Cruise Report

Belgica 06/13
HERMES Belgica BIO

23-29 June 2006
Cork (IE) – Zeebrugge (B)

Gollum Channels & Whittard Canyon

Mariene Biologie
Vakgroep Biologie
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RCMG

From left to right: Prof. Dr. Ann Vanreusel, Guy De Smet, Dr. Maarten Raes, Dr. David Van Rooij, Jeroen Ingels, Bart Beuselinck, Wim Versteeg, Wouter Willems

Cruise report outline:

1. Cruise Reference

Belgica 2006/13
Cork (IE) – Zeebrugge (B)
23.06.2006 - 29.06.2006

2. Scientific Personnel

Prof. Dr. Ann Vanreusel	Chief Scientist, Marine Biology Section, UGent
Jeroen Ingels	2nd responsible, PhD-student, Marine Biology Section, UGent
Guy Desmet	Marine Biology Section, UGent
Bart Beuselinck	Marine Biology Section, UGent
Wouter Willems	PhD student, Marine Biology Section, UGent
Dr. Maarten Raes	Marine Biology Section, UGent
Dr. David Van Rooij	RCMG, UGent
Willem Versteeg	RCMG, Ugent

3. Ships Officers and Crew

KVK Lieven Goussaert	Cmdr
2EV Yves Phlips	2Com
1MC Marc Salviolli	COX'N
MTR Patrick Dewulf	Chief Tel
1KC Eric De Witte	Boatswain
KMC Tino Carels	Dek 1
1KC Jo Debruyne	Dek 2
QMC Thierry Dumoulin	DET
1MR Marc Dierick	HTD
MTR Michel Kenens	Chief Mec
1KC Redgy Germonpre	Mec 1
MTC Henri Leclerq	Chief Elec
1KC Henri Eloy	Elec 1
1KC Erwin Van Bosch	Chef
1KC Didier Laurent	Steward
K Tamara Toussaint	Medic

4. FRAMEWORK AND OBJECTIVES

4.1. Framework

The biological/geophysical research programme of the Belgica cruise 2006/13 frames into several international and national projects:

- **EC FP6 IP HERMES (2006-2008) (Biology and Geophysics)**

HERMES or "Hotspot ecosystem research on the margins of European Seas" frames within the "Global Change and Ecosystem" of the EU 6th framework programme and is a research project concentrating on the European continental margins. It is the first initiative combining hydrosphere and biosphere on a pan-European scale and will compare key environments. The project studies a variety of ecosystems in a range of geographical settings, stretching along the Atlantic Margin from the Norwegian Sea in the north to the Gulf of Cadiz in the south, and across the Mediterranean up to the Black Sea. In each of these regions, specific study sites provide an opportunity to study in great detail a diverse range of ecosystems and their drivers. Selection of these key sites is based on existing data and known ecosystems identified in previous research. Each geographic region has something different to offer in terms of physiography, geological activity and oceanographic regime, resulting in a broad spectrum of ecosystems and communities. The HERMES project seeks to combine and integrate various scientific disciplines in order to get a complete picture on how biodiversity, biological processes and physical factors are linked to each other and how they can control the various ecosystems along the European Margin (geology, sedimentology, physical oceanography, biogeochemistry, biology). Within the framework of this project the University of Ghent (Renard Centre of Marine Geology and the Marine Biology Department) has agreed to contribute to most working packages. (www.eu-hermes.net)

- **EU FP5 RTN EURODOM (2002-2006) (Geophysics)**

The conducted geophysical research activities of this campaign frame into this European Research and Training Network (RTN) under the assessment of submarine continental slope stability.

- **FWO post-doctoral Fellowship project "Porcupine Neogene Palaeoceanographic turnover" (2005-2008) (Geophysics)**

4.2. Programme Objectives

This campaign is the result of collaboration between the Marine Biology Section and the Renard Centre of Marine Geology (RCMG) of Ghent University and is the first scientific cruise to the Irish Margin within the HERMES project.

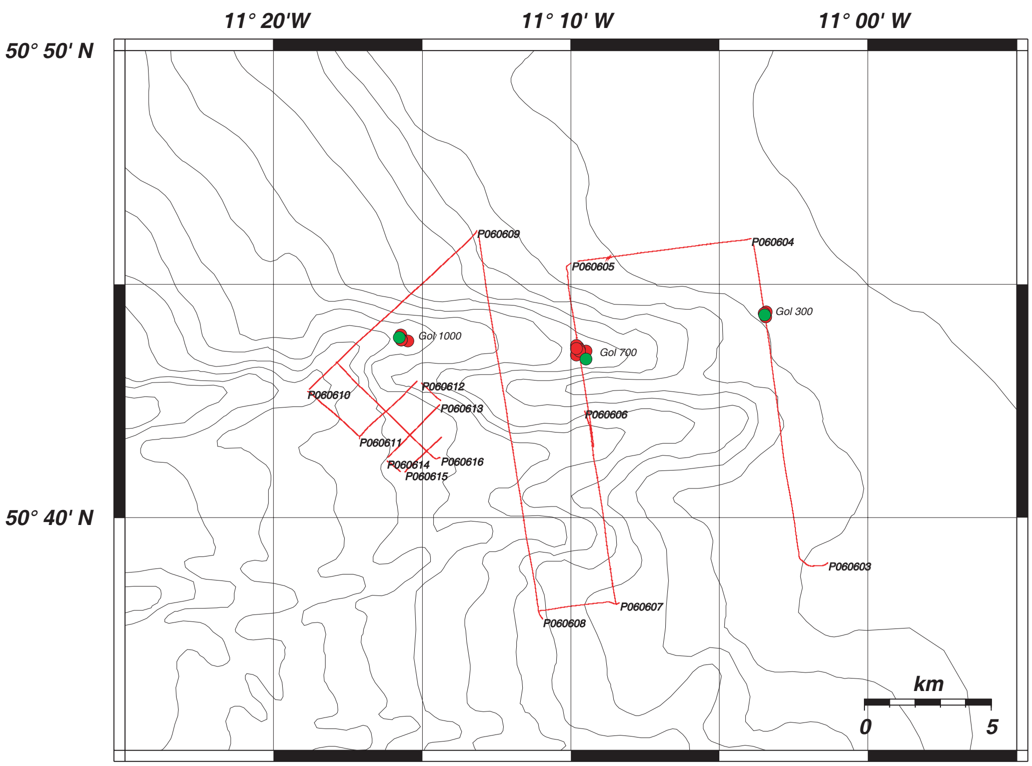
The main biological component of the programme objective is to contribute to the mapping of benthic structural and functional biodiversity along the European Continental Margin in canyons and on referential slope sites. There is very little biological data available on the Gollum channels and Whittard canyon and research of these geological phenomena on a biodiversity and ecological scale is essential to understand these complex ecosystems. The geophysical part of the campaign contributes to the better understanding of the morphology, evolution and creation of the investigated canyon/channel systems.

This campaign focuses on the following areas:

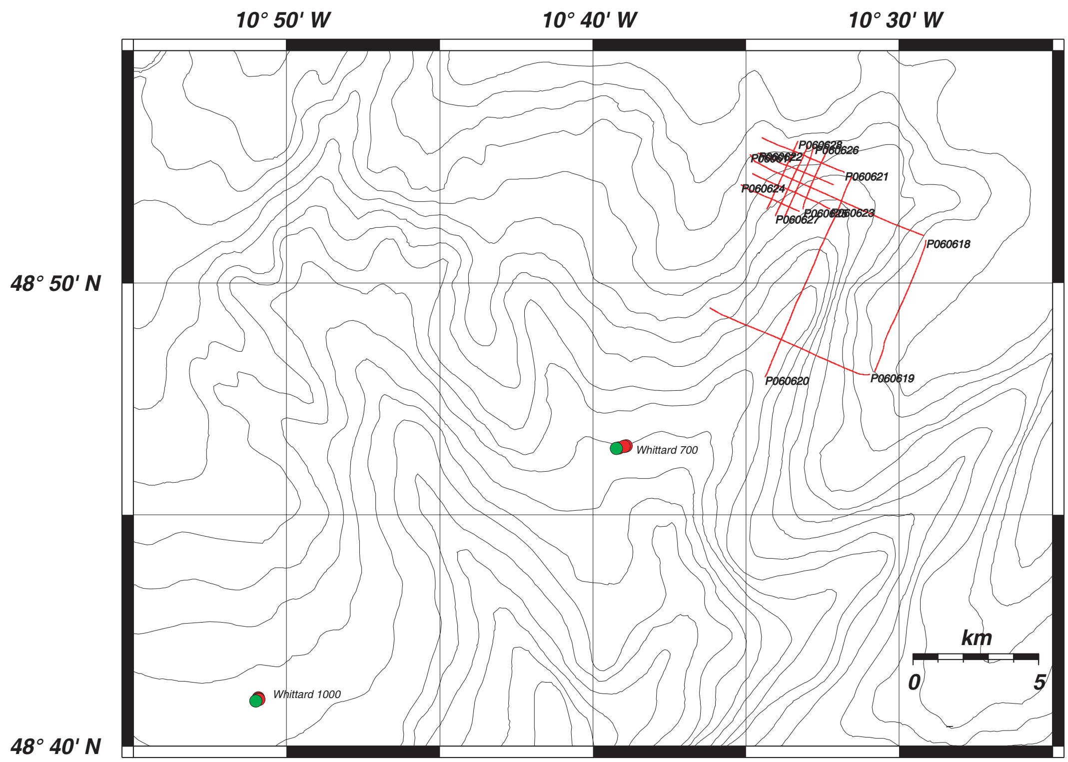
- Gollum Channels (Area 1): Biological sampling (Midicorer), a CTD-deployment and high-resolution seismic profiling.
- Whittard Canyon (Area 2): Biological sampling (Midicorer), a CTD-deployment and high-resolution seismic profiling.

