

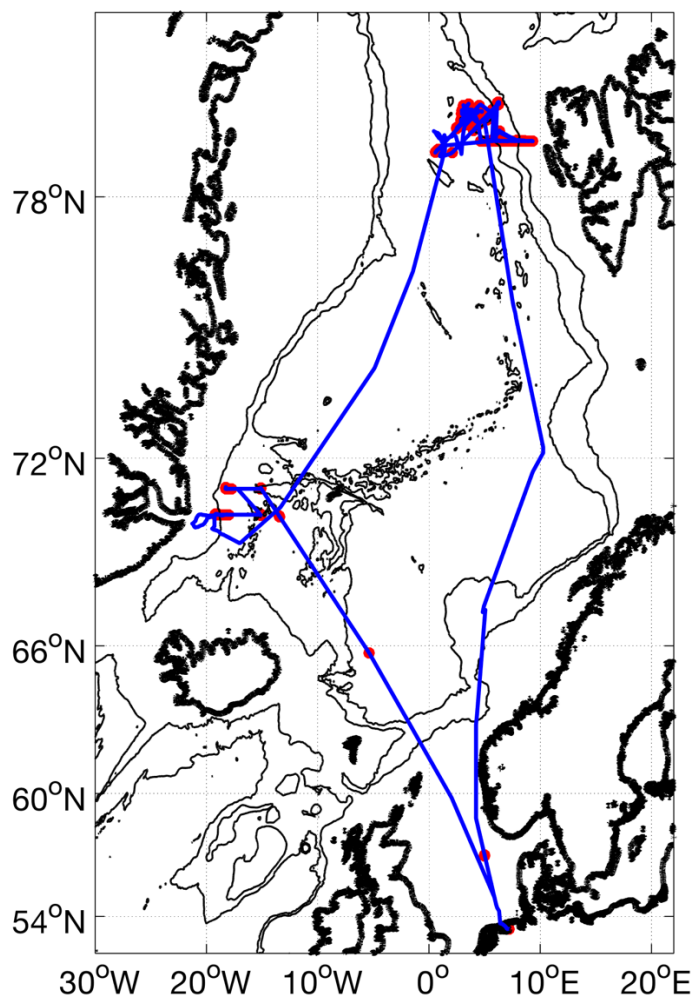
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Short Cruise Report
R/V MARIA S. MERIAN, MSM93 (GPF 18-1_33)

Emden – Emden
26.06.2020 – 30.07.2020

Chief Scientist: Wilken-Jon von Appen
Captain: Ralf Schmidt



Objectives

The cruise MSM93 had three goals: A process study in the Fram Strait between Greenland and Svalbard, the support of long-term observations in the Fram Strait and at the end of the cruise the recovery of four moorings in and in front of a fjord in East Greenland. For the long-term measurements of temperature and velocity of the northward flowing water in the Fram Strait, at the beginning of the cruise five moorings were supposed to be recovered and four moorings were supposed to be deployed. The process study was supposed to quantify the interaction between physics and biology in the upper ocean in the vicinity of the marginal ice zone on horizontal scales of hundreds of meters to several kilometers. To achieve this, station work was supposed to be combined with data acquisition by a system towed behind the ship.

Narrative

Due to the COVID-19 pandemic, all participants of MSM93 had to stay in a hotel in Leer from 21 June onwards and get tested. After the negative test results had arrived we were taken to Merian in the port of Emden by bus on 24 June. Our containers and non-containerized cargo were loaded and we were able to set up some of our equipment and start testing it. On June 26 we departed Emden and started the 6-day transit to the working area. Most of the transit was smooth, but on one day most scientists were sea-sick.

July 2 to July 6 constituted the first part of the cruise in the eastern Fram Strait. We used it for the testing of various instrument and laboratory procedures and we completed a CTD section across the West Spitsbergen Current. But the majority of that time was dedicated to mooring work. We recovered 5 moorings that are part of a long-term observation program of the AWI to monitor the warm Atlantic Water which flows into the Arctic Ocean. The recoveries went well and even included a so-called trawl resistant bottom mount, something which had eluded us in previous years for a multitude of different technical reasons. After the recoveries, we deployed 4 moorings.

