Cruise Report

Belgica 11/18a

Le Danois Bank

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& the shipboard scientific party

RCMG

Renard Centre of Marine Geology

Ghent University, Belgium

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1. Cruise reference

Belgica 10/18a
Zeebrugge (B) – Bilbao (ES)
07.06.2011 – 15.06.2011

2. Framework and objectives

2.1 Framework

The research programme of Belgica cruise 2011/18a is built upon achievements of previous projects such as EC FP6 HERMES, ESF EuroDIVERSITY MiCROSYSTEMS and EC FP7 HERMIONE. More specifically, it frames into the following projects;

- **Projecto coordinado CONTOURIBER (2009-2012)**

  This Spanish project aims to investigate the evolution and global implications of *contourite depositional systems* (CDS) generated by the Mediterranean water masses around Iberia (Hernández-Molina *et al.*, in press). Its objectives are (1) to characterize the contourite sedimentation with special emphasis in its onset and development, (2) to establish the evolution of the CDS in different areas under the influence of the *Mediterranean Outflow Water* (MOW), (3) to determine the recent sedimentary and palaeoceanographic processes in every CDS and (4) to identify the present Mediterranean water masses dynamics and its interrelation with morphologic features of the margin and development of geohabitats. Its activities are related to the oceanic drilling proposal in the Gulf of Cadiz and off West Iberia, within the international program Integrated Ocean Drilling Program (IODP Exp. 339, 17/11/11-17/01/12).

- **FWO post-doctoral project D. Van Rooij: "*Influence on deep-water ecosystems by the Plio-Pleistocene variability of bottom currents generated by intermediary water mass dynamics*" (2008-2011)**

  This project focuses on three main objectives, studied on less known key sites along the pathway of intermediate water masses such as the MOW;

  (a) Determination of the Plio-Pleistocene spatial and temporal variability of bottom currents generated by intermediate water masses (Van Rooij *et al.*, 2010a).

(b) Assessment of the direct and indirect consequences of this variability on palaeo-ecological level (influence on deep-water ecosystems) and on the level of co-occurent sedimentary processes (contourite genesis).

(c) Exploration of poorly-known, drift-associated deep-water coral ecosystems along the entire Atlantic margin, and specifically in the Bay of Biscay (Van Rooij *et al.*, 2010a).

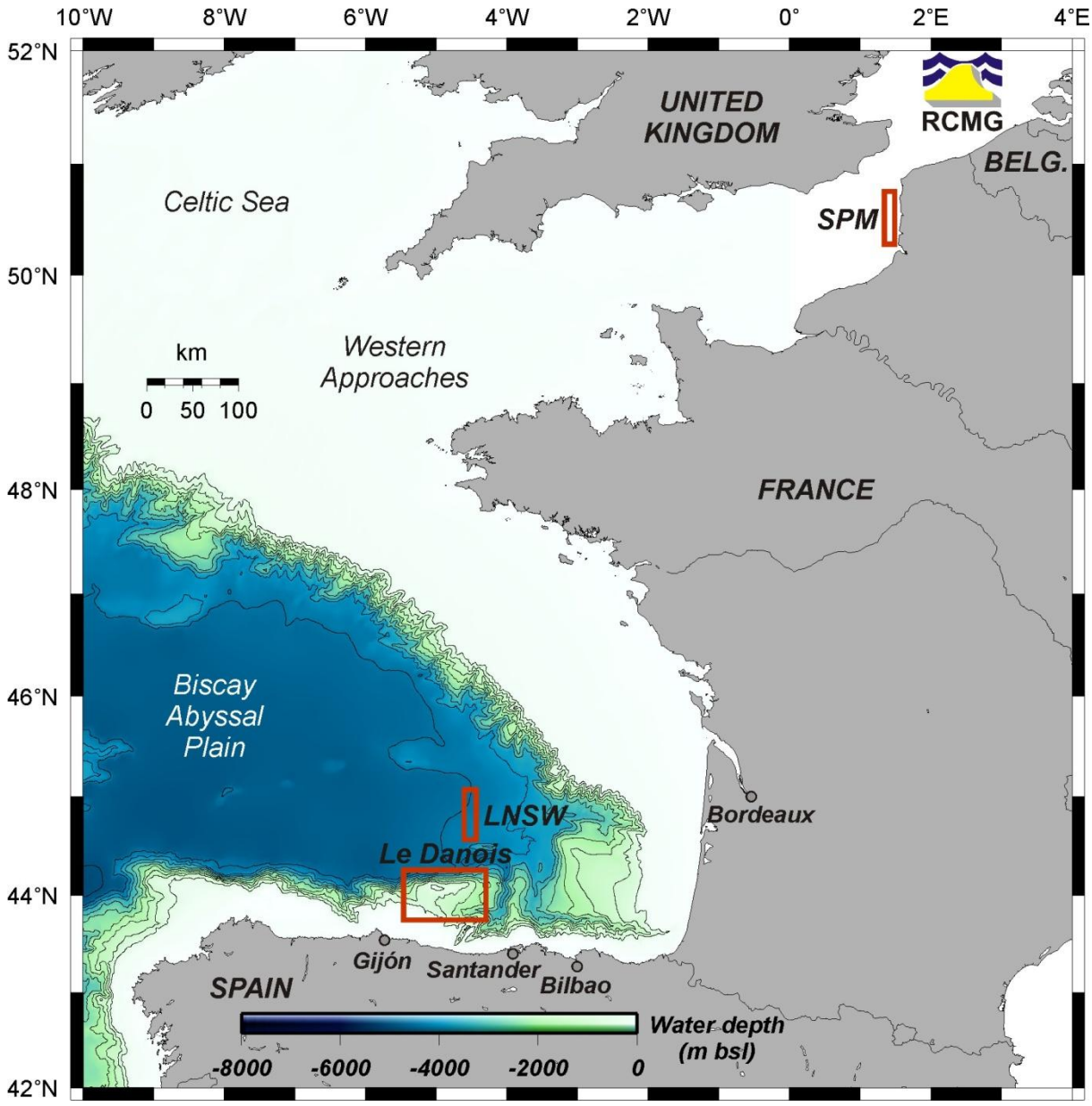

Figure 1: *Location map of the study areas (red boxes) during the R/V Belgica ST1118a campaign.*

