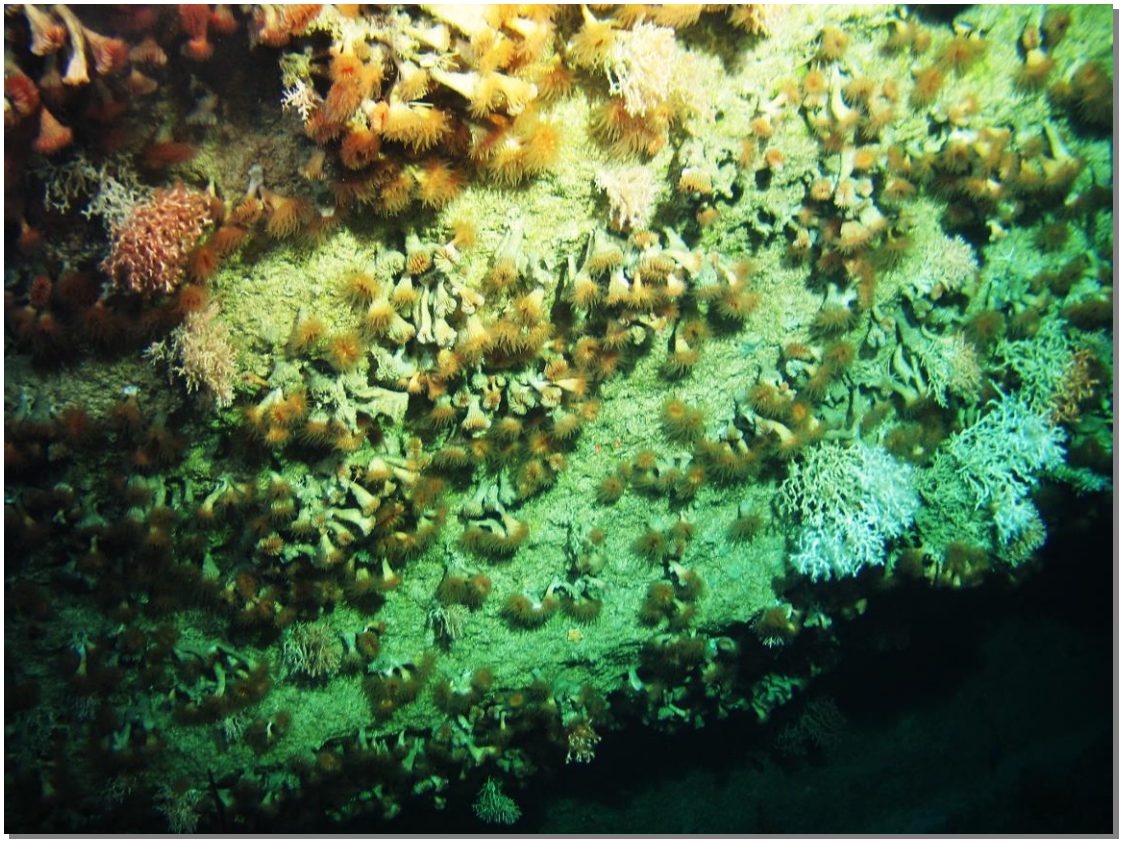
CE16015 - QuERCi II

Quantifying **E**nvi**R**onmental Controls on **C**old-water coral Reef Growth**:** Part 2

RV Celtic Explorer

Galway – Porcupine Bank Canyon – Cobh

23rd – 28th May 2016



Andy Wheeler, Niamh Connolly, Luis Conti, Raissa Hogan, Aaron Lim, Chiara Massironi, Monica Mullins, Paul Murphy, Roisin Pinfield, Kevin Power, Zsuzsanna Toth, Holland I ROV Technical Team & the Officers and Crew of the RV Celtic Explorer

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EXECUTIVE SUMMARY

This survey is a follow up to the QuERCi survey which investigated cold-water coral mounds on the southern lip of the Porcupine Bank Canyon and discovered an extensive field of corals attached to the near-vertical rock face on the upper canyon flank. QuERCi and QuERCi_II aim to understand the role of cold-water corals in canyon processes, map and explore the coral and canyon floor habitats and collect sample to assess temporal changes in the canyon environment.

In this survey, we extended the shipbased multibeam coverage of the area, attempted to collect gravity cores and successful completed two ROV dives. Coring determined that substrates where generally hard with very limited (only core catcher) retrieval. Interestingly, we sampled a hardground underlying a thin layer of muds in the main canyon channels.

ROV dives provided sample and new footage of the canyon lip coral mounds and also the coral colonised canyon upper flanks. Extensive areas of coral cover were found both on rock exposures but also on steep coral-micrite sediment cover. We have gained new insights into the impressive extent of coral influence of canyon sedimentation. We also found a vertical cliff heavily colonised by large *Desmophyllum* corals.

BACKGROUND

In 2014, the QuERCi survey discovered a cold-water coral habitat on the Porcupine Bank Canyon in Irish waters where cold-water corals were observed colonising near-vertical exposed bedrock outcrops. Rough estimates suggest that this habitat, that is only a line on a map, may infact in Irish water cover 500 km^2 and therefore proves highly significant (RTE 9 O'Clock News, 16th July 2015). However, we know very little about it. Studies of deep-sea submarine cliffed habitats (Huvenne *et al*., 2011) suggest they have distinct benthic assemblages and fauna associations that are rich and diverse dominated by suspension feeders.

Corals are not restricted to tropic shallow water seas. Of the 5100 extant coral species, over half are found in deep-water (Cairns, 2007). These include framework-forming Scleractinia that form reefs from the tropics to polar regions (Freiwald *et al*., 2004). Advances in seabed mapping in recent decades has significantly increased our knowledge of the deep-seafloor and thrown the "spot-light" on the hitherto poorly understood but common seabed structures such as cold-water coral reefs.

Through "ecological engineering" these cold-water coral reefs offer habitat for many different organisms and represent a unique speciose habitat in deep-water settings. Biodiversity estimates suggest higher biodiversity on reefs as opposed to off-mound habitats (Henry & Roberts, 2007), increase food web complexity and potential nursery/essential habitats for many organisms including commercial viable fisheries. Biological exploration of cold-water coral reef habitats, and our understanding of the ecological interactions between reef organisms is growing. The importance of cold-water coral reefs as centres of biodiversity is well recognised and has led to extensive international cooperation in the areas of conservation and the designation of marine protected areas (Davies *et al*., 2008). Ireland has designated a number of coral carbonate mound provinces supporting reefs as Areas of Special Conservation and is obliged under the EU Habitats Directive to monitor these designations. Effective management of cold-water coral reefs can only occur if there are good maps, the reef dynamics and controls on growth and decline processes are understood. This survey aims to add some resolution to these issues using Irish examples.

Submarine canyons, where the corals in this survey occur, link surface waters to the deep ocean and are routes of rapid exchange of sediments and particular carbon (e.g. de Stigter *et al*., 2007). As such, they are seen as pathways to the deep. Canyons also act as a barrier and capture sediment and nutrients moving along the margin, thereafter transporting it to deeper water. They are, in short, dynamic settings both in terms of vigorous tidal pumping but also subject to infrequent sediment avalanches (turbidites) and potentially cold-water cascades (Canals *et al*., 2006). Because of all of the above they are recognised as biodiverse and support high organismal abundances (De Leo *et al*., 2010).

On this survey, we will use the Holland I ROV to collect coral samples and further explore the Porcupine Bank Canyon coral habitat. Rather like trees, corals have growth rings and we have been looking at chemical signals laid down by the rings as proxies for ocean temperature and nutrients (Montagna *et al*., 2006; Rüggeberg *et al*., 2008). The new samples from key locations will help us understand the nature of change on a decadal scale but aso spatial variations as we go into the canyon. We will also be trialling a new gravity corer hoping to get several metre long corals through the canyon muds, coral debris fields and from one of the coral mounds. We hope these will tell us how this environment changes through time over 100s to 1000s of years in response to change ocean climate. All of these studies help us to understand more about how oceans change and how submarine canyon environments respond.

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3. SURVEY RATIONALE & OBJECTIVES

This survey targets the Porcupine Bank Canyon where reefs cluster around the Porcupine Bank Canyon head influenced presumably by up-canyon tidal pumping and spill over into the canyon colonising exposed rock outcrops and creating extensive cover of coral-micrites.

The proposed study has three principal scientific objectives:

- to further evaluate the status of cold-water coral reefs in the Porcupine Bank Canyon SAC.

- to retrieve canyon cores and coral samples to relate canyon sedimentation and bioproductivity histories with canyon edge cold-water coral mound development.

- to assess faunal distributions on the steep canyon wall habitats.

Description of tasks:

- Extend existing ship-based multibeam coverage of the area to produce better base-maps of the canyon
- Collect shallow seismic lines between coring stations to reveal the sediment architecture and thickness of units samples
- To collect CTD data from the canyon to place the coral habitat into it water mass context.
- To collect core material from the canyon, coral tallus slopes and the Querci Mound.
- To collect coral samples from the upper canyon to biogeochemical and genetic studies
- To further explore the coral habitat with the ROV video camera system.

4. EQUIPMENT

4.1 Research Vessel - RV Celtic Explorer

The Celtic Explorer is a 65.5 m multi-purpose research vessel. The vessel has wet, dry and chemical laboratories, which are permanently fitted with standard scientific equipment and can accommodate 20-22 scientists along with 13-15 crew who are highly skilled with the handling and deployment of scientific equipment. It has a maximum endurance of 35 days.
The Celtic Explorer is equipped with two Trimble 300-D GPS and has Dynamic Positioning.

On the aft deck is a 25 tonne A-frame with 4m outward and inward reach in addition to a 3m, 10 tonne starboard T-frame. The ship also comprises of a midship, forward and aft crane as well as a 6 tonne CTD winch.

4.2 Holland I ROV

The Holland 1 3000m depth ROV (remote operated vehicle) is a platform for capturing underwater footage of the seabed and transmitting the video as a live-feed to the scientists aboard the vessel. It has 100 hp with a maximum speed of 3 knots. The Holland I also has a HDTV camera, low resolution cameras and a HD digital stills with laser rangers. It is also fitted with a CTD and 2 robotic arms for sampling (1X7F and 1X5F) as well as an aspirator.

The Holland I ROV on deck (portside view)

4.3 Kongsberg EM302 multibeam echosounder

The EM302 operates at 30 kHz and is hull mounted. It is effective to 7000 m depth. Its swath width is up to 5.5 times water depth & there are up to 864 soundings per ping. Data is acquired, stored and managed using the Seafloor Information System (SIS).

4.4 CTD

The SBE 911 CTD includes the following equipment: Temperature and conductivity sensors, altimeter (for bottom detection), DO sensor and fluorometer.

SBE 911 CTD

4.5 IXSea ECHOES 3500 T7 ‘Chirp’

IXSea T7 Chirp is a hull mounted sub-bottom profiler operates at 1.5 - 5.5 kHz with at 237 dB (4 KVA) emitting a 20^{o} beam. The IXSea T7 Chirp works in a depth range of 5 to 11,000 m wd. It has 7 transponders and data is acquired, stored and managed with Delph acquisition software. Data is processed onboard using Delph interpretation.

4.6 Sonadyne Ranger 2 USBL Positioning Beacon

Ranger 2 is a high performance acoustic position reference system designed for tracking underwater targets and positioning dynamically positioned (DP) vessels. The system (commonly referred to as a HPR system) uses the Ultra-Short Base Line (USBL) positioning method to calculate the position of a subsea target, by measuring the range and bearing from a vessel-mounted transceiver to an acoustic transponder fitted to the target. Multiple subsea targets over a wide area and range of water depths can be simultaneously and precisely positioned. In standard configuration, Ranger 2 allows up to 10 subsea targets to be simultaneously tracked from a surface vessel. Operating ranges of greater than 6,000 metres are achievable and the system supports all industry standard survey and DP output telegrams. One second position updates are achievable in any water depth.

Sonadyne ranger beacons for the USBL system

4.8 Gravity Corers

Two gravity corers with different were employed on-board both using the same 640kg weight. One barrel was 6m long with a 107mm aperture, the other is 3m long with a 70mm aperture. Both are fitted with core catchers and liners.

6m gravity corer

3m gravity corer

5 TECHNICAL & WEATHER RELATED DIFFICULTIES

23rd May
Mobilisation in Galway Dock. Power failure in ROV winch caused delay to the in-dock wet test of a couple of hours. Fault traced and solved. Wet test in dock aborted by vessel not delayed catching early tide.

