

BOUSSOLE Monthly Cruise Report

Cruise 158

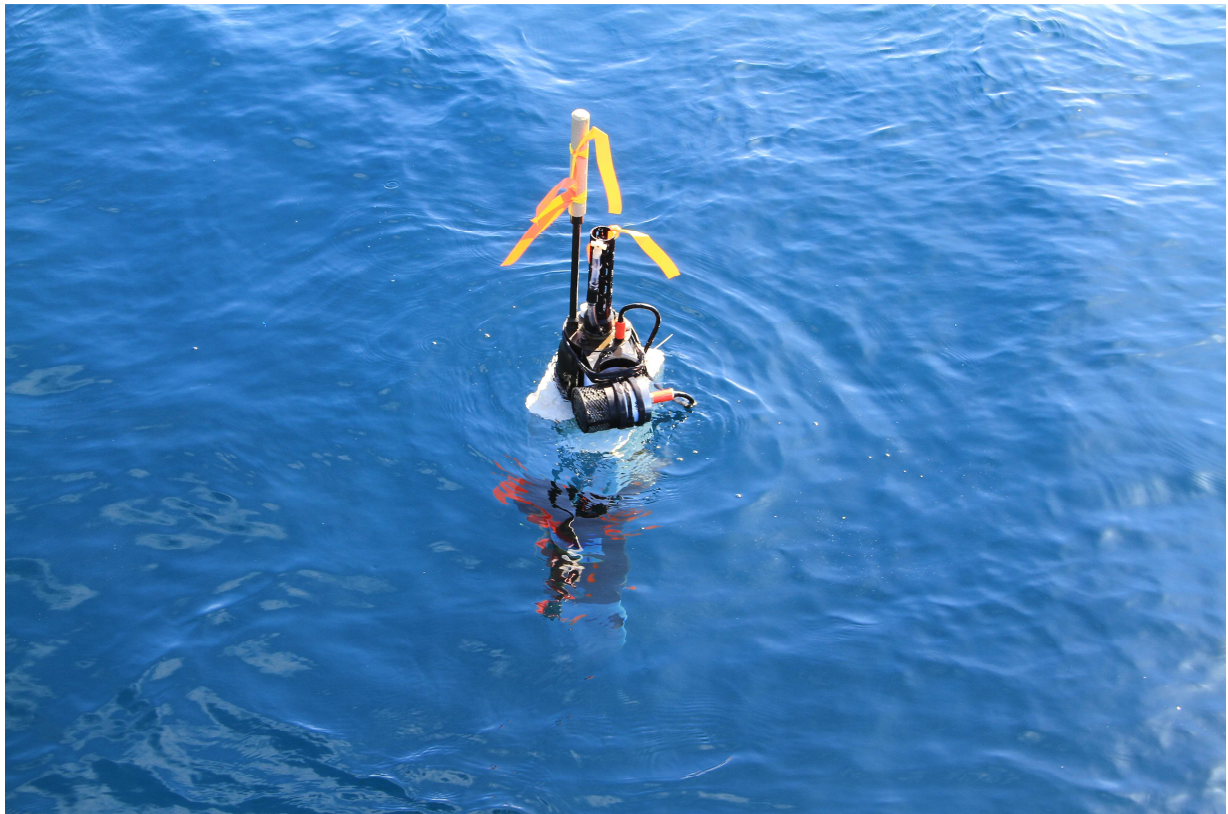
April 9–12, 2015

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

Vessel: R/V Téthys II
(Captain: Dany Deneuve)

Science Personnel: Emilie Diamond, Guillaume De Liège, Melek Golbol, David Luquet, Grigor Obolensky, Didier Robin and Vincenzo Vellucci.

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



One of the two PROVOR profiling floats deployed by IFREMER during the cruise.

BOUSSOLE project

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

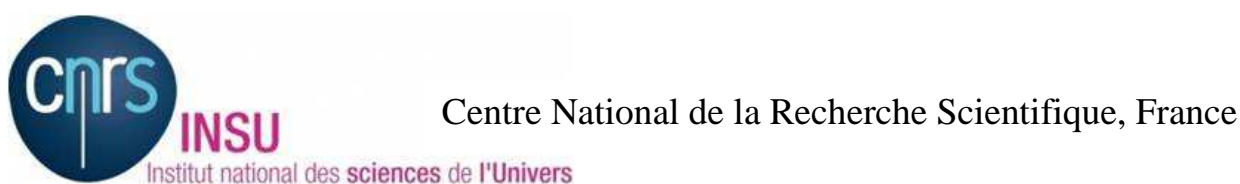
April 27, 2015



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



Observatoire Océanologique de Villefranche/mer, 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 second day, the optodes at 3m and 10m were swapped with other ones, and the CTD at 10m was removed from the buoy. Plankton nets and a deep CTD cast were performed for the DYFAMED program. Two PROVOR profiling floats equipped with NOSS sensors (Nke Oceanographic Salinity Sensor) were deployed at the DYFAMED site for testing by the IFREMER, Brest.

The third day, the DACNet (Data Acquisition and Control Network) was removed from the buoy by the divers because the buoy was not working. It was reinstalled on the buoy after changing the Microdrive and repairing a damaged connector.

Cruise Summary

The first day was cancelled because the *Téthys II* was on technical maintenance and was not repaired in due time for the cruise. The second day was used to perform diving operations, a CTD cast with water sampling, optical profiles and a Secchi disk at the BOUSSOLE site. It was also used to perform plankton nets at the BOUSSOLE

site and a deep CTD cast at the DYFAMED site for the DYFAMED program. The third day was used to perform diving operations for maintenance of the buoy, a Secchi disk, CTD casts with water sampling and optical profiles at the BOUSSOLE site. The last day was used to retrieve data directly from the buoy, a CTD cast with water sampling, optical profiles, a Secchi disk and the CTD transect.

Thursday 09 April 2015

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

Friday 10 April 2015

The sea state was smooth with a light breeze. The sky was cloudy with a medium visibility. When arrived at the BOUSSOLE site, divers went at sea to clean the instruments and to perform dark measurements of the transmissometers and backscattering meter. The two optodes located at 3m and 10m were swapped with newly calibrated ones. The CTD at 10m was removed in order to be sent for calibration. The sensors at the top of the buoy, the ARGOS and CISCO connectors and the solar panels were cleaned. Two unsuccessful attempts of retrieving data directly from the buoy (via the cable available on top of the buoy and via the AK DACNet connector) were performed. Then, 1 CTD cast with water sampling, 2 C-OPS profiles and a Secchi disk were performed at the BOUSSOLE site. 3 plankton nets were performed at the BOUSSOLE site for the DYFAMED program. When the work at BOUSSOLE was completed, 2 profiling floats were deployed and 1 deep CTD cast with water sampling was performed at the DYFAMED site.

