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CRUISE REPORT

PORO-CLIM

Deep Structure of Porcupine and Rockall Margins:
Did the North Atlantic Igneous Province alone cause the Paleocene/Eocene Thermal Maximum?

RV *Celtic Explorer*, Cruise No. CE21008

5th May – 30th May, Galway (Ireland) – Galway (Ireland)

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POROCLIM

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1 Summary

Project PORO-CLIM was conceived to study interplay between the first-order geological processes of continental rifting and break-up, Large Igneous Province emplacement, and global climate change, and to provide ship-based training for a cohort of international students. Cruise CE21008, the PORO-CLIM data acquisition cruise, carried out a marine geophysical survey of the POrcupine and ROckall continental passive margins, to investigate the cause of the Paleocene/Eocene Thermal Maximum, a natural CLIMate change event that is the closest deep-time analogue of anthropogenic environmental change (though the modern change is happening much faster). Project PORO-CLIM also includes a three year post-cruise data work-up phase. The €1.2M project is funded by the EU Horizon 2020 EuroFleets+ programme, the PIPCO-RSG industrial consortium and the Irish Marine Research Programme.

Despite the Covid pandemic, cruise CE21008 went ahead with a science party of 13, including about half the planned compliment of early career researchers. The cruise began after a 14-day pre-cruise lock-down period, followed by Covid-safe travel to the vessel. We lost 1.5 days at the start owing to equipment shipping delays. At sea we suffered 4.5 days of full weather downtime, and had to alter our work programme on a further 4.5 days, mostly to avoid bad weather, and the rest (1 day) because of equipment failure. Nevertheless, we ended by acquiring two deep seismic profiles, which were the first and third profiles on our initial priority list.

The seismic source was an array of four G-guns with total volume 1040 cu in. We made 47 ocean bottom seismometers (OBS) deployments with instrument spacings of 10 to 15 km. Seismic reflections were recorded on a 1 km long multi-channel streamer (MCS) towed behind the vessel. A magnetometer was towed behind the vessel alongside the MCS in order to determine oceanic crustal age. We deployed 65 expendable bathythermograph (XBT) probes to constrain the seismic velocity in the water layer. These datasets will be integrated post-cruise to give full crustal velocity models which will allow crustal structure and in particular crustal thickness to be interpreted. Initial data processing carried out onboard indicates that the dataset is of good quality and can address all scientific aims.

Profile 1 was a 400 km long dip profile from the Rockall Plateau passive margin in the east and following an oceanic plate-spreading westward across the Erriador Ridge to middle Eocene oceanic crust. This dataset will provide the first whole crustal seismic image of little-known Erriador Ridge, thought to be the track of the pulse of anomalously hot mantle that caused NAIP sill province emplacement, which played a significant role in driving PETM climate change. The dataset will also provide the first whole crustal seismic image of the Rockall Plateau continental passive margin, thought to be a magma-poor margin of late Cretaceous age. New swath bathymetry data was acquired along the entire length Profile 1, which lies outside of the region of the Irish National Seabed Survey. Three additional profiles of swath bathymetric and magnetometer data were acquired over Erriador Ridge while we waited for bad weather to clear.

Profile 2 was a 200 km long dip profile from the Irish Shelf edge southwestward across the Porcupine Seabight. This profile is coincident with an existing long-offset seismic reflection line PAD13-038, which

will be used during processing of the OBS data. By measuring the structure of the crust along this line, we will be able to document the process of continental break-up when volcanic production is limited, expanding and completing OBS-MCS mapping in Porcupine Basin to the north. Of particular interest is measuring how sea-water leaks into and reacts with mantle rocks; this process is an important part of the plate tectonic cycle, as well as a potential carbon sequestration mechanism.

CE21008 is the first time the *Celtic Explorer* has been used to carry out an active source OBS+MCS seismic survey to measure whole crustal structure. The seismic acquisition equipment was supplied by the user team in 8 shipping containers. The ease of operation of the user-supplied equipment and quality of the data obtained show that the *Explorer* is well suited to this type of survey.

We also acquired a dataset to investigate physical oceanographic processes. Underway EK60 fishfinder echosounder data and acoustic dopplar current profiler (ADCP) data were recorded at all times except when retrieving OBSs. Post-cruise, the MCS data will be processed to image reflectivity within the water layer and integrated with the underway data and XBT data to investigate the seismic response to thermohaline oceanic structure (seismic oceanography) and ultimately to measure oceanic mixing, which is known to be unusually vigorous in the study area.

A science outreach objective lead by the early career researcher team was particularly successful, and generated over 100,000 audience engagements across Europe and beyond. Given the reduced science party, the focus on outreach proved a more efficient and achievable way of training early career researchers than the floating university programme originally proposed.

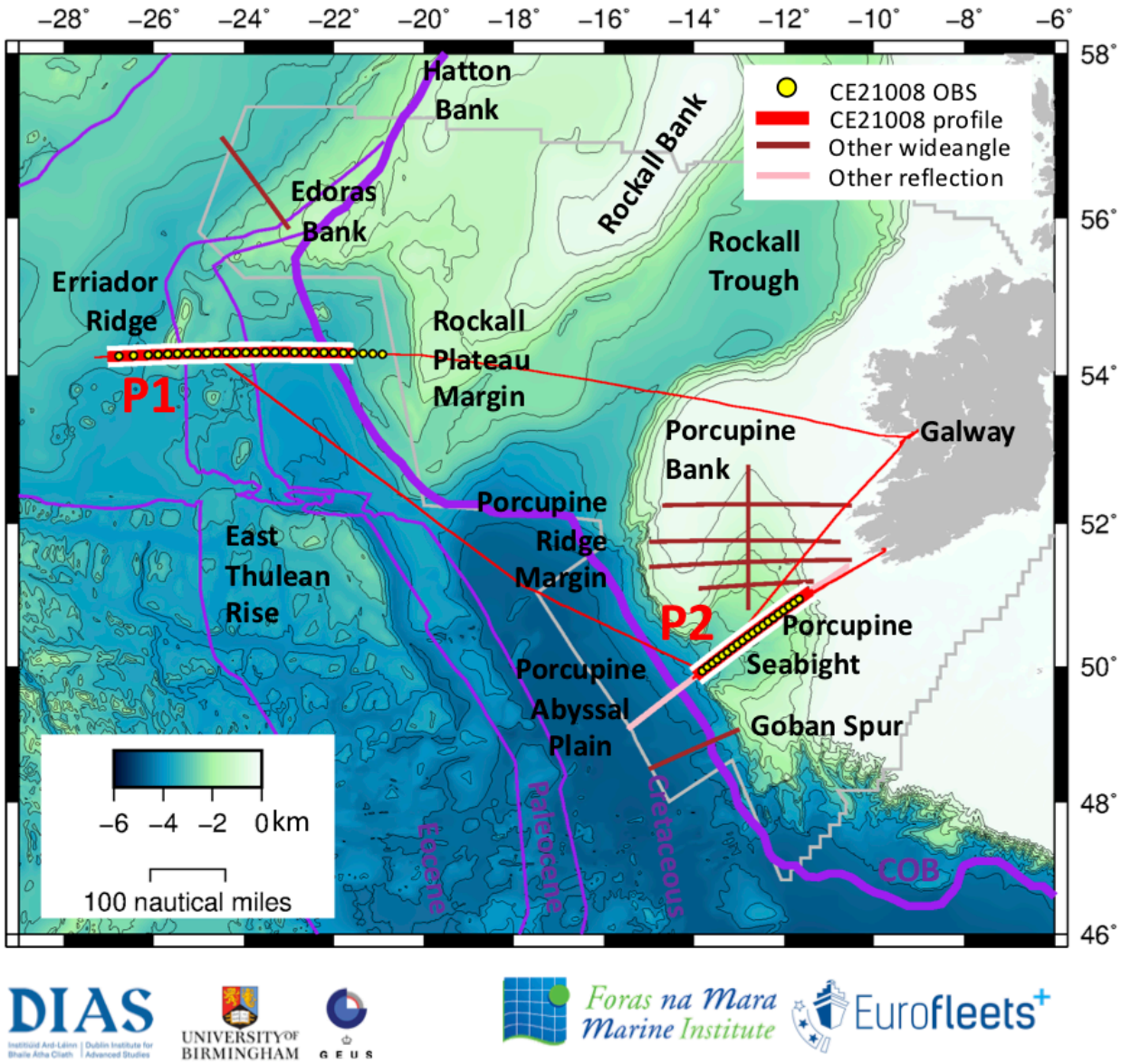

Figure 1.1 *Working area and track chart of R/V* Celtic Explorer *Cruise CE21008. P1, P2 = CE21008 deep seismic profiles 1 and 2. COB = continent-ocean boundary. Bathymetry from GEBCO (2008).*

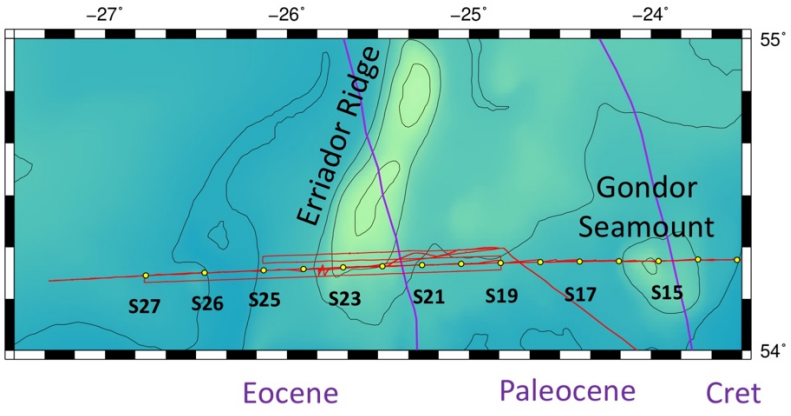

Figure 1.2. *Location of additional swath bathymetry and magnetometer profiles over southern Erriador Ridge. Three additional profiles were obtained parallel to Profile P1. Yellow circles are OBS locations. Red line is ship track. Purple lines are epoch boundaries from the Müller world age grid.*

2 Research Programme

2.1 Aims

The overarching science aim of PORO-CLIM can be summed up in one question: "Did the North Atlantic Igneous Province (NAIP) alone drive Paleocene-Eocene Thermal Maximum (PETM) global climate change event?" The PETM is of urgent societal interest as the closest deep-time analogue of anthropogenic environmental change, as measured by carbon emissions to the atmosphere and associated global warming. To address this question, CE21008 carried out a deep seismic survey of NE Atlantic oceanic crust that records the track of the mantle thermal anomaly that caused the NAIP. The age of this thermal anomaly relative to existing records elsewhere in the N Atlantic will allow project PORO-CLIM to calculate mantle plume flux, mantle melting rate, and ultimately the rate of thermogenic carbon emissions to the atmosphere.

The main CLIMate science objective could only be addressed by exploring the little known POrcupine and ROckall and passive margins, offshore Ireland (hence project PORO-CLIM). This study area is also well-placed to explain the temporal transition from magma- poor to magma-rich passive margins in the N Atlantic, to image continental rifting and hyper-extension modes within Porcupine Basin, and to infer late Cretaceous-Cenozoic deep- water circulation histories from multi-channel seismic images of contourite sediment drifts.

2.2 Scientific Background

Temporal associations between Large Igneous Provinces (LIPs) and perturbations to global climate, ecosystems and the carbon cycle occur throughout Mesozoic time, from the Permo-Triassic mass extinction (the most devastating in Earth's history) through multiple Ocean Anoxic Events [1,2]. They imply that greenhouse gases released directly by LIPs can initiate global change that persists over 10^4–10^5 years. The Paleocene-Eocene Thermal Maximum (PETM) is the largest natural climate change event of Cenozoic time, and an important yardstick for anthropogenic climate change [3,4]. During PETM initiation, release of 0.3–1.1 PgC yr^{-1} of carbon as greenhouse gases to the ocean-atmosphere system [4–6] drove 4–5°C of global warming [7] over a short period (<20 kyr) [5,8,9].

Although the North Atlantic Igneous Province (NAIP) LIP and the PETM are closely coincident in time [10,11], the rate and duration of NAIP carbon emissions had not been reconciled with the <20 kyr onset of PETM climate change prior to this year [8,9,12,13]. Thermogenic methane produced by shallow igneous sills and released to the atmosphere or shallow ocean through hydrothermal vents is the most likely source of the carbon required to explain the entire PETM [5,12,14]. Recently, Jones et al. [15] developed a method to calculate the flux of thermogenic methane associated with the NAIP at <1 kyr resolution by linking observations of the individual sills and vents that controlled gas emissions with measurements of the mantle convection process that generated NAIP magma with in a Monte Carlo framework (Figs 2.1 & 2.2). The mean emissions flux from an individual sill is <0.002 PgC yr^{-1} over <1 kyr [15]. Many sill-vent systems must therefore have supplied greenhouse gas simultaneously if NAIP sill province emissions are to explain the PETM. The crucial parameter that controls how many sills release gas simultaneously is

τ_{repeat}, the typical time period between intrusion of successive sills. The NAIP gas emission calculations showed that τ_{repeat} of 2 to 6 yr would have been required for the NAIP alone to drive the PETM [15].

The simplest way to estimate τ_{repeat} is to divide the sill province duration by the total number of sills. There are 11,000–18,000 sill-vent systems within the NAIP [14] but the sill province duration is uncertain. The generally quoted duration for the starting phases of the NAIP and other LIPs is 1–3 Myr [16,17], giving τ_{repeat} of 56–273 yr. However, 95% of sills intruded simultaneously (at seismic imaging resolution) in individual basins near the NAIP centre, perhaps suggesting 60 kyr for the local province duration [14], giving τ_{repeat} of 3 yr. Measuring τ_{repeat} for the NAIP sill province directly using traditional radiometric or biostratigraphic dating is not practical because these methods have 10^5–10^6-year resolution. Instead, Jones et al. [15] developed a novel alternative based on the mantle convection process that generated the sill province magma, by deriving an expression linking τ_{repeat} to mantle plume area flux, Q. Q is the areal expansion rate of the NAIP-forming pulse of anomalously hot mantle within the plume head (Fig. 2.1). Fig. 2.2 shows that if $Q \geq 4$ km^2 yr^{-1} then the relatively rapid magma production rate means that $\tau_{repeat} < 6$ years, and the NAIP alone could potentially have initiated PETM climate change. But if $Q < 4$ km^2 yr^{-1} then additional carbon sources and/or as-yet unknown carbon cycle feedbacks are also required to explain the PETM.

The value of Q at the Paleocene/Eocene boundary has already been estimated from the relative timing and amplitude of peak dynamic support (i.e. mantle convectively supported uplift) in two sedimentary basins either side of Scotland: the Judd region of the Faroe-Shetland Basin and the Bressay region of the North Sea [18–20]. Dynamic support is a direct indicator of the thermal anomaly that generated the sill province magma. Q is estimated from the time for the locus of peak dynamic support to travel between the two sedimentary basins, which is of order 10^5–10^6 years and amenable to biostratigraphic dating [19]. Uncertainties over plume centre location and plume head shape affect this calculation. The median value Q value is 4 km^2 yr^{-1}, with interquartile range 2.4–6 km^2 yr^{-1} and 10–90 centile range 1.6–8 km^2 yr^{-1} [15].

Based on this Q range, it now seems likely that the NAIP *did* contribute significant carbon during PETM initiation [15]. However, it is not yet certain whether other carbon sources or carbon cycle feedbacks are also required (Fig. 2). This question can be resolved by reducing uncertainty in Q, which requires recognising and dating the NAIP-forming temperature/uplift pulse at other locations.

Here, we propose to reduce uncertainty in Q by measuring the mantle temperature record of NAIP initiation in the oceanic realm. ("Mantle temperature" refers to the temperature of the convecting mantle immediately beneath the lithosphere). Neogene–Recent mantle thermal pulses were first recognised as V-Shaped Ridges in N Atlantic oceanic crust in 1971 [22]. The topographic, gravity, chemical and crustal thickness signatures of these thermal pulses have since been studied intensively [23]. Mantle temperature variations beneath the North Atlantic throughout Eocene time are also measured as standard from Ocean Bottom Seismometer (OBS) profiles that measure oceanic crustal thickness, which is directly proportional to mantle temperature at the time of crustal formation [24]. But no useful pre-Eocene oceanic crustal thickness information yet exists.

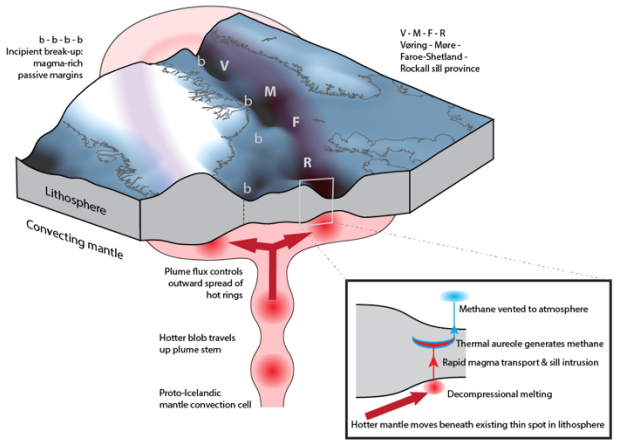

Figure 2.1*. New framework for determining greenhouse gas emissions from the North Atlantic Igneous Province, developed by Jones et al. [15]. They estimated carbon emissions rates from the NAIP sill province (Fig. 2.2), which was generated by lithospheric thin-spot melting beneath the Rockall-Faroe-Sheltand-Møre-Vøring Basins and comprises predominantly thermogenic methane. They developed a mantle processes approach to determine magma generation rates that can predict sill province emissions at sub-millennial resolution. This method requires accurate measurements of mantle plume flux, which we will obtain with the proposed survey. Additional carbon emissions comprising predominantly magmatic carbon dioxide are associated with break-up between Europe and Greenland to form the NAIP magma-rich passive margins; these emissions likely have lower flux in comparison with peak thermogenic methane emissions from the sill province.*

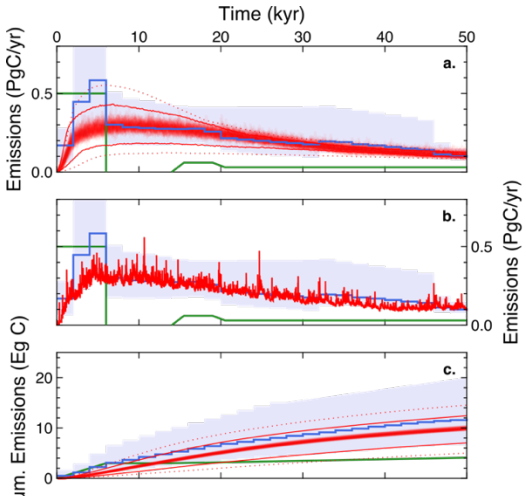

Figure 2.2*. NAIP carbon emissions based on mantle convection model, and comparison with climate-based emissions reconstructions.* ***a.*** *Red cloud, stack of 100 simulated NAIP emissions flux histories with variable τ_{repeat} controlled by plume head model and NAIP geography and the median mantle plume flux estimate of 4 km^2 yr^{-1}. Red lines, ensemble means using the upper and lower quartile mantle plume flux estimates (2.4–6 km^2 yr^{-1}); dotted red lines, ensemble means using the 10th and 90th percentile plume flux estimates (1.6–8 km^2 yr^{-1}):* our survey will considerably reduce this uncertainty. *Blue line/envelope, emissions from joint inverse modelling of oceanic pH and carbon isotope records [5]. Green line, emissions from forward modelling of carbon isotope and deep-sea carbonate dissolution records [6,13].* ***b.*** *Emissions flux for one stochastic run.* ***c.*** *Cumulative emissions associated with a.*

To observe the mantle thermal pulse that generated the NAIP sill province, we require a continuous mantle temperature record that spans the full waxing-waning cycle of NAIP emplacement, from latest Cretaceous to mid Eocene [16,17]. The only place in the North Atlantic where such a record can be obtained is between Ireland and Newfoundland, adjacent to the Porcupine Ridge and Rockall Plateau passive margins (Fig. 3). N of the Bight Fracture Zone, Europe-Greenland break-up occurred earliest Eocene, so the many existing deep seismic profiles across these margins (see NAG-TEC Atlas) contain no information on initiation of NAIP emplacement. One latest Cretaceous-Eocene OBS transect has been obtained in the Labrador Sea [25]. However, it cannot easily be interpreted in terms of mantle temperature because the sudden reduction plate spreading rate in the Labrador Sea Ridge after Europe-Greenland breakup means that the crustal thickness-mantle temperature relationship breaks down. S of Porcupine Seabight lies the edge of the Icelandic mantle convection cell, whose initiation generated the NAIP, and we pass into the Azores convection cell [21].

Thus, we must explore the little-known Rockall Plateau and Porcupine Ridge passive margins in order to obtain a latest Cretaceous-Paleocene mantle temperature record to address the NAIP-PETM link. This survey area fills a data gap in N Atlantic margin imaging. To the south lie magma-poor margins, including the classic Galicia-Newfoundland conjugate pair [26] and the Goban Spur [27]. To the north lie the classic magma-rich margins at Edoras and Hatton Banks [28], as well as the Faroes, Møre and Vøring margins and conjugates [24].

This survey area also provides opportunity to study the continuum of continental extension from rifting through hyper-extension to break-up. Porcupine Basin is well known as a natural laboratory for these processes, since both conjugate margins are preserved close together, and extension increases steadily from north to south [29,30]. Recent work to integrate OBS and MCS seismic data in central Porcupine Basin documents evolution in rift asymmetry, detachement faulting, and mantle hydration and serpentinisation as extension degree increases [31,32]. Our survey will complete this work by continuing the dataset into Porcupine Seabight, where extension almost achieved break-up, leading to formation of highly magmatic crust.

Our survey area also contains a complete record of Cenozoic contourite sedimentary drifts across the mouths of the Rockall Trough and Hatton Basins. Strong deep-water circulation in the NE Atlantic was established by Late Eocene times, associated with the C30 regional unconformity that can be mapped in all the basins [33], including Hatton, Rockall and Porcupine Basins [34,35]. However, it is unknown where in this large geographic region deep-water circulation started, how the ocean currents entered these basins, or how they interacted with well-established gravity-driven sediment processes. Bottom current circulation in the Hatton and Rockall Basins forms part of the Atlantic Meridional Overturning Circulation. Most of the N-S flowing currents of the East Atlantic traverse this area, including Antarctic Bottom Water, North Atlantic Deep Water which is fed by the Labrador Sea Water, and the Mediterranean Outflow Water [36,37]. Given their importance in the global current circulation, we need to establish their relative timing of onset, current pathways they followed in entering Hatton and Rockall, and explore shifts and migrations that took place in response to tectonic changes. Moreover, the combined effects of tectonic changes and ocean circulation changes heavily affected the initiation of cold-water coral mound growth along the NW European margin [38]. Within the Porcupine Seabight, coral presence since the Plio-Pleistocene is dictated associated by margin morphology (delivering stable settling grounds) and the local circulation (delivering the food particles) [39]. Hence, contouritic processes and cold-water coral growth mostly go hand-in-hand. However, the longer term tectonic influence of contouritic processes on settling of cold-water corals on a NW European margin-wide level (and in general) is unknown [40].

2.3 Objectives of Cruise CE21008

1. Carry out a controlled-source deep seismic imaging programme using 28 Ocean Bottom Seismometers (OBSs) and a 1 km multi-channel seismic streamer with the following targets:
(a) Rockall Plateau passive margin and Erriador Ridge;
(b) Porcupine Abyssal Plain and East Thulean Rise;
(c) Porcupine Seabight and Porcupine passive margin.

2. Provide multi-disciplinary training early career researcher (masters and PhD level) in techniques of controlled source seismology (OBS and MCS), physical oceanography and marine mammal observing, and in research areas of mantle processes, tectonic processes, sedimentary processes and physical oceanographic processes.

3. Carry out an outreach programme, led by the early career researcher team, that communicates scientific and technical aspects of the work to an audience from primary school children to adults.

2.4 Objectives of Project PORO-CLIM

The following objectives will be addressed based directly on the dataset acquired on cruise CE21008 over the next three years.

1. *Obtain continuous mantle temperature history from Late Cretaceous (Santonian) to Eocene.* Calculated directly from plate age transects of oceanic crustal thickness and average seismic velocity measured . First ever continuous high-resolution record of the entire waxing/waning cycle of mantle temperature during initiation of any of the world's Large Igneous Provinces.

2. *Test models for initiation of the North Atlantic Igneous Province (NAIP).* We hypothesise that (i) a mantle plume head was emplaced beneath the region latest Cretaceous to mid Paleocene, and (ii) a thermal anomaly ("pulse") within this plume structure caused peak magma generation and associated regional uplift in latest Paleocene-earliest Eocene (Fig. 2.1). These hypotheses will be tested using the mantle temperature record. The pulsing plume model is well established for Neogene-Recent NAIP activity [23] but has not yet been fully tested for the NAIP initiation phase.

3. *Test whether the NAIP alone drove the Paleocene/Eocene Thermal Maximum (PETM) global warming event*. If the objective 2 hypotheses are disproved, then we would lack a viable physical mechanism to explain fluctuations in NAIP volcanic production on the 10–100 kyr timescale of the PETM. It would suggest that other carbon sources and/or carbon-cycle feedbacks were more important than NAIP-associated greenhouse gas emissions in driving the PETM. Following a successful test of the objective 2 hypotheses, we can use the pulsing plume model to measure mantle plume flux, *Q*, from the timing of peak mantle temperature in our study area compared with existing records from basins surrounding Scotland [18–20]. This will reduce uncertainty in the peak greenhouse gas emissions flux from the NAIP (Fig. 2.2) [15]. Thus, we will prove for the first time whether existing knowledge of the carbon cycle can explain the PETM, or whether additional unknown carbon sources or feedbacks are required.

4. *Explain the temporal transition from magma-poor to magma-rich passive margins in the North Atlantic*. O1 fills a data gap in whole crustal passive margin images between Goban Spur (magma-poor) and Edoras Bank (magma-rich). We hypothesise that (i) the Porcupine and Rockall margins will be magma-poor, and (ii) the transition between magma-poor to -rich margins occurred because of mantle warming associated with NAIP initiation, after break-up between Goban Spur and Rockall and before break-up north of Edoras Bank. Successful hypotheses tests would confirm the dominant role of mantle temperature in controlling passive margin structure [24].

5. *Image continental rifting modes within Porcupine Basin*. Crustal velocity models from will be integrated with coincident long-offset multi-channel seismic data supplied by sponsor PIPCO-RSG. This continues existing work [31,32] and completes the basement structure map of Porcupine Basin, to generate the first continuous map of continental extension from rifting through hyper-extension to incipient break-up.

6. *Determine how the palaeogeography and sediment supply systems of Porcupine and Rockall Basins evolved through Cretaceous-Eocene*. Use mantle temperature record to calculate evolving dynamic (=mantle convective) uplift, and hence reconstruct palaeogeography of the surrounding region using existing methods [41,42].

7. *Infer Cretaceous-Cenozoic deep-water palaeoceanographic evolution from the seismic architecture of contourite sediment drifts*. Interpret Cretaceous-modern record of contourites across the entire southern mouths of Rockall Trough and Hatton Basin using PORO-CLIM data and existing data from sponsor PIPCO-RSG. Comparison with timing of deep-water unconformities with mantle temperature record will allow interpretation of relative importance of tectonic versus climatic drivers.

8. *Measure the seismic reflection response to thermohaline oceanic structure (seismic oceanography).* Test whether water layer reflectivity can be observed on short streamer, low fold MCS data. Measure oceanic mixing, which is known to be unusually vigorous in the study area.

9. *Measure modern dynamic support.* The study area lies near the edge of the modern dynamically (i.e. convectively) supported Iceland Plume swell. Dynamic support will be estimated from the new whole crustal seismic profiles and used to augment existing compilations [43,44].

3 Technical Information

3.1 User-Supplied Seismic Equipment

The seismic acquisition equipment was funded through PIPCO-RSG grant IS19/06 "Deep Structure of Porcupine Ridge and Rockall Plateau Margins" to Jones, O'Reilly and Hopper.

Shipboard and towed seismic equipment was provided by the Geological Survey of Denmark and Greenland (GEUS) and the University of Aarhus (Figure 3.1). Ocean Bottom Seismometers were hired from DanSeis Ltd, based in the University of Copenhagen. We sailed with 21 Sercel MicrOBS and 7 KUM Lobster instruments.

The equipment was supplied in eight 20 ft shipping containers: Hamworthy compressor container; Bauer compressor container; streamer winch container; umbilical winch flatbed; workshop container; acquisition computer lab container; MicrOBS container; KUM Lobster container. All containers except the KUM container were mobilised on the back deck. The KUM instruments were unloaded onto the back deck and the container stored ashore.

3.2 Seismic Reflection QC and Onboard Processing

The seismic program of the CE21008 cruise was primarily aimed at acquiring long-offset seismic refraction data recorded on OBSs to determine crustal thickness variations and the large scale crustal structure. The key profiles were therefore acquired with a shot interval of 60 s to minimize the possibility of previous shot noise interfering with long-offset arrivals from the lower crust and mantle. Because of this long shot interval, the coincident seismic reflection data, recorded on a 950 m, 152 channel streamer (6.25 m group interval), is very low fold. At 4.5 kt, the shot spacing at 60 s is 139 m, resulting in a nominal data fold of 4. This fold is nevertheless sufficient to achieve the primary objective, which is an accurate depth to basement in two-way travel time as a key constraint for the velocity modeling of the seismic refraction data.

For the seismic reflection acquisition, the original plan was to tow 20 streamer sections, each 50 m in length with a group spacing of 6.25 m, for 1000 m total active length and 160 channels. Upon completion of the the mobilization and testing of all equipment, one of the sections was found to be no longer working, and was therefore removed during the first streamer deployment.

The towing and streamer configuration of each line is provided in Tables B1–B3. In total, we acquired both reflection and refraction data along two primary profiles, recorded as 3 seismic lines as follows below. The basic towing configuration is shown schematically in Figure 3.2.

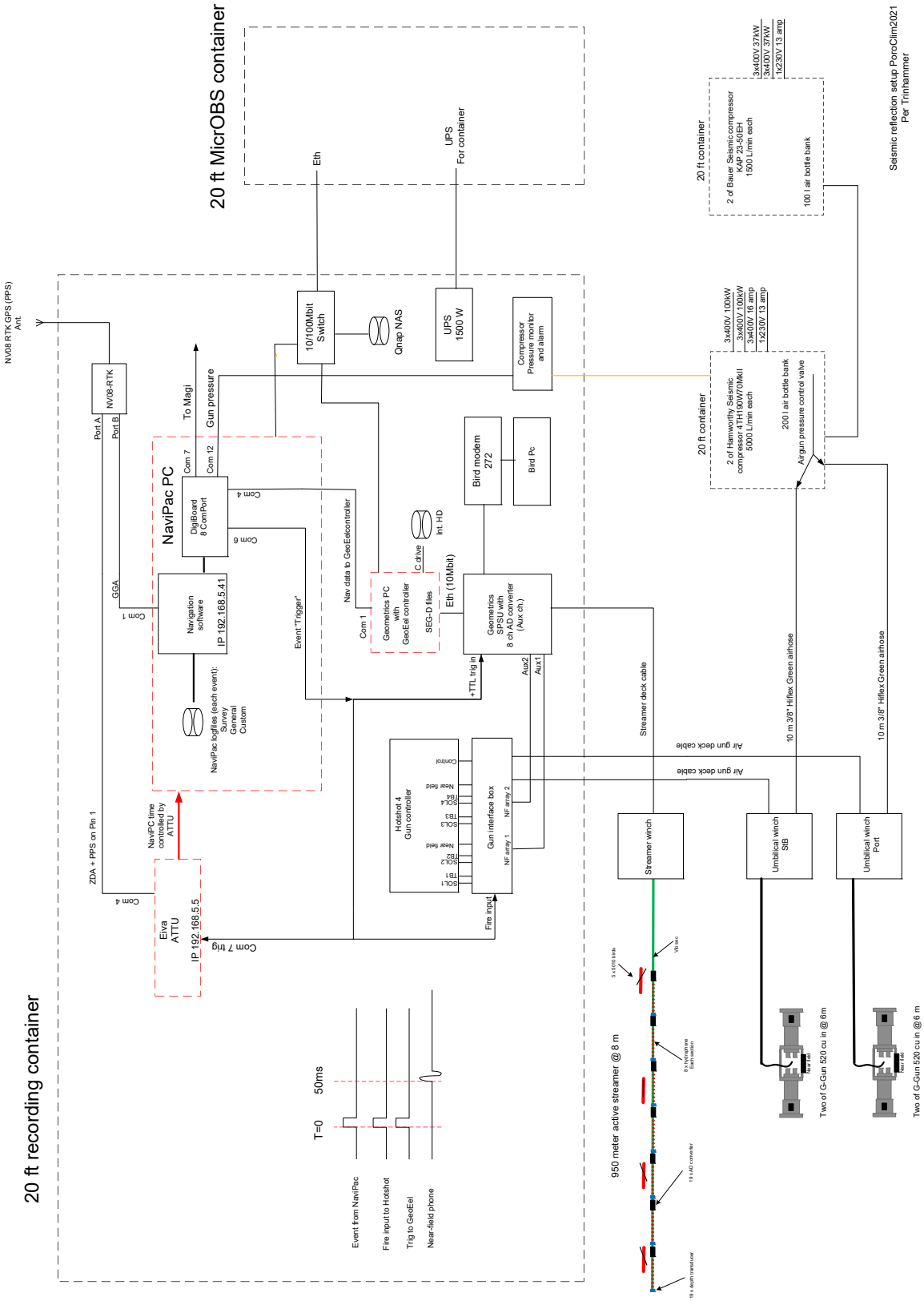

Figure 3.1. *Organisation of user-supplied controlled-source seismic acquisition equipment.*

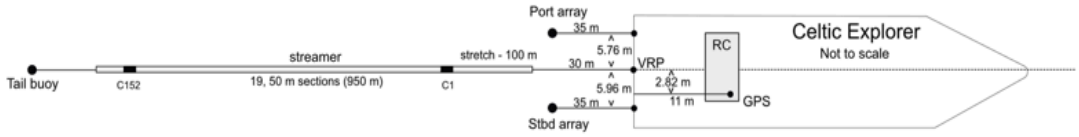

Figure 3.2. *Schematic of basic towing geometry and offsets.*

Profile 1 was shot/recorded in 5 segments. At the start of the profile (Line 01A), the near sections of the streamer were too shallow and could not reach the 8 m target depth. Acquistion was briefly suspended to bring in the near section to add lead to front (Line 01B). Initially, the record length was 10 s (Lines 01A,B), but was increased to 15 s after the first 100 shots (Line 01C). The record length was kept at 15 s for the remainder of the survey. Line 01C was terminated due to bad weather. After circling and coming back to the profile, Line 01D was shot and partly overlaps Line 01C. The GeoEel system crashed after several hours of shooting, resulting in several missed shots while the system rebooted, and necessitating starting a new recording, Line 01E. The observers' log is provided in Table A4 and the actual shot distances are shown in Figure A1.

Profile 2 was collected in the Porcupine Basin along a previously shot seismic reflection line collected by PAD in 2014 and reprocessed to pre-stack depth migration in 2020. Because coincident reflection data already existed, collection of MCS was not a high priority. The profile was initially shot in two segments. Because a low pressure system was moving in that interrupt shooting the line, Line 02A was collected with guns only and no streamer. This enabled us to go 5 kt, to acquire as much of the refraction line as possible prior to shutting down for weather. After coming on line again, Line 02B, we first shot with guns only, but decided to deploy the streamer after about 150 shots to compare the low-resolution and low-fold data with the industry profile and with the idea that the water column data could be of interest for later processing. The observers' log is provided in Tables A5 and A6, and the actual shot distances for line 2 are shown in Figure A2.

During recovery of the OBSs along Profile 2, one instrument was not recovered, resulting in the need to return to the location after picking up the rest to be on site for the timed release. Because time allowed, we deployed the streamer and collected additional MCS data along the profile (Line 03), again for comparison to other data, as well as for later processing of water column data. This line was shot at a 20 s interval (~ 50 m) for a nominal fold 12. The observers' log is provided in Table A7 and the actual shot distances for Line 3 are shown in Figure A3.

3.3 Shipboard Seismic Reflection QC and Processing

Real-time QC was provided by the Geometrics controller, which included a display of each shot, single channel display, simple brute stacks, and noise thresholds on the receiver groups. To better evaluate the data quality, simple processing was done on lines 01 and 02 after shooting stopped. There was not

sufficient time after completing line 03 to attempt any processing on board. Data was processed using ProMAX. A basic sequence included:

1. Geometry assignment and elimination of bad channels, noisy channels, and excessively noisy shots. Amplitude recovery was applied using a simple dB/sec correction. A standard mid-point geometry was used, resulting in a CDP spacing of 3.125 m.

2. *f-k* filtering of shot gathers to eliminate linear noise from towing and other sources. Missing channels were replaced by interpolated traces prior to *f-k* transformation, and were removed again afterwards.

3. For line 1, super-gather formation for semblance and velocity analysis. Because of the low fold, it was necessary to combine 40 cdp's to achieve full super-gather fold. Nevertheless, good semblance peaks are resolved and appear reasonable down to basement. Velocity picking was done every 1000 - 2000 CDP's, concentrating on the seafloor reflection, one (or at most two) strong reflections within the sediments, and the basement reflection. For line 2, a brute stack was produced by picking the seafloor and tying a simple velocity function to the depth below seafloor as follows: 1470 m/s up to seafloor, 1600 m/s 200 ms below seafloor, 1750 m/s 400 ms below seafloor, and 3500 m/s at 15 s.

4. Normal moveout correction and stack using a simple mean with no trace weighting.

3.4 Ocean Bottom Seismometers

Two OBS profiles were acquired (P1 and P2 in Figure 1.1). Five profiles were originally proposed. A strike profile along Erriador Ridge (proposed profile 2) was dropped early in the cruise planning stage when 26 of the 30 requested days of ship time were awarded. Acquisition of all four remaining proposed profiles depended on perfect operating conditions. With 4.5 days lost and a weather conditions curtailing operations on a further 4.5 days we were able to acquire two of the four possible proposed profiles. Weather conditions in the East Thulean Rise area were poor for most of the cruise, and dictated concentrating our effort on Rockall Plateau and Porcupine Seabight targets.

OBS profile P1 spans the Rockall Plateau passive margin to Erriador Ridge. It addresses cruise CE21008 Objective 1a and corresponds to the originally proposed profile 1. P1 was acquired along with MCS Lines 01A, B, C, D & E. We intended to deploy all available instruments at a spacing of 14 km. Ultimately we deployed 27 instruments because one of the Sercel micrOBS releasers failed the pre-deployment test. Consequently, the spacing between OBS stations 25, 26 and 27 is larger than the other spacings in order to maintain the required coverage of early Eocene oceanic crust.

OBS profile P2 crosses Porcupine Seabight. It addresses cruise CE21008 Objective 1c. It is in the vicinity of originally proposed profiles 4 and 5. P2 was acquired along with MCS Lines 02A & B. P2 is coincident with PORO-CLIM MCS Line 03 and with part of long-offset reprocessed MCS line PAD13-038. We deployed all 20 operational Sercel MicrOBS instruments along P2. We lacked time to deploy all 27

instruments, and chose not to deploy the KUM instruments because the data quality of the Sercel instruments along P1 seemed better.

Data was downloaded from the instruments and converted to SEGY format. Data quality was checked by on instrument gather plots. No further processing was carried out on board.

3.5 Magnetometer

A SeaSPY 1 Overhauser magnetometer supplied by the Marine Institute was towed at a distance of approximately 200 m behind the vessel to collect magnetic field data. The principal aim was to measure oceanic magnetic stripes that can be used to refine the geological age model along OBS profiles over oceanic crust.

4 Cruise Narrative

All times UTC.

More detailed information is provided in the Appendices:

- Appendix A has seismic observer logs
- Appendix B has a summary of the early career researcher outreach products
- Appendix C has the general log

Wednesday 28th April. Eight containers of user-supplied seismic acquisition equipment leave Aarhus on four trucks. ETA Galway Monday 3rd May for three trucks, and Tuesday 4th or possibly Wednesday 5th for final truck.

