BOUSSOLE Monthly Cruise Report

Cruise 150
August 09 – 12, 2014

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

Science Personnel: Laurent Coppola, Tatiana Donnay, Melek Golbol, David Luquet, Yves Lamblard, Patricia Maleyran, Nicolas Mayot, Lucie Millet, Fabien Moullec and Vincent Taillandier,

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

On the right of the image, at the forward deck of the R/V *Téthys II*: the C-OPS reference radiometer (measuring above-surface downward multispectral irradiance, $E_d(0^+)$). The BOUSSOLE buoy appears on the background.

BOUSSOLE project

ESA/ESRIN contract N° 13226/10/I-NB

September 24, 2014

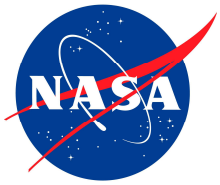
Foreword

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



National Aeronautics and Space Administration, USA

Centre National de la Recherche Scientifique, France

Université Pierre & Marie Curie, France

Observatoire Océanologique de Villefranche/mer, France

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). 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 (see map in appendix). 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 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 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, divers checked the state of the OCP (data logger of the radiometers and transmissometers) at 9m and the connection between this OCP and the DACNet (Data Acquisition and Control Network). The OCP did not operate continuously due to a bad connection.

Cruise Summary

The first day was used for operations of the DYFAMED program. The diving operations were performed this day because the weather forecasts were better than for the following days. The second and the third days were used to perform CTD casts with water sampling, optical profiles and a Secchi disk at the BOUSSOLE site. The CTD transect was performed the third day. The fourth day was used to retrieve data from the buoy, to perform CTD casts with water sampling, optical profiles and a Secchi disk at the BOUSSOLE site.

Saturday 09 August 2014

The sea state was smooth with a gentle breeze. After finishing the operations for the DYFAMED program, divers went at the BOUSSOLE site to clean the buoy sensors, to take pictures and to perform dark measurements of the backscattering meter and transmissometers. Divers checked the state of the OCP 9m and the connections between the OCP and the DACNet but they did not found anything. The instrument and connectors were in a good state.

Sunday 10 August 2014

The sea state was slight with a fresh breeze. The sky was blue and the visibility was good. 2 CTD casts with water sampling were performed at the BOUSSOLE site. Filtrations of HPLC samples for the first cast take a long time. The pump circuit was checked and cleaned. Then, there was no problem for the filtrations of HPLC samples of the second cast. This day, 3 C-OPS profiles and 1 Secchi disk were performed at the BOUSSOLE site. Two wireless radio connections (CISCO connection) were attempted with the buoy but failed.

Monday 11 August 2014

The sea state was slight with a gentle breeze in the morning and smooth with a light breeze in the afternoon. The sky was blue and the visibility was excellent. This day was used to perform 2 CTD casts with water sampling, 3 C-OPS profiles and 1 Secchi disk at the BOUSSOLE site. A direct connection with the buoy for data retrieving was attempted but failed. The above-surface irradiance and PAR sensors and the solar panels on the top of the buoy were cleaned. A second attempt to retrieve data via the CISCO connection from the boat also failed. Finally, the CTD transect was performed completely.

Tuesday 12 August 2014

The sea state was smooth with a gentle breeze. The sky was blue and the visibility was excellent. When arrived at BOUSSOLE, the dinghy was prepared and a direct connection with the buoy was attempted for retrieving data: data were retrieved successfully. Then, 2 CTD casts with water sampling, 1 Secchi disk and 1 C-OPS profile were performed at the BOUSSOLE site.

Pictures taken during this cruise can be found at:
https://plus.google.com/photos/114686870380724925974/albums/6062270990933768497?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

Saturday 09 August 2014 (UTC)

People on board: Laurent Coppola, Yves Lamblard, David Luquet, Nicolas Mayot, Lucie Millet and Fabien Moullec.

0610 Departure from the Nice harbour.
0840 Arrival at the DYFAMED site.
0845 Operations for DYFAMED program.
1240 Diving on the BOUSSOLE buoy for cleaning sensors, performing dark measurements, taking pictures.
1315 Departure to the Nice harbour.
1615 Arrival at the Nice harbour.

Sunday 10 August 2014 (UTC)

People on board: Melek Golbol and Vincent Taillandier.

0600 Departure from the Nice harbour.
0915 Arrival at the BOUSSOLE site.

0920 CTD 01, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, $a_{p,}$ and TSM.
1100 Attempts of CISCO connection with the buoy: failed.
1110 Finishing to install the C-OPS system.
1200 Attempts of CISCO connection with the buoy: failed.
1215 C-OPS 01, 02, 03.
1300 CTD 02, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC and $a_{p.}$
1330 Secchi disk 01 (20m).
1340 Departure to the Nice harbour.
1640 Arrival at the Nice harbour.

Monday 11 August 2014 (UTC)

People on board: Melek Golbol and Vincent Taillandier.

0505 Departure from the Nice harbour.
0815 Arrival at the BOUSSOLE site.
0820 CTD 03, 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.
0905 C-OPS 03, 04, 05.
1000 Attempts of direct connection with the buoy: failed.
Cleaning of head sensors and Solar panels
1100 Attempts of CISCO connection with the buoy: failed.
1115 CTD 04, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, $a_{p,}$ and TA/TC.
1140 Secchi disk 02 (21m).
1145 Departure to the first transect station.
1225 CTD 05, 400m, station 01(43°25'N 07°48'E).
1325 CTD 06, 400m, station 02 (43°28'N 07°42'E).
1425 CTD 07, 400m, station 03 (43°31'N 07°37'E).
1520 CTD 08, 400m, station 04 (43°34'N 07°31'E).
1620 CTD 09, 400 m, station 05 (43°37'N 07°25'E).
Dark Hydroscat-6 (neoprene cap).
1710 CTD 10, 400 m, station 06 (43°39'N 07°21'E).
1745 Departure to the Nice harbour
1820 Arrival at the Nice harbour.

Tuesday 12 August 2014 (UTC)

People on board: Tatiana Donnay, Melek Golbol, Patricia Maleyran and Vincent Taillandier.

0515 Departure from the Nice harbour.
0820 Arrival at the BOUSSOLE site.
0830 Direct connection with the buoy and data retrieval.
Downloading of pCO2 data at 3m.
0840 CTD 11, 400 m with water sampling at 400, 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a_p, and CDOM.
1005 C-OPS: sky cloudy and unstable: no optical profiles.
1010 Secchi disk 03 (19m).
1100 Lunch.
1110 CTD 12, 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 C-OPS 06.
1215 Departure to the Nice harbour
1510 Arrival at the Nice harbour.

Problems identified during the cruise

- Several attempts of connection (direct or wireless) with the buoy failed. Nevertheless data were retrieved the last day by direct connection to the buoy.

- The OCP at 9m was working discontinuously. Initially, we supposed a bad connection with the DACNet. The connectors were checked during the diving and the divers did not found any problems, however. So it is probably a problem with the instrument. But it could not be changed for the moment because there was not another OCP available.

