Impulsfinanciering 2005
Zware Apparatuur

Deep Reef & Lake Surveyor

Activity Report 2006–2011
## TECHNISCHE SPECIFICATIES

<table>
<thead>
<tr>
<th>Type</th>
<th>Cherokee ROV, Sub Atlantic, Aberdeen</th>
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<tbody>
<tr>
<td>Dimensions</td>
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</table>
| ROV | Length: 1400 mm  
Width: 870 mm  
Height: 1110 mm  
Weight in air: 300 kg |
| TMS: Tethered Management system | Length: 1950 mm  
Width: 1190 mm  
Height: 2372 mm  
Weight in air: 700 kg |
| Weight ROV + TMS + tether + equipment: 1500 kg |
| Depth rating | 2000 m, limited to 1400 m by cable length |
| Thrusters | 6 vectorized thrusters, powered by 440 VAC  
Forward thrust 117 kgf  
Lateral thrust 88 kgf  
Vertical thrust 78 kgf |
| Cameras and lighting | Colour zoom: Kongsberg OE14-366/367, 460 TV lines, 0.02 lux sensitivity  
Black and white: Kongsberg OE15-100a, 560 TV lines, 0.0013 lux sensitivity  
Rear black and white: Kongsberg OE1358, 570 TV lines, 0.004 lux sensitivity  
Digital stills: Kongsberg OE14-208, 5MP, 0.02 lux  
Flash gun: Kongsberg OE 11-242, 80W/s light output  
TMS camera: General purpose black and white  
Video format: PAL  
Video Output: Composite  
External lights  
Front: 3 x Q-LED from ROS, light output > 250 Watt  
Rear 1 x Q-LED from ROS, light output > 250 Watt  
TMS: 2 x 250 Watt halogen |
**Hydraulics**

- Hydrauliek HLK-EH5: 5 ft manipulator; medium duty work, lift capacity: 25 kg
- Drawer in skid: Drawer for sample stowage

**Sensors**

- Standard on video overlay: Heading, Depth, Height, Roll, Pitch
- Obstacle avoidance sonar: Tritech super seaKing dual freq., 325/675 kHz
- CTD probe: CTD 90M probe from SST
- extra sensors: Turbidity, Fluorometer, Oxygen
- Sediment temperature: Micrel THP temperature probe
- Side-scan sonar: Klein 3000 SSS, to be integrated
- Client sensor on request: RS 232, 12/24 VDC available
- Laser for measuring purposes
- Niskin bottles, operated by manipulator
- push core device

**Umbilicals**

**Live boating mode**

- 500 meter tether, dia 30 mm
- Weight in air: 750 kg/km
- Weight in H2O: 215kg/km

**TMS mode**

- 1600 m steel armored heavy lift cable, diameter 25.1 mm
- Weight in air: 1550 kg/km
- Weight in H2O: 1170 kg/km
- Breaking strength: 230 kN
- Min bending diameter: 900 mm

**Conductors**

- Copper for power, MultiMode fibre optics for telemetry

**Power**

**Live boating mode**

- ROV system: 380-440 VAC, 32 Amps
- Control system: 240 VAC, 16 Amps

**TMS mode**

- ROV system: 380-440 VAC, 32 Amps
- Winch: 380-440 VAC, 64-70 Amps
- Control container: 240 VAC, 16 amps

**Positioning**

- IXSEA GAPS: Plug and play USBL system, accuracy 0.2 %
deployment on fixed pole, or hanging on slings

**Winch**

Hydramec hydraulic winch
Length: 2.4 m
Height: 1.7 m
Width: 2.4 m
Weight with umbilical: 7500 kg
Power: 380-440 VAC, 70 Amps at full load

**Other**

Max weight of ROV + TMS system to be deployed: 2000 kg in air, 600 in H$_2$O
Max cable weight: 2170 kg in air, 1650 kg in H$_2$O
Sheave wheel comes with the ROV system, ships specific shackles needed
Required height of A-frame on board: 5 m
Total weight of transport container, incl winch ROV, TMS and controls: 14 tons
13-20 June 2006  
R/V Belgica  
Belgica 06/12  

