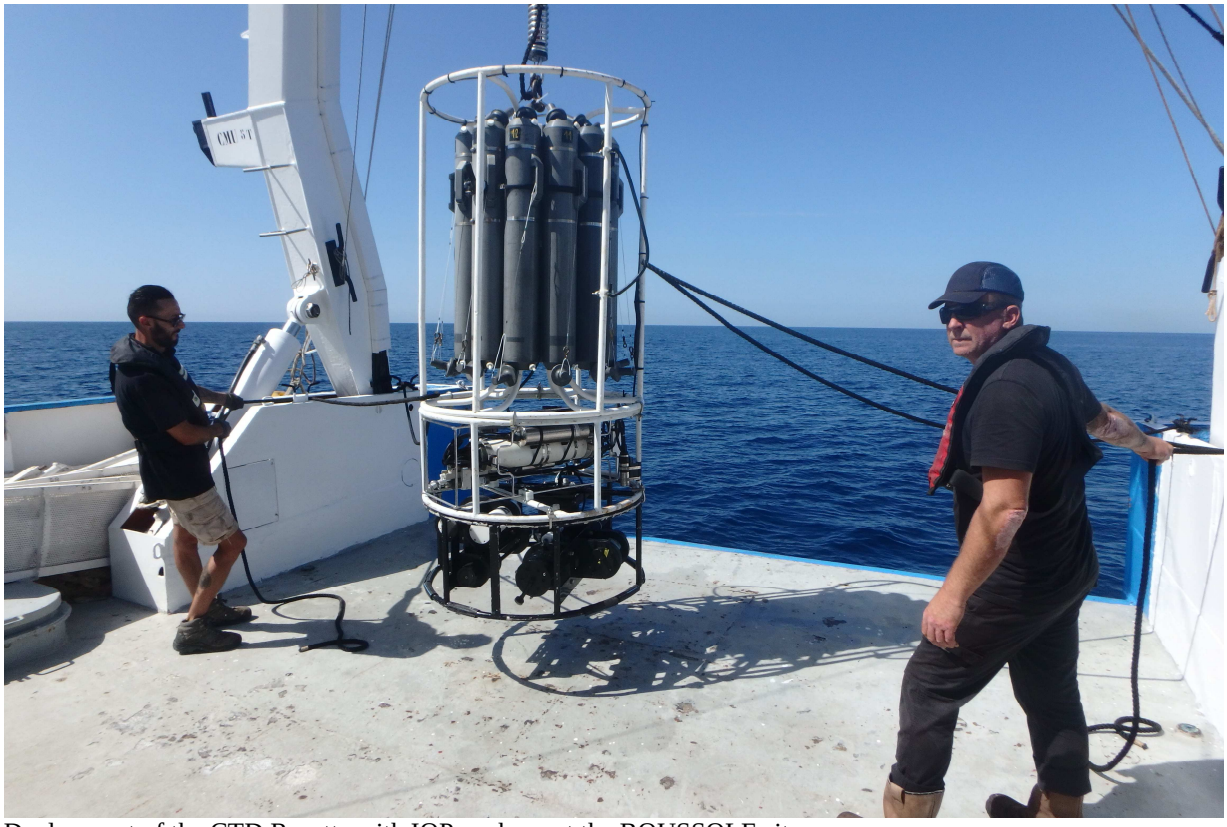
BOUSSOLE Monthly Cruise Report

Cruise 199
August 28-29, 2018

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

Science Personnel: Melek Golbol and Eduardo Soto.

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



Deployment of the CTD Rosette with IOP package at the BOUSSOLE site.

BOUSSOLE project

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

September 5, 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

European Space Agency

Centre National d'Etudes Spatiales, France

Centre National de la Recherche Scientifique, France

Sorbonne Université, France

Institut de la Mer de Villefranche, 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). Two CTD casts are to be performed at each data acquisition at the BOUSSOLE site: one cast with, and one cast without, a 0.2µm 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 pCO_2 CARIOCA sensors 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

No additional operations.

Cruise Summary

The first and second days of the cruise were used for CTD casts with water sampling, for optical profiles, for a Secchi disk and for CIMEL measurements at the BOUSSOLE site.

