thousand nine hundred and twenty-four MVP casts were carried out during those legs. A summary of the sampling data is presented in Table 3b and the locations of the MVP sections are shown in Appendix 2. The logbook of the MVP profiles available for all the stations and casts is presented in Appendix 9. Contours plots of salinity and potential temperature recorded along the sections are presented in Appendices 10 to 12.

Moorings

Moorings lines were deployed in 2002 and 2003 to measure ocean currents and long-term variability of the water masses in the Beaufort Sea. Ingram *et al.* (2004) described in detail the CASES mooring activities and van Hardenberg (2004a) presented the general description of the deployment and recovery procedures. The following schematics (Fig. 3) show the different type of instruments and sensors attached to the moorings. A summary of the moorings, the sensors, and the recovered data may be found in Tables 5 and 6.

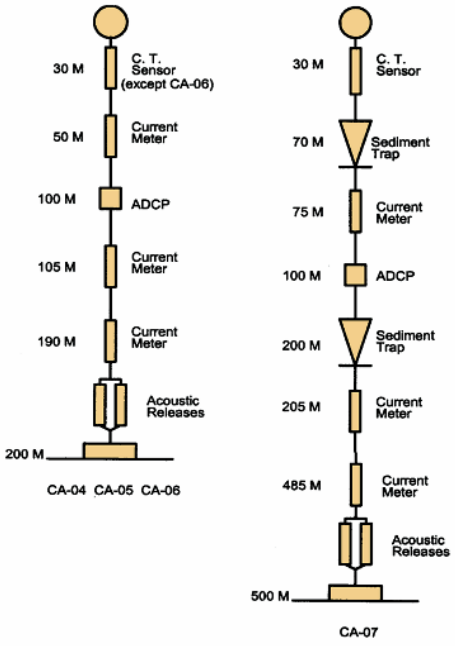

FIGURE 3 Example of mooring schematics. (Credits: Bon van Hardenberg, Fisheries and Ocean Canada)

Eight moorings were deployed in 2002 along the Beaufort continental shelf and Amundsen Gulf (see Fig.4). All of them were successfully recovered and redeployed for another year of measurements in 2003 (except CA01 and CA02). A total of seventeen moorings were deployed in October 2003 along the Beaufort continental shelf and in the Amundsen Gulf (see Fig. 4). All the moorings but two (CA13-03 and CA14-03) were

recovered in 2004 (CA13 was recovered in 2005) and six were re-deployed for another year of measurements in the Beaufort Sea and Amundsen Gulf for ArcticNet (CA04, CA05, CA07, CA15, CA18 and CA20).

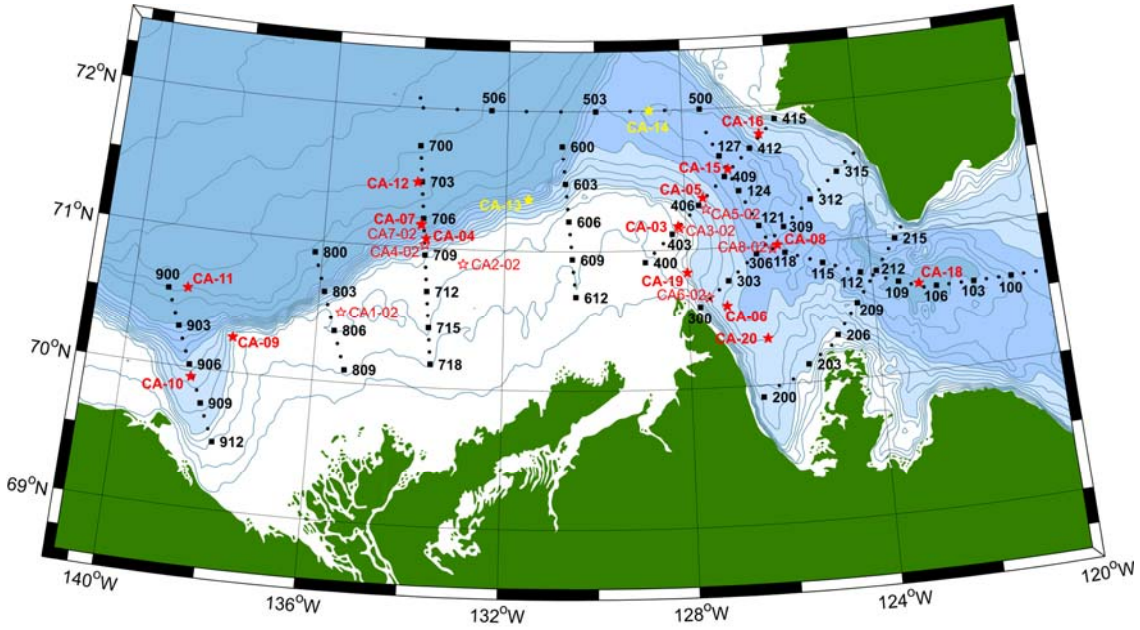

FIGURE 4. Mooring locations (2002-2004). The moorings are identified by the red and yellow stars.

A summary of the 30 instruments recovered in 2003 and the 51 instruments recovered in 2004 and 2005, their sensors, and the periods of valid data are shown in Tables 5 and 6. The instruments included RDI 300 kHz Workhorse ADCPs, Aanderaa RCM-11, RCM-7 and RCM-4 (Recording Current Meters), Sea-Bird SBE-37 conductivity-temperature sensors, Sea-Bird SBE-26 water level recorders, Alec conductivity-temperature sensors, Alec chlorophyll sensors and Alec light sensors. Ingram *et al.* (2004) and van Hardenberg (2004) have summarized all the problems encountered in their technical reports. The stick diagrams of the sea currents recorded by the ADCPs on the different moorings between 2003 and 2004 are presented in Appendix 13.

Ship mounted Acoustic Doppler Current Profiler (ADCP)

During the entire 2003-2004 CASES sampling season, the CCGS Amundsen was equipped with a RDI Ocean Surveyor (ship-mounted) 150 kHz ADCP, sampling 24 hours a day. Unfortunately, the instrument had a defect and although the flaw was quickly detected, there was nothing we could do to correct the problem until the next dry dock scheduled for April 2006. Regardless, we continue to collect data with the ADCP throughout the 2003-2004 expeditions. The data set was saved as it may be possible to correct them at a later time. Note that the raw data is available upon request.

3. DATA PROCESSING AND QUALITY CONTROL

Rosette-CTD data

The Rosette data processing and quality control are described in detail by Guillot (2003). The «READ ME » file attached to each yearly CTD data set also presents the most important processing steps and changes made to the data files. All users should read these files to be aware of data limitations.

Processing included the following steps: validation of the calibration coefficients, conversion of data to physical units, alignment correction and extraction of useless data. Oxygen sensor calibration was done using Winkler titrations and salinity data were compared with water samples analysed with a Guildline 8400B Autosal. The CTD data were passed through a quality control test based on UNESCO's algorithm standards (1990). The recorded data were averaged every 1 dbar. The computed oceanographic parameters (see Table 7) were calculated using the averaged data. Missing data were linearly interpolated. Lastly, there is one ASCII file for every CTD cast. The content of a typical ASCII file is shown in Table 7.

CTD profiles cover the water column down to 10 meters from the sea-bed. To reduce the amount of information presented in this report, temperature and salinity contours are only provided for each section shown in Appendix 2. The contours are presented in Appendices 5 to 8. Table 4 presents the stations and casts number used for each section interpolation process. The temperature and salinity data were interpolated on a 5 km by 5 m grid with a triangle-based cubic interpolation method and contoured in Matlab®. The origin of each section is always the westernmost or southernmost cast. For the West-East sections, West is on the left and East on the right; for the South-North sections, South is on the left and North on the right.

MVP data

MVP profiles cover the water column from 10 meters of the surface down to 10 meters from the sea-bed. The temperature and salinity contours are provided for each section shown in Appendix 2. The contours are presented in Appendices 10 to 12. The temperature and salinity data were averaged every 1 dbar but were not interpolated. The contours plots use the original data. The origin of each section is the westernmost or southernmost cast. For the West-East sections, West is on the left and East on the right; for the South-North sections, South is on the left and North on the right.

Mooring data

The mooring data were processed by Bon van Hardenberg of the Institute of Ocean Sciences in Sydney, B.C. and distributed as Excel files. Information about the compasses calibration will be found in his report: *Report on the 2003 calibrations of magnetic compasses of Aanderaa current meters and RDI Acoustic Doppler Current Profilers (ADCPs) for use in Arctic mooring deployments.*

The moored ADCP's data were processed by Dave Riedel from True North Scientific Company. The summary of the processing and the quality control performed on the data of 2002 and 2003 will be found in his report: *ADCP Data Processing Summary: CASES 2002-2003 ADCP*. The report also includes an appreciation of the data quality and a few recommendations.

4. DISCUSSION

CASES was a very demanding research program that was characterized by the overwintering of the first Canadian scientific icebreaker, the CCGS Amundsen, in the Amundsen Gulf. The ship was ice-bound in Franklin Bay for six months: from November 2003 to June 2004. The biggest surprise was the observation of a couple of eddies drifting under the ship during this period. A second surprise was the overwintering of an enormous school of Arctic cods under the ship. In February, the density of cods was so great that the ship-mounted ADCP was recording a ship vertical velocity when they were migrating up and down the water column.

Three on-going studies are also worth mentioning. Romain Lanos has completed his study of southern Beaufort Sea and Amundsen Gulf using the CASES (Canadian Shelf Exchange Study) mooring and CTD data. In his Ph.D. thesis (Lanos 2009), he describes the regional and seasonal variability in the Beaufort Sea – Amundsen Gulf region. Also in his Ph.D. thesis, Ryan Galley dedicates a chapter to the formation of the Cape Bathurst polynya in 2003-2004. Finally, current pulses were observed in the 2003-2004 and 2004-2005 mooring data at CA04. Some pulses were related to storms in Bering.

5. ACKNOWLEDGMENTS

We thank Captains Brulé, Thomas, Julien and Tremblay, the officers and crew of the CCGS Pierre Radisson, CCGS Sir Wilfrid Laurier and CCGS Amundsen for their outstanding collaboration throughout the CASES expeditions. We also thank the many members of the «Rosette team» and all the «Rosette monkeys» for their outstanding sampling effort cast after cast after cast. Thanks to the mooring team for their incredible work. And last but not least, thanks to Bon van Hardenberg, Pascal Guillot and Maryam Kamali Nezhad for their data processing efforts.

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TABLE 1. Summary of CASES expeditions.

Leg	Expedition Number	Dates	Chief Scientists	CTD Operators
0	0202	Sept 20th, 2002 To Oct 14th, 2002	Martin Fortier	Marie Robert Marie-Emmanuelle Rail Gilles Desmeules
1	0303	Sept 8th, 2003 To Oct 15th, 2003	Martin Fortier	Yves Gratton Jean-Éric Tremblay
2	0304	Oct 15th, 2003 To Nov 25th, 2003	Lisa Miller	Bill Williams Jane Eert
3	0305	Nov 26th, 2003 To Jan 6th, 2004	Christian Nozais	Marie-Emmanuelle Rail
4	0401	Jan 7th, 2004 To Feb 17th, 2004	Jody Deming	Claude Bélanger
5	0402	Feb 18th, 2004 To March 30th, 2004	Jody Deming	Mykola Vysotskyy
6	0403	March 31st, 2004 To May 11th, 2004	Louis Fortier Dave Barber	Sergey Kirillov
7	0404	May 12th, 2004 To June 24th, 2004	Dave Barber Yves Gratton	Louis Prieur Ian Beliveau
8	0405	June 25th, 2004 To August 4th, 2004	Louis Fortier Dave Scott	Romain Lanos Christof Konig
9	0406	August 5th, 2004 To August 26th, 2004	André Rochon	Marie-Emmanuelle Rail

TABLE 2. Rosette and MVP sensor specifications, CASES 2002-2004.

Parameter	Sensor		Range	Accuracy	Resolution
	Compagny	Instrument Type			
Attached to the Rosette					
CTD	SeaBird	SBE-9plus [1]			
Temperature	SeaBird	SBE-03 [1]	-5°C à +35°C	0.001°C	0.0002°C
Conductivity	SeaBird	SBE-4C [1]	0-7 S/m (0-70mmho/cm)	0.0003 S/m (0.003mmho/cm)	0.00004 S/m (0.0004 mmho/cm)
Pressure	Paroscientific	410K-105	up to 10 500m (15 000psia)[2]	0.015% of full scale	0.001% of full scale
Dissolved oxygen	SeaBird	SBE-43 [3]	120% of surface saturation[4]	2% of saturation	unknown
pH	SeaBird	SBE-18-I [5]	0-14 pH units	0,1 pH unit	unknown
Nitrates concentration	Satlantic	MBARI-ISUS 5T [6]	0.5 to 2000 μM	±2 μM	±0.5 μM
Light intensity (PAR)	Biospherical	QCP2300	1.4×10^{-5} to 0.5 μE/(cm^2·sec)		
sPAR	Biospherical	QCP2200	1.4×10^{-5} to 0.5 μE/(cm^2·sec)		
Fluorescence	Seapoint	Chlorophyll-fluorometer	0.02-150 μg/l	unknown	30
Transmissiometer	Wetlabs	C-Star	0-5 V	unknown	1.25 mV
Altimeter	Benthos	PSA-916 [7]	0 - 100 m	unknown	0.01 m
Attached to the MVP					
CTD	SeaBird	SBE-9plus [1]			
Temperature	SeaBird	SBE-03 [1]	-5°C à +35°C	0.001°C	0.0002°C
Conductivity	SeaBird	SBE-4C [1]	0-7 S/m (0-70mmho/cm)	0.0003 S/m (0.003mmho/cm)	0.00004 S/m (0.0004 mmho/cm)
Pressure	Paroscientific	410K-105	up to 10 500m (15 000psia)[2]	0.0015% of full scale	0.001% of full scale
Dissolved Oxygen	SeaBird	SBE-43 [3]	120% of surface saturation[4]	2% of saturation	unknown
Fluorescence	Seapoint	Chlorophyll-fluorometer	0.02-150 μg/l	unknown	30
Light transmission	Wetlabs	C-Star	0-5 V	unknown	1.25 mV

Notes: [1] Maximum depth of 6800m
[2] Depending on the configuration
[3] Maximum depth of 7,000m
[4] In all natural waters, fresh and marine
[5] Maximum depth of 1,200m
[6] Maximum depth of 1,000m
[7] Maximum depth of 6,000m

TABLE 3a. Summary of Rosette sampling, CASES 2002-2004.

Expedition number	Leg number	Date		Number of CTD casts	Number of stations	Number of sections
		Start	End			
0202	0	September 20	October 14	123	109	7
0303	1	September 8	October 15	37	17	n/a
0304	2	October 15	November 25	147	109	6
0305	3	November 26	January 6	60	1	n/a
0401	4	January 7	February 17	119	1	n/a
0402	5	February 18	March 30	90	1	n/a
0403	6	March 31	May 11	94	1	n/a
0404	7	May 12	May 30	40	1	n/a
		June 4	June 24	93	47	5
0405	8	June 25	August 4	137	53	8
0406	9	August 5	August 26	24	8	n/a

Notes: n/a = not applicable

TABLE 3b. Summary of MVP sampling, CASES 2004.

Expedition number	Leg number	Date		Number of CTD casts	Number of sections
		Start	End		
0404	7	June 17	June 21	276	3
0405	8	June 25	August 1	1588	20
0406	9	August 7	August 7	60	1

TABLE 4. List of CASES Rosette sections and their corresponding station and cast numbers in open water (page 1/3).

Expedition 0202, Leg 0

Section	Station	Cast
1	6	124
	7	123
	8	122
	9	121
	10	120
	11	119
	12	115
2	12	115
	13	114
	14	113
	15	112
	16	111
	17	110
	18	003
	19	004
	20	005
	21	006
	22	007
	23	008
	24	009
	25	013
	26	014
	28	016
	29	017
	30	018
	31	019
	32	020
	33	021
	34	022
3	34	022
	35	023
	36	024
	37	025
	38	026
	39	027
	40	028
	42	030
	43	031
	44	032
	45	033
	46	035
	47	037
	48	038

Section	Station	Cast
4	48	038
	49	039
	50	043
	51	044
	52	045
	53	046
	54	048
	56	050
	57	051
	58	052
	59	053
	60	054
	61	055
	62	056
	63	057
	64	058
	65	059
5	66	067
	67	068
	68	069
	69	070
	70	071
	71	072
	72	073
	73	074
	74	075
	75	076
	76	077
	77	078
	78	079
	79	080
	80	081
	81	082
	82	083
	83	086
	84	088
	85	089
	86	090
	87	091
	88	092
	89	094

Section	Station	Cast
6	89	094
	90	095
	91	096
	92	097
	93	098
	94	099
	95	100
	96	101
	97	102
	98	103
	99	104
	100	105
	101	106
7	101	106
	102	128
	103	129
	104	130
	105	131
	106	132
	107	133
	108	134
	109	135
	110	136

TABLE 4. List of CASES Rosette sections and their corresponding station and cast numbers in open water (page 2/3).

Expedition 0304, Leg 2

Section	Station	Cast
Section 100	100	065
	101	066
	102	067
	103	068
	104	069
	105	070
	106	071
	107	072
	108	073
	109	074
	112	060
	113	059
	114	058
	115	057
	116	056
	117	055
	118	054
	119	053
	120	052
	121	051
	122	050
	123	049
	124	045
	125	044
	126	043
	127	042
	128	041
	129	040
Section 200	206	079
	207	078
	208	077
	209	076
	210	075

Section	Station	Cast
Section 300	300	140
	301	137
	302	136
	303	135
	304	134
	305	133
	306	131
	307	130
	308	129
	309	127
	310	123
	311	122
	312	121
	313	119
	314	118
	315	117
	317	116
Section 400	400	084
	401	085
	402	086
	403	087
	404	088
	405	089
	406	090
	407	091
	408	092
	409	094
	410	095
	411	096
	412	097
	413	098
	414	099
	415	102

Section	Station	Cast
Section 500	500	038
	501	037
	502	036
	503	035
	504	034
	505	033
	506	032
	507	031
	508	030
Section 700	700	027
	702	025
	703	024
	705	022
	706	020
	707	019
	708	018
	709	016
	711	012
	712	011
	714	009
	715	007
	716	006
	717	005
	718	003

TABLE 4. List of CASES Rosette sections and their corresponding station and cast numbers in open water (page 3/3).

Expedition 0404, Leg 7

Section	Station	Cast
Section 100	108	059
	109	060
	110	061
	111	062
	112	063
	115	066
	115	067
	117	075
	118	076
	119	077
	120	078
	121	079
	122	080
	123	081
	124	083
	124	084
Section 300	347	130
	394	129
	395	128
	396	127
	397	125
Section 400 (West)	400	109
	401	108
	402	107
	403	106
	404	105
	405	104
	406	103
	407	095
	409	093
Section 400 (East)	410	085
	411	086
	412	087
	413	088
	414	089
	416	091

Expedition 0405, Leg 8

Section	Station	Cast
Section 100	109	124
	112	121
	115	120
	118	119
	121	118
	124	116
Section 200	203	136
	206	135
	209	132
	212	130
	215	128
Section 300	309	090
	312	091
	315	092
Section 400	400	111
	403	110
	406	109
	409	104
	412	100
	415	096

Section	Station	Cast
Section 700	703	006
	704	008
	705	009
	706	010
	707	011
	708	012
	709	013
	710	014
	711	015
	712	016
	715	113
	718	056
	721	112
Section 900	903	026
	906	027
	909	036
	912	042

TABLE 5. Summary of moored instruments, CASES 2002-2003.

Moor.	Water depth (m)	Position	Instr.	Serial No	Instr. Depth (m)	Date of first reliable data	Date of last reliable data	dt (min)	T (°C)	Cond. (m S/cm)	Press. (dbar)	Spd (cm/s)	Dir (true)
CA01-02	63	70°30.0' N 135°30.0' W	SBE37	#1695	30	2002-09-12 15:15	2003-10-04 15:00	15	×	×	×		
			RCM7	#12796	50	2002-09-12 16:00	2003-10-04 14:00	60	×	×		×	×
CA02-02	66	70°53.707' N 132°54.829' W	SBE37	#1697	33	2002-09-15 04:15	2003-10-01 11:45	15	×	×	×		
			RCM7	#12800	51	2002-09-15 04:59	2003-10-01 14:58	60	×	×		×	?
CA03-02	63	71°08.996' N 128°08.021' W	SBE-37	#2426	30	**No Data recorded**		-	-	-	-	-	-
			RCM4	#8859	49	2002-09-18 22:30	2003-03-22 06:30	120	×	×		×	×
CA04-02	201	71°01.335' N 133°46.443' W	SBE37	#2423	28	2002-09-15 19:45	2003-10-01 20:45	15	×	×	×		
			RCM4	#4427	47	2002-09-15 21:00	2003-01-16 15:00	60	×	×		×	×
			ADCP	#0272	93	2002-09-15 20:00	2003-10-01 20:45	30	×		×	×	×
			RCM4	#8214	103	2002-09-15 21:00	2003-10-01 21:00	60	×	×		×	×
			RCM4	#8677	187	2002-09-15 21:00	2003-10-01 21:00	60	×	×		×	×
CA05-02	201	71°16.954' N 127°32.139' W	SBE37	#2427	27	2002-09-18 16:45	2003-10-10 21:15	15	×	×	×		
			RCM4	#8213	47	2002-09-18 17:00	2003-10-11 01:00	60	×	×		×	×
			ADCP	#0335	94	2002-09-18 16:44	2003-10-10 20:45	30	×		×	×	×
			RCM4	#8673	102	2002-09-18 17:00	2003-08-18 00:00	60	×	×		×	×
			RCM4	#8858	185	2002-09-18 17:00	2003-09-05 14:00	60	×	×		×	×
CA06-02	205	70°38.996' N 127°32.854' W	RCM4	#2325	50	2002-09-19 02:00	2003-10-11 21:00	60	×	×		×	×
			ADCP	#2645	95	2002-09-19 01:30	2003-10-11 19:30	30	×		×	×	×
			RCM4	#3229	105	**No Data recorded**		-	-	-	-	-	-
			RCM4	#4645	189	**B.D.**	**B.D.**	**B.D.**	**B.D.**	**B.D.**	**B.D.**	**B.D.**	**B.D.**
CA07-02	500	71°09.745' N 133°52.630' W	SBE37	#2424	31	2002-09-16 02:44	2003-10-03 03:30	15	×	×	×		
			RCM7	#12213	75	2002-09-16 03:00	2003-10-03 03:00	60	×	×		×	×
			ADCP	#0333	106	2002-09-16 03:00	2003-10-03 03:11	30	×		×	×	×
			RCM4	#12484	207	2002-09-16 03:00	2003-10-03 03:00	60	×	×		×	×
			RCM4	#8857	490	2002-09-16 03:00	2003-09-09 00:00	60	×	×		×	×
CA08-02	389	70°58.383' N 126°06.720' W	SBE37	#2425	30	2002-09-19 16:00	2003-10-12 07:45	15	×	×	×		
			RCM7	#12214	65	2002-09-19 15:00	2003-08-11 23:00	60	×	×		×	×
			ADCP	#0296	98	2002-09-19 18:00	2003-10-12 07:19	20	×		×	×	×
			RCM7	#12273	197	2002-09-19 16:00	2003-10-12 06:00	60	×	×		×	×
			RCM4	#8850	377	2002-12-07 02:00	2003-10-12 05:00	60	×	×		×	×

Please notice that **B.D.** stands for Bad Data. The data marked with the "?" sign are doubtful.

TABLE 6. Summary of moored instruments, CASES 2003-2004 (page 1/2).

Moor.	Water depth (m)	Position	Instr.	Serial No	Instr. Depth (m)	Date of first reliable data	Date of last reliable data	dt (min)	T (°C)	Cond. (m S/cm)	Press. (dbar)	Spd (cm/s)	Dir (true)	Turb (NTU)	Diss. Ox. (µM)	Chl a	Light
CA3-03	64	71°09.182' N 128°07.569' W	ALEC CT	#592	27	2003-10-11 00:29	2004-09-27 16:00	10	×	×							
			RCM-11	#289	47	2003-10-11 00:30	2004-09-29 15:56	30	×	×	×	×	×	×	B.D		
CA4-03	304	71°05.158' N 133°43.392' W	ALEC CT	#688	34	2003-10-04 04:00	2004-09-07 13:10	10	×	×							
			ADCP	#3844	102	2003-10-04 04:44	2004-09-07 12:14	45	×		×	×	×				
			RCM-11	#281	202	2003-10-04 04:00	2004-09-07 12:52	30	×	×	×	×	×	×	×		
CA5-03	250	71°25.225' N 127°22.495' W	SBE37	#2425	33	2003-10-12 21:45	2004-07-28 17:15	15	×	B.D	B.D						
			ADCP	#2645	100	2003-10-12 21:29	2004-07-28 16:30	30	×		×	×	×				
			RCM-11	#271	202	2003-10-12 21:59	2004-07-28 16:58	30	×	×	×	×	×	×	×		
CA6-03	250	70°35.324' N 127°16.23' W	SBE37	#2427	35	2003-10-11 19:00	2004-09-05 21:00	15	×	×	B.D						
			ADCP	#0333	102	2003-10-11 19:00	2004-09-05 20:30	30	×		×	×	×				
			SBE26	#0371	243	2003-10-11 19:01	2004-09-05 20:31	30	×		×						
CA7-03	500	71°08.99' N 133°53.88' W	SBE37	#1697	17	2003-10-03 22:30	2004-09-08 14:45	15	×	×	×						
			ADCP	#3895	80	2003-10-03 22:30	2004-09-07 14:15	45	×		×	×	×				
			RCM-11	#282	186	2003-10-03 22:30	2004-09-07 14:36	30	×	×	×	×	×	×	×		
			RCM-11	#291	389	2003-10-03 22:30	2004-09-07 14:28	30	×	×	×	×	×	×	×		
CA8-03	401	71°00.048' N 125°57.852' W	ADCP	#0296	90	2003-10-13 15:29	2004-07-18 13:59	30	×		×	×	×				
			RCM-11	#276	190	2003-10-13 04:00	2004-05-21 16:02	30	×	×	×	×	×	×	×		
			ALEC CL	#200523	20	2003-10-13 03:30	2004-07-17 13:50	10									×
CA9-03	65	70°12.58' N 137°30.856' W	RCM-11	#266	47	2003-10-06 04:29	2004-09-09 21:42	30	×	×	×	×	×	×	×		
CA10-03	250	69°57.307' N 138°40.424' W	ALEC CT	#684	30	2003-10-06 23:10	2004-09-08 15:00	10	×	×							
			ADCP	#3778	95	2003-10-06 22:59	2004-09-08 13:59	45	×		×	×	×				
CA11-03	1000	70°34.629' N 138°39.289' W	SBE37	#2424	54	2003-10-05 22:30	2003-09-09 14:30	15	×	×	×						
			ADCP	#3045	122	2003-10-05 22:15	2003-09-09 13:59	45	×		×	×	×				
			RCM-11	#273	223	2003-10-05 22:30	2003-09-09 13:53	30	×	×	×	×	×	×	×		
			RCM-11	#280	430	B.D	B.D	B.D	B.D	B.D	B.D	B.D	B.D	B.D	B.D		
			RCM-11	#285	840	2003-10-05 22:29	2004-09-09 13:57	30	×	×	×	×	×	×	×		
			RCM-11	#290	1021	2003-10-05 22:30	2004-09-09 13:53	30	×	×	×	×	×	×	×		

Please notice that **B.D.** stands for Bad Data. The red color is used for flawed but still available data.

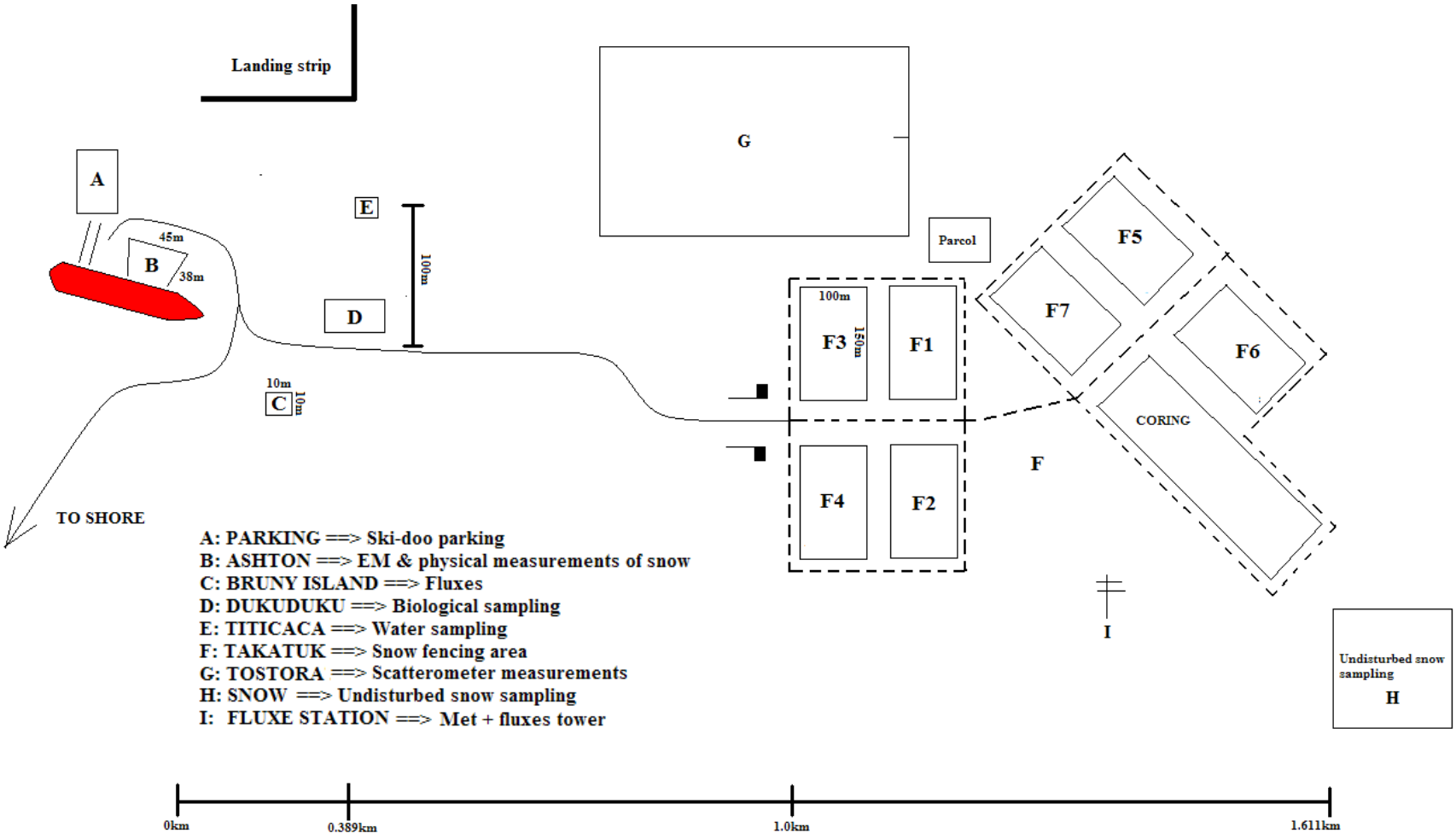
TABLE 6. Summary of moored instruments, CASES 2003-2004 (page 2/2).

Moor.	Water depth (m)	Position	Instr.	Serial No	Instr. Depth (m)	Date of first reliable data	Date of last reliable data	dt (min)	T (°C)	Cond. (m S/cm)	Press. (dbar)	Spd (cm/s)	Dir (true)	Turb (NTU)	Diss. Ox. (µM)	Chl a	Light
CA12-03	1234	71°25.613' N 134°12.028' W	ALEC CT	#685	25	2003-10-03 00:00	2004-02-18 20:30	10	×	×							
			ADCP	#3543	86	2003-10-02 22:30	2004-07-27 18:44	45	×		×	×	×				
			RCM-11	#270	188	2003-10-02 22:29	2004-07-27 19:24	30	×	×	×	×	×	×	×		
			RCM-11	#272	396	2003-10-02 22:30	2004-07-27 19:30	30	×	×	×	×	×	×	×		
			RCM-11	#287	801	2003-10-02 22:30	2004-07-27 19:29	30	×	×	×	×	×	×	×		
			RCM-11	#283	1007	2003-10-02 22:30	2004-07-27 19:29	30	×	×	×	×	×	×	×		
CA13-03	300	71°21.356' N 131°21.824' W	SBE37	#2423	49	2003-10-09 01:15	2005-09-04 04:30	15	×	×	×						
			ADCP	#3545	119	2003-10-09 01:30	2005-09-04 03:00	45	×		×	×	×				
			RCM-11	#274	217	2003-10-09 01:29	2005-02-10 17:28	30	×	×	×	×	×	×	×		
CA15-03	400	71°32.232' N 127°01.434' W	ALEC CT	#687	20	2003-10-10 17:20	2004-07-22 16:10	10	×	×							
			ADCP	#0272	88	2003-10-10 18:00	2004-07-22 15:44	45	×			×	×				
			RCM-11	#268	189	2003-10-10 18:00	2004-07-22 16:03	30	×	×	×	×	×	×	×		
CA16-03	250	71°47.886' N 126°27.354' W	ALEC CT	#686	36	2003-10-10 01:10	2004-07-22 13:10	10	×	×							
			ADCP	#3845	100	2003-10-10 02:15	2004-07-22 12:00	45	×		×	×	×				
CA18-03	500	70°38.56' N 123°06.04' W	ALEC CLW	#286	32	2003-10-14 00:00	2004-07-30 02:00	60	×					×		×	
			RCM-11	#267	100	2003-10-13 22:59	2004-03-29 20:01	30	×	×	×	×	×	×	×		
			RCM-7	#12214	202	2003-10-13 22:29	2004-07-30 01:24	30	×	**B.D**		×	×				
			RCM-7	#12273	403	2003-10-13 22:30	2004-07-30 01:28	30	×	**B.D**		×	×				
CA19-03	66	70°50.180' N 128°01.210' W	ALEC CT	#682	30	2003-10-11 03:30	2004-09-06 03:00	10	×	×							
			ALEC CL	#200524	30	2003-10-11 03:30	2004-09-06 03:00	10									×
			RCM-11	#284	50	**No Data recorded**			-	-	-	-	-	-	-	-	-
CA20-03	250	70°20.347' N 126°21.293' W	ALEC CT	#591	30	2003-10-12 02:00	2004-07-16 06:40	10	×	×							
			ALEC CLW	#285	30	2003-10-12 02:00	2004-07-16 06:00	60	×					×		×	
			ADCP	#0335	96	2003-10-12 02:15	2004-07-16 06:00	45	×			×	×				

Please notice that **B.D.** stands for Bad Data. The red color is used for flawed but still available data.

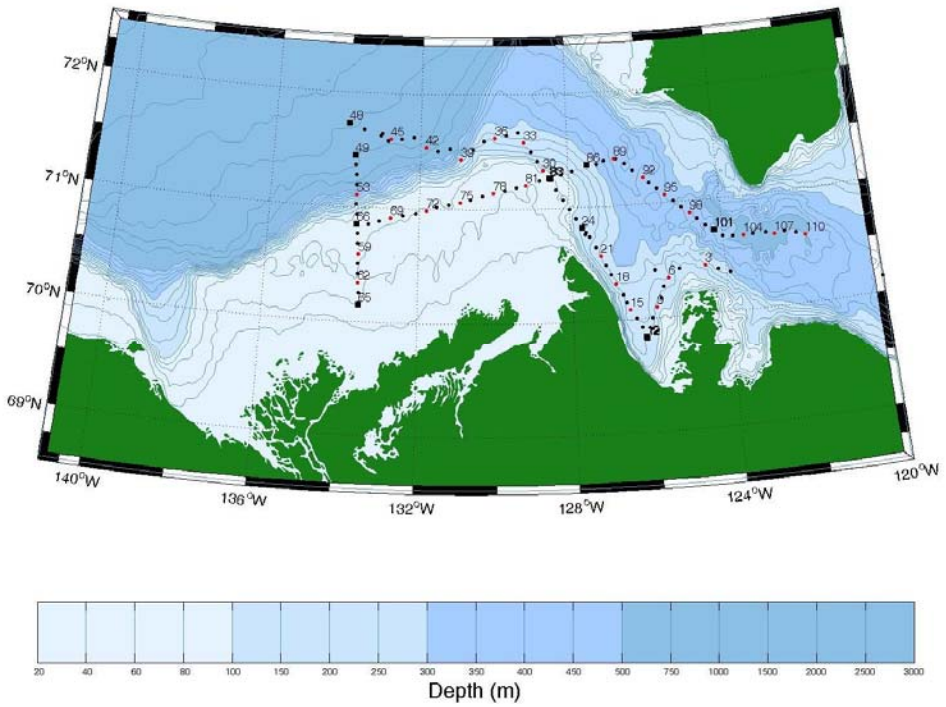
TABLE 7. Content of the ASCII Rosette data files.

Parameters	Units	Number of significant digits
Pressure (or depth)	dbars	2
Temperature	°C (ITS-90)	3
Transmissivity	%	2
Fluorescence	µg/l	2
Salinity	PSS (1978)	3
Density, σ (S,T,P)	kg/m^3	2
Specific volume anomaly	10^{-8} m^3/kg	0
N^2: Brunt-Väisälä frequency	$1/sec^2$	2
Density; σ_τ ; σ(S,T,O)	kg/m3	3
Potential temperature (θ)	°C	3
σ_θ ; σ(S,θ,O)	kg/m^3	3
Freezing temperature	°C	2
Dissolved oxygen concentration	ml/l	4
pH	no units	3
Nitrates	$mmol/m^3$	2
PAR pressure	dbars	2
PAR	µEinsteins/m^2/sec	3
Surface PAR	µEinsteins/m^2/sec	3

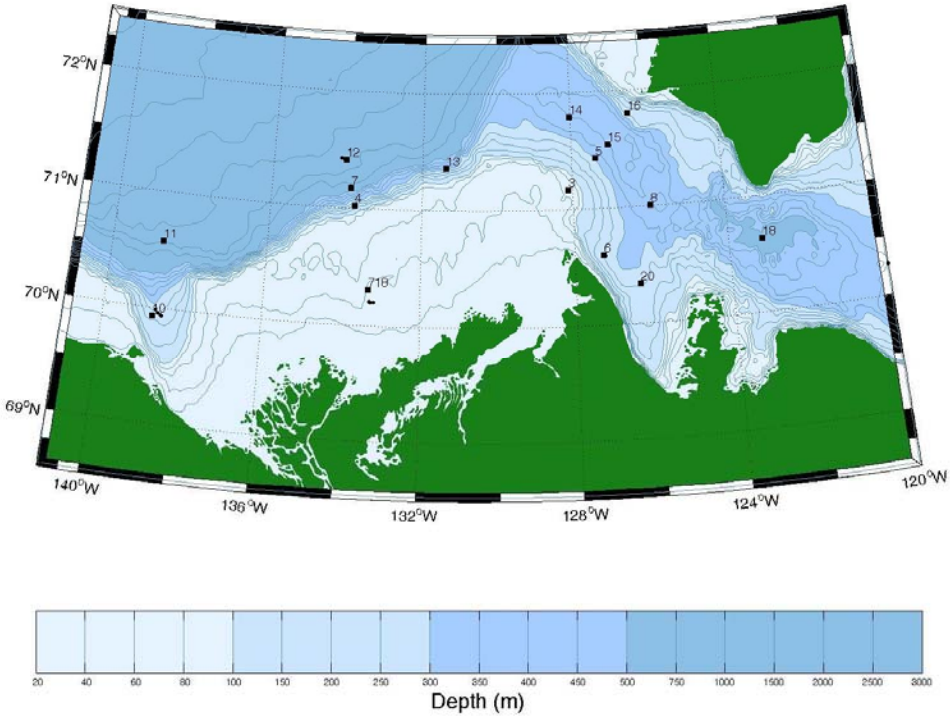


APPENDIX 1. Over-wintering station (ship position: 70° 02.71'N, 126° 18.06'W) and activities on the ice during CASES 2003-2004. The station "Angaguk", not shown on this figure, was located close to Horton River (69° 58.911'N, 126° 43.529'W). The station "River 1" refers to different locations close to "Angaguk" along Horton River.

APPENDIX 2. Maps of Beaufort Sea, Mackenzie Shelf and Amundsen Gulf where Rosette and MVP data were collected (Legs 0 to 9).

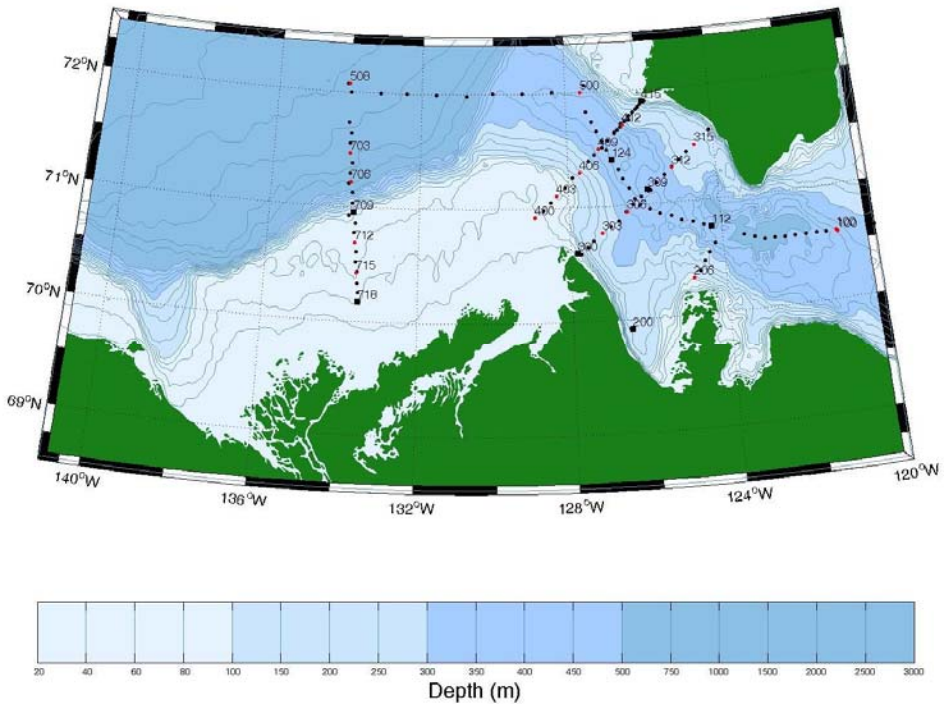


Leg 0 – Expedition 0202

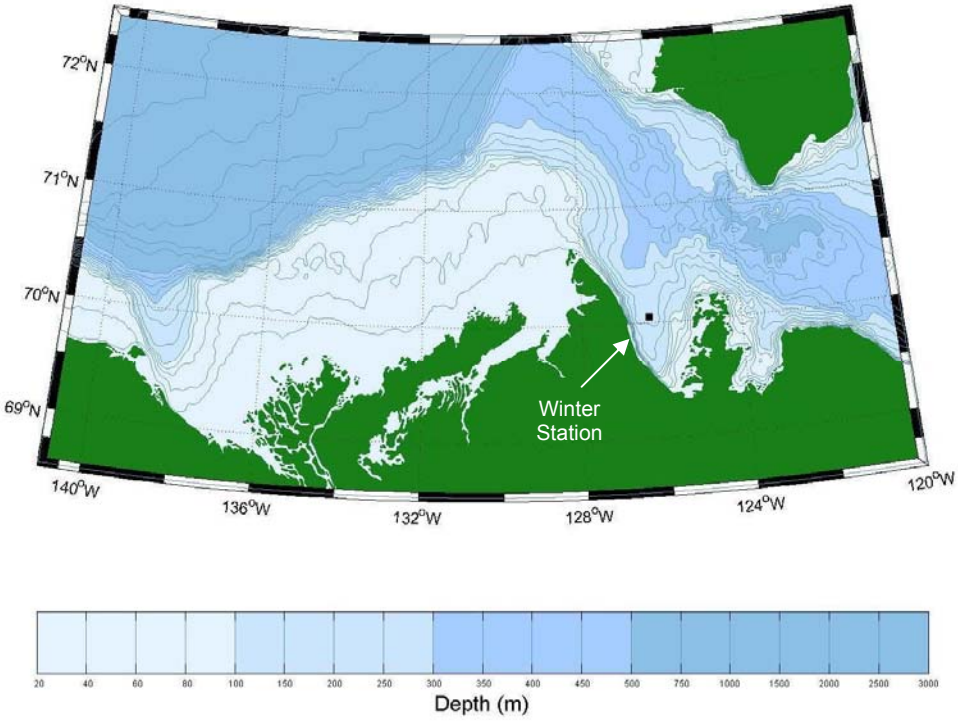


Leg 1 – Expedition 0303

APPENDIX 2.1 Maps of Beaufort Sea, Mackenzie Shelf and Amundsen Gulf Rosette sampling sites, Legs 0 and 1 (Sept-October 2002 and Sept-October 2003).

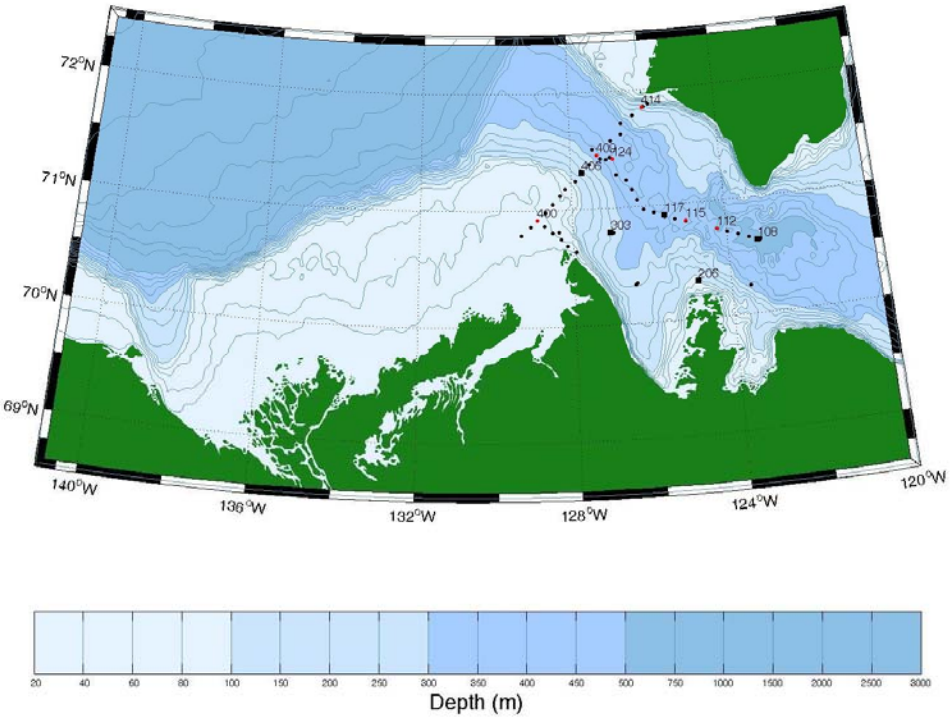


Leg 2 – Expedition 0304

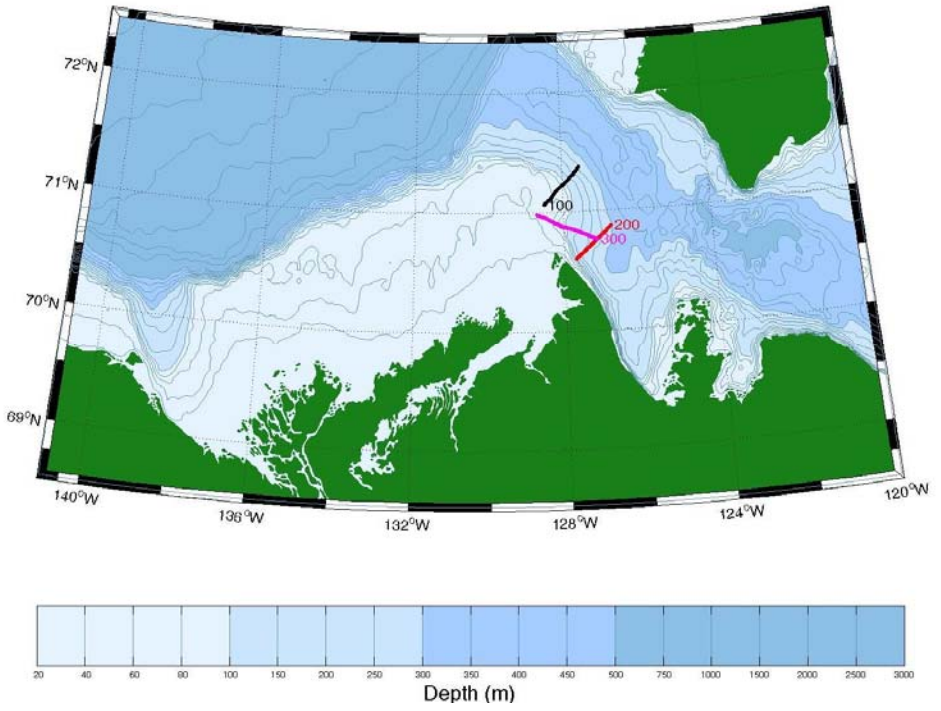


Legs 3 to the beginning of 7 – Expeditions 0305 to 0404

APPENDIX 2.2 Maps of Beaufort Sea, Mackenzie Shelf and Amundsen Gulf Rosette sampling sites, Leg 2 and Winter Station (Oct-November 2003 and December to May 2004).

