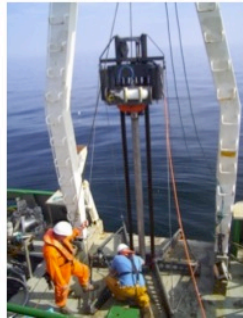


CV10_28 Cruise Report

2nd June – 7th June 2010



Compiled By Shane O' Reilly (DCU)¹

Contributors: Michal Szpak (DCU)¹, Xavier Monteys (GSI)² and Dr. Brian P. Kelleher (DCU)^{1*}

1. School of Chemical Sciences, Dublin City University, Glasnevin, Dublin 9
2. Geological Survey of Ireland, Beggars Bush, Haddington Road, Dublin 4

* Correspondence to brian.kelleher@dcu.ie



Acknowledgements

The members of the shipboard scientific crew would like to thank the captain and the crew of R.V. Celtic Voyager. Peter Croker (PAD) is thanked for sharing valuable advice and data for the cruise preparation. The Irish [Marine Insitute](#) is thanked for funding the ship time through the RTDI funding scheme. Eamonn Kelly (Dept. of the Environment, Heritage and Local Government) is also thanked for his assistance and input. This work was carried out within the framework of an [INFOMAR](#) research project (2009) and with the collaboration of the [Geological Survey of Ireland \(GSI\)](#).

Table of Contents

Abbreviations	4
Executive Summary	5
Background	6
Cruise rationale, objectives and planning.....	9
Cruise Log	11
Vessel & scientific crew equipment.....	14
Technical difficulties	20
Cruise outcome & preliminary results	21
Conclusion	32
Future work	34
References	35
Appendices	37

Abbreviations

AOM- Anaerobic oxidation of methane

CFZ- Codling Fault Zone

DCU- Dublin City University

DOM- Dissolved Organic Matter

GSI- Geological Survey of Ireland

IDSZ- Irish Designated Seabed Zone

INFOMAR- INtegrated Mapping FOr the Sustainable Development of Ireland's
MARine Resource

MDAC- Methane-derived authigenic carbonates

PAD- Petroleum Affairs Division

ROV- Remotely operated vehicle

TOC- Total Organic Matter

1. Executive Summary

Cruise CV10_28 mobilized and demobilized from Howth, Co. Dublin, on the 2nd and 7th June 2010 respectively, and totalled over 112 operational hours. The objectives of this cruise were primarily to investigate and sample previously identified methane-related seepage structures in the Irish Designated Seabed Zone (IDSZ) of the Irish Sea, to carry out sampling grids of Dublin Bay and of the region of the IDSZ from Dublin Bay to Dundalk Bay for multidisciplinary geochemical and microbiological studies, and also to sample the water column for dissolved organic matter studies. A total of 113 sampling stations were successfully sampled: 46 grabs; 55 boxcores (0.25m²); 5 gravity cores (1m); and 7 vibrocores (3m).

Gas-related seepage features successfully investigated were methane-derived authigenic carbonates (MDAC) in the Codling Fault Zone (CFZ), the Lambay Deep mud diapir, and also a shallow pockmark in the northern mudbelt region. Four videolines with over six hours of video footage were acquired in the MDAC target sites. Video footage and image stills of clusters of MDAC slabs, nodules and outcroppings, as well as indications enhanced anaerobic oxidation of methane (AOM) were successfully obtained. These features were subsequently successfully ground-truthed, sampled and preliminary geochemical analysis was carried out, thereby proving MDAC mounds in the CFZ are distinct features caused by active sub-surface seepage of methane.

The Lambay Deep mud diapir was investigated by videoline deployment, whereby no distinct differences in seabed structure or biodiversity were observed. Fine sandy muds with relatively high macrofaunal biodiversity characterized seabed both inside and outside of Lambay Deep. The feature and surrounding seabed was ground-truthed by vibrocore and boxcore, and results supported the videoline findings. Sub-surface sediment (0-3m) was characterized by homogenous well-sorted fine sandy mud, with low infauna and shell presence, and little or no evidence of sub-surface anoxia.

The mudbelt pockmark was investigated by videoline deployment and also subsequently ground-truthed by gravity core and boxcore. Videoline and sampling evidence suggests that the pockmark and reference samples from the surrounding seabed is uniform, and characterized by very fine mud with little sub-surface zonation. Previous sub-bottom profiling of the feature suggests no evidence of gas seepage or accumulations in the vicinity of the pockmark.

The weather and sampling conditions were overall favourable throughout the cruise but the lack of dynamic positioning aboard the *Celtic Voyager* and also the restriction on the vibrocore to slack water and day-time use resulted in some sampling limitations and incomplete secondary objectives. Overall CV10_28 achieved the vast majority of its objectives, and a comprehensive foundation for numerous studies and peer-reviewed publications has been established.

2. Background

CV10_28, an INFOMAR funded cruise, investigated the area from the southern limit of Dublin Bay to the northern and eastern limits (approx. 50km east of Dublin Bay) of the Irish Designated Seabed Zone (IDSZ) at the Irish/UK median line. The Irish Sea (approx. 260km long and 190km wide) lies between Great Britain on the east and Ireland on the west, and is connected with the Atlantic Ocean by the North Channel on the north and St. George's Channel on the south. Riverine input to the area from the East Irish coast area includes, among many others: the R. Liffey and the R. Tolka entering at Dublin Bay; the R. Boyne entering at Drogheda; and the R. Fane, the R. Lagan and the R. Castletown flowing into Dundalk Bay. Dublin bay is a shallow (<20m) embayment located at 53°20' N latitude and 6°5' W longitude and is enclosed by the headlands of Howth and Dalkey. It has an approximate area of 70km² and the bay entrance is 10.2km wide.

Water depths range from 0-20m in the coastal areas and bays and at the Ireland/UK median line are on average 100m, with localized depressions of 130 – 180m (Croker et al 2005). Geological investigations of the Irish Sea have primarily been confined to petroleum exploration and exploitation surveys, and cable route surveys (Judd et al 2007). The W. Irish Sea within the IDSZ encompasses the two Mesozoic sedimentary basins, namely the Kish Bank Basin and the S.W. section of the Central Irish Basin, and is primarily underlain with Permian and Carboniferous rocks. Quaternary sediment thickness in the W. Irish Sea is between 50-150m, but with the presence of thinner and even absent Quaternary cover also occurring (Croker et al. 2005).

Gas-seepage structures have been documented in the Irish Sea (e.g. Jones et al. 1986, Taylor, 1992, Yuan et al. 1992, Croker et al. 2005, Judd et al. 2007). Methane seepage from the seabed is either of thermogenic or biogenic origin i.e. microbial methanogenesis and occurs globally (Fleischer et al. 2001). The importance of studying such processes is broad and includes: assessing sinks and turn-over of carbon in the marine environment and its consequences for global warming (Fleischer et al. 2001); studying unique biological (both macro-benthic and microbial) communities (Boetius et al. 2000); marine industrial and

petroleum structure safety (Hovland et al. 2002); and petroleum/gas prospecting (Judd and Hovland, 2007).

In the Irish Sea the source of thermogenic methane is from coal-bearing Carboniferous rocks and the source of biogenic methane is from Tertiary lignites and modern silts and clays (Judd et al. 2007). Conditions suitable for biogenic methane production in the Irish Sea are in the so-called 'mudbelt' regions to the west and east. Migration pathways of methane from sub-seabed to seabed in the Irish Sea are thought to be primarily along faults, faults associated with salt-structures (e.g. diapirs) and regions where Carboniferous-age source rocks sub-crop beneath Quaternary sediments (Judd et al. 2007).

Pockmarks are globally ubiquitous shallow seabed depressions, believed to be formed due to rapid gas expulsion from gas accumulations underneath impermeable seabed layers. They are predominantly found in soft, fine-grained sediments, and are on average tens of metres across and a few metres deep (King and MacLean 1970, Hovland et al. 2002, Ussler et al. 2003, Judd and Hovland 2007). Soft silty clays seem to provide the ideal sediment grain size for pockmark formation and this means pockmarks are mostly found in regions with relatively fine sediments (Judd and Hovland 2007). In Irish waters, pockmarks have been documented a number of locations: in the Malin Sea (Monteys et al, 2008) and around the Porcupine Bank (Games, 2001) . In the Irish Sea, pockmarks have been previously documented in the northern mudbelt area of the IDSZ, where fine-grained muds are present (Yuan et al. 1992, Croker et al. 2005, Geological Survey of Ireland unpublished data).

Active sub-surface gas seepage in these muddy sediments has also facilitated mud diapir formation. Mud diapirs (and mud volcanoes) occur when gas-charged mud or clay sediments rise, as a result of buoyancy effects, through other sedimentary layers, and may be tens to hundreds of metres across (Croker et al 2005). The Lambay Deep Mud Diapir (Lat 53^o26.391'N, Lon 5^o48.143'W) was discovered by Croker and O' Loughlin on a *RV Celtic Voyager* cruise on 23rd-26th April 1998 and is the only documented mud diapir in the IDSZ of the Irish Sea. The Lambay Deep is a linear trench-like feature 50-60m lower than surrounding seabed and has a maximum depth of up to 110m (Croker et al. 2005). Detailed multibeam bathymetry and Geochirp mapping of this feature has

been carried out by Croker and his team and has shown the area to be largely influenced by sub-surface gas fronts.

Gas seepage in the Kish Bank Basin, predominantly characterized by sandy sediment, has facilitated the formation of carbonate mound-like structures (methane-derived authigenic carbonate- MDAC). MDAC comprises carbonate minerals (usually high-Mg calcite or aragonite), which cement the existing seabed matrix together to form a hard rock, which may form large regular slabs or mounds structures over time (Judd et al. 2007). This carbonate is formed as a by-product of the anaerobic oxidation of methane (AOM) and has been shown to be closely associated with seabed gas seeps (Boetius et al. 2000). Circa. 30 carbonate mounds have been identified in the Kish Bank Basin. The Codling Fault is a major NW-SE trending strike-slip fault making up the eastern edge of the Kish Bank Basin. This fault has been extensively surveyed and sampled by the Petroleum Affairs Division (PAD) and others (Croker et al. 2005, Judd et al. 2007). Water depth here is around 50-60m to the west of the fault and 80-120m to its east. Croker et al. (2005) divided the Codling Fault into three zones: the northern muddy zone containing the Lambay deep; the central sandy zone characterized by sand waves; and the southern zone characterized by current-swept seabed and patches of coarse sediments. 23 mounds in total have been identified in this central zone of the Codling Fault, and have a relief of circa. 5-10m. 3 MDAC mounds in the Codling Fault Zone were investigated by the *RV Lough Beltra* cruise in 1997 and were located at: Lat 53°19.754'N, Lon 5°36.925'W; Lat 53°20.296'N, Lon 5°37.750'W; and Lat 53°20.839'N, Lon 5°39.208'W. Croker et al. (2005) suggest, based on their evidence, that the Codling Fault Zone may be the most active site of gas migration and seepage in the IDSZ of the Irish Sea.

Other seepage-related seabed features of interest in the W. Irish Sea include the Western Trench (Lat 53°23'08"N, Lon 5°24'38"W), the Central Trench is (Lat 53°13'45"N, Lon 5°24'15"W), the Kish Bank Anomaly (Lat 53°23'46"N, Lon 5°24'38"W), and the Liassic outcrop (Lat 53°28.000'N, Lon 5°45.000'W).

3. Cruise Rationale, Objectives and Planning

The objectives of this cruise were as follows:

- To investigate and sample previously identified gas-related seabed structures in the Irish Sea for later geochemical and biological analysis.
- To carry out an extensive boxcore sampling grid in the W. Irish Sea, with the intention of encompassing the northern mudbelt region and the sandy region of the Kish Bank Basin, immediately east of Dublin Bay.
- To carry out a grab sampling grid of Dublin Bay for geochemical and pollution based studies.
- To sample the water column above a gas-seepage feature of interest for dissolved organic matter (DOM) studies.

The primary objective of this cruise was the investigation of gas-related seabed structures in this area. The sampling apparatus required for this study is a GEO-Resources 3000 vibrocorer. Based on the cruise length, number of scientific crew and labour involved, a maximum of 6 vibrocorers (to be fully processed as planned) was determined. Onboard labour to be carried out on these cores was visual core description, gas-sampling, pore-water sampling using Rhizons, redox potential (E_h), and pH and NH_4^+ measurements of the split cores. This aspect of the cruise was the most labour-intensive and had the highest potential for complications and subsequent modifications of the sampling plan. Potential problems envisaged included: penetration issues in hard lithology of the MDAC sites; and issues arising from operation of the corer in relatively rough weather and difficult tidal conditions. The following is a description of the proposed vibrocore stations, which were outlined in the sampling plan:

- 2 cores at a pockmark site in the mudbelt region. The pockmark chosen for this cruise is located at Long 53.677942 and Lat -5.935735, in about 43m depth. The pockmark itself is about 1.6m in depth. A core from inside the pockmark and outside the pockmark was planned.
- 2 cores from an MDAC site in the CFZ. 3 MDAC mounds of interest are located at Lat 53°19.754'N, Lon 5°36.925'W; Lat 53°20.296'N, Lon

5^o37.750'W; and Lat 53^o20.839'N, Lon 5^o39.208'W. 1 core from an MDAC mound and one from surrounding sand as a reference was planned.

- 2 cores at the Lambay Deep mud diapir, located at Lat 53^o26.391'N and Lon 5^o48.143'W. One core from within the mud diapir and one reference core from outside the feature was planned.

Based on the average speed of the *Voyager* (~6 knots), average sampling time per station and the total area of interest, the maximum number of boxcores envisaged to be obtained was 80. Each boxcore would be carefully logged, described, photographed and sampled using a single pushcore and subsequently stored at - 20°C freezer for analysis onshore. The boxcore sampling study was the largest potential grid and it was decided if there were time constraints and risks of not completing other objectives, then the sampling intensity would be reduced. The rationale behind this sampling study was the ground-truthing of geophysical datasets and the characterization of the surficial seabed environment in the W. Irish Sea from geological, geochemical and microbiological perspectives. A map and table of the proposed coordinates for each boxcore station is outlined in Appendix B and C respectively.

The rationale behind the proposed sampling grid of Dublin Bay was for the purpose of pollution-based assessment and basic geochemical and physical characterization of the Dublin Bay environment. Metal and bulk elemental studies shall be carried out using XRF-based techniques (DCU), particle size analysis (PSA) (GSI), and basic geochemical characterization (DCU). There is also the potential for advanced molecular analysis (DCU, Queens University Belfast and University of Scarborough, Toronto CA.). The sampling equipment proposed for this study was the Day grab, with sub-samples to be taken on deck. Sub-sampling to 125ml furnaced jars (with Teflon-lined caps) for organic analysis and to two plastic bags for metal analysis and PSA respectively was proposed. A sampling intensity of circa. 40 day grabs within the Bay area was proposed in order to provide sufficient spatial coverage of Dublin Bay. A map and table of the proposed coordinates set out in the sampling plan for each sampling station is given in Appendix B and C respectively.

The rationale behind the DOM study was to characterize DOM in the water column above an MDAC mound and attempt to assess potential variation

in DOM in the water column above these unique features, and subsequently link results to gas-seepage effects on DOM cycling.

4. Cruise Log

2nd June: Day 1 (Weather- sunny, calm)

7:30-10:00- Scientific crew mobilization undertaken on the *RV Celtic Voyager*. A photographer was present to take photos of the DCU scientific party from 8:30-10:00. During this period all equipment was transported onboard and set up in the *Voyager* wet lab.

13:00-13:20- A safety briefing was undertaken.

15:30- CTD/rosette sampler training.

16:00- Meeting with Captain to modify sampling plan for day grab sampling as approx. 40% of proposed stations were too shallow or close to the shore to allow sampling by the *Voyager* (which has no dynamic positioning and can drift significantly during sampler deployment). The modified sampling plan was completed and given to the Captain.

16:10- *Voyager* embarked with a southern heading around Howth head and into Dublin Bay to commence the at 17:00

17:00-23:00 Dublin Bay sampling study was commenced. The new MI Reineck boxcorer was tested in Dublin Bay area at station 010 (10th grab sample). At 23:00 Day grab sampling was stopped and the vessel was placed on an eastern heading for the Codling Fault Zone. 16 of 40 Day grab stations had been sampled successfully.

3rd June: Day 2 (Weather- sunny, calm)

1:30-2:30 Camera deployment and retrieved at Lambay Deep.

3:17- First camera deployment at Lat 53°20.3487N, Long 5°38.9669W at MDAC site.

4:00-4:40- Second camera deployment at MDAC target site. MDAC were nodules observed in sandy seabed. MDAC slabs observed at Lat 53°20.8222N, Long 5°39.2267W.

4:45-5:24- Third camera deployment at MDAC target site 2 Lat 53°20.4278N and Long 5°37.6125W. No features observed.

6:00- Three Van Veen sampling attempts were made to test the sampler and try to sample MDAC. All samples were sand but one sample successfully recovered MDAC crust and nodules (CV10_28_017).

7:00- Boxcoring at CFZ (CV10_28_018)

8:30- New heading for Lambay Deep to vibrocore Lambay Deep mud diapir in slack water.

10:20-11:10- 3m vibrocores collected from inside and outside mud diapir (CV10_28_019 and CV10_28_020 respectively.)

11:20- Plankton net deployed at Lat 53°26.5346N, Long 5°48.6698 and retrieved at Lat 53°26.5903N, Long 5°48.6810W

13:00- CTD technician dropped off at Howth before recommencing sampling.

13:30- 019 VC and 020 VC vibrocore sections were each opened and processed over the next few hours.

16:00-17:06- 3 vibrocores were collected (CV10_28_022, 023 and 024) from the MDAC area: Lat 53°20.8175N, Long 5°39.2931; Lat 53°20.7997N, Long 5°39.1605W; and Lat 53°20.8487N, Long 5°39.2164W.

19:04- 22:58- Boxcoring commenced in CFZ with heading west to Dublin for Day grab sampling (Samples 025 BC-029 BC)

23:20- 00:00- Day grab sampling commenced in Dublin Bay

4th June: Day 3 (Weather- sunny, calm)

12:00-8:18- Day grab sampling commenced through night shift and completed (Samples 030 DG- 046 DG).

9:00-13:00- North heading to mudbelt to pockmark target site to attempt vibrocore at slack water. On transit wind picked up and it was deemed unsuitable for vibrocore deployment. 2m and 1m gravity corer deployed instead. 2m gravity corer deployed (Lat 53°40.6666N, Long 5°55/5948W) but yielded poor recovery. Thus 1m gravity corer was deployed (Lat 53°40.6722N, Long 5°56.1720W) and successfully recovered 1m core from inside and outside the pockmark (Samples 050 GC and 049 GC respectively).

13:55- 17:34- Boxcoring commenced in mudbelt (Boxcore samples 051 BC-057 BC)

18:20- 1m gravity core collected from northern mudbelt Lat 53°54.9778N, Long 5°57.0730W (Sample 057 GC)

18:40-23:26- Boxcoreing continued in mudbelt (Boxcore samples 058 BC-066 BC)

5th June: Day 4 (Weather- sunny, calm)

00:00-6:48- Boxcoreing continued in mudbelt and (Boxcore samples 066 BC-074 BC).

7:30- Gravity core collected (075 GC) from eastern mudbelt- Lat 53°36.9934N, Long 5°25.4455W

7:50-11:46 Boxcoreing continued (076 BC- 081 BC)

12:00- Muster safety drill summoned

12:20- Vibrocore collected from southern mudbelt Lat 53°31.6471N, Long 5°47.5960W (082 VC)

13:40-23:31- Boxcoreing continued in mudbelt and Kish Bank Basin (083 BC-099BC)

6th June: Day 5 (Weather- sunny, calm)

00:37- 1:13- Boxcores continued (098 BC and 99 BC).

4:00- 9:00- CTD was deployed above the MDAC target site to collect water samples. Four casts per location, two casts per depth. A total of 480 liters of water was collected.

9:30- Camera deployed at MDAC target site

11:00- 13:30- Intensive shipek grab sampling commenced at MDAC target site to attempt to recover MDAC samples (100 SG- 110 SG). Sampling was extremely successful with significant amounts of MDAC samples recovered.

17:31- Two Van Veen deployments at MDAC site to attempt to recover MDAC samples (111 VV and 112 VV). Moderately successful, recovering a number of individual nodules.

