CRUISE SUMMARY REPORT

FOR COLLATING CENTRE USE

Centre: BODC Ref. No.:

Is data exchange restricted ☒ Yes ☐ In part ☐ No

SHIP

Name: RRS James Cook **Call Sign:** MLRM6

Type of ship: Research Vessel (Royal Research Ship / Oceanographic Research Vessel)

CRUISE NO. / NAME: JC293 / MISSING LINK expedition

CRUISE PERIOD 29/06/26 to 03/08/26

PORT OF DEPARTURE Southampton, UK

PORT OF RETURN Southampton, UK

RESPONSIBLE LABORATORY

Name: National Oceanography Centre

Address: National Oceanography Centre, European Way, Southampton, SO14 3ZH

Country: United Kingdom

CHIEF SCIENTIST(S)

Dr Michael Clare (National Oceanography Centre) – Chief Scientist for MISSING LINK
Dr Robert Hall (Scottish Association for Marine Science) – Chief Scientist for PISCES

OBJECTIVES AND BRIEF NARRATIVE OF CRUISE

Submarine canyons are among the most dynamic sediment-routing systems on Earth, transferring vast quantities of sediment, organic carbon, nutrients and pollutants from continental margins to the deep ocean through powerful turbidity currents and related gravity flows. These processes play a fundamental role in shaping seafloor morphology, regulating deep-sea ecosystems and influencing long-term carbon burial, while also representing one of the greatest natural hazards to offshore infrastructure. Fast-moving sediment density flows are capable of travelling hundreds to more than a thousand kilometres at speeds exceeding 20 m/s, damaging or burying subsea telecommunications cables, pipelines and other critical infrastructure that underpin the global digital economy and offshore energy sector. Despite their importance, the frequency, magnitude and triggering mechanisms of canyon-flushing events remain poorly constrained because they occur infrequently, unpredictably and at depths that are challenging to observe directly. The NERC-funded MISSING LINK expedition aboard the RRS *James Cook* was designed to address these knowledge gaps by integrating high-resolution seafloor mapping, sediment sampling, in situ observations and geophysical investigations to better understand the processes governing sediment transport through submarine canyons and their implications for geohazards, carbon cycling, marine ecosystems and the resilience of critical offshore infrastructure.

MISSING LINK aims to understand:

- When and how are fast-moving sediment flows called turbidity currents triggered in canyons whose heads lie far from present day sediment input sources?
- How much material (sediment, pollutants, carbon) do those flows carry from the shelf to the deep sea?
- How effectively and where is that material buried?
- How do the flows behave and what hazards do they pose to seafloor infrastructure such as subsea telecommunications cables?
- And more broadly, what is the global significance of land-detached canyons with regards to particulate, carbon and pollutant budgets?

The submarine canyon and channel systems in question are the Whittard canyon-channel-fan and Gollum channel system whose heads lie offshore the coast of Ireland, which have been chosen for study as: i) they are disconnected from land, meaning that they are not the sites of present day sediment delivery by rivers nor longshore drift (until recently thought to be the main drivers for turbidity current activity in submarine canyons); ii) their geometry means they present different orientations to the prevailing oceanographic conditions, resulting in differing natures of internal tide generation (an important process controlling cross-shelf exchange of nutrients and particulate material). These sorts of systems are representative of most submarine canyons/channels found globally, but which to date have not been the focus of such study. These projects should provide a major leap forwards in our understanding of these systems that can be translated to many other systems globally.

The JC293 expedition also included aspects of the NERC-funded PISCES (Processes Influencing Sediment Connectivity and Ecosystem Sustainability) project, which seeks to advance understanding of the processes that govern cross-shelf exchange of water and nutrients and the specific role of submarine canyons. This includes: i) diagnosing cross-slope fluxes through multiple canyon limbs and determining the relative importance of advective to diffusive processes; ii) assessing the predictability of cross-slope exchange from metrics of canyon geometry physical

forcing, and stratification intensity; iii) upscaling the results along the whole European northwest shelf break; and iv) determining how coarse-resolution ocean models can replicate realistic canyon fluxes.

Further scientific aims as part of the JC293 expedition included support to other research projects:

- Collection of data using vessel-based sensors while underway, which enabled opportunistic observations of the onset of a marine heatwave (initial results from which can be seen here: https://www.noc.ac.uk/news/rolling-updates-inside-uks-unfolding-marine-heatwave).
- Recovery of a hydrophone lander (previously deployed 20th May 2026 on Expedition DY210) that made passive acoustic observations to monitor cetaceans and ocean soundscapes.
- Deployment of a Sonardyne Origin 65 ADCP lander equipped with inverted echo-sounder for trial to assess performance in monitoring hydrodynamics in a submarine canyon that will be recovered in Summer 2027.

The project activities included:

i) **Deployment of short oceanographic moorings** (with no sea surface expression) to monitor near-seafloor currents and sediment transport,. Seafloor moorings were deployed at nine locations, including one mooring in 830 m water depth that was then recovered on 16/07/26 to monitor internal tides, and eight in water depths of between 816 and 4711 m which were left and will be recovered after a period of approximately 12 months (planned for Summer 2027).

ii) **Short-term (24 hour maximum) deployment of Autonomous Underwater Vehicle (AUV; Autosub5)** to map the seafloor and shallow subsurface using multibeam echosounder (Norbit WBMS 400kHz multibeam echosounder), side scan sonar (Edgetech 2205 Dual Frequency Sidescan Sonar - 420 kHz and 120 kHz), sub-bottom profiler (Edgetech 2205 Sub Bottom Profiler, 2-16 kHz), photograph the seafloor using a camera system (AESA 2.5 Camera System), and characterise the water column using a Conductivity, Temperature and Density (CTD) sensor (Seabird CTD9+), characterise suspended sediments using a Hydroptic UPV6, and is also equipped with an Acoustic Doppler Current (ADCP) profiler to assist with navigation (Syrinx SprintNav, 600 kHz). 25 missions were undertaken with a total of 347 hours of mission duration.

iii) **Shipboard geophysical imaging undertaken while the vessel was underway and as part of pre-planned seafloor surveys to cover deep-sea channels and submarine fan**, which include single beam echosounding (Kongsberg EA640 10/12 kHz), multi beam echosounding (Kongsberg EM122 12 kHz and EM710 70 to 100 kHz) and sub-bottom profiler (Kongsberg SBP27 Sub-bottom profiler 2-9 kHz).

iv) **Vertical profiling of the water column to characterise temperature, salinity, current velocity and turbulent mixing.** This included vertical profiles made using a CTD package and Lowered ADCP (two RDI 300 kHz Workhorse) mounted on a conventional CTD/Carousel frame. This was deployed off the side of the vessel using a winch. A Vertical Microstructure Profiler (VMP-2000) was also used for the measurement of turbulence kinetic energy dissipation rate through the water column. The VMP-2000 is equipped with cm-scale velocity probes (shear probes), high-resolution temperature sensors (fast thermistors), and a high-accuracy Seabird CTD.

v) **Short-term (3 weeks) deployment of an autonomous underwater glider (Kongsberg Seaglider)** to monitor ocean currents using an integrated Nortek 1 MHz ADCP and measure temperature and salinity using a SeaBird Electronics CTD sensor.

vi) **Sampling of seafloor sediments using scientific coring equipment,** which was limited to shallow penetration equipment; namely a Day Grab and small (1 m) lightweight gravity corer.

vii) **Deployment and recovery of seafloor landers**, including recovery of a previously-deployed hydrophone lander and deployment/recovery of a Sonardyne Origin 65 ADCP lander.

Project name: A MISSING LINK between continental shelves and the deep sea: Addressing the overlooked role of land-detached submarine canyons

Coordinating body: Funded by Natural Environment Research Council and led by National Oceanography Centre, UK

PRINCIPAL INVESTIGATORS:

A. Dr Michael Clare – National Oceanography Centre, UK (m.clare@noc.ac.uk)

B. Dr Robert Hall – Scottish Association of Marine Science (rob.hall@sams.ac.uk)

C. Dr Veerle Huvenne - National Oceanography Centre, UK (vaih@noc.ac.uk)

MOORINGS, BOTTOM MOUNTED GEAR AND DRIFTING SYSTEMS

This section should be used for reporting moorings, bottom mounted gear and drifting systems (both surface and deep) deployed and/or recovered during the cruise. Separate entries should be made for each location (only deployment positions need be given for drifting systems). This section may also be used to report data collected at fixed locations which are returned to routinely in order to construct 'long time series'.

PI See top of page.	APPROXIMATE POSITION LATITUDE deg	min	N/S	LONGITUDE deg	min	E/W	DATA TYPE enter code(s) from list on last page.	DESCRIPTION Identify, as appropriate, the nature of the instrumentation the parameters (to be) measured, the number of instruments and their depths, whether deployed and/or recovered, dates of deployments and/or recovery, and any identifiers given to the site.
A	48	45.0630	N	11	8.5704	W	D71	W1 - Downlooking 600 kHz ADCP and microcat to measure near seafloor currents Deployed 22/07/26 (to be recovered August 2027)
A	48	18.2508	N	10	48.1800	W	D71 B73	W2 - Downlooking 600 kHz ADCP, microcat and sediment trap to measure near seafloor currents Deployed 21/07/26 (to be recovered August 2027)

A	48	44.5008	N	10	6.5262	W	D71	W3 - Downlooking 600 kHz ADCP and microcat to measure near seafloor currents Deployed 16/07/26 (to be recovered August 2027)
A	48	22.0626	N	10	4.2780	W	D71	W4 - Downlooking 600 kHz ADCP and microcat to measure near seafloor currents Deployed 19/07/26 (to be recovered August 2027)
A	47	57.8946	N	10	13.1262	W	D71 B73	W5 - Downlooking 600 kHz ADCP, microcat and sediment trap to measure near seafloor currents Deployed 06/07/26 (to be recovered August 2027)
A	47	24.4176	N	10	16.2552	W	D71	W6 - Downlooking 600 kHz ADCP, microcat and sediment trap to measure near seafloor currents Deployed 08/07/26 (to be recovered August 2027)
A	46	39.0378	N	10	9.5268	W	B73	W7 - Downlooking 600 kHz ADCP, microcat and sediment trap to measure near seafloor currents Deployed 11/07/26 (to be recovered August 2027)
A	50	42.6486	N	11	21.4848	W	D71	G1 - Downlooking 600 kHz ADCP and microcat to measure near seafloor currents Deployed 24/07/26 (to be recovered August 2027)
B	48	44.4042	N	10	6.4338	W	D71	EL - Uplooking 75 KHz ADCP and microcat to measure ocean currents Deployed 02/07/26, recovered 16/07/26
B	48	21.4278	N	9	32.6508	W	D71	Sonardyne Lander - Uplooking 55 kHz ADCP and inverted echosounder to measure ocean currents Deployed 03/07/26 (to be recovered Summer 2027)
C	48	23.0598	N	9	44.4552	W	G90 D71	SCYLLA Lander - ORCA Hydrophone and current profiler to monitor ocean noise and currents Deployed 20/05/26. Recovered 01/07/26

SUMMARY OF MEASUREMENTS AND SAMPLES TAKEN

Except for the data already described on page 2 under 'Moorings, Bottom Mounted Gear and Drifting Systems', this section should include a summary of all data collected on the cruise, whether they be measurements (e.g. temperature, salinity values) or samples (e.g. cores, net hauls).