Saturday 1st May. Update from shipping company. Only two trucks shipped as planned to owing to Covid-related delays at Rotterdam, and will arrive Galway 3rd May as planned. The remaining two trucks will depart Rotterdam on 4th May and arrive Galway on afternoon of Thursday 6th May. We will need to adjust the mobilisation programme accordingly and will discuss options when sitting together in Galway.

Monday 3rd May. **1400** Jones travelled from home in private car via Birmingham to pick up Allison to Holyhead.

Tuesday 4th May. **0140– 0455** UK science party on ferry Holyhead to Dublin. **0630 – 0900** Danish science party on private charter flight Bilund to Shannon. **0830** UK science party arrive Harbour Hotel Galway. **0930** Danish science party arrive Harbour Hotel. **1300** Danish & UK science parties take Covid PCR tests and isolate in hotel for remainder of day. **1600** Meeting in Harbour Hotel (Jones, Hopper, Funck) to review work schedule in light of transport delays. Three of the four containers that have already arrived can be installed in their required positions so we should keep fairly close to the original programme tomorrow. The earliest possible departure time had been mid afternoon on 6th but this now slips to small hours of 7th since the remaining two trucks are still scheduled to arrive afternoon of 6th.

Wednesday 5th May. First scheduled day of CE21008. **0700** Science party in Harbour Hotel received negative PCR test results (except Andersen, whose result was delayed until mid afternoon). Clean science party cleared to work on back deck wearing masks but may not enter ship's accommodation. Commenced mobilisation working with deck crew and P&O Maritime staff. By end of day streamer winch container, airgun umbilical winch frame and Hamworthy compressor container are in final positions and partly connected; the acquisition lab container is in temporary position and work has begun inside. **1600** Meeting in Harbour Hotel (Jones, Hopper, Funck, White). Mobilisation progress has been good notwithstanding the shipping delay. Discussed plan for OBS back-up release times.

Thursday 6th May

Operations & Science. 0630 – 1030 Dublin-based science party travel by private coach to Galway. **0700** Meeting senior scientists (Jones, Hopper, White) and senior technicians (Trinhammer, Funck). Good progress yesterday with installing four containers. **0800** Technicans and P&O crew continue mobilisation on open back deck. **1000** Crew change complete; Danish and UK science party transferred from Harbour Hotel to ship. **1000** Jones met with Tadeo Pérez to discuss MMO protocol. **1130** Dublin-based science party arrived and embarked. **1100** First meal on board. **1200** Science Party signing on and familiarisation led by Second Mate. **1215–1315** Ship moves to allow tanker to manoeuvre within harbour. **1330** Chief Scientist met with Captain and Chief Officer to discuss operations. Noted bad weather system currently sitting to west. Estimated operations in Erriador/SW Rockall Plateau region cannot begin before Monday, Porcupine Seabight and East Thulean Rise operations cannot begin before mid week. Revised departure time from Galway Dock to 1400 tomorrow (Friday), then heave to in Galway Bay to wait for bad weather to pass. **1330** Senior Scientists meet with Early Career Researchers in Dry Lab. Introductions. State progress with mobilisation. State plan for departure. Discuss planned operations, watch system. Took questions. **1430** Two more containers arrive dockside. **1530** Final two containers arrive. Containers all in position by end of afternoon. Begin unpacking KUM OBSs on dockside.

Training & Outreach. Ben, Erica, Haleh, Niamh departed Dublin to meet Matt and Steve in Galway. Team checked into ship: documents, passports, and signatures. Safety meeting and ship tour. Scientific Crew photo on gangway (EuroFleets gave us shirts and other goodies!) and Steve interview with MI & EuroFleets. Team meeting with Steve to discuss delay of OBS delivery, watchman schedules, and departure delay due to impending storm. Arrival of shipping containers: Matt and Ben filmed mobilization and photographed Thomas and Per assembling an OBS. Ben created music for future videos. Erica posted on social media: packing; exploring the ship.

Friday 7th May

Operations & Science. 0800 Toolbox meeting on bridge: Jones, Hopper, White, Trinhammer, Funck; Captain, Chief Officer, OOW; Chief Engineer; Bosun; Tech Officer. Introductions. Reviewed weather: Profile 1 (Erriador) operations cannot begin before Tuesday. Operations on southerly profiles could not begin until after Tuesday, so it is clear that Profile 1 should be attempted first. Revised departure time Galway Docks to 1400 tomorrow Saturday, giving more time to complete assembly of KUM OBSs on dockside and continue setting up back deck. Discussed operations that could be carried out safely after departure and before bad weather passes. Likely possible to set up and balance multichannel streamer in Galway Bay immediately post departure Saturday afternoon or else Sunday morning; to review tomorrow morning. KUM releaser test needs > 1 km water depth and wave height <4 m; review tomorrow when/where this will be possible. **0900** Technicians resume setting up KUM OBSs on dockside. Deck crew & technicians resume making back deck ready. **1030** Test MK21 USB Data Acquisition System for disposible oceanographic probes owned by Jones. Does not work. **1145** Meeting with RV Ops rep Aodhan Fitzgerald on dockside. Magnetometer fish supplied by RV Ops for this cruise is not compatible with vessel's cabling system. They are trying to get a compatible fish from the *Celtic Voyager* before departure tomorrow. **1200** Diagnose MK21 USB DAQ problem: USB driver not compatible with Windows 10. Contact Lockheed Martin Sippican for advice. Request back-up XBT system from RV Ops. **1330**

Resolve MK21 issue using old laptop running Windows 7. **1500** Funck trains Early Career Researchers to assemble remaining KUM OBSs. OBS preparation continues through afternoon and evening on dockside. On back deck, compressors tested successfully and begin to assemble airguns.

Training & Outreach. Team took crew headshots, behind-the-scenes photos, and Lego photos in front of and on ship. Ben filmed OBS assembly. Niamh published mobilization blog post; Erica shared it to Twitter. Ben, Erica, Matt, Niamh worked on website update and bios. Matt sent opening video to U Birmingham. Niamh drafted next blog post – meet the crew. Team trained by Thomas in KUM OBS assembly, and then assembled 6 remaining OBSs. Erica posted on social media – OBS assembly.

Saturday 8th May

Operations & Science. 0700 Technicians expect to be ready to sail by midday. **0800** Jones met Captain on bridge. Pilot booked for 1400. Plan to work on streamer in Galway Bay between 1500 and 1900, overnight on DP in Galway Bay to wait for bad weather further west, on Sunday remain in Galway Bay to carry out further streamer testing and also test magnetometer and disposable temperature probes, before heading west toward work area on Sunday evening. **0900** Science Party meeting in dry lab to pass on plan as above, and to run through the data logging operations that will be required on each watch when we begin to collect underway data. **1030** Magnetometer arrives. **1100** All equipment on back deck secured for sea. **1400** Pilot on board. **1410** Let go and left Galway harbour. **1500** Began streamer operations. Deployed about 500 m of streamer and tied off while technicians investigated a broken section. The problem could not be resolved after several attempts. Brought in streamer by 1630. Plan for tomorrow discussed by Jones, Hopper, Trinhammer, White. We will remove the broken section completely because retaining it in the middle of the streamer will complicate the processing sequence. We will add some stretch length to the near end of the streamer to keep the far offsets at 1.05 km. **1630** Heave to on dynamic positioning off Black Head.

Training & Outreach. Uploaded outreach docs to shared drive. Ben worked on music and tested camera equipment. Team took pictures and footage of ship departure. Niamh posted a new blog entry and shared to Twitter. Erica posted on social media – departure.

Sunday 9th May

Operations & Science. 0900–1400. More work on streamer in Galway Bay. Faulty section removed. Stretch sections added at near end. Lead weights added for balancing. Late afternoon and evening hove to on DP off Black Head.

Training & Outreach. Erica posted on social media – safety. Ben and Matt interviewed Steve for a "Meet the Crew" video.

Monday 10th May

Operations & Science. 0000 depart for work area. Begin slow transit to Profile 1 work area at c. 6 kt so as to allow patch of high wind and swell between us and the work area to subside. Swell built through day. Uncomfortable night with c. 4 m swell on starboard beam.

Training & Outreach. Niamh published a blog piece "Meet the Crew" (Early Career Scientists).

Tuesday 11th May

Operations & Science. Still following plan of slow transit to work area. Estimated time of first deployment 1500 tomorrow Wednesday. **0700** Science Party begin standing watches. **0900** Releaser Test. The 7 KUM releasers were attached to the CTD rosette (without the bottles) for this work, so that we can collect CTD data at the same time as the releaser test. Rosette dropped to 2500 m. A problem with one of the transducers was discovered. The releasers did respond to the spare tranducer. An XBT-T11 drop was carried out with the CTD rosette at maximum depth to check correspondence between the two temperature measures. Rosette returned to deck and underway by **1345**.

Training & Outreach. Ben and Haleh filmed Operations log procedures and interviewed Thomas. Ben filmed pilot whales surrounding the ship. Ben posted on Instagram. Niamh wrote a Blog piece on the Pilot Whales. Niamh posted on Twitter.

Wednesday 12th May

Operations & Science. Swell 4 to 5 m in small hours, improving after breakfast. **0800** Weather forecast to improve steadily until Friday morning, then worsen for up to 24h, before improving for foreseable future. Big question is whether we can shoot through Friday's bad weather. Finalised plan for automatic release times: we will set the ARTs for profile P1 immediately after planned end of P1 (rather than setting them at the end of the cruise, which would use up too much transit time). The main uncertainty is the bad weather contingency for Friday, which was set to 24 h. On station K1 at **1217**; first OBS deployed at **1224**. We are used DP to deploy the KUM instruments. Sercel instruments are not so heavy and are quicker to deploy so DP is not needed. Achieved a good routine after the first few deployments with a mean time between deployments of 50 minutes, consisting of about 45 minutes' transit and about 5 minutes slowing and deploying.

Training & Outreach. Niamh posted the Pilot Whale piece. Ben filmed OBS deployment for a general audience and recorded ambient sounds. Ben and Haleh filmed a more technical piece on OBS deployment operations. Haleh wrote a blog piece about the CTD cast, edited by Niamh. Ben & Niamh filmed the “tour of the ship” video. Ben and Niamh posted on social media. Haleh posted on facebook. Erica posted on social media: pilot whale pic, YouTube link, Blog link.

Thursday 13th May

Operations & Science. Continued deploying OBS instruments until late morning. **0930** Meeting between Pérez Toledo, Trinhammer and Jones to review MMO permission and soft start procedure. Planned to begin shooting after deploying one gun cluster only, subject to MMO permission. This entails a soft-start procedure longer than the mandatory 40 minutes by up to an hour as the second gun cluster is deployed. Technician agreed to log the soft-start procedure as it happens and give this information to the MMO for her report. One Sercel OBS instrument had a faulty releaser that could not be fixed so we could not deploy it. Thus we achieved 27 of the 28 planned deployments. Deployments 1 to 25 were in the planned locations. Deployment 26 was adjusted to be midway between planned locations 26 and 27. Deployment 27 was at the planned location 28, i.e. the total length of the line of OBS deployments was as planned. Final deployment was at **1048**. Continued west at full speed to gun deployment location. We aimed to complete the shooting soft-start procedure in time to achieve a line start 20 km to the west of OBS S27. Time to deploy gun clusters was estimated as 1 hour each, and 30 minutes to deploy the streamer, making 2.5 hours total to deploy guns and streamer. The procedure to be carried out at 3 kt. We therefore steamed 7.5 nm west of the planned line start. This location was reached at 1238. **1205** MMO reported that a blow was sighted recently. **1235** MMO says shooting can start in 20 mins' time if there are no more sightings. **1255** Starboard gun cluster deployed and ready. MMO reports 2 pilot whales sighted and requested a further hour (confirmed with CS at 1301). Deployed port gun cluster. **1355** Both gun clusters deployed and ready but MMO reports recent whale spout close by and requests further hour. Commenced streamer deployment. **1452** MMO gives permission to commence soft start. **1545** Soft start complete. Western end of Profile 1 (i.e. first recorded shot on full power) is 16.3 km west of OBS S27. Commenced deploying magnetometer. Shooting continues uninterrupted for remainder of day. **1600** Commence deploying magnetometer to starboard. Some difficulty in getting fish and cable to clear starboard gun. Succeeded after 1.5 h. Attempted several XBT casts through late afternoon and evening. All recorded sensible data for 100 m but started returning noise by 200 m. After trying both several each of both probe types and checking MK21 software settings, suspect problem is with the MK21-USB acquisition unit and/or hand-held launcher. Plan to swap in spares tomorrow.

Training & Outreach. The CTD piece was posted & shared on social media by Niamh. Haleh wrote a blog post about OBS, edited by Niamh. Haleh posted on facebook and twitter. Everyone posted on social media- Blog posts, Marine Mammal Observation, general life at sea. Haleh and Matt filmed the OBS with simple language for elementary school kids. Niamh took some photos, including “Lego scientist photos”. Erica posted on social media – seasick, lego ladies.

Friday 14th May

Operations & Science. **0430** Chief Officer makes call to stop shooting and bring in equipment. Last shot at **0525** close to OBS 22 location. Retrieved magnetometer, streamer, port and starboard guns by **0640**. Hove to weather for remainder of day. Wind increasing to severe easterly gale and 6 m swell by early afternoon. Then improving very gradually. **1500** Weather review with Chief Officer and Chief Scientist. No chance of starting work again today, as anticipated. **1900** Weather review with Captain, Chief Officer

and Chief Scientist. Earliest feasible start will be first light tomorrow; decided to review weather at 0600 tomorrow.

Training & Outreach. Matt & Niamh storyboarded the "tour of the ship" video. Matt photographed & filmed the huge waves. Niamh posted on Twitter (storm) & Instagram (OBS deployment post). Niamh & Matt worked on the answers questions from the school students (7-8 years old) in Detroit Mich., USA. This will form part of the first Q&A blog post. Niamh was in contact with two Irish school connections for further Q&A posts. Niamh took a series of "Lego Scientist Photos".

Saturday 15th May

Operations & Science. 0600 Weather review with Chief Officer, Bosun, MMO, Chief Science Tech, Chief Scientist. Swell decreasing but still too high to deploy safely or to make MM observations. **0720** MMO began observing in crow's nest. **0735** Captain gave go ahead to start deploying equipment. **0740** Magnetometer deployed to starboard. Deck crew and bridge prepare. **0820** Commenced deployment of starboard gun cluster. **0840** Both guns deployed. MMO clears soft start. **0926** Commence recording line P1D. **0930** Soft start ends. **1125** Pass eastern end of line P1B, where it was abandoned owing to bad weather; now recording new data. Established that XBT problems may be caused by the copper wire snagging on the guns and streamer, when technicians reported that copper wire had been found when retrieving both yesterday. Experimented with new positions for XBT deployment. Found success with a position aft to port and using drainpipe poking through fairlead near deck level. Passed Cretaceous/Tertiary boundary around midnight.

Training & Outreach. Niamh wrote the Q&A blog entry. Erica & Niamh posted on social media. Matt took photos.

Sunday 16th May

Operations & Science. Shooting over late Cretaceous oceanic crust in hazy sunshine and 2.5 m swell. **0700** Weather review with captain. Conditions ideal for retrieval until Wednesday. Big storm predicted for Thursday could disrupt transit to collect instruments at eastern end of line on back-up release or transit to next line. Uneventful shooting through the day. Senior scientists made provisional plan for one further line in the region of planned line P4, from late Cretaceous oceanic crust in the west across Porcupine Ridge and into Porcupine Seabight in the east. Decided to terminate shooting P1 early above position of OBS 4. **1830** Magnetometer turned off. **1840** Magnetometer on deck. **1845** passed OBS 4 position, stopped recording streamer, began retrieving streamer. **1915** Streamer onboard. Guns stopped and compressors powered down. **1935** Guns on board. Began transit to OBS 1 location. **1935** Weather review meeting with Captain, Chief Officer, Chief Scientist. Storm identified this morning now looks very serious. There is a significant possibility we will have to run for shelter from a storm with predicted 10 m waves in our work area on Wednesday. At midnight tonight we will attempt to retrieve the first of 27 OBSs from the seabed. We are scheduled to retrieve the rest by Wednesday evening. The instruments are 14 km apart over a total distance of 380 km. Travelling faster between stations with two engines will

mean we can attempt to recover as many as possible before Captain has to take avoiding action. The timed releases are set for Wednesday night and Thursday. It is unlikely that we can remain in the work area then, so we will have only one shot at recovering these instruments by pinging them directly before bad weather hits. **2015** Chief Scientist emailed Research Vessel Operations to request permission to turn on the second engine. **2020** Permission granted. Plan to turn on second engine at scheduled stop 3 nm from OBS 1 to ping the releaser. **2140** Two engines on. Ping OBS 1. **2217** OBS on surface detected by radio beacon. **2259** OBS on deck 2 nm S of drop location. Light is difficult to see in the swell.

Training & Outreach. Niamh published the Q&A blog entry & shared on social media. Matt filmed the "Geology" video, assisted by Ben. Ben filmed some "Behind the Scenes". Ben filmed OBS retrieval. Erica posted on social media – blog entry link.

Monday 17th May

Operations & Science. Retrieving OBSs throughout this 24 hour period. Conditions imrpoving throughout the day to ideal conditions by afternoon. **0700** Weather review. We are in better position than last night. We are ahead of schedule with the OBS retrievals and now expect to complete the retrieval operation by Wednesday morning, possibly sooner. The storm is not anticipated to affect the survey area before Wednesday night, giving time to seek cover. Only two points to note about the OBS retrievals. First, one of the KUM OBSs came to the surface the upside down, meaning that the radio beacon and light were both ineffective. We would have lost this instrument if it had surfaced at night. This is something DanSeis need to think about. Secondly, the radio beacons on the KUM instruments are considerably better than those on the Sercel instruments. The Sercel beacons are adequate in this sea state but KUM-type beacons would help significantly in worse sea states. 1900 Weather review essentially the same as the morning one: cautiously optimistic.

Training & Outreach. Matt filmed OBS retrieval. Ben wrote a blog post about "Documenting Life At Sea". Niamh wrote a blog post about OBS retrieval.

Tuesday 18th May

Operations & Science. Retrieved remaining OBSs retrieved without difficulty in almost ideal weather conditions. **0700** Weather forecast predicts approaching storm will stay southeast of Profile 1. We can keep clear of the dangerous swell by moving only slightly northwest of the last OBS to be retrieved. Transit to the southern work area will have to be delayed by about a day, but it looks like work there can begin on Saturday and possibly even Friday. Another storm will come through next week that needs to be monitored. 1900 Weather report yet more positive. Plan to stay near current location for approximately 1 to 2 day to allow the storm to pass south of us and then begin transit south to the next work area. We therefore designed a 1-to-2 day work programme to collect additional swath bathymetry and magnetometer profiles across southern part of Erriador RIdge. **1933** OBS 27 back on deck. All the instruments have now been recovered. Begin contingency bathy-mag work programme over Erriador Ridge immediately.

Training & Outreach. Erica posted on social media – ECS blog post on all social media. Recording of episodes of iCRAGorama podcast with the whole ECS team. Niamh posted about OBS retrieval on the website blog. Niamh posted on Twitter. Haleh posted on Twitter.

Wednesday 19th May

Operations & Science. Continuing bathymetric and magnetic survey of southern Erriador RIdge. **0700** Weather forecast. Plan to leave this work area late this evening and begin transit to southern work area. Estimating we will deploy OBSs on Friday, then move south and heave to weather to allow a fourth storm to pass, before shooting the line on Sunday and Monday.

Training & Outreach. Niamh & Ben recorded an episode of iCRAGorama with Steve & various other crewmembers, including Per. Ben's blog piece on documenting life at sea was released, and shared on Twitter. Niamh & Ben posted on social media. Erica posted on social media bout OBS and life at sea blog links on Facebook and Instagram. Haleh wrote a post about Dry Lab in Celtic Explorer.

Thursday 20th May

Operations & Science. On transit from Rockall Plateau to Porcupine Seabight. **0700** Weather forecast shows we are travelling through a corridor of good sea conditions remeniscent of the Red Sea parting for the Israelites. Conditions look good to deploy OBSs in Porcupine Seabight and make cover in Bantry Bay before the bad weather late Saturday and Sunday. The swell from this storm is unlikely to subside below 4 m by dusk on Monday, so we should plan to start shooting on Tuesday. A fifth storm is now predicted to enter the area later next week and will need careful monitoring. ETA at western end of shortened P4 profile at 0920 tomorrow. Through middle of the day, the senior scientists debated how to make the most of the time available in Porucupine Seabight area. Provided we collect OBS data coincident with existing reprocessed lines from the PAD13/14 long-streamer MCS survey, we need not use our own streamer, and can therefore shoot at 5 to 5.5 kt. We have time for a line of only c. 200 km since we cannot start shooting before Tuesday morning. In correspondence with Tim Mishull earlier in the cruise we found that he will be collecting new dense OBS and CSEM data off Goban Spur in 2022. There seems no advantage therefore in siting our 200 km line at the outer edge of the margin beyond the mouth of the Seabight, since Minshull will survey this part in more detail. Instead we opted to site our line between the Irish shelf-slope break and the mouth of the Seabight, coincident with PAD13-038 rather than PAD13-048 as originally planned. This strategy should image the transition from moderately stretched continental crust, through hyper-extended crust, to highly serpentinised continent-ocean transition zone crust. It should link the the pre-exisiting OBS-MCS profiles in Porcupine Basin to the north and the anticipated Goban Spur data to the south. 1900 Weather forecast threw this plan into great doubt. The fifth storm noted this morning is now predicted to sweep through the work area on Wednesday and Thursday and generate c. 5 m swell. Captain advised us not to deploy instruments in this area tomorrow because there is a high risk we will not be able to recover them before returning to Galway. He asked us to draw up a contingency plan immediately, and advised that the best sea conditions would be found in Rockall Trough off Erris. Decided not to make a knee-jerk change, to draw up a plan through the evening, and make a

weather decision tomorrow morning. During the evening, we planned a 133 km OBS line from Rockall Bank to central Rockall Trough at 5 km spacing coincident with reprocessed PAD14-013. The science aim would be to look for evidence that a serpentinsed basement inherited from mid Cretaceous stretcing that was later intruded by Paleocene/Eocene basaltic material.

Training & Outreach. Ben interviewed Erica for a blog post. Meeting with early career scientists and Steve to discuss how the first half of the cruise has gone. Chief Engineer lead early career researchers and some others on a tour of the engines and other equipment down below; Matt took photos.

Friday 21st May

Operations & Science. On transit from Rockall Plateau to Porcupine Seabight. **0700** Weather forecast for the Porcupine Seabight has improved slightly. Captain and senior scientists agreed that we can now bank on enough time to deploy and retrieve all instruments along the Porcupine Seabight profile. At the same time, the forecast for Rockall Trough looks less settled than yesterday. We therefore agreed to go ahead with the Porcupine plan developed yesterday. **1900** Weather forecast supports earlier decision. **2345** Deployed first OBS on Profile 2 (OBS 28).

Training & Outreach. Ben wrote a blog post about recording podcasts at sea and social media. Erica posted on social media – porthole, YouTube video. Niamh and Matt recorded a boat tour video. Niamh edited two blog post pieces (dry lab & podcast/social media). Matt edited the boat tour video. Niamh uploaded the dry lab blog piece and shared it on social media.

Saturday 22nd May

Operations & Science. Deploying OBSs in Porcupine Seabight. **0700** Weather forecast shows weather will hold for deployment and possibly longer. We still plan to shelter in Bantry Bay on Sunday but scientists question whether there will be time for shooting heading to the coast on Saturday. 1245 Deployed last OBS. Captain agrees we can remain in this area until about 2100. **1420** Deploy guns but no streamer. **1455** MMO reports no whales in area for past hour and clear for soft start. **1540** Shooting Profile 2 at 5 kt. **1900** Weather forecast consistent with earlier ones. **2100** Reach OBS 44, stop guns and retrieve them. **2130** On transit to Bantry Bay.

Training & Outreach. Erica posted on social media – shared blog post, graveyard shift. Ben published blog post about recording podcasts at sea and social media.

Sunday 23rd May

Operations & Science. On transit to Bantry Bay. **0830** On DP in shelter east of Bear Island. Weather forecast shows c. 6 m swell in work area today and tomorrow morning, dropping to 4 m through Monday. Still expecting to re-start shooting line first light Tuesday. Science party have day off.

Training & Outreach. Haleh and Ben filmed interview with technicians Per, Lars and Thomas. Ben took photos of John Hopper processing seismic reflection data and Haleh interviewed John. Erica posted on social media about Per's birthday.

Monday 24th May

Operations & Science. Sheltering behind Bear Island, Bantry Bay. **0700** Weather review; captain suggests leaving late morning and heading slowly into weather, aiming to reach OBS 45 by 0400 tomorrow. **1050** On slow transit to work area. **1900** Weather review confirms we should be able to start shooting at dawn tomorrow in swell 3 m and decreasing, and weather looks good for recovery. Rather unconfortable 4 m swell overnight.

Training & Outreach. Haleh transcribed the interview with John Hopper, used the photo taken by Ben, and edited by Matt. Erica posted on social media about Bantry Bay. Team discussed print-out of Profile 1 seismic reflection profile.

Tuesday 25th May

Operations & Science. On transit to Porcupine Seabight work area. **0430** Reach planned gun deployment location. MMO considers sea-state too difficult for observing, mainly because of wind blowing up white caps. **0510** Deploy guns. **0540** Guns deployed but MMO still cannot start observing because of sea state. **0655** MMO begins watch. **0700** Weather reivew: 20–25 kt winnd and 3+ m swell but predicted to decrease gradually through the day. **0755** MMO confirms clear for soft start. **0835** Shooting Profile 2 again. **1900** Weather review. Swell now down around 2 m. Conditions looking good for retrieval tomorrow morning.

Training & Outreach. Erica posted on social media – day shift crew; retweeted youtube tour of boat. Ben worked on videos. Matt filmed & posted a video about our initial results.

Wednesday 26th May

Operations & Science. Shooting southern part of profile P2. **0556** Reached profile end and stopped shooting. **0600** Retrieved magnetometer. **0615** Retrieving streamer. **0639** Streamer onboard. Retrieving guns. **0700** Guns onboard. Transit to OBS S28. Weather reivew: light wind, quiet sea, excellent conditions for OBS retrieval. Forecast similar to last night: the edges of some patches of bad weather will cross us over the next few days but nothing to worry about. **0913** First OBS of profile (S28) on deck. **1650** Abandon search for OBS S32. Three sets of pings were attempted: 1435 at 3 nm, 1459 on station, 1533 on station. Estimated time to surface was 53 min. We carried out a systematic search from 1525 to 1650 in a pattern of increasing squares centred on the deployment site with minimum 4 and up to 8 searchers. No radio beacon signal was detected by either the ship's unit or the DanSeis hand-held unit. Visibility was moderate and sea conditions fairly good. First Officer stated there was a high probabiliy we would have seen the instrument if it had surfaced. Search called off at 1650 by agreement with Thomas

Funck (lead DanSeis rep). **1900** Weather review. Visibility now less than 500 m. Wind increasing to 20 kt and state worsening though swell < 2 m. Conditions look reasonable for Wednesday and Thursday. High winds and increasing swell predicted for Friday night, and could complicate our return to the OBS S32 location, whose automatic release time is 2201 on Friday night. **1930** Discovered that the bridge radio locator had been tuned to the wrong frequency for the past few deployments. **1948** OBS S34 on deck. Captain, Jones, Trinhammer discussed whether we should return to S32 site now with ship's dectector tuned to correct frequency. Decided we should make a quick search as we are about 3 hours ahead of schedule. **2000** Transit to S32, ship's VHF DF turned on and tuned to correct channel. **2100** Commenced search in area up to 2 nm west of drop location, bearing in mind wind and tide. Hand held DF used in crow's nest as well as ship's DF. No signal detected on either. **2145** Abandoned search for S32. Resumed recovery of S35.

Training & Outreach. Matt and Niamh answered the questions from schoolchildren- this will form a Q&A video, as well as a Q&A blog post.

Thursday 27th May

Operations & Science. Recovering OBSs. **0700** Weather reivew: depression to the NW now predicted to stay out of our way. Plan to finish recovering OBSs, then shoot Profile 3 coincident with Profile 2 but at 20 s shot interval. Aim is to see how well the 1 km streamer can image water layer reflectivity, so aim to launch as many XBTs as possible. **15:46** Retrieved final OBS S47. Turned round. **1605** Started to deploy guns. **1627** Guns deployed. MMO gives permission to begin soft start. Begin to deploy streamer. **1715** Soft start ends. Shooting Profile 3 at 20 s and around 115 bar pressure for remainder of day. Multiple XBTs deployed successfully. **1900** Weather review: no problems foreseen.

Training & Outreach. Erica posted on social media – retweeted YouTube video of prelim data, Lego scientists for #SeaToMe. Niamh wrote blog posts and posted on social media.

Friday 28th May

Operations & Science. Shooting Profile 3. XBTs began to foul ship. Tried launching on both sides, then stopped. **0700** Weather reivew: no problems foreseen for remainder of cruise. Reviewing the XBT situation in the afternoon, we discovered a considerable amout of copper wire trailing from the port stern. This was retrieved by hauling back aboard the ship. XBT deployments recommenced successfully from XBT 56. **15:46** Retrieved final OBS S47. Turned round and deployed guns. **1803** Reached end of Profile 3 and stopped shooting. **1813** Retrieving streamer. **1835** Streamer onboard. Retrieving guns. **1850** Guns onboard. Transit to OBS S32. Deployed several more XBTs. **1900** Weather review: no problems foreseen. **2015** Searching NW of S32 location, filling time before automatic release at 2201. Rise time is c. 55 minutes, so instrument would be on surface by 2300. Master has idea that instrument may have stuck in seabed canyon. **2053** Stopped above deployment location to ping releaser. **2110** Picked up beacon signal on main ship's radio by chance. Master and Chief Scientist were listening to coastal weather forecast. Beacon signal became audible when forecast finished. By chance, the forecast

this evening was on the same channel as the S32 beacon frequency! DF radio did not appear to pick up the beacon. We reasoned the OBS could be on the surface at a distance between 5 and 15 miles. The main radio does not provide a direction, but we discovered the signal was strong only when facing south. Tried the hand-held receiver without success. It was then noticed that a very faint signal was being detected by the red light display (but not the audio output) of the DF radio that correlated with the ping on the main radio; signal on bearing 160 from current location. We moved c. 1 mile in this direction and the signal became stronger. **2141** Stopped at c. 1 mile from S32 location in case it surfaced after earlier ping. We now do strongly suspect it is floating on the surface to south, but hedging bets. Second engine started to give extra speed and allow more time for searching before we have to head home. **2201** DanSeis reps (Funck, Trinhammer) and Chief Scientist all agree to leave drop location and follow the faint beacon signal southward. Set course 160 speed 12 kt. Multiple searchers on bridge and in crow's nest. Beacon signal becomes clearer and clearer. Strobe light spotted c. 2230. **2247** OBS 32 on board, making full house for the cruise. **2300** Set course for Galway.

Training & Outreach. Ben & Niamh recorded more for the podcast. Niamh and Ben wrote a blog post about finishing data acquisition. Erica posted on social media – beautiful weather last day; retweeted YouTube videos link. Ben posted on social media

Saturday 29th May

Operations & Science. Transit to Galway. Packing up and cleaning.

Training & Outreach. Erica posted on social media – shared blog entry – data acquisition finished. The team recorded a Q&A video, answering questions sent by the Bournville Village Primary School in Birmingham.

Sunday 30th May

0600 Pilot on board. **0630** alongside in Galway harbour. Ireland-based scientists leave mid morning. Ship demob complete by lunchtime. All user-supplied containers moved to P&O warehouse to continue packing (some of these containers and instruments will be used in another survey in Alaska later in 2021, others returning to base). All data downloaded to multiple hard disks carried by Jones & Hopper. **1230** Post-cruise meeting on bridge: Jones, Hopper, Trinhamme; RV Ops Aodhán Fitzgerald; P&O Denis Rowan, Clynt Gregory. UK-based party leaves early afternoon to spend night in Dublin. Danish party onboard one more night.

Monday 31st May

Danish party leave vessel for Dublin airport. UK party take 0800 ferry Dublin – Holyhead. All science party back home by evening.

5 Preliminary Results

5.1 Seismic Reflection Data

Figures 5.1 and 5.2 show Line 01 processed onboard using the flow described in §3.3. This profile is designed to provide a record of volcanic production spanning late Cretaceous to early Eocene time (c. 30 million years). The sedimentary layer is typical of published seismic reflection lines over North Atlantic oceanic basement [45] and is interpreted as contourite drift desposits. A clear reflection from the top of oceanic volcanic basement is observed. Smooth volcanic basement of Cretaceous age contrasts with rough basement of Paleocene and Eocene age. The topography of the top of the Paleocene-Eocene oceanic crust resembles the topography of the Neogene-Recent oceanic crust forming the Reykjanes Ridge south of Iceland [46,47]. Thus we provisionally interpret that the ridges in volcanic basement along Line 01, including Erriador Ridge, could be analagous to the Reykjanes V-Shaped Ridges (VSRs). The VSRs are thought to form fluctuations in volcanic productivity driven by asthenospheric temperature fluctuations that result from mantle plume pulsing. If confirmed by whole-crustal velocity models from the OBS data, this interpretation would support the project PORO-CLIM working hypotheses in §2.4, objective 2. In this case, the transition from smooth to rough volcanic basement would record emplacement of the head of the Icelandic mantle plume beneath the study area during the latest Cretaceous to early Paleocene time.

We observe strong westward dipping reflections within the uppermost volcanic basement of Gondor Seamount. We interpret these as subarial lava flows, by analagy with the seaward dipping reflections of earliest Eocene ages commonly observed along the Europe-Greenland passive margins [24,28]. This interpretation provides further evidence for unusually high mantle temperatures, since significant dynamic support would be required to bring the top of Gondor Seamount above sea-level.

Erriador Ridge is close in age to the Paleocene-Eocene Thermal Maximum global climate change event. If confirmed, peak volcanic productivity at this time would be in line with the model proposed by Jones et al. to explain the PETM [15]. However, Erriador Ridge shows a previously unknown double peak, which perhaps supports the idea that two major blasts of greenhouse gas were involved in the PETM [48]. A key focus of post-cruise data processing will be to establish the timing and number of volcanic production peaks relative to the PETM.

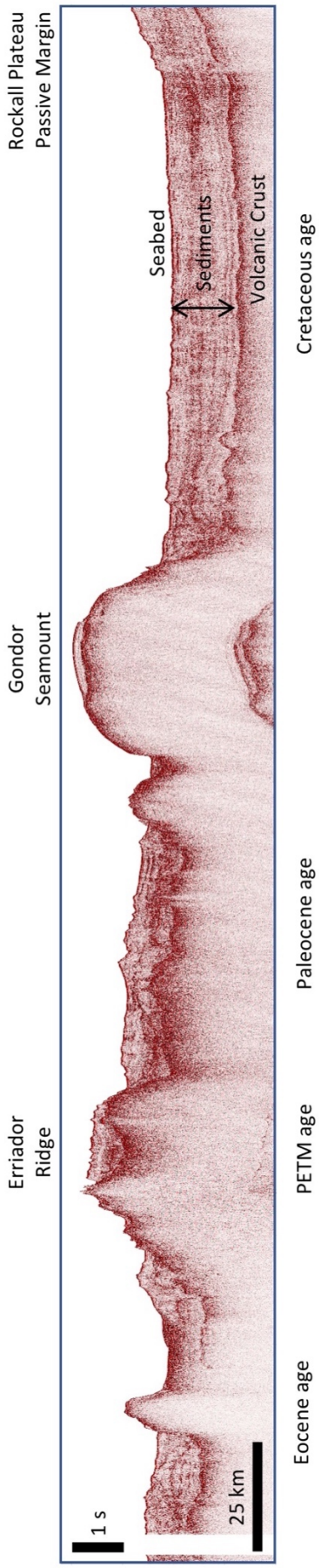

Figure 5.1. Ship-board processessed stack of Line 01 MCS dataset. Location shown on Figure 1.1.

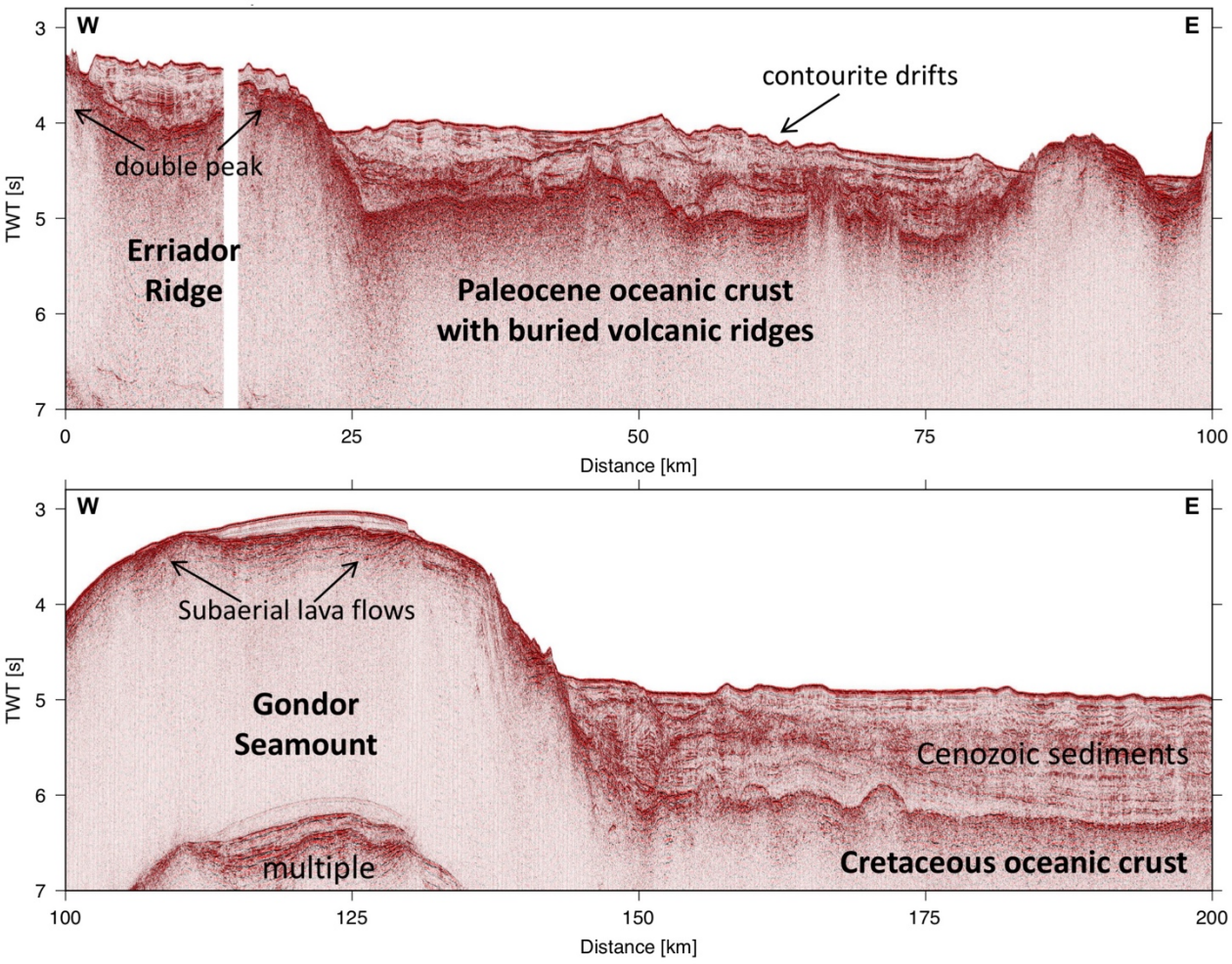

Figure 5.2. Central section of MCS Line 01. Note seaward dipping reflectors interpreted as subarial lava lows on Gondor Seamount. See Figure 1.1 and Figure 5.1 for location.

5.2 Ocean Bottom Seismometer Data

Figure 5.3 shows an example of the OBS data. All the instruments recorded usable data. As usual, the data quality varied between instruments, presumably related to the way the intrument landed on the seabed. The Sercel MicroOBS instruments tend to show less noise than the KUM instruments. Signal is observed to offsets of at least 80 km on the better records.

