BOUSSOLE Monthly Cruise Report

Cruise 159
May 07–09, 2015

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

Science Personnel: Marie Barbieux, Sorin Constantin, Melek Golbol, Tristan Harmel, Yves Lamblard, David Luquet, Baptiste Picard, Didier Robin and Vincent Taillandier.

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

Water filtrations in the wet lab of the R/V *Téthys II*, on samples taken from a CTD cast. The filters are subsequently used for quantification of phytoplankton pigments (HPLC) and particulate absorption.

BOUSSOLE project

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

July 10, 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

European Space Agency

Centre National d'Etudes Spatiales, France

Centre National de la Recherche Scientifique, France

Université Pierre & Marie Curie, France

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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.

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 first day, Several CTD-fluorometer 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 and fluorometer.

The second day, in order to prepare for the next deployment of the upper section of the buoy, divers removed the OCP (data logger of the radiometers and transmissometers) at 4m on the buoy. They also removed the CTD, the optode and the pCO_2 CARIOCA sensors located at 3m. All these instruments will be installed on the new buoy just after this cruise.

Cruise Summary

The first day was used to perform a CTD cast with water sampling and an optical profile at the BOUSSOLE site and a Secchi disk, and to clean the ARGOS connector and the sensors at the top of the buoy. The second day was used to perform diving operations with removing of sensors in order to prepare for the subsequent rotation of the upper buoy superstructure, three days later. This day was also used to download data directly from the buoy, to perform CTD casts with water sampling, optical profiles and a Secchi disk at the BOUSSOLE site. The third day was used to perform CTD casts with water sampling, a Secchi disk and an optical profile at the BOUSSOLE site.

Thursday 07 May 2015

The sea state was slight with a gentle breeze. The sky was hazy on the morning and cloudy on the afternoon. The visibility was bad on the morning and medium on the afternoon. During this day 1 CTD cast with water sampling, 1 C-OPS profile and 1 Secchi disk were performed at the BOUSSOLE site. The sensors at the top of the buoy, the ARGOS and CISCO connectors and the solar panels were cleaned. Finally, the CTD transect was performed.

Friday 08 May 2015

The sea state was smooth with a gentle breeze on the morning and a light breeze on the afternoon. The sky was cloudy with a good visibility. When arrived at the BOUSSOLE site, divers went at sea to remove the OCP at 4m and the CTD, the optode and the pCO_2 CARIOCA sensors at 3m. They cleaned the instruments. Buoy data were downloaded via the cable available on top of the buoy. The sensors at the top of the buoy and the solar panels were cleaned. This day was also used for 2 CTD casts with water sampling, 2 C-OPS profiles and 1 Secchi disk.

Saturday 09 May 2015

The sea state was slight with a light breeze. The sky was hazy and overcast, the visibility was medium. 2 CTD casts, 1 C-OPS profile and 1 Secchi disk were performed at the BOUSSOLE site.

Pictures taken during this cruise can be found at:
https://plus.google.com/photos/114686870380724925974/albums/6169139368776722897?banner=pwa

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 07 May 2015 (UTC)

People on board: Sorin Constantin, Melek Golbol, Baptiste Picard and Vincent Taillandier.

0610 Departure from the Nice harbour.
0915 Arrival at the BOUSSOLE site.
0930 CTD 01, 400m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a_p and TSM.
1000 Lunch
1100 Cleaning of the sensors and the ARGOS connector on the top of the buoy.
1210 C-OPS 01.
1220 Secchi 01, 19m.
1300 CTD 02, 400m, station 01 (43°25'N 07°48'E).
1400 CTD 03, 400m, station 02 (43°28'N 07°42'E).
1455 CTD 04, 400m, station 03 (43°31'N 07°37'E).
1555 CTD 05, 400m, station 04 (43°34'N 07°31'E).
1650 CTD 06, 400 m, station 05 (43°37'N 07°25'E).
1740 CTD 07, 400 m, station 06 (43°39'N 07°21'E).
1800 Departure to the Nice harbour.

1845 Arrival at the Nice harbour.

Friday 08 May 2015 (UTC)

People on board: Melek Golbol, Yves Lamblard, David Luquet, Didier Robin and Vincent Taillandier.

0505 Departure from the Nice harbour.
0815 Arrival at the BOUSSOLE site.
0830 Diving on the BOUSSOLE buoy: removing of the OCP at 4m; removing of the CTD, optode and pCO2 CARIOCA sensor at 3m; cleaning of the sensors.
0900 Direct connection with the buoy and data retrieval.
0930 Cleaning of solar panels and surface sensors.
0940 CTD 08, 400m with water sampling at 5 m for TSM.
1010 Secchi 02, 23m.
1030 C-OPS 02, 03.
1200 CTD 09, 400m with water sampling at 400, 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, $a_{p,}$ CDOM, TA/TC and O_2.
1330 Departure to the Nice harbour.
1630 Arrival at the Nice harbour.

Saturday 09 May 2015 (UTC)

People on board: Marie Barbieux, Sorin Constantin, Melek Golbol and Tristan Harmel.

0500 Departure from the Nice harbour.
0815 Arrival at the BOUSSOLE site.
0830 C-OPS tests.
0915 CTD 10, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, $a_{p,}$ and TSM.
1100 Lunch.
1110 Secchi 03, 17m.
1200 CTD 11, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC and $a_{p.}$
1300 C-OPS 04.
1330 Departure to the Nice harbour.
1630 Arrival at the Nice harbour.

Problems identified during the cruise

- The Niskin bottle #11 did not close during the CTD 09 cast. That was due to a faulty nylon. It was readjusted and then the CTD was deployed another time in order to sample water at 10m.

