

BOUSSOLE Monthly Cruise Report

Cruise 191

January 24-26, 2018

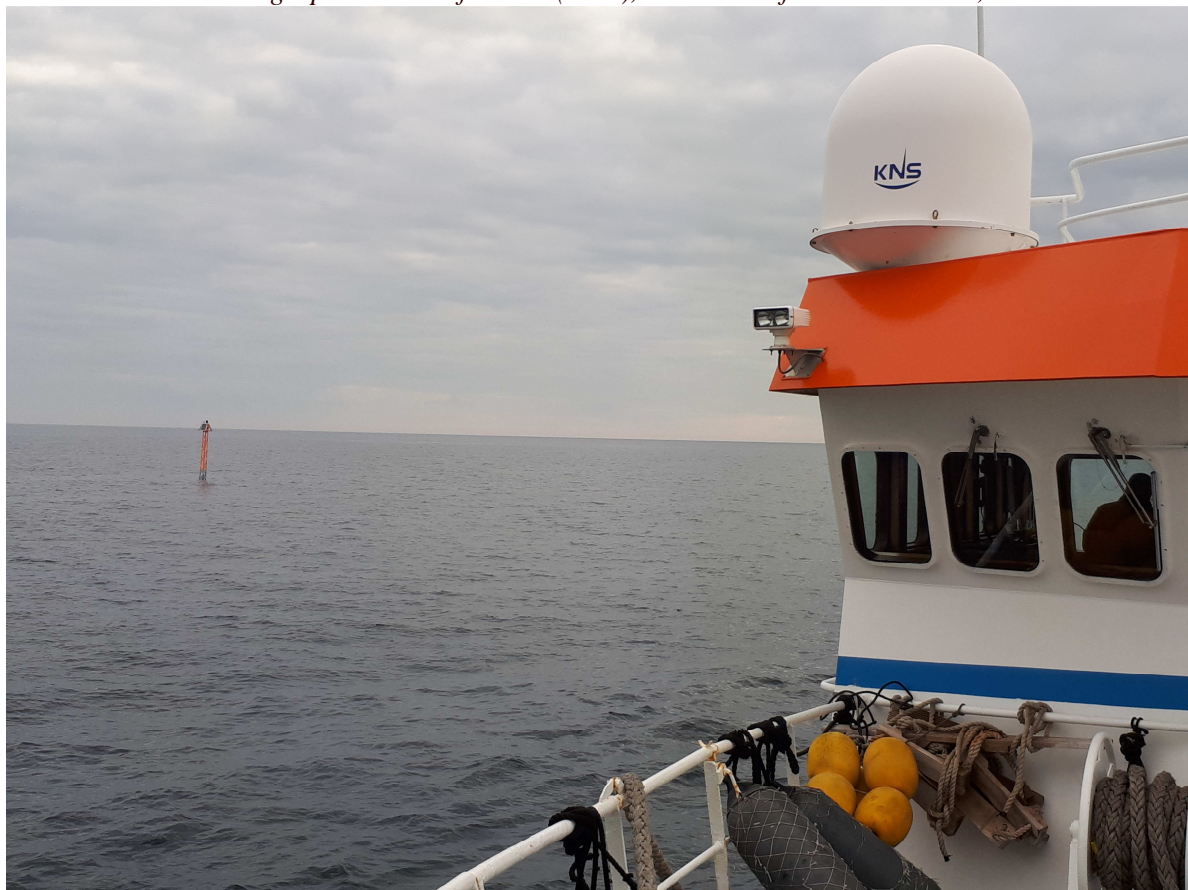
Duty Chief: Melek Golbol (golbol@obs-vlfr.fr)

Vessel: R/V *Téthys II*

(Captain: Joël Perrot)

Science Personnel: Guillaume De Liège, Melek Golbol, David Luquet, Judicaël Rivier and Eduardo Soto Garcia.

