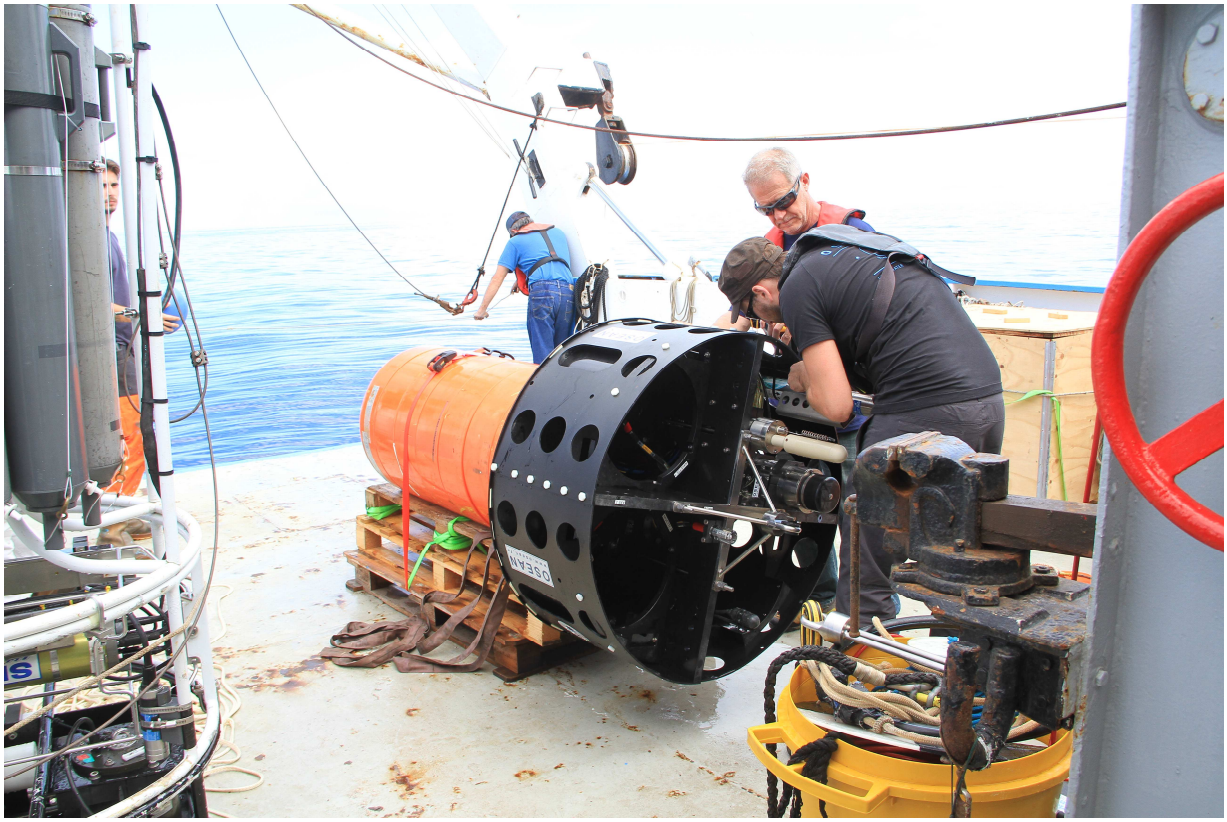
BOUSSOLE Monthly Cruise Report

Cruise 196
June 04-05, 2018

Duty Chief: Melek Golbol (golbol@obs-vlfr.fr)
Vessel: R/V Téthys II
(Captain: Vincent Le Duvéhat)

Science Personnel: Emilie Diamond, Melek Golbol, Yann Hello, Jean-Yves Royer, Jaouen Rozen, Vincent Taillandier, Vincenzo Vellucci and Romain Verfaillie.

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



A mooring for seismic activity was recovered the first day of the cruise next to the DYFAMED site.

BOUSSOLE project

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

June 20, 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

European Space Agency

Centre National d'Etudes Spatiales, France

Centre National de la Recherche Scientifique, France

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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 0.2µm 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

The HYDROBS mooring for seismic activity measurements was recovered the first day of the cruise next to the DYFAMED site. This operation is part of a collaboration between Laboratoire Géoazur (GEOAZUR Nice), Laboratoire Géosciences Océan (LGO – Brest) and Institut de la Mer de Villefranche (IMEV - Villefranche-sur-Mer) via the MOOSE program. The mooring line includes a CTD that provides complementary data to those of the DYFAMED mooring. This day, after finishing the work, as requested by Yann Hello from Laboratoire Geoazur, we went to another mooring site (MUG site) in order to test the communication with the mooring because they had problems with the communication during a previous cruise.

