

BOUSSOLE Monthly Cruise Report

Cruise 167

January 10–12, 2016

Vessel: R/V Téthys II (cancelled)

January 28, 2016

Duty Chief: Melek Golbol (golbol@obs-vlfr.fr)

Vessel: R/V Sagitta III

(Captain: Jean-Yves Carval)

Science Personnel: Melek Golbol, Anouck Ody and Collin Roesler.

Laboratoire d'Océanographie de Villefranche (LOV), 06238 Villefranche sur mer cedex, France



Niskin Bottles for water sampling and the two IOP packages for instruments intercomparison on the deck of the R/V Sagitta III.

BOUSSOLE project

ESA/ESRIN contract N° 4000111801/14/I-NB

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Foreword

This report is part of the technical report series that is being established by the BOUSSOLE project.

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Cruise Objectives

Routine operations

Multiple Biospherical's C-OPS (Compact Optical Profiling System) radiometric profiles are performed at the BOUSSOLE site around solar noon, under optimal conditions: clear blue skies and flat, calm sea surface. If the sky is clear and sea conditions are reasonably calm (no whitecaps or large swell), hand held CIMEL sun photometer measurements are to be performed consecutively where possible with C-OPS profiles. If sea conditions are poor but sky is good, hand held CIMEL sun photometer measurements can be made at intervals throughout the day to measure atmospheric optical thickness. CTD deployments are required at the start and the end of the C-OPS profiling day and around noon in the longer summer days or when there is a high possibility of a satellite matchup. The CTD package also includes a Chl fluorometer. Additional instrumentation for measurement of inherent optical properties has been added from December 2011. The package includes a hyperspectral absorption meter (Hobilabs a-sphere), a multispectral backscattering meter (Hobilabs Hydroscat-6) and a multispectral beam transmissometer (Hobilabs Gamma-4). 2 CTD casts are to be performed at each data acquisition at the BOUSSOLE site: one cast with, and one cast without, a 0.2 μ m filter added on the a-sphere for the dissolved matter absorption measurements.

Seawater samples are to be collected, filtered and stored into liquid nitrogen for subsequent HPLC pigment and particle absorption spectrophotometric filter analysis in the lab. Three replicates samples are to be collected at surface for total suspended matter weighting in the lab.

A new sensor ("Master REM A") was added to the IOP package and connected to the CTD. This sensor is identical to the ones installed on the Bio-Argo floats, and is planned to be used as a "gold standard" to inter-calibrate sensors among the Bio-Argo fleet. This sensor measures fluorescence of Chla, fluorescence of Coloured Dissolved Organic Matter (CDOM), and backscattering at 700nm. The objective is to evaluate what this instrument provides in terms of Chl and CDOM fluorescence, by comparing its measurements to those from the BOUSSOLE Chl and CDOM fluorometers (the ones installed on the BOUSSOLE IOP package), to the chlorophyll concentrations from the HPLC analyses, and to the CDOM absorption measurements from the CDOM analyses.

Operations that have to be performed in each cruise include:

- Collection and filtration of seawater samples for colored dissolved organic matter (from June 2005).
- One CTD transect is performed between the BOUSSOLE site and the Port of Nice. This transect consists of six fixed stations on-route from BOUSSOLE. Whenever feasible, this transect should be performed at a similar time for each cruise, in order to minimise the influence of possible diurnal variability.
- Divers check the underwater state of the buoy structure and instrumentation, take pictures for archiving, clean the sensor optical surfaces, and then take again some pictures after cleaning. Divers also put a neoprene cap on the backscattering meter and on the transmissometers for acquiring dark measurements (started in April 2009).

In addition, water samples are to be collected at two depths (5m and 10m) for dissolved oxygen (DO), total alkalinity (TA) and total inorganic carbon (TC) analysis (from March 2014). This operation is part of the BIOCAREX ANR project, in collaboration with the LOCEAN in Paris (J. Boutin and collaborators). The TA/TC samples will be processed by the National service for such analyses (SNAPOCO – LOCEAN in Paris). The results will allow checking the data collected by the two pCO₂ CARIOCA sensors installed on the buoy at 3m and 10m.

Further details about these operations and the data collection and processing protocols are to be found in:

Antoine, D. M. Chami, H. Claustre, F. D'Ortenzio, A. Morel, G. Bécu, B. Gentili, F. Louis, J. Ras, E. Roussier, A.J. Scott, D. Tailliez, S. B. Hooker, P. Guevel, J.-F. Desté, C. Dempsey and D. Adams. 2006, BOUSSOLE: a joint CNRS-INSU, ESA, CNES and NASA Ocean Color Calibration And Validation Activity. NASA Technical memorandum N° 2006 - 214147, 61 pp.

http://www.obs-vlfr.fr/Boussole/html/publications/pubs/BOUSSOLE_TM_214147.pdf

Additional operations

Collin Roesler (from Bowdoin College, Maine, USA) was on board to deploy a new IOP package. This package includes a Turner ICAM, a WET Labs AC-9plus and a WET Labs AC-S for absorption measurement and three 3X1M sensors (001,004 and F3-4115) for fluorescence measurement. The data acquired from these instruments

will be compared to those acquired from the BOUSSOLE instruments. For each IOP package (the new one and the BOUSSOLE one) 2 casts were performed at the BOUSSOLE site : one cast with, and one cast without, 0.2µm filters on the absorption meters (a-Sphere, AC-S, AC-9, ICAM) for the dissolved matter absorption measurements. It is planned to use this new package during a few subsequent cruises.

