

BOUSSOLE Monthly Cruise Report

Cruise 162

August 27–29, 2015

Duty Chief: Melek Golbol

Vessel: R/V Téthys II

(Captain: Joël Perrot)

Science Personnel: Louis Caray Counil, Vlad Costache, Guillaume De Liège, Emilie Diamond, Melek Golbol, Jean-Michel Grisoni, Natalia Llopis Monferrer, David Luquet, Sabine Marty, Didier Robin and Vincenzo Vellucci.

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



During the second day of the cruise, the weather conditions were optimal at the BOUSSOLE site: calm sea, blue sky and excellent visibility.

BOUSSOLE project

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

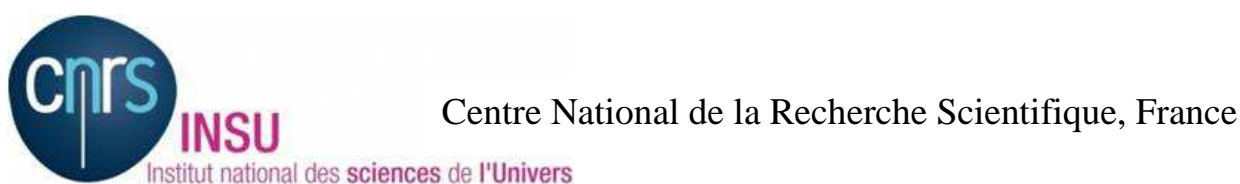
October 23, 2015



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



Contents

1. Cruise Objectives
2. Cruise Summary
3. Cruise Report
4. Problems identified during the cruise

Appendices

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

During the second day, divers went to the METEO-FRANCE buoy in order to install a new sensor ISUS V3 (In Situ Ultraviolet Spectrophotometer) for nitrates measurements in the frame of the MOOSE DYFAMED program.

For METEO-FRANCE operations, they also checked the sensors that are affixed on the chain of the mooring. They also installed a CTD below the surface structure. 2 GPS antenna were replaced on the top of the buoy.

At the BOUSSOLE site, divers removed the two dye pockets that were affixed on the BOUSSOLE buoy. These were the same dye pockets than the ones used inside the two pCO₂ CARIOCA sensors. They were installed two months ago at 3m and 9m in order to compare their aging with that of the ones installed on the sensors. The last day, some operations were performed for the MOOSE DYFAMED program: a deep CTD cast, and manta and plankton nets.

Cruise Summary

The first day was used for diving operations and maintenance on the METEO-FRANCE buoy and on the BOUSSOLE buoy. This day was also used to perform optical profiles, a CTD cast with water sampling and a Secchi disk. The second day was used for optical profiles, for a CTD cast with water sampling, for a Secchi disk, for CIMEL measurements and for the CTD transect.

The last day was used for a CTD cast with water sampling at the BOUSSOLE site, for CIMEL measurements and for a Secchi disk. It was also used to perform a deep CTD cast with water sampling at DYFAMED site, manta and plankton nets.

Thursday 27 August 2015

The sea state was smooth with a light breeze. The sky was blue and the visibility was excellent. When arrived at the METEO-FRANCE buoy, divers went at sea to install an ISUS V3 sensor for nitrates measurements at 45 m depth. They also checked the sensors that are affixed on the chain of the mooring. They installed a CTD below the surface structure. 2 GPS antenna were replaced on the top of the buoy. Then, we went to the BOUSSOLE site and 3 C-OPS profiles were performed. After, divers went at sea to clean the sensors, to perform dark measurements of the transmissometers and backscattering meters and to take pictures. They removed the two dye pockets affixed on the BOUSSOLE buoy at 3m and 10m. Buoy data and pCO₂ data at 3m and 10m were downloaded using the cables available on top of the buoy. Sensors on the top of the buoy and solar panels were cleaned. Then, 3 CIMEL measurements, 1 CTD cast with water sampling and a Secchi disk were performed at the BOUSSOLE site.

Friday 28 August 2015

The sea state was calm with a light breeze on the morning and a light air on the afternoon. The sky was blue and the visibility was excellent. The sensors at the top of the buoy and the solar panels were cleaned again, because they were still quite dirty. Then, 3 C-OPS profiles, 1 CTD cast with water sampling, 3 CIMEL measurements and 1 Secchi disk were performed at the BOUSSOLE site. Finally the CTD transect was performed. At the station 06, an IOP cast with a cap installed on the backscattering meter for dark measurements was performed before the CTD cast acquisition.

Saturday 29 August 2015

The sea state was smooth with a gentle breeze. The sky was blue and the visibility was excellent. 1 CTD cast with water sampling, 3 CIMEL measurements, 3 C-OPS profiles and 1 Secchi disk were performed at the BOUSSOLE site. Surface water was collected with a bucket for TSM analysis. Then, we went at the DYFAMED station to perform the MOOSE DYFAMED program. During the way up to DYFAMED, a manta net was towed on surface during 30 minutes. Then, 3 zooplankton nets and a deep CTD cast with water sampling were performed at the DYFAMED site.

Pictures taken during this cruise can be found at:

<https://plus.google.com/photos/114686870380724925974/albums/6209905556973921617?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 27 August 2015 (UTC)

People on board: Vlad Costache, Guillaume De Liège, Emilie Diamond, Melek Golbol, David Luquet, Didier Robin and Jean-Michel Grisoni.

0610 Departure from the Nice harbour.
0900 Arrival at the METEO-FRANCE buoy site.
0915 Diving at the METEO-FRANCE buoy to install the ISUS V3 sensors and for maintenance.
0930 Surface maintenance on the METEO-FRANCE buoy.
1000 Lunch.
1030 Departure to the BOUSSOLE site.
1100 Arrival at the BOUSSOLE site.
1120 C-OPS 01, 02, 03.
1230 Diving on the BOUSSOLE buoy: cleaning of the sensors, performing dark measurements, taking pictures and removing of the dye pocket.
1245 CIMEL 01, 02, 03.
1300 Direct connection with the buoy and data retrieval. Downloading of pCO₂ data at 3m and 10m depth.
1330 Cleaning of solar panels and surface sensors.
1400 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, CDOM and TSM.
1445 Secchi 01, 18 m.
1455 Departure to the Nice harbour.
1800 Arrival at the Nice harbour.