The second day, a CTD cast at 1500 m depth with water sampling was performed for the DYFAMED program.

C-OPS tests were performed the last day in order to test the velocity of the descent. This operation aims at preparing the instrument for an intercalibration cruise that will take place in July 2018.

Cruise Summary

The first day was used for CTD casts with water sampling, for optical profiles and for a Secchi disk at the BOUSSOLE site. It was also used for the recovery of the HYDROBS mooring and to test the communication with the MUG Mooring. The second day was used for CTD casts with water sampling, for optical profiles, C-OPS tests and a Secchi disk at the BOUSSOLE site. It was also used for a deep CTD cast at the DYFAMED site for the MOOSE program.

Monday 04 June 2018

The sea state was smooth with a light breeze. The sky was overcast and the visibility was good. Firstly a CTD cast with water sampling and 2 C-OPS profiles were performed. A third C-OPS profile was performed but the conditions were not optimal (many clouds and unstable irradiance) and the data was not kept. A second CTD cast was performed after the lunch. A cap was put on the Hydroscat-6 for dark measurements and a 0.2 µm filter on the a-Sphere absorption meter for the dissolved matter absorption measurements. A Secchi disk was performed before the departure to the HYDROBS mooring site. The mooring was recovered successfully. Finally we went to the MUG site to communicate with the mooring before returning to the Nice harbour.

Tuesday 05 June 2018

The sea state was slight with a moderate breeze. The sky was blue and the visibility was good. Firstly 2 CTD casts with water sampling were performed at the BOUSSOLE site. For the first cast, a 0.2 µm filter was put on the a-Sphere absorption meter for the dissolved matter absorption measurement. Then, 3 C-OPS profiles were performed. Then the C-OPS was deployed again in order to test the velocity of the descent. The C-OPS was adjusted in order to reduce the velocity in the surface layer and the frequency of acquisition was increased. Finally we went to the DYFAMED site in order to perform the CTD cast for the MOOSE program before returning to the Nice harbour.

Pictures taken during this cruise can be found at:
https://photos.app.goo.gl/vb8E8wUmHrS3iHf48

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

Cruise Report

Monday 04 June 2018 (UTC)

People on board: Emilie Diamond, Yann Hello, Jean-Yves Royer, Jaouen Rozen, Vincent Taillandier and Romain Verfaillie.

0550 Departure from the Nice harbour.
0900 Arrival at the BOUSSOLE site.
0915 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.
1000 C-OPS 01, 02.
1145 CTD 02, 400 m with water sampling at 10 and 5 m for TSM, O_2 and TA/TC (with 0.2 µm filter on a-Sphere and cap on HS-6).
1200 Secchi disk 01, 20 m.
1210 Departure to the HYDROBS site.
1230 Arrival to the HYDROBS site.
1240 Dropping of the last sphere of the mooring.
1315 Beginning of the recovery of the mooring.
1400 Departure to the MUG site.
1450 Departure to the Nice harbour.
1750 Arrival at the Nice harbour.

Tuesday 05 June 2018 (UTC)

People on board: Melek GOLBOL, Vincent Taillandier and Vincenzo Vellucci.

0610 Departure from the Nice harbour.
0940 Arrival at the BOUSSOLE site.
0955 CTD 03, 400 m with water sampling at 5 m for TSM (with 0.2 µm filter on a-Sphere).
1030 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.
1110 C-OPS 03, 04, 05.
1150 C-OPS tests and adjustments.
1215 Secchi 02, 19 m.
1220 Departure to the DYFAMED site.
1235 Arrival at the DYFAMED site.
1245 CTD 05, 1500 m (MOOSE program) with water sampling for O_2, TA/TC, nutrients and cytometry.
1345 Departure to the Nice harbour.
1645 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.