5. LOCALIZATION

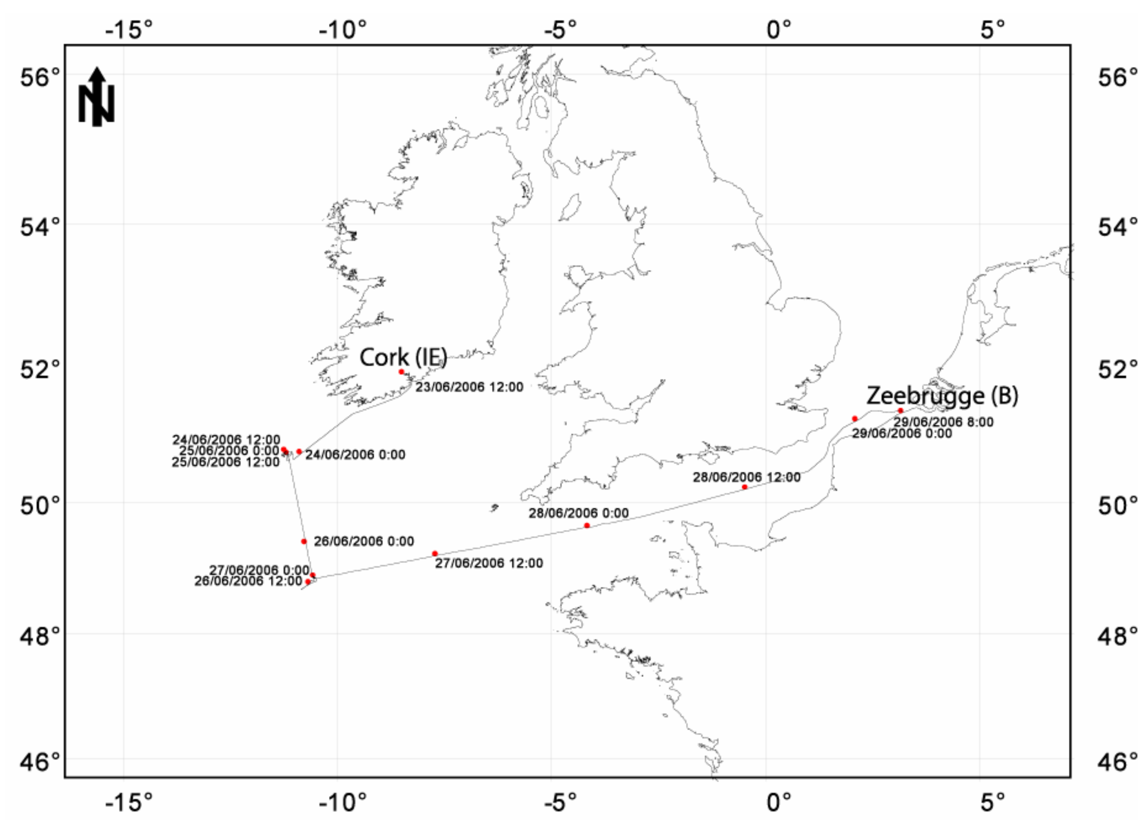
The two study areas are located respectively in the Porcupine Seabight and the Celtic Margin at water depths between 700 and 1200 m. **Area 1** is located between 50°35' and 50°50' N and 10°55' and 11°25' W; **Area 2** is located between 48°40' and 48°55' N and 10°25' and 10°55' W.



Map 1: Localisation of the stations in the Gollum Channels area (Area 1) with seismic lines and Midicorer and CTD stations



Map 2: Localisation of the stations in the Whittard Canyon area (Area 2)



Map 3: Cruise plot for Belgica campaign 2006/13

6. OPERATIONS

6.1. Biological Sampling and Oceanographical Measurements

Biological sampling was performed with a Midicorer (Ocean Scientific International Ltd) which was recently purchased by the VLIZ. It will be the first thorough test for this Midicorer in deeper waters and the idea was to develop a working protocol for this piece of equipment, based on experiences from other research institutes and our own experiences during this campaign.

6.1.1. Midicorer (OSIL)

Corer design

This Midicorer is designed to take undisturbed sediment cores of 100mm diameter. The core tubes are driven into the sediment by the weight of the corer head and its attached lead weights and the rate of descent is controlled by a hydraulic damper. The corer, when assembled, weighs 406 kg of which the frame weighs 235 kg and the head and drop bars weigh 59 kg. In addition to this 180 kg of lead was added to the head to aid penetration.

The corer is built of stainless steel and plastics, with the exception of the damper head plate and top-cap arms which are made of aluminium bronze, and the head block which is made of Leaded Gunmetal. The corer stands 2.28 m high when fully extended and 1.65 m high when lowered. The diameter of the base of the frame is 1.2 m. The 4 core tubes are evenly arranged, 740mm apart, centre to centre.

Each core tube is 110mm outside diameter, with 100mm inner diameter by 600mm long and has a ring by which it is retained in detachable tube carriers using a retaining ring. Three extra sets of 4 core tubes were made in the UGent workshop.

Practical problems and considerations

At the home laboratory, when gluing the ring onto the tubes using a larger size Plexiglas, the outline of the ring deformed and deviated to a non-perfectly circular contour. Because of this, the new core tubes didn't fit the head of the core carriers. Due to the fact that these new tubes could not be tested prior to this campaign, we were confronted with this problem 1 hour prior to departure from Cork harbor. The decision was made to cut of few mm of the ring on a lathe and finish it off by rubbing it down with sand paper until the core tubes fitted the core carriers. This was done with the help from the Haulbowline Navy base in Cork, Ireland. On the ship, we experienced that the core tubes' fit was very tight and that they needed some run in time in order to slightly loosen the fit. In this way a smooth and prompt assembly and disassembly of the core tubes could be performed.

During the campaign the Midicorer was damaged a few times. The first break was situated on one of the bottom catchers. Apparently the cutting plate experienced excess upper force (when hitting the bottom, or due to impact with sea surface or due to high initial deployment speed resulting in a high upper force), causing it to break off. In the future, spares of these fragile elements should be provided. Later on, a second bottom catcher was broken. Traces of both breaks were identical, insinuating identical circumstances (see Fig 2-5)

At first we decided to omit the tube carrier with the broken element and deployed the Midicorer with only 3 tube carriers. After considering a possible blocking of the guiding arms of the head, caused by the unbalanced distribution of pressure when hitting the bottom, it was decided to put the broken tube carrier back on. Interesting to note is that even the cores without a bottom catcher sometimes retrieved sediment with an undisturbed sediment-water interface. When coming out of the water the pressure that keeps the sediment in the core disappears and the impact of positioning the Midicorer on deck caused the sediment to fall out of these core tubes.

When deploying and retrieving the Midicorer, at the point where it reaches the sea surface, attention should be paid when bringing closer the A-frame of the Belgica. If the weather and sea circumstances are a bit rough, chances are that the Midicorer frame hits the ship and parts that are sticking out can be damaged (e.g. cutting plates of the bottom catchers, bottom closer rod; see Fig 1)

Fig 1: Fragile parts that are sticking out during deployment (bottom closer rod (upper) and bottom catcher (lower))

During the campaign it became obvious that spare parts are essential for successful sampling and should include: (1) most of the parts of the tube carriers, especial the moving parts since some of them seem fragile; we suggest parts for 2 complete extra tube carriers; (2) extra buoyant ropes (min 15m) to connect the Midicorer to the winch, since these are very liable to wear (the buoyancy of the rope avoids entanglement of the winch cable with parts of the Midicorer; note that these ropes with eye splice on both ends should come with a certificate to guarantee safe use); (3) Two extra guide rods that form the connection between the top plate with the lifting eye and the damper tube.