Friday 28 August 2015 (UTC)

People on board: Sabine Marty and Vincenzo Vellucci.

0515 Departure from the Nice harbour.
0850 Arrival at the BOUSSOLE site.
0900 Cleaning of surface sensors.
0940 C-OPS 04, 05, 06.
1100 CTD 02, 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.
1150 Secchi 02, 23m.
1155 CIMEL 04, 05, 06.
1205 Departure to the first transect station.
1250 CTD 02, 400 m, station 01 (43°25'N 07°48'E).
1345 CTD 03, 400 m, station 02 (43°28'N 07°42'E).
1435 CTD 04, 400 m, station 03 (43°31'N 07°37'E).
1540 CTD 05, 400 m, station 04 (43°34'N 07°31'E).
1635 CTD 06, 400 m, station 05 (43°37'N 07°25'E).
1715 Dark Hydroscat-6, 50m, station 06 (43°39'N 07°21'E).
1725 CTD 07, 400 m, station 06.
1745 Departure to the Nice harbour.
1825 Arrival at the Nice harbour.

Saturday 29 August 2015 (UTC)

People on board: Louis Caray Council, Emilie Diamond, Melek Golbol, and Natalia.Llopis Monferrer.

0505 Departure from the Nice harbour.
0830 Arrival at the BOUSSOLE site.
0835 CTD 08, 400 m with water sampling at 400, 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a_p, TA/TC and O₂.
0845 CIMEL 07, 08, 09.
0930 C-OPS, 07, 08, 09.
1000 Filtrations.

1030 Secchi 03, 20 m.
1030 Surface bucket for TSM.
1100 Lunch.
1145 Manta net between BOUSSOLE and DYFAMED site.
1230 Arrival at DYFAMED site.
1235 Zooplankton nets x3.
1330 Deep CTD cast, 2300m.
1515 Departure to the Nice harbour.
1845 Arrival at the Nice harbour.

Problems identified during the cruise

- The second day, the IOP package did not function correctly: the recorded files on the hydroDAS (data logger of the IOP package) are not valid. It only functioned during station 06 of the transect but not for the a-Sphere sensor. The IOP package worked correctly the other days. This problem was only discovered after the cruise. It was due to a corrupted file on the HydroDAS. It was then erased from it.
- The sensors at the top of the buoy were dirty due to birds. They were cleaned the first and the second day of the cruise.

