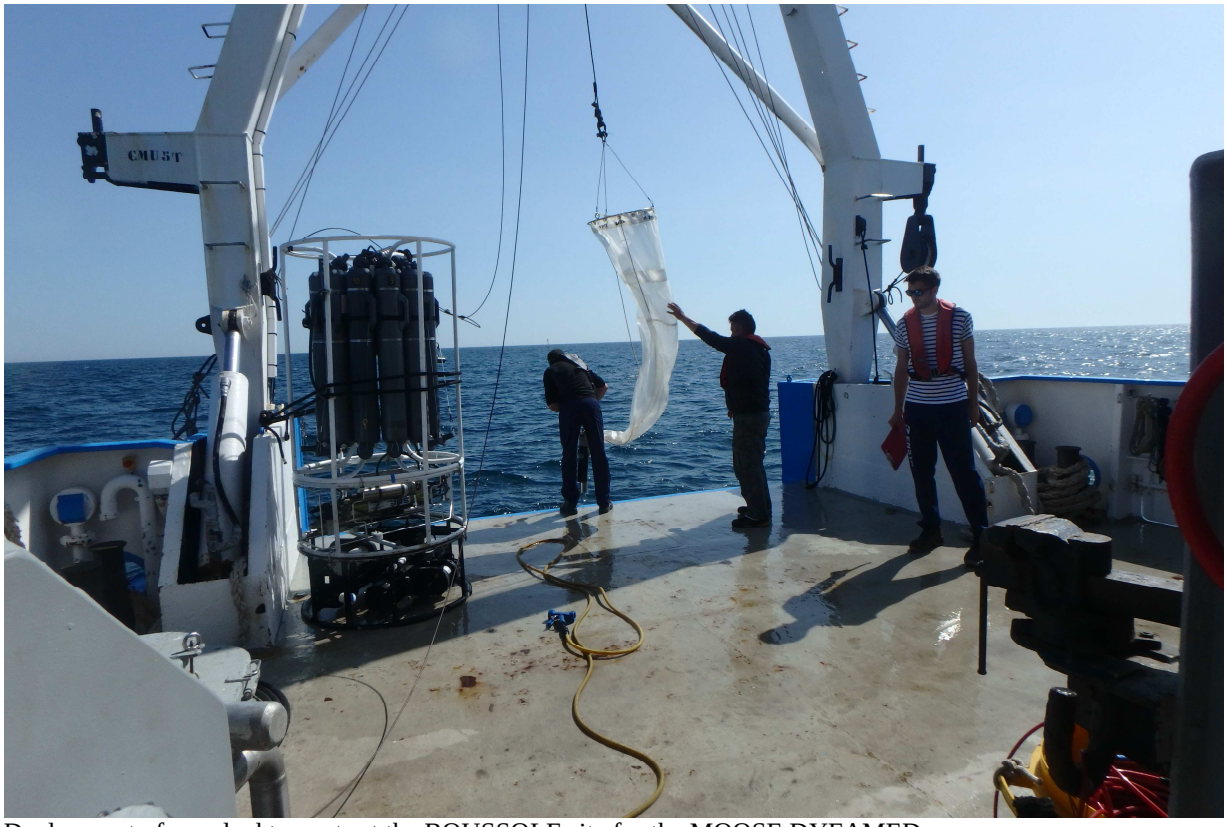
BOUSSOLE Monthly Cruise Report

Cruise 194
April 18-20, 2018

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

Science Personnel: Benjamin Briat, Melek Golbol and Eduardo Soto Garcia.

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



Deployment of zooplankton nets at the BOUSSOLE site for the MOOSE DYFAMED program.

BOUSSOLE project

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

April 30, 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 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

Three vertical zooplankton nets were deployed the second day of this BOUSSOLE cruise because this operation could not be performed during the MOOSE DYFAMED cruise.

Cruise Summary

The first day was used for an optical profile, for CTD casts with water sampling and for a Secchi disk at the BOUSSOLE site. The second and third days were used for optical profiles, for CTD casts with water sampling, for CIMEL measurements and for a Secchi disk at the BOUSSOLE site. Furthermore, maintenance on the top of the buoy was performed the last day.

Wednesday 18 April 2018

The sea state was slight and then, smooth with a moderate breeze. The sky was blue and the visibility was excellent. One of the solar panel on the top of the buoy was found broken. Firstly, 1 C-OPS profile was performed and it was not possible to do other profiles because a problem appeared with the connection between the deck unit of the C-OPS and the sensors, with a loss of communication with the sensors. It appeared that the cable was faulty. It was replaced with another one. In the meantime, a CTD deployment was attempted but failed because the pump did not turn on. Then, a C-OPS deployment was attempted but failed because there were knots on the new cable. Then, 2 CTD casts with water sampling and a Secchi disk were performed at the BOUSSOLE site. For the first CTD 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. The new C-OPS cable was unwound in the sea on the way back to the Nice harbour to remove the knots.