July 7 and July 8 marked the transition to the small-scale work that was the second part of the cruise. We occupied an in-situ camera transect parallel to the ice-edge comprised of 10 stations at a 4km horizontal resolution. This was followed by the first extensive deployment of the Triaxus towed system. A 100km section was occupied three times with measurements at three different constant depths. During this transect we identified a region of extremely strong horizontal gradients: a front.

We returned to that front near the ice-edge and sampled it extensively from July 9 to July 16. At that front warm salty Atlantic Water was subducted below cold fresh Polar Water. The goal of the survey was to map the front's complete spatial structure and how it evolved over time. For this we deployed all our gears with a rough separation of towed observations during night-time and stations during day-time. We towed the Triaxus as well as the underway CTD and observed the currents with the vessel mounted ADCP. We made profiles with the CTD-rosette, in-situ camera, and light optical package. Water was collected from the CTD-rosette, marine snow catcher and the ship's sea water intake and samples were collected for nutrient concentrations, primary production, particle properties (e.g. sinking speed and oxygen consumption), phytoplankton concentrations and functional group composition, CFCs, noble gases, and tritium. We deployed surface drifters and drifting sediment traps. During transit, optical properties of the surface water were also measured and we monitored the ship's radar which showed the line at which the subduction took place.

After completion of the front study we celebrated the cruise's half time ("Bergfest") and left Fram Strait. July 17 to July 19 was a transit to the shelf in front of Scoresby Sund in eastern Greenland. Unfortunately, those days were also marked by a storm, which did not play out as forecasted. Rather it pushed thick multi-year sea ice in front of the entrance of Scoresby Sund. We attempted to get into the fjord on July 19 and July 20. But at nearly 100% concentration the ice was too thick for MARIA S. MERIAN and we had to abort late on July 20. Therefore, we were not able to recover two oceanographic moorings deep in Scoresby Sund, one oceanographic mooring at the entrance of Scoresby Sund, and one passive acoustic mooring in front of the fjord.

By the end of July 21 we were back at the shelf break and until July 25 we proceeded to occupy two transects somewhat longer than 100km from the ice-edge across the East Greenland Current to the open ocean. We periodically returned to the ice-edge to check whether the ice conditions had improved which they however had not.

On July 25 we started the transit home and occupied a last deep station in the international waters east of Iceland. Parts of the remainder of the transit home were windy enough to cause some sea-sickness again, but we were able to store all our equipment and samples as well as to save and document the collected data. On July 30 the cruise successfully commenced in the port of Emden.

Acknowledgements

This cruise was supported by the Alfred Wegener Institute's program oriented research, the Helmholtz Infrastructure Initiative FRAM, the Helholtz Young Investigator Group SeaPump, and the DFG Transregional Collaborative Research Centre TRR 172 (AC3). Special thanks also to Ingo Schewe and the German Research Fleet Coordination Centre for making this cruise possible in times of Corona.

Participants

1	von Appen	Wilken-Jon	Fahrtleiter/ <i>Chief Scientist</i>	AWI
2	Hagemann	Jonas	Triaxus	AWI
3	Engicht	Carina	Verankerungen / <i>Moorings</i>	AWI
4	Kuhlmey	David	Verankerungen / <i>Moorings</i>	AWI
5	Hofmann	Zerlina	CTD, UCTD	AWI
6	Mathieu	Laura	CTD, UCTD	AWI
7	Iversen	Morten	Biologie / <i>Biology</i>	AWI/MARUM
8	Konrad	Christian	Partikel Kamera / <i>Particle camera</i>	AWI/MARUM
9	Ramondenc	Simon	UVP	MARUM
10	Hufnagel	Lili	Nährstoffe / <i>Nutrients</i>	MARUM
11	Oelker	Julia	Phytoplankton / <i>Phytoplankton</i>	AWI/UniHB
12	Körtke	Wiebke	FCKW, Edelgase / <i>CFC, noble gases</i>	UniHB
13	Kalvelage	Tim	Journalist	self-employed

