

The BOUSSOLE project technical reports; report # 10-115, issue 1.

BOUSSOLE Monthly Cruise Report

Cruise 132

February 12 - 16, 2013

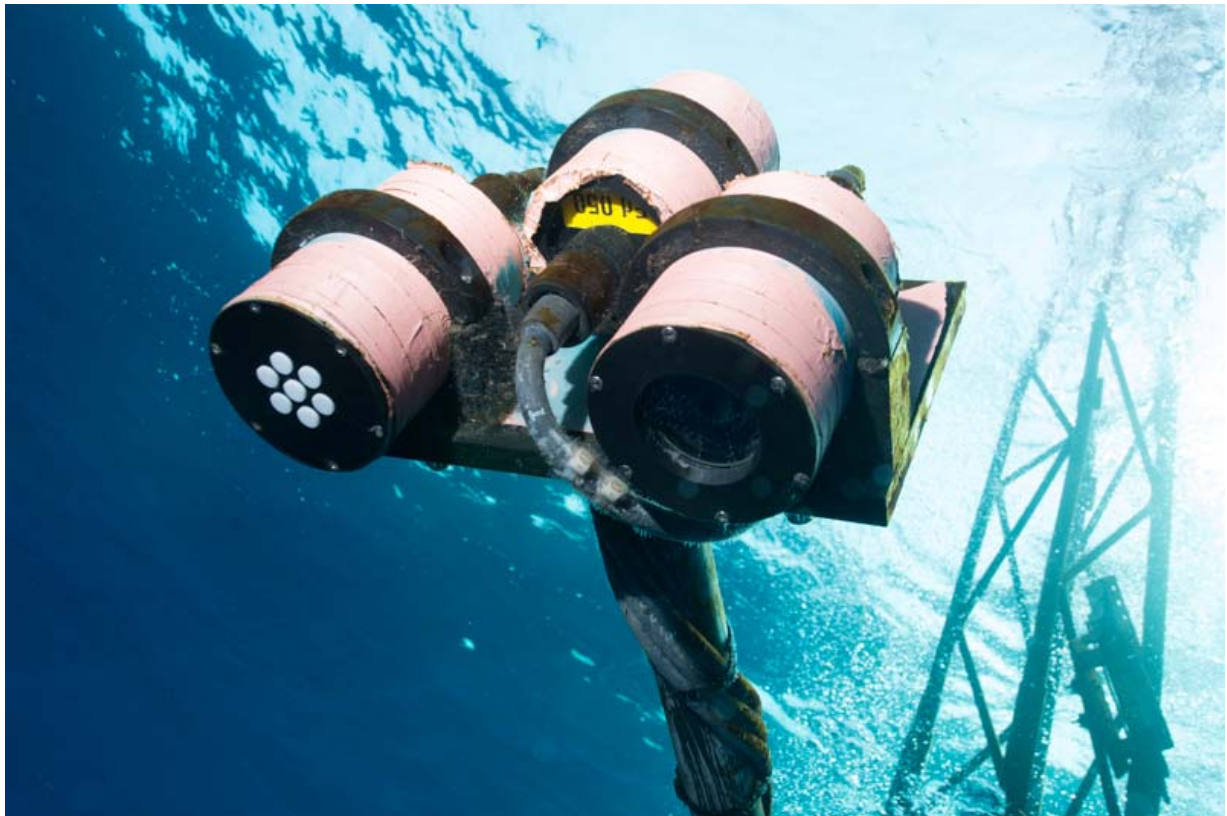
Duty Chief: Emilie Diamond (diamond@obs-vlfr.fr)

Vessel: R/V Téthys II

(Captains: Renaud Le Bourhis then Dany Deneuve)

Science Personnel: Emilie Diamond, Melek Golbol, David Luquet, Baptiste Picard, Didier Robin, Vincenzo Vellucci, and Jean (diver from Mare Nostrum)

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

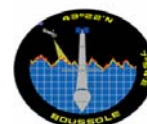


The BOUSSOLE buoy multispectral radiometers set measuring *Ed*, *Eu* and *Lu* at 4m depth.

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 Wetlabs CDOM fluorometer and a Chl fluorometer, an absorption-attenuation meter (Wetlabs AC9; from July 2002), and a backscattering meter (Wetlabs Eco-BB3, from June 2003). 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 Hydroscat-6) and a multispectral beam transmissometer (Hobilabs Gamma-4). The CDOM fluorometer, AC9 and Eco-BB3 have been withdrawn from the CTD package from March 2013. 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)

Additional operations

During this cruise, a CARIOCA pCO₂ sensor was installed on the buoy (part of a collaboration with the LOCEAN in Paris, in the frame of the BIOCAREX ANR project).

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, bad weather prevented the departure from the Nice harbour.

The second day was used for optical profiles, a CTD cast with water sampling at the BOUSSOLE site and diving operations. The third day was used for performing CTD cast at one station of the transect and for testing and working on the CTD pump system. The last day was used for a CTD cast with water sampling at the BOUSSOLE site, optical profiles, a deep CTD cast at the DYFAMED site with water sampling, and a CTD cast in one station of the transect.