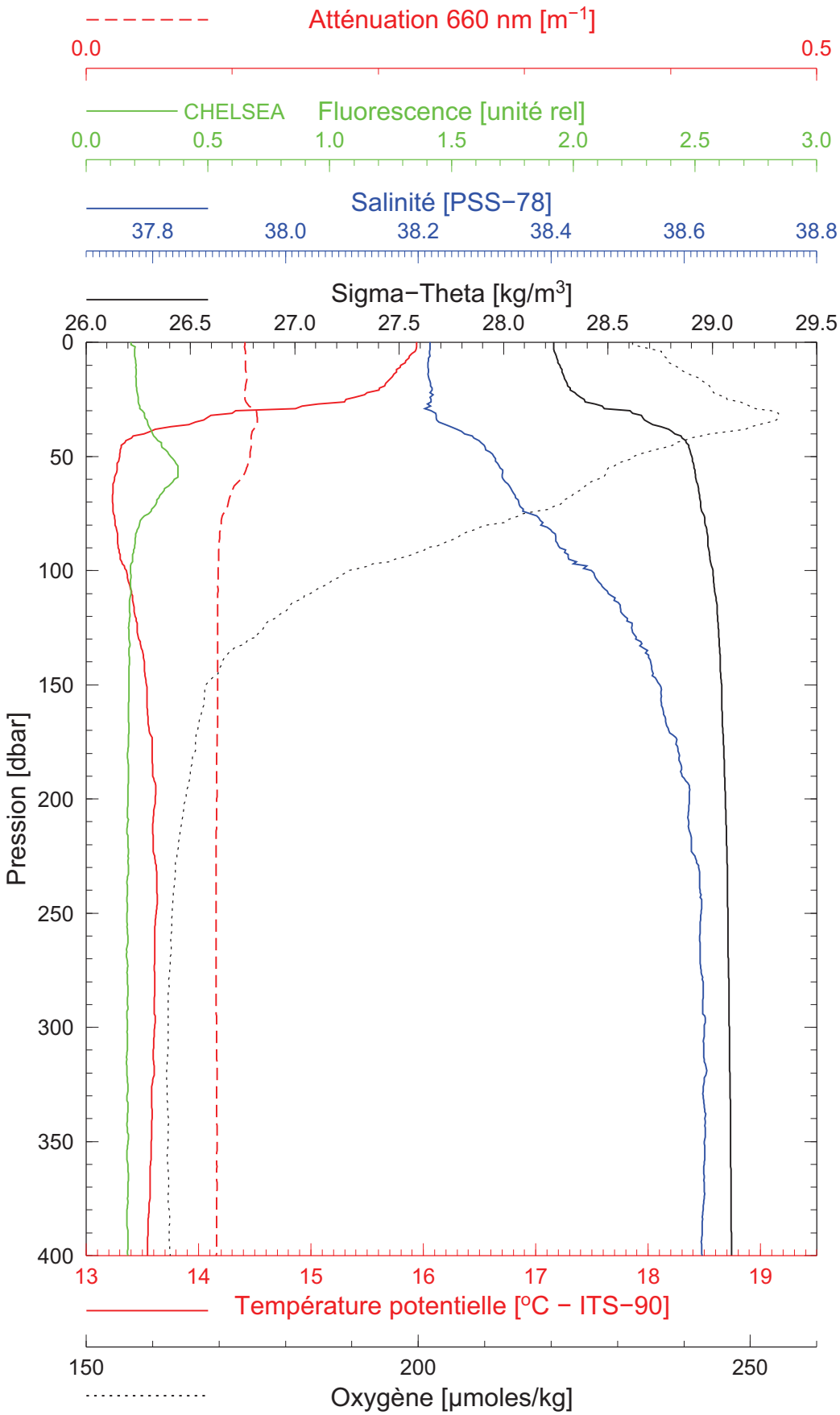
Appendices

Cruise Summary Table for Boussole 159

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
07/05/15			CTDBOUS001	HPLC, Ap & TSM	09:24	35:00	400	43	22.110	7	53.040	hazy		8	8	149	1017.2	91		16.2	15.94	calm			
		bou_c-ops_150507_1152_001_data.csv			12:09	2:05	48.3	43	22.308	7	54.054	cloudy	Ci,Cs,St	5	3	118	1017.1	91	medium	16.8		calm	0.6		no
				Secchi01	12:20	4:00	19	43	22	7	54	cloudy		5					medium			calm	0.6		
			CTDBOUS002		12:58	25:00	400	43	25.018	7	47.950	blue		2	2	67	1017.0	91		16.3	15.90	calm			
			CTDBOUS003		13:59	24:00	400	43	27.990	7	42.100	blue		1	1	199	1016.6	87		16.7	16.26	calm			
			CTDBOUS004		14:57	24:00	400	43	30.930	7	36.960	blue		0	2	146	1016.1	86		16.9	16.70	calm			
			CTDBOUS005		15:55	24:00	400	43	34.030	7	30.940	blue		0	2	85	1016.0	85		17.4	17.35	calm			
			CTDBOUS006		16:52	23:00	400	43	36.960	7	25.000	blue		0	3	122	1015.9	80		17.8	17.80	calm			
			CTDBOUS007		17:40	22:00	400	43	38.950	7	20.940	overcast		8	4	69	1016.1	80		17.7	17.33	calm			
08/05/15			CTDBOUS008	TSM	09:40	22:00	400	43	22.230	7	53.840	cloudy		5	7	63	1016.7	85		16.6	16.30	calm			
				Secchi02	10:10	4:00	23	43	22	7	54	cloudy		5					good			calm			
		bou_c-ops_150508_1006_002_data.csv			10:28	2:54	70.1	43	22.211	7	53.490	blue	Cu	2	5	24	1017.0	82	good	17.1		calm	0.5		no
		bou_c-ops_150508_1006_005_data.csv			10:45	2:33	60.1	43	22.140	7	52.840	blue	Cu	2	5	24	1017.0	82	good	17.1		calm	0.5		no
			CTDBOUS009	HPLC, Ap, CDOM, TA/TC & O_2	11:58	26:00	400	43	21.910	7	53.910	cloudy		4	4	233	1017.1	83		17.5	16.70	calm			
09/05/15			CTDBOUS010	HPLC, Ap & TSM	09:15	30:00	400	43	22.102	7	53.713	overcast		6	5	341	1018.4	84		17.2	16.31	calm			
				Secchi03	11:10	4:00	17	43	22	7	54	overcast		6					medium			calm	0.7		
			CTDBOUS011	HPLC & Ap	11:59	29:00	400	43	22.338	7	53.880	cloudy		5	2	326	1018.0	84		17.9	16.59	calm			
		bou_c-ops_150509_1253_001_data.csv			13:00	4:28	117	43	22.511	7	53.085	overcast	Ci	6	5	273	1018.4	82	good	18.0		calm	0.5		no