La Chapelle Bank and Bantry Bay, North Atlantic Ocean  
Brest (France) – Cork (Ireland)  
UGent-RCMG research  

Total dives: 10  
Total observation time: 20 hours  
Depth range: 15-600 m  

MAIN OBJECTIVE  
First testing and deployment of the ROV at the sheltered environment of the Bay of Douarnenez and visual observations on La Chapelle Bank  

PROJECT  
EU FP6 “HERMES”, EU FP5 RTN “EURODOM”, ESF EUROCORES EuroMargins “MOUNDFORCE”  

PARTICIPANTS  
UGent-RCMG (Belgium), NOC Southampton (UK), University College Cork (Ireland), IFREMER Brest (France)  

SUMMARY  
The main aim of this cruise was testing the ROV, which was successful. Lessons were learned in order to improve the ROV for next cruises. Two successful dives on La Chapelle Bank revealed a sandy-muddy seabed with intriguing bedforms and erosion exposing consolidated sedimentary sequences, often cut by vertical cliffs up to 10 m high. At the base of the cliffs, fallen blocks provided settlement sites for sessile organisms whilst the cliffs and protruding banks revealed dense communities of oysters with occasional cold-water coral (Lophelia). Although deep-water ‘oyster banks’ had already been reported earlier by Le Danois (1948) on the base of dredgings, these dramatic seascapes had remained largely hidden to the human eye up to now.  

PUBLICATIONS  
<table>
<thead>
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<th>06-21 September 2006</th>
<th>RRS Discovery</th>
<th>Discovery D311</th>
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<tr>
<td><strong>Denmark Strait, North Atlantic Ocean</strong></td>
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<tr>
<td>Reykjavik (Iceland) – Reykjavik (Iceland)</td>
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<td>Commissioned</td>
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</table>

| Total dives: 1   | Total observation time: 3 hours | Depth range: 40-70 m |

**MAIN OBJECTIVE**
Visual observations in Denmark Strait and recovery of moorings (test)

**COMMISSIONER**
Institut für Meereskunde, University of Hamburg (Germany)

**BUDGET**
travel/transport

**PARTICIPANTS**
UGent-RCMG (Belgium), University of Hamburg (Germany)

**SUMMARY**
Due to technical problems and bad weather conditions only a test-dive at the end of the survey was successfully performed near the coast of Iceland. It resulted in good-quality video-pictures of the shelf bottom. Also the technical knowledge of the ROV-system was greatly improved.

**PUBLICATIONS**
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### MAIN OBJECTIVE

Precise localisation, visual observation, measuring and sampling of active methane seeps

### PARTNER

IFM-GEOMAR, Kiel (Germany)

### PROJECT

BMBF GEOTECHNOLOGIEN “COMET”, EU FP6 “NEW-VENTS”, FWO-Flanders “GENESIS”

### PARTICIPANTS

UGent-RCMG (Belgium), IFM-GEOMAR, Kiel (Germany), NIWA Wellington (New Zealand), GNS, Lower Hutt (New Zealand), EAWAG, Kastanienbaum (Switzerland)

### SUMMARY

Two methane seeps sites (Faure Site & LM-3) were explored with the ROV in the Rock Garden area on the Hikurangi accretionary margin, east of the New Zealand North Island. ROV observations allowed the first visual observations of bubble-releasing seeps at the Hikurangi Margin. The ROV footage was also used to obtain a submeter characterization of both seeps sites, indicating a clear difference in seep environments for both sites. The total volume of bubble-released methane and the temporal variations in bubble-release activity was also estimated based on the ROV footage. Besides the visual observations also bottom-water and in-sediment temperature measurements were made with the ROV-based CTD en THP probes. Water and gas samples were taken with the two installed 5L Niskin bottles to analyse the dissolved gasses.