Separate entries should be made for each distinct and coherent set of measurements or samples. Different modes of data collection (e.g. vertical profiles as opposed to underway measurements) should be clearly distinguished, as should measurements/sampling techniques that imply distinctly different accuracy's or spatial/temporal resolutions. Thus, for example, separate entries would be created for i) BT drops, ii) water bottle stations, iii) CTD casts, iv) towed CTD, v) towed undulating CTD profiler, vi) surface water intake measurements, etc.

Each data set entry should start on a new line – it's description may extend over several lines if necessary.

NO, UNITS : for each data set, enter the estimated amount of data collected expressed in terms of the number of 'stations'; miles' of track; 'days' of recording; 'cores' taken; net 'hauls'; balloon 'ascents'; or whatever unit is most appropriate to the data. The amount should be entered under 'NO' and the counting unit should be identified in plain text under 'UNITS'.

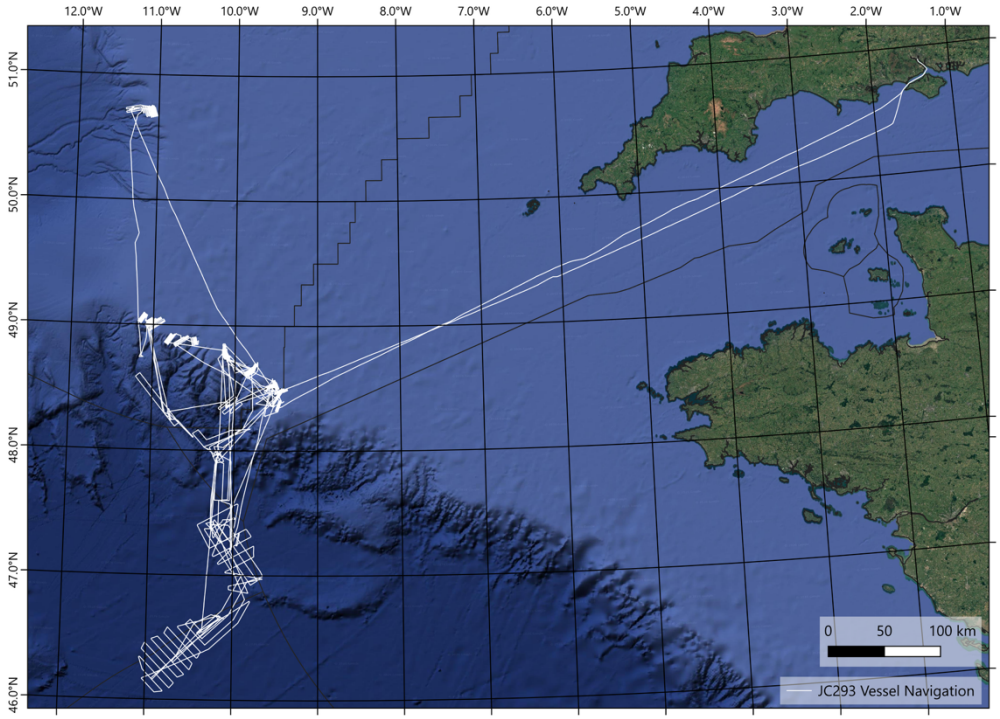
PI	NO	UNITS see above	DATA TYPE	DESCRIPTION Identify, as appropriate, the nature of the data and of the instrumentation/sampling gear and list the parameters measured. Include any supplementary information that may be appropriate, e. g. vertical or horizontal profiles, depth horizons, continuous recording or discrete samples, etc. For samples taken for later analysis on shore, an indication should be given of the type of analysis planned, i.e. the purpose for which the samples were taken.
A	62,010	Area km^2	G74	Vessel mounted multibeam was collected throughout JC293, both as dedicated surveys and during transits. The EM710 sonar was used primarily for depth <1000m and the EM122 for depths >1000m. Data cover a number of canyon heads as well as the deep sea channel and fan of the Whittard Canyon System, and a small region in the Gollum Channel.
A	8435	Line km	G75	Vessel mounted sub-bottom profiler data was collected throughout JC293, both as dedicated surveys and during transits using the Kongsberg SBP27. Data cover a number of canyon heads as well as the deep sea channel and fan of the Whittard Canyon System, and a small region in the Gollum Channel.
B	183	Samples	H09	Water nutrient samples taken from Niskin bottles on CTD rosette at discrete depths. A total of 183 50 ml samples were taken for analysis at the Scottish Association of Marine Science for nutrient content.
A	231	Samples	G02 P12	Sediment sampling during cruise JC293 on RRS James Cook in the Whittard Canyon area characterised surficial seabed sediments for microplastics, PFAS, organic carbon and sedimentology. Sampling used a Day grab sampler and attempted short gravity coring after the planned coring campaign could not proceed. A total of 522 sites were attempted. The campaign covered upper canyon branches and adjacent interfluves, with samples intended to link seabed deposits to sediment-trap observations and pollutant/organic-carbon transport pathways. The Day grab sampler was deployed from RRS James Cook using the aft-deck 8 mm winch, with sampling limited to <1000 mbsl during the campaign. The Day grab used opposing steel buckets and a contact-trigger mechanism to recover surficial sediment and shallow subsurface material. Short gravity coring used a compact free-fall coring tube beneath a weighted frame, reinforced with ~20 kg ballast, but did not recover usable samples after four deployments.
B	10	Transects	D90	A VMP-2000 was deployed during the JC293 cruise to measure the water column turbulence and mixing within different parts of the Whittard Canyon region. In total 10 VMP sections were completed across 4 sites; Explorer Canyon, the Eastern Limb, the Western Limb, and the Gollum Channel system. In total 113 vertical profiles were taken with 6 bad casts with a maximum water depth of 1300 metres. Two channels of microstructure shear (512 Hz), two channels of microstructure temperature (512 Hz), and one microstructure conductivity channel (512 Hz). 1 SeaBird pumped CT package (SBE 3F, SBE 4C and SBE 5T; 64 Hz).
B	17	Casts	H10	Water column observations (vertical profiles) from the Whittard Canyon region in the Eastern North Atlantic were made with a SBE 911plus CTD rosette equipped with upward- and downward-looking RDI 300 kHz Workhorse lowered ADCPs (LADCPs). In addition to twin pumped (SBE 5T) temperature (SBE 3P) and conductivity (SBE 4C) sensors, the rosette was equipped with twin SBE 43 dissolved oxygen sensors, two Chelsea Aquatracka MKIII fluorimeter, a WETLabs C-Star transmissometer, two WETLabs ECO-BB turbidity sensor, and a Valeport VA500 altimeter. Basic post-processing of the CTD data was carried out following guidelines established with BODC. Casts were processed using SBE Data Processing, V7.26.7. The following modules were used: 1) Data Conversion 2) Bottle Summary 3) Filter 4) Align 5) Cell Thermal Mass 6) Derive 7) Bin Average Strip. The naming convention is: Cruise_CTD_CastNumber_ModuleName. An example filename is: JC293_CTD_054_FilterP_AlignDO_CellTM_Derive_Strip.cnv. Additionally, files can have the standard 8 Hz resolution and a 2 Hz resolution format, which is specified in the filename by adding 2 Hz after the Derive process.
B	16	Days	D71	Autonomous Seaglider observations collected during JC293 providing repeated water-column profiles over virtual moorings in the Eastern Limb and Dangeard Canyon. Equipment on glider: SBE CT sail; Aanderaa 4831 optode; BB2FL ECO Puck; Nortek 1 MHz AD2CP
A	1028	Line km	D71 G74 G75 G24 G08 H10	AUTOSUB5 AUV missions: The objective was to characterise the Whittard Canyon System in high-resolution ready for repeat mapping in a years time as well as to characterise features like landslides and knickpoints and seabed morphology including bedforms. Multibeam bathymetry and backscatter; sidescan sonar; sub-bottom profiler; CTD; UVP-6; AESA 2.5 camera imagery

TRACK CHART: You are strongly encouraged to submit, with the completed report, an annotated track chart illustrating the route followed and the points where measurements were taken.

