

BOUSSOLE Monthly Cruise Report

Cruise 200

September 18-19, 2018

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

Vessel: R/V Téthys II

(Captain: Dany Deneuve)

Science Personnel: Melek Golbol, Grigor Obolensky, Eduardo Soto Garcia and Vincenzo Vellucci.

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



Deployment of a profiling float equipped with a pCO₂ sensor at the vicinity of the BOUSSOLE site.

BOUSSOLE project

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

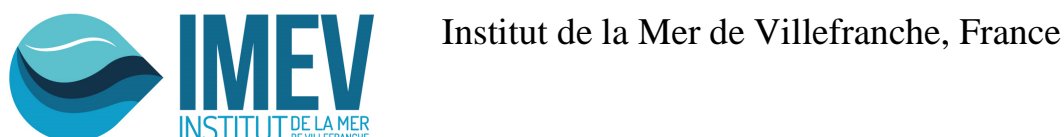
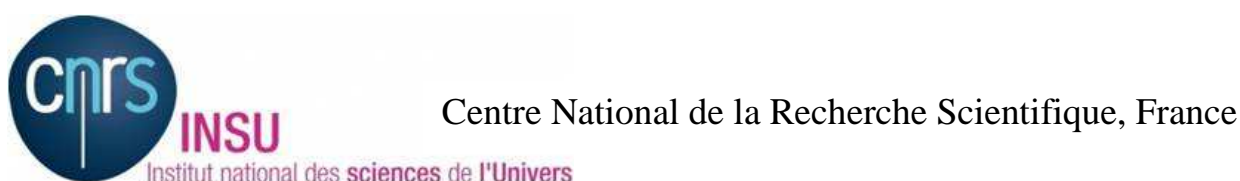
September 28, 2018



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



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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). 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 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.

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 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

Additional operations

The first day, Grigor Obolensky, engineer at Euro-Argo, Brest, was onboard to deploy and test an autonomous profiling float equipped with a pCO₂ sensor.

It was noticed that in the previous cruises, there were problems with absorption data acquisition when the 0.2 μ 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. So in order to determine this minimal time, the CTD was stopped at 10, 30, 50 meters depths during 5 minutes (CTD 002) and stopped at 10, 40 and 55 meters depth during 10 minutes (CTD 004).

Cruise Summary

The first day of the cruise was used for the deployment of the profiling float, for optical profiles, for CTD casts with water sampling and for a Secchi disk at the BOUSSOLE site. The second 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.

Tuesday 18 September 2018

The sea state was slight with a moderate and fresh breeze. The sky was blue and the visibility was excellent. Firstly, the profiling float was deployed on the way to BOUSSOLE at the position 43°38.525'N; 7°87.862. When arrived at the BOUSSOLE site, 3 C-OPS profiles were performed. Then, 2 CTD casts with water sampling and a Secchi disk were performed at the BOUSSOLE site. For the second cast, a 0.2 µm filter was installed on the inlet tube of the a-Sphere absorption meter for the dissolved matter absorption measurement and a cap was put on the Hydrosat-6 for dark measurements before returning to the Nice harbour. During the descent, this CTD was stopped at 3 depths (10, 30 and 50 m) during 5 minutes, in order to determine the minimal time for absorption data acquisitions to be stabilized at these 3 depths.

Wednesday 19 September 2018

The sea state was slight with a gentle breeze. The sky was blue and the visibility was good. Before arriving at the BOUSSOLE site, the C-OPS seawater cable was deployed from the ship's stern with the ship steaming, in order to unwind it and to remove loops before performing profiles subsequently. When arrived at the BOUSSOLE site, 3 C-OPS profiles and 2 CTD casts with water sampling were performed. For the second cast, a cap was put on the Hydrosat-6 for dark measurements and a 0.2 µm filter put on the a-Sphere absorption meter for the dissolved matter absorption measurements. After the tests performed the day before, it was noticed that 5 minutes per depth was not enough for absorption data acquisition to be stabilized when the filter was installed. So it was decided to extend this time and the CTD was stopped at 3 depths (10, 40 and 55 m) during 10 minutes. In the meantime, 2 CIMEL measurements and a Secchi disk were performed.

