R/V Helmer Hanssen

(Leg 1) 02-01-25 to 20-01-25

Tromsø – Tromsø

(Leg 2) 21-1-25 to 17-02-25

Tromsø – Tromsø

UiT-IG25-1 Cruise Report
(Sokkeldirektoratet Toktnavn: 2025-Sodir-01/2025-NOD-01)

Bathymetric Survey in the Northern Greenland Sea, Mohns Ridge (Part II)

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DOI:

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PREFACE and ACKNOWLEDGEMENT

This document reports on the acquisition and processing of multibeam, acquired during a two-leg cruise with the UiT research vessel RV Helmer Hanssen from 2 January to 17 February 2025. The cruise was a collaborative project between UiT Norway's Arctic University and the Norwegian Offshore Directorate (NOD)/Sokkeldirektoratet (Sodir).

We thank both captains and their crew of R/V Helmer Hanssen for their outstanding support during this hydrographic survey, and for their successful navigation in challenging weather conditions.

Tromsø, 2025

INTRODUCTION AND OBJECTIVES

The cruise aimed to complete the survey area started in 2024 (Figure 1), northwest of the Mohns Ridge in the northern Greenland Sea, using multibeam sonar data (MB) for sea floor mapping and subsequently for backscatter imagery. The resulting bathymetry map and backscatter data are required to establish a foundation for future studies on geological, hydrothermal, and geothermal processes in the region.

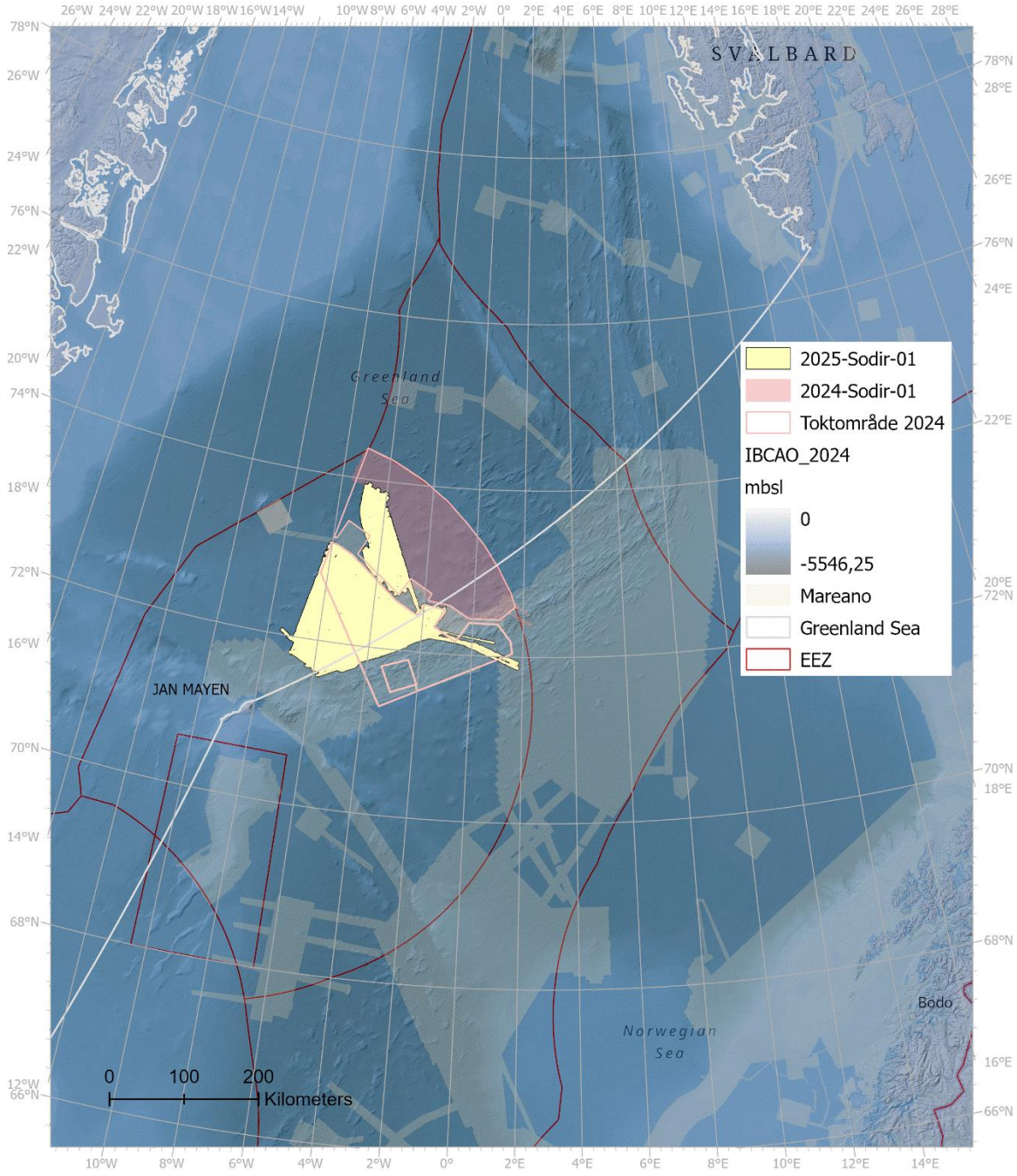

Figure 1: A location map of the study area in the northern Greenland Sea, and multibeam data coverage (in yellow) during this cruise, which overlaps survey areas planned, during "2024-Sodir-01" i.e. "Toktområde 2024".

METHODS

Multibeam echosounder (EM302)

Multibeam echosounders use a swath of beams giving off-track depth. Basic components of a multibeam system are two linear transducer arrays with separate units for transmitting and receiving. Echosounders measure the two-way travel time that a sound wave initiated by the transmitter needs to reach the seafloor and be reflected back to the receiver. The time-depth conversion is performed using a sound velocity profile of the water column, which can be calculated from a CTD cast.

R/V Helmer Hanssen is equipped with the hull-mounted Kongsberg Simrad EM302 multibeam echosounder system designed to perform seabed mapping with high resolution and accuracy to a maximum depth of more than 7000 m. The nominal sonar frequency of the sound waves is 30 kHz with an angular coverage sector of up to 150°.

The system has up to 432 beams per swath with pointing angles automatically adjusted according to achievable coverage or operator defined limits. With dual swath (up to 864 beams) the transmit fan is duplicated and transmitted with a small difference in along-track tilt. The applied tilt adjusts for depth, coverage and vessel speed to give a constant beam separation along track.

