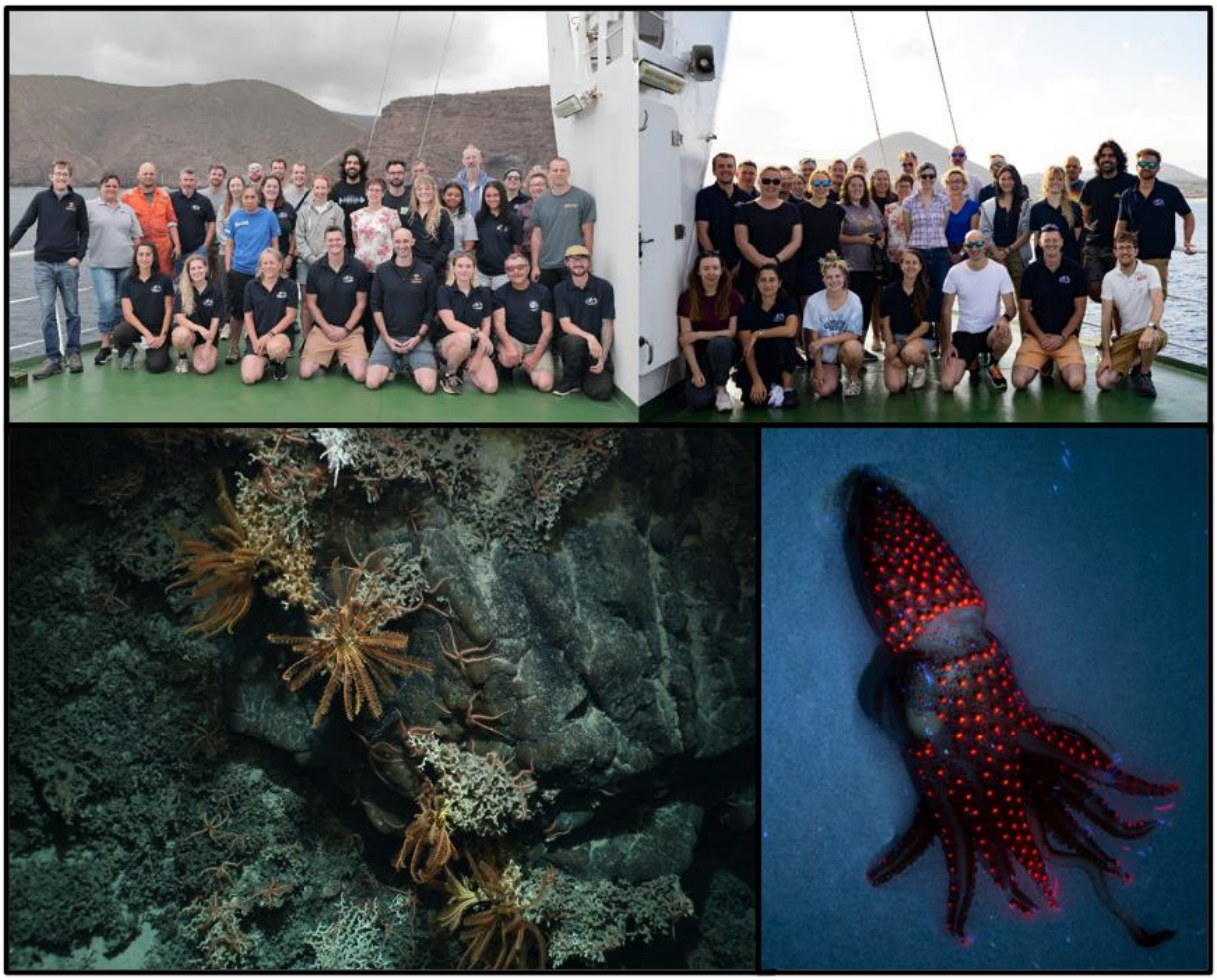
Blue Belt Expedition: Ascension and St Helena Marine Protected Areas (6th Nov – 5th Dec 2022) RRS *Discovery* 159 Cruise Report



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January 2023

Executive Summary

RRS *Discovery* expedition 159 (DY159) set sail from Southampton, UK in November 2022, headed for the UK Overseas Territories (UKOTs) of Ascension and St Helena. DY159 is the latest in the ongoing series of surveys in the waters of several UKOTs, the third of its kind to St Helena (following JR-17004 and DY100 in 2018 and 2019 respectively) and the first to Ascension. In recent years, both UKOTs have created very large marine protected areas in their exclusive economic zones, collectively totalling almost 900,000 km^2 but about which little is known, particularly beyond the narrow island shelf areas. Over 95% of the waters of each MPA is deeper than 200m, but most of the historic research effort has focussed only on inshore habitats. The *Discovery* expedition 159 aimed to fill some of the data gaps identified as most urgent by marine fisheries and conservation professionals based in each of Ascension and St Helena, by bringing a multidisciplinary team of UK marine scientists to work directly with local staff.

DY159 deployed a wide range of equipment in both UKOTs, principally with the goal of studying the ecology of commercially important species, or habitats and species that occur in previously unexplored areas. In Ascension, the main focus was upon the biodiversity and physical environment of different topographic features of the deep-sea and adjacent near surface habitats in its MPA, notably seamounts and abyssal plains. In St Helena, the priority areas of work were around species of current or prospective commercial importance, such as the small pelagic scads and mackerels that are consumed locally or used as bait in the tuna fishery.

The DY159 scientific crew would like to extend our thanks to Captain Mackay and the *Discovery*'s crew for their hard work and inclusive approach that made the survey such a success. The survey team would also like to acknowledge the vital support of the Governments of the UKOTs, and the Foreign, Commonwealth, and Development Office 'Blue Belt' Programme, without which this expedition and all its associated work would not be possible.

Contents

Tables

Figures

1 Introduction

1.1 Blue Belt Programme

The UK Overseas Territories (UKOTs) are home to some of the most incredible wildlife and habitats on the planet. In total, the UKOTs contain around 90% of the UK's biodiversity and host a huge range of unique and endangered species, some of which are found no-where else on earth. Combined, their Marine Protected Areas (MPA) cover over 1% of world's ocean, meaning they have a significant impact in safeguarding precious marine environments and helping to combat global ocean threats such as climate change.

The Blue Belt is the UK Government's flagship international marine conservation Programme. Since 2016 it has worked closely with a number of UKOTs to assist them in creating and maintaining healthy and productive ecosystems. These UKOTs are: St Helena, Ascension Island, Tristan da Cunha, Pitcairn Islands, British Indian Ocean Territory, South Georgia and the South Sandwich Islands, and the British Antarctic Territory.

The Blue Belt continues to expand, and discussions are ongoing with potential new UKOTs about joining the Programme. Recently the Blue Belt welcomed the Turks & Caicos Islands and Anguilla to the Programme.

The Blue Belt Programme's vision is for the UKOTs to be protecting and enhancing ocean health to halt biodiversity loss, enable sustainable growth, ensure climate change resilience, and to connect people with the natural environment. From cutting edge science to using new technology, this highly ambitious Programme is leading the way in supporting UKOTs in the effective management of their MPAs and in ensuring they are safeguarded for future generations.

1.2 Discovery 159 Expedition

Since 2017, four research surveys have been undertaken by the Blue Belt team together with key partners such as British Antarctic Survey onboard *RRS James Clark Ross*, *FPV Pharos* and *RRS Discovery.* These expeditions have explored oceanic deep-water and seamount habitats within the Exclusive Economic Zones (EEZ) of several of the Atlantic sector UKOTs currently included within the Blue Belt (BB) Programme. These surveys have improved the knowledge of these relatively unexplored and unknown habitats and have contributed to the creation, development, and monitoring of large

MPAs. Considering, the size of the UKOTs EEZs, a considerable amount of additional information is still largely lacking, therefore, there is a clear need to continue with the collection of the evidence-base required for management, including assessment of management effectiveness. The data collected have the potential to enhance current knowledge and understanding and to contribute to the development of effective management and protection strategies and assess the effectiveness of measures.

In addition to the core objectives of the Blue Belt programme, collecting both biological and physical data from these oceanic deep-water systems will provide us with the opportunity to contribute to existing and new initiatives that are aiming to address global scale issues such as climate change, ocean acidification, carbon sequestration, marine litter, and the exploitation of high-seas fish stocks.

1.3 Ascension Island & St Helena

Both Ascension and St Helena have established large MPAs, the management and monitoring of which requires offshore survey. Additionally, St Helenians depend on several key fisheries (e.g., species for food and trade to support income generation), which requires monitoring and management. Numerous shark and billfish species that are protected under existing national and international legislation (e.g., ICCAT conservation measures) are also found within the MPAs of both territories. Many of these species are associated with open ocean deep-water habitats such as seamounts and ocean ridges, whose distribution within their waters, are poorly described both in terms of understanding where these habitats are and how key species utilise them throughout their life cycles.

2 DY159 Survey Aims and Objectives

2.1 Ascension Island

Ascension Island Government (AIG) identified several priorities for the survey. AIG and Cefas therefore designed the survey with broad-scale habitat characterisation in mind. Given the short survey period available, the survey aimed to cover as many habitats as possible, rather than following a stratified sampling design, which AIG opted to reserve for future surveys. One advantage of this, is that it afforded much more opportunity to validate broader

scale habitat classification models, in preparation for other projects in which Blue Belt partners are involved.

2.1.1 Deep seabed biodiversity

The survey team conducted ecological survey, using a towed camera system and a sediment corer, of previously unexplored areas of the Ascension EEZ.

Since many of these areas have limited or no bathymetric data, the precise locations of sampling were designed at sea using the swathe bathymetry collected during the expedition and within the areas of interest defined by the Ascension team, and any other relevant criteria (e.g., depth rating of camera housing, or the locations of any previous samples).

The video survey focused upon the flanks of the southern MAR, and the Grattan and Young (uncharted) seamounts, in depths of between 500 and 3000 meters. These areas have received little or no biological study previously, but some have been the topic of a predictive habitat suitability modelling project (PhD project by Amelia Bridges). Testing the model predictions was a principal objective in the selection of transect locations.

In addition to complementing video transects with physical samples (see section 0), the survey team also conducted physical sampling in the areas of the abyssal plain either side of the MAR. The samples collected will be used for taxonomic identification primarily, but also analyses such as carbon sequestration, microplastic contamination, or for stable isotopes to study food webs and other ecological interactions.

The survey also mapped and collected water samples from one of the inferred hydrothermal vent systems on the section of the Mid-Atlantic Ridge (MAR) immediately to the east of Ascension Island at 7°57’S. A full ecological study of these vent fields was beyond the scope of the survey (both in time and equipment available) but the data collected during DY159 will be used to inform the design of future surveys dedicated to vent field study.

2.1.2 Pelagic biodiversity

Video and fisheries acoustic data, and physical specimens were collected to study pelagic biodiversity and food webs.

Video data was collected through use of Baited Remote Underwater Video Systems (BRUVS), which were deployed in partnership with a PhD student, Shona Murray, from the University of Exeter and University of Western Australia (linking to the Blue Belt Global Ocean Wildlife Analysis Network

programme). This work formed part of a scoping study into the use of BRUVS off large ships, and in the deployment in remote, far-offshore areas that have not previously been surveyed.

Fisheries acoustics transects were collected with the aim of understanding patterns in fish biomass distribution, particularly comparing open ocean regions with shallower areas over the seamounts or the MAR. Samples from associated rectangular mid-water trawls were collected to validate acoustic data, for taxonomic identification, and for microplastic and stable isotope analysis.

2.1.3 Oceanographic sampling

In each of the areas outlined above, the survey team also conducted oceanographic sampling using a CTD and water sampling rosette. Physical measurements (temperature, dissolved oxygen etc.) will contribute to regional modelling efforts in future projects under development. Water samples will be used for nutrients (phosphates, silicates, nitrates etc.) and environmental DNA analyses, and to estimate food web isotopic baselines at different depths (as in previous surveys).

2.2 St Helena

There remain several seamounts in the NW of the St Helena EEZ which have not been mapped (Features A-F, G & L; Figure 1). During the transit between the islands, the survey team undertook a detailed swath survey of the largest feature (F), to identify areas of interest for future surveys. These areas may prove to be important for island fisheries and provide habitat for some of the deep biodiversity of the St Helena EEZ.

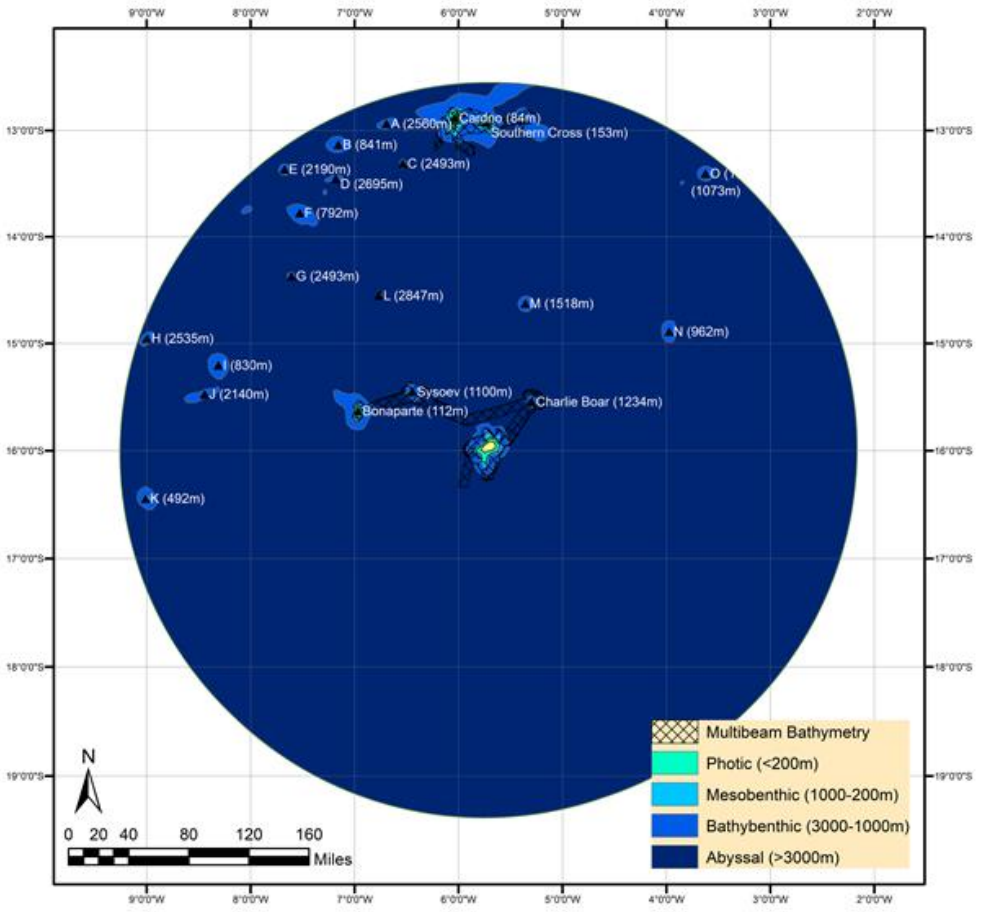


Figure 1 Locations of seamounts with water depths shallower than 3000 m within the St Helena EEZ. N.B. Summit depths of un-surveyed seamounts are highly uncertain (vertical errors may exceed 500m in places). Figure credit: Serena Wright.

2.2.1 Biodiversity surveys of key offshore habitats including seamounts, seabed (rock and coral habitat) and open water environments

As is common amongst the UKOTs, there is a lack data on benthic biodiversity in offshore/deeper waters. During DY159, the survey team revisited some of the features partially surveyed by previous surveys (JR17-004 and DY100), particularly around St Helena Island and at the Cardno seamount complex in the north of the EEZ.

Biodiversity sampling around the seamounts focused on camera surveys and midwater trawls. The main objectives of the camera studies is to collect data for testing habitat suitability models for cold water corals, and to survey, for the first time, some of the deeper areas (no previous surveys have studied biodiversity in areas deeper than 900 meters). Mid-water trawls were conducted over and around the Island and seamounts, as part of an ongoing effort to understand pelagic biodiversity, and the food webs that underpin commercially important stocks like yellowfin tuna.

2.2.2 Assessments of key & prospective fisheries

St Helena has an important fishery for six small pelagic species (*Decapterus* and *Scomber* spp.), used primarily as bait for the tuna fishery, but also for consumption on island. The bait fishery remains quite data poor, with such key uncertainties as the geographic extent of the stocks, biomass in fished and unfished regions, and life history of each species. During DY159, the survey team conducted a ship-borne fisheries acoustic biomass assessment of these species. Acoustic data alone cannot discern between these similarly sized species and so transects were supplemented by species composition data from local fishers working collaboratively with the DY159 crew. Acoustic transects were also conducted at both the Southern Cross and Cardno seamounts, though these could not be validated by fisher catch data. BRUVS were deployed in the same areas but did not detect many of these species since they school near the bottom during the day and were beyond the operating range of the BRUVS

Baited pot deployments were also trialled around the island and at Cardno seamount, to study scavenger biodiversity.

3 Expedition Narrative

Table 1 – Expedition key dates

Date	Location	Comment
2022-10-25	Southampton, UK	Mobilisation and boarding initial scientific party.
2022-10-27	Southampton, UK	Depart for Cape Verde.
2022-11-05	Cape Verde EEZ	Recover NIOZ buoy.
2022-11-06	Mindelo, Cape Verde	Board remaining scientific and technical crew. Refuel (Refuelling barge delivered 15 m^3 less than requested). Depart for Ascension
2022-11-13	Ascension EEZ	Commence Ascension science (North-west abyssal station)
2022-11-15	Ascension Island	Board Ascension Island Government scientific party.
2022-11-16	Ascension EEZ	Young seamount station
2022-11-18	Ascension EEZ	Grattan seamount station
2022-11-19	Ascension EEZ	South-east abyssal station
2022-11-21	Ascension EEZ	Atlantic Ridge Vent station
2022-11-22	Ascension Island	Disembark Ascension Island Government scientific party. Engagement with local community. Shore leave for ship's and scientific crew. Depart for St Helena.
2022-11-25	St Helena EEZ	North-west seamount station
2022-11-26	St Helena Island	Embark St Helena Government scientific party. St Helena margin station
2022-11-30	St Helena EEZ	Cardno and Southern Cross seamounts station
2022-12-04	St Helena Island	Returned to St Helena to disembark St Helena Government and 11 of UK scientific party. High swell prevented ship to shore transfers.
2022-12-05	St Helena Island	Scientific party partially disembarked. Depart for Montevideo.
2022-12-06	SW Atlantic	Poor weather forecast along transit to Montevideo. Decision taken to divert to Rio de Janeiro to refuel.
2022-12-14	Rio de Janeiro, Brazil	Refuelling.
2022-12-18	Montevideo, Uruguay	Disembark ship's crew and remaining scientific and technical party.

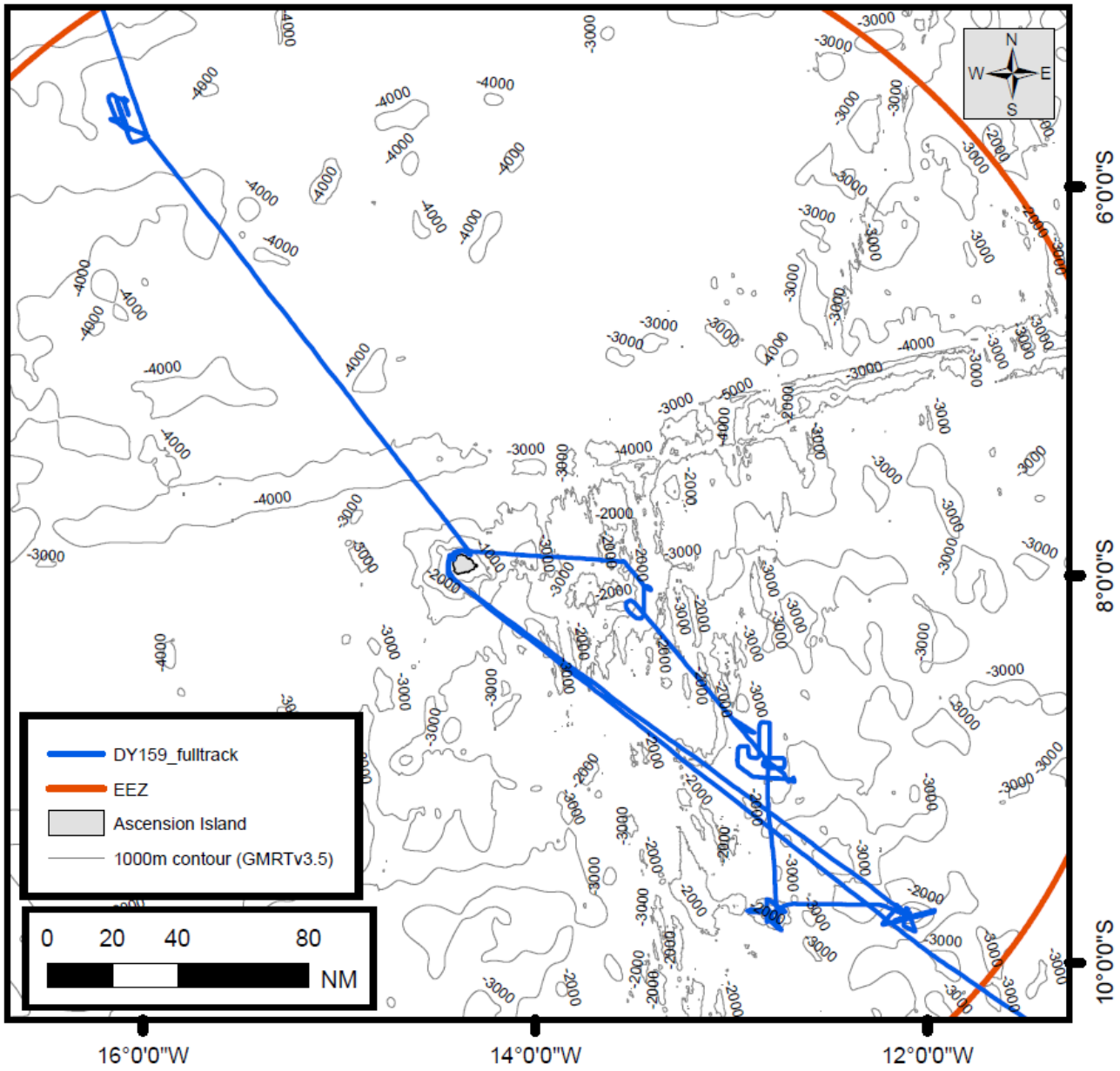


Figure 2 – Ship track in Ascension EEZ (position filtered to one per 10 minutes)

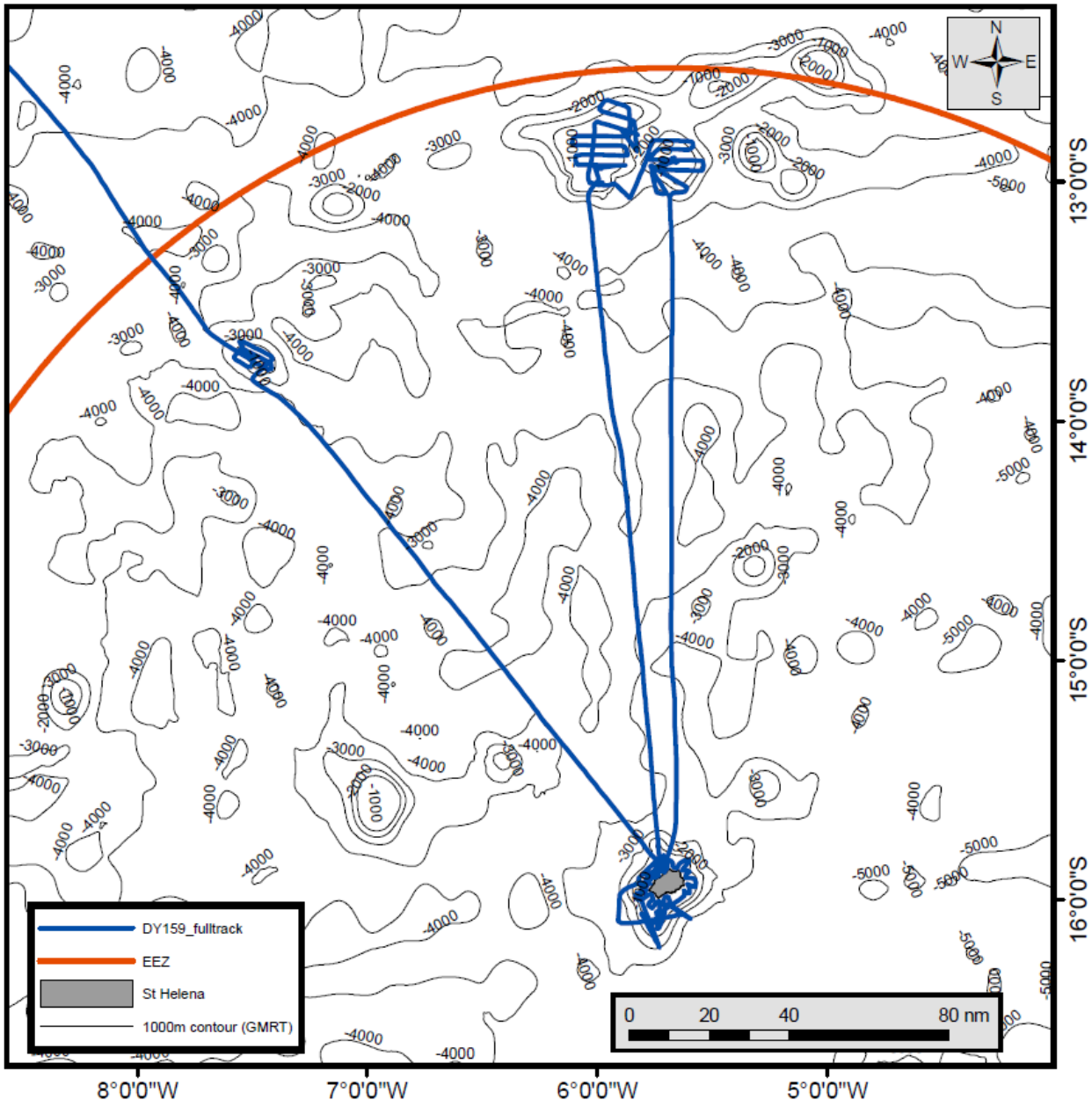


Figure 3 – Ship track in St Helena EEZ (position filtered to one per 10 minutes)

4 Survey Methodologies and Initial Observations

Alice Fremand & Rory O'Loughlin

4.1 Multibeam Bathymetry

RRS *Discovery* has two multibeam bathymetry systems: the Kongsberg EM122 and EM710. The two echosounders are used at specific depth range as shown in Table 1. While the EM710 echosounder was only used in shallow water, the EM122 multibeam bathymetry system was run continually through DY159 cruise to collect information on the seabed to create acoustic habitat characterisations.

Table 2 - Echosounder characteristics on RRS Discovery

Echosounder	Operational depth range
EM122 1°x 1°	50 – 7000 m
EM710 2°x 2°	5 – 800 m

4.1.1 Preliminary results

Unknown seamount (16°6.93'W 5°38.14'S)

The Unknown seamount is centred on 16°6.93'W 5°38.14'S and had no pre-existing multibeam data. The Unknown seamount is located in the Ascension EEZ, approximately 320 km NW of the island. The seamount is 12 km across in the East-West direction and 9 km across North-South. At the shallowest point of the seamount (16°5.68'W 5°37.98'S), a depth of 2650 m was recorded while the surrounding depths were in the range of 3600-3800m. The seamount is characterised by steep ridges and two different mounts (Figure 4).

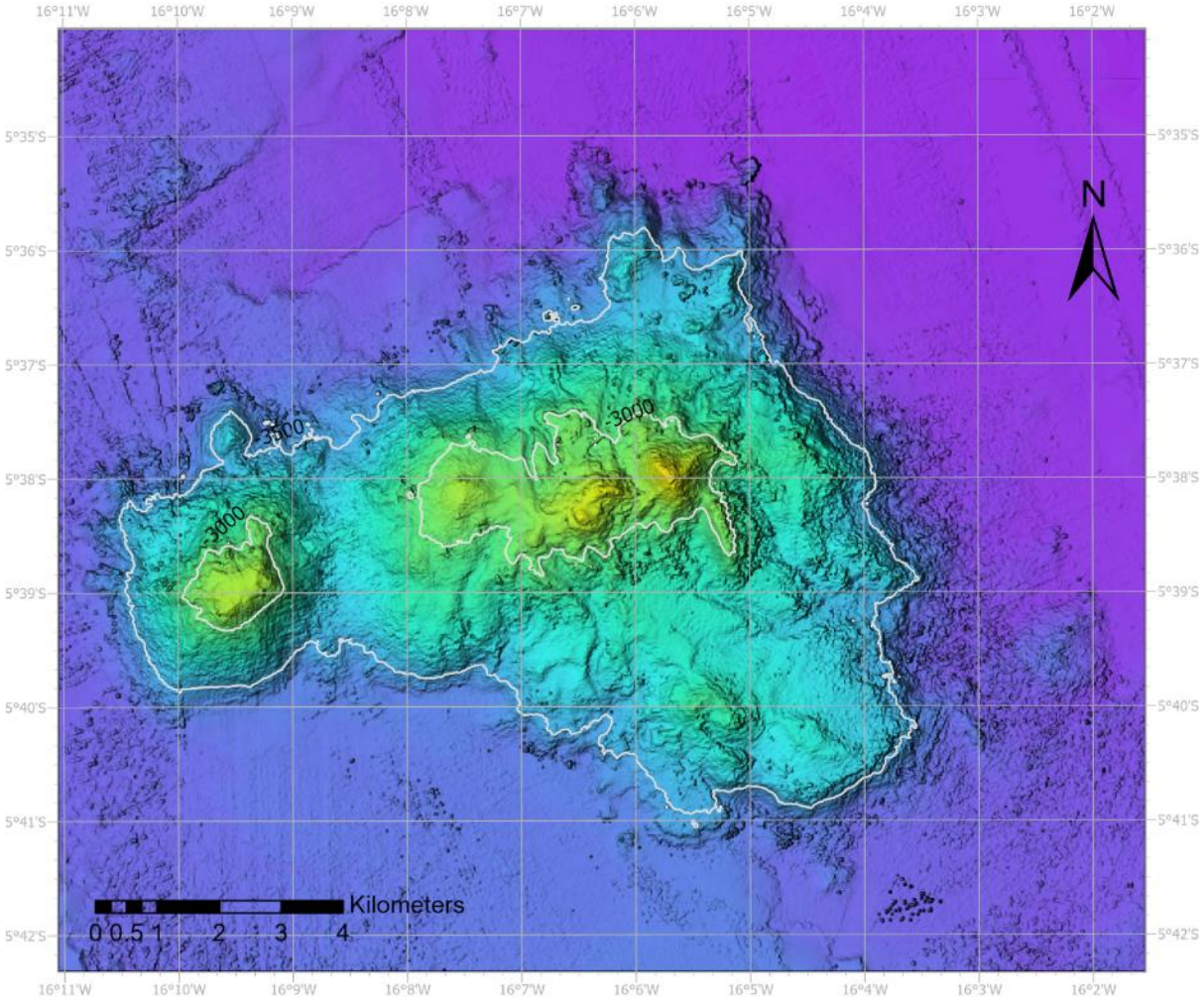


Figure 4 - Map of multibeam coverage of an unnamed seamount discovered in NW Ascension MPA

4.1.2 Mid Atlantic Ridge Vent

The mid-Atlantic Ridge Vent survey was undertaken on 21/11/2022. The goal of the survey was to find a vent around the following location: 13°28'W 8°4.0'S. No vents were clearly identified in the specific area but the survey identified interesting features from the mid-Atlantic ridge. The area surveyed covered an area of approximately 30 km in the North-South transect and was 10 km in the West-East direction. At the deepest point, depths of over 4000m were measured (Figure 5).

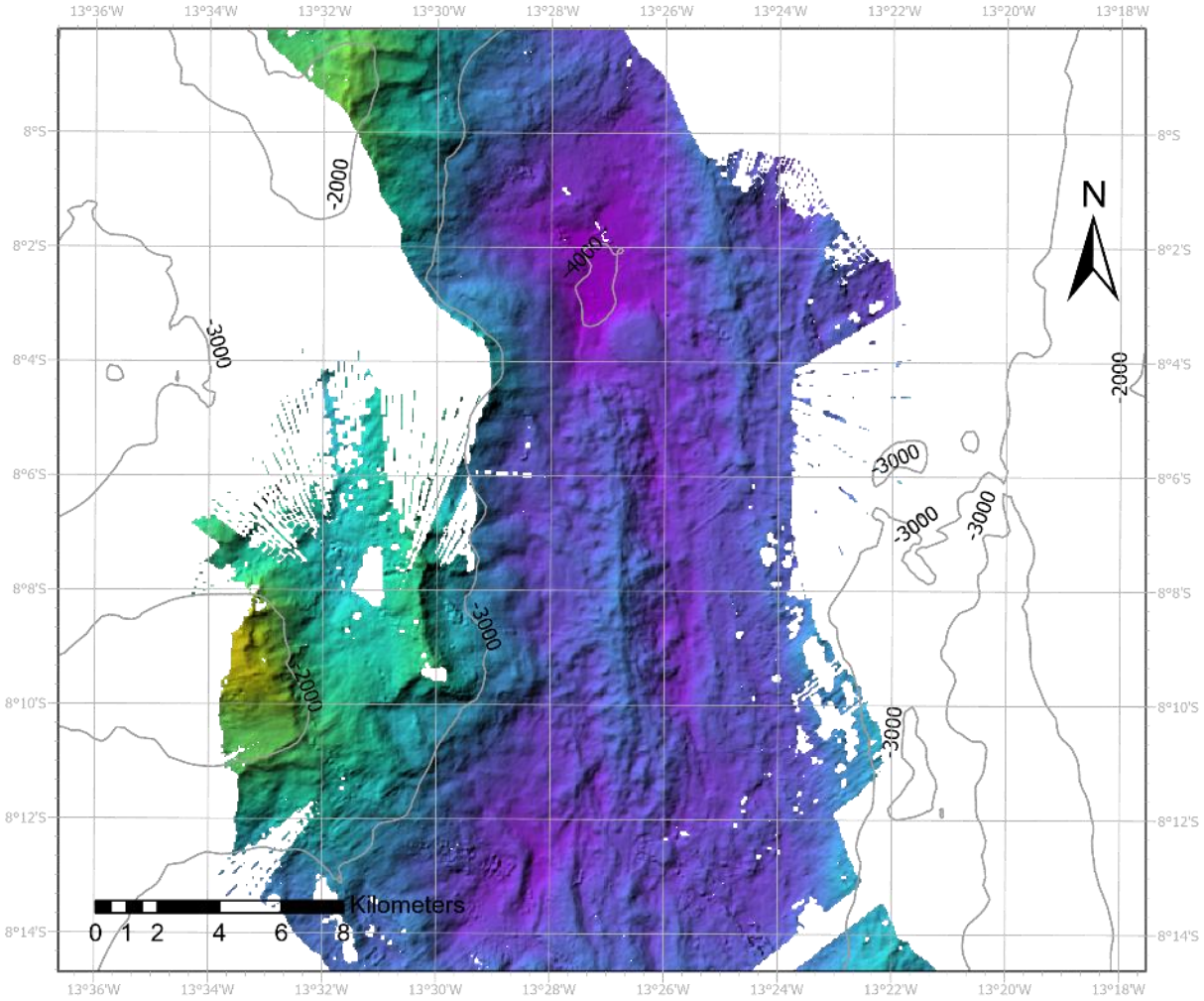


Figure 5 - Map of multibeam coverage of the Mid-Atlantic ridge in Ascension MPA

4.1.3 Grattan Seamount

The Grattan seamount was opportunistically surveyed between 18/11/2022 and 19/11/2022. The seamount had already been surveyed so only opportunistic infill data were recorded. The survey confirmed the results from the previous survey. The seamount has a diameter of approximately 20 kilometres and is located in the Ascension EEZ, approximately 258 km SE of the island. At the shallowest point, a depth of 120m were recorded while the surroundings were in the range 2500 – 2900 m (Figure 6).

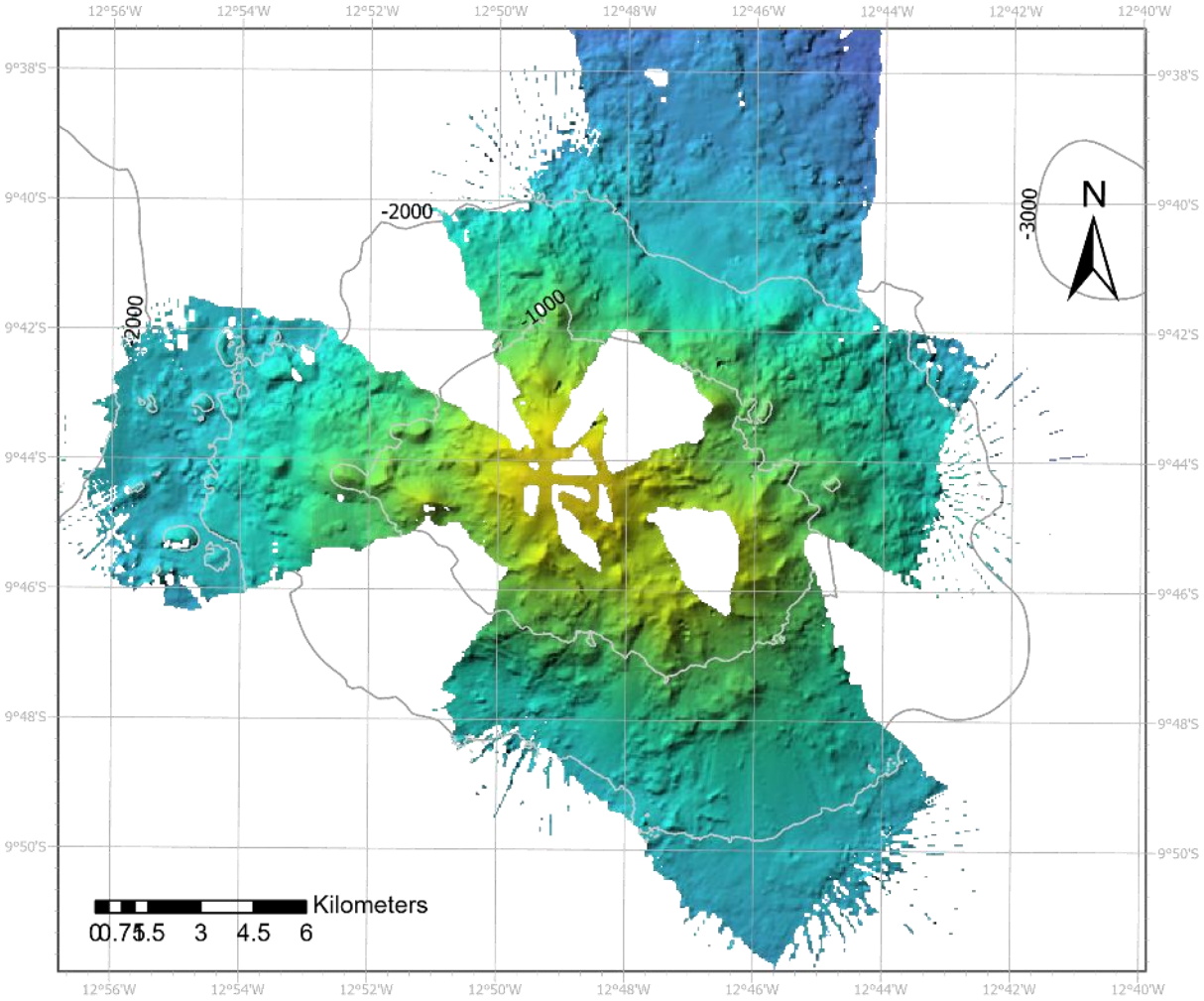


Figure 6 - Map of multibeam coverage of the Grattan Seamount located SE of Ascension MPA

4.1.4 Young Seamount

The Young seamount was visited and opportunistically surveyed between 16/11/2022 and 18/11/2022. The seamount is centred on located at 12°6'W 9°45'S, approximately 320 km SE of the island. The seamount is approximately 40 km across in the SW-NE direction and 20 km across N-S. At the shallowest point of the seamount, a depth of 270 m was recorded while the surrounding depths were in the range of 3000-3200m (Figure 7).

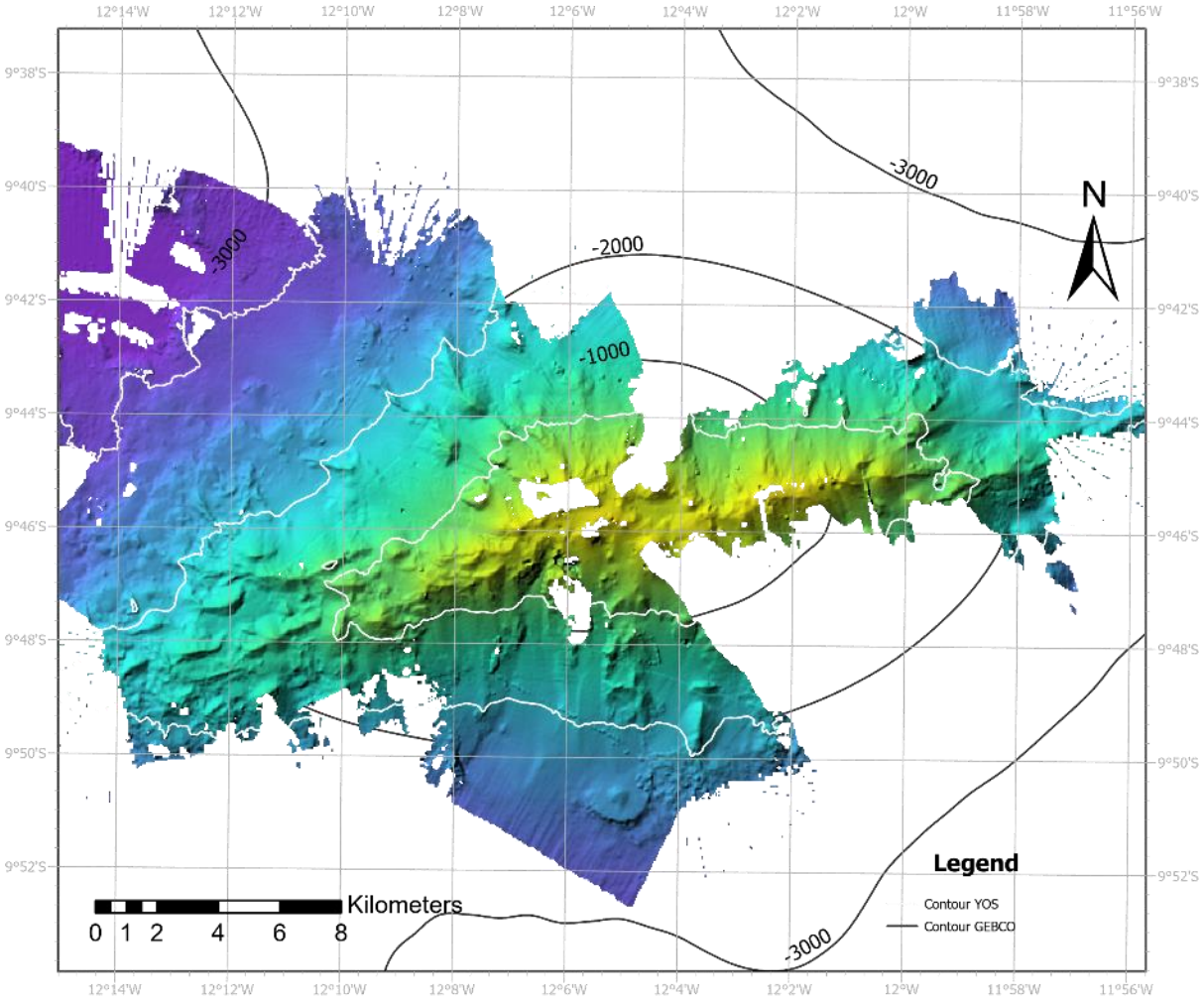


Figure 7 - Map of multibeam coverage of Young Seamount surveyed in SE Ascension MPA

4.1.5 St Helena North-West Seamount (no name)

The Saint-Helena North-West seamount was surveyed on 25/11/2022. There were no previous MBES data from the seamount but it was already identified by gravity measurements. The seamount is located NW of St Helena EEZ at a distance of approximately 310 km of the island. The seamount is approximately 30 km across in the NW-SE direction and 20 km across NE-SW. At the shallowest point of the seamount, a depth of 615 m was recorded while the surrounding depths were in the range of 4000-4300m. Contrary to the GEBCO, contour, the seamount was found to continue in the South-East direction with depth in the range of 3000-3500m for an additional 30 kilometres This was recorded on transit to St Helena island, and further analysis and measurements will be needed to complete the contour of the seamount (Figure 8).

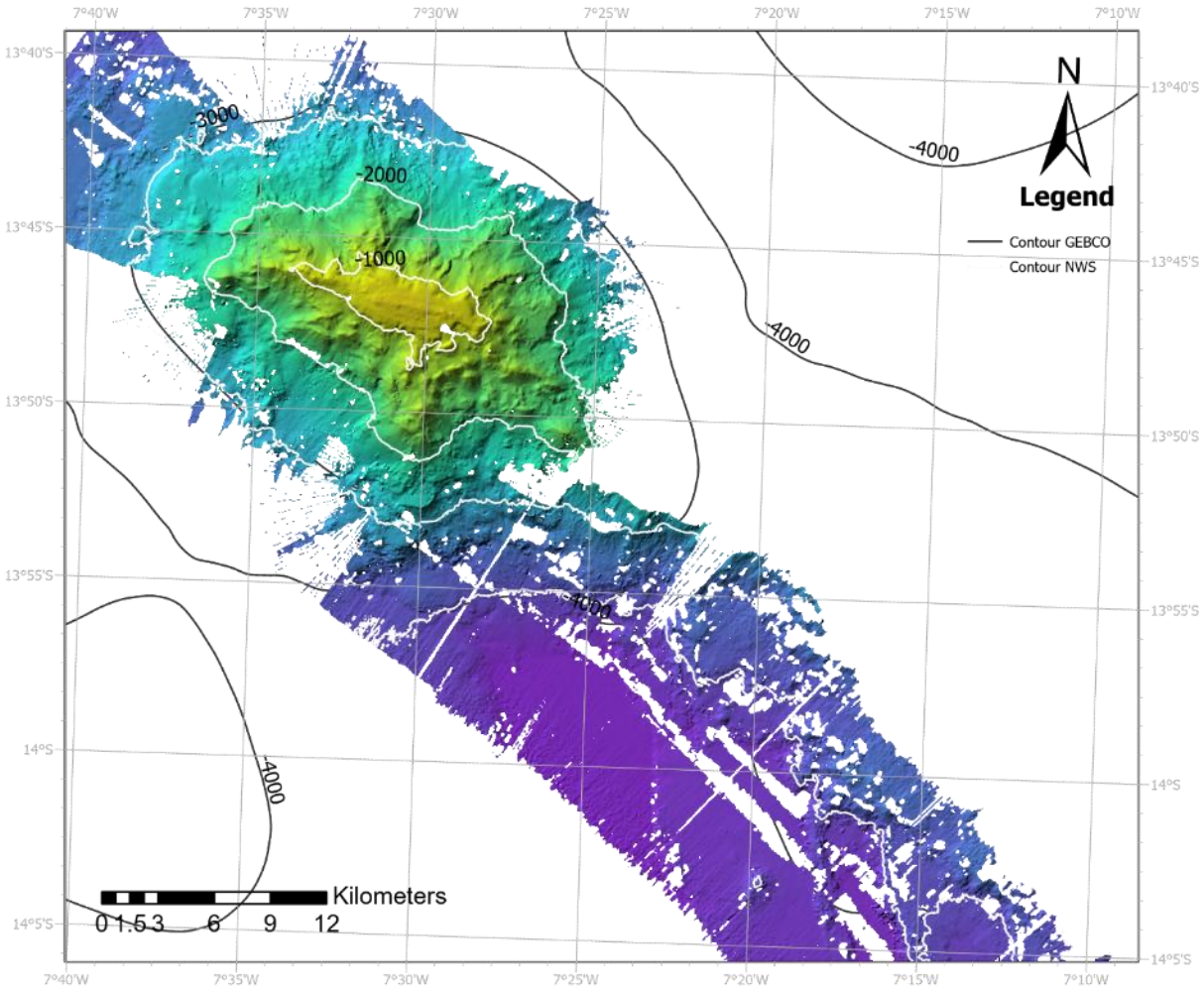


Figure 8 - Map of multibeam coverage of the Seamount surveyed in NW St Helena EEZ

4.1.6 St Helena Island

Previous multibeam bathymetry data had been collected around the island during cruise JR17004 on RRS *James Clark Ross*, cruise DY100 on RRS *Discovery* and during an inshore survey undertaken by the UK Hydrographic Office. Bathymetric measurements were undertaken opportunistically around St Helena Island from 26/11/2022 and 28/11/2022 while in transit (Figure 9).

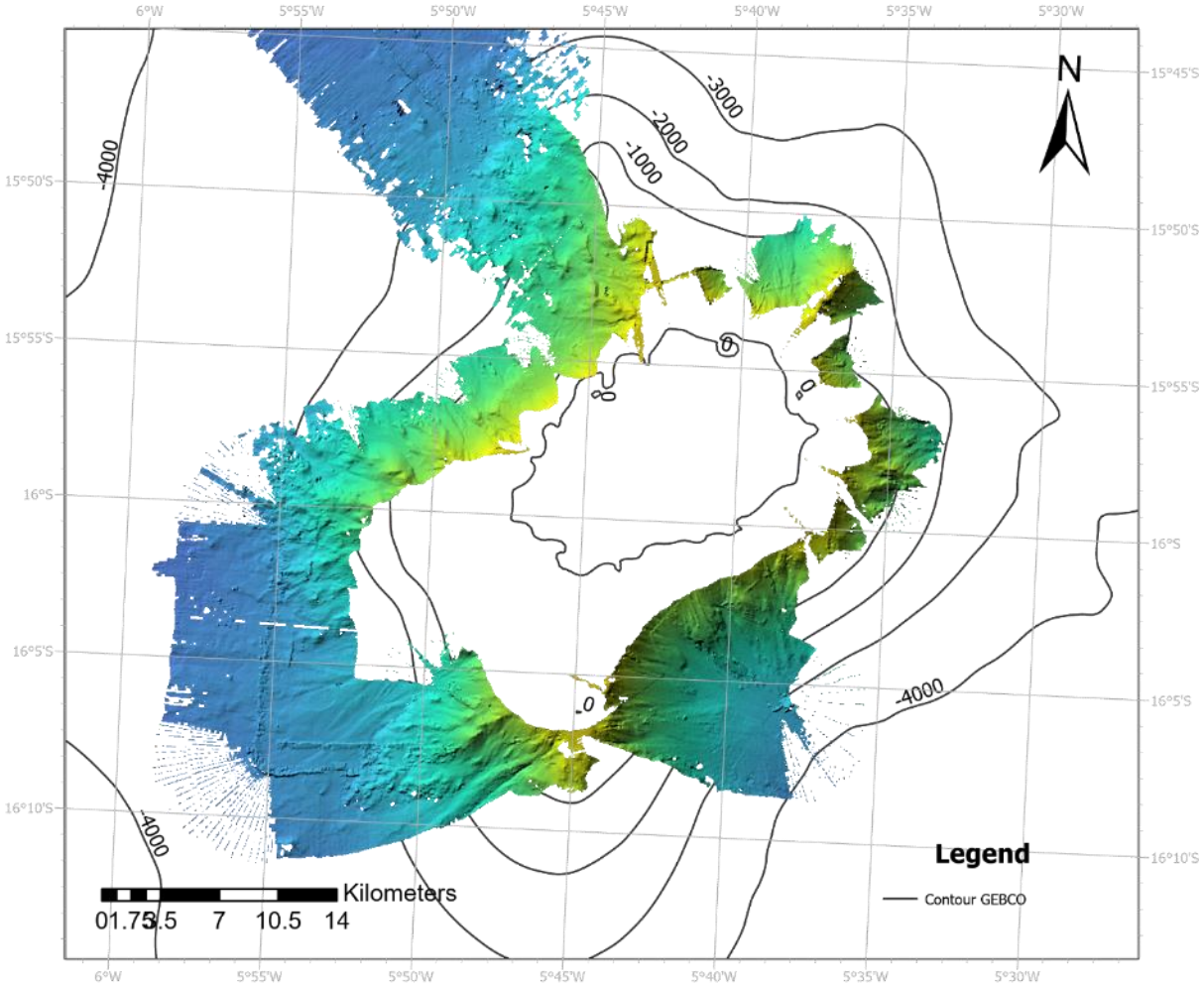


Figure 9 - Map of multibeam coverage around St Helena Island.

Cardno Seamount Complex

The Cardno Seamount Complex had already been surveyed during DY100 cruise on RRS *Discovery*. Cardno seamount is the westernmost of a group of seamounts located at the northern limit of the St Helena EEZ. The main objective of the current survey was to fill some of the gaps around the seamount with a particular focus given to the North-East part of the Cardno Seamount. In addition, between surveys, the MBES system was run opportunistically to fill gaps at the top of the seamount plateau. The Cardno seamount was surveyed from 30/11/2022 to 03/12/2022. The survey team note that as shown in GEBCO the Cardno seamount continues in towards the north-east, but the full extent of the footprint of this feature remains uncharted. The seamounts are characterized by a flat plateau with depth in the range 120-200 m for Cardno and 200-250m for Southern Cross (Figure 10).

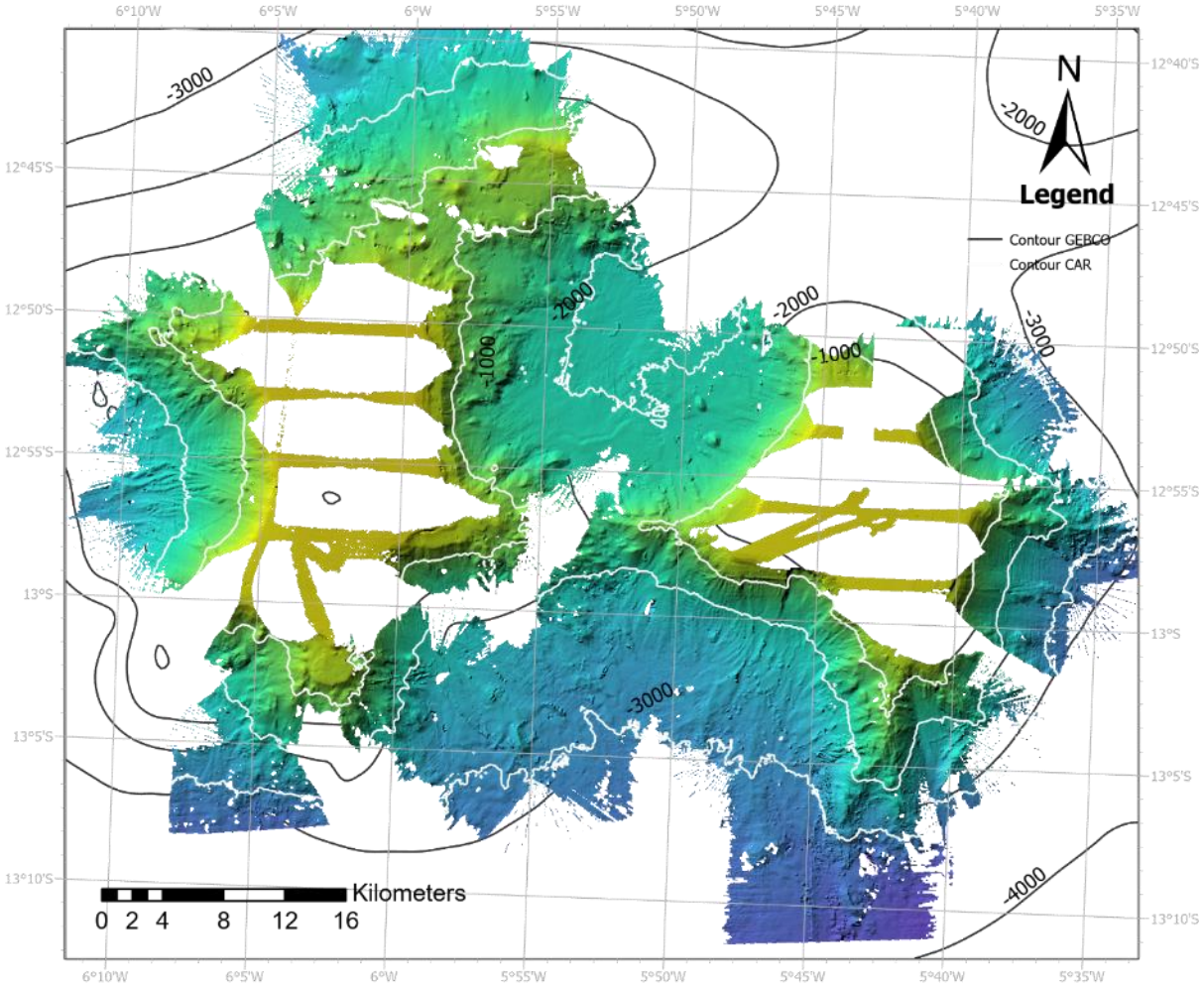


Figure 10 - Map of multibeam coverage of the Cardno and Southern Cross Seamounts in St Helena EEZ.