BOUSSOLE 159 **07/05/2015** **BOUS150507_01**

BOUS001

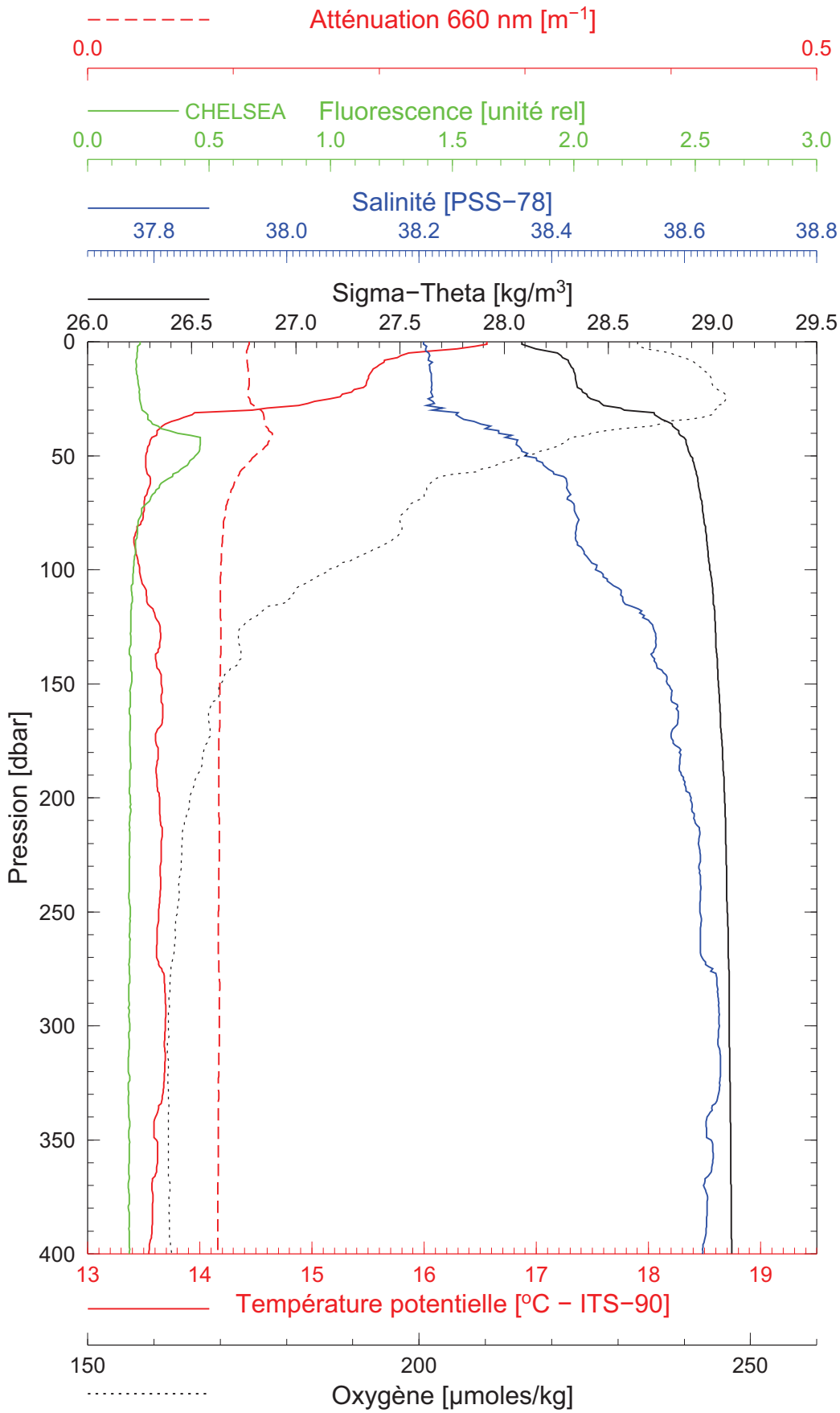


Date *07/05/2015* *Latitude* *43°22.110 N*

Heure déb *09h 24min [TU]* *Longitude* *07°53.040 E*

BOUSSOLE 159 **07/05/2015** **BOUS150507_02**

BOUS002

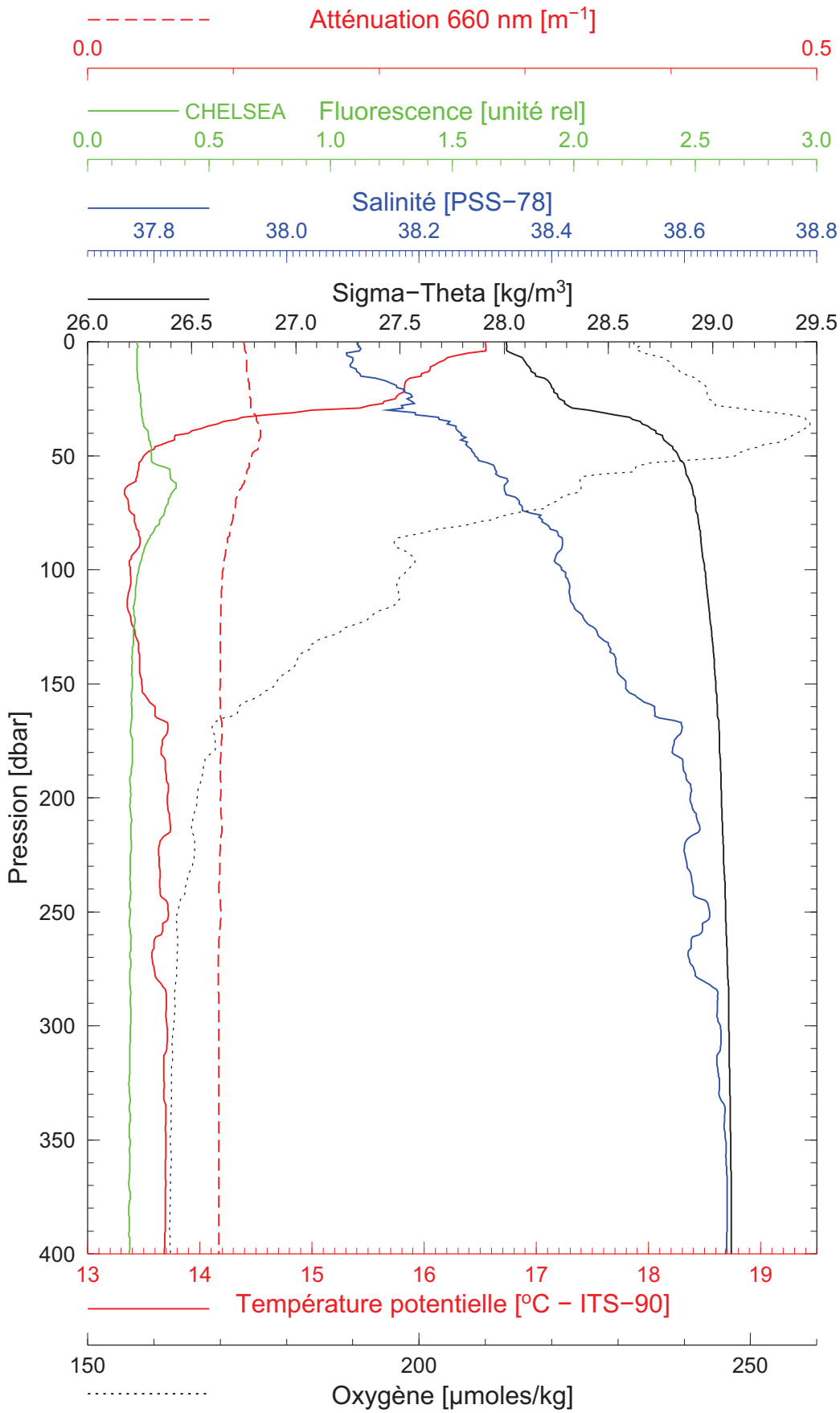


Date *07/05/2015* *Latitude* *43°25.018 N*

