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Short Cruise Report
- RV Maria S. Merian, cruise MSM-27 -

St. John's – St. John's
19th April - 06th May 2013
Chief Scientist: Dr. Dagmar Kieke
Captain: Ralf Schmidt

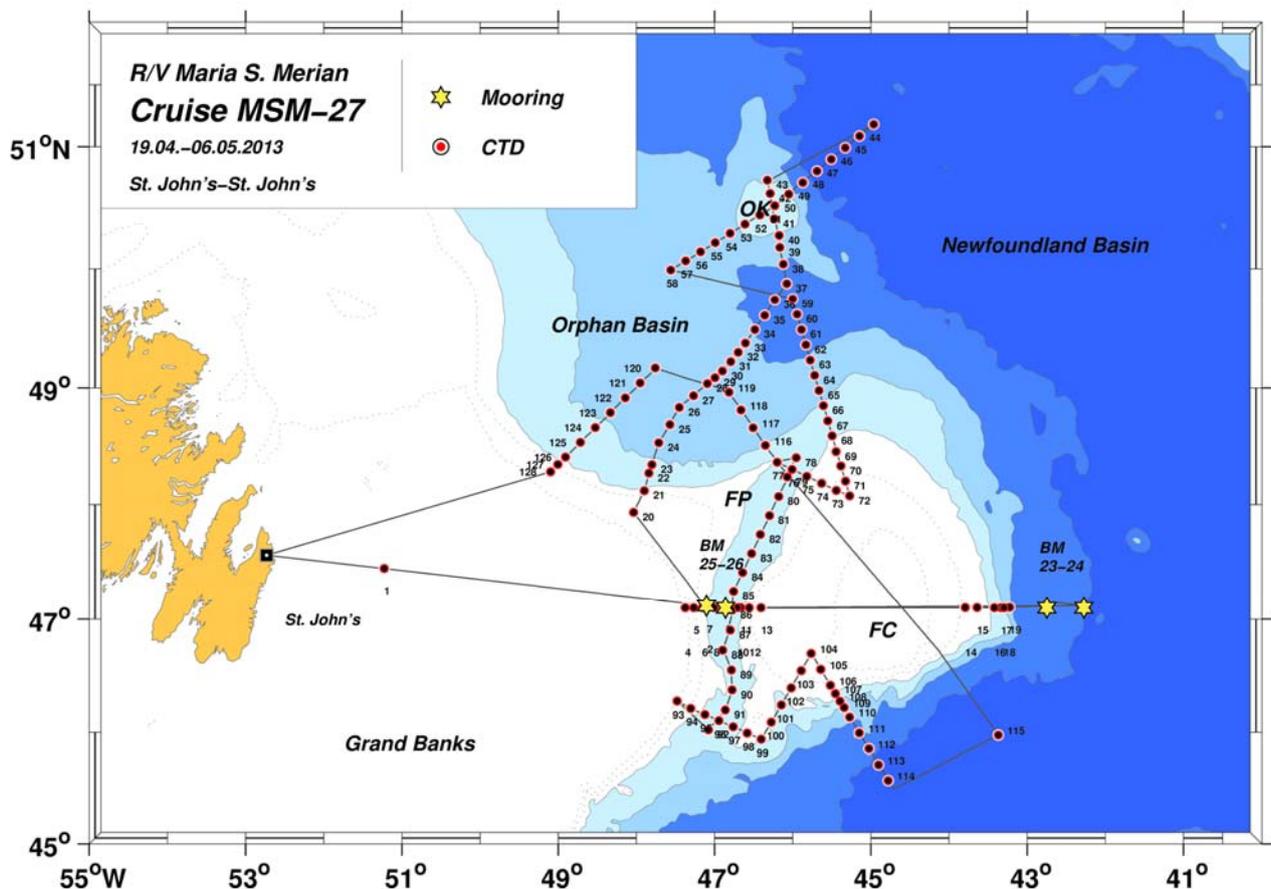


Figure 1: Track of RV Maria S. Merian, cruise MSM-27.

FC: Flemish Cap, FP: Flemish Pass; OK: Orphan Knoll.

