APPENDIX 5
SPECIMEN REPORT OF SURVEY

Italian Hydrographic Institute

HIGH NORTH23
Arctic Marine Geophysics Campaign

North/North-West of Svalbard
Area of the Yermak Plateau
Southern area of Vestnesa Ridge and Molloy Hole

NRV ALLIANCE

Scientist in Charge: Maurizio DEMARTE
Surveyed by CDR. Maurizio DEMARTE\ CDR Samuele STEFANUCCI

[2023.07.14 to 2023.08.08]

REPORT OF SURVEY

[2024.06.26] *[HN23]*

CONTENTS

PART 1 - DESCRIPTIVE

PART 1

1. Introduction

1.1 The Italian Navy – Acting as national marine focal point for Arctic marine research – launched in 2017, the Pluriannual Joint Research Program in the Arctic, named HIGH NORTH. A new year activity is in progress with an enhanced overview having a look to the 3D mapping from satellite to seabed.
The HIGH NORTH 2020-2023 Program has for main target the knowledge of Arctic Ocean (Svalbard area), in support of the global community for the gap of knowledge and the rapidly changing, at the beginning of the UN Decade of Ocean Science for Sustainable Development (2021-2030). It will develop on Hydro- Oceanographic campaign and research focused mainly on the unsurveyed area closed to the sea ice-edge.

1.2 Weather conditions during the survey were always favorable.

1.3 The survey started on 14th July and ended on 08th August. There was no interruption in the activities. There were no extra activities during the survey period. Tidal stream caused no difficulties. No logistic problem occurred.

1.4 The survey area has been split in 3 main zones. (North/North-West of Svalbard, Area of the Yermak Plateau and Southern area of Vestnesa Ridge and Molloy Hole)
Due to the absence of obstacles, the planned survey area has been totally covered. This corresponds to an area of 2856 km^2.

2. Geodetic Control

2.1 N.A.

3. Digital Surveying System

3.1 Following table summarize the equipped instrumentation used for the survey:

Hydrographic instruments			
Sensor	Company	Model	Serial Number
MBES	Kongsberg Marine	EM 302	//
MRU	Seatex	MRU 5E	//
Positioning system	Kongsberg Marine	Seapath 330	//
	FUGRO Seastar	3610 STARFIX L1	
CTD probe	Valeport	RapidCast CTD	//
Multiparametric probe	SBE	911 PLUS	//
SVS	Valeport	miniSVS	//

To acquire hydrographic data the proprietary software *SIS (Seafloor Information System)*, version 4.3.0, has been used, installed in a *HWS (Hydrographic Work Station)* MP8300 with following features:
- Processor: Intel® Core™ i7-3770 CPU @ 3.40 Ghz
- RAM: 8 GB
- Operating System: Windows 7 Professional SP1
- System Type: 64-bit Operating System

For data processing the software *CARIS "Hips & Sips", version 10.1*, has been used, installed on a commercial workstation with following features:
- Processor: Intel® Xenon® CPU E3-1535M v5 @ 2.9 Ghz
- RAM: 32 GB
- Operating System: Windows 7 Professional SP1
- System Type: 64-bit Operating System

Acquired lines have been converted and imported in Caris HIPS&SIPS projects. Later a BASE (Bathymetry Associated with Statistical Error) has been created, type *CUBE (Combined Uncertainty and Bathymetry Estimator)* with following settings:
- resolution: 50m;
- order IHO S-44: 2 (a=1; b=0.023);
- method: "density & locale" in configuration "default".

The obtained surface has been checked, using CARIS Editor H&S, leading to the necessary cleaning of anomalous data.
The resulting surface has been finalized for subsequent products realization.

3.2 N.A.

3.3 N.A.

4. Nav-aids

4.1 Positioning data have been acquired with Kongsberg Seapath 330 with STARFIX corrections type L1 received by a FUGRO demodulator SEASTAR 3610. Attitude and heading values have been acquired by the system Seatex Seapath 300 equipped in the ship, linked with organic attitude giver Seatex MRU 5E. The same system, operating in DGPS mode with STARFIX L1 corrections coming from FUGRO demodulator 3610, has been connected with the echosounder as primary positioning system.

4.2 The system, operating in DGPS mode with STARFIX L1 corrections coming from FUGRO demodulator 3610, has been connected with the echosounder as primary positioning system. Positioning systems used WGS84 horizontal datum for hydrographic data, ITRS system, representation ITRF2020.

4.3 The calibration of MBES EM 302 occurred on 20th July 2023.
Calibrations parameters have been repeatedly checked during acquisition phase, to verify their quality. Resulting angular variations from the calibration have been implemented directly into the acquisition software SIS ("Installation Parameters - MRU Angular Offset").

4.4 This setup has allowed a seabed data completely in accordance with requirements for order 2 surveys (IHO S44 – 6.1.0th Edition october 2022, Table 1: "Minimum Standards for Hydrographic Surveys").

5. Bathymetry

5.1 Acquisition of bathymetric data has been carried on with the multibeam echosounder Kongsberg EM 302.

Frequency:	30 kHz
Swath:	Dual
Head:	Single
Transmit Array (degrees)	150 x 2
Receive Array (degrees)	2 x 30
Max number of beams/swath	432 (HD Equidistant)

Acquisition settings:

Vs:	Profile
Dual Swath mode:	Dynamic
Ping Mode:	Auto
Sound Speed to Transducer:	Sensor
Sector Coverage angles:	From 55° to 70°
Angular Coverage mode:	Auto
Beam Spacing:	HD Equidistant
Absorption Coefficient:	Salinity (from CTD profile)
Filtering:	*Spike filter Strength*: MEDIUM *Range Gate*: NORMAL *Phase Ramp*: NORMAL *Penetration Filter Strength*: OFF *Slope*: ON *Aeration*: OFF *Sector Tracking*: OFF *Interference*: ON
Pitch Stabilization	ON

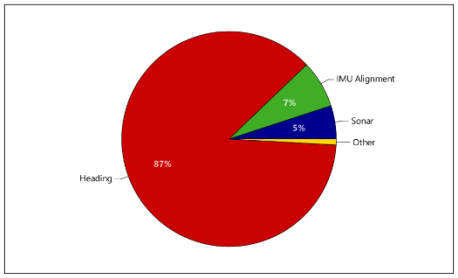
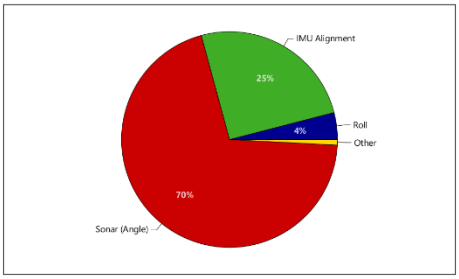
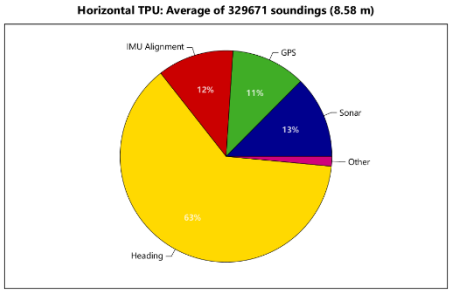
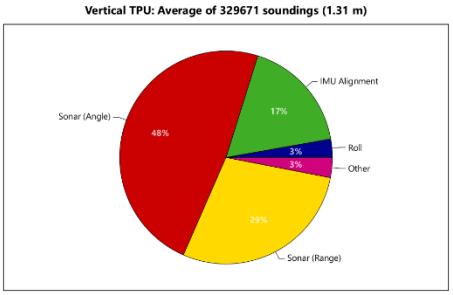
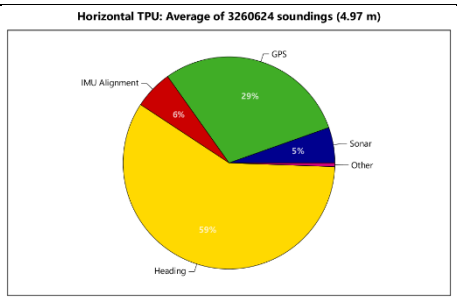
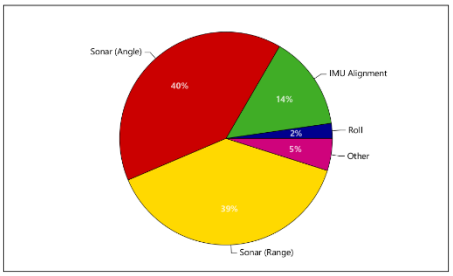
5.2 Sound propagation velocity data in the water column have been measured with SBE 911 plus CTD.

5.3 Due to no presence of obstacles, survey area in planning phase has been fully explored. This correspond to a coverage of 2856 km^2 area.

5.4 Line directions mainly followed a regular grid, with some variations to better check specific areas.

5.5 The statistical computation of the Total Propagated Uncertainty (TPU) has been computed using the Caris H&S tool for "Uncertainty" and expressed as two different values for the horizontal (THU) and vertical (TVU) uncertainty. These values have been linked with the max depth of the

corresponding area to check if the results were in compliance with the S-44 publication "IHO Standards for Hydrographic Surveys" (6.1.0th edition – 2022).