25th May
Encountered hardground in the canyon and bent the barrel of the gravity corer. Coring continued using the 3m narrow gauge corer. No successful recovery in any cores of significance despite 7.5 hours of effort. Substrate deemed unsuitable.

ROV deployed using the TMS system. Despite benign sea-states for this part of the world they proved too much for the ROV. Swell is confused and 2m high. This is causing a pull on the tether of 2m but occasionally reaching 4 and was observed at 9m. On the drop-down following a tug the ROV/TMS doesn't fall quick enough pitching and rolling frequently to 20^{o} and occasionally 45^{o}. A roll of 93^{o} was observed. This puts considerable strain on the tether. The A-frame was observed to judder on one of these tugs. Crucially, such movement and pitch/rolling of the TMS would make recovery impractical. Attempts were made to stabilise the vessel by flooding the ballast tanks and altering the heading as far as possible without overstraining the DP. This helped appreciably but not enough. The ROV/TMS was held in the water for 2.5 hrs while the situation was monitored. Improvements were noted with less frequent pitch/roll events occurring but these occurrence still persisted. Despite the low swell conditions the ROV/TMS were inoperable and deployment was aborted. As the forecast suggested a fall in the sea-state the situation was periodically reviewed. I think it is safe to say that the performance of the TMS on this vessel was pathetic with respect to sea-states. It should never be used except in lakes and enclosed bays. ROV successfully deployed once the heave had dropped to 1.5m at 09.30 26th May: 12.5 hrs of ROV dive time lost.

6 SURVEY NARRATIVE

All times in UTM

Galway

23rd May, Monday – *Sunny, no wind*
ROV and LARS mobilised.

Galway – Galway Bay

24th May, Tuesday – *Sunny, no wind*
Leave Galway Dock at **05.22**. Transit to the middle of Galway Bay (56m wd) for an ROV wet test. Arrive on station **07.56**. Commence wet test at **12.42**, finishing **13.36**. Commence transit **13.42**.

Porcupine Bank

25th May, Wednesday - *Sunny, no wind, low swell.*
Arrive on station at **05.49**. Start MBES line leading into area with sub-bottom on (**CE16015_1M**). End MBES and Sub-bottom line at **10.10** (**CE16015_1M).** CTD deployed at head of canyon close to cliff at **10.32** (**CE16015_2C**) to measure water properties and get a SVP for the USBL for the ROV. Sub-bottom profiler line (**CE16015_3S**) run from CTD station at cliff into the canyon to the channel coring site. Gravity core in channel at 1780m wd taken at **12.24** (**CE16015_4G**). Core unsuccessful with only a handful of coral debris in the core catcher. Sub-bottom profiler line (**CE16015_5S**) run to the next coring site. Gravity core deeper in channel at 1962m wd taken at **14.17** (**CE16015_6G**). Bent the barrel as a hardground encounter. Sub-bottom profiler line run from the canyon core site to Querci Mound (**CE16015_7S**). Coring with the narrow gauge 3m gravity corer on bottom at **16.05** on the edge of the Querci Mound (**CE16015_8G**). 2.5m penetration but core catcher choked with coral rubble and the barrel not filled. Second attempt on bottom at **16.55** (**CE16015_9G**). Core empty and no evidence of penetration, this was a slow lowering. Third attempt on bottom at **17.38** (**CE16015_10G**). No recovery or penetration. Core continues but now moved to the summit of the Querci Mound. Core **CE16015_11G** on seabed at **18.40**. No recovery again. Vessel moved to a different mound a 2 gravity cores take at **19.38** (**CE16015_12G)** and **20.06 (CE16015_13G**) respectively. **CE16015_12G** hit a dropstone and **CE16015_13G** gave no penetration. Gravity coring abandoned at **20.06**. Vessel transits to cliff site below the Querci Mound to commence ROV sampling and video inspection dive. Dive commences at **21.00 CE16015_14R** but was aborted at **23.23** due to the swell causing unacceptable degrees of movement to the ROV whilst in the water (see technical issues). This was Dive 1 (aborted).

26th May, Thursday - *Sunny, no wind, low swell.*
CTD shot in the middle of the canyon to 1955 m wd at **0.04** (**CE16015_15C**). Repeat CTD at **07.01** at same position (**CE16015_16C**). ROV successfully

deployed at **09.28** (**CE16015_17R**). ROV dive surveyed up the canyon spur imaging corals on the exposed rock face, on the gentler upper slope coral biosamples were taken. ROV recovered at **12.50**. ROV redeployed at a new cliff location at **13.52** (**CE16015_18R**). The ROV discovered an extensive field of coral growing on a coral micritic cover covering slope. Bedrock exposures of conglomerate were found and a cliff colonised by *Desmophyllum* sp. Numerous coral samples and push cores were taken as well as a pebble from the conglomerate.

Porcupine Bank – Kinsale Gas Field - Cobh

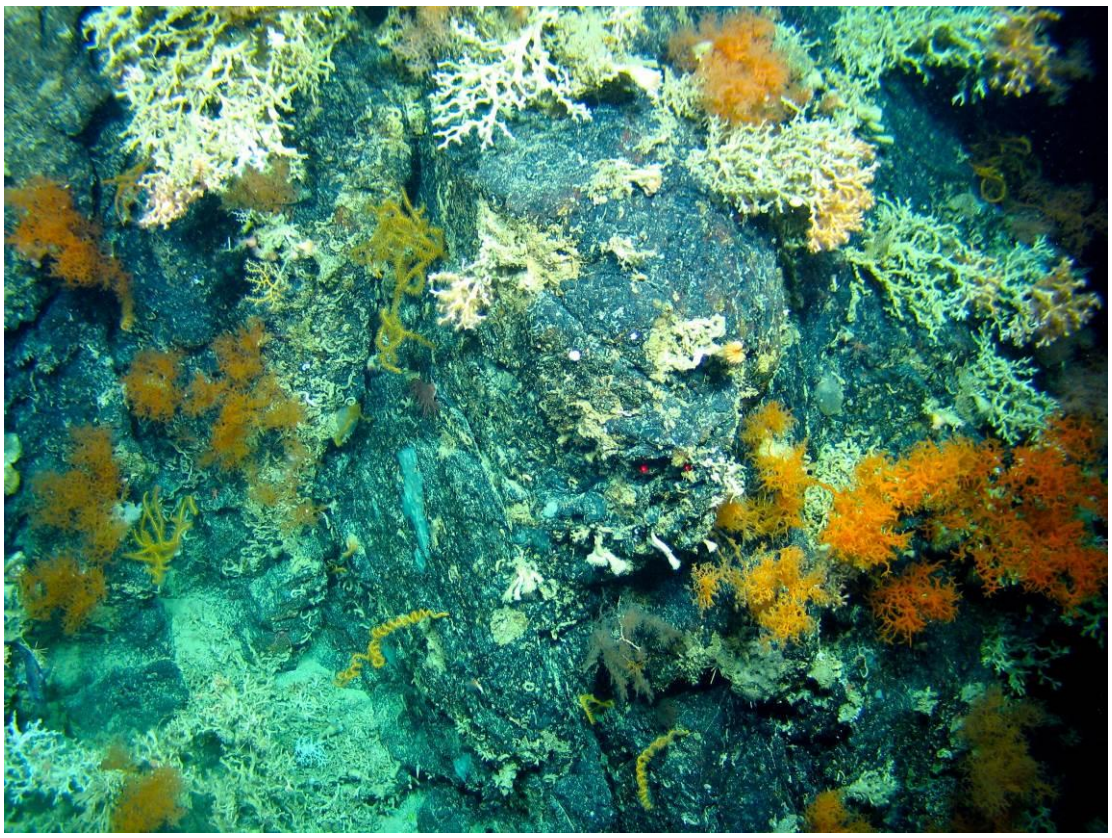
27th May, Friday - *Cloudy, no wind, no swell.*
ROV recovered at 02.15 (**CE16015_18R**). Start transit to Kinsale gas field for commercial operation before following onto Cobh.

28th May, Saturday – *Sunny, no wind, no swell*
Arrive at Cobh and start demobilisation and disembarkation at 16.00.

7 SUMMARY OF AREAS

Gravity coring operations were unsuccessful (with the exception of core catcher retrievals) on all mound, slope and within canyon sites. This was despite a new gravity corer with a wider barrel. This is because *most* substrates in the area are relatively stiff to hard being partially lithified with carbonate cement. The ROV has also visualised hardgrounds in several areas and dropstone as also common. Coral rubble is abundant but should not prevent gravity corer penetration. Many slope are also precipitous. Interesting, we also failed to collect core from the canyon floor which the ROV had previously visualised as muddy. Coring on this survey identified a buried hardground of lithified coral rubble underlying the surface muds at a shallow depth.

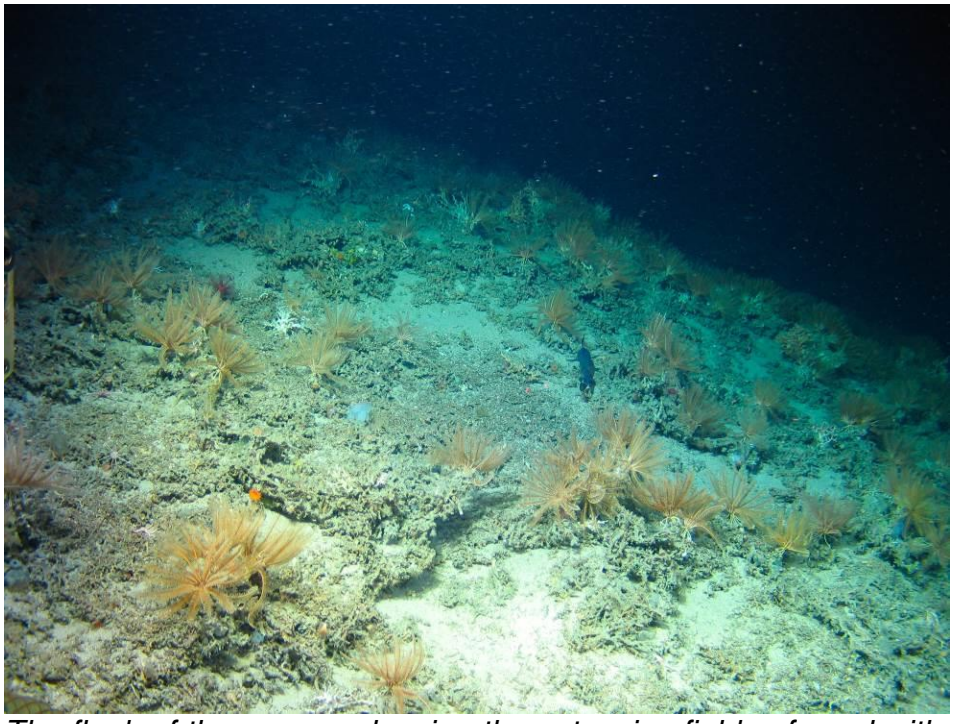
ROV dive 2 revisited the steep canyon margin below the Querci Mound where corals directly colonised the rock face. Further up the face where it is gentler, a coral debris rich sediment is colonised. Here, biological samples were taken.



