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> Short Cruise Report RV Maria S. Merian Cruise MSM102 (GPF 20-1\_031)

Emden – St. John's – Emden 23.07.2021 – 09.09.2021 Chief Scientist: Prof. Dr. Sebastian Krastel Captain: Björn Maaß





Fig 1: Track chart of Cruise MSM102 (Emden - St. John's - Emden).



Fig. 2: Track chart of working area.

### Objectives

The Northwest Atlantic Mid-Ocean Channel (NAMOC) offers a rare opportunity to examine several key problems related to submarine flow processes. The overarching objective of Cruise MSM102 was to acquire data that will enable investigations of the numerous processes relevant for the evolution of submarine channel systems and in particular the NAMOC, and its role in sediment (and nutrient) transport from land to the deep sea. High quality, modern data will support quantitative reconstruction of fundamental flow properties (e.g. thickness, speed and concentration) that are critical for estimation of the role of this sedimentary pathway and the response of the system to deglaciation of the northeastern North American and Greenland ice sheets. Specific objectives were:

1) How did the NAMOC develop over time and how does this link with ice-sheet dynamics on Canadian Shield and Greenland?

2) What was the fundamental character of the flows that produced the longest known channel system in the world?

3) How does the influence of Coriolis change along the length of the system?

4) Does the size and longevity of the NAMOC mean it is an effective carbon sink?

5) What impact will future warming likely have on the NAMOC and IMOC (Imarssuaq Mid-Ocean Channel)?

### Narrative

The scientific crew of Cruise MSM102 boarded RV MARIA S. MERIAN in Emden on the afternoon of July 22<sup>nd</sup>. The coring equipment was already onboard from Cruise MSM101, and the crew loaded the rest of the freight on July 20<sup>th</sup>. The scientific crew embarking in Emden consisted of 14 scientists from Kiel University and one scientist from the German Development Institute. One additional scientist from the Geological Survey of Canada embarked during a bunkering stop in St. John's. Additional proponents from the GEOMAR Helmholtz Centre for Ocean Research Kiel (Germany), the Geological Survey of Denmark and Greenland, and the University of Liverpool (UK) were not able to participate due to the pandemic, but were involved in the cruise as the shore-based party. RV MARIA S. MERIAN left the port of Emden on July 23th at 08:30h local time under cloudv skies and with calm seas. The weather conditions favored a transit south of the UK. The weather was very pleasant and we made good progress during the first few days. Hydroacoustic data collection started at 12:05h UTC on July 26th after leaving the Irish EEZ. The first sound velocity profile was collected using an expendable sound velocity probe. The first test of the seismic equipment was conducted on the morning of July 28<sup>th</sup> when crossing the Mid-Atlantic Ridge. One streamer segment needed to be replaced, but the test was successful. The first float for the international Argo program was deployed on the morning of July 29th. Three additional floats equipped with different sensors were deployed on the evening of July 29th. We arrived at the NAMOC early in the morning of July 30<sup>th</sup> and collected the first hydroacoustic profiles. The channel is about 100 m deep and relatively straight at this location. Three cores (Station MSM102 07 - 09) were taken based on the hydroacoustic profiles. An 8 m long core was recovered on the western levee, while two cores, each about 4 m in length, were recovered from the channel thalweg and the eastern levee. An additional float was deployed after coring. The night was used to map part of the NAMOC with hydroacoustics. We deployed our seismic system on the morning of July 31st and collected two profiles across the channel. The profiles are about 10 km apart from each other. The crossings are relatively similar but the northern crossing shows a significantly shallower basement reflector. The seismic gear was retrieved in the evening, before we left the working area for our transit to St. John's for a bunkering