Laboratoire d'Océanographie de Villefranche (LOV), 06230 Villefranche-sur-Mer, France



The upper superstructure of the BOUSSOLE buoy (on the left side of the picture) seen from the upper deck of the R/V *Téthys II* (on the right side).

BOUSSOLE project

ESA/ESRIN contract N° 4000119096/17/I-BG

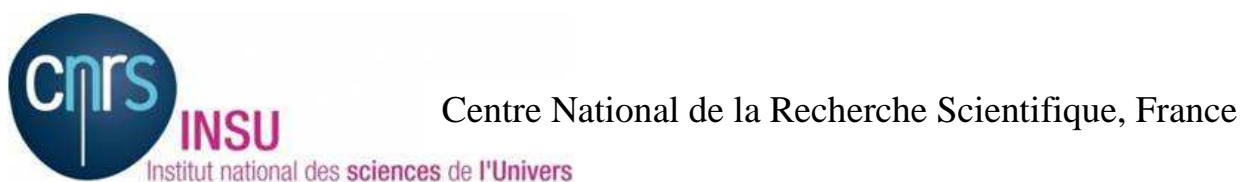
February 12, 2018



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



Contents

1. Cruise Objectives
2. Cruise Summary
3. Cruise Report
4. Problems identified during the cruise

Appendices

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). Two 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.

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 (5 m and 10 m) 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

Water samples for cytometry analysis were collected at 10 m depth in the frame of a collaboration with Collin Roesler (Bowdoin College, Maine, USA), about the installation of an ECO 3X1M multi-channel fluorimeter on the BOUSSOLE buoy at 9 m depth.

The first day, maintenance were performed on the buoy:

- The CONTROS HydroC PCO₂ sensor installed on the buoy at 20 m depth in June 2017 in the frame of the MOOSE program was recovered in order to download data and change the batteries in the lab.
- The hyperspectral radiometers of the buoy were not functioning. So, the connections (cables and connectors) of the STOR-X (data logger of the hyperspectral and PAR radiometers) were checked by the divers.
- They were problems on the OCP (data logger of the transmissometer) at 4 m depth. This problem provide from the configuration file in the DACNet (Data Acquisition and Control Network). It was replaced by the good one after downloading data from the buoy.
- A solar panel was lacking on the buoy, a new one was installed.

Cruise Summary

The first day was used for CTD casts with water sampling, for optical profiles, for a Secchi disk, and for diving operations and buoy maintenance at the BOUSSOLE site. The second day was used for optical profiles, for CTD casts with water sampling and for a Secchi disk at the BOUSSOLE site. The last day, bad weather prevented the departure from the Nice harbour.

Wednesday 24 January 2018

The sea state was slight with a gentle breeze. The sky was overcast and the visibility was medium. Firstly, 2 CTD casts with water sampling were performed at the BOUSSOLE site. For the first cast, a cap was put on the Hydroscat-6 for dark measurements and a 0.2 μm filter on the a-Sphere absorption meter for the dissolved matter absorption measurements. 3 C-OPS profiles were performed at the BOUSSOLE site. Then, divers went at sea to clean the sensors and to perform dark measurements of the transmissometers and backscattering meter. They also checked the connections (cables and connectors) of the STOR-X because the hyperspectral radiometers were not functioning. All the connections seemed to be alright. The CONTROS HydroC PCO_2 sensor at 20 m depth was recovered in order to download data and change the batteries in the lab. It will be reinstalled during a following cruise, next to the PCO_2 CARIOCA at 10 m depth. Buoy data were downloaded using the cable available at the top of the buoy and the configuration file in the DACNet was replaced. The ARGOS beacon connector and the solar panels were cleaned. In the meantime, a Secchi disk was performed at the BOUSSOLE site. Finally, the new solar panel was installed before returning to the Nice harbour.

