DANMARKS OG GRØNLANDS GEOLOGISKE UNDERSØGELSE **RAPPORT 2023/10**

Survey report for the inner Danish waters and the Baltic Sea around Bornholm, 2022

Geological screening for offshore wind farms, the Danish Energy Agency

Lara F. Pérez, Lars Ø. Hansen, Thomas Vangkilde-Pedersen, Nicklas Christensen, Mikkel S. Andersen, Lis Allaart, Lars-Georg Rödel, Sigurd B. Andersen, Eric J. Haase, Anna K. Baltz, Zia Przyswitt & Cecilia E. Nielsen

GEOLOGICAL SURVEY OF DENMARK AND GREENLAND
DANISH MINISTRY OF CLIMATE, ENERGY AND UTILITIES

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G E U S

Content

1. Summary

GEUS has carried out fieldwork as part of a geological screening for offshore wind farms for the Danish Energy Agency (DEA) in 2022 in the inner Danish waters and the Baltic Sea. The purpose of the survey was to acquire geophysical data, with particular focus on multichannel sparker seismic data, in regions with lack of data and geological information in order to establish a better basis for developing conceptual geological models and mapping geological units of importance for offshore wind farm development.

The survey, hereafter referred to as the ENS 2022 survey, started November 14 and was completed December 11. The ENS 2022 survey include six large areas: Læsø North, Læsø South, Anholt South, Køge-Kriegers Flak, Vejsnæs Flak and Bornholm. The activities were carried out using the survey vessel Fortuna Crane and involved three legs of geophysical mapping with single and multichannel seismic. Sub-bottom profiler, multibeam echo sounder and side scan sonar were obtained to support the seismic mapping.

Mobilization of the geophysical equipment took place in Hundested harbor from November 11 to November 14. The crew change between Leg 1 and Leg 2 took place in Skagen harbor on November 19 and the crew change between Leg 2 and Leg 3 took place in Køge harbor on December 2. Demobilization after the survey took place in Køge harbor on December 12.

The survey plan for the ENS 2022 survey included 4103 km of survey lines in Inner Danish waters and the Baltic Sea. Læsø North, Læsø South and Anholt South areas include 687 km, 909 km and 1109 km of planned lines in Kattegat, respectively. In addition, 530 km of lines were planned to be acquired in Køge-Krieger area, 126 km in the Vejsnæs Flak area and 742 km around Bornholm.

Leg 1 acquisition started off Hundested on November 14 surveying in the Anholt South, Læsø South and Læsø North areas. Weather conditions forced 70 hours of weather standby at Skagen harbor. A total of 407 km of data were acquired before Leg 1 ended with GEUS crew change in Skagen on November 19.

Leg 2 acquisition started off Skagen on November 20 surveying in the Læsø North, Læsø South, Vejsnæs Flak and Anholt South areas. Bad weather conditions on November 23 were used for transit to Vejsnæs Flak and picking up personnel in Fredericia. A total of 1604 km of geophysical data were acquired during Leg 2 before the GEUS crew change in Køge on December 2.

Leg 3 acquisition started off Køge on December 2 surveying in the Køge-Krieger and Bornholm areas. A total of 1280 km of data were acquired during Leg 3. The ENS 2022 survey finished in Køge on December 11, followed by demobilization of the geophysical equipment.

A total of 3291 km of geophysical data were acquired along the planned survey lines (Figure 1) during the ENS 2022 survey. Details on the survey lines and transits are provided in the survey log included as Appendix A.

A GAMS calibration of the positioning system for the geophysical data acquisition on board Fortuna Crane was performed on October 22 during another GEUS survey immediately prior to the ENS 2022 survey and a multibeam patch test was performed during Leg 3 on December 5 over the southern slope of the Bakkegrund Syd raw material area near Bornholm.

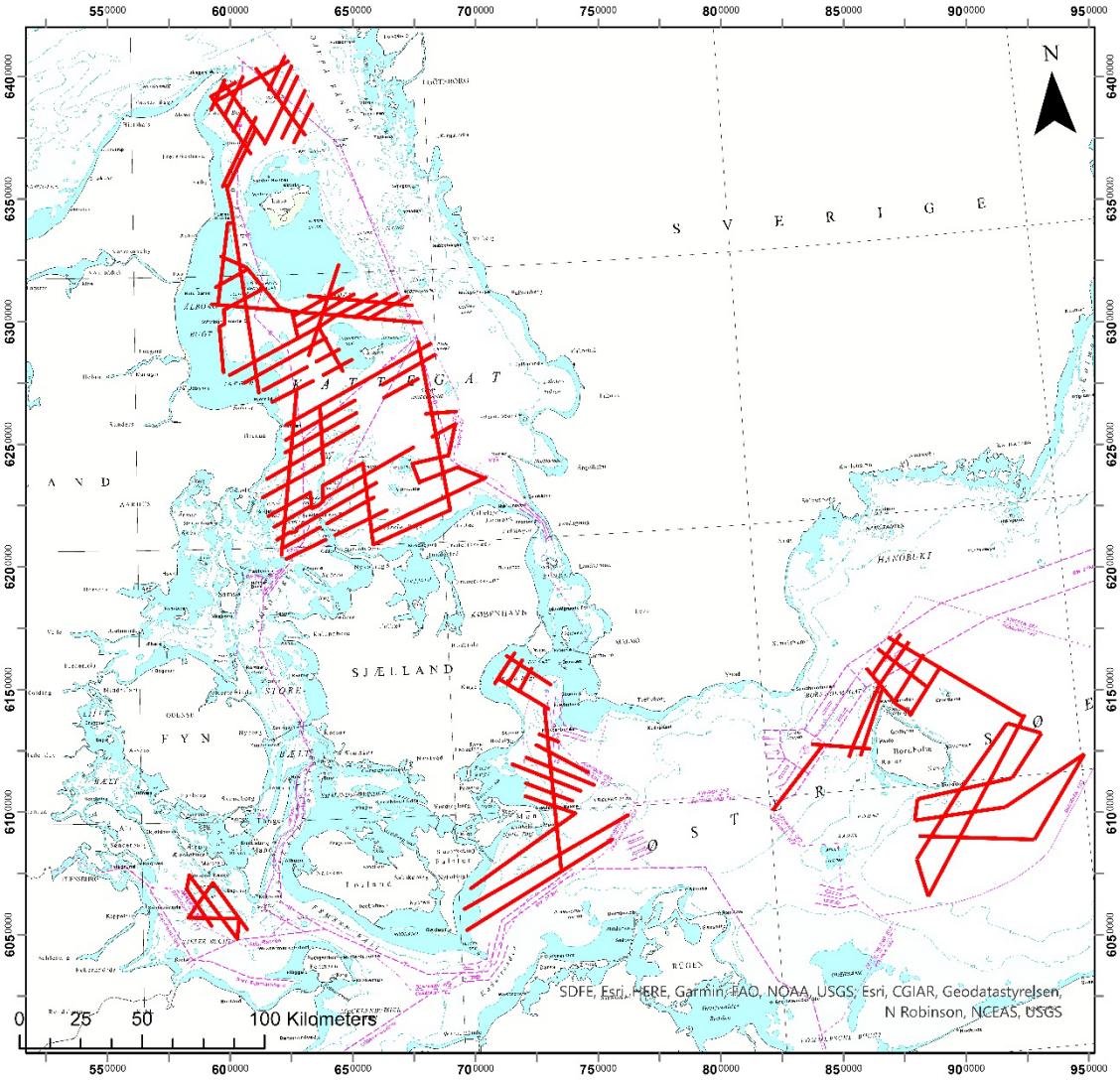


Figure 1. Survey lines recorded during the ENS 2022 survey, Leg 1, 2 and 3 in the Inner Danish waters and Baltic Sea.

2. Introduction and purpose

GEUS has carried out a geophysical survey as part of a geological screening for offshore wind farms for the Danish Energy Agency (DEA) in 2022. The survey, hereafter referred to as the ENS2022 survey, includes 6 larger areas in the Inner Danish waters and the Baltic Sea. The data acquisition comprised single and multichannel sparker seismic and multibeam echo sounder, side scan sonar and sub-bottom profiler to support the seismic mapping.

The purpose of the survey was to acquire geophysical data in regions with lack of data and geological information aiming to establish a better basis for developing conceptual geological models and mapping geological units of importance for offshore wind farm development.

An overview of the survey areas, line names, planned and actual acquired length can be seen in Table 1. Details on the data acquisition are included in the survey log in Appendix A.

Table 1. Overview of the survey lines sailed during the ENS 2022 survey. Details are included in Appendix A. One of the planned lines was not completed and a new line was added.*

Area	Line names	No. of lines	Planned length (km)	Acquired length (km)	% achieved
Transit line	T_				
Læsø North	LN	15	687,33	329,91	48%
Læsø South	LS	21	908,50	689,08	76%
Anholt South	AS	27	1109,32	866,10	78%
Køge-Krieger	KK	22	529,81	533,0*	100 %*
Vejsnæs Flak	VF	7	126,47	126,47	100%
Bornholm	BO	22	742,00	746,1	100%
Total		**114**	**4103,43**	**3290,66**	**80,2%**

3. Overview of survey activities

The ENS 2022 survey was carried out on board the survey vessel Fortuna Crane (Figure 2) provided by Foga Consult ApS. The survey includes multibeam bathymetry, side scan sonar, sub-bottom profiler and single and multichannel sparker seismic.

Figure 2. Survey vessel Fortuna Crane.

Mobilization of the geophysical equipment on board Fortuna Crane took place in Hundested harbor from November 11 to November 14. The subsequent survey was implemented in three legs with crew changes between legs.

Leg 1

Acquisition started off Hundested on November 14 surveying along Anholt South line AS_01 followed by Læsø South lines LS_01 and LS_02, and Læsø North line LN_01. Hereafter, critical weather conditions forced 70 hours of standby at Skagen harbor from November 15 to November 18 before proceeding with eight more lines in Læsø North survey area. In total, 407 km of geophysical data on planned lines were acquired before Leg 1 ended with GEUS crew change in Skagen on November 19.

Leg 2

Before initiating survey operations, a GEUS technician was examined at Hjørring Hospital because of knee problems. He was cleared to continue work and acquisition started off Skagen on November 20 surveying along six lines in Læsø North and six lines in Læsø South. Hereafter, rough weather conditions were used for transit to Vejsnæs Flak on November 22 and November 23. A stopover in Fredericia on November 23 allowed to pick up an extra ship officer and replacing a GEUS technician due to continuing problems with the knee. Seven lines were surveyed in Vejsnæs Flak before transit back to Kattegat on November 24. Here, survey continued along one line in Anholt South and 13 lines in Læsø South. Then, survey in Anholt South followed again, completing a total of 27 lines in the area. In total, 1604 km of geophysical data on planned survey lines were acquired before Leg 2 ended with GEUS crew change in Køge on December 2.

Leg 3

Geophysical data acquisition started off Køge on December 2. Increasingly rough weather conditions accompanied the beginning of the leg. Data were acquired along 9 lines in the Køge-Krieger survey area, before deteriorating weather forced survey interruption. The rough weather conditions were used to transit to the Bornholm survey area. Survey activities in Bornholm area were initiated on December 5, upon completion of a patch test of the multibeam system in the Bakkegrund Syd raw material area. Bornholm area was surveyed continuously until December 9 completing the 22 planned lines in the area. Transit back to Køge-Krieger area was followed by resumed survey activities here. In total 1280 km of geophysical data on planned survey lines were acquired before Leg 3 and the ENS 2022 survey finished in Køge harbor on December 11.

In total 3291 km of geophysical data were acquired out 4103 km of planned survey lines (Figure 1, Table 1). Navigation data were collected in WGS84, UTM32N. A general overview of the survey activities is included in Table 1 and a detailed survey log in Appendix A, contains further details on the progress.

4. Personnel

Apart from the professional ship crew, GEUS had 5 people manning each leg of the ENS 2022 survey with the GEUS personnel being responsible for the geophysical data acquisition and quality control.

Two technicians carried out the mobilization and the sailing crew was formed by one cruise lead, two surveyors, one technician and one trainee. Data acquisition, quality control, reporting and data processing were carried out 24/7 during survey with fixed watches on the data acquisition and floating watches on the reporting and data processing. The complete list of GEUS personnel was as follows:

Mobilization

- Lars-Georg Rödel (Technician)
- Sigurd Bøgelund Andersen (Technician)

Leg 1

- Lara F. Pérez (Cruise lead/Surveyor)
- Lars-Georg Rödel (Technician)
- Nicklas Christensen (Surveyor)
- Eric J. Haase (Surveyor)
- Anna K. Baltz (Trainee)

The schedule for fixed watches was as follows:

- 00:00-03:00 / 12:00-15:00 Nicklas Christensen
- 03:00-06:00 / 15:00-18:00 Anna K. Baltz
- 06:00-09:00 / 18:00-21:00 Eric J. Haase
- 09:00-12:00 Lara F. Pérez
- 21:00-24:00 Lars-Georg Rödel

Leg 2

- Lars Ø. Hansen (Cruise lead/Surveyor)
- Lars-Georg Rödel / Sigurd Bøgelund Andersen (Technician)
- Thomas Vangkilde-Pedersen (Surveyor)
- Mikkel Skovgaard Andersen (Surveyor)
- Zia Przyswitt (Trainee)

The schedule for fixed watches was as follows:

- 00:00-03:00 / 12:00-15:00 Mikkel Skovgaard Andersen
- 03:00-06:00 / 15:00-18:00 Zia Przyswitt
- 06:00-09:00 / 18:00-21:00 Thomas Vangkilde-Pedersen
- 09:00-12:00 Lars Ø. Hansen
- 21:00-24:00 Lars-Georg Rödel/Sigurd Bøgelund Andersen

Leg 3

- Lara F. Pérez (Cruise lead/Surveyor)
- Sigurd Bøgelund Andersen (Technician)
- Lis Allaart (Surveyor)
- Eric J. Haase (Surveyor)
- Cecilia E. Nielsen (Trainee)

The schedule for fixed watches was as follows:

- 00:00-03:00 / 12:00-15:00 Lis Allaart
- 03:00-06:00 / 15:00-18:00 Cecilia E. Nielsen
- 06:00-09:00 / 18:00-21:00 Eric J. Haase
- 09:00-12:00 Sigurd B. Andersen
- 21:00-24:00 Lara F. Pérez

5. Equipment

The Geophysical equipment used during the ENS 2022 survey is summarized in Table 2. Survey lines were defined in HyPack64 2022 software.

Table 2. Summary of the equipment on board Fortuna Crane during the ENS 2022 survey.

Geophysical equipment	
Combined Multibeam echosounder and Side scan sonar	EdgeTech 6205
Sub-bottom profiler	Innomar SES 2000 Medium
Sound Velocity Profiler	Valeport Mini CTD
Positioning/Motion sensor system	Applanix PosMV v.5
Sparker single channel streamer	GeoSense 1 channel, 8 elements, High resolution streamer
Sparker multichannel streamer	Geo-Eel 96 channels, 100 m
Sparker source	Geo-Spark 200
Sparker power supply	Geo-Spark 2000X / 1000

5.1 Ship setup

The setup of the geophysical equipment relative to the ship is shown in Figure 3 (pole mounted and arrangement on deck) and Figure 4 (towed equipment and arrangement on deck).

