BOUSSOLE Monthly Cruise Report

Cruise 188
October 17-18, 2017

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(Captain: Joël Perrot)

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Autonomous CTD beacons to be later on deployed on Weddell seals in the Southern Ocean were affixed on the CTD Rosette for testing and for data intercomparison with the main CTD.

BOUSSOLE project

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

Octobre 30, 2017

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). Two CTD casts are to be performed at each data acquisition at the BOUSSOLE site: one cast with, and one cast without, a 0.2µm 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_2 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

Water samples for cytometry analysis were collected at 10 m depth in the frame of a collaboration with Collin Roesler (Bowdoin College, Maine, USA), about the installation of an ECO 3X1M multi-channel fluorimeter on the BOUSSOLE buoy at 9 m depth.

Several CTD beacons that are planned to be deployed on Weddell seals in Antarctic by the CEBC (Centre d'Etudes Biologiques de Chizé) and LOCEAN (Laboratoire d'Océanographie et du Climat) were tested. They were installed on the CTD Rosette for comparison with the BOUSSOLE main CTD.

The CONTROS HydroC PCO_2 sensor installed on the buoy in June 2017 in the frame of MOOSE program was recovered in order to download data and change the batteries.

Cruise Summary

The cruise initially planned in October 3-5, was cancelled because the military authorities had not given us the authorization to work at the BOUSSOLE site. The cruise was postponed to October 7-8. But the cruise was cancelled again because of health problems of one crew member. The cruise eventually took place on October 17-18.

The first day was used for cleaning surface sensors on top of the buoy, the ARGOS beacon connector and the solar panels. This day was also used for optical profiles, for CTD casts with water sampling and for a Secchi disk at the BOUSSOLE site. The second day was used for diving operations, for CTD casts with water sampling, for optical profiles and for a Secchi disk at the BOUSSOLE site.

Tuesday 17 October 2017

The sea state was calm with a light air. The sky was cloudy and the visibility was good. CTD beacons were installed on the CTD Rosette during the way up to BOUSSOLE. The ARGOS sensor of the buoy did not transmit data. So, when arrived at BOUSSOLE, the functioning of the buoy was checked, ARGOS connector, surface sensors and solar panels were cleaned. Then, 3 C-OPS profiles and 2 CTD casts with water sampling were performed at the BOUSSOLE site. The second cast was performed with a 0.2 µm filter on the a-Sphere absorption meter and with a cap on the backscattering meter for dark measurements. Then, 1 CTD cast without water sampling and a Secchi disk were performed at the BOUSSOLE site before returning to the Nice harbour.

Wednesday 18 October 2017

The sea state was smooth with a gentle breeze. The sky was blue with some scattered clouds and the visibility was good. When arrived at BOUSSOLE, divers went at sea to remove the HydroC PCO_2 sensor. They also cleaned the underwater sensors, performed dark measurements of the transmissometer and the backscattering meter and took pictures. In the meantime, buoy data were downloaded using the cable available at the top of the buoy.
Then, a Secchi disk, 3 C-OPS profiles and 2 CTD casts with water sampling were performed at the BOUSSOLE site. The second cast was performed with a 0.2 µm filter on the a-Sphere absorption meter.

Pictures taken during this cruise can be found at:
https://photos.app.goo.gl/s9BfP9IBrMytx7UU2

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 17 October 2017 (UTC)

People on board: Melek Golbol, Anaïs Janc (CEBC) and Eduardo Soto Garcia.

0530 Departure from the Nice harbour.
0915 Arrival at the BOUSSOLE site.
0930 C-OPS 01, 02, 03.
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, a_p and cytometry.
1100 Filtrations.
1155 Secchi 01, 31 m.
1210 CTD 02, 400 m with water sampling at 5 m for TSM (with 0.2 µm filter on a-Sphere and cap on HS-6).
1235 CTD 03, 400 m.
1300 Departure to the Nice harbour.
1610 Arrival at the Nice harbour.