Data from Profile 1 was downloaded, plotted and inspected onboard. All instruments show P-wave refractions from the sediment layer, upper crust, lower crust and mantle, and Moho reflections. Many instruments also record S-waves. The variable gradient of the first arrivals with increasing offset indicates lateral changes in crustal structure, in line with the initial interpretations from the MCS data. Moho reflections becomes less distinct toward the eastern end of Profile 1. The Moho beneath the Goban Spur magma-poor passive margin and also beneath central Porcupine Basin is also observed to be indistinct. In these locations low reflectivity has been shown to arise from serpentinisation of the mantle immediately beheath beneath the Moho. If confirmed, this interpretation would support the working hypothesis (§2.4) that Rockall Plateau passive margin is a magma-poor margin similar to the Goban Spur margin, and further strengthen the case for mantle temperature from Cretaceous to Paleocene-Eocene time.

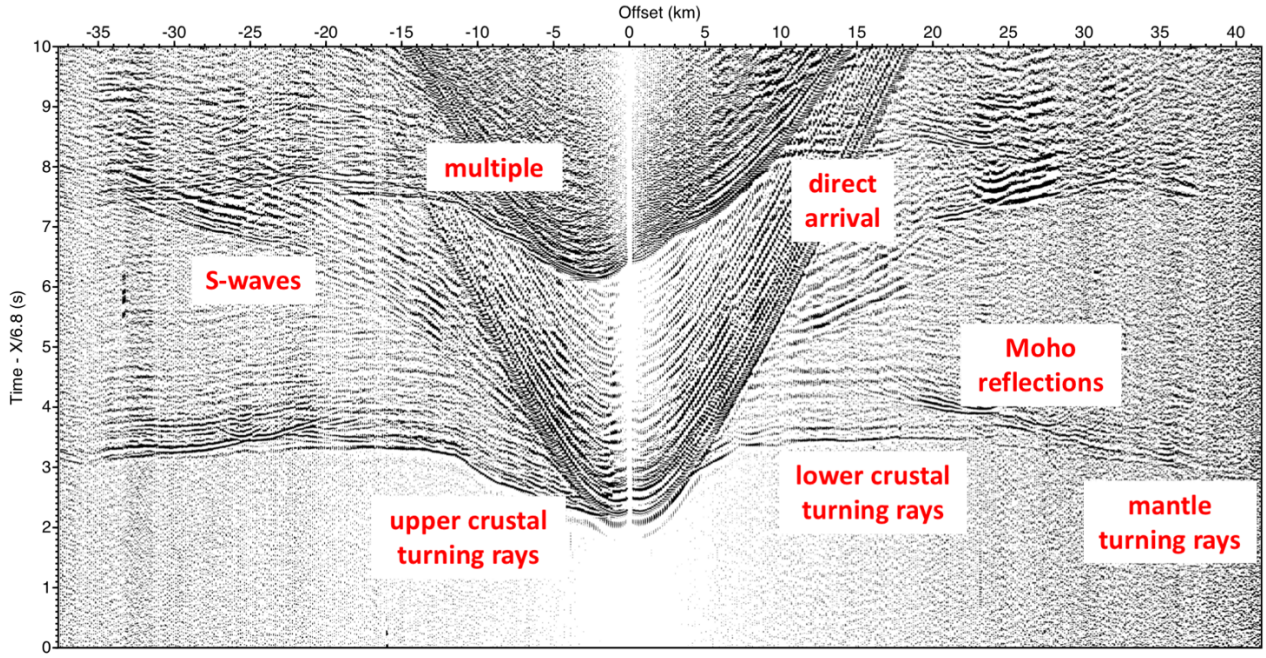

Figure 5.3. Example of PORO-CLIM ocean bottom seismometer data from station S26 Sercel MicrOBS hydrophone. A bandpass filter with corners at 3,5,24,26 Hz has been applied but no other processing was carried out on board. The reduction velocity of 6.8 km/s corresponds to the typical velocity of lower oceanic crust; thus inward dipping refractions on this plot are from upper crustal layers and outward dipping refractions are from sub-crustal layers.

5.3 Magnetometer Data

Figure 5.4 shows all the magnetometer data acquired. It was not possible to QC or process this dataset at sea; these tasks will be carried out beginning September 2021. Parts of the dataset show significant noise that is probably related to sea state. This noise appears straightfoward to distinguish from the signal by visual inspection.

The data obtained along OBS Profile 1 show a clear oceanic magnetic stripe signal that will be used to refine the age model for the profile. Accurate age determination over latest Paleocene to earliest Eocene crust is particularly important to clarify the relationship between mantle convection the PETM. The volcanic production rate record obtained from the PORO-CLIM seismic data will need to be correlated with existing records of volcanic production and dynamic support to achieve this objective (§2.4).

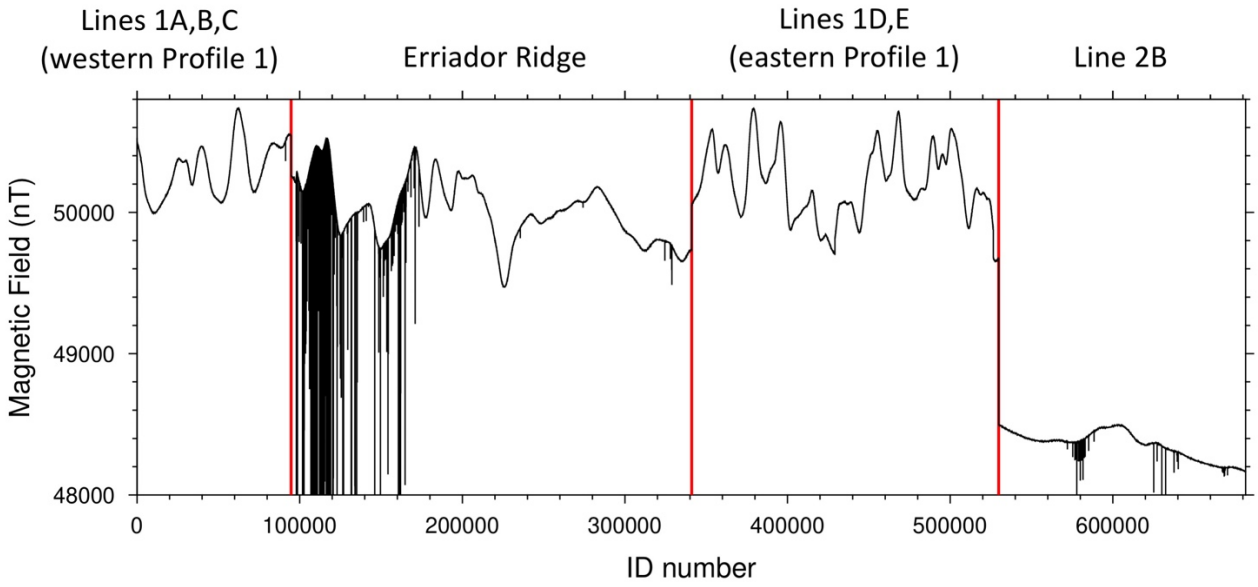

Figure 5.4. Magnetometer data (unprocessed). Lines 1A–E are coincident with OBS Profile 1; Line 2B is coincident with OBS Profile 2 (Figure 1.1). See Figure 1.2 for location of Erriador Ridge profiles.

5.4 Oceanographic Data

Figures 5.5 and 5.6 show the XBT data collected along Profiles 1 and 2 respectively, compared with legacy measurements from CTD casts. The new data show comparable structure to the legacy data. XBT data from Profile 1 was QC'd onboard and bad data points removed; the effect of this step can be seen from comparison of Figures 5.5 and 5.6.

Sound speed profiles were calculated from the XBT temperature profiles assuming a constant salinity of 34.9 psu, based on the legacy measurements. The sound speed curves profiles will be used for future OBS velocity modelling and seismic oceanography applications (§2.4). Salinity has little influence on sound speed, and the variability in salinity shallower than 1 km does not pose a problem for these applications.

Considerable thermohaline fine structure is observed shallower than 1.5 km on all lines that translates into fine structure in sound speed. This structure would be expected to generate clear reflections on MCS data of standard fold. Post-cruise processing of the water layer will be carried out to test whether reflectivity from the fine structure is observed on the low-fold PORO-CLIM data.

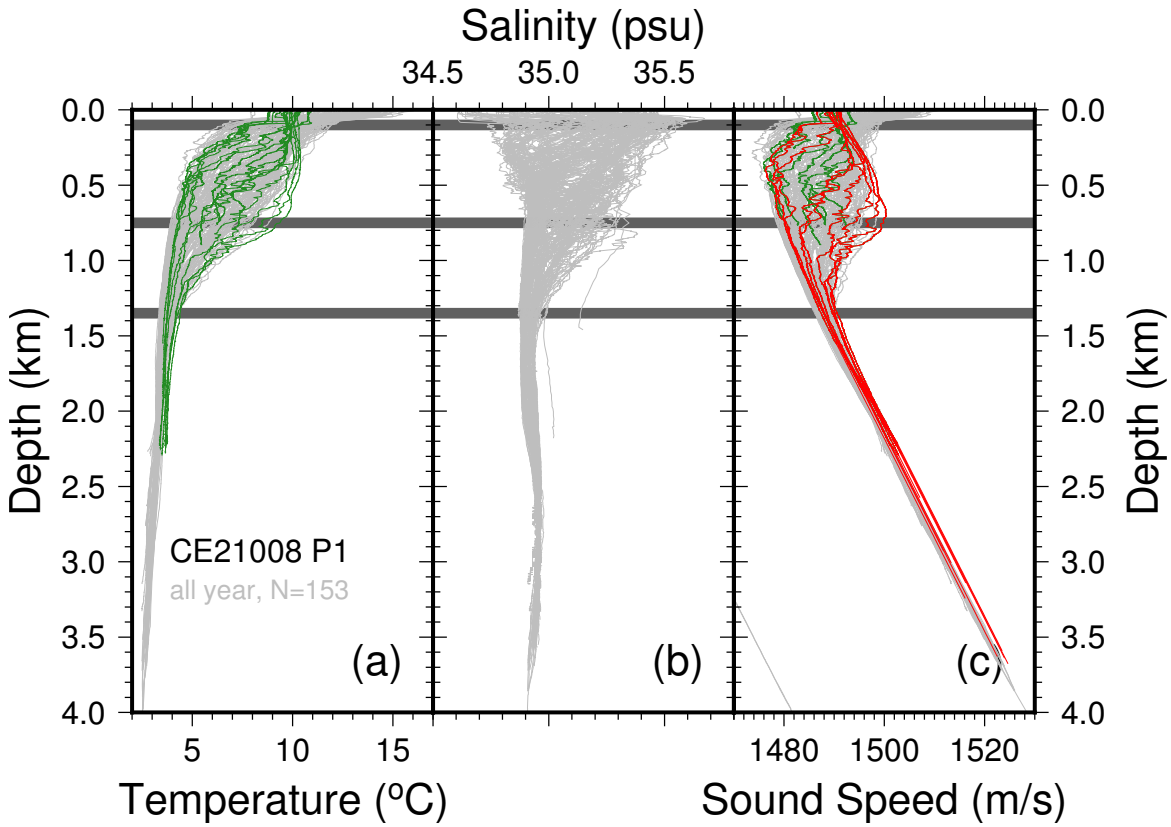

Figure 5.5. Direct physcial oceanographic measurements along Profile 1. Grey lines show a compilation of legacy CTD casts. Green lines show PORO-CLIM XBT data; these data have been QC'd and suspect data points removed. Red lines show data from T5 probes that have been downward-continued using the vertical gradient observed in the legacy dataset, for use in OBS velocity modelling of the water layer. Sound speed was calcuated from the XBT data assuming a constant salinity of 34.9 psu.

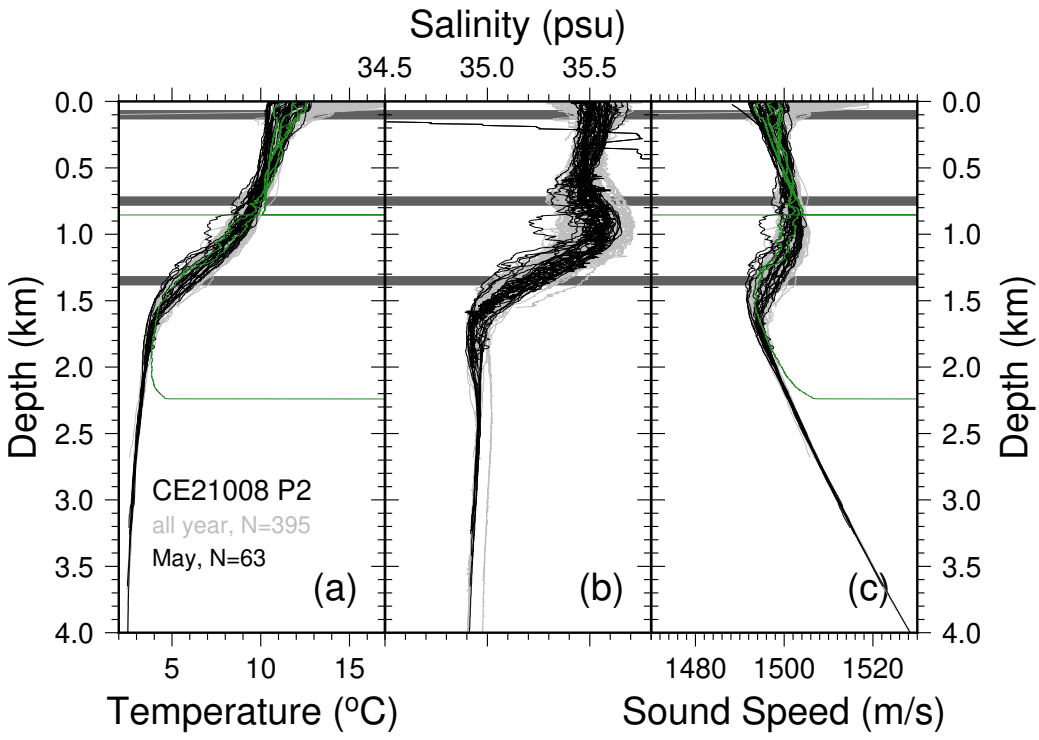

Figure 5.6. Direct physcial oceanographic measurements along Profile 2. Grey and black lines show a compilation of legacy CTD casts; black lines show casts in May. Green lines show PORO-CLIM XBT data; these data have not been fully QC'd. Sound speed was calcuated from the XBT data assuming a constant salinity of 34.9 psu.

6 Data and Sample Storage / Availability

Data storage and availability is goverened by three separate contracts.

1. A contract between PIPCO-RSG and University of Birmingham governs grant funding for all user-supplied seismic acquisition equipment, technical support and data analysis. It makes the following statements regarding data storage and availability.

- All data collection supported by this grant, including OBS and streamer seismic data, magnetometer data and other underway data, is jointly owned by the principal investigator (Birmingham University) and the co-investigators (GEUS and DIAS), known as the Investigators.
- The Investigators shall grant PIPCO-RSG immediate access to the dataset.
- GEUS will curate and archive the new dataset on behalf of the Investigators. [This archive does not preclude additional archives organised by EuroFleets].
- Access to data shall be restricted to the Investigators, and other academic partners named in the proposal and nominated subsequently, and PIPCO-RSG for a moratorium period of up to 3 years

after the data collection cruise. [These partners include all who sailed on CE21008 and also land-based partners, including those who were prevented from sailing by the Covid pandemic].

2. A contract between between DanSeis and University of Birmingham governs rental of user-supplied OBS equipment. This contract mandates that all raw OBS data must be supplied to DanSeis within a month of cruise end, and DanSeis will immediately archive the data in their repository, and DanSeis will make the data publically available after expiration of a 2-year moratorium period after the data collection cruise.

3. A transnational access end-user agreement between University of Birmingham, EuroFleets and the Irish Marine Institute governs part of the ship time and part of the science party mobilisation costs. It makes the following statements regarding data storage and availability.

- A cruise summary report (CSR) must be submitted within two weeks following the end of the cruise via the online Cruise Summary Report Content Management System (CSR CMS) as per SeaDataNet online submission guidelines. [The CSR was uploaded on time on ; it summarises the types and locations all datasets acquired.]
- A copy of all datasets generated together with sufficient metadata and, when possible, all the raw data collected during the cruise must be submitted to one of three reference data centres two months after cruise completion.
- Access to raw and processed data can be restricted to the project team for a moratorium period of up to 2 years.

In summary, the entire dataset will be archived in two locations (Eurofleets and GEUS), and the seismic data will be archived additionally by PIPCO-RSG, and the OBS data will be archived additionally by DanSeis. Access to raw and processed data will be restricted to project partners for a moratorium period of 2 years after cruse end, i.e. open access will begin on 2nd June 2023. Prior to this date, existing and future partners who require data collected on the cruise and did not take it away with them on leaving the ship can access the dataset archived by GEUS or Eurofleets, once permission has been obtained from the investigators.

7 Participants

The €1.2M project is funded by the EU Horizon 2020 EuroFleets+ programme, the PIPCO-RSG industrial consortium and the Irish Marine Research Programme. The project is led by the University of Birmingham in collaboration with the Geological Survey of Denmark and Greenland (GEUS) and the Dublin Institute of Advanced Studies (DIAS). Other cruise CE21008 participants (including onshore participants) were from the University of Aarhus, University of Brighton, University of Cambridge, Galway-Mayo Institute of Technology, University of Ghent, Tonnta Energy Ltd, Trinity College Dublin and University College Dublin. Eight different nationalities were represented in the onboard science party.

7.1 Participants on board CE21008

Despite the Covid19 pandemic, the final CE21008 work programme was close to that proposed. Success was due in large part to the hard work and professionalism of all involved in operating RV *Celtic Explorer*. The principal new constraints were that science party size was reduced from the 20 proposed to 13, and mobilization of the science party had to be Covid-safe. The senior science and technical party was therefore reduced from the 11 proposed to 9, prioritizing places for those needed for 24-hour seismic acquisition operations. Remaining places were reduced from the 9 proposed to 5, prioritising places for early career researchers who could reach the vessel safely and who were committed to outreach.

No.	Name	Early career (Y/N)	Gender	Affiliation	On-board tasks
1	Stephen Jones *	N	M	U Birmingham, UK	CE21008 Chief Scientist. PORO-CLIM project PI. Science watch leader.
2	John Hopper	N	M	GEUS, Denmark	PORO-CLIM project Co-I. Science watch leader. Seismic reflection data processing.
3	Nicky White *	N	M	U Cambridge, UK	Science watch leader. Seismic oceanography.
4	Per Trinhammer	N	M	U Aarhus, Denmark	Chief Technician for all user-supplied equipment.
5	Thomas Funck	N	M	GEUS, Denmark	OBS technician. Science leader for OBS data processing.
6	Lars Rasmussen	N	M	U Aarhus, Denmark	User-supplied equipment technician.
7	Sigurd Bøgelund Andersen	Y	M	U Aarhus, Denmark	User-supplied equipment technician.

8	María Pérez Tadeo	Y	F	Galway-Mayo Institute of Technology, Ireland	Marine Mammal Observer. PhD student (Irish ocean mammal population).
9	Matthew Allison *	Y	M	U Birmingham, UK	PhD student (North Atlantic palaeoclimate). Public outreach.
10	Benjamin Couvin *	Y	M	University College Dublin, Ireland	PhD student (Rockall Trough sedimentary processes). Public outreach.
11	Niamh Faulkner *	Y	F	Trinity College Dublin, Ireland	PhD student (Basalt carbon sequestration). Public outreach.
12	Haleh Karbala Ali *	Y	F	Dublin Institute of Advanced Study, Ireland	PostDoc (Karstic Groundwater Flow Systems). Public outreach.
13	Erica Krueger *	Y	F	Trinity College Dublin, Ireland	MSc student (Cold water corals / environmental science). Public outreach.

* denotes participants funded directly from the EF+ grant for science party mobilisation costs to Jones, most of which has been used to support early career researchers.

7.2 PORO-CLIM Participants not Sailing on CE21008

No.	Name	Early career (Y/N)	Gender	Affiliation	Tasks
14	Brian O'Reilly	N	M	DIAS, Ireland	PORO-CLIM project Co-I. Atlantic margin tectonics.
15	David Van Rooij	N	M	Ghent University, Belgium	PORO-CLIM Partner. Porcupine Basin seafloor processes.

16	Aggie Georgiopoulou	N	F	U Brighton, UK	PORO-CLIM Partner. Rockall Trough sedimentary processes.
17	Hazel Knight *	Y	F	U Birmingham, UK	PhD student (PORO-CLIM seismic dataset)
18	Tim Reston	N	M	U Birmingham, UK	Magma-poor extensional and break-up processes.
19	Rob Hardy	N	M	Tonnta Energy, Ireland	Seismic reflection processing.

* denotes participants funded directly from the EF+ grant for science party mobilisation costs to Jones; in this case, the money is being used to allow a non-sailing early career researcher to visit GEUS to access data and supervision.

Note also that all participants have benefitted from significant direct external funding from PIPCO-RSG and additional ship-time and facility support from the Irish Marine Institute.

7.3 Changes Forced by COVID

Despite the Covid19 pandemic, the final CE21008 work programme was close to that proposed. Success was due in large part to the hard work and professionalism of all involved in operating RV *Celtic Explorer*. The principal new constraints were that science party size was reduced from the 20 proposed to 13, and mobilization of the science party had to be Covid-safe. The senior science and technical party was therefore reduced from the 11 proposed to 9, prioritizing places for those needed for 24-hour seismic acquisition operations. Remaining places were reduced from the 9 proposed to 5, prioritising places for early career researchers who could reach the vessel safely and who were committed to outreach.

8 Station List

8.1 OBS Station List

OBS	Longitude	Latitutude	Water Depth	Deployment		Retrieval		Notes
Station	[°E]	[°N]	[m]	Date [2021]	Time [UTC]	Date [2021]	Time [UTC]	
Profile 1								
K01	-20.92439	54.26753	2864	12.05	12:24	16.05	22:59	
K02	-21.14091	54.27196	2931	12.05	13:21	17.05	00:35	
K03	-21.35790	54.27670	2907	12.05	14:10	17.05	02:01	
K04	-21.57499	54.28161	3084	12.05	15:15	17.05	03:31	
K05	-21.79216	54.28448	3446	12.05	16:04	17.05	05:13	
K06	-22.00686	54.28696	3592	12.05	16:53	17.05	07:13	
K07	-22.22264	54.28836	3636	12.05	17:43	17.05	08:53	
S08	-22.44081	54.28963	3689	12.05	18:33	17.05	11:35	
S09	-22.65866	54.29163	3695	12.05	19:26	17.05	13:31	
S10	-22.87645	54.29287	3663	12.05	20:16	17.05	15:18	
S11	-23.09248	54.29269	3645	12.05	21:06	17.05	17:03	
S12	-23.30983	54.29343	3586	12.05	21:55	17.05	18:47	
S13	-23.52644	54.29247	3518	12.05	22:45	17.05	20:20	
S14	-23.74180	54.29380	2310	12.05	23:35	17.05	21:47	
S15	-23.95835	54.28850	2324	13.05	00:24	17.05	23:16	
S16	-24.17604	54.28828	2890	13.05	01:11	18.05	00:45	
S17	-24.39186	54.28720	3153	13.05	01:57	18.05	02:22	
S18	-24.60803	54.28540	3225	13.05	02:43	18.05	04:06	
S19	-24.82630	54.28279	3007	13.05	03:30	18.05	06:21	
S20	-25.04264	54.27972	3032	13.05	04:18	18.05	08:01	
S21	-25.25813	54.27599	2962	13.05	05:05	18.05	09:44	
S22	-25.47577	54.27215	2540	13.05	05:56	18.05	11:05	
S23	-25.69147	54.26843	2444	13.05	06:45	18.05	12:27	
S24	-25.90954	54.26302	3125	13.05	07:34	18.05	13:54	
S25	-26.12836	54.25900	3416	13.05	08:23	18.05	15:36	
S26	-26.45327	54.25120	3243	13.05	09:37	18.05	17:37	
S27	-26.77623	54.24227	3388	13.05	10:47	18.05	19:33	
Profile 2								
S28	-13.82075	49.93076	3704	21.05	23:44	26.05	09:13	
S29	-13.71028	49.98584	3370	22.05	00:25	26.05	10:53	
S30	-13.59944	50.04052	3193	22.05	01:07	26.05	12:33	
S31	-13.48946	50.09333	3015	22.05	02:01	26.05	14:13	
S32	-13.37543	50.14877	2829	22.05	02:42			
S33	-13.26484	50.20174	2673	22.05	03:23	26.05	18:11	
S34	-13.15251	50.25636	2593	22.05	04:04	26.05	19:48	
S35	-13.04071	50.31027	2525	22.05	04:45	27.05	00:13	

S36	-12.92738	50.36397	2476	22.05	05:25	27.05	01:36	
S37	-12.81439	50.41818	2459	22.05	06:06	27.05	03:03	
S38	-12.70043	50.47023	2406	22.05	06:46	27.05	04:24	
S39	-12.58750	50.52541	2351	22.05	07:25	27.05	05:41	
S40	-12.47362	50.57951	2281	22.05	08:05	27.05	06:59	
S41	-12.35932	50.63367	2231	22.05	08:45	27.05	08:22	
S42	-12.24379	50.68639	2190	22.05	09:26	27.05	09:40	
S43	-12.13039	50.74059	2130	22.05	10:08	27.05	11:00	
S44	-12.01574	50.79261	2013	22.05	10:48	27.05	12:22	
S45	-11.90059	50.84546	1918	22.05	11:29	27.05	13:32	
S46	-11.78482	50.89820	1783	22.05	12:07	27.05	14:40	
S47	-11.66968	50.95166	1504	22.05	12:45	27.05	15:46	

8.2 Multi-Channel Streamer Profile Locations

MCS	Start of Line				End of Line			
Profile	Date [2021]	Time [UTC]	Lon [°E]	Lat [°N]	Date [2021]	Time [UTC]	Lon [°E]	Lat [°N]
01A	13.05	1542	-27.0278	54.2338	13.05	1559	-26.9926	54.2342
01B	13.05	1637	-26.9271	54.2374	13.05	1754	-26.7675	54.2421
01C	13.05	1756	-26.7634	54.2421	14.05	0525	-25.4703	54.2726
01D	15.05	0839	-25.7796	54.2556	15.05	1114	-25.4955	54.2711
01E	15.05	1117	-25.4893	54.2716	16.05	1849	-21.5670	54.2794
02A	Guns only; no MCS							
02B	25.05	1036	-12.1768	50.7192	26.05	0556	-13.9640	49.8569
03	27.05	1627	-11.6826	50.9557	28.05	1803	-13.6082	50.0367

8.3 Expendable Oceanographic Probe List

XBT	Longitude	Latitutude	Date	Time	Depth	Type	Notes
Station	[°E]	[°N]	[2021]	[UTC]	[m]		(see key below)
1	-14.6327	53.8253	11.05	11:48	460	T11	
2	-25.0717	54.2373	13.05	16:36	187	T5	F
3	-25.5067	54.2495	13.05	20:05	67	T11	F
4	-25.7750	54.2565	13.05	22:07	110	T11	F
Profile 1							
5	-24.5917	54.2735	15.05	11:54	254	T11	F
6	-24.7233	54.2757	15.05	12:57	700	T11	O

7	-24.7600	54.2763	15.05	13:14	1830	T5	
8	-24.9967	54.2800	15.05	15:06	2257	T5	O
9	-23.0183	54.2803	15.05	15:17	726	T11	O
10	-23.2767	54.2853	15.05	18:27	1554	T5	F
11	-23.6517	54.2898	15.05	20:16	767	T11	O
12	-23.8767	54.2868	15.05	22:04	737	T11	O
13	-22.0733	54.2885	15.05	23:37	895	T11	O
14	-22.2883	54.2922	16.05	01:24	765	T11	O
15	-22.4850	54.2928	16.05	03:03	760	T11	O
16	-22.6200	54.2927	16.05	04:00	2295	T5	O
17	-22.9900	54.2917	16.05	07:15	2228	T5	O
18	-21.1483	54.2913	16.05	08:29	776	T11	O
19	-21.4300	54.2917	16.05	10:44	2251	T5	O
20	-21.5900	54.2898	16.05	12:03	2237	T5	O
21	-21.7933	54.2887	16.05	13:41	2281	T5	O
22	-21.9867	54.2878	16.05	15:15	2221	T5	O
23	-20.2967	54.2815	16.05	17:42	2268	T5	O
24	-20.3850	54.2802	16.05	18:24	2230	T5	O
Erriador Profiles							
25	-24.4250	54.2922	19.05	12:29	2200	T5	O
26	-24.1733	54.2873	19.05	13:56	2237	T5	O
27	-25.9650	54.2843	19.05	15:09	2248	T5	O
28	-25.9383	54.2838	19.05	15.19	703	T11	O
29	-24.2850	54.3122	19.05	18:04	1942	T5	O
30	-24.2850	54.3122	19.05	18:14	564	T11	O
31	-24.4917	54.3167	19.05	19:35	575	T11	O
32	-24.7317	54.3213	19.05	20:54	611	T11	O
33	-23.1217	54.3290	19.05	23:09	1040	T5	F
34	-23.1417	54.3293	19.05	23:21	2060	T5	O
35	-23.1817	54.3302	19.05	23:32	741	T11	O
Profile 2							
36	-10.2550	50.9170	22.05	18:16	737	T11	O
37	-11.9333	50.7693	25.05	09.21	645	T11	ON
38	-11.7033	50.6623	25.05	11:56	61	T11	ONF
39	-11.4450	50.5422	25.05	14:41		T11	X
40	-12.4183	50.0490	26.05	01:46		T11	X
Test drops							
41	-13.9767	49.8235	26.05	07:09	417	T11	
42	-12.0100	49.8403	26.05	07:19	1322	T5	
43	-12.4000	50.0453	26.05	12:36	2236	T5	O
44	-12.4000	50.0465	26.05	12:45	850	T11	E
Profile 3							
45	-10.2183	50.9010	27.05	17:25	2028	T5	O
46	-10.1083	50.8492	27.05	19:21	981	T11	O
47	-11.9817	50.7908	27.05	20:53	2016	T5	O
48	-11.9083	50.7568	27.05	21:54	1000	T11	O
49	-11.8383	50.7253	27.05	22:45	2157	T5	O
50							D
51	-11.7600	50.6875	27.05	13:49	1000	T11	O
52	-11.7183	50.6683	28.05	00:23		T5	X

53	-11.6800	50.6502	28.05	00:54	538	T11	OF
54							D
55	-12.5800	50.1277	28.05	15:25	331	T11	NF
56	-12.5567	50.1150	28.05	15:49	1000	T5	O
57	-12.5400	50.1078	28.05	16:02	2211	T5	O
58	-12.5133	50.0950	28.05	16:25	2112	T5	O
59	-12.4917	50.0853	28.05	16:41	2188	T5	O
60	-12.4750	50.0767	28.05	16:56	2203	T5	O
61	-12.4317	50.0542	28.05	17:30	2216	T5	O
62	-12.4200	50.0495	28.05	17:39	2189	T5	O
63	-12.4083	50.0447	28.05	17:48	2198	T5	O
64	-12.3983	50.0402	28.05	17:57	2192	T5	O
65	-12.5850	50.1373	28.05	20:22	2190	T5	O
66	-12.6150	50.1545	28.05	21:08	406	T11	L

D Did not launch
E Error message on MK21 console but data appears good
F Copper wire fouled ship or equipment at depth indicated; data below this depth deleted
L Lost data file
N Noisy data, probably not useful
O Specified terminal depth over-ridden to get more/deeper data
X No useful data

8.4 Magnetometer Profiles

The following magnetometer profiles were acquired.

- Coincident with MCS Lines 1A, 1B and 1C.
- Mini survey of Erriador Ridge, consisting of 3 profiles parallel to Profile 1 (Figure 1.2).
- Coincident with MCS Lines 1D and 1E.
- Coincident with MCS Line 2B.
-

8.5 Underway Data List

The following underway data was acquired.

- EM302 multibeam bathymetry system (first file at 0945 on 08.05; last file at 0742 on 29.05)
- EK60 fish-finder echosounder (first file at 0650 on 10.05; last file at 1011 on 29.05).
- ADCP (first file at 1011 on 08.05; last file at 0743 on 29.05).

9 Outreach Programme

The original proposal to EuroFleets had significant emphasis on early career researcher training. The proposed training programme was based on a "floating university" model that has previously been used on EuroFleets and other cruises. However, the floating university model makes considerable demands on senior scientists' time . Given the reduced science party, it was decided in the cruise planning stage to organise earlier career research training around the outreach objective. In this model, the ECRs learn the fundamentals of various subjects by interviewing the senior scientists and technicians, before summarising key points in a series of written and visual presentations for dissemination on social media. The outreach-bsaed training model proved a more efficient and achievable way of providing early career researcher training than the programme originally proposed.

The outreach programme, led by the early career researcher team, made considerable impact. Daily social media posts, short videos and blog posts engaged audiences across Europe and beyond. Our Twitter posts alone had 100,000 engagements during the month of the cruise. The Lego scientist photo series proved particularly popular, and has influenced another expedition to document their forthcoming cruise with Lego characters. We engaged directly with schools in Detroit, Dublin and Birmingham via a Q&A series. Short videos documenting the expedition were posted to the University of Birmingham's pre-existing audience, reaching several thousand.

Throughout the summer of 2021, PORO-CLIM will continue to feature in iCRAGorama podcasts of the Irish Centre of Research for Applied Geosciences, the Girls into Geoscience (GiG) online conference and blog, and the European Geoscience Union (EGU) blogs, and teaching materials based on our new data will be developed. All this material, as well as the scientific results, can be accessed via the expedition website at www.poro-clim.org.

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11 References

[1] Courtillot, Renne, *Comp. Rend. Geosci.* 335, 113–140 (2003).
[2] Wignall, *Elements* 1, 293–297 (2005).
[3] Zachos et al., *Nature* 451, 279–283 (2008).
[4] Zeebe et al., *Nat. Geosci*. 9, 325–329 (2016).
[5] Gutjahr et al., *Nature* 548, 573–577 (2017).
[6] Zeebe et al., *Nat. Geosci.* 2, 576–580 (2009).
[7] Dunkley Jones et al., *Earth-Sci. Rev.* 125, 123–145 (2013).
[8] Kirtland Turner, Ridgwell, *Earth Planet. Sci. Lett.* 435, 1–13 (2016).
[9] Kirtland Turner et al., *Nat. Comm.* 8, 353 (2017).
[10] Storey et al., *Science* 316, 587–589 (2007).
[11] Svensen et al., *J. Geol. Soc., Lond.* 167, 433–436 (2010).
[12] Frieling et al., *Proc. Nat. Acad. Sci.* 43, 12059–12064 (2016).
[13] Bowen et al., *Nat. Geosci.* 8, 44–47 (2015).
[14] Svensen et al., *Nature* 429, 542–545 (2004).
[15] **Jones** et al. *Nat. Comm.* 10, 5547 (2019).
[16] White, McKenzie. *J. Geophys. Res.* 94, 7685–7729 (1989).
[17] Eldholm, Grue. *J. Geophys. Res.* 99, 2955–2968 (1994).
[18] Hartley et al. *Nat. Geosci.* 4, 562–565 (2011).
[19] Rudge et al. *Earth Planet. Sci. Lett.* 267, 146–160 (2008).
[20] Stucky de Quay et al., *Geochem., Geophys., Geosyst.* 18, 973–993 (2017).
[21] **Jones** et al. *Geol. Soc. Lond., Spec. Pubs* 188 (2001) 345–360.
[22] Vogt, *Earth Planet. Sci. Lett.* 13 (1971) 153–160.
[23] **Jones** et al., *Earth Planet. Sci. Lett.* 386, 86–97 (2014).
[24] White et al., *Nature* 452, 460–464 (2008).
[25] Funck et al. *Geol. Ass. Can. / Min. Ass. Can. Jnt Ann. Meet.*, 35, 47 (2012).
[26] **Reston**, *Tectonophys.* 468, 6–27 (2009).
[27] Bullock, Minshull, *Geophys. J. Int.* 163 (2005) 527–546.
[28] Barton, White, *J. Geophys. Res.* 102, 3109–3129 (1997).
[29] **Reston** et al., *Geology* 29, 587–590 (2001).
[30] **Reston** et al., *J. Geol. Soc. Lond.* 161 (2004) 783–798.
[31] Prada, **O'Reilly** et al., *Earth Planet. Sci. Lett.* 474, 148–159 (2017).
[32] Chen, **O'Reilly** et al., *J. Geophys. Res.* 123, 8312–8330 (2018).
[33] Stoker et al., *Geol. Soc. Lond., Spec. Pubs* 188, 411–438 (2001).
[34] MacLachlan et al., *Marine Geol.* 253, 170–184 (2008).
[35] Stoker, *Geol. Soc., Lond., Spec. Pubs* 129, 229–254 (1998).
[36] Holliday et al., *Deep-Sea Res. I* 47, 1303–1332 (2000).
[37] New, Smythe-Wright, *Cont. Shelf Res.* 21, 777–810 (2001).
[38] Hebbeln, **Van Rooij**, et al., *Marine Geol.* 411, 51–61 (2019).
[39] Huvenne, **Van Rooij**, et al., *Deep Sea Res. I* 56, 2263–2280 (2009).
[40] Rebesco et al., *Marine Geol.* 352, 111–154 (2014).

[41] **Jones**, White, *Earth Planet. Sci. Lett.* 216, 271–282 (2003).

[42] Maclennan, **Jones**, *Earth Planet. Sci. Lett.* 245, 65–80 (2006).

[43] Hoggard et al., *Nat. Geosci* 9, 436–463 (2016).

[44] Hoggard et al., *J. Geophys. Res.* 122, 2328–2372 (2017).

[45] Parnell Turner et al., *Geochem., Geophys., Geosyst.* 16, 3414–3435 (2015).

[46] **Jones** et al., *Geochem., Geophys., Geosyst.* 3, 1059 (2002).

[47] Parnell Turner et al., *Nat. Geosci.* 7, 914–919 (2014).

[48] Bowen et al., *Nat. Geosci.* 8, 44–47 (2015).

Appendices

A. Seismic Acquisition Logs and Figures

Date:	13-05-2021	**Marine Survey - General Information**						**Line:**	01							
Cruise:	CE210008			**Ship:**	R/V Celtic Explorer			**Location:**	Rockall/Porcupine							
GPS antenna		Refpoint ship (midt, agter, landmåler mærke)		Gyro		**Streamer**	Tow cable	Stretch section V1097 and S1099	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Section 8
X (m)	2.82	X (m)	0.00	X (m)	2.82	Length (m)	30	100	50	50	50	50	50	50	50	50
Y (m)	11	Y (m)	0.00	Y (m)	11.00	Serial no. depth transducer 6,25 m section			5008	5022	5018	5001	5006	5004	5020	5019
Z (m)	0	Z (m)	0.00	Z (m)	0.00	Front/Tail			Front	Front	Front	Tail	Tail	Front	Tail	Tail
						Bird S/N				14610	14514					14510
									Section 9	Section 10	Section 11	Section 12	Section 13	Section 14	Section 15	Section 16
						Length (m)			50	50	50	50	50	50	50	50
						Serial no. depth transducer 6,25 m section			5016	5002	5010	5011	5021	5017	5005	5015
						Front/Tail			Tail	Front	Tail	Tail	Tail	Tail	Tail	Tail
						Bird S/N						14497				
									Section 17	Section 18	Section 19					
						Length (m)			50	50	50					
						Serial no. depth transducer 6,25 m section			5013	5014	5009					
						Front/Tail			Tail	Tail	Front					
						Bird S/N					26567					
Airgun array 1		**Airgun array 2**		**Streamer**												
StB towpoint		Port towpoint		Streamer towpoint												
X (m)	5.96	X (m)	-5.76	X (m)	0.00	**Navigation:**			**Transformation parameters:**							
Y (m)	0.00	Y (m)	0.00	Y (m)	0.00	Software:	NaviPac ver 4.2.3		Semimajor axis (m):		6378137	Longitude at Origin		-21° 0' 0.0"		
Z (m)	0.00	Z (m)	0.00	Z (m)	0.00	Projection:	UTM north, Zone 27		Inverse flattening:		298.2572235	Latitude at Orgin		0° 00' 0.0"		
Tow length (m)		Tow length (m)		Tow length (m)		Datum:	WGS84		Scale at Origin		0.9996	False easting (m):		500000		
-35		-35		-100								False northing (m):		0		
Seismic Energy Source:				**Seismic Instruments:**					**Streamer:**							
Gun array 1		**G-Gun**		**Type:**		**Geometrics GeoEel contoller**			Type:			Geometrics GeoEel				
Serial no.				Lowcut filter (Hz):		out			Length of tow section (m):			30				
Volume G (cu.inch):		520		Lowcut filt. (dB/Oct):		out			Length of live sections (m):			50.0				
Volume G (cu.inch):		520		Highcut filter (Hz):		anti-alias			No. of live sections:			19				
Gun array 2				Highcut filt. (dB/Oct):		anti-alias			No. of channels:			152				
Serial no.				Gain Setting (dB):		0			No. of channels/live section:			8				
Volume G (cu.inch):		520		Sample Rate (ms):		4			channel interval (m):			6.25 m				
Volume G (cu.inch):		520		Record Length (ms):		10000 at start;15000 after ~100 shots			No. of hydrophones/channel:			8				
				No of recording chs:		152			Hydrophone type			Geopoint				
Delay		500 mS		Software version		5,844			Planned depth (m):			8				
Pressure (bar):		180		No of auxilliary chs:		4			Vib/Stretch section			100				
Planned depth (m):		6		Nearfield hydrophone		Aux 1 and 2			Length from Tail buoy (m)			40				
				Data format		Seg-D										

Remarks:

Streamer depth scanned on every shot.
Events set to trigger every 60 s.
Ch 37,123, 124, & 127 do not work.

