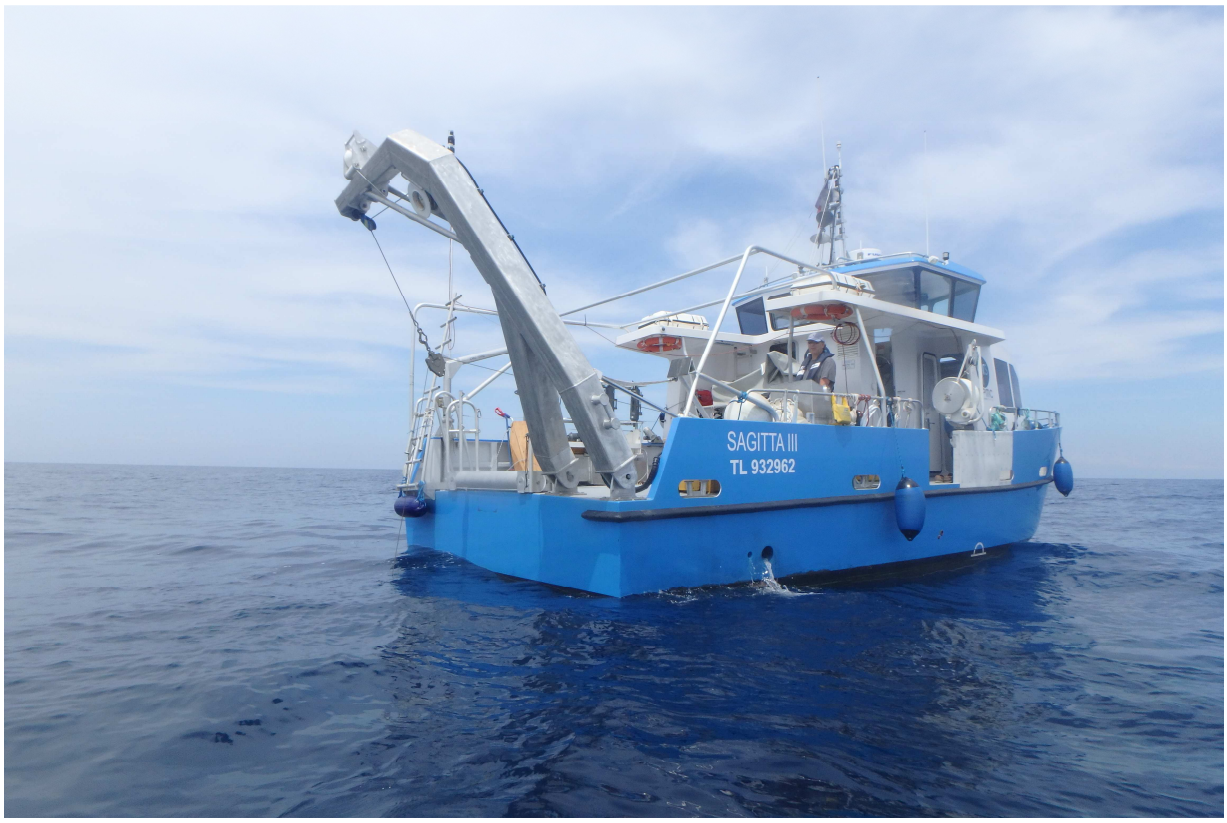
BOUSSOLE Monthly Cruise Report

Cruise 173
June 29, 2016

Duty Chief: Melek Golbol (golbol@obs-vlfr.fr)
Vessel: R/V Sagitta III
(Captain: Jean-Yves Carval)

Science Personnel: Céline Dimier, Melek Golbol and Eduardo Soto Garcia.

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



Because of the unavailability of the R/V *Téthys II* on July 2016, a cruise was carried out with the R/V *Sagitta III* on the end of June, 2016.

BOUSSOLE project

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

July 11, 2016

Foreword

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

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European Space Agency

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Contents

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). Two CTD casts are to be performed at each data acquisition at the BOUSSOLE site: one cast with, and one cast without, a 0.2 µm 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.

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 (5 m and 10 m) 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

No additional operations.