Saturday 11 April 2015

The sea state was smooth with a gentle breeze. When arrived at the BOUSSOLE site, divers went at sea to remove the DACNet from the buoy for its repair and maintenance on board. The AK connector was damaged, it was cut and isolated. The Microdrive was replaced and the configuration was updated. Then the DACNet was reinstalled during a second dive. The buoy's structure which appeared dirty because of biological colonisation was cleaned (note: the buoy has been at sea longer than usual because of delays with servicing of the sister buoy and instrumentation, plus difficulties with availability of the ship, divers, and helicopter normally used for buoy rotations). Then, a Secchi disk, 2 CTD casts including one with water sampling and 3 C-OPS profiles were performed at the BOUSSOLE site.

Sunday 12 April 2015

The sea state was slight with a moderate breeze. The sky was blue with a medium visibility. During this day, data were downloaded directly from the buoy (using the cable available in the top of the buoy) in order to check the system. Then, 1 CTD cast with water sampling, 3 C-OPS profiles and a Secchi disk were performed at the BOUSSOLE site. Finally, the CTD transect was performed.

Pictures taken during this cruise can be found at:

<https://plus.google.com/photos/114686870380724925974/albums/6142359796355707409?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 09 April 2015

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

Friday 10 April 2015 (UTC)

People on board: Emilie Diamond, Guillaume De Liège, Melek Golbol, David Luquet, Grigor Obolensky and Didier Robin.

0545 Departure from the Nice harbour.
0905 Arrival at the BOUSSOLE site.
0910 Diving on the BOUSSOLE buoy: replacement of the optodes, removal of the CTD at 10m, cleaning of the sensors and dark measurement.
0930 Attempts of direct connection with the buoy (AK connector): failed.
0930 Plankton nets (DYFAMED program).
1115 CTD 01, 400m with water sampling at 400, 150, 80, 70, 60, 40, 30, 20, 10 and 5 m for HPLC, a_p , TSM and CDOM.
1215 C-OPS 01, 02.
1300 Secchi 01, 21m.
1305 Departure to the DYFAMED site.
1330 Deployment of two profiling floats.
1355 CTD MOOSE 85, 2400m (DYFAMED program).
1530 Departure to the Nice harbour.
1900 Arrival at the Nice harbour.

Saturday 11 April 2015 (UTC)

People on board: Melek Golbol, David Luquet, Grigor Obolensky, Didier Robin and Vincenzo Vellucci.

0545 Departure from the Nice harbour.
0915 Arrival at the BOUSSOLE site.
0925 Diving on the BOUSSOLE buoy: removal of the DACNet.
0915 Secchi 02, 17m.
1005 CTD 02, 400m.
1130 Diving on the BOUSSOLE buoy: installation of the DACNet and cleaning of the buoy structure.
1235 C-OPS 03, 04, 05.
1335 CTD 03, 400m with water sampling at 200, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a_p , TSM, TA/TC and O_2 .
1410 Departure to the Nice harbour.
1725 Arrival at the Nice harbour.

Sunday 12 April 2015 (UTC)

People on board: Melek Golbol and Grigor Obolensky.

0515 Departure from the Nice harbour.
0845 Arrival at the BOUSSOLE site.
0900 Direct connection with the buoy and data retrieval.
0920 CTD 04, 400m with water sampling at 200, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC and a_p .
1005 C-OPS 06, 07, 08.
1045 Secchi 03, 15m.
1050 Departure to the first transect station.
1100 Lunch.
1210 CTD 05, 400m, station 01 (43°25'N 07°48'E).
1315 CTD 06, 400m, station 02 (43°28'N 07°42'E).
1415 CTD 07, 400m, station 03 (43°31'N 07°37'E).
1515 CTD 08, 400m, station 04 (43°34'N 07°31'E).
1615 CTD 09, 400 m, station 05 (43°37'N 07°25'E).
1710 CTD 10, 400 m, station 06 (43°39'N 07°21'E).
1735 Departure to the Nice harbour.
1800 Arrival at the Nice harbour.

Problems identified during the cruise

- Some of the Niskin bottles did not close during the CTD casts :
 - CTD 01: Niskin bottle #6 did not close, so there was no sampling at 50m.
 - CTD 03: Niskin bottle #2 did not close, so there was no sampling at 150m.

CTD 04: Niskin bottle #2 and #11 did not close, so there was no sampling at 150m.

The last day, the rosette and bottles were fully checked during the way up to BOUSSOLE, two faulty nylon strings on two bottles were replaced by new ones. After the CTD cast, it appeared that some of the bottles did still not close. This problem was probably due to damage on the carousel system. It will be replaced on the next cruise with another one.

- After the second day of cruise, it appeared that the buoy was probably not working. The third day, the divers returned at sea to remove the DACNet. Then, it was checked on board: the AK connector was damaged, so it was cut and isolated. It appeared also that the Microdrive was corrupted, it was replaced with another one and the configuration was updated before reinstalling the DACNet on the buoy. Then the buoy worked correctly (see note above, for Saturday 11 April).