Institutes

AWI	Alfred Wegener Institute, Bremerhaven, Germany
MARUM	Center for Marine Environmental Sciences, Bremen, Germany
UniHB	University of Bremen, Bremen, Germany

Station List

Activity	Date / Time	Position	Position	Depth	Comment
No.	[UTC]	Lat	Lon	[m]	
MSM93_1-1 topAWI	7/2/20 07:50	79° 22,024' N	004° 54,853' E	2355.4	Trim Test
MSM93_1-2 topAWI	7/2/20 07:57	79° 22,024' N	004° 54,854' E	2355.3	Trim Test
MSM93_1-3 topAWI	7/2/20 08:40	79° 22,024' N	004° 54,852' E	2355.5	Trim Test
MSM93_2-1 topAWI	7/2/20 10:36	79° 21,096' N	005° 12,501' E	2153.9	
MSM93_3-1 topAWI	7/2/20 13:39	79° 27,008' N	005° 37,361' E	2184	
MSM93_4-1 CTD	7/2/20 17:45	79° 00,463' N	005° 39,344' E	2054.6	
MSM93_4-2 ISC	7/2/20 19:44	79° 00,463' N	005° 39,350' E	2042.8	
MSM93_4-3 LIOP	7/2/20 21:54	79° 00,462' N	005° 39,351' E	2042.9	
MSM93_4-4 LIOP	7/2/20 23:25	79° 00,462' N	005° 39,354' E	2043	
MSM93_5-1 MOOR	7/3/20 04:57	78° 59,967' N	005° 40,049' E	2082.8	
MSM93_5-1 MOOR	7/3/20 06:00	78° 59,672' N	005° 38,646' E	2126	
MSM93_5-1 MOOR	7/3/20 07:50	79° 01,265' N	005° 43,797' E	1863.4	F5-18
MSM93_6-1 MOOR	7/3/20 10:35	79° 09,526' N	006° 15,451' E	1360.8	F4-OZA
MSM93_7-1 MOOR	7/3/20 14:22	79° 00,924' N	007° 56,601' E	1106.7	F3-18
MSM93_9-1 CTD	7/3/20 18:27	79° 00,022' N	009° 19,347' E	200.5	
MSM93_9-2 LIOP	7/3/20 19:07	79° 00,008' N	009° 19,978' E	199.6	
MSM93_10-1 CTD	7/3/20 20:40	79° 00,033' N	009° 00,065' E	199.3	
MSM93_11-1 CTD	7/3/20 21:30	79° 00,023' N	008° 40,055' E	245.4	
MSM93_12-1 CTD	7/3/20 22:30	79° 00,567' N	008° 19,803' E	789.8	
MSM93_8-1 MOOR	7/4/20 07:10	79° 00,086' N	008° 32,335' E	347	F1-17
MSM93_13-1 MOOR	7/4/20 09:55	78° 59,773' N	008° 20,202' E	768.8	F2-19
MSM93_13-2 ISC	7/4/20 10:52	78° 59,994' N	008° 19,721' E	782.1	
MSM93_13-3 MSC	7/4/20 12:14	78° 59,994' N	008° 19,721' E	782.2	
MSM93_13-4 MSC	7/4/20 12:33	78° 59,994' N	008° 19,721' E	782.1	
MSM93_13-5 MOOR	7/4/20 15:03	78° 59,973' N	008° 19,767' E	780.5	F2-20
MSM93_13-6 CTD	7/4/20 15:23	78° 59,994' N	008° 17,891' E	819.8	
MSM93_13-7 LIOP	7/4/20 16:19	78° 59,994' N	008° 17,893' E	819.6	
MSM93_14-1 CTD	7/4/20 17:56	78° 59,993' N	007° 58,122' E	1080.5	
MSM93_15-1 CTD	7/4/20 19:16	78° 59,977' N	007° 39,842' E	1176.7	
MSM93_16-1 CTD	7/4/20 20:39	79° 00,001' N	007° 19,865' E	1246.1	
MSM93_17-1 CTD	7/4/20 22:08	78° 59,693' N	006° 58,957' E	1190.2	
MSM93_18-1 CTD	7/4/20 23:27	79° 00,011' N	006° 39,690' E	1293.5	
MSM93_19-1 CTD	7/5/20 00:58	78° 59,986' N	006° 19,828' E	1515.8	
MSM93_20-1 CTD	7/5/20 02:30	79° 00,026' N	006° 00,224' E	1817.6	
MSM93_21-1 topAWI	7/5/20 08:30	79° 36,750' N	006° 07,030' E	1452.8	
MSM93_22-1 ISC	7/5/20 18:47	78° 47,964' N	002° 05,658' E	2492.7	
MSM93_23-1 MOOR	7/6/20 09:37	79° 00,015' N	005° 40,008' E	2071.3	F5-19
MSM93_24-1 LIOP	7/6/20 11:08	79° 09,981' N	006° 19,929' E	1411	

