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Short Cruise Report RV METEOR, cruise M184

St. Johns, Canada – Hamburg, Germany August 12 – September 15, 2022

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RV Meteor M184 cruise track from St. Johns, Canada to Hamburg, Germany. Yellow dots indicate CTD/IADCP casts, red stars indicate mooring operations (incl. mooring names), 75kHz ADCP (black), moving vessel profiler (green tracks), drifter positions (white circles; by end of cruise), underway CTD (blue squares), glider tracks (black circles with red frame). Insets shows a zoom to the 53°N Observatory (left) and the SWOT special survey area (right).

Objectives

The core program of the RV METEOR expedition M184 is dedicated to the re-deployment of moored instrumentation and to various different types of surveys of the water column. Moored instrumentation, programed for high temporal resolution sampling (<1 hour) and installed at distinct locations in the Labrador Sea record the local evolution of physical properties (temperature, salinity, density, currents). Continuous installation of such system over many years, and even up to decades at some locations, provide the observational base for the analysis of systematic changes of the interior ocean. In a global context, only a few of such long lasting oceanreference-stations exists. Along selected sections the hydrographic (temperature, salinity, density), oxygen, nutrients, and currents structure was recorded using CTD/(I)ADCP systems. These systems operate over the full water depth, from the surface to the ocean bottom. Moreover, quasicontinuous underway data collection was performed using the Thermosalinograph (Temperature, Salinity), and surface meteorological observations but also a ship based ADCP systems (currents in upper 500). In preparation for the upcoming SWOT satellite mission surveys were executed in two specific areas that host a submesoscale front, one at the boundary of the Labrador Current at the extension of the 53°N array and one in an area with strong mesoscale eddy activity and more in the northern part of the Labrador Sea (moving vessel profiler, underway CTDs, surface drifter, and underwater electric glider).

Narrative

On-site operations for departure of RV METEOR to the M184 cruise started with the container loading on August 10, 2022 in St. John's, Canada. All arrivals were welcomed by the ships doctor and underwent a COVID testing procedure. During the next days a rather continuous packing and setup of the equipment followed – all in strict compliance with the COVID rules. We installed the ships mobile 38kHz OS ADCP in the moon-pool. Unfortunately the ships 75kHz Ocean Surveyor ADCP, fitted to the hull, was not operational.

RV METEOR left pier 12 and shifted to the bunkering pier on August 12 around 09:00 am. A first science crew meeting was held at 01:00 pm followed by a safety drill at 03:20 pm. After leaving the bunker pier, we headed out of the sheltered bay of St John's and quickly arrived at "Station 27", a Canadian long term time series station. The first CTD was ready for deployment at 04:45 pm but awaited the complete set up of the Moving Vessel Profiler (MVP) first. The CTD operations went well and all systems were operating as we hoped they will.

After the CTD we continued to setup our equipment in particular the MVP that will be used for the SWOT-satellite related surveys. These surveys shall characterize the mesoscale flow and parameter pattern. Before a first deployment of the MVP a rewinding of the MVP winch was done when we reached water depth >400m. We slowly headed northeast, a strong front of the cold and fresh Labrador Current was crossed that was visible in the thermosalinograph (TSG). On the colder (and fresher) side of the front a first pair of Hereon drifters were launched to track the flow in the front. This front was crossed again before we continued the way towards the 53°N observatory. On Sunday, August 14, a test of the two underwater gliders was done in the testing pool on deck with sunny and calm weather. The pool also was used to test a couple of Helmholtz-Zentrum Hereon drifters. On our way, continuously MVP sampling was done, resolving the upper water layer structure of the front of the Labrador Current.

On August 15, we arrived in the working area "53°N observatory". In the middle of the night (02:00 am) two CTD station were done. The first close to the DSOW1 mooring location and with calibration of 15 Microcat instruments, a pair of acoustic mooring releaser and some Aquadop current meters (Temperature calibration only). At 09:00 am the K8 mooring was released while more or less with the release, the weather turned to foggy and sight was very limited and did not allow to spot the mooring elements at the surface. The Argos receiver (GONIO) showed signals from the sender but the direction information was not usable/random. A triangulation was started, using the two releasers. After a couple of hours, the search was successful and the mooring was on deck at 3pm. Shortly after the glider IFM13 (deployment 10) was deployed a couple of miles towards the southwest (Labrador coast). The deployment was done via crane and with 4 persons supporting the device and releasing. All went well and after couple of test dives the glider was send to deeper depth and southwest – towards the coast and crossing the Labrador current and in particular its frontal areas. Overnight we did a couple of CTD at "OSNAP West" CTD positions.