Appendices

Cruise Summary Table for Boussole 158

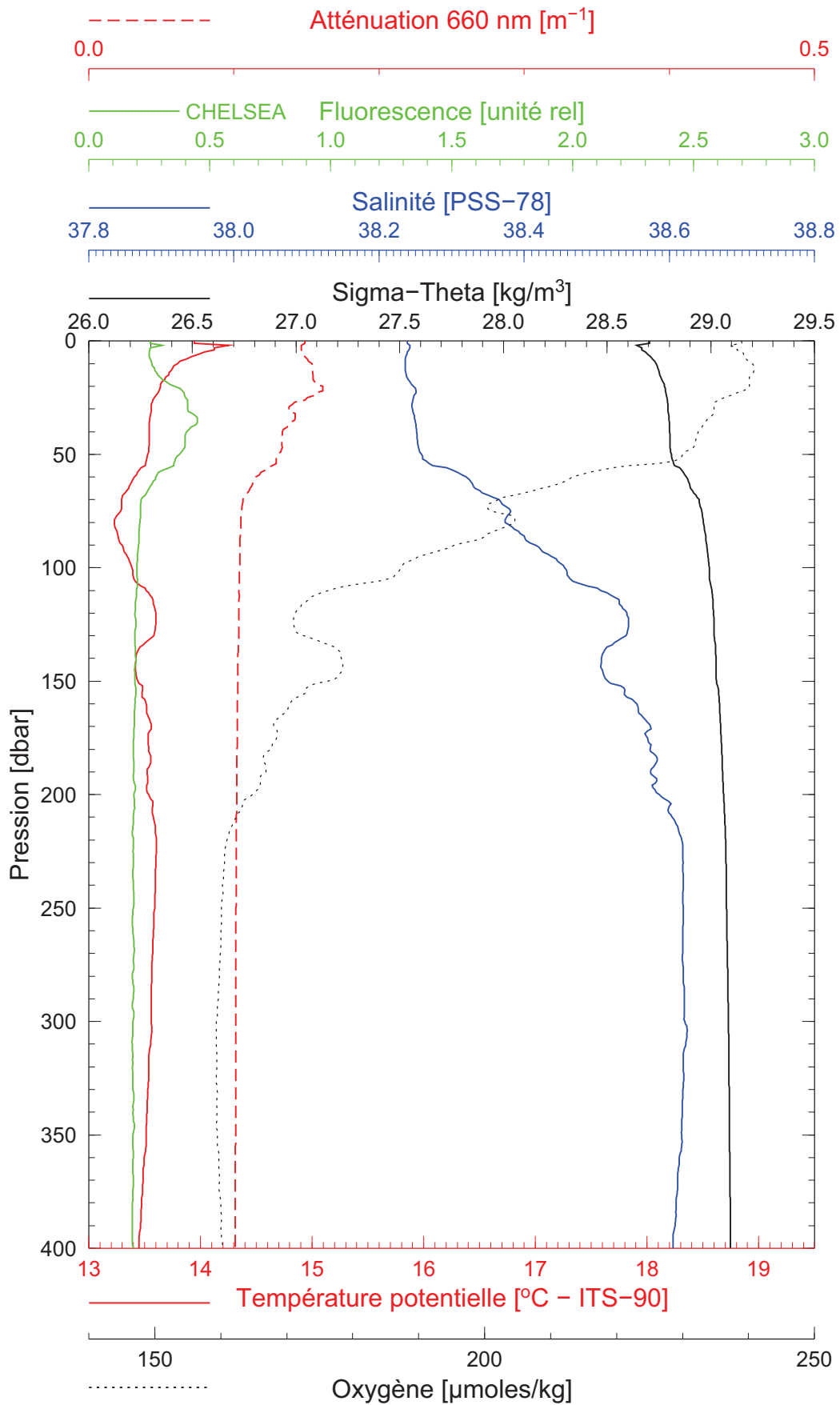
Date	Black names (file ext: *.raw)	Profile names (file extension: *.raw)	CTD notées	Other sensors	Start Time GMT (hour.min)	Duration (min.sec)	Depth max (meter)	Latitude (N)		Longitude		Sky	Clouds	Quantity (#/8)	Weather Wind sp. (kn)	Wind dir.	Atm. Pressure (hPa)	Humidity (%)	Visibility	T air	T water	Sea	Sea Swell H (m)	Swell dir.	Whitecaps
09/04/15								cancelled : technical maintenance of the Tethys II																	
10/04/15			CTDBOUS001	HPLC, Ap, TSM & CDOM	11:16	32:00	400	43	22.178	7	53.863	cloudy		4	4	139	1028.3	72		15.1	14.11	calm			
		bou_c-ops_150410_1044_001_data.csv			12:08	3:48	100.6	43	22.342	7	53.906	cloudy	Cl,Cs	4	4	139	1028.3	72	medium	15.1		calm	0.3	no	
		bou_c-ops_150410_1044_004_data.csv			12:39	3:55	104.2	43	23.318	7	53.766	cloudy	Cl,Cs	4	4	139	1028.3	72	medium	15.1		calm	0.3	no	
				Secchi01	12:15	4:00	21	43	22	7	54	cloudy		4					medium			calm	0.3		
11/04/15				Secchi02	09:15	4:00	17	43	22	7	54	cloudy		5	8	9	1027.0	82	medium	14.4	15.20	calm			
			CTDBOUS002		10:06	33:00	400	43	21.908	7	53.831	cloudy		6	7	27	1026.9	77		15.2	14.47	calm			
		bou_c-ops_150411_1219_001_data.csv			12:34	4:03	104.5	43	22.194	7	53.777	blue	Cl	3	8	78	1026.8	78	medium	15.1		calm	0.4	no	
		bou_c-ops_150411_1219_002_data.csv			12:46	3:45	96.6	43	22.413	7	53.512	blue	Cl	3	8	78	1026.8	78	medium	15.1		calm	0.4	no	
		bou_c-ops_150411_1219_004_data.csv			13:02	2:43	68.3	43	22.775	7	53.171	blue	Cl	3	8	78	1026.8	78	medium	15.1		calm	0.4	no	
			CTDBOUS003	HPLC, Ap, TSM, TA/TC & O ₂	13:33	32:00	400	43	22.051	7	53.826	cloudy		5	8	78	1026.0	78		15.1	14.86	calm			
12/04/15			CTDBOUS004	HPLC, Ap & TSM	09:32	32:00	400	43	22.088	7	53.810	cloudy		5	12	58	1030.5	80		14.6	14.23	calm			
		bou_c-ops_150412_0950_001_data.csv			10:06	3:58	101.1	43	22.096	7	53.849	blue	none	0	12	57	1030.4	82	medium	14.2		calm	0.7	yes	
		bou_c-ops_150412_0950_002_data.csv			10:18	3:49	98.4	43	22.163	7	53.383	blue	none	0	12	57	1030.4	82	medium	14.2		calm	0.7	yes	
		bou_c-ops_150412_0950_003_data.csv			10:29	3:42	96.7	43	22.187	7	52.996	blue	none	0	12	57	1030.4	82	medium	14.2		calm	0.7	yes	
				Secchi03	10:45	4:00	15	43	22	7	54	blue							medium			calm	0.7		
			CTDBOUS005		12:11	24:00	400	43	27.932	7	47.963	cloudy		5	7.6	64	1029.7	82		14.6	14.55	calm			
			CTDBOUS006		13:18	25:00	400	43	27.953	7	41.872	cloudy		5	6	46	1029.2	82		14.4	14.73	calm			
			CTDBOUS007		14:16	26:00	400	43	30.940	7	36.837	blue		2	4.8	44	1028.7	80		14.6	14.93	calm			
			CTDBOUS008		15:17	23:00	400	43	34.045	7	30.948	blue		2	2.3	100	1028.4	78		15.3	14.89	calm			
			CTDBOUS009		16:14	25:00	400	43	37.088	7	24.960	blue		2	3	278	1028.2	73		15.6	15.35	calm			
		CTDBOUS010		17:09	23:00	400	43	39.045	7	21.060	blue		2	3.4	350	1028.1	75		15.6	15.14	calm				

BOUSSOLE 158

10/04/2015

BOUS150410_01

BOUS001



Date 10/04/2015
Heure déb 11h 16min [TU]

