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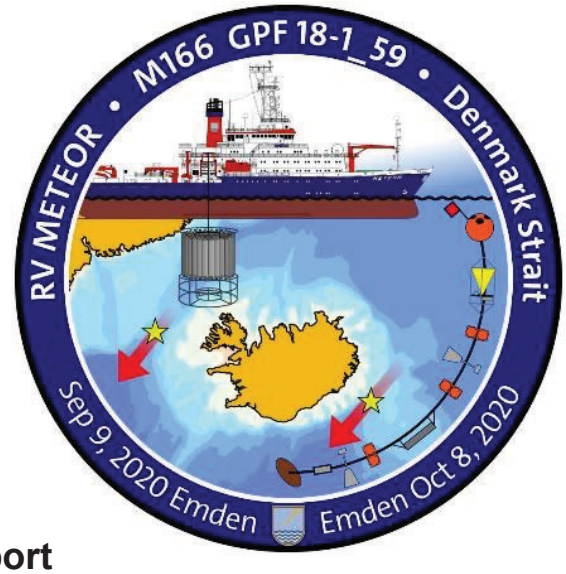


Short Cruise Report

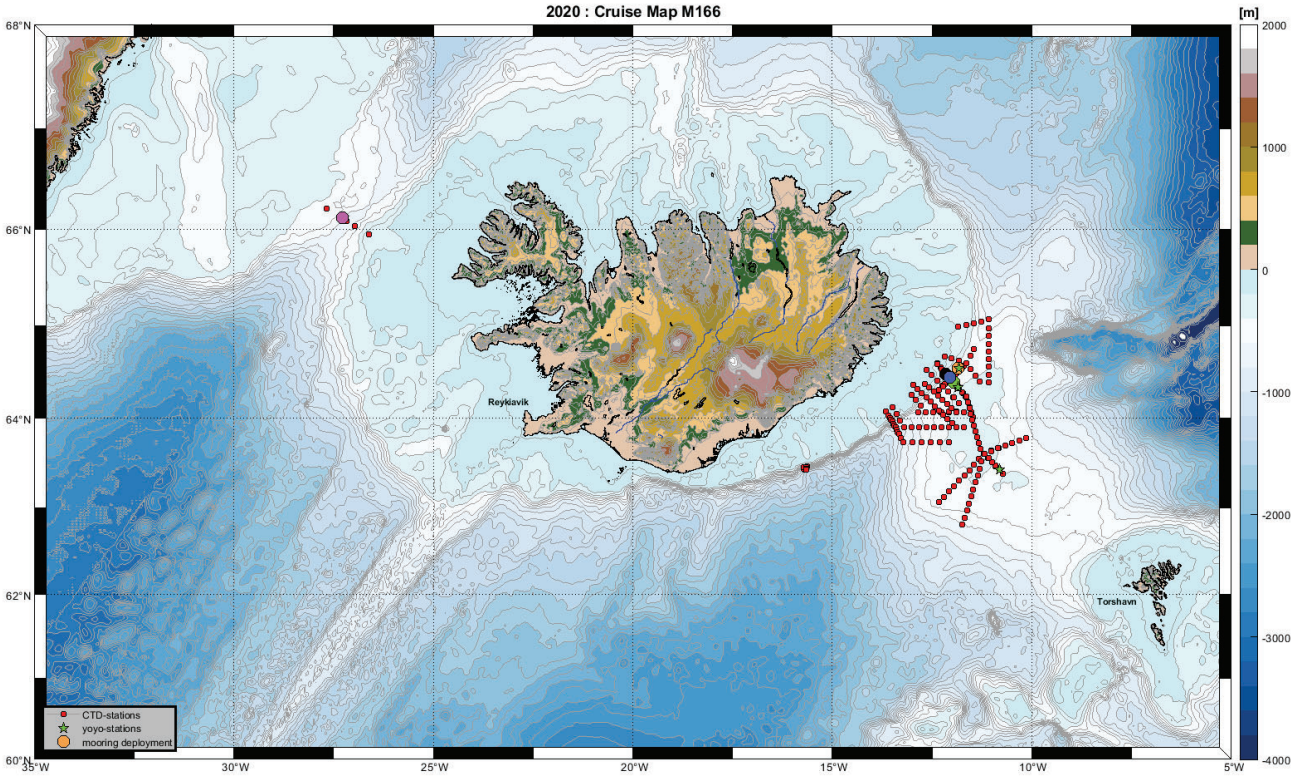
R/V METEOR, M166 (GPF 18-1_059)

Emden – Emden

9. September – 8. October 2020

Chief Scientist: Hossein Mashayekh Poul

Captain: Detlef Korte



Objectives

Dense water is formed in the Nordic Seas and spills over the Greenland-Scotland Ridge as overflow plumes. During their descent into the basins of the North Atlantic, these plumes entrain ambient waters, increasing the volume of dense water. The overflows thus contribute significantly to the formation of North Atlantic Deep Water and the lower limb of the Atlantic Meridional Overturning Circulation. The largest average volume flux in an overflow plume is observed in the Denmark Strait, which is modified by eddies on time scales of a few days. The ridge system between Iceland and the Faroes presumably supports several weak flows, which nevertheless add to the total Nordic Seas – Atlantic Ocean exchange. The Western Valley, which is the northernmost deep passage across the Iceland-Faroe Ridge, has been presumed as a location of at least intermittent overflow across the Iceland-Faroe Ridge. However, prolonged measurements of this transport are limited to less than one year.

Our goals for the cruise were (I) continuing the monitoring of the Denmark Strait Overflow transports at the sill of Denmark Strait and (II) investigating minor overflow branches at the Iceland-Faroe Ridge, in particular in the Western Valley.

In the Denmark Strait, we have conducted measurements (CTD/lowered ADCP and vm-ADCP) and tried to recover the existing mooring (DS2) which was not found as the mooring's releaser did not respond to any of the calling signals. Therefore we deployed another long-term mooring with the same design to continue monitoring (since 1996) of the overflow at the sill of the Denmark Strait using deep-sea moorings.