Total Propagated Uncertainty: Southern area of Vestnesa Ridge and Molloy Hole	
	
Order 2: 20m + 10% max depth MAX LIMIT (for order 2): 320 m	Order 2: $\pm\sqrt{a^2 + (b \times d)^2}$ (a=1; b=0.023) MAX LIMIT (for order 2): 69m
Total Propagated Uncertainty: Area of the Yermak Plateau	
	
Order 2: 20m + 10% max depth MAX LIMIT (for order 2): 83 m	Order 2: $\pm\sqrt{a^2 + (b \times d)^2}$ (a=1; b=0.023) MAX LIMIT (for order 2): 14.5 m
Total Propagated Uncertainty: North/North-West of Svalbard	
	
Order 2: 20m + 10% max depth MAX LIMIT (for order 2): 122 m	Order 2: $\pm\sqrt{a^2 + (b \times d)^2}$ (a=1; b=0.023) MAX LIMIT (for order 2): 23.5 m

Zones of Confidence (ZOC) and Data Quality:

AREA	CATZOC	DRVAL1	DRVAL2	POSACC	SOUACC	SUREND	SURSTA	TECSOU	VERDAT
Southern area of Vestnesa Ridge and Molloy Hole	B	1732	3030	44.8	6.7	20230803	20230729	MBES	-
Area of the Yermak Plateau	B	483	633	8.6	1.3	20230728	20230721	MBES	
North/North-West of Svalbard	B	151	1021	5.0	0.8	20230726	20230721	MBES	-

6. Sonar

6.1 No Side Scan Sonar was used.

6.2 N.A.

6.3 N.A.

6.4 N.A.

6.5 N.A.

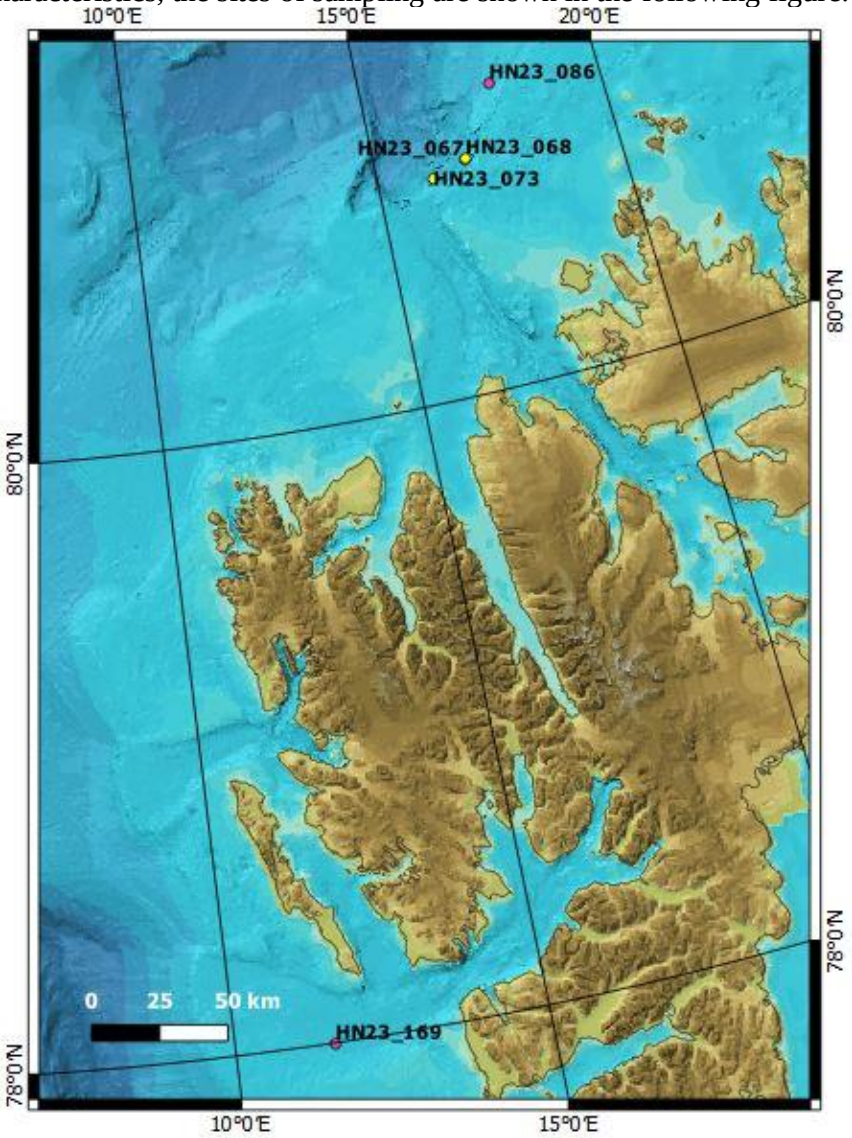
7. Seabed Sampling

7.1

Seafloor sediment stations were determinate based on morpho-bathymetric observation and data, during the HighNorth23 campaign, and the bottom sediments sampling were obtained using grab and box-corer methods. The difference of the two methods is that the grab samples disturbed sediments, instead, the box corer samples undisturbed sediment where the interface water-sediment is conserved.

The five seafloor sampling sites **Errore. L'origine riferimento non è stata trovata.**were conducted in the Norske Banken Region, NorthWest and West of Svalbard Islands between 24/07/2023 and 04/08/2023.

The two methods of seabed sampling were used during the campaign HighNorth23 to characterize some areas still unidentified, so the areas were determined on the morpho-batimetric characteristics, the sites of sampling are shown in the following figure.



In details:

- HN23_067_BEN_01 and HN23_068_BCO_01 **Errore. L'origine riferimento non è stata trovata.**)were sampled on the margin of the continental shelf , near the shelf break;
- HN23_068_BCO_02 was sampled at the end of the continental slope near the debris flow;
- HN23_073_BEN_02 was sampled at the end of the continental slope.
- HN23_169_BEN_03 was sampled in the West of Svalbard Island

SEAFLOOR ACTIVITY							
STATION	NR	YYYYMMDD	TIME UTC hh:mm	LAT dd° mm.mmmm'	LONG dd° mm.mmmm'	DEPTH m	ACTIVITY
HN23_067	1	20230724	08:49	80°45.7786'N	016°50.1881'E	197	BEN
HN23_068	1	20230724	09:16	80°45.9809'N	016°51.4403'E	200	BCO
HN23_073	2	20230724	14:21	80°43.5283'N	016°07.5344'E	678	BCO
HN23_086	2	20230725	15:21	80°59.1817'N	017°42.4624'E	410	BEN
HN23_169	3	20230804	16:44	77°59.8655'N	011°38 .1861'E	209	BEN

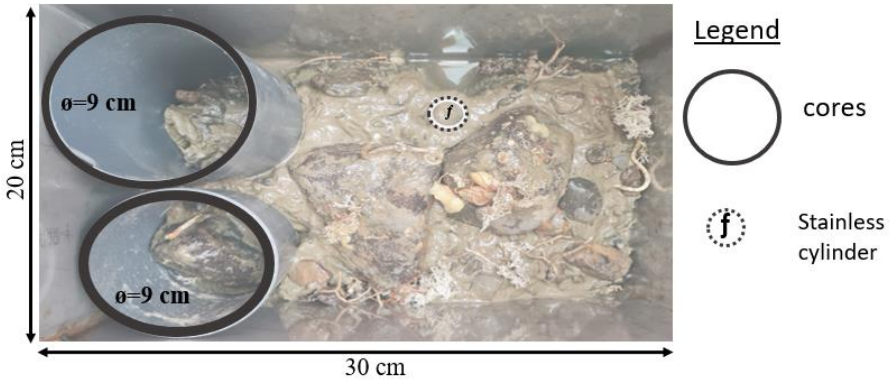
BCO= Box Corer site; BEN= Grab site

Table of the executed Grab and box corer

7.2 sediment analysis result

The bottom sediments sampling were obtained using grab and box-corer methods.

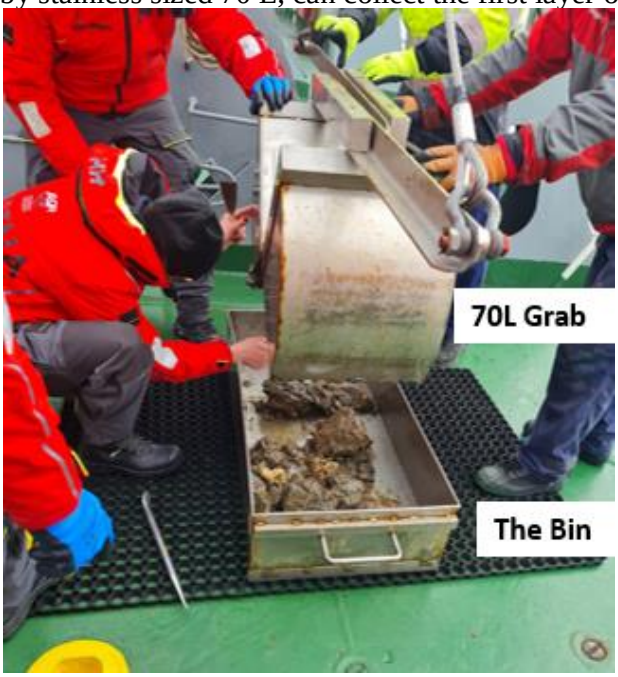
The box-corer characterized by a stainless box sized 30x20x50 cm working with 125 kg weighted head for the recovery of undisturbed sediment-water interface and a 70l stainless grab.



HN23 BCO_01 sampling scheme.

Box corer sample without box

During a sampling by box-corer, a boulder wedged between the blade and the box caused sampling failure and caused damage to the mechanism.
The grab is made by stainless sized 70 L, can collect the first layer of the seafloor.