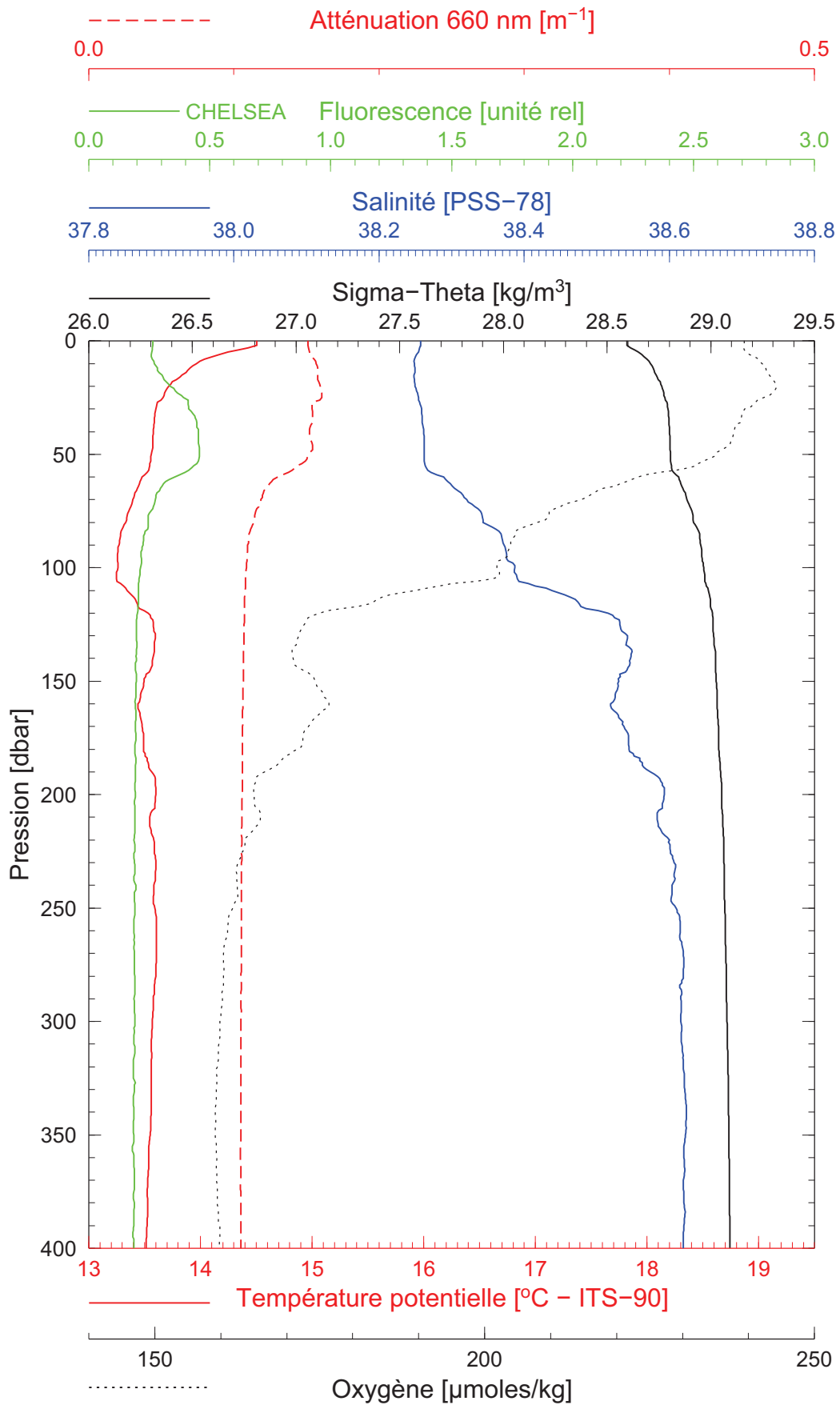
Latitude 43°22.178 N
Longitude 07°53.863 E

BOUSSOLE 158

11/04/2015

BOUS150411_01

BOUS002



Date 11/04/2015
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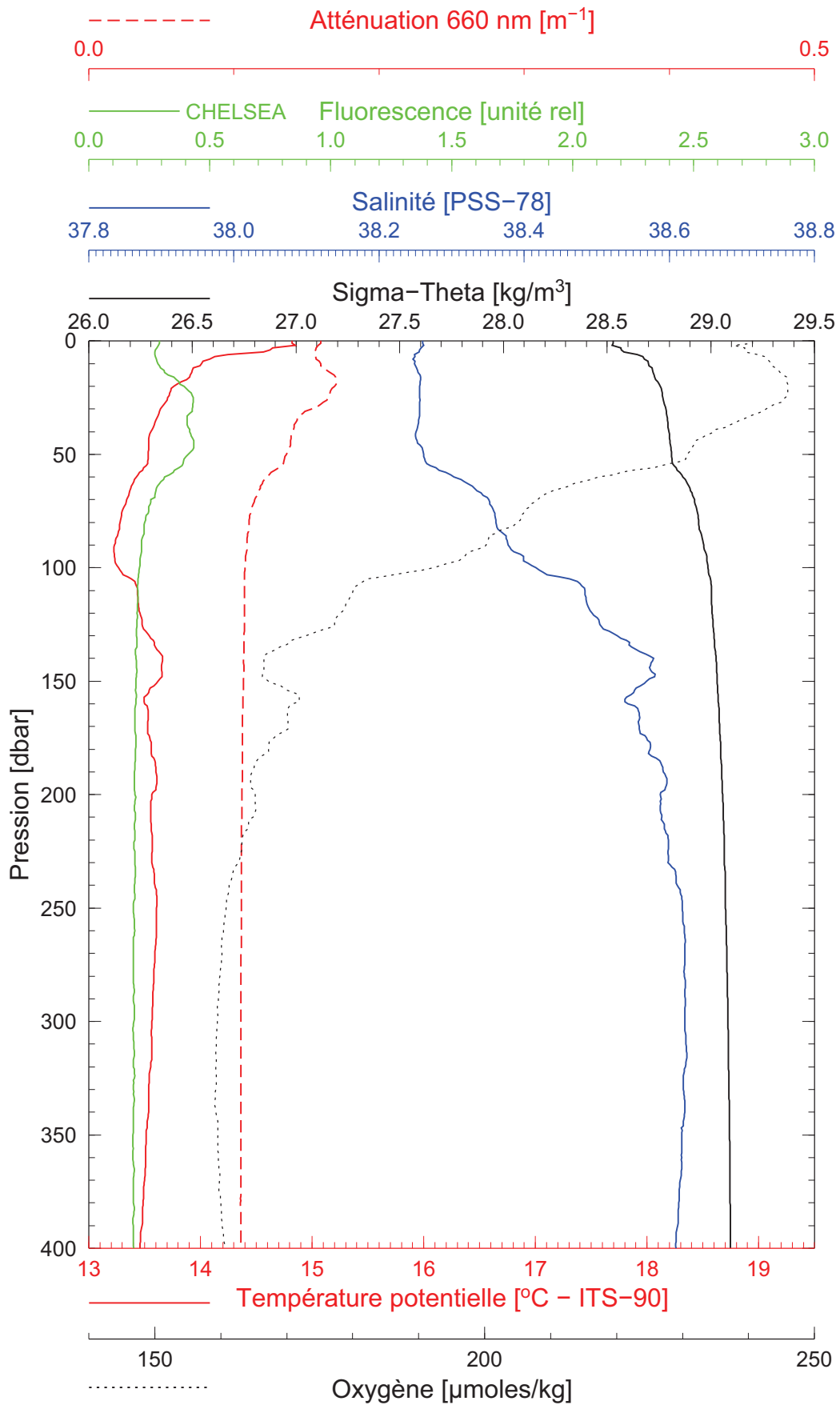
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Longitude 07°53.831 E