Table A1. General set-up information for MCS Line 01.

Date:	22-05-2021	**Marine Survey - General Information**								**Line:**	02						
Cruise:		CE210008		**Ship:**		R/V Celtic Explorer			**Location:**				Rockall/Porcupine				
GPS antenna		Refpoint ship (midt, agter, landmåler mærke)		Gyro		**Streamer**	Tow cable	Stretch section V1097 and S1099									
									Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Section 8	
X (m)	2.82	X (m)	0.00	X (m)	2.82	Length (m)	30	100	50	50	50	50	50	50	50	50	
Y (m)	11	Y (m)	0.00	Y (m)	11.00	Serial no. depth transducer 6,25 m section			5008	5022	5018	5001	5006	5004	5020	5019	
Z (m)	0	Z (m)	0.00	Z (m)	0.00	Front/Tail			Front	Front	Front	Tail	Tail	Front	Tail	Tail	
						Bird S/N				14610	14514					14510	
									Section 9	Section 10	Section 11	Section 12	Section 13	Section 14	Section 15	Section 16	
						Length (m)			50	50	50	50	50	50	50	50	
						Serial no. depth transducer 6,25 m section			5016	5002	5010	5011	5021	5017	5005	5015	
						Front/Tail			Tail	Front	Tail	Tail	Tail	Tail	Tail	Tail	
						Bird S/N						14497					
									Section 17	Section 18	Section 19						
						Length (m)			50	50	50						
						Serial no. depth transducer 6,25 m section			5013	5014	5009						
						Front/Tail			Tail	Tail	Front						
						Bird S/N					26567						
Airgun array 1		**Airgun array 2**		**Streamer**													
StB towpoint		Port towpoint		Streamer towpoint													
X (m)	5.96	X (m)	-5.76	X (m)	0.00	**Navigation:**			**Transformation parameters:**								
Y (m)	0.00	Y (m)	0.00	Y (m)	0.00	Software:	NaviPac ver 4.2.3		Semimajor axis (m):		6378137	Longitude at Origin		-15° 0' 0.0"			
Z (m)	0.00	Z (m)	0.00	Z (m)	0.00	Projection:	UTM north, Zone 28		Inverse flattening:		298.257223	Latitude at Orgin		0° 00' 0.0"			
Tow length (m)		Tow length (m)		Tow length (m)		Datum:	WGS84		Scale at Origin		0.9996	False easting (m):		500000			
-35		-35		-100								False northing (m):		0			
Seismic Energy Source:				**Seismic Instruments:**					**Streamer:**								
Gun array 1		**G-Gun**		**Type:**		**Geometrics GeoEel contoller**			Type:			Geometrics GeoEel					
Serial no.				Lowcut filter (Hz):		out			Length of tow section (m):			30					
Volume G (cu.inch):		520		Lowcut filt. (dB/Oct):		out			Length of live sections (m):			50.0					
Volume G (cu.inch):		520		Highcut filter (Hz):		anti-alias			No. of live sections:			19					
Gun array 2				Highcut filt. (dB/Oct):		anti-alias			No. of channels:			152					
Serial no.				Gain Setting (dB):		0			No. of channels/live section:			8					
Volume G (cu.inch):		520		Sample Rate (ms):		4			channel interval (m):			6.25 m					
Volume G (cu.inch):		520		Record Length (ms):		15000			No. of hydrophones/channel:			8					
				No of recording chs:		152			Hydrophone type			Geopoint					
Delay		50		Software version		5,844			Planned depth (m):			8					
Pressure (bar):		180		No of auxilliary chs:		4			Vib/Stretch section			100					
Planned depth (m):		6		Nearfield hydrophone		Aux 1 and 2			Length from Tail buoy (m)			40					
				Data format		Seg-D											

Remarks:

Streamer depth scanned on every shot.
Events set to trigger every 60 s.
Ch 37,123, 124, & 127 do not work.

Table A2. General set-up information for MCS Line 02.

Date:	27-05-2021	**Marine Survey - General Information**						**Line:**	03							
Cruise:	CE210008			**Ship:**	R/V Celtic Explorer			**Location:**	Rockall/Porcupine							
GPS antenna		Refpoint ship (midt, agter, landmåler mærke)		Gyro		**Streamer**	Tow cable	Stretch section V1097 and S1099	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Section 8
X (m)	2.82	X (m)	0.00	X (m)	2.82	Length (m)	30	100	50	50	50	50	50	50	50	50
Y (m)	11	Y (m)	0.00	Y (m)	11.00	Serial no. depth transducer 6,25 m section			5008	5022	5018	5001	5006	5004	5020	5019
Z (m)	0	Z (m)	0.00	Z (m)	0.00	Front/Tail			Front	Front	Front	Tail	Tail	Front	Tail	Tail
						Bird S/N				14610	14514					14510
									Section 9	Section 10	Section 11	Section 12	Section 13	Section 14	Section 15	Section 16
						Length (m)			50	50	50	50	50	50	50	50
						Serial no. depth transducer 6,25 m section			5016	5002	5010	5011	5021	5017	5005	5015
						Front/Tail			Tail	Front	Tail	Tail	Tail	Tail	Tail	Tail
						Bird S/N						14497				
									Section 17	Section 18	Section 19					
						Length (m)			50	50	50					
						Serial no. depth transducer 6,25 m section			5013	5014	5009					
						Front/Tail			Tail	Tail	Front					
						Bird S/N					26567					
Airgun array 1		**Airgun array 2**		**Streamer**												
StB towpoint		Port towpoint		Streamer towpoint												
X (m)	5.96	X (m)	-5.76	X (m)	0.00	**Navigation:**			**Transformation parameters:**							
Y (m)	0.00	Y (m)	0.00	Y (m)	0.00	Software:	NaviPac ver 4.2.3		Semimajor axis (m):		6378137	Longitude at Origin		-15° 0' 0.0"		
Z (m)	0.00	Z (m)	0.00	Z (m)	0.00	Projection:	UTM north, Zone 28		Inverse flattening:		298.2572235	Latitude at Orgin		0° 00' 0.0"		
Tow length (m)		Tow length (m)		Tow length (m)		Datum:	WGS84		Scale at Origin		0.9996	False easting (m):		500000		
-35		-35		-100								False northing (m):		0		
Seismic Energy Source:				**Seismic Instruments:**					**Streamer:**							
Gun array 1		**G-Gun**		**Type:**		**Geometrics GeoEel contoller**			Type:			Geometrics GeoEel				
Serial no.				Lowcut filter (Hz):		out			Length of tow section (m):			30				
Volume G (cu.inch):		520		Lowcut filt. (dB/Oct):		out			Length of live sections (m):			50.0				
Volume G (cu.inch):		520		Highcut filter (Hz):		anti-alias			No. of live sections:			19				
Gun array 2				Highcut filt. (dB/Oct):		anti-alias			No. of channels:			152				
Serial no.				Gain Setting (dB):		0			No. of channels/live section:			8				
Volume G (cu.inch):		520		Sample Rate (ms):		4			channel interval (m):			6.25 m				
Volume G (cu.inch):		520		Record Length (ms):		15000			No. of hydrophones/channel:			8				
				No of recording chs:		152			Hydrophone type			Geopoint				
Delay		50		Software version		5,844			Planned depth (m):			8				
Pressure (bar):		130		No of auxilliary chs:		4			Vib/Stretch section			100				
Planned depth (m):		6		Nearfield hydrophone		Aux 1 and 2			Length from Tail buoy (m)			40				
				Data format		Seg-D										

Remarks:

Streamer depth scanned on every shot.
Events set to trigger every 20 s.
Ch 37,123, 124, & 127 do not work.

Table A3. General set-up information for MCS Line 03.

Marine survey - Line log Line name : Line 1

Project : Poro-Clim 2021 **Vessel: Celtic Explorer**

Date dd-mm-yyyy	UTC hh:mm	FILE no	EVENT no.	nav file name yyyy_hhmmss_C and _G and _S	Airgun pressure	Ship's speed	Comments	initials
13-05-2021	15:42	1068	575	20210513_154238			**SOL 01A**	JRH
	15:52	1075	582				Ship up to 4.5 kt	JRH
	15:59	1085	591				**EOL 01A** Stop recording front of streamer to high - will bring in near sections to add lead	JRH
							ship speed to 3 kts	
	16:35						ship speed to 4.5 kts	JRH
	16:37	1086	629				**SOL 01B**	
	16:38	1087	630				Streamer at 8 m	JRH
	17:31						Note - channels 37 and 123 are bad	
	17:54	1163	706				**EOL 01B** to increase record length	JRH
	17:56	1164	708				**SOL 01C** - 15 s record length	
	18:22	1190	734				Gun 1 test	
	18:23	1191	735				Gun 2 test	
	18:24	1192	736				Gun 4 test	
	18:25	1193	737				Gun 3 test	
	18:26	1194	738				All guns back	
	19:00	1228	772				All OK	JRH
	19:29	1256	800				John touched the oscillator and it went crazy.	BC
	19:53	1280	824				All OK (except oscillator)	BC
	20:00	1287	831				All OK (except oscillator)	BC
	20:24	1311	855				All OK (except oscillator)	BC
	20:40	1327	871				All OK (except oscillator)	NF
	21:00	1347	891				All OK (except oscillator)	BC
	21:20	1367	911				All OK (except oscillator)	NF
	21:40	1387	931				All OK (except oscillator)	BC
	22:00	1407	951				All OK (except oscillator)	BC
	22:20	1427	971				All OK (except oscillator)	BC
	22:40	1447	991				All OK (except oscillator)	BC
	22:49	1456	1000				All OK (except oscillator)	BC
	23:11	1479	1023				All OK (except oscillator)	MA
	23:30	1498	1042				All OK (except oscillator)	MA
	23:40	1507	1051				All OK (except oscillator)	MA
14-05-2021	0:00	1527	1071				Nicky twiddled oscillator, seems happy now.	MA
	0:20	1547	1091				All OK	MA
	0:31	1558	1102				Birds are high, slowly coming back	MA
	0:35	1562	1106				Birds back in the green	MA
	0:40	1567	1111				Birds moving, but okay for now. Weather getting worse likely cause	MA
	1:00	1587	1131				Birds continue to look happy, all OK	MA
	1:20	1607	1151				All OK, second bird is high, but returning quickly	MA
	1:40	1627	1171				All OK, second bird variable but acceptable	MA
	1:46	1633	1177				Second bird reached the same height as the first, more weather now some sharp thuds from waves on ship. Above green until next entry	MA
	1:52	1639	1183				Second bird now back in the green. 6 mins fully outside the green, mostly not far out but occassional up by the first bird	MA
	2:00	1647	1191				All birds high and marginally outside green, weather noticeably worse outside.	MA
	2:16	1662	1206				Gun alarm, exceeded 200 before shooting, following shot went to high 190's now slowly returning back to the 180's at fire	MA
	2:18	1664	1208				Guns nominal	MA
	2:21	1667	1211				Per woken and turned compressors down. Happy to raise compressor power again. Second bird still variable but otherwise all OK	MA
	2:36	1682	1226				High pressure alarm again, compressor turned down. Pattern of 3 shots steadily buidling to 200. After the shot the pressure only reduced to 180.	MA
	2:40	1686	1230				All OK, birds slightly high. Ship speed reduced to 3.5knots	MA
	3:00	1706	1250				All OK. Ship speed around 4 knots and Per tinkering with pressure, guns firing around 190 bar	MA
	3:02	1709	1253				Gun alarm, 205 bar and long alarm. Per tinkering, potentially missed a shot	MA
	3:55	1762	1306				Birds 3rd and 4th are high	HK
	3:58	1765	1309				streamer depth unstable - ships speed 2.5-3.5 kts over ground	JRH
	3:59	1766	1310				gun pressure has been a bit up and down.Per has fiddled with compressors. Pressure at 160 bar.	
	4:15	1782	1326				Streamer depth still unstable	
	5:10	1837	1382				We hit by terrible weather. Kenny called the container. The streamer is now very deep.	
	5:25	1850	1395				**EOL 01C** due to weather- magnetometer is off and pulled in	

Table A4. Observers' log for MCS Line 01 [first part].

Marine survey - Line log Line name : Line 1

Project : Poro-Clim 2021 **Vessel: Celtic Explorer**

Date dd-mm-yyyy	UTC hh:mm	FILE no	EVENT no.	nav file name yyyy_hhmmss_C and _G and _S	Airgun pressure	Ship's speed	Comments	initials
							Weather Downtime	
15-05-2021	8:39			20210515_074448			Begin Soft Start	
	9:26	1851	103				**SOL 01D** - Guns at 150 Bar, going up to 180	
	9:30	1855	107				At full power, 180	
	10:16	1901	153				All OK. Video feed is offline. Oscilllator is offline.	BC
	10:36	1921	173				All OK.	BC
	10:51	1935	187				All Ok	NF
	11:01	1955	207				All OK	NF
	11:14						**EOL 01D -** GeoEel crash	PT
	11:17	1959	214				**SOL 01E** - GeoEel up running again	PT
	11:30	1971	227				All okay bar mag noise	MA
	11:40	1982	237				All okay bar mag noise	MA
	12:00	2002	257				All okay, mag noise lessened	MA
	12:20	2022	277				All okay, mag noise almost gone, mostly correlated to gun shots	MA
	12:40	2042	297				All okay bar mag noise	MA
	13:00	2061	316				All okay, middle birds were low for a while, but recovered to the green	MA
	13:20	2082	337				All okay, first and second bird tending to fly a little high	MA
	13:40	2101	356				All okay bar mag noise	MA
	14:00	2122	377				All okay	MA
	14:20	2142	397				All okay	MA
	14:40	2162	449				All okay,the magnetometre shows intermittent GPS time errors of 0.8-0.9s	MA
	15:00	2182	436				All okay	MA
	15:30	2211	466				Front of streamer tends to stay up still	JRH
	16:00	2242	497				Front of streamer tends to stay up still	HK
	16:30	2272	527				the streamer is deep - speed inconsistent - 3.9 to nearly 5 kts - so streamer depth unstable	HK
	16:41	2283	538				near sections at 2m	jrh
	17:00	2322	557				the streamer is deep - speed inconsistent - 3.9 to nearly 5 kts - so streamer depth unstable	
	17:18	2320	572				Near section at 2m and second section at 4m	HK
	17:30	2332	587				Ship speed frequently close to 5kts - near sections shallow	jrh
	17:37	2338	593				Talked to bridge to keep speed down - 4 to 4.5 kts	jrh
	18:04	2365	620				Speed better and more consistently close 4.5 kts	jrh
	18:09	2371	626				passing obs s18	jrh
	18:32	2393	648			4.50	OK	jrh
	19:00	2421	676			4.60	Mostly OK, Front of streamer shallow (3m)	jrh
	19:18	2439	694			4.20	OK. Bird #1 pretty shallow.	BC
	19:37	2458	713			4.20	OK	BC
	19:58	2479	734			4.00	OK. Bird #1 pretty shallow.	NF
	20:15	2496	751			4.50	All OK	NF
	20:30	2511	766			4.30	All OK	NF
	20:55	2536	791			4.20	All OK	NF
	21:15	2557	812			4.50	All OK	BC
	21:35	2577	832			4.50	All OK	BC
	22:17	2618	873			4.50	All OK	BC
	22:31	2633	888			4.60	All OK	BC
	22:35	2637	892			4.99	All OK. Speed slightly too high. Birds #1,2 quite shallow.	BC
	22:38	2640	895			5.10	All OK. Speed slightly too high. Birds #1,2,3 quite shallow.	BC
	22:55	2657	912			4.30	All OK.	BC
	23:20	2681	936			3.39	All OK	MA
	23:40	2702	957			4.07	All OK	MA
16-05-2021	0:00	2722	977			4.29	All OK	MA
	0:20	2742	997			4.18	All OK	MA
	0:40	2762	1017			4.31	All OK	MA
	1:00	2782	1037			4.66	All OK	MA
	1:20	2802	1057			4.38	All OK	MA
	1:40	2822	1077			4.32	All OK	MA
	2:00	2842	1097			3.83	All OK	MA
	2:20	2862	1116			4.49	All OK	MA
	2:40	2882	1137			4.19	All OK	MA
	3:00	2902	1157			3.98	All OK	MA
	3:30	2932	1187			4.20	All OK	jrh
	4:00	2962	1217			4.10	All OK	HK
	4:30	2992	1247			4.00	All OK	HK
	5:00	3022	1277			4.20	OK	JRH
	5:30	3052	1307			4.20	OK	jrh
	6:00	3082	1337			4.10	All OK	HK

Table A4. Observers' log for MCS Line 01 [middle part].

	06:30	3112	1367			4.10	First section of the streamer is shallow	HK
	07:00	3141	1396			4.47	First section of the streamer is shallow(at 5 and 6 res)	HK
	07:09	3151	1406			4.38	Channel 5018 went yellow for a moment then back to green after a couple of minutes	BC
	07:36	3177	1432			4.00	All OK	NF
	07:47	3188	1443			4.70	All OK	NF
	08:05	3207	1462			4.20	All OK	BC
	08:30	3232	1487			4.60	All OK	BC
	08:44	3245	1500			4.40	All OK	NF
	09:00	3262	1517			4.47	All OK	BC
	09:28	3289	1554			4.40	All OK	NF
	09:13	3304	1559			4.50	All OK	NF
	09:55	3316	1571			4.60	All OK.	BC
	10:11	3332	1586			4.20	All OK	NF
	10:15	3336	1590			4.10	Bringing in the airgun 50 cm, to remove a piece that is fraying, before it breakks	NF
	10:32	3353	1607			3.90	Still working on the backdeck to bring in the airgun. Pressure at gun when going off is 170 and red TXD light is flashing	NF
	10:40						Working finished on the airgun. Have informed Per about the 170 reading on the airgun. The TXD light is meant to flash	NF
	10:46	3367	1627			4.30	Per has gone to check on the airgun pressure, all good besides	NF
	11:00	3382	1636			4.16	Channels 5018, 5001 and 5004 turned yellow for a short while. Pressure is back to normal parameters.	BC
	11:15	3397	1651			4.50	Airgun pressure 188 bar	BC
	11:38	3420	1674			4.19	Airgun pressure 200 bar, alerted Per. Was a steady build up from the previous pressure report	MA
	11:42	3424	1678			4.16	Per has tinkered with compressor, now firing at 180 bar	MA
	12:00	3442	1696			4.25	Guns still creeping up, currently 190 bar. Otherwise all OK	MA
	12:20	3462	1716			4.34	Guns steady at 190-192 bar. First bird a little high,but otherwise okay	MA
	12:40	3482	1736			4.68	Guns reduced to firing at around 185bar. All OK	MA
	13:00	3502	1756			4.51	All OK	MA
	13:20	3522	1776			4.28	All OK	MA
	13:40	3542	1796			4.24	All OK	MA
	14:00	3562	1816			4.03	All OK	MA
	14:20	3582	1836			4.15	All OK	MA
	14:40	3602	1856			4.31	All OK	MA
	15:00	3622	1876			4.20	All OK	HK
	15:09	3631	1885			4.20	The first section of the streamer at 4m	HK
	15:20	3642	1897			4.20	All OK	HK
	15:40	3662	1916			4.50	All OK	HK
	16:00	3682	1936			4.20	All OK	HK
	16:20	3702	1956			4.30	All OK	HK
	16:43	3725	1978			4.60	All OK- The airgun pressure is aroun 190 bar over the last 30min	HK
	16:49	3731	1985			4.60	Per worked on it and its back to around 180bar	HK
	16:57	3739	1993			4.60	The pressure got high to 200bar and Per went to work on it	HK
	17:07	3749	2003			4.50	The presure is around 162bar and Per went to look after it again.	HK
	17:13	3755	2009				The pressure is back to around 180bar	HK
	17:28	3770	2024			4.30	The pressure around 188-190bar	HK
	17:50	3792	2046			4.50	The pressure around 188-190bar	HK
	18:04	3805	2059			4.50	Per worked on it and its around 173bar now	HK
	18:30	3832	2086			4.60	maggie off	jrh
	18:40	3841	2095			4.30	Per worked on the airgun and its stable at 186bar	HK
	18:49	3849	2103			3.60	**EOL 01E**	HK
							Guns shooting during streamer recovery	jrh
	19:14					2.50	Guns are shut down	HK

Nav file names:		Initials:			
Custom log	C.npd	John Hopper	JRH	Niamh Faulkner	NF
General log	G.npd	Steve Jones	SJ	Erica Krueger	EK
Survey log	S.npd	Nicky White	NW	Matthew Allison	MA
		Per Trinhammer	PT	Benjamin Couvin	BC
		Haleh Karbala Ali	HK		

Table A4. Observers' log for MCS Line 01 [final part].

Marine survey - Line log Line name : Line 2A

Project : Poro-Clim 2021 **Vessel: Celtic Explorer**

Date dd-mm-yyyy	UTC hh:mm	FILE no	EVENT no.	nav file name yyyy_hhmmss_C and _G and _S	Airgun pressure	Ship's speed	Comments	Initials
22-05-21	14:42			20210522_145608			Line 2 - shooting only, no MCS, no maggie - guns deployed	JRH
	14:57		10001		100	3.50	Soft start	jrh
	15:42		10048		180	5.10	Full power	jrh
	16:12		10077		182	5.10		hk
	16:42		10106		183	4.80		hk
	17:12		10136		181	4.80		hk
	17:45		10169		182	5.00		jrh
	18:08		10193		183	4.80		hk
	18:30		10214		183	4.80		jrh
	18:40		10225			4.80	OBS46	jrh
	19:02		10247		167	5.00	Will stop shooting at 21:00, so should be just past OBS 44	NF
	19:16		10260		182	4.90	all ok	NF
	19:23		10267		181	5.00	all ok	BC
	19:44		10289		164	5.00	all ok, passed OBS45 at 19:46	NF
	20:00		10303		186	4.60	all ok	BC
	20:15		10319		182	4.46	all ok	BC
	20:30		10334		168	4.50	all ok	NF
	20:42		10347		164	4.60	all ok	NF
	21:00		10365		161	4.50	About to withdraw the airgun, OBS44. Have turned off Hotshot air gun controller and monitor & NaviPac. Last event number on NaviPac is 10367	NF
	21:11					2.40	Port airgun retrieved	NF
	21:21						Starboard airgun retrieved. All airguns safely retrieved	NF

Nav file names:		Initials:			
Custom log	C.npd	John Hopper	JRH	Niamh Faulkner	NF
General log	G.npd	Steve Jones	SJ	Erica Krueger	EK
Survey log	S.npd	Nicky White	NW	Matthew Allison	MA
		Per Trinhammer	PT	Beniamin Couvin	BC
		Haleh Karbala Ali	HK		

Table A5. Observers' log for Line 02A (guns only; no streamer).

Marine survey - Line log Line name : Line 2B

Project : Poro-Clim 2021 **Vessel: Celtic Explorer**

Date dd-mm-yyyy	UTC hh:mm	FILE no	EVENT no.	nav file name yyyy_hhmmss_C and _G and _S	Airgun pressure	Ship's speed	Comments	Initials
25-05-2021	07:55		20001	20210525_075438_	95	1.5	Softstart	PT/JRH
	08:05		20010		105	2.5	increasing speed	jrh
	08:25		20031		100	4	All four guns firing	jrh
	08:40		20046		180	4.8	Full power	jrh
	08:56		20063		184	4	MAG is running	BC
	09:31		20097		183	4.75	OK	BC
	09:45		20112		167	3.88	ok	NF
	10:05		20132		184	4.44	Will be deploying the streamer shortly	NF
	10:16		20143		180	3.2	Deploying streamer	BC
	10:36		20162		179	3.8	Streamer fully deployed, but Bird's not activated on monitor	NF
	10:46		20173		161	4.6	Birds activated	NF
	10:48		20175		139	4.4	Compressor shut down briefly, alarm sounded (Per fell onto the emergency break- so it should now be returning back to pressure shortly)	NF
	11:10		20197		190	3.9		MA
	11:34		20221		188	3.9		MA
	12:00		20246		188	4.7		MA
	12:20		20266		188	4		MA
	12:40		20285		184	4.5	Per lowered the compressor pressure slightly	MA
	13:12		20318		185	4.5		MA
	13:20		20235		185	4.6		MA
	13:40		20347		186	4.8		MA
	14:00		20365		184	4.3		MA
	14:20		20386		185	4.3		MA
	14:40		20407		185	4.1		MA
	15:00		20425		185	3.6		MA
	15:23		20448		185	3.9		HK
	15:41		20467		188	3.8		HK
	15:59		20485		187	4.1		HK
	16:20		20506		187	4.4		HK
	16:27		20513		190	4		HK
	16:32		20518		190	4.10		HK
	16:42		20548		190	4.2	Per is going to decrease the compressor	HK
	17:17		20563		181	4.4		jrh
	17:45		20591		181	4		HK
	18:00		20605		181	4.6		jrh
	18:30		20636		183	4.6		HK
	19:00		20665		181	4.5		jrh
	19:10		20676		174	4.6	Depth sensor 5013 is yellow, rather than green. Will keep an eye on it	NF
	19:44		20711		185	4.7	Bird #4 has high amplitude movement, above and below the green zone	BC
	20:10		20736		180	5	all ok	NF
	20:37		20764		177	5	ok	BC
	21:00		20787		184	4.4	ok	BC
	21:20		20807		181	4.5	ok	BC
	21:55		20841		183	4.6	ok	BC
	22:11		20857		186	4.5	ok	NF
	22:30		20877		184	4.54	ok	BC
	23:00		20908		180	4.4	ok	MA
	23:20		20928		184	4.5	ok	MA
	23:40		20947		184	4.3	ok	MA
	00:00		20966		183	4.1	ok	MA
	00:22		20989		181	4.5	ok	MA
	00:40		21006		185	4.8	ok	MA
	01:00		21026		187	4.6	ok	MA
	01:20		21048		181	4.6	ok	MA
	01:40		21066		184	4.5	ok	MA
	02:00		21086		184	4.7	ok	MA
	02:20		21106		184	4.3	ok	MA
	02:40		21127		178	4.4	ok	MA
	03:00		21145		184	4.7	ok	MA
	03:30		21176		178	4.5	ok	jrh
	04:00		21206		180	4.4	ok	HK
	04:40		21246		182	4.4	ok	HK
	05:00		21266		186	4.8	ok	HK
	05:30		21296		187	4.7	ok	HK
	05:56		21322				EOL 2B	HK

Nav file names:

Custom log	_C.npd
General log	_G.npd
Survey log	_S.npd

Initials:

John Hopper	JRH	Niamh Faulkner	NF
Steve Jones	SJ	Erica Krueger	EK
Nicky White	NW	Matthew Allison	MA
Per Trinhammer	PT	Benjamin Couvin	BC
Haleh Karbala Ali	HK		

Table A6. Observers' log for MCS Line 02B.

Marine survey - Line log Line name : Line 3

Project : Poro-Clim 2021 **Vessel: Celtic Explorer**

Date dd-mm-yyyy	UTC hh:mm	FILE no	EVENT no.	nav file name yyyy_hhmmss_C and _G and _S	Airgun pressure	Ship's speed	Comments	Initials
27-05-2021	16:27		30001	20210527_162547_	100	2.5	soft start	jrh
	17:06	30122	30123		100		SOL line3	jrh
	17:15				118	3.5	max pressure ~120 bar	jrh
	17:45	30239	30238		118	3.5	OK	jrh
	18:00	30282	30283		119	3.5	OK	jrh
	18:17	30335	30336		118	3.2	OK	hk
	18:35	30388	30389		119	3.5	OK	hk
	19:00	30463	30464		118	3.3	OK	hk
	19:30	30553	30554		120	3.9	OK	BC
	20:00	30644	30645		117	3.9	OK	BC
	20:30	30733	30734		120	4.1	OK	BC
	21:00	30821	30822		119	2.9	ok	NF
	21:33	30922	30923		121	3.6	OK	BC
	22:00	31001	31002		122	3.5	ok	NF
	22:30	31093	31094		125	3.3	OK	BC
	23:00	31191	31192		125	3.6	ok	MA
	23:20	31242	31243		123	3.7	ok	MA
	23:40	31302	31303		126	3.3	Gun pressure steadily rising to fire at 126/127	MA
28-05-2021	00:00	31363	31364		127	3.5	Gun pressures stabilized at 126/127 at fire	MA
	00:20	31423	31424		126	3.5	ok	MA
	00:26	31440	31441		122	3.4	Compressors are loud, but there was a few seconds of compressed air leaking noise, followed by a reduction in gun pressure firing to around 122. Guns quickly returned to firing at 126	MA
	00:40	31482	31483		125	3.4	ok	MA
	00:44	31495	31496		125	3.4	Lights turn off and on (very quickly) with audible click. Has happened twice since start of shift	MA
	00:49	31510	31511		123	3.3	Another gun hiss. I expect the second compressor container that hasn't been active for far is the culprit. Slight pressure drop again to 122/123 on fire, but otherwise nominal	MA
	01:00	31542	31543		128	3.3	Since the hiss at 00.49 the guns have been firing at 128	MA
	01:11	31578	31579		128	3.3	Light flickering at intervals of 7 minutes. Gun pressures steady at 128 on fire with occassional compressor hissing.	MA
	01:18	31597	31598		128	3.4	Light flickering timed again at 7 minutes	MA
	01:40	31662	31663		128	3.3	Lights flickered once since last report. Otherwise ok	MA
	02:00	31722	31723		129	3.4	One light flicker and the guns have risen as high as 130 in the last 20 mins	MA
	02:20	31783	31784		128	3.4	All okay, same comments re gun pressure, light flickering and compressor noise	MA
	02:40	31845	31846		128	3.4	Same as above	MA
	03:00	31902	31903		125	3.3	OK	MA
	03:30	31996	31997		129	3.6	OK	hk
	04:03	32094	32095		128	3.8	OK	hk
	04:38	232190	32191		129	3.7	OK	hk
	05:10	32295	32296		126	3.7	OK	hk
	05:40	32384	32385		126	3.5	OK	hk
	06:00	32445	32446		128	3.9	OK	hk
	06:30	35531	35532		125	3.7	OK	hk
	07:00	32624	32625		129	3.7	ok	jrh
	07:40	32743	32744		126	3.7	ok	BC
	08:00	32806	32807		128	3.7	ok	BC
	08:38	32919	32920		126	3.5	ok	BC
	09:00	32983	32984		127	3.8	ok	BC
	09:27	33065	33066		127	3.7	ok	NF
	10:05	33178	33179		127	3.7	ok	BC
	10:35	33270	33271		129	3.8	ok	BC
	10:55	33328	33329		129	3.9	ok	BC
	11:20	33402	33403		130	3.5	ok	MA
	11:40	33462	33463		126	3.7	ok	MA
	12:00	33523	33524		127	3.7	ok	MA
	12:20	33582	33583		127	3.4	ok	MA
	12:40	33642	33643		126	3.7	ok	MA
	13:00	33703	33704		127	3.6	ok	MA
	13:20	33763	33764		128	3.4	ok	MA
	13:50	33853	33854		127	3.5	ok	MA
	14:00	33886	33887		127	3.4	ok	MA
	14:20	33943	33944		125	3.4	ok	MA
	14:40	34000	34001		124	3.4	ok	MA
	15:00	34065	34066		125	3.4	ok	MA
	15:30	34155	34156		127	3.2	OK	hk
	16:04	34254	34255		126	3.3	OK	hk
	16:41	34367	34368		125	3.8	OK	hk
	17:06	34442	34443		126	3.6	OK	hk
	17:30	35412	35413		124	3.5	ok	jrh
	18:00	34406	34407		125	3.5	ok	hk
	18:03	34612	34613		125	3.5	EOL	jrh

Nav file names:

Custom log	_C.npd
General log	_G.npd
Survey log	_S.npd

Initials:

John Hopper	JRH	Niamh Faulkner	NF
Steve Jones	SJ	Erica Krueger	EK
Nicky White	NW	Matthew Allison	MA
Per Trinhammer	PT	Benjamin Couvin	BC
Haleh Karbala Ali	HK		

Table A7. Observers' log for MCS Line 03.

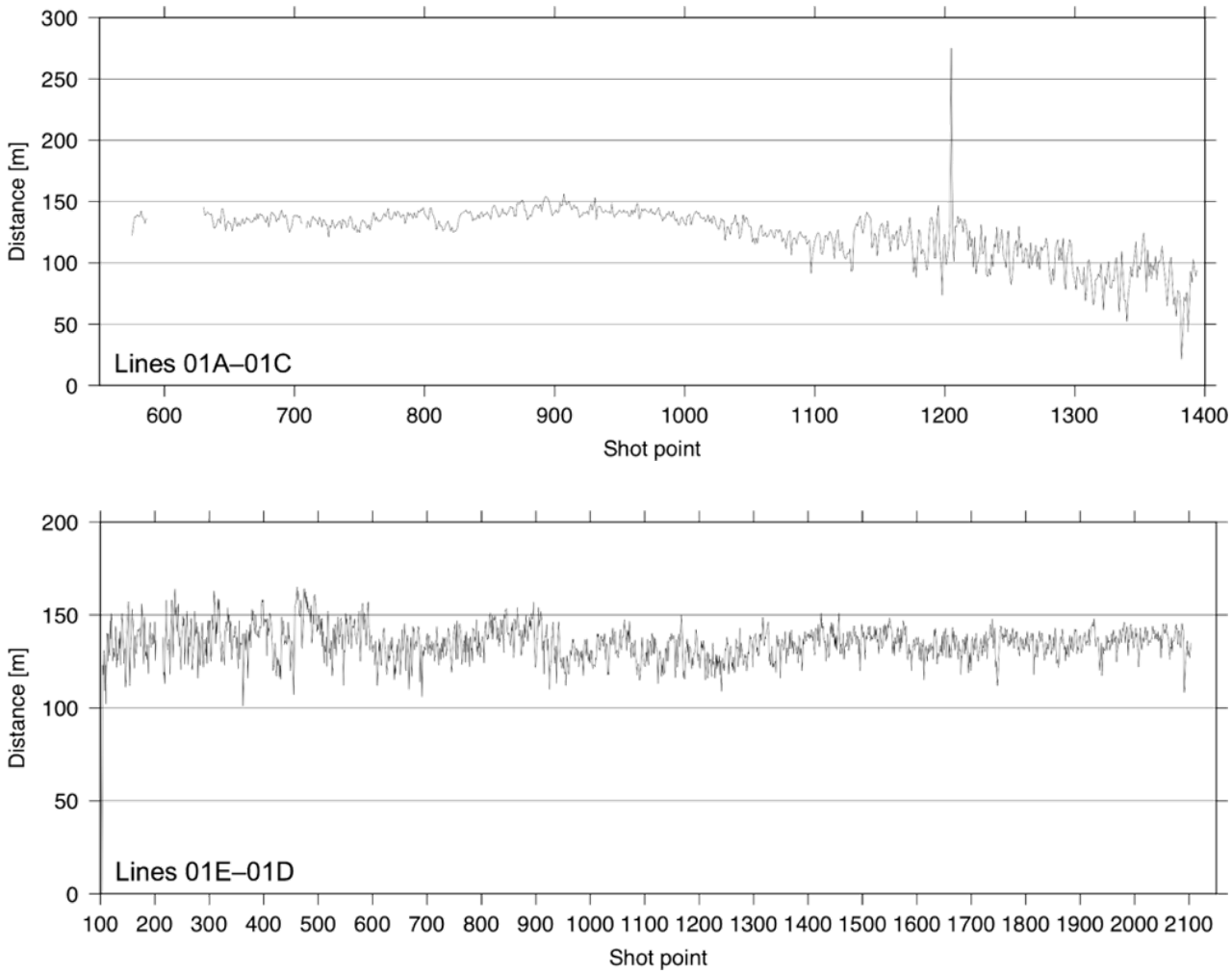

Figure A1. Shot spacing of lines 01A-01C and lines 01E–01D.

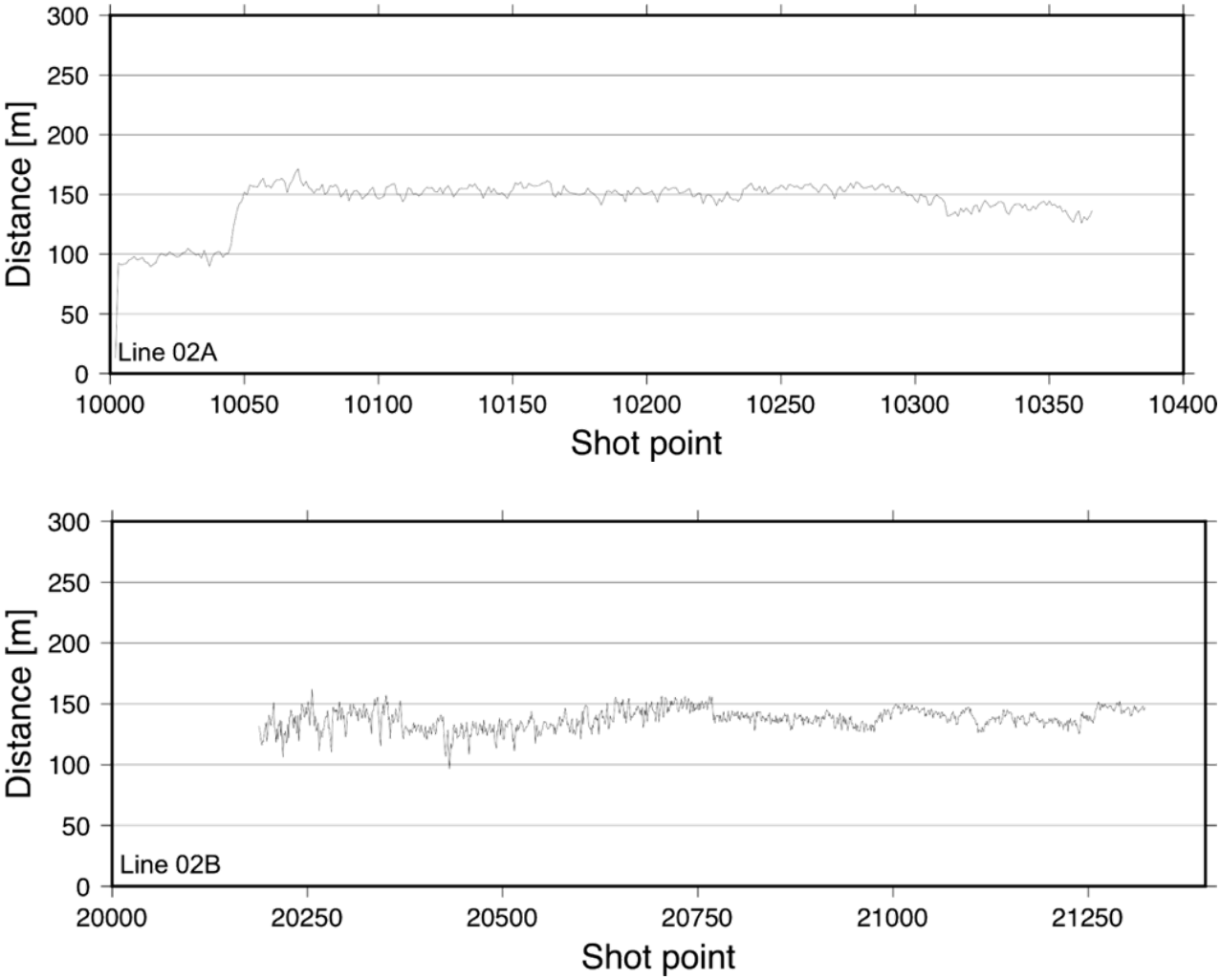

Figure A2. Shot spacing of lines 02A and 02B.