Exposed bedrock on the flank of the canyon below the Querci Mound colonised by Lophelia pertusa*,* Stichopathes *sp.,* Leiopathes *sp. and* Antipathes *sp..*

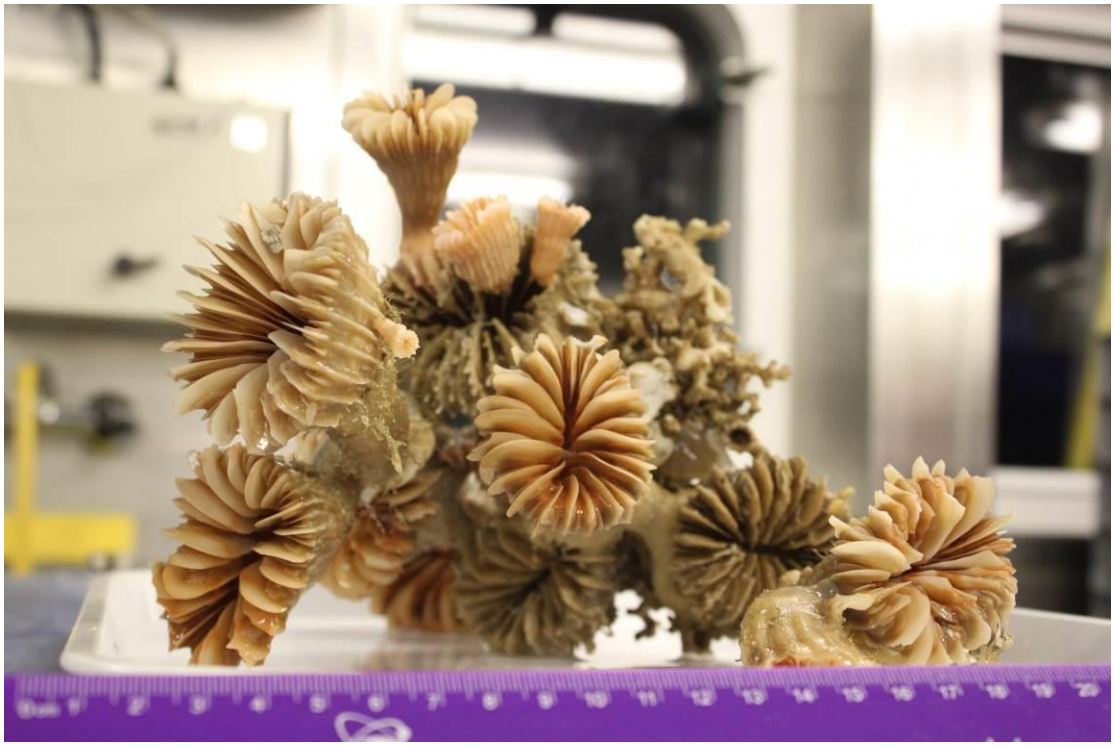
ROV dive 3 was a long dive up the canyon flank a few kilometres away but did not reveal the same exposed rock faces but rather a steep slope covered in coral micrite onto which corals colonised. The area of coral colonisation is extensive with large areas of coral debris fields below. We also discovered a

rock outcrop that appears to be a Devonian conglomerate and a cliff colonised by large *Desmophyllum* sp. The dive ended on the top of a coral mound on the lip of the canyon that we christen the Ziggy Mound after the late David Bowie who passed away this year.



The flank of the canyon showing the extensive fields of coral with a profusion of crinoids

Exposed ?Devonian conglomerates in the upper canyon with Antipathes *sp.,* Stichopathes *sp. and* Bathypathes *sp.*



Large Desmophyllum sp*. sampled for biogeochemical analysis*.

8 WEATHER REPORT

Note: all times in GMT 1 hour ahead of UTC

24th May - Galway Bay to Porcupine Bank
11.00: Wind E, Force 5
14.00: Wind E, Force 4, calm sea
16.10: Wind E, Force 4, calm sea
20.29: Wind E, Force 4
23.37: Wind NE, Force 3

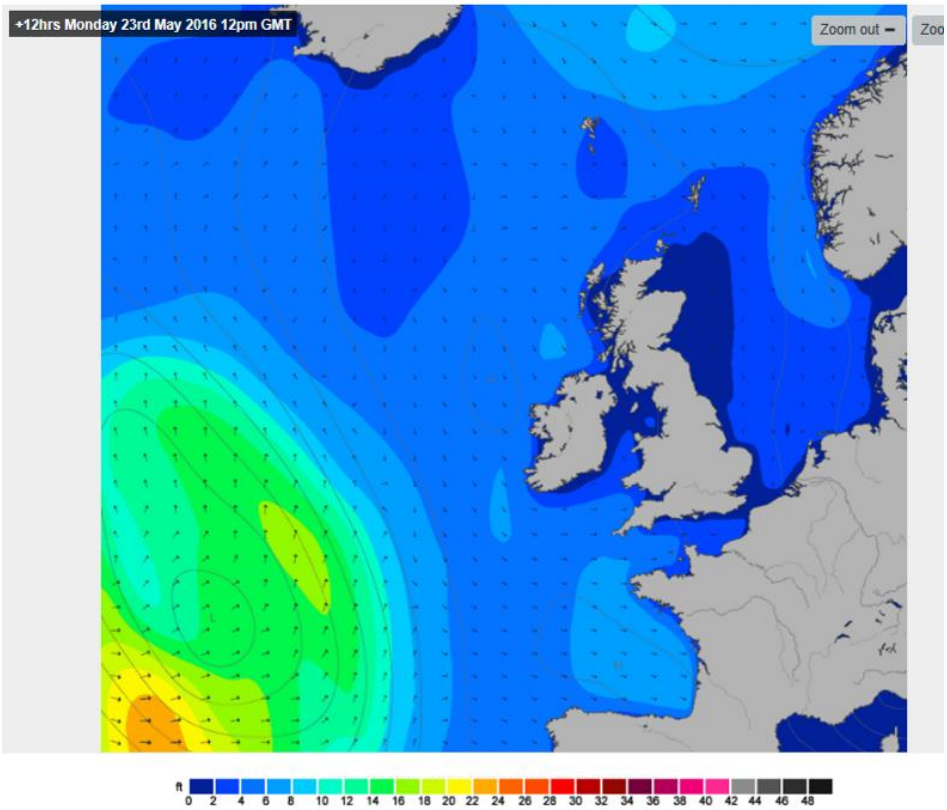
25th May – Porcupine Bank
02.00: Wind NE, Force 3, calm sea
04.00: Wind NE, Force 3
08.00: Wind NE, Force 3, slight sea
09.17: Wind NE, Force 4
14.00: Wind NE, Force 4
15.52: Wind NE, Force 4
20.00: Wind NE, Force 3, slight sea, low swell

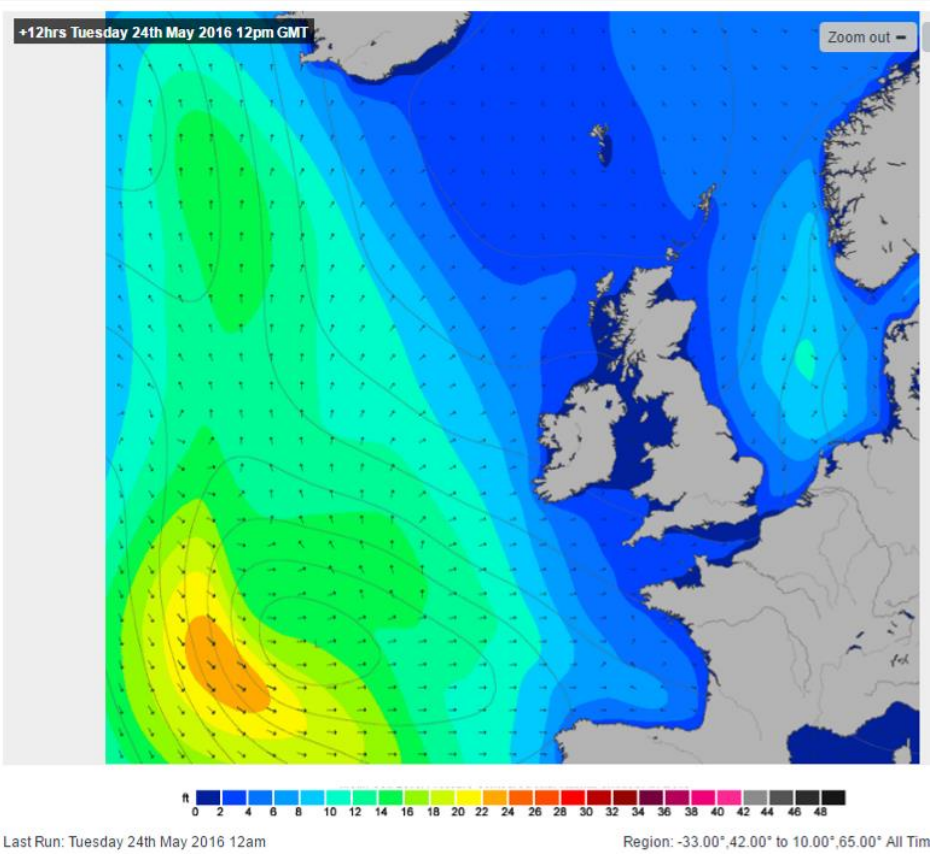
26th May – Porcupine Bank
02.00: Wind NE, Force 3, slight sea, low swell
03.57: Wind NNE, Force 4, slight sea, low swell
06.00: Wind NNE, Force 3, slight sea, low swell
08.00: Wind NE, Force 3, slight sea, low swell
10.28: Wind NE, Force 4, slight sea, wave height 1.9m
13.55: Wind NE, Force 5
15.00: Wind NNE, Force 2, slight sea, low swell
20.00: Wind NE, Force 2, slight sea, low swell

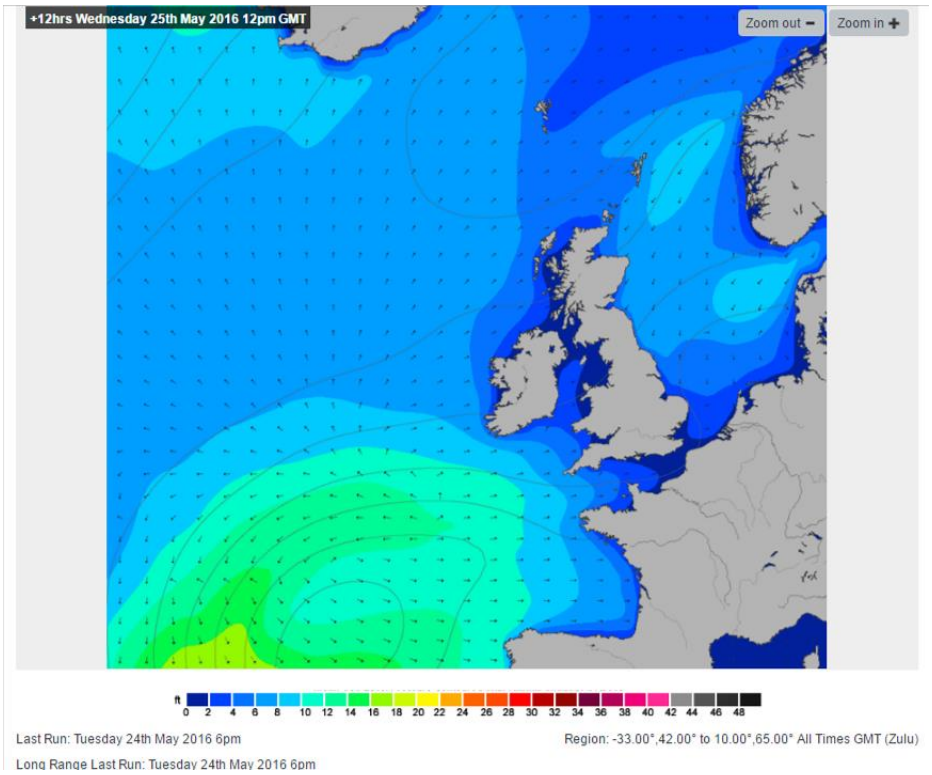
27th May – Porcupine Bank to transit
02.00: Wind NE, Force 4, calm sea
03.48: Wind NNE, Force 4
05.00: Wind ENE, Force 2, slight sea, low swell
07.00: Wind SE, Force 2, slight sea, low swell
08.00: Wind SE, Force 2, slight sea, low swell
11.50: Wind ESE, Force 3
14.00: Wind ESE, Force 3, calm sea, low swell
16.00: Wind E, Force 4, calm sea
18.00: Wind E, Force 2, calm sea
20.00: Wind E, Force 2
22.08: Wind E, Force 2
23.54: Wind E, Force 2

28th May – Off Cork
02.00: Wind ENE, Force 1, calm
04.00: Wind ESE, Force 1, calm