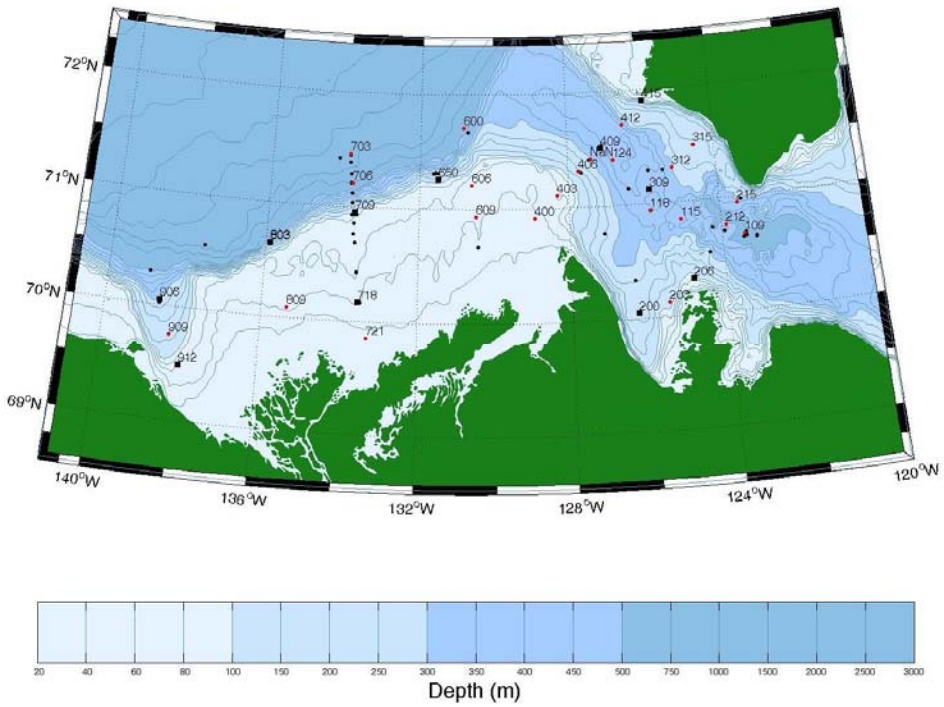


Rosette sampling stations

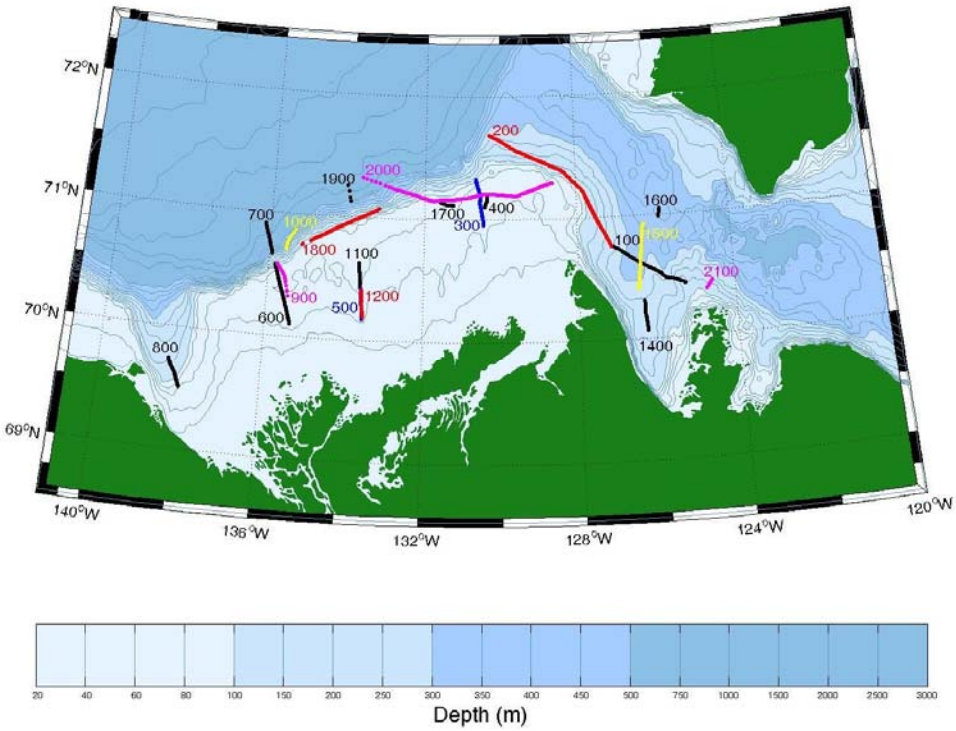


MVP sections

APPENDIX 2.3 Maps of Beaufort Sea, Mackenzie Shelf and Amundsen Gulf Rosette and MVP sampling sites, second half of leg 7 (May-June 2004).

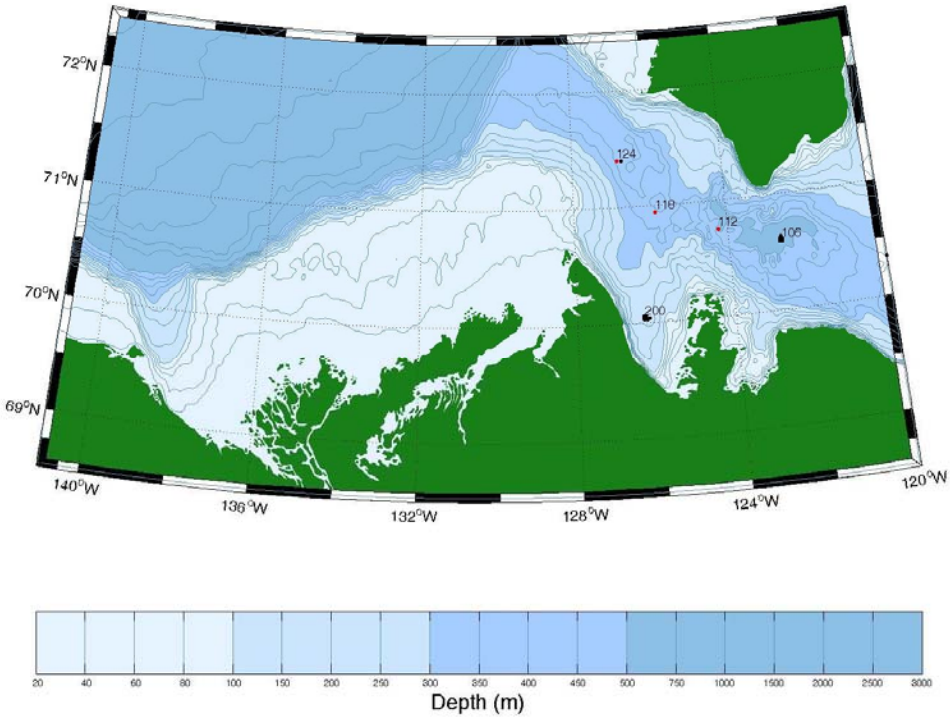


Rosette sampling stations

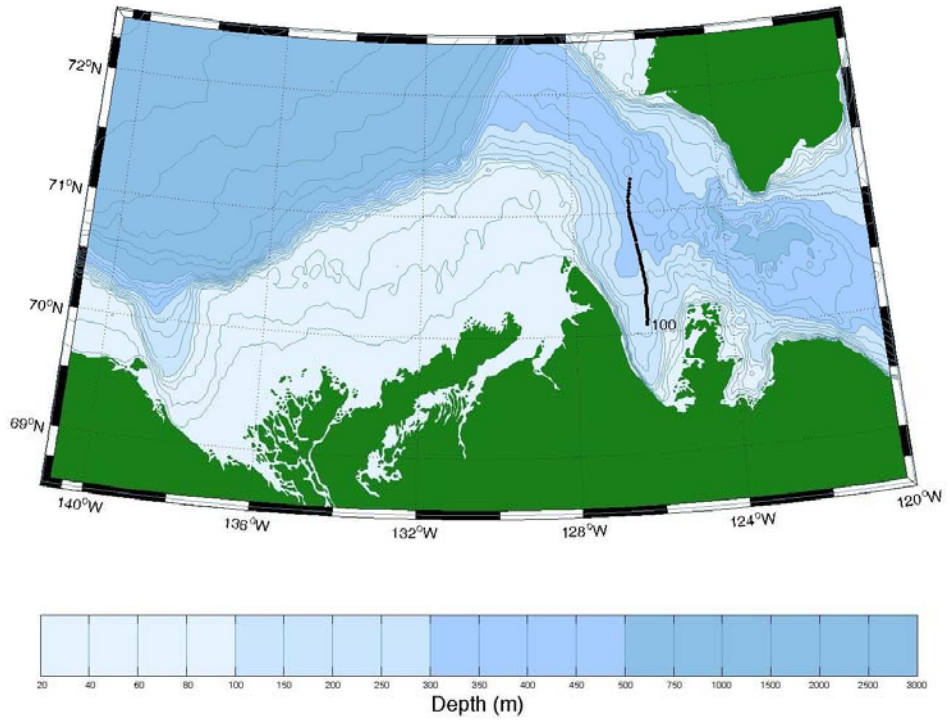


MVP sections

APPENDIX 2.4 Maps of Beaufort Sea, Mackenzie Shelf and Amundsen Gulf Rosette and MVP sampling sites, Leg 8 (June and July 2004).



Rosette sampling stations



MVP sections

APPENDIX 2.5 Maps of Beaufort Sea, Mackenzie Shelf and Amundsen Gulf Rosette and MVP sampling sites, Leg 9 (August 2004).

APPENDIX 3. Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers for all CASES scientific expeditions 2002-2004.

APPENDIX 3.1 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 0, Expedition 0202 (2002) (page 1/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
001	1	2002-09-22	16:10	70°21.01	123°53.88	312	318
002	2	2002-09-22	19:30	70°23.17	124°12.26	258	260
003	18	2002-09-23	06:26	70°19.20	126°51.42	229	237
004	19	2002-09-23	10:32	70°24.30	126°59.06	249	256
005	20	2002-09-23	11:32	70°29.33	127°05.99	204	213
006	21	2002-09-23	13:53	70°34.21	127°13.03	249	267
007	22	2002-09-23	17:05	70°38.96	127°19.87	239	246
008	23	2002-09-23	18:57	70°44.21	127°29.91	175	192
009	24	2002-09-24	09:51	70°49.30	127°40.39	136	151
010	24	2002-09-24	12:30	70°45.89	127°36.55	54	168
011	24	2002-09-24	13:53	70°46.83	127°35.02	49	165
012	24	2002-09-24	17:00	70°44.70	127°29.26	174	190
013	25	2002-09-25	03:09	70°54.23	127°49.61	110	116
014	26	2002-09-25	05:03	70°59.44	128°00.01	63	66
015	27	2002-09-25	06:32	71°04.41	128°10.07	49	60
016	28	2002-09-25	09:54	71°09.81	128°20.65	50	62
017	29	2002-09-25	11:32	71°14.90	128°30.30	44	56
018	30	2002-09-25	13:18	71°19.83	128°40.13	49	59
019	31	2002-09-25	16:20	71°24.83	128°49.45	78	84
020	32	2002-09-25	18:01	71°29.79	129°00.05	192	183
021	33	2002-09-25	20:23	71°34.88	129°11.02	242	258
022	34	2002-09-26	00:27	71°40.18	129°19.92	273	292
023	35	2002-09-26	01:46	71°38.69	129°38.98	277	294
024	36	2002-09-26	03:28	71°37.38	129°58.02	230	250
025	37	2002-09-26	07:21	71°35.99	130°16.49	228	245
026	38	2002-09-26	08:58	71°31.47	130°34.45	196	214
027	39	2002-09-26	10:31	71°26.17	130°54.71	295	309
028	40	2002-09-26	15:40	71°31.81	131°12.44	380	389
029	41	2002-09-26	18:33	71°30.59	131°32.52	560	582
030	42	2002-09-26	21:02	71°32.20	131°51.48	572	571
031	43	2002-09-27	05:03	71°37.32	132°11.26	570	572
032	44	2002-09-27	07:30	71°36.20	132°31.89	555	562
033	45 a	2002-09-27	09:38	71°36.09	132°49.93	961	1000
034	45 b	2002-09-27	12:15	71°35.24	132°53.79	71	1036
035	46	2002-09-27	14:43	71°37.76	133°06.19	657	662
036	46	2002-09-27	16:08	71°39.16	133°03.76	1162	1386
037	47	2002-09-27	19:00	71°40.69	133°33.86	1419	1260
038	48	2002-09-28	01:41	71°43.87	133°58.68	1605	1372
039	49	2002-09-28	19:56	71°27.12	133°46.52	961	1000
040	49	2002-09-29	02:23	71°27.07	133°47.20	401	989
041	49	2002-09-29	09:40	71°27.01	133°46.92	92	987
042	49	2002-09-29	11:03	71°26.82	133°46.97	91	1022
043	50	2002-09-29	18:38	71°22.14	133°44.98	1040	1060
044	51	2002-09-29	20:48	71°17.02	133°43.81	878	907
045	52	2002-09-29	22:20	71°11.64	133°43.03	662	689
046	53	2002-09-29	23:36	71°06.58	133°42.09	388	415
047	53	2002-09-30	02:15	71°06.48	133°42.16	78	407
048	54	2002-09-30	03:25	71°01.51	133°41.58	153	154
049	55	2002-09-30	04:27	70°56.30	133°40.10	73	87
050	56	2002-09-30	05:42	70°51.20	133°39.24	66	77

APPENDIX 3.1 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 0, Expedition 0202 (2002) (page 2/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
051	57	2002-09-30	08:37	70°46.16	133°37.72	60	66
052	58	2002-09-30	09:44	70°40.94	133°36.83	58	64
053	59	2002-09-30	13:05	70°35.56	133°35.13	60	69
054	60	2002-09-30	14:44	70°30.76	133°34.99	57	70
055	61	2002-09-30	15:56	70°25.50	133°34.04	51	61
056	62	2002-09-30	19:40	70°20.39	133°33.26	51	62
057	63	2002-09-30	21:40	70°15.37	133°32.08	41	52
058	64	2002-09-30	22:44	70°10.08	133°30.91	33	45
059	65	2002-10-02	11:33	70°08.75	133°30.69	31	43
060	65	2002-10-02	12:36	70°08.68	133°30.91	31	42
061	65	2002-10-02	23:06	70°08.81	133°31.31	31	44
062	65	2002-10-03	04:44	70°08.74	133°30.87	30	43
063	65	2002-10-03	19:55	70°08.79	133°30.62	31	43
064	66	2002-10-04	06:53	70°51.23	133°39.00	65	78
065	66	2002-10-04	11:03	70°51.16	133°38.99	50	78
066	66	2002-10-04	13:01	70°51.22	133°38.93	41	78
067	66	2002-10-04	19:29	70°51.05	133°39.18	65	78
068	67	2002-10-05	05:49	70°51.59	133°21.68	57	70
069	68	2002-10-05	07:03	70°53.12	133°04.11	56	69
070	69	2002-10-05	10:08	70°54.78	132°45.54	56	68
071	70	2002-10-05	13:15	70°56.21	132°26.66	52	65
072	71	2002-10-05	17:32	70°57.59	132°06.21	54	64
073	72	2002-10-05	18:52	70°59.10	131°48.97	56	62
074	73	2002-10-05	23:25	71°01.24	131°33.33	60	64
075	74	2002-10-06	00:31	71°02.34	131°13.83	50	63
076	75	2002-10-06	02:02	71°03.76	130°55.39	54	57
077	76	2002-10-06	05:20	71°05.27	130°38.74	39	50
078	77	2002-10-06	06:54	71°07.09	130°18.44	37	49
079	78	2002-10-06	10:28	71°08.42	130°01.95	34	46
080	79	2002-10-06	11:55	71°09.75	129°42.58	34	46
081	80	2002-10-06	14:03	71°11.36	129°23.84	36	47
082	81	2002-10-06	17:35	71°12.38	129°09.31	36	48
083	82	2002-10-06	19:05	71°14.64	128°47.08	43	55
084	83	2002-10-06	21:55	71°15.52	128°27.76	43	55
085	83	2002-10-07	08:12	71°15.89	128°28.83	10	55
086	83	2002-10-07	11:03	71°15.82	128°30.86	43	54
087	83	2002-10-07	12:59	71°15.73	128°30.51	30	55
088	84	2002-10-07	23:21	71°17.44	128°11.33	68	82
089	85	2002-10-08	01:00	71°18.92	127°53.42	150	160
090	86	2002-10-08	07:54	71°22.04	127°29.31	252	270
091	87	2002-10-08	10:03	71°22.17	127°13.21	305	340
092	88	2002-10-08	12:01	71°23.74	127°01.11	368	379
093	89	2002-10-08	16:34	71°24.82	126°40.68	140	458
094	89	2002-10-08	17:45	71°24.55	126°44.52	429	455
095	90	2002-10-08	20:39	71°21.63	126°28.26	450	472
096	91	2002-10-08	22:10	71°18.06	126°15.18	435	457
097	92	2002-10-09	02:27	71°14.07	125°58.77	386	395
098	93	2002-10-09	04:06	71°11.31	125°49.96	381	403
099	94	2002-10-09	06:05	71°07.76	125°38.40	400	415
100	95	2002-10-09	10:00	71°04.24	125°26.13	329	347

APPENDIX 3.1 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 0, Expedition 0202 (2002) (page 3/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
101	96	2002-10-09	11:57	71°00.85	125°13.60	328	348
102	97	2002-10-09	14:03	70°57.30	125°01.50	372	390
103	98	2002-10-09	18:03	70°53.73	124°49.00	351	367
104	99	2002-10-09	21:07	70°50.36	124°37.71	411	417
105	100	2002-10-09	22:57	70°46.77	124°25.14	437	459
106	101	2002-10-10	02:02	70°43.59	124°12.47	510	529
107	101	2002-10-10	10:09	70°43.70	124°11.73	479	502
108	101	2002-10-10	11:28	70°43.39	124°11.05	429	446
109	101	2002-10-10	12:57	70°43.48	124°11.19	41	449
110	17	2002-10-11	05:57	70°13.32	126°41.32	193	214
111	16	2002-10-11	07:10	70°09.04	126°37.14	209	223
112	15	2002-10-11	08:58	70°05.18	126°31.78	219	237
113	14	2002-10-11	13:04	70°00.42	126°22.60	196	212
114	13	2002-10-11	14:58	69°55.72	126°15.37	178	194
115	12	2002-10-12	00:56	69°49.68	126°08.47	140	150
116	12	2002-10-12	08:58	69°50.16	126°09.15	138	153
117	12	2002-10-12	10:56	69°49.89	126°09.89	133	149
118	12	2002-10-12	12:54	69°50.20	126°09.77	10	154
119	11	2002-10-12	18:19	69°54.70	126°00.32	146	157
120	10	2002-10-12	19:57	70°00.11	125°58.62	166	182
121	9	2002-10-12	22:07	70°05.68	125°51.49	124	140
122	8	2002-10-12	23:59	70°10.50	125°43.40	131	149
123	7	2002-10-13	01:33	70°16.45	125°38.49	219	240
124	6	2002-10-13	04:01	70°20.75	125°30.00	188	200
125	5	2002-10-13	06:15	70°25.17	125°12.17	155	170
126	4	2002-10-13	07:44	70°25.46	125°50.40	112	132
127	3	2002-10-13	10:00	70°25.55	124°31.28	164	182
128	102	2002-10-13	12:59	70°39.98	123°59.76	450	432
129	103	2002-10-13	14:28	70°39.60	123°43.93	477	503
130	104	2002-10-13	16:06	70°39.50	123°27.14	396	407
131	105	2002-10-13	21:36	70°39.40	123°11.66	526	540
132	106	2002-10-13	23:06	70°39.40	122°51.87	528	552
133	107	2002-10-14	01:38	70°38.20	122°38.18	484	516
134	108	2002-10-14	03:16	70°38.98	122°21.60	520	536
135	109	2002-10-14	04:29	70°37.62	122°04.70	482	571
136	110	2002-10-14	07:06	70°35.58	121°50.17	502	537
137	111	2002-10-15	20:47	68°22.47	112°45.78	92	107
138	112	2002-10-17	15:51	72°08.60	096°04.42	410	430

APPENDIX 3.2 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 1, Expedition 0303 (2003).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
001	0	2003-09-20	22:45	70°07.27	71°04.66	500	885
003	718	2003-09-30	05:05	70°18.48	133°20.20	28	31
004	718	2003-09-30	07:01	70°12.60	133°18.56	30	34
005	718	2003-09-30	09:45	70°12.27	133°15.48	27	30
006	718	2003-09-30	13:48	70°12.16	133°11.64	28	32
007	718	2003-09-30	20:28	70°12.11	133°17.19	28	33
008	4	2003-10-01	19:52	71°01.38	133°46.56	196	204
009	12	2003-10-02	04:10	71°24.60	134°03.90	1172	1185
010	12	2003-10-02	07:18	71°24.14	134°06.18	1188	1217
011	12	2003-10-02	11:41	71°25.09	134°08.14	1198	1201
012	12	2003-10-02	17:07	71°25.50	134°12.37	1215	1233
013	7	2003-10-03	07:25	71°10.06	133°53.34	500	517
014	7	2003-10-03	10:32	71°10.33	133°53.17	526	526
016	7	2003-10-03	14:28	71°11.08	133°55.05	584	584
017	11	2003-10-05	22:45	70°34.50	138°40.14	979	995
018	10	2003-10-06	14:36	69°55.74	138°44.22	192	212
019	10	2003-10-06	18:05	69°56.51	138°32.10	233	239
020	10	2003-10-06	20:35	69°57.30	138°36.28	235	247
021	10	2003-10-06	23:41	69°59.16	138°40.38	256	271
022	10	2003-10-07	02:27	69°56.01	138°30.50	227	235
023	10	2003-10-07	05:59	69°56.26	138°30.44	230	238
024	13	2003-10-09	01:46	71°21.60	131°22.20	330	346
025	14	2003-10-09	20:07	71°47.27	128°00.47	378	403
026	16	2003-10-10	01:44	71°47.84	126°24.96	220	235
027	15	2003-10-10	05:41	71°32.49	127°00.09	389	408
028	15	2003-10-10	09:45	71°32.20	126°57.18	395	409
029	15	2003-10-10	14:10	71°32.71	126°59.75	394	406
030	15	2003-10-10	16:12	71°32.76	126°58.90	390	410
031	3	2003-10-11	00:37	71°09.92	128°06.18	57	60
032	6	2003-10-11	07:38	70°35.83	127°14.58	243	262
033	6	2003-10-11	17:08	70°35.75	127°12.83	250	258
034	20	2003-10-12	02:43	70°20.17	126°20.72	245	252
035	5	2003-10-12	22:06	71°25.81	127°20.97	300	309
036	8	2003-10-13	03:58	70°60.00	125°57.88	383	401
037	18	2003-10-13	19:00	70°37.87	123°06.91	480	489
038	18	2003-10-13	23:09	70°37.74	123°06.56	526	538
039	18	2003-10-14	03:26	70°38.38	123°05.18	500	514

APPENDIX 3.3 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 2, Expedition 0304 (2003) (page 1/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
001	718	2003-10-18	20:13:54	70°10.27	133°32.28	35	44
002	718	2003-10-19	13:05:24	70°10.11	133°31.78	35	44
003	718	2003-10-19	14:28:11	70°10.24	133°33.71	36	43
004	718	2003-10-19	15:50:56	70°10.16	133°33.06	34	43
005	717	2003-10-20	14:22:25	70°15.38	133°33.27	44	52
006	716	2003-10-20	15:17:24	70°20.06	133°35.25	48	57
007	715	2003-10-20	17:37:32	70°25.81	133°36.73	55	63
008	715	2003-10-21	00:16:42	70°25.98	133°35.73	54	64
009	714	2003-10-21	02:59:02	70°31.39	133°39.16	58	66
010	713	2003-10-21	04:19:47	70°36.61	133°38.80	63	70
011	712	2003-10-21	05:45:14	70°41.30	133°41.62	58	67
012	711	2003-10-21	09:08:25	70°46.64	133°43.18	64	72
013	710	2003-10-21	10:54:33	70°51.63	133°42.02	67	75
014	709	2003-10-21	12:13:43	70°56.95	133°45.35	74	82
015	709	2003-10-21	14:15:01	70°57.03	133°45.10	72	81
016	709	2003-10-21	15:49:39	70°56.93	133°47.38	71	81
017	709	2003-10-21	19:42:34	70°55.38	133°52.17	78	85
018	708	2003-10-22	04:41:03	71°01.83	133°48.18	220	230
019	707	2003-10-22	07:51:11	71°07.66	133°49.18	453	462
020	706	2003-10-22	11:09:48	71°13.02	133°51.59	635	651
021	706	2003-10-22	16:09:04	71°12.47	133°55.20	673	683
022	705	2003-10-22	18:54:02	71°17.62	133°53.93	842	850
023	704	2003-10-22	21:08:56	71°22.72	133°51.70	1077	1085
024	703	2003-10-23	00:56:32	71°27.94	133°55.30	1187	1196
025	702	2003-10-23	10:45:09	71°33.27	133°56.58	1108	1117
026	701	2003-10-23	12:47:58	71°38.59	133°55.07	1186	1370
027	700	2003-10-23	15:09:42	71°44.14	133°59.75	1187	1400
028	508	2003-10-23	21:31:54	72°04.29	134°01.82	1186	1800
029	508	2003-10-24	02:42:44	72°04.38	134°05.03	74	1800
030	508a	2003-10-24	07:33:54	72°00.04	133°59.13	1186	1800
031	507	2003-10-24	12:18:54	71°59.82	133°09.54	1186	1500
032	506	2003-10-24	15:51:00	71°59.86	132°25.60	1186	1500
033	505	2003-10-24	19:28:12	71°59.80	131°35.57	1116	1125
034	504	2003-10-24	23:19:54	71°59.14	130°45.01	722	730
035	503	2003-10-25	02:35:12	72°00.58	130°01.37	352	352
036	502	2003-10-25	05:44:54	72°00.33	129°12.03	382	391
037	501	2003-10-25	09:22:48	72°00.46	128°22.36	403	410
038	500	2003-10-25	12:26:57	72°00.05	127°34.66	379	387
039	500	2003-10-25	21:39:32	72°03.75	127°28.74	368	376
040	129	2003-10-26	07:25:06	71°49.90	127°26.71	403	419
041	128	2003-10-26	09:23:04	71°44.59	127°18.27	410	420
042	127	2003-10-26	10:53:15	71°39.46	127°10.74	391	401
043	126	2003-10-26	12:54:11	71°34.03	127°02.06	394	402
044	125	2003-10-26	14:37:56	71°29.31	126°55.18	391	399
045	124	2003-10-26	16:06:58	71°23.94	126°47.74	419	426
046	124	2003-10-26	17:41:33	71°23.88	126°47.90	77	442
047	124	2003-10-26	20:04:51	71°23.63	126°48.36	415	425
048	124	2003-10-27	01:11:06	71°24.25	126°46.45	419	428
049	123	2003-10-27	09:26:30	71°18.91	126°38.15	438	447
050	122	2003-10-27	14:05:22	71°14.03	126°31.53	416	426

APPENDIX 3.3 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 2, Expedition 0304 (2003) (page 2/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
051	121	2003-10-27	15:40:53	71°08.87	126°22.55	386	395
052	120	2003-10-27	17:23:49	71°03.05	126°14.60	369	379
053	119	2003-10-27	19:48:05	70°59.69	126°06.35	378	387
054	118	2003-10-27	22:08:47	70°57.16	125°50.67	392	402
055	117	2003-10-28	02:41:32	70°54.66	125°35.12	398	408
056	116	2003-10-28	04:29:27	70°53.21	125°17.75	320	330
057	115	2003-10-28	06:06:25	70°50.56	125°02.58	343	353
058	114	2003-10-28	07:43:33	70°49.16	124°43.60	385	393
059	113	2003-10-28	09:07:30	70°47.07	124°27.83	472	481
060	112	2003-10-28	13:59:36	70°45.38	124°15.27	458	523
061	112	2003-10-28	17:41:56	70°45.13	124°16.22	43	456
062	112	2003-10-28	19:59:20	70°44.78	124°17.57	426	437
063	88	2003-10-31	03:00:18	70°36.27	117°44.48	285	294
064	100	2003-10-31	15:10:12	70°35.95	121°00.84	357	374
065	100	2003-10-31	18:22:05	70°35.15	120°59.47	377	388
066	101	2003-11-01	00:02:57	70°35.81	121°17.20	468	477
067	102	2003-11-01	01:10:21	70°35.97	121°32.43	447	458
068	103	2003-11-01	02:14:01	70°35.99	121°48.91	515	524
069	104	2003-11-01	03:25:00	70°35.94	122°05.75	477	486
070	105	2003-11-01	04:35:52	70°36.00	122°22.28	498	507
071	106	2003-11-01	05:49:38	70°36.19	122°38.47	530	537
072	107	2003-11-01	06:56:54	70°36.00	122°53.70	542	563
073	108	2003-11-01	08:08:39	70°37.84	123°09.49	470	484
074	109	2003-11-01	09:21:59	70°39.84	123°25.56	557	567
075	210	2003-11-01	11:45:22	70°36.75	124°12.66	428	438
076	209	2003-11-01	13:23:53	70°32.11	124°22.67	220	230
077	208	2003-11-01	14:11:21	70°28.03	124°30.45	201	211
078	207	2003-11-01	15:20:23	70°23.12	124°39.33	127	137
079	206	2003-11-01	19:43:37	70°19.48	124°50.33	86	96
080	200	2003-11-04	15:49:31	69°55.08	126°29.42	162	171
081	200	2003-11-04	17:17:51	69°55.30	126°29.62	163	171
082	200	2003-11-04	19:53:37	69°55.74	126°29.32	164	175
083	200	2003-11-05	01:21:49	69°54.98	126°30.50	162	170
084	400	2003-11-05	19:51:06	70°55.17	128°55.12	30	34
085	401	2003-11-06	00:20:19	70°59.05	128°41.40	35	40
086	402	2003-11-06	02:32:04	71°03.01	128°29.69	37	40
087	403	2003-11-06	04:27:12	71°06.42	128°19.19	50	56
088	404	2003-11-06	08:53:18	71°10.59	128°05.27	62	68
089	405	2003-11-06	10:12:26	71°15.67	127°53.28	111	118
090	406	2003-11-06	11:22:31	71°18.23	127°41.02	171	177
091	407	2003-11-06	17:24:57	71°24.12	127°25.94	273	282
092	408	2003-11-06	18:41:32	71°27.03	127°15.79	330	337
093	409	2003-11-06	22:43:47	71°29.87	127°08.48	367	371
094	409	2003-11-07	03:00:54	71°30.84	127°02.52	379	385
095	410	2003-11-07	04:46:34	71°34.39	126°52.96	414	419
096	411	2003-11-07	06:11:25	71°37.98	126°41.24	430	436
097	412	2003-11-07	08:58:32	71°42.00	126°27.05	368	377
098	413	2003-11-07	13:39:01	71°46.23	126°16.51	227	236
099	414	2003-11-07	15:02:42	71°49.87	126°03.65	193	201
100	415	2003-11-07	16:53:04	71°53.59	125°51.78	41	45

APPENDIX 3.3 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 2, Expedition 0304 (2003) (page 3/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
101	415	2003-11-07	21:18:08	71°54.53	125°50.58	48	56
102	415	2003-11-07	23:25:10	71°54.37	125°53.49	52	57
103	415	2003-11-08	00:47:05	71°53.84	125°49.17	40	45
104	B1	2003-11-08	02:41:03	71°54.02	125°51.94	41	45
105	B2	2003-11-08	03:20:44	71°52.42	125°56.56	108	113
106	B3	2003-11-08	04:11:10	71°50.88	126°00.55	198	202
107	B4	2003-11-08	04:57:49	71°49.77	126°04.56	204	207
108	B5	2003-11-08	05:41:27	71°48.54	126°09.40	227	232
109	B6	2003-11-08	06:25:56	71°46.81	126°15.21	231	234
110	B7	2003-11-08	08:32:51	71°44.57	126°15.39	231	237
111	B8	2003-11-08	09:35:21	71°43.93	126°22.68	313	318
112	B9	2003-11-08	10:31:18	71°42.87	126°28.90	368	373
113	B10	2003-11-08	11:40:36	71°40.89	126°30.87	436	441
114	B11	2003-11-08	12:48:35	71°39.69	126°35.94	441	444
115	B12	2003-11-08	13:39:21	71°38.55	126°40.74	434	439
116	317	2003-11-11	02:44:40	71°36.02	124°06.08	154	157
117	315	2003-11-11	08:40:07	71°29.13	124°30.99	209	218
118	314	2003-11-11	12:25:30	71°25.62	124°45.66	215	224
119	313	2003-11-11	14:09:12	71°21.89	124°58.53	218	226
120	312	2003-11-11	16:47:18	71°18.03	125°11.61	297	306
121	312	2003-11-11	20:19:21	71°18.35	125°10.79	301	305
122	311	2003-11-12	03:31:28	71°14.64	125°23.82	356	361
123	310	2003-11-12	05:19:26	71°10.69	125°37.16	371	378
124	309	2003-11-12	10:15:24	71°07.42	125°52.42	378	387
125	309	2003-11-12	12:30:48	71°07.22	125°50.71	375	383
126	309	2003-11-12	16:38:08	71°07.05	125°48.10	40	390
127	309	2003-11-12	18:34:23	71°06.67	125°50.66	382	388
128	309	2003-11-13	01:25:51	71°06.99	125°49.76	380	385
129	308	2003-11-13	07:59:31	71°03.86	126°03.25	385	394
130	307	2003-11-13	09:38:31	71°00.11	126°16.42	362	370
131	306	2003-11-13	12:45:20	70°56.69	126°28.47	330	340
132	306	2003-11-13	15:57:28	70°56.62	126°29.02	329	338
133	305	2003-11-13	18:13:53	70°52.10	126°41.45	292	301
134	304	2003-11-13	19:52:10	70°49.39	126°54.95	265	270
135	303	2003-11-14	00:17:02	70°46.11	127°08.45	229	234
136	302	2003-11-14	05:15:12	70°42.25	127°22.75	202	206
137	301	2003-11-14	06:44:17	70°38.83	127°33.05	197	201
138	300	2003-11-14	16:11:29	70°35.71	127°48.64	26	33
139	300	2003-11-14	17:58:31	70°35.64	127°49.57	21	28
140	300	2003-11-14	20:09:02	70°35.44	127°43.33	39	43
141	300	2003-11-14	21:54:29	70°35.44	127°44.52	35	40
142	200	2003-11-19	22:57:51	69°55.44	126°32.15	163	168
143	200	2003-11-20	01:06:45	69°55.43	126°32.13	163	168
144	200	2003-11-20	02:46:20	69°55.43	126°32.23	163	168
145	200	2003-11-20	16:12:15	69°55.35	126°32.05	167	168
146	200	2003-11-20	17:40:29	69°55.35	126°31.98	160	168
147	200	2003-11-20	19:44:53	69°55.35	126°31.96	163	168

APPENDIX 3.4 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 3, Expedition 0305 (2003) (page 1/2).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
001	winter1	2003-12-09	15:20	70°02.62	126°12.04	212	227
002	winter1	2003-12-09	17:50	70°02.73	126°11.815	216	227
003	winter1	2003-12-10	01:45	70°02.33	126°11.42	213	227
004	winter1	2003-12-10	13:41	70°01.18	126°25.12	213	227
005	winter1	2003-12-10	16:06	70°01.18	126°26.12	213	227
006	winter1	2003-12-11	02:10	70°01.17	126°25.12	213	227
007	winter1	2003-12-11	13:28	70°02.17	126°11.29	213	227
008	winter1	2003-12-12	01:30	70°02.36	126°13.03	215	229
009	winter1	2003-12-12	13:30	70°02.74	126°17.42	220	234
010	winter1	2003-12-13	14:18	70°02.73	126°18.07	218	232
011	winter1	2003-12-14	01:44	70°02.73	126°18.07	218	232
012	winter1	2003-12-14	15:40	70°02.73	126°18.07	218	232
013	winter1	2003-12-15	01:38	70°02.73	126°18.07	219	232
014	winter1	2003-12-15	13:36	70°02.73	126°18.07	218	232
015	winter1	2003-12-16	01:35	70°02.73	126°18.07	218	232
016	winter1	2003-12-16	13:33	70°02.73	126°18.07	219	232
017	winter1	2003-12-16	15:36	70°02.73	126°18.08	218	232
018	winter1	2003-12-17	01:40	70°02.73	126°18.07	218	232
019	winter1	2003-12-17	13:30	70°02.73	126°18.07	218	232
020	winter1	2003-12-18	01:50	70°02.73	126°18.07	219	232
021	winter1	2003-12-18	13:44	70°02.73	126°18.08	219	232
022	winter1	2003-12-19	01:40	70°02.73	126°18.07	219	232
023	winter1	2003-12-19	13:39	70°02.73	126°18.08	218	232
024	winter1	2003-12-20	01:44	70°02.73	126°18.07	219	232
025	winter1	2003-12-20	13:26	70°02.73	126°18.07	219	232
026	winter1	2003-12-21	01:37	70°02.73	126°18.07	218	232
027	winter1	2003-12-21	15:36	70°02.73	126°18.07	218	232
028	winter1	2003-12-22	01:40	70°02.74	126°18.07	219	232
029	winter1	2003-12-22	13:30	70°02.73	126°18.11	220	232
030	winter1	2003-12-22	15:40	70°02.73	126°18.07	219	232
031	winter1	2003-12-23	01:43	70°02.73	126°18.07	219	232
032	winter1	2003-12-23	13:27	70°02.73	126°18.07	219	232
033	winter1	2003-12-24	02:11	70°02.73	126°18.07	219	232
034	winter1	2003-12-24	13:46	70°02.73	126°18.07	219	232
035	winter1	2003-12-24	23:46	70°02.73	126°18.07	219	232
036	winter1	2003-12-25	20:08	70°02.73	126°18.07	219	232
037	winter1	2003-12-27	01:37	70°02.73	126°18.07	219	232
039	winter1	2003-12-27	13:39	70°02.74	126°18.07	219	232
040	winter1	2003-12-28	01:37	70°02.73	126°18.07	219	232
041	winter1	2003-12-28	15:45	70°02.73	126°18.07	219	232
042	winter1	2003-12-28	17:50	70°02.73	126°18.07	219	232
043	winter1	2003-12-29	01:40	70°02.73	126°18.07	218	232
044	winter1	2003-12-29	13:57	70°02.73	126°18.08	219	232
045	winter1	2003-12-30	01:35	70°02.73	126°18.07	219	232
046	winter1	2003-12-30	13:37	70°02.73	126°18.07	219	232
047	winter1	2003-12-31	01:52	70°02.73	126°18.07	219	232
048	winter1	2003-12-31	14:07	70°02.73	126°18.07	219	232
049	winter1	2003-12-31	23:35	70°02.73	126°18.07	219	232
050	winter1	2004-01-01	20:35	70°02.73	126°18.07	220	232

APPENDIX 3.4 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 3, Expedition 0305 (2003) (page 2/2).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
051	winter1	2004-01-02	13:42	70°02.73	126°18.07	219	232
052	winter1	2004-01-03	01:38	70°02.73	126°18.07	219	232
053	winter1	2004-01-03	13:40	70°02.73	126°18.07	219	232
054	winter1	2004-01-03	15:42	70°02.73	126°18.07	218	232
055	winter1	2004-01-04	02:09	70°02.73	126°18.07	219	232
056	winter1	2004-01-04	15:40	70°02.73	126°18.07	219	232
057	winter1	2004-01-05	02:01	70°02.73	126°18.07	219	232
058	winter1	2004-01-05	13:39	70°02.73	126°18.07	219	232
059	winter1	2004-01-06	01:42	70°02.73	126°18.07	219	232
060	winter1	2004-01-06	14:09	70°02.73	126°18.07	220	232
061	winter1	2004-01-07	01:30	70°02.73	126°18.07	220	233

APPENDIX 3.5 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 4, Expedition 0401 (2004) (page 1/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
001	Winter 1	2004-01-09	14:43	70°02.71	126°18.06	221	231
002	Winter 1	2004-01-10	13:45	70°02.71	126°18.06	220	231
003	Winter 1	2004-01-10	16:30	70°02.71	126°18.06	222	232
004	Winter 1	2004-01-11	01:55	70°02.71	126°18.06	221	232
005	Winter 1	2004-01-11	14:08	70°02.71	126°18.06	221	231
006	Winter 1	2004-01-12	01:50	70°02.71	126°18.06	221	232
007	Winter 1	2004-01-12	14:15	70°02.71	126°18.06	221	231
008	Winter 1	2004-01-13	01:37	70°02.71	126°18.06	221	231
009	Winter 1	2004-01-13	13:49	70°02.71	126°18.06	221	232
010	Winter 1	2004-01-14	02:03	70°02.71	126°18.06	221	231
011	Winter 1	2004-01-14	13:39	70°02.71	126°18.06	223	231
012	Winter 1	2004-01-15	01:35	70°02.71	126°18.06	223	231
013	Winter 1	2004-01-15	13:33	70°02.71	126°18.06	223	231
014	Winter 1	2004-01-16	01:50	70°02.71	126°18.06	223	231
015	Winter 1	2004-01-16	13:51	70°02.71	126°18.06	223	231
016	Winter 1	2004-01-16	15:50	70°02.71	126°18.06	223	231
017	Winter 1	2004-01-16	18:13	70°02.71	126°18.06	225	231
018	Winter 1	2004-01-17	01:47	70°02.71	126°18.06	222	231
019	Winter 1	2004-01-17	14:01	70°02.71	126°18.06	223	231
020	Winter 1	2004-01-18	01:43	70°02.71	126°18.06	223	232
021	Winter 1	2004-01-18	13:53	70°02.71	126°18.06	223	231
022	Winter 1	2004-01-19	01:43	70°02.71	126°18.06	223	232
023	Winter 1	2004-01-19	13:43	70°02.71	126°18.06	223	232
024	Winter 1	2004-01-20	01:41	70°02.71	126°18.06	223	232
025	Winter 1	2004-01-20	13:40	70°02.71	126°18.06	223	231
026	Winter 1	2004-01-21	01:41	70°02.71	126°18.06	223	231
027	Winter 1	2004-01-21	13:41	70°02.71	126°18.06	223	232
028	Winter 1	2004-01-22	01:37	70°02.71	126°18.06	223	231
029	Winter 1	2004-01-22	13:38	70°02.71	126°18.06	223	232
030	Winter 1	2004-01-22	15:51	70°02.71	126°18.06	224	231
031	Winter 1	2004-01-22	18:24	70°02.71	126°18.06	224	231
032	Winter 1	2004-01-23	01:43	70°02.71	126°18.06	223	231
033	Winter 1	2004-01-23	14:14	70°02.71	126°18.06	223	232
034	Winter 1	2004-01-24	01:42	70°02.71	126°18.06	223	232
035	Winter 1	2004-01-24	13:48	70°02.71	126°18.06	223	231
036	Winter 1	2004-01-25	13:43	70°02.71	126°18.06	223	231
037	Winter 1	2004-01-25	13:45	70°02.71	126°18.06	223	231
038	Winter 1	2004-01-26	01:50	70°02.71	126°18.06	223	231
039	Winter 1	2004-01-26	13:42	70°02.71	126°18.06	223	231
040	Winter 1	2004-01-27	01:36	70°02.71	126°18.06	223	231
041	Winter 1	2004-01-27	13:37	70°02.71	126°18.06	223	231
042	Winter 1	2004-01-28	01:39	70°02.71	126°18.06	223	231
043	Winter 1	2004-01-28	13:51	70°02.71	126°18.06	223	232
044	Winter 1	2004-01-28	15:52	70°02.71	126°18.06	223	232
045	Winter 1	2004-01-28	18:27	70°02.71	126°18.06	223	232
046	Winter 1	2004-01-29	01:46	70°02.71	126°18.06	223	232
047	Winter 1	2004-01-29	14:00	70°02.71	126°18.06	223	232
048	Winter 1	2004-01-30	01:42	70°02.71	126°18.06	223	232
049	Winter 1	2004-01-30	13:36	70°02.71	126°18.06	223	232
050	Winter 1	2004-01-31	01:35	70°02.71	126°18.06	223	232

APPENDIX 3.5 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 4, Expedition 0401 (2004) (page 2/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
051	Winter 1	2004-01-31	13:38	70°02.71	126°18.06	223	232
052	Winter 1	2004-02-01	01:45	70°02.71	126°18.06	223	232
053	Winter 1	2004-02-01	13:39	70°02.71	126°18.06	223	232
054	Winter 1	2004-02-02	01:41	70°02.71	126°18.06	223	232
055	Winter 1	2004-02-02	13:44	70°02.71	126°18.06	223	232
056	Winter 1	2004-02-03	01:44	70°02.71	126°18.06	223	232
057	Winter 1	2004-02-03	13:37	70°02.71	126°18.06	223	232
058	Winter 1	2004-02-03	15:07	70°02.71	126°18.06	223	232
059	Winter 1	2004-02-03	17:31	70°02.71	126°18.06	223	232
060	Winter 1	2004-02-03	19:18	70°02.71	126°18.06	223	232
061	Winter 1	2004-02-04	01:44	70°02.71	126°18.06	223	232
062	Winter 1	2004-02-04	13:41	70°02.71	126°18.06	223	232
063	Winter 1	2004-02-05	01:45	70°02.71	126°18.06	223	232
064	Winter 1	2004-02-05	13:38	70°02.71	126°18.06	223	232
065	Winter 1	2004-02-06	01:41	70°02.71	126°18.06	223	232
066	Winter 1	2004-02-06	13:38	70°02.71	126°18.06	223	232
067	Winter 1	2004-02-06	14:38	70°02.71	126°18.06	223	232
068	Winter 1	2004-02-06	15:43	70°02.71	126°18.06	223	232
069	Winter 1	2004-02-06	16:47	70°02.71	126°18.06	223	232
070	Winter 1	2004-02-06	17:36	70°02.71	126°18.06	223	232
071	Winter 1	2004-02-06	18:36	70°02.71	126°18.06	223	232
072	Winter 1	2004-02-06	20:04	70°02.71	126°18.06	224	232
073	Winter 1	2004-02-06	20:42	70°02.71	126°18.06	223	232
074	Winter 1	2004-02-06	21:36	70°02.71	126°18.06	223	232
075	Winter 1	2004-02-06	22:37	70°02.71	126°18.06	223	232
076	Winter 1	2004-02-06	23:35	70°02.71	126°18.06	223	232
077	Winter 1	2004-02-07	00:35	70°02.71	126°18.06	223	232
078	Winter 1	2004-02-07	01:42	70°02.71	126°18.06	223	232
079	Winter 1	2004-02-07	02:37	70°02.71	126°18.06	223	232
080	Winter 1	2004-02-07	13:43	70°02.71	126°18.06	223	232
081	Winter 1	2004-02-08	01:39	70°02.71	126°18.06	224	232
082	Winter 1	2004-02-08	13:36	70°02.71	126°18.06	223	232
083	Winter 1	2004-02-09	01:43	70°02.71	126°18.06	223	232
084	Winter 1	2004-02-09	13:46	70°02.71	126°18.06	223	231
085	Winter 1	2004-02-09	15:15	70°02.71	126°18.06	223	231
086	Winter 1	2004-02-09	17:15	70°02.71	126°18.06	223	231
087	Winter 1	2004-02-09	19:15	70°02.71	126°18.06	223	231
088	Winter 1	2004-02-10	01:48	70°02.71	126°18.06	223	231
089	Winter 1	2004-02-10	13:51	70°02.71	126°18.06	223	231
090	Winter 1	2004-02-11	01:42	70°02.71	126°18.06	223	231
091	Winter 1	2004-02-11	13:40	70°02.71	126°18.06	223	231
092	Winter 1	2004-02-12	01:38	70°02.71	126°18.06	223	231
093	Winter 1	2004-02-12	13:38	70°02.71	126°18.06	223	231
094	Winter 1	2004-02-13	01:42	70°02.71	126°18.06	223	231
095	Winter 1	2004-02-13	13:44	70°02.71	126°18.06	223	231
096	Winter 1	2004-02-13	14:48	70°02.71	126°18.06	223	232
097	Winter 1	2004-02-13	15:35	70°02.71	126°18.06	223	232
098	Winter 1	2004-02-13	16:33	70°02.71	126°18.06	223	232
099	Winter 1	2004-02-13	17:33	70°02.71	126°18.06	223	232
100	Winter 1	2004-02-13	18:30	70°02.71	126°18.06	223	232

APPENDIX 3.5 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 4, Expedition 0401 (2004) (page 3/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
101	Winter 1	2004-02-13	19:36	70°02.71	126°18.06	223	232
102	Winter 1	2004-02-13	20:32	70°02.71	126°18.06	223	232
103	Winter 1	2004-02-13	21:36	70°02.71	126°18.06	223	232
104	Winter 1	2004-02-13	22:33	70°02.71	126°18.06	224	232
105	Winter 1	2004-02-13	23:33	70°02.71	126°18.06	223	232
106	Winter 1	2004-02-14	00:33	70°02.71	126°18.06	224	232
107	Winter 1	2004-02-14	01:38	70°02.71	126°18.06	223	232
108	Winter 1	2004-02-14	02:33	70°02.71	126°18.06	224	232
109	Winter 1	2004-02-14	13:35	70°02.71	126°18.06	223	232
110	Winter 1	2004-02-14	17:14	70°02.71	126°18.06	223	232
111	Winter 1	2004-02-14	19:30	70°02.71	126°18.06	223	232
112	Winter 1	2004-02-14	20:56	70°02.71	126°18.06	223	232
113	Winter 1	2004-02-15	01:48	70°02.71	126°18.06	224	232
114	Winter 1	2004-02-15	13:46	70°02.71	126°18.06	223	231
115	Winter 1	2004-02-16	01:41	70°02.71	126°18.06	223	232
116	Winter 1	2004-02-16	13:41	70°02.71	126°18.06	223	232
117	Winter 1	2004-02-17	02:14	70°02.71	126°18.06	223	232
119	Winter 1	2004-02-18	01:37	70°02.71	126°18.06	223	232
120	Winter 1	2004-02-18	13:44	70°02.71	126°18.06	223	232

