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Short Cruise Report
- RV Maria S. Merian, cruise MSM-42 -

Bermuda – St. John's/Canada
02 May – 22 May 2015
Chief Scientist: Dr. Dagmar Kieke
Captain: Ralf Schmidt

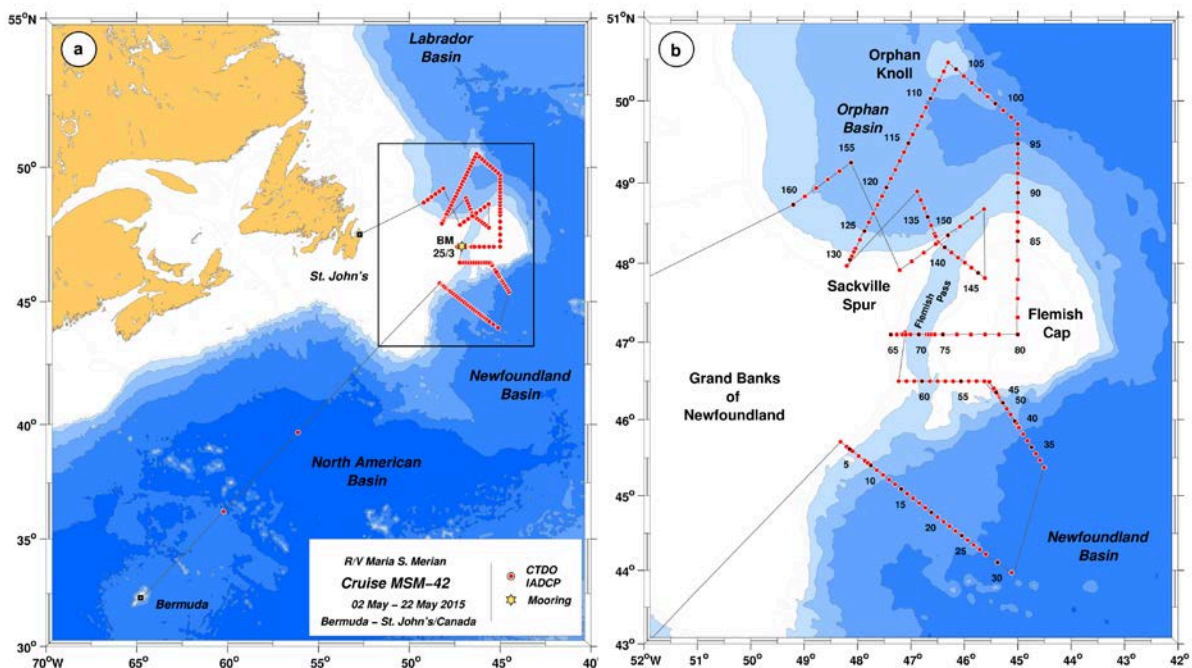


Figure 1. Track of RV MARIA S. MERIAN, cruise MSM-42 and locations of hydrographic profiles.
Bathymetric lines are indicated every 1000 m.

1. Objectives

Physical oceanographic measurements conducted during cruise *MSM-42* contributed to the scientific project “FLEPVAR”, funded by the *German Science Foundation* (DFG). Tracer measurements were carried out as part of the cooperative research project “RACE”, sub-project 1.2, funded by the *Federal Ministry of Education and Research* (BMBF). Focus was on investigating the pathways of North Atlantic Deep Water (NADW) in the vicinity of Flemish Cap, a topographic obstacle centered at 48°N, 45°W at the western rim of the subpolar North Atlantic. This obstacle divides the Deep Western Boundary Current (DWBC) into two branches. The shallow branch enters Flemish Pass (sill depth of 1200 m) located to the west of the cap and limits any southward NADW export to its lightest component, the Labrador Sea Water (LSW). The second but deeper branch detours to the east around Flemish Cap and carries all NADW components including LSW and the denser overflow waters towards the south. The primary objectives of cruise *MSM-42* were:

- 1) to assess the strength of the southward deepwater transport in the boundary current system near Flemish Cap and to compare it to the export observed in Flemish Pass as well as to estimates from previous surveys. Particular focus was on the LSW, one of the major NADW components;
- 2) to investigate the physical mechanisms that govern the inflow of LSW into Flemish Pass near Sackville Spur, a topographic protrusion located at the northern entrance of Flemish Pass. The pass constitutes a shortcut allowing parts of LSW to be exported southwards on a more direct and undisturbed pathway compared to the detour around Flemish Cap, where the DWBC may interact with the northbound and saline North Atlantic Current (NAC);
- 3) to analyze the spatial and temporal variability of the exported deep water components and to put this into relation to either local or to remote forcing mechanisms;
- 4) to infer the persistency of so far observed trends regarding warming and salinification of the LSW.

Scientific tools comprised profiling of the entire water column using a Conductivity-

Temperature-Depth-Oxygen (CTDO) unit and two lowered Acoustic Doppler Current Profilers (LADCP) attached to the carousel water sampler. Tracer measurements consisted of analyzing oceanic concentrations of chlorofluorocarbon-12 (CFC-12) and sulphur hexafluoride (SF₆), with high concentrations marking young or newly formed NADW in the deep ocean. Vessel-mounted ADCP measurements delivered velocity data of the upper water column while transiting across the working area.

2. Narrative of cruise MSM-42

RV MARIA S. MERIAN left the pier at Dockyard, Ireland Island, Bermuda on May 02nd, 2015, at 11:24 UTC. The scientific mission of cruise MSM-42 started at 13:00 UTC the same day after having passed the pilot station. Continuous logging of underway data (thermosalinograph, vessel-mounted Acoustic Doppler Current Profilers (ADCP) operated at 38 kHz and 75 kHz, and multibeam echo-sounding) was switched on at 03:00 UTC on May 03rd, when the border of the Exclusive Economic Zone (EEZ) of Bermuda was crossed. Course was set to northeast towards the southern flank of the Grand Banks of Newfoundland.

While on the way towards the Grand Banks two test stations were carried out on May 03rd (#050/001) and May 04th (#051/002), with the purpose to check the performance of the CTDO unit and the two LADCP devices attached to the carousel water sampler. First water samples were drawn for the gas-chromatographic analytical tracer system and for sensor calibration regarding dissolved oxygen and conductivity.

Scientific station work began on May 06th, 2015, 09:53 UTC, when the first hydrographic section crossing the boundary current system in the Newfoundland Basin was carried out (station distances of 6 nm¹, stations #052/003 to #080/031). Station work included profiling of the entire water column with the CTDO and LADCP units attached to the carousel water sampler as well as water sampling and subsequent analysis in the laboratories. Having finished this section on May 09th, RV MARIA S. MERIAN was in transit for about 88 nm towards 45°22'N/44°30'W. From there she approached the southern flank of Flemish Cap to perform a second hydrographic section at similar high-resolution across the boundary current system southeast of Flemish Cap (stations #081/032-#100/051, finished on May 11th). This was followed by a hydrographic section directed towards west that crossed the southern exit of Flemish Pass at the latitude of 46°30'N (stations #101/052 to #112/063,

1 nm = nautical mile

finished on May 12th).

After a short transit of about 40 nm towards north, mooring *BM-25/3* was installed at 47°07.11'N, 47°06.38'W at the western side of Flemish Pass on May 12th. Afterwards, RV MARIA S. MERIAN headed eastwards along 47°06'N and crossed Flemish Pass and Flemish Cap, thereby performing hydrographic stations that were carried out without any water sampling while on the shallow top of the cap (stations #114/065 to #130/080, finished on May 13th).