Thursday 19 April 2018

The sea state was slight with a moderate breeze. The sky was blue and the visibility was good. Firstly, 3 C-OPS profiles were performed and then, 2 CTD casts with water sampling and CIMEL measurements were performed at the BOUSSOLE site. For the second CTD cast, a 0.2 µm filter was put on the a-Sphere absorption meter for the dissolved matter absorption measurements. Finally, 6 vertical zooplankton nets (3 at 200 m depth and 3 at 100 m depth) for the MOOSE program and a Secchi disk were performed at the BOUSSOLE site before returning to the Nice harbour.

Friday 20 April 2018

The sea state was slight with a moderate breeze. The sky was blue and the visibility was good. Firstly, 3 C-OPS profiles were performed and then, 3 CTD casts with water sampling and CIMEL measurements were performed at the BOUSSOLE site. For the second and third CTD casts, a 0.2 µm filter was put on the a-Sphere absorption meter for the dissolved matter absorption measurements. The cavity of the a-Sphere was cleaned after the second cast in order to test the response of the a-Sphere when the cavity is cleaned and to do a comparison of data without and after cleaning of the a-Sphere. Then, the connector of the ARGOS beacon was cleaned on the top of the buoy and a plug was put on the junction box of the solar panel instead of the connector of the broken solar panel to avoid short circuit. Finally a Secchi disk was performed at the BOUSSOLE site before returning to the Nice harbour.

Pictures taken during this cruise can be found at:
https://photos.app.goo.gl/ZvEkJr4Ushd0BdWb2

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 18 April 2018 (UTC)

People on board: Melek Golbol and Eduardo Soto Garcia.

0640 Departure from the Nice harbour.
1020 Arrival at the BOUSSOLE site.
1035 C-OPS 01.
1100 CTD attempt: failed (pump did not turn on).
1100 Lunch.
1230 C-OPS attempt: failed (knots on the cable).
1245 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).
1355 CTD 02, 400 m with water sampling at 400, 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a_p, O_2 and TA/TC.
1425 Secchi disk 01, 10 m.
1430 Departure to the Nice harbour.
1730 Arrival at the Nice harbour.

Thursday 19 April 2018 (UTC)

People on board: Melek Golbol, Eduardo Soto Garcia and Benjamin Briat.

0605 Departure from the Nice harbour.
0945 Arrival at the BOUSSOLE site.
1000 Lunch.
1035 C-OPS 02, 03, 04.
1125 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 $a_{p.}$
1130 CIMEL 01, 02, 03.
1245 CTD 04, 400 m with water sampling at 5 m for TSM (with 0.2 µm filter on a-Sphere).
1315 Zooplankton nets x 6 (3 x 200 m depth, 3 x 100 m depth).
1330 Secchi disk 02, 11 m.
1405 Departure to the Nice harbour.
1730 Arrival at the Nice harbour.

Friday 20 April 2018 (UTC)

People on board: Melek Golbol and Eduardo Soto Garcia.

0530 Departure from the Nice harbour.
0900 Arrival at the BOUSSOLE site.
0905 C-OPS 05, 06, 07.
0950 CTD 05, 400 m with water sampling at 400, 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC and $a_{p.}$
1030 Lunch and filtrations.
1200 CTD 06, 400 m with water sampling at 5 m for TSM (with 0.2 µm filter on a-Sphere and cleaning of the sphere)
1205 CIMEL 04, 05, 06.
1250 CTD 07, 400 m with water sampling at 5 m for TSM (with 0.2 µm filter on a-Sphere without cleaning of the sphere).
1310 Cleaning of the ARGOS beacon connector and installation of a cap on the junction box on the top of the buoy.
1310 Secchi disk 02, 12 m.
1330 Departure to the Nice harbour.
1645 Arrival at 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.