MSM93_24-2 MOOR	7/6/20 13:12	79° 10,015' N	006° 19,962' E	1412.5	F4-OZA-2
MSM93_25-1 MOOR	7/6/20 16:01	79° 00,014' N	007° 59,793' E	1071.4	F3-19
MSM93_26-1 LIOP	7/6/20 18:31	79° 00,240' N	005° 38,290' E	2087	
MSM93_26-2 CTD	7/6/20 19:45	79° 00,057' N	005° 36,553' E	2121.9	
MSM93_27-1 CTD	7/6/20 22:05	78° 59,979' N	005° 19,860' E	2283.6	
MSM93_28-1 CTD	7/7/20 00:11	78° 59,970' N	005° 00,006' E	2386.4	
MSM93_29-1 CTD	7/7/20 02:22	79° 00,001' N	004° 39,906' E	2434	
MSM93_30-1 ISC	7/7/20 06:03	79° 16,462' N	004° 26,050' E	2367.2	
MSM93_31-1 ISC	7/7/20 07:25	79° 18,021' N	004° 33,939' E	2325.5	
MSM93_32-1 ISC	7/7/20 08:44	79° 19,591' N	004° 41,895' E	2332.1	
MSM93_33-1 ISC	7/7/20 10:02	79° 21,154' N	004° 49,844' E	2331.5	
MSM93_33-1 ISC	7/7/20 10:39	79° 21,156' N	004° 49,865' E	2331.2	
MSM93_34-1 ISC	7/7/20 11:29	79° 22,717' N	004° 57,768' E	2357.3	
MSM93_35-1 ISC	7/7/20 12:47	79° 24,282' N	005° 05,681' E	2386.2	
MSM93_36-1 ISC	7/7/20 16:26	79° 25,861' N	005° 13,775' E	2434.6	
MSM93_37-1 ISC	7/7/20 17:42	79° 27,430' N	005° 21,776' E	2422	
MSM93_38-1 ISC	7/7/20 19:04	79° 29,016' N	005° 29,672' E	2395.2	
MSM93_39-1 ISC	7/7/20 20:27	79° 30,568' N	005° 37,855' E	2270.6	
MSM93_39-2 CTD	7/7/20 21:32	79° 30,569' N	005° 37,861' E	2270.2	
MSM93_39-3 MSC	7/7/20 22:29	79° 30,569' N	005° 37,858' E	2270.4	
MSM93_39-4 LIOP	7/7/20 22:52	79° 30,567' N	005° 37,850' E	2271	
MSM93_40-1 CTD	7/8/20 02:00	79° 16,447' N	004° 26,026' E	2370	
MSM93_41-1 CTD	7/8/20 02:52	79° 18,033' N	004° 33,983' E	2326.8	
MSM93_42-1 CTD	7/8/20 03:51	79° 19,589' N	004° 41,881' E	2332.6	
MSM93_43-1 CTD	7/8/20 04:39	79° 21,151' N	004° 49,833' E	2332.2	
MSM93_44-1 CTD	7/8/20 05:37	79° 22,726' N	004° 57,800' E	2357.2	
MSM93_45-1 CTD	7/8/20 06:31	79° 24,293' N	005° 05,800' E	2385.8	
MSM93_46-1 CTD	7/8/20 07:32	79° 25,862' N	005° 13,769' E	2433.9	
MSM93_47-1 CTD	7/8/20 08:24	79° 27,437' N	005° 21,800' E	2421.1	
MSM93_48-1 CTD	7/8/20 09:24	79° 29,009' N	005° 29,795' E	2390.8	
MSM93_49-1 topAWI	7/8/20 11:22	79° 35,707' N	004° 31,981' E	3041.7	
MSM93_50-1 CTD	7/9/20 11:28	78° 51,363' N	000° 49,924' E	2365.3	
MSM93_50-2 ISC	7/9/20 12:20	78° 51,363' N	000° 49,928' E	2365.5	
MSM93_50-3 MSC	7/9/20 14:06	78° 51,361' N	000° 49,923' E	2365.7	
MSM93_49-2 topAWI	7/9/20 14:34	78° 51,219' N	000° 49,261' E	2372.1	
MSM93_51-1 ISC	7/9/20 19:24	79° 19,721' N	003° 10,127' E	1705.9	
MSM93_51-2 CTD	7/9/20 20:23	79° 19,721' N	003° 10,123' E	1706.5	
MSM93_52-1 CTD	7/9/20 21:42	79° 23,703' N	003° 30,343' E	3169.4	
MSM93_52-2 ISC	7/9/20 22:21	79° 23,702' N	003° 30,341' E	3170.9	
MSM93_53-1 UCTD	7/10/20 00:29	79° 25,951' N	003° 49,559' E	3693.1	
MSM93_54-1 UCTD	7/10/20 02:30	79° 19,042' N	003° 06,752' E	2030.8	
MSM93_55-1 UCTD	7/10/20 04:32	79° 27,436' N	003° 41,231' E	3033.6	
MSM93_56-1 CTD	7/10/20 06:53	79° 19,723' N	003° 10,075' E	1704.8	