9 WEATHER CHARTS (SWELL)



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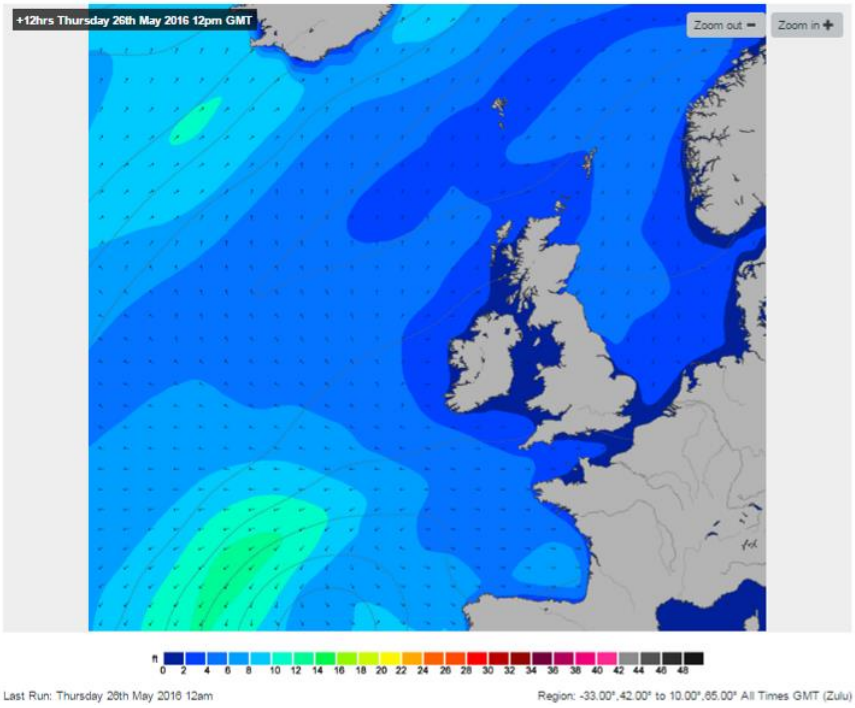
Long Range Last Run: Tuesday 24th May 2016 6pm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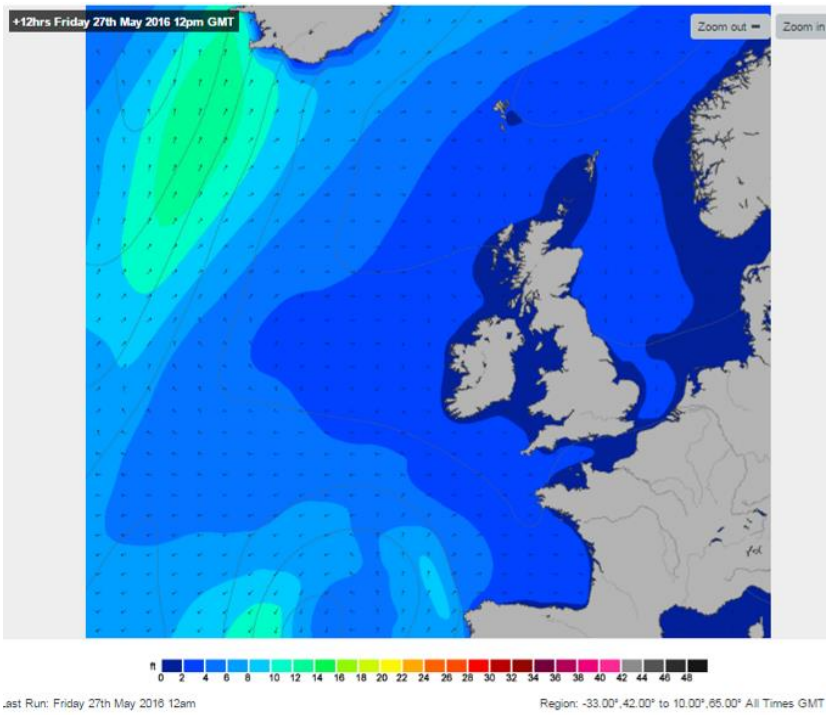
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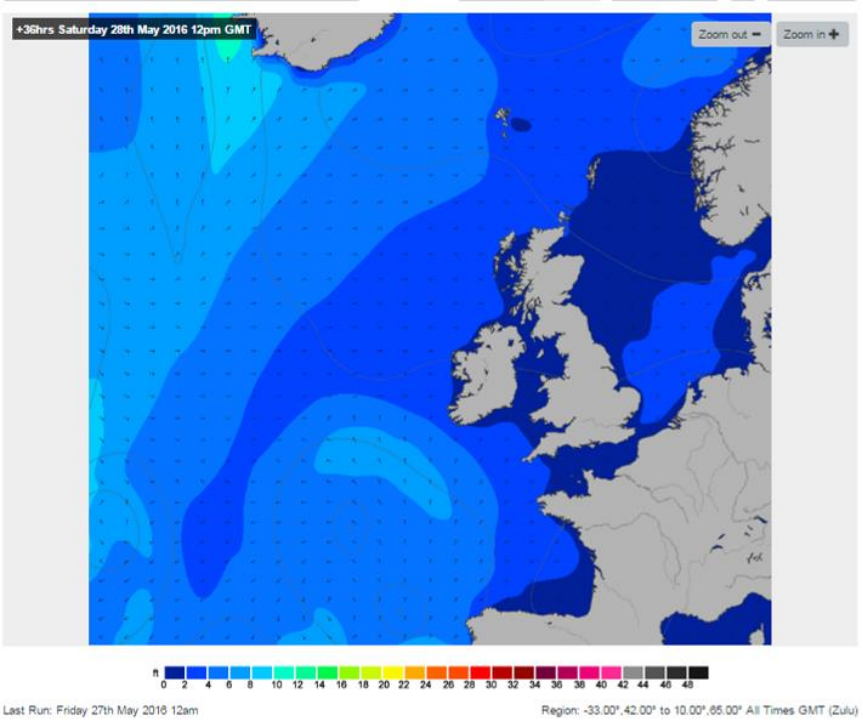
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Last Run: Friday 27th May 2016 12am
Region: -33.00°,42.00° to 10.00°,65.00° All Times GMT (Zulu)

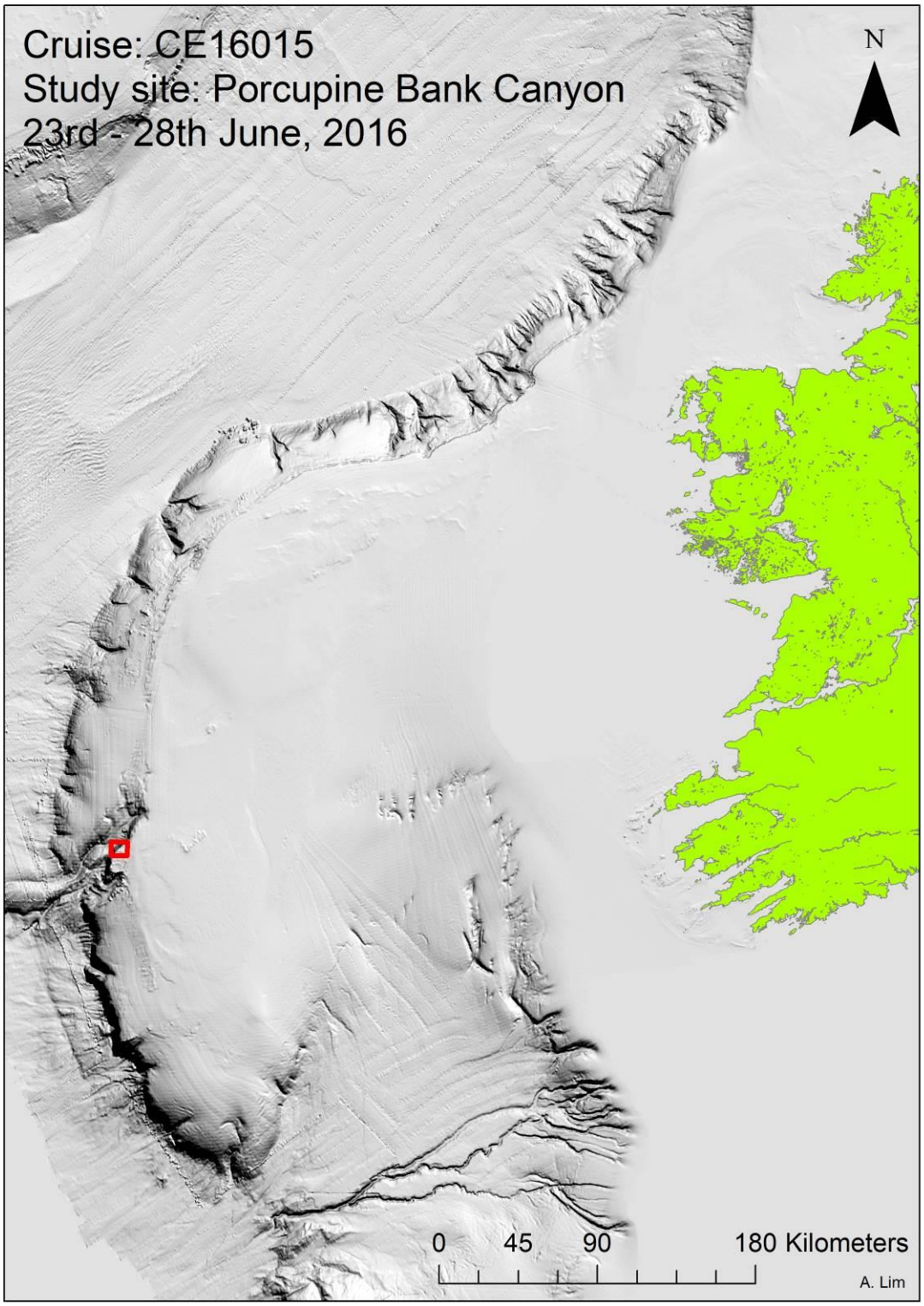
Appendices

PERSONNEL

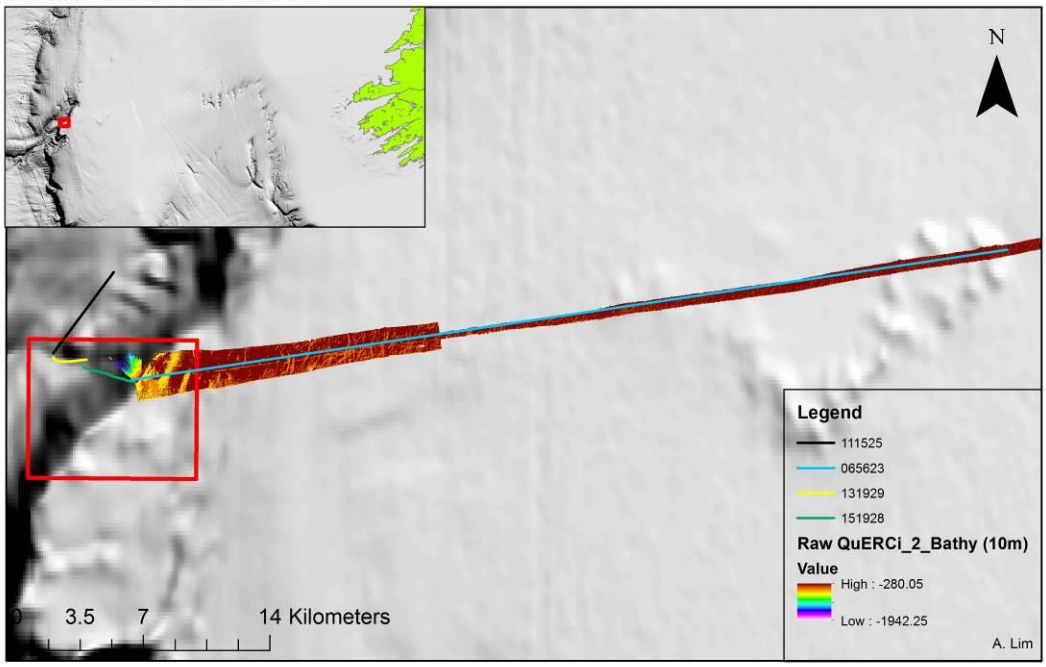
Ship's Crew	Scientific Party
Denis Rowan Master	Prof. Andy Wheeler Chief Scientist (UCC)
Jason White 2nd Engineer	Kevin Power Geologist – Night watch leader (UCC)
Basil Murphy Chief Officer	Aaron Lim Geologist – Day watch leader (UCC)
Paul Murphy 2nd Officer	Dr. Luis Conti Marine Geomatics (Uni Sao Paulo)
Frank Kenny Bosun	Dr. Zsuzsanna Toth Geophysicist (UCC)
Shane Horan Bosun's Mate	Niamh Connolly Geologist (UCC)
Brian Sharkey Technician	Raissa Hogan Biologist (NUIG)
Anthony English Technician	Chiara Massironi Biologist (Unimib, Milan)
Kevin O'Leary Cook	Monica Mullins Marine Scientist (NUIG)
Garvan Meehan AB Deckhand	Paul Murphy Geologist (UCC)
Kenny Downing AB Deckhand	Elizabeth Traye Biologist (TCD)
Dave Stack AB Deckhand	Roisin Pinfield MMO (UCC)
Gerry Diranne AB Deckhand	
Philip Gunnip AB Deckhand	**ROV Team**
Maurice Murphy Assistant Cook	Colin Ferguson ROV Technican/Pilot (team leader)
	Karl Bredendick ROV Technican/Pilot
	Rob Carpenter ROV Technican/Pilot
	Gary Jackson ROV Technican/Pilot
	Damien McCormack ROV Technican/Pilot
	Martin Rowse ROV Technican/Pilot