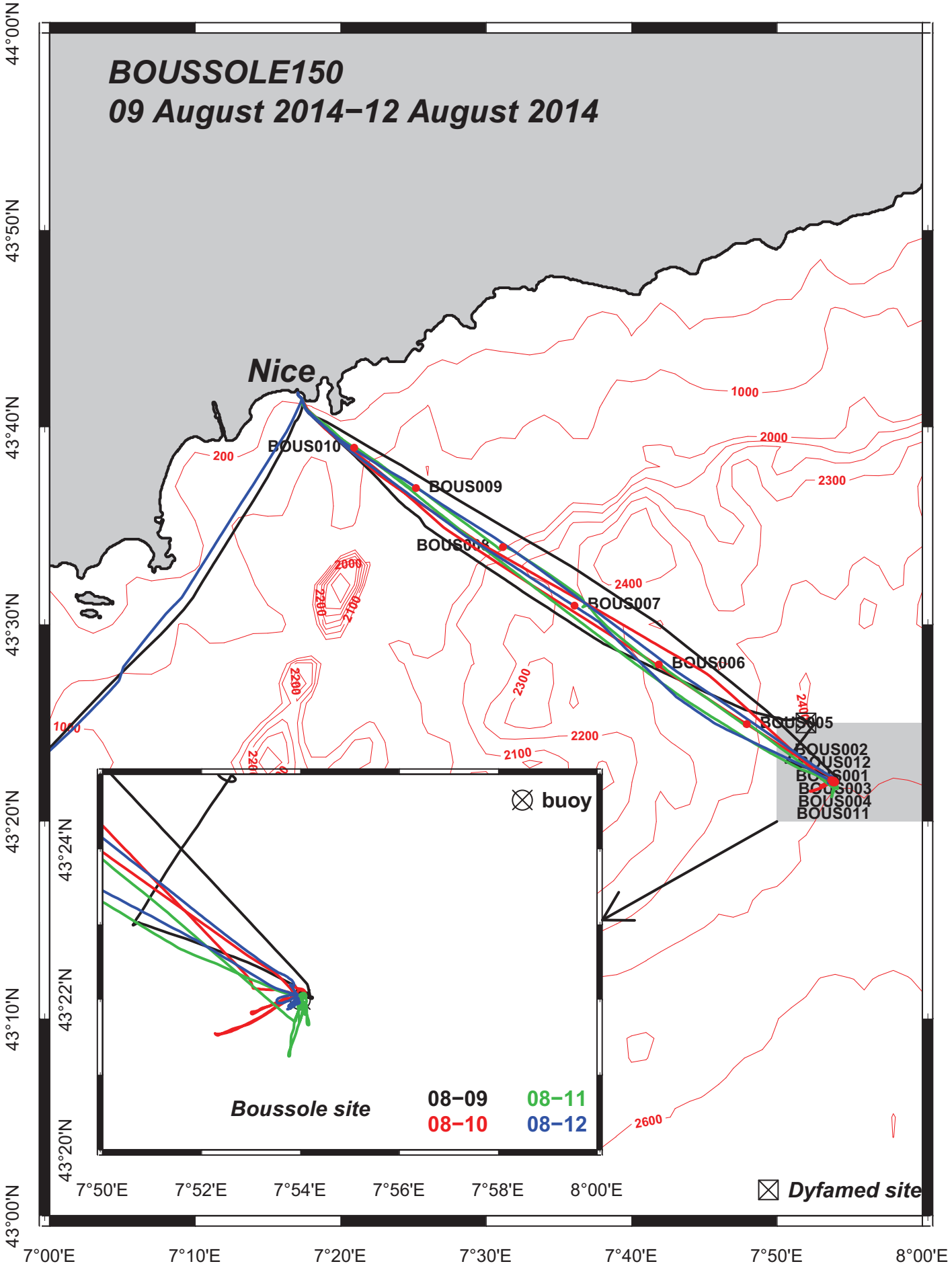
- The second day, filtrations of HPLC samples for the first CTD cast took a long time. This problem was solved with disassembling and cleaning the pump circuit. Probably a particle was blocked inside the pump circuit.

- There was a problem with the liquid nitrogen tank of the laboratory: there was not enough pressure to fill our liquid nitrogen container. So the samples collected for the CTD 01, 02, 03 and 04 were placed on board in the freezer at -20°C instead of the liquid nitrogen container. Our liquid nitrogen container was filled the fourth day. The samples collected for the CTD 11 and 12 were placed on board in the liquid nitrogen.

Appendices

Cruise Summary Table for Boussole 150

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
10/08/14			CTDBOUS001	HPLC, Ap & TSM	09:20	39:00	400	43	22,013	7	53,811	blue		3	15	110	1013,9	88		24,7	25,10	calm			
	bou_c-ops_140810_1141_001_data.csv				11:43	1:19																		
		bou_c-ops_140810_1141_004_data.csv			12:24	3:02	76,4	43	21,991	7	53,607	blue	St	2	17	66	1013,0	86	good	24,8		calm	0,7		yes
		bou_c-ops_140810_1141_005_data.csv			12:32	2:53	73,8	43	21,948	7	53,464	blue	St	2	17	66	1013,0	86	good	24,8		calm	0,7		yes
		bou_c-ops_140810_1141_006_data.csv			12:39	2:55	75,8	43	21,894	7	53,259	blue	St	2	17	66	1013,0	86	good	24,8		calm	0,7		yes
	bou_c-ops_140810_1141_007_data.csv				13:14	1:20																		
			CTDBOUS002	HPLC & Ap	13:01	30:00	400	43	22,102	7	53,738	blue		2	16	54	1012,9	86		24,9	25,20	calm			
				Secchi01	13:30	4:00	20	43	22	7	54	blue		2					good			calm			
11/08/14			CTDBOUS003	HPLC, Ap & TSM	08:20	27:00	400	43	22,012	7	54,005	blue		2	6	72	1012,8	82		24,7	25,10	calm			
	bou_c-ops_140811_0822_001_data.csv				08:35	3:26											1012,8							
		bou_c-ops_140811_0822_002_data.csv			09:07	3:12	81	43	21,821	7	53,944	blue		2	7	329	1012,8	82	excellent	24,9		calm	0,6		no
		bou_c-ops_140811_0822_003_data.csv			09:18	3:08	79,6	43	21,600	7	53,857	blue		2	7	329	1012,8	82	excellent	24,9		calm	0,6		no
		bou_c-ops_140811_0822_005_data.csv			09:28	1:34	38,2	43	21,307	7	53,789	blue		2	7	329	1012,8	82	excellent	24,9		calm	0,6		no
	bou_c-ops_140811_0822_006_data.csv				09:41	2:58																		
			CTDBOUS004	HPLC, Ap & TA/TC	11:14	32:00	400	43	21,987	7	53,980	blue		2	3	278	1012,8	77		25,2	25,60	calm			
				Secchi02	11:40	4:00	21	43	22	7	54	blue		2					excellent			calm			
			CTDBOUS005		12:26	19:00	400	43	24,942	7	47,930	blue		0	6	229	1012,3	80		25,4	26,00	calm			
			CTDBOUS006		13:23	26:00	400	43	27,966	7	41,878	blue		0	4	246	1012,2	82		24,9	26,00	calm			
			CTDBOUS007		14:24	21:00	400	43	30,953	7	36,085	blue		1	7	218	1012,1	82		24,9	25,80	calm			
			CTDBOUS008		15:19	23:00	400	43	33,924	7	31,165	cloudy		4	3	215	1011,7	82		25,2	26,00	calm			
			CTDBOUS009		16:22	21:00	400	43	36,918	7	25,188	overcast		6	3	151	1011,2	82		25,0	26,40	calm			
			CTDBOUS010		17:10	31:00	400	43	38,965	7	20,938	cloudy		4	5	143	1010,9	82		25,1	26,40	calm			
12/08/14			CTDBOUS011	HPLC, Ap & CDOM	08:41	29:00	400	43	21,985	7	53,885	blue		0	6	237	1011,0	77		24,8	25,70	calm			
				Secchi03	10:10	4:00	19	43	22	7	54	overcast		6					good			calm			
			CTDBOUS012	HPLC, Ap & TSM	11:10	35:00	400	43	22,068	7	53,932	cloudy		4	11	214	1010,6	75		25,3	26,00	calm			
	bou_c-ops_140812_1149_001_data.csv				11:50	1:19																		
		bou_c-ops_140812_1149_002_data.csv			11:57	3:57	102,5	43	22,266	7	53,812	blue	none	0	10	213	1010,5	79	excellent	25,1		calm	0,7		no
	bou_c-ops_140812_1149_003_data.csv				12:28	1:27																		


