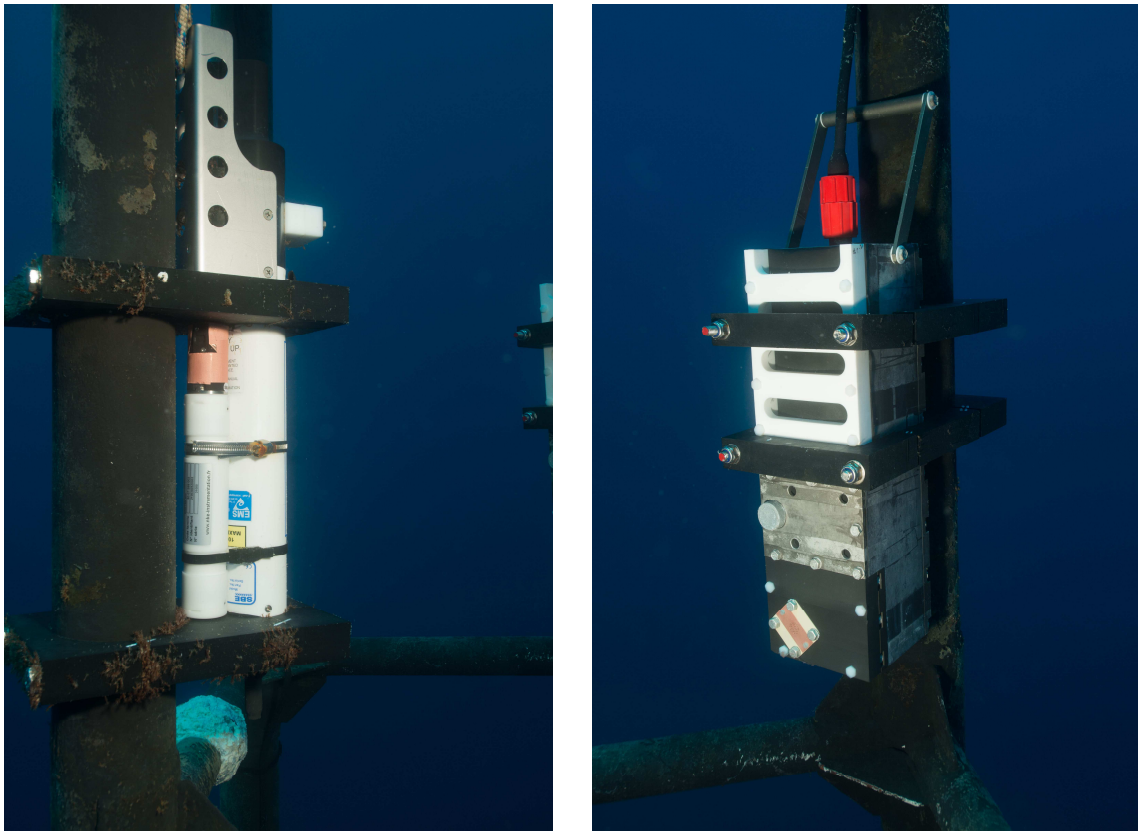
BOUSSOLE Monthly Cruise Report

Cruise 147
May 09 – 12, 2014

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

Science Personnel: Jeremy Delille, Emilie Diamond, Melek Golbol, Yves Lamblard, Morgane Larnicol, David Luquet, Didier Robin and Vincenzo Vellucci.

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



CTD plus optode (left) and pCO2 CARIOCA sensor (right), as installed on the BOUSSOLE buoy at 10m depth (BIOCAREX project).

BOUSSOLE project

ESA/ESRIN contract N° 13226/10/I-NB

May 27, 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

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Centre National de la Recherche Scientifique, 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 depth (5m and 10m) for total alkalinity (AT) and total inorganic carbon (CT) 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 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

Problems appeared with the CTD and its deck unit one day before the start of the BOUSSOLE cruise (during the DYFAMED cruise). The deck unit was switched on after connecting the electrocarrier cable to the CTD. The fuse of the deck unit was blown and the deck unit still did not work after the fuse was replaced. Therefore, the deep CTD cast could not be performed that day. Another CTD main housing and deck unit were brought on board the next day. After the work at BOUSSOLE was completed, a deep CTD cast was performed at the first station of the CTD transect.