QuERCi Scientists (left to right): Monica Mullins, Kevin Power, Andy Wheeler, Luis Conti, Chiara Massironi, Elizabeth Traye, Roisin Pinfield, Aaron Lim, Paul Murphy, Zsuzsanna Toth, Raissa Hogan, Niamh Connolly

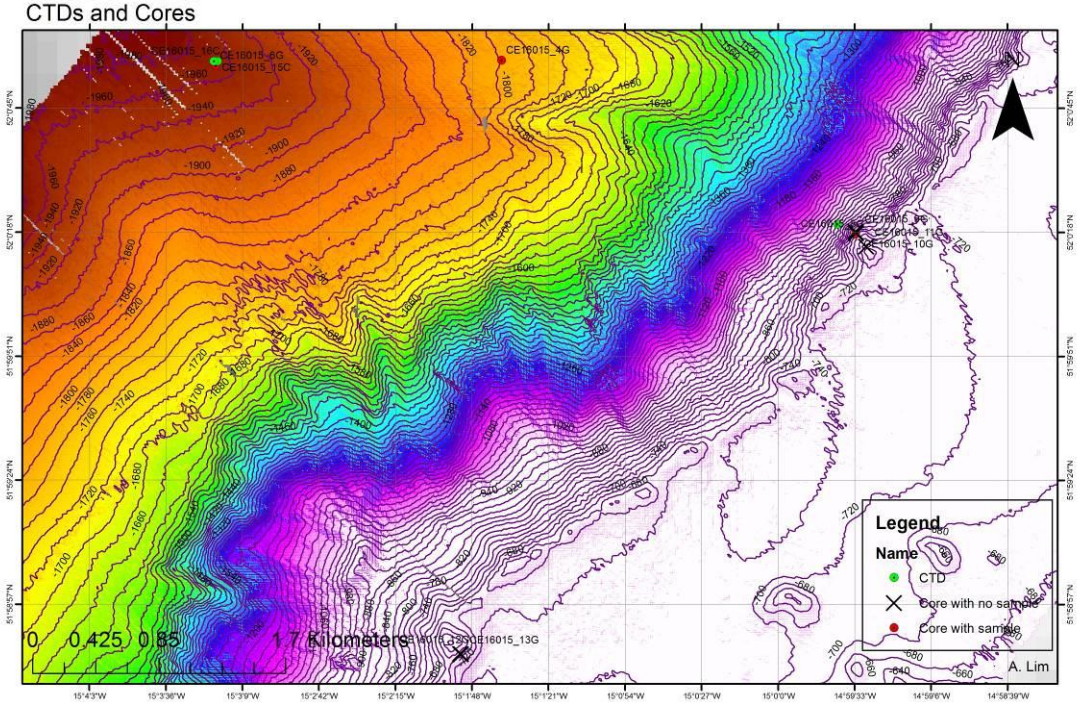
II. AREA MAPS: COVERAGES & SAMPLE LOCATIONS



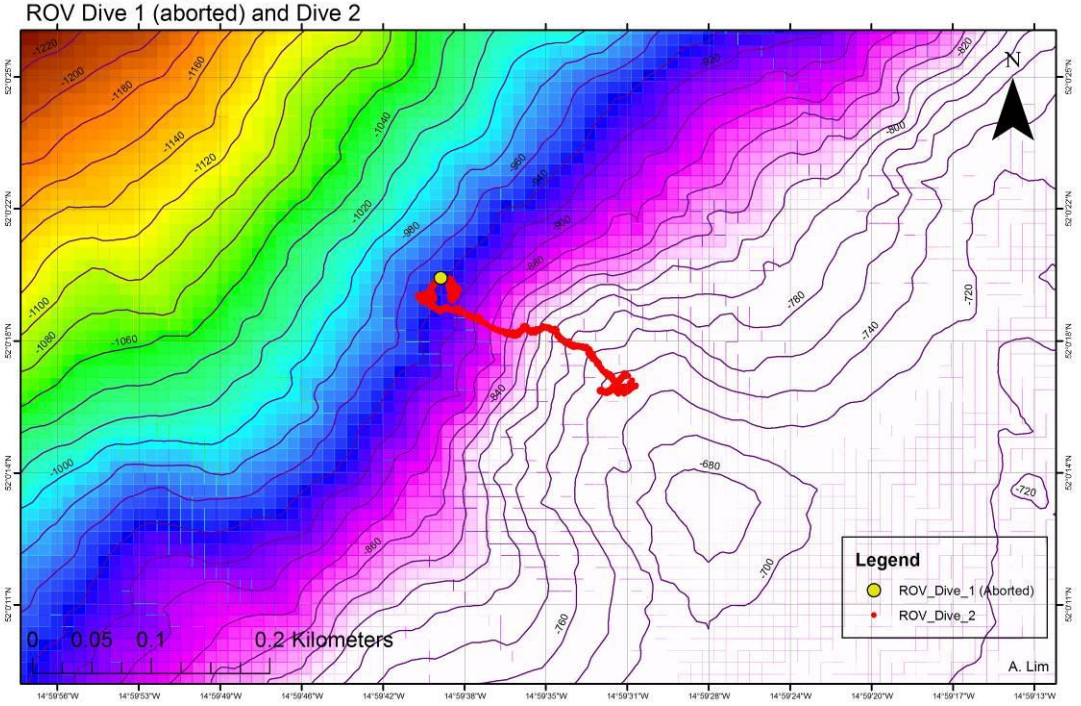
Cruise: CE16015
Multibeam and CHIRP stations



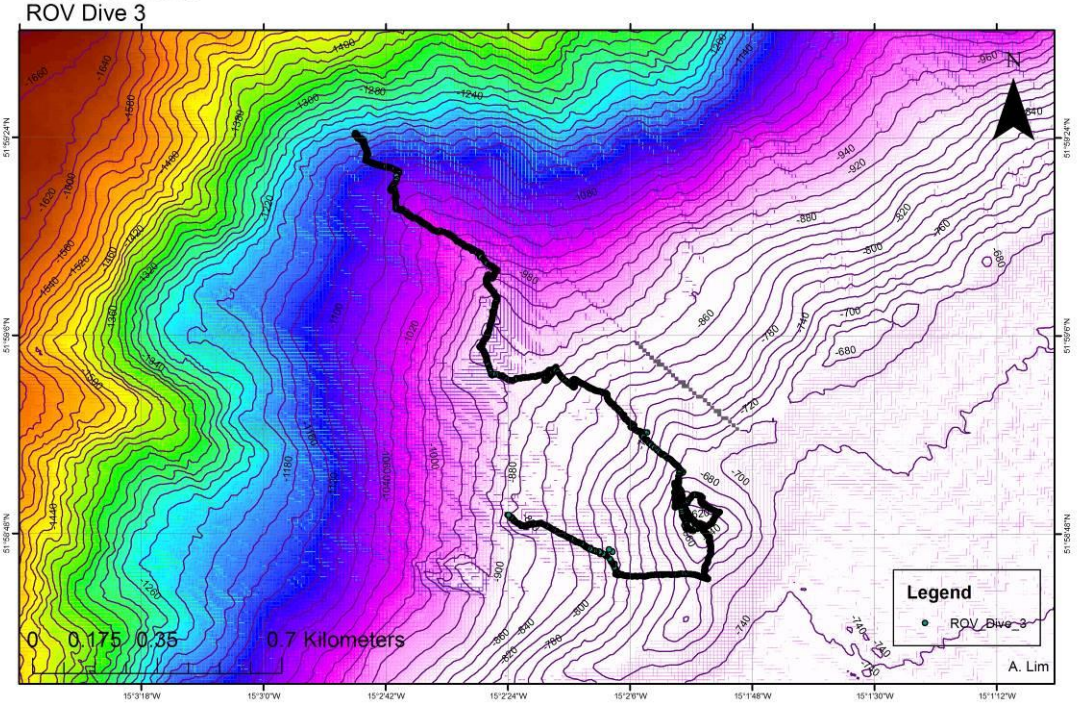
Cruise: CE16015
CTDs and Cores



Cruise: CE16015
ROV Dive 1 (aborted) and Dive 2



Cruise: CE16015
ROV Dive 3



III STATION LISTS

Master Log sheet													
Station Number	Dive Number	Date	Time (UTC)	Lat	Long	Depth (m)	CTD	ROV video	G. core	MBES	CHIRP	SVP	Note
CE16015_1M		25.5.16	06:49	52°4.27302'	14°15.66492'	347				X	X		no svp. 2040 (302 not working). 302 turned on halfways through line (line name ending with 0000).
CE16015_2C		25.5.16	10:32	52° 0.32912	14° 59.64897	730	X						
CE16015_3S		25.5.16	11:14	52° 3.56'	15° 0.47'	1796					X		
CE16015_4G		25.5.16	12:22	52° 0.92507'	15° 1.62617'	1826			X				no mud just a handful of coral in catcher
CE16015_5S		25.5.16	13:22	52°0.91'	15° 2.51'	1973					X		Between cores 1 and 2
CE16015_6G		25.5.16	14:17	52° 0.90412'	15° 3.30962'	1962.2			X				Coral rubble, lithified coral, and gastropods in catcher. Bent core
CE16015_7S		25.5.16	15:19	52° 0.69'	15° 1.77'	1734					X		Between cores 2 and 4
CE16015_8G		25.5.16	16:05	52° 0.29409'	14° 59.54277'	741.9			X				Same location as GC04 and GC05, 3m corer, coral rubble and silty mud in core catcher
CE16015_9G		25.5.16	16:55	52° 0.29783'	14° 59.53999'	743.5			X				Same location as GC03 and GC05, empty, using 3m corer
CE16015_10G		25.5.16	17:38	52° 0.30290'	14° 59.54436'	751			X				Same location as GC03 and GC04, empty, using 3m corer

Master Log sheet													
Station Number	Dive Number	Date	Time (UTC)	Lat	Long	Depth (m)	CTD	ROV video	G. core	MBES	CHIRP	SVP	Note
CE16015_11G		25.5.16	18:40	52° 0.24976'	14° 59.47976'	686.5			X				Empty, new position
CE16015_12G		25.5.16	19.38	51° 58.77090'	15° 1.86893'	672			X				Empty, dent in core catcher
CE16015_13G		26.5.16	20.06	51° 58.77017'	15° 1.86349'	676.9			X				
CE16015_14R	1	26.5.16	22.00	52° 00.3366'	14° 59.6555'	745		X					ROV abandoned
CE16015_15C		26.5.16	01:04	52° 00.92	15° 03.30	1955	X						
CE16015_16C		26.5.16	07:01	52° 00.92	15° 03.3	1959	X						
CE16015_17R	2	26.5.16	09:28	52° 00.3280	14° 59.6316	740		X					ROV CTD named CTD4
CE16015_18R	3	26.5.16	13.52	51° 59.405	15° 02.753	1200		X					out on deck at 02:15 UTC

Station Log: Core				On Bottom			
station #	**Core_label**	**Time (UTC)**	**Date**	**USBL Lat SOL**	**USBL Long SOL**	**Length (m)**	**Note**
4	GC01	12:22	25.05.16	52° 0.92507'	15° 1.62617'	0	Handful of coral in core catcher. No mud at all
6	GC02	14:17	25.05.16	52° 0.90412'	15° 3.30962'	0	Coral rubble and lithified coral and gastropods in core catcher. Slightly bent core
8	GC03	16:05	25.05.16	52° 0.29409'	14° 59.54277'	0	Same location as GC04 and GC05, 3m corer, coral rubble and silty mud in core catcher
9	GC04	16:55	25.05.16	52° 0.29783'	14° 59.53999'	0	Same location as GC03 and GC05, empty, 3m corer
10	GC05	17:38	25.05.16	52° 0.30290'	14° 59.54436'	0	Same location as GC03 and GC04, empty, 3m corer
11	GC06	18:15	25.05.16	52° 0.24976'	14° 59.47976'	0	New position from GC03,04,05. Empty
12	GC07	19.38	25.05.16	51° 58.77090'	15° 1.86893'	0	
13	GC08	20.06	25.05.26	51° 58.77017'	15° 1.86349'	0	

Station Log: CTD				Acquisition		
station #	**CTD_label**	**Time (UTC)**	**Date**	**USBL Lat SOL**	**USBL Long SOL**	**note**
CE16015_2C	CTD1 in	10:32	2016.05.25	52° 0.32912' N	14° 59.64897' W	CTD in the water
CE16015_2C	CTD1 out	11:16	2016.05.25	52° 0.67602' N	15° 0.93341' W	CTD out of water (on deck)
CE16015_15C	CTD2 in	01:04	2016.05.26	52° 0.92' N	15° 3.30' W	
CE16015_15C	CTD2 out	02:30	2016.05.26	52° 0.54' N	15° 3.29' W	
CE16015_16C	CTD3 in	07:01	2016.05.26	52° 0.92' N	15° 3.32' W	
CE16015_16C	CTD3 out	08:30	2016.05.26	52° 0.9154' N	15° 3.3193	

Station Log: Multibeam							
station #	**start line name**	**Time (UTC)**	**Date**	**Lat SOL**	**Long SOL**	**MBES type**	**note**
CE16015_1M	9	06:49	25.5.16	52°4.2732'	14°8.556654'	2040	302 not working. 302 started working and logging halfway through line. Passed BIST test.