MSM93_56-2 ISC	7/10/20 07:44	79° 19,723' N	003° 10,075' E	1704	
MSM93_56-3 MSC	7/10/20 08:50	79° 19,724' N	003° 10,074' E	1703.9	
MSM93_56-4 LIOP	7/10/20 09:04	79° 19,725' N	003° 10,066' E	1702.9	
MSM93_56-5 DF	7/10/20 11:03	79° 19,728' N	003° 10,000' E	1701.4	
MSM93_57-1 ISC	7/10/20 11:37	79° 21,555' N	003° 19,525' E	2159.4	
MSM93_57-2 CTD	7/10/20 12:37	79° 21,556' N	003° 19,535' E	2157.6	
MSM93_58-1 LIOP	7/10/20 13:57	79° 24,577' N	003° 34,660' E	3165.4	
MSM93_58-2 CTD	7/10/20 14:56	79° 24,577' N	003° 34,664' E	3181	
MSM93_58-3 ISC	7/10/20 15:42	79° 24,577' N	003° 34,665' E	3175.6	
MSM93_59-1 ISC	7/10/20 17:00	79° 26,005' N	003° 42,009' E	3205.8	
MSM93_59-2 CTD	7/10/20 18:03	79° 26,006' N	003° 42,008' E	3206.5	
MSM93_60-1 UCTD	7/10/20 19:18	79° 26,174' N	003° 50,866' E	3722.8	
MSM93_61-1 DRIFT	7/10/20 19:24	79° 25,746' N	003° 48,655' E	3674.1	LCE00506
MSM93_61-2 DRIFT	7/10/20 19:40	79° 24,632' N	003° 43,038' E	3754.9	LCE00508
MSM93_61-3 DRIFT	7/10/20 19:55	79° 23,564' N	003° 37,553' E	3752	LCE00509
MSM93_61-4 DRIFT	7/10/20 20:09	79° 22,501' N	003° 32,227' E	3593.8	LCE00510
MSM93_61-5 DRIFT	7/10/20 20:24	79° 21,413' N	003° 26,660' E	3182.1	LCE00511
MSM93_61-6 DRIFT	7/10/20 20:39	79° 20,333' N	003° 21,244' E	2311.2	LCE00512
MSM93_61-7 DRIFT	7/10/20 20:54	79° 19,267' N	003° 15,843' E	2113.4	LCE00513
MSM93_62-1 UCTD	7/10/20 21:28	79° 19,041' N	003° 06,745' E	2066.8	
MSM93_61-8 DRIFT	7/10/20 21:34	79° 19,476' N	003° 08,900' E	1752.6	LCE00514
