

# BOUSSOLE Monthly Cruise Report

## Cruise 137

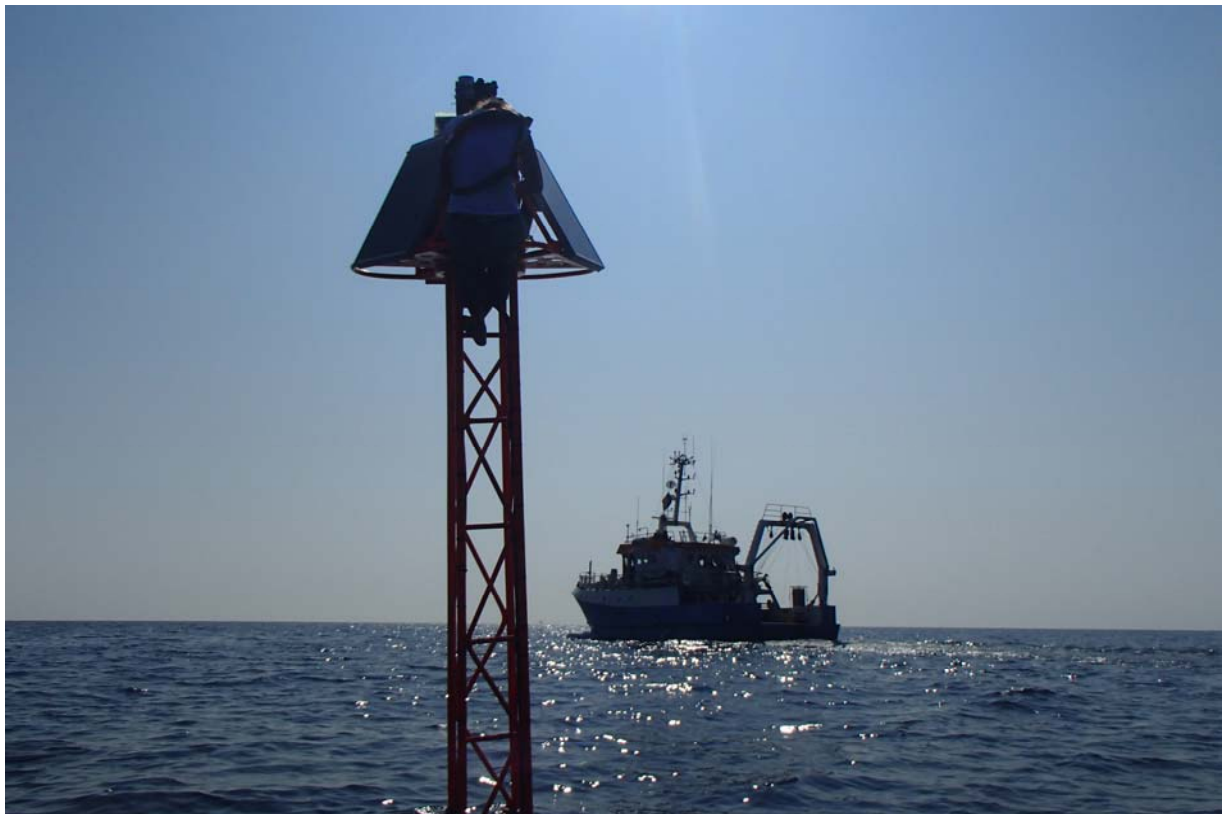
July 12 - 15, 2013

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

Vessel: R/V Téthys II  
(Captain: Renaud Le Bourhis)

Science Personnel: Marie Barbieux, Emilie Diamond, Tatiana Donnay, Melek Golbol, David Luquet, Grigor Obolensky, Baptiste Picard and Didier Robin.

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



E. Diamond on the top of the BOUSSOLE buoy for data retrieval and the R/V Téthys II on the background.

## BOUSSOLE project

ESA/ESRIN contract N° 13226/10/I-NB

October 28, 2013



## 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'Études Spatiales, France

CENTRE NATIONAL D'ÉTUDES SPATIALES



National Aeronautics and Space Administration, USA



Centre National de la Recherche Scientifique, France



Université Pierre & Marie Curie, France



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 new package includes a hyperspectral absorption meter (Hobilabs a-sphere), a multispectral backscattering meter (Hobilabs Hydrosat-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) and particulate organic carbon (from October 2011) analyses in the lab. Small quantities of seawater are to be fixed with glutaraldehyde for cytometric analysis (from December 2011).

- 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).

From 2013, the BOUSSOLE cruises are coupled with one day of operations by the DYFAMED program. This coupling aims at optimizing usage of ship time and human resources. So for one day of each cruise, there will be one deep CTD cast with water sampling for oxygen, alkalinity and nutrients analysis at the DYFAMED site and also two vertical plankton nets (0-100 m).

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](http://www.obs-vlfr.fr/Boussole/html/publications/pubs/BOUSSOLE_TM_214147.pdf))

### Additional operations

During this cruise, the divers replaced the pCO<sub>2</sub> sensor located at 3m with a new sensor with an update structure. They installed a new CTD plus optode at 10m, and an optode on the CTD at 3m. These operations are part of the BIO CAREX ANR project, in collaboration with the LOCEAN in Paris (J. Boutin and collaborators).

A Profiling float was deployed at the BOUSSOLE site during this cruise by the Marine Optics and Remote Sensing Lab - Laboratoire d'Océanographie de Villefranche.

Several CTD-fluorometer beacons that are planned to be deployed on elephant seals (by the CEBC-Centre d'Etudes Biologiques de Chizé) were tested during this cruise. They were installed on the CTD Rosette for comparison with the main CTD and fluorometer.

## Cruise Summary

The first day was used for 1 CTD cast with water sampling at the BOUSSOLE site, optical profiles, cleaning of the connexions at the buoy, and performing the CTD transect. The second day was used for 1 CTD cast with water sampling at the BOUSSOLE site, optical profiles and 1 Secchi disk. The third day was the MOOSE cruise day, a dark measurement of the Hydrosat-6 was done with a CTD deployment at the Dyfamed site. The last day was used for the diving operations and to install new sensors on the buoy, to perform optical profiles, 1 CTD cast with water sampling at the BOUSSOLE site and 1 Secchi disk.

### Friday 12 July 2013

This day the sea state was smooth with a light air. The sky was blue and the visibility was good. When arrived at the BOUSSOLE site, 1 CTD cast with water sampling and optical profiles were performed. A cleaning of the connections and solar panel at the top of the buoy was performed. Then the CTD transect was performed.

### Saturday 13 July 2013

The second day, the sea state was smooth with a gentle breeze. The sky was overcast in the morning and blue in the afternoon, the visibility was good. 1 CTD cast with water sampling, optical profiles and 1 Secchi disk were performed at the BOUSSOLE site.

### Sunday 14 July 2013

The third day was the DYFAMED cruise day, it was used to perform a dark measurement of the Hydrosat-6 with a CTD deployment at the Dyfamed site.

### Monday 15 July 2013

The last day, the sea state was smooth with a light breeze. The sky was blue during the optical profiles and overcast in the afternoon, the visibility was good. When arrived at the BOUSSOLE site, divers went at sea to clean the underwater sensors and perform dark measurements. They replaced the pCO<sub>2</sub> sensor at 3m and they installed a CTD plus an optode at 10m, and an optode on the CTD at 3m. Then, optical profiles, 1 Secchi disk, a CTD cast with water sampling were performed at the BOUSSOLE site, and a retrieval of data with direct connection at the buoy.

