Cruise report
Expedition 64PE537

Texel – Texel, the Netherlands (15-08 – 01-09-2024)

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General introduction and expedition goals

Helge Niemann, Chief Scientist

Methane (CH_4) is an important greenhouse gas, that is 32 times more potent than CO_2 on a time horizon of 100 years (Etminan et al., 2016). Though the half-life of atmospheric methane is relatively short (~ 9 years), CH_4 concentrations in the atmosphere have risen drastically to current values of ~ 1.9 ppm; i.e. ~ 2.5-fold higher compared to preindustrial values (IPCC, 2021). The exact mechanisms behind this increase are not fully understood, yet it is clear that the increase in the atmospheric methane budget is caused by anthropogenic sources (Nisbet et al., 2019); together, these amount to 336 - 376 Tg yr^{-1}. Natural CH_4 sources are overall on a similar scale contributing about 40% (183–248 Tg yr^{-1}) to the total atmospheric budget (Saunois et al., 2020; IPCC, 2021).

Though it is likely that the overall contribution of the Ocean to the atmospheric methane content is comparably small, ocean budget estimates vary considerably. Shelf seas for example are with 9 - 22 Tg yr^{-1} the main contributor of natural oceanic methane emission to the atmosphere though the shelf only accounts for 8 - 10 % of the global ocean surface (Weber et al., 2019; Saunois et al., 2020). Compared to the open ocean, shelf seas are characterized by high nutrient loads, high primary production, high sedimentation rates and subsequent burial of dead organic matter to the seabed. This leads to elevated methane production in sediments by microbial or thermogenic processes (Reeburgh, 2007). Methane emission related to offshore industries on the other hand are virtually unknown. However, methane in shelf sea sediments is of commercial value and thus extracted. After exploitation, wells are sealed to prevent leakage, but recent investigations in the UK and German sector of the North Sea by Vielstädte et al. (2017) and Böttner et al. (2020), however, found acoustic flares in the water column in vicinity of well heads; these acoustic features are caused by plumes of rising bubbles emanating from the sea floor. The authors almost always found such flares if the well heads were above bright spots in seismic data. Bright spots are caused by high amplitude response in sound velocity of the subsurface, e.g. triggered by the presence of shallow gas. These previous studies could not fully clarify why the location of sea floor gas release was often at some distance from the well head (i.e. the leak-tightness of the well head seal itself was not necessarily compromised). However, the statistical co-occurrence of flares and (abandoned) wells suggested a causality.

The Dutch sector of the North Sea is rich in shallow and deep subsurface methane. The deep methane is extracted from multiple active wells and many more wells are abandoned and sealed. With respect to the previous findings (Vielstädte et al., 2017; Böttner et al., 2020) this raises the questions:

- **if and how frequent gas release occurs at or in the vicinity of (abandoned) wells in the Dutch sector of the North Sea;**
- **if the gas release is caused by the previous drilling and/or inappropriate sealing attempts.**

Furthermore, leaking offshore wells, may form an anthropogenic analogue to natural cold seeps. At cold seeps, methane migrates upwards through cracks and fissures in the sea bed and may be released as dissolved or free gas into the water column (James et al., 2016). Cold seeps are thus methane hotspot point sources and they occur frequently along shelf seas across the globe (Steinle et al., 2015), promoting methane transport to the atmosphere (McGinnis et al., 2006; Deimling et al., 2011). Nevertheless, a substantial amount of the water column methane content at cold seeps is consumed by aerobic methane oxidizing bacteria (MOB) that mediate the aerobic oxidation of methane (MOx; Reeburgh 2007):

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$$\mathrm{CH_4 + 2O_2 \rightarrow CO_2 + H_2O} \qquad \text{(equation 1)}$$

This raises a further question:

- **if and how much of the released CH_4 is microbially consumed in the water column and how much is ultimately released to the atmosphere.**

Answering these questions are the main rational of the North Sea Methane Project (joint scientific research project of NIOZ, TNO and SodM). In the first phase of this project, a research expedition with R/V Pelagia was carried out in summer 2022 (June 2nd to 22nd (cruise PE-503). During this cruise, around 57 well locations were investigated for leakage and ranked for further in-depth investigation during two subsequent cruises (PE-525 in October 2023 and the PE-537). These investigations are part of the scientific cooperation project "Meetcampagne Methaanemissie Offshore" (measurement campaign methane emissions offshore) and are aimed to take place during well mixed and fully stratified water column conditions, as this can severely influence methane release to the atmosphere (Steinle et al., 2016). The previous cruise (PE-525) was conducted during fully mixed and quite stormy conditions, while the current cruise (PE-537) was conducted during stratified water column conditions.

During cruise PE-537, we investigated methane dynamics using a variety of different sampling and investigation tools. Video investigation of seepage was conducted with a Remotely Operated Vehicle (ROV), which was also used to measure gas-flux directly and to direct a hose that was lowered form the deck (termed 'SLURF 2.0') to pump water from bubble plume locations to the ship's labs for subsequent analysis. The ROV was also used to place landers at bubble plumes. A funnel-lander (F-lander) was used to catch bubbles in order to measure methane fluxes over a two-day period. The mini-lander (M-Lander) was placed close to a bubble plume. It measures dissolved methane, current direction, depth, temperature, and makes video and sound recordings of the bubbles. Discrete sediment and water column samples were recovered using a box-corer and CTD water sampler, respectively. Also, the ship's underway systems was used to monitor gas anomalies. Surface water gas exchange was measured with a floating chamber and atmospheric gases were sampled from an inlet at the front mast.

Many observations were conducted with temporal replication (for example repeated CTD casts were carried out at one location over multiple time periods of 24h). This was done to account for the high variability of the North Sea system parts of which are likely related to tides.

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1. Geographical area and Station overview

Helge Niemann, Chief Scientist

Al sampling during PE-537 was conducted in the North Sea, S of the Doggerbank within the EEZ of the Netherlands (Fig. 1-1). This region features several shallow gas fields and gas is exploited from numerous wells (www.nlog.nl). Water depth in this area is mostly 30-45 m. In total, we conducted 109 single stations at three main areas, A15-03, B17-04 and B17-05. ROV observations at locations A15-03 and B17-05 revealed ~3-5 individual bubble streams directly above the location of the well head, while B17-4 featured many more individual bubble streams (~10-20) that are ~200 m to the S of the well head. A complete station list is presented in the appendix.

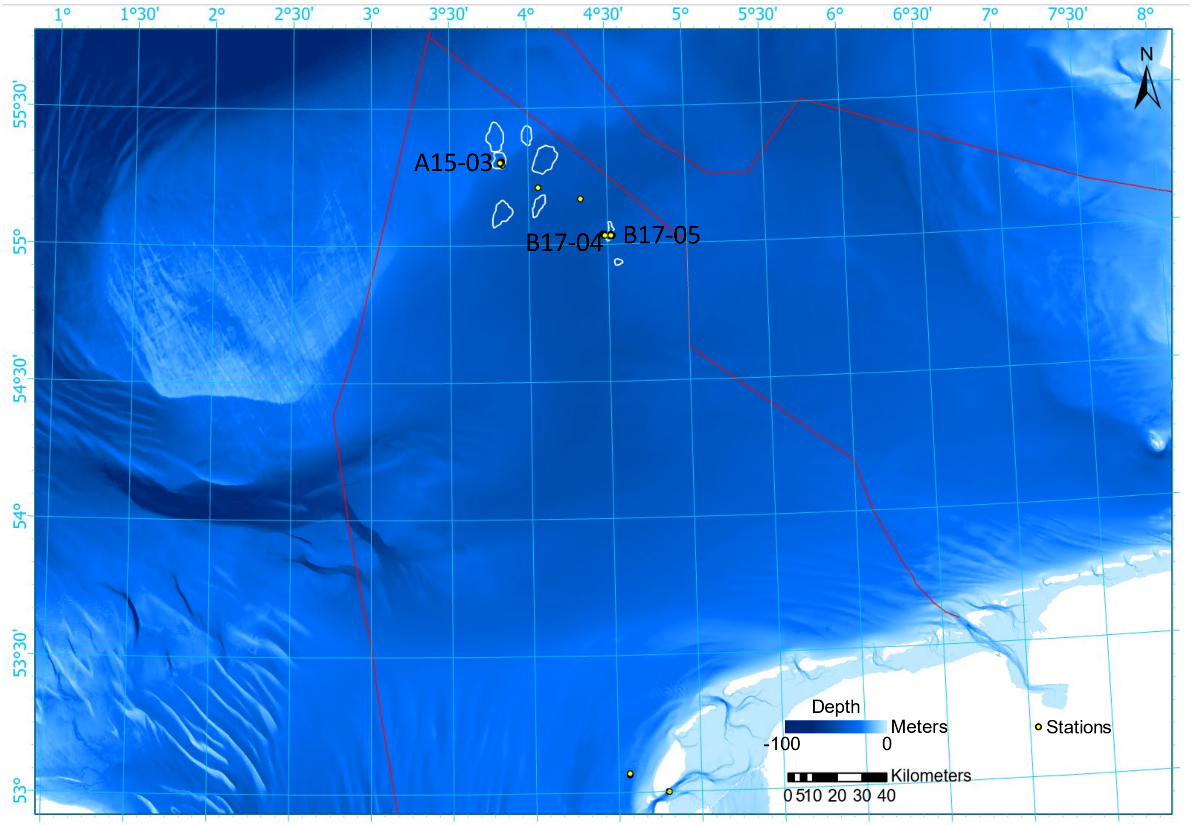

Fig. 1-1. Area of investigation during cruise PE-537. Well locations A15-03, B17-04 and B17-05 were investigated in detailed with temporally replicated sampling for CH_4-realted parameters, ROV and Lander deployment. Sampling stations shown as yellow dots.

2. Methane

2.1 Dissolved methane

2.1.1 Discrete water samples

Annalisa Delre

We performed conductivity-temperature-depth (CTD) casts every 2 hours with discrete water sampling over multiple time periods of 24h. To obtain a higher resolution of the dissolved methane in the water column, we decided to collect distinct samples at every 5m (from bottom to surface).
Dissolved methane concentrations were determined using a headspace (HS) technique (Green, 2005). As soon as CTD was in the deck, 260 ml glass serum bottles were filled in triplicates from the Niskin bottles, closed with black-butyl rubber stoppers (Rubber B.V., the Netherlands) and crimped top-sealed. Subsequently, 10ml N_2 was added to create a headspace and we fixed the sample with 5ml NaOH solution (25% w/v). The methane concentrations in the headspace will be measured in our home laboratory with a gas-chromatograph (Thermo Scientific FOCUS GC equipped with a Restek stainless steel column HayeSep-Q, 80/100, General configuration (length 2 m, 2 mm i.d., 1/8 in. o.d.) with flame ionization detection.

2.1.2 In situ measurements

Annalisa Delre

Along with the standard method consisting of sampling with Niskin bottles, a Methane Sensor Type LMS (Franatech GmbH, Germany, Fig. 2-1a) was used to measure dissolved methane concentration in the water column (Fig. 2-1b). The detection principle of this device is based on laser absorptiometry. Water is pumped across the laser cavities membrane with a Seabird 5M Titanium pump. The dissolved methane in the water diffuses through a silicon-rubber membrane into the measuring chamber. Absorption of laser light was then proportional to the mixing ratio of methane in the instrument's measuring chamber, which was in equilibrium with dissolved methane in the sea water. With the aid of a factory calibration, the mixing ratio in the cavity was corrected for the inertia of the silicon membrane, allowing to calculate water column methane concentration (Wiesenburg et al., 1979). The sensor was installed in the frame of the CTD carousel and measured during each cast. A second sensor was also installed on the lander frame (see respective section in the cruise report).

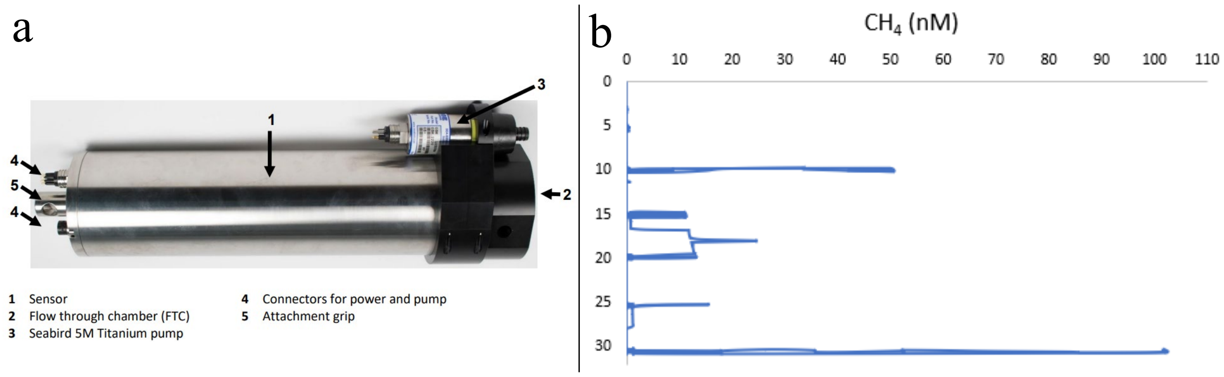

Fig. 2-1. **a)** The Methane Sensor. **b)** Example of water column profile at A15-03, showing the dissolved methane concentration in nM.

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2.1.3 Online measurements of methane in the water phase

Ilona Velzeboer

Equipment

Laser spectrometer: Tunable Infrared Laser Direct Absorption Spectroscopy; TILDAS; Aerodyne Research Inc., Billerica,USA

A laser spectrometer (Tunable Infrared Laser Direct Absorption Spectroscopy; TILDAS; Aerodyne Research Inc., Billerica, USA) was used to measure CH_4, C_2H_6, N_2O, CO_2 and CO. This instrument contains a quantum cascade laser (QCL) and an interband cascade laser (ICL) and can simultaneously measure CH_4, C_2H_6, N_2O, CO_2 and CO. For measurements of the concentration and composition of gas in the water column, measurements were done with the laser spectrometer on: 1) deep water that was pumped up via a weighted hose ("SLURF") from a few meters above the seabed (Fig. 2-2a) or 2) surface water of 4 m depth which was taken in at the bow of RV Pelagia via the Aquaflow system of the ship (Fig. 2-2c) or 3) via the improved SLURF system ("SLURF 2.0"), where a funnel was attached to the hose, which can be placed above a bubble plume with a ROV (Fig. 2-2b and 2-2c). The funnel was made by Roel Bakker (senior instrument maker; NIOZ). Besides that, it also has an inlet for a controlled release of N_2O into the funnel, to be able to quantify CH_4 coming from the bubble plumes. The SLURF was deployed from midship starboard side, taped to a steel cable with depressor weight that was lowered via the starboard A-frame (Fig. 1c). The SLURF 2.0 including the funnel was also deployed from midship starboard side, with the funnel attached to the ROV. The water from both sources flowed through a few meters of hose to a temperature-controlled lab container placed on the winch deck. The inflow of water from one or the other source used for the laser spectrometer measurements was controlled by means of a valve system.

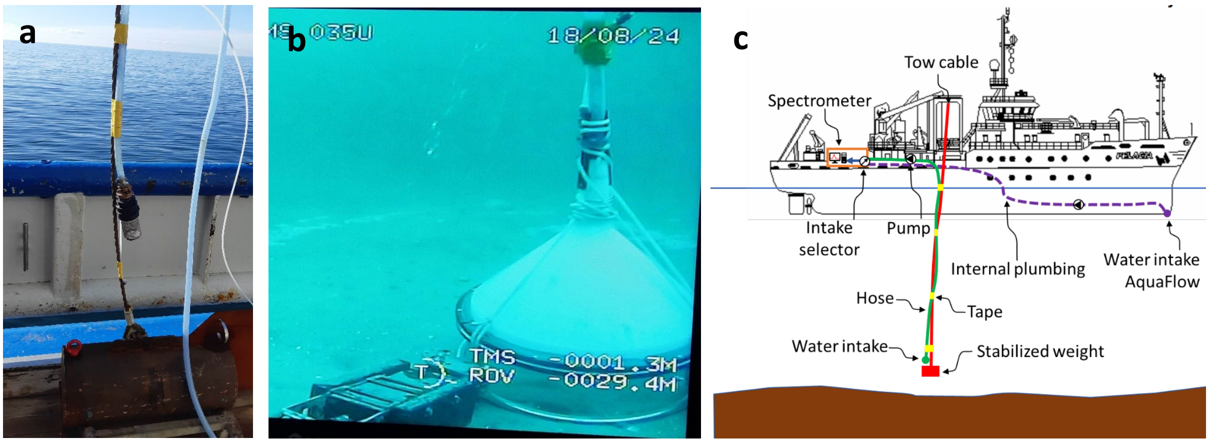

Fig. 2-2 **a)** The lower end of the water intake hose (SLURF), attached to steel cable and depressor weight with stabilizing fin. **b)** The SLURF 2.0 is the improved version of the SLURF. A funnel is attached to the hose and has an inlet for a tracer release. Here, the ROV hold the funnel on top of a bubble plume at the sea floor. **c)** Schematic diagram of the setup of the deep water intake hose "SLURF" and the Aquaflow system for the analysis of gases with the laser spectrometer.

The technique to extract gas from the water phase was performed by using two membranes in series (3M-Liqui-Cel, MM Series; 3M Nederland B.V., Delft). The 3M membrane is able to extract trace gases from the water phase, to make plumes of CH_4 directly visible. Water flows through the two membranes (3M), placed in series, where the air flows in opposite directions, to extract the gases from the water phase. This then goes via a Permapure system to dry the air, directly to the laser spectrometer.

A picture of the water part, with the 3M Liqui-Cel membranes is shown in Fig. 2-3a, and a picture of the air part, with the laser spectrometer is shown in Fig. 2-3b. When the ROV is in the water, the SLURF 2.0 with the funnel can be used. When meteorological conditions were not suitable for ROV deployment, the SLURF with the weight could be used for water sampling. When there was no SLURF sampling, like during transits or CTD sampling, the surface water collected with RV Pelagia's Aquaflow system could be analyzed. Or, if the wave height allows, floating chamber measurements were performed, using the same laser spectrometer measurements (more information about the floating chamber can be found in 2.3.1).

Fig. 2-3 **a)** The "water part" in the container, showing the inlet, the filter system and the membrane set-up. **b)** The "air part" in the container, showing the laser spectrometer and the monitors, to directly see the measured concentrations.

One SLURF 2.0 measurement was performed with the ROV at station A15-03, just above a bubble plume (Fig. 2-4). Very high concentrations were measured, samples for CH_4 measurements with GC-MS were taken, to compare concentrations. The N_2O tracer release worked well. A second SLURF 2.0 deployment was not performed as the concentrations directly on top of the plumes were too high for the laser spectrometer to be able to quantify the CH_4 emission rate.