Heading North-West to pockmark site in mudbelt to perform camera deployment and avail of slack water for vibrocoreing.

7th June: Day 6 (Weather- Overcast and rainy, calm)

2:00 Camera lines were deployed in the pockmark area at 53°40.7N and 5°56.2W. There was a miscommunication initially whereby the initial lines were deployed at the pockmark reference site (53°40.67'N and 5°55.6'W). After video footage and pictures in this area, the camera was recovered and the vessel was repositioned 600m due west at the pockmark site.

7:00- The new Duncan & Ass. Reineck Boxcorer was tested in the pockmark area and achieved good recovery (Lat 53°40.6914N, Long 5°55.6713W).

7:28- Vibrocore collected from pockmark reference site Lat 53°40.6399N, Long 5°55.6957W (Sample 114 VC)

8:00-11:00- Heading for Howth harbour for end of expedition and demobilization.

11:00-15:00- Demobilization and sample transport to DCU.

5. Vessel & Scientific Crew Equipment

A full list of vessel equipment used on the cruise is tabulated in Appendix D, including frequency of use and overall performance. A full list of scientific equipment and chemicals used on the cruise is given in Appendix E. The following discussion shall focus on the most important and most used equipment for this cruise.

The KC Day grab 12.300 was deployed from the ship stern and used in the first two days to collect 33 grabs from Inner and Outer Dublin Bay. The Day grab performed well overall with no difficulties to report. Other grabs used were the Shipek grab and Van Veen grab (both from Duncan & Ass.). The Shipek grab sampler was deployed from the starboard winch mid-ship and used in the CFZ to collect MDAC samples. The sampler, which takes a sediment sample from the top 10 cm of the seabed, was deployed on the starboard winch mid-ship. The Shipek performed very well, successfully obtaining a number of MDAC samples. A Van Veen grab sampler, deployed from the stern, was tested in Dublin Bay and also tried in the CFZ to attempt to recover MDAC samples. The sampler performed quite well but was unsuccessful in recovering any MDAC samples of interest (See Figure 1. for images of each grab).



Figure 1: Grabs used on cruise (From left) 1) Day grab 2) Van Veen grab 3) Shipek grab

A Reineck box-corer (Figure 2.) was used to take undisturbed sediment samples from the upper 30 cm of the seabed. The boxcorer was the most intensely used sampler and performed well overall, with generally excellent recovery in muddy seabed and moderate to poor recovery in the sandy seabed types. The boxcorer was deployed from the stern of the vessel.



Figure 2: Reineck boxcorer ready for deployment (left) and sample processing (right)

A 1m gravity (Figure 3.) was used on 5 occasions in the mudbelt region and performed very well, generally achieving good quality 1m length cores. This corer was used in place of the vibrocorer during periods where vibrocoring was not possible i.e. strong currents and/ or high winds. The 2m gravity corer was initially tried but achieved less than 1m recovery in muddy seabed.



Figure 3: 1m gravity corer (with 2m gravity corer on right)

A Geo-Resources 3000 vibrocore (Figure 4.) was used and deployed via the A-Frame at the vessel stern. The use of the vibrocorer was restricted to day-time, slack water and low winds (See technical difficulties). Seven 3m vibrocores were taken, with four being opened and fully processed. Core-liners were sectioned into 1 m lengths, labelled, sealed with end caps, taped and sealed with tape. They were stored at room temperature until processing. Upon processing all sub-samples were stored at -20°C onboard.

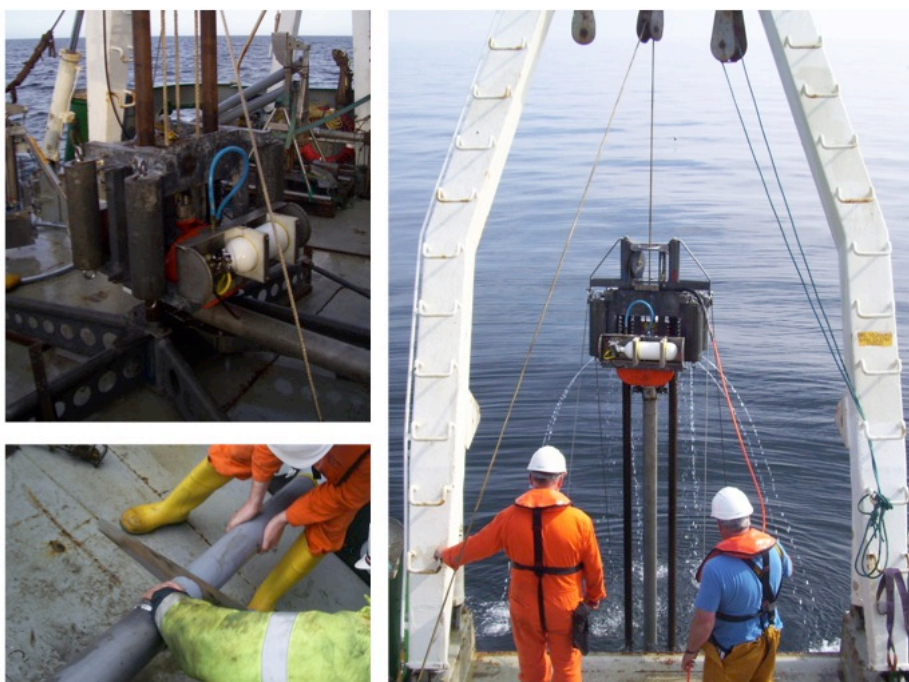


Figure 4: GeoResources 3000 Vibrocore. (Clockwise from top left) 1) Close-up on deck
2) Retrieval 3) Liner sectioning

The Kongsberg Simrad OE14-208 digital camera and video system, housed in a Seatronics frame, (Figure 5.) was deployed to give a total of 6 video lines. This operation and performance of the equipment was frequently hindered by tide currents and had to be stopped on two occasions for safety reasons.

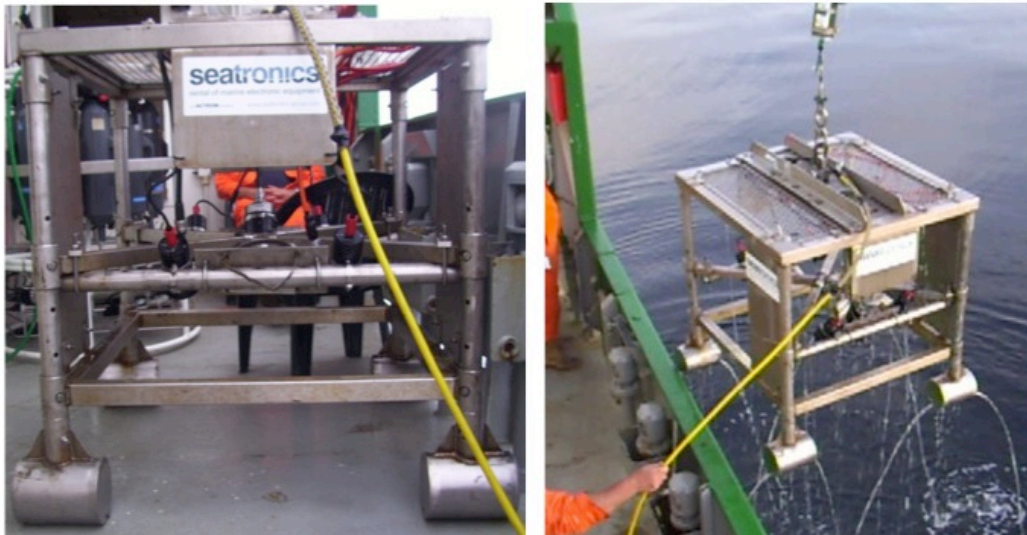


Figure 5: Kongsberg Simrad OE14-208 digital camera and video, in Seatronics frame.

(From left) 1) Close-up 2) Retrieval

The CTD & Rosette sampler (Figure 6.) was deployed on the starboard winch mid-ship. A total of 8 casts were deployed, at two different sites and two different depths in the water column. A total of 480L of water was sampled.



Figure 6: Sea-Bird 9plus CTD profiler (Clockwise from top-left) 1) Rosette sampler close-up 2) Sensor system close-up 3) Deployment 4) Remote operation

The plankton net (Figure 7.) was used at two sites, once at night and once at day, in order to collect plankton samples from the water body. A total of 4 casts were performed, collecting about 2L of sample. This was frozen at -20°C immediately.



Figure 7: Plankton net

A custom-built glove box, with Argon gas supply, (Figure 8.) was used for taking redox sensitive measurements (e.g. HS⁻, E_h, Fe²⁺) and gas sampling. This cruise was its first use and at times it was not practical to use the glovebox, due to the intensity of vibrocore sampling. Its use shall be optimized and it shall be an important addition to future cruises.



Figure 8 : Custom-built glove box (Clockwise from top-left) 1) Glovebox 2) Argon supply positioning 3) Measuring volatile and redox sensitive parameters

Core processing was the most labour-intensive aspect of the cruise. Figure 9. outlines some of the work involved. Gas sampling of each core catcher and each core section (typically 5-10 samples depending on core length) was carried out. 3g NaCl and 500 μ l 2000mgL⁻¹ sodium merthiolate were added as a preservative to these vials and stored at 4^oC. Pore water sampling (typically 17-35 samples depending on core length) and pore water sub-sampling and preservation for later analysis of Fe²⁺, SO₄²⁺, HS⁻, NH₄⁺, PO₄³⁻ and NO₃⁻ pore water profiling. Preservation and storage conditions are outlined in Table 1.



Figure 9: Vibrocore and gravity core processing (Clockwise from top left) 1) Gas sub-sampling of core catcher 2) Gas sub-sampling and redox measurements 3) Porewater sampling 4) Porewater sub-sampling and preservation

Analyte	Preservative	Container
Nitrate	1-2 drops CHCl ₃	Plastic
Sulphate	None	Plastic
Phosphate	1-2 drops CHCl ₃	Glass
Sulphide	400 μ L 50mM Zinc acetate/1ml samples	Plastic
Iron (II)	1 μ L 1% ascorbic acid/1ml sample	Plastic
Ammonium	None (ISE used)	Plastic

All stored at 4^oC prior to analysis
 Table 1: Pore water preservation & storage

6. Technical Difficulties

Overall relatively few technical difficulties were encountered. The primary issues, which arose, were as follows:

- Prior to leaving Howth the Argon supply line for the glovebox was broken during transit from DCU. This required another replacement line being transported from DCU and installed by approx. 11:00am. This caused no delay to mobilization or time of departure and no further problems with the line recurred.
- The sampling plan originally intended to use both the 3m vibrocore and the large Duncan & Ass. boxcore but on consulting the crew it was deemed a safety risk and over-laborious to have both pieces of equipment on deck, and also to switch between them at the necessary frequency outlined in the sampling plan. Thus it was decided to use the small Reineck box corer, which was deployed from the ship aft and not the A-ring on the vessel stern.
- Some proposed sampling stations in shallow water (<10m), in particular many Day grabs (approx 40% of total day grab stations) in the inner Dublin Bay and boxcore stations (approx 18% of total) in close proximity to the coastline and in Dundalk Bay, had to be omitted. The sampling plan was modified in order to take this into account and sampling frequency was increased in other areas.
- The use of the Kongsberg Simrad OE camera system was hampered on numerous occasions due to strong tidal currents causing the camera's frame to topple to the side and the video feed was showing disturbed sediment without any seabed structures. The drift was substantial and the distance between the vessel and the camera reached up to 120m behind the stern and up to 50m at the starboard side. This along with the risk of the cable being caught by the propeller forced the videoline investigations to be cancelled on a number of occasions.
- The use of the 3m vibrocore was limited to day-time use in periods of slack water, with relatively calm weather conditions. i.e. generally less than 2-hour window twice a day. This was for safety, accuracy and crew availability reasons. This was largely overcome by prioritizing being at

vibrocoring stations during these windows, and using a 1m gravity corer at other times.

- Due to the intensity of sampling at certain stages and the nature of the analysis being performed it was not viable to perform all necessary analysis within the glove box. The glove box design and use is more than satisfactory but the procedure requires optimization in times of intensive core sampling.
- A Shipek grab bucket was lost at 7:05 on 6th June. A replacement bucket was at hand and no delays occurred.
- On two occasions there was a miscommunication between the scientific party and the captain, which resulted in a 1m gravity core and a 3m vibrocore being collected from the pockmark 'reference' site instead of the intended site, which was within the pockmark itself. Sampling of specified features shall be reiterated and followed more carefully in future.

7. Cruise Outcome & Initial Results

Overall the cruise was a success, with the majority of objectives completed. The initial sampling plan was very ambitious for the relatively short duration of the cruise. The total operational hours were 112 (with 3 hours downtime) and the maximum and minimum water depths were 138m and 9m respectively. A complete description, including photographs, of each sample obtained on this cruise is given in Appendices F-K. These are organized according to method of sampling. Table 2. below is a summary list of the number of total samples taken by each sampler type and table 3. is a complete list of all sample names, coordinates and sample type.

Sediment Sampling		Camera/Video Lines	
Sample type	Number	Location	Number
Day Grabs	33	MDAC	4
Reineck Boxcores	55	Lambay Deep	1
Gravity cores	5	Mudbelt	1
Vibrocores	7	Lambay Deep	
Van Veen grabs	3		
Shipek grabs	10	Total	6
<i>Total</i>	<i>113</i>	Total time	c. 12 hrs

Table 2: CV10_28 Overall sampling and videoline statistics

Name	Type	Decimal Degrees						Name	Type	Decimal Degrees					
		Deg	Mins	Deg	Mins	Deg	Mins			Deg	Mins	Deg	Mins		
001	DG	53	22	0.5197	6	0	0.5935	040	DG	53	18	0.0008	6	5	0.9254
002	DG	53	21	0.2975	6	3	0.3195	041	DG	53	17	0.7078	6	4	0.2006
003	DG	53	21	0.3135	6	4	0.5623	042	DG	53	17	0.337	6	2	0.8249
004	DG	53	21	0.0007	6	5	0.0993	043	DG	53	18	0.241	6	3	0.333
005	DG	53	21	0.4558	6	5	0.5506	044	DG	53	19	0.0285	6	3	0.1994
006	DG	53	20	0.9896	6	6	0.3405	045	DG	53	18	0.2323	6	2	0.2991
007	DG	53	20	0.565	6	5	0.5823	046	DG	53	19	0.7987	6	0	0.6859
008	DG	53	20	0.2248	6	6	0.0041	047	BC	53	40	0.7543	5	55	0.0135
009	DG	53	19	0.8975	6	6	0.5438	048	GC	53	40	0.6666	5	55	0.5948
010	DG	53	19	0.318	6	6	0.0979	049	GC	53	40	0.6765	5	55	0.6449
011	BC	53	19	0.0531	6	6	0.1615	050	GC	53	40	0.6722	5	56	0.172
012	DG	53	18	0.8965	6	6	0.9605	051	BC	53	40	0.4732	6	1	0.4514
013	DG	53	18	0.3945	6	7	0.6154	052	BC	53	43	0.4326	6	8	0.4046
014	DG	53	17	0.6102	6	6	0.158	053	BC	53	47	0.6662	6	9	0.3102
015	DG	53	17	0.0475	6	4	0.8751	054	BC	53	50	0.3006	6	10	0.69
016	DG	53	16	0.5718	6	3	0.6826	055	BC	53	53	0.6255	6	5	0.3202
017	VV	53	20	0.7661	5	39	0.0943	056	BC	53	54	0.9377	5	57	0.2076
018	BC	53	20	0.3434	5	42	0.7908	057	GC	53	54	0.9778	5	57	0.037
019	VC	53	26	0.4088	5	48	0.1412	058	BC	53	51	0.0677	5	48	0.3299
020	VC	53	26	0.4404	5	48	0.5529	059	BC	53	50	0.1961	5	57	0.6566
021	BC	53	22	0.5281	5	57	0.5541	060	BC	53	50	0.5235	6	5	0.8841
022	VC	53	20	0.8175	5	39	0.2931	061	BC	53	47	0.1573	6	3	0.3243
023	VC	53	20	0.7997	5	39	0.1605	062	BC	53	43	0.9762	6	2	0.3854
024	VC	53	20	0.8324	5	39	0.1685	063	BC	53	43	0.6985	5	56	0.6319
025	BC	53	17	0.3224	5	42	0.9252	064	BC	53	47	0.1512	5	57	0.0606
026	DG	53	18	0.7691	5	47	0.943	065	BC	53	45	0.8181	5	50	0.5536
027	BC	53	22	0.3442	5	47	0.6276	066	BC	53	43	0.2838	5	50	0.8171
028	BC	53	24	0.6567	5	53	0.399	067	BC	53	45	0.826	5	33	0.5412
029	BC	53	21	0.8456	6	0	0.697	068	BC	53	42	0.7616	5	23	0.7875
030	DG	53	21	0.6099	6	1	0.9272	069	BC	53	42	0.6144	5	34	0.9359
031	DG	53	20	0.9888	6	1	0.2357	070	BC	53	42	0.6598	5	44	0.2633
032	DG	53	20	0.4197	6	2	0.0096	071	BC	53	39	0.8987	5	48	0.1625
033	DG	53	19	0.7495	6	2	0.5643	072	BC	53	39	0.5813	5	40	0.4707
034	DG	53	20	0.9034	6	2	0.8106	073	BC	53	39	0.3867	5	29	0.6961
035	DG	53	20	0.5151	6	3	0.4031	074	BC	53	37	0.644	5	25	0.4067
036	DG	53	15	0.1475	6	4	0.9409	075	GC	53	36	0.9934	5	25	0.4455
037	DG	53	20	0.0554	6	4	0.9409	076	BC	53	36	0.8002	5	36	0.106
038	DG	53	19	0.7765	6	4	0.0318	077	BC	53	36	0.6844	5	46	0.248

039	DG	53	18	0.1883	6	5	0.5422	078	BC	53	37	0.1765	5	55	0.3821
079	BC	53	31	0.6841	6	2	0.3975	097	BC	53	24	0.7757	5	42	0.573
080	BC	53	31	0.6036	5	54	0.54	098	BC	53	28	0.1097	5	53	0.2777
081	BC	53	34	0.3189	5	49	0.6479	099	BC	53	26	0.371	5	58	0.2177
082	VC	53	31	0.6471	5	47	0.596	100	SG	53	20	0.1889	5	37	0.5058
083	BC	53	28	0.0453	5	42	0.3682	101	SG	53	20	0.0439	5	37	0.3243
084	BC	53	34	0.3494	5	41	0.5628	102	SG	53	20	0.0069	5	37	0.2684
085	BC	53	31	0.6341	5	37	0.2027	103	SG	53	19	0.9154	5	37	0.1514
086	BC	53	26	0.4481	5	37	0.0779	104	SG	53	19	0.838	5	37	0.0399
087	BC	53	24	0.7242	5	31	0.3537	105	SG	53	19	0.7693	5	36	0.9373
088	BC	53	28	0.1033	5	31	0.3438	106	SG	53	19	0.6809	5	36	0.8108
089	BC	53	34	0.2152	5	30	0.2368	107	SG	53	19	0.8475	5	37	0.1246
090	BC	53	31	0.5815	5	25	0.2898	108	SG	53	19	0.7136	5	31	0.0932
091	BC	53	26	0.329	5	25	0.5929	109	SG	53	19	0.5904	5	37	0.0692
092	BC	53	22	0.377	5	25	0.4442	110	SG	53	19	0.9238	5	37	0.1634
093	BC	53	18	0.9198	5	25	0.7751	111	VV	53	19	0.9749	5	37	0.3612
094	BC	53	17	0.5587	5	32	0.0864	112	VV	53	20	0.0283	5	37	0.2291
095	BC	53	20	0.573	5	31	0.8398	113	BC	53	40	0.6914	5	55	0.6713
096	BC	53	22	0.34	5	36	0.7774	114	VC	53	40	0.6399	5	55	0.6713

Table 3: CV10_28 total sediment sampling stations.

