

BOUSSOLE Monthly Cruise Report

Cruise 154

December 11– 14, 2014

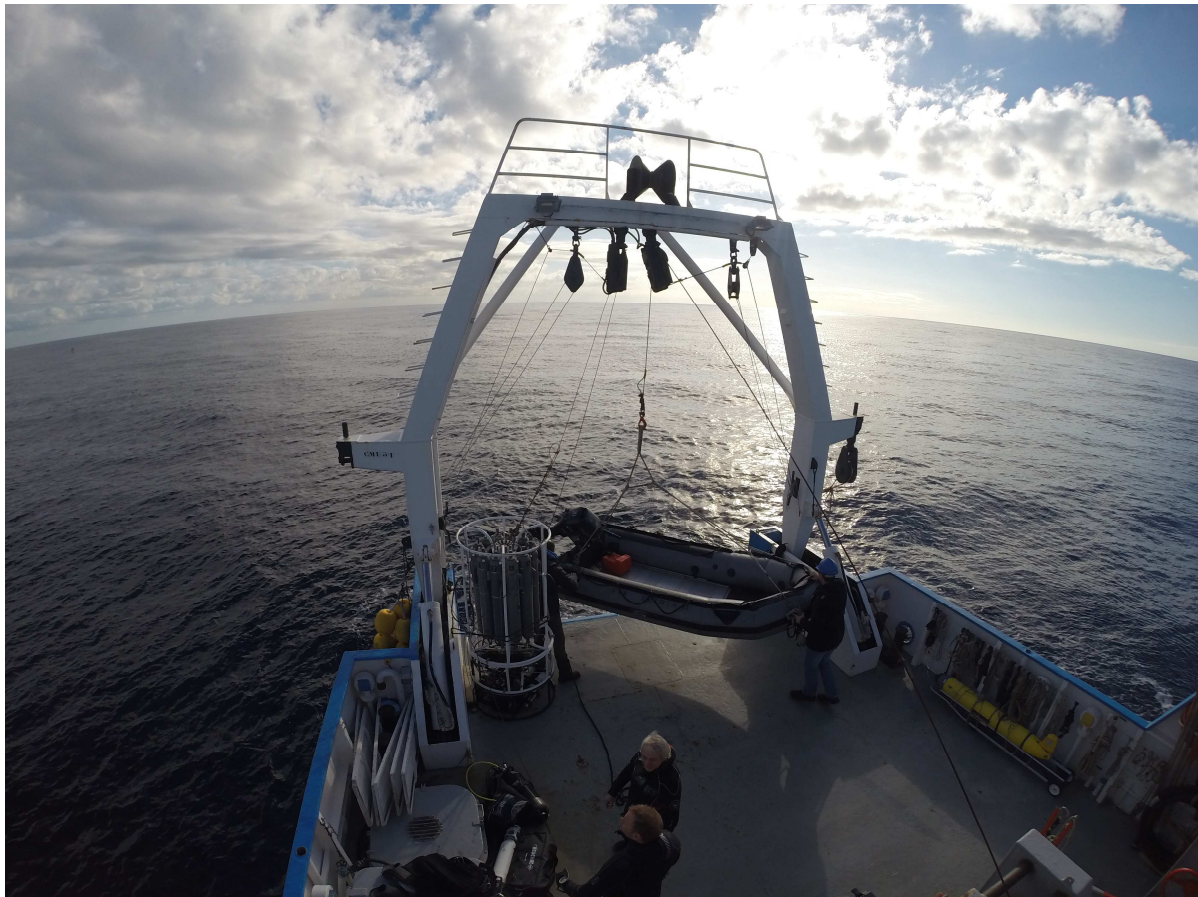
Duty Chief: Melek Golbol (golbol@obs-vlfr.fr)

Vessel: R/V Téthys II

(Captain: Joël Perrot)

Science Personnel: Guillaume De Liège, Melek Golbol, Yves Lamblard, Sabine Marty, Grigor Obolensky, Didier Robin, Vincenzo Vellucci and Samuel Wilson.

