



UNIVERSITÉ LIBRE DE BRUXELLES, UNIVERSITÉ D'EUROPE

Summary Report Belgica Cruise 2009/12 20-23 April 2009



ÉCOLOGIE DES SYSTÈMES AQUATIQUES

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1 INTRODUCTION

This report summarizes the scientific activities performed during cruise 2009/12 from 20 to 23 April 2009, aboard the R.V. Belgica. Six scientific teams from different institutions and universities were participating to this cruise. Scientific results can be obtained by contacting directly scientific team leaders (as indicated in Table 1).

2 PARTICIPANTS

Table 1 : List of participants to cruise 2009/12. Team leaders are indicated for the purpose of data request (*).

Name	Institution	Project	Email of team leader
ROUSSEAU Véronique (*)	ULB-ESA	AMORE & BELCOLOUR	vrousso@ulb.ac.be
PARENT Jean-Yves	ULB-ESA	AMORE	
ASTORECA Rosa	ULB-ESA	BELCOLOUR	
PHILIPPE Morgane	ULB-ESA	AMORE	
DENIS Kevin (*)	UMH-Aq. Ecol.	AMORE	Kevin.Denis@umh.ac.be
NEUKERMANS Griet	MUMM	BELCOLOUR	
DOXARAN David (*)	LOV (F)	BELCOLOUR	doxaran@obs-vlfr.fr
LACROIX Geneviève	MUMM	BELCOLOUR	
SUYKENS Kim (*)	ULg	BELCOLOUR	kim.suykens@ulg.ac.be
LOISEL Hubert (*)	ULCO (F)	BELCOLOUR	Hubert.Loisel@univ-littoral.fr

3 OPERATION SUMMARY

The geographical coverage of the cruise was the Belgian, Dutch, U.K. and French waters. Operations are summarized here below. Time is given as UTC + 2

Monday 20th April 2009

11.30 : Departure Zeebrugge
12.10 : Station 700
14.25 : Station W07
15.20 : Mooring
17.35 : Station W04
19.15 : Station S01
20.30: Transit to Station W09 and anchorage

Tuesday 21th April 2009

09.10: Station W09
11.10 : Station W10
13.00 : Station MH3
15.25 : Station MH5
17.05: Station TH1
Transit to Station AMO-06 at a speed of 2 knots to test the FlowCAM
Anchorage

Wednesday 22^h April 2009

08.38 : Station AMO6
09.55 : Station AMO8
11.15 : Station AMO7
12.35 : Station AMO3-A: MERIS overpass
14.30 : Statio AMO3-B: MODIS overpass
16.00 : Mooring Oostdijck
17.20: Station W06

Thursday 23th April 2009

06.00: Transit to Zeebrugge because of engine problems
Measurements made in Zeebrugge harbour

11.25 → 12.50: Sampling at nearshore station with rubber boat during MERIS overpass (12.15)
12.30 : continuous measurements with TriOS System (MUMM); Profiling TriOS radiometers and BB9 (ULCO) in the harbour
14.30 → 15.45: Sampling at nearshore station with rubber boat during MODIS overpass (15.15)

18.00: End of cruise
Disembark material and scientists

4 SCIENTIFIC REPORTS

4.1. AMORE project (ULB-ESA + UMH)

4.1.1. Objectives

The research project AMORE-3 seeks to contribute to the development of Sustainability Science for the management of coastal zones. In particular AMORE-3 address the dual control of changing human activity and climate on eutrophication processes in the Belgian coastal zone and the feedback effect of eutrophication on goods (newly-deployed offshore mussel farming) and services (atmospheric CO₂ absorption) provided by the Belgian coastal zone.

ULB-ESA objectives of the cruise were the study of phytoplankton ecophysiology and more particularly photoadaptation properties.

ULB-ESA + UMH's objectives were to test the FlowCAM, a real-time digital imaging flow cytometry in field conditions, and more particularly the possibility for continuous measurements and real time analysis of natural phytoplankton communities present in spring in the Southern Bight of the North Sea.

4.1.2. Measurements

At each station, ULB-ESA and UMH sampled seawater with Niskin bottles for Chla, Suspended matter content, phytoplankton community composition (core parameters)

while CTD and ODAS (coordinates, time, salinity, temperature, depth) parameters were collected (Table 2). At 7 stations (Table 2), deck incubations were performed during photoperiod for photosynthetic parameters determination using radiotracer methodology. Incubations with a photosynthetron were run in parallel in the lab container. At these stations subsamples were taken for nutrient (nitrate+nitrite, ammonium, silicate and phosphate) determinations. Incident PAR was recorded continuously on the upper deck.

UMH and ULB-ESA have tested the FlowCAM (Fluid Imaging), a digital imaging flow cytometry in field conditions. The feasibility of continuous measurements and real time analysis of natural phytoplankton communities present in spring in the Southern Bight of the North Sea was tested during this cruise and was very successful.

A significant Phaeocystis bloom was observed in the coastal waters, in particular close to the BCZ coast. Colonies were correctly detected with the FlowCAM.