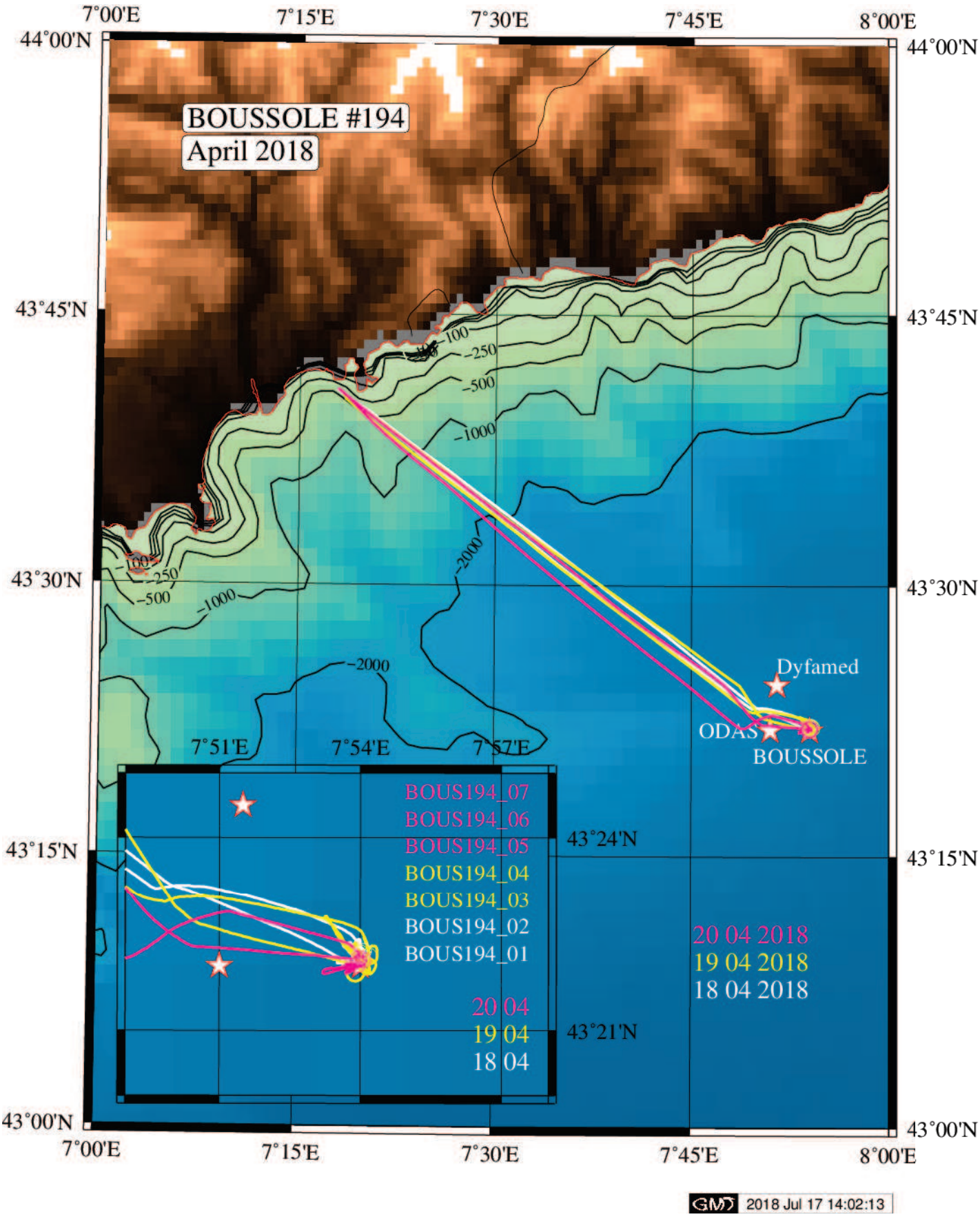
- The first day, only 1 C-OPS profile could be performed. A problem appeared with the connection between the deck unit of the C-OPS and the sensors, with a loss of communication with sensors. It was the same problem which happened during last cruise. The cables and connectors were examined and tested in the lab before the cruise but nothing was detected in the lab. However a spare cable was took on board to prevent this problem. The faulty cable was replaced the first day after the first deployment. During the second deployment, the profile had to be stopped because several knots on the new cable appeared during the deployment. It was unwound in the sea on the way back to the Nice harbour to remove the knots.

- CTD 05: the filter used to remove big particles and normally placed on the inlet tube of the a-sphere absorption meter was not installed as it should have been normally.

Appendices

Cruise Summary Table for Boussole 194

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
18/04/18		bou_c-ops_180418_1017_001_data.csv			10:33	3:52	97	43	22.136	7	53.877	blue	None	0	12	69	1026.5	71	excellent	17.6		slight	0.6		few
			BOUS194_01	TSM	12:47	22:00	400	43	22.160	7	53.992	blue		3	11	112	1026.1	71		17.7	14.92	smooth			
			BOUS194_02	HPLC, Ap, TA/TC & O_2	13:55	23:00	400	43	22.226	7	54.066	blue		4	12	126	1025.2	69		17.7	15.15	smooth			
				Secchi01	14:25	4:00	10	43	22	7	54	blue		4					excellent			smooth			
19/04/18		bou_c-ops_180419_1026_001_data.csv			10:35	3:42	89	43	22.150	7	53.950	blue	None	0	14	72	1026.1	71	good	17.1		slight	0.7		few
		bou_c-ops_180419_1026_002_data.csv			10:46	3:44	89	43	22.362	7	53.662	blue	None	0	14	72	1026.1	71	good	17.1		slight	0.7		few
		bou_c-ops_180419_1026_004_data.csv			10:55	3:30	85	43	22.515	7	53.520	blue	None	0	14	72	1026.1	71	good	17.1		slight	0.7		few
			BOUS194_03	HPLC & Ap	11:27	26:00	400	43	22.199	7	53.994	blue		0	10	78	1026.1	73		16.9	14.30	slight			
				CIMEL01	11:33	5:00		43	22	7	54	blue		0			1026.1								
				CIMEL02	11:39	2:00		43	22	7	54	blue		0			1026.1								
				CIMEL03	11:42	3:00		43	22	7	54	blue		0			1026.1								
			BOUS194_04	TSM	12:44	16:00	400	43	22.154	7	54.182	blue		0	10	124	1025.6	76		16.8	15.25	slight			
				Secchi02	13:30	4:00	11	43	22	7	54	blue		0					good			slight			
20/04/18		bou_c-ops_180420_0853_001_data.csv			09:04	3:15	77	43	22.009	7	54.000	blue	None	0	13	54	1023.5	65	good	18.4		slight	0.6		few
		bou_c-ops_180420_0853_002_data.csv			09:13	3:11	75	43	21.988	7	53.748	blue	None	0	13	54	1023.5	65	good	18.4		slight	0.6		few
		bou_c-ops_180420_0853_003_data.csv			09:22	3:13	77	43	21.961	7	53.488	blue	None	0	13	54	1023.5	65	good	18.4		slight	0.6		few
			BOUS194_05	HPLC & Ap	09:47	26:00	400	43	22.092	7	54.056	blue		0	11	74	1023.6	66		18.3	15.26	slight			
			BOUS194_06	TSM	12:05	23:00	400	43	22.019	7	53.944	blue		0	13	70	1022.6	64		19.2	15.89	slight			
				CIMEL04	12:08	3:00		43	22	7	54	blue		1			1022.5								
				CIMEL05	12:12	3:00		43	22	7	54	blue		1			1022.5								
				CIMEL06	12:16	3:00		43	22	7	54	blue		1			1022.5								
			BOUS194_07		12:51	6:00	100	43	22.127	7	53.972	blue		0	12	89	1022.2	66		18.9	15.25	slight			
				Secchi03	13:10	4:00	12	43	22	7	54	blue		1					good			slight			