Note: DG=Day grab, VV= Van Veen grab, SG= Shipek grab, BC= Boxcore, VC= vibrocore, GC= gravity core



Figure 10: CV10_28 Sampling station map- Northern mudbelt area

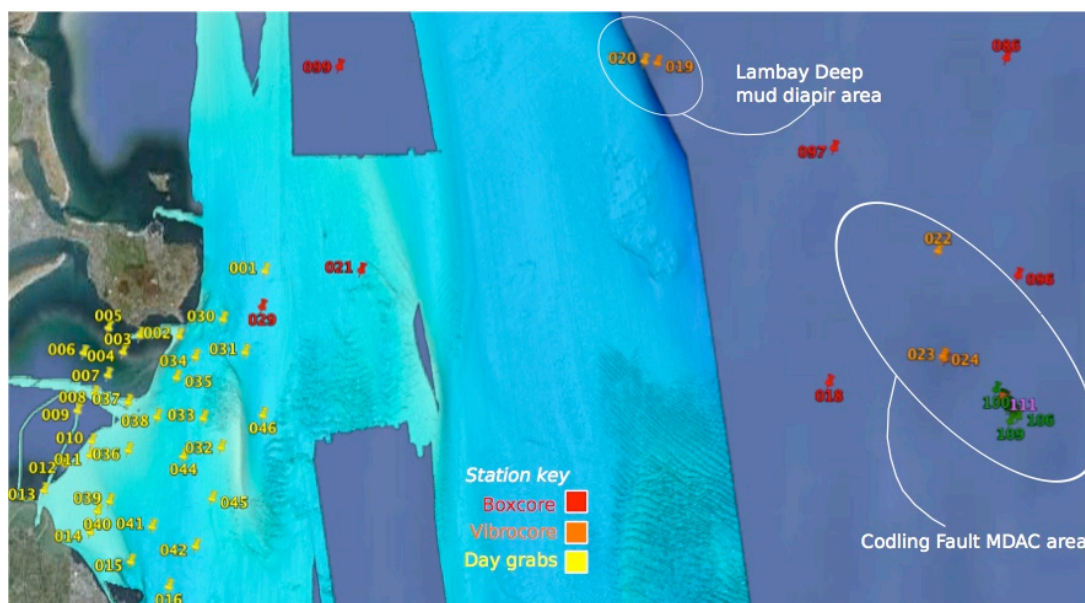


Figure 11: CV10_28 Sampling station map- Kish Bank Basin and Dublin Bay

An overview of the videolines (on previously obtained bathymetric data) conducted in the Codling Fault Zone is shown in Figure 12. and detailed individual videolines at the MDAC target sites is given in Figure 13. The investigation of the MDAC target sites at the Codling Fault Zone successfully yielded image stills and footage of MDAC slabs (Figure 14.), nodules, potential outcroppings (Figure 15.) and also evidence of surface anaerobic oxidation of methane (Figure 16.).

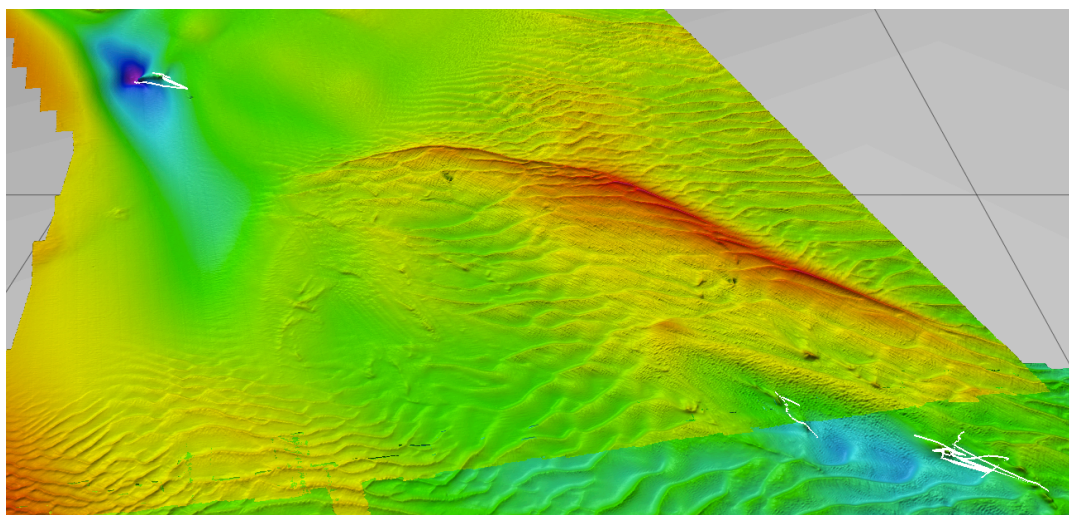
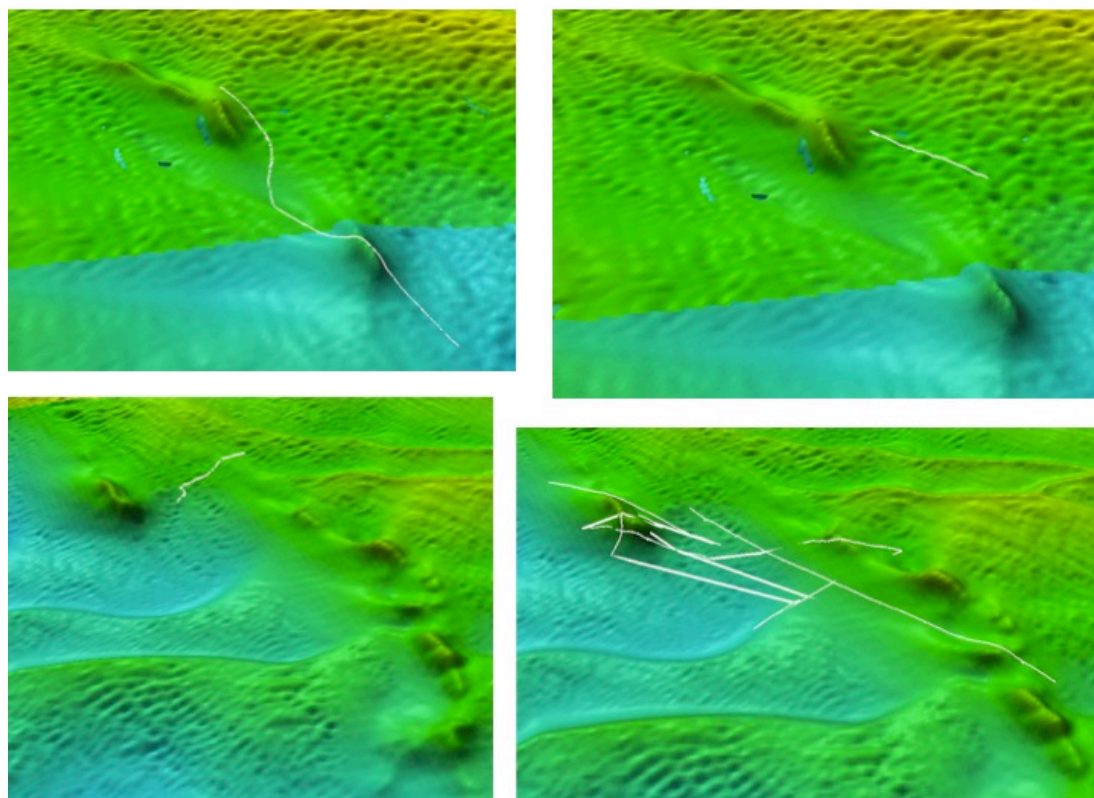


Figure 12: Multibeam bathymetry showing overview of videolines (in white) in Codling Fault Zone. Upper left area- Lambay Deep; Lower right- MDAC target sites.



500m

Figure 13: Multibeam bathymetry showing videolines (in white) in MDAC target site of CFZ (Clockwise from top left) 1) Videoline deployment 1. 2) Videoline deployment 2. 3) Videoline deployment 3. 4) Videoline deployment 4.



Figure 14: Still picture showing several hard ground slabs in the vicinity of MDAC mounds

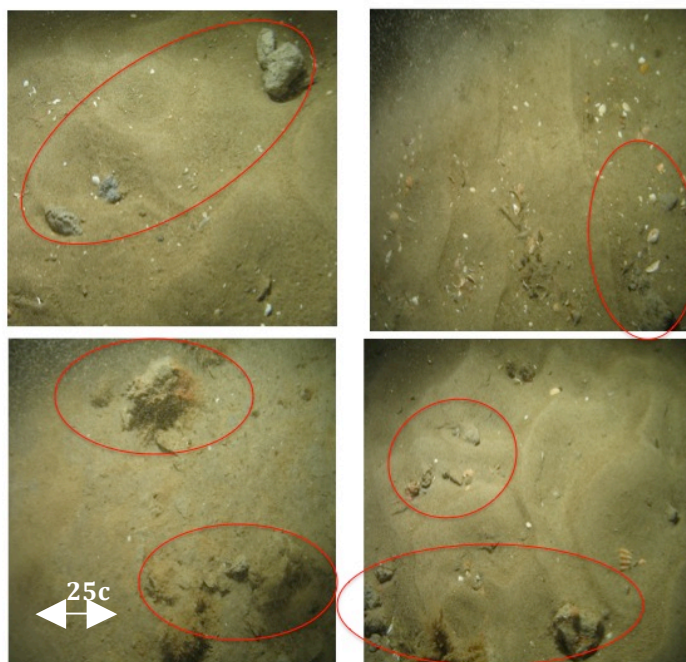


Figure 15: Four still pictures showing numerous nodules and crusts, presumed to be MDAC

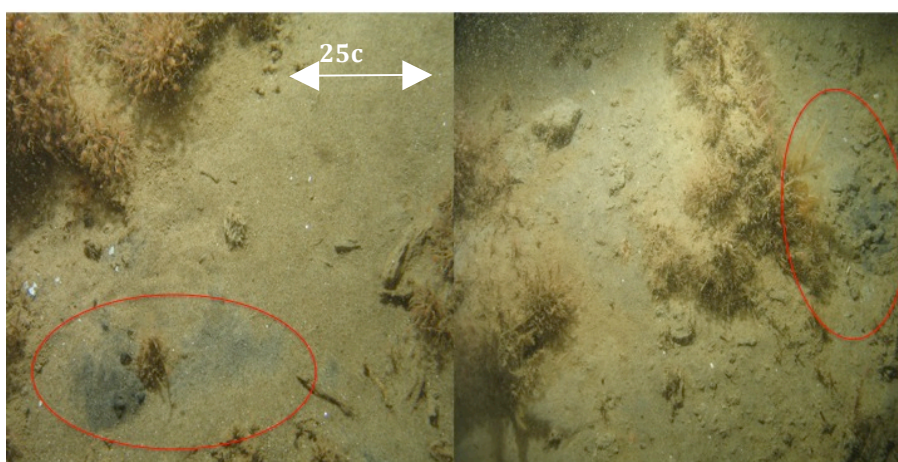


Figure 16: Two still pictures showing apparent surface anoxia, likely arising from anaerobic oxidation of methane (outlined in red)

The MDAC target sites were subsequently successfully ground-truthed using the Van Veen grab (Figure 17.) and Shipek grab (Figure 18.), with the later sampler being more successful. The investigations carried out at the MDAC target sites were extremely successful in quite a short period. The MDAC slabs stacked consecutively on each other, indicating substantial periodic and long-term methane seepage. The small outcroppings were present only in the vicinity of the mounds and suggest that a significant proportion of the carbonate structures is partially covered by sand, which is plausible in a relatively high-energy dynamic environment. The black irregular spots in Figure 16. indicated anoxic sediment

(reduced sulphur species) and possible anaerobic oxidation of methane. After ground-truthing it became clear that these were in fact sites where methane is or has seeped to the sediment-water interface. This was confirmed by redox measurements, which recorded unusually high negative values (-386 mV) typical for anoxic sediments.



Figure 17: Sampling of MDAC at the Codling Fault Zone, here using the Van Veen grab



Figure 18: MDAC ground-truthing. (Clockwise from top right) 1) Successful recovery of MDAC using Shipek grab 2) Close-up of highly anoxic sediment, cemented shells and plant-like organism 3) Close-up of large 7cm MDAC nodule 4) Close- still if numerous varying types of hard MDAC fragments and cemented shell tubes.

The Lambay Deep and the mud diapir were investigated by a videoline (Figure 19.) and subsequently successfully ground-truthed by the vibrocorer and the boxcorer. Video and image stills inside and outside the features suggest relative homogeneity, both in terms of biodiversity and sediment type. No obvious indications of recent or current gas seepage to the surface were observed, visually or using acoustic methods, and overall the surface seabed inside the feature was similar to surrounding seabed- that of fine sandy muds with relatively high macrofaunal biodiversity (Figure 20.) The two 3m vibrocores obtained from inside and outside the Lambay Deep were very similar, characterized by homogenous fine sandy mud for the 3 metres, with similarly low infaunal biodiversity and shell presence. No clear anoxic zones were observed, either visibly or by redox probing. These findings suggest that the Lambay Deep and its associated mud diapir are at present not significantly influenced by active gas seepage.

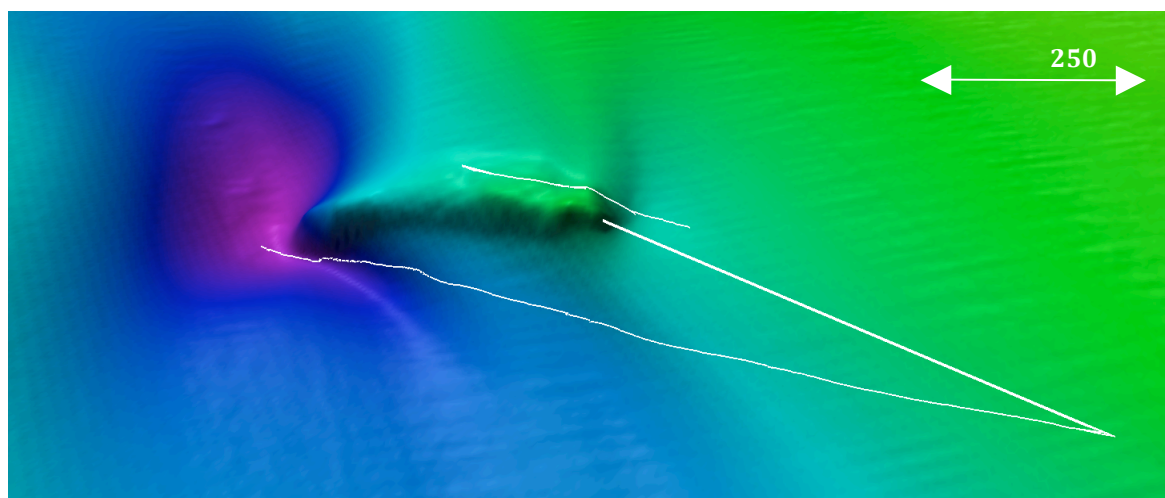


Figure 19: Multibeam bathymetry of Lambay Deep and associated mud diapir showing videoline (in white)

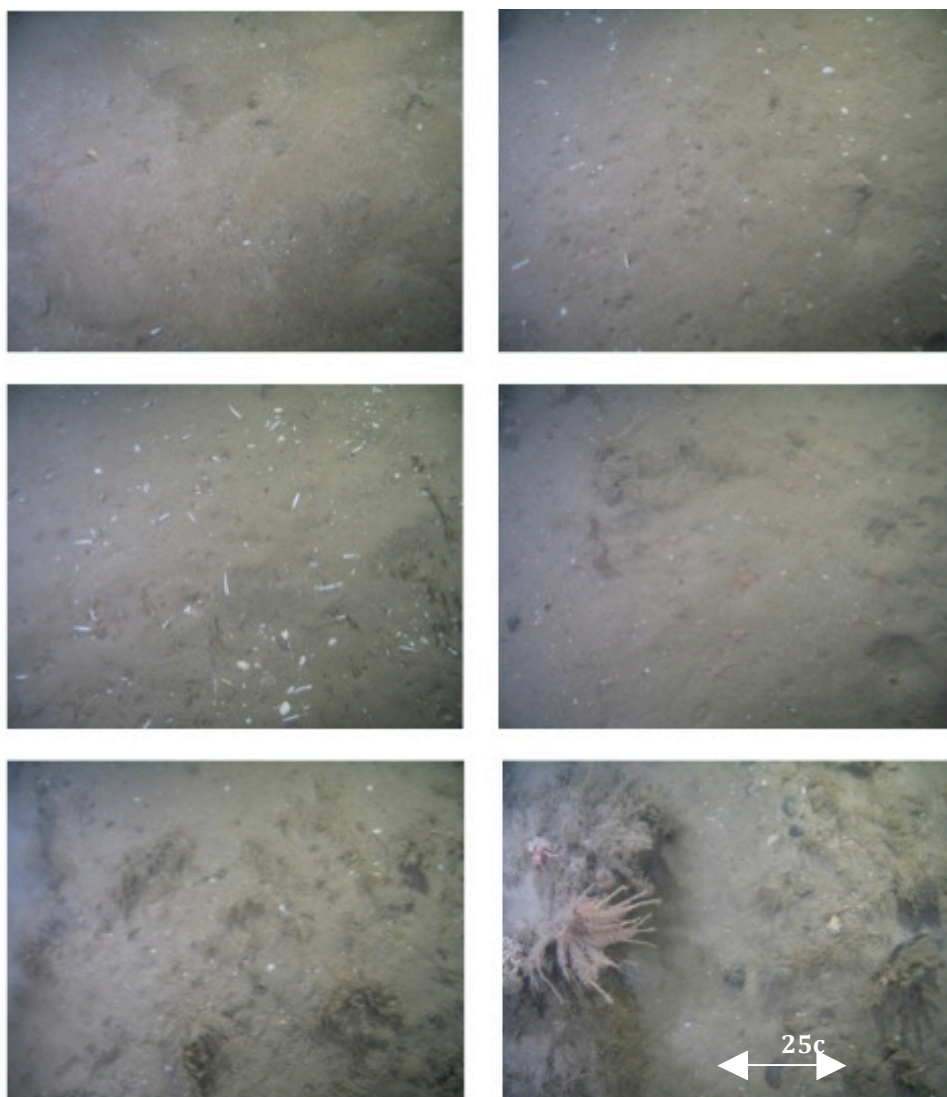


Figure 20: Representative images from Lambay Deep area. Fine sandy muds with relatively high biodiversity (e.g. brittle stars, tube worms and marine plant species)

The camera and video lines deployed in the pockmark showed that inside and outside the pockmark homogenous and seabed is characterized by very fine mud with high densities of burrows from the Dublin Bay prawn (*Nephrops norvegicus*), which are very common in the Mudbelt region (Figure 21.) Additionally ground-truthing in the pockmark and a surrounding reference site showed very little downcore variations between inside and outside the feature and overall little sub-surface zonation. These findings along with previous sub-bottom profiling of the feature suggests no evidence of gas seepage or accumulations in the vicinity of the pockmark and that the pockmark is not currently influenced by gas seepage from underlying layers.

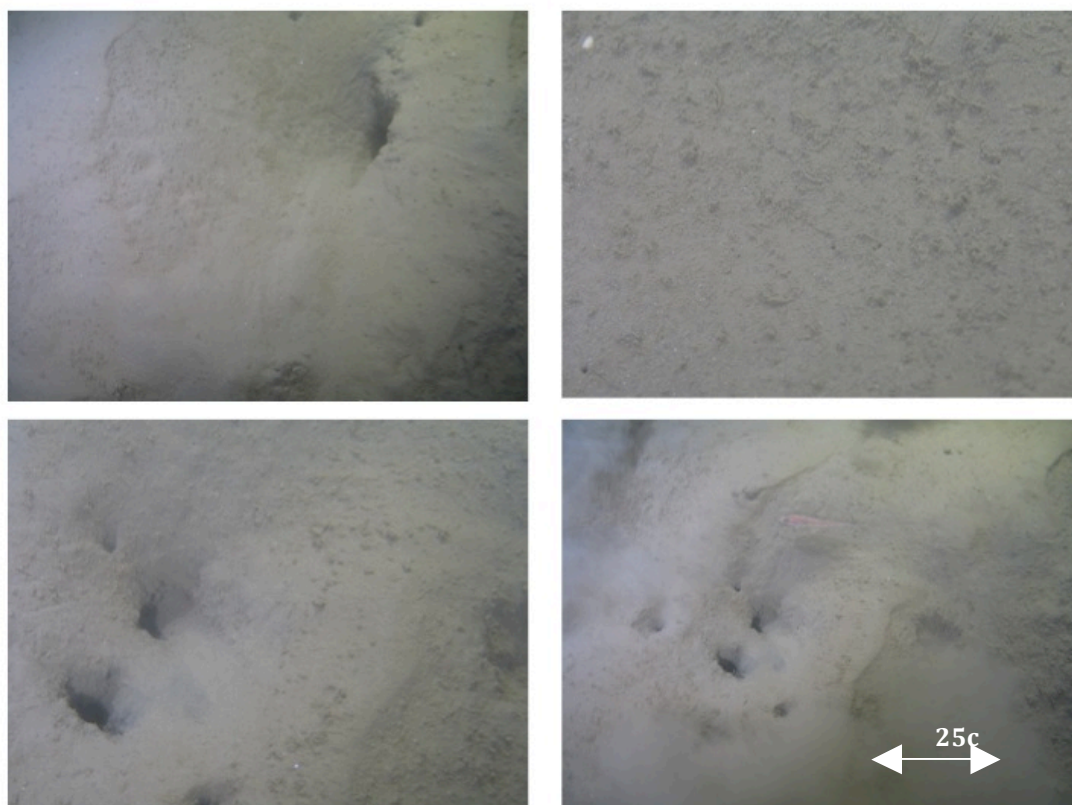


Figure 21: Representative still images of mudbelt and pockmark seabed
- very fine mud with relatively high-density *Nephrop* burrows.