Station Log: Sub bottom profiler											
station #	**start line name**	**Start Time (UTC)**	**End Time (UTC)**	**Date**	**Lat SOL**	**Long SOL**	**Lat EOL**	**Long EOL**	**kHz**	**Speed (knts)**	**note**
CE16015_1M	65622	06:56		25.5.16	52°4.1'	14°17.23	52°0.35'	14°59.62'	1.7	8	1.7-5.5
CE16015_3S	111525	11:14	11:20	25.5.16	52°3.56'	15°0.47'	52°1.14'	15°3.4'	1.7	9	1.7-5.5
CE16015_5S	131929	13:22	13:32	25.5.16	52°0.91'	15°2.51'	52°1.010667	15°3.4'	1.7	8	1.7-5.5
CE16015_7S	151926	15:19		25.5.16	52°0.69	15°1.77'	52°0.3	15°59.44	1.7	7	1.7-5.5

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ROV DIVE PLAN CE16015

ROV DIVE: 345 | Date: 25/05/16

Vessel: **RV Celtic Explorer**	Dive lead scientist: Andy
Cruise Dive/Event: 1	
Approximate duration: 3h	Site name: Porcupine Bank Canyons
Location (start point) (DD MM.MMMM): Lat: 52° 0.33902' N Long: 14° 59.64870' W	Launch Time (UTC): 21:00
Start Dive Depth: 850m	Bottom in sight (UTC): ——
Location (end point) (DD MM.MMMM): Lat: 52° 0.33884' N Long: 14° 59.64288' W	Time off bottom (UTC): 23:54
End Dive Depth: 720m	Time on surface (UTC): 00:20

Dive aims:

1. sampling: Lophelia, Madrepora, Desmophyllum, Leiopathes
2. Exploration
3.
4.

Optional Tasks:

1.
2.
3.
4.

Notes: Stop at 800m depth - ROV - pitching roll - (TMS)
→ captain - Denis - filling the 4th ballast tank -

Dive aborted! Forecast: sea improving from 4 am.

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ROV DIVE PLAN CE16015

ROV DIVE: 346	Date: 26th May 2016

Vessel: **RV Celtic Explorer**	Dive lead scientist: Raissa Hogan, Kevin Power
Cruise Dive/Event: Station 17 Rov dive 2	
Approximate duration: 3h	Site name: QuERCi mound
Location (start point) (DD MM.MMMM): Lat: 52° 0. 32067 Long: 14° 59. 64611	Launch Time (UTC): 09:30 UTM
Start Dive Depth: 830m	Bottom in sight (UTC): NA (10:20 wall)
Location (end point) (DD MM.MMMM): Lat: 52° 0.27814 Long: 14° 59.52972	Time off bottom (UTC): 12:10
End Dive Depth: 722 m	Time on surface (UTC): 12:47

Dive aims:

1. Sampling Scleractinian corals on the lip & the canyon cliff face
2. Sampling antipatharians (small samples!)
3. Exploring more of the vertical cliff face
4. Exploring to the North of last year's site (QuERCi mound)

Optional Tasks:

1.
2.
3.
4.

Notes:

ROV Samples Collected

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Sheet No. 1/1

Site Porcupine Bank Canyons QUERCi Mound | CE16015 Dive N° 2 | ROV Dive N° 346

Event N°	Event Type	Date	Time (UTC)	Lat DD MM.MMM	Long DD MM.MMM	Depth (m)	Sample description	Sample Location in the BioBoxes	Recipient	Logger
1	SLP	26.05	11:34	52° 0.27814	14°59.52972	752.5	Leiopathes 1	SLP 3	RH/KeV	RH
2	BIOB	26.05	11:47	52° 0.27814	14°59.52972	752.5	Leiopathes 2	LC	RH/KeV	RH
3	BIOB	26.05	11:51	52° 0.27814	14° 59.52972	752.5	Leiopathes 3	LA	RH/KeV	RH
4	BIOB	26.05	11:54	52° 0.27814	14° 59.52972	752.5	Madrepora	LB	RH/KeV	RH
5	BIOB	26.05	11:59	52° 0.27814	14° 59.52972	752.5	Lophelia	LD	RH/KeV	RH
6	SLP	26.05	12:00	52° 0.27814	14°59.52972	752.5	cf. Parantipathes-Antipatharia	SLP 2	RH/KeV	RH

Event type: **SLP** (slurp with ROV), **BIOB** (scoop and claw with ROV), **PSH** (push core with ROV), **RCK** (rock), **TBE** (sample tube), **NSK** (niskin bottle)
Sample labelling: CruiseN°_dive number_eventN°: e.g. **CE16015_Dive1_ev1_sam1** - *Log the samples in the "Samples Master Logsheet"*

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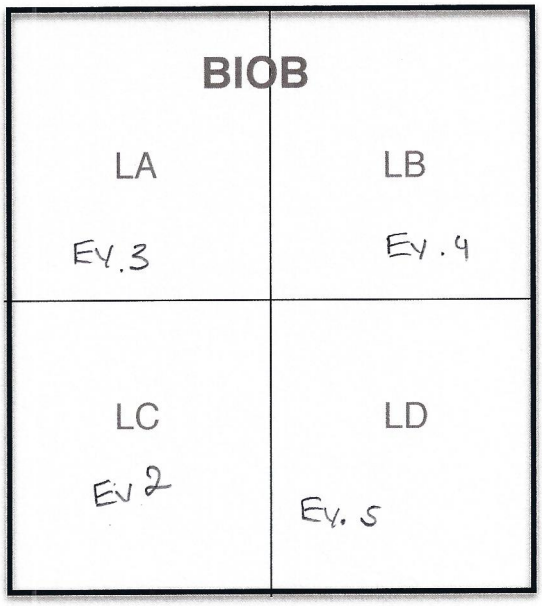
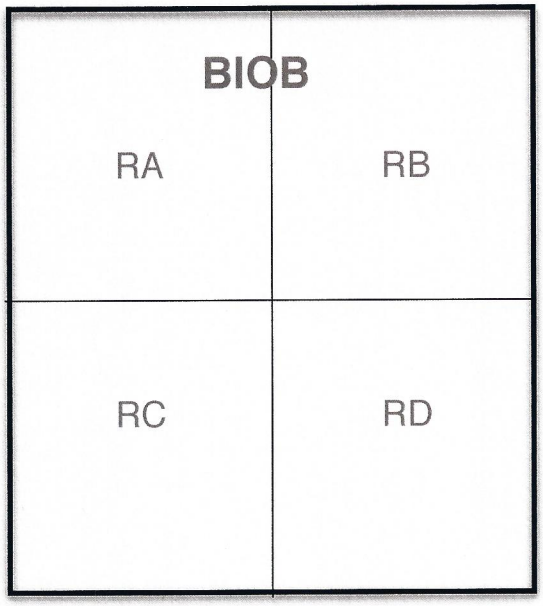
Site QUERCI Mound **Date** 26/5/16

CE16015 Dive/event N° 2 **ROV Dive N°** 346

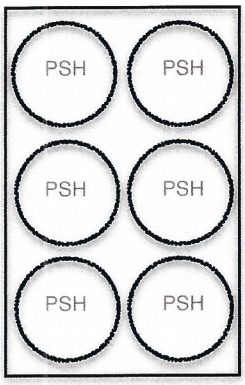
BIO BOXES



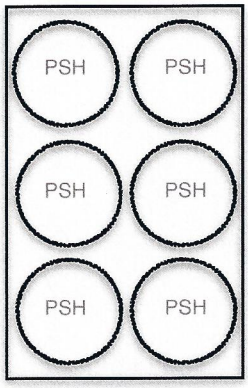


PUSH CORES

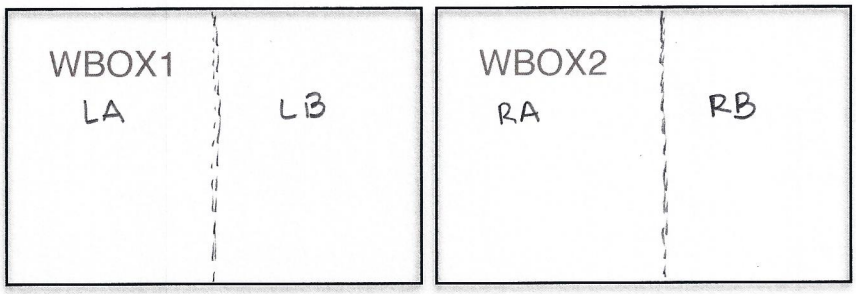
ROV LHS



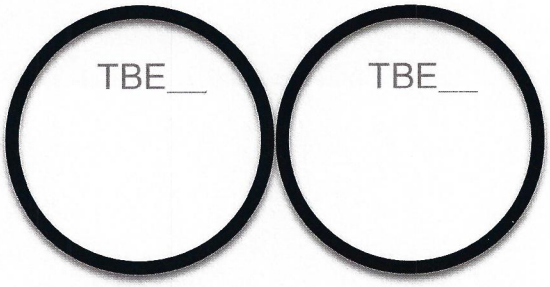
ROV RHS



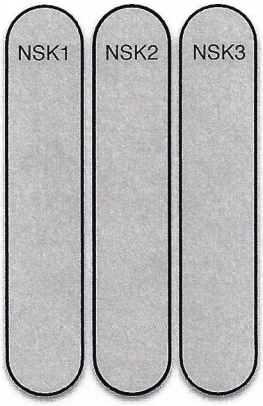
WHITE BOX



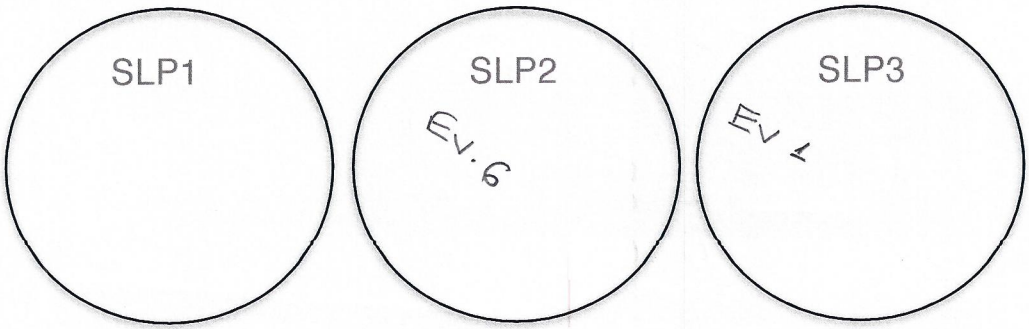
PVC TUBES



NISKINS



SLURP CHAMBERS



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ROV DIVE PLAN CE16015

ROV DIVE: 347	Date: 26 May 2016

Vessel: **RV Celtic Explorer** Cruise Dive/Event: Dive 3 / Station 18	Dive lead scientist: Russa Hogan Kevin Power
Approximate duration: 12h	Site name: New QuERCi mound
Location (start point) (DD MM.MMMM): Lat: 51° 59.405 Long: 15° 2.753	Launch Time (UTC): 13:52
Start Dive Depth: ≈ 1200m	Bottom in sight (UTC): 14:33
Location (end point) (DD MM.MMMM): Lat: 51° 58.82823 Long: 15° 2.39908	Time off bottom (UTC): 01:37
End Dive Depth: 900m	Time on surface (UTC): 02:16

Dive aims:

1. Exploring QuERCi II, a new mound South west of last years cruise
2. Pushcores
3. Sampling Scleractinians
4.

Optional Tasks:

1.
2.
3.
4.