## Cruise Report

### Friday 12 July 2013 (UTC)

People on board: Emilie Diamond, Melek Golbol and Baptiste Picard.

- 0545 Departure from the Nice harbour.
- 0925 Arrival at the BOUSSOLE site.
- 0935 CTD 01, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a<sub>p</sub>, TSM.
- 1030 C-OPS 01, 02, 03.
- 1100 Lunch.
- 1200 Attempt of CISCO connection with the buoy: unsuccessful.
- 1220 Cleaning connections and solar panel at the top of the buoy.
- 1300 Attempt of direct connection with the buoy: unsuccessful.
- 1325 Departure to the first transect station.
- 1405 CTD 02, 400 m, station 01 (43°25'N 07°48'E).
- 1510 CTD 03, 400 m, station 02 (43°28'N 07°42'E).
- 1610 CTD 04, 400 m, station 03 (43°31'N 07°37'E).
- 1720 CTD 05, 400 m, station 04 (43°34'N 07°31'E).
- 1825 CTD 06, 400 m, station 05 (43°37'N 07°25'E).
- 1925 CTD 07, 400 m, station 06 (43°39'N 07°21'E).
- 1950 Departure to the Nice harbour.
- 2010 Arrival at the Nice harbour.

## Saturday 13 July 2013 (UTC)

People on board: Emilie Diamond, Tatiana Donnay and Melek Golbol.

0500 Departure from the Nice harbour.  
0845 Arrival at the BOUSSOLE site.  
0900 Attempt of CISCO connection with the buoy: unsuccessful.  
0915 CTD 08, 400 m, with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC,  $a_p$ , TSM.  
1025 C-OPS 04, 05, 06, 07.  
1100 Lunch  
1200 Attempt of CISCO connection with the buoy: unsuccessful.  
1235 CTD 09, 400 m, with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC,  $a_p$ , TSM.  
1325 C-OPS 08, 09, 10.  
1415 Secchi disk 01 (17 m).  
1420 Departure to the Nice harbour.  
1745 Arrival at the Nice harbour.

## Sunday 14 July 2013 (UTC)

People on board: Emilie Diamond (duty chief) and Melek Golbol.

0525 Departure from the Nice harbour.  
0845 Arrival at the DYFAMED site.  
0900 CTD with dark measurement of the HS6, 200m.  
1320 Departure to the Nice harbour.  
1640 Arrival at the Nice harbour.

## Monday 15 July 2013 (UTC)

People on board: Marie Barbieux, Emilie Diamond, Melek Golbol, Grigor Obolensky and 2 divers.

0500 Departure from the Nice harbour.  
0835 Arrival at the BOUSSOLE site.  
0900 Diving on the buoy for cleaning instruments, dark measurements and maintenance of the buoy: changing of the  $pCO_2$  sensor, installation of a CTD with optode at 10m, installation of an optode on the CTD at 3m.  
1100 Lunch.  
1200 Attempt of CISCO connection with the buoy: unsuccessful.  
1210 C-OPS 11,12,13,14.  
1315 CTD 10, 400 m with water sampling at 400, 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC,  $a_p$ , TSM, POC and Cytometry.  
1340 Secchi disk 02 (22m).  
1400 Attempt of CISCO connection with the buoy: unsuccessful.  
1410 Deployment of a profiling float at the BOUSSOLE site.  
1500 Attempt of direct connection with the buoy: unsuccessful.  
1510 Direct connection with the buoy (AK DacNet connector) and data retrieval.  
1545 Departure to the Nice harbour.  
1900 Arrival at the Nice harbour.

## Problems identified during the cruise

- Several attempt of data retrieval through the CISCO connection with the buoy were performed but none of them were successful.