Tuesday 12 February 2013

Bad weather prevented departure from the Nice harbour.

Thursday 14 February 2013

This day, the sea state was slight with a gentle breeze. The sky was blue. When arrived at the BOUSSOLE site, 3 C-OPS profiles, 1 CTD cast with water sampling and 1 Secchi disk were performed. Divers went at sea to clean the underwater sensors and perform dark measurements. The pCO₂ sensor was installed in subsurface with a long cable up to the head of the buoy. In parallel to diving operations, a direct connection with the buoy was established for data retrieval but it took a lot of time. The solar panels and connectors were cleaned.

Friday 15 February 2013

Bad weather prevented the work at the BOUSSOLE site but this day was used for CTD casts at one station of the transect and for working on the CTD pump system which did not work correctly.

Saturday 16 February 2013

The last day, the sea state was smooth with a light air during the morning and with a moderate breeze in the afternoon. The sky was blue.

When arrived at the BOUSSOLE site, 1 CTD cast with water sampling, 3 C-OPS profiles and a CISCO connection with retrieving data were performed. ARGOS connectors on the top of the buoy were cleaned and the ARGOS connectors were tested but failed. Then 1 deep CTD cast with water sampling for the MOOSE cruise, and a CTD cast at one station of the transect were performed.

Cruise Report

Tuesday 12 February 2013 (UTC)

Bad weather prevented departure from the Nice harbour.

Thursday 14 February 2013 (UTC)

People on board: Emilie Diamond, Melek Golbol, Baptiste Picard, Vincenzo Vellucci and 3 divers.

0745 Departure from the Nice harbour.

1110 Arrival at the BOUSSOLE site.

1115 C-OPS balance tests.

1130 C-OPS 01, 02, 03.

1220 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 (problems in the cast: many spikes appear, mainly during the upcast).

1310 Diving on the buoy for cleaning of instruments and for dark measurements.

Divers installed the pCO₂ Carioca sensor.

1410 Direct connection with the buoy for data retrieval.

1515 Secchi disk 01 (24m).

1610 Departure to the Nice harbour.

1950 Arrival at the Nice harbour.

Friday 15 February 2013 (UTC)

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

0840 Departure from the Nice harbour.
0910 Arrival at the station 06.
0910 CTD 02, 120m, station 06 (43°39'N 07°21'E). Problems in the dissolved oxygen (DO) data from 20m and in the salinity data from 100m. The cast was stopped.
0945 Changing of the TC duct (small tube between the temperature and conductivity sensors).
1010 CTD 03, 400m, station 06 (43°39'N 07°21'E), dark HS6. Same problems with DO and salinity data as CTD 02.
1100 Lunch.
1200 Changing on the SBE43 pump system between the cables of the CTD/DO with the cables of the AC9 pump. Removing of the AC9, CDOM and BB3 sensors of the rosette.
1225 CTD 04, 400 m, station 06 (43°39'N 07°21'E).
1300 Departure to the Nice harbour.
1330 Arrival at the Nice harbour.

Saturday 16 February 2013 (UTC)

People on board: Emilie Diamond, Melek Golbol and Vincenzo Vellucci.

0640 Departure from the Nice harbour.
1000 Arrival at the BOUSSOLE site. The buoy was a little tilted and below its nominal water line.
1005 CTD 05, 400 m with water sampling at 400, 200, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a_p , POC, CDOM and cytometry (problems in the data of DO, salinity and density from 150m)
1100 CISCO connection with the buoy.
1115 C-OPS 04, 05, 06.
1200 Filtrations for POC.
1250 Cleaning and test of the ARGOS connectors: failed.
1300 Changing of cables and connectors between AC9 pump and CTD pump.
1350 CTD MOOSE 61, 2400m with water sampling, at the BOUSSOLE site.
1525 Departure to the station 04.
1725 CTD 06, 400 m, station 04 (43°34'N 07°31'E).
1800 Departure to the Nice harbour.
1915 Arrival at the Nice harbour.

Problems identified during the cruise

- Data were retrieved with a direct connection with the buoy but the downloading was very long: the DACNet software had many message errors and many files were not downloaded, fortunately the connection was not lost and data were downloaded through FTP, though very slowly (about 1h for the whole data). Some old data appeared on the disk and were all removed since they could be the cause of the slow download rate.
- Problems on O_2 /salinity/CDOM/density data of the CTD casts: different tests were made to find the problem (change of the TC duct, of the pumping system cable ...). Finally, the cable of the DO sensor was deficient. The problem was resolved by removing this cable after the cruise.