Pictures taken during this cruise can be found at:

<https://photos.app.goo.gl/B5xBD9engVjENVro6>

Data from the BOUSSOLE cruises and buoy are available at:

http://www.obs-vlfr.fr/Boussole/html/boussole_data/login_form.php

Cruise Report

Tuesday 18 September 2018 (UTC)

People on board: Melek Golbol, Grigor Obolensky, Eduardo Soto Garcia and Vincenzo Vellucci.

0600 Departure from the Nice harbour.
0750 Deployment of the profiling float (43°38.525'N; 7°87.862).
0850 Arrival at the BOUSSOLE site.
0900 C-OPS 01, 02, 03.
1000 Lunch.
1135 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 .
1235 Secchi disk 01, 17 m.
1320 CTD 02, 50 m with water sampling at 5 m for TSM (with 0.2 µm filter on a-Sphere and cap on HS-6 and 5 minutes stop at 10, 30 and 50 m).
1335 Departure to the Nice harbour.
1700 Arrival at the Nice harbour.

Wednesday 19 September 2018 (UTC)

People on board: Melek Golbol and Eduardo Soto Garcia.

0600 Departure from the Nice harbour.
0900 Unwinding of the C-OPS seawater cable on the way to BOUSSOLE
0945 Arrival at the BOUSSOLE site.
1015 C-OPS 04, 05, 06.
1220 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 CIMEL 01, 02.
1330 CTD 04, 55 m with water sampling at 10 and 5 m for TSM, O₂ and TA/TC (with 0.2 µm filter on a-Sphere and 10 minutes stop at 10, 40 and 55 m).
1350 Secchi 02, 24 m.
1410 Departure to the Nice harbour.
1600 Arrival to the Nice harbour.