# **Appendices**

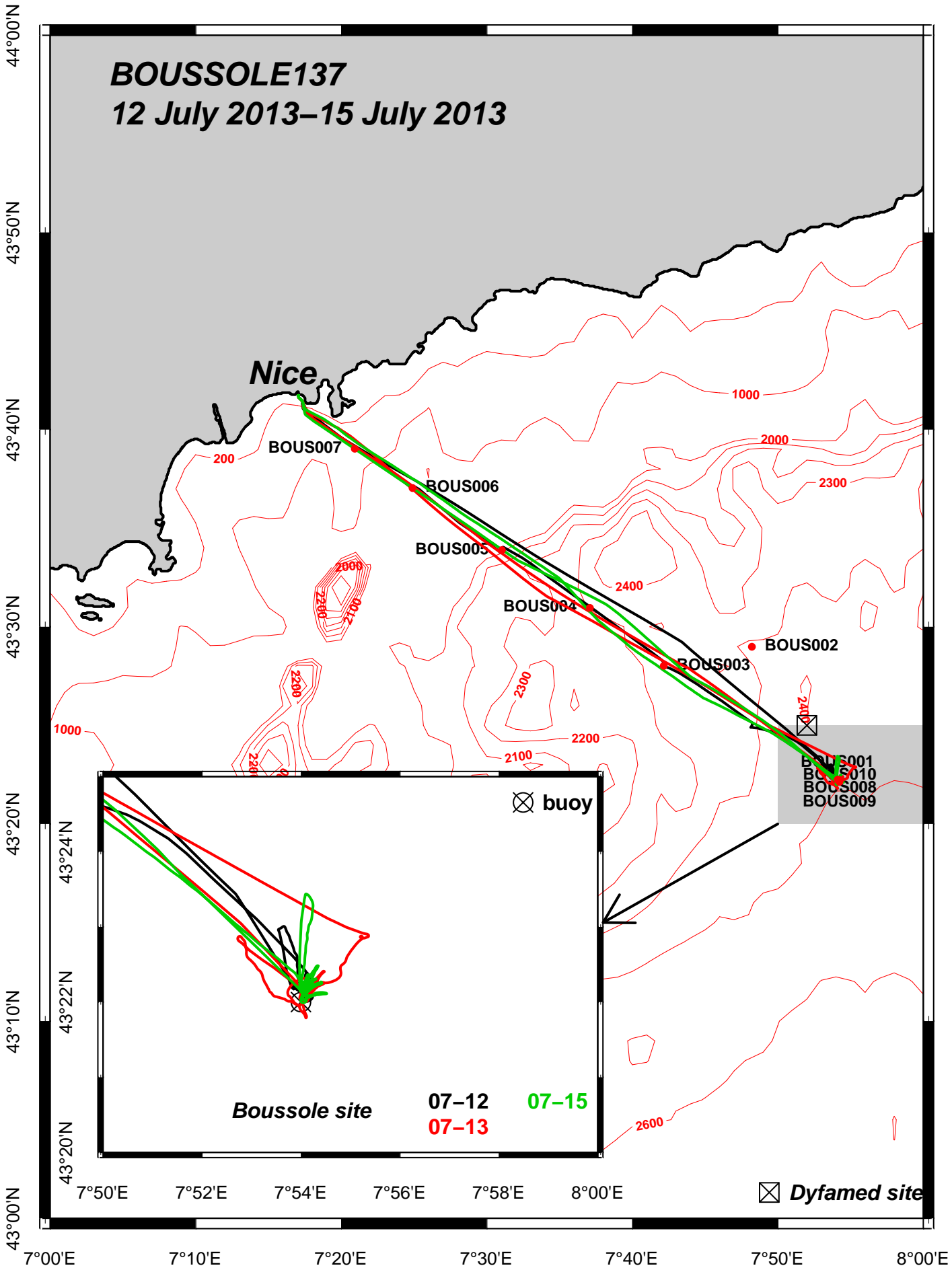
Cruise Summary Table for Boussole 137

Date	Black names (file ext: ".raw")	Profile names (file extension: ".raw")	CTD notes / satellite overpass	Other sensors	Start Time	Duration	Depth max	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)	(min.sec)	(meter)	(Degree)	(Minute)	(Degree)	(Minute)				Wind sp. (kn)	Wind dir.									
12/07/13	bou c-ops 130712	0857_001_data.csv	CTDBOUS001	HPLC, Ap, TSM	9:38	37:00	400	43	22.245	7	54.111	blue		4	1	194	1016.4	79		24.8	23.8	calm			
		bou c-ops 130712_0857_002_data.csv			09:04	1:20																			
		bou c-ops 130712_0857_004_data.csv			10:32	3:26	78.9	43	22.322	7	53.940	blue	Ci&Cu	4	2	166	1016.5	77	good	19.0		calm	0.1	no	
		bou c-ops 130712_0857_005_data.csv			10:49	3:25	81	43	22.613	7	53.920	blue	Ci&Cu	4	2	166	1016.5	77	good	19.0		calm	0.1	no	
		bou c-ops 130712_0857_006_data.csv			11:02	3:03	72.2	43	22.863	7	53.766	blue	Ci&Cu	4	2	166	1016.5	77	good	19.0		calm	0.1	no	
					13:11	1:26																			
				CTDBOUS002		14:08	24:00	400	43	24.987	7	48.222	overcast		6	7	120	1016.2	80		24.4	24.1	calm		
				CTDBOUS003		15:13	22:00	400	43	28.018	7	42.166	overcast		7	10	105	1016.1	82		24.2	24.2	calm		
				CTDBOUS004		16:12	26:00	400	43	30.957	7	37.093	overcast		5	8	109	1015.8	80		24.2	24.3	calm		
				CTDBOUS005		17:22	25:00	400	43	33.890	7	31.941	overcast		6	7	100	1015.6	80		23.4	24.2	calm		
			CTDBOUS006		18:28	27:00	400	43	37.036	7	24.906	twilight		7	5	96	1015.3	82		23.8	24.3	calm			
			CTDBOUS007		19:25	24:00	400	43	39.031	7	20.936	twilight		7	5	91	1015.4	82		23.6	24.0	calm			
			CTDBOUS008	HPLC, Ap, TSM	9:16	34:00	400	43	22.222	7	54.270	overcast		7	8	268	1016.9	81		24.6	24.2	calm			
13/07/13	bou c-ops 130713	0836_001_data.csv			08:41	2:45																			
		bou c-ops 130713_0836_005_data.csv			10:27	2:31	85.8	43	22.069	7	53.521	blue	Ci&Cu	2	5	260	1017.3	84	good	23.9		calm	0.1	no	
		bou c-ops 130713_0836_007_data.csv			10:47	3:17	78.9	43	22.415	7	53.160	blue	Ci&Cu	2	5	260	1017.3	84	good	23.9		calm	0.1	no	
		bou c-ops 130713_0836_008_data.csv			10:57	2:21	55.3	43	22.560	7	52.960	blue	Ci&Cu	2	5	260	1017.3	84	good	23.9		calm	0.1	no	
		bou c-ops 130713_0836_011_data.csv			12:43	1:21																			
				CTDBOUS009		12:37	34:00	400.0	43	22.135	7	54.236	overcast		6	7	102	1016.7	82		24.2	25.0	calm		
		bou c-ops 130713_1252_001_data.csv			12:55	1:57																			
		bou c-ops 130713_1252_003_data.csv			13:38	2:43	62.2	43	22.341	7	54.792	blue	Ci&Cu	2	5	228	1016.5	80	good	24.8		calm	0.1	no	
	bou c-ops 130713_1252_004_data.csv			13:49	3:03	71.4	43	22.648	7	54.980	blue	Ci&Cu	2	5	228	1016.5	80	good	24.8		calm	0.1	no		
	bou c-ops 130713_1252_005_data.csv			14:29	1:20																				
				Secchi01	14:15	4:00	17	43	22	7	54	blue		2					medium			calm			
15/07/13	bou c-ops 130715	1053_001_data.csv			10:58	1:52																			
		bou c-ops 130715_1053_002_data.csv			12:11	3:20	76.7	43	22.230	7	53.995	blue	no	0	4	200	1018.3	69	good	25.6		calm	0.2	no	
		bou c-ops 130715_1053_003_data.csv			12:23	2:51	67.8	43	22.528	7	54.075	blue	no	0	4	200	1018.3	69	good	25.6		calm	0.2	no	
		bou c-ops 130715_1053_004_data.csv			12:34	3:06	73.7	43	22.840	7	54.130	blue	no	0	4	200	1018.3	69	good	25.6		calm	0.2	no	
		bou c-ops 130715_1053_005_data.csv			12:46	2:40	61.9	43	23.138	7	54.225	blue	no	0	4	200	1018.3	69	good	25.6		calm	0.2	no	
		bou c-ops 130715_1053_006_data.csv			13:12	2:01																			
				CTDBOUS010	HPLC, Ap, TSM, CDOM, POC & cyto	13:14	34:00	400	43	22.229	7	54.2575	overcast		6	6	180	1017.9	63		27.1	24.9	calm		
				Secchi02	13:40	4:00	22	43	22	7	54	overcast		6					good			calm			