Tuesday 28 August 2018

The sea state was smooth with a light breeze. The sky was blue and the visibility was excellent. The IOP package was prepared during the way up to BOUSSOLE and a pure water blank measurement was performed on board on the a-Sphere spectrometer, in order to compare it with the same blank measurements performed in the lab before the cruise. When arrived at the BOUSSOLE site, 2 CTD casts with water sampling were performed. For the first

cast, a cap was put on the Hydroscat-6 for dark measurements and a 0.2 µm filter put on the a-Sphere absorption meter for the dissolved matter absorption measurements. Then, 3 C-OPS profiles, a Secchi disk and 3 CIMEL measurements were performed before returning to the Nice harbour.

Wednesday 29 August 2018

The sea state was smooth with a light breeze. The sky was blue and the visibility was excellent. Firstly 4 C-OPS profiles were performed. The third profile was stopped at 14 m depth because a cloud appeared and irradiance became unstable. Then, 2 CTD casts with water sampling were performed at the BOUSSOLE site. For the second cast, a 0.2 µm filter was put on the a-Sphere absorption meter for the dissolved matter absorption measurement. In the meantime, 3 CIMEL measurements were performed and finally a Secchi disk was performed before returning to the Nice harbour.

Pictures taken during this cruise can be found at:
https://photos.app.goo.gl/Z37b3d7BvuDmVfrF7

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 28 August 2018 (UTC)

People on board: Melek Golbol and Eduardo Soto Garcia.

0630 Departure from the Nice harbour.
0850 Preparation of IOP package: pure water blank measurement.
1015 Arrival at the BOUSSOLE site.
1045 CTD 01, 400 m with water sampling at 5 m for TSM (with 0.2 µm filter on a-Sphere and cap on HS-6).
1130 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 C-OPS 01, 02, 03.
1245 Secchi disk 01, 23 m.
1250 CIMEL 01, 02, 03.
1305 Departure to the Nice harbour.
1630 Arrival at the Nice harbour.

Tuesday 05 June 2018 (UTC)

People on board: Melek Golbol and Eduardo Soto Garcia.

0530 Departure from the Nice harbour.
0850 Arrival at the BOUSSOLE site.
0855 C-OPS 04, 05, 06, 07.
1005 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.
1100 Lunch, filtrations.
1200 CTD 04, 400 m with water sampling at 10 and 5 m for TSM, O_2 and TA/TC (with 0.2 µm filter on a-Sphere)
1205 CIMEL 04, 05, 06.
1225 Secchi 02, 22 m.
1230 Departure to the Nice harbour.
1600 Arrival to the Nice harbour.

Problems identified during the cruise

- Diving and maintenance operations of the buoy were not carried out because the buoy is currently not functioning. The faulty data acquisition system will be replaced during the next rotation of the upper superstructure of the buoy.