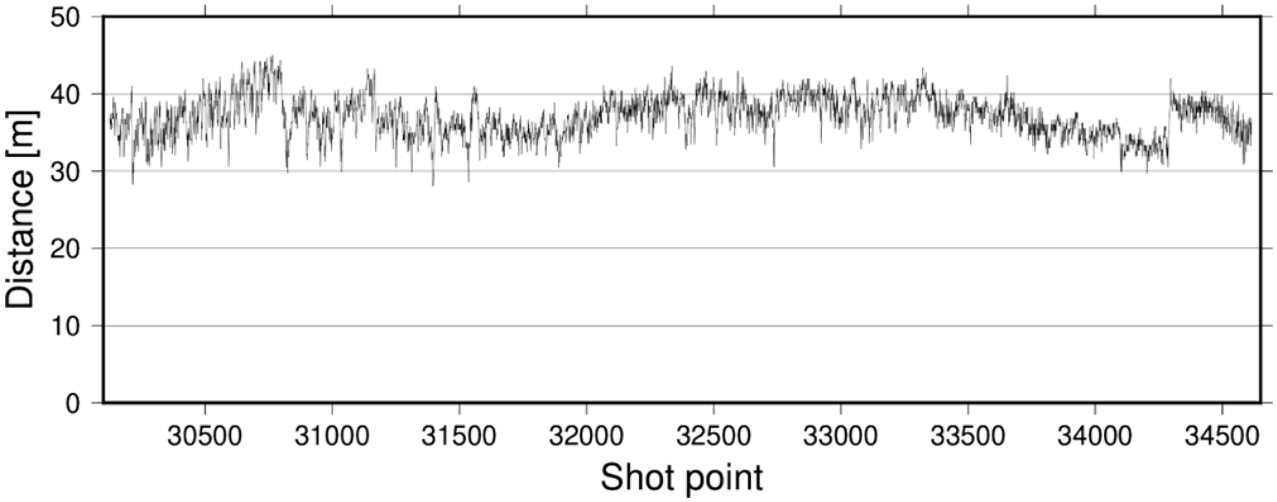

Figure A3. Shot spacing of line 03.

B. Outreach Activity

All material available on the project website at www.poro-clim.org.

Video Production Log

Video Title	Published
Quarantine and Mobilisation	07/05/2021
Science Behind Expedition POROCLIM	17/05/2021
OBS Explaination	19/05/2021
Boat Tour	21/05/2021
POROCLIM Geophysical Survey	25/05/2021
Q&A with Bourneville Primary	30/05/2021

Social Media Posts

Date	Post	Platform
16/04/2021	Cartoon #1	Instagram, Facebook, Twitter
27/04/2021	Cartoon #2	Instagram, Facebook, Twitter
29/04/2021	Cartoon #3	Instagram, Facebook, Twitter
30/04/2021	Logo video	Instagram, Facebook, Twitter
03/05/2021	Website link	Twitter
04/05/2021	CE in port waiting for us	Instagram, Facebook, Twitter
05/05/2021	Retweeted Marine Institute post	Twitter
05/05/2021	What we packed	Instagram, Facebook, Twitter
05/05/2021	Mobilisation	Twitter
05/05/2021	Retweeted Eurofleets post	Twitter
06/05/2021	Downtime to explore CE	Instagram, Facebook, Twitter
07/05/2021	Morning from port	Twitter
07/05/2021	Shared blog entry - Mobilisation	Twitter
07/05/2021	GEUS and Aarhus assembling OBS	Instagram, Facebook, Twitter
07/05/2021	Storm cell video clip	Instagram, Facebook, Twitter
08/05/2021	Retweeted Christine Loughlin post of CE	Twitter
08/05/2021	Meeting before leaving port	Instagram, Facebook, Twitter
08/05/2021	Time lapse video leaving port	Instagram, Twitter
09/05/2021	Shared blog entry - Setting Sail	Facebook, Twitter
09/05/2021	Safety drill	Instagram, Facebook, Twitter
09/05/2021	Leaving port	Twitter
09/05/2021	Rainbow over Galway Bay	Twitter
09/05/2021	Sunset over Galway Bay	Instagram, Facebook, Twitter
12/05/2021	Pilot whales, shared blog entry - Whale of a Time	Facebook, Twitter
12/05/2021	Retweeted Uni Birmingham video	Twitter
12/05/2021	Retweeted iCRAGorama post	Twitter
13/05/2021	Retweeted Haleh Ali post	Twitter
13/05/2021	Seasick lego post	Twitter

13/05/2021	Lego ladies	Instagram, Facebook, Twitter
13/05/2021	Shared blog entry - Whale of a Time	Twitter
13/05/2021	Retweeted YouTube video - Quarantine and Mobilisation	Facebook, Twitter
14/05/2021	Bad weather video clip	Twitter
14/05/2021	Lego scientists	Instagram, Facebook, Twitter
14/05/2021	OBS deployment, shared blog entry - Good Vibrations	Instagram, Facebook
14/05/2021	Lego scientists	Instagram, Facebook
15/05/2021	Retweeted Alan Berry lego post	Twitter
16/05/2021	Rough seas/shared blog entry - Q&A	Instagram, Facebook, Twitter
16/05/2021	Retweeted Draw Another Fish video	Twitter
17/05/2021	Retweeted Rockall Island post	Twitter
17/05/2021	Spot the OBS	Twitter
18/05/2021	Retweeted Haleh Ali post	Twitter
18/05/2021	Science Crew legos, shared blog entry - Meet the Crew	Instagram, Facebook, Twitter
19/05/2021	Shared 2 blog entries - Life at Sea; Catch Me If You Can	Instagram, Facebook, Twitter
19/05/2021	Mocktail hour	Instagram, Twitter
21/05/2021	Retweeted Eurofleets post	Twitter
21/05/2021	Porthole	Instagram, Facebook, Twitter
21/05/2021	Retweeted YouTube video - what is an OBS	Facebook, Twitter
21/05/2021	Shared blog entry - Mission Control	Twitter
22/05/2021	Shared blog entry - Mission Control	Instagram, Facebook
22/05/2021	Graveyard Shift	Instagram, Facebook, Twitter
22/05/2021	Shared blog post - Podcast & Social Media at Sea	Instagram, Facebook, Twitter
23/05/2021	Per birthday post	Instagram, Twitter
24/05/2021	Bantry Bay	Instagram, Facebook, Twitter
25/05/2021	Day Shift crew	Instagram, Facebook, Twitter
25/05/2021	Retweeted YouTube video - Tour of CE	Twitter
27/05/2021	Lego scientists for #SeaToMe; retweeted Youtube video - Matt prelim data	Twitter
27/05/2021	Shared blog entry - Chasing Storms	Instagram, Facebook, Twitter
28/05/2021	Last day weather	Instagram, Facebook, Twitter
28/05/2021	Retweeted YouTube video link page	Twitter
29/05/2021	Shared blog entry - Finishing Data Acquisition	Instagram, Facebook, Twitter

Blog Posts

Title	Release Date
T-Minus 3 Weeks	14/04/2021
The countdown is on! 2 weeks to go!	22/04/2021
Equipment Shipped! One week to go...	29/04/2021
Mobilistation is under way	06/05/2021
Setting Sail	07/05/2021
Meet the Crew: Early Career Scientists	10/05/2021
Having a whale of a time	12/05/2021
CTD Release	13/05/2021
Good Vibrations: A closer look at the OBS	13/05/2021
I'm a scientist on a boat, ask me anything: Q&A 1	16/05/2021

Catch me if you can: OBS retrieval	19/05/2021
Documenting Life at Sea	19/05/2021
Missoon Control: An insight into the Dry Lab	21/05/2021
Document Life at Sea 2: the Power of Words	22/05/2021
Chasing storms (Or being chased!)	27/05/2021
That's a wrap for data acquisition!	29/05/2021

C. General Log

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
11/05/2021	07:00																Science party begin standing watches. See narrative for earlier information.
11/05/2021	07.17	Transit		53	45.00	45	14	42.0	33.6	3.0	282	2502	ok	ok	ok		Just completed turn. Why is ADCP not in UTC? Depth used is imprecise (Echosounder)
11/05/2021	07.33	Transit		53	45.00	58	14	44.0	46.9	5.9	277	2870	ok	ok	ok		Depth used is imprecise (Echosounder)
11/05/2021	07:45	Transit		53	46.00	9	14	46.0	23.4	6.7	279	2906	ok	ok	ok		Depth used is imprecise (Echosounder)
11/05/2021	08:00	Transit		53	46.00	21	14	49.0	21	7.0	277	2925	ok	ok	ok		Depth used is imprecise (Echosounder)
11/05/2021	08:15	Transit		53	46.00	46	14	45.0	45.2	7.4	277	2943	ok	ok	ok		Depth used is imprecise (Echosounder)
11/05/2021	08:30	Transit		53	46.00	34	14	55.0	37.1	7.3	282	2952	ok	ok	ok		Depth used is imprecise (Echosounder)
11/05/2021	08:45	Transit		53	46.00	47	14	58.0	30.6	7.7	279	2997	ok	ok	ok		Depth used is imprecise (Echosounder)
11/05/2021	09:00	Transit		53	46.00	56	15	1.0	42.6	8.0	284	3015	ok	ok	ok		Depth used is imprecise (Echosounder)
11/05/2021	09:15	Transit		53	47.00	17	15	5.0	5.66	7.6	288	3016	ok	ok	ok		Depth used is imprecise (Echosounder)
11/05/2021	09:30	Transit		53	47.00	42	15	8.0	10.5	8.0	292	3016	ok	ok	ok		Depth used is imprecise (Echosounder)
11/05/2021	09:45	Transit		53	48.00	11	15	11.0	21.3	7.4	292	3016	ok	ok	ok		Depth used is imprecise (Echosounder)
11/05/2021	10:00	Transit		53	48.00	38	15	14.0	39.3	8.1	288	2965	ok	ok	ok		ADCP is logged in ship's time (UTC+1)
11/05/2021	10:15	Transit		53	49.00	5.1	15	18.0	6.94	8.3	291	2972	ok	ok	ok		
11/05/2021	10:30	Transit		53	49.00	28	15	21.0	31.8	8.5	288	2981	ok	ok	ok		
11/05/2021	10.36	Releaser Test	CTD1	53	49.00	32	15	21.0	57.9	0.0	350	2983	ok	ok	ok	ok	On DP for releaser test
11/05/2021	10:43	Releaser Test	CTD1	53	49.00	31	15	22.0	0.8	0.0	357	2983	ok	ok	ok		
11/05/2021	10:48	Releaser Test	CTD1	53	49.00	31	15	22.0	1.68	0.0	007	2981	ok	ok	ok		Releaser Test CTD1 Dropped at this time
11/05/2021	11:00	Releaser Test	CTD1	53	49.00	32	15	22.0	2.84	0.0	10	2982	ok	ok	ok		Releaser Test CTD1 being released to 2.5km depth
11/05/2021	11:15	Releaser Test	CTD1	53	49.00	32	15	22.0	2.3	0.0	29	2982	ok	ok	ok		Releaser Test CTD1 being released to 2.5km depth
11/05/2021	11:30	Releaser Test	CTD1	53	49.00	32	15	22.0	2.32	0.0	27	2982	ok	ok	ok		Releaser Test CTD1 being released to 2.5km depth
11/05/2021	11:38	Releaser Test	CTD1	53	49.00	32	15	22.0	2.31	0.0	29	2983	ok	ok	ok		CTD1 at 2500, beginning release test
11/05/2021	11:48	XBT Test	XBT-T11-01	53	49.00	31	15	22.0	2.35	0.0	30	2982	ok	ok	ok	ok	XBT test in parallel with CTD at depth
11/05/2021	11:55	XBT Test End	XBT-T11-01	53	49.00	31	15	22.0	2.35	0.0	30	2982	ok	ok	ok	ok	XBT end of test - terminated 460m
11/05/2021	12:15	Releaser Test	CTD1	53	49.00	32	15	22.0	2.35	0.0	28	2983	ok	ok	ok		Releaser test CTD1, trouble getting the acoustic pings to work on releasers
11/05/2021	12:30	Releaser Test	CTD1	53	49.00	32	15	22.0	2.25	0.0	30	2982	ok	ok	ok		Releaser Test CTD1 being released to 2.5km depth
11/05/2021	12:45	Releaser Test	CDT1	53	49.00	32	15	22.0	2.38	0.0	29	2981	ok	ok	ok		Releaser Test CTD1 being released to 2.5km depth
11/05/2021	12:57	Releaser Test	CDT1	53	49.00	32	15	22.0	2.37	0.0	32	2981	ok	ok	ok		Test complete, CTD being reeled in. New CDT file for ascent, it was shut down to check comms issues with the releasers
11/05/2021	13:15	Releaser Test	CDT1	53	49.00	32	15	22.0	2.3	0.0	31	2981	ok	ok	ok		Reeling CTD1 in
11/05/2021	13:30	Releaser Test	CDT1	53	49.00	32	15	22.0	2.31	0.0	28	2981	ok	ok	ok		Reeling CTD1 in
11/05/2021	13:43	Releaser Test	CTD1	53	49.00	32	15	22.0	2.33	0.0	16	2983	ok	ok	ok	ok	CTD1 recovered and beimg brought aboard

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
11/05/2021	14:03	Transit to P1		53	49.00	32	15	22.0	2.3	0.0	11	2981	ok	ok	ok		CTD1 recovered and stowed, now steaming towards P1
11/05/2021	14:15	Transit to P1		53	49.00	51	15	24.0	25	8.0	289	2967	ok	ok	ok		En route to P1
11/05/2021	14:30	Transit to P1		53	50.00	18	15	27.0	46.7	8.1	285	2981	ok	ok	ok		En route to P1
11/05/2021	14:45	Transit to P1		53	50.63		15	31.1		8.3	284	2967	ok	ok	ok		En route to P1, switched to recording deg min.decimals
11/05/2021	15:00	Transit to P1		53	50.96		15	34.5		8.6	286	2955	ok	ok	ok		En route to P1
11/05/2021	15:15	Transit to P1		53	51.34		15	38.2		7.8	286	2924	ok	ok	ok		
11/05/2021	15:30	Transit to P1		53	51.73		15	41.4		8.0	281	2907	ok	ok	ok		
11/05/2021	15:45	Transit to P1		53	52.14		15	45.0		8.3	283	2877	ok	ok	ok		
11/05/2021	16:00	Transit to P1		53	52.47		15	48.0		7.9	285	2855	ok	ok	ok		
11/05/2021	16:15	Transit to P1		53	52.79		15	51.4		7.3	280	2820	ok	ok	ok		
11/05/2021	16:30	Transit to P1		53	53.16		15	54.9		8.1	282	2855	ok	ok	ok		
11/05/2021	16:45	Transit to P1		53	53.56		15	58.2		8.1	285	2786	ok	ok	ok		
11/05/2021	17:00	Transit to P1		53	53.88		16	1.5		8.4	285	2817	ok	ok	ok		
11/05/2021	17:15	Transit to P1		53	54.23		16	5.9		8.5	281	2771	ok	ok	ok		
11/05/2021	17:30	Transit to P1		53	54.61		16	8.3		8.6	284	2771	ok	ok	ok		
11/05/2021	17:45	Transit to P1		53	55.02		16	11.8		7.9	284	2734	ok	ok	ok		
11/05/2021	18:00	Transit to P1		53	55.44		16	15.4		8.7	285	2616	ok	ok	ok		
11/05/2021	18:15	Transit to P1		53	55.83		16	19.0		8.5	284	2567	ok	ok	ok		
11/05/2021	18:30	Transit to P1		53	56.12		16	22.4		8.0	279	2516	ok	ok	ok		
11/05/2021	18:45	Transit to P1		53	56.37		16	25.9		8.1	280	2464	ok	ok	ok		
11/05/2021	19:00	Transit to P1		53	56.71		16	29.2		8.3	285	2431	ok	ok	ok		
11/05/2021	19:15	Transit to P1		53	57.10		16	32.7		8.3	284	2411	ok	ok	ok		
11/05/2021	19:30	Transit to P1		53	57.43		16	36.1		8.2	282	2372	ok	ok	ok		
11/05/2021	19:45	Transit to P1		53	57.73		16	39.3		7.8	284	2333	ok	ok	ok		
11/05/2021	20:00	Transit to P1		53	58.02		16	42.6		8.8	284	2316	ok	ok	ok		
11/05/2021	20:15	Transit to P1		53	58.34		16	46.2		7.9	285	2326	ok	ok	ok		
11/05/2021	20:30	Transit to P1		53	58.65		16	49.6		8.4	285	2357	ok	ok	ok		
11/05/2021	20:45	Transit to P1		53	58.96		16	53.0		8.2	824	2375	ok	ok	ok		
11/05/2021	21:00	Transit to P1		53	59.29		16	56.6		9.3	282	2384	ok	ok	ok		
11/05/2021	21:15	Transit to P1		53	59.59		17	0.0		8.1	283	2401	ok	ok	ok		
11/05/2021	21:30	Transit to P1		53	59.88		17	3.6		8.3	283	2404	ok	ok	ok		
11/05/2021	21:45	Transit to P1		54	0.18		17	0.8		8.7	286	2410	ok	ok	ok		
11/05/2021	22:00	Transit to P1		54	0.47		17	10.8		8.6	284	2418	ok	ok	ok		
11/05/2021	22:15	Transit to P1		54	0.79		17	14.2		8.2	285	2430	ok	ok	ok		
11/05/2021	22:30	Transit to P1		54	1.16		17	17.7		8.4	288	2439	ok	ok	ok		
11/05/2021	22:45	Transit to P1		54	1.52		17	21.3		7.8	290	2422	ok	ok	ok		
11/05/2021	23:00	Transit to P1		54	1.93		17	24.5		8.3	291	2421	ok	ok	ok		
11/05/2021	23:15	Transit to P1		54	2.40		17	27.9		8.6	280	2427	ok	ok	ok		
11/05/2021	23:30	Transit to P1		54	2.62		17	31.2		8.6	285	2435	ok	ok	ok		
11/05/2021	23:45	Transit to P1		54	2.89		17	34.4		7.7	285	2430	ok	ok	ok		
12/05/2021	0:00	Transit to P1		54	3.32		17	37.8		8.7	286	2413	ok	ok	ok		
12/05/2021	0:15	Transit to P1		54	3.37		17	41.6		8.6	286	2412	ok	ok	ok		
12/05/2021	0:30	Transit to P1		54	3.38		17	45.2		8.8	278	2407	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
12/05/2021	0:45	Transit to P1		54	4.12		17	49.1		8.6	286	2402	ok	ok	ok		
12/05/2021	01:00	Transit to P1		54	4.49		17	52.7		8.5	287	2392	ok	ok	ok		
12/05/2021	1:15	Transit to P1		54	4.87		17	56.4		9.0	287	2386	ok	ok	ok		
12/05/2021	1:30	Transit to P1		54	5.23		17	59.9		8.7	285	2374	ok	ok	ok		
12/05/2021	1:45	Transit to P1		54	5.46		18	3.5		8.7	281	2368	ok	ok	ok		
12/05/2021	2:00	Transit to P1		54	5.70		18	7.5		8.8	286	2365	ok	ok	ok		
12/05/2021	2:15	Transit to P1		54	6.00		18	10.9		8.8	282	2398	ok	ok	ok		
12/05/2021	2:30	Transit to P1		54	6.30		18	14.3		8.2	289	2447	ok	ok	ok		
12/05/2021	2:45	Transit to P1		54	6.81		18	17.8		8.4	286	2471	ok	ok	ok		
12/05/2021	3:00	Transit to P1		54	7.08		18	22.1		8.4	283	2395	ok	ok	ok		
12/05/2021	3:15	Transit to P1		54	7.35		18	26.0		10.2	281	2290	ok	ok	ok		
12/05/2021	3:30	Transit to P1		54	7.68		18	30.2		10.1	280	2157	ok	ok	ok		
12/05/2021	3:45	Transit to P1		54	8.08		18	34.3		9.7	281	2006	ok	ok	ok		
12/05/2021	4:00	Transit to P1		54	8.42		18	38.5		10.0	283	1956	ok	ok	ok		
12/05/2021	4:15	Transit to P1		54	8.72		18	42.7		10.5	281	1835	ok	ok	ok		
12/05/2021	4:30	Transit to P1		54	9.05		18	47.0		9.8	286	1698	ok	ok	ok		
12/05/2021	4:45	Transit to P1		54	9.47		18	51.0		9.9	283	1590	ok	ok	ok		
12/05/2021	5:00	Transit to P1		54	9.82		18	55.2		9.7	282	1516	ok	ok	ok		
12/05/2021	5:15	Transit to P1		54	10.10		18	59.3		9.6	282	1473	ok	ok	ok		
12/05/2021	5:30	Transit to P1		54	10.37		19	3.4		9.8	282	1460	ok	ok	ok		
12/05/2021	5:45	Transit to P1		54	10.70		19	7.5		10.0	280	1458	ok	ok	ok		
12/05/2021	6:00	Transit to P1		54	11.04		19	11.6		9.7	280	1464	ok	ok	ok		
12/05/2021	6:15	Transit to P1		54	11.39		19	15.7		9.8	282	1477	ok	ok	ok		
12/05/2021	6:30	Transit to P1		54	11.60		19	20.0		10.1	277	1414	ok	ok	ok		
12/05/2021	6:45	Transit to P1		54	11.92		19	24.3		9.8	286	1359	ok	ok	ok		
12/05/2021	7:00	Transit to P1		54	12.28		19	28.5		10.3	285	1298	ok	ok	ok		
12/05/2021	7:15	Transit to P1		54	12.66		19	32.7		10.2	284	1268	ok	ok	ok		
12/05/2021	7:30	Transit to P1		54	13.09		19	36.9		10.3	284	1260	ok	ok	ok		
12/05/2021	7:45	Transit to P1		54	13.59		19	41.4		10.4	281	1264	ok	ok	ok		
12/05/2021	8:00	Transit to P1		54	13.86		19	45.6		10.0	279	1273	ok	ok	ok		
12/05/2021	8:15	Transit to P1		54	14.16		19	49.8		10.3	277	1284	ok	ok	ok		
12/05/2021	8:30	Transit to P1		54	14.47		19	54.1		10.1	277	1315	ok	ok	ok		
12/05/2021	8:45	Transit to P1		54	14.89		19	58.5		10.4	277	1374	ok	ok	ok		
12/05/2021	9:00	Transit to P1		54	15.28		20	2.5		10.1	276	1412	ok	ok	ok		
12/05/12021	9:15	Transit to P1		54	15.45		20	6.8		10.1	266	1553	ok	ok	ok		Big artifacts on the EK60 (interference from another echo sounder?)
12/05/2021	9:30	Transit to P1		54	15.51		20	11.1		10.1	270	1722	ok	ok	ok		
12/05/2021	9:45	Transit to P1		54	15.62		20	15.4		10.0	268	2027	ok	ok	ok		
12/05/2021	10:03	Transit to P1		54	15.63		20	20.8		8.8	268	2633	ok	ok	ok		The second screen on the EK60 (higher frequency screen) was reading 0.0m for a bit, but is back to reading depth again.
12/05/2021	10:15	Transit to P1		54	15.56		20	22.5		4.3	268	2775	ok	ok	ok		The chief engineer slowed the ship to test the second engine
12/05/2021	10:30	Transit to P1		54	15.53		20	25.0		10.1	270	2799	ok	ok	ok		
12/05/2021	10:45	Transit to P1		54	15.60		20	29.4		10.1	271	2785	ok	ok	ok		
12/05/2021	11:00	Transit to P1		54	15.72		20	33.9		9.8	274	2782	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
12/05/2021	11:15	Transit to P1		54	15.72		20	37.7		10.1	271	2751	ok	ok	ok		
12/05/2021	11:30	Transit to P1		54	15.81		20	42.0		10.2	276	2783	ok	ok	ok		
12/05/2021	11:45	Transit to P1		54	15.95		20	46.2		10.5	277	2844	ok	ok	ok		
12/05/2021	12:00	Transit to P1		54	15.95		20	50.7		10.8	277	2847	ok	ok	ok		
12/05/2021	12:13	Slowing for K1	K1							10.0	277						Starting to slow down for K1
12/05/2021	12:17	Stopped for K1	K1							0.0	300						Stopped for K1 deploy
12/05/2021	12:24:17	Kum K1 Deploy	K1	54	16.00	3.5	20	55.0	27.8	0.0	33	2864	ok	ok	ok	ok	K1 - KUM deployment: Serial 15-09183
12/05/2021	12:27	Accelerating to K2	K1							0.0							Accelerating to transit speed to K2
12/05/2021	12:30	Transit to K2	K1	54	16.05		20	56.2		10.1	277	2876	ok	ok	ok		Back up to speed, transit to K2
12/05/2021	12:53	Transit to K2		54	16.19		21	3.4		11.2	277	2915	ok	ok	ok		Clint looked at the swath, narrowed the band and is looking happier now
12/05/2021	13:00	Transit to K2		54	16.22		21	5.6		10.9	278	2937	ok	ok	ok		
12/05/2021	13:09	Slowing for K2	K2							10.0							Slowing down for K2
12/05/2021	13:11	Stopped for K2	K2							0.0							Stopped for K2 deploy
12/05/2021	13:20:53	Deploying K2	K2	54	16.00	19	21	8.0	27.3	0.0	19	2931				ok	K2 Deploy, some issues with cables holding up deployment
12/05/2021	13:24	Accelerating to K3	K2							0.0							Accelerating away
12/05/2021	13:26	Transit to K3		54	16.30		21	9.1		10.0	275	2947	ok	ok	ok		At transit speed, heading to K3
12/05/2021	13:45	Transit to K3		54	16.46		21	14.7		11.1	281	2906	ok	ok	ok		
12/05/2021	14:00	Transit to K3		54	16.47		21	20.0		11.2	275	2895	ok	ok	ok		
12/05/2021	14:05	Slowing for K3	K3	54	16.54		21	21.3		11.2	285	2905					Starting to slow for K3
12/05/2021	14:07	Stopped for K3	K3							0.0	25						Stopped for K3
12/05/2021	14:10:25	Deploying K3	K3	54	16.00	36	21	21.0	29.4	0.0	25	2907				ok	K3 deployment
12/05/2021	14:12	Accelerating to K4	K4							0.0	280						Accelerating away
12/05/2021	14:17	Transit to K4	K4	54	16.59		21	22.4		11.0	269	2894	ok	ok	ok		At transit speed, heading to K4
12/05/2021	14:30	Transit to K4		54	16.61		21	25.7		11.3	274	2927	ok	ok	ok		
12/05/2021	14:45	Transit to K4		54	16.72		21	31.4		11.1	271	3029	ok	ok	ok		
12/05/2021	14:53	Slowing for K4	K4							11.0	275						Starting to slow for K4
12/05/2021	14:57	Stopped for K4	K4							0.0	30						Stopped for K4
12/05/2021	15:15:20	Deploying K4	K4	54	16.00	54	21	34.0	30	0.0	25	3085				ok	K4 Deployment
12/05/2021	15:17	Accelerating to K5		54	16.91		21	34.5		1.0	26	3084					Accelerating away
12/05/2021	15:20	Transit to K5															At transit speed, heading to K4
12/05/2021	15:30:47	Transit to K5		54	16.91		21	38.3		10.8	270	3197	ok	ok	ok		Heading to K5
12/05/2021	15:46	Transit to K5		54	16.97		21	43.3		10.8	270	3370	ok	ok	ok		
12/05/2021	16:00	Transit to K5		54	17.10		21	47.4		6.1	323	3447	ok	ok	ok		
12/05/2021	16:04	Deploying K5	K5	54.2845			21.79					3446				ok	
12/05/2021	16:30	Transit to K6		54	17.16		21	54.4		10.9	266	3568	ok	ok	ok		
12/05/2021	16:45	Transit to K6		54	17.15		21	59.1		10.9	270	3596	ok	ok	ok		
12/05/2021	16:49	Slowing for K6	K6	54	17.17		22	0.1		5.8	271	3595					
12/05/2021		Stopped for K6	K6														
12/05/2021	16:53:30	Deploying K6	K6	54	17.00	14	22	0.0	25.4	0.5	26	3592				ok	
12/05/2021	16:56:08	Accelerating to K7		54	17.26		22	0.5									
12/05/2021	17:00	Transit to K7		54	17.26		22	1.2		10.2	261	3602	ok	ok	ok		
12/05/2021	17:20	Transit to K7		54	17.20		22	7.4		10.5	268	3614	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
12/05/2021	17:30	Transit to K7		54	17.21		22	10.4		10.6	268	3629	ok	ok	ok		
12/05/2021	17:39	Slowing for K7	K7	54	17.23		22	13.2		8.3	281	3632					
12/05/2021	17:40	Stop for K7	K7	54	17.30		22	13.3									
12/05/2021	17:42	Deploying K7	K7	54	17.00	18	22	13.0	21	0.0	49	3636				ok	
12/05/2021	17:44	Accelerating from K7		54	17.32		22	13.3		1.5	355	3635					
12/05/2021	18:00	Transit to S8		54	17.32		22	17.4		10.5	265	3647	ok	ok	ok		
12/05/2021	18:15	Transit to S8		54	17.29		22	21.9		10.5	270	3687	ok	ok	ok		
12/05/2021	18:28	Slowing for S8	S8	54	17.31		22	26.2		8.5	270	3687					
12/05/2021	18:30	Stop for S8	S8	54	17.36		22	26.4		1.7	18	3688					
12/05/2021	18:32	Deploying S8	S8	54	17.00	23	22	26.0	27.2	0.1	40	3688				ok	
12/05/2021	18:34	Accelerating to S9		54	17.39		22	26.5		1.8	55	3689					
12/05/2021	18:50	Transit to S9		54	17.40		22	30.6		10.6	267	3697	ok	ok	ok		
12/05/2021	19:00	Transit to S9		54	17.41		22	33.6		10.4	266	3680	ok	ok	ok		
12/05/2021	19:15	Transit to S9		54	17.39		22	38.0		10.5	267	3697	ok	ok	ok		
12/05/2021	19:20	Slowing for S9	S9	54	17.46		22	39.5		3.1	22	3695	ok	ok	ok		
12/05/2021	19:26	Deploying S9	S9	54	17.00	31	22	39.0	31.2	0.0	45	3695	ok	ok	ok	ok	
12/05/2021	19:28	Accelerating to S10		54	17.52		22	39.5		1.9	292	3692	ok	ok	ok		
12/05/2021	19:30	Transit to S10		54	17.53		22	39.8		7.2	257	3685	ok	ok	ok		
12/05/2021	19:45	Transit to S10		54	17.48		22	44.1		10.6	267	3691	ok	ok	ok		
12/05/2021	20:00	Transit to S10		54	17.46		22	48.6		10.6	268	3683	ok	ok	ok		
12/05/2021	20:14	Slowing for S10	S10	54	17.51		22	52.6		6.0	359	3662					
12/05/2021	20:15	Stopping for S10	S10	54	17.56		22	52.6		1.5	45	3663					
12/05/2021	20:16	Deploying S10	S10	54	17.00	35	22	52.0	35.1	0.5	52	3662	ok	ok	ok	ok	
12/05/2021	20:18	Accelerating to S11		54	17.62		22	52.6		2.7	267	3665	ok	ok	ok		More artefacts appear on the EK60
12/05/2021	20:30	Transit to S11		54	17.61		22	55.7		10.3	269	3608	ok	ok	ok		
12/05/2021	20:45	Transit to S11		54	17.58		22	5.0		10.4	268	3636	ok	ok	ok		
12/05/2021	21:00	Transit to S11		54	17.54		23	4.4		10.3	265	3639	ok	ok	ok		
12/05/2021	21:03	Slowing for S11	S11	54	17.53		23	5.5		1.5	33	3646	ok	ok	ok		
12/05/2021	21:06	Deploying S11	S11	54	17.00	34	23	5.0	33	0.0	10	3645	ok	ok	ok	ok	
12/05/2021	21:09	Accelerating to S12		54	17.60		23	5.7		5.5	268	3645	ok	ok	ok		
12/05/2021	21:17	Transit to S12		54	17.54		23	8.3		10.5	269	3639	ok	ok	ok		
12/05/2021	21:30	Transit to S12		54	17.53		23	12.0		10.6	272	3596	ok	ok	ok		
12/05/2021	21:45	Transit to S12		54	17.56		23	16.3		10.5	271	3605	ok	ok	ok		
12/05/2021	21:52	Slowing for S12	S12	54	17.55		23	18.5		5.4	355	3584	ok	ok	ok		
12/05/2021	21:53	Stopping for S12	S12	54	17.60		23	18.6		1.6	40	3585	ok	ok	ok		
12/05/2021	21:55	Deploying S12	S12	54	17.00	37	23	18.0	35	0.0	59	3585	ok	ok	ok	ok	
12/05/2021	21:58	Accelerating to S13		54	17.64		23	18.6		2.9	246	3587	ok	ok	ok		
12/05/2021	22:00	Transit to S13		54	17.59		23	19.0		8.5	269	3603	ok	ok	ok		
12/05/2021	22:15	Transit to S13		54	17.55		23	23.5		10.4	271	3654	ok	ok	ok		
12/05/2021	22:30	Transit to S13		54	17.54		23	27.8		10.8	270	3549	ok	ok	ok		
12/05/2021	22:41	Slowing for S13	S13	54	17.51		23	31.3		8.9	272	3528					
12/05/2021	22:43	Stopping for S13	S13	54	17.52		23	31.6		2.0	29	3519					
12/05/2021	22:45	Deploying S13	S13	54	17.00	33	23	31.0	34.9	0.0	49	3518	ok	ok	ok	ok	
12/05/2021	22:47	Accelerating to S14		54	17.58		23	31.6		2.6	257	3516	ok	ok	ok		
12/05/2021	23:00	Transit to S14		54	17.60		23	35.0		10.2	270	3109	ok	ok	ok		
12/05/2021	23:15	Transit to S14		54	17.61		23	39.4		10.5	269	2579	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
12/05/2021	23:30	Transit to S14		54	17.50		23	42.9		10.8	269	2453	ok	ok	ok		
12/05/2021	23:31	Slowing for S14	S14	54	17.54		23	44.3		9.0	282	2317	ok	ok	ok		
12/05/2021	23:33	Stopping for S14	S14	54	17.61		23	44.5		1.2	52	2309	ok	ok	ok		
12/05/2021	23:35	Deploying S14	S14	54	17.00	38	23	44.0	30	0.0	64	2309	ok	ok	ok	ok	
12/05/2021	23:37	Accelerating to S15		54	17.64		23	44.5		1.1	26	2309	ok	ok	ok		
12/05/2021	23:45	Transit to S15		54	17.48		23	47.2		10.3	264	2250	ok	ok	ok		
13/05/2021	00:00	Transit to S15		54	17.44		23	49.6		10.3	272	2236	ok	ok	ok		Swath looking a little off. Waterfall plot getting quite choppy, and the depth reading is severly off (~2.5km too deep)
13/05/2021	00:15	Transit to S15		54	17.35		23	55.0		10.2	269	2279	ok	ok	ok		Swath needs looking at, no one (clint) around to advise
13/05/2021	00:22	Slowing for S15	S15	54	17.31		23	57.2		8.9	266	2317	ok	ok	ok		
13/05/2021	00:23	Stopping for S15	S15														
13/05/2021	00:24	Deploying S15	S15	54	17.00	19	23	57.0	30.7	2.3	356	2322	ok	ok	ok	ok	OBS bashed the side of the boat, didn't come to full stop. Getting quick now at deployment
13/05/2021	00:25	Accelerating to S16		54	17.36		23	57.6		2.8	292	2327	ok	ok	ok		
13/05/2021	00:30	Transit to S16		54	17.33		23	58.9		10.6	270	2354	ok	ok	ok		
13/05/2021	00:45	Transit to S16		54	17.34		24	2.8		10.8	269	2428	ok	ok	ok		
13/05/2021	01:00	Transit to S16		54	17.33		24	7.5		10.6	270	2629	ok	ok	ok		
13/05/2021	01:08	Slowing for S16	S16	54	17.27		24	10.1		9.9	264	2840	ok	ok	ok		
13/05/2021	01:10	Stopping for S16	S16	54	17.26		24	10.4		3.5	277	2869					
13/05/2021	01:11	Deploying S16	S16	54	17.00	17	24	10.0	29.5	2.6	355	2884	ok	ok	ok	ok	Neater than the last, didn't bash ship on way down
13/05/2021	01:12	Accelerating to S17		54	17.35		24	10.6		3.6	243	2892	ok	ok	ok		
13/05/2021	01:15	Transit to S17		54	17.33		24	11.2		9.8	274	2961	ok	ok	ok		Swath still not great
13/05/2021	01:30	Transit to S17		54	17.31		24	15.3		10.4	266	3378	ok	ok	ok		
13/05/2021	01:45	Transit to S17		54	17.28		24	19.7		10.4	267	3125	ok	ok	ok		
13/05/2021	01:55	Slowing for S17	S17	54	17.22		24	23.2		7.9	269	3169	ok	ok	ok		
13/05/2021	01:56	Stopped for S17	S17	54	17.22		24	23.4		5.4							
13/05/2021	01:57	Deploying S17	S17	54	17.00	15	24	23.0	31.5	3.4	335	3183	ok	ok	ok	ok	
13/05/2021	02:00	Accelerating to S18		54	17.30		24	23.6		3.5	266	3166	ok	ok	ok		
13/05/2021	02:15	Transit to S18		54	17.20		24	27.9		10.8	268	3318	ok	ok	ok		Swath looking happier. The chaotic ramps on the waterfall display have cleared back to something resembling seafloor
13/05/2021	02:30	Transit to S18		54	17.11		24	32.5		10.5	265	3245	ok	ok	ok		Swath is getting a bit noisy again.
13/05/2021	02:41	Slowing for S18	S18	54	17.12		24	36.2		7.6	270	3229	ok	ok	ok		
13/05/2021		Stopped for S18	S18														Getting hard to separate stopped and deploy, just recording deploy from now on
13/05/2021	02:43	Deploying S18	S18	54	17.00	7.4	24	36.0	28.3	4.8	280	3326	ok	ok	ok	ok	Swath coming and going, deployment is very slick now
13/05/2021	02:45	Accelerating to S19		54	17.16		24	36.7		5.0	245	3220	ok	ok	ok		
13/05/2021	03:00	Transit to S19		54	17.04		24	41.5		10.9	265	3163	ok	ok	ok		
13/05/2021	03:15	Transit to S19		54	16.97		24	45.8		11.1	262	3112	ok	ok	ok		
13/05/2021	03:28	Slow for S19	S19	54	16.90		24	49..4		7.2	299	3015					

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
13/05/2021	03:30	Deploying S19	S19	54	16.00	59	24	49.0	35.7	1.3	44	3008				ok	
13/05/2021	03:31	accelerate for S20		54	17.02		24	49.6		3.0	305	3006					
13/05/2021	03:45	Transit to S20		54	16.92		24	53.1		11.0	263	3025	ok	ok	ok		swath does not look very good!
13/05/2021	04:00	Transit to S20		54	16.78		24	57.8		10.6	265	2954	ok	ok	ok		
13/05/2021	04:15	Slow for S20	S20	54	16.72		25	2.3		8.3	266	3034					
13/05/2021	04:18	Deploying S20	S20	54	16.00	48	25	2.0	33.9	1.2	41	3032					
13/05/2021	04:19	accelerate for S21		54	16.83		25	2.6		4.4	321	3030					
13/05/2021	04:30	Transit to S21		54	16.82		25	5.4		10.8	265	3024	ok	ok	ok		Swath is getting better now
13/05/2021	04:45	Transit to S21		54	16.65		25	9.8		10.7	264	2985	ok	ok	ok		
13/05/2021	05:04	Slowing for S21	S21	54	16.54		25	15.5		1.6	34	2960					
13/05/2021	05:05	Deploying S21	S21	54	16.00	24	25	15.0	29.1	0.1	59	2962				ok	
13/05/2021	05:08	accelerate for S22		54	16.63		25	15.5		4.2	276	2959					
13/05/2021	05:15	Transit to S22		54	16.58		25	17.3		10.3	265	2945	ok	ok	ok		Swath is getting better now
13/05/2021	05:30	Transit to S22		54	16.42		25	21.7		10.3	264	3032	ok	ok	ok		
13/05/2021	05:45	Transit to S22		54	16.28		25	26.1		10.2	268	2591	ok	ok	ok		
13/05/2021	05:53	Slow for S22	S22	54	16.28		25	28.4		7.5	278	2547	ok	ok	ok		
13/05/2021	05:56	Deploying S22	S22	54	16.00	20	25	28.0	32.6	0.1	75	2540	ok	ok	ok	ok	swath not good
13/05/2021	05:58	Accelerate for S23		54	16.37		25	28.5		3.3	286	2531					swath not good
13/05/2021	06:15	Transit to S23		54	16.19		25	33.3		10.5	267	2507	ok	ok	ok		Clint is working on the sis software to change the parameters for a better swath.
13/05/2021	06:30	Transit to S23		54	16.13		25	37.8		10.4	271	2485	ok	ok	ok		Bathymety map is getting better asfter changing the parameters.
13/05/2021	06:43	Slow for S23	S23	54	16.08		25	41.4		5.1	27	2444					
13/05/2021	06:45	Deploying S23	S23	54	16.00	6.9	25	41.0	28.7	0.4	63	2443	ok	ok	ok	ok	
13/05/2021	06:50	Accelerate for S24		54	16.13		25	41.9		9.0	268	2575	ok	ok	ok		
13/05/2021	07:00	Transit to S24		54	15.98		25	45.5		10.5	267	2530	ok	ok	ok		
13/05/2021	7:15	Transit to S24		54	15.80		25	49.4		10.8	269	2919	ok	ok	ok		
13/05/2021	7:31	Slowing for S24	S24	54	15.73		25	54.5		7.5	319	3135	ok	ok	ok		
13/05/2021	7:33	Stopped for S24	S24	54	15.77		25	54.6		0.9	56	3127					
13/05/2021	07:34	Deploying S24	S24	54	15.00	47	25	54.0	33.9	0.1	69	3126				ok	
13/05/2021	7:36	Accelerating to S25		54	15.80		25	54.6		2.0	313	3128	ok	ok	ok		
13/05/2021	7:45	Transit to S25		54	15.77		25	56.8		11.0	267	3296	ok	ok	ok		
13/05/2021	8:00	Transit to S25		54	15.62		26	1.5		10.9	269	3168	ok	ok	ok		
13/05/2021	8:15	Transit to S25		54	15.52		26	5.9		10.7	268	3352	ok	ok	ok		
13/05/2021	8:20	Slowing for S25	S25	54	15.48		26	7.6		6.2	327	3413	ok	ok	ok		
13/05/2021	8:22	Stopped for S25	S25	54	15.54		26	7.7		0.9	64	3416	ok	ok	ok		
13/05/2021	08:23	Deploying S25	S25	54	15.00	33	26	7.0	42	0.4	78	3416	ok	ok	ok	ok	
13/05/2021	8:27	Accelerating to S26		54	15.58		26	7.8		6.0	253	3421	ok	ok	ok		
13/05/2021	8:30	Transit to S26		54	15.55		26	8.5		10.3	271	3445	ok	ok	ok		
13/05/2021	8:45	Transit to S26		54	15.41		26	12.9		12.2	266	3551	ok	ok	ok		
13/05/2021	9:00	Transit to S26		54	15.26		26	17.7		10.5	263	3641	ok	ok	ok		
13/05/2021	9:09	Slowing for potential S26 - Aborted		54	15.16		26	20.6		6.0	299	3631	ok	ok	ok		Operation aborted. No OBS was deployed at this location.
13/05/2021	9:11	Accelerating to S26		54	15.23		26	20.7		3.0	330	3629	ok	ok	ok		S26 has changed location. Resuming course towards new S26 site.