Appendices

Cruise Summary Table for Boussole 162

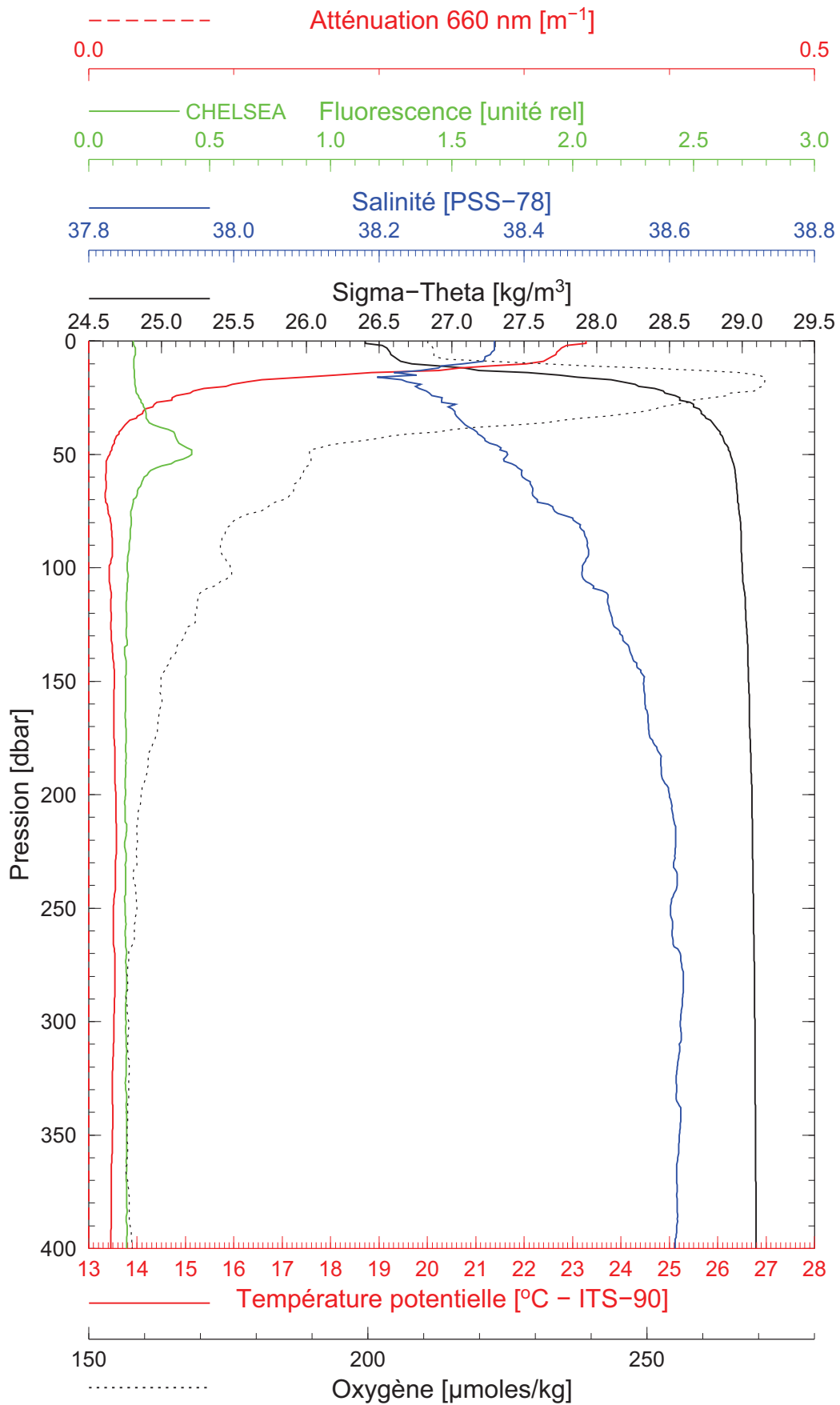
Date	Black names (file ext: ".raw")	Profile names (file extension: ".raw")	CTD notées	Other sensors	Start Time		Depth max (meter)	Latitude (N)			Longitude			Sky	Clouds	Quantity (#/8)	Weather		Atm. Pressure (hPa)	Humidity (%)	Visibility	T air	T water	Sea	Sea Swell H (m)	Swell dir.	Whitecaps
					GMT (hour.min)	Duration (min.sec)		(Degree)	(Minute)	(Degree)	(Minute)	Wind sp. (kn)	Wind dir.														
27/08/15		bou c-ops_150827_1047_001_data.csv			11:18	5:20	145	43	22.230	7	53.940	blue	none	0	5	222	1018.3	57	excellent	24.6		calm	0.2		no		
		bou c-ops_150827_1047_002_data.csv			11:38	5:08	134	43	22.680	7	54.190	blue	none	0	5	222	1018.3	57	excellent	24.6		calm	0.2		no		
		bou c-ops_150827_1047_003_data.csv			11:57	5:11	137	43	22.880	7	53.930	blue	none	0	5	222	1018.3	57	excellent	24.6		calm	0.2		no		
					CIMEL01	12:50	13:00		43	22.166	7	54.126	blue		0			1018.0									
					CIMEL02	13:15	8:00		43	22.166	7	54.126	blue		0			1017.9									
					CIMEL03	13:29	9:00		43	22.166	7	54.126	blue		0			1017.9									
				CTDBOUS001	HPLC, Ap, CDOM & TSM	14:05	41:00	400	43	21.991	7	54.146	blue		0	5	259	1017.6	60		24.6	23.17	calm				
					Secchi01	14:45	4:00	18	43	22	7	54	blue		0					excellent			calm				
28/08/15		bou c-ops_150828_0940_001_data.csv			09:48	4:17	79	43	22.200	7	53.400	blue	none	0	3	50	1020.6	71	excellent	24.7		calm	0.2		no		
		bou c-ops_150828_0940_002_data.csv			10:02	3:28	91	43	22.320	7	53.160	blue	none	0	3	50	1020.6	71	excellent	24.7		calm	0.2		no		
		bou c-ops_150828_0940_003_data.csv			10:16	3:21	85	43	22.540	7	52.680	blue	none	0	3	50	1020.6	71	excellent	24.7		calm	0.2		no		
			CTDBOUS002	HPLC, Ap & TSM	11:01	38:00	400	43	22.147	7	53.802	blue		0	1	168	1020.6	64		25.1	24.40	calm					
				Secchi02	11:50	4:00	23	43	22	7	54	blue		0					excellent			calm					
				CIMEL04	11:53	3:00		43	22	7	54	blue		0			NA										
				CIMEL05	11:57	3:00		43	22	7	54	blue		0			NA										
				CIMEL06	12:00	4:00		43	22	7	54	blue		0			NA										
			CTDBOUS003		12:48	19:00	400	43	25.058	7	47.880	blue		0	1	141	1020.7	62		25.6	23.70	calm					
			CTDBOUS004		13:43	17:00	400	43	28.045	7	41.925	blue		0	1	140	1020.6	65		25.1	24.40	calm					
			CTDBOUS005		14:33	20:00	400	43	29.715	7	37.291	blue		0	NA	NA	1020.4	64		25.3	25.70	calm					
			CTDBOUS006		15:39	18:00	400	43	34.033	7	30.852	blue		0	2	64	1020.3	65		25.6	25.40	calm					
		CTDBOUS007		16:34	20:00	400	43	36.948	7	24.981	blue		0	2	117	1020.1	64		25.5	26.40	calm						
		CTDBOUS008		17:25	20:00	400	43	38.979	7	20.907	blue		0	3	6	1019.8	62		25.7	26.10	calm						
29/08/15			CTDBOUS009	HPLC, Ap, 02 & TA/TC	08:35	37:00	400	43	22.063	7	53.892	blue		0	6	82	1022.0	79		24.8	23.91	calm					
				CIMEL07	08:47	7:00		43	22.110	7	53.820	blue		0			1022.0										
				CIMEL08	08:59	4:00		43	22.110	7	53.820	blue		0			1022.0										
				CIMEL09	9:06	6:00		43	22.110	7	53.820	blue		0			1022.0										
			bou c-ops_150829_0924_001_data.csv			09:30	3:19	80	43	22.220	7	53.650	blue	none	0	8	64	1022.1	73	excellent	25.1		calm	0.4		no	
			bou c-ops_150829_0924_003_data.csv			09:40	3:53	99	43	22.356	7	53.427	blue	none	0	8	64	1022.1	73	excellent	25.1		calm	0.4		no	
			bou c-ops_150829_0924_004_data.csv			09:51	3:40	94	43	22.500	7	53.170	blue	none	0	8	64	1022.1	73	excellent	25.1		calm	0.4		no	
				Secchi03	10:30	4:00	20	43	22	7	54	blue		0					excellent			calm	0.4				
			bucket TSM	10:30	2:00	surface	43	22	7	54	blue		0								calm						

BOUSSOLE 162

27/08/2015

BOUS150827_01

BOUS001



Date 27/08/2015
Heure déb 14h 05min [TU]