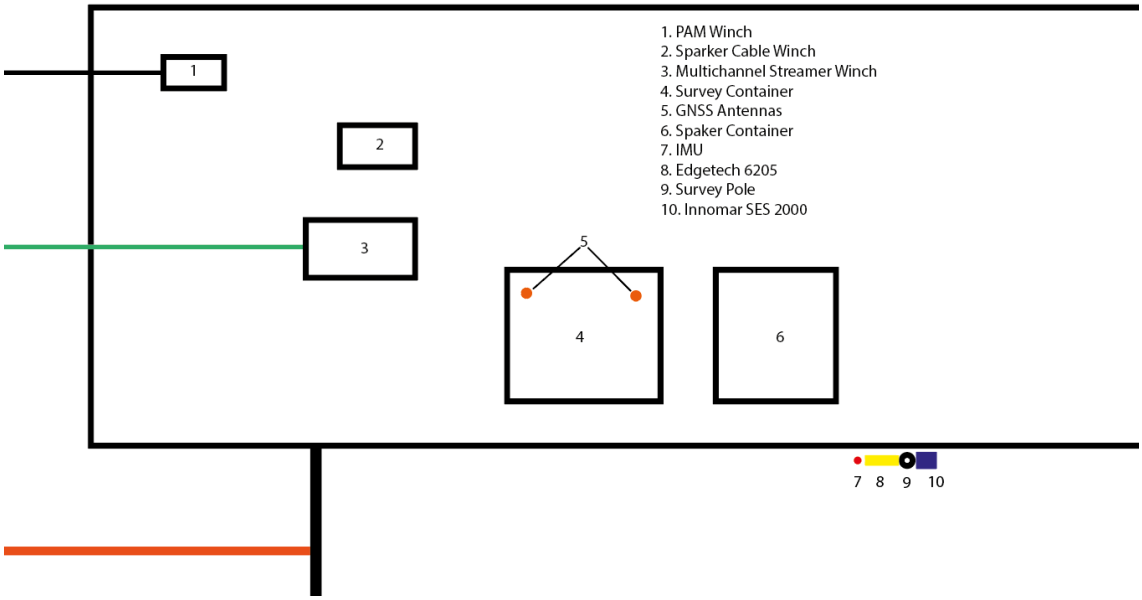


Figure 3. Sketch of pole mounted equipment and arrangement on deck of the geophysical equipment on board Fortuna Crane during the ENS 2022 survey. The Innomar sub-bottom profiler is located 2,95 m under the water line. The EdgeTech multibeam and side scan sonar is located 3,25 m under the water line.

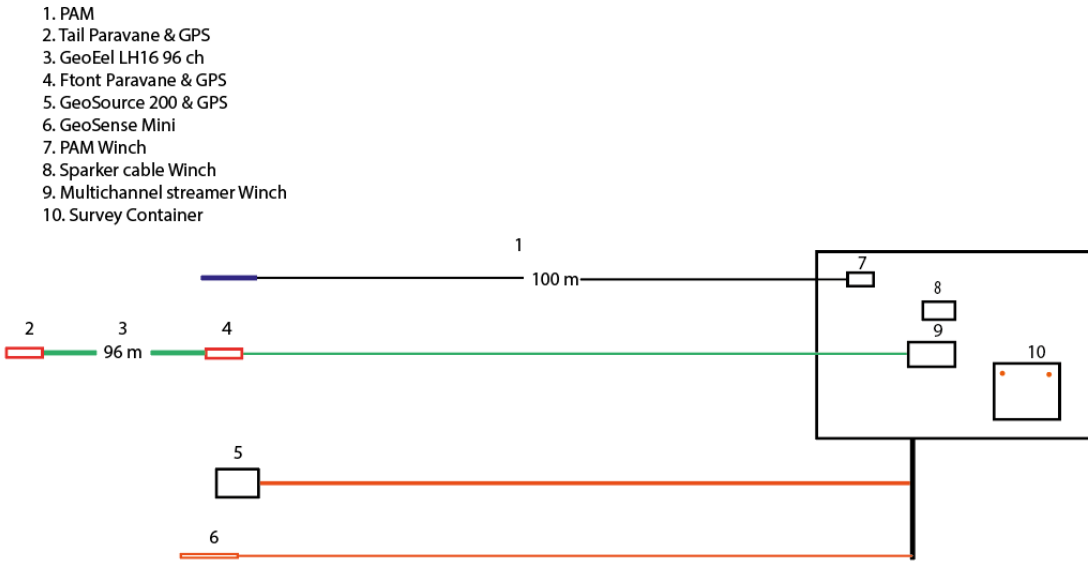


Figure 4. Offset diagram of the towed geophysical equipment on board Fortuna Crane during the ENS 2022 survey. Sparker and multichannel streamer are deployed 20 m / 42 m and 45 m behind the ship and separated from each other by 9 m. The passive acoustic monitoring (PAM) streamer layback is 100 m.

5.2 Applanix PosMV positioning and motion sensor system

The GPS antennas for the Applanix PosMV positioning and motion sensor system (Figure 5) for the geophysical mapping was located on the roof of GEUS' survey container on the stern deck of Fortuna Crane (Figure 3) and the Inertial Motion Sensor (IMU) unit was placed directly on the EdgeTech multibeam/side scan and Innomar sub-bottom profiler units. The Applanix PosMV merges position data from the Global Navigation Satellite System (GNSS) and NTRIP RTK corrections with angular rate and acceleration data from the IMU, together with heading from the GNSS Azimuth Measurement System (GAMS) to produce a robust and accurate full six degrees-of-freedom position and orientation solution. The positioning and motion sensor data were distributed to the respective acquisition software using HyPack64 2022 software.

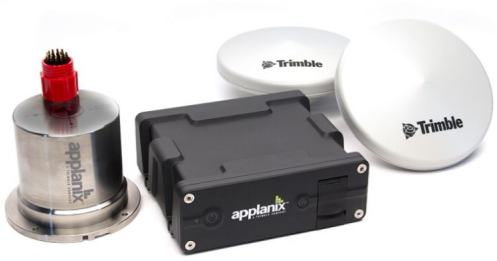


Figure 5. Internal motion unit installed - POS MV by Applanix.

5.2.1 GAMS calibration test

A calibration of the GAMS system is required to check the offsets of the primary and secondary antennas of the GNSS and their correlation with the land observations before starting data acquisition. The GAMS test was carried out during other survey activities immediately before the ENS 2022 survey. Thus, a heading calibration test (or GAMS test) was performed on the PosMV unit on October 22 near the Lysegrund raw material area (Figure 6). During the GAMS calibration, the ship sailed sharp turns and figures of eight at variable speed. After the GAMS calibration the baseline vector was adjusted to: X component = -1,994 m, Y component = -0,009 m, Z component = 0,032 m with 0 degrees heading correction and a heading calibration threshold of 0,500 degrees.

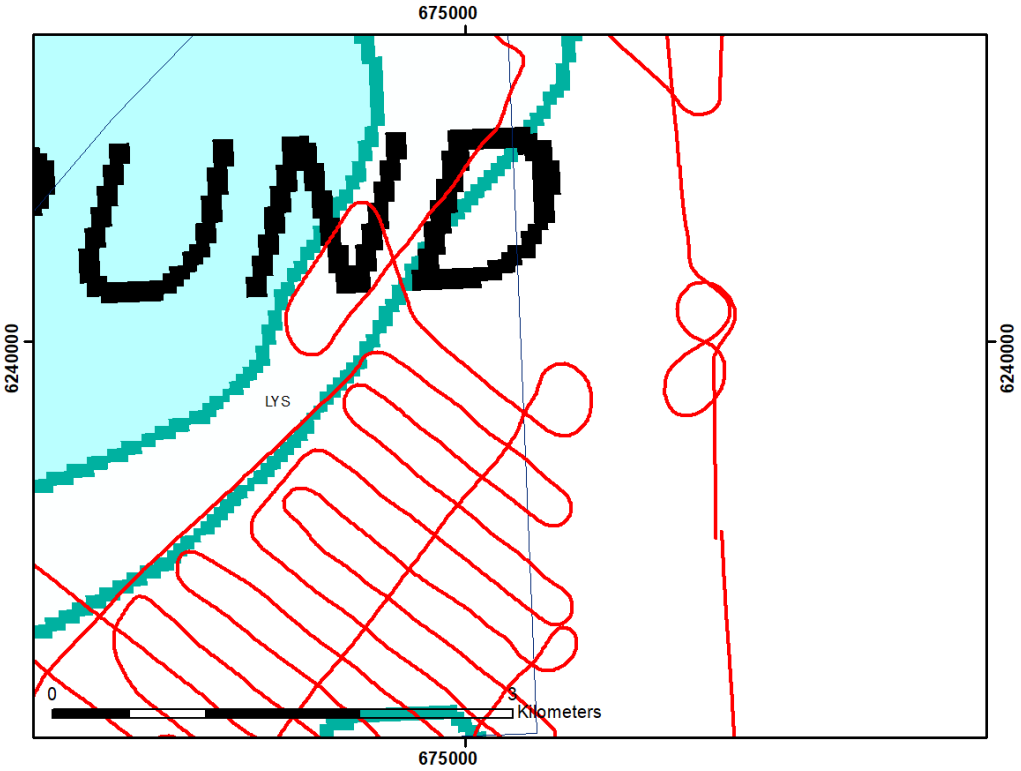


Figure 6. Figures of eight sailing pattern to the right for the GAMS test prior to the ENS 2022 survey.

5.3 EdgeTech 6205 multibeam and side scan sonar

The EdgeTech 6205 was mounted on a pole in the starboard side of the ship. The sensors of the EdgeTech were located 3,25 m under the water line. The combined multibeam and side scan sonar EdgeTech operates on two channels: one low frequency (LF) and one high frequency (HF). The recording range was 100 m to each side, i.e. a total width of 200 m (Table 3, Figure 7).

Table 3. Specifications of the Edgetech 6205 Multibeam and side scan sonar.

Center Frequency	230/550 kHz
Recording range (per side)	100 m
Depth (acoustic center) below water surface	3,25 m

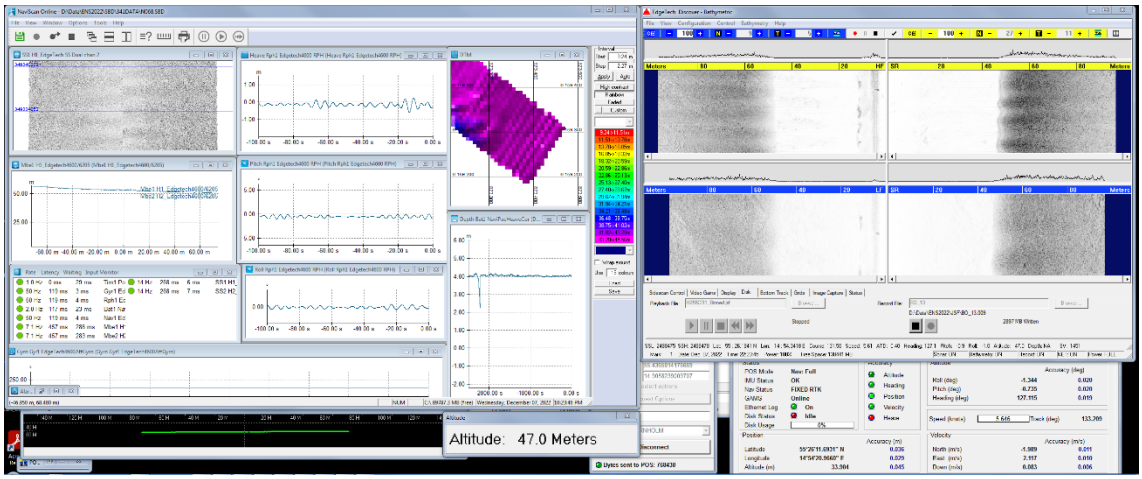


Figure 7. Screenshot of the general EdgeTech settings during ENS 2022 survey.

5.3.1 Sound velocity profiles (SVP)

24 sound velocity profiles (SVP) were obtained during the ENS 2022 survey (Appendix A). The profiles were obtained with a Valeport Mini CTD probe manually dropped to the seafloor with a ship speed close to 0 kn. The SVPs were widespread across the survey areas and taken roughly every 24 hours, or at least in order to ensure adequate coverage of velocity measurements in the water column to calibrate the multibeam data (Figure 8).

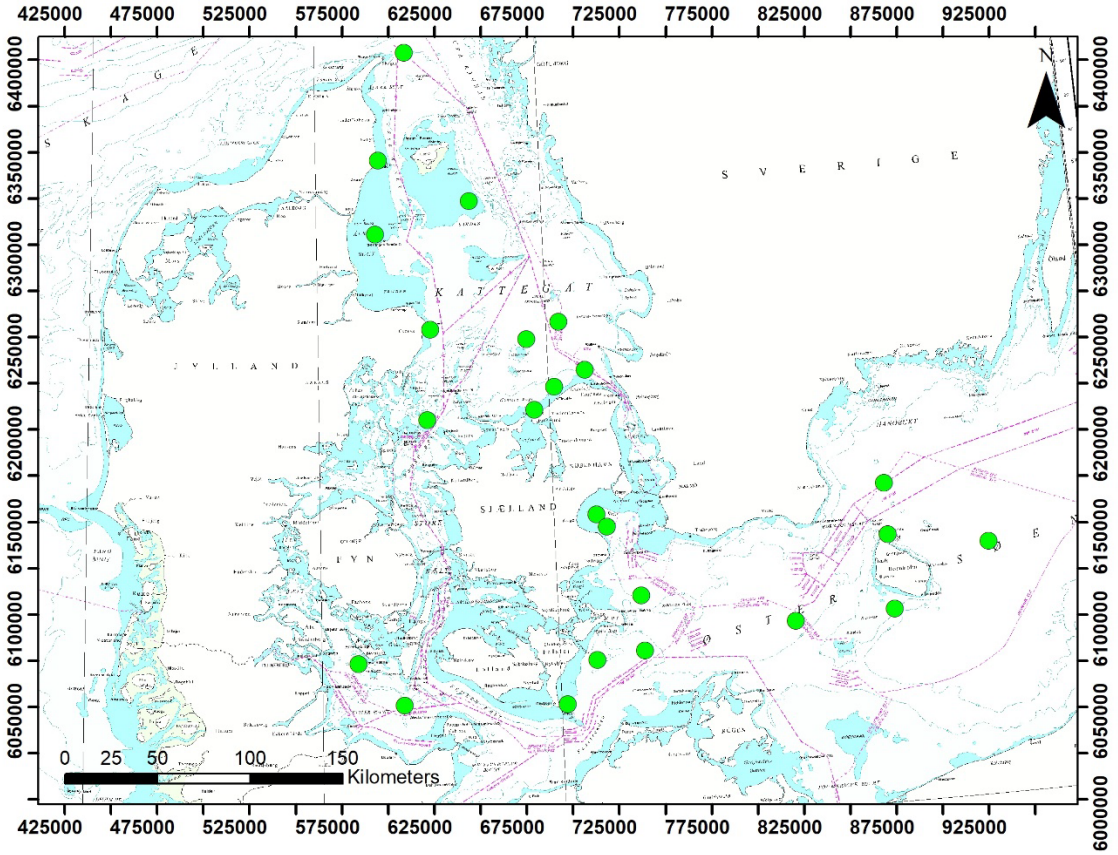


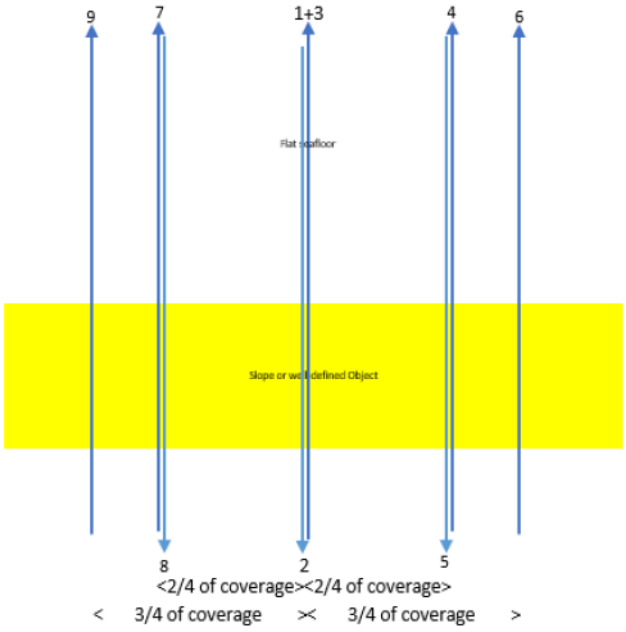
Figure 8. Location of the SVPs obtained during the ENS 2022 survey, see also Appendix A.