Cruise Summary

The BOUSSOLE #167 cruise on the *R/V Tethys II* planned from 10 January to 12 January was cancelled because of bad weather. Therefore, the BOUSSOLE operations including C-OPS profiles and IOP profiles were conducted on the *R/V Sagitta III* on 28 January. This day was used for IOP casts, for water sampling, for optical profiles and for a Secchi disk at the BOUSSOLE site. The main BOUSSOLE CTD Rosette could not be used with the *R/V Sagitta III*. However a CTD is included in the BOUSSOLE IOP package and the CTD data from the BOUSSOLE IOP package were used for this cruise. The CIMEL measurements was not performed during this cruise because the sky was overcast and hazy.

Sunday 10 January to Tuesday 12 January 2016

Bad weather prevented departure from the Nice harbour.

Thursday 28 January 2016

The sea state was slight with a moderate breeze. The sky was overcast and the visibility was medium. When arrived at BOUSSOLE, we started the operations with the IOP casts. Firstly, 2 IOPs casts from the new package were performed including 1 cast with 0.2 µm filters on the ac meters. Then, 2 IOPs casts with the BOUSSOLE package were performed including 1 cast with 0.2 µm filters on the a-sphere and with a cap on the backscattering meter for dark measurements.

After these casts, water was sampled with Niskin bottles at 4 depths (9, 30, 100 and 1 m). Finally, 2 C-OPS profiles and then a Secchi disk were performed at the BOUSSOLE site.

Cruise Report

Sunday 10 January to Tuesday 12 January 2016

Bad weather prevented departure from the Nice harbour.

Thursday 28 January 2016

People on board: Melek Golbol, Anouck Ody and Collin Roesler.

0725	Departure from the Villefranche-sur-mer harbour.
1045	Arrival at the BOUSSOLE site.
1100	IOP cast J4.1, 180 m.
1145	IOP BOUSSOLE 01, 180m (with 0.2 µm filter on a-sphere and cap on HS-6).
1155	IOP BOUSSOLE 02, 180m.
1240	Water sampling at 9, 30,100 and 1 m for HPLC and a _p .
1340	C-OPS 01, 02.
1415	Secchi 01, 16 m.
1435	C-OPS 01, 02.
1430	Departure to the Villefranche-sur-mer harbour.
1640	Arrival at the Villefranche-sur-mer harbour.

Problems identified during the cruise

It was not possible to use the main BOUSSOLE Rosette on the deck of the Sagitta III: the electrocarrier cable was not operational. So, the water sampling was performed directly with Niskin bottles and a messenger.

Cruise Summary Table for Boussole 167

Date	Black names	Profile names	CTD notées	Other sensors	Start Time	Duration	Depth max (meter)	Latitude (N)		Longitude		Sky	Clouds	Quantity (#/8)	Weather		Atm. Pressure (hPa)	Humidity (%)	Visibility	T air	T water	Sea		Swell H (m)	Swell dir.	Whitecaps
	(file ext: ".raw")	(file extension: ".raw")			GMT (hour.min)	(min.sec)		(Degree)	(Minute)	(Degree)	(Minute)				Wind sp. (kn)	Wind dir.						Sea	Swell H (m)			
10/01/16																										
11/01/16																										
12/01/16																										
13/01/16				IOP J1.1	11:00	NA	180	43	22.972	7	54.128	overcast		8	15	35	1028.0	81		11.8	14.25	calm				
				IOP BOUSSOLE 01	11:45	8:00	180	43	23.314	7	54.516	overcast		7	15	41	1028.0	80		11.7	14.68	calm				
				IOP BOUSSOLE 02	11:55	8:00	180	43	23.314	7	54.516	overcast		7	15	41	1028.0	80		11.7	14.68	calm				
				Niskin sampling for HPLC & Ap	12:40			43	22.144	7	54.050	overcast		7	15	16	1028.0	80		11.6	13.91	calm				
		bou_c-ops_160128_1028_002_data.csv			13:40	3:24	80	43	22.767	7	54.809	overcast	Cu	7	13	141	1027.0	80	medium	12.0		calm	0.8		few	
		bou_c-ops_160128_1028_003_data.csv			13:58	5:56	157	43	23.025	7	54.967	overcast	Cu	7	13	141	1027.0	80	medium	12.0		calm	0.8		few	
				Secchi01	14:15	4:00	16	43	22	7	54	overcast		8	13	221	1022.3	72	medium	14.9	16.30	calm				