BOUSSOLE150
09 August 2014−12 August 2014
Nice
BOUS010
BOUS009
BOUS008
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BOUS006
BOUS005
BOUS002
BOUS012
BOUS001
BOUS003
BOUS004
BOUS011
200
1000
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2300
2400
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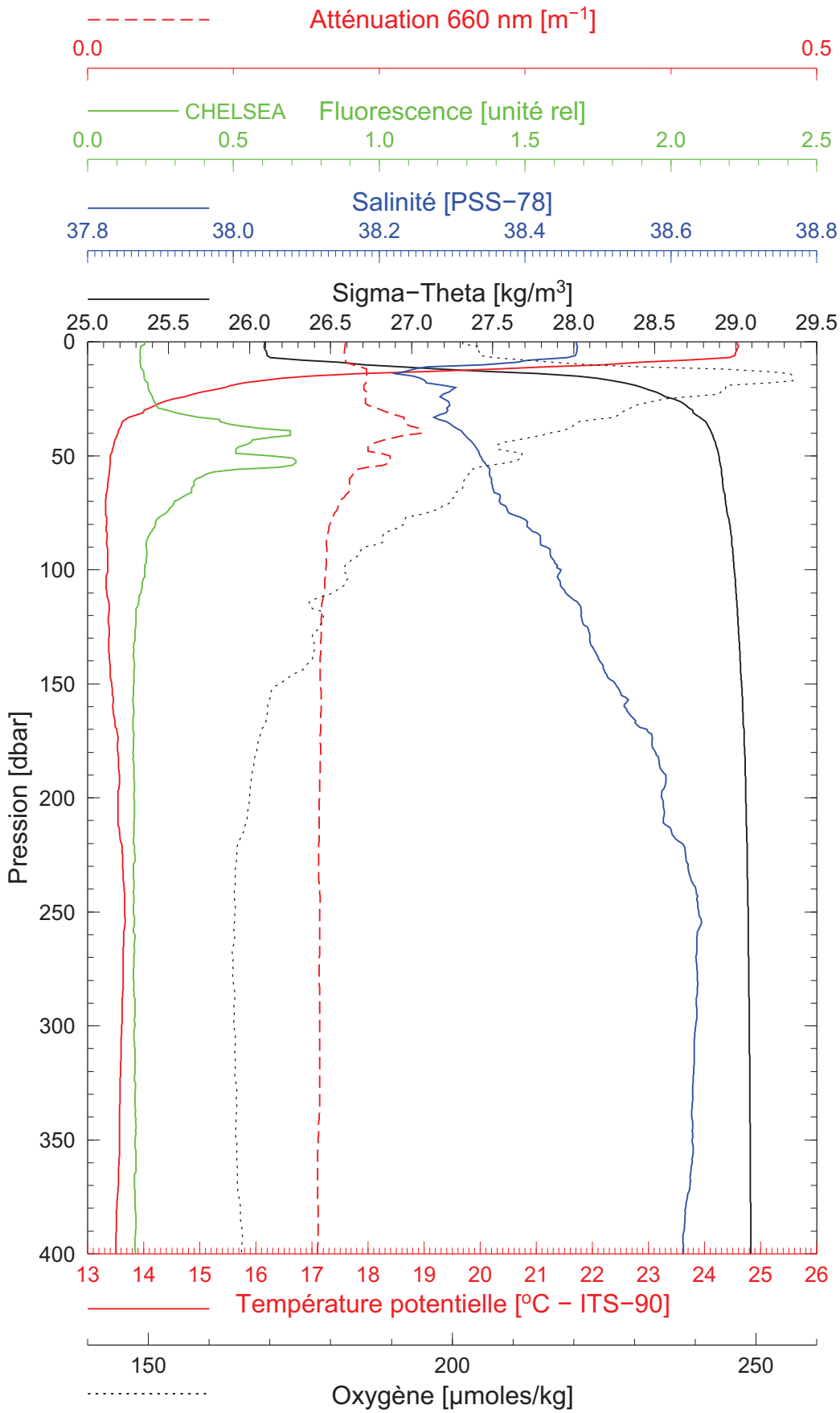
2100
2600
buoy
Boussole site
08−09
08−10
08−11
08−12
Dyfamed site
44°00'N
43°50'N
43°40'N
43°30'N
43°20'N
43°10'N
43°00'N
7°00'E
7°10'E
7°20'E
7°30'E
7°40'E
7°50'E
8°00'E
43°24'N
43°22'N
43°20'N
7°50'E
7°52'E
7°54'E
7°56'E
7°58'E
8°00'E