1. Objectives

Measurements conducted during cruise MSM-27 contribute to the project FLEPVAR, funded by the German Science Foundation (DFG) and jointly conducted by the Universities of Bremen and Hamburg. Mooring activities carried out in the Deep Western Boundary Current east of Flemish Cap are funded by the German Ministry of Education and Research (BMBF) as part of RACE, work package 1.2, affiliated to the University of Bremen.

The primary objectives of cruise MSM-27 are:

- 1) To exchange two deep-sea mooring arrays installed at about 47°N in Flemish Pass and in the Deep Western Boundary Current (DWBC) east of Flemish Cap. The Flemish Pass array aims at measuring the velocity structure and temperature and salinity of different types of Labrador Sea Water exported through Flemish Pass. The DWBC array is a full water-column mooring array. It serves to establish time series of volume transport and water mass properties related to the different components contributing to the DWBC and the North Atlantic Current (NAC).
- 2) To analyze the deep water characteristics in the vicinity of Flemish Pass and Flemish Cap, with particular focus on the different types of Labrador Sea Water.
- 3) To investigate how much of the water gathering in the Orphan Basin does enter Flemish Pass, and how much water propagates to the south east around Flemish Cap.
- 4) To estimate the export of Labrador Sea Water through Flemish Pass in 2012/2013.
- 5) To assess whether hydraulic control is one of the mechanisms governing the variability of the flow through Flemish Pass.

2. Narrative of cruise MSM-27

RV Maria S. Merian left St. John's/Newfoundland on April 19th, 2012, at 13:00 UTC. Having passed the 12 nm-zone¹, continuous logging of underway data (thermosalinograph and vessel-mounted Acoustic Doppler Current Profiler) was switched on at 14:35 UTC. At 18:30 UTC, a first hydrographic station (station 138, profile 001) was conducted on the shallow Grand Banks of Newfoundland with the purpose to check the performance of the carousel water sampler, the conductivity/temperature/depth/oxygen (CTDO) sensor package, the oxygen titration system, the salinometer and the two attached lowered Acoustic Doppler Current Profilers (IADCP).

On April 20th the vessel arrived in Flemish Pass. Multibeam data logging was switched on and the location of mooring BM-25/1, deployed at 47°07.13'N/47°06.20'W in summer 2012 was visited. While the mooring was still in place a CTDO/IADCP cast (139/002) was carried out nearby. Recovery activities started shortly after the cast (10:19 UTC) and were successfully finished at 11:16 UTC. Afterwards, the vessel headed towards the location of mooring FP-02-11, installed at a more southern location (47°05.99'N/47°06.18'W) in summer 2011. The release of this mooring could not be contacted during several previous attempts made in 2012. Foggy conditions prevented any attempt to recover the mooring now. Afterwards, the vessel headed towards the location of mooring BM-26/1, installed in summer 2012 in the center of Flemish Pass. The release could be contacted successfully, but still visibility conditions were too low because of fog to start recovering the mooring. After another hydrographic cast near the mooring site (140/003) the vessel headed again towards the western side of Flemish Pass. Following the latitude of 47°06'N a first hydrographic section including water sampling for the onboard analysis of oxygen and salinity as well as for home-based analysis of the anthropogenic tracers CFC-12 and CFC-11 was carried out. Sampling in Flemish Pass stopped on April 21st, 22:10 UTC when the hydrographic station 151/013 was finished at the eastern side of Flemish Pass.

Course was set towards east, and on April 21st, *RV Maria S. Merian* arrived the location of mooring BM-22/4, installed at 47°06.00'N/43°13.70'W in summer 2012. The releases of the mooring were contacted, and the mooring was released at 17:29 UTC. Watch-keepers were sent out to bridge to assist in spotting the mooring after its ascend to the surface. Neither was the mooring identified at the surface, nor was any radio signal stemming from

1 nm = nautical mile

the top buoy received. Thus, the mooring could not be recovered. One of the releases responded information indicating it was lying horizontally on the sea floor, while the second did not reply to acoustic commands. Activities to approach the releases and spot the mooring ended at 19:04 UTC. Overnight the vessel headed back to the eastern flank of Flemish Cap, and a hydrographic section across the DWBC including stations 152/014 to 157/019 was performed. On April 22nd, BM-22/4 was visited again. Another attempt was made to acoustically contact the two releases of BM-22/4. This time both replied its horizontal position, and the mooring was considered lost.