BOUSSOLE 158

11/04/2015

BOUS150411_02

BOUS003



Date 11/04/2015
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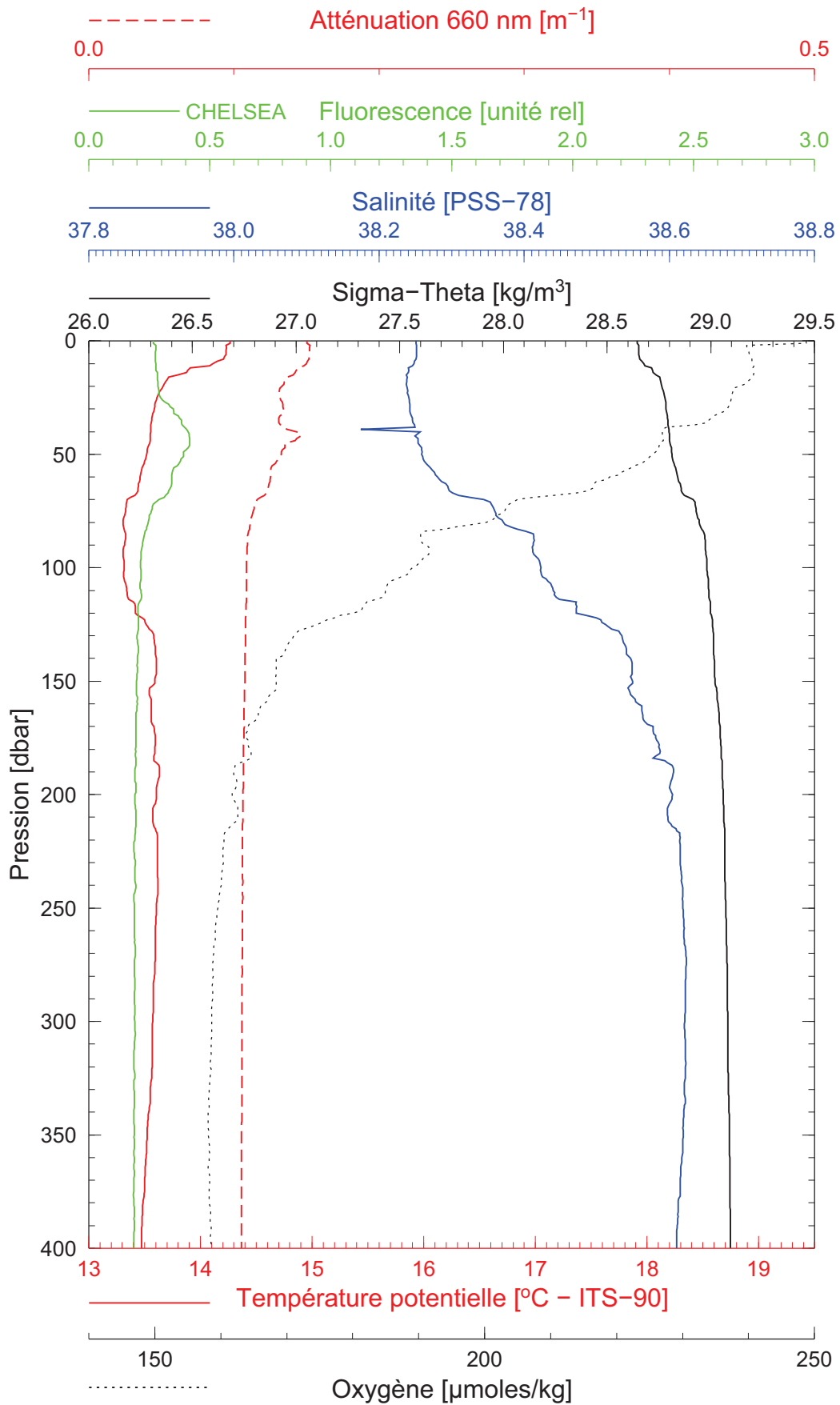
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Longitude 07°53.826 E

BOUSSOLE 158

12/04/2015

BOUS150412_01

BOUS004



Date 12/04/2015
Heure déb 09h 22min [TU]

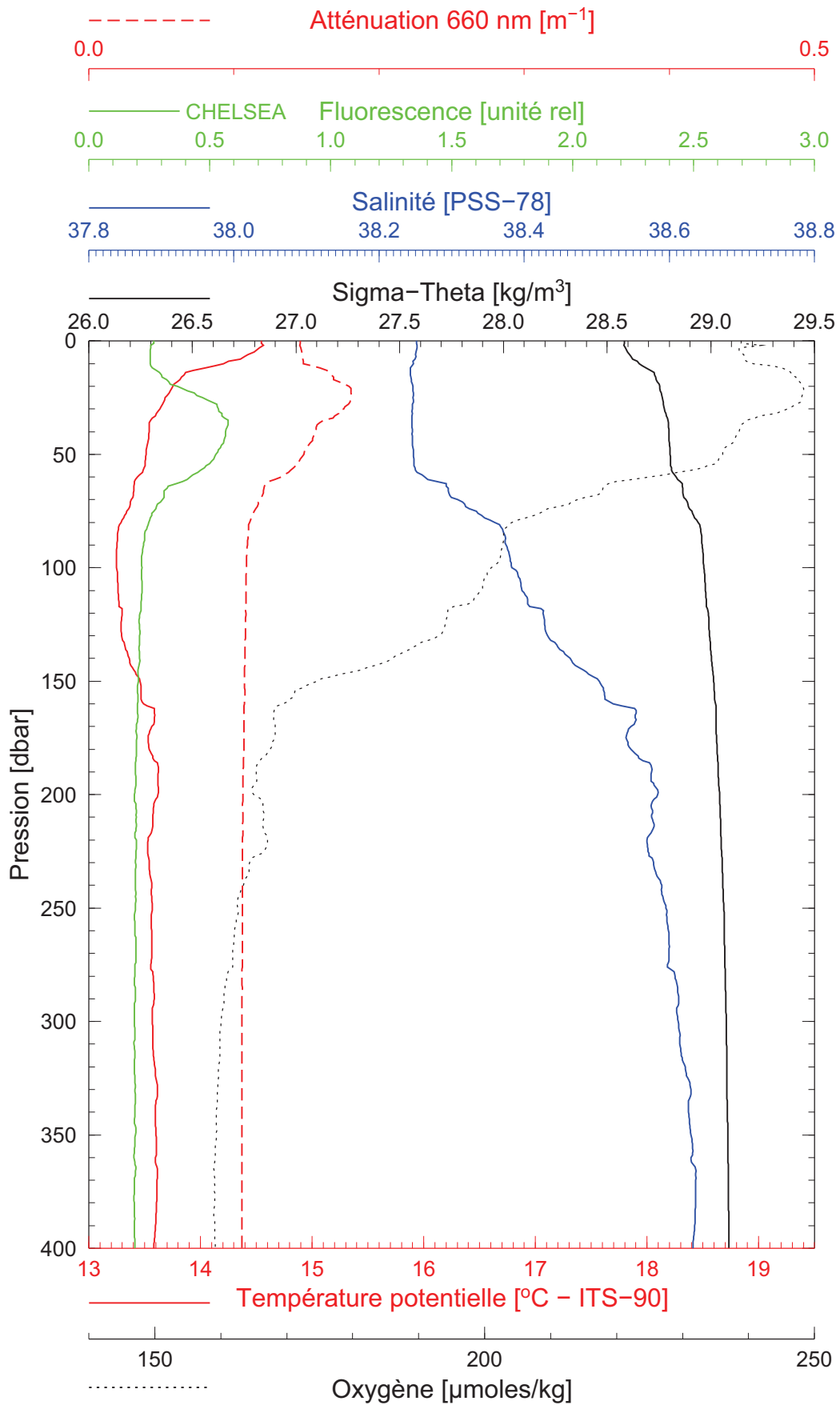
Latitude 43°22.088 N
Longitude 07°53.810 E

