

BOUSSOLE Monthly Cruise Report

Cruise 207

April 15-17, 2019

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

Vessel: R/V Téthys II

(Captain: Joël Le Guennec)

Science Personnel: Céline Dimier, Melek Golbol, Flavien Petit, Alice Pierret and Eduardo Soto Garcia.

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

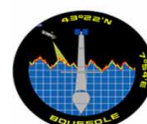


Divers returning to the sea surface after diving maintenance on the BOUSSOLE buoy, and the *R/V Téthys II* on the background.

BOUSSOLE project

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

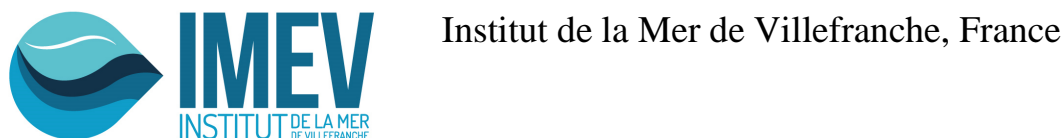
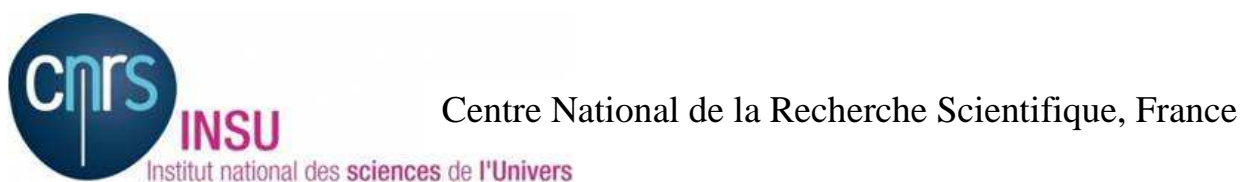
April 29, 2019



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). A CTD cast including a 0.2 μm filter installed on the inlet tube of the a-Sphere is to be performed once per cruise at the BOUSSOLE site for the dissolved matter absorption measurements. This cast will be stopped at ten depths during 2 or 7 min depending on the depths in order to ensure that the integrating cavity of the a-Sphere be completely filled at each of these depths during the ascent of the CTD.

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 BIO CAREX 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 pCO_2 CARIOCA sensors and the two optodes installed on the buoy at 3 m and 10 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

The MOOSE DYFAMED cruise of 14th April was cancelled because of bad weather, so their operations were performed during the second day of the BOUSSOLE cruise (16th April).

That day, a BGC-Argo profiling float (LOVAPMO16C) was deployed by the *Marine optics and remote sensing group* of the *Laboratoire d'Océanographie de Villefranche* (LOV) at the DYFAMED site. This float is equipped with the following biogeochemical and bio-optical sensors: remA pack, SUNA, optode and pH sensor.

The second day, a square grid survey was performed with the *R/V Téthys II* in order to characterize the spatial variability of the surface chlorophyll concentration in the vicinity of the BOUSSOLE buoy. Data were acquired by the underway fluorimeter installed on the ship. This operation will be performed once per cruise until the end of 2019 in the frame of the ROSACE project (Radiometry for Ocean Colour SATellites Calibration & Community Engagement). This project aims to propose a preliminary design of the new European infrastructure dedicated to the SVC (Copernicus Ocean Colour Vicarious Calibration).

The last day, divers replaced the CTD at 9 m with the newly calibrated one. As a reminder, this CTD was installed during the rotation of the upper superstructure of the buoy but was not functioning. The problem was possibly due to a configuration issue. So it was brought back to the lab after a previous cruise in order to be tested and configured again, before its reinstallation on the buoy, which took place during this cruise.

Cruise Summary

The first day of the cruise was cancelled because of the bad weather. The second day of the cruise was used for optical profiles, for CTD casts with water sampling, for the surface chlorophyll grid, for the profiling float deployment and for a Secchi disk at the BOUSSOLE site. This day was also used to deploy zooplankton nets and to perform a deep CTD cast at the DYFAMED site in the frame of MOOSE program. The last day of the cruise was used for diving operations, for optical profiles, for CTD casts with water sampling and for a Secchi disk at the BOUSSOLE site.