APPENDIX 3.6 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 5, Expedition 0402 (2004) (page 1/2).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
001	Winter 1	2004-02-19	13:30	70°02.71	126°18.06	223	232
002	Winter 1	2004-02-20	01:29	70°02.71	126°18.06	221	232
003	Winter 1	2004-02-20	13:34	70°02.71	126°18.06	223	232
004	Winter 1	2004-02-20	15:58	70°02.71	126°18.06	225	232
005	Winter 1	2004-02-21	01:43	70°02.71	126°18.06	225	232
006	Winter 1	2004-02-21	13:30	70°02.71	126°18.06	224	232
007	Winter 1	2004-02-22	01:41	70°02.71	126°18.06	226	232
008	Winter 1	2004-02-22	13:45	70°02.71	126°18.06	228	232
009	Winter 1	2004-02-23	01:39	70°02.71	126°18.06	221	232
010	Winter 1	2004-02-23	13:32	70°02.71	126°18.06	223	232
011	Winter 1	2004-02-24	01:29	70°02.71	126°18.06	222	232
012	Winter 1	2004-02-24	13:27	70°02.71	126°18.06	224	232
013	Winter 1	2004-02-25	01:30	70°02.71	126°18.06	223	232
014	Winter 1	2004-02-25	13:34	70°02.71	126°18.06	224	232
015	Winter 1	2004-02-26	01:30	70°02.71	126°18.06	222	232
016	Winter 1	2004-02-26	13:34	70°02.71	126°18.06	222	232
017	Winter 1	2004-02-26	15:48	70°02.71	126°18.06	223	232
018	Winter 1	2004-02-27	01:37	70°02.71	126°18.06	223	232
019	Winter 1	2004-02-27	13:38	70°02.71	126°18.06	223	232
020	Winter 1	2004-02-28	01:28	70°02.71	126°18.06	222	232
021	Winter 1	2004-02-28	13:34	70°02.71	126°18.06	225	232
022	Winter 1	2004-02-29	01:31	70°02.71	126°18.06	222	232
023	Winter 1	2004-02-29	13:30	70°02.71	126°18.06	222	232
024	Winter 1	2004-03-01	01:29	70°02.71	126°18.06	222	232
025	Winter 1	2004-03-01	13:31	70°02.71	126°18.06	223	232
026	Winter 1	2004-03-02	01:30	70°02.71	126°18.06	223	232
027	Winter 1	2004-03-02	13:31	70°02.71	126°18.06	223	232
028	Winter 1	2004-03-03	01:35	70°02.71	126°18.06	224	232
029	Winter 1	2004-03-03	13:34	70°02.71	126°18.06	224	232
030	Winter 1	2004-03-03	15:33	70°02.71	126°18.06	225	232
031	Winter 1	2004-03-04	01:36	70°02.71	126°18.06	224	232
032	Winter 1	2004-03-04	13:30	70°02.71	126°18.06	224	232
033	Winter 1	2004-03-05	01:27	70°02.71	126°18.06	225	232
034	Winter 1	2004-03-05	13:39	70°02.71	126°18.06	223	232
035	Winter 1	2004-03-06	01:26	70°02.71	126°18.06	225	232
036	Winter 1	2004-03-06	13:34	70°02.71	126°18.06	223	232
037	Winter 1	2004-03-06	21:13	70°02.71	126°18.06	215	232
038	Winter 1	2004-03-07	15:41	70°02.71	126°18.06	224	232
039	Winter 1	2004-03-08	01:29	70°02.71	126°18.06	225	232
040	Winter 1	2004-03-08	13:39	70°02.71	126°18.06	223	232
041	Winter 1	2004-03-09	01:37	70°02.71	126°18.06	225	232
042	Winter 1	2004-03-09	13:36	70°02.71	126°18.06	224	232
043	Winter 1	2004-03-09	15:38	70°02.71	126°18.06	227	232
044	Winter 1	2004-03-10	01:27	70°02.71	126°18.06	226	232
045	Winter 1	2004-03-10	13:37	70°02.71	126°18.06	226	232
046	Winter 1	2004-03-11	01:30	70°02.71	126°18.06	224	232
047	Winter 1	2004-03-11	13:41	70°02.71	126°18.06	226	232
048	Winter 1	2004-03-12	01:31	70°02.71	126°18.06	225	232
049	Winter 1	2004-03-12	13:34	70°02.71	126°18.06	225	232
050	Winter 1	2004-03-13	01:28	70°02.71	126°18.06	224	232

APPENDIX 3.6 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 5, Expedition 0402 (2004) (page 2/2).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
051	Winter 1	2004-03-13	13:38	70°02.71	126°18.06	226	232
052	Winter 1	2004-03-14	01:41	70°02.71	126°18.06	227	232
053	Winter 1	2004-03-14	15:35	70°02.71	126°18.06	225	232
054	Winter 1	2004-03-15	01:38	70°02.71	126°18.06	224	232
055	Winter 1	2004-03-15	13:38	70°02.71	126°18.06	224	232
056	Winter 1	2004-03-15	15:29	70°02.71	126°18.06	223	232
057	Winter 1	2004-03-16	01:29	70°02.71	126°18.06	224	232
058	Winter 1	2004-03-16	13:32	70°02.71	126°18.06	224	232
059	Winter 1	2004-03-17	01:29	70°02.71	126°18.06	224	232
060	Winter 1	2004-03-17	13:34	70°02.71	126°18.06	227	232
061	Winter 1	2004-03-18	01:35	70°02.71	126°18.06	224	232
062	Winter 1	2004-03-18	13:32	70°02.71	126°18.06	224	232
063	Winter 1	2004-03-18	21:25	70°02.71	126°18.06	224	232
064	Winter 1	2004-03-19	13:40	70°02.71	126°18.06	224	232
065	Winter 1	2004-03-20	01:32	70°02.71	126°18.06	224	232
066	Winter 1	2004-03-20	13:37	70°02.71	126°18.06	224	232
067	Winter 1	2004-03-21	01:27	70°02.71	126°18.06	224	232
068	Winter 1	2004-03-21	13:30	70°02.71	126°18.06	224	232
069	Winter 1	2004-03-21	15:30	70°02.71	126°18.06	224	232
070	Winter 1	2004-03-22	01:30	70°02.71	126°18.06	224	232
071	Winter 1	2004-03-22	13:34	70°02.71	126°18.06	224	232
072	Winter 1	2004-03-23	01:29	70°02.71	126°18.06	224	232
073	Winter 1	2004-03-23	13:33	70°02.71	126°18.06	224	232
074	Winter 1	2004-03-24	01:26	70°02.71	126°18.06	224	232
075	Winter 1	2004-03-24	13:30	70°02.71	126°18.06	225	232
076	Winter 1	2004-03-25	01:30	70°02.71	126°18.06	224	232
077	Winter 1	2004-03-25	13:32	70°02.71	126°18.06	225	232
078	Winter 1	2004-03-26	01:30	70°02.71	126°18.06	226	232
079	Winter 1	2004-03-26	13:29	70°02.71	126°18.06	226	232
080	Winter 1	2004-03-27	01:38	70°02.71	126°18.06	226	232
081	Winter 1	2004-03-27	13:31	70°02.71	126°18.06	225	232
082	Winter 1	2004-03-27	15:32	70°02.71	126°18.06	225	232
083	Winter 1	2004-03-28	01:36	70°02.71	126°18.06	224	232
084	Winter 1	2004-03-28	15:28	70°02.71	126°18.06	224	232
085	Winter 1	2004-03-29	02:12	70°02.71	126°18.06	224	232
086	Winter 1	2004-03-29	13:45	70°02.71	126°18.06	225	232
087	Winter 1	2004-03-30	01:29	70°02.71	126°18.06	222	232
088	Winter 1	2004-03-30	13:29	70°02.71	126°18.06	224	232
089	Winter 1	2004-03-31	01:33	70°02.71	126°18.06	224	232
090	Winter 1	2004-03-31	13:33	70°02.71	126°18.06	224	232

APPENDIX 3.7 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 6, Expedition 0403 (2004) (page 1/2).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
001	Winter 1	2004-04-01	01:31	70°02.71	126°18.06	224	232
002	Winter 1	2004-04-01	13:35	70°02.71	126°18.06	223	232
003	Winter 1	2004-04-01	22:31	70°02.71	126°18.06	224	232
004	Winter 1	2004-04-02	13:27	70°02.71	126°18.06	225	232
005	Winter 1	2004-04-03	01:30	70°02.71	126°18.06	224	232
006	Winter 1	2004-04-03	13:31	70°02.71	126°18.06	225	232
007	Winter 1	2004-04-03	17:08	70°02.71	126°18.06	225	332
008	Winter 1	2004-04-04	01:28	70°02.71	126°18.06	225	332
009	Winter 1	2004-04-04	12:32	70°02.71	126°18.06	225	232
010	Winter 1	2004-04-04	15:01	70°02.71	126°18.06	226	232
011	Winter 1	2004-04-05	00:55	70°02.71	126°18.06	225	232
012	Winter 1	2004-04-05	12:38	70°02.71	126°18.06	226	232
013	Winter 1	2004-04-06	00:22	70°02.71	126°18.06	225	232
014	Winter 1	2004-04-06	12:24	70°02.71	126°18.06	226	232
015	Winter 1	2004-04-07	00:29	70°02.71	126°18.06	226	232
016	Winter 1	2004-04-07	12:26	70°02.71	126°18.06	225	232
017	Winter 1	2004-04-07	14:52	70°02.71	126°18.06	227	232
018	Winter 1	2004-04-08	00:30	70°02.71	126°18.06	226	232
019	Winter 1	2004-04-08	12:31	70°02.71	126°18.06	225	232
020	Winter 1	2004-04-09	00:35	70°02.71	126°18.06	227	232
021	Winter 1	2004-04-09	12:27	70°02.71	126°18.06	226	232
022	Winter 1	2004-04-10	00:28	70°02.71	126°18.06	225	232
023	Winter 1	2004-04-10	12:27	70°02.71	126°18.06	225	232
024	Winter 1	2004-04-10	14:49	70°02.71	126°18.06	226	232
025	Winter 1	2004-04-11	00:25	70°02.71	126°18.06	225	232
026	Winter 1	2004-04-11	12:41	70°02.71	126°18.06	226	232
027	Winter 1	2004-04-11	14:30	70°02.71	126°18.06	227	232
028	Winter 1	2004-04-12	00:40	70°02.71	126°18.06	225	232
029	Winter 1	2004-04-12	12:25	70°02.71	126°18.06	226	232
030	Winter 1	2004-04-13	00:24	70°02.71	126°18.06	226	232
031	Winter 1	2004-04-13	12:24	70°02.71	126°18.06	226	232
032	Winter 1	2004-04-14	00:25	70°02.71	126°18.06	226	232
033	Winter 1	2004-04-14	12:28	70°02.71	126°18.06	226	232
034	Winter 1	2004-04-15	00:26	70°02.71	126°18.06	226	232
035	Winter 1	2004-04-15	12:23	70°02.71	126°18.06	226	232
036	Winter 1	2004-04-16	00:26	70°02.71	126°18.06	226	232
037	Winter 1	2004-04-16	12:24	70°02.71	126°18.06	226	232
038	Winter 1	2004-04-16	14:27	70°02.71	126°18.06	227	232
039	Winter 1	2004-04-17	00:32	70°02.71	126°18.06	226	232
040	Winter 1	2004-04-17	12:25	70°02.71	126°18.06	226	232
041	Winter 1	2004-04-18	00:29	70°02.71	126°18.06	225	232
042	Winter 1	2004-04-18	12:27	70°02.71	126°18.06	226	232
043	Winter 1	2004-04-19	00:27	70°02.71	126°18.06	226	232
044	Winter 1	2004-04-19	12:25	70°02.71	126°18.06	226	232
045	Winter 1	2004-04-20	00:20	70°02.71	126°18.06	225	232
046	Winter 1	2004-04-20	12:25	70°02.71	126°18.06	225	232
047	Winter 1	2004-04-21	00:30	70°02.71	126°18.06	226	232
048	Winter 1	2004-04-21	12:22	70°02.71	126°18.06	225	232
049	Winter 1	2004-04-22	00:24	70°02.71	126°18.06	226	232
050	Winter 1	2004-04-22	12:26	70°02.71	126°18.06	226	232

APPENDIX 3.7 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 6, Expedition 0403 (2004) (page 2/2).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
051	Winter 1	2004-04-22	14:23	70°02.71	126°18.06	227	232
052	Winter 1	2004-04-23	00:22	70°02.71	126°18.06	225	231
053	Winter 1	2004-04-23	12:18	70°02.71	126°18.06	226	232
054	Winter 1	2004-04-24	01:25	70°02.71	126°18.06	226	232
055	Winter 1	2004-04-24	12:20	70°02.71	126°18.06	226	232
056	Winter 1	2004-04-25	00:19	70°02.71	126°18.06	226	232
057	Winter 1	2004-04-25	12:21	70°02.71	126°18.06	226	232
058	Winter 1	2004-04-26	00:33	70°02.71	126°18.06	226	232
059	Winter 1	2004-04-26	12:31	70°02.71	126°18.06	226	232
060	Winter 1	2004-04-27	00:36	70°02.71	126°18.06	226	232
061	Winter 1	2004-04-27	12:38	70°02.71	126°18.06	226	232
062	Winter 1	2004-04-28	00:29	70°02.71	126°18.06	226	232
063	Winter 1	2004-04-28	12:23	70°02.71	126°18.06	226	233
064	Winter 1	2004-04-28	14:23	70°02.71	126°18.06	227	233
065	Winter 1	2004-04-29	00:30	70°02.71	126°18.06	227	233
066	Winter 1	2004-04-29	12:21	70°02.71	126°18.06	226	233
067	Winter 1	2004-04-30	00:27	70°02.71	126°18.06	227	233
068	Winter 1	2004-04-30	12:23	70°02.71	126°18.06	226	233
069	Winter 1	2004-05-01	00:19	70°02.71	126°18.06	226	233
070	Winter 1	2004-05-01	12:19	70°02.71	126°18.06	226	233
071	Winter 1	2004-05-02	00:33	70°02.71	126°18.06	226	233
072	Winter 1	2004-05-02	12:30	70°02.71	126°18.06	226	233
073	Winter 1	2004-05-03	00:24	70°02.71	126°18.06	227	233
074	Winter 1	2004-05-03	12:19	70°02.71	126°18.06	227	233
075	Winter 1	2004-05-04	01:24	70°02.71	126°18.06	226	233
076	Winter 1	2004-05-04	12:20	70°02.71	126°18.06	227	233
077	Winter 1	2004-05-04	14:26	70°02.71	126°18.06	227	233
078	Winter 1	2004-05-05	00:29	70°02.71	126°18.06	227	233
079	Winter 1	2004-05-05	12:19	70°02.71	126°18.06	226	233
080	Winter 1	2004-05-06	00:19	70°02.71	126°18.06	227	233
081	Winter 1	2004-05-06	12:22	70°02.71	126°18.06	227	233
082	Winter 1	2004-05-07	00:33	70°02.71	126°18.06	227	233
083	Winter 1	2004-05-07	12:23	70°02.71	126°18.06	226	233
084	Winter 1	2004-05-08	00:21	70°02.71	126°18.06	227	233
085	Winter 1	2004-05-08	12:26	70°02.71	126°18.06	226	233
086	Winter 1	2004-05-09	00:21	70°02.71	126°18.06	227	233
087	Winter 1	2004-05-09	12:22	70°02.71	126°18.06	226	233
088	Winter 1	2004-05-09	14:28	70°02.71	126°18.06	228	233
089	Winter 1	2004-05-09	16:25	70°02.71	126°18.06	227	233
090	Winter 1	2004-05-10	00:25	70°02.71	126°18.06	227	233
091	Winter 1	2004-05-10	12:24	70°02.71	126°18.06	227	233
092	Winter 1	2004-05-11	00:22	70°02.71	126°18.06	227	233
093	Winter 1	2004-05-11	12:23	70°02.71	126°18.06	226	233
094	Winter 1	2004-05-12	00:24	70°02.71	126°18.06	227	233

APPENDIX 3.8 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 7, Expedition 0404 (2004) (page 1/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
001	Winter 1	2004-05-12	12:24	70°02.74	126°18.08	226	233
002	Winter 1	2004-05-14	12:43	70°02.74	126°18.08	221	232
003	Winter 1	2004-05-15	00:46	70°02.74	126°18.08	222	227
004	Winter 1	2004-05-15	12:31	70°02.74	126°18.08	221	227
005	Winter 1	2004-05-15	15:02	70°02.74	126°18.08	221	227
006	Winter 1	2004-05-16	00:34	70°02.74	126°18.08	222	227
007	Winter 1	2004-05-16	12:27	70°02.74	126°18.08	220	227
008	Winter 1	2004-05-17	00:35	70°02.74	126°18.08	221	227
009	Winter 1	2004-05-17	12:30	70°02.74	126°18.08	206	227
010	Winter 1	2004-05-17	12:43	70°02.74	126°18.08	221	227
011	Winter 1	2004-05-18	00:35	70°02.74	126°18.08	221	227
012	Winter 1	2004-05-18	12:42	70°02.74	126°18.08	223	227
013	Winter 1	2004-05-19	00:34	70°02.74	126°18.08	223	227
014	Winter 1	2004-05-20	00:28	70°02.74	126°18.08	221	227
015	Winter 1	2004-05-20	12:37	70°02.74	126°18.08	222	232
016	Winter 1	2004-05-20	14:30	70°02.74	126°18.08	221	232
017	Winter 1	2004-05-21	00:34	70°02.74	126°18.08	221	226
018	Winter 1	2004-05-21	12:30	70°02.74	126°18.08	223	227
019	Winter 1	2004-05-21	14:59	70°02.74	126°18.08	222	227
020	Winter 1	2004-05-22	00:29	70°02.74	126°18.08	224	227
021	Winter 1	2004-05-22	12:34	70°02.74	126°18.08	223	227
022	Winter 1	2004-05-23	00:30	70°02.74	126°18.08	223	227
023	Winter 1	2004-05-23	12:26	70°02.74	126°18.08	223	227
024	Winter 1	2004-05-24	00:30	70°02.74	126°18.08	223	227
025	Winter 1	2004-05-24	12:45	70°02.74	126°18.08	223	227
026	Winter 1	2004-05-24	13:35	70°02.74	126°18.08	224	227
027	Winter 1	2004-05-25	00:29	70°02.74	126°18.08	224	227
028	Winter 1	2004-05-25	12:32	70°02.74	126°18.08	223	227
029	Winter 1	2004-05-26	00:24	70°02.74	126°18.08	223	227
030	Winter 1	2004-05-26	12:30	70°02.74	126°18.08	223	227
031	Winter 1	2004-05-27	00:30	70°02.74	126°18.08	224	227
032	Winter 1	2004-05-27	12:30	70°02.74	126°18.08	223	227
033	Winter 1	2004-05-27	14:59	70°02.74	126°18.08	223	227
034	Winter 1	2004-05-28	00:25	70°02.74	126°18.08	224	227
035	Winter 1	2004-05-28	12:35	70°02.74	126°18.08	223	227
036	Winter 1	2004-05-29	00:30	70°02.74	126°18.08	224	227
037	Winter 1	2004-05-29	12:34	70°02.74	126°18.08	223	227
038	Winter 1	2004-05-30	00:35	70°02.74	126°18.08	224	227
039	Winter 1	2004-05-30	12:35	70°02.74	126°18.08	223	227
040	Winter 1	2004-05-30	22:15	70°02.74	126°18.08	223	227
041	206	2004-06-04	02:09	70°19.33	123°50.40	86	90
042	206	2004-06-04	06:15	70°19.34	124°51.52	95	98
043	206	2004-06-04	08:36	70°19.28	124°50.59	95	95
044	206	2004-06-04	12:10	70°19.29	124°50.50	88	92
045	206	2004-06-04	15:47	70°19.23	124°50.30	89	95
046	206	2004-06-04	20:00	70°19.28	124°50.71	95	95
047	206	2004-06-04	22:05	70°19.80	124°50.40	93	95
048	206	2004-06-05	01:43	70°19.26	124°50.33	83	92
050	256	2004-06-06	01:32	70°15.09	123°30.16	337	341

APPENDIX 3.8 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 7, Expedition 0404 (2004) (page 2/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
051	256	2004-06-06	04:25	70°15.10	123°30.16	280	341
052	108	2004-06-06	21:15	70°37.68	123°12.54	521	538
053	108	2004-06-07	02:04	70°37.91	123°10.13	478	482
054	108	2004-06-07	07:30	70°37.67	123°09.10	496	507
055	108	2004-06-07	10:46	70°38.63	123°10.17	479	484
056	108	2004-06-07	15:28	70°37.75	123°10.53	497	495
057	108	2004-06-07	17:41	70°38.01	123°09.50	488	487
058	108	2004-06-07	20:21	70°38.12	123°08.40	491	490
059	108	2004-06-08	01:14	70°37.77	123°10.29	484	488
060	109	2004-06-08	07:33	70°39.61	123°25.91	557	566
061	110	2004-06-08	08:55	70°41.61	123°42.09	486	490
062	111	2004-06-08	09:52	70°43.50	123°58.49	429	428
063	112	2004-06-08	12:42	70°45.48	124°14.64	517	519
064	112	2004-06-08	16:21	70°45.37	123°14.27	504	519
065	115	2004-06-09	06:45	70°51.03	125°01.67	354	359
066	115	2004-06-09	10:01	70°50.83	125°02.25	346	358
067	115	2004-06-09	15:36	70°52.33	125°19.05	328	329
068	117	2004-06-09	23:39	70°54.72	125°34.59	405	410
069	117	2004-06-10	02:57	70°54.82	125°34.44	401	410
070	117	2004-06-10	09:00	70°54.80	125°35.00	402	404
071	117	2004-06-10	12:27	70°54.67	123°34.36	404	410
072	117	2004-06-10	14:55	70°54.59	125°36.33	401	410
073	117	2004-06-10	16:53	70°54.03	125°34.11	399	402
074	117	2004-06-10	19:37	70°54.03	125°34.78	401	404
075	117	2004-06-11	00:44	70°54.70	125°34.81	406	410
076	118	2004-06-11	06:55	70°56.44	125°50.68	377	378
077	119	2004-06-11	08:08	70°58.29	126°06.76	384	387
078	120	2004-06-11	09:38	71°03.52	126°15.92	380	384
079	121	2004-06-11	11:14	71°08.82	126°22.92	390	384
080	122	2004-06-11	13:07	71°14.00	126°31.45	426	430
081	123	2004-06-11	16:37	71°16.90	126°47.46	368	373
082	124	2004-06-11	19:40	71°25.30	126°51.89	404	403
083	124	2004-06-12	02:02	71°25.92	126°55.82	386	388
084	124	2004-06-12	05:01	71°34.16	126°53.08	364	376
085	410	2004-06-12	10:11	71°34.46	126°53.08	413	376
086	411	2004-06-12	13:06	71°37.76	126°36.73	444	445
087	412	2004-06-12	14:36	71°43.42	126°35.07	412	413
088	413	2004-06-12	16:40	71°46.93	126°15.65	234	236
089	414	2004-06-12	21:59	71°51.00	125°59.46	196	206
090	414	2004-06-13	02:54	71°51.27	125°56.67	173	175
091	416	2004-06-13	05:08	71°52.37	125°48.50	70	70
092	409	2004-06-14	22:43	71°27.52	127°17.82	329	330
093	409	2004-06-15	03:05	71°30.84	127°23.72	337	330
094	408	2004-06-15	08:44	71°25.55	127°12.23	346	343
095	407	2004-06-15	10:24	71°22.77	127°29.63	262	263
096	406	2004-06-15	12:04	71°18.62	127°42.00	176	173
097	406	2004-06-15	16:26	71°18.66	127°42.22	175	173
098	406	2004-06-15	17:27	71°18,37	127°42.95	171	173
099	406	2004-06-15	19:55	71°18.52	127°42.15	174	174
100	406	2004-06-15	23:34	71°18.64	127°41.71	176	177

APPENDIX 3.8 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 7, Expedition 0404 (2004) (page 3/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
101	406	2004-06-16	03:46	71°19.86	127°44.18	186	184
102	406	2004-06-16	09:42	71°18.82	127°42.65	174	175
103	406	2004-06-16	12:48	71°18.57	127°41.96	177	176
104	405	2004-06-17	03:13	71°14.67	127°53.65	107	105
105	404	2004-06-17	04:20	71°10.73	128°10.11	63	66
106	403	2004-06-17	06:43	71°07.56	128°18.97	54	55
107	402	2004-06-17	09:00	71°03.00	128°30.51	38	41
108	401	2004-06-17	10:15	70°58.81	128°42.81	39	40
109	400	2004-06-17	13:38	70°55.02	128°54.85	32	33
110	400	2004-06-17	18:50	70°54.98	128°55.18	31	31
111	399	2004-06-17	20:03	70°51.76	129°06.37	27	29
112	407	2004-06-18	06:13	70°54.98	128°55.18	260	257
113	303	2004-06-19	03:46	70°47.52	127°00.25	252	255
114	303	2004-06-19	09:03	70°47.99	126°58.79	262	260
115	303	2004-06-19	13:32	70°47.86	126°59.68	255	255
116	303	2004-06-19	15:25	70°47.73	127°00.13	252	255
117	303	2004-06-19	17:23	70°47.45	126°58.45	256	260
118	303	2004-06-19	21:15	70°47.35	126°56.02	265	260
119	303	2004-06-20	00:41	70°47.81	126°59.95	252	255
120	303	2004-06-20	03:19	70°47.67	127°02.22	246	248
121	303	2004-06-20	09:29	70°47.94	126°59.07	254	258
122	401	2004-06-21	02:10	70°58.83	128°42.44	40	41
123	398	2004-06-21	05:10	70°47.39	129°21.52	21	24
124	400	2004-06-21	11:59	70°54.99	128°55.07	33	33
125	397	2004-06-21	12:52	70°51.86	128°44.66	29	29
126	396	2004-06-21	14:11	70°48.53	128°21.80	39	39
127	396-1	2004-06-21	15:02	70°48.53	128°31.92	38	35
128	395	2004-06-21	16:06	70°45.02	128°19.07	39	40
129	394	2004-06-21	17:09	70°41.53	128°08.37	32	36
130	347	2004-06-21	18:40	70°38.06	127°55.38	29	32
132	CA-20	2004-06-22	03:40	70°20.67	126°23.55	254	255
133	CA-20	2004-06-22	07:15	70°20.20	126°25.60	252	254

APPENDIX 3.9 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 8, Expedition 0405 (2004) (page 1/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
002	303	2004-06-25	22:13	70° 45.82	127° 05.81	235	242
003	600	2004-06-26	20:27	71° 42.40	130° 49.69	552	562
004	600	2004-06-27	02:55	71° 40.32	130° 42.78	425	442
005	609	2004-06-27	19:45	70° 56.23	130° 28.88	34	47
006	703	2004-06-28	18:06	71° 27.60	133° 54.00	1149	1160
007	703	2004-06-29	00:24	71° 27.05	133° 54.22	1000	1180
008	704	2004-06-29	07:35	71° 23.11	133° 53.37	1000	1100
009	705	2004-06-29	09:09	71° 12.39	133° 50.37	609	619
010	706	2004-06-29	10:35	71° 17.38	133° 52.03	836	846
011	707	2004-06-29	11:55	71° 07.08	133° 48.26	437	440
012	708	2004-06-29	13:03	71° 02.30	133° 47.52	227	236
013	709	2004-06-29	14:44	70° 56.09	133° 47.84	74	83
014	710	2004-06-29	15:44	70° 51.63	133° 44.14	67	76
015	711	2004-06-29	16:46	70° 45.80	133° 43.97	63	73
016	712	2004-06-29	17:24	70° 41.46	133° 41.44	60	69
018	709	2004-06-30	11:33	70° 57.12	133° 43.04	71	83
019	709	2004-06-30	14:18	70° 56.65	133° 41.23	70	81
020	709	2004-06-30	16:30	70° 56.14	133° 40.65	72	81
021	709	2004-07-01	00:49	70° 56.44	133° 43.71	70	80
022	709	2004-07-01	01:52	70° 56.01	133° 43.49	70	80
023	709	2004-07-01	07:08	70° 57.15	133° 45.36	73	84
024	803	2004-07-02	13:44	70° 38.69	135° 53.47	245	260
025	850	2004-07-03	05:48	70° 34.03	137° 35.50	985	1122
026	903	2004-07-03	17:05	70° 17.30	138° 55.57	481	491
027	906	2004-07-04	01:40	70° 02.82	138° 35.07	273	280
028	906	2004-07-04	06:22	70° 01.19	138° 35.78	265	270
029	906	2004-07-04	09:26	70° 01.30	138° 35.90	264	270
030	906	2004-07-04	11:29	70° 01.17	138° 35.70	263	281
031	906	2004-07-04	13:09	70° 01.14	138° 36.02	265	282
032	906	2004-07-04	15:15	70° 01.55	138° 35.23	265	272
033	906	2004-07-04	20:16	70° 01.43	138° 35.51	263	273
034	906	2004-07-04	22:21	70° 01.21	138° 35.52	264	282
035	909	2004-07-05	09:26	69° 45.09	138° 16.11	160	170
036	909	2004-07-05	13:04	69° 45.29	138° 16.19	162	175
037	912	2004-07-06	00:42	69° 29.29	137° 56.41	45	54
038	912	2004-07-06	02:19	69° 29.30	137° 56.35	45	55
039	912	2004-07-06	04:30	69° 29.32	137° 56.47	44	54
040	912	2004-07-06	06:57	69° 29.33	137° 56.35	44	55
041	912	2004-07-06	09:25	69° 29.28	137° 56.32	43	53
042	912	2004-07-06	12:30	69° 29.34	137° 57.12	46	56
043	809	2004-07-07	23:18	70° 05.53	135° 20.53	35	43
044	803	2004-07-08	10:02	70° 38.48	135° 53.40	235	243
045	803	2004-07-08	11:59	70° 38.62	135° 54.29	250	251
046	803	2004-07-08	14:29	70° 38.61	135° 53.35	239	252
048	803	2004-07-08	18:16	70° 38.50	135° 53.15	230	235
049	803	2004-07-08	22:19	70° 38.45	135° 53.43	230	239
050	803	2004-07-09	00:12	70° 38.45	135° 53.58	233	241

APPENDIX 3.9 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 8, Expedition 0405 (2004) (page 2/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
051	803	2004-07-09	05:32	70° 38.59	135° 52.94	237	251
052	706	2004-07-10	03:40	71° 12.41	133° 47.99	615	623
053	706	2004-07-10	06:16	71° 12.62	133° 50.98	620	630
054	712	2004-07-10	12:08	70° 41.43	133° 40.93	59	68
055	715	2004-07-10	21:23	70° 25.71	133° 36.46	55	65
056	718	2004-07-11	04:53	70° 10.14	133° 31.83	36	46
057	718	2004-07-11	07:37	70° 10.19	133° 32.12	35	44
058	718	2004-07-11	11:12	70° 10.22	133° 31.96	35	45
059	718	2004-07-11	13:30	70° 09.93	133° 29.34	34	43
060	718	2004-07-11	15:23	70° 10.08	133° 32.09	34	48
061	718	2004-07-11	19:13	70° 10.25	133° 32.15	35	45
062	612	2004-07-12	06:07	70° 40.44	130° 26.39	26	32
063	606	2004-07-12	13:53	71° 12.73	130° 35.98	39	53
064	650	2004-07-13	05:26	71° 15.61	131° 30.50	93	102
065	650	2004-07-13	07:38	71° 18.88	131° 38.13	255	260
066	650	2004-07-13	09:16	71° 18.66	131° 36.89	234	240
067	650	2004-07-13	11:00	71° 18.87	131° 36.07	242	259
068	650	2004-07-13	12:41	71° 19.11	131° 34.95	247	257
069	650	2004-07-13	17:17	71° 18.82	131° 31.13	215	223
070	650	2004-07-13	20:10	71° 18.62	131° 37.21	239	248
071	CA-20	2004-07-16	05:38	70° 20.36	126° 21.44	243	253
072	200	2004-07-16	13:23	70° 02.83	126° 18.14	220	235
073	200	2004-07-16	15:09	70° 02.72	126° 18.15	220	228
074	200	2004-07-16	16:52	70° 02.76	126° 17.77	221	230
075	200	2004-07-16	18:58	70° 02.68	126° 18.12	219	227
076	200	2004-07-17	00:48	70° 02.87	126° 17.90	221	237
077	200	2004-07-17	02:39	70° 02.71	126° 17.94	220	221
078	200	2004-07-17	05:00	70° 02.58	126° 17.65	220	231
079	200	2004-07-17	06:21	70° 02.82	126° 17.60	221	230
080	CA-20	2004-07-17	18:50	70° 20.25	126° 21.27	243	254
081	118	2004-07-18	08:04	70° 56.55	125° 50.87	381	385
082	118	2004-07-18	11:16	70° 56.60	125° 50.69	378	387
083	309	2004-07-19	01:18	71° 07.49	125° 49.92	388	395
084	309	2004-07-19	03:30	71° 17.50	125° 50.16	389	385
085	309	2004-07-19	05:23	71° 07.56	125° 50.00	384	394
086	309	2004-07-19	07:20	71° 07.57	125° 50.36	389	390
087	309	2004-07-19	09:43	71° 07.63	125° 49.87	375	387
088	309	2004-07-19	11:30	71° 07.53	125° 50.04	388	392
089	309	2004-07-19	13:27	71° 07.41	125° 50.71	390	399
090	309	2004-07-19	15:23	71° 07.47	125° 50.21	390	399
091	312	2004-07-20	02:39	71° 18.06	125° 11.51	299	307
092	315	2004-07-20	10:05	71° 29.22	124° 33.38	217	224
093	315	2004-07-20	13:23	71° 29.01	124° 32.29	216	227
094	415	2004-07-21	01:48	71° 54.04	125° 51.93	36	45
095	415	2004-07-21	03:09	71° 54.26	125° 51.96	39	48
096	415	2004-07-21	04:12	71° 54.54	125° 52.31	42	52
097	415	2004-07-21	10:04	71° 54.19	125° 52.36	38	46
098	415	2004-07-21	11:35	71° 54.09	125° 52.23	36	46
099	415	2004-07-21	13:34	71° 54.08	125° 51.84	38	46
100	412	2004-07-22	01:05	71° 42.09	126° 28.88	388	400

APPENDIX 3.9 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 8, Expedition 0405 (2004) (page 3/3).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
101	409	2004-07-22	21:05	71° 30.36	127° 05.36	372	380
102	409	2004-07-23	03:25	71° 30.36	127° 05.77	371	378
103	409	2004-07-23	10:00	71° 30.22	127° 06.18	370	380
104	409	2004-07-23	11:22	71° 31.82	127° 03.50	381	387
105	409	2004-07-23	13:49	71° 30.89	127° 04.81	375	385
106	409	2004-07-23	15:50	71° 30.37	127° 05.69	370	380
107	409	2004-07-23	21:10	71° 30.60	127° 05.31	373	382
108	406	2004-07-24	09:04	71° 18.83	127° 42.75	168	178
109	406	2004-07-24	14:46	71° 18.25	127° 38.69	175	186
110	403	2007-07-25	04:22	71° 06.77	128° 18.46	47	56
111	400	2007-07-25	14:42	70° 55.04	128° 54.93	31	36
112	721	2007-07-27	02:57	69° 51.35	133° 17.14	10	14
113	715	2007-07-27	08:14	70° 25.88	133° 36.48	57	65
114	CA12	2007-07-27	22:27	71° 25.33	134° 12.25	1001	1230
115	CA05	2007-07-28	18:15	71° 25.06	127° 22.50	293	303
116	124	2007-07-28	20:57	71° 24.09	126° 46.41	425	434
117	CA05	2007-07-29	06:23	71° 24.78	127° 24.51	271	298
118	121	2007-07-29	09:18	71° 08.57	126° 23.01	370	392
119	118	2007-07-29	11:18	70° 56.48	125° 50.56	370	384
120	115	2007-07-29	14:23	70° 50.95	125° 02.81	350	355
121	112	2007-07-29	21:47	70° 45.32	124° 14.50	505	515
122	109	2004-07-30	00:00	70° 39.26	123° 21.93	558	568
123	CA18	2004-07-30	03:33	70° 38.21	123° 06.08	478	483
124	109	2004-07-30	05:15	70° 40.56	123° 24.69	560	564
125	109	2004-07-30	10:04	70° 41.20	123° 21.76	517	523
126	109	2004-07-30	14:09	70° 38.60	123° 26.23	560	569
127	CA18	2004-07-30	18:56	70° 38.73	123° 06.01	571	581
128	215	2004-07-31	04:34	70° 56.69	123° 31.37	361	365
129	215	2004-07-31	08:02	70° 58.44	123° 24.96	283	300
130	212	2004-07-31	11:03	70° 45.93	123° 52.71	443	447
131	212	2004-07-31	15:28	70° 42.79	123° 55.83	440	450
132	209	2004-07-31	23:38	70° 32.35	124° 22.01	232	241
133	206	2004-08-01	09:06	70° 19.24	124° 50.31	83	90
134	206	2004-08-01	12:31	70° 19.22	124° 50.67	85	95
135	206	2004-08-01	18:58	70° 19.32	124° 50.41	87	96
136	203	2004-08-01	23:55	70° 07.81	125° 30.65	99	107
137	311	2004-08-02	18:39	71° 17.35	125° 26.52	349	359

APPENDIX 3.10 Rosette cast locations, sampling time, water depth and corresponding station or mooring numbers. CASES Leg 9, Expedition 0406 (2004).

Cast number	Station or mooring	Start date UTC	Start time UTC	Latitude (North)	Longitude (West)	Cast depth (m)	Sea bottom depth (m)
001	200	2004-08-06	06:10	70°03.87	126°18.06	230	242
002	200	2004-08-06	10 :19	70°02.66	126°17.18	226	236
003	200	2004-08-06	12 :13	70°02.39	126°16.74	225	237
004	200	2004-08-06	14 :40	70°02.50	126°15.61	221	238
005	200	2004-08-06	20:09	70°01.61	126°14.19	217	225
006	200	2004-08-07	02 :21	70°02.43	126°10.65	221	232
007	200	2004-08-07	09 :50	70°02.00	126°18.00	222	236
008	200	2004-08-07	11:52	70°02.72	126°17.56	225	238
009	124	2004-08-08	02:40	71°24.22	126°47.80	417	426
010	124	2004-08-08	07:34	71°23.78	126°40.65	436	446
011	118	2004-08-08	18:08	70°56.40	125°51.14	372	380
012	118	2004-08-09	00:19	70°56.45	125°51.03	378	386
013	112	2004-08-09	08:02	70°45.29	124°14.32	500	513
014	112	2004-08-09	13:33	70°45.20	124°14.40	491	508
015	106	2004-08-09	23:10	70°36.07	122°37.99	527	537
016	106	2004-08-10	03:06	70°38.34	122°08.72	524	534
017	106	2004-08-10	10 :32	70°36.02	122°37.90	530	541
018	106	2004-08-10	12 :49	70°36.06	122°37.22	532	542
019	106	2004-08-10	16 :42	70°35.67	122°36.75	535	544
020	106	2004-08-10	21 :42	70°35.97	122°37.37	532	541
021	2	2004-08-12	08 :47	69°00.03	106°35.00	103	113
022	7	2004-08-18	08:04	74°17.22	085°35.22	524	534
023	7	2004-08-18	19:18	74°13.51	083°20.57	692	702
024	9	2004-08-18	23:00	74°09.58	081°14.56	758	764

APPENDIX 4. Ice-CTD data logbook (over-wintering station Winter 1).

APPENDIX 4.1 Ice-CTD casts sampling date and time, water depth and corresponding station. CASES Leg 3 (0305), 4 (0401) and 5 (0402).

Leg 0305

Station or mooring	Start date UTC	Start time UTC	Cast depth (m)
Dukuduku	2003-12-14	20:29	220
Dukuduku	2003-12-17	21:00	12
Dukuduku	2003-12-20	20:00	24
Dukuduku	2003-12-20	13:39	230
Dukuduku	2003-12-26	13:15	232
Dukuduku	2003-12-23	20:35	26
Dukuduku	2003-12-29	19:57	29
Dukuduku	2004-01-04	13:35	233

Leg 0401

Station or mooring	Start date UTC	Start time UTC	Cast depth (m)
Dukuduku	2004-01-29	14:35	20
Dukuduku	2004-02-14	15:38	233

Leg 0402

Station or mooring	Start date UTC	Start time UTC	Cast depth (m)
Angaguk	2004-03-05	16:00	100
Angaguk	2004-03-08	15:00	107
Angaguk	2004-03-09	11:15	106
Angaguk	2004-03-12	11:17	106
Dukuduku	2004-02-21	09:37	109
Dukuduku	2004-02-29	11:40	229
Dukuduku	2004-03-07	14:00	227
Takatuk	2004-02-22	16:53	-2
Takatuk	2004-02-24	14:47	150
Takatuk	2004-03-05	09:40	150
Takatuk	2004-03-08	13:50	150

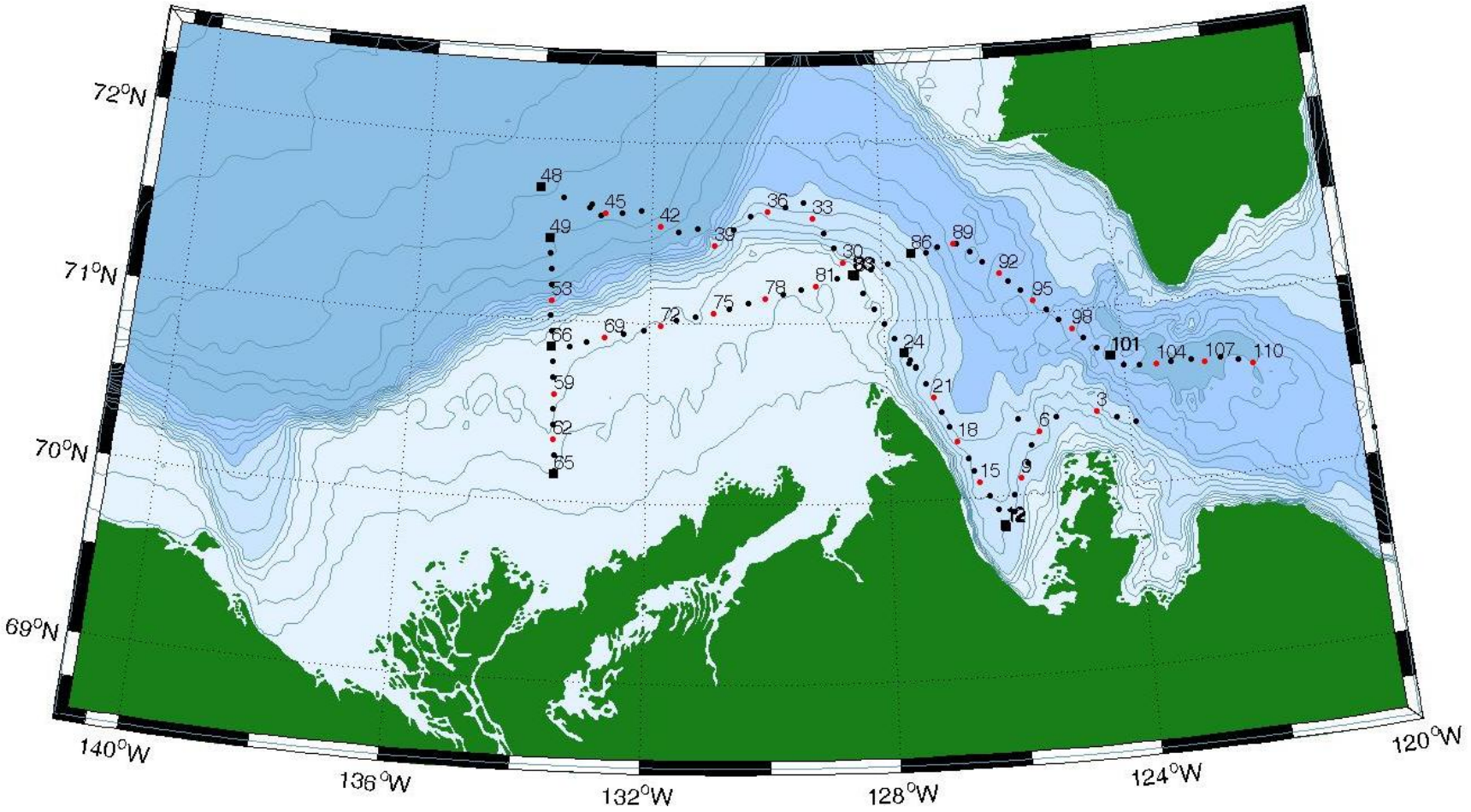
APPENDIX 4.2 Ice-CTD casts sampling date and time, water depth and corresponding station. CASES Leg 7 (0404).

Leg 0404

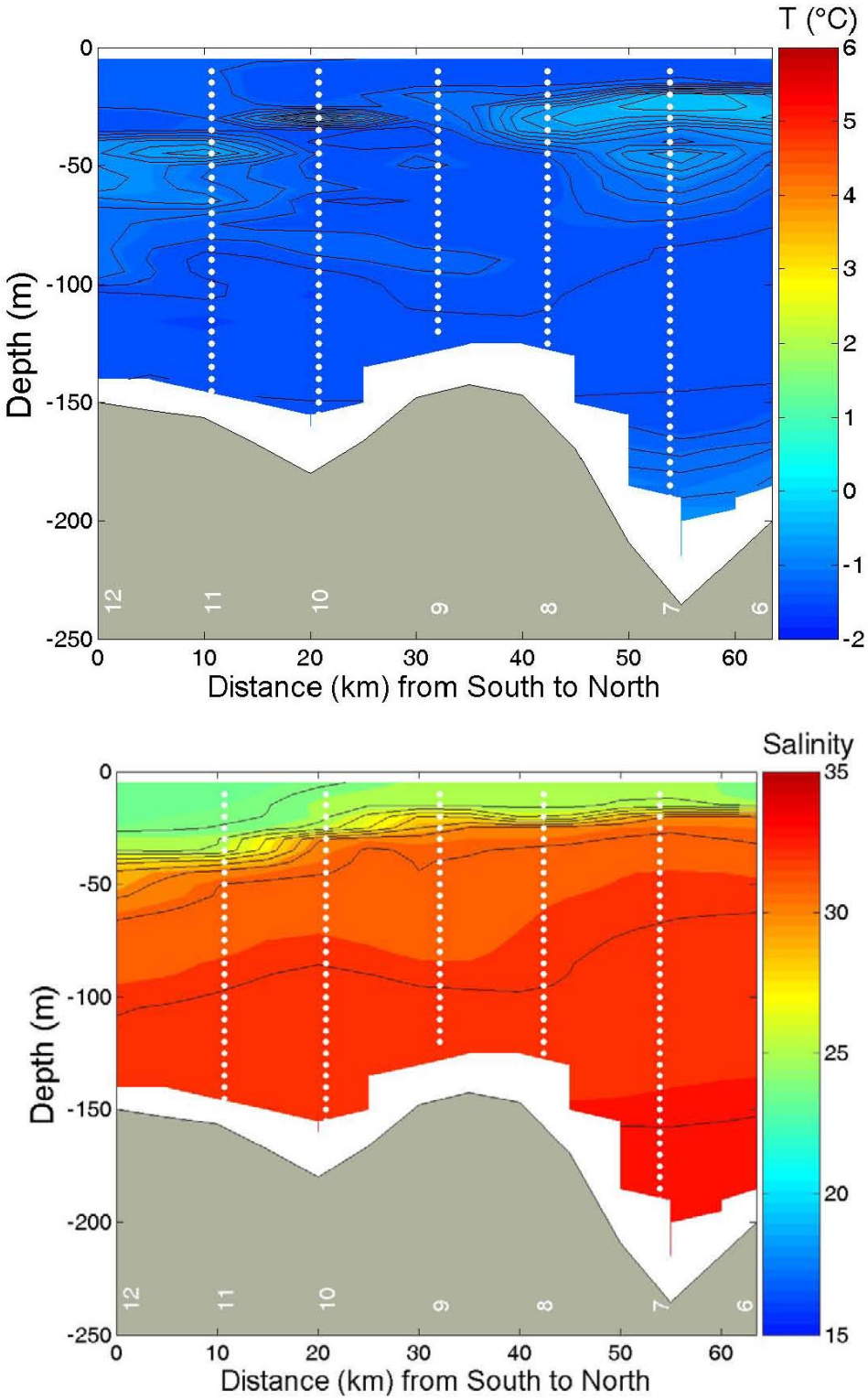
Station or mooring	Start date UTC	Start time UTC	Cast depth (m)
Dukuduku	2004-05-24	10:54	15
Dukuduku	2004-05-24	10:57	37
Dukuduku	2004-05-24	11:00	38
Dukuduku	2004-05-26	13:50	25
Dukuduku	2004-05-26	14:25	45
Dukuduku	2004-05-26	14:46	41
Dukuduku	2004-05-26	15:20	7
Dukuduku	2004-05-26	15:33	0
Dukuduku	2004-05-26	15:34	67
Dukuduku	2004-05-26	15:54	65
Dukuduku	2004-06-06	14:22	62
Dukuduku	2004-06-06	14:35	62
Dukuduku	2004-06-06	14:45	58
Dukuduku	2004-06-06	14:56	63
Dukuduku	2004-06-06	15:03	60
Titicaca	2004-05-16	11:00	0
Titicaca	2004-05-19	08:57	8
River 1	2004-05-27	20:01	16
River 1	2004-05-27	21:38	80
River 1	2004-05-27	22:31	108
River 1	2004-05-27	23:30	138
River 1	2004-05-28	00:42	192

APPENDIX 5. Sections of salinity and potential temperature from CASES Rosette data. Leg 0 (September-October 2002).