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



Launch of the dinghy from the deck of the *Téthys II* before the diving operations at the BOUSSOLE site.

BOUSSOLE project

ESA/ESRIN contract N° 13226/10/I-NB

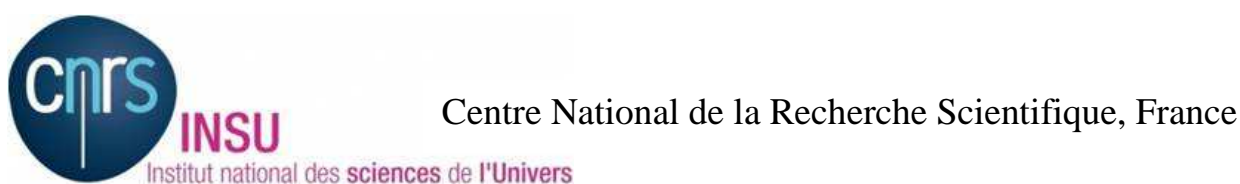
January 27, 2015



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



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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 (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 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 first day, 4 anodes were installed by the divers next to the sphere on the metallic structure of the buoy.

The second day, a radiance camera was deployed at surface on the BOUSSOLE site. The radiance camera is an underwater multispectral instrument that measures upwelling radiances in all direction of a hemisphere at a 1° angular resolution in 6 spectral bands.

Measurements of above-surface reference irradiance with a TriOS radiometer and 2 Biospherical's C-OPS radiometers were performed in the same time at the BOUSSOLE site and during the way back from BOUSSOLE. The objective is to compare the data acquired by these sensors.

During the diving day, the pCO₂ CARIOCA sensor at 3m was replaced by another one.

Cruise Summary

The first day was used to perform the diving operations, two CTD casts with water sampling and optical profiles at the BOUSSOLE site. The second day was used for a CTD cast with water sampling, optical profiles, a Secchi

disk and upwelling radiance measurements at the BOUSSOLE site. The CTD transect could not be performed during the way back from the BOUSSOLE site because of bad weather. The third day was cancelled because of bad weather. The last day, we planned to perform the CTD transect from the Nice harbour to the BOUSSOLE site. It was cancelled because bad weather prevented us to perform CTD casts at Station #06 and Station #05.

Thursday 11 December 2014

The sea state was slight with a light breeze. The sky was blue with an excellent visibility. The buoy was tilted and below its nominal water line probably because of strong currents. This day was used for diving operations (cleaning of the buoy sensors, taking pictures and performing dark measurements of the backscattering meter and transmissometers). Divers installed 4 anodes next to the sphere on the metallic structure of the buoy. They also replaced the pCO₂ CARIOCA sensor at 3m by another one. Unfortunately they could not replace the pCO₂ sensors at 10m because they had not enough oxygen in their bottles. 2 CTD casts with water sampling and 3 C-OPS profiles were performed at the BOUSSOLE site.

Friday 12 December 2014

The sea state was slight with a moderate breeze. The sky was blue with an excellent visibility. The buoy was tilted and below its nominal water line as during the previous day. This day was used to perform 1 CTD cast with water sampling and 3 C-OPS profiles. The cleaning of the ARGOS and CISCO connectors was attempted directly from the dinghy but this operation failed. The Radiance Camera was deployed at the BOUSSOLE site to measure the upwelling radiance. Then we tried to do the CTD transect on the way back from the BOUSSOLE site but bad weather prevented us to perform the CTD casts at Station #01 and Station #02, so this operation was cancelled and postponed to the next days. An intercomparison of above-surface reference irradiance obtained with a TriOS radiometer and 2 Biospherical's C-OPS radiometers was performed on the BOUSSOLE site and during the way back from BOUSSOLE.

Saturday 13 December 2014

Bad weather prevented departure from the Nice harbour.

Sunday 14 December 2014

This day, we tried to perform the CTD transect from the Nice harbour to the BOUSSOLE site but bad weather prevented us to perform the CTD casts at Station #06 and Station #05. Then we decided to return to the Nice harbour.