2.2 Objectives

2.2.1 RCMG-DVR "*ANIMO*"

This cruise aims to investigate the seismic stratigraphy and palaeoceanographic evolution of the *Le Danois contourite depositional system* (Van Rooij *et al.*, 2010b), at several locations in the Le Danois "intraslope basin", within the framework of "*Assessing the Neogene Variability and Influence of the Mediterranean Outflow Water within the NE Atlantic Ocean*". Previous research (R/V Belgica in 2004, among others) has highlighted a significant correlation with the Cadiz CDS, suggesting a nearly simultaneous control by the Mediterranean Outflow Water since the Early Pliocene (Van Rooij *et al.,* 2010b; Ercilla *et al.*, 2008). As such, the Le Danois CDS is the only location in the Bay of Biscay where high-resolution climate change (e.g. bottom currents) may be recorded in a continuous way. It will assist in better constrain the role of the MOW in the thermohaline circulation system.

Therefore, this large-scale sediment body is an ideal target for (a) investigating the MOW palaeoceanography within the NE Atlantic basin and (b) a palaeoclimatologic reconstruction of the Cantabrian margin. The main objective of this campaign is to acquire additional geophysical data which will give more insight in the construction and 3D evolution of this sedimentary deposit. This campaign will be executed in close cooperation with the Proyecto Coordinado CONTOURIBER (CTM 2008-06399-C04/MAR), with invited researchers from Spanish research institutes.

More specifically, R/V Belgica ST1118a aimed to perform:

- ***High-resolution single channel sparker seismic profiling:*** investigation of the stratigraphic framework and the sedimentary environment in the western part of the intraslope basin between the *Vizco High* (west), the *Lastras canyon system* (east), *Le Danois bank* (north) and the *Asturias continental slope* (south). This will mainly focus on the lateral and temporal evolution of Le Danois drift and the Gijon drift and their interaction. The location of these profiles is determined based on industrial multichannel airgun profiles, in order to compare seismic methods with different penetration depths and seismic resolutions. We are very grateful to TGS-NOPEC for allowing us to use a large unpublished data set of seismic records from the Cantabrian Sea.
- ***Hydrography:*** at specific sites in the intraslope basin, CTD casts will aim to better map the presence and behavior of the Mediterranean Outflow Water within the main elements of the Gijon and Le Danois drifts. The newly acquired Seapoint turbidity sensor will be able to indicate regions of active sediment transport within the Le Danois CDS.

In order to respect the Marine Protected Area status of the Le Danois Bank, special care was taken to ensure vigilance with respect to marine mammals. For this, a close cooperation was set up with the participating team of whale watchers of MUMM, ULg (Belgium), CRMM (France) and OCEAMM (France).

This part of the campaign is a cooperation between the RCMG (UGent), the University of Vigo, the Geological Survey of Spain (IGME), the Spanish Oceanographic Institute (IEO), the Spanish Institute of Marine Sciences (CMIMA-CSIC) and the University of Cádiz.

2.2.2 BMM-JAUNIAUX

The principal objective of the project "*Small Cetaceans in the European Atlantic and North Seas*" is to test and practice cetacean survey protocols, as developed in the European SCANS projects. The aims of these projects were to estimate absolute abundance of small cetaceans, particularly of harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*) and common dolphin (*Delphinus delphis*) inhabiting shelf waters of the Atlantic margin, the North Sea and adjacent waters. The information on abundance is essential to assess the impact of bycatch in fishing gear and other anthropogenic threats, and as input to management actions to ensure the favourable conservation status of these species.

In addition, seismic surveys are suspected to have an impact on some target cetacean species such as beaked whales but the exact relationship is not demonstrated and subject to controversy. The presence of whale-watchers reporting the presence of species as well as their behaviour:

- can help in the understanding of the potential impact of seismic surveys on cetaceans;
- allows potential adaptation of the survey protocol taking into account the presence of some targeted species by reducing or stopping the seismic, by reducing the vessel speed or changing the navigation route;
- allows the deployment of the hydrophone available on board (POD) for the recording of selected species.

2.2.3 KUL-RA "*Clay mineralogy*"

The main objective of this part of the campaign is the source tracing of muddy sediments in the Belgian coastal area. Some of the proposed sediment sources in literature are the English Channel and Atlantic Ocean, transport via the North (Northern North Sea) and/or the estuary of the Rhine. Hydrodynamically, the English Channel is the most obvious sediment source but this was clearly not proven by earlier studies (Zeelmaekers, KUL). This sampling campaign aims to work with a larger sample set, taking into account both space and time

variations. These parameters need to be evaluated before excluding the English Channel as the main provenance area. The aim is to sample suspended particulate matter (SPM) in the English Channel (from different distances of the French coast) in combination with bottom load samples to confirm their correlation. This project is in the framework of a PhD study in Sciences (Geology) of the KUL.