Thursday 25 January 2018

The sea state was smooth with a light breeze. The sky was overcast and the visibility was medium. When arrived at BOUSSOLE, C-OPS balance tests were performed in order to check and adjust it during the descent phase of the profiles. Then 3 C-OPS profiles, 2 CTD casts were performed with water sampling. For the last cast, a 0.2 μm filter was put on the a-Sphere absorption meter for the dissolved matter absorption measurements. Finally, a Secchi disk was performed at the BOUSSOLE site before returning to the Nice harbour.

Friday 26 January 2018

Bad weather prevented departure from the Nice harbour.

Pictures taken during this cruise can be found at:

<https://photos.app.goo.gl/kktMgFzp8hKH8CBq1>

Data from the BOUSSOLE cruises and buoy are available at:

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

Cruise Report

Wednesday 24 January 2018 (UTC)

People on board: Guillaume De Liège, Melek Golbol, David Luquet, Judicaël Rivier and Eduardo Soto Garcia.

- 0640 Departure from the Nice harbour.
- 1000 Arrival at the BOUSSOLE site.
- 1025 CTD 01, 400 m with water sampling at 10 and 5 m for O_2 , TA/TC and TSM (with 0.2 μm filter on a-Sphere and cap on HS-6).
- 1140 CTD 02, 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 .
- 1210 Lunch, filtrations.
- 1305 C-OPS 01, 02, 03.
- 1350 Diving operations: removing of the CONTROS HydroC PCO_2 sensor, check of the STOR-X, cleaning sensors, dark measurements.

1400 Direct connection with the buoy, data retrieval and change of file configuration.
1415 Secchi disk 01, 14m.
1420 Cleaning of ARGOS connector and solar panels.
1430 Installation of the solar panel.
1515 Departure to the Nice harbour.
1830 Arrival at the Nice harbour

Thursday 25 January 2018 (UTC)

People on board: Melek Golbol and Eduardo Soto Garcia.

0630 Departure from the Nice harbour.
0945 Arrival at the BOUSSOLE site.
1000 C-OPS balance tests.
1015 C-OPS 04, 05, 06.
1055 CTD 03, 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 cytometry.
1100 Lunch, filtrations.
1245 CTD 04, 400 m with water sampling at 10 and 5 m for TSM (with 0.2 μm filter on a-Sphere).
1310 Secchi 02, 14 m.
1315 Departure to the Nice harbour.
1630 Arrival at the Nice harbour.