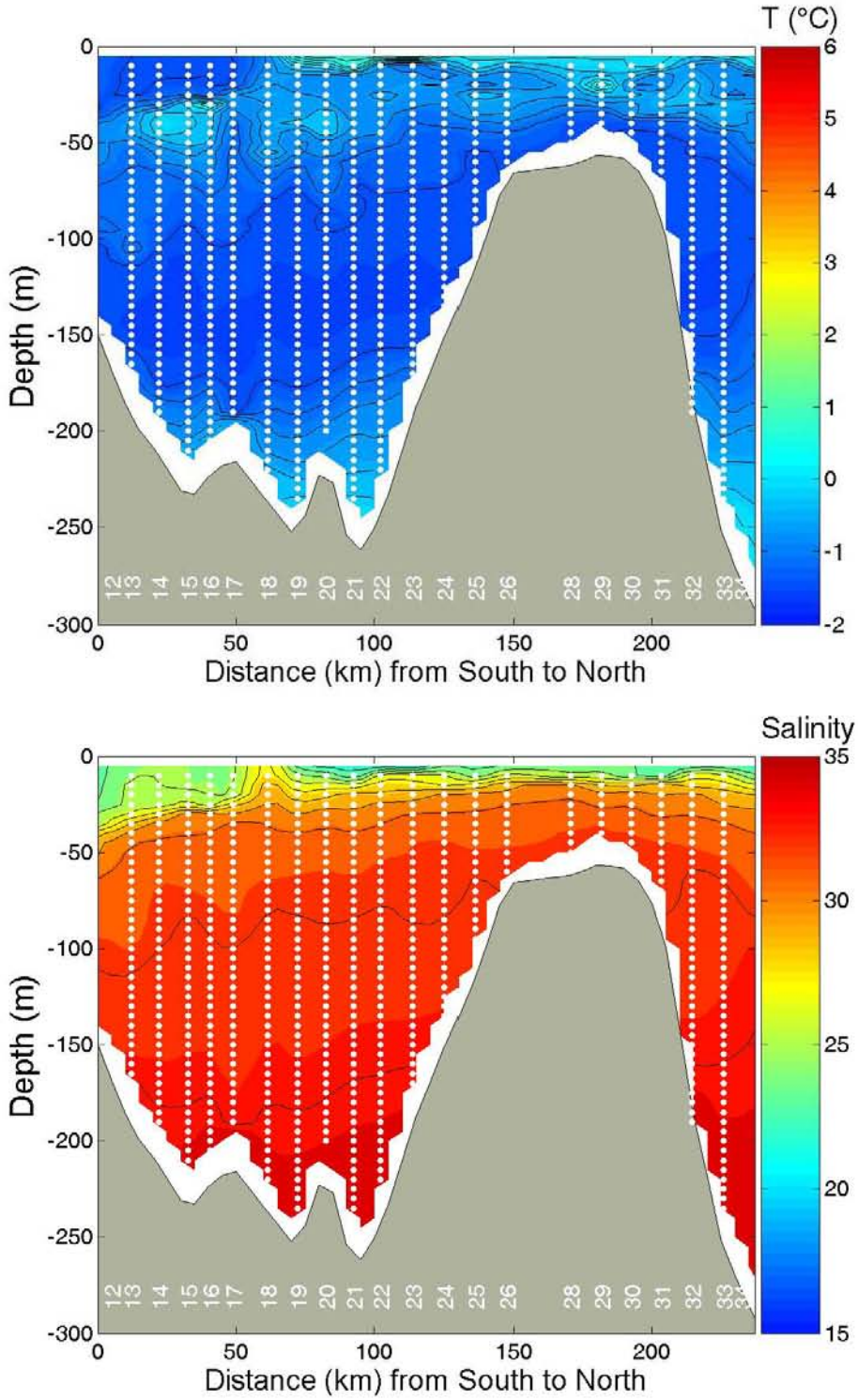
The same color scale is used for all sections.



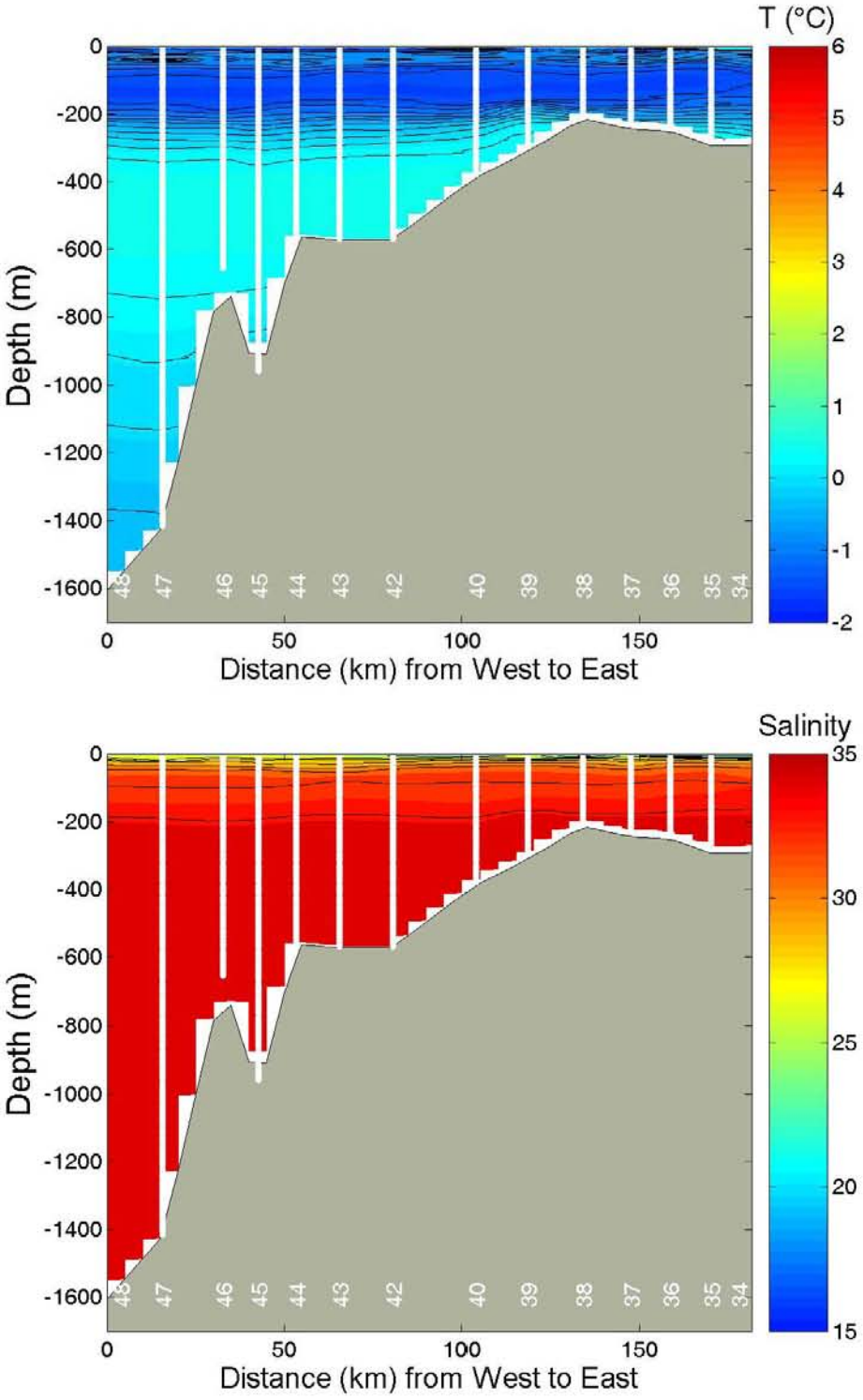
APPENDIX 5.1 Rosette sampling stations for Leg 0 (September-October 2002).



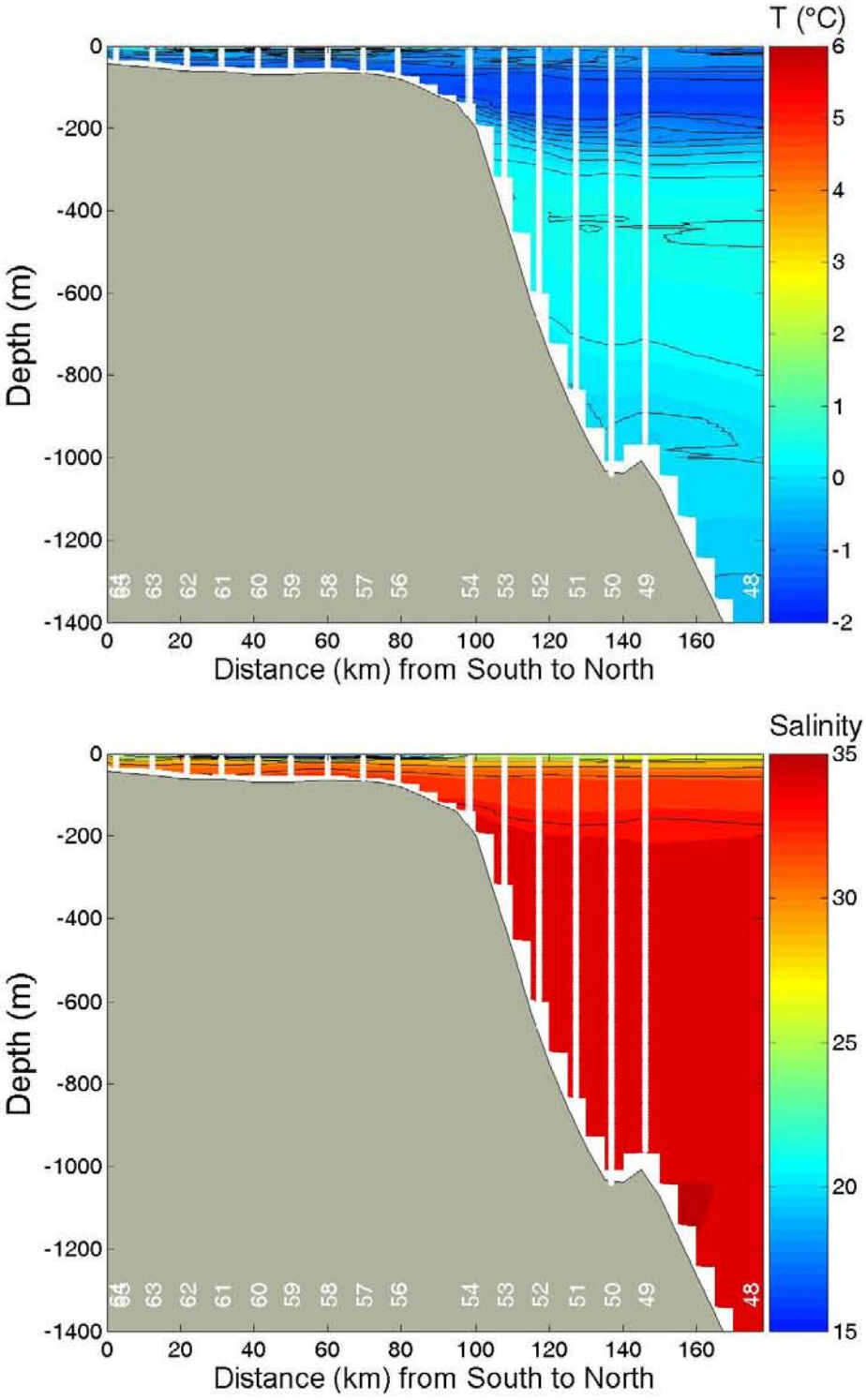
APPENDIX 5.2 Potential temperature and salinity between stations 12 and 6, Leg 0. South-West is on the left and North-East is on the right.



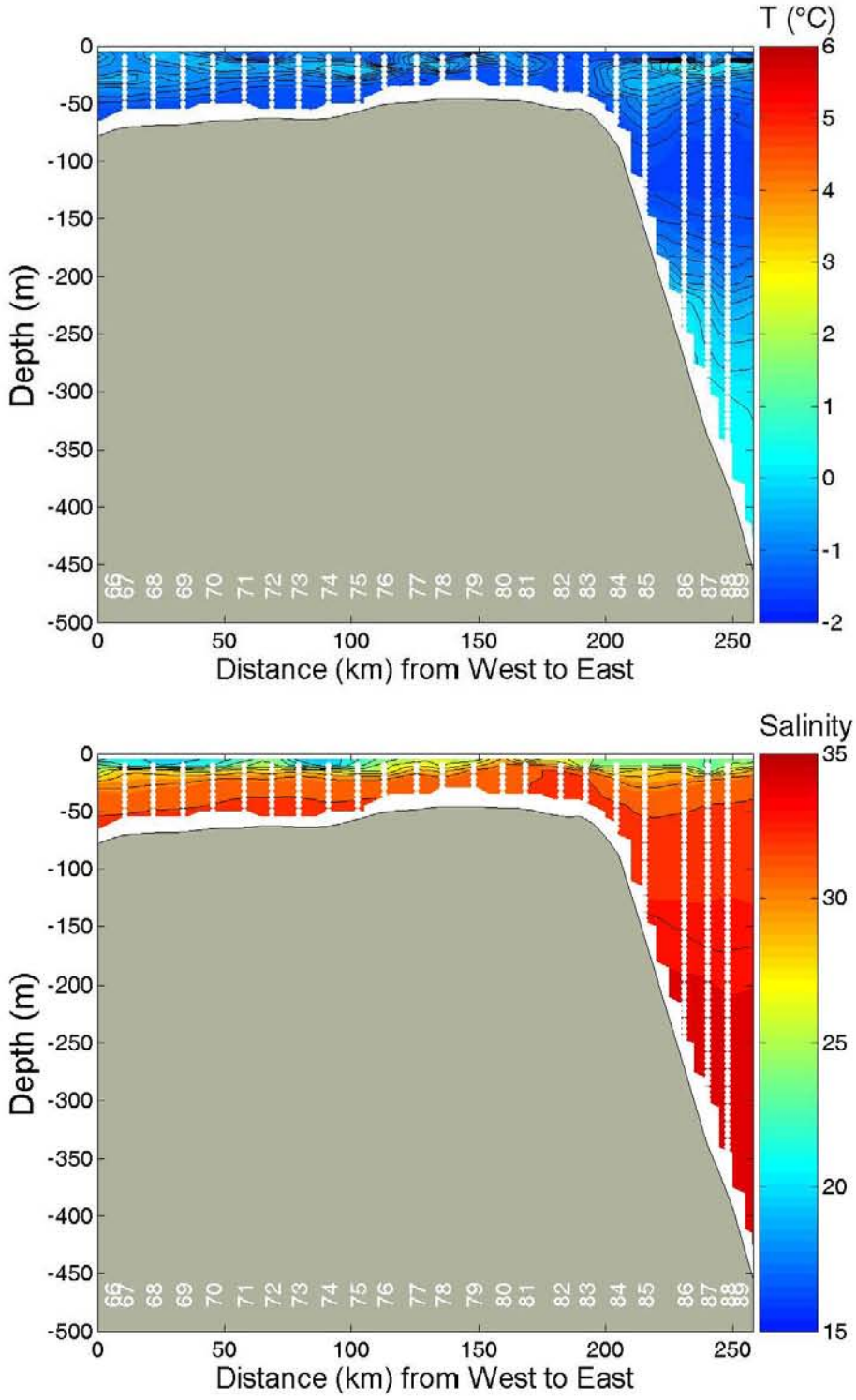
APPENDIX 5.3 Potential temperature and salinity between stations 12 and 34, Leg 0. South-East is on the left and North-West is on the right.



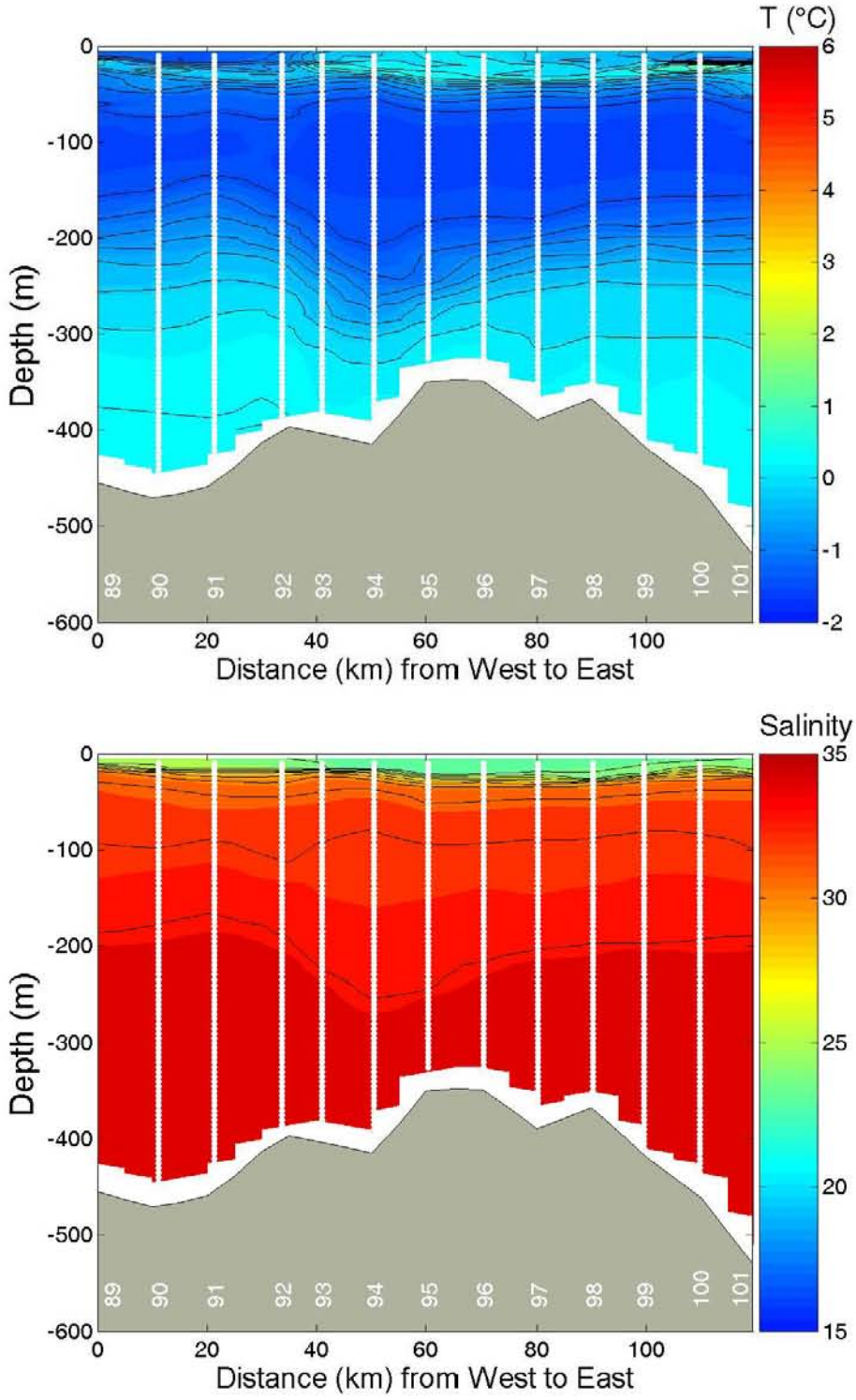
APPENDIX 5.4 Potential temperature and salinity between stations 48 and 34, Leg 0. West is on the left and East is on the right.



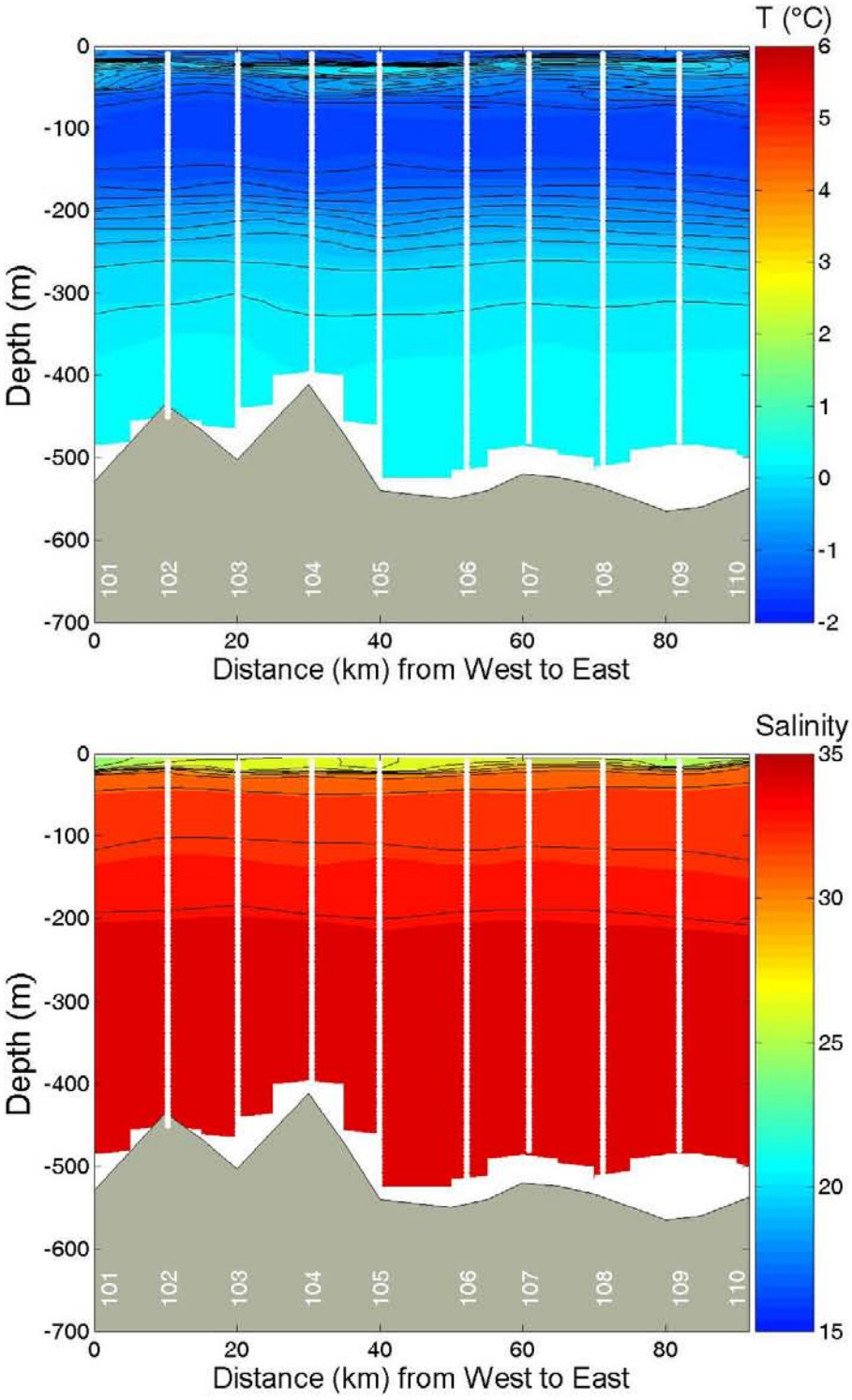
APPENDIX 5.5 Potential temperature and salinity between stations 65 and 48, Leg 0. South is on the left and North is on the right.



APPENDIX 5.6 Potential temperature and salinity between stations 66 and 89, Leg 0. West is on the left and East is on the right.



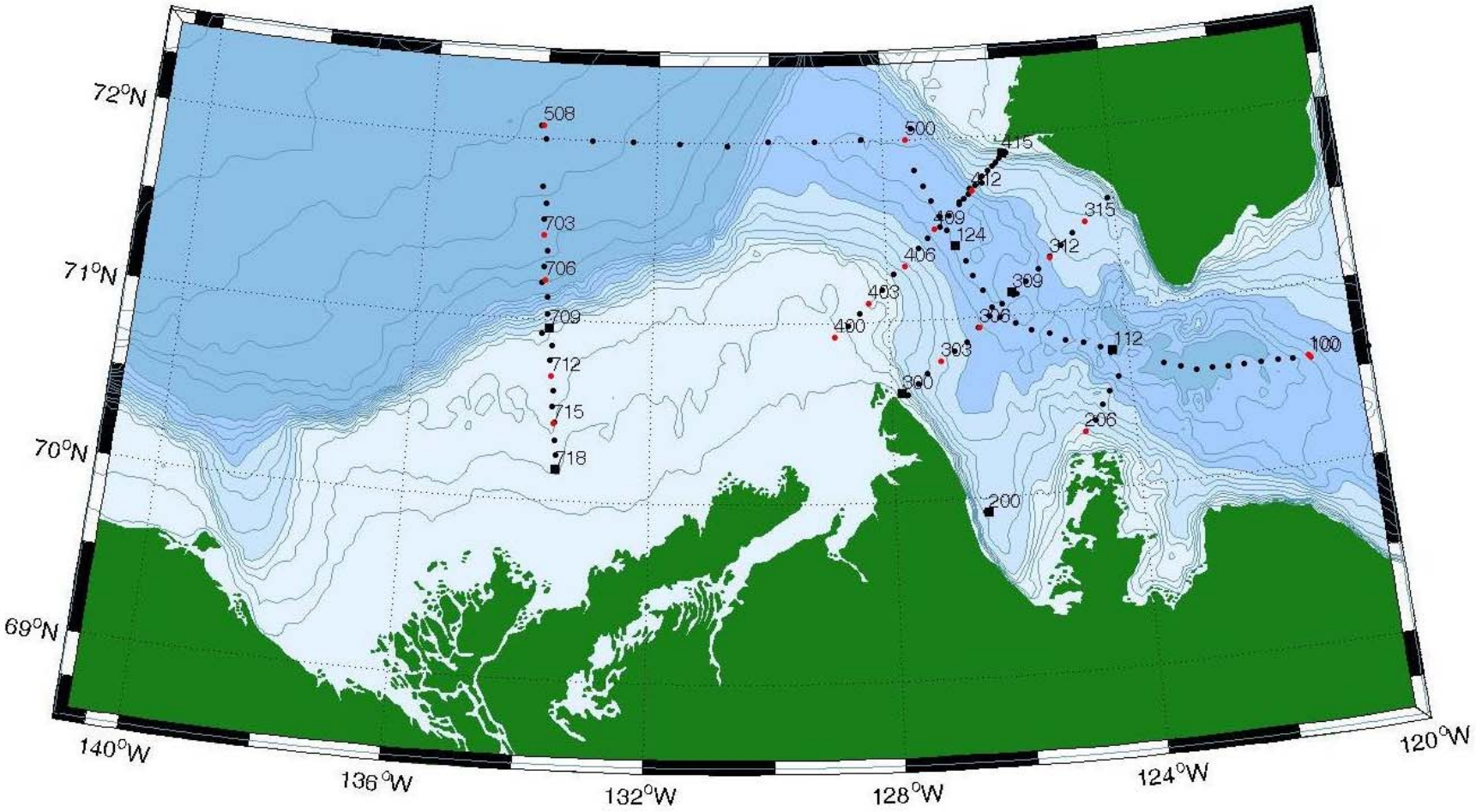
APPENDIX 5.7 Potential temperature and salinity between stations 89 and 101, Leg 0. North-West is on the left and South-East is on the right.



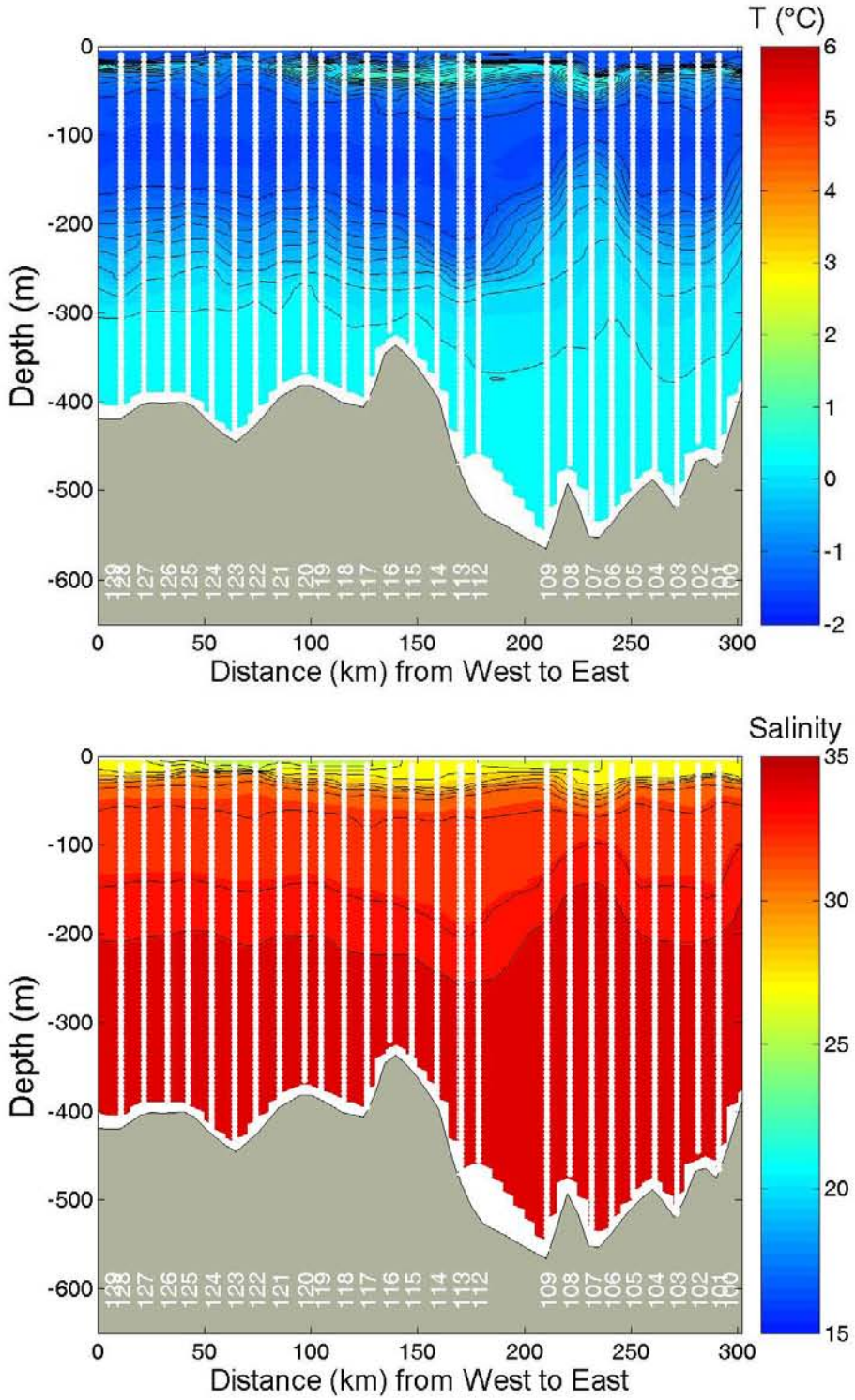
APPENDIX 5.8 Potential temperature and salinity between stations 101 and 110, Leg 0. West is on the left and East is on the right.

APPENDIX 6. Sections of salinity and potential temperature from CASES Rosette data. Leg 2 (October-November 2003).

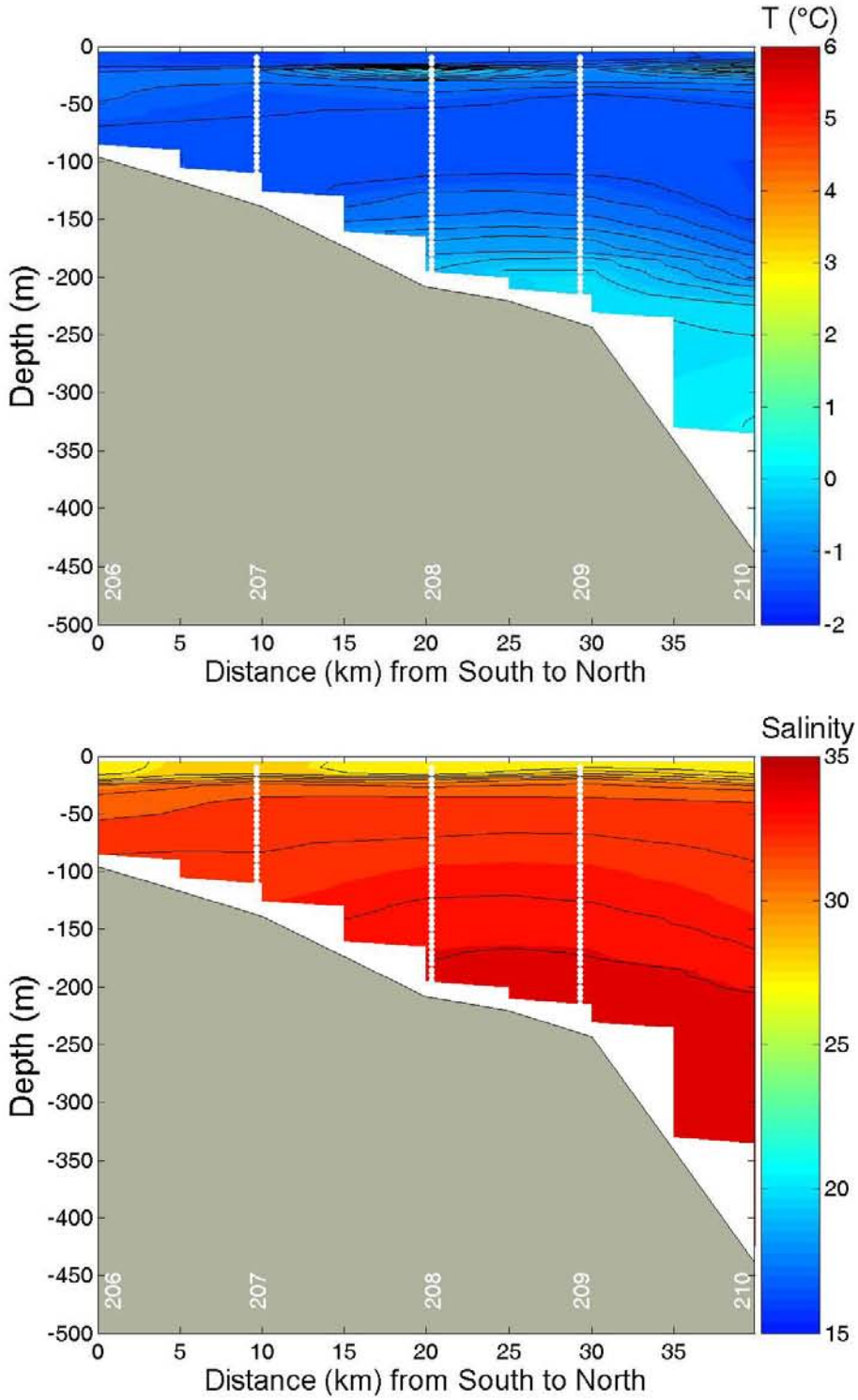
The same color scale is used for all sections.



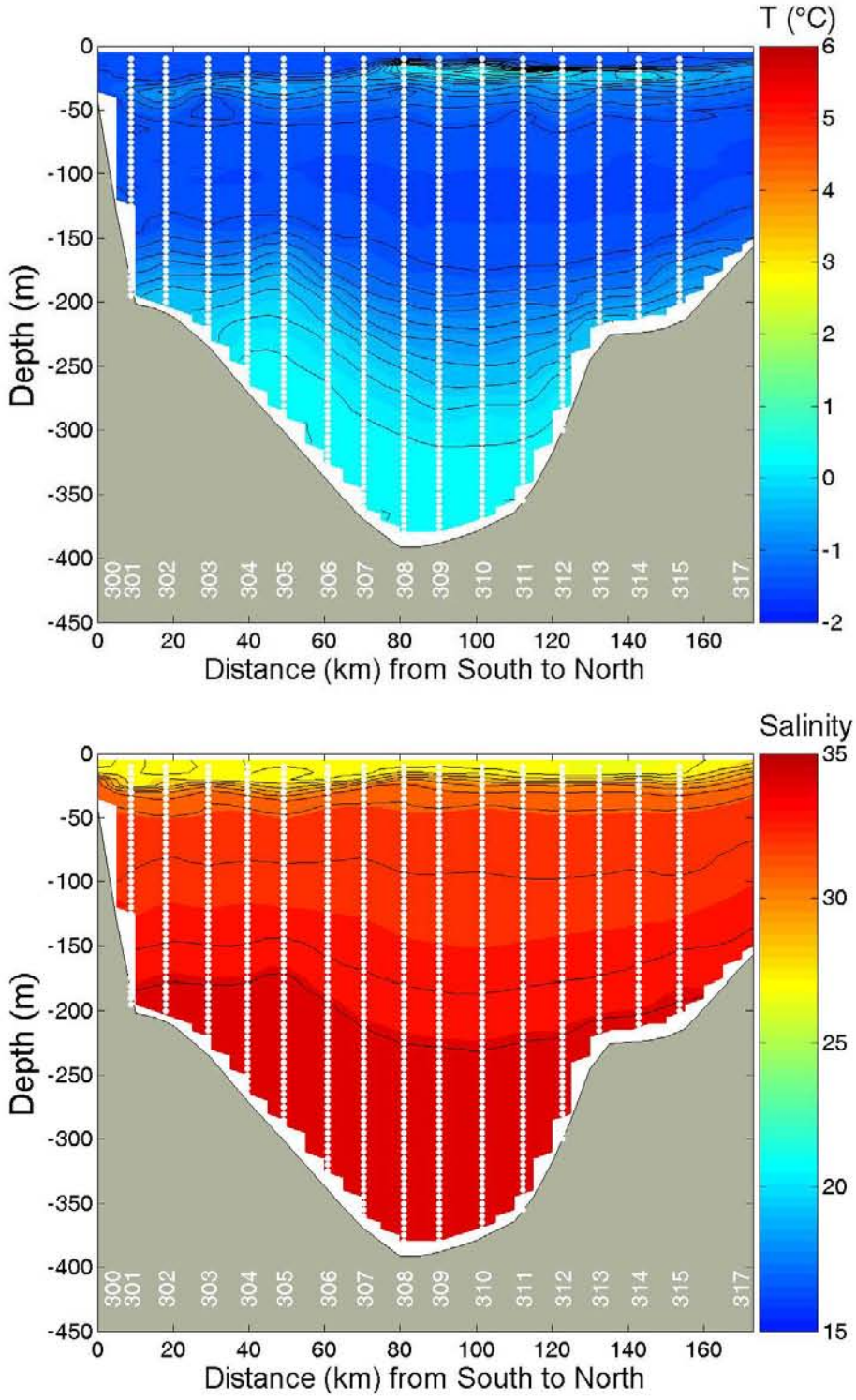
APPENDIX 6.1 Rosette sampling stations for Leg 2 (October-November 2003).



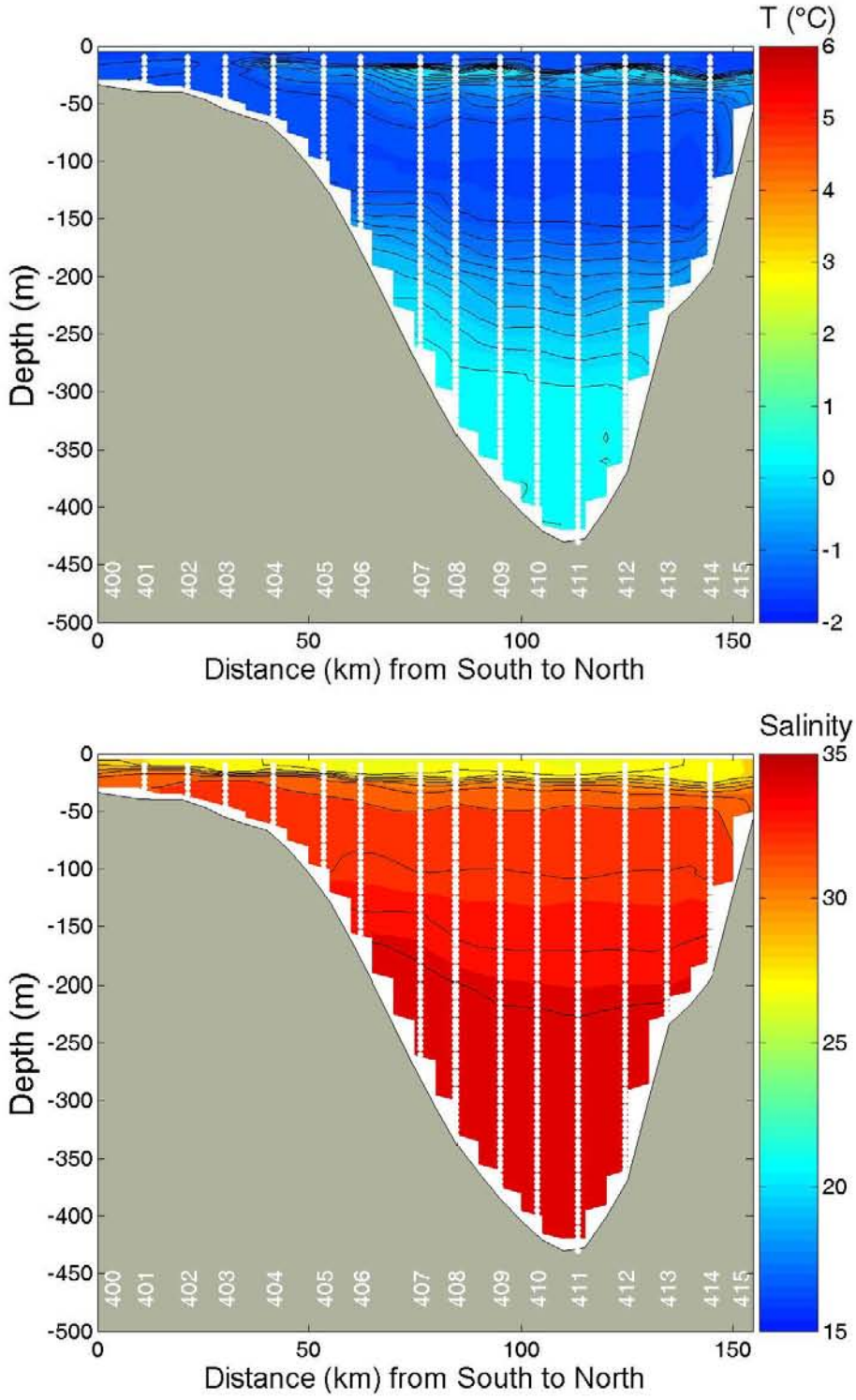
APPENDIX 6.2 Potential temperature and salinity along section 100, Leg 2. North-West is on the left and South-East is on the right.



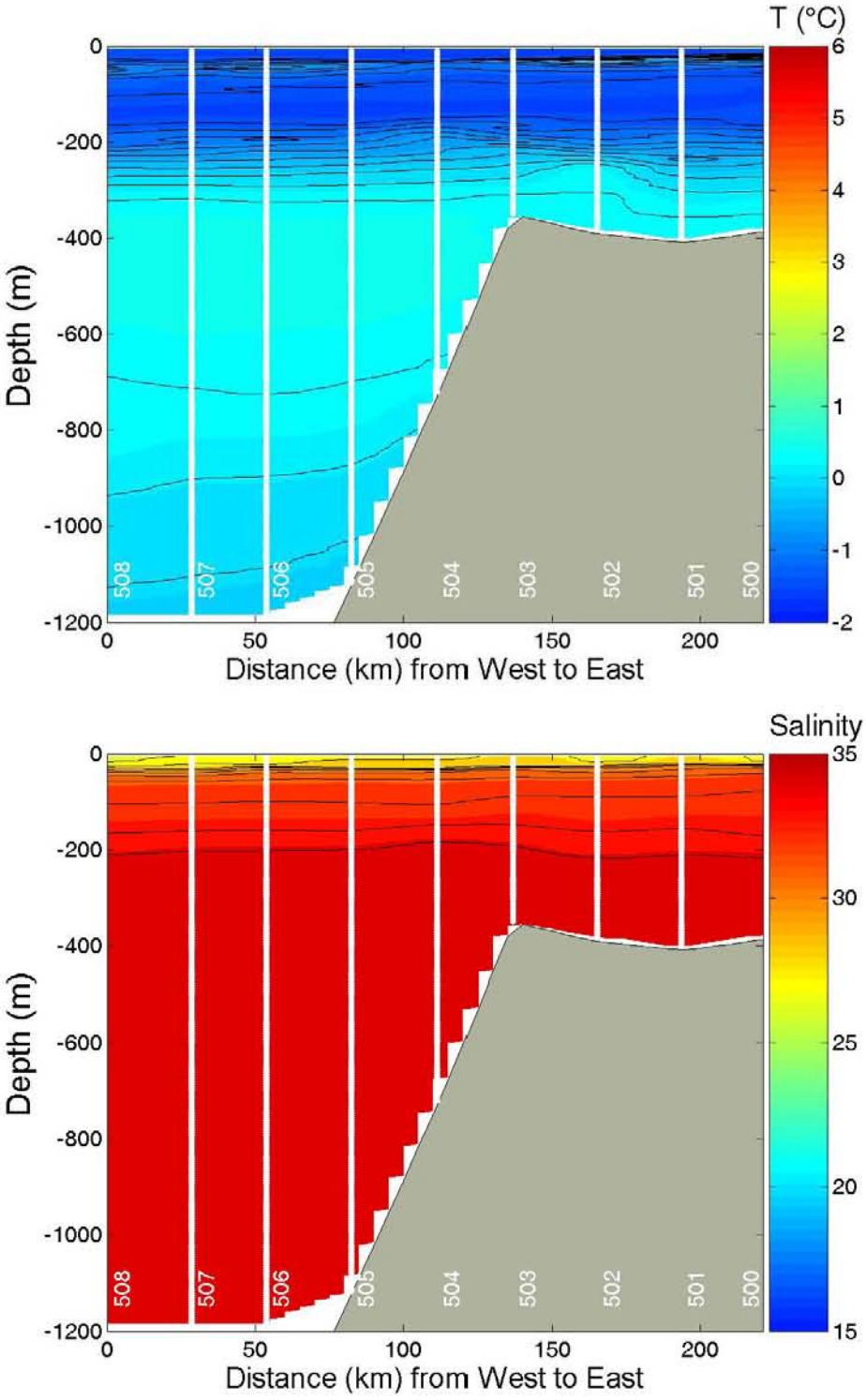
APPENDIX 6.3 Potential temperature and salinity along section 200, Leg 2. South-West is on the left and North-East is on the right.



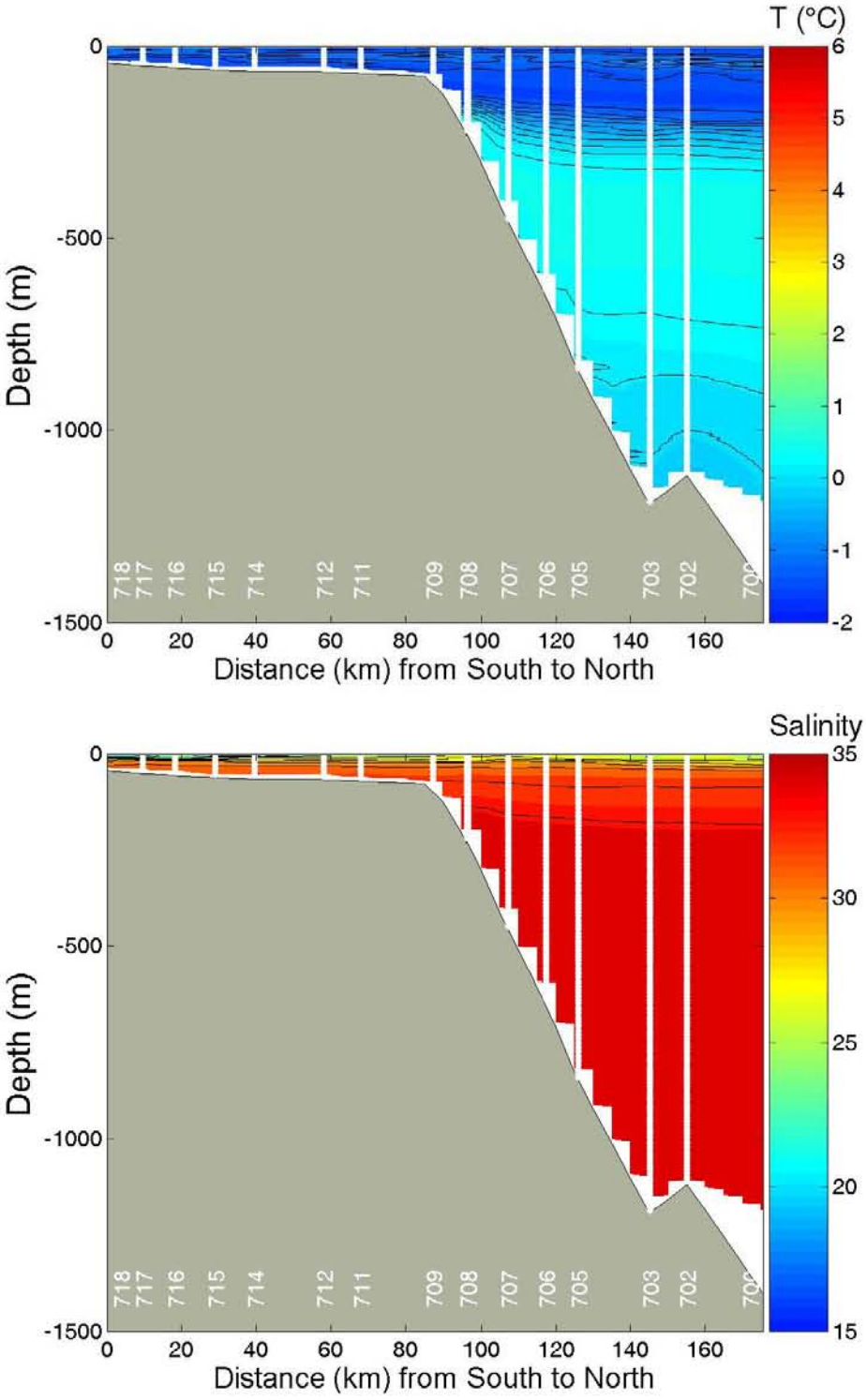
APPENDIX 6.4 Potential temperature and salinity along section 300, Leg 2. South-West is on the left and North-East is on the right.