4.1.7 CARIS projects

Table 3 - Caris project information

Project name	Description	Comments
DY159	General transit lines	Not processed, used for visualisation.
DY159_ASC	Transit lines in the Ascension EEZ	
DY159_Cal	Calibration and unknown seamount survey	
DY159_GRS	Grattan seamount survey	
DY159_YOS	Young Seamount	All lines from DY159_YOS SIS project imported and processed
DY159_SEA	South-East Abyssal Plain	
DY159_ARV	Atlantic Ridge Vent	
DY159_NWS	North-west Seamount in St Helena EEZ	
DY159_SHI	St Helena margin	
DY159_CAR	Cardno and Southern Cross seamounts	

4.2 Fisheries Acoustics & Sampling

Fabio Campanella, Leeann Henry, Joachim Naulaerts & Samantha Barnett

The focus of the acoustic sampling was to:

- investigate the distribution patterns and density of fish and micronekton at the different study areas around Ascension and St. Helena in combination with pelagic net RMT8.
- estimate the distribution and biomass of small pelagic fish (bait fish) around the coastal waters of St. Helena and over the seamounts within St Helena EEZ.
- collect fish distribution data in the vicinity of the deployment location of the BRUVS to compare fish camera- and acoustic-based density estimates and to obtain Target Strength data of large pelagic fish species.

The acoustic sampling was conducted using a SIMRAD EK80 hull-mounted echosounder at 6 frequencies (18, 38, 70, 120, 200, & 333 kHz). The echosounder settings used varied based on the objective of the sampling. A detailed list of all the settings and parameters used during the survey is shown in tables 2-3.

The maximum logged depth was 1000 m and the ping rate used was between 1 and 4 seconds based on the depth of the study area. The slower ping rate was used at higher depths to avoid false bottom echo return. A higher ping rate (~ 0.2 s) was used during the BRUVS deployment.

4.2.1 Preliminary acoustic analysis

The acoustic data were analysed using the software Echoview v13. The first step in the analysis was to edit the bottom line, which is not always correctly detected by the bottom detection algorithm of the EK80 software and remove noise and unwanted targets. The area immediately below the transducers (~10m below the transducer) was excluded from the analysis because it was impacted by the near-field effect and surface noise (e.g., surface bubbles). Background noise, pulse noise and attenuated signals were removed using a series of tools integrated in the Echoview software. This noise can be caused by different sources (e.g. boat propeller, hydraulic winches, bad weather, cross talking from other electronic instruments) and could potentially affect the quality of the data during further analysis. Other sources of noise that could not be identified automatically (e.g. false bottom interference) were eliminated by visual inspection of the echogram and manual editing of the acoustic data.

In order to reduce the stochastic variability of the data, the data were resampled to a lower resolution (25m x 0.2m cell) before further steps. The Nautical Area Backscattering Coefficient (NASC) was exported from the "clean" echograms. The distance interval used to export the integrated NASC was 500 m. The data were exported for the entire depth range (1000m) and stratified by depth layers (every 10 m). The NASC was exported at 38 kHz using a minimum threshold value of -80 dB. The threshold was used to exclude the weak scatterers such as some plankton organisms (e.g. copepods, euphasiids). The NASC exported was mainly associated to fish but it could also include gas-filled organisms such as siphonophores. NASC can be considered as a proxy for biomass.

In order to discriminate different classes of acoustic target, a combination of thresholding and DB differencing was also used (results not shown in this report). This analysis was limited to the first 200 m of the water column due to the depth range limit of the 120 KHz. The analysis consisted of 2 steps:

Thresholding

Mean Volume Backscattering Strength (MVBS) at 38 and 120 kHz was summed, and the resulting echogram was thresholded in order to separate 2 broad classes of targets (fish vs plankton). The difference in variability between fish and zooplankton was used to enhance the contrast between both types of organisms. The use of this approach is helpful when there is a high density of gas-bearing plankton that can easily be mistaken for fish if only dB-differencing is used. The threshold value used for the data collected during the day was empirically chosen at-140 dB. Values above the threshold were classified as fish and values below threshold were identified as plankton. A Boolean mask was then created to assign the backscatter to fish and plankton. Fish schools, when present, were detected and assigned to the fish class without going through the thresholding procedure.

DB differencing

The fish and plankton categories were further separated into 4 additional classes (fish with swim bladder, fish without swim bladder, fluid-like plankton, gas-bearing plankton). Identification of these classes was based on the differences of MVBS measured at 120 and 70 kHz (ΔMVBS120–38).

NASC was exported from the final classes obtained by the discrimination algorithm.

4.2.2 Ascension

The locations of the acoustic transects with examples of echograms recorded along the transects are show in

Figure 11-Figure **13**. All the surveys were conducted during the night before or after the deployment of the RMT8.

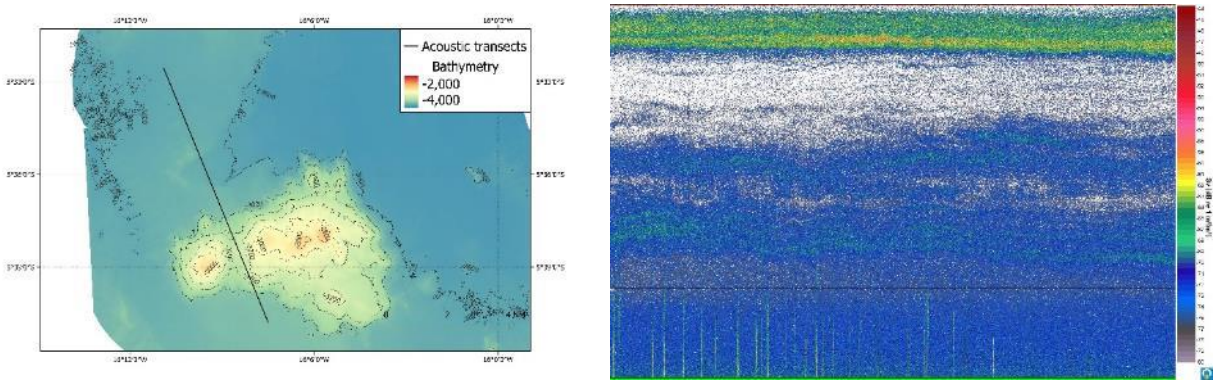


Figure 11 – Acoustic transect at the north-west abyssal site (left panel) and examples of echograms recorded along the transects (right panel).

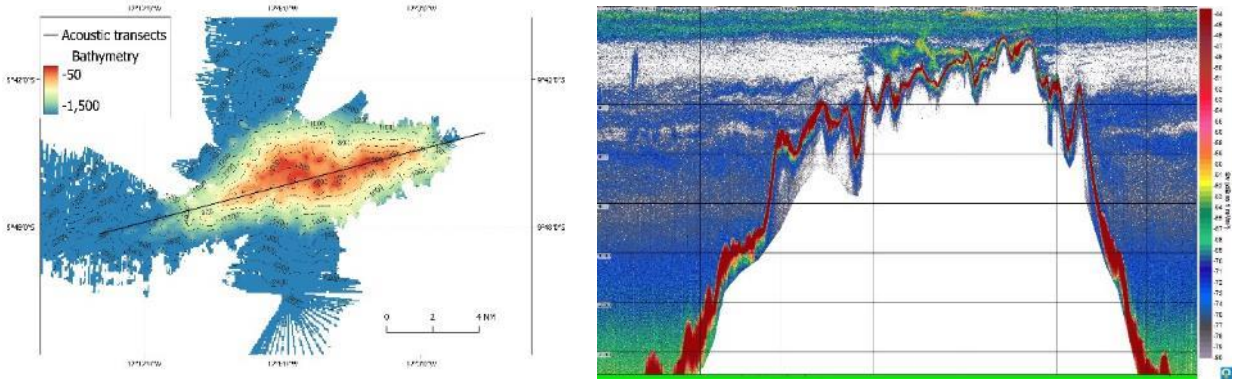


Figure 12 – Acoustic transect at the Young Seamount (left panel) and examples of echograms recorded along the transects (right panel).

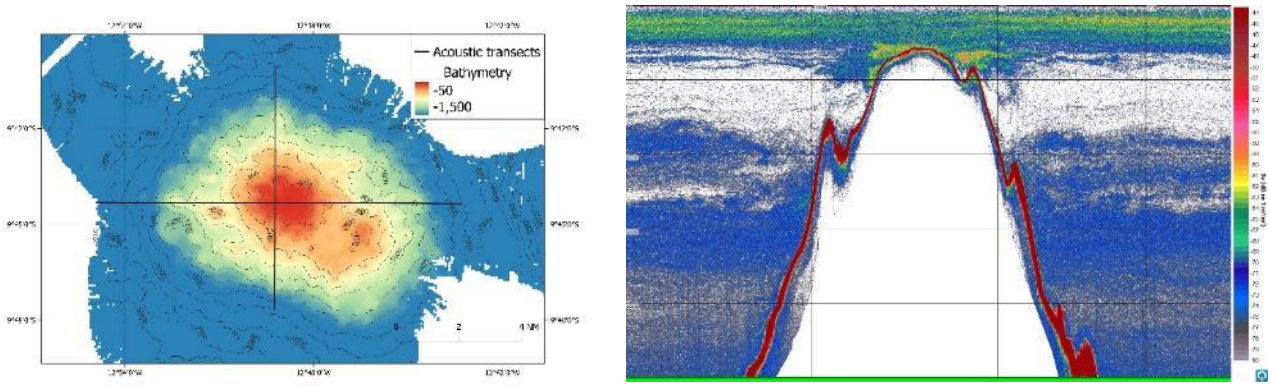


Figure 13 – Map of transects carried out at the sampling locations around Grattan Seamount (left panel) and examples of echograms recorded along the transects (right panel). The cell grids are 2.5 nm long and 200 m deep. The minimum Sv threshold was set to -80 dB.

4.2.3 St Helena

The locations of the acoustic transects with examples of echograms recorded along the transects are shown in Figure 14. All the surveys were conducted during the day to target small pelagic fish species around and over the seamounts.

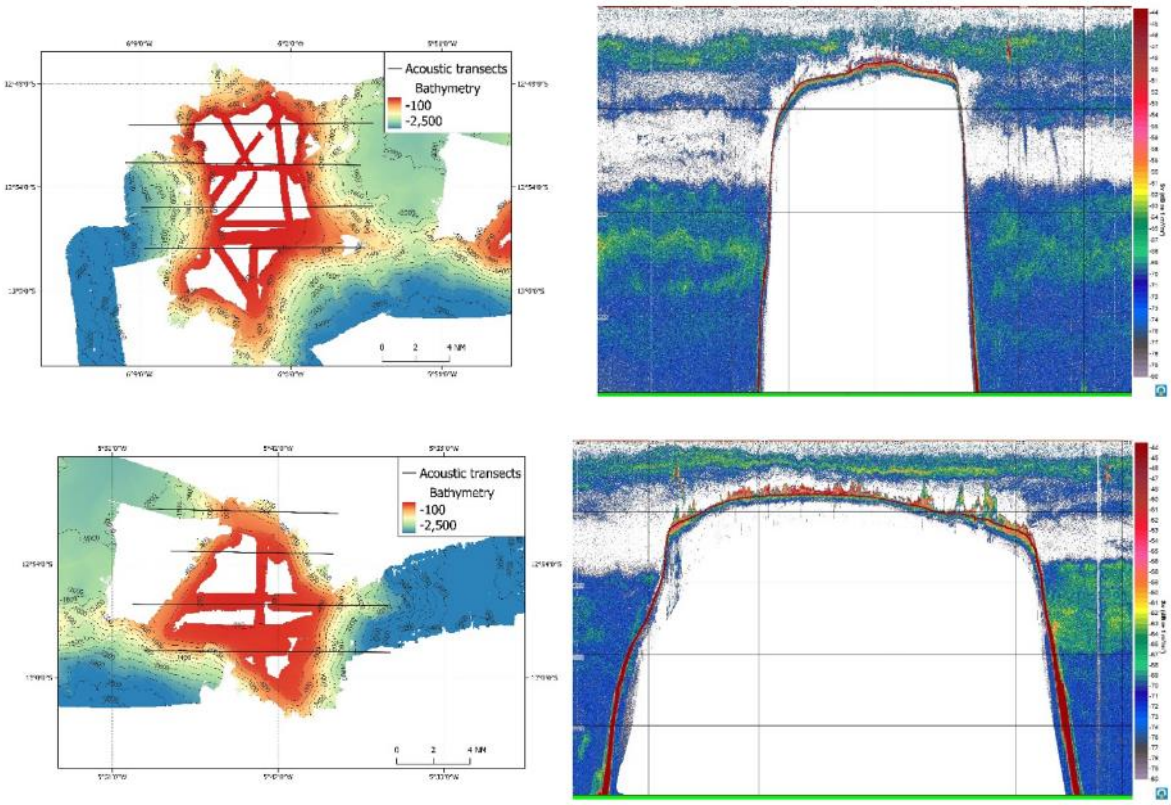


Figure 14 – Map of transects carried out at the sampling locations around Cardno and

Southern Cross Seamounts (top and bottom left panels respectively) and examples of echograms recorded along the transects (top and bottom right panels respectively).

4.2.4 Baitfish survey

Baitfish is the colloquial name of a range of small fish that are pelagic, living and feeding in the upper layers of oceanic water. They are caught for use as bait for such target species as tuna and wahoo. The term baitfish is functional and defines a particular both taxonomic and commercial group of fishes. In respect to tuna fishery around St Helena the baitfish category comprises a complex of fish families Carangidae and Scombridae occurring in surface waters. This complex encompasses six species: chub mackerel, (*Scomber colias*), which is the main species caught, and five species from the trevally family (Carangidae):- kingston, (*Decapterus macarellus*), stonebrass, (*Decapterus muroadsi*), summer stonebrass (*Decapterus punctatus*), great kingston, (*Decapterus tabl*) and steenbrass, (*Selar crumenophthalmus*).

The survey conducted around the island was aimed at estimating the distribution and abundance of the main baitfish species. The acoustic survey consisted of a series of parallel acoustic transects perpendicular to the bathymetry and the coastline that covered the whole island coastal area. The inter-transect distance was ~1.5 nm and the transects extended from the coast (~0.5 nm from the shore) to the 1000m bathymetry (Figure 15). The survey speed ranged from 5 to 9 knots. The transects were run during the daytime when small pelagic fish are aggregated into schools and distributed in the water column off the seafloor and the surface making them more easily detectable by the echosounder. Specific settings and parameters used during the surveys are listed in Table 22 and Table 23.

Fish samples were collected by local fishermen to ground truth the acoustic data and obtain information about species composition and species-specific length distribution, age and maturity. The sampling was undertaken by two vessels (*Helena – Dorothy* and *Swordfish*) at the same time in different locations. The locations were selected based on distribution of the fish backscatter detected the day before along the transects and communicated to the fishermen the evening before the sampling (Figure 15). Fishing started at the sample locations at around 02:00 and a maximum of 30 minutes was spent at each fishing locations using three different fishing gears (droppers, handline, sprig). The fish samples caught were bagged separately per gear type used and sampling location and stored on ice. At the end of each sampling day (~6:00) the samples were transferred from the fishing vessels to the RRS *Discovery* at the leeward side of the Island. Once on board, the samples were sorted by species and processed by taking total length, individual weight, otoliths and assessing sex and maturity stage. In the case

of very large catches, subsamples were taken before weighing and measuring.

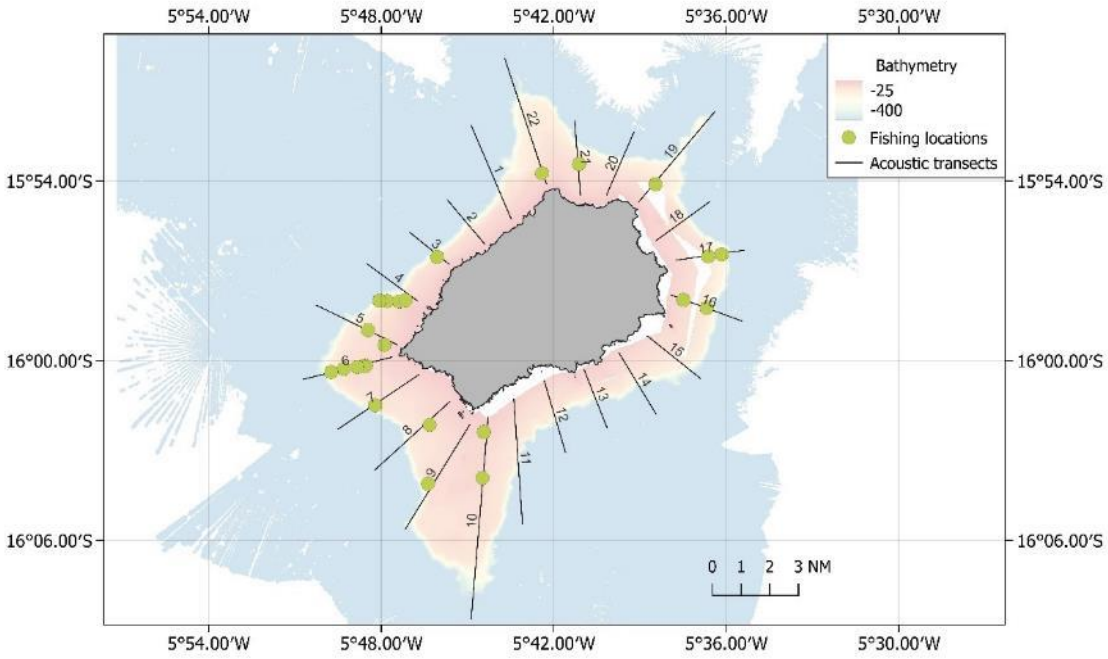


Figure 15 – Map of acoustic transects and fish sampling locations for the baitfish survey in St Helena

Preliminary analysis and results

The NASC used at this stage as a proxy for biomass, was exported from the "clean" echograms. The distance interval used to export the integrated NASC was 250 m. The data were exported for the entire depth range (1000m) and stratified by depth layers (every 10 m). The NASC was exported at 38 kHz using a minimum threshold value of -80 dB.

The preliminary baitfish distribution is shown in Figure 16. Fish were densely aggregated into schools and primarily distributed close to the bottom and often associated with ledges. The depth distribution range went from 40 m to 150 m with the highest densities located in the shallower parts of the study area. Fish were patchily distributed all around the island. The largest density hotspot was located at the western side of the island.

Only two of the target species (steenbrass - *Selar crumenophthalmus* and mackerel – *Scombrus colias*) were caught during the fish sampling. The largest catch was around 18 kg and consisted of 65% of steenbrass and 35% of mackerel (Figure 17). Two additional pelagic species (sarpon –

Promethichthys prometheus and flying fish) were also caught in small numbers. The species composition at each fishing locations per fishing gear is shown in Figure 18. The average size detected for each of the species caught was: steenbrass (23.3 cm), mackerel (31.8 cm), sarpon (37.1 cm), flying fish (41.5 cm).

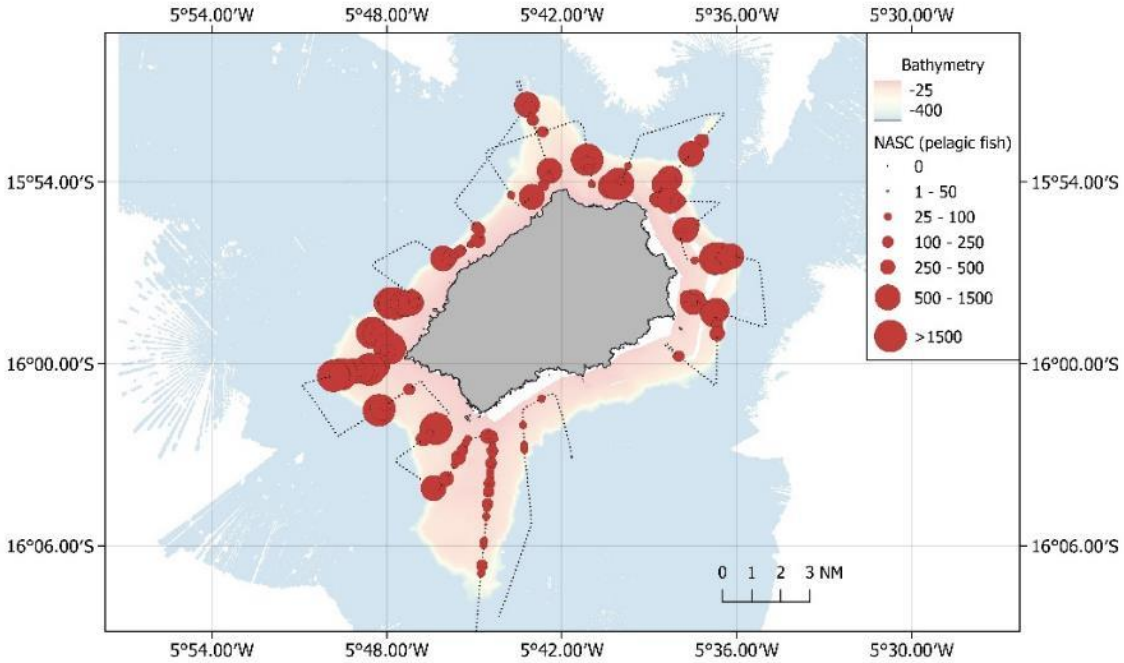
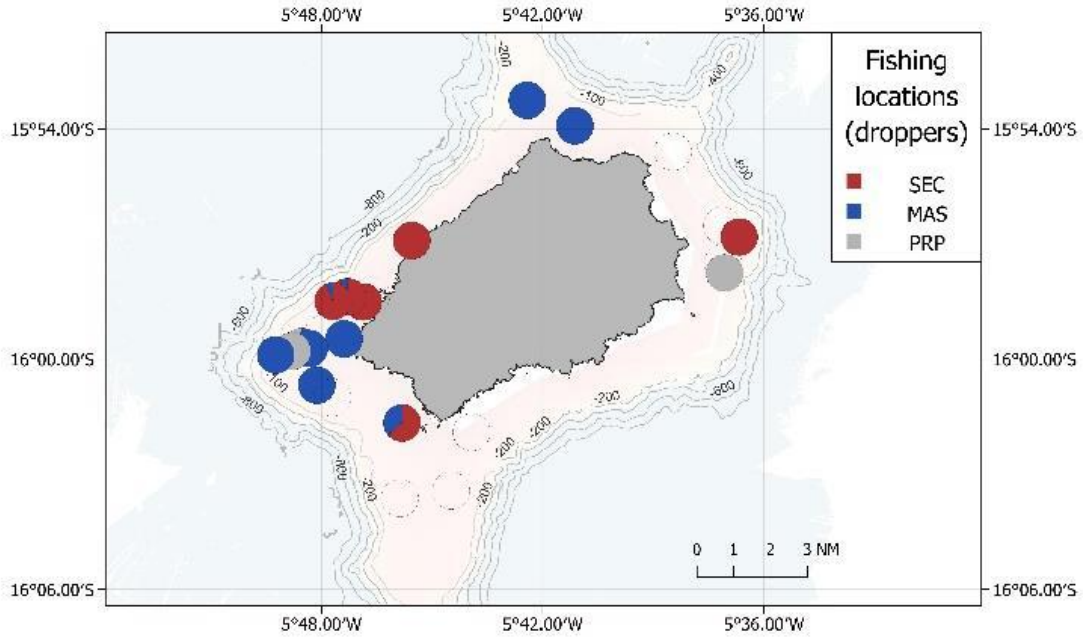


Figure 16 – Baitfish NASC (Nautical Area Backscattering Coefficient, proxy for biomass) distribution

Figure 17 - Fish catch at location 9 in the western part of St. Helena caught with droppers by the fishing vessel Helena-Dorothy



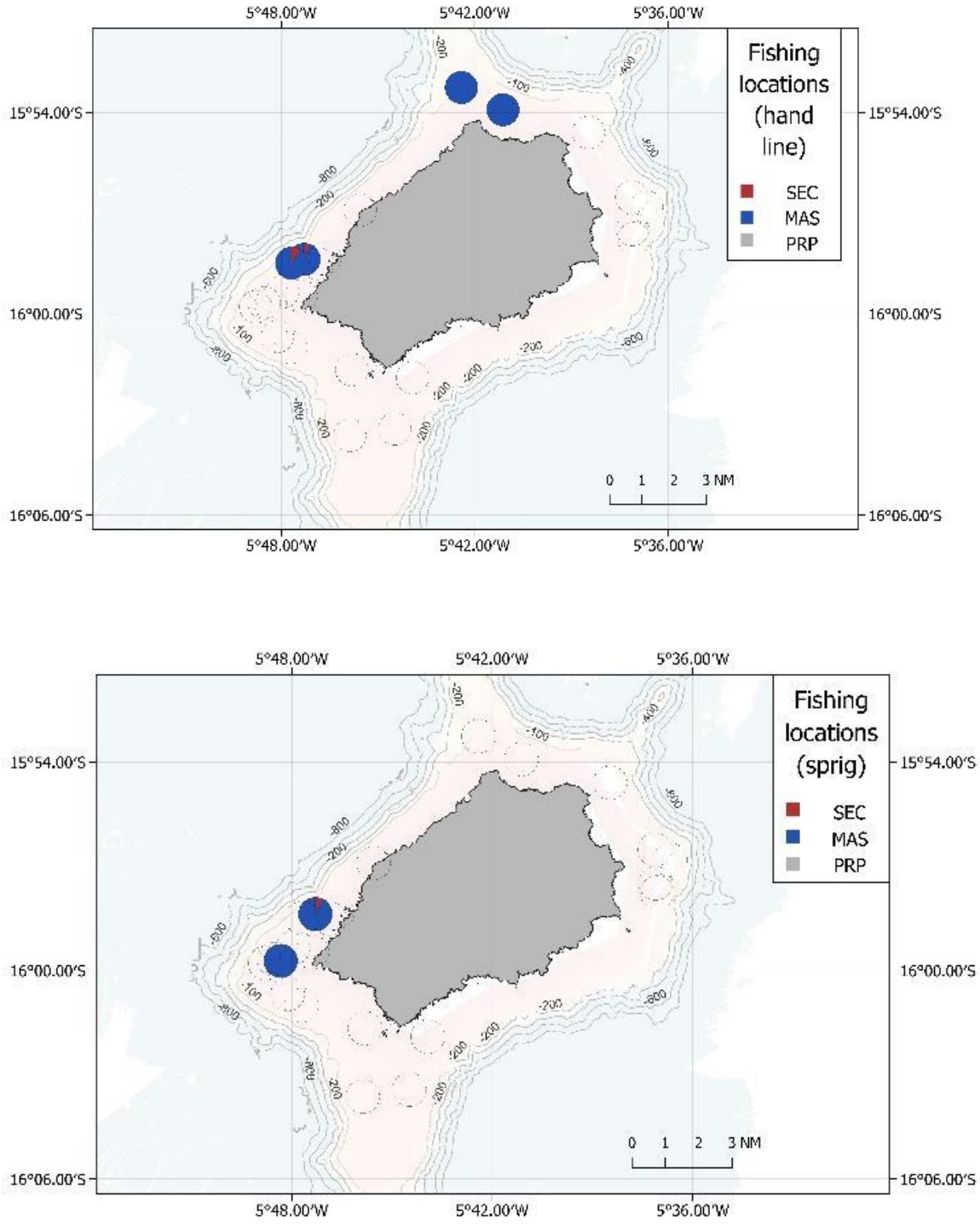


Figure 18 – Fishing stations by gear types with relative catch composition by key species. Three letter codes: SEC= steenbrass, MAS= mackerel, PRP= sarpon.

4.2.5 Acoustic and BRUVS

Acoustic data were recorded at the highest possible resolution using wideband settings (see Table 22 and Table 23) during the deployment and recovery of the BRUVS in order to obtain information about individual fish density and species-specific target strength information. The data will be further analysed in combination with the video information. An example of an echogram recorded during the deployment of the BRUVS around Ascension is shown in Figure 19.

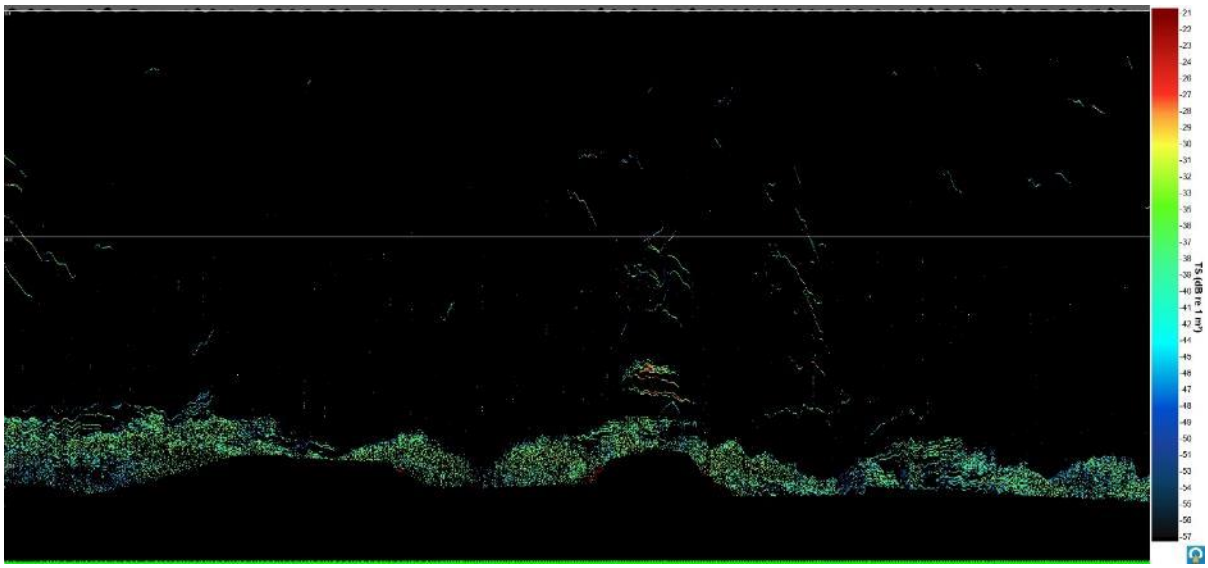


Figure 19 – Example of echogram recorded during the deployment of the BRUVS around Ascension with several individual fish tracks detected in midwater.

4.3 Rectangular Mid-water Trawl (RMT8)

Paul Whomersley, James Maclaine, Gabriele Stowasser, Fabio Campanella, Chris Fletcher & Molly Meadows

4.3.1 Deployment

Pelagic Rectangular Midwater Trawl (RMT) nets (8 m^2 aperture, 4mm net mesh size) or RMT 8 were deployed between dusk and dawn when meso-pelagic organisms (e.g., tunicates cnidarians, crustaceans fish species and cephalopods) were concentrated in surface layers. The RMT 8 was rigged with two nets and deployments depth stratified (various depth horizons; Figure 20). Opening and closing of the nets was controlled through the Down Wire Net Monitor system which also recorded depth, temperature, and salinity. The flow

meter was damaged during one of the deployments and could not be replaced. Tows were selected to represent oceanic and seamount environments. Several tows were also selected to target acoustic signals identified using on-board fisheries acoustics.

Figure 20 – The Rectangular Mid-water Trawl (RMT) while being tested on the deck of RRS Discovery. Adjacent to this is an annotated echogram illustrating the different layers that were targeted using the RMT and the final two images depict a representative catch from the RMT.

4.3.2 Faunal Collections

Samples from the cod end were collected in separate buckets to ensure catches from the different depth bands remained separate. The catches were then weighed and photographed. Specimens were identified to the highest taxonomic level possible, enumerated, weighed, and photographed before being persevered. Where required a subsample of each species was

preserved for isotope and genetic analysis. Whole specimens of various fish and invertebrate species were furthermore retained for curation at the Natural History Museum in London, UK and at the St Helena Marine and Fisheries & Ascension Island Conservation Departments.

4.3.3 Ascension Island

A total of 7 RMT deployments were undertaken within the EEZ of Ascension Island. Targeted areas (Figure 21) included a newly discovered Seamount in the Northwest of the Ascension Island EEZ, over the Grattan and Young Seamount and over the abyssal planes southeast of Ascension Island.

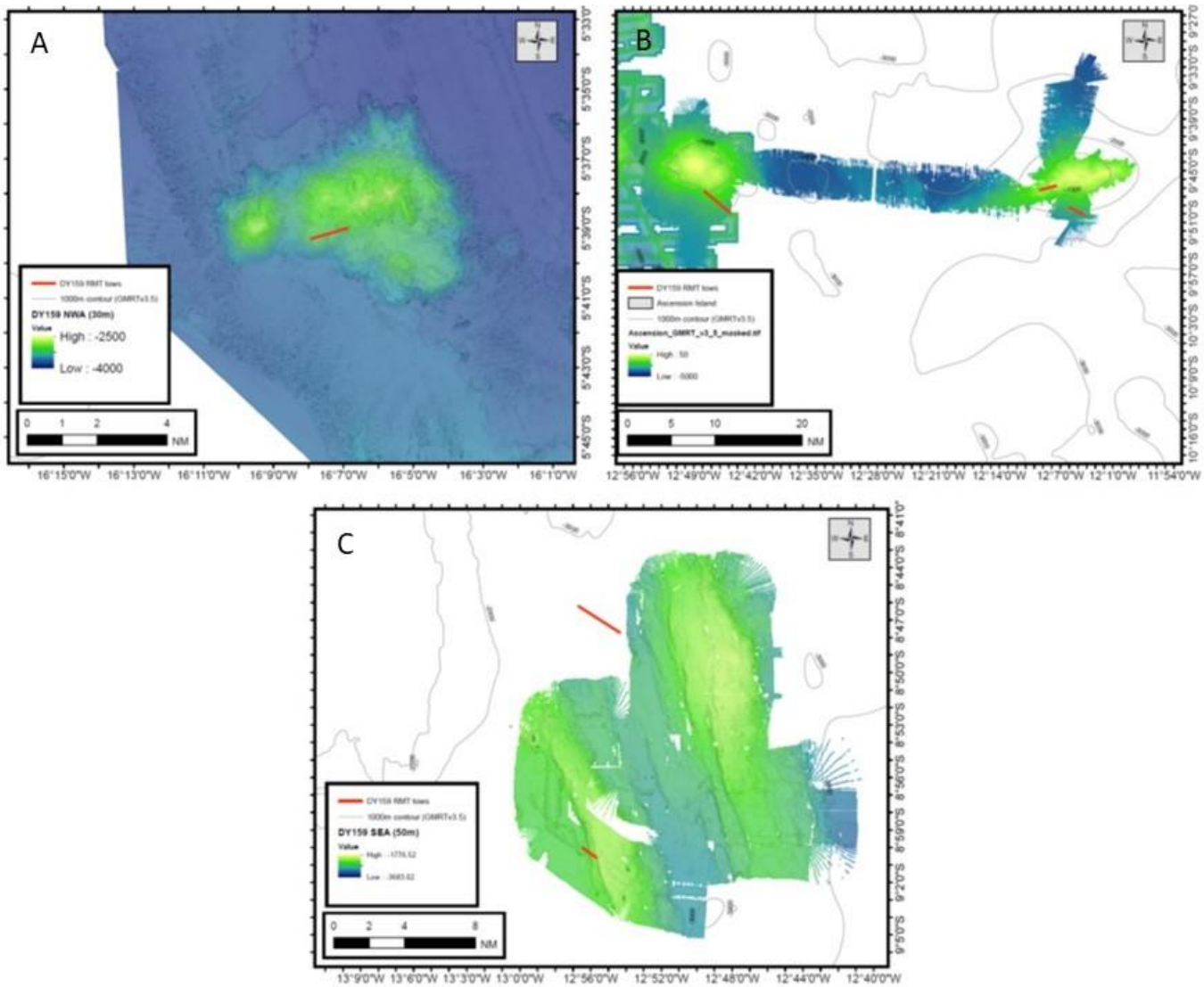


Figure 21 – Maps illustrating the location of RMT deployments. A) Over a newly discovered seamount located in the Northwest of the Ascension Island EEZ, B) over

Young and Grattan seamounts and C) in the Southeast approaches to Ascension Island.

Catches were of a consistent nature, with catches from shallower depths (200m to surface being dominated numerically by pelagic invertebrate species including colonial tunicates, medusae and a wide range of crustaceans. A diverse number of deep-sea fish and cephalopods were also caught during deeper tows (1000-500m). The most abundant fish species caught were found to be from the families Gonostomatidae and Myctophidae.

4.3.4 St Helena

A total of five RMT deployments were undertaken within the EEZ of St Helena. Targeted areas included inshore areas around St Helena and the Cardno and Southern Cross seamount complex (

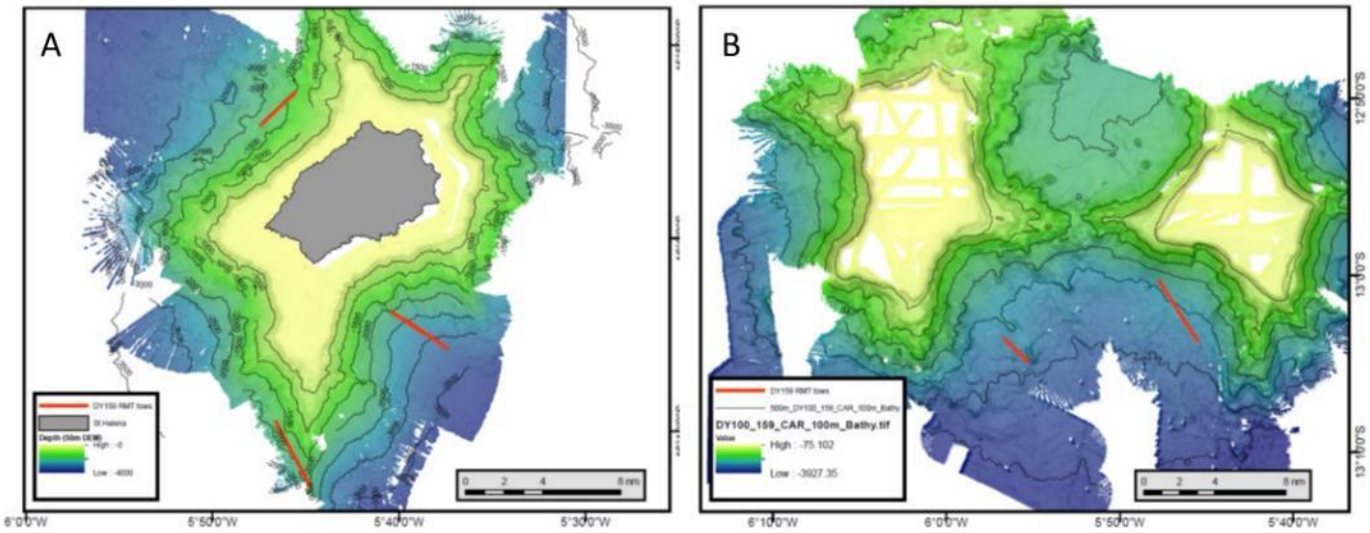


Figure 22).

Figure 22 – Maps illustrating the location of RMT deployments. A) Within the inshore of St Helena, and B) south of the Cardno and Southern Cross seamounts

As with previous RMT surveys around St Helena the windward side of the Island was found to be dominated by the pelagic scorpion fish *Ectreposebastes imus*. Which differs significantly from catches from the leeward side of the Island. As with the RMT catches from Ascension Island the shallower tows were found to be dominated by invertebrate species which included colonial tunicates, medusae and crustaceans. However, there was a greater diversity of deep-sea fish caught around St Helena when compared with preliminary results from Ascension Island.

4.3.5 Highlights

Several interesting species were caught throughout the expedition, these included the jewelled squid (*Histioteuthis* sp.), an extremely rare angler fish (possibly *Himantolophus melanophus*) and the pelican eel and fang tooth (Figure 23). A rare whale fish which is yet to be identified was caught from 1100m in addition to several examples of angler fish and one of the largest bronze saw-toothed eels (*Serrivomer lanceolatoides*) on record.

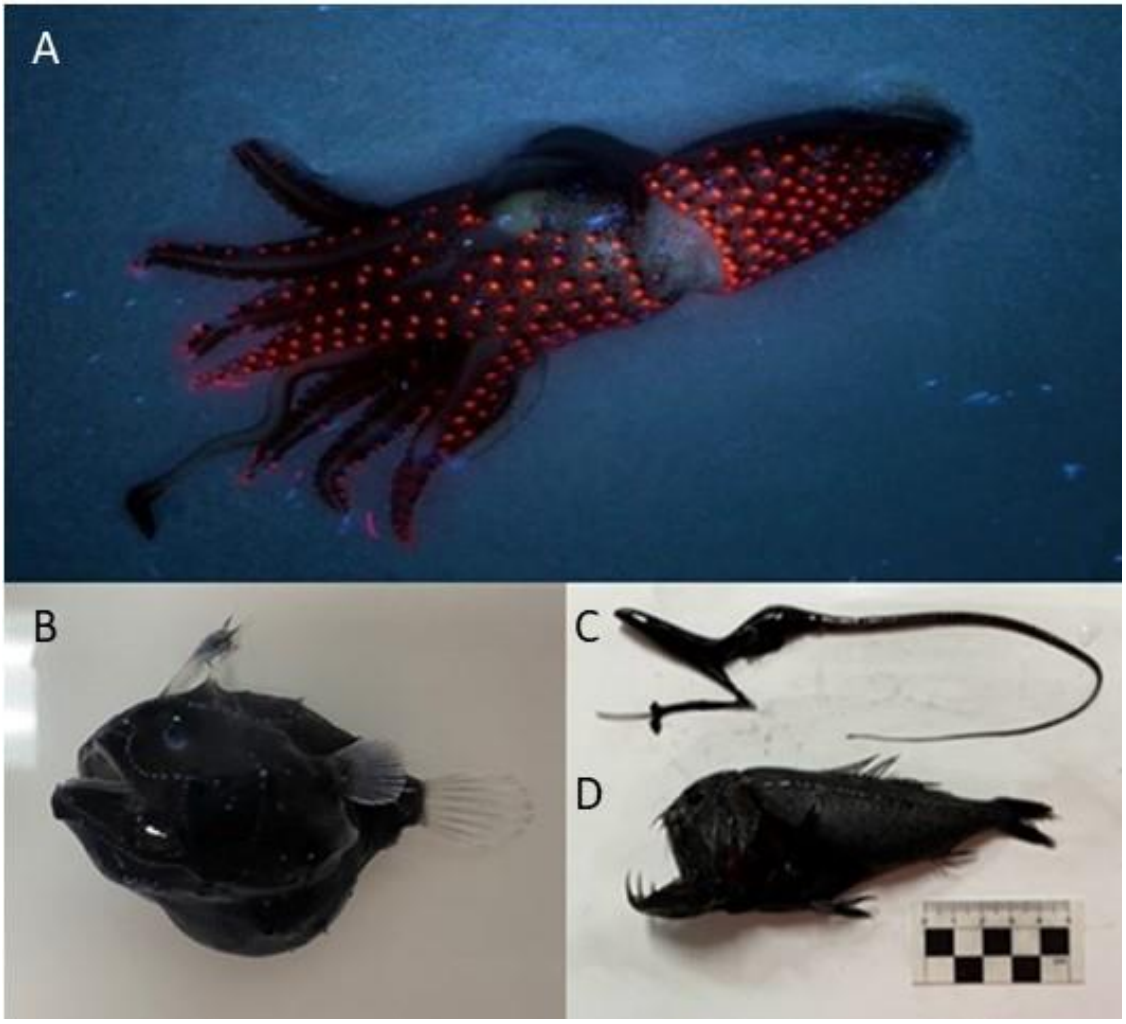


Figure 23 – Examples of specimens caught using the RMT. A) jewelled squid, B) angler fish, C) pelican eel and D) fang tooth.

During the expedition and while on St Helena, staff from the Natural History Museum fully curated many samples of fish and invertebrates (Figure 24). These samples will be displayed in the new St Helena Marine Laboratory and used as an educational resource to help communicate the importance of protecting marine habitats and species.

Figure 24 –Fish samples curated by National History Museum staff and presented to the St Helena Marine Laboratory for display and educational purposes.

4.4 Autonaut *Jura* – Uncrewed Surface Vehicle (USV)

Rodney Brash, Fabio Campanella, Paul Nelson & Paul Whomersley

Jura is a 5 m Autonaut, which uses a novel wave energy system for propulsion and solar and batteries for the computers and payload. The vehicle is crewed remotely via Iridium satellite, and locally via VHF. The command and control system includes a RayMarine class B AIS transponder, EchoMax Radar transponder and navigational light to alert nearby vessels.

Jura's payload consisted of a Aanderaa Conductivity-Temperature sensor and a Simrad EK80 WBT mini echosounder operating at 70 kHz. The WBT mini operated in autonomous mode and was programmed to perform a predefined mission. The mission plan was designed using the EK Mission Planner software and downloaded to the WBT Mini before the mission start. Data were

stored internally and retrieved after the recovery. The settings used for the mission are listed in Table 4.

Jura was deployed in St. Helena on 26/11/2022 at 11:45 and recovered on 29/11/2022 at 17:00 (Figure 25). The safety boat was deployed during Jura's deployment to allow the calibration of the echosounder. The calibration was performed from the small boat while alongside Jura following the standard sphere method (Demer et al., 2015). A 38.1 mm diameter sphere made from tungsten carbide with 6 % cobalt binder material (WC) was used as a reference target. It was positioned at about 5 m from the transducers and moved systematically throughout the acoustic beams. The results of the calibration could not be checked in real time as the echosounder was operating in autonomous mode.

Figure 25 – Deployment of Autonaut *Jura*.

Jura was remotely monitored using the Remote Control Workstation (RCW) software (Figure 26) through the Iridium by the onboard pilots and a lead pilot

located in the UK. In particular, position, speed, battery, power consumption, bilge pump, tide and wind were periodically checked and logged by the pilot on watch. Initially, this observation interval was expected to be between 1 – 4 hours, but persistent problems were found with the vehicle not adhering to its expected track. In practice, the vehicle's status was monitored every five minutes. A separate report on the feasibility of an ASV like Autonaut *Jura* for the UKOTs will be prepared in due course but initial observations are that the level of maintenance, supervision required, and the vehicle's operational constraints (e.g., minimum distance from shore), substantially compromise its suitability for future deployments across overseas territories.

Figure 27 shows the track carried out by Jura during the mission. The acoustic data were successfully logged and an example of an echogram is showed in Figure 28.

Table 4 - Details of the acoustic sampling on Autonaut *Jura*

Frequency	70 kHz
Transducer type	ES70-18CD
Transducer power (W)	300
Pulse length (us)	1024
Pulse type	CW (narrowband)
Max recorded depth range	800 m
Ping interval	1 s

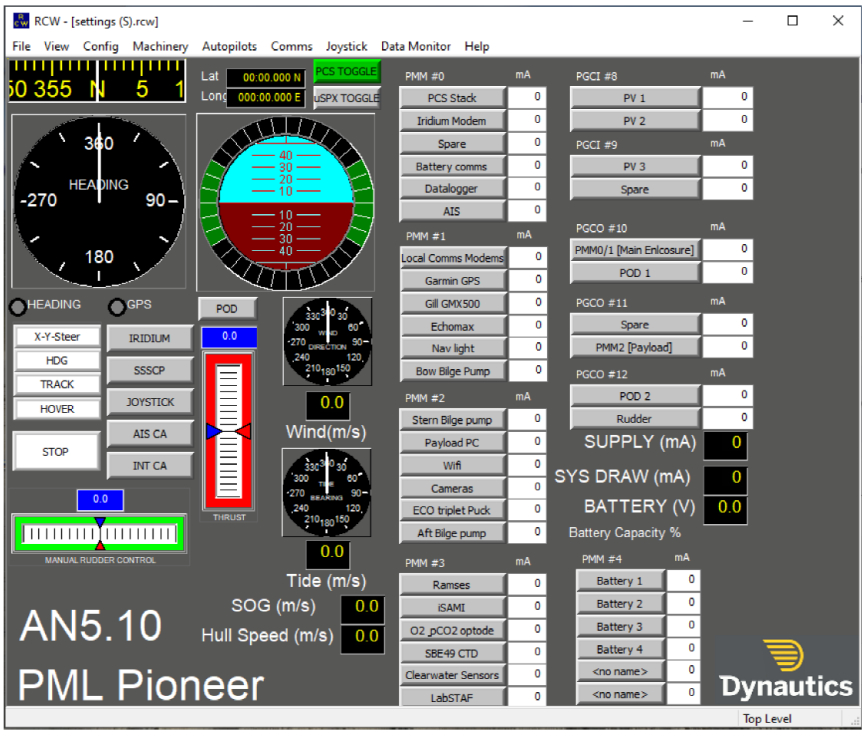


Figure 26 - Command and Control window of the Remote Control Workstation (RCW) software

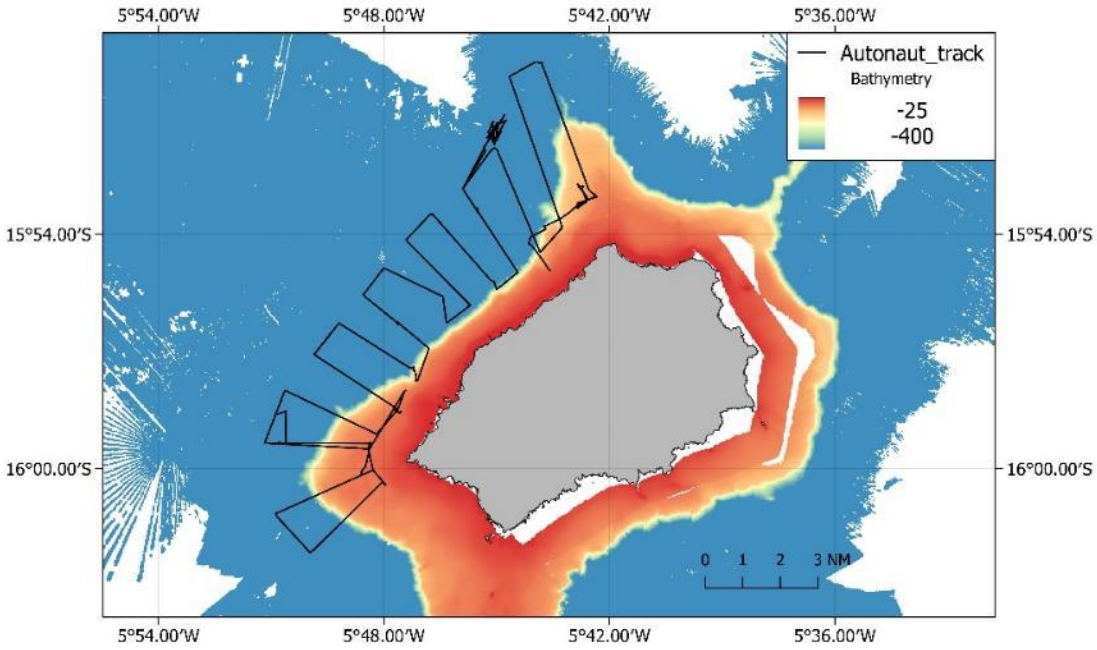


Figure 27 - Map of Jura's track in St. Helena.

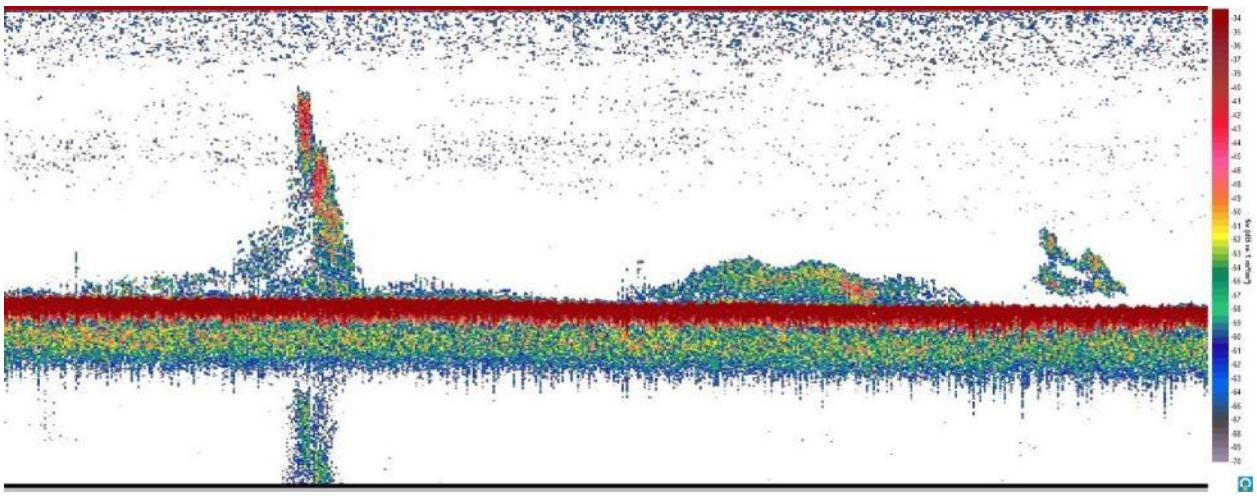


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Figure 28 - Example of echogram with small pelagic fish aggregations at the seafloor recorded during the Autonaut mission

4.5 CTD Oceanographic Observations

Paul Nelson, Tiffany Simpson, Toby Capel, Gabriele Stowasser & Emma Defriez

4.5.1 Water Column Sampling

Water at multiple depths for various samples was collected using a CTD Rosette fitted with 24 x 20 litre Niskin bottles. The Rosette also included several sensors that can continuously measure the following parameters as it moves through the water column (see section 6.4):

- Pressure
- Conductivity (Salinity)
- Temperature
- Fluorescence (Chlorophyll)
- Turbidity (Optical Back Scatter & Transmission)
- Dissolved Oxygen
- PAR (Photosynthetically Active Radiation): Only used on casts less than 500m deep.

The CTD Rosette was used to collect water samples at depth for the following, per depths in

Table 5:

- Marine Plastics
- Chlorophyll
- Dissolved Inorganic Nutrients.
- eDNA
- Plankton Nanopore Sequencing
- Salinity
- Stable Isotope Analysis

Table 5 – CTD bottle firing depths and associated samples. *Chlorophyll maximum depth was selected per deployment and was typically in the range 70-90m and was at times combined with the 75m bottle. **Plastics sampling required 100 litres and so five separate bottles were fired at a single depth per transect. N.B. – Not all depths were sampled for each method at every station.