During this "2025-Sodir-01" survey, dual swath was activated in the relatively shallow areas and deactivated in deeper areas. The opening angle of the system varied between 30°/30° and 40° /40° and the ping mode settings varied from "deep" to "very deep".

CTD

Six CTD casts were conducted where weather permitted, to extract information about different (T, S) properties of water masses to calculate the speed of sound for calibrating the acoustic systems (see Appendix Table 1).

Multibeam data

Multibeam (MB) data were acquired in two regions ("A" and "B") as detailed in the "2024-NOD-01" report (https://www.sodir.no/fakta/dyphavsdata-for-havbunnsmineraler//). The MB coverage for this survey extends southwest beyond the original boundary of the 2024-Sodir-01 MB area "B" and adjoins the Mareano MB coverage (Figures 1 and 2). The data (94 MB lines) were processed onboard and cleaned using Geocap software and subsequently gridded to 21 m resolution. The total MB area covered during this cruise is approximately 26 000 km^2. The MB *.all files are used also for backscatter mosaicking.

The total count of MB lines and *.all files acquired while on site, are listed (Table 1). During the second leg of the cruise, extreme weather conditions required taking shelter at Jan Mayen (see Appendix, Table 2 for bad weather windows).

Water column data

Multibeam water column data were collected throughout the survey and are available as *.wcd files.

At site	Dates (UTC)	Multibeam line	*.all files (line segments)
Leg 1	5th -17th Jan	001-032 (32)	010-673 (664)
Leg 2	23rd Jan-14th Feb	033-094 (62)	822-1640 (819)

Table 1. Multibeam line numbers and corresponding segments (total number in parenthesis), in the survey area.

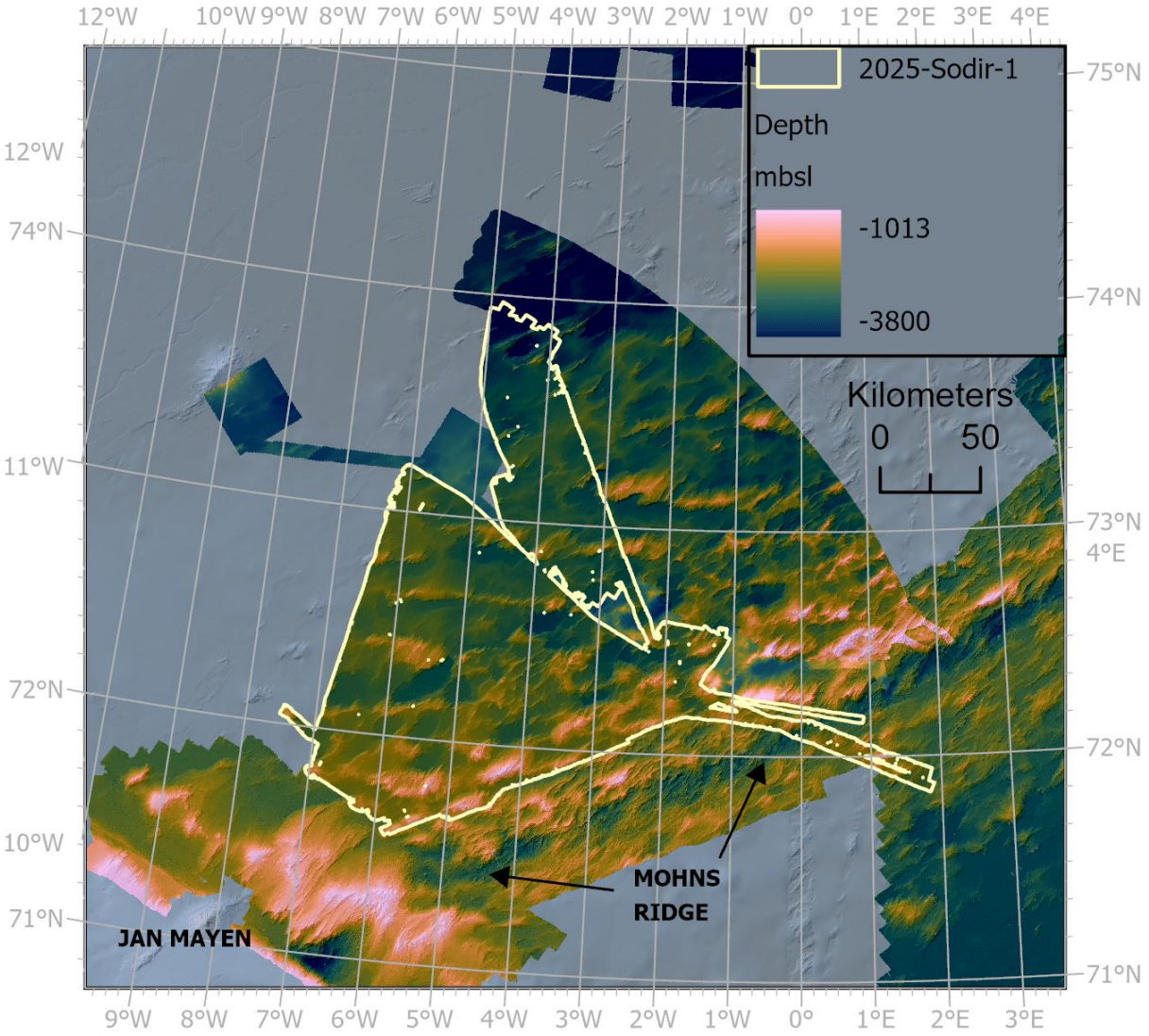

Figure 2: A map displaying an overview of multibeam (MB) data coverage in the region. MB data from survey "2024-Sodir-01" is combined with MB data from other Mareano cruises (see Figure 1), with the current survey outlined in yellow.

DATA PROCESSING

Backscatter

For optimal multibeam backscatter (BS) data collection, the hardware system must be calibrated and decibel (dB) values across datasets normalized, using reference areas. Calibration of the multibeam system at sea is challenging and is not conducted on UiT cruises. The extensive survey area, extreme weather, and limited time constraints are also not ideal for BS calibration. Even with calibration, BS levels can vary between surveys because of variation in system frequency, ship heading, and seasonal variations. Other factors such as changes in system parameters, also impact the backscatter imagery and, in this survey, have contributed to inconsistencies in dB values across the swath areas (Figure 3a).