APPENDIX 6.5 Potential temperature and salinity along section 400, Leg 2. South-West is on the left and North-East is on the right.



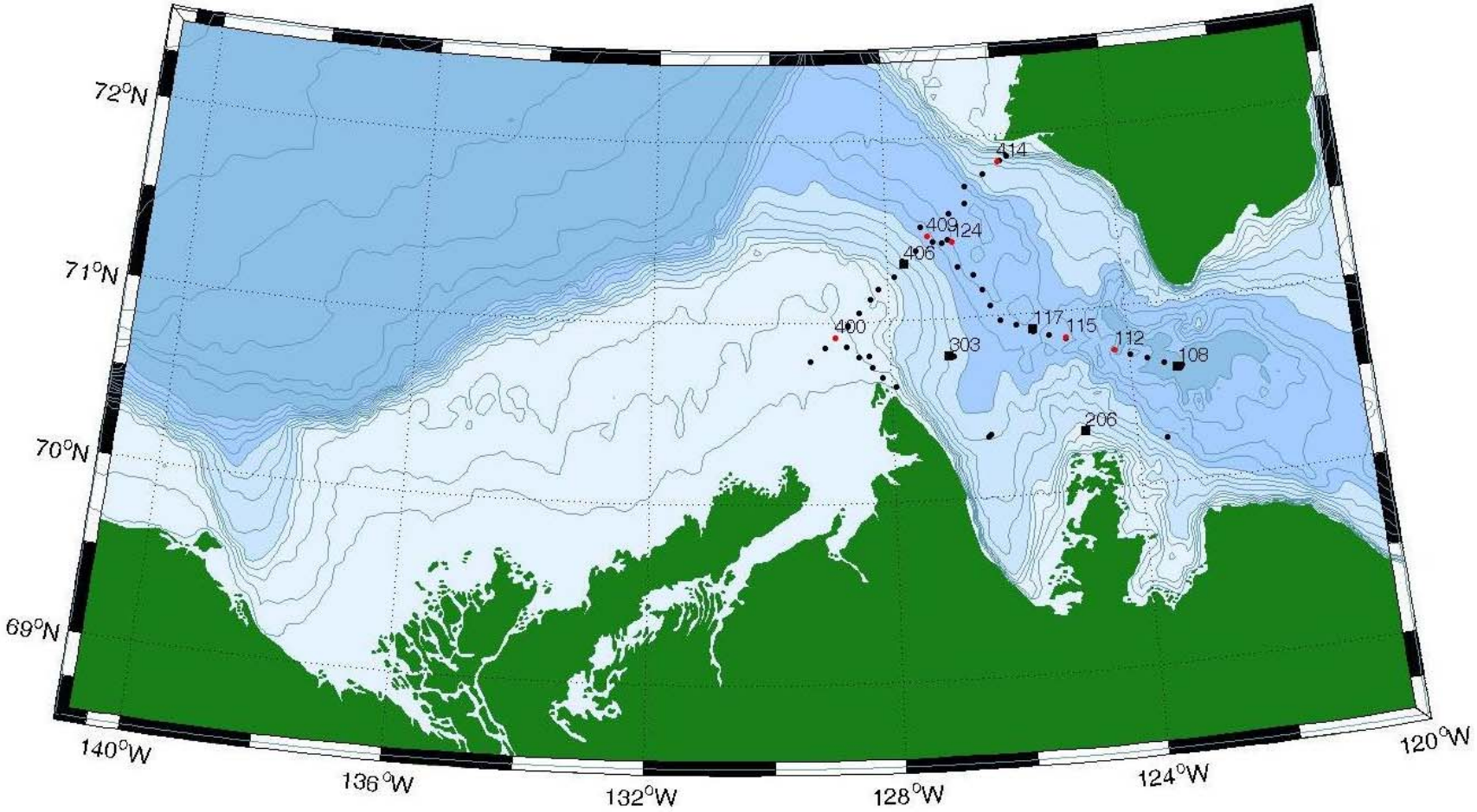
APPENDIX 6.6 Potential temperature and salinity along section 500, Leg 2. West is on the left and East is on the right.



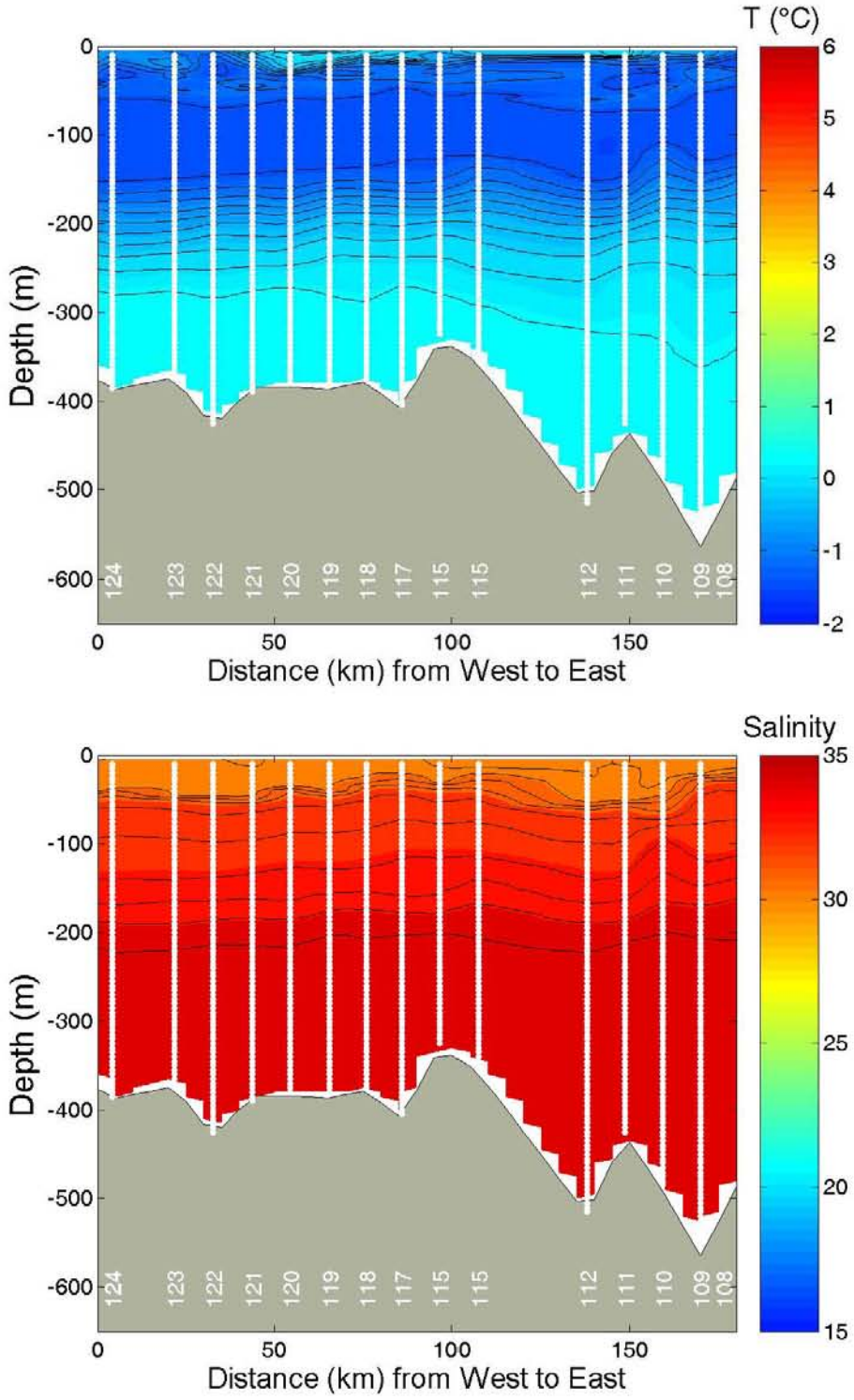
APPENDIX 6.7 Potential temperature and salinity along section 700, Leg 2. South is on the left and North is on the right.

APPENDIX 7. Sections of salinity and potential temperature from CASES Rosette data. Leg 7 (May-June 2004).

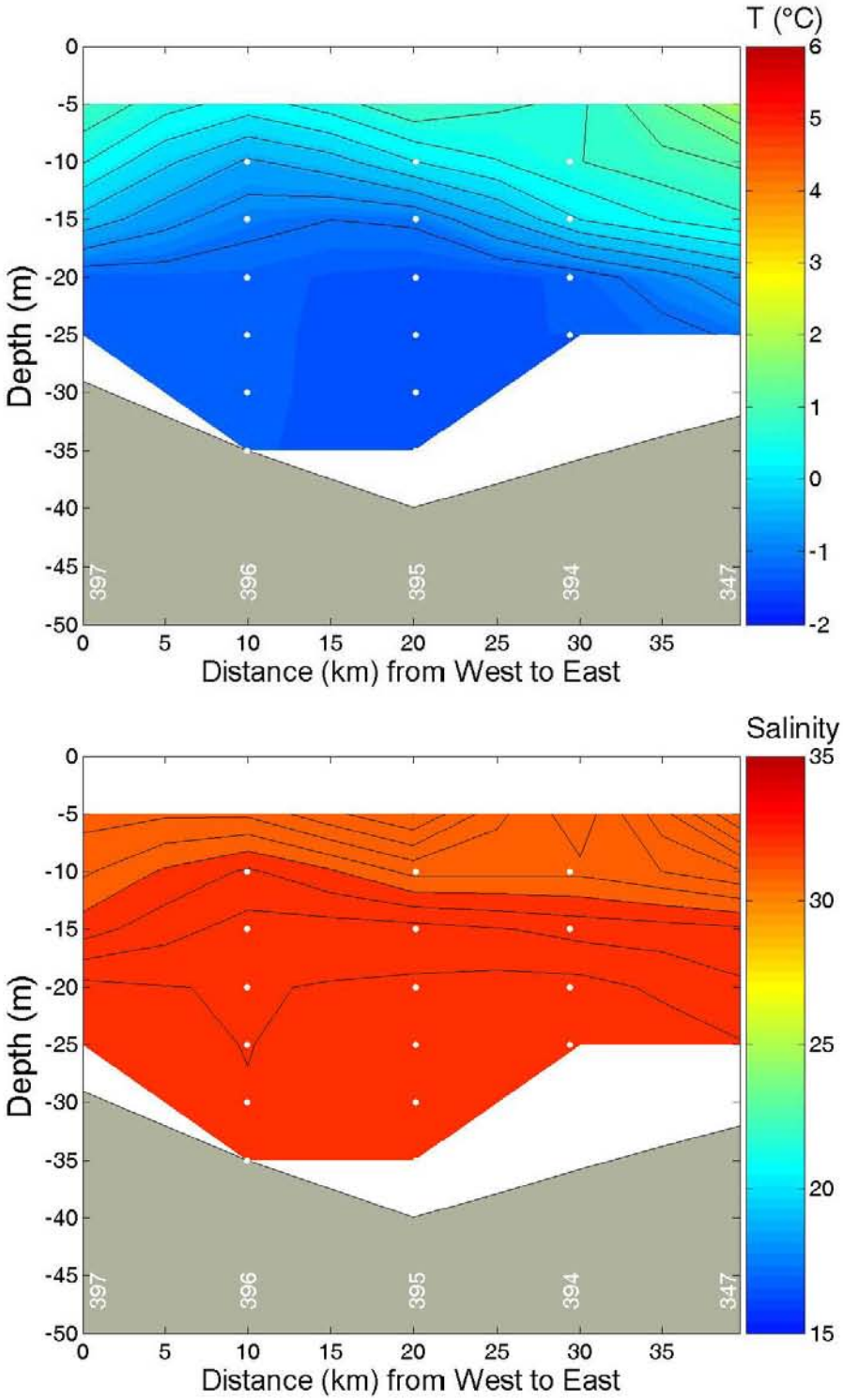
The same color scale is used for all sections.



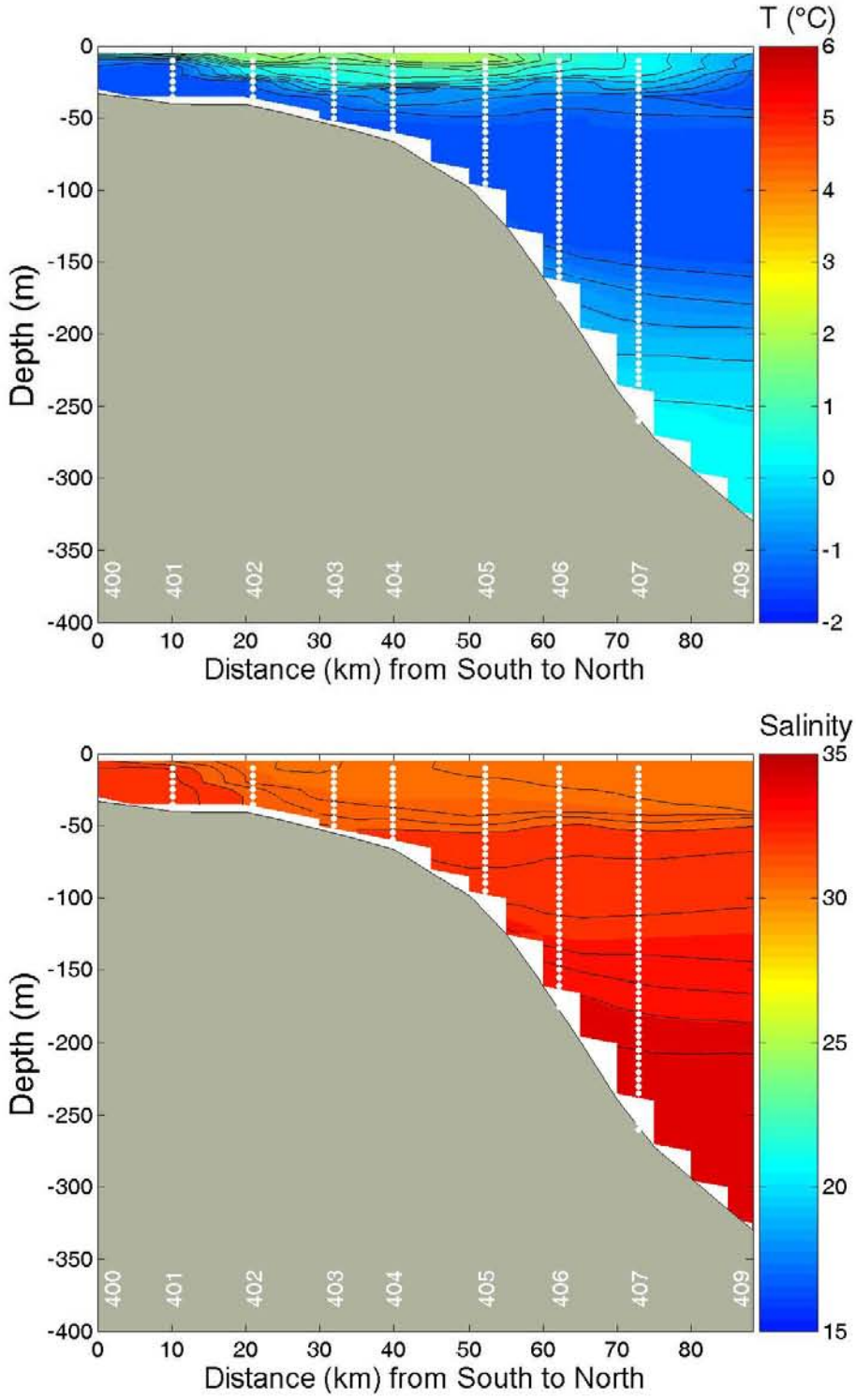
APPENDIX 7.1 Rosette sampling stations for Leg 7 (May-June 2004).



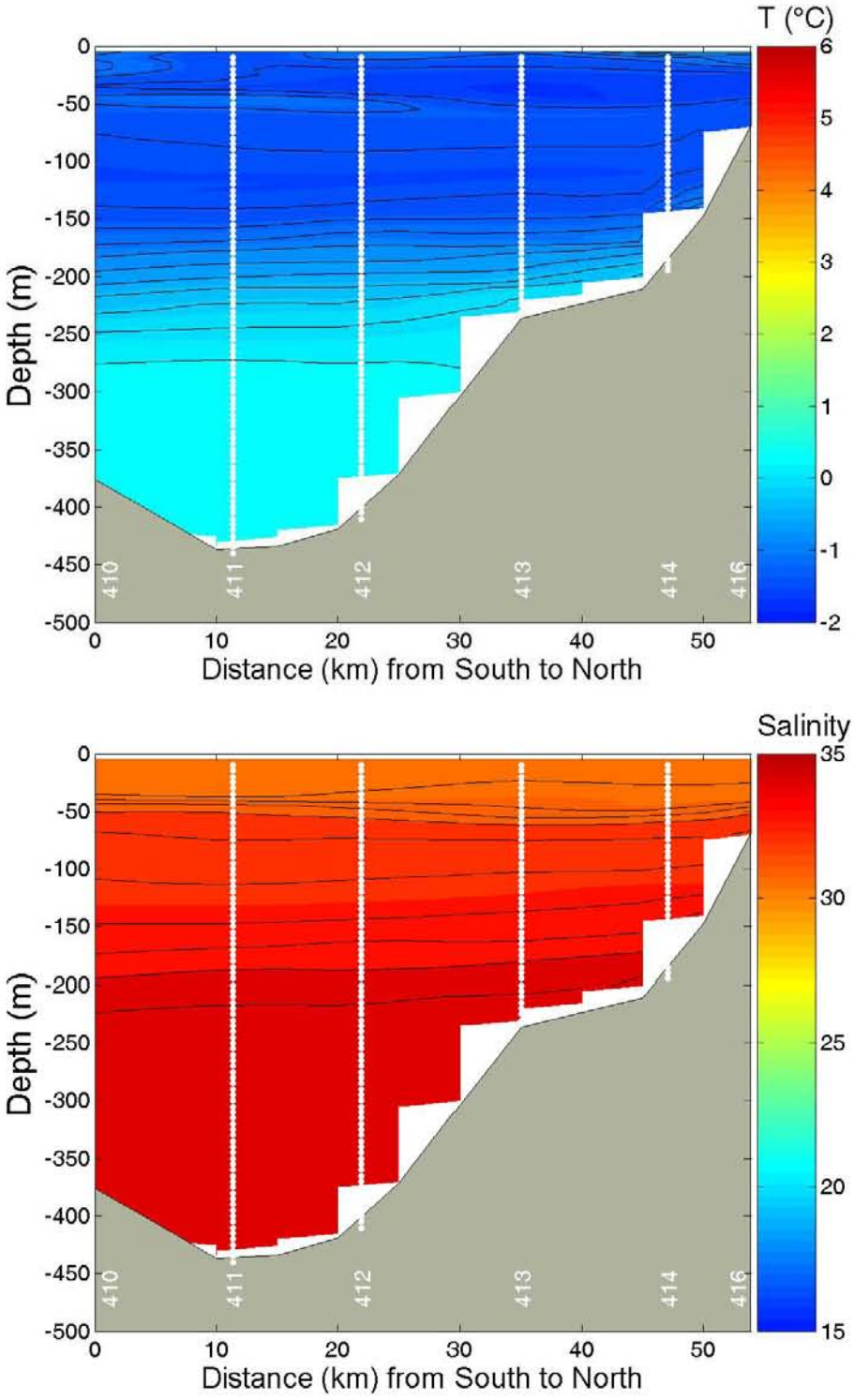
APPENDIX 7.2 Potential temperature and salinity along section 100 Leg 7. West is on the left and East is on the right.



APPENDIX 7.3 Potential temperature and salinity along section 300, Leg 7. North-West is on the left and South-East is on the right.



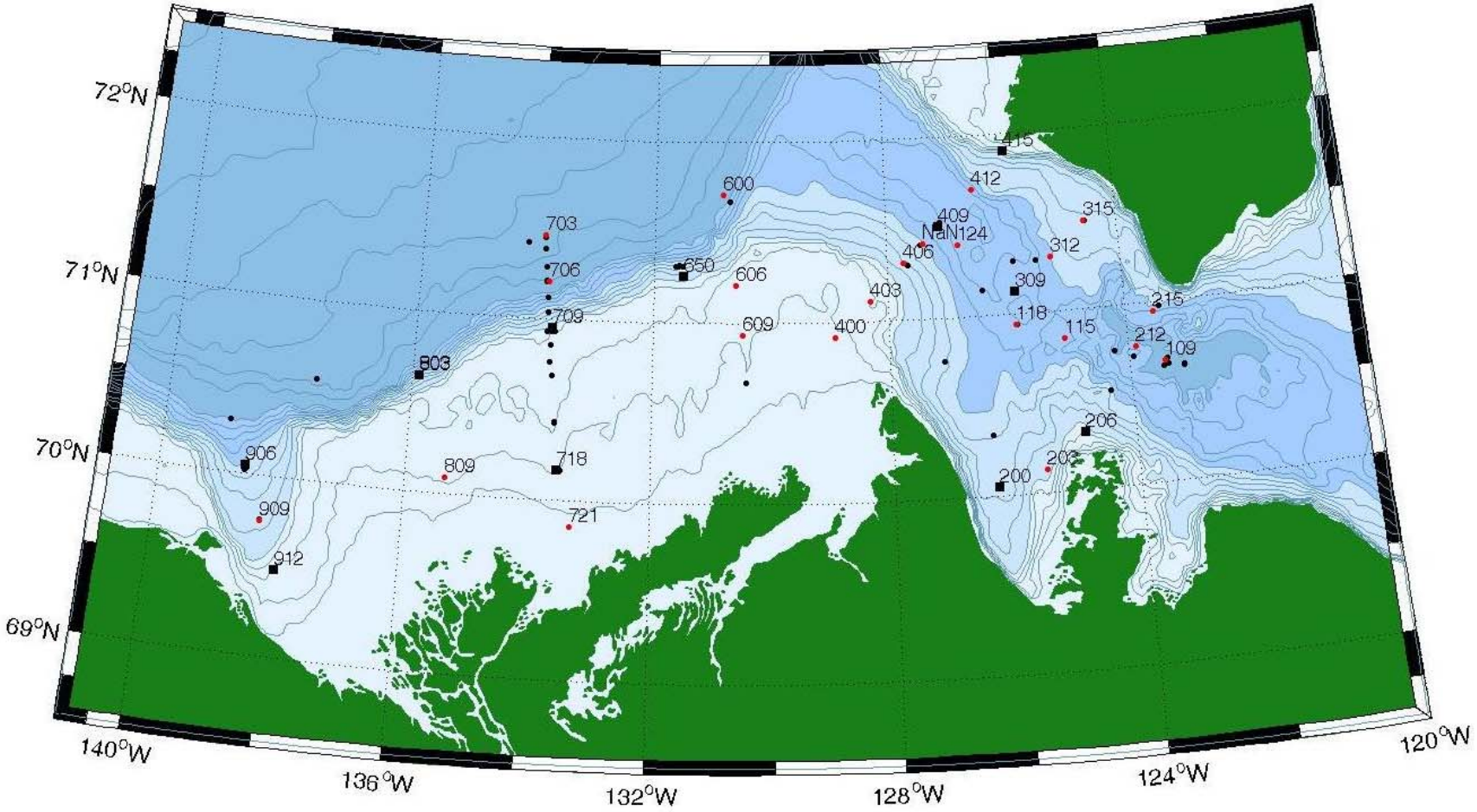
APPENDIX 7.4 Potential temperature and salinity along western part of section 400, Leg 7. South-West is on the left and North-East is on the right.



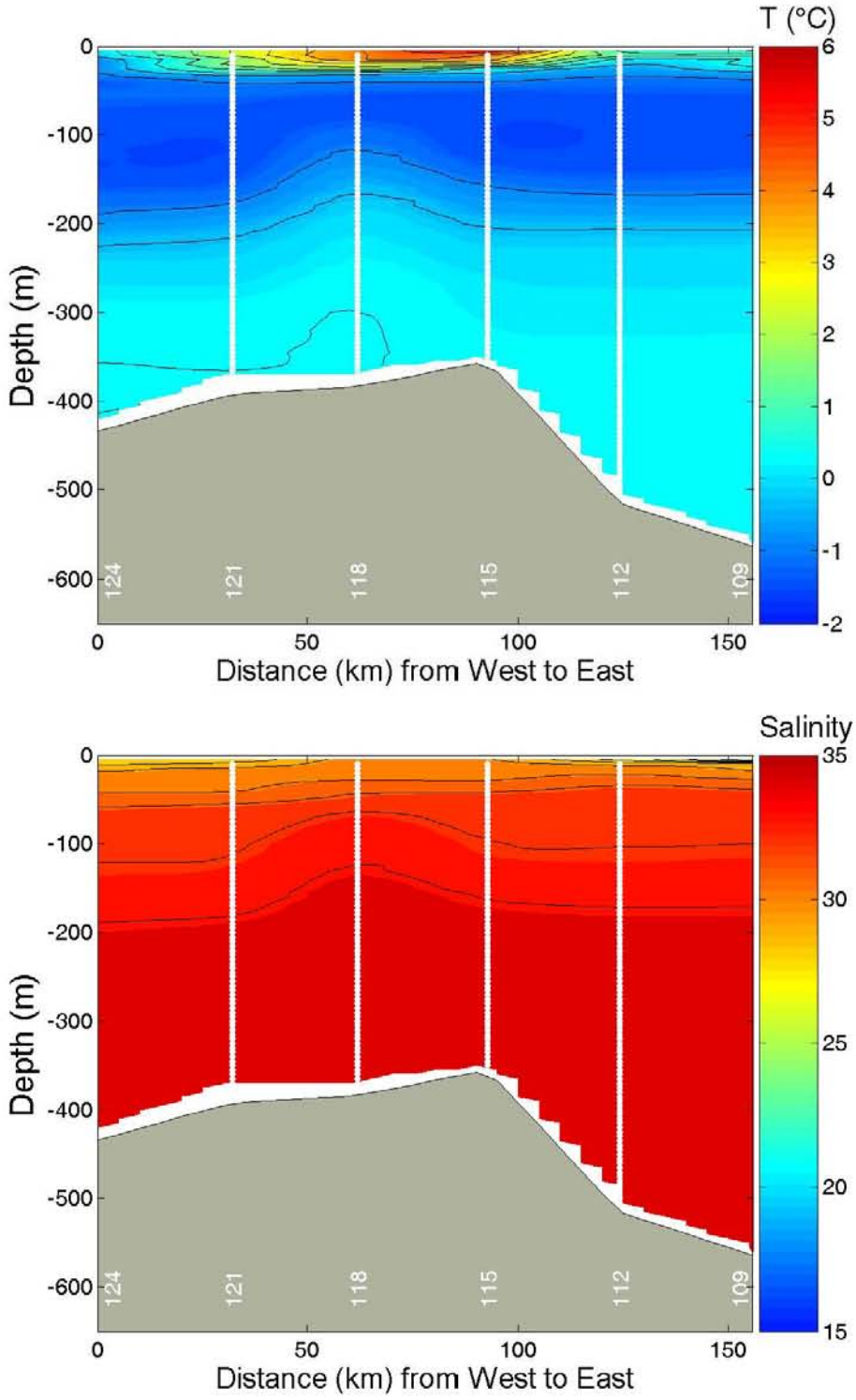
APPENDIX 7.5 Potential temperature and salinity along eastern part of section 400, Leg 7. South-West is on the left and North-East is on the right.

APPENDIX 8. Sections of salinity and potential temperature from CASES Rosette data. Leg 8 (June-July 2004).

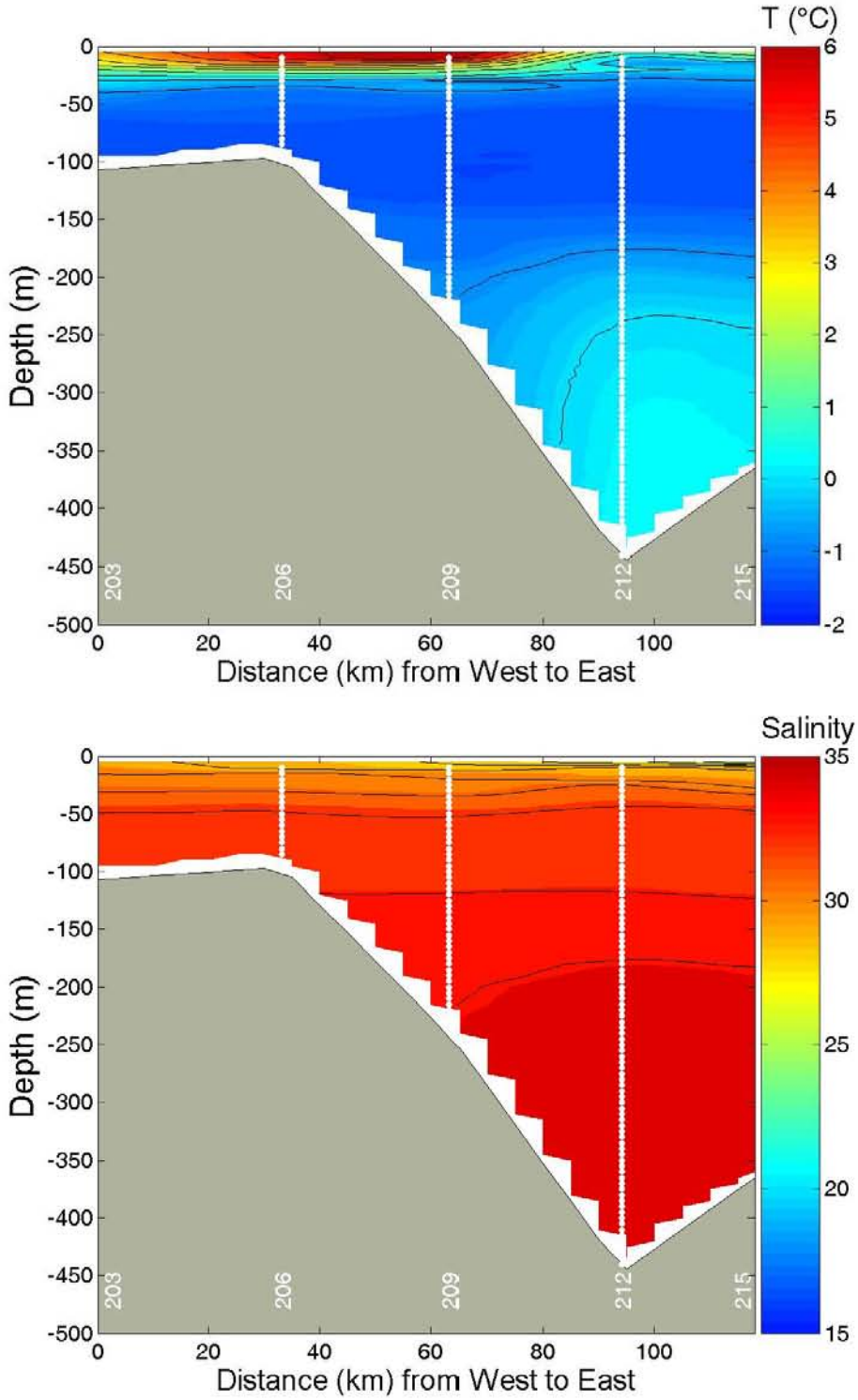
The same color scale is used for all sections.



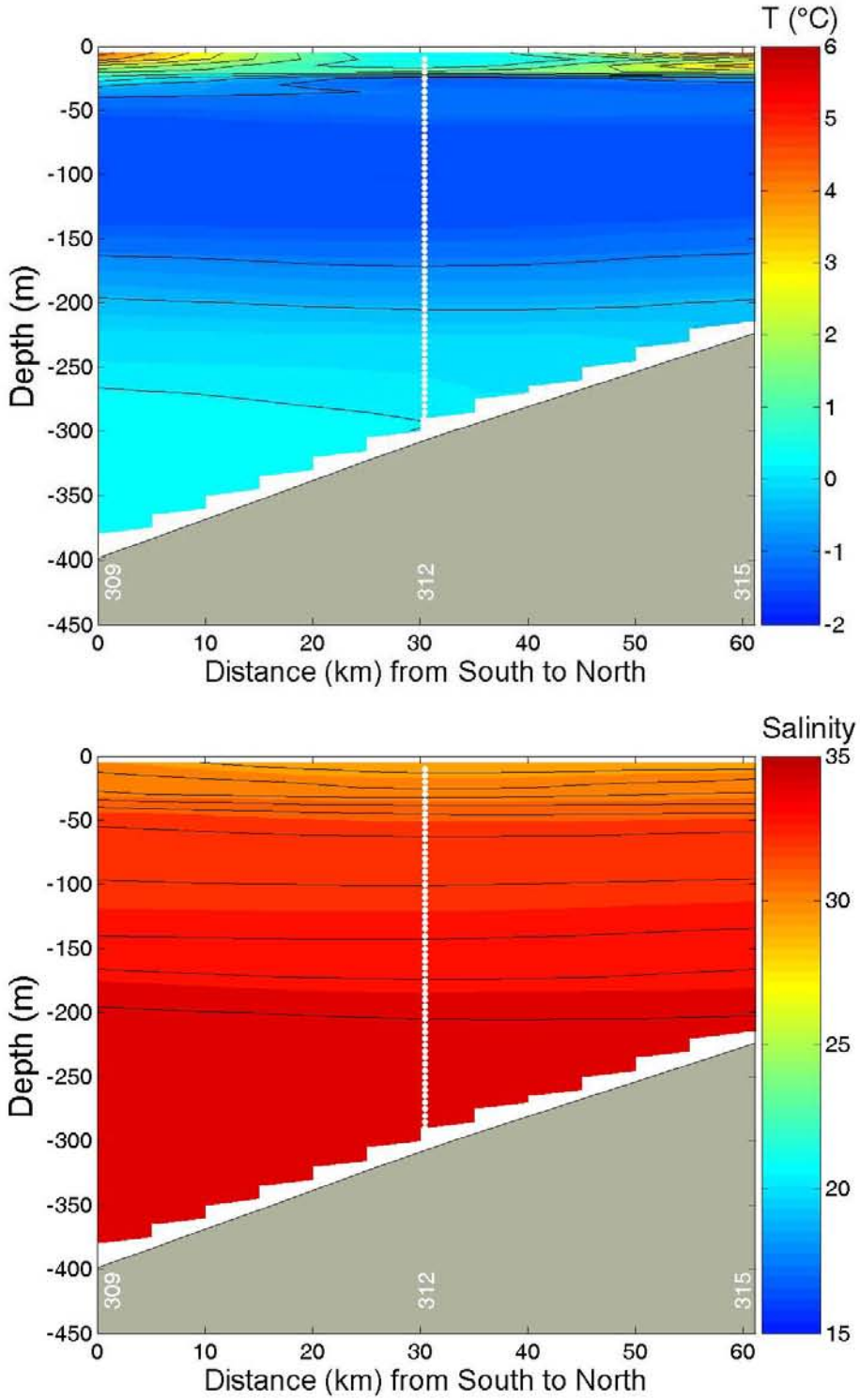
APPENDIX 8.1 Rosette sampling stations for Leg 8 (June-July 2004).



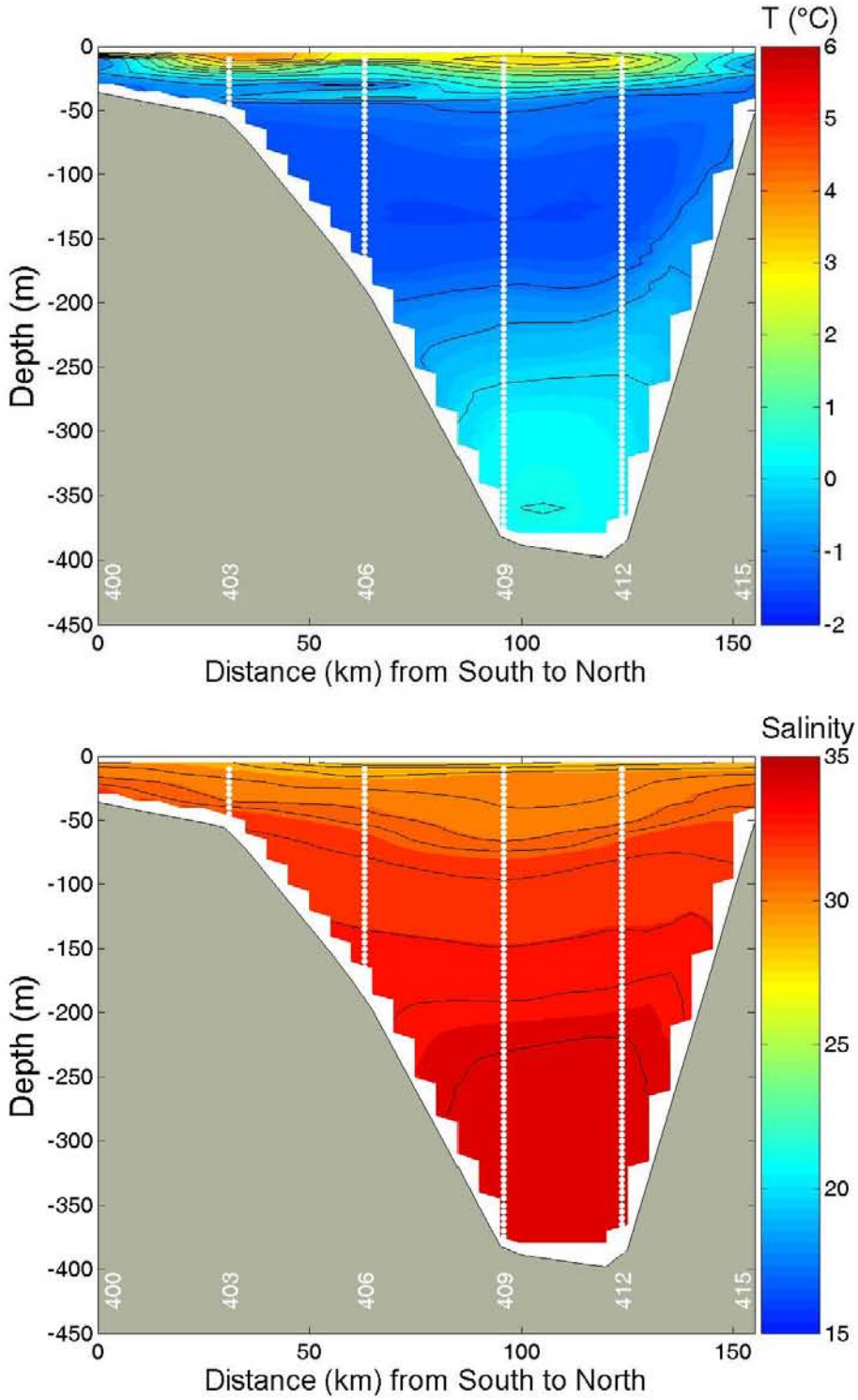
APPENDIX 8.2 Potential temperature and salinity along section 100 of Leg 8. North-West is on the left and South-East is on the right.



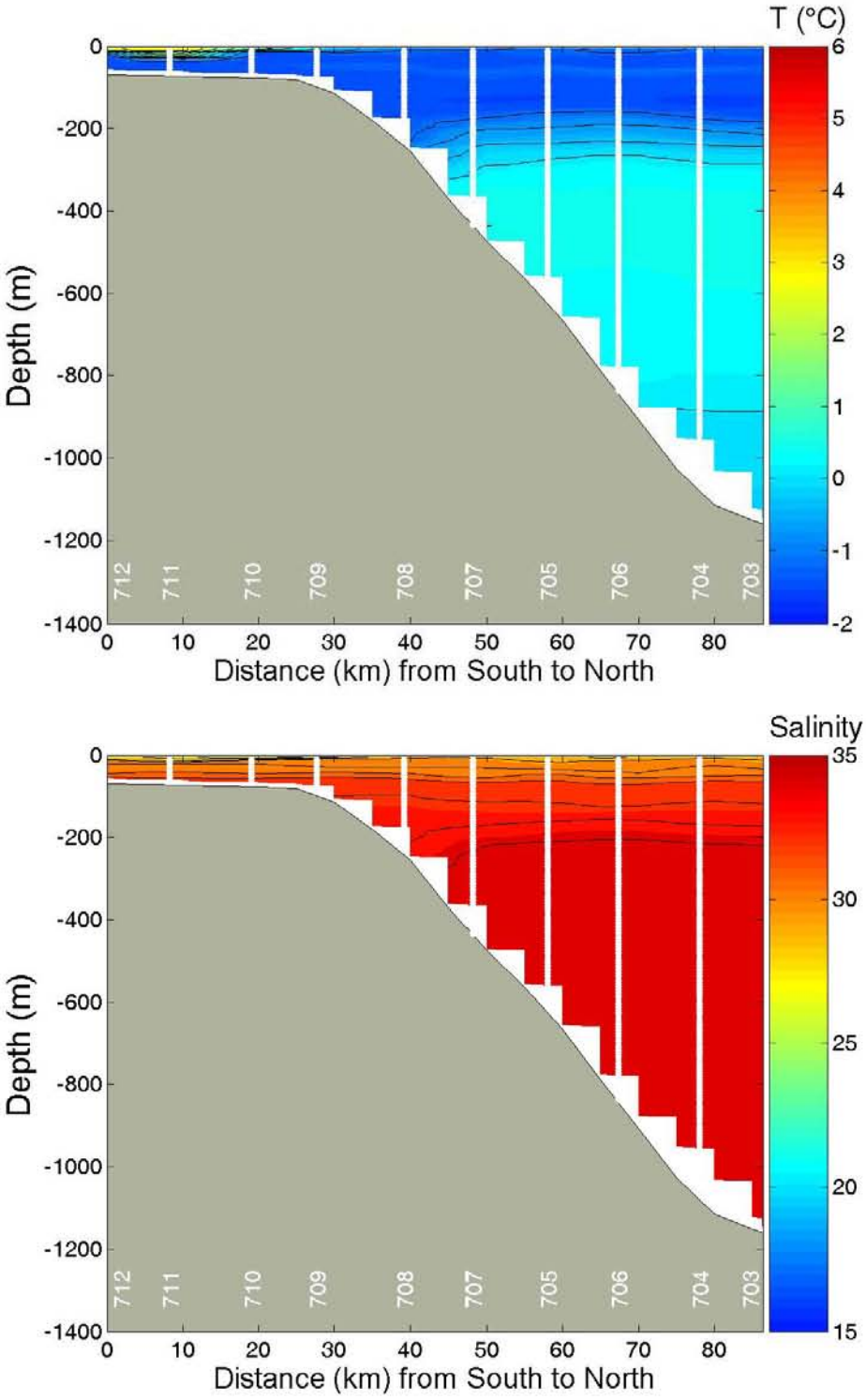
APPENDIX 8.3 Potential temperature and salinity along section 200 of Leg 8. South-West is on the left and North-East is on the right.



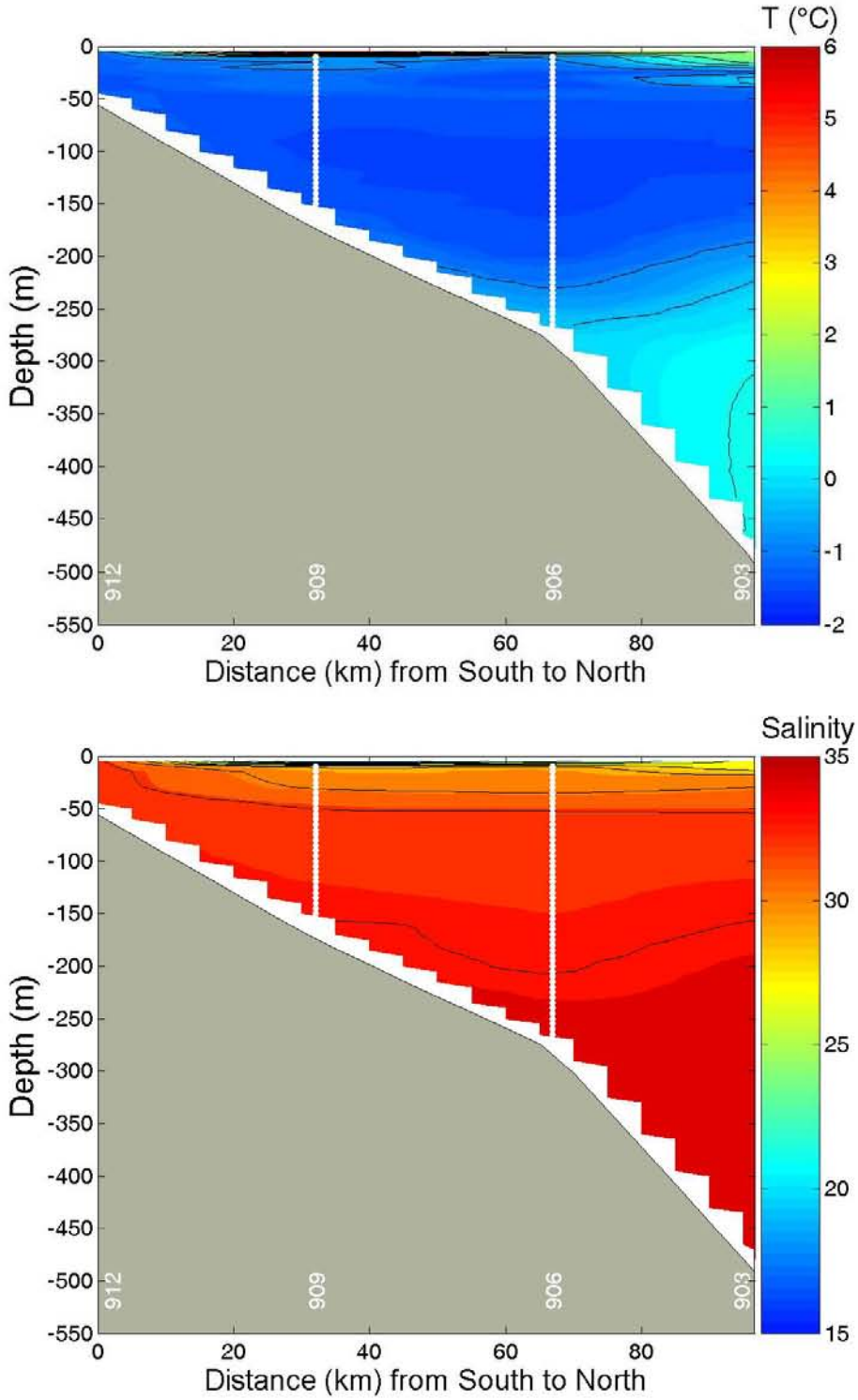
APPENDIX 8.4 Potential temperature and salinity along section 300 of Leg 8. South-West is on the left and North-East is on the right.



APPENDIX 8.5 Potential temperature and salinity along section 400 of Leg 8. South-West is on the left and North-East is on the right.



APPENDIX 8.6 Potential temperature and salinity along section 700 of Leg 8. South is on the left and North is on the right.



APPENDIX 8.7 Potential temperature and salinity along section 900 of Leg 8. South is on the left and North is on the right.

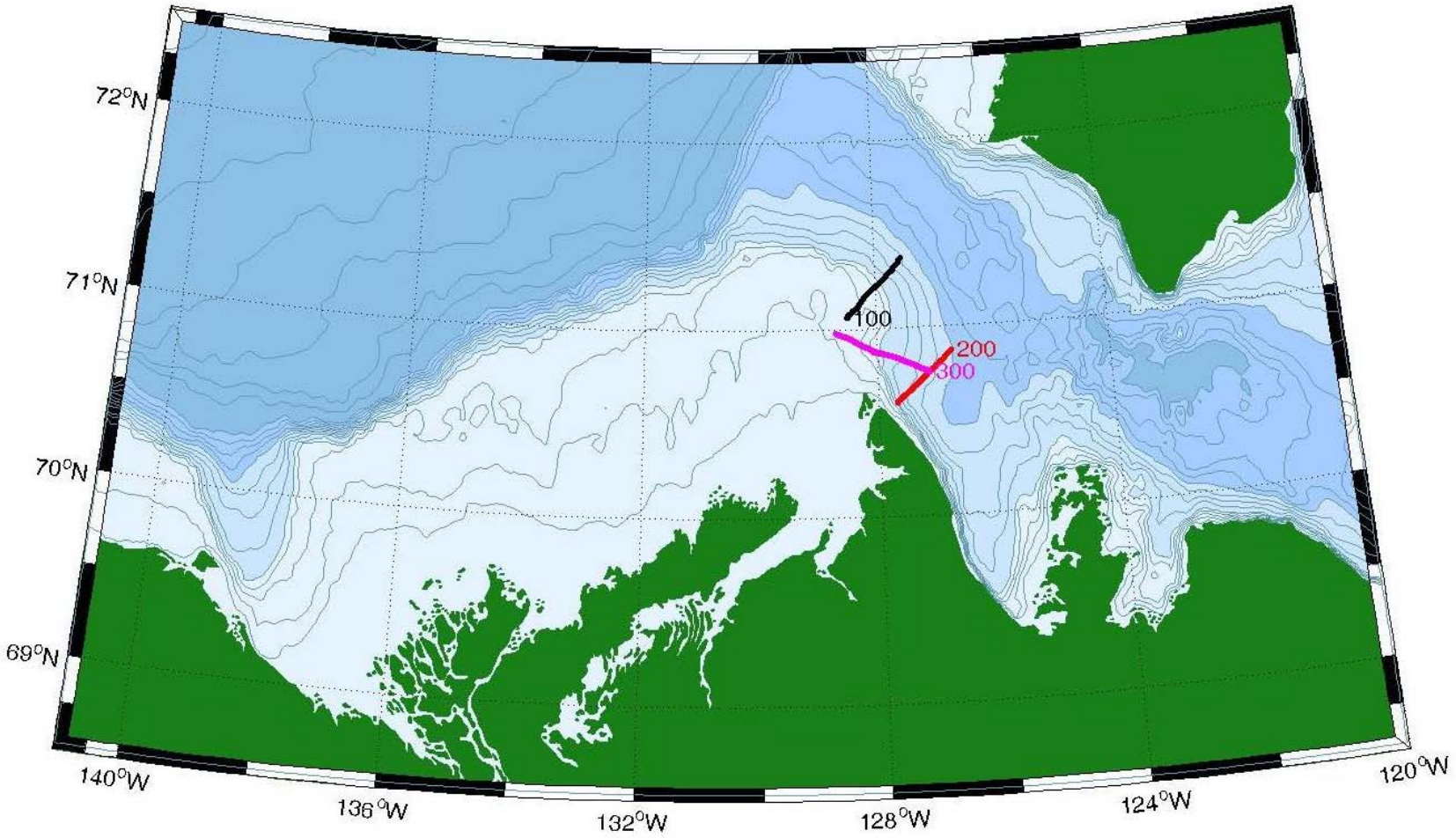
APPENDIX 9. MVP section locations, sampling time, water depth and corresponding station or mooring numbers, CASES scientific expeditions 2004.