Depth (m) or profile mark	Samples collected
5	Nutrients, Chlorophyll, Salinity, eDNA, SIA
25	Nutrients, Chlorophyll, Salinity, eDNA, SIA
50	eDNA, SIA
75	Nutrients, Chlorophyll, Salinity, SIA
Chlorophyll maximum	Nutrients, Chlorophyll, Salinity, eDNA, SIA
200	Nutrients, Chlorophyll, Salinity, SIA
450	Nutrients, Chlorophyll, Salinity, eDNA, SIA
750	Nutrients, Chlorophyll, Salinity, SIA
1000	Nutrients, Chlorophyll, Salinity, eDNA, Plastics
1500	Plastics
2000	Plastics
2500	Nutrients, Chlorophyll, Salinity, Plastics
3000	Nutrients, Chlorophyll, Salinity, Plastics
Bottom depth (if deeper than above)	Nutrients, Chlorophyll, Salinity, eDNA, SIA

Chlorophyll

A known volume of water, typically in the order of 1 to 5 litres was filtered through Glass Microfibre (GF/F) 4.7 cm filters, using a glass filtration system attached to a vacuum pump. The filters were then carefully folded and wrapped in foil before being stored at -80 °C.

Analysis will be performed once the samples have been returned to shore. Method of analysis is yet to be determined, spectrophotometry, fluorescence, and HPLC are the possible options.

Dissolved Inorganic Nutrients.

Approximately 60ml of water was filtered through Sartorius Minisart PES 0.45µm 2 mm syringe filters into 60ml polycarbonate pots and stored at -20 to -30 °C.

Analysis will be performed at the Cefas Lowestoft using a Seal Analytical AA3 Continuous Flow Analyser (CFA) for TOxN (Total Oxidised Nitrogen = Nitrate + Nitrite), nitrite, silicate, phosphate, and ammonia.

Plankton Nanopore Sequencing

Water was collected into plastic 50ml centrifuge tubs and fixed with 100-200 ul of acidified lugol's iodine. Samples were stored in a fridge at 1 to 8 Deg C. The samples will be screened for pathogenic and invasive species of phytoplankton once returned to Cefas' Weymouth lab.

Salinity

Water was collected into 125ml narrow mouthed glass bottles and sealed with a plastic insert and screw cap. Analysis was performed onboard using a Guildline Autosal Salinometer.

Marine Plastics.

100 litres of seawater were emptied over four stacked sieves (mesh sizes of 5mm, 900 µm, 315 µm and 100 µm; Figure 29). Each sieve is then rinsed using Ultra Pure Water (UPW) into clean glass jars. Samples were stored frozen at approximately -20 °C.

Figure 29 – Images of residues on four sieves after filtration.

eDNA

Each sample depth consists of five replicate 1000ml samples. Samples were filtered through 0.45 GN-6 mixed cellulose ester µm filter paper using a peristaltic pump. Filters were divided in half, one half going into cryovials and returned to the UK for analysis, the second half is placed in plastics bags to be returned to Ascension for storage. All samples were stored at -80 Deg C.

CTD water sampling (Stable Isotope Analysis)

To establish an isotopic baseline for the depth horizons where zooplankton samples originated from, corresponding particulate organic matter (POM) was collected. CTD deployments were carried out in deep water off the shelf and shallower water over the plateau of the seamounts. POM samples were obtained through filtering waters collected by Niskin bottles. Water was taken from various depths at each station. All water samples collected from Niskin bottles were processed on-board and filtered onto 47mm GF/F filters and frozen at -80°C.

4.5.2 Underway Sampling

The ships underway system (see section 6.6.6) continuous pumps water from approximately 5m below the surface and passes it through several sensors, a list of which can be found below. This allows both spatial and temporal data of the below parameters to be collected on surface conditions as the ship transects through the water:

- Pressure
- Conductivity (Salinity)
- Temperature
- Fluorescence (Chlorophyll)
- Turbidity (Optical Back Scatter & Transmission)

Chlorophyll and salinity samples were taken periodically to validate the sensor data. In addition, nutrient, eDNA and plankton samples were collected. Sample preparation and analysis for these samples will be the same as the water column samples.

4.6 Deep-water Cameras

Oliver Hogg, Nicola Geary, Giulia La Bianca & James Bell

Methodology

Video observations were made with a deep-water capable drop-frame camera system (STR Telemetry), which has a separate video camera and still images system. Illumination was provided by four high-powered Light Emitting Diodes (LED) and a separate high-powered synchronised flash. The high definition (1080p/25/30fps) subsea video camera and 18-megapixels digital stills camera were oriented to provide a forward oblique view of the seabed. The frame also comprised an integrated 250khz precision altimeter, combined compass and depth sensor and was fitted with four dual scaling lasers spaced at 215mm. A 780p IP camera and two high-powered LEDs provided a forward-facing live feed to aid navigation and provide a wider view of the seabed environment.

A dedicated third-party winch was used for deployment, via a sheave shackled to a ship's winch cable through the starboard 'bullhorn' extendable gantry (Figure 30).

Figure 30 – Deployment of the towed camera.

Setup and operation followed the ‘Mapping European Seabed Habitats’ (MESH) ‘Recommended Operating Guidelines (ROG) for underwater video and photographic imaging techniques’ (Coggan et al., 2007). Video and stills data were collected along 45-120 min transects with the vessel moving at a velocity of 0.2 knots. The transects covered a distance of between 200 and 800 m and were either centred on positions of high predicted likelihood for cold water coral reefs (Bridges *et al.,* submitted), or target depth bands selected with a minimum of additional vessel transit. For habitat and species annotation during the dives, the survey team used a combination of resources including the University of Plymouth Deep-Sea Species Catalogue (unpublished), Vinha *et al.* (2022), and Smartar-ID catalogue (specifically for Crinoidea and Pennatulacea – https://smartar-id.app/taxonomic-guides). The survey team gratefully acknowledge the remote support in species ID

provided by Amelia Bridges, Kerry Howell, Michelle Taylor, Rebecca Ross, Joanna Xavier and Christopher Mah.

Video was recorded simultaneously to two video capture top side units: one logging Central Reference Point (CRP) and telemetry data and one logging Ultra Short Base Length (USBL) position (as a backup). Recording commenced when the seabed became visible and continued until the end of the tow and recovery off the seabed.

Still images were acquired continuously throughout the dive using the altimeter reading to ensure the camera was no more than 1.4m from the seabed, thus maximising the number of high-quality images available for subsequent analysis. At the beginning of each camera transect tow the focus of the stills camera was checked, this was done while on as close as possible to the seabed.

USBL and/or CRP position data, altimeter data and combined compass and depth sensor data were combined to one file. Each still image was linked to coordinates and telemetry data through matching the time stamps in the image Exif file, allowing each individual image to be associated with depth and plotted in space (with an associated position error of between 10-50m).

System adjustments

The digital stills camera was set to full manual mode with a default shutter speed of 1/60. After the first deployment this was increased to 1/125 to avoid the risk of image blur through movement of the camera system. The aperture was set at F8.0 as a balance between maintaining a depth of field that kept the full image in focus whilst limiting the need for high ISO settings. All of these setting were changed manually through the camera interface (Figure 31).

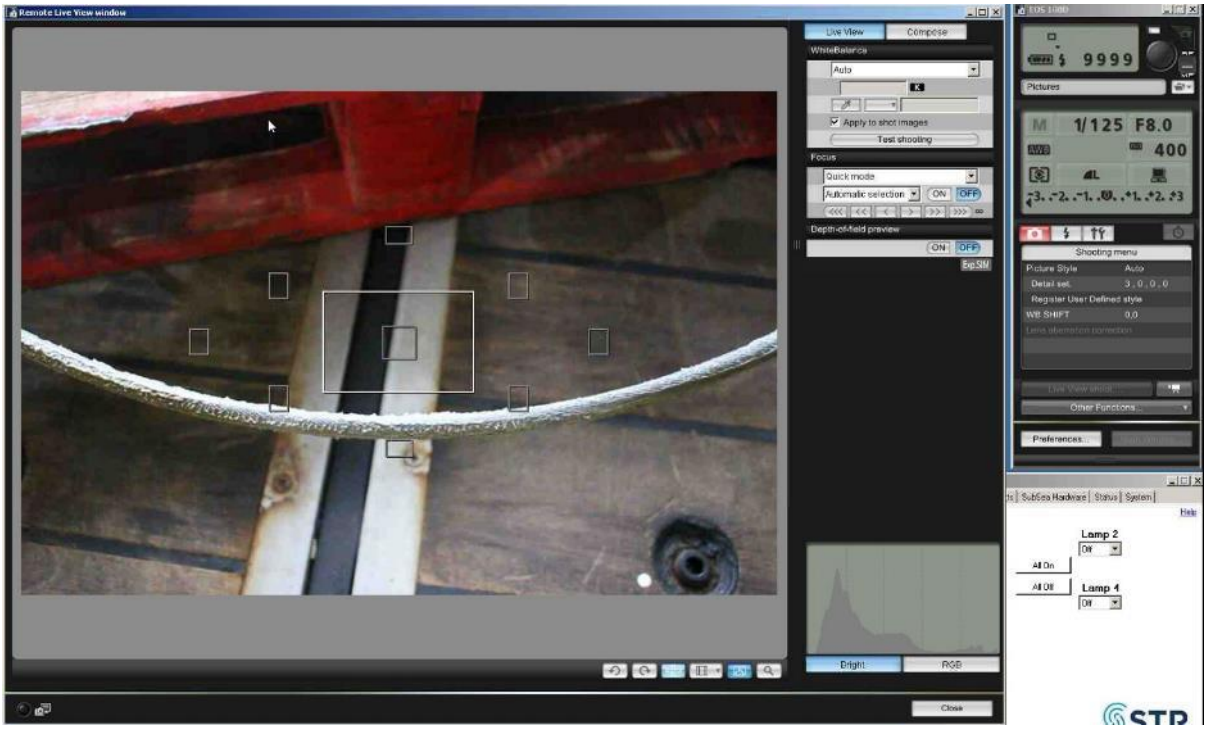


Figure 31 – Frame grab of towed stills camera operating set up

The position of the six LEDs was adjusted during the survey to try and limit areas of the HD video in shade. Some shading was difficult to avoid completely especially in rugose or down-slope terrain where part of the frame was beyond the range of the LEDs. This resulted in some areas at the top of each frame being too dark to analyse.

In playback of the HD videos, it was noted that the image quality (especially towards the top of the frame where there was less light) was lower than when viewed through the live feed. This was identified as a file compression (CODEC) issue in which the default settings favour file compression and write speed to image quality. Through a series of bench tests the settings were revised through the 'Video Config' tab on the HD camera screen. Pixel format was changed from 8-bit YUV and 10-bit YUV (Figure 32) and 'Average bitrate Rate Control' was changed from 8000 kbit/sec to 30000 kbit/sec (Figure 32). Because the effects of these changes could not be simulated effectively 'on deck' the changes were only made for the primary HD camera feed with the backup camera feed kept at the original settings to ensure usable imagery was recorded on each dive. It is recommended for future deployments that these setting are checked and that our revised settings should be adopted at least as initial set up parameters.

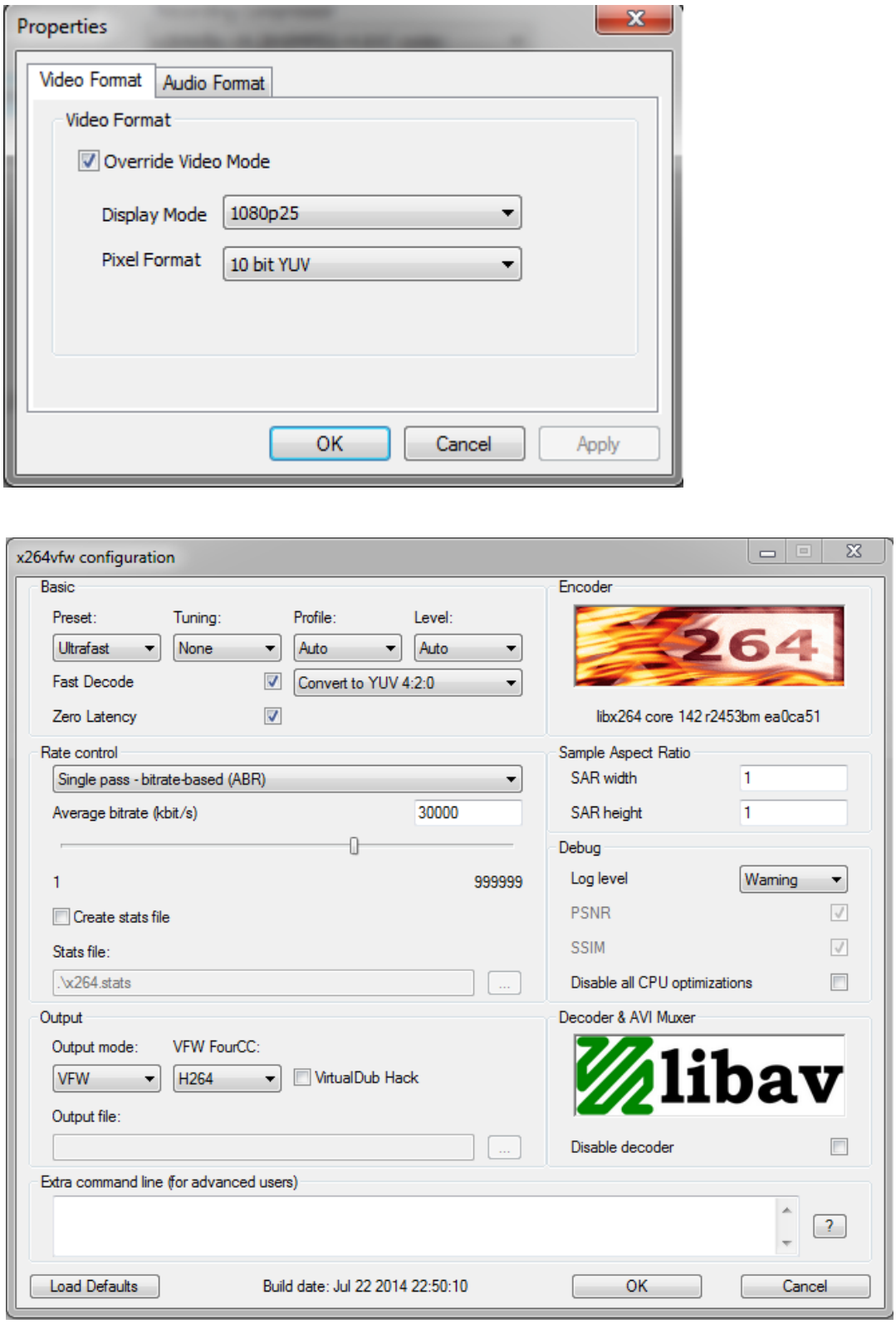


Figure 32 – Towed camera video recording configuration

Global Navigation Satellite System and corrections

Position fixes were recorded on paper log sheets using the ship-based display, noting both time (UTC) and CRP as a minimum. The drop camera was deployed from the aft starboard crane. During camera operations, the position of the gear on the seabed was recorded using a USBL positioning beacon. As offset of up to ~10 m may occur and the USBL position can be lost entirely in deep water and when the vessel is operating using dynamic positioning. Comparison of the USBL position and the CRP allowed for USBL accuracy to be determined and a decision made on which was preferable/ available for use with georeferencing seabed imagery. Positional data were recorded every second between the start and end of each tow on the top side acquisition suite. Still images were matched, based on embedded Exif time staps within the renames '.jpg' file, to the corrected positional data to provide geo-referenced still images.

4.6.1 Ascension Dive Logs

Ascension Island (ASI)

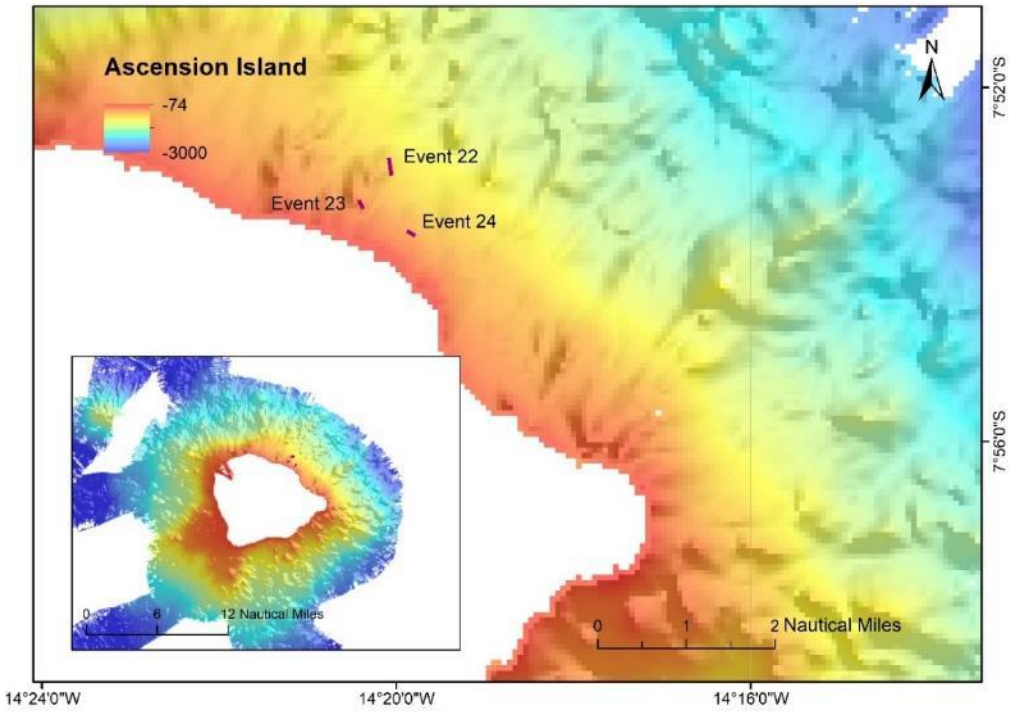


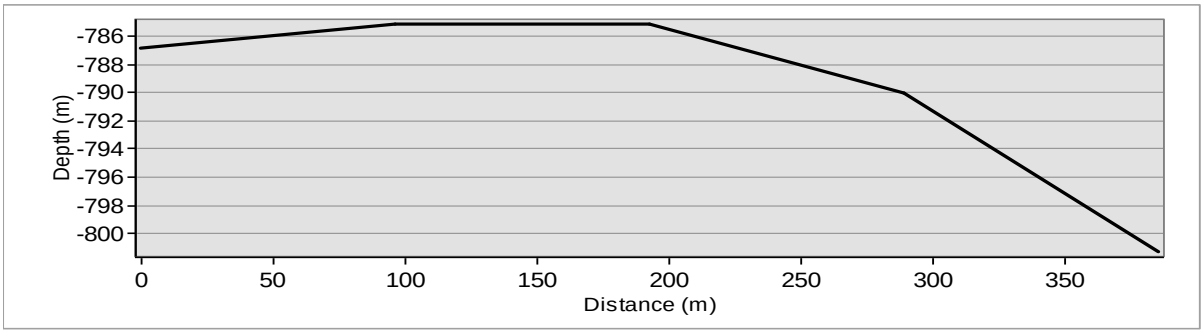
Figure 33 – Ascension Island margin towed camera transects.

SurveyID	DY159	UKOT	ASC
Date	15/11/2022	EventNo	022
Station Code	ASI		

Summary description

START AT 03:34. This dive was undertaken on Ascension Islands northern slope. Starting at 786 m the dive transected across slope, maintaining roughly the same depth throughout. The dive started on a moderate slope, characterised by sand/gravel/boulders with sparse epifauna on boulders (e.g., anemones, crinoids). Shortly after coral framework was observed on sand and boulders with no dominant epifauna and boulder outcrops with dead scleractinian and a few crinoids (likely *Koehlermetra porrecta*). The same biotope type continues with more coral framework and an aggregation of crinoids on big boulder and a large *Parantipathes sp* on boulder. The substrata was mainly boulders and sand interspersed with frequent coral framework. No dominant epifauna was observed, but occasionally crinoids and scleractinian colonies were observed. As the dive progressed biotope types interchange between boulders/sand and coral framework/coral colonies with feather stars and scleractinians. **END AT 04:48.**

Dive Profile



Representative Images

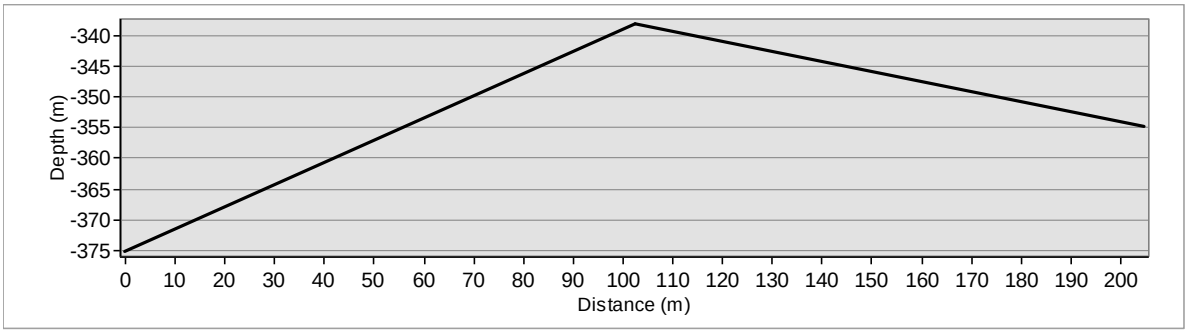
SurveyID	DY159	UKOT	ASC

Date	15/11/2022	EventNo	023
Station Code	ASI		

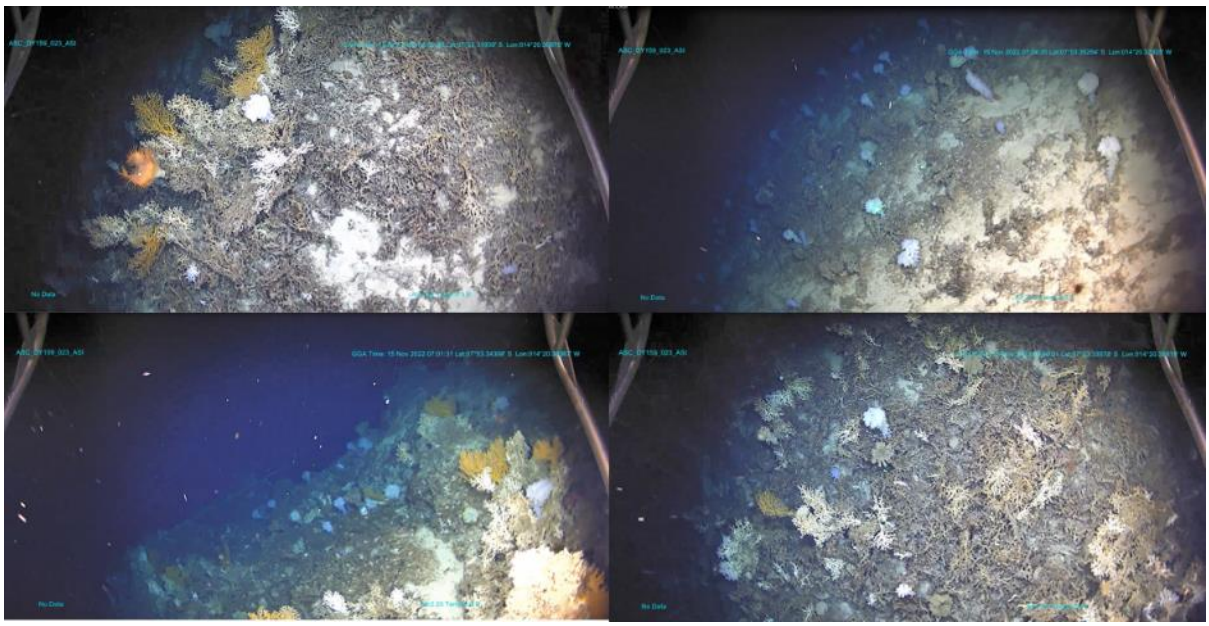
Summary description

START AT 06:34. This dive was undertaken on Ascension Islands northern slope. The entire dive is a homogenous biotope: scleractianian (poss *Desmophyllum pertusum*) reef. It is recommended to use both videos (HD and IP) for habitat characterisation. *Aphrocallistes sp* is the dominant fauna, with occasional *Leiopathes sp* and *Paramuricea sp*. Other observed fauna included *Stichopathes sp, Cerianthidae sp* and *Chaceon sp.* **END AT 07:10.**

Dive Profile



Representative Images

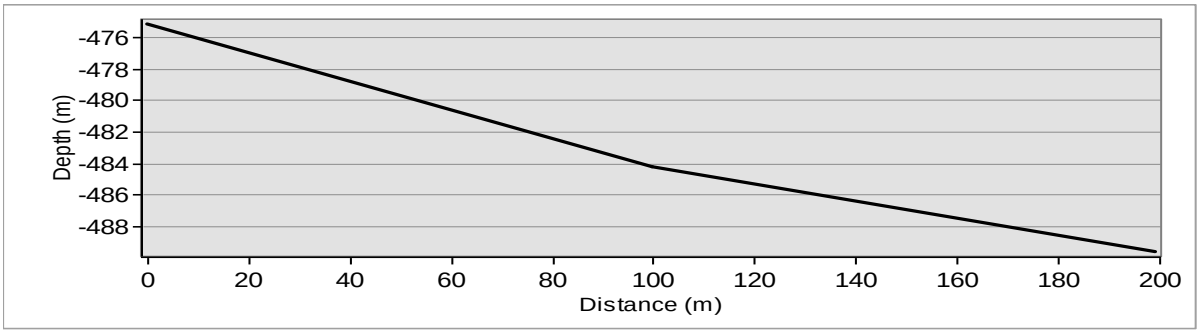


SurveyID	DY159	UKOT	ASC
Date	15/11/2022	EventNo	024
Station Code	ASI		

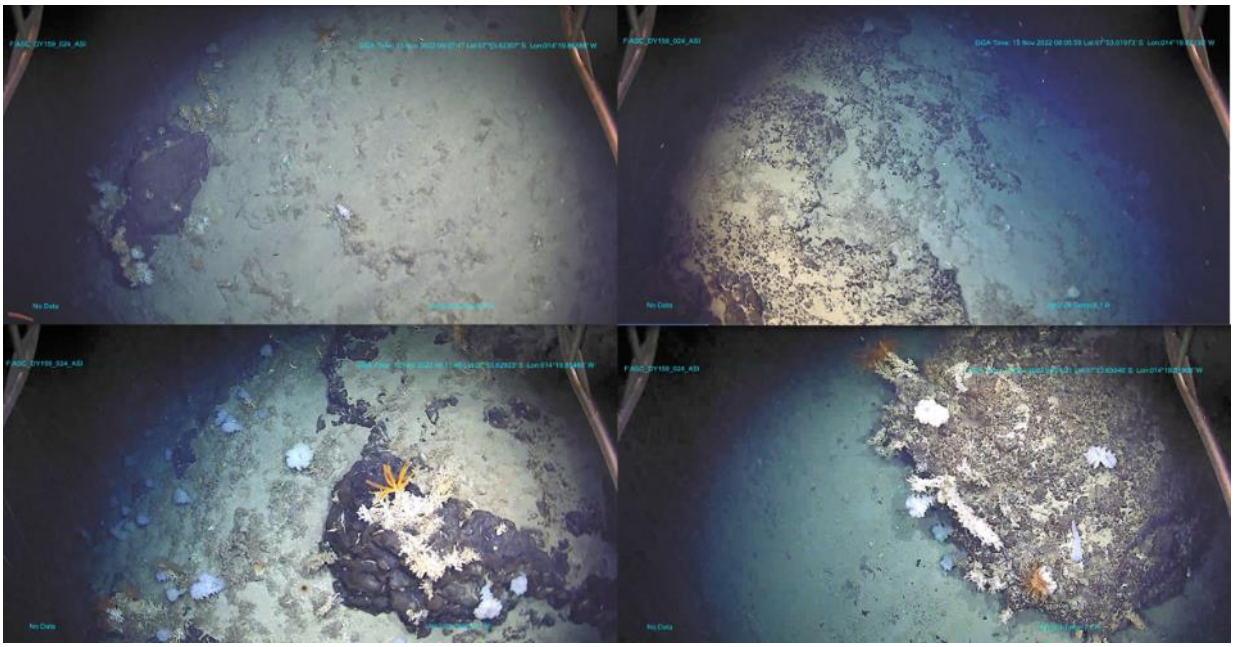
Summary description

START AT 07:49. This dive was undertaken on a relatively flat transect across Ascension Islands northern slope. The dive is characterised by two biotopes, 1) frequent glass sponges (*Aphrocallistes sp*) on boulders and soft sediment (sparsely gravelly/rubble-y), and 2) occasional coral colonies (scleractinians) on boulders. *Aphrocallistes sp* is the dominant species across the dive (see pictures). There was good visibility throughout the dive while the drop cam travels across a steep rocky slope. Grenadiers (*Coryphaenoides sp*) were occasionally encountered throughout the dive. Towards the end of the dive many empty shells were observed on gravel (possible brachiopoda) along with a specimen of white skeleton coral (further investigation needed). **END AT 08:37.**

Dive Profile



Representative Images



Young Seamount (YOS)

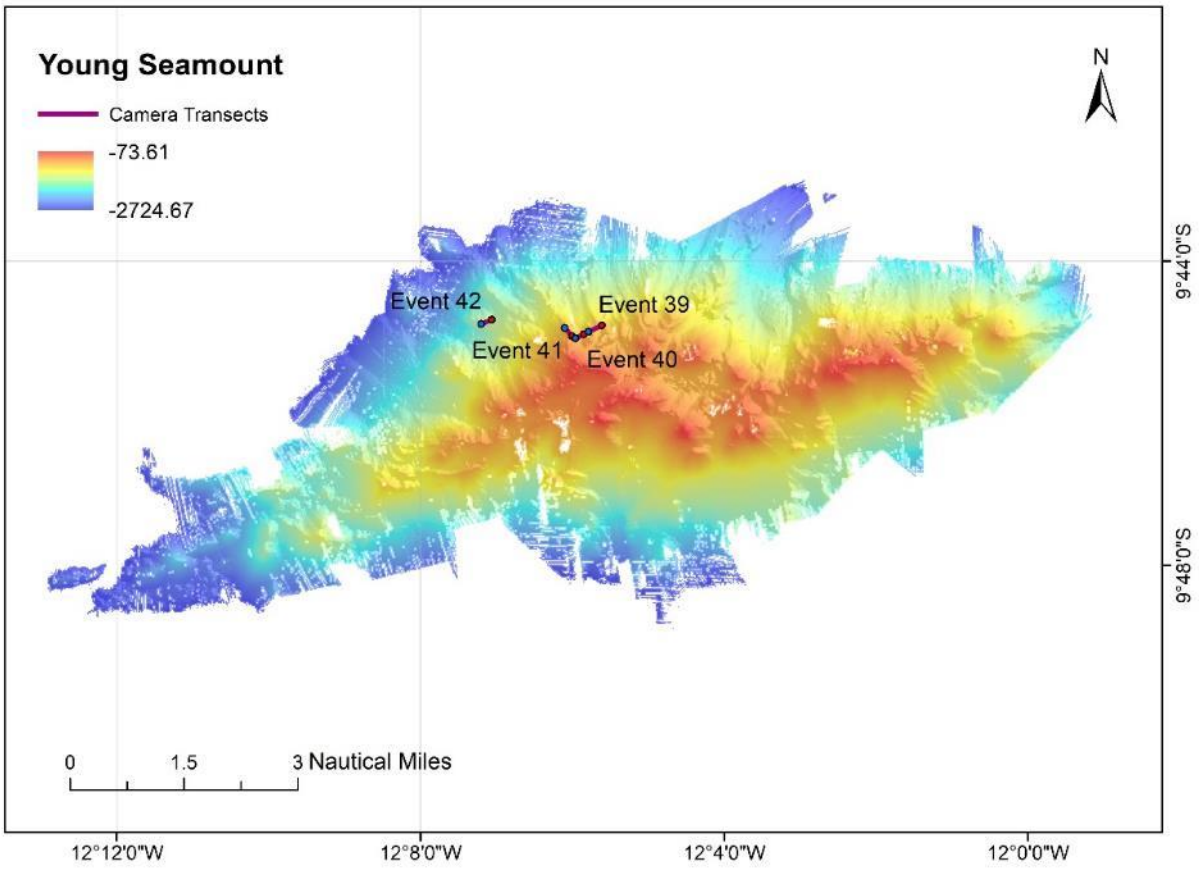


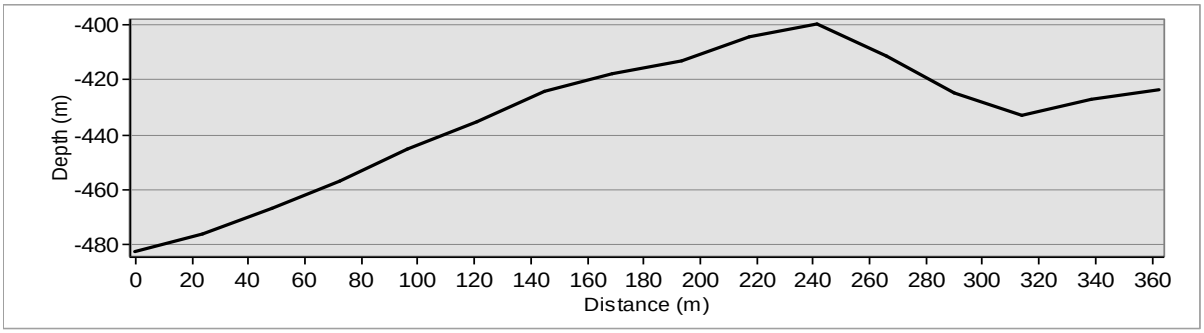
Figure 34 – Young Seamount towed camera transects (Events 39, 40, 41 and 42).

SurveyID	DY159	UKOT	ASC
Date	17/11/2022	EventNo	039
Station Code	YOS		

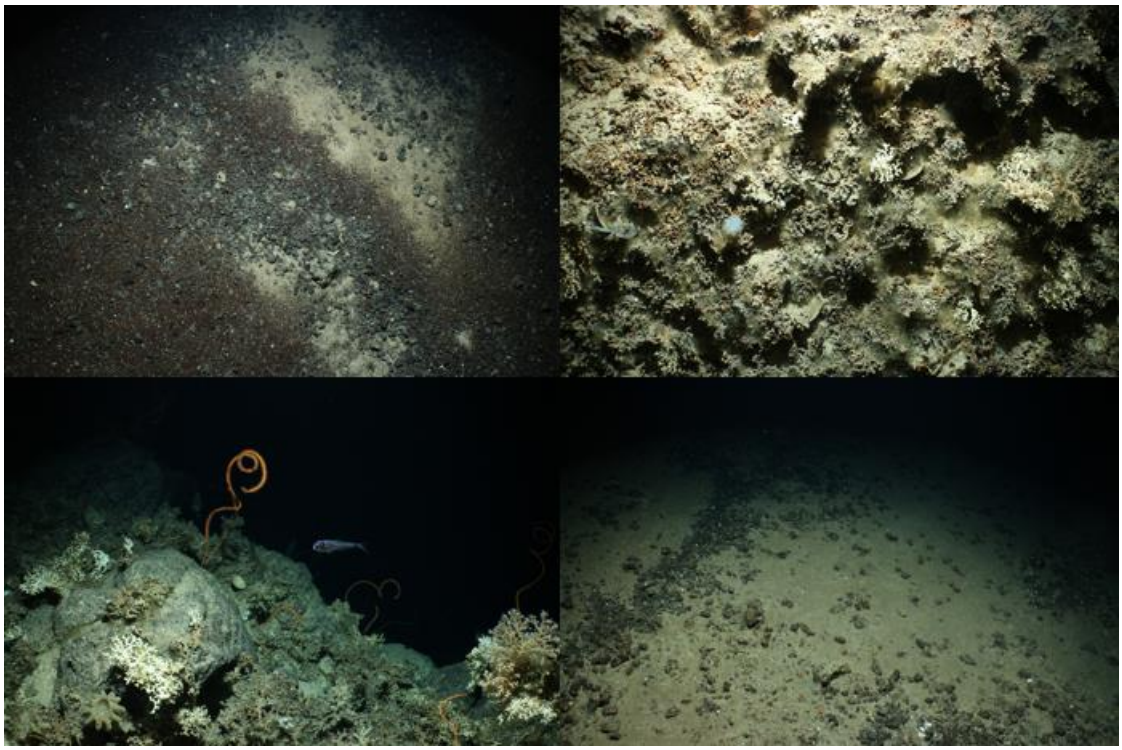
Summary description

START AT 12:47. This dive was undertaken on an up-slope transect on the northern flank of the Young Seamount. Starting at 480 m, the seabed comprised dark coarse sediment (possibly volcanic rock) on a moderate slope. There were scattered broken coral skeleton (unconfirmed) and small ophiuroids. There were scarce epifauna throughout the dive, including fish species, *Stichopathes sp*, scleractinian on boulders and occasional cidarid on sediment. Roughly half way through the biotope changes into boulders/sand with sparse epifauna, including scleractinians, *Aphrocallistes sp*, broken bivalves, and rare *Stichopathes sp*. There was coral framework on boulders. *Stichopathes sp* aggregation boulders. **END AT 13:55.**

Dive Profile



Representative Images

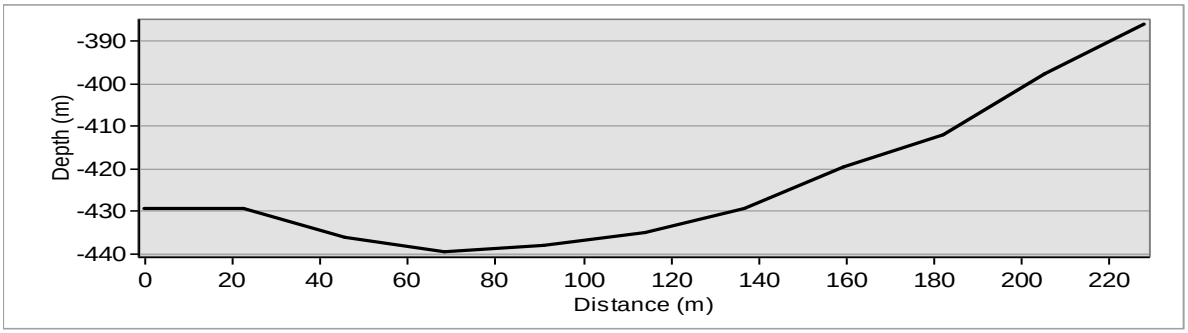


SurveyID	DY159	UKOT	ASC
Date	17/11/2022	EventNo	040
Station Code	YOS		

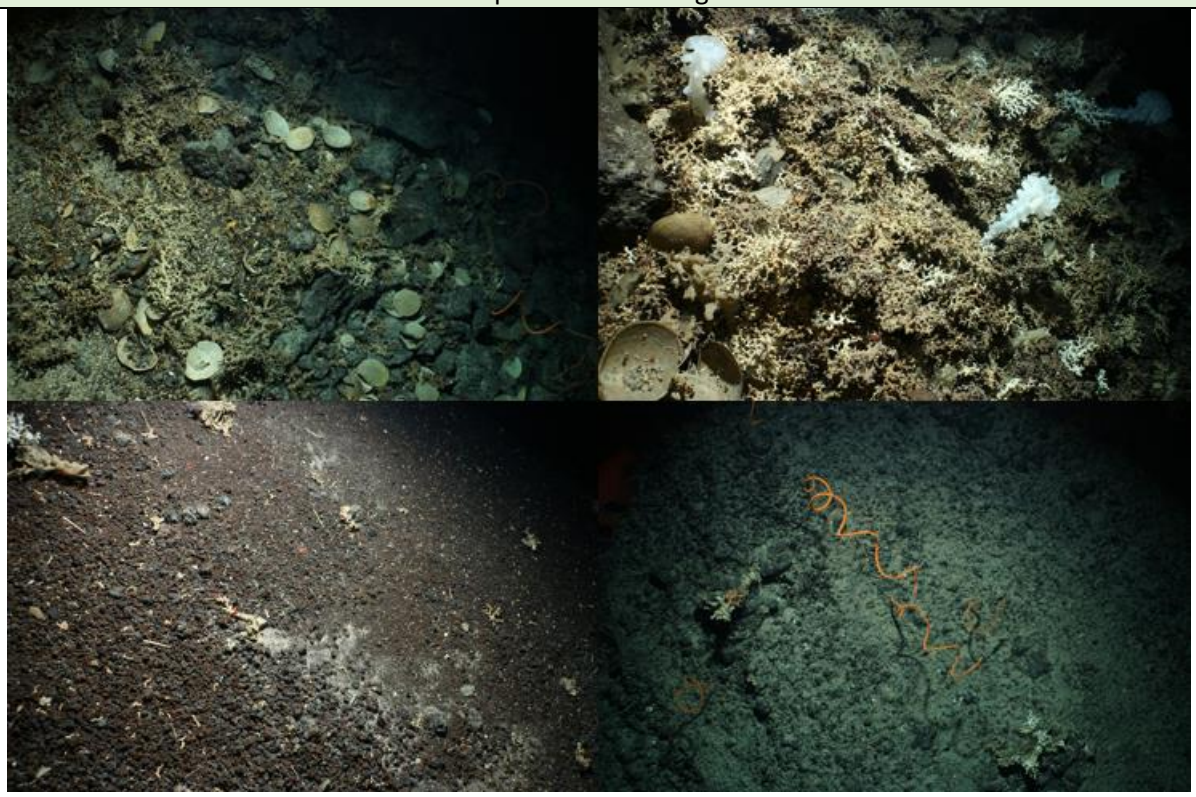
Summary description

START AT 14:21. This dive was undertaken on a cross/up-slope transect on the northern flank of the Young Seamount. The dive started (430 m) on dense boulders and sparse sand, with abundant *Stichopathes sp* colonising rocks, cidarids and scleractinian skeleton. Many broken shells were observed during the start of the dive. The biotope quickly changed into coral framework and a few boulders with frequent *Aphrocallistes sp* across the dive. At one point the camera system collides with a rock wall, disturbing some of the corals and possibly other epifauna on the wall. Caution is taken to avoid further impacts with the camera hovering above the seafloor limiting the collection of stills and video imagery. On returning to the seabed the sediment is dark and coarse, with sparse *Stichopathes sp*. And a few *Aphrocallistes sp*. There were no dominant fauna throughout the rest of the dive. **END AT 14:59.**

Dive Profile



Representative Images

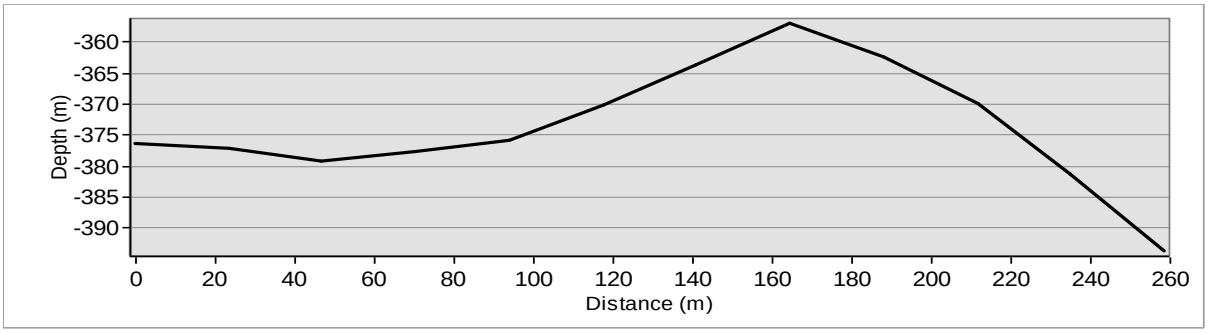


SurveyID	DY159	UKOT	ASC
SurveyID	DY159	UKOT	ASC
Date	17/11/2022	EventNo	041
Station Code	YOS		

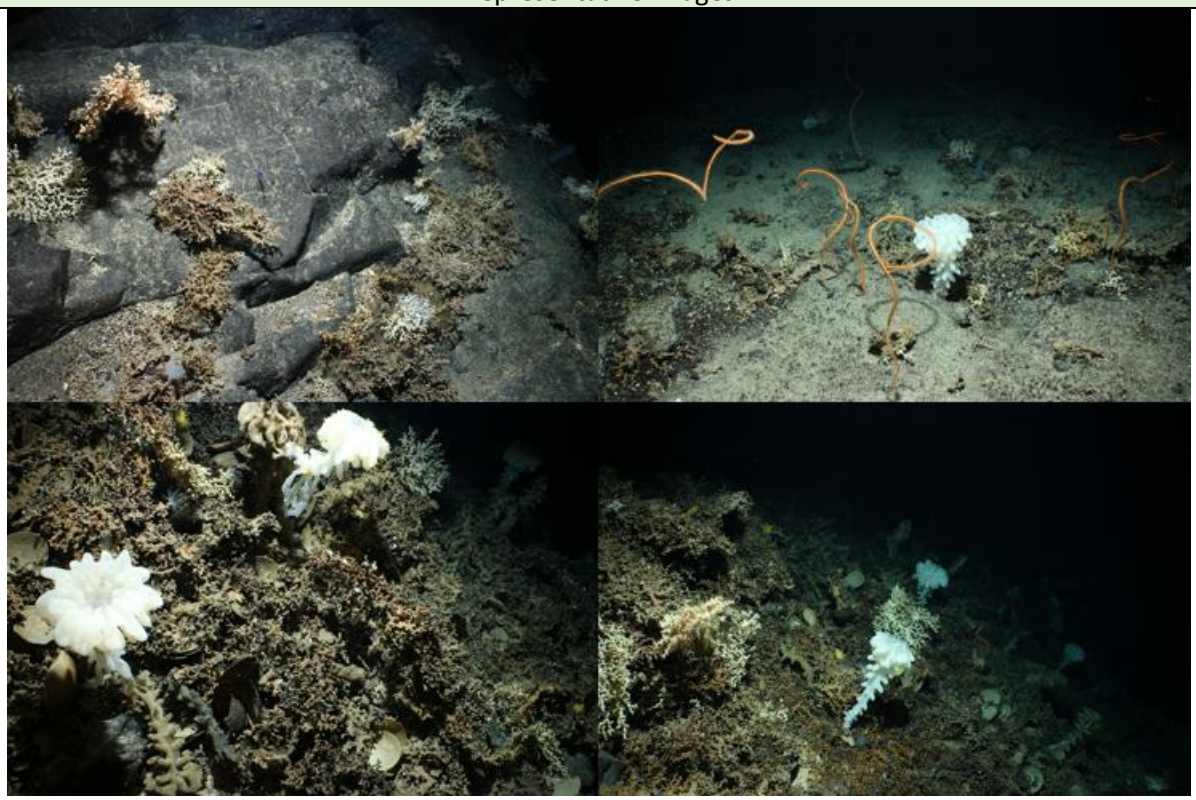
Summary description

START AT 15:20. This dive was undertaken on a cross/down-slope transect on the northern flank of the Young Seamount. The dive started (375 m) on a dense fish school (to be identified) with abundant *Stichopathes sp* and *Aphrocallistes sp*. The biotope was mainly rocky seafloor with abundant *Stichopathes sp* and *Aphrocallistes sp*. This transitions into dense scleractinian framework and again (after 27 mins) into a coral reef which is observed as the camera system ascends a steep wall. Living corals were observed on dead framework hosting abundant *Aphrocallistes sp*, *Leiopathes sp*, *Stichopathes sp, Paramuricea sp.* From 36 mins, the drop cam starts to descend the mount. As the transect descends, the thick coral reef continues until the end of the dive (400 m). **END AT 16:04.**

Dive Profile



Representative Images

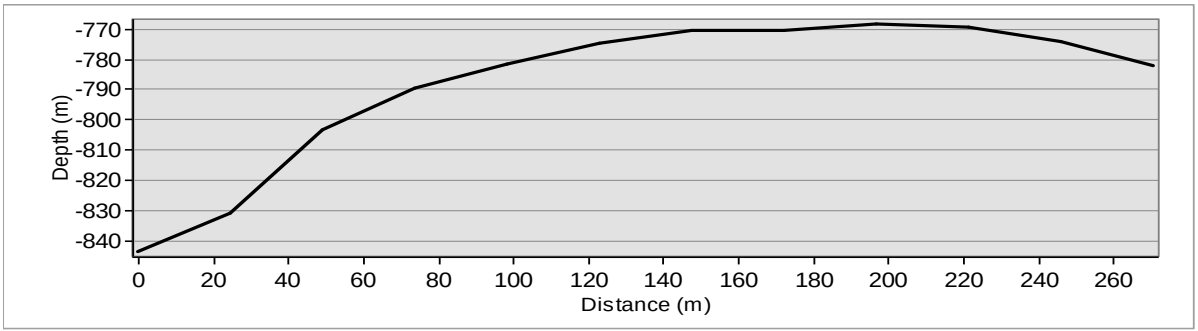


SurveyID	DY159	UKOT	ASC
Date	17/11/2022	EventNo	042
Station Code	YOS		

Summary description

START AT 20:08. This dive was undertaken on a cross/up-slope transect on the north-western flank of the Young Seamount. Starting at 843 m, the seabed comprised of coarse sandy sediment and black volcanic rubble. Generally faunal diversity and density was low with occasional sea pens (*Bathypathes sp*. And *Halipteris sp*.). The dive was characterised by pockets of different substratum with areas of framework and boulders; steeper rocky walls with large boulders and bedrock; and flatter sandy sections with broken coral fragments. On harder terrain, cup corals and various gorgonians and hard corals were observed. Crinoids were present throughout, sometimes in high densities. **END AT 21:20.**

Dive Profile



Representative Images

Grattan Seamount (GRS)

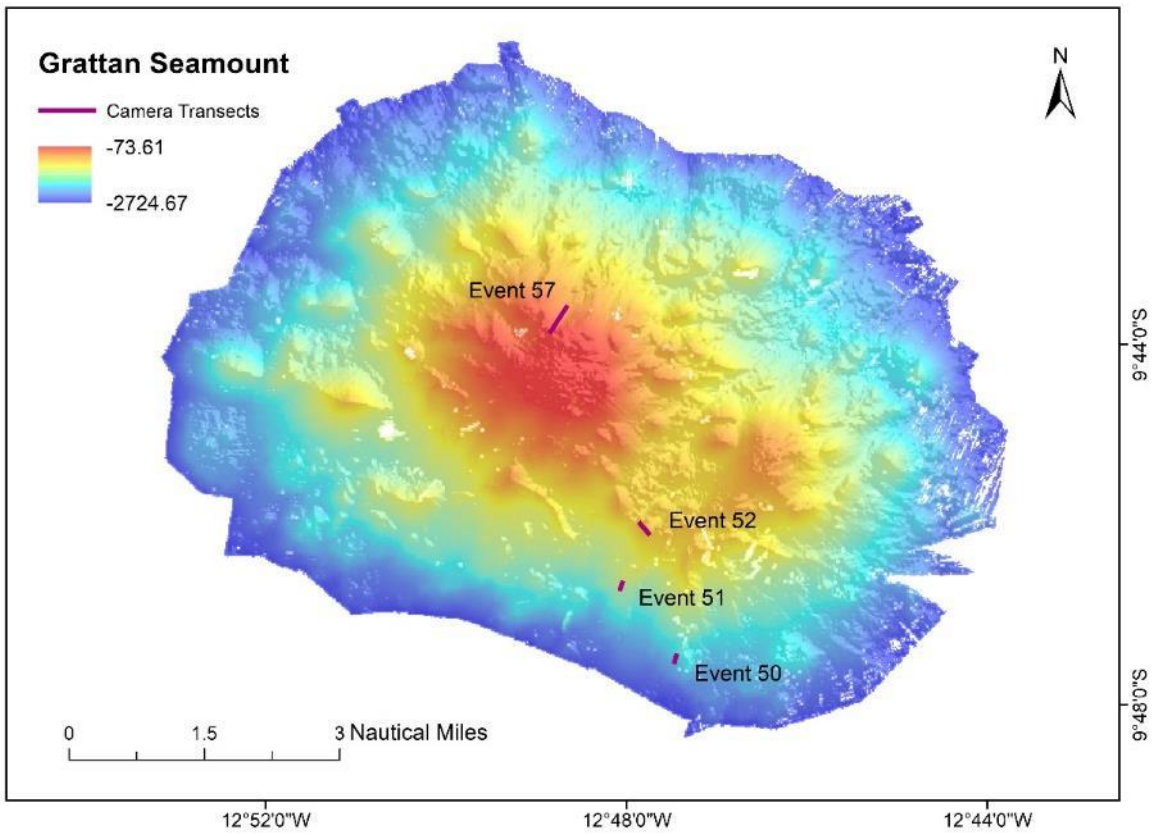


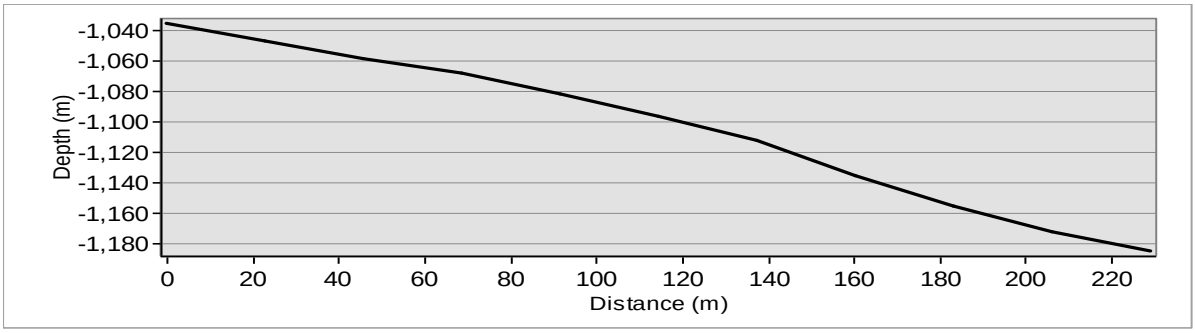
Figure 35 – Grattan Seamount towed camera transects (Events 50, 51, 52 and 57)