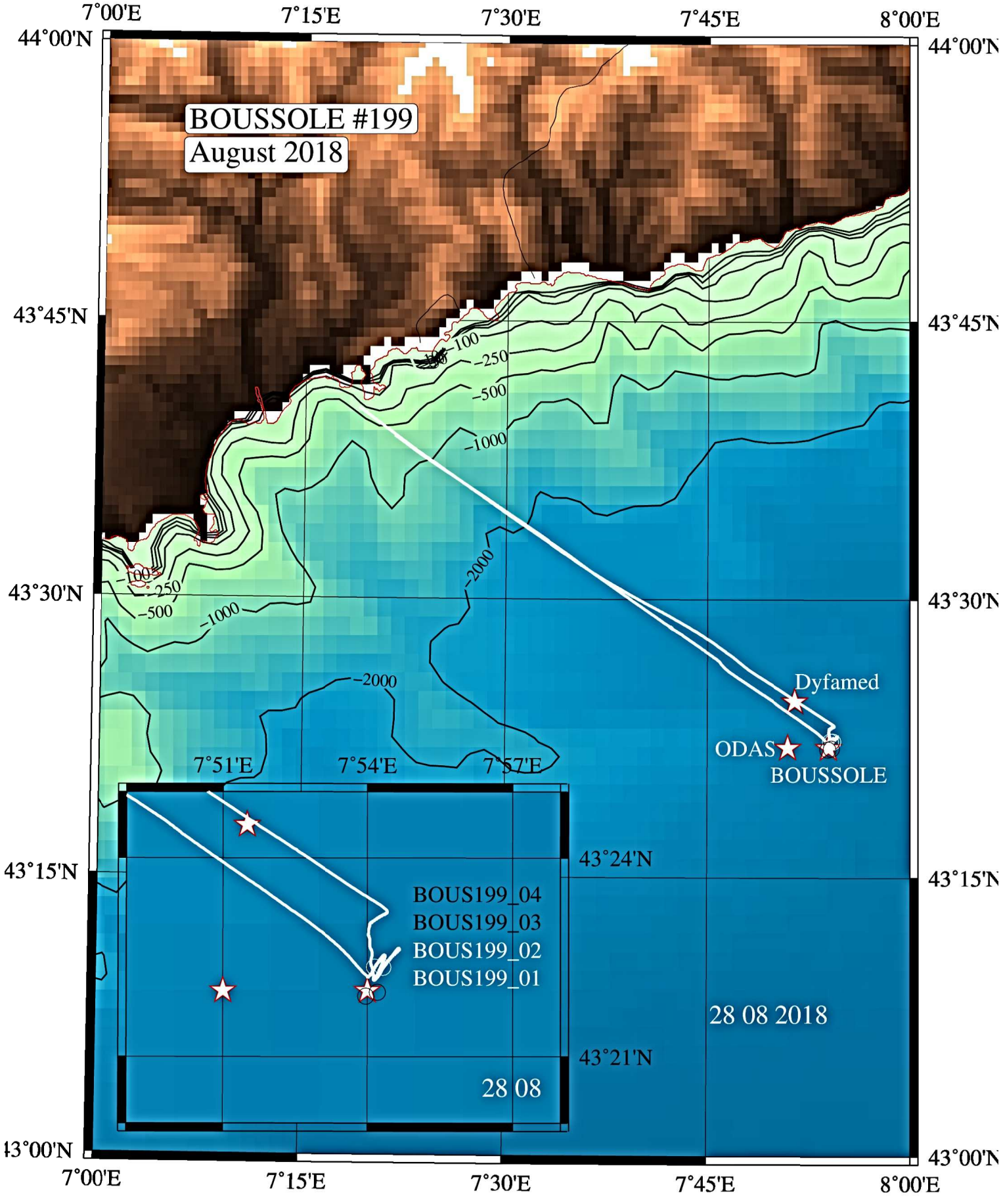
- There was no communication with the above-water irradiance (Es) radiometer after installation and testing of the C-OPS before its deployment. It appeared that the surface cable that connects Es to the deck unit was faulty. The cable was replaced with a spare cable that was taken onboard and C-OPS measurements were then performed.

- Navigation and meteorology were not recorded on 5th June 2018, after the R/V *Téthys II* onboard instrumentation stopped working.

Appendices

Cruise Summary Table for Boussole 199

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
28/08/18			BOUS199_01	TSM	10:47	19:00	400	43	22.360	7	54.164	blue		0-1	5	248	1018.3	68		24.1	23.12	smooth			
			BOUS199_02	HPLC & Ap	11:27	28:00	400	43	22.362	7	54.330	blue		0-1	7	248	1018.3	70		24.1	23.42	smooth			
		bou_c-ops_180828_1135_001_data.csv			12:11	3:30	83	43	22.293	7	54.113	blue	None	0	7	239	1018.0	70	excellent	24.1		smooth	0.3		no
		bou_c-ops_180828_1135_002_data.csv			12:23	3:26	80	43	22.565	7	54.097	blue	None	0	7	239	1018.0	70	excellent	24.1		smooth	0.3		no
		bou_c-ops_180828_1135_003_data.csv			12:32	3:43	91	43	22.757	7	54.051	blue	None	0	7	239	1018.0	70	excellent	24.1		smooth	0.3		no
				Secchi01	12:45	4:00	23	43	22	7	54	blue		0					excellent			smooth			
				CIMEL01	12:53	3:00		43	23.062	7	54.154	blue		0			1017.8								
				CIMEL02	12:56	2:00		43	23.062	7	54.154	blue		0			1017.8								
				CIMEL03	12:59	3:00		43	23.062	7	54.154	blue		0			1017.8								
29/08/19		bou_c-ops_180829_0838_001_data.csv			08:53	5:22	130	43	22.102	7	54.075	blue	Ci, Cs	3	6	216	1016.2	88	excellent	23.2		smooth	0.2		no
		bou_c-ops_180829_0838_002_data.csv			09:07	3:57	94	43	22.034	7	53.931	blue	Ci, Cs	3	6	216	1016.2	88	excellent	23.2		smooth	0.2		no
		bou_c-ops_180829_0838_003_data.csv			09:16	0:40	14	43	21.948	7	53.774	blue	Ci, Cs	3	6	216	1016.2	88	excellent	23.2		smooth	0.2		no
		bou_c-ops_180829_0838_004_data.csv			09:30	5:18	130	43	21.784	7	53.546	blue	Ci, Cs	3	6	216	1016.2	88	excellent	23.2		smooth	0.2		no
			BOUS199_03	HPLC & Ap	10:03	27:00	400	43	21.971	7	54.222	blue		3	7	216	1016.5	86		23.4	22.98	smooth			
			BOUS199_04	TA/TC, O2 & TSM	12:02	21:00	400	43	21.916	7	53.981	blue		3	7	230	1016.2	79		23.8	23.38	smooth			
				CIMEL04	12:03	3:00		43	22	7	54	blue		0			1016.2								
				CIMEL05	12:06	3:00		43	22	7	54	blue		0			1016.2								
				CIMEL06	12:09	4:00		43	22	7	54	blue		0			1016.2								
				Secchi02	12:25	4:00	22	43	22	7	54	blue		0					excellent			smooth			



