

# **CRUISE REPORT BELGICA 2003/26**

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## 1. Cruise reference

Cruise number: 0326  
13/10/2003-23/10/2003: Zeebrugge-Zeebrugge

## 2. Framework, objectives and results

### 2.1 Framework.

Initially this cruise was made for the purpose of the research team from the Marine Biology Section of Ghent University. This team is working in the OSTC-sponsored programme Trophos, aiming at unravelling benthic food webs and monitoring the benthos at the Belgian Continental Shelf. However, due to the failure of previous sampling campaigns (Belgica 0325 due to bad weather and Belgica 0322 and 0323 due to the oil pollution issue of the Tricolor wreckage) the sampling on the Kwintebank for the European EUMERSAND project and the scientific diving program were added to this cruise.

### 2.2 Objectives of the cruise.

#### **Project: TROPHOS**

The main aim of the cruise was to sample all compartments of the benthos (macro-, meio-, epi- and hyperbenthos) at 11 stations on the Belgian Continental Shelf. Since this sampling effort was started halfway the 90ies, it will allow to assess long term changes in diversity and density of the benthos of different habitats on the Belgian Continental Shelf.

A second objective was to collect samples of both water column and sediment at station 330 and station 115bis. Since this is part of a monthly sampling in which the dynamics in the two realms are followed (in terms of animal biomass, density, diversity, nutrients, pigments, stable isotope composition), this will gain insight in the benthic food web at that station. This is a joint effort between UG-MARBIOL and the Dutch NIOO-CEME (Yerseke).

Thirdly, the collection of mysids from the different locations will allow to study the molecular relationships between the individuals of different locations.

Forth, seabird distribution will be investigated by linking their distribution to the distribution of pelagic fish that serve as food for these birds. (IN-team)

#### **Project: EUMERSAND** (European Marine Sand and Gravel Resources: Evaluation and Environmental Impact of Extraction)

This project addresses the urgent need for integrated and coherent approaches (at a European level) to resource prospecting and the assessment of the environmental impacts of marine aggregates (sand and gravel) extraction. Its objectives include (i) the compilation of information on usage, production, resource availability and relevant regulatory (licensing) regimes at a European level; (ii) the evaluation of existing geophysical/geological survey strategies,

instrumentation and interpretative techniques used to prospect resources; (iii) the assessment of existing methods to assess the physical and ecological impacts of the extraction. The project comprises both 'desk'- and 'fieldwork'-based investigations. With regard to the field studies, two resources (and extraction sites) at the southern North Sea and Baltic Seas will be prospected using state-of-the-art geophysical/geological techniques and instrumentation (e.g multi-beam and very high resolution seismics). The physical impacts of the extraction on the seabed/adjacent coastlines will be assessed using innovative hydro-, sediment and morphodynamic modelling, calibrated/validated by high quality in-situ measurements. The ecological impacts will be assessed using improved research protocols. The integration of the results will be then used to formulate improved research protocols and guidelines.

### **Project: SCD (Scientific Diving) KBIN**

After the success of the two last year feasibility study, this project continues the biological sampling work undertaken on the Birkenfels wreck located inside the Belgian waters. The specificity of the approach is that *in situ* observation and sampling are conducted by scientific divers. The Birkenfels or the Kilmore or/ and the Bourrasque (depending of the weather) will be prospected. Study of the bio-diversity of wrecks, of their faunal associations, of their total biomass and of their oxygen fluxes are the goals of the project.

## **3. Scientific staff**

### **UG-Marine Biology Team**

Thomas Remerie (chief scientist)  
Jan Vanaverbeke (on 13/10/2003 only)  
Maaïke Steyaert  
Maria Franco  
Guy De Smet  
Danny Peelaers  
Annick Van Kenhove (from 21/10 – 23/10/2003)  
Annelies De Bakker (from 13/10 – 17/10/2003)  
Ann Vanreusel (on 13/10/2003 only)

### **NIOO-CEME Team**

Lennert Van Ijzerloo (on 13/10/2003 only)  
Johannes Van Oevelen (on 13/10/2003 only)  
Bogaards Roelof (on 13/10/2003 only)  
Karlina Soetaert (on 13/10/2003 only)

### **IN Team**

Wouter Courtens (from 14/10 – 17/10/2003)  
Marc Van de Walle  
Walter Wackenier (from 20/10 – 23/10/2003)