stop. The hydroacoustic systems were switched off when entering the Canadian EEZ on August 1<sup>st</sup> at 09:00h UTC. We arrived at St John's on August 2<sup>nd</sup> at 8:30h local time with clear skies and very pleasant weather conditions. We left the port that same day at 16:00h after bunkering and headed back to the NAMOC. The hydroacoustic systems were switched on again when leaving the Canadian EEZ on August 3rd around noon. The strong winds were luckily blowing from behind. We arrived at NAMOC on August 4<sup>th</sup> at 8:00h at 50°40'N and 042°50'W, and started to map the channel to the northwest by following the channel axis. Cross profiles were taken about every 40 nm. The weather conditions were quite rough with a wind force of up to 9 Beaufort. August 5<sup>th</sup> was used to collect a coring transect across the channel in an area where the bathymetric data show a pronounced terrace structure about 50 m above the thalweg. The first two cores (MSM102 14 and 15) were taken at different heights above the channel on the western levee. Core recovery was less than 5 m for both cores succession of turbidites. but the cores show а nice Coring on the terrace (MSM102 16) was not successful. Some sand and gravel was found in the core catcher but the liner was empty. Following this, a 1 m long core (MSM102 17) was recovered from the thalweg. We then twice attempted to collect some sediment from the terrace using a giant box corer, but the corer unfortunately did not release on either attempt. Hydroacoustic mapping along the channel was continued through the night. Two seismic profiles across NAMOC were collected on August 6<sup>th</sup>. Afterwards, we continued to map the NAMOC towards the northwest until August 9. It was possible to image the channel with a single swath through most of this area. Sound velocity profiles were taken whenever needed using expendable sound velocity profilers. We collected cross profiles about every 30 nm; mainly with the objective of acquiring sediment echo sounder data in order to image the architecture of the levees. The channel morphology varies significantly. Parts of the NAMOC tend to be straight, while other areas are slightly meandering. In some areas, terraces are found at different levels, and the channel cross-section alternates between v-shaped and u-shaped. In parts, the channel is well confined. the boundaries of while in other areas the channel are not clearly visible.

We reached our first focus area early in the morning of August 9th. This area includes the IMOC (Imarssuag Mid-Ocean Channel), which is the only known major eastern tributary of the entire system, and thus enables investigation of the influence of the Greenland margin. In addition, there is a large detached sediment drift landward of the NAMOC in this area, and another objective is to investigate the interplay between the growth of the drift and the NAMOC. We collected several profiles crossing the NAMOC and cored along one of these profiles on August 10<sup>th</sup>. This day was extremelv stations (MSM1 02 24 -27) with very successful with 4 coring good recovery. Hydroacoustic mapping continued during the night and focused on the confluence with IMOC exhibits a very interesting braided pattern before joining the IMOC. The the NAMOC. Individual channels are incised to different depths, and some channels are partly filled with sediments. The system seems to be very dynamic. Two cores were collected at the thalweg and from the levee of the IMOC channel with the greatest incision depth. The 10 m-long corer (MSM102 29) at the levee bent but we still had a recovery of 160 cm. A 5 m barrel in the thalweg (MSM102 30) was empty. A giant box corer at this location recovered clay with some cross-laminated silt layers. Coring was followed by a seismic survey, which crossed the NAMOC south of its confluence with the IMOC. This profile was extended for about 75 nautical miles to the west in order to image the Hamilton Spur sediment drift. The new line connects to a seismic line that runs along the Hamilton Spur further to the west. The new seismic data clearly show that the levee onlaps the drift body; indicating that the NAMOC is younger than the drift body. A couple of small

