

BOUSSOLE Monthly Cruise Report

Cruise 164

October 15–18, 2015

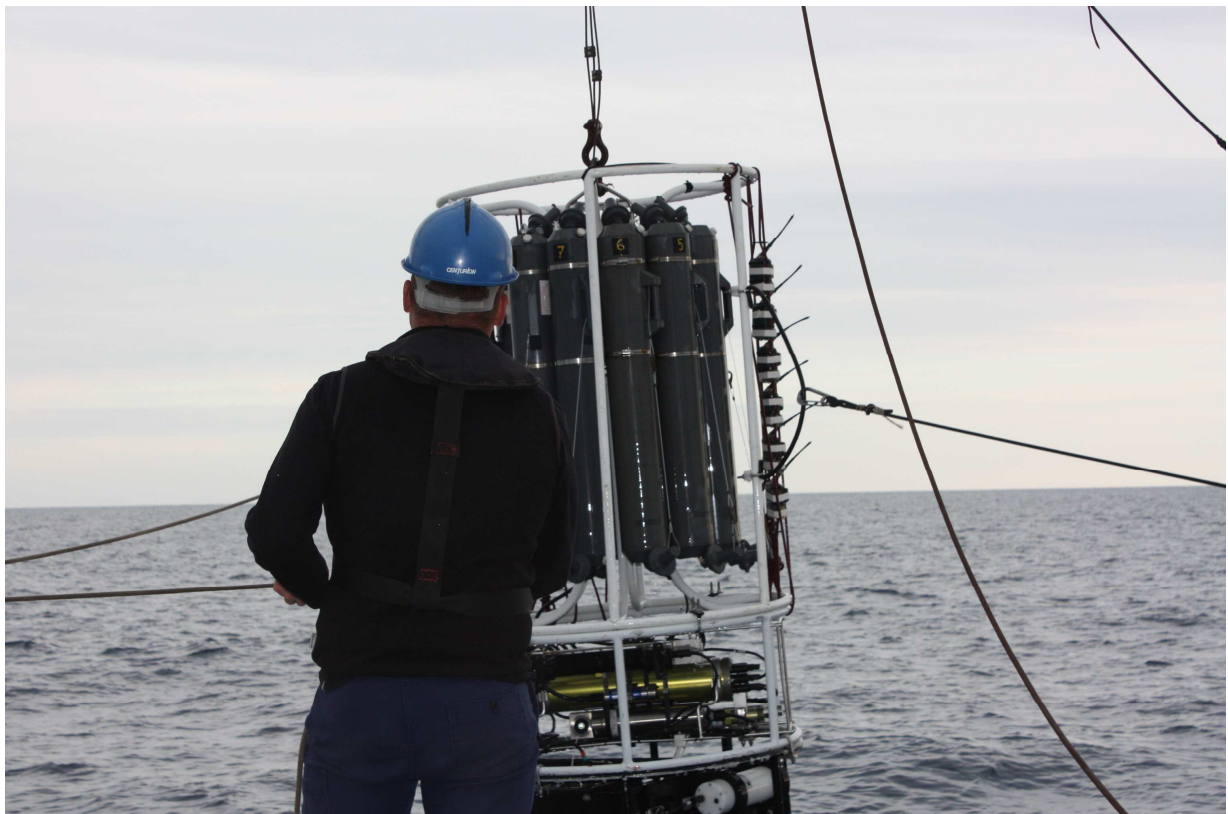
Duty Chief: Melek Golbol (golbol@obs-vlfr.fr)

Vessel: R/V *Téthys II*

(Captain: Joël Perrot)

Science Personnel: Emilie Diamond, Céline Dimier, Melek Golbol and Yves Le Bras.

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



Deployment of the CTD Rosette from the deck of the R/V *Téthys II*: CTD beacons were affixed on the CTD for testing by the Centre d'Etudes Biologiques de Chizé (CEBC).

BOUSSOLE project

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

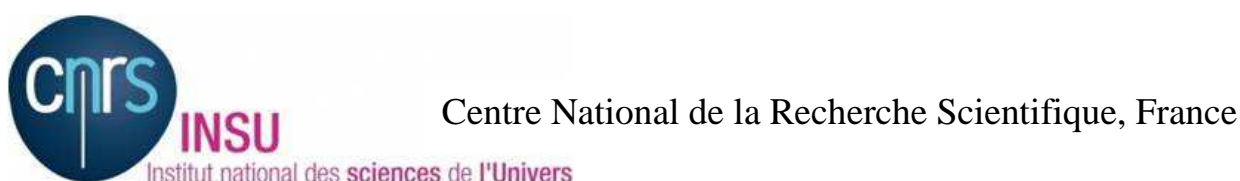
November 30, 2015



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). 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 pCO₂ 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 third day, a deep CTD cast at the DYFAMED site and a zooplankton net at the BOUSSOLE site were performed for the MOOSE DYFAMED program.

The last day, several CTD beacons that are planned to be deployed on elephant seals (by the CEBC-Centre d'Etudes Biologiques de Chizé) were tested. They were installed on the CTD Rosette for comparison with the BOUSSOLE main CTD.

Cruise Summary

The first two days were cancelled because the R/V *Téthys II* was on technical maintenance and was not repaired in due time. The third day was used for the DYFAMED operations and for a CTD cast with water sampling, optical profiles, CIMEL measurements and a Secchi disk at the BOUSSOLE site.

The last day was used for a CTD cast with water sampling and a Secchi disk at the BOUSSOLE site and for the CTD transect.

Thursday 15 October 2015

This day was cancelled because of technical maintenance on the R/V *Téthys II*.

Friday 16 October 2015

This day was cancelled because of technical maintenance on the R/V *Téthys II*.