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
13/05/2021	9:16	Transit to S26		54	15.18		26	21.8		10.5	258	3628	ok	ok	ok		
13/05/2021	9:30	Transit to S26		54	15.04		26	25.8		11.8	269	3529	ok	ok	ok		
13/05/2021	9:35	Slowing for S26	S26	54	15.01		26	27.1		7.4	303	3263					
13/05/2021	09:37	Deploying S26	S26	54	15.00	5.1	26	27.0	11.8	0.1	76	3238				ok	
13/05/2021	9:38	Accelerating to S27		54	15.10		26	27.2		2.2	0	3275	ok	ok	ok		
13/05/2021	9:45	Transit to S27		54	15.08		26	28.7		10.6	262	3015	ok	ok	ok		
13/05/2021	10:00	Transit to S27		54	14.91		26	33.1		11.0	264	3268	ok	ok	ok		
13/05/2021	10:15	Transit to S27		54	14.79		26	37.8		11.0	264	3474	ok	ok	ok		
13/05/2021	10:30	Transit to S27		54	14.64		26	42.3		10.6	264	3435	ok	ok	ok		
13/05/2021	10:42	Slowing for S27	S27	54	14.47		26	46.1		8.5	270	3393	ok	ok	ok		
13/05/2021	10:45	Stopped for S27	S27	54	14.49		26	46.5		3.3	347	3389					
13/05/2021	10:47	Deploying S27	S27	54	14.00	33	26	46.0	34.5	1.3	60	3390	ok	ok	ok	ok	All operational OBSs deployed. Moving to Start P1.
13/05/2021	10:50	Transit		54	14.61		26	46.6		2.6	244	3357	ok	ok	ok		Crane operations stopped at 10:53
13/05/2021	11:00	Transit		54	14.41		26	49.1		10.5	260	3306	ok	ok	ok		
13/05/2021	11:15	Transit		54	14.23		26	54.2		10.8	267	3301	ok	ok	ok		
13/05/2021	11:30	Transit		54	14.16		26	57.6		10.5	265	3282	ok	ok	ok		
13/05/2021	11:45	Transit		54	13.95		27	2.8		10.4	264	3334	ok	ok	ok		
13/05/2021	12:00	Transit		54	13.79		27	7.4		10.5	268	3320	ok	ok	ok		
13/05/2021	12:15	Transit		54	13.69		27	11.7		10.5	266	3328	ok	ok	ok		
13/05/2021	12:30	Transit		54	13.52		27	16.3		10.5	265	3335	ok	ok	ok		
13/05/2021	12:38	180 degrees turn around		54	13.54		27	18.3		3.7	108	3317	ok	ok	ok		Ship turning for instrument deployment and data acquisition
13/05/2021	12:45	Deploying guns & streamer		54	13.51		27	17.9		3.2	099	3321	ok	ok	ok		
13/05/2021	13:00	Deploying guns & streamer		54	13.58		27	16.5		3.3	096	3338	ok	ok	ok		Airguns being deployed
13/05/2021	13:15	Deploying guns & streamer		54	13.61		27	15.1		3.0	094	3321	ok	ok	ok		Airguns being deployed
13/05/2021	13:30	Deploying guns & streamer		54	13.64		27	13.8		3.2	094	3335	ok	ok	ok		
13/05/2021	13:45	Deploying guns & streamer		54	13.68		27	12.0		3.2	095	3320	ok	ok	ok		
13/05/2021	14:00	Deploying guns & streamer		54	13.69		27	10.9		2.9	094	3316	ok	ok	ok		
13/05/2021	14:15	Deploying guns & streamer		54	13.78		27	9.7		3.4	090	3327	ok	ok	ok		Deploying streamer, whales delaying soft start
13/05/2021	14:30	Deploying guns & streamer		54	13.82		27	8.2		3.4	101	3334	ok	ok	ok		
13/05/2021	14:45	Deploying guns & streamer		54	13.88		27	7.0		3.5	098	3311	ok	ok	ok		
13/05/2021	14:52	Begin Soft Start	Start P1	54	13.88		27	6.1		3.3	098	3328	ok	ok	ok		Beginnning soft start procedure, magnetometer deployed
13/05/2021	15:00	Magnetometer Issues	P1	54	13.88		27	5.3		3.3	097	3320	ok	ok	ok		Magnetometer was deployed, bu the airguns are spaced too far apart and are blocking the mag's path. Need to rearrange the gun positions
13/05/2021	15:45	Soft start end, 4.5knots	P1	54	14.03		27	1.2		4.5	095	3336	ok	ok	ok	ok	Soft start completed successfully. Guns at full power and ship at acquisition speed. Magnetometer being deployed, tricky as it has to fit around guns.

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
13/05/2021	16:20	Shooting	P1	54	14.20		26	56.9		3.0	094	3294	ok	ok	ok		Near end streamer too shallow at 4.5 kt. Stopped streamer recording. Reeling in to add weight to inner section.
13/05/2021	16:21	XBT-T5 Launch	XBT-T5-02	54	14.20		26	56.9		2.7	096	3290	ok	ok	ok		XBT launched, not recording on pc
13/05/2021	16:29	XBT-T5 terminated	XBT-T5-02	54	14.25		26	56.4		3.1	096	3301	ok	ok	ok		Probe terminated and reloading to see if probe was the issue
13/05/2021	16:36	XBT-T5 Launch	XBT-T5-02	54	14.24		26	55.7		4.9	100	3307	ok	ok	ok	ok	New probe and nominal behaviour. Seems the previous probe was a dud.
13/05/2021	16:42	XBT-T5 Self terminate	XBT-T5-02	54	14.23		26	54.9		4.5	095	3298	ok	ok	ok	ok	End of wire termination at 2211m. Temperature recording was clean for the first 300m, but defaulted to 37.07 thereafter. Showed some sign of life at 2km depth, but very breif
13/05/2021	18:54	Shooting in progress	P1	54	14.72		26	38.6		4.5	97	3470	ok	ok	ok		
13/05/2021	20:05	XBT T11 Launch	XBT-T11-03	54	14.97		26	29.6		4.4	097	3016	ok	ok	ok	ok	XBT T11 launched serial 22713, inititally reading well, but then the temp. readings went all over the place- showing readings of 32 C
13/05/2021	20:12	XBT T11 Termination	XBT-T11-03	54	14.97		26	28.7		4.6	095	3013	ok	ok	ok	ok	XBT probe terminated as the readings were nonsensical. Giving simultaneous temp readings of 37 C and below 0 C
13/05/2021	20:38	Shooting	P1	54	15.03		26	25.5		4.8	089	3542	ok	ok	ok		GPS time sync issue noted with magnetometer
13/05/2021	21:21	Shooting	P1	54	15.20		26	19.8		4.6	094	3631	ok	ok	ok		
13/05/2021	22:07	XBT T11 Launch	XBT-T11-04	54	15.39		26	13.5		4.6	091	3553	ok	ok	ok	ok	XBT launched, having reset max depth to 460m to see if that was the problem, serial 22710, inititally reading well, but then the temp. readings went all over the place- showing readings of 37 C
13/05/2021	22:12	XBT T11 Termination	XBT-T11-04	54	15.41		26	13.1		4.4	089	3551	ok	ok	ok	ok	XBT T11 probe terminated. Same issue as previous XBT T11 test. Reading temp of 37 C
13/05/2021	22:56	Shooting	P1	54	15.49		26	7.5		4.8	086	3411	ok	ok	ok		
13/05/2021	23:00	Shooting	P1	54	15.51		26	7.0		4.5	089	3397	ok	ok	ok		
13/05/2021	23:15	Shooting	P1	54	15.53		26	5.2		4.2	090	3317	ok	ok	ok		
13/05/2021	23:30	Shooting	P1	54	15.55		26	3.4		3.8	086	3216	ok	ok	ok		
13/05/2021	23:45	Shooting	P1	54	15.64		26	1.7		4.1	089	3170	ok	ok	ok		
14/05/2021	00:00	Shooting	P1	54	15.68		25	59.9		4.0	088	3248	ok	ok	ok		
14/05/2021	00:15	Shooting	P1	54	15.70		25	58.4		3.8	088	3295	ok	ok	ok		
14/05/2021	00:30	Shooting	P1	54	15.75		25	55.7		4.1	089	3295	ok	ok	ok		
14/05/2021	00:45	Shooting	P1	54	15.79		25	55.0		4.1	088	3168	ok	ok	ok		
14/05/2021	01:00	Shooting	P1	54	15.81		25	53.5		4.1	085	3075	ok	ok	ok		
14/05/2021	01:15	Shooting	P1	54	15.83		25	51.7		3.9	086	3011	ok	ok	ok		
14/05/2021	01:30	Shooting	P1	54	15.85		25	50.0		4.0	083	3005	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
14/05/2021	01:45	Shooting	P1	54	15.93		25	48.4		3.6	085	2817	ok	ok	ok		
14/05/2021	02:00	Shooting	P1	54	15.97		25	46.8		3.4	087	2617	ok	ok	ok		
14/05/2021	02:14	Alarm	P1	54	15.99		25	45.2		3.0	088	2547	ok	ok	ok		air pressure at 200
14/05/2021	02:15	Shooting	P1	54	15.99		25	45.2		3.0	088	2547	ok	ok	ok		
14/05/2021	02:30	Shooting	P1	54	16.04		25	43.4		3.1	088	2441	ok	ok	ok		
14/05/2021	02:45	Shooting	P1	54	16.07		25	42.1		3.1	087	2574	ok	ok	ok		
14/05/2021	03:00	Shooting	P1	54	16.11		25	40.5		2.8	087	2449	ok	ok	ok		
14/05/2021	04:00	Shooting	P1	54	16.22		25	34.7		3.0	92	2507	ok	ok	ok		bathymery map doesn’t look ok
14/05/2021	05:00	Shooting	P1	54	16.36		25	30.0		2.8	85	2549	ok	ok	ok		bathymery map doesn’t look ok
14/05/2021	05:30	Instruments PULLED IN	P1	54	16.38		25	52.8		2.3	87	2544	ok	ok	ok		bathymery map doesn’t look ok
14/05/2021	6:30	P1	P1	54	17.30		25	25.2		1.9	82	2645	ok	0k	ok		bathymery map doesn’t look ok. Have spoken to Clint about this and he says it's just due to the bad weather, some of the beams aren't bouncing back due to the rocking boat (NF)
14/05/2021	7:30	P1	P1	54	17.72		25	23.2		1.1	086	2812	ok	ok	ok		
14/05/2021	7:45	Hove to		54	17.85		25	22.5		0.9	087	2925	ok	ok	ok		
14/05/2021	10:25	Hove to		54	18.88		25	16.8		1.0	089	2942	ok	ok	ok		
14/05/2021	12:00	Hove to		54	18.61		25	13.5		0.5	089	2934	ok	ok	ok		
14/05/2021	15:00	Hove to		54	18.60		25	7.6		1.6	079	2969	ok	ok	ok		
14/05/2021	23:00	Hove to		54	19.83		24	50.2		1.9	084	2870	ok	ok	ok		Holding station still. Aiming for 12:00 start on the 15th
15/05/2021	7:16	Hove to		54	15.72		25	49.1		1.6	080	2901	ok	ok	ok		
15/05/2021	7:30	Hove to		54	15.69		25	48.8		1.2	026	2919	ok	ok	ok		
15/05/2021	7:36	Green light to redeploy MAG	P1	54	15.80		25	48.9		0.7	029	2858	ok	ok	ok		
15/05/2021	7:39	Starting to deploy MAG	P1	"	"	"	"	"	"	"	"	"	ok	ok	ok		
15/05/2021	7:44	MAGNETOMETER deployed	P1	54	16.00		25	48.6		2.2	026	2819	ok	ok	ok		
15/05/2021	8:01	Prepping to deploy airgun	P1	54	16.36		25	48.1		7.5	167	2808	ok	ok	ok		
15/05/2021	8:09	Ready to deploy AIRGUN	P1	54	15.21		25	47.9		8.3	168	2601	ok	ok	ok		
15/05/2021	8:18	Starting to deploy AIRGUN	P1	54	14.60		25	47.5		2.1	032	2561	ok	ok	ok		
15/05/2021	8:30	All clear to start shooting	P1	54	15.04		25	47.1		2.7	36	2539	ok	ok	ok		MMO gives the all clear
15/05/2021	8:37	AIRGUNS deployed	P1	54	15.30		25	46.8		3.0	35	2555	ok	ok	ok		
15/05/2021	8:39	Begin Soft Start	P1	54	15.36		25	46.7		3.0	33	2572	ok	ok	ok		
15/05/2021	8:45	Soft start & STREAMER deployment	P1	54	15.53		25	46.5		2.0	38	2578	ok	ok	ok		
15/05/2021	9:00	Soft start	P1	54	15.98		25	45.7		3.1	059	2597	ok	ok	ok		
15/05/2021	9:14	Soft start	P1	54	16.07		25	44.5		3.6	077	2382	ok	ok	ok		
15/05/2021	9:26	Start of recording	P1														
15/05/2021	9:30	End of Soft Start	P1	54	16.11		25	42.7		3.5	078	2452	ok	ok	ok		
15/05/2021	9:45	Shooting	P1	54	16.16		25	40.8		4.4	080	2447	ok	ok	ok		
15/05/2021	10:01	Shooting	P1	54	16.18		25	38.9		4.6	078	2492	ok	ok	ok		
15/05/2021	10:17	Shooting	P1	54	16.27		25	36.7		4.3	080	2499	ok	ok	ok		
15/05/2021	10:45	Shooting	P1	54	16.31		25	33.4		4.3	083	2498	ok	ok	ok		
15/05/2021	11:00	Shooting	P1	54	16.29		25	31.5		4.5	087	2532	ok	ok	ok		
15/05/2021	11:15	Shooting	P1	54	16.28		25	29.5		4.6	075	2539	ok	ok	ok		
15/05/2021	11:30	Shooting	P1	54	16.35		25	27.7		3.4	078	2542	ok	ok	ok		
15/05/2021	11:45	Shooting	P1	54	16.40		25	25.7		5.0	081	2674	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
15/05/2021	11:54	Launch XBT	XBT-T11-05	54	16.41		25	24.5		4.8	083	2752	ok	ok	ok		
15/05/2021	11:57	Start of interferance	XBT-T11-05	54	16.41		25	24.1		3.5	084	2774	ok	ok	ok		Temp reading haywire at approx 250 m, terminated
15/05/2021	12:00	Shooting	P1	54	16.41		25	23.7		4.5	084	2882	ok	ok	ok		
15/05/2021	12:15	Shooting	P1	54	16.41		25	21.9		5.0	084	3032	ok	ok	ok		
15/05/2021	12:30	Shooting	P1	54	16.46		25	20.0		4.2	082	2894	ok	ok	ok		
15/05/2021	12:45	Shooting	P1	54	16.52		25	18.1		4.0	081	2991	ok	ok	ok		
15/05/2021	12:57	Launch XBT	XBT-T11-06	54	16.54		25	16.6		4.8	092	2950	ok	ok	ok		Probe 22709
15/05/2021	13:00	Shooting	P1	54	16.51		25	16.2		5.0	092	2944	ok	ok	ok		
15/05/2021	13:04	XBT stop	XBT-T11-06	54	16.49		25	15.6		4.0	061	2959	ok	ok	ok		Terminal depth of 700 m reached; port side stern
15/05/2021	13:14	Launch XBT	XBT-T5-07	54	16.58		25	14.4		4.8	088	2942	ok	ok	ok		Probe 372157
15/05/2021	13:15	Shooting	P1	54	16.58		25	14.3		4.4	089	2940	ok	ok	ok		
15/05/2021	13:19	XBT stop	XBT-T5-07	54	16.56		25	13.8		5.0	088	2942	ok	ok	ok		Terminal depth reached; depth of 1826.5 m, 3.5 degrees C; port side, stern
15/05/2021	13:30	Shooting	P1	54	16.55		25	12.3		4.6	082	2975	ok	ok	ok		
15/05/2021	13:45	Shooting	P1	54	16.62		25	10.5		3.9	081	2982	ok	ok	ok		
15/05/2021	14:00	Shooting	P1	54	16.67		25	8.6		4.7	086	2998	ok	ok	ok		
15/05/2021	14:15	Shooting	P1	54	16.67		25	6.7		4.6	090	3014	ok	ok	ok		
15/05/2021	14:30	Shooting	P1	54	16.71		25	4.7		4.8	085	3028	ok	ok	ok		
15/05/2021	14:45	Shooting	P1	54	16.76		25	2.8		3.6	084	3034	ok	ok	ok		
15/05/2021	15:00	Shooting	P1	54	16.78		25	1.1		4.5	088	3019	ok	ok	ok		
15/05/2021	15:06	Launch XBT	XBT-T5-08	54	16.80		25	0.2		4.5	088	3008	ok	ok	ok		Probe 367866
15/05/2021	15:12	XBT Stop	XBT-T5-08	54	12.33		24	59.5		4.5	088	2990	ok	ok	ok		Terminal depth reached
15/05/2021	15:15	Shooting	P1	54	16.82		24	59.1		4.5	088	2987	ok	ok	ok		
15/05/2021	15:17	Launch XBT	XBT-T11-09	54	16.82		24	58.9		3.6	088	2974	ok	ok	ok		Probe 22752
15/05/2021	15:24	XBT Stop	XBT-T11-09	54	16.85		24	57.9		4.9	089	2953	ok	ok	ok		15:21 past terminal depth; depth 726 m reached
15/05/2021	17:22	Shooting	P1	54	17.07		24	42.4		5.1	92	3120	ok	ok	ok		
15/05/2021	18:27	Launch XBT	XBT-T5-10	54	17.12		24	43.4		3.9	092	3243	ok	ok	ok		Probe 372160
15/05/2021	18:33	XBT Stop	XBT-T5-10	54	17.00	13	24	33.7		3.9	093	3245	ok	ok	ok		Terminal depth reached below 1550
15/05/2021	19:00	Shooting	{1	54	17.17		24	30.6		4.3	092	3232	ok	ok	ok		
15/05/2021	20:16	XBT drop	XBT-T11-11	54	17.39		24	20.9		4.3	094	3088	ok	ok	ok		Probe 22754
15/05/2021	20:23	XBT drop	XBT-T11-11	54			24						ok	ok	ok		Terminal depth approx 770m
15/05/2021	22:04	XBT drop	XBT-T11-12	54	17.21		24	7.4		4.8	090	2624	ok	ok	ok		Probe 22755
15/05/2021	22:11	XBT drop	XBT-T11-12	54	17.22		24	6.4		4.2	090	2580	ok	ok	ok		Terminal depth 738m
15/05/2021	23:00	Shooting	P1	54	17.34		24	0.1		4.4	088	2381	ok	ok	ok		
15/05/2021	23:15	Shooting	P1	54	17.36		23	58.3		4.6	091	2336	ok	ok	ok		
15/05/2021	23:30	Shooting	P1	54	17.32		23	56.5		4.2	094	2304	ok	ok	ok		
15/05/2021	23:37	Launch XBT	XBT-T11-13	54	17.31		23	55.6		3.6	081	2290	ok	ok	ok		Probe 22749
15/05/2021	23:45	Shooting	P1	54	17.35		23	54.8		3.8	087	2276	ok	ok	ok		
15/05/2021	23:46	XBT Stop	XBT-T11-13	54	17.35		23	54.6		4.2	086	2273	ok	ok	ok		Terminal depth reached, approx 900 m
16/05/2021	00:00	Shooting	P1	54	17.37		23	53.0		4.2	087	2253	ok	ok	ok		
16/05/2021	00:15	Shooting	P1	54	17.38		23	51.2		4.2	083	2240	ok	ok	ok		
16/05/2021	00:30	Shooting	P1	54	17.46		23	49.4		4.1	081	2236	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
16/05/2021	00:45	Shooting	P1	54	17.49		23	47.6		4.3	085	2248	ok	ok	ok		
16/05/2021	01:00	Shooting	P1	54	17.53		23	45.8		4.4	086	2273	ok	ok	ok		
16/05/2021	01:15	Shooting	P1	54	17.60		23	43.9		4.3	094	2391	ok	ok	ok		
16/05/2021	01:24	Launch XBT	XBT-T11-14	54	17.53		23	42.7		4.7	094	2466	ok	ok	ok		Probe 22748
16/05/2021	01:30	Shooting	P1	54	17.49		23	42.1		4.4	093	2486	ok	ok	ok		
16/05/2021	01:31	XBT Stop	XBT-T11-14	54	17.48		23	41.9		4.6	088	2492	ok	ok	ok		Temp haywire at 610 m depth; terminated
16/05/2021	01:45	Shooting	P1	54	17.44		23	40.1		4.1	086	2556	ok	ok	ok		
16/05/2021	02:00	Shooting	P1	54	17.53		23	38.4		4.3	084	2645	ok	ok	ok		
16/05/2021	02:15	Shooting	P1	54	17.54		23	36.7		4.3	086	2912	ok	ok	ok		
16/05/2021	02:30	Shooting	P1	54	17.54		23	34.8		4.2	085	3170	ok	ok	ok		
16/05/2021	02:45	Shooting	P1	54	17.55		23	33.1		4.2	085	3348	ok	ok	ok		
16/05/2021	03:00	Shooting	P1	54	17.57		23	31.2		4.7	086	3527	ok	ok	ok		
16/05/2021	03:03	Launch XBT	XBT-T11-15	54	17.57		23	30.9		4.3	085	3534	ok	ok	ok		Probe 22750
16/05/2021	03:10	Stop XBT	XBT-T11-15	54	17.60		23	33.0		4.7	088	3551	ok	ok	ok		Terminal depth reached, 750 m
16/05/2021	03:15	Shooting	P1	54	17.60		23	29.5		3.8	089	3550	ok	ok	ok		
16/05/2021	04:00	Launch XBT	XBT-T5-16	54	17.56		23	22.8		3.8	091	2581	ok	ok	ok		
16/05/2021	05:52	Shooting	P1	54	17.48		23	10.7		4.2	091	3608	ok	ok	ok		
16/05/2021	06:41	Shooting	P1	54	17.52		23	4.7		4.0	091	3639	ok	ok	ok		
16/05/2021	07:15	Launch XBT	XBT-T5-17	54	17.50		23	0.6		4.3	089	2581	ok	ok	ok		Probe 372156
16/05/2021	07:21	Launch XBT	XBT-T5-17	54	17.50		22	59.4		4.5	089	3629	ok	ok	ok		
16/05/2021	08:29	Launch XBT	XBT-T11-18	54	17.48		22	51.1		4.7	087	3655	ok	ok	ok		Probe 22751
16/05/2021	08:37	Launch XBT	XBT-T11-18	54	17.48		22	50.1		4.5	087	3680	ok	ok	ok		Terminal depth 778m
16/05/2021	09:44	Shooting	P1	54	17.49		22	41.6		4.4	090	3683	ok	ok	ok		
16/05/2021	10:38	Launch XBT	XBT-T5-19	54	17.50		22	34.9		4.4	093	3695	ok	ok	ok		Probe 372155
16/05/2021	10:44	Launch XBT	XBT-T5-19	54	17.50		22	34.2		4.3	092	3679	ok	ok	ok		Terminal depth 2250m
16/05/2021	11:03	Shooting	P1	54	17.45		22	31.8		4.2	098	3694	ok	ok	ok		
16/05/2021	11:15	Shooting	P1	54	17.44		22	30.4		4.6	090	3695	ok	ok	ok		
16/05/2021	11:30	Shooting	P1	54	17.43		22	28.6		4.5	096	3690	ok	ok	ok		
16/05/2021	11:45	Shooting	P1	54	17.41		22	26.8		3.9	098	3687	ok	ok	ok		
16/05/2021	12:00	Shooting	P1	54	17.40		22	24.9		4.1	095	3681	ok	ok	ok		
16/05/2021	12:03	Launch XBT	XBT-T5-20	54	17.39		22	24.6		3.9	100	3680	ok	ok	ok		Probe 367870
16/05/2021	12:09	XBT End	XBT-T5-20	54	17.37		22	23.8		4.3	100	3680	ok	ok	ok		Terminal depth 2250 m
16/05/2021	12:15	Shooting	P1	54	17.36		22	23.1		4.2	101	3685	ok	ok	ok		
16/05/2021	12:30	Shooting	P1	54	17.31		22	21.3		4.4	101	3680	ok	ok	ok		
16/05/2021	12:45	Shooting	P1	54	17.32		22	19.4		4.3	095	3667	ok	ok	ok		
16/05/2021	13:00	Shooting	P1	54	17.33		22	17.6		4.5	095	3648	ok	ok	ok		
16/05/2021	13:15	Shooting	P1	54	17.33		22	15.7		4.4	096	3636	ok	ok	ok		
16/05/2021	13:30	Shooting	P1	54	17.33		22	13.8		4.3	096	3639	ok	ok	ok		
16/05/2021	13:41	Launch XBT	XBT-T5-21	54	17.32		22	12.4		4.4	095	3629	ok	ok	ok		Probe 372158
16/05/2021	13:45	Shooting	P1	54	17.31		22	11.9		4.3	096	3640	ok	ok	ok		
16/05/2021	13:47	XBT End	XBT-T5-21	54	17.31		22	11.6		4.5	095	3643	ok	ok	ok		Terminal depth 2285 m
16/05/2021	14:00	Shooting	P1	54	17.31		22	10.0		4.2	093	3614	ok	ok	ok		
16/05/2021	14:15	Shooting	P1	54	17.28		22	8.2		4.5	098	3609	ok	ok	ok		
16/05/2021	14:30	Shooting	P1	54	17.20		22	6.4		4.2	099	3614	ok	ok	ok		
16/05/2021	14:45	Shooting	P1	54	17.21		22	4.6		4.2	089	3608	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
16/05/2021	15:00	Shooting	P1	54	17.31		22	2.7		4.2	092	3609	ok	ok	ok		
16/05/2021	15:15	Launch XBT	XBT-T5-22	54	17.27		22	0.8		4.6	095	3597	ok	ok	ok		Probe: 367874 T5
16/05/2021	15:21	XBT End	XBT-T5-22	54	17.26		22	0.1		4.4	093	3592	ok	ok	ok		Terminal Depth: 2200m
16/05/2021	15:33	Shooting	P1	54	17.22		21	58.5		4.4	98	3587	ok	ok	ok		
16/05/2021	16:07	Shooting	P1	54	17.15		21	54.2		4.3	93	3567	ok	ok	ok		
16/05/2021	16:31	Shooting	P1	54	17.10		21	51.3		4.2	97	3552	ok	ok	ok		
16/05/2021	17:00	Shooting	P1	54	17.03		21	47.6		4.5	93	3448	ok	ok	ok		
16/05/2021	17:30	Shooting		54	16.93		21	43.9		4.5	93	3382	ok	ok	ok		
16/05/2021	17:42	Launch XBT	XBT-T5-23	54	16.89		21	42.2		4.6	087	3315	ok	ok	ok		Probe: 263667
16/05/2021	17:48	XBT end	XBT-T5-23	54	16.88		21	41.5		4.4	087	3266	ok	ok	ok		Terminal Depth: 2268m
16/05/2021	17:54	shooting	P1	54	16.87		21	14.1		4.7	87	3240	ok	ok	ok		
16/05/2021	18:24	Launch XBT	XBT-T5-24	54	16.81		21	36.9		4.7	086	3151	OK	OK	OK		Probe: 326807
16/05/2021	18:29	Turning off the MAG	P1	54	16.79		21	13.6		4.6	085	3134	ok	ok	ok		
16/05/2021	18:31	XBT E	XBT-T5-24	54	16.78		21	13.6		4.7	086	3125	ok	ok	ok		Terminal Depth: 2237 m
16/05/2021	18:39	MAG retrieved successfully	P1	54	16.75		21	35.2		4.3	085	3095	ok	ok	ok		Green light given for retrieving streamer
16/05/2021	18:50	Green light to retrieve streamer	P1	54	15.77		21	33.9		2.6	081	3064	ok	ok	ok		
16/05/2021	19:12	Streamer recovered	P1	54	16.71		21	32.5		2.5	079	3050	ok	ok	ok		
16/05/2021	19:14	Guns off	P1	54	16.71		21	32.3		2.3	080	3041	ok	ok	ok		
16/05/2021	19:36	Guns aboard - End P1	P1	54	16.68		21	30.6		6.5	089	2984	ok	ok	ok		
16/05/2021	16:45	Sailing to K1		54	16.64		21	28.4		10.0	88	2960	ok	ok	ok		
16/05/2021	20:04	Sailing to K1		54	16.53		21	22.9		9.9	089	2909	ok	ok	ok		
16/05/2021	20:16	Sailing to K1		54	16.45		21	19.6		9.9	088	2899	ok	ok	ok		
16/05/2021	20:33	Sailing to K1		54	16.33		21	14.8		9.6	087	2908	ok	ok	ok		
16/05/2021	20:45	Sailing to K1		54	16.21		21	11.3		9.9	087	2956	ok	ok	ok		
16/05/2021	21:02	Sailing to K1		54	16.15		21	6.7		9.9	0.86	2933	ok	ok	ok		
16/05/2021	21:16	Sailing to K1		54	16.14		21	2.6		9.7	084	2893	ok	ok	ok		
16/05/2021	21:20	Going to ping K1 in 5 mins	K1	54	16.14		21	1.2		9.7	085	2897	ok	ok	ok		
16/05/2021	21:25	Stopping to ping K1		54	16.18		21	0.5		0.0	317		off	off	off		Turned off the Multibeam, Echo sounder & ADCP because it could interfer with the ping
16/05/2021	21:27	Pinging K1	K1	54	16.16		21	0.5		1.0	305		off	off	off		Pinging K1 but no response
16/05/2021	21:39	Sailing to K1	K1	54	15.92		21	0.6		1.0	020		off	off	off		Couldn't get in contact wit he OBS so we are moving closer
16/05/2021	22:01	Stopping to ping K1		54	16.06		20	55.3		0.0	335		off	off	off		
16/05/2021	22:04	Pinging K1	K1	54	16.03		20	55.3		0.0	326		off	off	off		
16/05/2021	22:12	Response received		54	15.87		20	55.4		1.2	286		off	off	off		Estimated emersion time 22:42
16/05/2021	22:20	Sailing to K1															
16/05/2021	22:58	K1 located	K1	54	14.22		20	55.5		1.9	158		off	off	off		
16/05/2021	23:00	K1 on board	K1	54	14.18		20	55.5		1.4	122		off	off	off		Retrieval 2.1 m south of deployment site
16/05/2021	23:02	Pinging K2	K1														
16/05/2021	23:11	Sailing to K2		54	14.11		20	55.7		8.5	319		off	off	off		
16/05/2021	23:30	Sailing to K2		54	15.94		21	1.1		11.9	291		off	off	off		
16/05/2021	23:37	Pinging K2		54	16.17		21	3.3		3.8	25		off	off	off		Transducer out, 3 miles from deployment site
16/05/2021	23:45	Sailing to K2		54	16.08		21	3.4		1.2	60		off	off	off		no response, release 3 miles out

