

BELGICA CRUISE ST0502 - REPORT

Subscribers

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GEOLOGY - Cruise 05/02 Period: 7-11/02/2005

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1. BELGICA CRUISE ST2005-02

1.	Cruise number	2005-02
2.	Date / hour	Zeebrugge ETD: 07/02, 10h46 Zeebrugge ETA: 08/02, 10h00 Zeebrugge ETD: 08/02, 11h10 Oostende ETA: 10/02, 8h24 Oostende ETD: 10/02, 9h04 Zeebrugge, ETA: 11/02, 10h55
3.	Responsible scientist	Samuel DELEU (08-11/02/2005) / Michael FETTWEIS (07/02/2005)

	Participating institutions	UG-RCMG, MUMM, UG-MARBIO
4.	Area of interest	Belgian near coastal zone, Hinder Banken area, Sierra Ventana
5.	Number of scientists	February 7 - February 8 (10h): 4 February 8(11h10) - February 10(8h24): 9 February 10(9h04) – February 11: 7

2. PARTICIPANTS

		February 7 - February 8 (10h)	February 8(10h30) - February 10(10h)	February 10(10h30) - February 11
UG-RCMG	Samuel DELEU* Vera VAN LANCKER Valérie BELLEC Els VERFAILLIE Isabelle DU FOUR David VAN ROOIJ Peter STAELENS Jeroen VERCRUYSSSE		X X X X X X X X	X X X X X X
UG-MARBIO	Guy DE SMET		X	X
MUMM	Michael FETTWEIS** Dries VAN DEN EYNDE Joan BACKERS Jean-Pierre DE BLAUWE	X X X X		
TOTAL		4	9	7

*Chief scientist February 8 – February 11

**Chief scientist February 7

3. PROGRAM OBJECTIVES

MAREBASSE project (RCMG/MUMM/MARBIO/MAGELAS):

The -Marebasse- research project is essentially meant to set-up an integrated assessment framework for marine aggregates. This framework is regarded important to answer management/policy questions on how a sustainable exploitation of marine resources should be viewed and what approaches should be envisaged. This implies that essentially an increase of knowledge is necessary on the level of the sediments themselves and their distribution, but also on the dynamical environment. The project is structured around a three-tiered approach encompassing three spatial scales: broad-based, regional and site-specific. Fieldwork programmes are the focal point of the regional and site-specific research, however with a coupling towards the broad-based approach.

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 Environment, Energy and Process Innovation (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)

MOMO project (MUMM):

MOMO stands for the monitoring and modelling of cohesive sediment transport and the evaluation of the effects on the marine ecosystem due to dredging and dumping operations. The primary objective of the project is the study of the cohesive sediments on the Belgian Continental Shelf (BCS) using numerical models and field measurements. The combination of monitoring and modelling will provide information on the transport processes of this fine fraction and is therefore fundamental to answer questions on composition, origin and residence of it on the BCS, the change in characteristics of this sediment due to dredging and dumping operations, the effects of the natural variability, the impact on the marine ecosystem especially due to alterations of habitats, the estimation of the net input of hazardous substances in the marine environment and the possibilities to reduce these last two items.

MOCHA project (BMM, RCMG, KUL):

The MOCHA project is focusing on the cohesive sediment transport system occurring in the Belgian coastal zone (BCZ). The presence of mud fields and high turbidity in such an energetic environment has been the subject of various studies, the origin of the mud in the BCZ remains however still controversial. Different mud sources have been identified, such as the Dover Strait, the erosion of clay layers, the Schelde, but reliable quantitative data are often not available, especially for the smaller sources (erosion of clay, Schelde), which could be of importance on a regional scale. The project aims therefore at presenting different evaluation tools and strategies in order to study these different sources of mud on the BCZ. Mud is transported by natural processes, such as tides, winds, but also human activities (dredging and dumping operations) have an important influence, therefore the project follows a twofold strategy:

1. Investigating the contribution of the different possible sources of mud by collecting and critically analysing existing data on the muddy sediments, by carrying out sediment transport measurements using advanced technologies (LISST) and by performing analysis of mud samples to determine sediment strength, erosion behaviour, clay mineral associations, microfossils, geochemical and geological characteristics.
2. Influence of human activities is investigated by determining how dredging and dumping operations and the harbour constructions have changed the cohesive sediment transport system.

4) MEASUREMENTS

1. Near Coastal area

The deployment and recuperation of the tripod, buoy and ADCP have been performed under perfect weather conditions. Some photos can be found at the end of paragraph 5 (operations).