The software used to process BS are FMGT (QPS) and Sonarscope. The *.all bathymetry files were loaded into FMGT and converted to BS mosaics (Figures 3 and 4). The BS processing involved 1) removing line turns and crosscutting survey lines that distort the BS image (Figure 3a), 2) splitting lines (using Sonarscope) that have had system changes mid-file so that they can be processed separately, 3) adjusting the dynamic range by modifying the minimum and maximum dB scale values to ensure consistent colour matching across mosaics. This helps standardize the intensity variations, improving the visual uniformity and interpretability of the final mosaic.

Note that even in the final mosaic there are image artefacts relating to: bad weather, the “nadir” (which is an artefact that follows the ship’s track), and inconsistencies in colour matching i.e. dB values, between swaths (Figures 3, 4 and 5). To avoid imaging the nadir, best practice is to ensure adequate swath overlap; however, time constraints on this cruise prevented this. Also note that the polygons that outline the mosaicked areas reveal small gaps between each segment (i.e. when a new bathymetry file is generated, Figure 3b). This could be avoided or minimized by increasing the size of the *.all file in the system settings.

Two features with similar backscatter characteristics are shown in detail (Figure 5), both exhibiting a “hard” centre contrasted with “softer” surrounding sediments.

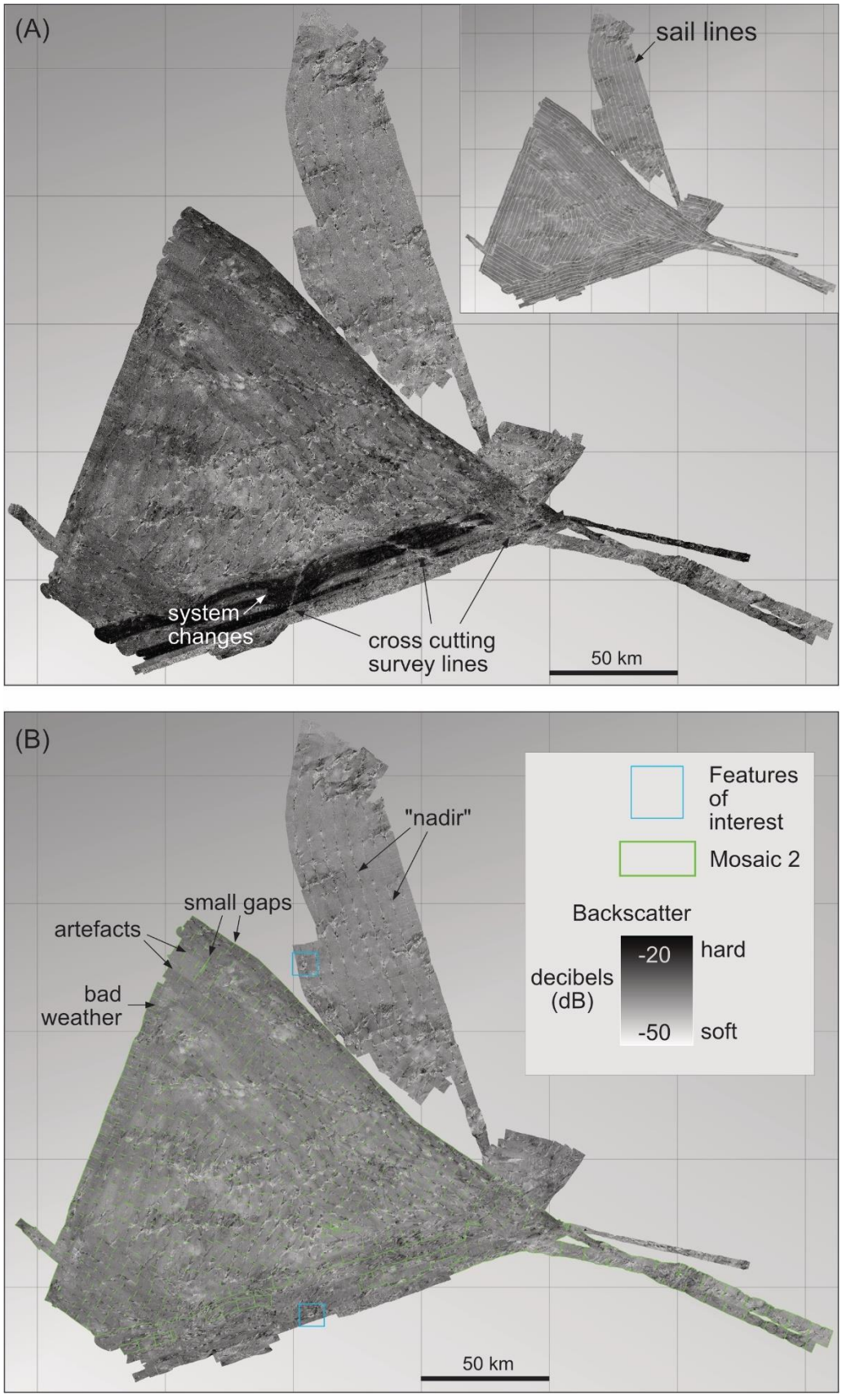

Figure 3. (A) The unprocessed backscatter mosaic, and sail lines shown in insert; (B) The processed backscatter mosaic with the dB range shown for the largest mosaic-2 (green polygon) and features of interest (Figure 5).