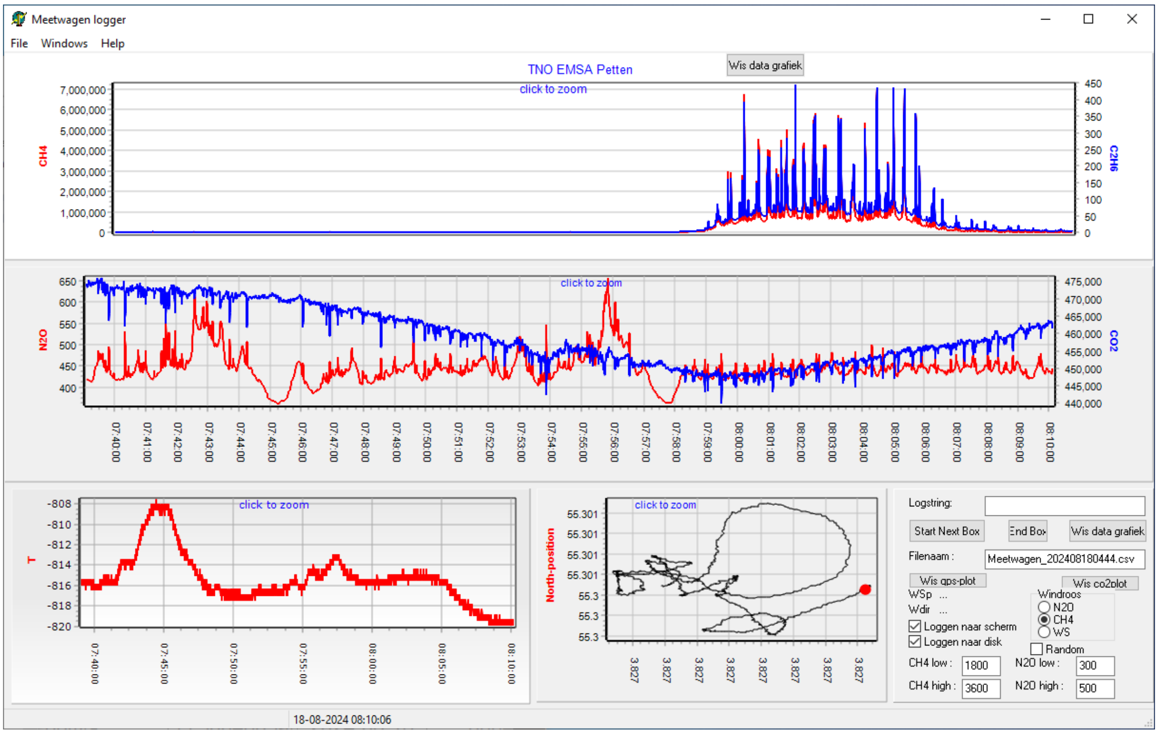

Fig. 2-4 Top figure showing the CH_4 and C_2H_6 concentrations (in ppb), when the funnel was placed on top of a bubble plume at A15-03

SLURF measurements were performed in the first part of the cruise. These measurements were performed at 17, 18, 20 and 21 August at A15-03. Aquaflow measurements were performed at 16 and 17 August at B17-05; 18 August at A15-03; 19 August at B17-04 and B17-05; 21 August at A15-03.

2.1.4 Methane in sediments

Annalisa Delre

Sediments samples were collected using a box corer and subsampled with 3 small push cores (diameter = 7 cm). From each push core, we collected 5ml of sediment every 2cm that was added to 60ml glass bottles containing 30ml of a saturated NaCl brine solution. The bottles were immediately sealed with butyl rubber stoppers. The methane concentration in the sediments will be measured in the laboratory similar to water column samples.

2.2 Methane consumption

2.2.1 Methane oxidation rates

Annalisa Delre

Methane oxidation rates (MOx) in the water column were determined by ex-situ incubation with trace amounts of ^{3}H-labelled methane as describe previously (Niemann et al., 2015). Aliquots from the Niskin bottle were filled in 20ml glass vials in quadruplicates, sealed with grey-bromobutyl stopper that are known to not hamper methanotrophic activity. These samples were then amended with 10ul of ^3H-CH_4 (American Rabiolabeled Chemicals, USA) and incubated for ~72h at situ temperature in the dark. The activities of residual C^3H_4 and the product of methane oxidation (^3H_2O) were measured by liquid scintillation counting. The First-order rate constant (k) was then determined from the fractional turnover of the added tracer (Reeburgh, 2007):

$$k = \frac{^3H_2O}{^3H_2O + C^3H_4} \times \frac{1}{t} \qquad \text{(equation 2.2.1-1)}$$

where t is incubation time in days. k was corrected for tracer turnover in killed controls (k_{KC}, fixed with 10ul $HgCl_2$ directly after sampling) and multiplied with methane concentrations [CH_4], resulting in MOx:

$$\text{MOx} = (k - k_{KC}) \times [CH_4] \qquad \text{(equation 2.2.1-2)}$$

2.2.2 Methane Oxidizing Bacteria

Annalisa Delre

Water aliquots (2l) for identification and quantification of methane oxidizing bacteria (MOB) were collected in triplicate from surface, thermocline and bottom waters and stored in 2l glass bottles (rinsed three times before filling). The water was then filtered through glass fibre filters (pore size 0.3 µm, diameter 47 mm, ADVANTEC®, GF-75) placed on Swin-Lok filter holder (Whatman®) by using a peristaltic pumps. The filters were stored at -80 °C for further analysis (DNA extraction/sequencing) at NIOZ.

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2.3 Sea-atmosphere fluxes of methane

2.3.1 Floating chamber

Ilona Velzeboer

Laser spectrometer: Tunable Infrared Laser Direct Absorption Spectroscopy; TILDAS; Aerodyne Research Inc., Billerica, USA

A special floating chamber, suitable for offshore measurements is designed by Dave Huijsman (senior sea technician; NIOZ) (Fig. 2-5). The chamber has a diameter of 60 cm. The height of the chamber is adjustable, but for this cruise set to high setting, resulting in a height of 49 cm. The used chamber settings had a total air volume of 174 L (because of the waves, this could be a bit variable, but the height cancels out in the final calculation of the flux). A ½" tubing is used to go from the container to the floating chamber and back (in total 60 m), to have a closed loop. CH_4, C_2H_6, N_2O, CO_2 and CO were measured with the same laser spectrometer (Aerodyne) as the water phase measurements, by switching a valve.

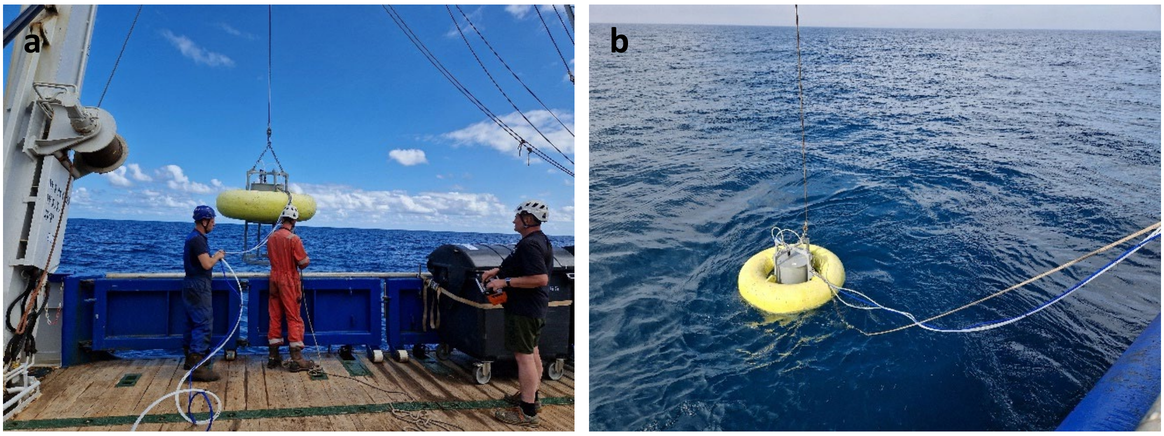

Fig. 2-5 The Floating chamber (DONUT), a) floating chamber being deployed, b) floating chamber deployed in the water.

Compressed air with an added amount of N_2O (8 ppm), was added to the return line with a controlled flow. This was done to be able to quantify the flux of CH_4 coming from the water phase. The air inside the chamber is mixed by a propeller driven by a pneumatic pistol. The floating chamber was deployed at 16 and 28 August at B17-05, 18 August at A15-03 and 19 August at B17-04. An example of the resulting concentrations of the chamber measurements at B17-04 is shown in Fig. 2-6.

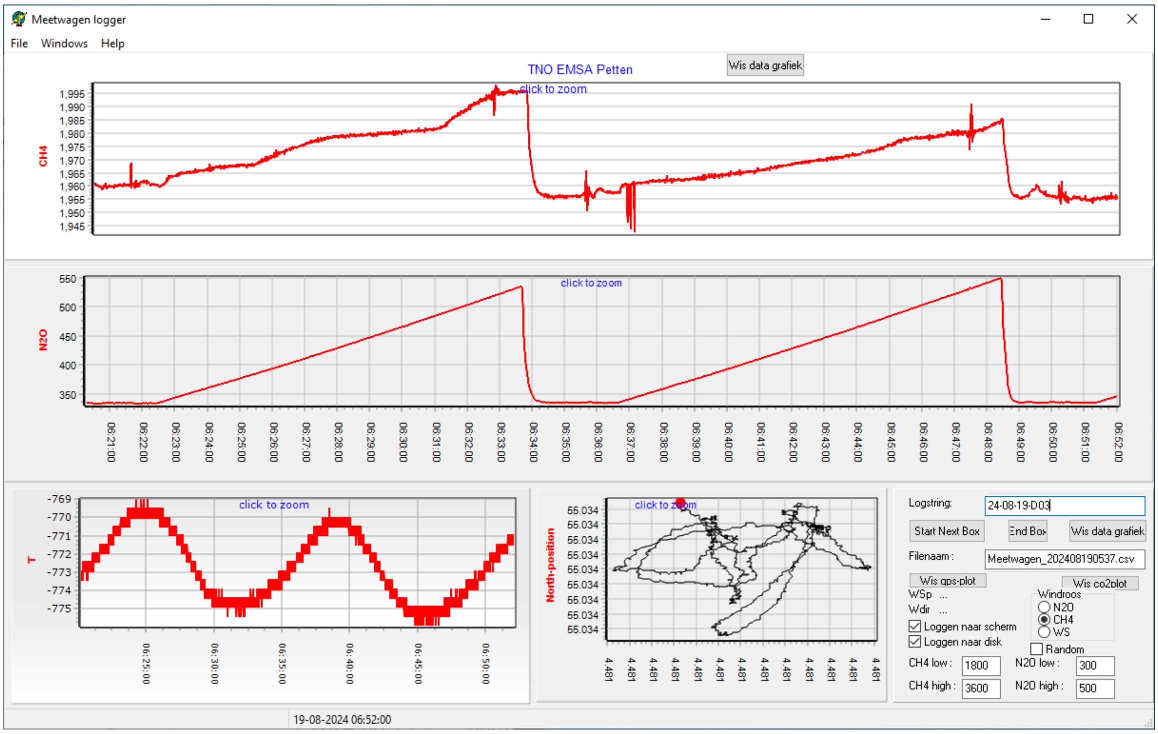

Fig. 2-6 Preliminary results of floating chamber measurement at B17-04. In this example no CH_4 bubbles were detected. Upper figure shows CH_4, the middle figure shows the released N_2O.

2.3.2 Gradient measurements
Ilona velzeboer

Laser spectrometer: Tunable Infrared Laser Direct Absorption Spectroscopy; TILDAS; Aerodyne Research Inc., Billerica, USA
Gas analyser: Picarro G2401: Picarro, Inc., Santa Clara, USA

On the portside pole, a frame was mounted with 3 inlet lines at 1, 1.7 and 3 m above sea level, 2.75 m outside of the vessel (Fig. 2-7). Next to the frame, a 3D sonic anemometer was mounted (1m outside of the vessel). A gas analyzer (Picarro 2401) was used to measure CH_4, CO_2 and CO via a valve system, to measure at each height 5 minutes and then switch to the next inlet. In this way gradient measurements can be performed as Eddy Covariance measurements at a moving vessel is even more complicated.
Besides the inlets at portside, there was also an inlet at the foremast at 10 m height together with a GPS corrected 2D sonic anemometer. When not using the portside inlets (when the portside pole was up), the front inlet was sampled.

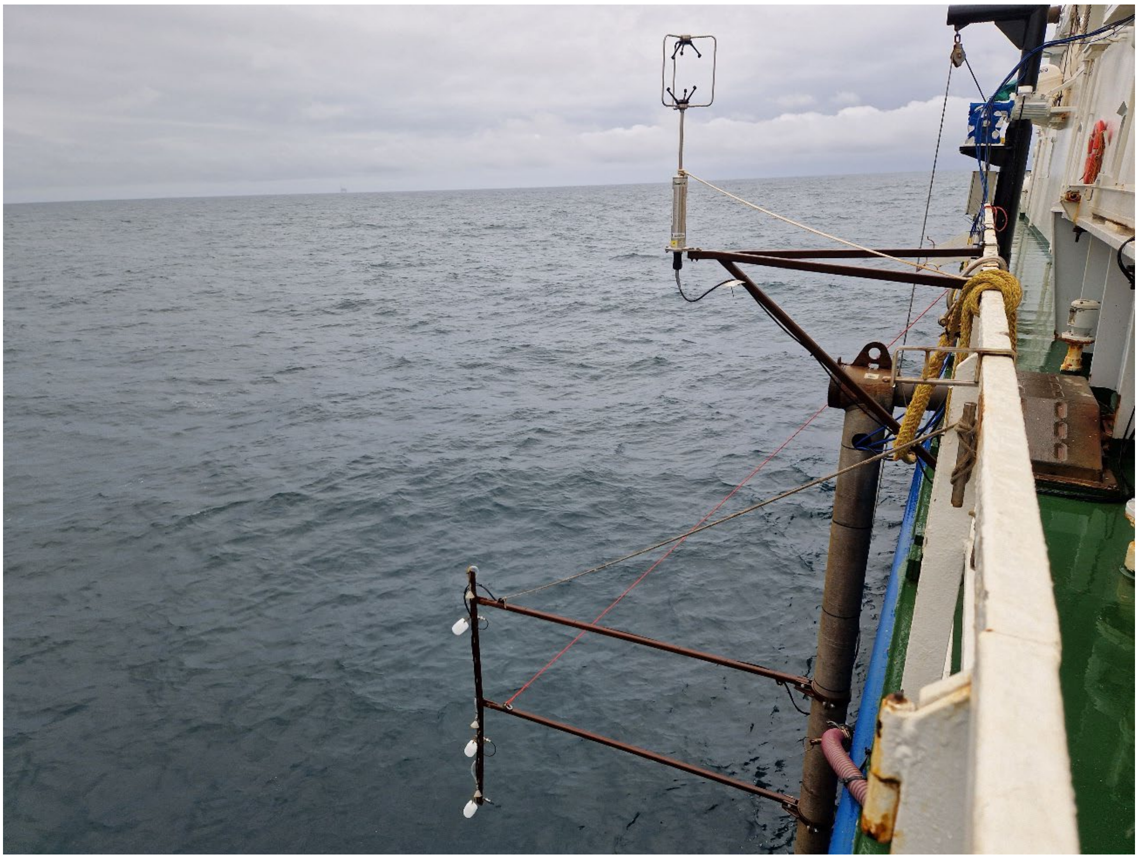

Fig. 2-7 Gradient set-up with 3 inlet heights and a 3D sonic anemometer.

Because we brought a spare gas analyzer, from 18 August, both gas analyzers were used for the gradient measurements, to measure at 2 heights simultaneously (1.7 and 3 m). From 20 August also the third height was measured simultaneously, by also switching the laser spectrometer to the gradient system. The gradient measurements were performed when the portside pole was in the water, so most of the time simultaneously with the MBES measurements.

2.3.3 Plume measurements (Ilona's special)

Ilona Velzeboer

During the gradient measurements, CH_4 concentrations were visible at the all 3 inlet heights at the portside pole. If fluxes coming from the bubbles out of the water into the atmosphere were visible, it should be possible to do plume measurements in the same way as we perform onshore. By sailing downwind of the bubble plumes, with portside in the direction of where the wind is coming from, it was possible sail through the plumes and detect it on all 3 heights. The multibeam (MBES) was used to detect the bubble plumes, not only the location at the seabed, but also to detect the exact location where the bubble plume exit the water (exit point).

The plume measurements were performed at B17-04 and B17-05. An example of the resulting concentrations of the plume measurements at B17-04 is shown in Fig. 2-8.

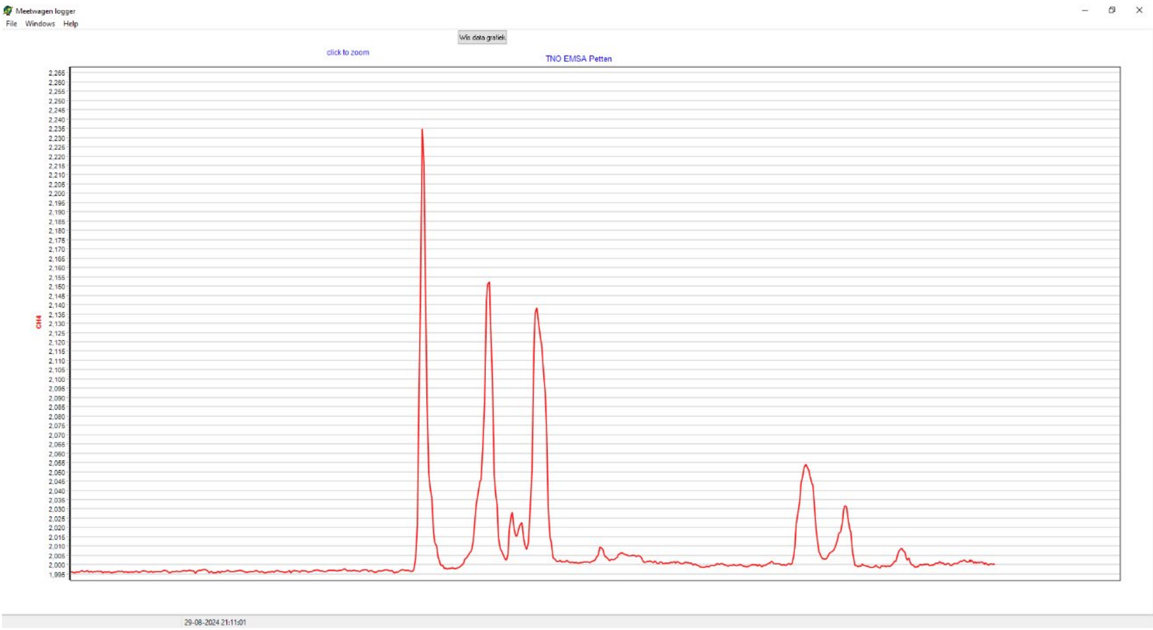

Fig. 2-8 CH_4 plumes when passing bubbles plumes downwind at B17-04, 1.7m above sea level.

2.4 Echosounder-based detection of bubbles

Geert de Bruin, Henk de Haas

In combination with a multibeam echo sounder (Kongsberg EM2040SRX) a Kongsberg EK80 Scientific Echo Sounder system was used to study bubble plumes in the water column. During a period of several hours EK80 lines and one multibeam lines were recorded alternatively directly over a bubble plume location in order to study any possible temporal (tide related) changes in gas flux. Recording of the instrument was done separately to avoid interference of one tool on to the other. The sailing speed was aimed to be 2 knots to allow sufficient data points to be recorded within the water column needed for proper statistical analyses of the reflection strength (enough data points per 3D water column grid cell). Each individual survey was planned to be carried out along the same line, but because of strong and variable wind, wave and current conditions during a survey the line orientation regularly had to altered to be able to keep following the track at the required low sailing speed. A full list of all multibeam (EM2040) and water column echo sounder (EK80) bubble plume surveys can be found in the appendix.

2.4.1 Single beam echo sounder

The EK80 is a system consisting of one or multiple transducers with centre frequencies ranging from 18 to 333 kHz. For this study a mobile system, installed on the port side measurement pole of the vessel, was used consisting of a wide band transceiver (WBT mini) and two transducers with nominal frequencies of 70 and 200 kHz (Simrad ES70-7C and ES200-7C respectively).

The ES70-7C is a split beam transducer with a bandwidth of 45-90 kHz and a circular beamwidth of 7 degrees. The ES200-7C also is a 7 degrees split beam transducer. The bandwidth for this device ranges from 160 to 260 kHz.

Position and motion data is stored within the datafile. This information is supplied by the Seapath380/MRU 5+ ships attitude system. The position of the transducers on the pole relative to the GNSS antenna and MRU5+ is included in the final positioning of the data.

Data was recorded using the matching Kongsberg EK80 software. The data was stored in raw format.

2.4.2 Multibeam echo sounder

All surveys were carried out with a high resolution Konsgberg EM2040SRX mobile multibeam echosounder mounted on the ships port side measuring pole. The EM2040SRX is a high resolution 200-700 kHz shallow water multibeam. Experience during the 2022 cruise for this project has shown that running it at a frequency of 400 kHz gives the best possible results. Therefore, also this year surveys were carried out using 400 kHz. The beam opening angle at this frequency is 0.4°x0.7° for the transmitter and receiver beam angle respectively. The swath opening angle was fixed at 60° port side and starboard side.

An offset calibration was carried out at the beginning of the cruise. However, since the pole did not return to exactly the same position at each deployment, this resulted in variable angular offsets for subsequent runs (i.e. a horizontal seabed appears to be dipping a couple of degrees). Therefore, a correction must be applied to the raw data post cruise.