Overall vibrocores and gravity cores were homogenous with generally little stratification or zonation. Anoxic zones were not reached in most cores. However the last gravity core collected in the Mud Belt (CV10_28_075 GC) showed interesting zonation. Three distinct zones were observed, including a distinct anoxic zone. Strong sulphide odour was observed and redox potential measurements recorded values of -400mV (-200mV or lower considered anoxic).

55 out of 65 (85%) boxcore stations in the modified plan were occupied and sampled (Initially circa. 15 stations were omitted from the original sampling plan due to proximity to the coast and water being too shallow). Stations had to be omitted in the very eastern region of the mudbelt, due to long transit times required. Typical boxcore samples from the mudbelt and sandy Kish bank Basin are given Figure 22. As expected the sediment type found in the mudbelt region is characterized by soft mud while the southern region is characterized by medium/coarse sand.



Figure 22: Representative boxcore sample from mudbelt (left) and sandy region in Kish Bank Basin (Right)

33 out of 40 (83%) of the Day grab stations in the modified sampling plan were successfully sampled and resulted in a comprehensive sampling grid of the Outer Bay. A number of representative samples from the Dublin Bay are given in Figure 23. Sediment types included fine – coarse sands, muds, shells and pebbles/ rocks and were characterized by quite diverse infauna (e.g. crabs, starfish, cockles, scallops, razorshells, urchins, worms). Overall the boxcore sampling plan and Dublin Bay Day grab sampling plan yielded very comprehensive sampling grids and shall allow numerous comprehensive studies and potential publications.

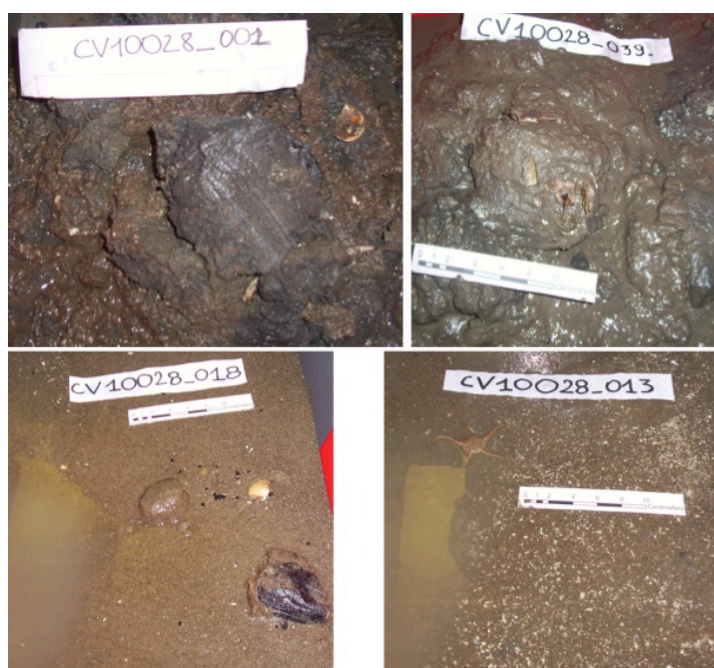


Figure 23: Representative Day grabs samples from Dublin Bay

The new GSI Reineck boxcorer was also tested on this cruise. It appears that this type of boxcorer is more susceptible to adverse environmental conditions. This is because this boxcorer requires a period of minutes to settle on the seabed and the pistons then commence, recovering the sample. We found that in moderate-strong currents this boxcorer does not have time to position itself adequately. However boxcore sample CV10_28_113 taken from the mudbelt achieved very good recovery and quality of sample.

8. Conclusions

Overall the cruise was a success and accomplished most primary objectives:

1. Videoline investigations at gas-seepage features were highly informative and guided subsequent ground-truthing investigations, which was paramount for completion of objectives in the relatively timeframe.
2. Image stills and video evidence taken confirmed that the carbonate mounds in the CFZ are distinct features from the surrounding seabed and primarily composed of different types of hard grounds. Four videolines were deployed at the MDAC target sites in the CFZ, which informed subsequent ground-truthing activities.
3. Extensive ground-truthing of the MDAC area provided a variety of hard ground samples, as well as sediment samples from high microbial activity sites, where suspected seepage intensifies microbial processes of methane oxidation.
4. The Lambay Deep and its associated mud diapir were investigated by videoline deployment, and subsequently ground-truthed. No visible evidence of recent gas-seepage was observed and no distinct differences in seabed structure or biodiversity were observed. Fine sandy muds with relatively high macrofaunal biodiversity characterized seabed both inside and outside the features. Sub-surface sediment (0-3m) was found to be largely homogenous well-sorted fine sandy mud, with low infauna and shell presence, and little or no evidence of sub-surface anoxia. This suggests that the Lambay Deep surficial seabed region is at present not influenced by sub-surface gas seepage.

5. The camera and video lines deployed in the pockmark showed that inside and outside the pockmark appear highly homogenous in appearance and characterized by very fine mud with high densities of burrows from the Dublin Bay prawn (*Nephrops norvegicus*), which are very common in the Mudbelt region. Successive ground-truthing in these sites supported these findings and cores obtained showed little sub-surface zonation or differences. These findings along with previous sub-bottom profiling of the feature suggests no evidence of gas seepage or accumulations in the vicinity of the pockmark and that the pockmark is not currently influenced by gas seepage from underlying layers.
6. About 85% (55/65) of the boxcoring stations from the modified sampling plan were occupied. Most box core stations yielded good recovery whereby full push cores were taken for further onshore analysis. In instances where boxcore recovery was unsatisfactory samples were taken in jars. Samples were also taken for PSA.
7. 83% (33/40) day grab stations were successfully sampled for PSA, metals, geochemical and molecular studies. This yielded an extensive sampling grid of Outer Dublin Bay. Circa. 10 further samples from the R. Liffey and inner bay closer to the coast shall complete the sampling grid of Dublin Bay.
8. 7 vibrocores and 5 gravity cores were taken in total, with 8 of these cores being fully processed as planned. The onboard geochemical analyses of vibrocore and gravity cores, which included redox potential measurements and pore water extraction, successfully complemented the ground-truthing and allowed for initial results to be drafted.
9. The quality and variety of samples collected complemented with acoustics and video data shows great potential for further research and studies, which should lead to peer reviewed publications.

9. Future Work

The goal of the Dr. Brian Kelleher research group, in collaboration with Dr. Chris Allen in Queen's University Belfast and Dr. Andre Simpson in Univ. of Toronto, is to use advanced molecular techniques such as the following: Nuclear magnetic resonance; gas-chromatography isotope-ratio mass spectrometry (GC-irMS); liquid chromatography time-of-flight mass spectrometry (LC-TOF-MS); matrix-assisted laser desorption ionization time-of-flight mass spectrometry (MALDI-TOF); and microbial population analysis using 16s rRNA gene sequencing in and denaturing gradient gel electrophoresis (DGGE), in combination with fundamental marine geochemical and geophysical approaches to study marine organic matter cycling and marine microbiology. As well as applying these techniques to the general seabed the group has a particular interest in studying gas-related seabed features.

It is intended to assess and quantify organic matter cycling in the region-from source inputs to mixing, deposition, burial and diagenetic alteration within the sediment. Lipid biomarker profiling shall allow characterization and subsequent source and degradation of organic matter in this region. Pore water profiles of sediments shall be used to assess early diagenetic processes and nutrient cycling within the first 0-3m of sediment. Gas sub-samples from cores shall be analysed by portable gas chromatography and also by GC-irMS and the abundance and carbon isotopic signature could be used to assess presence and sources of methane within the first few metres of the seabed. From a microbiological perspective, the identification and abundance of eubacteria and archaea is necessary since marine microbes play a major role in organic matter and biogeochemical cycling.

In broad terms there is still much unknown about the cycling of organic matter in the marine environment and its link to other marine processes, and terrestrial and atmospheric processes. The application of molecular biological techniques in marine research will help identify marine microbes, of which only a miniscule fraction have been, aid in elucidating the specific processes they mediate. The application of these methods in the Irish Sea has not been undertaken before.

10. References

Boetius, A., Ravensschlag, K., Schubert, C.J., Rickert, D., Widdel, F., Gieseke, A., Amann, R., Jorgensen, B.B., Witte, U., Pfannkucche, O. (2000) A marine microbial consortium apparently mediating anaerobic oxidation of methane. *Nature* 407:623-626

Croker, P.F., Kozachenko, M., Wheeler, A.J. (2005) Gas-related seabed structures in the Western Irish Sea (IRL-SEA6). SEA6 Technical Report

Fleischer, P., Orsi, T.H., Richardson, M.D., Anderson, A.L. (2001) Distribution of free gas in marine sediments: a global overview. *Geo-Marine Letters* 21: 103-122

Games, K.P., (2001) Evidence of shallow gas above the Connemara oil accumulation, Block 26/28, Porcupine Basin. The petroleum exploration of Ireland's offshore basins By Pat Shannon, P. D. W. Haughton, D. V. Corcoran, Geological Society of London

Hovland, M., Gardner, J.V., Judd, A., (2002) The significance of pockmarks to understanding fluid flow processed and geohazards. *Geofluids* 2: 127-136

Jones, G.B., Floodgate, G.D., Bennell, J.D. (1986) Chemical and microbiological aspects of acoustically turbid sediments: preliminary investigations. *Marine Biotechnology* 6: 315-332

Judd, A., Croker, P.F., Tizzard, L., Voisey, C. (2007) Extensive methane-derived authigenic carbonates in the Irish Sea. *Geo-Marine Letters* 27:259-267

Judd, A., Hovland, M. (2007) *Seabed Fluid Flow: The Impact on Geology, Biology and the Marine Environment*. 1st. Cambridge, UK: Cambridge University Press

King, L.H., MacLean, B. (1970) Pockmarks on the Scotian Shelf. *Geological Society of America Bulletin* 81: 3141-3148

Monteys, X., Hardy, D., Szpak, M., Garcia-Gil, S., Kelleher, B., O Keeffe, E., (2008) Distribution, morphology and acoustic characterisation of a gas pockmark field on the Malin Shelf, NW Ireland. Symposium OSP-01, 33rd International Geological Congress, Oslo.

Ussler, W., Paull, C.K., Boucher, J. (2003) Submarine pockmarks: a case study from Belfast Bay, Maine. *Marine Geology* 202: 175-192

Yuan, F., Bennell, J.D., Davis, A.M. (1992) Acoustic and physical characteristics of gassy sediments in the Western Irish Sea. *Continental Shelf Research* 12: 1124-1134

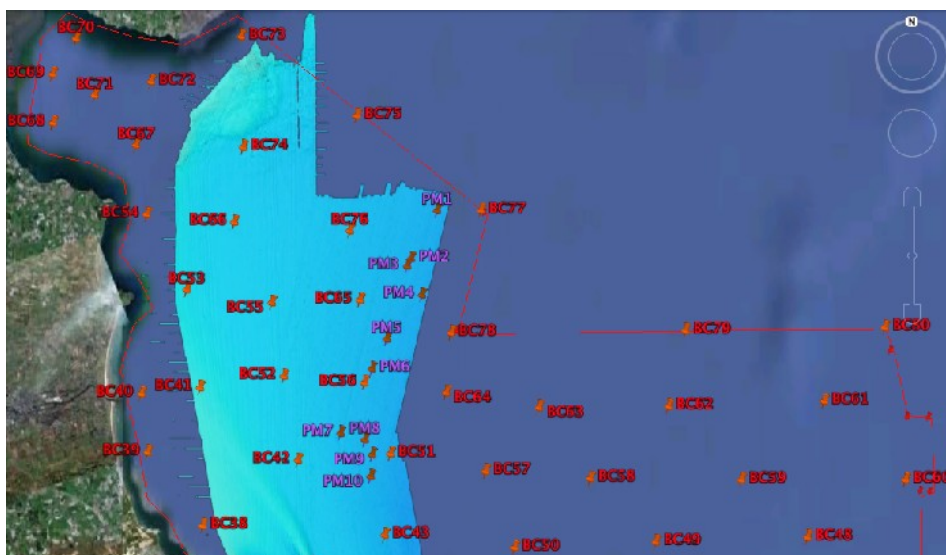
Appendices

a. Personnel List

<i>Name</i>	<i>Position</i>	<i>Affil.</i>	<i>Name</i>	<i>Position</i>	<i>Affil</i>
Michal Szpak	Chief scientist	DCU	Colin Mc Brearty	Master	PO
Shane O' Reilly	Scientist-Chemistry	DCU	John Baugh	Mate	PO
Brian Murphy	Scientist-Chemistry	DCU	Jason White	C/Eng	PO
Sean Jordan	Scientist-Chemistry	DCU	Tom Irwin	Motorman	PO
Sara Sandron	Scientist-Chemistry	DCU	David Murphy	Bosun	PO
Xavier Monteys	Scientist-Geologist	GSI	Philip Gunnip	AB	PO
Lukasz Pawlikowski	Technician	PO	Thomas Byrne	AB	PO
			Kevin O Leary	Cook	PO

b. Proposed sampling plan maps

The following three figures are maps of proposed boxcore stations (First 2 figures, red icons) vibrocore stations (pink= pockmarks, yellow- MDACs, green= western trench) and day grabs in Dublin Bay (last figure, red icons), which were initially drafted. (Bathymetry overlay map (.kmz files) taken from web-published GSI merged east coast bathymetry datasets.





c. Proposed sampling stations

i. Boxcore sampling stations

Boxcore No.	Degree, Mins, Secs		Decimal Degrees		MaxSea Format		
	Lat	Lon	Lat	Lon	Lat	N	Long
1	53°17'22.84"N	6° 3'27.85"W	53.289678	-6.057736	53.289678	N	6.057736
2	53°17'21.84"N	5°53'40.60"W	53.289400	-5.894611	53.289400	N	5.894611
3	53°17'39.47"N	5°43'3.33"W	53.294297	-5.717592	53.294297	N	5.717592
4	53°17'38.63"N	5°32'1.31"W	53.294064	-5.533697	53.294064	N	5.533697
5	53°17'42.36"N	5°20'9.47"W	53.295100	-5.335964	53.295100	N	5.335964
6	53°18'59.14"N	5°25'40.60"W	53.316428	-5.427944	53.316428	N	5.427944
7	53°18'51.83"N	5°36'48.34"W	53.314397	-5.613428	53.314397	N	5.613428
8	53°18'58.02"N	5°47'45.56"W	53.314450	-5.795989	53.314450	N	5.795989
9	53°18'57.45"N	5°57'58.88"W	53.315958	-5.966356	53.315958	N	5.966356
10	53°20'30.09"N	6° 1'38.55"W	53.341692	-6.027375	53.341692	N	6.027375
11	53°20'25.04"N	5°53'26.52"W	53.340289	-5.890700	53.340289	N	5.890700
12	53°20'33.94"N	5°42'43.63"W	53.342761	-5.712119	53.342761	N	5.712119
13	53°20'33.12"N	5°31'40.86"W	53.342533	-5.528017	53.342533	N	5.528017
14	53°20'31.22"N	5°20'17.55"W	53.342006	-5.338208	53.342006	N	5.338208
15	53°22'28.41"N	5°25'37.27"W	53.374558	-5.427019	53.374558	N	5.427019
16	53°22'25.85"N	5°36'40.75"W	53.373847	-5.611319	53.373847	N	5.611319
17	53°22'27.33"N	5°47'46.43"W	53.374258	-5.796231	53.374258	N	5.796231
18	53°22'26.86"N	5°57'35.48"W	53.374128	-5.959856	53.374128	N	5.959856
19	53°24'42.05"N	5°53'13.17"W	53.411681	-5.886992	53.411681	N	5.886992
20	53°24'42.75"N	5°42'23.62"W	53.411875	-5.706561	53.411875	N	5.706561
21	53°24'42.51"N	5°31'22.68"W	53.411808	-5.522967	53.411808	N	5.522967
22	53°24'42.85"N	5°20'15.60"W	53.411903	-5.337667	53.411903	N	5.337667
23	53°26'23.00"N	5°25'36.65"W	53.439722	-5.426847	53.439722	N	5.426847
24	53°26'23.60"N	5°37'12.20"W	53.439889	-5.620194	53.439889	N	5.620194
25	53°26'23.45"N	5°47'35.48"W	53.439847	-5.793189	53.439847	N	5.793189
26	53°26'23.00"N	5°58'9.78"W	53.439722	-5.969383	53.439722	N	5.969383
27	53°26'54.96"N	6° 6'8.83"W	53.448600	-6.102453	53.448600	N	6.102453
28	53°28'4.68"N	6° 4'30.27"W	53.467967	-6.075075	53.467967	N	6.075075
29	53°28'4.80"N	5°53'15.03"W	53.468000	-5.887508	53.468000	N	5.887508
30	53°28'3.93"N	5°42'21.69"W	53.467758	-5.706025	53.467758	N	5.706025