SurveyID	DY159	UKOT	ASC
Date	18/11/2022	EventNo	050
Station Code	GRS		

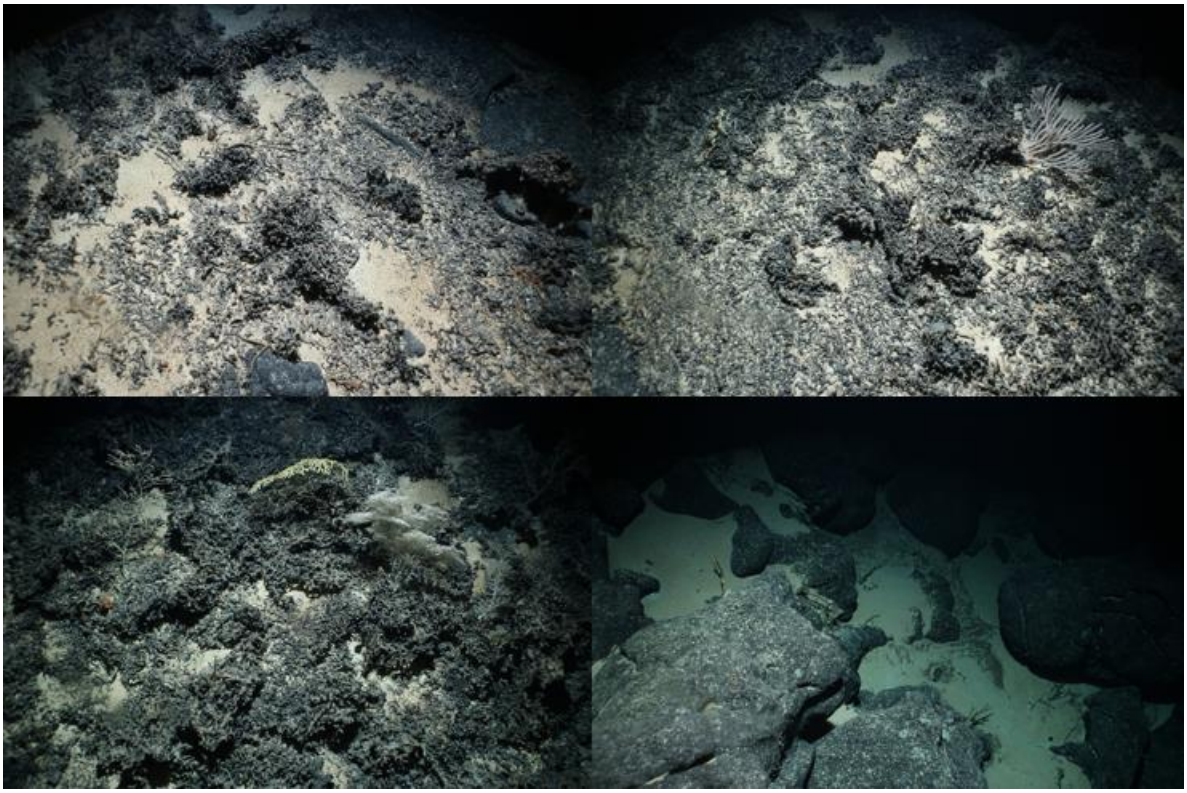
Summary description

START AT 14:16. The dive was the deepest camera deployment on the Gratton Seamount (1,157m), undertaken on a down-slope transect on the seamount's South-eastern flank. The seabed comprised predominantly of rocky terrain (stones and boulders) with occasional bottlebrush corals (*Acanthogongia sp*.) and brisingids. As the dive progressed there was a transition to a mix of dead framework and boulders with steep rocky drop-offs to a less epifaunally diverse biotope of lower-profile framework, smaller rocks, sand, and broken coral. Here diversity was notably lower with less colonisation on the rocky surfaces. Notable taxa here included isolated stalked gorgonians (*Metallogorgia sp*.), other unidentified octocorals, crinoids and anemones (*Anthromatus* sp.). The dive ended descending a steep slope to 1,206 m) of sand and boulders. **END AT 14:58.**

Dive Profile



Representative Images

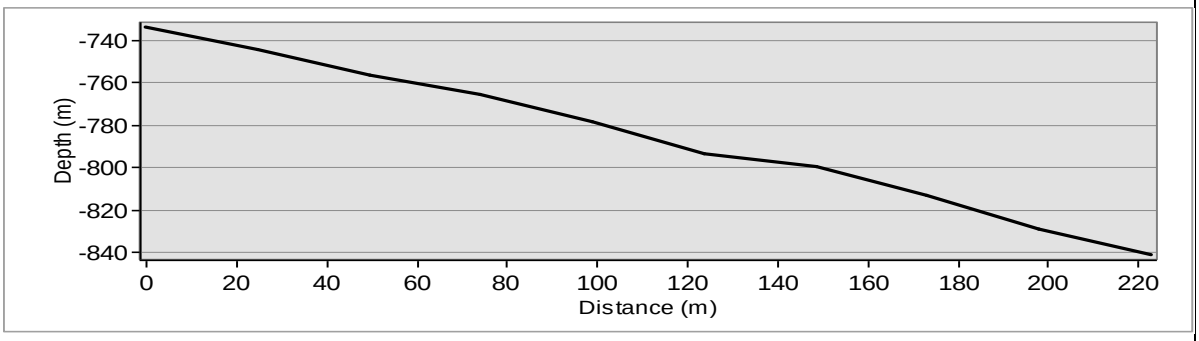


SurveyID	DY159	UKOT	ASC
SurveyID	DY159	UKOT	ASC
Date	18/11/2022	EventNo	051
Station Code	GRS		

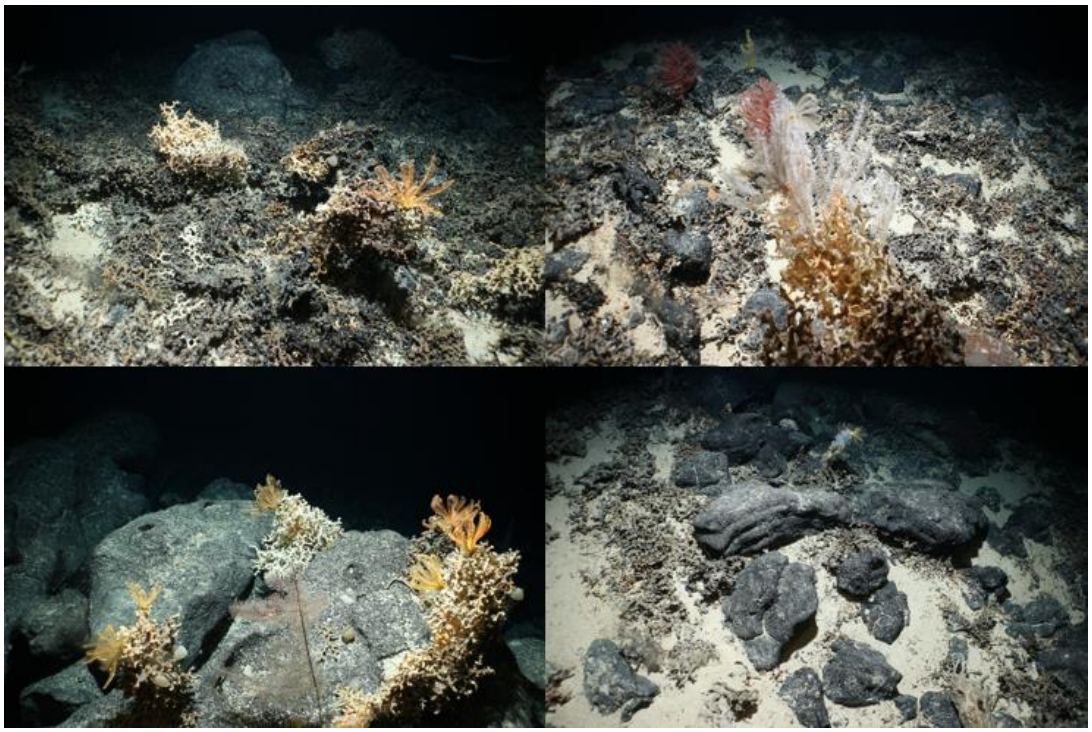
Summary description

START AT 16:35. The dive was undertaken on a down-slope transect on the southern flank of the Gratton Seamount (716 – 822 m). Starting at 716 m coral framework provided almost 100% coverage of the seabed with numerous ophiuroids and crinoids and Antipatharians. The terrain in the first part of the dive was quite rugose with some steep slope drop-offs observed. As the dive progressed the environment opened out to a mixture of less framework and more rocks and sandy sediment. Occasionally large boulders were covered in large coral framework, glass sponges (*Aphrocallistes sp*.), Antipatharians, gorgonians and occasionally brisingids. Across the transect, taxa were zoned dependent on substrate and topographic position with greater diversity on rocky/ reef framework ridges and typically lower epifaunal diversity observed on the flatter sandy/rock fields. **END AT 17:16.**

Dive Profile



Representative Images

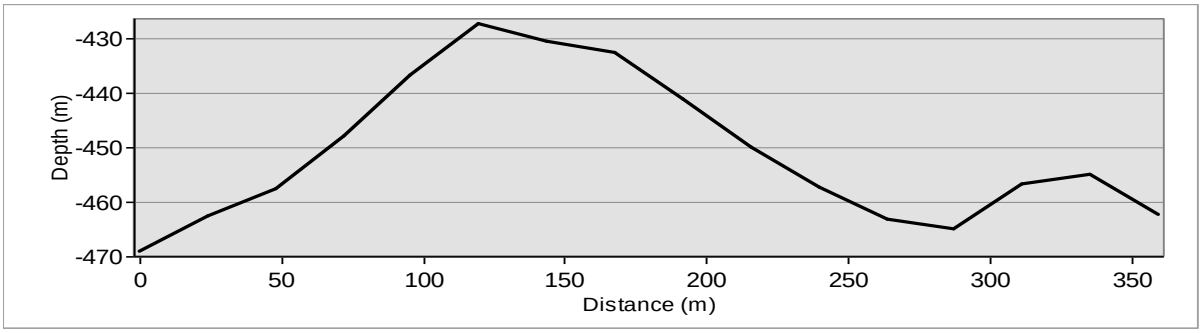


Dive summary			
SurveyID	DY159	UKOT	ASC
Date	18/11/2022	EventNo	052
Station Code	GRS		

Summary Description

START AT 18:30. The dive was undertaken on a plateau (447-463 m) on the south-eastern sector of Gratton Seamount. The seabed comprised of coral framework with loose cobble/ rocky fields. In places, rock basement was visible with 'iron-like' colouration. Glass sponges (*Aphrocallistes sp*.) were the predominant taxa (both alive and dead) with increasing density as the dive progressed. Cup corals (Caryophyllia), various bivalves, sea urchins (Cidaroida) and Antipatharians (Stichopathes) were commonly observed on and between rocks and framework. Towards the end of the dive the transect traversed a rocky ridge with a steep drop off on both sides. Here there were greater densities of *Aphrocallistes*, stoney coral, Stichopathes and crinoids with reef framework across a large area and sections of coral reef. **END AT 19:29.**

Dive Profile



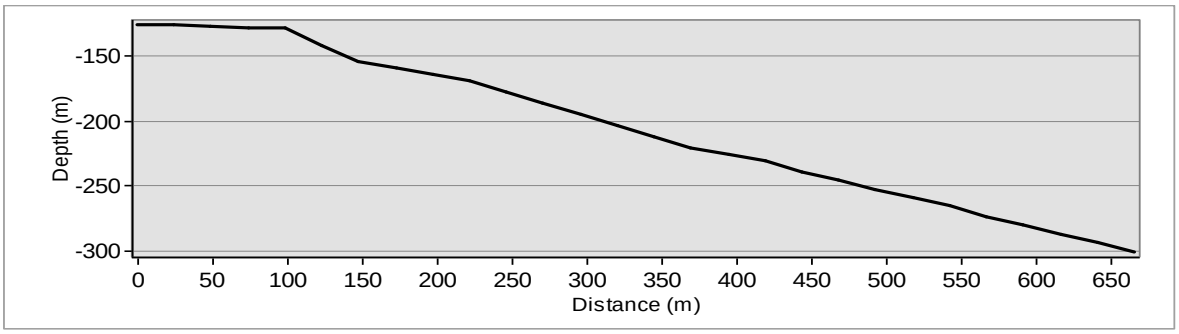
Representative Images

Dive summary			
SurveyID	DY159	UKOT	ASC
Date	18/11/2022	EventNo	057
Station Code	GRS		

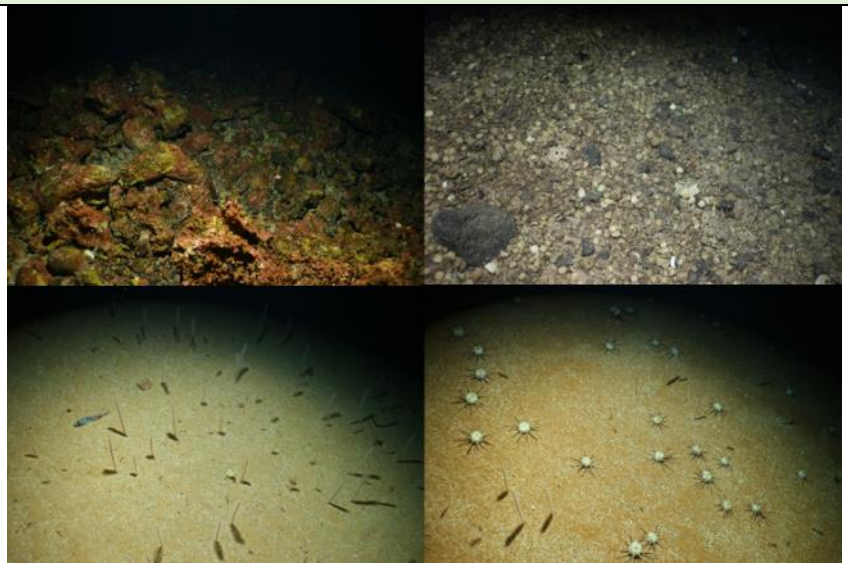
Summary Description

START AT 02:58. The dive started on the top of the Grattan Seamount (130 m) and followed the slope down to a depth of ~300 m. The dive transitioned between several distinct biotopes, changing with depth. The top of the seamount was characterised by rock, boulders and rubble covered in encrusting growth forms (sponge and possible coralline algae) and algal growth. A variety of demersal fish species were prevalent in gaps between the rocky structures. Travelling down-slope (160 m), rocks became interspersed with more sandy/fine aggregate with occasional sea whips and glass sponges (*Aphrocallistes sp*.). Further downslope, sand became the dominant substrate with a field of sea pens covering a large area. By 200 m, the still extensive sea pen field was interspersed with numerous pencil urchins (Cidaroida). Beyond 235 m the substrate was covered in broken urchin tests and spines with observations of several octopus. Throughout the rest of the dive, sea pens were observed (but less frequently) alongside occasional hard corals (scleractinians) colonising medium-sized rocks and boulders. A notable additional observation to dive #57 was the observation of a Sixgill shark near the seabed during the initial decent. **END AT 04:51.**

Dive Profile



Representative Images



Atlantic Ridge Flank Site (ARF)

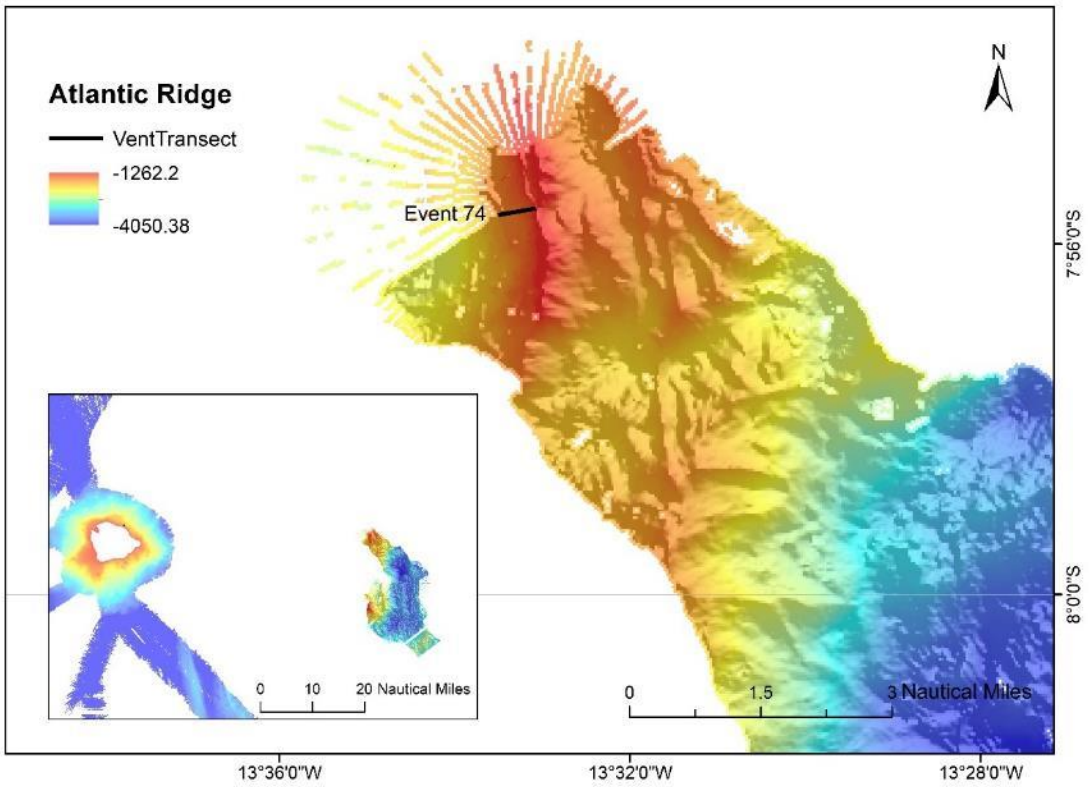


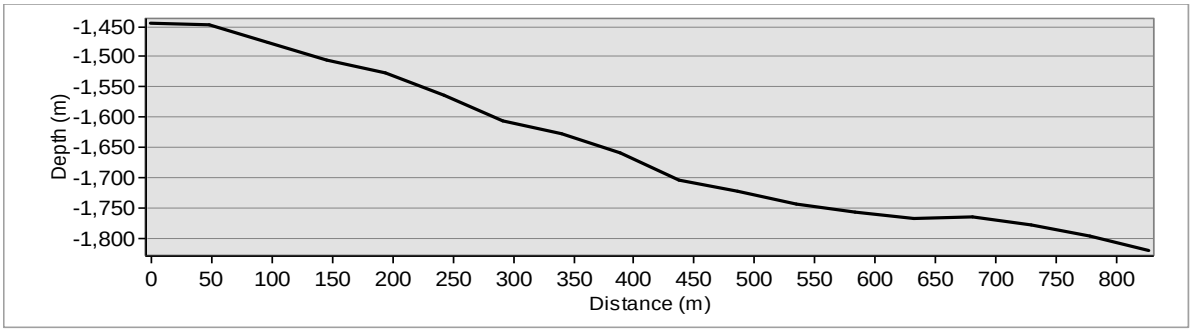
Figure 36 – Atlantic Ridge towed camera transect (Event 74)

Dive summary			
SurveyID	DY159	UKOT	ASC
Date	21/11/2022	EventNo	074
Station Code	ARF		

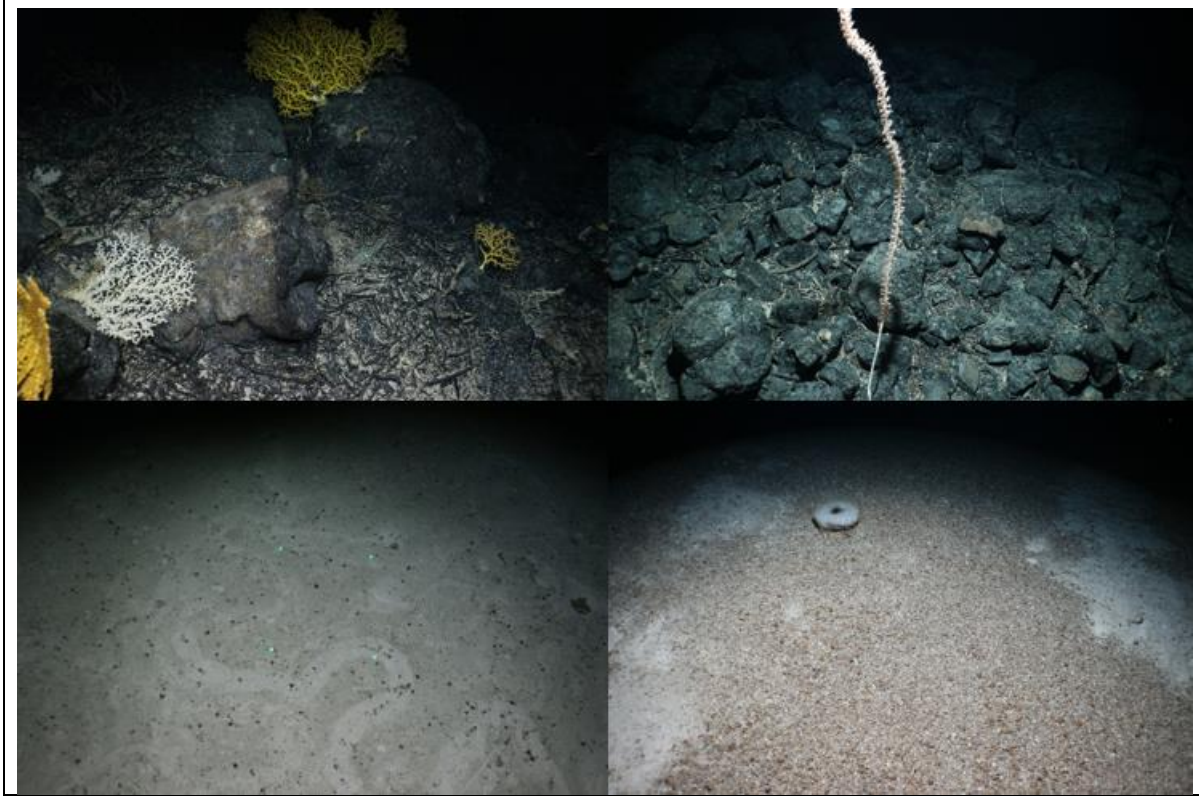
Summary Description

START AT 21:00. The dive was undertaken on a deep-water (1450 – 1800 m) ridge adjacent to a deeper water site identified as potentially hydrothermally active. The transect started on boulders and coral skeleton with sparse epifauna. There were notably frequent encounters of yellow octocoral (species to ID) and sparse stalked crinoids. Patches of rippled sand were observed; however the main biotope type was boulders with sand and sparse epifauna, including Metallogorgia, sea whips, stalked crinoids. Later in the dive this changed to muddy/sandy/barnacle shells (refer to stills) with no dominant epifauna and then to sandy sediment and boulders until the end of the dive, with no dominant epifauna. **END AT 23:21.**

Dive Profile



Representative Images



4.6.2 St Helena Dive Logs

St Helena Island (SHI)

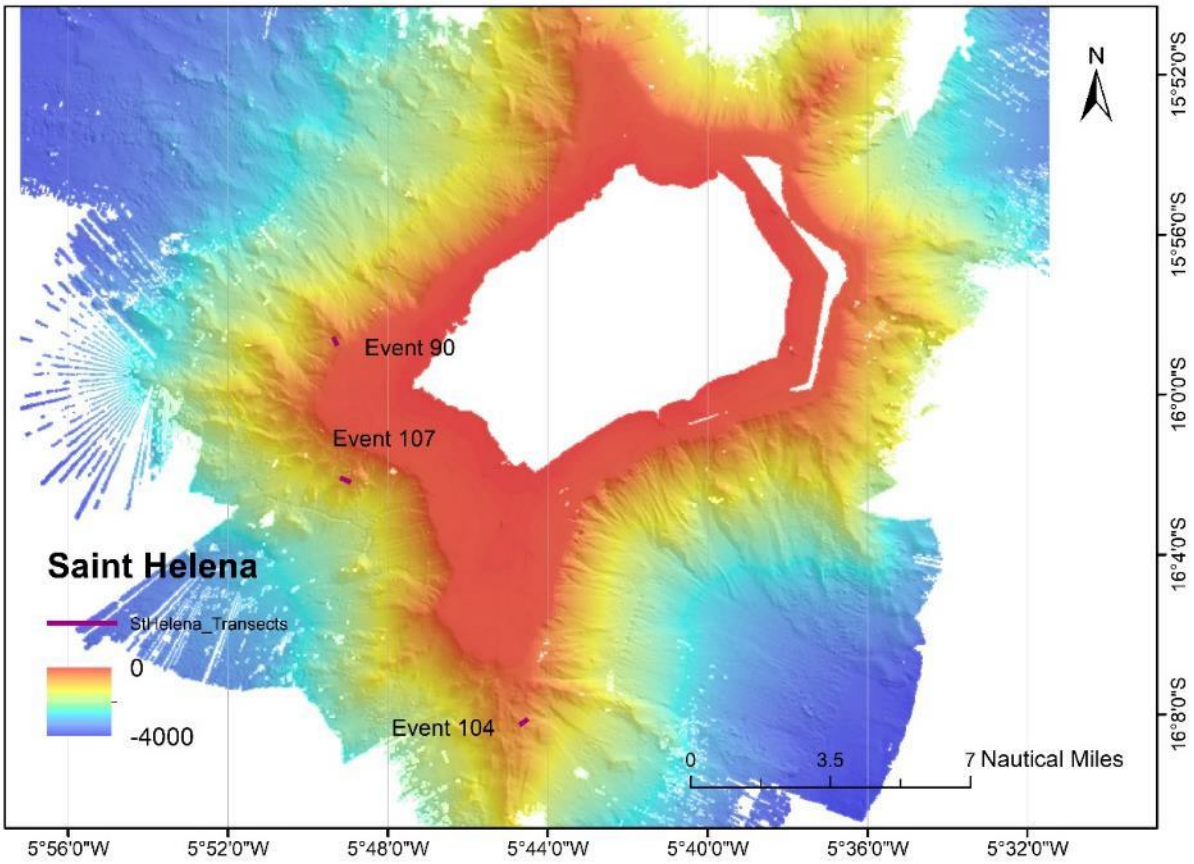


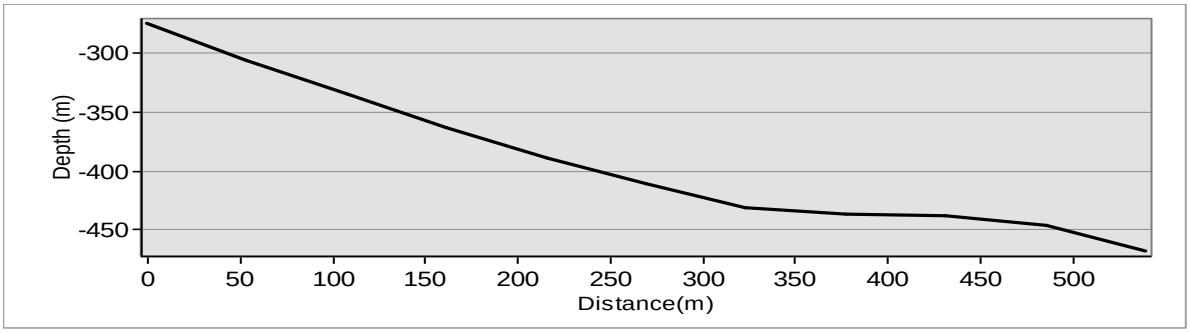
Figure 37 – St Helena towed camera transects (Events 90, 104 and 107)

SurveyID	DY159	UKOT	STH
Date	26/11/2022	EventNo	90
Station Code	SHI		

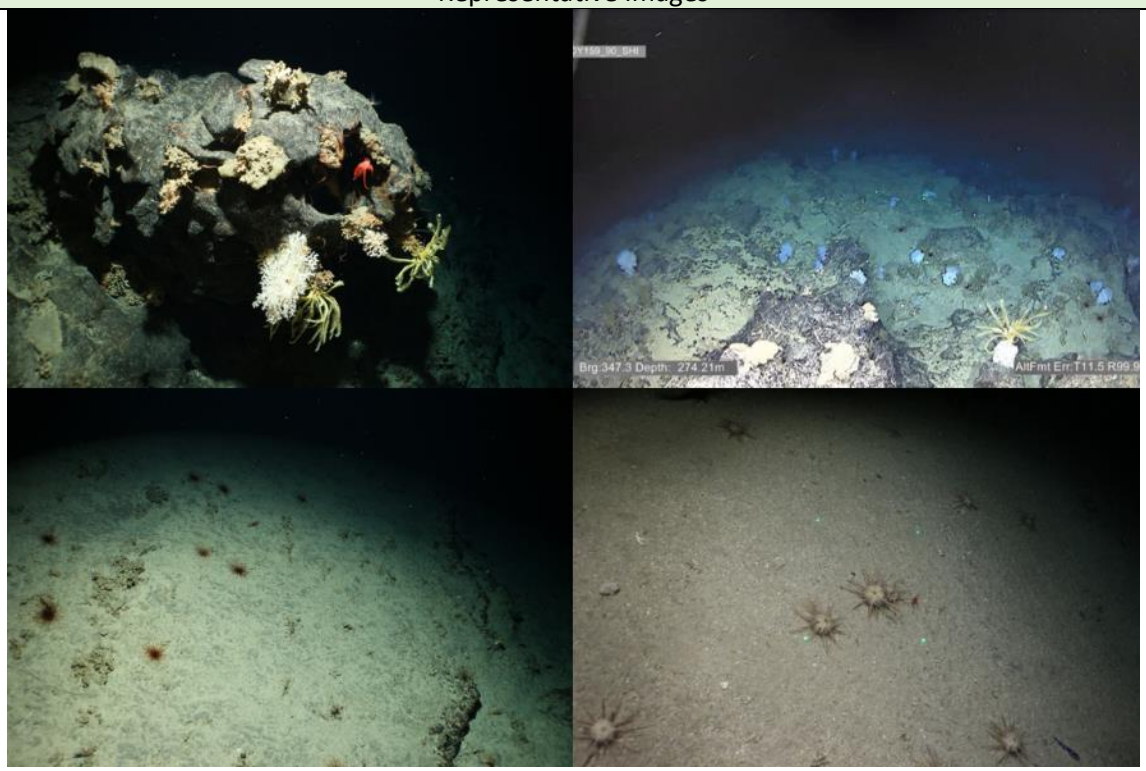
Summary description

START AT 22:56. This dive was undertaken down-slope on Saint Helena's western slope between depths of 250 m and 470 m. The dive started on boulders with low biodiversity and no dominant epifauna. As the dive progressed, a distinct abundant aggregation of glass sponges, *Aphrocallistes sp,* were observed on coarse sand and boulders, a few feather stars on rock and an abundant distribution of anemones on coarse sediment. At 22 min, the biotope was predominantly bedrock with patches of hard corals, crinoids and *Aphrocallistes sp*. There was a notable transition about half-way through the dive where the dominant biotope became pencil urchin on coarse sediment. From 1h10 min bedrock was predominant hosting a few species, including *Primonidae sp*, bivalves (poss *Acesta* sp.) and *Bathypathes sp*. In between there were many broken shells on coarse sediment. **END AT 00:13.**

Dive Profile



Representative Images

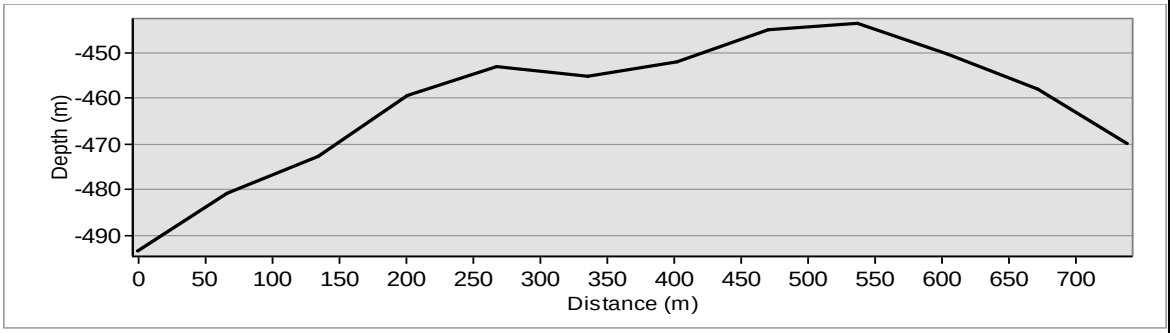


SurveyID	DY159	UKOT	STH
Date	28/11/2022	EventNo	104
Station Code	SHI		

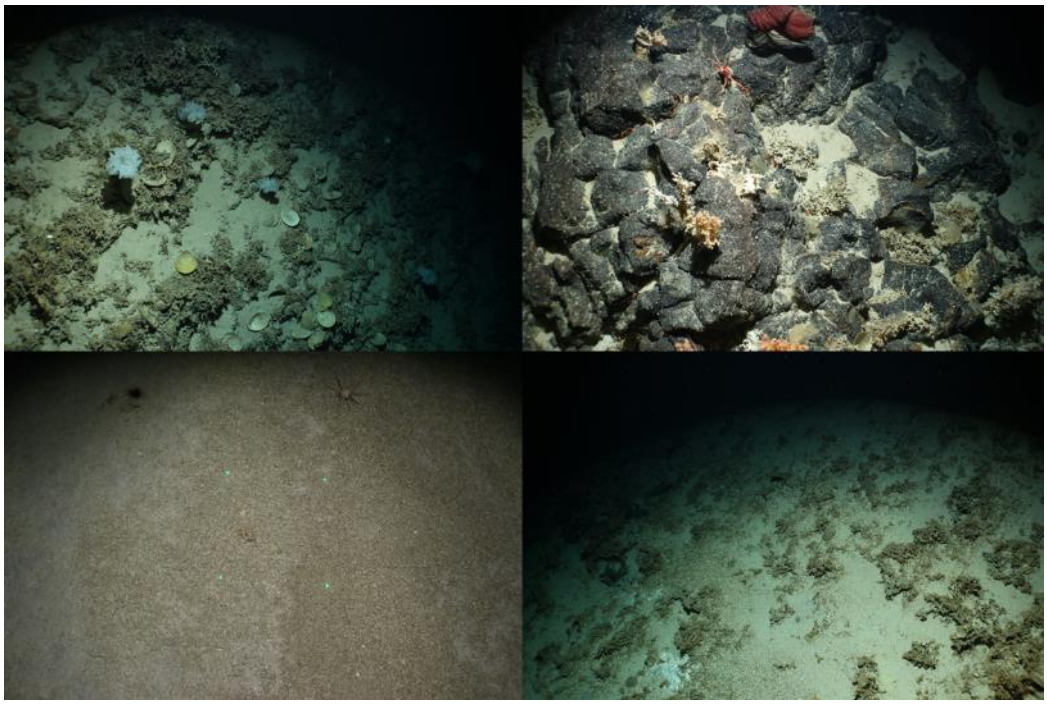
Summary description

START AT 20:22. This dive was undertaken on the southern slope of Sperry Ledge on Saint Helena's southern slope. The dive started transecting up-slope in an environment characterised by coral framework and broken shells. Occasional glass sponge (*Aphrocallistes sp.*) and sea pens (*Bathypathes sp.*) are seen throughout the dive. The main biotope was coral framework with no dominant epifauna however there was variation throughout the dive. This included boulders with steep rocky drop-offs colonised by *Leiopathes sp.* And *Bathypathes sp.* Which transitioned to coral framework with boulders with dead and living coral, *Asteroidea sp, Ophiuroidea sp. And Bathypathes sp.* After 33 mins the dominant substrate was bedrock with Ophiuroidea sp. And sandy patches with coral framework which then abruptly changed to coarse sandy sediment with urchins and crabs before returning to coral framework/gravel and boulders, with no dominant epifauna for the rest of the dive. Other notable species include a large Pyrosome seen being predated by crabs (to be identified). A variety of demersal fish species are seen including a Scorpionfish (to be identified).
END AT 22:12.

Dive Profile



Representative Images

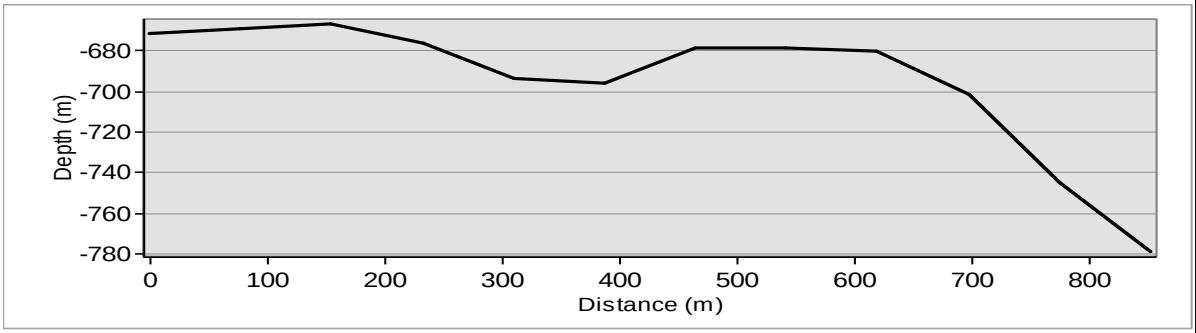


SurveyID	DY159	UKOT	STH
Date	29/11/2022	EventNo	107
Station Code	SHI		

Summary description

START AT 06:48. This dive was undertaken on Saint Helena's western slope, initially starting on a cross-slope transect (680 m) before descending steeply to 780 m. The dive was characterised by a sediment-laden environment. Initially this was a wide sandy/ fine particulate plain dominated by a large sea pen field (likely *Pennatula sp*.) covering large areas and occasionally in high densities. Sea pens were present throughout much of the dive and lebensspuren were often visible across the fine sediment. As the dive progressed, hard substrate became more dominant, however this was always covered in a veneer of fine particulate sediment. Rocky terrain generally exhibited low density of epifauna with occasional white branching octocorals (sometime reaching large sizes). Basket stars (*Gorgonocephalus sp*.), crinoids and squat lobsters were observed as coral epifauna. Rocky outcrops were interspersed with sea pen dominated soft sediments and areas of broken coral framework and shells. Towards the end of there was a steep drop off. This environment remained sediment-laden and support generally low faunal densities with the exception of occasional black corals (Bathypathes sp.) and branching octocorals (Primnoidae). **END AT 08:19.**

Dive Profile



Representative Images

Cardno (CAR) and Southern Cross (SC) Seamounts

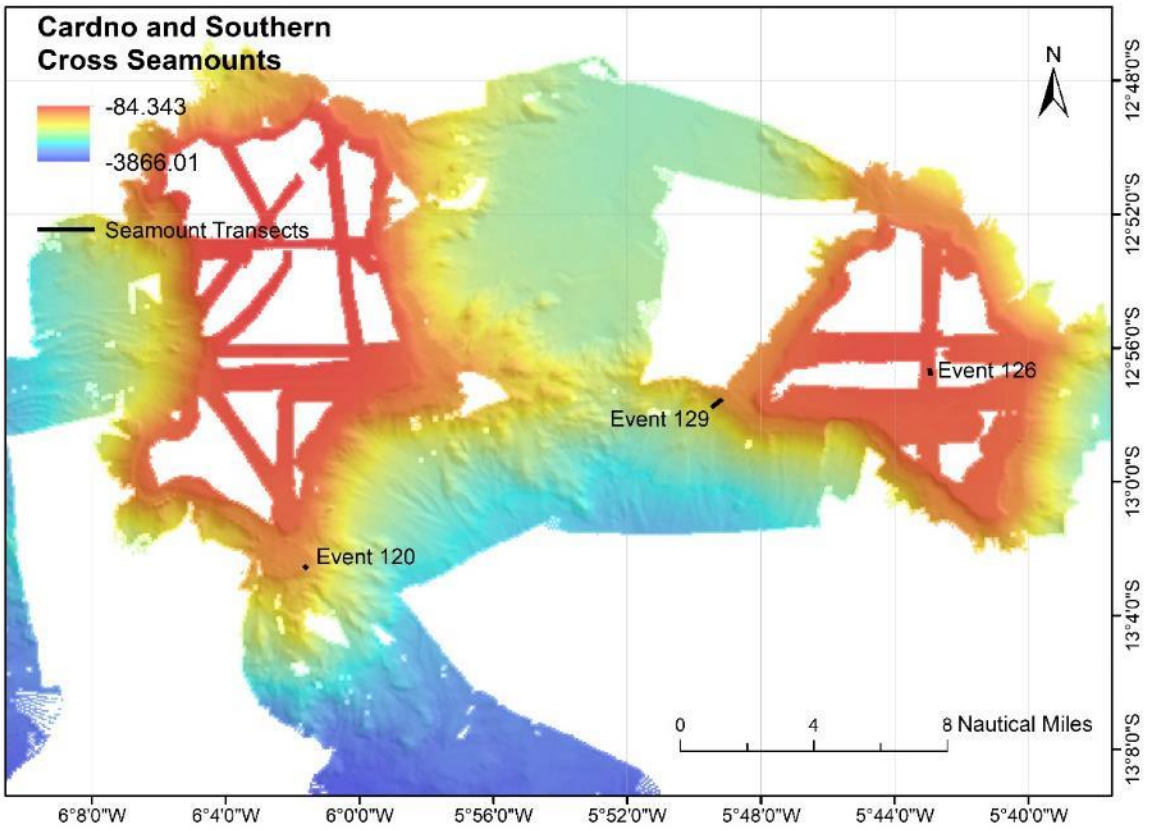


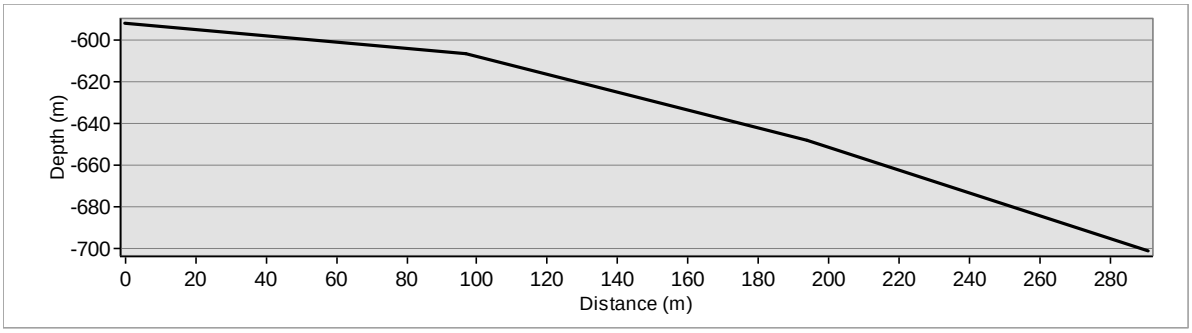
Figure 38 – Cardno (Left) and Southern Cross (Right) seamounts towed camera transects (Events 120, 126 and 129)

SurveyID	DY159	UKOT	STH
Date	01/12/2022	EventNo	120
Station Code	CAR		

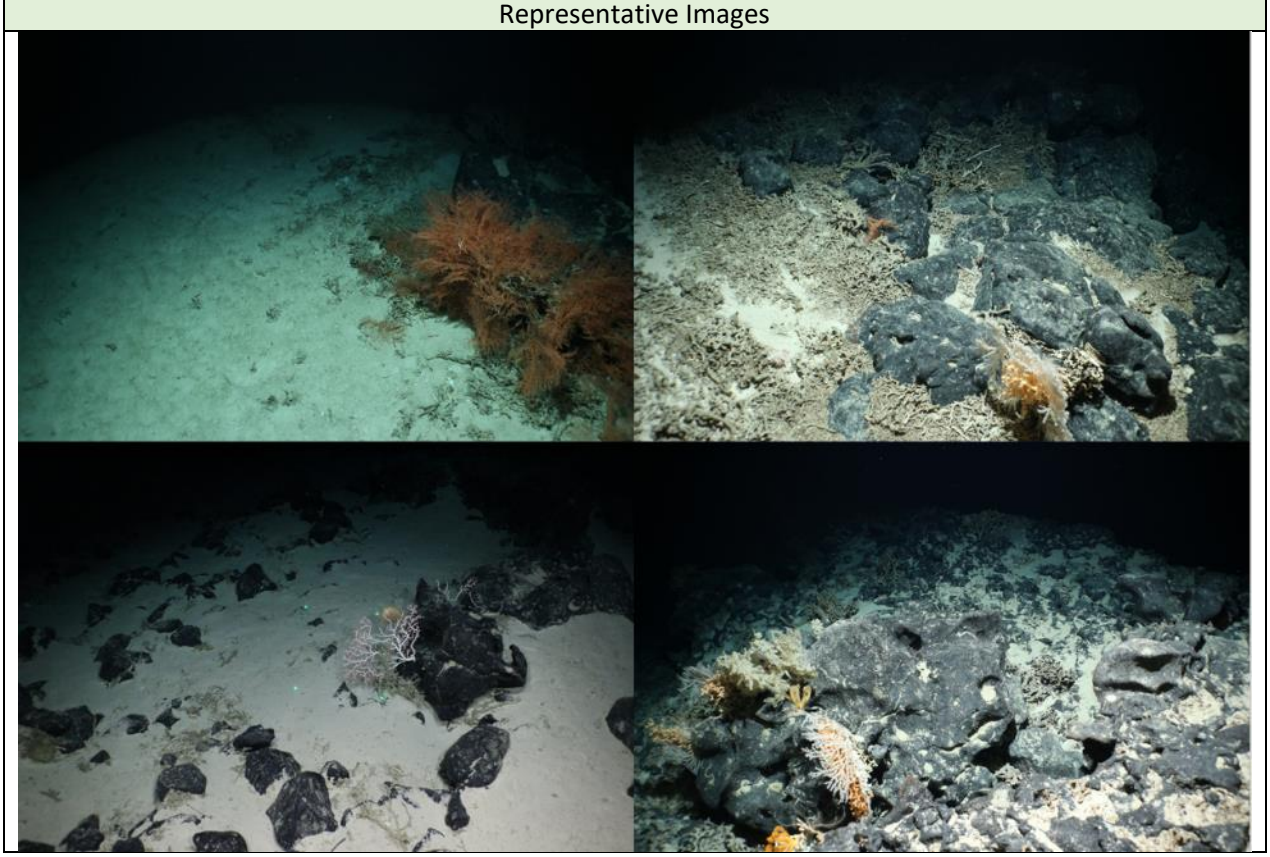
Summary description

START AT 23:04. The dive starts at 608m deep off the Southeast of Cardno Seamount. At the beginning of the dive, the drop camera hovers on the seabed while scientists adjust camera settings. Start of the line begins after 5min into the recording. The transect shows varied substrate types, including sand, gravel, rubble, and boulders and bedrock. Biodiversity distribution is equally heterogenous, characterised by many octocorals, scleractinians, crinoids. In the second video, it was predominantly bedrock with frequent encounters of scleractinians and octocorals. The third video was mainly bedrock and sand sediment, showing clear animals tracks. The dive ends at 707m deep. **END AT 00:02.**

Dive Profile



Representative Images

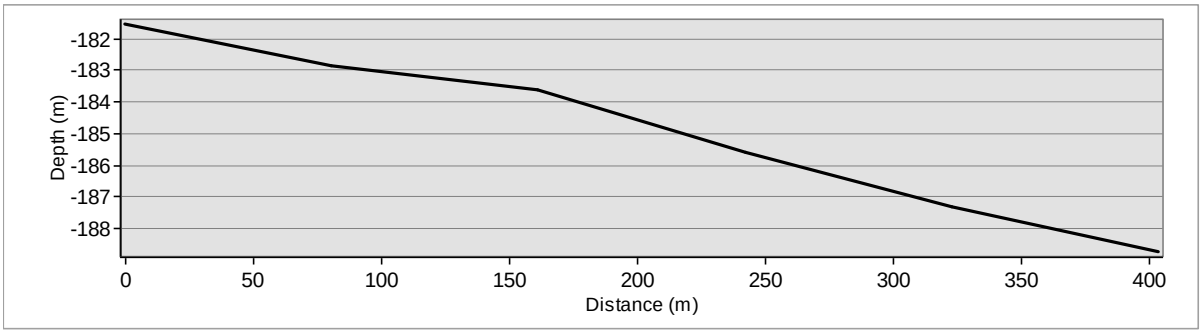


SurveyID	DY159	UKOT	STH
Date	02/12/2022	EventNo	126
Station Code	SC		

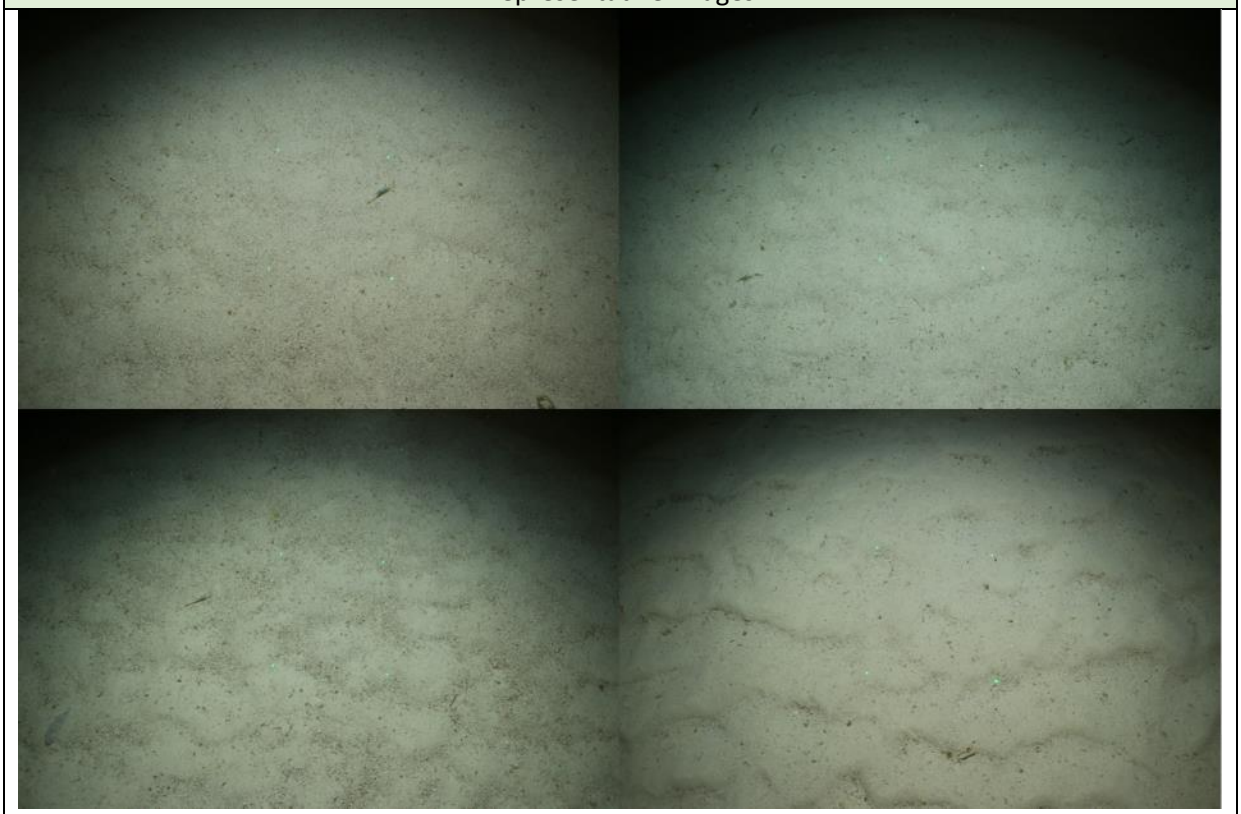
Summary description

START AT 17:01. This transect is entirely homogenous, characterised by mud/sand flat at 180m deep, with abundant shrimps across the entire dive, keeping the same depth range from start to finish. **END AT 17:40.**

Dive Profile



Representative Images

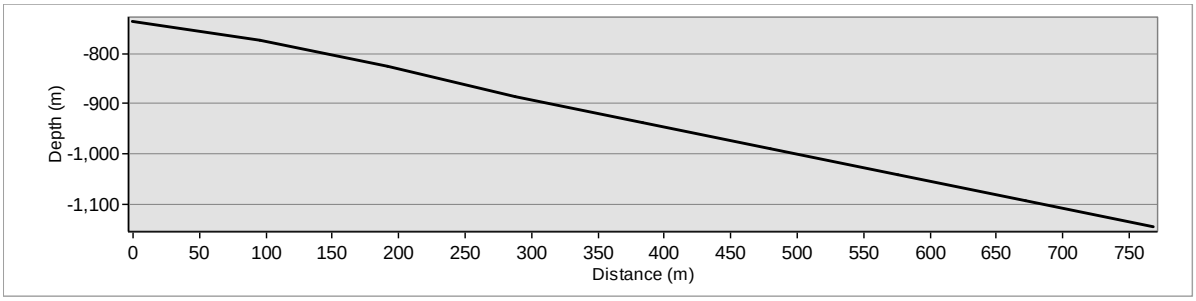


SurveyID	DY159	UKOT	SRH
Date	03/12/2022	EventNo	129
Station Code	SC		

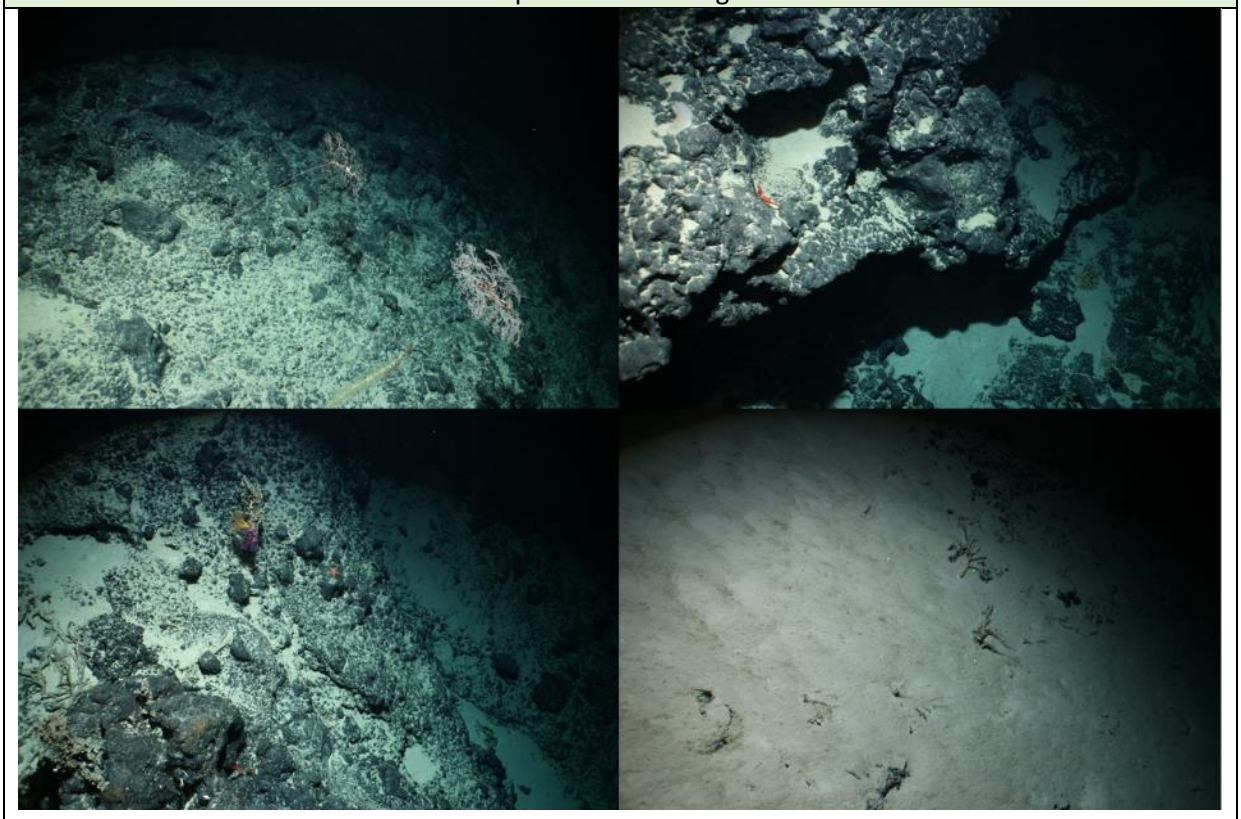
Summary description

START AT 03:38. The drop cam starts the tow on bedrock with a few red shrimps and scattered coral rubble with no dominant epifauna. Going downhill across the transect, biodiversity is low and predominantly rocky seabed with some sandy sediment. On the way down the slope, biotope alternates between bedrock, rocky outcrops, and mud/sand downhill sediment. Biodiversity is still low. The survey team occasionally/rarely observed sessile fauna, including crinoids, Metallogorgia, sea pens, *Lepidisis sp* (sea whip), gorgonian. The transect ends at 1150m. **END AT 05:48.**

Dive Profile



Representative Images



4.6.3 Towed Camera technical report

The towed camera system encountered minor technical faults during deployments as follows:

1. Stills software (Canon EOS viewer) failed to load during events 023 and 024. Issue traced to an initialisation file that had corrupted. Manufacturer promptly supplied replacement file; no further issues encountered with software.
2. Primary compass-bearing unit failed during event 039. Spare unit installed after dive, which resolved the issue.
3. The altimeter started experiencing intermittent failures during event 050, which gradually worsened to a complete loss of altimeter data.
    a. Replacement of primary unit with spare resolved the issue initially, but data loss continued throughout event 051.
    b. Wet test on deck indicated both units were performing normally. Manufacturers advised that terrain was potentially the issue (but data loss eventually experienced over all types of terrain roughness and substrata).
    c. No software errors could be identified.
    d. Altimeter units to be returned to manufacturer for diagnostics.
4. To try and correct for the frame moving sideways at depth (making winch altitude control very difficult), a larger tail fin was mounted. However, this created additional turns in the cable that had to be unwound, after which the original fin was re-attached.