RV Maria S. Merian headed further east and visited mooring BM-23/4 and BM-24/2 the same day. Both moorings were successfully recovered, and activities carried out in the DWBC region ended at 19:00 UTC. Subsequently, western course was set to visit again the moorings installed in Flemish Pass. Throughout April 23rd, atmospheric pressure rose to values exceeding 1040 hPa. Mooring BM-26/2 was successfully recovered the same day. Subsequently releasing mooring FP-02-11 failed. Since it was unclear whether the mooring was still in place but the release could not respond, a dredging attempt was carried out, but was not successful. Therefore, also mooring FP-02-11 was considered lost. Due to the loss of instruments, especially necessary acoustic releases, damages in recovered floatation elements, shackles and rings, the intended deployment of the DWBC and Flemish Pass mooring arrays was abandoned during this cruise, and the following scientific program of cruise MSM-27 consisted of CTDO/IADCP casts, water sampling, and underway measurements.

On April 24th, the vessel arrived in the southern Orphan Basin. A hydrographic section led from the shelf break to the center of the Orphan Basin and ended on the top of Orphan Knoll, a topographic feature located at 50°30'N/46°30'W (stations 162/020 to 185/043). At station 175/033 two acoustic releases were attached to the water sampler system with the purpose of testing their function. Stations 177/035 and 184/042 were used for calibrating recovered MicroCAT instruments. Water samples were taken along this section on every second station with the intention of a later home-based analysis.

On April 26th, 15:58 UTC, the section from the shelf break towards Orphan Knoll was finished (station 185/043). Since the bottle release unit of the water sampler system showed failures, it was replaced by another release unit while on transit to the next station location. A subsequent section started at 51°11'N/44°58'W on April 26th, 20:20 UTC, and

crossed Orphan Knoll again in westward direction (stations 186/044 to 200/058). The section was ended on April, 28th, 14:07 UTC, at 49°59'N/47°33'W.

After a transit of about 62 nm *RV Maria S. Merian* arrived at 49°45'N/46°00'W and extended the hydrographic line from Orphan Knoll towards Flemish Cap. Stations were carried out at distances of 9 nm. The southern end of the line located at Flemish Cap was reached on April, 30th, 00:30 UTC (station 214/072, 350m water depth).

A short section from Flemish Cap towards Sackville Spur at the northern entrance to Flemish Pass followed on April 30th (stations 215/073 to 219/077, 8 nm distances between stations).

Beginning at 48°14'N/46°04'W a hydrographic section followed the central axis of Flemish Pass towards its southern exit (stations 220/078 to 234/092, distances of 11 nm between stations, April 30th to May 01st). At station 222/080 the uncharted drilling platform West Aquarius was passed.

Having arrived at the southern exit of Flemish Pass, a short section running from the shelf break towards Beothuk Knoll and later on Flemish Cap was conducted (stations 235/093 to 246/104, station distances of 8 nm, May 01st to May 02nd). Starting at a water depth of about 260 nm (station 246/104) station work was conducted following a course towards the southeast across the DWBC (end of section at station 256/114, 4372m water depth, May 03rd, 09:54 UTC). Wind had continuously increased since April 29th and peaked on May 03rd. Recorded wind speeds exceeded 8 Bf. A last station intended to be carried out at a water depth of around 4700m had to be canceled since high sea state and strong winds experienced during the night of May 02nd to May 03rd put the vessel into strong pitching and rolling movements. This severely hampered station work and caused kinks in the sea cable connected to the water sampler unit. Data quality of lowered ADCP data is expected to be low for stations 250/108 to 256/114.

After a transit of 67 nm towards the northeast, a second section across the DWBC was planned, and station 257/115 was conducted at 45°58'N/43°22'W at a water depth of 4633m. While sea state conditions still allowed deploying the water sampler unit, the cast was aborted while the unit was at 1500 dbar, since the wind and sea conditions again led to massive pitch and roll movements of the vessel that impacted on the data quality. Therefore, no further station work was conducted along this second line across the DWBC. Instead, *RV Maria S. Merian* was in transit along the intended track to the top of Flemish

Cap, and underway measurements were carried out. Multibeam logging was switched off while crossing the shallow top of Flemish Cap.