Monday 15 April 2019

Bad weather prevented departure from the Nice harbour.

Tuesday 16 April 2019

The sea state was smooth with a light breeze in the morning and a moderate breeze in the afternoon. The sky was overcast and the visibility was good. Firstly, 3 C-OPS profiles and 2 CTD casts with water sampling were performed at the BOUSSOLE site. For the second cast, a cap was put on the Hydroscat-6 for dark measurements. During the lunchtime, the sea surface chlorophyll measurements grid was performed in the vicinity of the BOUSSOLE site. Then the profiling float was deployed between the BOUSSOLE and DYFAMED sites. Finally, operations for the MOOSE program were completed at the DYFAMED site (zooplankton nets and deep CTD cast). In the meantime, the Secchi disk was performed at the DYFAMED site.

Wednesday 17 April 2019

The sea state was smooth with a light breeze. The sky was blue and the visibility was excellent. Firstly, divers went at sea in order to perform dark measurements on the buoy backscattering meter and on the transmissometers, to clean the sensors and to take pictures. They also replaced the CTD at 9 m. In the meantime, surface sensors of the buoy, solar panels and the ARGOS connector were cleaned. Buoy data were retrieved using the cable available on the top of the buoy. Then, 3 C-OPS profiles and 2 CTD casts with water sampling were performed at the BOUSSOLE site. For the last CTD cast (CTD #04), a 0.2 μm filter was put on the a-Sphere absorption meter for the dissolved matter absorption measurements. This CTD cast was stopped at 10 depths during the ascent of the CTD.

Pictures taken during this cruise can be found at:

<https://photos.app.goo.gl/iGiQqgxz67QNiNjy9>

Data from the BOUSSOLE cruises and buoy are available at:

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

Cruise Report

Monday 15 April 2019

Bad weather prevented departure from the Nice harbour.

Tuesday 16 April 2019 (UTC)

People on board: Melek Golbol, Flavien Petit (student), Alice Pierret and Eduardo Soto Garcia.

0500 Departure from the Nice harbour.

0810 Arrival at the BOUSSOLE site.
0820 C-OPS 01, 02, 03.
0905 CTD 01, 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 .
1015 CTD 02, 50 m with water sampling at 10 and 5 m for TSM, TA/TC and O_2 (with cap on HS-6).
1025 Surface chlorophyll fluorescence transect
1140 Deployment of the profiling float: 43°24.603'N, 07°50.562'E.
1145 Departure to the DYFAMED site.
1200 Arrival to DYFAMED site.
1205 Zooplankton nets x 2, 100 and 200 m.
1300 CTD MOOSE 130, 2350 m with water sampling.
1310 Secchi disk 01, 10 m.
1430 Departure to the Nice harbour.
1730 Arrival to the Nice harbour.

Wednesday 17 April 2019 (UTC)

