NOTIFICATION OF PROPOSED RESEARCH CRUISE

PART A : GENERAL ORGANISATION

1. Name of research ship **BELGICA** Cruise N° **2011/18a**

2. Dates of cruise From **07 June** to **15 June 2011**

3. Operating Authority
Belgian Navy under contract for Belgian Ministry of Science Policy
Management Unit of the North Sea Mathematical Model "M.U.M.M.",
3° & 23° Linieregimentsplein, 8400 Oostende
Tel: 32(0)59 70 01 31, Facsimile: 32(0)59 70 49 35
Email : bmmost@mumm.ac.be

4. Owner **Belgian state represented by Minister for Science Policy**

5. Particulars of ship

Name	**Belgica**	
Nationality	Belgian	
Overall length	51 meters	
Maximum draught	4,5 meters	
Nett tonnage	232 NRT	
Propulsion	Diesel	
Call Sign	ORGQ	
Telephone	INMARSAT	00870 76 218 73 27
Facsimile	INMARSAT	00870 32 052 18 12
Email	belgica@mumm.ac.be	

6. Crew
Name of master **DE MAESSCHALK Luc, KVK**
N° of Crew **15**

7. Scientific Personnel
Name and address of scientists in charge :

Prof. Dr. David Van Rooij (PI 18a)
Universiteit Gent
Renard Centre of Marine Geology (RCMG)
Krijgslaan 281, S8
B-9000 Gent
Tel:+32-9-264 45 83, Fax:+32-9-264 49 67
e-mail: david.vanrooij@UGent.be

N° of scientists **15**

(A nominal roll of all personnel other than nationals of the applicant (flag) state is required)

8. Geographical area in which ship will operate (with reference in latitude and longitude).

Purpose a) (main purpose)
Cantabrian continental margin, between the Asturias continental shelf and the Le Danois Bank
The survey area will be located between 43°40'N - 44°10'N and 5°20'W – 4°30'W

Purpose b)
Transit towards the Cantabrian continental margin, between the Asturias continental shelf and the Le Danois Bank
The survey area will be located between 51°0'N - 50°51'N and 1°42'W – 1°16'W

Purpose c)
Spanish, French, UK and Belgian Continental shelf

9. Brief description of purpose of cruise

<u>Purpose a)</u> (main purpose):
This cruise aims to investigate the seismic stratigraphy and palaeoceanographic evolution of the Le Danois contourite depositional system (Van Rooij et al., 2010), at several locations in the "intraslope basin". Previous research has highlighted a significant correlation with the Cadiz CDS, suggesting a nearly simultaneous control by the Mediterranean Outflow Water since the Early Pliocene. 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.

<u>Purpose b):</u>
This cruise aims to investigate the seismic stratigraphy and palaeoceanographic evolution of the Le Danois contourite depositional system (Van Rooij et al., 2010), along the Spanish continental margin. During the transit towards the study area, within the French EEZ, water samples (suspended particular matter) will be collected in a 20 nm NE-SW transect nearby le "Pas de Calais".

<u>Purpose c):</u>
The Belgica will be used as a platform of opportunity to report marine mammals observation during the campaigns. The aim of the project is to correlate cetacean observations data (species, abundance, location, behaviour…) in the Bay of Biscay and between the Bay of Biscay and Zeebrugges with oceanographic data concerning suspended matter, chlorophyl, water temperature and phytoplankton recorded in a standard way on board.

10. Port of Call. Dates. Reasons.

Zeebrugge	**07/06/2011**	**Departure homeport : Start of research cruise 11/18a**
Bilbao	**15/06/2011**	**Arrival : End of research cruise 11/18a**
Bilbao	**15/06-16/06**	**Relaxation of crew and scientists. Disembarkation of a part of the scientists.**

11. Any special logistic requirements at ports of call (other than water, fuel provisions, etc.)

N.A.

