

BOUSSOLE Monthly Cruise Report

Cruise 171

May 03-04, 2016

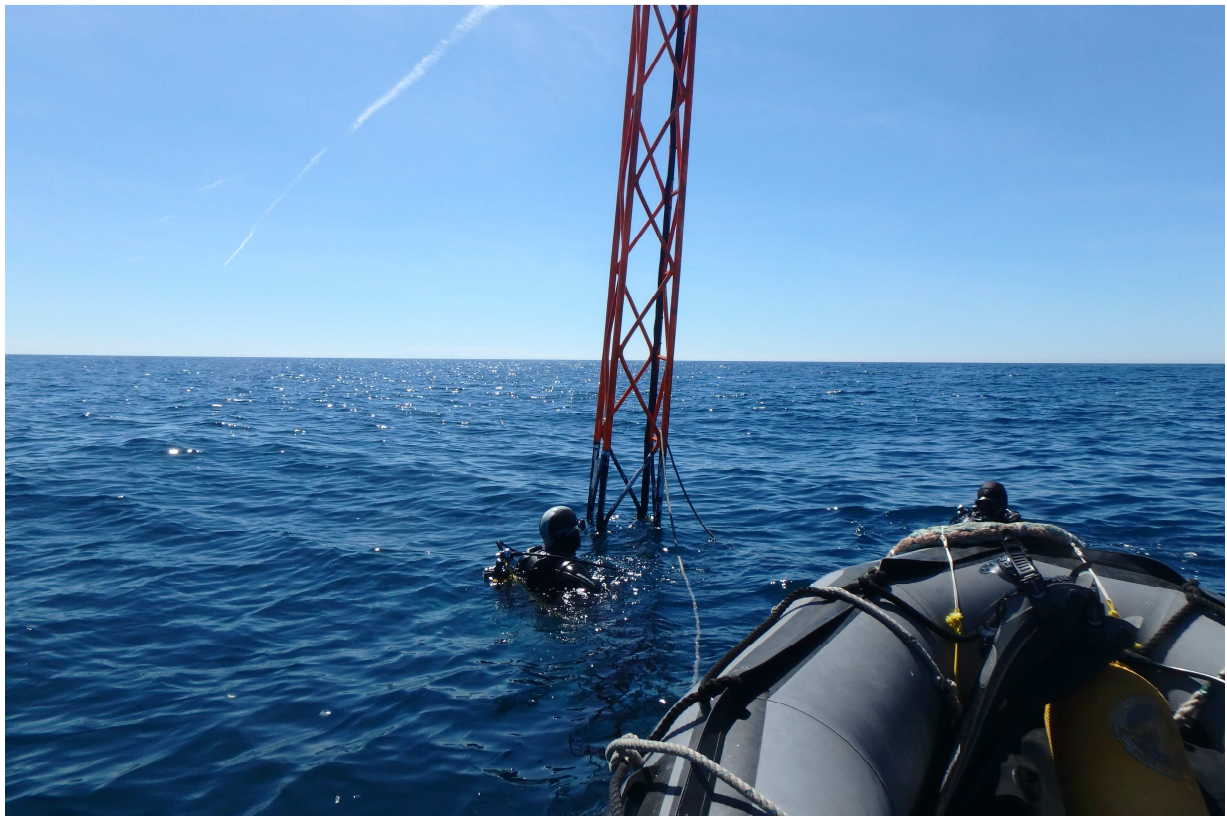
Duty Chief: Melek Golbol (golbol@obs-vlfr.fr)

Vessel: R/V Téthys II

(Captain: Dany Deneuve)

Science Personnel: Delphine Amodeo, Guillaume De Liège, Anna Derkacheva, Carmine Di Polito, Melek Golbol, David Luquet, Eduardo Soto Garcia, Julia Uitz and Bastien Gaucher.

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



View of the BOUSSOLE buoy and the divers from the dinghy before performing diving operations.