Fig 2: damage of bottom catcher after GoI700#2

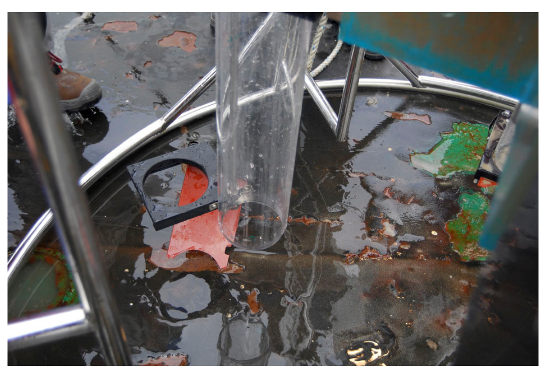


Fig 3: damage of bottom catcher after GoI700#2

Fig 4: damage of bottom catcher after Gol700#10

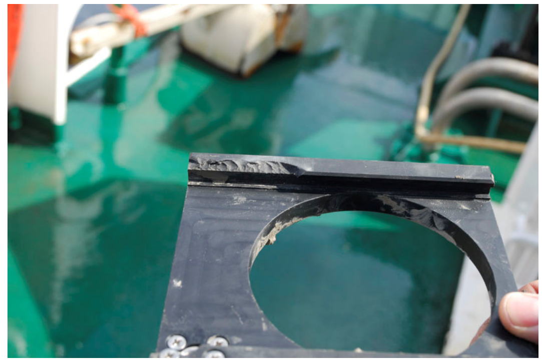


Fig. 5: damage of bottom catcher after Gol700#10

Deployment protocol

The initial protocol for deployment implied a pay out speed of 55 à 60 m/min straight onto the bottom. Once the frame has hit the bottom, the core penetration is damped and the core tubes penetrate with a speed of approx. 50mm/sec. Later on during the cruise, slight changes were made to the protocol and after the breaks it was decided that a slower deployment speed was needed. From that point on deployment speed was reduced to approx. 40m/min. We experienced no more breaks when using this pay out speed.

When the sea circumstances were a bit rougher a stabilization period of 1 to a few minutes, 20-50m above seabottom, while letting the ship go into drift, seemed to increase the success rate of the Midicorer. After the stabilization period, the corer was lowered at approx. 20 to 30m/min, which seemed optimal. A stabilization period close to the bottom is recommended.

During deployment of the Midicorer on the Belgica, 3 parties should communicate through the portable radios: (1) The person operating the winch, (2) the bridge, and (3) a person looking at the depth meter and keeping an eye on the tension meter of the winch so he or she can tell the winch man when the corer has hit the bottom. This way the winch operator has an accurate view on the depth and conditions of the ship and can deploy the Midicorer under optimal circumstances.

Extra pay out varied from 10m up to even 100m, depending on the swell and stability of the ship (heave of the working deck). A higher extra pay out seemed to be more successful but increased the risk of entanglement of the steel cable and the buoyant rope. At no point was there an entanglement of buoyant rope or steel cable with the frame or inside parts of the Midicorer observed. A minimum of 20m extra pay out is advisable when using a 15m buoyant rope.

6.1.2. Processing of core samples

Per Midicorer deployment (4 cores), 1 core was used for Meiofauna, 1 for environmental variables, 1 for natural stable isotope analysis and 1 core for Macrofauna.

For meiofaunal characterization, the sediment was sub-sampled with a smaller diameter core (57mm diam, no compaction and undisturbed sediment-water interface) and extruded and sliced in cm layers to investigate community variability with sediment depth: 0-1, 1-2, 2-3, 3-4, 4-5, 5-10 and 10-15 cm when available. The slices were washed down into 250mL and 500mL bottles and fixed with 10% formalin, buffered with Li_2CO_3, to obtain a final formalin concentration of about 4 à 5%. By sub-sampling, we uphold consistency among the collected seafloor area and avoid having to deal with sample size variability, an important bias when it comes down to diversity and small scale community structure variability. Another advantage of sub-sampling was that it allowed us to sub-sample the same 100mm diam core with a syringe for environmental variables. At the lab of the Marine Biology Department of Ghent University, these samples will be rinsed over 1000 and 32 µm mesh-sieves to retain the meiofaunal size-class (32-1000µm). Following a standard protocol, the samples are then resuspended and centrifuged with the colloidal silica gel LUDOX HS 40% to separate the meiofaunal organisms from the surrounding sediment (Heip et al., 1985; Vincx, 1996). After staining with Rose Bengal, all metazoan meiobenthic organisms will then be classified at higher taxon level and counted under a stereoscopic microscope using Higgins & Thiel (1988) and reference material. Nematodes will be picked out and transferred over an alcohol-glycerine solution to glycerine and mounted on Cobb (Cobb, 1917) or glass slides. Nematodes will then be identified to genus/species level using relevant taxonomic literature and reference drawings of the Department of Marine Biology of Ghent University, gathered in the nematode-library of Ghent University and the NeMys database (Deprez et al., 2005).

For purposes of obtaining environmental data on the sediment, cores or sub-samples were sliced (0-1, 1-2, 2-3, 3-4, 4-5, 5-10 cm); the 1 cm slices were collected in Petri dishes and wrapped in aluminium foil for storage at -20°C. When time permitted, we sub-sampled small amounts of the slices and put them in small oscillation bottles to ease the process of analysis for environmental variables at the home lab in Ghent. Here, the following analyses for environmental variables will be carried out: CPE (Chl-a and breakdown products), grain-size, C/N ratio/content.

The cores for natural stable isotope analysis went through the same processing protocol as the cores for environmental variables.

The sediment cores for Macrofauna characterization were extruded and sliced (0-1, 1-3, 3-5, 5-10, 10-15 cm), sieved over a 500µm mesh sieve and stored in 500mL bottles with 10% buffered formalin.

6.1.3. CTD

Per station 1 additional CTD deployment was performed to provide data on salinity, depth and temperature. At the GoI300 station the CTD failed to operate as no data transfer occurred. Several times the power was switched on and off to reset the system, without result. Since sediment sampling failed at this station, it was decided that an extra deployment at this station was not necessary. At the GoI700 station, the CTD system seemed to be working fine. The data produced at GoI700 station, however, lets us suspect a fault in either the data transfer or the detection process (constant salinity of 38PSU). When deployed at the GoI1000 and the other stations, a clear salinity profile was observed, indicating the proper functioning of the CTD-equipment. A Niskin bottle was attached to the cable above the CTD to recover an amount of above bottom seawater; in the ship's lab this water was filtered for chl-a measurements.

Fig 6: releasing the water from the Niskin bottle

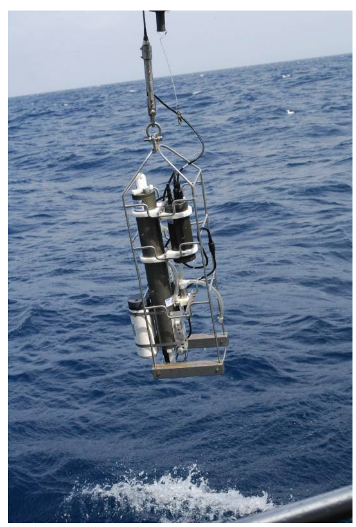


Fig 7: CTD deployment

6.2. *Seismic Survey*

The seismic profiles are single channel surface sparker lines, acquired with a SIG sparker source (120 electrodes). The sparker was triggered every 3 s reaching 500J energy. The sampling frequency was set at 8 kHz and a record length of 2500 ms TWT was used. The velocity of the ship during surface sparker seismics was tried to be maintained at about 3 knots.

6.3. *Operational Report*

It is worth noting that the time used in this cruise report and on the seismic survey sheets is the Belgian Summer time (BRAVO TIME = UTC+2hours).

Friday 23-06-2006

12:00 Delayed departure due to the fact that core tubes for the Midi corer needed to be adjusted in order to fit properly into the Midicorer tube carriers prior to sampling. This was done in the workshop at the Navy base *Haulbowline*, Cork, Ireland.
14:00 Departure of *Belgica* from Cork harbour; course set for seismic Gollum channels site
16:00 Scientific programme briefing with the scientific crew, captain, boatswain, executive officer, chief engineer, and officer of the watch
19:00 Scientific programme briefing for the scientific crew: practical considerations, run over the time schedule and allocation of tasks

Saturday 24-06-2006

Meteo: Westerly wind in a cloudy and slightly rainy weather. A gentle and long swell (0.5m) was present with sea state 3 to 4.

