RV BELGICA CRUISE 2011/19 – CRUISE REPORT

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Ecosystem/Monitoring: 04/07/2011 - 08/07/2011

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1. CRUISE DETAILS

1.	Cruise number	2011/19
2.	Date/time	Zeebrugge TD: 04/07/2011 at 11h30 (local) Zeebrugge TA: 07/07/2011 at 17h30 (local)
3.	Chief Scientist Participating institutes	Kevin Ruddick 1. Management Unit of the North Sea Mathematical Models, Royal Belgian Institute for Natural Sciences (MUMM/RBINS) 2. Université de Liège (ULg) 3. Laboratoire Océanographique de Villefranche, France (LOV) Participation of ILVO and UGent was planned but cancelled
4.	Area of interest	Belgian part of the North Sea + UK

2. LIST OF PARTICIPANTS

INSTITUTE	NAME	04/07-07/07/2011
MUMM/RBINS	Kevin RUDDICK	X
"	Ana DOGLIOTTI	X
"	Quinten VANHELLEMONT	X
"	Xavier DESMIT	X
ULg	Willy CHAMPENOIS	X
LOV	David DOXARAN	X
"	Fang SHEN	X
"	Edouard LEYMARIE	X
"	Amel HOUYOU	X
Total number of participants:		9

Notes:
1. 5 participants from ILVO, UGent and MUMM were planned for the Offnoise project, but cancelled prior to the cruise start.
2. Ana Dogliotti is a postdoc visitor at MUMM from Instituto de Astronomía y Física del Espacio (IAFE), Argentina
3. Fang Shen is a visitor at LOV from East China Normal University

3. SCIENTIFIC OBJECTIVES

MUMM-KR (BELCOLOUR-2 project)

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 were to make in-situ measurements simultaneous with satellite overpasses of MERIS (Medium Resolution Imaging Spectrometer) and MODIS (Moderate Resolution Imaging Spectrometer), measurements of apparent and inherent optical properties relating to particulate scattering and measurement of carbon-related parameters (partial pressure of CO2, primary production). Particular interests of this cruise, in comparison with previous BELCOLOUR cruises, were: establishing turbidity-retrieval algorithms for extremely turbid waters, generalising an existing pCO2 retrieval algorithm to a new region (Thames estuary and East Anglia coastal waters), testing of a new floating radiometer with multidirectional measurements. This cruise was carried out in collaboration with French BELCOLOUR-2 partners (Laboratoire Océanographique de Villefranche) as well as Argentine (BELCOLOUR-ARG project for La Plata Estuary) and Chinese colleagues (Yangtze/Chang Jiang plume).

Cruise objectives were achieved successfully for the BELCOLOUR project. A large number of optical instruments were deployed, including a prototype floating full hemisphere radiance camera, an above water hyperspectral radiometer system and a set of Inherent Optical Property measurement instruments. These were deployed at 31 stations. Water samples were also taken at these stations for turbidity and Total Suspended Matter. At 5 further (night-time) stations water sampels were taken for chemical analysis only (especially dissolved gasses). A variety of weathr conditions were encountered, with a majority of good conditions. At lest 2 matchups were recorded for the MODIS-AQUA satellite sensor, plus one very good matchup for the MERIS satellite sensor. Reasonably turbid waters were encountered.

ILVO-KH (OFFNOISE project)

The Offnoise project aims to evaluate the impact of noise from offshore windmill construction activities on marine life. In this cruise an experiment was planned to measure the underwater noise and the impact on fish in the vicinity of windmills during construction activities. This was cancelled just prior tot he cruise start because no piling activities were planned during this cruise.