31	53°28'5.23"N	5°31'25.42"W	53.468119	-5.523728	53.468119	N	5.523728
32	53°28'3.98"N	5°20'26.09"W	53.467772	-5.340581	53.467772	N	5.340581
33	53°31'35.10"N	5°25'22.30"W	53.526417	-5.422861	53.526417	N	5.422861
34	53°31'36.03"N	5°37'13.53"W	53.526675	-5.620425	53.526675	N	5.620425
35	53°31'37.34"N	5°47'32.90"W	53.527039	-5.792472	53.527039	N	5.792472
36	53°31'36.29"N	5°57'43.94"W	53.526747	-5.962206	53.526747	N	5.962206
37	53°31'38.95"N	6° 2'25.37"W	53.527486	-6.040381	53.527486	N	6.040381
38	53°37'41.19"N	6° 8'15.95"W	53.628108	-6.137764	53.628108	N	6.137764
39	53°40'48.64"N	6°12'10.46"W	53.680178	-6.202906	53.680178	N	6.202906
40	53°43'17.45"N	6°12'37.95"W	53.721514	-6.210542	53.721514	N	6.210542
41	53°43'32.11"N	6° 8'24.86"W	53.725586	-6.140239	53.725586	N	6.140239
42	53°40'27.34"N	6° 1'26.14"W	53.674261	-6.023928	53.674261	N	6.023928
43	53°37'16.11"N	5°55'16.93"W	53.621142	-5.921369	53.621142	N	5.921369
44	53°34'20.17"N	5°49'35.13"W	53.572269	-5.826425	53.572269	N	5.826425
45	53°34'20.22"N	5°41'38.93"W	53.572283	-5.694147	53.572283	N	5.694147
46	53°34'20.22"N	5°30'22.62"W	53.572283	-5.506283	53.572283	N	5.506283
47	53°34'19.89"N	5°18'1.30"W	53.572192	-5.300361	53.572192	N	5.300361
48	53°37'0.37"N	5°25'8.69"W	53.616769	-5.419081	53.616769	N	5.419081
49	53°36'53.19"N	5°35'57.77"W	53.614775	-5.599381	53.614775	N	5.599381
50	53°36'42.49"N	5°46'2.28"W	53.611803	-5.767300	53.611803	N	5.767300
51	53°40'42.89"N	5°54'51.00"W	53.678581	-5.914167	53.678581	N	5.914167
52	53°44'0.64"N	6° 2'25.20"W	53.733511	-6.040333	53.733511	N	6.040333
53	53°47'41.45"N	6° 9'21.49"W	53.794847	-6.155969	53.794847	N	6.155969
54	53°50'51.87"N	6°12'12.68"W	53.847742	-6.203572	53.847742	N	6.203572
55	53°47'7.83"N	6° 3'16.25"W	53.785508	-6.054514	53.785508	N	6.054514
56	53°43'43.04"N	5°56'40.35"W	53.728622	-5.944542	53.728622	N	5.944542
57	53°39'56.41"N	5°48'4.19"W	53.665669	-5.801164	53.665669	N	5.801164
58	53°39'36.04"N	5°40'36.19"W	53.660011	-5.676719	53.660011	N	5.676719
59	53°39'28.16"N	5°29'49.15"W	53.657822	-5.496986	53.657822	N	5.496986
60	53°39'22.96"N	5°18'5.27"W	53.656378	-5.301464	53.656378	N	5.301464
61	53°42'45.97"N	5°23'50.86"W	53.712769	-5.397461	53.712769	N	5.397461
62	53°42'37.56"N	5°34'58.23"W	53.710433	-5.582842	53.710433	N	5.582842
63	53°42'37.58"N	5°44'12.61"W	53.710439	-5.736836	53.710439	N	5.736836
64	53°43'17.03"N	5°50'50.20"W	53.721397	-5.847278	53.721397	N	5.847278
65	53°47'13.29"N	5°56'57.98"W	53.787025	-5.949439	53.787025	N	5.949439
66	53°50'31.99"N	6° 5'55.62"W	53.842219	-6.098783	53.842219	N	6.098783
67	53°53'48.78"N	6°12'59.14"W	53.896883	-6.216428	53.896883	N	6.216428
68	53°54'45.37"N	6°18'58.64"W	53.912603	-6.316289	53.912603	N	6.316289
69	53°56'49.10"N	6°19'1.00"W	53.946972	-6.316944	53.946972	N	6.316944
70	53°58'19.45"N	6°17'17.93"W	53.972069	-6.288314	53.972069	N	6.288314
71	53°55'55.88"N	6°15'57.04"W	53.932189	-6.265844	53.932189	N	6.265844
72	53°56'29.82"N	6°11'54.22"W	53.941617	-6.198394	53.941617	N	6.198394
73	53°58'23.84"N	6° 5'24.25"W	53.973289	-6.090069	53.973289	N	6.090069
74	53°53'42.68"N	6° 5'17.41"W	53.895189	-6.088169	53.895189	N	6.088169
75	53°55'1.00"N	5°57'7.14"W	53.916944	-5.951983	53.916944	N	5.951983
76	53°50'9.05"N	5°57'38.93"W	53.835847	-5.960814	53.835847	N	5.960814
77	53°50'58.76"N	5°48'15.77"W	53.849656	-5.804381	53.849656	N	5.804381
78	53°45'48.34"N	5°50'27.93"W	53.763428	-5.841092	53.763428	N	5.841092
79	53°45'48.54"N	5°33'41.34"W	53.763483	-5.561483	53.763483	N	5.561483
80	53°45'50.45"N	5°19'24.94"W	53.764014	-5.323594	53.764014	N	5.323594

ii. Day grab sampling stations

Grab No.	Degrees, Mins, Secs				Decimal Degrees		Maxsea Format		
	Latitude		Longitude		Latitude	Longitude	Latitude	N	Longitude
	Deg.	Mins	Deg.	Mins					
1	53	19.550000	6	11.597667	53.325833	-6.193294	53.325833	N	6.193294

2	53	20.050500	6	10.757500	53.334175	-6.179292	53.334175	N	6.179292
3	53	20.612333	6	9.902500	53.343539	-6.165042	53.343539	N	6.165042
4	53	20.576333	6	10.788000	53.342939	-6.179800	53.342939	N	6.179800
5	53	20.583333	6	11.644833	53.343056	-6.194081	53.343056	N	6.194081
6	53	20.960667	6	9.280667	53.349344	-6.154678	53.349344	N	6.154678
7	53	21.397833	6	8.589500	53.356631	-6.143158	53.356631	N	6.143158
8	53	21.794000	6	7.886667	53.363233	-6.131444	53.363233	N	6.131444
9	53	22.169500	6	7.206667	53.369492	-6.120111	53.369492	N	6.120111
10	53	21.927333	6	6.243333	53.365456	-6.104056	53.365456	N	6.104056
11	53	21.661333	6	6.808000	53.361022	-6.113467	53.361022	N	6.113467
12	53	21.347333	6	7.395667	53.355789	-6.123261	53.355789	N	6.123261
13	53	20.971833	6	8.029333	53.349531	-6.133822	53.349531	N	6.133822
14	53	20.541167	6	8.571333	53.342353	-6.142856	53.342353	N	6.142856
15	53	19.933000	6	9.435500	53.332217	-6.157258	53.332217	N	6.157258
16	53	19.386333	6	10.264500	53.323106	-6.171075	53.323106	N	6.171075
17	53	18.970000	6	11.336333	53.316167	-6.188939	53.316167	N	6.188939
18	53	18.453000	6	10.513000	53.307550	-6.175217	53.307550	N	6.175217
19	53	18.825333	6	9.967833	53.313756	-6.166131	53.313756	N	6.166131
20	53	19.380833	6	9.032000	53.323014	-6.150533	53.323014	N	6.150533
21	53	19.903500	6	8.005333	53.331725	-6.133422	53.331725	N	6.133422
22	53	20.493667	6	7.188500	53.341561	-6.119808	53.341561	N	6.119808
23	53	21.000167	6	6.392833	53.350003	-6.106547	53.350003	N	6.106547
24	53	21.534000	6	5.622667	53.358900	-6.093711	53.358900	N	6.093711
25	53	21.304333	6	4.499000	53.355072	-6.074983	53.355072	N	6.074983
26	53	20.962833	6	5.014167	53.349381	-6.083569	53.349381	N	6.083569
27	53	20.552167	6	5.557000	53.342536	-6.092617	53.342536	N	6.092617
28	53	20.230833	6	5.969167	53.337181	-6.099486	53.337181	N	6.099486
29	53	19.909833	6	6.545167	53.331831	-6.109086	53.331831	N	6.109086
30	53	19.393833	6	7.518667	53.323231	-6.125311	53.323231	N	6.125311
31	53	18.816833	6	8.676333	53.313614	-6.144606	53.313614	N	6.144606
32	53	18.206500	6	9.560667	53.303442	-6.159344	53.303442	N	6.159344
33	53	18.304667	6	7.661833	53.305078	-6.127697	53.305078	N	6.127697
34	53	18.766333	6	6.912333	53.312772	-6.115206	53.312772	N	6.115206
35	53	19.342333	6	6.054667	53.322372	-6.100911	53.322372	N	6.100911
36	53	20.006000	6	4.988500	53.333433	-6.083142	53.333433	N	6.083142
37	53	20.734833	6	4.218333	53.345581	-6.070306	53.345581	N	6.070306
38	53	21.313000	6	3.376667	53.355217	-6.056278	53.355217	N	6.056278
39	53	18.650000	6	5.392333	53.310833	-6.089872	53.310833	N	6.089872
40	53	17.609833	6	6.112000	53.293497	-6.101867	53.293497	N	6.101867

iii. Vibrocore sampling stations

Seabed feature	Lat	Long	Number of cores
Mudbelt Pockmark	53 ⁰ 40.677'N	5 ⁰ 56.144'W	2- 1 from feature and 1 reference
Lambay Deep Mud Diapir	53 ⁰ 26.391'N	5 ⁰ 48.143'W	2- 1 from feature and 1 reference
Methane-derived authigenic carbonate mounds	53 ⁰ 19.754'N 53 ⁰ 20.296'N	5 ⁰ 36.925'W 5 ⁰ 37.750'W	A minimum of 2- 1 from feature and 1 reference
Western Trench	53 ⁰ 20.839'N	5 ⁰ 39.208'W	
	53 ⁰ 23.134'N	5 ⁰ 24.633'W	1 core from feature

d. RV Celtic Voyager equipment list

<i>No.</i>	<i>Item Name</i>	<i>Brief Use & Performance</i>
Grab samplers		
1	KC® Day grab	Used intensively in Dublin bay and performed very well overall.
2	Shipek grab	Used in MDAC area, performed well recovering numerous high quality MDAC samples
3	Van Veen grab	Used infrequently. In MDAC area, recovery of MDAC surface nodules and crusts was poor.
Corers		
4	Geo-Corer 3000® Vibrocorer	Used frequently, obtaining 7 cores with good recoveries. Performance in sandy seabed was lower than muddy seabed and performance on MDAC hard grounds was very poor.
5	Bowers & Connolly® multicorer	Unused
6	Duncan & Ass.® 500x500mm double-spaded box corer.	Unused in order to facilitate regular vibrocorer deployment. Use of both for this sampling plan was not possible.
7	Gravity corer (1m)	Used 4 times and performed very well in muddy seabed.
8	Gravity corer (2m)	Used once with poor recovery, the 1m gravity corer was used in its place.
9	Small Reineck box corer	Used intensively and performed well overall. Good recoveries and sample quality in muds, but often poor performance in sandy seabed.
Geophysical & positioning		
10	CODA acquisition system	Most geophysical & positioning equipment was frequently used throughout the cruise.
11	Motion reference unit	
12	Multibeam echosounder	
13	Sub-bottom profiler	
14	Subsea acoustic positioning system (USBL)	
15	USBL beacon 1	
16	USBL beacon 3 (MIPS)	
17	Kongsberg Simrad OE 14-208 Camera	
18	ROV	
18	ROV	
Water Column		
19	SBE43® CTD Dissolved O ₂ sensor	Unused
20	ECOFLO TBD® CTD Fluorimetry and turbidity meter	Unused
21	CTD profiler and Rosette sampler 1	Used in MDAC area, with a total of 8 casts at 2 sites. Sampler and CTD sensors performed well.
22	12x 5L HydroBios® Rosette sampling bottles	Used in MDAC area, with a total of 8 casts at 2 sites
23	CTD Transmissometer	Used as above
24	Plankton Nets	Used twice and performed well.
25	Wetlabs Wetstar® Underway fluorimeter	Unused
26	SBE21® Underway thermosalinograph	Unused

e. Scientific crew equipment & chemicals list

<i>Item No.</i>	<i>Item Description</i>	<i>Amount</i>
Multi-purpose		
1	Blue paper towel roll	1
2	Lab glasses	5
3	Labcoats	5
4	Aluminium foil roll 90m	1
5	Parafilm roll 250ft	1
6	1L volumetric flask	2
7	100mL volumetric flask	2
8	250mL graduated cylinder	1
9	100mL graduated cylinder	1
10	25mL graduated cylinder	1
11	20mL glass pipette	1
12	10mL glass pipette	1
13	5mL glass pipette	1
14	Pipette bulb filler	1
15	2L beaker	1
16	600mL beaker	1
17	250mL beaker	1
18	50mL beaker	2
19	25mL beaker	1
20	Eppendorf 1000µL auto-pipette	2
21	Eppendorf 200µL auto-pipette	2
22	1000µL pipette tips	1000
23	200µL pipette tips	1000
24	Stainless steel tweezers	1
25	Permanent pens	6
26	Core section holders	4
27	Glove box	1
28	Ducktape roll	1
29	Cellotape roll	1
30	Scissors	1
31	Metre stick	1
32	Argon X10S gas cylinder	2
33	Argon regulator	1
34	Straight-head Screwdriver	1
35	Stainless steel spatulas (various size range)	3
36	Stanley knife	1
37	Pliers	1
38	Solvent dispenser bottle	3
39	Labels box	2
40	Nitrile powder-free gloves (Size L) Box	3
41	Measuring tape 25m	1
42	Sediment core description forms	200
43	Digital camera (with charger and memory card)	2
44	Heavy-duty hardback A4 notebook	1
45	20L waste container	1
Core splitting		
46	Fein Multimaster core cutter w/ blades	1
47	Stainless steel core spatulas	2
48	Stainless steel chicken wire roll	1
Sediment sampling		
49	125ml glass jars with Teflon-lined caps	288

50	Ziplock plastic bags	50
Gas sampling		
51	12ml plastic syringes (top removed)	200
52	20mm Al head space caps (Sigma-Z292044)	500
53	Headpace vials (Sigma- Z292036)	160
54	20mm Butyl head space septa (Sigma-	200
Pore water sampling		
55	Rhizons	115
56	12ml plastic syringes	200
57	Wooden spacers	100
58	6ml plastic vials with caps	1000
59	12ml glass vials with caps (PO ₄ ³⁻)	124
60	Peristaltic pump	1
61	Peristaltic pump tubes	3
pH & E_h measurement		
62	Eutech pH probe	1
63	Eutech Cyberscan PC300 Series	1
64	Conductivity/Temperature probe	1
65	pH probe storage solution	1
66	Eutech E _h probe	1
67	Eutech Cyberscan pH300	1
68	Thermocouple temperature probe	1
NH₄⁺ ISE measurement		
69	Micro magnetic stirring bar	3
70	Gilson Labstir magnetic stirrer	1
71	SCHOTT NH 1100 ISE	1
72	Gas permeable membrane nodules	3
73	Teflon membrane	1
74	L1BNC electrode BNC cable	1
75	Probe Stand	1

No.	Item Description	CAS No.	Quantity	Purpose and Use
General purpose				
1	Deionized water	7732-18-5	20L	Cleaning, reagent preparation
2	1% Hydrochloric acid	7647-01-0	1L	Cleaning, Rhizon cleaning
3	0.1M Sodium Hydroxide	1310-73-2	1L	Cleaning, NH ₄ ⁺ analysis
4	Acetone	67-64-1	2.5L	Cleaning (lipid removal)
Gas sample preservative				
5	Sodium merthiolate	54-64-8	0.20g (x2)	Antimicrobial for gas samples
6	Sodium chloride	7647-14-5	750g	Salting-out
Pore-water preservatives				
7	Chloroform	67-66-3	300ml	PO ₄ ³⁻ and NO ₃ ⁻ Anti-microbial
8	Zinc acetate	557-34-6	1.09g (x3)	HS ⁻ precipitation
9	Ascorbic acid	50-81-7	1.0g (x2)	Fe(II) preservative
pH and Redox measurement				
10	pH4 buffer	/	200mL	pH and Redox probe calibration
11	pH7 buffer	/	200mL	pH and Redox probe calibration
12	Quinhydrone	106-34-3	0.02g (x6)	Redox probe calibration
Ammonia measurement				
13	1000ppm NH ₄ Cl	12125-02-9	500ml	Calibration standard for ISE
14	10M NaOH	1310-73-2	500mL	Ion strength adjustment buffer

f. Day Grab sample descriptions

Name	CV10_28_001	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°22.5197	6°00.5935	Dublin Bay
Date	02/06/2010	Time	17:00	Depth (m)	~30
Description					
<i>General</i>	Muddy sand with some pebbles. <10% shell fragments				
<i>Colour</i>	Surface- 10YR 3/2 Grayish brown Bottom- 10YR 3/1 Very dark gray				
<i>Infauna</i>	1 sea urchin, 1 ragworm observed				



Name	CV10_28_002	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°21.3135	6°03.3195	Dublin Bay
Date	02/06/2010	Time	17:38	Depth (m)	~9
Description					
<i>General</i>	Homogenous coarse sand, <1% shell fragments				
<i>Colour</i>	Surface- 10YR 3/2 Grayish brown Bottom- 10YR 3/1 Very dark gray				
<i>Infauna</i>	None observed				



Name	CV10_28_003	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°21.3135	6°04.5623	Dublin Bay
Date	02/06/2010	Time	17:57	Depth (m)	~9
Description					
<i>General</i>	Fine sand 70-80% , 2cm-4cm pebbles 20-30%, <1% shell fragments (white)				
<i>Colour</i>	Surface- 10YR 3/N Very dark grey				
<i>Infauna</i>	None observed				



Name	CV10_28_004	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°21.0007	6°05.0993	Dublin Bay
Date	02/06/2010	Time	18:50	Depth (m)	9
Description					
<i>General</i>	Fine muddy sand, well sorted. <1%~3mm shell fragments				
<i>Colour</i>	Surface- Gley1 3/N Very dark grey				
<i>Infauna</i>	None observed				



Name	CV10_28_005	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°21.4558	6°05.5506	Dublin Bay
Date	02/06/2010	Time	19:05	Depth (m)	9.7
Description					
<i>General</i>	Homogenous well sorted sandy mud, minor shell content				
<i>Colour</i>	Gley1 10YR 3/2 Dark grayish brown				
<i>Infauna</i>	Razorshell, sea urchin, starfish, crab				



Name	CV10_28_006	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°20.9896	6°06.3405	Dublin Bay
Date	02/06/2010	Time	19:15	Depth (m)	10.0
Description					
<i>General</i>	Homogenous well sorted sandy mud, <1% shell fragments (1 Razorshell)				
<i>Colour</i>	3/10Y Very dark green gray				
<i>Infauna</i>	Numerous white worms observed				



Name	CV10_28_007	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°20.5650	6°05.5823	Dublin Bay
Date	02/06/2010	Time	19:23	Depth (m)	9.7
Description					
<i>General</i>	Homogenous well sorted sandy mud, no visible shell fragments				
<i>Colour</i>	3/10Y Dark greenish gray				
<i>Infauna</i>	2 large (~5cm) sea urchins				



Name	CV10_28_008	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°20.2248	6°06.0041	Dublin Bay
Date	02/06/2010	Time	19:31	Depth (m)	12.5
Description					
<i>General</i>	90% shell fragments and intact shells (~0.5-10cm), primarily clam and scallop, ~10% pebbles, rocks				
<i>Colour</i>	10YR 8/2 Vary pale brown				
<i>Infauna</i>	2 large (~5cm) sea urchins				



Name	CV10_28_009	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°19.8475	6°06.5438	Dublin Bay
Date	02/06/2010	Time	19:44	Depth (m)	11.0
Description					
<i>General</i>	Well sorted sandy mud				
<i>Colour</i>	3/10Y Dark greenish grey, dark with depth				
<i>Infauna</i>	Black clam, spiked shell				



Name	CV10_28_010	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°19.3180	6°06.0979	Dublin Bay
Date	02/06/2010	Time	19:59	Depth (m)	12.8
Description					
<i>General</i>	Well sorted sandy mud				
<i>Colour</i>	4/4 Brown olive at surface, 3/N Dark grey with depth				
<i>Infauna</i>	Black clam with spiked shell, worms, brittle star				



Name	CV10_28_012	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°18.8965	6°06.9605	Dublin Bay
Date	02/06/2010	Time	21:27	Depth (m)	10.4
Description					
<i>General</i>	Well sorted sandy mud, <1% shell fragments				
<i>Colour</i>	4/4 Olive brown at surface, 3/N Dark grey with depth				
<i>Infauna</i>	Clam with spiked shell, sea urchin				



Name	CV10_28_013	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°18.3945	6°07.6154	Dublin Bay
Date	02/06/2010	Time	21:27	Depth (m)	11.0
Description					
<i>General</i>	Well sorted muddy sandy, ~20% fine shell fragments				
<i>Colour</i>	2.5/1 Brown/black				
<i>Infauna</i>	1 Starfish, 1 ragworm				



Name	CV10_28_014	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Day grab		53°17.6102	6°06.1580	Dublin Bay
Date	02/06/2010	Time	21:55	Depth (m)	13.09
Description					
<i>General</i>	Well sorted sandy mud, ~5% shells 2-3cm, 1 Razorshell				
<i>Colour</i>	2.5/1 Brown/black				
<i>Infauna</i>	1 urchin, 1 sea slug, 1 starfish, numerous worms				



Name	CV10_28_015	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Day grab		53°17.0475	6°04.8751	Dublin Bay
Date	02/06/2010	Time	22:10	Depth (m)	24
Description					
<i>General</i>	Muddy sand, ~10% shells 2-3cm, ~1% pebble, strong sulphide odour,				
<i>Colour</i>	Primarily 3/N (very dark grey) with patches 3/2 (dark brown)				
<i>Infauna</i>	Numerous small starfish, worms				



Name	CV10028_016	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Day grab		53°16.5718	6°03.6826	Dublin Bay
Date	02/06/2010	Time	22:20-23:10	Depth (m)	33.1
Description					
<i>General</i>	Muddy sand, ~20% shells & fragments 0.5-4cm, ~1% pebble, strong odour				
<i>Colour</i>	2.5/1 Brown/black				
<i>Infauna</i>	Numerous small starfish observed				