In the early morning of August 16, we arrived at the K7 site and released the mooring around 8:30 am, despite foggy weather. Fortunately, the first floatation elements were spotted shortly after release and at 09:30 am the ship was in a position to start recovering the mooring. All recovery went well and was finished before lunch. We steamed for the DSOW1 position and the mooring was also recovered. A CTD-cast was performed with various instruments attached for calibration. Further CTDs and two mooring deployments (K8, DSOW1) followed on August 17 before noon and with calm sea conditions and sunny weather. In the afternoon the recovery of the K9 mooring started at around 05:00 pm and went smooth. A calibration CTD at the DSOW5 position was prepared and executed shortly after midnight. During night we enjoyed the rarely seen this far south, Aurora Borealis. On the following day three further mooring were recovered and which finalized the mooring recovery activities in the 53°N observatory area. Heading northwest we arrived in the K1 deep convection mooring recovery area and the mooring was released after our obligatory calibration CTD near the mooring position. This CTD revealed that last winter deep convection did not go very deep, maybe down to 1400m maximum. The weather was calm and first sunny with very good visibility while about 30' after release and spotting the mooring the visibility degraded to less than 100m. However, the mooring was recovered without any problem.

Next, we started headed further north, towards Greenland, to survey through a potential intense mesoscale eddy (low salinity surface conditions suggested this an Irminger Ring) that we identified using the online track planning tool OceanGSN.com. This survey was motivated by SWOT satellite missions preparational experiments. The original idea was to measure submesoscale dynamics insitu and parallel to the overflies of the satellite but the launch was postponed by 1 year (to the end of 2020). Therefore, we decided to work on a general characterization of the submesoscale in representative regions of the Labrador Sea – and information that shall be of use in the SWOT context even without the satellite launched. For this eddy survey we proceed the following way: After an initial survey guided by operational forecasting model, the ADCP data was analyzed and the position for the center (couple of kilometers from the initial guess), the eddy radius (31km) and the maximum rotation velocities (>60 cm/s) were determined. After steaming to the center, we deployed two underwater gliders (IFM13; SUNA nitrate sensor and IFM03; Microstructure) using the Zodiac in the very calm seas. Fortunately, the communication with the gliders could be done via the Freewave system that we have setup on board because we could not rely only on the internet. After verifying both gliders operate well, we steamed northwest, out of the eddy and towards a position where a BGC Argo float (contribution to Euro-Argo) from the BSH, Hamburg, Germany, was drifting. On our way we released triplets of Hereon drifter at five specific regions of the eddy (centre, linear V-increase, rim, outer rim, exterior) and also recovered 4 CTDs profiles (centre, linear, rim, exterior).

On August 25, we arrived at the float position and recovered the float in calm sea but with very little visibility and relying primarily on the GPS positions the float was transmitting. The recovery was done directly from the ship using a rescue pole with a ring. Further MVP surveying was done and we arrived at the DSOW6 mooring (total length about 500m) position on August 26 in the early morning and did a calibration CTD followed by the mooring recovery and shortly after, the mooring deployment.

We continued our operations with CTD-stations following the OSNAP west line that connects the 53°N observatory with the moorings off Greenland which are operated primarily by WHOI except of the DSOW6, 3 and 4. DSOW3 and 4 will be re-deployed with RV ARMSTRONG later this year. For the OSNAP West CTD section survey we used the MVP (underway between the stations) and did CTD casts. Guided by the operational ocean forecast (Hycom) and NOAA "Coraltemp" sea surface temperature product, and under the assumption that mesoscale eddies will appear as cold or warm anomalies, we identified three more potential mesoscale eddies on our route towards the south. We designed the track as such and that we could sample them in more details and as a potential contribution to the SWOT sub-mesoscale studies on fronts. On August 29 the MVP system broke down due to a problem with the spooling winch. However, further underway eddy surveys where done using the underway CTD which samples not with such a high frequency but covering a deeper range up to 450m. The sea state and wind increased. Finally, arriving in the south at the offshore end of the 53°N Observatory, we surveyed further offshore along a virtual line to cover the recirculation of the boundary currents and recording a picture of the potential heat transport into the Labrador Sea caused by this recirculation.

On August 31, we arrived for the second time during this cruise at the K1 site and because it was early morning and still dark, we first did a CTD cast at the K1 position. Then followed the deployment of K1 and that went smooth despite some swell and fresh wind of 6-7Bft. We headed further north to survey the mesoscale eddy again where the two underwater gliders had been deployed on August 24. The glider progress and data was tracked throughout their deployment time, also adapting their sampling. We had quite some wind (7-8Bft) and also the swell forecast was not favorable for a recovery of the gliders, but the situation was also forecasted even to be worst for the coming days. As such we decided to approach the area without further delay (doing uCTD measurements underway) and indeed we managed to execute the recovery in a short time window where both, swell and wind, had substantially decreased. Despite very foggy conditions the gliders were located and also quickly recovered with the ships rescue star device and which went surprisingly smooth. We realized from analysis of the ADCP data that we may have passed two mesoscale eddies when approached the glider recovery position (the one we knew of as the glider and drifter were operating in). As such further eddy sampling was done to the south and somehow repeating the formed track, but this time also releasing a couple of Hereon drifter triplets, performing uCTD casts and a couple of CTDs. This way we headed towards the latitude of another mesoscale feature that we observed further east, when we occupied the OSNAP West section. Heading east we manage to again sample the feature but it was found that it had drifted mostly away.