In the Western Valley, we obtained spatially high resolution hydrographic and current data (CTD/lowered ADCP and vm-ADCP) with some repeating sections to cover the sill of Western Valley from Iceland to Faroe Ridge. In combination with data from recent and historic cruises these data provide information on the different conditions in Western Valley, featuring either strong or weak overflow. Due to its unknown variability nature only an extensive data collection allows the identification of the mean conditions at Western Valley and of modes of variability and trends. Finally, two moorings were deployed on the sill and about 10 nm upstream of the sill of Western Valley to cover spatial variability of the flow and the interface of the dense deep overflow water and the Atlantic surface inflow. These moorings will be recovered in 2021.

Narrative

The research vessel METEOR left the port of Emden, Germany, on Wednesday, September 9, 2020 at about 09:00 local time. The cruise participants arrived on the ship the day before departure after the entire team was tested negatively for the novel coronavirus during a three-day test camp at a hotel in Leer. We started to unload the instruments from our two containers and secured the heavy instrumentation on the main deck. The mooring preparations were running during the transit, as the deployment of the moorings was planned for the first day in the working area.

The main work of the first days was to prepare the laboratories, check the instruments and install computers to ensure that we could start properly at the first station. The transit to the first station, which was our test station, went smoothly at the beginning, but from Friday evening on, we had stormy weather and the swell waves started to rise to 4 meters, coming from the west and later from the north.

On Saturday, September 12, evening time, we entered the research area in the Icelandic EEZ, where we started to test the sensors and releases of our moorings. At the same time the underway measurements started. When we reached the working area southeast of Iceland, 3 moorings (WV-ST4, WV-ST1, and WV-ST3) were deployed in a row crossing the western valley. Here the overflow water is found as a dense bottom layer below the Atlantic water. The height of the dense layer changes with different factors. The temporal variability of the overflow will be investigated with our moorings. The mooring operations went smoothly, also due to the long preparation time. Finally, after having performed three CTD sections and a yoyo station with 7 casts and checked the profiles to find the best location for the last deployment, we deployed the fourth mooring (WV-ST2). In total, four short-term moorings were deployed and high frequency sampling was performed. Two moorings from this arrangement were redeployed at the end of the cruise to be collected in 2021. Afterwards we made our way to the Denmark Strait on Friday, September 18, at 13:30 UTC. More storms were predicted for the next few days, so we had to reorganize and update the work plan based on the weather conditions. On September 18 at 06:45 UTC RV METEOR reached the position of the mooring DS2-19, which had been deployed during the last cruise in 2019. Starting with the recovery procedure we tried to communicate with the mooring until 12:15 UTC - with no success. The mooring release did not respond to any of the calling signals (neither a response signal nor a release signal). Despite no response, most of the scientific M166 participants observed the sea surface around the vessel in case of a release without responding to the release signal. At 09:30 UTC we had to stop the searching for DS2-19 to start a CTD section across the Denmark Strait. But we continued to try to communicate with the mooring at each CTD station until 12:15 UTC. At 10:29 UTC we deployed the planned mooring DS2-20 as a replacement at a reasonable distance from the DS2-19 position. After the last CTD station at about 17:50 UTC we had to leave the Denmark Strait and immediately sail back to the East of Iceland, where we had to reach a bay near Vopnafjördur in time to get shelter from the heavy storm approaching from the west. There we had to stay and wait for calmer weather conditions. On Monday, September 21, the wind and waves began to decrease slowly. So we could leave the bay. At 18:40 UTC a new CTD section was started covering the Western Valley from northeast to southwest (stations 67-75). CTD station work was continued until September 24th at 03:12 UTC until we had to stop the work in order to avoid the upcoming storm to the Western Valley. We had to go around 180 km away to the west of the Western valley to get shelter from the storm. There, we were able to run two short CTD sections looking for the overflow water downstream at the slope of the Iceland shelf.

On Friday, September 25, at 11:30 UTC, CTD work started again with an extended section across the Western Valley, where the short-term mooring were deployed in a row (stations 119-131). CTD station work was continued on Saturday 26, at 15:07 UTC with yoyo station. During the night, 8 yoyo casts were conducted at a distance of 5 nm from the southern end of the line, where three short term moorings were deployed. On 26th of September at 06:30 UTC the position of mooring WV-ST1 was reached. As it was predicted, the wind and swell conditions were good to attempt a mooring recovery. The procedure went smoothly and the mooring was on deck at 07:03 UTC and one CTD/ LADCP station was performed to be compared to the mooring data. In short succession, moorings WV-ST2 was recovered as well at 09:20 UTC. These are the moorings that were redeployed at the end of the cruise, which is why they had to be recovered earlier. The other two moorings (WV-ST3, WV-ST4) could stay in the water a bit longer. The CTD station work was continued during the day until 19:30 UTC, when we had to interrupt the work again for 37 hours, because of the high waves.

On Monday, September 28, at 06:55 UTC, RV METEOR reached the position of the mooring (WV-ST3) and work started in the Western Valley. Starting with the recovery procedure we couldn't find the mooring in its original position. The answer from the releaser was not clear and because of the reflection of the hydrophone signal from an unknown source the distance between the hydrophone and the releaser was much smaller than the depth of the mooring. However, with listening to the signal we could hear from the releaser we were able to calculate the distance manually and after 4 communications from different location we found the position of the releaser in approximately 1 nm away from its original position. The release command has been send to the releaser and a clear answer has been received. The scientific team were watching the ocean surface around the Meteor for about 20 minutes and they couldn't find the mooring. Finally, sending a diagnostic command we found that the releaser is in horizontal position, means on the ground. Later on we found that the mooring was accidentally fished away by an Icelandic trawler after only 4 days. However, it was handed over to the Icelandic Coast Guard and the collected data can still be used hopefully. We informed our colleagues in the Marine and Freshwater Research Institute in Reykjavik, who will take care for the data and the instruments and send them back to us.