BOUSSOLE project

ESA/ESRIN contract N° 4000111801/14/I-NB

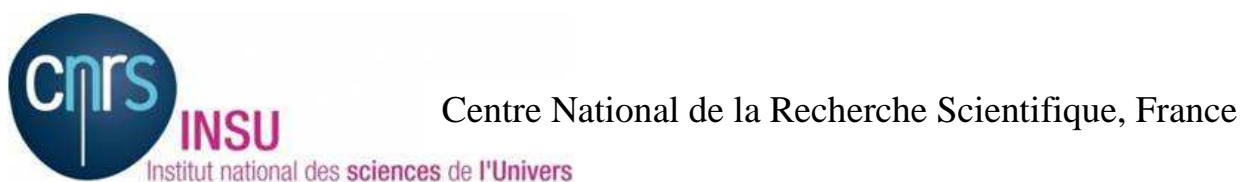
May 30, 2016



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). 2 CTD casts are to be performed at each data acquisition at the BOUSSOLE site: one cast with, and one cast without, a 0.2 μ m filter added on the a-sphere for the dissolved matter absorption measurements.

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.

A new sensor ("Master REM A") was added to the IOP package and connected to the CTD. This sensor is identical to the ones installed on the Bio-Argo floats, and is planned to be used as a "gold standard" to inter-calibrate sensors among the Bio-Argo fleet. This sensor measures fluorescence of Chla, fluorescence of Coloured Dissolved Organic Matter (CDOM), and backscattering at 700nm. The objective is to evaluate what this instrument provides in terms of Chl and CDOM fluorescence, by comparing its measurements to those from the BOUSSOLE Chl and CDOM fluorometers (the ones installed on the BOUSSOLE IOP package), to the chlorophyll concentrations from the HPLC analyses, and to the CDOM absorption measurements from the CDOM analyses.

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 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, the 3X1M-004 fluorimeter sensor installed on the buoy at 9 m in December 2015 cruise was recovered by the divers in order to download the data and to change the battery. It will be re-installed during a subsequent cruise.

Cruise Summary

The first day was used for the diving operations, downloading data from the buoy, CIMEL measurements, a Secchi disk, optical profiles and CTD casts with water sampling. The last day was used for optical profiles, CTD casts with water sampling, CIMEL measurements and a Secchi disk at the BOUSSOLE site.

Tuesday 03 May 2016

The sea state was slight with a gentle breeze. The sky was blue and the visibility was excellent. When arrived at the BOUSSOLE site, divers went at sea to clean the sensors, to perform dark measurements of the transmissometers and backscattering meter and to take pictures. The 3X1M-004 fluorimeter at 9 m was recovered. Surface sensors and solar panels were cleaned. Buoy data were downloaded directly using the telemetry cable available on the top of the buoy. Then 3 CIMEL measurements, 1 Secchi disk, 3 C-OPS profiles and 2 CTD casts with water sampling were performed at the BOUSSOLE site. The second CTD cast was performed, including a 0.2 μ m filter on the a-Sphere absorption meter and a cap on the HS-6 backscattering meter for dark measurements.

Wednesday 04 May 2016

The sea state was slight with a light breeze. The sky was blue and the visibility was excellent. Firstly, 3 C-OPS profiles and 2 CIMEL measurements were performed at the BOUSSOLE site. 2 CTD casts were performed with water sampling, the first one with the 0.2 μ m filter on the a-sphere absorption meter and the next one without the 0.2 μ m filter. Then a Secchi disk was performed before returning back to the Nice harbour.