Pictures taken during this cruise can be found at:

<https://plus.google.com/photos/114686870380724925974/albums/6102287390251851393?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 11 December 2014 (UTC)

People on board: Guillaume De Liège, Melek Golbol, Yves Lamblard, Didier Robin, Vincenzo Vellucci and Samuel Wilson.

0635 Departure from the Nice harbour.
1000 Arrival at the BOUSSOLE site.

1015 Diving on the BOUSSOLE buoy for cleaning sensors, performing dark measurements, taking pictures and replacing of the pCO₂ sensor at 3m.
1100 Lunch.
1225 CTD 01, 400m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a_p and TSM.
1330 C-OPS 01, 02, 03.
1445 CTD 02, 400m with water sampling at 400, 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a_p, CDOM, DO and TA/TC.
1520 Departure to the Nice harbour.
1830 Arrival at the Nice harbour.

Friday 12 December 2014 (UTC)

People on board: Melek Golbol, Sabine Marty and Grigor Obolensky.

0615 Departure from the Nice harbour.
0940 Arrival at the BOUSSOLE site.
0945 Attempts of cleaning ARGOS and CISCO connectors: failed.
1045 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.
1125 C-OPS 04, 05, 06.
1150 Secchi 01, 26m.
1200 Upwelling radiance measurement.
1315 Departure to the first transect station.
1345 Station 01 (43°25'N 07°48'E): CTD cancelled (bad weather).
1415 Station 02 (43°28'N 07°42'E): CTD cancelled (bad weather).
Departure to the Nice harbour.
1630 Arrival at the Nice harbour.

Saturday 13 December 2014 (UTC)

Bad weather prevented departure from the Nice harbour.

Sunday 14 December 2014

People on board: Melek Golbol and Grigor Obolensky.

0630 Departure from the Nice harbour.
0700 Arrival at the Station 06 (43°39'N 07°21'E): CTD cancelled (bad weather).
0705 Departure to the Station 05 of the CTD transect.
0735 Arrival at the Station 05 (43°37'N 07°25'E): CTD cancelled (bad weather).
0740 Departure to the Nice harbour.
0900 Arrival at the Nice harbour.

Problems identified during the cruise

- Only the PCO₂ sensor at 3m was replaced during the cruise. The pCO₂ sensor at 10m could not be replaced because the divers had not enough oxygen. It will be replaced during the next cruise.
- The first day, the metallic structure of the Rosette was damaged during the second CTD cast: The Rosette was attached to the electrocarrier cable operated by the winch. The lever of the winch was inadvertently engaged and when the hydraulic pump was switched on, the Rosette crossed suddenly the after deck of the boat and

collided violently with the boat. Only two metal bars were damaged, the sensors and Niskin bottles were not impacted by the shock.

- The IOP package did not work correctly. There were problems in the data files acquired by the sensors and the data could not be processed. The sensors were sent back to manufacturer (Hobilabs Inc.) for calibration just after the cruise and the problem is not solved for this moment.
- The buoy data could not be downloaded directly (via cable) because the buoy was tilted and below its nominal water line. The CISCO connection also did not work, likely because the connectors needed to be cleaned. The second day, cleaning of the ARGOS and CISCO connectors on the top of the buoy was attempted directly from the dinghy. This operation failed and was cancelled: the dinghy collided with a corner of a solar panel and one inflated tube of the dinghy was deflated.
- The « Daufin » system managing the acquisition, storage and provision of navigation, meteorological, thermosalinometer and fluorimeter data from the sensors installed on the *Tethys II* was unavailable during this cruise. It will be replaced in February 2015 by a new system. Therefore the corresponding data are not available for this cruise.