2.2.4 MUMM "*Sea water sampling*"

Additional sampling of surface waters during the transit towards the study area will be performed upon request of Marc Knockaert (MUMM-Marchem). For this purpose, 2 tanks of 600 L will be filled with Low Nutrient Seawater (LNSW). The sampling will be carried out over a deep-water location within the Bay of Biscay.

3. Departure and arrival of the cruise

Departure: Zeebrugge (B)	07.06.2011, at 10h25.
Arrival: Bilbao (ES)	15.06.2011, at 04h00.

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4. Working area

The main study area for objectives 2.1 and 2.2 are located on the Cantabrian continental margin, in the intraslope basin between the Asturias shelf and the *Le Danois Bank*, in water depths between 200 and 1000 m depth, 30 nautical miles north of the Iberian Peninsula (Fig. 1). More specifically, the area of operations is restricted between the *Vizco High* in the West, the *Llastres Canyon* in the East, *the Le Danois Bank* in the North and the *Asturias* shelf in the South (Fig. 1). Objectives 2.3 and 2.4 will be carried out during the transit towards the study area, respectively along a coastal transect near Pas-de-Calais and in the central Bay of Biscay.

4.1 Coordination at Sea

Chief scientist:	Prof. Dr. David VAN ROOIJ Renard Centre of Marine Geology (RCMG), Ghent University, Belgium
Co-chief scientists:	Willem VERSTEEG

4.2 Scientific staff

Prof. Dr. David VAN ROOIJ	Ghent University, RCMG,
Willem VERSTEEG	Ghent University, RCMG,
Gloria JANE	IGME (Spain),
Dr. Maria del Carmen FERNANDEZ-PUGA	Universidad de Cádiz (Spain),
Carmen JUAN	CMIMA-CSIC (Spain),
Ruth MARTINEZ LAMAS	Universidad de Vigo (Spain),
Thomas VANDORPE	Ghent University, RCMG,
Willem VANDOORNE	Ghent University, RCMG,
Dr. Thierry JAUNIAUX	Université de Liège & MUMM,
Dr. Emeline PETTEX	CRMM (France),
Valentine SIMAR	OCEAMM (France),

4.3 Operations

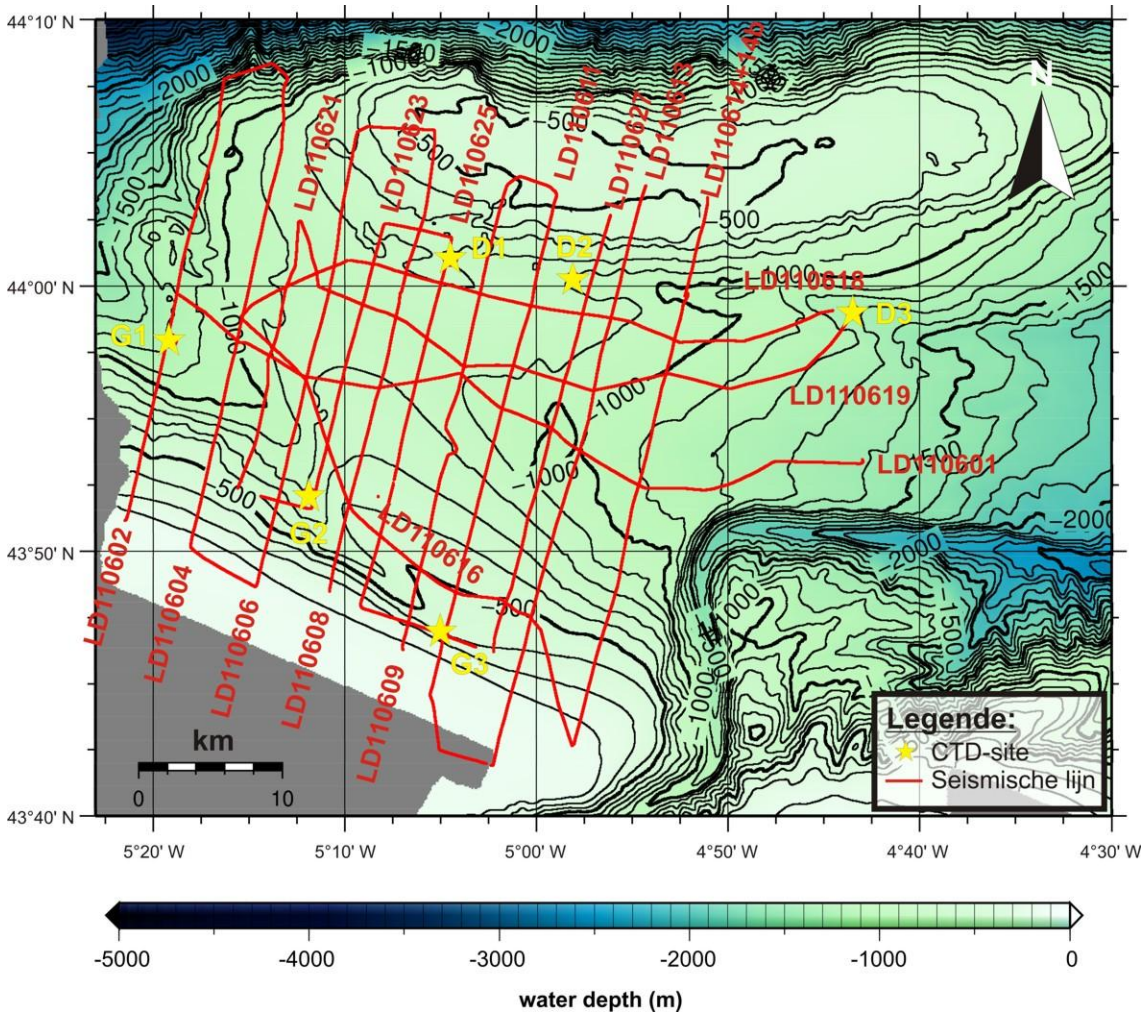

Figure 2: *Location of seismic profiles (red lines) and CTD-sites (yellow stars) in the Bay of Biscay. Note that connection profiles are indicated, though not annotated on the map. Multibeam bathymetry data by courtesy of the IEO, acquired within the framework of the ECOMARG project.*

