BOUSSOLE Monthly Cruise Report

Cruise 197
June 29, 2018

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Vessel: R/V Téthys II
(Captain: Vincent Le Duvéhat)

Science Personnel: Jean-Baptiste Abelé, Melek Golbol, David Luquet, Didier Robin and Eduardo Soto Garcia.

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

Deployment of an Argo profiling float equipped with a pH sensor at the DYFAMED site.

BOUSSOLE project

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

July 09, 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

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Contents

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

An Argo profiling float equipped with a pH sensor was deployed during this cruise for the marine optics and remote sensing group of the Laboratoire d'Océanographie de Villefranche.

The optode sensor located at 3 m depth on the buoy was recovered in order to be sent to the LOCEAN for servicing and calibration. The PCO_2 CARIOCA sensor located at 10 m depth was removed from the buoy in order to download data.

Cruise Summary

This cruise was not initially scheduled, and was opportunistically organised at the end of June 2018. A single day was used to perform all operations: diving operations, optical profiles, CTD casts with water sampling, CIMEL measurements and a Secchi disk at the BOUSSOLE site. It was also used for a deployment of the profiling float at the DYFAMED site.

Friday 29 June 2018

The sea state was slight with a moderate breeze. The sky was blue and the visibility was good. When arrived at the BOUSSOLE site, divers went at sea to recover the optode sensor at 3 m depth and the PCO_2 sensor at 10 m depth. They also cleaned the sensors on the buoy and took photos. Then, downloading data from the PCO_2 sensor was attempted but failed. It was probably due to a lack of battery power. So this sensor was not reinstalled on the buoy. Then 3 C-OPS profiles and 2 CTD casts with water sampling were performed at the BOUSSOLE site. In the meantime, 2 CIMEL measurements and then a Secchi disk were performed before the departure to the DYFAMED site. The Argo profiling float was deployed before returning the Nice harbour.

Pictures taken during this cruise can be found at:
https://photos.app.goo.gl/13CQXjARRzTFff54A

Data from the BOUSSOLE cruises and buoy are available at:
http://www.obs-vlfr.fr/Boussole/html/boussole_data/login_form.php

Cruise Report

Friday 29 June 2018 (UTC)

People on board: Jean-Baptiste Abelé (Ulisse-CNRS), Melek Golbol, David Luquet, Didier Robin and Eduardo Soto Garcia.

0530 Departure from the Nice harbour.
0840 Arrival at the BOUSSOLE site.
0850 Diving operations on buoy (cleaning sensors, photos, recovering O_2 and PCO2 sensor).
1005 C-OPS 01, 02, 03.
1115 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.
1300 CIMEL 01, 02.
1315 CTD 02, 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 and cap on HS-6).
1345 Secchi disk 01, 20 m.
1350 Departure to the DYFAMED site.
1420 Profiling float deployment.
1425 Departure to the Nice harbour.
1645 Arrival at the Nice harbour.