Wednesday 18 October 2017 (UTC)

People on board: Jean De Vaugelas, Emilie Diamond, Melek Golbol, Anaïs Janc, David Luquet, Judicaël Rivier and Eduardo Soto Garcia.

0510 Departure from the Nice harbour.
0840 Arrival at the BOUSSOLE site.
0850 Diving operations: cleaning, dark measurements, pictures, recovering of the HydroC CO2 sensor.
0900 Direct connection with the buoy and data retrieval.
0920 Secchi 02, 25 m.

1035 End of diving operations.
1110 CTD 04, 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.
1205 C-OPS 04, 05, 06.
1255 CTD 05, 400 m with water sampling at 10 and 5 m for O_2, TA/TC and TSM (with 0.2 µm filter on a-Sphere).
1325 Departure to the Nice harbour.
1630 Arrival at the Nice harbour.

Problems identified during the cruise

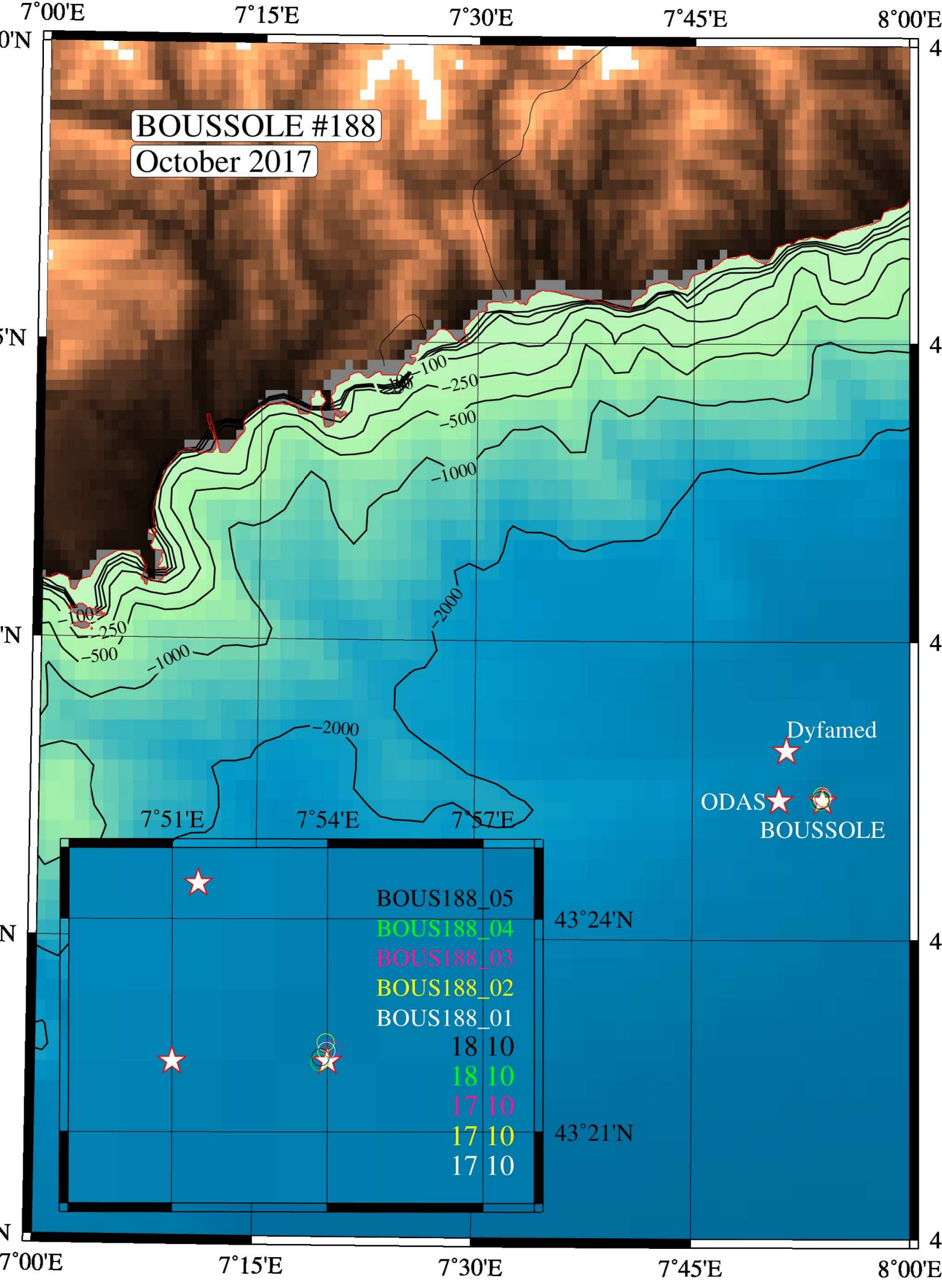
- The HydroC CO_2 sensor was not re-installed on the buoy because problems appeared on the data acquisition and batteries. It will be re-installed in a subsequent cruise after the cause of the malfunction will have been identified and possibly corrected.