NOTIFICATION OF PROPOSED RESEARCH CRUISE

PART B: DETAIL

1. Name of research ship **BELGICA** Cruise N° **2011/18a**

2. Date of cruise From **07 June** To **15 June 2011**

3. Purpose of research and general methods. (If the research work is being taken on behalf of a research institution of a third state, it is the responsibility of that state to obtain prior permission; it is essential that written confirmation that this has been done is obtained and quoted in this application.

Purpose a): (main purpose)
The *Le Danois* drift, discovered by R/V Belgica in 2004, is - until present - the only sediment drift of its size within the Bay of Biscay (Van Rooij *et al.*, 2010). The genesis of this drift is closely related to the palaeoceanography of the *Mediterranean Outflow Water* (MOW). Therefore, this sedimentary deposit 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. The acquired data will be essential in the preparation of a high-resolution coring campaign. 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.

The proponents are aware of the Marine Protected Area status of the Le Danois Bank, and will be vigilant to respect the guidelines of conducting scientific research. The research methods of this cruise will include (a) high-resolution seismic reflection profiling, (b) multibeam imagery, (c) CTD profiling and (d) bottom sampling by boxcoring. We would like to emphasize that all these techniques are harmless for marine mammals. The reflection seismic method (single channel) uses a high-voltage sparker source with a frequency range between 200-700 Hz. The Renard Centre of Marine Geology has obtained a long and respected experience in using this source in various environments, among which the Antarctic Seas and the Porcupine Seabight (Belgica cold-water coral mounds, also an MPA). In order to ensure vigilance with respect to marine mammals, a team of whale watchers of the ULg (Belgium) will be participating.

Purpose b):
The research project aims to find the provenance source of the fine grained sediments in the Belgian coastal area. Since the transport of suspended particulate matter through the English Channel is the most obvious provenance source, a sampling of the SPM flowing through the English Channel is necessary. Only suspension material will be sampled and centrifuged.

Purpose c):
The principal objective of the Cetaceans in the European Atlantic, Channel and North Sea (CANS) project 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 Belgica campaigns in the Bay of Biskay are ideal to test and practice survey protocols, given that in the waters covered a high species diversity and in selected locations (a.o. north of Bilbao) a high density of cetaceans occurs. Waters covered in these surveys are less well known than waters in the southern North Sea, where other survey methods are better suited (such as use of passive acoustic systems, aerial surveys), and as such the results of the surveys can be used to ameliorate our knowledge on the occurrence and distribution of cetaceans in this area.
As the ship should be considered as a platform of opportunity, given that the campaign is not dedicated to cetacean surveys, it should be considered as cost effective. As many environmental variables are collected on board this oceanographic vessel, remarkable sightings can be coupled with the additional data collected in a standardised way on board, and links with oceanographic phenomena and the occurrence of cetaceans can possibly be made.
The method consists to have two trained observers on the monkey bridge and to report all marine mammals observation from the sunrise up to sunset. Other relevant information and oceanographic data (position, water temperature, suspended matter,…) will be provided directly by the Belgica.

4. Attach chart(s) showing (on an appropriate scale) the geographical area of the intended work, positions of intended stations, tracks of survey lines, positions of moored / seabed equipment.

Purpose a: See charts Annex 1

The survey will focus on 3 main areas:
-1- Le Danois contourite drift, located on the southern slope of Le Danois Bank
-2- Sediment wave field at western entry of intraslope basin between Asturias Shelf and Le Danois Bank
-3- Gijon contourite drift, located on the slope of the Asturias continental slope

These 3 boxes will be surveyed with multibeam bathymetry and high-resolution seismic profiling. The position of the seismic profiles, CTD and boxcores will be determined based on the encountered seabed features

Purpose b): See Chart Annex 2

Sampling of water material (and thus SPM) will be performed during the transit towards the study area, within the French EEZ off Calais (see map in appendix).