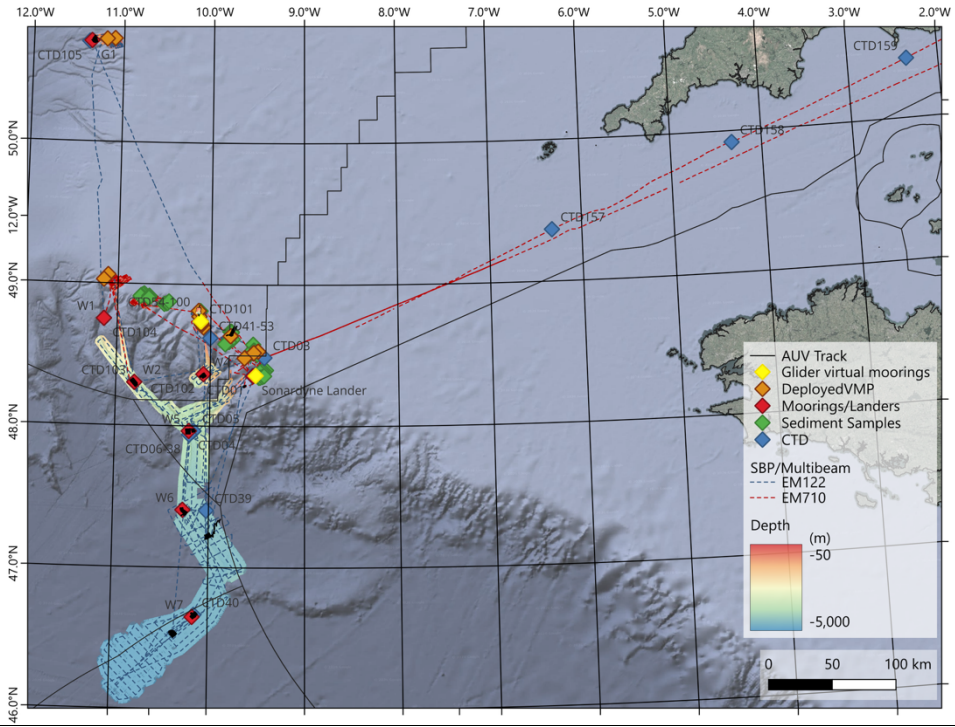
Insert a tick(✔) in this box if a track chart is supplied

✔

Tracklines for JC293



All science station locations during JC293



GENERAL OCEAN AREA(S):

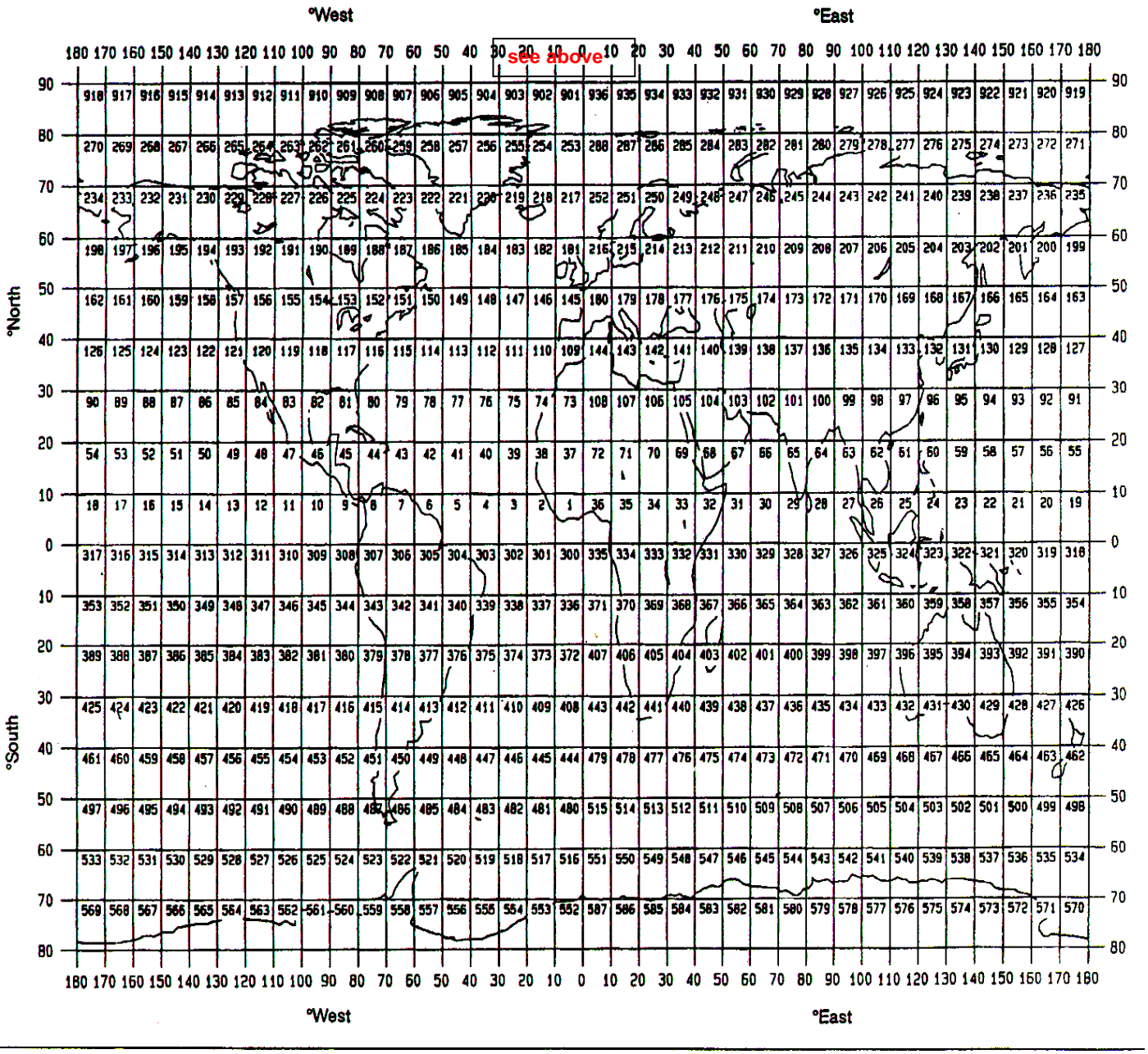
Research activities on JC293 were focused in the Celtic Sea and the Bay of Biscay.

SPECIFIC AREAS:

181, 182, 145, 146

Research activities were focused in the Celtic Sea and the Bay of Biscay, specifically in the Whittard Canyon (which lies primarily in Irish Waters but extends into UK waters), Gollum Channel (entirely within Irish Waters), the deep sea Whittard Channel (that lies in Uk and International Waters) and the deep sea Whittard Submarine Fan (Spanish Waters).

GEOGRAPHIC COVERAGE - INSERT 'X' IN EACH SQUARE IN WHICH DATA WERE COLLECTED



PARAMETER CODES

METEOROLOGY

M01	Upper air observations
M02	Incident radiation
M05	Occasional standard measurements
M06	Routine standard measurements
M71	Atmospheric chemistry
M90	Other meteorological measurements

PHYSICAL OCEANOGRAPHY

H71	Surface measurements underway (T,S)
H13	Bathythermograph
H09	Water bottle stations
H10	CTD stations
H11	Subsurface measurements underway (T,S)
H72	Thermistor chain
H16	Transparency (eg transmissometer)
H17	Optics (eg underwater light levels)
H73	Geochemical tracers (eg freons)
D01	Current meters
D71	Current profiler (eg ADCP)
D03	Currents measured from ship drift
D04	GEK
D05	Surface drifters/drifting buoys
D06	Neutrally buoyant floats
D09	Sea level (incl. Bottom pressure & inverted echosounder)
D72	Instrumented wave measurements
D90	Other physical oceanographic measurements

CHEMICAL OCEANOGRAPHY

H21	Oxygen
H74	Carbon dioxide
H33	Other dissolved gases
H22	Phosphate
H23	Total - P
H24	Nitrate
H25	Nitrite
H75	Total - N
H76	Ammonia
H26	Silicate
H27	Alkalinity
H28	PH
H30	Trace elements
H31	Radioactivity
H32	Isotopes
H90	Other chemical oceanographic measurements

MARINE CONTAMINANTS/POLLUTION

P01	Suspended matter
P02	Trace metals
P03	Petroleum residues
P04	Chlorinated hydrocarbons
P05	Other dissolved substances
P12	Bottom deposits
P13	Contaminants in organisms
P90	Other contaminant measurements

MARINE BIOLOGY/FISHERIES

B01	Primary productivity
B02	Phytoplankton pigments (eg chlorophyll, fluorescence)
B71	Particulate organic matter (inc POC, PON)
B06	Dissolved organic matter (inc DOC)
B72	Biochemical measurements (eg lipids, amino acids)
B73	Sediment traps
B08	Phytoplankton
B09	Zooplankton
B03	Seston
B10	Neuston
B11	Nekton
B13	Eggs & larvae
B07	Pelagic bacteria/micro-organisms
B16	Benthic bacteria/micro-organisms
B17	Phytobenthos
B18	Zoobenthos
B25	Birds
B26	Mammals & reptiles
B14	Pelagic fish
B19	Demersal fish
B20	Molluscs
B21	Crustaceans
B28	Acoustic reflection on marine organisms
B37	Taggings
B64	Gear research
B65	Exploratory fishing
B90	Other biological/fisheries measurements

MARINE GEOLOGY/GEOPHYSICS

G01	Dredge
G02	Grab
G03	Core - rock
G04	Core - soft bottom
G08	Bottom photography
G71	In-situ seafloor measurement/sampling
G72	Geophysical measurements made at depth
G73	Single-beam echosounding
G74	Multi-beam echosounding
G24	Long/short range side scan sonar
G75	Single channel seismic reflection
G76	Multichannel seismic reflection
G26	Seismic refraction
G27	Gravity measurements
G28	Magnetic measurements
G90	Other geological/geophysical measurements