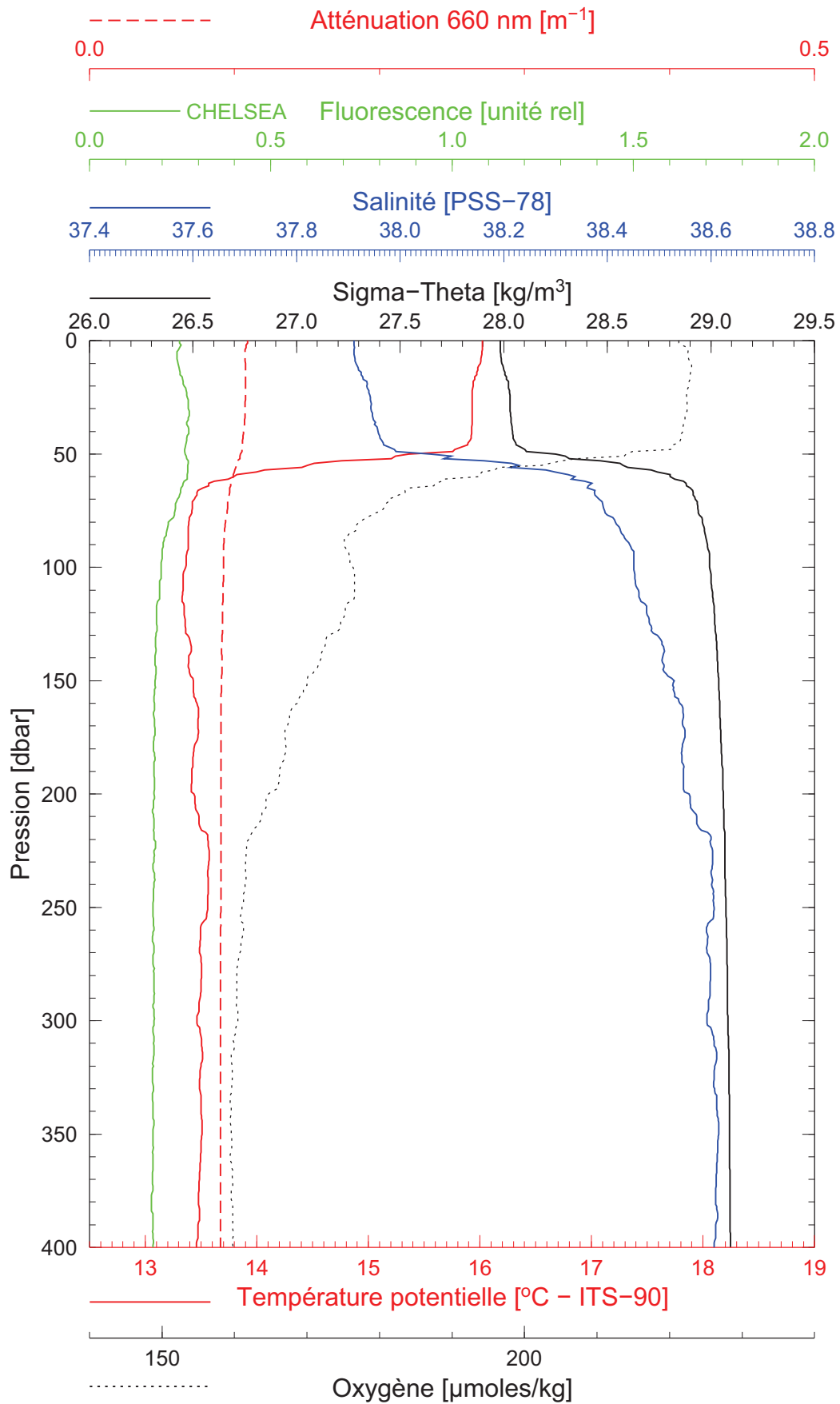
Appendices

BOUSSOLE 154

11/12/2014

BOUS141211_01

BOUS001



Date 11/12/2014
Heure déb 12h 25min [TU]