Heure déb *12h 58min [TU]* *Longitude* *07°47.950 E*

BOUSSOLE 159 **07/05/2015** **BOUS150507_03**

BOUS003

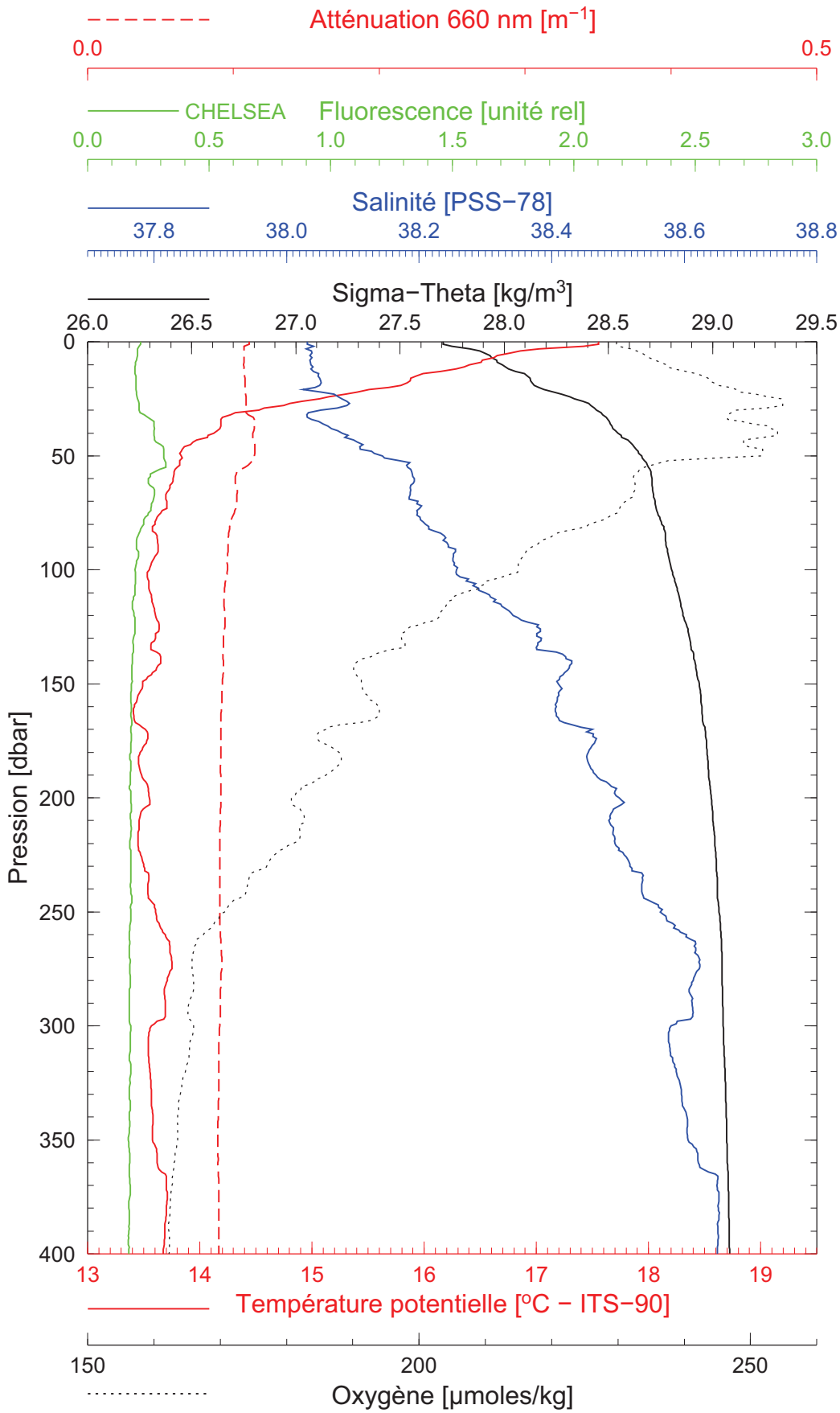


Date *07/05/2015* *Latitude* *43°27.990 N*

Heure déb *13h 59min [TU]* *Longitude* *07°42.010 E*

BOUSSOLE 159 **07/05/2015** **BOUS150507_04**

BOUS004

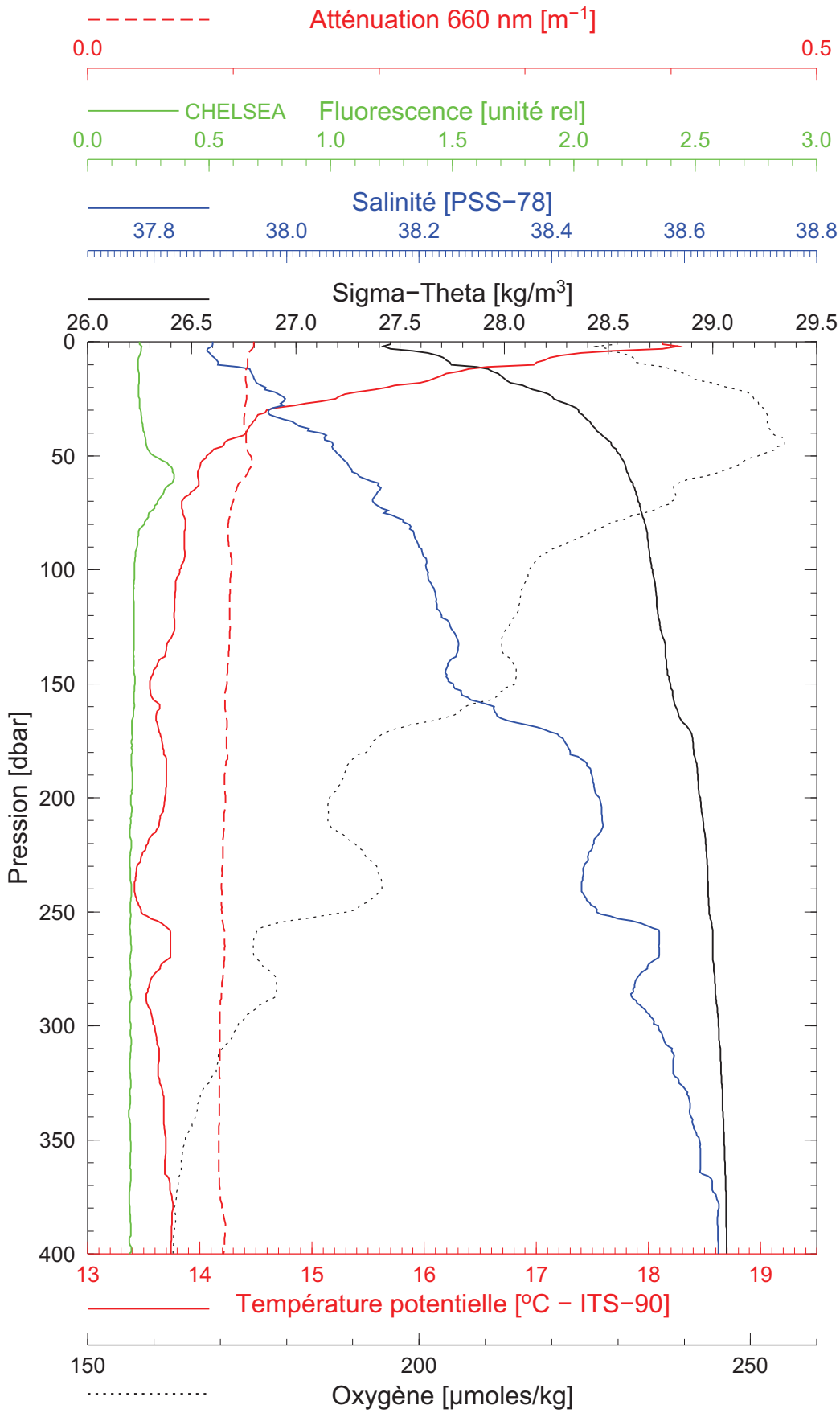