5.3.2 Patch test

A Calibration of the multibeam system through a patch test was performed to 1) determine the mount angles of the multibeam transducer (roll, pitch and heading) in relation to the local coordinate system and the IMU; and 2) confirm the relationship between the time tagging on the multibeam and position data.

A standard patch test for a dual head multibeam was implemented. Calibration of the time validation, pitch, roll and heading requires a navigation pattern consisting of 5 parallel lines that are perpendicular to a sharp lineal morphological feature (Figure 9). During the ENS 2022 survey, the slope located on the southern edge of the Bakkegrund Syd raw material area near Bornholm served as morphological feature for the patch test performed December 5 for 1 hour and 30 minutes.

The navigation during the patch test fulfil the calibration of: a) time validation: lines surveyed at survey speed and repeated with the same heading at twice the speed; b) pitch: three lines was surveyed twice with opposite headings at survey speed; c) roll: a line was surveyed with opposite headings at identical survey speed on flat seafloor; and d) heading: two parallel lines were surveyed with the same heading with approximately 3/4 of the full coverage in separation allowing swath overlap.



Calibration type	Lines
Time	1+3
Pitch_0 (Port)	1+8 or 2+4
Roll_0 (Port)	1+2, 7+8 or 4+5
Heading_0 (Port)	4+6 or 7+9
Pitch_1 (Starboard)	1+5 or 2+7
Roll_1 (Starboard)	1+2, 7+8 or 4+5
Heading_1 (Starboard)	4+6 or 9+7

Figure 9. Predefined sailing pattern of a patch test to determine the mount angles and time validation. Light blue and dark blue arrows illustrate the sailing lines in opposite directions for the four calibration types.

5.4 Innomar SES 2000 Medium (Sub-bottom profiler)

The Innomar SES 2000 sub-bottom profiler was mounted on the starboard pole above the EdgeTech and 2,95 m under the water line. The recording window was set to 25 m, but was changed to 30 and 45 m, respectively, in the Anholt South and Læsø South areas due to the

local conditions. The trigger interval was synchronized with the multibeam, and thus changing with depth. The penetration of the Innomar record varied within the areas, but on average it was 5-10 m under seafloor. Table 4 and Figure 10 summarize the sub-bottom profiler settings.

Table 4. General settings of the Innomar sub-bottom profiler system.

Primary frequencies	12 kHz and 100 kHz
Recording window	25 m
LF Gain	18 dB
HF Gain	15 dB
Trigger interval	Synchronized with Edge Tech

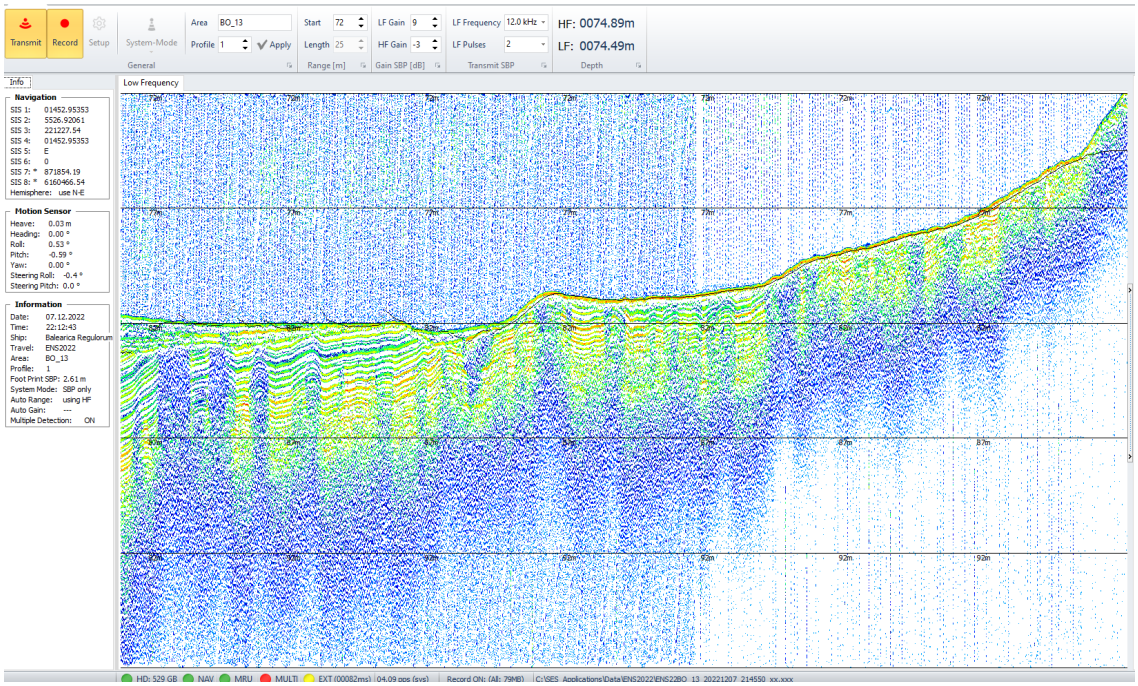


Figure 10. Screenshot of the general sub-bottom profiler settings during the ENS 2022 survey. The example of the profile is from the Bornholm survey area on line BO_13.

5.5 Seismic system

The seismic system consisted of a sparker, a multichannel streamer and a single channel streamer. The source was a sparker Geo-Source 200 towed after the ship with a layback of approximately 20 m and later changed to 42 m. The power output was 400 J for the first section of the line AS_01 and changed to 500 J for the second section. After checking the data quality, a power output of 500 J was chosen for the rest of the survey. The power supply was changed on December 10 due to a failure on the original Geo-Spark 2000X, replaced by a Geo-Spark 1000. Both power supplies were used with an output of 500 J every second.

The seismic data were recorded through a single channel Geo-Sense 8 streamer and a multichannel 100 m Geo-eel 96 channel streamer. The multichannel streamer was towed on starboard side about 2.5 m from the sparker source during Leg 1. However, it was located

on the central axis behind the ship for the rest of the survey, separated 9 m from the source. The single channel streamer changed location during the survey to ensure optimal acquisition. It was located on the starboard side 2.5 m away from the source during Leg 1. In the beginning of Leg 2, the single channel streamer was towed from the port side with a separation of 5-10 m from the source. Four days into Leg 2 and hereafter, the single channel streamer was placed in the starboard side with a separation from the source of 4 m (Figure 4). The seismic data were recorded with the Mini-Trace II acquisition system and GeoSuite acquisition software as well as and Geometrics acquisition software. Specifications of the seismic system are summarized in Table 5 and Figure 11.

Table 5. Specifications of the seismic acquisition system.

Power Supply	Geo-Spark 2000X / 1000
Power output	500 J
Tow frame	Geo-Source 200
Multichannel Streamer	Geo-Eel 96 channels 100 m
Single channel Streamer	Geo-Sense 8 element single channel
Firing interval	1 s
Layback	20 m / 42 m

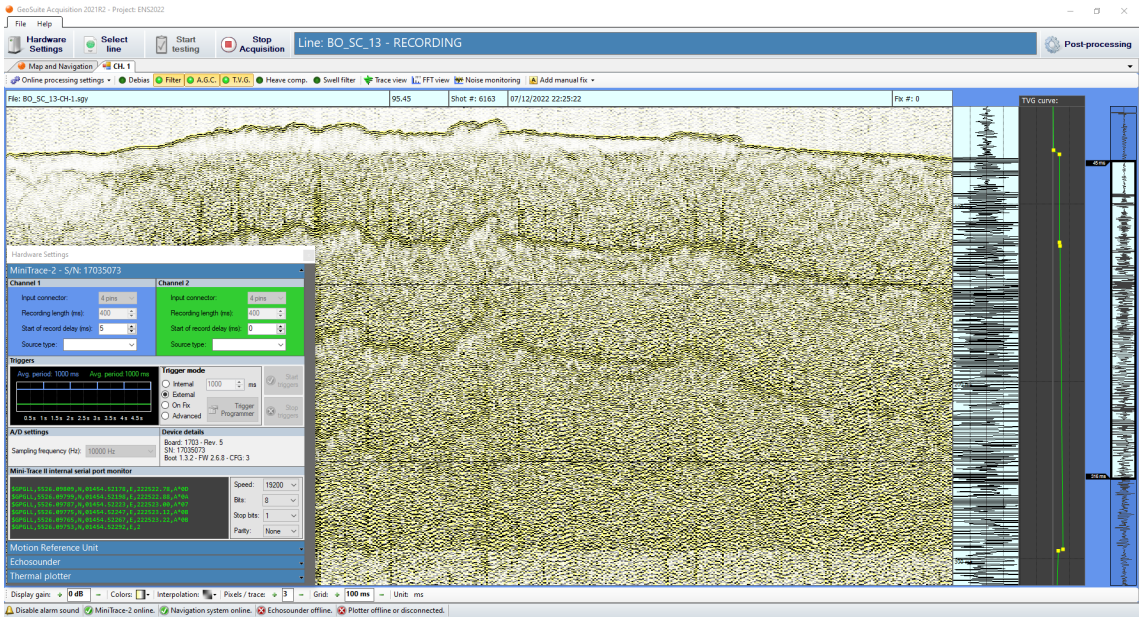


Figure 11. Screenshot of the acquisition settings in the GeoSuite (top) single channel acquisition software and the Geometrics (bottom) multichannel acquisition software during the ENS 2022 survey.

6. Unintended events

The general overview of the survey activities during the ENS 2022 survey appears from Table 1 and the survey log in Appendix A. Survey activities ran according to plans and major delays were related to weather and sea conditions. In addition, the sparker power supply Geo-Spark 2000X was replaced on December 10, one day before the end of the survey, due to a major failure. The Geo-Spark 1000 was used as replacement with unchanged settings (500 J every second).

7. Survey activity report

The GEUS survey team headed by the GEUS cruise lead was responsible for the geophysical data acquisition, backup and onboard quality control of the acquired data. The GEUS cruise lead managed the overall planning and daily/weekly reporting and the GEUS technician was responsible for the technical performance of the equipment.

During the ENS 2022 survey, geophysical data were acquired in 6 areas widespread around the Inner Danish waters and the Baltic Sea. Data acquired in Læsø North, Læsø South and Anholt South include 330 km, 689 km and 866 km of the planned lines in Kattegat, respectively. In addition, 533 km of data were acquired in the Køge-Krieger area, 126 km in Vejsnæs Flak and 746 km around Bornholm. Single channel sparker seismic data and side scan sonar data were processed on board, while selected sections of the multichannel sparker seismic data were submitted to an external consultant (Aarhus University) for preliminary processing and quality control (Figure 12). The examples in the following sections are excerpts from processed single channel sparker lines, since the multichannel processing will only be done in the following months after the survey.

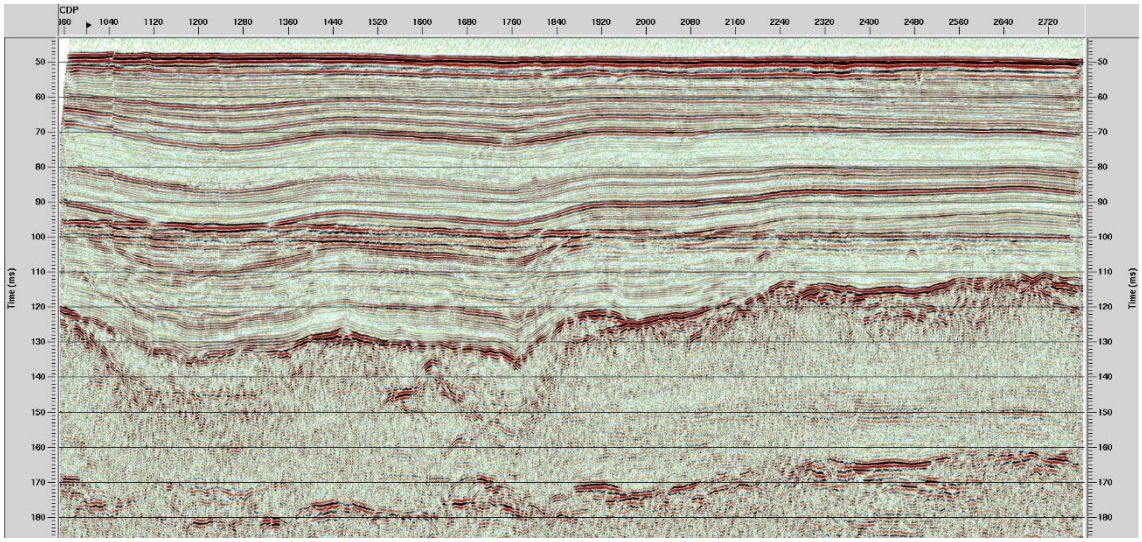


Figure 12. Processed section of multichannel sparker seismic profile from line AS_01.

7.1 Læsø North

The survey activities in the Læsø North area were conducted between November 15 and November 21 (Appendix A). Rough weather conditions compromised the quality of the data, and the survey was put on hold for a period due to weather. In total 687 km of survey lines were planned in Læsø North, but prioritization was necessary due to the weather conditions and only 330 km of geophysical data were acquired (Figure 13). Thus, 48% of the survey plan in Læsø North was completed (Table 1). The data quality varies from poor to moderate in the area (Figure 14).

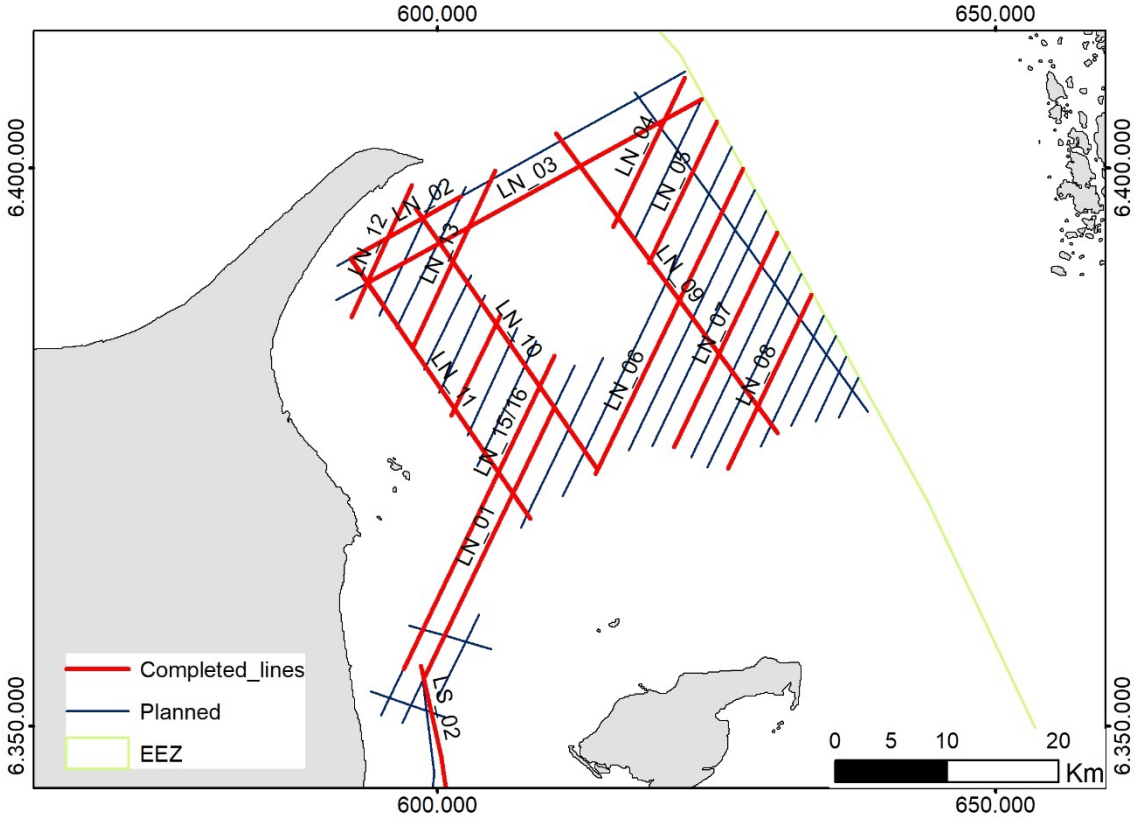


Figure 13. Planned lines (blue) and actual sailed lines (red) in the Læsø North survey area.