4.7 Box Corer

Oliver Hogg, Nicola Geary, Giulia La Bianca, Toby Capel, Tiffany Simpson, James Bell

Sediment samples were collected using a box corer (Figure 39) fitted with a 40cm^3 box. The corer was deployed at rate of 1 m/sec until 50 m above the seabed which was then reduced to 0.2 m/sec for when the corer hit the seabed. Seabed landing was recorded by monitoring the tension on the winch wire. Recovery was done at 0.2 m/sec until the corer left the seabed and was then increased to 0.6 m/sec. The reduced ascent rate was adopted in order to avoid 'washing out' the core sample during recovery.

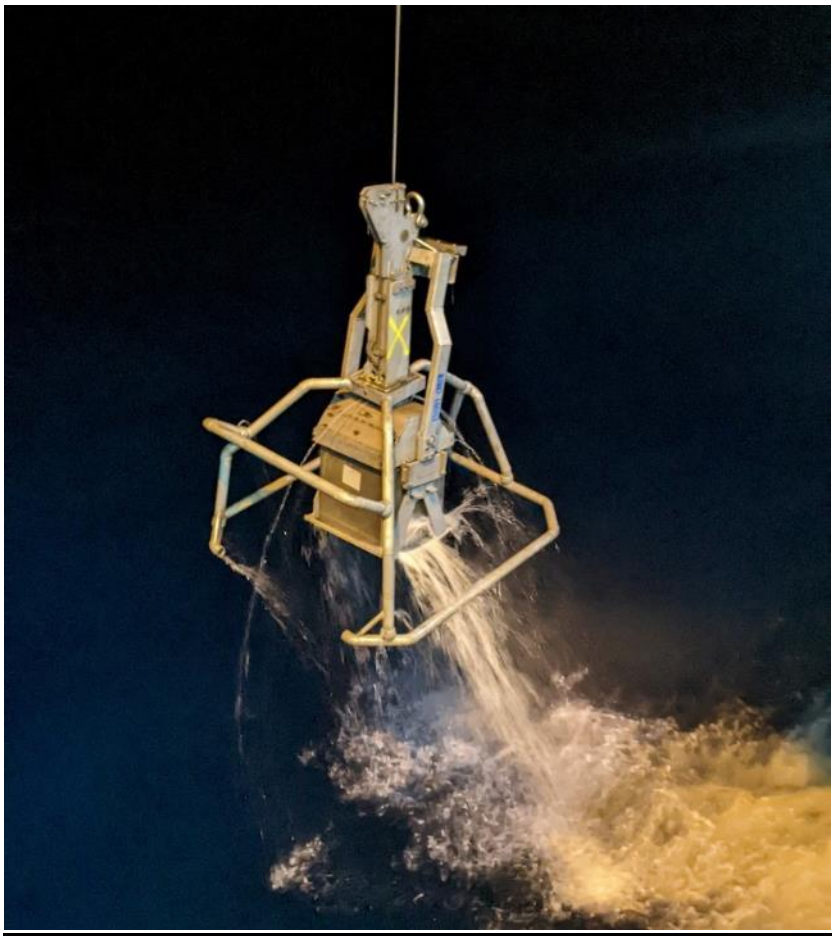


Figure 39 – Box core during recovery.

On recovery to deck, a hydraulic jack was used to support the weight of the box whilst it was removed from the corer frame. The surface of each core recovered was photographed with intact sediment and water interface. The water on top of the sediment was then extracted with a siphon (with a bottled sample retained for eDNA work). Once the water was drained, any potential biological samples were removed

using forceps and stored in a labelled plastic jar with lid. Sediment sampling then followed the following protocol:

1. **Plastic sampling**. Using a metal spoon, sediment was extracted from the top 5cm of the core. Two sterile glass jars were then opened. The sample was placed in one with the other acting as a blank sample to collect any ambient micro-plastics. This sample was labelled (externally only) and preserved at -20°C.
2. **Isotope sampling**. Using a spoon, sediment was extracted from the top 5cm of the core and transferred to a plastic bag to be preserved at -20°C.
3. **EDNA sampling**. Using a sterilised spoon, a ~10ml sample was extracted from the top 2cm of surface sediment and transferred to a labelled 50ml container, toped up with 99% ethanol and preserved at -20°C.
4. **Blue carbon sub cores**. Once the first three samples were taken, six cylindrical sub cores (with a diameter of 3.5') were inserted into the core Figure 40. The side wall of the core was removed, and the sub cores were extracted and capped. Using a custom-built extruder Figure 401cm sections were taken for the full depth of five of the sub cores. These samples were transferred to labelled bags for analysis of – (i) organic carbon; (ii) inorganic carbon; (iii) redox; (iv) sedimentation; and (v) particle size. The sixth core was used to recorded fauna in two 5cm sections (0-5cm and 5-10cm). All labelled sub cores were stored in the -80°C freezer for 24hours before being transferred to the -20°C freezer. For two sites at Ascension Island an additional seventh core was sampled in 1cm sections and preserved at -80°C for EDNA analysis.
5. **Faunal sampling**. The remining sediment in the main core was sifted for faunal samples. This was done for the top 0-5cm and 5-10cm using 1mm and 300 µm sieves. Any samples were identified were possible and preserved in 99% ethanol at -20°C.

Figure 40 – Left: Box core following removal from corer frame with the hydraulic jack (pictured). Yellow-capped sub cores were inserted into the core to extract subsamples for blue carbon analysis. Right: sub core with custom-build core extruder.

Three box cores deployments with undertaken during DY159. One core was taken at 3644 m at the Northwest Abyssal Site (Ascension Island) and two at the Southeast Abyssal Site (Ascension Island) at depths of 3291m and 3276m. All cores were very homogeneous in colour and consistency (Figure 41) with no obvious layering. Faunal samples were non-existent or limited to partial specimens with none retained for further analysis. The sediment samples will be analysed by scientist from the Ascension Island Government (for microplastic and EDNA work) and scientists at the British Antarctic Survey (for blue carbon and isotope analysis).

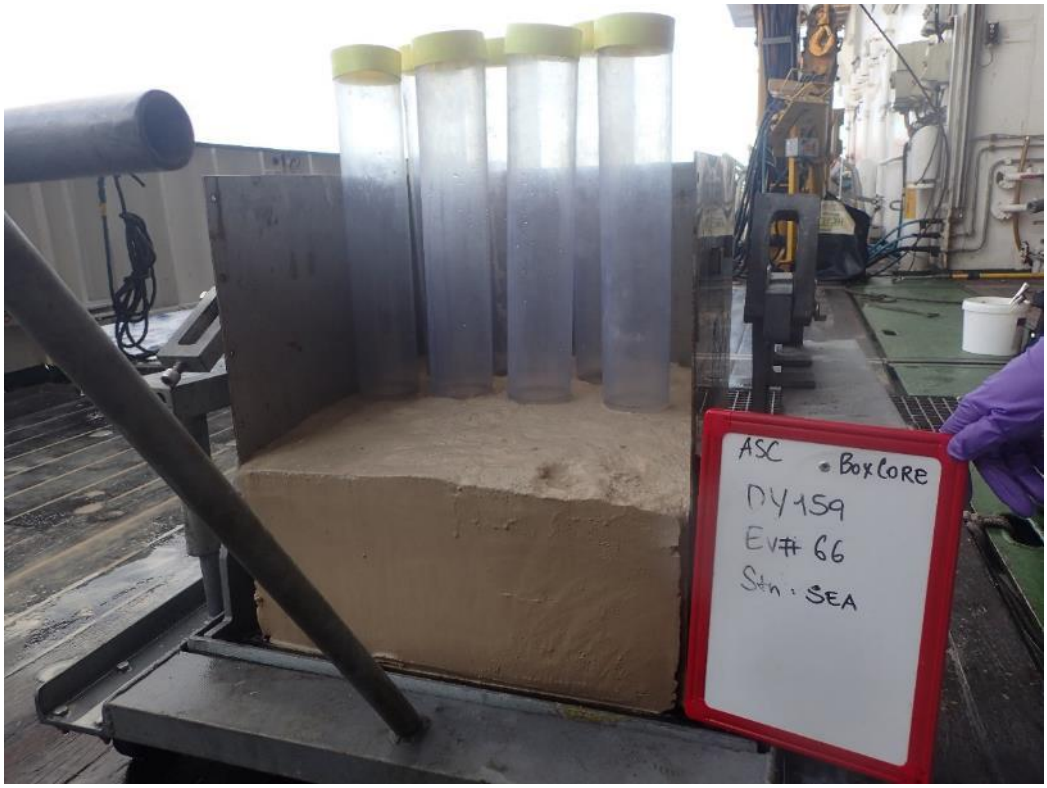


Figure 41 – Profile of box core sample taken from the Ascension Southeast Abyssal site showing sub core placement and homogenous sediment structure.

4.8 Deep-water Scavenger Trap

James Bell, Oliver Hogg, Chris Fletcher, Nicola Geary, Giulia La Bianca

The baited trap Figure 42 is a 1.1m^3 frame comprising four traps on a steel rig; two benthic and two suprabenthic traps set at 90° to each other. Each trap consisted of a squared-off cylinder, 500 mm in length, 370 mm in depth and 290 mm internal diameter, with a single funnel entrance (35 mm aperture) at one end and a fine 500 µm sieve on the other end. The frame was fitted with an acoustic release (IXBLUE OCEANO 2500 S-UNIVERSAL) rated to 6000 meters.

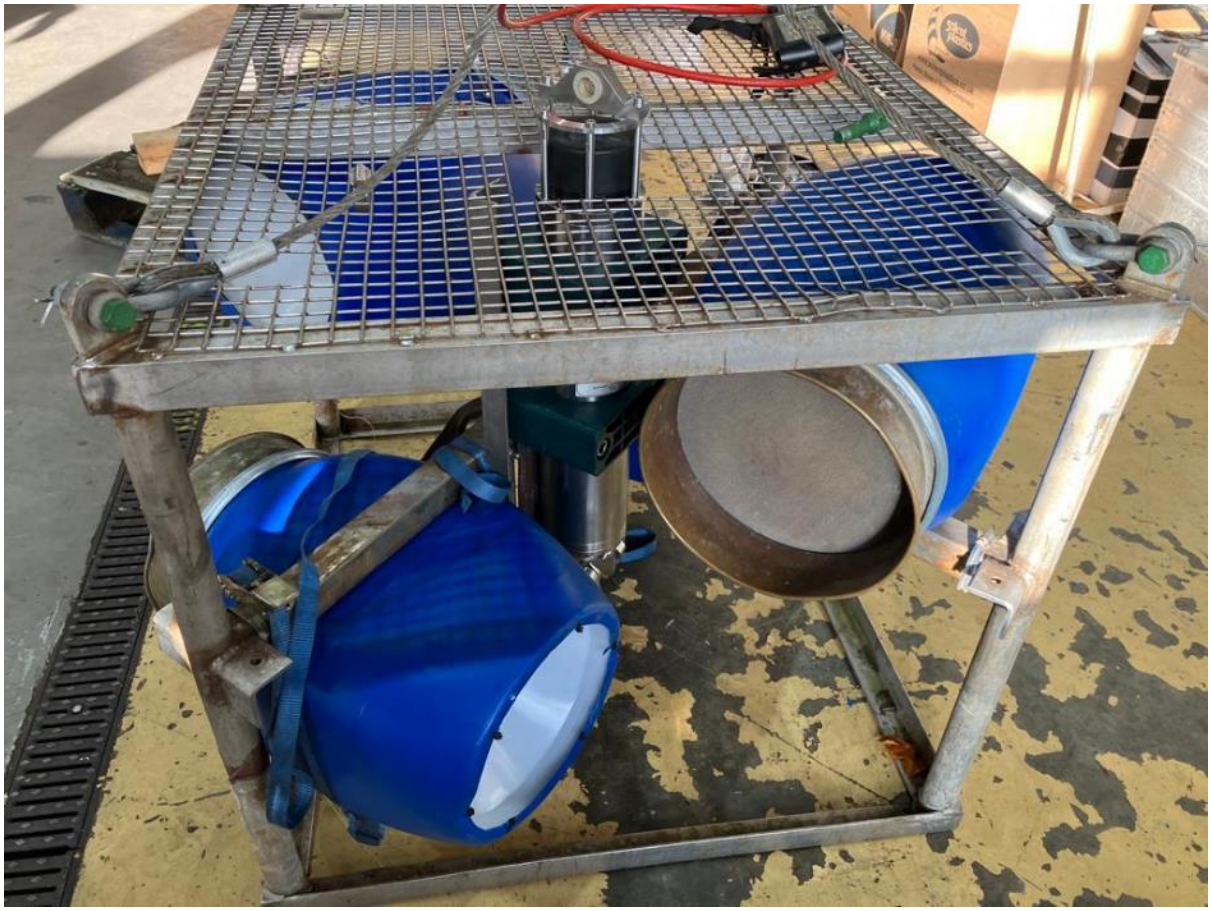


Figure 42 – The baited amphipod trap showing the acoustic release in the centre and perpendicularly mounted benthic and suprabenthic cylinders.

Initially each trap was baited with thoroughly defrosted mackerel pieces which were left loose inside the drum. Additional mackerel pieces were placed in two gauze pouches on the outside of the trap frame. In subsequent deployments each trap was baited with thoroughly defrosted whole mackerel cut along the underside and weighing approximately 200-300 g. No mackerel pieces were placed in the gauze pouches on the outside of the trap frame to encourage amphipods to enter the traps instead.

The traps were deployed with a ships speed of 0.2 – 1.0 kn, with the marker buoy and buoyancy floats first, followed by the trap frame and iron weights Figure 43. The frame was deployed from the back deck on a crane and released with a slip hook. Ideally the trap was left *in situ* for 24 h, but soak times varied (19-24 h) owing

to ship schedule constraints with other deployments/recoveries occurring simultaneously.

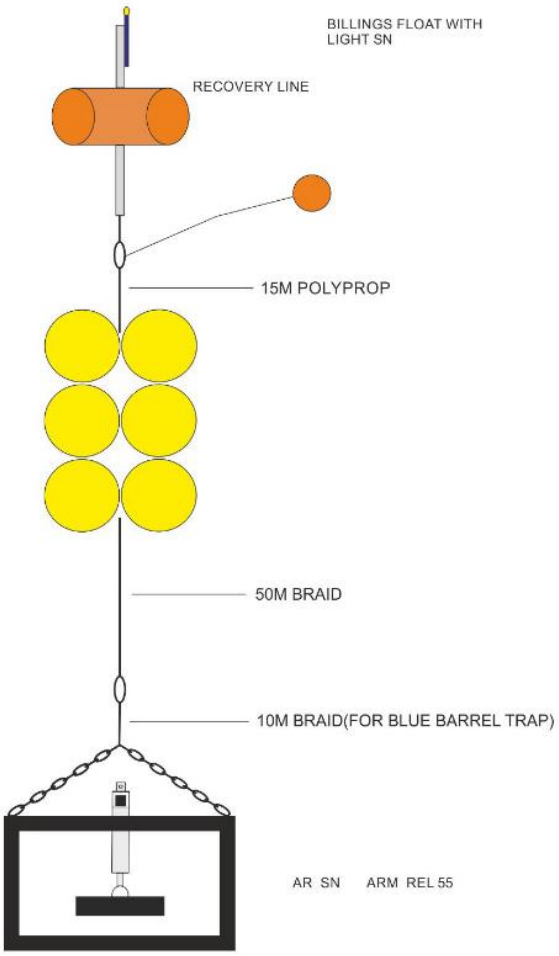


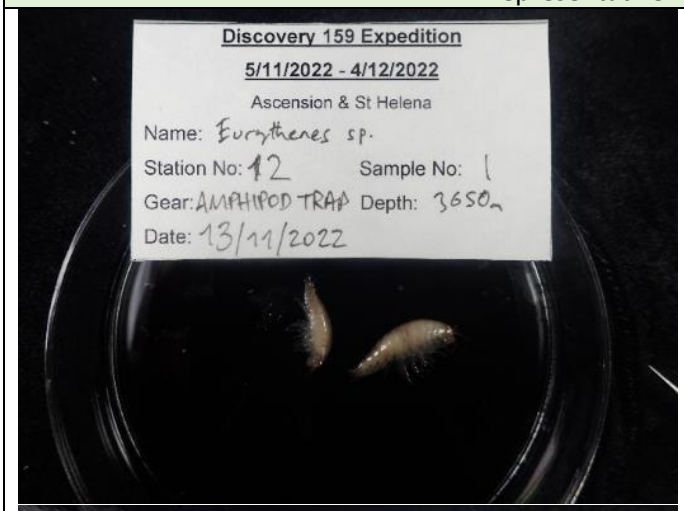
Figure 43 – A schematic diagram of the benthic baited amphipod trap.

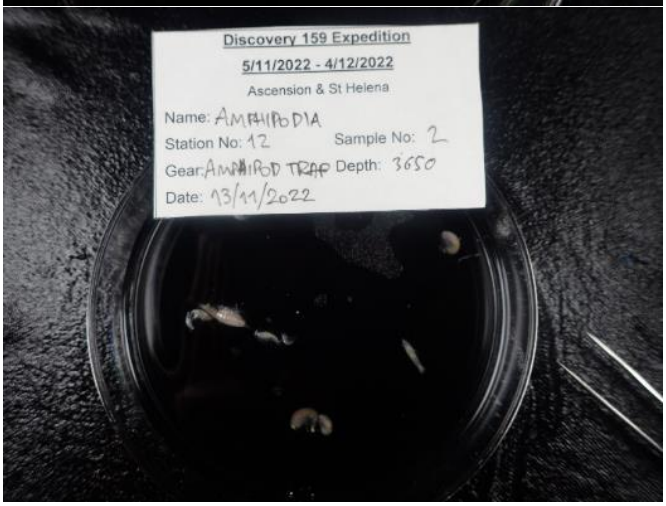
A mark and recapture system were used to retrieve the traps by triggering the acoustic release mechanism. On recovery, the individual traps were removed from the frame and transferred the cold lab (5°C) for further processing. Amphipods were removed with forceps to be identified down to an appropriate taxonomic level, counted, weighed, and sampled either as a whole specimen or tissue (pleopod) for further identification and later molecular analysis for inclusion in the Darwin Tree of Life project. Whole-type specimens were photographed with a Canon EOS 6D DSLR camera with 24-70mm image stabiliser ultrasonic lens.

After initial sorting and identification specimens or tissue samples were either freeze dried at −80 °C or fixed in 99% ethanol and subsequently stored at −80 °C. Although benthic and suprabenthic traps have been used, the specimen numbers for each of the traps in each trap-set were combined to produce a single count for each station.

Baited trap summary			
SurveyID	DY159	UKOT	ASC
Station Code	NWA	Event No	12
Date deployed	13/11/2022	Date recovered	14/11/2022
Latitude	-5.7457	Longitude	-15.9773

Representative images





Summary description

START AT 10:58. The baited trap deployment location was the North-West Abyssal Plain to a water depth of 3661 meters. The traps were baited with thoroughly defrosted mackerel pieces and extra pieces placed outside the traps in the gauze pouches. The buoys were lowered first at 10:52 with the trap being released to the seabed at 10:58 with a ship speed of 0.4 kn. The intended soak time was 24 hours. Trigger release was initiated the next day with the trap surfacing approximately 1.5 hours after release at 07:43 with a soak time of approximately 19 hours. **END AT 08:13.**

The traps were dismantled from the rig and moved to the cold lab (5°C) for processing. A total of 12 Amphipod specimens were collected from the traps (initially identified as *Eurythenes* sp. Or Amphipoda sp.). Whole specimens were preserved with 99% ethanol and frozen at – 80°C for further identification at the National History Museum.

Baited trap summary			
SurveyID	DY159	UKOT	ASC
Station Code	YOS	Event No	29
Date deployed	16/11/2022	Date recovered	17/11/2022
Latitude	-9.7027	Longitude	-12.1554

Representative images

Summary description

START AT 15:42. The baited trap deployment location was the Young Seamount to a water depth of 2524 meters. The traps were baited with thoroughly defrosted whole mackerel (one in each trap). To encourage amphipods into the baited trap no mackerel pieces were placed in gauze pouches. The trap was released to the seabed at 15:42 with a ship speed of 1.0 kn. The intended soak time was 24 hours. Trigger release was initiated the next day with the trap surfacing approximately 1.5 hours after release with a soak time of approximately 24 hours. **END AT 18:38.**

The traps were dismantled from the rig and moved to the cold lab (5°C) for processing. Many more amphipods were captured by the trap compared to the previous event. The pleopods of 15 specimens were preserved either with 99% ethanol or by freeze drying at – 80°C for later molecular analysis for the Darwin Tree of Life project. All other specimens were identified down to an

appropriate taxonomic level (*Amphipoda* sp. Or *Eurythenes s*p.) before being preserved whole in 99% ethanol and frozen to – 80°C.

Baited trap summary			
SurveyID	DY159	UKOT	ASC
Station Code	GRS	Event No	49
Date deployed	17/11/2022	Date recovered	Attempted recovery on 18/11/2022 but trap not recovered
Latitude	-9.8237	Longitude	-12.760
Representative images			
Trap not recovered			
Summary description			
START AT 12:32. The deployment starts on the Grattan Seamount to a depth of 1927m at a ship speed of 0.2 kn. Intended soak time was 24 hours. On release at 08:21 on 18/11/2022 the baited trap did not surface, the reason for this is unknown but could be that the release did not fully disengage, or that the weights remained on top of a section of the trap after release and prevented surfacing. Owing to time constraints and the low probability of a successful recovery, the decision was taken by PW, DB and JB to leave the baited trap unrecovered. **END AT 09:39** The Master of RRS *Discovery* has issued the appropriate notices to mariners of the location and details of the lost equipment.			

4.9 Crab Pots

Molly Meadows, Leeann Henry, Elizabeth Clingham & James Bell

Potting lines were deployed for the purpose of investigating the species of deep-sea crustaceans in the waters surrounding St Helena, specifically looking at species from the genus *Chaceon* of the family *Geryonidae* Figure 44. Previous fisheries reports had contained unreliable species information, our data supplies a baseline of species availability which would be required before considering any future crustacean fisheries.

Figure 44 – Two species of *Chaceon* previously found around St Helena. Top: *C. sanctaehelenae* Bottom: *C. atopus*.

Two deployments took place in the St Helena MPA. The first deployment used 7 double side entry crab pots positioned 21m apart on an 880m line with dual anchors and buoys positioned at each end (Figure 45).

First Deployment – St Helena Island

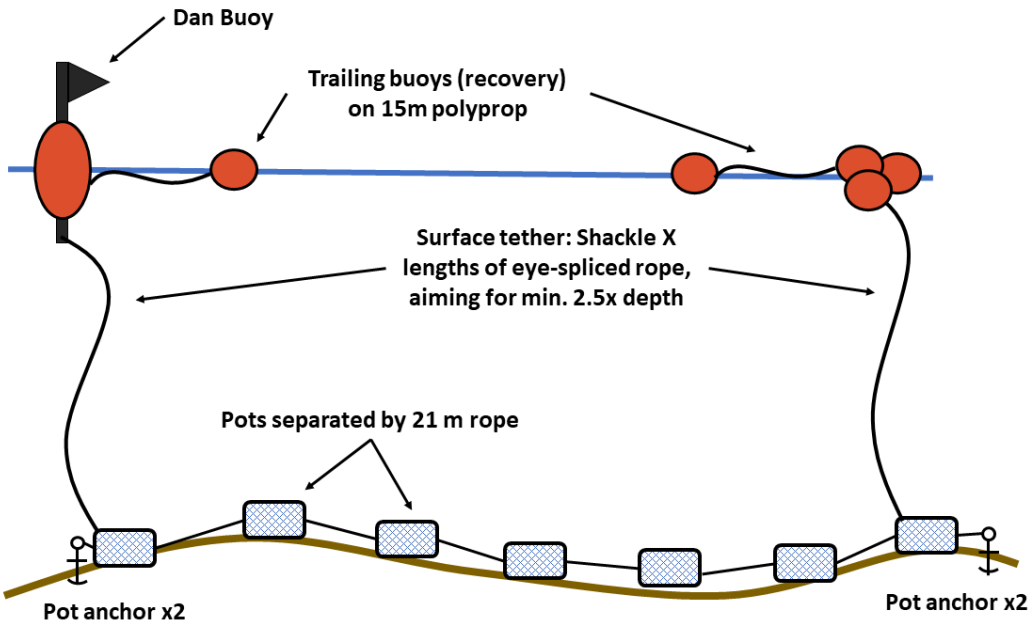


Figure 45 – Crab pot rigging schematic. First deployment was carried out to this schematic.

An initial deep-water site was scoped for crab pot suitability using the deep-water towed camera. Ultimately, this site was deemed unsuitable for potting due to steep cliffs, thus, a second location at 250m water depth was chosen. The line deployment began at the point where the pots were to be positioned which meant the pots were deployed several hundred metres away at a much shallower position. The final potting line water depth was 100-230m. The survey schedule and transit between event locations meant that the soak time for these pots was 49 hours. Due to the shallower than anticipated depth and extended soak time the recovered pots contained a high proportion of live coastal scavenger species as bycatch and no crustaceans of interest were obtained. The pots contained a variety of reef species, including spotted moray eels, common octopus, giant hermit crabs, robust mora, blunthead pufferfish, butterfly fish, deepwater gurnard and St Helena golden moray (Figure 46). The recovery procedure of the first set of plots was also difficult due to the two fluke dhan anchors becoming lodged amongst the seabed and the two trailing lines from either end of the string becoming entangled, following extensive manoeuvring from the boat the pots were eventually freed and recovered.

Figure 46 – Subsample of live bycatch caught in first crab pot deployment, common octopus (*Octopus vulgaris)* and blunthead pufferfish (*Sphaeroides pachygaster*).

Second Deployment – Cardno Seamount

The second deployment at Cardno seamount was much refined due to lessons learned from the first deployment. Only three pots were deployed on a 1160m surface tether, the first pot was weighted with anchor chain instead of pot anchors, to reduce the risk of snagging, and only one surface tether was used, to increase the speed of deployment and recovery (Figure 47).

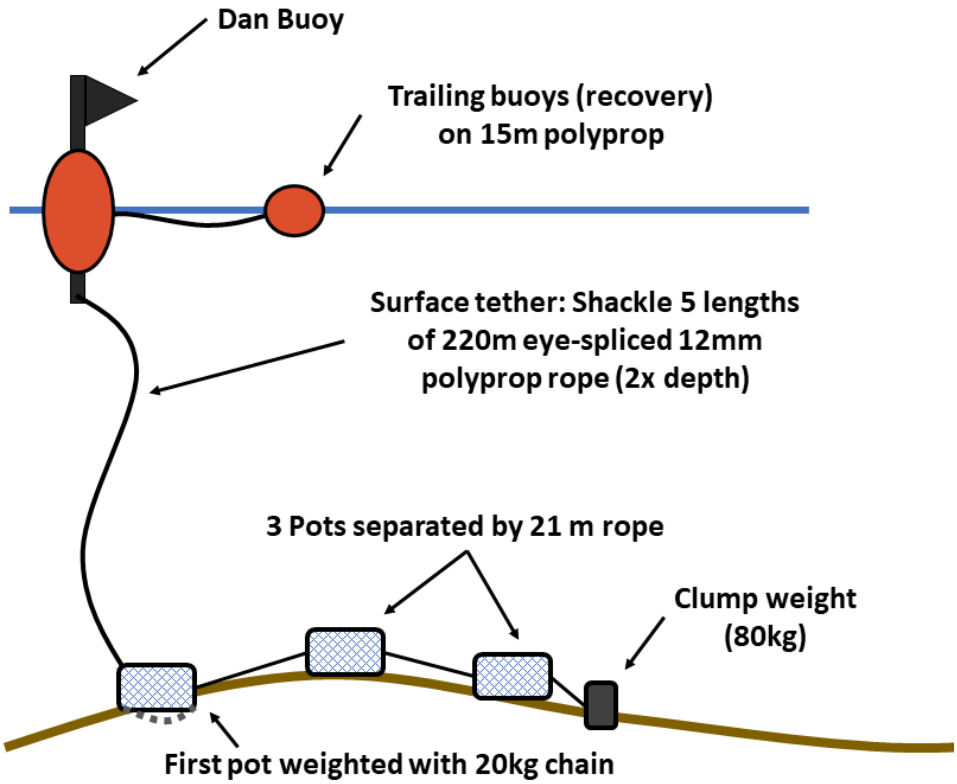


Figure 47 – Refined deep water potting schematic used for second deployment.

The deployment took place at a depth of 550-600m, which was more within the general prospective depth profile for *Chaceon* species and less likely to have coastal scavengers such as common octopus and moray eels. The soak time for this deployment was 29 hours. The recovery process was much more efficient with only minor dragging of the pots causing the first and third pots to become entangled. The pots contained entirely *Chaceon sanctaehelenae* with no bycatch species (Figure 48). There were 56 *C. sanctaehelenae* across all pots, with more males (n=42) than females (n=14) caught at this depth and the males being generally larger (Figure 49). *Chaceon* species have been shown to exhibit sex-based depth distribution (Stevens & Guida, 2016), further research could be carried out around St Helena to examine the sex and size distribution at different depths. Tissues samples were collected for DNA analysis by Cefas and the specimens were used to train St Helena Government colleagues on identification techniques.

Figure 48 – First pot of second deployment contained 23 *C. sanctaehelenae.*

Figure 49 – Carapace width distribution in 14 female and 42 male *C. sanctaehelenae* at pot depth of 550-600m around St Helena.

4.10 Bongo Nets

Gabriele Stowasser

To sample small mesozooplankton that cannot be collected with the RMT8 the survey team deployed motion compensated Bongo nets (60 cm mouth opening, with one 100 µm and one 200µm mesh size net and cod end each) at each RMT station (Figure 50). The Bongo nets were vertically deployed to a depth of 200m. All Bongo samples were filtered through a 100µm or 200µm mesh sieve and the whole sample stored in seawater at -80°C until further analysis.

Figure 50 – Motion compensated Bongo nets with 100µm and 200µm mesh size nets and cod ends.

4.11 Compliance and Enforcement Trials

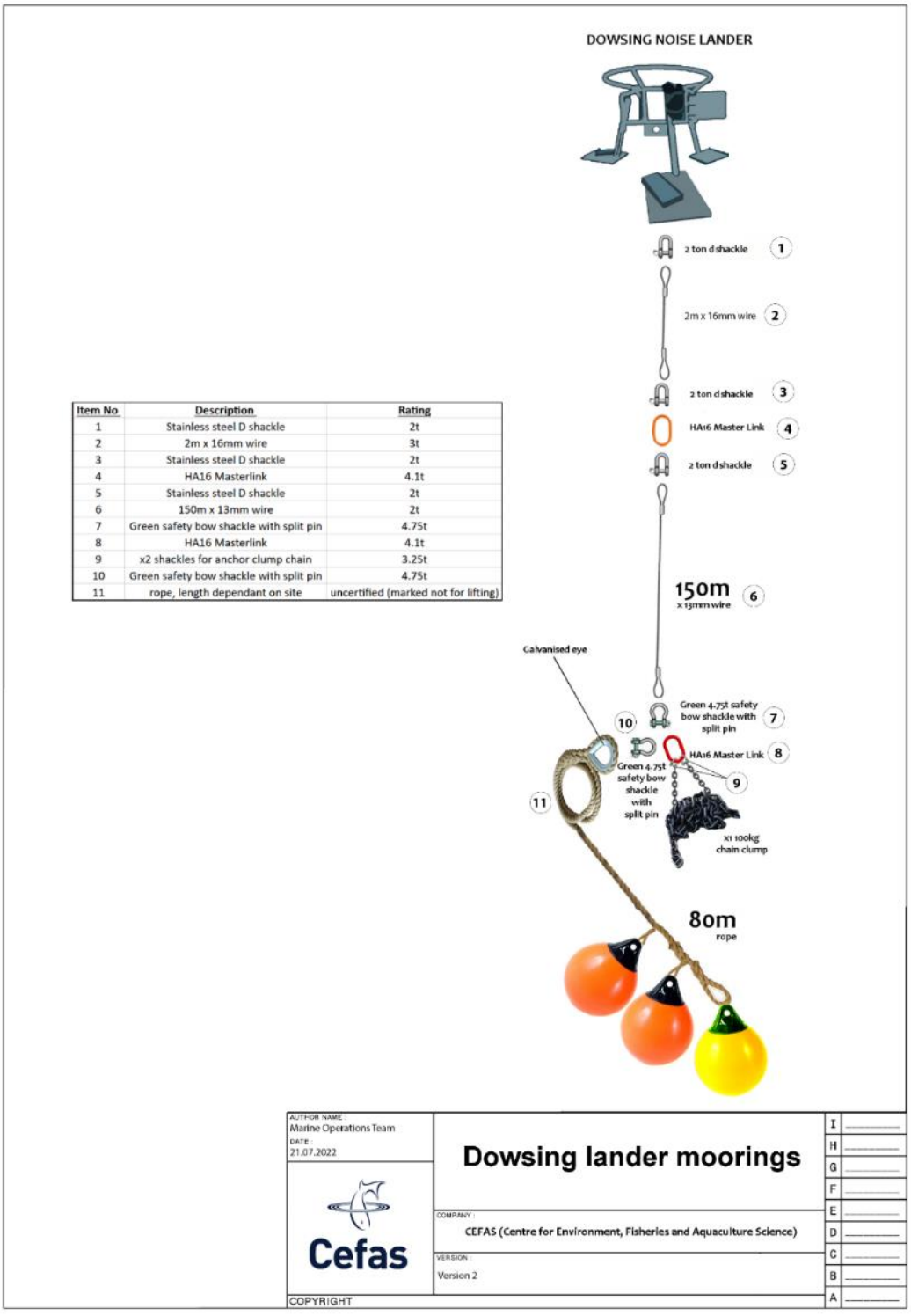
Emma Defriez & Rodney Brash

4.11.1 Passive Acoustics

Equipment set up and deployment

The passive acoustic landers consisted of a Soundtrap Hydrophone on a Dowsing lander. 150m of steel cable attached this to a clump chain which was itself attached to three surface buoys (Figure 51; Figure 52).

Figure 51 – Lander on deck prior to deployment.



Item No	Description	Rating
1	Stainless steel D shackle	2t
2	2m x 16mm wire	3t
3	Stainless steel D shackle	2t
4	HA16 Masterlink	4.1t
5	Stainless steel D shackle	2t
6	150m x 13mm wire	2t
7	Green safety bow shackle with split pin	4.75t
8	HA16 Masterlink	4.1t
9	x2 shackles for anchor clump chain	3.25t
10	Green safety bow shackle with split pin	4.75t
11	rope, length dependant on site	uncertified (marked not for lifting)

Figure 52 – Schematic of lander rigging.

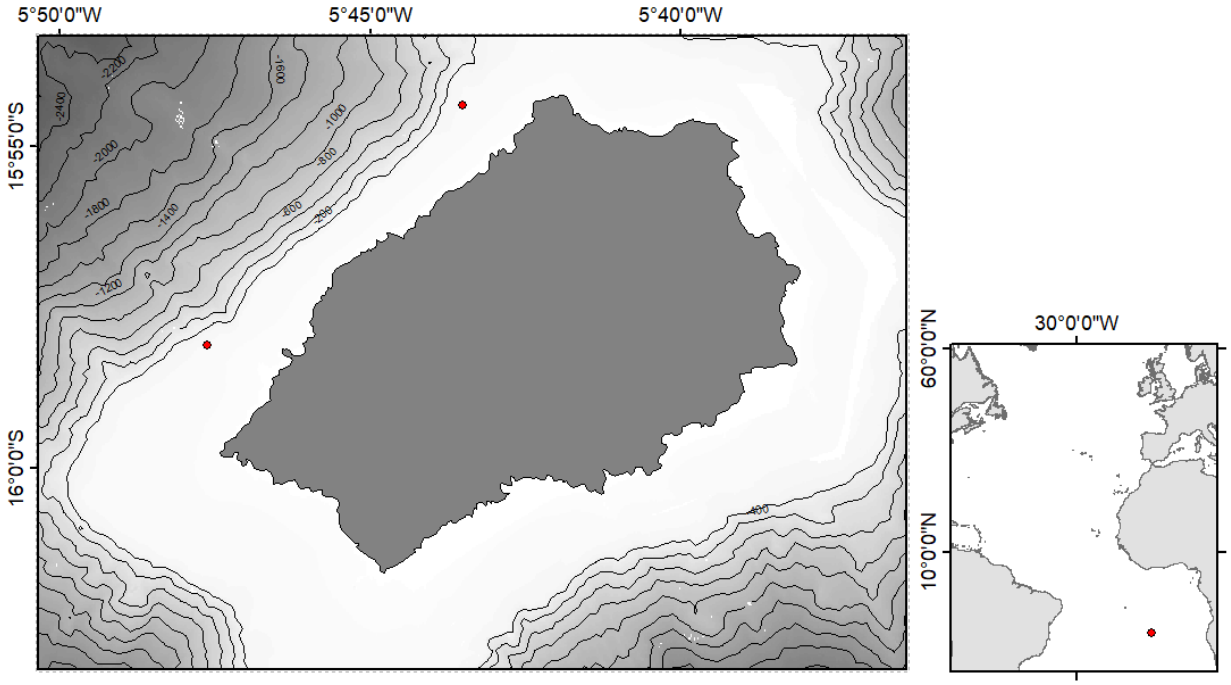


Figure 53 – Lander deployment locations

Table 6 – Details of lander deployments

Location	Latitude (DD.MM)	Longitude (DD.MM)	Depth (m)	Date-Time (GMT)	
				Deployed	Recovered
James Bay	-15.9064	-5.7952	91	2022-11-26 20:08	2022-12-04 06:26
Egg Island	-15.9687	-5.7245	96	2022-11-26 22:01	2022-12-04 09:36

Vessel noise trial

The landers were deployed in two locations in the inshore (Figure 53 and Table 6). While the landers were on the seabed, transects were performed (Figure 54) by a 12.4m mono hull (fibre glass and wood) vessel with a 212 HP engine in the following patterns:

Egg Island vessel transit plan:

1. Transit past noise recorder
2. Troll past noise recorder
3. Stop 1000 m away
4. Stop 500 m away
5. Stop at noise recorder
6. Troll away from noise recorder
7. Transit towards noise recorder
8. Two circles 100m and 500m away from device at trolling speed.
9. Two circles 100m and 500m away from device at transit speed

Jamestown vessel transit plan

1. Transit towards noise recorder
2. Stop at noise recorder

3. Stop 500 m away
4. Stop 1000 m away
5. Transit past noise recorder
6. Troll past noise recorder

(Then return to noise recorder)

7. Troll away from noise recorder
8. Two circles 100m and 500m away from device at trolling speed.
9. Two circles 100m and 500m away from device at transit speed.

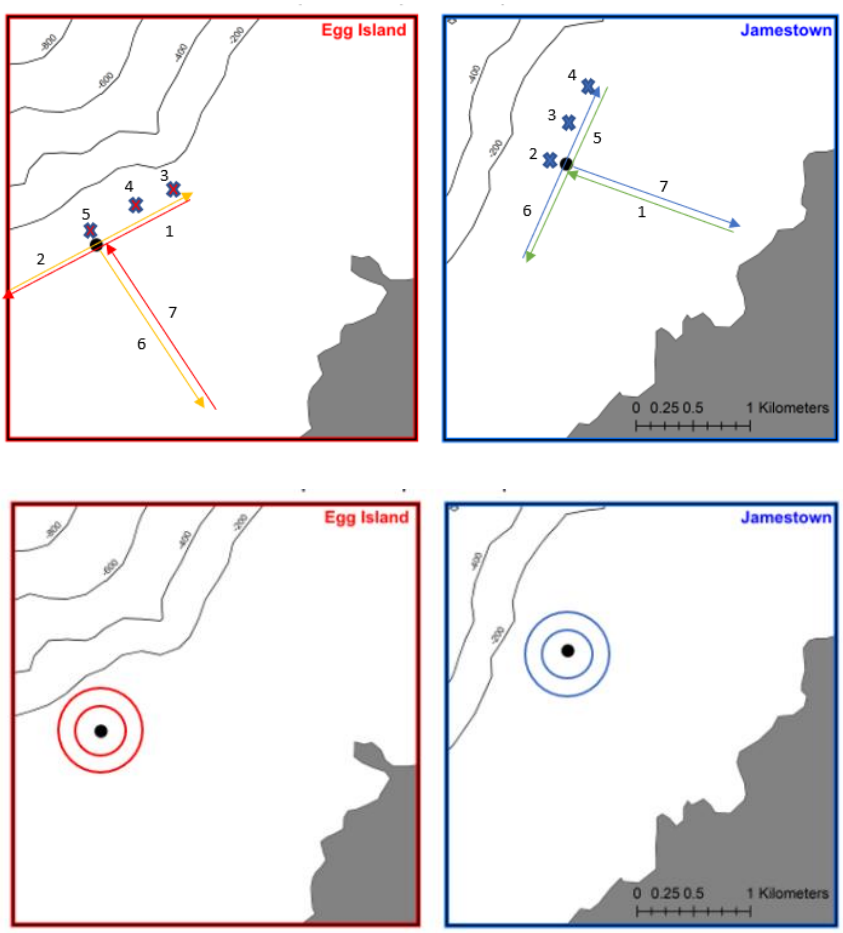


Figure 54 – Indicative transit vessel movements performed around landers.

Recovery

Both landers were recovered successfully and without damage.

During the recovery of the James Bay lander, a submerged anchor of unknown providence, approximately 4.5 in length and at least 1 tonne in weight, became entangled with the steel ground line and was recovered to deck. The anchor remained intact until reaching the deck, whereupon the brittle material broke into a number of pieces (Figure 55). Upon the direction of the St Helena Government and

St Helena National Trust representatives, the anchor was returned to the seafloor at the lander recovery location. Local authorities, and the UKHO were both subsequently notified to update local charts to make other vessel operators aware of the potential hazard on the seafloor.

Figure 55 – Anchor recovered during recovery of James Bay lander

Post recovery, data from the hydrophones was downloaded, at which point it became evident that some form of instrument failure had occurred. Both hydrophones commenced recording at the appointed time (00:00 GMT on 2022-11-24) but ceased recording around 28hrs later prior to deployment. The cause of this failure is unprecedented and remains unclear. An investigation is ongoing by staff in the Cefas bioacoustics team (lead: Rosalyn Putland) and the manufacturer.

4.12 Baited Remote Underwater Video System (BRUVS)

Shona Murray, Kirsty Jones, Laura Shearer & Paul Whomersley

4.12.1 Set up and operations

Components

Mid-water stereo BRUVS are a standardised sampling tool that allow users to document the status of pelagic wildlife. The video samples generated by BRUVS document the diversity, abundance, and length of all observed individual animals. The video samples can also be used to explore animal behaviour.

The Blue Abacus BRUVS are a carbon fibre rig comprised of four pieces (Figure 56): (1) camera base bar in which two small action cameras are secured in a fixed

stereo position; (2) inner bait arm which inserts into the base bar and vertical arm to lock system into place; (3) outer bait arm which slides over part of the inner bait arm and supports the PVC bait cannister; and (4) vertical arm that connects the rig to the downline which extends to the surface floats and the weights that maintain the rig's vertical position in the water column. The bait cannisters are filled with 1 kg of oily, bloody fish. The bait sourced for this survey was a combination of salmon, mackerel, and tuna offcuts.

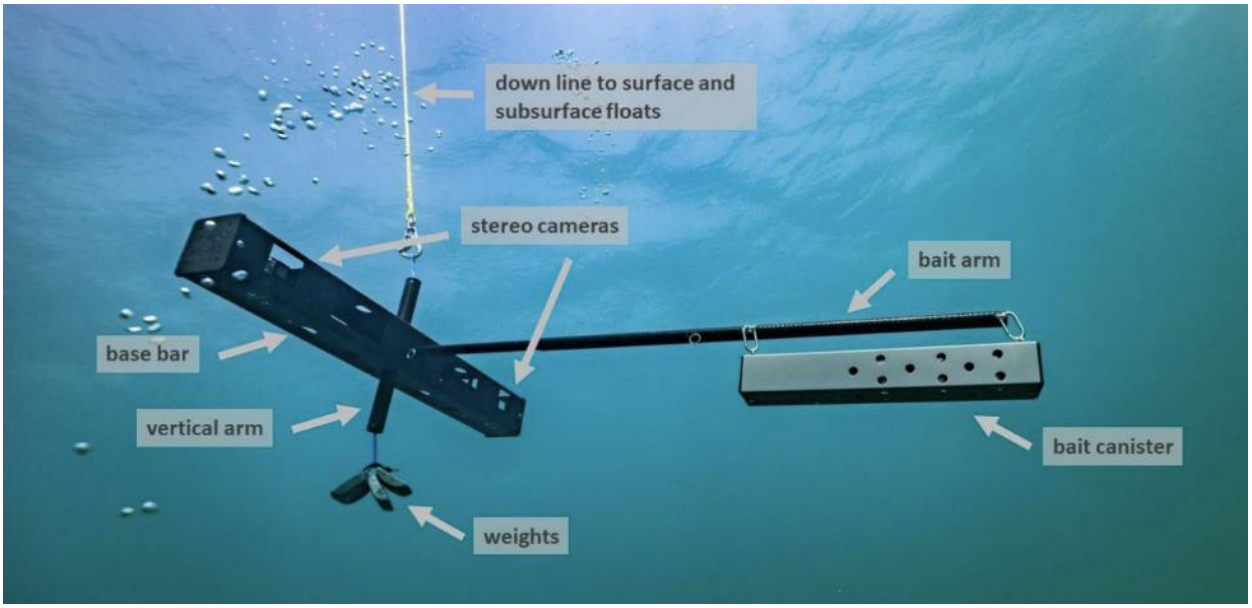


Figure 56 – Assembled mid-water BRUVS with labelled components.

Deployment

Mid-water BRUVS were deployed in a longline configuration of 'sets' of five individual BRUVS, each separated by 200 m of surface line, and suspended at a depth of 10 m. A dan buoy with attached radio and satellite beacons to monitor the drifting position of the BRUVS was tethered to the first rig via a 15 m recovery line. BRUVS were deployed by hand off the aft deck as the ship steamed forward at a speed of 0.5 – 1 kn to maintain tension on the line and ensure that the longline streamed out straight (Figure 57). All mid-water BRUVS were deployed during daylight hours to minimise the influence of crepuscular behaviour of fishes.

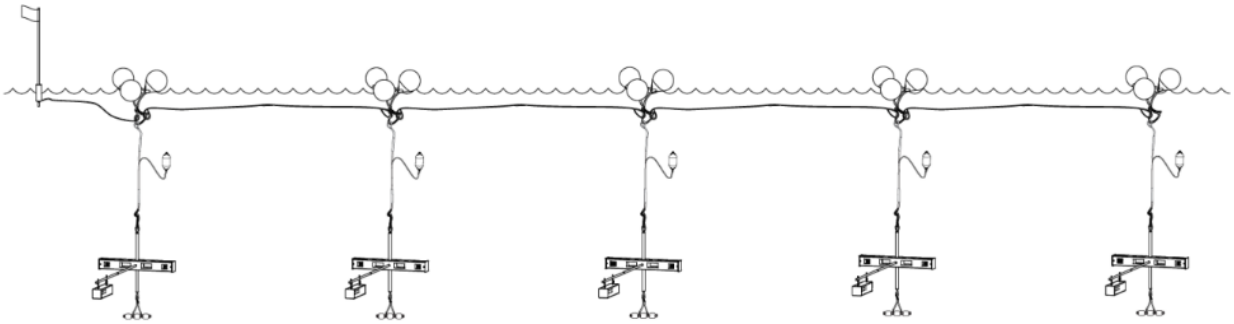


Figure 57 – Schematic of longline configuration for the deployment of five mid-water BRUVS.

Recovery

BRUVS remained in the water for a minimum of two hours. Upon recovery, BRUVS were located using the position of the satellite beacon. The recovery line was grappled from the starboard deck and the dan buoy was recovered. The line was then manoeuvred to the aft deck and the individual rigs and 200 m connecting surface lines were recovered using the double barrel drum winch (Figure 58). The video footage was viewed upon recovery of the rigs.

Figure 58 – Deployment/ recovery of the BRUVS showing double barrel winch.

4.12.2 Ascension

BRUVS were deployed five times at four sites. Upon preliminary viewing of the footage, there was a low abundance of marine wildlife observed at the North West Abyssal, Young Seamount and South East Abyssal sites, with either no individuals or solely pilotfish observed. In contrast, Grattan seamount was highly abundant, with a large aggregation of Galapagos sharks, a school of rainbow runner and a wahoo (Table 7 and Figures 59-63).

Table 7 – Summary of species observed on mid-water BRUVS in Ascension's EEZ.

Date	Site	Event #	Deployment	Species observed
13/11/2022	North West Abyssal	13	ASC22_01	None
17/11/2022	Young Seamount	38	ASC22_02	Pilot fish (*Naucrates ductor*)
18/11/2022	Grattan Seamount	47	ASC22_03	Galapagos shark (*Carcharhinus galapagensis*) Rainbow runner (*Elegatis bipinnulata*) Wahoo (*Acanthocybium solandri*)
19/11/2022	South East Abyssal	59	ASC22_04	Pilot fish (*Naucrates ductor*)
20/11/2022	South East Abyssal	65	ASC22_05	None

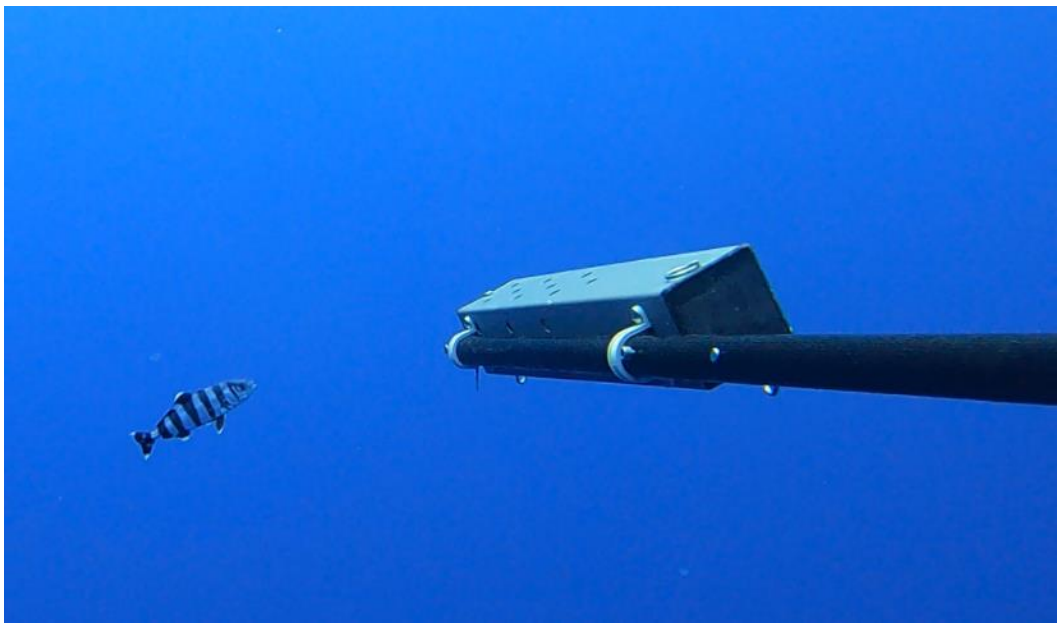


Figure 59 – Pilot fish at Young Seamount.

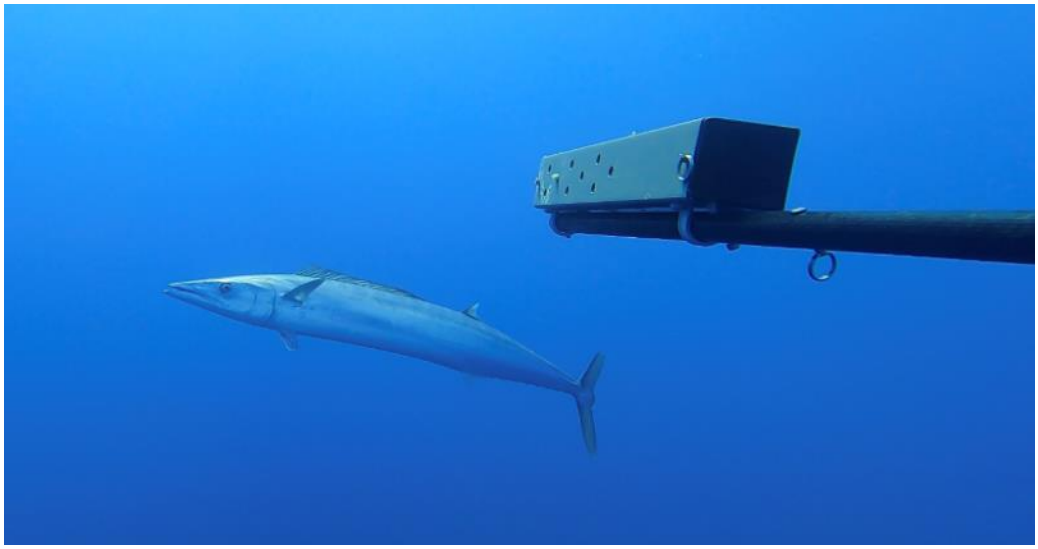


Figure 60 – Wahoo at Grattan Seamount.

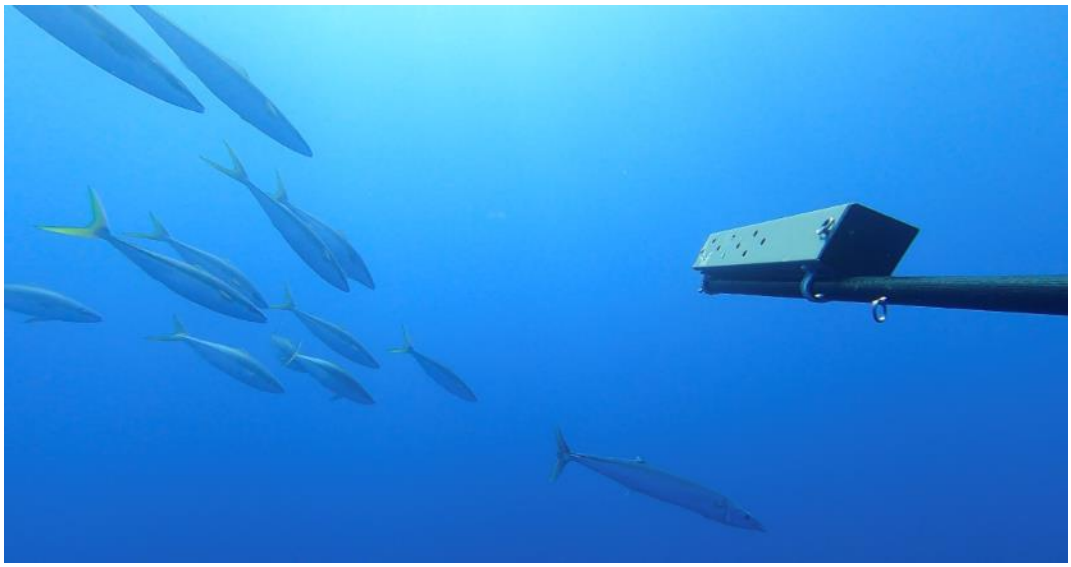


Figure 61 – Wahoo and rainbow runner at Grattan Seamount.

Figure 62 – Aggregation of Galapagos sharks at Grattan Seamount.

Figure 63 – Galapagos shark investigating the bait cannister at Grattan seamount.

