RV BELGICA CRUISE 2012/03– CRUISE REPORT

Subscribers:	Willem Versteeg, David Garcia Moreno
Institutes:	UGent - Renard Centre of Marine Geology
Addresses:	UGent-RCMG: Krijgslaan 281 S8, 9000 Ghent
Telephones:	+32(0)9 264 45 94
E-mails:	Wim.Versteeg@vliz.be David.GarciaMoreno@oma.be

Geology: 06/022012 - 10/02/2012

---

1. CRUISE DETAILS

1.	Cruise number	2012/03
2.	Date/time	Zeebrugge ETD: 06/02/2012 at 13h30 Zeebrugge ETA: 10/02/2012 at 09h15
3.	Chief Scientist Participating institutes	Willem Versteeg David Garcia Moreno RCMG - Ghent University (Belgium); Koninklijke Sterrenwacht van België; Université de Paris VI (F); Université des Sciences et Technologies de Lille (F); Institut de Radioprotection et de Sûreté Nucléaire (F).
4.	Area of interest	France & UK (French-British Continental Shelf) Between N 50°52.2', E 1°34.2' and N 51°8.4', E 1°22.2'

2. LIST OF PARTICIPANTS

INSTITUTE	NAME	06/02 – 10/02/12
UGent, RCMG	Willem VERSTEEG	X
Kon.Sterrrenwacht	David GARCIA MORENO	X
Kon.Sterrrenwacht	Kris VANNESTE	x
Kon.Sterrrenwacht	Koen VERBEEK	x
Univ. Lille I, France	Alain TRENTESAUX	x
Student ULB	Billie HEENE	x
Student UGent	Sophie VAN DE PUTTE	x
Student UGent	Naomi DE ROECK	x
Student UGent	Alexander COMEYNE	x
Total number of participants:		10

3. SCIENTIFIC OBJECTIVES

Onshore, investigations are being conducted on the North-Artois Shear Zone, an old fault zone which may have become active again, and which continues through the English Channel. The purpose of this Belgica 2012/03 cruise is to look for evidence of recent activity of these faults in the English Channel, such as displacement of young sediments or tectonic seafloor relief.

This campaign will focus on the following objectives within the study area (Figure 1):

1. ***Multibeam bathymetry:*** using the shipboard EM3002 multibeam bathymetry echosounder, bathymetry data will be collected towards the Northwest in the direction of the prolongation of the suspected fault in order to extend the multibeam-bathymetry map constrained from the data collected in 2010 from the French side of the Dover/Pas-de-Calais Strait with the same purpose.

2. ***High-resolution single channel sparker seismic profiling:*** Seismic lines will be acquired perpendicular to the prolongation of the suspected fault with a mean separation of 1.5 km between profiles.

The campaign was executed in close cooperation with Koninklijke Sterrenwacht van België, Université de Paris VI (France), Université des Sciences et Technologies de Lille (France) and Institut de Radioprotection et de Sûreté Nucléaire (France).

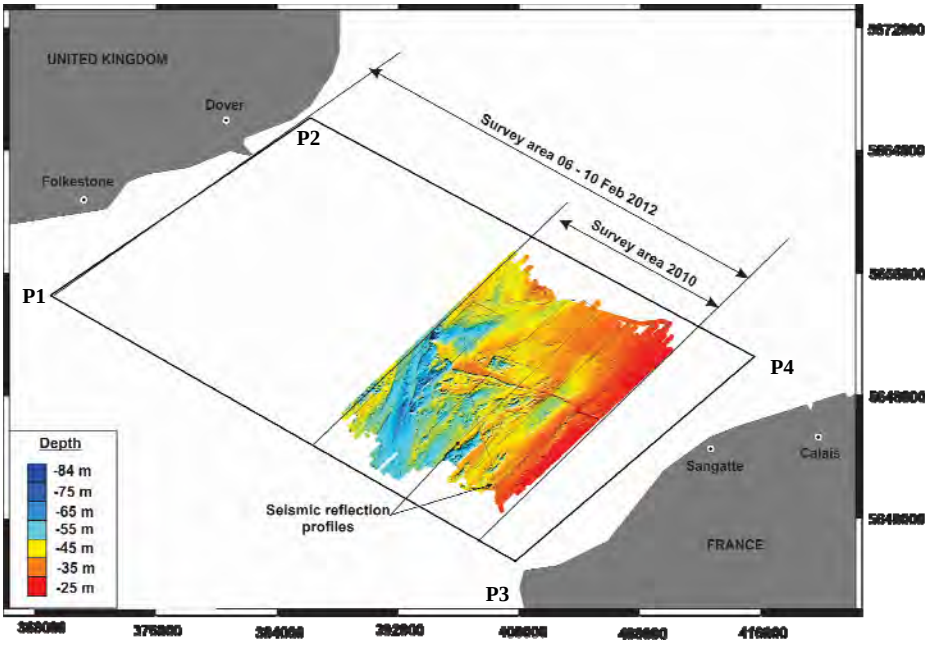

Figure 1: ***Localization map of the survey area schedule on 06-10 Feb 2012 plotted with the location of the survey of 2010 (Projections: UTM-WGS 84).***

Data will be available in near real-time via MUMM's public web site and following quality control, from the Belgian Marine Data Centre.