Pictures taken during this cruise can be found at:

<https://picasaweb.google.com/114686870380724925974/6291503652065297777>

Data from the BOUSSOLE cruises and buoy are available at:

http://www.obs-vlfr.fr/Boussole/html/boussole_data/login_form.php

Cruise Report

Tuesday 03 May 2016 (UTC)

People on board: Delphine Amodeo, Guillaume De Liège, Melek Golbol, David Luquet, Eduardo Soto Garcia, Julia Uitz and Bastien Gaucher.

| | |
|------|--|
| 0600 | Departure from the Nice harbour. |
| 0930 | Arrival at the BOUSSOLE site. |
| 0935 | Diving operations: cleaning of the sensors, dark measurements and taking pictures, recovery of the fluorimeter. |
| 1000 | Direct connection with the buoy and data retrieval. Cleaning of surface sensors and solar panels. |
| 1045 | CIMEL 01, 02, 03. |
| 1135 | Secchi 01, 12 m. |
| 1200 | C-OPS 01, 02, 03. |
| 1245 | CTD 01, 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. |
| 1415 | CTD 02, 400 m with water sampling at 10 and 5 m for TSM, TA/TC and O ₂ (with 0.2 μ m filter on a-Sphere and cap on HS-6). |
| 1445 | Departure to the Nice harbour. |
| 1800 | Arrival at the Nice harbour. |

Wednesday 04 May 2016 (UTC)

People on board: Delphine Amodeo, Anna Derkacheva, Carmine Di Polito, Melek Golbol and Eduardo Soto Garcia.

0630 Departure from the Nice harbour.
1045 Arrival at the BOUSSOLE site.
1105 C-OPS 04, 05, 06.
1155 CTD 03, 400 m with water sampling at 400, 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC and a_p .
1215 CIMEL 04, 05.
1315 CTD 04, 400 m with water sampling at 10 and 5 m for TSM, TA/TC and O_2 (with 0.2 μm filter on a-Sphere).
1345 Secchi 02, 10 m.
1350 Departure to the Nice harbour.
1650 Arrival at the Nice harbour.

Problems identified during the cruise

No Problems.