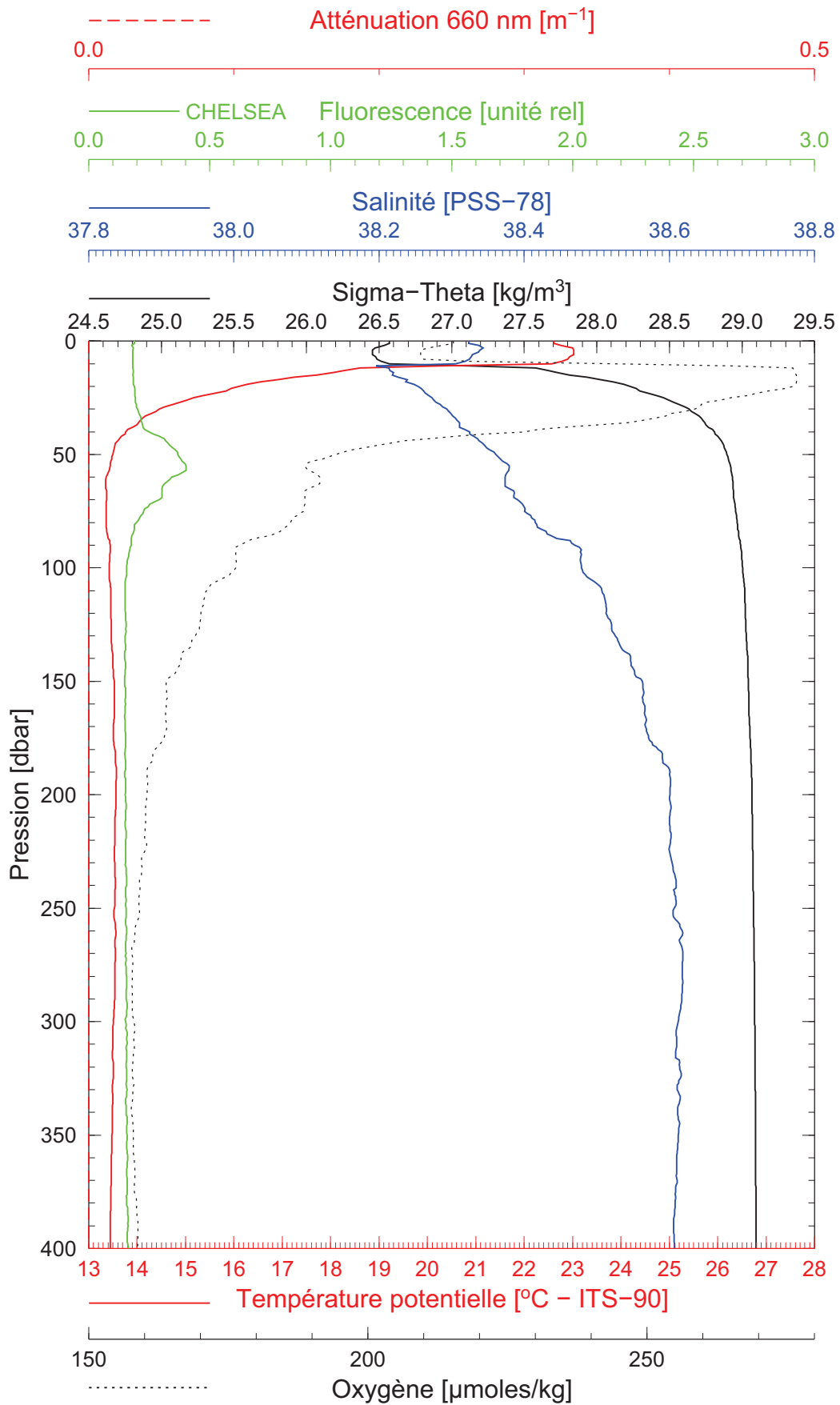
Latitude 43°21.991 N
Longitude 07°54.146 E

BOUSSOLE 162

28/08/2015

BOUS150828_01

BOUS002



Date 28/08/2015
Heure déb 11h 01min [TU]

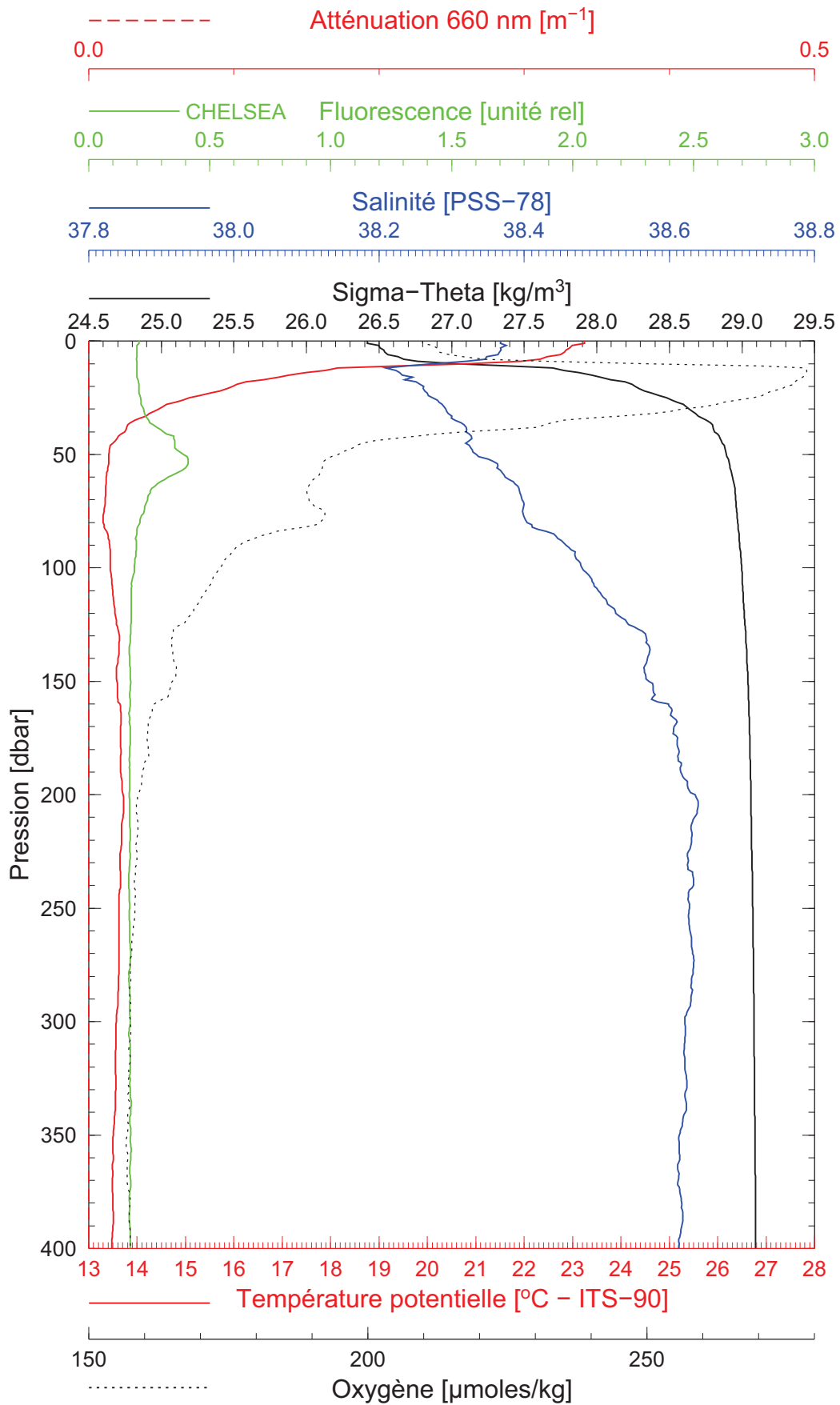
Latitude 43°22.147 N
Longitude 07°53.802 E