02:30 Arrival on Gollum channel site, switch from diesel propulsion to electric propulsion
02:40 Preparation and deployment of seismic equipment
02:55 Start of seismic profile P060603, heading 342° (av. speed 3.4 knots)
04:29 Passing of sampling station Gol300, located at the flank
05:07 End of seismic profile P060603
05:10 Start of seismic profile P060604, heading 266° (av. speed 3.7 knots)
06:10 End of seismic profile P060604
06:15 Start of seismic profile P060605, heading 176° (av. speed 3.6 knots)
07:15 End of seismic profile P060605, recovery of seismic equipment, transfer to diesel propulsion and transit towards station Gol300 for biological sampling.
08:15 Deployment of CTD (Gol300 CTD #1)
08:20 CTD on deck (quickly recovered due to malfunction of the equipment; no data)
08:50 Deployment of Midicorer at Gol300 station (Gol 300 #1)
08:56 Midicorer on bottom
08:59 Midicorer on deck
09:00 Relocation of the ship more to the North due to too coarse sediment for Midicorer at Gol300 site
09:22 Deployment of Midicorer at Gol300bis station (Gol 300 #2)
09:29 Midicorer on bottom
09:40 Midicorer on deck
09:51 Deployment of Midicorer at Gol300bis station (Gol 300 #3)
09:54 Midicorer on bottom
09:57 Midicorer on deck

10:00 Transit to Gol700 station
10:40 Deployment of Midicorer at Gol700 station (Gol 700 #1)
10:54 Midicorer at bottom
11:15 Midicorer on deck
12:37 Deployment of Midicorer at Gol700 station (Gol 700 #2)
13:02 Midicorer on bottom
13:17 Midicorer on deck, needed repair, closing mechanism broke
13:41 Deployment of Midicorer at Gol700 station (Gol700 #3)
13:59 Midicorer on bottom
14:17 Midicorer on deck
14:37 Deployment of Midicorer at Gol700 station (Gol700 #4)
14:51 Midicorer at bottom
15:15 Midicorer on deck
15:19 Deployment of Midicorer at Gol700 station (Gol700 #5)
15:34 Midicorer on bottom
15:50 Midicorer on deck
15:56 Deployment of Midicorer at Gol700 station (Gol700 #6)
16:11 Midicorer on bottom
16:30 Midicorer on deck
16:31 Transit to Gollum Channel 1000m station
17:10 Deployment of Midicorer at Gol1000 station (Gol1000#1)
17:34 Midicorer on bottom
18:01 Midicorer on deck
18:30 Deployment of Midicorer at Gol1000 station (Gol1000#2)
18:50 Midicorer on bottom
19:10 Midicorer on deck
19:25 deployment of Midicorer at Gol1000 station (Gol1000#3)
19:53 Midicorer on bottom
20:15 Midicorer on deck
20:18 Deployment of CTD at Gol1000 station (Gol1000 CTD#1)
20:34 CTD on bottom
20:57 CTD on deck
21:05 steaming for 1st seismic waypoint (2nd seismic session for Gollum area) ETA 21:30
21:20 Arrival on 2nd seismic survey site, switch from diesel propulsion to electric propulsion
21:30 Preparation and deployment of seismic equipment
21:40 Start of seismic profile P060606, heading 167° (av. speed 3.8 knots)
22:46 End of seismic profile P060606
22:52 Start of seismic profile P060607, heading 272° (av. speed 3.8 knots)
23:22 End of seismic profile P060607
23:30 Start of seismic profile P060608, heading 353° (av. speed 3.3 knots)

<u>Sunday 25.06.2006</u>

Meteo: Northerly wind in a cloudy and slightly rainy weather. A very gentle and long swell (0.5m max) was present with sea state 3 to 4.

02:02 End of seismic profile P060608
02:10 Start of seismic profile P060609, heading 230° (av. speed 3.4 knots)
03:36 End of seismic profile P060609
03:43 Start of seismic profile P060610, heading 120° (av. speed 3.4 knots)
04:09 End of seismic profile P060610

04:23 Start of seismic profile P060611, heading 35° (av. speed 3.2 knots)
04:57 End of seismic profile P060611
05:00 Start of seismic profile P060612, heading 130° (av. speed 3.5 knots)
05:09 End of seismic profile P060612
05:11 Start of seismic profile P060613, heading 232° (av. speed 3.0 knots)
05:42 End of seismic profile P060613
05:44 Start of seismic profile P060614, heading 111° (av. speed 3.1 knots)
05:51 End of seismic profile P060614
05:53 Start of seismic profile P060615, heading 40° (av. speed 3.0 knots)
06:15 End of seismic profile P060615
06:27 Start of seismic profile P060616, heading 320° (av. speed 3.0 knots)
07:33 End of seismic profile P060616, recovery of seismic equipment, transfer to diesel propulsion and transit towards next sampling station
08:00 Arrival at Gollum Channel 1000m station
08:09 Deployment of Midicorer at Gol1000 station (Gol1000#4)
08:29 Midicorer at bottom
08:52 Midicorer on deck
09:54 Deployment of Midicorer at Gol1000 station (1000#5)
10:15 Midicorer on bottom
10:37 Midicorer on deck
11:07 Deployment of Midicorer at Gol1000 station (Gol1000#6)
11:27 Midicorer on bottom
11:45 Midicorer on deck
11:48 transit to Gol700 station
13:19 Deployment of Midicorer at Gol700 station (Gol700#7)
13:30 Midicorer on bottom
13:47 Midicorer on deck
14:04 Deployment of Midicorer at Gol700 station (Gol700#8)
14:16 Midicorer on bottom
14:44 Midicorer on deck
14:57 repositioning
14:58 Deployment of Midicorer at Gol700 station (Gol700#9)
15:13 Midicorer on bottom
15:28 Midicorer on deck
15:46 Deployment of Midicorer at Gol700 station (Gol700#10)
16:02 Midicorer on bottom
16:12 Midicorer on deck, needed repair, closing mechanism broke
16:45 Deployment of CTD at Gol700 station (Gol700 CTD#1)
17:02 CTD on bottom
17:20 CTD on deck
18:11 Deployment of Midicorer at Gol700 station (Gol700#11)
18:35 Midicorer on bottom
18:55 Midicorer on deck
19:00 Transit to Whittard seismic survey site

Monday 26.06.2006

Meteo: Northerly wind in a cloudy weather. A gentle swell (0.5-1.0m) was present with sea state 4 to 5.

04:30 Arrival on Whittard seismic survey site, switch from diesel propulsion to electric propulsion
04:40 Preparation and deployment of seismic equipment

04:59 Start of seismic profile P060617, heading 114° (av. speed 3.6 knots)
06:09 End of seismic profile P060617
06:11 Start of seismic profile P060618, heading 204° (av. speed 3.6 knots)
07:02 End of seismic profile P060618
07:04 Start of seismic profile P060619, heading 294° (av. speed 3.3 knots)
08:21 End of seismic profile P060619, recovery of seismic equipment, transfer to diesel propulsion and transit towards next sampling station.
09:37 Deployment of Midicorer at Whittard slope 700m station (Wh700#1)
09:54 Midicorer on bottom
10:03 Midicorer on deck, didn't hit the bottom, closing mechanisms not triggered
10:30 Deployment of Midicorer at Whittard slope 700m station (Wh700#2)
10:47 Midicorer on bottom
11:05 Midicorer on deck
11:20 Deployment of Midicorer at Whittard slope 700m station (Wh700#3)
11:38 Midicorer on bottom
11:58 Midicorer on deck
14:00 Deployment of Midicorer at Whittard slope 700m station (Wh700#4)
14:15 Midicorer on bottom
14:32 Midicorer on deck
14:40 Deployment of CTD at Whittard slope 700m station (Wh700 CTD#1)
14:58 CTD on bottom
15:16 CTD on deck
15:20 Transit for Whittard 1000m station
16:02 Deployment of Midicorer at Whittard slope 1000m station (Wh1000#1)
16:34 Midicorer on bottom
17:03 Midicorer on deck
17:25 Deployment of Midicorer at Whittard slope 1000m station (Wh1000#2)
17:55 Midicorer on bottom
18:30 Midicorer on deck
18:36 Deployment of Midicorer at Whittard slope 1000m station (Wh1000#3)
19:06 Midicorer on bottom
19:36 Midicorer on deck
19:40 Deployment of CTD at Whittard slope 1000m station (Wh1000 CTD#1)
20:00 CTD on bottom
20:25 CTD on deck
20:30 Transit for seismic survey site
21:30 Arrival on seismic survey site, switch from diesel propulsion to electric propulsion
22:50 Preparation and deployment of seismic equipment
22:06 Start of seismic profile P060620, heading 18° (av. speed 3.2 knots)
23:28 End of seismic profile P060620
23:33 Start of seismic profile P060621, heading 300° (av. speed 3.7 knots)

Tuesday 27.06.2006

Meteo: Northerly wind in a cloudy weather. A very gentle swell (0.5m) was present with sea state 3 to 4.

00:04 End of seismic profile P060621
00:10 Start of seismic profile P060622, heading 105° (av. speed 4.0 knots)
00:36 End of seismic profile P060622
00:45 Start of seismic profile P060623, heading 290° (av. speed 3.8 knots)
01:13 End of seismic profile P060623

01:20 Start of seismic profile P060624, heading 111° (av. speed 4.0 knots)
01:40 End of seismic profile P060624
01:42 Start of seismic profile P060625, heading 21° (av. speed 3.5 knots)
02:05 End of seismic profile P060625
02:12 Start of seismic profile P060626, heading 202° (av. speed 3.8 knots)
02:37 End of seismic profile P060626
02:42 Start of seismic profile P060627, heading 25° (av. speed 3.2 knots)
03:14 End of seismic profile P060627
03:20 Start of seismic profile P060628, heading 203° (av. speed 3.8 knots)
03:45 End of seismic profile P060628, recovery of seismic equipment, transfer to diesel propulsion
04:00 End of scientific programme, start of transit to Zeebrugge
10:00 Arrival at Zeebrugge

6.4. Operational Remarks

During our campaign we encountered few problems, similar to the difficulties encountered during the campaign immediately prior to this leg. Therefore, we refer to the cruise report of the HERMES Belgica 2006/12 campaign (RCMG UGent) for operational remarks.