GMT 2018 Sep 11 05:32:55

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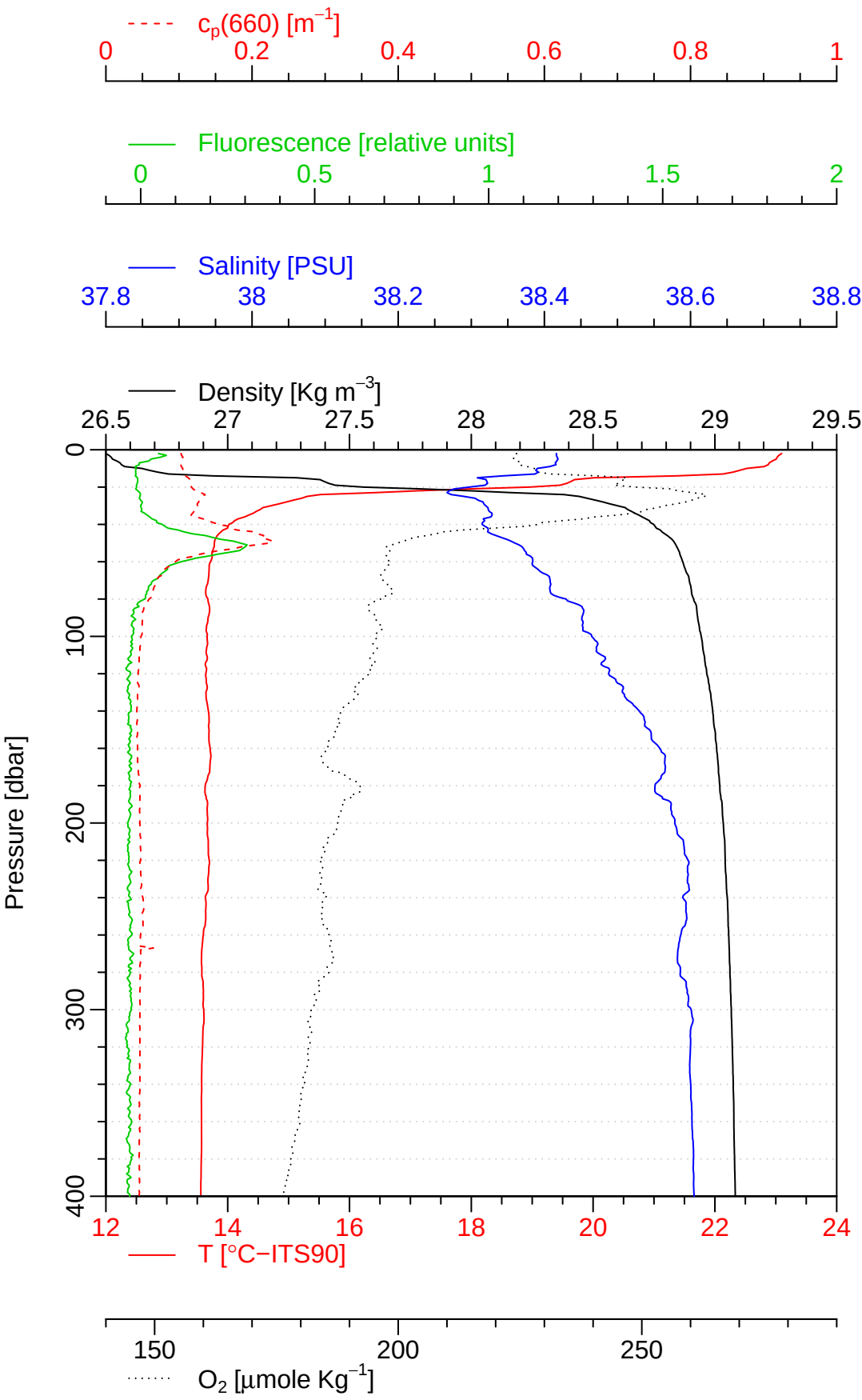