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
17/05/2021	00:00	Sailing to K2		54	16.23		21	7.6		9.7	285		off	off	off		
17/05/2021	00:05	Pinging K2	K2	54	16.35		21	8.5		0.6	032		off	off	off		
17/05/2021	00:41	K2 on board	K2	54	15.34		21	9.1		1.2	093		off	off	off		located at 00:35
17/05/2021	00:42	Sailing to K3		54	15.34		21	9.1		11.5	304		off	off	off		
17/05/2021	01:00	Sailing to K3		54	16.30		21	14.0		11.6	276		off	off	off		
17/05/2021	01:08	Pinging K3		54	16.46		21	16.1		0.7	019		off	off	off		Transducer out, 3 miles from deployment site
17/05/2021	01:13	Sailing to K3															
17/05/2021	01:30	Sailing to K3		54	16.50		21	12.0		10.0	281		off	off	off		
17/05/2021	02:01	K3 on board	K3	54	16.04		21	22.4		1.4	222		off	off	off		
17/05/2021	02:07	Sailing to K4															
17/05/2021	02:15	Sailing to K4		54	16.40		21	24.4		12.1	289		off	off	off		
17/05/2021	02:30	Sailing to K4		54	16.72		21	29.1		6.2	278		off	off	off		
17/05/2021	02:32	Pinging K4		54	16.75		21	29.4		1.9	331		off	off	off		Transducer out, 3 miles from deployment site
17/05/2021	02:37	Sailing to K4															
17/05/2021	02:45	Sailing to K4		54	16.76		21	30.8		12.0	278		off	off	off		
17/05/2021	02:58	Pinging K4	K4	54	16.82		21	34.6		2.2	305		off	off	off		
17/05/2021	03:31	K4 on board	K4	54	17.00		21	35.0		0.8	118		off	off	off		
17/05/2021	03:35	Sailing to K5															
17/05/2021	04:02	Pinging K5		54	16.96		21	42.4		0.3	104		off	off	off		Transducer out, 3 miles from deployment site
17/05/2021	04:11	Sailing to K5		54	16.89		21	43.3		11.6	274		off	off	off		
17/05/2021	04:27	Pinging K5	K5	54	17.07		21	47.5		0.3	55		off	off	off		
17/05/2021	05:13	K5 on board	K5	54	18.02		21	14.8		0.2	98		off	off	off		
17/05/2021	05:16	Sailing to K6		54	17.98		21	47.8		5.6	259		off	off	off		
17/05/2021	05:41	Pinging K6		54	17.65		21	55.1		0.7	67		off	off	off		Transducer out, 3 miles from deployment site
17/05/2021	05:49	Sailing to K6		54	17.67		21	55.2		2.0	34		off	off	off		
17/05/2021	06:09	Pinging K6	K6	54	17.34		22	0.0		0.7	39		off	off	off		
17/05/2021	07:13	K6 on board	K6	54	18.44		22	1.2		1.3	288		off	off	off		
17/05/2021	07:16	Sailing to K7	K7	54	18.42		22	1.6		10.0	258		off	off	off		
17/05/2021	07:42	Pinging K7	K7	54	17.71		22	8.9		0.6	350		off	off	off		No reply
17/05/2021	07:51	Sailing to K7		54	17.71		22	0.9		3.1	262		off	off	off		
17/05/2021	08:08	Slowing to drop hydrophone		54	17.51		22	13.3		2.8	191		off	off	off		
17/05/2021	08:17	Pinging K7		54	17.52		22	13.3		0.7	059		off	off	off		Made contact but not sure if it has released
17/05/2021	08:31	Pinging K7	K7	54	17.65		22	13.7		0.9	129		off	off	off		Waiting for a signal
17/05/2021	08:33	Removing the hydrophone		54	17.67		22	13.8		0.9	128		off	off	off		Signal is ~800m off
17/05/2021	08:40	Sailing to K7		54	17.77		22	13.3		2.7	086		off	off	off		
17/05/2021	08:53	K7 on board	K7	54	17.61		22	13.7		0.0	136		off	off	off		K7 surfaced upside down
17/05/2021	09:00	Sailing to S8		54	17.60		22	14.6		11.9	264		off	off	off		
17/05/2021	9:24	Deploying the hydrophone		54	17.73		22	17.7		1.1	034		off	off	off		
17/05/2021	9:35	Sailing to S8		54	17.77		22	21.9		1.1	347		off	off	off		
17/05/2021	10:20	Sailing to S8		54	18.02		22	26.4		0.1	086		off	off	off		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
17/05/2021	10:35	On station for S8		54	18.02		22	26.4		0.1	084		off	off	off		
17/05/2021	10:55	On station for S8	S8	54	18.02		22	26.4		0.4	087		off	off	off		
17/05/2021	11:35	S8 on board	S8	54	17.82		22	26.8		1.3	010		off	off	off		orange buoy mistaken for obs
17/05/2021	11:38	Sailing to S9	S8	54	17.87		22	26.9		0.4	256		off	off	off		
17/05/2021	12:00	Sailing to S9		54	17.72		22	33.8		10.8	264		off	off	off		
17/05/2021	12:02	Pinging S9		54	17.72		22	34.3		4.2	283		off	off	off		Slowing for ping
17/05/2021	12:30	Sailing to S9		54	17.59		22	39.5		5.6	265		off	off	off		
17/05/2021	12:32	On station for S9	S9	54	17.61		22	39.7		1.9	299		off	off	off		
17/05/2021	12:39	Deploying hydrophone	S9	54	17.60		22	39.7		0.1	321		off	off	off		
17/05/2021	12:44	Pinging S9	S9	54	17.61		22	39.7		0.3	334		off	off	off		
17/05/2021	13:31	S9 on board	S9	54	17.38		22	39.6		0.8	159		off	off	off		
17/05/2021	13:35	Sailing to S10		54	17.37		22	39.5		2.8	348		off	off	off		
17/05/2021	13:45	Sailing to S10		54	17.67		22	42.7		12.8	279		off	off	off		
17/05/2021	14:00	Slowing to ping S10		54	17.81		22	47.2		3.4	017		off	off	off		
17/05/2021	14:02	Pinging S10		54	17.87		22	47.2		0.1	099		off	off	off		
17/05/2021	14:06	Sailing to S10		54	17.86		22	47.2		1.0	097		off	off	off		
17/05/2021	14:15	Sailing to S10		54	17.78		22	49.6		12.7	266		off	off	off		
17/05/2021	14:27	On station for S10	S10	54	17.66		22	52.7		0.7	034		off	off	off		
17/05/2021	14:30	Pinging S10	S10	54	17.66		22	52.7		0.7	038		off	off	off		
17/05/2021	14:45	Pinging S10	S10	54	17.66		22	52.8		0.2	038		off	off	off		
17/05/2021	15:18	S10 on board	S10	54	17.48		22	52.4		0.8	075		off	off	off		
17/05/2021	15:22	Sailing to S11		54	17.51		22	52.5		7.2	270		off	off	off		
17/05/2021	15:48	pinging S11		54	17.62		23	0.3		0.7	79		off	off	off		Transducer out, 3 miles from deployment site
17/05/2021	15:54	Sailing to S11		54	17.60		23	0.4		1.9	219		off	off	off		
17/05/2021	16:13	Pinging S11	S11	54	17.54		23	0.5		0.7	45		off	off	off		
17/05/2021	17.03	S11 on board	S11	54	17.57		23	0.5		0.5	92		off	off	off		
17/05/2021	17:07	Sailing to S12		54	17.60		23	0.5		7.0	271		off	off	off		
17/05/2021	17:32	Pinging S12		54	17.65		23	13.4		1.0	358		off	off	off		
17/05/2021	17:36	Sailing to S12		54	17.68		23	13.5		2.4	288		off	off	off		Transducer out, 3 miles from deployment site
17/05/2021	17:55	Pinging S12	S12	54	17.68		23	18.3		0.5	83		off	off	off		
17/05/2021	18:47	S12 on board	S12	54	17.88		23	18.4		1.0	111		off	off	off		
17/05/2021	18:49	Sailing to S13		54	17.83		23	18.5		5.6	265		off	off	off		
17/05/2021	19:07	Sailing to S13		54	17.75		23	24.0		11.4	266		off	off	off		
17/05/2021	19:36	Sailing to S13		54	17.65		23	31.1		7.7	273		off	off	off		
17/05/2021	19:39	Pinging S13	S13	54	17.74		23	31.5		1.3	039		off	off	off		
17/05/2021	20:20	S13 onboard	S13	54	17.73		23	31.6		0.3	046		off	off	off		
17/05/2021	20:39	Sailing to S14		54	17.55		23	37.2		12.6	055		off	off	off		
17/05/2021	20:46	Slowing to ping S14		54	17.60		23	39.5		2.6	043		off	off	off		
17/05/2021	20:51	Pinging S14	S14	54	17.64		23	39.5		0.4	089		off	off	off		
17/05/2021	21:00	Sailing to S14		54	17.58		23	41.3		11.0	264		off	off	off		
17/05/2021	21:17	Stationed at S14	S14	54	17.59		23	44.6		0.6	087		off	off	off		Surfacing within half an hour
17/05/2021	21:47	S14 on board	S14	54	17.64		23	44.8		1.4	132		off	off	off		
17/05/2021	21:53	Sailing to S15	S15	54	17.67		23	45.7		11.5	268		off	off	off		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
17/05/2021	22:17	Pinging S15		54	17.45		23	52.4		0.5	066		off	off	off		
17/05/2021	22:24	Sailing to S15		54	17.37		23	52.6		3.8	277		off	off	off		
17/05/2021	22:40	Sailing to S15		54	17.37		23	57.3		9.1	274		off	off	off		
17/05/2021	22:44	Stationed and pinging at S15		54	17.40		23	57.5		0.1	066		off	off	off		
17/05/2021	23:16	S15 on board	S15	54	17.19		23	57.8		2.2	032		off	off	off		
17/05/2021	23:18	Sailing to S16		54	17.19		23	57.8		2.2	033		off	off	off		
17/05/2021	23:30	Sailing to S16		54	17.33		24	1.8		13.2	273		off	off	off		3 miles out
17/05/2021	23:45	Pinging to S16		54	17.44		24	5.2		0.4	094		off	off	off		
17/05/2021	23:46	Sailing to S16		54	17.47		24	5.2		3.3	279		off	off	off		
18/05/2021	00:00	Sailing to S16		54	17.30		24	9.8		11.8	263		off	off	off		
18/05/2021	00:05	Stationed and pinging at S16	S16	54	17.35		24	10.6		0.6	065		off	off	off		surface due in 30 min
18/05/2021	00:45	S16 on board	S16	54	17.51		24	10.7		0.9	056		off	off	off		
18/05/2021	00:47	Sailing to S17	S16	54	17.53		24	10.7		2.4	329		off	off	off		
18/05/2021	01:02	Sailing to S17		54	17.41		24	15.6		12.6	266		off	off	off		
18/05/2021	01:10	Pinging S17		54	17.46		24	18.1		2.1	036		off	off	off		3 miles out
18/05/2021	01:15	Sailing to S17		54	17.49		24	18.1		0.6	084		off	off	off		
18/05/2021	01:30	Sailing to S17		54	17.32		24	22.2		12.3	267		off	off	off		
18/05/2021	01:39	Stationed and pinging at S17	S17	54	17.35		24	23.4		0.1	055		off	off	off		
18/05/2021	02:22	S17 on board	S17	54	17.58		24	23.6		0.6	115		off	off	off		
18/05/2021	02:26	Sailing to S18	S17	54	17.61		24	23.6		2.6	315		off	off	off		
18/05/2021	02:45	Sailing to S18		54	17.37		24	29.6		12.7	265		off	off	off		
18/05/2021	02:51	Pinging S18		54	17.45		24	31.2		2.0	044		off	off	off		3 miles out
18/05/2021	02:56	Sailing to S18		54	17.52		24	31.2		1.4	007		off	off	off		
18/05/2021	03:00	Sailing to S18		54	17.51		24	32.3		12.7	255		off	off	off		
18/05/2021	03:16	Stationed and pinging at S18	S18	54	17.13		24	36.6		1.2	034		off	off	off		
18/05/2021	04:06	S18 on board	S18	54	17.51		24	37.0		0.6	352		off	off	off		
18/05/2021	04:09	Sailing to S19	S18	54	17.56		24	37.5		10.9	260		off	off	off		
18/05/2021	04:34	Pinging S19		54	17.12		24	44.5		0.3	53		off	off	off		Transducer out, 3 miles from deployment site
18/05/2021	04:38	Sailing to S19		54	17.14		24	44.5		1.8	359		off	off	off		
18/05/2021	04:57	Pinging S19	S19	54	16.91		24	49.4		0.2	69		off	off	off		
18/05/2021	06:21	S19 on board	S19	54	17.44		24	50.5		0.1	55		off	off	off		
18/05/2021	06:23	Sailing to S20	S19	54	17.46		24	40.5		2.2	258		off	off	off		
18/05/2021	06:51	Pinging S20		54	16.91		24	57.7		0.3	80		off	off	off		
18/05/2021	06:55	Sailing to S20		54	16.88		24	57.7		0.8	55		off	off	off		
18/05/2021	7:14	Sailing to S20		54	16.82		25	2.4		4.9	042		off	off	off		
18/05/2021	7:21	Pinging S20	S20	54	16.79		25	2.6		1.2	200		off	off	off		
18/05/2021	8:01	S20 onboard	S20	54	16.89		25	3.0		1.2	220		off	off	off		
18/05/2021	8:05	Sailing to S21	S20	54	16.79		25	0.4		11.6	268		off	off	off		
18/05/2021	8:33	Pinging S21		54	16.58		25	10.2		0.7	330		off	off	off		
18/05/2021	8:40	Sailing to S21		54	16.58		25	10.9		10.0	276		off	off	off		
18/05/2021	9:00	Pinging S21	S21	54	16.57		25	15.9		2.1	068		off	off	off		
18/05/2021	9:44	S21 onboards	S21	54	16.62		25	15.9		1.3	113		off	off	off		
18/05/2021	9:48	Sailing to S22	S21	54	16.55		25	16.2		9.3	269		off	off	off		
18/05/2021	10:05	Sailing to S22		54	16.47		25	21.8		11.8	270		off	off	off		
18/05/2021	10:14	Pinging S22		54	16.45		25	23.5		0.4	078		off	off	off		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
18/05/2021	10:32	Sailing to S22		54	16.30		25	27.5		10.4	270		off	off	off		
18/05/2021	10:39	Pinging S22	S22	54	16.35		25	28.8		0.4	056		off	off	off		
18/05/2021	11:05	S22 onboard	S22	54	16.69		25	29.1		1.6	281		off	off	off		
18/05/2021	11:08	Sailing to S23	S22	54	16.21		25	29.7		10.9	271		off	off	off		
18/05/2021	11:15	Sailing to S23		54	16.18		25	31.8		13.0	270		off	off	off		
18/05/2021	11:30	Pinging S23		54	16.29		25	36.5		1.5	052		off	off	off		3 miles out
18/05/2021	11:36	Sailing to S23		54	16.31		25	36.4		3.5	275		off	off	off		
18/05/2021	11:45	Sailing to S23		54	16.16		25	39.2		12.5	271		off	off	off		
18/05/2021	11:58	Stationed and pinging at S23	S23	54	16.15		25	41.6		0.1	077		off	off	off		
18/05/2021	12:27	S23 aboard	S23	54	15.94		25	42.0		1.6	300		off	off	off		
18/05/2021	12:28	Sailing to S24	S23	54	15.94		25	42.0		3.4	301		off	off	off		
18/05/2021	12:45	Sailing to S24		54	15.93		25	48.2		12.7	269		off	off	off		
18/05/2021	12:53	Pinging S24		54	15.96		25	49.6		0.5	050		off	off	off		3 miles out
18/05/2021	12:56	Sailing to S24		54	15.95		25	49.6		0.6	072		off	off	off		
18/05/2021	13:15	Stationed and pinging at S24	S24	54	15.80		25	54.7		1.1	038		off	off	off		
18/05/2021	13:54	S24 on board	S24	54	15.42		25	55.0		0.2	150		off	off	off		
18/05/2021	13:57	Sailing to S25	S24	54	15.38		25	55.1		1.2	126		off	off	off		
18/05/2021	14:15	Sailing to S25		54	15.64		26	0.5		12.6	267		off	off	off		
18/05/2021	14:22	Pinging S25		54	15.72		26	2.4		1.0	053		off	off	off		3 miles out
18/05/2021	14:27	Sailing to S25		54	15.72		26	2.3		1.1	341		off	off	off		
18/05/2021	14:45	Stationed and pinging at S25	S25	54	15.59		26	7.7		0.5	080		off	off	off		
18/05/2021	15:36	S25 on board	S25	54	15.40		26	0.8		2.1	201		off	off	off		the rope was tangled around eh hudrophone and one of the power cables may be also loose.
18/05/2021	15:38	Sailing to S26		54	15.34		26	0.8		8.0	270		off	off	off		
18/05/2021	16:21	Pinging S26		54	15.27		26	22.4		0.4	73		off	off	off		
18/05/2021	16:25	Sailing to S26		54	15.26		26	22.5		1.0	150		off	off	off		
18/05/2021	16:35	Pinging S26	S26										off	off	off		
18/05/2021	17:37	S26 on board	S26	54	15.08		26	27.4		3.1	263		off	off	off		
18/05/2021	17:39	Sailing to S27		54	15.04		26	27.8		6.4	266		off	off	off		
18/05/2021	18:20	Pinging S27		54	14.73		26	41.7		0.7	54		off	off	off		
18/05/2021	18:24	Sailing to S27		54	14.74		26	41.7		0.7	68		off	off	off		
18/05/2021	18:46	Pinging S27											off	off	off		
18/05/2021	19:33	S27 on board	S27	54	14.66		26	46.6		0.9	007		off	off	off		
18/05/2021	19:50	Waiting to deploy the MAG		54	14.69		26	46.6		1.2	304		ok	ok	ok		Going to do a survery of the Eriador SEAMOUNT
18/05/2021	20:12	Deploying the MAG	Eriador PRO	54	13.17		26	46.4		3.3	090		ok	ok	ok		Up until now the EK60 had only been recording down to 500 m. Have now rectified record to 3500 m
18/05/2021	21:01	MAG & BATHY Eriador		54	13.34		26	38.6		5.7	088		ok	ok	ok		
18/05/2021	21:37	MAG & BATHY Eriador		54	13.47		26	33.1		5.6	090		ok	ok	ok		
18/05/2021	22:00	MAG & BATHY Eriador		54	13.52		26	29.6		5.8	088		ok	ok	ok		
18/05/2021	22:30	MAG & BATHY Eriador		54	13.63		26	24.5		5.5	089		ok	ok	ok		
18/05/2021	23:00	MAG & BATHY Eriador		54	13.73		26	19.7		5.6	089	3629	ok	ok	ok		
18/05/2021	23:30	MAG & BATHY Eriador		54	13.83		26	14.7		5.9	088	3590	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
19/05/2021	00:00	MAG & BATHY Eriador		54	13.93		26	9.8		6.0	087	3496	ok	ok	ok		
19/05/2021	00:30	MAG & BATHY Eriador		54	14.03		26	4.8		5.9	082	3217	ok	ok	ok		
19/05/2021	01:00	MAG & BATHY Eriador		54	14.13		25	59.9		6.0	083	3137	ok	ok	ok		
19/05/2021	01:30	MAG & BATHY Eriador		54	14.23		25	54.9		6.1	086	3244	ok	ok	ok		
19/05/2021	02:00	MAG & BATHY Eriador		54	14.34		25	49.7		6.3	083	2987	ok	ok	ok		
19/05/2021	02:30	MAG & BATHY Eriador		54	14.49		25	44.7		5.9	086	2567	ok	ok	ok		
19/05/2021	03:00	MAG & BATHY Eriador		54	14.57		25	40.0		6.2	089	2626	ok	ok	ok		
19/05/2021	03:30	MAG & BATHY Eriador		54	14.69		25	34.0		6.3	089	2648	ok	ok	ok		
19/05/2021	04:15	MAG & BATHY Eriador		54	14.88		25	25.7		6.4	88	2714	ok	ok	ok		
19/05/2021	04:39	MAG & BATHY Eriador		54	14.93		25	21.9		6.3	88	3059	ok	ok	ok		
19/05/2021	05:14	MAG & BATHY Eriador		54	15.09		25	16.1		6.1	88	2949	ok	ok	ok		
19/05/2021	05:48	MAG & BATHY Eriador		54	15.21		25	10.2		6.2	88	3000	ok	ok	ok		
19/05/2021	06:15	MAG & BATHY Eriador		54	15.28		25	50.6		6.1	84	2983	ok	ok	ok		
19/05/2021	06:47	MAG & BATHY Eriador		54	15.41		24	59.9		5.9	90	3020	ok	ok	ok		MAG Data View was frozen since 19/05/2021 4:12. Data recorded on log sheet are erroneous, but MAG data was recorded normally.
19/05/2021	7:30	MAG & BATHY Eriador		54	15.56		24	52.6		5.9	092	3125	ok	ok	ok		
19/05/2021	7:56	MAG & BATHY Eriador		54	16.21		24	49.5		6.1	000	3089	ok	ok	ok		
19/05/2021	9:00	MAG & BATHY Eriador		54	18.17		24	45.7		6.3	266	2892	ok	ok	ok		
19/05/2021	9:25	MAG & BATHY Eriador		54	18.11		25	1.4		6.4	269	2933	ok	ok	ok		
19/05/2021	9:55	MAG & BATHY Eriador		54	18.00		25	0.7		6.3	269	2991	ok	ok	ok		
19/05/2021	10:30	MAG & BATHY Eriador		54	17.89		25	13.1		6.4	270	2955	ok	ok	ok		
19/05/2021	10:59	MAG & BATHY Eriador		54	17.78		25	18.4		6.3	271	2967	ok	ok	ok		
19/05/2021	11:30	MAG & BATHY Eriador		54	17.67		25	24.1		6.5	271	2787	ok	ok	ok		
19/05/2021	12:00	MAG & BATHY Eriador		54	17.56		25	29.3		6.2	268	2439	ok	ok	ok		
19/05/2021	12:29	Launch XBT	XBT-T5-25	54	17.53		25	34.5		6.0	272	2421	ok	ok	ok		Probe 263666
19/05/2021	12:35	XBT End	XBT-T5-25	54	17.54		25	35.5		5.9	272	2391	ok	ok	ok		terminal depth reached; 2200 m, 3 deg C
19/05/2021	13:00	MAG & BATHY Eriador		54	17.39		25	39.8		6.2	270	2378	ok	ok	ok		
19/05/2021	13:30	MAG & BATHY Eriador		54	17.35		25	45.0		6.3	275	2391	ok	ok	ok		
19/05/2021	13:56	Launch XBT	XBT-T5-26	54	17.24		25	49.6		6.3	271	2945	ok	ok	ok		Probe 263668
19/05/2021	14:00	MAG & BATHY Eriador		54	17.22		25	50.2		6.2	272	2967	ok	ok	ok		MAG screen frozen, still recording data though
19/05/2021	14:02	XBT End	XBT-T5-26	54	17.21		25	50.7		6.1	272	2967	ok	ok	ok		terminal depth reached; 2200 m, 4 deg C
19/05/2021	14:30	MAG & BATHY Eriador		54	17.13		25	55.6		6.1	272	3120	ok	ok	ok		MAG screen frozen, Per tinkering
19/05/2021	15:00	MAG & BATHY Eriador		54	17.08		26	0.5		5.7	272	3299	ok	ok	ok		
19/05/2021	15:09	Launch XBT	XBT-T5-27	54	17.06		26	2.1		5.9	273	3239	ok	ok	ok		Probe 263672
19/05/2021	15:15	XBT End	XBT-T5-27	54	17.05		26	3.1		5.8	271	3254	ok	ok	ok		terminal depth reached; 2250 m, 4 deg C
19/05/2021	15:19	Launch XBT	XBT-T11-28	54	17.03		26	3.7		5.7	266	3255	ok	ok	ok		Probe 22745
19/05/2021	15:26	XBT End	XBT-T11-28	54	16.99		26	4.9		5.9	267	3306	ok	ok	ok		terminal depth reached; 707 m, 5 deg C; MAG screen back running
19/05/2021	15:30	MAG & BATHY Eriador		54	16.95		26	5.9		5.6	267	3358	ok	ok	ok		
19/05/2021	15:46	MAG & BATHY Eriador		54	17.11		26	8.0		4.6	353	3457	ok	ok	ok		We are turning towards a new line

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
19/05/2021	16:00	MAG & BATHY Eriador		54	18.24		26	7.6		5.4	82	3443	ok	ok	ok		We started the new line (Per was working on his machine and the delta GPS=-44 sec recorded on magi can be due to that). He belives it started 15 minutes ago.
19/05/2021	16:30	MAG & BATHY Eriador		54	18.38		26	2.2		6.2	87	3295	ok	ok	ok		
19/05/2021	17:00	MAG & BATHY Eriador		54	18.45		25	57.3		5.8	85	3284	ok	ok	ok		
19/05/2021	17:31	MAG & BATHY Eriador		54	18.53		25	51.9		5.9	84	3046	ok	ok	ok		
19/05/2021	18:04	Launch XBT- T5	XBT-T5-29	54	18.73		25	42.9		6.3	85	2277	ok	ok	ok		T5 probe:263664
19/05/2021	18:09	XBT End	XBT-T5-29	54	18.73		25	42.9		6.3	85	2277	ok	ok	ok		end depth at 1950 temperature 3.5
19/05/2021	18:14	Launch XBT- T11	XBT-T11-30	54	18.73		25	42.9		6.3	85	2277	ok	ok	ok		T11:22744
19/05/2021	18:20	XBT End	XBT-T11-30	54	18.73		25	42.9		6.3	85	2277	ok	ok	ok		end depth at 560 temperature 4.75
19/05/2021	18:40	MAG & BATHY Eriador		54	18.81		25	40.4		6.2	87	2255	ok	ok	ok		
19/05/2021	19:00	MAG & BATHY Eriador		54	18.86		25	36.7		5.9	87	2313	ok	ok	ok		
19/05/2021	19:15	MAG & BATHY Eriador		54	18.92		25	34.1		6.2	086	2399	ok	ok	ok		
19/05/2021	19:35	Launch XBT- T11	XBT-T11-31	54	19.00		25	30.5		6.2	086	2404	ok	ok	ok		T11 probe: 22824
19/05/2021	19:41	XBT End	XBT-T11-31	54	19.02		25	29.4		6.4	086	2357	ok	ok	ok		End depth: 575m, temp 4.65 C
19/05/2021	20:07	MAG & BATHY Eriador		54	19.11		25	24.7		6.4	085	2599	ok	ok	ok		
19/05/2021	20:25	MAG & BATHY Eriador		54	19.24		25	21.4		6.5	086	2936	ok	ok	ok		
19/05/2021	20:48	MAG & BATHY Eriador		54	19.29		25	17.2		6.4	092	2945	ok	ok	ok		
19/05/2021	20:54	Launch XBT- T11	XBT-T11-32	54	19.28		25	16.1		6.3	091	2913	ok	ok	ok		T11 probe: 22825
19/05/2021	21:00	XBT End	XBT-T11-32	54	19.27		25	15.0		6.3	092	2901	ok	ok	ok		End depth: 610m, temp 4.49 C
19/05/2021	21:18	MAG & BATHY Eriador		54	19.28		25	11.9		6.2	088	2925	ok	ok	ok		
19/05/2021	21:31	MAG & BATHY Eriador		54	19.33		25	9.5		6.2	088	2940	ok	ok	ok		
19/05/2021	22:00	MAG & BATHY Eriador		54	19.40		25	4.5		6.1	087	2947	ok	ok	ok		
19/05/2021	22:31	MAG & BATHY Eriador		54	19.54		24	59.2		6.4	087	2868	ok	ok	ok		
19/05/2021	23:01	MAG & BATHY Eriador		54	19.74		24	54.1		6.1	087	2872	ok	ok	ok		
19/05/2021	23.09	Launch XBT- T5	XBT-T5-33	54	19.74		24	52.7		5.9	091	2872	ok	ok	ok		T-5 probe: 263673
19/05/2021	23:14	XBT End	XBT-T5-33	54	19.74		24	52.0		6.1	091	2855	ok	ok	ok		End depth: 2100, but garbage after 1000
19/05/2021	23:21	Launch XBT- T5	XBT-T5-34	54	19.76		24	51.5									T-5 probe: 383220
19/05/2021	23:25	XBT End	XBT-T5-34	54	19.77		24	50.1									End Depth: 1760. potentially rubbish between 750-1000
19/05/2021	23:32	MAG retrieved successfully		54	19.81		24	49.1		3.5	091	2920	ok	ok	ok		in
19/05/2021	23:32	Launch XBT- T11	XBT-T11-35	54	19.81		24	49.1		3.5	092	2921	ok	ok	ok		T-11 Probe: 22746
19/05/2021	23:39	XBT End	XBT-T11-35	54	19.68		24	48.3		8.9	130	2949	ok	ok	ok		End Depth: 740
19/05/2021	23:41	Heading to P2		54	19.48		24	47.9		9.6	130	2965	ok	ok	ok		
20/05/2021	00:33	Heading to P2		54	14.25		24	36.6		10.0	125	3230	ok	ok	ok		
20/05/2021	01:20	Heading to P2		54	9.48		24	25.9		10.3	125	3393	ok	ok	ok		
20/05/2021	02:31	Heading to P2		54	3.03		24	11.3		10.8	125	3427	ok	ok	ok		
20/05/2021	02:50	Heading to P2		53	59.92		24	4.4		10.6	125	3477	ok	ok	ok		
20/05/2021	07:41	Heading to P2		53	29.99		22	56.9		10.6	130	3880	ok	ok	ok		
20/05/2021	10:08	Heading to P2		53	14.62		22	22.4		10.0	124	244	?	?	ok		Strange artefact on the swath: no data directly under ship. EK60 shows very low or zero depth.
20/05/2021	10:30	Heading to P2		53	12.42		22	17.3		10.1	123	4013	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
20/05/2021	15:22	Heading to P2		50	37.28		16	5.7		10.9	110	4486	ok	ok	ok		
20/05/2021	21:52	Heading to P2		50	37.30		14	15.0		10.3	114	3886	ok	ok	ok		
21/05/2021	23:00	Heading to P2		49	58.89		13	59.3		10.1	123	3743	ok	ok	ok		
21/05/2021	23:15	Heading to P2		49	57.81		13	55.6		10.1	120	3798	ok	ok	ok		
21/05/2021	23:35	Heading to P2		49	56.38		13	51.1		10.1	121	3727	ok	ok	ok		
21/05/2021	23:41	Slow for S28	S28	49	55.89		13	49.6		8.0	119	3703	ok	ok	ok		
21/05/2021	23:44	Deploying S28	S28	49	55.00	51	13	49.0	15.7	0.9	336	3704	ok	ok	ok		
21/05/2021	23:45	Accelerate to S29	S28	49	55.86		13	49.3		1.7	349	3707	ok	ok	ok		
22/05/2021	00:00	Transit to S29		49	57.02		13	46.9		8.1	056	3491	ok	ok	ok		
22/05/2021	00:15	Transit to S29		49	58.33		13	44.1		8.7	052	3449	ok	ok	ok		
22/05/2021	00:22	Slow for S29	S29	49	58.89		13	43.0		6.7	052	3376	ok	ok	ok		
22/05/2021	00:25	Deploying S29	S29	49	59.00	9	13	42.0	37	1.5	342	3364	ok	ok	ok		
22/05/2021	00:27	Accelerate to S30	S29	49	59.19		13	42.6		2.6	057	3371	ok	ok	ok		
22/05/2021	00:30	Transit to S30		49	59.37		13	42.2		8.5	056	3416	ok	ok	ok		
22/05/2021	00:45	Transit to S30		50	0.69		13	39.5		8.5	055	3367	ok	ok	ok		
22/05/2021	01:00	Transit to S30		50	1.89		13	37.0		9.1	054	3230	ok	ok	ok		
22/05/2021	01:04	Slow for S30	S30	50	2.27		13	36.2		6.1	054	3201	ok	ok	ok		
22/05/2021	01:07	Deploying S30	S30	50	2.00	26	13	35.0	58.6	1.6	324	3192	ok	ok	ok		
22/05/2021	01:09	Accelerate to S31	S30	50	2.47		13	36.0		1.8	033	3192	ok	ok	ok		
22/05/2021	01:15	Transit to S31		50	2.91		13	35.0		9.2	057	3158	ok	ok	ok		
22/05/2021	01:30	Transit to S31		50	4.12		13	32.4		8.9	050	3100	ok	ok	ok		
22/05/2021	01:45	Slow for S31	S31	50	5.52		13	29.5		7.0	049	3017	ok	ok	ok		
22/05/2021	01:48	Deploying S31	S31	50	5.00	39	13	29.0	21.2	1.3	331	3016	ok	ok	ok		delay (caught on rope line)
22/05/2021	02:01	Deploying S31 - second attempt	S31	50	5.00	36	13	29.0	22.6	0.6	276	3016	ok	ok	ok		
22/05/2021	02:03	Accelerate to S32	S31	50	5.60		13	29.4		1.3	048	3017	ok	ok	ok		
22/05/2021	02:15	Transit to S32		50	6.52		13	27.5		9.2	054	2969	ok	ok	ok		
22/05/2021	02:30	Transit to S32		50	7.87		13	24.7		9.2	056	2916	ok	ok	ok		
22/05/2021	02:41	Slow for S32	S32	50	8.88		13	22.6		5.6	051	2832	ok	ok	ok		
22/05/2021	02:42	Deploying S32	S32	50	8.00	56	13	22.0	32.1	2.1	345	2829	ok	ok	ok		
22/05/2021	02:44	Accelerate to S33	S32	50	8.97		13	22.5		1.2	005	2826	ok	ok	ok		
22/05/2021	03:00	Transit to S33		50	10.18		13	19.8		9.4	053	2729	ok	ok	ok		
22/05/2021		Transit to S33															
22/05/2021	03:18	Slow for S33	S33	50	11.95		13	16.2		6.7	48	2673	ok	ok	ok		
22/05/2021	03:23	Deploying S33	S33	50	12.00	6.8	13	15.0	54	1.4	14	2672	ok	ok	ok		OBS hit the ship
22/05/2021	03:25	Accelerate to S34	S33	50	12.21		13	15.7		6.4	49	2669	ok	ok	ok		
22/05/2021	03:45	Transit to S34		50	14.04		13	11.9		9.4	54	2621	ok	ok	ok		
22/05/2021	03:58	Slow for S34	S34	50	15.18		13	9.4		6.8	53	2597	ok	ok	ok		
22/05/2021	04:04	Deploying S34	S34	50	15.00	23	13	9.0	9.73	0.8	346	2592	ok	ok	ok		
22/05/2021	04:16	Accelerate to S35	S34	50	16.37		13	7.1		9.0	53	2572	ok	ok	ok		
22/05/2021	04:39	Transit to S35		50	18.70		13	2.8		9.1	52	2532	ok	ok	ok		
22/05/2021	04:40	Slow for S35	S35	50	18.46		13	2.6		6.6	54	2526	ok	ok	ok		
22/05/2021	04:45	Deploying S35	S35	50	18.00	37	13	2.0	27.2	0.8	351	2526	ok	ok	ok		
22/05/2021	04:48	Accelerate to S36		50	18.47		13	2.2		7.6	50	2526	ok	ok	ok		
22/05/2021	05:03	Transit to S36		50	20.18		12	59.1		9.2	53	2499	ok	ok	ok		
22/05/2021	05:22	Slow for S36	S36	50	21.75		12	55.8		4.8	52	2477	ok	ok	ok		
22/05/2021	05:25	Deploying S36	S36	50	21.00	51	12	55.0	39.3	1.6	15	2475	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
22/05/2021	05:31	Accelerate to S37		50	22.23		12	54.8		9.1	51	2471	ok	ok	ok		
22/05/2021	05:44	Transit to S37		50	23.37		12	52.5		9.4	53	2487	ok	ok	ok		
22/05/2021	06:03	Slow for S37	S37	50	25.02		12	48.9		4.4	48	2462	ok	ok	ok		
22/05/2021	06:06	Deploying S37	S37	50	25.00	5.3	12	48.0	51.9	0.9	349	2460	ok	ok	ok		
22/05/2021	06:08	Accelerate to S38		50	25.15		12	48.8		5.9	51	2460	ok	ok	ok		
22/05/2021	06:22	Transit to S38		50	26.46		12	46.0		9.3	54	2444	ok	ok	ok		
22/05/2021	06:43	Slow for S38	S38	50	28.27		12	42.0		3.4	10	2407	ok	ok	ok		
22/05/2021	06:46	Deploying S38	S38	50	28.00	19	12	42.0	1.79	1.2	358	2407	ok	ok	ok		
22/05/2021	06:48	Accelerating for S39		50	28.35		12	42.0		4.4	51	2406	ok	ok	ok		
22/05/2021	7:04	Transit to S39		50	29.76		12	39.0		9.0	050	2382	ok	ok	ok		
22/05/2021	7:23	Slowing for S39	S39	50	31.74		12	35.3		5.4	045	2351	ok	ok	ok		
22/05/2021	7:25	Deploying S39	S39	50	31.00	31	12	35.0	15.8	0.8	314	2351	ok	ok	ok		
22/05/2021	7:28	Accelerating to S40		50	31.56		12	35.2		5.6	046	2350	ok	ok	ok		
22/05/2021	7:38	Transit to S40		50	32.38		12	33.5		9.3	048	2334	ok	ok	ok		
22/05/2021	08:04	Slowing for S40	S40	50	34.75		12	28.4		2.5	335	2280					
22/05/2021	08:05	Deploying S40	S40	50	34.00	46	12	28.0	26.2	0.8	320	2281	ok	ok	ok		
22/05/2021	08:08	Accelerating to S41		50	34.80		12	28.4		2.9	054	2280	ok	ok	ok		
22/05/2021	08:30	Transit to S41		50	36.81		12	24.1		9.6	051	2246	ok	ok	ok		
22/05/2021	08:45	Deploying S41	S41	50	38.00	1.6	12	21.0	34.8	1.3	291	2230	ok	ok	ok		
22/05/2021	08:48	Accelerating to S42		50	38.06		12	21.6		2.9	049	2231	ok	ok	ok		
22/05/2021	09:00	Transit to S42		50	38.99		12	19.4		9.5	050	2220	ok	ok	ok		
22/05/2021	09:23	Slowing for S42	S42	50	41.11		12	14.7		7.2	044	2188	ok	ok	ok		
22/05/2021	09:26	Deploying S42	S42	50	41.00	9.7	12	14.0	41.1	0.6	278	2187	ok	ok	ok		
22/05/2021	09:31	Accelerating to S43		50	41.17		12	14.6		4.0	050	2187	ok	ok	ok		
22/05/2021	09:47	Transit to S43		50	42.74		12	11.3		9.1	052	2158	ok	ok	ok		
22/05/2021	10:00	Transit to S43		50	43.70		12	9.2		9.3	049	2142	ok	ok	ok		
22/05/2021	10:06	Slowing for S43	S43	50	44.42		12	7.8		2.4	332	2129	ok	ok	ok		
22/05/2021	10:08	Deploying S43	S43	50	44.00	26	12	7.0	49.2	0.3	321	2130	ok	ok	ok		
22/05/2021	10:11	Accelerating to S44		50	44.47		12	7.8		3.0	045	2128	ok	ok	ok		
22/05/2021	10:15	Transit to S44		50	44.74		12	7.2		9.3	052	2120	ok	ok	ok		
22/05/2021	10:30	Transit to S44		50	46.07		12	4.2		9.2	052	2071	ok	ok	ok		
22/05/2021	10:46	Slowing for S44	S44	50	47.52		12	1.0		4.2	007	2012	ok	ok	ok		
22/05/2021	10:48	Deploying S44	S44	50	47.00	34	12	0.0	58.2	1.1	334	2013	ok	ok	ok		
22/05/2021	10:50	Accelerating for S45		50	47.61		12	0.9		3.6	052	2012	ok	ok	ok		
22/05/2021	11:00	Transit to S45		50	48.37		11	59.1		9.6	056	1987	ok	ok	ok		
22/05/2021	11:15	Transit to S45		50	49.89		11	55.7		9.3	050	1935	ok	ok	ok		
22/05/2021	11:24	Slowing for S45	S45	50	50.54		11	54.4		7.2	048	1922	ok	ok	ok		
22/05/2021	11:29	Deploying S45	S45	50	50.00	44	11	54.0	2.9	0.7	341	1919	ok	ok	ok		
22/05/2021	11:31	Accelerating for S46		50	50.78		11	54.0		4.3	069	1916	ok	ok	ok		
22/05/2021	11:45	Transit to S46		50	51.90		11	51.4		9.4	051	1879	ok	ok	ok		
22/05/2021	12:00	Transit to S46		50	53.31		11	48.3		9.4	054	1812	ok	ok	ok		
22/05/2021	12:05	Slowing for S46	S46	50	53.82		11	47.2		5.8	052	1788	ok	ok	ok		
22/05/2021	12:07	Deploying S46	S46	50	53.00	54	11	47.0	6.06	1.1	329	1783	ok	ok	ok		
22/05/2021	12:09	Accelerating for S47		50	53.93		11	47.1		4.8	062	1781	ok	ok	ok		
22/05/2021	12:15	Transit to S47		50	54.31		11	46.2		9.8	053	1757	ok	ok	ok		
22/05/2021	12:30	Transit to S47		50	55.91		11	42.6		10.1	057	1623	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
22/05/2021	12:42	Slowing for S47	S47	50	56.97		11	40.3		7.3	048	1513	ok	ok	ok		
22/05/2021	12:45	Deploying S47	S47	50	57.00	5.9	11	40.0	12.2	1.1	310	1505	ok	ok	ok		OBS banged against side of boat
22/05/2021	12:50	Transit to start P2	P2	50	57.12		11	40.2		5.1	054	1502	ok	ok	ok		
22/05/2021	13:20	Transit to start P2	P2	50	59.85		11	34.1		10.2	054	1190	ok	ok	ok		
22/05/2021	13:51	Transit to start P2	P2	51	2.87		11	26.8		10.6	050	552	ok	ok	ok		
22/05/2021	14:09	Turning Around	P2	51	4.77		11	23.0		5.0	316	355	ok	ok	ok		3 fishing vessels nearby
22/05/2021	14:23	Preping to deploy airgun	P2	51	4.70		11	23.0		1.0	228	358	ok	ok	ok		
22/05/2021	14:30	Deploying first airgun	P2	51	4.56		11	23.2		3.0	241	372	ok	ok	ok		Starboard
22/05/2021	14:41	Deploying second airgun	P2	51	4.26		11	24.0		3.0	245	412	ok	ok	ok		Port
22/05/2021	14:43	Airguns deployed	P2	51	4.20		11	24.1		2.8	245	419	ok	ok	ok		
22/05/2021	14:56	Soft start has begun	P2	51	3.88		11	25.0		3.0	240	452	ok	ok	ok		
22/05/2021	15:42	Soft start has finished- Full Power	P2	51	23.70		11	28.3		4.9	268	692	ok	ok	ok		
22/05/2021	15:42	Start P2	P2	51	23.70		11	28.3		4.9	268	692	ok	ok	ok		
22/05/2021	16:25	Shooting- P2	P2	51	0.31		11	32.9		4.9	240	1018	ok	ok	ok		
22/05/2021	16:50	Shooting- P2	P2	50	59.18		11	35.5		4.9	240	1275	ok	ok	ok		
22/05/2021	17:22	Shooting- P2	P2	50	57.65		11	39.0		4.9	238	1448	ok	ok	ok		
22/05/2021	17:45	Shooting- P2	P2	50	56.53		11	41.4		4.9	234	1536	ok	ok	ok		
22/05/2021	18:16	XBT launch	XBT-T11-36	50	55.02		11	44.7		4.8	235	1695	ok	ok	ok		Serial 22816
22/05/2021	18:23	xbt end	XBT-T11-36	50	54.67		11	45.4		4.9	235	1742	ok	ok	ok		Final depth 740 m
22/05/2021	18:30	Shooting- P2	P2	50	54.37		11	46.1		5.0	235	1755	ok	ok	ok		
22/05/2021	18:59	Shooting- P2	P2	50	52.99		11	49.1		4.9	237	1830	ok	ok	ok		
22/05/2021	19:15	Shooting - P2	P2	50	52.22		11	50.9		5.2	237	2863	ok	ok	ok		
22/05/2021	20:15	Shooting - P2	P2	50	49.30		11	56.9		4.4	231	1952	ok	ok	ok		
22/05/2021	21:02	Guns off		50	47.20		12	0.2		3.1	237	2020	OK	OK	OK		Stopped shooting at S44, we can start deploying at S45 when we resume
22/05/2021	21:24	Guns onboard		50	46.69		12	2.8		2.9	235	2047	ok	ok	ok		Will turn shortly & head for Bantry Bay
22/05/2021	21:30	Turning around to head to Bantry Bay		50	46.62		12	3.1		3.8	061	2581	ok	ok	ok		
22/05/2021	22:40	Transit to Bere Island		50	47.38		12	1.0		10.9	058	2013	ok	ok	ok		
23/05/2021	08:30	Arrive Bere Island															
24/05/2021	10:50	Depart Bere Island															
25/05/2021	04:55	Start deploing air Guns	P2	50	52.31		11	51.0		2.3	264	1863	ok	ok	ok		The bathymetry does not look good. The guns needed adjustment so no deployment now
25/05/2021	05:12	Deployment of air Guns	P2	50	52.28		11	51.6		0.1	262	1868	ok	ok	ok		
25/05/2021	06:55	MMO Starting watch	P2														
25/05/2021	07:03	MMO on watch	P2	50	50.29		11	55.0		1.5	254	1928	ok	ok	ok		
25/05/2021	07:15	MMO on watch		50	50.12		11	55.4		2.0	256	1934	ok	ok	ok		
25/05/2021	07:30	MMO on watch		50	49.89		11	55.9		1.3	254	1938	ok	ok	ok		
25/05/2021	07:45	MMO on watch		50	49.64		11	56.4		1.7	253	1946	ok	ok	ok		Hopefully starting soft start in 10-15mins
25/05/2021	07:55	Soft start commenced	P2	50	49.47		11	56.7		1.6	256	1952	ok	ok	ok		Full shooting should start at 8:35. Going to increase the SOG
25/05/2021	08:20	Soft Start	P2	50	48.91		11	58.4		4.7	234	1977	ok	ok	ok		
25/05/2021	08:32	Soft Start	P2	50	48.26		11	59.4		4.8	235	1994	ok	ok	ok		End of soft start at 8:40
25/05/2021	08:40	End of Soft Start		50	47.81		12	0.3		4.7	241	2003	ok	ok	ok		
25/05/2021	08:53	MAG deployed	P2	50	47.28		12	1.3		4.8	244	2012	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
25/05/2021	09:00	Launch XBT	XBT-T11-36	50	47.00		12	1.9		4.6	245	2027	ok	ok	ok		Probe 22747
25/05/2021	09:09	End of XBT	XBT-T11-36	50	46.64		12	2.8		4.6	246	2046	ok	ok	ok		Terminal Depth: 847.2m; Temp: 9.98C. Dodgey probe, plotted oddly(fuzzy) and still had readings of 10C at 760m. Going to run another one
25/05/2021	09:21	Launch XBT	XBT-T11-37	50	46.16		12	4.0		5.3	244	2065	ok	ok	ok		Probe: 22817
25/05/2021	09:27	End of XBT	XBT-T11-37	50	45.90		12	4.6		4.3	244	2074	ok	ok	ok		Terminal Depth: 645m; Temp: 10.63C. Profile also fuzzy. Potential issue with connections. Clint is going to have a look
25/05/2021	09:30	Shooting P2	P2	50	54.74		12	4.9		4.6	244	2078	ok	ok	ok		
25/05/2021	10:15	Shooting P2, streamer deploy	P2	50	43.85		12	9.0		4.2	243	2140	ok	ok	ok		Decision made to deploy streamer
25/05/2021	10:39	Streamer fully depolyed	P2	50	43.02		12	10.9		4.2	246	2158	ok	ok	ok		Birds not active yet
25/05/2021	10:50	Shooting P2	P2	50	42.62		12	11.9		4.5	251	2163	ok	ok	ok		Birds activated. Air compressor alarm rang. Accidental pressing of emergency stop at 10:48. Compressor relaunched at 10:50.
25/05/2021	11:00	Shooting P2	P2	50	42.10		12	12.9		4.9	229	2169	ok	ok	ok		
25/05/2021	11:15	Shooting P2	P2	50	41.33		12	14.1		4.4	248	2183	ok	ok	ok		
25/05/2021	11:30	Shooting P2	P2	50	40.74		12	15.5		3.1	237	2193	ok	ok	ok		
25/05/2021	11:45	Shooting P2	P2	50	40.18		12	16.8		4.4	243	2197	ok	ok	ok		
25/05/2021	11:56	Launch XBT	XBT-T11-38	50	39.74		12	17.8		4.9	242	2208	ok	ok	ok		Probe 22821
25/05/2021	11:56	XBT End	XBT-T11-38	50	39.70		12	17.9		4.8	242	2208	ok	ok	ok		Didn't work
25/05/2021	12:00	Shooting P2	P2	50	39.51		12	18.4		4.6	242	2214	ok	ok	ok		
25/05/2021	12:20	Shooting P2	P2	50	38.62		12	20.1		4.0	243	2223	ok	ok	ok		
25/05/2021	12:30	Shooting P2	P2	50	38.23		12	20.9		4.1	243	2229	ok	ok	ok		
25/05/2021	12:45	Shooting P2	P2	50	37.57		12	22.3		4.9	242	2237	ok	ok	ok		
25/05/2021	13:05	Shooting P2	P2	50	36.63		12	24.4		4.6	242	2252	ok	ok	ok		
25/05/2021	13:15	Shooting P2	P2	50	36.22		12	25.3		4.8	243	2261	ok	ok	ok		
25/05/2021	13:30	Shooting P2	P2	50	35.55		12	26.7		4.6	244	2268	ok	ok	ok		
25/05/2021	13:45	Shooting P2	P2	50	34.86		12	28.2		4.8	242	2281	ok	ok	ok		
25/05/2021	14:00	Shooting P2	P2	50	34.20		12	29.6		4.6	243	2290	ok	ok	ok		
25/05/2021	14:15	Shooting P2	P2	50	33.56		12	31.0		4.2	243	2304	ok	ok	ok		
25/05/2021	14:30	Shooting P2	P2	50	32.96		12	32.3		4.1	244	2322	ok	ok	ok		
25/05/2021	14:41	Launch XBT	XBT-T11-39	50	32.53		12	33.3		4.1	244	2334	ok	ok	ok		Probe 22822
25/05/2021	14:42	XBT End	XBT-T11-39	50	32.50		12	33.4		4.0	243	2334	ok	ok	ok		Didn’t work
25/05/2021	14:45	Shooting P2	P2	50	32.38		12	33.7		4.4	244	2337	ok	ok	ok		
25/05/2021	15:00	Shooting P2	P2	50	31.63		12	34.8		3.6	254	2351	ok	ok	ok		
25/05/2021	15:24	Shooting P2	P2	50	30.79		12	37.0		4.3	239	2368	ok	ok	ok		
25/05/2021	16:01	Shooting P2	P2	50	29.22		12	40.2		4.3	243	2393	ok	ok	ok		
25/05/2021	16:21	Shooting P2	P2	50	28.38		12	42.0		4.5	243	2407	ok	ok	ok		
25/05/2021	16:46	Shooting P2	P2	50	27.34		12	44.1		4.2	243	2426	ok	ok	ok		
25/05/2021	17:18	Shooting P2	P2	50	25.98		12	47.0		4.1	246	2451	ok	ok	ok		
25/05/2021	18:01	Shooting P2	P2	50	24.14		12	50.9		4.9	244	2477	ok	ok	ok		
25/05/2021	18:20	Shooting P2	P2	50	23.31		12	52.6		4.4	248	2492	ok	ok	ok		
25/05/2021	19:01	Shooting P2	P2	50	21.43		12	56.6		4.6	245	2480	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
25/05/2021	19:32	Shooting P2	P2	50	20.00		12	59.6		4.4	243	2503	ok	ok	ok		
25/05/2021	20:20	Shooting P2	P2	50	17.71		13	4.3		4.7	248	2539	ok	ok	ok		
25/05/2021	20:40	Shooting P2	P2	50	16.71		13	6.5		5.0	243	2566	ok	ok	ok		
25/05/2021	21:22	Shooting P2	P2	50	14.79		13	10.3		4.6	241	2604	ok	ok	ok		
25/05/2021	22:02	Shooting P2	P2	50	12.95		13	14.1		4.4	248	2648	ok	ok	ok		
25/05/2021	22:45	Shooting P2	P2	50	11.15		13	18.0		4.4	243	2700	ok	ok	ok		
25/05/2021	23:00	Shooting P2	P2	50	10.45		13	19.4		4.2	243	2720	ok	ok	ok		
25/05/2021	23:15	Shooting P2	P2	50	9.77		13	20.8		4.5	243	2757	ok	ok	ok		
25/05/2021	23:30	Shooting P2	P2	50	9.10		13	22.1		4.4	244	2820	ok	ok	ok		
25/05/2021	23:45	Shooting P2	P2	50	8.47		13	23.5		4.4	243	2865	ok	ok	ok		
26/05/2021	00:00	Shooting P2	P2	50	7.88		13	24.9		4.1	242	2940	ok	ok	ok		
26/05/2021	00:15	Shooting P2	P2	50	7.26		13	26.2		4.5	232	3297	ok	ok	ok		
26/05/2021	00:30	Shooting P2	P2	50	6.49		13	27.5		4.5	231	2970	ok	ok	ok		
26/05/2021	00:45	Shooting P2	P2	50	5.74		13	29.0		4.6	237	3007	ok	ok	ok		
26/05/2021	01:00	Shooting P2	P2	50	5.04		13	30.5		4.7	237	3056	ok	ok	ok		
26/05/2021	01:15	Shooting P2	P2	50	4.39		13	32.0		4.6	233	3087	ok	ok	ok		
26/05/2021	01:30	Shooting P2	P2	50	3.67		13	33.4		4.6	234	3118	ok	ok	ok		
26/05/2021	01:45	Shooting P2	P2	50	3.00		13	34.8		4.4	237	3155	ok	ok	ok		
26/05/2021	01:46	Launch XBT	XBT-T11-40	50	2.94		13	34.9		4.4	239	3159	ok	ok	ok		Probe 22820
26/05/2021	01:46	XBT End	XBT-T11-40	50	2.94		13	34.9		4.4	239	3159	ok	ok	ok		Didn't work
26/05/2021	02:00	Shooting P2	P2	50	2.29		13	36.1		4.6	230	3201	ok	ok	ok		
26/05/2021	02:15	Shooting P2	P2	50	1.55		13	37.6		4.6	236	3258	ok	ok	ok		
26/05/2021	02:30	Shooting P2	P2	50	0.95		13	38.9		4.2	235	3331	ok	ok	ok		
26/05/2021	02:45	Shooting P2	P2	50	0.33		13	40.3		4.4	235	3449	ok	ok	ok		
26/05/2021	03:00	Shooting P2	P2	49	59.62		13	41.7		4.7	227	3388	ok	ok	ok		
26/05/2021	03:30	Shooting P2	P2	49	58.22		13	44.5		4.5	231	3464	ok	ok	ok		
26/05/2021	04:22	Shooting P2	P2	49	55.92		13	49.1		4.3	228	3690	ok	ok	ok		
26/05/2021	05:00	Shooting P2	P2	49	54.06		13	52.7		4.8	231	3780	ok	ok	ok		
26/05/2021	05:35	Shooting P2	P2	49	52.43		13	56.0		4.8	232	3844	ok	ok	ok		
26/05/2021	05:56	End of Shooting P2	P2														
26/05/2021	06:00	Pulling in magnetometer		49	50.92		13	58.8		3.8	231	3901	ok	ok	ok		
26/05/2021	06:15	Pulling in streamer		49	50.45		13	59.6		2.5	231	3916	ok	ok	ok		
26/05/2021	06:39	Streamer on board		49	49.96		14	0.5		2.5	232	3930	ok	ok	ok		
26/05/2021	06:52	First airgun onboard		49	49.59		14	1.1		2.6	231	3940	ok	ok	ok		
26/05/2021	07:00	Second airgun (port) onboard		49	49.32		14	1.6		2.8	232	3947	ok	ok	ok		
26/05/2021	07:09	XBT Launch	XBT-T11-41	49	49.41		14	1.4		8.1	049	3946	ok	ok	ok		Probe: 22818
26/05/2021	07:13	XBT End	XBT-T11-41	49	50.04		14	0.2		10.6	050	3926	ok	ok	ok		Terminal Depth: 417m ; Temp: 10.6 C
26/05/2021	07:19	XBT Launch	XBT-T5-42	49	50.42		13	59.4		10.5	049	3913	ok	ok	ok		Probe: 263675
26/05/2021	07:22	XBT End	XBT-T5-42	49	50.76		13	58.8		10.6	046	3902	ok	ok	ok		Terminal Depth: 1328m ; Temp: 1.8 C
26/05/2021	07:53	Pinging S28		49	54.02		13	52.7		0.4	210	3778	ok	ok	ok		
26/05/2021	08:23	Sailing to S28		49	55.47		13	50.0		8.5	053	3713	ok	ok	ok		
26/05/2021	08:39	Pinging S28		49	55.92		13	49.1		0.5	152	3682	ok	ok	ok		
26/05/2021	09:13	S28 onboard	S28	49	56.05		13	49.2		0.7	271	3674	ok	ok	ok		
26/05/2021	09:15	Pinging S29 at same location															
26/05/2021	09:19	Sailing to S29		49	56.11		13	49.3		3.0	048	3666	ok	ok	ok		
26/05/2021	09:39	Slowing to ping		49	57.51		13	46.1		1.5	194	3473	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
26/05/2021	09:42	Pinging S29		49	57.49		13	46.1		0.1	254	3471	ok	ok	ok		S29 ETA is 10:40
26/05/2021	10:53	S29 on board	S29	49	59.36		13	42.6		0.9	291	3391	ok	ok	ok		
26/05/2021	11:00	Sailing to S30		49	59.65		13	41.8		10.6	071	3388	ok	ok	ok		
26/05/2021	11:11	Pinging S30		50	0.48		13	39.4		3.3	165	3397	ok	ok	ok		Techs at lunch - miscommunication
26/05/2021	11:20	Pinging S30		50	0.36		13	39.5		0.5	313	3281	ok	ok	ok		3 miles out
26/05/2021	11:23	Sailing to S30		50	0.39		13	39.5		2.4	040	3298	ok	ok	ok		
26/05/2021	11:44	Slowing to ping	S30	50	2.34		13	35.9		1.8	142	3193	ok	ok	ok		
26/05/2021	11:48	Pinging S30	S30	50	2.30		13	35.9		0.6	198	3193	ok	ok	ok		S30 ETA 12:20
26/05/2021	12:33	S30 on board	S30	50	2.67		13	36.0		1.7	003	3185	ok	ok	ok		
26/05/2021	12:36	Launch XBT	XBT-T5-43	50	2.72		13	36.0		0.8	068	3183	ok	ok	ok		Probe 263669
26/05/2021	12:42	XBT End	XBT-T5-43	50	2.77		13	35.9		0.6	078	3180	ok	ok	ok		Terminal depth; 2236 m, 4.6 deg C
26/05/2021	12:45	Launch XBT	XBT-T11-44	50	2.79		13	36.0		0.6	064	3180	ok	ok	ok		Probe 22819
26/05/2021	12:50	Sailing to S31		50	2.83		13	36.0		2.2	065	3180	ok	ok	ok		
26/05/2021	12:54	XBT End	XBT-T11-44	50	3.02		13	35.2		10.2	070	3160	ok	ok	ok		Terminal depth; 850 m; 10 deg C; Spent probe error before launch; Compromised?
26/05/2021	13:00	Sailing to S31		50	3.46		13	33.8		10.3	056	3126	ok	ok	ok		
26/05/2021	13:10	Pinging S31		50	3.79		13	32.9		0.6	195	3110	ok	ok	ok		
26/05/2021	13:15	Sailing to S31		50	3.95		13	32.7		8.7	047	3107	ok	ok	ok		
26/05/2021	13:30	Slowing to ping	S31	50	5.59		13	29.4		6.2	055	3020	ok	ok	ok		
26/05/2021	13:33	Pinging S31	S31	50	5.57		13	29.2		1.9	158	3013	ok	ok	ok		S31 ETA 14:00
26/05/2021	14:13	S31 on board	S31	50	5.62		13	29.5		1.0	233	3020	ok	ok	ok		
26/05/2021	14:15	Sailing to S32		50	5.61		13	29.5		3.0	289	3021	ok	ok	ok		
26/05/2021	14:30	Sailing to S32		50	6.79		13	26.8		10.3	050	2967	ok	ok	ok		
26/05/2021	14:35	Pinging S32		50	7.07		13	26.0		2.1	180	2999	ok	ok	ok		3 miles out
26/05/2021	14:45	Sailing to S32		50	7.46		13	25.3		10.3	047	3299	ok	ok	ok		
26/05/2021	14:58	Slowing to ping	S32	50	8.86		13	22.7		5.2	112	2834	ok	ok	ok		
26/05/2021	14:59	Pinging S32	S32	50	8.80		13	22.6		2.3	177	2845	ok	ok	ok		S32 ETA 15:25
26/05/2021	15:33	Pinging S32 again(3rd time)	S32	50	8.98		13	22.6				2825	ok	ok	ok		
26/05/2021	16:55	No findey l'OBSey - Sailing to S33		50	9.44		13	21.9		9.7	056	2782	ok	ok	ok		S32 not found, has not surfaced - foggy weather. Proceeding to S33.
26/05/2021	17:10	Pinging S33		50	10.52		13	19.4		1.5	145	2723	ok	ok	ok		
26/05/2021	17:16	Sailing to S33		50	10.53		13	19.5		4.2	69	2724	ok	ok	ok		
26/05/2021	17:37	Pinging S33	S33	50	12.10		13	15.9		0.5		2692	ok	ok	ok		
26/05/2021	18:11	S33 onboard	S33	50	11.95		13	16.5		1.3	187	2680	ok	ok	ok		
26/05/2021	18:15	Sailing to S34		50	11.93		13	16.5		2.9	59	2680	ok	ok	ok		
26/05/2021	18:37	Pinging S34		50	13.66		13	12.6		1.8	146	2630	ok	ok	ok		
26/05/2021	18:41	Sailing to S34		50	13.68		12	12.6		2.8	68	2630	ok	ok	ok		
26/05/2021	19:01	Pinging S34	S34	50	15.39		13	9.2		1.2	205	2593	ok	ok	ok		
26/05/2021	19:48	S34 on board	S34	50	15.11		13	9.9		1.4	206	2599	ok	ok	ok		Recovering tricky because of poor light and fog. Realised bridge has been using the wrong frequency for the direction finder. Now corrected, but should S32 have surfaced then the ship would have been unable to get a bearing to the OBS.