APPENDIX 9. Summary of MVP logbook, CASES scientific Legs 2004.

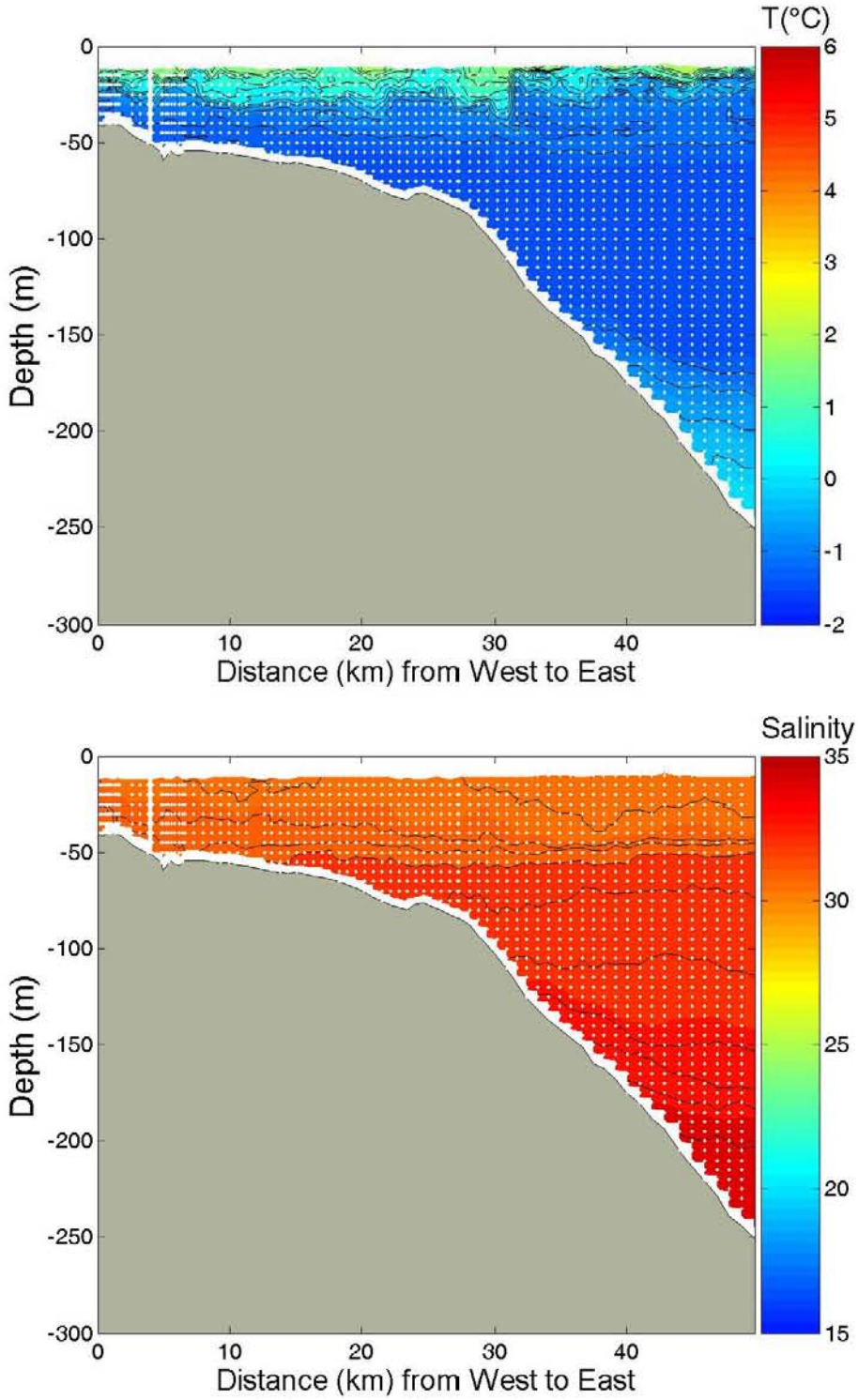
Leg Number	Section I.D.	Date		Sampling time		Coordonates				Number of casts
		Start (UTC)	End (UTC)	Start (UTC)	End (UTC)	Latitude (N) Start	Latitude (N) End	Longitude (W) Start	Longitude (W) End	
7	0404mvp100	June 17	June 18	23:15	05:54	71°07.53	71°22.33	128°17.33	127°31.46	86
	0404mvp200	June 18	June 19	17:36	03:21	70°52.36	70°43.99	126°43.44	127°12.85	98
	0404mvp300	June 20	June 21	12:22	01:39	70°45.91	70°58.90	127°07.04	128°42.23	131
8	0405mvp100	June 25	June 25	05:02	15:27	70°25.88	70°45.77	125°15.57	127°06.06	88
	0405mvp200	June 26	June 26	02:09	16:44	70°45.81	71°41.09	127°06.07	130°17.01	192
	0405mvp300	June 27	June 27	10:08	15:34	71°19.82	70°57.35	130°39.23	130°26.66	84
	0405mvp400	June 28	June 28	03:11	04:07	71°06.28	71°10.97	130°25.00	130°20.76	17
	0405mvp500	June 29	June 29	19:21	23:47	70°30.65	70°10.47	133°37.82	133°32.16	76
	0405mvp600	July 2	July 2	06:43	12:53	70°06.01	70°34.56	135°21.14	135°49.53	84
	0405mvp700	July 2	July 3	20:53	00:54	70°39.81	70°54.55	135°55.92	136°09.43	56
	0405mvp800	July 5	July 5	17:21	21:21	69°44.00	69°30.17	138°17.37	137°57.54	102
	0405mvp900	July 8	July 8	03:49	05:34	70°18.66	70°35.00	135°26.73	135°46.37	23
	0405mvp1000	July 9	July 9	11:26	12:29	70°43.83	70°51.98	135°34.46	135°21.26	8
	0405mvp1100	July 10	July 10	04:24	20:14	70°37.25	70°26.47	133°39.62	133°37.13	50
	0405mvp1200	July 11	July 11	01:03	04:18	70°24.66	70°11.32	133°34.73	133°31.21	63
	0405mvp 1400	July 16	July 16	08:41	12:14	70°18.48	70°03.81	126°20.24	126°17.91	34
	0405mvp1500	July 17	July 18	22:30	01:41	70°24.27	70°55.75	126°27.76	126°14.80	26
	0405mvp1600	July 18	July 18	13:29	14:00	70°59.29	71°03.15	125°51.06	125°48.66	5
	0405mvp1700	July 25	July 25	21:39	22:58	71°05.47	71°08.32	130°57.86	131°36.20	58
	0405mvp1800	July 26	July 26	02:44	07:54	71°04.48	70°45.35	133°11.71	135°10.28	98
	0405mvp1900	July 27	July 27	16:34	17:22	71°07.82	71°15.46	133°57.00	134°03.57	5
	0405mvp2000	July 28	July 28	01:21	11:41	71°19.27	71°17.37	133°39.80	128°36.41	137
	0405mvp2100	August 1	August 1	05:45	06:15	70°26.30	70°22.44	124°35.05	124°43.56	7
9	0406mvp100	August 7	August 7	16:26	23:53	70°04.35	71°16.69	126°11.14	126°23.35	60

APPENDIX 10. Sections of salinity and potential temperature from MVP data. Leg 7 (May-June 2004).

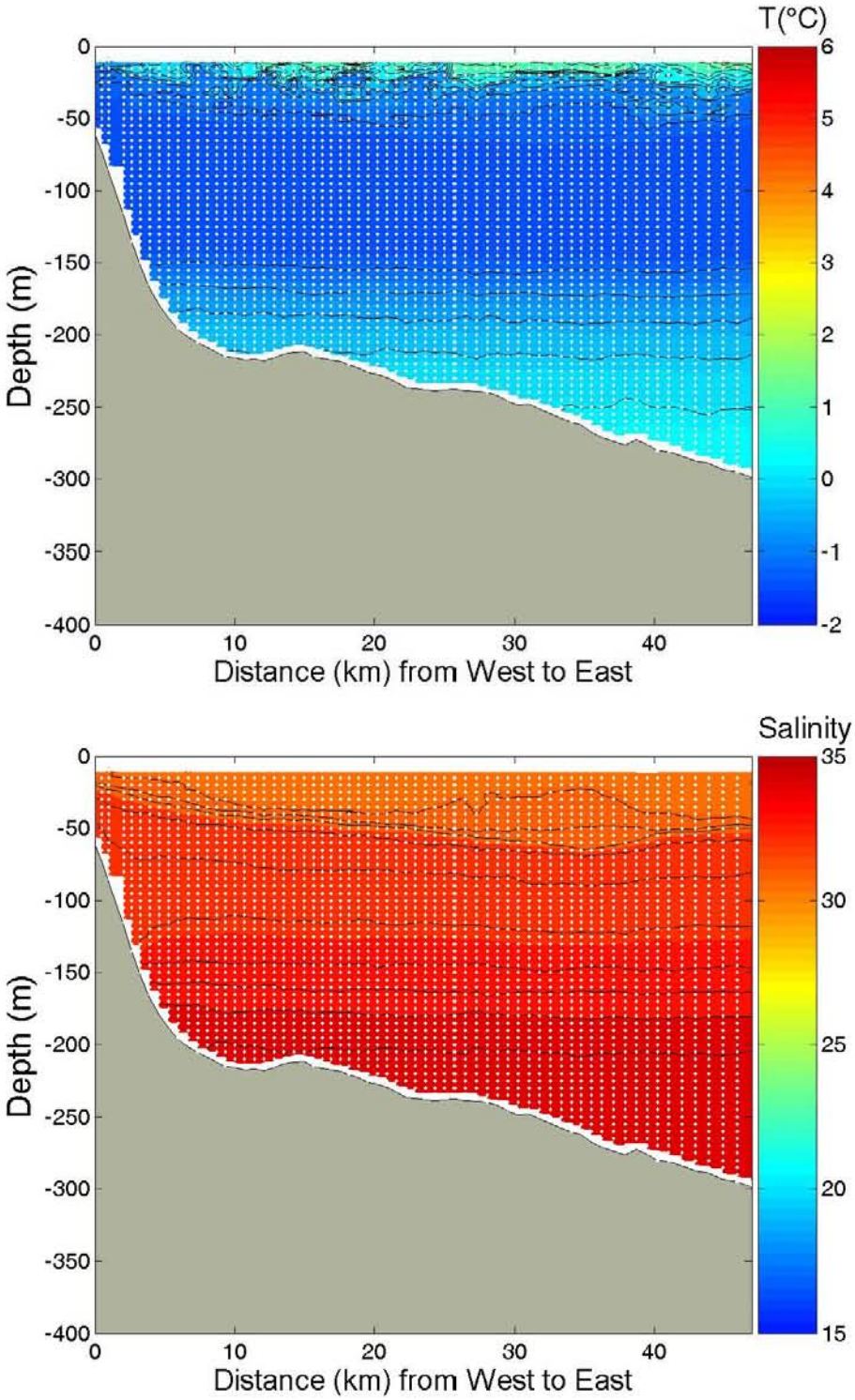
The same color scale is used for all sections.



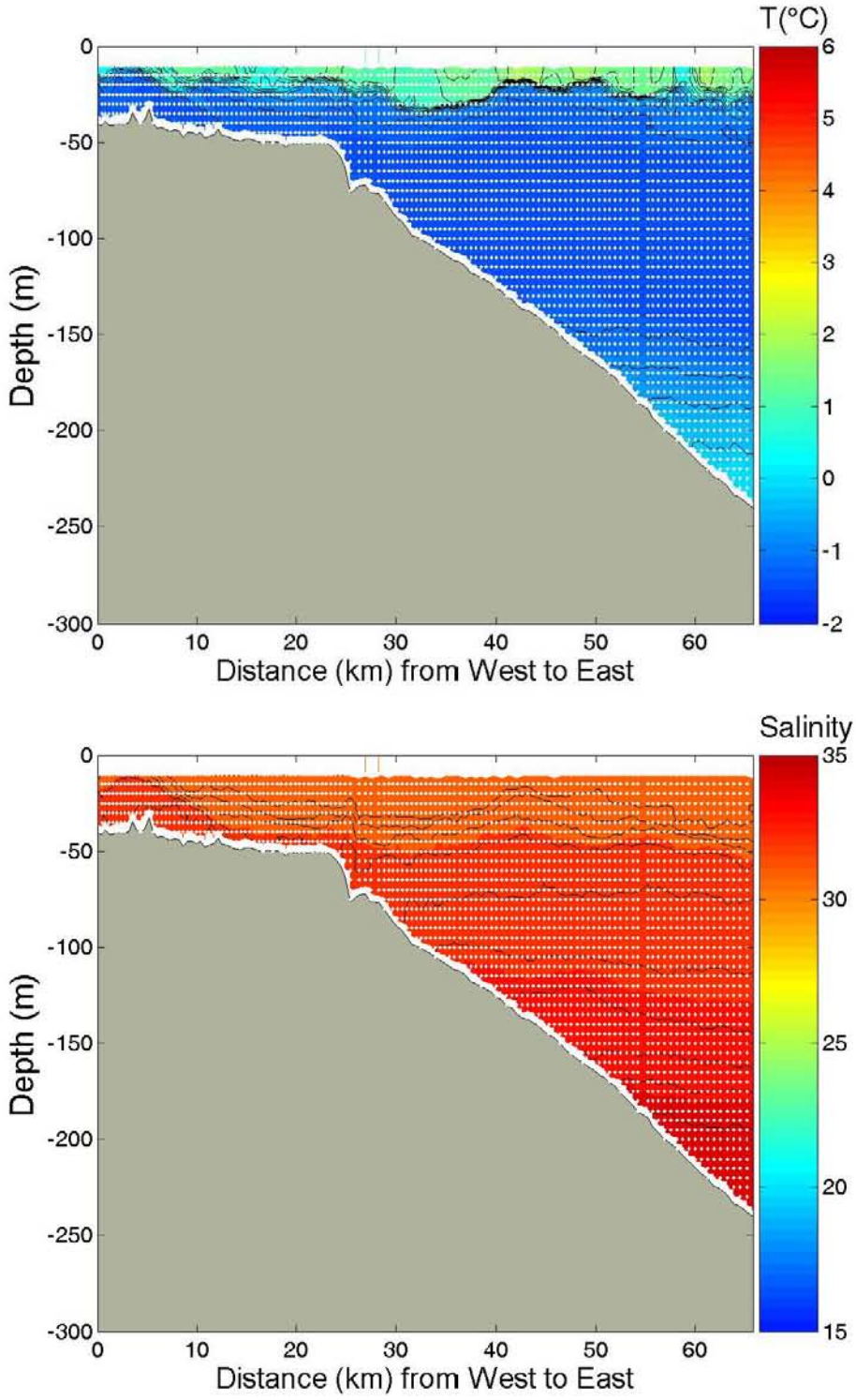
APPENDIX 10.1 MVP sections for Leg 7 (May-June 2004).



APPENDIX 10.2 Potential temperature and salinity along section 100, Leg 7. South-West is on the left and North-East is on the right.



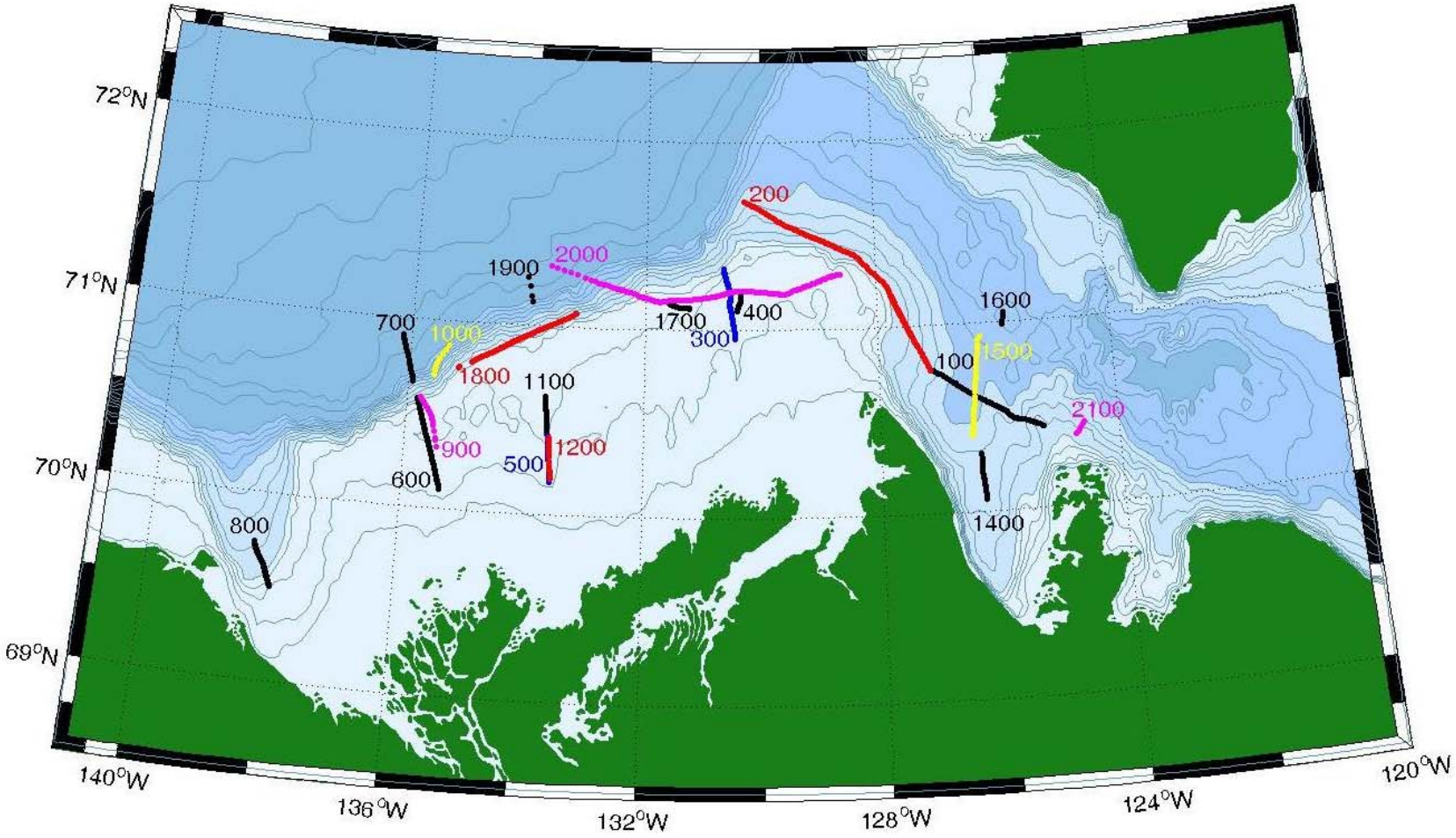
APPENDIX 10.3 Potential temperature and salinity along section 200, Leg 7. South-West is on the left and North-East is on the right.



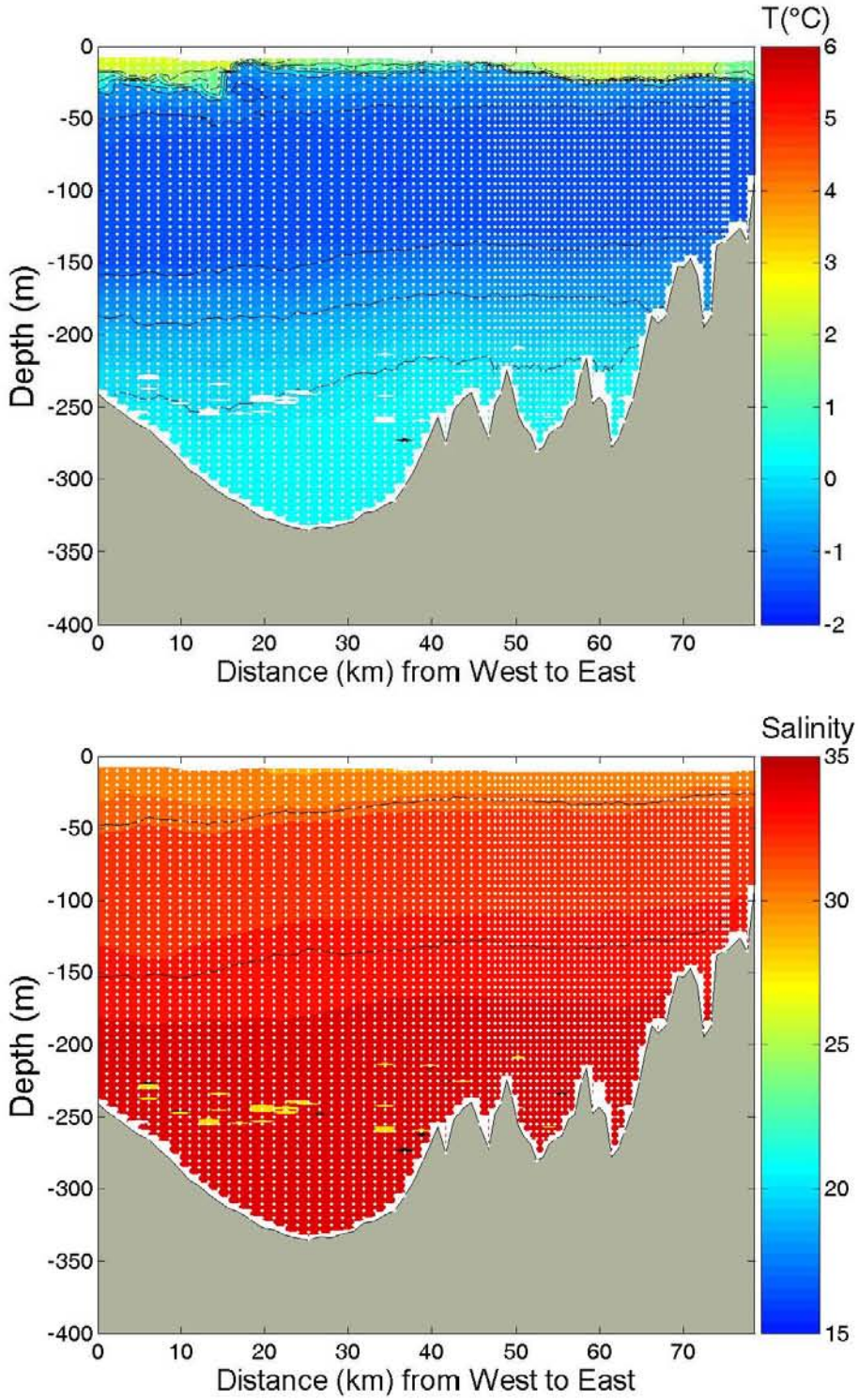
APPENDIX 10.4 Potential temperature and salinity along section 300, Leg 7. North-West is on the left and South-East is on the right.

APPENDIX 11. Sections of salinity and potential temperature from MVP data. Leg 8 (June-July 2004).

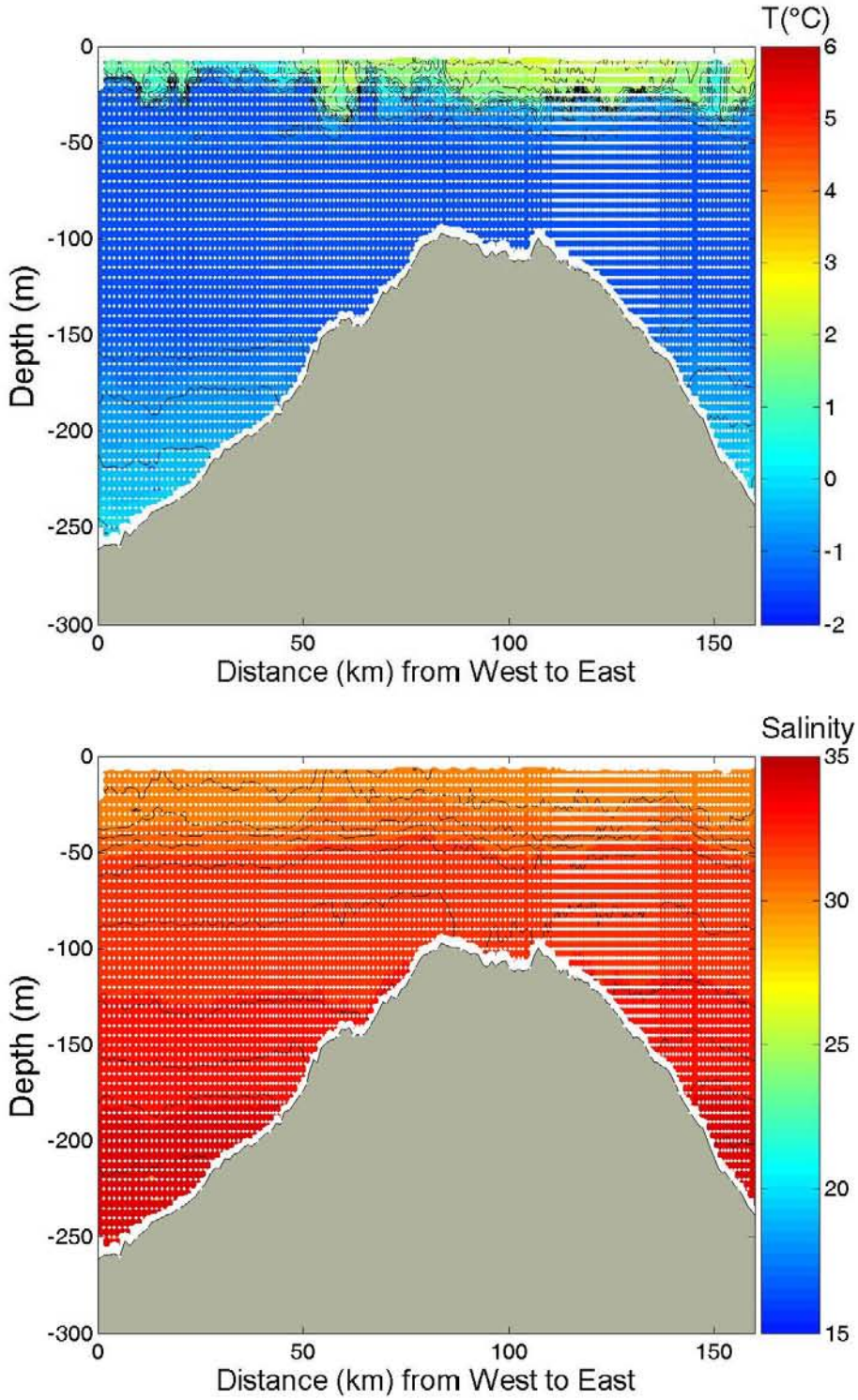
The same color scale is used for all sections.



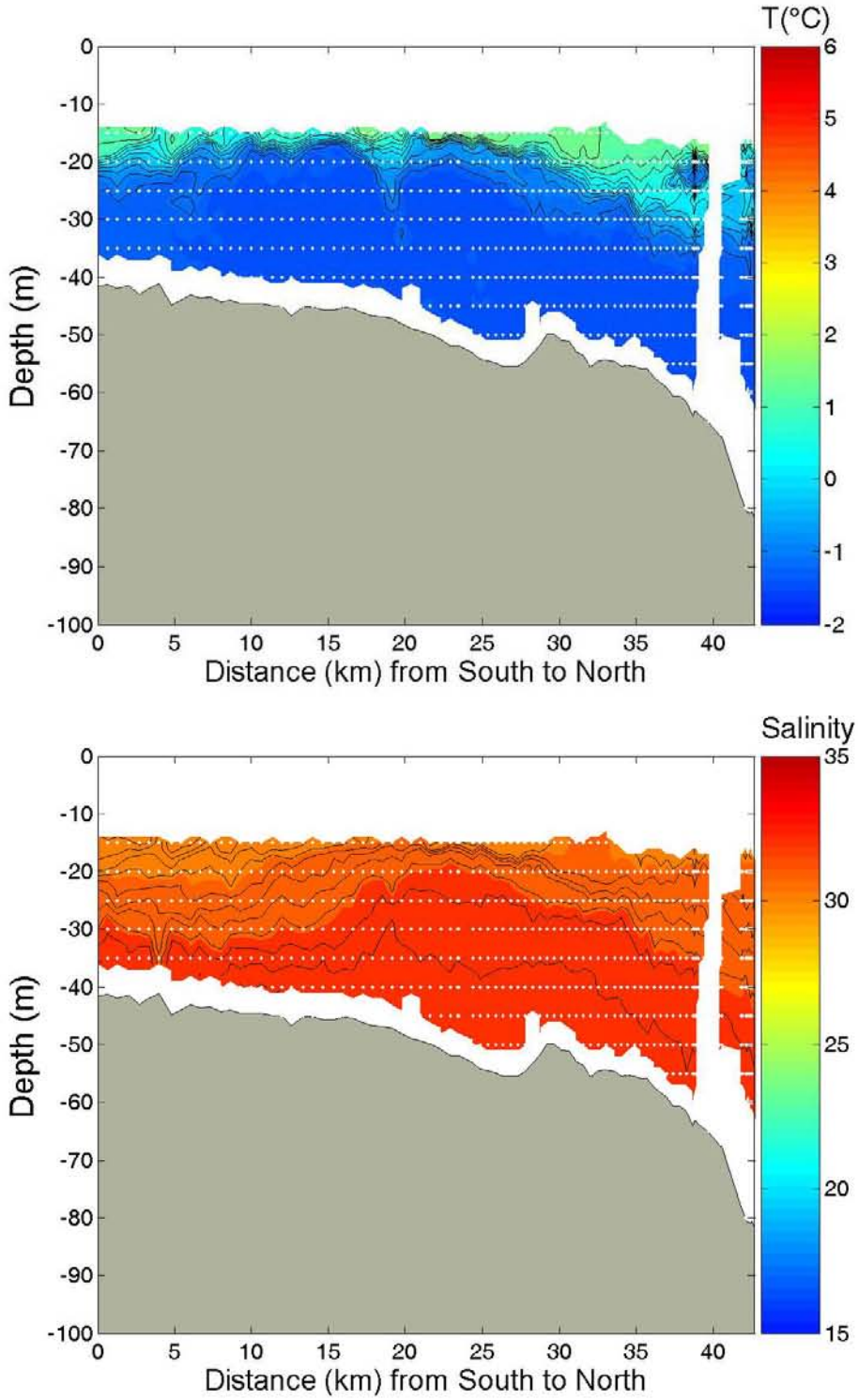
APPENDIX 11.1 MVP sections for Leg 8 (June-July 2004).



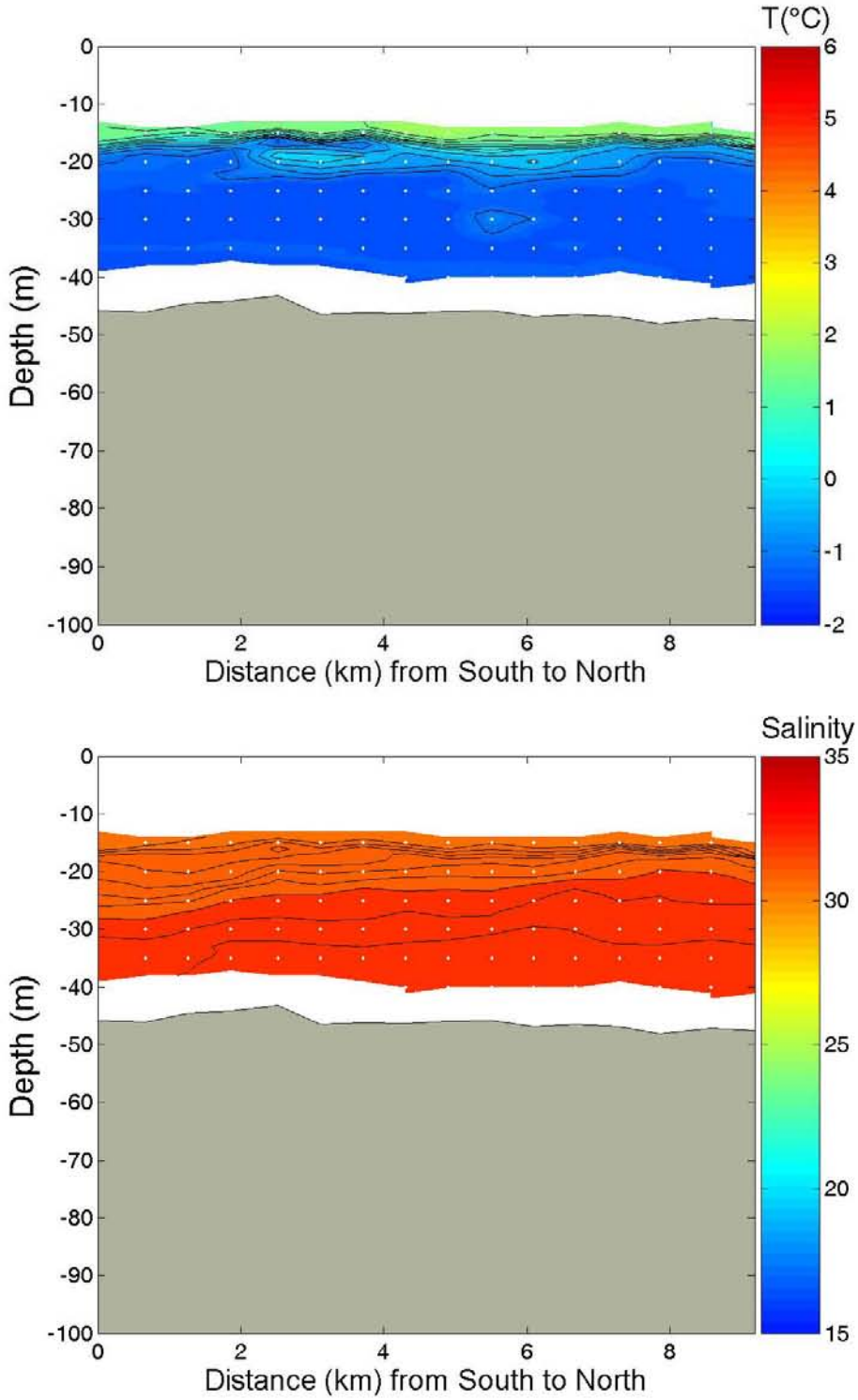
APPENDIX 11.2 Potential temperature and salinity along section 100, Leg 8. North-West is on the left and South-East is on the right.



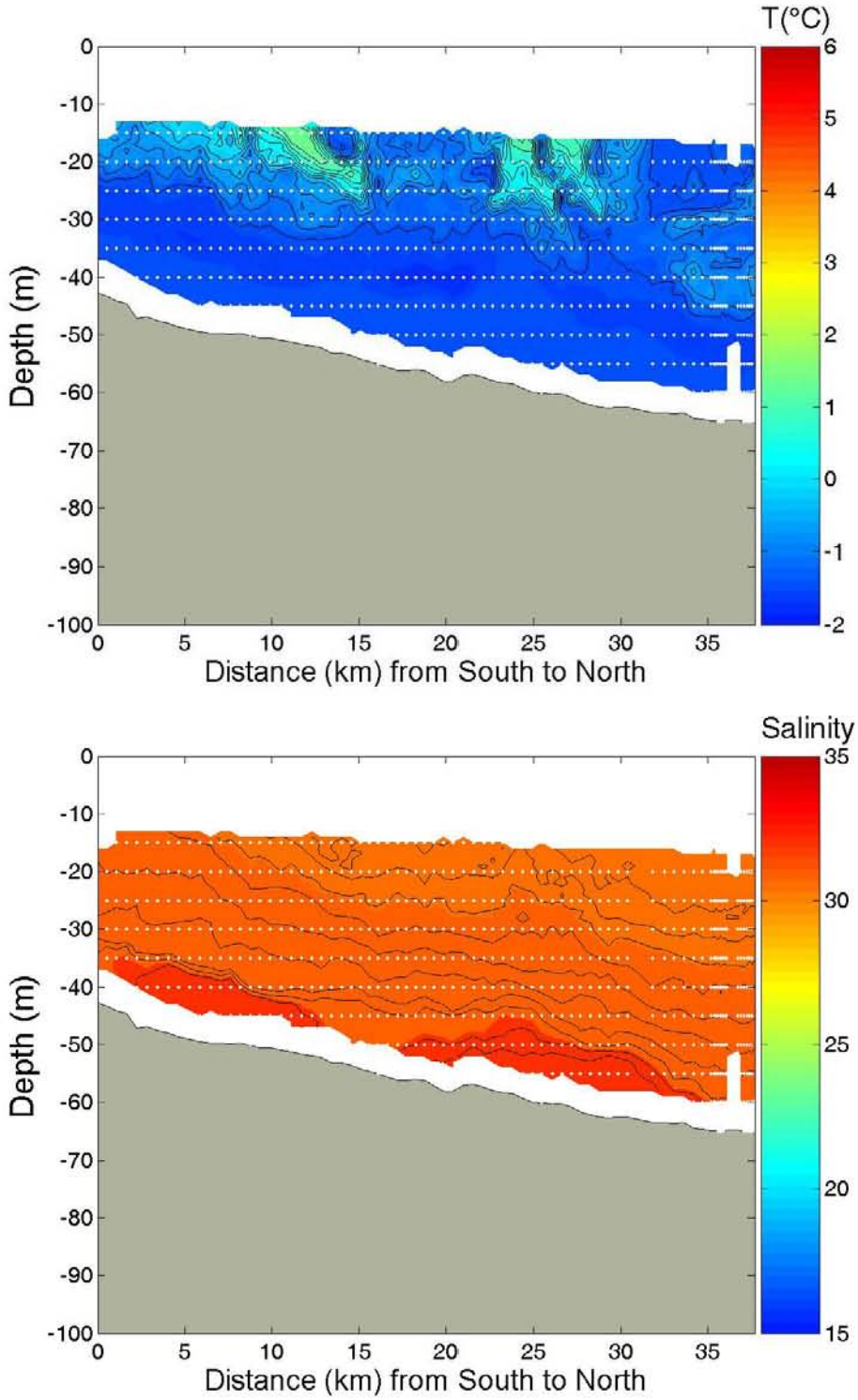
APPENDIX 11.3 Potential temperature and salinity along section 200, Leg 8. North-West is on the left and South-East is on the right.



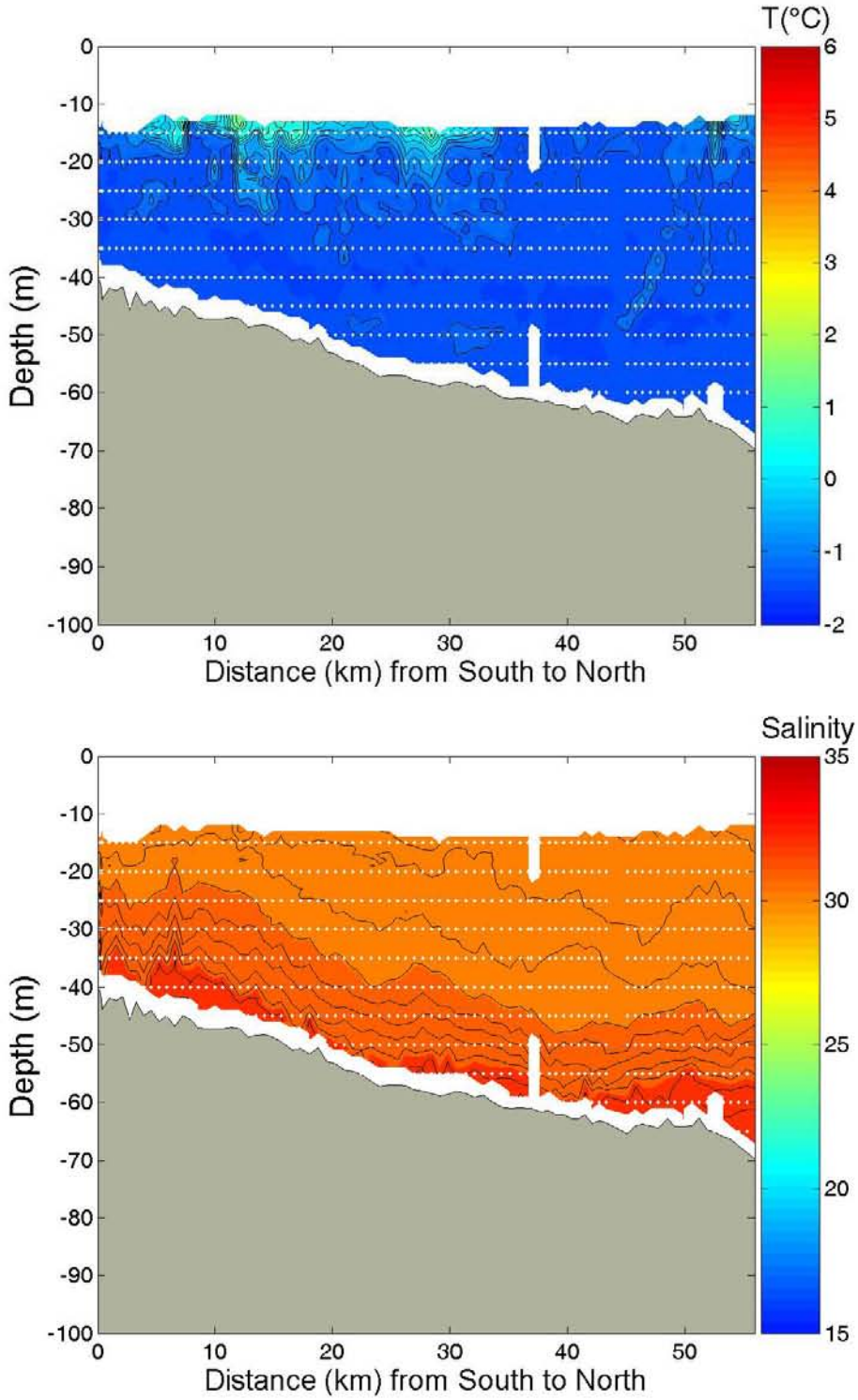
APPENDIX 11.4 Potential temperature and salinity along section 300, Leg 8. South is on the left and North is on the right.



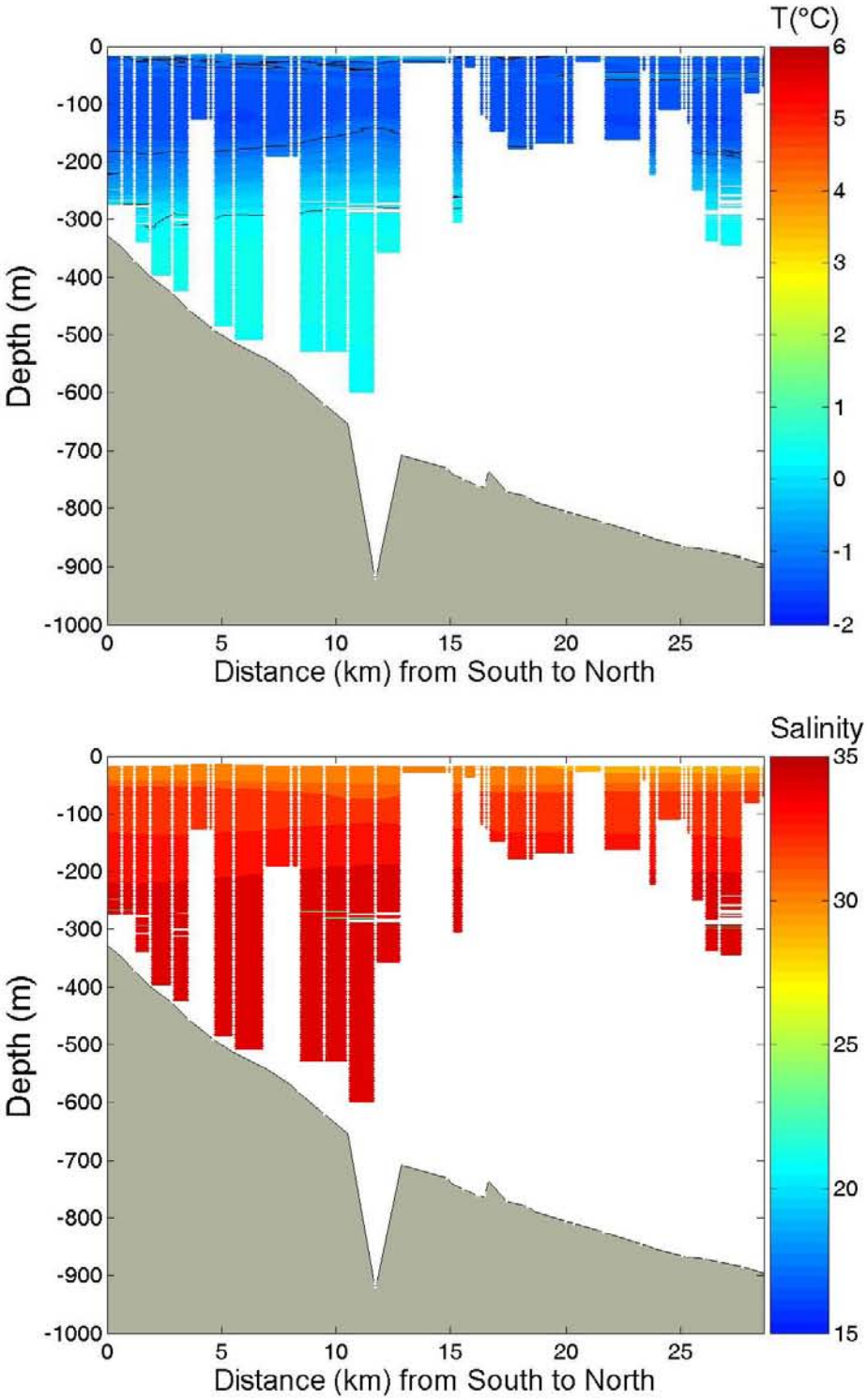
APPENDIX 11.5 Potential temperature and salinity along section 400, Leg 8. South is on the left and North is on the right.



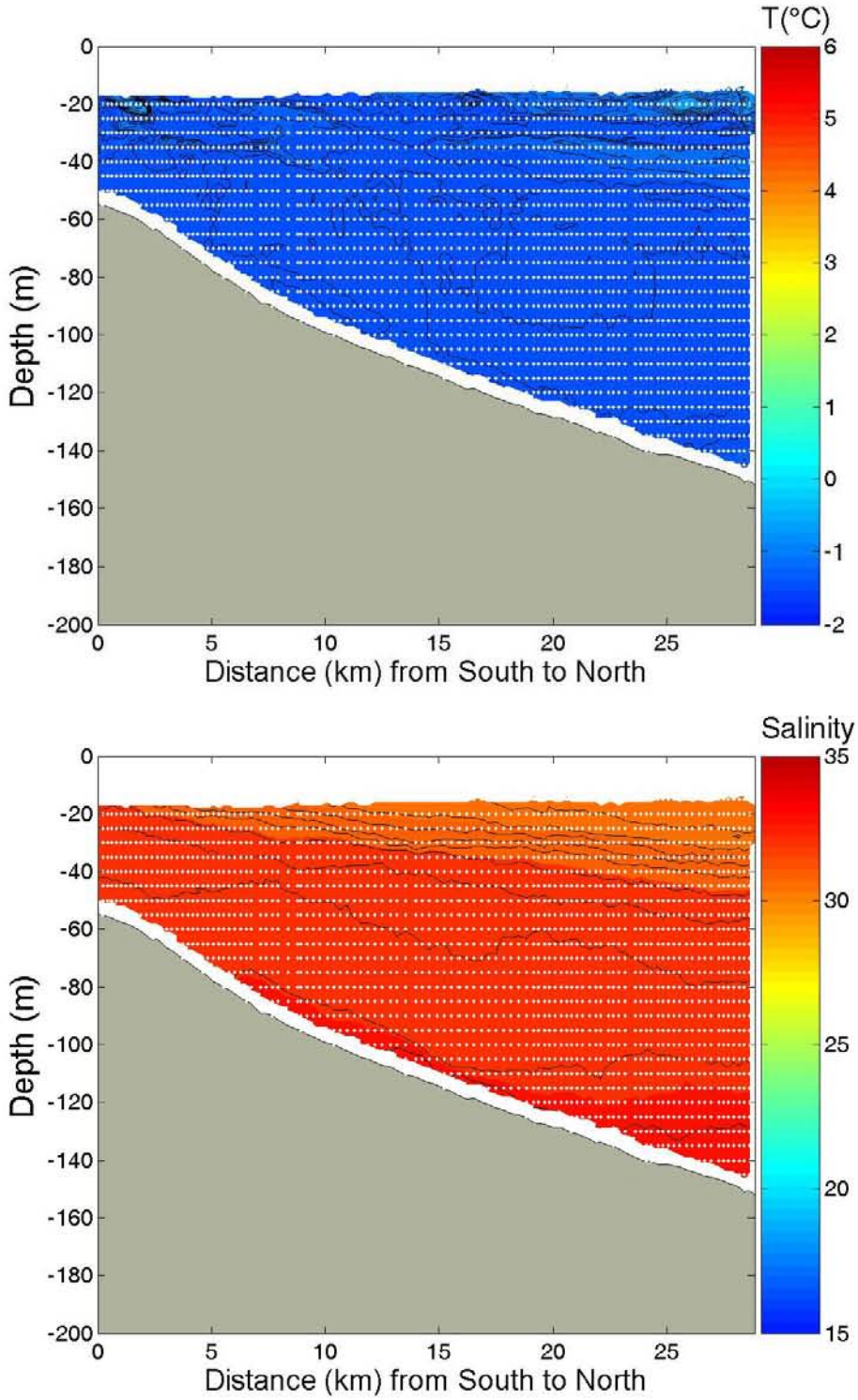
APPENDIX 11.6 Potential temperature and salinity along section 500, Leg 8. South is on the left and North is on the right.



