

RV BELGICA ST0624 - CRUISE REPORT



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1. BELGICA CRUISE ST2006-24

1.	Cruise number	2006-24
2.	Date / hour	Zeebrugge TD: 20/11, 11h00 Zeebrugge TA: 21/11, 05h00 Zeebrugge TD, 21/11, 16h30 Zeebrugge TA: 24/11, 08h30
3.	Responsible scientist Participating institutions	Isabelle DU FOUR (UG-RCMG) UG-RCMG, UG-MARBIO, UG-MARELAC STUDENTS

2. PARTICIPANTS

		20-11-2006 – 21-11-2006 (08h00)	21-11-2006 – 24-11-2006 (08h00-13h00)
UG-RCMG	Isabelle DU FOUR	X	X
	Vera VAN LANCKER	X	
	Els VERFAILLIE	X	
	Peter STAELENS	X	X
	Kristien SCHELFAUT	X	
	Koen DERYCKER	X	
Marelac	Arne BAEYENS*	X	X
	Annelies DE GROOTE*	X	X
	Gert KLAASSEN*	X	X
	Joke LENOIR*	X	X
	Sarah VANDEN EEDE*	X	X
	Georgios NAKAS*	X	X
	Bert DEZEUERE*	X	X
	Brecht DE MEULENAER*	X	X
UG-MARBIO	Guy DE SMET		X
	Jeroen INGELS		X
	Ulrike BRAECKMAN		X
ROVIN	Jeroen VERCRUYSSSE		X
TOTAL		14	14

* First embarkation

3. PROGRAM OBJECTIVES

The intention of the campaign was to train students in the framework of the MSc program Marelac (Marine and Lacustrine Sciences, course "Tools in Oceanography") of Ghent University.

This has been done whilst performing useful measurements that are valuable in the framework of the Interreg IIIb project MESH, the PhD research of Marijn Rabaut and the PhD research of Ulrike Braeckman

The campaign focussed on the region north of the Wenduinebank, the region north of the Vlakte van de Raan and the Westdiep.

MESH (Development of a framework for Mapping European Seabed Habitats) (RCMG)

MESH is an EU Interreg IIIb-funded international marine habitat mapping programme aiming at the development of international standards and protocols for seabed mapping. Partnership: Joint Nature Conservation Committee (JNCC, coordination) (UK); Ghent University (B); IFREMER (FR); Marine Institute (IRL); Alterra-Texel (NL); TNO Built Environment and Geosciences (NL); Centre for Environment, Fisheries and Aquaculture Science (CEFAS) (UK); Department for Agriculture and Rural Development, Northern Ireland (DARD) (UK); English Nature (UK); Envision Mapping Ltd (UK); National Museums and Galleries of Wales (NMGW) (UK); Natural Environment Research Council (British Geological Survey) (BGS) (UK).

The habitat mapping in the Belgian-Dutch border area is conducted in cooperation with TNO Built Environment and Geosciences (NL).

Ecological Interactions in Lanice-fields: An Ecosystem Approach for Nature Conservation in the North Sea (MARBIOL, PhD. research Marijn Rabaut)

This PhD. study aims to investigate specific ecological interactions in order to provide information on how marine protection, *i.e.* reducing or excluding fisheries effect, impacts the ecosystem functioning as well as how the higher trophic levels are influenced. The study is performed along the coast of the Belgian Continental Shelf and on the Flemish beaches. The presence of the sandmason *Lanice conchilega* provides habitat complexity. This polychaete occurs in very high densities (3000 ind/m² and higher). The tubes create a micro-environment in which suspended material is trapped. In this way 'tubereefs' develop. The impacts of beam trawl fisheries on this habitat will be investigated in different disturb experiments. The dispersion of the subtidal reefs can be analysed through side scan sonar imagery. The ecological interactions with sole *Solea solea* will be investigated through stomach analyses. The stomach contents of sole foraging near *Lanice* reefs and sole further off those reefs will be compared. Sole will be caught with special designed drift nets. The quantitative data of this research will be integrated in a decision support system through the Stella® software. During this sampling campaign an *in situ* experimental fishing study will be done. The research area is the sea side of the *Wenduinebank*, where mature *L. conchilega* reefs have been found through ground thruthing (*cf.* August Zeeleeuw campaign 06-480). After sampling before disturbance, specific areas will be fished intensively. Both fished and non-fished areas will be followed up over time to identify the impact on the reefs. The experiment includes 10 sampling days in a period of two months.