4. OPERATIONAL COURSE

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

Monday 04/07/2011

08h30	Embarkation of personnel and equipment in Zeebrugge LOV radiance camera transport unsuccessful last week, awaiting news of location.
10h30	Planned start delayed, pending arrival of LOV radiance camera
11h30	Departure Zeebrugge with 1 LOV scientist, awaiting arrival of radiance camera
12h30-12h55	BELCOLOUR measurements at station 700. LISST not waking up.
13h25	Ferrybox flow stopped (not noticed until later)
13h25-13h40	BELCOLOUR measurements at station CH08. White firing button broken on Niskin. Can continue to use but not stack.
14h00	Sending zodiac to Zeebrugge to pickup LOV scientist and radiance camera
14h50	Zodiac back onboard, continue route to CH07
15h00	Ferrybox problems noted (Turner fluorimeter high temperature). Contacted JB, BMM-Oostende
15h00-???	Investigating Ferrybox with crew. Leak fixed. System still turned off (humidity sensor). Floor dried.
15h25-15h40	BELCOLOUR at CH07. First SIMBADA station.
16h15-16h30	BELCOLOUR at CH06. No SIMBADA (battery low).
16h50	Ferrybox successfully restarted. All Ferrybox data since 13h25 was bad.
17h25-17h45	BELCOLOUR at CH04. First station with LOVCAM (LOV/CIMEL radiance camera)
18h35-19h00	BELCOLOUR at W02
19h45-20h10	BELCOLOUR at W03
20h45-20h50?	Ulg only at CH01 - Niskin bottom and surface
21h20-21h25	ULg only at CH02h Niskin bottom and surface
22h00-22h05	ULg only at CH03h Niskin bottom and surface
22h20	Anchor near CH03. LOV IOPs into water for night

Tuesday 05/07/2011

04h00	LOV IOPs out of water.
04h20	Anchor up. Transit to MH3
09h05-09h20	BELCOLOUR at MH3

10h35-10h50	MH4 - BELCOLOUR at MH4
11h30	Crew member injured (cut hand).Contacting UK coastguard for medical assistance. Plan rendez-vous with life boat. Cancel/postpone MH5 while meeting life boat.
	Checking LISST, battery not connected; Battery replaced, connected and tested, now OK.
12h15	SIMBADA measurement while underway
12h40-13h00	BECLOLOUR at MH6. Excellent sky and sea state conditions for MERIS matchup. First station with LISST.
	Station order rearranged to facilitate return of injured crew member
13h50-14h05	BELCOLOUR at TH4. SIMBADA underway at 13h45
	Received phone call cancellation of OffNoise expt
15h15-15h30	BELCOLOUR at SER (South East Roughs), awaiting rendez-vous
	According to Vessel Traffic Centre, pilot is necessary to approach station HARE. Decide to sample further East to avoid need for pilot.
16h40-17h05	BELCOLOUR at CORK (East of HARE). LOVCAM was in turbid wake of vessel. Trios+LOVCAM repeated as CORK-B with alternative ship heading (-135° azimuth) but LOVCAM deployed too close to ship and so aborted.
19h20-19h45	BELCOLOUR at TH2
20h40-21h05	TH3
22h35-22h50	TH5
23h30	Ferrybox flow stopped. Not noticed until later.
00h30-00h40	TH1

Wednesday 06/07/2011

09h05-09h25	BELCOLOUR at 702N. Trios was restarted (instrument malfunction). Ferrybox automatic valve closed. Bad ferrybox data at 702N. Investigating ferrybox with BMM-JB and crew. Stopped because GPS near Zeebrugge? No red or green light on leak detection box.
09h40	Ferrybox restarted with “Run”; Seems OK.
10h00-10h20	BELCOLOUR at CH10. Ferrybox data OK now but Turner fluorimeter~2 while Trios fluorimeter~40. Other factors (AC9 absorption and filter colour/smell) suggest high Chl and so Turner fluorimeter probably wrong.
10h30-10h50	BELCOLOUR at W04
11h20-11h35	BELCOLOUR at 700-B (same location as 700 on Monday)
12h15-12h35	BELCOLOUR at W01. MERIS matchup is cloudy.
14h05-14h30	BELCOLOUR at W05. Waves getting stronger (Bf 5-6). Current strong. Could not take Niskin at bottom (cable inclined 45°). Did not deploy LOVCAM.

16h00-16h25 BELCOLOUR at W06. Waves too strong for LOVCAM. Other deployments OK. Trios made before IOP and water samples because cannot keep Trios heading with instruments in water.

Decide to abort offshore stations and return to coastal stations because of bad sea state.