technical problems during the seismic survey resulted in very minor data gaps. The seismic equipment was retrieved early in the morning of August 14<sup>th</sup>. The seismic system was redeployed after a 7 hour transit. Two long seismic lines were collected across the NAMOC and seismic lines were collected across the NAMOC and IMOC, and also tied in old data. Seismic surveying finished on August 14<sup>th</sup> at 10:00h and was followed by a long coring day. The first core south of IMOC (MSM102 33) was intended to represent background sediments, but core recovery was unfortunately only 129 cm. Four additional cores (MSM102 34 - 37) were collected along a profile from the thalweg of the NAMOC to the western levee. Core recovery was variable: the thalweg core had a recovery of 240 cm, while the core on the western levee was 825 cm lona. We started to follow the NAMOC further to the northwest very early in the morning of August 15<sup>th</sup>. We deployed three floats on the afternoon of August 15<sup>th</sup> and started mapping our next focus area on the evening of the same day. Several Yazoo channels enter the NAMOC in this area. Mapping continued until midday on August 17<sup>th</sup>. The data show that the levees of the NAMOC are very well developed at this location. The Yazoo channels disappear as morphological features a short distance away from the NAMOC, but can be traced as buried channels. The channels are mainly filled with thick debris flow deposits. We collected two long seismic profiles across the buried channels and the NAMOC in order to investigate if more of these channels exist in the sub-surface. The seismic data show additional buried channels and a great variability in the levee architecture on these two parallel profiles. The seismic gear was retrieved after lunch on August 18<sup>th</sup>. Three cores (MSM102 42 - 44) were collected in the afternoon/evening; targeting both welldeveloped levees, as well as a prominent transparent layer found at the western levee. The core from the eastern levee penetrated deeply into the sediments, but we lost the majority of the core during retrieval. The western levee core includes numerous thin turbidites. The third core targeted a widespread transparent layer onlapping the western levee. The lower boundary of this transparent layer seems to be marked by the sandy base of a major turbidite. The origin of this turbidite, however, remains unclear. After coring, we continued to follow the NAMOC to the northwest. The channel morphology changes quite significantly in this section, with a meandering, incised thalweg inside an overall minimally meandering channel. We reached the main confluence zone of the NAMOC late on the evening of August 19th, and started mapping this area with lines perpendicular to the NAMOC. The data show major confluences on the western side, while the main NAMOC seems to become a pretty wide depression compared to the well confined channel seen further south. The 'original' NAMOC seems to be filled with glaciogenic debris flows. We started to collect three long seismic lines at different locations of the confluence zone around noon on August 21<sup>st</sup>, and were able to continue seismic acquisition until early on the morning of August 23<sup>rd</sup> despite temporarily bad weather conditions. We interrupted seismic shooting for a short period on the afternoon of August 22<sup>nd</sup> because some pilot whales were close to the mitigation area. Shooting was resumed once they had moved away; beginning with a soft start. The seismic data confirm that the NAMOC is in-filled with thick debrites in this area. Several buried channels are visible in the seismic data. Seismic surveying was followed by coring on August 23. A box corer just upslope of an incised thalweg (MSM102 52) recovered some silt beneath a clay cover. A gravity corer close by (MSM102 53) was not successful. The coring day was completed with an 808 cm long levee core (MSM102 54). Additional hydroacoustic data collected during the night were used to select coring locations for the next day. Four stations (MSM102 56 - 59) targeted channel fills and levee deposits. All cores except for one gravity core in a thalweg were successful. The following night was used for additional hydroacoustic mapping. One last seismic profile was collected in the confluence area of the NAMOC on August 25<sup>th</sup> We left