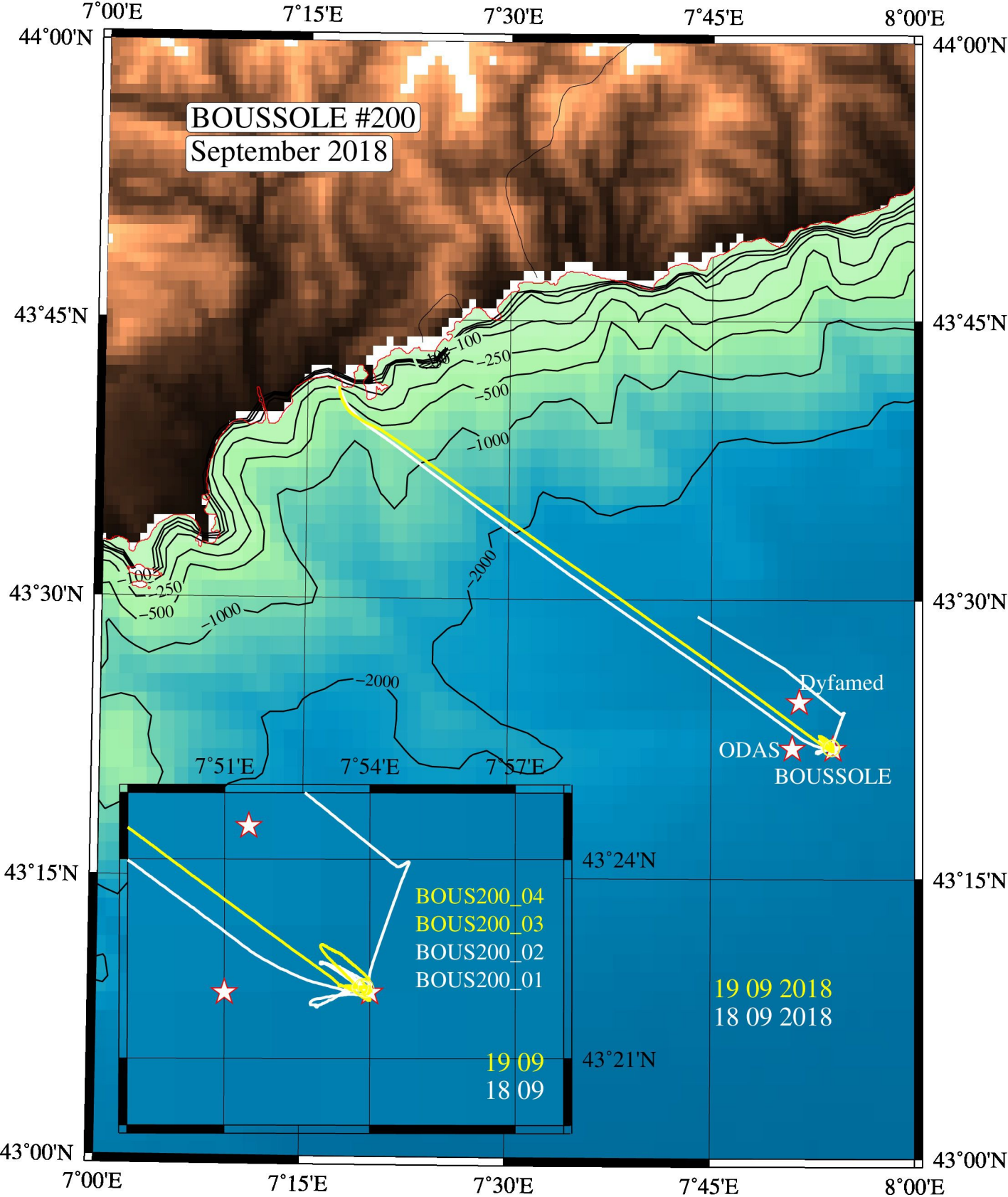
Problems identified during the cruise

- 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.
- The second day, only 2 CIMEL measurements were performed because of Cirrus clouds build up.
- The fluorimeter of the R/V *Téthys II* was not functioning.

Appendices

Cruise Summary Table for Boussole 200

Date	Black names (file ext: ".raw")	Profile names (file extension: ".raw")	CTD notes	Other sensors	Start Time		Depth max (meter)	Latitude (N)			Longitude			Weather		Atm. Pressure (hPa)	Humidity (%)	Visibility	T air	T water	Sea		Swell dir.	Whitecaps	
					GMT (hour.min)	Duration (min.sec)		(Degree)	(Minute)	(Degree)	(Minute)	Sky	Clouds	Quantity (#/8)	Wind sp. (kn)						Wind dir.	Swell H (m)			Swell dir.
18/09/18		bou_c-ops_180918_0850_001_data.csv			08:58	4:49	115	43	22.166	7	53.705	blue	Cl	1	13	77	1019.5	77	good	24.4		slight	0.7	yes	
		bou_c-ops_180918_0914_001_data.csv			09:24	4:12	100	43	22.147	7	53.810	blue	Cl	1	13	77	1019.5	77	good	24.4		slight	0.7	yes	
		bou_c-ops_180918_0914_002_data.csv			09:38	4:18	103	43	22.313	7	53.401	blue	Cl	1	13	77	1019.5	77	good	24.4		slight	0.7	yes	