4.12.3 St Helena

BRUVS were deployed seven times at four sites. Upon preliminary viewing of the footage, a generally low abundance of marine wildlife at all sites was observed. Notably, a very small blue shark at Cardno seamount was observed. This individual

may have been a young juvenile or potentially a young-of-year. A grey triggerfish with a large dermal parasitic load demonstrating the interesting behaviour of using the bait cannister as a 'scraper' to rid its skin of copepods was also observed (Table 8 and Figures 64-66).

At the last site, an alternate chumming method was trialled. A position was selected on the ship's track during an acoustic transect over Southern Cross Seamount and chummed around 2 hours prior to deployment of the BRUVS.

Table 8 – Summary of species observed on mid-water BRUVS in St Helena's EEZ.

Date	Site	Event #	Deployment	Species observed
25/11/2022	North-West Seamount	84	STH22_01	Pilot fish (*Naucrates ductor*) Pompano dolphinfish (*Coryphaena equiselis*)
27/11/2022	St Helena Island	93	STH22_02	None
28/11/2022	St Helena Island	102	STH22_03	None
29/11/2022	St Helena Island	108	STH22_04	Pilot fish (*Naucrates ductor*) Bigeye scad (*Selar crumenophthalmus*) (ID TBC)
30/11/2022	Cardno Seamount	111	STH22_05	Pilot fish (*Naucrates ductor*)
01/12/2022	Cardno Seamount	118	STH22_06	Blue shark (*Prionace glauca*)
02/12/2022	Southern Cross Seamount	125	STH22_07	Grey triggerfish (*Balistes capriscus*)

Figure 64 – Pompano dolphinfish at North West seamount.

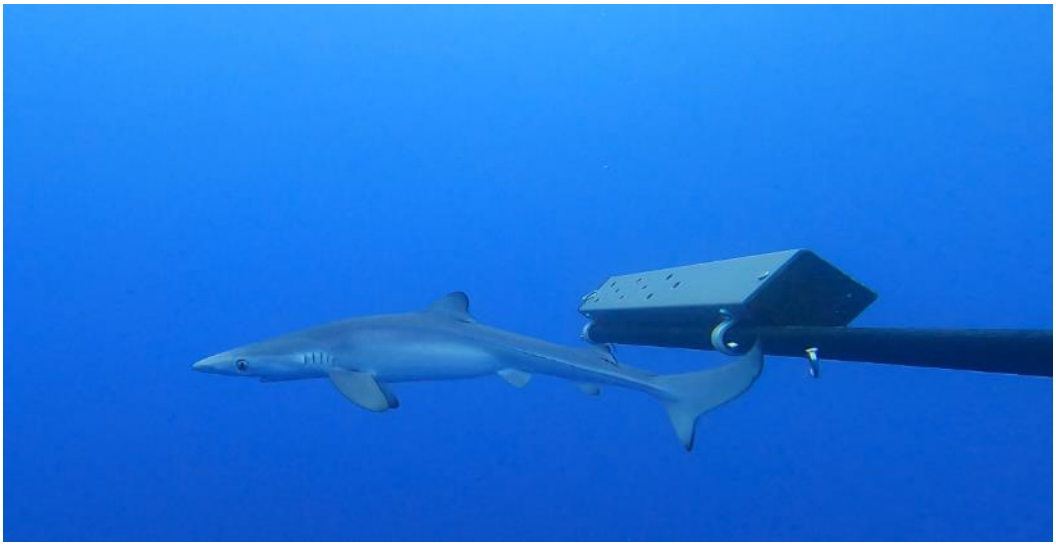


Figure 65 – Blue shark at Cardno seamount.

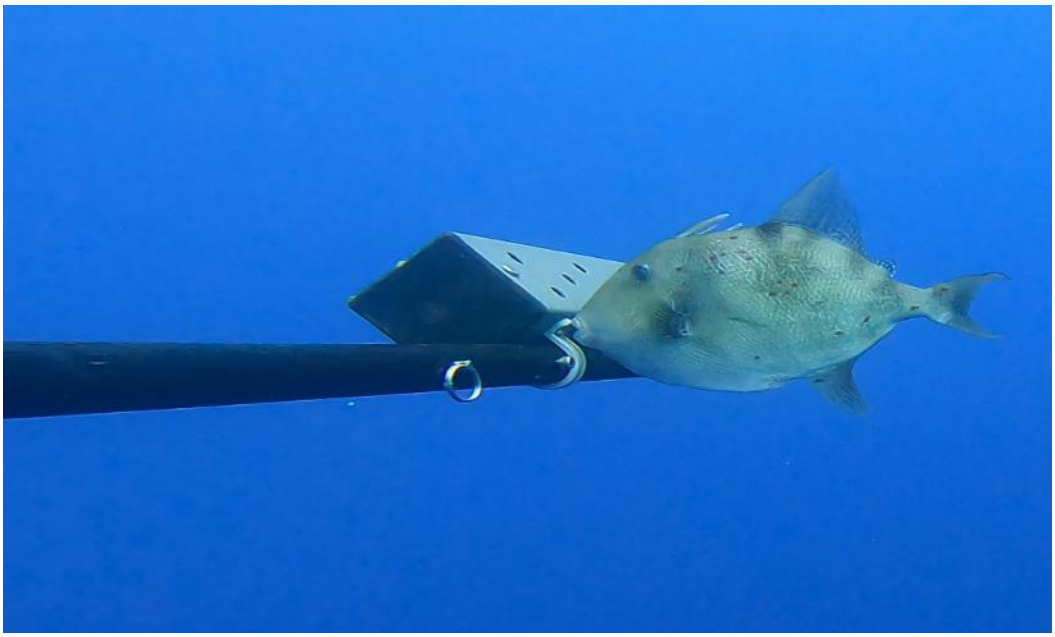


Figure 66 – Grey triggerfish at Southern Cross seamount.

4.13 Drifting Buoys

Paul Whomersley & James Bell

During DY159 planning, Cefas was requested to transport and deploy 25 Lagrangian oceanographic buoys, supplied by the UK Met Office, and SOFAR Ocean. These floats provide data that help condition models for real-time weather forecasts and climate change monitoring. Five Met Office ‘Argo’ floats, and twenty SOFAR Ocean ‘Spotter’ buoys were deployed at various points during transit, all in areas beyond national jurisdiction. Buoys were deployed per supplier instructions during transit at speeds of 9 – 11 knots (Figure 67; Table 9).

Figure 67 – SOFAR Ocean Spotter Buoy being deployed.

Table 9 – Deployments of drifting oceanographic buoys. n.d. = ID number not recorded prior to deployment.

Buoy Type	Unit ID	Unit Count	Date-Time (GMT)	Lat (DD.mm)	Lon (DD.mm)
Spotter	2001	1	2022-11-04 17:14	22.9997	-20.3850
Spotter	1829	2	2022-11-05 00:15	21.9986	-21.1735
Spotter	1985	3	2022-11-05 07:19	21.0063	-22.0095
Spotter	2000	4	2022-11-09 14:52	7.1423	-20.6859
Spotter	n.d.	5	2022-11-10 05:04	4.9937	-19.7883
Spotter	n.d.	6	2022-11-10 10:33	4.1585	-19.4503
Spotter	n.d.	7	2022-11-12 03:04	-2.0015	-17.2834
Argo	8582	1	2022-11-24 16:43	-12.4140	-8.6909
Spotter	1831	8	2022-12-07 09:50	-18.7800	-14.0000
Argo	9471	2	2022-12-07 12:00	-18.8333	-14.2150
Spotter	1878	9	2022-12-07 14:58	-19.0167	-14.9983
Argo	9472	3	2022-12-07 14:58	-19.0167	-14.9983
Spotter	1875	10	2022-12-07 21:45	-19.2717	-16.0000
Spotter	1876	11	2022-12-08 03:25	-19.4950	-17.0000
Argo	8984	4	2022-12-08 03:25	-19.4950	-17.0000
Spotter	30344	12	2022-12-08 08:46	-19.7333	-18.0000
Spotter	30023R	13	2022-12-08 14:16	-19.9533	-18.9983
Spotter	300342R	14	2022-12-08 19:30	-20.1817	-20.0000
Spotter	30345R	15	2022-12-09 01:06	-20.3817	-21.0000
Spotter	30343R	16	2022-12-09 06:30	-20.5867	-22.0000
Spotter	1882	17	2022-12-09 11:52	-20.7833	-23.0000
Spotter	1869	18	2022-12-09 17:14	-20.9780	-23.9975
Spotter	1877	19	2022-12-09 22:30	-21.1500	-25.0000
Spotter	1867	20	2022-12-11 23:20	-22.5315	-34.0000
Argo	8983	5	2022-12-12 04:46	-22.6538	-35.0000

For further details of these buoys and how to access the data they collect, please contact Fiona Carse (fiona.carse@metoffice.gov.uk), or Colin Bowser and Melanie Feen (colin.bowser@sofarocean.com; melanie.feen@sofarocean.com), for Argo and Spotter floats respectively.

4.14 Communications

Joe Wells, Lorna West & Lawrence Eagling

4.14.1 Overview

Ahead of the RRS *Discovery* 159 expedition, a multi-channel communications and engagement plan was created. The DY159 communications plan aimed to ensure that the key objectives and scientific activity taking place during the expedition were impactfully and accurately communicated to the Blue Belt Programme's core audience groups – such as UKOT stakeholders, UK public and school-age groups.

These objectives were:

- Showcase and raise awareness of the science taking place on the expedition, linking this to how it informs the management and protection of these marine environments through the Blue Belt Programme.
- Connect the work of the expedition in building understanding and helping to address major human impacts on our oceans, namely climate change, biodiversity loss, illegal- and over-fishing.
- Use the work of the survey to increase education and awareness – especially targeting school ages – of the marine environment, the challenges it faces and the ways to protect it.

A timeline of activity was created which spanned before, during and after the surveys conclusion that aimed to fulfil these objectives, using the communications channels available to the Blue Belt Programme – such as social media platforms, an email-newsletter, and media engagement tools.

A key component of the DY159 communications work onboard was also the creation of a documentary video, which concisely captures the experience of life on board, the scientific work, and activities, and ultimately how the expedition links to the work of the Blue Belt Programme.

The communications outputs for the expedition were delivered by an onboard communications officer and a dedicated videographer, with remote support from colleagues based in the UK.

4.14.2 Traditional and broadcast media engagement

The work and progress of the expedition was highlighted through traditional and broadcast media channels in a number of ways during the expedition.

On the launch of DY159 and its departure from Southampton, a press release document was created which outlined the key scientific aims and how the

expedition supports the work of the Blue Belt Programme. It featured quotes from the leading scientists and UK ministers.

After being distributed to a variety of media contacts, the press release resulted in UK local, national, and international coverage. Throughout the expedition, engagement opportunities were also sought with media outlets. Further media engagement opportunities will be investigated upon further analysis of the survey findings and arrival of the biological specimens in the UK (mid-2023).

Traditional media outlets that featured a story on DY159 included *Press Association, BBC News Online, The Times, The Daily Mirror, The Independent, CBBC Newsround online, and Corriere della Serra* (Figure 68). More focussed articles on DY159 and its work with the UKOTs have also been agreed with the *Marine Biological Association* and the *Deep Ocean Stewardship Initiative.*

Climate > News

Research ship on voyage of discovery to South Atlantic Ocean

The RRS Discovery will set sail for Ascension Island and St Helena in the search for new species on the seabed.

Ben Mitchell • Thursday 27 October 2022 00:01

(Blue Belt Discovery 100 expedition/PA) *(PA Media)*

Figure 68 – Headline in *The Independent* on 27th October 2022

Broadcast media which featured DY159 included BBC Radio 5 Live, which ran an interview with the lead scientist for the expedition, Paul Whomersley. Local radio

station for St Helena and Ascension Island Saint FM also featured two interviews with James Bell and Paul Whomersley during *Discovery's* time around St Helena.

The BBC Radio World Service's *Science in Action* programme also delivered five feature slots over several weeks, following the progress of DY159, life on board and the scientific work taking place.

Around 5 – 10 minutes in length, each of these five updates on the expedition were presented by the scientists and experts on board and distributed on a fortnightly basis. The first feature was run during the week of the *Discovery's* departure from Southampton and focussed on how you prepare for a large scale scientific expedition. The features following this included a focus on life on board, the science behind the Ascension Island and St Helena's MPAs, as well as how the work of the expedition supports local efforts to conserve the marine environment.

Other media opportunities secured during the DY159 expedition included a feature slot on the *Deep Sea* podcast. Members of the scientific crew updated the podcast about life onboard, provided an overview of the Blue Belt Programme, and outlined the deep-sea research work taking place on DY159.

4.14.3 Digital communications

During DY159 a regular schedule of activity was delivered across the Blue Belt Programme's digital channels, as well as those of associated UK Government agencies and the UKOTs.

Social media

On social media, #DY159 was determined as the expedition's hashtag, and to date it has received 150k impressions and 15,500 profile visits for the official Blue Belt account on Twitter alone (total impressions for the hashtag not measured but will have been much higher, e.g., twitter account of J Bell achieved 97k impressions in the same period). Instagram and Facebook were also both used regularly to promote content and updates from the expedition's work (reach of 5,418 and 9,515 respectively).

Daily updates were given across all of the channels (Table 10) and provided live insights to audiences on the work of the experts onboard. Focus was given to ensuring that the variety of scientific deployments being carried out was conveyed to audiences, but also how each specific activity linked to the overarching objectives and key messages, as set out in the DY159 communications plan.

Table 10 – Social media channels used by DY159 communications officers. Numerous other members of the scientific party also used personal accounts.

Channel	Username/ link
Facebook	https://www.facebook.com/ukgovBlueBelt
Instagram	https://www.instagram.com/bluebeltprogramme/
Twitter	@ukgovbluebelt @sthelenampa @AscensionMPA

An example of how this was achieved was through a series of concise social media videos, that were created during the expedition using footage collected onboard. Around 30 seconds in length, they each focussed on a different strand of work taking place onboard, following the process of their deployment through to the results they provide. These included videos on the deep-sea camera transects and the ground-truthing of satellite surveillance data.

Another strand of social media activity focussed on life on board, and how scientists and crew onboard *Discovery* live and work on a research vessel for several weeks at a time. For example, this was conveyed through video tours of the vessel and interviews with key members of the *Discovery* crew (e.g., Captain, chefs and technicians).

Amplifying the social media activity of partner organisations and participating scientists also helped increase engagement with the hashtag and reach broader audience groups.

Creating, sourcing, and promoting engaging video content and imagery was given priority due to its higher engagement rates on social media. Video content was filmed and edited largely on board, and where possible uploaded within the limitations of the internet bandwidth on board.

E-Newsletter

The Blue Belt's e-newsletter platform (GovDelivery) was used as part of the digital communications approach to the campaign. These newsletters allowed for longer form content and more detailed updates to be sent to subscribers (approx. 2600 people). Throughout the expedition, four newsletters were distributed, providing regular updates on the scientific work occurring and the initial findings. Spread across the duration of the expedition, the newsletters each had a separate focus:

1. Expedition launch, covering the surveys overall objectives, news coverage, and the legacy of previous Blue Belt Programme expeditions.
2. Introducing members of the scientific crew and the different specialisms onboard.

3. Ascension Island scientific leg, key discoveries, and activities.
4. St Helena scientific leg, key discoveries, activities and what comes next.

Blog

The Blue Belt Programmes blog platform is hosted on the UK Government's Gov.uk blog site. An overview introductory blog was written by DY159 scientific lead Paul Whomersley and published on the launch of the expedition. It outlined key scientific objectives, context around the planning of the expedition, the scientific deployments planned, and how the work of the expedition supports the Blue Belt Programme and conservation work of the UK Overseas Territories. Further blog posts are planned upon the publication of more detailed findings from the DY159 expedition.

4.14.4 Documentary

Throughout the expedition footage was collected for the purpose of creating a DY159 video documentary. Around 15 minutes in length, the documentary will be released in 2023.

Work was undertaken prior to the expedition to agree areas of focus, key messaging, and an overview storyboard for the documentary. Footage was then collected throughout the expedition and aimed to record the scientific deployments and research taking place, as well as provide a sense of what daily life on board a large research ship is like.

This specifically involved recording interviews with participating scientists and members of the operational crew as the journey progressed and events unfolded (Figure 69). Footage was also collected of scientific equipment being deployed, scientists analysing newly collected samples, as well as unexpected events or new discoveries as they happened.

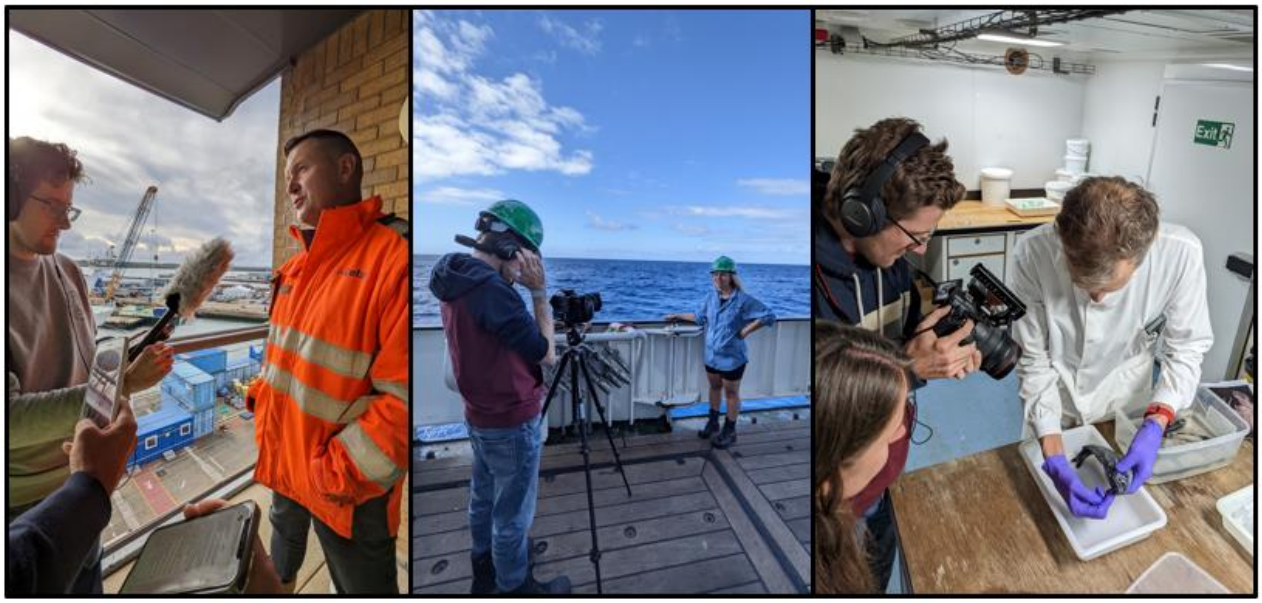


Figure 69 – Recording and filming for radio broadcasts and the expedition documentary

The documentary aims to give an impactful and engaging insight into the DY159 expedition, synthesise its key scientific objectives, and highlight how it directly supports the work of the UKOTs and Blue Belt Programme. The documentary will, once finalised, be hosted on Blue Belt Programme channels. It will also be offered to relevant media outlets, conferences, and events to further highlight the expedition.

4.14.5 Outreach and engagement

As outlined in the communication objectives for the DY159 expedition, a key target for this campaign was to engage the populations of the local UK Overseas Territory populations with the work and findings of the expedition, with a specific focus on young people.

Outreach and engagement work was a key strand to the scientific legs around Ascension Island and St Helena (Figure 70).

During the Ascension Island leg of the expedition, local school children recorded a video of themselves asking questions to the scientists onboard DY159 about the deep ocean. Throughout the scientific leg around Ascension, work was undertaken to film answers to these questions from a variety of the scientists on board, and a video was provided to them upon arrival at the island. It was also promoted on social media channels.

Once on island, three members of the scientific crew delivered an overview of DY159's work around Ascension at a local community event. They outlined key findings, as well as answered questions from the community on the expedition. Following this, a school event also took place, where the scientists held a session with the children, showed them some of the specimens collected within the deep ocean around Ascension, and answered their questions.

A similar approach was taken around St Helena. Once disembarked and on island, members of the scientific crew delivered four school assemblies for the different schools on the island. Within these, they showcased some of the specimens collected during the expedition, video footage of the biodiversity and habitats recorded, and answered their questions. A local event for the wider community was also held.

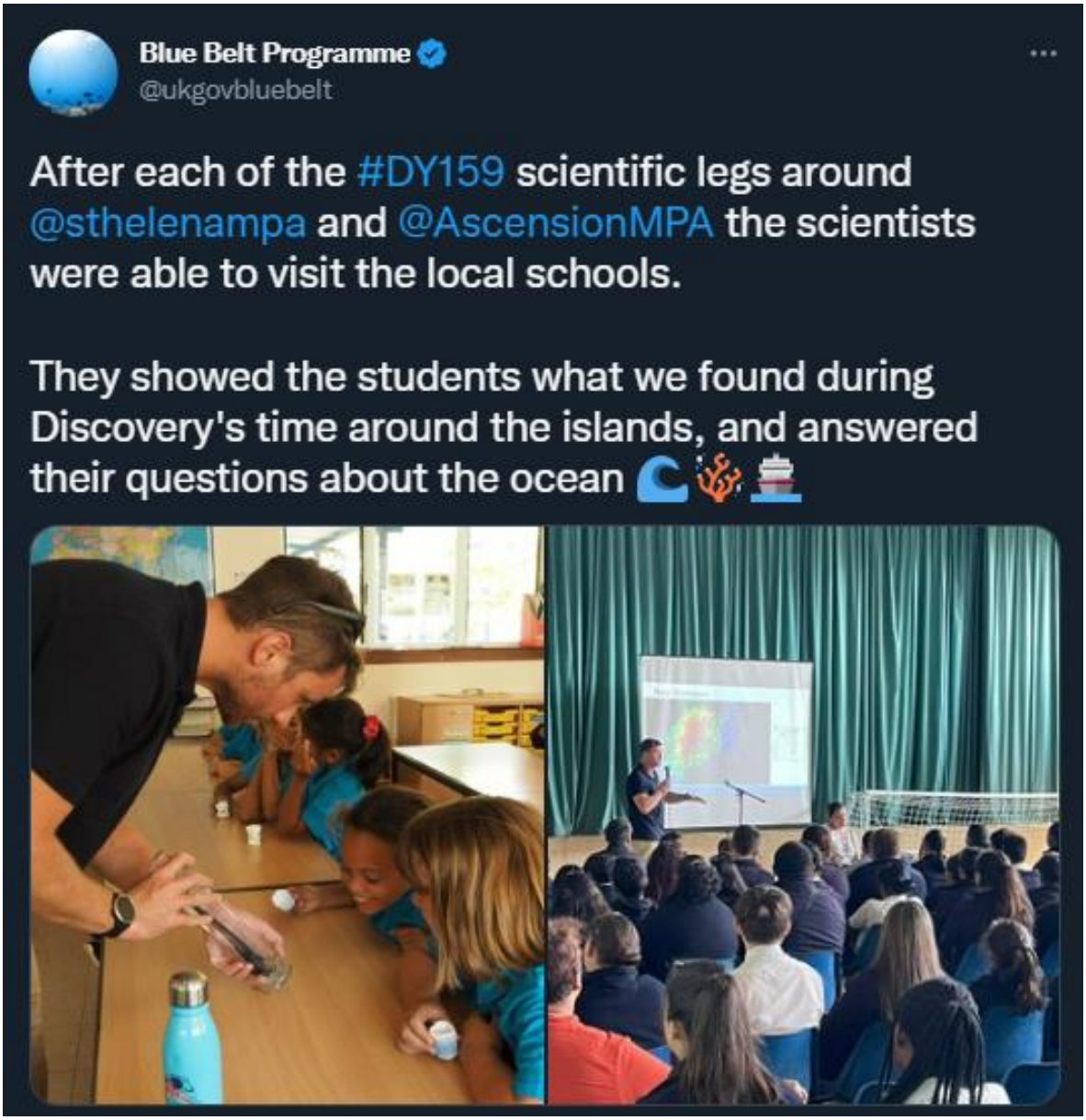


Figure 70 – Engagement events with local schools on Ascension (left) and St Helena.

A glass cabinet was also transferred on *Discovery* and presented to the St Helena Government marine section and will be placed in the new marine centre (officially opened in June 2022). A selection of the specimens collected during the DY159 expedition around St Helena will be presented to the marine section, and will be displayed in the cabinet for local members of the community to view.

Figure 71 - Glass display cabinet installed in the new St Helena marine laboratory ready for specimens.

4.14.6 Next steps

Following the conclusion of the DY159 expedition, further communications are planned to raise awareness of the legacy of the expedition, its key findings, and next steps. Over the coming months, the Blue Belt Programme communications team will actively plan for and look to identify new stories which emerge from the findings of the survey, such as the publication of scientific papers or conference attendance of participating scientists.

A large aspect to the legacy communications will centre on the completed documentary, which will be launched during 2023 and promoted with key audience groups. Another key milestone will be the arrival of the biological specimens collected during DY159 in the UK (expected April 2023). They will be stored and curated in the Natural History Museum, and will be available to researchers and scientists from around the world. Key stakeholders will be invited to view the specimens, and communications activity will coincide with their arrival.

5 Citations

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6 Appendices

6.1 Crew

Table 11 – DY159 Scientific and Technical Crew. AFBI = Agri-Food and Biosciences Institute of Northern Ireland. AIG = Ascension Island Government. BAS = British Antarctic Survey. Cefas = Centre for Environment, Fisheries and Aquaculture Science. MMO = Marine Management Organisation. NHM = Natural History Museum. NMF = National Marine Facilities. SHG = St Helena Government. SHNT = St Helena National Trust.

Name	Organisation	Role
Whomersley, Paul	Cefas	Chief Scientist
Bell, James	Cefas	Deputy Chief Scientist
Baum, Diane	AIG Conservation Dept.	Director
Capel, Toby	AIG Conservation Dept.	Plastics Officer
Shearer, Laura	AIG Conservation Dept.	Seabird Officer
Simpson, Tiffany	AIG Conservation Dept.	Deputy Director
Watkins, Simon	AIG Conservation Dept.	Fisheries Scientist
West, Lorna	AIG Conservation Dept.	Communications Officer
Clingham, Elizabeth	SHG Marine & Fisheries Dept.	Lead
Henry, Leeann	SHG Marine & Fisheries Dept.	Senior Assistant
Jones, Kirsty	SHG Marine & Fisheries Dept.	Assistant
Joshua, Cerys	SHG Marine & Fisheries Dept.	Intern
Naulaerts, Joachim	SHG Marine & Fisheries Dept.	Assistant
Augustus, Kirsten	SHNT	Project Team
Fletcher, Michelle	SHNT	Director
Flint, Gareth	BAS	Marine Engineer
Fremand, Alice	BAS	Hydrographer
Stowasser, Gabriele	BAS	Food Webs Ecologist
Barnett, Samantha	Cefas	Fisheries Scientist (Bio. Sampling)
Brash, Rodney	Cefas	Marine Engineer
Campanella, Fabio	Cefas	Fisheries Scientist (Acoustics)
Geary, Nicola	Cefas	Benthic Ecologist
Hogg, Oliver	Cefas	Benthic Ecologist
Kiff, Gemma	Cefas	Data Manager
Meadows, Molly	Cefas	Fisheries Scientist (Shellfish)
Nelson, Paul	Cefas	Biogeochemist
Wells, Joseph	Cefas	Blue Belt Comms Officer
Defriez, Emma	MMO	Compliance and Enforcement
La Bianca, Giulia	Uni. of Plymouth	Benthic Ecologist
Fletcher, Christopher	NHM	Invertebrate Taxonomy

MacLaine, James	NHM	Fish Taxonomy
O'Loughlin, Rory	AFBI	Hydrographer
Murray, Shona	Uni. of Western Australia	Pelagic Ecologist
Eagling, Lawrence	Swimming Head Productions	Videographer
Comben, Daniel	NMF	Senior Technician
Cotmore, Andrew	NMF	Technician
Henderson, Paul	NMF	Technician
McGarry, Emmy	NMF	Technician – Ship's Systems

Table 12 – DY159 Ship's Crew

Name	**Role**
Mackay, Stewart	Master
Mahon, Andrew	Chief Officer
Stringfellow, Graham	Second Officer
Astell, Rachel	Third Officer
Bullimore, Graham	Purser
McCoy, Garry	Chief Engineer
Hay, Derek	Second Engineer
Evans, Daniel	Third Engineer
Gheisari, Jonathan	Third Engineer
Fisher, Charles	Electro-Technical Officer
Smith, Stephen	Chief Petty Officer, Science
Cook, Stuart	Deputy Chief Petty Officer, Science
Fraser, Grant	Petty Officer, Science
Stivey, Mark	Petty Officer, Deck
Peppin, Christopher	Able-bodied Seamen
Paris, Ryan	Able-bodied Seamen
Burke, Terry	Able-bodied Seamen
Quenault, Paul	Petty Officer, Engine Room
Lynch, Peter	Head Chef
MacLeod, Coleen	Chef
Carrilho, Clementina	Steward
Mason, Kevin	Assistant Steward

6.2 Equipment

Table 13 – Equipment used during DY159. *Ship's Fitted Systems. DWNM = Down-wire net monitoring (RMT topside control unit). AFBI = Agri-Food and Biosciences Institute of Northern Ireland. BAS = British Antarctic Survey. Cefas = Centre for Environment, Fisheries and Aquaculture Science. NMF = National Marine Facilities. MMO = Marine Management Organisation. UWA = University of Western Australia.

Name	Responsible organisation(s)/ staff	Summary of performance
Agassiz Trawls	BAS – Gareth Flint	Not used
Amphipod Trap	Cefas – Rodney Brash, James Bell NMF – Dan Comben	Acoustic release responded but trap did not resurface after third deployment, reason for failure unknown. Trap recovery not attempted because of time pressure.
Argo floats	Met Office – Fiona Carse Cefas – James Bell	Performed as expected/ within usual operational limits.
Autonomous Surface Vehicle – *Autonaut Jura*	Autonaut – Jesse Loynes Cefas – Paul Whomersley, Fabio Campanella	Issues with communications and steering prevented deployment at Ascension. Deployed around St Helena but persistent issues with adherence to mission plan.
Bongo Nets	BAS – Gareth Flint, Gabi Stowasser	Performed as expected/ within usual operational limits.
Box Core	BAS – Gareth Flint Cefas – James Bell	Deployment method altered after first deployment (reduced recovery speed to 45m/min) to preserve sample integrity. Otherwise performed as expected/ within usual operational limits
BRUVS	Cefas – Paul Whomersley UWA – Shona Murray NMF – Dan Comben	Deployment method off *Discovery* quickly refined but time constraints limited to max. 1 deployment per day.
Crustacean Pots	Cefas – James Bell, Molly Meadows	Deployment method refined for deep-water after first deployment to reduce change of gear getting stuck and improve catch selectivity. Otherwise performed as expected/ within usual operational limits
CTD and rosette	NMF – Paul Henderson Cefas – Paul Nelson	Performed as expected/ within usual operational limits.
Fisheries echosounder (EK80)*	NMF – Emmy McGarry Cefas – Fabio Campanella	First calibration attempt failed because of local conditions. Otherwise performed as expected/ within usual operational limits

Multibeam bathymetry (EM122)*	NMF – Emmy McGarry AFBI – Rory O'Loughlin BAS – Alice Fremand	Performed as expected/ within usual operational limits.
Multibeam bathymetry (EM710)*	NMF – Emmy McGarry AFBI – Rory O'Loughlin BAS – Alice Fremand	See MB section – unexplained drops in data acquisition throughout usage.
Noise Landers	Cefas – Rodney Brash, Ros Putland MMO – Emma Defriez	Lander deployment and recovery as expected but hydrophones failed during deployment. Cause unknown, investigation ongoing (by RP).
Rectangular Mid-Water Trawl	BAS – Gareth Flint	Persistent issues with surface comms between net and new topside units. Only resolved by reverting to old DWNM system.
Towed Camera & MacArtney winch	Cefas – Rodney Brash, Oliver Hogg	Unresolved altimeter failure. Otherwise performed as expected/ within usual operational limits
Sub-Bottom Profiler (SBP27)*	NMF – Emmy McGarry BAS – Alice Fremand	Used briefly at ARV station but failed to resolve bottom depth effectively during survey. Not used further.
SOFAR Spotter Buoys	SOFAR – Colin Bowser Cefas – James Bell	Performed as expected/ within usual operational limits.

6.3 Multibeam calibration and runtime parameters

6.3.1 System setup and calibration – EM122

The EM122 equipment was operated using Kongsberg Information System (SIS) – version 4.3.2 and Helmsman software. The installation parameters were set up following the information from Parker Maritime Survey (2013) as follows:

Table 14 – EM122 Installation parameters

	Forward (X)	Starboard (X)	Downward (Z)
TX Transducer	39.910	0.885	7.426
RX Transducer	35.219	-0.005	7.438

6.3.2 Calibration

A Basic Installation Self-Test (BIST) was conducted in SIS prior to the calibration and no errors were identified (see section 6.3.6). A patch test was performed on 13-14/11/2022 to calibrate the EM122 prior to start the scientific work under the survey name: DY159_Cal. The calibration was undertaken over two parallel lines (see Calibration lines parameters in Table 15; Table 16) at the North-West of Ascension Island EEZ. To ensure that the Multibeam Echosounder system was fully calibrated, the Sound Velocity Profile (SVP) was updated with new values from the first CTD (DY159_CTD_001). Lines were run at 6 knots and 2 knots to check for latency, pitch, roll and heading errors (Figure 72Figure 73;Figure 74). The results of the calibration are as follows:

Table 15 EM122 calibration results

Element	Offset prior to calibration	Correction
Roll MRU (°)	-0.1	0
Pitch MRU (°)	0.0	0.45
Heading MRU (°)	-0.85	-0.3
Time (sec)	0	0

Table 16 – EM122 Calibration line properties

Date-Time start	Lat start (decimal degrees)	Lon start (decimal degrees)	MB line count	Date-Time end	Lat end (decimal degrees)	Lon end (decimal degrees)	MB line count	Speed (kn)	Comments
13/11/2022 15:18:51	-5.554949	-16.10255	0007	13/11/2022 15:57:06	-5.61634	-16.08047	0007	6	Roll, pitch and heading calibration
13/11/2022 16:14:14	-5.627033	-16.07665	0008	13/11/2022 16:58:59	-5.55741	-16.10215	009	6	Roll and pitch tests
13/11/2022 18:45:05	-5.561058	-16.13307	0010	13/11/2022 19:28:56	-5.62928	-16.106921	0010	6 knots	Heading calibration
14/11/2022 01:32:07	-5.592281	-16.12090	0019	14/11/2022 02:32:07	-5.62997	-16.10642	0019	2 knots	MBES run opportunistically at calibration location for latency calibration

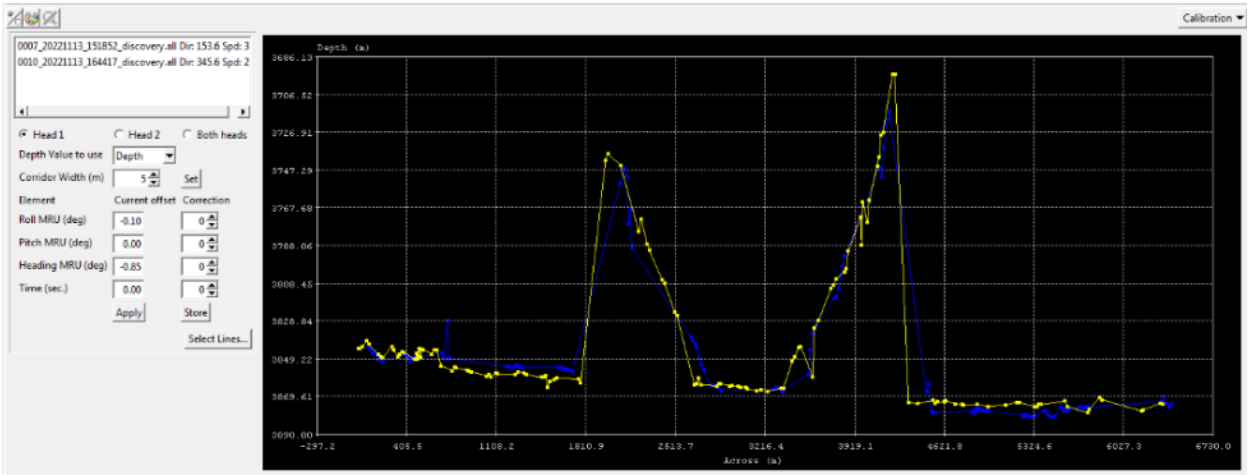


Figure 72 – EM122 Roll calibration

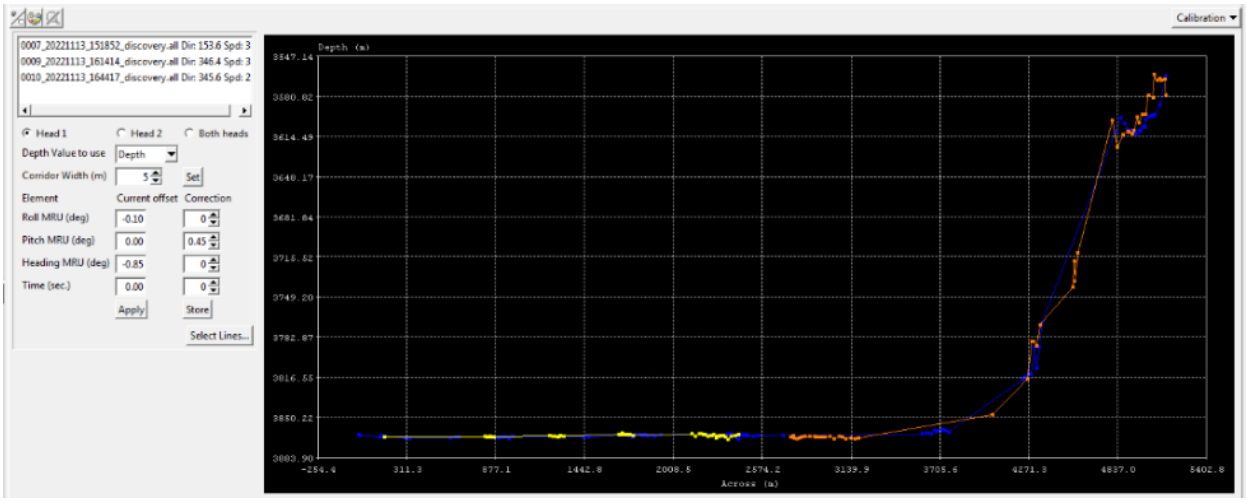


Figure 73 – EM122 Pitch calibration

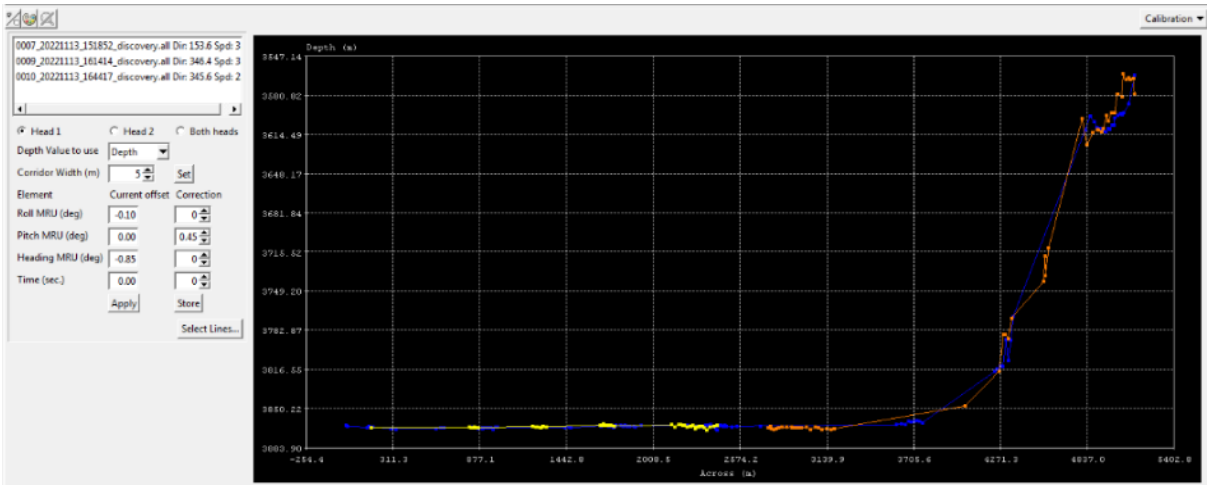


Figure 74 – EM122 Heading calibration

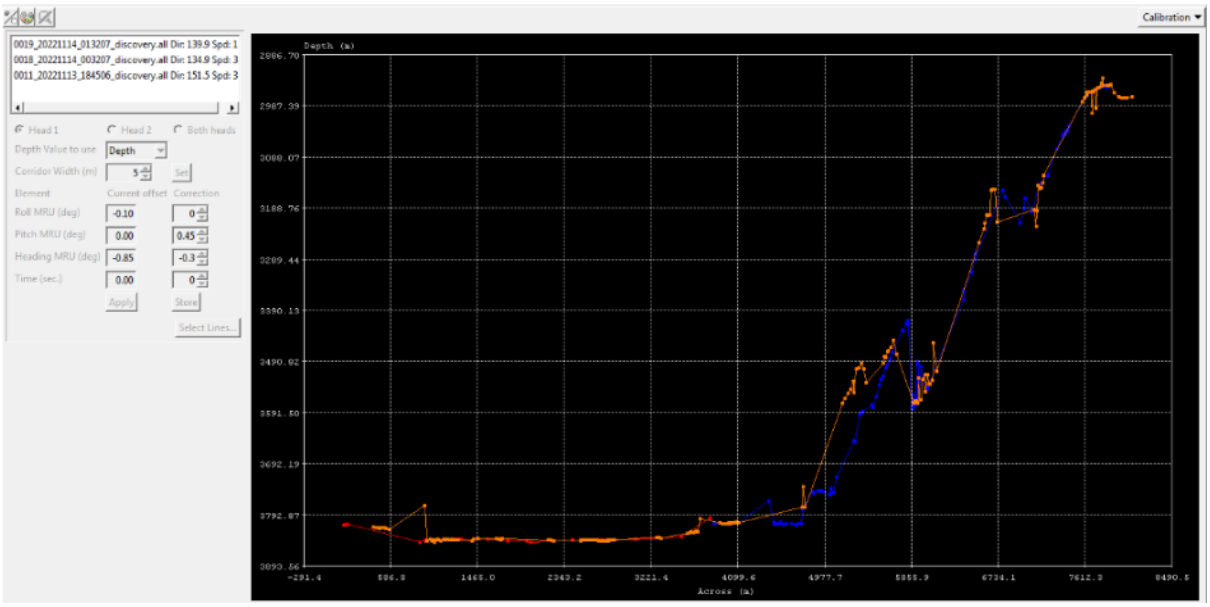


Figure 75 – EM122 Latency calibration

6.3.3 Runtime parameters

Different parameters were used depending on the type of survey. The following runtime parameters were used while in transit:

Table 17 – EM122 Runtime parameters used

Option	Setting
Angular coverage	AUTO or MANUAL: port: 45° - 75°/ Starboard: 45° - 75°
Beam spacing	HD EQDST
Yaw stabilization	REL. MEAN HEADING
Pitch calibration	ON
Heading filter	MEDIUM
Ping mode	AUTO
Filtering and gain	Spike Filter Strength: WEAK Range gate: NORMAL Phase ramp: NORMAL Penetration Filter strength: WEAK Slope: ON Aeration: OFF Sector tracking: ON Interference: OFF
Absorption Coefficient	Salinity
External trigger	ON (K-SYNC)
Mammal protection	ON -20 to -10 dB

6.3.4 System setup – EM710

The EM710 equipment was operated using Kongsberg Information System (SIS) – version 4.3.2 and Helmsman software. The installation parameters were set up following the information from Parker Maritime Survey (2013) as follows:

Table 18 – EM710 Installation parameters

	Forward (X)	Starboard (X)	Downward (Z)
TX Transducer	37.570	-1.994	7.425
RX Transducer	36.819	-2.051	7.427

No calibration was undertaken on the EM710. It is to be noted that some issues with the system were identified. It was indeed impossible to get proper depth measurement in depth superior to 700m. While some lines were sent to Kongsberg for further investigations, no solution were found.

Table 19 – EM710 Angular offsets

Element	Offset angles (degrees)
Roll MRU (°)	-0.14
Pitch MRU (°)	-0.4
Heading MRU (°)	-1.0
Time (sec)	0

Table 20 – EM710 Runtime parameters

Option	Setting
Angular coverage	MANUAL: port: 45°/ Starboard: 45°
Beam spacing	HD EQDST
Yaw stabilization	REL. MEAN HEADING
Pitch calibration	ON
Heading filter	MEDIUM
Ping mode	MANUAL or AUTO
Filtering and gain	Spike Filter Strength: WEAK Range gate: LARGE Phase ramp: SHORT Penetration Filter strength: STRONG Slope: ON Aeration: ON Sector tracking: ON Interference: ON
Absorption Coefficient	Salinity
External trigger	ON (K-SYNC)
Mammal protection	ON -10 dB

6.3.5 Changing SV profile

The Sound velocity profile data were directly used from the CTD measurements. They were edited in the SVP editor within SIS:

- From the main menu: Tools>Custom…>SVP Editor
- From the window menu, select File>Open>select the profile wanted
- Data are then loaded on the SVP editor
- Check the profile: Tools>Check profile automatic.
- Then, extend the profile: Tools> Extend profile
- Save as .asvp profile
- If the file is too big, the profile was thinned: Tools > Thin profile using 0.1 and saved the profile.

6.3.6 MBES BIST test

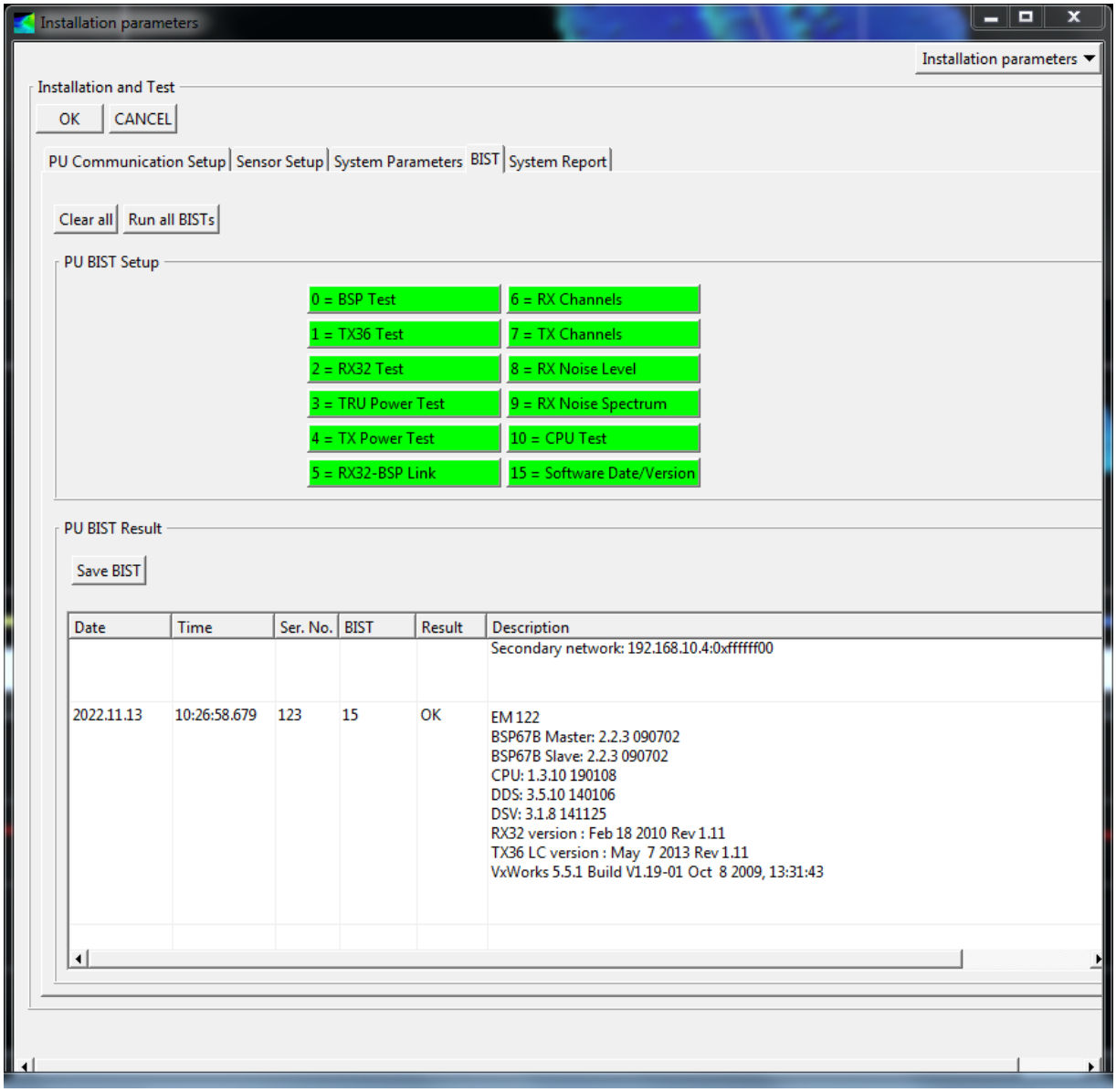


Figure 76 - Successful BIST run on 13/11/2022

Table 21 - EM122 Event log

Date and time	Event	Comment	Lat. (D.mm)	Lon. (D.mm)	SOG (kn)	COG (°)	Heading (°)	Multibeam Depth (m)
13/11/2022 09:24	New SV profile applied	CTD_001	-5.74506	-15.9784	0.1	125.7	118.4	3659.94
13/11/2022 09:37	Stopped logging	DY159 Survey	-5.74506	-15.9784	0.1	19.6	118.2	3657.79
13/11/2022 09:42	Stopped pinging	DY159 survey	-5.74506	-15.9784	0.1	151.7	118.4	3657.51
13/11/2022 09:54	Start pinging	DY159_Cal - First line to discard (0000)	-5.74505	-15.9784	0.4	340.7	118.3	3658.05
13/11/2022 10:00		log started	-5.74505	-15.9784	0.1	357.2	119.1	3658.18
13/11/2022 10:21	BIST test. Stopped logging	Run without errors	-5.74506	-15.9784	0.4	173.9	118.8	NaN
13/11/2022 11:22	Start logging	DY159_Cal - Heading to the potential feature for calibration	-5.74589	-15.9769	0.4	311.8	118.2	3661.74
13/11/2022 14:00	SIS crash	DY159_Cal	-5.54879	-16.1113	8	106.1	105.4	3857.2
13/11/2022 14:11	Start logging again	DY159_Cal	-5.55452	-16.0866	4.3	115.2	120.8	3869.98
13/11/2022 14:32	SIS crashed again	DY159_Cal	-5.55681	-16.0844	1.1	126.8	122.8	NaN
13/11/2022 15:18	Starting Patch test. Beam angle set as 45°	DY159_Cal - line 0007	-5.55495	-16.1026	6.1	170	159.6	3860.82
13/11/2022 15:57	Stopped logging	DY159_Cal - End of first line	-5.61634	-16.0805	5.9	160.4	153.2	3500.81
13/11/2022 16:14	Start line 2	DY159_Cal	-5.62703	-16.0767	7.1	339.5	343.5	3089.04
13/11/2022 16:58	End of second line. Stopped logging	DY159_Cal	-5.55741	-16.1021	5.4	343.6	350.3	3861.3
13/11/2022 18:45	Starting logging. 3rd line	DY159_Cal	-5.56106	-16.1331	6.1	160	154	3809.68
13/11/2022 19:28	End of third line for calibration	DY159_Cal	-5.62928	-16.1069	6.1	160.6	151.4	2982.24
13/11/2022 19:35	Start logging for potential new calibration lines overnight. Beam angles set to 60°	DY159_Cal	-5.64322	-16.1014	9	158.7	154.7	3081.02
14/11/2022 01:32	Start of latency calibration line (0019)	DY159_Cal	-5.59228	-16.1209	4.1	157.2	147.5	3794.48

14/11/2022 02:32	End of line of latency calibration	DY159_Cal	-5.62997	-16.1064	2.2	159.6	143.3	2947.34
14/11/2022 06:20	Changed parameters following calibration results	DY159_Cal	-5.74181	-15.9748	0.2	171.2	125.4	3662.03
14/11/2022 08:27	Stopped logging	DY159_Cal	-5.74594	-15.981	7.3	146.2	141.5	3654.63
14/11/2022 08:28	Start logging transit line	DY159 (changed survey again as it is transit data)	-5.7485	-15.9791	7.8	142.8	140.9	3688.46
16/11/2022 10:59	Possible seamount	DY159 - line 817	-9.29921	-12.7005	2.3	164.6	161.4	2296.37
16/11/2022 18:22	Starting new survey	DY159_YOS	-9.70827	-12.1511	0.3	3.7	122.3	2470.01
16/11/2022 18:23	Start logging	DY159_YOS	-9.70828	-12.1511	0.1	33.9	123.1	2470.58
16/11/2022 19:20	Changed SVP with CTD_002 data	DY159_YOS	-9.74643	-12.1831	6.1	217.6	220.8	2180.72
16/11/2022 23:11	Stopped for RMT and end of line	DY159_YOS	-9.75525	-12.0668	9.6	254.2	255	344.49
17/11/2022 00:11	Start RMT - line 0006	DY159_YOS RMT line	-9.79061	-12.1698	0.1	176.6	104.2	1060.89
17/11/2022 00:42	Changed swath angle to 60° due to poor data. Was 75°	DY159_YOS	-9.78847	-12.1603	2.1	68	76.2	962.46
17/11/2022 03:39	Line 0010 - changed line count as leaving Young Seamount	DY159_YOS	-9.77685	-12.1157	1.3	171.6	179.3	466.68
17/11/2022 05:03	Change line count to 0012 as moving with RMT	DY159_YOS	-9.81113	-12.1182	1.8	114.8	116.9	1792.52
17/11/2022 18:08	Line 0029 - Leaving Young Seamount	DY159_YOS	-9.70263	-12.1552	0.5	136.5	161.3	2651.65
17/11/2022 22:55	Line 030 - Transit to the seamount	DY159_YOS	-9.70099	-12.2363	9.5	268.1	264	3219.72
18/11/2022 02:38	Stopped logging	DY159_YOS	-9.74621	-12.799	0.5	253.5	128.1	313.52
18/11/2022 02:40	Create new survey - Grattan Seamount	DY159_GRS	-9.74636	-12.7991	0.2	117.2	118.3	NaN
18/11/2022 02:41	Start logging	DY159_GRS	-9.74637	-12.7991	0.3	321	120.1	309.96
19/11/2022 09:20	Stopped pinging/logging for acoustic test	DY159_GRS	-9.82007	-12.7624	0.1	293.3	139.5	1843.78

19/11/2022 09:26	Started pinging again	DY159_GRS not logging as vessel stationary	-9.82007	-12.7624	0.1	280.6	139.7	1842.18
19/11/2022 09:45	Starting logging	DY159_GRS	-9.81929	-12.7611	4.2	356.2	358.8	1817.21
19/11/2022 12:05	Changed SVP profile. CTD_005	DY159_GRS	-9.4488	-12.7856	9.7	354.2	355.4	2830.49
19/11/2022 13:07	SIS crashed	DY159_GRS	-9.28287	-12.8043	9.7	354.5	357.9	NaN
19/11/2022 13:09	Started logging again	DY159_GRS	-9.27711	-12.8051	10.2	350.4	354.2	3234.1
19/11/2022 14:28	Increased swath angle to 75°	DY159_GRS	-9.0593	-12.8146	10	0.8	2.8	3008.4
19/11/2022 14:42	Reducing beam angles to 60°	DY159_GRS	-9.02088	-12.8137	8	7.6	6.1	2897.37
19/11/2022 15:06	Started new survey	DY159_SEA	-8.98149	-12.8177	3.9	284.5	272.6	2792.46
19/11/2022 16:04	Starting line for survey. Line 0001	DY159_SEA	-8.99279	-12.8144	5.6	85.7	94.1	2833.96
19/11/2022 18:04	Stopping for the BRUVS - end of first part of the survey - line 0003	DY159_SEA	-8.94076	-12.8194	6.8	269.1	271.3	2682.54
19/11/2022 19:26	Leaving BRUVS site (BRUVS recovered)	DY159_SEA	-8.97739	-12.832	4.7	26.8	31.7	2890.48
19/11/2022 19:57	Starting line for survey - line 0005	DY159_SEA	-8.92431	-12.8038	6.8	2.6	5.3	2304.69
19/11/2022 20:32	Increasing swath angle to 65°	DY159_SEA	-8.85743	-12.8025	7.3	357.9	358.5	2062.12
19/11/2022 20:34	Decreasing swath angle to improve data quality	DY159_SEA	-8.85248	-12.8026	7.4	2	2.6	2062.35
19/11/2022 20:50	Increase swath angle to 65°	DY159_SEA	-8.81997	-12.8027	7.5	357.4	0.8	2021.76
19/11/2022 20:55	Decreased swath angle to 60°	DY159_SEA	-8.80915	-12.8028	7.4	358.3	1	2033.12
19/11/2022 21:16	Starting turning for new line. End of line (0006). New line 0007	DY159_SEA	-8.76845	-12.8028	7.2	2.4	3.6	2464.89
19/11/2022 21:53	Changed line count as finished the turn to the new line. New line 0008	DY159_SEA	-8.77626	-12.8566	6.8	180.4	179	2289.77
19/11/2022 23:15	Starting turn for new line	DY159_SEA	-8.94076	-12.8586	7	221.8	224.1	2747.16
20/11/2022 11:28	Changed SVP profile to CTD_006. Line 0021	DY159_SEA	-9.05667	-12.6899	0.1	277.1	134.1	3245.45
20/11/2022 17:16	Stopped pinging	DY159_SEA	-9.04086	-12.6832	0	208.3	133.5	3277.64
20/11/2022 17:58	Start logging again. Looking for BRUVS	DY159_SEA	-9.05948	-12.7048	4.5	257.6	250.9	3163.07
21/11/2022 08:41	SIS crash	DY159_SEA	-8.2533	-13.3994	10	321.6	323.1	3191.48

21/11/2022 08:45	Start of specific survey around the vent	DY159_SEA	-8.24463	-13.4066	9.8	319.8	322.9	3468.96
21/11/2022 08:53	Changed swath angle to 75° to find the vent	DY159_SEA	-8.22752	-13.4209	9.9	319.9	322.8	3646.22
21/11/2022 09:33	Vent survey from line 0044	DY159_SEA	-8.14378	-13.4904	9.8	318.5	323.1	2866.29
21/11/2022 09:55	Changed swath angle to 60° due to poor data	DY159_SEA	-8.13978	-13.5383	10	217.3	217.8	2344.81
21/11/2022 11:23	Dark spots on the backscatter	DY159_SEA	-8.14818	-13.4462	6.7	1.1	5.1	3355.23
21/11/2022 18:28	End of specific survey around the vent	DY159_SEA	-7.92624	-13.5517	0	205.5	136.5	1438.7
23/11/2022 08:57	The TX power level was increased to -10 (was -20 - changed while in Ascension) to improve quality of the data	DY159_SEA	-9.5035	-12.5518	9	129.8	129.8	3006.18
23/11/2022 16:42	Stopped survey DY159_SEA as leaving Ascension EEZ. SVP: CTD_006	DY159	-10.2301	-11.5885	9.2	122.1	123.5	3150.76
25/11/2022 03:12	Created new survey for survey over seamount at entrance of St-Helena EEZ. CTD_002 used as SVP.	DY159_NWS	-13.6876	-7.69154	8.2	123.3	122.4	3904.78
25/11/2022 06:01	Increased swath angle to 75°	DY159_NWS	-13.7805	-7.48589	6.8	297.8	301	846.42
25/11/2022 08:44	Changed line count as deploying BRUVS	DY159_NWS	-13.7721	-7.51708	1.2	119.7	109.2	740.25
25/11/2022 12:15	Changed SVP profile. CTD_009	DY159_NWS	-13.7549	-7.55211	9.1	330.2	334.1	1427.56
25/11/2022 12:35	Reduced swath angle to 65°	DY159_NWS	-13.7123	-7.57603	7.8	340.8	348.1	2734.39
25/11/2022 12:49	Reduced swath angle to 60°	DY159_NWS	-13.7157	-7.55538	7	120.1	119.5	2410.28
25/11/2022 15:15	End of the proper survey, turning to get to St-Helena. Continuing to record as the data will be used to map the edge of the seamount	DY159_NWS	-13.8693	-7.52255	6.3	185.9	178.6	2742.9

25/11/2022 15:47	Increased swath angle to 75° to get as much as the outer edges of the seamount as possible	DY159_NWS	-13.9132	-7.45879	9.2	118	122.2	3894.26
25/11/2022 19:00	Stopped logging under NWS survey	DY159_NWS	-14.258	-7.10585	8.7	139.3	139.9	NaN
25/11/2022 19:01	Started logging under DY159 survey	DY159	-14.2587	-7.10526	9	142.9	141	4270.19
26/11/2022 12:58	Reduced power for EK80 calibration. -20dB	DY159	-15.9124	-5.72241	0.2	256.1	129.3	NaN
27/11/2022 17:40	Starting logging again	DY159	-16.1202	-5.72889	9	18.2	22.6	712.87
27/11/2022 19:30	81	Applies CTD_010 SVP	-16.0515	-5.69428	0.4	32.7	102.1	1167.89
30/11/2022 12:43	Started new survey. SVP: CTD_10	DY159_CAR	-13.137	-6.08205	10.2	350.2	354.1	NaN
30/11/2022 17:07	Changed SVP profile to CTD_12	DY159_CAR	-13.0448	-6.04128	9.2	287.5	290.1	585.2
30/11/2022 20:31	Increased swath angle to 75°	DY159_CAR	-12.7792	-6.05145	7.8	113.9	112.9	1293.34
01/12/2022 03:43	Start of specific survey NW area (Cardno seamount) - SVP: CTD_12	DY159_CAR (event 116)	-12.8208	-5.89146	9.3	359.9	7.1	2022.95
01/12/2022 07:28	End of specific bathymetric survey	DY159_CAR	-12.8303	-5.91518	8.9	195.3	195.2	1917.82
02/12/2022 10:14	SIS crashed	DY159_CAR	-12.9354	-5.82976	0.4	204.5	130.3	1272.69
03/12/2022 10:25	Stopped logging on DY159_CAR. Logging again in DY159 project	DY159	-13.3646	-5.72652	8.4	177.4	176.5	4173.69

6.4 Fisheries Acoustics – calibration and runtime parameters

EK80 calibration

The calibration was performed following the standard sphere method (Demer et al., 2015). A 38.1 mm diameter sphere made from tungsten carbide with 6 % cobalt binder material (WC) is used as a reference target. It was positioned between 15 to 25 m from the transducers and moved systematically throughout the acoustic beams to measure and adjust the on-axis system gains.