BOUSSOLE 158

12/04/2015

BOUS150412_02

BOUS005



Date 12/04/2015

Latitude 43°24.932 N

Heure déb 12h 11min [TU]

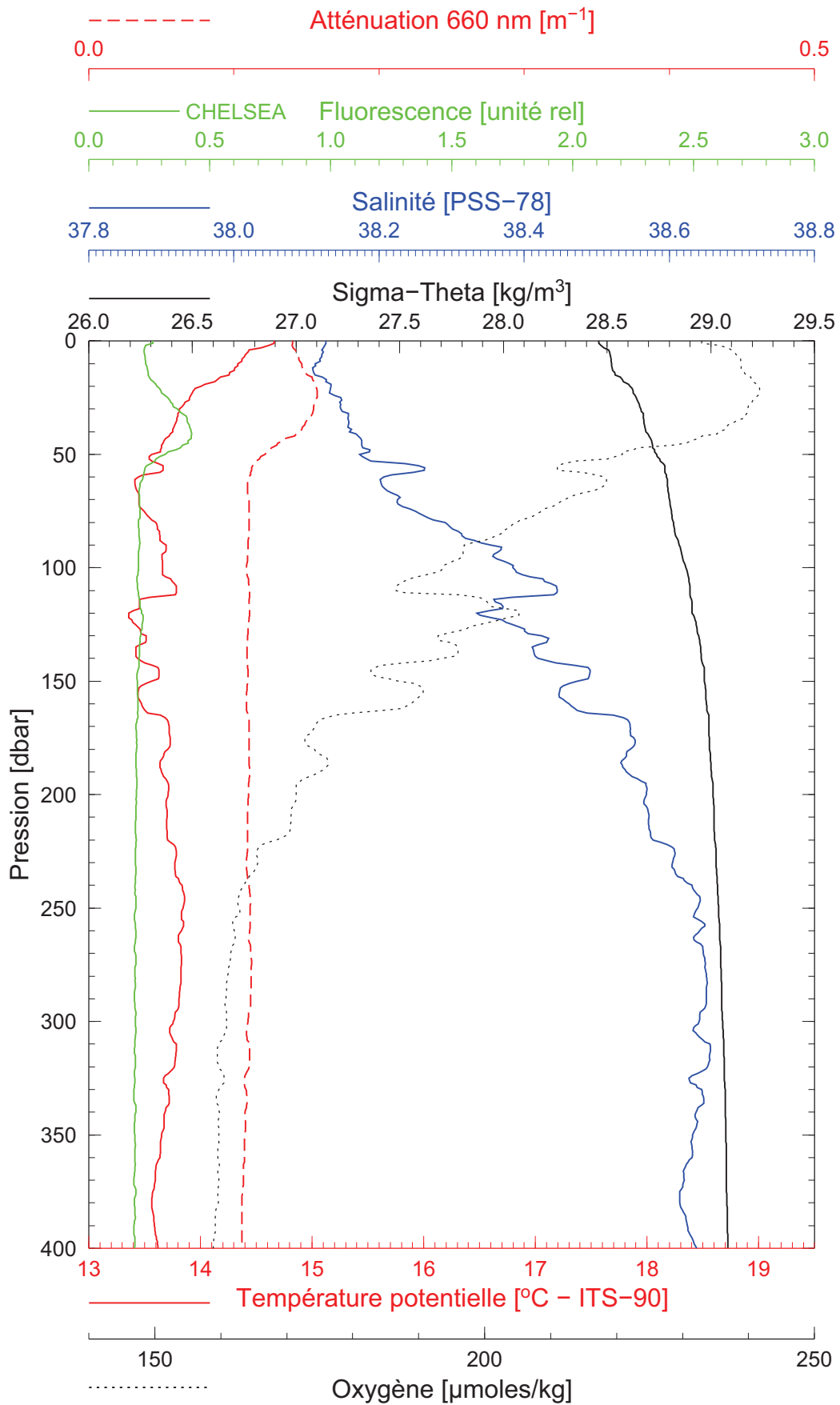
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BOUSSOLE 158

12/04/2015

BOUS150412_03

BOUS006



Date 12/04/2015
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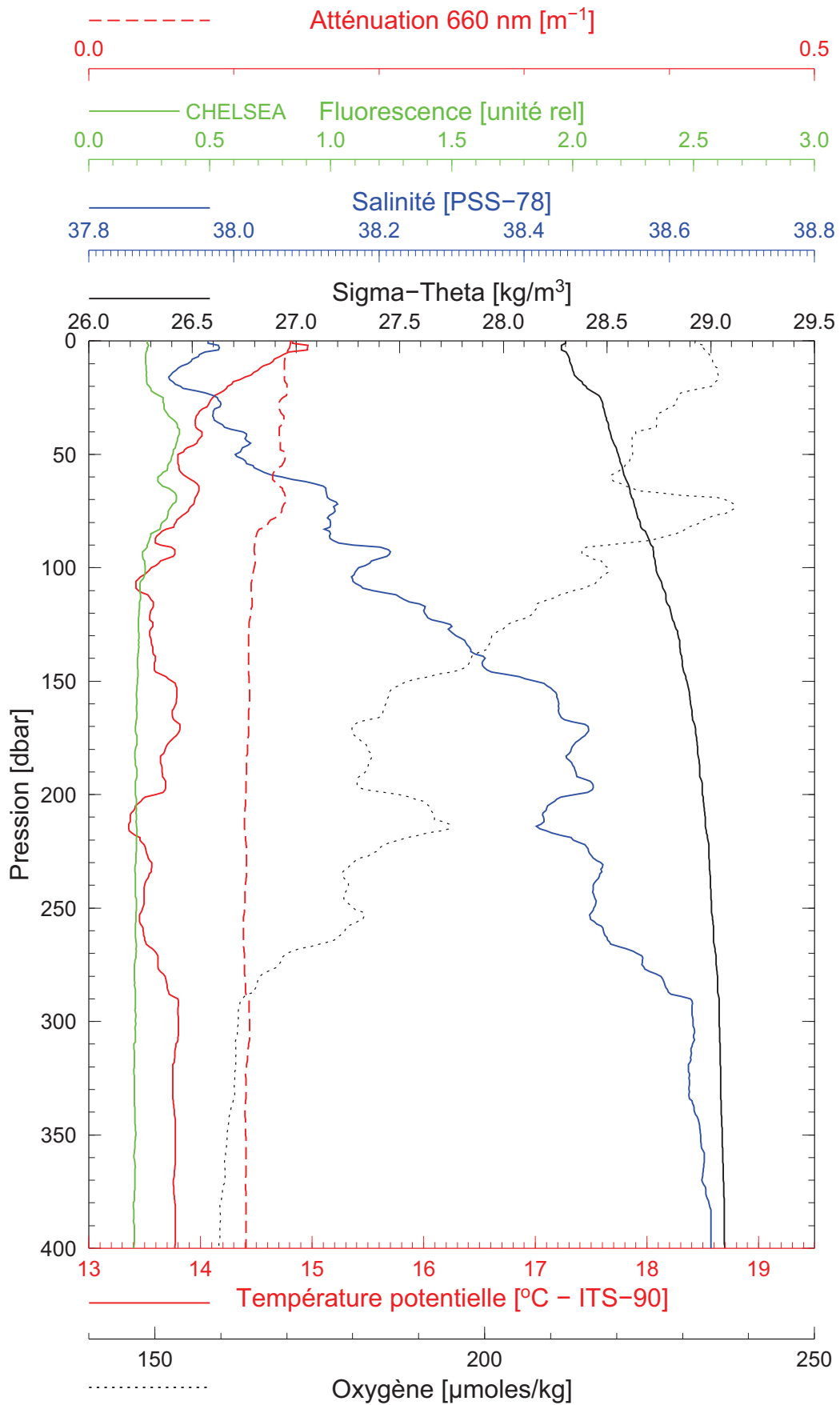
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BOUSSOLE 158