Appendices

Cruise Summary Table for Boussole 171

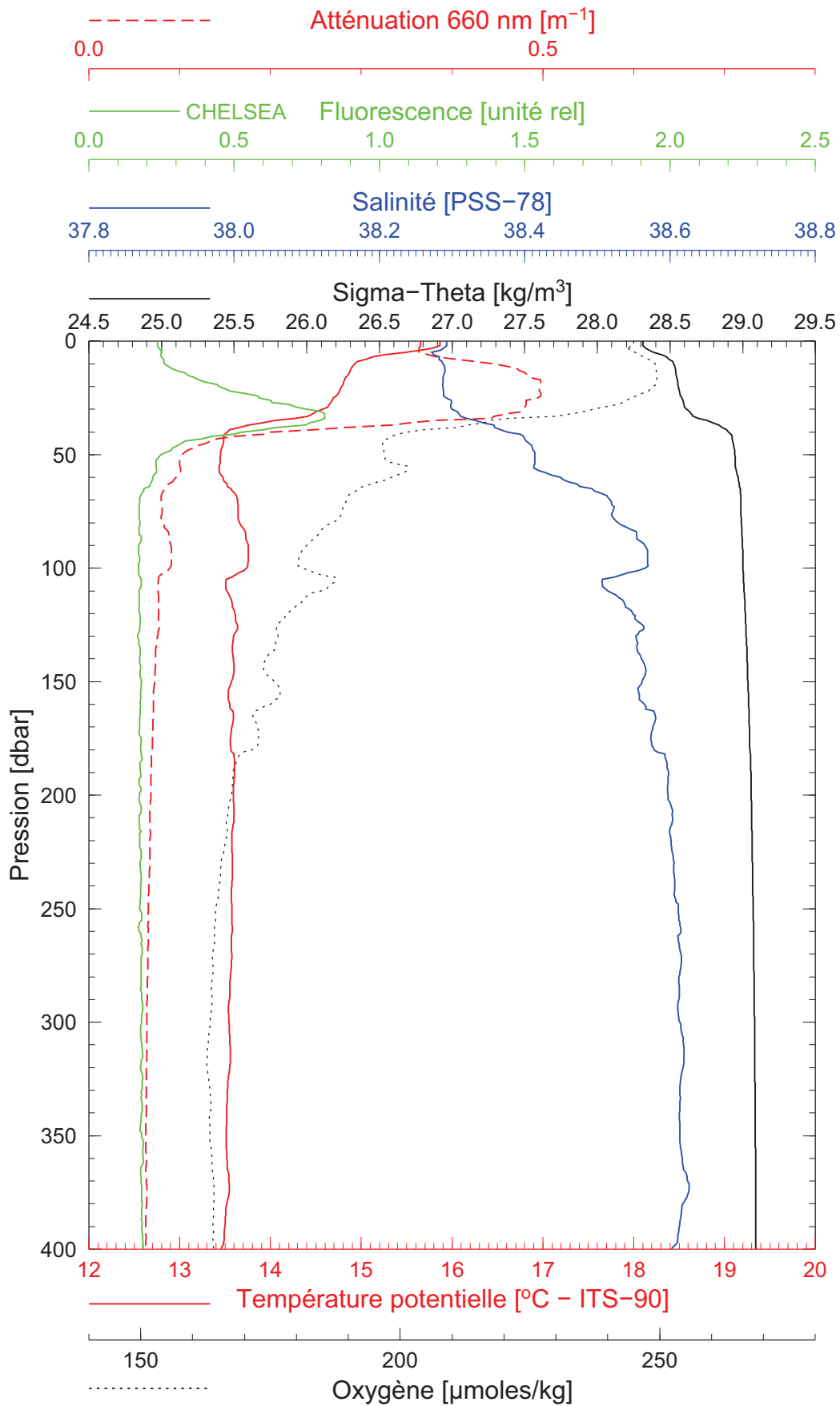
| Date | Black names (file ext: ".raw") | Profile names (file extension: ".raw") | CTD notes | Other sensors | Start Time GMT (hour.min) | Duration (min.sec) | Depth max (meter) | Latitude (N) | | | Longitude | | | Sky | Clouds | Quantity (#/8) | Weather | | Atm. Pressure (hPa) | Humidity (%) | Visibility | T air | T water | Sea | | Swell dir. | Whitecaps | |
|----------|-----------------------------------|---|------------|------------------|------------------------------|-----------------------|----------------------|--------------|----------|----------|-----------|---------------|-----------|-----|--------|----------------|-----------------|----------------|---------------------|--------------|------------|-------|---------|-------|------|------------|-----------|--|
| | | | | | | | | (Degree) | (Minute) | (Degree) | (Minute) | Wind sp. (kn) | Wind dir. | | | | Sea Swell H (m) | Sea Swell dir. | | | | | | | | | | |
| 03/05/16 | | | | CIMEL01 | 10:48 | 7:00 | | 44 | 29.180 | 6 | 32.270 | blue | | | NA | | | 1005.4 | | | | | | | | | | |
| | | | | CIMEL02 | 10:58 | 7:00 | | 44 | 29.180 | 6 | 32.270 | blue | | | NA | | | 1005.2 | | | | | | | | | | |
| | | | | CIMEL03 | 11:08 | 9:00 | | 44 | 29.180 | 6 | 32.270 | blue | | | NA | | | 1005.4 | | | | | | | | | | |
| | | | | Secchi01 | 11:35 | 4:00 | 12 | 43 | 22.000 | 7 | 54.000 | blue | | | 1 | | | | | | excellent | | | | calm | | | |
| | | bou_c-ops_160503_1147_001_data.csv | | | 11:55 | 3:37 | 92 | 43 | 22.293 | 7 | 53.963 | blue | Cc | 1 | 8 | 193 | 1014.8 | 85 | excellent | 16.3 | | | calm | 0.6 | | | no | |
| | | bou_c-ops_160503_1147_002_data.csv | | | 12:06 | 4:00 | 103 | 43 | 22.504 | 7 | 53.751 | blue | Cc | 1 | 8 | 193 | 1014.8 | 85 | excellent | 16.3 | | | calm | 0.6 | | | no | |