List of science stations from JC293

Station	Other ID	date	time UTC Hr	Min	Lat Deg	Lat Min	Lon Deg	Lon Min	Water depth	Operation
1		29-Jun	17	55	50	53.47	-1	23.696	11	At Southampton NOC dock. Start MBES EM710. Also switching on EA640.
1		29-Jun	18	17	50	52.21	-1	22.684	16.2	Switch on SBP.
1	MB01	01-Jul	4	1	48	30.09	-9	22.402	159	Start MB01 survey.
1	MB01	01-Jul	6	14	48	29.5	-9	25.548	156	End MB01 survey.
2	AS5M136	01-Jul	6	41	48	29.53	-9	25.6	155	AUV in water.
2	AS5M136	01-Jul	6	51	48	29.42	-9	25.754	155	AUV diving. AS5 M136A.
2	AS5M136	01-Jul	7	8	48	29.1	-9	25.426	152	AUV diving for M136B.
2	AS5M136	01-Jul	7	15	48	29.14	-9	25.279	152	AUV back on surface.
2	AS5M136	01-Jul	7	26	48	29.11	-9	24.668	153	AUV diving for M136C.
2	AS5M136	01-Jul	7	39	48	29.14	-9	25.215	151	AUV on surface holding position.
2	ASM137	01-Jul	7	58	48	29.16	-9	25.677	153	AUV driving for M137 Sonar patch test.
2	ASM137	01-Jul	9	4	48	29.16	-9	25.648	153	AUV abort and recovery.
2		01-Jul	10	49	48	28.61	-9	25.382	149	AUV on deck.
3		01-Jul	10	56	48	28.84	-9	25.924	150	MBES on transit.
3		01-Jul	11	51	48	27.72	-9	33.228	207	On station for GS1. End of MBES.
4	GS01	01-Jul	12	0	48	27.65	-9	33.378	209	Grab in water.
4	GS01	01-Jul	12	6	48	27.65	-9	33.379	209	Winch stopped. Motor stopped. Needs repair.
4	GS01	01-Jul	13	8	48	27.55	-9	33.378	210	Grab on deck.
5		01-Jul	13	32	48	26.44	-9	36.331	262.88	Transit multibeam to SCYLLA hydrophone.
		01-Jul	14	9	48	22.98	-9	44.139	337.64	End of transit.
6		01-Jul	14	20	48	22.84	-9	44.488	354.1	Pinging stopped for MBES, singlebeam, SBP. Talking to hydrophone.
6		01-Jul	14	28	48	22.84	-9	44.488	354.1	Pinging restarted. Hydrophone lander spotted.
6		01-Jul	14	43	48	22.98	9	44.303	344	Lander grappled.
6		01-Jul	15	18	48	22.87	9	44.546	357	Lander on deck.
7		01-Jul	15	28	48	22.61	9	43.977	354	MBES transit to CTD01.
7		01-Jul	16	14	48	21.53	9	33.056	990	End of MBES and SBP on station.
8	CTD01	01-Jul	16	40	48	21.54	9	33.11	982	CTD01 in water.
8	CTD01	01-Jul	17	9	48	21.54	9	33.11	982	CTD01 at bottom.
8	CTD01	01-Jul	17	48	48	21.54	9	33.109	982	CTD01 out of water.
9		01-Jul	18	13	48	21.54	-9	33.11	981	Glider Deployment
10		01-Jul	20	40	48	21.54	-9	33.11	981	Transit to CTD
11	CTD02	01-Jul	21	0	48	21.41	-9	32.551	960	CTD in water
11	CTD02	01-Jul	21	28	48	21.41	-9	32.551	960	CTD max depth
11	CTD02	01-Jul	21	43	48	21.41	-9	32.55	960	CTD out of water
12		01-Jul	22	0	48	21.41	-9	32.552	953	Transit to MBES. Patch test & MBES 02
13		01-Jul	22	55	48	29.65	-9	27.727		End PT01
13		02-Jul	1	25	48	30	-9	26.088	163	Entered Irish Waters. Stopped Pinging

13		02-Jul	1	35	48	29.99	-9	25.857	158	Entered UK waters, resumed pinging
14	MB02	02-Jul	1	55	48	28.35	-9	26.475	170	MBES 02 - Start Survey
14	MB02	02-Jul	5	47	48	21.45	-9	32.538	968	End of Survey
15		02-Jul	6	47	48	21.42	-9	32.568	966	Sonardyne Lander in water for test
15		02-Jul	7	08	48	21.42	-9	32.567	967	Lander back on deck
16		02-Jul	7	16	48	21.62	-9	32.824	928	Transit to Whittard Canyon Eastern Limb
16		02-Jul	8	19	48	29.93	-9	43.165	258	Entered Irish waters. Turned off MBES, Single Beam and SBP
16		02-Jul	12	16	48	45.65	-10	3.9048	284	Turned on Ship ADCP
16		02-Jul	13	19	48	45.65	-10	3.904	284	Moving to EL Mooring location
17	EL	02-Jul	14	34	48	44.37	-10	6.346		Moorings Ops started
17	EL	02-Jul	14	37	48	44.37	-10	6.347		ADCP in water
17	EL	02-Jul	14	50	48	44.41	-10	6.474	814	EL Mooring deployed
17	EL	02-Jul	15	3						Trilaterating Mooring first location
17	EL		15	31						2nd location
17	EL		15	50						3rd location
			15	50						Transit to VMP Site
18	VMP01	02-Jul	18	0	48	38.38	-9	47.017	740	VMP section 001 start
18	VMP01	02-Jul	18	27	48	38.29	-9	47.264	710	VPM section 001 stop. VMP out of water
19	MB03	02-Jul	18	30	48	38.29	-9	47.264	710	Transit to Whittard Canyon confluence zone. (MB3)
19	MB03	02-Jul	23	9	48	2.591	-10	15.562	3669	Arrived at MB03 location Survey
20	MB03	02-Jul	23	23	48	1.426	-10	17.593	3845	Begin MB03 Survey
21		03-Jul	2	31	48	3.466	-10	10.432	3805	Transit to AUV site (Dangaard Canyon)
22	Sonardyne Lander	03-Jul	6	20	48	4864	-9	42611	154.87	Sonardyne Lander test. Arrived at site.
22	Sonardyne Lander	03-Jul	7	18	48	29.18	-9	25.568	154	Lander in water.
22	Sonardyne Lander	03-Jul	7	39	48	29.18	-9	25.568	154	Lander on deck. Test successful.
23	CTD03	03-Jul	11	26	48	29.19	-9	25.569	152	CTD3 for sound velocity profile.
23	CTD03	03-Jul	11	36	48	29.18	-9	25.569	152	CTD max wire out.
23	CTD03		11	43	48	29.18	-9	25.568	151	CTD recovered!
24	AS5M137	03-Jul	13	27	48	29.21	-9	25.604	152	AUV in water. AS5M137.
24	AS5M137	03-Jul	13	49	48	29.19	-9	25.895	155	AUV driving.
24	AS5M137	03-Jul	14	30	48	29.33	-9	25.848	155	AUV at surface.
24	AS5M138	03-Jul	14	38	48	29.33	-9	25.847	150	AUV starts mission M138.
25	Sonardyne Lander	03-Jul	17	2	48	21.43	-9	32.651	973	Sonardyne lander in the water.
24	AS5M138	03-Jul								AUV on surface (M138).
24	AS5M138	03-Jul	19	37	48	28.96	-9	25.021	154	AUV recovered.
26	MB4	04-Jul	0	0	47	53.94	-10	12.84	3751	MB4 Survey
26	MB4	04-Jul	8	41	48	5.091	-10	1.049	3152	MB4 Survey ended. Transit to AUV site

26		04-Jul	9	40	47	58.11	-10	11.161	3926	End of transit.
27	AS5M139	04-Jul	11	0	47	58.37	-10	9.998	3898	AUV deployed for AS5M139
27	AS5M139	04-Jul	11	36	47	58.23	-10	9.748	3905	AUV diving
27	AS5M139	04-Jul	13	45	47	58.4	-10	10.06	3903	AUV Surfacing unschedulled
27	AS5M139	04-Jul	14	47	47	58.03	-10	11.275	3949	AUV grappled
27	AS5M139	04-Jul	15	3	47	57.86	-10	11.263	3929	AUV on deck.
28	CTD04	04-Jul	15	41	47	57.94	-10	12.666	3927	CTD004 in water
28	CTD04	04-Jul	17	0	47	57.94	-10	12.665	3934	Acoustic off for acoustic release test
28	CTD04	04-Jul	17	6	47	57.94	-10	12.666	3936	Acoustics back on
28	CTD04	04-Jul	18	12	47	57.34	-10	12.665	3932	CTD004 out of water
29	CTD05	04-Jul	18	51	47	57.91	-10	13.097	3955	CTD005 in water
29	CTD05	04-Jul	20	12	47	57.91	-10	13.098	3955	Acoustic off for acoustic release test
29	CTD05	04-Jul	20	18	47	57.91	-10	13.098	3955	Acoustics back on
29	CTD05	04-Jul	22	4	47	57.31	-10	13.098	3969	CTD005 out of water
30	MB05	04-Jul	22	4	48	1.8	-10	21.312	3727	Start of MB05 survey
30	M05	05-Jul	9	56	47	58.52	-10	10.323	3906	End of MB05 survey
31	AS5M141	05-Jul	10	24	47	58.39	-10	10.02	3903	AUV in water - AS5M141
31	AS5M141	05-Jul	10	46	47	58.2	-10	9.99	3906	AUV diving
	AS5M141	05-Jul	11	47	47	58.39	-10	10.407	3892	Switched ADCP recording back on
	AS5M141	05-Jul	13	9	47	58.36	-10	10.406	3900	Move to CTD location (AUV started survey)
32	CTD06-38	05-Jul	13	48	47	56.37	-10	12.799	3991	CTD006 in water
32	CTD06-38	05-Jul	22	14	47	56.37	-10	12.799	3994	CTD038 out of water
32	CTD06-38									Station 32 Yo Yo CTD006-CTD038
33	MB06	05-Jul	0	25	47	36.02	-10	15.947	4127	Start of MB06 Multibeam Survey
34	MB06	06-Jul	10	58	47	57.36	-10	9.589	3907	Arrival at AUV recovery site/mooring W5 location
31	AS5M141	06-Jul	12	5	47	58.66	-10	10.927	?	AUV grappled
31	AS5M141	06-Jul	12	22	47	58.77	-10	10.594	3888	AUV on deck.
34	W5	06-Jul	13	59	47	57.93	-10	13.305	3985	W5 mooring in the water
34	W5	06-Jul	14	24	47	57.9	-10	13.059	3937	Mooring deployed
34	W5	06-Jul	14	40						Attempting to communicate with mooring
34	W5	06-Jul	16	0	47	57.9	-10	13.126		As deployed location for W5 - Triangulation complete
35	CTD39	06-Jul								Transit to CTD039 (meander bend)
35	CTD39	06-Jul	19	24	47	24.43	-10	16.196	4370	CTD039 deployed
35	CTD39	06-Jul	22	19	47	24.24	-10	16.26	4420	CTD039 complete
36	MB07	06-Jul	22	20	47	24.24	-10	16.26	4420	Transit to MB07 Multibeam survey site
36	MB07	06-Jul	23	14	47	16.55	-10	8.8764	4369	Begin MB07.
36	MB07	07-Jul	9	5	47	22.28	-10	15.285	4308	End MB07.
		07-Jul	9	0						Waiting for fog to lift for deployment of AUV.
		07-Jul								Decided to start SBP survey across channel.
37	SBP1	07-Jul	10	47	47	22.46	-10	15.4	3912	SBP survey.

