

# BOUSSOLE Monthly Cruise Report

**Cruise 169**

**March 04-07, 2016**

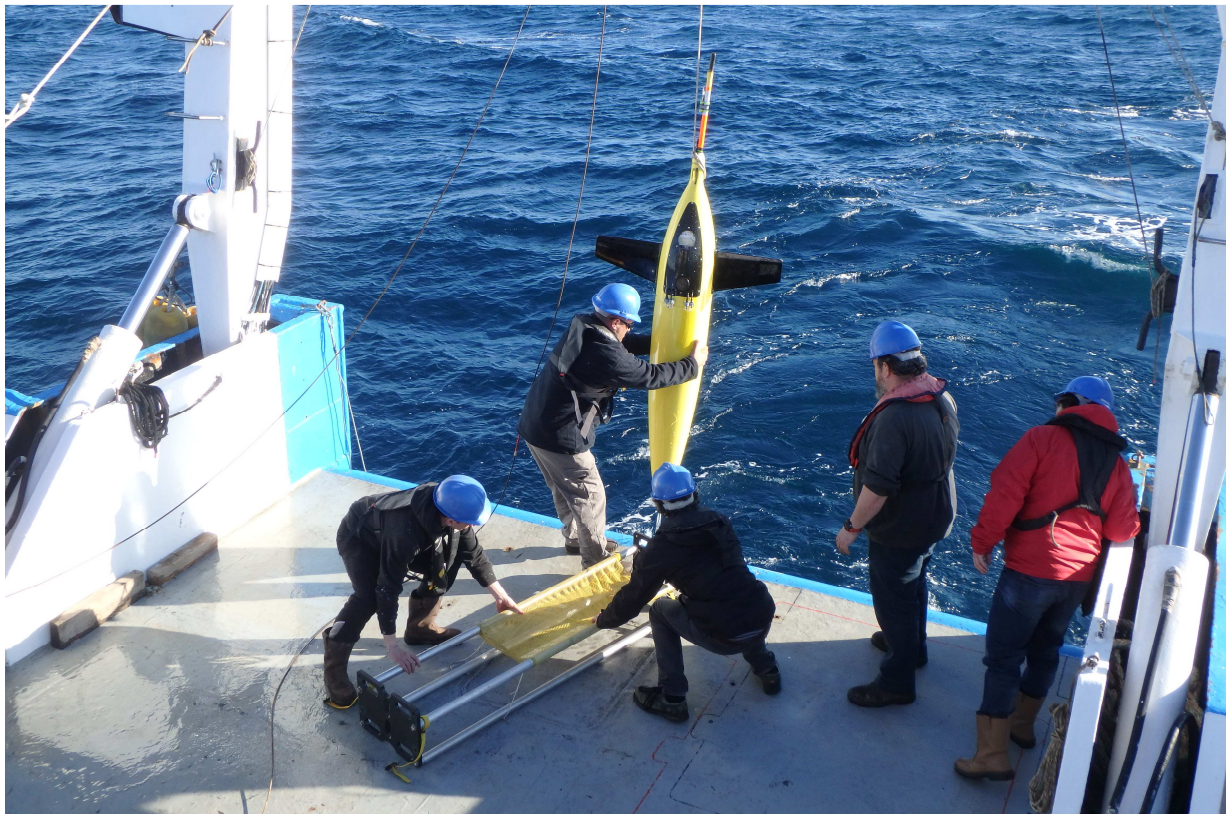
Duty Chief: Melek Golbol ([golbol@obs-vlfr.fr](mailto:golbol@obs-vlfr.fr))

Vessel: R/V Téthys II

(Captain: Joël Perrot)

Science Personnel: Marcos Cobas-Garcia, Marin Cornec, Emilie Diamond, Melek Golbol, Michael Hemming, Gareth Lee and Kiminori Shitashima.

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



Recovery of the Sea glider operated by the University of East Anglia (UK) in order to adjust the ballast before its redeployment.