- The last C-OPS profiles of each day (C-OPS 03 and C-OPS 06) had to be stopped before completion because clouds appeared during the acquisition and sky conditions became not optimal (unstable irradiance).

Appendices

Cruise Summary Table for Boussole 188

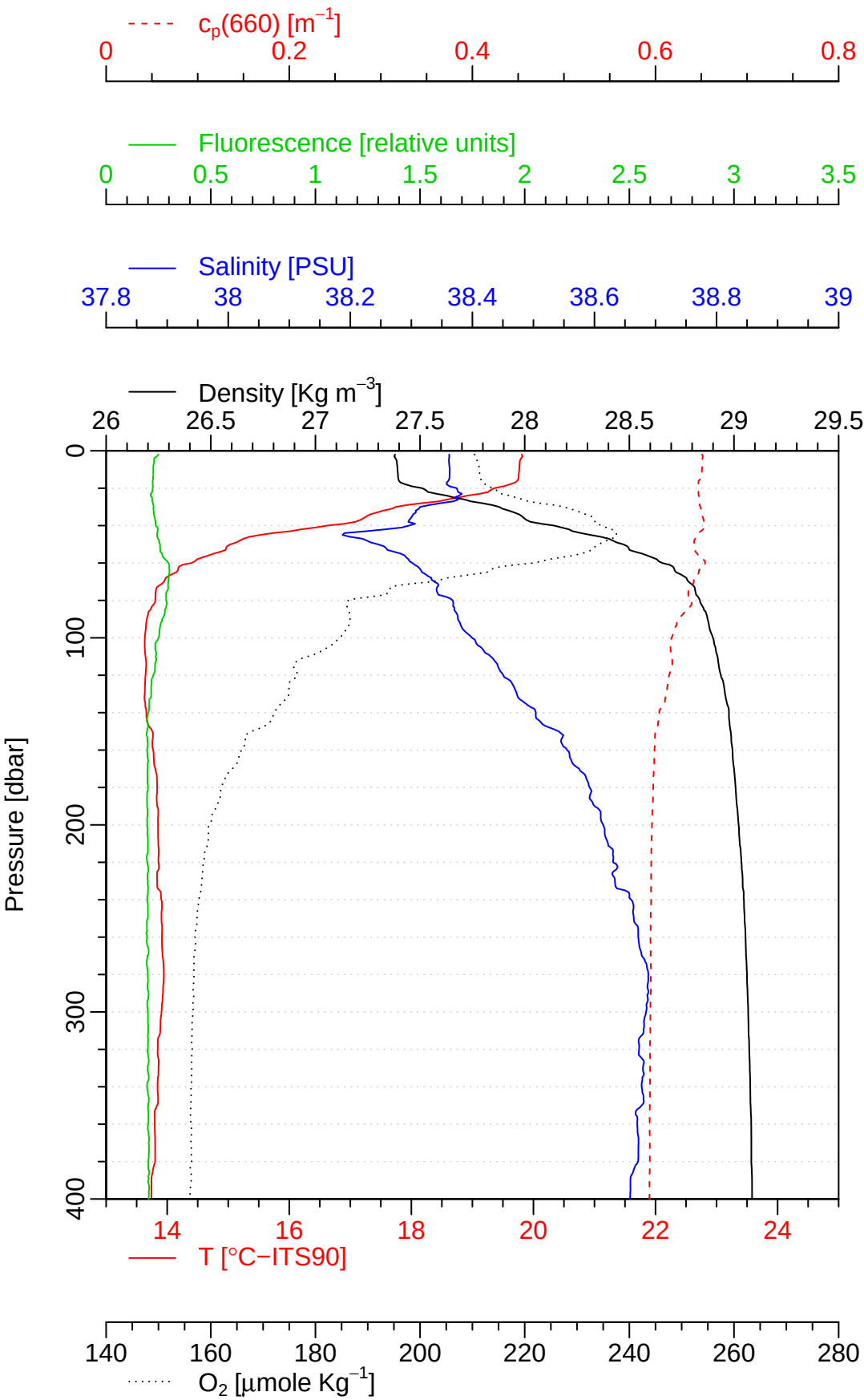
Date	Black names	Profile names	CTD notées	Other sensors	Start Time	Duration	Depth max	Latitude (N)		longitude					Weather							Sea		
	(file ext: ".raw")	(file extension: ".raw")			GMT (hour.min)	(min.sec)	(meter)	(Degree)	(Minute)	(Degree)	(Minute)	Sky	Clouds	Quantity (#/8)	Wind sp. (kn)	Wind dir.	Atm. Pressure (hPa)	Humidity (%)	Visibility	T air	T water	Sea	Swell H (m)	Swell dir.	Whitecaps
17/10/17		bou_c-ops_171017_0921_001_data.csv			09:32	2:10	50	43	22.190	7	54.026	cloudy	St	4	2	66	1025.7	75	good	19.9		calm	0.2		no
		bou_c-ops_171017_0921_002_data.csv			09:42	3:52	93	43	22.222	7	53.725	cloudy	St	4	2	66	1025.7	75	good	19.9		calm	0.2		no
		bou_c-ops_171017_0921_003_data.csv			09:55	3:33	12	43	22.092	7	53.427	cloudy	St	4	2	66	1025.7	75	good	19.9		calm	0.2		no