Having reached the longitude of 45°W on top of Flemish Cap, another high-resolution section was conducted towards north along 45°W, which was later on shifted towards northwest to end on top of Orphan Knoll (stations #131/081 to #156/106, finished on May 16th). RV MARIA S. MERIAN subsequently crossed the Orphan Basin towards the southeast and reached the shelf break at 47°58'N, 48°12'W on May 18th (stations #157/107 to #181/131). Between May 18th and May 20th a number of short hydrographic sections were run across the northern Flemish Pass and across as well as along Sackville Spur at the northern entrance of Flemish Pass (stations #182/131 to #204/154). On May 20th, RV MARIA S. MERIAN headed northwest towards 49°15'N, 48°07'W in the central Orphan Basin to carry out a final hydrographic section that led in southwestern direction towards the shelf break (station distances of 11 nm, stations #205/155 to #210/160). Scientific station work was finished at 48°43.9'N, 49°12.2'W on May 21st, 16:50 UTC, and RV MARIA S. MERIAN started her westward transit towards St. John's, Canada. Continuous logging of underway data was stopped on May 22nd, 01:00 UTC. The same day at 09:30 UTC, the scientific mission MSM-42 of RV MARIA S. MERIAN ended. The vessel arrived at the pilot station of St. John's at 09:58 UTC and was finally towed at pier 17 at 11:30 UTC. In total, 160 hydrographic stations were carried out during cruise MSM-42.

Weather conditions during the cruise were surprisingly comfortable for most of the time. Station work in the Newfoundland Basin proper was affected by higher sea states and swell from different directions. Dense fog prevailed over the period May 18th to May 21st.

Acknowledgements

We would like to thank the master of the vessel, Ralf Schmidt, and his entire crew for the assistance and support granted to us during cruise *MSM-42*. The great team spirit, the enthusiasm, and the close cooperation between the scientific team and the ship's crew made this cruise a great success and our stay aboard *RV Maria S. Merian* very

comfortable. Further thanks goes to the “helping hands” at our home laboratories, the *Senatskommission für Ozeanographie*, the *German Science Foundation* (DFG), the *Federal Ministry for Education and Research* (BMBF), and the *Control Station German Research Vessels (Leitstelle Deutsche Forschungsschiffe)* that provided the necessary ship time, funding, and support to pursue all scientific work. We furthermore acknowledge G. Krahnemann (Geomar, Kiel) for providing the CTD processing and calibration toolbox for MATLAB.

Table 1. Participants of cruise MSM-42

	Name	Institute	Field of Activity
1.	Kieke, Dagmar, Dr.	IUPHB/MARUM	chief scientist
2.	Barbosa Primon, Rafael	IFMHH	CTDO/LADCP watch, data analysis
3.	Bulsiewicz, Klaus	IUPHB	tracer sampling & analysis
4.	Jochumsen, Kerstin, Dr.	IFMHH	CTDO data processing, calibration, analysis
5.	Meyerjürgens, Jens	IUPHB	tracer sampling
6.	Moritz, Martin	IFMHH	oxygen titration and analysis
7.	Müller, Vasco	MARUM	LADCP data processing & analysis
8.	Rieper, Christoph	IFMHH	CTDO/LADCP watch & oxygen titration
9.	Rochner, Andrea	IFMHH	CTDO/LADCP watch
10.	Sültenfuß, Pia	IUPHB	tracer sampling
11.	Tiemann, Louisa	IFMHH	CTDO/LADCP watch
12.	Varotsou, Eirini	IFMHH	salinometry, data analysis
13.	Welsch, Andreas	IFMHH	technics & salinometry
14.	Wett, Simon	IFMHH	CTDO/LADCP watch
15.	Wiegand, Kevin	IFMHH	CTDO/LADCP watch
16.	Winkel, Jeannine	CWS	bird observations
17.	Wischnewski, Fanny	IUPHB	CTDO/LADCP watch

CWS Canadian Wildlife Service, Dartmouth, Canada

IFMHH University of Hamburg, Institute of Oceanography, Dep. Experimental Oceanography, Hamburg, Germany

IUPHB University of Bremen, Institute of Environmental Physics, Dep. Oceanography Bremen, Germany

MARUM University of Bremen, Center for Marine Environmental Sciences, Bremen, Germany

Table 2. Moorings deployed in Flemish Pass, cruise MSM-42

Mooring ID	Latitude	Longitude	Depth [m]	Deployment Date/Time	CTD Profile
BM-25/3	47°07.11'N	47°06.38'W	1003	12 May 2015 21:16-22:00	114/064

All times are given as UTC. The top buoy of the mooring was equipped with two radio beacons.