GMT 2018 Jul 17 14:02:13

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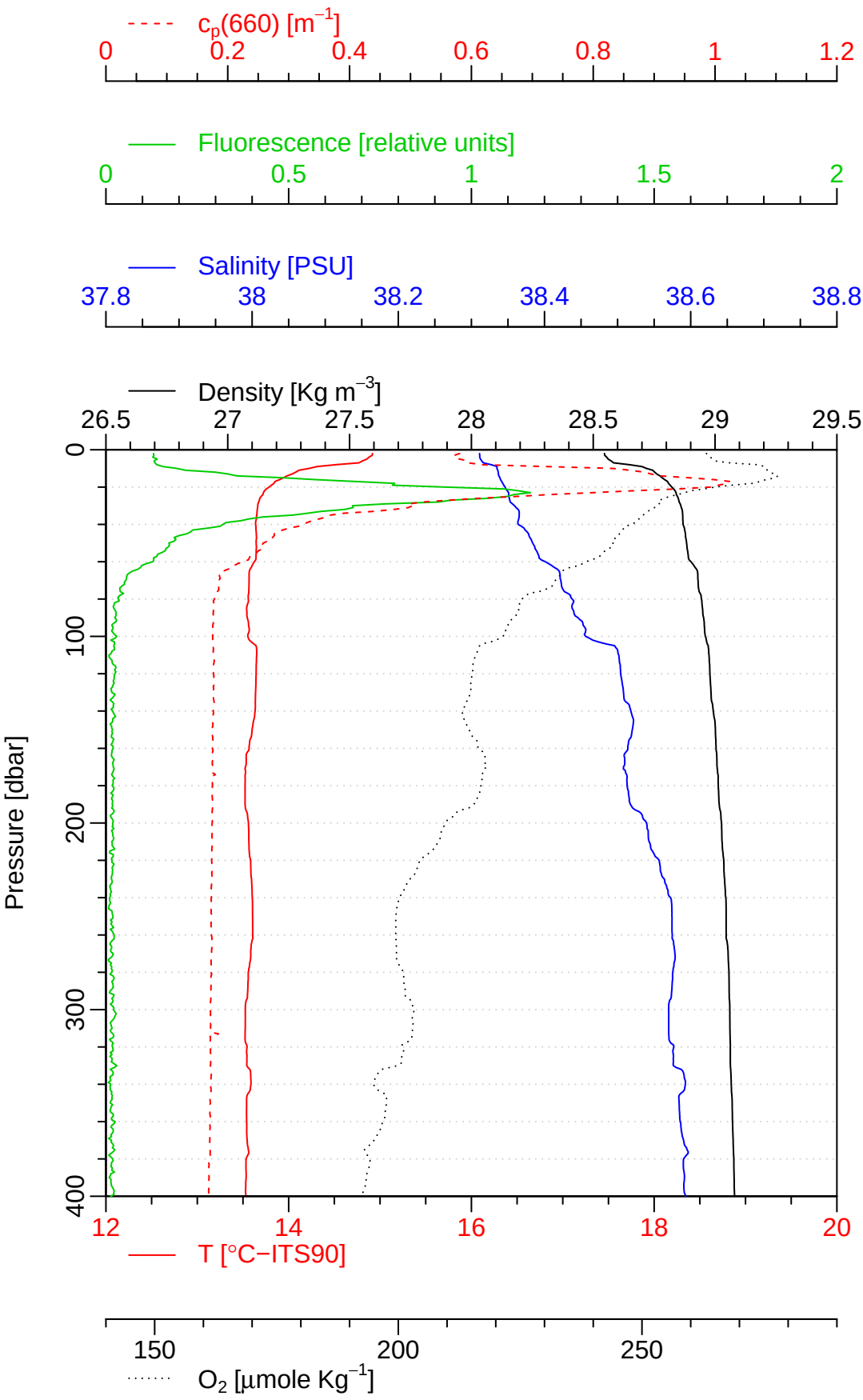