19h20-19h45 BELCOLOUR at 115bis

20h00-20h30 BELCOLOUR at 120

22h00 Anchor 4km North of Oostende
LOV instruments in water for night (station 1119A)

Thursday 07/07/2011

04h45 LOV instruments out of water
Anchor up

05h00 Transit to Zeebrugge

07h00 Zodiac departs to Zeebrugge with injured crew member

09h00-09h30 BELCOLOUR at 1119B (North of Vlakte van de Raan)

10h05-10h25 BELCOLOUR at 1119C

11h10-11h35 BELCOLOUR at 1119D (not MOW1)

12h25-12h50 BELCOLOUR at MOW1

13h25-13h50 BELCOLOUR at 1119E

14h10-14h35 BELCOLOUR at 230

15h20-15h25 BELCOLOUR at 130

15h25 Returning to Zeebrugge

17h30 Arrival Zeebrugge
Disembarkation of scientists and equipment in evening of 07/07/2011 and morning of 08/07/2011

- End of campaign 2011/19 -

5. TRACK PLOT

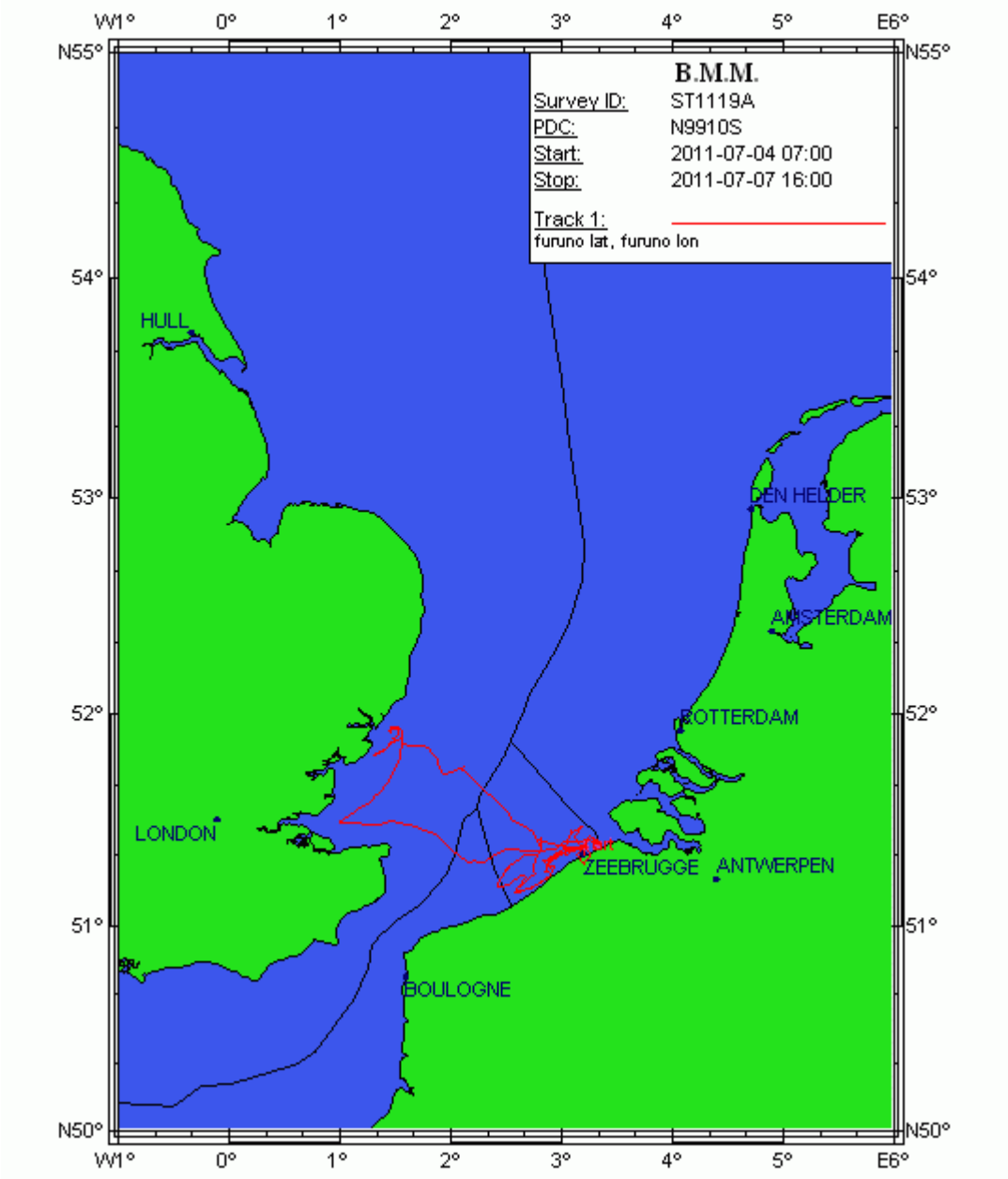


Figure 1: Track plot of campaign 2011/19

6. MEASUREMENTS AND SAMPLING

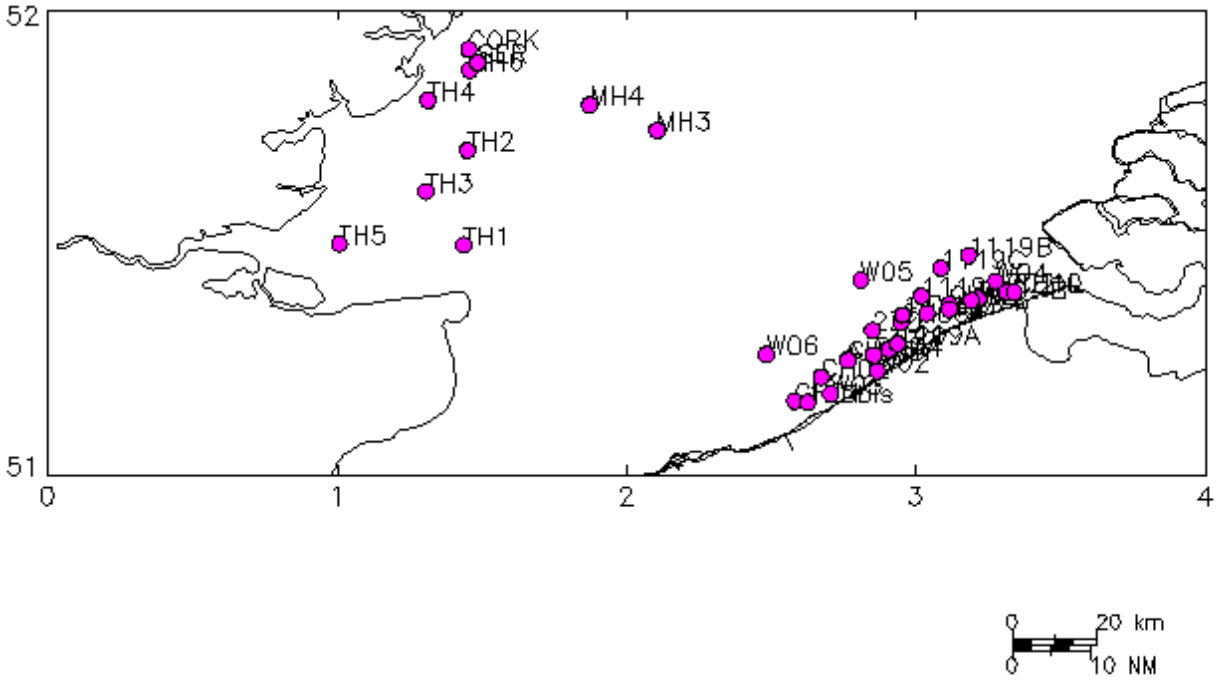
6.1. BELCOLOUR

All times are given in local time. All coordinates in WGS84.

