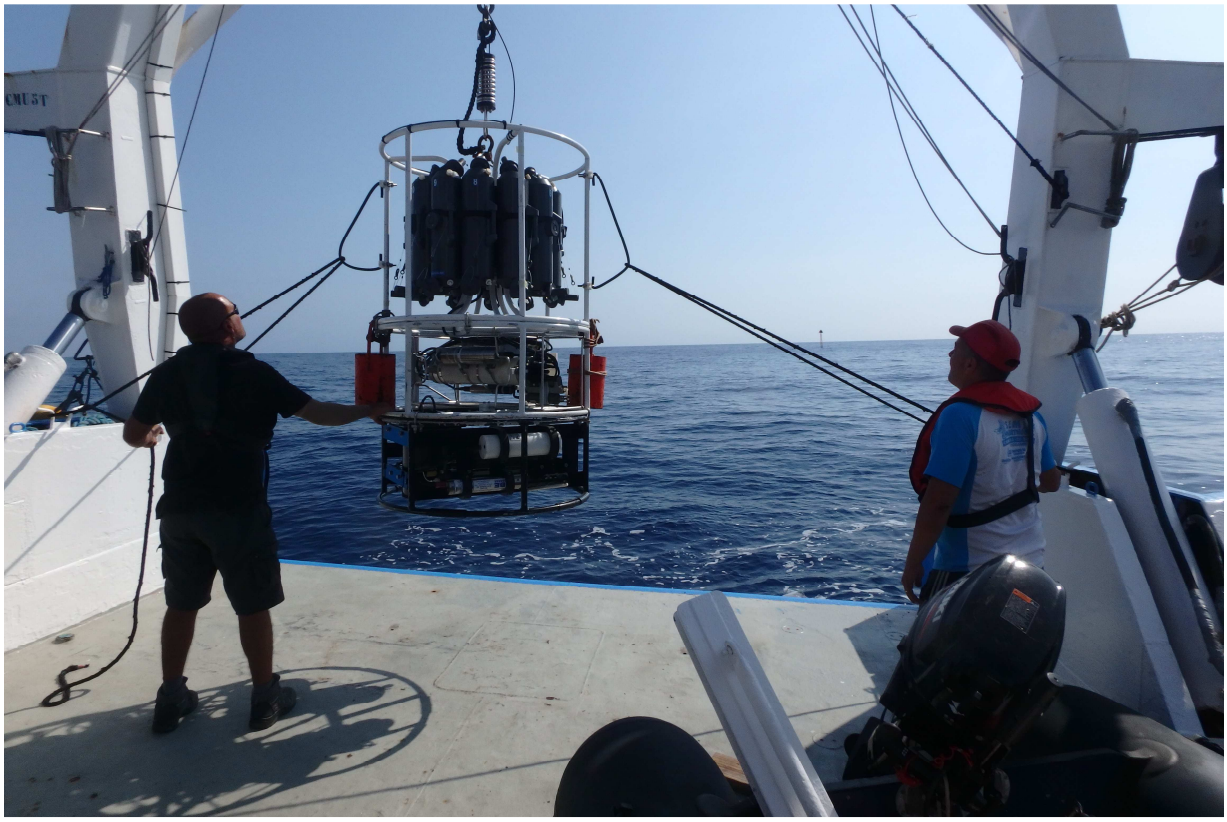
BOUSSOLE Monthly Cruise Report

Cruise 187
September 07-08, 2017

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

Science Personnel: Melek Golbol and Eduardo Soto Garcia.

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



Deployment of the CTD Rosette from the deck of the R/V *Téthys II* on the BOUSSOLE site.

BOUSSOLE project

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

September 14, 2017

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

Université Pierre & Marie Curie, 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

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.
Additional water samples were collected at 200m, 150m, 80m, 70m, 20m and 10m on the BOUSSOLE site for the MOOSE DYFAMED program.

Cruise Summary

The first day was used for optical profiles, for CTD casts with water sampling, for CIMEL measurements and for a Secchi disk 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.

Tuesday 07 September 2017

The sea state was slight with a light breeze on the morning and a gentle breeze on the afternoon. The sky was blue and the visibility was good. This day, 3 C-OPS profiles, 3 CIMEL measurements and 2 CTD casts with water sampling were performed at the BOUSSOLE site. The second cast was performed with a 0.2 µm filter on the a-Sphere absorption meter and with a cap on the backscattering meter for dark measurements. Then, 1 Secchi disk was performed at the BOUSSOLE site before returning to the Nice harbour.