			BOUS188_01	HPLC, Ap & Cyto	10:19	27:00	400	43	22.142	7	53.982	cloudy		6	2	116	1025.6	79		19.2	19.75	calm			
				Secchi01	11:55	4:00	31	43	22	7	54	cloudy		NA					good			calm			
			BOUS188_02		12:11	16:00	400	43	22.26	7	53.967	cloudy		4	2	131	1024.7	74		19.8	19.85	calm			
			BOUS188_03	TSM	12:38	17:00	400	43	22.164	7	54.081	cloudy		5	2	127	1024.3	78		19.5	19.91	calm			
18/10/17				Secchi02	09:20	4:00	25	43	22	7	54	blue		3					good			calm			
			BOUS188_04	HPLC & Ap	11:11	30:00	400	43	21.984	7	53.852	blue		2	6	70	1019.9	78		19.0	20.05	calm			
		bou_c-ops_171018_1157_002_data.csv			12:11	3:21	80	43	22.224	7	53.857	blue		3	8	53	1018.9	80	good	19.3		calm	0.3		no
		bou_c-ops_171018_1157_003_data.csv			12:22	4:06	100	43	22.352	7	53.579	blue		3	8	53	1018.9	80	good	19.3		calm	0.3		no
		bou_c-ops_171018_1157_002_data.csv			12:32	1:01	22	43	22.408	7	53.341	cloudy		4	8	53	1018.9	80	good	19.3		calm	0.3		no
			BOUS188_05	TA/TC, O2 & TSM	12:56	20:00	400	43	22.050	7	53.869	blue		1	8	49	1018.4	78		19.5	20.09	calm			



GMT 2017 Dec 20 11:38:42

bous188_01

Date = 17/10/2017
Heure debut [TU] = 10:19
Longitude = 007 53.982 E
Latitude = 43 22.142 N