During earlier cruises an equipment setup was used with the EM2040 connected to its own Kongsberg Seapath380 navigation and attitude processing unit with associated GNSS antennas and an MRU5+ motion reference unit mounted on the transducer pod. However, experience during these earlier cruises has shown that the vibration of the ships deployment pole is too fast for the MRU to be able to compensate for this motion. This resulted in a cascading of errors. Because of this, during the present cruise it was decided to use the ships Seapath380 in combination with a Kongsberg 3710 DGNSS receiver and ships MRU. Although in theory this would result in data not properly corrected for motion (the pole vibrations is not corrected for) in practice the data was of good enough quality since no accurate bathymetry was needed during this cruise and only water column backscatter data (with backscatter intensity as such being more important than the exact position at which this was measured) was aimed for.

The water column sound velocity profile was determined by means of CTD casts. The velocity was calculated using the Chen-Millero formula (Chen and Millero, 1977)

Bibliography

C-T. Chen and F.J. Millero, Speed of sound in seawater at high pressures (1977) J. Acoust. Soc. Am. 62(5) pp 1129-1135

2.4.3 ROV mounted ARIS

The ROV was equipped with an ARIS Explorer 3000 imaging sonar (Fig. 2.9) produced by Sound Metrics. The two main aims of this instrument were 1) detecting the presence of gas seeps and help guiding the ROV towards the seep locations and 2) use the high-resolution images to determine bubble speed and bubble rate fluctuations order to quantify the volume of gas being released within a certain time period at these sites.
The ARIS 3000 Explorer is a high-resolution acoustic imaging instrument using a frequency of 1.8 MHz in detection mode and 3 MHz when in identification mode. The image is constructed from its 128 individual beams. During the cruise the high resolution 3 MHz identification mode was used. This resulted in high quality `acoustic video' data. Because of the high frequency used, the range of the system is limited to about 5 metres in identification mode. However, since the acoustic signals were not hampered by the very high concentration of suspended material in the water column, limiting the optical visibility often to less than the length of the ROV manipulator arm, it was still possible to produce the needed high-resolution imagery. An example of the quality of the ARIS data can be seen in Fig. 2-11.

Fig. 2-9 The complete ARIS Explorer 3000 equipment. The underwater transducer unit is shown on the right hand side (size about 30x18x14 cm). Image by Sound Metrics.

When interpreting ARIS images, one has to take into account that the sonar produces a 2 dimensional image of a 3-dimensional world (Fig. 2-10). In addition to this, because the positioning of the ROV relative to the seep site can be limited due to wave (shallow water and sometimes strong wave action during the cruise, waves can influence conditions at the seabed) and tidal current conditions it was not always possible to have an optimal orientation of the acoustic camera which could result in non-optimal imaging orientations. In addition to this, one has to realise that the `viewing direction' of the camera is not the same as the viewing direction of the observer watching the screen (Fig. 2-11).

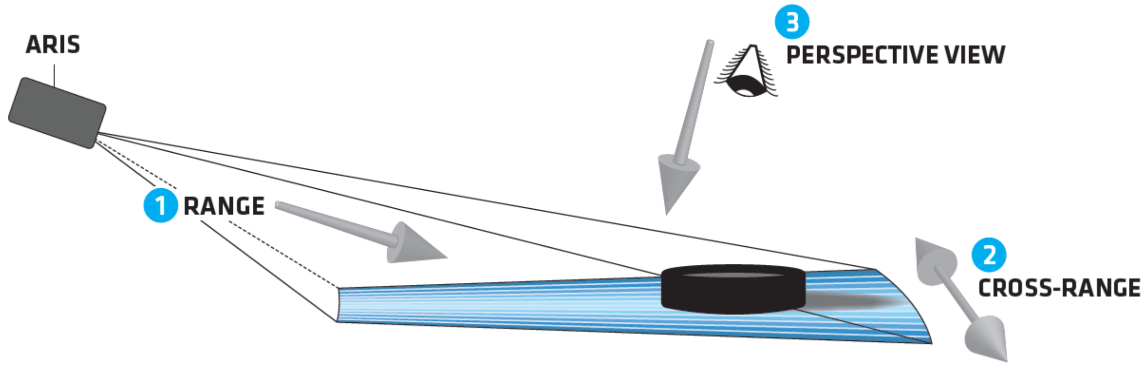

Fig. 2-10. Image illustrating the viewing direction of the ARIS 3000 and the perspective view of the observer. Image by Sound Metrics.

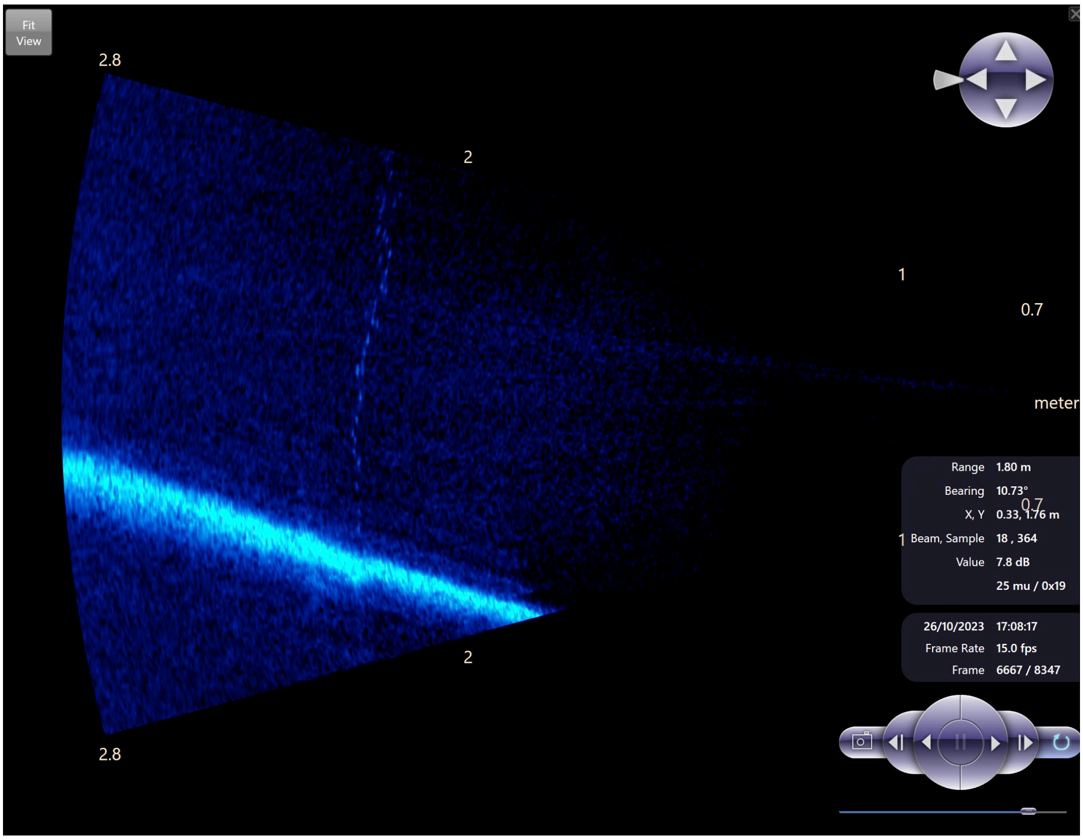

Fig. 2-11 Screenshot of the ARIS 3000 as an example of the data quality produced by the system. A bubble stream can clearly be observed in the centre of image. The seabed (bright blue line) appears to be sloping due to the Aris orientation.

2.5 Landers

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Two autonomous landers were used during the cruise to measure at bubble plumes for a prolonged period. Most deplyments lasted about two days in order to cover multiple tidal cycles. The Funnel Lander (or F-lander) was used to catch bubbles and measure fluxes, while the Mini-lander was used to measure multiple parameters.

2.5.1 Mini Lander

Mini Lander (M-Lander)

An autonomous lander frame was developed by NIOZ that was equipped with multiple sensors and cameras to enable long-term timelapse measurements and recordings. For the PE-537 cruise a mini-lander (M-lander for short) was developed (fig 2-12). The reason to do so was that it proved to be difficult to accurately place the previously used Albex lander and the M-lander could be dragged in place by the ROV. The lander was equipped with an HD camera, a sensors to measure methane, a current sensor, hydrophone and a temperature & depth sensor. The HD camera, hydrophone and Methane sensor were powered by battery-packs that was attached to the lander. The rest of the sensors were powered by internal batteries.

During the PE537 cruise the M-lander was deployed five times at three locations, namely near two leaking wells and one natural seepage location. Before lander deployment, the bubble plume locations were determined with the multibeam. Based on the plume locations, the lander was deployed as close as possible with respect to the bubble plumes and dragged in its final position by the ROV. After each deployment of a few days, the lander was retrieved and the data from each sensor and camera was collected.

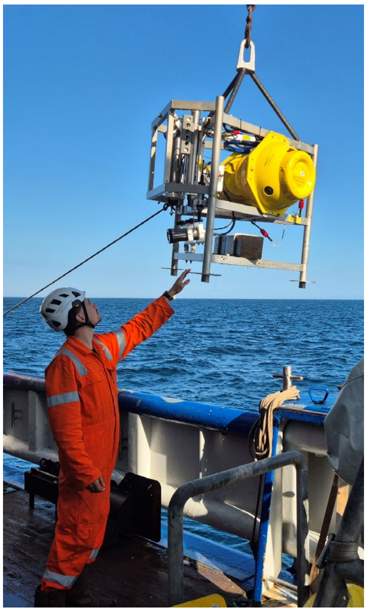


Fig. 2-12. The M-lander

Measurement equipment and configuration

Tab. 2.5.-1. Equipment mounted to the lander with the used configurations during PE-525.

Equipment	Model	Serial number	Last calibration	Software
Current sensor	Nortek Aquadopp current profiler	110990	July 2023	Aquapro V20.00.02
Geophone	icListen 200 SC2 ETH	S/N 2055	n.a.	Lucy
Methane sensor	Franatech	113991	n.a.	Franatech Datalogger Support
CTD	Microcat CTD SBE37	95389	05-may-07	Sea Term V1.59
HD Camera	Rayfin SubC Camera	00111010	n.a.	SubC Rayfin Control V3.4.8

Current profiler (Aquapro)

The Nortek aquadopp current profiler (Aquapro) measure current speed and direction in multiple layers, or vertical cells, through the water column. The idea of vertical cells is that the currents vary little in the horizontal plane, but may differ more in vertical layers during for instance the tidal cycle. An acoustic Doppler instrument transmits a short pulse of sound (“ping”) of constant frequency into the water, listen to its echo and measure the change in pitch or frequency of the echo caused by the doppler effect.
The temperature is measured by a thermistor embedded in the head and reported in degrees Celsius. This information is of vital importance, since the instrument uses the speed of sound to convert time to distance, and the speed of sound depends on temperature. Furthermore, the hydrostatic pressure is measured with the pressure sensor and reports in units of dbar.

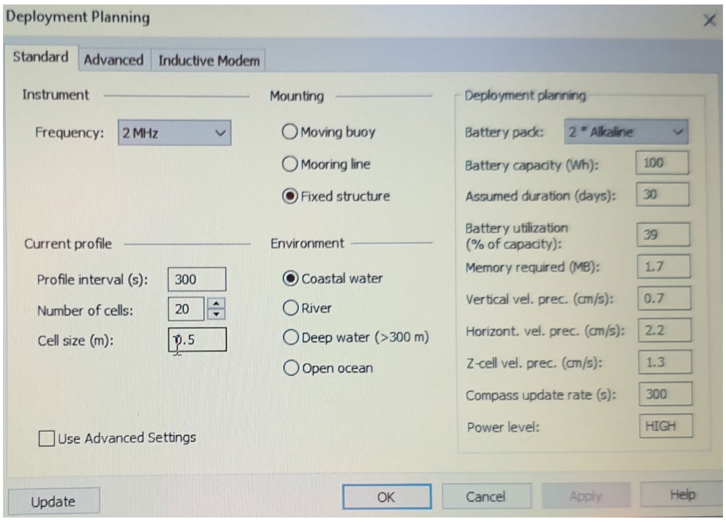


Fig. 2-13 Settings of the Aquapro current profiler

During PE-537, the current profiler was mounted on the lander with the transducer head facing upward and level with the top of the frame, so that it has an unobstructed ‘view’ into the overlying water column. During the deployment of the lander, every 5 minutes the current and direction was measured over 20 cells of each 0.5 m, covering a water column of 10 m. Also, the pressure and temperature at the instrument was measured every 5 minutes.

Geophone

A geophone (Fig 2-14) was used to record the sound of the bubbles. The idea is to relate sound to the number of bubbles in the water column. Sound is recorded continuously. Unfortunately, not the entire duration of the deployment could be recorded due to battery limitations.

Fig. 2-14: Geophone mounted in M-Lander

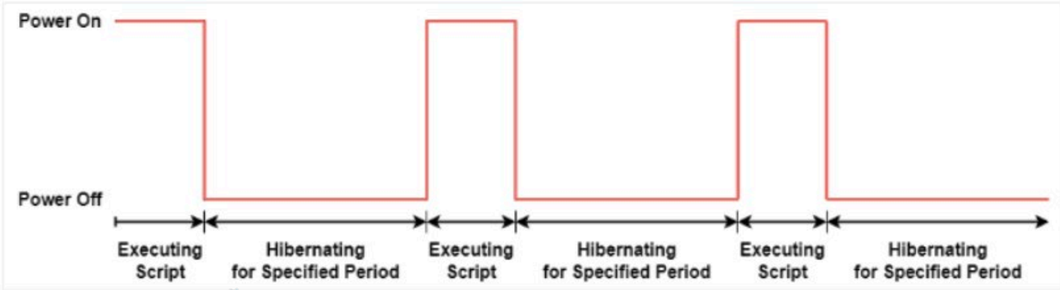
Methane sensor
A sensor based on laser absorption (Franatec LMS) was mounted on Albex. This sensor was the same model as the one mounted on the CTD frame; see chapter 2.2 for specifications.

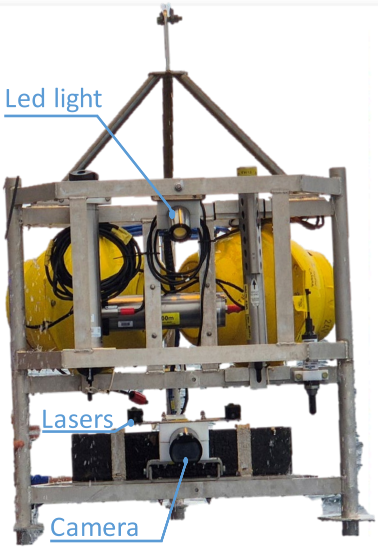
CTD (MicroCAT)
The SBE 37-SM MicroCAT (CTD) (Fig. 2-15) is a sensor that measures water parameters in one location over an extended period to produce a time-series of data. It measures the Conductivity (S/m),

Fig. 2-15 CTD (MicroCAT)

Temperature (°C) and pressure (dbar), from which the variable salinity and sound velocity of the seawater can be derived.
During the PE525 expedition the MicroCAT was fixed vertically in the top part of the lander. During deployment every 10 minutes the conductivity, temperature and pressure were measured and from which salinity was derived (not sound velocity).

Rayfin SubC Camera
The Rayfin SubC HD camera (Fig 2-16) was used for time lapse recording of digital stills and HD videos with the use of a hibernation feature. The camera runs through a series of commands in a script and then hibernates to use as little power as possible. Then after a pre-set period of time, the hibernation function will power the camera up to run through the script again.
During the PE537 cruise the camera was mounted in the lower part of the frame looking outwards. Two parallel lasers were used to give a size reverence and to indicate what is in view of the camera. This is useful so the ROV operator can place a bubble plume within the recorded area. A LED light was placed as high as possible on the frame facing downwards to area within viewing range of the camera to lighten the area during the recording of the footage. The script with series of commands was executed, making multiple recordings every 15 or 30 minutes. The camera was externally powered by a 24V battery pack and all the recordings were stored in the camera's internal memory.





Recordings every 15 minutes with Rayfin SubC HD camera. Timelapse recordings = 15 sec			
Name	**Shutter speed (nanoseconds)**	**ISO**	**recording**
Still_Manual_A	8000000	150	
Still_Manual_B	4000000	200	
Still_Manual_C	2000000	400	
Still_Auto_A	auto	auto	
Still_Auto_B	auto	auto	
Still_Auto_C	Automatic	auto	
Videos_Timelapse	auto	auto	15 sec

Figure 2-16. Oscillation of hibernation and measurement mode of the camera (top). The camera mounted in the frame with, lasers and led lights(left). Camera shutter times are indicated (right).

2.5.2 Funnel Lander

The Funnel lander (Fig. 2-17) , or F-Lander for short is a newly developed lander that consists of a large funnel (1,5 by 1,5 m) that catches bubbles and guides them into a measuring chamber. We measure how long it takes to before a measuring chamber is filled. The measuring chamber is 4350 ml in volume and when it is full, the captured gas is automatically released, and the time of release is recorded. From this we can compute the flux in ml per second. Secondly, the lander is equipped with a microcat CTD (see previous chapter for more details). The CTD records depth and temperature, and this allows us the convert the measured volume into moles and grams (using the formula PV = nRT). This results in a flux in gram per second.

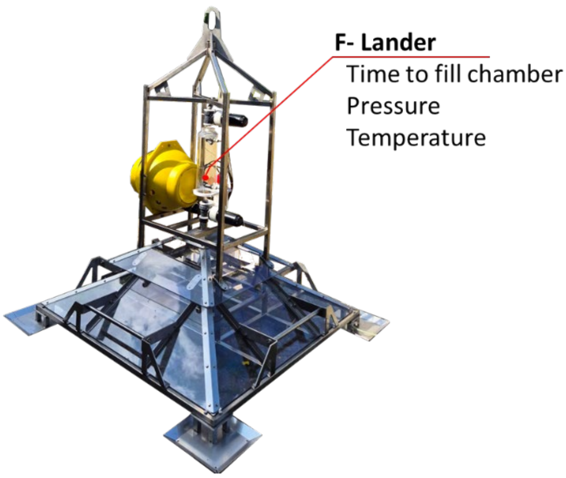


Fig. 2-17. The funnel lander or f-lander is a large funnel that catches bubbels and measures how long it takes to fill the measuring table. Furthermore, depth/pressure and temperature are measured.

2.6 ROV Funnel measurements

Flux measurements were conducted with a ROV operated funnel (Fig.2-18). A measuring cup of 50 ml with a funnel below it was placed with the manipulator arm of the ROV over a bubble plume. The filling of the measuring cup was filmed, and based on that the time to fill the measuring cup was established. Based on the depth and temperature of the water a methane flow can be calculated.

Fig. 2-18 ROV operated funnel is used to measure the methane flows.