4.3.1 Seismic survey

The single channel reflection seismic profiling was performed with a SIG sparker source (120 electrodes), and recorded through single channel surface streamer using Delph Seismic 2.7.0.0 (Ixsea). The sparker source was triggered every 2.5 s reaching 500 J energy. The sampling frequency was set at 10 kHz and a record length of 2.2 s TWT was used. The data was filtered using a 80-2500 Hz analogue bandpass filter. The velocity of the ship during surface sparker seismics was maintained at about 3.5 knots. During the sparker seismic profiling, the whale watchers were in direct radio contact with the crew to ensure a close coordination to adapt the seismic survey or the R/V Belgica track in case of target species observation.

4.3.2 CTD measurements

CTD measurements during this campaign were acquired from the Seacat SBE-19 Plus deep-water CTD profiler of the MUMM. The data were processed using SBE Data Processing (v7.18c) software. Only downcast profiles were selected and binned at 5 m.

4.3.3 SPM transect

The SPM sampling was performed using the ship's centrifuge system, along a well-defined track along the French northern coast (Cap Gris Nez – Le Touquet – Somme Estuary). At the start of the track (see coordinates below), the centrifuge was turned on, filtering suspended material from the pumped surface water. At the end of the track, the suspended material was collected and stored.

	Latitude	***Longitude***
Start centrifuge	*50°48.6968'N*	*1°31.7957'E*
Mid-way	*50°32.3965'N*	*1°31.9667'E*
Stop centrifuge	*50°17.1958'N*	*1°29.2982'E*

Table 1: *Coordinates of the SPM transect along the French coastal zone.*

4.3.4 Operational Report

It is worth noting that the time used in this cruise report and on the seismic survey sheets is the Belgian Summer time (BRAVO TIME = UTC+2hours). The whale watching survey took place every day from 08:00 to 22:30.

Tuesday 07.06.2011

Meteo: Sea state 3 to 4, in a general clear and dry weather.

10:25 Departure of R/V Belgica towards Iberian continental margin
10:35 Safety briefing on aft deck
10:45 Abandon ship training
14:00 Scientific briefing in wardroom, with presence of CO, XO, HTD and boatswain of R/V Belgica. Discussion of whale watching procedure and implementation on seismic survey
17:25 Start of SPM track at 50°48'36.78"N and 001°31'20.64"E
20:38 End of SPM track at 50°18'48.18"N and 001°26'00.54"E

Wednesday 08.06.2011

Meteo: Sea state 5 to 6, in a clear to clouded and slightly rainy weather

Transit to study site

Thursday 09.06.2011

Meteo: Sea state 3 to 4, in a general clear and dry weather with an Atlantic swell

Transit to study site, installation of seismic equipment

Friday 10.06.2011

Meteo: Sea state 2 to 3, in a cloudy and dry weather with a gentle Atlantic swell

00:50 Start of acquisition LNSW at 44°58'21.6" N, 3°03'33.12" W
01:27 End of acquisition LNSW at 44°52'13.92" N, 3°01'7.14" W
06:45 Approach study area; transition from diesel to electrical propulsion
06:55 Sparker & streamer in the water, test of acquisition
07:04 Start of line LD110601, heading 238 (av. speed 3.5 knots)
15:05 End of line LD110601; start transit to CTD-site G1
15:35 Start of CTD G1, water depth 1208 m (43°57'56.64" N, 05°19'06.30"W)
16:14 CTD reaches bottom of the seafloor; start retrieval B1118a-CTD-01 (1200 m)
16:20 Winch problem: cable track above 1200 m (cfr. Belgica ST1017b)
16:30 Winch problem solved
17:05 End of CTD G1; start transit to start line LD110602
17:42 Start of line LD110602, heading 006 (av. speed 3.4 knots)
20:50 Strange feature observed on the seabed on EA400 33/35 kHz
22:38 End of line LD110602; Start of line LD110603, heading 072 (av. speed 3.8 knots)
23:18 End of line LD110603; Start of line LD110604, heading 187 (av. speed 3.7 knots)

Saturday 11.06.2011

Meteo: Sea state 2 to 3, in a partly cloudy to sunny, but dry weather with a very gentle Atlantic swell

04:14 End of line LD110604; start of line LD110605, heading 121 (av. speed 3.8 knots)
05:06 End of line LD110605; start of line LD110606, heading 015 (av.speed 3.4 knots)
10:06 End of line LD110606; start of line LD110607, heading 034 (av.speed 4 knots)
10:48 End of line LD110607; start of line LD110608, heading 190 (av. speed 3.7 knots)