Table 3. List of CTDO/lowered ADCP/Water Sampling Stations, MSM-42

Station	Profile	Date	Time [UTC]	Latitude	Longitude	Water Depth [m]	CFC offline	SF6/ CFC	Bottle Oxygen	Bottle Salinity	LADCP	Comments
MSM-050	001	2015/05/03	12:58	36°13.67'N	60°13.20'W	5064			x	x	x	test station, test of acoustic release s/n 1874
MSM-051	002	2015/05/04	16:06	39°39.96'N	56°07.80'W	5263		x	x		x	test station
MSM-052	003	2015/05/06	09:51	45°42.64'N	48°19.13'W	141			x		x	
MSM-053	004	2015/05/06	10:55	45°38.89'N	48°12.31'W	432			x	x	x	
MSM-054	005	2015/05/06	12:06	45°36.98'N	48°08.93'W	757	x		x	x	x	
MSM-055	006	2015/05/06	13:30	45°35.20'N	48°05.50'W	1113	x		x	x	x	
MSM-056	007	2015/05/06	15:02	45°31.50'N	47°58.72'W	1363	x		x	x	x	
MSM-057	008	2015/05/06	16:54	45°27.77'N	47°51.92'W	1528		x	x	x		LADCP low battery, malfunction
MSM-058	009	2015/05/06	18:44	45°26.01'N	47°48.44'W	1820		x	x	x	x	
MSM-059	010	2015/05/06	20:45	45°24.06'N	47°45.05'W	2037		x	x	x	x	
MSM-060	011	2015/05/06	22:59	45°20.31'N	47°38.33'W	2469	x		x	x	x	
MSM-061	012	2015/05/07	01:25	45°16.56'N	47°31.46'W	2800	x		x	x	x	
MSM-062	013	2015/05/07	04:01	45°12.75'N	47°24.54'W	3074	x		x	x	x	
MSM-063	014	2015/05/07	06:42	45°09.17'N	47°17.95'W	3226			x	x	x	
MSM-064	015	2015/05/07	09:30	45°05.36'N	47°11.07'W	3359	x		x	x	x	
MSM-065	016	2015/05/07	12:24	45°01.61'N	47°04.21'W	3446		x	x	x	x	
MSM-066	017	2015/05/07	15:11	44°57.88'N	46°57.51'W	3564			x	x	x	
MSM-067	018	2015/05/07	18:03	44°54.19'N	46°50.67'W	3614		x	x	x	x	
MSM-068	019	2015/05/07	20:53	44°50.44'N	46°43.88'W	3702			x	x	x	
MSM-069	020	2015/05/08	00:11	44°46.71'N	46°37.03'W	3633	x		x	x	x	
MSM-070	021	2015/05/08	03:06	44°42.98'N	46°30.25'W	3643			x	x	x	
MSM-071	022	2015/05/08	05:56	44°39.20'N	46°23.44'W	3722		x	x	x	x	
MSM-072	023	2015/05/08	08:53	44°35.56'N	46°16.68'W	3735			x	x	x	
MSM-073	024	2015/05/08	11:57	44°31.83'N	46°09.93'W	3800		x	x	x	x	
MSM-074	025	2015/05/08	15:04	44°28.08'N	46°03.06'W	3811			x	x	x	
MSM-075	026	2015/05/08	18:02	44°24.41'N	45°56.29'W	3849		x	x	x	x	
MSM-076	027	2015/05/08	21:05	44°20.59'N	45°49.46'W	3942			x	x	x	