Recovery of the last short term mooring (WV-ST4-20) started at 14:44 UTC, and the mooring was recovered at 15:07 UTC. Later on two long-term moorings (WV-LT1-20, WV-LT2-20) were deployed at 17:47 UTC and 18:42 UTC in the same day. Station work was continued during the night and the next day conducting two short CTD sections looking for the overflow water downstream of the Western Valley (stations 148-156 and 157-167). On Tuesday, September 29th, at 22:10 UTC, we had to interrupt the work again for 15 hours, because of the high waves. On Wednesday, September 30, at 13:10 UTC, CTD work started again with an extended section begins at the continental shelf near Iceland and covers the Iceland-Faroe Ridge across the Western Valley until the Icelandic EEZ border (stations 168-192), where we had permission for measurements. During this section we had to interrupt the work twice (between stations 170-171 about 5 hours and between stations 176-177 about 4 hours), because the CTD frame sometimes hit the vessel's side before recovery. On both events we repeated the last station before interruption. For the last 3 days of the cruise, station work was continued in the second deep passage across the Iceland-Faroe Ridge after the Western Valley, with cross sections and sections on both sides of the ridge. Stations work of cruise M166 was finished with 9 yoyo casts in this small passage on Sunday, October 4, at 12:03 UTC. RV METEOR thus set course towards Emden, which was reached on 8th of October at about 16:00 UTC.

Preliminary Results

The measurement program of RV METEOR cruise M166 focused on identifying the overflow in the Western Valley and continuing the monitoring of the Denmark Strait Overflow. Most of the measurements were performed on CTD sections along (Fig. 1) and across (Fig. 2) the Western Valley. The records indicate an overflow layer of 50 – 110 m thickness in the middle of the passage in Western Valley, with surface temperatures about 10 degrees and near-bottom temperatures close to zero degrees (about 0.3°C).

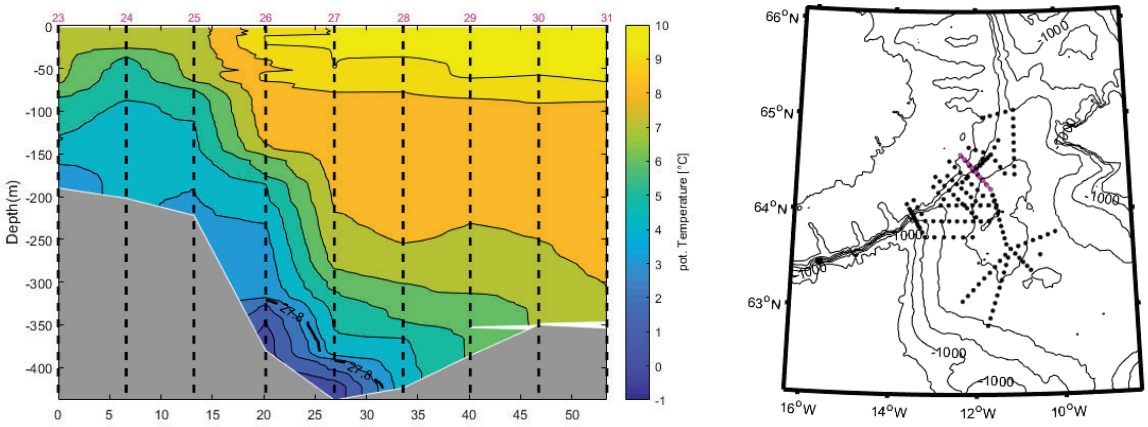


Figure 1: Vertical temperature (left) and stations map (right) evolution from CTD measurements at the station 23 to 31 across the Western Valley.

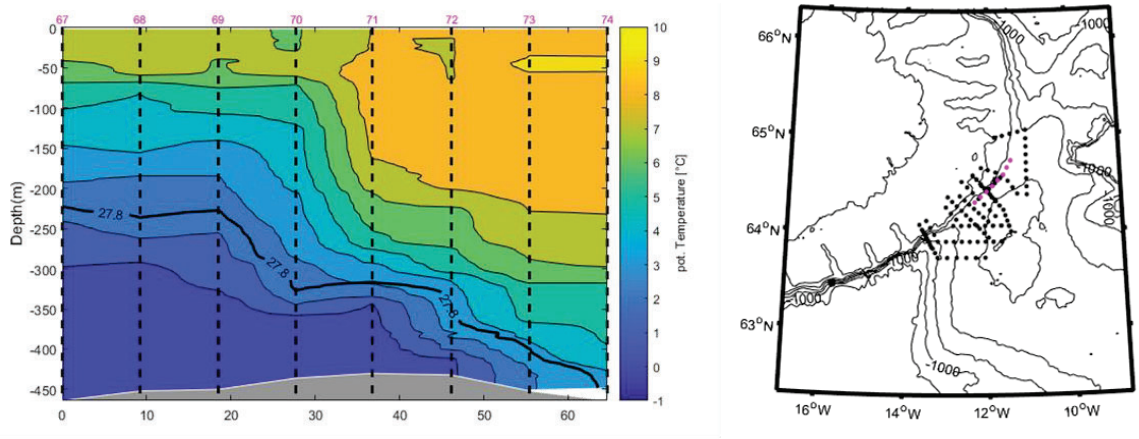


Figure 2: Vertical temperature (left) and stations map (right) evolution from CTD measurements at the station 67 to 74 along the Western Valley.

Acknowledgements

I would like to thank the scientific crew for their great contribution to the work. I would especially like to thank Captain Detlef Korte and his entire crew for their professional cooperation and patience with our flexible work plans. I would like to thank our Senior Scientist, Bernhard Mayer, for all his efforts in planning and onboard data analysis. Last but not least, I highly appreciate the fantastic and reliable work of Andreas Welsch, our talented technician with his excellent knowledge and nearly 25 years of experience in scientific cruises.

We gratefully acknowledge the support of the German Science foundation, the German Research Fleet Coordination Centre and the shipping company Briese Research.