15:42 End of line LD110608
15:45 Switch to diesel propulsion and transit to CTD-site G2
16:30 Approach CTD-site G2
16:33 Start of CTD G2, water depth 795 m (43°52'07.56"N, 05°11'49.62"W)
16:56 CTD reaches bottom of the seafloor, start retrieval B1118a-CTD-02 (790 m)
17:15 Start transit to CTD-site G3
18:06 Start of CTD G3, water depth 395 m (43°46'55.62"N, 05°04'58.74"W)
18:20 CTD reaches bottom of the seafloor, start retrieval B1118a-CTD-03 (390 m)
18:31 End of CTD G3; start transit to line LD110609; switch to electric propulsion
18:51 Start of line LD110609, heading 020 (av. speed 3.6 knots)
20:44 Deviation of track, square depression on seafloor (43°53'47.97"N, 05°04'18.23"W)
20:57 Change heading to 331, back to line
23:43 End of line LD110609; Start of line LD110610, heading 130 (av. speed 3.4 knots)

Sunday 12.06.2011

Meteo: Sea state 1 to 2 in a cloudy to semi- cloudy weather (occasional droplets of rain) with a gentle Atlantic swell; general improvement of the weather is observed towards the evening

00:19 End of line LD110610; Start of line LD110611, heading 190 (av. speed 3.5 knots)
03:47 Sediment waves-like structures are observed in subsurface
05:52 End of line LD110611; Start of line LD110612, heading 107 (av. speed 3.4 knots)
06:55 End of line LD110612; Start of line LD110613, heading 017 (av. speed 3.6 knots)
12:58 Zodiac in water, start of C-POD measurements at several distances from the research vessel (100, 500 and 1000 m) during both electrical propulsion with and without seismic and during diesel propulsion, in order to obtain background noise measurements.
13:24 EOL LD1106013, switch to diesel propulsion
13:41 Replacement of sparker source (new electrodes)
14:27 End of C-POD measurements, Zodiac back on board
15:07 Start of CTD D2, water depth 813m (44°01'00.18"N, 05°04'29.70"W)
15:31 CTD reaches bottom of the seafloor, start retrieval B1118a-CTD-04 (800 m)
15:39 2 sperm whales observed
15:46 Zodiac in the water for observation of two sperm whales and POD measurements
15:49 End of CTD D2, start transit to CTD-site D3
16:23 Arrival on CTD-site D3
16:30 Start of CTD D3, water depth 917m (44°06'16.50"N, 04°58'03.30"W)
16:57 CTD reaches bottom of the seafloor, start retrieval B1118a-CTD-05 (900 m)

17:15 End of CTD D3, start transit to line LD110614

18:43 Switch from diesel to electric propulsion; start of line LD110614, heading 200 (av. speed 3.5 knots)

19:45 End of line LD110614; turning of Belgica; pick up of Zodiac

20:11 Start of line LD110614b, heading 194 (av. speed 3.6 knots)

Monday 13.06.2011

Meteo: Sea state 1 to 2, in a semi-cloudy and dry weather with a moderate to large Atlantic swell.

01:00 End of line LD110614b; Start of line LD110615, heading 347 (av. speed 3.3 knots)

02:30 End of line LD110615; Start of line LD110616, heading 290 (av. speed 3.6 knots)

02:52 Small deviation due to another ship, heading 303

03:03 Return to line after deviation, heading 279

07:12 End of line LD110616; Start of line LD110617, heading 048 (av. speed 3.6 knots)

07:24 Change of course due to heavy roll of the ship, heading 067 (av. speed 3.7 knots)

08:28 End of Line LD110617; Start of line LD110618, heading 100 (av. speed 3.6 knots)

11:30 Refresher course reanimation by medical officer on board

13:42 End of line LD110618; start transit to CTD-site D4

13:56 Start of CTD D4, water depth 1300m (43°59'03.06" N, 04°43'24.00" W)

14:36 CTD reaches bottom of the seafloor, start retrieval B1118a-CTD-06 (1290 m)

15:01 End of CTD D4; start transit to line LD110619

15:18 Start of line LD110619, heading 216 (av. speed 3.6 knots)

21:57 End of line LD110619; Start of line LD110620, heading 340 (av. speed 3.6 knots)

22:39 End of line LD110620; Start of line 110621, heading 186 (av. speed 3.5 knots)

Tuesday 14.06.2011

Meteo: Sea state 1 to 2, in a cloudy and dry weather with a gentle Atlantic swell.

01:36 End of line LD110621; cutting of the electrodes

01:51 Start of line LD110622, heading 104 (av. speed 4.5 knots)

02:15 End of line LD110622; Start of line LD110623, heading 012 (av. speed 3.8 knots)

05:18 End of line LD110623; Start of line LD110624, heading 104 (av. speed 4.0 knots)

05:49 End of line LD110624; Start of line LD110625, heading 198 (av. speed 3.6 knots)

08:32 No navigation data from shotpoints 3750-3790

09:50 End of line LD110625; Start of line LD110626, heading 110 (av. speed 4.0 knots)

11:02 End of line LD110626; change of power supply CSP1500 to CSP1000

11:12 Start of line LD110627, heading 356 (av. speed 3.5 knots)

16:04 End of line LD110627; end of survey, transit to Bilbao. Break-up and cleaning of the seismic equipment. Back-up of acquired data and preparation for demobilization

Wednesday 15.06.2011

Meteo: Sea state 1 to 2, in a semi-cloudy and dry weather.

04:00 Arrival in the Port of Bilbao (Spain)

09:00 Start of disembarkation scientific team

13:30 Official lunch with the Belgian consul in Bilbao

19:00 Official reception on board of R/V Belgica with invited scientists

4.4 Operational remarks

First of all, we wish to thank the captain and crew for their efforts and the fine cooperation for this campaign. As always, the on-board skilfulness contributed greatly to the success of this campaign.