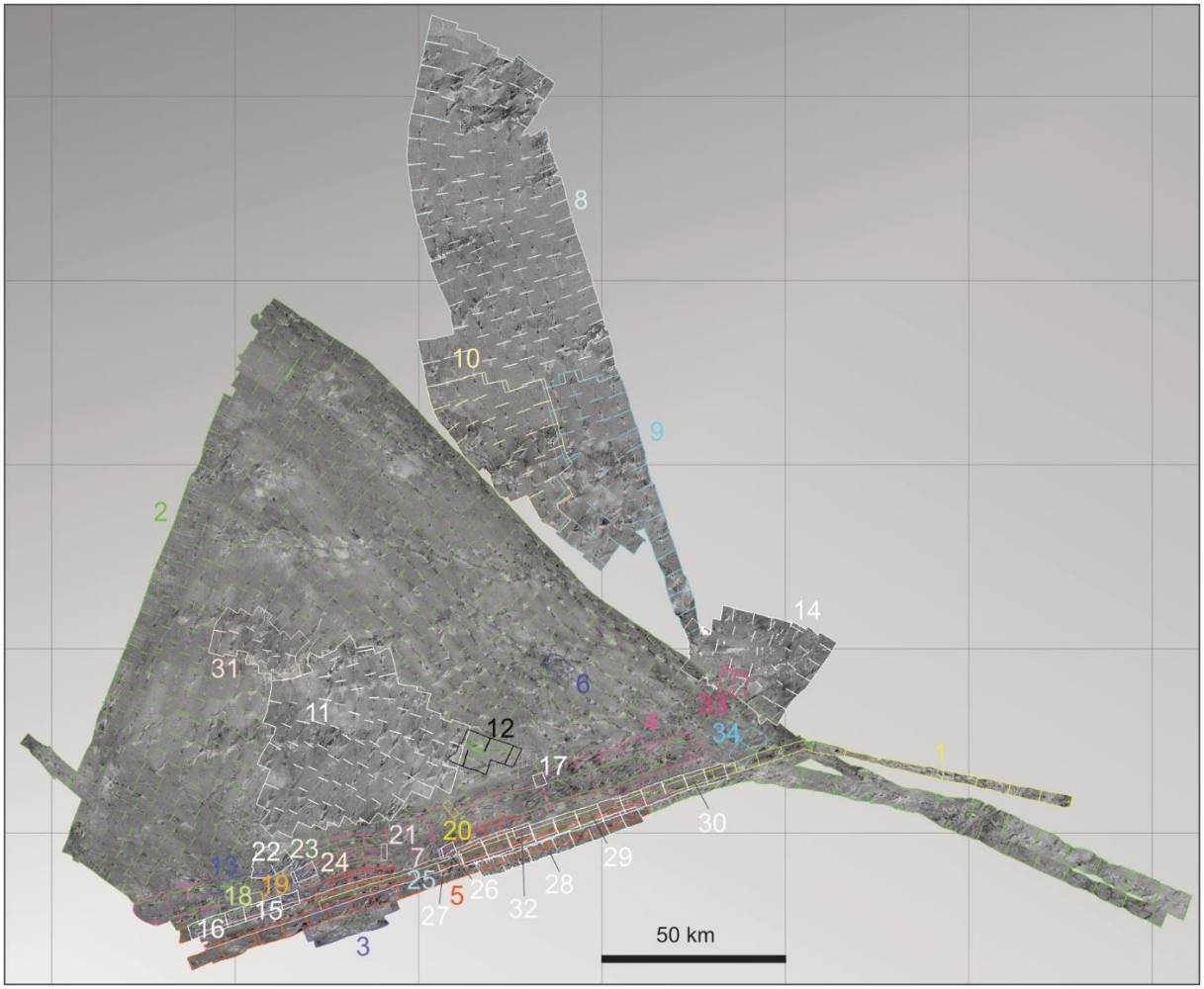

Figure 4. Areal extent of the 34 backscatter mosaics displayed in order from 1 (bottom) to 34 (top).

Data products

The MB data products for bathymetry and backscatter are listed (Table 2). There are 34 backscatter mosaics (Figure 4) which should be arranged from 1 at the bottom, to 34 at the top (see Appendix, Table 3 for further details). A fully merged mosaic, incorporating all 34 mosaics, is available only as an exported scene from QPS software Fledermaus. All data products are projected to WGS84/ UTM31N (EPSG:32631).

Type and file name	File formats	Comments
34 backscatter mosaics (see Appendix, Table 3 for each file name)	(1) Image .tif (RGB) (2) Floating point .tif	Uses a grey colour scale, where black (less negative dB values) indicates high backscatter (hard surfaces) and white (more negative dB values) represents low backscatter (soft sediments). Exported from Fledermaus Needs adjustment by setting the min and max dB values for each mosaic (see values in Appendix, Table 3).
Merged backscatter mosaic (25 m) Geoimage-backscatter-processed.tif	GeoImage	Exported from Fledermaus
Individual mosaic area polygons	.shp	Exported from GlobalMapper
Bathymetry grid (21-25 m) 2025-sodir-01_25mGrid_001_2025-02-15_06-03.tif 2025-sodir-01_21mGrid_001_2025-02-15_06-04.xyz and .sd	Floating point .tif, .XYZ and .sd	Exported from Geocap
Backscatter drape onto bathymetry 2025-sodir-01_21mGrid_001_2025-02-15_06-04-Draped-backscatter.sd	.sd	Requires Fledermaus (see 3D views Figure 5)