After this survey we steamed northeast, to a point with on an as shallow as possible depth on the Eirik Ridge but that is still outside the IMO Polar Waters. Here we started a CTD program on September 3 and that continued for 5 days until September 8 in the afternoon. This way we could obtain a synoptic picture of the water mass structure across the Irminger Sea but south of the OSNAP East section. Our section and the OSNAP East merged over the Reykjanes Ridge. The CTD program was stopped on August 8 and we continued our eastward course towards final destination Hamburg, Germany, with a coarse underway CTD sampling program(approximately every 40nm) until we reached the UK EEZ waters on September 10 at about 11:00 UTC.

The cleaning up that had started already a few days ago was now intensified. In parallel final raw data preparation, writing reports, having meetings on the data and discussing the first findings of the cruise went on. After crossing the North Sea we entered the Elbe rive and headed to Hamburg on September 15 with the incoming tide. We moored on September 15 at 07:55 am at the Norderwerft shipyard, where the RV METEOR cruise M184 ended.

Acknowledgement

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Cruise participants

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Cruise participants RV METEOR expedition M184

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Station List

Gear coding

CTD/RO: CTD/lowered Acoustic Doppler Current Profiler/and rosette sampler MOOR: Mooring operation moor code: Re – Recovery; De - deployment

Station No.	Date & time (UTC)	Gear	Latitude	Longitude	Depth (m)	Remarks
M184_1-1	2022-08-12 19:26	CTD	47° 33,308' N	052° 34,842' W	181	CTD #1
M184_0-1	2022-08-12 19:20	ADCP	47° 33,306' N	052° 34,846' W	181	Start
M184_0-2	2022-08-12 19:20	TSG	47° 33,307' N	052° 34,846' W	181	Start
M184_0-3	2022-08-12 19:20	EM122	47° 33,307' N	052° 34,845' W	181	Start
M184_2-1	2022-08-13 13:30	MVP	49° 44,907' N	050° 14,175' W	347	Start Profiles
M184_2-1	2022-08-15 02:24	MVP	53° 00,547' N	051° 02,966' W	2586	End Profiles
M184_3-1	2022-08-13 15:20	Drifter	49° 47,359' N	050° 10,163' W	396	Drifter #1
M184_4-1	2022-08-13 16:06	Drifter	49° 47,810' N	050° 09,385' W	416	Drifter #2
M184_5-1	2022-08-14 00:40	Drifter	49° 20,174' N	050° 46,380' W	330	Drifter #3
M184_6-1	2022-08-14 14:22	Drifter	51° 14,778' N	049° 38,510' W	1692	Drifter #4
M184_7-1	2022-08-14 14:22	Drifter	51° 14,804' N	049° 38,494' W	1696	Drifter #5
M184_8-1	2022-08-14 14:23	Drifter	51° 14,828' N	049° 38,478' W	1696	Drifter #6
M184_9-1	2022-08-15 03:45	CTD	53° 02,893' N	051° 04,899' W	2617	CTD #2
M184_10-1	2022-08-15 08:13	CTD	52° 57,879' N	051° 18,760' W	2263	CTD #3
M184_11-1	2022-08-15 10:42	Mooring	52° 57,877' N	051° 18,765' W	2264	K8 Released
M184_12-1	2022-08-15 20:23	Glider	52° 48,153' N	051° 35,842' W	1077	IFM 13
M184_13-1	2022-08-15 22:10	Drifter	52° 48,467' N	051° 35,958' W	1102	Drifter #7
M184_14-1	2022-08-15 22:39	CTD	52° 48,466' N	051° 35,958' W	1101	CTD #4
M184_15-1	2022-08-16 01:44	CTD	52° 50,560' N	051° 32,959' W	1404	CTD #5
M184_16-1	2022-08-16 03:51	CTD	52° 50,696' N	051° 22,988' W	1794	CTD #6
M184_17-1	2022-08-16 06:08	CTD	52° 47,603' N	051° 36,495' W	997	CTD #7
M184_18-1	2022-08-16 09:56	Mooring	52° 50,553' N	051° 32,787' W	1410	K7 Released
M184_19-1	2022-08-16 15:46	Mooring	53° 02,694' N	051° 04,423' W	2450	DSOW1 Released
M184_20-1	2022-08-16 19:37	CTD	53° 08,039' N	050° 51,923' W	2898	CTD #8
M184_21-1	2022-08-17 00:34	CTD	53° 15,484' N	050° 33,187' W	3221	CTD #9
M184_22-1	2022-08-17 04:11	CTD	53° 23,486' N	050° 14,312' W	3410	CTD #10
M184_23-1	2022-08-17 10:51	Mooring	53° 02,851' N	051° 04,861' W	2620	DSOW1 Deployed
M184_24-1	2022-08-17 15:23	Mooring	52° 57,399' N	051° 19,192' W	2217	K8 Deployed
M184_25-1	2022-08-17 17:49	Mooring	53° 07,876' N	050° 51,465' W	2812	K9 Released
M184_26-1	2022-08-18 02:50	CTD	53° 35,670' N	049° 46,926' W	3606	CTD #11
M184_27-1	2022-08-18 09:32	Mooring	53° 35,560' N	049° 46,587' W	3630	DSOW5 Released
M184_28-1	2022-08-18 13:09	Mooring	53° 23,745' N	050° 13,940' W	3589	K10 Released
M184_29-1	2022-08-18 17:50	Mooring	53° 15,521' N	050° 32,771' W	3402	DSOW2 Released
M184_30-1	2022-08-18 22:08	CTD	53° 17,894' N	050° 22,306' W	3305	CTD #12