this area after running profiles for a roll calibration of the mb-system. On our way back towards the southeast, we collected a profile along the south-western levee with several cross profiles at key locations. One of these profiles crosses the sites of two giant piston cores taken by the Marion Dufresne in 1999. The locations of the other profiles were specifically chosen to cross the channel where its walls have a low slope gradient, so that we could locate promising coring sites for sampling turbidite successions at different heights above the thalweg. However, low gradient channel walls appear to mostly be formed by mass wasting, and do not show an obvious turbidite cover. We therefore continued our mapping to the area where we had mapped the merging of Yazoo channels and the NAMOC earlier in the cruise. We acquired an additional seismic profile in this area on the night of August 27th/28th because the levee architecture changes very abruptly here. We collected additional cores on August 28<sup>th</sup>. The first core (MSM102 65) targeted a very widespread transparent layer close to the sea floor. We had previously cored this layer close to its pinch out, and this core targeted the center of this layer. Core recovery, however, was only 269 cm, meaning that only the upper part of the transparent layer was recovered. The next two cores (MSM1 02 66 and 67) targeted terraces at different heights above the thalweg, but core recovery was relatively low (218 cm and 119 cm, respectively). The last core (MSM102 68) was located on the eastern levee. We had previously cored at this location (MSM102 42) but the majority of that core was lost at the first attempt. The core was successful this time with 748 cm recovery, and contains typical levee deposits. Seismic surveying was supposed to start immediately after coring, but the start was delayed due to pilot whales approaching the vessel. We were finally able to do a soft start at ~20:00h local time after all mammals left the mitigation area. The main aim of this survey was to tie the new seismic lines to IODP Site 1305, which was drilled in 2005 during IODP leg 303. We collected one long profile to the west crossing Site 1305. A second line connects the IMOC survey area to the drill site, and a final seismic profile was collected across the NAMOC. The seismic gear was retrieved on August 30<sup>th</sup> at 15:30h. The remainder of the afternoon and the night were used to map the western levee north of the IMOC junction. The data confirm that the transparent layer mentioned above is a widespread and continuous feature. A final core (MSM1 02\_71) was taken on the morning of August 31<sup>st</sup> at a site where the transparent layer is very thin (< 1m). Core recovery was 705 cm and the preliminary onboard core description suggests that the base of the transparent layer is coarse sand, which corresponds with what was found for core MSM102 44. The final 1.5 days of working time were used to fill bathymetric data gaps and to follow the IMOC-system further to the east, i.e. in the direction of the transit to Emden. We finished the last hydroacoustic profile shortly after midnight on September 2<sup>nd</sup> and started our long transit back to Emden. We continued underway acoustic data acquisition until the evening of September 4<sup>th</sup>, when we reached the Icelandic EEZ. Data collection was interrupted for about 1 2 hours from early morning on September 3rd because we transited through an area of the EEZ of Greenland for which we did not have permission to collect data. We arrived in Emden 10:00h local time in September 9<sup>th</sup>. at RV MARIA S. MERIAN Cruise MSM102 was a great success. Hydroacoustic data were collected along an almost 2000 km long section of the NAMOC, including many cross profiles and detailed mapping in three main areas. We collected a total of about 1600 km of high quality, high-resolution seismic data, which both crosses the NAMOC, and ties in regional stratigraphy and IODP site 1305. Geological samples (31 gravity corers and 5 giant box corers) were taken at 34 stations. The new data allow a fascinating view of the NAMOC and its surrounding areas, and will help to reconstruct the properties of the flows forming the NAMOC. In addition, we deployed 9 floats at 5 locations for the international ARGO program.