37	SBP1	07-Jul								End of Survey. SADCP turned off. Possible Med-Evacuation.
37	SBP1	07-Jul								Survey continued.
37	SBP1	07-Jul	14	23	47	22.39	-10	15.054	4272	End of survey.
38	AS5M142	07-Jul	14	32						USBL Pole deployed for AUV.
38	AS5M142	07-Jul	14	52	47	22.45	-10	15.077		AUV deployment start.
38	AS5M142	07-Jul	14	57	47	22.46	-10	15.074		AUV in the water.
38	AS5M142	07-Jul	15	10	47	22.51	-10	15.474	4309	AUV dived (out of sight).
39	MB08	07-Jul	18	3	47	22.1	-10	20.204	4325	Transit to MB08
39	MB08	07-Jul	20	53	47	0	-9	53.742	4512	MB08 Line 1
39	MB08	08-Jul	12	22	47	24.46	-10	15.617	4398	End of MB08 + Transit to W6 Mooring
		08-Jul	12	45	47	24.42	-10	16.213	4422	Tracking AUV on USBL
40	W6	08-Jul	13	13	47	24.28	-10	16.248	4417	Mooring in the water
40	W6	08-Jul	13	38	47	24.45	-10	16.25	4411	Mooring sinking to the bottom
40	W6	08-Jul	14	0	47	24.45	-10	16.25	4411	Mooring at bottom, moving to recover AUV
38	AS5M142	08-Jul	14	45	47	22.41	-10	15.142	4258	AUV at surface
38	AS5M142	08-Jul	14	52	47	22.31	-10	15.162		AUV grappled
38	AS5M142	08-Jul	15	6	47	22.33	-10	15.084	4268	AUV on deck.
		08-Jul	15	45	47	22.15	-10	15.201	4265	Checking ship's emergency steering
40	W6	08-Jul	15	45	47	22.14	-10	15.2	4266	Triangulating W6 mooring position
41	MB09	08-Jul	17	22	47	24.87	-10	13.654	4302	Start logging MBES SBP
41	MB09	08-Jul	21	12	46	48.5	-9	51.267	4611	Start MB09
41	MB09	09-Jul	6	11	46	39.74	-10	8.6028	4709	Stop MBES SBP logging
42	CTD40	09-Jul	6	30	46	39.93	-10	8.505	4704	CTD-40, single cast for calibration and testing acoustic release
42	CTD40	09-Jul	7	51	46	39.92	-10	8.5106	4697	Max wire
	CTD40		7	53	46	40.09	-10	8.5106	4699	SADCP, MBES and SBP stopped
	CTD40		8	2						Continue pinging
	CTD40		8	12						Sensors off again for acoustic release
	CTD40		8	19						Acoustics back on
42	CTD40	09-Jul	10	0	46	39.77	-10	8.7352	4700	CTD on deck
43		09-Jul	10	59	46	40.52	-10	9.583	4684	AUV in water
		09-Jul								AUV diving
		09-Jul	13	47	46	40.5	-10	9.605	4682	Testing Ship's steering system
		09-Jul	14	33						Finished maintenance. Moving to MB10 survey.
		09-Jul	14	39	46	40.51	-10	10.282	4682	Start MBES on the way to MB10.
44	MB10	09-Jul	16	33	46	34.85	-10	37.772	4762	Start MB10.
44	MB10	09-Jul	21	37						ADCP (ship) off.
43/44		10-Jul	10	47	46	40.06	-10	8.28	4675	End MB & SBP. ADCP (ship) on.
43	AS5M143	10-Jul	11	31	46	40.44	-10	8.57	4014	AUV at surface.
43	AS5M143	10-Jul	12	19	46	40.22	-10	10.051	4691	AUV on deck.

		10-Jul	14	58	46	24.5	-10	36.197		Stopping to do maintenance on AUV LARS.
		10-Jul	15	15	46	23.7	-10	36.669		Maintenance complete. Continue transit to MB10.
45	MB10	10-Jul	15	59	46	18.15	-10	41.023	4790	Resume MB10.
45/46	A5M144	11-Jul	9	2	46	32.64	-10	22.244	4437	End at 45 MBES / Start of 46 AUV
46	A5M144	11-Jul	9	16	46	32.66	-10	22.034	4514	AUV in water for M144
46	A5M144	11-Jul	9	33	46	32.89	-10	23.047	4336	AUV diving
46	A5M144	11-Jul	11	44	46	32.64	-10	22.916	4705	AUV started moving
47	W7	11-Jul	13	10	46	39.03	-10	9.668		On station for mooring W7
47	W7	11-Jul	13	4	46	39.04	-10	9.636	4627	1st float in the water
47	W7	11-Jul	13	23	46	39.04	-10	9.63	4701	ADCP float deployed
47	W7	11-Jul	13	29	46	39.06	-10	9.596		Sediment trap in water
47	W7	11-Jul	13	47	46	39.11	-10	9.428	4681	Final weight released
47	W7	11-Jul	14	13	46	39.1	-10	9.459	4680	Mooring W7 on bottom
		11-Jul	16	17	46	36.1	-10	12.055		Transit to MBES
48	MB10	11-Jul	22	58	46	9.932	-11	2.115	4810	End of MB10.
49	MB11	12-Jul	2	17	46	24.48	-10	16.02	4740	Start of MB11.
49	MB11	12-Jul	6	36	46	47.34	-9	47.806	4612	End of MB11.
46	AS5M144	12-Jul	10	16	46	32.64	-10	22.919	4704	AUV at surface.
46	AS5M144	12-Jul	10	44	46	32.14	-10	22.718	4220	AUV grappled.
46	AS5M144	12-Jul	10	59	46	32.17	-10	22.641	4135	AUV on deck + transit to Irish waters.
		12-Jul	11	45	46	35.75	-10	20.786	4868	Transit to Irish Waters
50	MB12	13-Jul	1	2	48	47.5	-10	8.8488	234	MB12 Shallow Multibeam Survey.
50	MB12	13-Jul	5	45	48	37.34	-9	59.94	1595	End of MB12.
51	CTD 41-53	13-Jul	6	16	48	37.37	-9	59.989	1589	Start CTD41 (13hr yoyo).
51	CTD 41-53	13-Jul	19	28	48	37.34	-10	0.232	1486	End CTD53. (13hr yoyo).
51	CTD 41-53	13-Jul	19	30	48	37.34	-10	0.234	1604	CTD on deck. No. 6 didn't fire, No. 10 leaking at bottom.
52	GS01	13-Jul	20	57	48	40.17	-9	47.43	256	GS01 in water. Location EL01.
52	GS01	13-Jul	21	3	48	40.17	-9	47.43	256	GS01 at bottom.
52	GS01	13-Jul	21	8	48	40.17	-9	47.43	256	GS01 out of water (empty).
53	GS02	13-Jul	21	13	48	40.17	-9	47.43	256	GS02 in water.
53	GS02	13-Jul	21	16	48	40.17	-9	47.43	256	GS02 at bottom.
53	GS02	13-Jul	21	21	48	40.17	-9	47.43	256	GS02 out of water (empty).
54	GS03	13-Jul	21	23	48	40.17	-9	47.43	256	GS03 in water.
54	GS03	13-Jul	21	28	48	40.17	-9	47.43	256	GS03 at bottom.
54	GS03	13-Jul	21	33	48	40.17	-9	47.43	256	GS03 out of water (empty).
55	GS04	13-Jul	21	40	48	40.19	-9	47.353	333	Moved ~ 100m from Station 54. GS04 in water.
55	GS04	13-Jul	21	46	48	40.19	-9	47.353	333	GS04 at bottom.
55	GS04	13-Jul	21	51	48	40.19	-9	47.353	333	GS04 out of water (empty).
56	GS05	13-Jul	22	20	48	39.82	-9	46.53	333	Location EL02 - G505 in water
56	GS05	13-Jul	22	27	48	39.82	-9	46.53	333	GS05 at bottom
56	GS05	13-Jul	22	33	48	39.82	-9	46.53	333	GS05 out of water (empty)
57	GS06	13-Jul	22	35	48	39.82	-9	46.53	333	GS06 in water
57	GS06	13-Jul	22	41	48	39.82	-9	46.53	333	GS06 at bottom