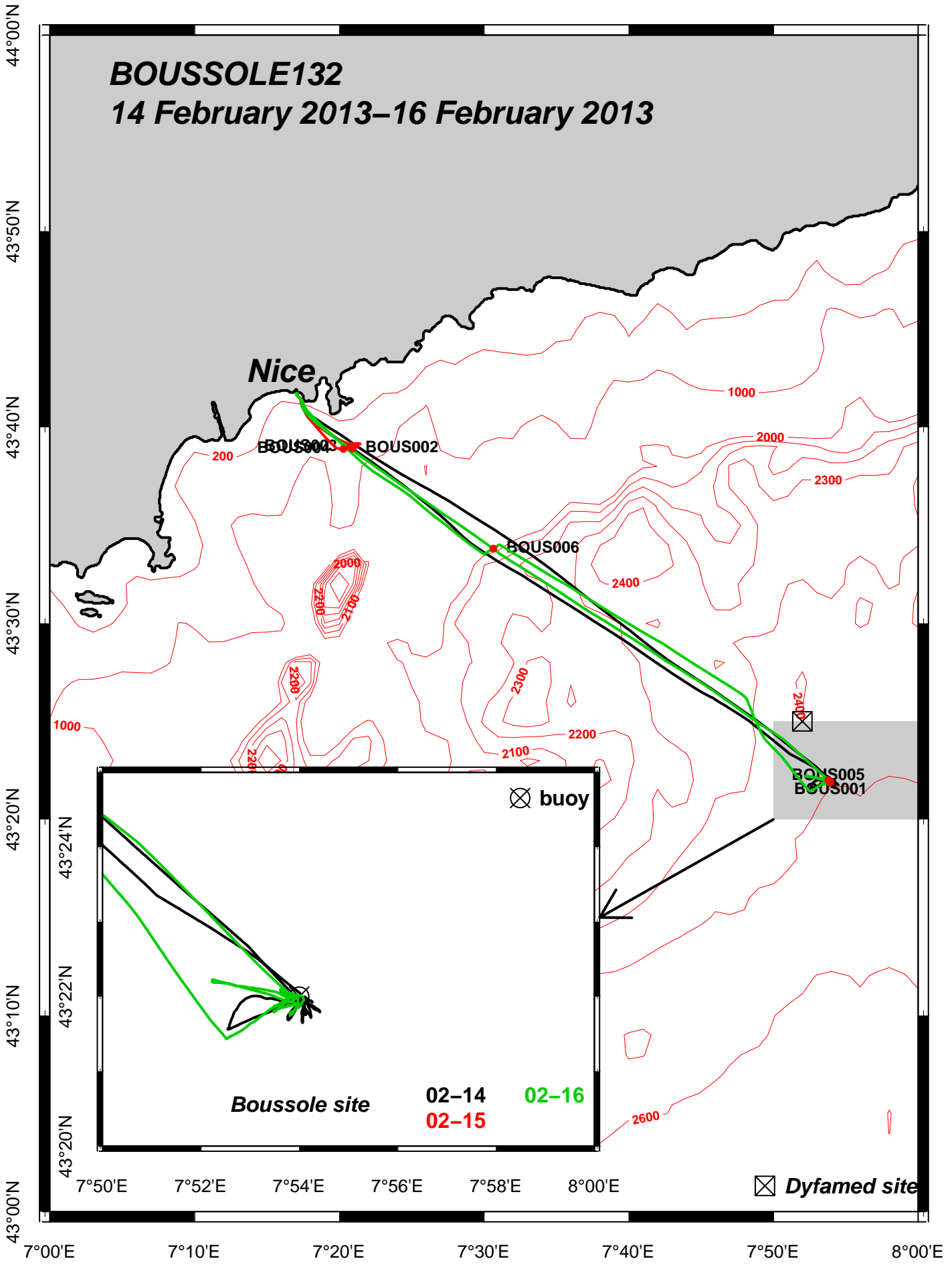
Appendices

Cruise Summary Table for Boussole 132

Date	Black names (file ext: ".raw")	Profile names (file extension: ".raw")	CTD notes / satellite overpass	Other sensors	Start Time GMT (hour.min)	Duration (min.sec)	Depth max (meter)	Latitude (N) (Degree)	Longitude (Degree)	Sk	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	
12/02/13																								
14/02/13	bou_c-ops_130214	1054_001_data.csv			11:12	1:19																		
		bou_c-ops_130214_1054_002_data.csv			11:34	4:49	118.1	43	21.979	7	53.294	blue	Ci	3	10	38	1018.0	40	good	12.4	13.3	calm	1.1	some
		bou_c-ops_130214_1054_003_data.csv			11:47	3:55	90	43	21.850	7	52.744	blue	Ci	3	10	38	1018.0	40	good	12.4	13.3	calm	1.1	some
		bou_c-ops_130214_1054_005_data.csv			11:57	2:26	51.3	43	21.777	7	52.665	blue	Ci	3	10	38	1018.0	40	good	12.4	13.3	calm	1.1	some
	bou_c-ops_130214	1054_006_data.csv			12:13	103:07																		
			CTDBOUS001	HPLC, Ap & TSM Secchi01	12:29	29:00	400	43	21.891	7	53.960	blue		3	8	283	1018.0	39		11.4	13.3	calm		
					15:15	4:00	24	43	22	7	54	blue		3				good						
15/02/13			CTDBOUS002		9:17	4:00		43	38.924	7	20.917	blue		0	11	255	1014.0	56		11.2	13.3	calm		
			CTDBOUS003		10:12	25:00		43	39.000	7	20.764	blue		0	9	76	1014.0	46		11.8	13.3	calm		
			CTDBOUS004		12:30	27:00		43	38.893	7	20.282	cloudy		6	14	217	1014.0	58		12.2	13.3	moved		
16/02/13			CTDBOUS005	HPLC, Ap, TSM, CDOM, POC & cyto	10:10	33:00	400	43	22.004	7	53.792	blue		1	2	321	1020.0	63		11.8	13.3	calm		
	bou_c-ops_130216	1106_001_data.csv			11:19	4:07	100.3	43	22.062	7	53.521	blue	Ci	1	15	344	1020.0	44	good	12.4		calm	0.5	yes
		bou_c-ops_130216_1106_002_data.csv			11:32	4:10	100.3	43	22.101	7	53.211	blue	Ci	1	15	344	1020.0	44	good	12.4		calm	0.5	yes
		bou_c-ops_130216_1106_003_data.csv			11:46	3:44	90.1	43	22.141	7	52.768	blue	Ci	1	15	344	1020.0	44	good	12.4		calm	0.5	yes
	bou_c-ops_130216	1106_004_data.csv			13:05	1:14																		
			CTDBOUS006		17:29	27:00	400	43	33.811	7	30.651	blue		1	2	128	1019.0	46		11.7	13.4	calm		