Notes:

ROV Samples Collected

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Sheet No. 1/1

Site New QUERCI (II) | CE16015 Dive N° 3 | ROV Dive N° 347

Event N°	Event Type	Date	Time (UTC)	Lat DD MM.MMM	Long DD MM.MMM	Depth (m)	Sample description	Sample Location in the BioBoxes	Recipient	Logger
1	Push Core 1	26/5	15:53	51° 59.3153	15° 2.632	1064	"Crinoid forest" Sand	Push 1	Kev	Kev
2	Bio Sampling	26/5	16:37	51° 59.2343	15° 2.4819	985.4	Black Coral - Bathypathes	LC	Raissa	Kev
3	PSH	26/5	17:32	51° 59.1025	15° 2.4496	904	Plateau	PSH 2	Kev	Raissa
4	RCK	26/5/16	18:38	51° 59.03960'	15° 2.29579'	-887	Pebble Clast from Outcrop.	WBox 1	Kev/Andy	Aaron
5	PSH	26/5	19:42	51° 59.02334'	15° 2.23855'	864.6	Drop stone	PSH 4	Kev	Raissa
6	PSH	26/5	19:48	51° 59.02260'	15° 2.23875'	864.6	Dropstone	PSH 3	Kev	Monica
7	BIOB	26/5	19:52	51° 59.02349'	15° 2.23734'	864.3	Dropstone. Lophelia	WBOX 1	Kev	Monica
8	BIOB	26/5	20:04	51° 59.02349'	15° 2.23734'	864.3	Dropstone - tick 'Black coral branch	BIOB	Kev	Monica
9	BIOB	26/5	20:15	51° 59.02379'	15° 2.23779'	864.1	Dropstone - Leiopathes	BIOB	Kev	Monica
10	BIOB	26/5	22:11	51° 58.955	15° 1.993	650	Desmophyllum Wall	~~LB~~	Kev	Kev
11	PSH	26/5	23:28	51° 58.8147	15° 1.9281	-612	~~Mound~~ Summit	PSH 5	KEV	Aaron
12	PSH	26/5	23:34	51° 58.8148	15° 1.9281	-611.6	(N. Apparent Sample) Mound Summit (Push Core Broke)	PSH 6	Kev	Aaron
13	BIOB	27/5	00:00	51° 58.8148	15° 1.928	-611.6	Mound Summit attempt to collect	WBOX	Kev	Kev part of sample fell into BIOBOX
14	BIOB	27/5	00:00	51° 58.8148	15° 1.928	-611.6	Mound Summit	LC	Kev	Kev

Event type: **SLP** (slurp with ROV), **BIOB** (scoop and claw with ROV), **PSH** (push core with ROV), **RCK** (rock), **TBE** (sample tube), **NSK** (niskin bottle)
Sample labelling: CruiseN°_dive number_eventN°: e.g. **CE16015_Dive1_ev1_sam1** - *Log the samples in the "Samples Master Logsheet"*

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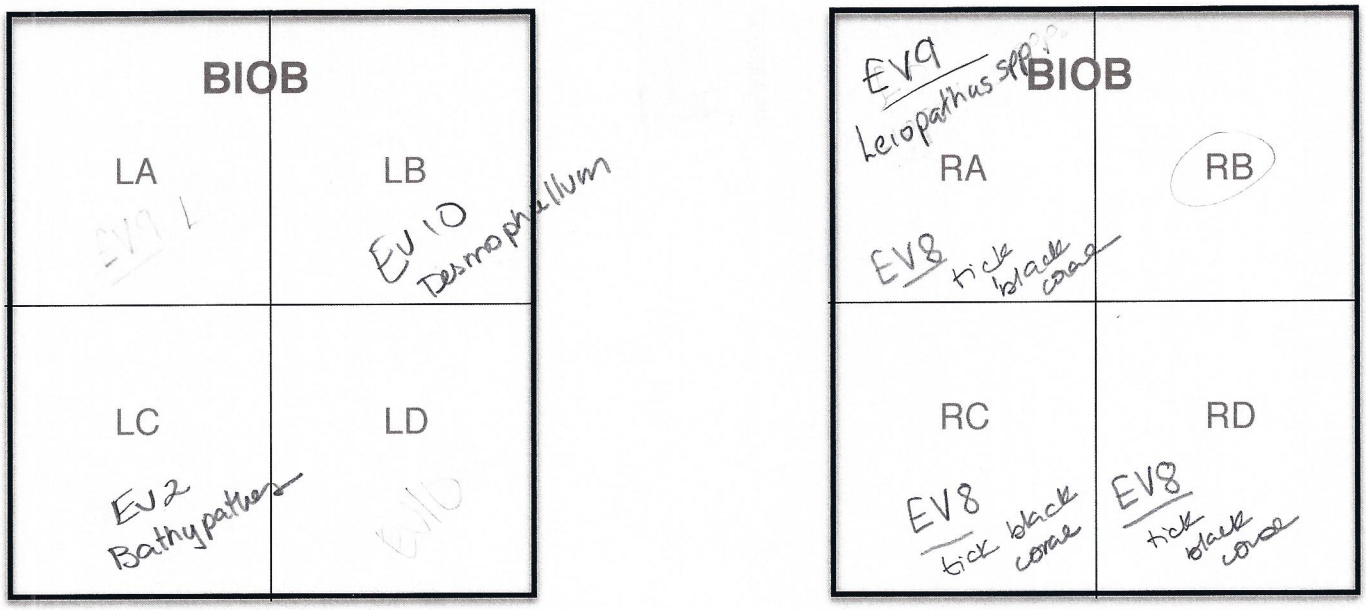
Site New QUERCI (II) **Date** 26/05/16

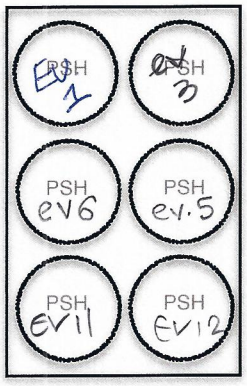
CE16015 Dive/event N° 3 **ROV Dive N°** 347

BIO BOXES

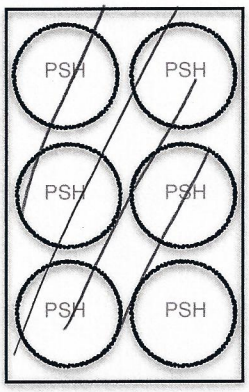


PUSH CORES

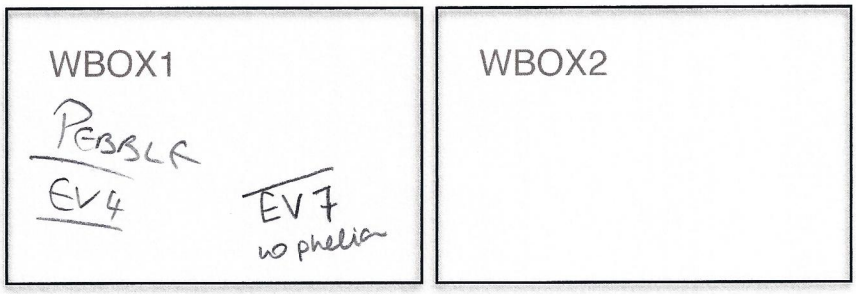
ROV LHS



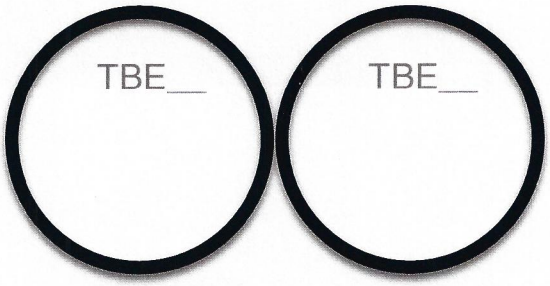
ROV RHS



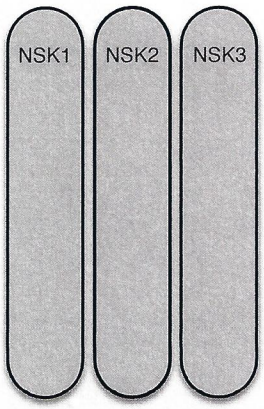
WHITE BOX



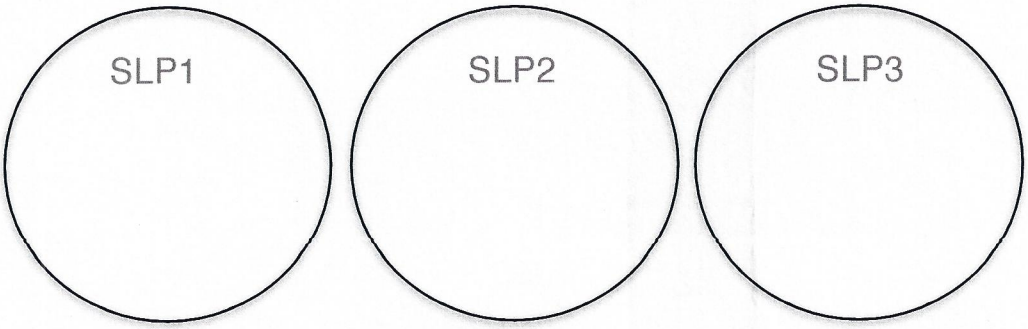
PVC TUBES



NISKINS



SLURP CHAMBERS



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ROV Media Logsheet

Sheet No. 1 / 1

Site

CE16015 Dive N° 1, 2, 3

ROV Dive N° 345 / 346 / 347

Date	Time (UTC)	MEDIA KiPro A, B, C, D	MEDIA Composite PT, RE, DW, FWD, DS	File Name (ROV HD - KiPro)	Copied to LaCie	Copied to HD	Check Files LaCie	Check Files HD	Delete & Format KiPro	Comments
26/5/16	08:18	—	PT		✓	✓	✓	✓	—	Dive aborted DIVE 1 we had only PT composite video
26/5/16	12:25	A	PT, RE, DW, DS	SC300TK2.mov	✓	✓	✓	✓	✓	DIVE 2
26/5/16	16:59	F	PT, RE, DW, DS	SC 300TK3.mov	✓	✓	✓	✓	✓	DIVE 3
26/5/16	19:10	C	PT, RE, DW, DS	SC 300TK4.mov	✓	✓	✓	✓	✓	DIVE 3
26/5/16	21:09	A	PT, RE, DW, DS	SC 300TK5.mov	✓	✓	✓	✓	✓	DIVE 3
26/5/16	23:05	F	PT, RE, DW, DS	SC300TK6.mov	✓	✓	✓	✓	✓	DIVE 3
27/5/16	01:04	C	PT, RE, DW, DS	SC300TR7.mov	✓	✓	✓	✓	✓	DIVE 3
27/5/16	04:52	A	PT, RE, DW, DS	SC300TR8.mov	✓	✓	✓	✓	✓	DIVE 3

Composite video: Pilot: (PT), Rear: (RE), Down: (DW), Forward: **FWD**, Digital Still: (DS)

(back in Freezer : 10:55 pm) 26/5/16

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Samples Master Logsheet

Sheet No. 1/5

Date	Cruise	Dive	Event	Sample N°	Sample ID	Description	Container size	Sample Preservation	Recipient
26/05/16	CE16015	2	1	01	Leiopathes 1	strong orange color, ≈20cm height	1L WHITE PLASTIC CONTAINER	ethanol	RH
26/5/16	CE16015	2	2	02	Leiopathes 2	Subsamples: A, B, C (3 ex.)	1L PLASTIC BAG	ethanol	RH
26/5/16	CE16015	2	3	03	Leiopathes 3		1L WHITE PLASTIC CONTAINER	ethanol	RH
26/5/16	CE16015	2	4	04	Madrepora		Green tube 0.75 Litres	ethanol	KEVIN
26/5/16	CE16015	2	5	05	Lophelia		Green tube 0.75 L.	ethanol	KEVIN
26/5/16	CE16015	2	6	06	Antipatharia C.f. Parantipathes		PLASTIC BAG	ethanol	RH
26/5/16	CE16015	2	1	07	Crinoid 1		15mL FALCON	ethanol	RH
26/5/16	CE16015	2	1	08	Crinoid 2		15 mL FALCON	ethanol	RH
26/5/16	CE16015	2	2	09	Sponges		PLASTIC BAG	frozen	RH
26/5/16	CE16015	2	2	10	Worm		EPPENDORF	ethanol	RH
26/5/16	CE16015	2	2	11	Crinoids (3 ex.)		50 mL FALCON	ethanol	RH
26/5/16	CE16015	2	2	12	Ophiuroid		EPPENDORF	ethanol	RH
26/5/16	CE16015	2	2	13	Coral rubble		PLASTIC BAG	frozen	RH
26/5/16	CE16015	2	6	14	Crabs (2 ex)		50 mL FALCON	ethanol	RH
26/5/16	CE16015	3	2	15	Bathypathes		PLASTIC BAG	ethanol	RH