4. OPERATIONAL COURSE

All times are given in local time. All coordinates in WGS84.
Throughout the campaign, measurements are made with the AUMS system.

Multibeam survey

The multibeam echosounder used during this cruise is the Simrad EM3002d system from the Belgian Ministry of Economical Affairs, installed permanently on the Belgica. Standard procedures were chosen for its application. Before leaving the port of Zeebrugge, the draft of the ship was measured at four locations, resulting in the average value of 3.25 m.
Once arrived at the study site, the sound absorption coefficient in the water was calculated from the temperature, salinity and pH of the surface water, given by the ODAS-II system. An average of 0.040 km was taken for the survey water depth. A sound profile was not taken as the water layer appears to be really well mixed from previous experiences.
A calibration of the multibeam system was not needed due to the fact that on a previous campaign the calibration of the system was already executed by colleagues of the Belgian Ministry of Economical Affairs. The water layer appears to be really well mixed, so we selected an average velocity of 1478 m/s for the water layer.

During the actual survey we aimed at keeping a 10-20% overlap between the consecutive swaths. This resulted in an average line spacing of 150 m for an average depth of 30 m. This line spacing could dynamically change in real-time by the operators of the multibeam within the planning module of the SIS-software. The coverage of the multibeam data is also controlled by the crew on a 2nd display near the steering wheel.
The weather conditions were excellent during this survey permitting a good freedom of movement to collect the data. However, the traffic in this area is very dense forcing us to shot most of the multibeam and seismic lines following the direction of the traffic navigation (NE-SW) of perpendicular to it (N-S). The acquisition of the bathymetry was also disturbed by very shallow sand-banks (> 5 m depth) located in the western part of English side of the study area, preventing the data acquisition from these location.
During the survey, the "raw" data were regularly backed up on an extra PC.

Seismic survey

The seismic profiling was performed with a SIG Sparker source (120 electrodes), and recorded through a single channel surface streamer using IXSEA DelphSeismic acquisition software. Initially the Sparker was triggered every 750 ms with energy of 500 J. The sampling frequency was set at 10 kHz and a record length of 400 ms TWTT was used. Due to the electrical propulsion and the strong (changing) tide-currents, the velocity of the ship changed along the sailing lines with opposite directions, being in between 4 and 6 knots.

Operational Report

It is worth noting that the time used in this cruise report and on the multi-beam and seismic sheets is in the UTC time (Belgian time –1 hour). The EM3002D multibeam data were acquired in GMT time.

Monday 06.02.2012
09:15 (Belgian time) Arrival of scientific team.

13:00 (Belgian time) Start of mobilization & installation of equipment on RV Belgica

13:30 (Belgian time) Departure of RV Belgica towards survey area. The departure time was delayed from the schedule 10:30 to 10:30 due to a problem with the main crane of the Belgica.

14:00 (Belgian time) Safety briefing for new embarked scientists
20:00 (Belgian time) Arrival near the NW-point of the study area

Survey details:

LN	Start time (PU-Time)	End time (PU-Time)	Comments
Monday 06.02.2012			
1	19:33	20:52	Seismic starts
2	20:53	21:06	Transit line
3	21:06	22:41	21:17 shipwreck?
4	22:43	22:53	Transit - Parameter Alpha change from 68.9 to 65.04 (T ~6.5 °C, salinity ~35.25 ppm, pH ~8.15, Vs ~1478 m/s)
5	22:58	01:17	00:13 shipwreck 01:00 small wreck
Tuesday 07.02.2012			
6	01:21	01:27	Transit line
7	01:31	03:29	01:38 fault & fosses on seismic p
8	03:32	03:45	Transit line
9	03:47	5.27	
10	05:28	5.48	Transit line
11	5.5	08:50	
12	08:55	09:07	Transit line (sparker electrode cut during this line) - we miss about 200 m from the last line