List of scientific participants

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2.	Bernhard Andreas Mayer	Senior Scientist, CTD	IFM-CEN
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4.	Laura Schaffer	Scientist, Moorings ADCP	IFM-CEN
5.	Andreas Welsch	Technician	IFM-CEN
6.	Jan Oliver Eisermann	PhD-St, vm-ADCP	IFGEO
7.	Marek Muchow	MSc-St, Head of CTD watch	IFM-CEN
8.	David Kilian Drewes	MSc-St, CTD watch/Data analysis	IFM-CEN
9.	Ryan Mole	MSc-St, CTD watch/Data analysis	IFM-CEN
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13.	Christine Kaufhold	MSc-St, CTD watch	IFM-CEN
14.	Carolin Meier	MSc-St, CTD watch	IFM-CEN
15.	Martin Stelzner	Meteorological technician	DWD
16.	Patrick Suter	Meteorologist	DWD
17.	Vincent Urban	Documentary filmmaker	

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Stationsliste

Abbreviations:

ADCP.	Acoustic Doppler Current Profiler
CTD/LADCP.	Conductivity-Temperature-Depth and Lowered ADCP
Pos.	Posidonia
Mooring Dep.	Mooring Deployment
Mooring Rec.	Mooring Recovery
BE	Begin station
EN	End station

STATION NR.	CAST	TYPE	DATE + TIME	LATITUDE	LONGITUDE	BOTTOM DEPTH (m)
1	1	CTD	9/12/2020 19:42	63° 32.961' N	010° 29.814' W	506
2	1	CTD	9/13/2020 6:36	64° 35.816' N	011° 38.196' W	459
3	1	CTD	9/13/2020 7:58	64° 33.723' N	011° 43.157' W	452
4	1	CTD/LADCP	9/13/2020 9:34	64° 29.615' N	011° 53.213' W	442
5	1	CTD/LADCP	9/13/2020 11:02	64° 23.656' N	011° 57.103' W	440
5	2	Mooring Dep	9/13/2020 12:12	64° 23.655' N	011° 57.150' W	440
6	1	CTD/LADCP	9/13/2020 13:03	64° 26.670' N	012° 03.799' W	415
6	2	Mooring Dep	9/13/2020 13:50	64° 26.672' N	012° 03.796' W	414
7	1	CTD/LADCP	9/13/2020 14:28	64° 29.042' N	012° 09.447' W	252
7	2	Mooring Dep	9/13/2020 15:08	64° 29.105' N	012° 09.466' W	248
8	1	CTD/LADCP	9/13/2020 16:26	64° 40.245' N	012° 10.121' W	173
9	1	CTD/LADCP	9/13/2020 17:24	64° 38.896' N	012° 00.140' W	248
10	1	CTD/LADCP	9/13/2020 18:35	64° 37.434' N	011° 48.991' W	392
11	1	CTD/LADCP	9/13/2020 19:56	64° 36.001' N	011° 37.706' W	460
12	1	CTD/LADCP	9/13/2020 21:00	64° 33.115' N	011° 32.433' W	454
13	1	CTD/LADCP	9/13/2020 22:51	64° 28.057' N	011° 24.487' W	427
14	1	CTD/LADCP	9/14/2020 0:09	64° 24.040' N	011° 17.926' W	390
15	1	CTD/LADCP	9/14/2020 2:14	64° 35.998' N	011° 37.845' W	459
16	1	CTD/LADCP	9/14/2020 3:15	64° 34.237' N	011° 42.046' W	450
17	1	CTD/LADCP	9/14/2020 4:21	64° 32.553' N	011° 46.090' W	445
18	1	CTD/LADCP	9/14/2020 5:34	64° 30.772' N	011° 50.005' W	444
19	1	CTD/LADCP	9/14/2020 6:35	64° 29.064' N	011° 54.410' W	439
20	1	CTD/LADCP	9/14/2020 7:35	64° 27.313' N	011° 58.573' W	439
21	1	CTD/LADCP	9/14/2020 8:45	64° 25.581' N	012° 02.901' W	438
22	1	CTD/LADCP	9/14/2020 10:38	64° 32.833' N	011° 50.079' W	422
22	2	Mooring Dep	9/14/2020 13:22	64° 32.836' N	011° 50.077' W	422
23	1	CTD/LADCP	9/14/2020 14:53	64° 35.669' N	012° 22.287' W	196
24	1	CTD/LADCP	9/14/2020 16:01	64° 33.035' N	012° 16.700' W	207
25	1	CTD/LADCP	9/14/2020 16:56	64° 30.376' N	012° 11.036' W	227
26	1	CTD/LADCP	9/14/2020 17:50	64° 27.589' N	012° 05.260' W	387
27	1	CTD/LADCP	9/14/2020 18:48	64° 24.875' N	011° 59.790' W	442
28	1	CTD/LADCP	9/14/2020 19:51	64° 21.959' N	011° 54.865' W	432
29	1	CTD/LADCP	9/14/2020 20:59	64° 19.469' N	011° 49.016' W	393
30	1	CTD/LADCP	9/14/2020 22:09	64° 16.730' N	011° 43.624' W	356