Some minor problems were encountered with the SBE-19 CTD system. Although the bulk of the parameters worked perfectly (especially the newly acquired Seapoint sensor), the altimeter was not working properly. The altimeter sometimes switched to values of 300 m either 0 m, which is probably related to an oblique angle of descent. Additionally, there was a suspicious increase in temperature, salinity and sound velocity during upcast acquisition, always near 150 m water depth.

Additionally, it is important to note the good and very useful and excellent cooperation between the geophysical and whale watching team, as well as with the crew. Every cetacean observation was directly reported by radio arousing the interest of almost everybody on board. First of all, this allows a safe and environmentally conscious acquisition of seismic data, taking account for the presence of marine mammals. In addition, on June 12 (11h37 local time), a group of three sperm whales was observed, coming to the Belgica (Belgica was stopped for water sampling between two seismic surveys). It has been possible to deploy very quickly the POD hydrophone in 300 meters of distance to record the animals. Such intervention demonstrated that it would be possible to deploy quickly equipment necessary to track and to record selected cetaceans. This also mutually gives possibility to make observations and assess abundances of marine mammals. As such, in order to assure a responsible marine geophysical acquisition procedure in the future, the presence of whale watching teams are strongly encouraged.

4.5 Data processing and preliminary results

In this section, a brief review is given regarding the obtained datasets during the campaign. The location of these data is given in Fig. 3.

4.5.1 Water mass stratification

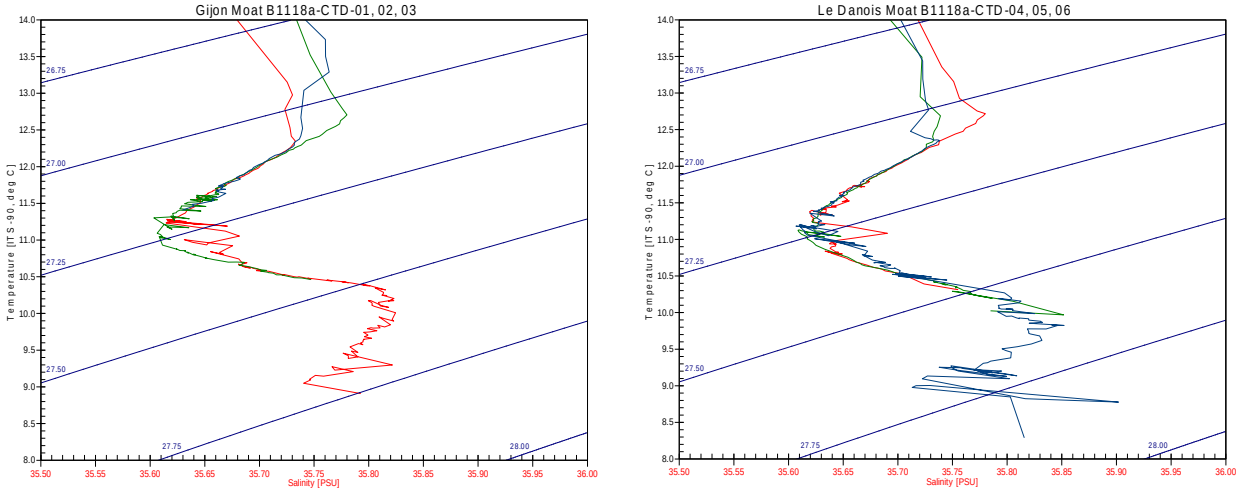

Figure 3: *Compilation of the TS plots for –left- the Gijon Moat (casts 01-02-03) and –right- the Le Danois Moat (04-05-06).*

The general distribution of water masses at the Le Danois intraslope domain can be identified using the potential temperature-salinity plot through the water column (Figs. 3A; B). Below the variable thermocline surface water mass (SW, upper 100 m) down to 550 m water depth, temperature and salinity decrease to values of T = 11°C and S = 35.62. These waters correspond to the Eastern North Atlantic Water (ENAW) being formed mainly during the winter months in the Bay of Biscay and carried northwards adjacent to the NE Atlantic margin (Pollard *et al.* 1996). Higher salinity values below 550 m, up to 35.8, mark the Mediterranean Outflow Water (MOW). All TS plots show a variability in the transition from ENAW to MOW within both the Gijon (casts 01, 02, 03) and Le Danois (casts 04, 05, 06) Moats.

Name	***Location***	***Latitude***	***Longitude***	***Water depth***	***CTD depth***
B1118a-CTD-01	G1	43°57'56.64"N	05°19'06.30"W	1208 m	1200 m
B1118a-CTD-02	G2	43°52'07.56"N	05°11'49.62"W	795 m	790 m
B1118a-CTD-03	G3	43°46'55.62"N	05°04'58.74"W	395 m	390 m
B1118a-CTD-04	D2	44°01'00.18"N	05°04'29.70"W	813 m	800 m
B1118a-CTD-05	D3	44°06'16.50"N	04°58'03.30"W	917 m	900 m
B1118a-CTD-06	D4	43°59'03.06"N	04°43'24.00"W	1300 m	1290 m