PhD Research Ulrike Braeckman: The role of diversity, functionality and density of macrobenthos in the functioning of a sea floor.

The aim of this study is to find out how different functional groups of macrofauna (delineated according to their bioturbation activity) influence ecosystem processes in the marine sediment-water interface. The area of interest is situated in the Belgian Western Coastal Banks, which has been put forward as a first natural sea reserve along the Belgian coastline. The macrobenthic community characteristics together with the meiobenthic and bacterial diversity and sediment metabolism make this area a very dynamic benthic ecosystem with a high ecological value. Temporal changes in bacterial diversity, densities and vertical distribution of nematode communities, oxygen consumption, degradation of phytodetritus and

available food sources are related to the sedimentation of phytoplankton after spring phytoplankton bloom. Bioturbation by macrofaunal activity is an important factor in the interpretation of the observed biogeochemical patterns in the vertical structure of the sediment. Detailed knowledge on the structuring role of the macrobenthos in this ecosystem will be gathered by means of integrated lab-experiments in which (1) different densities (2) different species and (3) different functional groups of macrobenthic organisms will be incubated in controlled conditions. By repeating these experiments in different periods of the year (in function of the period of phytoplankton bloom and quality of available organic matter) with relevant densities of macrobenthic organisms, the way in which functional diversity of macrobenthos influences the ecosystem processes of the study area will be investigated.

4) MEASUREMENTS

Due to bad weather conditions the planning of this campaign was completely changed. On Monday, the Belgica left the harbour at 20h instead of 11h. Tuesday night the measurements had to be stopped at 03h30 due to an electrical short cut. As the breakdown could not be repaired by a crew member, we needed to sail back to the harbour. Tuesday at 16h30, we left again the harbour.

NORTH OF THE WENDUINEBANK (PhD research Marijn Rabaut, MESH)

Normally, UG-RCMG's side-scan sonar would have been deployed, but due to bad weather conditions only the multibeam sonar system was deployed in the two boxes indicated in the planning. The second box was completely covered, whereas in the first one only a couple of lines were sailed. A part of the second box was covered a second time after a disturbance experiment, done by Marijn Rabaut on the Zeeleeuw, had taken place. Van Veen samples, both for sedimentological and biological purposes, were taken to validate the multibeam images (coordinates are indicated in annex).

On Wednesday the small ROV, the video and the side-scan sonar system were deployed in succession. The ROV and video recordings were bad due to the high turbidity caused by the bad weather conditions and as a consequence they were cancelled. Also the side-scan sonar measurements had to be cancelled due to the bad weather conditions.

Point	Easting (wgs84)	Northing (wgs84)	NB (wgs84)	OL (wgs84)
Wenduinebank box 1	491339.45	5686254.52	51 19.65	2 52.54
	491696.58	5685794.09	51 19.40	2 52.85
	492826.99	5686664.78	51 19.87	2 53.82
	492472.82	5687131.11	51 20.13	2 53.52
Wenduinebank box 2	496624.27	5689803.96	51 21.57	2 57.09
	497086.66	5689204.96	51 21.25	2 57.49
	498221.61	5690077.19	51 21.72	2 58.47
	497762.72	5690676.19	51 22.04	2 58.07

NORTH OF THE VLAKTE VAN DE RAAN (MESH)

Side-scan sonar measurements were originally planned to be performed simultaneous with multibeam measurements, but due to the bad weather conditions only multibeam measurements were performed. The coordinates of the box, which was completely covered, are indicated below. Boxcore sampling was originally planned but due to the bad weather conditions only Van Veen samples were taken to validate the multibeam images. At each biological station, 5 samples were

taken and subsequently sieved on board, at the sedimentological station only one sample was taken. The coordinates can be found in annex.