Date	Time (local)	Station	Longitude (E)	Latitude (N)	MUMM	LOV	Ulg
4.7.2011	12:30-12:55	700	3° 13.109'	51° 22.619'	Full	IOP ex LISST	Surf+Bott
	13:25-13:40	CH08	3 06.913	51 22.004	Full	IOP ex LISST	Surf+Bott
	15:25-15:40	CH07	3 02.209	51 20.819	Full+SIM	IOP ex LISST	Surf+Bott
	16:15-16:30	CH06	2 56.803	51 19.673	Full	IOP ex LISST	Surf+Bott
	17:25-17:45	CH04	2 51.230	51 15.433	Full+SIM	IOP ex LISST +LOVCAM	Surf+Bott
	18:35-19:00	W02	2 51.919	51 13.392	Full+SIM	IOP ex LISST +LOVCAM	Surf+Bott
	19:45-20:10	W03	2 42.260	51 10.451	Full+SIMB	IOP ex LISST +LOVCAM	Surf+Bott
	20:41	CH01	2 34.783	51 09.526	-	-	Surf+Bott
	21:28	CH02	2 40.316	51 12.586	-	-	Surf+Bott
	22:02	CH03	2 45.901	51 14.982	-	-	Surf+Bott
	22:20-04:00	Anchor	2 45.8331	51 14.7270	-	5 hours IOP	-
5.7.2011	09:05-09:20	MH3	2 06.269	51 44.509	Full+SIM	IOP ex LISST +LOVCAM	Surf
	10:35-10:50	MH4	1 52.266	51 47.746	Full+SIM	IOP ex LISST ex ap +LOVCAM	Surf
	12:15				SIM		
	12:40-13:00	MH6	1 27.391	51 52.275	Full+SIM	IOP+LOVCAM	Surf
	13:50-14:05	TH4	1 18.774	51 48.375	Full+SIM[1]	IOP+LOVCAM	Surf
	15:15-15:30	SER	1 29.054	51 53.226	Full+SIM	IOP+LOVCAM	Surf
	16:40-17:05	CORK	1 27.221	51 54.954	Full+SIM	IOP ex ap +LOVCAM	Surf
	19:20-19:45	TH2	1 26.912	51 41.923	Full+SIMnosun	IOP+LOVCAM	Surf
	20:40-21:05	TH3	1 18.263	51 36.596	Full+SIMnosun	IOP+LOVCAM	Surf
	22:35-22:50	TH5	1 00.358	51 29.840	-	IOP ex ap	Surf
	00:30-00:40	TH1	1 26.167	51 29.652	-	-	Surf
6.7.2011	09:05-09:25	702N	3 18.744	51 23.664	Full+SIM	IOP+LOVCAM	Surf+Bott
	10:00-10:20	CH10	3 20.314	51 23.559	Full+SIMnosun	IOP+LOVCAM	Surf+Bott
	10:30-10:50	W04	3 16.463	51 24.996	Full+SIMnosun	IOP+LOVCAM	Surf+Bott
	11:20-11:35	700-B	3 12.918	51 22.725	Full+SIMnosun	IOP+LOVCAM	Surf+Bott
	12:15-12:35	W01	3 11.483	51 22.501	Full+SIMnosun	IOP+LOVCAM	Surf+Bott
	14:05-14:30	W05	2 48.533	51 25.112	Full	IOP	Surf
	16:00-16:25	W06	2 28.958	51 15.530	Full	IOP	Surf, Bott
	19:20-19:45	115bis	2 37.452	51 09.332	Full+SIM	IOP+LOVCAM	Surf, Bott
	20:00-20:30	120	2 56.204	51 16.903	Full+SIM	IOP+LOVCAM	Surf, Bott
	22:30-04:45	1119A	2 56.1994	51 16.893	-	5 hours IOP	-
7.7.2011	09:00-09:30	1119B	3 10.898	51 28.339	Full+SIMnosun	IOP? +LOVCAM	Surf, Bott
	10:05-10:25	1119C	3 05.113	51 26.677	Full+SIM	IOP+LOVCAM	Surf, Bott
	11:10-11:35	1119D	3 01.052	51 23.109	Full+SIM	IOP+LOVCAM	Surf, Bott
	12:25-12:50	MOW1	3 06.816	51 21.371	Full+SIM	IOP+LOVCAM	Surf, Bott
	13:25-13:50	1119E	2 57.144	51 20.625	Full+SIMnosun	IOP+LOVCAM	Surf, Bott
	14:10-14:35	230	2 50.931	51 18.640	Full+SIM	IOP+LOVCAM	Surf, Bott
	15:20-15:25	130	2 54.364	51 16.202	Full+SIMnosun	IOP+LOVCAM	Surf, Bott

[1] SIMBADA made just before arrival to match with MERIS overpass 1 hour earlier

Table 1: List of measurement stations. For MUMM, Full = Trios reflectance, Water samples (TSM, HPLC, Turbidity), Secchi; for LOV, IOP= Inherent Optical Properties, LOVCAM=underwater radiance camera; For ULg, Surface=Alkalinity, O_2, CH_4, N_2O, TEP; Bottom=CH_4, N_20.