The grab scheme

HN23 grab sampling and color determination

Moisture content is determined by the difference between of the sample's wet weight and the sample's dry weight after removal water through drying it.
In the lab each sample was treated according to the following steps:
-Weigh wet sample;
-dry the sample at 80-120°C for 12-24h;
-weigh dry sample;
-moisturize the dry sample to washing the grain size <0,0625µm to remove fine particles of clay and silt;
-dry again the sample

-put the sample on the pile of sieve mechanically shaken (about 45min) to separate all coarse sediment classes
-weigh the sediment over each sieve
-calculated the % of each grain size class

Only for BCO_01, was determined the sediment density, using a stainless cylinder having a fixed weight and volume (7.5 cm3), here referred as density-cylinder.
The textural colour of the sample is observed using the Munsell soil color chart then placed next to the sampled sediments for photographs.
The on-board sediment analysis included the classification of the sediment colour, the determination of sediment bulk density, the water content, the grain size and the mud/sand ratio according to the S-57.
The water content was obtained by the difference between wet and dry samples.
The density of a sediment sample is calculated by adding a known weight of dry sediment to a known volume of water. The density is calculated only with the stainless cylinder.

$$Bulk\ density = \frac{Ww}{Vc} * 1000$$

$$\text{Dry } bulk\ density = \frac{Wd}{Vc} * 1000$$

Ww = weight wet sediment; Wd = weight dry sediment; Vc = volume density-cylinder

Stainless cylinder cm^3	7.5
Wet weight (g)	12.40
Dry weight (g)	8.90
Water content (g)	3.50
Weight sediment >0.063 mm (g)	5.70
Weight sediment <0.063 mm (g)	3.20
Bulk density g/cm3	1.65
Bulk dry density g/cm3	1.19

BCO_01 stainless cylinder

The sand/mud ratio was obtained by wet sieving at 63 microns.
As results we obtained data about the percentage of each grain size.
The data is used to determine the NATSUR/NATQUA attributes of SBDARE according to the IHO S-57 standard.
The details of the different sampled steps are represented below (Table of Sediments analysis results) and sediment sheets are present in the Annex L.

HN23_067_BEN_01				
	Weight (g)	%		
Wet sample	512.90			
Dry sample	382.20			
Water content	130.70	25.48		
> 4 mm	43.90	11.49	Gravel	19.05
> 2 mm	28.90	7.56		
> 1 mm	44.90	11.75	Coarse sand	17.97
> 0.5 mm	23.80	6.23		
> 0.25 mm	24.60	6.44	Medium sand	13.63
> 0.125 mm	27.50	7.20		
> 0.063 mm	0.50	0.13	Fine sand	0.13
< 0.063 mm	188.10	49.22	Mud	49.22

Lab analysis HN23_067_BEN_01

Organic HN23_067_BEN_01

From left to right: a – pebbles > 4mm; b – granuls > 2mm; c – very coars sand > 1mm; d – coarse sand> 500µm; e – medium sand > 250µm; f – fine sand > 125µm; g – very fine sand > 63µm

Grain size classification HN23_067_BEN_01

HN23_068_BCO_01_0-5 cm				
	Weight (g)	%		
Wet sample	356.30			
Dry sample	271.10			
Water content	85.20	23.91		
> 4 mm	144.40	53.26	Gravel	58.54
> 2 mm	14.30	5.27		
> 1 mm	12.00	4.43	Coarse sand	8.45
> 0.5 mm	10.90	4.02		
> 0.25 mm	10.90	4.02	Medium sand	10.37
> 0.125 mm	17.20	6.34		
> 0.063 mm	15.50	5.72	Fine sand	5.72
< 0.063 mm	45.90	16.93	Mud	16.93

Lab analysis HN23_BCO_01 0-5 cm

From left to right: a, b – cobbles pebbles > 4mm; c – medium, fine pebbles, granules > 2mm; d – very coarse sand > 1mm;

Grain size classification HN23_068_BCO_01_0-5cm

HN23_068_BCO_01_5-16cm				
	Weight (g)	%		
Wet sample	594.20			
Dry sample	400.40			
Water content	193.80	32.62		
> 4 mm	10.60	2.65	Gravel with shells	5.47
> 2 mm	11.30	2.82		
> 1 mm	12.50	3.12	Coarse sand	7.07
> 0.5 mm	15.80	3.95		
> 0.25 mm	24.60	6.14	Medium sand	15.16
> 0.125 mm	36.10	9.02		
> 0.063 mm	41.70	10.41	Fine sand	10.41
< 0.063 mm	247.80	61.89	Mud	61.89

Lab analysis HN23_068_BCO_01 5-16 cm

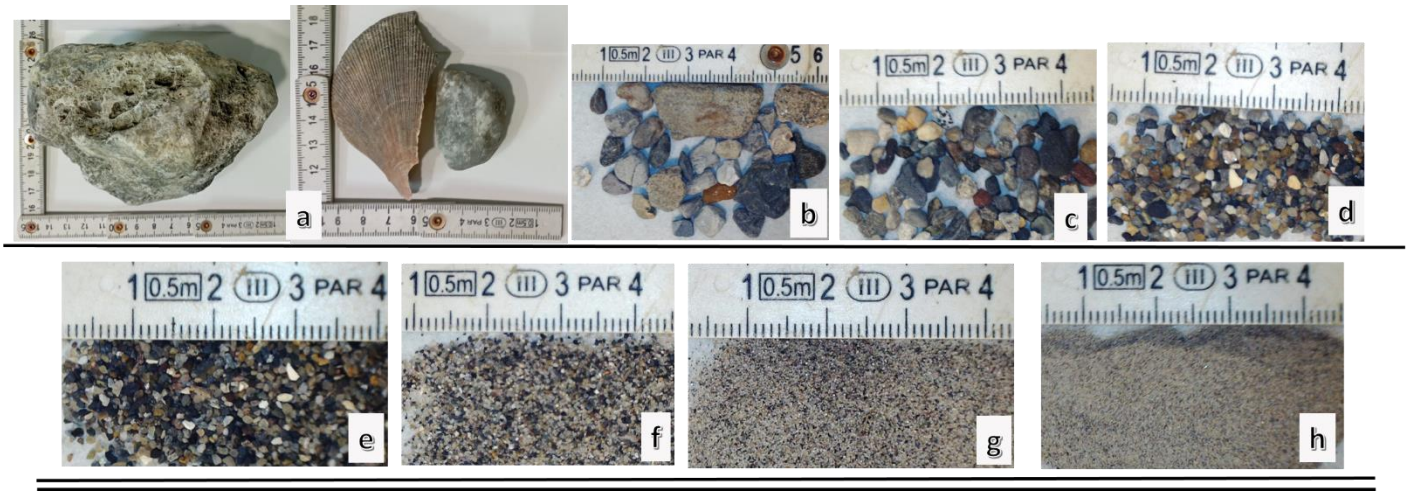
From left to right: a – medium pebbles > 4mm; b – pebbles > 2mm; c – very coarse sand> 1mm; d – coarse sand > 500µm; e – medium sand > 250µm; f – fine sand > 125µm; g – very fine sand > 63µm

Grain size classification HN23_068_BCO_01 5-16cm

HN23_073_BCO_02				
	Weight (g)	%		
Wet sample	476.60	31.14		
Dry sample	328.20	23.43		
Water content	148.40	3.90		
> 4 mm	76.90	4.24	Gravel	27.33
> 2 mm	12.80	3.87		
> 1 mm	13.90	4.75	Coarse sand	8.10
> 0.5 mm	12.70	6.28		
> 0.25 mm	15.60	15.33	Medium sand	11.03
> 0.125 mm	20.60			
> 0.063 mm	50.30	38.21	Fine sand	15.33
< 0.063 mm	125.40	31.14	Mud	38.21

Lab analysis HN23_073_BCO_02

From left to right: a,b – pebbles, shells > 4mm; c – granules > 2mm; d – very coarse sand > 1mm; e – coarse sand> 500µm; f – medium sand > 250µm; g – fine sand > 125µm; h – very fine sand > 63µm



Grain size classification HN23_073_BCO_02

HN23_086_BEN_02				
	Weight (g)	%		
Wet sample	524.60			
Dry sample	362.70			
Water content	161.90	30.86		
> 4 mm	5.00	1.38	Gravel	2.23
> 2 mm	3.10	0.85		
> 1 mm	3.90	1.08	Coarse sand	2.43
> 0.5 mm	4.90	1.35		
> 0.25 mm	8.60	2.37	Medium sand	11.06
> 0.125 mm	31.50	8.68		
> 0.063 mm	48.40	13.34	Fine sand	13.34
< 0.063 mm	257.30	70.94	Mud	70.94

Lab analysis HN23_086_BEN_02

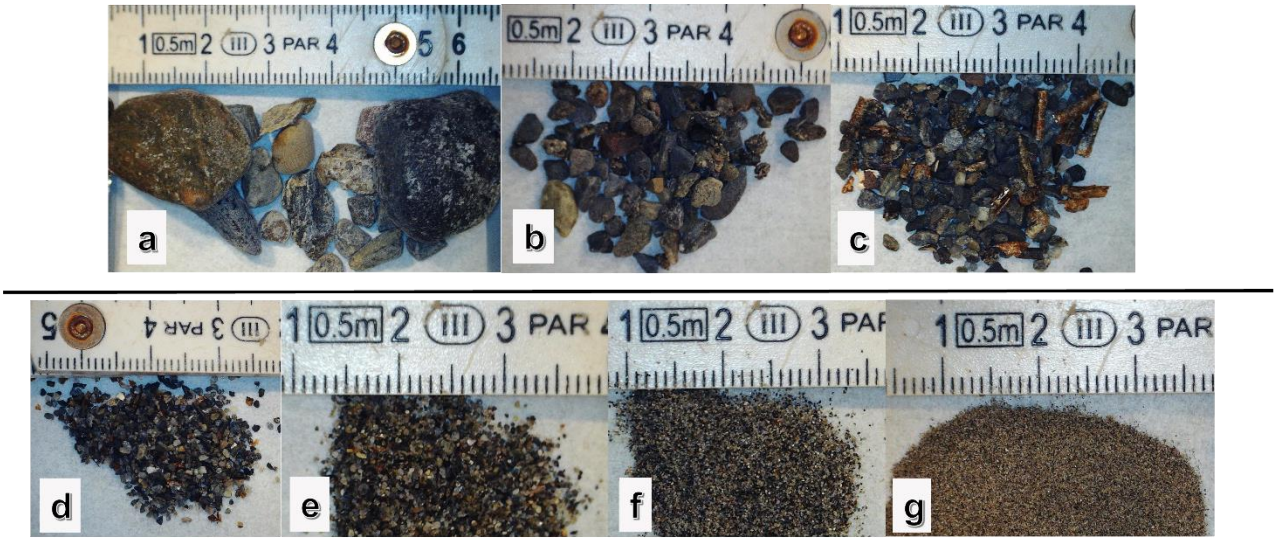
From left to right: a,b – pebbles > 4mm; c – granuls > 2mm; d – very coars sand > 1mm; e – coarse sand> 500µm; f – medium sand > 250µm; g – fine sand > 125µm; h – very fine sand > 63µm