Table 2. Data products for multibeam bathymetry data, including backscatter

Features of interest

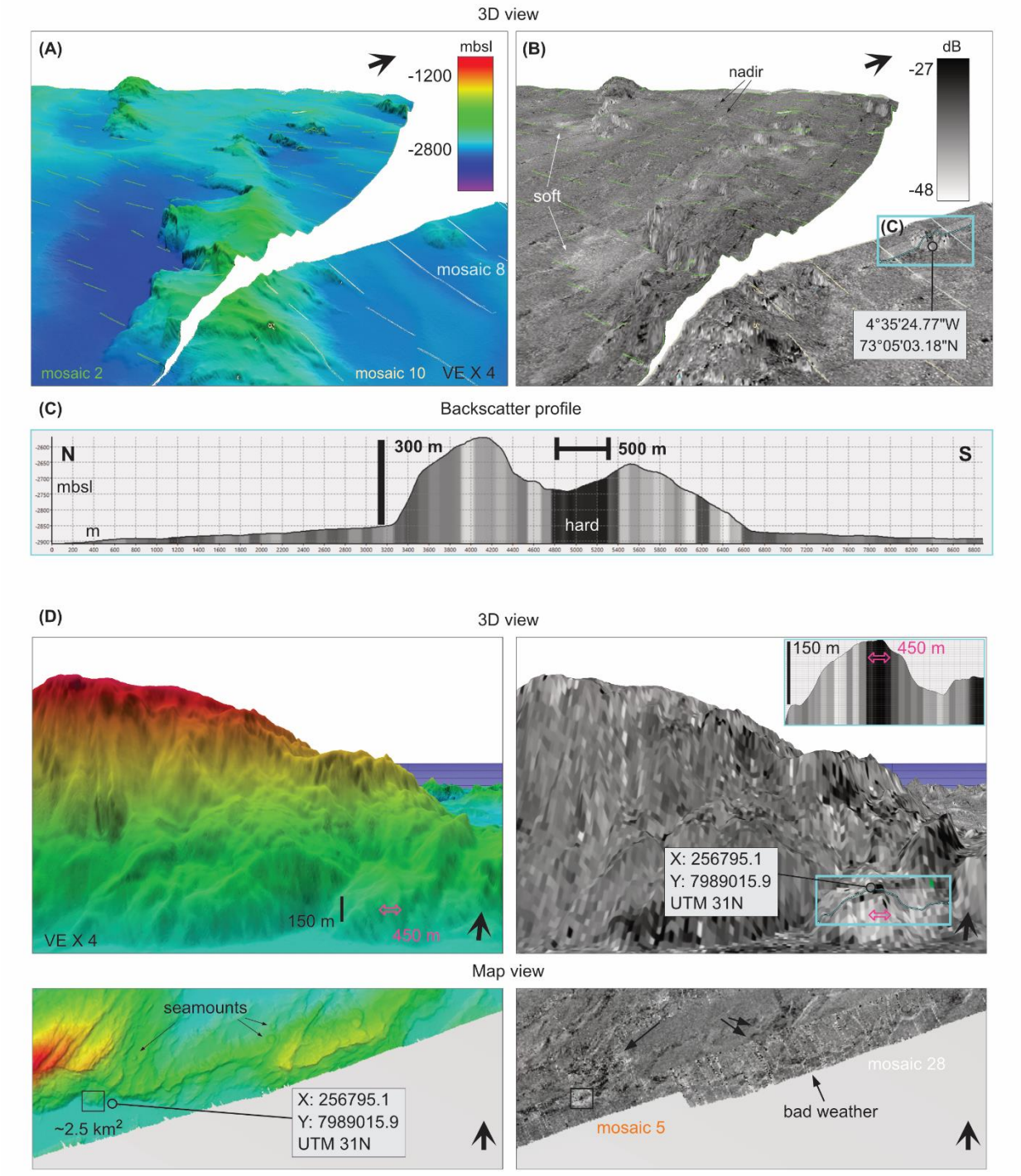

Figure 5. (A) Bathymetry map with vertical exaggeration (VE) x 4, and (B) Backscatter drape/overlay, showing examples of "soft" sediment and "hard", labelled in profile (C), note "nadir" artefacts which follow the sail lines. (C) Backscatter profile of a feature of interest with height ~300 m and width ~3.5 km. (D) A second feature of interest, at the southern edge of the survey, with similar characteristics to (C) i.e. "hard" centre and "soft" surrounding sediment with high contrast. There are multiple flat-topped seamounts in the surrounding area marked with black arrows.

APPENDIX

Tables of station, line logs and backscatter products are included in the report.

Station log UiT-IG25-1

Location	Station Id	Date	Time (UTC)	Lat. [N] Long. [E]	Bottles fired [#]	Water Depth [m]	Notes
Greenland Sea	UiT-IG25-1-1-CTD	05/01	16:14	71°37.817' -05°46.462'		2385	
Greenland Sea	UiT-IG25-1-3-CTD	06/01	11:57	72°17.078' -01°17.441'		1750	
Greenland Sea	UiT-IG25-1-6-CTD	08/01	09:55	73°08.691' -06°05.866'		2640	
Greenland Sea	UiT-IG25-1-13-CTD	23/01	16:59	72°14.720' -03°08.555'		2920	
Greenland Sea	UiT-IG25-1-16-CTD	08/02	23:57	71°40.970' -05°01.780'		1850	
Greenland Sea	UiT-IG25-1-17-CTD	11/02	21:04	72°45.157' -02°55.057'		2794	

Table 1. CTD casts

Line log UiT-IG25-1

Location	Line ID	Date	Time (UTC) START	Lat. [N] Long. [E] START	Time (UTC) STOP	Lat. [N] Long. [E] STOP	Ship Speed (kn)	MB Line	Comments
Greenland Sea	UiT-IG25-1-0-MB	04/01		72°09.824' -00°51.626'			7	001-009	
Greenland Sea	UiT-IG25-1-1-MB	05/01	3:15	72°16.165' -00°56.515'	16:08	71°37.777' -05°45.339'	7	010-35	Very deep swath with dual mode deactivated
Greenland Sea	UiT-IG25-1-2-MB	05/01	18:09	71°38.372' -05°50.387'	11:51	72°16.908' -01°17.397'	7	39-074	Deep swath and dual swath activated & deactivated
Greenland Sea	UiT-IG25-1-3-MB	06/01	13:21	72°16.597' -05°19.752'	03:51	73°11.567' -06°01.638'	7	77-105	Very Deep 30/30
Greenland Sea	UiT-IG25-1-4-MB	07/01	4:06	73°10.738' -06°03.597'	19:35	72°16.061' -01°23.635'	7	107-137	Very Deep 30/30
Greenland Sea	UiT-IG25-1-5-MB	07/01	20:00	72°15.233' -01°31.259'	09:52	73°08.658' -06°05.673'	7	139-166	Very deep 40/40
Greenland Sea	UiT-IG25-1-6-MB	08/01	0:00	73°06.529' -06°06.616'	01:34	72°14.292' -01°38.316'	7	171-199	Very deep 40/40
Greenland Sea	UiT-IG25-1-7-MB	09/01	2:02	72°13.133' -01°46.089'	15:41	73°04.622' -06°10.351'	7	201-228	Very deep 40/40
Greenland Sea	UiT-IG25-1-8-MB	09/01	16:06	73°02.214' -06°11.760'	05:18	72°12.321' -01°53.988'	7	230-256	Very deep 40/40
Greenland Sea	UiT-IG25-1-9-MB	10/01	5:34	72°13.304' -01°56.554'	21:56	71°38.416' -05°58.833'	7	258-290	Very deep 40/40 - also deep + dual swath in shallow area
Greenland Sea	UiT-IG25-1-10-MB	10/01	22:11	71°39.821' -06°03.320'	09:35	72°14.254' -02°04.318'	7	292-316	Very deep 40/40 - also deep + dual swath in shallow area
Greenland Sea	UiT-IG25-1-11-MB	11/01	10:02	72°15.568' -02°10.580'	22:02	71°40.415' -06°11.713'	7	318-342	Very deep 40/40 - also deep + dual swath in shallow area
Greenland Sea	UiT-IG25-1-12-MB	11/01	22:21	71°41.544' -06°18.985'	10:38	72°16.882' -02°16.176'	7	344-368	Very deep 40/40 - also deep + dual swath in shallow area
Greenland Sea	UiT-IG25-1-13-MB	12/01	10:51	71°15.911' -02°21.213'	22:49	72°59.885' -06°13.095'	7	370-393	Very deep 40/40 - also deep + dual swath in shallow area
Greenland Sea	UiT-IG25-1-14-MB	12/01	23:09	72°57.719' -06°12.719'	00:00	72°56.021' -05°59.461'	6	395-396	Very deep 40/40 - also deep + dual swath in shallow area
Greenland Sea	UiT-IG25-1-15-MB	13/01	1:50	72°57.217' -06°07.730'	15:15	71°47.536' -06°56.707'	5	399-426	Very deep 35/35
Greenland Sea	UiT-IG25-1-16-MB	13/01	15:38	71°48.851' -06°58.897'	18:06	71°43.227' -06°21.888'	5	428-432	Very deep 35/35
Greenland Sea	UiT-IG25-1-17-MB	13/01	18:12	71°42.927' -06°21.995'	18:45	71°44.101' -06°15.288'	5	434-435	Very deep 40/40 + dual swath in shallow area
Greenland Sea	UiT-IG25-1-18-MB	13/01	19:11	71°43.728' -06°08.539'	21:27	71°49.616' -06°55.040'	7	437-441	Very deep 40/40