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
26/06/2021	20:00	Turning around to head to S32	S32	50	14.89		13	10.8		9.8	227	2608	ok	ok	ok		Due to issue with wrong frequency & being 3 hours ahead of retrieval schedual, we are going to trun around and look for S32
26/05/2021	21:08	Hunt for S32 commenced	S32	50	9.04		13	24.0		8.6	266	2805	ok	ok	ok		If it surfaced 4 hours ago, the potential drift is 4 miles (assuming a drift of 1 kt per hour) so we are going to run a series of transects across the area.
26/05/2021	21:35	Hunt for S32 called off	S32	50	8.90		13	26.4		10.5	057	2846	ok	ok	ok		Visibility very poor. No radio signal on ship or hand held finders. Decision made to call off search and continue along the profile to the next OBS site. Will return on Firday and hope the backup release works.
26/05/2021	21:45	Sailing to S35		50	9.82		13	24.0		10.5	063	2796	ok	ok	ok		Should be pinging S35 at 00:00
26/05/2021	22:01	Sailing to S35		50	11.17		13	20.1		10.6	064	2730	ok	ok	ok		
26/05/2021	22:15	Sailing to S35		50	12.27		13	17.0		10.4	063	2683	ok	ok	ok		
26/05/2021	22:31	Sailing to S35		50	13.69		13	13.1		10.3	059	2634	ok	ok	ok		
26/05/2021	23:00	Sailing to S35		50	16.50		13	6.8		10.5	053	2569	ok	ok	ok		
26/05/2021	23:08	Pinging S35		50	16.70		13	6.2		0.3	189	2562	ok	ok	ok		3 miles out
26/05/2021	23:30	Slowing to ping	S35	50	18.57		13	2.3		0.9	184	2527	ok	ok	ok		
26/05/2021	23:34	Pinging S35	S35	50	18.57		13	2.3		0.3	172	2527	ok	ok	ok		S35 ETA 23:58
27/05/2021	00:13	S35 on board	S35	50	18.17		13	2.5		0.6	207	2531	ok	ok	ok		
27/05/2021	00:17	Sailing to S36		50	18.18		13	3.2		5.1	017	2530	ok	ok	ok		
27/05/2021	00:30	Sailing to S36		50	19.60		13	0.3		10.5	048	2509	ok	ok	ok		
27/05/2021	00:37	Pinging S36		50	20.01		12	59.3		0.7	209	2501	ok	ok	ok		3 miles out
27/05/2021	00:45	Sailing to S36		50	20.27		12	58.9		9.7	045	2500	ok	ok	ok		
27/05/2021	01:00	Slowing to ping	S36	50	21.85		12	55.7		6.7	058	2476	ok	ok	ok		
27/05/2021	01:05	Pinging S36	S36	50	21.81		12	55.5		0.3	195	2477	ok	ok	ok		S36 ETA 01:20
27/05/2021	01:36	S36 on board	S36	50	21.48		12	56.0		0.1	266	2480	ok	ok	ok		
27/05/2021	01:45	Sailing to S37		50	22.32		12	54.7		10.2	052	2474	ok	ok	ok		
27/05/2021	01:59	Pinging S37		50	23.23		12	52.5		0.4	224	2492	ok	ok	ok		3 miles out
27/05/2021	02:15	Sailing to S37		50	24.36		12	50.3		10.6	050	2473	ok	ok	ok		
27/05/2021	02:23	Slowing to ping	S37	50	25.07		12	48.7		3.0	159	2461	ok	ok	ok		
27/05/2021	02:27	Pinging S37	S37	50	25.00		12	48.6		1.3	208	2464	ok	ok	ok		S37 ETA 02:45
27/05/2021	03:03	S37 on board	S37	50	24.69		12	49.1		0.9	252	2466	ok	ok	ok		
27/05/2021	03:08	Sailing to S38		50	24.79		12	48.9		8.3	043	2467	ok	ok	ok		
27/05/2021	03:27	Pinging S38		50	26.50		12	45.5		0.4	247	2443	ok	ok	ok		
27/05/2021	03:30	Sailing to S38		50	26.52		12	44.7		3.5	052	2443	ok	ok	ok		
27/05/2021	03:53	Pinging S38	S38	50	28.30		12	42.0		0.1	290	2409	ok	ok	ok		
27/05/2021	04:24	S38 onboard	S38	50	27.85		12	42.2		0.5	293	2415	ok	ok	ok		
27/05/2021	04:32	Sailing to S39		50	28.21		12	41.6		9.8	050	2407	ok	ok	ok		
27/05/2021	04:49	Pinging S39		50	29.65		12	38.6		1.0	223	2385	ok	ok	ok		
27/05/2021	04:59	Sailing to S39		50	29.76		12	37.9		9.6	046	2382	ok	ok	ok		
27/05/2021	05:17	Pinging S39	S39	50	31.42		12	35.3		1.0	232	2354	ok	ok	ok		
27/05/2021	05:41	S39 onboard	S39	50	31.04		12	35.5		1.2	268	2359	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
27/05/2021	05:49	Sailing to S40		50	31.50		12	34.5		9.7	050	2349	ok	ok	ok		
27/05/2021	06:05	Pinging S40		50	32.90		12	31.8		0.8	263	2315	ok	ok	ok		
27/05/2021	06:23	Sailing to S40		50	34.00		12	29.6		9.7	045	2288	ok	ok	ok		
27/05/2021	06:35	Pinging S40	S40	50	34.70		12	28.5		1.2	290	2283	ok	ok	ok		
27/05/2021	06:59	S40 onboard	S40	50	34.46		12	28.8		1.1	316	2284	ok	ok	ok		
27/05/2021	07:06	Sailing to S41		50	34.88		12	27.9		9.6	052	2275	ok	ok	ok		
27/05/2021	07:25	Pinging S41		50	36.14		12	25.0		0.9	218	2258	ok	ok	ok		
27/05/2021	07:45	Sailing to S41		50	37.53		12	22.3		9.8	048	2237	ok	ok	ok		
27/05/2021	07:50	Slowing for S41		50	37.98		12	21.6		1.3	277	2232	ok	ok	ok		
27/05/2021	07:55	Pinging S41	S41	50	37.98		12	21.7		0.3	305	2232	ok	ok	ok		
27/05/2021	08:22	S41 on board	S41	50	37.77		12	21.6		4.9	045	2232	ok	ok	ok		
27/05/2021	08:30	Sailing to S42	S42	50	38.40		12	20.5		9.6	052	2222	ok	ok	ok		
27/05/2021	08:45	Pinging S42		50	39.50		12	18.4		0.6	183	2212	ok	ok	ok		
27/05/2021	09:14	Pinging S42	S42	50	41.18		12	14.7		0.3	310	2187	ok	ok	ok		
27/05/2021	09:40	S42 on board	S42	50	40.87		12	14.4		3.0	042	2183	ok	ok	ok		
27/05/2021	10:02	Pinging S43		50	42.63		12	11.7		1.3	277	2161	ok	ok	ok		
27/05/2021	10:35	Pinging S43		50	44.42		12	7.9		0.0	308	2129	ok	ok	ok		
27/05/2021	11:00	S43 on board	S43	50	44.20		12	7.7		1.0	237	2130	ok	ok	ok		
27/05/2021	11:05	Sailing to S44		50	44.36		12	7.6		8.2	040	2126	ok	ok	ok		
27/05/2021	11:15	Sailing to S44		50	45.39		12	5.6		10.0	052	2092	ok	ok	ok		
27/05/2021	11:24	Pinging S44		50	45.85		12	4.9		1.5	243	2077	ok	ok	ok		3 miles out
27/05/2021	11:45	Sailing to S44		50	47.17		12	1.6		9.6	036	2018	ok	ok	ok		
27/05/2021	11:48	Slowing to ping	S44	50	47.51		12	1.1		5.1	053	2011	ok	ok	ok		
27/05/2021	11:53	Pinging S44	S44	50	47.58		12	1.1		0.6	267	2013	ok	ok	ok		S44 ETA 12:05
27/05/2021	12:22	S44 on board	S44	50	47.41		12	1.1		1.2	277	2013	ok	ok	ok		
27/05/2021	12:43	Pinging S45		50	49.06		11	57.9		3.1	291	1968	ok	ok	ok		3 miles out
27/05/2021	13:00	Sailing to S45		50	49.69		11	56.4		9.7	055	1945	ok	ok	ok		
27/05/2021	13:13	Pinging S45	S45	50	50.79		11	54.2		1.4	278	1915	ok	ok	ok		S45 ETA 13:25
27/05/2021	13:32	S45 on board	S45	50	50.86		11	54.0		0.8	039	1910	ok	ok	ok		
27/05/2021	13:35	Sailing to S46		50	50.96		11	53.8		7.2	049	1906	ok	ok	ok		
27/05/2021	13:45	Sailing to S46		50	51.77		11	51.8		10.1	060	1879	ok	ok	ok		
27/05/2021	13:52	Pinging S46		50	52.16		11	51.2		1.2	259	1867	ok	ok	ok		3 miles out
27/05/2021	13:55	Sailing to S46		50	52.14		11	51.2		1.4	288	1868	ok	ok	ok		
27/05/2021	14:00	Sailing to S46		50	52.30		11	50.8		9.4	066	1860	ok	ok	ok		
27/05/2021	14:18	Slowing to ping	S46	50	53.96		11	47.2		1.7	276	1783	ok	ok	ok		
27/05/2021	14:22	Pinging S46	S46	50	53.95		11	47.3		0.5	258	1783	ok	ok	ok		S46 ETA 14:30
27/05/2021	14:40	S46 on board	S46	50	54.14		11	47.1		1.7	028	1775	ok	ok	ok		
27/05/2021	14:53	Sailing to S47		50	54.23		11	46.8		8.3	070	1769	ok	ok	ok		
27/05/2021	15:00	Pinging S47		50	55.59		11	43.8		0.5	248	1660	ok	ok	ok		3 miles out
27/05/2021	15:10	Sailing to S47		50	55.88		11	42.8		10.3	57	1627	ok	ok	ok		
27/05/2021	15:25	Pinging S47	S47	50	57.11		11	40.2		0.1	263	1502	ok	ok	ok		
27/05/2021	15:46	S47 onboard	S47	50	57.23		11	40.1		0.7	7	1496	ok	ok	ok		
27/05/2021	16:05	Deployment of first airgun	Line3														
27/05/2021	16:15	Deployment of second airgun															
27/05/2021	16:27	Initiation of softstart															

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
27/05/2021	16:30	Deployment of streamer															
27/05/2021	17:15	End soft start															
27/05/2021	17:52	XBT launch	XBT -T5-45	50	54.06		11	46.9		3.5	230	1770	ok	ok	ok		Probe 263670
27/05/2021	17:57	XBT end	XBT-T5-45	50	53.85		11	47.3		3.3	235	1787	ok	ok	ok		Terminal depth 1793 m
27/05/2021	19:21	XBT Launch	XBT-T11-46	50	50.95		11	53.5		3.4	240	1912	ok	ok	ok		Probe 22823
27/05/2021	19:30	XBT end	XBT-T11-46	50	50.58		11	54.4		3.3	239	1935	ok	ok	ok		Terminal depth 982 m
27/05/2021	20:50	XBT Launch Attempt - Aborted		50	47.60		12	0.8		4.4	243	2001	ok	ok	ok		Probe 263674 - Problem with software? Would not let us launch probe. Rebooting…
27/05/2021	20:53	XBT Launch	XBT-T5-47	50	47.45		12	1.1		3.9	243	2013	ok	ok	ok		Probe 263665
27/05/2021	20:59	XBT End	XBT-T5-47	50	47.22		12	1.6		2.0	242	2016	ok	ok	ok		Terminal Depth 2300 m (deeper than seafloor, see to remove data under 2016 mbsf)
27/05/2021	21:54	XBT Launch	XBT-T11-48	50	45.41		12	5.5		3.7	243	2092	ok	ok	ok		Probe 22826
27/05/2021	22:04	XBT End	XBT-T11-48	50	44.93		12	6.6		3.8	243	2110	ok	ok	ok		Terminal Depth 1000 m (the probe probably went deeper than that but the software stooped registering after 1000 m)
27/05/2021	22:45	XBT Launch	XBT-T5-49	50	43.52		12	9.7		4.0	241	2143	ok	ok	ok		Probe: 338633
27/05/2021	22:51	XBT End	XBT-T5-49	50	43.27		12	10.2		3.7	240	2150	ok	ok	ok		Terminal depth: 2176
27/05/2021	23:00	Shooting		50	42.95		12	10.8		3.4	244	2155	ok	ok	ok		
27/05/2021	23:15	Shooting		50	42.42		12	11.9		3.7	247	2161	ok	ok	ok		
27/05/2021	23:23	Launch XBT - Aborted	XBT-T11-50														Probe 22835 - failure to launch
27/05/2021	23:30	Shooting		50	41.89		12	13.0		3.7	241	2170	ok	ok	ok		
27/05/2021	23:45	Shooting		50	41.39		12	14.1		3.4	246	2180	ok	ok	ok		
27/05/2021	23:49	Launch XBT	XBT-T11-51	50	41.25		12	14.4		3.6	246	2184	ok	ok	ok		Probe 22831
27/05/2021	23:59	XBT End	XBT-T11-51	50	40.93		12	15.2		3.7	247	2190	ok	ok	ok		Terminal depth; 1000 m; 10 deg C
28/05/2021	00:15	Shooting		50	40.43		12	16.3		3.9	235	2196	ok	ok	ok		
28/05/2021	00:23	Launch XBT	XBT-T5-52	50	40.10		12	16.9		3.3	240	2199	ok	ok	ok		Probe 338626
28/05/2021	00:23	XBT End	XBT-T5-52	50	40.10		12	16.9		3.3	240	2199	ok	ok	ok		Didn't work; we are crabbing, going to switch to starboard side
28/05/2021	00:30	Shooting		50	39.87		12	17.4		3.4	244	2204	ok	ok	ok		
28/05/2021	00:45	Shooting		50	39.34		12	18.5		3.6	236	2213	ok	ok	ok		
28/05/2021	00:54	Launch XBT	XBT-T5-53	50	39.01		12	19.2		3.2	245	2218	ok	ok	ok		Probe 338627; launching from starboard side
28/05/2021	00:56	XBT end	XBT-T5-53	50	38.97		12	19.3		3.3	246	2218	ok	ok	ok		Failed at 500 m
28/05/2021	01:00	Shooting		50	38.87		12	22.0		3.4	248	2220	ok	ok	ok		
28/05/2021	01:15	Shooting		50	38.39		12	20.7		3.4	246	2225	ok	ok	ok		
28/05/2021	01:30	Shooting		50	37.86		12	21.8		3.6	239	2232	ok	ok	ok		
28/05/2021	01:45	Shooting		50	37.30		12	22.9		3.2	234	2240	ok	ok	ok		
28/05/2021	02:00	Shooting		50	36.84		12	24.0		3.2	244	2247	ok	ok	ok		
28/05/2021	02:15	Shooting		50	36.37		12	25.1		3.4	236	2257	ok	ok	ok		
28/05/2021	02:30	Shooting		50	35.88		12	26.1		3.5	238	2265	ok	ok	ok		
28/05/2021	02:45	Shooting		50	35.32		12	27.2		3.6	232	2273	ok	ok	ok		

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
28/05/2021	03:00	Shooting		50	34.79		12	28.2		3.4	241	2281	ok	ok	ok		
28/05/2021	03:32	Shooting		50	33.73		12	30.7		3.5	240	2300	ok	ok	ok		
28/05/2021	03:45	Launch XBT	XBT-T11-54	50	33.68		12	30.8		3.8	235	2334	ok	ok	ok		probe 2283? Failed at start
28/05/2021	04:43	Shooting		50	31.16		12	36.1		3.6	237	2361	ok	ok	ok		
28/05/2021	05:12	Shooting		50	30.08		12	38.3		3.7	236	2380	ok	ok	ok		
28/05/2021	06:46	Shooting		50	26.56		12	45.7		3.5	239	2443	ok	ok	ok		
28/05/2021	07:15	Shooting		50	25.51		12	48.1		3.7	244	2455	ok	ok	ok		
28/05/2021	09:02	Shooting		50	21.49		12	56.5		3.5	238	2480	ok	ok	ok		
28/05/2021	09:43	Shooting		50	19.99		12	59.6		3.5	237	2503	ok	ok	ok		
28/05/2021	11:00	Shooting		50	17.07		13	5.8		3.9	236	2558	ok	ok	ok		
28/05/2021	11:20	Shooting		50	16.31		13	7.4		3.5	237	2573	ok	ok	ok		
28/05/2021	11:30	Shooting		50	15.95		13	8.1		3.6	233	2579	ok	ok	ok		
28/05/2021	11:45	Shooting		50	15.41		13	9.2		3.9	235	2592	ok	ok	ok		
28/05/2021	12:00	Shooting		50	14.88		13	10.3		3.9	225	2603	ok	ok	ok		
28/05/2021	12:15	Shooting		50	14.25		13	11.5		3.9	229	2618	ok	ok	ok		
28/05/2021	12:30	Shooting		50	13.73		13	12.6		3.6	235	2628	ok	ok	ok		
28/05/2021	12:45	Shooting		50	13.19		13	13.8		3.8	238	2644	ok	ok	ok		
28/05/2021	13:00	Shooting		50	12.70		13	14.9		3.6	238	2658	ok	ok	ok		
28/05/2021	13:15	Shooting		50	12.08		13	16.0		3.5	227	2672	ok	ok	ok		
28/05/2021	13:30	Shooting		50	11.56		13	16.9		3.5	239	2687	ok	ok	ok		
28/05/2021	14:00	Shooting		50	10.58		13	19.2		3.5	233	2717	ok	ok	ok		
28/05/2021	14:15	Shooting		50	10.03		13	20.2		3.6	232	2735	ok	ok	ok		
28/05/2021	14:30	Shooting		50	9.52		13	21.2		3.3	238	2782	ok	ok	ok		
28/05/2021	14:45	Shooting		50	9.06		13	22.3		3.5	238	2826	ok	ok	ok		
28/05/2021	15:00	Shooting		50	8.57		13	23.4		3.3	229	2868	ok	ok	ok		
28/05/2021	15:25	Launch XBT	XBT-T11-55	50	7.66		13	25.2		3.3	232	2979	ok	ok	ok		Probe: 22839
28/05/2021	15:30	XBT End	XBT-T11-55	50	7.54		13	25.4		3.2	231	3260	ok	ok	ok		Garbage data below: 331m. Data seems okay from 37-331m
28/05/2021	15:49	Launch XBT	XBT-T11-56	50	6.90		13	26.6		3.2	230	2979	ok	ok	ok		Probe: 22834
28/05/2021	15:59	XBT End	XBT-T11-56	50	6.57		13	27.3		3.1	236	2956	ok	ok	ok		Terminal Depth: 1000m
28/05/2021	16:02	Launch XBT	XBT-T5-57	50	6.47		13	27.6		3.3	234	2970	ok	ok	ok		Probe: 338628
28/05/2021	16:08	XBT End	XBT-T5-57	50	6.30		13	28.0		3.5	235	2992	ok	ok	ok		Terminal Depth: 2212m
28/05/2021	16:25	Launch XBT	XBT-T5-58	50	5.70		13	29.2		3.7	234	3014	ok	ok	ok		Probe: 263674
28/05/2021	16:31	XBT End	XBT-T5-58	50	5.48		13	39.7		3.6	233	3027	ok	ok	ok		Terminal Depth: 2232m
28/05/2021	16:41	Launch XBT	XBT-T5-59	50	5.12		13	30.5		3.7	226	3057	ok	ok	ok		Probe: 338630
28/05/2021	16:47	XBT End	XBT-T5-59	50	4.89		13	30.9		3.7	227	3065	ok	ok	ok		Terminal depth; 2190 m
28/05/2021	16:56	Launch XBT	XBT-T5-60	50	4.60		13	31.5		3.9	226	3079	ok	ok	ok		Probe 338632
28/05/2021	17:00	XBT End	XBT-T5-60	50	4.37		13	31.9		3.6	224	3086	ok	ok	ok		Terminal depth; 2200 m
28/05/2021	17:30	Launch XBT	XBT-T5-61	50	3.25		13	34.1		3.5	228	3131	ok	ok	ok		Probe: 338636
28/05/2021	17:35	XBT End	XBT-T5-61	50	3.07		13	34.5		3.5	231	3149	ok	ok	ok		Terminal Depth: 2220m
28/05/2021	17:39	Launch XBT	XBT-T5-62	50	2.97		13	34.8		3.5	231	3156	ok	ok	ok		Probe: 338635
28/05/2021	17:44	XBT End	XBT-T5-62	50	2.78		13	35.2		3.5	228	3169	ok	ok	ok		Terminal Depth: 2190m
28/05/2021	17:48	Launch XBT	XBT-T5-63	50	2.68		13	35.5		3.3	228	3179	ok	ok	ok		Probe: 338629
28/05/2021	17:53	XBT End	XBT-T5-63	50	2.50		13	35.9		3.4	228	3189	ok	ok	ok		Terminal Depth: 2202m
28/05/2021	17:57	Launch XBT	XBT-T5-64	50	2.41		13	36.1		3.5	228	3198	ok	ok	ok		Probe: 338634

Date	Time UTC	Operation	Site (OBS/XBT)	Lat Deg N	Lat min	Lat sec	Lon Deg W	Lon min	Lon sec	Speed kt	Heading	Depth m	Swath file	EK60 file	ADCP file	EARS transfer	Comments
28/05/2021	18:02	XBT End	XBT-T5-64	50	2.20		13	36.5		3.4	226	3211	ok	ok	ok		Terminal depth: 2196m
28/05/2021	18:03	End of Line															End of acquisition, pulling guns in before sailing to OBS32 for backup release time ~ 11:00pm
28/05/2021	18:13	Pulling in streamer	P2	50	1.89		13	37.1		1.8	224	3231	ok	ok	ok		
28/05/2021	18:35	Streamer onboard		50	1.55		13	38.1		2.1	237	3269	ok	ok	ok		
28/05/2021	18:44	First airgun onboard		50	1.45		13	38.6		2.2	236	3284	ok	ok	ok		
28/05/2021	18:50	Second airgun (port) onboard		50	1.39		13	38.8		2.0	237	3294	ok	ok	ok		
28/05/2021	20:22	XBT Launch	XBT-T5-65	50	8.24		13	24.9		10.7	072	2877	ok	ok	ok		Probe: 338631
28/05/2021	20:38	XBT End	XBT-T5-65	50	8.21		13	25.5		10.2	073	2877	ok	ok	ok		Terminal Depth: 2190
28/05/2021		XBT Launch	XBT-T5-66	50	8.91		13	22.5		0.7	171	2834	ok	ok	ok		Probe: 383207 (bust, didn't launch. Trying probes with known issues)
28/05/2021		XBT Launch	XBT-T5-66														Probe: 322236 (bust, didn't launch. Trying probes with known issues)
28/05/2021	21:08	XBT Launch	XBT-T11-66	50	9.27		13	23.1		9.9	304	2788	ok	ok	ok		Probe: 22827
28/05/2021	21:13	XBT End	XBT-T11-66	50	9.79		13	24.2		8.1	344	2802	ok	ok	ok		Terminal Depth: 406m
28/05/2021	22:46	S32 on board		50	0.57		13	19.7		1.0	146	2607	ok	ok	ok		GRAND HUZZAH
28/05/2021	23:00	End of operations - Transit to Galway		50	1.10		13	19.0		10.0	014	2575	ok	ok	ok		End of Operations - Closing Log