# BOUSSOLE137

12 July 2013–15 July 2013

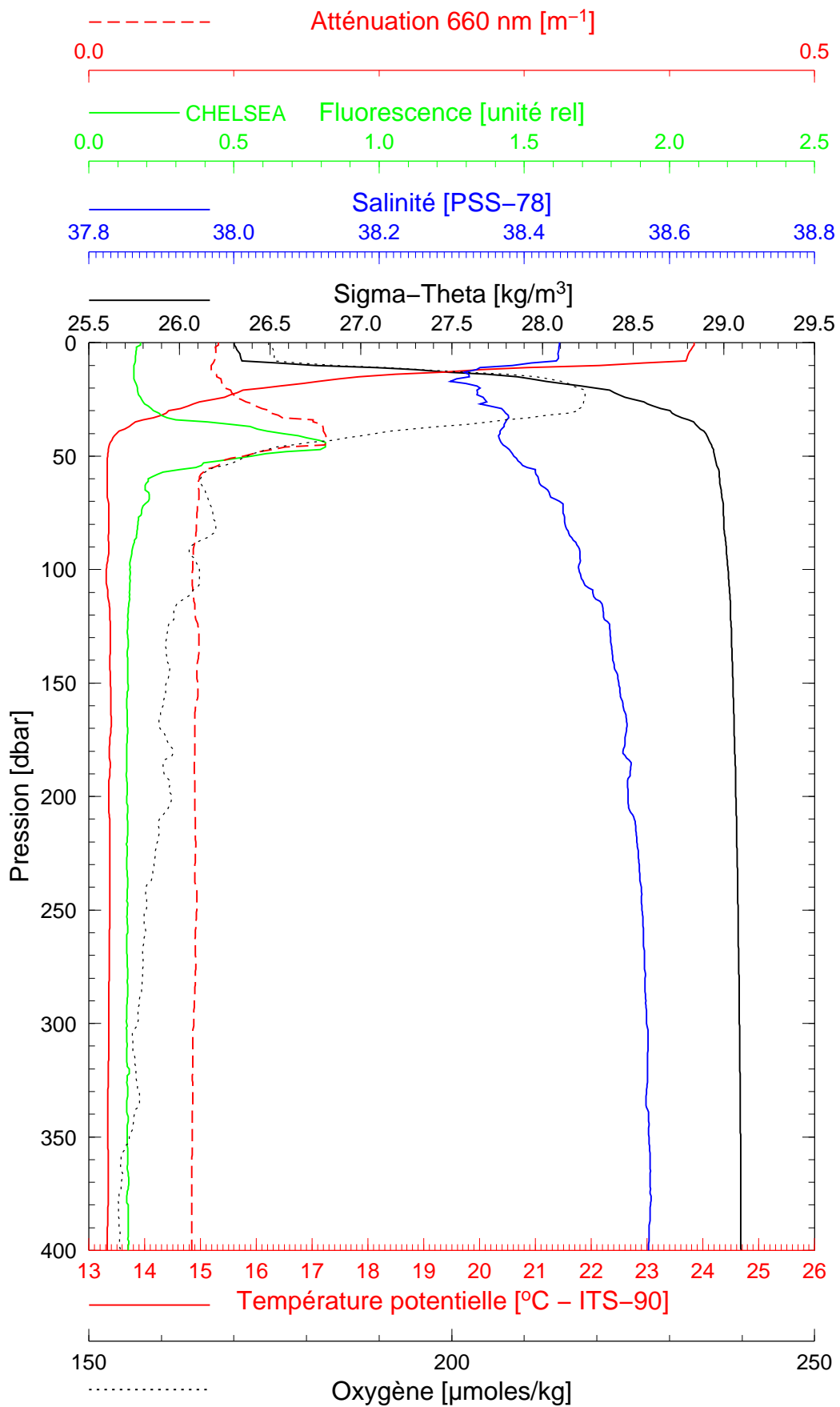


BOUSSOLE 137

12/07/2013

BOUS130712\_01

BOUS001



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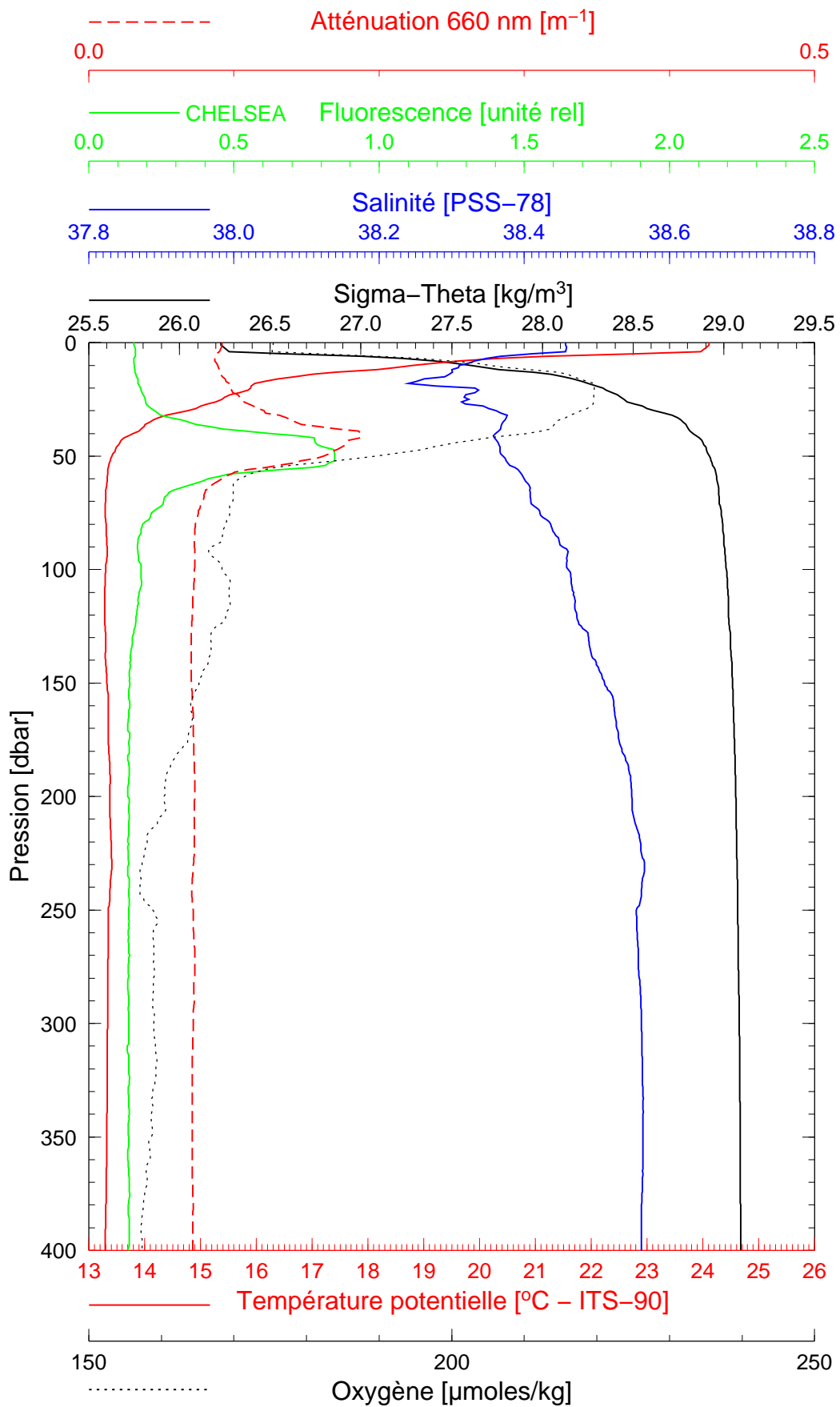
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BOUSSOLE 137