Saturday 17 October 2015

The sea state was smooth with a gentle breeze. The sky was blue and the visibility was good. Firstly, a deep CTD cast with water sampling was performed at the DYFAMED site for the MOOSE DYFAMED program. Then, we went to the BOUSSOLE site and 3 C-OPS profiles were performed. The buoy was tilted and below its nominal water line because of strong currents. A wireless connection with the buoy was attempted using the CISCO antenna for downloading data but failed. Then a CTD cast with water sampling and 3 CIMEL measurements were performed at the BOUSSOLE site at the same time.

Sunday 18 October 2015

The sea state was slight with a moderate breeze. The sky was overcast and the visibility was medium. The CTD cast could not be performed when arrived at the BOUSSOLE site because there were problems with the deck unit. After the problems were solved, a CTD cast with water sampling and then a Secchi disk were performed at the BOUSSOLE site. Similarly to what was observed on 17 October, the buoy was tilted and below its nominal water line because of strong currents. Therefore it was not possible to download the data directly from the buoy. The sky conditions were not optimal to perform the optical profiles (sky overcast and unstable). Finally the CTD transect was completed. At station 05, an IOP cast with a cap installed on the backscattering meter for dark measurements was performed before the CTD cast.

Pictures taken during this cruise can be found at:

https://picasaweb.google.com/114686870380724925974/2015_10_boussole164

Data from the BOUSSOLE cruises and buoy are available at:

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

Cruise Report

Thursday 15 October 2015

This day was cancelled because of technical maintenance on the R/V *Téthys II*.

Friday 16 October 2015

This day was cancelled because of technical maintenance on the R/V *Téthys II*.

Saturday 17 October 2015 (UTC)

People on board: Emilie Diamond and Melek Golbol.

0620 Departure from the Nice harbour.
0915 Arrival at the DYFAMED site.
0920 CTD MOOSE 90, 2300m (MOOSE DYFAMED program).
1105 Departure to the BOUSSOLE site.

1130 Arrival at the BOUSSOLE site.
1145 C-OPS 01, 02, 03.
1300 Attempt of CISCO connection: failed.
1310 Secchi 01, 22m.
1350 CTD 01, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a_p , TA/TC, O_2 and TSM.
1350 CIMEL 01, 02, 03.
1430 Zooplankton net, 100m (MOOSE DYFAMED program).
1445 Departure to the Nice harbour.
1800 Arrival at the Nice harbour.

Sunday 18 October 2015 (UTC)

People on board: Céline Dimier, Melek Golbol and Yves le Bras.

0500 Departure from the Nice harbour.
0800 Arrival at the BOUSSOLE site.
0840 Attempt of CTD cast: failed.
CTD testing.
1045 Attempt of C-OPS: no (sky overcast and not stable).
1105 CTD 02, 400 m with water sampling at 400, 200, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a_p , CDOM and TSM.
1145 Secchi 02, 20m.
1150 Departure to the first station transect.
1240 CTD 03, 400 m, station 01 (43°25'N 07°48'E).
1330 CTD 04, 400 m, station 02 (43°28'N 07°42'E).
1430 CTD 05, 400 m, station 03 (43°31'N 07°37'E).
1525 CTD 06, 400 m, station 04 (43°34'N 07°31'E).
1615 Dark Hydroscat-6, 50 m, station 05 (43°37'N 07°25'E).
1625 CTD 07, 400 m, station 05.
1705 CTD 08, 400 m, station 06 (43°39'N 07°21'E).
1725 Departure to the Nice harbour.
1800 Arrival at the Nice harbour.

Problems identified during the cruise

- Diving operations were not performed during the cruise. Because of the uncertainty on the weather and because of the unavailability of the ship for the first two days (maintenance), the diving was anticipated and performed with another ship three days before the beginning of this cruise.
- The pCO_2 CARIOCA sensor at 3 m depth was not functioning. So we have sampled the TA/TC parameters only at 10 m depth.
- The last day, the deck-unit of the CTD was not working. In fact, the "fish/tape" switch was accidentally moved to the tape position. It was then repositioned to the "fish" position and the deck unit was functioning. Then, there was another problem with the communication with the deck unit. It was resolved by disconnecting and re-installing all the connections.
- The last day, the elastic band of the Niskin bottle #9 was broken, so there was no sampling at 150m for the CTD 02.
- It was not possible to download the data via a cable connection to the buoy because the buoy was tilted and below its nominal water line because of strong currents, and also because the wireless CISCO connection did not work.