### **Scientific Diving Team**

Alain Norro (from 21/10 – 23/10/2003)  
 Jérôme Mallefet (from 21/10 – 23/10/2003)  
 Vincent Zintzen (from 21/10 – 23/10/2003)  
 François Darchambeau (from 21/10 – 23/10/2003)  
 Claude Massin (from 21/10 – 23/10/2003)

#### 4. Working area

##### Project: Trophos

12 locations on the Belgian Continental Shelf were visited:

Station	Latitude	Longitude
701	51 22 63	03 09 25
702	51 22 63	03 18 68
780	51 27 70	03 02 60
790	51 16 87	02 51 13
140	51 19 50	03 03 00
120	51 11 10	02 42 07
115	51 09 44	02 36 11
215	51 16 20	02 36 76
630	51 37 75	02 33 24
UG8	51 28 57	02 35 01
330	51 26 00	02 48 50
115bis	51 09 11	2 37 13

Three stations on the Dutch Continental Shelf were sampled with the hyperbenthic sledge:

Station	Latitude	Longitude
V5 (Nauw van de Banjaard)	51 44 30	3 30 93
V3 (Bollen van het Zand)	51 45 37	3 37 49
V4 (Ooster bank)	51 48 02	3 38 40

##### Project EUMARSAND

A total of six stations were sampled on the Kwintebank:

Station	Lat	Long
Kwintebank		
KW1	51 20 26.98	2 41 35.15
KW2	51 19 41.98	2 40 55.15
KW5	51 17 56.97	2 40 5.16
KW6	51 17 26.97	2 39 25.16
KW14	51 20 4.48	2 41 15.15
KW18	51 17 45.43	2 39 46.99

##### Project: SCD KBIN

Scientific diving (SCD): wrecks of the Belgian economic exclusive zone of the North Sea. The wreck of the Birkenfels (ED50-N51°39',040/E02°32',350) was prospected.

## **5. Operations**

### **Project: Trophos**

The operations included mainly sampling of the fixed stations mentioned above. All stations on the Belgian Continental Shelf were sampled for meiobenthos, macrobenthos, hyperbenthos and epibenthos. Stations on the Dutch Continental Shelf were only sampled for hyperbenthos. Meiobenthos was sampled by means of a Reineck boxcorer. At all places: the corer was deployed three times in order to get true replicates. At most of the stations, two perspex cores (10 cm<sup>2</sup>) were used to subsample the Reineck boxcorer. One core was fixed in a hot (70°C) 4% formaldehyde tap water solution and will be used for meiobenthic studies. The sediment from the other core was dried in the oven and will serve to establish sediment characteristics. Macrobenthos was sampled using a Van Veen grab. Out of each grab, some sediment was collected for sediment characterisation. On all stations, five replicates were taken. The sediment was sieved on board of the Belgica over a 1-mm sieve. All animals retained on the sieve were fixed in a formaldehyde tap water solution.

Epibenthos was sampled with a three-metre beam trawl with a mesh size of 5 mm (10 mm stretched) in the cod end. All tows were made over a distance of 1000 m in the direction of the current with a towing speed of 3.5 knots per hour.

Hyperbenthos was sampled with a hyperbenthic sledge containing four nets: two nets with 0.5-mm mesh and two with 1.0-mm mesh. The lower nets sample the lower 0.5 m of the water column while the upper nets sample the water column between 0.5 and 1 m above the bottom. All tows were made against the current at a speed of 1.5 knot per hour. Mysids from the 1mm net were separated from the rest of the sample and fixed in acetone for molecular analysis.

### **Project: EUMARSAND**

All stations on the Kwintebank were sampled for meiobenthos by means of a Reineck boxcorer. At all places: the corer was deployed three times in order to get true replicates. At most of the stations, two perspex cores (10 cm<sup>2</sup>) were used to subsample the Reineck boxcorer. One core was fixed in a hot (70°C) 4% formaldehyde tap water solution and will be used for meiobenthic studies. The sediment from the other core was dried in the oven and will serve to establish sediment characteristics.

### **Scientific diving program.**

Sampling of biological specimens by means of scientific divers was performed on each dive. The diving team was formed by two divers: a biologist selecting the sampling area and estimating the covering, a photographer taking a picture of the selected area and taking the sample and looking at the dive parameter.

Wreck sampling: Samples were taken on vertical and horizontal surfaces at two different depths (depending on the dimensions of the wreck).