On May 05th *RV Maria S. Merian* arrived again at the northern entrance of Flemish Pass. Wind and sea state had significantly reduced over night. Thus, the remaining ship time was spent to carry out a short section across the southern Orphan Basin as well as a final section from the central Orphan Basin towards the shelf break. Station work began the same day at 12:31 UTC (station 258/116) and lasted on until May 05th, 18:39 UTC (station 270/128). Multibeam data logging was stopped for the remaining time of the cruise. After station work was finished, *RV Maria S. Merian* started sailing towards St. John's, Canada. Logging of underway measurements was stopped on May 05th at 23:30 UTC. Cruise MSM-27 ended on May 06th, 10:30 UTC when the vessel moored at Pier 17 of St. John's harbor.

Acknowledgements

This was a short but nevertheless intense cruise that led us up and down the slopes of Flemish Cap and Flemish Pass. We all benefited from the great hospitality granted to us aboard *RV Maria S. Merian*. Therefore, we would like to thank the master of *RV Maria S. Merian*, Ralf Schmidt, and his entire crew for the support during cruise *MSM-27* which made our stay aboard very comfortable. Further thanks goes to the agencies (*DFG-FLEPVAR*, *BMBF-RACE-WP 1.2*, the *Senatskommission für Ozeanographie*, and the *Leitstelle Deutsche Forschungsschiffe*) that provided the necessary ship time, funding, and support to pursue all scientific work. Special thanks goes to Klaus Bohn (*LPL Projects + Logistics GmbH*) and Francis Kenny (*Avalon Customs Brokers*) who both made it possible that our containers arrived on schedule in St. John's, besides the bad weather conditions on the North Atlantic in early April.

Table 1. Participants, RV Maria S. Merian, cruise MSM-27

	Name	Institution	Field of Activity
1.	Kieke, Dagmar	IUPHB	chief scientist
2.	de Abreu Nunes, Nuno	IFM-ZMAW	oxygen analysis, data evaluation
3.	Grieshaber, Björn	IFM-ZMAW	CTD/IADCP watch
4.	Horn, Myriel	IUPHB	CTD/IADCP watch
5.	Hinrichs, Claudia	IFM-ZMAW	CTD/IADCP watch
6.	Jochumsen, Kerstin	IFM-ZMAW	CTD calibration, Flemish Pass moorings, data evaluation
7.	Mertens, Christian	IUPHB	vm-ADCP processing, DWBC moorings, data evaluation
8.	Moritz, Martin	IFM-ZMAW	CTD/IADCP watch
9.	Peters, Maike	IUPHB	CTD/IADCP watch
10.	Schneider, Linn	IUPHB	IADCP processing, data evaluation
11.	Sültenfuß, Pia	IUPHB	CTD/IADCP watch, tracer sampling
12.	Varotsou, Eirini	IFM-ZMAW	CTD/IADCP watch, salinometry
13.	Welsch, Andreas	IFM-ZMAW	technics, moorings, CTD

IFM-ZMAW: Universität Hamurg, Institut für Meereskunde, Zentrum für Marine und Atmosphärische Wissenschaften, Hamburg, Germany

IUPHB: Universität Bremen, Institut für Umweltphysik, AG Ozeanographie Bremen, Germany

Table 2. Flemish Pass Moorings, MSM-27, 2013

Mooring ID	Latitude	Longitude	Depth [m]	Deployment Date/Time	Recovery Date/Time
FP-02-11	47°05.99'N	47°06.18'W	1001	---	recovery/dredging attempt unsuccessful
BM-25/1	47°07.13'N	47°06.20'W	1009	---	20.04.2012 10:32-11:16
BM-26/1	47°05.94'N	46°51.58'W	1170	---	23.04.2013 12:31-13:04

All times are given as UTC. All moorings except FP-02-11 were equipped with radio beacons, flashers, and flags. FP-02-11 carried an *Argos* beacon. During this cruise no moorings were deployed in the Flemish Pass region.