BOUSSOLE132

14 February 2013–16 February 2013

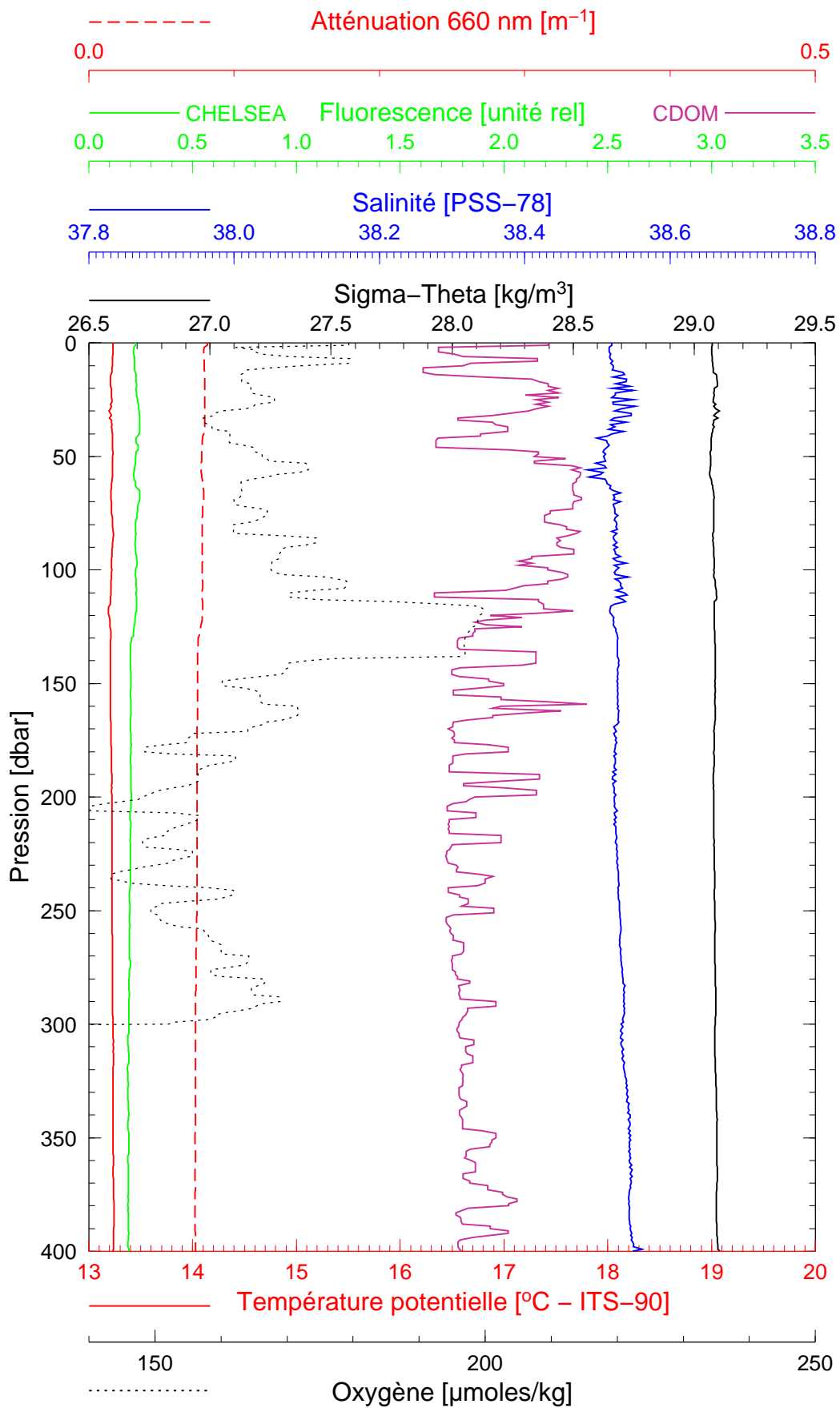


BOUSSOLE 132

14/02/2013

BOUS130214_01

BOUS001



Date 14/02/2013
Heure déb 12h 29min [TU]