Greenland Sea	UiT-IG25-1-19-MB	13/01	0:41	71°51.315' -06°53.309'	00:38	71°44.446' -06°05.713'	6	443-450	Very deep 40/40
Greenland Sea	UiT-IG25-1-20-MB	14/01	0:59	71°45.410' -06°07.678'	02:08	71°47.326' -05°48.738'	6	452-454	Very deep 40/40
Greenland Sea	UiT-IG25-1-21-MB	14/01	2:32	71°46.307' -05°55.269'	05:36	71°52.928' -06°51.304'	5	455-462	Very deep 40/40 - also deep + dual swath in shallow area
Greenland Sea	UiT-IG25-1-22-MB	14/01	5:54	71°45.691' -06°50.578'	11:07	71°46.643' -05°39.869'	5	464-474	Very deep 40/40
Greenland Sea	UiT-IG25-1-23-MB	14/01	0:00	71°47.866' -05°32.042'	15:42	71°56.365' -06°48.911'	5	477-484	
Greenland Sea	UiT-IG25-1-24-MB	14/01	15:57	71°56.074' -06°44.968'	17:20	72°01.418' -06°41.861'	4	486-489	Very deep 40/40
Greenland Sea	UiT-IG25-1-xx_west-MB	14/01	19:15	71°56.232' -06°43.229'			4	492-497	Bad weather, went west out of area
Greenland Sea	UiT-IG25-1-25-MB	14/01	0:55	71°58.127' -06°55.841'	12:32	72°57.139' -06°14.157'	5	504-527	Very deep 40/40
Greenland Sea	UiT-IG25-1-26-MB	15/01	12:43	72°57.642' -06°12.281'	01:34	72°14.931' -02°32.589'	6	529-554	Very deep 40/40
Greenland Sea	UiT-IG25-1-27-MB	16/01	1:55	72°15.345' -02°40.025'	15:37	71°57.609' -06°43.318'	6	556-583	Very deep 40/40
Greenland Sea	UiT-IG25-1-28-MB	16/01	15:46	71°57.401' -06°44.173'	01:07	72°55.631' -06°02.466'	6	585-604	Very deep 40/40
Greenland Sea	UiT-IG25-1-29-MB	17/01	1:23	72°54.358' -06°03.446'	11:44	72°14.516' -02°48.809'	7	606-626	Very deep 40/40
Greenland Sea	UiT-IG25-1-30-MB	17/01	12:15	72°14.933' -02°59.665'	17:54	72°05.267' -04°09.898'	5	629-641	Very deep 40/40
Greenland Sea	UiT-IG25-1-31-MB	17/01	20:31	71°49.751' -04°16.407'	09:04	72°15.530' -01°12.176'	7	648-673	Very deep 40/40
Greenland Sea	UiT-IG25-1-32-MB	23/01	18:55	72°14.480' -03°06.500'	04:16	72°52.381' -06°06.011'	7	822-840	Very deep 40/40
Greenland Sea	UiT-IG25-1-33-MB	24/01	4:38	72°49.768' -06°09.531'	13:45	72°13.094' -03°14.904'	7	842-860	Very deep 45/45 - 40/40
Greenland Sea	UiT-IG25-1-34-MB	24/01	14:04	72°11.731' -03°21.465'	23:00	72°47.474' -06°10.156'			Very deep 40/40
Greenland Sea	UiT-IG25-1-35-MB	24/01	23:17	72°45.373' -06°10.800'	08:09	72°10.600' -03°26.884'	7 & 5	862-879	Very deep 40/40 - weather picked up towards end
Greenland Sea	UiT-IG25-1-36-MB	25/01	8:28	72°11.731' -03°21.786'	17:19	72°43.206' -06°12.790'	7	881-	WX bad, 20+m/s,speed 3kn, 5m+ heave, line paused
Greenland Sea	UiT-IG25-1-37-MB	25/01	17:45	72°41.004' -06°14.432'	03:13	72°13.610' -04°10.582'		900-938	
Greenland Sea	UiT-IG25-1-38-MB	26/01	20:44	72°24.590' -03°15.220'	22:16	72°10.885' -03°24.122'	8_9	-	Transit after bad weather to continue surveying
Greenland Sea	UiT-IG25-1-39-MB	26/01	22:16	72°10.885' -03°24.122'	08:15	71°59.369' -06°41.296'	6	974-977	Very deep 40/40
Greenland Sea	UiT-IG25-1-40-MB	27/01	8:36	72°01.419' -06°40.160'	12:45	71°53.877' -05°17.850'	6	978-997	Very deep 40/40. Stopped the line because of bad direction.
Greenland Sea	UiT-IG25-1-41-MB	27/01	12:46	71°53.908' -05°18.067'	16:57	72°03.816' -06°41.275'	7	999-1007	
Greenland Sea	UiT-IG25-1-42-MB	27/01	17:24	72°02.532' -06°35.186'	23:25	72°39.798' -06°08.991'	7	1009-	
Greenland Sea	UiT-IG25-1-43-MB	27/01	23:42	72°39.470' -06°02.346'	05:22	72°02.440' -06°29.038'	7	-1031	
Greenland Sea	UiT-IG25-1-44-MB	28/01	5:43	72°01.692' -06°22.428'	11:32	72°37.959' -05°56.005'	7	1033-1044	Very deep 42/42
Greenland Sea	UiT-IG25-1-45-MB	28/01	12:16	72°36.381' -05°48.921'	17:31	72°01.176' -06°15.915'	7	1046-1058	
Greenland Sea	UiT-IG25-1-46-MB	28/01	17:51	72°00.501' -06°09.819'	23:06	72°34.676' -05°41.187'	7	-	
Greenland Sea	UiT-IG25-1-47-MB	28/01	23:24	72°33.527' -05°34.836'	04:29	71°59.738' -06°03.589'	7	-1084	
Greenland Sea	UiT-IG25-1-48-MB	29/01	4:52	71°58.368' -05°56.768'	09:52	72°31.546' -05°29.401'	7	1086-1096	
Greenland Sea	UiT-IG25-1-49-MB	29/01	10:06	72°30.751' -05°24.084'	15:09	71°57.854' -05°51.339'	7	1098-1108	
Greenland Sea	UiT-IG25-1-50-MB	29/01	15:33	71°57.031' -05°43.958'	20:23	72°28.738' -05°19.044'	7	1110-1132	
Greenland Sea	UiT-IG25-1-51-MB	29/01	20:43	72°27.245' -05°14.503'	01:26	71°56.365' -05°39.345'	7	1134-	
Greenland Sea	UiT-IG25-1-52-MB	30/01	1:38	71°55.609' -05°34.932'	06:40	72°27.648' -05°05.808'	7	-1143	

