

# BOUSSOLE Monthly Cruise Report

**Cruise 201**

**October 24-26, 2018**

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

Vessel: R/V *Téthys II*

(Captain: Dany Deneuve)

Science Personnel: Melek Golbol and Eduardo Soto Garcia.

*Laboratoire d'Océanographie de Villefranche (LOV), 06230 Villefranche-sur-Mer, France*



CTD Rosette on the deck of the *R/V Téthys II* before its deployment, and the BOUSSOLE buoy in the background.

**BOUSSOLE project**

**ESA/ESRIN contract N° 4000119096/17/I-BG**

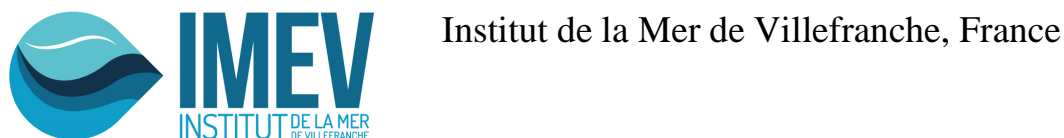
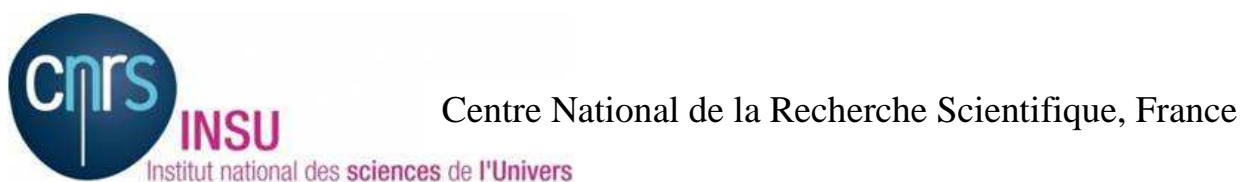
*October 31, 2018*



## 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



## Contents

1. Cruise Objectives
2. Cruise Summary
3. Cruise Report
4. Problems identified during the cruise

## Appendices

## 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 $\mu$ 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.

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 pCO<sub>2</sub> CARIOCA sensors installed on the buoy at 3 m and 10 m.

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

It was noticed that in the previous cruises, there were problems with absorption data acquisition when the 0.2  $\mu$ m filter was installed on the inlet tube of the a-sphere for the dissolved matter absorption measurements. In fact when the filter is installed, the cavity of the a-Sphere needs a minimal time to be completely filled and therefore to stabilize data acquisition. This minimal time was determined during last cruise. In order to establish the best protocol for the absorption profiles of dissolved matter, the CTD 004 was stopped at 8 depths during either 5 or 7 minutes depending on the depth during the descent and the ascent of the CTD.

## Cruise Summary

The first day of the cruise was used for optical profiles, for CTD casts with water sampling, for CIMEL measurements and for a Secchi disk at the BOUSSOLE site. The second day of the cruise was used for CTD casts with water sampling and for a Secchi disk at the BOUSSOLE site. Optical profiles could not be performed this day because of a failure on the sea cable, which connects the sensors with the deck unit. The last day was used only for a Secchi disk because bad weather did not allow us to deploy the CTD and C-OPS.

## Wednesday 24 October 2018

The sea state was slight with a moderate breeze. The sky was blue and the visibility was excellent. When arrived at the BOUSSOLE site, 2 C-OPS profiles were performed. It was not possible to perform a third profile because the communication between the deck unit and the sensors was lost when the C-OPS returned to the surface. Then, 2 CTD casts with water sampling were performed at the BOUSSOLE site. In the meantime, 3 CIMEL measurements, and finally a Secchi disk were performed at the BOUSSOLE site before returning to the Nice harbour.

## Thursday 25 October 2018

The sea state was slight with a light breeze in the morning and a gentle breeze in the afternoon. The sky was blue in the morning and overcast in the afternoon and the visibility was excellent. Firstly, the C-OPS was deployed but it was no possible to perform optical profiles because the communication between the deck unit and the sensors was always lost when profiling. It was probably due to a failure of the sea cable. Then, 2 CTD casts with water sampling and a Secchi disk were performed. For the second CTD cast, a cap was put on the Hydrosat-6 for dark measurements and a 0.2  $\mu\text{m}$  filter put on the a-Sphere absorption meter for the dissolved matter absorption measurements. The CTD 004 was stopped at 8 depths (5, 10 and 20 m during 7 minutes and 40, 60, 80, 200, 400 m during 5 minutes) during the descent and the ascent of the CTD. A protocol will be chosen after comparing the data between descent and ascent acquisitions.