31	1	CTD/LADCP	9/14/2020 23:14	64° 14.014' N	011° 38.233' W	682
32	1	CTD/LADCP	9/15/2020 0:28	64° 10.179' N	011° 49.841' W	380
33	1	CTD/LADCP	9/15/2020 1:32	64° 13.858' N	011° 57.672' W	416
34	1	CTD/LADCP	9/15/2020 2:36	64° 17.467' N	012° 06.015' W	431
35	1	CTD/LADCP	9/15/2020 3:41	64° 21.096' N	012° 13.863' W	460
36	1	CTD/LADCP	9/15/2020 4:55	64° 24.680' N	012° 22.167' W	235
37	1	CTD/LADCP	9/15/2020 5:53	64° 28.235' N	012° 30.240' W	179
38	1	CTD/LADCP	9/15/2020 6:49	64° 31.678' N	012° 38.427' W	171
39	1	CTD/LADCP	9/15/2020 9:41	64° 15.675' N	013° 01.106' W	163
40	1	CTD/LADCP	9/15/2020 10:46	64° 11.857' N	012° 53.887' W	209
41	1	CTD/LADCP	9/15/2020 11:49	64° 08.114' N	012° 46.328' W	531
42	1	CTD/LADCP	9/15/2020 13:27	64° 04.116' N	012° 38.993' W	579
43	1	CTD/LADCP	9/15/2020 14:39	64° 04.208' N	012° 27.712' W	515
44	1	CTD/LADCP	9/15/2020 15:56	64° 04.192' N	012° 16.358' W	464
45	1	CTD/LADCP	9/15/2020 17:11	64° 04.227' N	012° 04.902' W	421
46	1	CTD/LADCP	9/15/2020 18:14	64° 04.206' N	011° 53.588' W	370
47	1	CTD/LADCP	9/15/2020 19:16	64° 04.222' N	011° 42.041' W	349
48	1	CTD/LADCP	9/15/2020 20:30	64° 04.205' N	011° 30.575' W	341
49	1	CTD/LADCP	9/15/2020 23:25	64° 23.429' N	011° 04.050' W	360
50	1	CTD/LADCP	9/16/2020 0:40	64° 28.454' N	011° 04.166' W	397
51	1	CTD/LADCP	9/16/2020 1:47	64° 33.479' N	011° 04.230' W	426
52	1	CTD/LADCP	9/16/2020 2:48	64° 38.449' N	011° 04.197' W	436
53	1	CTD/LADCP	9/16/2020 3:58	64° 43.341' N	011° 04.187' W	447
54	1	CTD/LADCP	9/16/2020 5:03	64° 48.345' N	011° 04.191' W	464
55	1	CTD/LADCP	9/16/2020 6:08	64° 53.406' N	011° 04.213' W	507
56	1	CTD/LADCP	9/16/2020 7:13	64° 58.456' N	011° 04.173' W	580
57	1	CTD/LADCP	9/16/2020 8:28	65° 03.785' N	011° 04.239' W	639
58	1	CTD/LADCP	9/16/2020 9:47	65° 02.633' N	011° 15.558' W	571
59	1	CTD/LADCP	9/16/2020 10:57	65° 01.491' N	011° 27.229' W	391
60	1	CTD/LADCP	9/16/2020 12:04	65° 00.252' N	011° 38.721' W	232
61	1	CTD/LADCP	9/16/2020 13:05	64° 59.124' N	011° 50.240' W	193
62	1	Mooring Rec	9/18/2020 6:47	66° 07.397' N	027° 16.242' W	570
62	2	CTD/LADCP	9/18/2020 9:38	66° 07.155' N	027° 16.788' W	579
62	3	Mooring Dep	9/18/2020 10:29	66° 07.150' N	027° 16.763' W	577
63	1	CTD/LADCP	9/18/2020 12:16	66° 12.213' N	027° 40.172' W	485
64	1	CTD/LADCP	9/18/2020 14:18	66° 04.930' N	027° 10.717' W	637
65	1	CTD/LADCP	9/18/2020 15:39	66° 01.831' N	026° 58.364' W	583
66	1	CTD/LADCP	9/18/2020 17:27	65° 56.791' N	026° 37.497' W	289
67	1	CTD/LADCP/Pos	9/21/2020 18:42	64° 44.859' N	011° 26.950' W	466
68	1	CTD/LADCP/Pos	9/21/2020 20:06	64° 40.464' N	011° 32.411' W	454
69	1	CTD/LADCP/Pos	9/21/2020 21:31	64° 36.007' N	011° 37.770' W	451
70	1	CTD/LADCP/Pos	9/21/2020 22:49	64° 32.533' N	011° 46.055' W	437
71	1	CTD/LADCP/Pos	9/22/2020 0:07	64° 29.011' N	011° 53.952' W	429
72	1	CTD/LADCP/Pos	9/22/2020 1:32	64° 25.493' N	012° 02.392' W	430
73	1	CTD/LADCP/Pos	9/22/2020 2:43	64° 22.254' N	012° 11,172' W	447
74	1	CTD/LADCP/Pos	9/22/2020 4:03	64° 18.786' N	012° 19.326' W	460