Problems identified during the cruise

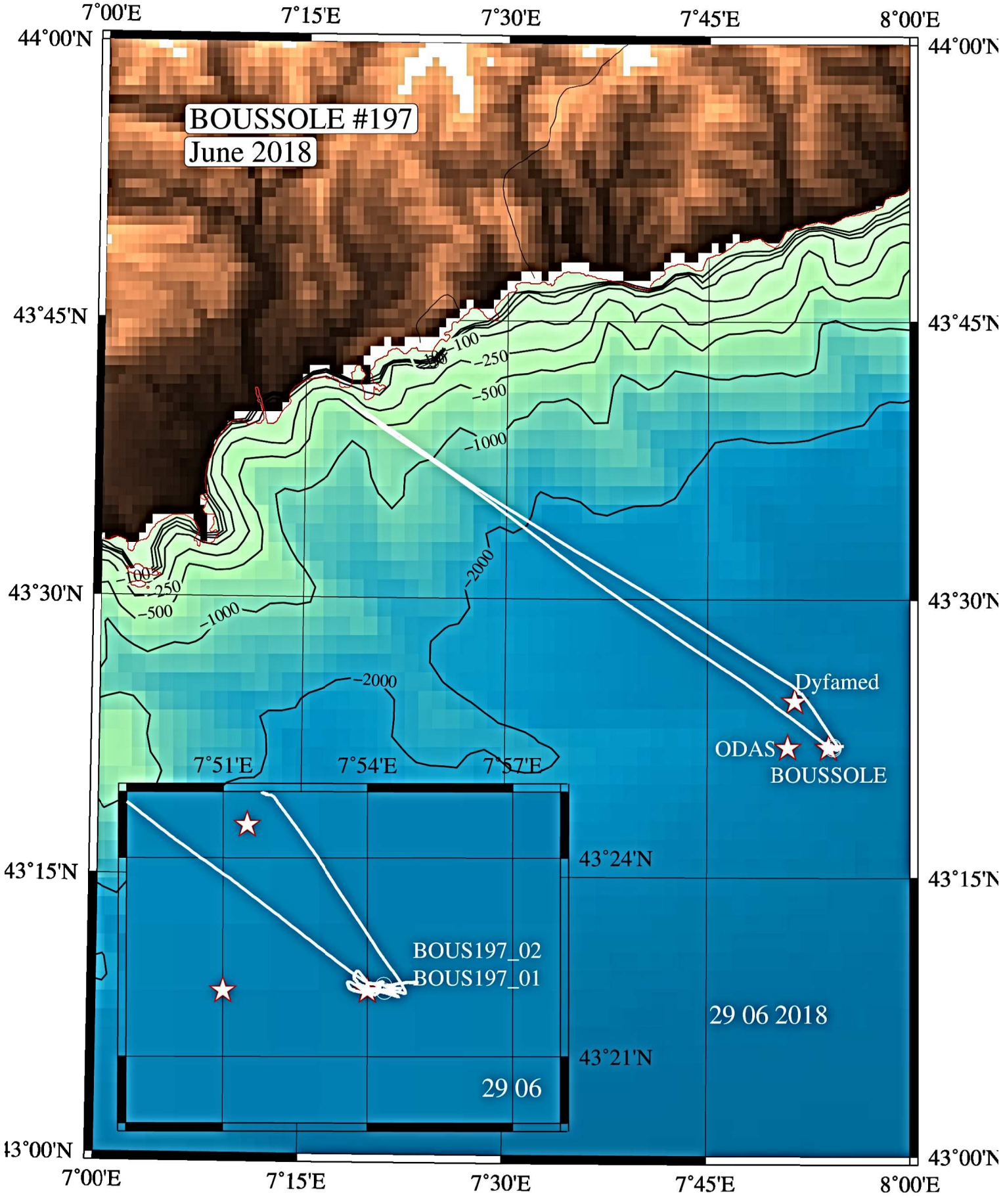
- Maintenance operations on the buoy were not carried out completely because the buoy is currently not functioning. The faulty data acquisition system will be replaced during the next rotation of the upper superstructure of the buoy. Only the cleaning of buoy sensors and maintenance on the autonomous sensors (O_2 and PCO_2) were performed.

- The PCO2 CARIOCA sensor at 10 m was removed from the buoy in order to download data. Unfortunately it could be not re-installed because the battery was apparently fully discharged.