### Acknowledgements

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# List of Participants

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GSC Geological Survey of Canada

### Stationlist

Station	Date / Time UTC	Device	Latitude	Longitude	Depth (m)	Comment	
MSM102_1-1	26-07-21 12:35	XSV	50° 44,493' N	015° 45,408' W	4213.2	Probe defective	
MSM102_1-2	26-07-21 12:50	XSV	50° 44,678' N	015° 48,109' W	4261.7		
MSM102_2-1	28-07-21 09:17	Seismic Towed	51° 05,209' N	030° 02,325' W	3652.5	Begin soft start	
MSM102_2-1	28-07-21 09:34	Seismic Towed	51° 05,008' N	030° 03,706' W	3294.8	End soft start, start of test survey	
MSM102_2-1	28-07-21 10:28	Seismic Towed	51° 04,230' N	030° 09,786' W	2766.2	End of survey	
MSM102_2-2	28-07-21 10:52	XSV	51° 04,035' N	030° 11,945' W	2902.7		
MSM102_3-1	29-07-21 08:27	Float	50° 39,267' N	036° 43,197' W	4385.2	Float S/N: P43200-20DE103	
MSM102_4-1	29-07-21 14:50	Float	50° 26,539' N	038° 46,459' W	4347.6	Float S/N: 9236	
MSM102_4-2	29-07-21 14:50	Float	50° 26,534' N	038° 46,491' W	4346.4	Float S/N: 9239	
MSM102_4-3	29-07-21 14:53	Float	50° 26,499' N	038° 46,799' W	4307.7	Float S/N: P43200-20DE104	
MSM102_5-1	29-07-21 17:03	XSV	50° 10,721' N	039° 16,647' W	4157.3		
MSM102_6-1	30-07-21 02:20	MB and Para	49° 04,757' N	041° 15,426' W	4445.9	Start of survey	
MSM102_6-1	30-07-21 09:03	MB and Para	49° 10,859' N	041° 45,403' W	4362.5	End of survey	
MSM102_7-1	30-07-21 10:30	Gravity Corer	49° 12,234' N	041° 42,408' W	4372.4	5 m, over-penetration	
MSM102_7-2	30-07-21 13:06	Gravity Corer	49° 12,234' N	041° 42,408' W	4372.8	10 m with SVP (SVP failed), 792 cm recovery	
MSM102_8-1	30-07-21 15:55	Gravity Corer	49° 15,492' N	041° 35,244' W	4439.7	10 m with SVP, 369 cm recovery	
MSM102_9-1	30-07-21 18:22	Gravity Corer	49° 14,371' N	041° 37,674' W	4523.3	5 m with USBL, 432 cm recovery	
MSM102_9-2	30-07-21 19:32	Float	49° 14,332' N	041° 37,770' W	4525.9	Float S/N: P43200-20DE105	
MSM102_10-1	30-07-21 19:33	MB and Para	49° 14,315' N	041° 37,814' W	4525.9	Start of survey	
MSM102_10-1	31-07-21 09:10	MB and Para	50° 42,962' N	042° 54,859' W	4394.3	End of survey	
MSM102_11-1	31-07-21 10:30	Seismic Towed	50° 40,672' N	042° 39,708' W	4288.1	Begin soft start	
MSM102_11-1	31-07-21 11:40	Seismic Towed	50° 36,698' N	042° 39,794' W	4291.8	End soft start, start of survey	
MSM102_11-1	31-07-21 19:18	Seismic Towed	50° 30,225' N	042° 38,746' W	4301.9	End of survey	
MSM102_12-1	04-08-21 10:12	MB and Para	50° 41,567' N	042° 53,656' W	4424.9	Start of survey	
MSM102_13-1	04-08-21 10:58	XSV	50° 47,559' N	042° 56,145' W	4416		
MSM102_12-1	05-08-21 08:25	MB and Para	51° 32,487' N	044° 52,247' W	4145.6	End of survey	
MSM102_14-1	05-08-21 09:25	Gravity Corer	51° 32,478' N	044° 52,249' W	4147.8	10 m, no recovery	
MSM102_14-2	05-08-21 11:48	Gravity Corer	51° 32,480' N	044° 52,252' W	4146.6	10 m with SVP, 459 cm recovery	
MSM102_15-1	05-08-21 14:26	Gravity Corer	51° 34,789' N	044° 50,123' W	4366.7	10 m, 263 cm recovery	
MSM102_16-1	05-08-21 16:50	Gravity Corer	51° 37,097' N	044° 48,092' W	4226	5 m with USBL, no recovery	
MSM102_17-1	05-08-21 19:19	Gravity Corer	51° 38,259' N	044° 46,984' W	4303.2	5 m with USBL, 91 cm recovery	
MSM102_18-1	05-08-21 21:59	Box Corer	51° 36,974' N	044° 48,211' W	4219.9	with USBL, not released, no recovery	
MSM102_18-2	06-08-21 00:56	Box Corer	51° 37,065' N	044° 48,074' W	4225.2	with USBL, not released, no recovery	
MSM102_19-1	06-08-21 03:32	MB and Para	51° 29,705' N	044° 27,012' W	4158.1	Start of survey	
MSM102_19-1	06-08-21 13:11	MB and Para	51° 56,474' N	045° 07,427' W	4264.4	End of survey	
MSM102_20-1	06-08-21 14:21	Seismic Towed	51° 58,157' N	044° 55,570' W	4158.4	Begin soft start	
MSM102_20-1	06-08-21 14:55	Seismic Towed	51° 56,550' N	044° 58,236' W	4161.4	End soft start, start of survey	
MSM102_20-1	06-08-21 19:58	Seismic Towed	52° 05,269' N	045° 08,269' W	4141	End of survey	
MSM102_21-1	06-08-21 21:13	MB and Para	52° 01,775' N	045° 16,294' W	4243.5	Start of survey	
MSM102_22-1	07-08-21 11:58	XSV	52° 28,512' N	046° 35,121' W	4076		
MSM102_23-1	08-08-21 14:23	XSV	54° 05,068' N	048° 03,362' W	3967.4		
MSM102_21-1	10-08-21 09:01	MB and Para	56° 17,358' N	049° 23,366' W	3697.8	End of survey	