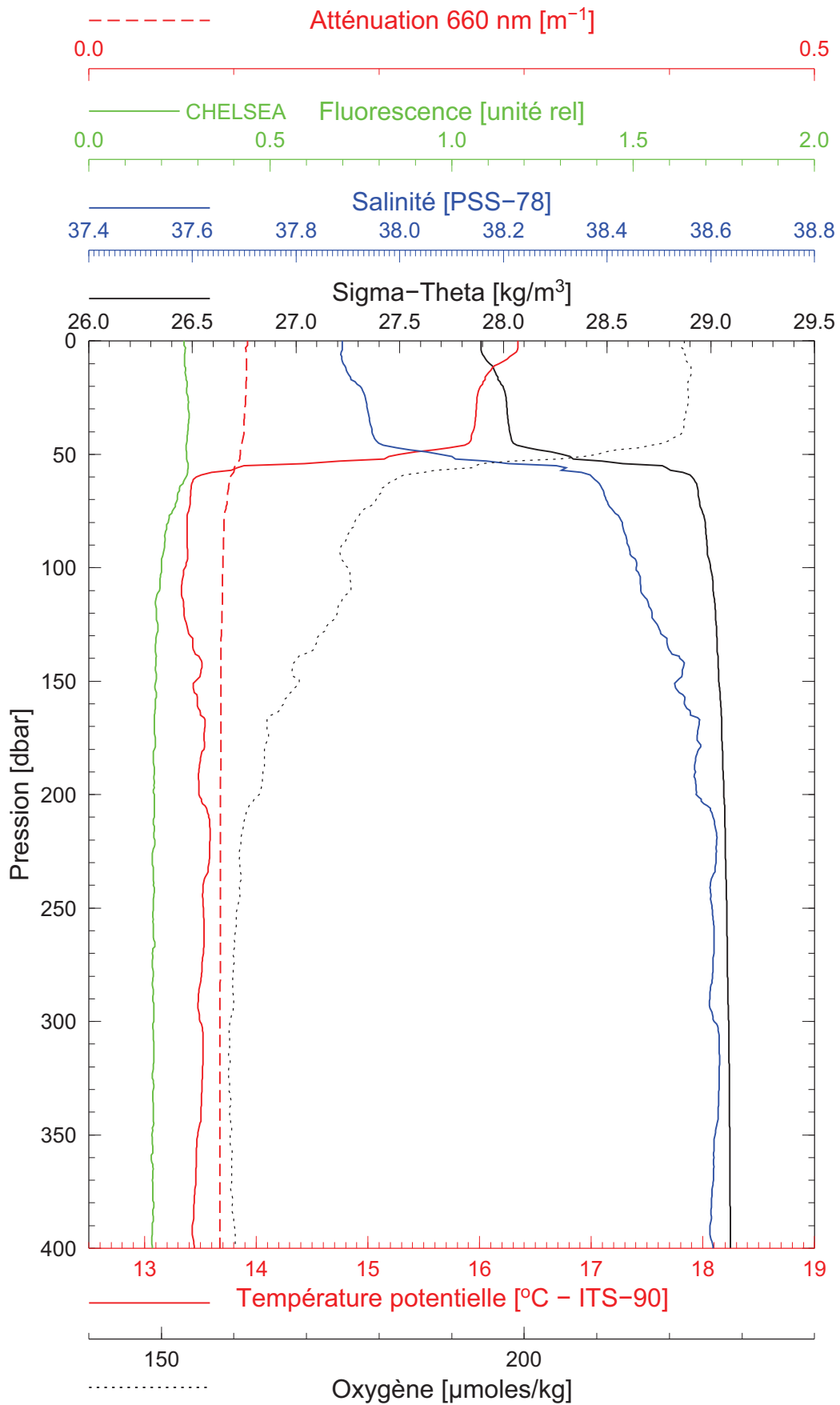
Latitude 43°22.037 N
Longitude 07°52.809 E

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11/12/2014

BOUS141211_02

BOUS002



Date 11/12/2014

Latitude 43°22.236 N

Heure déb 14h 43min [TU]