## Friday 26 October 2018

The sea state was moderate with a moderate breeze. The sky was cloudy. Only a Secchi disk was performed at the BOUSSOLE site. Unfortunately it was not possible to deploy the CTD and the C-OPS because of the bad weather.

Pictures taken during this cruise can be found at:  
<https://photos.app.goo.gl/iWRdUFmtV6o42XBT6>

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

### Wednesday 24 October 2018 (UTC)

People on board: Melek Golbol and Eduardo Soto Garcia.

0615 Departure from the Nice harbour.  
0930 Arrival at the BOUSSOLE site.  
0940 C-OPS 01, 02.  
1020 CTD 01, 400 m with water sampling at 400, 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC and  $a_p$ .  
1245 CTD 02, 400 m with water sampling at 400, 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC and  $a_p$ .  
1300 CIMEL 01, 02, 03.  
1320 Secchi disk 01, 22 m.  
1325 Departure to the Nice harbour.  
1700 Arrival at the Nice harbour.

### Thursday 25 October 2018 (UTC)

People on board: Melek Golbol and Eduardo Soto Garcia.

0530 Departure from the Nice harbour.  
0900 Arrival at the BOUSSOLE site.  
1015 C-OPS (no deployment: failure of the sea cable).

0940 CTD 03, 400 m with water sampling at 400, 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC and  $a_p$ .  
1230 Secchi 02, 21 m.  
1205 CTD 04, 400 m with water sampling at 70 m for HPLC and  $a_p$  and 5 m for TSM (with 0.2  $\mu$ m filter on a-Sphere, 7 minutes stop at 5, 10 and 20 m and 10 minutes stop at 40, 60, 80, 200 and 400 m).  
1410 Departure to the Nice harbour.  
1730 Arrival to the Nice harbour.

## Friday 26 October 2018 (UTC)

People on board: Melek Golbol and Eduardo Soto Garcia.

0645 Departure from the Nice harbour.  
0830 Unwinding of the C-OPS seawater cable on the way to BOUSSOLE.  
1030 Arrival at the BOUSSOLE site.  
1050 Secchi 03, 18 m.  
1015 C-OPS and CTD not deployed: bad weather.  
1115 Departure to the Nice harbour.  
1500 Arrival to the Nice harbour.