Table 2: *Coordinates and depth of the CTD casts.*

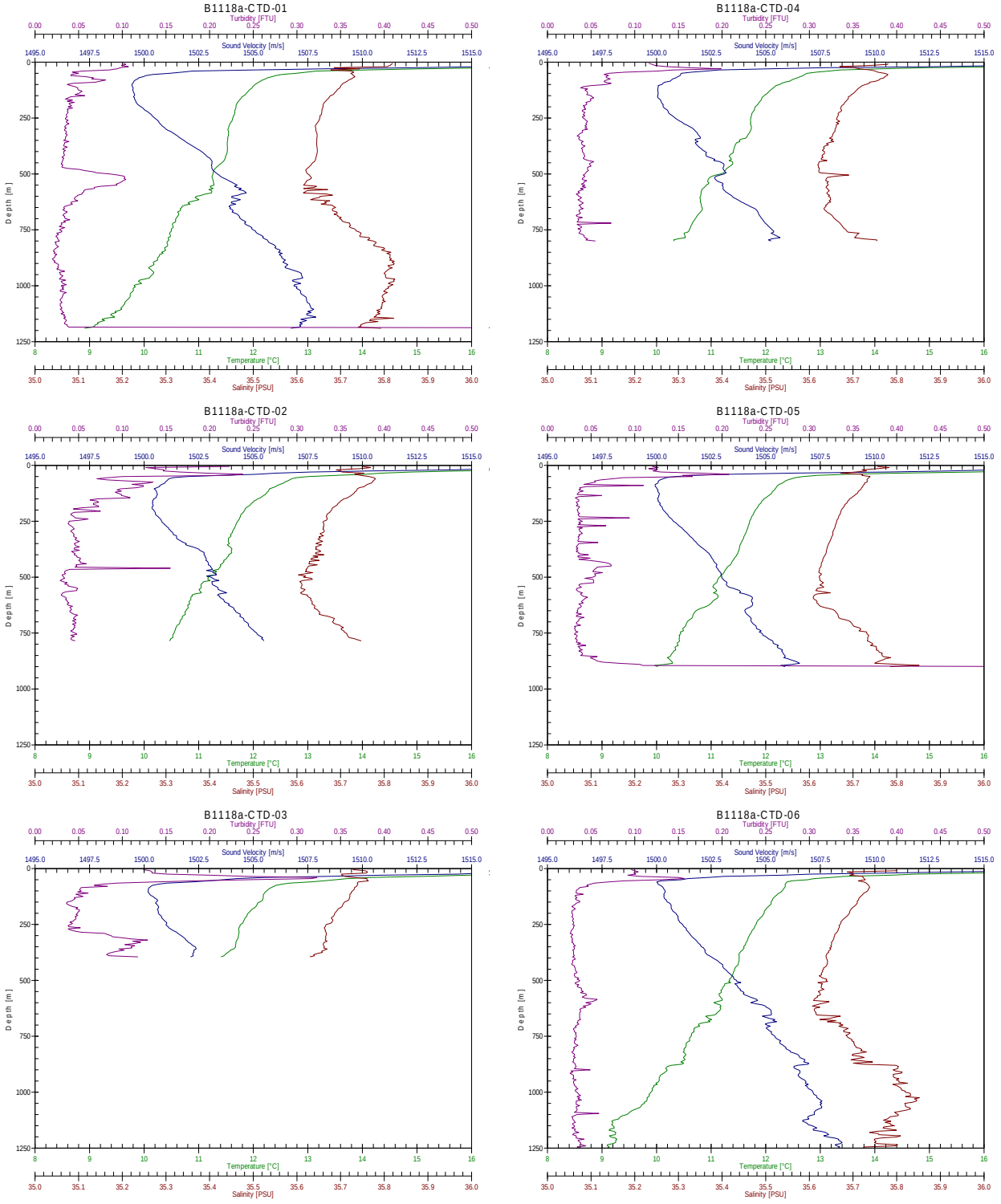

Figure 4: *Compilation of depth versus salinity, temperature, sound velocity and turbidity values plots for –left- the Gijon Moat (casts 01-02-03, decreasing depth with number) and –right- the Le Danois Moat (casts 04-05-06, increasing depths with number).*

The turbidity measurements show an elevated SPM concentrations up to 0.25 FTU within the thermocline waters (Fig. 4). A general turbidity baseline of 0.5 FTU is present over the entire area and depth range. Only the deeper (> 900 m) CTD stations 01, 05 and 06 show an increased turbidity at the ENAW to MOW transition from 0.07 up to 0.10 FTU. Even if the transition is present at the shallower stations, it doesn't seem to affect the SPM concentration. Increased suspended matter at the sea floor ("*bottom nepheloid layer*") was only observed in CTD casts 03, 04 and very pronounced 05. This could be related to either the effective strength of the bottom current or to the earlier discussed oblique descent of the CTD cast.