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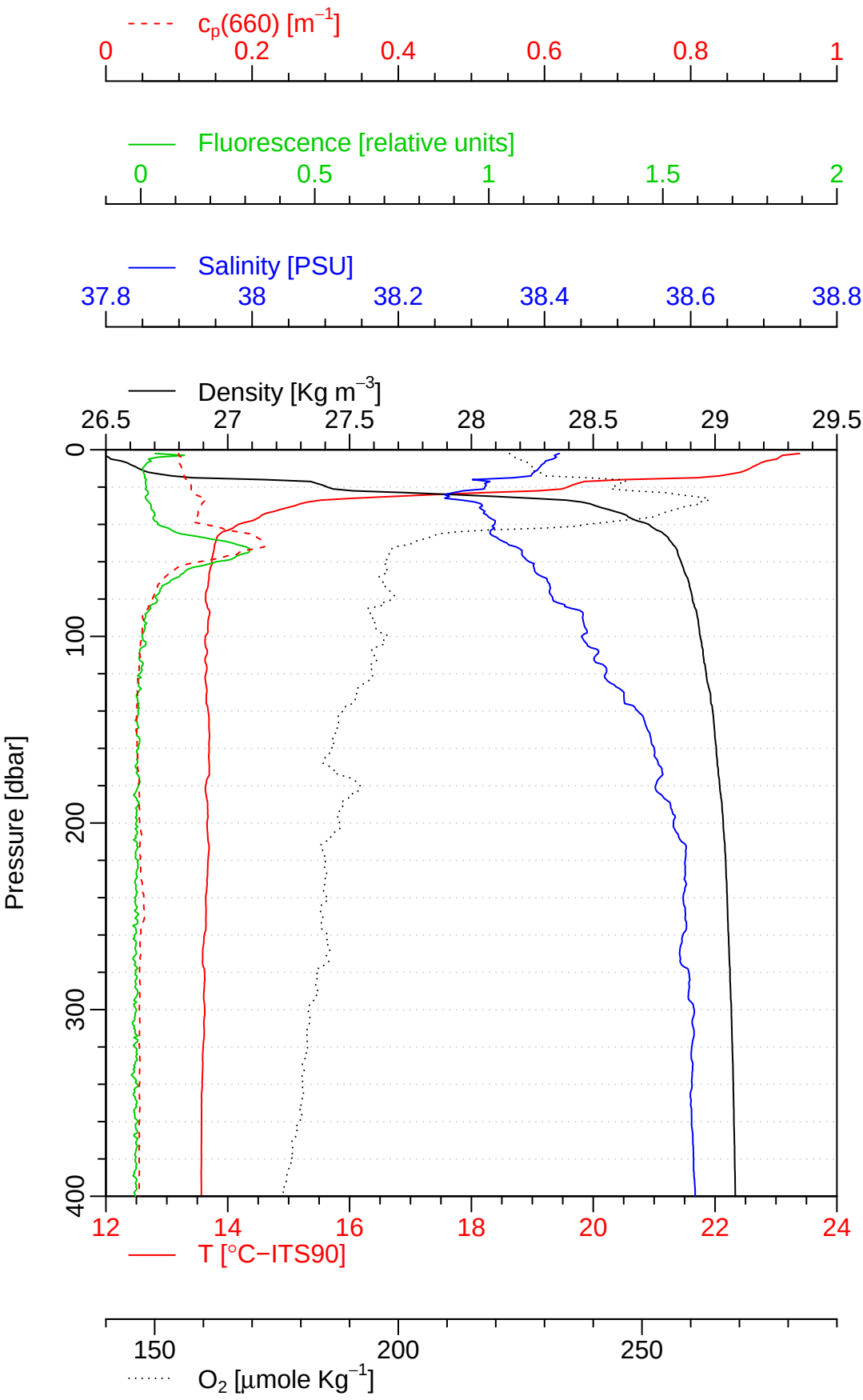