Cruise Summary

The R/V *Tethys II* was not available in July 2016. So we decided to use the *R/V Sagitta III* to perform the BOUSSOLE operations at the end of June 2016. Therefore, the 29th June 2016 was used to perform CTD casts, water sampling for HPLC and a_p measurements, and for a Secchi disk. The main BOUSSOLE CTD Rosette could not be used with the R/V *Sagitta III*. So, the CTD cast was performed with a CTD SBE 25plus and seawater was sampled directly with Niskin bottles using a messenger to close the bottles. The same day was also used for the surface maintenance of, and downloading data from, the buoy.
The C-OPS and CIMEL measurements could not be performed during this cruise because the sky was overcast and hazy.

Wednesday 29 June 2016

The sea state was smooth with a gentle breeze. The sky was overcast and the visibility was medium. When arrived at the BOUSSOLE site, the CTD was deployed. Nevertheless, the CTD was not functioning and no data were recorded. Then, buoy data were downloaded directly using the telemetry cable available on the top of the buoy. Surface sensors and solar panels were cleaned. A cap was removed from one of the surface radiometers, which had been forgotten during the rotation of the buoy upper superstructure that took place on June 6th and 7th. After this, a second CTD cast was performed and the CTD functioned correctly. The DCM (Deep Chlorophyll Maximum) was located at 35 m depth. A Secchi disk was performed and seawater was collected at 5 depths (300, 50, 35, 10 and 5 m) with Niskin bottles. Finally, seawater was collected with a bucket from the surface for TSM sampling. C-OPS measurements could not be performed because the sky was overcast and hazy and irradiance was unstable.

Pictures taken during this cruise can be found at:
https://get.google.com/albumarchive/114686870380724925974/album/AF1QipNh13t1AP90wl7xLemCb_0AodXhndbpbsWEAdU3

Data from the BOUSSOLE cruises and buoy are available at:
http://www.obs-vlfr.fr/Boussole/html/boussole_data/login_form.php

Cruise Report

Wednesday 29 June 2016 (UTC)

People on board: Céline Dimier, Melek Golbol and Eduardo Soto.

0700 Departure from the Villefranche-sur-mer harbour.
1005 Arrival at the BOUSSOLE site.
1025 CTD cast: failed.
1045 Cleaning of buoy surface sensors and solar panels.
1100 Direct connection with the buoy and data retrieval.
1115 CTD 01, 300m.
1145 Secchi 01, 15m.
1200 Attempt of C-OPS deployment cancelled (sky cloudy and unstable irradiance).
1235 Water sampling at 300, 50, 35, 10 and 5m for HPLC and $a_{p.}$
1250 Surface bucket for TSM sampling.
1300 Attempt of C-OPS deployment cancelled (sky cloudy and unstable).
1330 Departure to the Villefranche-sur-mer harbour.
1630 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 messengers