12/07/2013

BOUS130712\_02

BOUS002



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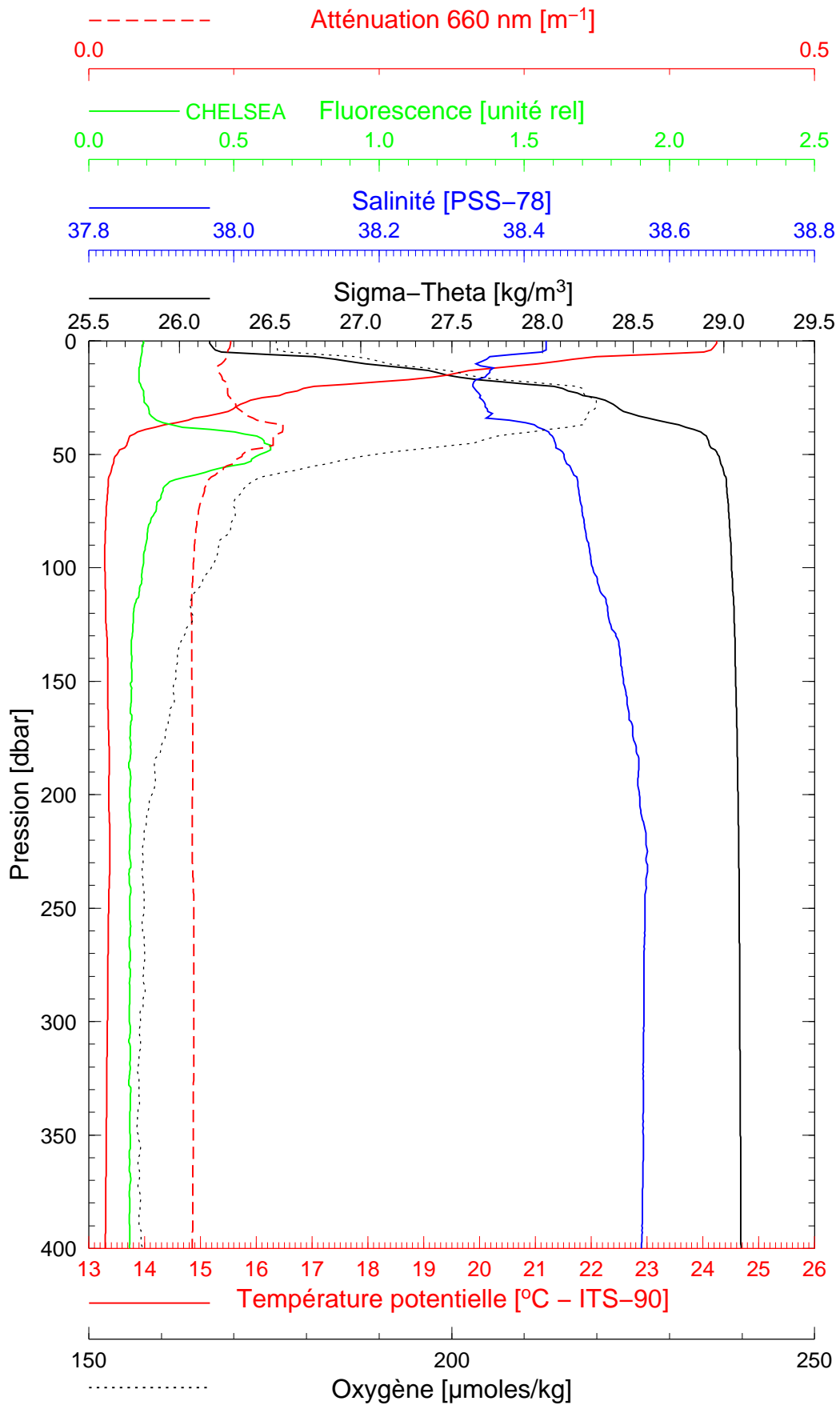
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BOUSSOLE 137

12/07/2013

BOUS130712\_03

BOUS003



Date 12/07/2013

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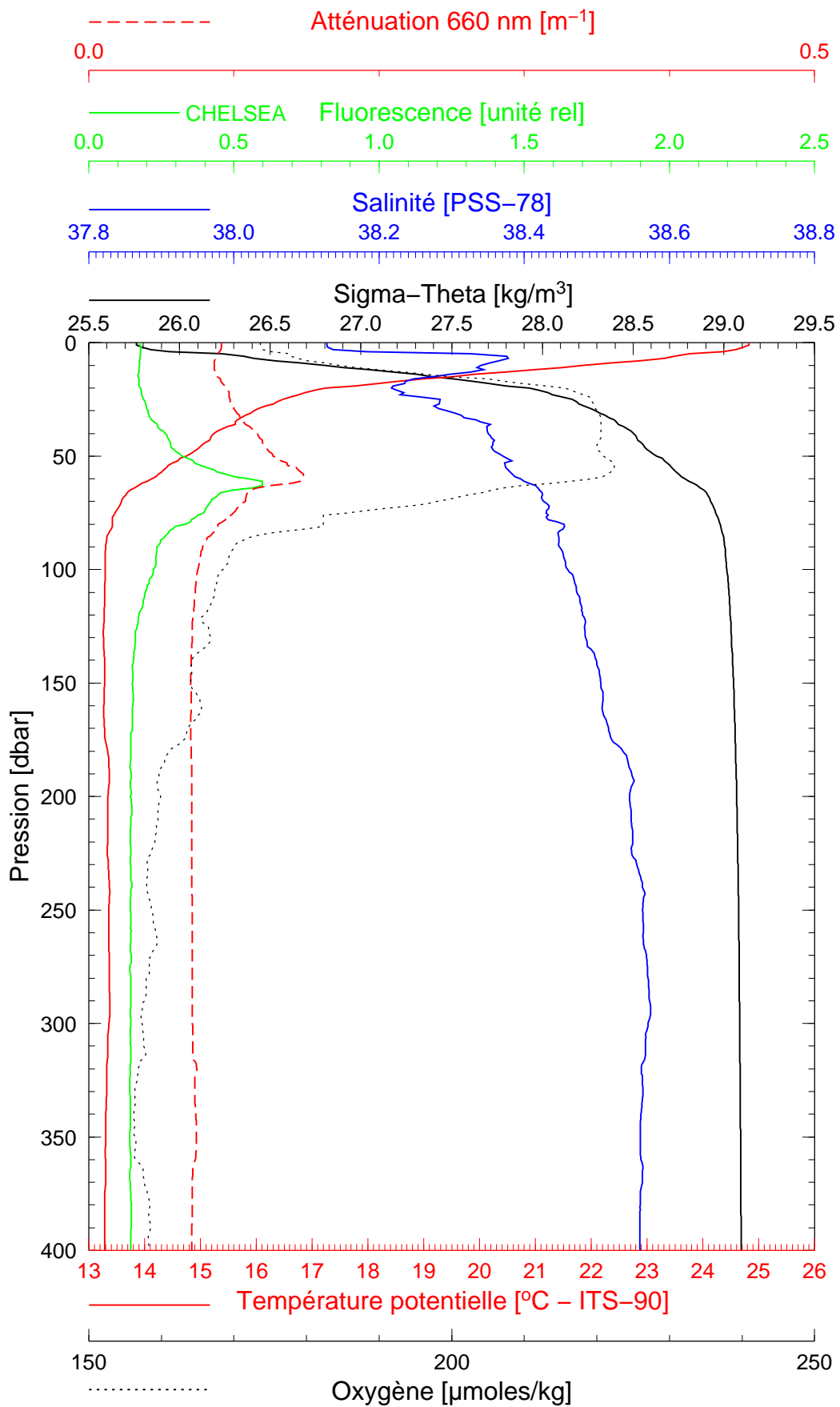
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BOUSSOLE 137