			BOUS200_01		HPLC & Ap Secchi01	11:37	32:00	400	43	22.042	7	53.728	blue		2	14	72	1019.0	82		24.2	24.38	slight		
						12:35	4:00	17	43	22	7	54	cloudy		6				good			slight			
					TSM	13:19	17:00	50	43	22.067	7	53.806	cloudy		6	19	79	1018.5	81	cloudy	24.2	24.27	slight		
19/09/18		bou_c-ops_180919_0955_002_data.csv			10:12	4:14	100	43	22.270	7	53.883	blue	Cl	1	9	75	1019.3	79	good	25.0		slight	0.6	few	
		bou_c-ops_180919_0955_003_data.csv			10:24	4:35	112	43	22.441	7	53.613	blue	Cl	1	9	75	1019.3	79	good	25.0		slight	0.6	few	
		bou_c-ops_180919_0955_004_data.csv			10:38	4:42	116	43	22.601	7	53.323	blue	Cl	1	9	75	1019.3	79	good	25.0		slight	0.6	few	
			BOUS200_03		HPLC & Ap	12:17	33:00	400	43	22.082	7	53.855	blue		3	9	80	1019.1	80		24.5	24.47	slight		
					CIMEL01	12:32	3:00		43	22.082	7	53.810	blue		1			1019.0							
					CIMEL02	12:06	3:00		43	22.082	7	53.810	blue		1			1019.0							
					TA/TC, O ₂ & TSM	13:30	37:00	55	43	22.087	7	53.702	blue		3	9	86	1018.5	82		24.4	24.61	slight		
					Secchi02	13:50	4:00	24	43	22	7	54	blue		3				good			slight			