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Station	Profile	Date	Time [UTC]	Latitude	Longitude	Water Depth [m]	CFC offline	SF6/CFC	Bottle Oxygen	Bottle Salinity	LADCP	Comments
MSM-077	028	2015/05/09	00:00	44°16.97'N	45°42.78'W	4128		x	x	x	x	
MSM-078	029	2015/05/09	03:10	44°13.15'N	45°35.89'W	4362			x	x	x	
MSM-079	030	2015/05/09	06:50	44°06.48'N	45°22.66'W	4456		x	x	x	x	
MSM-080	031	2015/05/09	10:36	43°58.21'N	45°06.91'W	4586		x	x	x	x	
MSM-081	032	2015/05/09	21:02	45°22.39'N	44°30.25'W	4557		x	x	x	x	
MSM-082	033	2015/05/10	00:37	45°28.16'N	44°34.98'W	4541			x	x	x	
MSM-083	034	2015/05/10	04:24	45°33.31'N	44°39.71'W	4477			x	x	x	
MSM-084	035	2015/05/10	07:58	45°38.42'N	44°44.36'W	4308		x	x	x	x	
MSM-085	036	2015/05/10	11:32	45°43.46'N	44°49.11'W	4142			x	x	x	
MSM-086	037	2015/05/10	14:51	45°48.63'N	44°53.94'W	3983	x		x	x	x	
MSM-087	038	2015/05/10	17:58	45°53.80'N	44°58.70'W	3758			x	x	x	
MSM-088	039	2015/05/10	20:48	45°57.25'N	45°01.68'W	3183		x	x	x		LADCP low battery, malfunction
MSM-089	040	2015/05/10	23:40	45°58.90'N	45°03.47'W	2798			x	x	x	
MSM-090	041	2015/05/11	02:08	46°04.04'N	45°08.17'W	2805		x	x	x	x	
MSM-091	042	2015/05/11	05:25	46°17.75'N	45°20.98'W	2349		x	x	x	x	
MSM-092	043	2015/05/11	07:31	46°19.26'N	45°22.27'W	1931		x	x	x	x	
MSM-093	044	2015/05/11	09:24	46°20.20'N	45°23.18'W	1658		x	x	x	x	
MSM-094	045	2015/05/11	11:02	46°21.21'N	45°24.17'W	1339		x	x	x	x	
MSM-095	046	2015/05/11	13:23	46°21.90'N	45°24.73'W	1078		x	x	x	x	LADCP s/n 1973 replaced with s/n 7915
MSM-096	047	2015/05/11	14:43	46°22.77'N	45°25.45'W	824		x	x	x	x	
MSM-097	048	2015/05/11	16:02	46°24.41'N	45°27.13'W	574		x	x	x	x	
MSM-098	049	2015/05/11	17:24	46°29.54'N	45°31.94'W	349			x	x	x	
MSM-099	050	2015/05/11	19:38	46°13.13'N	45°16.62'W	2874		x	x	x	x	
MSM-100	051	2015/05/11	22:07	46°08.59'N	45°12.44'W	3112		x	x	x	x	
MSM-101	052	2015/05/12	02:31	46°29.94'N	45°37.63'W	328			x	x	x	
MSM-102	053	2015/05/12	03:37	46°30.00'N	45°46.34'W	422			x	x	x	
MSM-103	054	2015/05/12	04:56	46°29.97'N	45°55.12'W	395			x	x	x	
MSM-104	055	2015/05/12	06:08	46°29.93'N	46°03.83'W	415			x	x	x	
MSM-105	056	2015/05/12	07:25	46°29.93'N	46°12.61'W	456		x	x	x	x	
MSM-106	057	2015/05/12	08:38	46°29.96'N	46°21.32'W	908		x	x	x	x	
MSM-107	058	2015/05/12	10:04	46°29.96'N	46°30.13'W	899		x	x	x	x	