Grain size classification HN23_086_BEN_02

HN23_169_BEN_03				
	Weight (g)	%		
Wet sample	917.00			
Dry sample	587.80			
Water content	329.20	35.90		
> 4 mm	79.30	13.49	Gravel	19.63
> 2 mm	36.10	6.14		
> 1 mm	25.20	4.29	Coarse sand	7.33
> 0.5 mm	17.90	3.05		
> 0.25 mm	11.80	2.01	Medium sand	3.98
> 0.125 mm	11.60	1.97		
> 0.063 mm	12.50	2.13	Fine sand	2.13
< 0.063 mm	393.40	66.93	Mud	66.93

Lab analysis HN23_169_BEN_03

From left to right: **a** – pebbles> 4mm; **b** – granuls > 2mm; **c** – very coars sand > 1mm; **d** – coarse sand> 500µm; **e** – medium sand > 250µm; **f** – fine sand > 125µm; **g** – very fine sand > 63µm



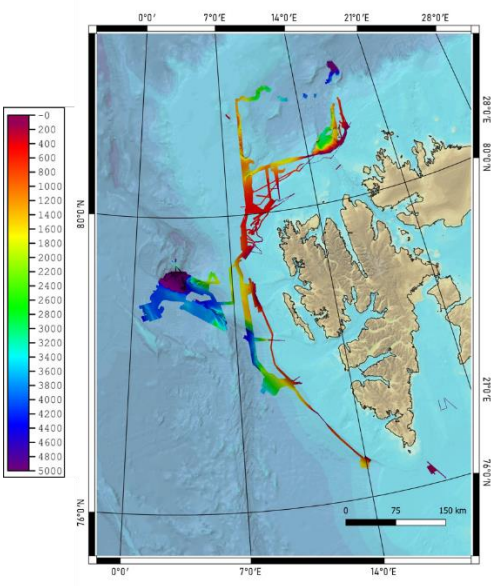
Grain size classification HN23_BEN_03

	ATTRIBUTE S-57			IHO S-44
HN23_067_BEN_01	NATSUR 1	NATSUR 2	NATSUR 3	Gravelly mud
	1	6	4	
	NATQUA 1	NATQUA 2	NATQUA 3	
	5	-	3	
HN23_068_BCO_01 0-5 cm	NATSUR 1	NATSUR 2	NATSUR 3	Sandy gravel
	7	1	4	
	NATQUA 1	NATQUA 2	NATQUA 3	
	-	5	2	
HN23_068_BCO_01 5-16 cm	NATSUR 1	NATSUR 2	NATSUR 3	Sandy mud
	1	4	4	
	NATQUA 1	NATQUA 2	NATQUA 3	
	7	2	1	
HN23_073_BCO_02	NATSUR 1	NATSUR 2	NATSUR 3	Gravelly mud
	1	7	4	
	NATQUA 1	NATQUA 2	NATQUA 3	
	7	-	1	
HN23_086_BEN_02	NATSUR 1	NATSUR 2	NATSUR 3	Sandy mud
	1	4	4	
	NATQUA 1	NATQUA 2	NATQUA 3	
	5	1	2	
HN23_169_BEN_03	NATSUR 1	NATSUR 2	NATSUR 3	Gravelly mud
	1	6	4	
	NATQUA 1	NATQUA 2	NATQUA 3	
	7	-	3	

IHO S-57 and S-44 ATTRIBUTE

8. Seabed Topography and Texture

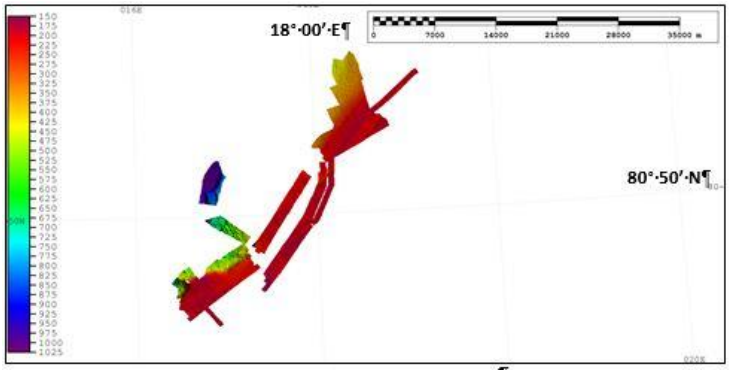
The High North23 cruise gave us the opportunity to collect new Multibeam data, in order to complete or increase the bathymetric coverage of some areas along the continental margin that haven't been completely covered previously



8.1

a) North-North/West of Svalbard Islands:

At the end of the operations, an area of 161km^2 was scanned on this area, covering a bathymetric range between 151 m and 1021 m depth.

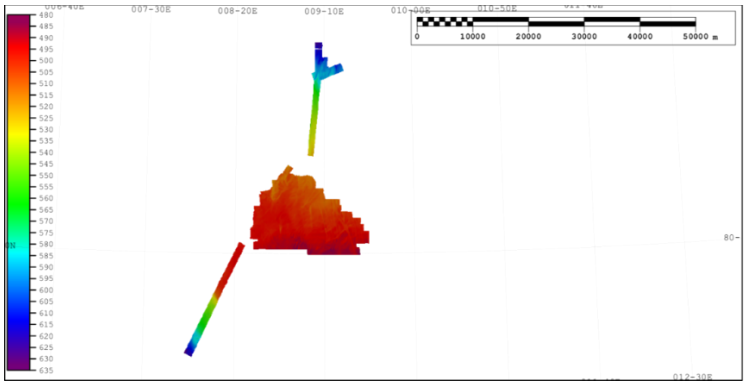


Depth:	Km²	%
0 – 500	139,83	86,85
500 – 1000	19,63	12,19
1000 – 1500	1,54	0,96
1500 – 2000		
2000 – 2500		
2500 – 3000		
3000 – 3500		

Min Depth	151,3
Max Depth	1021,4

b) Yeramk Plateau Area:

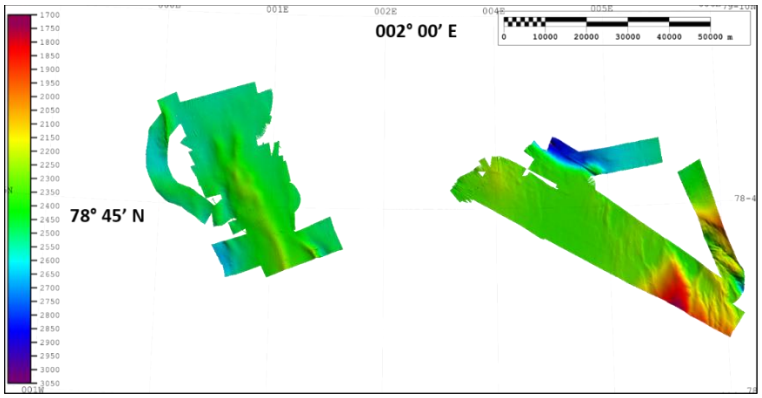
At the end of the operations, an area of 278 km^2 was scanned on this area, covering a bathymetric range between 483 m and 633 m depth.



Depth:	Km²	%
0 – 500	115,53	41,52
500 – 1000	162,69	58,48
1000 – 1500		
1500 – 2000		
2000 – 2500		
2500 – 3000		
3000 – 3500		

Min Depth	483
Max Depth	633

c) Southern area of Vestnesa Ridge and Molloy Hole:
At the end of the operations, an area of 2668 km^2 was scanned on this area, covering a bathymetric range between 1732 m and 3030 m depth.



Depth:	Km²	%
0 – 500		
500 – 1000		
1000 – 1500		
1500 – 2000	63,97	2,39
2000 – 2500	1883,95	70,61
2500 – 3000	374,79	14,04
3000 – 3500	345,32	12,86

Min Depth	1732,4
Max Depth	3030

8.2 N.A.
8.3 N.A.
8.4 N.A.
8.5 N.A.
8.6 During the survey, no significant discordances have been found with existing bathymetric.
8.7 N.A.

9. Tides and Sounding Datum

9.1 Considering the depth inside the areas, the distance from nearest reference ports, and that tide variations were small, bathymetric data has not been corrected with tidal variations.
9.2 N.A.
9.3 N.A.
9.4 N.A.
9.5 N.A.
9.6 N.A.
9.7 N.A.

10. Tidal Streams

10.1 N.A.
10.2 N.A
10.3 N.A.
10.4 N.A.
10.5 N.A.

11. Wrecks and Obstructions

11.1 No wrecks or obstruction has been observed, so no further investigation has been necessary.
11.2 N.A.
11.3 N.A.
11.4 N.A

12. Lights and Buoys

12.1 No lights or buoys were present in the area.
12.2 N.A.
12.3 N.A.

12.4 N.A.

13. Coastline, Topography, Measured Distances, Conspicuous Objects and Marks

13.1 Due to the distance from the coast, a detailed description of the coastline (or alignments and conspicuous points) has not been possible, since it was out of sight.
13.2 N.A.
13.3 N.A.
13.4 N.A.
13.5 N.A.
13.6 N.A.

14. Sailing Directions and Nomenclature

14.1 N.A.
14.2 N.A.
14.3 N.A.

15. Radio Signals

15.1 N.A.

16. Ancillary Observations

16.1 N.A

17. Miscellaneous

17.1

***CTD\XBT** (Annex R.1):*

During survey activities, oceanographic data were acquired using multiparameter probes. The purpose of these acquisitions is manifold: firstly, it is essential to obtain the sound velocity in water to correct hydrographic acquisition; particularly in regions where variations in sound propagation in water are rapid and sometimes substantial. Additionally, the acquisition of water temperature and salinity parameters, along with other associated variables, enables a long-term study of characteristics of Arctic water masses.