Cruise Summary

Bad weather prevented departure from the Nice harbour the two last days. Only the first day was used for the cruise. This day was used to retrieve data from the buoy, to perform optical profiles and a Secchi disk. The

problems with the CTD were solved. Then, a CTD cast with water sampling at the BOUSSOLE site was performed. Finally, the CTD transect was performed partially and included a deep cast at the first station.

Friday 09 may 2014

This day was programmed for the DYFAMED Cruise. The meteorological forecasts were better than those of the next days. Divers were already on board for a dive on the Météo France – Côte d'Azur Buoy programmed during the DYFAMED cruise. So we took advantage of that day to perform the diving operations on the BOUSSOLE buoy (cleaning and taking pictures of the buoy sensors, dark measurements of the backscattering meter and transmissometers).

Saturday 10 May 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 overcast. The CTD main housing and deck unit brought on board this day were tested during the way up to BOUSSOLE. The same problems as the day before appeared: the fuse of the deck unit was blown when the deck unit was switched on after connecting the CTD to the electocarrier cable. When arrived at BOUSSOLE, the above-surface irradiance and PAR sensors were cleaned, as well as the connectors of the ARGOS beacon, solar panels, and CISCO antenna. Buoy data were partially retrieved via cable connection to the buoy computer. The remaining data were retrieved one hour after using the wireless radio connection. Data from the pCO_2 sensor at 3m were downloaded using the telemetry cable. Data from the pCO_2 sensor at 10m could not be downloaded. Then, 2 C-OPS profiles and a Secchi disk were performed at the BOUSSOLE site. In the meantime the issue on the CTD was identified by the crew : the ship side termination of the electrocarrier cable had a short circuit at the level of the welding with the coaxial cable. This issue was then fixed and the CTD worked correctly. The sensors used at BOUSSOLE were installed with the CTD main housing on the rosette. A CTD cast with water sampling could be performed subsequently at the BOUSSOLE site, and followed by a deep CTD cast at station 01 of the CTD transect (for the DYFAMED program). Finally, the CTD transect was partially completed (station 03 and station 05).

Sunday 11 May 2014

Bad weather prevented departure from the Nice harbour.

Monday 12 May 2014

Bad weather prevented departure from the Nice harbour.

Pictures taken during this cruise can be found at:
https://plus.google.com/photos/114686870380724925974/albums/6012900678082311105?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

Friday 09 may 2014 (UTC)

People on board: Jérémy Delille, Emilie Diamond, Yves Lamblard, Morgane Larnicol, David Luquet and Didier Robin.

0515 Departure from the Nice harbour.
0810 Arrival at the Météo France - Cote d'Azur buoy.
0830 Diving on the Météo France - Cote d'Azur buoy.
0920 Departure to the DYFAMED site.
0940 Operations at DYFAMED site.

1130 Departure to the BOUSSOLE site.
1200 Diving on the buoy for cleaning sensors, performing dark measurements, taking pictures.
1310 Departure to the Nice harbour.
1610 Arrival at the Nice harbour.

Saturday 10 May 2014 (UTC)

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

0545 Departure from the Nice harbour.
0915 Arrival at the BOUSSOLE site.
0935 Cleaning of the solar panels, ARGOS and CISCO connectors, sensors on the top of the buoy. Connection with the pCO2 sensors at 3m and 10 m and data retrieval of the pCO2 sensor at 3m.
0945 C-OPS 01, 02.
1000 Direct connection with the buoy and partial data retrieval (35%).
1100 Wireless radio connection with the buoy and data retrieval (100%).
1145 Secchi disk 01 (15m).
1200 CTD tests and installation of the sensors on the Rosette.
1315 CTD 01, 400 m with water sampling 400, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a_p, CDOM and TA/TC.
1400 Departure to the first transect station.
1445 CTD 02, 1500m, station 01 (43°25'N 07°48'E).
1600 Departure to the third transect station.
1730 CTD 03, 400m, station 03 (43°31'N 07°37'E).
1800 Departure to the fifth transect station.
1900 CTD 04, 400 m, station 05 (43°37'N 07°25'E).
1925 Departure from the station 05.
2030 Arrival at the Nice harbour.