7. Biological investigations: preliminary results

7.1. Midicorer

A total of 10 sampling stations were proposed prior to the cruise. Due to the relatively low efficiency of Midicorer sampling during the first 2 days of the scientific programme, the amount of stations needed to be reduced. Moreover, the proposed Whittard Canyons stations were discarded based on seismic data that showed the upper canyon not to be suitable for Midicorer deployment. New stations along the flank of the Northwestern arm of the Whittard Canyon were proposed.

Table 1: Overview of Midicorer stations sampled during HERMES Belgica 2006/13

Date	Area	Gear	Station & drop	Lat (N)	Long (W)	Depth (m)	Remarks
24/06/2006	Gollum Channels	Midicorer	GOL300 #1	50° 44.302'	11° 3.4368'	292	0/4
24/06/2006	Gollum Channels	Midicorer	GOL300 #2	50° 44.402'	11° 3.4242'	295	0/4
24/06/2006	Gollum Channels	Midicorer	GOL300 #3	50° 44.373'	11° 3.4976'	294	0/4
24/06/2006	Gollum Channels	Midicorer	GOL700 #1	50° 43.538'	11° 9.7733'	740	4/4
24/06/2006	Gollum Channels	Midicorer	GOL700 #2	50° 43.657'	11° 9.7561'	765	1/4
24/06/2006	Gollum Channels	Midicorer	GOL700 #3	50° 43.688'	11° 9.8127'	760	1/3
24/06/2006	Gollum Channels	Midicorer	GOL700 #4	50° 43.566'	11° 9.4952'	770	1/3
24/06/2006	Gollum Channels	Midicorer	GOL700 #5	50° 43.589'	11° 9.7603'	768	0/3
24/06/2006	Gollum Channels	Midicorer	GOL700 #6	50° 43.533'	11° 9.7448'	774	0/3
24/06/2006	Gollum Channels	Midicorer	GOL1000 #1	50° 43.915'	11° 15.7196'	1086	0/3
24/06/2006	Gollum Channels	Midicorer	GOL1000 #2	50° 43.782'	11° 15.4885'	1085	3/3
24/06/2006	Gollum Channels	Midicorer	GOL1000 #3	50° 43.846'	11° 15.7567'	1095	0/3
25/06/2006	Gollum Channels	Midicorer	GOL1000 #4	50° 43.808'	11° 15.7098'	1094	1/3
25/06/2006	Gollum Channels	Midicorer	GOL1000 #5	50° 43.817'	11° 15.7115'	1075	2/3
25/06/2006	Gollum Channels	Midicorer	GOL1000 #6	50° 43.802'	11° 15.7111'	1070	0/3
25/06/2006	Gollum Channels	Midicorer	GOL700 #7	50° 43.523'	11° 9.7106'	785	0/3
25/06/2006	Gollum Channels	Midicorer	GOL700 #8	50° 43.601'	11° 9.7148'	770	0/3
25/06/2006	Gollum Channels	Midicorer	GOL700 #9	50° 43.483'	11° 9.817'	779	0/3

Table 1 continued

25/06/2006	Gollum Channels	Midicorer	GOL700 #10	50° 43.573'	11° 9.7042'	770	3/3
25/06/2006	Gollum Channels	Midicorer	GOL700 #11	50° 43.62'	11° 9.8093'	770	0/2
26/06/2006	Whittard Slope	Midicorer	WH1S700 #1	48° 46.474'	10° 38.9607'	770	0/2
26/06/2006	Whittard Slope	Midicorer	WHS1700 #2	48° 46.446'	10° 39.1488'	708	2/2
26/06/2006	Whittard Slope	Midicorer	WHS700 #3	48° 46.493'	10° 38.9204'	815	2/2
26/06/2006	Whittard Slope	Midicorer	WHS700 #4	48° 46.476'	10° 38.9768'	764	2/2
26/06/2006	Whittard Slope	Midicorer	WHS1000 #1	48° 41.041'	10° 50.9254'	1155	2/2
26/06/2006	Whittard Slope	Midicorer	WHS1000 #2	48° 41.022'	10° 50.9128'	1155	2/2
26/06/2006	Whittard Slope	Midicorer	WHS1000 #3	48° 41.008'	10° 50.9017'	1175	2/2

Table 2: Retrieved samples and research destination. Env. var.: environmental variables (grain size, pigments, C%); Isotopes: natural stable isotopes; Macro : macrofauna; Meio: meiofauna; (Meio): qualitative sample for meiofauna; failed: Midicorer failed to sample; n/a: not applicable (bottom catcher broke).

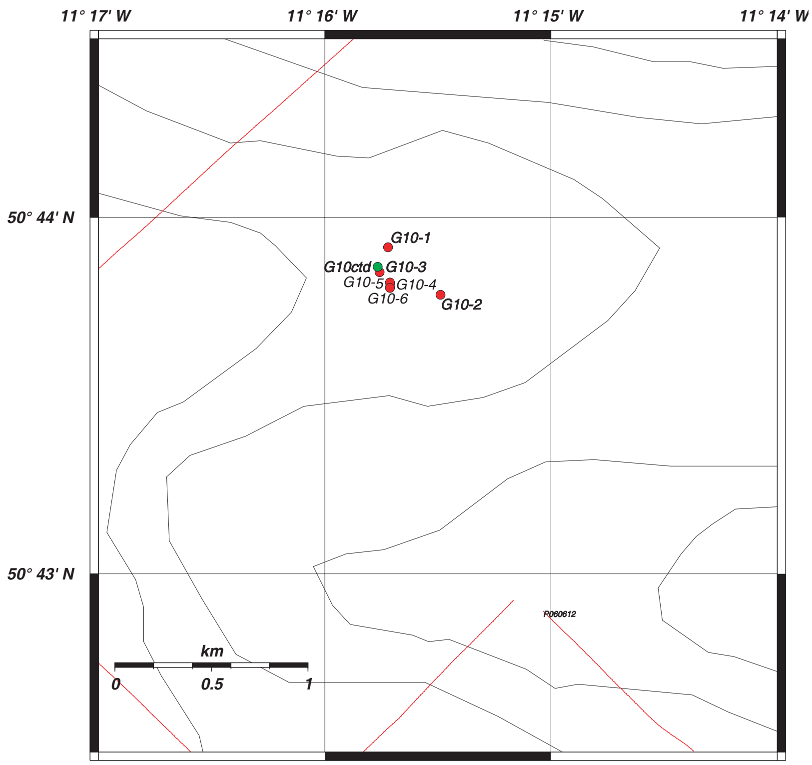
Gear	Area	Station & drop	core 1	core 2	core 3	core 4
Midicorer	Gollum Channels	GOL700 #1	Env. var.	Isotopes	Macro	Meio
Midicorer	Gollum Channels	GOL700 #3	n/a	failed	failed	(Meio)
Midicorer	Gollum Channels	GOL1000 #2	n/a	Isotopes	Meio + Env. var.	Macro
Midicorer	Gollum Channels	GOL1000 #4	n/a	failed	Meio + Env. var.	failed
Midicorer	Gollum Channels	GOL1000 #5	n/a	Isotopes	Meio + Env. var.	failed
Midicorer	Gollum Channels	GOL700 #10	n/a	Meio + Env. var.	Isotopes	Meio
Midicorer	Whittard Slope	WHS700 #2	n/a	Meio + Env. var.	n/a	failed
Midicorer	Whittard Slope	WHS700 #3	n/a	Meio	n/a	Isotopes + Env. var.
Midicorer	Whittard Slope	WHS700 #4	n/a	Meio	n/a	Isotopes + Env. var.
Midicorer	Whittard Slope	WHS1000 #1	n/a	Isotopes + Env. var.	n/a	Meio
Midicorer	Whittard Slope	WHS1000 #2	n/a	Isotopes + Env. var.	n/a	Meio
Midicorer	Whittard Slope	WHS1000 #3	n/a	Isotopes + Env. var.	n/a	Meio