While the majority of samplings occurred from the deck of the Alliance ship, a portion of CTD probes was deployed from a smaller boat to approach as close as possible to the ice line, obtaining data from these challenging-to-explore zones as well. Also transects were performed with the system "underway CTD" to profile some areas where different masses of water are mixed.

Finally, a series of "XBT" was launched from which temperature and salinity measurements were extrapolated.

***Drifters** (Annex R.2):*

During the High North 23 (HN23) campaign, the Hydrographic Institute on board of the Research Vessel "Alliance'' deployed Iridium SVP drifters, made by MetOcean Data System LTD in the different operational areas of interest. The purpose of this activity was to collect data about the surface currents and sea surface temperatures in the Arctic Ocean. The deployment of the drifters was made considering the coverage of the area that were of a specific interest based in the studies performed before for the sea currents circulation.

***Marine Mammals Observations** (Annex R.3):*

During the High North23 campaign, , various marine mammals observations were conducted by the personnel of the Italian Hydrographic Institute. These observations were carried out throughout the duration of the cruise. The purpose of this activity was to identify and catalog observed marine mammals in the Arctic Ocean with the aim of creating a database of data, useful for scientific research. The observations were carried out throughout the duration of the expedition, with operators stationed on the bridge and deck of the ship 24 hours a day. At the beginning of the campaign, the onboard personnel were briefed and educated to enhance their knowledge of Arctic marine mammals, aiming to facilitate the identification and classification of marine species in the region.

Ice Dynamic Observation :

One of the most important activity to carry out during a polar cruise as High North23 is to set an efficient and reliable service of ice dynamic observation. Through this service, it is possible to plan and conduct the navigation, manage and schedule (or re-schedule if needed) the sequence of scientific activities. In order to set up and make systematic observation of ice dynamics possible, a procedure was developed during the High North23 cruise. Nowadays, the principal instrument utilized in order to provide this kind of service are satellites: the Global Monitoring for Environment and Security (also known as Copernicus) is one of the most important program of Earth observation, coordinated and managed by the European Commission.

Marine Litter Observations (Annex R.4):

During the "High North23" campaign, conducted by the staff of the Hydrographic Institute of the Italian Navy on the R/V Alliance from 19/07/2023 to 05/08/2023, a systematic activity of observations of marine litter was done in the Arctic Ocean during the transfer of navigation.
GESAMP (Group of Expert on the Scientific Aspect of Marine Environmental Protection) has formulated guidelines also disseminated by the UNEP (United Nations Environmental Program), useful for tracing and subsequent analysis of the dispersion of plastics and microplastics in the sea; to contribute to the marine litter observation, it is necessary to establish the observation corridor according to the height above the water and the vessel speed assuring that the observation corridor is not affected by the hull of the vessel. The litter must be separated by the type of material into anthropogenic (plastic, paper, other) or organic matter according to its length.
The observations were made in accordance with the guidelines created by observing a sector of 30° on the port side, for a distance not exceeding 20 meters from the ship.

Manta Trawl (Annex R.5):

During the High North 23 (HN23) "Marine Geophysics Campaign manta trawls have been conducted in the Arctic Ocean. The purpose of this activity was to analyze water samples collected and to assess the plastic pollution in the Arctic Ocean. This information is essential to understand the extent of plastic pollution which is a widespread problem affecting the marine environment, threatening ocean health, the health of marine species, food safety and quality, human health Furthermore, performing this activity provides essential information of how the ocean currents contribute to the transport of plastic. Each sample was filtered with a 100 µm mesh sieve, collected in special glass jar and stabilized with 80% ethanol for subsequent analysis upon return to the laboratories.

Final Embossing Quality Certification to IHO/S-44 Standard		
Hydrographer	**Signature**	**Date**
The undersigned C.F. r.n. (s.p.e.) IDO Maurizio DEMARTE in possession of the "Certificate of Field Proficiency of Hydrographic Surveyor specialized in Nautical Charting Hydrography" n. 31 issued on 17/09/2003 by the Italian Navy Hydrographic Institute, I certify that the survey carried out by Nave ALLIANCE in the period 2023.07.14-2023.08.08 in the North West of Svalbard was carried out following the minimum standards provided by the publication IHO/S-44 (6th Edition) published by the International Hydrographic Organization. Order 2. IHO S-57 CATZOCB	C.F. r.n. (s.p.e.) IDO Maurizio Demarte *Firmato Digitalmente da/Signed by:* MAURIZIO DEMARTE Capo Reparto Geofisica Marina e Oceanografia *In Data/On Date:* lunedì 8 luglio 2024 10:54:10	01/07/2024

CONTENTS

PART 2 - TECHNICAL

Additional annexes, e.g. copies of communication with the Hydrographic Office, may be added as required.

ANNEX A TO
[HN23]
[2023-11-27]

Accompanying Documents

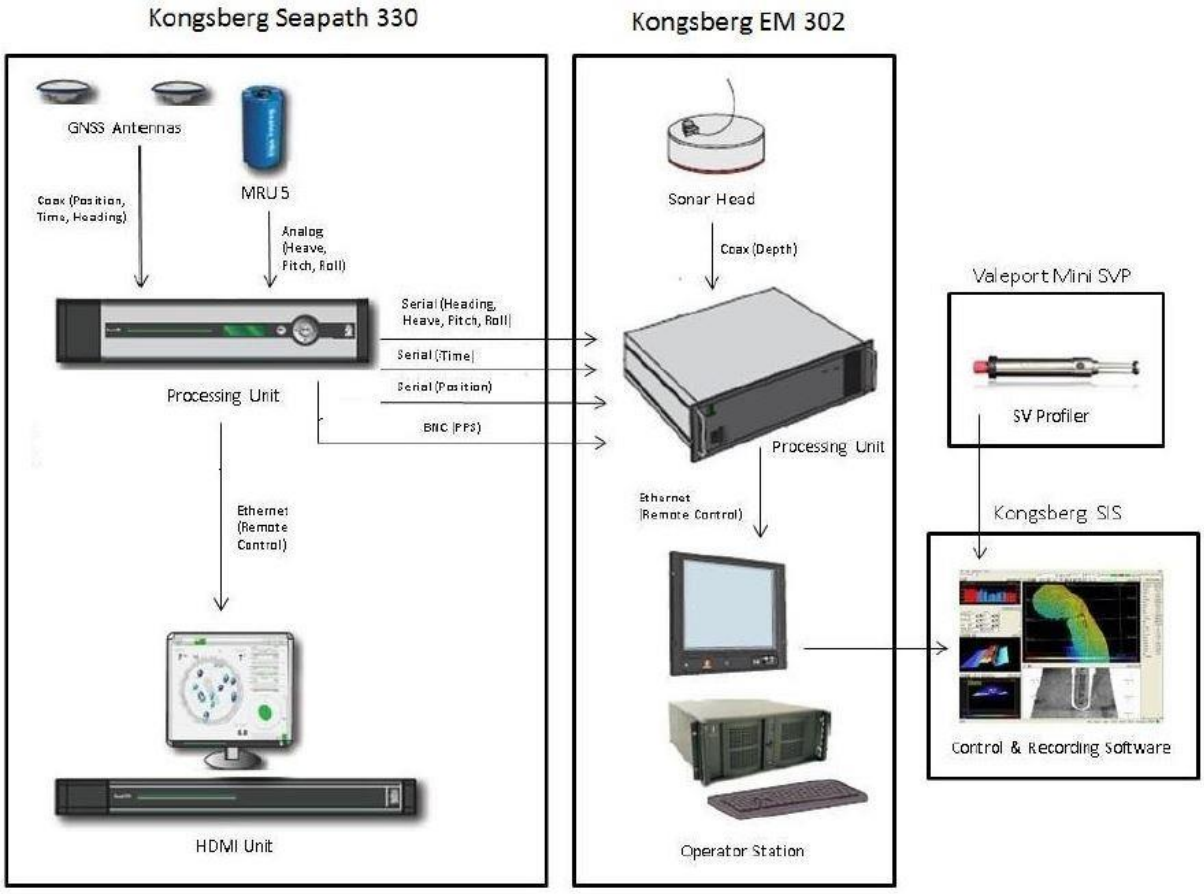
A.1 In the accompanying documents, the following data can be found:

a. Raw multibeam data;
b. Sound Velocity Profiles and CTD data;
c. Vessel file *.hvf.