Sunday 11 May 2014

Bad weather prevented departure from the Nice harbour.

Monday 12 May 2014

Bad weather prevented departure from the Nice harbour.

Problems identified during the cruise

- The CTD deck unit usually used at the BOUSSOLE site was not working before the cruise. This deck unit was used during the DYFAMED cruise one day before. When it was switched on after connecting the electrocarrier cable to the CTD, an alarm sounded and the fuse of the deck unit was blown. The deck unit still did not work despite the change of the fuse. So another CTD main housing and deck unit were brought on board the day of the BOUSSOLE cruise. During the way up to BOUSSOLE, the CTD main housing and deck unit were connected initially to the cable test in order to test them. The system worked correctly. The CTD was connected secondly to the electrocarrier cable. When the deck unit was switched on: the alarm sounded and the fuse was blown. The issue on the CTD was identified by the crew : the ship side termination of the electrocarrier cable had a short circuit at the level of the welding with the coaxial cable. This issue was then fixed and the CTD worked correctly.
A few days after, the faulty BOUSSOLE deck unit was tested in the laboratory. In fact, there were two fuses on the deck unit, only one was changed during the cruise. The other was difficult to find. It was eventually located and changed, the deck unit was tested, and it worked correctly.

- Data from the pCO_2 sensor at 10m could not be downloaded, only data from the pCO_2 sensor at 3m could be downloaded via the telemetry cable.

- Buoy data were partially retrieved via cable connection to the buoy computer because the connection was interrupted. Nevertheless, the remaining data were retrieved one hour after using the wireless radio connection.

- The CTD transect could not be performed entirely due to the lack of time. 50% of the transect was performed (CTD casts only at Station 01, 03 and 05). The CTD cast at station 01 was performed without the IOP package because it was a deep cast (1500m depth), and the IOP instruments cannot go deeper than 400m.

- The computer of the Téthys managing the system « Daufin » was not functioning. This system allows the acquisition, storage and provision of data from the sensors installed on the boat. Therefore, the navigation file is not available for this cruise.