75	1	CTD/LADCP/Pos	9/22/2020 6:41	64°04.206' N	012°50.396' W	591
76	1	CTD/LADCP/Pos	9/22/2020 8:14	64° 04.177' N	012° 38.973' W	568
77	1	CTD/LADCP/Pos	9/22/2020 9:52	64° 04.176' N	012° 27.725' W	568
78	1	CTD/LADCP/Pos	9/22/2020 11:23	64° 04.186' N	012° 16.179' W	454
79	1	CTD/LADCP/Pos	9/22/2020 12:35	64° 04.238' N	012° 04.835' W	414
80	1	CTD/LADCP/Pos	9/22/2020 13:45	64° 04.244' N	011° 53.282' W	366
81	1	CTD/LADCP/Pos	9/22/2020 14:54	64° 04.170' N	011° 41.318' W	341
82	1	CTD/LADCP/Pos	9/22/2020 16:31	63° 54.140' N	011° 41.590' W	341
83	1	CTD/LADCP/Pos	9/22/2020 17:44	63° 54.210' N	011° 53.001' W	374
84	1	CTD/LADCP/Pos	9/22/2020 18:49	63° 54.229' N	012° 04.282' W	404
85	1	CTD/LADCP/Pos	9/22/2020 20:04	63° 54.190' N	012° 15.650' W	427
86	1	CTD/LADCP/Pos	9/22/2020 21:16	63° 54.203' N	012° 26.892' W	491
87	1	CTD/LADCP/Pos	9/22/2020 22:34	63° 54.261' N	012° 38.185' W	538
88	1	CTD/LADCP/Pos	9/22/2020 23:58	63° 54.219' N	012° 49.443' W	618
89	1	CTD/LADCP/Pos	9/23/2020 1:17	63° 54.235' N	013° 00.746' W	713
90	1	CTD/LADCP/Pos	9/23/2020 2:40	63° 54.223' N	013° 12.093' W	792
91	1	CTD/LADCP/Pos	9/23/2020 4:05	63° 58.615' N	013° 17.539' W	675
92	1	CTD/LADCP/Pos	9/23/2020 5:23	64° 02.809' N	013° 23.440' W	218
93	1	CTD/LADCP/Pos	9/23/2020 6:26	64° 07.167' N	013° 29.127' W	143
94	1	CTD/LADCP/Pos	9/23/2020 7:17	64° 04.671' N	013° 38.957' W	137
95	1	CTD/LADCP/Pos	9/23/2020 8:09	64° 01.673' N	013° 34.988' W	145
96	1	CTD/LADCP/Pos	9/23/2020 8:49	64° 00.347' N	013° 33.280' W	150
97	1	CTD/LADCP/Pos	9/23/2020 9:34	63° 59.089' N	013° 31.608' W	193
98	1	CTD/LADCP/Pos	9/23/2020 10:17	63° 57.783' N	013° 29.863' W	683
99	1	CTD/LADCP/Pos	9/23/2020 11:16	63° 56.457' N	013° 28.018' W	776
100	1	CTD/LADCP/Pos	9/23/2020 12:26	63° 55.235' N	013° 26.457' W	739
101	1	CTD/LADCP/Pos	9/23/2020 13:30	63° 53.952' N	013° 24.645' W	791
102	1	CTD/LADCP/Pos	9/23/2020 14:38	63° 52.402' N	013° 23.366' W	845
103	1	CTD/LADCP/Pos	9/23/2020 15:41	63° 50.881' N	013° 21.763' W	895
104	1	CTD/LADCP/Pos	9/23/2020 16:50	63° 49.981' N	013° 19.762' W	893
105	1	CTD/LADCP/Pos	9/23/2020 18:16	63° 47.207' N	013° 16.334' W	856
106	1	CTD/LADCP/Pos	9/23/2020 19:33	63° 44.158' N	013° 12.548' W	828
107	1	CTD/LADCP/Pos	9/23/2020 21:19	63° 44.245' N	012° 59.049' W	670
108	1	CTD/LADCP/Pos	9/23/2020 22:50	63° 44.219' N	012° 45.476' W	588
109	1	CTD/LADCP/Pos	9/24/2020 0:22	63° 44.238' N	012° 31.926' W	487
110	1	CTD/LADCP/Pos	9/24/2020 1:36	63° 44.175' N	012° 18.264' W	415
111	1	CTD/LADCP/Pos	9/24/2020 2:50	63° 44.198' N	012° 04.894' W	392
112	1	CTD/LADCP/Pos	9/24/2020 12:00	63° 25.703' N	015° 41.423' W	1001
113	1	CTD/LADCP/Pos	9/24/2020 12:58	63° 26.612' N	015° 42.350' W	749
114	1	CTD/LADCP/Pos	9/24/2020 13:52	63° 27.526' N	015° 42.994' W	416
115	1	CTD/LADCP/Pos	9/24/2020 14:53	63° 28.083' N	015° 38.353' W	381
116	1	CTD/LADCP/Pos	9/24/2020 15:32	63° 27.351' N	015° 38.546' W	657
117	1	CTD/LADCP/Pos	9/24/2020 16:20	63° 26.694' N	015° 38.643' W	894
118	1	CTD/LADCP/Pos	9/24/2020 17:22	63° 25.978' N	015° 38.595' W	1070
118	2	Multibeam survey	9/24/2020 18:50	63° 28.798' N	015° 49.873' W	131

118	2	Multibeam survey	9/25/2020 0:10	63° 38.517' N	015° 51.094' W	165
119	1	CTD/LADCP/Pos	9/25/2020 11:29	64° 35.712' N	012° 22.263' W	194
120	1	CTD/LADCP/Pos	9/25/2020 12:32	64° 33.166' N	012° 16.567' W	203
121	1	CTD/LADCP/Pos	9/25/2020 13:26	64° 30.441' N	012° 11.081' W	224
122	1	CTD/LADCP/Pos	9/25/2020 14:29	64° 27.694' N	012° 04.697' W	387
123	1	CTD/LADCP/Pos	9/25/2020 15:28	64° 24.917' N	011° 59.507' W	435
124	1	CTD/LADCP/Pos	9/25/2020 16:29	64° 22.036' N	011° 54.204' W	424
125	1	CTD/LADCP/Pos	9/25/2020 17:24	64° 19.475' N	011° 49.097' W	386
126	1	CTD/LADCP/Pos	9/25/2020 18:21	64° 16.759' N	011° 43.714' W	350
127	1	CTD/LADCP/Pos	9/25/2020 19:16	64° 14.023' N	011° 38.288' W	353
128	1	CTD/LADCP/Pos	9/25/2020 20:10	64° 10.639' N	011° 35.541' W	345
129	1	CTD/LADCP/Pos	9/25/2020 21:10	64° 07.245' N	011° 32.989' W	322
130	1	CTD/LADCP/Pos	9/25/2020 22:10	64° 03.869' N	011° 30.356' W	336
131	1	CTD/LADCP/Pos	9/25/2020 23:15	64° 00.478' N	011° 27.671' W	332
132	1	CTD/LADCP/Pos	9/26/2020 1:57	64° 20.639' N	011° 50.694' W	413
133	2	Mooring Rec	9/26/2020 7:03	64° 26.847' N	012° 02.974' W	409
133	1	CTD/LADCP/Pos	9/26/2020 7:19	64° 26.897' N	012° 03.004' W	414
134	2	Mooring Rec	9/26/2020 9:20	64° 32.840' N	011° 49.956' W	415
134	1	CTD/LADCP/Pos	9/26/2020 9:45	64° 32.870' N	011° 50.102' W	415
135	1	CTD/LADCP/Pos	9/26/2020 12:24	64° 28.199' N	012° 30.242' W	181
136	1	CTD/LADCP/Pos	9/26/2020 13:23	64° 24.636' N	012° 22.159' W	233
137	1	CTD/LADCP/Pos	9/26/2020 14:29	64° 21.055' N	012° 13.691' W	453
138	1	CTD/LADCP/Pos	9/26/2020 15:37	64° 17.413' N	012° 05.989' W	424
139	1	CTD/LADCP/Pos	9/26/2020 16:45	64° 13.782' N	011° 57.516' W	406
140	1	CTD/LADCP/Pos	9/26/2020 17:53	64° 10.187' N	011° 49.711' W	356
141	1	CTD/LADCP/Pos	9/26/2020 19:23	64° 04.119' N	011° 53.391' W	365
142	1	Mooring Rec	9/28/2020 6:55	64° 29.427' N	012° 09.204' W	242
143	2	Mooring Rec	9/28/2020 14:44	64° 23.878' N	011° 57.110' W	430
143	1	CTD/LADCP/Pos	9/28/2020 15:27	64° 23.774' N	011° 56.855' W	430
144	1	Mooring Dep	9/28/2020 17:47	64° 26.671' N	012° 03.793' W	406
145	1	Mooring Dep	9/28/2020 18:42	64° 32.839' N	011° 50.080' W	412
146	1	CTD/LADCP/Pos	9/28/2020 19:07	64° 33.397' N	011° 49.919' W	406
147	1	CTD/LADCP/Pos	9/28/2020 20:56	64° 27.013' N	012° 04.638' W	394
148	1	CTD/LADCP/Pos	9/28/2020 23:44	64° 25.465' N	012° 47.917' W	159
149	1	CTD/LADCP/Pos	9/29/2020 1:58	64° 22.682' N	012° 40.989' W	177
150	1	CTD/LADCP/Pos	9/29/2020 2:52	64° 20.102' N	012° 34.103' W	217
151	1	CTD/LADCP/Pos	9/29/2020 3:57	64° 17.503' N	012° 27.403' W	447
152	1	CTD/LADCP/Pos	9/29/2020 5:01	64° 14.823' N	012° 20.540' W	475
153	1	CTD/LADCP/Pos	9/29/2020 6:10	64° 12.116' N	012° 13.769' W	448
154	1	CTD/LADCP/Pos	9/29/2020 7:15	64° 09.448' N	012° 06.964' W	427
155	1	CTD/LADCP/Pos	9/29/2020 8:19	64° 06.801' N	012° 00.300' W	400
156	1	CTD/LADCP/Pos	9/29/2020 9:24	64° 04.105' N	011° 53.614' W	368
157	1	CTD/LADCP/Pos	9/29/2020 11:15	63° 54.074' N	011° 53.200' W	373
158	1	CTD/LADCP/Pos	9/29/2020 12:28	63° 56.803' N	011° 59.863' W	387
159	1	CTD/LADCP/Pos	9/29/2020 13:41	63° 59.534' N	012° 06.339' W	409
160	1	CTD/LADCP/Pos	9/29/2020 14:54	64° 02.429' N	012° 12.582' W	438