Appendices

Cruise Summary Table for Boussole 164

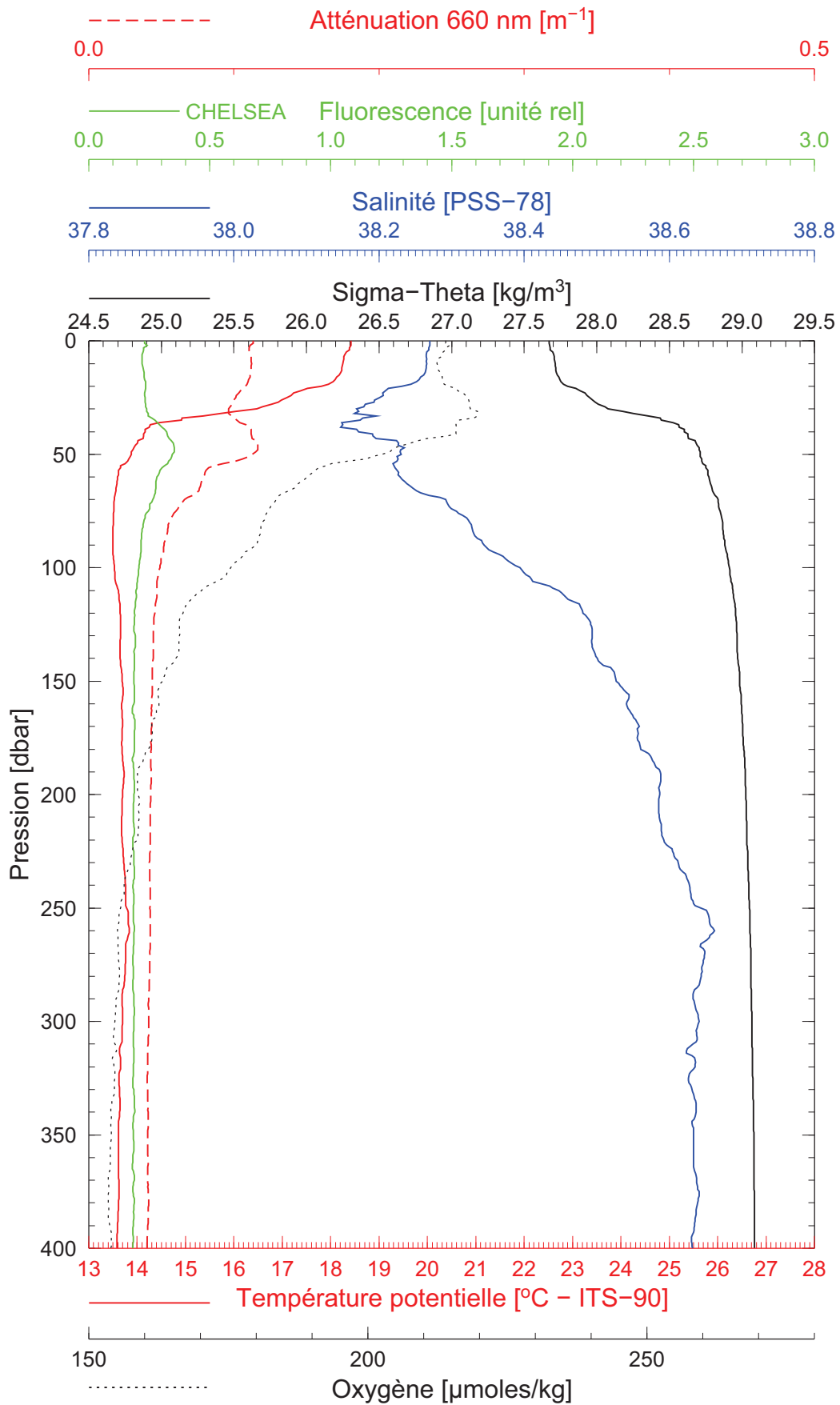
Date	Black names (file ext: ".raw")	Profile names (file extension: ".raw")	CTD notées	Other sensors	Start Time GMT (hour.min)	Duration (min.sec)	Depth max (meter)	Latitude (N)		Longitude		Sky	Clouds	Quantity (#/8)	Weather Wind sp. (kn)	Wind dir.	Atm. Pressure (hPa)	Humidity (%)	Visibility	T air	T water	Sea	Sea Swell H (m)	Swell dir.	Whitecaps	
15/10/15																										
cancelled : technical maintenance of the <i>Téthys II</i>																										
16/10/15																										
cancelled : technical maintenance of the <i>Téthys II</i>																										
17/10/15		bou_c-ops_151017_1135_001_data.csv			11:42	4:34	119	43	21.854	7	53.849	blue	Ci	1	7	223	1017.9	66	good	16.1		calm	0.6		no	
		bou_c-ops_151017_1135_002_data.csv			11:53	4:11	109	43	21.805	7	53.542	blue	Ci	1	7	223	1017.9	66	good	16.1		calm	0.6		no	
		bou_c-ops_151017_1135_003_data.csv			12:04	4:04	107	43	21.747	7	53.104	blue	Ci	1	7	223	1017.9	66	good	16.1		calm	0.6		no	
			Secchi01		13:10	4:00	22	43	22	7	54	blue														
			CTDBOUS001	HPLC, Ap, TA/TC, Oz & TSM	13:51	35:00	400	43	21.874	7	53.936	blue			3	11	266	1017.3	64		16.3	18.38	calm			
				CIMEL01	13:58	4:00		43	21.853	7	53.896	blue														
				CIMEL02	14:07	5:00		43	21.853	7	53.896	blue														
			CIMEL03	14:15	5:00		43	21.853	7	53.896	blue															
18/10/15			CTDBOUS002	HPLC, Ap, CDM & TSM	11:03	37:00	400	43	22.087	7	53.345	overcast			8	12	121	1016.5	73		14.9	18.38	calm			
				Secchi02	11:45	4:00	20	43	22	7	54	overcast			8											
			CTDBOUS003		12:37	19:00	400	43	25.003	7	47.606	overcast			8	14	58	1015.6	70		16.9	18.83	moved			
			CTDBOUS004		13:29	20:00	400	43	28.007	7	41.999	overcast			8	12	53	1015.5	64		18.1	19.76	moved			
			CTDBOUS005		14:32	20:00	400	43	31.030	7	36.890	overcast			8	8	67	1015.3	66		16.8	19.86	moved			
			CTDBOUS006		15:25	18:00	400	43	34.000	7	30.864	overcast			8	6	46	1015.2	73		16.7	20.07	moved			
			CTDBOUS007		16:22	18:00	400	43	36.961	7	24.958	overcast			8	10	54	1015.1	76		16.7	20.44	calm			
			CTDBOUS008		17:04	19:00	400	43	39.038	7	20.953	night			8	3	27	1015.0	81		16.1	20.33	calm			