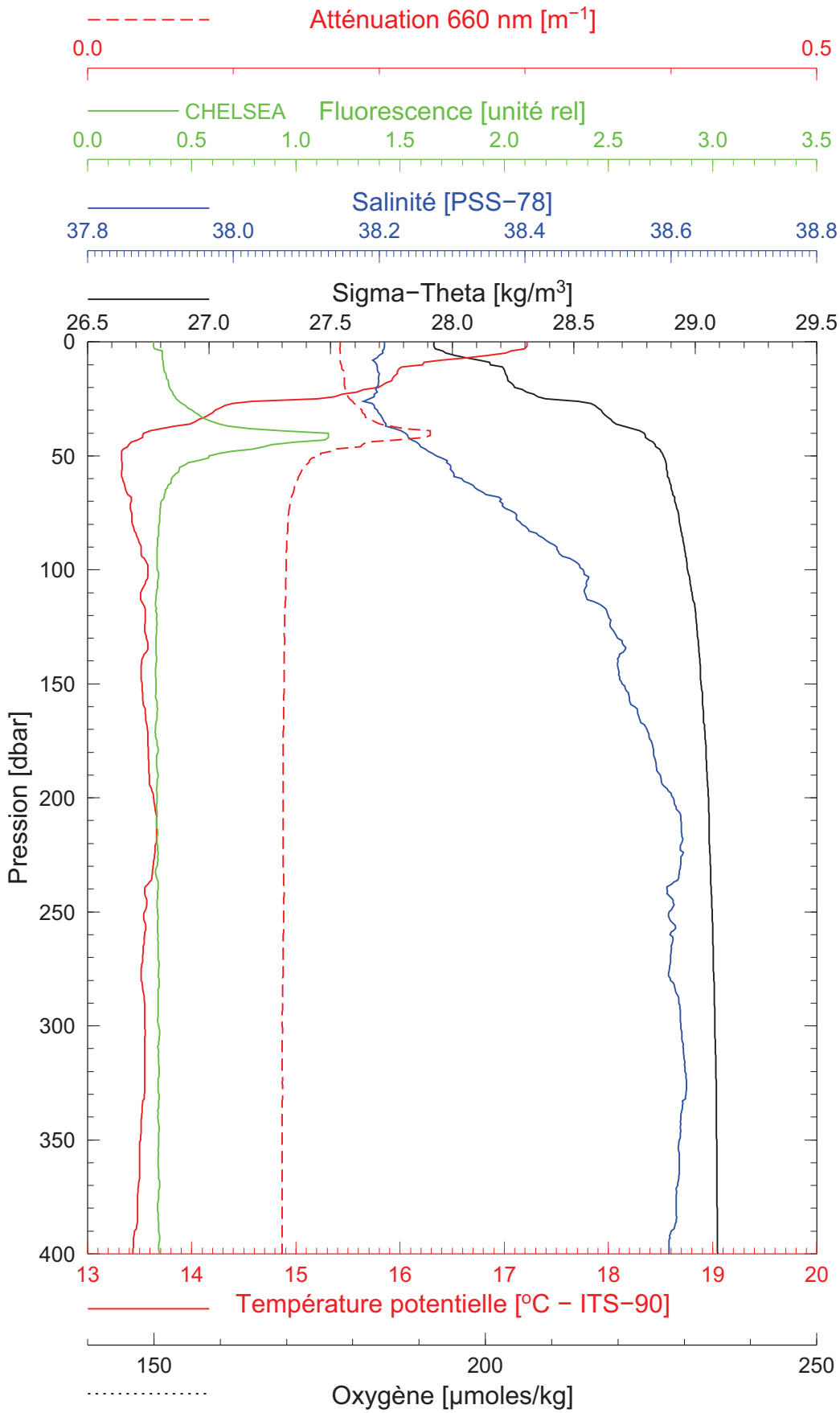
Appendices

Cruise Summary Table for Boussole 147

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
09/05/14	DYFAMED cruise																								
	bou_c-ops_140510_0833_001_data.csv				09:37	1:19																			
		bou_c-ops_140510_0833_002_data.csv			09:47	2:26	60.0	43	22.263	7	53.671	overcast	Cu&Sc	7	8	94	1016.8	81	medium	17.3		calm	0.7		no
		bou_c-ops_140510_0833_003_data.csv			10:09	2:23	60.0	43	22.485	7	53.088	overcast	Cu&Sc	7	8	94	1016.8	81	medium	17.3		calm	0.7		no
	bou_c-ops_140510_0833_006_data.csv				10:29	1:34																			
10/05/14				Secchi01	11:45	4:00	15	43	22	7	54	overcast		7					medium			calm			
			CTDBOUS001	HPLC, Ap, TSM, CDOM & TA/TC	13:21	32:00	400	43	22.110	7	53.789	overcast		7	5	23	1016.0	75		19.7	17.25	calm			
			CTDBOUS002		14:49	72:00	1500	43	24.932	7	47.980	overcast		8	1	273	1015.7	77		18.3	17.30	calm			
			CTDBOUS003		17:32	24:00	400	43	30.901	7	36.817	overcast		8	5	193	1014.6	77		17.3	17.88	calm			
			CTDBOUS004		18:59	23:00	400	43	36.964	7	24.879	overcast		night	2	143	1015.1	79		17.3	17.62	calm			
11/05/14	Bad weather																								
12/05/14	Bad weather																								