Appendix

The appendix comprises a detailed list of all echosounder surveys and a complete station list

Date	latitude	longitude	Phase name	Device name	Action name	Cast	Location	Comment
15-8-2024 08:24	52.9985	4.799	None 0	None	CRUISE START	None	Texel	
15-8-2024 08:33	52.9982	4.7992	STATION 1	CTD	BEGIN	1_1	Marsdiep	
15-8-2024 08:33	52.9982	4.7992	STATION 1	CTD	BOT	1_1	Marsdiep	
15-8-2024 08:33	52.9982	4.7992	STATION 1	CTD	END	1_1	Marsdiep	
15-8-2024 09:05	52.9995	4.8015	STATION 2	Multibeam	BEGIN	2_1	Marsdiep	
15-8-2024 11:22	52.9993	4.803	STATION 2	Multibeam	END	2_1	Marsdiep	
15-8-2024 14:48	53.0635	4.5682	STATION 3	ROV deployment	BEGIN	3_1	L17	
15-8-2024 14:48	53.0635	4.5682	STATION 3	ROV deployment	DEP	3_1	L17	
15-8-2024 16:00	53.0643	4.568	STATION 3	ROV deployment	REC	3_1	L17	
15-8-2024 16:03	53.0648	4.568	STATION 3	ROV deployment	END	3_1	L17	
16-8-2024 06:48	55.03	4.5248	STATION 4	Multibeam	BEGIN	4_1	B17-05	
16-8-2024 06:48	55.03	4.5248	STATION 4	Multibeam	END	4_1	B17-05	
16-8-2024 07:58	55.0303	4.5232	STATION 5	CTD	BEGIN	5_1	B17-05	
16-8-2024 08:04	55.0302	4.5232	STATION 5	CTD	BOT	5_1	B17-05	
16-8-2024 08:09	55.0302	4.5232	STATION 5	CTD	END	5_1	B17-05	
16-8-2024 08:09	55.0302	4.5232	STATION 5	CTD	BEGIN	5_2	B17-05	
16-8-2024 08:09	55.0302	4.5232	STATION 5	CTD	BOT	5_2	B17-05	
16-8-2024 08:36	55.0302	4.5233	STATION 5	CTD	END	5_2	B17-05	
16-8-2024 08:50	55.0302	4.5233	STATION 6	In Situ Pump	BEGIN	6_1	B17-05	
16-8-2024 08:53	55.0302	4.5233	STATION 6	In Situ Pump	START	6_1	B17-05	
16-8-2024 09:32	55.0302	4.5232	STATION 6	In Situ Pump	STOP	6_1	B17-05	
16-8-2024 09:32	55.0302	4.5232	STATION 6	In Situ Pump	END	6_1	B17-05	
16-8-2024 09:50	55.03	4.5233	STATION 7	In Situ Pump	END	6_1	B17-05	
16-8-2024 09:50	55.03	4.5233	STATION 7	CTD yoyo	BEGIN	7_1	B17-05	
16-8-2024 09:55	55.0302	4.5232	STATION 7	CTD yoyo	BOT	7_1	B17-05	
16-8-2024 10:29	55.0302	4.5232	STATION 7	CTD yoyo	SURF	7_1	B17-05	
16-8-2024 10:31	55.0302	4.5233	STATION 7	CTD yoyo	END	7_1	B17-05	
16-8-2024 11:54	55.0303	4.5233	STATION 8	CTD yoyo	BEGIN	8_1	B17-05	
16-8-2024 12:00	55.0302	4.5233	STATION 8	CTD yoyo	BOT	8_1	B17-05	
16-8-2024 12:28	55.0302	4.5232	STATION 8	CTD yoyo	SURF	8_1	B17-05	
16-8-2024 12:30	55.0302	4.5233	STATION 8	CTD yoyo	END	8_1	B17-05	
16-8-2024 12:35	55.0302	4.5233	STATION 9	In Situ Pump	BEGIN	9_1	B17-05	
16-8-2024 12:37	55.0302	4.5233	STATION 9	In Situ Pump	START	9_1	B17-05	
16-8-2024 13:00	55.0302	4.5233	STATION 9	Floating Chamber	BEGIN	9_2	B17-05	
16-8-2024 13:20	55.0302	4.5233	STATION 9	In Situ Pump	STOP	9_1	B17-05	
16-8-2024 13:21	55.0302	4.5233	STATION 9	In Situ Pump	END	9_1	B17-05	
16-8-2024 13:54	55.0302	4.5235	STATION 10	CTD yoyo	BEGIN	10_1	B17-05	
16-8-2024 14:02	55.0302	4.5233	STATION 10	CTD yoyo	BOT	10_1	B17-05	
16-8-2024 14:03	55.0302	4.5233	STATION 10	Floating Chamber	RECOVER	9_2	B17-05	
16-8-2024 14:03	55.0302	4.5233	STATION 10	Floating Chamber	END	9_2	B17-05	
16-8-2024 14:34	55.0302	4.5235	STATION 10	CTD yoyo	END	10_1	B17-05	
16-8-2024 15:54	55.0302	4.5237	STATION 11	CTD yoyo	BEGIN	11_1	B17-05	
16-8-2024 16:03	55.0303	4.5237	STATION 11	CTD yoyo	BOT	11_1	B17-05	
16-8-2024 16:38	55.0302	4.5233	STATION 11	CTD yoyo	END	11_1	B17-05	
16-8-2024 16:43	55.0302	4.5233	STATION 12	In Situ Pump	BEGIN	12_1	B17-05	
16-8-2024 16:44	55.0302	4.5233	STATION 12	In Situ Pump	START	12_1	B17-05	
16-8-2024 17:24	55.0303	4.5235	STATION 12	In Situ Pump	STOP	12_1	B17-05	
16-8-2024 17:25	55.0303	4.5235	STATION 12	In Situ Pump	END	12_1	B17-05	
16-8-2024 17:59	55.0303	4.5233	STATION 13	CTD yoyo	BEGIN	13_1	B17-05	
16-8-2024 18:00	55.0302	4.5235	STATION 13	CTD yoyo	BOT	13_1	B17-05	
16-8-2024 18:23	55.0302	4.5235	STATION 13	CTD yoyo	SURF	13_1	B17-05	
16-8-2024 18:28	55.0303	4.5235	STATION 13	CTD yoyo	END	13_1	B17-05	
16-8-2024 19:53	55.0302	4.5232	STATION 14	CTD with Samples	BEGIN	14_1	B17-05	
16-8-2024 19:58	55.0302	4.5235	STATION 14	CTD with Samples	BOT	14_1	B17-05	
16-8-2024 20:29	55.0302	4.5235	STATION 14	CTD with Samples	END	14_1	B17-05	
16-8-2024 20:34	55.0302	4.5237	STATION 15	In Situ Pump	BEGIN	15_1	B17-05	
16-8-2024 20:37	55.0303	4.5235	STATION 15	In Situ Pump	START	15_1	B17-05	
16-8-2024 21:17	55.0302	4.5235	STATION 15	In Situ Pump	STOP	15_1	B17-05	
16-8-2024 21:19	55.0302	4.5233	STATION 15	In Situ Pump	END	15_1	B17-05	
16-8-2024 21:55	55.0303	4.5237	STATION 16	CTD with Samples	BEGIN	16_1	B17-05	
16-8-2024 22:01	55.0302	4.5237	STATION 16	CTD with Samples	BOT	16_1	B17-05	
16-8-2024 22:31	55.0303	4.5235	STATION 16	CTD with Samples	END	16_1	B17-05	
16-8-2024 23:47	55.0302	4.5235	STATION 17	CTD with Samples	BEGIN	17_1	B17-05	
16-8-2024 23:51	55.0302	4.5235	STATION 17	CTD with Samples	BOT	17_1	B17-05	

17-8-2024 00:23	55.0302	4.5235	STATION 17	CTD with Samples	END	17_1	B17-05
17-8-2024 01:54	55.0302	4.5235	STATION 18	CTD with Samples	BEGIN	18_1	B17-05
17-8-2024 01:59	55.0302	4.5237	STATION 18	CTD with Samples	BOT	18_1	B17-05
17-8-2024 02:29	55.0303	4.5237	STATION 18	CTD with Samples	END	18_1	B17-05
17-8-2024 03:50	55.0302	4.5238	STATION 19	CTD yoyo	BEGIN	19_1	B17-05
17-8-2024 03:53	55.0302	4.5237	STATION 19	CTD yoyo	BOT	19_1	B17-05
17-8-2024 04:23	55.0302	4.5232	STATION 19	CTD yoyo	END	19_1	B17-05
17-8-2024 05:51	55.0302	4.5238	STATION 20	CTD with Samples	BEGIN	20_1	B17-05
17-8-2024 06:06	55.0302	4.5233	STATION 20	CTD with Samples	BOT	20_1	B17-05
17-8-2024 06:26	55.0302	4.5233	STATION 20	CTD with Samples	END	20_1	B17-05
17-8-2024 08:03	55.0302	4.5233	STATION 21	Mini lander	BEGIN	21_1	B17-05
17-8-2024 08:10	55.0302	4.5233	STATION 21	ROV deployment	BEGIN	21_2	B17-05
17-8-2024 09:52	55.0298	4.5233	STATION 21	Mini lander	DEPL	21_1	B17-05
17-8-2024 09:52	55.0298	4.5233	STATION 21	ROV deployment	DEP	21_2	B17-05
17-8-2024 09:52	55.0298	4.5233	STATION 21	ROV deployment	REC	21_2	B17-05
17-8-2024 09:52	55.0298	4.5233	STATION 21	ROV deployment	END	21_2	B17-05
17-8-2024 09:59	55.0297	4.523	STATION 21	Mini lander	DEPL	21_1	B17-05
17-8-2024 09:59	55.0297	4.523	STATION 21	Mini lander	END	21_1	B17-05
17-8-2024 11:17	55.034	4.4843	STATION 22	Multibeam	BEGIN	22_1	B17-04
17-8-2024 11:32	55.0338	4.4797	STATION 22	Multibeam	END	22_1	B17-04
17-8-2024 11:49	55.034	4.4815	STATION 23	Funnel lander	BEGIN	23_1	B17-04
17-8-2024 11:53	55.034	4.4815	STATION 23	ROV deployment	BEGIN	23_2	B17-04
17-8-2024 11:58	55.034	4.4815	STATION 23	ROV deployment	DEP	23_2	B17-04
17-8-2024 12:20	55.034	4.4813	STATION 23	ROV deployment	REC	23_2	B17-04
17-8-2024 12:30	55.0338	4.4815	STATION 23	ROV deployment	END	23_2	B17-04
17-8-2024 12:39	55.0333	4.4823	STATION 23	Funnel lander	DEPL	23_1	B17-04
17-8-2024 12:42	55.0328	4.4823	STATION 23	Funnel lander	END	23_1	B17-04
17-8-2024 12:52	55.0343	4.4838	STATION 24	Multibeam	BEGIN	24_1	B17-04
17-8-2024 12:58	55.0343	4.4782	STATION 24	Multibeam	END	24_1	B17-04
17-8-2024 16:55	55.2993	3.8258	STATION 25	Multibeam	BEGIN	25_1	A15-03
17-8-2024 17:07	55.3003	3.8305	STATION 25	Slurf	BEGIN	25_2	A15-03
17-8-2024 17:25	55.2998	3.825	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 18:32	55.3003	3.8252	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 18:37	55.3015	3.8272	STATION 25	Slurf	END	25_2	A15-03
17-8-2024 18:37	55.3017	3.8273	STATION 25	Slurf	BEGIN	25_3	A15-03
17-8-2024 19:00	55.3002	3.8255	STATION 25	Slurf	END	25_3	A15-03
17-8-2024 19:01	55.3002	3.8252	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 19:09	55.3023	3.83	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 19:19	55.301	3.829	STATION 25	Slurf	BEGIN	25_4	A15-03
17-8-2024 19:31	55.3002	3.8255	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 19:31	55.3002	3.8255	STATION 25	Slurf	END	25_4	A15-03
17-8-2024 19:39	55.3025	3.8298	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 19:53	55.3008	3.8282	STATION 25	Slurf	BEGIN	25_5	A15-03
17-8-2024 20:02	55.3002	3.8255	STATION 25	Slurf	END	25_5	A15-03
17-8-2024 20:02	55.3002	3.8255	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 20:10	55.3025	3.8295	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 20:24	55.3008	3.8277	STATION 25	Slurf	BEGIN	25_6	A15-03
17-8-2024 20:34	55.3002	3.8255	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 20:34	55.3002	3.8255	STATION 25	Slurf	END	25_6	A15-03
17-8-2024 20:42	55.3023	3.8298	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 20:51	55.3008	3.828	STATION 25	Slurf	BEGIN	25_7	A15-03
17-8-2024 21:03	55.3003	3.825	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 21:03	55.3003	3.825	STATION 25	Slurf	END	25_7	A15-03
17-8-2024 21:09	55.3028	3.8227	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 21:22	55.3013	3.8258	STATION 25	Slurf	BEGIN	25_8	A15-03
17-8-2024 21:31	55.2998	3.8272	STATION 25	Slurf	END	25_8	A15-03
17-8-2024 21:31	55.2998	3.8272	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 21:31	55.2997	3.8272	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 21:39	55.3023	3.8292	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 21:52	55.3008	3.828	STATION 25	Slurf	BEGIN	25_10	A15-03
17-8-2024 22:03	55.3003	3.8255	STATION 25	Slurf	END	25_10	A15-03
17-8-2024 22:04	55.3003	3.8253	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 22:25	55.3008	3.8277	STATION 25	Slurf	BEGIN	25_11	A15-03
17-8-2024 22:33	55.3003	3.8255	STATION 25	Slurf	END	25_11	A15-03
17-8-2024 22:33	55.3003	3.8255	STATION 25	Multibeam	COCH	25_1	A15-03

17-8-2024 22:50	55.3008	3.8277	STATION 25	Slurf	BEGIN	25_12	A15-03
17-8-2024 22:57	55.3003	3.8255	STATION 25	Slurf	END	25_12	A15-03
17-8-2024 23:14	55.3008	3.8277	STATION 25	Slurf	BEGIN	25_13	A15-03
17-8-2024 23:23	55.3003	3.8253	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 23:23	55.3003	3.8253	STATION 25	Slurf	END	25_13	A15-03
17-8-2024 23:39	55.3008	3.8277	STATION 25	Slurf	BEGIN	25_14	A15-03
17-8-2024 23:47	55.3003	3.8253	STATION 25	Multibeam	COCH	25_1	A15-03
17-8-2024 23:47	55.3003	3.8253	STATION 25	Slurf	END	25_14	A15-03
18-8-2024 00:04	55.3008	3.8273	STATION 25	Slurf	BEGIN	25_15	A15-03
18-8-2024 00:10	55.3003	3.8253	STATION 25	Slurf	END	25_15	A15-03
18-8-2024 00:10	55.3003	3.8253	STATION 25	Multibeam	COCH	25_1	A15-03
18-8-2024 00:26	55.3008	3.8275	STATION 25	Slurf	BEGIN	25_16	A15-03
18-8-2024 00:33	55.3003	3.8253	STATION 25	Multibeam	COCH	25_1	A15-03
18-8-2024 00:33	55.3003	3.8253	STATION 25	Slurf	END	25_16	A15-03
18-8-2024 00:51	55.3008	3.8277	STATION 25	Slurf	BEGIN	25_17	A15-03
18-8-2024 00:57	55.3003	3.8253	STATION 25	Multibeam	COCH	25_1	A15-03
18-8-2024 00:57	55.3003	3.8253	STATION 25	Slurf	END	25_17	A15-03
18-8-2024 01:15	55.3008	3.8277	STATION 25	Slurf	BEGIN	25_18	A15-03
18-8-2024 01:22	55.3003	3.8253	STATION 25	Multibeam	COCH	25_1	A15-03
18-8-2024 01:22	55.3003	3.8253	STATION 25	Slurf	END	25_18	A15-03
18-8-2024 01:41	55.3008	3.828	STATION 25	Slurf	BEGIN	25_19	A15-03
18-8-2024 01:47	55.3003	3.8255	STATION 25	Multibeam	COCH	25_1	A15-03
18-8-2024 01:47	55.3003	3.8255	STATION 25	Slurf	END	25_19	A15-03
18-8-2024 02:06	55.3008	3.8273	STATION 25	Slurf	BEGIN	25_20	A15-03
18-8-2024 02:12	55.3003	3.8252	STATION 25	Slurf	END	25_20	A15-03
18-8-2024 02:12	55.3003	3.8252	STATION 25	Multibeam	COCH	25_1	A15-03
18-8-2024 02:34	55.3008	3.8277	STATION 25	Slurf	BEGIN	25_21	A15-03
18-8-2024 02:42	55.3003	3.8255	STATION 25	Slurf	END	25_21	A15-03
18-8-2024 03:03	55.3012	3.8272	STATION 25	Slurf	BEGIN	25_22	A15-03
18-8-2024 03:12	55.3	3.8257	STATION 25	Slurf	END	25_22	A15-03
18-8-2024 03:36	55.301	3.8273	STATION 25	Slurf	BEGIN	25_23	A15-03
18-8-2024 03:44	55.3	3.8257	STATION 25	Slurf	END	25_23	A15-03
18-8-2024 04:09	55.3005	3.8278	STATION 25	Slurf	BEGIN	25_24	A15-03
18-8-2024 04:16	55.3007	3.8253	STATION 25	Slurf	END	25_24	A15-03
18-8-2024 04:34	55.3005	3.8278	STATION 25	Slurf	BEGIN	25_25	A15-03
18-8-2024 04:39	55.3005	3.8253	STATION 25	Slurf	END	25_25	A15-03
18-8-2024 04:53	55.3003	3.8278	STATION 25	Slurf	BEGIN	25_26	A15-03
18-8-2024 04:57	55.3008	3.8257	STATION 25	Slurf	END	25_26	A15-03
18-8-2024 04:57	55.3008	3.8255	STATION 25	Multibeam	END	25_1	A15-03
18-8-2024 06:24	55.3005	3.8268	STATION 26	ROV deployment	BEGIN	26_1	A15-03
18-8-2024 06:32	55.3005	3.8265	STATION 26	ROV deployment	DEP	26_1	A15-03
18-8-2024 06:50	55.3005	3.8263	STATION 26	Funnel slurf	BEGIN	26_2	A15-03
18-8-2024 09:14	55.3003	3.8263	STATION 26	Funnel slurf	END	26_2	A15-03
18-8-2024 10:07	55.3005	3.8268	STATION 26	Multibeam	BEGIN	26_3	A15-03
18-8-2024 11:16	55.3003	3.8267	STATION 26	Floating Chamber	BEGIN	26_4	A15-03
18-8-2024 12:41	55.3003	3.8267	STATION 26	Floating Chamber	RECOVER	26_4	A15-03
18-8-2024 12:41	55.3003	3.8267	STATION 26	Floating Chamber	END	26_4	A15-03
18-8-2024 13:13	55.3005	3.8268	STATION 26	Floating Chamber	BEGIN	26_5	A15-03
18-8-2024 15:37	55.3005	3.8263	STATION 26	Floating Chamber	RECOVER	26_5	A15-03
18-8-2024 15:40	55.3005	3.8267	STATION 26	Floating Chamber	END	26_5	A15-03
18-8-2024 18:02	55.3003	3.8268	STATION 26	ROV deployment	REC	26_1	A15-03
18-8-2024 18:07	55.3003	3.8268	STATION 26	ROV deployment	END	26_1	A15-03
18-8-2024 18:16	55.3002	3.8278	STATION 26	Multibeam	END	26_3	A15-03
18-8-2024 18:20	55.3003	3.8282	STATION 27	Slurf	BEGIN	27_1	A15-03
18-8-2024 18:21	55.3003	3.8282	STATION 27	Multibeam	BEGIN	27_2	A15-03
18-8-2024 18:53	55.3015	3.831	STATION 27	Slurf	END	27_1	A15-03
18-8-2024 18:53	55.3015	3.831	STATION 27	Multibeam	COCH	27_2	A15-03
18-8-2024 18:54	55.3012	3.8333	STATION 27	Multibeam	COCH	27_2	A15-03
18-8-2024 19:12	55.3003	3.8285	STATION 27	Slurf	BEGIN	27_3	A15-03
18-8-2024 19:23	55.3005	3.8253	STATION 27	Slurf	END	27_3	A15-03
18-8-2024 19:23	55.3005	3.8253	STATION 27	Multibeam	COCH	27_2	A15-03
18-8-2024 19:45	55.3003	3.8278	STATION 27	Slurf	BEGIN	27_4	A15-03
18-8-2024 19:51	55.3007	3.8252	STATION 27	Slurf	END	27_4	A15-03
18-8-2024 19:51	55.3007	3.8252	STATION 27	Multibeam	COCH	27_2	A15-03
18-8-2024 20:00	55.3007	3.833	STATION 27	Multibeam	COCH	27_2	A15-03