BOUSSOLE 162

28/08/2015

BOUS150828_02

BOUS003



Date 28/08/2015
Heure déb 12h 48min [TU]

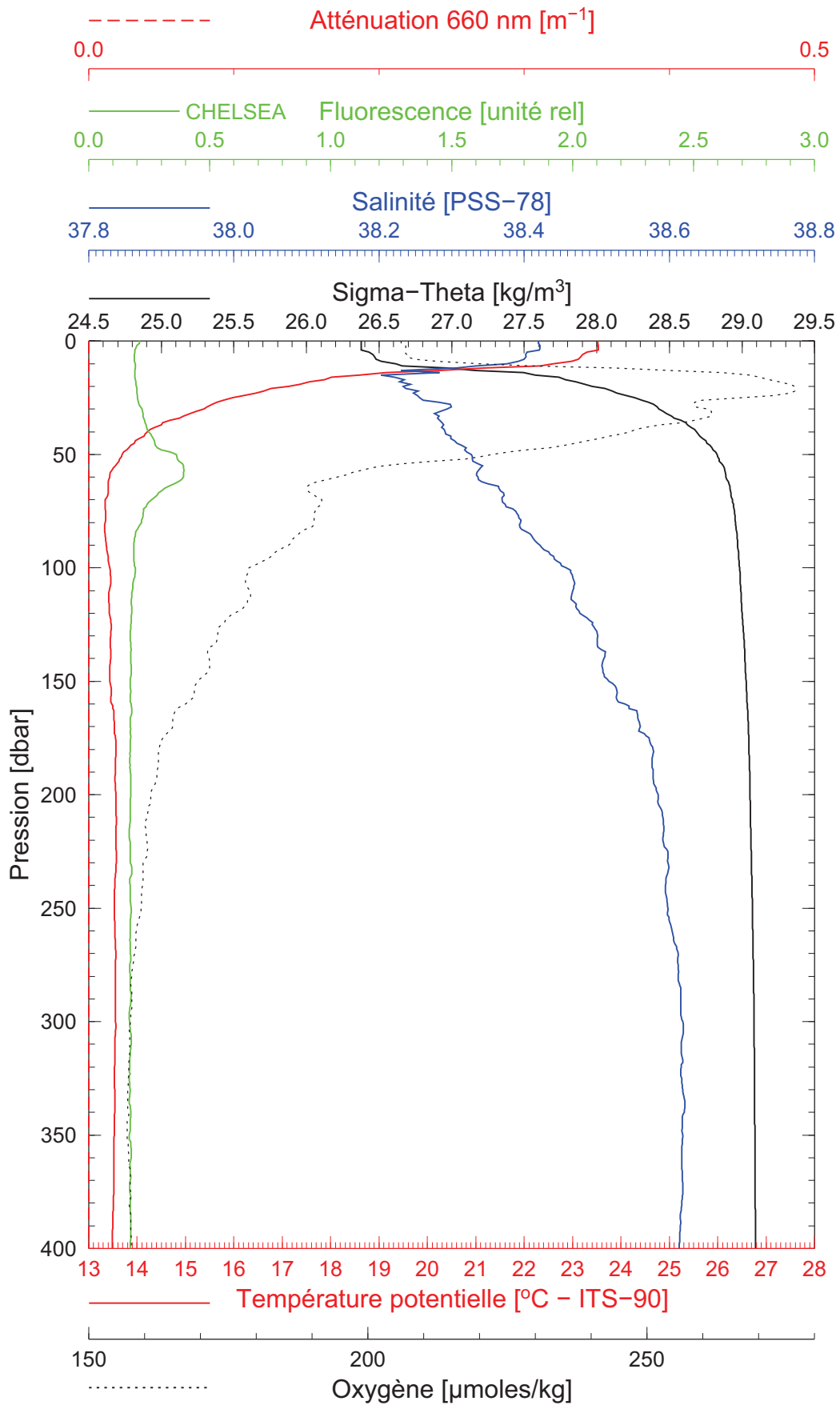
Latitude 43°25.058 N
Longitude 07°47.880 E

BOUSSOLE 162

28/08/2015

BOUS150828_03

BOUS004



Date 28/08/2015
Heure déb 13h 43min [TU]