**BOUSSOLE project**

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

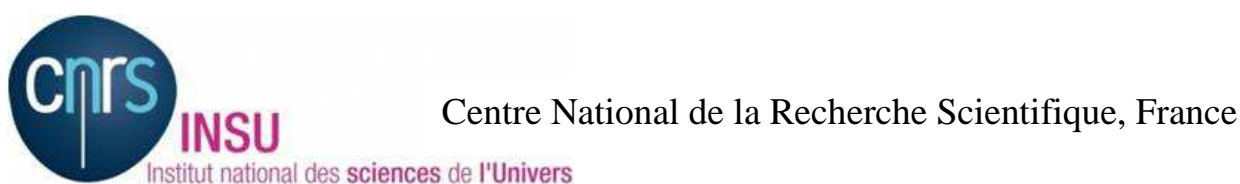
*March 23, 2016*



## Foreword

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

BOUSSOLE is funded and supported by the following Agencies and Institutions



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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 $\mu$ 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 pCO<sub>2</sub> 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](http://www.obs-vlfr.fr/Boussole/html/publications/pubs/BOUSSOLE_TM_214147.pdf)

### Additional operations

A Sea glider operated by the University of East Anglia (UK) was deployed at the vicinity of the BOUSSOLE site. The aim is to investigate changes in pH, pCO<sub>2</sub>, and mixed layer during the time of an expected spring bloom. Data measured by the glider will be compared with measurements collected by the nearby moorings and CTD casts

undertaken during BOUSSOLE/DYFAMED cruises. This is the second test of two novel ISFET (ion-sensitive field-effect transistor) pH-pCO<sub>2</sub> sensors developed at the University of Kyushu and the University of Tokyo (Japan).

## **Cruise Summary**

The three first days, bad weather prevented the departure from the Nice harbour. The weather allowed us to work only the fourth day. In fact, it was programmed for the MOOSE DYFAMED cruise but it was also used for BOUSSOLE operations. 2 CTD casts with water sampling, optical profiles and a Secchi disk were performed this day. The glider operated by the University of East Anglia was deployed close to the BOUSSOLE and DYFAMED sites.

### **Friday 04 March 2016**

Bad weather prevented departure from the Nice harbour.

### **Saturday 05 March 2016**

Bad weather prevented departure from the Nice harbour.

### **Sunday 06 March 2016**

Bad weather prevented departure from the Nice harbour.

### **Monday 07 March 2016**

The sea state was slight with a gentle to moderate breeze. The sky was blue and the visibility was good. When arrived at the BOUSSOLE site, a CTD cast with water sampling was performed, including a 0.2µm filter on the a-Sphere absorption meter and a cap on the HS-6 backscattering meter for dark measurements. Then 2 C-OPS profiles were performed. Then a CTD cast was attempted but failed. The CTD was taken on board. A burning smell was detected on the extension cable between the CTD and the electrocarrier cable and a fuse had blown. The fuse was changed, the extension cable was removed. Then the CTD worked correctly and the second CTD cast (without the 0.2µm filter and without the HS-6 cap) with water sampling was performed. Then a Secchi disk was performed before going to the DYFAMED site. When arrived at the DYFAMED site, the glider was deployed. Then a deep CTD cast was performed. Then the glider had to be recovered because it did not sink. It was necessary to adjust the ballast before its redeployment. Finally it was deployed during the way up to the Nice harbour, at 43°25.89'N 7°49.57'E.

Pictures taken during this cruise can be found at:

[https://picasaweb.google.com/114686870380724925974/2016\\_03\\_boussole169](https://picasaweb.google.com/114686870380724925974/2016_03_boussole169)

Data from the BOUSSOLE cruises and buoy are available at:

[http://www.obs-vlfr.fr/Boussole/html/boussole\\_data/login\\_form.php](http://www.obs-vlfr.fr/Boussole/html/boussole_data/login_form.php)

## **Cruise Report**

### **Friday 04 March 2016**

Bad weather prevented departure from the Nice harbour.