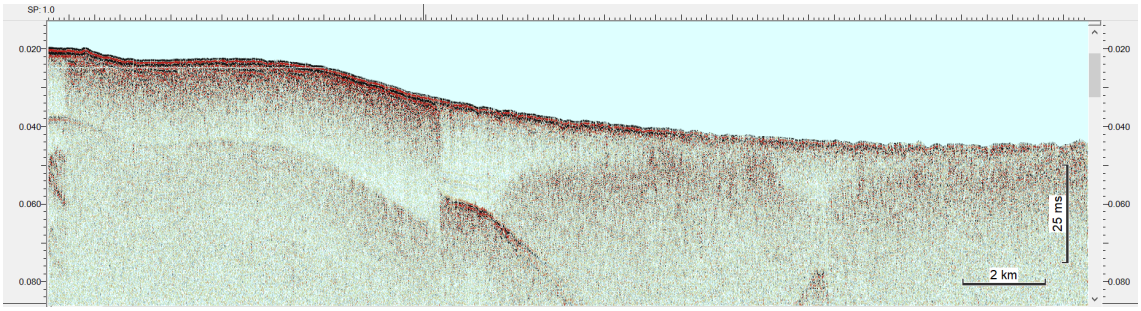


Figure 14. Example of single channel sparker seismic profile (line LS_01) acquired in the Læsø North survey area.

7.2 Læsø South

The survey activities in the Læsø South area took place on November 15, November 21-22 and November 25-26 (Appendix A). The weather conditions were relatively good and stable during the survey in this area. In total 689 km of data, out of 909 km planned, were acquired (Figure 15). Thus, 76% of the survey plan in Læsø South was completed (Table 1). The data quality varies from moderate to good in the area (Figure 16).

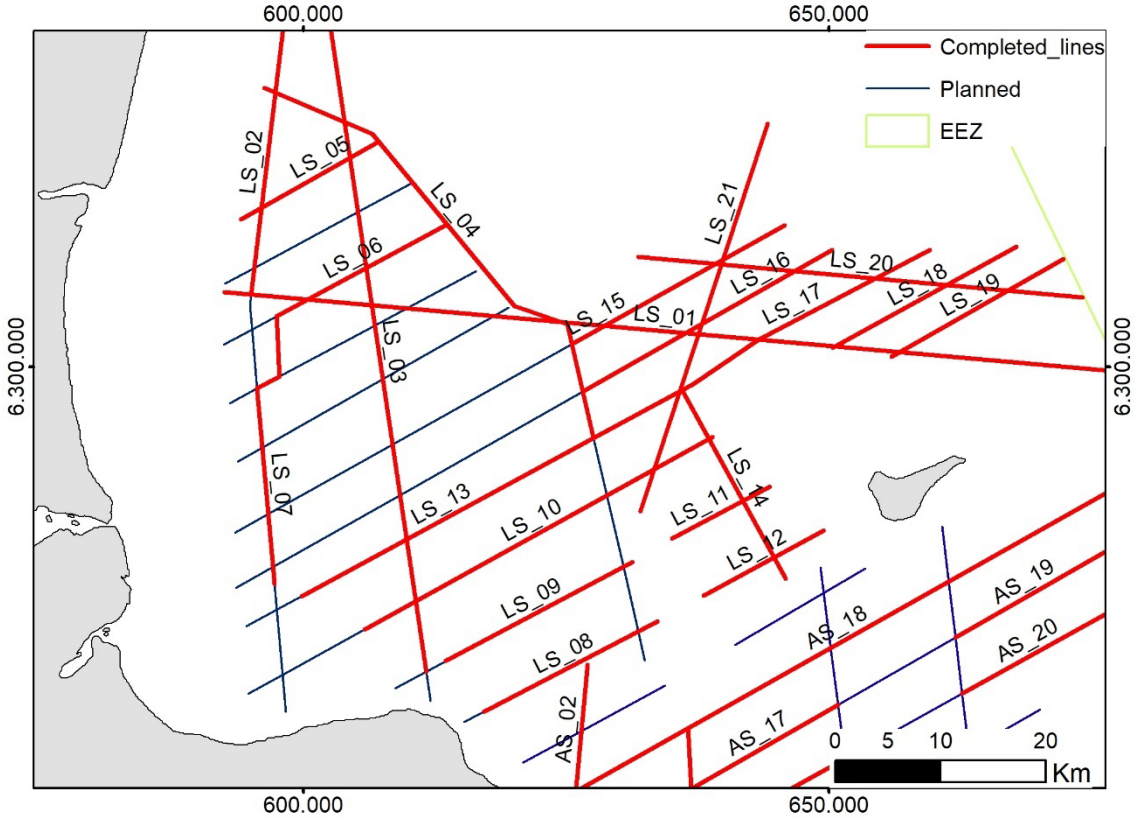


Figure 15. Planned lines (blue) and actual sailed lines (red) in the Læsø South survey area.

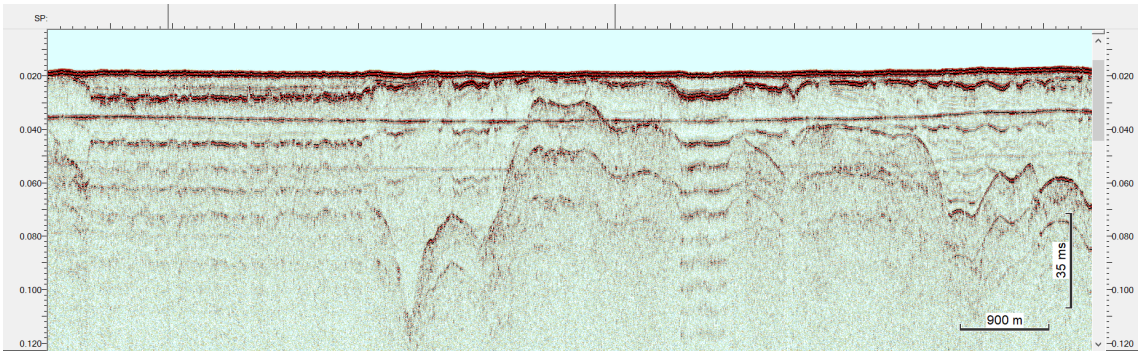


Figure 16. Example of single channel sparker seismic profile (line LS_03) acquired in the Læsø South survey area.

7.3 Anholt South

The survey activities in the Anholt South area took place on November 14, November 24 and from November 27 to December 2 (Appendix A). The Weather conditions were relatively good and stable during the survey in this area. In total 866 km of data, out of 1109 km planned, were acquired (Figure 17). Thus, 78% of the survey plan in Anholt South was completed (Table 1). The data quality varies from moderate to good in the area (Figure 18).

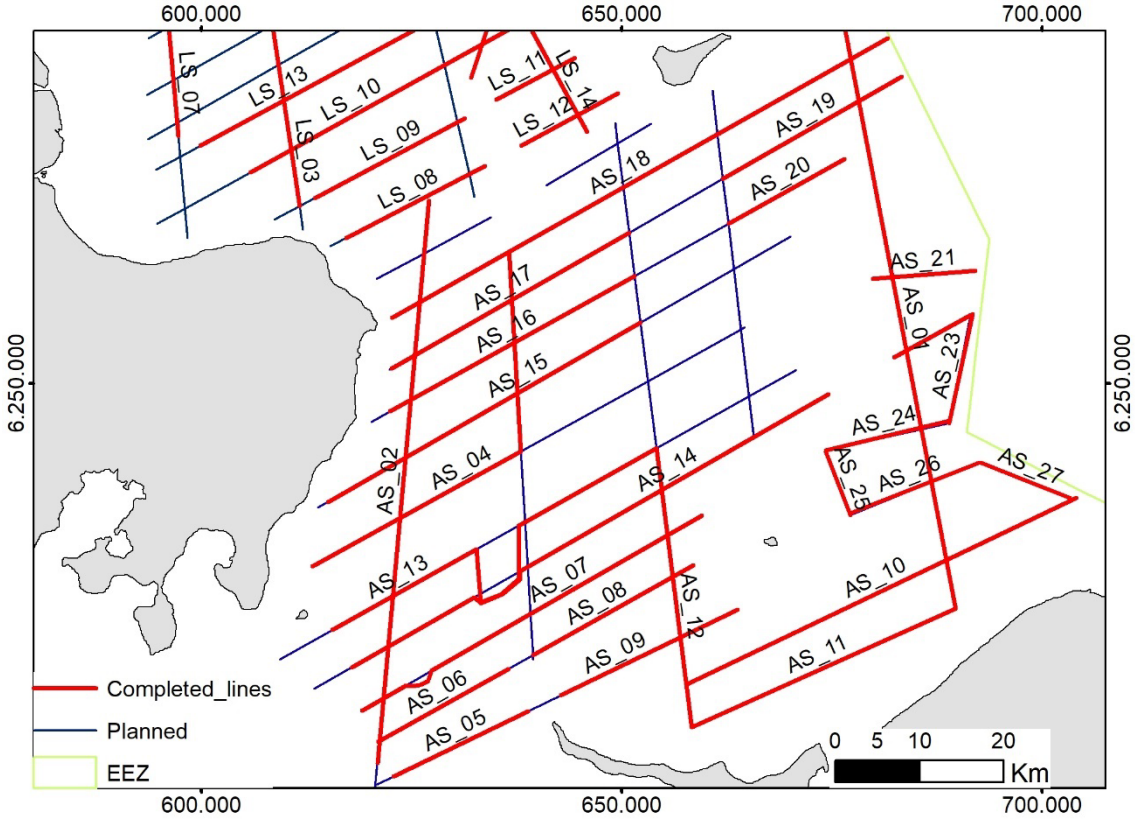


Figure 17. Planned lines (blue) and actual sailed lines (red) in the Anholt South survey area.

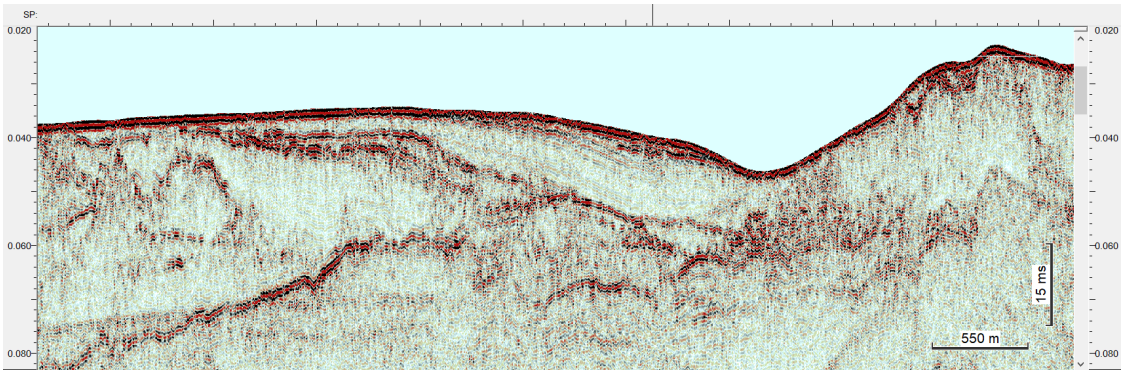


Figure 18. Example of single channel sparker seismic profile (line AS_06) acquired in the Anholt South survey area.

7.4 Køge Bugt – Kriegers Flak

The survey activities in the Køge Bugt - Kriegers Flak area took place from December 2-4 and December 9-11 (Appendix A). The weather conditions were poor during the first part of the survey in the area and some lines had to be interrupted due to poor quality. The weather was better during the second part allowing to complete most of the remaining lines. In total 530 km of data were originally planned and 533 km were acquired (Figure 20). The difference in length is due to an additional connecting line while one of the planned survey lines was only partly completed. Thus, 100% of the survey plan in the Køge Bugt – Kriegers Flak area was completed (Table 1). The data quality varies from moderate to good in the area (Figure 21).

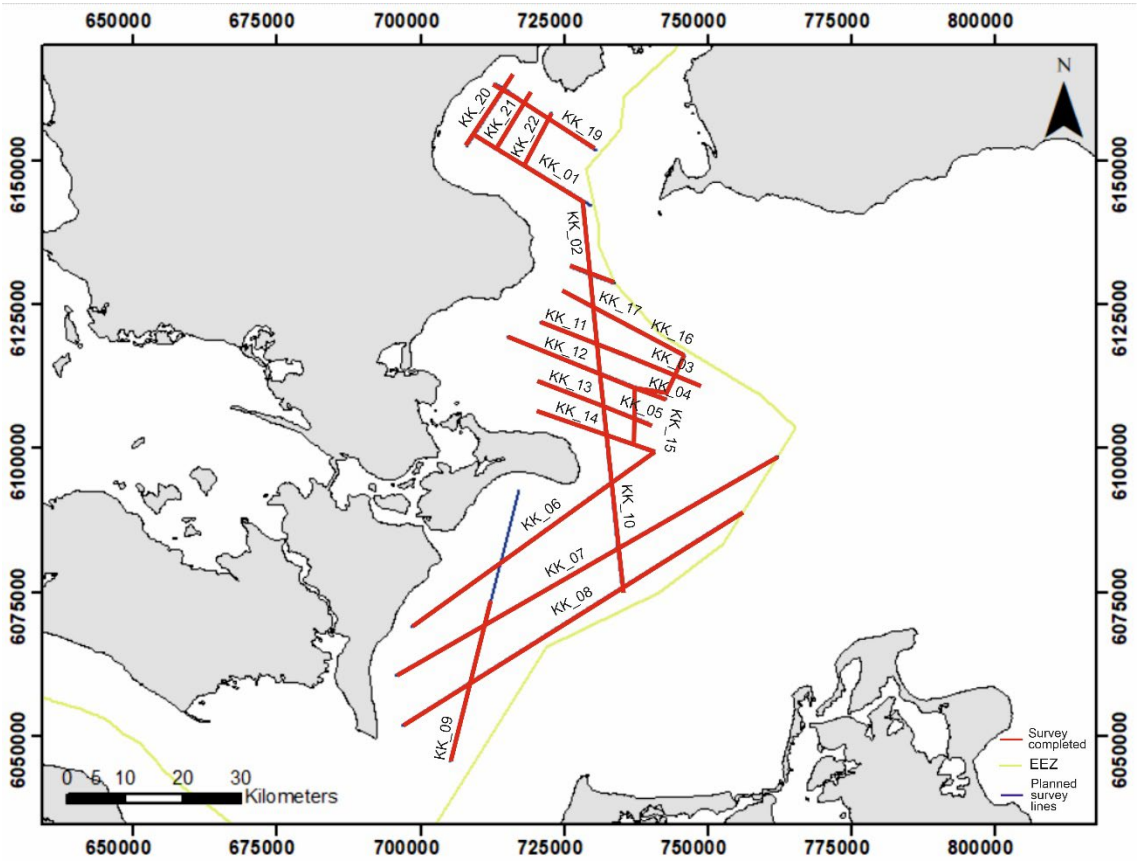


Figure 19. Planned lines (blue) and actual sailed lines (red) in the Køge Bugt - Kriegers Flak survey area.