7.1.1. Gollum Channels stations

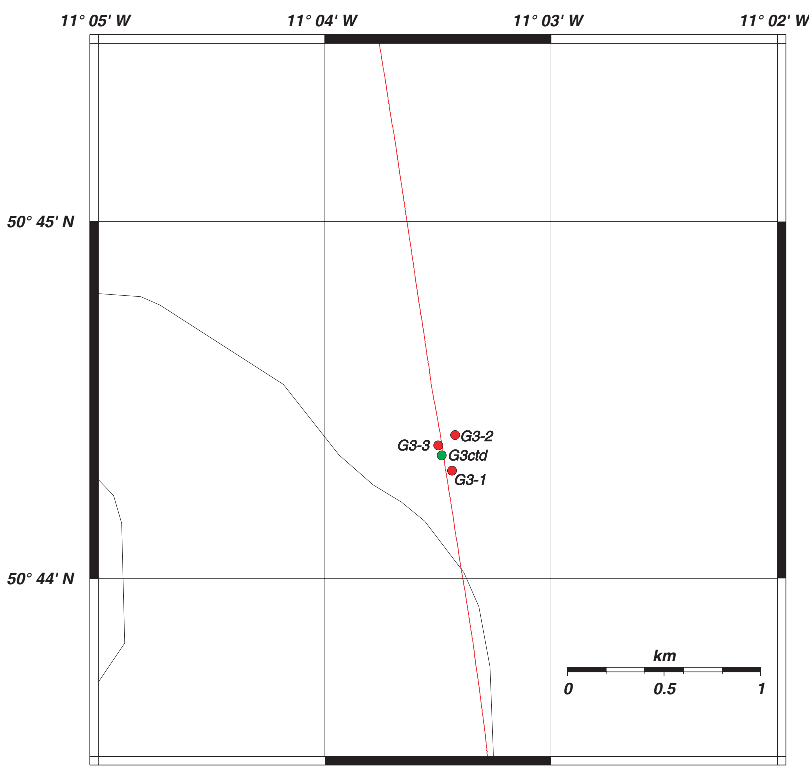
300m station: Core tubes did not penetrate the bottom due to the coarse material. However, the bottom catchers seemed to have scraped off the very top layer of the coarse sediment (small stones, debris, bivalve fragments, scaphopods, *Desmophyllum* sp., fragments of echinoids and gastropods)

700m station: Sediment cores of variable length (6-38 cm), all with upper layers of fine sandy sediments (greyish, yellow) followed by deeper silt/clay layers (grey with sometimes fine black intermediate layers). The surface of the sediment was characterized by fine branches of foraminifera, trace fossils, burrows and small worm tubes.

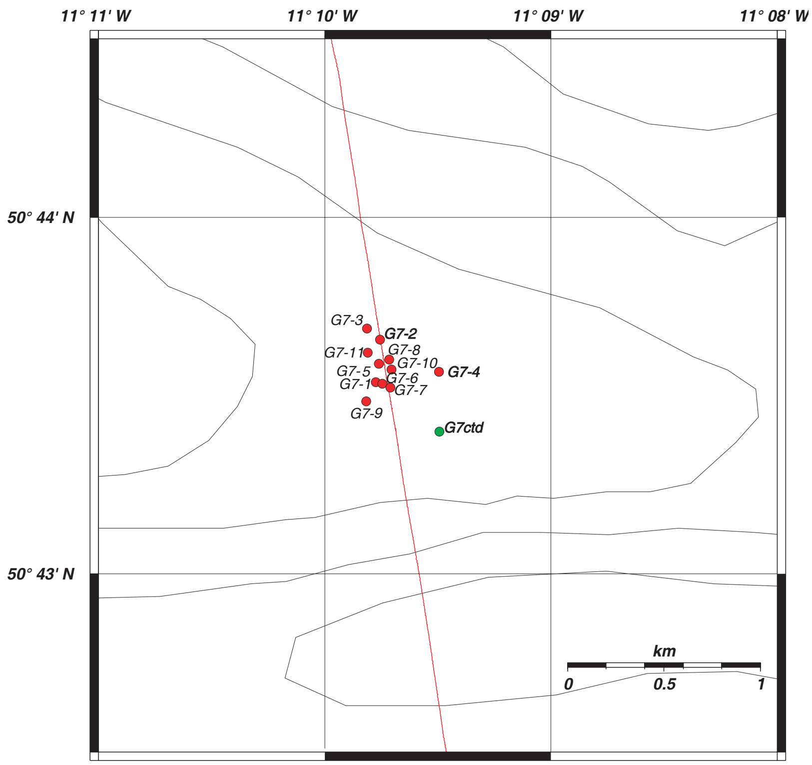
1000m station: Sediment cores of variable length (9-12 cm), all with upper layers of fine sandy sediments (greyish, yellow) followed by deeper silt/clay layers (grey with sometimes fine black intermediate layers). The surface of the sediment was characterized by fine branches of foraminifera, trace fossils, burrows and small worm tubes.



Map 4: Location of Gollum 1000m stations (red dots: Midicorer; green dot: CTD, red lines: seismic lines)



Map 5: Location of Gollum 300m stations (red dots: Midicorer; green dot: CTD, red lines: seismic lines)

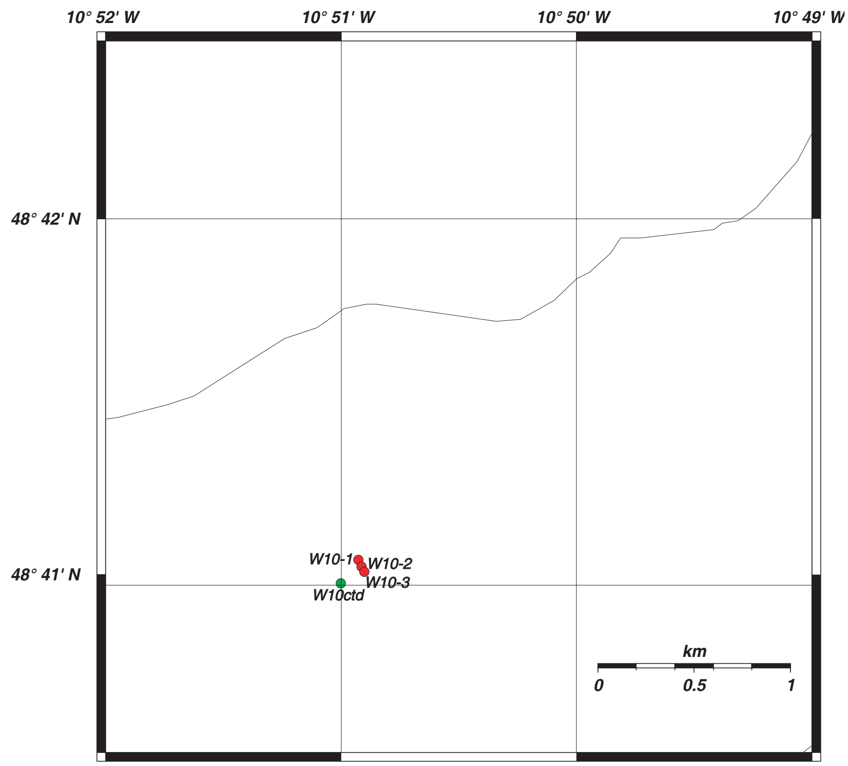


Map 6: Location of Gollum 700m stations (red dots: Midicorer; green dot: CTD, red lines: seismic lines)

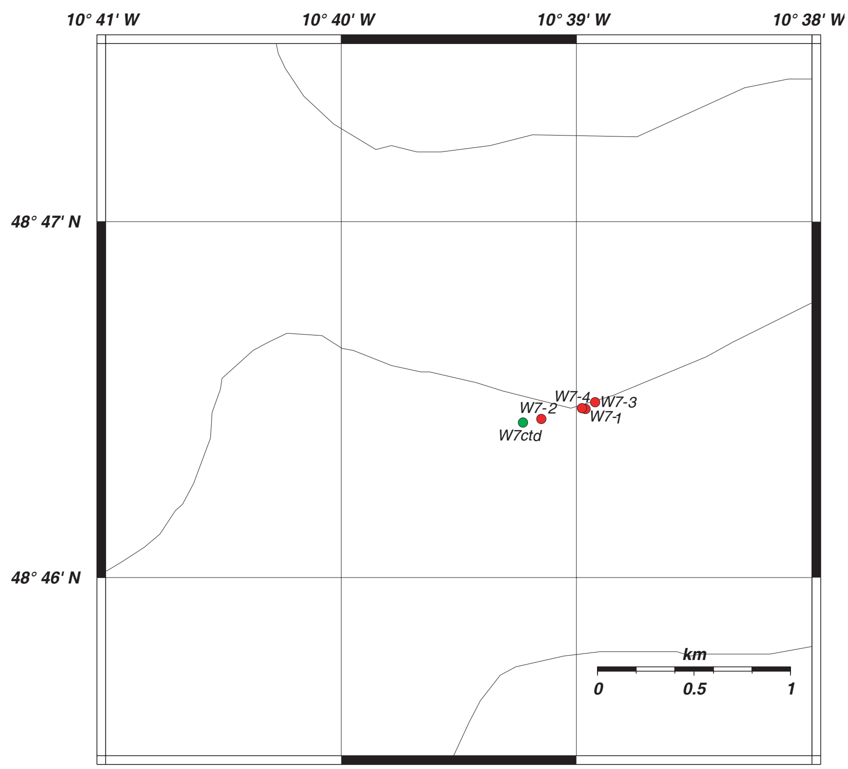
7.1.2. Whittard Canyon (Slope) stations

700m station: Sediment cores of variable length (13-35 cm), all with upper layers of fine sandy sediments (greyish, yellow) followed by deeper silt/clay layers (grey with sometimes fine black intermediate layers). The surface of the sediment was characterized by fine branches of foraminifera, trace fossils, burrows and small worm tubes.