18-8-2024 20:15	55.3003	3.8282	STATION 27	Slurf	BEGIN	27_5	A15-03
18-8-2024 20:46	55.3003	3.8278	STATION 27	Slurf	END	27_5	A15-03
18-8-2024 20:46	55.3003	3.8277	STATION 27	Slurf	BEGIN	27_6	A15-03
18-8-2024 20:53	55.3008	3.8253	STATION 27	Slurf	END	27_6	A15-03
18-8-2024 20:53	55.3008	3.8253	STATION 27	Multibeam	COCH	27_2	A15-03
18-8-2024 21:02	55.3007	3.8328	STATION 27	Multibeam	COCH	27_2	A15-03
18-8-2024 21:14	55.3002	3.8283	STATION 27	Slurf	BEGIN	27_7	A15-03
18-8-2024 21:24	55.3007	3.8252	STATION 27	Multibeam	COCH	27_2	A15-03
18-8-2024 21:32	55.3007	3.8327	STATION 27	Slurf	END	27_7	A15-03
18-8-2024 21:32	55.3007	3.8327	STATION 27	Multibeam	COCH	27_2	A15-03
18-8-2024 21:46	55.3003	3.8278	STATION 27	Slurf	BEGIN	27_9	A15-03
18-8-2024 21:56	55.3008	3.8253	STATION 27	Slurf	END	27_9	A15-03
18-8-2024 21:56	55.3008	3.8253	STATION 27	Multibeam	COCH	27_2	A15-03
18-8-2024 22:17	55.3005	3.8278	STATION 27	Slurf	BEGIN	27_10	A15-03
18-8-2024 22:17	55.3005	3.8278	STATION 27	Multibeam	COCH	27_2	A15-03
18-8-2024 22:27	55.3005	3.8253	STATION 27	Slurf	END	27_10	A15-03
18-8-2024 22:27	55.3005	3.8253	STATION 27	Multibeam	COCH	27_2	A15-03
18-8-2024 22:42	55.3005	3.8278	STATION 27	Slurf	BEGIN	27_11	A15-03
18-8-2024 22:42	55.3005	3.8278	STATION 27	Multibeam	COCH	27_2	A15-03
18-8-2024 22:50	55.3005	3.8255	STATION 27	Slurf	END	27_11	A15-03
18-8-2024 22:51	55.3005	3.8253	STATION 27	Multibeam	END	27_2	A15-03
19-8-2024 03:44	55.0297	4.5267	STATION 28	Mini lander	BEGIN	28_1	B17-05
19-8-2024 03:54	55.0295	4.5243	STATION 28	Mini lander	RECOV	28_1	B17-05
19-8-2024 04:24	55.0292	4.5228	STATION 28	Mini lander	END	28_1	B17-05
19-8-2024 04:40	55.0338	4.4848	STATION 29	Funnel lander	BEGIN	29_1	B17-04
19-8-2024 04:45	55.034	4.4827	STATION 29	Funnel lander	REC	29_1	B17-04
19-8-2024 05:03	55.0338	4.4815	STATION 29	Funnel lander	END	29_1	B17-04
19-8-2024 06:08	55.0342	4.4808	STATION 30	Floating Chamber	BEGIN	30_2	B17-04
19-8-2024 06:18	55.0342	4.481	STATION 30	Floating Chamber	RECOVER	30_2	B17-04
19-8-2024 06:21	55.0342	4.4812	STATION 30	Shipsdata	COMMENT		B17-04
19-8-2024 10:10	55.034	4.481	STATION 30	Floating Chamber	END	30_2	B17-04
19-8-2024 13:15	55.0297	4.5232	STATION 31	Mini lander	BEGIN	31_1	B17-05
19-8-2024 13:15	55.0297	4.5232	STATION 31	Mini lander	END	31_1	B17-05
19-8-2024 13:15	55.0297	4.5232	STATION 31	Funnel lander	BEGIN	31_2	B17-05
19-8-2024 13:17	55.0297	4.5232	STATION 31	Shipsdata	COMMENT		B17-05
19-8-2024 13:19	55.0297	4.523	STATION 31	ROV deployment	BEGIN	31_3	B17-05
19-8-2024 13:25	55.0297	4.5232	STATION 31	ROV deployment	DEP	31_3	B17-05
19-8-2024 15:01	55.0303	4.5232	STATION 31	ROV deployment	END	31_3	B17-05
19-8-2024 15:11	55.0303	4.5233	STATION 31	Funnel lander	END	31_2	B17-05
19-8-2024 15:24	55.0313	4.5185	STATION 32	Multibeam	BEGIN	32_1	B17-05
19-8-2024 15:40	55.0285	4.5222	STATION 32	Multibeam	END	32_1	B17-05
19-8-2024 16:55	55.0343	4.4817	STATION 33	ROV deployment	BEGIN	33_1	B17-04
19-8-2024 17:02	55.0342	4.4817	STATION 33	Mini lander	BEGIN	33_2	B17-04
19-8-2024 17:27	55.0342	4.4817	STATION 33	Mini lander	DEPL	33_2	B17-04
19-8-2024 17:41	55.0345	4.4825	STATION 33	ROV deployment	END	33_1	B17-04
19-8-2024 17:44	55.0345	4.4827	STATION 33	Mini lander	END	33_2	B17-04
20-8-2024 06:15	55.3067	3.8358	STATION 34	Slurf	BEGIN	34_1	A15-03
20-8-2024 06:16	55.3067	3.8358	STATION 34	Multibeam	BEGIN	34_2	A15-03
20-8-2024 06:40	55.2998	3.8255	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 06:40	55.2998	3.8255	STATION 34	Slurf	END	34_1	A15-03
20-8-2024 06:48	55.3052	3.8307	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 07:04	55.3013	3.8273	STATION 34	Slurf	BEGIN	34_3	A15-03
20-8-2024 07:09	55.3	3.8257	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 07:09	55.3	3.8257	STATION 34	Slurf	END	34_3	A15-03
20-8-2024 07:19	55.3058	3.8308	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 07:32	55.3017	3.828	STATION 34	Slurf	BEGIN	34_4	A15-03
20-8-2024 07:37	55.3	3.8255	STATION 34	Slurf	END	34_4	A15-03
20-8-2024 07:38	55.2998	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 07:48	55.3063	3.8317	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 08:06	55.3013	3.8275	STATION 34	Slurf	BEGIN	34_5	A15-03
20-8-2024 08:12	55.3002	3.8255	STATION 34	Slurf	END	34_5	A15-03
20-8-2024 08:12	55.3002	3.8255	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 08:22	55.3058	3.8305	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 08:36	55.3015	3.8277	STATION 34	Slurf	BEGIN	34_6	A15-03
20-8-2024 08:44	55.3	3.8257	STATION 34	Slurf	END	34_6	A15-03

20-8-2024 08:44	55.3	3.8257	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 08:52	55.3053	3.8295	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 09:05	55.3015	3.8275	STATION 34	Slurf	BEGIN	34_7	A15-03
20-8-2024 09:13	55.3002	3.8255	STATION 34	Slurf	END	34_7	A15-03
20-8-2024 09:13	55.3002	3.8255	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 09:24	55.306	3.8312	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 09:35	55.3015	3.8275	STATION 34	Slurf	BEGIN	34_8	A15-03
20-8-2024 09:44	55.3002	3.8255	STATION 34	Slurf	END	34_8	A15-03
20-8-2024 09:44	55.3002	3.8255	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 09:53	55.3058	3.8298	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 10:05	55.3015	3.8275	STATION 34	Slurf	BEGIN	34_9	A15-03
20-8-2024 10:05	55.3015	3.8273	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 10:12	55.3	3.8258	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 10:12	55.3	3.8258	STATION 34	Slurf	END	34_9	A15-03
20-8-2024 10:35	55.3017	3.8278	STATION 34	Slurf	BEGIN	34_10	A15-03
20-8-2024 10:35	55.3017	3.8278	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 10:43	55.3002	3.8258	STATION 34	Slurf	END	34_10	A15-03
20-8-2024 10:43	55.3002	3.8258	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 11:07	55.3015	3.8277	STATION 34	Slurf	BEGIN	34_11	A15-03
20-8-2024 11:07	55.3015	3.8277	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 11:13	55.3002	3.8258	STATION 34	Slurf	END	34_11	A15-03
20-8-2024 11:13	55.3002	3.8257	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 11:34	55.3017	3.8273	STATION 34	Slurf	BEGIN	34_12	A15-03
20-8-2024 11:34	55.3017	3.8273	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 11:40	55.3	3.826	STATION 34	Slurf	END	34_12	A15-03
20-8-2024 11:40	55.3	3.826	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 11:58	55.3018	3.8275	STATION 34	Slurf	BEGIN	34_13	A15-03
20-8-2024 11:58	55.3018	3.8273	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 12:07	55.3	3.826	STATION 34	Slurf	END	34_13	A15-03
20-8-2024 12:07	55.3	3.826	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 12:32	55.3018	3.8275	STATION 34	Slurf	BEGIN	34_14	A15-03
20-8-2024 12:40	55.3	3.8258	STATION 34	Slurf	END	34_14	A15-03
20-8-2024 12:40	55.3	3.8258	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 13:03	55.3018	3.8273	STATION 34	Slurf	BEGIN	34_15	A15-03
20-8-2024 13:03	55.3018	3.8273	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 13:12	55.3	3.826	STATION 34	Slurf	END	34_15	A15-03
20-8-2024 13:12	55.3	3.826	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 13:34	55.3015	3.8272	STATION 34	Slurf	BEGIN	34_16	A15-03
20-8-2024 13:40	55.3	3.826	STATION 34	Slurf	END	34_16	A15-03
20-8-2024 13:40	55.3	3.826	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 14:02	55.3013	3.8272	STATION 34	Slurf	BEGIN	34_17	A15-03
20-8-2024 14:02	55.3013	3.8272	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 14:08	55.3	3.826	STATION 34	Slurf	END	34_17	A15-03
20-8-2024 14:08	55.3	3.826	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 14:33	55.301	3.8277	STATION 34	Slurf	BEGIN	34_18	A15-03
20-8-2024 14:33	55.301	3.8277	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 14:39	55.3	3.8258	STATION 34	Slurf	END	34_18	A15-03
20-8-2024 14:39	55.3	3.8257	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 15:02	55.3012	3.8275	STATION 34	Slurf	BEGIN	34_19	A15-03
20-8-2024 15:02	55.3012	3.8275	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 15:09	55.3002	3.8258	STATION 34	Slurf	END	34_19	A15-03
20-8-2024 15:09	55.3002	3.8257	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 15:31	55.301	3.8275	STATION 34	Slurf	BEGIN	34_20	A15-03
20-8-2024 15:31	55.301	3.8275	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 15:38	55.3	3.8255	STATION 34	Slurf	END	34_20	A15-03
20-8-2024 15:38	55.3	3.8255	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 16:02	55.3008	3.8275	STATION 34	Slurf	BEGIN	34_21	A15-03
20-8-2024 16:02	55.3008	3.8275	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 16:06	55.3	3.8257	STATION 34	Slurf	END	34_21	A15-03
20-8-2024 16:06	55.3	3.8257	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 16:32	55.3008	3.8277	STATION 34	Slurf	BEGIN	34_22	A15-03
20-8-2024 16:32	55.3008	3.8277	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 16:37	55.3002	3.8257	STATION 34	Slurf	END	34_22	A15-03
20-8-2024 16:37	55.3002	3.8257	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 17:04	55.3005	3.8278	STATION 34	Slurf	BEGIN	34_23	A15-03

20-8-2024 17:04	55.3005	3.8278	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 17:09	55.3005	3.8255	STATION 34	Slurf	END	34_23	A15-03
20-8-2024 17:09	55.3005	3.8255	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 17:35	55.3005	3.8277	STATION 34	Slurf	BEGIN	34_24	A15-03
20-8-2024 17:39	55.3005	3.8253	STATION 34	Slurf	END	34_24	A15-03
20-8-2024 17:39	55.3005	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 18:03	55.3005	3.8292	STATION 34	Slurf	BEGIN	34_25	A15-03
20-8-2024 18:14	55.3007	3.8248	STATION 34	Slurf	END	34_25	A15-03
20-8-2024 18:14	55.3007	3.8248	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 18:34	55.3005	3.8285	STATION 34	Slurf	BEGIN	34_26	A15-03
20-8-2024 18:34	55.3005	3.8285	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 18:42	55.3005	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 18:42	55.3005	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 18:42	55.3005	3.8253	STATION 34	Slurf	END	34_26	A15-03
20-8-2024 18:49	55.3013	3.8338	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 19:04	55.3005	3.8283	STATION 34	Slurf	BEGIN	34_27	A15-03
20-8-2024 19:04	55.3005	3.8283	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 19:10	55.3003	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 19:10	55.3003	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 19:10	55.3003	3.8253	STATION 34	Slurf	END	34_27	A15-03
20-8-2024 19:18	55.3013	3.835	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 19:34	55.3005	3.828	STATION 34	Slurf	BEGIN	34_28	A15-03
20-8-2024 19:34	55.3005	3.828	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 19:41	55.3003	3.8253	STATION 34	Slurf	END	34_28	A15-03
20-8-2024 19:41	55.3003	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 19:49	55.3015	3.8335	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 20:04	55.3005	3.8288	STATION 34	Slurf	BEGIN	34_30	A15-03
20-8-2024 20:04	55.3005	3.8287	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 20:11	55.3005	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 20:11	55.3005	3.8253	STATION 34	Slurf	END	34_30	A15-03
20-8-2024 20:19	55.3017	3.8332	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 20:35	55.3005	3.8283	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 20:35	55.3005	3.8283	STATION 34	Slurf	BEGIN	34_31	A15-03
20-8-2024 20:41	55.3005	3.8252	STATION 34	Slurf	END	34_31	A15-03
20-8-2024 20:41	55.3005	3.8252	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 20:49	55.3017	3.8333	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 21:05	55.3005	3.8283	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 21:05	55.3005	3.8283	STATION 34	Slurf	BEGIN	34_32	A15-03
20-8-2024 21:11	55.3005	3.8252	STATION 34	Slurf	END	34_32	A15-03
20-8-2024 21:11	55.3005	3.8252	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 21:19	55.3018	3.8332	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 21:34	55.3005	3.8288	STATION 34	Slurf	BEGIN	34_33	A15-03
20-8-2024 21:34	55.3005	3.8288	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 21:41	55.3005	3.8252	STATION 34	Slurf	END	34_33	A15-03
20-8-2024 21:41	55.3005	3.8252	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 21:50	55.3015	3.8332	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 22:05	55.3005	3.8282	STATION 34	Slurf	BEGIN	34_34	A15-03
20-8-2024 22:05	55.3005	3.828	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 22:11	55.3005	3.8253	STATION 34	Slurf	END	34_34	A15-03
20-8-2024 22:11	55.3005	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 22:30	55.3005	3.8288	STATION 34	Slurf	BEGIN	34_35	A15-03
20-8-2024 22:30	55.3005	3.8288	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 22:38	55.3005	3.8253	STATION 34	Slurf	END	34_35	A15-03
20-8-2024 22:38	55.3005	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 22:55	55.3005	3.8282	STATION 34	Slurf	BEGIN	34_36	A15-03
20-8-2024 22:55	55.3005	3.8282	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 23:01	55.3005	3.8253	STATION 34	Slurf	END	34_36	A15-03
20-8-2024 23:01	55.3005	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 23:17	55.3007	3.8285	STATION 34	Slurf	BEGIN	34_37	A15-03
20-8-2024 23:17	55.3007	3.8285	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 23:24	55.3005	3.8253	STATION 34	Slurf	END	34_37	A15-03
20-8-2024 23:24	55.3005	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 23:40	55.3005	3.8287	STATION 34	Slurf	BEGIN	34_38	A15-03
20-8-2024 23:40	55.3005	3.8287	STATION 34	Multibeam	COCH	34_2	A15-03
20-8-2024 23:47	55.3005	3.8253	STATION 34	Slurf	END	34_38	A15-03

20-8-2024 23:47	55.3005	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 00:03	55.3005	3.8287	STATION 34	Slurf	BEGIN	34_39	A15-03
21-8-2024 00:03	55.3005	3.8285	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 00:09	55.3005	3.8253	STATION 34	Slurf	END	34_39	A15-03
21-8-2024 00:09	55.3005	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 00:25	55.3005	3.8283	STATION 34	Slurf	BEGIN	34_40	A15-03
21-8-2024 00:25	55.3005	3.8283	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 00:32	55.3005	3.8253	STATION 34	Slurf	END	34_40	A15-03
21-8-2024 00:32	55.3005	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 00:49	55.3005	3.8285	STATION 34	Slurf	BEGIN	34_41	A15-03
21-8-2024 00:49	55.3005	3.8285	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 00:54	55.3005	3.8253	STATION 34	Slurf	END	34_41	A15-03
21-8-2024 00:54	55.3005	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 01:09	55.3007	3.8283	STATION 34	Slurf	BEGIN	34_42	A15-03
21-8-2024 01:10	55.3007	3.8283	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 01:15	55.3005	3.8253	STATION 34	Slurf	END	34_42	A15-03
21-8-2024 01:15	55.3005	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 01:34	55.3005	3.8287	STATION 34	Slurf	BEGIN	34_43	A15-03
21-8-2024 01:34	55.3005	3.8287	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 01:43	55.3003	3.8255	STATION 34	Slurf	END	34_43	A15-03
21-8-2024 01:43	55.3003	3.8255	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 02:02	55.3007	3.8283	STATION 34	Slurf	BEGIN	34_44	A15-03
21-8-2024 02:02	55.3007	3.8283	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 02:08	55.3003	3.8252	STATION 34	Slurf	END	34_44	A15-03
21-8-2024 02:08	55.3003	3.8252	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 02:30	55.3005	3.8277	STATION 34	Slurf	BEGIN	34_45	A15-03
21-8-2024 02:30	55.3005	3.8277	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 02:36	55.3005	3.8247	STATION 34	Slurf	END	34_45	A15-03
21-8-2024 02:36	55.3005	3.8247	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 03:00	55.3003	3.8277	STATION 34	Slurf	BEGIN	34_46	A15-03
21-8-2024 03:00	55.3003	3.8277	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 03:05	55.3003	3.8253	STATION 34	Slurf	END	34_46	A15-03
21-8-2024 03:05	55.3003	3.8253	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 03:30	55.3003	3.828	STATION 34	Slurf	BEGIN	34_47	A15-03
21-8-2024 03:30	55.3003	3.828	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 03:40	55.3003	3.8252	STATION 34	Slurf	END	34_47	A15-03
21-8-2024 03:40	55.3003	3.8252	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 04:11	55.3005	3.8278	STATION 34	Slurf	BEGIN	34_48	A15-03
21-8-2024 04:11	55.3005	3.8278	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 04:16	55.3005	3.8253	STATION 34	Slurf	END	34_48	A15-03
21-8-2024 04:16	55.3005	3.8252	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 04:38	55.3005	3.8278	STATION 34	Slurf	BEGIN	34_49	A15-03
21-8-2024 04:38	55.3005	3.8278	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 04:43	55.3005	3.8253	STATION 34	Slurf	END	34_49	A15-03
21-8-2024 04:43	55.3005	3.8252	STATION 34	Multibeam	COCH	34_2	A15-03
21-8-2024 04:54	55.3015	3.8248	STATION 34	Multibeam	END	34_2	A15-03
21-8-2024 06:04	55.3002	3.827	STATION 35	CTD with Samples	BEGIN	35_1	A15-03
21-8-2024 06:14	55.3	3.8268	STATION 35	CTD with Samples	BOT	35_1	A15-03
21-8-2024 06:43	55.3003	3.8267	STATION 35	CTD with Samples	END	35_1	A15-03
21-8-2024 06:52	55.3002	3.8268	STATION 36	In Situ Pump	BEGIN	36_1	A15-03
21-8-2024 07:31	55.3005	3.827	STATION 36	In Situ Pump	START	36_1	A15-03
21-8-2024 07:31	55.3005	3.827	STATION 36	In Situ Pump	STOP	36_1	A15-03
21-8-2024 07:33	55.3005	3.827	STATION 36	In Situ Pump	END	36_1	A15-03
21-8-2024 07:49	55.3003	3.8268	STATION 37	Shipsdata	COMMENT		A15-03
21-8-2024 07:50	55.3003	3.8268	STATION 37	CTD with Samples	BEGIN	37_1	A15-03
21-8-2024 07:56	55.3003	3.8268	STATION 37	CTD with Samples	BOT	37_1	A15-03
21-8-2024 08:17	55.3003	3.8267	STATION 37	CTD with Samples	END	37_1	A15-03
21-8-2024 09:51	55.3003	3.8265	STATION 38	CTD with Samples	BEGIN	38_1	A15-03
21-8-2024 09:55	55.3005	3.8265	STATION 38	CTD with Samples	BOT	38_1	A15-03
21-8-2024 10:22	55.3005	3.8267	STATION 38	CTD with Samples	END	38_1	A15-03
21-8-2024 10:27	55.3007	3.8268	STATION 39	In Situ Pump	BEGIN	39_1	A15-03
21-8-2024 10:32	55.3005	3.8265	STATION 39	In Situ Pump	START	39_1	A15-03
21-8-2024 11:08	55.3003	3.8265	STATION 39	In Situ Pump	STOP	39_1	A15-03
21-8-2024 11:09	55.3003	3.8263	STATION 39	In Situ Pump	END	39_1	A15-03
21-8-2024 11:51	55.3005	3.8265	STATION 40	CTD with Samples	BEGIN	40_1	A15-03