Calibration was carried out in St. Helena 0.5 nm off the north-west coast of the island at 50 m depth. A CTD cast was performed before the start of the calibration and values inputted into the EK80 software. The absence of currents and wind allowed us to easily move the sphere within the beam. A list of the calibration parameters is shown in Table 22 & Table 23.

Issues

The calibration sphere was not visible in the beam when the survey team started the calibration of the wideband settings even though was at the right location and detected on the single target view. After the ramping settings were changed from “slow” to “fast” the survey team were able to detect the sphere and continue with the calibration. This issue needs to be investigated further to understand if the calibration parameters obtained using the “fast ramping” settings can be applied to the “slow ramping” mode (settings used during the survey).

Table 22 - Calibration settings and parameters used for the baitfish survey and acoustics transects at the seamounts and abyssal sites. *Drop-keel down.

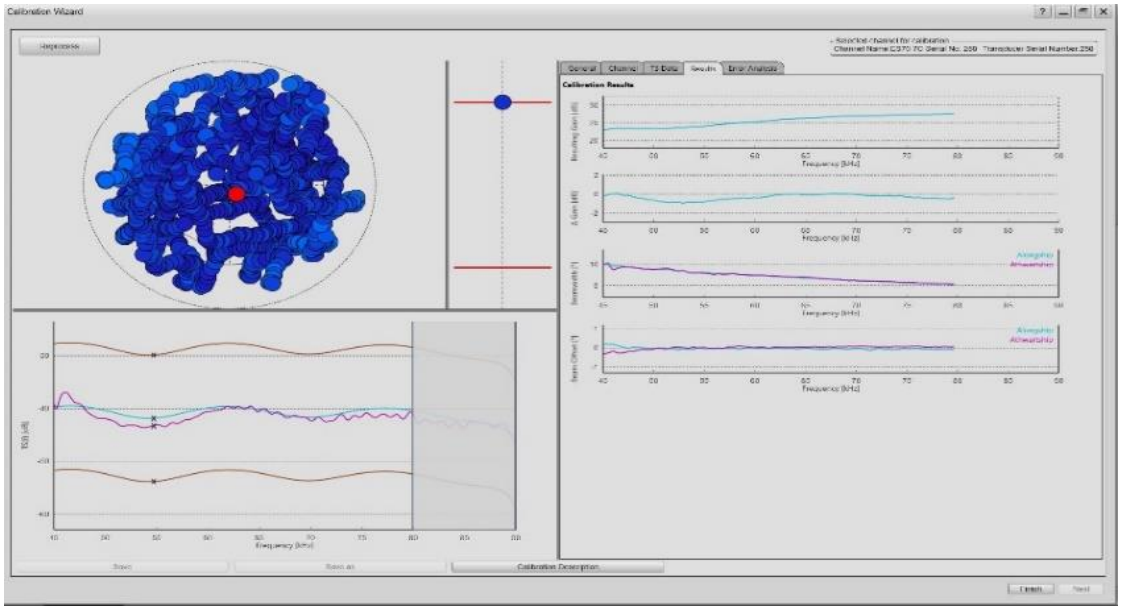
Variable	18 kHz	38 kHz	70 kHz	120 kHz	200 kHz	333 kHz
Transducer type	ES18-11	ES38B	ES70-7C	ES120-7C	ES200-7C	ES333-7C
Transducer Serial No.	2111	350	258	890	533	125
Transducer depth (m)	6.6 (9.9)*	6.6 (9.9)*	6.6 (9.9)*	6.6 (9.9)*	6.6 (9.9)*	6.6 (9.9)*
Transducer power (W)	1400	2000	750	250	150	50
Pulse length (us)	1024	1024	1024	1024	1024	1024
Pulse type	CW (narrowband)	CW (narrowband)	CW (narrowband)	CW (narrowband)	CW (narrowband)	CW (narrowband)
2-way beam angle (dB)	-17	-20.7	-20.7	-20.7	-20.7	-

Transducer gain (dB)	22.08	26.18	27.36	26.23	26.67	-
Sa correction (dB)	-0.65	-0.0110	-0.086	-0.0774	-0.1562	-
3dB beam along (°)	10.1	6.85	6.54	7.04	6.53	-
3dB beam athwart (°)	10.16	6.69	6.67	7.09	6.48	-
Along offset (°)	-0.20	-0.02	-0.03	-0.16	-0.29	-
Athwart offset (°)	-0.11	-0.04	0	-0.08	0.15	-
RMS (Root Mean Square error)	0.1233	0.107	0.128	0.128	0.1764	-
Ramping	Fast	Fast	Fast	Fast	Fast	fast
Sound velocity (m/s)	1528.14	1528.14	1528.14	1528.14	1528.14	1528.14
Absorption coefficient	0.001942	0.007694	0.021059	0.054138	0.086353	0.1192
Comments					Very noisy below 50 meters potentially from electrical sources	Not calibrated

Table 23 - Calibration settings and parameters used at the BRUVS deployment locations. *Drop-keel down.

Variable	18 kHz	38 kHz	70 kHz	120 kHz	200 kHz	333 kHz
Transducer type	ES18-11	ES38-7	ES70-7C	ES120-7C	ES200-7C	ES333-7C
Transducer Serial No.	2111	350	258	890	533	125
Transducer depth (m)	6.6 (9.9)*	6.6 (9.9)*	6.6 (9.9)*	6.6 (9.9)*	6.6 (9.9)*	6.6 (9.9)*
Transducer power (W)	1400	2000	750	250	150	50
Pulse length (us)	512	512	2048	2048	2048	1024
Pulse type	CW (narrowband)	CW (narrowband)	FM (wideband)	FM (wideband)	FM (wideband)	CW (narrowband)
2-way beam angle (dB)	-17.1	-20.7	-20.7	-20.7	-20.7	-20.7
Transducer gain (dB)	21.26	26.63	See fig. 12	See fig. 12	See fig. 12	-
Sa correction (dB)	-0.48	-0.37	See fig. 12	See fig. 12	See fig. 12	-
3dB beam along (°)	10.09	6.68	See fig. 12	See fig. 12	See fig. 12	-
3dB beam athwart (°)	10.18	6.68	See fig. 12	See fig. 12	See fig. 12	-
Along offset (°)	-0.22	0	See fig. 12	See fig. 12	See fig. 12	-
Athwart offset (°)	-0.18	-0.02	See fig. 12	See fig. 12	See fig. 12	-

RMS (Root Mean Square error)	0.0679	0.0691	See fig. 12	See fig. 12	See fig. 12	-
Ramping	Fast	Fast	Slow (fast for calibration)	Slow (fast for calibration)	Slow (fast for calibration)	Fast
Sound velocity (m/s)	1528.14	1528.14	1528.14	1528.14	1528.14	1528.14
Absorption coefficient	0.001942	0.007694	0.021059	0.054138	0.086353	0.1192
Comments					Very noisy below 50 meters potentially from electrical sources	Not calibrated



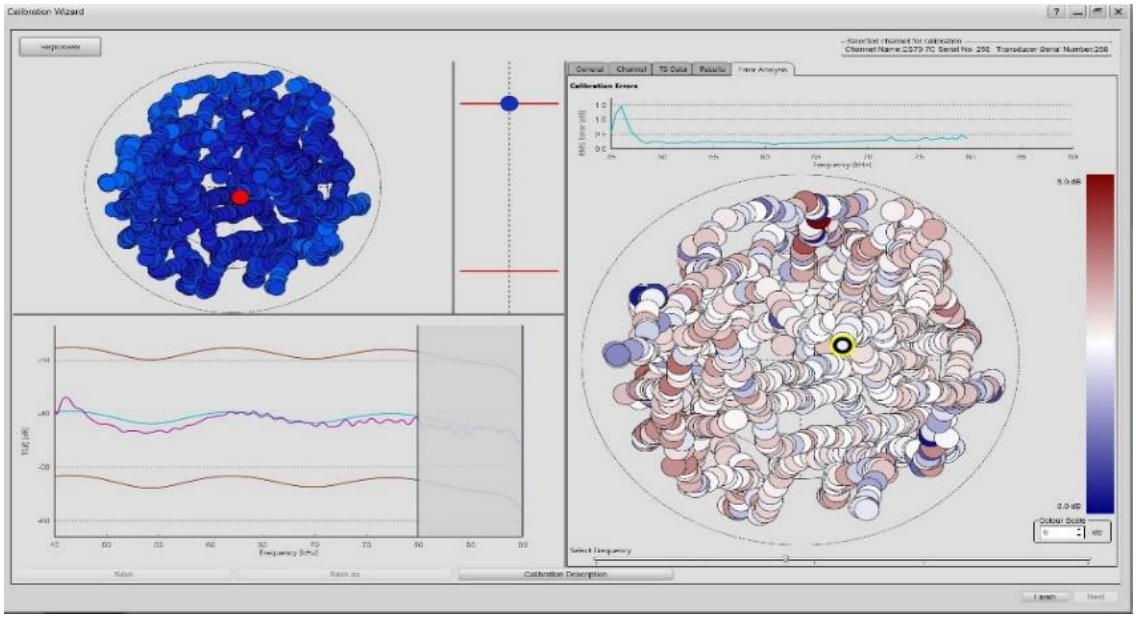
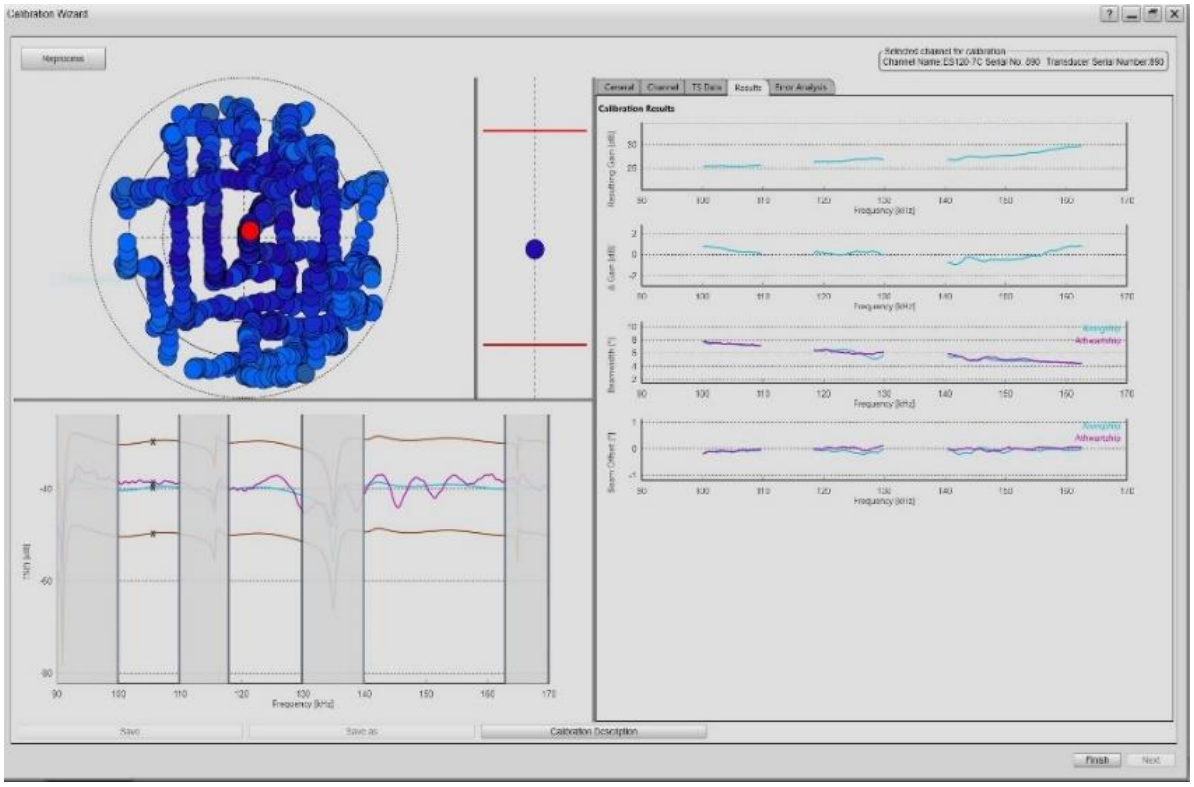


Figure 77 - Wideband calibration results for the 70 kHz frequency



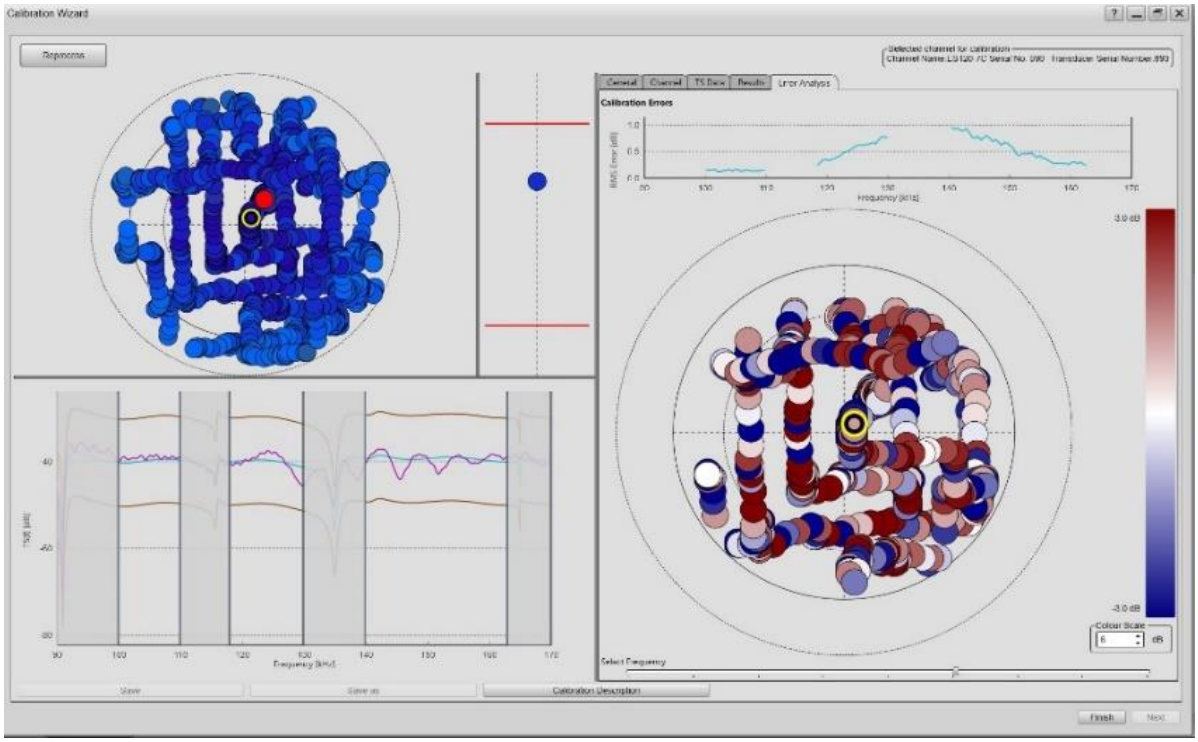


Figure 78 - Wideband calibration results for the 120 kHz frequency

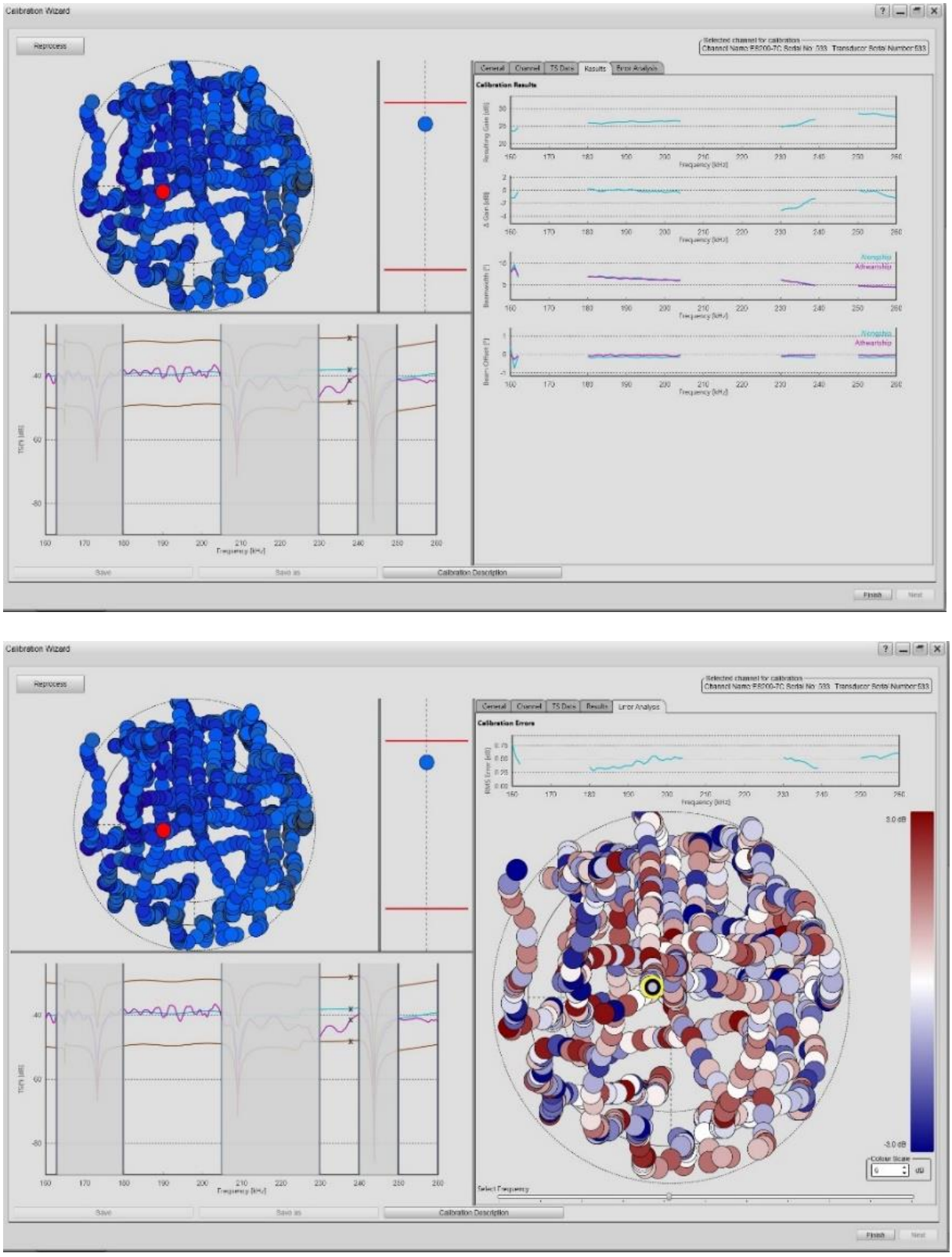


Figure 79 - Wideband calibration results for the 200 kHz frequency.

6.5 CTD Instrumentation Report

CTD Cast Summary

Total number of casts: 14
Casts around Ascension: 8
Casts around St. Helena: 6
Number of casts <500m: 5
Number casts >500m: 9
Deepest cast: 3647m
CTD Technicians: Paul Henderson / Daniel Comben

CTD Wires

CDT Wire 2 was used for all deployments. The wire was both electrically and mechanically terminated at the start of DY159 and load tested to two tonnes. Resistance and insulation of the cable were checked periodically. The torque setting on the fasteners of the mechanical termination were periodically checked throughout and no slippage was noted. The termination was left on the wire at the end of the cruise for use on DY158.

> CTD Wire 2 before cast 001 readings:
> Resistance 74.6 Ohms Insulation >550 MOhms @500 VDC
> CTD Wire 2 readings after cast 014:
> Resistance 75.1 Ohms Insulation >550 MOhms @500 VDC
> CTD Wire 1 was due to be streamed on passage between Southampton and Cape Verde – this did not happen to lack of time.

S&M sensor set-up

CTD frame was set-up for DY159 with primary conductivity, temperature, and dissolved oxygen sensors on the 9plus and secondary conductivity, temperature and dissolved oxygen sensors on the vane. Other sensors on the frame were, altimeter, fluorometer, transmissometer, backscatter and 2 x PAR. Full sensor information can be found in section CTD Sensor Information. All sensors functioned well without any problems. No sensors were swapped out during the cruise. PAR sensors were removed for casts deeper than 500m due to the rating of their pressure housing.

Water Samplers

OTE 20L Water Samplers were used on the SS frame and performed well throughout the cruise with no bottles miss-firing. Bottle 21's large tap was replaced prior to cast 005. A number of the water samplers' taps had their O-rings replaced over the cruise.

USBL Beacons

Two USBL beacons were tested on the CTD frame: 2406 & 2797 for SSS. Both beacons worked well, and depths read within 2m of the CTD depths and each other most of the time. Beacons were attached to outside of CTD frame with jubilee clips.

6.5.1 SeaSave

CTD cast data was recorded using SBE Seasave V7.26.7.121.

6.5.2 SBE Data Processing

Basic post-processing of the CTD cast data was carried out following guidelines established with BODC (ref. Moncoiffe 7th July 2010).

The casts were processed using SBE Data Processing, V7.26.7. The following modules were used to process the data:

- Data Conversion
- Bottle Summery
- Align CTD
- CellTM
- Derive
- Bin Average
- Strip

Any CTD casts where PAR sensors were used have _PAR appended to the processed file names.

Sounds velocity profiles were produced after every cast using the following modules:

- Data Conversion
- Bin Average
- ASCII Out

Sound velocity was calculated using the Millero and Chen method and bin averaged to 1m for casts <500m and 10m for casts >500m.

6.5.3 Autosal

A Guildline Autosal 8400B salinometer, S/N: 71185, was used for salinity measurements. The salinometer was located in the Salinometer laboratory. Bath temperature was set at 21°C with the ambient room temperature being approximately 18.0-18.5°C. The salinometer was standardised before the first set of samples. Once standardised the Autosal was not adjusted for the duration of the cruise. A standard was analysed before and after each crate of samples to monitor & record drift. Standards were recorded in the spreadsheets as '0'. Standard deviation was set to 0.0002.

Standards used:

IAPSO Standard Seawater
Batch: P165
Expiry: 15th April 2024
K15 = 0.99986
Practical Salinity = 34.994

A program written in Labview called "Autosal" was used to record data for salinity values. Four salinity samples were taken and analysed from all casts and the results tabulated with CTD salinity data in spreadsheet DY159_Sanlinity.csv.

Guildline Autosal 8400B salinometer 68958 was set-up as a spare instrument.

6.5.4 CTD UPS

The Eaton 9130 UPS S/N GJ513A0435 for the CTD primary computer (SBE CTD Topside Rack 1A) was replaced, following issues, with S/N GJ513A0441 from the CTD secondary computer (SBE CTD Topside Rack 1B). Secondary CTD computer is currently running without a UPS.

On 18th December the UPS alarmed with the error: 'Alarm #191 Battery (open cell voltage)'. The UPS was shut down, but no fault could be found and it was restarted without problems. On 20th Dec the UPS alarmed with the error: 'Alarm # 68 Battery DC over voltage'. The UPS was shut down but no faults could be found. Battery voltage for the UPS was 55.01V with individual batteries between 13.75 and 13.78V. The UPS was not used again after this.

6.5.5 Autosal Computer

Autosal PC 1A stopped working on the 8th of December due to a suspected failure with the PC power supply. This will need replaced/repaired back at NOC. This caused the Powertecnique UPS to cut out (‘error 06’) shutting down the Autosals and other PC. UPS restarted without any problems and Autosal water baths were left to stabilise at 21°C before use.

6.5.6 Scanfish Winch

The new junction box on the winch drum, that was replaced prior to DY143, was catching on the base plate of the winch when rotating. This was moved temporary but will need a more permanent/watertight replacement back at NOC.

Electrical termination was removed after sustaining mild damage and will need replaced prior to use.

The winch was only used as a ‘dumb winch’ throughout the DY159.

6.5.7 CTD Training

Daniel Comben - refresher training on the CTD before carrying out any CTDs on his watch independently.

Emmy McGarry - basic training in CTD operations and data processing.

6.5.8 DY159 CTD Log

Table 24 – CTD deployment information

Cast Number	Station	Event	Julian Day	Date	Latitude	Longitude	Water Depth [uncorrected] (m)	Time in Water	Time at Bottom	Time on Deck	CTD Depth at Deepest Stop (m)	Altimeter at Deepest Stop (m)	Max Wire Out (m)	Comments
001	NWA	9	317	13/11/2022	5°44.703S	15°58.705W	3663	05:09:00	06:17:00	08:00:00	3647	11	3630	IXSEA acoustic released S/N 1469 & 2322 tested on CTD frame at 3000m
002	YOS	30	320	16/11/2022	9°42.497S	12°9.068W	2451	16:15:00	17:11:00	18:40:00	2489	11	2475	
003	YOS	37	321	17/11/2022	9°44.012S	12°5.638W	457	09:09:00	09:31:00	10:19:00	457	11		PAR sensors added
004	GRS	48	322	18/11/2022	9°44.436S	12°48.511W	110	09:00:00	09:08:00	09:41:00	102	10		Bottle 21 swapped out with spare due to broken tap
005	GRS	58	323	19/11/2022	9°49.500S	12°45.578W	1952	06:20:00	07:03:00	08:07:00	1942	10		PAR sensors removed. Bottle 21 returned to CTD with new tap
006	SEA	63	324	20/11/2022	9°3.401S	12°41.392W	3226	07:05:00	08:05:00	09:49:00	3240	10		
007	ARV	72	325	21/11/2022	8°3.624S	13°26.087W	3605	13:29:00	14:44:00	16:32:00	3615	9	3598	USBL 2406 on frame
008	ARF	73	325	21/11/2022	7°55.575S	13°33.104W	1432	18:12:00	18:47:00	19:43:00	1438	10	1431	USBL 2406 & 2707 on frame

009	NWS	85	329	25/11/2022	13°46.592S	7°30.315W	728	09:35:00	09:59:00	10:43:00	724	9	720	
010	SHI	94	331	27/11/2022	15°55.830S	5°45.643W	461	08:22:00	08:42:00	09:21:00	447	7	445	PAR sensors added
011	SHI	103	332	28/11/2022	16°5.722S	5°43.771W	453	17:18:00	17:37:00	18:19:00	472	11	470	
012	CAR	112	334	30/11/2022	13°2.254S	6°2.209W	551	14:51:00	15:13:00	15:57:00	542	8	540	PAR sensors removed
013	CAR	119	335	01/12/2022	12°58.489S	6°2.059W	168	16:06:00	16:17:00	16:53:00	160	7	157	PAR sensors added
014	SC	124	336	02/12/2022	12°56.123S	5°49.785W	1268	09:47:00	10:28:00	11:32:00	1317	12	1310	PAR sensors removed

6.5.9 CTD Sensor Information

SHIP: RRS *DISCOVERY*	CRUISE: DY159

FORWARDING INSTRUCTIONS / ADDITIONAL INFORMATION: **Main Stainless Steel 24-way CTD frame on board for DY159 (Blue Belt)**

Checked By: Paul Henderson	DATE: 03 December 2022

Instrument / Sensor	Manufacturer/ Model	Serial Number	Channel	Casts Used
Primary CTD deck unit	SBE 11plus	11P-24680-0588	N/A	All casts
CTD Underwater Unit	SBE 9plus	09P-77801-1182	N/A	All casts
Stainless steel 24-way frame	NOCS	CTD-6	N/A	All casts
Primary Temperature Sensor	SBE 3P	03P-4381	F0	All casts
Primary Conductivity Sensor	SBE 4C	04C-3873	F1	All casts
Digiquartz Pressure sensor	Paroscientific	129735	F2	All casts
Secondary Temperature Sensor	SBE 3P	03P-4383	F3	All casts
Secondary Conductivity Sensor	SBE 4C	04C-4143	F4	All casts
Primary Pump	SBE 5T	05T-3085	N/A	All casts
Secondary Pump	SBE 5T	05T-3607	N/A	All casts
24-way Carousel	SBE 32	32-1376	N/A	All casts
Primary Dissolved Oxygen Sensor	SBE 43	43-1624	V0	All casts
Secondary Dissolved Oxygen Sensor	SBE 43	43-3847	V1	All casts
Fluorometer	CTG Aquatracka MKIII	88-2960-163	V2	All casts
Transmissometer	WETLabs C-Star	CST-1719	V3	All casts
Altimeter	Valeport VA500	81629	V4	All casts
Light Scattering Sensor	WETLabs BBRTD	BBRTD-168	V5	All casts
PAR Up-looking DWIRR	CTG Par	PAR-04	V6	All casts <500m
PAR Down-looking UWIRR	CTG Par	PAR-09	V7	All casts <500m
20L Water Samplers	OTE	Bottles 1-24	N/A	All casts
CTD Swivel	MDS	1246-2	N/A	All casts

6.5.10 CTD Instrument Configurations

Date: 12/03/2022

Instrument configuration file: C:\Users\sandm\Documents\Cruises\DY159\Data\Seasave Setup Files\DY159_SS_1182_nmea.xmlcon

Configuration report for SBE 911plus/ 917plus CTD

Frequency channels suppressed: 0

Voltage words suppressed:	0
Computer interface:	RS-232C
Deck unit:	SBE11plus Firmware Version >= 5.0
Scans to average:	1
NMEA position data added:	Yes
NMEA depth data added:	No
NMEA time added:	Yes
NMEA device connected to:	PC
Surface PAR voltage added:	No
Scan time added:	Yes

1) Frequency 0, Temperature

Serial number:	03P-4381
Calibrated on:	11-August-2021
G:	4.42358835e-003
H:	6.44921520e-004
I:	2.26464950e-005
J:	1.96836584e-006
F0:	1000.000
Slope:	1.00000000
Offset:	0.0000

2) Frequency 1, Conductivity

Serial number:	04C-3873
Calibrated on:	18-August-2021
G:	-1.02114237e+001
H:	1.35957511e+000
I:	-1.44994712e-003
J:	1.74002759e-004
CTcor:	3.2500e-006
CPcor:	-9.57000000e-008
Slope:	1.00000000
Offset:	0.00000

3) Frequency 2, Pressure, Digiquartz with TC

Serial number:	129735
Calibrated on:	13-Nov-2020
C1:	-6.064446e+004
C2:	6.966022e-002
C3:	1.971200e-002
D1:	2.882500e-002
D2:	0.000000e+000
T1:	3.029594e+001
T2:	-6.713680e-005
T3:	4.165390e-006
T4:	0.000000e+000
T5:	0.000000e+000
Slope:	0.99986000
Offset:	-3.33660
AD590M:	1.279180e-002
AD590B:	-8.821250e+000

4) Frequency 3, Temperature, 2

Serial number:	03P-4383

Calibrated on:	14-August-2021
G:	4.39883014e-003
H:	6.55680856e-004
I:	2.43679732e-005
J:	2.03485058e-006
F0:	1000.000
Slope:	1.00000000
Offset:	0.0000

5) Frequency 4, Conductivity, 2

Serial number:	04C-4143
Calibrated on:	25-August-2021
G:	-9.80139768e+000
H:	1.32180863e+000
I:	4.06486066e-005
J:	6.55692892e-005
CTcor:	3.2500e-006
CPcor:	-9.57000000e-008
Slope:	1.00000000
Offset:	0.00000

6) A/D voltage 0, Oxygen, SBE 43

Serial number:	43-1624
Calibrated on:	06-January-2022
Equation:	Sea-Bird
Soc:	3.49900e-001
Offset:	-7.21400e-001
A:	-3.61040e-003
B:	1.53800e-004
C:	-2.58670e-006
E:	3.60000e-002
Tau20:	1.22000e+000
D1:	1.92634e-004
D2:	-4.64803e-002
H1:	-3.30000e-002
H2:	5.00000e+003
H3:	1.45000e+003

7) A/D voltage 1, Oxygen, SBE 43, 2

Serial number:	43-3847
Calibrated on:	17-May-2022
Equation:	Sea-Bird
Soc:	3.81200e-001
Offset:	-7.21300e-001
A:	-4.81590e-003
B:	2.03150e-004
C:	-3.02670e-006
E:	3.60000e-002
Tau20:	1.78000e+000
D1:	1.92634e-004
D2:	-4.64803e-002
H1:	-3.30000e-002
H2:	5.00000e+003
H3:	1.45000e+003

8) A/D voltage 2, Fluorometer, Chelsea Aqua 3

Serial number:	88-2960-163
Calibrated on:	20-April-2022
VB:	0.099110
V1:	1.905480
Vacetone:	0.471530
Scale factor:	1.000000
Slope:	1.000000
Offset:	0.000000

9) A/D voltage 3, Transmissometer, WET Labs C-Star

Serial number:	CST-1719TR
Calibrated on:	16-November-2022
M:	21.1810
B:	-0.0508
Path length:	25.000

10) A/D voltage 4, Altimeter

Serial number:	Valeport VA500 81629
Calibrated on:	N/A
Scale factor:	15.000
Offset:	0.000

11) A/D voltage 5, OBS, WET Labs, ECO-BB

Serial number:	BBRTD-168
Calibrated on:	14-April-2020
ScaleFactor:	0.003243
Dark output:	0.043000

12) A/D voltage 6, Free

Serial number:	04
Calibrated on:	3-September-2020
M:	0.51512300
B:	1.00565600
Calibration constant:	100000000000.00000000
Conversion units:	Watts/m^2
Multiplier:	0.99830000
Offset:	0.00000000

13) A/D voltage 7, Free

Serial number:	09
Calibrated on:	3-September-2020
M:	0.52185900
B:	1.00704200
Calibration constant:	100000000000.00000000
Conversion units:	Watts/m^2
Multiplier:	0.99880000
Offset:	0.00000000

Scan length: 45

6.6 Ship's Scientific Systems Report

6.6.1 Cruise overview

Ship Scientific Systems (SSS) is responsible for operating and managing the Ship's scientific information technology infrastructure, data acquisition, compilation and delivery, and the suite of ship-fitted instruments and sensors in support of the Marine Facilities Programme (MFP). All times in this report are in UTC.

6.6.2 Scientific computer systems

Underway data acquisition

Data from the suite of ship-fitted scientific instrumentation was aggregated onto a network drive on the ship's file server. This was available throughout the voyage in read-only mode to permit scientists to work with the data as it was acquired. A Public network folder was also available for scientists to share files.

A copy of these two drives are written to the end-of-cruise disks that are provided to the Principal Scientist. In this case, a second set of disks was provided to the deputy SIC, as data acquisition continued during transit to the disembarkation port.

The data acquisition systems used on this cruise are detailed in the table below. The data and data description documents are filed per system in the *Data* and *Documentation* directories respectively within Ship Systems folder on the cruise data disk.

Table 25 - Data acquisition systems used during DY159

Data acquisition system	*Usage*	*Data products*	*Directory system name*
Ifremer TechSAS	Continuous	NetCDF ASCII pseudo-NMEA	`/TechSAS/`
NMF RVDAS	Continuous	ASCII Raw NMEA	`/RVDAS/`
Kongsberg SIS (EM122)	Discrete	Kongsberg .all	`/Acoustics/EM-122/`
Kongsberg SIS (EM710)	Discrete	Kongsberg .all	`/Acoustics/EM-710/`
Kongsberg SBP	Unused	None	`/Acoustics/SBP-120/`
Kongsberg EA640	Discrete	None, redirected to Techsas/RVDAS RAM	`/Acoustics/EA-640/`
Kongsberg EK80	Discrete		`/Acoustics/EK-60/`

UHDAS (ADCPs)	Discrete	ASCII raw, RBIN, GBIN, CODAS files	/Acoustics/ADCP/
VMDAS (ADCPs)	Unused		/Acoustics/ADCP/
Sonardyne Ranger2	Discrete	None, redirected to Techsas/RVDAS RAM	/Acoustics/USBL/

Significant acquisition events and gaps

Data gaps in continuous ocean monitoring data (underway, multibeam and ADCP) were due to entry into non international waters or interference with other instruments.

6.6.3 Internet provision

Satellite communications were provided with both the VSat and Fleet Broadband systems.

While underway, the ship operated with bandwidth controls to prioritise business use.

6.6.4 Instrumentation

Origin (RRS Discovery)

All coordinates, unless otherwise specified, use the following convention: Central reference point (0,0,0) at Frame 44, centreline, main deck with sense (X+ fwd, Y+ stbd, Z+ down). This CRP is at (32.4m, 0m, -7.4m) with respect to the ship's absolute stern, centreline, baseline.

The ship's survey (Parker Maritime, 2013) defines two systems of reference point using two different central reference points (CRPs):

1. (0,0,0) at Frame 0 (aft-most frame, 6m forward from stern), centreline (centre of keel), baseline (ship's bottom-most longitudinal).
2. (0,0,0) at ship's centre of gravity (CG), Frame 44 (26.4m forward from Frame 0 at 0.6m framespacing), centreline (centre of keel), main deck (7.4m up from baseline).

The survey coordinate sense is X is positive forward, Y positive starboard, and Z positive down. The coordinate order in the survey is (Y,X,Z), but unless otherwise noted, all coordinates are given elsewhere as (X,Y,Z).

For all scientific purposes, unless otherwise stated, the coordinate system is referenced using the second system, with the CRP at the CG.

Multibeam

The Kongsberg axes reference conventions are (see Figure 80) as follows:

1. X positive forward,
2. Y positive starboard,
3. Z positive downward.

The rotational sense for the multibeam systems and Seapath is set to follow the convention of Applanix PosMV (the primary scientific position and attitude system), as per Figure 80.

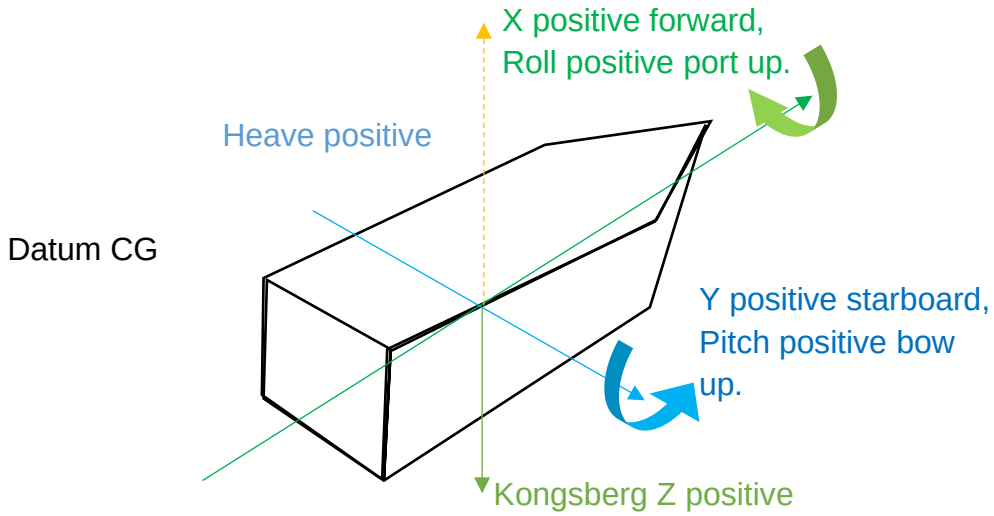


Figure 80 - Conventions used for position and attitude. On the Discovery, the Datum is the CRP at the CG

Primary scientific position and attitude system

The translations and rotations provided by this system (Applanix PosMV) have the following convention:

1. Roll positive port up,
2. Pitch positive bow up,
3. Heading true,
4. Heave positive up.

6.6.5 Position, attitude, and time

Table 26 – Ship's position instrumentation

System	**Navigation (Position, attitude, time)**		
Statement of Capability	*/Ship_Systems/Documentation/GPS_and_Attitude*		
Data product(s)	NetCDF: */Ship_Systems/Data/TechSAS/NetCDF/* Pseudo-NMEA: */Ship_Systems/Data/TechSAS/NMEA/* Raw NMEA: */Ship_Systems/Data/RVDAS/NMEA/*		
Data description	*/Ship_Systems/Documentation/TechSAS* */Ship_Systems/Documentation/RVDAS*		
Other documentation	*/Ship_Systems/Documentation/GPS_and_Attitude*		
Component	*Purpose*	*Outputs*	*Headline Specifications*
Applanix PosMV	Primary GPS and attitude.	Serial NMEA to acquisition systems, multibeam and ADCP.	Positional accuracy within 2 m.
Kongsberg Seapath 330	Secondary GPS and attitude.	Serial and UDP NMEA to acquisition systems and multibeam	Positional accuracy within 1 m.
Oceaneering CNav 3050	Correction service for primary and secondary GPS and dynamic positioning.	To primary and secondary GPS	Positional accuracy within 0.15 m.
Fugro Seastar / MarineStar	Correction service for primary and secondary GPS and dynamic positioning.	To primary and secondary GPS	Positional accuracy within 0.15 m.
Meinberg NTP Clock	Provide network time	NTP protocol over the local network.	

6.6.6 Ocean and atmosphere monitoring systems

Table 27 – Ship's underway data collection instrumentation (SURFMET)

System	**SURFMET (Surface water and atmospheric monitoring)**	
Statement of Capability	*/Ship_Systems/Documentation/Surfmet*	
Data product(s)	NetCDF: */Ship_Systems/Data/TechSAS/NetCDF/* Pseudo-NMEA: */Ship_Systems/Data/TechSAS/NMEA/* Raw NMEA: */Ship_Systems/Data/RVDAS/NMEA/*	
Data description	*/Ship_Systems/Documentation/TechSAS* */Ship_Systems/Documentation/RVDAS*	
Underway events and other documentation	*/Ship_Systems/Documentation/Surfmet*	
Calibration info	See Ship Fitted Sensor sheet for calibration info for each sensor.	
Component	*Purpose*	*Outputs*
Inlet temperature probe (SBE38)	Measure temperature of water at hull inlet	UDP NMEA to SBE45
Drop keel temperature probe (SBE38)	Measure temperature of water in drop keel space	UDP NMEA to Surfmet VM
Thermosalinograph (SBE45)	Measure temp, sal and conductivity at sampling board	Serial to Interface Box
Interface Box (SBE 90402)	Signals management	Serial to Moxa
Debubbler	Reduces bubbles through instruments.	None
Transmissometer (CST)	Measure of transmittance	Voltage output to Surfmet VM
Fluorometer (WS3S)	Measure of fluorescence	Voltage output to Surfmet VM
Air temperature and humidity probe (HMP155)	Temperature and humidity at met platform	Analogue to NUDAM
Ambient light sensors (PAR, TIR)	Ambient light at met platform	Analogue to NUDAM
Barometer (PTB210)	Atmospheric pressure at met platform	Analogue to NUDAM
Anemometer (Windsonic)	Wind speed and direction at met platform	Serial to Moxa
NUDAM	A/D converter	Serial NMEA to Moxa
Moxa	Serial to UDP converter	UDP NMEA to Surfmet VM
Surfmet Virtual Machine	Data management	UDP NMEA to TechSAS, RVDAS

The NMF Surfmet system was run throughout the cruise, excepting times for cleaning, entering and leaving port, and whilst alongside. Please see the separate information sheet for details of the sensors used and whether their recorded data have calibrations applied or not.

Surface water sampling board maintenance

The system was cleaned prior to the cruise, and on 16th, and 26th November when it was turned off for arrival into Ascension and St Helena respectively.

6.6.7 Wave radar

Table 28 – Wave Radar information

System	**WAMOS Wave Radar**	
Statement of Capability	*/Ship_Systems/Documentation/Wamos*	
Data product(s)	NetCDF: */Ship_Systems/Data/TechSAS/NetCDF/* Raw NMEA: */Ship_Systems/Data/RVDAS/NMEA/*	
Data description	*/Ship_Systems/Documentation/TechSAS* */Ship_Systems/Documentation/RVDAS*	
Other documentation	*/Ship_Systems/Documentation/Wamos*	
Component	*Purpose*	*Outputs*
Rutter OceanWaves WAMOS	Measure wave height, direction, period and spectra.	Summary statistics in NMEA to TechSAS and RVDAS. Spectra files.
Furuno Radar	Measures radar reflection on sea surface.	Radar data to WAMOS.

The wave radar magnetron requires annual replacement. Following replacement, WAMOS needs to collect wave data within 5 km of another wave height sensor over the full range of sea-states in order to derive wave height calibration coefficients for the new magnetron. This reference dataset can be derived by examining the ship's track for wave buoys and downloading their data.

6.6.8 Hydroacoustic systems

Table 29 – Acoustic systems

System	**Acoustics**
Statement of Capability	*/Ship_Systems/Documentation/Acoustics*
Data product(s)	Raw: */Ship_Systems/Data/Acoustics* NetCDF (EA640, EM122cb): */Ship_Systems/Data/TechSAS*

	NMEA (EA640, EM122cb): */Ship_Systems/Data/RVDAS*		
Data description	*/Ship_Systems/Documentation/Acoustics*		
Other documentation	*/Ship_Systems/Documentation/Acoustics*		
Component	*Purpose*	*Outputs*	*Operation*
10/12 kHz Single beam (Kongsberg EA-640)	Primary depth sounder	NMEA over serial, raw files	Discrete Free running
12 kHz Multibeam (Kongsberg EM-122)	Full-ocean-depth multibeam swath.	Binary swath, centre-beam NMEA, *.all files, optional water column data	Unused
70 kHz Multibeam (Kongsberg EM-710)	Coastal/shallow multibeam swath.	Binary swath, centre-beam NMEA, *.all files.	Discrete
Sub-bottom Profiler (Kongsberg SBP-120)	Multi-frequency echogram to provide along-track sub-bottom imagery.	BMP, raw files, optional water column data.	Discrete
Drop keel sound velocity sensor	Provide sound velocity at transducer depth	Value over serial to Kongsberg SIS.	Continuous
Sound velocity profilers (Valeport Midas, Lockheed XBT)	Direct measurement of sound velocity in water column.	ASCII pressure vs sound velocity files. Manually loaded into Kongsberg SIS or Sonardyne Ranger2.	Unused
75 kHz ADCP (Teledyne OS75)	Along-track ocean current profiler	(Via UHDAS)	Discrete Free running
150 kHz ADCP (Teledyne OS150)	Along-track ocean current profiler	(Via UHDAS)	Discrete Free running
USBL (Sonardyne Ranger2)	Underwater positioning system to track deployed packages or vehicles.	NMEA over serial	Discrete
CARIS	Post-processing	CARIS Project file.	Unused

		CARIS Vessel files	
MB-System	Post-processing	XYZ, SegY files	Unused

All data gaps were due to entry into non international waters for which diplomatic clearance was not sought.

Marine Mammal Protection

MMO surveys were performed before use of EM122 and SBP27 (**Error! Not a valid bookmark self-reference.**).

Table 30 – Marine mammal observations prior to and during acoustic survey

System	*Actions taken to protect mammals, in compliance with NERC and JNCC protocols*
12 kHz Multibeam (Kongsberg EM-122)	45-minute bridge observation. Marine mammal protection ramped start initiated at 30 minutes into observation if no mammals sighted. Clock restarted if mammals sighted.
Sub-bottom Profiler (Kongsberg SBP-27)	45-minute bridge observation. Marine mammal protection ramped start initiated at 30 minutes into observation if no mammals sighted. Clock restarted if mammals sighted.

6.6.9 Sound velocity profiles

Sound velocity profiles were derived from CTD or calculated from the WOA13 model using Ifremer DORIS.

6.6.10 Equipment-specific comments

Table 31 – ADCP instrument information

Attribute	*Value*
Acquisition software	UHDAS
Frequencies used	75 kHz, 150 kHz
Running mode	Free running (untriggered)
Configuration details	os150: Narrow band 40 bins, length 8m, 4m blanking. Performance from beam 4 is currently degraded so running a 3-beam solution. os75: narrow band, 60bins, length 16m, 8m blanking.

EM-122 Configuration and Surveys

Table 32 – EM122 Configuration: Calibration information (30/09/2020)

Item	*X (m, + Forward)*	*Y (m, + Starboard)*	*Z (m, + Down)*
Tx transducer	39.910	0.885	7.426
Rx transducer	35.219	-0.005	7.438
Att 1 (Applanix)	0.00	0.00	0.00
Att 2 (Seapath)	0.00	0.00	0.00
Waterline (distance from Att 1 to W/L)			1.34

Item	*Roll (°)*	*Pitch (°)*	*Yaw (°)*
Tx transducer	0.07	0.15	0.05
Rx transducer	0.05	0.37	359.98
Att 1 (Applanix)	-0.10	0.00	-0.85
Att 2 (Seapath)	0.00	0.00	0.00

6.6.11 Other systems

Cable Logging and Monitoring

Winch activity is monitored and logged using the CLAM system.

6.7 Daily Progress Reports

Daily progress reports included for period of charter, plus any significant events during transit either side. Other reports available for days between UK and Cape Verde but not recorded after 2022-12-04.