1000m station: Large sediment cores of variable length (41-43 cm), all with upper layers of fine sandy sediments (greyish, yellow) followed by deeper silt/clay layers (grey with sometimes fine black intermediate layers). The surface of the sediment was characterized by fine branches of foraminifera, trace fossils, burrows and small worm tubes, Brachiopoda, Holothuroidea, Echiura, Ophiuroidea.



Map7: Location of the Whittard 700m stations (red dots: Midicorer; green dot: CTD, red lines: seismic lines)



Map 8: Location of the Whittard 1000m stations (red dots: Midicorer; green dot: CTD, red lines: seismic lines)

Fig 8: Gol300 #3, scraped-off debris

Fig 9: WHS1000 #1, surface of sediment core

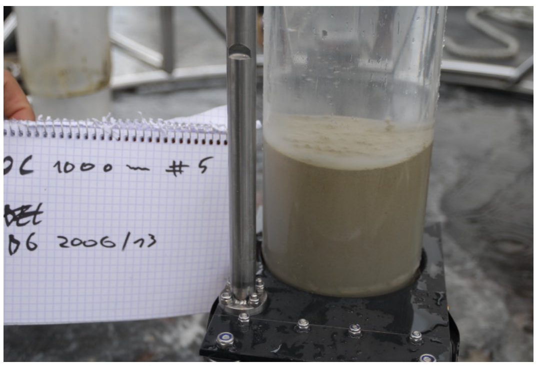


Fig 10: Gol1000 #5, small undisturbed sediment core

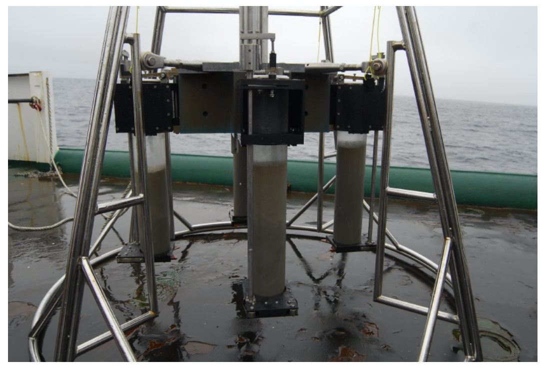


Fig 11: Gol700 #1, Midicorer on deck with large sediment cores

7.2. CTD + Niskin Bottle

For each Midicorer station a CTD + Niskin bottle deployment was performed in order to obtain oceanographic background data of the water column and chl-a concentrations of the bottom water.

Table 3: Overview of the CTD stations. ucm: uncorrected meters depth

Date	Area	Gear	Station & drop	Lat (N)	Long (W)	Depth (ucm)	Remarks
24/06/2006	Gollum Channels	CTD + Niskin	GOL300 CTD#1	50° 44.345'	11° 3.4821'	294	no data
24/06/2006	Gollum Channels	CTD + Niskin	GOL1000 CTD#1	50° 43.861'	11° 15.7657'	1089	data ok
25/06/2006	Gollum Channels	CTD + Niskin	GOL700 CTD#1	50° 43.399'	11° 9.4934'	776	data error
26/06/2006	Whittard Slope	CTD + Niskin	WHS700 CTD#1	48° 46.436'	10° 39.2267'	760	data ok
26/06/2006	Whittard Slope	CTD + Niskin	WHS1000 CTD#1	48° 40.976'	10° 51.0012'	1162	data ok

7.3. In-Situ Observations

During the campaign several organisms were observed at the sea surface and sometimes sampled, identified and photographed. Obvious and fairly large organisms that were encountered on the sediment surface of the cores were also identified and photographed. The pictures presented below are a selection of these organisms.


Fig 7: *Tursiops truncates* (Bottlenose dolphin)


Fig 8: *Globicephala melaena (* Long-finned pilot whale)


Fig 9: *Fulmarus glacialis* (Fulmar)


Fig 10: *Morus bassanus* (Northern gannet)


Fig 11: *Salpa* sp. (Salpe)


Fig 12: *Dosima* (*Lepas) fascicularis* (Goose barnacle)

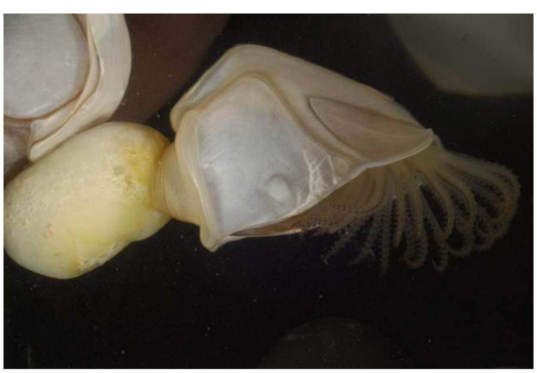


Fig 13: *Dosima (Lepas) fascicularis* (Goose barnacle)


Fig 14: *Dosima* (*Lepas*) *fascicularis* (Goose barnacle)

Fig 15: solitary coral

Fig 16: *Dosima* (*Lepas*) *fascicularis* (Goose barnacle)

Fig 17: WHS1000 #3, Foraminifera

Fig 18: WHS1000 #3, brachiopod attached to small piece of rock

Fig 19: WHS1000 #3, Echiura

Fig 20: WHS1000 #3, ophiuroid

8. Geological investigations: preliminary results

8.1. Gollum Channels

During this campaign, special attention was given to the upper slope configuration of the Gollum channel heads. This included a study of a side-branch of the northernmost Gollum channel, from head to foot, where it merges with the Gollum channel thalweg. The floor of this small channel has a stepwise downslope profile, featuring smaller turbiditic deposits in a sedimentary dynamic environment. Towards its end, more slump features are encountered.