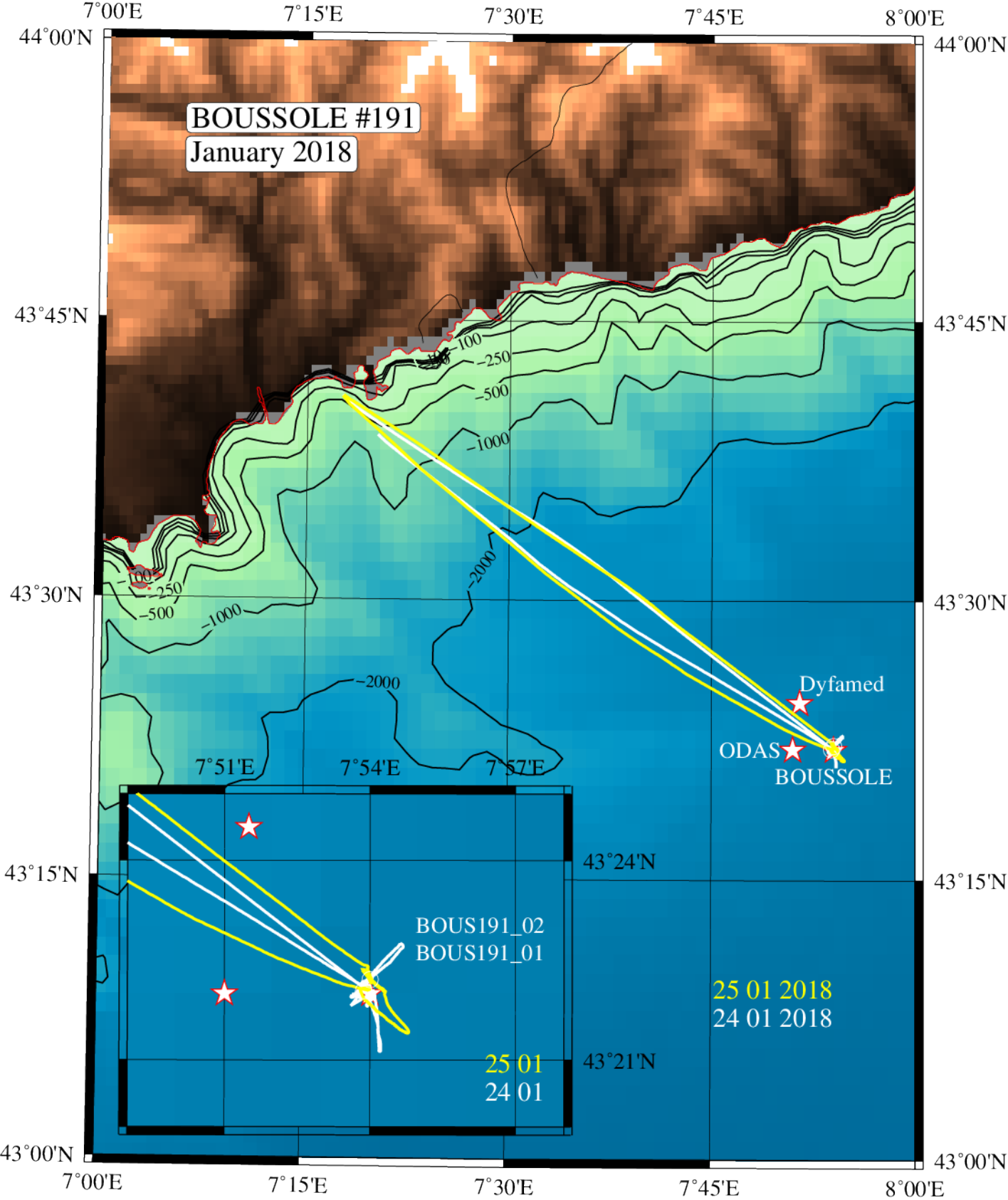
Friday 26 January 2018

Bad weather prevented departure from the Nice harbour.

Problems identified during the cruise

- CTD 02: HPLC filters were rinsed with milliQ water by mistake.
- The C-OPS commonly used on the BOUSSOLE missions was still under calibration at *Biospherical*. The C-OPS used for this cruise was the one shared among the marine optics and remote sensing group at LOV. The instrument is similar to the BOUSSOLE one, yet has a L_u sensor instead of a E_u one.
- C-OPS balance tests could not be performed the first day because of lack of time. They were performed the second day. The COPS was slightly more tilted on the first day (COPS 01, 02, 03) than on the second day (COPS 04, 05, 06).
- Underwater pictures could not be taken during this cruise because the sea was a little rough during the diving.
- The hyperspectral radiometers of the buoy were not functioning. So, the connections (cables and connectors) of the STOR-X were checked by the divers but all the connections seemed to be alright. We expect to recover the sensors during a following cruise.