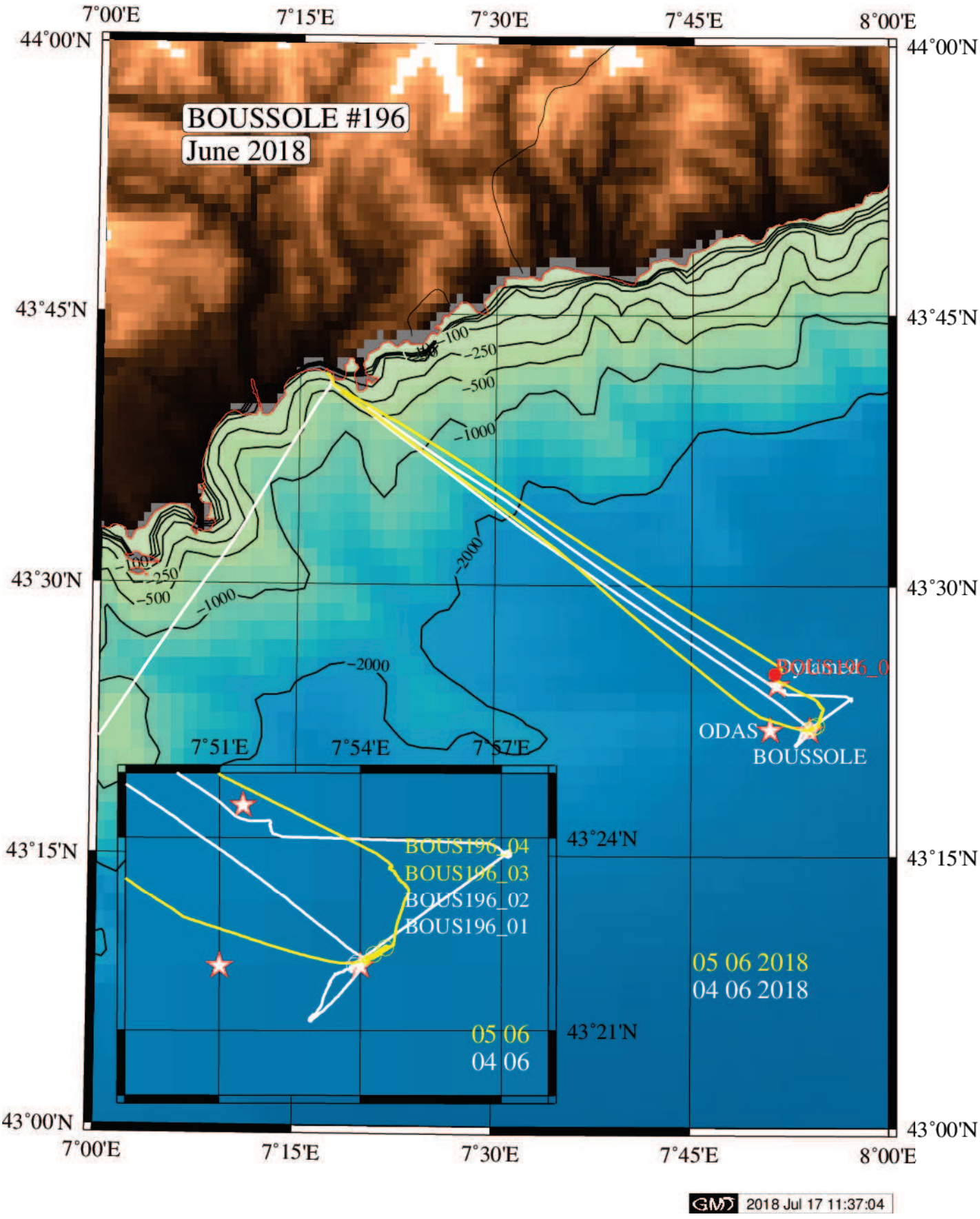
- The first day, the laboratory lights remained turned on by mistake when the HPLC samples were filtered.

- The second day, there were problems on IOPs data: IOPs files were corrupted for CTD 03 cast and there was no data recording for CTD 04 cast. After the cruise, the IOP package was tested in the lab and this problem was solved by the cleaning of connections between the data logger and the cable of the batteries.