57	GS06	13-Jul	22	49	48	39.82	-9	46.53	333	GS06 out of water (empty)
58	GS07	13-Jul	22	51	48	39.82	-9	46.53	333	GS07 In water
58	GS07	13-Jul	22	57	48	39.82	-9	46.53	333	GS07 at bottom
58	GS07	13-Jul	23	4	48	39.82	-9	46.53	333	GS07 out of water (empty)
59	MB13	13-Jul	23	35	48	38.49	-9	48.74	208	Start MB13
59	MB13	14-Jul	5	44	48	53.96	-9	7.5042	132	End MB13 - start transit
60	AS5M145	14-Jul	6	7	48	50.98	-10	7.466	162	AUV in water for AS5M145
60	AS5M145	15-Jul	6	23	48	51.21	-10	7.419	161	AUV diving
61	VMP002	16-Jul	8	15	48	46.41	-10	7.386	503	Start VMP
61	VMP002	17-Jul	9	26	48	45.09	-10	6.867		Stopped VMP to change over hydraulic pump
61	VMP002	18-Jul	9	35	48	44.11	-10	6.749	750	Winch pump replaced. Start VMP again
61	VMP002	19-Jul	12	27	48	41.91	-10	4.692	1106	VMP on deck
62	VMP003	20-Jul	13	20	48	46.53	-10	7.37	475	VMP in water, start VMP003
62	VMP003	21-Jul	19	29	48	43.01	-10	5.813		VMP on deck, end VMP003
63	VMP004	22-Jul	20	32	48	46.43	-10	7.387	501	VMP in water; start VMP004
63	VMP004	23-Jul	23	12	48	43.61	-10	6.018		VMP on deck; end VMP004
64	MB14	15-Jul	0	12	48	47.44	-10	6.0858	241	Start MB14
64	MB14	15-Jul	5	36	48	46.45	-10	9.236	283	End MB14
60	AS5M145	15-Jul	6	6	48	46.55	-10	7.346	460	AUV grappled
60	AS5M145	15-Jul	6	22	48	46	-10	6.699	410	AUV on deck
65	CTD54-100	15-Jul	6	57	48	47.56	-10	7.854	395	CTD in water (E1) 13hr
66	CTD101	15-Jul	21	38	48	44.53	-10	6.528	788	CTD (Single) W3 in water
66	CTD101	15-Jul	22	59	48	44.51	-10	6.775	788	CTD (single) W3 on deck
			23	23						Transit to MB15
67	MB15	16-Jul	0	37	48	39.63	-9	48.348	353	MB15 - (EM122)
67	MB15	16-Jul	5	27	48	37.74	-9	46.244	438	MB15 - End
68	AS5M146	16-Jul	6	23	48	42.55	-9	43.475	193	AUV in water for M146
68	AS5M146	16-Jul	6	38	48	42.51	-9	43.822	196	AUV diving
69	GS08	16-Jul	7	37	48	36.9	-9	45.865	395	GB08 in water. Grab on deck
69	GS08	16-Jul	8	0	48	36.9	-9	45.865		Grab on deck.
69	GS08	16-Jul	7	48	48	36.9	-9	45.865	404	Grab on bottom
70	GS09	16-Jul	8	42	48	35.8	-9	48.216	342	GS09 in water
70	GS09	16-Jul	8	49	48	35.8	-9	48.216	342	GS09 on bottom
70	GS09	16-Jul	8	59	48	35.8	-9	48.216	342	GS09 on deck
71	GS10	16-Jul	9	22	48	34.86	-9	50.631	404	GS10 in water
71	GS10	16-Jul	9	33	48	34.86	-9	50.632	404	GS10 on bottom
71	GS10	16-Jul	9	43	48	34.86	-9	50.632	404	GS10 on deck
17	EL Mooring	16-Jul	12	26	48	44.56	-10	6.333	749	Released EL Mooring
17	EL Mooring	16-Jul	12	32	48	44.56	-10	6.332	749	EL Mooring sighted
17	EL Mooring	16-Jul	12	41	48	44.45	-10	6.555	775	EL Mooring Grappled
17	EL Mooring	16-Jul	12	55	48	44.59	-10	6.416	746	EL Mooring recovered
72	W3 Mooring	16-Jul	14	14	48	44.51	-10	6.509	828	W3 Mooring first float in water

72	W3 Mooring	16-Jul	15	0						Crane required repair - waiting on standby
72	W3 Mooring	16-Jul	15	50	48	44.51	-10	6.523	791	Crane repaired, deployment resumed
72	W3 Mooring	16-Jul	15	54						Another crane fault - waiting on standby
72	W3 Mooring	16-Jul	18	17	48	44.46	-10	6.533	795	W3 Mooring deployed
73	MB16	16-Jul	21	0	48	26.45	-10	0.999	1694	Start MB16
73	MB16	17-Jul	4	15	48	18.05	-10	2.934	2006	End MB16
68	A5M146	17-Jul	6	20						AUV at surface
68	A5M146	17-Jul	6	51	48	38.57	-9	49.21		AUV grappled
68	A5M146	17-Jul	7	13	48	36.67	-9	48.999		AUV on deck
74	VMP05	17-Jul	9	15	48	31.83	-9	29.521	332	VMP in water
74	VMP05	17-Jul	13	12	48	29.06	-9	37.945	995	VMP on deck
75	VMP06	17-Jul	14	18	48	31.83	-9	29.595	330	VMP in water
75	VMP06	17-Jul	17	6	48	31.03	-9	32.708	548	VMP on deck
76	VMP07	17-Jul	17	37	48	31.22	-9	32.31	489	VMP in water (VMP 007)
76	VMP07	17-Jul	23	23	48	28.94	-9	38.277	1001	VMP on deck
77	MB17	18-Jul	0	34	48	29.59	-9	30.394	188	Start MB17
77	MB17	18-Jul	5	51	48	24.76	-9	50.222	3218	End MB17
78	AS5M147	18-Jul	6	13	48	21.1	-10	6.118	3383	AUV in water (AS5M147)
78	AS5M147	18-Jul	7	25	48	20.33	-10	5.709	3530	AUV aborted and grappled
78	AS5M147	18-Jul	7	38	48	20.36	-10	5.636	3296	AUV on deck
79	CTD102	18-Jul	9	28	48	22.05	-10	4.298	3228	CTD (CT102) in water
79	CTD102	18-Jul	12	14	48	22.05	-10	4.298	3224	CTD (CT102) on deck
80	A5M148	18-Jul	13	45	48	21.25	-10	6.236	3323	AUV in water (AS5M148)
81	VMP008	18-Jul	18	48	48	48.88	-10	7.778	306	VMP 008 in the water
81	VMP008	18-Jul	23	52	48	44.58	-10	6.532	825	VMP 008 out of water
	Transit	19-Jul	0	12	48	44.58	-10	6.533	800	Transit to MB18
82	MB18	19-Jul	2	24	48	31.1	-9	37.238	449	Start MB18 survey
80	AS5MI48	19-Jul	10	13	48	20.96	-10	6.5301	3269	AUV grappled. AS5MI48.
80	AS5MI48	19-Jul	10	27	48	20.99	-10	6.443	3258	AUV on deck.
83	W4 Mooring	19-Jul	12	42	48	22.08	-10	4.428	2951	Small float deployed. W4 mooring.
83	W4 Mooring	19-Jul	12	45	48	22.08	-10	4.425	3216	ADCP float deployed. W4 mooring.
83	W4 Mooring	19-Jul	13	6	48	22.06	-10	4.195	3336	Ballast weight released.
83	W4 Mooring	19-Jul	13	16	48	22.06	-10	4.1445	3240	Turned off single and multibeam.
83	W4 Mooring	19-Jul	14	39	48	23.58	-10	5.07	3240	EM122 and 12kHz back on.
	Transit	19-Jul	14	43	48	23.53	-10	5.356	2705	Start transit to W2 CTD site.
84	CTD103	19-Jul	17	34	48	18.27	-10	48.209	3425	CTD103 in water
84	CTD103	19-Jul	19	41	48	18.27	-10	48.206	3448	CTD103 out of water
		19-Jul	20	0	48	16.64	-10	47.13	3909	Transit to MB19 survey
85	MB19	19-Jul	20	18	48	14.27	-10	46.423	3131	Start MB19 survey
85	MB19	20-Jul	5	38	48	14.25	-10	46.552	3112	End of MB19 survey
86	AS5M149	20-Jul	6	20	48	16.77	-10	47.118	3401	AUV in water. AS5M149
86	AS5M149	20-Jul	6	39	48	16.68	-10	46.863	3402	AUV diving

		20-Jul	8	23	48	16.91	-10	47.531	3426	Start transit to MB20
		20-Jul	12	16	48	54.67	-11	1.979	506	Changed EM122 to EM710
87	MB20	20-Jul	12	32	48	56.99	-11	2.601	667	MB20 start line 1
87	MB20	21-Jul	3	5	49	1.492	-11	2.754	355	End MB20. Transit to AUV AS5149 site.
86	AS5M149	21-Jul	8	20	48	16.67	-10	47.311	3420	AUV grappled
86	AS5M149	21-Jul	8	33	48	16.71	-10	47.208	3365	AUV on deck
88	W2	21-Jul	12	39	48	21.09	-10	48.293	3450	On station for mooring W2
88	W2	21-Jul	13	4	48	18.15	-10	48.192	3532	Mooring float in water
88	W2	21-Jul	13	10	48	18.16	-10	48.19	3304	Sediment trap in water
88	W2	21-Jul	13	31	48	18.3	-10	48.177	3452	W2 mooring deployed
	Transit	21-Jul	15	26	48	19.9	-10	51.313	3865	Transit to VMP 009
89	VMP 009	21-Jul	20	2	49	3.683	-11	6.497	510	VMP 009 in water
89	VMP 009	21-Jul	23	30	49	1.653	-11	9.213	798	VMP 009 out of water
	Transit	21-Jul	23	34	49	1.52	-11	9.437	786	Transit to MB22
90	MB22	21-Jul	23	55	49	2.911	-11	19.111	343	Start MB22
91	CTD 104	22-Jul	9	50	48	45.07	-11	8.571	2091	CTD 104 in the water
91	CTD 104	22-Jul	10	33	48	45.06	-11	8.513	209	CTD 104 at the bottom
91	CTD 104	22-Jul	11	51	48	45.07	-11	8.5702	2091	CTD 104 on deck
92	W1	22-Jul	13	23	48	45.01	-11	8.746	2091	W1 buoy in water
92	W1	22-Jul	13	44	48	45.08	-11	8.524	2064	W1 mooring released
93	MB23	23-Jul	2	15	50	43.45	-11	13.507	626	Start MB23 survey (GOLLUM)
93	MB23	23-Jul	5	55	50	44.43	-11	19.963	966	MB23 finished
94	AS5M150	23-Jul	6	19	50	44.37	-11	19.548	972	AUV M150 in water
94	AS5M150	23-Jul	6	29	50	44.29	-11	19.173	927	AUV 150 diving
94	AS5M150	23-Jul	10	28	50	44.09	-11	19.899	1924	AUV 150 dive aborted - grappled
94	AS5M150	23-Jul	10	40	50	44.05	-11	19.793	1924	AUV on deck.
94	AS5M151	23-Jul	13	45	50	44.36	-11	19.507	974	AUV in water (AS5M151)
94	AS5M151	23-Jul	13	58	50	44.41	-11	19.149	970	AUV diving
96	CTD 105	23-Jul	15	24	50	42.36	-11	22.918	1531	CTD in the water
96	CTD 105	23-Jul	15	54	50	42.36	-11	22.92	1531	CTD 105 at bottom
96	CTD 105	23-Jul	17	8	50	42.36	-11	22.919	1531	CTD 105 on deck
93	MB23	23-Jul	17	31	50	42.76	-11	19.063	1325	Transit to unfinished line of MB23 before MB24
97	MB24	23-Jul	18	30	50	45.2	-11	14.425	603	Start transit to start of MB24
97	MB24	23-Jul	19	17	50	44.18	-11	2.811	265	Start MB24
98	VMP010	24-Jul	8	10	50	43.76	-11	6.04	510	Start of VMP010
98	VMP010	24-Jul	11	37	50	43.5	-11	11.278	863	End of VMP010 - VMP on deck
		24-Jul	11	41	50	43.58	-11	11.288	864	Transit to AUV station 95
95	AS5M151	24-Jul	12	41	50	42.9	-11	20.886	1136	AUV grappled
95	AS5M151	24-Jul	12	52	50	43.01	-11	20.888	1166	AUV on deck
99	G1	24-Jul	13	46	50	42.58	-11	21.294	1078	Float in water for G1 mooring
99	G1	24-Jul	14	5	50	42.67	-11	21.52	1156	Anchor deployed - G1 deployed. Sunfish spotted
99	G1	24-Jul								Triangulating G1 mooring
		24-Jul								Transit to Whittard from Gollum.
100	MB25	25-Jul	5	17	48	23.93	-9	26.178	202	MB25 start.