## Problems identified during the cruise

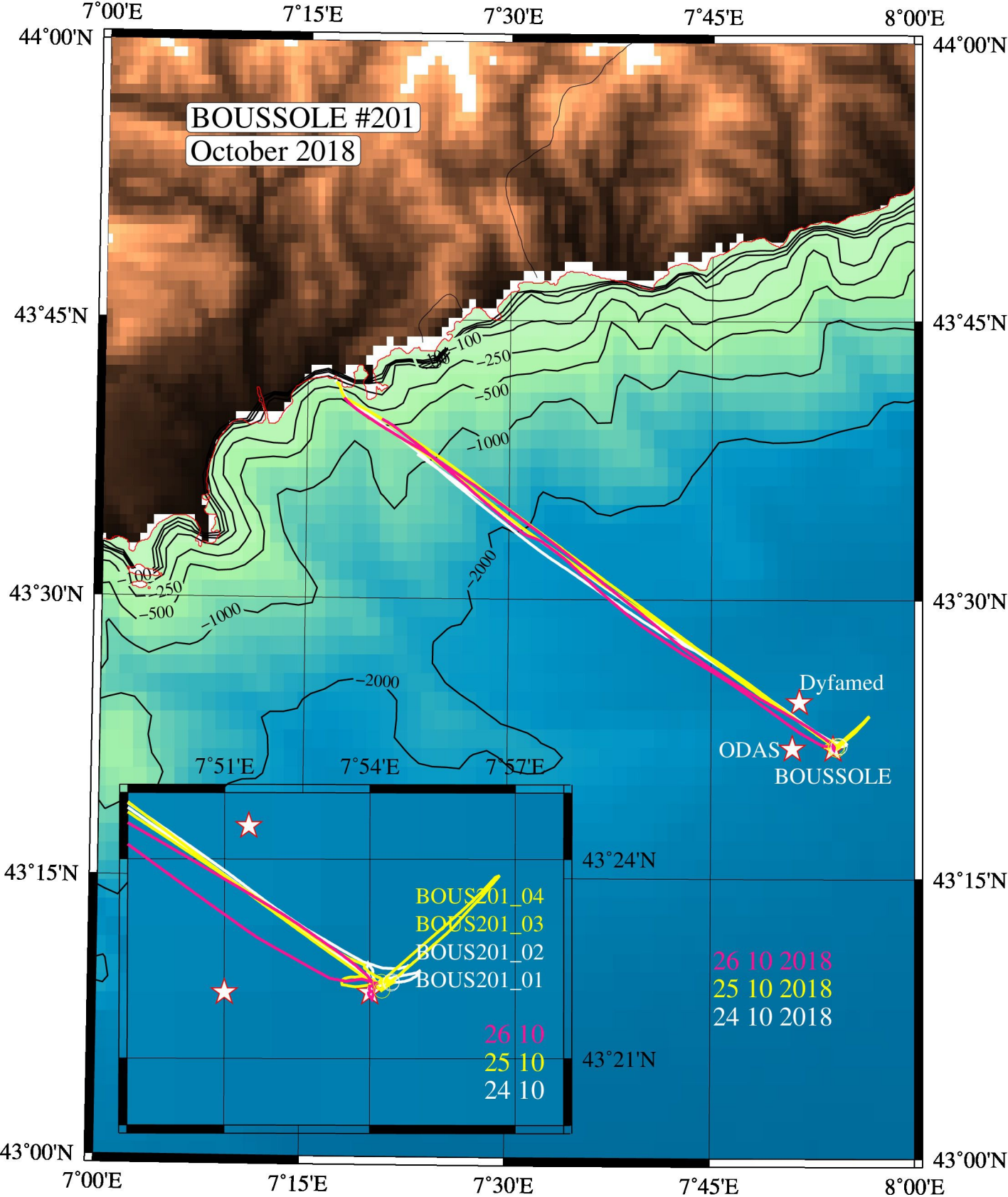
- Diving and maintenance operations of the buoy were not carried out because the buoy is currently not functioning. The faulty data acquisition system will be replaced during the next rotation of the upper superstructure of the buoy.
- It was not possible to perform C-OPS profiles after the second deployment of the first day. A problem appeared with the connection between the deck unit of the C-OPS and the sensors, with a loss of communication with sensors. The faulty cable was replaced the third day by a shorter one but the bad weather did not allow us to deploy the C-OPS.
- The first day, there was a problem of acquisition on the IOP package. There were no IOP data recorded during the CTD 001 cast. It seemed that the IOP package was not well switched. So a second cast was performed with HPLC and  $a_p$  sampling and the IOP package worked well.
- The Niskin bottle #5 was not completely filled during the CTD 003 cast probably due to a leak. There was not enough sea water for HPLC and  $a_p$  sample at 70 m depth. So, the O-Ring of the bottle was replaced and the sample at 70 m was collected again during CTD 004 cast.
- Unfortunately, there was no sampling of  $O_2$  and TA/TC during this cruise because of the bad weather. This sampling was planned the last day as the weather forecasts were favourable the day before.
- The thermosalinograph and fluorimeter of the R/V *Téthys II* were not functioning.