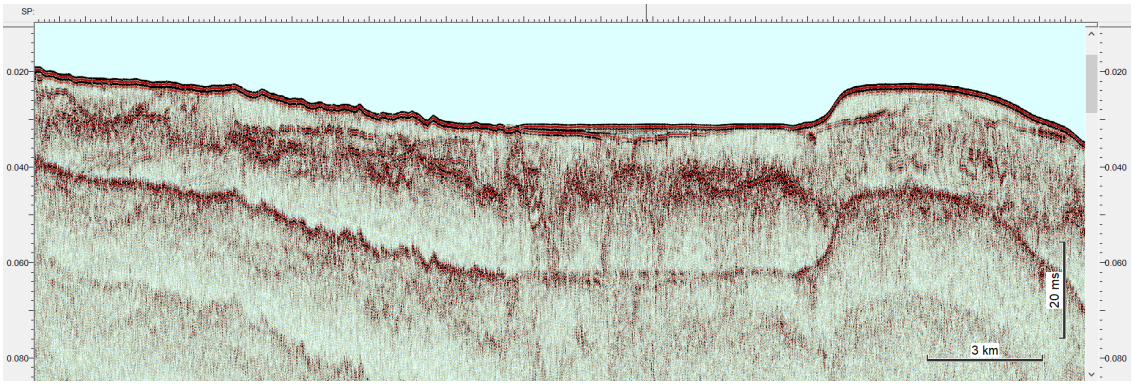


Figure 20. Example of single channel sparker seismic profile (line KK_06) acquired in the Køge Bugt - Kriegers Flak survey area.

7.5 Vejsnæs Flak

The survey activities in the Vejsnæs Flak area took place during November 23-24 (Appendix A). The weather conditions were relatively good and stable during data acquisition. All of the 126 km of planned survey lines were acquired and thus, 100% of the survey plan in the Vejsnæs Flak area was completed (Figure 21, Table 1). The data quality is good in the area (Figure 22).

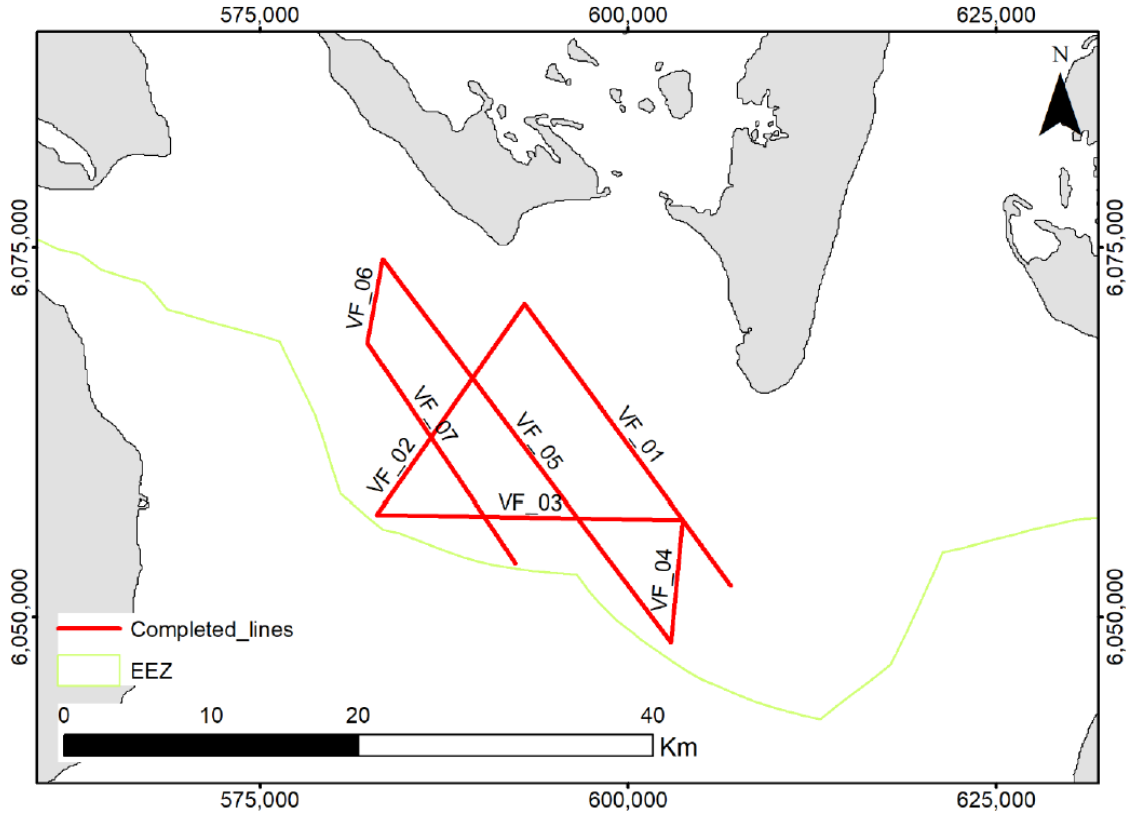


Figure 21. Planned lines (blue) and actual sailed lines (red) in the Vejsnæs Flak survey area.

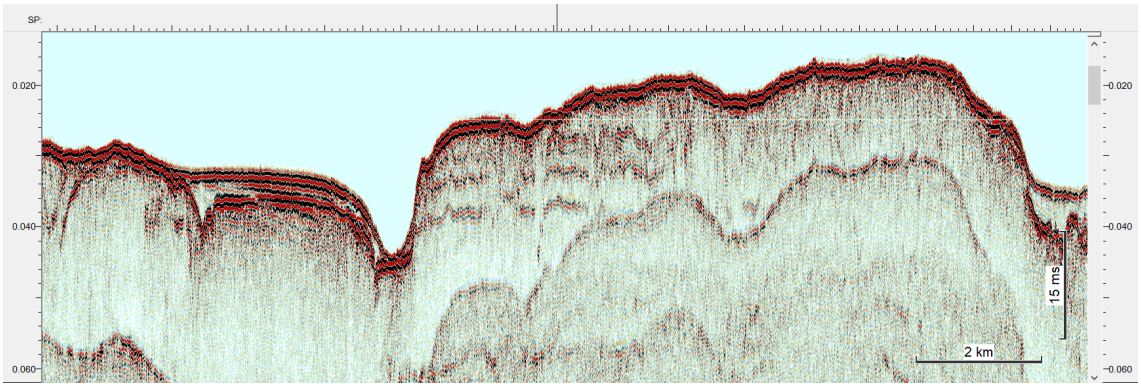


Figure 22. Example of single channel sparker seismic profile (line VF_02) in the Vejsnæs Flak survey area.

7.6 Bornholm

The survey activities in the Bornholm area took place during December 5-9 (Appendix A). The good weather conditions allowed continuous surveying in the area. In total 742 km of data were originally planned and 746 km were acquired (Figure 23). The difference in length is due to a last minute modification of the last planned survey line. Line BO_22 was originally located in the maritime traffic corridor north of Bornholm and re-located 2,7 km to the south-west during the survey to avoid traffic interruptions. Thus, 100 % of the survey plan in the Bornholm area was completed (Table 1). The data quality is good to very good in the area (Figure 24).

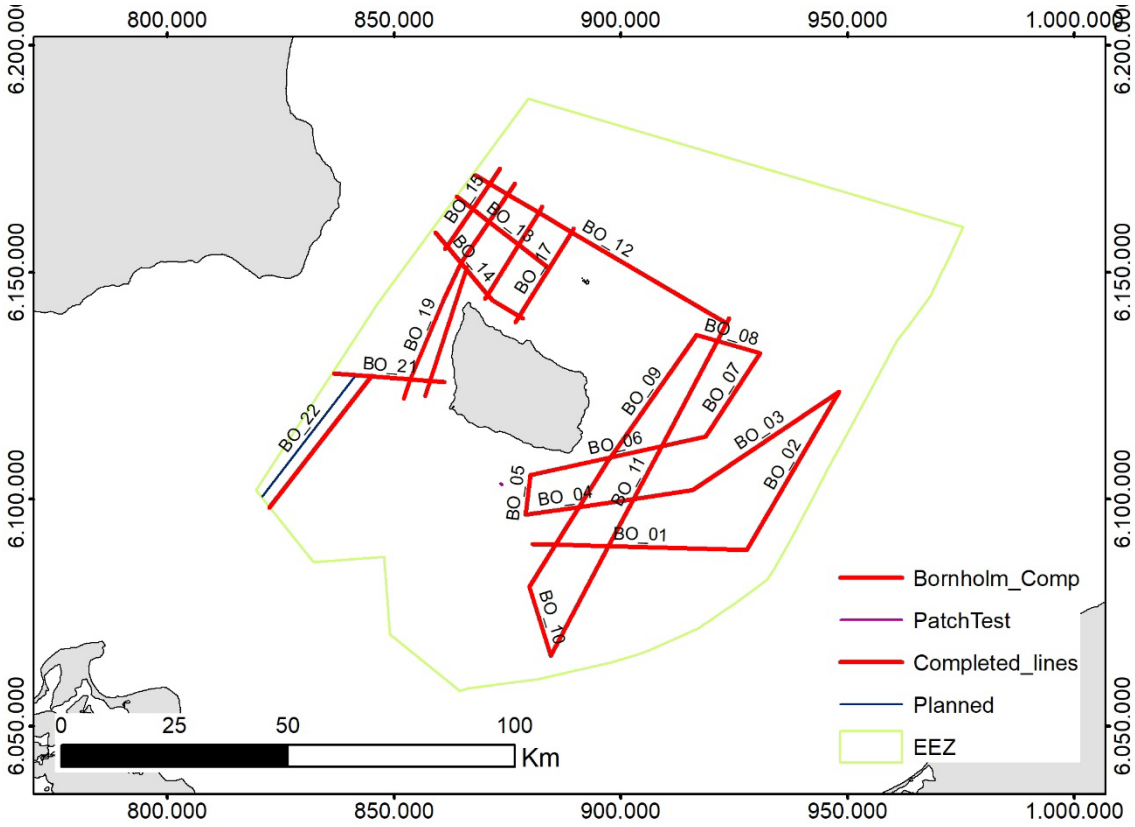


Figure 23. Planned lines (blue) and actual sailed lines (red) in the Bornholm survey area.

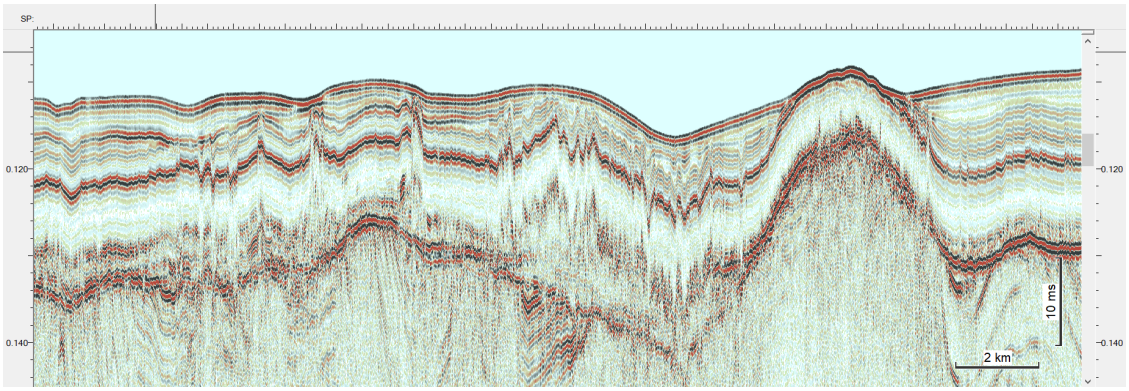


Figure 24. Example of single channel sparker seismic profile (line BO_03) acquired in the Bornholm survey area.

8. Concluding remarks

GEUS has carried out fieldwork as part of a geological screening for offshore wind farms for the Danish Energy Agency (DEA) in 2022 in the inner Danish waters and Baltic Sea.

The ENS 2022 survey was completed on board the survey vessel Fortuna Crane between November 14 and December 11 and the survey was divided in three legs.

During Leg 1 geophysical data were collected along 407 km of planned survey lines recording multibeam echo sounder, side scan sonar, sub-bottom profiler as well as shallow single channel and multichannel sparker seismic (Figure 1, Table 1 and Table 2). During Leg 2 geophysical data were collected along 1604 km of planned survey lines and during Leg 3 along 1280 km. Thus, a total of 3291 km of geophysical data were acquired along the planned survey lines (Figure 1) during the ENS 2022 survey (i.e., excluding turns and connecting lines). Details on the survey lines and transits are provided in the survey log included as Appendix A.

The ship, crew and survey equipment performed satisfactorily and there were no incidents to report. Rough weather conditions and weather standby had an impact on the quantity of acquired data and also on the quality of some of the data. However, the first quality assessment of the data reveals moderate to high quality for most of the data and poor quality for some, but all in all serving the purpose of the survey.