M184_31-1	2022-08-19 02:48	CTD	53° 23,990' N	050° 07,416' W	3480	CTD #13
M184_32-1	2022-08-19 10:29	Mooring	53° 35,502' N	049° 46,924' W	3606	DSOW5 Deployed
M184_33-1	2022-08-19 16:37	Mooring	53° 23,234' N	050° 14,099' W	3408	K10 Deployed
M184_34-1	2022-08-19 19:53	Mooring	53° 15,378' N	050° 33,144' W	3162	DSOW2 Deployed
M184_35-1	2022-08-19 21:52	CTD	53° 11,693' N	050° 37,697' W	3133	CTD #14
M184_36-1	2022-08-20 01:57	CTD	53° 09,010' N	050° 45,013' W	3011	CTD #15
M184 37-1	2022-08-20 04:55	CTD	53° 05,540' N	050° 52,887' W	2894	CTD #16
M184 38-1	2022-08-20 07:23	CTD	53° 03,372' N	051° 00,013' W	2695	CTD #17
M184 39-1	2022-08-20 12:21	Mooring	53° 08,010' N	050° 52,824' W	2881	K9 Deployed
M184 40-1	2022-08-20 17:43	Mooring	52° 49,982' N	051° 32,850' W	1376	K7 Deployed
 M184_41-1	2022-08-20 19:36	CTD	52° 50,628' N	051° 29,803' W	1450	CTD #18
M184 42-1	2022-08-20 21:39	CTD	52° 53.133' N	051° 23.375' W	1982	CTD #19
M184_43-1	2022-08-21 00:10	CTD	52° 56.541' N	051° 16.075' W	2313	CTD #20
M184_44-1	2022-08-21 02:44	CTD	52° 59.361' N	051° 08.177' W	2411	CTD #21
M184_45-1	2022-08-21 07:51	CTD	52° 37,184' N	052° 03.370' W	300	CTD #22
M184_46-1	2022-08-21 09:34	CTD	52° 41 871' N	051° 51 861' W	306	CTD #23
M184_47-1	2022-08-21 12:03	Glider	52° 50 075' N	051° 32 585' W	1387	Gliders in Zodiac
M184_48-1	2022-08-21 15:39	Lander	52° 56 989' N	051° 18 751' W	2140	SAMS Lander
M184_49-1	2022-08-22 02:36	CTD	53° 28 279' N	049° 55 760' W	3582	
M184_50-1	2022-08-22-02:00	СТО	53° 30 228' N	049° 27 611' W	3607	CTD #25
M184_51-1	2022-08-22-00:00	M\/P	53° 30 013' N	040° 27,883' W	3600	Start Profiles
M184_51-1	2022-00-22 03.27	M\/D	53° 44 909' N	040° 32 038' W	3671	End Profiles
M184_52-1	2022-00-22 10.13	M\/D	53° 51 070' N	049° 32,330° W	3663	Start Profiles
M184_52_1	2022-00-22 11.02		54° 12 674' N	049 40,990 W	3500	End Profiles
M184_52_1	2022-00-22 14.07		54° 16 970' N	050° 03,033° W	3/71	Start Profiles
M104_52-1	2022-00-22 14.30		56° 22 907' N	050 06,076 W	240	End Profiles
M104_52-1	2022-06-23 10.17		50 33,007 N	052 57,911 W	3409	Ellu Flollies
M104_53-1	2022-06-23 11.37	CID	56° 34,27 I N	052 36,365 W	3490	CTD #20
M104_04-1	2022-06-23 13.31		50 34,290 N	052 36,331 W	3494	
M104_55-1	2022-06-24 03.05	Olider	57 43,475 N	051 09,300 W	3507	
M184_56-1	2022-08-24 17:55	Glider	58 05,420 N	050 49,792 W	3560	IFM13
W184_57-1	2022-08-24 18:17	Glider	58 05,291 N	050 49,929 W	3009	
M184_58-1	2022-08-24 20:43	CTD	58° 05,247' N	050° 50,038' W	3561	CID #27 Eddy Centre"
M184_59-1	2022-08-24 21:47	Drifter	58° 05,305' N	050° 49,857' W	3558	3x Drifter (#8, 9, 10)
M184_60-1	2022-08-25 00:43	CTD	58° 13,154' N	050° 45,428' W	3545	CTD #28
M184_61-1	2022-08-25 01:44	Drifter	58° 13,370' N	050° 44,313' W	3542	3x Drifter (#11, 12, 13)
M184_62-1	2022-08-25 02:16	Drifter	58° 17,154' N	050° 44,405' W	3541	4x Drifter (#14, 15, 16, 17)
M184_63-1	2022-08-25 04:05	CTD	58° 20,946' N	050° 42,669' W	3540	CTD #29
M184_64-1	2022-08-25 05:07	Drifter	58° 20,970' N	050° 42,775' W	3540	3x Drifter (#18, 19, 20)
M184_65-1	2022-08-25 05:49	Drifter	58° 24,826' N	050° 40,827' W	3539	3 x Drifter (#21, 22, 23)