BOUSSOLE 147 **10/05/2014** **BOUS140510_01**

BOUS001

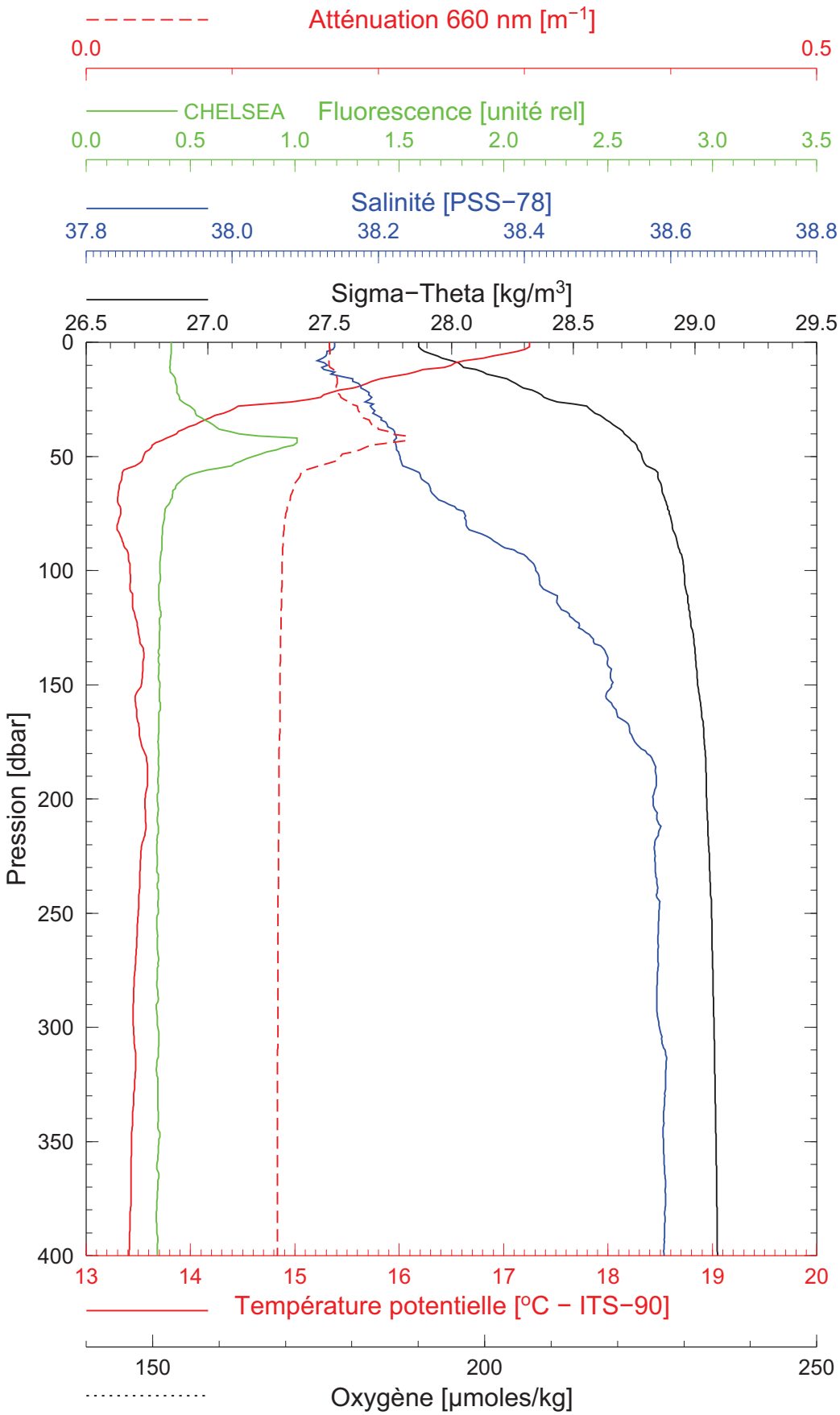


Date *10/05/2014* *Latitude* *43°22.110 N*

Heure déb *13h 21min [TU]* *Longitude* *07°53.789 E*

BOUSSOLE 147 **10/05/2014** **BOUS140510_02**