BOUSSOLE 164

17/10/2015

BOUS151017_01

BOUS001



Date 17/10/2015
Heure déb 13h 51min [TU]

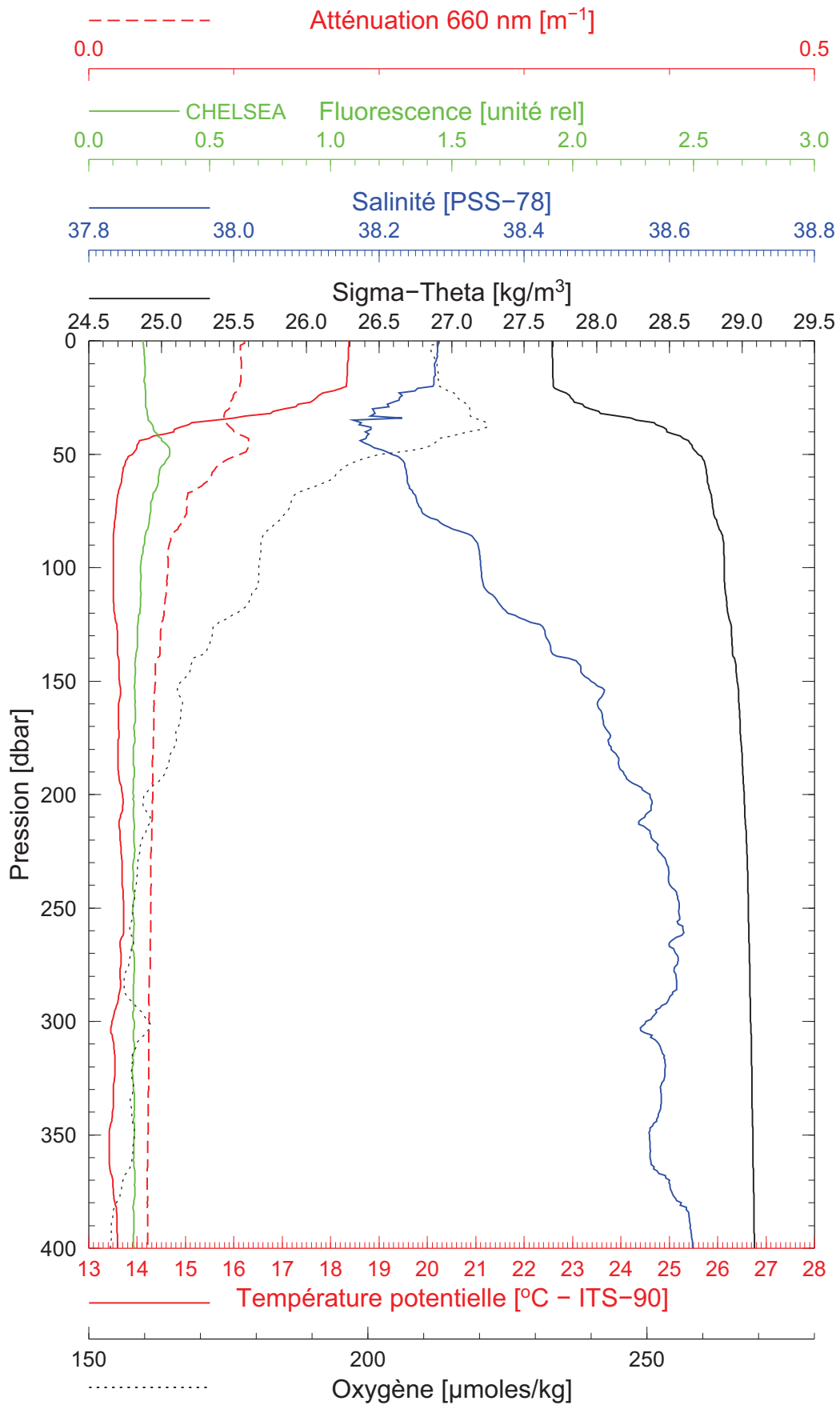
Latitude 43°21.874 N
Longitude 07°53.936 E

BOUSSOLE 164

18/10/2015

BOUS151018_01

BOUS002



Date 18/10/2015

Latitude 43°22.087 N

Heure déb 11h 03min [TU]