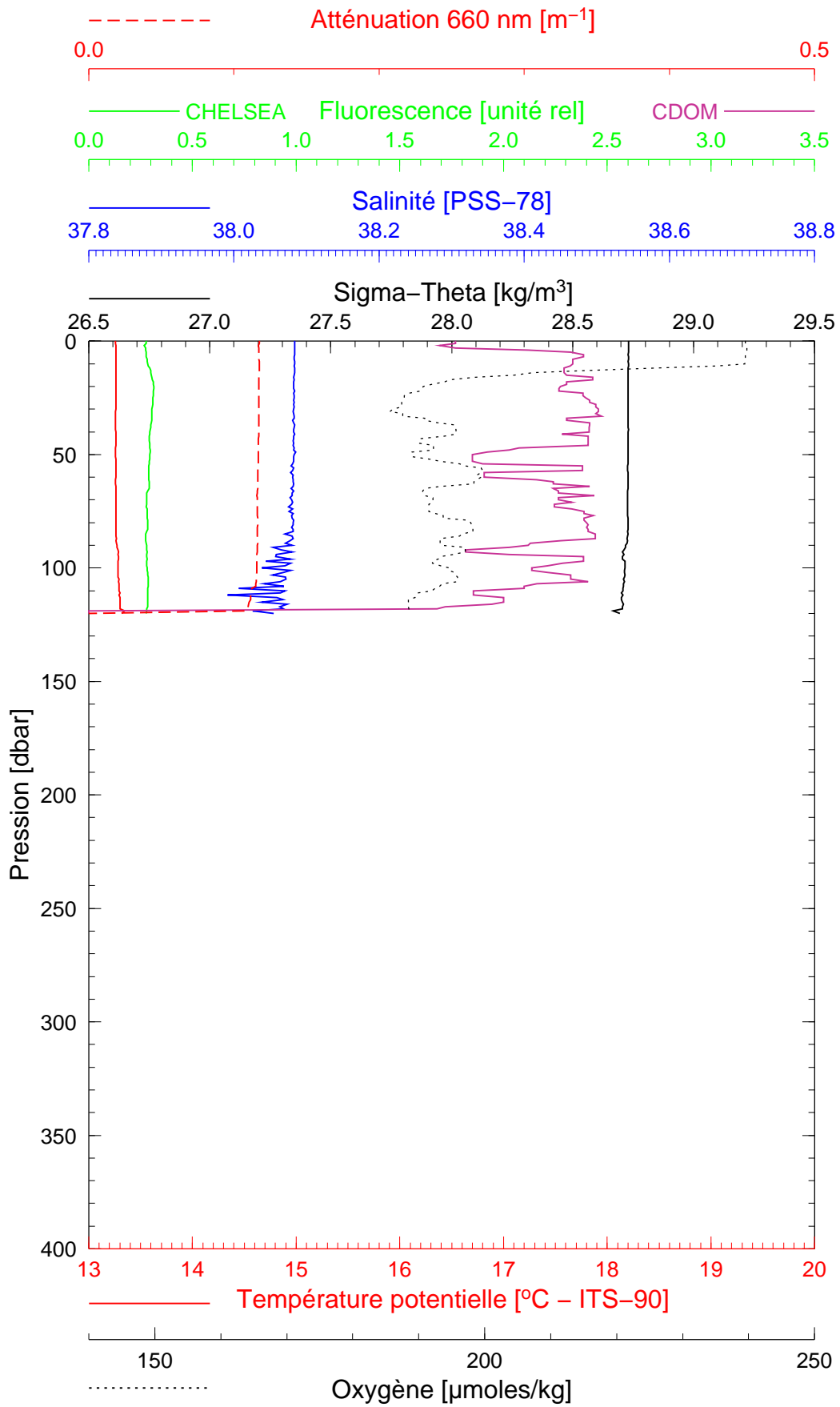
Latitude 43°21.891 N
Longitude 07°53.960 E

BOUSSOLE 132

15/02/2013

BOUS130215_01

BOUS002



Date 15/02/2013

Latitude 43°38.924 N

Heure déb 09h 17min [TU]