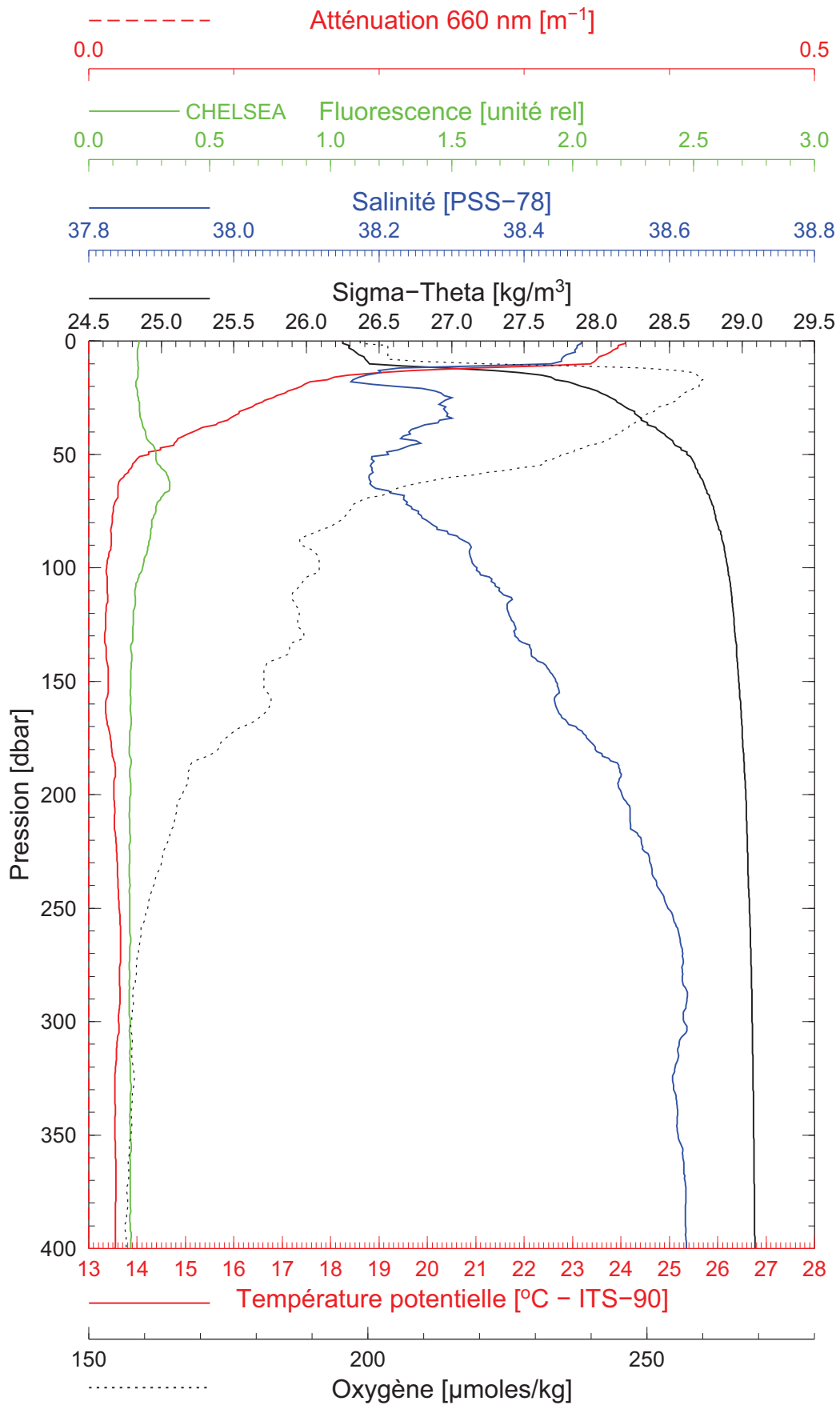
Latitude 43°28.045 N
Longitude 07°41.925 E

BOUSSOLE 162

28/08/2015

BOUS150828_04

BOUS005



Date 28/08/2015
Heure déb 14h 33min [TU]

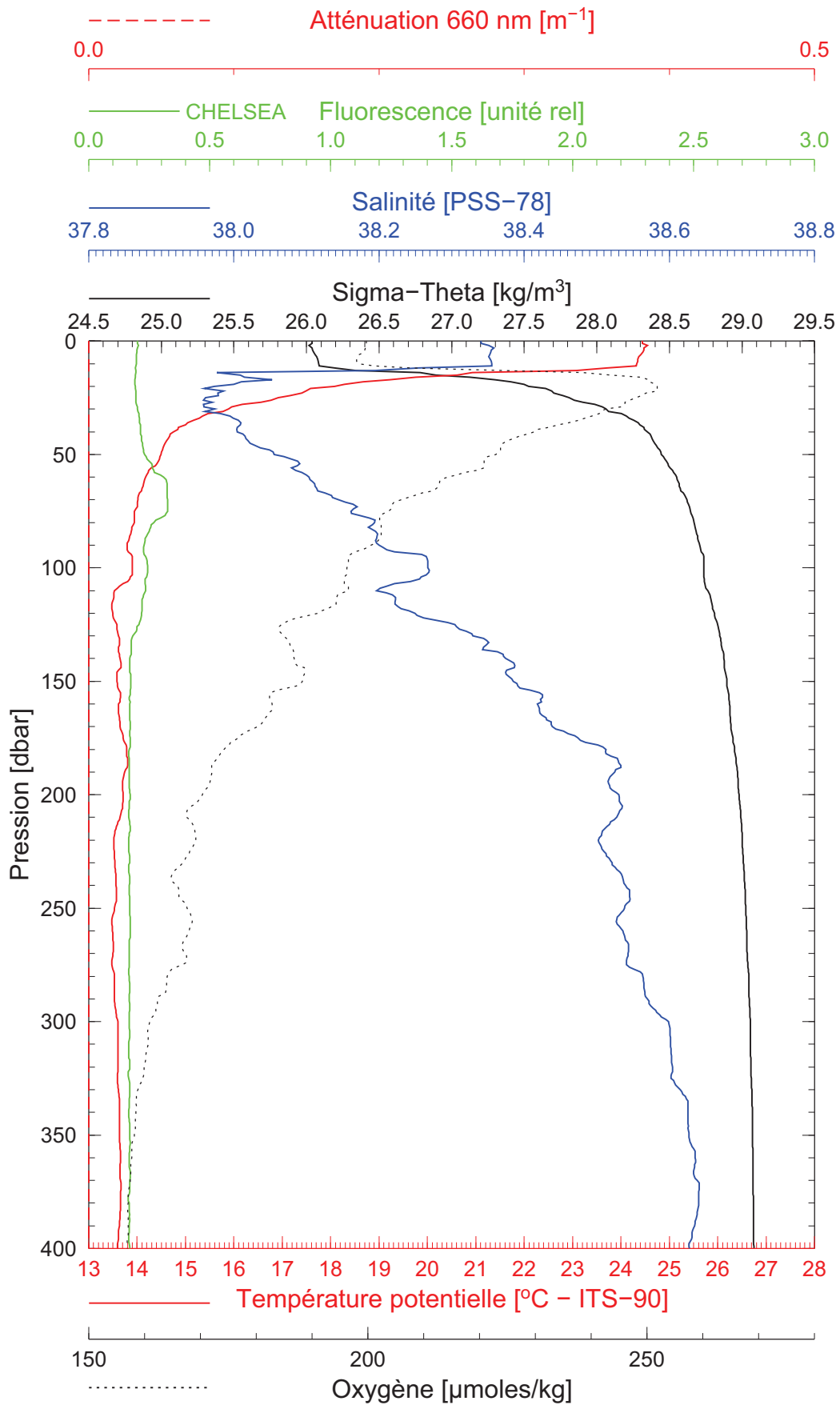
Latitude 43°29.715 N
Longitude 07°37.291 E