M184_66-1	2022-08-25 07:30	CTD	58° 28,724' N	050° 39,127' W	3536	CTD #30
M184_67-1	2022-08-25 09:30	MVP	58° 36,888' N	050° 35,516' W	3525	Start Profiles
M184_67-1	2022-08-25 13:16	MVP	59° 14,956' N	050° 36,116' W	3471	End Profiles
M184_68-1	2022-08-25 13:57	Floater	59° 16,808' N	050° 36,861' W	3468	ARGO - Float 6904115
M184_69-1	2022-08-25 14:27	MVP	59° 15,636' N	050° 31,384' W	3468	Start Profiles
M184_69-1	2022-08-26 06:18	MVP	58° 44,575' N	048° 13,840' W	3371	End Profiles
M184 70-1	2022-08-26 07:49	CTD	58° 44,390' N	048° 09,582' W	3352	CTD #31
M184 71-1	2022-08-26 10:40	Mooring	58° 44,127' N	048° 09,229' W	3361	DSOW6 recovery
M184 72-1	2022-08-26 14:03	Mooring	58° 44,029' N	048° 09,979' W	3358	DSOW6 deployed
M184 73-1	2022-08-26 14:14	MVP	58° 44,313' N	048° 09,332' W	3353	Start Profiles
M184 73-1	2022-08-26 16:42	MVP	58° 49,704' N	048° 39,423' W	3413	End Profiles
M184 74-1	2022-08-26 18:07	CTD	58° 49,716' N	048° 40,415' W	3417	CTD #32
M184 75-1	2022-08-26 19:20	MVP	58° 48.939' N	048° 40.535' W	3418	Start Profiles
M184 75-1	2022-08-26 22:50	MVP	58° 21.902' N	048° 46.010' W	3484	End Profiles
M184 76-1	2022-08-27 00:14	CTD	58° 20.858' N	048° 46.087' W	3485	CTD #33
M184 77-1	2022-08-27 05:24	CTD	57° 52.048' N	048° 52.156' W	3484	CTD #34
M184 78-1	2022-08-27 10:42	CTD	57° 23.291' N	048° 57.812' W	3553	CTD #35
M184 79-1	2022-08-27 11:58	MVP	57° 22.941' N	048° 56.740' W	3543	Start Profiles
M184 79-1	2022-08-27 13:47	MVP	57° 16.599' N	048° 39.210' W	3527	End Profiles
M184 80-1	2022-08-27 15:10	CTD	57° 15.759' N	048° 37.711' W	3529	CTD #36
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M184_81-1	2022-08-27 17:37	MVP	57° 15,556' N	048° 38,617' W	3533	Start Profiles
M184_81-1	2022-08-27 20:21	MVP	57° 09,077' N	049° 06,716' W	3608	End Profiles
M184_82-1	2022-08-27 21:48	CTD	57° 08,948' N	049° 07,281' W	3615	CTD #37
M184_83-1	2022-08-27 22:55	MVP	57° 08,793' N	049° 07,274' W	3613	Start Profiles
M184_83-1	2022-08-27 23:45	MVP	57° 05,877' N	049° 01,410' W	3608	End Profiles
M184 84-1	2022-08-28 01:07	CTD	57° 05,380' N	049° 00,571' W	3611	CTD #38
	2022-08-28 02:20	MVP	57° 05,159' N	049° 00,408' W	3609	Start Profiles
	2022-08-28 04:05	MVP	56° 54.698' N	049° 04.002' W	3623	End Profiles
M184_86-1	2022-08-28 05:27	CTD	56° 54.395' N	049° 04.290' W	3625	CTD #39
M184_87-1	2022-08-28 10:47	CTD	56° 25,504' N	049° 09.836' W	3677	CTD #40
M184_88-1	2022-08-28 16:24	CTD	55° 56 700' N	049° 15 711' W	3759	CTD #41
M184_89-1	2022-08-28 22:33	CTD	55° 27 915' N	049° 21 444' W	3667	CTD #42
M184_90-1	2022-08-29 03:34	CTD	55° 24 699' N	048° 38 235' W	3753	CTD #43
M184_91-1	2022-08-29 05:03	MVP	55° 24 423' N	048° 39 199' W	4642	Start Profiles
M184_91-1	2022-08-29-07:25	M\/P	55° 13 571' N	048° 57 395' W	3702	End Profiles
M184_91-1	2022-00-23 01.23		55° 07 860' N	040° 07,093' W	3683	
M184_02_1	2022-00-29 09.37		50 07,000 N	049 07,193 W	3644	CTD #45
M104_95-1	2022-00-29 13.31		54° 20 204' N	049 27,570 W	2615	CTD #45
N104_94-1	2022-00-29 19.13		54 30,204 N	049 33,355 W	2644	CTD #40
M184_95-1	2022-06-30 00.40		54 01,496 N	049 39,130 W	3041	