Date *07/05/2015* *Latitude* *43°30.930 N*

Heure déb *14h 57min [TU]* *Longitude* *07°36.960 E*

BOUSSOLE 159 **07/05/2015** **BOUS150507_05**

BOUS005

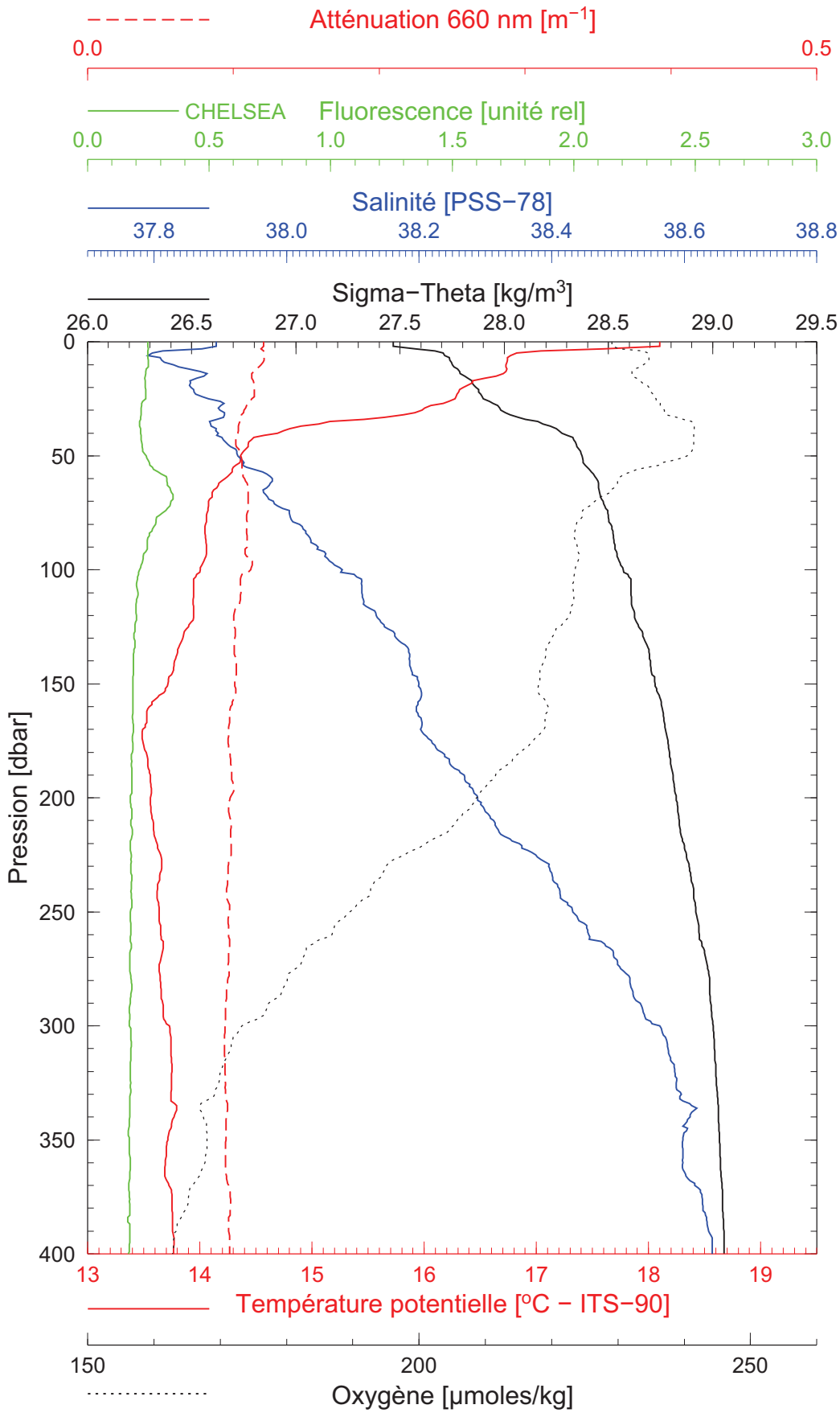


Date *07/05/2015* *Latitude* *43°34.030 N*

Heure déb *15h 55min [TU]* *Longitude* *07°30.940 E*

BOUSSOLE 159 **07/05/2015** **BOUS150507_06**

BOUS006