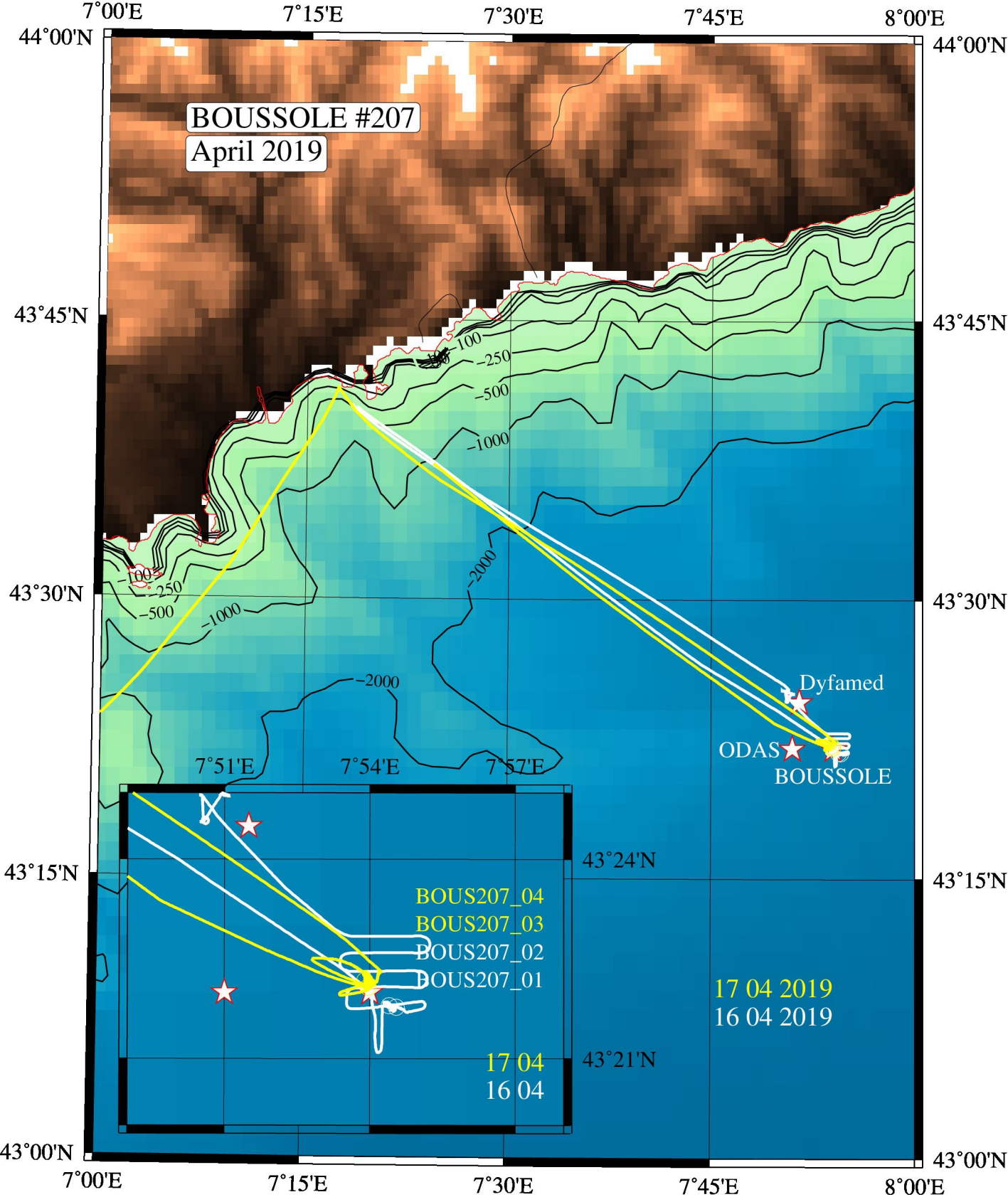
People on board: Guillaume De Liège, Céline Dimier, Melek Golbol, Flavien Petit (student) and Eduardo Soto Garcia.

0530 Departure from the Nice harbour.
0830 Arrival at the BOUSSOLE site.
0845 Diving operations: cleaning, dark measurements, pictures, replacement of the CTD at 9 m.
0900 Connexion with the buoy and data retrieval.
Cleaning of surface sensors, solar panels and ARGOS connector.
1030 C-OPS 03, 04, 05.
1115 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 .
1234 CTD 04, 400 m with water sampling at 5 m for TSM (with 0.2 μ m filter on a-Sphere and 2 minutes stop at 400 and 150 m and 7 minutes stop at 80, 60, 50, 40, 30, 20, 10 and 5 m).
1240 Secchi disk 02, 10.5 m.
1400 Departure to the Nice harbour.
1700 Arrival to the Nice harbour.