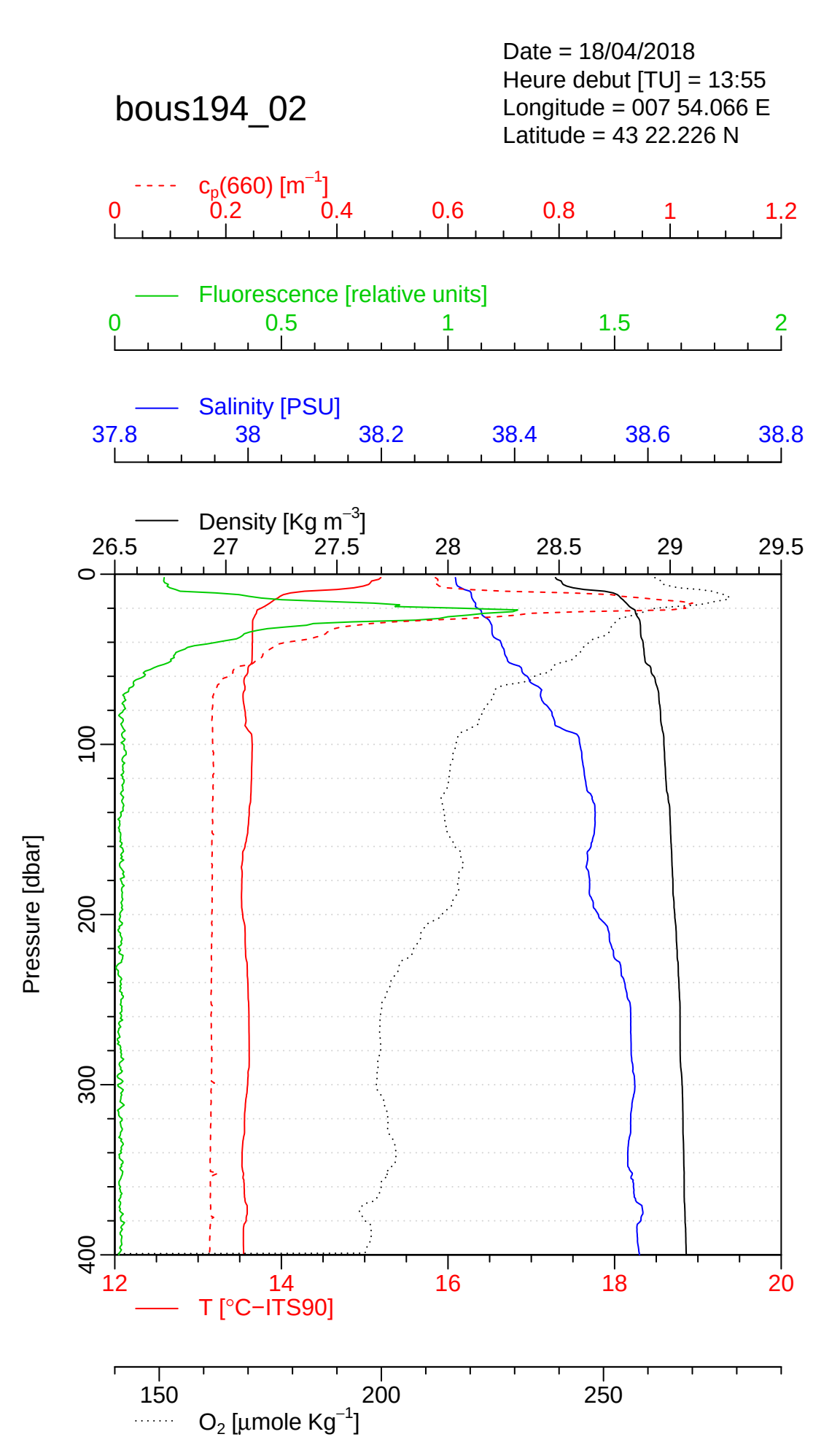
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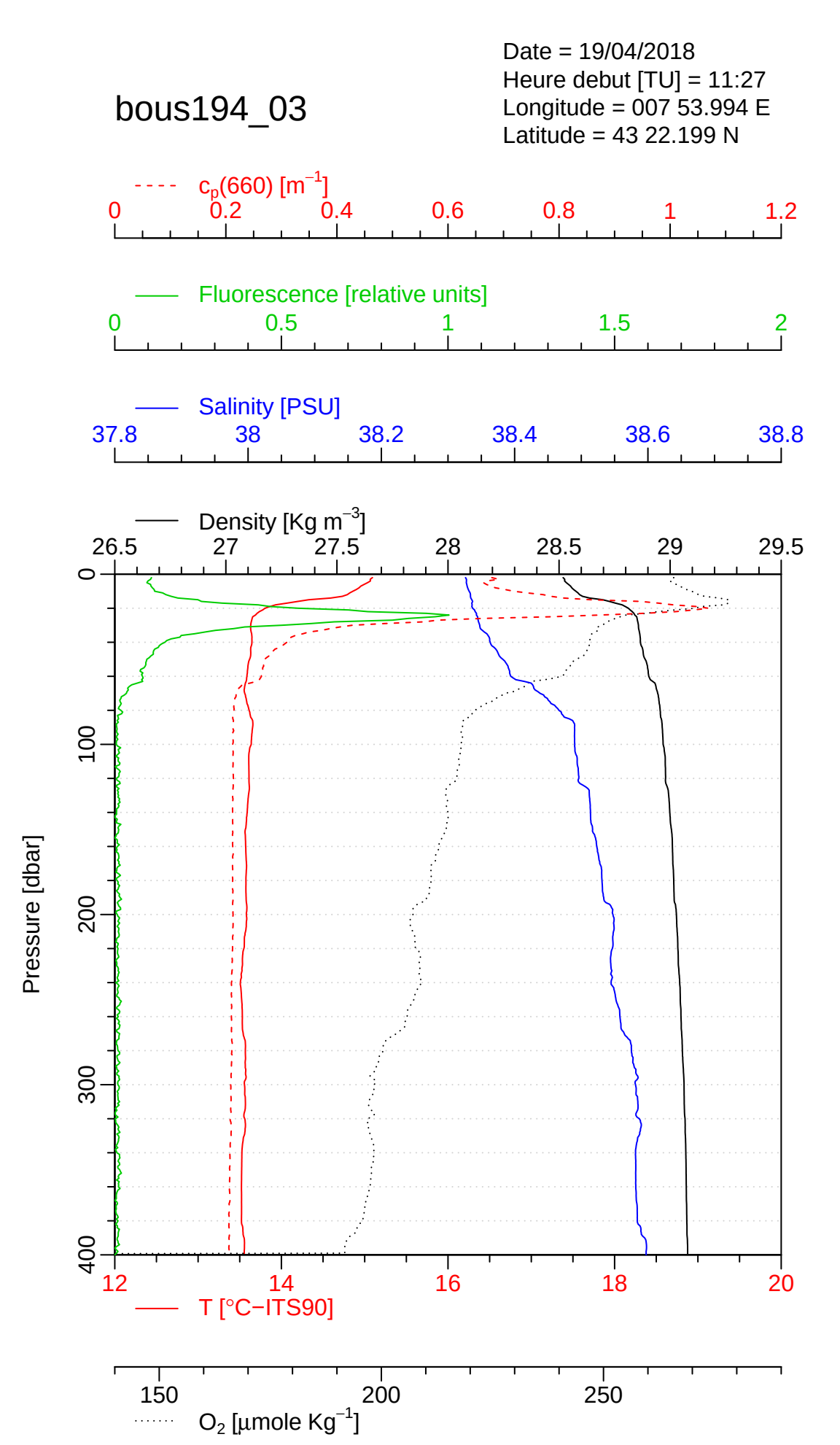
0.4
0.6
0.8
1
1.2
Fluorescence [relative units]
0
0.5
1
1.5
2
Salinity [PSU]
37.8
38
38.2
38.4
38.6
38.8
Density [Kg m^-3]
26.5
27
27.5
28
28.5
29
29.5
Pressure [dbar]
0
100
200
300
400
12
14
16
18
20
T [°C−ITS90]
150
200
250
O2 [µmole Kg^-1]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0.4