Purpose c) : See chart Annex 3

Transect between Belgium, France, UK and Spain

5. Types of samples required, e.g. Geological / Water / Plankton / Fish / Radioactivity / Isotope ….

Purpose a) : Geophysical / sediment / benthos / water
Purpose b): Geological ; Suspended particulate matter
Purpose c): acoustical measurements

and methods by which samples will be obtained (including dredging/coring/drilling).

Purpose a): Multibeam bathymetry, high-resolution seismic profiling, boxcore sampling, CTD data
Purpose b): SPM by water sampling and centrifuging
Purpose c): hydrophones

6. Details of moored equipment : **N.A.**

Dates Laying	Recovery	Description	Latitude	Longitude

7. Explosives : **N.A.**

(a) Type and Trade Name
(b) chemical content
(c) Dept of trade class and stowage
(d) Size
(e) Depth of detonation
(f) Frequency of detonation
(g) Dates of detonation

8. Details and reference of

(a) Any relevant previous/future cruises

Purpose a): Previous cruises:
ECOMARG-03 & 04: R/V Vizconde de Eza, 2003 & 2004 (IEO & CSIC, Spain)
MARCONI: R/V Hesperides 2003 (CMIMA-CSIC, Spain)
GALIPOR: R/V Belgica 20 June – 01 July 2004 (Ghent University, Belgium)
Future cruises:
CONTOURIBER-2: R/V Sarmiento de Gamboa (Proyecto Coordinado CONTOURIBER CTM 2008-06399-C04/MAR, tentatively scheduled summer 2011)

Purpose b): previous cruises:
R/V Belgica cruise 2011/12 (26-29 april 2011)

Purpose c): previous cruises:
18/06/2007-22/06/2007 Belgica campaign 2007/(14)T2
09/06/2008-17/06/2008 Belgica campaign 2008/13b
30/05/2009-08/06/2009 Belgica campaign 2009/14c
19/06/2010-28/06/2010 Belgica campaign 2010/17b

(b) Any previous published research data relating to the proposed cruise (attach separate sheet if necessary)

Purpose a-b-c) **See Annex 4**

9. Names and addresses of scientist of the coastal state in whose waters the proposed cruise takes place with whom previous contact has been made.

Purpose a): SPAIN

- **Prof. Dr. Francisco Javier Hernández-Molina, Universidad de Vigo, Facultad de Ciencias del Mar, Dpto. De Geociencias Marinas y O.T., 36310 Vigo (Pontevedra), Spain**
  Tel.: +34 986 814017
  E-mail: fjhernan@uvigo.es
- **Dr. Gemma Ercilla, Instituto de Ciencias del Mar – CSIC, CMIMA, Paseo Maririmo 37-49, 08003 Barcelona, Spain**
  Tel. : +34 93 2309500
  E-mail : gemma@icm.csic.es
- **Dr. Estefania Llave, Geological Survey of Spain (IGME), La Calera 1, 28760 Madrid, Spain**
  Tel.: +34 917 287276
  E-mail: e.llave@igme.es
- **Dr. Juan Acosta; Instituto Espanol de Oceanografia, c/Corazon de Maria 8, 28002 Madrid, Spain**
  Tel.: +34 91 4175422
  E-mail: juan.acosta@md.ieo.es

Purpose b) France
Prof. Dr. LAFITE Robert, Directeur-Adjoint, UMR 6143 M2C, Université de Rouen
Tel 33-(0)235148181, Mobile 0631416841

Purpose c) France:
Partners in the project SCANS II:
Dr. Vincent Ridoux, Université de La Rochelle
Address: Centre de Recherche sur les Mammifères Marins, Avenue du Lazaret, 17000 La Rochelle, France
Tel: +33 546 44 99 10; E-mail: vridoux@univ-lr.fr

10. State :

(a) Whether visits to the ship in port by scientists of the coastal state concerned will be acceptable.

YES

(b) Whether it will be acceptable to carry on board an observer from the coastal state for any part of the cruise and dates and ports of embarkation / disembarkation.

Yes, cfr. part A § 10

(c) When research data from intended cruise is likely to be made available to the coastal state and if so by what means. (If the final report is likely to be delayed beyond 12 months, interim progress reports are required.