Point	Easting (wgs84)	Northing (wgs84)	NB (wgs84)	OL (wgs84)
ZW	510457.62	5706477.59	51 30.55	03 09.04
ZO	506518.23	5706428.71	51 30.53	03 05.63
NW	505546.61	5702145.62	51 28.22	03 04.79
NO	503845.90	5704054.39	51 29.25	03 03.32

WESTDIEP (PhD Ulrike Braekman)

20 instead of 10 Van Veen samples were taken around point 115 bis.

Point	Easting (wgs84)	Northing (wgs84)	NB (wgs84)	OL (wgs84)
Point 115bis	473341.12	5666778.61	51 09.11	02 37.13

5. OPERATIONS

All times are given in local time.

Monday, November 20th

10h30 Embarkation of UG-RCMG, Marelac students and material

Due to bad weather forecasts, the departure was postponed.

20h00 Sail off from Zeebrugge

Transit to the region north of the Wenduinebank

21h00 Multibeam measurements in box 2

Thursday, November 21th

– 03h30 Break-off of multibeam measurements in box 2

Transit to Zeebrugge because of a short cut, which could not be repaired by the crew members of the RV Belgica

08h00 – 16h30 Disembarkation of all the UG-RCMG staff with exception of Peter Staelens and Isabelle Du Four; embarkation of UG-MARBIO staff and Jeroen Vercruysse. In the meantime the electrical problems were repaired by an external expert.

Transit to Westdiep

19h00 – 19h45 Van Veen sampling

Transit to the region north of the Wenduinebank

20h45 – Van Veen sampling in box 2

Wednesday, November 22th

– 00h45 Van Veen sampling in box 2

00h45 – 03h00 Multibeam measurements in box 1

09h30 – 11h00 test of ROV

Transit to box 1

11h20 – 14h00 Multibeam measurements in box 1

14h00 – 15h15 test of ROV, video and side-scan sonar, without success

Transit to box 2

15h30 – 18h30 Multibeam measurements in box 2, after the disturbance experiment of Marijn Rabaut with the RV Zeeleeuw

Transit to the region north of the Vlake van de Raan

19h30 – Multibeam measurements

Thursday, November 23th

– 11h15 Multibeam measurements

Birthday dinner of the commander

12h45 – 17h30 Van Veen sampling (5 biological sample points, 11 sedimentological)

17h30 – Multibeam measurements

Friday, November 24th

02h00 Multibeam measurements

Anchoring, transit to Zeebrugge

08h30 Arrival at Zeebrugge and disembarkation of scientific staff, students and material.

- End of campaign ST0624 -

6. LABORATORY SPACE USED

BRIDGE: Multibeam and side-scan sonar operations
WET LAB: Samplings

CHEMISTRY LAB:	Filtration of water samples
MICROBIOLOGY LAB:	Storage of instruments (sampling equipment, sound velocity probe)
BIOCHEMISTRY LAB:	Storage of instruments
FISHERIES LAB:	Sieving of samples

7. INFRASTRUCTURE USED

Continuous measurements

- Thermosalinograph SCTD-SBE21
- Turner fluorometer
- Sea water pump

Navigation / Meteorology / Bathymetry

- Friedrichs meteo
- DGPS Thales Aquarius
- Atlas Deso 20
- Tss 320B heave compensator
- RoxAnn bottom discriminator
- Kongsberg-Simrad EM1002S multibeam
- Sound velocity probe (side-winch needed)

Laboratories equipment

- Milli-Q water purification system with provision tank
- ph meter
- Freezer and refrigerator for sample preservation
- Filtration set
- Oven

Side-scan sonar recordings (UG-RCMG)