BOUSSOLE 162

28/08/2015

BOUS150828_05

BOUS006



Date 28/08/2015
Heure déb 15h 39min [TU]

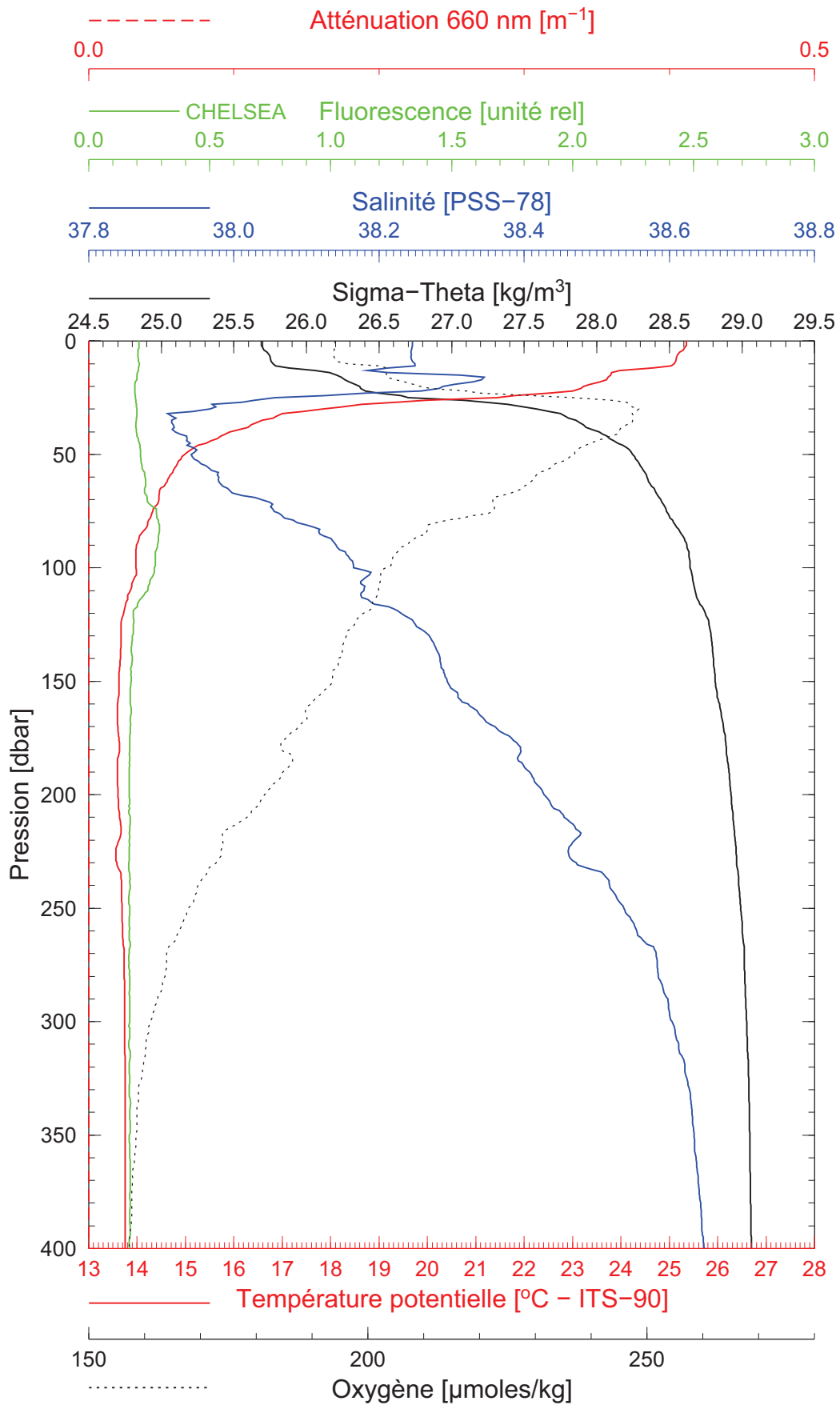
Latitude 43°34.033 N
Longitude 07°30.852 E

BOUSSOLE 162

28/08/2015

BOUS150828_06

BOUS007



Date 28/08/2015
Heure déb 16h 34min [TU]