| | | bou_c-ops_160503_1147_003_data.csv | | | 12:17 | 4:17 | 114 | 43 | 22.699 | 7 | 53.568 | blue | Cc | 1 | 8 | 193 | 1014.8 | 85 | excellent | 16.3 | | | calm | 0.6 | | | no | |
| | | | CTDBOUS001 | HPLC_Ap & CDOM | 12:49 | 29:00 | 400 | 43 | 22.180 | 7 | 54.080 | blue | | | 1 | 7 | 100 | 1014.5 | 86 | | | | 16.0 | 16.60 | calm | | | |
| | | | CTDBOUS002 | O2 & TA/TC & TSM | 14:14 | 26:00 | 400 | 43 | 22.276 | 7 | 54.244 | blue | | | 3 | 7 | 235 | 1014.1 | 81 | | | | 16.6 | 16.6 | calm | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04/05/16 | | bou_c-ops_160504_1048_001_data.csv | | | 11:01 | 4:04 | 105 | 43 | 22.297 | 7 | 53.887 | blue | None | 0 | 5 | 33 | 1018.8 | 65 | excellent | 16.6 | | | calm | 0.9 | | | few | |
| | | bou_c-ops_160415_0925_002_data.csv | | | 11:11 | 4:04 | 106 | 43 | 22.361 | 7 | 53.613 | blue | None | 0 | 5 | 33 | 1018.8 | 65 | excellent | 16.6 | | | calm | 0.9 | | | few | |
| | | bou_c-ops_160415_0925_003_data.csv | | | 11:23 | 4:10 | 109 | 43 | 22.420 | 7 | 53.252 | blue | None | 0 | 5 | 33 | 1018.8 | 65 | excellent | 16.6 | | | calm | 0.9 | | | few | |
| | | | CTDBOUS003 | HPLC & Ap | 11:57 | 28:00 | 400 | 43 | 22.069 | 7 | 53.827 | blue | | | 2 | 3 | 40 | 1018.6 | 65 | | | | 17.5 | 16.40 | calm | | | |
| | | | | CIMEL04 | 12:16 | 5:00 | | 43 | 22.026 | 7 | 53.621 | blue | | | 0 | | | 1018.4 | | | | | | | | | | |
| | | | | CIMEL02 | 12:22 | 2:00 | | 43 | 22.026 | 7 | 53.621 | blue | | | 0 | | | 1018.4 | | | | | | | | | | |
| | | | CTDBOUS004 | TSM | 13:12 | 24:00 | 400 | 43 | 22.211 | 7 | 53.818 | blue | | | 2 | 1 | 39 | 1018.3 | 60 | | | | 18.0 | 16.8 | calm | | | |
| | | | | Secchi02 | 13:50 | 4:00 | 10 | 43 | 22 | 7 | 54 | blue | | | 2 | | | | | excellent | | | | calm | | | | |