Table 3. Deep Western Boundary Current Moorings, MSM-27, 2013

Mooring ID	Latitude	Longitude	Depth [m]	Deployment Date/Time	Recovery Date/Time
BM-22/4	47°06.00'N	43°13.70'W	3000	---	mooring could not be recovered
BM-23/4	47°06.00'N	42°45.00'W	3622	---	22.04.2013 10:30-13:11
BM-24/2	47°06.00'N	42°16.50'W	4050	---	22.04.2013 15:01-19:00

All times are given as UTC. All moorings were equipped with two radio beacons, flashers, and flags. Mooring BM-24/2 carried an additional *Argos* beacon. During this cruise no moorings were deployed in the DWBC region.

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Table 4. CTD/LADCP/Tracer-Stations. CFCs: chlorofluorocarbon sampling, O2: oxygen sampling, S: salinity sampling

Stn	Prf	Date	Time [UTC]	Latitude	Longitude	Water Depth [m]	Max. Pressure [dbar]	CFCs	O2	S	LADCP	Comment
138	1	2013/04/19	18:32	47°26.73'N	51°13.50'W	127	114	---	x	x	x	Test Station
139	2	2013/04/20	09:20	47°07.63'N	47°05.70'W	1028	1015	---	x	x	x	
140	3	2013/04/20	13:53	47°06.43'N	46°51.24'W	1100	1165	---	x	x	x	
141	4	2013/04/20	17:50	47°06.01'N	47°22.56'W	250	227	x	x	x	x	
142	5	2013/04/20	18:55	47°05.98'N	47°15.90'W	490	468	x	x	x	x	
143	6	2013/04/20	20:00	47°06.01'N	47°09.36'W	888	877	x	x	x	x	
144	7	2013/04/20	21:10	47°06.62'N	47°05.88'W	1029	1012	x	x	x	x	
145	8	2013/04/20	22:26	47°06.01'N	47°00.48'W	1137	1126	x	x	x	x	
146	9	2013/04/21	00:10	47°06.42'N	46°51.24'W	1177	1166	x	x	x	x	
147	10	2013/04/21	01:46	47°06.01'N	46°42.48'W	1148	1138	x	x	x	x	
148	11	2013/04/21	03:04	47°06.03'N	46°40.02'W	1113	1097	x	x	x	x	
149	12	2013/04/21	04:34	47°06.01'N	46°33.36'W	510	493	x	x	x	x	
150	13	2013/04/21	05:55	47°06.01'N	46°24.42'W	365	343	x	x	x	x	
152	14	2013/04/21	21:43	47°06.05'N	43°47.52'W	590	575	x	x	x	x	
153	15	2013/04/21	23:01	47°06.02'N	43°38.46'W	770	760	---	x	x	x	
154	16	2013/04/22	00:41	47°05.98'N	43°25.26'W	1280	1282	---	x	x	x	
155	17	2013/04/22	02:21	47°05.93'N	43°20.10'W	1835	1827	---	x	x	x	
156	18	2013/04/22	04:08	47°06.00'N	43°17.88'W	2560	2596	---	x	x	x	
157	19	2013/04/22	06:38	47°06.13'N	43°13.56'W	3026	3053	---	x	x	x	
162	20	2013/04/24	04:09	47°56.05'N	48°02.22'W	321	312	---	x	x	x	
163	21	2013/04/24	05:51	48°07.27'N	47°53.88'W	853	813	x	x	x	x	
164	22	2013/04/24	07:26	48°16.27'N	47°50.40'W	1762	1777	---	x	x	x	
165	23	2013/04/24	09:10	48°20.69'N	47°48.06'W	1952	1951	x	x	x	x	
166	24	2013/04/24	11:36	48°31.95'N	47°42.78'W	2255	2279	---	x	x	x	
167	25	2013/04/24	14:10	48°41.27'N	47°34.20'W	2393	2416	x	x	x	x	
168	26	2013/04/24	16:52	48°49.97'N	47°27.06'W	2502	2527	---	x	x	x	
169	27	2013/04/24	19:43	48°55.94'N	47°16.20'W	2591	2613	x	x	x	x	
170	28	2013/04/24	22:19	49°02.20'N	47°05.46'W	2677	2709	---	x	x	x	
171	29	2013/04/25	00:47	49°05.18'N	46°59.64'W	2725	2756	x	x	x	x	
172	30	2013/04/25	03:13	49°08.50'N	46°53.88'W	2773	2805	---	x	x	x	
173	31	2013/04/25	05:40	49°13.30'N	46°47.64'W	2845	2875	x	x	x	---	no IADCP data available
174	32	2013/04/25	08:49	49°18.00'N	46°41.76'W	2884	2920	---	x	x	x	
175	33	2013/04/25	11:22	49°22.71'N	46°36.24'W	2933	2968	x	x	x	x	test of acoustic releases
176	34	2013/04/25	14:23	49°29.47'N	46°29.10'W	3015	3052	---	x	x	x	