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Master | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: masterdy@noc.ac.uk
Daily Progress Report No. 7 01/11/2022	Location at 08:00 (02/11/2022) Transit to Cape Verde: 32˚22.8N 014˚20.7W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	3
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
08:00	11:00	Deployment test - Camera	Test deployment of the STR Camera system. Deployed to 2,000m. All checks completed and system is working (apart from IP camera).
14:30	17:00	Comms test - Autonaut	Test Autonaut onshore comms is working via iridium/satellite link.
09:00	17:30	Preparations	Continue to set up survey equipment, laboratories, systems and data management processes aboard.

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 02/11/2022	12	NE	F3	1021.5

Progress

Gear	Today	Accum.	Remarks
MBES	1	5	MBES underway data collection (days)

Weather forecast for the next 24 hours:

Gentle seas with slight swell. Fine and clear. Temperature 20-21˚C.

DAILY LOG
STATUS REPORT

Planned operation for the next 24 hours:

Continue to set up survey equipment, laboratories, systems and data management processes aboard. Demonstration of BRUVs to vessel crew. Additional Autonaut iridium/satellite communications check with onshore team.

Agreed Changes to Scope/Survey operation priorities

Retrieval of Met Office weather buoy Carmen (currently drifting within our transit route to Cape Verde) under review due to potential impact on ETA.
Request for 3rd engine has been raised as Cape Verde ETA is expected on 06/11/2022.

Comments:

The STR cameras has a couple of issues to resolve:

- the IP camera, it is not communicating with the systems software
- one of the power supply units (PU A) has a safety warning – 046vac and constant alarm

Requirement for new items to be shipped to Cape Verde to replace IP camera and repair power supply unit.

Autonaut Jura:

- Potential software update required for onshore comms to fully work with all onshore teams.

Further tests expected 02/11/2022.

Images from the STR Camera deployment test:

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Master | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: masterdy@noc.ac.uk
Daily Progress Report No. 10 04/11/2022	Location at 08:00 (05/11/2022) Transit to Cape Verde: 20˚54.6N 022˚05.0W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	3
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
08:30	09:00	Carmen buoy	Discussions with Captain and deck crew regarding NIOZ Carmen Buoy recovery procedures.
12:00	-	Transit	Down to 2 engines after 24hrs running.
16:00	17:00	Spotter Buoy	Preparations for the first spotter buoy deployment at 23˚N
09:00	17:30	Preparations	Continue to set up survey equipment, laboratories, systems and data management processes aboard.

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 05/11/2022	12	NE	F4/5	1014.3

Progress

Gear	Today	Accum.	Remarks
MBES	1	8	MBES underway data collection (days)
SB	1	1	Spotter Buoy deployments start at each degree of latitude from 23N as vessel transits south

Weather forecast for the next 24 hours:

Gentle occasionally moderate seas with slight/low swell. Fine and clear. Temperature 23-26˚C.

DAILY LOG
STATUS REPORT

Planned operation for the next 24 hours:

Continue to set up survey equipment, laboratories, systems and data management processes aboard. Recovery of Carmen Buoy. Spotter Buoy deployments continue.

Agreed Changes to Scope/Survey operation priorities

Retrieval of Met Office (NIOZ) Carmen weather buoy (currently drifting within our transit route to Cape Verde) has been agreed and will be attempted tomorrow (05/11/2022).
Bunkering at Cape Verde booked in from 18:00 on 06/11/2022.

Comments:

The STR cameras has a couple of issues to resolve:

- the IP camera, it is not communicating with the systems software
- one of the power supply units (PU A) has a safety warning – 046vac and constant alarm

Items currently in Cape Verde.

Spotter buoy deployment:

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Master | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: masterdy@noc.ac.uk
Daily Progress Report No. 11 05/11/2022	Location at 08:00 (06/11/2022) Transit to Cape Verde: 17˚46.3N 024˚20.7W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	3
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
11:00	15:00	Carmen buoy	NIOZ Carmen Buoy recovery
09:00	17:30	Preparations	Continue to set up survey equipment, laboratories, systems and data management processes aboard.

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 06/11/2022	8-10	NE	F4	1013.3

Progress

Gear	Today	Accum.	Remarks
MBES	1	9	MBES underway data collection (days)
SB	2	3	Spotter Buoy deployments start at each degree of latitude from 23N as vessel transits south (avoiding EEZs)

Weather forecast for the next 24 hours:

Slight seas with low swell. Sunshine and scattered cloud with sand haze. Temperature 24-26˚C.

DAILY LOG
STATUS REPORT

Planned operation for the next 24 hours:

Continue to set up survey equipment, laboratories, systems and data management processes aboard. Arrival at Cape Verde. Removal of Nioz Carmen Buoy from the vessel. Embarkment of the rest of the Scientific personnel.

Agreed Changes to Scope/Survey operation priorities

Bunkering at Cape Verde booked in from 18:00 on 06/11/2022.

Comments:

The STR cameras has a couple of issues to resolve:

- the IP camera, it is not communicating with the systems software
- one of the power supply units (PU A) has a safety warning – 046vac and constant alarm

Items currently in Cape Verde.

Carmen buoy recovery:

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Master | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: masterdy@noc.ac.uk
Daily Progress Report No. 12 06/11/2022	Location at 08:00 (07/11/2022) Transit to Ascension 15˚45.8N 024˚28.8W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	1	3
Additional comments:	Vessel induction for Cape Verde joining Scientists at 18:45 led by NMF representative (Graham Bullimore)	

Summary of operations 0000-2400 (UTC-1):

Start	End	Type	Comments
01:00	-	Clocks	Ships clocks retard 1 hour to UTC-1.
09:00	17:30	Preparations	Continue to set up survey equipment, laboratories, systems and data management processes aboard.
09:00	09:15	Training	Respect at sea training video for Cefas Scientists currently onboard.
10:50	-	Marine Mammals	6 dolphins at the Bow of the ship.
15:00	16:00	Arrive at Cape Verde	Pilot onboard, all lines secure, finished with engines.
16:25	17:40	Supplies	Loading fresh water.
17:00	-	Carmen Buoy	NIOZ Carmen buoy off loaded from the vessel.
17:15	-	Onboarding	Scientists from Cape Verde board.
18:40	23:45	Bunkering	Bunkering from barge alongside.

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 07/11/2022	8	NE	F4	1012.8

DAILY LOG
STATUS REPORT

Progress

Gear	Today	Accum.	Remarks
MBES	1	10	MBES underway data collection (days)
SB	0	3	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)

Weather forecast for the next 24 hours:

Slight seas with low swell. Sunshine and scattered cloud with haze. Temperature 26˚C.

Planned operation for the next 24 hours:

Continue to set up survey equipment, laboratories, systems and data management processes aboard. Leave Cape Verde and start transit to Ascension. Scientific crew to remain in cabins for 48hrs unless for meal times and comfort breaks.

Agreed Changes to Scope/Survey operation priorities

Comments:

The STR cameras has a couple of issues to resolve:

- the IP camera, it is not communicating with the systems software
- one of the power supply units (PU A) has a safety warning – 046vac and constant alarm

Items are on now on board to resolve the camera issues.

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 13 07/11/2022	Location at 08:00 (08/11/2022) Transit to Ascension 11˚47.9N 022˚38.8W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	1	4
Additional comments:	Vessel safety muster drill for all crew and scientists at 16:00	

Summary of operations 0000-2400 (UTC-1):

Start	End	Type	Comments
00:42	-	Leave Cape Verde	Vessel full away on passage on 3 engines.
09:00	17:30	Preparations	Continue to set up survey equipment, laboratories, systems and data management processes aboard. Including RMT8 net testing, load testing and cable terminations
09:00	11:30	STR Camera	Power unit and IP camera issues resolved
12:00	12:15	Training	Respect at sea training video for Cape Verde boarded Scientists.
15:30	-	Transit	3rd engine offline due to engine room temperatures.

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 08/11/2022	8-9	NE	F3	1012.4

Progress

Gear	Today	Accum.	Remarks
MBES	1	11	MBES underway data collection (days)
SB	0	3	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)

DAILY LOG
STATUS REPORT

Weather forecast for the next 24 hours:

Slight seas with low swell. Overcast. Temperature 28˚C.

Planned operation for the next 24 hours:

Continue to set up survey equipment, laboratories, systems and data management processes aboard. Transit to Ascension. Scientific crew to remain in cabins for 48hrs unless for meal times and comfort breaks.

Agreed Changes to Scope/Survey operation priorities

A review will be made as we approach Ascension of the timings to pick up Ascension Scientists from Island and the start location of the survey.

Comments:

The STR cameras issues have been resolved. We have two working Cefas STR systems.

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 14 08/11/2022	Location at 08:00 (09/11/2022) Transit to Ascension 08˚00.6N 021˚03.0W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	4
Additional comments:		

Summary of operations 0000-2400 (UTC-1):

Start	End	Type	Comments
09:00	17:30	Preparations	Continue to set up survey equipment, laboratories, systems and data management processes aboard.
" "	" "	" "	RMT8 net load testing and cable terminations completed and CTD cable termination started
17:30	-	Scientists	Scientists who boarded at Cape Verde released from 48hr isolation period.

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 09/11/2022	6-8	ENE	F2/3	1011.7

Progress

Gear	Today	Accum.	Remarks
MBES	1	12	MBES underway data collection (days)
SB	0	3	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)

Weather forecast for the next 24 hours:

Slight seas with low swell. Partly cloudy with haze. Temperature 28-29˚C.

DAILY LOG
STATUS REPORT

Planned operation for the next 24 hours:

Continue to set up survey equipment, laboratories, systems and data management processes aboard. Transit to Ascension. Scientists meeting to discuss survey plan at 10:00, prepare the BRUVS, RMT8 net deck test, prepare the cold lab.

Agreed Changes to Scope/Survey operation priorities

A review will be made as we approach Ascension of the timings to pick up Ascension Scientists from Island and the start location of the survey.

Comments:

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 15 09/11/2022	Location at 08:00 (10/11/2022) Transit to Ascension 04˚24.1N 019˚32.8W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	4
Additional comments:		

Summary of operations 0000-2400 (UTC-1):

Start	End	Type	Comments
09:00	17:30	Preparations	Continue to set up survey equipment, laboratories, systems and data management processes aboard.
" "	" "	" "	BRUV preparation and set up.
" "	" "	" "	STR camera laser calibration.
10:00	10:30	Meeting	Science meeting about survey plan and objectives
13:30	-	Gear test	RMT8 net deck testing.
14:00	-	Preparations	Temperature controlled lab set up.

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 10/11/2022	8	SE	F4	1011.0

Progress

Gear	Today	Accum.	Remarks
MBES	1	13	MBES underway data collection (days)
SB	1	4	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)

DAILY LOG
STATUS REPORT

Weather forecast for the next 24 hours:

Slight seas with low swell. Scattered cloud occasional rain showers. Temperature 26-27˚C.

Planned operation for the next 24 hours:

Continue to set up survey equipment, laboratories, systems and data management processes aboard. Transit to Ascension. Crew meeting to discuss survey plan at 16:00, CTD and RMT8 net wet tests.

Agreed Changes to Scope/Survey operation priorities

Currently the survey will start at the North-West abyssal site and then the Atlantic ridge flank before going to Ascension Island. Positive Covid cases have been identified amongst Ascension personnel intending to board for the Ascension section of the survey.

Comments:

RMT8 net deck test identified some comms problems. These were investigated and resolved.

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 16 10/11/2022	Location at 08:00 (11/11/2022) Transit to Ascension 00˚41.5N 018˚14.4W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	4
Additional comments:		

Summary of operations 0000-2400 (UTC-1):

Start	End	Type	Comments
09:00	17:30	Preparations	Continue to set up survey equipment, laboratories, systems and data management processes aboard. Including RMT8 and CTD testing and terminations.
16:00	16:30	Meeting	Crew and scientists meeting about survey plan and objectives

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 11/11/2022	12	SE	F4	1010.6

Progress

Gear	Today	Accum.	Remarks
MBES	1	14	MBES underway data collection (days)
SB	2	6	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)

Weather forecast for the next 24 hours:

Slight seas with low swell. Sun and scattered cloud. Temperature 26-27˚C.

DAILY LOG
STATUS REPORT

Planned operation for the next 24 hours:

Continue to set up survey equipment, laboratories, systems and data management processes aboard. Transit to Ascension. CTD and RMT8 net wet tests. Crossing the equator.

Agreed Changes to Scope/Survey operation priorities

Currently the survey will start at the North-West abyssal site and then the Atlantic ridge flank before going to Ascension Island. Positive Covid cases have been identified amongst Ascension personnel intending to board for the Ascension section of the survey. Boarding protocols sent to Ascension awaiting response and update on Covid status. Current ETA to NWA site 12/11/2022, 21:00.

Comments:

RMT8 net additional technical issues. These were investigated and resolved.

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 17 11/11/2022	Location at 08:00 (12/11/2022) Transit to Ascension 02˚45.1S 017˚01.3W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	4
Additional comments:		

Summary of operations 0000-2400 (UTC-1):

Start	End	Type	Comments
08:30	-	Meeting	Captain reports that 48hrs of 3 engine time has now been used.
09:00	12:30	Preparations	Continue to set up survey equipment, laboratories, systems and data management processes aboard. Including RMT8 and CTD.
10:30	11:30	Toolbox	Box core sample acquisition run through.
11:00	11:02	Armistice	2 minutes silence for Armistice Day.
12:30	-	Equator crossing	Crossing the equator.

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 12/11/2022	12	SE	F4	1010.9

Progress

Gear	Today	Accum.	Remarks
MBES	1	15	MBES underway data collection (days)
SB	0	6	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)

Weather forecast for the next 24 hours:

Slight seas with low swell. Sun and scattered cloud. Temperature 25-27˚C.

DAILY LOG
STATUS REPORT

Planned operation for the next 24 hours:

Continue to set up survey equipment, laboratories, systems and data management processes aboard. Transit to Ascension. RMT8 net deck tests. Bongo preparation. Box core deployment demonstration. Autonaut echosounder testing.

Agreed Changes to Scope/Survey operation priorities

Currently the survey will start at the North-West abyssal site before going to Ascension Island. Positive Covid cases have been identified amongst Ascension personnel intending to board for the Ascension section of the survey. Boarding protocol established. Gear testing moved to when we are on site. Current ETA to NWA site 13/11/2022, 04:00.

Comments:

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 18 12/11/2022	Location at 10:00 (13/11/2022) At Ascension Island North West Abyssal Site 05˚44.7S 015˚58.7W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	4
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:07	-	Clocks	Clocks advance 1 hour to UTC.
09:00	11:00	Gear Test	RMT8 net deck test.
10:00	10:30	Gear Test	Autonaut echosounder tested.
10:30	11:30	Demo	Baited trap demonstration.
13:00	15:00	Gear Test	Box core deck test run through.
16:30	17:00	Gear Test	Box core deck test run through.
18:00	19:30	Preparations	Bongos being built and prepared

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
10:00 13/11/2022	12	ESE	F4	1013.8

Progress

Gear	Today	Accum.	Remarks
MBES	1	16	MBES underway data collection (days)
SB	1	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)

Weather forecast for the next 24 hours:

DAILY LOG
STATUS REPORT

Slight seas with low swell. Sun and scattered cloud. Temperature 24-26˚C.

Planned operation for the next 24 hours:

Arrive on site at ~05:00. CTD, Bongo, Baited trap, BRUV, MBES calibration, Box core and RMT8 deployments planned.

Agreed Changes to Scope/Survey operation priorities

Currently the survey will start at the North-West abyssal site before going to Ascension Island. Positive Covid cases have been identified amongst Ascension personnel intending to board for the. Updates of test results are being provided daily.

Comments:

The initial Box core deck test deployment run through identified some mechanism issues with the core, these were rectified, and a further test was completed later in the day.

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 19 13/11/2022	Location at 08:00 (14/11/2022) At Ascension Island North-West Abyssal Site 05˚44.6S 015˚58.8W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	4
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
05:00	24:00	Science	Scientific operations start at North-West Abyssal site within Ascension EEZ.
05:00	8:00	Water & Benthic	CTD deployment. Baited trap releases attached to the CTD tested.
09:40	10:00	Pelagic	Bongo.
11:00	-	Benthic	Baited trap deployed to be collected tomorrow (14/11/2022).
15:15	19:30	Calibration	MBES calibration lines (following scoping exercise to find appropriate site).
15:00	18:20	Pelagic	BRUV deployed, MBES calibration lines continued following deployment to coincide with expected collection location.
20:30	-	Benthic	Box core deployment and sample processing.
23:40	-	Acoustics	EK80 transect pre RMT8 deployment.

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 14/11/2022	10	SE	F4/5	1013.1

DAILY LOG
STATUS REPORT

Progress

Gear	Today	Accum.	Remarks
MBES	1	17	MBES underway data collection (days)
SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
CTD	1	1	A CTD is planned for each Ascension station visited
BONGO	1	1	Bongos planned for each RMT8 location
Baited trap	1	1	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	1	1	Calibration lines run for MBES
BRUV	1	1	BRUV left to drift for ~2hrs
Box core	1	1	Multiple samples collected from the box core
Acoustics	1	1	EK80 transects relate to RMT8 and BRUV deployments.

Weather forecast for the next 24 hours:

Slight seas with low swell. Sun and scattered cloud. Temperature 24-25˚C.

Planned operation for the next 24 hours:

Continue to work at North-West abyssal site to complete Box core, EK80 survey lines, RMT8 deployment and retrieve Baited trap and transit to deep water coral camera sites at Ascension Island.

Agreed Changes to Scope/Survey operation priorities

Following the North-West abyssal site we will be going to camera sites close to Ascension Island. Positive Covid cases have been identified amongst Ascension personnel intending to board. Updates of test results are being provided daily.

Comments:

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 20 14/11/2022	Location at 10:00 (15/11/2022) At Ascension Island camera site 07˚54.3S 014˚24.8W

Distribution:

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	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
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	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	4
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:00	08:30	Science	Scientific operations continue at North-West Abyssal site within Ascension EEZ.
-	00:26	Acoustics	EK80 transect pre RMT8 deployment complete.
02:20	04:20	Pelagic	RMT8 net deployment, only 1 net opened.
06:20	08:15	Benthic	Baited trap release system triggered and successfully recovered.
08:30	-	Transit	Transit to Ascension Island deep water coral camera site.
13:30	22:00	Underway	Underway water sampling.

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 15/11/2022	10	SSE	F4/5	1014.3

Progress

Gear	Today	Accum.	Remarks
MBES	1	18	MBES underway data collection (days)
NA	3	3	Underway water sampling
SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
CTD	0	1	A CTD is planned for each Ascension station visited

DAILY LOG
STATUS REPORT

BONGO	0	1	Bongos planned for each RMT8 location
Baited trap	1	1	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	0	1	BRUV left to drift for ~2hrs
Box core	0	1	Multiple samples collected from the box core
Acoustics	1	1	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	1	1	RMT8 deployment with 2 nets.

Weather forecast for the next 24 hours:

Slight seas with low swell. Sun and scattered cloud. Temperature 24-25˚C.

Planned operation for the next 24 hours:

Transit to deep water coral camera sites at Ascension Island. Attempt 3-4 camera transects, collect Ascension Government personnel, calibrate EK80, Autonaut calibration and launch.

Agreed Changes to Scope/Survey operation priorities

The next site will be Young Seamount towards the South of the EEZ.

Comments:

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 21 15/11/2022	Location at 08:00 (16/11/2022) Transit to Young Seamount site 09˚02.0S 013˚03.5W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	2	4
Additional comments:	Induction and Emergency muster drill for Ascension Government personnel.	

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
01:30	20:00	Science	Scientific operations at Ascension Island sites within Ascension EEZ.
01:30	-	Underway	Underway water sampling.
02:00	09:00	Benthic	Camera deployments.
10:00	-	Onboarding	Ascension Government personnel board vessel and isolate.
10:45	20:00	Acoustics	EK80 calibration is attempted twice.
12:30	12:45	Comms	Drone flight for comms material by Videographer.
15:00	16:30	Acoustics	Autonaut calibration and launch attempted.
20:00	-	Transit	Transit to Young Seamount site.

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 16/11/2022	8-10	SE	F4	1014.3

Progress

Gear	Today	Accum.	Remarks
MBES	1	19	MBES underway data collection (days)
NA	1	4	Underway water sampling (samples)

DAILY LOG
STATUS REPORT

SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
CTD	0	1	A CTD is planned for each Ascension station visited
BONGO	0	1	Bongos planned for each RMT8 location
Baited trap	0	1	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	0	1	BRUV left to drift for ~2hrs
Box core	0	1	Multiple samples collected from the box core
Acoustics	0	1	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	0	1	RMT8 deployment with 2 nets
STR cameras	3	3	Camera tows

Weather forecast for the next 24 hours:

Slight seas with low swell. Sun and scattered cloud. Temperature 23-24˚C.

Planned operation for the next 24 hours:

Transit to Young Seamount. CTD, EK80 transects before RMT net.

Agreed Changes to Scope/Survey operation priorities

Comments:

The EK80 calibration was unsuccessful, the first attempt was interrupted due to fish being attracted to the vessel. The second attempt was also unsuccessful.
The Autonaut calibration and launch was postponed due to onshore comms issues.

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 22 16/11/2022	Location at 07:50 (17/11/2022) Transit to Young Seamount site 09˚46.5S 012˚04.9W

Distribution:

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	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	6
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
-	xxx	Transit	Transit to Young Seamount site.
08:30	13:00	Underway	Underway water sampling.
15:00	24:00	Science	Scientific operations at Young Seamount site within Ascension EEZ.
15:30	-	Benthic	Baited trap deployed to seabed for collection tomorrow (17/11/2022).
16:15	18:40	Water	CTD deployment.
19:00	20:00	Acoustics	MBES transects of seamount site
20:00	22:30	Acoustics	EK80 transects for RMT8 net deployment.

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 17/11/2022	10	SE	F4	1014.0

Progress

Gear	Today	Accum.	Remarks
MBES	1	20	MBES underway data collection (days)
NA	2	6	Underway water sampling (samples)

DAILY LOG
STATUS REPORT

SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
CTD	1	2	A CTD is planned for each Ascension station visited
BONGO	0	1	Bongos planned for each RMT8 location
Baited trap	1	2	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	0	1	BRUV left to drift for ~2hrs
Box core	0	1	Multiple samples collected from the box core
Acoustics	1	2	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	0	1	RMT8 deployment with 2 nets
STR cameras	0	3	Camera tows

Weather forecast for the next 24 hours:

Slight seas with low swell. Sun and scattered cloud. Temperature 22-24˚C.

Planned operation for the next 24 hours:

Continue work at Young Seamount including RMT8 net, Bongo, BRUV, CTD and Baited trap.

Agreed Changes to Scope/Survey operation priorities

Comments:

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 23 17/11/2022	Location at 09:00 (18/11/2022) Transit to Young Seamount site 09˚44.3S 012˚48.5W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	6
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
0:00	24:00	Science	Scientific operations at Young Seamount site within Ascension EEZ.
00:50	07:15	Pelagic	RMT8 deployments
02:20	03:30	Pelagic	Bongo deployments
08:30	11:30	Pelagic	BRUV deployed and recovered
09:00	10:15	Water	CTD deployment
12:15	21:50	Benthic	Camera deployments
17:05	18:40	Benthic	Baited trap released and recovered
22:05	-	Transit	Transit to Grattan Seamount

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 18/11/2022	12	ESE	F4	1012.5

Progress

Gear	Today	Accum.	Remarks
MBES	1	21	MBES underway data collection (days)
NA	0	6	Underway water sampling (samples)

DAILY LOG
STATUS REPORT

SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
CTD	1	3	A CTD is planned for each Ascension station visited
BONGO	2	3	Bongos planned for each RMT8 location
Baited trap	1	2	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	1	2	BRUV left to drift for ~2hrs
Box core	0	1	Multiple samples collected from the box core
Acoustics	0	2	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	2	3	RMT8 deployment with 2 nets
STR cameras	4	7	Camera tows

Weather forecast for the next 24 hours:

Slight seas with low swell. Sun and scattered cloud. Temperature 23-24˚C.

Planned operation for the next 24 hours:

Transit to Grattan Seamount for EK80 acoustics, RMT8 nets, BRUV deployment, CTD, cameras.

Agreed Changes to Scope/Survey operation priorities

Comments:

The Ascension Government personnel are now able to observe the survey operations.

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 24	Location at 08:00 (19/11/2022) Transit to Young Seamount site 09˚49.5S 02˚45.5W
18/11/2022	

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	6
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:00	02:45	Transit	Transit to Grattan Seamount
00:00	24:00	Science	Scientific operations at Grattan Seamount site within Ascension EEZ.
02:45	03:30	Pelagic	Bongo deployments
03:50	04:30	Acoustics	EK80 transects
04:45	06:50	Pelagic	RMT8 deployments, technical issue with comms.
08:50	11:05	Pelagic	BRUV deployment
09:00	09:40	Water	CTD deployment
12:30	-	Benthic	Baited trap deployed
13:40	19:40	Benthic	Camera deployments
20:30	21:10	Pelagic	RMT7 wet test and cable testing to identify technical issue with comms
21:50	-	Acoustics	EK80 transects commence

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 19/11/2022	10	SE	F4	1015.3

DAILY LOG
STATUS REPORT

Progress

Gear	Today	Accum.	Remarks
MBES	1	22	MBES underway data collection (days)
NA	2	6	Underway water sampling (samples)
SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
CTD	1	4	A CTD is planned for each Ascension station visited
BONGO	2	5	Bongos planned for each RMT8 location
Baited trap	1	3	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	1	3	BRUV left to drift for ~2hrs
Box core	0	1	Multiple samples collected from the box core
Acoustics	2	4	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	2	5	RMT8 deployment with 2 nets (including 1x test)
STR cameras	3	10	Camera tows

Weather forecast for the next 24 hours:

Slight seas with low swell. Sun and scattered cloud. Temperature 23-24˚C.

operation for the next 24 hours:

Agreed Changes to Scope/Survey operation priorities

RMT deployment identified issues with the comms, it started to drop out from 400m and got worse with depth until comms was completely lost at 05:27 after which the net was recovered. A wet test and cable testing was carried out in the evening.

Comments:

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 25 19/11/2022	Location at 06:00 (20/11/2022) South East Abyssal site 09˚02.6S 012˚49.3W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	6
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:00	09:45	Science	Scientific operations at Grattan Seamount within Ascension EEZ
00:00	00:45	Acoustics	EK80 transects completed
01:40	02:20	Pelagic	Bongo deployments
02:50	05:15	Benthic	Camera deployment
06:20	08:10	Water	CTD deployment
08:20	09:40	Benthic	Baited trap released, recovery aborted.
09:45	15:15	Transit	Transit to South East Abyssal site within Ascension EEZ
15:30	24:00	Science	Scientific operations at South East Abyssal site within Ascension EEZ
15:50	19:20	Pelagic	BRUV deployed and recovered
16:00	18:10	Acoustics	MBES transects
21:50	-	Acoustics	EK80 and continue MBES transects

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 20/11/2022	12	SE	F4	1012.7

DAILY LOG
STATUS REPORT

Progress

Gear	Today	Accum.	Remarks
MBES	1	23	MBES underway data collection (days)
NA	0	6	Underway water sampling (samples)
SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
CTD	1	5	A CTD is planned for each Ascension station visited
BONGO	2	7	Bongos planned for each RMT8 location
Baited trap	0	3	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	1	4	BRUV left to drift for ~2hrs
Box core	0	1	Multiple samples collected from the box core
Acoustics	1	5	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	0	5	RMT8 deployment with 2 nets (including 1x test)
STR cameras	1	11	Camera tows

Weather forecast for the next 24 hours:

Slight seas with low swell. Sun and scattered cloud. Temperature 23-24˚C.

Planned operation for the next 24 hours:

Continue operations in South East Abyssal site including RMT8, CTD, Box cores, BRUVs, camera, Bongo and acoustics.

Agreed Changes to Scope/Survey operation priorities

A camera tow was carried out instead of an RMT due to the technical fault. The RMT cable was re-terminated following a test deployment and cable testing yesterday (18/11/2022) for deployment tomorrow (20/11/2022).

Comments:

The Baited Trap did not leave the seabed following the triggering of the release mechanism. A decision was made between Cefas and Ascension personnel to leave the trap in situ as retrieval could take up too much survey time.
A shark was recorded on the camera tow.

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Daily Progress Report No. 26 20/11/2022	Location at 08:00 (21/11/2022) Transit to Atlantic Ridge Vent site 08˚20.3S 013˚19.6W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	6
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:00	24:00	Science	Scientific operations at South East Abyssal site within Ascension EEZ
02:00	05:00	Pelagic	RMT8 net deployment
07:00	10:00	Water	CTD deployment
10:15	17:30	Benthic	Box core deployments
14:00	19:15	Pelagic	BRUV deployed and recovered
20:45	21:40	Pelagic	BONGO deployments

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 21/11/2022	12	SSE	F4	1013.3

DAILY LOG
STATUS REPORT

Progress

Gear	Today	Accum.	Remarks
MBES	1	24	MBES underway data collection (days)
NA	0	6	Underway water sampling (samples)
SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
CTD	1	6	A CTD is planned for each Ascension station visited
BONGO	2	9	Bongos planned for each RMT8 location
Baited trap	0	3	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	1	5	BRUV left to drift for ~2hrs
Box core	2	3	Multiple samples collected from the box core
Acoustics	0	5	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	1	6	RMT8 deployment with 2 nets (including 1x test)
STR cameras	0	11	Camera tows

Weather forecast for the next 24 hours:

Slight seas with low swell. Sun and scattered cloud. Temperature 23-24˚C.

Planned operation for the next 24 hours:

Transit to Atlantic Ridge vent site for MBES, CTD and further gear deployments if deemed possible to deploy in the vicinity.

Agreed Changes to Scope/Survey operation priorities

Comments:

Still issues with the RMT8 net comms, solutions are being explored including using a different control unit.

DAILY LOG STATUS REPORT DY159

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Daily Progress Report No. 27 21/11/2022	Location at 08:50 (22/11/2022) Ascension Island 07˚55.0S 014˚25.0W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	6
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:00	24:00	Science	Scientific operations at South East Abyssal, Atlantic Ridge Vent and Flank sites within Ascension EEZ
00:00	04:00	Pelagic	RMT8 net deployment
04:00	08:45	Transit	Transit to Atlantic Ridge Vent site
04:50	-	Transit	Underway water sample
08:45	18:30	Acoustics	MBES survey of Atlantic Ridge Vent and Flank site
13:30	19:45	Water	CTD deployments at Atlantic Ridge Vent and Flank site
16:30	18:10	Transit	Transit to Atlantic Ridge Flank site
20:15	24:00	Benthic	Camera deployment at Atlantic Ridge Flank site

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 22/11/2022	12	SE	F3	1014.9

DAILY LOG
STATUS REPORT

Progress

Gear	Today	Accum.	Remarks
MBES	1	25	MBES underway data collection (days)
NA	1	7	Underway water sampling (samples)
SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
CTD	2	8	A CTD is planned for each Ascension station visited
BONGO	0	9	Bongos planned for each RMT8 location
Baited trap	0	3	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	0	5	BRUV left to drift for ~2hrs
Box core	0	3	Multiple samples collected from the box core
Acoustics	0	5	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	1	7	RMT8 deployment with 2 nets (including 1x test)
STR cameras	1	12	Camera tows

Weather forecast for the next 24 hours:

Slight seas with low swell. Sun and scattered cloud. Temperature 23-24˚C.

Planned operation for the next 24 hours:

Transit to Ascension Island to disembark Ascension personnel. Ascension officials visit the vessel. Into the Deep presentation to the Ascension community and a presentation to the school.

Agreed Changes to Scope/Survey operation priorities

Comments:

A different control unit was used for the RMT8 net deployment.

DAILY LOG STATUS REPORT DY159

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Daily Progress Report No. 28 22/11/2022	Location at 08:00 (23/11/2022) Transit to St Helena 09˚24.7S 012˚39.9W

Distribution:

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	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	6
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:00	08:00	Transit	Transit to Ascension Island
09:00	16:00	Ascension	Engagement activities on Ascension Island and the Discovery vessel.
09:00	15:30	Ascension	Ascension personnel, scientists and crew disembark for tours of the Island.
11:00	14:00	Discovery	Visitors are welcomed to the Discovery for tours and lunch including the Ascension Commissioner, Councillors and members of the Ascension Marine Youth Committee.
12:00	13:30	Ascension	Scientists deliver Into the Deep presentation with the local Ascension community.
14:00	15:00	Ascension	Scientists deliver School presentation.
15:40	-	Discovery	All scientists and crew onboard
16:40	-	Transit	Transit to St Helena

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 23/11/2022	8-10	SE	F4	1011.7

DAILY LOG
STATUS REPORT

Progress

Gear	Today	Accum.	Remarks
MBES	1	26	MBES underway data collection (days)
NA	0	7	Underway water sampling (samples)
SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
CTD	0	8	A CTD is planned for each Ascension station visited
BONGO	0	9	Bongos planned for each RMT8 location
Baited trap	0	3	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	0	5	BRUV left to drift for ~2hrs
Box core	0	3	Multiple samples collected from the box core
Acoustics	0	5	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	0	7	RMT8 deployment with 2 nets (including 1x test)
STR cameras	0	12	Camera tows

Weather forecast for the next 24 hours:

Slight seas with low swell. Overcast. Temperature 23-24˚C.

Planned operation for the next 24 hours:

Transit to St Helena Island EEZ ETA 25/11/2022 00:30.

Agreed Changes to Scope/Survey operation priorities

Comments:

Discussions to commence with St Helena personnel regarding survey schedule and priorities.

DAILY LOG STATUS REPORT DY159

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Daily Progress Report No. 29 23/11/2022	Location at 08:00 (24/11/2022) Transit to St Helena 11˚30.2S 009˚36.7W

Distribution:

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	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	6
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:00	24:00	Transit	Transit to St Helena
09:00	17:30	Preparations	Preparations for St Helena part of the survey
09:00	18:00	Water	Underway water sampling
13:30	-	Transit	Route to St Helena updated to start at the North-West Seamount site
15:30	-	Transit	Exiting Ascension Island EEZ

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 24/11/2022	8-10	SE	F4/5	1012.5

Progress

Gear	Today	Accum.	Remarks
MBES	1	27	MBES underway data collection (days)

DAILY LOG
STATUS REPORT

NA	4	7	Underway water sampling (samples)
SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
CTD	0	8	A CTD is planned for each St Helena station visited
BONGO	0	9	Bongos planned for each RMT8 location
Baited trap	0	3	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	0	5	BRUV left to drift for ~2hrs
Box core	0	3	Multiple samples collected from the box core
Acoustics	0	5	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	0	7	RMT8 deployment with 2 nets (including 1x test)
STR cameras	0	12	Camera tows

Weather forecast for the next 24 hours:

Slight/moderate seas with low swell. Sun and scattered cloud. Temperature 23˚C.

Planned operation for the next 24 hours:

Transit to St Helena Island EEZ ETA 25/11/2022 00:30.

Agreed Changes to Scope/Survey operation priorities

Comments:

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 30 24/11/2022	Location at 08:00 (25/11/2022) Transit to St Helena 13˚49.3S 007˚31.8W

Distribution:

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	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	1	6
Additional comments:	Crew only SOPEP practical exercise and enclosed space rescue at 16:00	

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:00	24:00	Transit	Transit to St Helena
08:00	17:00	Water	Underway water sampling
09:00	17:30	Preparations	Preparations for St Helena section of the survey
16:40	-	Buoys	ARCO buoy deployed
18:30	18:45	Meeting	Science meeting for all to discuss the plan for the St Helena work

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 25/11/2022	8-10	ESE	F4	1014.7

Progress

Gear	Today	Accum.	Remarks
MBES	1	28	MBES underway data collection (days)
NA	4	11	Underway water sampling (samples)

DAILY LOG
STATUS REPORT

SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
AB	1	1	Arco weather buoy deployments
CTD	0	8	A CTD is planned for each St Helena station visited
BONGO	0	9	Bongos planned for each RMT8 location
Baited trap	0	3	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	0	5	BRUV left to drift for ~2hrs
Box core	0	3	Multiple samples collected from the box core
Acoustics	0	5	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	0	7	RMT8 deployment with 2 nets (including 1x test)
STR cameras	0	12	Camera tows

Weather forecast for the next 24 hours:

Slight seas with low swell. Overcast. Temperature 21-23˚C.

Planned operation for the next 24 hours:

Transit to St Helena Island EEZ ETA 25/11/2022 00:30.

Agreed Changes to Scope/Survey operation priorities

Comments:

DAILY LOG STATUS REPORT DY159

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Daily Progress Report No. 31 25/11/2022	Location at 06:00 (26/11/2022) Transit to St Helena Island 15˚31.6S 006˚02.9W

Distribution:

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	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	1	7
Additional comments:	Crew only Fire exercise drill at 16:00	

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:30	-	Transit	Enter St Helena EEZ
03:00	19:00	Transit	Scientific operations at North-West seamount site in St Helena EEZ.
03:00	19:00	Acoustics	MBES survey of North-West seamount
08:30	12:00	Pelagic	BRUV deployment and recovery
09:30	11:00	Water	CTD deployment
10:30	12:00	Tours	Tours of the winch and engine room for scientists with the Chief Engineer.
19:00	-	Transit	Transit to St Helena Island

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 26/11/2022	8	ESE	F5/6	1015.3

Progress

Gear	Today	Accum.	Remarks
MBES	1	29	MBES underway data collection (days)
NA	0	11	Underway water sampling (samples)

DAILY LOG
STATUS REPORT

SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
AB	0	1	Arco weather buoy deployments
CTD	1	9	A CTD is planned for each St Helena station visited
BONGO	0	9	Bongos planned for each RMT8 location
Baited trap	0	3	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	1	6	BRUV left to drift for ~2hrs
Box core	0	3	Multiple samples collected from the box core
Acoustics	0	5	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	0	7	RMT8 deployment with 2 nets (including 1x test)
STR cameras	0	12	Camera tows

Weather forecast for the next 24 hours:

Slight/moderate seas with low swell. Overcast. Temperature 21-23˚C.

Planned operation for the next 24 hours:

Arrive at St Helena. Onboard St Helena personnel. Calibrate and deploy Autonaut. Calibrate EK80. Deploy crab pots.

Agreed Changes to Scope/Survey operation priorities

Comments:

The rope of the BRUV array broke between rig 3 and 4 during the deployment. It was tied and taped and the deployment resumed with no further issues.

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Daily Progress Report No. 32 26/11/2022	Location at 08:20 (27/11/2022) St Helena Island 15˚55.8S 005˚45.6W

Distribution:

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	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	2	8
Additional comments:	Safety briefing and emergency muster for St Helena personnel	

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:00	09:00	Transit	Transit to St Helena Island
10:00	-	Stores	Additional stores taken onboard
10:35	-	Onboard	Onboard St Helena Island personnel and stores
11:00	24:00	Science	Scientific operations at St Helena Island sites
11:00	-	Acoustics	Autonaut deployed, calibrated, control established, and mission implemented
13:00	17:40	Acoustics	EK80 calibration
19:00	22:00	Noise	Noise landers deployed
22:45	24:00	Benthic	Camera deployment

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 27/11/2022	8	ExN	F2/3	1013.5

Progress

Gear	Today	Accum.	Remarks
MBES	1	30	MBES underway data collection (days)
NA	0	15	Underway water sampling (samples)

DAILY LOG
STATUS REPORT

SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
AB	0	1	Arco weather buoy deployments
CTD	0	9	A CTD is planned for each St Helena station visited
BONGO	0	9	Bongos planned for each RMT8 location
Baited trap	0	3	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	0	7	BRUV left to drift for ~2hrs
Box core	0	3	Multiple samples collected from the box core
Acoustics	1	1	EK80 calibration
Acoustics	0	5	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	0	7	RMT8 deployment with 2 nets (including 1x test)
STR cameras	1	13	Camera tows
Autonaut	1	1	Autonaut mission (days)
Noise Landers	2	2	Noise landers left on seabed until the end of the St Helena work

Weather forecast for the next 24 hours:

Slight/moderate seas with moderate swell. Overcast. Temperature 21-22˚C.

Planned operation for the next 24 hours:

Continue work around St Helena Island including RMT8 nets, BONGO, BRUV, CTD, EK80 acoustic transacts.

Agreed Changes to Scope/Survey operation priorities

Comments:

Autonaut: At 11:43 Jura was deployed by winch from RRS Discovery. Acoustics calibration of the payload performed from Work Boat and completed by 12:11. At 12:16 control handed over to Jesse Loynes (AutoNaut Ltd) and Jura piloted to waypoint (wpt) 25. A problem was encountered trying to engage first waypoint requiring tracks to be replotted and renamed. Issues resolved at 17:00 and first way point engaged, and piloting handed back to Discovery. Internet connectivity lost serval times during the evening requiring Jesse to take control. Jura completes wpts 7, 8, and 9.

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Daily Progress Report No. 33 27/11/2022	Location at 10:00 (28/11/2022) St Helena Island 15˚53.0S 005˚42.6W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	8
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:00	24:00	Science	Scientific operations at St Helena Island sites
01:40	05:10	Pelagic	RMT8 net deployment
05:30	06:00	Pelagic	BONGO deployment
08:00	10:30	Pelagic	BRUV deployment and recovery
08:20	09:20	Water	CTD deployment
12:30	-	Benthic	Crab pot array deployed to seabed for collection after 48hrs
13:20	19:10	Acoustics	EK80 bait fish transect lines
19:30	19:45	Pelagic	BONGO deployment
20:30	23:31	Pelagic	RMT8 net deployment

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 28/11/2022	8	ESE	F4	1013.1

Progress

Gear	Today	Accum.	Remarks
MBES	1	31	MBES underway data collection (days)
NA	0	15	Underway water sampling (samples)

DAILY LOG
STATUS REPORT

SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
AB	0	1	Arco weather buoy deployments
CTD	1	10	A CTD is planned for each St Helena station visited
BONGO	2	11	Bongos planned for each RMT8 location
Baited trap	0	3	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	1	7	BRUV left to drift for ~2hrs
Box core	0	3	Multiple samples collected from the box core
Acoustics	0	1	EK80 calibration
Acoustics	1	6	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	2	9	RMT8 deployment with 2 nets (including 1x test)
STR cameras	0	13	Camera tows
Autonaut	2	2	Autonaut mission (days)
Noise Landers	2	2	Noise landers left on seabed until the end of the St Helena work
Crab pots	1	1	Crab pot array deployed to seabed

Weather forecast for the next 24 hours:

Slight seas with moderate swell. Overcast. Temperature 21-22˚C.

Planned operation for the next 24 hours:

Continue work around St Helena Island including bait fish processing, RMT8 net, EK80 bait fish transects, CTD, camera, BONGO deployments.

Agreed Changes to Scope/Survey operation priorities

Comments:

Autonaut: Jura completes wpts 10, 11, and 12 before encountering a problem at 05:50 and disengages from wpt 13 and starts to head back to wpt 7. Jesse contacted and tracks are required to be replotted and renamed once again. Piloting handed back to Discovery and Jura heads to way point 47 at the start of the new track. Jura completed wpts 47 through to 54.

RMT8 net damaged during deployments, the net mesh ripped and flow meter and frame has been bent. Repairs to the net mesh to be carried out before it is next deployed due 28/11/2022.

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 34 28/11/2022	Location at 08:00 (29/11/2022) St Helena Island 16˚02.0S 005˚49.1W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	8
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:00	24:00	Science	Scientific operations at St Helena Island sites
01:00	03:10	Pelagic	RMT8 net deployment
07:19	-	Pelagic	Bait fish delivery from fishers for processing
08:00	15:15	Acoustics	EK80 bait fish transect lines
16:00	19:45	Pelagic	BRUV deployment and recovery
17:20	18:20	Water	CTD deployment
20:30	22:30	Benthic	Camera deployment
23:50	24:00	Pelagic	BONGO deployment

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 29/11/2022	6-8	ESE	F4	1012.1

Progress

Gear	Today	Accum.	Remarks
MBES	1	32	MBES underway data collection (days)
NA	0	15	Underway water sampling (samples)

DAILY LOG
STATUS REPORT

SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
AB	0	1	Arco weather buoy deployments
CTD	1	11	A CTD is planned for each St Helena station visited
BONGO	1	12	Bongos planned for each RMT8 location
Baited trap	0	3	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	1	8	BRUV left to drift for ~2hrs
Box core	0	3	Multiple samples collected from the box core
Acoustics	0	1	EK80 calibration
Acoustics	1	7	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	1	10	RMT8 deployment with 2 nets (including 1x test)
STR cameras	1	14	Camera tows
Autonaut	3	3	Autonaut mission (days)
Noise Landers	0	2	Noise landers left on seabed until the end of the St Helena work
Crab pots	0	1	Crab pot array deployed to seabed
Fish delivery	1	1	Delivery of bait fish from acoustic transects

Weather forecast for the next 24 hours:

Slight/moderate seas with moderate swell. Overcast. Temperature 21-22˚C.

Planned operation for the next 24 hours:

Continue work around St Helena Island including BONGO, RMT8 net, cameras, crab pot recovery, BRUV deployment and Autonaut recovery.

Agreed Changes to Scope/Survey operation priorities

Comments:

Autonaut: At 00:05 Jura fails to engage wpt 55 and starts to head to wpt 58. Pilot onboard Discovery re-engages wpt 54 while trying to resolve issue with wpt 55. Issue resolved at 00:31 and Jura heads to wpt 55. Jura complete wpts 56 & 57. New track added and Jura continues to wpt 11. Jura completes wpts 11 to 22.

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 35 29/11/2022	Location at 08:00 (30/11/2022) Transiting to Cardno Seamount 13˚53.8S 005˚59.3W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	8
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:00	19:10	Science	Scientific operations at St Helena Island sites
00:40	04:10	Pelagic	RMT8 net deployment
06:20	08:40	Benthic	Camera deployment
09:45	16:10	Pelagic	BRUV deployment and recovery
13:40	-	Benthic	Crab pots recovered
17:05	-	Acoustics	Autonaut recovered
19:10	-	Pelagic	Bait fish delivery from fishers for processing
19:10	-	Transit	Transit to Cardno Seamount

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 30/11/2022	6-8	SE	F5/6	1012.7

Progress

Gear	Today	Accum.	Remarks
MBES	1	33	MBES underway data collection (days)
NA	0	15	Underway water sampling (samples)

DAILY LOG
STATUS REPORT

SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
AB	0	1	Arco weather buoy deployments
CTD	0	11	A CTD is planned for each St Helena station visited
BONGO	0	12	Bongos planned for each RMT8 location
Baited trap	0	3	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	1	9	BRUV left to drift for ~2hrs
Box core	0	3	Multiple samples collected from the box core
Acoustics	0	1	EK80 calibration
Acoustics	0	7	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	1	11	RMT8 deployment with 2 nets (including 1x test)
STR cameras	1	15	Camera tows
Autonaut	4	4	Autonaut mission (days)
Noise Landers	0	2	Noise landers left on seabed until the end of the St Helena work
Crab pots	1	1	Crab pot array deployed to seabed
Fish delivery	2	2	Delivery of bait fish from acoustic transects

Weather forecast for the next 24 hours:

Slight/moderate seas with moderate swell. Overcast. Temperature 21-22˚C.

Planned operation for the next 24 hours:

Continue work around St Helena Island including BONGO, RMT8 net, cameras, crab pot recovery, BRUV deployment and Autonaut recovery.

Agreed Changes to Scope/Survey operation priorities

Comments:

Autonaut: Jura completes wpts 23 & 24. Internet connectivity issues encountered Wpt13 of the current track is assigned as recovery point and Jura is moved through wpts 18, 17, 15, and finally onto wpt 13 and meets Discovery at 16:00. Jura recovered to Discovery and back onboard at 17:07.

BRUVs separated on recovery into two sections between rig 3 and 4. Visual site was maintained of the two separated BRUVs and they were recovered within 40 minutes.

The crab pots did not collect the targeted crab species, the pots contained white spotted morae eels, octopus, fish including a butterfly and puffer fish and hermit crabs.

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 36 30/11/2022	Location at 07:50 (01/12/2022) Cardno Seamount 12˚50.3S 005˚57.6W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	8
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:00	13:30	Transit	Transit to Cardno Seamount
08:45	-	Water	Underway sampling
13:30	24:00	Science	Scientific operations at Cardno Seamount
14:00	18:30	Pelagic	BRUV deployment and recovery
14:50	16:00	Water	CTD deployment
16:00	17:00	Benthic	Crab pots deployed
22:30	22:45	Pelagic	BONGO deployment
23:50	-	Pelagic	RMT8 net deployment

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 01/12/2022	8-10	SE	F5	1014.0

Progress

Gear	Today	Accum.	Remarks
MBES	1	34	MBES underway data collection (days)
NA	1	16	Underway water sampling (samples)

DAILY LOG
STATUS REPORT

SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)
AB	0	1	Arco weather buoy deployments
CTD	1	12	A CTD is planned for each St Helena station visited
BONGO	1	13	Bongos planned for each RMT8 location
Baited trap	0	3	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	1	10	BRUV left to drift for ~2hrs
Box core	0	3	Multiple samples collected from the box core
Acoustics	0	1	EK80 calibration
Acoustics	0	7	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	1	12	RMT8 deployment with 2 nets (including 1x test)
STR cameras	0	15	Camera tows
Autonaut	0	4	Autonaut mission (days)
Noise Landers	0	2	Noise landers left on seabed until the end of the St Helena work
Crab pots	2	2	Crab pot array deployed to seabed
Fish delivery	2	2	Delivery of bait fish from acoustic transects

Weather forecast for the next 24 hours:

Moderate seas with low swell. Overcast. Temperature 21-23˚C.

Planned operation for the next 24 hours:

Continue work at Cardno Seamount including MBES, EK80 transects, BRUV, CTD and recover the crab pots.

Agreed Changes to Scope/Survey operation priorities

Comments:

The RMT8 net did not function correctly, and no sample was collected from the nets. The comms were working topside however both nets did not open in the water during the tow.
The crab pots were deployed in deeper water with a simplified rigging and no anchors.

DAILY LOG STATUS REPORT DY159

Vessel: RRS Discovery	Project: C8411A DY159 Stewart MacKay | Captain | RRS Discovery | National Marine Facilities |National Oceanography Centre, European Way, Southampton, SO14 3ZH Tel: +44(0)2381680163 | Mob: +44(0)7780 796336 | e: captaindy@noc.ac.uk
Daily Progress Report No. 37 01/12/2022	Location at 06:00 (02/12/2022) Cardno Seamount 12˚55.3S 005˚50.3W

Distribution:

Cefas	Maura Smyth	maura.smyth@cefas.gov.uk
	Charlotte Jessop	charlotte.jessop@cefas.gov.uk
	Paul Whomersley	paul.whomersley@cefas.gov.uk
	Dave Limpenny	david.limpenny@cefas.gov.uk
	FAST	fast@cefas.co.uk
	Tracy Maxwell	tracy.maxwell@cefas.gov.uk

Health and Safety and Environmental Quality:

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	8
Additional comments:		

Summary of operations 0000-2400 (UTC):

Start	End	Type	Comments
00:00	24:00	Science	Scientific operations at Cardno Seamount
03:45	07:30	Acoustics	MBES survey of Cardno Seamount
07:30	14:30	Acoustics	EK80 transects
15:45	18:15	Pelagic	BRUV deployment and recovery
16:00	17:00	Water	CTD deployment
19:50	21:30	Benthic	Crab pots recovered
22:45	-	Benthic	Camera deployment

Weather:

Time period	Visibility	Wind direction	Wind speed	Barometer
08:00 02/12/2022	8-10	SE	F6	1012.7

Progress

Gear	Today	Accum.	Remarks
MBES	1	35	MBES underway data collection (days)
NA	0	16	Underway water sampling (samples)
SB	0	7	Spotter Buoy deployments start at various degrees of latitude from 23N as vessel transits south (avoiding EEZs)

DAILY LOG
STATUS REPORT

AB	0	1	Arco weather buoy deployments
CTD	1	13	A CTD is planned for each St Helena station visited
BONGO	0	13	Bongos planned for each RMT8 location
Baited trap	0	3	Bait trap is left on the seabed for approx. 18hrs
MBES calibration	0	1	Calibration lines run for MBES
BRUV	1	11	BRUV left to drift for ~2hrs
Box core	0	3	Multiple samples collected from the box core
Acoustics	0	1	EK80 calibration
Acoustics	1	8	EK80 transects relate to RMT8 and BRUV deployments.
RMT8	0	12	RMT8 deployment with 2 nets (including 1x test)
STR cameras	1	16	Camera tows
Autonaut	0	4	Autonaut mission (days)
Noise Landers	0	2	Noise landers left on seabed until the end of the St Helena work
Crab pots	2	2	Crab pot array deployed to seabed
Fish delivery	0	2	Delivery of bait fish from acoustic transects

Weather forecast for the next 24 hours:

Moderate seas with moderate swell. Overcast. Temperature 21-23˚C.

Planned operation for the next 24 hours:

Transit to Southern Cross Seamount including MBES, EK80 transects, BRUV, CTD and camera

Agreed Changes to Scope/Survey operation priorities

Comments:

The crab pots contained only crabs for this deployment with no unexpected species captured.

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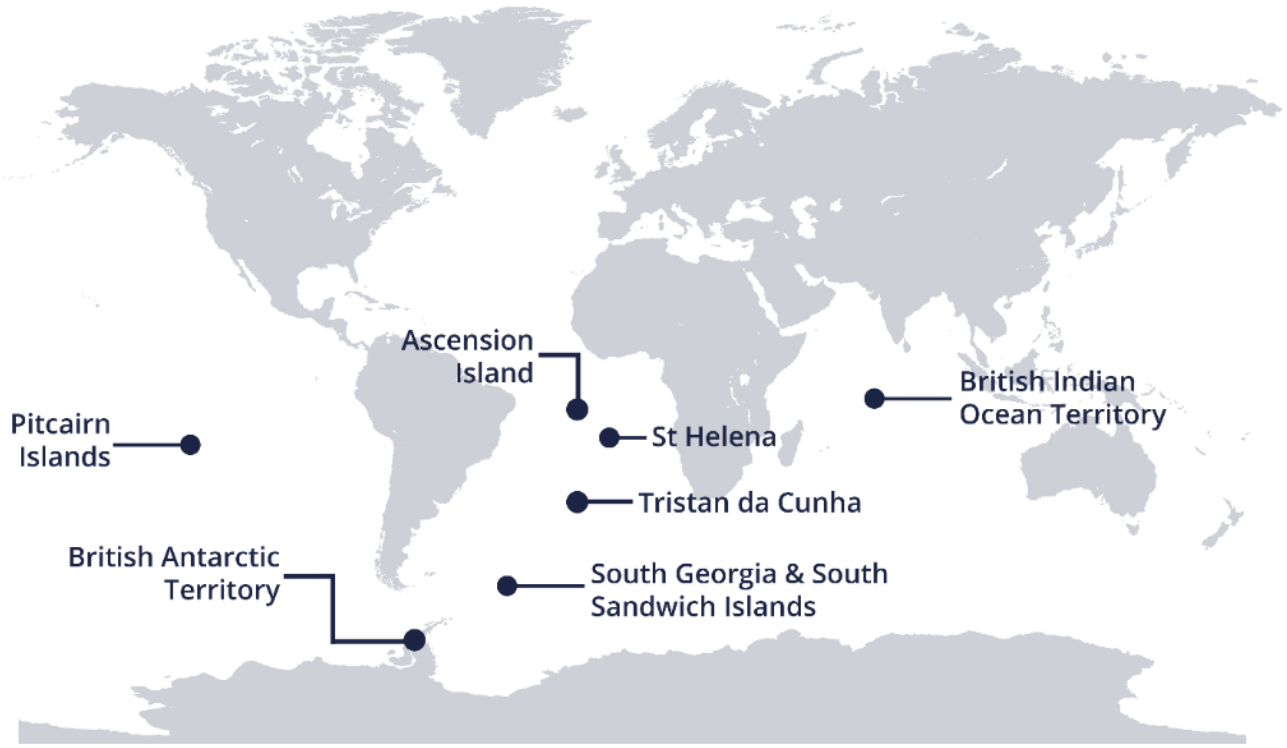

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