MSM93_61-9 DRIFT	7/10/20 21:49	79° 20,532' N	003° 14,258' E	1711.7	LCE00515
MSM93_61-10 DRIFT	7/10/20 22:04	79° 21,662' N	003° 19,962' E	2299.9	LCE00516
MSM93_61-11 DRIFT	7/10/20 22:20	79° 22,820' N	003° 25,840' E	2859.6	LCE00517
MSM93_61-12 DRIFT	7/10/20 22:35	79° 23,936' N	003° 31,473' E	3218.5	LCE00518
MSM93_61-13 DRIFT	7/10/20 22:51	79° 25,038' N	003° 37,071' E	3080	LCE00519
MSM93_61-14 DRIFT	7/10/20 23:06	79° 26,147' N	003° 42,727' E	3227.4	LCE00521
MSM93_63-1 UCTD	7/10/20 23:35	79° 27,479' N	003° 41,456' E	3044.6	
MSM93_61-15 DRIFT	7/10/20 23:40	79° 27,099' N	003° 39,469' E	2972.3	LCE00522
MSM93_61-16 DRIFT	7/10/20 23:55	79° 26,005' N	003° 33,876' E	2730.9	LCE00523
MSM93_61-17 DRIFT	7/11/20 00:11	79° 24,891' N	003° 28,197' E	2908.2	LCE00524
MSM93_61-18 DRIFT	7/11/20 00:26	79° 23,809' N	003° 22,700' E	2800.8	LCE00525
MSM93_61-19 DRIFT	7/11/20 00:42	79° 22,640' N	003° 16,758' E	2388.6	LCE00526
MSM93_61-20 DRIFT	7/11/20 00:57	79° 21,534' N	003° 11,199' E	1693.7	LCE00528
MSM93_61-21 DRIFT	7/11/20 01:11	79° 20,477' N	003° 05,838' E	1483.3	LCE00529
MSM93_64-1 UCTD	7/11/20 01:49	79° 21,128' N	002° 53,305' E	1554.5	
MSM93_65-1 UCTD	7/11/20 04:33	79° 24,414' N	003° 57,988' E	3232.3	
MSM93_66-1 CTD	7/11/20 07:06	79° 18,776' N	002° 54,881' E	2430.1	
MSM93_56-5 DF	7/11/20 08:14	79° 19,024' N	002° 53,510' E	2452.3	recovered
MSM93_66-2 ISC	7/11/20 09:00	79° 19,076' N	002° 52,629' E	2356.1	
MSM93_67-1 CTD	7/11/20 10:32	79° 19,716' N	003° 10,110' E	1704.2	
MSM93_67-2 LIOP	7/11/20 11:39	79° 19,716' N	003° 10,116' E	1707.2	