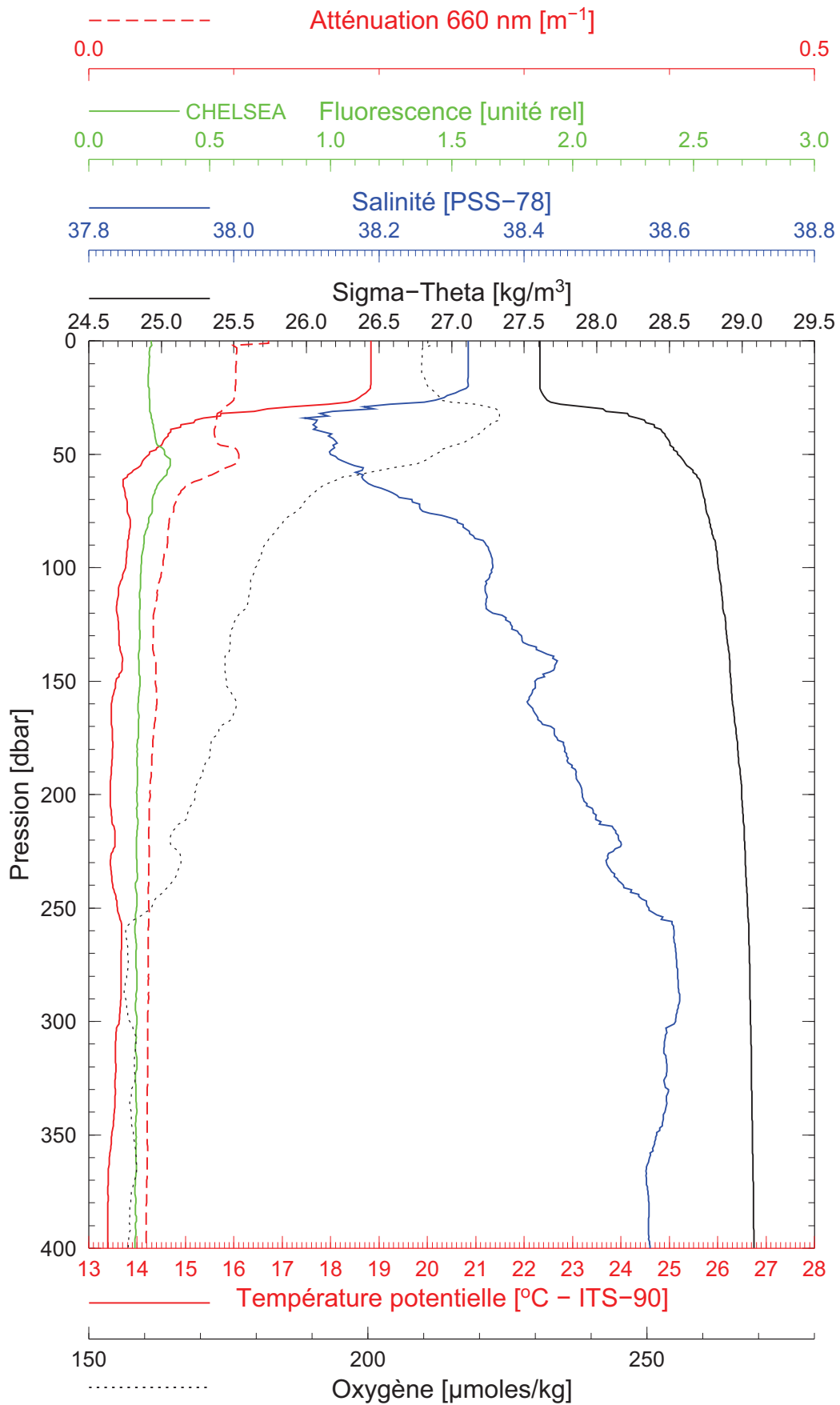
Longitude 07°53.345 E

BOUSSOLE 164

18/10/2015

BOUS151018_02

BOUS003



Date 18/10/2015
Heure déb 12h 37min [TU]

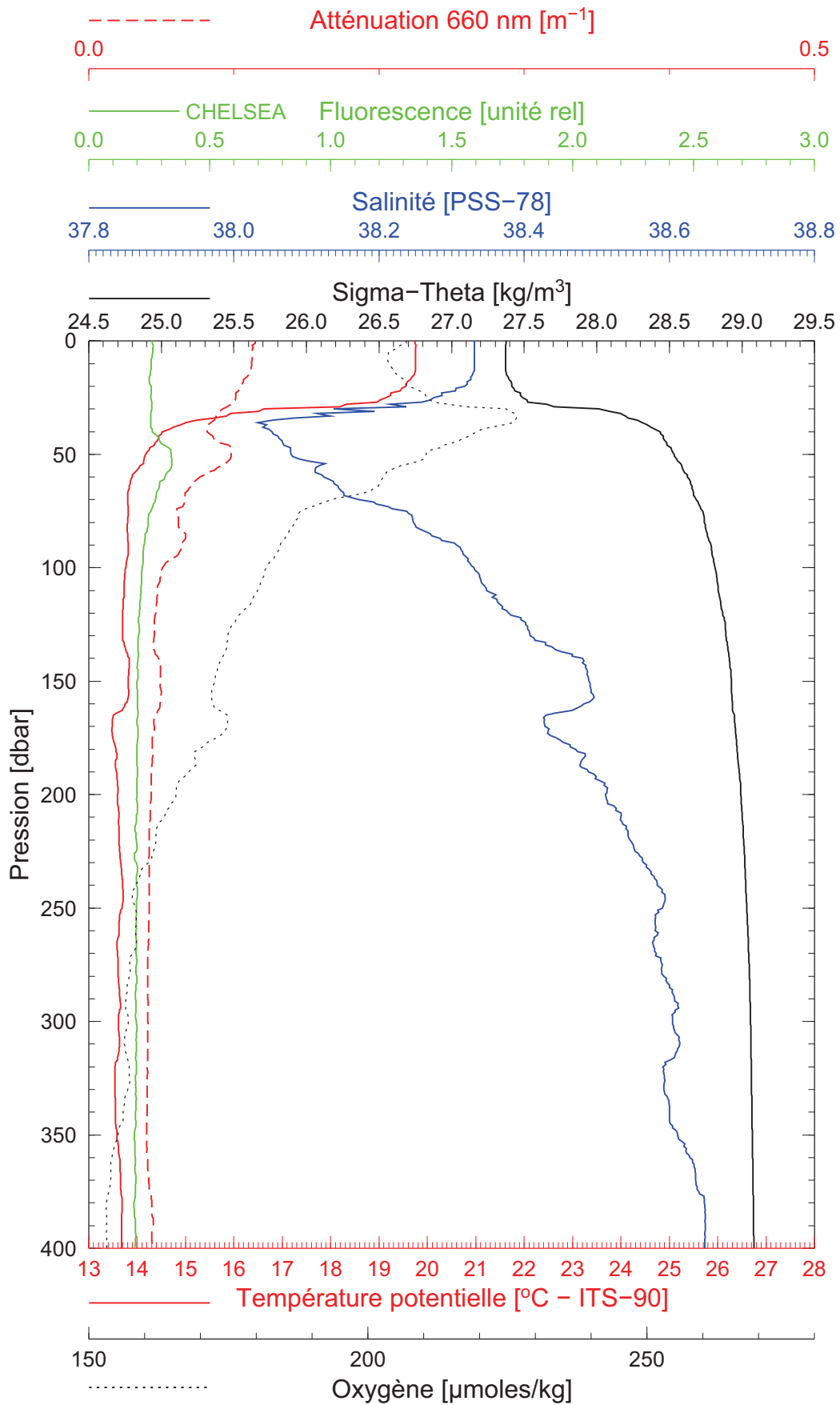
Latitude 43°25.003 N
Longitude 07°47.606 E