Problems identified during the cruise

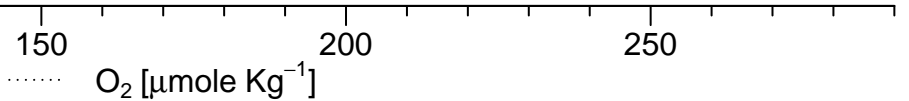
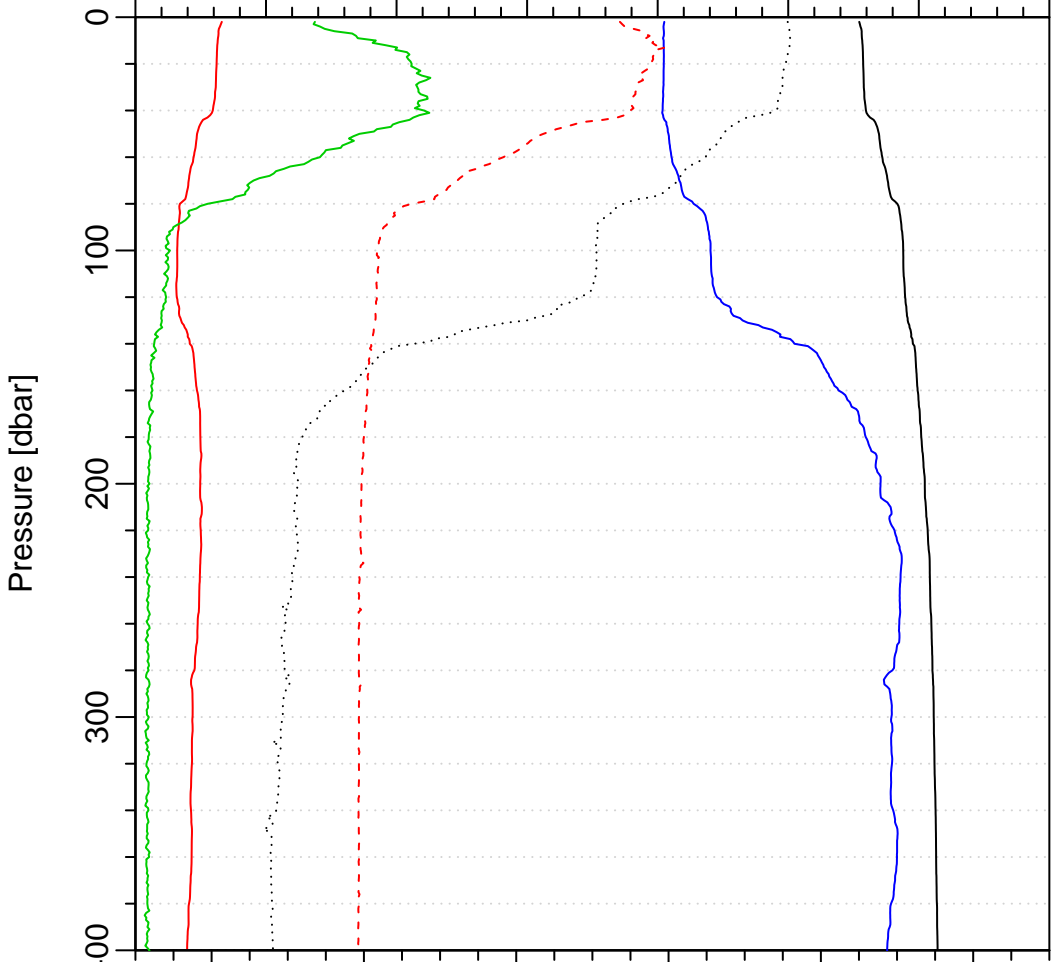
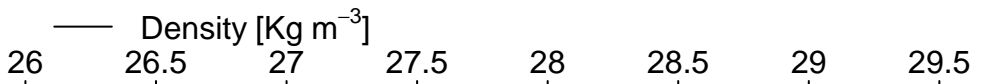
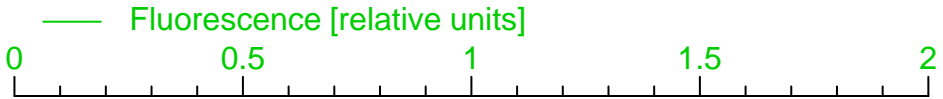
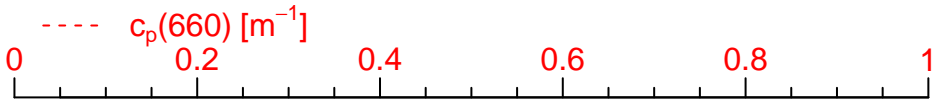
- CTD03: The HPLC & a_p filtrations for the surface samples took a long time because there was a leak in the filtration system. The leak was found and the system repaired.