13	09:08	11:14	Seismic line 12
14	11:17	11:27	Transit line, Seismic acquisition out during second half of transit line
15	11:29	13:07	
16	13:08	13:20	Transit line
17	13:22	15:11	14:58 stop seismic
18	15:12	15:35	Transit line - The satellite signal was lost at 15:31 - Stop 5 min from 15:30
19	16:02	17:49	on the first line from the SE
20	17:51	18:22	no overlap to the SW
21	18:25	20:34	Interval reduced to 180 m
22	20:36	21:07	
23	21:09	22:38	21:27 shipwreck
24	22:40	23:26	
25	23:28	00:29	
Wednesday 08.02.2012			
26	00:34	01:42	
27	01:45	02:57	
28	02:59	03:44	
29	03:45	05:48	spacing: 180 m
30	05:50	06:32	spacing: 160 m
31	06:36	08:10	
32	08:13	08:45	change track caused by buoy
33	08:50	09:48	9:04 noise data
34	09:51	10:33	
35	10:35	11:20	
36	11:22	12:33	
37	12:39	13:30	12:57 change to parallel line continued logging
38	13:32	14:40	14:17 change to parallel line in between at 75 m
39	14:44	15:44	
40	15:46	16:24	Changed line spacing to 200 m in the deeper part; 16:00 deviation to port to avoid lightship
41	16:26	17:31	16:57 deviation to port to avoid lightship
42	17:32	17:47	New line with a 200 m interval. Stop at the lightship to move 150 m N
43	17:49	18:17	
44	18:22	18:58	
45	19:00	20:04	this line is 140 away from previous one
46	20:04	20:40	
47	20:41	21:30	Boot went zigzagging to fill some small holes at the end
48	21:31	21:44	Changed the line in same direction
49	21:45	22:16	small deviation at the end due to the presence of a light
50	22:16	22:48	small deviation at the beginning due to the presence of a light
51	22:49	23:32	
52	23:33	00:00	
Thursday 09.02.2012			
53	00:02	00:28	
54	00:31	00:42	
55	00:48	01:17	
56	01:18	01:21	problem with compass

57	01:23	01:30	transit
58	01:30	01:55	
59	02:05	02:20	
60	02:22	02:29	
61	02:32	02:49	
62	02:52	03:05	
63	03:06	03:28	
64	03:30	03:46	
65	03:53	04:13	Returning to SW of study area, mostly duplicate line
66	04:15	04:27	
67	04:29	04:39	
68	04:40	04:42	Stopped logging due to gyro problem
69	04:46	04:49	Returning to previous line
70	04:50	04:52	Stopped logging due to gyro compass problem
71	06:08	06:16	
72	06:17	06:34	Connection line then profile
73	06:39	06:44	Short SW-NE profile to pass over the "submarine"
74	06:47	06:58	
75	07:00	07:26	
76	07:27	07:34	
77	07:40	08:28	Transfer N-S seismic line
78	08:38	10:46	N-S seismic line + connection line
79	10:47	12:01	
80	12:09	12:37	Transit line
81	12:37	15.27	
82	15.29	16:26	Transit line
83	16:30	19:41	long seismic line England - France; cut electrodes 19:43 seismic line 22 stoped 1 min
84	19:54	20:19	19:52 seismic line 23 stopped and 19:54 line 24 activated
85	20:19	21:17	Transfer - Fin profile seismic 26
86	21:20	23:22	
Friday 10.02.2012			
87	23:26	00:16	
88	00:29	00:40	End of seismic survey and departure to Zeebrugge

Overview start en end times of seismic profiles

Seismic line start end (acquisition PC time; GPS time stored in header)

Monday 06.02.2012		
Art120201	19:38	19:52
Art120201_1	19:51	20:52
Art120202	20:54	21:06
Art120203	21:06	22:42
Art120204	22:44	22:53
Art120205	22:58	01:18
Tuesday 07.02.2012		
Art120206	01:21	01:28
Art120207	01:31	03:25
Art120209	03:43	05:24
Art120210	05:27	05:44

Art120211	05:48	08:50	
Art120212	09:08	11:14	Sparker electrodes cut before start of line.
Art120213	11:17	11:24	
Art120214	11:55	13:06	
Art120215	13:08	13:20	
Art120216	13:24	14:57	Stop of seismics due to sea state (6-7 Bft)
Thursday 09.02.2012			
Art120217	08:38	10:18	
Art120218	10:19	10:46	
Art120219	10:47	12:05	
Art120220	12:36	15:27	
Art120221	15:29	16:25	
Art120222	16:32	19:42	
Art120223	19:43	19:51	Sparker electrodes cut
Art120224	19:53	20:17	
Art120225	20:17	20:19	
Art120226	20:20	21:16	
Art120227	21:18	23:22	
Art120228	23:36	00:16	
Friday 10.02.2012			
Art120229	00:18	00:28	
Art120230	00:29	00:40	Stop of the measurements