Station	Date / Time UTC	Device	Latitude	Longitude	Depth (m)	Comment	
MSM102_24-1	10-08-21 09:53	Gravity Corer	56° 17,368' N	049° 23,336' W	3700.8	5 m with SVP, 283 cm recovery	
MSM102_25-1	10-08-21 12:11	Gravity Corer	56° 16,600' N	049° 27,661' W	3726	5 m with USBL, 524 cm recovery	
MSM102_26-1	10-08-21 14:51	Gravity Corer	56° 16,132' N	049° 31,363' W	3775.2	5 m with USBL, 440 cm recovery	
MSM102_27-1	10-08-21 18:10	Gravity Corer	56° 14,921' N	049° 38,392' W	3644.3	10 m with USBL, 872 cm recovery	
MSM102_28-1	10-08-21 19:43	MB and Para	56° 20,141' N	049° 38,817' W	3720	Start of survey	
MSM102_28-1	11-08-21 14:00	MB and Para	56° 25,709' N	048° 23,423' W	3655.8	End of survey	
MSM102_29-1	11-08-21 16:31	Gravity Corer	56° 16,464' N	048° 50,339' W	3682.4	10 m with SVP and USBL, 118 cm recovery, bent core barrel	
MSM102_30-1	11-08-21 18:58	Gravity Corer	56° 14,678' N	048° 48,466' W	3721.1	5 m with USBL, no recovery	
MSM102_30-2	11-08-21 21:18	Box Corer	56° 14,549' N	048° 48,410' W	3723.4	with USBL	
MSM102_31-1	11-08-21 23:07	Seismic Towed	56° 15,990' N	048° 47,808' W	3721.1	Begin soft start	
MSM102_31-1	11-08-21 23:39	Seismic Towed	56° 16,491' N	048° 50,121' W	3684.9	End soft start, start of survey	
MSM102_31-1	13-08-21 08:43	Seismic Towed	55° 06,515' N	051° 13,494' W	2867.7	End of survey	
MSM102_32-1	13-08-21 18:22	Seismic Towed	56° 27,662' N	050° 25,431' W	3628.5	Begin soft start	
MSM102_32-1	13-08-21 18:44	Seismic Towed	56° 26,053' N	050° 25,223' W	3628.5	End soft start, start of survey	
MSM102_32-1	14-08-21 11:58	Seismic Towed	56° 13,466' N	048° 48,331' W	3698.2	End of survey	
MSM102_33-1	14-08-21 14:12	Gravity Corer	56° 04,389' N	048° 44,361' W	3691	10 m with SVP and USBL, 130 cm recovery	
MSM102_34-1	14-08-21 18:44	Gravity Corer	55° 37,251' N	048° 57,681' W	3859	5 m with SVP, 248 cm recovery	
MSM102_35-1	14-08-21 20:55	Gravity Corer	55° 36,515' N	049° 00,868' W	3818.1	5 m with USBL, no recovery	
MSM102_36-1	14-08-21 23:11	Gravity Corer	55° 35,336' N	049° 06,065' W	3726.5	10 m with USBL, 653 cm recovery	
MSM102_37-1	15-08-21 01:24	Gravity Corer	55° 34,176' N	049° 11,284' W	3693.2	10 m with USBL, 823 cm recovery	
MSM102_38-1	15-08-21 02:24	MB and Para	55° 34,209' N	049° 11,385' W	3693.1	Start of survey	
MSM102_39-1	15-08-21 17:07	Float	57° 02,902' N	050° 19,113' W	3645.9	Float S/N: 9233	
MSM102_39-2	15-08-21 17:09	Float	57° 02,877' N	050° 19,114' W	3644.8	Float S/N: 9240	
MSM102_39-3	15-08-21 17:14	Float	57° 02,743' N	050° 19,084' W	3646.3	Float S/N: P43200-20DE102	
MSM102_40-1	16-08-21 19:10	XSV	57° 47,251' N	051° 57,164' W	3503.5		
MSM102_38-1	17-08-21 10:44	MB and Para	58° 15,209' N	051° 41,616' W	3516.4	End of survey	
MSM102_41-1	17-08-21 13:37	Seismic Towed	57° 54,042' N	051° 05,046' W	3574	Begin soft start	
MSM102_41-1	17-08-21 14:11	Seismic Towed	57° 52,091' N	051° 03,289' W	3579	End soft start, start of survey	
MSM102_41-1	18-08-21 14:29	Seismic Towed	58° 09,931' N	051° 21,995' W	3544	End of survey	
MSM102_42-1	18-08-21 17:09	Gravity Corer	57° 58,908' N	051° 30,636' W	3521.7	10 m with SVP and USBL, 137 cm recovery, core catcher damaged	
MSM102_43-1	18-08-21 19:34	Gravity Corer	57° 55,075' N	051° 39,463' W	3452.7	10 m with USBL, 995 cm recovery	
MSM102_44-1	18-08-21 22:09	Gravity Corer	57° 51,594' N	051° 47,327' W	3495.6	10 m with USBL, 569 cm recovery	
MSM102_45-1	18-08-21 23:00	MB and Para	57° 51,594' N	051° 47,327' W	3493.3	Start of survey	
MSM102_46-1	19-08-21 15:15	XSV	59° 35,994' N	054° 29,013' W	3395.1		
MSM102_47-1	19-08-21 20:20	Float	59° 56,539' N	055° 33,887' W	3289.4	Float S/N: P43200-20DE101	
MSM102_48-1	20-08-21 11:19	XSV	60° 05,287' N	057° 27,476' W	2838.2		
MSM102_49-1	20-08-21 14:46	XSV	60° 29,186' N	056° 53,216' W	3001.8		
MSM102_45-1	21-08-21 14:52	MB and Para	59° 52,657' N	057° 19,378' W	2901.4	End of survey	
MSM102_50-1	21-08-21 15:31	Seismic Towed	59° 50,516' N	057° 14,451' W	2930.9	Begin soft start	
MSM102_50-1	21-08-21 16:08	Seismic Towed	59° 49,677' N	057° 09,933' W	2948.5	End soft start, start of survey	
MSM102_50-1	22-08-21 17:05	Seismic Towed	60° 02,769' N	057° 45,384' W	2779.9	Stopped seismics due to whale sighting	
MSM102_50-1	22-08-21 17:19	Seismic Towed	60° 03,310' N	057° 47,181' W	2771.4	Begin soft start	
MSM102_50-1	22-08-21 17:42	Seismic Towed	60° 04,174' N	057° 50,052' W	2765.2	End soft start, start of survey	