Appendices

Cruise Summary Table for Boussole 196

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
04/06/18			BOUS196_01	HPLC & Ap	09:24	30:00	400	43	22.048	7	53.932	overcast		8	5	87	1012.0	85		18.7	21.50	smooth			
		bou_c-ops_180604_0952_002_data.csv			10:10	4:40	110	43	21.887	7	53.533	overcast	Cs, Ns , Cu	8	3	108	1012.0	79	good	19.8		smooth	0.4		no
		bou_c-ops_180604_0952_003_data.csv			10:22	1:56	40	43	21.780	7	53.381	overcast	Cs, Ns , Cu	8	3	108	1012.0	79	good	19.8		smooth	0.4		no
			BOUS196_02	TA/TC, O_2 & TSM	11:48	25:00	400	43	22.003	7	53.878	cloudy		5	5	62	1012.0	81		19.6	21.70	smooth			
				Secchi01	12:00	4:00	20	43	22	7	54	cloudy		5					good			smooth			
05/06/18			BOUS196_03	TSM	09:56	23:00	400	43	22.175	7	54.283	blue		3	13	247	1011.6	81		20.6	21.90	slight			
			BOUS196_04	HPLC & Ap	10:32	30:00	400	43	22.279	7	54.535	blue		3	15	237	1011.4	80		20.6	22.00	slight			
		bou_c-ops_180605_1100_001_data.csv			11:08	3:39	85	43	22.452	7	54.729	blue	Ci	1	14	236	1011.4	80	good	20.7		slight	0.7		yes
		bou_c-ops_180605_1100_002_data.csv			11:18	3:01	71	43	22.674	7	54.792	blue	Ci	1	14	236	1011.4	80	good	20.7		slight	0.7		yes
		bou_c-ops_180605_1100_003_data.csv			11:29	3:39	88	43	22.920	7	54.907	blue	Ci	1	14	236	1011.4	80	good	20.7		slight	0.7		yes
				Secchi02	12:15	4:00	19	43	22	7	54	blue		1					good			slight			
			BOUS196_05	O_2, TA/TC, Nutrients & Cyto	12:41	1:00:00	1500	43	25.116	7	51.361	blue		3	16	229	1011.0	77		20.6	22.00	slight			


BOUSSOLE #196
June 2018
7°00'E
7°15'E
7°30'E
7°45'E
8°00'E
44°00'N
43°45'N
43°30'N
43°15'N
43°00'N
-100
-250
-500
-1000
-2000
7°51'E
7°54'E
7°57'E
43°24'N
43°21'N
ODAS
BOUSSOLE
BOUS196_04
BOUS196_03
BOUS196_02
BOUS196_01
05 06 2018
04 06 2018
05 06
04 06
GMT 2018 Jul 17 11:37:04