161	1	CTD/LADCP/Pos	9/29/2020 15:59	64° 05.130' N	012° 19.231' W	468
162	1	CTD/LADCP/Pos	9/29/2020 17:00	64° 07.968' N	012° 25.584' W	498
163	1	CTD/LADCP/Pos	9/29/2020 18:04	64° 10.811' N	012° 32.129' W	505
164	1	CTD/LADCP/Pos	9/29/2020 19:10	64° 13.589' N	012° 38.554' W	434
165	1	CTD/LADCP/Pos	9/29/2020 20:18	64° 16.409' N	012° 45.200' W	182
166	1	CTD/LADCP/Pos	9/29/2020 21:10	64° 19.182' N	012° 52.041' W	165
167	1	CTD/LADCP/Pos	9/29/2020 21:57	64° 21.995' N	012° 58.577' W	148
168	1	CTD/LADCP/Pos	9/30/2020 13:07	64° 35.138' N	012° 21.264' W	189
169	1	CTD/LADCP/Pos	9/30/2020 14:02	64° 32.218' N	012° 15.245' W	190
170	1	CTD/LADCP/Pos	9/30/2020 15:06	64° 29.241' N	012° 08.956' W	260
171	1	CTD/LADCP/Pos	9/30/2020 20:12	64° 29.512' N	012° 08.346' W	272
172	1	CTD/LADCP/Pos	9/30/2020 21:16	64° 26.251' N	012° 02.565' W	425
173	1	CTD/LADCP/Pos	9/30/2020 22:19	64° 23.214' N	011° 57.206' W	428
174	1	CTD/LADCP/Pos	9/30/2020 23:19	64° 20.287' N	011° 51.198' W	410
175	1	CTD/LADCP/Pos	10/1/2020 0:23	64° 17.291' N	011° 44.849' W	359
176	1	CTD/LADCP/Pos	10/1/2020 1:19	64° 14.347' N	011° 39.121' W	353
177	1	CTD/LADCP/Pos	10/1/2020 5:22	64° 14.102' N	011° 38.648' W	353
178	1	CTD/LADCP/Pos	10/1/2020 6:26	64° 10.440' N	011° 36.281' W	334
179	1	CTD/LADCP/Pos	10/1/2020 7:29	64° 06.585' N	011° 33.787' W	323
180	1	CTD/LADCP/Pos	10/1/2020 8:31	64° 02.731' N	011° 31.484' W	331
181	1	CTD/LADCP/Pos	10/1/2020 9:28	63° 58.864' N	011° 28.931' W	324
182	1	CTD/LADCP/Pos	10/1/2020 10:30	63° 55.035' N	011° 26.601' W	345
183	1	CTD/LADCP/Pos	10/1/2020 11:32	63° 51.123' N	011° 24.386' W	366
184	1	CTD/LADCP/Pos	10/1/2020 12:38	63° 47.302' N	011° 21.934' W	385
185	1	CTD/LADCP/Pos	10/1/2020 13:33	63° 43.453' N	011° 19.630' W	390
186	1	CTD/LADCP/Pos	10/1/2020 14:30	63° 39.568' N	011° 17.288' W	353
187	1	CTD/LADCP/Pos	10/1/2020 15:23	63° 36.743' N	011° 11.152' W	318
188	1	CTD/LADCP/Pos	10/1/2020 16:22	63° 33.740' N	011° 05.301' W	322
189	1	CTD/LADCP/Pos	10/1/2020 17:25	63° 30.993' N	010° 59.368' W	341
190	1	CTD/LADCP/Pos	10/1/2020 18:18	63° 28.503' N	010° 54.209' W	428
191	1	CTD/LADCP/Pos	10/1/2020 19:20	63° 25.928' N	010° 48.763' W	429
192	1	CTD/LADCP/Pos	10/1/2020 20:29	63° 23.352' N	010° 43.332' W	429
193	1	CTD/LADCP/Pos	10/1/2020 21:31	63° 25.863' N	010° 48.749' W	429
194	1	CTD/LADCP/Pos	10/1/2020 22:32	63° 28.412' N	010° 54.063' W	438
195	1	CTD/LADCP/Pos	10/1/2020 23:38	63° 30.965' N	010° 59.381' W	340
196	1	CTD/LADCP/Pos	10/2/2020 0:36	63° 33.703' N	011° 05.109' W	320
197	1	CTD/LADCP/Pos	10/2/2020 1:47	63° 36.722' N	011° 11.410' W	313
198	1	CTD/LADCP/Pos	10/2/2020 2:48	63° 33.002' N	011° 19.057' W	313
199	1	CTD/LADCP/Pos	10/2/2020 3:53	63° 29.360' N	011° 26.834' W	340
200	1	CTD/LADCP/Pos	10/2/2020 4:59	63° 25.620' N	011° 33.766' W	395
201	1	CTD/LADCP/Pos	10/2/2020 6:10	63° 21.911' N	011° 40.900' W	413
202	1	CTD/LADCP/Pos	10/2/2020 7:22	63° 18.436' N	011° 48.890' W	417
203	1	CTD/LADCP/Pos	10/2/2020 8:35	63° 14.736' N	011° 56.556' W	417
204	1	CTD/LADCP/Pos	10/2/2020 9:46	63° 11.055' N	012° 04.043' W	422
205	1	CTD/LADCP/Pos	10/2/2020 10:53	63° 07.469' N	012° 11.509' W	434
206	1	CTD/LADCP/Pos	10/2/2020 12:00	63° 03.838' N	012° 18.918' W	452