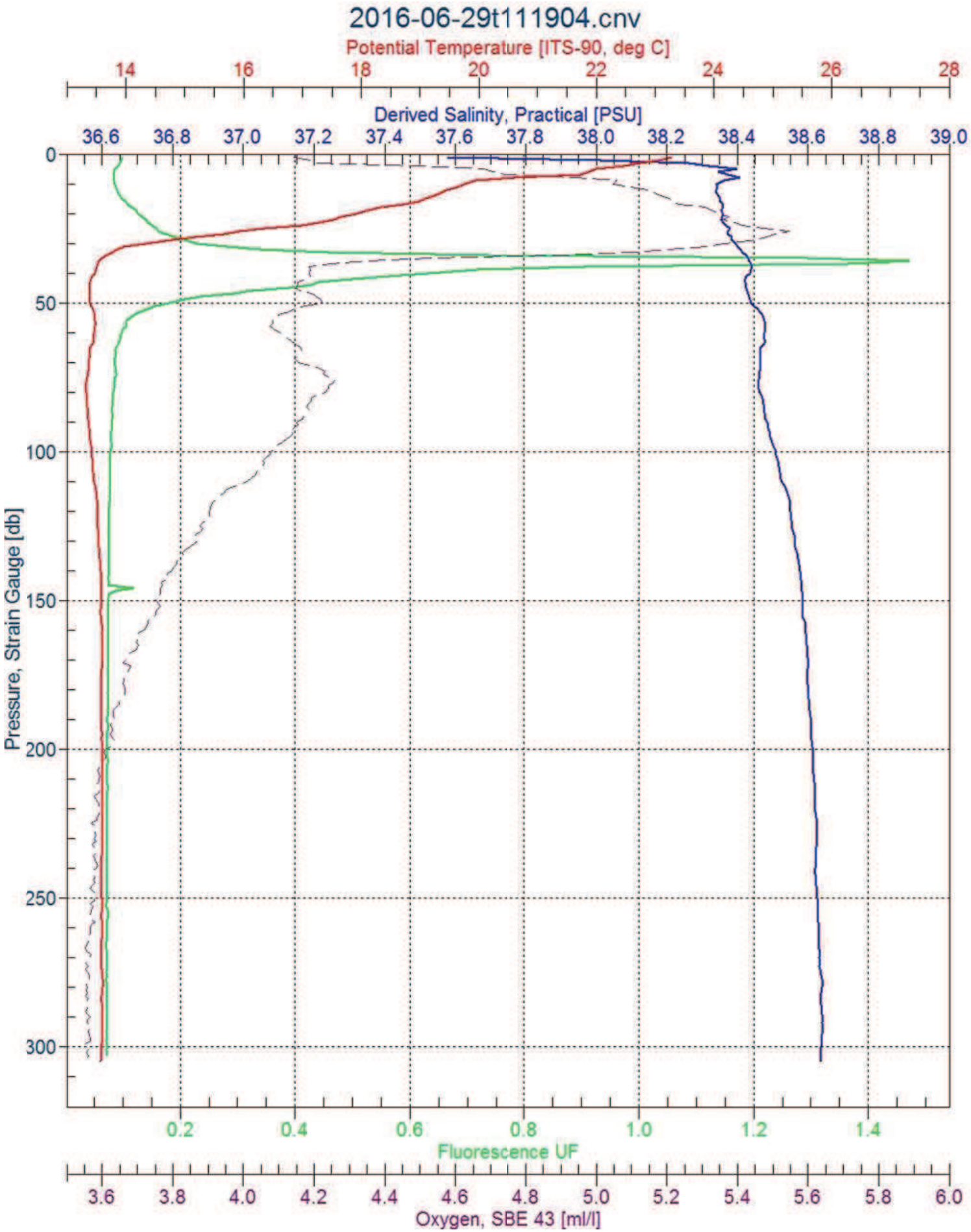
- The first CTD cast has failed. When data were checked after its deployment, it appeared that no data were recorded. The problem was due to a contact failure with the switch of the CTD.

- No C-OPS profiles and no CIMEL measurements could be performed during this cruise because of the bad conditions of the sky (many clouds and unstable irradiance).

Appendices

Cruise Summary Table for Boussole 173

Date	Black names	Profile names	CTD notées	Other sensors	Start Time	Duration	Depth max	Latitude (N)		longitude					Weather							Sea		
	(file ext: ".raw")	(file extension: ".raw")			GMT (hour.min)	(min.sec)	(meter)	(Degree)	(Minute)	(Degree)	(Minute)	Sky	Clouds	Quantity (#/8)	Wind sp. (kn)	Wind dir.	Atm. Pressure (hPa)	Humidity (%)	Visibility	T air	T water	Sea	Swell H (m)	Swell dir.	Whitecaps
29/06/16			CTDBOUS001		11:23	20:00	305	43	22.348	7	54.094	overcast		6	8	245	1016.0	NA		22.3	23.27	calm	0.3		
				Secchi01	11:45	4:00	15	43	22	7	54	overcast		6	8	245	1016.0	NA	good	22.3	23.27	calm	0.3		
				HPLC & Ap (Niskin bottles)	12:35	15:00	300	43	22.320	7	54.010	overcast		6					good			calm			
				TSM (bucket)	12:50	2:00	surface	43	22	7	54	overcast		6					good			calm			


2016-06-29t111904.cnv
Potential Temperature [ITS-90, deg C]
14
16
18
20
22
24
26
28
Derived Salinity, Practical [PSU]
36.6
36.8
37.0
37.2
37.4
37.6
37.8
38.0
38.2
38.4
38.6
38.8
39.0
Pressure, Strain Gauge [db]
0
50
100
150
200
250
300
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Fluorescence UF
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
5.2
5.4
5.6
5.8
6.0
Oxygen, SBE 43 [ml/l]