BOUSSOLE 150 **10/08/2014** **BOUS140810_01**

BOUS001

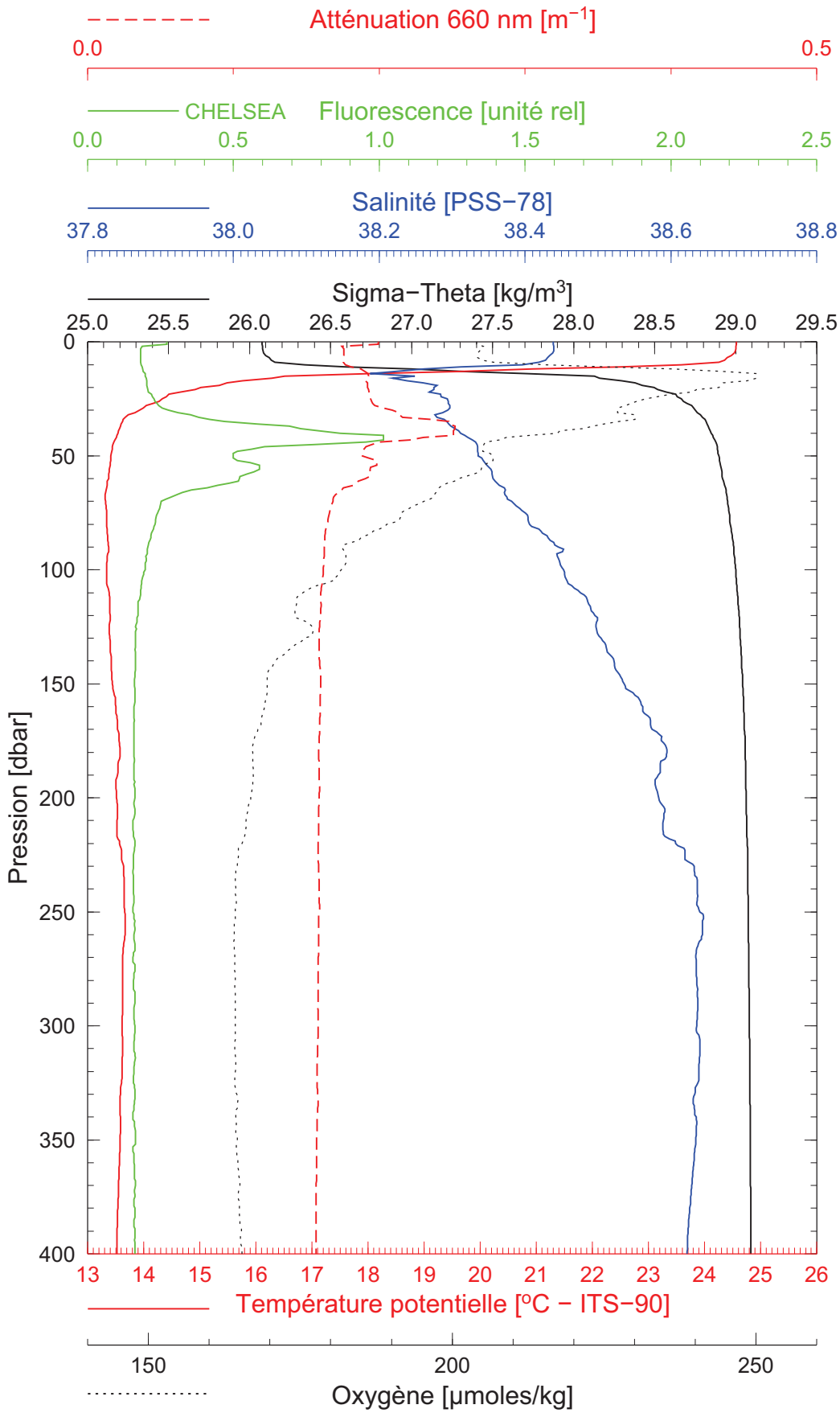


Date *10/08/2014* *Latitude* *43°22.013 N*

Heure déb *09h 20min [TU]* *Longitude* *07°53.811 E*

BOUSSOLE 150 **10/08/2014** **BOUS140810_02**

BOUS002



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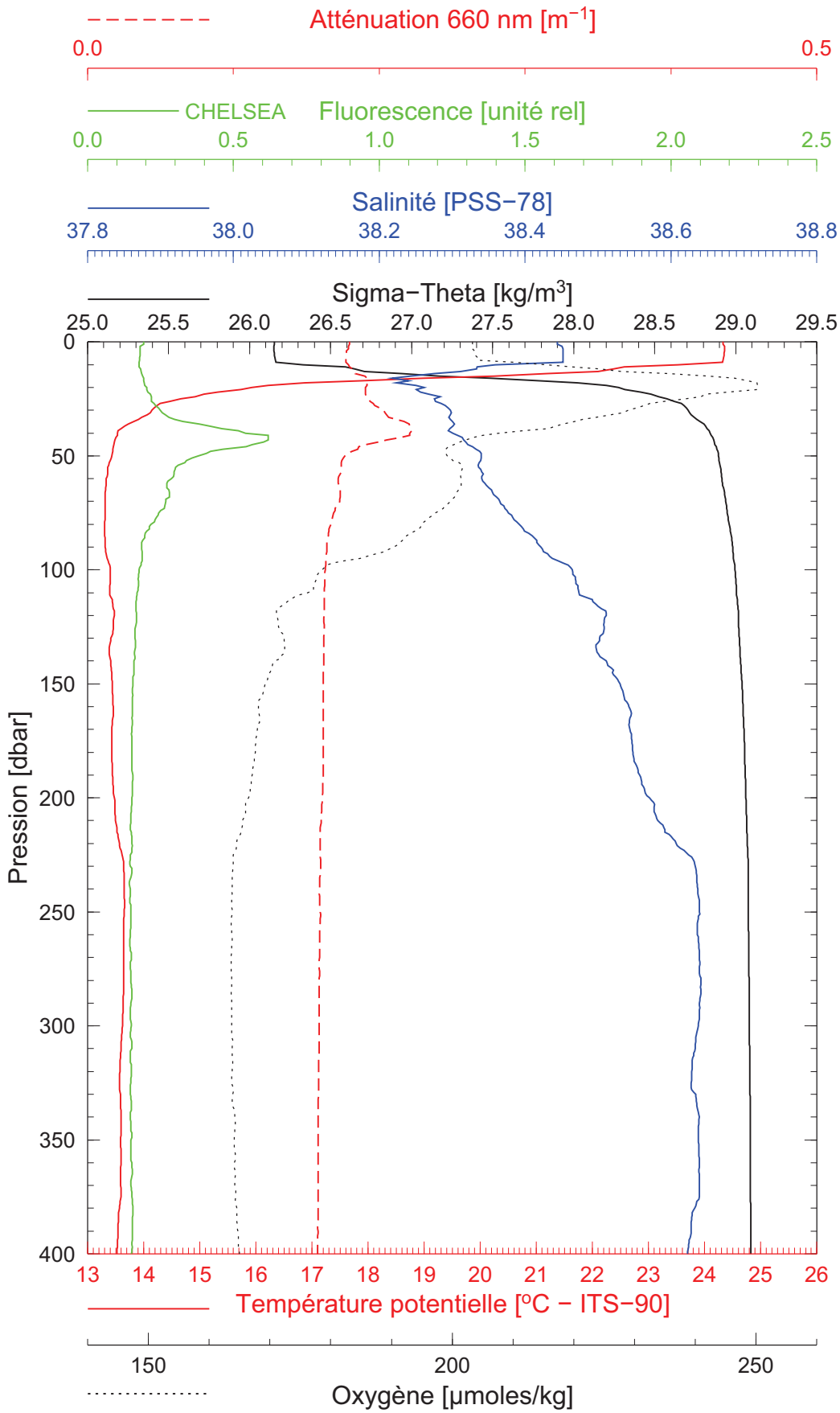
BOUSSOLE 150 **11/08/2014** **BOUS140811_01**

BOUS003



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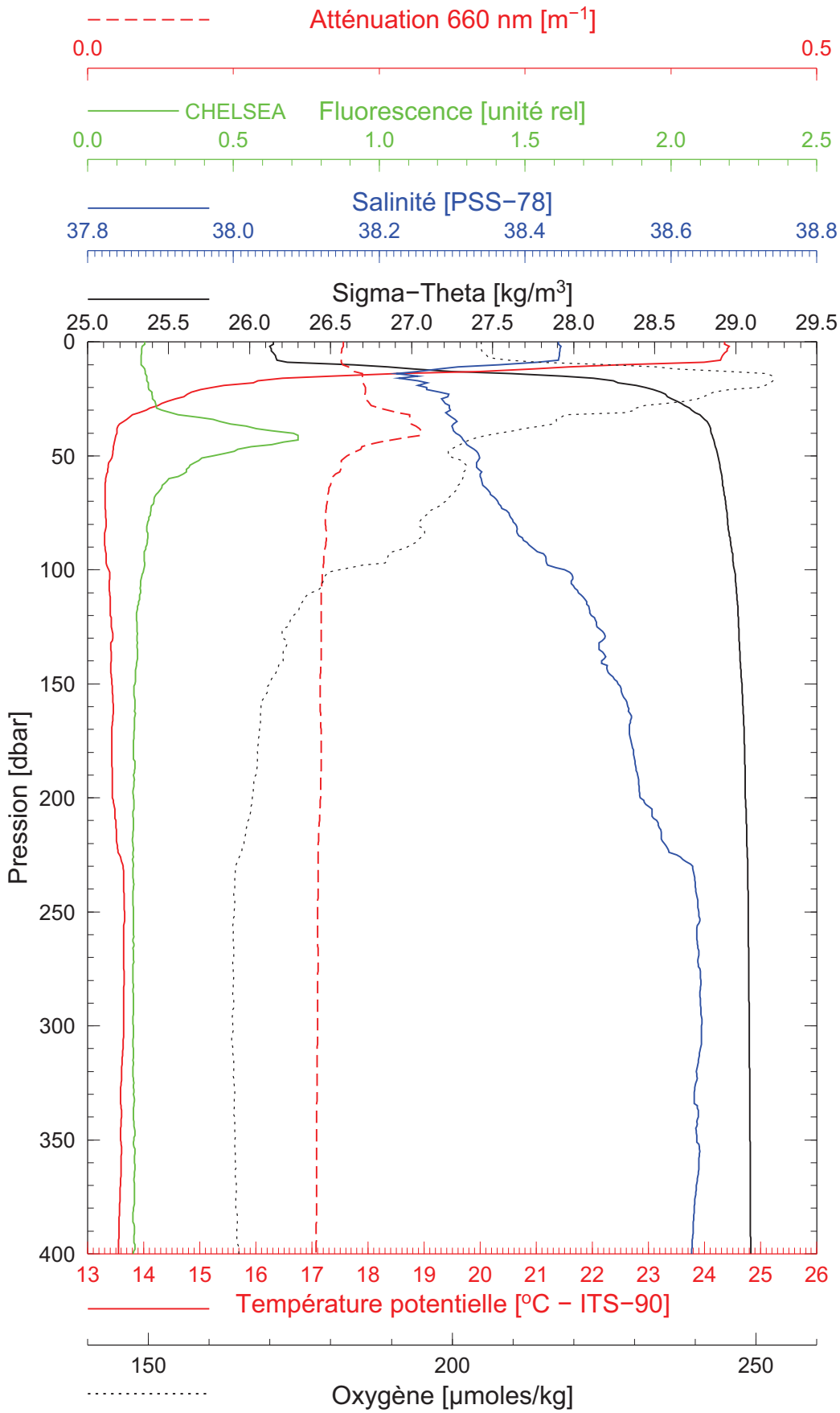
BOUSSOLE 150 **11/08/2014** **BOUS140811_02**