MSM93_68-1 CTD	7/11/20 13:02	79° 21,553' N	003° 19,399' E	2126	
MSM93_69-1 LIOP	7/11/20 14:33	79° 24,568' N	003° 34,652' E	3157.3	
MSM93_69-2 CTD	7/11/20 15:38	79° 24,568' N	003° 34,659' E	3174.1	
MSM93_70-1 ISC	7/11/20 16:55	79° 26,005' N	003° 41,949' E	3208.3	
MSM93_70-2 CTD	7/11/20 17:55	79° 26,004' N	003° 41,952' E	3208.1	
MSM93_71-1 topAWI	7/11/20 19:18	79° 29,111' N	003° 49,655' E	3572	
MSM93_72-1 ISC	7/12/20 16:20	79° 25,840' N	003° 17,680' E	2587.7	
MSM93_72-2 ISC	7/12/20 16:47	79° 25,840' N	003° 17,687' E	2586.8	
MSM93_73-1 ISC	7/12/20 17:58	79° 25,646' N	003° 18,830' E	2615.6	
MSM93_74-1 ISC	7/12/20 19:11	79° 25,464' N	003° 19,900' E	2674	
MSM93_75-1 ISC	7/12/20 20:26	79° 25,280' N	003° 20,972' E	2760.1	
MSM93_76-1 ISC	7/12/20 21:42	79° 25,101' N	003° 21,997' E	2780.8	
MSM93_76-1 ISC	7/12/20 22:33	79° 25,097' N	003° 22,017' E	2783.4	
MSM93_77-1 ISC	7/12/20 22:57	79° 24,914' N	003° 23,086' E	2831.5	
MSM93_78-1 ISC	7/13/20 00:15	79° 24,730' N	003° 24,152' E	2857.8	
MSM93_79-1 UCTD	7/13/20 01:44	79° 25,446' N	003° 07,661' E	2631.1	
MSM93_80-1 UCTD	7/13/20 03:05	79° 23,290' N	003° 37,266' E	3728.6	
MSM93_81-1 DRIFT	7/13/20 03:11	79° 23,709' N	003° 34,852' E	3475.2	LCE00530
MSM93_81-2 DRIFT	7/13/20 03:23	79° 24,506' N	003° 30,226' E	3058.3	LCE00531
MSM93_81-3 DRIFT	7/13/20 03:34	79° 25,299' N	003° 25,570' E	2663.2	LCE00532
MSM93_81-4 DRIFT	7/13/20 03:46	79° 26,105' N	003° 20,837' E	2501.5	LCE00535
MSM93_81-5 DRIFT	7/13/20 03:58	79° 26,925' N	003° 16,051' E	2546.1	LCE00536
MSM93_82-1 UCTD	7/13/20 04:27	79° 28,696' N	003° 22,743' E	2679.4	
MSM93_81-6 DRIFT	7/13/20 04:31	79° 28,384' N	003° 24,645' E	2573.9	LCE00537
MSM93_81-7 DRIFT	7/13/20 04:42	79° 27,686' N	003° 28,820' E	2592.8	LCE00538
MSM93_81-8 DRIFT	7/13/20 04:53	79° 26,877' N	003° 33,473' E	2767.7	LCE00539
MSM93_81-9 DRIFT	7/13/20 05:05	79° 26,068' N	003° 38,211' E	2922.9	LCE00540
MSM93_81-10 DRIFT	7/13/20 05:17	79° 25,255' N	003° 42,981' E	3442.6	LCE00534
MSM93_83-1 UCTD	7/13/20 05:44	79° 26,415' N	003° 53,275' E	3694.9	
MSM93_84-1 CTD	7/13/20 08:16	79° 30,011' N	003° 26,137' E	2585.9	
MSM93_85-1 UCTD	7/13/20 09:12	79° 30,032' N	003° 26,184' E	2598.8	
MSM93_86-1 CTD	7/13/20 10:32	79° 29,994' N	003° 32,038' E	2918.7	
MSM93_86-2 LIOP	7/13/20 11:36	79° 29,993' N	003° 32,039' E	2934.4	
MSM93_87-1 UCTD	7/13/20 12:33	79° 29,967' N	003° 32,028' E	2950.4	
MSM93_87-2 UCTD	7/13/20 12:45	79° 29,212' N	003° 32,081' E	2673.4	
MSM93_88-1 CTD	7/13/20 13:41	79° 29,988' N	003° 37,993' E	3076.2	
MSM93_88-2 LIOP	7/13/20 14:41	79° 29,988' N	003° 37,994' E	3076.2	
MSM93_88-3 ISC	7/13/20 15:41	79° 29,989' N	003° 37,990' E	3076.4	
MSM93_88-4 MSC	7/13/20 16:45	79° 29,989' N	003° 37,993' E	3076.4	
MSM93_88-5 MSC	7/13/20 17:01	79° 29,989' N	003° 37,993' E	3076.4	
MSM93_88-6 DF	7/13/20 18:09	79° 29,955' N	003° 37,848' E	3092.9	
MSM93_89-1 UCTD	7/13/20 18:16	79° 29,990' N	003° 37,697' E	3080.4	
MSM93_90-1 CTD	7/13/20 19:24	79° 30,007' N	003° 43,924' E	3207.2	