Friday 08 September 2017

The sea state was slight with a light breeze on the morning and a gentle breeze on the afternoon. The sky was blue and the visibility was good. This day, 3 C-OPS profiles and 2 CTD casts with water sampling were performed at the BOUSSOLE site. The second cast was performed with a 0.2 µm filter on the a-Sphere absorption meter. Then, 1 Secchi disk was performed at the BOUSSOLE site before returning to the Nice harbour.

Pictures taken during this cruise can be found at:
https://get.google.com/albumarchive/114686870380724925974/album/AF1QipNH2J-h_mHFUzY0ApzLSY349iYT3fvM4aXOUx_o

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 07 September 2017 (UTC)

People on board: Melek Golbol and Eduardo Soto Garcia.

0500 Departure from the Nice harbour.
0820 Arrival at the BOUSSOLE site.
0830 C-OPS 01, 02, 03.
0915 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 cytometry.
0925 CIMEL 01, 02, 03.
1000 Filtrations.
1125 CTD 02, 400 m with water sampling at 5 m for TSM (with 0.2 µm filter on a-Sphere and cap on HS-6).
1150 Secchi 01, 24 m.
1200 Departure to the Nice harbour.
1530 Arrival at the Nice harbour.

Friday 08 September 2017 (UTC)

People on board: Melek Golbol and Eduardo Soto Garcia.

0545 Departure from the Nice harbour.
0820 Arrival at the BOUSSOLE site.
0830 C-OPS 04, 05, 06.
0920 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 O_2.
1120 CTD 04, 400 m with water sampling at 10 and 5 m for TSM and TA/TC (with 0.2 µm filter on a-Sphere).
1140 Secchi 02, 20 m.
1145 Departure to the Nice harbour.
1530 Arrival at the Nice harbour.