Appendices



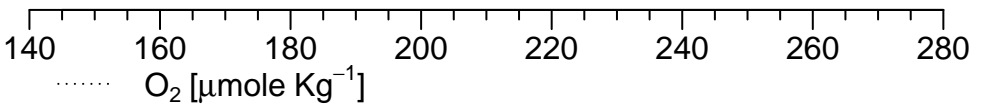
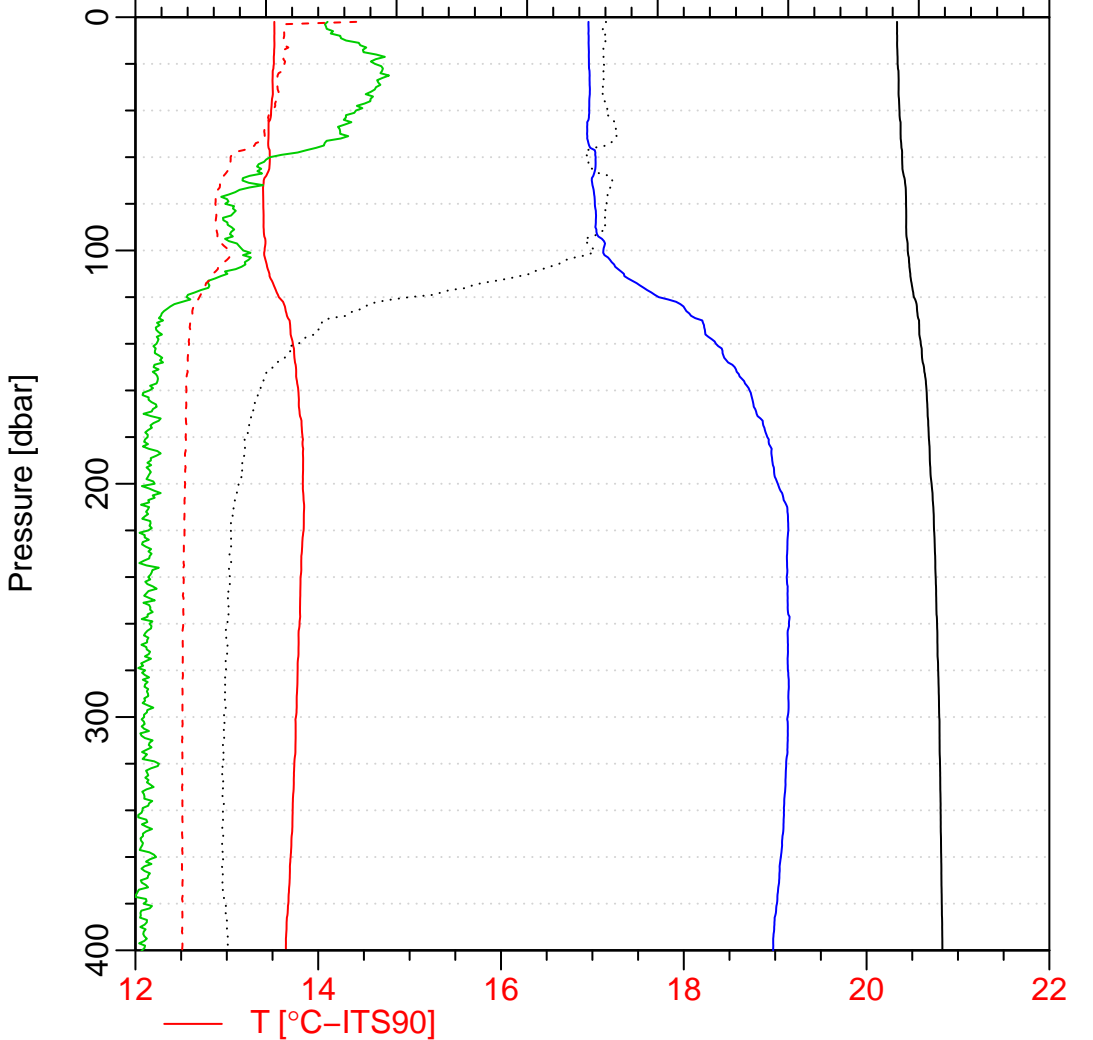
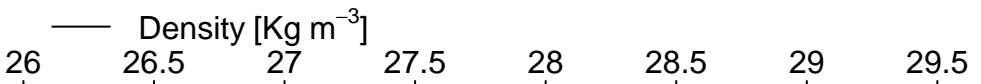
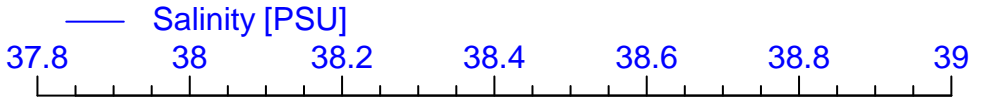
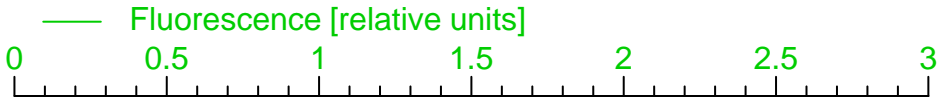
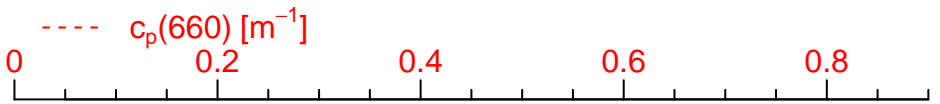
bous191_01