BOUSSOLE 164

18/10/2015

BOUS151018_03

BOUS004



Date 18/10/2015
Heure déb 13h 29min [TU]

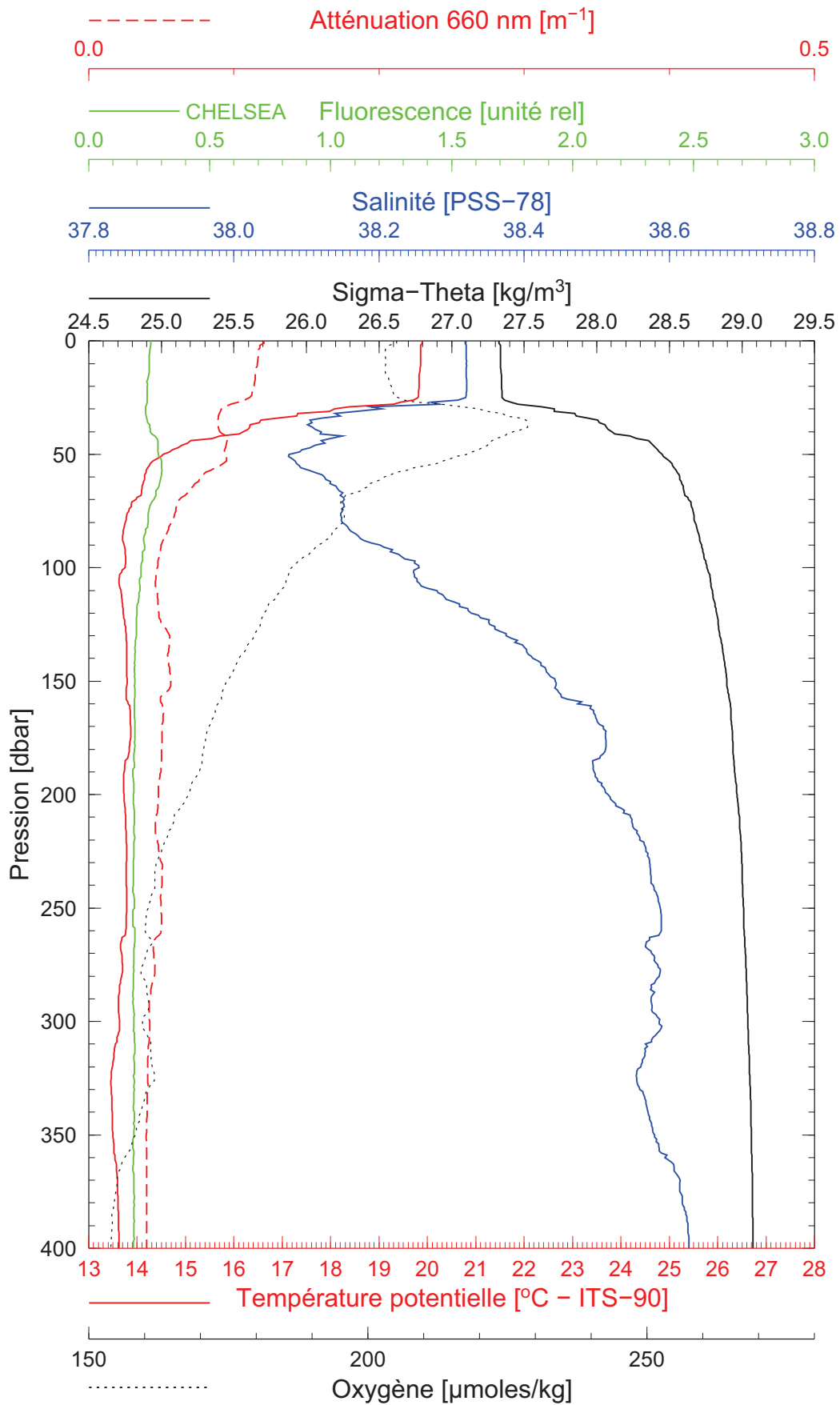
Latitude 43°28.007 N
Longitude 07°41.999 E

BOUSSOLE 164

18/10/2015

BOUS151018_04

BOUS005



Date 18/10/2015

Latitude 43°31.030 N

Heure déb 14h 32min [TU]