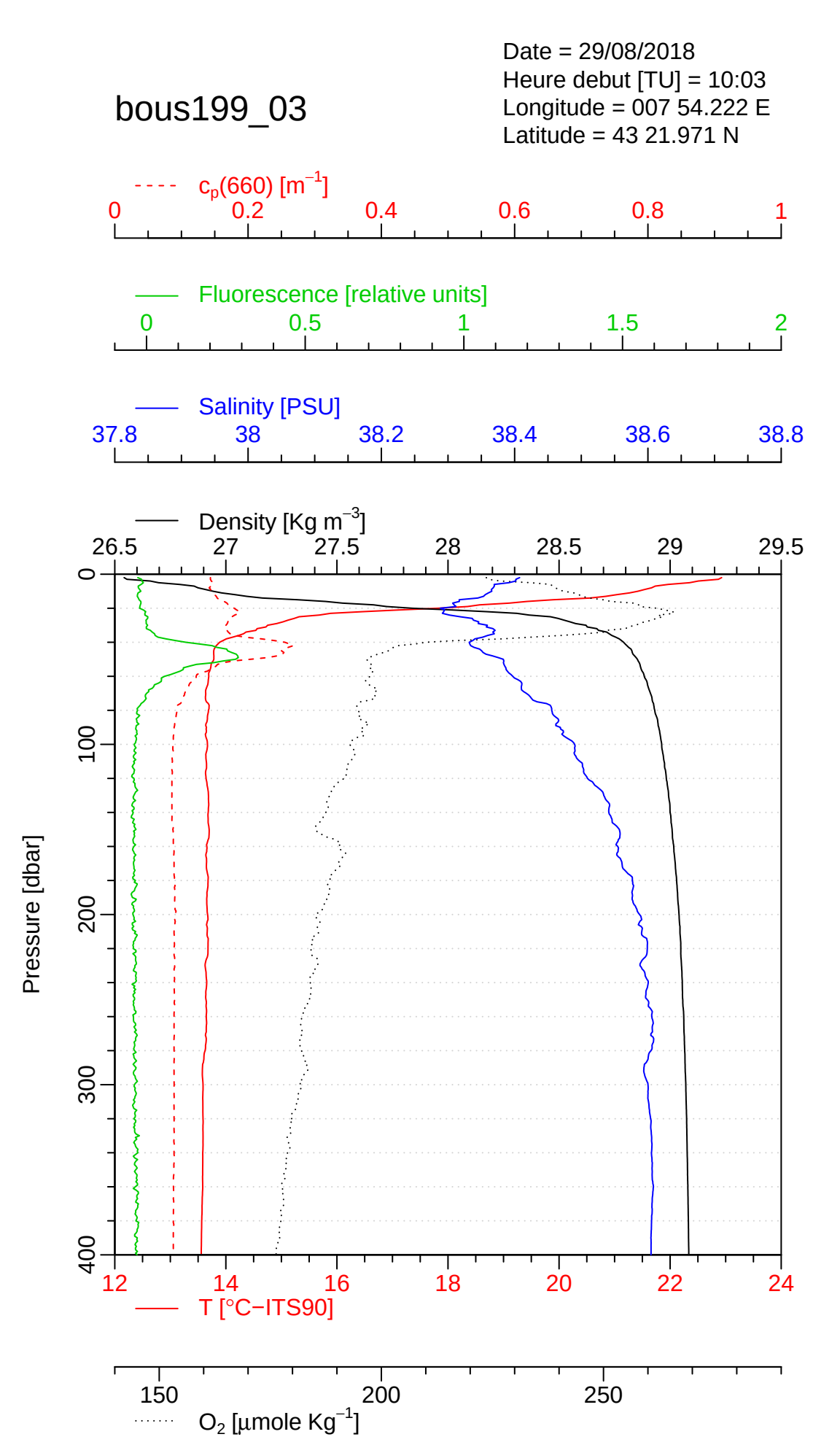
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0
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0.4
0.6
0.8
1
Fluorescence [relative units]
0
0.5
1
1.5
2
Salinity [PSU]
37.8
38
38.2
38.4
38.6
38.8
Density [Kg m−3]
26.5
27
27.5
28
28.5
29
29.5
Pressure [dbar]
0
100
200
300
400
12
14
16
18
20
22
24
T [°C−ITS90]
150
200
250
O2 [µmole Kg−1]

bous199_04

Date = 29/08/2018
Heure debut [TU] = 12:02
Longitude = 007 53.981 E
Latitude = 43 21.916 N