12/07/2013

BOUS130712\_04

BOUS004



Date 12/07/2013

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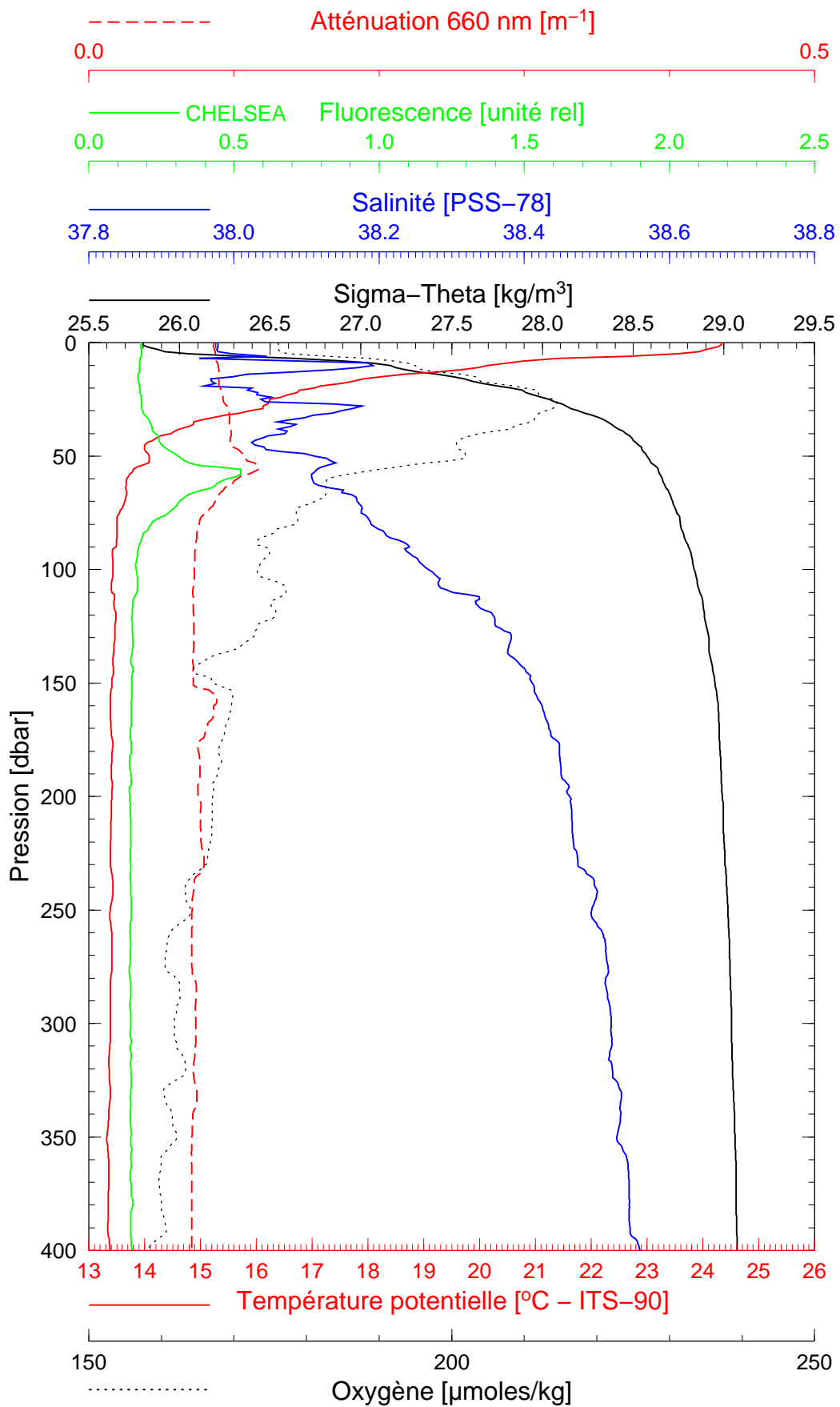
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BOUSSOLE 137

12/07/2013

BOUS130712\_05

BOUS005



Date 12/07/2013

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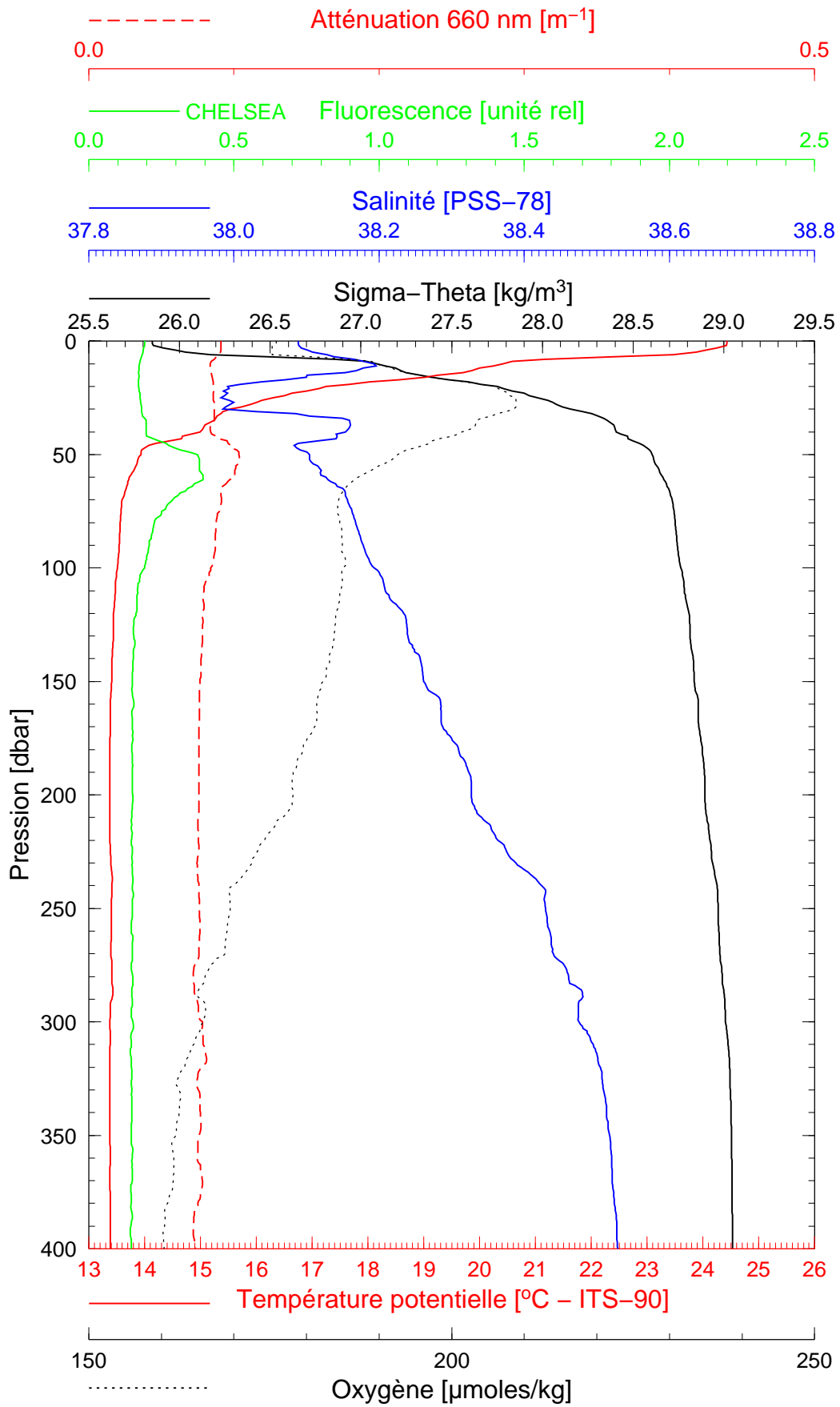
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BOUSSOLE 137

12/07/2013

BOUS130712\_06

BOUS006



Date 12/07/2013

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Heure déb 18h 28min [TU]