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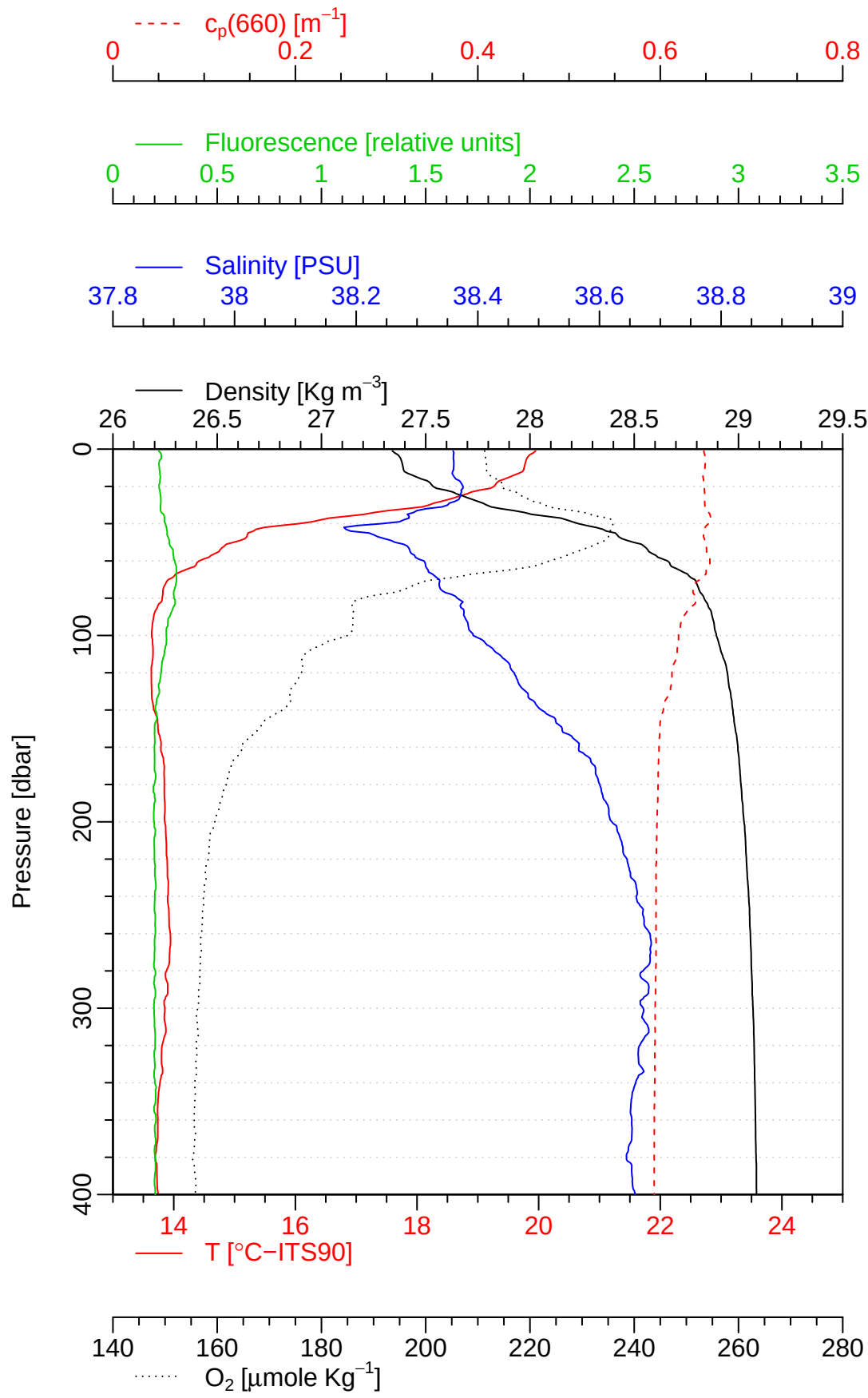
Latitude = 43 22.260 N