Name	CV10_28_030	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Day grab		53°21.6099	6°01.9272	Dublin Bay
Date	03/06/2010	Time	23:20	Depth (m)	25.6
Description					
<i>General</i>	20% Muddy sand, ~30% shells & fragments 0.5-6cm, ~30% large pebble (6-10cm)				
<i>Colour</i>	10YR 3/1 Very dark grey				
<i>Infauna</i>	Small starfish, sea cucumber, crab and sea urchin observed				



Name	CV10_28_031	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°20.9888	6°01.2357	Dublin Bay
Date	03/06/2010	Time	23:32	Depth (m)	22.4
Description					
<i>General</i>	Muddy sand, <1% shell fragments <1cm				
<i>Colour</i>	10YR 3/2 Very dark grey brown				
<i>Infauna</i>	Fine-haired sea urchin observed				



Name	CV10_28_032	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°20.4197	6°02.0096	Dublin Bay
Date	03/06/2010	Time	23:45	Depth (m)	21.7
Description					
<i>General</i>	Muddy sand, <5% shell fragments <1cm, reddish black rock present				
<i>Colour</i>	10YR 3/3 Dark brown				
<i>Infauna</i>	Fine-haired sea urchin observed				



Name	CV10_28_033	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°19.7495	6°02.5643	Dublin Bay
Date	04/06/2010	Time	00:03	Depth (m)	21.2
Description					
<i>General</i>	Sand, ~25% shell fragments <1cm, ~10% 2-4cm pebbles				
<i>Colour</i>	10YR 2/2 Very dark brown				
<i>Infauna</i>	Fine-haired sea urchin observed				



Name	CV10_28_034	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°20.9034	6°02.8106	Dublin Bay
Date	04/06/2010	Time	1:26	Depth (m)	?
Description					
<i>General</i>	Coarse/very coarse muddy sand, 30-50% shell fragments 0.5-4cm, ~10% 2-4cm pebbles				
<i>Colour</i>	10YR 3/2 Very dark grey, black at depth				
<i>Infauna</i>	Numerous starfish, razorshells, clams and cockles				



Name	CV10_28_035	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°20.5151	6°03.4031	Dublin Bay
Date	04/06/2010	Time	2:26	Depth (m)	?
Description					
<i>General</i>	Medium/coarse sandy mud, 20-30% shell fragments ~1cm				
<i>Colour</i>	10YR 4/1 Dark grey, black at depth				
<i>Infauna</i>	Numerous brittle stars, clams (white), cockles (black) and worms (red)				



Name	CV10_28_036	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°20.5151	6°03.4031	Dublin Bay
Date	04/06/2010	Time	3:00	Depth (m)	17.8
Description					
<i>General</i>	Fine/ Medium sandy mud, <5% shell content				
<i>Colour</i>	Gley 1 3/5GY Very dark greenish grey, greenish black at depth				
<i>Infauna</i>	Numerous brittle stars, 4 sea urchins				



Name	CV10_28_037	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°20.0554	6°04.9403	Dublin Bay
Date	04/06/2010	Time	3:21	Depth (m)	11.8
Description					
<i>General</i>	Very fine/fine well sorted sandy mud, <1% shell content, 1 razorshell				
<i>Colour</i>	Gley 1 3/10Y Very dark greenish grey, slightly darker at depth				
<i>Infauna</i>	Sea urchin observed				



Name	CV10_28_038	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°19.7765	6°04.0318	Dublin Bay
Date	04/06/2010	Time	4:00	Depth (m)	20.6
Description					
<i>General</i>	Very fine/fine well sorted sandy mud, <10% shell fragments, <20% pebbles				
<i>Colour</i>	Gley 1 4/10Y Dark greenish grey, slightly darker at depth				
<i>Infauna</i>	1 Sea urchin, 1 scallop observed				



Name	CV10_28_039	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Day grab		53°19.7765	6°04.0318	Dublin Bay
Date	04/06/2010	Time	5:01	Depth (m)	19.6
Description					
<i>General</i>	Very fine/fine well sorted sandy mud, <10% shell fragments (~1cm)				
<i>Colour</i>	Gley 1 4/10Y Dark greenish grey, darker at depth				
<i>Infauna</i>	1 Sea urchin, 1 brittle star, 1 common crab observed				



Name	CV10_28_040	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Day grab		53°18.0008	6°05.9254	Dublin Bay
Date	04/06/2010	Time	5:15	Depth (m)	12.4
Description					
<i>General</i>	Very fine/fine well sorted sandy mud, <10% shell fragments (~1cm), 2 razorshells, some apparent terrigenous matter- bark				
<i>Colour</i>	Gley 1 4/10Y Dark greenish grey, darker at depth				
<i>Infauna</i>	1 small starfish, numerous tube worms				



Name	CV10_28_041	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°17.7078	6°04.2006	Dublin Bay
Date	04/06/2010	Time	5:50	Depth (m)	30.2
Description					
<i>General</i>	Very fine/fine well sorted sandy mud, <30% shell fragments (~1cm)				
<i>Colour</i>	Gley 1 4/10Y Dark greenish grey, darker at depth				
<i>Infauna</i>	1 brittle starfish, numerous red worms				



Name	CV10_28_042	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°17.3370	6°02.8249	Dublin Bay
Date	04/06/2010	Time	6:15	Depth (m)	12.3
Description					
<i>General</i>	Fine well sorted sandy mud, <20% shell fragments (~1cm)				
<i>Colour</i>	10YR 3/1 Very dark grey, darker at depth				
<i>Infauna</i>	1 starfish				



Name	CV10_28_043	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		~53°18.241	~6°03.333	Dublin Bay
Date	04/06/2010	Time	6:50	Depth (m)	25.2
Description					
<i>General</i>	Fine well sorted sandy mud, no shell fragments observed, distinct oily odour and gelatinous texture				
<i>Colour</i>	2.5Y 4/2 Dark grayish brown, Gley 2 2.5/5B bluish black at depth				
<i>Infauna</i>	1 sea urchin, 1 worm				



Name	CV10_28_044	Location	<i>Lat</i>	<i>Long</i>	Geographic
Type	Day grab		53°19.0285	6°03.1994	Dublin Bay
Date	04/06/2010	Time	7:05	Depth (m)	25.4
Description					
<i>General</i>	Fine well sorted sandy mud, <5% shell fragments, scallop and clam shell				
<i>Colour</i>	2.5Y 4/2 Dark grayish brown, Gley 2 2.5/5B bluish black at depth				
<i>Infauna</i>	1 sea urchin				



Name	CV10_28_045	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Day grab		53°18.2323	6°02.2991	Dublin Bay
Date	04/06/2010	Time	7:20	Depth (m)	23.7
Description					
<i>General</i>	Fine well sorted sandy mud, <5% shell fragments and a clam shell, gelatinous viscous texture				
<i>Colour</i>	2.5Y 4/3 Olive brown, Gley 2 2.5/5B bluish black patches				
<i>Infauna</i>	1 sea urchin, 1 starfish				



Name	CV10_28_045	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Day grab		53°19.7987	6°00.6859	Dublin Bay
Date	04/06/2010	Time	8:18	Depth (m)	29.8
Description					
<i>General</i>	Fine well sorted sandy mud, <10% shell fragments and a clam shell, oily odour				
<i>Colour</i>	2.5Y 3/4 Very dark grey, Gley 2 2.5/5B blueish black at depth				
<i>Infauna</i>	none observed				



g. Van Veen sample descriptions

Name	CV10_28_017	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Van Veen grab		53°20.7661	5°39.0943	Codling Fault Zone
Date	03/06/2010	Time	6:00	Depth (m)	78.9
Description					
<i>General</i>	Medium well sorted sand, <10% shell fragments ~0.5-2cm				
<i>Colour</i>	2.5Y 4/3 Olive brown				
<i>Infauna</i>	None observed				



Name	CV10_28_111	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Van Veen grab		53°19.9749	5°37.3612	Codling Fault
Date	06/06/2010	Time	17:31	Depth (m)	65.3
Description					
<i>General</i>	~60% medium/coarse sand, numerous large nodules present, presumed to be MDAC				
<i>Colour</i>	Hue 2.5Y 5/4 Olive brown				
<i>Infauna</i>	Sand eel observed				



Name	CV10_28_112	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Van Veen grab	Location	53°20.0283	5°37.2291
Date	06/06/2010	Time	17:31	Depth (m)
				65.3
Description				
<i>General</i>	Medium well sorted sand, <10% shell fragments ~0.5-2cm, some distinct nodules present presumed to be MDAC			
<i>Colour</i>	Hue 2.5Y 4/3 Olive brown			
<i>Infauna</i>	None observed			



h. Shipek grab sample descriptions

Name	CV10_28_100	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Shipek grab		53°20.1889	5°37.5058	Codling Fault
Date	06/06/2010	Time	11:10	Depth (m)	68
Description					
<i>General</i>	Medium well sorted sand, <5% shell fragments, some distinct black nodules present presumed to be MDAC				
<i>Colour</i>	Gley 2.5Y 3/1 Very dark grey				
<i>Infauna</i>	None observed				



Name	CV10_28_101	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Shipek grab		53°20.0439	5°37.3243	Codling Fault
Date	06/06/2010	Time	11:15	Depth (m)	~65
Description					
<i>General</i>	Medium well sorted sand, <1% shell fragments, few black spots present				
<i>Colour</i>	Gley 2.5Y 3/1 Very dark grey				
<i>Infauna</i>	None observed				



Name	CV10_28_102	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Shipek grab		53°20.0439	5°37.3243	Codling Fault
Date	06/06/2010	Time	11:20	Depth (m)	66.8
Description					
<i>General</i>	Medium well sorted sand, <1% shell fragments				
<i>Colour</i>	Gley 2.5Y 3/1 Very dark grey				
<i>Infauna</i>	None observed				



Name	CV10_28_103	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Shipek grab		53°19.9154	5°37.1514	Codling Fault
Date	06/06/2010	Time	11:23	Depth (m)	58
Description					
<i>General</i>	MDAC nodules and concretions, strong sulphide odour				
<i>Colour</i>	Gley 2 2.5/10G Black				
<i>Infauna</i>	Numerous red worms observed				





Name	CV10_28_104	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Shipek grab		53°19.8380	5°37.6399	Codling Fault
Date	06/06/2010	Time	11:29	Depth (m)	67.9
Description					
<i>General</i>	Medium well sorted sand, <5% shell fragments, no sample taken				
<i>Colour</i>	2.5Y 3/2 Very dark greyish brown				
<i>Infauna</i>	None observed				



Name	CV10_28_105	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Shipek grab		53°19.8380	5°37.6399	Codling Fault
Date	06/06/2010	Time	11:33	Depth (m)	64.9
Description					
<i>General</i>	Medium well sorted sand, <5% shell fragments, no sample taken				
<i>Colour</i>	2.5Y 3/3 Dark olive brown				
<i>Infauna</i>	None observed				



Name	CV10_28_106	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Shipek grab		53°19.6809	5°36.8108	Codling Fault
Date	06/06/2010	Time	11:36	Depth (m)	67.0
Description					
<i>General</i>	Medium well sorted sand, <5% shell fragments, some intact bivalve shells, no sample taken				
<i>Colour</i>	2.5Y 3/2 Very dark greyish brown				
<i>Infauna</i>	None observed				



Name	CV10_28_107	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Shipek grab		53°19.8475	5°37.1246	Codling Fault
Date	06/06/2010	Time	12:54	Depth (m)	60.8
Description					
<i>General</i>	Well sorted sandy mud, <5% shell fragments, poor recovery				
<i>Colour</i>	Gley 1 3/10Y Very dark greenish grey				
<i>Infauna</i>	Small crabs and worms (<1cm) and fibrous plant-like organism observed				



Name	CV10_28_108	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Shipek grab		53°19.7136	5°31.0932	Codling Fault
Date	06/06/2010	Time	13:02	Depth (m)	71.0
Description					
<i>General</i>	Well sorted fine sandy mud, <5% shell fragments, slight odour				
<i>Colour</i>	10YR 3/1 Very dark grey → Gley 1 3/N				
<i>Infauna</i>	Small crabs and worms (<1cm) and fibrous plant-like organism observed				



Name	CV10_28_109	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Shipek grab		53°19.5904	5°37.0692	Codling Fault
Date	06/06/2010	Time	13:??	Depth (m)	66.7
Description					
<i>General</i>	Well sorted muddy sand, ~50% MDAC nodules, <10% shell fragments, slight odour				
<i>Colour</i>	Gley 1 3/10Y Very dark greenish grey and Gley 1 2.5/N Black				
<i>Infauna</i>	1 starfish observed				



Name	CV10_28_110	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Shipek grab		53°19.5904	5°37.0692	Codling Fault
Date	06/06/2010	Time	13:??	Depth (m)	66.7
Description					
<i>General</i>	50-70% MDAC derived tubular concretions, 25-45% well sorted medium sand, <5% shell fragments				
<i>Colour</i>	2.5Y 4/3 Olive brown				
<i>Infauna</i>	None observed				

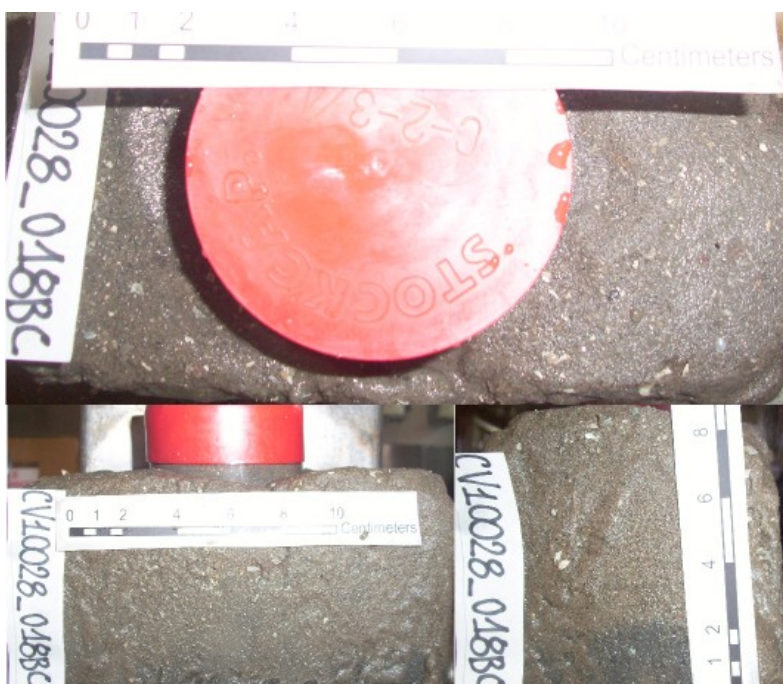


i. Reineck boxcore sample descriptions

Name	CV10_28_011	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°19.5310	6°6.1615	Dublin Bay
Date	02/06/2010	Time	20:47	Depth (m)	12
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish grey, 3N with depth				
<i>Recovery</i>	Poor, 9cm				
Homogenous well-sorted medium sandy mud. Numerous shell fragments visible on surface, <5%. Spiny clam (black) observed at sediment surface.					



Name	CV10_28_018	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°20.3434	5°42.7908	Kish bank basin
Date	03/06/2010	Time	7:11	Depth (m)	73
Description					
<i>Colour</i>	10YR 3/2 Dark greyish brown, Gley 1 3/N at 8cm depth				
<i>Recovery</i>	Poor, 10cm				
Homogenous well-sorted muddy sand at surface. Distinct colour change at 8cm depth whereby sediments is darker sandy mud. Numerous shell fragments visible on surface, <10%. No infauna observed.					



Name	CV10_28_020	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°20.3434	5°42.7908	Kish bank basin
Date	03/06/2010	Time	13:??	Depth (m)	73
Description					
<i>Colour</i>	10YR 3/2 Dark greyish brown, Gley 1 3/N at 8cm depth				
<i>Recovery</i>	Poor, 10cm				
Homogenous well-sorted muddy sand with little change with depth. Some shell fragments visible <1%. No infauna observed.					



Name	CV10_28_021	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°22.5281	5°57.5541	W. Kish Basin
Date	03/06/2010	Time	14:00	Depth (m)	24.5
Description					
<i>Colour</i>	10YR 3/2 Very dark greyish brown				
<i>Recovery</i>	Poor, 9cm (Grab taken)				
Homogenous well-sorted muddy sand with little change with depth. Some shell fragments visible <1%. No infauna observed.					

(No photo available)

Name	CV10_28_025	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°17.3224	5°42.9252	Kish B. Basin
Date	03/06/2010	Time	18:04	Depth (m)	45.5
Description					
<i>Colour</i>	2.5Y 4/3 Olive brown				
<i>Recovery</i>	Poor, 9cm				
Homogenous well-sorted medium/coarse sand. Some shell fragments visible <10%. No infauna observed.					



Name	CV10_28_026	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°18.7691	5°47.9430	Kish B. Basin
Date	03/06/2010	Time	19:40	Depth (m)	22
Description					
<i>Colour</i>	10YR 4/4 Brown				
<i>Recovery</i>	Poor, 7cm (Grab taken)				
Homogenous well-sorted medium/coarse sand. Some shell fragments visible <5%. No infauna observed.					



Name	CV10_28_027	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°22.3442	5°47.6276	Kish B. Basin
Date	03/06/2010	Time	20:26	Depth (m)	52.6
Description					
<i>Colour</i>	10YR 3/2 Very dark greyish brown → Gley 2 3/10BG				
<i>Recovery</i>	Moderate, 12cm				
Homogenous well-sorted sandy (fine) mud with distinct colour change at 4cm depth. Some shell fragments visible <5%. No infauna observed.					



Name	CV10_28_028	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°24.6567	5°53.3990	Kish B. Basin
Date	03/06/2010	Time	21:05	Depth (m)	43.0
Description					
<i>Colour</i>	Gley 1 3/10Y Very dark greenish grey → 2.5Y 4/1 Dark grey				
<i>Recovery</i>	Poor, 9cm				
Homogenous well-sorted sandy (fine) mud. 1-2cm drift, colour change at 2-3cm depth. Some shell fragments visible <1%. Large surficial marine coralline plant, 1 starfish, small crabs (10) white ragworms (3) observed. Slight odour present.					



Name	CV10_28_029	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°21.8456	6°00.6970	Kish B. Basin
Date	03/06/2010	Time	22:58	Depth (m)	30.2
Description					
<i>Colour</i>	10YR 3/2 Very dark greyish brown → 2.5Y 4/1 Dark grey				
<i>Recovery</i>	Poor, 6cm (Grab taken)				
Homogenous well-sorted muddy sand. Distinct colour change in lower depths. Shell fragments visible <10%. No infauna observed.					



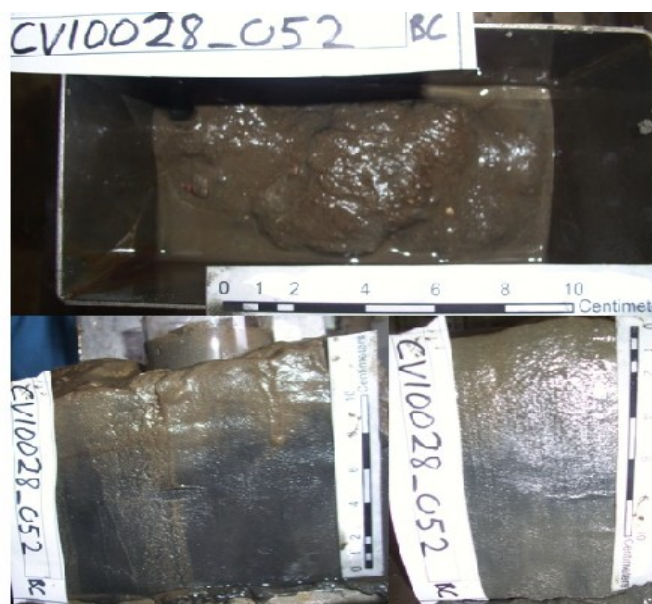
Name	CV10_28_047	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°40.7543	5°55.0135	Mudbelt
Date	04/06/2010	Time	11:06	Depth (m)	47.6
Description					
<i>Colour</i>	2.5Y 4/2 Dark greyish brown → 2.5Y 4/1 Dark grey				
<i>Recovery</i>	Good, 19cm				
Homogenous well-sorted sandy (very fine) mud. 2-3cm drift. Distinct colour change at 2-3cm depths. No shell fragments visible. No infauna observed.					