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Table 4. continued ...

Stn	Prf	Date	Time [UTC]	Latitude	Longitude	Water Depth [m]	Max. Pressure [dbar]	CFCs	O2	S	LADCP	Comment
177	35	2013/04/25	17:02	49°36.71'N	46°21.42'W	3117	3154	x	x	x	x	MicroCAT calibration stops
178	36	2013/04/25	20:40	49°44.45'N	46°13.74'W	3184	3227	---	x	x	x	
179	37	2013/04/25	23:36	49°52.64'N	46°04.50'W	3293	3340	x	x	x	x	
180	38	2013/04/26	02:31	50°02.33'N	46°07.26'W	2963	2998	---	x	x	x	
181	39	2013/04/26	05:05	50°10.60'N	46°09.84'W	2812	2844	x	x	x	x	
182	40	2013/04/26	07:28	50°16.54'N	46°10.38'W	2096	2113	---	x	x	x	
183	41	2013/04/26	09:38	50°24.66'N	46°14.16'W	1806	1817	x	x	x	x	
184	42	2013/04/26	12:00	50°37.19'N	46°17.28'W	1821	1757	---	x	x	x	MicroCAT calibration stops
185	43	2013/04/26	14:42	50°43.76'N	46°19.44'W	2168	2190	x	x	x	x	release unit of water sampler system was replaced after station
186	44	2013/04/26	20:20	51°10.90'N	44°57.84'W	4126	4203	---	---	---	---	no communication to water sampler unit at depth, exchange of COM port
187	45	2013/04/27	00:27	51°05.18'N	45°08.76'W	4122	4196	---	x	x	---	no LADCP data available, slave instrument was not woken up
188	46	2013/04/27	03:56	50°59.52'N	45°19.62'W	4115	4189	---	x	x	x	
189	47	2013/04/27	07:26	50°53.88'N	45°30.48'W	4101	4176	---	x	x	x	
190	48	2013/04/27	10:59	50°48.21'N	45°41.28'W	4093	4161	---	x	x	x	
191	49	2013/04/27	14:26	50°42.55'N	45°52.26'W	3624	3706	---	x	x	x	
192	50	2013/04/27	18:19	50°36.87'N	46°03.00'W	1952	1959	---	x	x	x	
193	51	2013/04/27	20:22	50°31.21'N	46°13.80'W	1761	1772	---	x	x	x	
194	52	2013/04/27	22:22	50°26.68'N	46°25.20'W	1785	1799	---	x	x	x	
195	53	2013/04/28	00:21	50°22.13'N	46°36.60'W	1859	1869	---	x	x	x	
196	54	2013/04/28	02:32	50°17.61'N	46°48.00'W	2289	2308	---	x	x	x	
197	55	2013/04/28	04:46	50°13.05'N	46°59.40'W	2865	2899	---	x	x	x	
198	56	2013/04/28	07:18	50°08.51'N	47°10.80'W	2853	2885	---	x	x	x	
199	57	2013/04/28	09:53	50°03.99'N	47°22.20'W	2808	2841	---	x	x	x	
200	58	2013/04/28	12:33	49°59.43'N	47°33.54'W	2742	2772	---	x	x	x	
201	59	2013/04/28	19:35	49°44.94'N	46°00.00'W	3306	3349	---	x	x	x	
202	60	2013/04/28	22:22	49°37.23'N	45°56.64'W	3331	3375	---	x	x	x	
203	61	2013/04/29	01:11	49°29.48'N	45°53.22'W	3285	3330	---	x	x	x	
204	62	2013/04/29	03:54	49°21.79'N	45°49.86'W	3098	3137	---	x	x	x	
205	63	2013/04/29	06:29	49°14.05'N	45°46.56'W	2935	2970	---	x	x	x	
206	64	2013/04/29	09:04	49°06.38'N	45°43.20'W	2730	2759	---	---	---	---	bottle file was corrupt
207	65	2013/04/29	12:11	48°58.60'N	45°39.78'W	2374	2393	---	x	x	x	
208	66	2013/04/29	14:31	48°50.90'N	45°36.42'W	1772	1785	---	x	x	x	
209	67	2013/04/29	16:32	48°43.13'N	45°33.06'W	1120	1120	---	x	x	x	
210	68	2013/04/29	18:32	48°35.44'N	45°29.70'W	1030	1031	---	x	x	x	