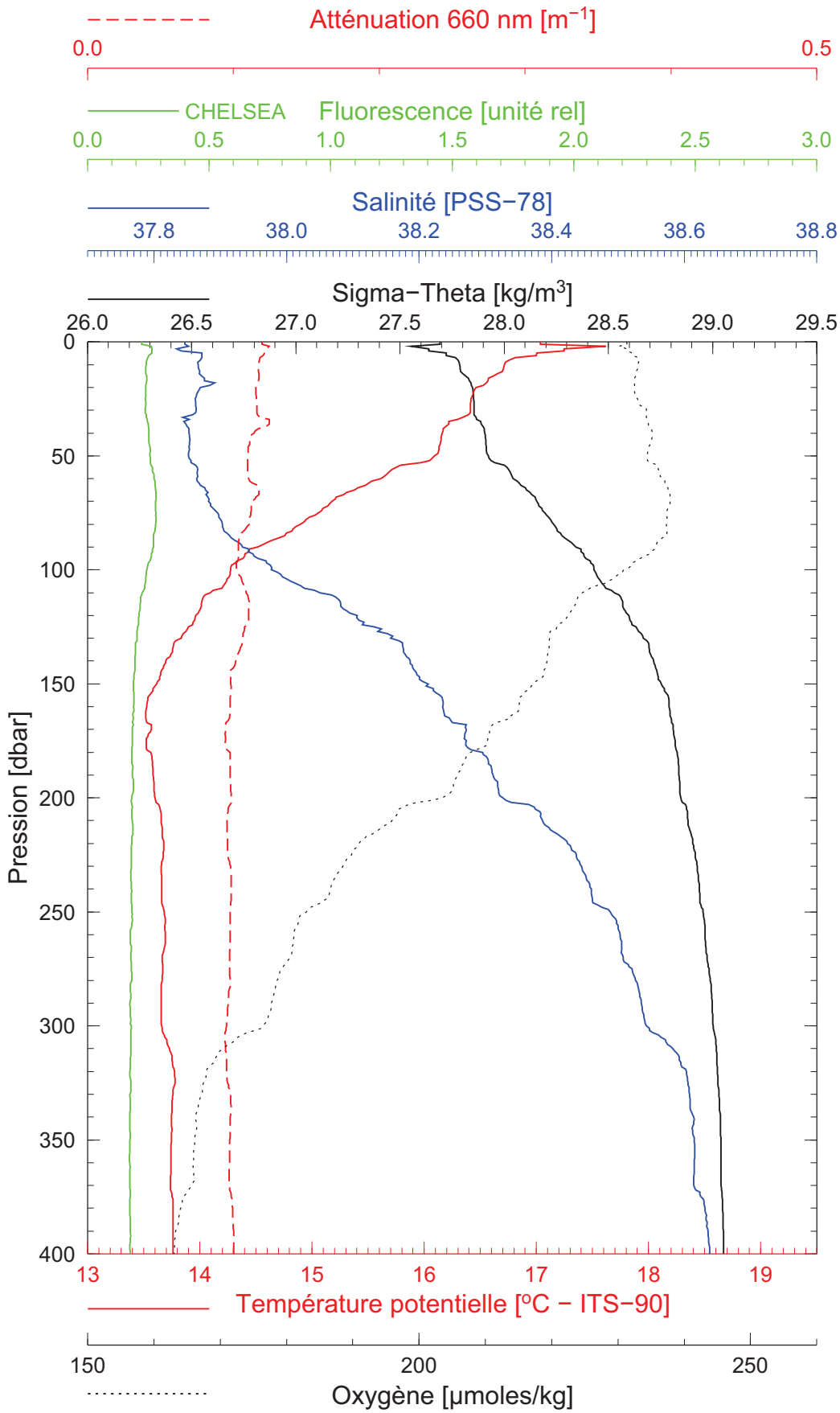


Date *07/05/2015* *Latitude* *43°36.960 N*

Heure déb *16h 52min [TU]* *Longitude* *07°25.000 E*

BOUSSOLE 159 **07/05/2015** **BOUS150507_07**

BOUS007

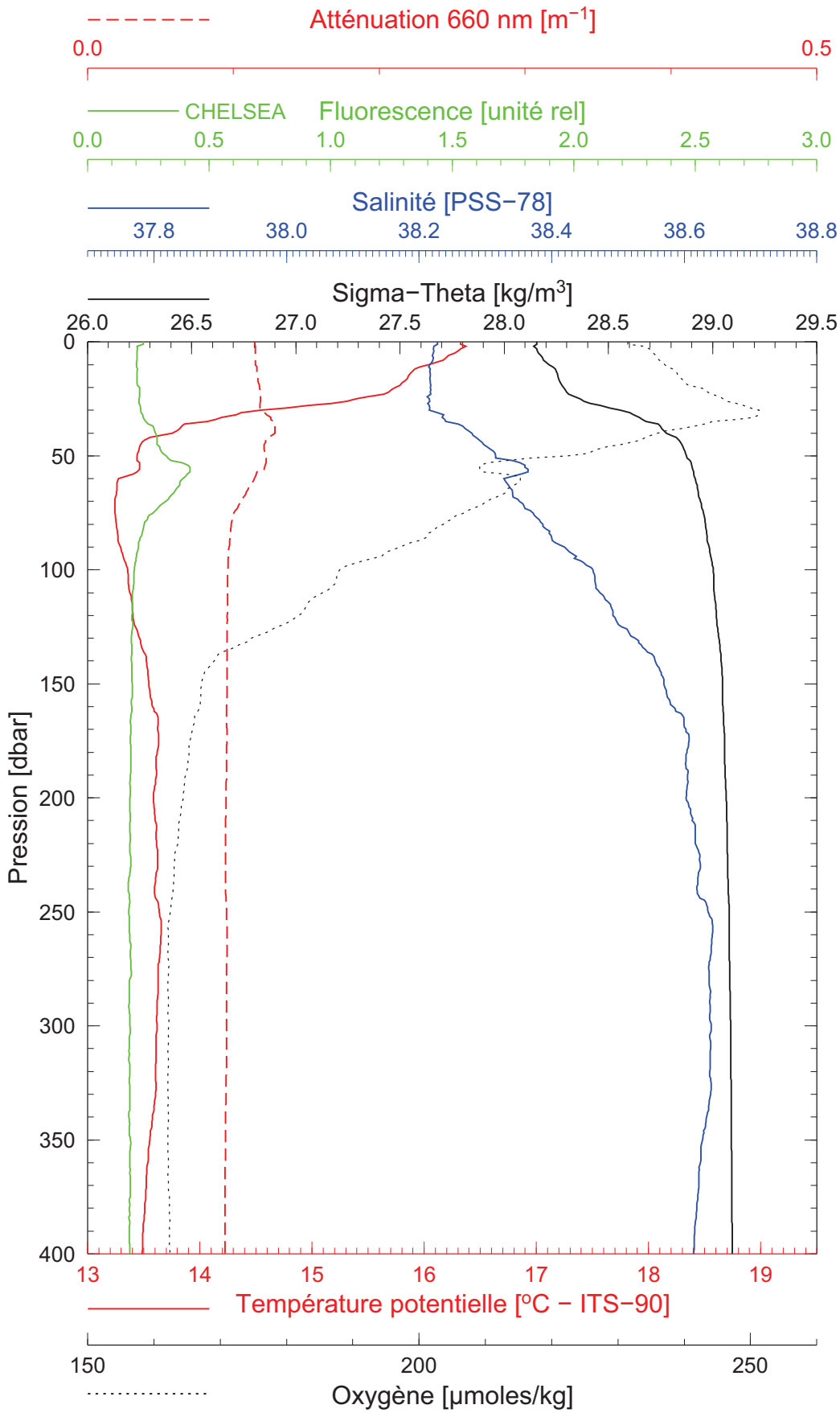


Date *07/05/2015* *Latitude* *43°38.950 N*

Heure déb *17h 40min [TU]* *Longitude* *07°20.940 E*

BOUSSOLE 159 **07/05/2015** **BOUS150508_01**