Date = 24/01/2018

Heure debut [TU] = 10:24

Longitude = 007 53.869 E

Latitude = 43 22.042 N



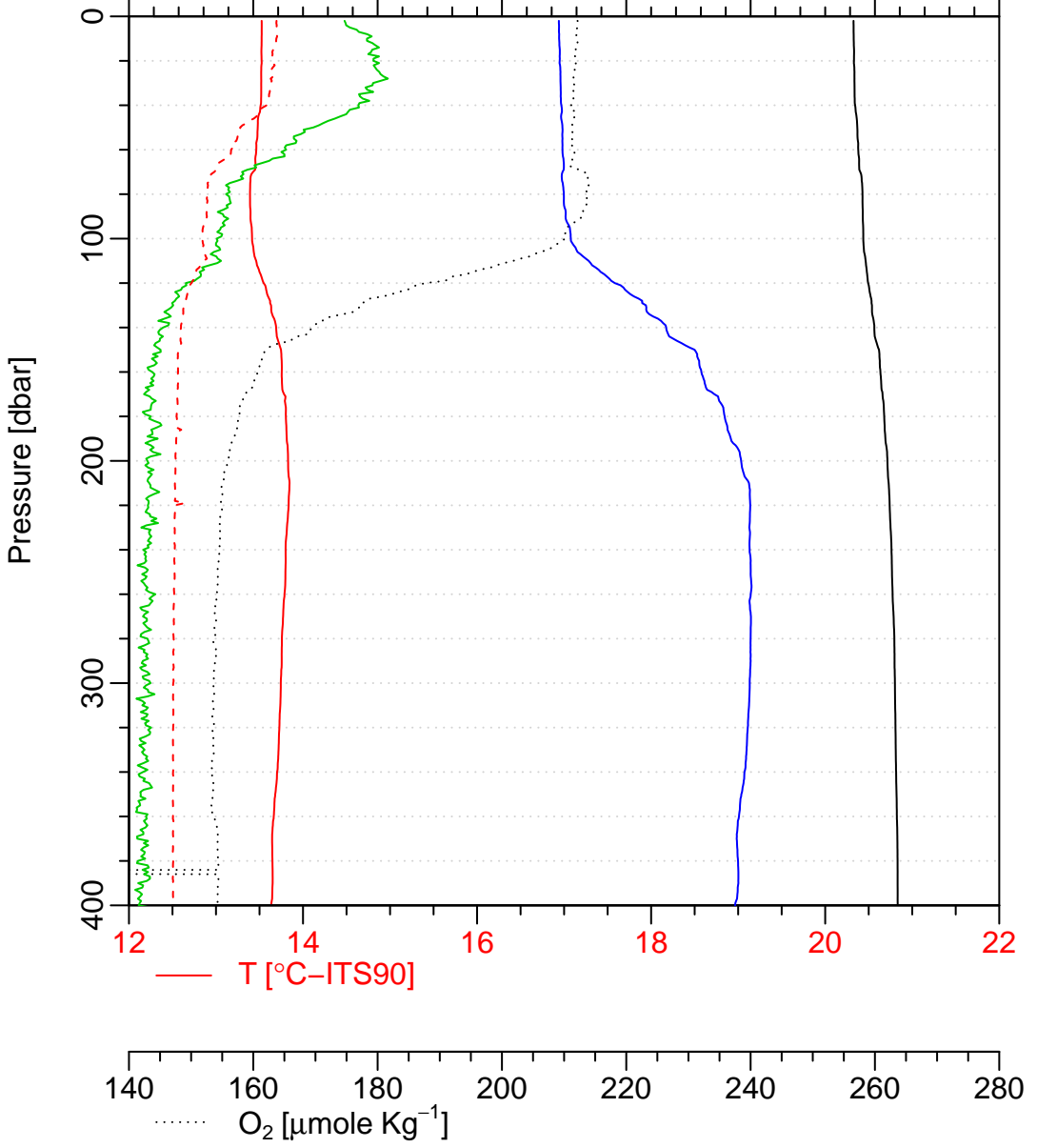
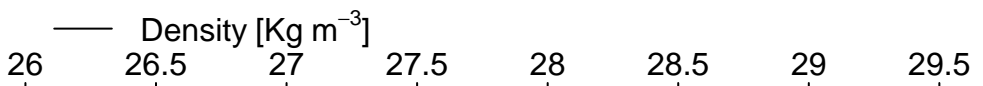
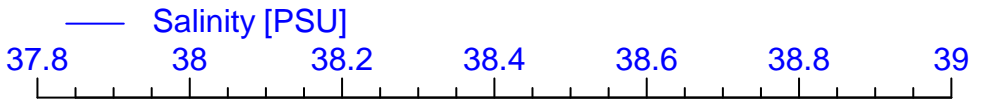
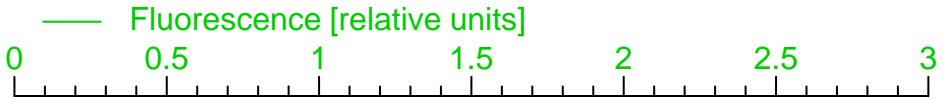
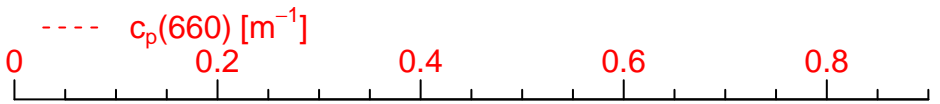
bous191_02