Greenland Sea	UiT-IG25-1-53-MB	30/01	6:59	72°26.658' -04°58.106'	12:04	71°55.102' -05°28.428'	7	1145-1155	
Greenland Sea	UiT-IG25-1-54-MB	30/01	12:37	71°55.258' -05°18.546'	16:47	72°22.552' -05°07.078'	7	1157-1167	
Greenland Sea	UiT-IG25-1-55-MB	30/01	17:08	72°24.097' -05°02.633'	21:18	71°55.990' -05°10.750'	7	1170-1178	
Greenland Sea	UiT-IG25-1-56-MB	30/01	21:38	71°57.011' -05°02.852'	01:43	72°23.793' -04°51.419'	7	1180-1189	
Greenland Sea	UiT-IG25-1-57-MB	31/01	1:59	72°23.547' -04°43.900'	05:51	71°57.674' -04°56.576'	7	1191-1199	
Greenland Sea	UiT-IG25-1-58-MB	31/01	6:15	710°58.553' -04°48.160'	09:23	72°19.678' -04°27.588'	7	1201-1208	
Greenland Sea	UiT-IG25-1-59-MB	31/01	9:37	72°18.417' -04°21.525'	12:38	71°58.571' -04°41.189'	7	1210-1216	
Greenland Sea	UiT-IG25-1-60-MB	31/01	12:56	71°59.617' -04°32.331'	15:21	72°15.842' -04°15.162'	7	1218-1224	
Greenland Sea	UiT-IG25-1-61-MB	31/01	16:00	72°14.684' -04°07.551'	17:38	72°03.482' -04°16.747'	7	1226-1230	
Greenland Sea	UiT-IG25-1-62-MB	31/01	18:06	72°04.689' -04°07.426'	19:31	72°14.498' -04°00.949'	7	1232-1235	
Greenland Sea	UiT-IG25-1-63-MB	31/01	19:56	72°12.380' -03°58.872'	21:08	72°10.298' -03°32.498'	7	1236-1239	
Greenland Sea	UiT-IG25-1-64-MB	31/01	21:56	72°08.962' -03°45.198'	22:41	72°10.315' -04°01.889'	7	1241-1243	
Greenland Sea	UiT-IG25-1-65-MB	01/02	1:32	72°04.012' -02°31.286'	06:12	71°54.812' -03°34.317'	3-6	1246-1247	[Vind:15m/s, Heave:3, mye stampig]
Greenland Sea	UiT-IG25-1-66-MB	01/02	6:12	71°54.812' -03°34.317'	14:21	71°42.672' -05°00.321'	3	1254-1263	WX bad, 20+m/s,speed 3kn, 6m+ heave, line paused
Greenland Sea	UiT-IG25-1-67-MB	08/02	13:18	71°17.070' -07°29.860'			10	1264-1280	Transit from Jan Mayen back to area
Greenland Sea	UiT-IG25-1-68-MB	08/02	17:53	71°39.662' -05°22.618'	21:10	71°50.090' -04°15.832'	7	1315-1324	
Greenland Sea	UiT-IG25-1-69-MB	08/02	21:41	71°47.428' -04°20.998'	23:48	71°40.954' -05°01.686'	6	1325-1332	
Greenland Sea	UiT-IG25-1-70-MB	09/02	1:37	71°40.297' -04°56.523'	03:08	71°44.755' -04°25.865'	7	1334-1338	
Greenland Sea	UiT-IG25-1-Transit-MB	09/02	3:09	71°44.755'	04:08	71°44.755' -04°25.865'	10	1345-1347	
Greenland Sea	UiT-IG25-1-71-MB	09/02	4:07	71°51.703' -04°14.789'	11:28	72°12.338' -01°46.868'	7	1348-1349	
								1350-1364	
Greenland Sea	UiT-IG25-1-72-MB	09/02	17:32	72°19.192' -01°33.088'	20:18	72°31.979' -01°07.458'	5	1369-1374	
Greenland Sea	UiT-IG25-1-73-MB	09/02	20:43	72°32.516' -01°13.850'	23:09	72°20.219' -01°39.333'	7	1376-1380	
Greenland Sea	UiT-IG25-1-74-MB	09/02	23:30	72°21.682' -01°47.061'	01:36	72°33.414' -01°22.128'	7	1382-1386	
Greenland Sea	UiT-IG25-1-75-MB	10/02	1:57	72°32.484' -01°26.477'	03:45	72°34.314' -02°00.527'	7	1388-1391	
Greenland Sea	UiT-IG25-1-76-MB	10/02	4:11	72°31.979' -02°05.303'	06:07	72°30.769' -01°28.314'	7	1395-1398	
Greenland Sea	UiT-IG25-1-77-MB	10/02	6:59	72°28.367' -01°27.999'	10:05	72°29.729' -02°10.261'	6	1401-1407	
Greenland Sea	UiT-IG25-1-78-MB	10/02	10:47	72°27.804' -02°14.153'	12:35	72262°86.000' -01°38 803'	6	1410-	
Greenland Sea	UiT-IG25-1-79-MB	10/02	13:32	72°23.792' -01°45.707'	15:05	72°25.755' -02°05.522'	4	-1419	
Greenland Sea	UiT-IG25-1-80-MB	10/02	19:23	72°48.855' -02°40.804'	06:16	73°41.226' -03°58.707'	3-6	1429-1450	
Greenland Sea	UiT-IG25-1-81-MB	11/02	6:58	73°40.101' -04°07.085'	16:41	72°45.020' -02°46.153'	7	1453-1472	
Greenland Sea	UiT-IG25-1-82-MB	11/02	17:30	72°42.452' -02°53.290'	17:43	72°43.236' -02°54.178'	4	1475-	WX bad, breaking off line for now.
Greenland Sea	UiT-IG25-1-83-MB	11/02	21:29	72°46.648' -02°52.283'	22:38	72°39.732' -03°06.380'		1480-1482	
Greenland Sea	UiT-IG25-1-84-MB	11/02	23:13	72°41.515'	00:46	72°49.792' -02°54.802'	7	1485-1488	
Greenland Sea	UiT-IG25-1-85-MB	12/02	0:53	72°50.414' -02°55.347'	01:08	72°51.527' -02°58.310'	7	1491-1491	