BOUSSOLE 171

03/05/2016

BOUS160503_01

BOUS001



Date 03/05/2016

Latitude 43°22.180 N

Heure déb 12h 49min [TU]

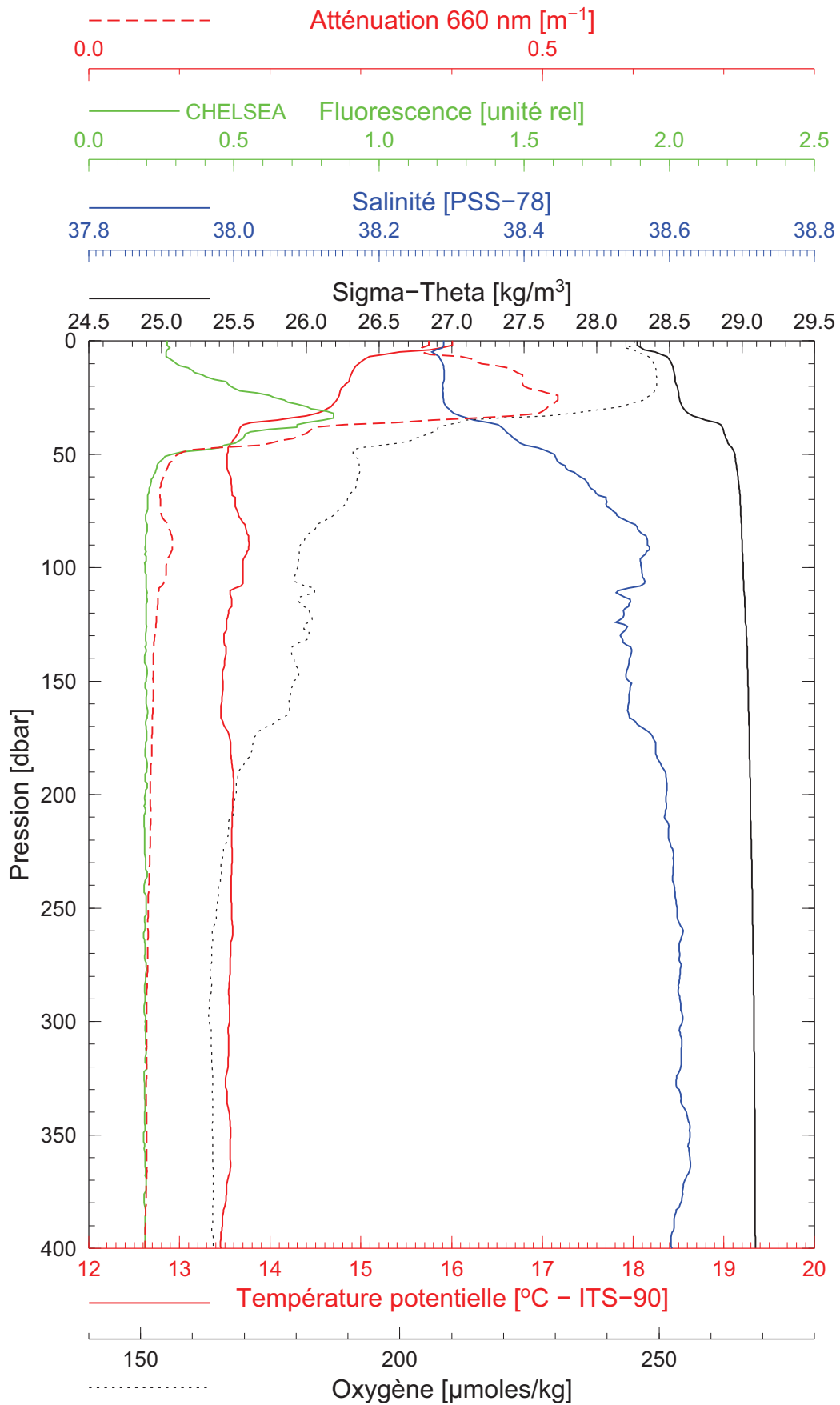
Longitude 07°54.080 E

BOUSSOLE 171

03/05/2016

BOUS160503_02

BOUS002



Date 03/05/2016

Latitude 43°22.276 N

Heure déb 14h 14min [TU]