The heights above the bottom of the two OBS during through tide measuring were 25 cm and 200 cm and during long term measurement three OBS sensors are mounted at 25 cm, 95 cm and 165 cm.

Table 1: Co-ordinates of the through tide and long term stations.

Station	Time (UTC) Start	Time (UTC) End	Dgps lat	Dgps long	Depth (m MLLWS)
MOW1 – TT	07/02 13h50	08/02 06h15	51° 21.698'	3° 7.422'	11
MOW1 – ADCP	07/02 12h40		51° 21.648'	3° 7.435'	
MOW1 - LT	08/02 08h20		51° 21.730'	3° 7.493'	12

Table 2: Co-ordinates, date and time of sea bed sediment sampling stations and short description of the samples. (VV = Van Veen).

Id	Date/Time UTC	dgps lat (N) WGS84	dgps lon (E) WGS84	Description
ST0502_MOW1_VV	07/02 13h44	51°21.735'	3° 7.2786	Very fine dark silty sand with shells

2. Hinder Banken region

The main part of the campaign focussed on a gravel area, which is one of the key regions in the Marebasse project.

2.1 Multibeam recordings

Measurements were carried out in two boxes. Box 4 is filled completely, Box 5 is filled partially.

Box 4: area covered: between the crest of the Oosthinder and the anchorage zone.

Point	Easting (wgs84)	Northing (wgs84)	NB (wgs84)	OL (wgs84)
NW	468960	5697390	51 25.612	002 33.212
NE	470610	5697340	51 25.590	002 34.636
SW	466900	5693580	51 23.549	002 31.456
SE	468630	5693580	51 23.555	002 32.947

Box 5: polygon to the west of the Oosthinder and crossing the Westhinder sandbank.

Point	Easting (wgs84)	Northing (wgs84)	NB (wgs84)	OL (wgs84)
1	462340	5703300	51 28.776	002 27.461
2	468930	5703300	51 28.800	002 33.155
3	466720	5697810	51 25.831	002 31.277
4	465610	5697810	51 25.827	002 30.319
5	463140	5693640	51 23.568	002 28.213
6	456710	5693640	51 23.541	002 22.668

2.2 Video recordings

The video system of RCMG is used, mounted in the same frame (Magelas) as used during campaign ST0424. The coordinates of the 20 measured points can be found in annex. At each station, a recording of 4 to 5 minutes was made.

2.3 Hamon grab sampling

The Hamon grab is used for the first time during this campaign and results are very good: see paragraph 6 (remarks). Unlike the Van Veen, it proved highly successful to take samples with a Hamon grab in gravelly areas. The coordinates of the sampling points can be found in annex.

3. Sierra Ventana region

3.1 Multibeam recordings

Multibeam measurements were carried out over the new dumping site circle S1. Measurements had to be stopped due to the bad weather. The first line was chosen where recordings stopped in campaign ST0309 and has following coordinates:

Point	NB (wgs84)	OL (wgs84)
NE	51 28.039	3 03.182
SW	51 26.531	3 00.820

3.2 Video recordings

As the water was too turbid (probably due to the bad weather the day before and due to the spring-tide), the recordings were unsuccessful. Two points were recorded after which it was decided to stop.

Point	NB (wgs84)	OL (wgs84)
SV1	51 28.240	3 08.919
SV2	51 27.389	3 02.791

3.3 Hamon grab sampling

The coordinates of the sampling points can be found in annex.

5. OPERATIONS

All times are given in local time.

Monday, February 7th

10h40 Departure from Zeebrugge.

11h00 - 12h30	Calibration of motor engine.
12h30 - 13h00	Transit to MOW1 measuring pile.
13h15	Deployment of tripod with new instruments (SonTek/YSI 3MHz ADP, SonTek/YSI ADV Ocean/Hydra, OBS) at 51°N 21.698, 3°E 7.422 (see photo). The measuring period is intended for testing of instruments.
13h40	Deployment of bottom mounted ADCP at 51°N 21.648' 3°E 7.435'.
14h20	Deployment of buoy current velocity meter at 51°N 21.750, 3°E 7.309.
14h25	Anchoring at 51°N 21.725, 3°E 7.217. Near MOW1 measuring pile.
14h44	Van Veen grab sample at 51°N 21.735', 3°E 7.2786'. Very fine dark grey sand with shells, see photo.
14h50	Start of through tide measurements. Valeport Model 106 current meter is used for the first time. Water samples are taken every 20'. Rosette is taken out of water every hour for emptying Niskin bottles. Filtration to determine SPM concentration on every 20' samples and to determine POC concentration on every 1 hour samples. Water samples for salinity every hour.
15h00, 15h20, 15h40, 16h00	Niskin Samples 1, 2, 3, 4
16h20, 16h40, 17h00	Niskin samples 5, 6, 7
17h20, 17h40, 18h00	Niskin samples 8, 9, 10
18h20, 18h40, 19h00	Niskin samples 11, 12, 13
19h20, 19h40, 20h00	Niskin samples 14, 15, 16
20h20, 20h40, 21h00	Niskin samples 17, 18, 19
21h20, 21h40, 22h00	Niskin samples 20, 21, 22
22h20, 22h40, 23h00	Niskin samples 23, 24, 25
23h20, 23h40	Niskin samples 26, 27