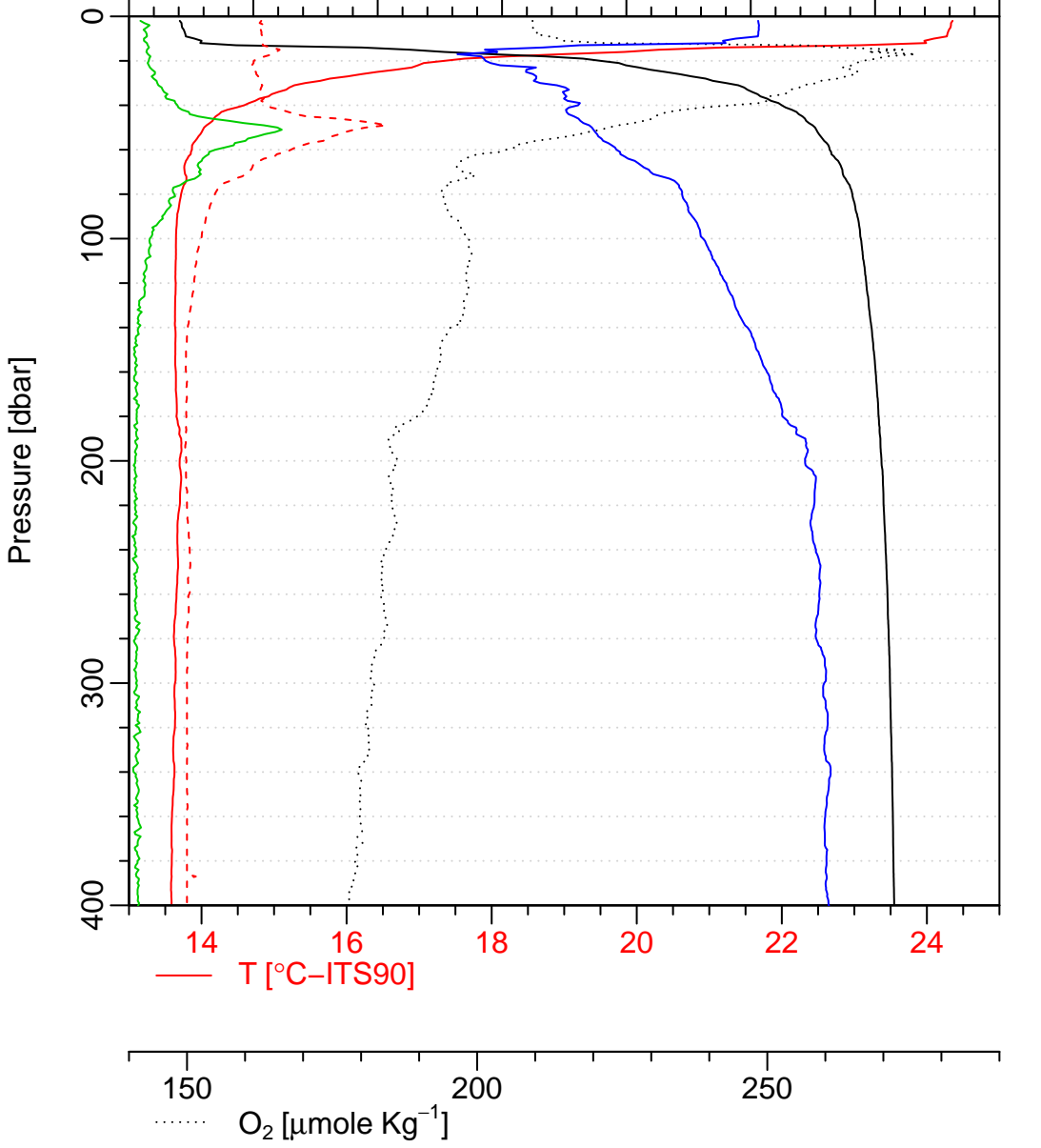
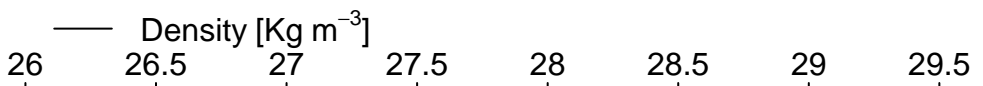
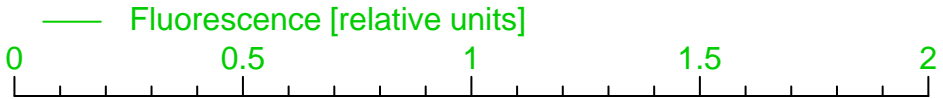
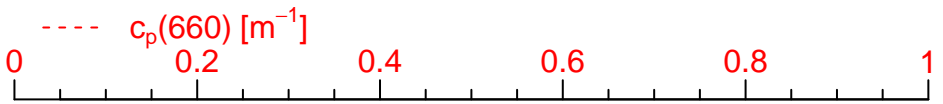
bous200_01