### **Saturday 05 March 2016**

Bad weather prevented departure from the Nice harbour.

## Sunday 06 March 2016

Bad weather prevented departure from the Nice harbour.

## Monday 07 March 2016 (UTC)

People on board: Marcos Cobas-Garcia, Marin Cornec, Emilie Diamond, Melek Golbol, Michael Hemming, Gareth Lee and Kiminori Shitashima.

0715 Departure from the Nice harbour.  
1030 Arrival at the BOUSSOLE site.  
1035 CTD 01, 50 m with water sampling at 10 and 5 m for TA/TC and O<sub>2</sub> (with 0.2 µm filter on a-Sphere and cap on HS-6).  
1055 C-OPS 01, 02.  
1145 Attempt of CTD cast: failed  
1200 CTD 02, 400 m with water sampling at 400, 200, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a<sub>p</sub>, CDOM and TSM.  
1230 Secchi 01, 14 m.  
1235 Departure to the DYFAMED site.  
1330 Sea glider deployment.  
1355 CTD MOOSE 95, 2000m.  
1520 Recovery of the sea glider. Ballast adjustment.  
1525 Departure from DYFAMED site.  
1535 Redeployment of the sea glider.  
1540 Departure to the Nice harbour.  
1830 Arrival at the Nice harbour.

## Problems identified during the cruise

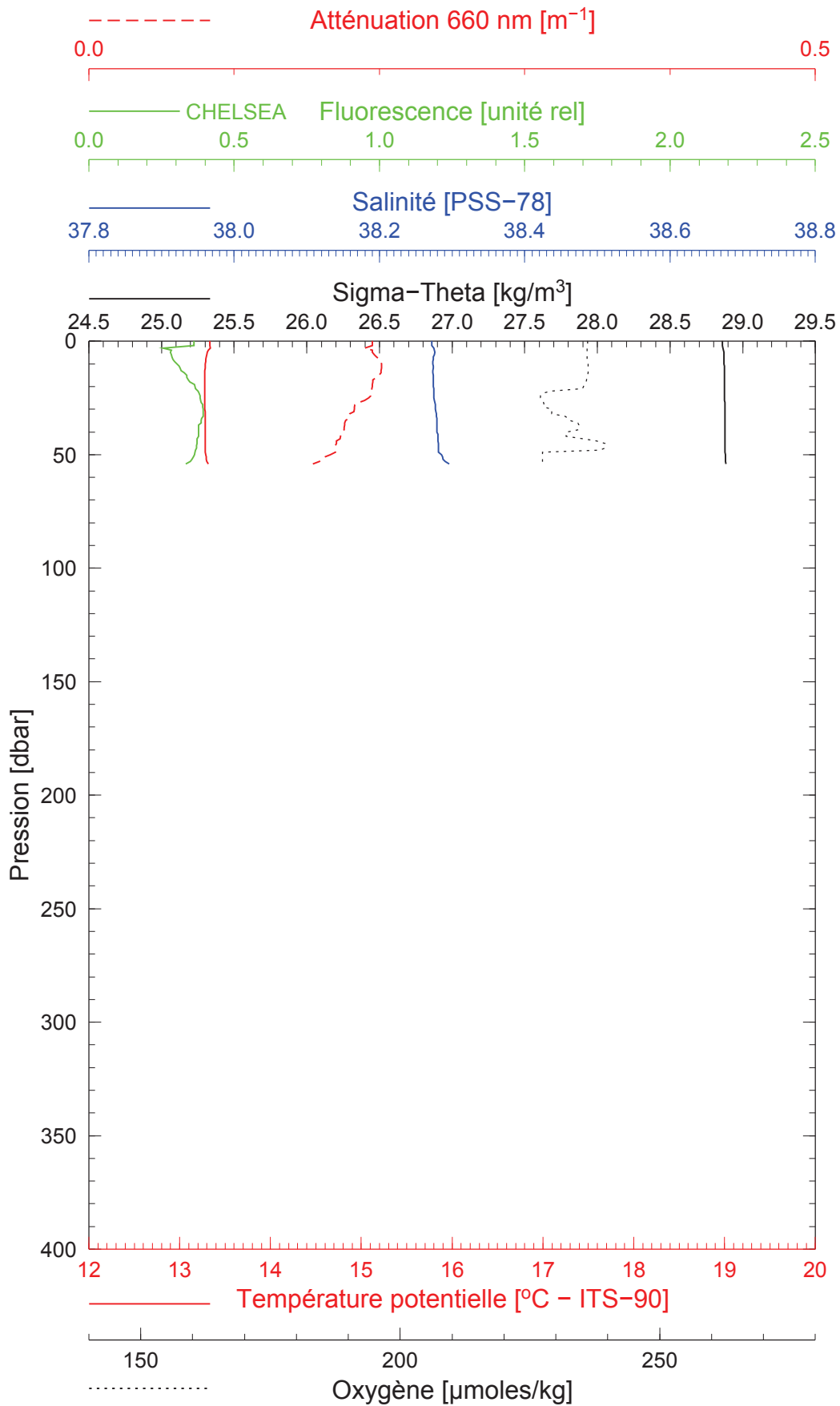
- O<sub>2</sub> data from the CTD 01 and CTD 02 were bad: after the CTD 01 cast, the tube arriving to the O<sub>2</sub> sensor was checked and re-adjusted. But the problem persisted during the CTD 02 cast. Then, the problem was solved by cleaning the connector of the O<sub>2</sub> sensor. O<sub>2</sub> data were good during the deep CTD cast at the DYFAMED site (after cleaning of the O<sub>2</sub> sensor connector).
- Problems appeared with the communication between the CTD and the deck unit after the first CTD cast. In fact, during the previous cruise, the same issue was due to the connection between the CTD and the electrocarrier cable. A fuse had blown and a burning smell was detected on the extension cable between the CTD and the electrocarrier cable. The problem was solved by changing the fuse and removing the extension cable that was faulty.
- The diving operations could not be programmed during this cruise because of the bad weather. These operations were postponed when the weather will be better.