100	MB25	25-Jul	6	0	48	18.95	-9	28.743	159	MB25 finished.
101	AS5M153	25-Jul	7	13	48	16.92	-9	37.629	314	AUV in the water.
101	AS5M153	25-Jul	7	25	48	16.68	-9	37.757	310	AUV diving.
101	AS5M153	25-Jul	13	30	48	16.91	-9	38.366	339	AUV grappled
101	AS5M153	25-Jul	13	44	48	17.1	-9	38.411	340	AUV on deck
102	GS11	25-Jul	15	37	48	34.72	-9	32.753	187	On site for GS11.
102	GS11	25-Jul	15	40	48	34.74	-9	32.749	187	GS11 in the water.
102	GS11	25-Jul	15	44	48	34.74	-9	32.751	187	200m wire out. GS11 on bottom.
102	GS11	25-Jul	15	49	48	34.74	-9	32.741	187	GS11 on deck. Sample collected. Blank 15:49.
103	GS12	25-Jul	16	14	48	33.44	-9	32.704	203	On site for GS12.
103	GS12	25-Jul	16	16	48	33.44	-9	32.702	203	GS12 in the water.
103	GS12	25-Jul	16	21	48	33.44	-9	32.702	203	GS12 on bottom.
103	GS12	25-Jul	16	26	48	33.44	-9	32.701	203	GS12 on deck. Blank open at 16:28 and closed at 16:33.
104	GS13	25-Jul	16	51	48	32.23	-9	32.099	436	On site for GS13.
104	GS13	25-Jul	16	52	48	32.23	-9	32.095	435	GS13 in the water.
104	GS13	25-Jul	17	0	48	32.23	-9	32.093	434	GS13 on bottom.
104	GS13	25-Jul	17	9	48	32.23	-9	32.093	434	GS13 on deck. Empty.
105	GS14	25-Jul	17	11	48	32.23	-9	32.093	434	GS14 in the water.
105	GS14	25-Jul	17	19	48	32.23	-9	32.092	434	GS14 on bottom.
105	GS14	25-Jul	17	28	48	32.23	-9	32.092	433	GS14 on deck.
106	GS15	25-Jul	17	34	48	32.23	-9	32.092	434	GS15 in the water.
106	GS15	25-Jul	17	41	48	32.23	-9	32.092	434	GS15 on bottom.
106	GS15	25-Jul	17	51	48	32.23	-9	32.092	432	GS15 on deck.
107	GS16	25-Jul	17	59	48	32.23	-9	32.091	434	GS16 in the water.
107	GS16	25-Jul	18	9	48	32.23	-9	32.091	433	GS16 on bottom.
107	GS16	25-Jul	18	19	48	32.23	-9	32.093	434	GS16 on deck.
108	GS17	25-Jul	18	36	48	32.99	-9	32.485	354	GS17 in the water.
108	GS17	25-Jul	18	44	48	31.99	-9	32.482	354	GS17 on bottom.
108	GS17	25-Jul	18	52	48	31.99	-9	32.484	353	GS17 on deck.
109	GS18	25-Jul	19	18	48	30.73	-9	34.594	812	GS18 in the water.
109	GS18	25-Jul	19	32	48	30.73	-9	34.594	811	GS18 on bottom.
109	GS18	25-Jul	19	48	48	30.74	-9	34.594	812	GS18 on deck.
110	GS19	25-Jul	19	54	48	30.73	-9	32.593	811	GS19 in the water.
110	GS19	25-Jul	20	7	48	30.73	-9	34.594	811	GS19 on bottom.
110	GS19	25-Jul	20	24	48	30.73	-9	34.595	811	GS19 on deck.
111	GS20	25-Jul	20	54	48	30.23	-9	35.556	883	GS20 in the water.
111	GS20	25-Jul	21	10	48	30.23	-9	35.555	885	GS20 on bottom.
111	GS20	25-Jul	21	29	48	30.23	-9	35.555	882	GS20 on deck.
112	GS21	25-Jul	21	42	48	30.45	-9	36.001	752	GS21 in the water.
112	GS21	25-Jul	21	54	48	30.45	-9	36.001	750	GS21 on bottom.
112	GS21	25-Jul	22	10	48	30.45	-9	36	750	GS21 on deck.
113	GS22	25-Jul	22	13	48	30.45	-9	36	750	GS22 in the water.
113	GS22	25-Jul	22	23	48	30.45	-9	35.999	751	GS22 on bottom.
113	GS22	25-Jul	22	34	48	30.45	-9	36.001	750	GS22 on deck.
114	GS23	25-Jul	23	28	48	30.55	-9	30.089	219	GS23 in the water

114	GS23	25-Jul	23	36	48	30.55	-9	30.088	220	GS23 on bottom
114	GS23	25-Jul	23	42	48	30.55	-9	30.087	220	GS23 on deck
115	GS24	25-Jul	23	43	48	30.55	-9	30.089	220	GS24 in the water
115	GS24	25-Jul	23	48	48	30.55	-9	30.089	220	GS24 on bottom
115	GS24	25-Jul	23	54	48	30.55	-9	30.089	220	GS24 on deck
116	MB25	26-Jul	0	1	48	30.41	-9	30.316	218	Transit to MB25
116	MB25	26-Jul	0	47	48	24.03	-9	26.502		Start MB25 survey
116	MB25	26-Jul	4	12	48	25.02	-9	29.032	361	End of MB25 survey
117	CTD106	26-Jul	7	54	48	41.74	-10	4.354	1133	Start of CTD yo-yo
117	CTD123	26-Jul	21	0	48	41.76	-10	4.373	1126	End of CTD yo-yo
118	AS5M155	27-Jul	6	16	47	12.33	-10	1.618	3934	AUV in water
118	AS5M155	27-Jul	6	32	47	12.43	-10	1.913	4380	AUV diving
119	MB26	27-Jul	10	56	47	34.4	-9	57.512	4244	
		27-Jul	18	0	47	20.58	-9	55.455	4368	Stopped MB26 for AUV recovery
118	AS5M155	27-Jul	18	50	47	14.45	-9	57.682	4416	AUV recovery
118	AS5M155	27-Jul	19	7	47	14.62	-9	57.527	3977	Grappled AUV.
118	AS5M155	27-Jul	19	20	47	14.67	-9	57.67	400	AUV on deck.
120	SBP02	27-Jul	20	1	47	20.61	-9	55.689	4360	SBP02 start.
120	SPB02	27-Jul	23	56	47	9.35	-10	12.798		SBP02 end
9		28-Jul	19	26	48	21.56	-9	31.042	605	Seaglider on deck.
25		28-Jul	7	59	48	21.33	-9	31.968	825	Sonardyne lander released.
25		28-Jul	9	23	48	21.39	-9	32.793	891	First point triangulation.
25		28-Jul								Lander not recovered. Still on seafloor.
121	CTD 124	28-Jul	12	11	48	31.08	-9	32.635	549	CTD in water for YoYo at A1.
121	CTD 150	28-Jul	23	59	48	31.07	-9	32.569	495	CTD out of water. End of YoYo.
		29-Jul	0	12	48	31.03	-9	32.574	489	Transit to AUV site.
122	AS5M156	29-Jul	8	45	47	12.27	-10	1.662	4377	AUV in water.
122	AS5M156	29-Jul	9	2	47	12.32	-10	1.936	4377	AUV diving.
122	AS5M156	29-Jul	11	6	47	12.3	-10	1.615	4377	AUV starts mission. Heading to SBP27 Survey.
123	SBP27	29-Jul	11	13	47	11.93	-10	1.989	4410	SBP27 start.
123	SBP27	30-Jul	5	27	46	51.65	-9	49.264	4454	SBP27 end.
122	AS5M156	30-Jul	9	29	47	13.03	-10	1.522	4364	AUV grappled.
122	AS5M156	30-Jul	9	40	47	13.05	-10	1.52	3669	AUV on deck.
		30-Jul	10	1	47	12.98	-10	2.2384	4382	Transit to Eastern Branch.
124	GS25	30-Jul	20	38	48	48.79	-10	6.671	202	GS25 in water.
124	GS25	30-Jul	20	45	48	48.79	-10	6.662	202	GS25 on bottom.
124	GS25	30-Jul	20	51	48	48.79	-10	6.663	202	GS25 on deck.
125	GS26	30-Jul	21	11	48	48.49	-10	7.089	213	GS26 in water.
125	GS26	30-Jul	21	17	48	48.49	-10	7.088	213	GS26 on bottom.
125	GS26	30-Jul	21	23	48	48.49	-10	7.088	213	GS26 on deck.
126	GS27	30-Jul	21	40	48	48.42	-10	7.258	224	GS27 in water.
126	GS27	30-Jul	21	45	48	48.42	-10	7.257	224	GS27 on bottom.
126	GS27	30-Jul	21	51	48	48.42	-10	7.256	232	GS27 on deck.
127	GS28	30-Jul	22	2	48	48.47	-10	7.304	227	GS28 in water.
127	GS28	30-Jul	22	8	48	48.47	-10	7.304	228	GS28 on bottom.