Table 2: Stations coordinates, sampling time and measured parameters by ULB-ESA and UMH during cruise 2009/12 in the frame AMORE and BELCOLOUR projects. Time is given as UTC+1

Station	Date	Time	Lat N DMS	Long E DMS	State	Core param	Incub deck	IOP's	FlowCAM.
700	20/04/2009	12.10	51°23 00	3°14.00	B	X		X	X
W07	20/04/2009	14.25	51°34 60	3°00 30	B	X	X	X	X
W04	20/04/2009	17.35	51°27 00	3°14 20	B	X		X	X
S01	20/04/2009	19.15	51°25 00	3°34 12	NL	X		X	X
W09	21/04/2009	09.10	51°45 00	2°42 00	B	X	X	X	X
W10	21/04/2009	11.10	51°41 00	2°25 00	B	X		X	X
MH3	21/04/2009	13.00	51° 44.41	2° 06.20	UK	X	X	X	X
MH5	21/04/2009	15.25	51° 50.79	1° 38.72	UK	X	X	X	X
TH1	21/04/2009	17.05	51° 46.30	1° 25.40	UK	X		X	X
AMO-6	22/04/2009	08.38	50° 54.00	1° 32.00	F	X		X	X
AMO-8	22/04/2009	09.55	51° 02.25	1° 40.48	F	X	X	X	X
AMO-7	22/04/2009	11.15	51° 08.00	1° 54.00	F	X	X	X	X
AMO3A	22/04/2009	12.35	51° 15.12	2° 10.30	F	X		X	X
AMO3B	22/04/2009	14.30	51° 16.40	2° 13.00	F	X	X	X	X
W06	22/04/2009	17.20	51°16 15	2°25 50	B	X		X	X

4.2 BELCOLOUR-2: MUMM+ULB-ESA+ LOV+ULCO+ULg

4.2.1 Objectives

The general objective of the BELSPO-funded BELCOLOUR-2 project is to improve the quality of existing optical remote sensing products for marine, coastal and inland waters based on new scientific knowledge and to develop new products (including partial pressure of CO₂ and primary production) for key applications such as aquaculture and air-sea CO₂ flux quantification. In addition to algorithm work and image processing BELCOLOUR-2 participates in seaborne cruises for the purposes of calibration of algorithms and for validation of the end products. The primary objectives of this campaign are making in-situ measurements simultaneous with satellite overpasses of MERIS (Medium Resolution Imaging Spectrometer) and MODIS (Moderate Resolution Imaging Spectrometer), measurements

MUMM-Ruddick : backscatter and reflectance measurements

ULB-ESA : measurements of primary production using both radio-isotopic and fluorimetric methods and inherent optical properties of case-2 coastal waters.

ULg-Borges : CO₂ measurements

ULCO scientist has been invited to make backscatter and reflectance measurements for comparison with Mumm's measurements

LOV : understanding the relationships between the nature (concentration, composition and size) of particles suspended in turbid coastal waters and their optical properties.

4.2.2 Measurements

At each BELCOLOUR station, ULB-ESA sampled seawater for IOP's determination (absorption (CDOM, NAP, pigments), suspended matter, HPLC pigments, ac-9 attenuation). At the 7 stations where deck incubations were performed (Table 2), fluorimetric measurements were performed using a PAM (Pulse Amplitude Modulated fluorimeter).

For ULg, the parameters sampled were Total Alkalinity (TA), Oxygen (O₂), pH, dissolved inorganic carbon (DIC) at each station and partial pressure of carbon dioxide (pCO₂) continuously during the whole campaign (Table 3). All ULg instruments (except the pH meter) worked correctly and no samples were lost. All objectives were achieved.

Due to engine problems encountered 23/04/2009 in the morning, measurements were made in the harbour of Zeebrugge aboard the Belgica. During satellite overpass, bio-optical measurements were made from a rubber boat just outside the harbour.

Table 3: Date, stations date, and measured parameters by Ulg-Borges during cruise 2009/12 in the frame BELCOLOUR project.

date:	stations:	TA	O ₂	DIC	pH
20/04/2009	700	y	y	y	n
20/04/2009	W07	y	y	y	n
20/04/2009	W04	y	y	y	n
20/04/2009	S01	y	y	y	n
21/04/2009	W09	y	y	y	n
21/04/2009	W10	y	y	y	n
21/04/2009	MH3	y	y	y	n
21/04/2009	MH5	y	y	y	n
21/04/2009	TH1	y	y	y	n
22/04/2009	AMO6	y	y	y	n
22/04/2009	AMO8	y	y	y	n
22/04/2009	AMO7	y	y	y	n
22/04/2009	AMO3	y	y	y	n
22/04/2009	AMO3-bis	y	y	y	n
22/04/2009	W06	y	y	y	n

4.3 BMM-Vigin

4.3.1 Objectives

The objectives are related to the monitoring of the effects of offshore windfarms on marine mammals and on benthic species related to hard substrates.

For the monitoring of marine mammals C-PoDs will be moored in the immediate vicinity of existing buoys. C-PoDs are autonomous acoustic devices for monitoring especially the presence of harbour porpoises, possibly impacted by the construction and exploitation of offshore windfarms. C-PoDs need to be moored at 2 locations.

Windturbine foundations will create new artificial hard substrates in the southern North Sea, possibly allowing for the establishment of species previously not present in this environment dominated by soft sediment habitats. They will possibly also allow for the further spread of non indigenous species. The objective of this part of the monitoring programme is aimed at a regular description of the stages in the the intertidal fouling community, and at making a quantitative assessment of the subtidal benthic species.

The two mooring operations were done according the objectives and were both successful.

Mooring 1	20/04/2009	51° 35.00	3° 00.45	B
Mooring 2	22/04/2009	51° 26.95	2°52.72	B

5 CONCLUDING REMARKS

Scientific objectives were achieved during the cruise 2009/12 despite shortening due to engine problems encountered on 23/04/2009. All instruments functioned correctly.. Both ULB-ESA and UMH made very interesting observations and experiments at a high number of stations.