bous188_03

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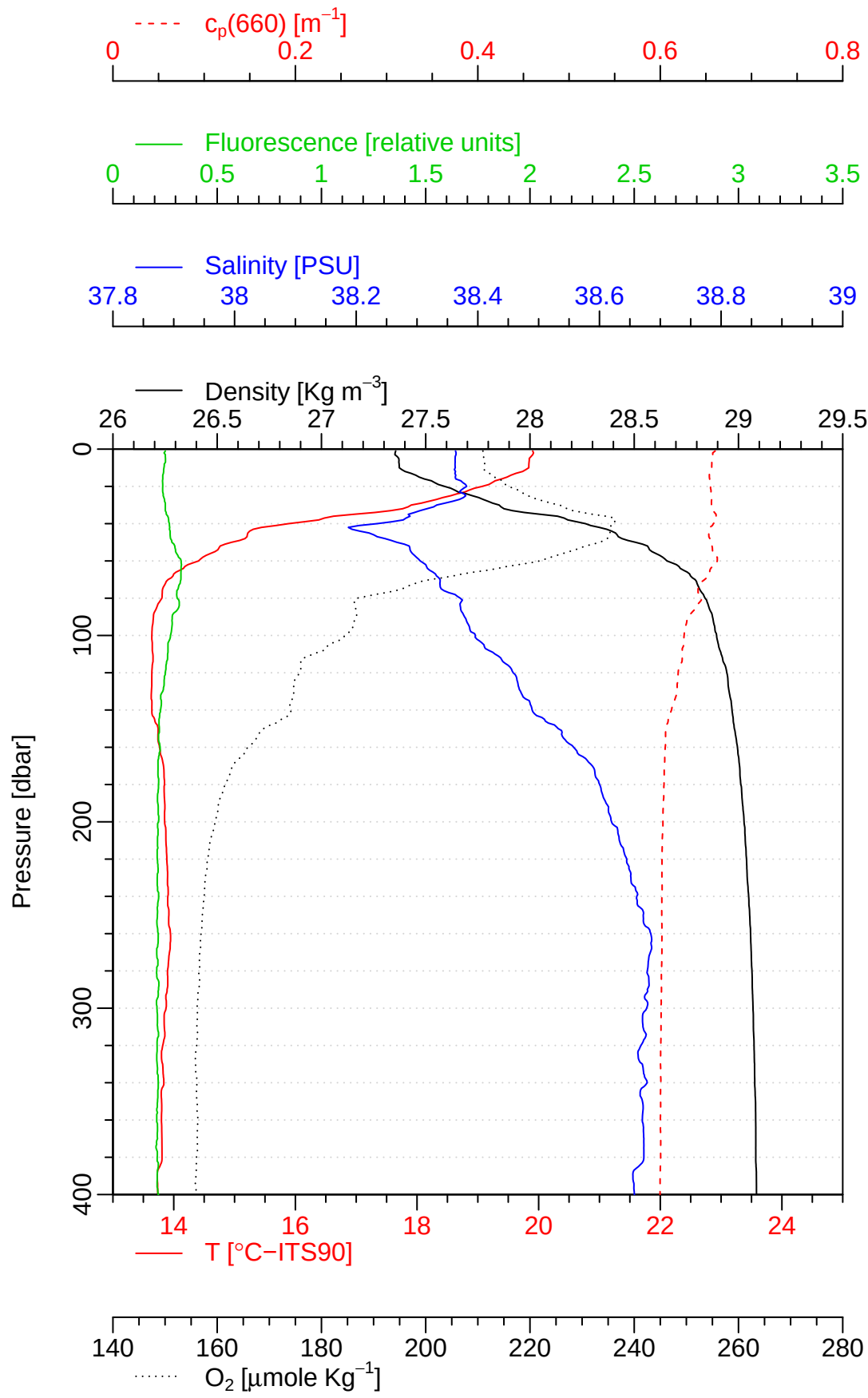
Latitude = 43 22.164 N