BOUS004



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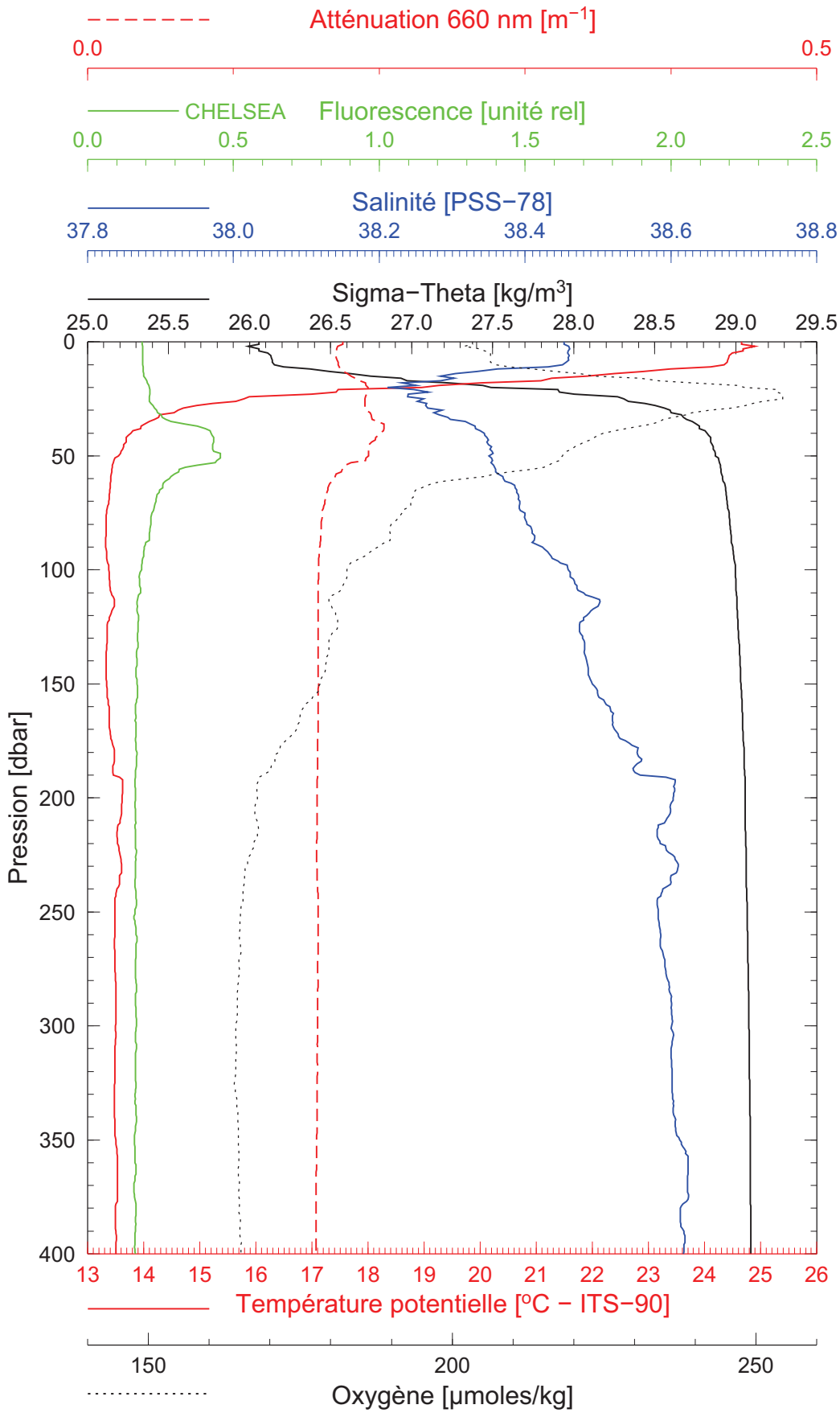
BOUSSOLE 150 **11/08/2014** **BOUS140811_03**

BOUS005



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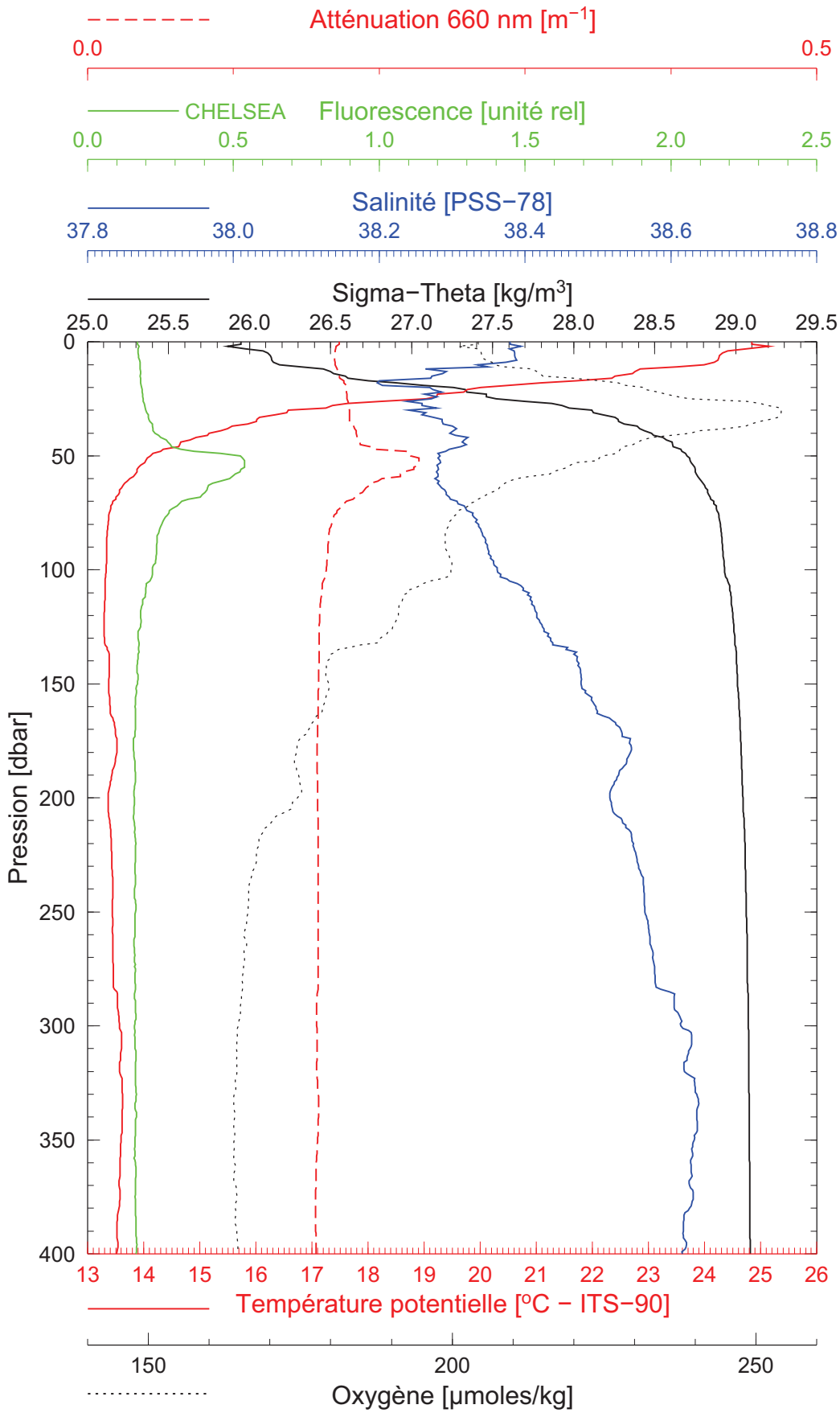
BOUSSOLE 150 **11/08/2014** **BOUS140811_04**