Scientific publications when available by request to the project chief

PART C : SCIENTIFIC EQUIPMENT

COASTAL STATE : **SPAIN**

INDICATE "YES" OR "NO"

LIST SCIENTIFIC WORK BY FUNCTION eg. MAGNETOMETRY : GRAVITY DIVING : SEISMICS: BATHYMETRY SEABED SAMPLING TRAWLING ECHO SOUNDING : WATER SAMPLING U/W T.V. : MOORED INSTRUMENTS: TOWED INSTRUMENTS:	WATER COLUMN INCLUDING SEDIMENT SAMPLING OF THE SEABED	FISHERIES RESEARCH WITHIN FISHING LIMITS	RESEARCH CONCERNING THE NATURAL RESOURCES OF THE CONTINENTAL SHELF OR ITS PHYSICAL CHARACTERISTICS	DISTANCE FROM COAST		
				WITHIN 12 NMS	BETWEEN 12-200 NMS	CONTINENTAL SHELF WORK ONLY) BEYOND 200 NM BUT WITHIN THE CONTINENTAL MARGIN
Purpose a)						
Multibeam echosounder	**YES**	**NO**	**NO**		**YES**	
High-resolution seismic profiling	**YES**	**NO**	**NO**		**YES**	
Water sampling (CTD)	**YES**	**NO**	**NO**		**YES**	
Boxcoring	**YES**	**NO**	**NO**		**YES**	
Purpose c)						
Only visual observation with binoculars						

PART C : SCIENTIFIC EQUIPMENT

COASTAL STATE : **FRANCE**

INDICATE "YES" OR "NO"

LIST SCIENTIFIC WORK BY FUNCTION eg. MAGNETOMETRY : GRAVITY DIVING : SEISMICS: BATHYMETRY SEABED SAMPLING TRAWLING ECHO SOUNDING : WATER SAMPLING U/W T.V. : MOORED INSTRUMENTS: TOWED INSTRUMENTS:	WATER COLUMN INCLUDING SEDIMENT SAMPLING OF THE SEABED	FISHERIES RESEARCH WITHIN FISHING LIMITS	RESEARCH CONCERNING THE NATURAL RESOURCES OF THE CONTINENTAL SHELF OR ITS PHYSICAL CHARACTERISTICS	DISTANCE FROM COAST		
				WITHIN 12 NMS	BETWEEN 12-200 NMS	CONTINENTAL SHELF WORK ONLY) BEYOND 200 NM BUT WITHIN THE CONTINENTAL MARGIN
Purpose b) **Water sampling**	**YES**	**NO**	**NO**	**YES**		
Purpose c) **Only visual observation with binoculars**						