BOUS008

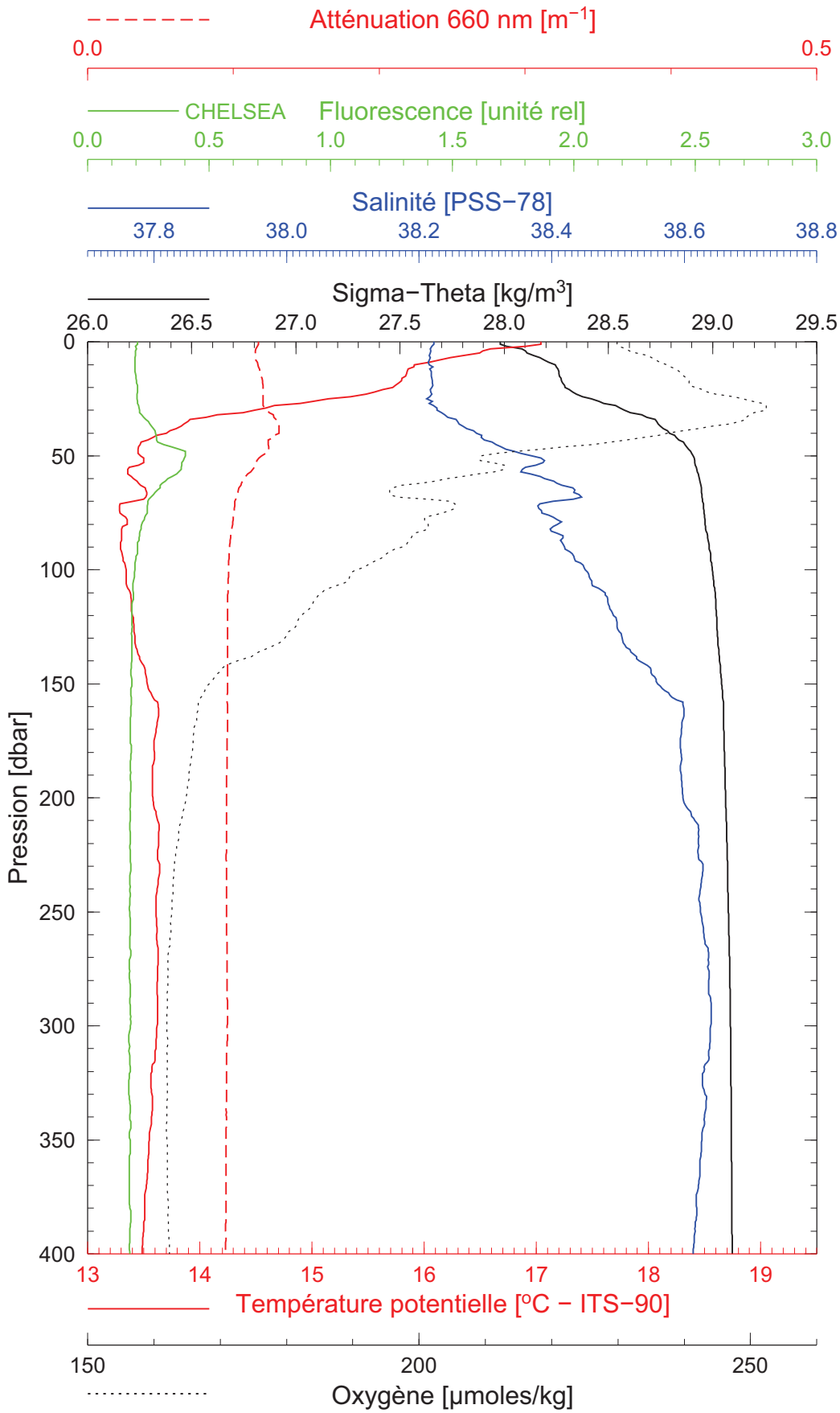


Date *07/05/2015* *Latitude* *43°22.230 N*

Heure déb *09h 40min [TU]* *Longitude* *07°53.840 E*

BOUSSOLE 159 **08/05/2015** **BOUS150508_02**

BOUS009

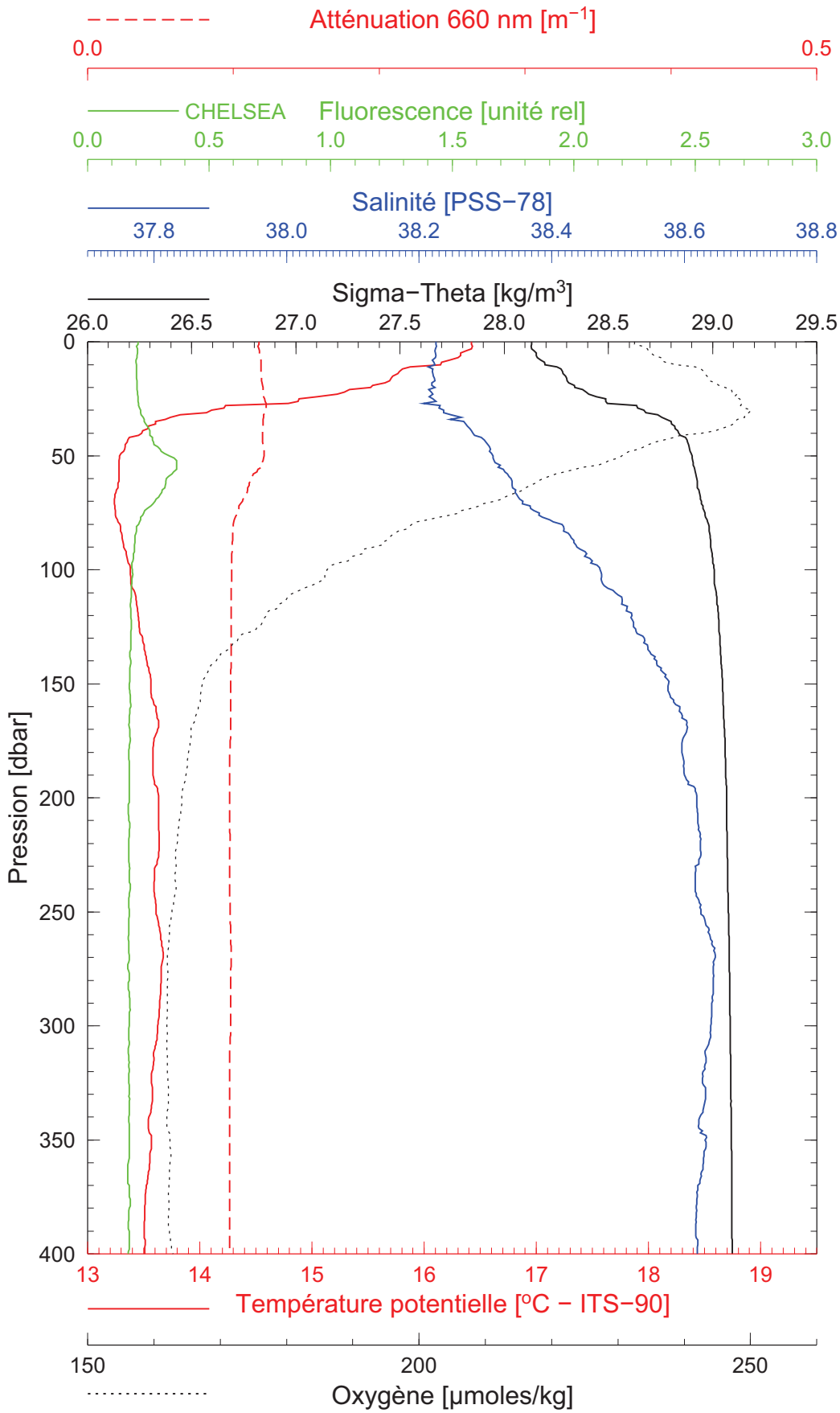


Date *08/05/2015* *Latitude* *43°21.910 N*

Heure déb *11h 58min [TU]* *Longitude* *07°53.910 E*