Greenland Sea	UiT-IG25-1-86-MB	12/02	1:26	72°53.597' -02°56.923'	03:25	72°42.755' -03°21.032'	7	1493-1496	
Greenland Sea	UiT-IG25-1-87-MB	12/02	4:00	72°44.553' -03°29.128'	06:21	72°55.376' -03°02.936'	7	1499-1503	
Greenland Sea	UiT-IG25-1-88-MB	12/02	6:57	72°54.730' -03°08.238'	16:15	73°49.948' -03°57.424'	7	1506-1524	Lost the MRU again, second time. Had to do a U-turn and restart. Lost approx. 25 minutes
Greenland Sea	UiT-IG25-1-89-MB	12/02	16:48	73°51.375' -04°08.410'	01:44	72°53.063' -03°13.436'	7	1527-1545	
Greenland Sea	UiT-IG25-1-90-MB	13/02	2:03	72°50.461' -03°16.329'	11:37	73°51.862' -04°19.329'	7	1547-1566	
Greenland Sea	UiT-IG25-1-91-MB	13/02	11:57	73°53.526' -04°29.757'	21:59	72°48.367' -03°23.585'	7	1568-1588	
Greenland Sea	UiT-IG25-1-92-MB	13/02	22:19	72°46.128' -03°29.560'	08:46	73°54.784' -04°41.647'	7	1590-1610	
Greenland Sea	UiT-IG25-1-93-MB	14/02	9:08	73°56.179' -04°53.080'	19:25	72°48.116' -03°45.166'	7	1612-1632	
Greenland Sea	UiT-IG25-1-94-MB	14/02	19:37	72°48.903' -03°50.225'	23:06	73°10.462' -04°31.297'	7	1634-1640	

Table 2. Bathymetry log, bad weather windows indicated in grey.

Mosaics dB values

BOTTOM	Original file name	Starting value (dB)	Ending value (dB)	Comments
1	01_Mosaic-1.tif	-45.506	-7.188	
2	02_Mosaic-8-42_order_3.tif	-50.831	-17.812	as shown Figure 3B (Mosiac-2)
3	03_Mosaic-8-45_order_3-missing-bit.tif	-50.831	-17.812	
4	04_Mosaic-6.tif	-41.524	-14.011	
5	05_Mosaic-9-41_order_4.tif	-48.281	-23.506	
6	06_Mosaic-10-40_order_5.tif	-44.183	-11.128	
7	07_Mosaic-11-39_order_6.tif	-41.279	-9.587	
8	08_Mosaic-12-38_order_7.tif	-49.391	-24.238	
9	09_Mosaic-13-32_order_8.tif	-49.945	-25.457	
10	10_Mosaic-14-33_order_9.tif	-47.961	-26.233	
11	11_Mosaic-15-34_order_10.tif	-50.055	-21.801	
12	12_Mosaic-16-35_order_11.tif	-49.614	-23.352	
13	13_Mosaic-17-36_order_12.tif	-37.954	-11.496	
14	14_Mosaic-18-37_order_13.tif	-53.932	-19.695	
15	15_Mosaic-3-2.tif	-43.106	-21.16	
16	16_Mosaic-4-2.tif	-42.894	-24.628	
17	17_Mosaic-5-2.tif	-45.433	-21.209	
18	18_Mosaic-7-2.tif	-47.485	-20.183	
19	19_Mosaic-19-2.tif	-48.089	-1.686	
20	20_Mosaic-20-2.tif	-38.01	-14.762	
21	21_Mosaic-21-2.tif	-38.84	-15.69	
22	22_Mosaic-22-2.tif	-46.361	-17.546	
23	23_Mosaic-23-2.tif	-38.837	-8.413	
24	24_Mosaic-24-2.tif	-43.578	-21.941	
25	25_Mosaic-25-2.tif	-35.617	-16.374	
26	26_Mosaic-26-2.tif	-50.366	-18.767	
27	27_Mosaic-27-2.tif	-31.612	-14.615	
28	28_Mosaic-28-2.tif	-54.713	-22.283	
29	29_Mosaic-29-2.tif	-51.583	-20.623	
30	30_Mosaic-30-2.tif	-56.618	-17.692	
31	31_Mosaic-31-2.tif	-46.508	-19.744	
32	32_Mosaic-11-39_order_6_5_add_on.tif	-57.015	-10.166	shifted position to between 11 and 12
33	33_Mosaic-43-missing-bit.tif	-53.932	-19.695	
34	34_Mosaic-46-missing-bit.tif	-55.263	-20.028	
TOP	**AVERAGE dB values**	**-46.68079412**	**-17.66238235**	

Table 3. Mosaic ordering and dB values.