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Samples Master Logsheet

Sheet No.	2/5

Date	Cruise	Dive	Event	Sample N°	Sample ID	Description	Container size	Sample Preservation	Recipient
26/5/16	CE16015	3	9	16	Leiopathes (Kev got basal branch)	SAMPLE – Kevin SUB SAMPLE – Rousse	25 mL VIAL	Ethanol/NA	RH/KP
26/5/16	CE16015	3	8	17	Crinoid		250 mL PLASTIC CONTAINER	Ethanol	RH
26/5/16	CE16015	2	4	18	Madrepora	Small bottle Section - QuERCi(ole) Mostly broken year collection	green tub .75 liters	NA	KP
26/5/16	CE16015	2	5	19	Lophelia	Lophelia section - QuERCi(ole) thickened stalk unusable (hollow)	.75 liters green tub	NA	KP
27/5/16	CE16015	3	13	20	Lophelia	Summit QuERCi II Lophelia	green tub .75 liters	NA	KP
27/5/16	CE16015	2	5	21	Lophelia (2 ex)		plastic bag	ethanol	AV
27/5/16	CE16015	3	Extra	22	Lophelia		green tub .75 liters	Dry	KP
27/5/16	CE16015	2	5	23	worm	Very small, and thin	eppendorf	Ethanol	RH
27/5/16	CE16015	3	13	24	Lophelia	From summit	green tub	Dry	KP
27/5/16	CE16015	2	5	25	Lophelia Worm	Very long, living inside lophelia, black mouth	50mL FALCON	ethanol	RH
27/5/16	CE16015	2	5	26	Hydroid		eppendorf	ethanol	RH
27/5/16	CE16015	3	13	27	Leiopathes		100 mL VIAL	ethanol	RH
27/5/16	CE16015	2	5	28	Asperarca cf. nodulosa		eppendorf	ethanol	AV
27/5/16	CE16015	3	13	29	Worm	epifauna found on #24	50ml Falcon	ethanol	RH
27/5/16	CE16015	3	14	30	Lophelia	lophelia from summit	green tub	dry	KP

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Samples Master Logsheet

Sheet No.	3/5

Date	Cruise	Dive	Event	Sample N°	Sample ID	Description	Container size	Sample Preservation	Recipient
27/5/16	CE16015	3	13	31	Acanthogorgia cf	epifauna found on #24	plastic bag with paper	ethanol	AV
27/5/16	CE16015	3	13	32	Lophelia (2x)	epifauna found on #24	plastic Bag	ethanol	AV
27/5/16	CE16015	3	13	33	Anemones (3x)	epifauna found on #24	25 ml Vial	ethanol	RH
27/5/16	CE16015	3	Extra	34	worm		eppendorf	ethanol	RH
27/5/16	CE16015	3	Extra	35	ophiuroid	pinkish color	eppendorf	ethanol	RH
27/5/16	CE16015	3	Extra	36	Sponge		50ml Falcon	ethanol	RH
27/5/16	CE16015	3	13	37	Ophiuroid	epifauna found on #24	eppendorf	ethanol	RH
27/5/16	CE16015	3	Extra	38	Octocoral		eppendorf	ethanol	AV
27/5/16	CE16015	3	Extra	39	Desmophyllum		50mL Falcon	ethanol	AV
27/5/16	CE16015	3	Extra	40	Asperarca cf. nodulosa (4x)		eppendorf	ethanol	AV
27/5/16	CE16015	3	8	41	Barnicles (x5)		50ml falcon	ethanol	AV
27/5/16	CE16015	3	8	42	gastropod		50 ml falcon	ethanol	AV
27/5/16	CE16015	3	8	43	Bivalves (x2)		eppendorf	ethanol	AV
27/5/16	CE16015	3	8	44	Ophiuroids		15 ml falcon	ethanol	RH
27/5/16	CE16015	3	8	45	Squat lobster		5 Plastic cylinder ~ 20ml	ethanol	RH

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Samples Master Logsheet

Sheet No.	4/5

Date	Cruise	Dive	Event	Sample N°	Sample ID	Description	Container size	Sample Preservation	Recipient
27/5/16	CE16015	3	8	46	Worm		eppendorf	ethanol	RH
27/5/16	CE16015	3	8	47	Lophelia worm		50ml falcon	ethanol	RH
27/5/16	CE16015	3	8	48	Bivalve 2		15 ml falcon	ethanol	AV
27/5/16	CE16015	3	7	49	Lophelia		Plastic Bag	ethanol	AV
27/5/16	CE16015	3	7	50	Worm	still alive while processing. light brown	eppendorf	ethanol	RH
27/5/16	CE16015	3	10	51	Desmophyllum		very large	N/A	KP
27/5/16	CE16015	3	14	52	Desmophyllum		small plastic cilinder ~20ml	N/A	AV
27/5/16	CE16015	3	14	53	Gastropod		eppendorf	ethanol	AV
27/5/16	CE16015	3	14	54	Serpulidae		15ml falcon	ethanol	AV
27/5/16	CE16015	3	8	55	Octocoral/Barnacle	epifauna attached on #66	plastic bag.	ethanol	AV
27/5/16	CE16015	3	8	56	Black coral	small specimen attached on #57	eppendorf	ethanol	RH
27/5/16	CE16015	3	8	57	Madrepora	sample attached to Leiopathes branch (dead)	plastic bag/green tube 0.75L	ethanol/dry	AV/Key
27/5/16	CE16015	3	10	58	Desmophyllum (bundle on the wall)	sample Kevin / subsample Raissa	eppendorf	Dry/ethanol	RH
27/5/16	CE16015	3	14	59	Lophelia worm	Ophiuroid 2x	50ml falcon	ethanol	RH
27/5/16	CE16015	3	14	60	Ophiuroid 2x		eppendorf	ethanol	RH

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Samples Master Logsheet

Sheet No. 5 / 5

Date	Cruise	Dive	Event	Sample N°	Sample ID	Description	Container size	Sample Preservation	Recipient
27/5/16	CE16015	3	8	61	Desmophyllum	From madrepora attached to Leiopathes from dropstone	eppendorf	ethanol	AV
28/5/16	CE16015	3	10	62	Cidaris cidaris		Wide mouth Jar 125mL	ethanol	RH
28/5/16	CE16015	3	10	63	Ophiuroid (1x)	epifauna found on #58	eppendorf	ethanol	RH
28/5/16	CE16015	3	9	64	Ophiuroid (big)	epifauna found on #16 Leiopathes	25ml vial	ethanol	RH
28/5/16	CE16015	3	10	65	tube worm	epifauna found on #58	20ml plastic cylinder	ethanol	RH
28/5/16	CE16015	3	8	66	dead thick branch Leiopathes	attached to madrepora #57	Plastic Bag	Dry	RH / KEV
28/5/16	CE16015	3	10	67	Lophelia worm	Lophelia on base of #58	15mL falcon	ethanol	RH
28/5/16	CE16015	3	10	68	Desmophyllum Worm	Found inside the tube of #58			
28/5/16	CE16015	3	10	69	Desmophyllum worm	Found deep in #58 cup/top	eppendorf	ethanol	RH
28/5/16	CE16015	3	10	70	Desmophyllum worm	Found attatched to base of #58	15ml falcon	ethanol	RH
28/5/16	CE16015	3	10	71	Lophelia (Blob)	Found attached to lophelia on base of #58			
28/5/16	CE16015	3	10	72	Ophiuroid (1x)	Found in water of #58	eppendorf	ethanol	RH
28/5/16	CE16015	3	10	73	Bivalves (x4)	Found attached on Lophelie (on base of #58)			
28/5/16	CE16015	3	10	74	Sponge (2x)	Found attatched to Desmophyllum (#58)	small cylinder 20ml	ethanol	AV
28/5/16	CE16015	3	10	75	Ophiuroid (1x)	Found dwelling on Desmophyllum (#58)	eppendorf	ethanol	

MARINE MAMMAL OBSERVATION REPORT

During the trip a Marine Mammal Observer (MMO) was onboard recording marine mammal sightings. Effort watches were conducted throughout daylight hours from the crows nest (17m above sea level). In total 17 sightings were recorded; 15 cetacean species, 1 phocid and 1 unidentified large vertebrate species. Sightings were mainly clustered in coastal waters and in the Porcupine Bank Canyon SAC. Sightings included; grey seal (*Halichoerus grypus*), common dolphins (*Delphinus delphis*), white-beaked dolphins (*Lagenorhynchus albirostris*), Risso's dolphins (*Grampus griseus*), long-finned pilot whales (*Globicephala melas*), minke whales (*Balaenoptera acutorostrata*) and one humpback whale (*Megaptera novaeangliae*) (Table 1). Common dolphins were the most commonly sighted cetacean species inshore and are frequently recorded along the Irish coastline.

Table 1: Marine Mammal sightings during the QuERCi II survey 2016.

Date	Time	Latitude	Longitude	Species	Animals	Adults	Juveniles	Calves
24-May-16	12:49:47 PM	53.1927	-9.673922	MW	2			
24-May-16	2:22:21 PM	53.18869	-9.829673	CD	15			
24-May-16	2:50:28 PM	53.17018	-9.947782	HBW	1	1		
24-May-16	3:08:31 PM	53.15344	-10.023	MW	1	1		
24-May-16	3:16:03 PM	53.14618	-10.05428	CD	8	8		
24-May-16	3:48:36 PM	53.1141	-10.19047	WBD	2	2		
24-May-16	4:31:08 PM	53.07341	-10.3682	UIC	1			
25-May-16	3:39:47 PM	52.00512	-14.99059	PW	4	3	1	4
26-May-16	8:26:19 AM	52.01526	-15.05544	PW	8	7		1
26-May-16	9:13:12 AM	52.00541	-14.99395	PW	4			1
26-May-16	1:10:50 PM	51.99062	-15.04033	PW	8	8	0	0
26-May-16	1:28:37 PM	51.99027	-15.04578	PW	8	5	2	1
27-May-16	1:32:10 PM	51.58951	-12.00536	PW	8			
27-May-16	3:48:27 PM	51.50714	-11.35152	GS	1	1		
27-May-16	4:48:16 PM	51.46856	-11.06259	RD	3	3		
27-May-16	8:49:53 PM	51.3181	-9.894925	CD	10	10		
28-May-16	11:57:43 AM	51.46498	-8.13055	HBW	1	1		

MW = minke whale; CD = common dolphin; PW = Pilot whale; RD = Risso's dolphin; WBD = white-beaked dolphin; HBW = humpback whale; GS = grey seal; UIC = unidentified large vertebrate

White-beaked dolphins were recorded off Galway bay, white-beaked dolphins are an oceanic dolphin species mainly sighted offshore over the continental shelf, especially along continental shelf edges however, they are recorded inshore infrequently in Ireland (Culloch *et al*., 2015). Risso's dolphins were recorded west of Kerry, again another oceanic species preferring deeper waters, however, in Britain and Ireland, most records are within 11km of the coast (Carwardine, 2000). Another interesting sighting was that of a humpback whale at the mouth of Galway Bay. A second humpback whale sighting was recorded south of Cork and have been recorded in this area since April this year. During 2015 the Irish humpback whale identification catalogue doubled (www.iwdg.ie) and in recent months,

humpback whales have been recorded from west Cork to Sligo and thus appear to be along the south and west coast of Ireland. Generally, at this time of year they are expected to be seen off Kerry and west Cork with sightings from Galway, Mayo and Sligo considered quite rare. This apparent increase in abundance and range expansion has not been investigated thus far but is likely correlated with their prey distribution as Ireland is a known feeding ground for humpback whales.

No sightings were recorded between the mouth of Galway Bay and the Porcupine Bank Canyon, this was expected as dedicated cetacean offshore surveys in the past have had similar results (O'Brien *et al*., 2009). Long-finned pilot whales were the only cetacean species sighted in the Porcupine Bank Canyon SAC (Figure 1), pilot whales are known to inhabit Ireland's continental shelf edge waters and therefore, were an expected sight. There was one offshore grey seal sighting

Figure 1: Long-finned pilot whales (*Globicephala melas*) photographed in the Porcupine Bank Canyon SAC during the QuERCi II survey 2016.

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