- End of campaign 2012/03-

5. TRACK PLOT

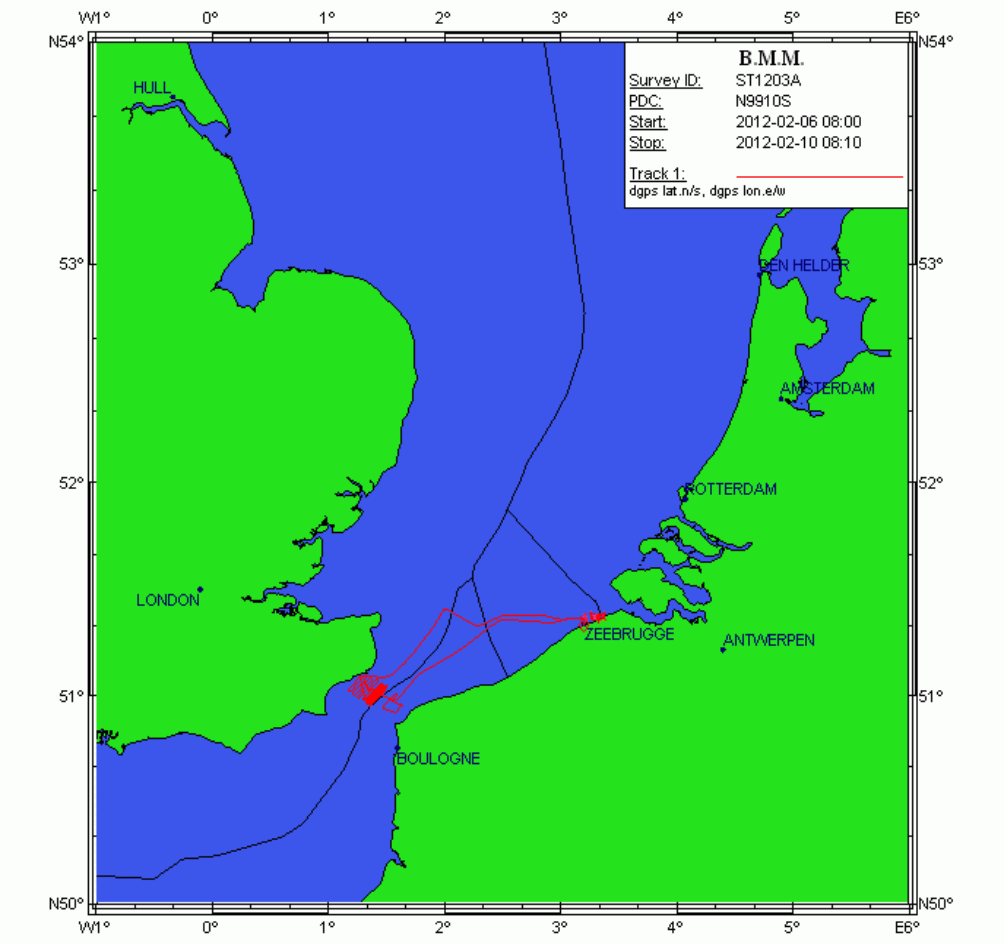

Figure 2: Track plot of campaign 2012/03

6. MEASUREMENTS AND SAMPLING

Overview of the acquired data

In this section, a brief overview is given regarding the obtained datasets during the campaign.

Preliminary results of the EM3002D multibeam survey

several kilometers of multibeam coverage was acquired in the English and French sites of the Channel during this survey (Figure 2). This bathymetry has revealed several paleochannels and basins (some of them completely isolated), as well as some scarp-like features that may be interested for our seimotectonic study. These structures will be further investigated after cleaning and processing this multibeam dataset.

Preliminary results of the seismic survey.