BOUS006



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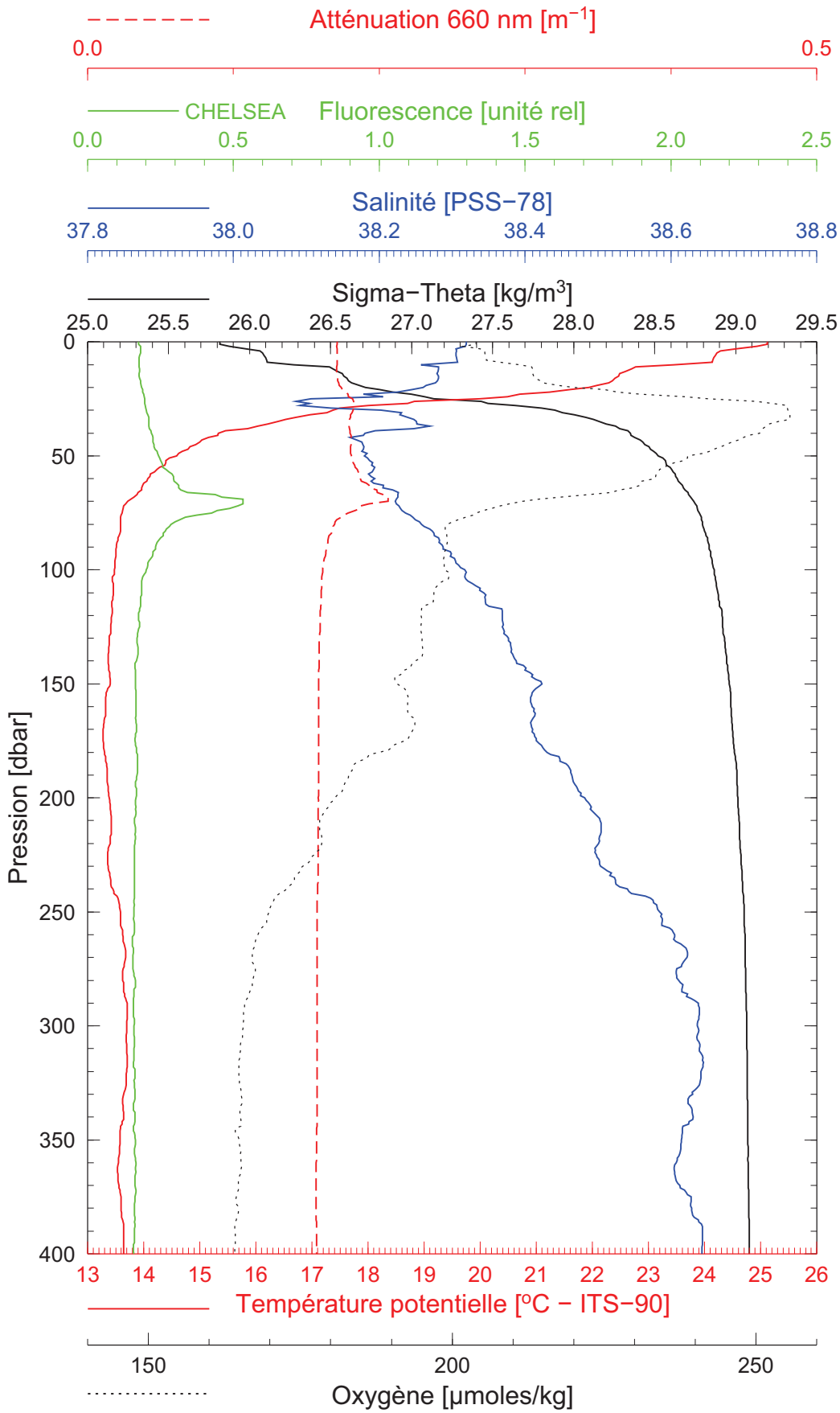

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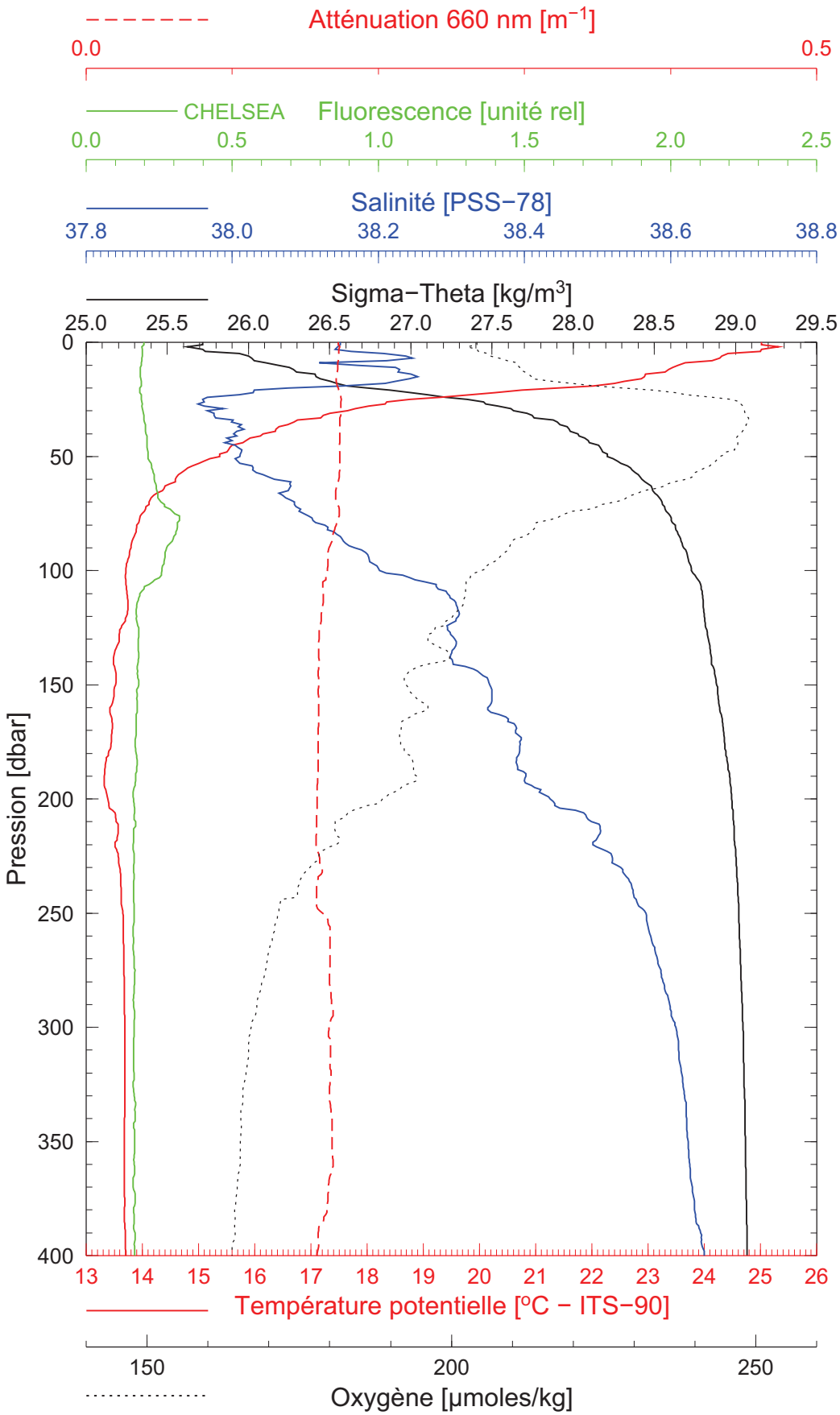