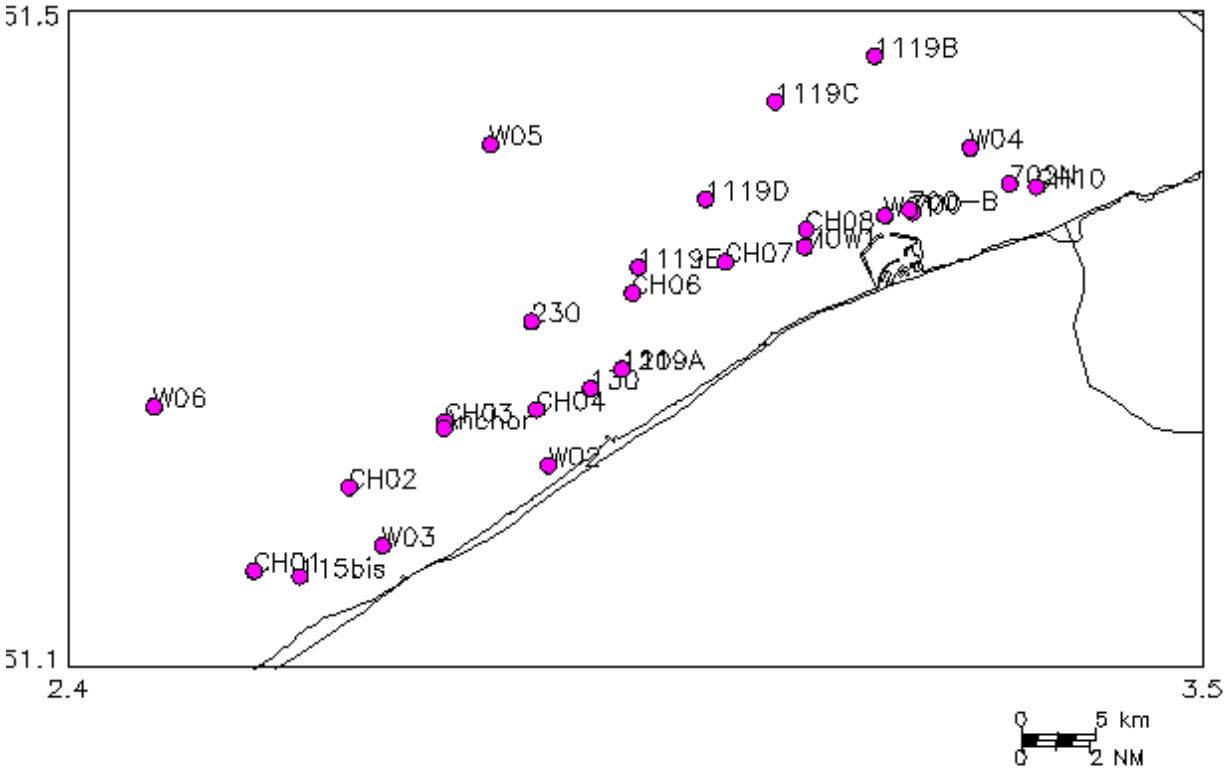


Figure2: Map of sampling stations: (top) whole cruise, (bottom) zoom on Belgian waters.

7. REMARKS

- Weather conditions were generally good to very good. Only on the afternoon of Weds 6th July, the sea state conditions (6 Bf) made it difficult to deploy instruments and achieve good data quality. On that afternoon it was decided to make measurements closer to the coast, with much better results.
- Injury of a crew member on Tues 5th July necessitated evacuation to a medical center in the UK. Measurements continued in the vicinity and the incident had minimal negative impact on the cruise.
- Late arrival on Mon 4th July of an instrument from the French colleagues, caused by an error of the courier service, caused a slight delay in departure. A zodiac was dispatched while measuring near Zeebrugge to pick up this instrument and the scientists concerned with minimal negative impact to the cruise. The instrument was successfully deployed on the same day.
- On station navigation was difficult because of the need to keep heading (for abovewater radiometric measurements) while drifting to deploy a floating radiometer camera from the aft deck. This was achieved successfully in all but one bad weather station, when it was necessary to deploy instruments sequentially.
- AUMS (Ferrybox) instruments provided useful data, especially chlorophyll fluorescence, turbidity, OBS, pCO2. Two AUMS stoppages occurred leading to loss of data for one 3.5 hour (caused by a leak) and one 10 hour period (cause unknown).
- The Turner fluorimeter seemed to give bad data throughout the cruise, although the cause could not be identified.
- Excellent collaboration between scientists and crew and efficient working of all onboard enabled many high quality measurements to be made. Our thanks go to the captain and crew for their wholehearted support and to BMM-Oostende, particularly for Ferrybox installation and support.

8. DATA STORAGE

The data acquired is being processed by the participating institutions (MUMM, LOV, ULg) and will be supplied to the Belgian Marine Data Centre according to the conventions agreed within the BELCOLOUR-2 project.

Contact persons:
MUMM – Kevin Ruddick
LOV – David Doxaran
ULg – Willy Champenois