12/04/2015

BOUS150412_04

BOUS007



Date 12/04/2015

Latitude 43°30.940 N

Heure déb 14h 16min [TU]

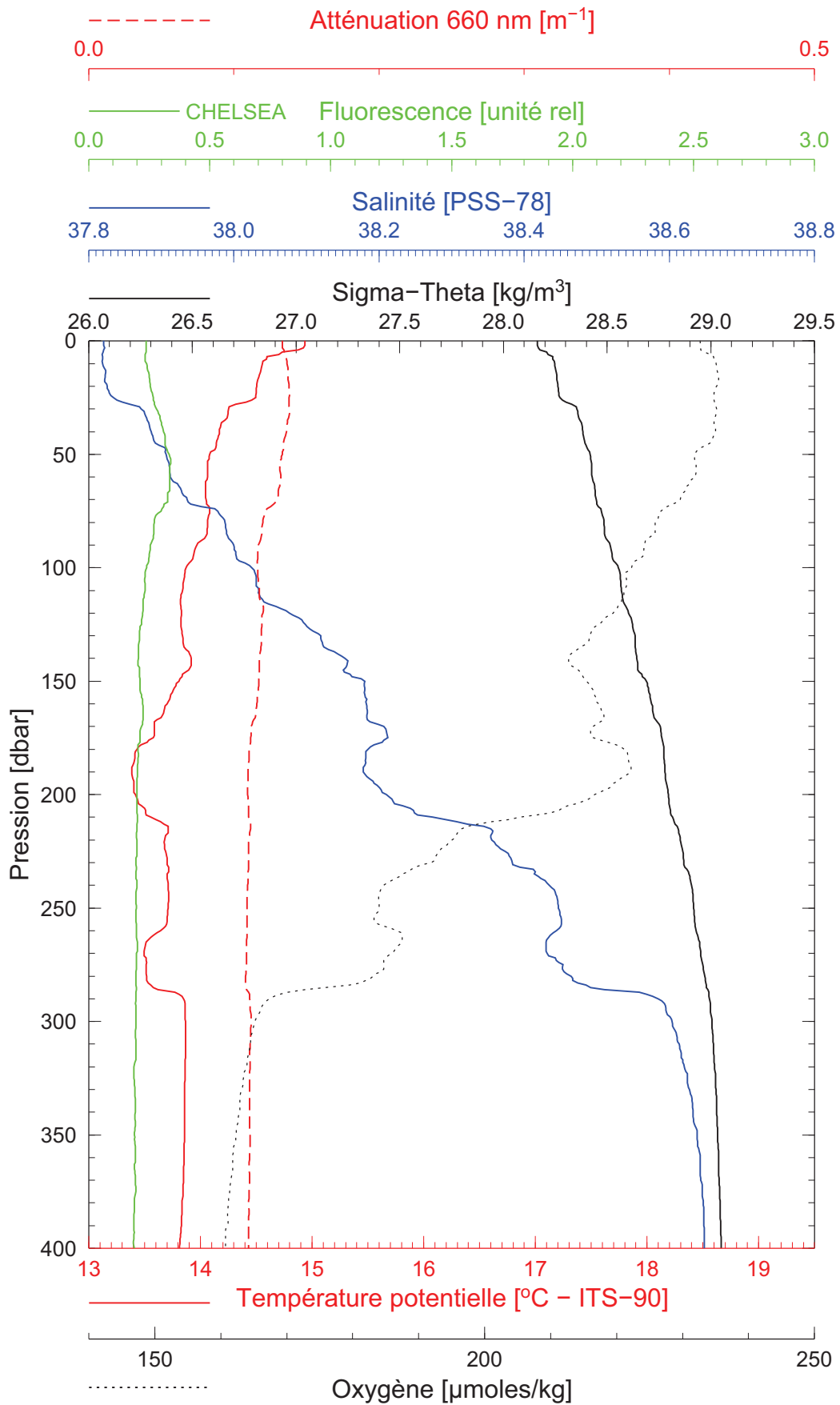
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BOUSSOLE 158