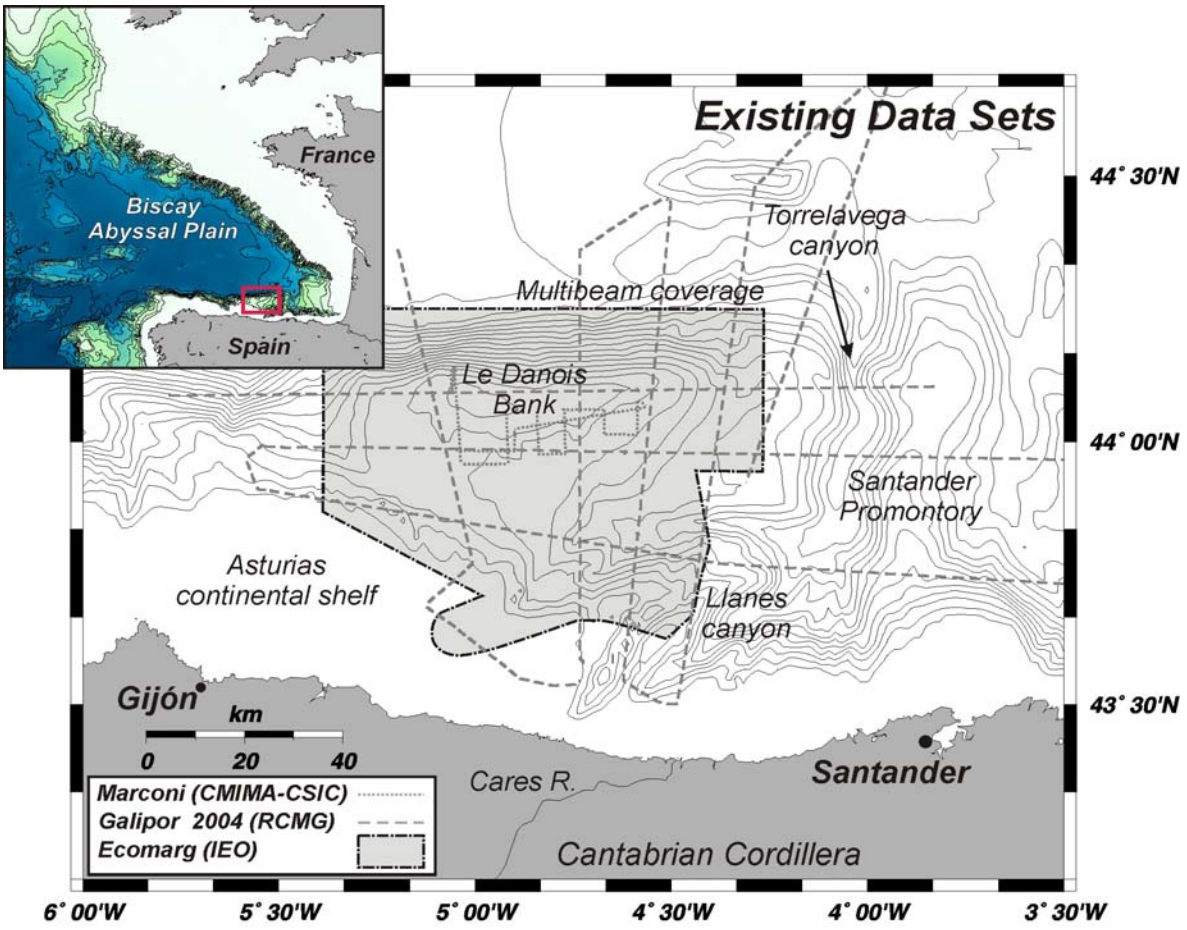
PART C : SCIENTIFIC EQUIPMENT

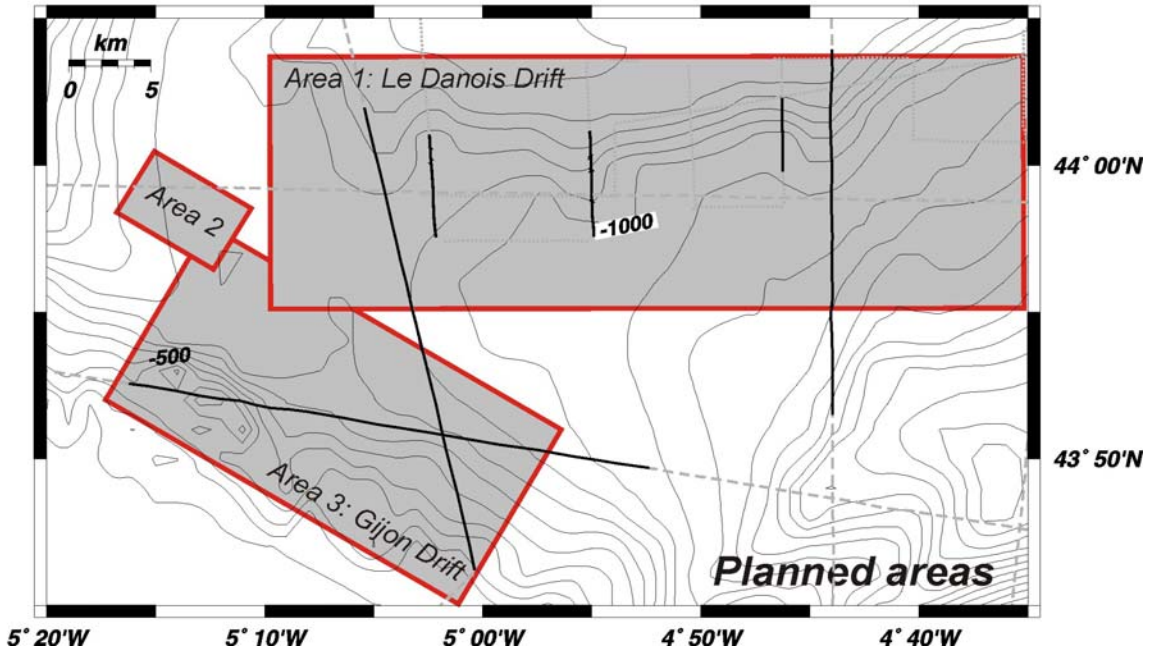
COASTAL STATE : **UNITED KINGDOM**

INDICATE "YES" OR "NO"

LIST SCIENTIFIC WORK BY FUNCTION eg. MAGNETOMETRY : GRAVITY DIVING : SEISMICS: BATHYMETRY SEABED SAMPLING TRAWLING ECHO SOUNDING : WATER SAMPLING U/W T.V. : MOORED INSTRUMENTS: TOWED INSTRUMENTS:	WATER COLUMN INCLUDING SEDIMENT SAMPLING OF THE SEABED	FISHERIES RESEARCH WITHIN FISHING LIMITS	RESEARCH CONCERNING THE NATURAL RESOURCES OF THE CONTINENTAL SHELF OR ITS PHYSICAL CHARACTERISTICS	DISTANCE FROM COAST		
				WITHIN 12 NMS	BETWEEN 12-200 NMS	CONTINENTAL SHELF WORK ONLY) BEYOND 200 NM BUT WITHIN THE CONTINENTAL MARGIN
Purpose c): **Only visual observation with binoculars**						