Station	Date / Time UTC	Device	Latitude	Longitude	Depth (m)	Comment	
MSM102_50-1	23-08-21 07:58	Seismic Towed	60° 53,727' N	057° 07,325' W	2881	End of survey	
MSM102_51-1	23-08-21 10:59	MB and Para	60° 25,518' N	057° 05,069' W	3026.3	Start of survey	
MSM102_51-1	23-08-21 11:36	MB and Para	60° 29,761' N	056° 57,648' W	3006	End of survey	
MSM102_52-1	23-08-21 13:21	Box Corer	60° 27,787' N	057° 01,041' W	3035.1	with SVP and USBL	
MSM102_53-1	23-08-21 15:45	Gravity Corer	60° 26,944' N	057° 02,543' W	3026.2	5 m with USBL, no recovery	
MSM102_54-1	23-08-21 19:26	Gravity Corer	60° 02,981' N	057° 18,364' W	2844.3	10 m with SVP and USBL, 800 cm recovery	
MSM102_55-1	23-08-21 20:19	MB and Para	60° 02,966' N	057° 18,038' W	2845.2	Start of survey	
MSM102_55-1	24-08-21 10:05	MB and Para	59° 55,213' N	056° 08,468' W	3198.4	End of survey	
MSM102_56-1	24-08-21 10:54	Gravity Corer	59° 55,227' N	056° 08,482' W	3197.9	5 m with USBL, 406 cm recovery	
MSM102_57-1	24-08-21 13:26	Gravity Corer	60° 02,022' N	055° 58,721' W	3235.2	5 m with USBL, no recovery	
MSM102_57-2	24-08-21 15:26	Box Corer	60° 02,077' N	055° 58,774' W	3231.9	with USBL	
MSM102_58-1	24-08-21 19:03	Box Corer	60° 09,974' N	056° 27,202' W	3176.6	with SVP and USBL, not released, no recovery	
MSM102_58-2	24-08-21 21:38	Box Corer	60° 09,988' N	056° 27,176' W	3179.1	with USBL	
MSM102_59-1	24-08-21 23:55	Gravity Corer	60° 05,025' N	056° 34,253' W	2944.5	10 m with USBL, 836 cm recovery	
MSM102_60-1	25-08-21 00:54	MB and Para	60° 03,956' N	056° 31,046' W	2954.1	Start of survey	
MSM102_60-1	25-08-21 12:16	MB and Para	59° 51,028' N	056° 06,681' W	3094.2	End of survey	
MSM102_61-1	25-08-21 13:42	Seismic Towed	59° 38,390' N	056° 04,725' W	3082.7	Begin soft start	
MSM102_61-1	25-08-21 14:09	Seismic Towed	59° 37,134' N	056° 03,516' W	3099.1	End soft start, start of survey	
MSM102_61-1	25-08-21 23:18	Seismic Towed	60° 12,238' N	055° 20,578' W	3157.3	End of survey	
MSM102_62-1	25-08-21 23:28	XSV	60° 12,748' N	055° 19,956' W	3151.6		
MSM102_63-1	26-08-21 01:23	MB and Para	60° 12,105' N	055° 19,746' W	3158.3	Start of survey	
MSM102_63-1	27-08-21 17:30	MB and Para	58° 22,212' N	051° 46,908' W	3509.2	End of survey	
MSM102_64-1	27-08-21 20:06	Seismic Towed	58° 04,961' N	051° 12,144' W	3553	Begin soft start	
MSM102_64-1	27-08-21 20:31	Seismic Towed	58° 03,544' N	051° 11,068' W	3552.9	End soft start, start of survey	
MSM102_64-1	28-08-21 08:59	Seismic Towed	57° 28,602' N	052° 33,304' W	3492.3	End of survey	
MSM102_65-1	28-08-21 12:14	Gravity Corer	57° 44,621' N	052° 03,036' W	3510.7	10 m with SVP and USBL (USBL failed), 269 cm recovery	
MSM102_66-1	28-08-21 15:33	Gravity Corer	57° 56,397' N	051° 36,623' W	3503.7	10 m with USBL, 274 cm recovery	
MSM102_67-1	28-08-21 17:39	Gravity Corer	57° 57,820' N	051° 33,466' W	3569.8	10 m with USBL, 119 cm recovery, core barrel bent	
MSM102_68-1	28-08-21 19:44	Gravity Corer	57° 59,008' N	051° 30,783' W	3511.9	10 m with USBL, 738 cm recovery	
MSM102_69-1	28-08-21 21:52	Seismic Towed	58° 00,223' N	051° 26,322' W	3538.9	Begin soft start	
MSM102_69-1	28-08-21 22:18	Seismic Towed	57° 59,205' N	051° 23,301' W	3544.8	End soft start, start of survey	
MSM102_69-1	30-08-21 17:10	Seismic Towed	56° 44,568' N	050° 28,604' W	3612.1	End of survey	
MSM102_70-1	30-08-21 18:43	MB and Para	56° 47,361' N	050° 13,364' W	3590.8	Start of survey	
MSM102_70-1	31-08-21 10:05	MB and Para	57° 41,120' N	051° 37,550' W	3497.2	End of survey	
MSM102_71-1	31-08-21 11:00	Gravity Corer	57° 41,103' N	051° 37,539' W	3499.3	10 m with SVP and USBL, 695 cm recovery	
MSM102_72-1	31-08-21 13:55	MB and Para	57° 31,805' N	051° 10,237' W	3584.9	Start of survey	
MSM102_72-1	02-09-21 02:20	MB and Para	57° 05,639' N	048° 38,749' W	3591.4	End of survey	