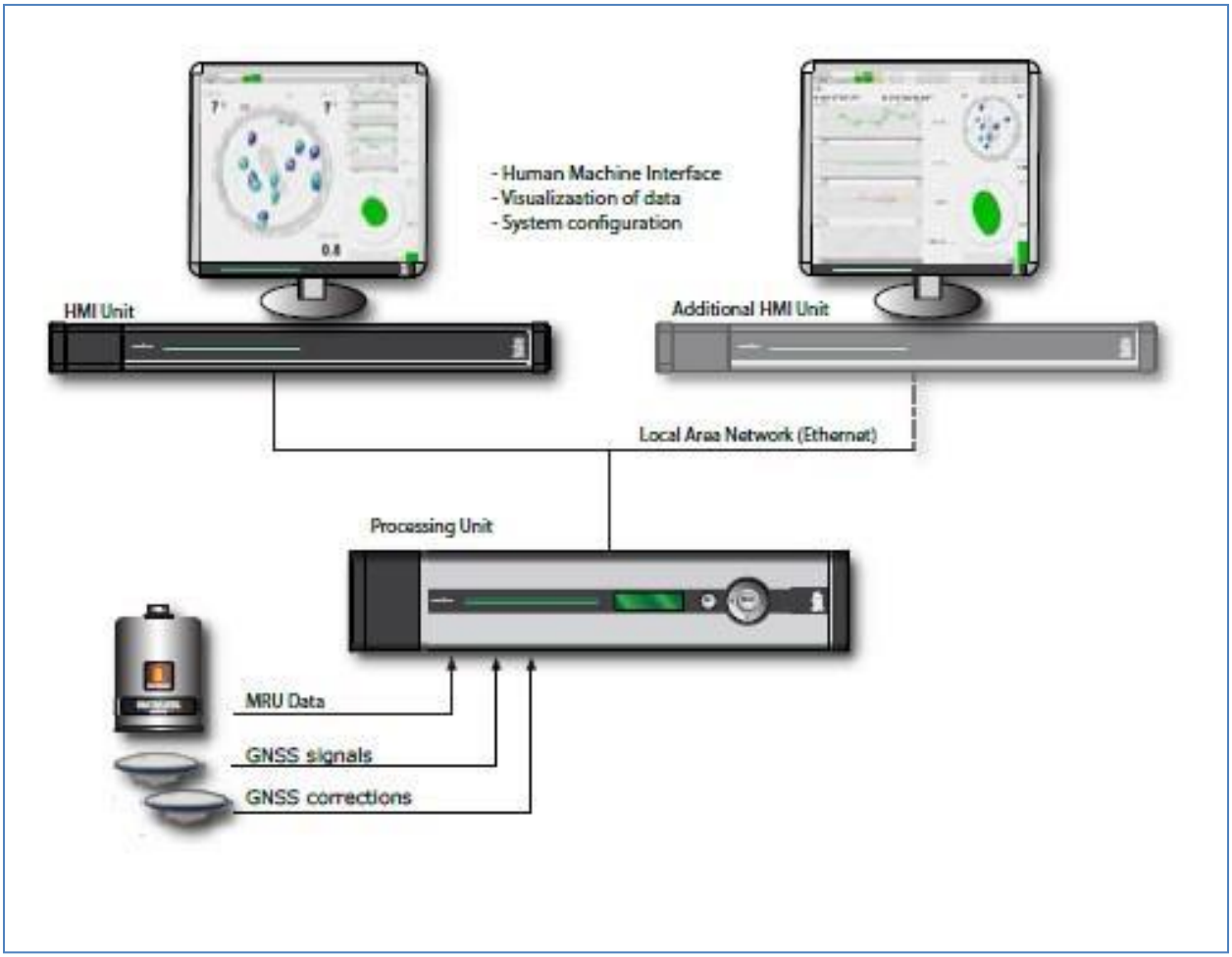
A.2 N.A.

Digital Surveying System

B.1 In addition to the description carried on in Chapter 3, the following pictures explain the system hardware onboard.



MB EM302 System



Seapath 330 & MRU5 System

B.2 N.A.

B.3 N.A.

B.4 N.A.

B.5 N.A.

B.6 N.A.

B.7 N.A.

B.8 N.A.

B.9 N.A.

ANNEX C TO
[HN2023]
[2023-11-27]

Geodetic Data

Section 1 - Description of Observations

C.1.1 See Chapter 4.

Section 2 - Horizontal Datum, Spheroid, Projection and Grid Details; List of Coordinates

C.2.1 All control is referred to World Geodetic System 1984 Datum, World Geodetic System 1984 Spheroid.

C.2.2 N.A.

C.2.3 N.A.

C.2.4 N.A.

Section 3 - Descriptions of Stations

C.3.1 N.A.

C.3.2 N.A.

C.3.3 N.A.

C.3.4 N.A.

C.3.5 N.A.

Section 4 - Abstract of observations

C.4.1 See Chapter 5.

Section 5 - Description of Adjustment

C.5.1 N.A.

C.5.2 N.A.

Section 6 – Transformation of Co-ordinates

C.6.1 N.A.

Section 7 – Correspondence with other Surveying Authorities

C.7.1 N.A

Diagram of Control

1. N.A.
2. N.A.

ANNEX D TO
[HN2023]
[2023-11-27]

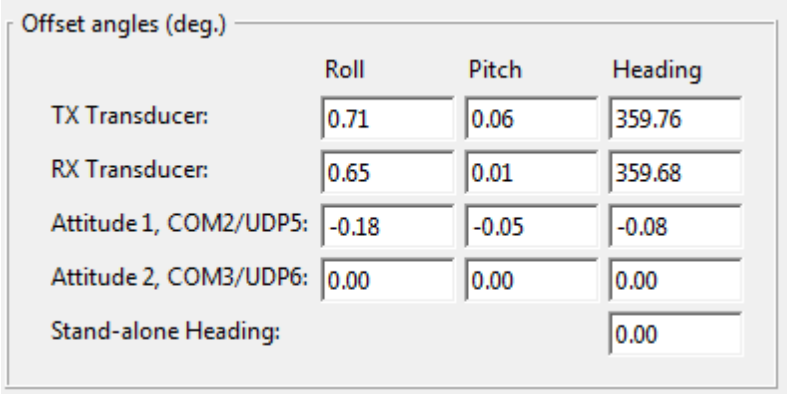
Navaid Calibrations and Validations

D.1 See Chapter 4.

D.2 See Chapter 4.

D.3 Calibration has been done on 20th July 2023 with a patch test. All computed parameters, have been periodically checked during acquisitions, verifying their goodness. Angular variations, resulting from calibrations, have been directly inserted into the acquisition software SIS (Installation Parameters – MRU Angular Offset).

D.4 See Vessel File attached in the accompanying documents.



Offsets for angles in SIS.

D.5 N.A.

D.6 N.A.

ANNEX E TO
[HN2023]
[2023-11-27]

Sound Velocity and Bar-Check Observations

E.1 Data in the project.

E.2 N.A.

E.3 Data in the project.

E.4 N.A.

E.5 N.A.

ANNEX F TO
[HN2023]
[2023-11-27]

Levelling and Tidal Observations

F.1 N.A.

F.2 N.A.

F.3 N.A.

F.4 N.A.

F.5 N.A.

ANNEX G TO
[HN2023]
[2023-11-27]

Accuracy of Soundings

G.1 See Chapter 5.5 and 9.1.

G.2 See Chapter 5.

G.3 See Chapter 5.

ANNEX H TO
[HN2023]
[2023-11-27]

Comparison with Published Chart

H.1 N.A.

H.2 N.A.

H.3 N.A

H.4 N.A.

H.5 The horizontal reference datum of the positions correspond to the datum of the survey.

H.6 N.A.

ANNEX I TO
[HN2023]
[2023-11-27]

Wrecks and Obstructions

I.1 No wrecks or obstruction observed.

I.2 N.A.

I.3 N.A.

I.4 N.A.

I.5 N.A.

I.6 N.A.

I.7 N.A.

ANNEX J TO
[HN2023]
[2023-11-27]

Tidal Stream Observations

J.1 N.A.

ANNEX K TO
[HN2023]
[2023-11-27]

Light Sectors and Buoys

K.1 N.A.

K.2 N.A.

ANNEX L TO
[HN2023]
[2023-11-27]

Seabed Textures, Natures of the Bottom and Retained Seabed Samples

L.1 View Chapter 7.

L.2 View Chapter 7.

L.3 View Chapter 7.

ANNEX M TO
[HN2023]
[2023-11-27]

Topographical Features, Conspicuous Objects and Marks

M.1 N.A.

M.2 N.A.

M.3 N.A.

M.4 N.A.

M.5 N.A.

ANNEX N TO
[HN2023]
[2023-11-27]

Sailing Directions Amendments and Nomenclature

N.1 N.A.

N.2 N.A.

N.3 N.A.

N.4 N.A.

N.5 N.A.

N.6 N.A.

N.7 N.A.

N.8 N.A.

N.9 N.A.

N.10 N.A.

ANNEX O TO
[HN2023]
[2023-11-27]

Views

O.1 N.A.

O.2 N.A.

O.3 N.A.

ANNEX P TO
[HN2023]
[2023-11-27]

Light List Amendments

P.1 N.A.

ANNEX Q TO
[HN2023]
[2023-11-27]

Radio Signals Amendments

Q.1 N.A.

Ancillary/Miscellaneous Observations

R.1 Tables of miscellaneous observations: CTD + ICE EDGE CTD + Underway CTD +XBT

CTD STATION	DATE YYYYMMDD	TIME UTC HH:MM	LAT (N) DD MM.MMM	LONG (E) DD MM.MMM	DEPTH (in meters)	BOTTOM DEPTH (in meters)	DEEPEST WATER SAMPLE (in meters)
HN23_001_CTD_001	20230719	14:18	76 26.286	013 49.110	1093	1100	1080
HN23_004_CTD_002	20230720	06:34	77 39.028	010 15.570	1040	1047	//
HN23_010_CTD_003	20230720	14:52	78 45.073	008 35.438	595	608	//
HN23_014_CTD_004	20230720	19:44	79 03.355	008 26.784	694	714	//
HN23_017_CTD_005	20230721	05:20	79 46.245	007 30.978	752	760	//
HN23_029_CTD_006	20230721	19:28	80 21.379	008 59.259	644	660	//
HN23_035_CTD_007	20230721	21:42	80 19.407	008 54.391	615	628	//
HN23_037_CTD_008	20230722	02:24	80 24.084	010 51.110	575	580	//
HN23_038_CTD_009	20230722	06:41	80 29.171	012 19.480	646	660	//
HN23_047_CTD_010	20230722	19:02	80 46.912	016 31.897	768	776	//
HN23_059_CTD_011	20230723	16:16	80 52.950	016 51.189	975	987	//
HN23_091_CTD_012	20230726	01:19	80 34.299	015 46.379	318	327	//
HN23_092_CTD_013	20230726	06:14	80 36.285	013 48.563	150	160	//
HN23_095_CTD_014	20230726	12:04	80 24.376	011 30.998	440	450	//
HN23_097_CTD_015	20230726	16:57	80 10.219	009 56.750	549	558	//
HN23_098_CTD_016	20230726	22:38	80 06.356	007 58.222	508	522	//
HN23_115_CTD_017	20230728	13:24	80 00.125	008 10.775	480	502	350
HN23_120_CTD_018	20230729	05:08	78 13.154	010 24.402	282	292	//
HN23_122_CTD_019	20230729	09:12	78 17.613	009 02.274	1085	1105	//
HN23_126_CTD_020	20230729	13:28	78 19.872	007 51.814	2577	2594	//
HN23_132_CTD_021	20230729	18:17	78 25.540	006 58.012	3330	3337	//
HN23_136_CTD_022	20230730	00:52	78 37.374	005 28.370	2290	2310	//
HN23_141_CTD_023	20230730	07:56	78 48.279	003 46.415	2195	2216	//
HN23_160_CTD_024	20230802	19:16	78 52.042	001 04.716	2483	2495	2200
HN23_170_CTD_025	20230805	04:55	78 45.364	006 11.029	2221	2230	//