21-8-2024 11:55	55.3005	3.8265	STATION 40	CTD with Samples	BOT	40_1	A15-03
21-8-2024 12:20	55.3005	3.8263	STATION 40	CTD with Samples	END	40_1	A15-03
21-8-2024 13:51	55.3005	3.8265	STATION 41	CTD with Samples	BEGIN	41_1	A15-03
21-8-2024 13:55	55.3005	3.8263	STATION 41	CTD with Samples	BOT	41_1	A15-03
21-8-2024 14:24	55.3007	3.8265	STATION 41	CTD with Samples	END	41_1	A15-03
21-8-2024 14:28	55.3007	3.8265	STATION 42	In Situ Pump	BEGIN	42_1	A15-03
21-8-2024 14:28	55.3007	3.8265	STATION 42	In Situ Pump	START	42_1	A15-03
21-8-2024 15:08	55.3005	3.8265	STATION 42	In Situ Pump	STOP	42_1	A15-03
21-8-2024 15:10	55.3005	3.8267	STATION 42	In Situ Pump	END	42_1	A15-03
21-8-2024 15:50	55.3005	3.8268	STATION 43	CTD with Samples	BEGIN	43_1	A15-03
21-8-2024 16:00	55.3005	3.8267	STATION 43	CTD with Samples	BOT	43_1	A15-03
21-8-2024 16:22	55.3003	3.8265	STATION 43	CTD with Samples	END	43_1	A15-03
21-8-2024 17:51	55.3007	3.8268	STATION 44	CTD with Samples	BEGIN	44_1	A15-03
21-8-2024 17:56	55.3007	3.8267	STATION 44	CTD with Samples	BOT	44_1	A15-03
21-8-2024 18:18	55.3007	3.8272	STATION 44	CTD with Samples	END	44_1	A15-03
21-8-2024 18:24	55.3008	3.8275	STATION 45	In Situ Pump	BEGIN	45_1	A15-03
21-8-2024 18:26	55.3007	3.8273	STATION 45	In Situ Pump	START	45_1	A15-03
21-8-2024 19:04	55.3005	3.8268	STATION 45	In Situ Pump	STOP	45_1	A15-03
21-8-2024 19:05	55.3005	3.8268	STATION 45	In Situ Pump	END	45_1	A15-03
21-8-2024 19:49	55.3003	3.8268	STATION 46	CTD with Samples	BEGIN	46_1	A15-03
21-8-2024 19:53	55.3005	3.8267	STATION 46	CTD with Samples	BOT	46_1	A15-03
21-8-2024 20:20	55.3005	3.8267	STATION 46	CTD with Samples	END	46_1	A15-03
21-8-2024 21:46	55.3007	3.827	STATION 47	CTD with Samples	BEGIN	47_1	A15-03
21-8-2024 21:50	55.3005	3.827	STATION 47	CTD with Samples	BOT	47_1	A15-03
21-8-2024 22:15	55.3007	3.8263	STATION 47	CTD with Samples	END	47_1	A15-03
21-8-2024 23:51	55.3008	3.8265	STATION 48	CTD with Samples	BEGIN	48_1	A15-03
21-8-2024 23:55	55.3008	3.8267	STATION 48	CTD with Samples	BOT	48_1	A15-03
22-8-2024 00:20	55.3005	3.8262	STATION 48	CTD with Samples	END	48_1	A15-03
22-8-2024 01:48	55.3003	3.8262	STATION 49	CTD with Samples	BEGIN	49_1	A15-03
22-8-2024 01:51	55.3003	3.8263	STATION 49	CTD with Samples	BOT	49_1	A15-03
22-8-2024 02:16	55.3008	3.8267	STATION 49	CTD with Samples	END	49_1	A15-03
22-8-2024 03:51	55.3007	3.827	STATION 50	CTD with Samples	BEGIN	50_1	A15-03
22-8-2024 03:54	55.3007	3.827	STATION 50	CTD with Samples	BOT	50_1	A15-03
22-8-2024 04:19	55.3007	3.8272	STATION 50	CTD with Samples	END	50_1	A15-03
24-8-2024 05:24	55.0353	4.5218	STATION 51	Funnel lander	BEGIN	51_1	B17-05
24-8-2024 05:40	55.0308	4.5242	STATION 51	Funnel lander	REC	51_1	B17-05
24-8-2024 05:58	55.0305	4.523	STATION 51	Funnel lander	END	51_1	B17-05
24-8-2024 06:45	55.0348	4.4813	STATION 52	Mini lander	BEGIN	52_1	B17-04
24-8-2024 06:45	55.0348	4.4813	STATION 52	Mini lander	RECOV	52_1	B17-04
24-8-2024 06:45	55.0348	4.4813	STATION 52	Mini lander	END	52_1	B17-04
24-8-2024 06:55	55.0375	4.471	TRANSIT 52	Shipsdata	COMMENT		B17-04
24-8-2024 11:07	55.3005	3.8265	STATION 53	ROV deployment	BEGIN	53_1	A15-03
24-8-2024 11:12	55.3003	3.8267	STATION 53	ROV deployment	DEP	53_1	A15-03
24-8-2024 11:38	55.3003	3.8265	STATION 53	Funnel lander	BEGIN	53_2	A15-03
24-8-2024 11:54	55.3002	3.8267	STATION 53	ROV deployment	REC	53_1	A15-03
24-8-2024 11:54	55.3002	3.8267	STATION 53	Funnel lander	DEPL	53_2	A15-03
24-8-2024 12:21	55.3012	3.8292	STATION 53	ROV deployment	END	53_1	A15-03
24-8-2024 12:22	55.3012	3.8292	STATION 53	Funnel lander	END	53_2	A15-03
24-8-2024 15:56	55.0318	4.5257	STATION 54	Multibeam	BEGIN	54_1	B17-05
24-8-2024 16:12	55.0302	4.5223	STATION 54	Multibeam	END	54_1	B17-05
24-8-2024 16:37	55.0303	4.5233	STATION 55	ROV deployment	BEGIN	55_1	B17-05
24-8-2024 16:41	55.0303	4.5233	STATION 55	ROV deployment	DEP	55_1	B17-05
24-8-2024 17:02	55.0302	4.5232	STATION 55	Mini lander	BEGIN	55_2	B17-05
24-8-2024 17:11	55.0302	4.5233	STATION 55	Mini lander	DEPL	55_2	B17-05
24-8-2024 17:37	55.0302	4.5233	STATION 55	ROV deployment	REC	55_1	B17-05
24-8-2024 17:37	55.0302	4.5233	STATION 55	ROV deployment	REC	55_1	B17-05
24-8-2024 17:41	55.0302	4.5233	STATION 55	ROV deployment	END	55_1	B17-05
24-8-2024 17:52	55.03	4.5237	STATION 55	Mini lander	END	55_2	B17-05
24-8-2024 18:45	55.0357	4.4863	STATION 56	Multibeam	BEGIN	56_1	B17-04
24-8-2024 18:58	55.033	4.4783	STATION 56	Multibeam	END	56_1	B17-04
24-8-2024 19:08	55.033	4.4822	STATION 57	Pluim Gradient	BEGIN	57_1	B17-04
24-8-2024 19:11	55.0348	4.4805	STATION 57	Pluim Gradient	COCH	57_1	B17-04
24-8-2024 19:11	55.0348	4.4805	STATION 57	Pluim Gradient	END	57_1	B17-04
24-8-2024 19:28	55.0332	4.4822	STATION 57	Pluim Gradient	BEGIN	57_2	B17-04
24-8-2024 19:30	55.035	4.4808	STATION 57	Pluim Gradient	END	57_2	B17-04

24-8-2024 19:44	55.0332	4.4822	STATION 57	Pluim Gradient	BEGIN	57_3	B17-04
24-8-2024 19:47	55.0352	4.4807	STATION 57	Pluim Gradient	END	57_3	B17-04
24-8-2024 19:58	55.0332	4.4828	STATION 57	Pluim Gradient	BEGIN	57_4	B17-04
24-8-2024 20:02	55.0353	4.481	STATION 57	Pluim Gradient	END	57_4	B17-04
24-8-2024 20:14	55.0333	4.4822	STATION 57	Pluim Gradient	BEGIN	57_5	B17-04
24-8-2024 20:16	55.035	4.4808	STATION 57	Pluim Gradient	END	57_5	B17-04
24-8-2024 20:28	55.033	4.4822	STATION 57	Pluim Gradient	BEGIN	57_6	B17-04
24-8-2024 20:31	55.035	4.4805	STATION 57	Pluim Gradient	END	57_6	B17-04
24-8-2024 20:44	55.0335	4.4828	STATION 57	Pluim Gradient	BEGIN	57_7	B17-04
24-8-2024 20:48	55.0355	4.4813	STATION 57	Pluim Gradient	END	57_7	B17-04
24-8-2024 21:02	55.0332	4.4817	STATION 57	Pluim Gradient	BEGIN	57_8	B17-04
24-8-2024 21:05	55.0352	4.4833	STATION 57	Pluim Gradient	END	57_8	B17-04
24-8-2024 21:24	55.0352	4.4828	STATION 57	Pluim Gradient	BEGIN	57_9	B17-04
24-8-2024 21:24	55.0355	4.4828	STATION 57	Pluim Gradient	END	57_9	B17-04
24-8-2024 21:40	55.0332	4.4825	STATION 57	Pluim Gradient	BEGIN	57_10	B17-04
24-8-2024 21:44	55.0363	4.4823	STATION 57	Pluim Gradient	END	57_10	B17-04
24-8-2024 22:01	55.0332	4.4823	STATION 57	Pluim Gradient	BEGIN	57_11	B17-04
24-8-2024 22:05	55.0362	4.4823	STATION 57	Pluim Gradient	END	57_11	B17-04
24-8-2024 22:22	55.0333	4.483	STATION 57	Pluim Gradient	BEGIN	57_12	B17-04
24-8-2024 22:27	55.0362	4.4837	STATION 57	Pluim Gradient	END	57_12	B17-04
24-8-2024 22:45	55.033	4.4828	STATION 57	Pluim Gradient	BEGIN	57_13	B17-04
24-8-2024 22:50	55.0363	4.4838	STATION 57	Pluim Gradient	END	57_13	B17-04
24-8-2024 23:08	55.033	4.4832	STATION 57	Pluim Gradient	BEGIN	57_14	B17-04
24-8-2024 23:14	55.0363	4.4833	STATION 57	Pluim Gradient	END	57_14	B17-04
24-8-2024 23:33	55.033	4.4832	STATION 57	Pluim Gradient	BEGIN	57_15	B17-04
24-8-2024 23:39	55.0365	4.4832	STATION 57	Pluim Gradient	END	57_15	B17-04
24-8-2024 23:55	55.033	4.483	STATION 57	Pluim Gradient	BEGIN	57_16	B17-04
25-8-2024 00:01	55.0367	4.4832	STATION 57	Pluim Gradient	END	57_16	B17-04
25-8-2024 00:19	55.033	4.484	STATION 57	Pluim Gradient	BEGIN	57_17	B17-04
25-8-2024 00:25	55.0368	4.484	STATION 57	Pluim Gradient	END	57_17	B17-04
25-8-2024 00:42	55.0332	4.4838	STATION 57	Pluim Gradient	BEGIN	57_18	B17-04
25-8-2024 00:48	55.037	4.484	STATION 57	Pluim Gradient	END	57_18	B17-04
25-8-2024 01:07	55.0332	4.4847	STATION 57	Pluim Gradient	BEGIN	57_19	B17-04
25-8-2024 01:14	55.0372	4.4847	STATION 57	Pluim Gradient	END	57_19	B17-04
25-8-2024 01:32	55.0332	4.4845	STATION 57	Pluim Gradient	BEGIN	57_20	B17-04
25-8-2024 01:39	55.0372	4.4847	STATION 57	Pluim Gradient	END	57_20	B17-04
25-8-2024 06:00	55.1668	4.3335	STATION 58	CTD with Samples	BEGIN	58_1	Background B14
25-8-2024 06:04	55.1668	4.3335	STATION 58	CTD with Samples	BOT	58_1	Background B14
25-8-2024 06:39	55.1672	4.3337	STATION 58	CTD with Samples	END	58_1	Background B14
25-8-2024 07:48	55.1672	4.3342	STATION 59	Boxcore d=300	BEGIN	59_1	Background B14
25-8-2024 07:51	55.1673	4.3342	STATION 59	Boxcore d=300	BOT	59_1	Background B14
25-8-2024 07:54	55.1672	4.334	STATION 59	Boxcore d=300	END	59_1	Background B14
25-8-2024 09:52	55.034	4.4877	STATION 60	Multibeam	BEGIN	60_1	B17-04
25-8-2024 10:03	55.0332	4.4802	STATION 60	Multibeam	COCH	60_1	B17-04
25-8-2024 10:11	55.0337	4.4798	STATION 60	Multibeam	COCH	60_1	B17-04
25-8-2024 10:13	55.034	4.4835	STATION 60	Multibeam	COCH	60_1	B17-04
25-8-2024 10:26	55.036	4.4838	STATION 60	Multibeam	COCH	60_1	B17-04
25-8-2024 10:30	55.0355	4.4795	STATION 60	Multibeam	END	60_1	B17-04
25-8-2024 11:19	55.0337	4.483	STATION 61	Pluim Gradient	BEGIN	61_1	B17-04
25-8-2024 11:22	55.0355	4.4815	STATION 61	Pluim Gradient	END	61_1	B17-04
25-8-2024 11:38	55.0333	4.483	STATION 61	Pluim Gradient	BEGIN	61_2	B17-04
25-8-2024 11:41	55.035	4.4813	STATION 61	Pluim Gradient	END	61_2	B17-04
25-8-2024 11:55	55.0332	4.483	STATION 61	Pluim Gradient	BEGIN	61_3	B17-04
25-8-2024 11:58	55.035	4.4813	STATION 61	Pluim Gradient	END	61_3	B17-04
25-8-2024 12:12	55.033	4.4832	STATION 61	Pluim Gradient	BEGIN	61_4	B17-04
25-8-2024 12:15	55.035	4.4813	STATION 61	Pluim Gradient	END	61_4	B17-04
25-8-2024 12:32	55.0335	4.483	STATION 61	Pluim Gradient	BEGIN	61_5	B17-04
25-8-2024 12:34	55.035	4.482	STATION 61	Pluim Gradient	END	61_5	B17-04
25-8-2024 12:49	55.0332	4.4832	STATION 61	Pluim Gradient	BEGIN	61_6	B17-04
25-8-2024 12:52	55.035	4.482	STATION 61	Pluim Gradient	END	61_6	B17-04
25-8-2024 13:07	55.0332	4.4833	STATION 61	Pluim Gradient	BEGIN	61_7	B17-04
25-8-2024 13:10	55.035	4.4818	STATION 61	Pluim Gradient	END	61_7	B17-04
25-8-2024 13:24	55.0332	4.4843	STATION 61	Pluim Gradient	BEGIN	61_8	B17-04
25-8-2024 13:27	55.035	4.4828	STATION 61	Pluim Gradient	END	61_8	B17-04
25-8-2024 13:41	55.033	4.4843	STATION 61	Pluim Gradient	BEGIN	61_9	B17-04

25-8-2024 13:45	55.0352	4.4828	STATION 61	Pluim Gradient	END	61_9	B17-04
25-8-2024 13:58	55.033	4.4842	STATION 61	Pluim Gradient	BEGIN	61_10	B17-04
25-8-2024 14:07	55.0373	4.4808	STATION 61	Pluim Gradient	END	61_10	B17-04
25-8-2024 14:29	55.0335	4.4848	STATION 61	Pluim Gradient	BEGIN	61_11	B17-04
25-8-2024 14:37	55.0373	4.4805	STATION 61	Pluim Gradient	END	61_11	B17-04
25-8-2024 14:56	55.0335	4.4847	STATION 61	Pluim Gradient	BEGIN	61_12	B17-04
25-8-2024 15:05	55.0378	4.48	STATION 61	Pluim Gradient	END	61_12	B17-04
25-8-2024 15:24	55.0332	4.4847	STATION 61	Pluim Gradient	BEGIN	61_13	B17-04
25-8-2024 15:34	55.0383	4.481	STATION 61	Pluim Gradient	END	61_13	B17-04
25-8-2024 16:46	55.0337	4.4813	STATION 62	CTD yoyo	BEGIN	62_1	B17-04
25-8-2024 17:36	55.0345	4.4817	STATION 62	CTD yoyo	END	62_1	B17-04
25-8-2024 17:39	55.0342	4.4812	STATION 62	CTD yoyo	BEGIN	62_2	B17-04
25-8-2024 18:27	55.0342	4.4812	STATION 62	CTD yoyo	END	62_2	B17-04
25-8-2024 18:38	55.0342	4.4812	STATION 62	CTD yoyo	BEGIN	62_4	B17-04
25-8-2024 19:20	55.0337	4.4813	STATION 62	CTD yoyo	END	62_4	B17-04
25-8-2024 19:22	55.0338	4.4813	STATION 62	CTD yoyo	BEGIN	62_5	B17-04
25-8-2024 20:10	55.0337	4.4812	STATION 62	CTD yoyo	END	62_5	B17-04
25-8-2024 20:12	55.0335	4.4813	STATION 62	CTD yoyo	BEGIN	62_6	B17-04
25-8-2024 20:59	55.0342	4.4812	STATION 62	CTD yoyo	END	62_6	B17-04
25-8-2024 21:01	55.0342	4.481	STATION 62	CTD yoyo	BEGIN	62_7	B17-04
25-8-2024 21:50	55.034	4.4818	STATION 62	CTD yoyo	END	62_7	B17-04
25-8-2024 21:58	55.034	4.4817	STATION 62	CTD yoyo	BEGIN	62_8	B17-04
25-8-2024 22:49	55.034	4.4815	STATION 62	CTD yoyo	END	62_8	B17-04
25-8-2024 23:32	55.0338	4.4815	STATION 62	CTD yoyo	BEGIN	62_9	B17-04
26-8-2024 00:21	55.0343	4.4817	STATION 62	CTD yoyo	END	62_9	B17-04
26-8-2024 00:21	55.0343	4.4817	STATION 62	CTD yoyo	BEGIN	62_10	B17-04
26-8-2024 01:07	55.0342	4.4815	STATION 62	CTD yoyo	END	62_10	B17-04
26-8-2024 01:09	55.0342	4.4815	STATION 62	CTD yoyo	BEGIN	62_11	B17-04
26-8-2024 01:56	55.0338	4.4818	STATION 62	CTD yoyo	END	62_11	B17-04
26-8-2024 01:59	55.034	4.4815	STATION 62	CTD yoyo	BEGIN	62_12	B17-04
26-8-2024 02:45	55.0343	4.4817	STATION 62	CTD yoyo	END	62_12	B17-04
26-8-2024 02:56	55.0342	4.4818	STATION 62	CTD yoyo	BEGIN	62_13	B17-04
26-8-2024 03:41	55.0342	4.4815	STATION 62	CTD yoyo	END	62_13	B17-04
26-8-2024 03:59	55.034	4.4817	STATION 62	CTD yoyo	BEGIN	62_14	B17-04
26-8-2024 04:48	55.0342	4.481	STATION 62	CTD yoyo	END	62_14	B17-04
26-8-2024 05:55	55.034	4.4817	STATION 63	CTD with Samples	BEGIN	63_1	B17-04
26-8-2024 06:30	55.0343	4.4813	STATION 63	CTD with Samples	BOT	63_1	B17-04
26-8-2024 06:31	55.0343	4.4813	STATION 63	CTD with Samples	END	63_1	B17-04
26-8-2024 06:36	55.0342	4.482	STATION 64	In Situ Pump	BEGIN	64_1	B17-04
26-8-2024 06:44	55.034	4.4817	STATION 64	In Situ Pump	START	64_1	B17-04
26-8-2024 07:20	55.0338	4.4817	STATION 64	In Situ Pump	STOP	64_1	B17-04
26-8-2024 07:20	55.0338	4.4817	STATION 64	In Situ Pump	END	64_1	B17-04
26-8-2024 07:56	55.0338	4.4818	STATION 65	CTD with Samples	BEGIN	65_1	B17-04
26-8-2024 08:00	55.0338	4.4818	STATION 65	CTD with Samples	BOT	65_1	B17-04
26-8-2024 08:29	55.0337	4.4813	STATION 65	CTD with Samples	END	65_1	B17-04
26-8-2024 09:49	55.034	4.4817	STATION 66	CTD with Samples	BEGIN	66_1	B17-04
26-8-2024 09:55	55.0342	4.4818	STATION 66	CTD with Samples	BOT	66_1	B17-04
26-8-2024 10:25	55.034	4.4813	STATION 66	CTD with Samples	END	66_1	B17-04
26-8-2024 10:29	55.0338	4.4813	STATION 67	In Situ Pump	BEGIN	67_1	B17-04
26-8-2024 10:31	55.0338	4.4813	STATION 67	In Situ Pump	START	67_1	B17-04
26-8-2024 11:09	55.0338	4.4812	STATION 67	In Situ Pump	STOP	67_1	B17-04
26-8-2024 11:13	55.0338	4.4812	STATION 67	In Situ Pump	END	67_1	B17-04
26-8-2024 11:50	55.0338	4.4815	STATION 68	CTD with Samples	BEGIN	68_1	B17-04
26-8-2024 11:54	55.034	4.4815	STATION 68	CTD with Samples	BOT	68_1	B17-04
26-8-2024 12:22	55.0338	4.4815	STATION 68	CTD with Samples	END	68_1	B17-04
26-8-2024 13:47	55.034	4.4813	STATION 69	CTD with Samples	BEGIN	69_1	B17-04
26-8-2024 13:51	55.034	4.4815	STATION 69	CTD with Samples	BOT	69_1	B17-04
26-8-2024 14:21	55.0338	4.4817	STATION 69	CTD with Samples	END	69_1	B17-04
26-8-2024 14:28	55.034	4.482	STATION 70	In Situ Pump	BEGIN	70_1	B17-04
26-8-2024 15:13	55.0342	4.4815	STATION 70	In Situ Pump	STOP	70_1	B17-04
26-8-2024 15:13	55.0342	4.4815	STATION 70	In Situ Pump	END	70_1	B17-04
26-8-2024 15:46	55.034	4.4815	STATION 71	CTD with Samples	BEGIN	71_1	B17-04
26-8-2024 16:24	55.034	4.4818	STATION 71	CTD with Samples	END	71_1	B17-04
26-8-2024 17:47	55.0342	4.4813	STATION 72	CTD with Samples	BEGIN	72_1	B17-04
26-8-2024 18:19	55.0345	4.4812	STATION 72	CTD with Samples	BOT	72_1	B17-04