Sessile fauna: Study of the sessile fauna on the selected wreck was performed by means of three different techniques. These techniques are complementary. Only macro-organisms (visible with naked eyes) were taken into account.

Photography: Surfaces delimited by a frame of 50 X 50 cm were photographed (using 24 X 36 camera, digital camera and digital video camera). Species diversity and density will be estimated from these photographs.

Rough estimate of covering: Within the same frame of 50 X 50 cm, divers estimated the rate of coverage with the main benthic organisms using the techniques established by Dahl (1981).

Sampling: Within each frame of 50 X50 cm, two surfaces of 25 X 25 cm were scraped off in order to collect all the sessile fauna. Scraped organisms were collected in a plastic bag. If water turbulence (current) was high and the risk of loosing material evident, scraped organisms were sucked up in a bag by means of a small suction dredge (air lift). On board, each sample was properly labeled. From each sample pair, one specimen was frozen for further studies on the total organic matter and the other was anaesthetised in 6% magnesium chloride for a few hours and preserved in buffered formalin. Later on, the material will be transferred to buffered alcohol, identified and the number of specimens/surface unit will be counted.

Moreover, some pieces of non-preserved specimens of sea anemones, molluscs, crustaceans and echinoderms were fixed in pure alcohol in order to allow future biochemical analysis (protein electrophoresis and/or DNA sequencing).

Vagile fauna/Invertebrates: Small carnivorous and scavenger invertebrates (mainly crustaceans) were collected by means of baited traps. Traps were installed at the different prospected points for one night.

Vertebrates: Fishes living in open water were identified *in situ* and their number estimated by the divers.

## 6. Daily course of the operations

### Monday 13/10/2003

14.00: arrival and boarding UG-MARBIOL + NIOO-CEME team

15.30: Belgica leaves the harbour and heads for station 330

18.15: arrival at **station 330** sampling starts with CTD, Niskin (one Niskin at 3m depth, 3 Niskins at sea floor), Plankton sampling, Box corer: two attempts failed since many stones were present at the seabed. Therefore the ship repositioned and the next 6 deployments were succesful, Van Veen Grab (5 replicates)

20.50: end of sampling at station 330

22.45: arrival at **station 115bis** sampling starts with CTD, Niskin (one Niskin at 3m depth, 3 Niskins at sea floor), no plankton was sampled due to heavy winds, Box corer: 10 deployments, Van Veen Grab (5 replicates), testing of multicore sampling

Operations were finished at 00.45 and Belgica returned to Zeebrugge

### Tuesday 14/10/2003

07.00: **Touch and Go in Zeebrugge**: Jan Vanaverbeke and Ann Vanreusel (UG-MARBIOL) + Lennert Van Ijzerloo, Johannes Van Oevelen, Bogaards Roelof and Karline Soetaert (NIOO-CEME) left the vessel, Wouter Courtens and Marc Van de Walle (IN-team) boarded the ship.

08.00: Belgica leaves Zeebrugge

08.00-13.00: **Bird observations** by IN-team

13.15: arrival at **Station 701**: sampling starts with CTD, five Van Veen grabs, three Reineck box corers, a hyperbenthic sledge and a beam trawl tow of 1 km. The beam trawl was not succesfull since a lot of sediment was caught in the trawl and the fishing net was damaged.

15.20: end of sampling at station 701

16.30: arrival at **Station 780**: sampling starts with CTD, five Van Veen grabs, three Reineck box corers and a hyperbenthic sledge. The hyperbenthic sledge sampling was not successful since a lot of sediment and epifauna were caught in the trawl. Due to the damaged fish net the beam trawl was not used at this station.

17.40: end of sampling at station 780

19.15: arrival at **Station 790**: sampling starts with CTD, three Reineck box corers and five Van Veen grabs were obtained. Sampling at this station ended at 20.00.

21.00: arrival at **Kwintebank**, 6 stations were sampled (**KW6, KW18, KW5, KW2, KW1, KW14**) with three Reineck box corers at each station.

23.45: end of sampling at Kwintebank.

### Wednesday 15/10/2003

8.00-13.00: **Bird observations** by IN-team

13.10: arrival at **Station 215**: sampling starts with CTD, only four successful Van Veen grabs were obtained after 15 deployments since many stones were present at the seabed, hence no Reineck boxcorer samples were taken. The sampling at this station was finished at 14.00.