M184_96-1	2022-08-30 04:50		53 39,205 N	049 27,622 VV	3700	CTD #48
M184_97-1	2022-08-30 09:53		53° 55,318' N	048° 36,348° W	3793	CTD #49
M184_98-1	2022-08-30 10:43		53° 56,429' N	048° 33,487' W	3793	uCTD #1
M184_99-1	2022-08-30 11:17		53° 59,381' N	048° 25,827' W	3794	uCTD #2
M184_100-1	2022-08-30 11:46	uCID	54° 01,931' N	048° 19,193' W	3793	uCTD #3
M184_101-1	2022-08-30 12:15	uCTD	54° 04,518' N	048° 12,466' W	3806	uCTD #4
M184_102-1	2022-08-30 13:20	CTD	54° 06,952' N	048° 06,090' W	3892	CTD #50
M184_103-1	2022-08-30 15:11	uCTD	54° 13,341' N	048° 17,486' W	3781	uCTD #5
M184_104-1	2022-08-30 16:29	uCTD	54° 22,236' N	048° 33,642' W	3772	uCTD #6
M184_105-1	2022-08-30 17:21	uCTD	54° 28,035' N	048° 44,210' W	3761	uCTD #7
M184_106-1	2022-08-31 17:48	Mooring	56° 34,501' N	052° 40,337' W	3485	K1 Deployed
M184_107-1	2022-08-31 19:09	CTD	56° 34,463' N	052° 40,248' W	3485	CTD #51
M184_108-1	2022-09-01 14:20	Glider	57° 57,257' N	050° 17,275' W	3564	IFM03
M184_109-1	2022-09-01 15:08	Glider	57° 54,767' N	050° 18,238' W	3564	IFM13
M184_110-1	2022-09-01 16:13	uCTD	58° 00,498' N	050° 18,640' W	3556	uCTD #8
M184_111-1	2022-09-01 17:00	uCTD	58° 07,301' N	050° 13,404' W	3548	uCTD #9
M184_112-1	2022-09-01 17:31	uCTD	58° 08,379' N	050° 03,233' W	3547	uCTD #10
M184_113-1	2022-09-01 18:03	uCTD	58° 06,744' N	050° 01,509' W	3548	uCTD #11
M184_114-1	2022-09-01 18:39	uCTD	58° 02,569' N	050° 09,125' W	3553	uCTD #12
M184_115-1	2022-09-01 19:10	uCTD	57° 58,990' N	050° 15,629' W	3558	uCTD #13
M184_116-1	2022-09-01 19:38	uCTD	57° 55,677' N	050° 21,645' W	3560	uCTD #14
M184 117-1	2022-09-01 20:08	uCTD	57° 52,152' N	050° 28,033' W	3570	uCTD #15
M184 118-1	2022-09-01 20:35	uCTD	57° 48,946' N	050° 33,835' W	3576	uCTD #16
M184 119-1	2022-09-01 21:35	uCTD	57° 42,015' N	050° 46,345' W	3598	uCTD #17
	2022-09-01 22:07	uCTD	57° 38,340' N	050° 52,940' W	3596	uCTD #18
	2022-09-01 23:31	CTD	57° 37,351' N	050° 54,825' W	3595	CTD #52
	2022-09-02 00:33	Drifter	57° 37,304' N	050° 55,055' W	3596	3x Drifter (#24, 25, 26)
	2022-09-02 01:00	uCTD	57° 35.911' N	050° 57.834' W	3576	uCTD #19
M184 124-1	2022-09-02 01:45	uCTD	57° 32.011' N	051° 05.925' W	3655	uCTD #20
M184_125-1	2022-09-02 01:59	Drifter	57° 31.372' N	051° 07,383' W	3663	3x Drifter (#27, 28, 29)
M184_126-1	2022-09-02 02:06	UCTD	57° 30 976' N	051° 08 046' W	3586	uCTD #21
M184 127-1	2022-09-02 02:34		57° 28 482' N	051° 12 630' W	3505	uCTD #22
M184 128-1	2022-09-02 02:04	Drifter	57° 27 323' N	051° 14 792' W	3511	1x Drifter (#30)
M184 120-1	2022-09-02-02:00		57° 26 387' N	051° 16 455' W	3516	UCTD #23
M18/ 120-1	2022 03-02 03.04	Drifter	57° 2/ 880' N	051° 10, 1 00 W	3520	1y Drifter (#21)
M18/ 121 1	2022-03-02 03.23		57° 24 840' N	051° 10,207 W	3520	
M18/ 122 1	2022-03-02 03.21		57° 23 370' N	051° 21 994' \\\	3520	uCTD #24
M194 102-1	2022-03-02 03.44		57° 20,019 N		3525	
M104_133-1	2022-09-02 00.11	Drifter	57° 22,220 IN	051 20,979 W	3535	1v Drifter (#22)
104-134-1 M104 425 4	2022-09-02 04.39		57° 20 549' N		2524	
IVI 104_135-1	2022-09-02 00:38		57 20,548 N	051 20,989 W	3534	uCTD #26
₩184_136-1	2022-09-02 07:04	uCTD	ວ/ 18,184' N	051 31,258 W	3549	uCTD #27