26-8-2024 18:21	55.0345	4.4812	STATION 72	CTD with Samples	END	72_1	B17-04
26-8-2024 18:25	55.0347	4.4812	STATION 73	In Situ Pump	BEGIN	73_1	B17-04
26-8-2024 19:03	55.0342	4.4813	STATION 73	In Situ Pump	START	73_1	B17-04
26-8-2024 19:04	55.0342	4.4813	STATION 73	In Situ Pump	STOP	73_1	B17-04
26-8-2024 19:06	55.034	4.4813	STATION 73	In Situ Pump	END	73_1	B17-04
26-8-2024 19:48	55.034	4.4815	STATION 74	CTD with Samples	BEGIN	74_1	B17-04
26-8-2024 19:52	55.034	4.4817	STATION 74	CTD with Samples	BOT	74_1	B17-04
26-8-2024 20:19	55.034	4.4817	STATION 74	CTD with Samples	END	74_1	B17-04
26-8-2024 21:46	55.034	4.4817	STATION 75	CTD with Samples	BEGIN	75_1	B17-04
26-8-2024 21:51	55.034	4.4815	STATION 75	CTD with Samples	BOT	75_1	B17-04
26-8-2024 22:19	55.0338	4.4815	STATION 75	CTD with Samples	END	75_1	B17-04
26-8-2024 23:50	55.0342	4.4813	STATION 76	CTD with Samples	BEGIN	76_1	B17-04
26-8-2024 23:53	55.0345	4.4813	STATION 76	CTD with Samples	BOT	76_1	B17-04
27-8-2024 00:21	55.0338	4.4815	STATION 76	CTD with Samples	END	76_1	B17-04
27-8-2024 01:50	55.034	4.4813	STATION 77	CTD with Samples	BEGIN	77_1	B17-04
27-8-2024 01:53	55.034	4.4813	STATION 77	CTD with Samples	BOT	77_1	B17-04
27-8-2024 02:24	55.0342	4.4817	STATION 77	CTD with Samples	END	77_1	B17-04
27-8-2024 03:46	55.0343	4.4817	STATION 78	CTD with Samples	BEGIN	78_1	B17-04
27-8-2024 03:49	55.0342	4.4817	STATION 78	CTD with Samples	BOT	78_1	B17-04
27-8-2024 05:29	55.0323	4.5225	STATION 79	Mini lander	BEGIN	79_1	B17-05
27-8-2024 05:29	55.0323	4.5223	STATION 79	CTD with Samples	END	78_1	B17-05
27-8-2024 05:38	55.0307	4.523	STATION 79	Mini lander	RECOV	79_1	B17-05
27-8-2024 05:54	55.0307	4.5238	STATION 79	Mini lander	END	79_1	B17-05
27-8-2024 09:40	55.3007	3.828	STATION 80	ROV deployment	BEGIN	80_1	A15-03
27-8-2024 09:44	55.3007	3.8282	STATION 80	ROV deployment	DEP	80_1	A15-03
27-8-2024 10:07	55.3003	3.828	STATION 80	ROV deployment	REC	80_1	A15-03
27-8-2024 10:10	55.3	3.8277	STATION 80	ROV deployment	END	80_1	A15-03
27-8-2024 10:42	55.3007	3.828	STATION 81	Funnel lander	BEGIN	81_1	A15-03
27-8-2024 10:59	55.3003	3.8277	STATION 81	Funnel lander	REC	81_1	A15-03
27-8-2024 11:06	55.3003	3.8272	STATION 81	Funnel lander	END	81_1	A15-03
27-8-2024 11:26	55.3003	3.8268	STATION 82	ROV deployment	BEGIN	82_1	A15-03
27-8-2024 11:29	55.3005	3.8267	STATION 82	ROV deployment	DEP	82_1	A15-03
27-8-2024 12:46	55.3005	3.8267	STATION 82	Mini lander	BEGIN	82_2	A15-03
27-8-2024 13:10	55.3003	3.8267	STATION 82	ROV deployment	REC	82_1	A15-03
27-8-2024 13:15	55.3003	3.8267	STATION 82	ROV deployment	END	82_1	A15-03
27-8-2024 14:06	55.3017	3.8243	STATION 82	Mini lander	END	82_2	A15-03
27-8-2024 14:37	55.3005	3.8285	STATION 83	ROV deployment	BEGIN	83_1	A15-03
27-8-2024 14:39	55.3005	3.8285	STATION 83	ROV deployment	DEP	83_1	A15-03
27-8-2024 14:57	55.3007	3.8287	STATION 83	ROV deployment	REC	83_1	A15-03
27-8-2024 15:05	55.299	3.8275	STATION 83	ROV deployment	END	83_1	A15-03
27-8-2024 18:20	55.0342	4.4813	STATION 84	ROV deployment	BEGIN	84_1	B17-04
27-8-2024 18:29	55.0342	4.4815	STATION 84	ROV deployment	DEP	84_1	B17-04
27-8-2024 18:30	55.0342	4.4815	STATION 84	Funnel lander	BEGIN	84_2	B17-04
27-8-2024 19:07	55.034	4.4813	STATION 84	ROV deployment	REC	84_1	B17-04
27-8-2024 19:11	55.034	4.4815	STATION 84	Funnel lander	DEPL	84_2	B17-04
27-8-2024 19:14	55.034	4.4813	STATION 84	ROV deployment	END	84_1	B17-04
27-8-2024 19:25	55.0328	4.4837	STATION 84	Funnel lander	END	84_2	B17-04
27-8-2024 20:03	55.0315	4.5228	STATION 85	Multibeam	BEGIN	85_1	B17-05
27-8-2024 20:10	55.029	4.5232	STATION 85	Multibeam	END	85_1	B17-05
27-8-2024 20:36	55.0308	4.5233	STATION 86	Pluim Gradient	BEGIN	86_1	B17-05
27-8-2024 20:38	55.0307	4.521	STATION 86	Pluim Gradient	END	86_1	B17-05
27-8-2024 20:58	55.0308	4.5245	STATION 86	Pluim Gradient	BEGIN	86_2	B17-05
27-8-2024 21:00	55.0307	4.521	STATION 86	Pluim Gradient	END	86_2	B17-05
27-8-2024 21:18	55.0307	4.5243	STATION 86	Pluim Gradient	BEGIN	86_3	B17-05
27-8-2024 21:21	55.0305	4.521	STATION 86	Pluim Gradient	END	86_3	B17-05
27-8-2024 21:36	55.0307	4.5253	STATION 86	Pluim Gradient	BEGIN	86_4	B17-05
27-8-2024 21:40	55.0307	4.5212	STATION 86	Pluim Gradient	END	86_4	B17-05
27-8-2024 22:01	55.031	4.5242	STATION 86	Pluim Gradient	BEGIN	86_5	B17-05
27-8-2024 22:03	55.0308	4.5212	STATION 86	Pluim Gradient	END	86_5	B17-05
27-8-2024 22:21	55.0315	4.5243	STATION 86	Pluim Gradient	BEGIN	86_6	B17-05
27-8-2024 22:25	55.0305	4.5208	STATION 86	Pluim Gradient	END	86_6	B17-05
27-8-2024 22:42	55.0312	4.5243	STATION 86	Pluim Gradient	BEGIN	86_7	B17-05
27-8-2024 22:45	55.0303	4.5208	STATION 86	Pluim Gradient	END	86_7	B17-05
27-8-2024 23:01	55.0312	4.5245	STATION 86	Pluim Gradient	BEGIN	86_8	B17-05
27-8-2024 23:04	55.0303	4.5208	STATION 86	Pluim Gradient	END	86_8	B17-05

27-8-2024 23:20	55.031	4.5245	STATION 86	Pluim Gradient	BEGIN	86_9	B17-05
27-8-2024 23:22	55.0302	4.5212	STATION 86	Pluim Gradient	END	86_9	B17-05
27-8-2024 23:37	55.031	4.5245	STATION 86	Pluim Gradient	BEGIN	86_10	B17-05
27-8-2024 23:41	55.0302	4.5212	STATION 86	Pluim Gradient	END	86_10	B17-05
27-8-2024 23:56	55.0308	4.5245	STATION 86	Pluim Gradient	BEGIN	86_11	B17-05
27-8-2024 23:59	55.03	4.5213	STATION 86	Pluim Gradient	END	86_11	B17-05
28-8-2024 00:13	55.0308	4.5247	STATION 86	Pluim Gradient	BEGIN	86_12	B17-05
28-8-2024 00:25	55.0283	4.5152	STATION 86	Pluim Gradient	END	86_12	B17-05
28-8-2024 00:59	55.0312	4.5245	STATION 87	CTD yoyo	BEGIN	87_1	B17-05
28-8-2024 01:05	55.0312	4.5243	STATION 87	CTD yoyo	BOT	87_1	B17-05
28-8-2024 01:30	55.0312	4.5243	STATION 87	CTD yoyo	END	87_1	B17-05
28-8-2024 01:36	55.0308	4.5243	STATION 87	CTD yoyo	BEGIN	87_2	B17-05
28-8-2024 01:41	55.0307	4.5243	STATION 87	CTD yoyo	BOT	87_2	B17-05
28-8-2024 02:08	55.0307	4.5242	STATION 87	CTD yoyo	END	87_2	B17-05
28-8-2024 02:11	55.0303	4.5242	STATION 87	CTD yoyo	BEGIN	87_3	B17-05
28-8-2024 02:38	55.0303	4.5243	STATION 87	CTD yoyo	END	87_3	B17-05
28-8-2024 02:43	55.0298	4.5243	STATION 87	CTD yoyo	BEGIN	87_4	B17-05
28-8-2024 02:49	55.0298	4.5243	STATION 87	CTD yoyo	BOT	87_4	B17-05
28-8-2024 03:12	55.0298	4.5243	STATION 87	CTD yoyo	SURF	87_4	B17-05
28-8-2024 03:13	55.0297	4.5243	STATION 87	CTD yoyo	END	87_4	B17-05
28-8-2024 03:16	55.0293	4.5243	STATION 87	CTD yoyo	BEGIN	87_5	B17-05
28-8-2024 03:26	55.0293	4.5243	STATION 87	CTD yoyo	BOT	87_5	B17-05
28-8-2024 03:47	55.0293	4.5242	STATION 87	CTD yoyo	SURF	87_5	B17-05
28-8-2024 03:49	55.0293	4.5242	STATION 87	CTD yoyo	END	87_5	B17-05
28-8-2024 06:04	55.0342	4.482	STATION 88	ROV deployment	BEGIN	88_1	B17-04
28-8-2024 06:10	55.0343	4.4818	STATION 88	ROV deployment	DEP	88_1	B17-04
28-8-2024 10:13	55.0333	4.4818	STATION 88	ROV deployment	REC	88_1	B17-04
28-8-2024 10:19	55.033	4.482	STATION 88	ROV deployment	END	88_1	B17-04
28-8-2024 11:14	55.0303	4.5235	STATION 89	ROV deployment	BEGIN	89_1	B17-05
28-8-2024 11:38	55.0303	4.5235	STATION 90	Floating Chamber	BEGIN	90_1	B17-05
28-8-2024 13:53	55.0302	4.5235	STATION 90	ROV deployment	REC	89_1	B17-05
28-8-2024 14:12	55.0302	4.5237	STATION 90	Floating Chamber	END	90_1	B17-05
28-8-2024 15:51	55.03	4.5232	STATION 90	ROV deployment	END	89_1	B17-05
28-8-2024 16:39	55.0305	4.522	STATION 91	Multibeam	BEGIN	91_1	B17-05
28-8-2024 16:43	55.03	4.5242	STATION 91	Multibeam	END	91_1	B17-05
28-8-2024 16:59	55.0305	4.5222	STATION 91	Multibeam	BEGIN	91_2	B17-05
28-8-2024 17:03	55.0298	4.524	STATION 91	Multibeam	END	91_2	B17-05
28-8-2024 17:19	55.0305	4.5222	STATION 91	Multibeam	BEGIN	91_3	B17-05
28-8-2024 17:22	55.03	4.524	STATION 91	Multibeam	END	91_3	B17-05
28-8-2024 17:37	55.0305	4.5222	STATION 91	Multibeam	BEGIN	91_4	B17-05
28-8-2024 17:41	55.03	4.524	STATION 91	Multibeam	END	91_4	B17-05
28-8-2024 17:55	55.0305	4.5222	STATION 91	Multibeam	BEGIN	91_5	B17-05
28-8-2024 17:59	55.03	4.524	STATION 91	Multibeam	END	91_5	B17-05
28-8-2024 18:11	55.0307	4.522	STATION 91	Multibeam	BEGIN	91_6	B17-05
28-8-2024 18:13	55.03	4.5242	STATION 91	Multibeam	END	91_6	B17-05
28-8-2024 18:26	55.0305	4.5222	STATION 91	Multibeam	BEGIN	91_7	B17-05
28-8-2024 18:28	55.03	4.524	STATION 91	Multibeam	END	91_7	B17-05
28-8-2024 18:40	55.0305	4.522	STATION 91	Multibeam	BEGIN	91_8	B17-05
28-8-2024 18:42	55.0298	4.5242	STATION 91	Multibeam	END	91_8	B17-05
28-8-2024 18:56	55.0307	4.522	STATION 91	Multibeam	BEGIN	91_9	B17-05
28-8-2024 18:58	55.0298	4.5242	STATION 91	Multibeam	END	91_9	B17-05
28-8-2024 19:12	55.0305	4.5222	STATION 91	Multibeam	BEGIN	91_10	B17-05
28-8-2024 19:14	55.0298	4.5242	STATION 91	Multibeam	END	91_10	B17-05
28-8-2024 19:26	55.0307	4.5218	STATION 91	Multibeam	BEGIN	91_11	B17-05
28-8-2024 19:29	55.03	4.5242	STATION 91	Multibeam	END	91_11	B17-05
28-8-2024 19:44	55.0302	4.5218	STATION 91	Multibeam	BEGIN	91_12	B17-05
28-8-2024 19:47	55.0302	4.5245	STATION 91	Multibeam	END	91_12	B17-05
28-8-2024 20:00	55.0303	4.522	STATION 91	Multibeam	BEGIN	91_13	B17-05
28-8-2024 20:02	55.0302	4.5242	STATION 91	Multibeam	END	91_13	B17-05
28-8-2024 20:31	55.0308	4.5228	STATION 92	Pluim Gradient	BEGIN	92_1	B17-05
28-8-2024 20:33	55.0297	4.5213	STATION 92	Pluim Gradient	END	92_1	B17-05
28-8-2024 20:51	55.0298	4.521	STATION 92	Pluim Gradient	BEGIN	92_2	B17-05
28-8-2024 20:51	55.0298	4.521	STATION 92	Pluim Gradient	END	92_2	B17-05
28-8-2024 21:05	55.0313	4.524	STATION 92	Pluim Gradient	BEGIN	92_3	B17-05
28-8-2024 21:09	55.0297	4.5203	STATION 92	Pluim Gradient	END	92_3	B17-05