Date = 18/09/2018

Heure debut [TU] = 11:37

Longitude = 007 53.928 E

Latitude = 43 22.042 N



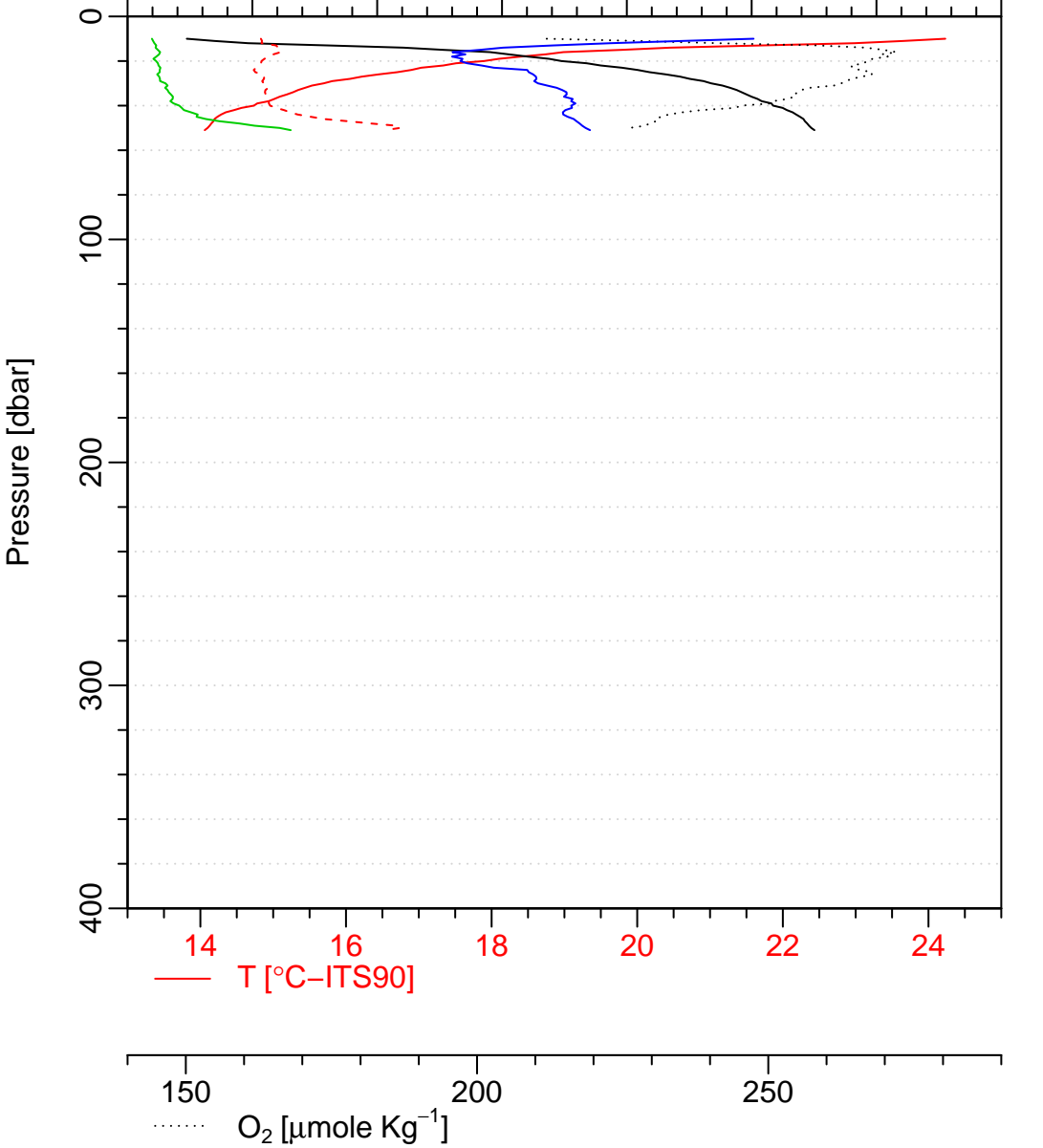
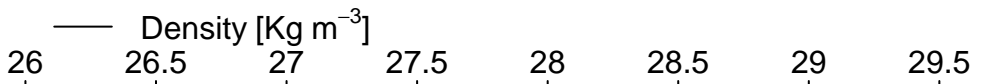
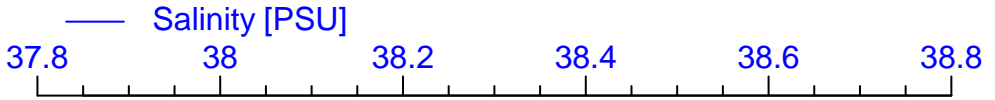
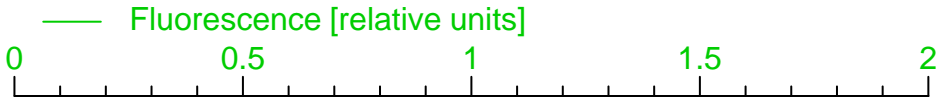
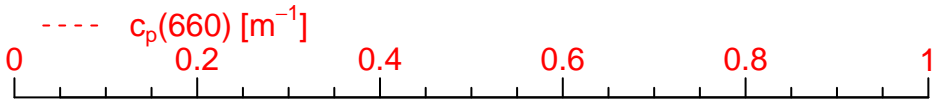
bous200_02