M184_137-1	2022-09-02 07:27	uCTD	57° 16,103' N	051° 35,011' W	3546	uCTD #28
M184_138-1	2022-09-02 07:49	uCTD	57° 14,058' N	051° 38,708' W	3553	uCTD #29
M184_139-1	2022-09-02 08:11	uCTD	57° 12,011' N	051° 42,393' W	3561	uCTD #30
M184 140-1	2022-09-02 08:31	uCTD	57° 10,243' N	051° 45,578' W	3551	uCTD #31
M184 141-1	2022-09-02 08:52	uCTD	57° 08,367' N	051° 48,947' W	3533	uCTD #32
	2022-09-02 09:13	uCTD	57° 06,466' N	051° 52,365' W	3526	uCTD #33
M184_143-1	2022-09-02 10:05	uCTD	57° 05.075' N	051° 42,945' W	3536	uCTD #34
M184_144-1	2022-09-02 11:01	uCTD	57° 05,264' N	051° 26 461' W	3577	uCTD #35
M184_145-1	2022-09-02 11:48	UCTD	57° 05 387' N	051° 13 024' W	3579	uCTD #36
M184_146-1	2022-09-02 12:58	UCTD	57° 02 857' N	050° 54 972' W	3584	uCTD #37
M184_147-1	2022-09-02 19:26		56° 49 740' N	049° 24 911' W	3646	uCTD #38
M184_148-1	2022-00-02-10:20		56° 52 117' N	040° 24,011 W	3638	UCTD #39
M184_140_1	2022-00-02-10:40		56° 53 685' N	040°24,207 W	3658	UCTD #40
M184_150_1	2022-03-02 20.11	Drifter	56° 56 128' N	049 20,320 W	36/3	$3 \times \text{Drifter} (\#33, 34, 35)$
M184_151-1	2022-09-02 20.39		56° 56 267' N	049 31,092 W	3640	UCTD #41
M184_151-1	2022-09-02 20.42		56° 58 346' N	049 31,014 W	3650	uCTD #41
M104_152-1	2022-09-02 21.00		50 50,540 N	049 20,747 W	2620	uCTD #42
M104_153-1	2022-09-02 21.17		57 00,005 N	049 25,972 W	3039	
101164_154-1	2022-09-02 21.40		57 U2,394 N	049 21,967 VV	3024	
M184_155-1	2022-09-02 21:53	Drifter	57° 03,552' N	049° 20,034' W	3843	3x Drifter (#36, 37, 38)
M184_156-1	2022-09-02 22:12	uCTD	57° 04,864' N	049° 17,842' W	3617	uCTD #45
M184_157-1	2022-09-02 22:35	uCTD	57° 07,039' N	049° 14,183' W	3614	uCTD #46
M184_158-1	2022-09-03 18:28	CTD	58° 18,013' N	044° 50,018' W	1845	CTD #54
M184_159-1	2022-09-03 22:51	CTD	58° 14,318' N	044° 15,881' W	2463	CTD #55
M184_160-1	2022-09-04 02:54	CTD	58° 10,805' N	043° 42,007' W	2873	CTD #56
M184_161-1	2022-09-04 06:50	CTD	58° 07,212' N	043° 08,088' W	3135	CTD #57
M184_162-1	2022-09-04 10:50	CTD	58° 03,655' N	042° 33,806' W	3161	CTD #58
M184_163-1	2022-09-04 14:46	CTD	57° 59,995' N	041° 59,992' W	3177	CTD #59
M184_164-1	2022-09-04 18:48	CTD	58° 02,638' N	041° 21,676' W	3190	CTD #60
M184 165-1	2022-09-04 22:50	CTD	58° 05,309' N	040° 43,757' W	3201	CTD #61
M184 166-1	2022-09-05 03:05	CTD	58° 08,013' N	040° 05,551' W	3171	CTD #62
M184 167-1	2022-09-05 07:12	CTD	58° 10,769' N	039° 27,296' W	3161	CTD #63
	2022-09-05 11:19	CTD	58° 13,278' N	038° 48,776' W	3212	CTD #64