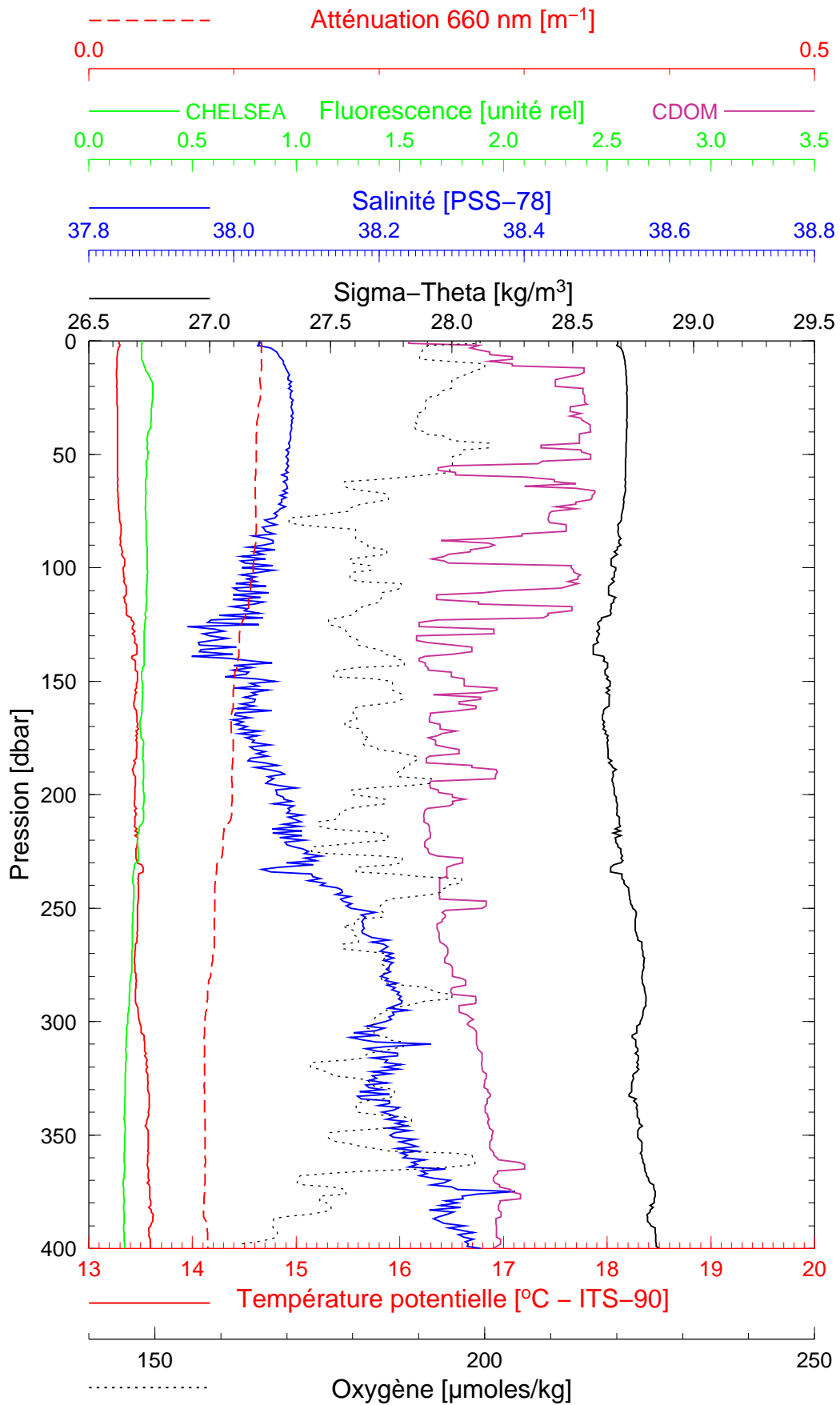
Longitude 07°20.917 E

BOUSSOLE 132

15/02/2013

BOUS130215_02

BOUS003



Date 15/02/2013

Latitude 43°39.000 N

Heure déb 10h 12min [TU]