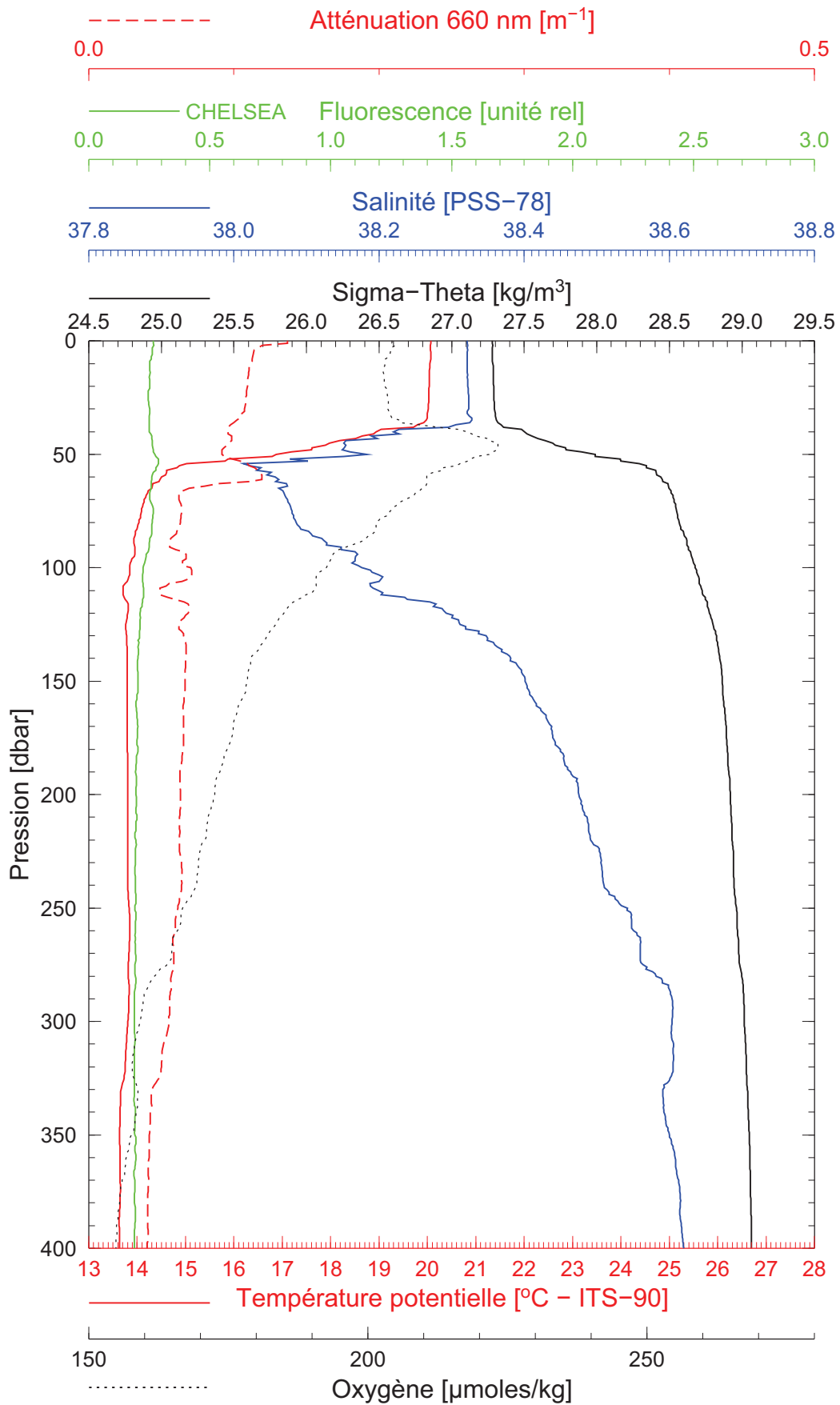
Longitude 07°36.890 E

BOUSSOLE 164

18/10/2015

BOUS151018_05

BOUS006



Date 18/10/2015

Latitude 43°34.000 N

Heure déb 15h 25min [TU]