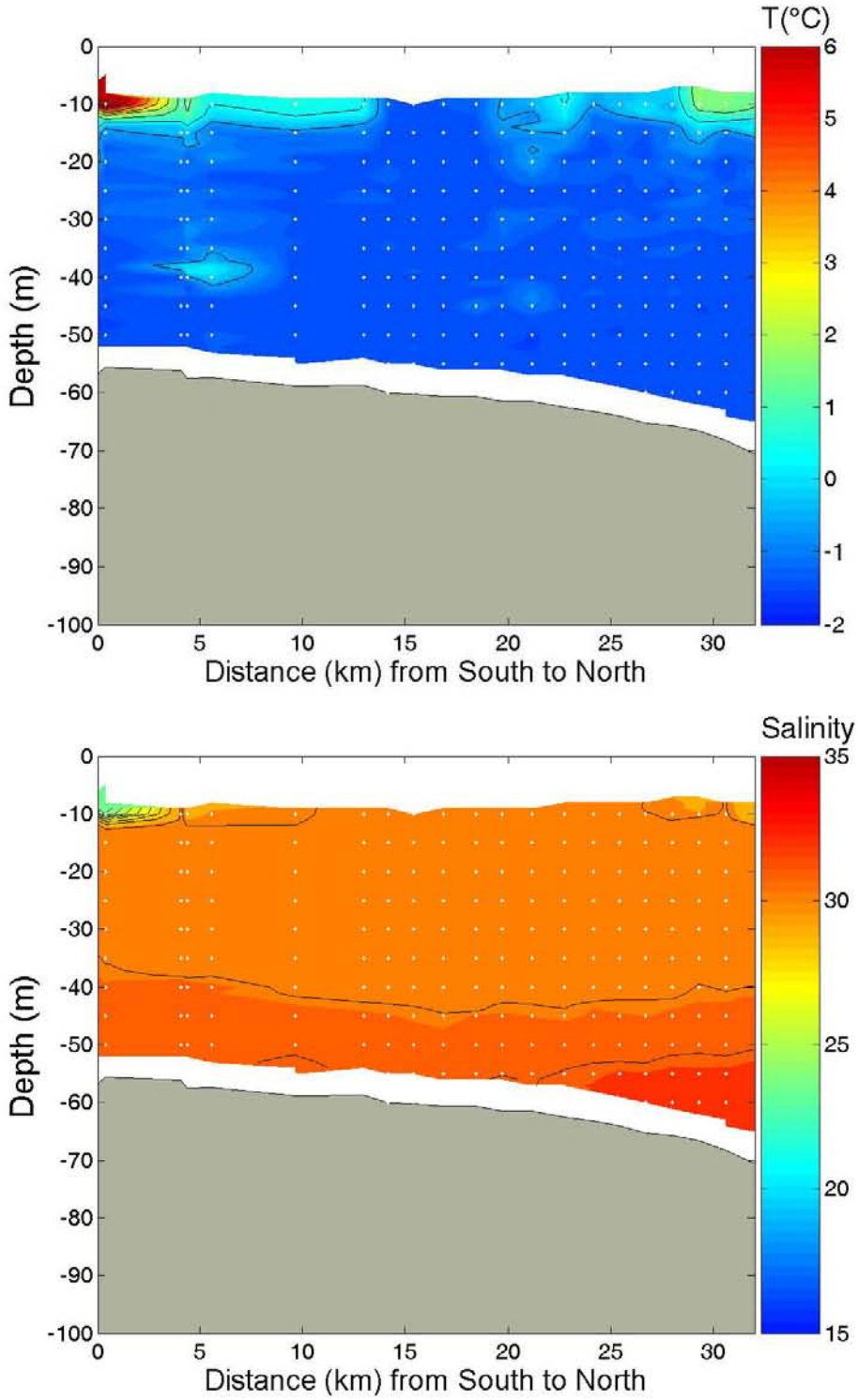
APPENDIX 11.7 Potential temperature and salinity along section 600, Leg 8. South is on the left and North is on the right.



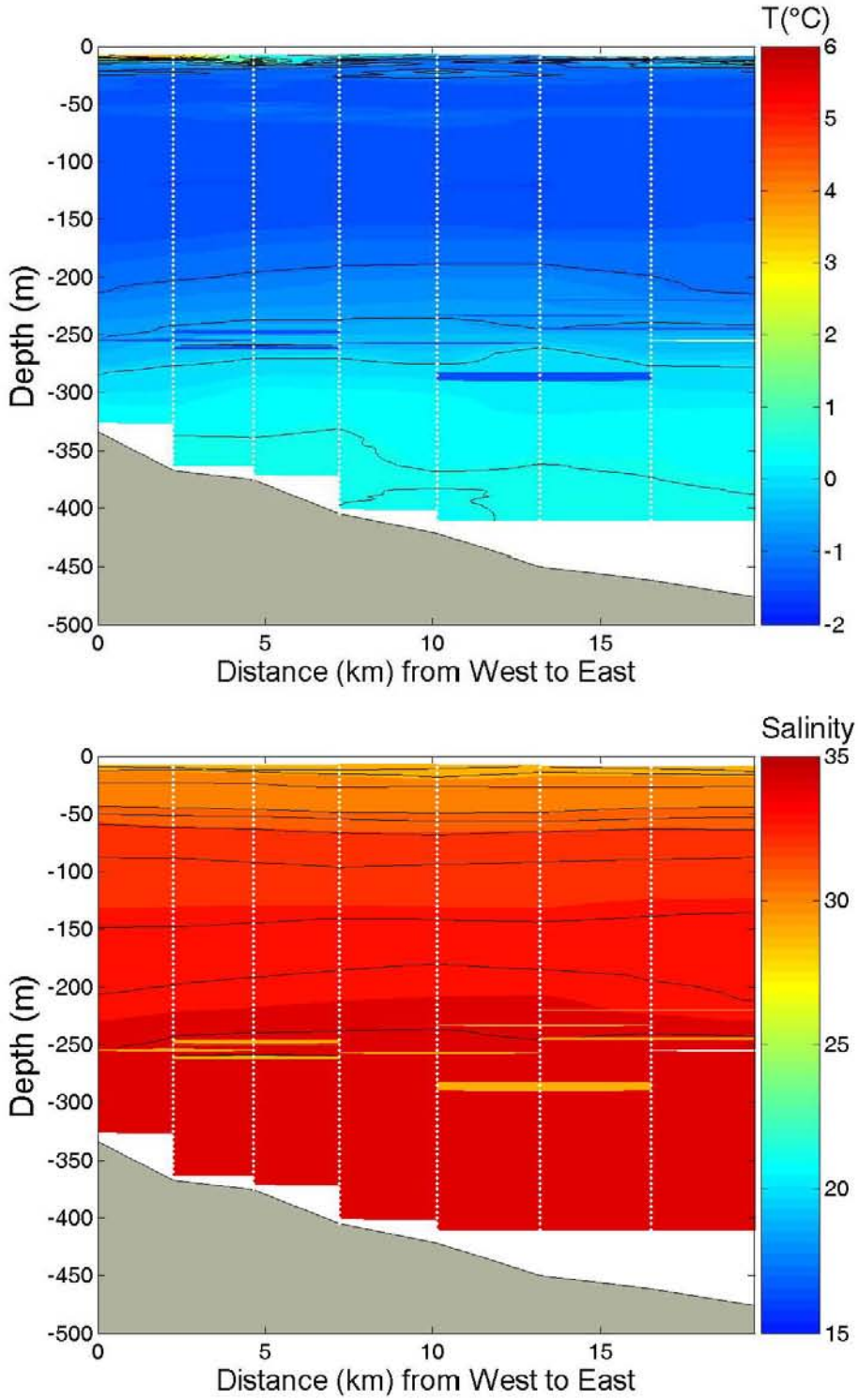
APPENDIX 11.8 Potential temperature and salinity along section 700, Leg 8. South is on the left and North is on the right.



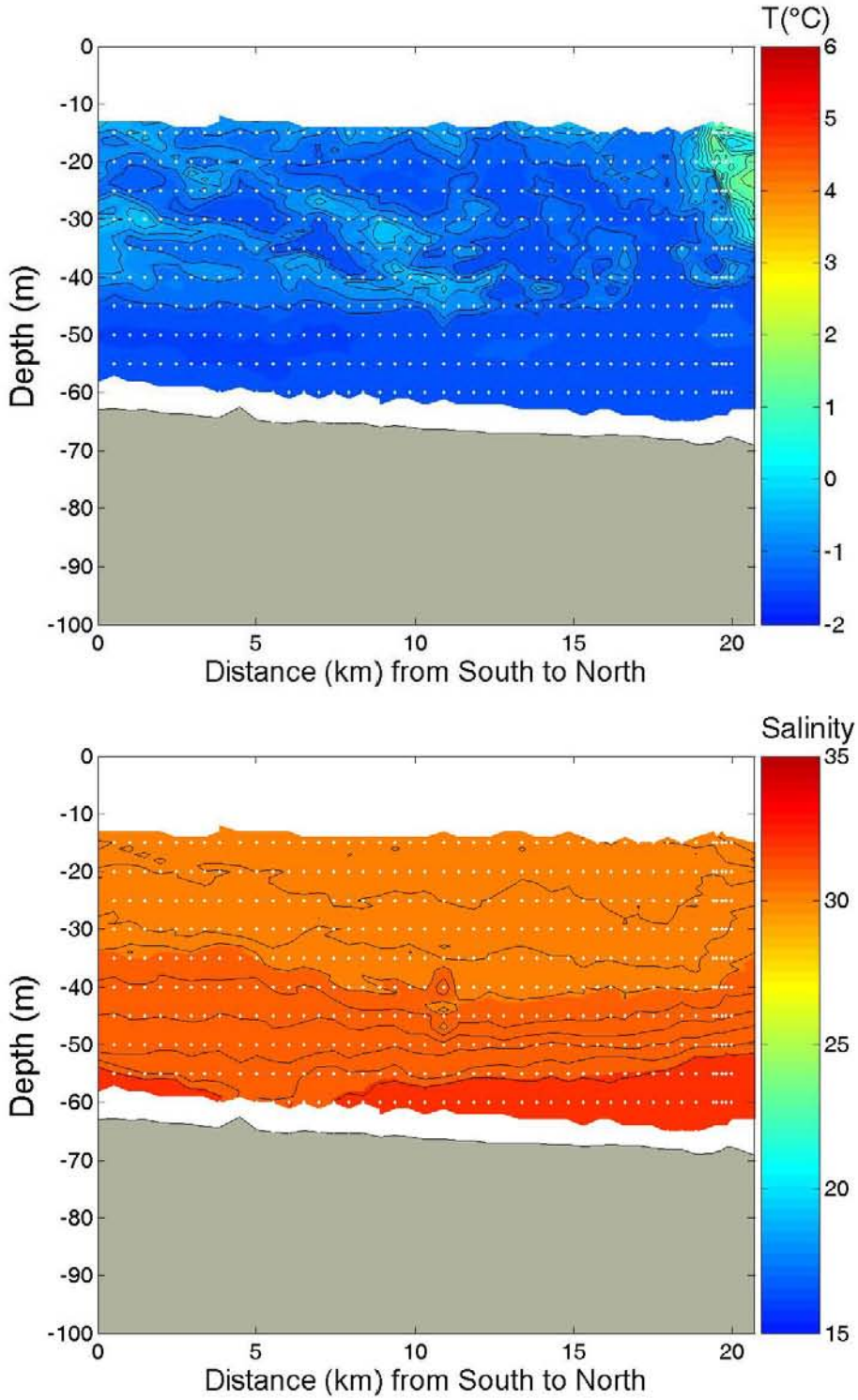
APPENDIX 11.9 Potential temperature and salinity along section 800, Leg 8. South is on the left and North is on the right.



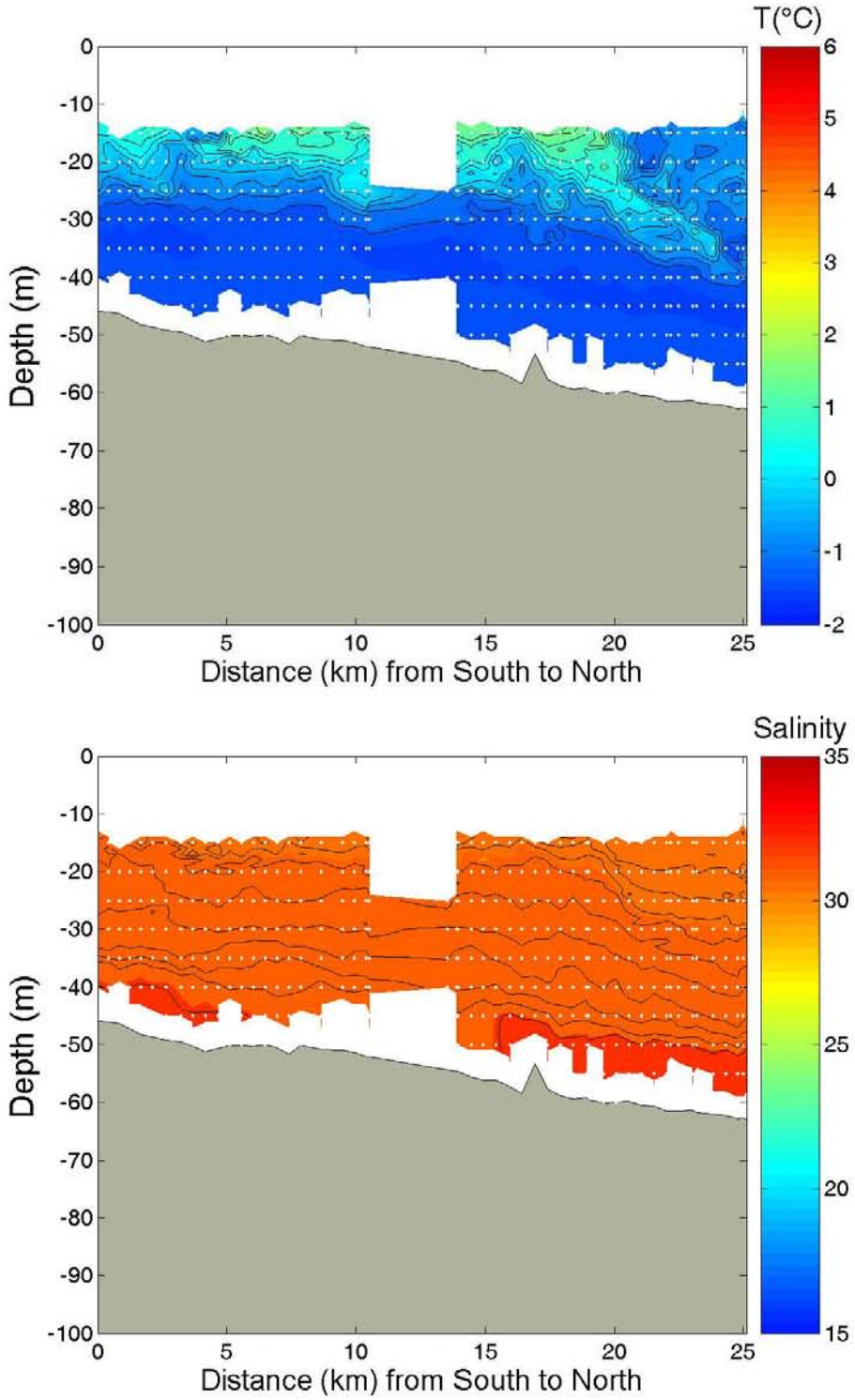
APPENDIX 11.10 Potential temperature and salinity along section 900, Leg 8. South is on the left and North is on the right.



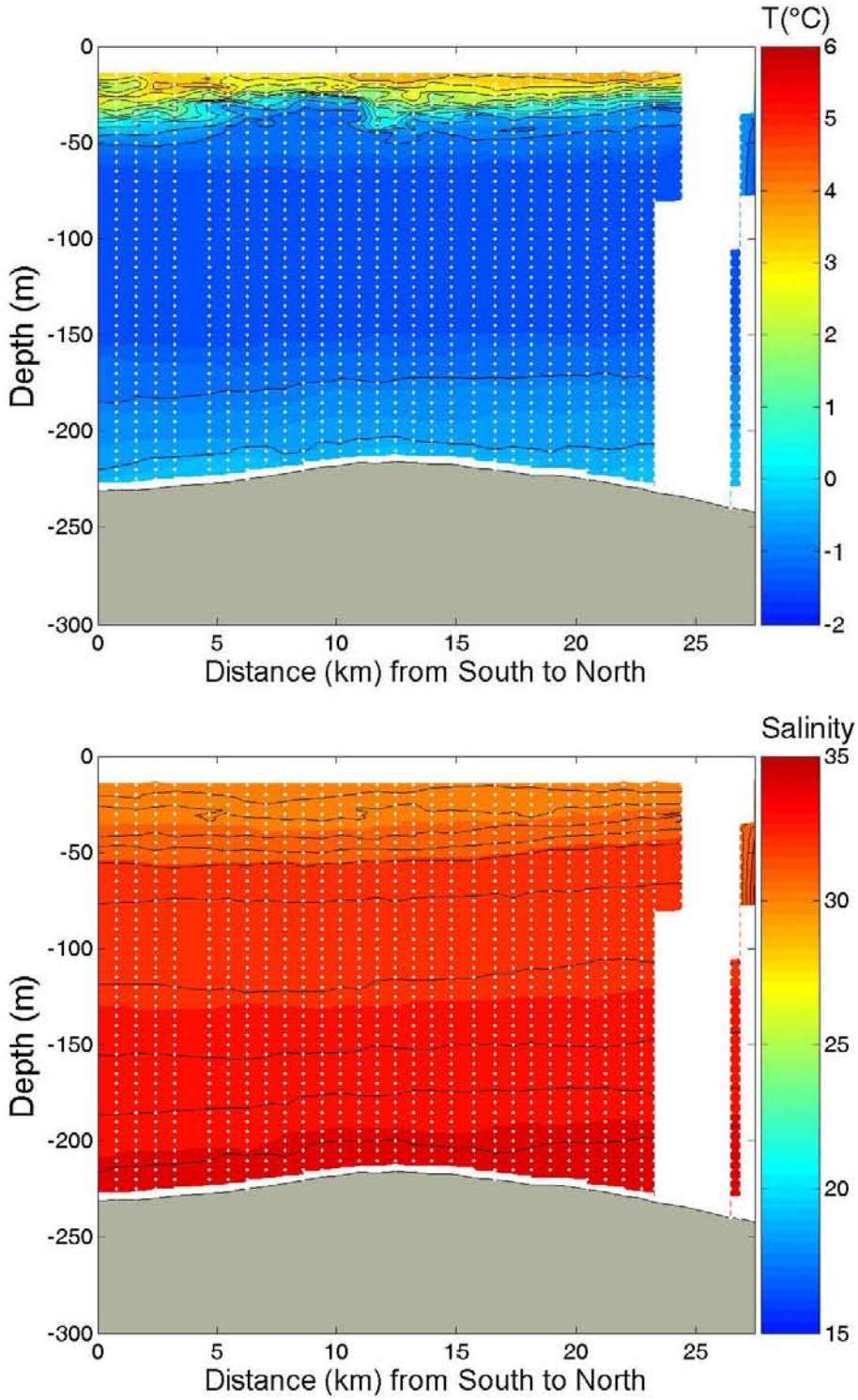
APPENDIX 11.11 Potential temperature and salinity along section 1000, Leg 8. South-West is on the left and North-East is on the right.



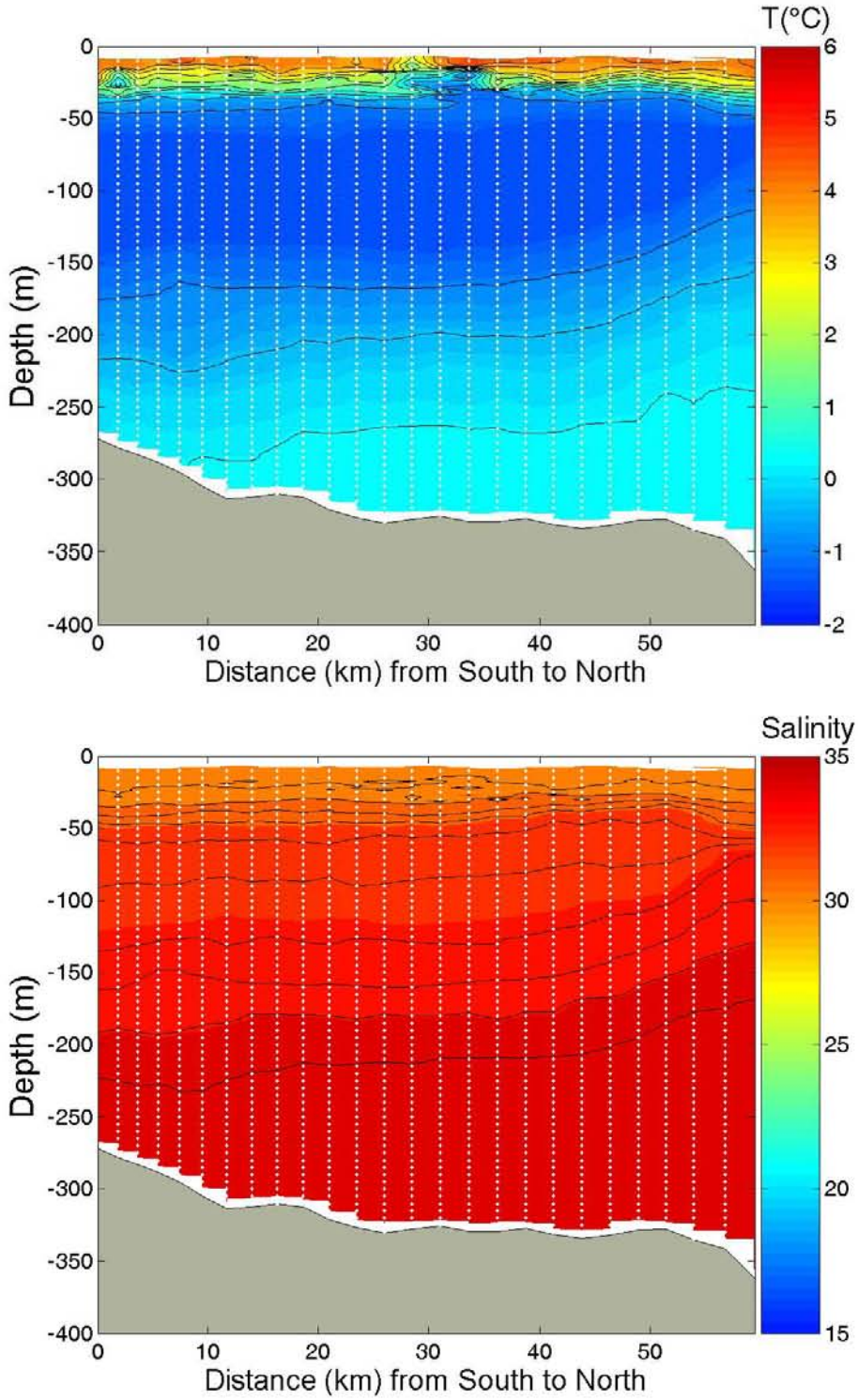
APPENDIX 11.12 Potential temperature and salinity along section 1100, Leg 8. South is on the left and North is on the right.



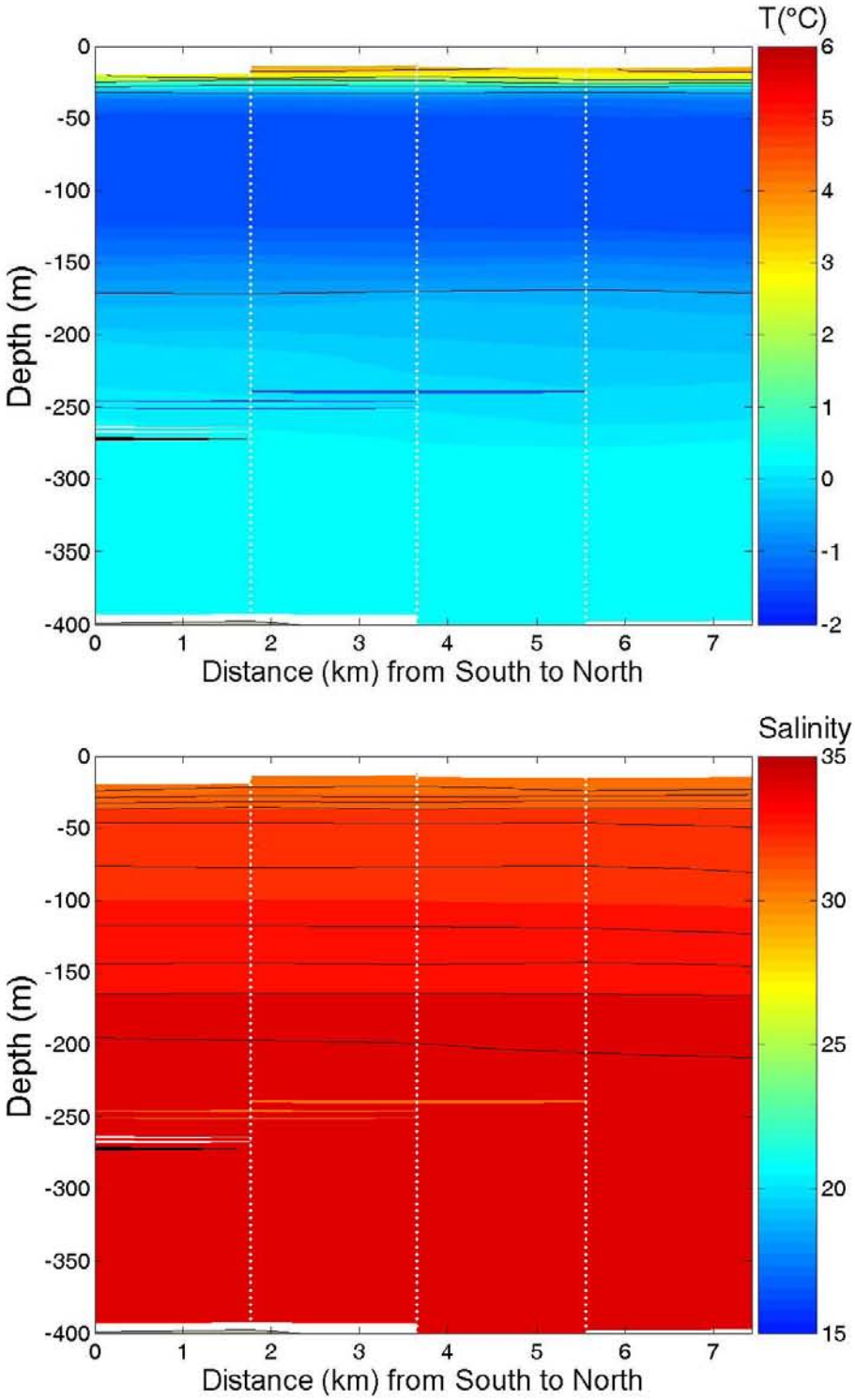
APPENDIX 11.13 Potential temperature and salinity along section 1200, Leg 8. South is on the left and North is on the right.



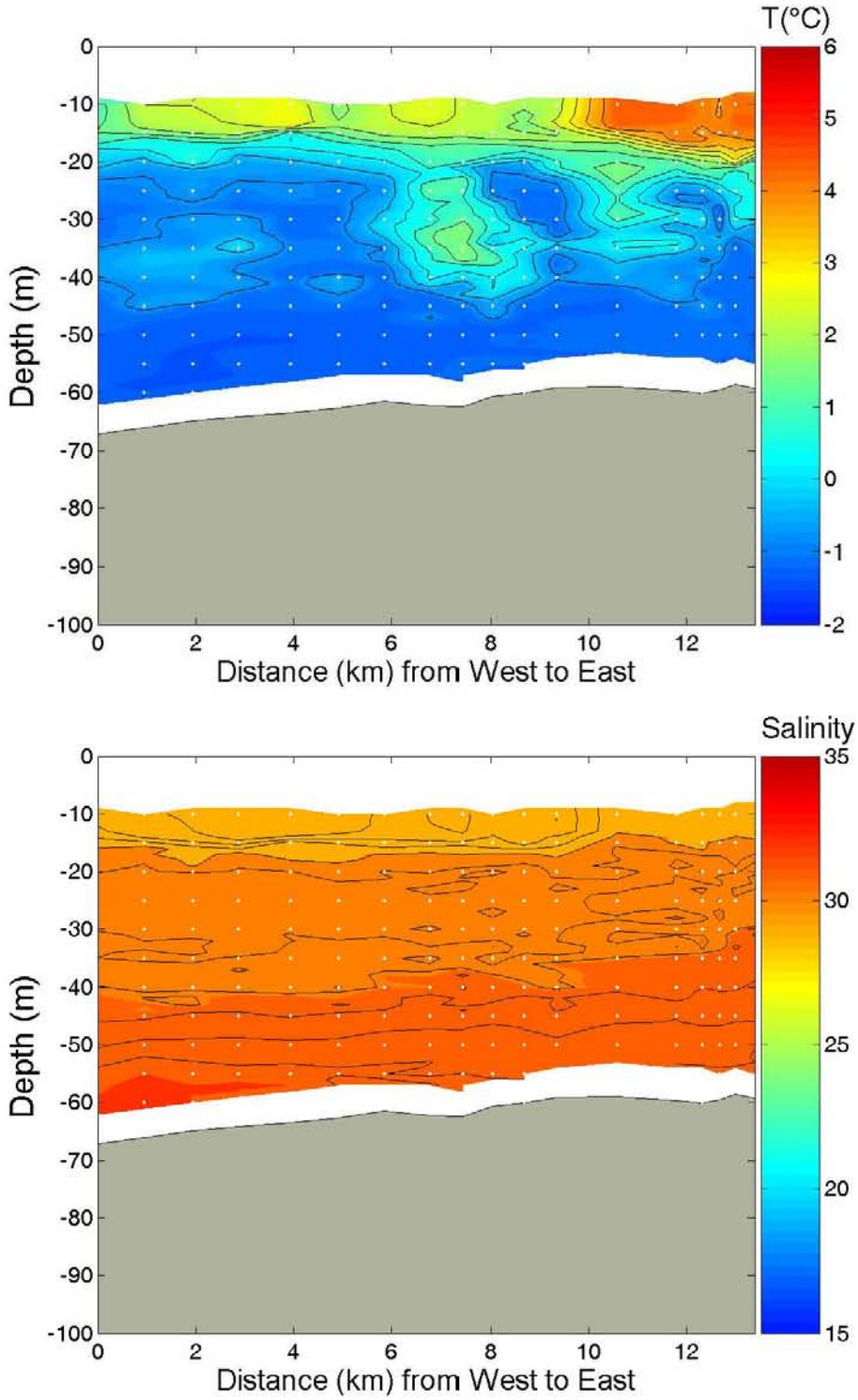
APPENDIX 11.14 Potential temperature and salinity along section 1400, Leg 8. South is on the left and North is on the right.



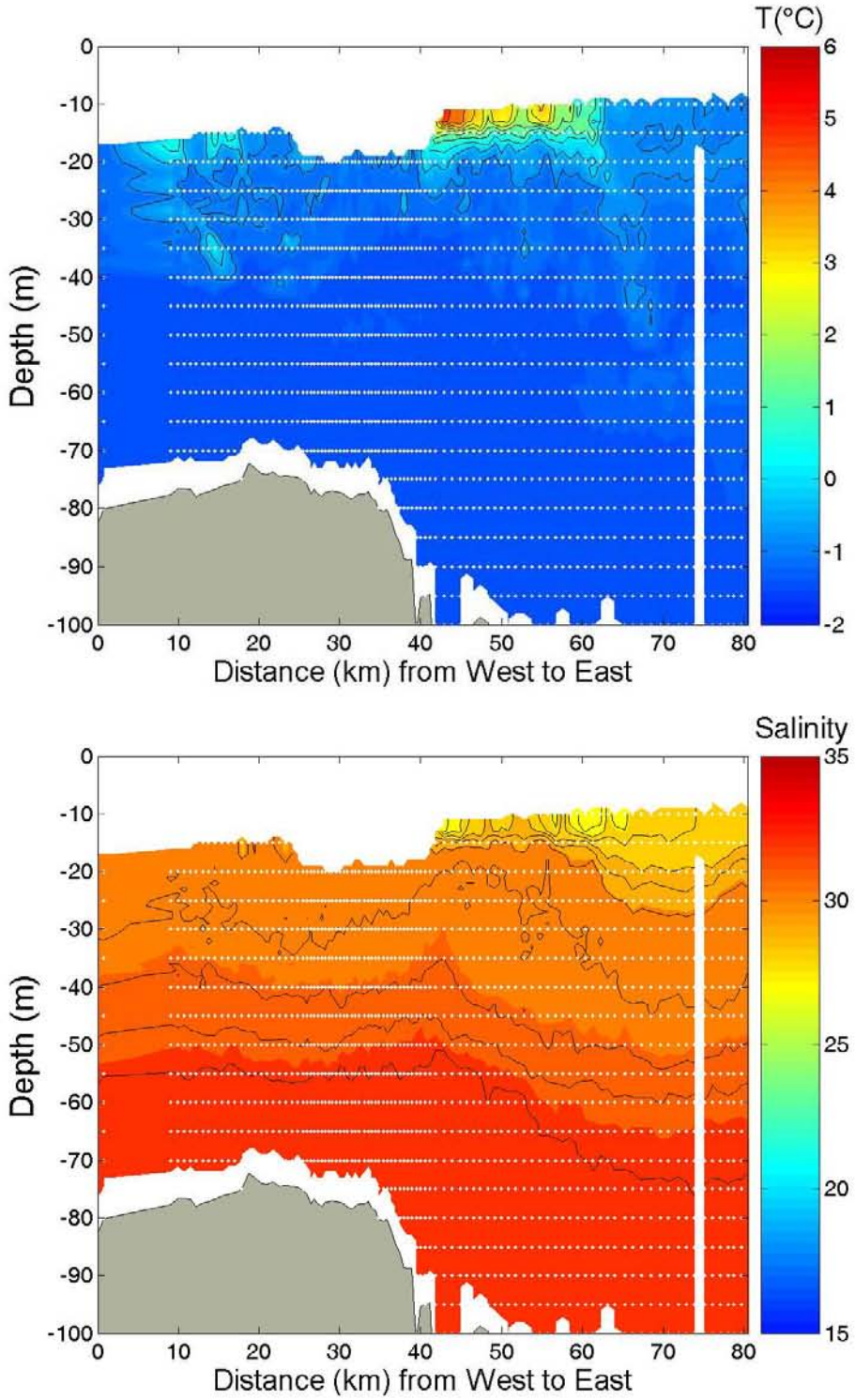
APPENDIX 11.15 Potential temperature and salinity along section 1500, Leg 8. South is on the left and North is on the right.



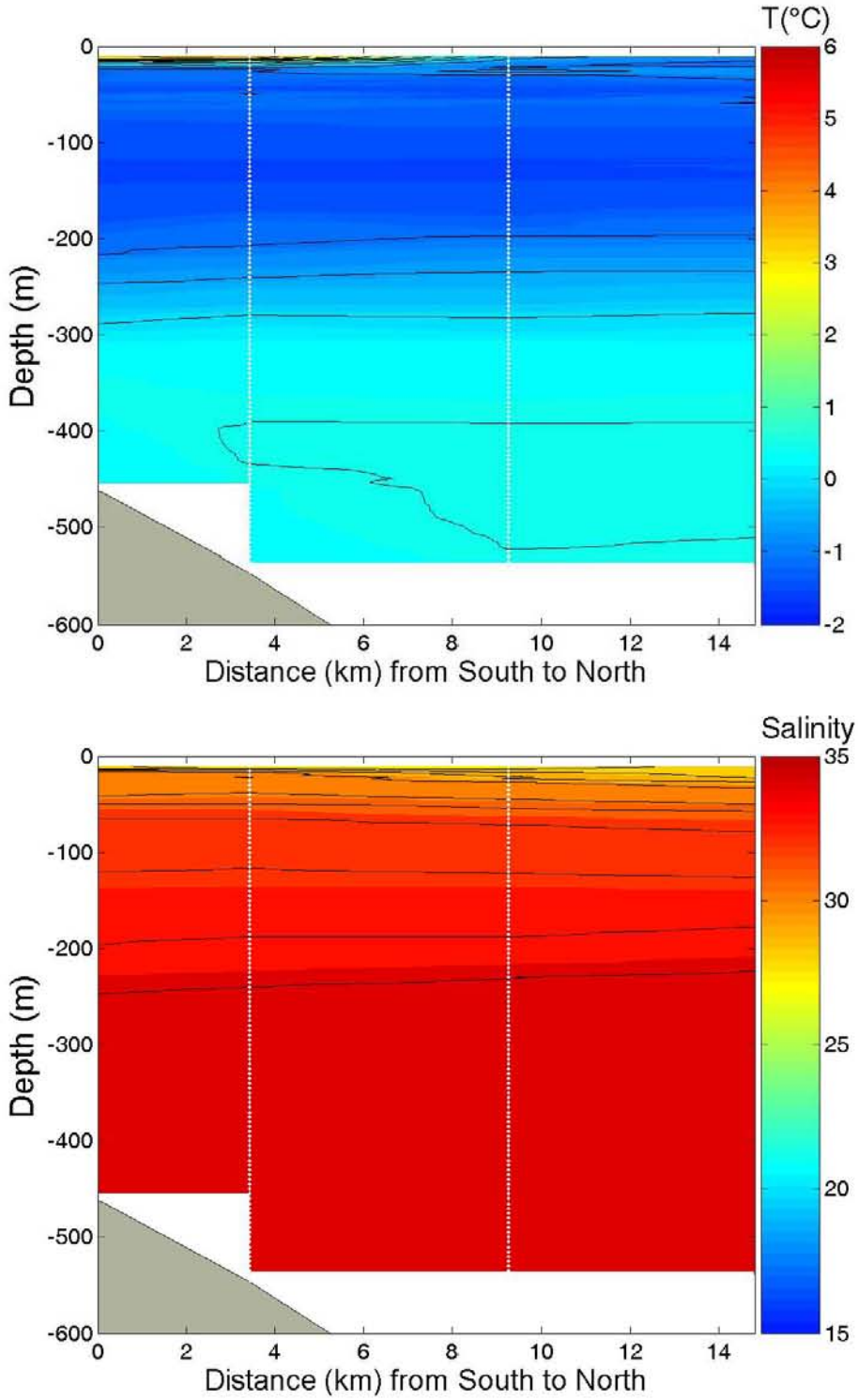
APPENDIX 11.16 Potential temperature and salinity along section 1600, Leg 8. South is on the left and North is on the right.



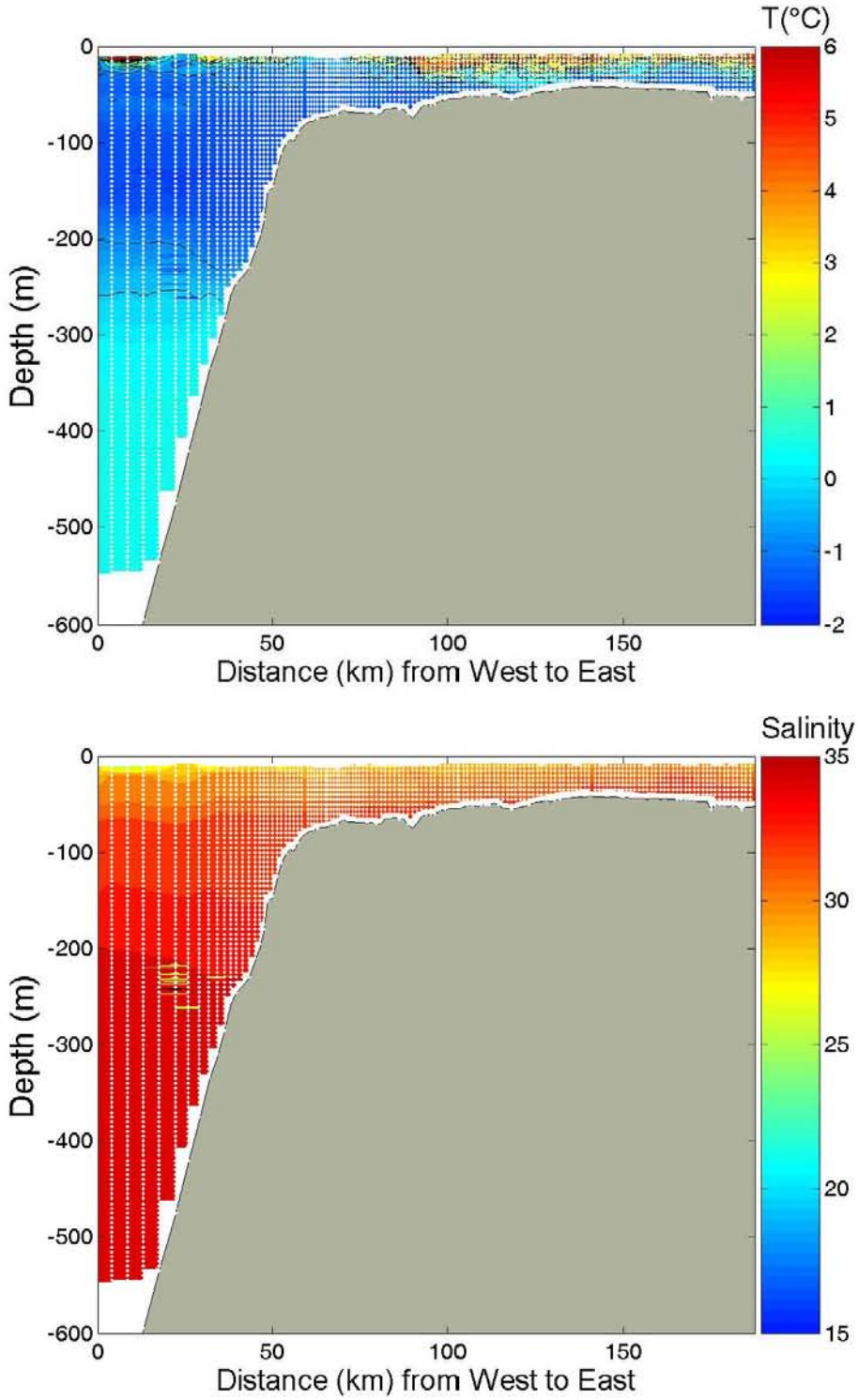
APPENDIX 11.17 Potential temperature and salinity along section 1700, Leg 8. South is on the left and North is on the right.



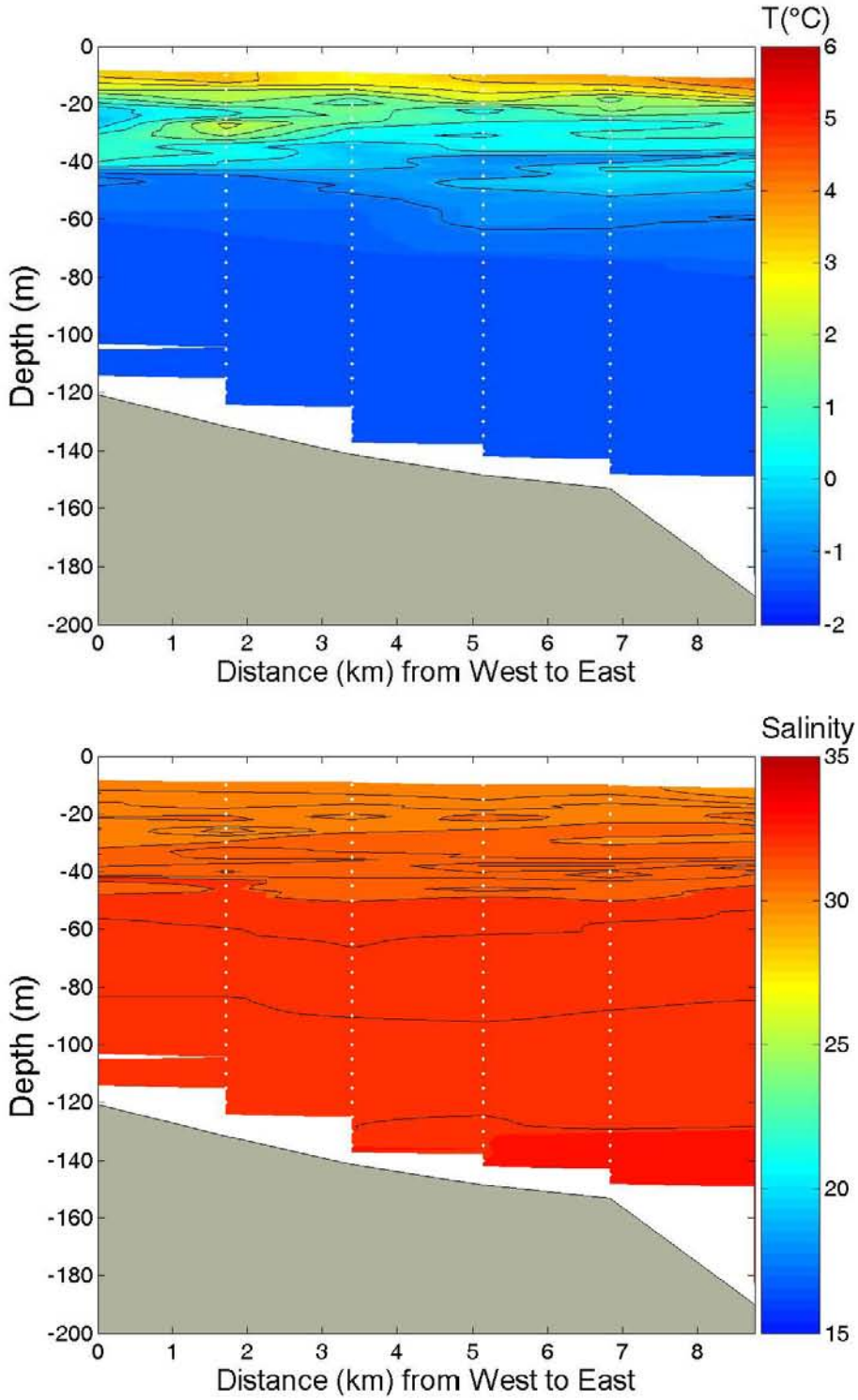
APPENDIX 11.18 Potential temperature and salinity along section 1800, Leg 8. South-West is on the left and North-East is on the right.



APPENDIX 11.19 Potential temperature and salinity along section 1900, Leg 8. South is on the left and North is on the right.