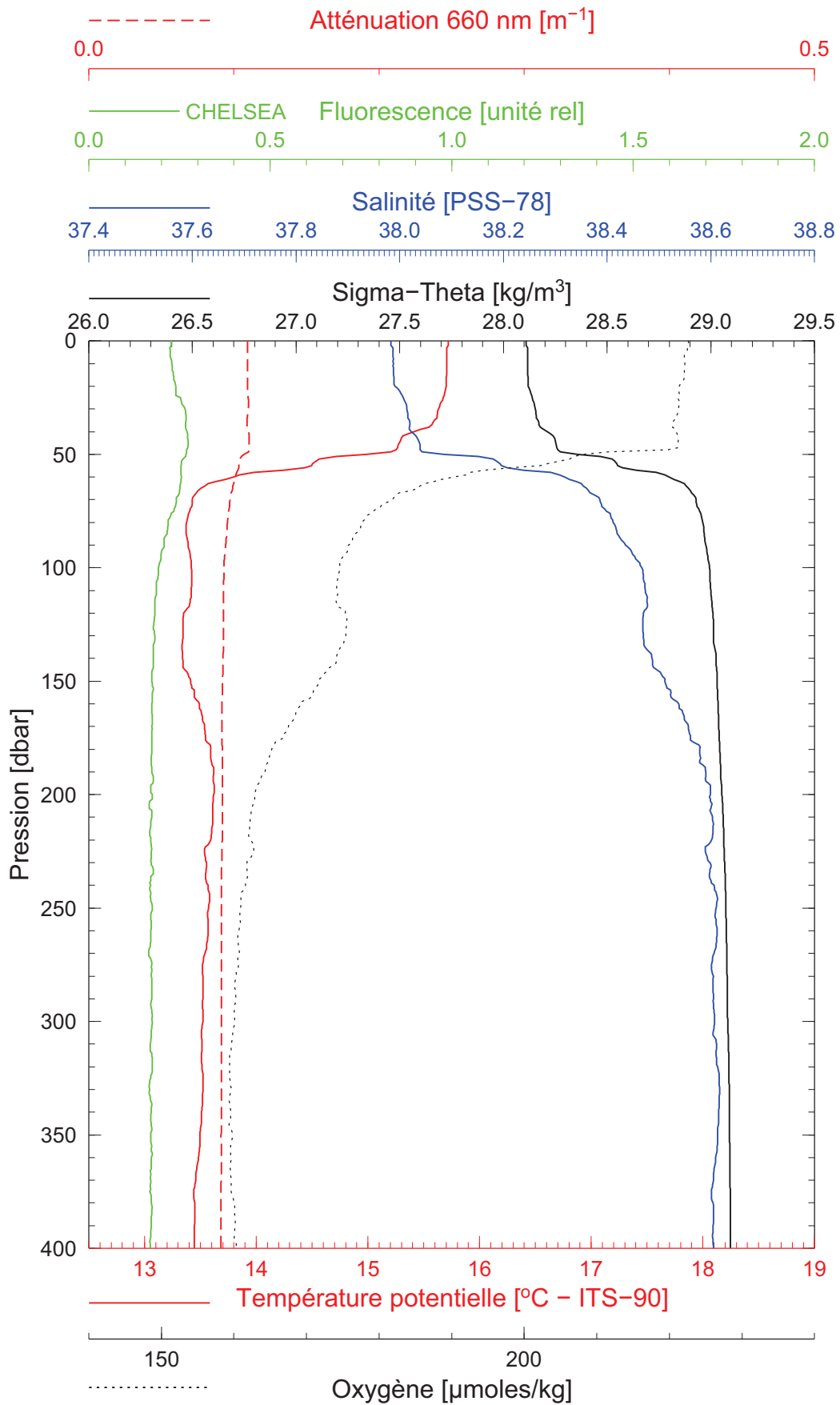
Longitude 07°53.626 E

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12/12/2014

BOUS141212_03

BOUS003



Date 12/12/2014

Latitude 43°22.528 N

Heure déb 10h 46min [TU]

Longitude 07°53.739 E