Name	CV10_28_051	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°40.4732	6°01.4515	Mudbelt
Date	04/06/2010	Time	13:55	Depth (m)	29.6
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown→ Gley 1 3/10Y Very dark greenish gray at depth				
<i>Recovery</i>	Good, 18.5cm Homogenous well-sorted sandy (very fine) mud with 2-3cm drift. Colour change at 3-4cm depth. No shell fragments visible. 1 red worm observed.				



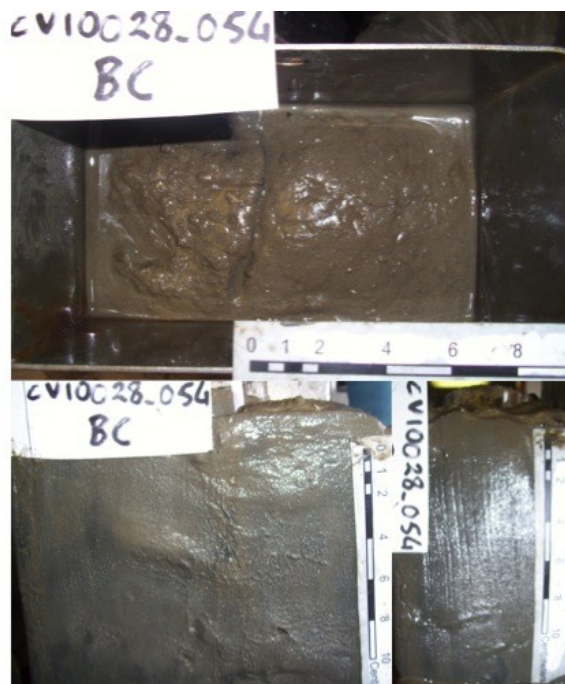
Name	CV10_28_052	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°43.4326	6°08.4046	Mudbelt
Date	04/06/2010	Time	14:20	Depth (m)	19.1
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown→ Gley 2 2.5/10b Blueish black				
<i>Recovery</i>	Good, 15.5cm Homogenous well-sorted sandy (very fine) mud with colour change at 2-3cm depth. Some small shell fragments visible. <1%. No infauna observed.				



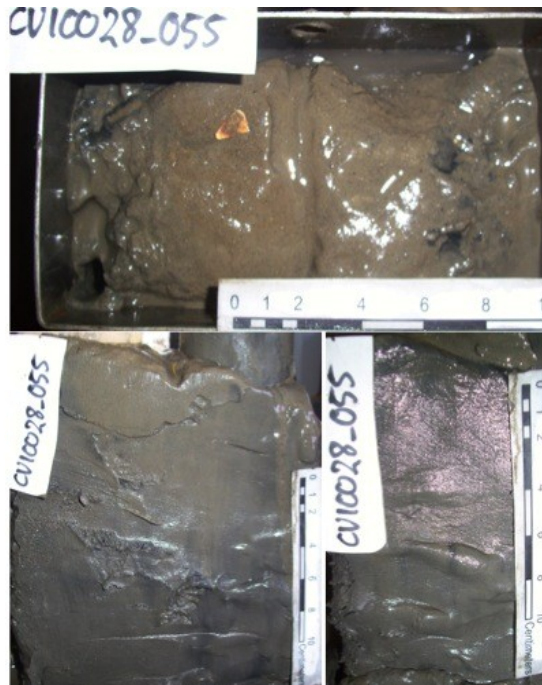
Name	CV10_28_053	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°47.6662	6°09.3102	Mudbelt
Date	04/06/2010	Time	14:57	Depth (m)	24.38
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown→ Gley 2 2.5/10b Blueish black				
<i>Recovery</i>	Good, 19.5cm				
Homogenous well-sorted sandy (very fine) mud with colour change at 0-1cm depth. No shell fragments visible. No infauna observed.					



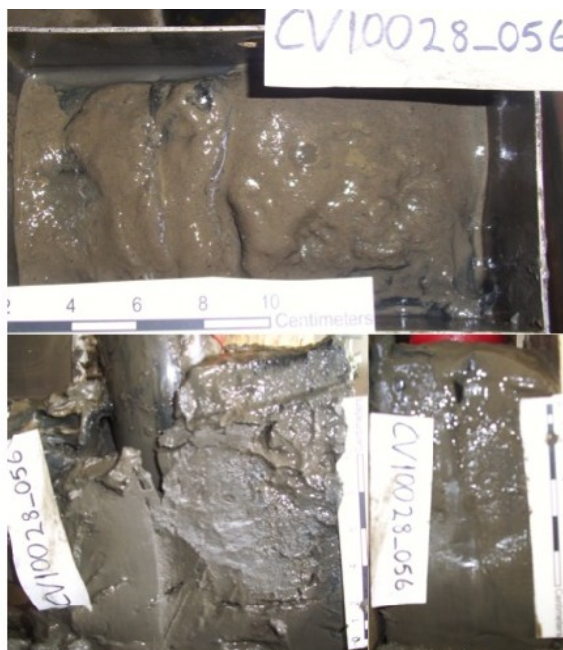
Name	CV10_28_054	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°50.3006	6°10.6900	Mudbelt
Date	04/06/2010	Time	15:21	Depth (m)	21.52
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown→ Gley 2 3/5BG Very dark greenish gray				
<i>Recovery</i>	Good, 16cm				
Homogenous well-sorted sandy (very fine) mud with colour change at 2-3cm depth. Some small shell fragments visible. <1%. No infauna observed.					



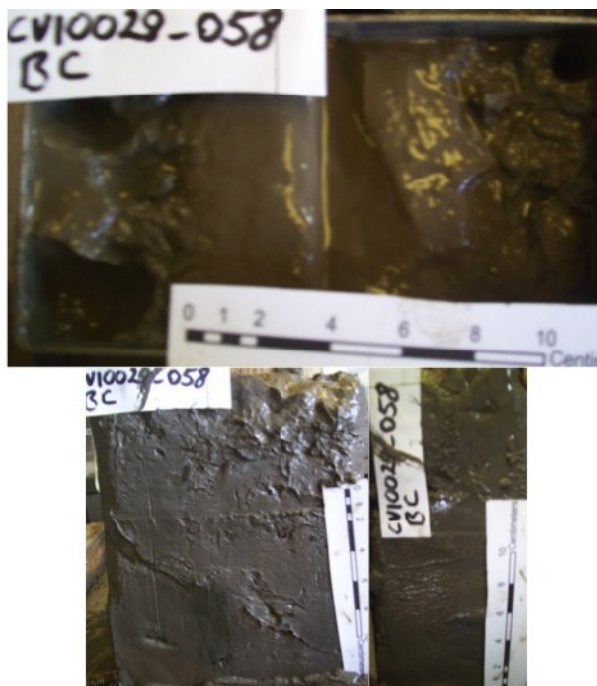
Name	CV10_28_055	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°53.6255	6°05.3202	Mudbelt
Date	04/06/2010	Time	15:57	Depth (m)	31.9
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown→ 2.5Y 3/2 Very dark grayish brown				
<i>Recovery</i>	Excellent, 23cm				
Homogenous well-sorted sandy (very fine) mud with colour change at 1-2cm depth. Black patches on surface. Some small shell fragments visible, <1%, 1 1-2cm fragment on surface					



Name	CV10_28_056	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°54.9377	6°08.4046	Mudbelt
Date	04/06/2010	Time	17:34	Depth (m)	41.9
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown				
<i>Recovery</i>	Good, 17cm				
Homogenous well-sorted mud, no colour change observed with depth. <1% small surficial shell fragments visible. No infauna observed.					



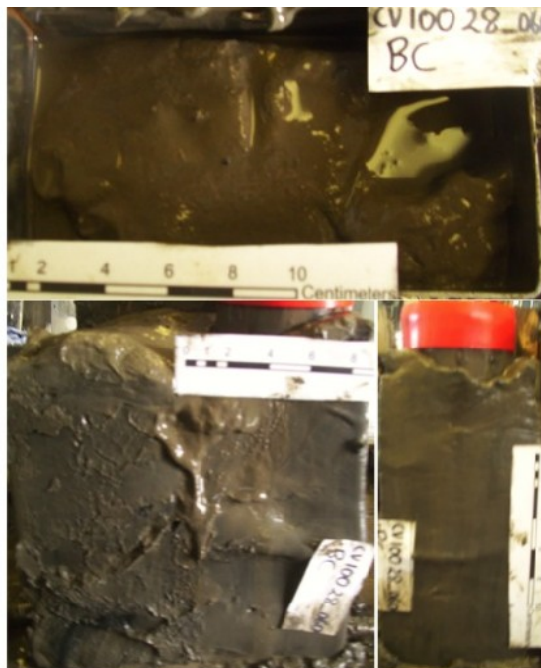
Name	CV10_28_058	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°54.9377	5°57.2076	Mudbelt
Date	04/06/2010	Time	18:40	Depth (m)	41.9
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown				
<i>Recovery</i>	Excellent, 23.5cm				
Homogenous well-sorted mud, no colour change observed with depth. No shell fragments visible. No infauna observed.					



Name	CV10_28_059	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°50.1961	5°57.6366	Mudbelt
Date	04/06/2010	Time	19:27	Depth (m)	39.8
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown				
<i>Recovery</i>	Excellent, 23cm				
Homogenous well-sorted mud, no colour change observed with depth. No shell fragments visible. 1 red worm observed.					



Name	CV10_28_060	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°50.5235	6°05.8841	Mudbelt
Date	04/06/2010	Time	20:07	Depth (m)	31
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown				
<i>Recovery</i>	Excellent, 22cm				
Homogenous well-sorted mud, no distinct colour change observed with depth but some black zones at 20cm. No shell fragments visible. 1 red worm observed.					



Name	CV10_28_061	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°47.1573	6°03.3243	Mudbelt
Date	04/06/2010	Time	20:40	Depth (m)	30.6
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown → 10 YR 3/1				
<i>Recovery</i>	Excellent, 23cm				
Homogenous well-sorted mud, colour change observed with depth with distinct black zones also. No shell fragments visible. 1 red worm observed.					



Name	CV10_28_062	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°43.9762	6°02.3854	Mudbelt
Date	04/06/2010	Time	21:09	Depth (m)	30.1
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown→ Gley 1 2.5/10Y Very dark grayish brown				
<i>Recovery</i>	Excellent, 20.5cm				
Homogenous well-sorted mud, distinct colour change observed with depth. Red Fe oxidation streaks visible at depth. Numerous 1-2cm surficial shells & fragments visible. No infauna observed.					



Name	CV10_28_063	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°43.6985	5°56.6319	Mudbelt
Date	04/06/2010	Time	21:38	Depth (m)	42.8
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown→ Gley 1 2.5/10Y Very dark grayish brown				
<i>Recovery</i>	Excellent, 23cm				
Homogenous well-sorted mud, distinct colour change observed with depth. No shell fragments visible. No infauna observed.					



Name	CV10_28_064	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°43.6985	5°56.6319	Mudbelt
Date	04/06/2010	Time	21:38	Depth (m)	42.8
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown→ Gley 1 2.5/10Y Very dark grayish brown				
<i>Recovery</i>	Excellent, 23cm				
Homogenous well-sorted mud, some colour change observed with depth. No shells fragments visible. No infauna observed.					



Name	CV10_28_065	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°45.8118	5°50.5536	Mudbelt
Date	04/06/2010	Time	22:58	Depth (m)	54.1
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown→ Gley 1 2.5/10Y Very dark grayish brown				
<i>Recovery</i>	Excellent, 24cm				
Homogenous well-sorted mud, some colour change observed with depth. No shells fragments visible. No infauna observed.					



Name	CV10_28_066	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°43.2838	5°50.8171	Mudbelt
Date	04/06/2010	Time	23:26	Depth (m)	54.9
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown → Gley 1 2.5/10Y Very dark grayish brown				
<i>Recovery</i>	Excellent, 25cm				
Homogenous well-sorted mud, some colour change observed with depth. No shells fragments visible. No infauna observed.					



Name	CV10_28_067	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°45.8260	5°33.5412	Mudbelt
Date	05/06/2010	Time	00:42	Depth (m)	102.7
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish grey				
<i>Recovery</i>	Excellent, 22cm				
Homogenous well-sorted mud, no distinct colour change observed with depth. No shells fragments visible. No infauna observed.					



Name	CV10_28_068	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°42.7616	5°23.7875	Mudbelt
Date	05/06/2010	Time	1:56	Depth (m)	91.2
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish grey → Gley 1 4/N Dark grey				
<i>Recovery</i>	Excellent, 22cm				
Homogenous well-sorted mud, redox-related colour change observed with depth. No shells fragments visible. No infauna observed.					



Name	CV10_28_069	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°42.6144	5°34.9359	Mudbelt
Date	05/06/2010	Time	3:10	Depth (m)	103.1
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish grey → Gley 1 4/N Dark grey				
<i>Recovery</i>	Excellent, 25cm				
Homogenous well-sorted mud, redox-related colour change observed with depth. No shells fragments visible. No infauna observed.					



Name	CV10_28_070	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°42.6598	5°44.2633	Mudbelt
Date	05/06/2010	Time	4:00	Depth (m)	77.7
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish grey → Gley 1 4/N Dark grey				
<i>Recovery</i>	Excellent, 25cm				
Homogenous well-sorted mud, redox-related colour change observed with depth. No shells fragments visible. No infauna observed.					



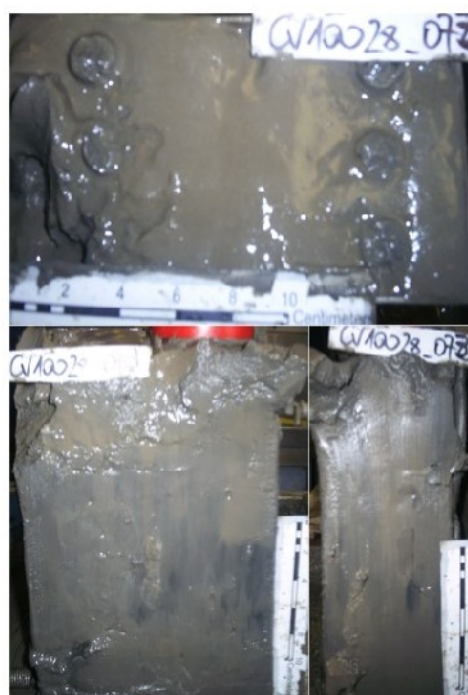
Name	CV10_28_071	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°39.8987	5°48.1625	Mudbelt
Date	05/06/2010	Time	4:37	Depth (m)	64.9
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish grey → Gley 1 3/10Y Very dark greenish grey				
<i>Recovery</i>	Excellent, 21cm				
Homogenous well-sorted mud. 2-3cm drift. Redox-related colour change observed with depth, some darker patches. No shells fragments visible. 1 ~4cm green slug observed at 20cm.					



Name	CV10_28_072	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°39.5813	5°40.4707	Mudbelt
Date	05/06/2010	Time	5:17	Depth (m)	90.7
Description					
<i>Colour</i>	Hue 2.5Y 4/2 Dark greyish brown→ Hue 2.5Y 4/3 Very dark grey brown				
<i>Recovery</i>	Excellent, 23cm				
Homogenous well-sorted mud. 1-2cm drift. Redox-related colour change observed with depth, some darker patches. No shells fragments visible. No infauna observed.					



Name	CV10_28_073	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°39.3867	5°29.6961	Mudbelt
Date	05/06/2010	Time	6:12	Depth (m)	110.8
Description					
<i>Colour</i>	Hue 10Yr 4/2 Dark greyish brown→ Hue 10Yr 3/1 Very dark grayish brown				
<i>Recovery</i>	Excellent, 25cm				
Homogenous well-sorted mud. 2-3cm drift. Redox-related colour change with depth, some darker patches. No shells fragments visible. No infauna observed.					



Name	CV10_28_074	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°37.0644	5°25.4067	Mudbelt
Date	05/06/2010	Time	6:48	Depth (m)	100.2
Description					
<i>Colour</i>	Gley 1 4/10Y Dark greenish brown→ Hue 2.5Y 3/1 Very dark grey				
<i>Recovery</i>	Excellent, 23cm				
Homogenous well-sorted sandy (very fine) mud. 1cm drift. Distinct redox-related colour change below surficial sediment. <1% shell fragments visible. No visible infauna observed.					



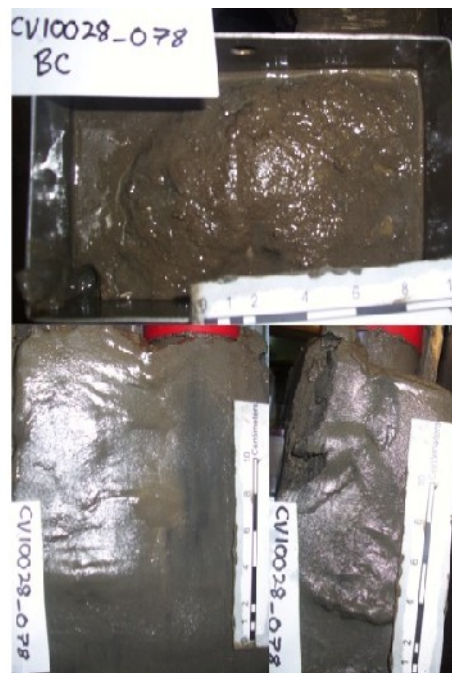
Name	CV10_28_076	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°36.8002	5°36.0106	Mudbelt
Date	05/06/2010	Time	7:50	Depth (m)	102.7
Description					
<i>Colour</i>	Hue 2.5Y 3/2 Very dark greyish brown→ Gley 1 3/N Very dark grey				
<i>Recovery</i>	Excellent, 24cm				
Homogenous well-sorted sandy (very fine) mud. 2cm drift. Redox-related colour change below surficial sediment, very dark patches at bottom depths. No shell fragments visible. No visible infauna observed.					



Name	CV10_28_077	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°36.6844	5°46.2480	Mudbelt
Date	05/06/2010	Time	8:52	Depth (m)	69.5
Description					
<i>Colour</i>	Hue 2.5Y 4/2 → Dark greyish brown Gley 1 3/N Very dark grey				
<i>Recovery</i>	Excellent, 22cm				
Homogenous well-sorted sandy (very fine) mud. 2cm drift. Redox-related colour change with depth, very dark patches at bottom depths. No shell fragments visible. 1 reddish-purple worm observed. Sulphide odour.					



Name	CV10_28_078	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°37.1765	5°55.3821	Mudbelt
Date	05/06/2010	Time	9:38	Depth (m)	45.5
Description					
<i>Colour</i>	Hue 2.5Y 3/2 Very dark greyish brown → Gley 1 3/10Y Very dark greenish grey				
<i>Recovery</i>	Excellent, 21cm				
Homogenous well-sorted sandy (very fine) mud. 2cm drift. Redox-related colour change with depth. <1% shell fragments visible. Small red worm observed. Strong sulphide odour.					



Name	CV10_28_079	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°31.6841	6°02.3975	N. Lambay
Date	05/06/2010	Time	10:33	Depth (m)	12.4
Description					
<i>Colour</i>	2.5Y 4/2 Dark greyish brown → 10YR 3/1 Very dark grey				
<i>Recovery</i>	Poor, 11cm				
Homogenous well-sorted muddy sand (medium). Redox-related colour change at ~5cm depth. <1% shell fragments visible. 1 sea louse observed.					



Name	CV10_28_080	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°31.6036	5°54.5400	N. Lambay
Date	05/06/2010	Time	11:00	Depth (m)	32.3
Description					
<i>Colour</i>	Hue 2.5Y 4/2 Dark grayish brown → Gley 1 3/N Very dark grey				
<i>Recovery</i>	Moderate, 15.5cm				
Homogenous well-sorted sandy (medium) mud. Redox-related colour change at ~5cm depth. <1% shell fragments visible. No infauna observed.					



Name	CV10_28_081	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°34.3189	5°49.6479	Mudbelt
Date	05/06/2010	Time	11:46	Depth (m)	66.6
Description					
<i>Colour</i>	Hue 2.5Y 3/2 Dark grayish brown → Gley 1 3/N Very dark grey				
<i>Recovery</i>	Excellent, 20cm				
Homogenous well-sorted sandy (very fine) mud. 1-2cm drift. Redox-related colour change at ~2cm depth. No shell fragments visible. No infauna observed.					