0.6
0.8
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1.2
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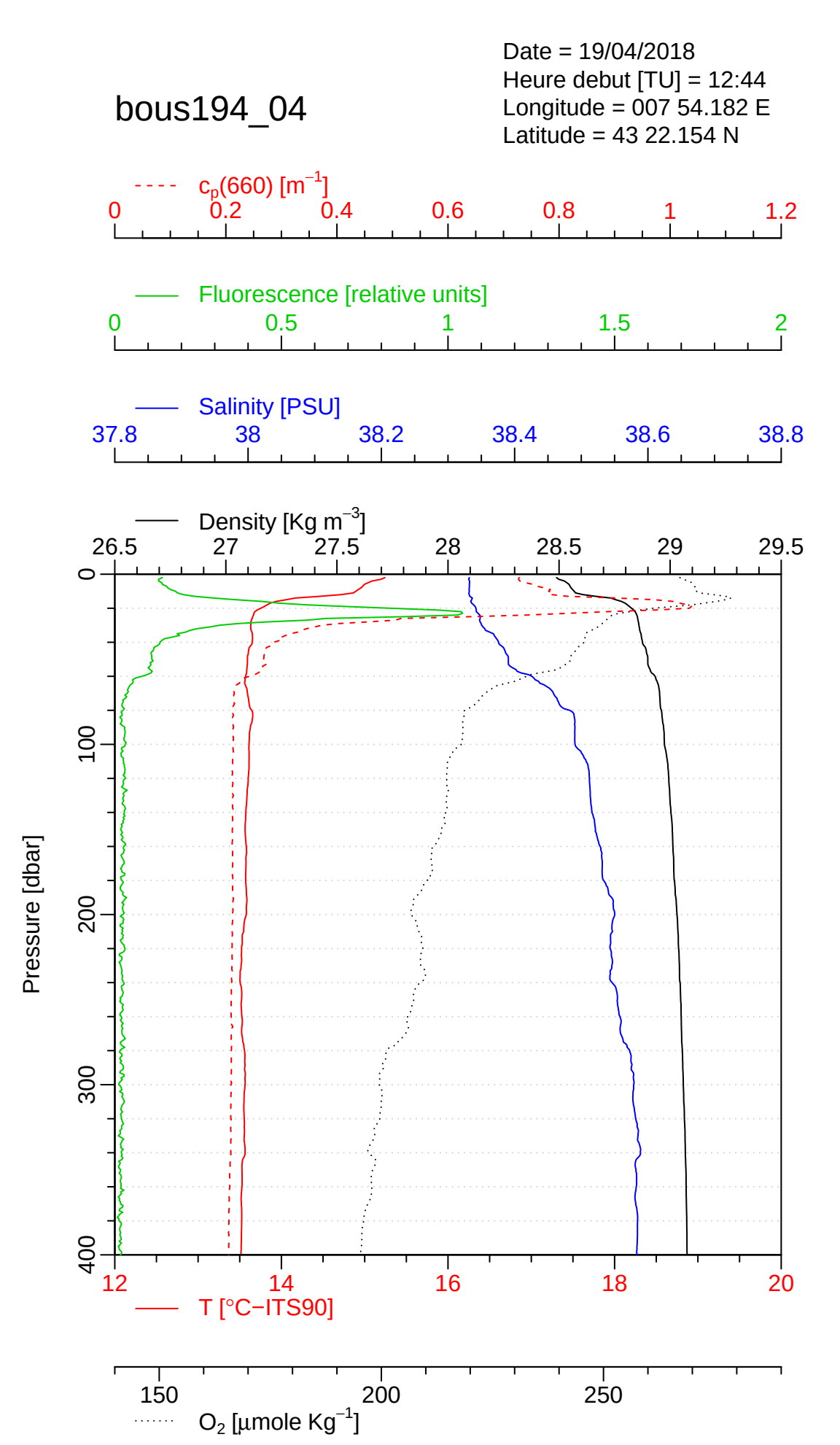
0
0.5
1
1.5
2
Salinity [PSU]
37.8
38
38.2
38.4
38.6
38.8
Density [Kg m^-3]
26.5
27
27.5
28
28.5
29
29.5
Pressure [dbar]
0
100
200
300
400
12
14
16
18
20
T [°C−ITS90]
150
200
250