### PUBLICATIONS

MAIN OBJECTIVE
(1) Surveying and mapping of carbonate mound systems, (2) video-surveying of IODP ready sites, (3) surveying of mud volcano craters to identify active seepage systems, and (4) deployment and retrieval of colonisation experiments

PROJECT

PARTICIPANTS
UGent-RCMG (Belgium), UGent-MBS (Belgium), University of Aveiro (Portugal), Mohamed V University of Rabat (Morocco)

SUMMARY
In total, three mud volcanoes were investigated, namely Mercator, Lazarillo de Tormes and Gemini mud volcanoes. Unfortunately it was not possible to recover the colonisation experiment of the University of Aveiro due to malfunctioning of the ROV arm. After repairing the arm the experiment of the Marine Biology Section was deployed on Gemini mud volcano. In addition two cold-water coral mounds (Alpha and Beta mound) were observed on Pen Duick Escarpment as well as the foot of the escarpment and a small mound on Vernadsky Ridge was imaged.

PUBLICATIONS

Main Objective
Visual observation and mapping of deep-sea ecosystems and targeted sampling

Project
EU FP6 “HERMES”, ESF EUROCORES EuroDiversity “MICROSYSTEMS”

Participants
UGent-RCMG (Belgium), IFREMER Brest (France)

Summary
Two different cold-water coral reef settings were distinguished. In water depths ranging from 260 to 350 m, mini mounds up to 5 m high, covered by dead cold-water coral rubble, were observed. The second setting (350-950 m) features hard substrates with cracks, spurs, cliffs and overhangs. In water depths of 700 to 950 m, both living and dead cold-water corals occur. Occasionally, they form dense coral patches with a diameter of about 10–60 m, characterised by mostly stacked dead coral rubble and a few living specimens. In addition, deep-water pycnodontine oysters were observed. The combined use of multibeam bathymetry, seismic profiling, CTD casts and ROV observations made it possible to describe the physical habitat and to assess the oceanographic control for the recently described species *Neopycnodonte zibrowii*.

Publications

07-25 November 2008

R/V Pelagia

Pelagia 64PE298

West Nile Delta, Mediterranean Sea

Heraklion (Greece) – Port Said (Egypt)

Total dives: 17

Total observation time: 60 hours

Depth range: 400-500 m

MAIN OBJECTIVE

(1) Installation of temperature observatories and CAT meters for long term monitoring, (2) video monitoring of seafloor structures of mud volcanoes, (3) deployment of an active source for CSEM measurements

COMMISSIONER

IFM-GEOMAR Kiel (Germany)

BUDGET

44 633 €
(excl. travel/transport)

PARTICIPANTS

UGent-RCMG (Belgium), IFM-GEOMAR Kiel (Germany)

SUMMARY

The survey area consisted of two mud volcanoes: North Alex and Giza. After two general reconnaissance video dives of North Alex, a long term heatflow station was deployed with the aid of the ROV. A 10 m wide EM-source was successfully implemented on the ROV. During 4 dives (total of 20 hrs) tracks were sailed...
covering whole North Alex. Six CAT-meters were deployed (3 dives) by the ROV. Also heatflow (T-stick) measurements at different sites and some push cores were taken in different dives. A general reconnaissance video dive at Giza was followed by heatflow measurements, one CAT-meter deployment and some pushcores. Also a lost transponder (20,000 Euro) was recovered.

PUBLICATIONS
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18-27 May 2009
R/V Belgica
Belgica 09/14b

Gulf of Cadiz, North Atlantic Ocean
Cadiz (Spain) – Vigo (Spain)
UGent-RCMG research

| Total dives: 10 | Total observation time: 9.5 hours | Depth range: 350-1150 m |

MAIN OBJECTIVE
(1) Recovery of colonisation devices on Mercator, Meknes and Darwin mud volcanoes; and (2) visual observation of deep-water ecosystems on top of cold-water coral mounds (Pen Duick Escarpment) for habitat and environmental mapping

PROJECT
EC FP7 “HERMIONE”, ESF EUROCORES EuroDEEP “CHEMECO”

PARTICIPANTS
UGent-RCMG (Belgium), University of Aveiro (Portugal), Laval University (Canada), Mohamed V University of Rabat (Morocco)

SUMMARY
(1) Each colonisation set, composed of three devices loaded with different types of substrate (carbonate,
wood and alfalfa), was recovered. Each device was photographed and fixed following specific protocols for the study of the microbial film and the taxonomic and trophic characterisation of colonising metazoans. (2) The ROV observations will allow a detailed study of the distribution and significance of cold-water corals and discuss their role in the build-up of cold-water coral mounds and their potential for the reconstruction of palaeoceanographic conditions.