28-8-2024 21:22	55.0312	4.5237	STATION 92	Pluim Gradient	BEGIN	92_4	B17-05
28-8-2024 21:25	55.03	4.5208	STATION 92	Pluim Gradient	END	92_4	B17-05
28-8-2024 21:38	55.0312	4.5237	STATION 92	Pluim Gradient	BEGIN	92_5	B17-05
28-8-2024 21:41	55.03	4.5205	STATION 92	Pluim Gradient	END	92_5	B17-05
28-8-2024 21:54	55.0313	4.5235	STATION 92	Pluim Gradient	BEGIN	92_6	B17-05
28-8-2024 21:57	55.0302	4.5208	STATION 92	Pluim Gradient	END	92_6	B17-05
28-8-2024 22:19	55.0315	4.523	STATION 92	Pluim Gradient	BEGIN	92_7	B17-05
28-8-2024 22:23	55.0293	4.523	STATION 92	Pluim Gradient	END	92_7	B17-05
28-8-2024 22:35	55.031	4.5248	STATION 92	Pluim Gradient	BEGIN	92_8	B17-05
28-8-2024 22:38	55.0298	4.522	STATION 92	Pluim Gradient	END	92_8	B17-05
28-8-2024 22:51	55.0315	4.525	STATION 92	Pluim Gradient	BEGIN	92_9	B17-05
28-8-2024 22:54	55.03	4.522	STATION 92	Pluim Gradient	END	92_9	B17-05
28-8-2024 23:10	55.0315	4.5252	STATION 92	Pluim Gradient	BEGIN	92_10	B17-05
28-8-2024 23:13	55.0302	4.522	STATION 92	Pluim Gradient	END	92_10	B17-05
28-8-2024 23:28	55.0315	4.525	STATION 92	Pluim Gradient	BEGIN	92_11	B17-05
28-8-2024 23:31	55.0302	4.5215	STATION 92	Pluim Gradient	END	92_11	B17-05
29-8-2024 00:05	55.0312	4.5232	STATION 93	CTD yoyo	BEGIN	93_1	B17-05
29-8-2024 00:16	55.0312	4.5233	STATION 93	CTD yoyo	BOT	93_1	B17-05
29-8-2024 00:41	55.0312	4.5233	STATION 93	CTD yoyo	END	93_1	B17-05
29-8-2024 00:47	55.0307	4.5233	STATION 93	CTD yoyo	BEGIN	93_2	B17-05
29-8-2024 00:48	55.0307	4.5233	STATION 93	CTD yoyo	BOT	93_2	B17-05
29-8-2024 01:12	55.0307	4.5233	STATION 93	CTD yoyo	END	93_2	B17-05
29-8-2024 01:20	55.0303	4.5235	STATION 93	CTD yoyo	BEGIN	93_3	B17-05
29-8-2024 01:21	55.0303	4.5235	STATION 93	CTD yoyo	BOT	93_3	B17-05
29-8-2024 01:53	55.0298	4.5233	STATION 93	CTD yoyo	END	93_3	B17-05
29-8-2024 01:57	55.0298	4.5233	STATION 93	CTD yoyo	BEGIN	93_4	B17-05
29-8-2024 01:58	55.0297	4.5235	STATION 93	CTD yoyo	BOT	93_4	B17-05
29-8-2024 02:25	55.0297	4.5237	STATION 93	CTD yoyo	SURF	93_4	B17-05
29-8-2024 02:25	55.0297	4.5237	STATION 93	CTD yoyo	END	93_4	B17-05
29-8-2024 02:29	55.0293	4.5235	STATION 93	CTD yoyo	BEGIN	93_5	B17-05
29-8-2024 02:38	55.0293	4.5235	STATION 93	CTD yoyo	BOT	93_5	B17-05
29-8-2024 03:01	55.0293	4.5233	STATION 93	CTD yoyo	SURF	93_5	B17-05
29-8-2024 03:05	55.0292	4.5233	STATION 93	CTD yoyo	END	93_5	B17-05
29-8-2024 04:13	55.0342	4.4858	STATION 94	Funnel lander	BEGIN	94_1	B17-04
29-8-2024 04:23	55.034	4.482	STATION 94	Funnel lander	REC	94_1	B17-04
29-8-2024 04:33	55.034	4.4815	STATION 94	Funnel lander	END	94_1	B17-04
29-8-2024 07:59	55.3002	3.8253	STATION 95	Mini lander	BEGIN	95_1	A15-03
29-8-2024 08:15	55.3003	3.8267	STATION 95	Mini lander	RECOV	95_1	A15-03
29-8-2024 08:15	55.3003	3.8265	STATION 95	Mini lander	END	95_1	A15-03
29-8-2024 08:30	55.3005	3.826	STATION 96	ROV deployment	BEGIN	96_1	A15-03
29-8-2024 08:37	55.3005	3.8258	STATION 96	ROV deployment	DEP	96_1	A15-03
29-8-2024 11:45	55.3005	3.8257	STATION 96	ROV deployment	REC	96_1	A15-03
29-8-2024 11:48	55.3005	3.8257	STATION 96	ROV deployment	END	96_1	A15-03
29-8-2024 11:51	55.3005	3.8257	STATION 97	ROV deployment	BEGIN	97_1	A15-03
29-8-2024 11:51	55.3005	3.8257	STATION 97	ROV deployment	DEP	97_1	A15-03
29-8-2024 11:57	55.3005	3.8257	STATION 97	Funnel lander	BEGIN	97_2	A15-03
29-8-2024 12:40	55.3003	3.8265	STATION 97	ROV deployment	REC	97_1	A15-03
29-8-2024 12:43	55.3003	3.8265	STATION 97	ROV deployment	END	97_1	A15-03
29-8-2024 12:53	55.2998	3.8267	STATION 97	Funnel lander	DEPL	97_2	A15-03
29-8-2024 12:53	55.2998	3.8267	STATION 97	Funnel lander	END	97_2	A15-03
29-8-2024 12:59	55.2995	3.8267	STATION 97	ROV deployment	BEGIN	97_3	A15-03
29-8-2024 13:05	55.2995	3.8265	STATION 97	ROV deployment	DEP	97_3	A15-03
29-8-2024 14:29	55.2997	3.8263	STATION 97	ROV deployment	END	97_3	A15-03
29-8-2024 17:33	55.0302	4.5235	STATION 98	ROV deployment	BEGIN	98_1	B17-05
29-8-2024 17:46	55.0302	4.5232	STATION 98	Mini lander	BEGIN	98_2	B17-05
29-8-2024 19:16	55.0302	4.523	STATION 98	Mini lander	DEPL	98_2	B17-05
29-8-2024 19:18	55.0302	4.523	STATION 98	ROV deployment	REC	98_1	B17-05
29-8-2024 19:21	55.0302	4.523	STATION 98	ROV deployment	END	98_1	B17-05
29-8-2024 19:29	55.0298	4.5233	STATION 98	Mini lander	END	98_2	B17-05
29-8-2024 20:09	55.0347	4.484	STATION 99	Multibeam	BEGIN	99_1	B17-04
29-8-2024 20:15	55.0337	4.4792	STATION 99	Multibeam	END	99_1	B17-04
29-8-2024 20:35	55.033	4.4832	STATION 99	Multibeam	BEGIN	99_2	B17-04
29-8-2024 20:35	55.033	4.4832	STATION 99	Pluim Gradient	BEGIN	99_3	B17-04
29-8-2024 20:35	55.0332	4.4832	STATION 99	3.5KHz seismics	BEGIN	99_4	B17-04
29-8-2024 20:38	55.0352	4.4817	STATION 99	Pluim Gradient	END	99_3	B17-04

29-8-2024 20:59	55.033	4.483	STATION 99	Pluim Gradient	BEGIN	99_5	B17-04
29-8-2024 21:02	55.035	4.4817	STATION 99	Pluim Gradient	END	99_5	B17-04
29-8-2024 21:17	55.0328	4.4832	STATION 99	Pluim Gradient	BEGIN	99_6	B17-04
29-8-2024 21:21	55.0353	4.4815	STATION 99	Pluim Gradient	END	99_6	B17-04
29-8-2024 21:33	55.033	4.483	STATION 99	Pluim Gradient	BEGIN	99_7	B17-04
29-8-2024 21:36	55.0353	4.4815	STATION 99	Pluim Gradient	END	99_7	B17-04
29-8-2024 21:50	55.0333	4.4833	STATION 99	Pluim Gradient	BEGIN	99_8	B17-04
29-8-2024 21:53	55.0352	4.4822	STATION 99	Pluim Gradient	END	99_8	B17-04
29-8-2024 22:06	55.0332	4.4835	STATION 99	Pluim Gradient	BEGIN	99_9	B17-04
29-8-2024 22:09	55.0352	4.4823	STATION 99	Pluim Gradient	END	99_9	B17-04
29-8-2024 22:20	55.0332	4.4835	STATION 99	Pluim Gradient	BEGIN	99_10	B17-04
29-8-2024 22:23	55.0352	4.4822	STATION 99	Pluim Gradient	END	99_10	B17-04
29-8-2024 22:38	55.0332	4.484	STATION 99	Pluim Gradient	BEGIN	99_11	B17-04
29-8-2024 22:41	55.0353	4.4827	STATION 99	Pluim Gradient	END	99_11	B17-04
29-8-2024 22:55	55.0332	4.484	STATION 99	Pluim Gradient	BEGIN	99_12	B17-04
29-8-2024 22:59	55.0353	4.4827	STATION 99	Pluim Gradient	END	99_12	B17-04
29-8-2024 23:12	55.0333	4.4838	STATION 99	Pluim Gradient	BEGIN	99_13	B17-04
29-8-2024 23:15	55.0353	4.4827	STATION 99	Pluim Gradient	END	99_13	B17-04
29-8-2024 23:30	55.0332	4.4847	STATION 99	Pluim Gradient	BEGIN	99_14	B17-04
29-8-2024 23:34	55.0353	4.4833	STATION 99	Pluim Gradient	END	99_14	B17-04
29-8-2024 23:46	55.0333	4.4845	STATION 99	Pluim Gradient	BEGIN	99_15	B17-04
29-8-2024 23:49	55.0355	4.4832	STATION 99	Pluim Gradient	END	99_15	B17-04
30-8-2024 00:08	55.0342	4.4847	STATION 99	Multibeam	END	99_2	B17-04
30-8-2024 00:08	55.0342	4.4847	STATION 99	3.5KHz seismics	END	99_4	B17-04
30-8-2024 00:20	55.0358	4.4823	STATION 100	CTD yoyo	BEGIN	100_1	B17-04
30-8-2024 00:25	55.0358	4.4823	STATION 100	CTD yoyo	BOT	100_1	B17-04
30-8-2024 00:57	55.0358	4.4823	STATION 100	CTD yoyo	END	100_1	B17-04
30-8-2024 00:57	55.0358	4.4825	STATION 100	CTD yoyo	BEGIN	100_2	B17-04
30-8-2024 01:02	55.0358	4.4823	STATION 100	CTD yoyo	BOT	100_2	B17-04
30-8-2024 01:26	55.036	4.4825	STATION 100	CTD yoyo	END	100_2	B17-04
30-8-2024 01:37	55.0348	4.4825	STATION 100	CTD yoyo	BEGIN	100_3	B17-04
30-8-2024 01:38	55.0348	4.4825	STATION 100	CTD yoyo	BOT	100_3	B17-04
30-8-2024 02:07	55.0345	4.4827	STATION 100	CTD yoyo	END	100_3	B17-04
30-8-2024 02:11	55.034	4.4825	STATION 100	CTD yoyo	BEGIN	100_4	B17-04
30-8-2024 02:22	55.0338	4.4825	STATION 100	CTD yoyo	BOT	100_4	B17-04
30-8-2024 02:39	55.0338	4.4825	STATION 100	CTD yoyo	SURF	100_4	B17-04
30-8-2024 02:39	55.0338	4.4825	STATION 100	CTD yoyo	END	100_4	B17-04
30-8-2024 02:44	55.0333	4.4827	STATION 100	CTD yoyo	BEGIN	100_5	B17-04
30-8-2024 02:51	55.0332	4.4827	STATION 100	CTD yoyo	BOT	100_5	B17-04
30-8-2024 03:13	55.0332	4.4827	STATION 100	CTD yoyo	SURF	100_5	B17-04
30-8-2024 03:14	55.033	4.4828	STATION 100	CTD yoyo	END	100_5	B17-04
30-8-2024 03:17	55.0327	4.4827	STATION 100	CTD yoyo	BEGIN	100_6	B17-04
30-8-2024 03:27	55.0327	4.4827	STATION 100	CTD yoyo	BOT	100_6	B17-04
30-8-2024 03:46	55.0327	4.4825	STATION 100	CTD yoyo	SURF	100_6	B17-04
30-8-2024 03:48	55.0325	4.4827	STATION 100	CTD yoyo	END	100_6	B17-04
30-8-2024 05:59	55.0357	4.4808	STATION 101	ROV deployment	BEGIN	101_1	B17-04
30-8-2024 06:01	55.0357	4.4808	STATION 101	ROV deployment	DEP	101_1	B17-04
30-8-2024 09:37	55.036	4.481	STATION 101	ROV deployment	REC	101_1	B17-04
30-8-2024 09:39	55.036	4.481	STATION 101	ROV deployment	END	101_1	B17-04
30-8-2024 09:57	55.0338	4.4815	STATION 102	ROV deployment	BEGIN	102_1	B17-04
30-8-2024 10:31	55.0338	4.4813	STATION 102	ROV deployment	REC	102_1	B17-04
30-8-2024 10:34	55.0338	4.4815	STATION 102	ROV deployment	END	102_1	B17-04
30-8-2024 11:17	55.034	4.4815	STATION 103	Boxcore d=300	BEGIN	103_1	B17-04
30-8-2024 11:22	55.034	4.4815	STATION 103	Boxcore d=300	BOT	103_1	B17-04
30-8-2024 11:53	55.0342	4.4817	STATION 103	Boxcore d=300	BOT	103_1	B17-04
30-8-2024 12:01	55.034	4.4817	STATION 103	Boxcore d=300	END	103_1	B17-04
30-8-2024 12:22	55.0338	4.4813	STATION 104	ROV deployment	BEGIN	104_1	B17-04
30-8-2024 12:29	55.034	4.4813	STATION 104	ROV deployment	DEP	104_1	B17-04
30-8-2024 15:54	55.0335	4.4822	STATION 104	ROV deployment	END	104_1	B17-04
30-8-2024 16:45	55.0345	4.481	STATION 105	Multibeam	BEGIN	105_2	B17-04
30-8-2024 16:46	55.0338	4.4825	STATION 105	Multibeam	END	105_2	B17-04
30-8-2024 17:05	55.0335	4.483	STATION 105	Multibeam	BEGIN	105_3	B17-04
30-8-2024 17:07	55.0347	4.4805	STATION 105	Multibeam	END	105_3	B17-04
30-8-2024 17:24	55.0328	4.4813	STATION 105	Multibeam	BEGIN	105_4	B17-04
30-8-2024 17:27	55.0348	4.4837	STATION 105	Multibeam	END	105_4	B17-04

30-8-2024 17:41	55.0347	4.4825	STATION 105	Multibeam	BEGIN	105_5	B17-04
30-8-2024 17:42	55.0347	4.4823	STATION 105	Pluim Gradient	BEGIN	105_6	B17-04
30-8-2024 17:44	55.0335	4.4805	STATION 105	Pluim Gradient	END	105_6	B17-04
30-8-2024 17:44	55.0335	4.4805	STATION 105	Multibeam	END	105_5	B17-04
30-8-2024 17:53	55.033	4.4815	STATION 105	Pluim Gradient	BEGIN	105_7	B17-04
30-8-2024 17:53	55.033	4.4815	STATION 105	Multibeam	BEGIN	105_8	B17-04
30-8-2024 17:57	55.0347	4.4837	STATION 105	Multibeam	END	105_8	B17-04
30-8-2024 17:57	55.0347	4.4837	STATION 105	Pluim Gradient	END	105_7	B17-04
30-8-2024 18:09	55.0348	4.4833	STATION 105	Multibeam	BEGIN	105_9	B17-04
30-8-2024 18:12	55.0337	4.48	STATION 105	Multibeam	END	105_9	B17-04
30-8-2024 19:31	55.0332	4.4822	STATION 105	Multibeam	BEGIN	105_10	B17-04
30-8-2024 19:36	55.0338	4.4868	STATION 105	Multibeam	END	105_10	B17-04
30-8-2024 19:42	55.0345	4.4837	STATION 105	Multibeam	BEGIN	105_11	B17-04
30-8-2024 19:42	55.0343	4.4837	STATION 105	Pluim Gradient	BEGIN	105_12	B17-04
30-8-2024 19:54	55.0322	4.4807	STATION 105	Pluim Gradient	END	105_12	B17-04
30-8-2024 19:54	55.0322	4.4807	STATION 105	Multibeam	END	105_11	B17-04
30-8-2024 19:54	55.0322	4.4807	STATION 105	Pluim Gradient	BEGIN	105_13	B17-04
30-8-2024 19:54	55.0322	4.4808	STATION 105	Multibeam	BEGIN	105_14	B17-04
30-8-2024 19:57	55.0327	4.484	STATION 105	Multibeam	END	105_14	B17-04
30-8-2024 19:57	55.0327	4.484	STATION 105	Pluim Gradient	END	105_13	B17-04
30-8-2024 20:08	55.0343	4.4838	STATION 105	Multibeam	BEGIN	105_15	B17-04
30-8-2024 20:08	55.0343	4.4837	STATION 105	Pluim Gradient	BEGIN	105_16	B17-04
30-8-2024 20:13	55.0337	4.4788	STATION 105	Pluim Gradient	END	105_16	B17-04
30-8-2024 20:13	55.0337	4.4788	STATION 105	Multibeam	END	105_15	B17-04
30-8-2024 20:20	55.0323	4.48	STATION 105	Pluim Gradient	BEGIN	105_17	B17-04
30-8-2024 20:20	55.0323	4.4802	STATION 105	Multibeam	BEGIN	105_18	B17-04
30-8-2024 20:23	55.0327	4.4835	STATION 105	Multibeam	END	105_18	B17-04
30-8-2024 20:23	55.0327	4.4837	STATION 105	Pluim Gradient	END	105_17	B17-04
30-8-2024 20:34	55.0343	4.4837	STATION 105	Multibeam	BEGIN	105_19	B17-04
30-8-2024 20:34	55.0343	4.4835	STATION 105	Pluim Gradient	BEGIN	105_20	B17-04
30-8-2024 20:38	55.034	4.4793	STATION 105	Pluim Gradient	END	105_20	B17-04
30-8-2024 20:38	55.034	4.4793	STATION 105	Multibeam	END	105_19	B17-04
30-8-2024 20:44	55.0323	4.4798	STATION 105	Pluim Gradient	BEGIN	105_21	B17-04
30-8-2024 20:44	55.0323	4.48	STATION 105	Multibeam	BEGIN	105_22	B17-04
30-8-2024 20:47	55.0325	4.4833	STATION 105	Multibeam	END	105_22	B17-04
30-8-2024 20:47	55.0325	4.4833	STATION 105	Pluim Gradient	END	105_21	B17-04
30-8-2024 20:57	55.0342	4.484	STATION 105	Multibeam	BEGIN	105_23	B17-04
30-8-2024 20:57	55.0342	4.4838	STATION 105	Pluim Gradient	BEGIN	105_24	B17-04
30-8-2024 21:00	55.034	4.4803	STATION 105	Pluim Gradient	BEGIN	105_25	B17-04
30-8-2024 21:00	55.034	4.4802	STATION 105	Multibeam	END	105_23	B17-04
30-8-2024 21:00	55.034	4.4802	STATION 105	Pluim Gradient	END	105_24	B17-04
30-8-2024 21:00	55.034	4.4802	STATION 105	Pluim Gradient	END	105_25	B17-04
30-8-2024 21:08	55.0317	4.4798	STATION 105	Pluim Gradient	BEGIN	105_26	B17-04
30-8-2024 21:08	55.0317	4.48	STATION 105	Multibeam	BEGIN	105_27	B17-04
30-8-2024 21:11	55.0318	4.4835	STATION 105	Multibeam	END	105_27	B17-04
30-8-2024 21:11	55.0318	4.4835	STATION 105	Pluim Gradient	END	105_26	B17-04
30-8-2024 21:19	55.0342	4.4837	STATION 105	Multibeam	BEGIN	105_28	B17-04
30-8-2024 21:19	55.0342	4.4837	STATION 105	Pluim Gradient	BEGIN	105_29	B17-04
30-8-2024 21:22	55.034	4.48	STATION 105	Pluim Gradient	END	105_29	B17-04
30-8-2024 21:22	55.034	4.48	STATION 105	Multibeam	END	105_28	B17-04
30-8-2024 21:29	55.0313	4.48	STATION 105	Pluim Gradient	BEGIN	105_30	B17-04
30-8-2024 21:29	55.0313	4.48	STATION 105	Multibeam	BEGIN	105_31	B17-04
30-8-2024 21:32	55.0313	4.4835	STATION 105	Multibeam	END	105_31	B17-04
30-8-2024 21:32	55.0313	4.4837	STATION 105	Pluim Gradient	END	105_30	B17-04
30-8-2024 21:39	55.034	4.4835	STATION 105	Multibeam	BEGIN	105_32	B17-04
30-8-2024 21:39	55.034	4.4835	STATION 105	Pluim Gradient	BEGIN	105_33	B17-04
30-8-2024 21:43	55.034	4.4797	STATION 105	Multibeam	END	105_32	B17-04
30-8-2024 21:43	55.034	4.4797	STATION 105	Pluim Gradient	END	105_33	B17-04
30-8-2024 21:49	55.0313	4.4797	STATION 105	Pluim Gradient	BEGIN	105_34	B17-04
30-8-2024 21:49	55.0313	4.4798	STATION 105	Multibeam	BEGIN	105_35	B17-04
30-8-2024 21:52	55.0313	4.4833	STATION 105	Multibeam	END	105_35	B17-04
30-8-2024 21:52	55.0313	4.4833	STATION 105	Pluim Gradient	END	105_34	B17-04
31-8-2024 04:08	55.2985	3.8282	STATION 106	Mini lander	BEGIN	106_1	A15-03
31-8-2024 04:17	55.3002	3.8272	STATION 106	Mini lander	RECOV	106_1	A15-03
31-8-2024 04:27	55.3003	3.8267	STATION 106	Mini lander	END	106_1	A15-03

31-8-2024 05:57	55.3003	3.8262	STATION 107	Boxcore d=300	BEGIN	107_1	A15-03
31-8-2024 06:19	55.3005	3.8263	STATION 107	Boxcore d=300	BOT	107_1	A15-03
31-8-2024 06:27	55.3003	3.8262	STATION 107	Boxcore d=300	END	107_1	A15-03
31-8-2024 07:48	55.2102	4.0642	TRANSIT 107	Shipsdata	COMMENT		
31-8-2024 10:57	55.028	4.5227	STATION 108	Mini lander	BEGIN	108_1	B17-05
31-8-2024 11:15	55.0303	4.5223	STATION 108	Mini lander	RECOV	108_1	B17-05
31-8-2024 11:26	55.0305	4.5228	STATION 108	Mini lander	END	108_1	B17-05
31-8-2024 11:47	55.0307	4.523	STATION 109	Boxcore d=300	BEGIN	109_1	B17-05
31-8-2024 12:01	55.0303	4.5233	STATION 109	Boxcore d=300	BOT	109_1	B17-05
31-8-2024 12:09	55.0303	4.5233	STATION 109	Boxcore d=300	END	109_1	B17-05