12/04/2015

BOUS150412_05

BOUS008



Date 12/04/2015
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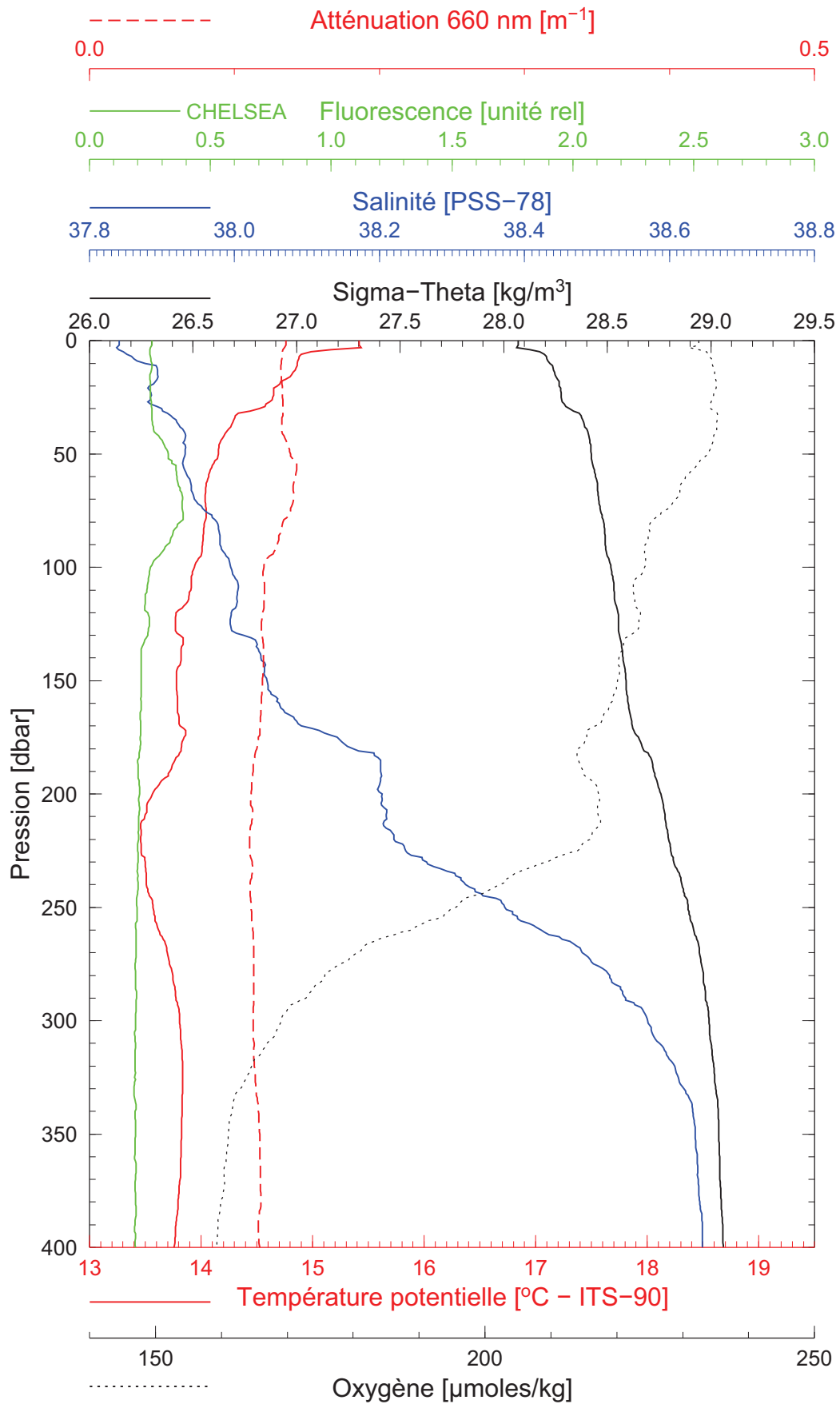
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BOUSSOLE 158

12/04/2015

BOUS150412_06

BOUS009



Date 12/04/2015

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Heure déb 16h 14min [TU]

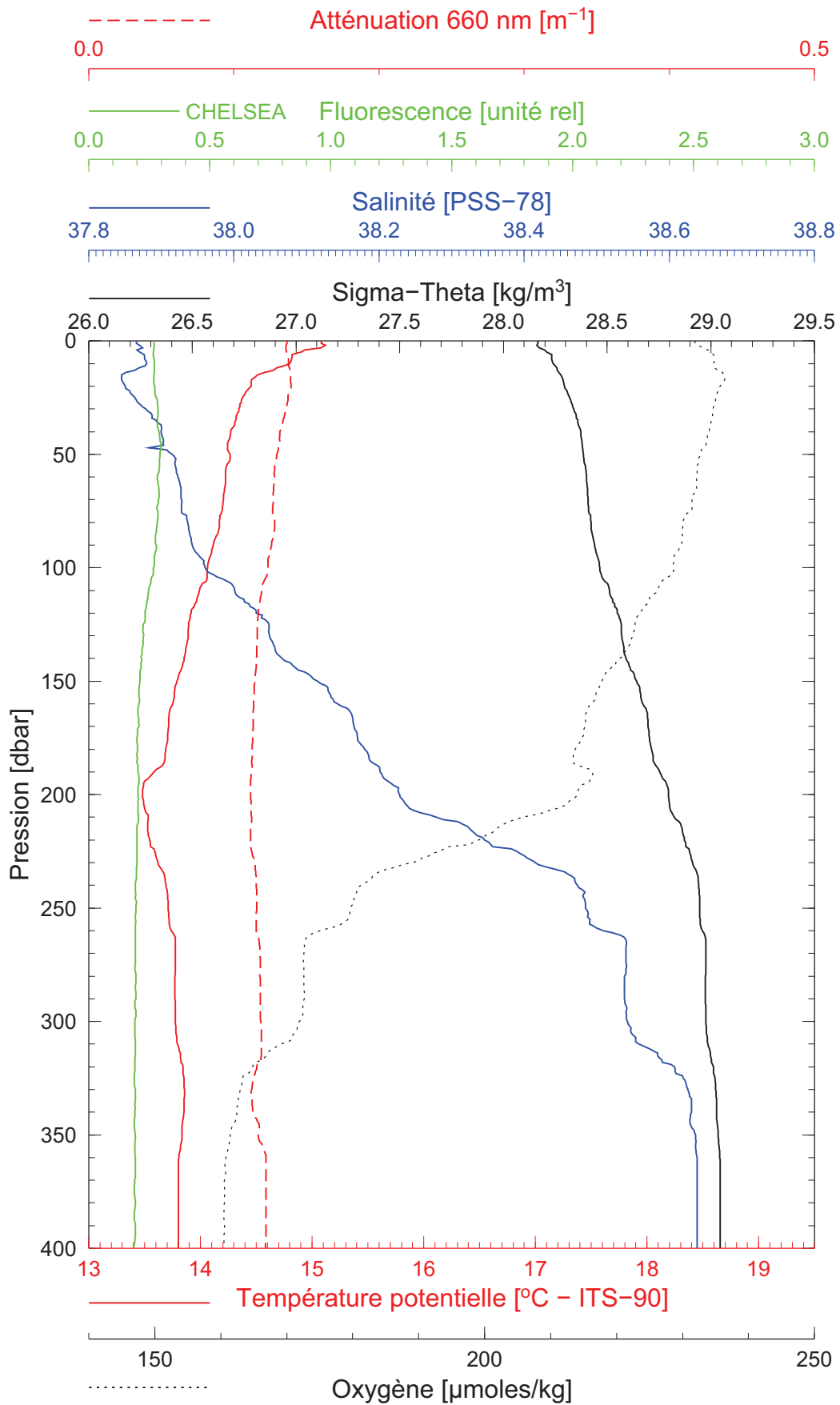
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BOUSSOLE 158

12/04/2015

BOUS150412_07

BOUS010



Date 12/04/2015

Latitude 43°39.045 N

Heure déb 17h 09min [TU]

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