4.5.2 Preliminary results of the seismic survey

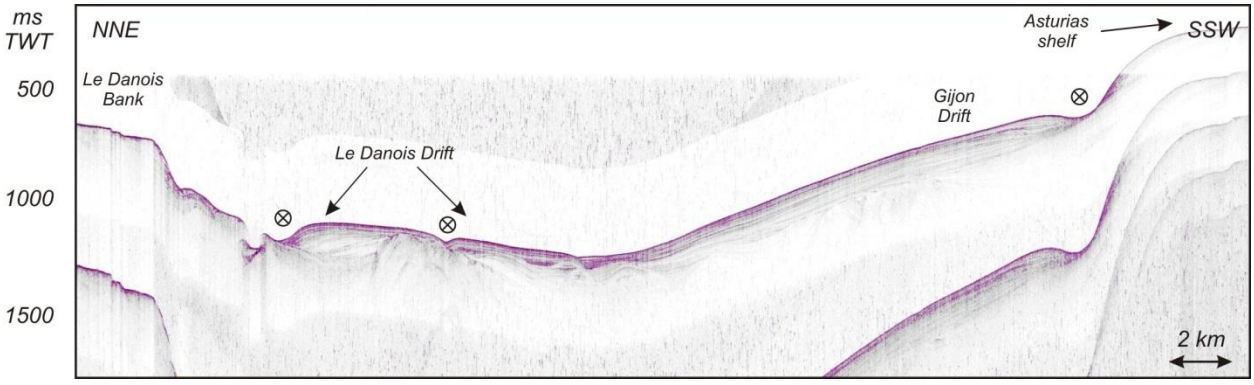

Figure 5: *Unprocessed seismic line LD110611 crossing the Le Danois intraslope basin, featuring the Le Danois Bank and the Asturias margin, as well as three contourite drift deposits (for location, see Fig. 2).*

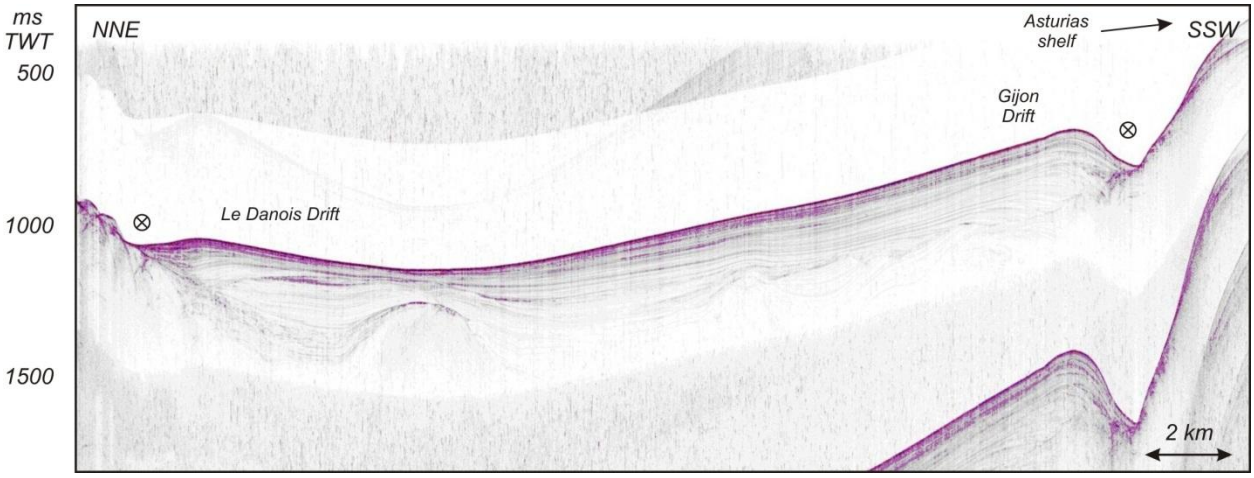

Figure 6: *Unprocessed seismic line LD110625, located 10 km west of line LD110611 (for location, see Fig. 2).*

During the seismic survey, a total of 27 seismic lines were sailed over a distance of 595 km. Two sets of seismic lines were acquired, each with their own objectives. A basic set of NNE-SSW lines (spacing 3-5 km) highlight the upper 300 ms TWT of the sedimentary series

deposited in the intraslope basin between the Le Danois Bank and the Asturias continental shelf. From West to East, these profiles predominantly show the spatial and temporal evolution of the Gijon and Le Danois drifts, starting from a profile crossing Vizco High. The role of a structural high near Le Danois Bank was also highlighted, as a cause for the confined character of the Le Danois Drift and also for the local creation of a 2nd drift deposit. Additionally, sediment-wave like features were investigated and a rectangular seafloor depression. A second set of seismic profiles involved E-W lines with an irregular track (lines LD110601, 16, 18 and 19). These lines connect basement features and drift crests in order to obtain a best possible east-to-west correlation of the seismic stratigraphy.

4.5.3 Preliminary results of the whale watching survey

Fin whale *Balaenoptera acutorostrata*	1
Cétacés sp	23
Common dolphin *Delphinus delphis*	339
Pilot whale *Globicephala melas*	45
Humpback whale *Megaptera novaengliae*	1
Sperm whale *Physeter macrocephalus*	8
Bottlenose dolphin *Tursiops truncatus*	60
Grand Total	**477**

During this R/V Belgica campaign, a total of 477 cetaceans (6 different species) have been observed, when the ship was cruising or during seismic survey (at distances beyond 300 m). The behaviour of cetacean seemed to be not influenced by the presence of R/V Belgica or by the seismic survey. And even, in various occasions, cetaceans were approaching the vessel during a sparker seismic survey. In addition (details not shown), 944 seabirds (16 species), 2 sunfishes (*Mola mola*), 2 sharks, and 1 leatherback turtle (*Dermochelys coriacea*) have been reported.

5. Data storage

During the Belgica 11/18a campaign, 27 seismic lines were acquired over approximately 595 km, as well as 6 CTD casts. The seismic lines were recorded directly in SegY-Motorola format with associated navigation files (these are text files containing shot point, longitude, latitude, date and time). All CTD data has been stored under its original format, as well with processed data. For more information about these data, please contact Prof. Dr. David Van Rooij (David.VanRooij@UGent.be). A full copy of the dataset was given to the representatives of IGME (Madrid), IEO (Madrid), CSIC-CMIMA (Barcelona) and the University of Vigo.

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