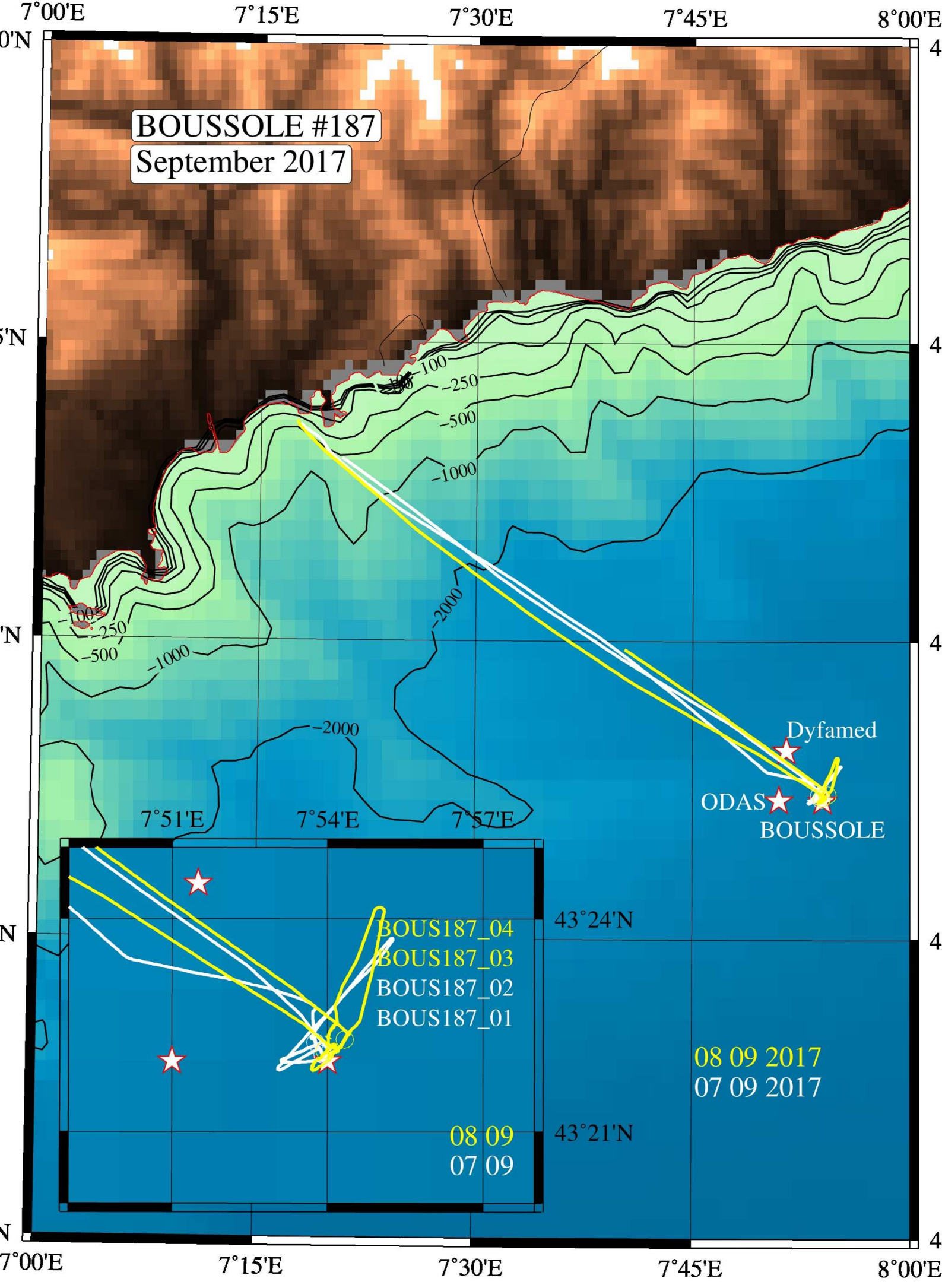
Problems identified during the cruise

- The buoy system had stopped before the cruise, but the diving operations for maintenance could not be performed. High waves were announced by the weather forecasts and it was too risky to remove the DACNet (Data Acquisition and Control Network) unit with bad weather conditions.

Appendices

Cruise Summary Table for Boussole 187

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
07/09/17		bou_c-ops_170907_0809_001_data.csv			08:27	4:27	110	43	22.233	7	53.816	blue	None	0	2	67	1012.5	75	good	23.4		calm	0.6		no
		bou_c-ops_170907_0809_002_data.csv			08:38	4:15	105	43	22.161	7	53.565	blue	None	0	2	67	1012.5	75	good	23.4		calm	0.6		no
		bou_c-ops_170907_0809_003_data.csv			08:48	4:13	104	43	22.099	7	53.362	blue	None	0	2	67	1012.5	75	good	23.4		calm	0.6		no
			BOUS187_01	HPLC, Ap & Cyto	09:14	30:00	400	43	22.093	7	53.906	blue		2	3	116	1012.7	78		22.8	22.90	calm			
				CIMEL01	09:24	3:00		43	22.122	7	53.881	blue		0			1012.8								
				CIMEL02	09:29	3:00		43	22.122	7	53.881	blue		0			1012.8								
				CIMEL03	09:35	3:00		43	22.122	7	53.881	blue		0			1012.8								
			BOUS187_02	TSM	11:24	23:00	400	43	22.259	7	53.77	blue		2	9	148	1012.1	67		22.8	23.02	calm			
				Secchi01	11:50	4:00	24	43	22	7	54	blue		2					good			calm			
08/09/17		bou_c-ops_170908_0806_001_data.csv			08:32	4:06	97	43	22.170	7	54.033	blue	None	0	3	79	1012.9	68	good	22.9		calm	0.9		no
		bou_c-ops_170908_0806_002_data.csv			08:42	3:57	97	43	22.170	7	54.033	blue	None	0	3	79	1012.9	68	good	22.9		calm	0.9		no
		bou_c-ops_170908_0806_003_data.csv			08:52	04:00	98	43	21.984	7	53.757	blue	None	0	3	79	1012.9	68	good	22.9		calm	0.9		no
			BOUS187_03	HPLC, Ap & O_2	09:18	30:00	400	43	22.145	7	53.994	blue		2	4	136	1012.9	67		22.9	23.15	calm			
			BOUS187_04	TA/TC & TSM	11:18	20:00	400	43	22.301	7	54.335	blue		3	7	109	1012.8	68		23.5	23.339	calm			
				Secchi02	11:40	4:00	20	43	22	7	54	blue		3					good			calm			