During the seismic survey, a total of 15 long (> 10 km) and 8 (< 5 km) short seismic lines were sailed over a distance of 120 km (figure 2). All lines are stored in SEGY-format, which is the standard exchange format for this kind of data. The weather conditions were excellent for seismic adquicition, thus we expect data of much better quality than the one took in 2010 (Figure 1). After processing and especially with the help of swell-fitering we hope to get better understanding of the features identified on the bathymetry and some deformation structures seen

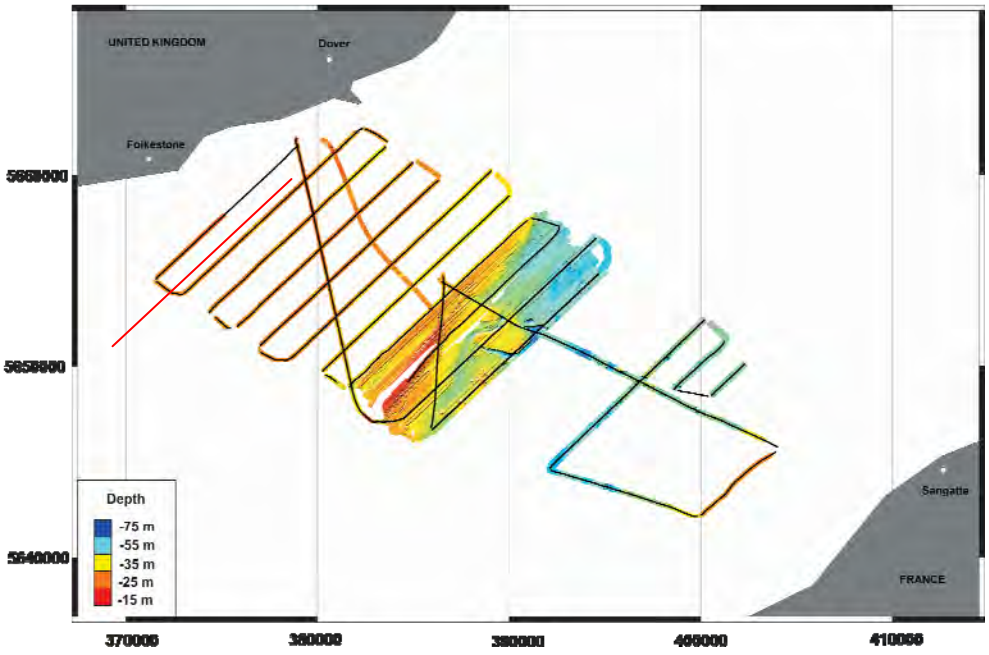

Figure 3: ***"raw" bathymetry map from multibeam data plotted with the location of the seismic profiles (black lines) collected during this campaign. Red line: Profile plotted in figure 3.***

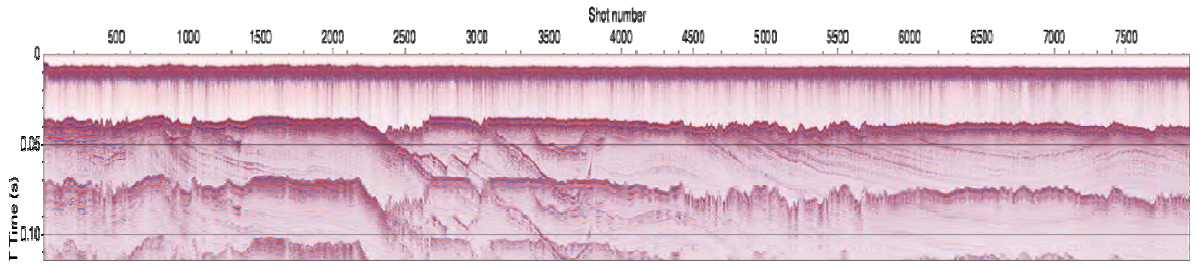

Figure 4: example of one of the Seismic profiles collected during the February 2012 campaign (see figure 2 for location).

7. REMARKS

First of all, we want to thank the captain and crew for their tremendous efforts and the fine cooperation for this campaign. The on-board skillfulness really contributed greatly to this success of this campaign.

Due to good weather conditions we acquired very good seismic and MB data. However, we could not fit the English and (previous acquired) French bathymetry due to miscommunication about the permits needed to cross the English-French boundary. But fortunately it resulted in spectacular seismics in the French survey area.

8. DATA STORAGE

The multibeam and seismic data are stored at the RCMG on DVD disks and external hard-disk. For more information about these data, please contact:

Wim Versteeg (Willem.Versteeg@UGent.be)
Marc De Batist (Marc.DeBatist@UGent.be)
Renard Centre of Marine Geology (RCMG)
Department of Geology and Soil Science
Ghent University
Krijgslaan 281 s8
9000 Gent
Belgium
Tel.: +32 9 264 4596
Fax: +32 9 264 4967
http://www.rcmg.ugent.be

or

David García Moreno
Royal Observatory of Belgium
Av. Circulaire 3,
1180-Bussels.
Belgium
Ph: +32 (0) 28 90 98 85
Email: David.GarciaMoreno@oma.be

ODAS III Data will be available in near real-time via MUMM's public web site and following quality control, from the Belgian Marine Data Centre.