Appendices

Cruise Summary Table for Boussole 197

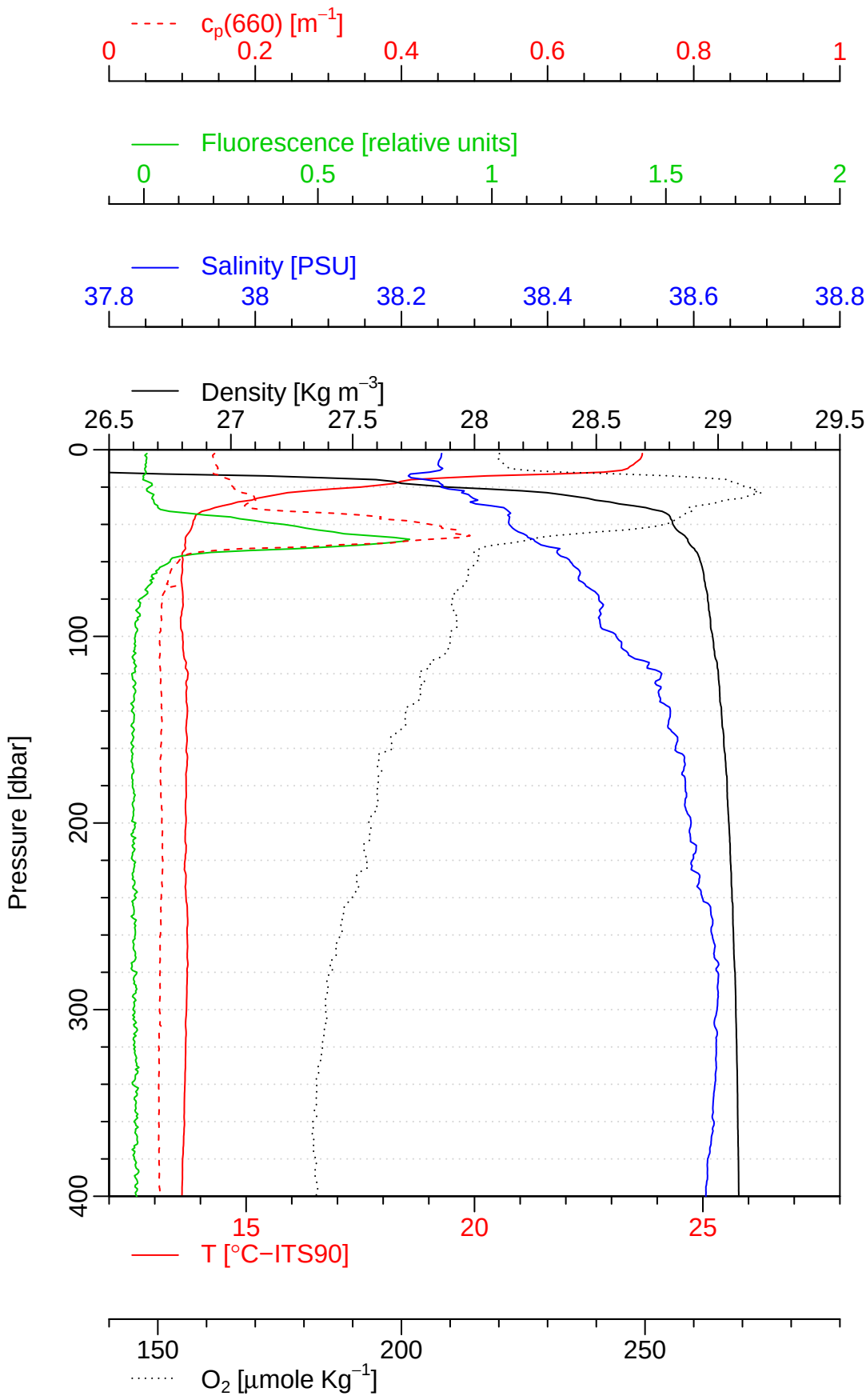
Date	Black names	Profile names	CTD notées	Other sensors	Start Time	Duration	Depth max	Latitude (N)		longitude					Weather							Sea		
	(file ext: ".raw")	(file extension: ".raw")			GMT (hour.min)	(min.sec)	(meter)	(Degree)	(Minute)	(Degree)	(Minute)	Sky	Clouds	Quantity (#/8)	Wind sp. (kn)	Wind dir.	Atm. Pressure (hPa)	Humidity (%)	Visibility	T air	T water	Sea	Swell H (m)	Swell dir.	Whitecaps
29/06/18		bou_c-ops_180629_1006_001_data.csv			10:06	4:02	101	43	21.987	7	53.781	blue	None	0	11	234	1011.8	77	good	22.9		slight	0.6		few
		bou_c-ops_180629_1037_002_data.csv			10:37	5:05	125	43	22.061	7	53.941	blue	None	0	11	234	1011.8	77	good	22.9		slight	0.6		few
		bou_c-ops_180629_1048_003_data.csv			10:48	5:17	132	43	22.130	7	53.763	blue	None	0	11	234	1011.8	77	good	22.9		slight	0.6		few
			BOUS197_01	HPLC & Ap	11:18	36:00	400	43	22.076	7	54.338	blue		3	14	238	1011.9	76		24.2	23.50	slight			
				CIMEL01	13:02	5:00		43	21.936	7	54.508	blue	Ci	2			1011.5								
				CIMEL02	13:07	10:00		43	21.936	7	54.508	blue	Ci	2			1011.5								
			BOUS197_02	TA/TC, O2 & TSM	13:17	27:00	400	43	21.998	7	54.355	blue		3	14	229	1011.5	75		23.4	23.77	slight			
				Secchi01	13:46	4:00	18	43	22	7	54	blue		3					good			slight			