Tuesday, February 8th

00h00	Niskin sample 28
00h05	Problems with oceanographic sea cable of Rosette, Rosette out of water and no samples 29-32.
01h30	Rosette back in water
01h40, 02h00	Niskin samples 33, 34
02h20, 02h40, 03h00	Niskin samples 35, 36, 37
03h20, 03h40, 04h00	Niskin samples 38, 39, 40
07h15	End of through tide cycle.

- 07h30 Weigh anchor.
- 07h30 - 08h10 Recuperation of tripod. Tripod is partly covered with a layer of dark grey very fine sand/silt, see photo.



Deployment of tripod for testing of new instruments



Van Veen sample ST0502_MOW1_VV at the through tide position



Very fine sand/silt on tripod after recuperation on 8/02.

- 08h10 – 9h10 Dismantling of new measuring instruments and mounting of old instruments on tripod.
- 09h10 - 09h20 Deployment of tripod at 51°N 21.730', 3°E 7.493'.
- 09h20 - 10h00 Transit to Zeebrugge. Disembarkation of MOMO team. Embarkation of RCMG & MARBIO team.

Touch & go at Zeebrugge (9h59 – 11h10). Embarkation of video equipment.

Transit to the Hinder Banken region

- 13h50 – 14h50 Video recordings. Due to the strong currents during the spring-tide cycle, it was decided to postpone the video recordings until tidal reversal. Two points were measured. Meanwhile the Hamon grab is being prepared.
- 14h50 – 18h30 Hamon grab samples. In each point two samples are taken: one sedimentological (RCMG), one biological (MARBIO). In total 3 points are sampled. A fire drill took place between 16h40 and 17h10.
- 18h30 – 20h08 Video recordings during the reversal of the tide: 4 recordings.
- 21h00 - Multibeam calibration and recordings. Box 4 is completed.

Wednesday, February 9th

- 4h20 End of multibeam recordings
- 5h10 – 8h00 Video recordings: 7 stations.
- 8h00 – 12h00 Hamon grab sampling: 13 stations, 2 grabs per station.

- 12h50 – 18h15 Multibeam recordings in Box 5: 8 lines were recorded.
- 18h30 – 20h20 Video recordings: 6 stations, lamp broke down in 7th station.
- 20h50 - Multibeam recordings in Box 5 (continuation): 9 lines were recorded.

Thursday, February, 10th

- 3h30 Due to bad weather, it was decided to stop the multibeam measurements.

Transit to Zeebrugge for the disembarkment of Els Verfaillie and Vera Van Lancker (UG-RCMG).

Touch & go at Zeebrugge (8h24 – 9h04).
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Transit to the Sierra Ventana region

- 11h00 – 15h40 Multibeam measurements over the new dumpsite. Due to bad weather, lines had to be sailed from SW to NE. 5 lines were recorded, then quality became too poor.
- 16h00 – 17h35 Transit to the Appelzak.
- 17h35 - Due to the bad weather, it was decided to spend the night at anchor in the Appelzak, sheltered from the open sea by the Paardenmarkt.

Friday, February, 11nd

- 4h30 - 6h00 Transit to Sierra Ventana.
- 6h00 – 7h30 Video recordings: 2 stations. Recordings were stopped as there was no visibility at all.
- 8h00 – 10h20 Hamon grab sampling: 12 stations in the region of the Sierra Ventana where multibeam was done (RCMG). 2 stations in the Scheur towards Zeebrugge (MARBIO). In all stations only one sample was taken.

Transit to Zeebrugge

- 11h00 Arrival at Zeebrugge. Disembarkment of scientific equipment and personnel
- End of campaign ST0502 -

6. REMARKS

Video measurements

-Attention has to be paid to the strength of the currents. Only in current strengths less than 1.2kn, safe recordings can be made. Because of the spring-tide during this campaign, recording time boxes were limited to reversal of the tide.