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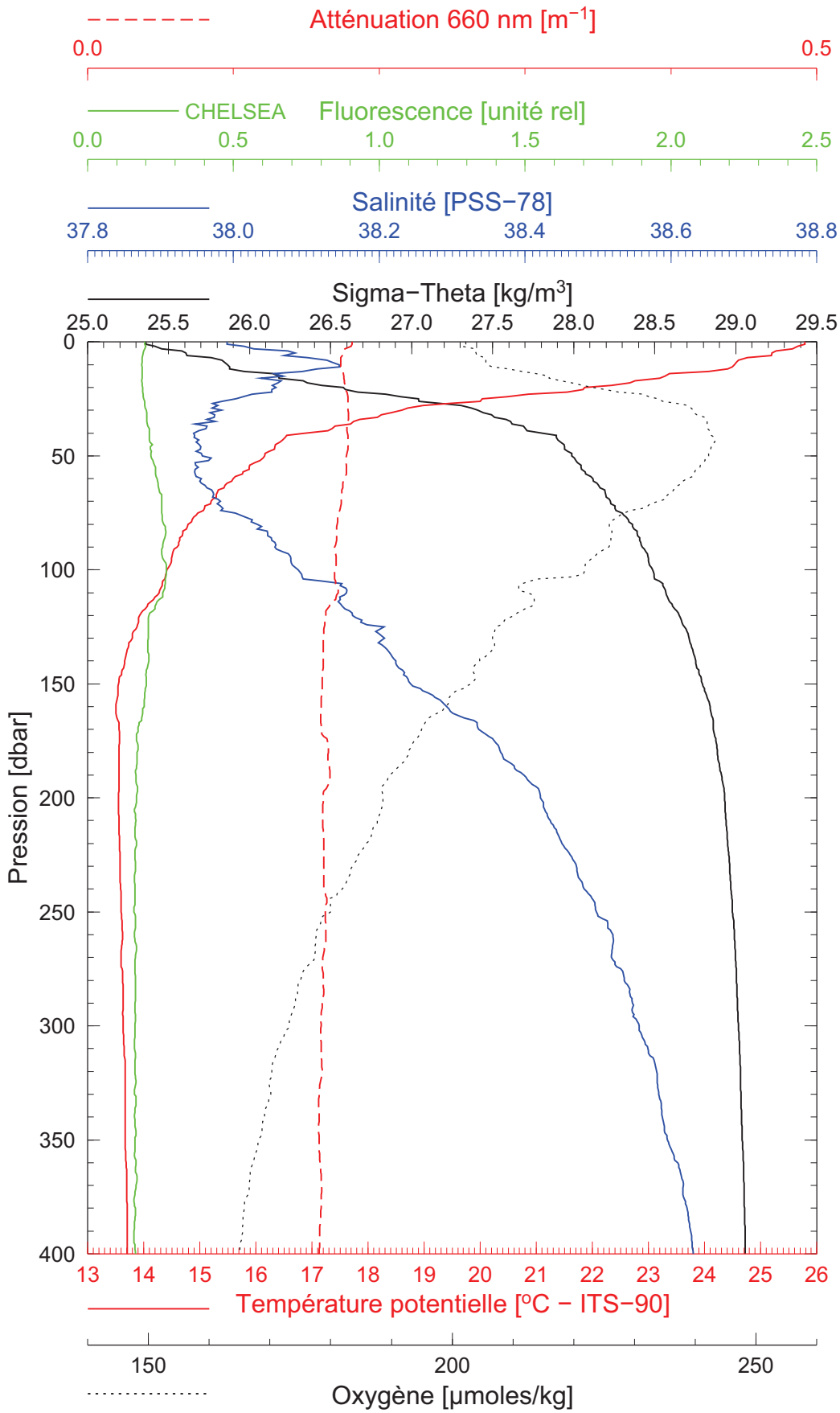

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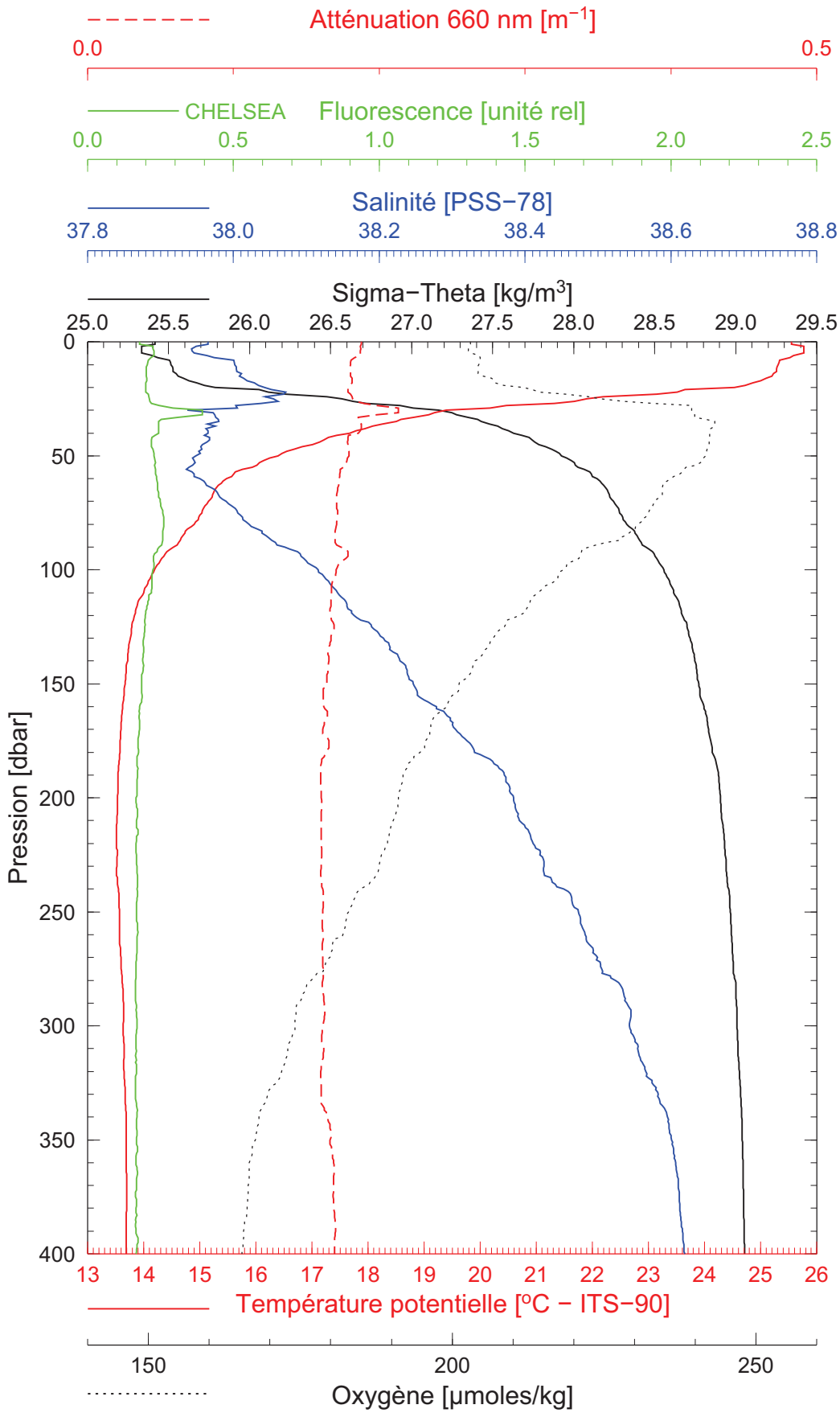