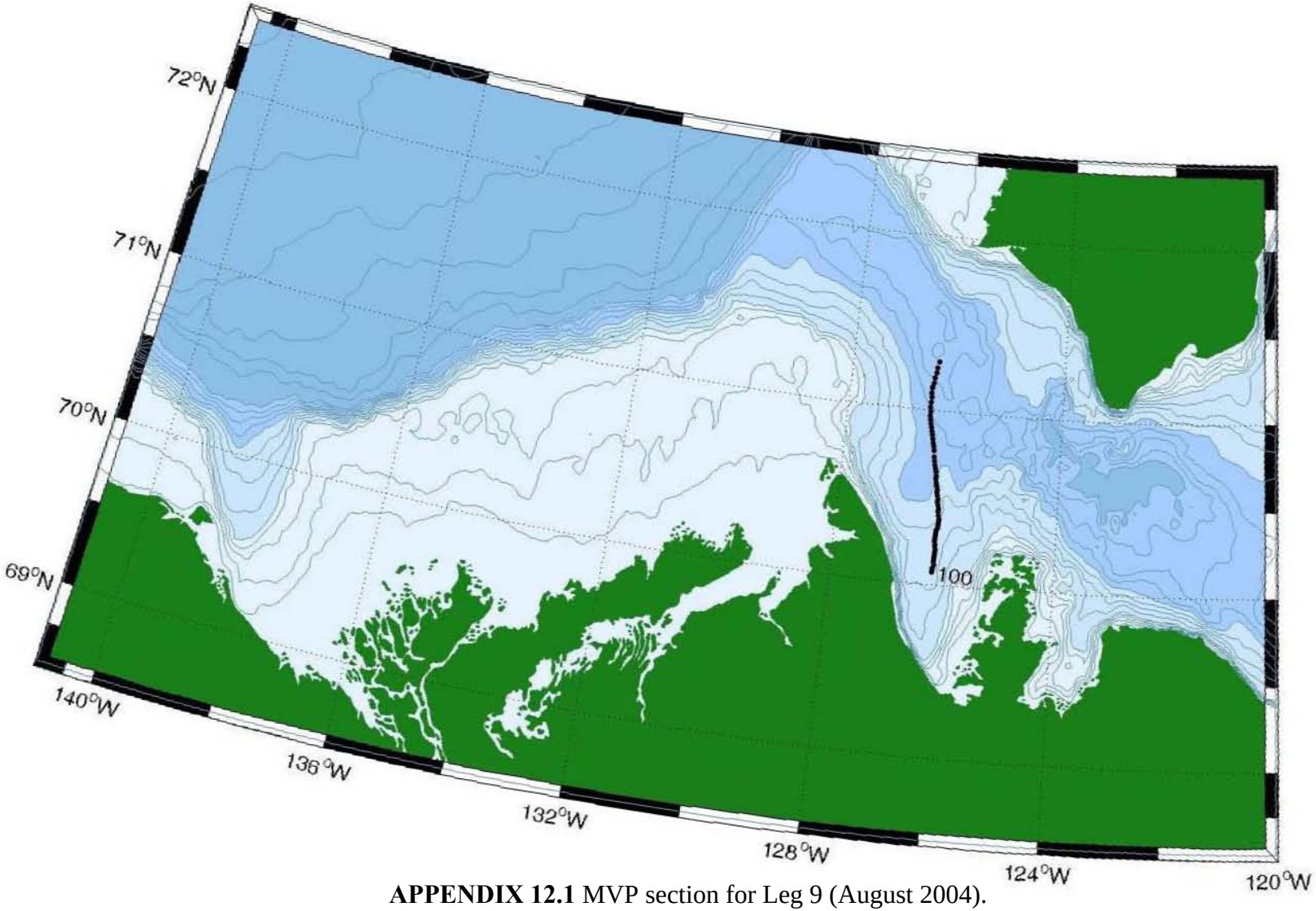


APPENDIX 11.20 Potential temperature and salinity along section 2000, Leg 8. West is on the left and East is on the right.

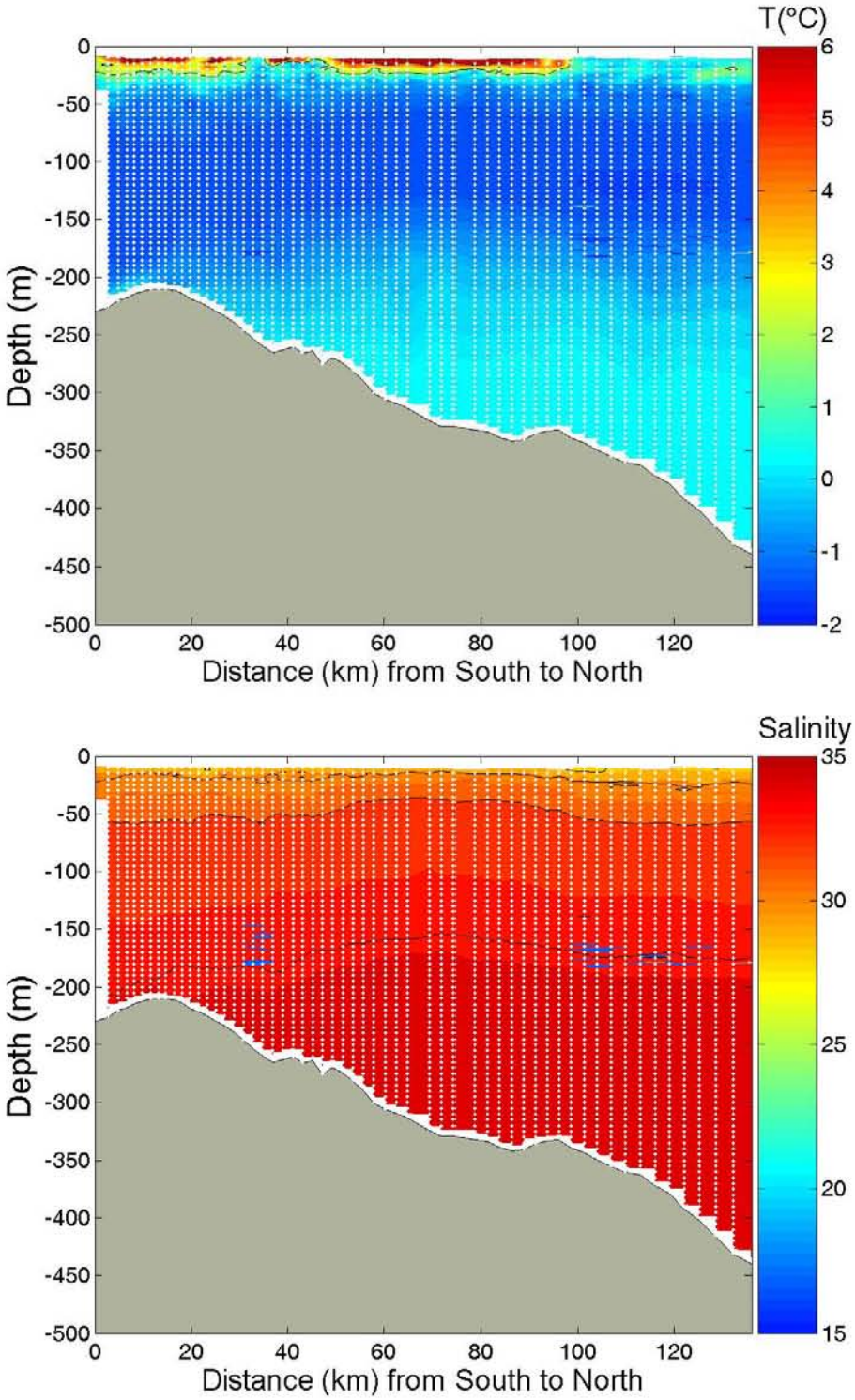


APPENDIX 11.21 Potential temperature and salinity along section 2100, Leg 8. South-West is on the left and North-East is on the right.

APPENDIX 12. Sections of salinity and potential temperature from MVP data. Leg 9 (August 2004).



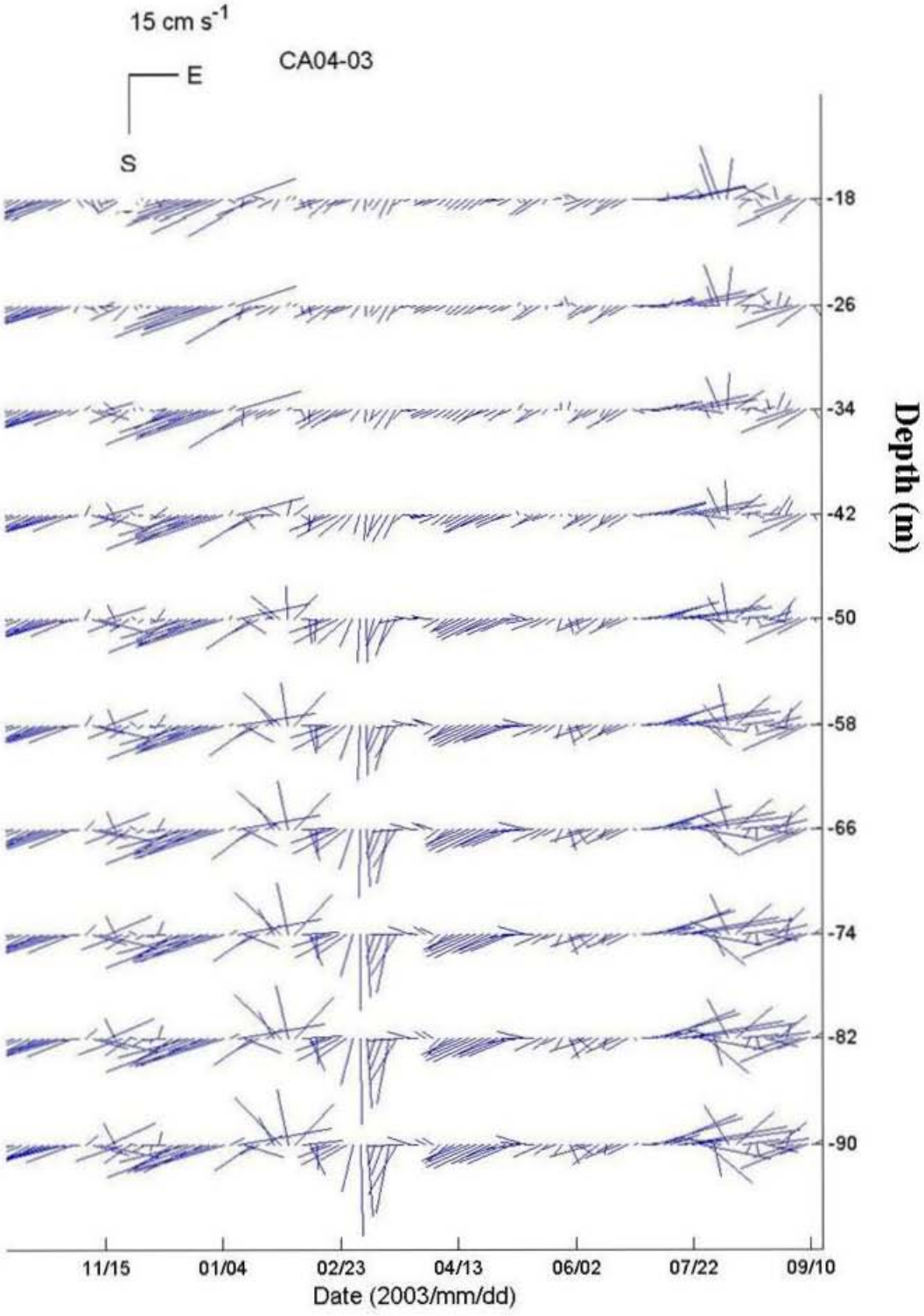
APPENDIX 12.1 MVP section for Leg 9 (August 2004).



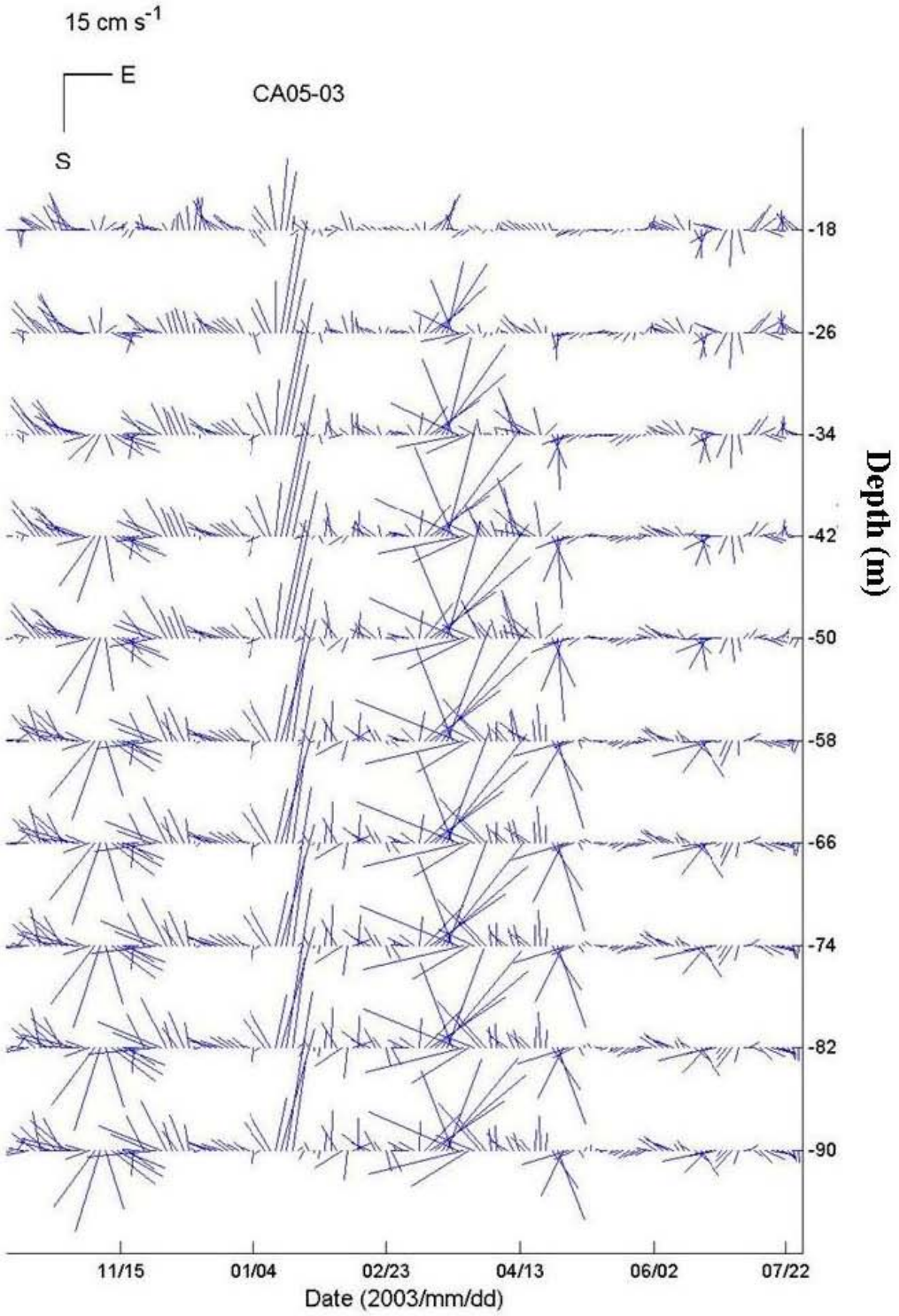
APPENDIX 12.2 Potential temperature and salinity along section 100, Leg 9. South is on the left and North is on the right.

APPENDIX 13 ADCP data recorded between October 2003 and September 2004.

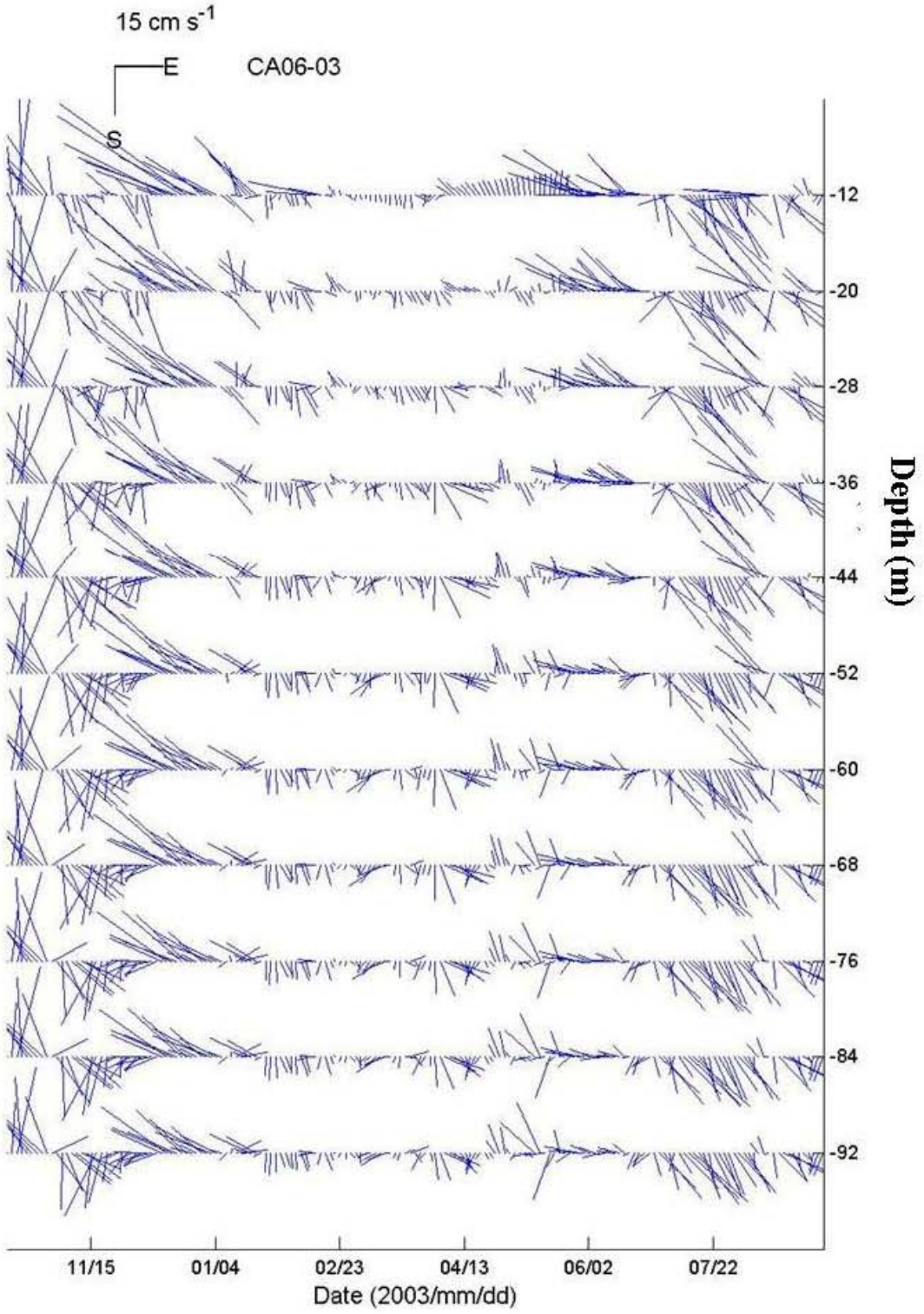
Data are presented as stick diagram plot every 8 m of depth. There is one figure for every mooring. Moorings location will be found on fig. 4 and in table 6. Eastward is to the right and the velocity scale is shown at the top of each figure.



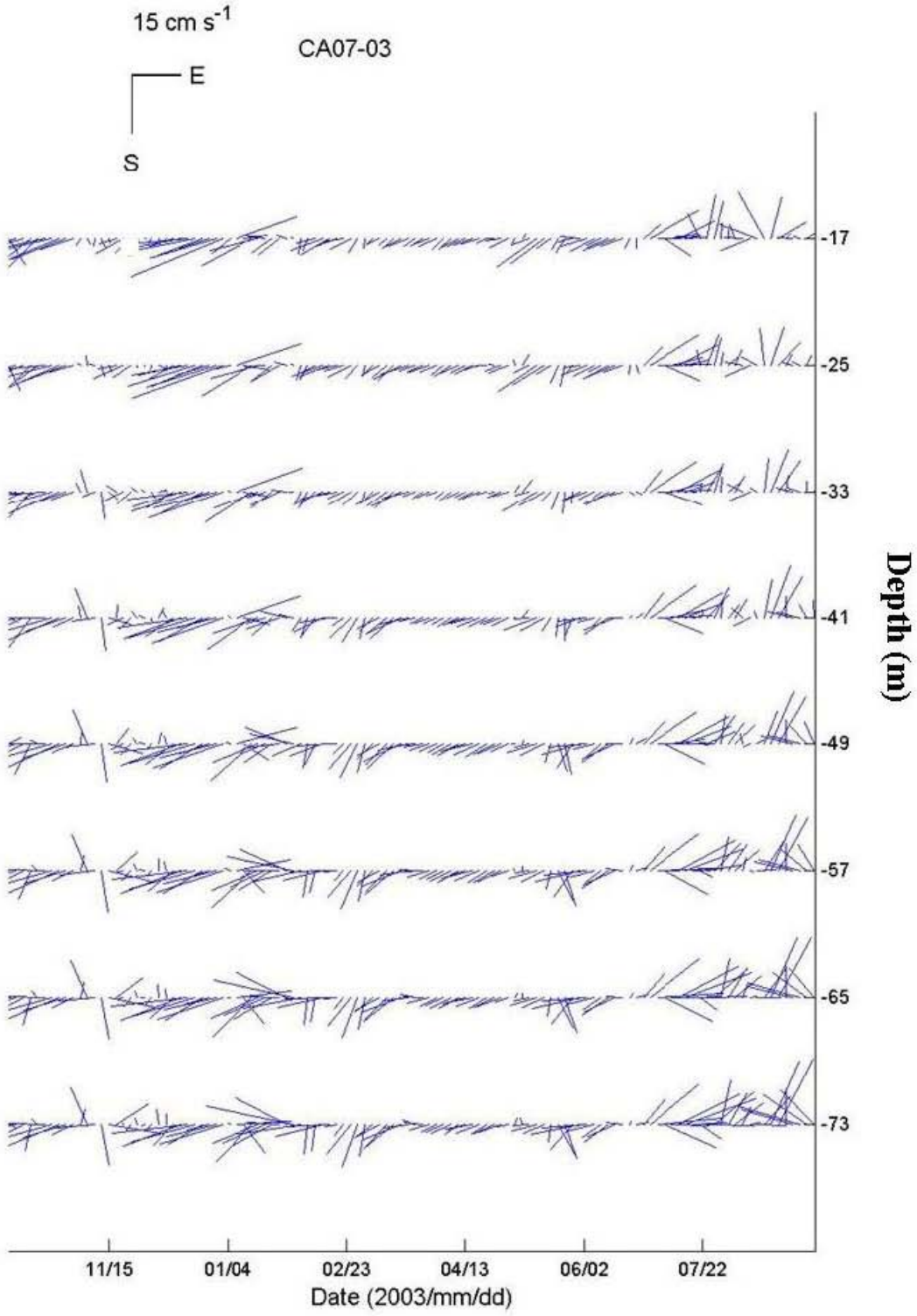
APPENDIX 13.1 Stick diagram showing the ADCP velocity recorded every 8 m between 18 m and 90 m from the mooring CA04-03 between October 4th, 2003 and September 17th, 2004.



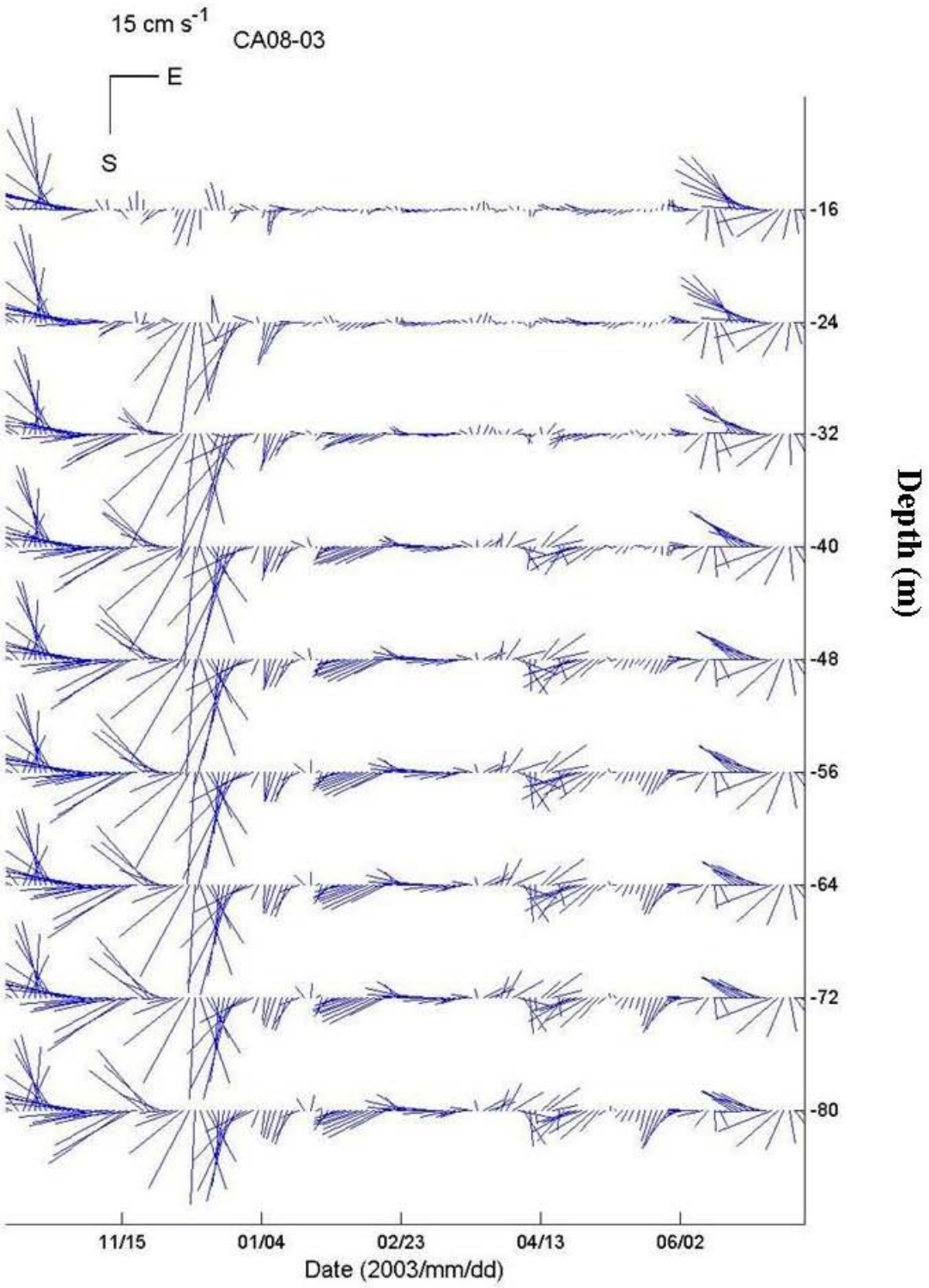
APPENDIX 13.2 Stick diagram showing the ADCP velocity recorded every 8 m between 18 m and 90 m from the mooring CA05-03 between October 12th, 2003 and July 28th, 2004.



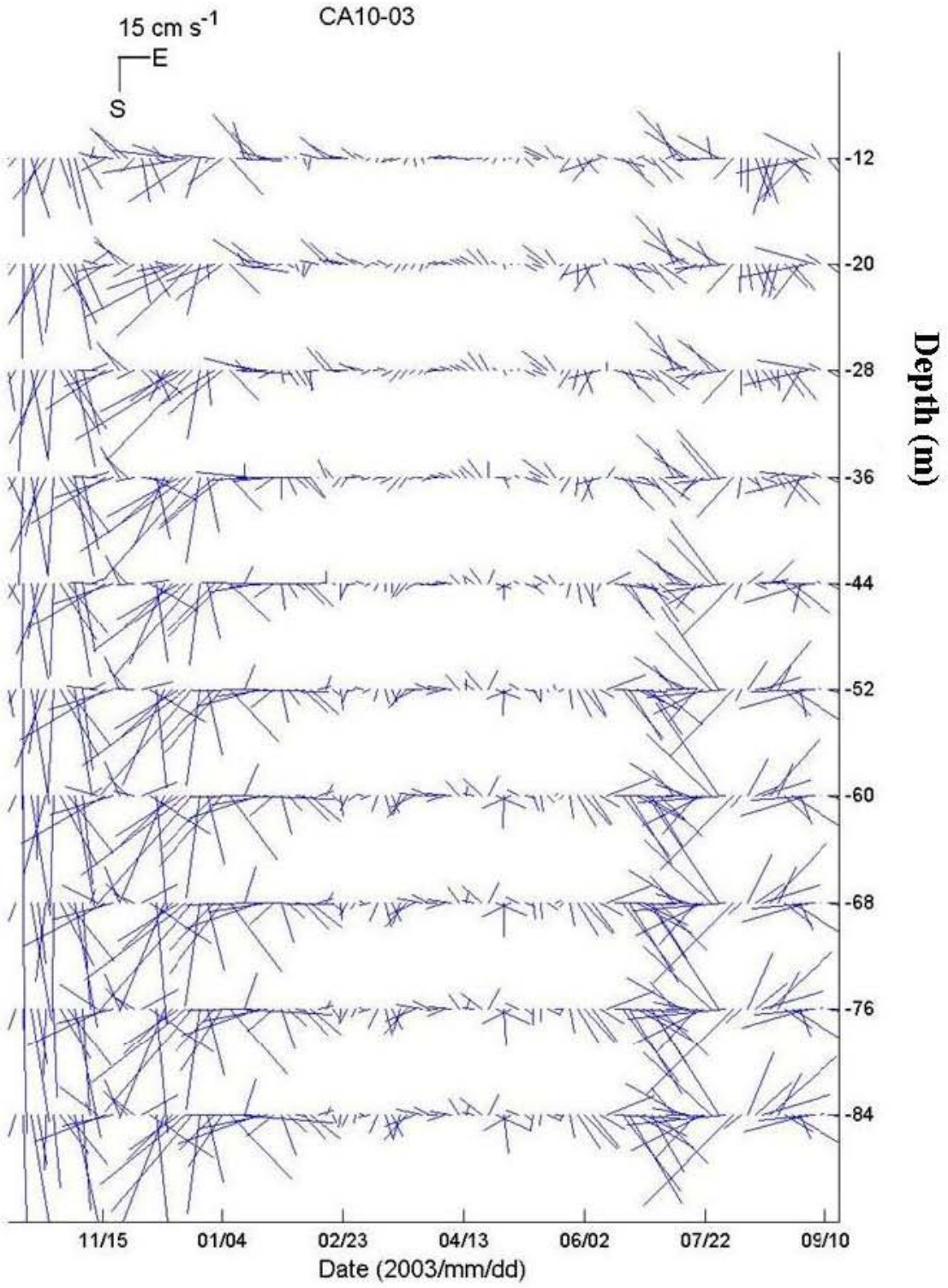
APPENDIX 13.3 Stick diagram showing the ADCP velocity recorded every 8 m between 12 m and 92 m from the mooring CA06-03 between October 11th, 2003 and September 5th, 2004.



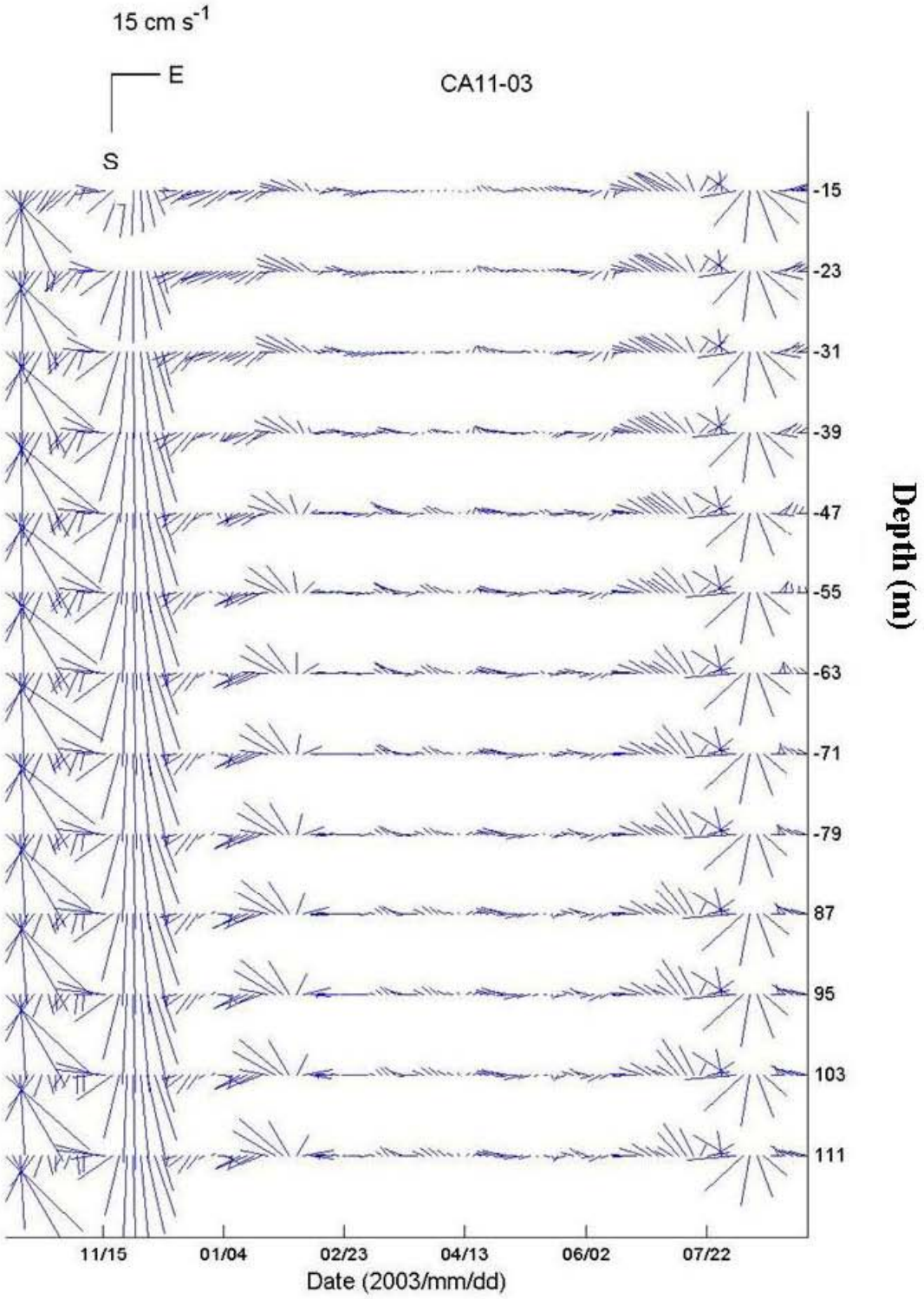
APPENDIX 13.4 Stick diagram showing the ADCP velocity recorded every 8 m between 17 m and 73 m from the mooring CA07-03 between October 3rd, 2003 and September 7th, 2004.



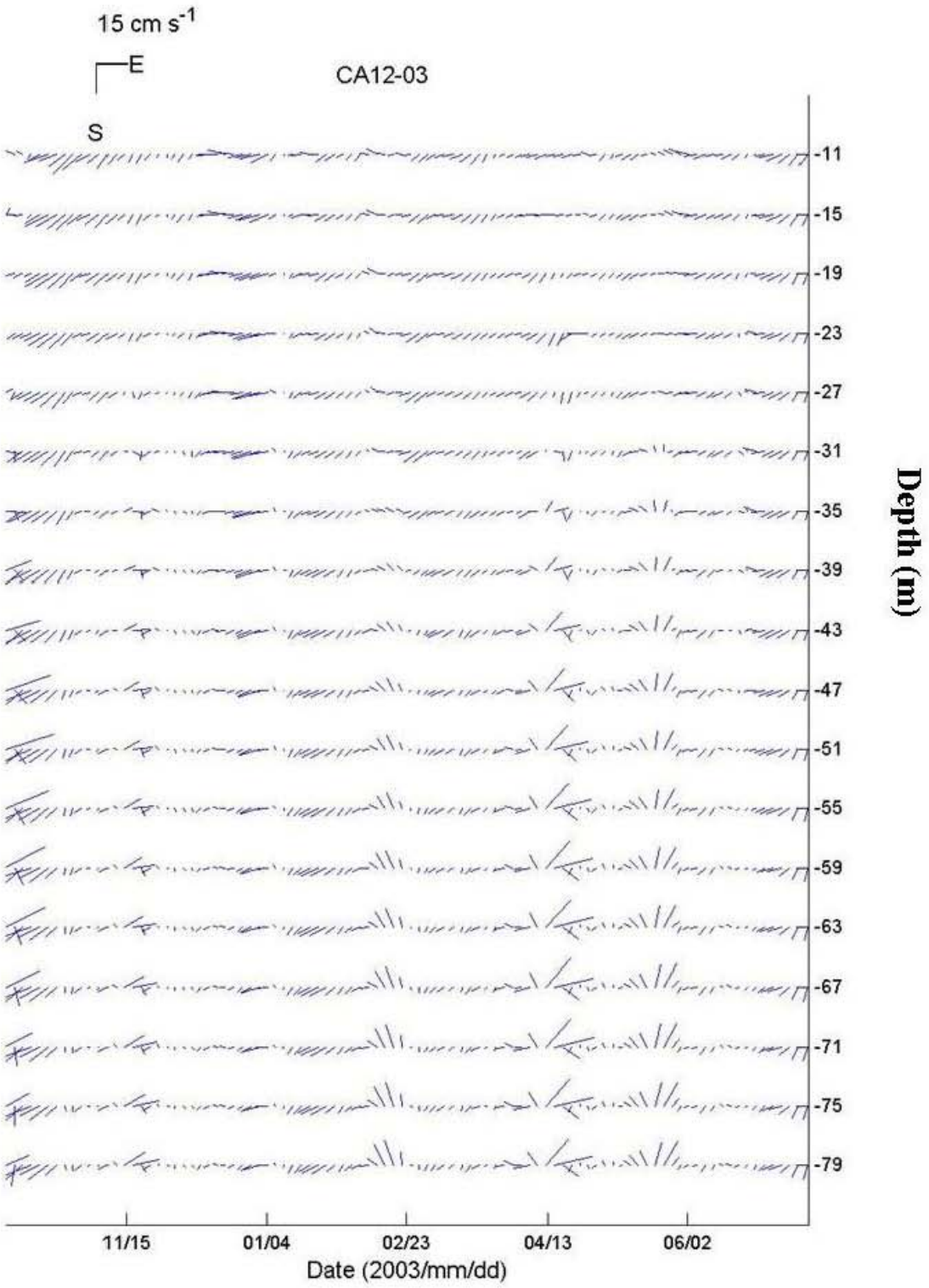
APPENDIX 13.5 Stick diagram showing the ADCP velocity recorded every 8 m between 16 m and 80 m from the mooring CA08-03 between October 13th, 2003 and July 18th, 2004.



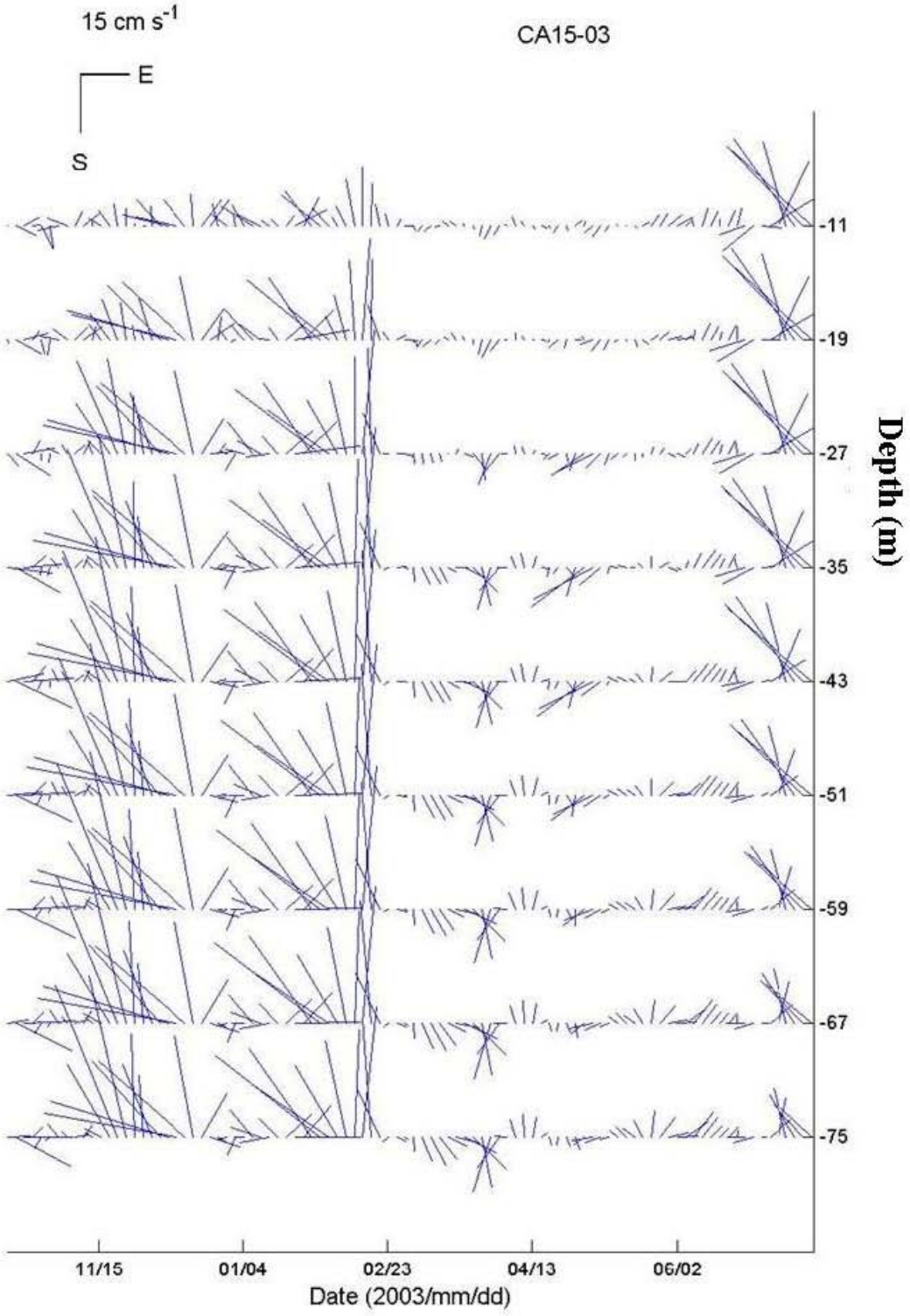
APPENDIX 13.6 Stick diagram showing the ADCP velocity recorded every 8 m between 12 m and 84 m from the mooring CA10-03 between October 6th, 2003 and September 8th, 2004.



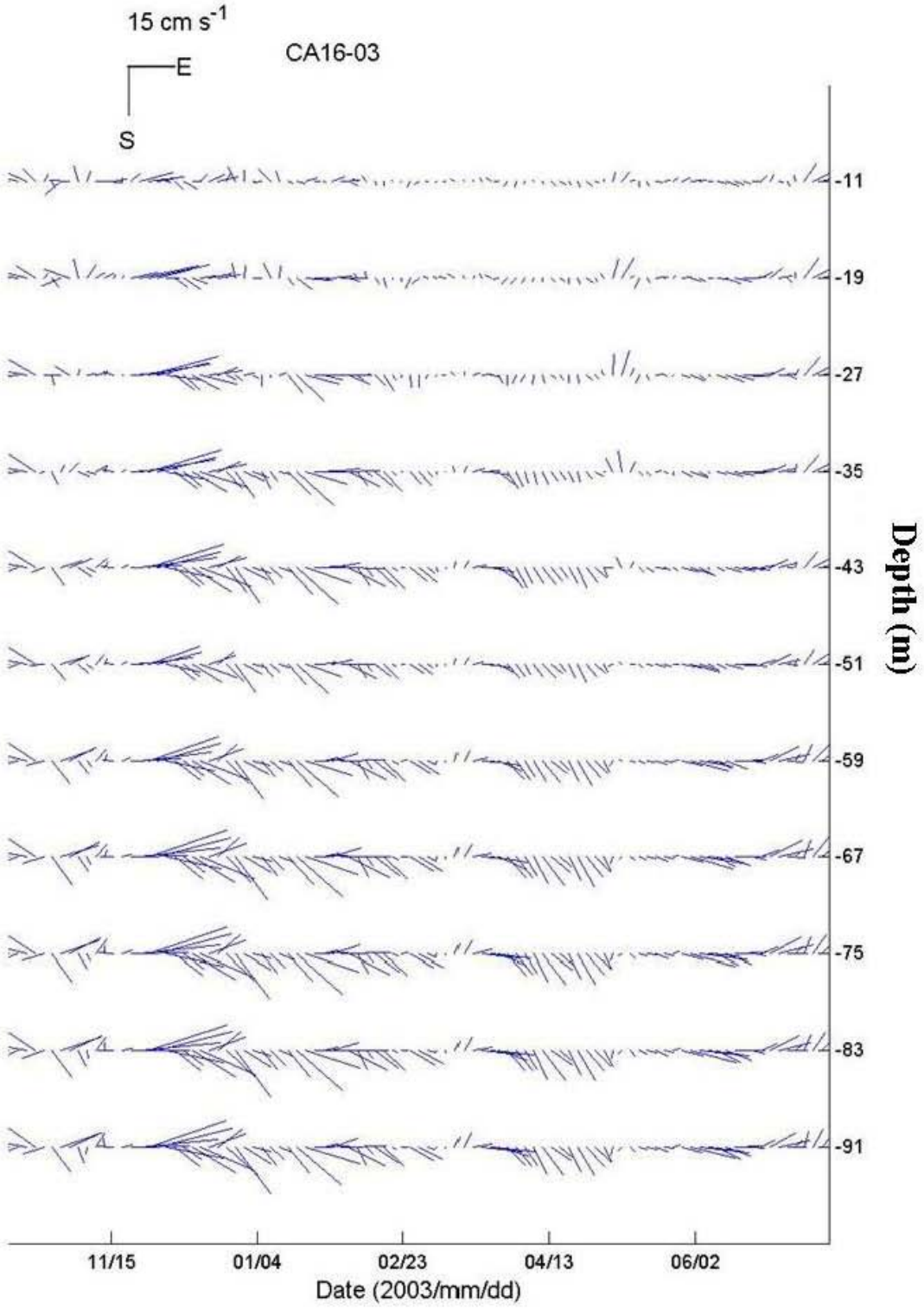
APPENDIX 13.7 Stick diagram showing the ADCP velocity recorded every 8 m between 15 m and 111 m from the mooring CA11-03 between October 5th, 2003 and September 9th, 2004.



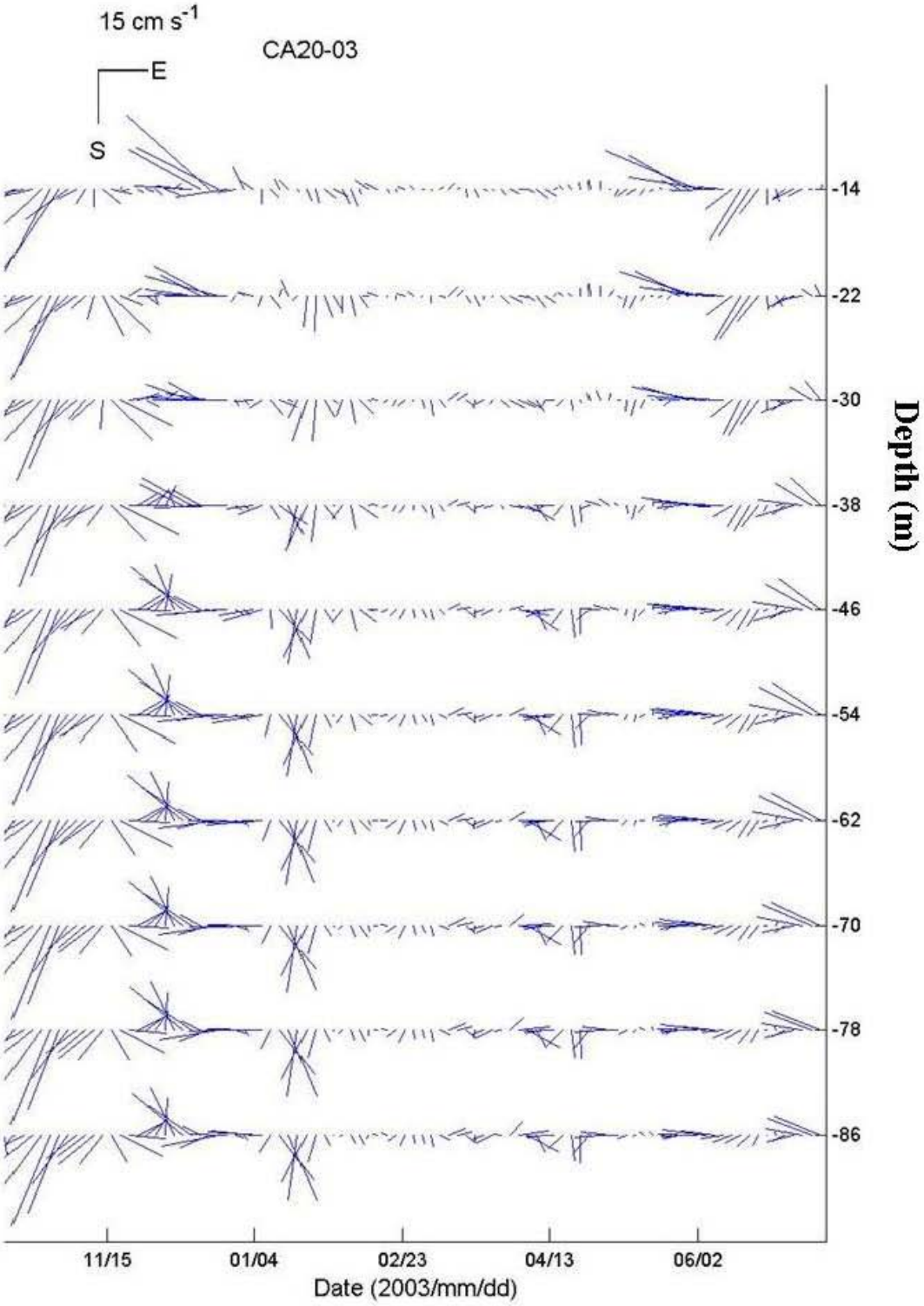
APPENDIX 13.8 Stick diagram showing the ADCP velocity recorded every 8 m between 11 m and 79 m from the mooring CA12-03 between October 2nd, 2003 and July 27th, 2004.



APPENDIX 13.9 Stick diagram showing the ADCP velocity recorded every 8 m between 11 m and 75 m from the mooring CA15-03 between October 10th, 2003 and July 22nd, 2004.



APPENDIX 13.10 Stick diagram showing the ADCP velocity recorded every 8 m between 11 m and 91 m from the mooring CA16-03 between October 10th, 2003 and July 22nd, 2004.



APPENDIX 13.11 Stick diagram showing the ADCP velocity recorded every 8 m between 14 m and 86 m from the mooring CA20-03 between October 12th, 2003 and July 16th, 2004.