## **Appendices**

Cruise Summary Table for Boussole 201

Date	Black names (file ext: ".raw")	Profile names (file extension: ".raw")	CTD notées	Other sensors	Start Time		Depth max (meter)	Latitude (N)			longitude			Weather			Humidity (%)	Visibility	T air	T water	Sea		Whitecaps		
					GMT (hour.min)	hour.min.sec		(Degree)	(Minute)	(Degree)	(Minute)	Sky	Clouds	Quantity (#/8)	Wind sp. (kn)	Wind dir.					Atm. Pressure (hPa)	Sea Swell H (m)		Swell dir.	
24/10/18		bou_c-ops_181024_0909_001_data.csv			09:39	4:46	117	43	22.152	7	54.127	blue	None	0	13	245	1014.7	78	excellent	19.0		slight	0.8	yes	
		bou_c-ops_181024_0909_002_data.csv			09:49	4:13	104	43	22.264	7	54.056	blue	None	0	13	245	1014.7	78	excellent	19.0		slight	0.8	yes	
			BOUS201_01	HPLC & Ap	10:19	32:00	400	43	22.139	7	54.438	blue		1	20	255	1013.4	74		19.4	19.26	slight			
			BOUS201_02	TSM	12:46	29:00	400	43	22.157	7	54.449	blue		1	12	209	1013.0	80		19.7	19.60	slight			