M184 169-1	2022-09-05 15:40	CTD	58° 16,017' N	038° 11,012' W	3200	CTD #65
 M184_170-1	2022-09-05 19:50	CTD	58° 18.641' N	037° 32.884' W	3194	CTD #66
M184 171-1	2022-09-05 23:59	CTD	58° 21.319' N	036° 54.259' W	2899	CTD #67
M184_172-1	2022-09-06 04:02	CTD	58° 24,009' N	036° 16 483' W	3051	CTD #68
M184_173-1	2022-09-06 08:11	CTD	58° 26 700' N	035° 38 321' W	3064	CTD #69
M184_174-1	2022-09-06 12:19	CTD	58° 29 341' N	035° 00 192' W	2772	CTD #70
M184_175-1	2022-09-06 16:10	CTD	58° 31 995' N	034° 22 017' W	2663	CTD #71
M184_176-1	2022-09-06 19:56	CTD	58° 34 694' N	033° 43 790' W	2417	CTD #72
M184_177-1	2022-00-06-23:31	CTD	58° 37 363' N	033° 05 541' W	2030	CTD #73
M18/ 178-1	2022-00-07-03-23	СТО	58° 40 466' N	032° 21 019' W	1715	CTD #74
M184_179-1	2022-09-07-06:20	CTD	58° 42 689' N	031° 49 438' W	1634	CTD #75
M184 180-1	2022-00-07-00.27	СТО	58° 45 348' N	031° 11 178' W	1467	CTD #76
M184_181_1	2022-03-07 03.40	СТО	58° 48 007' N	030° 33 022' W	1536	CTD #77
M184_182-1	2022-03-07 12:31	СТО	58° 42 055' N	030° 18 130' W	1361	CTD #78
M184 182 1	2022-09-07 13.47	СТО	50° 42,955 N	030° 02 068' W	1700	CTD #78
M104_103-1	2022-09-07 17.30		50° 37,022 N	030 02,900 W	2101	CTD #79
M104_104-1	2022-09-07 20.37		50° 32,097 N	029 47,003 W	2191	
M104_100-1	2022-09-07 23.20		50°20,143 N	029 34,077 W	2400	
M104_100-1	2022-09-00 02:22		50 20,913 N	023 12,331 W	2314	
IVI 104_187-1	2022-09-08 04:49		00 17,404 N		2109	
IVI 104_188-1	2022-09-08 07:33		50° 12,320° N	020 40,782 W	2222	
N184_189-1	2022-09-08 10:24		50 U/,188 N	028 31,542 W	2325	
IVI184_190-1	2022-09-08 12:59		58° U2,154' N	028° 16,340° W	2320	
IVI 184_191-1	2022-09-08 15:48		57 53,322 N	028 04,853 W	2040	
M184_192-1	2022-09-08 21:28		57 59,783 N	U26 41,667 W	2/65	uCID #47
M184_193-1	2022-09-09-01:36		58° 06,284' N	025° 23,091' W	2/18	uCID #48
M184_194-1	2022-09-09-06:47		58° 14,152' N	023° 43,283' W	2906	uCID #49
M184_195-1	2022-09-09 09:43	uCTD	58° 17,947' N	022° 47,739' W	2956	uCTD #50
M184_196-1	2022-09-09 14:23	uCTD	58° 23,244' N	021° 17,166' W	2929	uCTD #51

M184_197-1	2022-09-09 18:23	uCTD	58° 26,901' N	019° 59,940' W	2433	uCTD #52
M184_198-1	2022-09-09 21:33	uCTD	58° 29,145' N	019° 01,572' W	1104	uCTD #53
M184_199-1	2022-09-10 01:45	uCTD	58° 31,486' N	017° 41,894' W	896	uCTD #54
M184_200-1	2022-09-10 06:52	uCTD	58° 33,236' N	016° 03,721' W	1186	uCTD #55
M184_201-1	2022-09-10 09:47	uCTD	58° 33,677' N	015° 05,948' W	1083	uCTD #56