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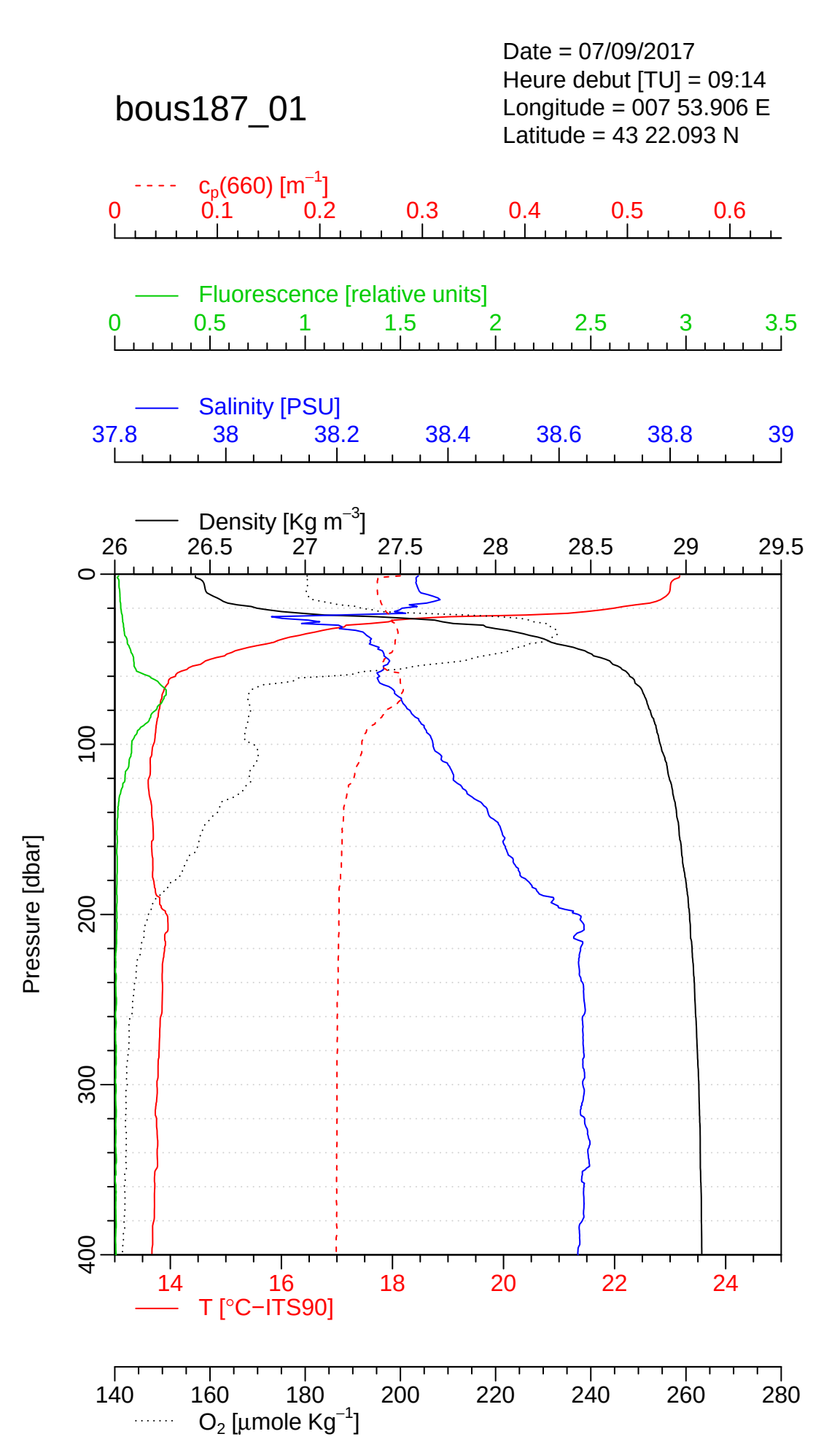
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Latitude = 43 22.093 N
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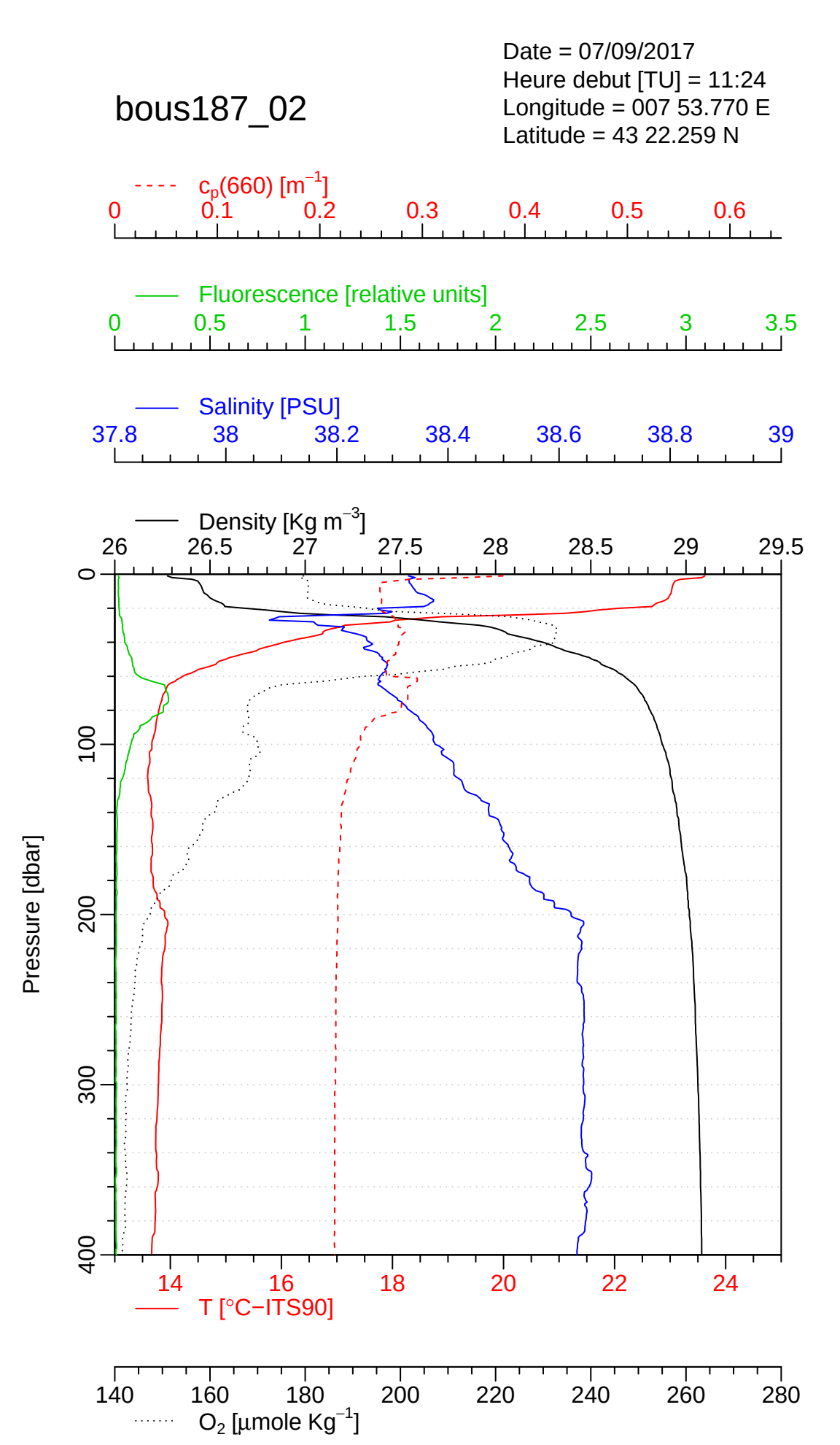
Fluorescence [relative units]
0 0.5 1 1.5 2 2.5 3 3.5
Salinity [PSU]
37.8 38 38.2 38.4 38.6 38.8 39
Density [Kg m−3]
26 26.5 27 27.5 28 28.5 29 29.5
Pressure [dbar]
0 100 200 300 400
14 16 18 20 22 24
T [°C−ITS90]
140 160 180 200 220 240 260 280
O2 [µmole Kg−1]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Fluorescence [relative units]
0 0.5 1 1.5 2 2.5 3 3.5
Salinity [PSU]
37.8 38 38.2 38.4 38.6 38.8 39
Density [Kg m−3]
26 26.5 27 27.5 28 28.5 29 29.5
Pressure [dbar]
0 100 200 300 400
14 16 18 20 22 24
T [°C−ITS90]
140 160 180 200 220 240 260 280
O2 [µmole Kg−1]