**PUBLICATIONS**


### MAIN OBJECTIVE
Visual observation and mapping of seafloor ecosystems as well as sampling of sponges associated with cold-water corals.

### PROJECT
EC FP7 “HERMIONE”, ESF EUROCORES EuroDEEP “BIOFUN”

### PARTICIPANTS
UGent-RCMG (Belgium), UGent-MBS (Belgium), University of Santiago de Compostella (Spain), University of Amsterdam (The Netherlands)

### SUMMARY
Two dives were taking place in an area of so-called mini mounds whereas the third dive took place in an area where coral rubble was recovered by means of dredge samples during the RV Sarmiente de Gamboa cruise in 2008. The seafloor consisted of bioturbated soft sediment with on a regular base small to larger pieces of dead coral (*Lophelia pertusa*). In addition, anemones, crinoids, gastropods, holothurians, sea pens, hermit crabs and a few galatheid lobsters were observed.

### PUBLICATIONS
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<th>04 January – 02 March 2010</th>
<th>RVIB N.B. Palmer</th>
<th>Palmer 10-01</th>
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<tr>
<td>Punta Arenas (Chile) – Punta Arenas (Chile)</td>
<td>Scientific collaboration</td>
<td></td>
</tr>
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</table>

| Total dives: 10 | Total observation time: 30 hours | Depth range: 160-1420 m |

**MAIN OBJECTIVE**
Visualisation and sampling of ecosystems (including methane seeps) at the newly accessible seafloor below the recently disintegrated Larsen B ice shelf

**PARTNER**
Hamilton College, Clinton NY (USA)

**PROJECT**
NSF “Larissa”, BELSPO “HOLANT”

**PARTICIPANTS**
UGent-RCMG (Belgium), Hamilton College, Clinton NY (USA), University of Hawaii at Manoa (USA), University of Colorado, Boulder (USA), Duke University, Beaufort (USA), Ohio State University, Columbus (USA), Scripps Institute of Oceanography, San Diego (USA), Lamont-Doherty Earth Observatory, New York (USA), Korean Polar Research Institute, Incheon (Korea)

**SUMMARY**
Due to severe sea ice conditions, the Larsen B study area could not be reached by RVIB NBP during the 2010 Larissa expedition. As a backup plan several locations at the western and eastern side of the Antarctica Peninsula were explored with the ROV to study submerged ice shelf moraines, sediment drifts, several circular basins at the western side of the Antarctic Peninsula, a submarine volcano and different fjord basins. At these different environments, epibenthic fauna was recognized, quantified and sampled and compared in relation to their habitats. The main discovery was the presence of invasive lithodid crab species in the Palmer Deep basin.

**PUBLICATIONS**
7-16 June 2010
R/V Belgica
Belgica 10/17a

Guilvinec Canyon, Bay of Biscay, North Atlantic Ocean
Zeebrugge (Belgium) – La Rochelle (France)

UGent-RCMG research

Total dives: 3
Total observation time: 7 hours
Depth range: 650-1100 m

MAIN OBJECTIVE
Visual observation of deep-water ecosystems (mainly cold-water corals) for habitat and environmental mapping

PROJECT
EC FP7 “HERMIONE”

PARTICIPANTS
UGent-RCMG (Belgium), IFREMER Brest (France)

SUMMARY
Due to bad weather, only three dives were carried out during this cruise. Thick cold-water coral rubble graveyards with living corals on top were observed, often colonised by sponges, crinoids, antipatharians and soft corals. Madrepora oculata and Lophelia pertusa are the most common species. In addition, a lot of trawl marks were observed.