				CIMEL01	13:00	3:00		43	22.226	7	54.582	blue		0			1012.5								
				CIMEL02	13:04	4:00		43	22.226	7	54.582	blue		0			1012.5								
				CIMEL03	13:08	3:00		43	22.226	7	54.582	blue		0			1012.5								
				Secchi01	13:20	4:00	22	43	22	7	54	blue		1					excellent				slight		
25/10/18			BOUS201_03	HPLC & Ap	09:42	28:00	400	43	22.030	7	54.250	blue		2	4	156	1016.9	86		20.4	19.58	slight			
				Secchi02	11:15	4:00	21	43	22	7	54	blue		2									slight		
			BOUS201_04	TSM	12:05	2:00:00	400	43	22.145	7	54.234	overcast		7	7	166	1015.8	86		20.6	19.71	slight			
26/10/18			Secchi03	10:50	4:00	18	43	22	7	54	cloudy		5	14	241	1013.3	79		19.8	20.10	moderate	1.6			





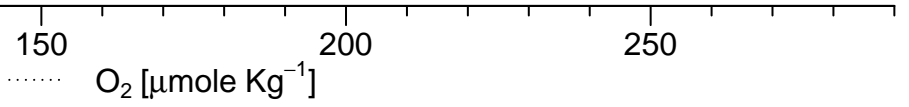
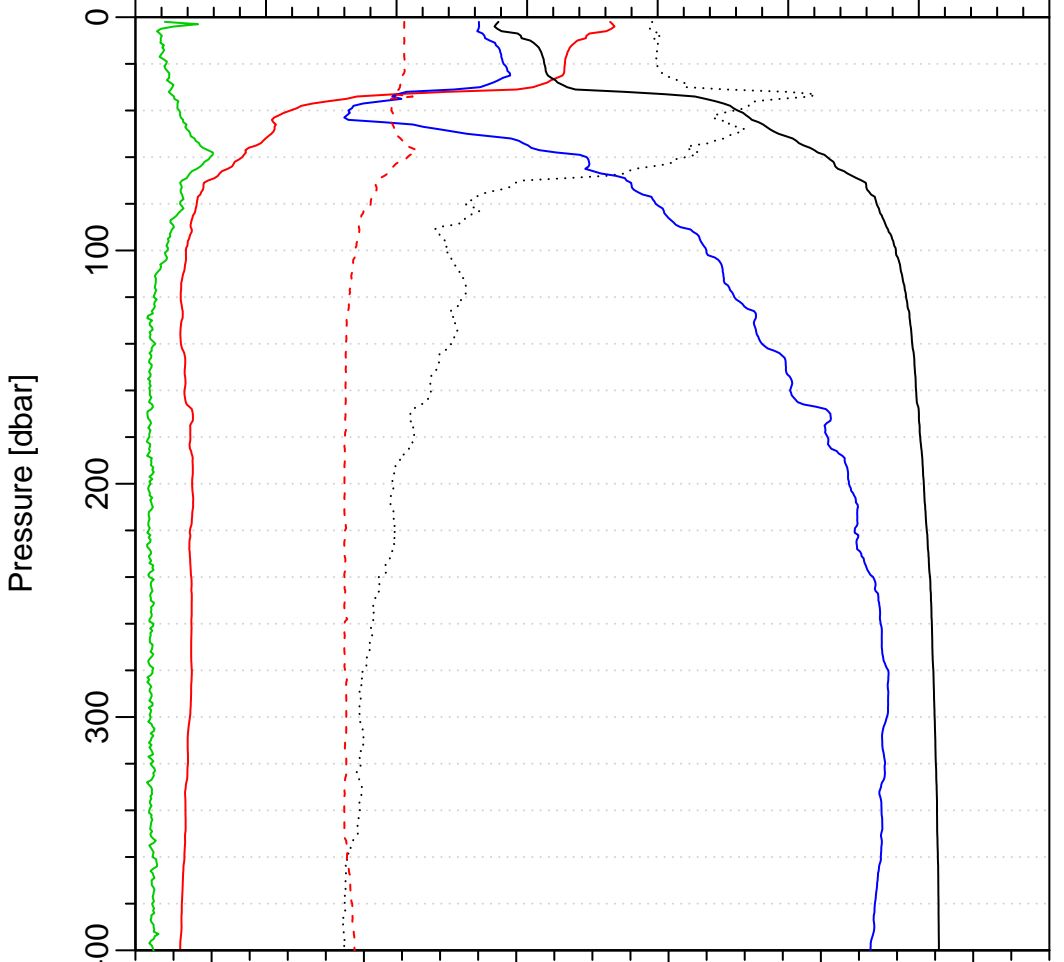
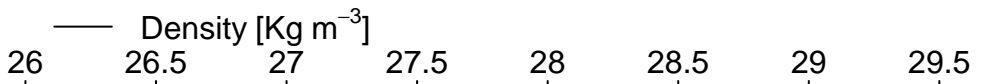
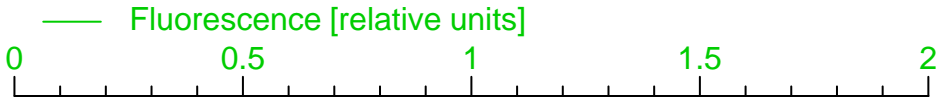
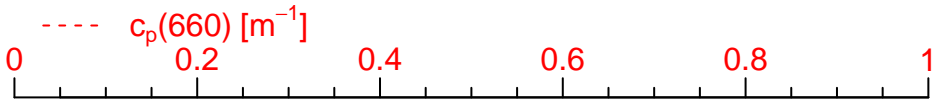
bous201\_01