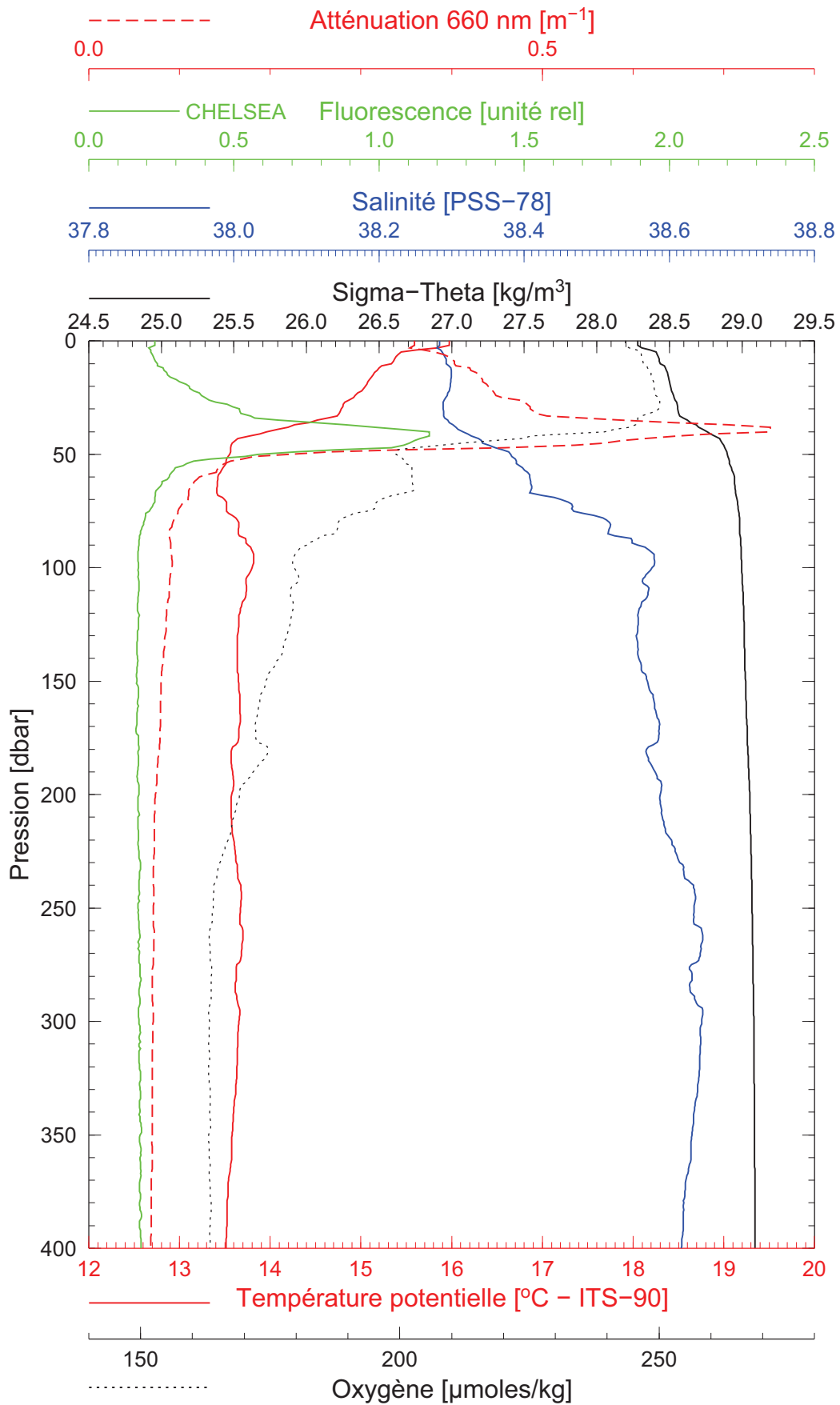
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BOUSSOLE 171

04/05/2016

BOUS160504_01

BOUS003



Date 04/05/2016

Latitude 43°22.069 N

Heure déb 11h 57min [TU]