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Station	Profile	Date	Time [UTC]	Latitude	Longitude	Water Depth [m]	CFC offline	SF6/CFC	Bottle Oxygen	Bottle Salinity	LADCP	Comments
MSM-108	059	2015/05/12	11:33	46°29.95'N	46°38.78'W	972		x	x		x	
MSM-109	060	2015/05/12	13:04	46°29.97'N	46°47.59'W	1235		x	x	x	x	
MSM-110	061	2015/05/12	14:41	46°29.97'N	46°56.39'W	804		x	x	x	x	
MSM-111	062	2015/05/12	15:59	46°29.98'N	47°05.10'W	741		x	x	x	x	
MSM-112	063	2015/05/12	17:15	46°30.00'N	47°13.84'W	421			x	x	x	
MSM-113	-	2015/05/12	21:10	47°07.60'N	47°06.42'W	1001						deployment, mooring BM-25/3
MSM-114	064	2015/05/12	22:10	47°07.60'N	47°06.42'W	981			x	x	x	
MSM-115	065	2015/05/13	00:09	47°05.97'N	47°22.55'W	231				x	x	
MSM-116	066	2015/05/13	01:10	47°05.97'N	47°15.93'W	460		x		x	x	
MSM-117	067	2015/05/13	02:12	47°05.98'N	47°09.34'W	865		x	x	x	x	
MSM-118	068	2015/05/13	03:24	47°05.96'N	47°05.90'W	1008		x	x	x	x	
MSM-119	069	2015/05/13	04:45	47°06.04'N	47°00.61'W	1113		x	x	x	x	
MSM-120	070	2015/05/13	06:24	47°06.02'N	46°51.24'W	1154		x	x	x	x	
MSM-121	071	2015/05/13	07:56	47°06.02'N	46°42.49'W	1124		x	x	x	x	
MSM-122	072	2015/05/13	09:19	47°06.02'N	46°40.04'W	1088		x	x	x	x	
MSM-123	073	2015/05/13	10:39	47°06.02'N	46°36.66'W	793		x	x	x	x	
MSM-124	074	2015/05/13	11:47	47°06.03'N	46°33.29'W	483		x	x	x	x	
MSM-125	075	2015/05/13	12:57	47°06.03'N	46°24.21'W	345			x	x	x	
MSM-126	076	2015/05/13	14:40	47°06.03'N	46°08.41'W	322					x	
MSM-127	077	2015/05/13	16:10	47°05.99'N	45°52.65'W	294					x	
MSM-128	078	2015/05/13	17:47	47°06.01'N	45°36.73'W	254					x	
MSM-129	079	2015/05/13	19:23	47°05.98'N	45°21.09'W	181					x	
MSM-130	080	2015/05/13	21:18	47°06.01'N	45°00.05'W	146					x	
MSM-131	081	2015/05/13	23:13	47°19.03'N	45°00.03'W	186					x	
MSM-132	082	2015/05/14	01:17	47°33.48'N	45°00.08'W	231					x	
MSM-133	083	2015/05/14	03:24	47°47.90'N	44°59.99'W	235					x	
MSM-134	084	2015/05/14	05:24	48°02.29'N	44°59.99'W	304					x	
MSM-135	085	2015/05/14	07:33	48°16.70'N	45°00.03'W	539		x	x	x	x	
MSM-136	086	2015/05/14	09:06	48°23.94'N	45°00.03'W	660		x	x	x	x	
MSM-137	087	2015/05/14	10:47	48°31.13'N	44°59.98'W	806		x	x	x	x	
MSM-138	088	2015/05/14	12:30	48°38.35'N	45°00.01'W	1031		x	x	x	x	