Klein 3000 series

Water sampling and in situ sampling

- Seabird SeaCAT system (SCTD-SBE19, OBS)
- Niskin bottles

Sediment sampling

- Boxcorer
- Reineck corer (MUMM)
- Van Veen grab

Biological sampling

- Rincing table (UG-MARBIO)
- Trawl net
- Dredge

ROV recordings (ROVIN, Jeroen Vercruyse)

8. ANALYSIS CARRIED OUT ON BOARD

Sieving of samples for macrobenthos

9. AUTOMATIC DATA ACQUISITION

Parameters that were acquired:

N°	Parameters	Acquisition rate 0.5 sec	Acquisition rate 10 sec
13	PT/ST SPEED		*
14	DEPTH SPEED		*
15	FO/AF SPEED		*
16	REL. WINDDIR		*
17	REL. WINDSPD		*
19	HUMIDITY_HR		*
20	ATM PRESSURE		*
24	SEATEMP_1		*
30	SOL-RAD		*
34	AIRTEMP.DRY		*
35	AIRTEMP.WET		*
36	SHIP HEADING	*	*
120	IN-WIND DIR		*
121	IN-WINDSPD		*
122	IN-WINDSPD.BF		*
123	CUMUL.DIST	*	*
182	HUMIDITY_DW		*
184	TSS DEPTH-L	*	*
185	TSS DEPTH-H	*	*
186	TSS HEAVE	*	*
191	SBE21 TEMP.	*	*
192	SBE21 SALIN.	*	*
193	SBE21 SIGTH.	*	*
195	TURNER FLUO.	*	*
197	DGPS LAT.N/S	*	*
198	DGPS LONG.E/W	*	*
199	DGPS HG_MSL	*	*
200	DGPS UTCTIME	*	*
201	DGPS SPEED	*	*
202	DGPS COURSE	*	*
203	DGPS QUALITY	*	*
214	MGN DGPS LAT	*	*
215	MGN DGPS LON	*	*
219	ROXANN DEPTH	*	*
220	ROXANN ROUGH	*	*
221	ROXAN HARD	*	*

10. REMARKS ON THE MEASUREMENTS, INSTRUMENTS AND ON THE OPERATIONAL COURSE OF THE CAMPAIGN

Remarks on the measurements

Multibeam system and sound velocity probe

No sound velocity profiles could be taken due to a short cut in line 2 and 5 of the cable with the subcon to RS232, probably due to pulling too much the cable instead of the probe in the lifetime of the probe. The problem was determined by means of a multimeter (Peter Staelens). It was also noted that there were no spare batteries. During the multibeam acquisition, previously defined straight sound velocity profiles were used.

Due to the electrical short cut, the multibeam system could not be retracted automatically on Tuesday 3.30am. The captain reported the problems to the necessary people. We still had that problem after the short cut was repaired, but in the end the system did work automatically.

Side-scan sonar

It was the first time that the KLEIN 3000 side-scan sonar of the RCMG was deployed. QUINSY was used as recording software. The installation went well and also no problems were encountered with the software. Recordings were planned but due to the bad weather only one test could be performed. Unfortunately, the efforts were almost immediately ceased because:

- the sonar rolled too much
- the sonar continuously pulled and dropped down again

- there was too much suspended matter in the water column
These three causes were due to the bad weather conditions and the high turbulence caused by the propeller, as navigation on electrical propulsion was not possible.

ROV and video measurements

A couple of tests were performed with the ROV during the reversal of the tide:

- when the Belgica was anchored:

* First test: deployment over the side: Due to strong currents while anchored, the ROV was pushed against the hull, too dangerous to dive

* Second test: Deployment on the Aft deck: 15 kg as dead weight on cable. ROV reached the bottom, but force on the cable was too strong, test suspended

- when the Belgica was adrift

* no weight : ROV couldn't reach the bottom, because of drag on the cable

* with 5 kg of weight: the ROV could perform a controlled dive

However no images could be recorded due to the high turbidity. Subsequently a test was performed with the videoframe, but also without any success.

General remarks

The officers and crew of the Belgica are greatly acknowledged for their cooperation.