207	1	CTD/LADCP/Pos	10/2/2020 14:54	62° 48.582' N	011° 43.890' W	598
208	1	CTD/LADCP/Pos	10/2/2020 16:03	62° 53.370' N	011° 40.610' W	523
209	1	CTD/LADCP/Pos	10/2/2020 17:14	62° 58.129' N	011° 37.357' W	474
210	1	CTD/LADCP/Pos	10/2/2020 18:17	63° 02.913' N	011° 34.212' W	458
211	1	CTD/LADCP/Pos	10/2/2020 19:17	63° 07.698' N	011° 30.901' W	442
212	1	CTD/LADCP/Pos	10/2/2020 20:20	63° 12.446' N	011° 27.586' W	426
213	1	CTD/LADCP/Pos	10/2/2020 21:32	63° 17.230' N	011° 24.263' W	421
214	1	CTD/LADCP/Pos	10/2/2020 22:42	63° 21.944' N	011° 21.197' W	363
215	1	CTD/LADCP/Pos	10/2/2020 23:44	63° 26.702' N	011° 18.068' W	324
216	1	CTD/LADCP/Pos	10/3/2020 0:56	63° 31.311' N	011° 15.107' W	310
217	1	CTD/LADCP/Pos	10/3/2020 1:55	63° 36.693' N	011° 11.242' W	315
218	1	CTD/LADCP/Pos	10/3/2020 2:48	63° 33.791' N	011° 05.161' W	322
219	1	CTD/LADCP/Pos	10/3/2020 3:36	63° 31.012' N	010° 59.388' W	340
220	1	CTD/LADCP/Pos	10/3/2020 4:26	63° 28.421' N	010° 54.147' W	437
221	1	CTD/LADCP/Pos	10/3/2020 5:24	63° 25.852' N	010° 48.746' W	429
222	1	CTD/LADCP/Pos	10/3/2020 6:20	63° 23.263' N	010° 43.456' W	430
223	1	CTD/LADCP/Pos	10/3/2020 7:12	63° 25.871' N	010° 48.790' W	430
224	1	CTD/LADCP/Pos	10/3/2020 8:06	63° 28.419' N	010° 54.142' W	438
225	1	CTD/LADCP/Pos	10/3/2020 9:01	63° 31.012' N	010° 59.416' W	340
226	1	CTD/LADCP/Pos	10/3/2020 9:52	63° 33.854' N	011° 05.081' W	322
227	1	CTD/LADCP/Pos	10/3/2020 11:06	63° 36.727' N	011° 11.123' W	316
228	1	CTD/LADCP/Pos	10/3/2020 13:36	63° 25.850' N	010° 48.781' W	429
229	1	CTD/LADCP/Pos	10/3/2020 14:37	63° 25.876' N	010° 48.764' W	429
229	2	CTD/LADCP/Pos	10/3/2020 17:17	63° 25.860' N	010° 48.696'	429
230	1	CTD/LADCP/Pos	10/3/2020 19:59	63° 38.443' N	011° 00.507' W	342
231	1	CTD/LADCP/Pos	10/3/2020 21:00	63° 40.191' N	010° 50.015' W	427
232	1	CTD/LADCP/Pos	10/3/2020 22:00	63° 41.930' N	010° 39.512' W	481
233	1	CTD/LADCP/Pos	10/3/2020 23:06	63° 43.635' N	010° 28.948' W	502
234	1	CTD/LADCP/Pos	10/4/2020 0:17	63° 45.369' N	010° 18.381' W	532
235	1	CTD/LADCP/Pos	10/4/2020 1:27	63° 47.179' N	010° 07.917' W	572
236	1	CTD/LADCP/Pos	10/4/2020 2:38	63° 45.198' N	010° 18.449' W	535
237	1	CTD/LADCP/Pos	10/4/2020 3:42	63° 43.606' N	010° 29.122' W	498
238	1	CTD/LADCP/Pos	10/4/2020 4:44	63° 41.896' N	010° 39.677' W	481
239	1	CTD/LADCP/Pos	10/4/2020 5:44	63° 40.159' N	010° 50.140' W	420
240	1	CTD/LADCP/Pos	10/4/2020 6:41	63° 38.417' N	011° 00.700' W	342
241	1	CTD/LADCP/Pos	10/4/2020 7:36	63° 36.748' N	011° 11.136' W	317
242	1	CTD/LADCP/Pos	10/4/2020 9:46	63° 25.881' N	010° 48.705' W	429