ICE CTD	DATE YYYYMMDD	TIME UTC HH:MM	LAT (N) DD MM.MMM	LONG (E) DD MM.MMM	DEPTH (in meters)
HN23_026_ICE_CTD_001	2023.07.21	16:04	80 20.604	009.09.101	50.5
HN23_027_ICE_CTD_002	2023.07.21	16:30	80 20.237	009 08.849	66.4
HN23_055_ICE_CTD_003	2023.07.23	14:14	80 53.199	016 51.092	64.7
HN23_056_ICE_CTD_004	2023.07.23	14:20	80 53.321	016 51.156	66.2
HN23_057_ICE_CTD_005	2023.07.23	15:09	80 53.395	016 55.443	62.1
HN23_058_ICE_CTD_006	2023.07.23	15:16	80 53.599	016 55.630	63.4
HN23_076_ICE_CTD_007	2023.07.24	19:22	80 51.239	017 27.766	66.1
HN23_077_ICE_CTD_008	2023.07.24	19:30	80 51.316	017 26.367	65.9
HN23_078_ICE_CTD_009	2023.07.24	19:35	80 51.380	017 26.353	66.4
HN23_104_ICE_CTD_010	2023.07.27	15:48	80 07.086	008 54.768	64.0
HN23_105_ICE_CTD_011	2023.07.27	15:56	80 07.077	008 53.810	60.8
HN23_106_ICE_CTD_012	2023.07.27	16:24	80 07 061	008 54.695	63.1
HN23_107_ICE_CTD_013	2023.07.27	16:30	80 07.223	008 54.773	62.7

UCTD TRANSECT							
DATE	STATION	TIME UTC	LATITUDE (N)	LONGITUDE (E)	SEABED DEPTH	TRANSECT LENGTH (m)	TRANSECT DEPTH (m)
20.07.2023	HN23_011	15:22	78 45.424	008 35.732	581	5477	323
	HN23_012	15:57	78 48.300	008 34.435	498		
20.07.2023	HN23_013	16:04	78 49.295	008 33.930	485	25927	321
	HN23_014	19:10	79 03.181	008 27.053	703		
25/26.07.2023	HN23_090	19:46	80 53.342	017 37.989	208	50008	256
	HN23_091	00:53	80 34.378	015 48.546	322		
26.07.2023	HN23_091	01:54	80 34.523	015 46.491	327	36590	257
	HN23_092	05:32	80 34.128	013 51.642	156		
26.07.2023	HN23_092	06:48	80 34.353	013 44.011	170	45672	365
	HN23_095	11:36	80 24.571	011 32.525	452		
26.07.2023	HN23_095	12:34	80 24.109	010 27.475	451	39641	363
	HN23_097	16:28	80 10.312	009 55.414	555		
26.07.2023	HN23_097	18:14	80 09.471	009 50.345	555	36972	365
	HN23_098	21:58	80 06.349	008 00.278	523		
29.07.2023	HN23_121	05:36	78 15.434	010 21.815	291	29004	377
	HN23_122	08:30	78 17.645	009 05.875	1003		
29.07.2023	HN23_123	09:48	78 17.869	008 58.068	1199	24972	403
	HN23_126	12:22	78 19.737	007 52.435	2598		
29.07.2023	HN23_126	14:20	78 19.910	007 51.818	2595	21174	396
	HN23_131	16:54	78 25.772	007 01.503	3307		
29.07.2023	HN23_133	19:36	78 26.249	006 56.715	3317	39347	392
	HN23_136	23:50	78 37.147	005 25.664	2308		
30.07.2023	HN23_137	02:46	78 37.603	005 20.629	2307	10680	385
	HN23_138	03:33	78 40.428	004 55.385	2343		
30.07.2023	HN23_139	03:51	78 40.889	004 51.320	2342	27742	402
	HN23_140	06:58	78 48.417	003 45.566	2223		

25/26.07.2023	HN23_090	19:46	80 53.342	017 37.989	208	50008	256
	HN23_091	00:53	80 34.378	015 48.546	322		
26.07.2023	HN23_091	01:54	80 34.523	015 46.491	327	36590	257
	HN23_092	05:32	80 34.128	013 51.642	156		
26.07.2023	HN23_092	06:48	80 34.353	013 44.011	170	45672	365
	HN23_095	11:36	80 24.571	011 32.525	452		
26.07.2023	HN23_095	12:34	80 24.109	010 27.475	451	39641	363
	HN23_097	16:28	80 10.312	009 55.414	555		
26.07.2023	HN23_097	18:14	80 09.471	009 50.345	555	36972	365
	HN23_098	21:58	80 06.349	008 00.278	523		

20.07.2023	HN23_011	15:22	78 45.424	008 35.732	581	5477	323
	HN23_012	15:57	78 48.300	008 34.435	498		
20.07.2023	HN23_013	16:04	78 49.295	008 33.930	485	25927	321
	HN23_014	19:10	79 03.181	008 27.053	703		
29.07.2023	HN23_121	05:36	78 15.434	010 21.815	291	29004	377
	HN23_122	08:30	78 17.645	009 05.875	1003		
29.07.2023	HN23_123	09:48	78 17.869	008 58.068	1199	24972	403
	HN23_126	12:22	78 19.737	007 52.435	2598		
29.07.2023	HN23_126	14:20	78 19.910	007 51.818	2595	21174	396
	HN23_131	16:54	78 25.772	007 01.503	3307		
29.07.2023	HN23_133	19:36	78 26.249	006 56.715	3317	39347	392
	HN23_136	23:50	78 37.147	005 25.664	2308		
30.07.2023	HN23_137	02:46	78 37.603	005 20.629	2307	10680	385
	HN23_138	03:33	78 40.428	004 55.385	2343		
30.07.2023	HN23_139	03:51	78 40.889	004 51.320	2342	27742	402
	HN23_141	06:58	78 48.417	003 45.566	2223		

XBT						
XBT STATION	DATE	TIME UTC	LATITUDE (N)	LONGITUDE (E)	XBT DEPTH (meters)	SEABED DEPTH (meters)
HN23_003_XBT_001	2023.07.19	17:53	76 27.738	012 32.584	1718	1718
HN23_124_XBT_002	2023.07.29	10:22	78 18.278	008 43.764	1545	1545
HN23_125_XBT_003	2023.07.29	11:25	78 19.066	008 15.998	1830	2195
HN23_129_XBT_004	2023.07.29	15:19	78 21.835	007 34.697	1830	2785
HN23_130_XBT_005	2023.07.29	16:11	78 24.078	007 15.954	1830	3212
HN23_134_XBT_006	2023.07.29	20:38	78 29.061	006 33.407	1830	2379
HN23_135_XBT_007	2023.07.29	22:13	78 32.910	005 59.835	1830	2168
HN23_138_XBT_008	2023.07.30	03:33	78 40.428	004 55.385	1830	2343
HN23_140_XBT_009	2023.07.30	05:25	78 44.564	004 17.062	1830	2358

R.2 Tables of miscellaneous observations: Drifters

Drifters							
DRIFTERS STATION	NR	Date YYYYMMDD	UTC TIME HH:MM	LATITUDE dd mm.mmm	LONGITUDE dd mm.mmm	DEPTH m	ID Drifter
HN23_079	1	20230724	21:41	80°59.206'N	018°12.431'E	191	300534064584500
HN23_079	2	20230724	21:42	80°59.186'N	018°12.485'E	196	300534064580500
HN23_110	3	20230727	18:13	80°07.313'N	008°46.897'E	510	300534064587540
HN23_165	4	20230803	19:11	78°37.845'N	001°02.173'E	2469	300534064580410
HN23_171	5	20230805	09:20	78°43.730'N	006°01.026'E	2080	300534064582500
HN23_174	6	20230806	00:02	76°55.743'N	009°56.144'E	430	300534064588390

R.3 Tables of miscellaneous observations: Marine Mammals Observations

Marine Mammals					
DD/MM/YY	UTC TIME HHMM	LAT: DD/MM.MMM	LON: DD/MM.MMM	SPECIES	N. ANIMALS
20/07/2023	15:11	78°50.981' N	008°32.924' E	ROUGHT-TOOTHED DOLPHIN	5
20/07/2023	11:00	77°48.000' N	010°01.000' E	HOURGLASS DOLPHIN	20
20/07/2023	15:30	78°35.065' N	008°57.402' E	HOURGLASS DOLPHIN	8
20/07/2023	11:40	77°54.000' N	009°54.000' E	MINKE WHALE	2
20/07/2023	19:15	79°03.210' N	008°26.995' E	FIN WHALE	1
20/07/2023	13:33	78°35.000' N	008°55.000' E	COMMON DOLPHIN	15
21/07/2023	13:10	80°08.524' N	008°51.267' E	MINKE WHALE	1
23/07/2023	8:30	80°43.896' N	016°46.568' E	FIN WHALE	1
25/07/2023	18:52	80°51.896' N	017°21.492' E	FIN WHALE	1
26/07/2023	7:29	80°43.386' N	013°22.902' E	SOWERBY'S BEAKED WHALE	1
26/07/2023	23:10	80°46.716' N	017°19.481' E	SOWERBY'S BEAKED WHALE	1
27/07/2023	8:50	80°02.437' N	009°11.329' E	WHITE BEAKED DOLPHIN	15
27/07/2023	15:26	80°10.059' N	009°54.034' E	FIN WHALE	6
27/07/2023	20:40	80°05.898' N	008°37.818' E	WHITE BEAKED DOLPHIN	6
28/07/2023	7:40	80°01.262' N	008°42.737' E	WHITE BEAKED DOLPHIN	4
29/07/2023	12:49	78°19.814' N	007°51.883' E	MINKE WHALE	1
29/07/2023	16:30	78°25.504' N	006°57.925' E	SPERM WHALE	1
30/07/2023	16:00	78°51.345' N	005°12.431' E	SPERM WHALE	1
01/08/2023	21:25	78°42.800' N	001°16.900' E	MINKE WHALE	1
02/08/2023	11:40	78°46.972' N	000°25.922' E	NARVAL	1
04/08/2023	8:25	78°04.385' N	009°20.506' E	WHITE BEAKED DOLPHIN	4