O2 [µmole Kg^-1]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0.8
1
1.2
Fluorescence [relative units]
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0.5
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
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18
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200
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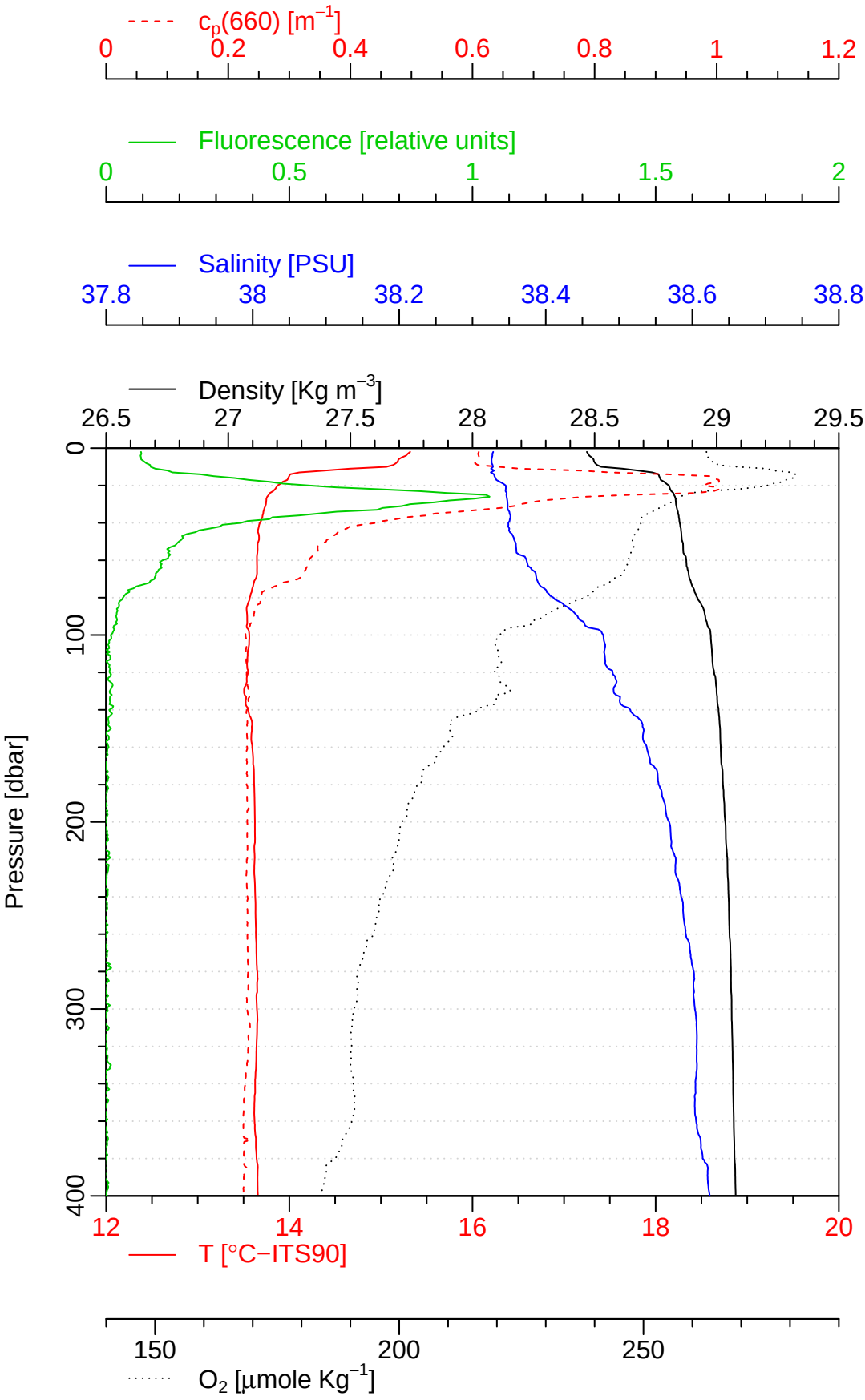