bous187_03

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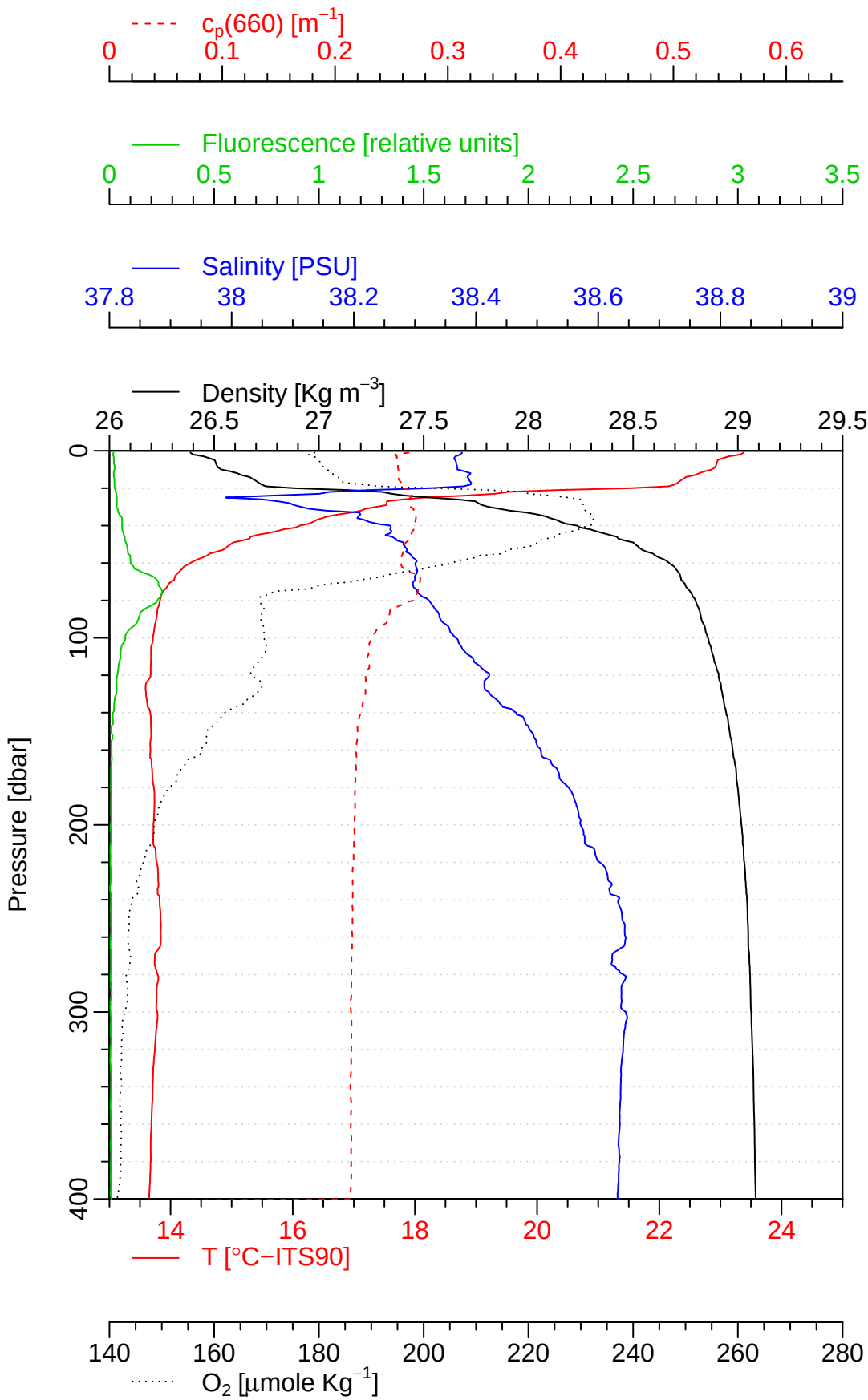
Latitude = 43 22.145 N



bous187_04

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Latitude = 43 22.301 N