PUBLICATIONS
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19-28 June 2010

R/V Belgica

Belgica 10/17b

Whittard Canyon, Bay of Biscay, North Atlantic Ocean

La Rochelle (France) – Zeebrugge (Belgium)

UGent-RCMG research

| Total dives: 5 | Total observation time: 9 hours | Depth range: 450-1150 m |

MAIN OBJECTIVE

Benthic habitat mapping and groundtruthing of previously observed acoustic features

PROJECT

EC FP7 “HERMIONE”

PARTICIPANTS

UGent-RCMG (Belgium), UGent-MBS (Belgium), University College Cork (Ireland)

SUMMARY

During these dives, (rippled) soft sediment, often colonized by numerous pennatulids, was seen alternately with hard substrates in the shape of small banks, ridges and/or large cliffs with heights varying between 10 cm and 8 m (even one cliff of about 50 m high). The area was characterised by an irregular topographic relief with steep slopes and frequent evidence of downslope transport. Mostly dead cold-water coral rubble was observed with occasional living cold-water corals (*Lophelia pertusa* and *Madrepora oculata*) on top of the rubble. Several *Dendrophyllia* sp. and *Desmophyllum* species were noticed, as well as debris from the deep-water oyster *Neopycnodonte zibrowii*.

PUBLICATIONS

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MAIN OBJECTIVE
(1) Recovery of seafloor observatory “LOOME”, (2) deployment of temperature lance and camera, (3) video-surveying of the Håkon Mosby mud volcano.

COMMISSIONER
Max Planck Institute for Marine Microbiology, Bremen (Germany)

BUDGET
42 566 €
(excl. travel/transport)

PARTICIPANTS
UGent-RCMG (Belgium), Max Planck Institute for Marine Microbiology, Bremen (Germany)

SUMMARY
During a reconnaissance dive of the mud volcano the seafloor observatory “LOOME” and still-camera were easily found and recovered on the next dive. The T-lance was found around 160 m to the south and recovered on the 4th dive. Three wooden blocks for a colonization experiment were taken in the 5th dive. In
the 6th dive temperature-stick measurements were acquired at 13 sites. Next to this, video-surveying over selected sites was also undertaken during these dives to map e.g. the distribution of gas flares, recent mud volcanism and benthic habitats.
### MAIN OBJECTIVE
Quantifying hydrocarbon migration and seepage in the offshore Northern Perth Basin, and its effect on benthic biota

### COMMISSIONER
Royal NIOZ (Netherlands), Geoscience Australia (Australia)

### BUDGET
travel/transport/maintenance

### PARTICIPANTS
UGent-RCMG (Belgium), Royal NIOZ (Netherlands), Geoscience Australia (Australia)

### SUMMARY
Despite 21 h of video surveying, no hydrocarbon migrations or seepages were spotted. A reconnaissance survey (prior to our survey) of multibeam and subbottom profiles had also not been successful in revealing seepage structures. The study area consisted mainly of a sandy-muddy seabed with consolidated bed forms in some areas.

### PUBLICATIONS
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# RECENTE SOLICITATIES

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<td>Marine Biology Section, UGent</td>
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<tr>
<td>Antarctic Peninsula</td>
<td>Scripps Institution, San Diego (USA)</td>
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<td>North Sea</td>
<td>NIOZ, Den Helder (NED)</td>
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<td>Gulf of Biscay (EuroFLEETS)</td>
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<td>Red Sea</td>
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<td>Offshore South Australia</td>
<td>Australian National University, Canberra (AUS)</td>
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<td>Université Pierre et Marie Curie, Paris (FRA)</td>
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<td>2013-2014 ?</td>
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<td>Tyrrhenian Sea</td>
<td>IfM-GEOMAR, Kiel (GER)</td>
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<td>Offshore Marquesas Islands</td>
<td>Université de Perpignan (FRA)</td>
<td>JAN-FEB 2012</td>
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<td>Portuguese continental margin</td>
<td>University of Aveiro (POR)</td>
<td>2011-2013</td>
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