Appendix A – Survey log and SVP log

Contractor: Energistyrelsen				Project name: ENS Havvind screening - ENS 2022 survey			Vessel: Fortuna Crane (Call sign: OZWM2)					GEUS survey crew:					Survey crew Leg 1: Lara F. Pérez (LFP), Lars Georg Rödel (LGR), Nicklas Christensen (NC), Eric Haase (EJH), Anna K. Baltz (AKB); Survey crew L Øbro Hansen (LHA), Lars Georg Rödel, (LGR), Mikkel Skovgaard Andersen (MAN), Thomas Vangkilde-Pedersen (TVP), Zia Møller Moltesen Przysv Sigurd B. Andersen (SBA); Survey crew Leg 3: Lara F. Pérez (LFP), Cecilia E. Nielsen (CEN), Eric Haase (EJH), Lis Allaart (LA), Sigurd B. Andersei
Initials	Date	Start time UTC	End time UTC	Line name	Nav file name	Subbottom profiler	Single Channel Seismic	Multichannel Seismic	EdgeTech SSS	EdgeTech MB	Heading	Line length km	Acc. length km	Wind m/sec	Sea state	Backup status	Comments
LFP	14-11-2022	06:51		Transit to AS_01					T_AS					7	2	x	Departure from Hundested harbor
LFP	14-11-2022	07:23												7	2	x	Marine mammal observation watch began
LFP	14-11-2022	07:32												7	2	x	SVP, boom set up and seismic equipment deploiment
LFP	14-11-2022	09:23	10:54											8	3	x	Deployment operation finished and sparker soft start was initiated
LFP	14-11-2022	10:54	12:47	AS_01	0024_1054_001	ENS22AS_01_20221114_105750	AS_01	AS_01	AS_01	318Data/N011	355			9	3	x	Sparker shooting with 1100 Joule at the beginning of the line, but it could not keep up with 1 shots per seconds. Sparker changed to 400 joule, 1 shot/s
LFP	14-11-2022	12:47	19:24	AS_01_500J			AS_01_500J	AS_01_500J			355	69,8	69,8	9	3	x	Sparker at 500Joule 1 shot/sec. 15:17 Window length on Innomar changed from 25 to 30 m, line renamed as AS_01A. 17:25 window length changed to 45 m, line renamed as AS_01C
EJH	14/15-11-2022	19:24	05:44	LS_01	0008_1922	ENS22LS_01_20221114_192410	LS_SC_01_500J	LS_MC_01_55J	LS_01	318Data/N037	270	85,6	155,4	9	3	x	
AKB	15-11-2022	05:44	12:23	LS_02	0022_0549	ENS22LS_02_20221115_054805	LS_SC_02	LS_MC_02	LS_02	319Data/N018	9	50,0	205,4	10	3	x	6:20 Window length on Innomar changed to 30 m. 10:29 deviation from the line due to shallow water. From N036 is the witing of mbes down to 10 ms before was it 400 ms
AKB	15-11-2022	12:23	15:41	LN_01	0033_1224	ENS22_LN_01_20221115_122311	LN_SC_01_500J	LN_MC_01_500J	LN_01	319Data/N039	20	27,8	233,2	11	4	x	Seismic acquisition stopped
AKB	15-11-2022	15:41	17:41	T_SK		ENS22T_SK_20221115_154126			TSK	319DATA/N049			233,2	11	4	x	Surey on weather standby in Skagen harbor
AKB	18-11-2022	13:25		T_LN02	029_1321	ENS22T_LN02_20221118_132351			T_LN02	322DATA/N000	82					x	Leaving Skagen harbor heading towards the next survey line to resume survey activities
AKB	18-11-2022	13:40			0035_1339						195					x	Navigation test: steering on survey direction at <5 kn
AKB	18-11-2022	13:50			029_1351											x	Change of line decision due to sea status
AKB	18-11-2022	14:56														x	Equipment deploiment and MMO watch started
LFP	18-11-2022	15:53					T_LN_02a	LN_02								x	Soft start initiated 100J for >55 min
LGR	18-11-2022	16:54	17:39	LN_02		ENS22LN_02a_20221118_165454	T_LN_02a	LN_08_500J	LN_08		274	8,8	242,0			x	
EJH	18-11-2022	17:39	22:09	LN_03	0026_1736_0001	ENS22LN_03_20221118_173718	LN_SC_03	LN_MC_03	LN_03	322DATA/N014	86	34,0	276,0	10	4	x	
LGR	18-11-2022	22:09	00:22	LN_04	0015_2213	ENS22LN_04_20221118_220948	LN_SC_04	LN_MC_04	LN_04	322DATA/N028	200	14,8	290,9			x	
NC	19-11-2022	00:22	02:22	LN_05	0012_0010	ENS22_LN_05_20221119_001125	LN_SC_05	LN_MC_05A	LN_05	323DATA/N000	31	14,0	304,9			x	Forgot to Arm seismograph. Therefore restart of MC line and named as LN_05A
AKB	19-11-2022	02:22	06:35	LN_06	0036_0222	ENS22LN_06_20221119_022345	LN_SC_06	LN_MC_06	LN_06	323DATA/N007	200	30,4	335,3			x	04:15 of the line, 04:21 back on line
EJH	19-11-2022	06:35	10:26	LN_07	0009_0642	ENS22LN_07_20221119_063741	LN_SC_07	LN_MC_07	LN_07	323DATA/N020	20	21,3	356,6	11	4	x	
LFP	19-11-2022	10:26	13:15	LN_08	0006_1023_0001	ENS22LN_08_20221119_102607	LN_SC_08	LN_MC_08	LN_08	323DATA/N032	200	17,2	373,8	14	4	x	
NC	19-11-2022	13:15	18:01	LN_09	0017_1314	ENS22LN_09_20221119_131729	LN_SC_09	LN_MC_09	LN_09	323DATA/N041	338	33,4	407,2	15	4	x	
AKB	19-11-2022	18:01	19:40	T_SK2		ENS22T_SK2_20221119_180134			T_SK2	323DATA/N56							Seismic acquisition stopped transit to Skagen harbor for crew change
LFP	19-11-2022	19:40															Dock at Skagen harbor
LHA	20-11-2022	10:25															Leaving Skagen harbor heading towards the next survey line to resume survey activities
LHA	20-11-2022	10:40															Equipment deploiment and MMO watch started
LHA	20-11-2022	11:30															Soft start initiated 100J for >55 min
LHA	20-11-2022	12:45	16:27	LN_10	0031_1248	ENS22LN_10_20221120_124506	LN_SC_10	LN_MC_10	LN_10	324DATA/N00	150	28,3	435,4	9	3	x	start of line offset to avoid anchored ship; single channel streamer malfunction; SVP taken near northwestern start of line; MC data recorded on???
LHA	20-11-2022	16:27	20:02	LN_11	0001_1650	ENS22LN_11_20221120_162715	LN_SC_11b	LN_MC_11a	LN_11	324DATA/N012	330	28,3	463,7	9	3	x	Single channel streamer replaced with backup streamer towed from port stern together with PAM streamer; MC data recorded on D:\ENS_MC
TVP	20-11-2022	20:02	22:23	LN_12	0035_1957	ENS22LN_12_20221120_200212	LN_SC_12	LN_MC_12	LN_12	324DATA/N022		13,0	476,7	9	3	x	
LGR	20-11-2022	22:23		LN_13	0024_2223	ENS22LN_13_20221120_222505	LN_SC_13	LN_MC_13	LN_13	324DATA/N030	205		476,7	9	3	x	Turn to the next line
MAN	20-11-2022	23:16	01:10	LN_14/13a	0024_2325	ENS22LN_14_20221120_231620	LN_SC_13a	LN_MC_14	LN_14	324DATA/N032	210	17,5	494,2	10	4	x	The names "LN_13a" (for SBP + SC) may be renamed afterwards to "LN_14" so all has the same name
MAN	21-11-2022	01:10	03:13	LN_15	0023_0103	ENS22LN_15_20221121_011405	LN_SC_15	LN_MC_15	LN_15	325DATA/N003	30	10,0	504,2	10	4	x	
ZMP	21-11-2022	03:13	07:35	LN_16/16a	0019_0400	ENS22LN_16_20221121_032045	LN_SC_16	LN_MC_16a	LN_16	325DATA/N009	200	31,1	535,3	10/9	4/3	x	MC did not log after first file creation (file 16), so a new file was made (file 16a); Sparker power supply out in c. 2hours from 02.45-06.00
TVP	21-11-2022	07:35	16:40	LS_03	0023_0734	ENS22LS_03_20221121_073515	LS_SC_03	LS_MC_03	LS_03	325DATA/N022	165	85,4	620,7	9→6	3→2	x	Ship deviated from line due to shallow water in the northern part. Edgetech was not recording the first 15 km. Found that Applanix has not been logging since 16/11. Restarted logging 13:15)
LGR	21-11-2022	16:40	20:47	LS_13	0015_1642	ENS22LS_13_20221121_164215	LS_SC_13	LS_MC_13	LS_13	325DATA/N049	62	31,6	652,3	3	2	x	INNO named LS_004 first then changed to LS_013
LGR	21-11-2022	20:47	02:13	LS_04	0021_2047	ENS22LS_04_20221121_204829	LS_SC_04	LS_MC_04	LS_04	325DATA/N062	347	48,8	701,2	4	2	x	Line logged at LS_04 on previous line later changed to 13 on single channel and innomar, now logged as 4a
ZMP	22-11-2022	02:13	05:35	LS_05	0009_0400	ENS22LS_05_20221122_021324	LS_SC_05	LS_MC_05	LS_05	326DATA/N006	60	15,0	716,2	5	3	x	First nav file for turn is 0009_0212. Line mapped with wrong direction, therefore it stopped logging and chose neighbor line at the beginning of line, second nav-file created 0010_033(0009_0400 created after re-select of line in right directio
TVP	22-11-2022	05:35	08:33	LS_06	0011_0535	ENS22LS_06_20221122_053541	LS_SC_06	LS_MC_06	LS_06	326DATA/N016	240	26,4	742,6	9	3	x	Internet connection lost around 7:46 and thus also RTK; connection re-established at 7:54; single channel sparker error; line stopped before EOL due to bad weather
LHA	22-11-2022	08:33	11:48	LS_07	0001_0836	ENS22LS_07_20221122_083347	LS_SC_07	LS_MC_07	LS_07	326DATA/N026	165	18,7	761,3			x	First part of line offset due to previous line abandonment
MAN	22-11-2022	12:54	04:30	T_LS_AS_FR	0001_1258	ENS22T_LS_AS_FR_20221122_125414	x	x	T_LS_AS_FR	326DATA/N036	x			10-13	3→4	x	Transit line from LS (north of Djursland) through AS to Fredericia habour. Sailing with transit speed. Recording SSS, MB and Innomar
LHA	23-11-2022	06:06	11:45	T_VF	x	ENS22T_VF_20221123_060616	x	x	T_VF	327DATA/N015	x					x	Transit line from Fredericia to Vejsnæs Flak, Remote GPS
LHA	23-11-2022	12:00															MMO watch initiated and equipment deployment
LHA	23-11-2022	14:02															Soft start initiated 100J for >55 min
MAN	23-11-2022	14:14		T_VF_2	x	ENS22T_VF_20221123_141415	x	x	T_VF_2	327DATA/N034	x			8	3		
LHA	23-11-2022	14:51	15:43	T_VF_07	0007_1454	ENS22T_VF_07_20221123_145137	T_VF_07	T_VF_07	T_VF_07	327DATA/N036	165						RTK lost
ZMP	23-11-2022	15:43	17:38	VF_07/07a	0007_1540	ENS22VF_07_20221123_154330	VF_SC_07a	VF_MC_07	VF_07	327DATA/N038	325	18,0	779,2	7	2	x	RTK still lost
TVP	23-11-2022	17:38	18:12	VF_06	0006_1737_0001	ENS22VF_06_20221123_173816	VF_SC_06	VF_MC_06	VF_07	327DATA/N044	10	5,8	785,0	8	3	x	RTK still lost
TVP	23-11-2022	18:12	22:49	VF_05	0006_1820/0005_1836	ENS22VF_05_20221123_182112	VF_SC_05	VF_MC_05	VF_05	327DATA/N046	143	32,5	817,5	8	3	x	20:18 Minitrace genstartet. VF_SC_05b 22:05 MV-POSView ændret fra Monitor til Connect. Ingen RTK
SBA	23-11-2022	22:49	23:48	VF_04	0004_2249	ENS22VF_04_20221123_225225	VF_SC_04	VF_MC_04	VF_04	327DATA/N060	5	8,3	825,8	8	3	x	MV-POSView genstartet SOL i forsøg på at få RTK.
MAN	23-11-2022	23:48	02:04	VF_03	0003_2348	ENS22VF_03_20221123_235333	VF_SC_03	VF_MC_03	VF_03	327DATA/N064	270	20,8	846,6	8	3	x	No pospac data
ZMP	24-11-2022	02:04	03:59	VF_02	0002_0206	ENS22VF_02_20221124_020325	VF_SC_02	VF_MC_02	VF_02	328DATA/N006	43	17,5	864,1	7	3	x	Nav file in turn 0003_0202, no pospac data
ZMP	24-11-2022	03:59	06:40	VF_01	0001_0354	ENS22VF_01_20221124_035831	VF_SC_01	VF_MC_01	VF_01	328DATA/N011	134	23,6	887,7	7	3	x	Equipment retrieved at end of line for start transit back to Kattegat Anholt South/Læsø South area, no pospac data
TVP	24-11-2022	07:15		Transit to AS													10:15 Applanix og MV-POSView genstartet for at løse problem med ntrip, rtk er nu tilbage SBA.
LHA	24-11-2022	16:45															MMO watch initiated and equipment deployment, SVP taken near start of line AS_02
LHA	24-11-2022	18:08															Soft start initiated 100J for >55 min
LHA	24-11-2022	18:23	19:10	AS_02		ENS22AS_02_20221124_182330			AS_02	AS_02							
TVP	24-11-2022	19:10	19:45	AS_02	0023_1910	ENS22AS_02_20221124_182330	T_AS_02	T_AS_02	T_AS_02	328DATA/N020	200			5	2	x	Transit til AS_02
TVP	24-11-2022	19:45	03:30	AS_02	0023_1943	ENS22AS_02_20221124_193525	AS_SC_02 + 02b	AS_MC_02	AS_02	328DATA/N022	5	70,7	958,4	5	2	x	Single channel streamer moved to outermost position on boom in starboard, multichannel streamer towed from center stern, Sparker, SC and MC layback 15-20 m more than before ca Around 23:40: SC restarted and began new line called AS_SC_02
ZMP	25-11-2022	03:30	05:32	LS_08	0017_0325	ENS22LS_08_20221125_033055	LS_SC_08	LS_MC_08	LS_08	329DATA/N010	240	18,6	977,0	9	3	x	Started line with 17,8 km to the end
TVP	25-11-2022	05:32	07:44	LS_09	0018_0535	ENS22LS_09_20221125_053248	LS_SC_09	LS_MC_09	LS_09	329DATA/N018	240	20,1	997,1	9	3	x	First part is transit to line start and line started with 13.3 km to end
TVP	25-11-2022	07:44	12:48	LS_10	0008_0745	ENS22LS_10_20221125_074444	LS_SC_10	LS_MC_10	LS_10	329DATA/N024	60	37,8	1034,9	10	3	x	First part is transit to line start and line started with 37.4 km to end
MAN	25-11-2022	12:48	14:59	LS_11	0019_1246	ENS22LS_11_20221125_125106	LS_SC_11	LS_MC_11	LS_11	329DATA/N040	240	10,5	1045,5	11	4	x	Tried to restart the Applanix in the turn in order to get RTK signal (13:12) – unfortunately it did not work, so still no RTK signal.
ZMP	25-11-2022	14:59	16:44	LS_12	0019_1458	ENS22LS_12_20221125_150132	LS_SC_12	LS_MC_12	LS_12	329DATA/N047	60	13,0	1058,5	11	4	x	
ZMP	25-11-2022	16:44	19:20	LS_14	0020_1644	ENS22LS_14_20221125_164658	LS_SC_14	LS_MC_14	LS_14	329DATA/N053	330	20,3	1078,7	10→9	4→3	x	
TVP	25-11-2022	19:20	23:16	LS_15	0005_1919	ENS22LS_15_20221125_192017	LS_SC_15	LS_MC_15	LS_15	329DATA/N061	60	23,2	1101,9	9	3	x	First part is transit to line start and line started with ~22km to end
MAN	25-11-2022	23:16	03:28	LS_16	0014_2314	ENS22LS_16_20221125_231838	LS_SC_16	LS_MC_16	LS_16	329DATA/N073	240	27,3	1129,2	10→9	3	x	
ZMP	26-11-2022	03:28	08:32	LS_17	0015_0327	ENS22LS_17_20221126_033040	LS_SC_17+17a	LS_MC_17	LS_17	330DATA/N010	60	36,7	1165,9	7	3	x	Sparker froze at 4:28, new file 17a created
LHA	26-11-2022	08:32	11:48	LS_18	0003_0831	ENS22LS_18_20221126_083249	LS_SC_18	LS_MC_18	LS_18	330DATA/N026	240	19,9	1185,8	6	3	x	First part is transit to line start and line started with 20 km to end; ~9:50 bottom detection lost briefly on edgetech and innomar due to large depression/channel on seafloor
MAN	26-11-2022	11:48	14:51	LS_19	0002_1156	ENS22LS_19_20221126_115257	LS_SC_19	LS_MC_19	LS_19	330DATA/N036	60	18,9	1204,6	6	3	x	Max depth multibeam changed from 50 to 80m
ZMP	26-11-2022	15:32	20:37	LS_20+20a+20b	0006_1527	ENS22LS_20_20221126_153424	LS_SC_20a	LS_MC_20	LS_20	330DATA/N045	275	42,5	1247,1	6	3	x	Sparker frozen, new file 20a created
SBA	26-11-2022	20:37	22:17	T_LS_21	0004_2037	ENS22T_LS_21_20221126_203933	T_LS_SC_21	T_LS_MC_21	T_LS_21	330DATA/N061	40		1247,1	6	3	x	Applanix & Edgetech/Applanix survey PC restartet to fix Ntrip problem.
LHA	26-11-2022	22:17	02:51	LS_21	0004_2037	ENS22_LS_21_20221126_221757	LS_SC_21	LS_MC_21	LS_21	330DATA/N066	200	38,8	1285,9	6	3	x	SVP at start of line. Connection to Applanix falls out, and then it quickly reestablish the connection – this happens many times
ZMP	27-11-2022	02:51	08:43	AS_03	0014_0251	ENS22AS_03_20221127_025540	AS_SC_03	AS_MC_03	AS_03	331DATA/N008	175	23,8	1309,7	6	3	x	First part is transit to line and sailing around windfarm area, start of line c. 06:00 UTC; RTK lost again
LHA	27-11-2022	08:43	12:20	AS_04	0009_0842	ENS22AS_04_20221127_084335	AS_SC_04	AS_MC_04	AS_04	331DATA/N026	241	28,3	1337,9	8	3	x	10:50 single channel sparker frosset – genstart
MAN	27-11-2022	12:20	15:26	T_AS_05	0012_1218	ENS22T_AS_05_20221127_122328	T_AS_SC_05	T_AS_MC_05	T_AS_05	331DATA/N037	150		1337,9	9	3	x	Transit line from AS_04 to AS_05
ZMP	27-11-2022	15:26	17:30	AS_05	0012_1524	ENS22AS_05_20221127_152624	AS_SC_05	AS_MC_05	AS_05	331DATA/N047	65	17,8	1355,8	9	3	x	
TVP	27-11-2022	17:30	20:13	AS_06	0003_1729	ENS22AS_06_20221127_173010	AS_SC_06	AS_MC_06	AS_06	331DATA/N054	240	17,8	1373,6	9	3	x	First part of line is transit from AS_05 to AS_06
SBA	27-11-2022	20:13	02:14	AS_07	00022_2013	ENS22AS_07_20221127_201337	AS_SC_07	AS_MC_07	AS_07	331DATA/N063	60	47,1	1420,7	9	3	x	First part of line is transit from AS_06 to AS_07
ZMP	28-11-2022	02:14	05:38	AS_08	0003_0211	ENS22AS_08_20221128_021357	AS_SC_08	AS_MC_08	AS_08	332DATA/N006	240	21,9	1442,6	12	3	x	First part of line is transit from AS_06 to AS_08
TVP	28-11-2022	05:38	09:08	AS_09	0012_0537	ENS22AS_09_20221128_053841	AS_SC_09	AS_MC_09	AS_09	332DATA/N006	65	23,3	1465,9	9	3	x	First part of line is transit from AS_06 to AS_09, Geosuite frozen 07:16, restarted 07:28
LHA	28-11-2022	09:08	10:15	T_AS_10	0011_0911	ENS22T_AS_10_20221128_090810	T_AS_SC_10	T_AS_MC_10	T_AS_10	332DATA/N028	214		1465,9	11	3	x	
LHA	28-11-2022	10:15	16:23	AS_10	0011_0911	ENS22AS_10_20221128_101506	AS_SC_10	AS_MC_10	AS_10	332DATA/N032	65	51,4	1517,3	11	3	x	
ZMP	28-11-2022	16:23	18:02	AS_11	0025_1620	ENS22AS_11_20221128_162320	AS_SC_11	AS_MC_11	AS_11	332DATA/N051	194		1517,3	10	3	x	GPS receiver (port 2) stopped (out of battery); recording stopped and sparker+streamer retrieved to replace GPS batteries.
TVP	28-11-2022	18:59	23:52	AS_11a	0025_1902	ENS22AS_11a_20221128_185949	AS_SC_11a	AS_MC_11a	AS_11a	332DATA/N057	194	34,4	1551,7	10	3	x	Continue recording at breakpoint, first part circle back to point
MAN	28-11-2022	23:52	03:50	AS_12	0026_2350	ENS22AS_12_20221128_235454	AS_SC_12	AS_MC_12	AS_12	332DATA/N072		33,4	1585,1	10	3	x	
ZMP	29-11-2022	03:50	10:15	AS_13	0020_0347	ENS22AS_13_20221129_034932	AS_SC_13	AS_MC_13	AS_13	333DATA/N011	222	56,5	1641,6	11	3	x	Detour due to shallow water (mid-line); line stopped ~7.3 km before end-of-line due to shallow water
LHA	29-11-2022	10:15	19:06	AS_14	0021_1013	ENS22AS_14_20221129_101511	AS_SC_14	AS_MC_14	AS_14	333DATA/N031	60	66,5	1708,1	9	3	x	
LHA	29-11-2022	19:06	21:12	T_AS_15	0019_1909	ENS22T_AS_15_20221129_190654	T_AS_SC_15	T_AS_MC_15	T_AS_15	333DATA/N058			1708,1	9	3	x	SVP SOL
SBA	29-11-2022	21:12	02:33	AS_15	0019_2113	ENS22AS_15_20221129_211232	AS_SC_15	AS_MC_15	AS_15	333DATA/N065	240	42,9	1751,0	9	3	x	