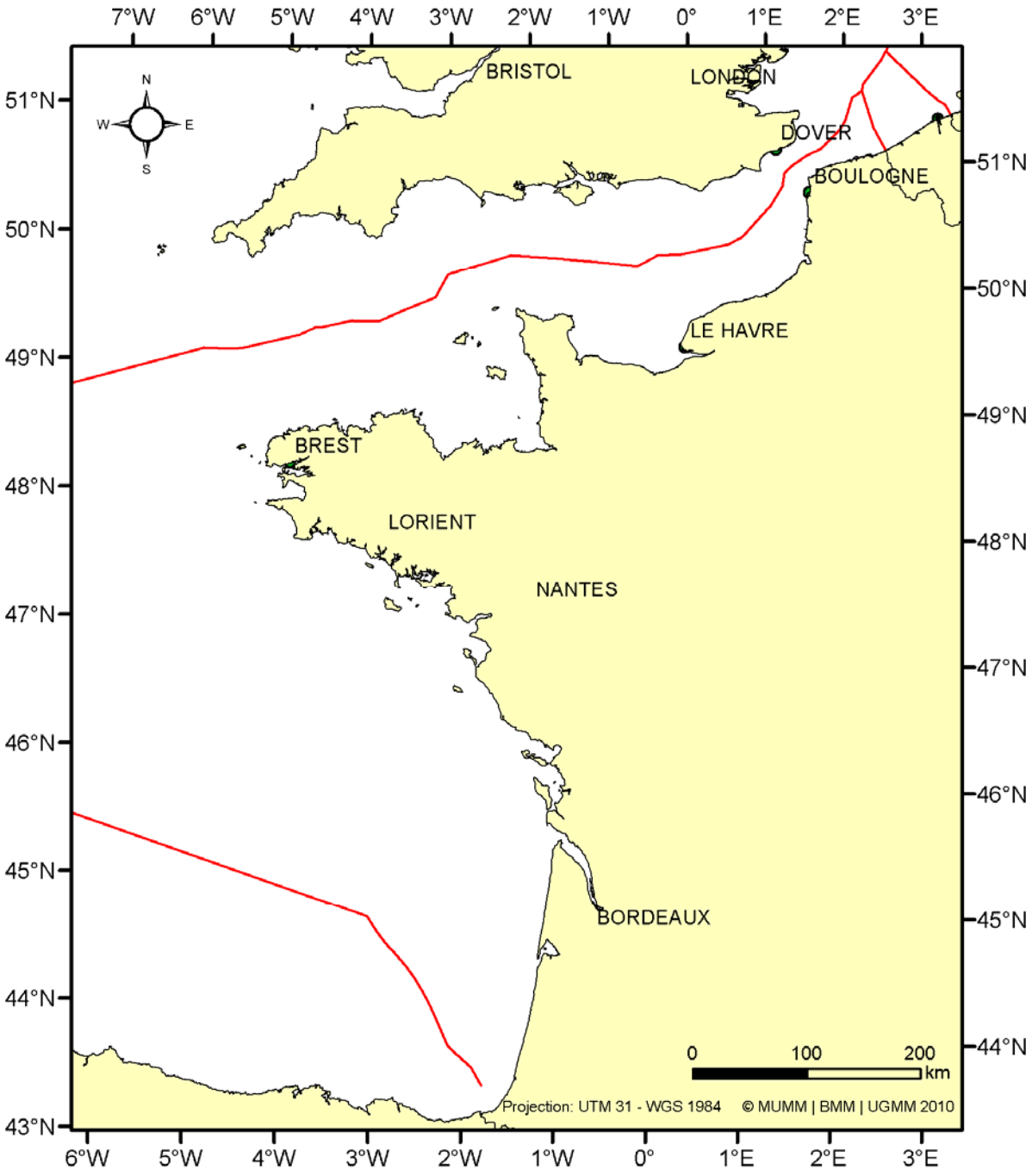
Belgica campaign 2011/18a : Purpose a) general chart





Belgica campagne 2011/018a : Purpose b) general chart

Belgica campagne 2011/018a : Purpose c) general chart



Annex 4 (previous published research data relating to the proposed cruise)

Purpose a)