15.30: arrival at **Station 115**: sampling starts with CTD, three Reineck box corers and five Van Veen grabs, a hyperbenthic sledge and a beam trawl tow of 1 km.

17.00: end of sampling at station 115

18.15: arrival at **Station 120**: sampling starts with CTD, three Reineck box corers and five Van Veen grabs, a hyperbenthic sledge and a beam trawl tow of 1 km.

20.00: end of sampling at station 120

### Thursday 16/10/2003

8.00-13.00: **Bird observations** by IN-team

12.45: arrival at **Station 330**: due to bad weather (6-7 bft) the sampling with the hyperbenthic sledge was not possible at this station. 13.00: the Belgica steamed towards station 790.

14.00: arrival at **Station 790**: sampling starts with CTD and successful sampling with the hyperbenthic sledge and beam trawl.

14.45: end of sampling at station 790.

16.00: arrival at **Station 140**: sampling starts with CTD, three Reineck box corers and five Van Veen grabs. Due to the presence of extremely muddy sediment a hyper- and an epibenthic trawl could not be performed.

At 16.30, sampling was finished here and the Belgica steamed towards the Dutch Continental Shelf.

### Friday 17/10/2003

8.00: sampling at **Station V3** started with a CTD, followed by a successful hyperbenthic trawl.

8.45: end of sampling at station V3.

9.00: sampling at **Station V4**: CTD and hyperbenthic trawl

9.30: end of sampling at station V4.

10.05: sampling at **Station V5**: again the sampling started with a CTD and a successful hyperbenthic trawl. Sampling ended at 10.30

10.30-16.00: **Bird observations** by the IN-team while the Belgica set course to Scheveningen

16.00: arrival at Scheveningen

### Monday 20/10/2003

8.30: Belgica leaves the harbour of Scheveningen

13.00: arrival at **Station V5bis** due to bad weather (heavy swelling of the sea) the sampling with the hyperbenthic sledge was not possible at this station. 13.20: Belgica left the station V5bis.

13.30-18.00: **Bird observations** by the IN-team

19.00: Arrival in **Zeebrugge**: boarding of the Scientific diving Team.

Because of bad weather forecast (6-7 Beaufort) for the night, the first diving window (Tuesday 21 October AM) was cancelled and the Belgica stayed in Zeebrugge until Tuesday morning.

### Tuesday 21/10/2003

8.10: Belgica leaves the harbour of Zeebrugge and set course to station 630

11.00: arrival at **Station 630**: sampling starts with CTD, three Reineck box corers, five Van Veen grabs and a trawl of 1 km with the hyperbenthic sledge.

12.45: end of sampling at station 630.

13.00: arrival at **Birkenfels** and buoing of the front superstructure of the wreck at 13.30.

15.00-17.30: Diving window at Birkenfels, the diving window ended with a CTD profiling.

Dates	Divers	Safety on RIB	Weather
21.10.03- PM	<b>Mallefet-Zintzen</b>	Norro-Darchambeau	Water T°: 14,7°C
	Time in: 15H32		Air T°: 11,0°C
	Max depth: 24 m		Wind dir. South variable
	Bottom time: 24'		Wind speed: 4B slacking off 2B
	Deco stop: 3'		Waves: more or less 1m
	Time out: 16H12		Overcast sky, frequent showers
	<b>Norro-Darchambeau</b>	Mallafet-Zintzen	Id. previous dive
	Time in: 16H15		
	Max Depth: 25 m		
	Bottom time: 26'		
	Deco stop: 5'		
	Time out: 16H52		

### Wednesday 22/10/2003

9.00-11.00: Diving window at Birkenfels, the diving window ended with a CTD profiling.

Dates	Divers	Safety on RIB	Weather
22.10.03- AM	<b>Norro-Darchambeau</b>	Mallefet Zintzen	Water T°: 14,7°C
	Time in: 9H27		Air T°: 11,0°C
	Max Depth: 26 m		Wind dir. SE
	Bottom time: 30'		Wind speed: 4-5 B
	Deco stop: 5'		Waves: more or less 1m
	Time out: 10H05		Overcast sky, no shower
	<b>Mallefet-Zintzen</b>	Norro-Darchambeau	Id. previous dive
	Time in: 10H09		
	Max Depth: 26 m		
	Bottom time: 30'		
	Deco stop: 3'		
	Time out: 10H49		



11.00-15.00: **Bird observations** by the IN-team

15.30-17.30: Diving window at Birkenfels, the diving window ended with a CTD profiling.