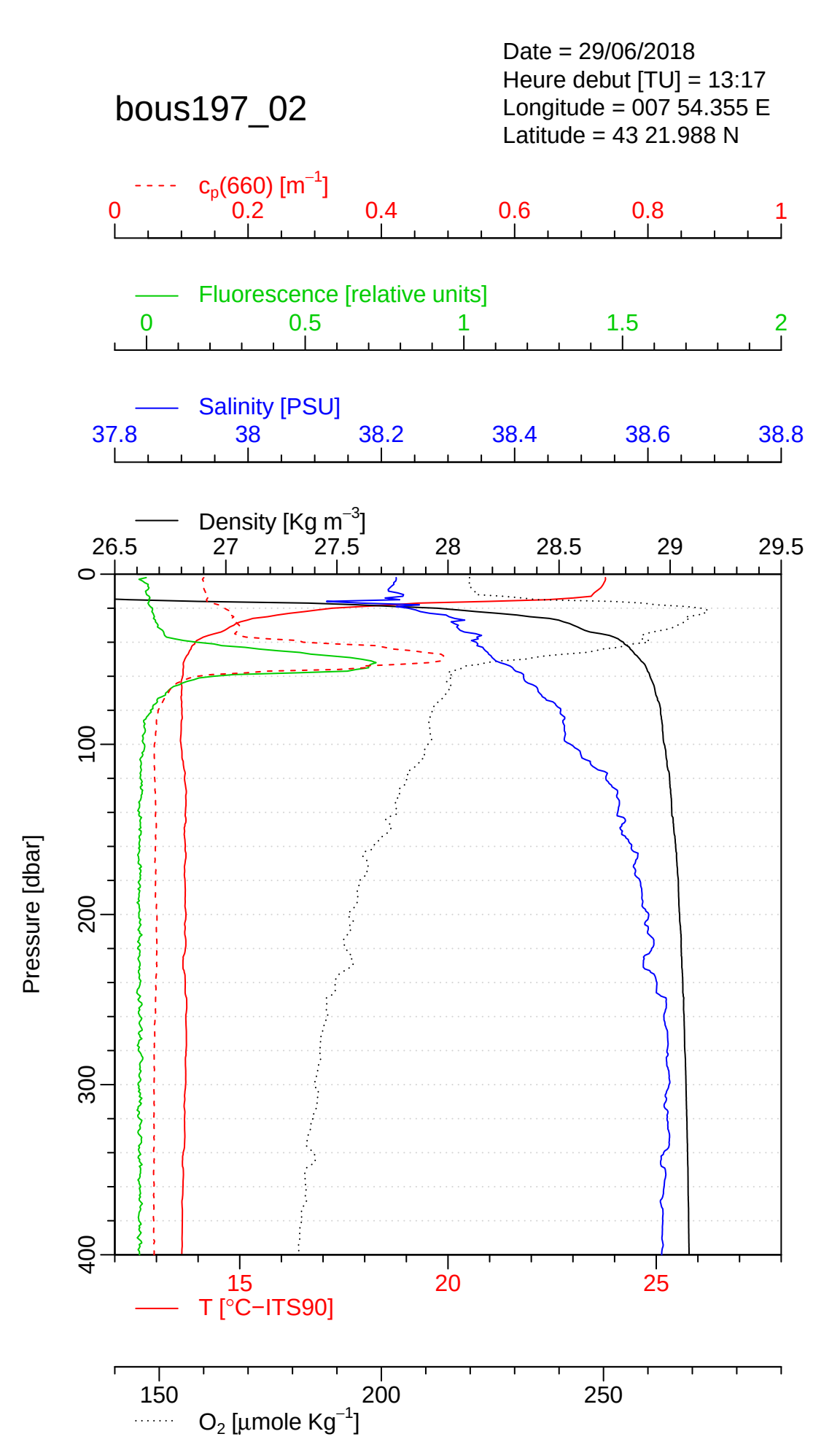


GMT 2018 Sep 11 05:27:51

bous197_01

Date = 29/06/2018
Heure debut [TU] = 11:18
Longitude = 007 54.338 E
Latitude = 43 22.076 N




bous197_02
Date = 29/06/2018
Heure debut [TU] = 13:17
Longitude = 007 54.355 E
Latitude = 43 21.988 N
cp(660) [m−1]
0
0.2
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
15
20
25
T [°C−ITS90]
150
200
250
O2 [µmole Kg−1]