bous196_01

Date = 04/06/2018
Heure debut [TU] = 09:24
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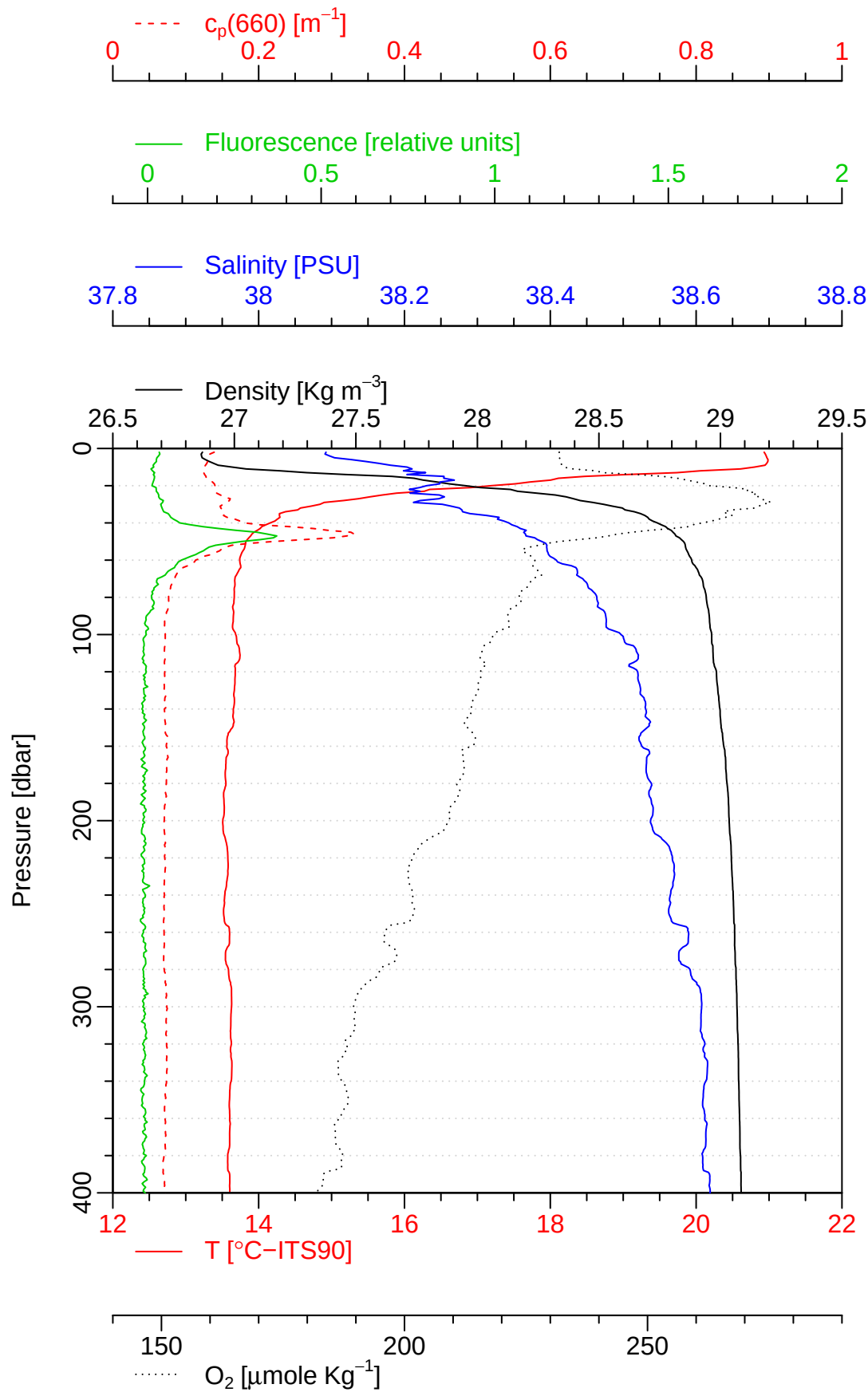