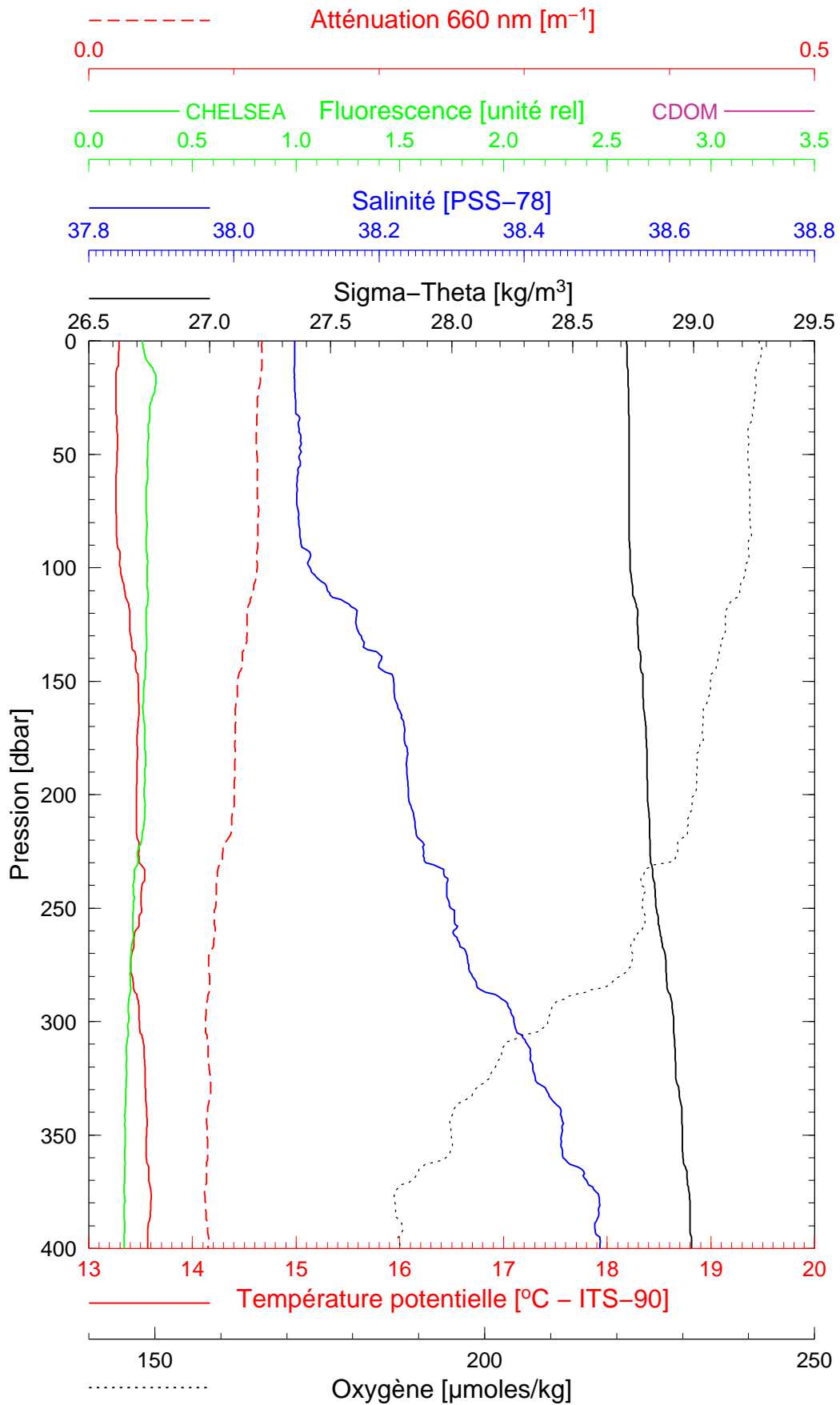
Longitude 07°20.764 E

BOUSSOLE 132

15/02/2013

BOUS130215_03

BOUS004



Date 15/02/2013
Heure déb 12h 30min [TU]

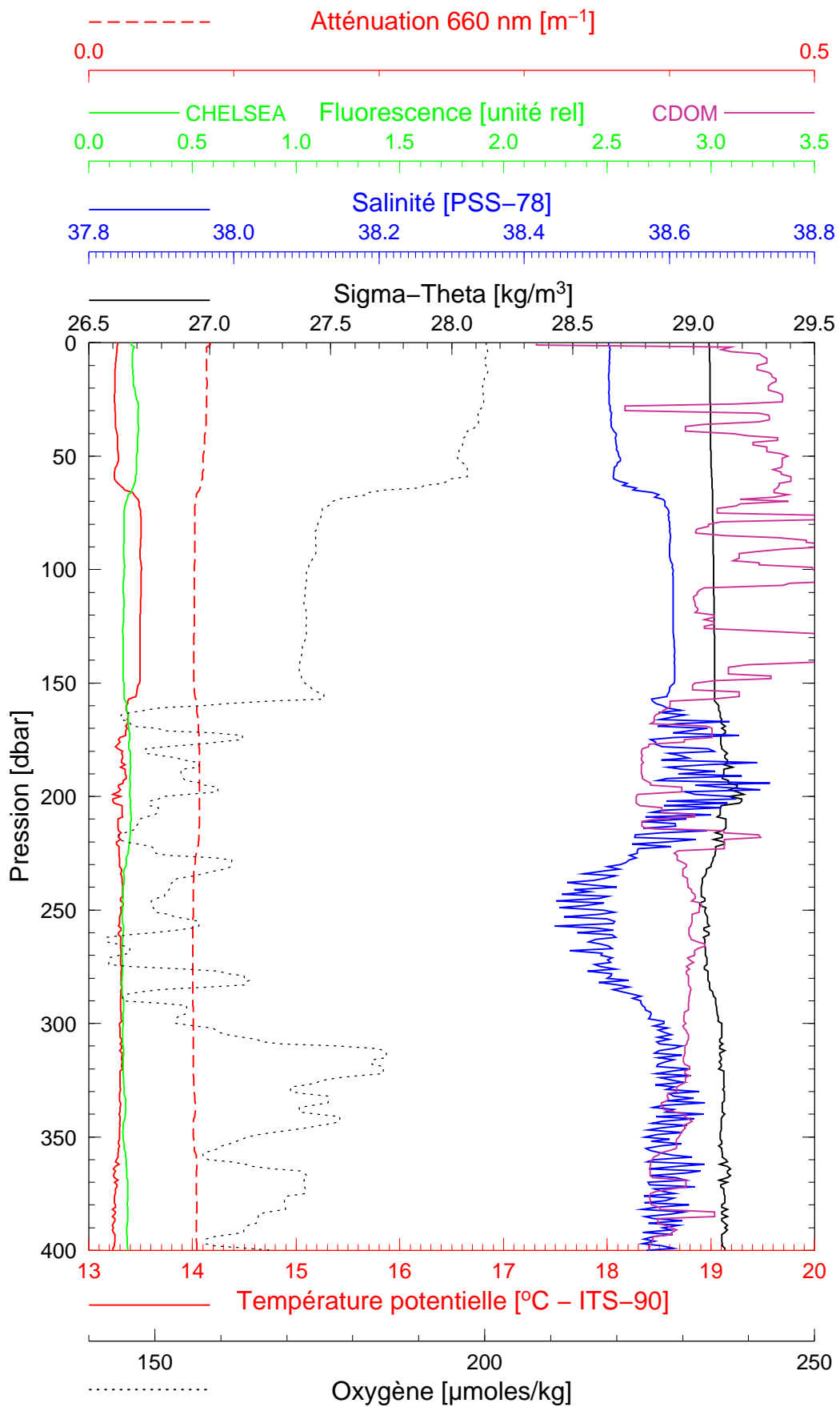
Latitude 43°38.893 N
Longitude 07°20.282 E