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Station	Profile	Date	Time [UTC]	Latitude	Longitude	Water Depth [m]	CFC offline	SF6/CFC	Bottle Oxygen	Bottle Salinity	LADCP	Comments
MSM-139	089	2015/05/14	14:29	48°45.53'N	44°59.97'W	1254		x	x	x	x	
MSM-140	090	2015/05/14	16:18	48°52.78'N	44°59.86'W	1307		x	x	x	x	
MSM-141	091	2015/05/14	18:04	48°59.97'N	45°00.11'W	1605		x	x	x	x	
MSM-142	092	2015/05/14	19:59	49°07.16'N	44°59.97'W	2184		x	x	x	x	
MSM-143	093	2015/05/14	22:13	49°14.35'N	44°59.97'W	2507		x	x	x	x	
MSM-144	094	2015/05/15	00:35	49°21.56'N	44°59.97'W	2701		x	x	x	x	
MSM-145	095	2015/05/15	03:02	49°28.81'N	44°59.92'W	2948		x	x	x	x	
MSM-146	096	2015/05/15	05:38	49°36.00'N	44°59.96'W	3299		x	x	x	x	
MSM-147	097	2015/05/15	08:36	49°43.26'N	45°00.01'W	3666		x	x	x	x	
MSM-148	098	2015/05/15	11:32	49°48.22'N	45°07.42'W	3833			x	x	x	
MSM-149	099	2015/05/15	15:53	49°53.14'N	45°16.29'W	3765			x	x	x	
MSM-150	100	2015/05/15	19:04	49°58.03'N	45°25.15'W	3253	x		x	x	x	
MSM-151	101	2015/05/15	21:44	50°03.02'N	45°33.95'W	3125	x		x	x	x	
MSM-152	102	2015/05/16	00:23	50°07.97'N	45°42.85'W	2725	x		x	x	x	
MSM-153	103	2015/05/16	02:46	50°12.92'N	45°51.69'W	2368		x	x	x	x	
MSM-154	104	2015/05/16	05:01	50°17.88'N	46°00.56'W	2086		x	x	x	x	
MSM-155	105	2015/05/16	07:13	50°22.80'N	46°09.41'W	1830		x	x	x	x	
MSM-156	106	2015/05/16	09:14	50°27.73'N	46°18.21'W	1761		x	x	x	x	
MSM-157	107	2015/05/16	11:20	50°21.24'N	46°23.21'W	1834		x	x	x	x	
MSM-158	108	2015/05/16	13:12	50°14.74'N	46°28.17'W	2031		x	x	x	x	
MSM-159	109	2015/05/16	15:06	50°08.21'N	46°33.14'W	2476		x	x	x	x	
MSM-160	110	2015/05/16	17:17	50°01.70'N	46°38.09'W	2984		x	x	x	x	
MSM-161	111	2015/05/16	19:48	49°55.24'N	46°43.05'W	2979			x	x	x	
MSM-162	112	2015/05/16	22:17	49°48.72'N	46°47.98'W	2931		x	x	x	x	
MSM-163	113	2015/05/17	00:42	49°42.23'N	46°52.91'W	2885			x	x	x	
MSM-164	114	2015/05/17	03:03	49°35.71'N	46°57.89'W	2831		x	x	x	x	
MSM-165	115	2015/05/17	05:25	49°29.22'N	47°02.82'W	2780			x	x	x	
MSM-166	116	2015/05/17	07:48	49°22.70'N	47°07.78'W	2741		x	x	x	x	
MSM-167	117	2015/05/17	10:14	49°16.20'N	47°12.70'W	2683			x	x	x	
MSM-168	118	2015/05/17	12:35	49°09.69'N	47°17.65'W	2623		x	x	x	x	
MSM-169	119	2015/05/17	14:52	49°03.23'N	47°22.61'W	2587			x	x	x	

Short Cruise Report, RV Maria S. Merian, Cruise MSM-42, Bermuda – St. John's, 02 May – 22 May 2015