## **Appendices**

Cruise Summary Table for Boussole 169

Date	Black names (file ext: ".raw")	Profile names (file extension: ".raw")	CTD notées	Other sensors	Start Time (GMT (hour.min))	Duration (min.sec)	Depth max (meter)	Latitude (N) (Degree)   (Minute)	Longitude (Degree)   (Minute)	Sky	Clouds	Quantity (#/8)	Weather Wind sp. (kn)	Wind dir.	Atm. Pressure (hPa)	Humidity (%)	Visibility	T air	T water	Sea	Sea Swell H (m)	Swell dir.	Whitecaps	
04/03/16																								
05/03/16																								
06/03/16																								
07/03/16			CTDBOUS001	O <sub>2</sub> & TA/TC	10:36	8:00	50	43	22.166	7	53.868	blue	1	9	203	1002.6	64		10.8	13.38	calm			
		bou_c-ops_160307_1036_001_data.csv			10:51	4:12	109	43	22.229	7	53.781	blue	None	0	10	191	1002.6	64	good	10.7		calm	0.9	no
		bou_c-ops_160307_1036_002_data.csv			12:41	2:43	70	43	22.256	7	53.489	blue	None	0	10	191	1002.6	64	good	10.7		calm	0.9	no
			CTDBOUS002	HPLC, Ap, CDOM & TSM	12:01	29:00	400	43	22.446	7	53.935	blue	1	12	95	1002.5	61		10.0	13.36	calm			
			Secchi01		12:30	4:00	14	43	22	7	54	blue	1				good							





Date 07/03/2016  
Heure déb 10h 36min [TU]