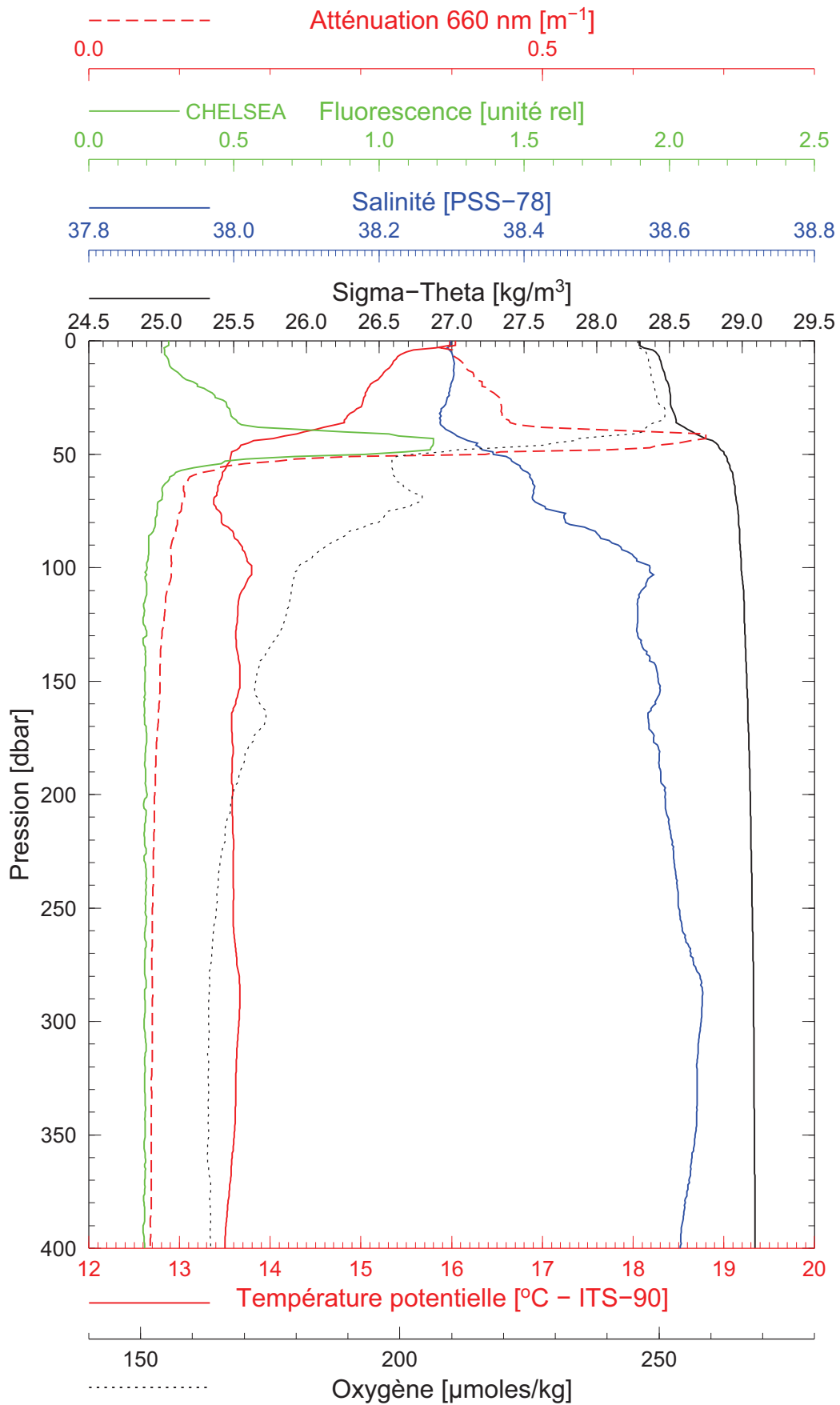
Longitude 07°53.827 E

BOUSSOLE 171

04/05/2016

BOUS160504_02

BOUS004



Date 04/05/2016
Heure déb 13h 12min [TU]

Latitude 43°22.211 N
Longitude 07°53.818 E