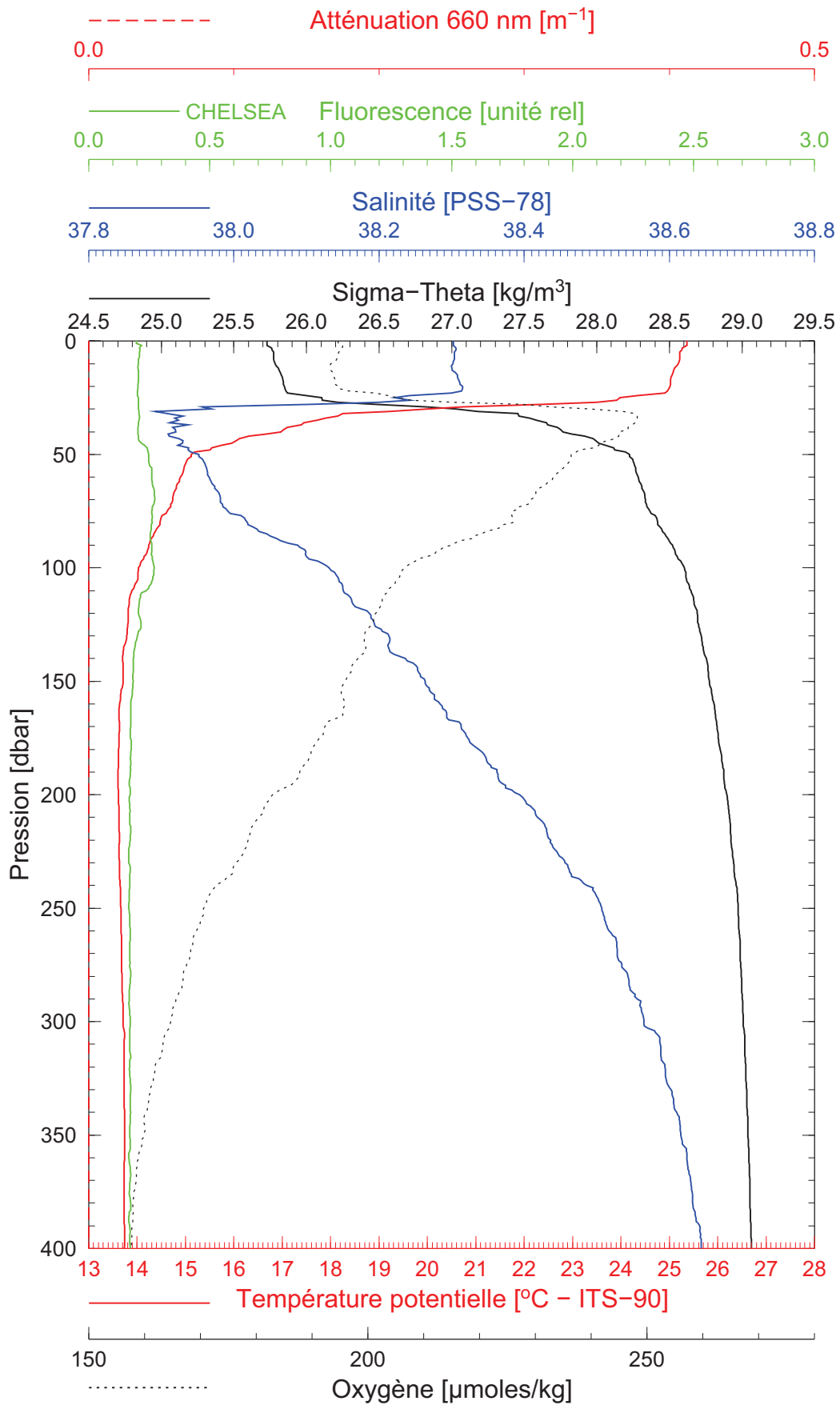
Latitude 43°36.948 N
Longitude 07°24.981 E

BOUSSOLE 162

28/08/2015

BOUS150828_07

BOUS008



Date 28/08/2015
Heure déb 17h 25min [TU]

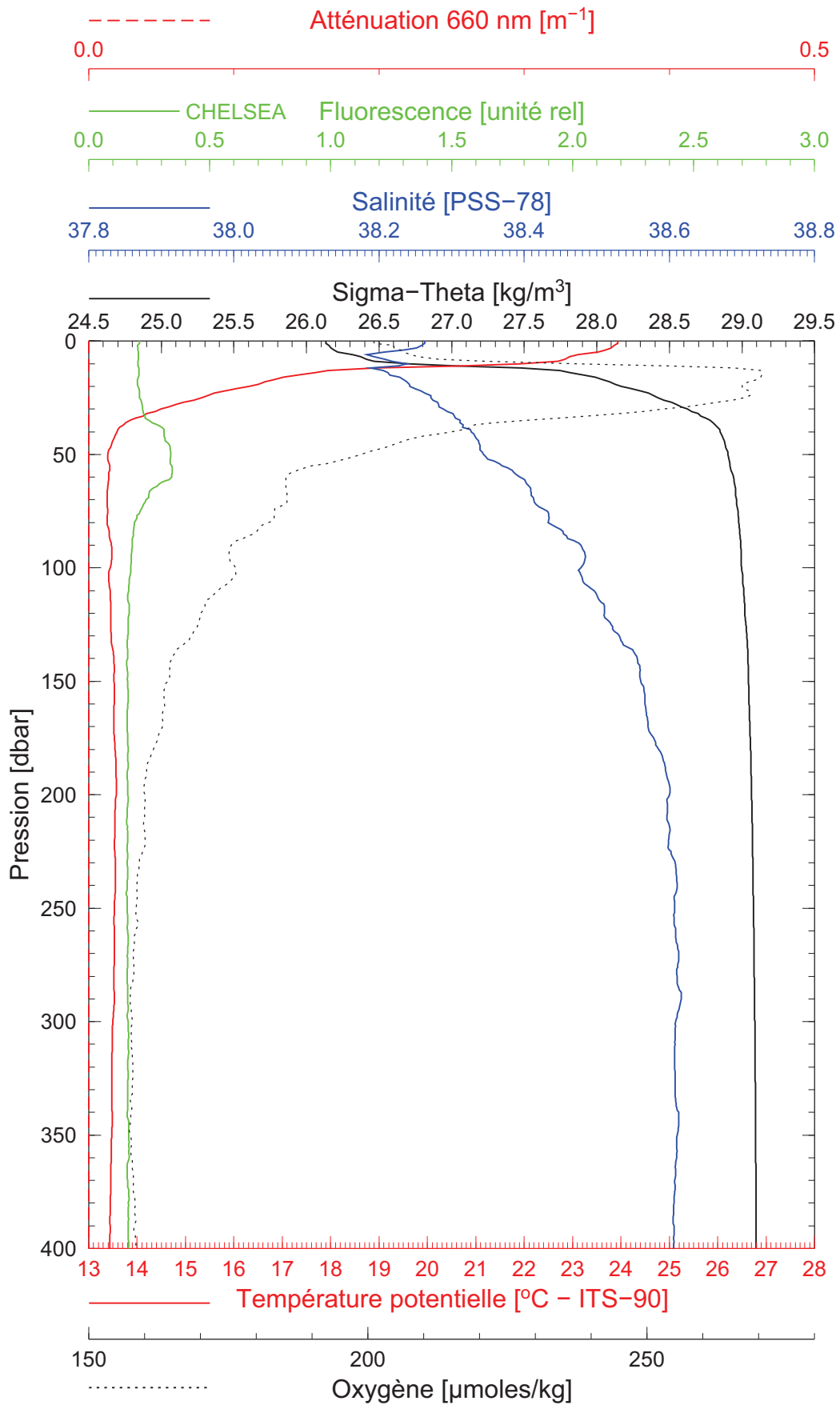
Latitude 43°38.979 N
Longitude 07°20.907 E

BOUSSOLE 162

29/08/2015

BOUS150829_01

BOUS009



Date 29/08/2015
Heure déb 08h 35min [TU]

Latitude 43°22.063 N
Longitude 07°53.892 E