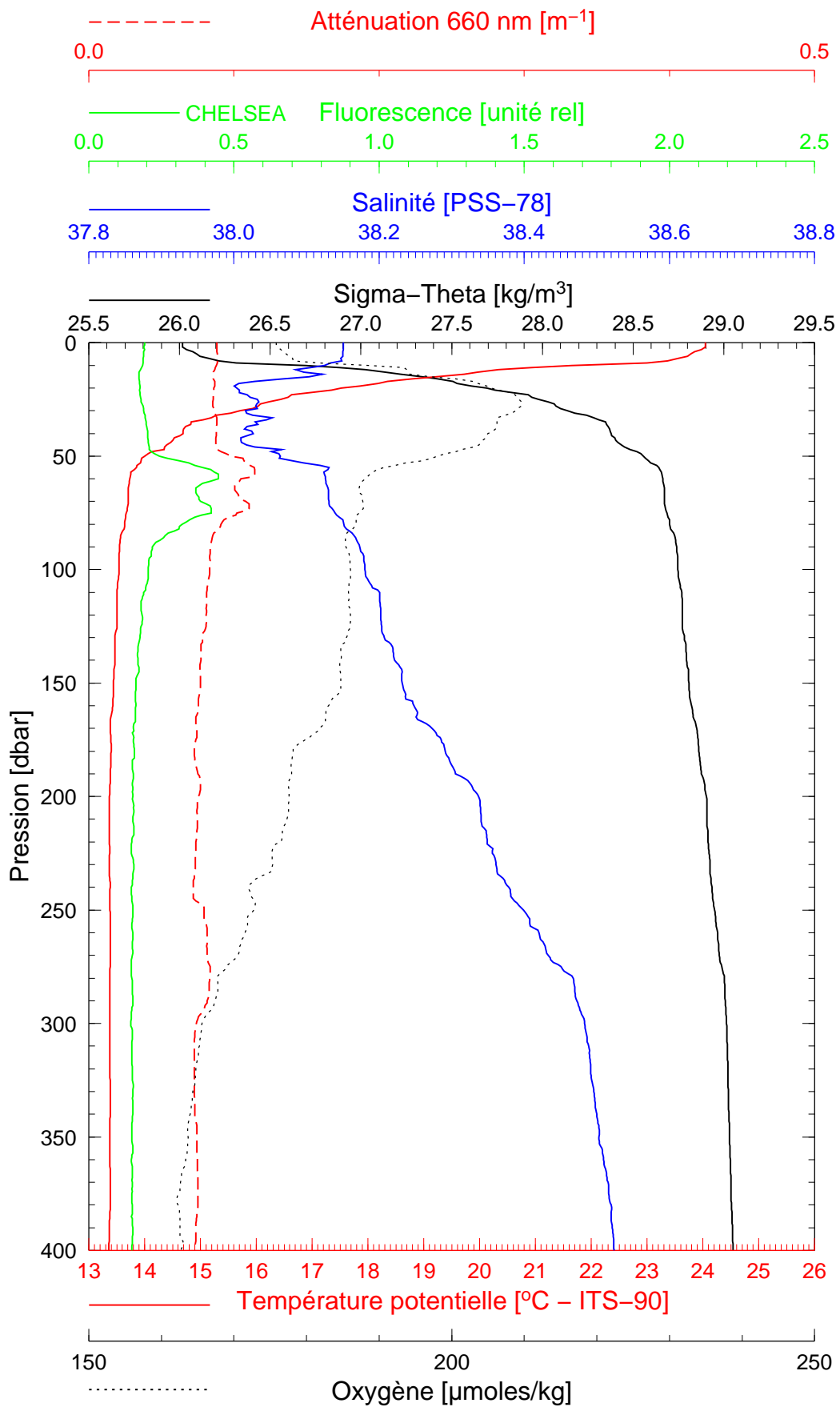
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BOUSSOLE 137

12/07/2013

BOUS130712\_07

BOUS007



Date 12/07/2013

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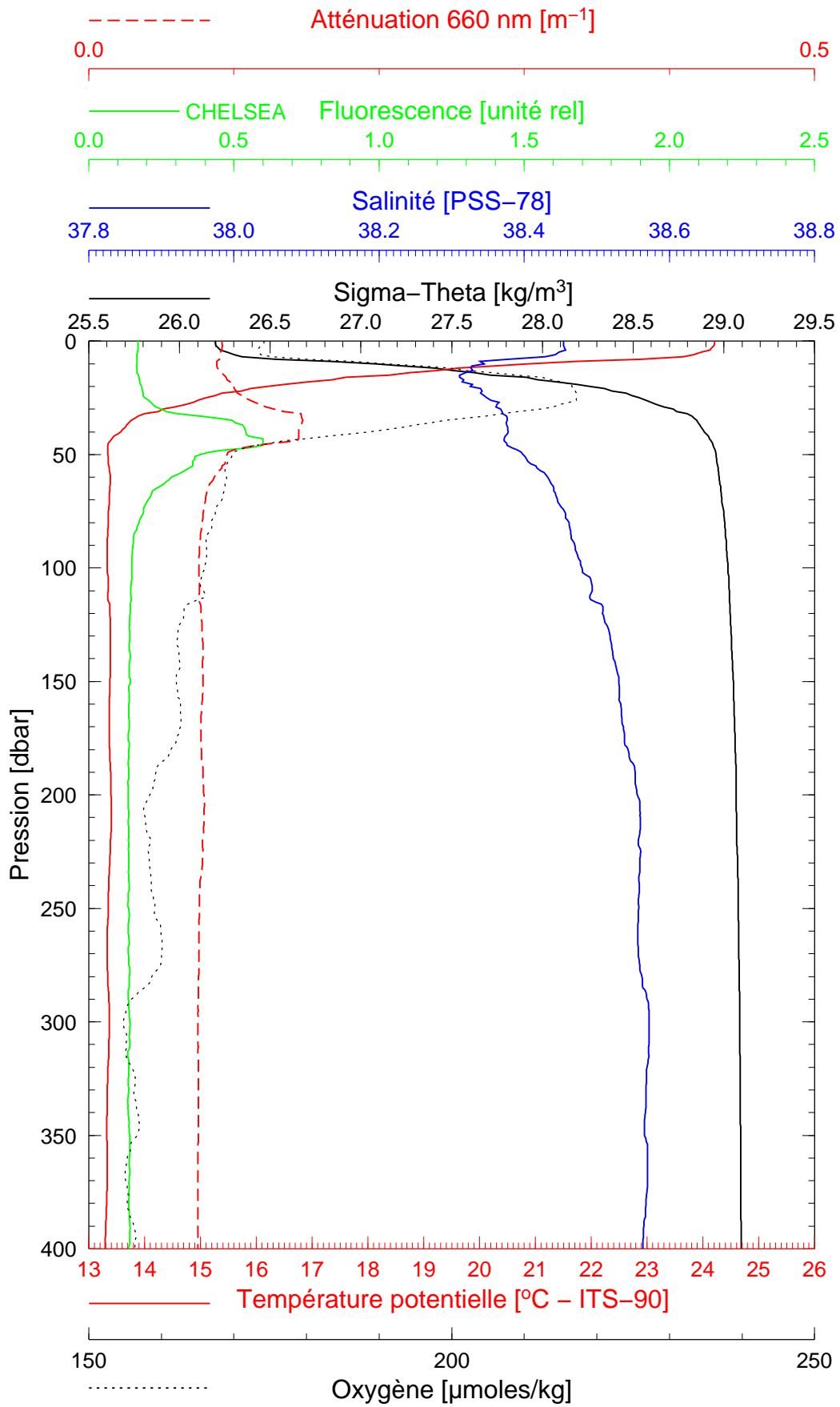