Appendices



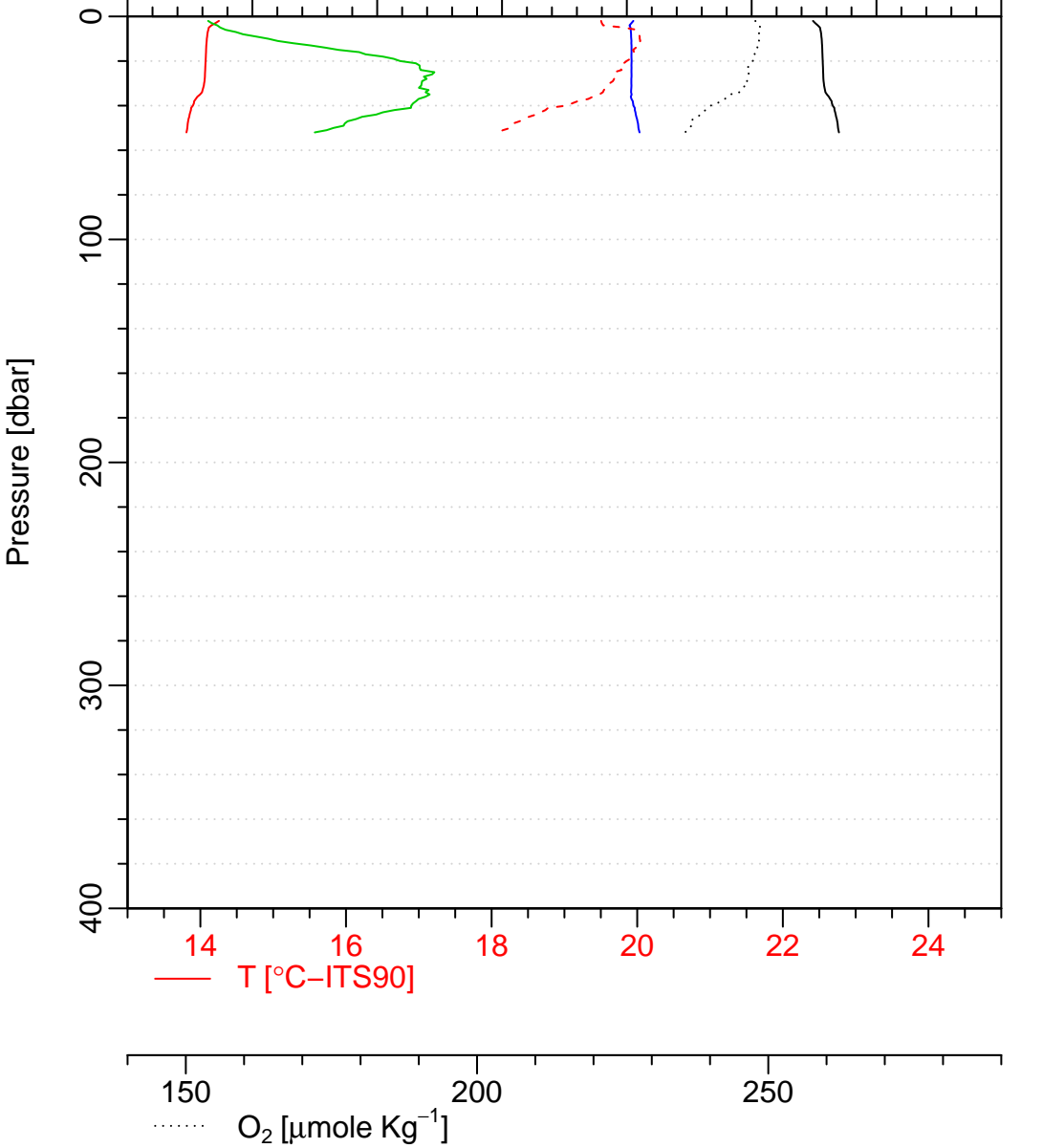
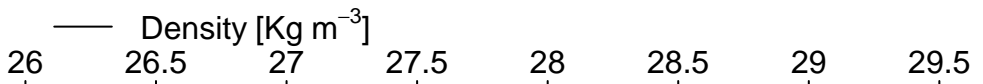
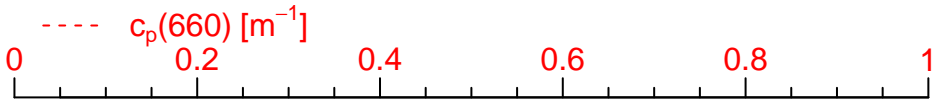
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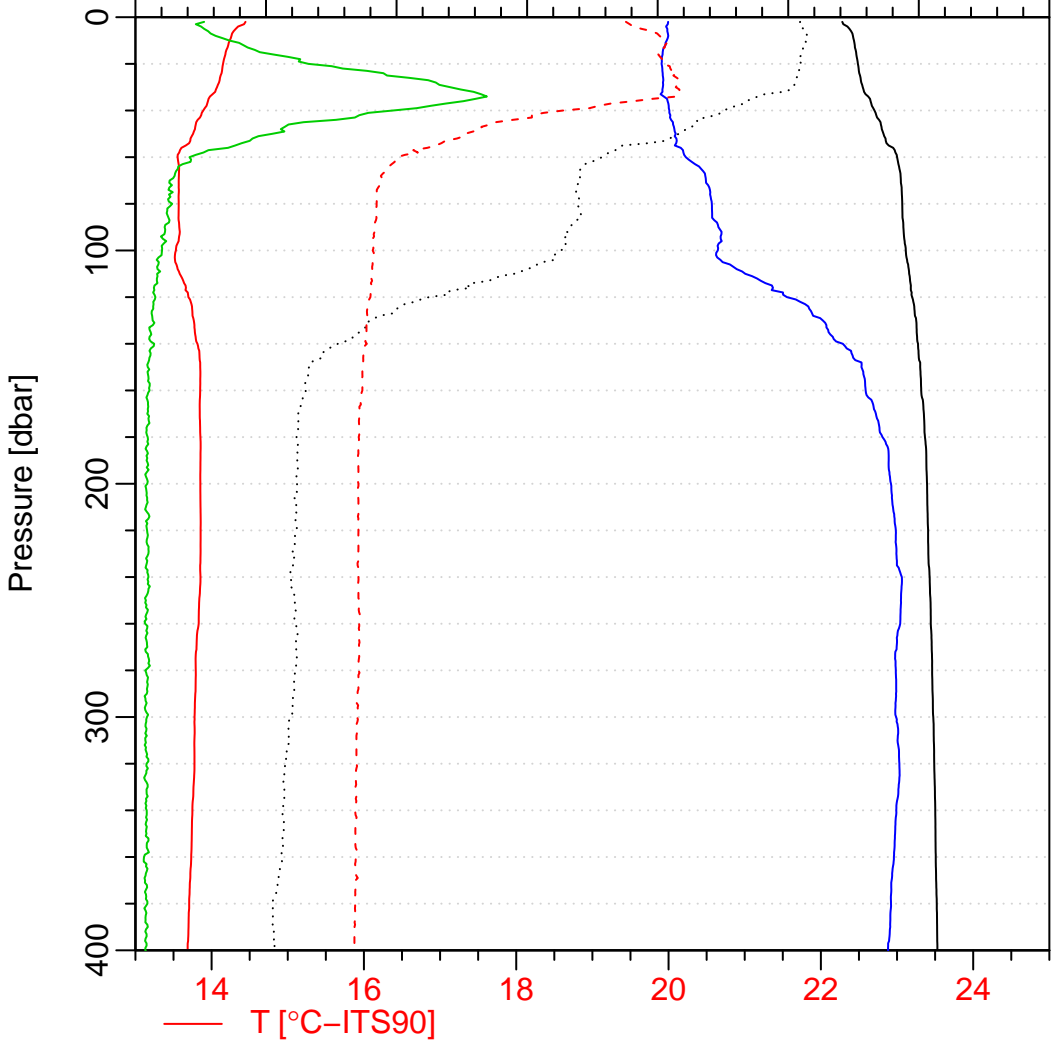
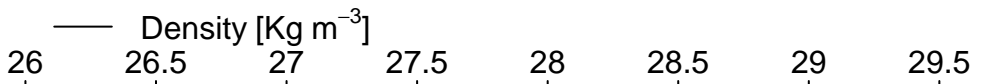
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bous207_03

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bous207_04

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