R.4 Tables of miscellaneous observations: Marine Litter Observations

Marine Litter							
STATION	NR.	DD/MM/YY	UTC TIME HHMM	LAT: DD/MM.MMM	LON: DD/MM.MMM	DEPTH	ACTIVITY
HN23_001	1	19/07/2023	15:08	76°26.621' N	013°46.660' E	1132	OBSML_IN
HN23_002	1	19/07/2023	15:38	76°27.348' N	013°41.260' E		OBSML_OUT
HN23_006	2	20/07/2023	8:24	77°40.866' N	010°10.052' E	963	OBSML_IN
HN23_007	2	20/07/2023	8:57	77°47.418' N	010°02.915' E	503	OBSML_OUT
HN23_008	3	20/07/2023	13:30	77°35.065' N	008°57.402' E	732	OBSML_IN
HN23_009	3	20/07/2023	14:00	78°41.224' N	008°42.888' E	674	OBSML_OUT
HN23_019	4	21/07/2023	8:30	79°54.907' N	008°07.401' E	544	OBSML_IN
HN23_020	4	21/07/2023	9:00	79°57.817' N	008°15.267' E	499	OBSML_OUT
HN23_022	5	21/07/2023	13:33	80°20.193' N	009°04.453' E	628	OBSML_IN
HN23_024	5	21/07/2023	14:03	80°17.930' N	009°09.369' E	597	OBSML_OUT
HN23_039	6	22/07/2023	8:26	80°30.126' N	012°37.615' E	711	OBSML_IN
HN23_040	6	22/07/2023	8:58	80°29.957' N	012°53.053' E	652	OBSML_OUT
HN23_042	7	22/07/2023	13:40	80°38.893' N	014°38.310' E	162	OBSML_IN
HN23_043	7	22/07/2023	14:10	80°40.635' N	015°07.219' E	228	OBSML_OUT
HN23_049	8	23/07/2023	8:32	80°44.026' N	016°45.864' E	321	OBSML_IN
HN23_050	8	23/07/2023	9:05	80°45.619' N	016°37.778' E	440	OBSML_OUT
HN23_053	9	23/07/2023	13:00	80°49.590' N	016°52.134' E	662	OBSML_IN
HN23_054	9	23/07/2023	13:30	80°53.007' N	016°45.873' E	1015	OBSML_OUT
HN23_071	10	24/07/2023	13:14	80°43.674' N	016°30.435' E	374	OBSML_IN
HN23_072	10	24/07/2023	13:44	80°43.055' N	016°13.936' E	625	OBSML_OUT
HN23_081	11	25/07/2023	8:34	80°40.100' N	017°26.575' E	205	OBSML_IN
HN23_082	11	25/07/2023	9:04	80°50.985' N	017°33.615' E	187	OBSML_OUT
HN23_83	12	25/07/2023	13:30	80°56.057' N	017°47.270' E	312	OBSML_IN
HN23_084	12	25/07/2023	14:00	80°58.512' N	017°42.186' E	398	OBSML_OUT

HN23_093	13	26/07/2023	8:35	80°31.174’ N	012°54.073’ E	718	OBSML_IN
HN23_094	13	26/07/2023	9:05	80°30.600’ N	012°41.815’ E	718	OBSML_OUT
HN23_095	14	26/07/2023	13:35	80°21.658’ N	011°01.954’ E	469	OBSML_IN
HN23_096	14	26/07/2023	14:05	80°19.280’ N	010°48.818’ E	463	OBSML_OUT
HN23_100	15	27/07/2023	10:30	80°02.507' N	009°00.241' E	510	OBSML_IN
HN23_101	15	27/07/2023	11:00	80°02.418’ N	009°14.558’ E	497	OBSML_OUT
HN23_102	16	27/07/2023	13:31	80°03.582’ N	009°14.613’ E	503	OBSML_IN
HN23_103	16	27/07/2023	14:02	80°03.578’ N	009°27.961' E	503	OBSML_OUT
HN23_112	17	28/07/2023	9:00	80°00.760' N	008°50.500' E	490	OBSML_IN
HN23_113	17	28/07/2023	9:30	80°00.768' N	009°50.500' E	492	OBSML_OUT
HN23_116	18	28/07/2023	13:55	79°59.805' N	008°11.418' E	502	OBSML_IN
HN23_117	18	28/07/2023	14:25	79°59.018' N	008°10.831' E	501	OBSML_OUT
HN23_127	19	29/07/2023	14:25	78°20.059' N	007°49.928' E	2637	OBSML_IN
HN23_128	19	29/07/2023	14:55	78°21.381' N	007°38.504' E	2760	OBSML_OUT
HN23_142	20	30/07/2023	9:06	78°48.293' N	003°54.532' E	2235	OBSML_IN
HN23_144	20	30/07/2023	9:36	78°48.570' N	003°44.320' E	2224	OBSML_OUT
HN23_145	21	30/07/2023	13:20	78°47.883' N	004°43.182' E	2356	OBSML_IN
HN23_146	21	30/07/2023	13:50	78°49.435' N	004°28.737' E	2366	OBSML_OUT
HN23_147	22	31/07/2023	08:;45	78°48.240' N	003°29.367' E	2305	OBSML_IN
HN23_148	22	31/07/2023	9:15	78°46.751' N	003° 21.424' E	2296	OBSML_OUT
HN23_150	23	01/08/2023	13:35	78°46.986' N	000°55.580' E	2519	OBSML_IN
HN23_151	23	01/08/2023	16:05	78°46.202' N	000°43.800' E	2519	OBSML_OUT
HN23_153	24	01/08/2023	13:35	78°46.986' N	000°55.580' E	2292	OBSML_IN
HN23_154	24	01/08/2023	14:05	78°46.202' N	000°43.800' E	2522	OBSML_OUT
HN23_155	25	02/08/2023	8:30	78°48.888' N	001°13.113' E	2458	OBSML_IN
HN23_156	25	02/08/2023	9:00	78°49.721' N	001°25.347' E	2455	OBSML_OUT
HN23_157	26	02/08/2023	13:34	78°50.790' N	000°55.850' E	2480	OBSML_IN
HN23_158	26	02/08/2023	14:04	78°51.509' N	001°06.914' E	2485	OBSML_OUT
HN23_161	27	03/08/2023	8:36	78°59.328' N	000°01.547' E	2560	OBSML_IN
HN23_162	27	03/08/2023	9:06	78°57.037' N	000°03.510' E	2580	OBSML_OUT
HN23_163	28	03/08/2023	13:33	78°45.078' N	000°49.740' E	2453	OBSML_IN
HN23_164	28	03/08/2023	14:09	78°48.509' N	000°52.202' E	2369	OBSML_OUT
HN23_167	29	04/08/2023	8:20	78°04.395' N	009°20.159' E	673	OBSML_IN
HN23_168	29	04/08/2023	8:40	78°03.946' N	009° 35.663' E	360	OBSML_OUT

R.5 Tables of miscellaneous observations: Manta Trawl

MANTA							
STATION	NR	YYYYMMDD	UTC TIME hh:mm	LAT dd° mm.mmm’	LONG dd° mm.mmm’	DEPTH m	ACTIVITY
HN23_001	1	20230719	15:08	76°26.621’N	013°46.660’E	1132	MAN_IN
HN23_002	1	20230719	15:48	76°27.433’N	013°40.614’E	1192	MAN_OUT
HN23_004	2	20230720	07:16	77°39.203’N	010°14.861’E	1039	MAN_IN
HN23_005	2	20230720	07:52	77°40.360’N	010°11.461’E	1016	MAN_OUT
HN23_118	3	20230728	14:35	79°58.393’N	008°10.987’E	504	MAN_IN
HN23_119	3	20230728	15:08	79°57.343’N	008°11.155’E	502	MAN_OUT
HN23_150	4	20230801	10:00	78°45.499’N	001°54.121’E	2519	MAN_IN
HN23_151	4	20230801	10:36	78°44.707’N	001°47.620’E	2511	MAN_OUT
HN23_172	5	20230805	12:24	78°23.642’N	006°53.498’E	3319	MAN_IN
HN23_173	5	20230805	12:58	78°24.616’N	006°54.114’E	3316	MAN_OUT

Personnel

T.1

ACOUSTIC SURVEY: Giuseppe Casano Maurizio Demarte Mauro Marro Alberto Niccolini Samuele Stefanucci
MISCELLANEOUS COLLECTED DATA: Serena Bigelli Matteo Guideri Elisa Mammi Roberto Nardini Andrea Simone Pinna Francesco Capece Gilbert Dagher Vincenzo Iacono Giulia Luzi Oronzo Pacucci Giulia Prior Elettra Rosalio Gabriella Taccardi Giovanni Tomaselli Dario Zampini

ANNEX U TO
[HN2023]
[2023-11-27]

Diary of Notable Events

U.1 No notable event happened

ANNEX V TO
[HN2023]
[2023-11-27]

Summary of Surveying Activity

V.1

TOTAL	**SEA**				**Harbour**		
		Days Lost					
Calendar Days	Surveying	Weather, Ship and Equipment Downtime	Passage	Military Duties	Maintenance and Emergency Repair	Leave	Visits including logistic stops
26	16	0	0	0	0	0	0