Date = 24/10/2018

Heure debut [TU] = 10:19

Longitude = 007 54.438 E

Latitude = 43 22.139 N



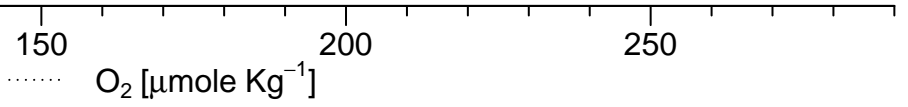
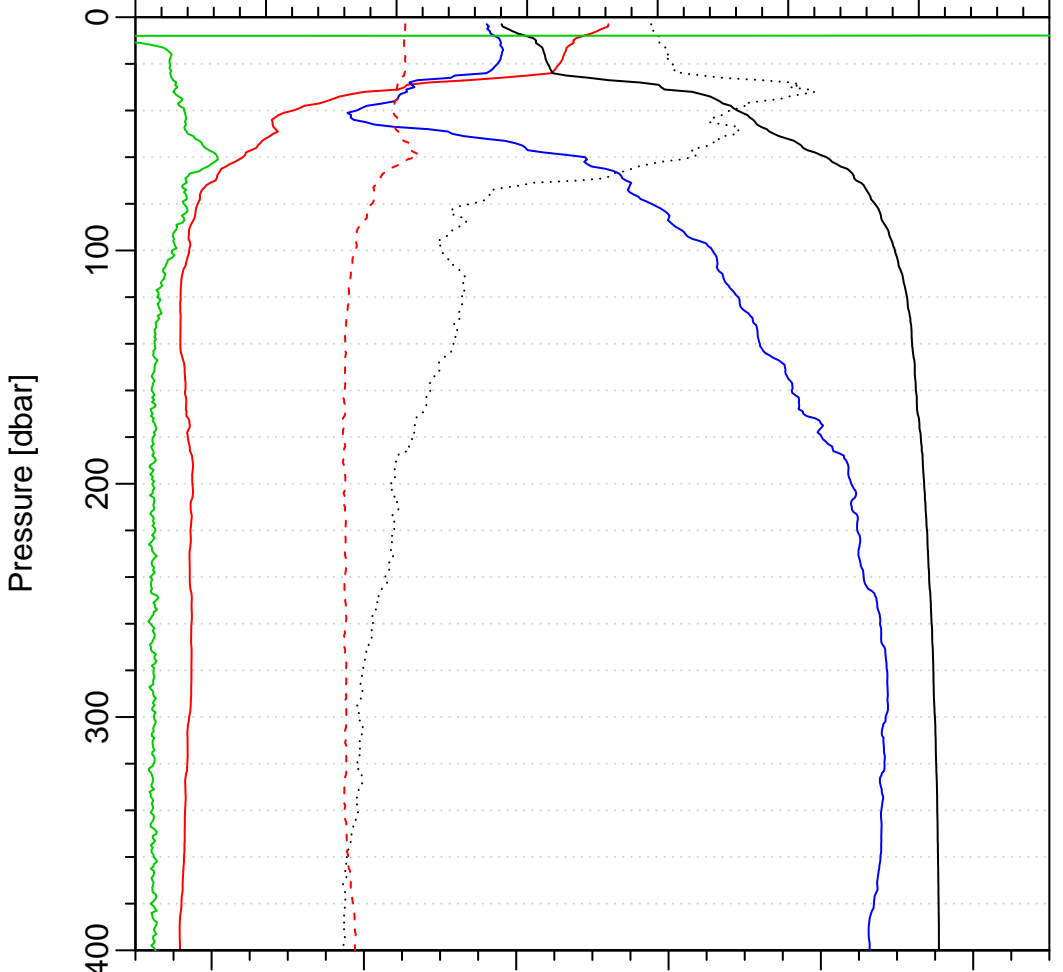
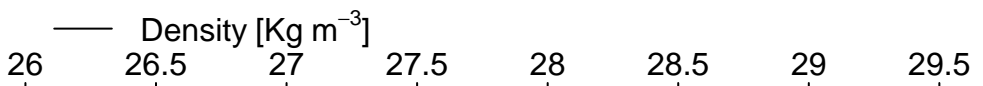
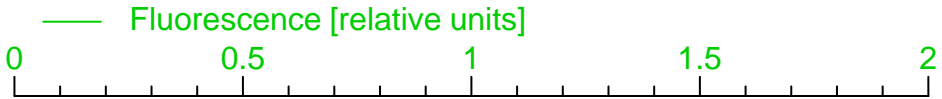
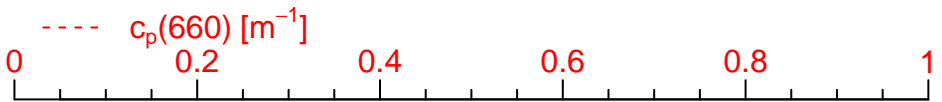
bous201\_02