Station	Profile	Date	Time [UTC]	Latitude	Longitude	Water Depth [m]	CFC offline	SF6/CFC	Bottle Oxygen	Bottle Salinity	LADCP	Comments
MSM-170	120	2015/05/17	17:05	48°56.71'N	47°27.57'W	2549		x	x	x	x	
MSM-171	121	2015/05/17	19:20	48°50.18'N	47°32.57'W	2474			x	x	x	
MSM-172	122	2015/05/17	21:29	48°43.71'N	47°37.46'W	2392		x	x	x	x	
MSM-173	123	2015/05/17	23:39	48°37.22'N	47°42.39'W	2310			x	x	x	
MSM-174	124	2015/05/18	01:49	48°30.71'N	47°47.36'W	2232		x	x	x	x	
MSM-175	125	2015/05/18	03:58	48°24.22'N	47°52.31'W	2021		x	x	x	x	
MSM-176	126	2015/05/18	06:08	48°17.69'N	47°57.32'W	1741		x	x	x	x	
MSM-177	127	2015/05/18	08:04	48°11.17'N	48°02.27'W	1368		x	x	x	x	
MSM-178	128	2015/05/18	09:24	48°08.69'N	48°04.11'W	1233		x	x	x	x	
MSM-179	129	2015/05/18	11:09	48°05.28'N	48°06.43'W	691		x	x	x	x	
MSM-180	130	2015/05/18	12:15	48°02.71'N	48°08.48'W	397			x	x	x	
MSM-181	131	2015/05/18	13:22	47°58.16'N	48°12.12'W	309			x	x	x	
MSM-182	132	2015/05/18	20:16	48°53.75'N	46°52.97'W	2704		x	x	x	x	
MSM-183	133	2015/05/18	22:35	48°47.43'N	46°49.06'W	2626		x	x	x	x	
MSM-184	134	2015/05/19	01:08	48°41.17'N	46°45.20'W	2643			x	x	x	
MSM-185	135	2015/05/19	03:33	48°34.87'N	46°41.22'W	2556		x	x	x	x	
MSM-186	136	2015/05/19	05:59	48°28.55'N	46°37.39'W	2184		x	x	x	x	
MSM-187	137	2015/05/19	08:12	48°22.24'N	46°33.50'W	1537		x	x	x	x	
MSM-188	138	2015/05/19	09:45	48°20.36'N	46°32.28'W	1180		x	x	x	x	
MSM-189	139	2015/05/19	11:20	48°15.91'N	46°29.55'W	858		x	x	x	x	
MSM-190	140	2015/05/19	12:56	48°12.04'N	46°22.02'W	1106		x	x	x	x	
MSM-191	141	2015/05/19	14:30	48°08.21'N	46°14.52'W	1152		x	x	x	x	
MSM-192	142	2015/05/19	16:10	48°04.37'N	46°07.05'W	1116		x	x	x	x	
MSM-193	143	2015/05/19	17:46	48°00.51'N	45°59.55'W	879		x	x	x	x	
MSM-194	144	2015/05/19	19:22	47°56.70'N	45°52.02'W	699		x	x	x	x	
MSM-195	145	2015/05/19	20:51	47°52.84'N	45°44.50'W	412				x	x	
MSM-196	146	2015/05/19	22:05	47°49.00'N	45°37.06'W	314				x	x	
MSM-197	147	2015/05/20	03:40	48°40.60'N	45°37.90'W	1097		x	x	x	x	
MSM-198	148	2015/05/20	05:51	48°34.11'N	45°51.42'W	1073		x	x	x	x	
MSM-199	149	2015/05/20	07:59	48°27.62'N	46°04.91'W	990		x	x	x	x	
MSM-200	150	2015/05/20	09:59	48°21.09'N	46°18.49'W	965		x	x	x	x	

Short Cruise Report, RV Maria S. Merian, Cruise MSM-42, Bermuda – St. John's, 02 May – 22 May 2015

Station	Profile	Date	Time [UTC]	Latitude	Longitude	Water Depth [m]	CFC offline	SF6/ CFC	Bottle Oxygen	Bottle Salinity	LADCP	Comments
MSM-201	151	2015/05/20	12:02	48°14.54'N	46°32.00'W	847		x			x	
MSM-202	152	2015/05/20	14:08	48°08.02'N	46°45.57'W	714		x	x		x	
MSM-203	153	2015/05/20	16:10	48°01.51'N	46°59.12'W	579		x			x	
MSM-204	154	2015/05/20	18:04	47°54.98'N	47°12.66'W	429					x	
MSM-205	155	2015/05/21	02:50	49°14.97'N	48°07.41'W	2333					x	
MSM-206	156	2015/05/21	05:31	49°08.73'N	48°20.28'W	2219					x	
MSM-207	157	2015/05/21	08:15	49°02.54'N	48°33.32'W	2122					x	
MSM-208	158	2015/05/21	10:45	48°56.30'N	48°46.36'W	2021					x	
MSM-209	159	2015/05/21	13:17	48°50.08'N	48°59.22'W	1887					x	
MSM-210	160	2015/05/21	15:49	48°43.89'N	49°12.19'W	1536					x	