bous188_04

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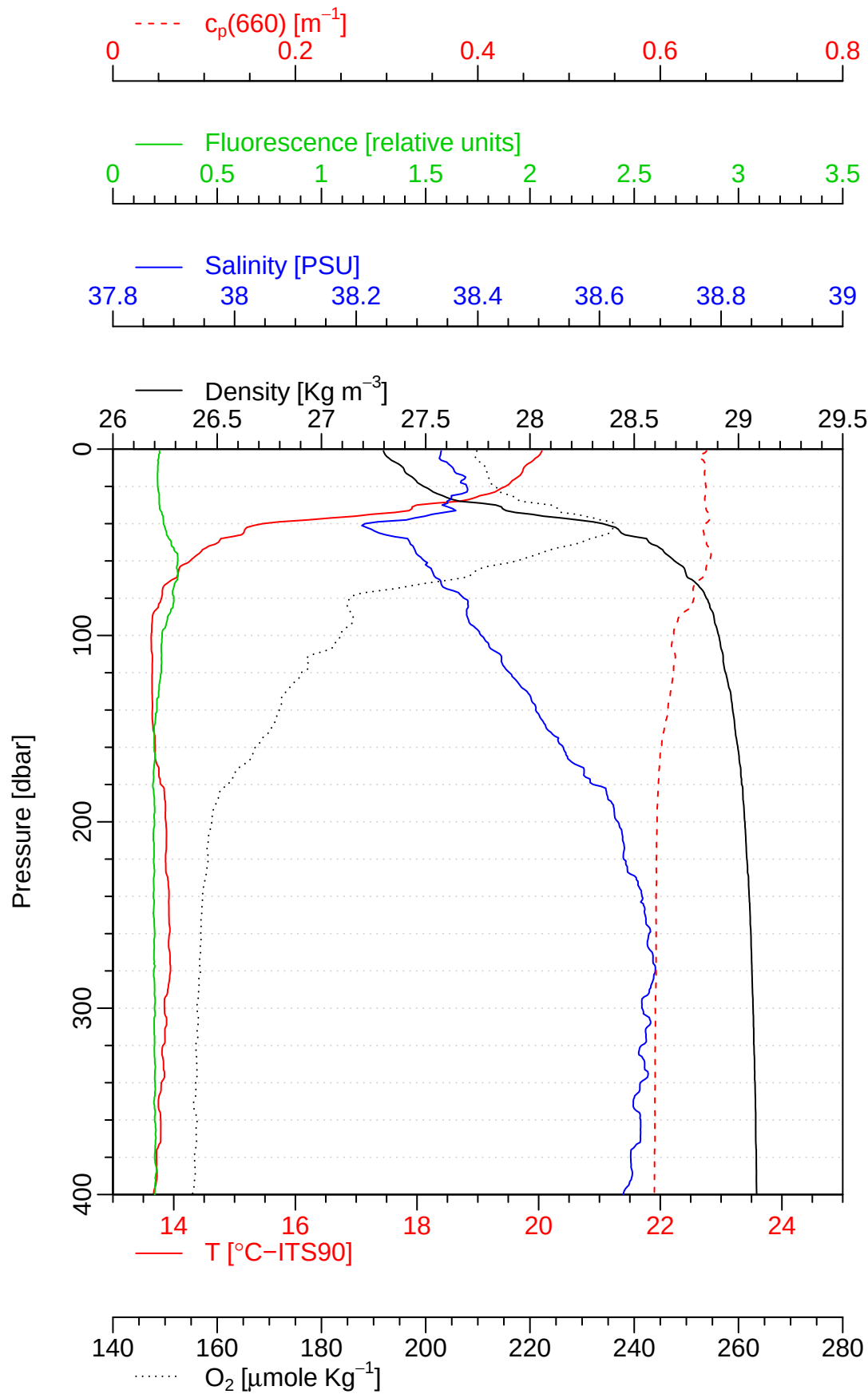
Latitude = 43 21.984 N



bous188_05

Date = 18/10/2017
Heure debut [TU] = 12:56
Longitude = 007 53.869 E
Latitude = 43 22.050 N