ZMP	30-11-2022	02:33	08:24	AS_16	0018_0230	ENS22AS_16_20221130_023317	AS_SC_16	AS_MC_16	AS_16	334DATA/N007	60	33,2	1784,2	7	3	x		
TVP	30-11-2022	08:24	13:22	AS_17	0017_0825	ENS22_17_20221130_082432	AS_SC_17	AS_MC_17	AS_17	334DATA/N025	240	32,5	1816,7	7	3	x	09:39 - small deviation from line due to fishing gear in the water. Line ended with slow speed in the transit towards AS_18 (SVP sample)	
MAN	30-11-2022	13:22	22:03	AS_18	0016_1322	ENS22_18_20221130_132232	AS_SC_18	AS_MC_18	AS_18	334DATA/N040	60	67,7	1884,4	7	3	x	Line started with slow speed in the transit from AS_17 (SVP sample); 21:19 wreck observed on SSS (lat 56°42.1863 lon 11°52,8381)	
SBA	30-11-2022	22:35	01:40	AS_19	0017_2235	ENS22_19_20221130_223536	AS_SC_19	AS_MC_19	AS_19	334DATA/N067	240	24,5	1908,9	7	3	x		
MAN	01-12-2022	01:40	04:26	AS_20	0018_0140	ENS_20_20221201_014409	AS_SC_20	AS_MC_20	AS_20	335DATA/N005		15,8	1924,7	7	3	x		
ZMP	01-12-2022	04:26	06:07	T_AS_21	0008_0426	ENS22T_AS_21_20221201_042545	T_AS_SC_21	T_AS_MC_21	T_AS_21	335DATA/N014	180		1924,7	6	3	x		
TVP	01-12-2022	06:07	07:41	AS_21	0008_0606	ENS22_AS_21_20221201_060707	AS_SC_21	AS_MC_21	AS_21	335DATA/N020	85	12,3	1937,0	5	3	x		
TVP	01-12-2022	07:41	09:09	T_AS_22	0008_0740	ENS22T_AS_22_20221201_074120	T_AS_SC_22	T_AS_MC_22	T_AS_22	335DATA/N025	225		1937,0	5	3	x		
LHA	01-12-2022	09:09	10:32	AS_22	0007_0814	ENS22AS_22_20221201_090942	AS_SC_22	AS_MC_22	AS_22	335DATA/N030	61	10,4	1947,4	5	3	x		
LHA	01-12-2022	10:32	12:18	AS_23	0002_1035	ENS22AS_23_20221201_103200	AS_SC_23	AS_MC_23	AS_23	335DATA/N034	191	13,2	1960,6	5	3	x	SVP at SOL	
MAN	01-12-2022	12:18	13:55	AS_24	0004_1217	ENS22AS_24_20221201_122053	AS_SC_24	AS_MC_24	AS_24	335DATA/N040	260	15,0	1975,6	4	2/3	x		
MAN	01-12-2022	13:55	14:58	AS_25	0005_1355	ENS22AS_25_20221201_135915	AS_SC_25	AS_MC_25	AS_25	335DATA/N045	155	8,1	1983,7	4	2	x		
ZMP	01-12-2022	14:58	17:00	AS_26	0006_1455	ENS22AS_26_20221201_145803	AS_SC_26	AS_MC_26	AS_26	335DATA/N048	66	16,5	2000,1	6	2	x		
ZMP	01-12-2022	17:00	18:17	AS_27	0001_1658	ENS22AS_27_20221201_170023	AS_SC_27	AS_MC_27	AS_27	335DATA/N055	111	11,4	2011,6	6	2	x	SVP at EOL	
LHA		18:58															End of Leg 2; equipment recovered setting course toward Køge Havn	
LFP	01-12-2022	17:22	20:04	T_KK_01	0013_1738	ENS22T_KK_01_20221202_173242			T_KK_01	336DATA/N001				9	3	x	Start of ENS 2022 leg 3. Leaving Køge harbor and heading to SOL KK_01; SVP taken at 18:03 at 55°27.4422 17°55,XXXX; PAM deployed at 18:12 at 55°27.4881 12°17.9942; began P	
SBA	02-12-2022	20:04	23:05	KK_01	0013_1738	ENS22KK_01_20221202_200600	KK_SC_01	KK_MC_01	KK_01	336DATA/N009	121	22,2	2033,8	9	3	x	stop 18:50; 18:51 soft start sparker at 100 J.	
LA	02-12-2022	23:05	02:44	KK_02	0006_2304	ENS22KK_02_20221202_230506	KK_02	KK_MC_02	KK_02	336DATA/N019	174	30,3	2064,1	8	4	x	SOL KK_02 at the beginning of LA's shift;	
CEN	03-12-2022	02:44	03:38	KK_02a	0006_2304	ENS22KK_02a_20221203_024441	KK_SC_02a	KK_02a	KK_02a	337DATA/N009	66			10	4	x	Direction changed from line because of bad weather	
CEN	03-12-2022	03:38	05:15	KK_03	0004_0337	ENS22KK_03_20221203_033657	KK_SC_03	KK_MC_03	KK_03	337DATA/N011	112	13,6	2077,7	10	4	x	SOL KK_03; 04:45 the Robin Hood, a large vessel passed rather close behind us.; ended line 5 mins early due to Windmill farm in front of us.	
EJH	03-12-2022	05:15	07:15	KK_04	0003_0514_0001	ENS22KK_04_20221203_051504	KK_SC_04	KK_MC_04	KK_04	337DATA/N017	300	7,3	2085,0	10	4	x	At 27.5 km interesting Sonar seafloor features.	
LFP	03-12-2022	07:15	08:44	KK_05	0002_0714	ENS22KK_05_20221203_071505	KK_SC_05	KK_MC_05	KK_05	337DATA/N023		8,2	2093,2	10	4	x	The bridge warned they can not keep on the line and on the heading due to weather. Waves are 1,3 m and wind 10 m/s. Thus we keep recording while heading on zig-zag to SOL KK_	
SBA	03-12-2022	08:44	15:07	KK_06	0011_0844	ENS22KK_06_20221203_084650	KK_SC_06	KK_MC_06	KK_06	337DATA/N028		52,4	2145,6	10	4	x	Survey speed 6 knots the bridge (Jan) needs 6 knots to steer because of the weather	
CEN	03-12-2022	15:07	01:28	KK_07	0014_1505	ENS22KK_07_20221203_150738	KK_SC_07	KK_MC_07	KK_07	337DATA/N048	60	77,0	2222,6	11	4	x	NaviScan lost the position Data recording in MB and SSS lost for about 45 mins, message about 'no valid velocity data' from edgetech around 00:00, bathymetry marked with 'error' on clicked OK on the error box around 00:04 and 'error' switched back to OI	
LA	04-12-2022	01:28	10:47	KK_08	0016_0126	ENS22KK_08_20221204_012907	KK_SC_08	KK_MC_08	KK_08	338DATA/N005	237	69,7	2292,3	7	3	x	Stopped sss KK_07 and started the line again before chnaging name, stopped again and started with new line name (hope I did not overwrite the KK_07 data!), blue navipack window 01:50: 07:30 noted the SSS not recording, out of space, disk was full since 05:52. SPD files 335DATA deleted from disk. Ethernet Log started 09.01 stoped 05:4	
SBA	04-12-2022	10:57	12:10	T_KK_09	0015_1047	ENS22T_KK_09_20221204_105753	T_KK_SC_09	T_KK_MC_09	T_KK_09	338DATA/N033	120			7	3	x	SVP SOL	
LA	04-12-2022	12:10	15:41	KK_09	0015_1207	ENS22_KK_09_20221204_121033	KK_SC_09	KK_MC_09	KK_09	338DATA/N037	14	30,0	2322,3	8	3	x	Line stopped due to bad weather	
CEN	04-12-2022	15:41		T_Bornholm	0015_1540	ENS22_T_Bornholm_20221204_153930			T_Bornholm	338DATA/N048				11	4	x	Equipment recovered, SVP and setting course towards Bornholm	
LFP	05-12-2022	06:55		Patch Test						339Data/N022						x	MB and SSS patch test over Bakkegrund Syd Slope	
LFP	05-12-2022									339Data/N023						x	The offsets during the patch tests were nearly 20 meters in some cases due to poor steering	
LFP	05-12-2022									339Data/N024						x		
LFP	05-12-2022									339Data/N026						x		
LFP	05-12-2022									339Data/N027						x		
LFP	05-12-2022									339Data/N028						x		
LFP	05-12-2022									339Data/N029						x		
LFP	05-12-2022									339Data/N030						x		
LFP	05-12-2022									339Data/N031						x		
LFP	05-12-2022	08:23		End of patch test													Patch test is over initiating equipment deployment, MMO and PAM watches, and transit to BO_01	
LFP	05-12-2022	08:48															PAM and MMO watches started. Equipment deployed, Tail streamer snap hook moved 10 cm down.	
LFP	05-12-2022	09:18															Sparker soft start initiated 100 J every 3 seconds	
SBA	05-12-2022	09:20	10:20	T_BO_01			T_BO_09	T_BO_01	T_BO_01							x		
SBA	05-12-2022	10:14														x	Sparker 500 J shoting 1 per second	
SBA	05-12-2022	10:20	16:28	BO_01	0019_1020	ENS22BO_01_20221205_102254	BO_SC_09	BO_MC_01	BO_01	399Data/N038	91	47,2	2369,5			x	Realised that sparker was not shooting around 13:30, fixed 13:34	
CEN	05-12-2022	16:28	21:09	BO_02	0020_1626_0001	ENS22BO_02_20221205_162853	BO_SC_02	BO_MC_02	BO_02	339DATA/N057		40,3	2409,8	5	3	x	17:30 internet went out (EJH); 19:25 single channel froze, tried restarting as BO_SC_02a but didn't work. Rebooted Trace2 and named line BO_SC_02b.	
LFP	05-12-2022	21:09	01:45	BO_03	0021_2109_0001	ENS22BO_03_20221205_211111	BO_SC_03	BO_MC_03	BO_03	339DATA/N072	236	38,8	2448,6	2	3	x		
LA	06-12-2022	01:45	05:57	BO_04	0022_0141	ENS2022BO_04_20221206_014519	BO_SC_04	BO_MC_04	BO_04	340DATA/N005	262	37,2	2485,8	2	3	x		
EJH	06-12-2022	05:57	07:14	BO_05	0006_0557	ENS22BO_05_20221206_055828	BO_SC_05	BO_MC_05	BO_05	340DATA/N018	13	8,8	2494,6	1	2	x	07:02 at 1.8 km from EOL, bridge said unmarked buoy in our path, will deviate course if necessary. Ship passed it at 400m from EOL, at 100m off our port side.	
EJH	06-12-2022	07:14	12:03	BO_06	0007_0713_0001	ENS22BO_06_20221206_071518	BO_SC_06	BO_MC_06	BO_06	340DATA/N022	80	40,0	2534,6	1	2	x	Stayed away from Buoy near EOL_05/SOL_06	
LA	06-12-2022	12:03	14:57	BO_07	0002_1200	ENS22BO_07_20221206_120330	BO_SC_07	BO_MC_07	BO_07	340DATA/N037	33	21,9	2556,5	1	2	x		
CEN	06-12-2022	14:57	16:53	BO_08	0004_1455_001	ENS22BO_08_20221206_145755	BO_SC_08	BO_MC_08	BO_08	340DATA/N046	286	14,6	2571,1	4	2/3	x		
CEN	06-12-2022	16:53	00:10	BO_09	0005_1652	ENS22BO_09_20221206_165339	BO_SC_09	BO_MC_09	BO_09	340DATA/N052	219	66,5	2637,6	5	3	x		
LA	07-12-2022	00:10	02:13	BO_10	0008_0007	ENS22BO_10_20221207_001046	BO_SC_10	BO_MC_10	BO_10	341DATA/N000	163	15,9	2653,5	6	3	x	Speed has been a little more than 5 knots until 00:05 local time, then reduced to 4.3 knots after bridge asked about if the speed was fine, weird thing on SSS 01:39 – ship wreck? Visit innomar too looking like (positive) hyperbol	
CEN	07-12-2022	02:13	12:47	BO_11	0009_0211	ENS22BO_11_20221207_121355	BO_SC_11	BO_MC_11	BO_11	341DATA/N007	28	84,0	2737,5	6	3	x	02:30 internet went out, back on at 03:41.	
LA	07-12-2022	12:47	20:42	BO_12	0003_1244	ENS22BO_12_20221207_124717	BO_SC_12	BO_MC_12	BO_12	341DATA/N039	300	64,3	2801,8	5	3	x	SVP 12:38 at nearly 100 m depth. 17:15ish the SC stopped, re-start named BO_SC_12b.	
LFP	07-12-2022	20:42	23:45	BO_13	0013_2043	ENS22BO_12_20221207_204218	BO_SC_13	BO_MC_13	BO_13	341DATA/063	127	25,3	2827,1	6	3	x	SVP before starting line. 5,5 kn due to wind, SC stopped around 23:25 re-start named BO_SC_13a, realised 23:49 that I had not clicked in 'external' triggering, mistake in SB-name in t	
LA	07-12-2022	23:45	01:21	T_BO_14	0015_2341	ENS22T_BO_14_20221207_234519	T_BO_SC_14	T_BO_MC_14	TBO_14	341DATA/N037	214		2827,1	7	3	x	Start of T_BO_14 SC not recording, recording from 23:49, knots down to 4.5 :)	
LA	08-12-2022	01:21	04:41	BO_14	0015_0118	ENS22_BO_14_20221208_012142	BO_SC_14	BO_MC_14	BO_14	342DATA/N004	300	27,3	2854,4	7	3	x		
CEN	08-12-2022	04:41	05:13	T_BO_15	0014_0438	ENS22_T_BO_15_20221208_044147	T_BO_SC_15	T_BO_MC_15	T_BO_15	342DATA/N014	164		2854,4	7	3	x		
EJH	08-12-2022	05:13	07:41	BO_15	0014_0513	ENS22_BO_15_20221208_051048	BO_SC_15	BO_MC_15	BO_15	342DATA/N017	38	21,3	2875,7	8	3	x		
EJH	08-12-2022	07:41	08:59	T_BO_16	0012_0741 – 0749_0001	ENS22_T_BO_16_20221208_074104	T_BO_MC_16	T_BO_MC_16	T_BO_16	342DATA/N024	123		2875,7	4	3	x	Changed navigation line selection a few times because Bridge wanted tracking, so NAV file name may have changed from original indicated.	
SBA	08-12-2022	08:59	11:41	BO_16	0012_0859	ENS22BO_16_20221208_090108	BO_SC_16	BO_MC_16	BO_16	342DATA/N028	211	23,8	2899,5	4	3	x	Between 08:00 and 12:00 survey speed has been kept over 5 knots even on calm sea. From 12:00 onwards and the speed was kept around 4.4 knots	
LA	08-12-2022	11:41	12:37	T_BO_17	0010_1139	ENS22T_BO_17_20221208_114146	T_BO_SM_17	T_BO_MC_17	T_BO_17	342DATA/N037	150		2899,5	1	2	x	SVP around 11:41	
LA	08-12-2022	12:37	15:56	BO_17	0010_1236	ENS_BO_17_20221208_123709	BO_SC_17	BO_MC_17	BO_17	342DATA/N040	32	24,2	2923,7	1	2	x		
CEN	08-12-2022	15:56	17:39	T_BO_18	0011_1553	ENS22T_BO_18_20221208_155615	T_BO_SC_18	T_BO_MC_18	T_BO_18	342DATA/N050	320		2923,7	2	2	x		
EJH	08-12-2022	17:39	20:18	BO_18	0011_1741	ENS22_BO_18_20221208_174313	BO_SC_18	BO_MC_18	BO_18	342DATA/N056	225	21,2	2944,9	3	2	x		
LFP	08-12-2022	20:18	00:08	BO_19	0017_2017	ENS22_BO_19_20221208_201827	BO_SC_19	BO_MC_19	BO_19	342DATA/N064	205	32,5	2977,4	3	2	x		
LA	09-12-2022	00:08	00:42	T_BO_20	0016_0005	ENS22T_BO_20_20221209_000815	T_BO_SC_20	T_BO_20	T_BO_20	343DATA/N000	116		2977,4	3	2	x	Speed over 5 knots during transit	
LA	09-12-2022	00:42	04:17	BO_20	0016_0039	ENS22_BO_20_20221209_004220	BO_SC_20	BO_20	BO_20	343DATA/N002	18	29,8	3007,2	3	2/3	x	4.6 knots, error on MC noticed around 00:57 – new line BO_MC_20a started. SC stopped at 2:57, started again as BO_SC_20a.	
CEN	09-12-2022	04:17	08:05	T_BO_21	0018_0415	ENS22T_BO_21_20221209_041734	T_BO_SC_21	T_BO_MC_21	T_BO_21	343DATA/N013	180		3007,2	5	2	x		
SBA	09-12-2022	08:05	10:54	BO_21	0018_0805	ENS22BO_21_20221209_080742	BO_SC_21	BO_MC_21	BO_21	343DATA/N025	274	24,3	3031,5	5	3	x		
SBA	09-12-2022	10:54	16:19	BO_22	0001_1054	ENS22BO_22_20221209_105602	BO_SC_22	BO_MC_22	BO_22	343DATA/N034	217	36,9	3068,4	5	3	x	The original position of BO_22 can not be surveyed due to the trafic corridor and navigation regulations. Thus, the line has been moved 1.5 nm towards Bornholm.	
CEN	09-12-2022	16:19		T_KK_10	0001_1617_0001	ENS22T_KK_1020221209_161959				343DATA/N051				5	3	x	Equipment recovered, SVP, setting course towards Møn.	
LFP	09-12-2022	21:05	21:35													x	PAM watch started	
LFP	09-12-2022	21:35	22:35				T_KK_SC_10a	T_KK_MC_10								x	Soft start mode initiated on the sparker and seismic recording on SC and MC initiated as T_KK_10	
LFP	09-12-2022	22:35	03:35	KK_10	0009_2236	ENS22KK_10_20221209_223500	KK_10	KK_MC_10	KK_10	343DATA/N070	354	41,5	3109,9	2	2	x	Sparker mode 500 J regular acquisition initiated	
CEN	10-12-2022	03:35	06:26	KK_11	0007_0333	ENS22KK_11_20221210_033627	KK_SC_11	KK_MC_11	KK_11	344DATA/N010	290	16,6	3126,5	3	2	x	First part of line is transit, SOL at 04:30. Innomar losing bottom tracking occasionally (EJH)	
EJH	10-12-2022	06:26	09:58	KK_12	0006_0627	ENS22KK_12_20221210_062814	KK_SC_12	KK_MC_12b	KK_12	344DATA/N019	118	23,0	3149,5	2	2	x	MC not showing line name, so re-started as KK_12a during transit, 12b on line. Innomar losing bottom tracking occasionally.	
SBA	10-12-2022	09:58	12:01	KK_13	0005_0958	ENS22KK_13_20221210_095843	KK_SC_13	KK_MC_13	KK_13	344DATA/N030	290	12,3	3161,8	2	2/3	x	SVP EOL(12?), call from the bridge: towards EOL 13 there are patchy areas of shallow water so will end the line 200-300 metres before planned EOL	
LA	10-12-2022	12:01	15:13	KK_14	0004_1159	ENS22KK_14_20221210_120147	KK_SC_14	KK_MC_14	KK_14	344DATA/N037	109	21,5	3183,3	4	2	x		
CEN	10-12-2022	15:13	17:39	KK_15	0002_1511_0001	ENS22KK_15_20221210_151306	KK_SC_15	KK_MC_15	KK_15	344DATA/N047	20	17,5	3200,8	3	2	x	A wind farm was on the first part of the line, sailed around it.	
EJH	10-12-2022	17:39	21:52	KK_16	0008_1739	ENS22KK_16_20221210_174024	KK_SC_16	KK_MC_16	KK_16	344DATA/N055	300			4	2	x	Sparker stopped working: circa 19:20 , 55N11'20.96 012E41'25.28, 11km before EOL.	
LFP	10-12-2022	21:52	00:09	KK_17	0008_2155	ENS22KK_17_20221210_215236	KK_SC_17	KK_MC_17	KK_17	344DATA/N068	297	23,8	3224,6	4	2	x	A testing line T_KK_16B was recorded in both SC and MC before going back to the line KK_16 that has been renamed as KK_16 in all the systems	
LA	11-12-2022	00:09	01:33	KK_18	0010_0006	ENS22KK_18_20221210_000912	KK_SC_18	KK_MC_18	KK_18	345DATA/N000	111	8,3	3232,9	4	2	x	Connection between navigation screen on bridge and survey container is broken, bridge now sailing after start/endOL coordinates, reaching the 'real' SOL around 00:42	
LA	11-12-2022	01:33	04:32	T_KK_19	0001_0130	ENS22T_KK_19_20221210_013336	T_KK_SC_19	KK_MC_19	T_KK_19	345DATA/N005	273			6	2	x	KK_18 ends in Swedish territory, so will stop and turn before that. Furthermore, the drawn transit line to KK_19 interfers with the main sailing direction in the Øresund corridor, so we west 3 nautic miles, before sailing north. During the transit, 03:50 Navigation system temporarily offline (SC). 04:21 NTRIP temporarily on/offlir	
CEN	11-12-2022	04:32	07:01	KK_19	0012_0431	ENS22KK_19_20221211_043349	KK_SC_19	KK_MC_19	KK_19	345DATA/N015	303	21,4	3254,3	5	2	x	SC stopped around 04:xx	
EJH	11-12-2022	07:01	09:12	KK_20	0013_0702	ENS22KK_20_20221211_070330	KK_SC_20	KK_MC_20	KK_20	345DATA/N024	213	14,7	3269,0	3	2	x	SC restarted around 08:36, and around 09:00	
LFP	11-12-2022	09:12	11:10	KK_21	0014_0912	ENS22KK_21_20221211_091303	KK_SC_21	KK_MC_21	KK_21	345DATA/N030	31	11,5	3280,5	3	2	x		
LA	11-12-2022	11:10	13:02	KK_22		ENS22KK_22_20221211_111047	KK_SC_22	KK_MC_22	KK_22	345DATA/N036	208	10,7	3291,2	4	2	x	SOL final line ENS22	
LA	11-12-2022	13:02	14:38	T_KK_F	0012_1301	Off – 130255	off	off	T_KK_F	345DATA/N043	320			4	2	x	EOL, Innomar ran for 5 minutes then Sigurd asked to get it switched off as well	
LFP	11-12-2022	14:38															Dock at Køge harbor	