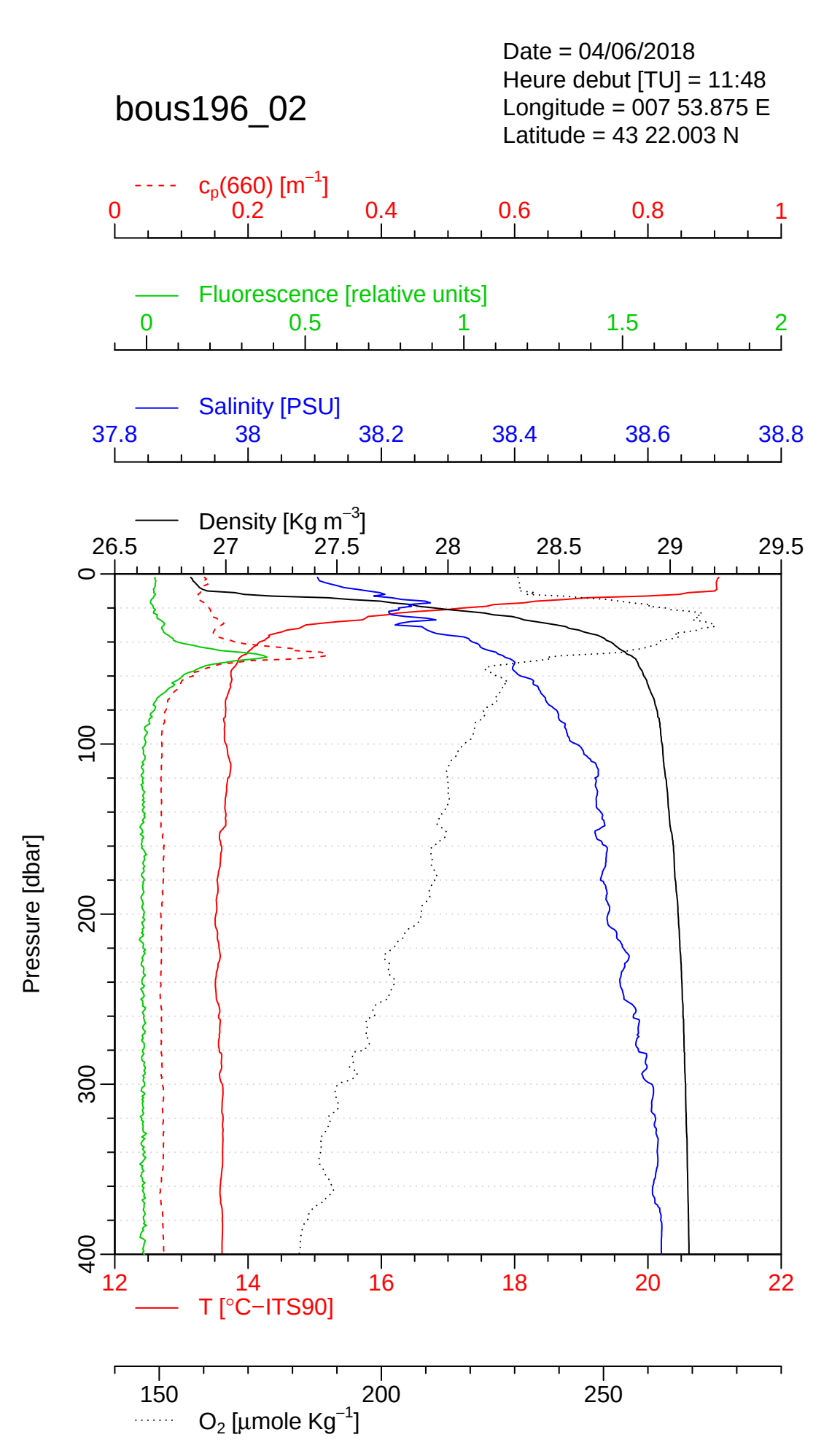
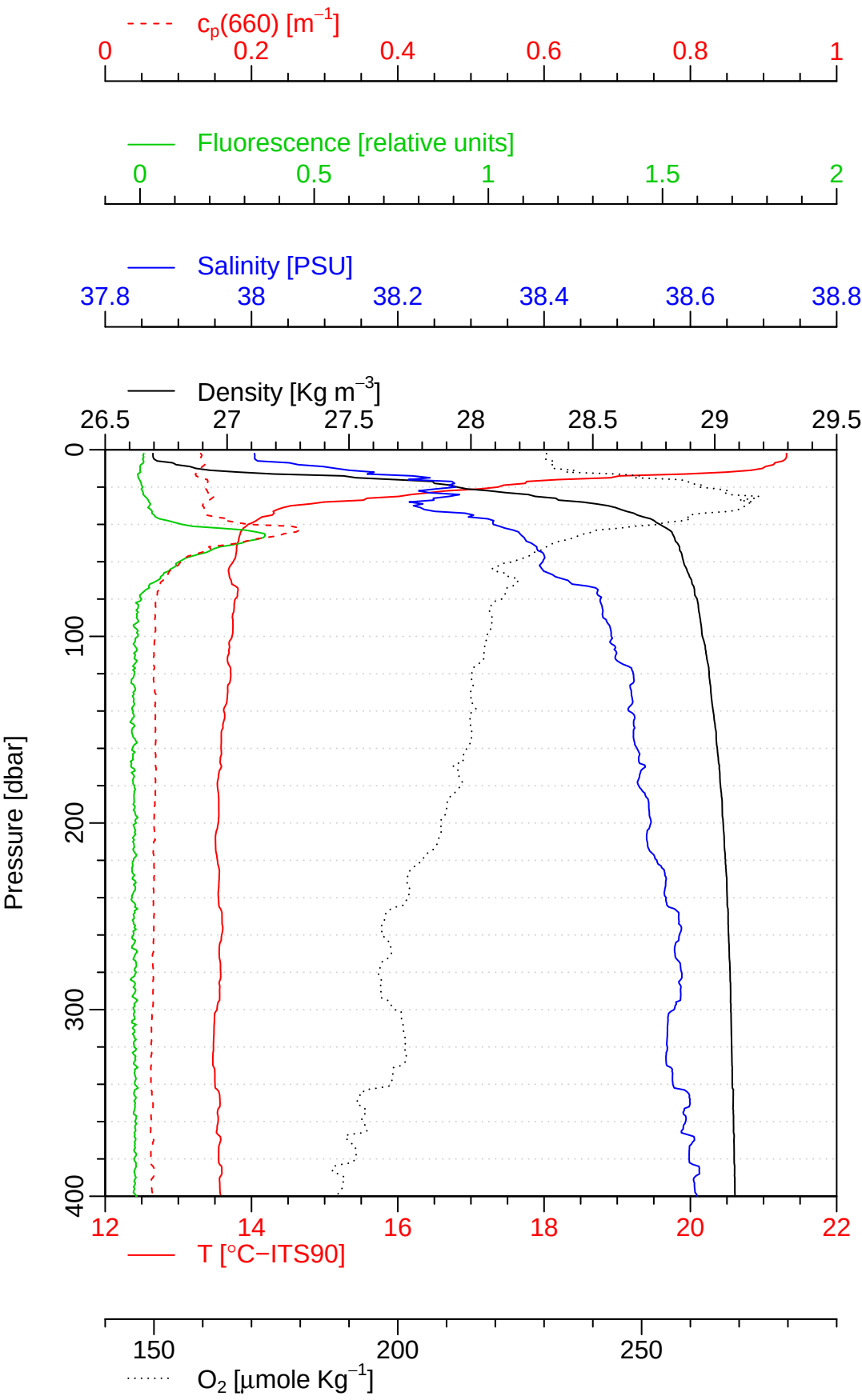
Latitude = 43 22.048 N