Dates	Divers	Safety on RIB	Weather
22.10.03- PM	<b>Norro-Mallefet</b>	Darchambeau-Zintzen	Water T°: 14,6°C
	Time in: 15H59	(safety on board of	Air T°: 11,4°C
	Max Depth: 27 m	the Belgica)	Wind dir. SE
	Bottom time: 20'		Wind speed: 5-6 B
	Deco stop: 5'		Waves: 1, 2 to 1,5 m
	Time out: 16H31		Sun with a few clouds

During this diving window the second team couldn't dive because of bad weather (wind speed around 6-7 bft). After the last dive, the buoy (line, anchor and ballast included) marking the wreck was recuperated. 17.00: Belgica started transit to station UG8.

18.00: arrival at **Station UG8**: sampling starts with CTD and five Van Veen grabs, Reineck boxcorer sampling failed since many stones were present at the seabed. Sampling was finished at 18.45.

#### Thursday 23/10/2003

8.00-12.00: **Bird observations** by the IN-team

12.00: arrival at **Station 702**: due to bad weather (winds around 7-8 bft) it was not possible to do a CTD profiling, Reineck boxcorer sampling and trawls with the hyperbenthic sledge and beam trawl. Only five succesful Van Veen grabs were obtained.

12.30: end of sampling at station 702 and transit to Zeebrugge.

13.30: arrival at Zeebrugge, end of campaign.

## **7. Problems**

No problems are to be reported

## **8. Remarks**

We warmly acknowledge the skilful and patient help from the master and the crew of the Belgica during our sampling and the warm cooperation.

### **Remarks from the Scientific diving team:**

#### **Safety rules for diving**

During the transit between Zeebrugge and the Birkenfels the commandant (P. Ramboer), Cl. Massin and the diving master (A. Norro) have established the safety rules and the diving procedure as follow:

The commandant is in charge of the evacuation of (a) diver(s) in case of accident. In this respect he took contact with the hyperbare centre of Zeebrugge and with the helicopter Sea King service.

The diving team is in charge of the recuperation of the diver(s) in difficulties and to the first aid. In this respect A. Norro presented to the diving team the first aid oxygen equipment available on board (DAN rescue kit and use of two (20L/200 bars) oxygen tanks located on the rear deck, close to the wet lab).

Each diver needs to be in order of medical visit and must be covered by a DAN professional insurance. This has been checked by Cl. Massin and the diving master.

Each diver must have in its safety equipment the following items: a strobe light turn on during all the diving operation, a dive alert, a deco-stop surface marker and a pairing (wire cutters or shears). A spare tank with regulator, pressure gauge and line of 6 m with buoy is ready in the safety RIB.

During the dives, Cl. Massin will assume the co-ordination between the divers and the Belgica crew.

Team of two divers sample the wreck whereas the two other divers act as safety surface on the RIB. The way down to the wreck and up to the surface is expected to follow the wreck marking.

When the first team emerges from the water, there is a shift between the diving team and the safety team.

No wreck penetration is foreseen. Diving is planned within the no decompression limit. Safety stop (5' at 5 m) is expected when possible.

In case of the diver team is not able to ascent following the marking line one deco-stop surface marker is to be used. In case of problem(s) two deco-stop surface markers have to be deployed side by side.

Continuous use of the dive alert means OK; discontinuous use means emergency. Diver moving arm hitting the surface means also emergency.

#### **Additional remarks by the Scientific Diving Team:**

The participation of the divers to the Belgica campaign 2003/26 was decided only two weeks before departure. Because of this very short time limit, only 4 divers had the possibility to join the campaign. For this reason the diving procedure foreseen for teams of 3 divers has to be changed as described supra.

For the safety of the divers, two RIBs have been asked. They were on board, but only one pilot was available, making the presence of the second RIB useless. The fact that we have only one RIB at disposal brings some problems. It is impossible to load in one RIB two crew mans, four divers and all the diving and collecting equipment. This means that when the second team emerges, it has to wait 5-10' at the surface. This is the time requested for the first team to make the shuttle between the diving spot and the Belgica. Because of water temperature, current and waves these ten minutes at the surface are particularly unpleasant. If a diver become sea sick (this was nearly the case) it could generate safety problems.

For the forthcoming diving campaign it is imperative to have one pilot for each RIB on board.