- Van Rooij, D., Blamart, D., De Mol, L., Mienis, F., Pirlet, H., Wehrman, L.M., Barbieri, R., Maignien, L., Templer, S.P., de Haas, H., Hebbeln, D., Frank, N., Larmagnat, S., Stadnitskaia, A., Stivaletta, N., van Weering, T.C.E., Zhang, Y., Hamoumi, N., Cnudde, V., Duyck, P., Henriet, J.-P. & the MiCROSYSTEMS MD169 shipboard party (in press). Cold-water coral mounds on the Pen Duick Escarpment, Gulf of Cadiz: the MiCROSYSTEMS project approach. *Marine Geology*. doi: 10.1016/j.margeo.2010.08.012.
- Van Rooij, D., De Mol, L., Le Guilloux, E., Wisshak, M., Huvenne, V. A. I., Moeremans, R. & Henriet, J. P. (2010). Environmental setting of deep-water oysters in the Bay of Biscay. *Deep Sea Research Part I: Oceanographic Research Papers,* **157**, 1561-1572. doi:10.1016/j.dsr.2010.09.002.
- De Mol, L., Van Rooij, D., Pirlet, H., Greinert, J., Frank, N., Quemmerais, F. & Henriet, J. P. (in press). Cold-water coral ecosystems in the Penmarc'h and Guilvinec canyons (Bay of Biscay): Deep-water versus shallow water settings. *Marine Geology*. doi: 10.1016/j.margeo.2010.04.011.
- Van Rooij, D., Iglesias, J., Hernández-Molina, F. J., Ercilla, G., Gomez-Ballesteros, M., Casas, D., Llave, E., De Hauwere, A., Gil, S. G., Acosta, J. & Henriet, J. P. (2010). The Le Danois Contourite Depositional System: interactions between the Mediterranean Outflow Water and the upper Cantabrian slope (North Iberian margin). *Marine Geology*, **274**, 1-20.
- Iglesias, J., Van Rooij, D., Hernández-Molina, F.J., Ercilla, G., Gomez-Ballesteros, M., Casas, D. & Llave, E. (2010). The Le Danois Contourite Depositional System (Cantabrian Margin): a record of the MOW palaeoceanography. *Geo-Temas,* **11**, 79-80.
- Jane, G., Maestro, A., Llave, E., López-Martinez, J., Hernández-Molina, F.J., Van Rooij, D., De-Andrés, J.R., Catalán-Morollón, M. (2010). Contourite Drifts on canyon heads related to the Mediterranean Outflow Water in the Ortegal Marginal Platform (Northwestern of Iberian Peninsula). *Geo-Temas,* **11**, 83-84.
- Van Rooij, D., De Mol, L., Le Guilloux, E., Réveillaud, J., Hernández-Molina, F.J., Llave, E., Léon, R., Estrada, F., Mienis, F., Moeremans, R., Blamart, D., Vanreusel, A. & Henriet, J.-P. (2010). Influence of the Mediterranean Outflow Water on benthic ecosystems: answers and questions after a decade of observations. *Geo-Temas*, **11**, 179-180.
- Van Rooij, D., Vanreusel, A., Henriet, J.-P., De Mol, L., De Groote, A. & the Belgica ST0914 shipboard parties (2009). 30 days of deep-water ecosystem exploration: R/V Belgica cruise ST0914 “Genesis”. *HERMIONE Newsletter*, **1**, 7-8.
- Van Rooij, D., Baeye, M., Hernandez-Molina, F.J., Llave, E., Leon, R., Estrada, F., Perez, L. & De Rycker, K. (2009). Cruise Report Belgica 09/14a “Belgica GENESIS”, "Cabo Ortegal". *RCMG internal publication*, 26 pp.

Purpose b)

* **FETTWEIS M. & VAN DEN EYNDE D. 2003. The mud deposits and the high turbidity in the Belgian-Dutch coastal zone, Southern bight of the North Sea. Continental Shelf Research, 23, 669-691.**

* **FETTWEIS, M., DU FOUR, I., ZEELMAEKERS, E., BAETEMAN, C., FRANCKEN, F., HOUZIAUX, J.-S., MATHYS, M., NECHAD, B., PISON, V., VANDENBERGHE, N., VAN DEN EYNDE, D., VAN LANCKER, V., WARTEL, S. 2007. Mud Origin, Characterisation and Human Activities (MOCHA). Final Scientific Report. Belgian Science Policy Office. 59pp.**

Purpose c):

- **Hammond, P.S., Benke, H., Berggren, P., Borchers, D.L., Buckland, S.T., Collet, A., Heide-Jørgensen, M.P., Heimlich-Boran, S., Hiby, A.R., Leopold, M. & Øien., N., 1995. Distribution & abundance of the harbour porpoise & other small cetaceans in the North Sea & adjacent waters. Report EC LIFE 92-2/UK/027, 240p.**
- **Hammond, P.S, Berggren, P., Benke, H., Borchers, D.L., Collet, A., Heide-Jørgensen, M.P., Heimlich, S., Hiby, A.R., Leopold, M.F. & Øien, N., 2002. Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. Journal of Applied Ecology Vol. 39 Issue 2: 361**

Website: http://biology.st-andrews.ac.uk/scans2, dd. 22 November 2004
http://www.mumm.ac.be/Common/Belgica/Campaigns/Reports/re2007_(14)T2.pdf
http://www.mumm.ac.be/Common/Belgica/Campaigns/Reports/re2010_17b.pdf