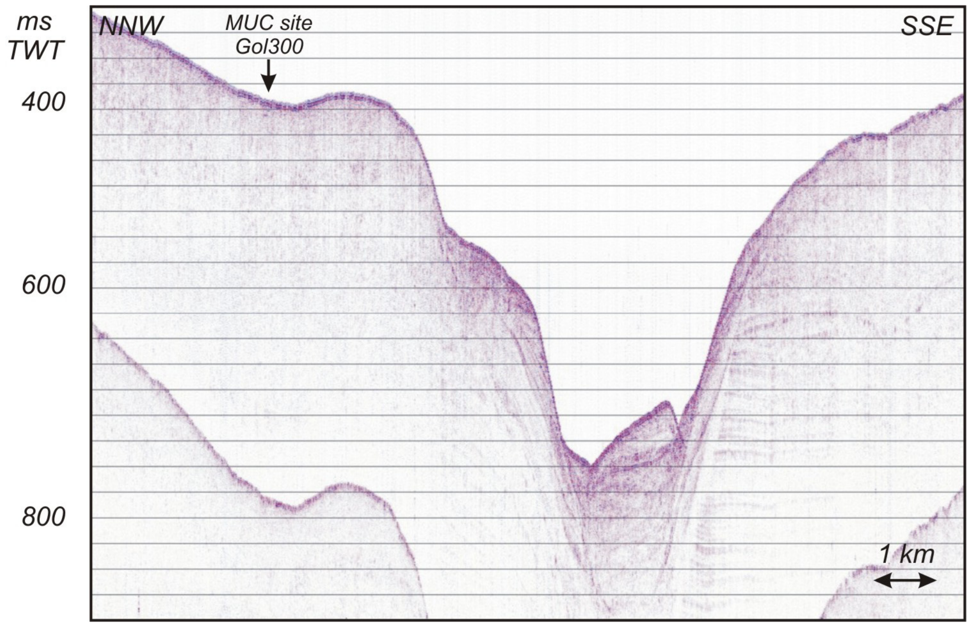


Fig 21: Seismic profile of Gol 300 site

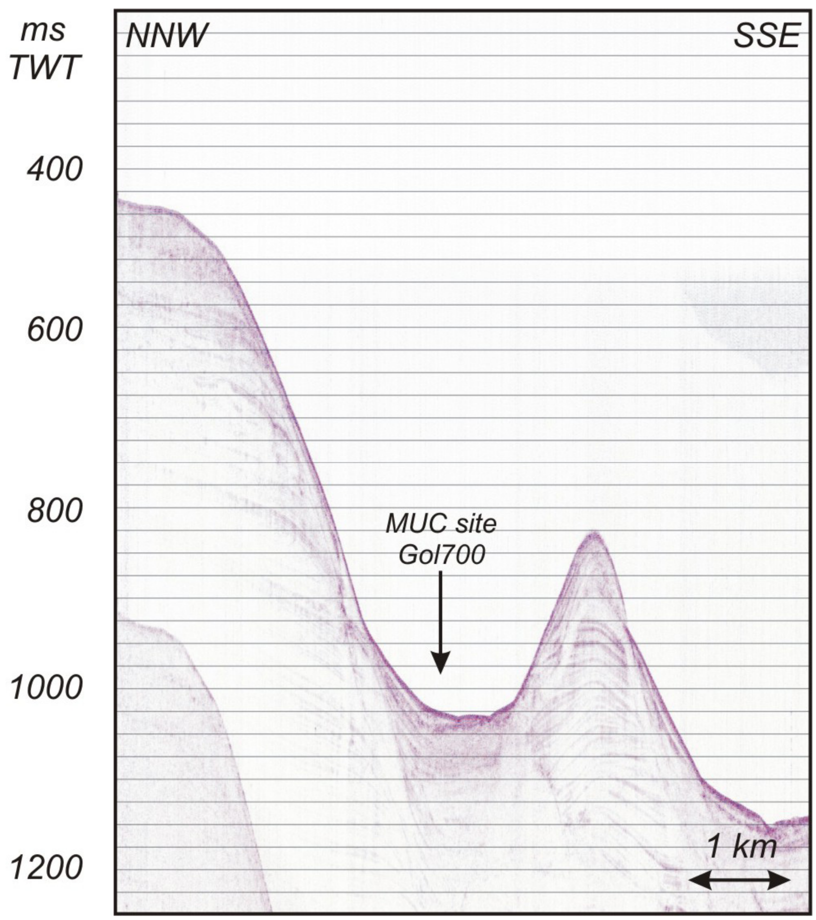


Fig 22: Seismic profile of Gol 700m site

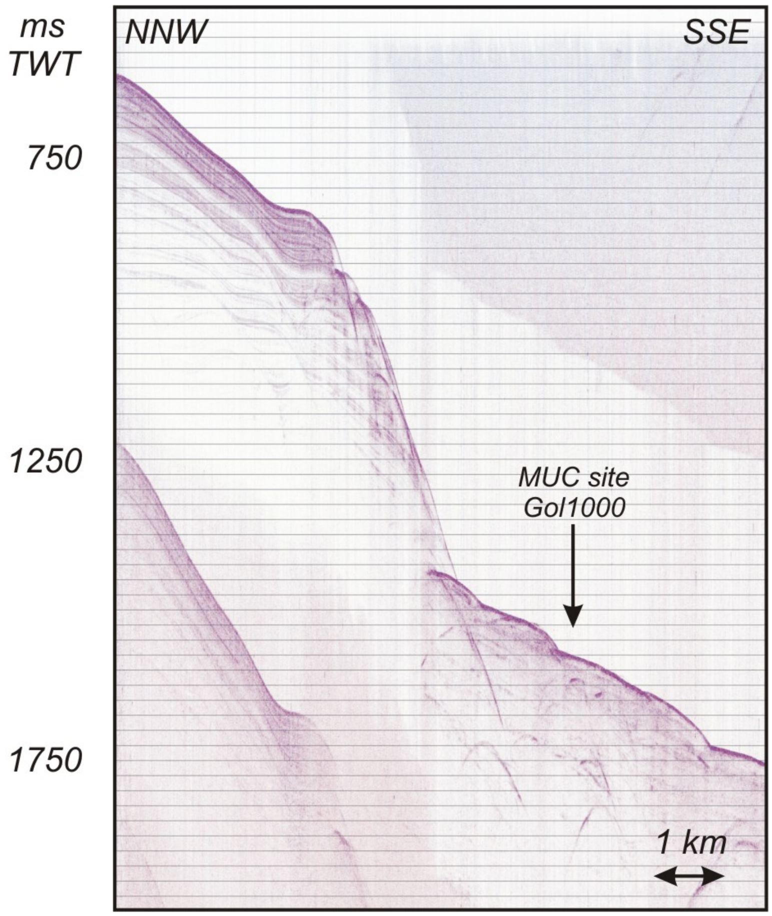


Fig 23: Sesmic profile of GoI 1000m site

8.2. Whittard Canyon

The Whittard canyon survey initially was designed to provide site reconnaissance for the Midicorer sampling. However, two transects along these canyons proved that, with its relatively steep (V-shaped) walls and mass-wasting deposits, this was not a suitable environment to deploy the midicorer. Moreover, it has proven a lack in accuracy in the Gebco bathymetry, especially at the western flank of the canyon. During the first survey line, mound-like features were observed near the upper western flank of the canyon in water depths of 300 to 500m. They are closely associated to a downslope gully of the Whittard canyon and some levee (or even drift) deposits. Further investigations within the Hermes community will be conducted in order to verify this potentially interesting observation.

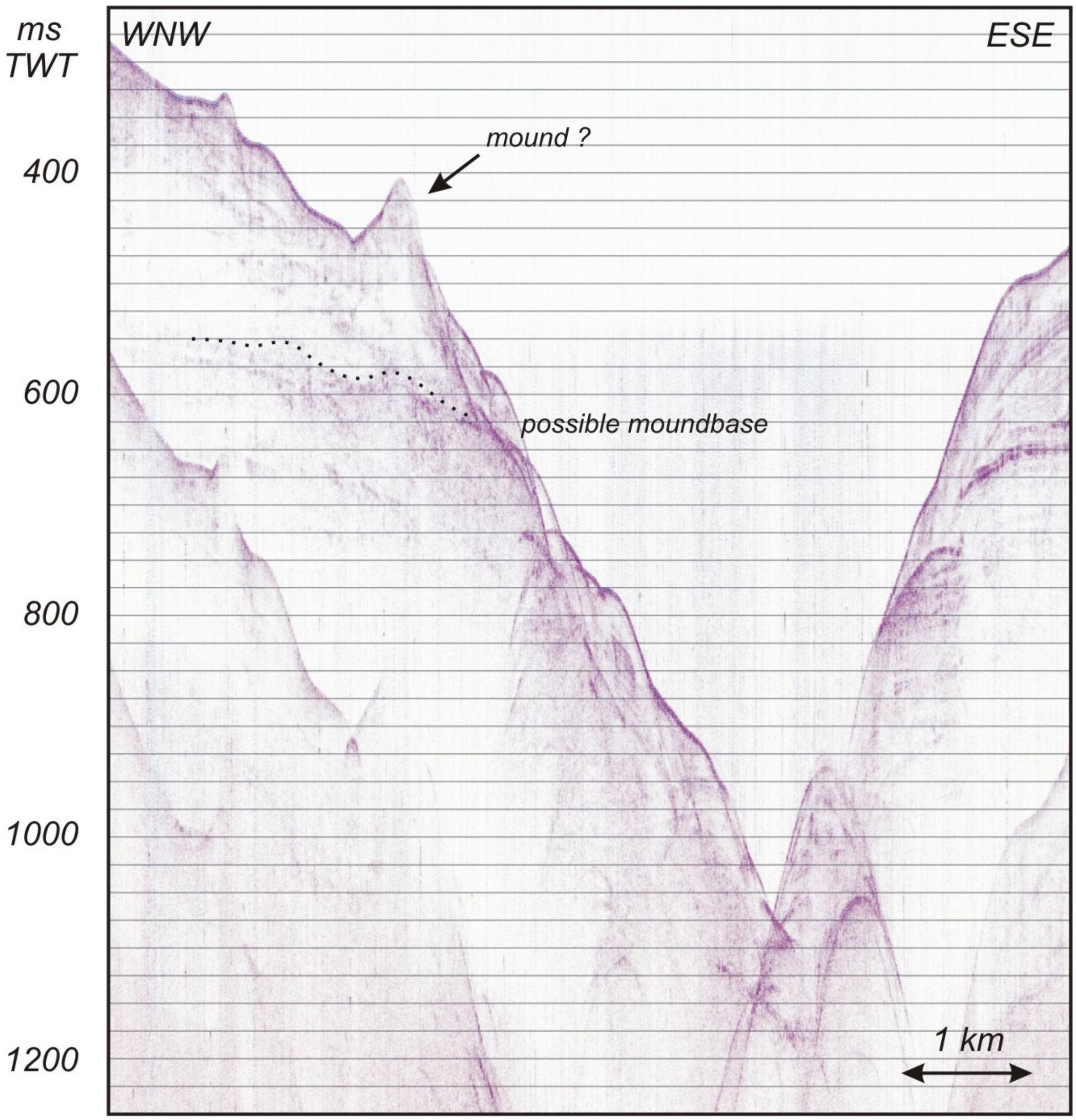


Fig 24: Seismic profile of the Whittard Canyon (possible mound reflection)

8.3. *Data storage*

During the Belgica 06/13 campaign, 26 seismic lines were acquired over approximately 134 km. All lines were recorded in ELICS format and were converted in a SegY-Motorola format with associated navigation files (these are text files containing shot point, longitude, latitude, date and time). The geophysical data are stored at the RCMG on DVD. For more information about the seismic data, please contact

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All pictures in this cruise report were taken by Wouter Willems.