Date = 24/01/2018

Heure debut [TU] = 11:39

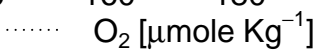
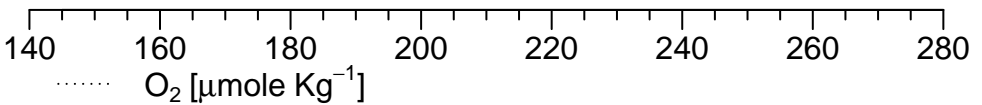
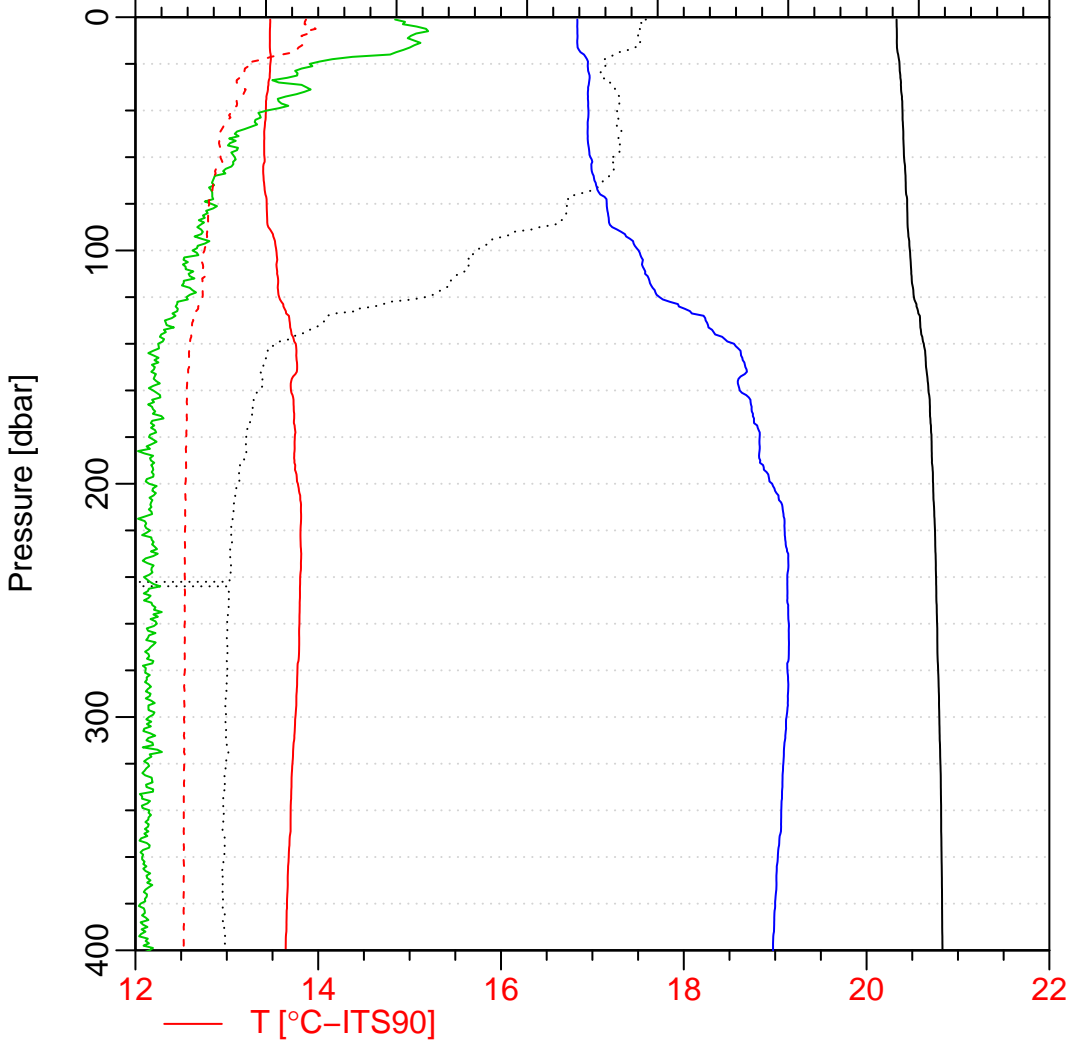
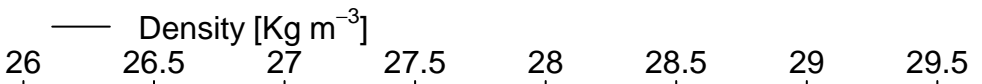
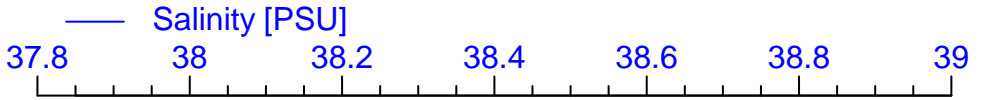
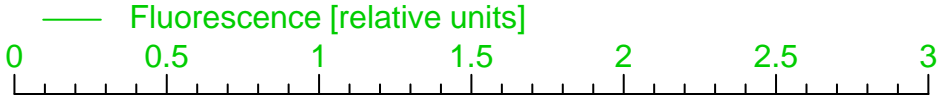
Longitude = 007 54.007 E

Latitude = 43 22.206 N



bous191_03

Date = 25/01/2018
Heure debut [TU] = 10:54
Longitude = 007 53.329 E
Latitude = 43 22.018 N



bous191_04

Date = 25/01/2018
Heure debut [TU] = 12:46
Longitude = 007 54.036 E
Latitude = 43 22.194 N