MSM93_91-1 UCTD	7/13/20 20:20	79° 29,951' N	003° 44,024' E	3192.2	
MSM93_92-1 CTD	7/13/20 21:25	79° 30,000' N	003° 49,910' E	3324.8	
MSM93_93-1 UCTD	7/13/20 22:30	79° 30,017' N	003° 49,824' E	3322.3	
MSM93_94-1 UCTD	7/14/20 00:59	79° 25,652' N	003° 57,801' E	3388.1	
MSM93_95-1 UCTD	7/14/20 02:42	79° 29,502' N	003° 18,129' E	2983.1	
MSM93_88-6 DF	7/14/20 06:27	79° 31,520' N	003° 47,296' E	3103.4	recovered
MSM93_96-1 ISC	7/14/20 06:36	79° 31,520' N	003° 47,296' E	3103.4	
MSM93_97-1 topAWI	7/14/20 07:43	79° 31,527' N	003° 46,195' E	3050.9	
MSM93_97-2 topAWI	7/14/20 14:54	79° 35,726' N	003° 06,202' E	3115.6	
MSM93_98-1 CTD	7/15/20 07:00	79° 30,005' N	003° 58,573' E	3818.1	
MSM93_99-1 CTD	7/15/20 08:22	79° 29,994' N	004° 06,051' E	3843	
MSM93_99-2 LIOP	7/15/20 09:25	79° 29,995' N	004° 06,052' E	3843	
MSM93_99-3 ISC	7/15/20 10:20	79° 29,996' N	004° 06,053' E	3842.9	
MSM93_99-4 MSC	7/15/20 11:23	79° 29,995' N	004° 06,052' E	3842.7	
MSM93_99-5 MSC	7/15/20 11:36	79° 29,996' N	004° 06,050' E	3842.7	
MSM93_99-6 DF	7/15/20 12:27	79° 29,957' N	004° 06,104' E	3837.4	
MSM93_100-1 CTD	7/15/20 13:00	79° 29,996' N	003° 51,037' E	3383.8	
MSM93_101-1 CTD	7/15/20 14:26	79° 30,000' N	003° 43,529' E	3180.1	
MSM93_101-2 LIOP	7/15/20 15:29	79° 30,004' N	003° 43,516' E	3178.8	
MSM93_102-1 CTD	7/15/20 16:46	79° 30,003' N	003° 36,114' E	3101	
MSM93_103-1 topAWI	7/15/20 19:11	79° 36,883' N	003° 32,896' E	3646.8	
MSM93_104-1 ISC	7/16/20 05:18	79° 29,041' N	004° 25,962' E	2722.2	
MSM93_99-6 DF	7/16/20 06:48	79° 28,863' N	004° 23,579' E	2694.9	recovered
MSM93_103-2 topAWI	7/16/20 08:18	79° 27,396' N	003° 47,590' E	3517.1	
MSM93_105-1 topAWI	7/21/20 17:40	70° 23,235' N	019° 00,032' W	553.6	
MSM93_105-2 topAWI	7/23/20 16:36	70° 22,009' N	018° 01,344' W	1640.4	
MSM93_106-1 topAWI	7/24/20 08:00	71° 10,649' N	018° 15,365' W	1652.4	
MSM93_107-1 LIOP	7/26/20 16:13	65° 44,015' N	005° 22,010' W	2786.7	
MSM93_107-2 CTD	7/26/20 17:24	65° 43,987' N	005° 21,996' W	2786.5	
MSM93_107-3 ISC	7/26/20 18:09	65° 43,986' N	005° 21,997' W	2786.6	
MSM93_107-4 CTD	7/26/20 21:36	65° 43,986' N	005° 21,998' W	2786.2	
MSM93_107-5 MSC	7/26/20 23:45	65° 43,986' N	005° 21,997' W	2786	
MSM93_107-6 MSC	7/26/20 23:58	65° 43,986' N	005° 21,997' W	2786.1	