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Table 4. continued ...

Stn	Prf	Date	Time [UTC]	Latitude	Longitude	Water Depth [m]	Max. Pressure [dbar]	CFCs	O2	S	LADCP	Comment
211	69	2013/04/29	20:08	48°27.70'N	45°26.34'W	790	786	---	x	x	x	
212	70	2013/04/29	21:37	48°19.96'N	45°22.98'W	640	636	---	x	x	x	
213	71	2013/04/29	22:57	48°12.22'N	45°19.56'W	456	450	---	x	x	x	
214	72	2013/04/30	00:09	48°04.54'N	45°16.26'W	350	340	---	x	x	x	
215	73	2013/04/30	01:20	48°07.38'N	45°26.46'W	427	420	---	---	x	x	
216	74	2013/04/30	02:32	48°11.02'N	45°37.86'W	680	672	---	x	x	x	
217	75	2013/04/30	03:53	48°14.67'N	45°49.20'W	956	952	---	---	x	x	
218	76	2013/04/30	05:22	48°18.26'N	46°00.60'W	1157	1156	---	x	x	x	
219	77	2013/04/30	06:58	48°21.90'N	46°11.94'W	1024	1022	---	---	x	x	
220	78	2013/04/30	08:44	48°24.23'N	45°57.36'W	1123	1120	---	x	x	x	
221	79	2013/04/30	10:41	48°14.26'N	46°04.26'W	1169	1166	---	---	x	x	
222	80	2013/04/30	12:33	48°04.22'N	46°10.68'W	1165	1166	---	---	---	---	cast run without closing bottles
223	81	2013/04/30	14:28	47°54.35'N	46°17.88'W	1172	1170	---	---	x	x	
224	82	2013/04/30	16:22	47°44.46'N	46°24.78'W	1169	1170	---	x	x	x	
225	83	2013/04/30	18:14	47°34.54'N	46°31.62'W	1162	1162	---	---	x	x	
226	84	2013/04/30	20:03	47°24.59'N	46°38.52'W	1158	1158	---	x	x	x	
227	85	2013/04/30	21:54	47°14.64'N	46°45.30'W	1154	1151	---	---	x	x	
228	86	2013/04/30	23:40	47°04.71'N	46°47.04'W	1164	1168	---	x	x	x	
229	87	2013/05/01	01:33	46°54.18'N	46°48.84'W	1186	1186	---	---	x	x	
230	88	2013/05/01	03:29	46°43.63'N	46°53.76'W	1218	1220	---	x	x	x	
231	89	2013/05/01	05:31	46°33.12'N	46°46.98'W	1225	1226	---	---	x	x	
232	90	2013/05/01	07:18	46°22.53'N	46°46.50'W	1258	1256	---	x	x	x	
233	91	2013/05/01	09:11	46°11.90'N	46°51.78'W	1264	1264	---	---	x	x	
234	92	2013/05/01	11:18	46°01.26'N	47°04.74'W	1430	1433	---	x	x	x	
235	93	2013/05/01	14:21	46°16.58'N	47°28.74'W	271	258	---	---	x	x	
236	94	2013/05/01	15:42	46°12.71'N	47°18.24'W	611	603	---	x	x	x	
237	95	2013/05/01	17:09	46°09.44'N	47°07.38'W	1452	1451	---	---	x	x	
237	96	2013/05/01	19:08	46°06.14'N	46°56.58'W	1288	1291	---	x	x	x	
239	97	2013/05/01	20:52	46°02.83'N	46°45.72'W	1267	1270	---	---	x	x	
240	98	2013/05/01	22:36	45°59.54'N	46°34.92'W	547	540	---	x	x	x	
241	99	2013/05/02	00:00	45°56.24'N	46°24.12'W	873	871	---	---	x	x	
242	100	2013/05/02	01:50	46°05.38'N	46°16.44'W	1150	1156	---	x	x	x	