bous196_02
Date = 04/06/2018
Heure debut [TU] = 11:48
Longitude = 007 53.875 E
Latitude = 43 22.003 N
cp(660) [m−1]
0
0.2
0.4
0.6
0.8
1
Fluorescence [relative units]
0
0.5
1
1.5
2
Salinity [PSU]
37.8
38
38.2
38.4
38.6
38.8
Density [Kg m−3]
26.5
27
27.5
28
28.5
29
29.5
Pressure [dbar]
0
100
200
300
400
12
14
16
18
20
22
T [°C−ITS90]
150
200
250
O2 [µmole Kg−1]

bous196_03

Date = 05/06/2018
Heure debut [TU] = 09:56
Longitude = 007 54.289 E
Latitude = 43 22.175 N



bous196_04

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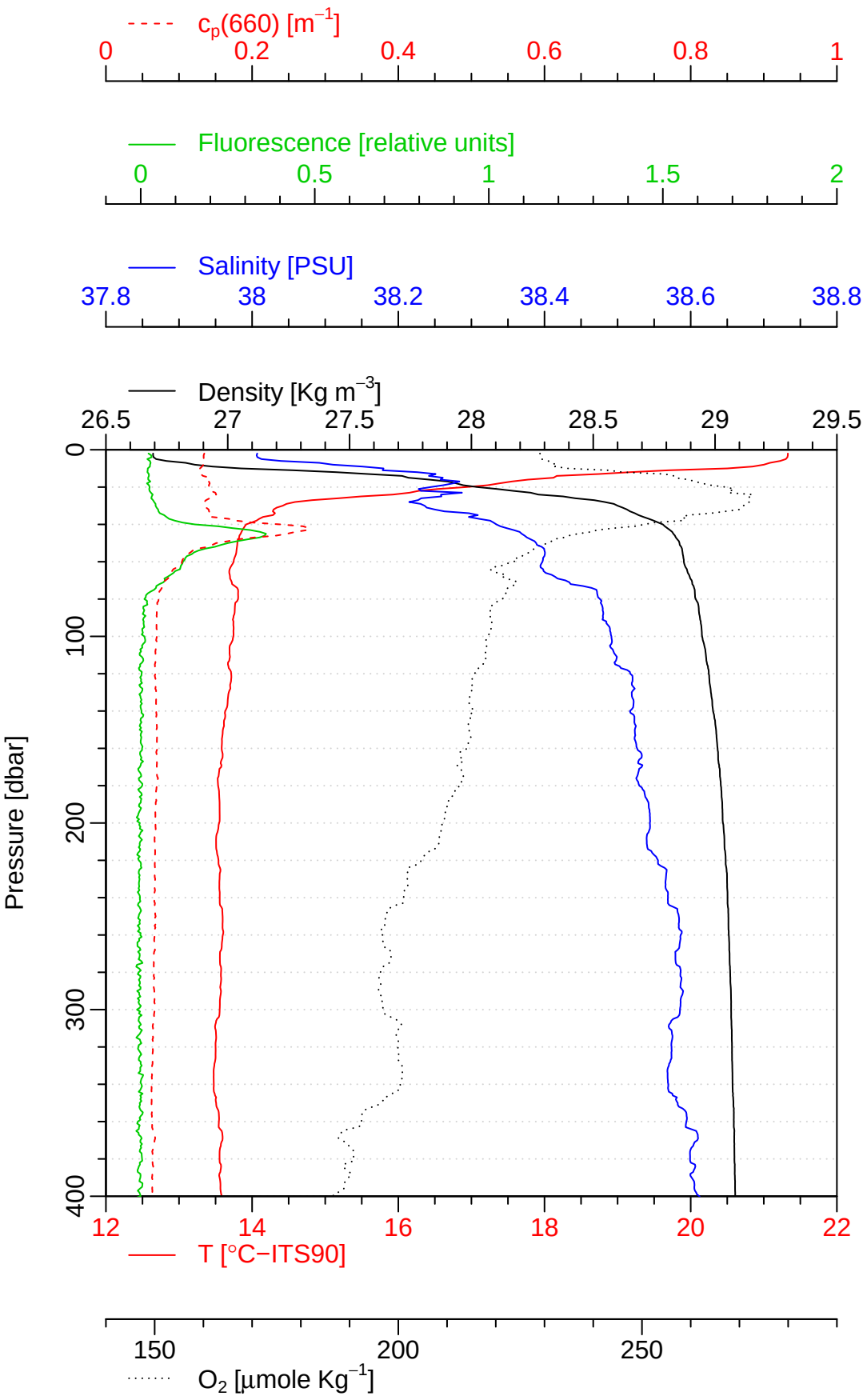
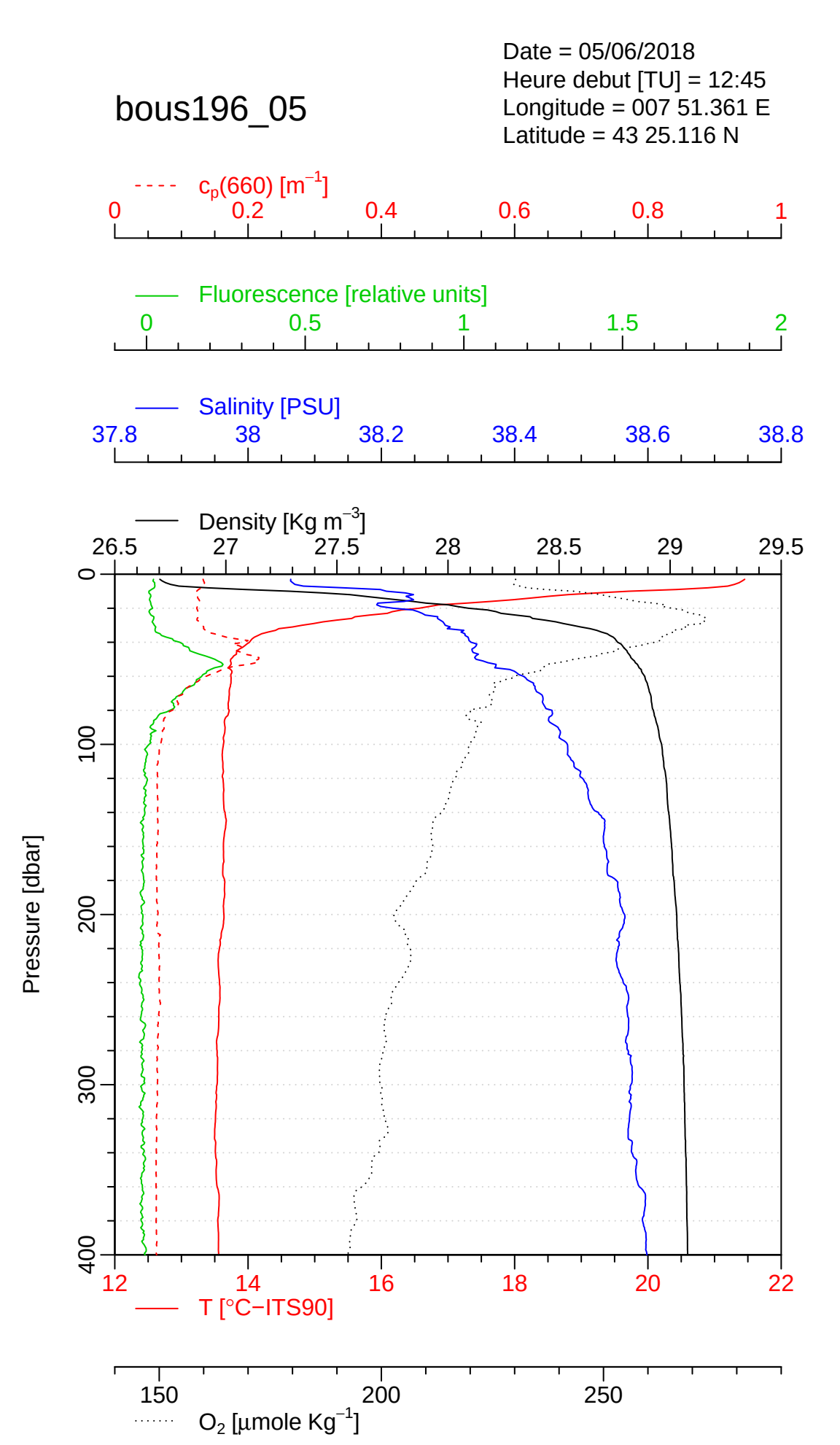
Longitude = 007 54.535 E
Latitude = 43 22.275 N




bous196_05
Date = 05/06/2018
Heure debut [TU] = 12:45
Longitude = 007 51.361 E
Latitude = 43 25.116 N
cp(660) [m−1]
0
0.2
0.4
0.6
0.8
1
Fluorescence [relative units]
0
0.5
1
1.5
2
Salinity [PSU]
37.8
38
38.2
38.4
38.6
38.8
Density [Kg m−3]
26.5
27
27.5
28
28.5
29
29.5
Pressure [dbar]
0
100
200
300
400
12
14
16
18
20
22
T [°C−ITS90]
150
200
250
O2 [µmole Kg−1]