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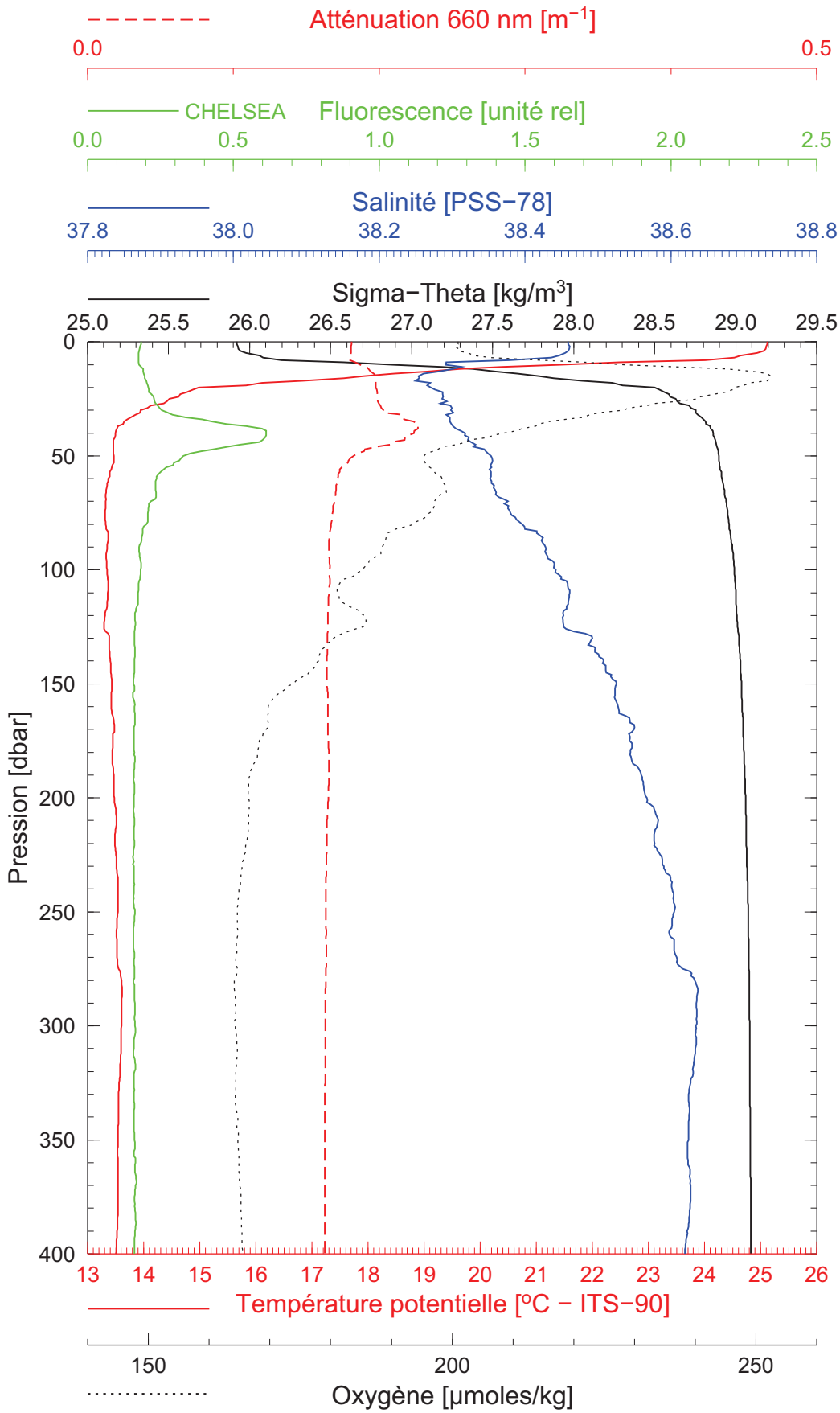

Date *12/08/2014* *Latitude* *43°21.985 N*

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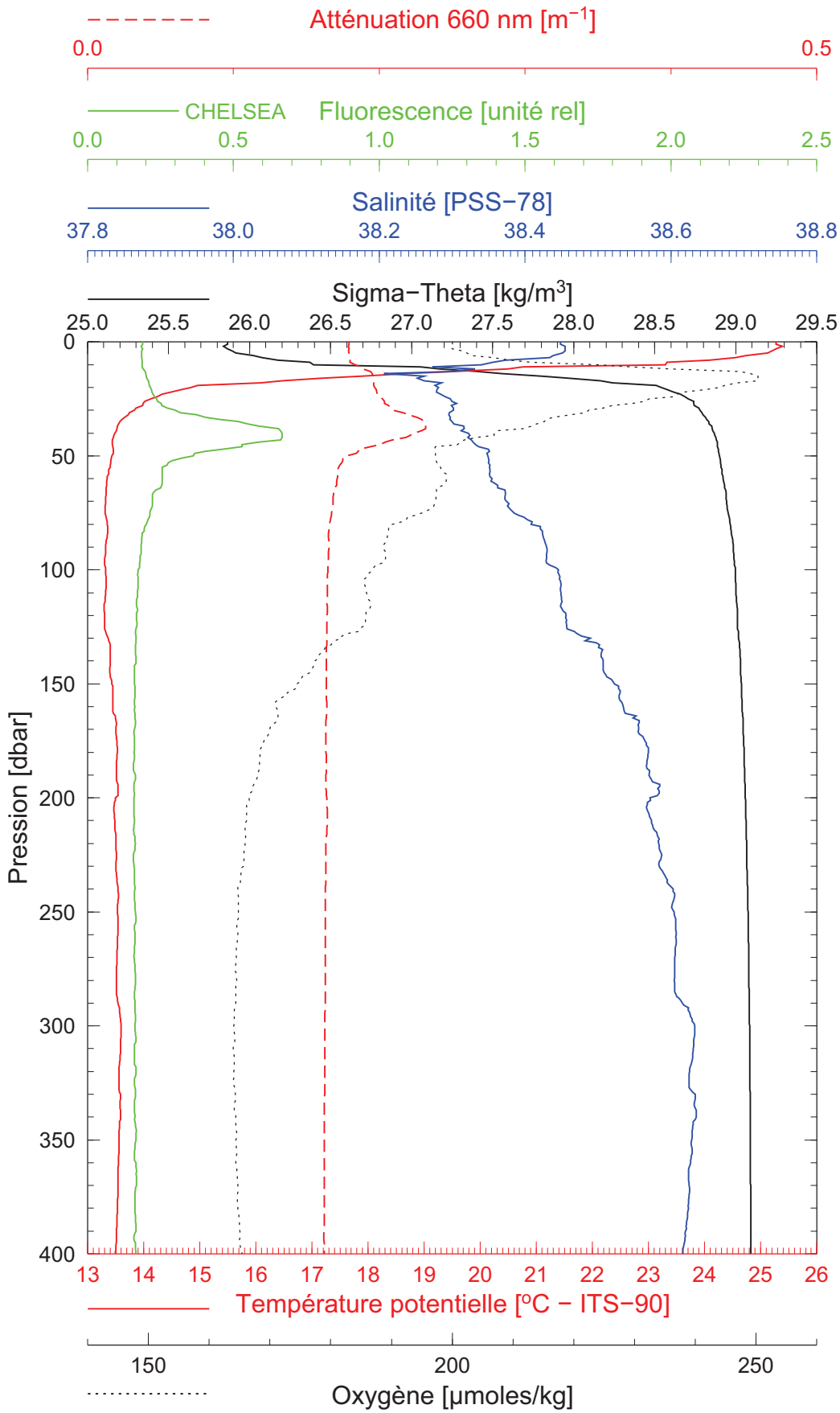
BOUSSOLE 150 **12/08/2014** **BOUS140812_02**

BOUS012



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