Short Cruise Report, RV Maria S. Merian, cruise MSM-27, St. John's – St. John's, Apr 19th – May 06th 2013

Table 4. continued ...

Stn	Prf	Date	Time [UTC]	Latitude	Longitude	Water Depth [m]	Max. Pressure [dbar]	CFCs	O2	S	LADCP	Comment
243	101	2013/05/02	03:44	46°14.48'N	46°08.82'W	1309	1314	---	---	x	x	
244	102	2013/05/02	05:43	46°23.60'N	46°01.14'W	494	492	---	x	x	x	
245	103	2013/05/02	07:21	46°32.69'N	45°53.52'W	381	373	---	---	x	x	
246	104	2013/05/02	08:53	46°41.83'N	45°45.84'W	264	253	---	x	x	x	
247	105	2013/05/02	10:23	46°33.40'N	45°38.46'W	281	273	---	---	x	x	
248	106	2013/05/02	11:53	46°24.97'N	45°31.08'W	540	535	x	x	x	x	
249	107	2013/05/02	13:11	46°20.52'N	45°27.18'W	1341	1349	x	---	x	x	
250	108	2013/05/02	14:47	46°16.53'N	45°23.70'W	1699	1697	x	x	x	x	
251	109	2013/05/02	16:32	46°13.12'N	45°20.52'W	2311	2299	x	---	x	x	
252	110	2013/05/02	18:50	46°08.07'N	45°16.26'W	2841	2870	x	x	x	x	
253	111	2013/05/02	21:38	45°59.60'N	45°08.88'W	3075	3108	x	x	x	x	
254	112	2013/05/03	00:42	45°51.20'N	45°01.44'W	3700	3758	x	x	x	x	
255	113	2013/05/03	03:56	45°42.76'N	44°54.06'W	4085	4148	x	x	x	x	
256	114	2013/05/03	07:28	45°34.32'N	44°46.74'W	4372	4440	x	x	x	x	
257	115	2013/05/03	18:33	45°58.47'N	43°22.26'W	4633	1518	---	x	x	x	cast aborted at 1518 dbar
258	116	2013/05/04	12:32	48°30.56'N	46°21.06'W	1981	1996	---	x	x	x	
259	117	2013/05/04	15:02	48°39.61'N	46°30.36'W	2636	2664	---	x	x	x	
260	118	2013/05/04	17:40	48°48.63'N	46°39.66'W	2702	2730	---	x	x	x	
261	119	2013/05/04	20:20	48°57.71'N	46°48.96'W	2766	2796	---	x	x	x	
262	120	2013/05/05	01:22	49°10.03'N	47°45.59'W	2459	2482	---	x	x	x	
263	121	2013/05/05	03:59	49°02.46'N	47°57.08'W	2361	2383	---	x	x	x	
264	122	2013/05/05	06:28	48°54.89'N	48°08.56'W	2262	2277	---	---	x	x	
265	123	2013/05/05	08:52	48°47.31'N	48°20.04'W	2117	2135	---	x	---	x	
266	124	2013/05/05	11:14	48°39.74'N	48°31.52'W	1900	1914	---	---	x	x	
267	125	2013/05/05	13:27	48°32.18'N	48°43.01'W	1685	1684	---	x	x	x	
268	126	2013/05/05	15:35	48°24.57'N	48°54.45'W	1223	1213	---	---	x	x	
269	127	2013/05/05	17:00	48°20.81'N	49°00.40'W	967	960	---	x	x	x	
270	128	2013/05/05	18:19	48°16.97'N	49°05.92'W	397	387	---	---	---	x	