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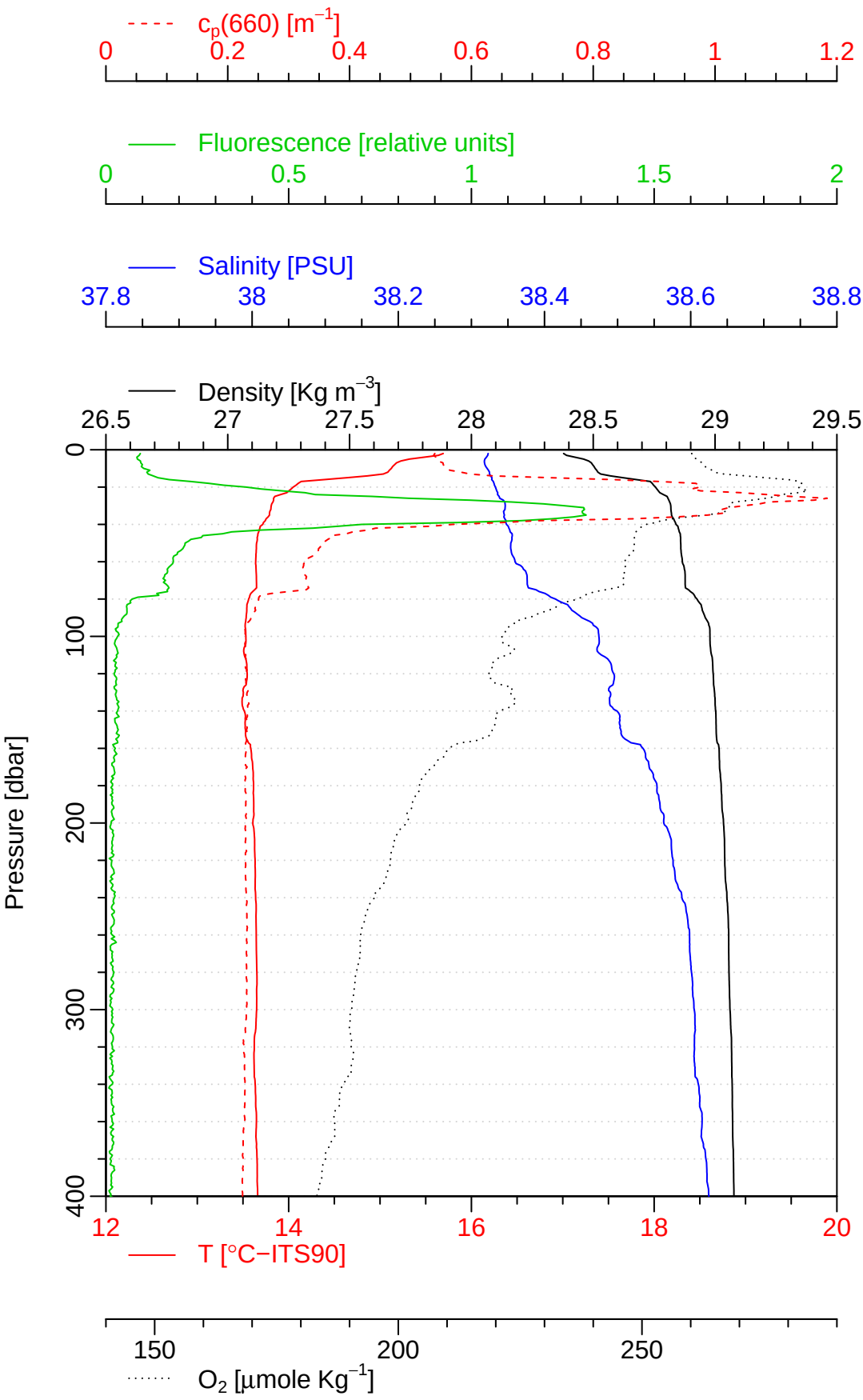

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