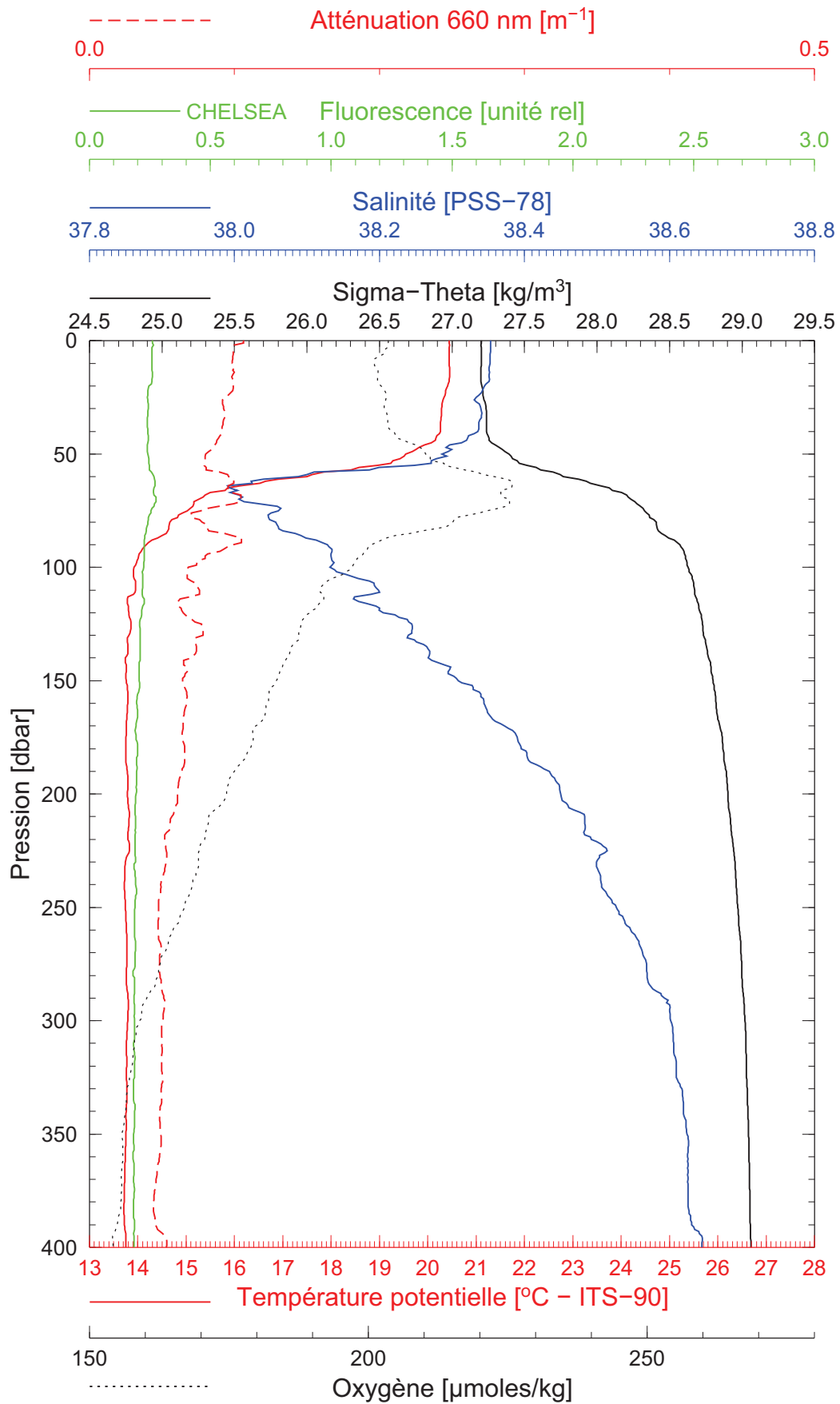
Longitude 07°30.864 E

BOUSSOLE 164

18/10/2015

BOUS151018_06

BOUS007



Date 18/10/2015

Latitude 43°36.961 N

Heure déb 16h 21min [TU]

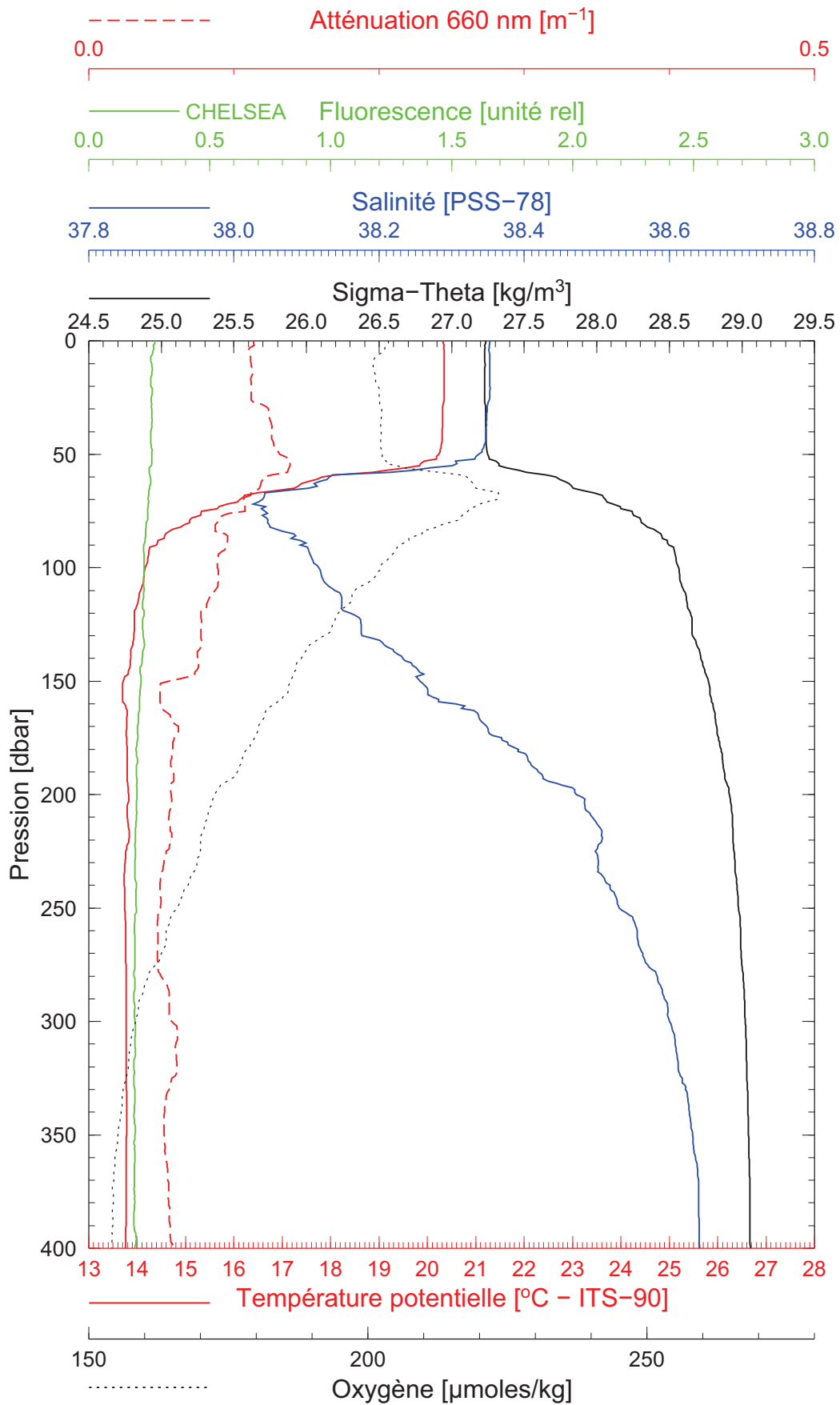
Longitude 07°24.958 E

BOUSSOLE 164

18/10/2015

BOUS151018_07

BOUS008



Date 18/10/2015

Latitude 43°39.038 N

Heure déb 17h 04min [TU]

Longitude 07°20.953 E