Date = 24/10/2018

Heure debut [TU] = 12:46

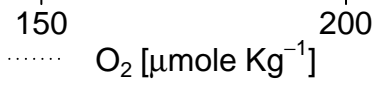
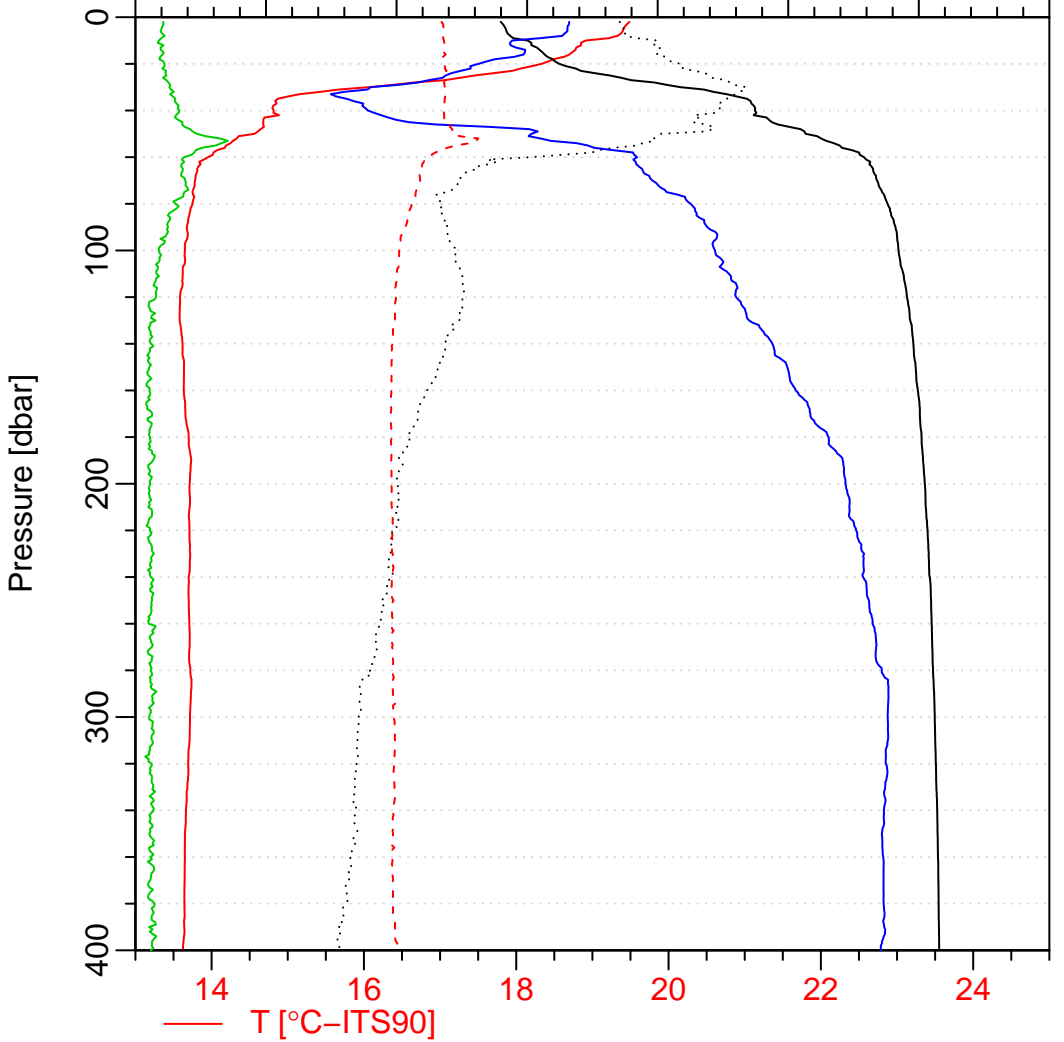
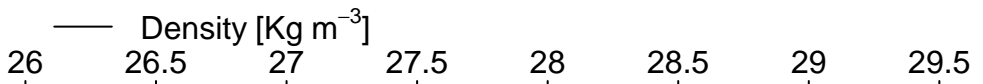
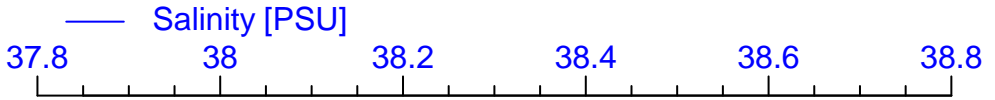
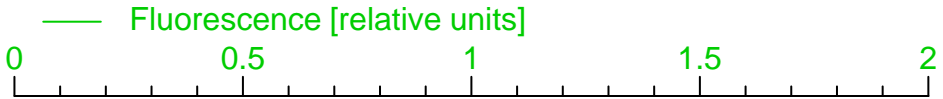
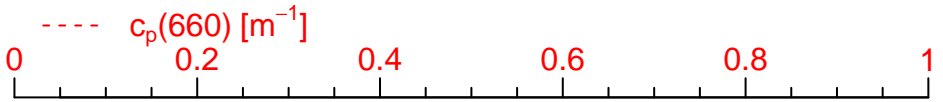
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Latitude = 43 22.157 N



bous201\_03

Date = 25/10/2018  
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Longitude = 007 54.250 E  
Latitude = 43 22.030 N



bous201\_04

Date = 25/10/2018  
Heure debut [TU] = 12:05  
Longitude = 007 54.234 E  
Latitude = 43 22.145 N