BOUS002

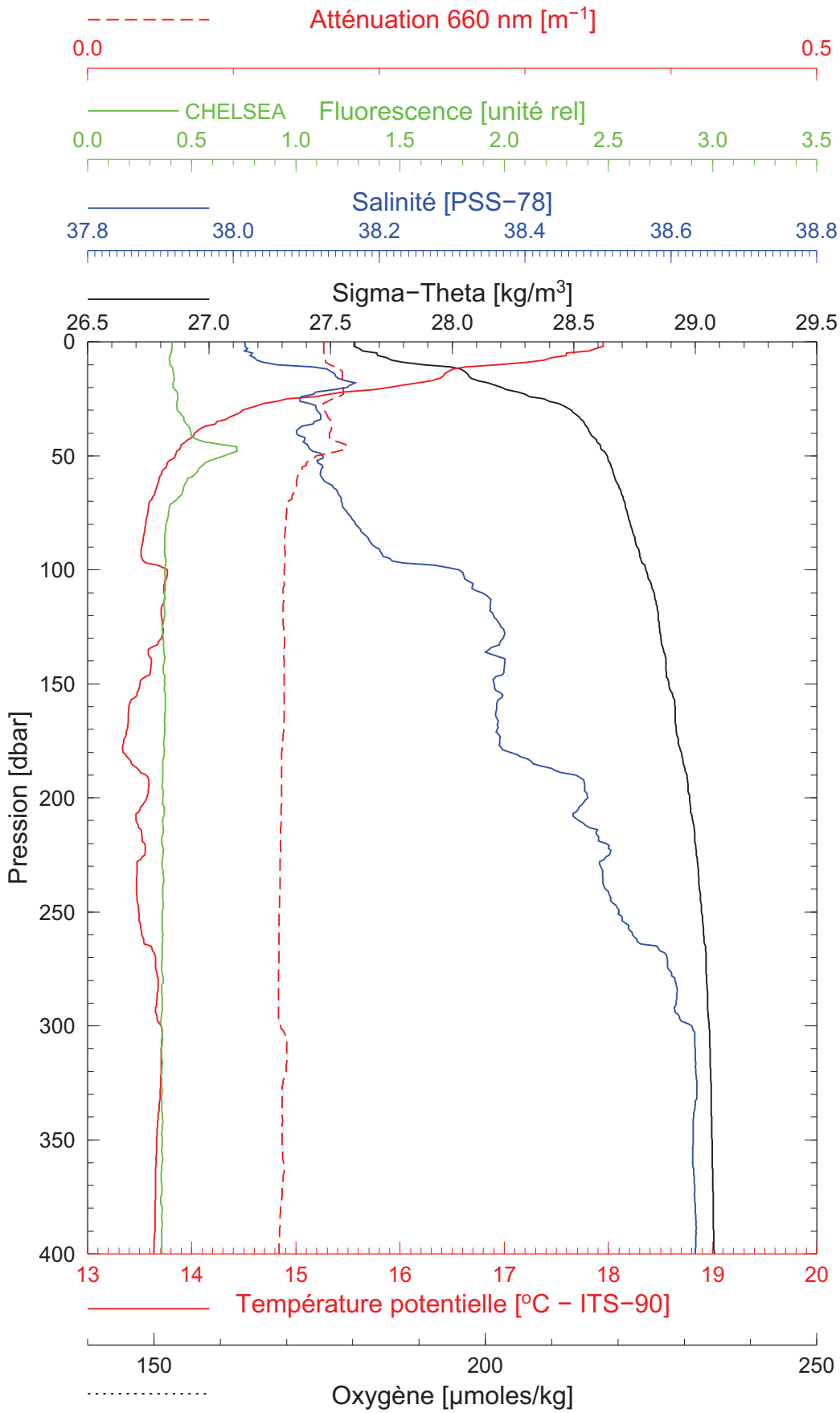


Date *10/05/2014* *Latitude* *43°24.932 N*

Heure déb *14h 49min [TU]* *Longitude* *07°47.980 E*

BOUSSOLE 147 **10/05/2014** **BOUS140510_03**

BOUS003

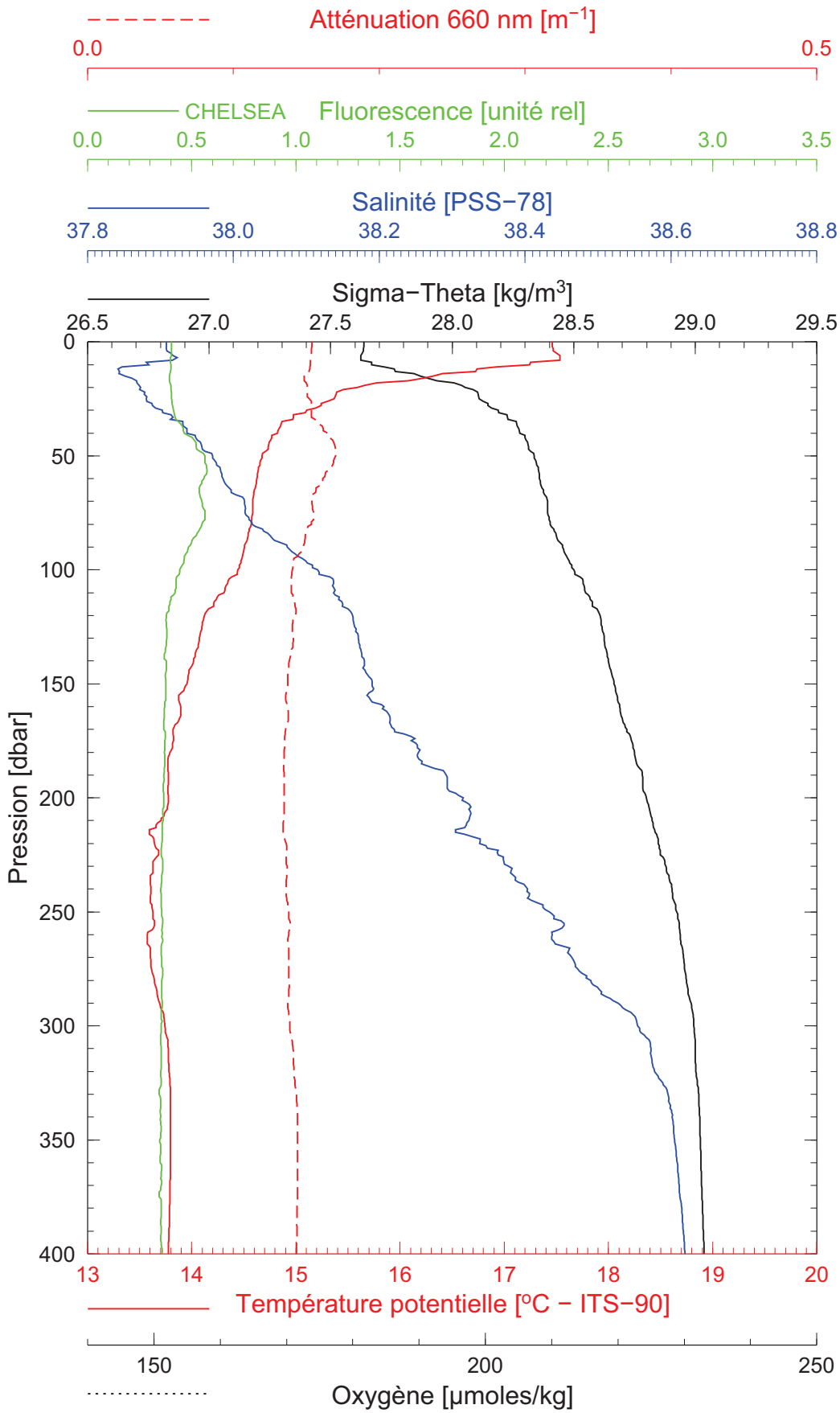


Date *10/05/2014* *Latitude* *43°30.901 N*

Heure déb *17h 32min [TU]* *Longitude* *07°36.817 E*

BOUSSOLE 147 **10/05/2014** **BOUS140510_04**

BOUS004



Date *10/05/2014* *Latitude* *43°36.964 N*

Heure déb *18h 59min [TU]* *Longitude* *07°24.879 E*