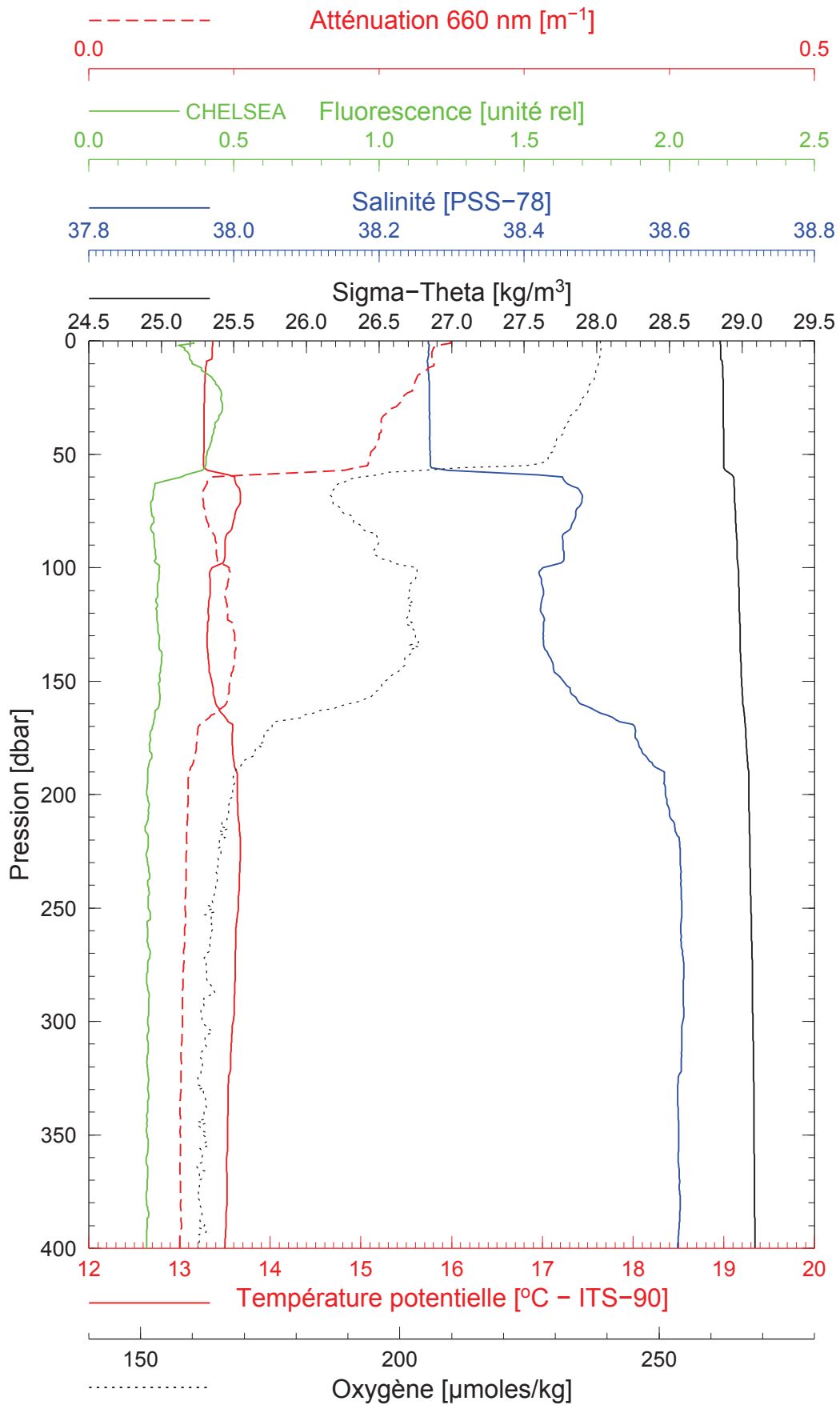
Latitude 43°22.166 N  
Longitude 07°53.868 E

BOUSSOLE 169

07/03/2016

BOUS160307\_02

BOUS002



Date 07/03/2016  
Heure déb 12h 01min [TU]

Latitude 43°22.446 N  
Longitude 07°53.935 E