127	GS28	30-Jul	22	14	48	48.47	-10	7.303	227	GS28 on deck.
128	GS29	30-Jul	22	26	48	48.51	-10	7.47	278	GS29 in water.
128	GS29	30-Jul	22	33	48	48.51	-10	7.47	281	GS29 on bottom.
128	GS29	30-Jul	22	40	48	48.51	-10	7.47	281	GS29 on deck.
129	GS30	30-Jul	22	53	48	48.29	-10	7.366	234	GS30 in water.
129	GS30	30-Jul	22	59	48	48.29	-10	7.366	235	GS30 on bottom.
129	GS30	30-Jul	23	5	48	48.29	-10	7.365	235	GS30 on deck.
130	GS31	30-Jul	23	25	48	48.2	-10	7.706	321	GS31 in water.
130	GS31	30-Jul	23	33	48	48.2	-10	7.705	323	GS31 on bottom.
130	GS31	30-Jul	23	40	48	48.2	-10	7.705	324	GS31 on deck.
131	MB28	31-Jul	2	35	48	51.69	-10	51.579	406	MB28 survey.
132	GS32	31-Jul								Grab sample 42 bottom.
		31-Jul								At surface.
133	GS33	31-Jul	9	9					221	Grab 33 in water.
133	GS33	31-Jul	9	14						Grab 33 bottom.
133	GS33	31-Jul	9	20						Grab 33 at surface.
134	GC1	31-Jul	9	42	48	55.46	-10	43.92	221	Gravity Core 1 in water.
134	GC1	31-Jul	9	46	48	55.46	-10	43.92	221	Gravity Core 1 at bottom.
134	GC1	31-Jul	9	51						Gravity Core 1 at surface.
135	GC2	31-Jul	9	54	48	55.46	-10	43.92	220	GC02 in water.
135	GC2	31-Jul	9	59	48	55.46	-10	43.92	220	GC02 on bottom.
135	GC2	31-Jul	9	4						GC02 on deck.
136	GS34	31-Jul	10	29	48	55.01	-10	45.025	325	Grab 34 in water.
136	GS34	31-Jul	10	36	48	55.01	-10	45.026	325	Grab 34 bottom.
136	GS34	31-Jul	10	44						Grab 34 at surface. No sample.
137	GS35	31-Jul								Grab 35 in water.
137	GS35	31-Jul	10	55	48	55.01	-10	45.026	325	Grab 35 bottom.
137	GS35	31-Jul	11	3						Grab 35 at surface.
138	GC03	31-Jul								GC03 in water.
138	GC03	31-Jul	11	23	48	55.01	-10	45.026	327	GC03 on bottom.
138	GC03	31-Jul								GC03 on deck.
139	GS36	31-Jul	11	40	48	54.78	-10	45.468	361	Grab 36 in water.
139	GS36	31-Jul	11	50	48	54.78	-10	45.469	360	Grab 36 bottom.
139	GS36	31-Jul	11	59						Grab 36 at surface.
140	GS37	31-Jul	12	52	48	54.94	-10	39.729	192	Grab 37 in water.
140	GS37	31-Jul	12	57	48	54.94	-10	39.728	193	Grab 37 bottom.
140	GS37	31-Jul	13	1						Grab 37 at surface.
141	GS38	31-Jul	13	17	48	54.46	-10	39.762	281	Grab 38 in water.
141	GS38	31-Jul	13	24	48	54.46	-10	39.761	280	Grab 38 bottom.
141	GS38	31-Jul	13	31						Grab 38 at surface.
142	GS39	31-Jul	13	44	48	54.07	-10	40.02	361	Grab 39 in water.
142	GS39	31-Jul	13	53	48	54.07	-10	40.014	357	Grab 39 bottom.
142	GS39	31-Jul	14	2						Grab 39 at surface.
143	GC04	31-Jul	14	14	48				358	GC04 in water.
143	GC04	31-Jul	14	20	48	54.08	-10	40.003	358	GC04 on bottom.
143	GC04	31-Jul	14	29	48	54.08	-10	40.003	358	GC04 on deck.

144	GS40	31-Jul	15	22	48	51.6	-10	30.018	730	Grab 40 in water.
144	GS40	31-Jul	15	37	48	51.6	-10	30.019	727	Grab 40 bottom.
144	GS40	31-Jul	15	54	48	51.6	-10	30.018	727	Grab 40 at surface. Did not trigger.
145	GS41	31-Jul	16	18	48	51.86	-10	28.644	457	GS41 in water.
145	GS41	31-Jul	16	29	48	51.86	-10	28.645	464	GS41 bottom.
145	GS41	31-Jul	16	39	48	51.86	-10	28.64	461	GS41 at surface.
146	GS42	31-Jul	16	57	48	52.04	-10	27.964	381	GS42 in water.
146	GS42	31-Jul	17	8	48	52.05	-10	27.962	380	GS42 bottom.
146	GS42	31-Jul	17	19	48	52.05	-10	27.962	379	GS42 at surface.
147	GS43	31-Jul	17	20	48	52.05	-10	27.962	379	GS43 in water.
147	GS43	31-Jul	17	30	48	52.05	-10	27.961	379	GS43 bottom.
147	GS43	31-Jul	17	40	48	52.05	-10	27.961	379	GS43 at surface.
148	GS44	31-Jul	17	54	48	52.65	-10	26.984	235	GS44 in water.
148	GS44	31-Jul	17	59	48	52.66	-10	27.011	235	GS44 bottom.
148	GS44	31-Jul	18	5	48	52.66	-10	27.012	235	GS44 at surface.
		31-Jul	18	10	48	52.67	-10	26.988	235	Transit to MB29.
149	MB29	31-Jul	18	30	48	51.04	-10	27.609	215	Start of MB29 multibeam survey.
149	MB29	31-Jul	4	57	48	51.46	-10	44.729	667	End of MB29.
		31-Jul	4	57	48	51.46	-10	44.729		Transit to Lander site.
25		31-Jul	11	0	48	21.42	-9	32.579	946	Interrogated Sonardyne Lander.
25		31-Jul	12	7	48	21.37	-9	32.58	780	1st position for new triangulation.
150	GS45	31-Jul	14	2						GS45 in water.
150	GS45	31-Jul	14	7	48	23.88	-9	24.532	180	GS45 bottom.
150	GS45	31-Jul	14	11						GS45 at surface.
151	GS46	31-Jul	14	35	48	23.3	-9	25.712	227	GS46 in water.
151	GS46	31-Jul	14	46	48	23.3	-9	25.711	227	GS46 bottom.
151	GS46	31-Jul	14	45	48	23.3	-9	25.711	227	GS46 at surface.
152	GS47	31-Jul	15	5	48	23.32	-9	27.146	323	GS47 in water.
152	GS47	31-Jul	15	13	48	23.33	-9	27.145	323	GS47 bottom.
152	GS47	31-Jul	15	20	48	23.33	-9	27.145	324	GS47 at surface.
153	GS48	31-Jul	15	37	48	23.07	-9	28.351	424	GS48 in water.
153	GS48	31-Jul	15	45	48	23.07	-9	28.399	422	GS48 bottom.
153	GS48	31-Jul	15	55	48	23.07	-9	28.399	421	GS48 at surface.
154	GS49	31-Jul	16	21	48	20.74	-9	29.015	526	GS49 in water.
154	GS49	31-Jul	16	36	48	20.73	-9	29.015	525	GS49 bottom.
154	GS49	31-Jul	16	49	48	20.73	-9	29.015	519	GS49 at surface.
155	GS50	31-Jul	17	4	48	20.78	-9	28.152	387	GS50 in water.
155	GS50	31-Jul	17	14	48	20.78	-9	28.15	378	GS50 bottom.
155	GS50	31-Jul	17	24	48	20.78	-9	28.15	377	GS50 at surface.
156	GS51	01-Aug	17	40	48	21.09	-9	26.751	202	GS51 in water.
156	GS51	01-Aug	17	45	48	21.09	-9	26.751	202	GS51 bottom.
156	GS51	01-Aug	17	51	48	21.09	-9	26.751	202	GS51 at surface.
157	GS52	01-Aug	18	4	48	21.4	-9	25.697	150	GS52 in water.
157	GS52	01-Aug	18	9	48	21.4	-9	25.699	150	GS52 bottom.

157	GS52	01-Aug	18	13	48	21.4	-9	25.698	150	GS52 at surface.
			18	22	48	21.37	-9	25.61	147	Start of transit back to Southampton.
158	CTD157	02-Aug	7	10	49	21.97	-6	19.431	102	CTD157 (1st in English channel). Arrival at station.
158	CTD157	02-Aug	7	26	49	21.97	-6	19.431	102	CTD back on deck.
159	CTD158	02-Aug	15	55	49	55.15	-4	19.632	78	CTD158 (2nd in English channel). Arrival at station.
159	CTD158	02-Aug	16	6	49	55.15	-4	19.632	78	CTD back on deck.
160	CTD159	02-Aug	23	36	50	25.14	-2	20.895	50	CTD159 (3rd in English channel). Arrival at station.
160	CTD159	02-Aug	23	55	50	25.13	-2	20.928	49	CTD back on deck.
161		03-Aug	08	00	50	53.47	-1	23.696	11	Back at Southampton