BOUSSOLE 132

16/02/2013

BOUS130216_01

BOUS005



Date 16/02/2013
Heure déb 10h 10min [TU]

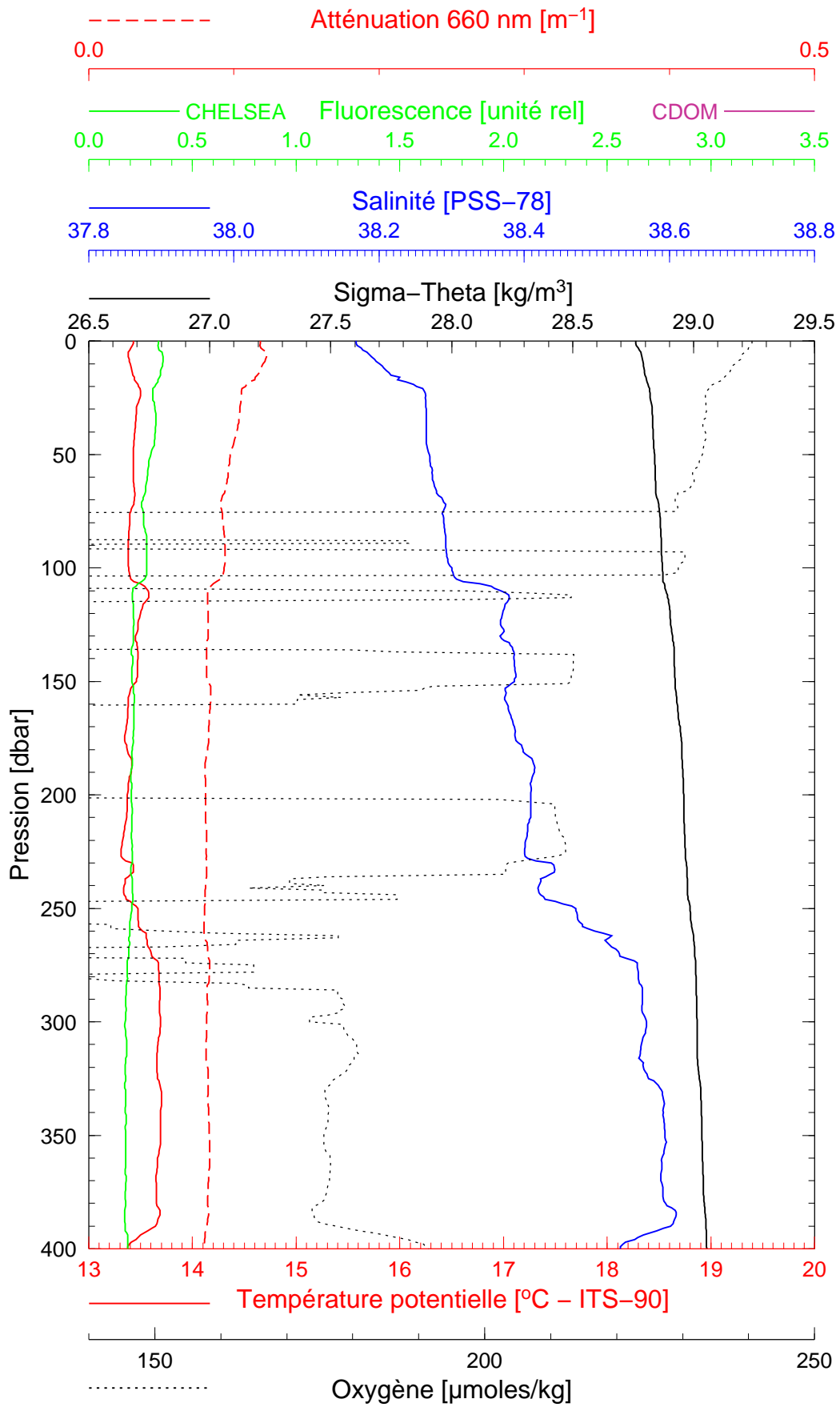
Latitude 43°22.004 N
Longitude 07°53.792 E

BOUSSOLE 132

16/02/2013

BOUS130216_02

BOUS006



Date 16/02/2013
Heure déb 17h 29min [TU]

Latitude 43°33.811 N
Longitude 07°30.651 E