BOUSSOLE 159 **09/05/2015** **BOUS150509_01**

BOUS010

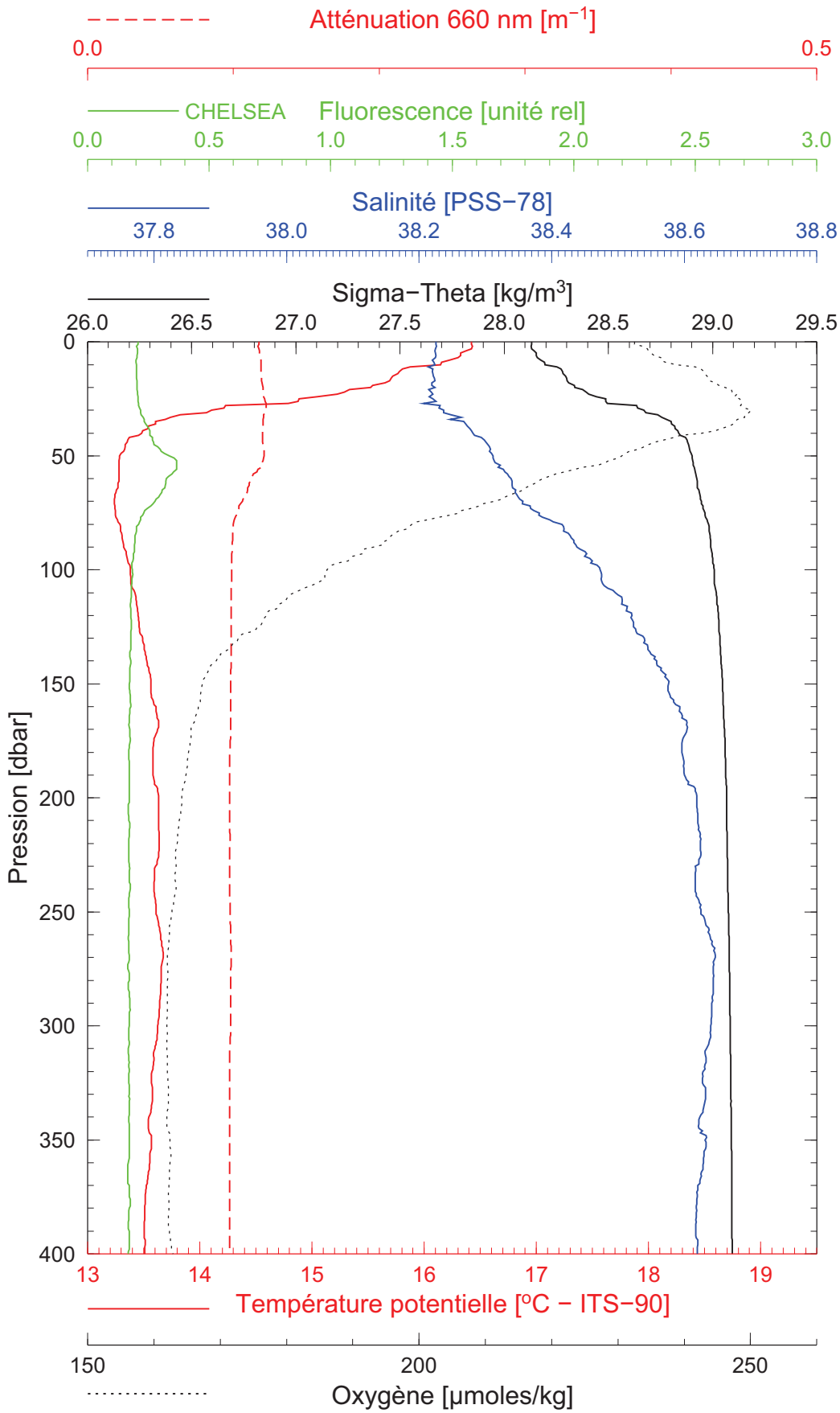


Date *09/05/2015* *Latitude* *43°22.102 N*

Heure déb *09h 15min [TU]* *Longitude* *07°53.713 E*

BOUSSOLE 159 **09/05/2015** **BOUS150509_02**

BOUS010



Date *09/05/2015* *Latitude* *43°22.102 N*

Heure déb *09h 15min [TU]* *Longitude* *07°53.713 E*