Date = 18/09/2018

Heure debut [TU] = 13:19

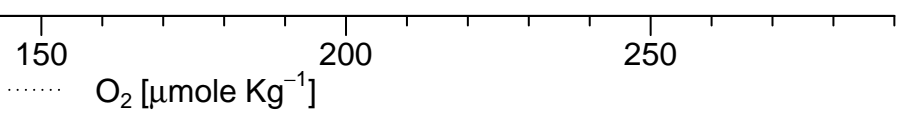
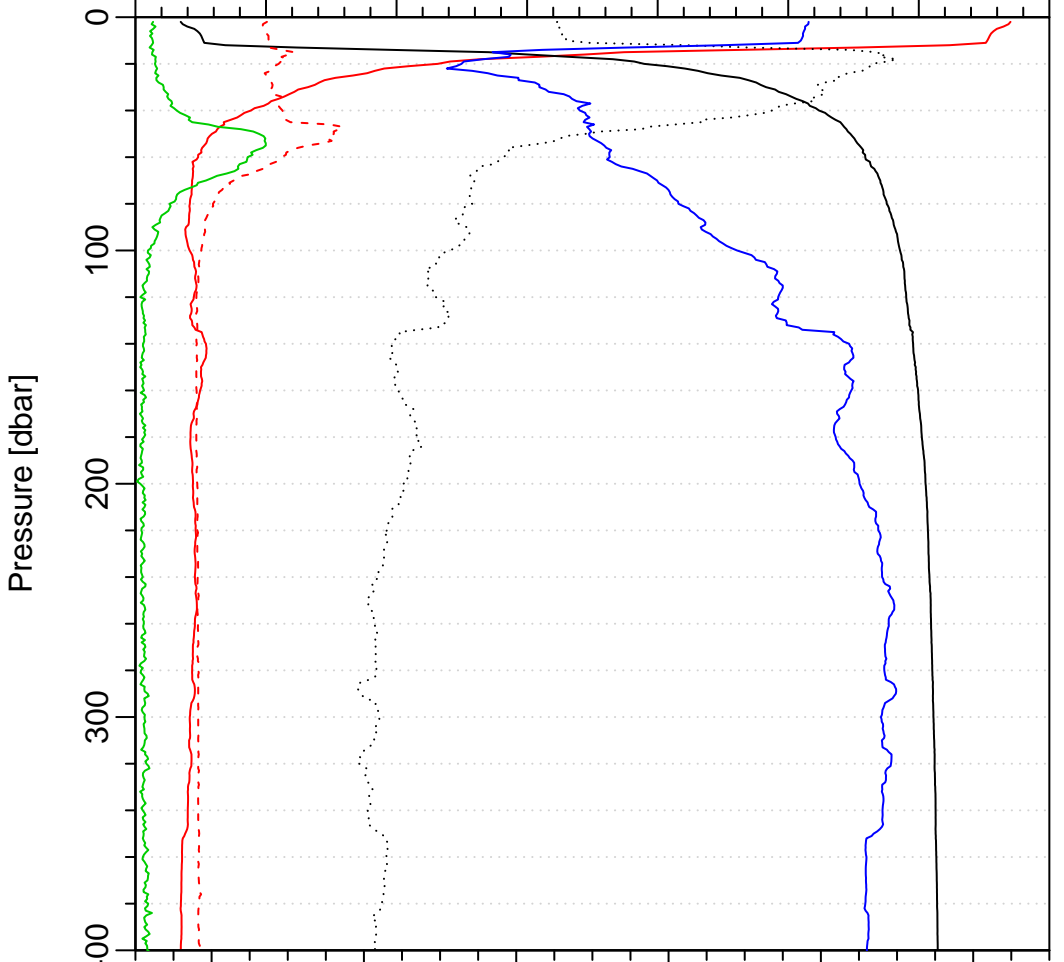
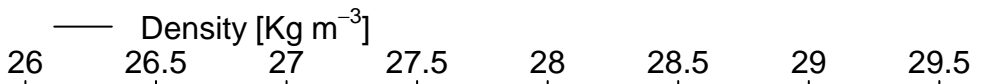
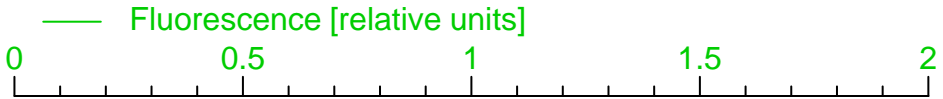
Longitude = 007 53.806 E

Latitude = 43 22.067 N



bous200_03

Date = 19/09/2018
Heure debut [TU] = 12:17
Longitude = 007 53.855 E
Latitude = 43 22.082 N



bous200_04

Date = 19/09/2018
Heure debut [TU] = 13:30
Longitude = 007 53.902 E
Latitude = 43 22.087 N