Project: ENS Havvind screening - ENS 2022 survey				Vessel: Fortuna Crane (Call sign: OZWM2)							
Location	**SVP**	**Date**	**Time (UTC)**	**Coordinate**	**Degrees**	**Minutes**	**Seconds**	**Degrees**	**Decimal minutes**	**Decimal degrees**	**Comments**
Anholt S – before SOL AS_01	V0027	14-11-2022	07:32	*Latitude*	56	0,5029		56	0,5029	56,00838167	
				Longitude	11	52,3071		11	52,3071	11,871785	
Læsø South before SOL LS_02	V0030	15_11_2022	06:00	*Latitude*	56	53,09		56	53,09	56,88483333	
				Longitude	10	31,305		10	31,305	10,52175	
Læsø North EOL LN_09	V0035	19-11-2022	18:35	*Latitude*	57	45,804		57	45,804	57,7634	
				Longitude	10	49,3		10	49,3	10,82166667	
Læsø North SOL LN_10	V0037	20-11-2022	12:30	*Latitude*				0	0	0	
				Longitude				0	0	0	
Læsø South LS_03	V0042	21-11-2022	15:15:00	*Latitude*	57	14	33,659	57	14,56098333	57,24268306	
				Longitude	10	33	49,506	10	33,8251	10,56375167	
Vejsnæs Flak	V0045	23-11-2022	11:45:00	*Latitude*				54	47,9787	54,799645	
				Longitude				10	18,4229	10,30704833	
Vejsnæs Flak	V0046	24-11-2022		*Latitude*				54	35,5199	54,59199833	
				Longitude				10	41,036	10,68393333	
Anholt South	V0047	24-11-2022		*Latitude*				55	58,6661	55,97776833	
				Longitude				10	56,3509	10,93918167	
Læsø South LS_21	V0051	26-11-2022		*Latitude*				57	2,0608	57,03434667	
				Longitude				11	21,8379	11,363965	
Anholt south	V0055	28-11-2022		*Latitude*	56	7	1,64	56	7,027333333	56,11712222	
				Longitude	12	2	57,842	12	2,964033333	12,04940056	
Anholt south	V000058	29-11-2022		*Latitude*				56	21,1863	56,353105	
				Longitude				11	49,6466	11,82744333	
Anholt south	V000060	30-11-2022	13:20:00	*Latitude*	56	24	52,886	56	24,88143333	56,41469056	
				Longitude	10	59	13,214	10	59,22023333	10,98700389	
Anholt south SOL AS_23	V000062	01-12-2022	10:25:00	*Latitude*				56	25,9035	56,431725	
				Longitude				12	6,7549	12,11258167	
Anholt south EOL AS_27	V000063	01-12-2022	19:00:00	*Latitude*				56	11,5825	56,19304167	Position not accurate
				Longitude				12	19,3644	12,32274	
Køge Bugt SOL KK_01	V000001	02-12-2022	18:03:00	*Latitude*	55	29,3		55	29,3	55,48833333	
				Longitude	12	22		12	22	12,36666667	
Gedser T_KK_09	V000002	04-12-2022	10:56:00	*Latitude*	54	34	24	54	34,4	54,57333333	Position not accurate
				Longitude	12	2	51	12	2,85	12,0475	
End of line KK_09	V000004	04-12-2022	16:15:00	*Latitude*	54	46,83		54	46,83	54,7805	
				Longitude	12	18,81		12	18,81	12,3135	
End of patch test	V000006	05-12-2022	08:25:00	*Latitude*	54	56	7	54	56,11666667	54,93527778	
				Longitude	14	50	25	14	50,41666667	14,84027778	
End of BO_11	V000002	07-12-2022	12:50	*Latitude*	55	13	26	55	13,43333333	55,22388889	
				Longitude	15	40	53	15	40,88333333	15,68138889	
End of Bo_12	V000004	07-12-2022	20:40:00	*Latitude*	55	32,856		55	32,856	55,5476	
				Longitude	14	50,29		14	50,29	14,83816667	
Eed og BO_16	V000005	08-12-2022	11:39:00	*Latitude*	55	17	57	55	17,95	55,29916667	
				Longitude	14	49	49	14	49,81666667	14,83027778	
End of BO_22	V000001	09-12-2022	16:19:00	*Latitude*	54	54	49	54	54,81666667	54,91361111	
				Longitude	13	59	53	13	59,88333333	13,99805556	
Deploiment in Krieger Flak	V000002	09-12-2022	21:05:00	*Latitude*	54	49	0	54	49	54,81666667	Position not accurate
				Longitude	12	43	9	12	43,15	12,71916667	
EOL KK_12	V000004	10_12-2022	09:54	*Latitude*	55	5	5	55	5,083333333	55,08472222	
				Longitude	12	42	32	12	42,53333333	12,70888889	
End of line KK_22	V000005	11-12-2022	14:15:00	*Latitude*	55	25,62		55	25,62	55,427	Failed?
				Longitude	12	26,851		12	26,851	12,44751667	

Danish Ministry of Climate,
Energy and Utilities

Geological survey of
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