-Recordings near the Sierra Ventana were worthless as the visibility is zero. This has already been observed in a previous campaign when recordings were made near the Ostend dump site. Important for good recordings is the type of sediment on the bottom, the depth and the previous weather conditions.

-Recordings are made with the ship motors off, and the ship adrift. This causes the camera to jump up and down. A hydraulic compensation mechanism mounted in the cable could be useful for future recordings.

Hamon grab

-The instrument is used for the first time on the Belgica. Both the RCMG-team (sedimentological samples) as the MARBIO-team (biological samples) are very satisfied with the results. Moreover the instrument is user-friendly and works quite well with a rougher sea-state. 3 crew members and 3 scientists are needed.



Recovery of Hamon grab



Sample result

-An important remark is that the bucket in some cases (during this campaign 2 out of 56 times) does not close. This is due to the fact that during recovery of the grab, the shackle and swivel that connect the cable of the winch with the cable of the arm onto which the bucket is attached, tends to be stuck in the “knob” of the grab. This causes the arm not to lift and the bucket not to close. This causes also a dangerous situation for the crew members doing the recovery of the grab: if the cable should slip through the “knob”, the grab (425kg) would fall suddenly down. According to the Boots this problem can be solved by lengthening the cable of the arm with 0,5m. A spare cable would also be useful.



Cable of the arm (onto which te bucket is attached) is stuck in the “knob” of the grab.

- MUMM is thanked for providing transport of the Hamon grab from and to Ostend.
- VLIZ is thanked for the use of the Hamon grab.

ANNEX: coordinates of the video and sampling stations

Video stations Hinder Banken area (WGS84)

Area 1: East of the Oosthinder.

number	NB (wgs84)	OL (wgs84)
HB8	51 28.216	2 40.757
HB10	51 28.035	2 40.761
HB12	51 28.012	2 39.619
HB20	51 27.595	2 36.612
HB22	51 27.602	2 37.744
HB24	51 27.601	2 38.877
HB32	51 27.187	2 38.099
HB34	51 27.186	2 36.957
HB36	51 27.179	2 35.808
HB44	51 26.784	2 39.755
HB46	51 26.375	2 40.052
HB48	51 26.340	2 38.826

Area 2: in the swale between West- and Oosthinder

number	NB (wgs84)	OL (wgs84)
HB_WO1	51 24.252	2 30.361
HB_WO2	51 24.854	2 31.094
HB_WO4	51 24.945	2 29.490
HB_WO5	51 26.349	2 32.657
HB_WO6	51 27.730	2 33.564
HB_WO7	51 27.930	2 34.505
HB_WO8	51 28.352	2 34.123
HB_WO9	51 24.611	2 30.188

Hamon grab stations Hinder Banken (WGS84):

number	NB (wgs84)	OL (wgs84)
HB1	51 28.305	2 38.051
HB2	51 28.146	2 38.087
HB3	51 27.812	2 38.211
HB4	51 27.371	2 37.178
HB5	51 27.335	2 37.920
HB6	51 27.311	2 38.675
HB7	51 27.229	2 39.259
HB8	51 27.078	2 36.660
HB9	51 27.100	2 37.554
HB10	51 27.048	2 38.382
HB11	51 26.965	2 39.215
HB12	51 27.199	2 40.107
HB13	51 26.941	2 39.872
HB14	51 26.735	2 36.555
HB15	51 26.763	2 37.364
HB16	51 26.731	2 38.179
HB17	51 26.781	2 38.989
HB18	51 26.721	2 39.824
HB22	51 26.505	2 39.285
HB23	51 26.521	2 40.102

Hamon grab stations Sierra Ventana (WGS84):

number	NB (wgs84)	OL (wgs84)
SV6	51 26.796	3 01.355
SV7	51 26.623	3 02.630
SV8	51 26.895	3 01.377
SV9	51 27.216	3 01.747
SV10	51 27.436	3 02.093
SV11	51 27.721	3 02.561
SV12	51 27.863	3 03.029
SV13	51 27.018	3 01.335
SV14	51 27.495	3 02.058
SV15	51 26.591	3 00.866
SV16	51 26.702	3 00.798
SV17	51 28.152	3 03.147

Hamon grab stations Scheur (WGS84):

number	NB (wgs84)	OL (wgs84)
Scheur1	51 24.006	3 06.033
Scheur2	51 24.022	3 08.015