BOUSSOLE 137

13/07/2013

BOUS130713\_01

BOUS008



Date 13/07/2013

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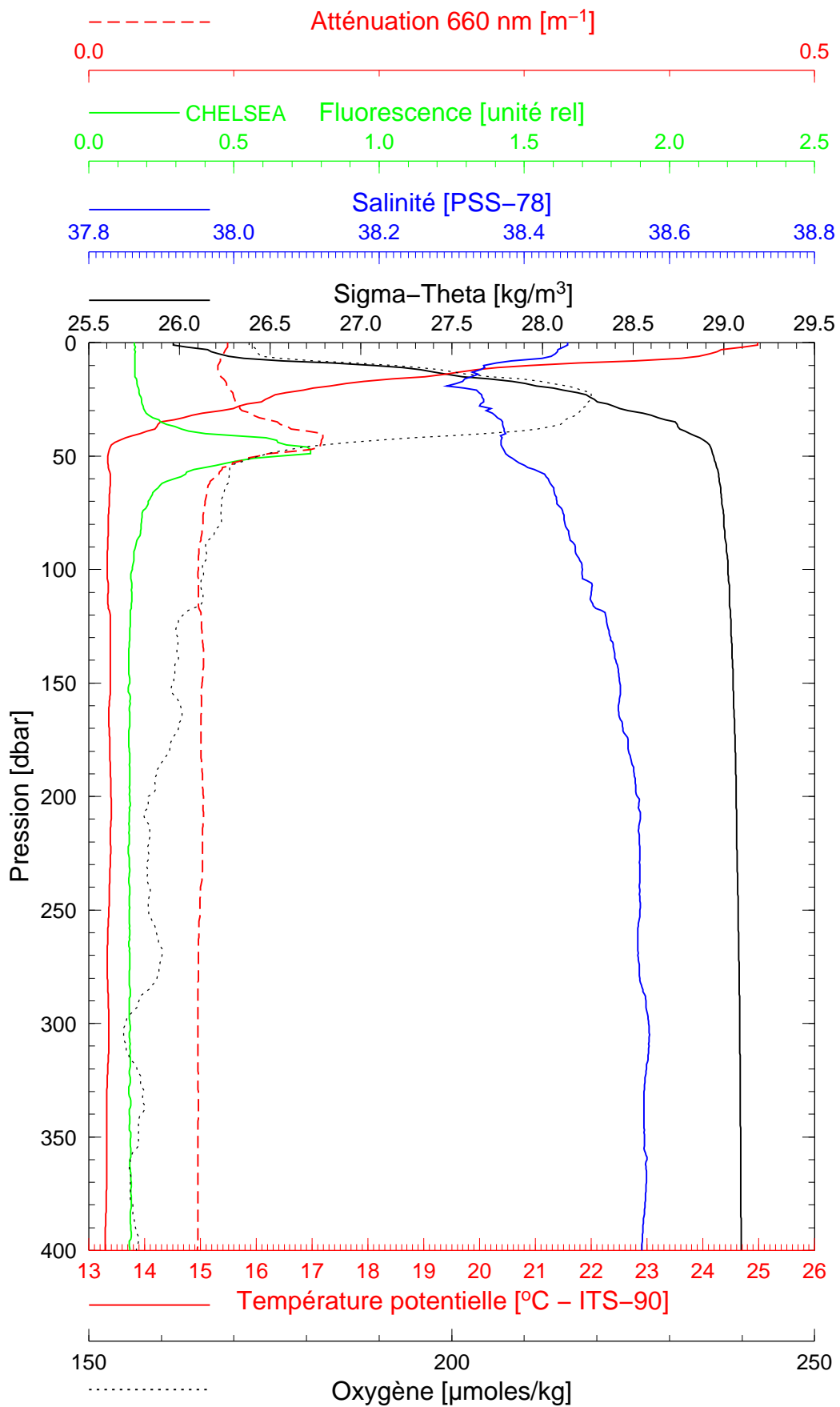
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BOUSSOLE 137

13/07/2013

BOUS130713\_02

BOUS009



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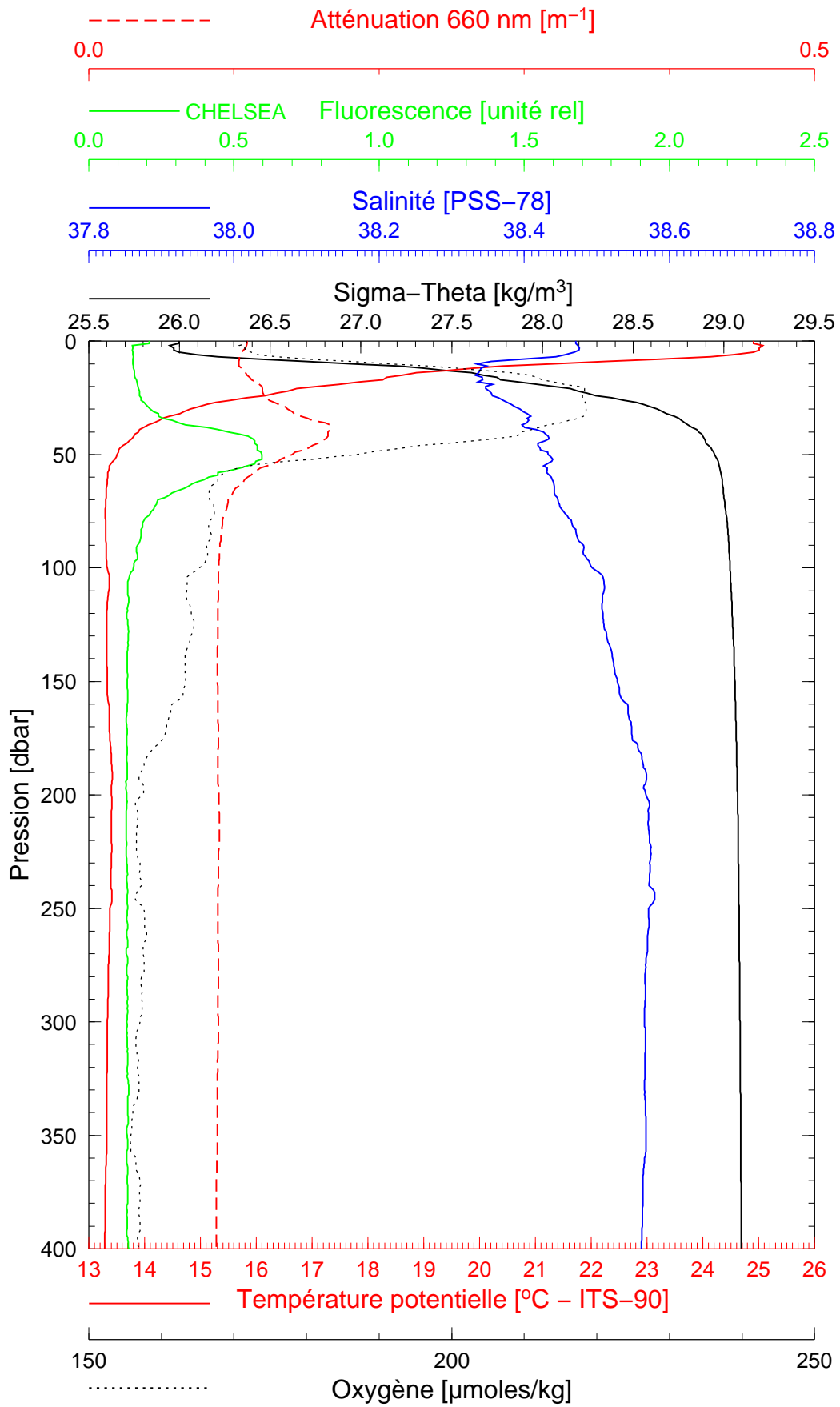
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BOUSSOLE 137

15/07/2013

BOUS130715\_01

BOUS010



Date 15/07/2013

Latitude 43°22.229 N

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