ANNEX: coordinates of Van Veen sampling stations

ID	Bio_Geo	Time
Wenduinebank		
ST0624_WB01	BIO	21/11/2006 20:56:20
	GEO	21/11/2006 20:54:10
ST0624_WB02	BIO	21/11/2006 21:08:20
	GEO	21/11/2006 21:10:10
ST0624_WB03	BIO	21/11/2006 21:22:20
	GEO	21/11/2006 21:25:10
ST0624_WB04	BIO	21/11/2006 21:37:20
	GEO	21/11/2006 21:40:00
ST0624_WB05	BIO	21/11/2006 21:56:10
	GEO	21/11/2006 21:58:30
ST0624_WB06	BIO	21/11/2006 22:13:30
	GEO	21/11/2006 22:16:20
ST0624_WB07	BIO	21/11/2006 22:20:00
	GEO	21/11/2006 22:22:20
ST0624_WB08	BIO	21/11/2006 22:39:20
	GEO	21/11/2006 22:41:50
ST0624_WB09	BIO	21/11/2006 22:55:30
	GEO	21/11/2006 22:57:40
ST0624_WB10	BIO	21/11/2006 23:08:50
	GEO	21/11/2006 23:11:20
ST0624_WB11	BIO	21/11/2006 23:17:40
	GEO	21/11/2006 23:20:00
ST0624_WB12	BIO	21/11/2006 23:26:00
	GEO	21/11/2006 23:29:10
ST0624_WB13	BIO	21/11/2006 23:36:00
	GEO	21/11/2006 23:38:50
Vlakte van de Raan		
ST0624_VR02_A	BIO	23/11/2006 12:19:10
ST0624_VR02_B	BIO	23/11/2006 12:21:10
ST0624_VR02_C	BIO	23/11/2006 12:23:30

ST0624_VR02_D	BIO	23/11/2006 12:26:00
ST0624_VR02_E	BIO	23/11/2006 12:28:30
ST0624_VR09	GEO	23/11/2006 12:42:30
ST0624_VR01_A	BIO	23/11/2006 12:46:40
ST0624_VR01_B	BIO	23/11/2006 12:49:00
ST0624_VR01_C	BIO	23/11/2006 12:52:10
ST0624_VR01_D	BIO	23/11/2006 12:55:20
ST0624_VR01_E	BIO	23/11/2006 12:59:30
ST0624_VR08	GEO	23/11/2006 13:11:20
ST0624_VR07	GEO	23/11/2006 13:22:30
ST0624_VR04_A	BIO	23/11/2006 13:35:30
ST0624_VR04_B	BIO	23/11/2006 13:39:30
ST0624_VR04_C	BIO	23/11/2006 13:41:20
ST0624_VR04_D	BIO	23/11/2006 13:44:10
ST0624_VR04_E	BIO	23/11/2006 13:47:10
ST0624_VR12	GEO	23/11/2006 13:58:40
ST0624_VR03_A	BIO	23/11/2006 14:13:10
ST0624_VR03_B	BIO	23/11/2006 14:16:00
ST0624_VR03_C	BIO	23/11/2006 14:18:40
ST0624_VR03_D	BIO	23/11/2006 14:21:20
ST0624_VR03_E	BIO	23/11/2006 14:25:50
ST0624_VR19	GEO	23/11/2006 14:46:10
ST0624_VR13	GEO	23/11/2006 14:58:00
ST0624_VR06_A	BIO	23/11/2006 15:14:00
ST0624_VR06_B	BIO	23/11/2006 15:16:00
ST0624_VR06_C	BIO	23/11/2006 15:18:50
ST0624_VR06_D	BIO	23/11/2006 15:21:30
ST0624_VR06_E	BIO	23/11/2006 15:24:10
ST0624_VR18	GEO	23/11/2006 15:27:20
ST0624_VR17	GEO	23/11/2006 15:41:20
ST0624_VR10	GEO	23/11/2006 15:52:40
ST0624_VR11	GEO	23/11/2006 16:02:20