Name	CV10_28_083	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°28.0453	5°42.3682	Kish B. Bank
Date	05/06/2010	Time	13:40	Depth (m)	63.1
Description					
<i>Colour</i>	Hue 2.5Y 4/3 Olive brown				
<i>Recovery</i>	Poor, 9cm (Grab taken)				
Homogenous well-sorted medium sand. No colour change at depth. 1-5% shell fragments visible. No infauna observed.					



Name	CV10_28_084	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°34.3494	5°41.5628	S. Mudbelt
Date	05/06/2010	Time	14:32	Depth (m)	84.2
Description					
<i>Colour</i>	Hue 10Yr 4/2 Dark greyish brown→ Gley 1 3/N Very dark grey				
<i>Recovery</i>	Excellent, 22cm				
Homogenous well-sorted mud. Redox-related colour change at depth, some darker streaks. No shell fragments visible. No infauna observed.					



Name	CV10_28_085	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°31.6341	5°37.2027	S. Mudbelt
Date	05/06/2010	Time	15:08	Depth (m)	95.8
Description					
<i>Colour</i>	Hue 10Yr 4/2 Dark greyish brown→ Gley 1 3/N Very dark grey				
<i>Recovery</i>	Good, 18cm				
Homogenous well-sorted mud. 2-3cm drift. Distinct redox-related colour change at 2-3cm depth. No shell fragments visible. No infauna observed.					



Name	CV10_28_086	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°26.4481	5°37.0779	W. Kish B. Basin
Date	05/06/2010	Time	16:04	Depth (m)	58.6
Description					
<i>Colour</i>	Hue 10Yr 4/3 Brown				
<i>Recovery</i>	Poor, 10cm				
Homogenous well-sorted medium sand. No colour change at depth. <5% shell fragments visible. No infauna observed.					



Name	CV10_28_087	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°24.7242	5°31.3537	W. Kish B. Basin
Date	05/06/2010	Time	16:35	Depth (m)	79
Description					
<i>Colour</i>	Hue 2.5Y 4/3 Olive Brown				
<i>Recovery</i>	Poor, 6cm (grab taken)				
Homogenous well-sorted medium sand. No colour change at depth. <10% shell fragments visible. 1 white worm observed.					



Name	CV10_28_088	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°28.1033	5°31.3438	Kish B. Basin
Date	05/06/2010	Time	17:22	Depth (m)	81.8
Description					
<i>Colour</i>	Hue 2.5Y 4/2 Dark greyish brown→ Gley 1 2.5/10Y Very dark greenish brown				
<i>Recovery</i>	Moderate, 14cm				
Homogenous well-sorted medium sand. Distinct redox-related colour change at ~10cm depth. <1% shell fragments visible. No infauna observed. Slight sulphide odour.					



Name	CV10_28_089	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°34.2152	5°30.2368	Mudbelt
Date	05/06/2010	Time	18:22	Depth (m)	113.5
Description					
<i>Colour</i>	Hue 2.5Y 3/2 Very dark greyish brown→ Gley 1 3/10Y Very dark greenish brown				
<i>Recovery</i>	Excellent, 21cm				
Homogenous well-sorted sandy (fine) mud. Distinct redox-related colour change at ~4cm depth. <1% shell fragments visible. No infauna observed.					



Name	CV10_28_090	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°31.5815	5°25.2898	Mudbelt
Date	05/06/2010	Time	18:53	Depth (m)	92.9
Description					
<i>Colour</i>	Hue 2.5Y 3/2 Very dark greyish brown→ Gley 1 3/10Y Very dark greenish brown				
<i>Recovery</i>	Moderate, 13cm				
Homogenous well-sorted sandy (fine) mud. 3-4cm drift. Distinct redox-related colour change at ~6cm depth. <1% shell fragments visible. No infauna observed. Sulphide odour					



Name	CV10_28_091	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°26.3290	5°25.5929	Kish Bank
Date	05/06/2010	Time	19:41	Depth (m)	94.4
Description					
<i>Colour</i>	Hue 10Yr 4/3 Brown				
<i>Recovery</i>	Poor, 9cm				
Homogenous well-sorted medium/coarse sand. No colour change at depth. 40-50% shells and fragments visible, including 3cm cockle and 5cm scallop shells No infauna observed.					



Name	CV10_28_092	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°22.3770	5°25.4442	Kish B. Basin
Date	05/06/2010	Time	20:15	Depth (m)	101.3
Description					
<i>Colour</i>	Hue 10Yr 4/3 Brown→Gley 1 3/N Very dark grey				
<i>Recovery</i>	Poor, 8cm				
Homogenous well-sorted muddy sand. Distinct redox-related colour change at depth. 20-30% shells and fragments visible, including razorfish (5cm), scallop (4cm) and mussel (6cm). Small 2cm shrimp observed.					



Name	CV10_28_093	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°18.9198	5°25.7751	Kish B. Basin
Date	05/06/2010	Time	20:45	Depth (m)	104.4
Description					
<i>Colour</i>	Hue 10Yr 4/4 Brown				
<i>Recovery</i>	Poor, 8cm (grab taken)				
Homogenous well-sorted medium sand. No colour change at depth. <10% shell fragments visible. Small 2cm shrimp observed.					



Name	CV10_28_094	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°17.5587	5°32.0864	Kish B. Basin
Date	05/06/2010	Time	21:32	Depth (m)	90.1
Description					
<i>Colour</i>	Hue 2.5Y 4/4 Brown				
<i>Recovery</i>	Poor, 8cm (grab taken)				
Homogenous well-sorted medium sand. No colour change at depth. <5% shell fragments visible. No infauna observed.					



Name	CV10_28_095	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore		53°20.5370	5°31.8398	Kish B. Basin
Date	05/06/2010	Time	22:09	Depth (m)	87.4
Description					
<i>Colour</i>	Hue 2.5Y 3/3 Dark olive brown				
<i>Recovery</i>	Poor, 8cm (grab taken)				
Homogenous well-sorted medium/coarse sand. No colour change at depth. <5% shells and shell fragments, 3cm cockle shells. No infauna observed.					



Name	CV10_28_096	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°22.3400	5°36.7774	Kish B. Basin
Date	05/06/2010	Time	22:54	Depth (m)	87.4
Description					
<i>Colour</i>	Hue 2.5Y 4/4 Brown				
<i>Recovery</i>	Moderate, 13cm				
Homogenous well-sorted medium sand. No colour change at depth. 10-20% shells and shell fragments, including cockle and scallop shells. No infauna observed.					



Name	CV10_28_097	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°24.7757	5°42.5730	Kish B. Basin
Date	05/06/2010	Time	23:31	Depth (m)	60
Description					
<i>Colour</i>	Hue 2.5Y 4/3 Olive brown				
<i>Recovery</i>	Poor, <8cm (Grab taken)				
Homogenous well-sorted medium sand. No colour change at depth. <5% shell fragments. 1 worm observed.					



Name	CV10_28_098	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°28.1097	5°53.2777	Kish B. Basin
Date	06/06/2010	Time	00:37	Depth (m)	42
Description					
<i>Colour</i>	Hue 10Yr 3/2 Very dark grayish brown → Gley 1 2.5/N Black				
<i>→Recovery</i>	Moderate, 12cm				
Homogenous well-sorted sandy (medium) mud. Distinct redox-related colour change at ~6cm depth. 5-10% shell fragments. No infauna observed.					



Name	CV10_28_099	Location	<u>Lat</u>	<u>Long</u>	<u>Geographic</u>
Type	Boxcore		53°26.3710	5°58.2177	Kish B. Basin
Date	06/06/2010	Time	01:13	Depth (m)	18.3
Description					
<i>Colour</i>	Hue 2.5Y 4/3 Olive brown				
<i>→Recovery</i>	Poor, 6cm (Grab taken)				
Homogenous well-sorted medium sand. No colour change at depth. <1% shell fragments. 1.7cm sand eel observed.					



Name	CV10_28_113	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Boxcore (GSI)		53°26.3710	5°58.2177	Mudbelt
Date	07/06/2010	Time	6:30	Depth (m)	48.0
Description					
<i>Colour</i>	Hue 2.5Y 4/2 Dark brownish grey→ Gley 1 3/N very dark grey				
→ <i>Recovery</i>	Good, 16cm				
Homogenous well-sorted mud sand. No distinct colour change but patches of colour change. No shell fragments.					



j. Vibrocore sample descriptions

(Note: Photos not included)

Name	CV10_28_019	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Vibrocore		53°26.4068	5°48.1412	Lambay Deep
Date	03/06/2010	Time	10:22	Depth (m)	118
Section No.	3/3	Length (m)	1.0		
Description					
<i>Colour</i>		Gley 1 4/5GY Dark greenish grey			
Homogenous well-sorted medium sandy mud. No distinct change in lithology or colour evident. Occasional shell fragments observed, no significant clusters. No infauna observed					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	10- 0.01, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9m				
<i>Gas sub-sampling</i>	7- 0.05, 0.15, 0.3, 0.45, 0.6, 0.85, 1.0m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res., remaining bagged at 20cm ⁻¹ Res.				

Name	CV10_28_019	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Vibrocore		53°26.4068	5°48.1412	Lambay Deep
Date	03/06/2010	Time	10:22	Depth (m)	118
Section No.	2/3	Length (m)	1.0		
Description					
<i>Colour</i>		Gley 1 4/5GY Dark greenish grey			
Homogenous well-sorted medium sandy mud. No distinct change in lithology or colour evident. Occasional shell fragments observed, no significant clusters. No infauna observed					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	9- 0.01, 0.1, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9m				
<i>Gas sub-sampling</i>	6- 0.05, 0.15, 0.3, 0.45, 0.6, 0.85m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res., remaining bagged at 20cm ⁻¹ Res.				

Name	CV10028_019	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Vibrocore		53°26.4068	5°48.1412	Lambay Deep
Date	03/06/2010	Time	10:22	Depth (m)	118
Section No.	1/3	Length (m)	1.0		
Description					
<i>Colour</i>		Gley 1 4/5GY Dark greenish grey			
Homogenous well-sorted medium sandy mud. No distinct change in lithology or colour evident. Occasional shell fragments observed, no significant clusters. No infauna observed					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	10- 0.01, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 1.0m				
<i>Gas sub-sampling</i>	5- 0.05, 0.3, 0.45, 0.6, 0.85m				
<i>Sediment sub-sampling</i>	10cm ⁻¹ Res., remaining bagged at 20cm ⁻¹ Res.				

Name	CV10028_020	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Vibrocore		53°26.4404	5°48.5529	Lambay Deep (reference)
Date	03/06/2010	Time	10:45		
Section No.	3/3	Length (m)	1.0	Depth (m)	78.5
Description					
<i>Colour</i>		Gley 1 4/10Y Dark greenish grey			
Homogenous well-sorted medium sandy mud. No significant change in lithology or colour evident, slightly sandier at depth. Very wet, occasional shell fragments observed, no significant clusters. No infauna or bioturbation observed					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	7- 0.05, 0.2, 0.35, 0.5, 0.65, 0.8, 0.95m				
<i>Gas sub-sampling</i>	5- 0.05, 0.3, 0.45, 0.6, 0.85m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res., remaining bagged at 20cm ⁻¹ Res.				

Name	CV10_28_020	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Vibrocore		53°26.4404	5°48.5529	Lambay Deep (reference)
Date	03/06/2010	Time	10:45		
Section No.	2/3	Length (m)	1.0	Depth (m)	78.5
Description					
<i>Colour</i>		Gley 1 3/10Y Very dark greenish grey			
Homogenous well-sorted medium sandy mud. No significant change in lithology or colour evident, slightly sandier at depth. No shell fragments observed, hard white worm casts observed at 20-30cm and 60-70cm. Definite slight sulphide odour present					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	5- 0.05, 0.2, 0.4, 0.6, 0.8m				
<i>Gas sub-sampling</i>	5- 0.05, 0.3, 0.45, 0.6, 0.85m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res., remaining bagged at 20cm ⁻¹ Res.				

Name	CV10_28_020	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Vibrocore		53°26.4404	5°48.5529	Lambay Deep (reference)
Date	03/06/2010	Time	10:45		
Section No.	1/3	Length (m)	1.0	Depth (m)	78.5
Description					
<i>Colour</i>		Gley 1 3/10Y Very dark greenish grey			
Homogenous well-sorted medium sandy mud. No significant change in lithology or colour evident, slightly sandier at depth. No shell fragments observed, white tube worm observed at 50-60cm.					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	5- 0.05, 0.2, 0.4, 0.6, 0.8m				
<i>Gas sub-sampling</i>	5- 0.05, 0.3, 0.45, 0.6, 0.85m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res., remaining bagged at 20cm ⁻¹ Res.				

Name	CV10_28_082	Location	Lat	Long	Geographic
Type	Vibrocore		53°31.6471	5°47.5960	Mudbelt
Date	05/06/2010	Time	10:45		
Section No.	3/3	Length (m)	1.0	Depth (m)	70.5
Description					
<i>Colour</i>		Hue 2.5Y 3/1 Very dark greyish brown ~0-0.1m, Hue 2.5Y 4/1 Dark grey ~0.1-1.0m			
Homogenous wet well-sorted fine sandy mud. Black streaks observed from 0-0.1m with colour change evident 0.1-1.0m. Some shell fragments observed, some small clusters at 0.3, 0.5 & 0.7m					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	14- 0.02, 0.04, 0.08, 0.12, 0.16, 0.24, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0m				
<i>Gas sub-sampling</i>	7- 0.05, 0.15, 0.3, 0.45, 0.65, 0.85, 1.0m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res. Remaining bagged at 20cm ⁻¹ Res.				

Name	CV10_28_082	Location	Lat	Long	Geographic
Type	Vibrocore		53°31.6471	5°47.5960	Mudbelt
Date	05/06/2010	Time	10:45		
Section No.	2/3	Length (m)	1.0	Depth (m)	70.5
Description					
<i>Colour</i>		Hue 10YR 3/1 Dark grey			
Homogenous well-sorted muddy sand 0- ~0.5m, Homogenous well-sorted fine sandy mud ~0.5-1.0m. High shell content 0-0.1m observed.					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	9- 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9m				
<i>Gas sub-sampling</i>	5- 0.05, 0.15, 0.45, 0.65, 0.85m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res. Remaining bagged at 20cm ⁻¹ Res.				

Name	CV10_28_082	Location	Lat	Long	Geographic
Type	Vibrocore		53°31.6471	5°47.5960	Mudbelt
Date	05/06/2010	Time	10:45		
Section No.	1/3	Length (m)	1.0	Depth (m)	70.5
Description					
<i>Colour</i>		Gley 1 3/10Y Very dark greenish grey			
Homogenous well-sorted medium sandy mud. No significant change in lithology or colour evident, slightly sandier at depth. No shell fragments observed, white tube worm observed at 50-60cm.					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	11- 0.05, 0.13, 0.18, 0.23, 0.33, 0.39, 0.55, 0.64, 0.75, 0.85, 0.94m				
<i>Gas sub-sampling</i>	5- 0.05, 0.15, 0.45, 0.65, 0.85m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res. Remaining bagged at 20cm ⁻¹ Res.				

Name	CV10028_114	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Vibrocore		53°40.6399	5°55.6957	Mudbelt
Date	07/06/2010	Time	7:28		
Section No.	3/3	Length (m)	1.0	Depth (m)	~47
Description					
<i>Colour</i>		2.5Y 4/3 Olive brown			
Homogenous well-sorted fine-grained sandy mud. No significant change in lithology or colour evident. Some shell fragments observed, no clusters.					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	13- 0.02, 0.05, 0.1, 0.15, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0m				
<i>Gas sub-sampling</i>	5- 0.05, 0.15, 0.45, 0.65, 0.85m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res. Remaining bagged at 20cm ⁻¹ Res.				

Name	CV10028_114	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Vibrocore		53°40.6399	5°55.6957	Mudbelt
Date	07/06/2010	Time	7:28		
Section No.	2/3	Length (m)	1.0	Depth (m)	~47
Description					
<i>Colour</i>		2.5Y 4/3 Olive brown			
Homogenous well-sorted fine-grained sandy mud. No significant change in lithology or colour evident. Some shell fragments observed, no clusters.					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	10- 0.01, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9m				
<i>Gas sub-sampling</i>	5- 0.05, 0.15, 0.45, 0.65, 0.85m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res. Remaining bagged at 20cm ⁻¹ Res.				

Name	CV10028_114	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	Vibrocore		53°40.6399	5°55.6957	Mudbelt
Date	07/06/2010	Time	7:28		
Section No.	1/3	Length (m)	1.0	Depth (m)	~47
Description					
<i>Colour</i>		2.5Y 4/3 Olive brown			
Homogenous well-sorted fine-grained sandy mud. No significant change in lithology or colour evident. Some shell fragments observed, no clusters. Overall homogenous 3m core with no stratification or colour change with depth.					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	10- 0.02, 0.06, 0.12 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9m				
<i>Gas sub-sampling</i>	5- 0.05, 0.15, 0.45, 0.65, 0.85m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res. Remaining bagged at 20cm ⁻¹ Res.				

k. Gravity core sample descriptions

(Note: Photos not included)

Name	CV10028_049	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	1m gravity core		53°40.6765	5°55.6449	Mudbelt (pockmark ref)
Date	03/06/2010	Time	~12:30		
Section No.	1/1	Length (m)	1.01	Depth (m)	~50
Description					
<i>Colour</i>		2.5Y 4/2 Dark grayish brown			
Homogenous well-sorted mud. No significant change in lithology or colour evident. Some shell fragments observed, no clusters.					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	10- 0.01, 0.15, 0.3, 0.45, 0.6, 0.7, 0.8, 0.95				
<i>Gas sub-sampling</i>	5- 0.05, 0.15, 0.45, 0.65, 0.85m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res. Remaining bagged at 20cm ⁻¹ Res.				

Name	CV10_28_050 GC	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	1m gravity core		53°40.6722	5°56.1720	Mudbelt (Inside pockmark)
Date	04/06/2010	Time	~13:00		
Section No.	1/1	Length (m)	1.01	Depth (m)	43
Description					
<i>Colour</i>		Gley 1 4/10Y			
Homogenous well-sorted fine sandy mud. No change in lithology but slightly darker with depth. Some shell fragments observed at 0.5 and 0.8m. Orange streak observed at 0.7m					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	10- 0.05, 0.15, 0.3, 0.45, 0.6, 0.75, 0.85, 1.0m				
<i>Gas sub-sampling</i>	5- 0.05, 0.15, 0.45, 0.65, 0.85m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res. Remaining bagged at 20cm ⁻¹ Res.				

Name	CV10028_057	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	1m gravity core		53°54.9778	5°57.0370	Mudbelt
Date	04/06/2010	Time	18:20		
Section No.	1/1	Length (m)	1.0	Depth (m)	42.07
Description					
<i>Colour</i>		Gley 1 2.5Y 4/1 Dark grey, streaks of Gley 1 3/N Very dark grey			
Homogenous well-sorted fine sandy mud. No change in lithology but slightly darker with depth. Some shell fragments observed at 0.5 and 0.8m. Orange streak observed at 0.7m					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	8- 0.02, 0.07, 0.15, 0.25, 0.4, 0.55, 0.7, 0.85m				
<i>Gas sub-sampling</i>	5- 0.05, 0.15, 0.45, 0.65, 0.85m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res. Remaining bagged at 20cm ⁻¹ Res.				

Name	CV10028_075	Location	<i>Lat</i>	<i>Long</i>	<i>Geographic</i>
Type	1m gravity core		53°36.9934	5°25.4455	Mudbelt
Date	05/06/2010	Time	7:30		
Section No.	1/1	Length (m)	0.85	Depth (m)	100.19
Description					
<i>Colour</i>		Gley 1 3/5G 0-0.3m, Gley 1 3/10Y 0.3-0.5m, Gley 2 3/5BG 0.5-0.85m			
Distinctive stratification- medium sandy mud 0-0.3m, fine mud 0.3m- 0.85m. Clear change in colour with depth (as above). No shell fragments observed. Strong sulphide odour present					
Sub-sampling & Analysis					
<i>Interstitial water sampling</i>	7- 0.01, 0.12, 0.24, 0.36, 0.48, 0.60, 0.72				
<i>Gas sub-sampling</i>	5- 0.05, 0.15, 0.45, 0.65, 0.85m				
<i>Sediment sub-sampling</i>	10- 10cm ⁻¹ Res. Remaining bagged at 20cm ⁻¹ Res.				