# List of seismic profiles

Profile -Nr.	Date Start	Time Start UTC	Date End	Time End UTC	Latitude Start (North)	Longitude Start (West)	Latitude End (North)	Longitude End (West)	FFN Start	FFN End
P101	31.07.21	11:48	31.07.21	15:06	50°36.26	042°40.50	50°34.21	043°02.41	1124	2654
P102	31.07.21	15:06	31.07.21	16:22	50°34.21	043°02.41	50°29.00	042°59.23	2655	3249
P103	31.07.21	16:22	31.07.21	19:18	50°29.00	042°59.23	50°30.23	042°38.62	3250	4602
P201	06.08.21	15:08	06.08.21	17:37	51°56.06	044°59.48	51°57.18	045°17.47	5250	6450
P202	06.08.21	17:51	06.08.21	19:58	51°58.00	045°18.04	52°05.29	045°08.21	6450	7420
P301	12.08.21	03:16	12.08.21	10:30	56°14.59	048°49.27	55° 42.99	048°34.29	9561	13320
P302	12.08.21	10:40	13.08.21	08:42	55°42.40	048°34.87	55°06.53	051°13.42	13320	24933
P401	13.08.21	19:00	14.08.21	04:45	56°25.66	050°23.71	56°42.43	049°10.86	25315	30336
P402	14.08.21	04:45	14.08.21	11:58	56°42.43	049°10.86	56°13.44	048°48.26	30336	34043
P501	17.08.21	14:11	17.08.21	22:07	57°52.07	051°03.34	57°31.51	051°57.58	35291	39375
P502	17.08.21	22:07	18.08.21	01:20	57°31.51	051°57.58	57°30.50	052°24.71	39376	41027
P503	18.08.21	01:20	18.08.21	03:16	57°30.50	052°24.71	57°37.40	052°34.30	41028	42018
P504	18.08.21	03:16	18.08.21	14:30	57°37.40	052°34.30	58°10.06	051°21.69	42018	47786
P601	21.08.21	16:08	22.08.21	02:00	59°49.68	057°09.92	60°25.54	056°17.72	48286	54218
P602	22.08.21	02:30	22.08.21	06:54	60°27.18	056°20.06	60°39.12	056°51.33	54518	57157
P603	22.08.21	06:54	22.08.21	15:00	60°39.12	056°51.33	60°02.57	057°44.35	57157	63207
P604	22.08.21	15:21	22.08.21	20:13	60°03.38	057°47.43	60°10.43	058°08.54	63261	65000
P605	22.08.21	20:13	23.08.21	07:58	60°10.43	058°08.54	60°53.73	057°07.31	65000	72041
P701	25.08.21	14:08	25.08.21	23:15	59°37.09	056°03.56	60°12.08	055°20.76	73226	78265
P801	27.08.21	20:31	28.08.21	08:58	58°03.51	051°11.17	57°28.59	052°33.33	79207	85603
P901	28.08.21	21:52	29.08.21	20:14	58°00.22	051°26.29	57°28.02	048°29.05	86001	97508
P902	29.08.21	20:14	30.08.21	08:00	57°28.02	048°29.05	56°41.73	049°13.85	97508	103554
P903	30.08.21	08:00	30.08.21	17:10	56°41.73	049°13.85	56°44.57	050°28.59	103554	108264