

# BOUSSOLE Monthly Cruise Report

**Cruise 240**

**March 07-10, 2022**

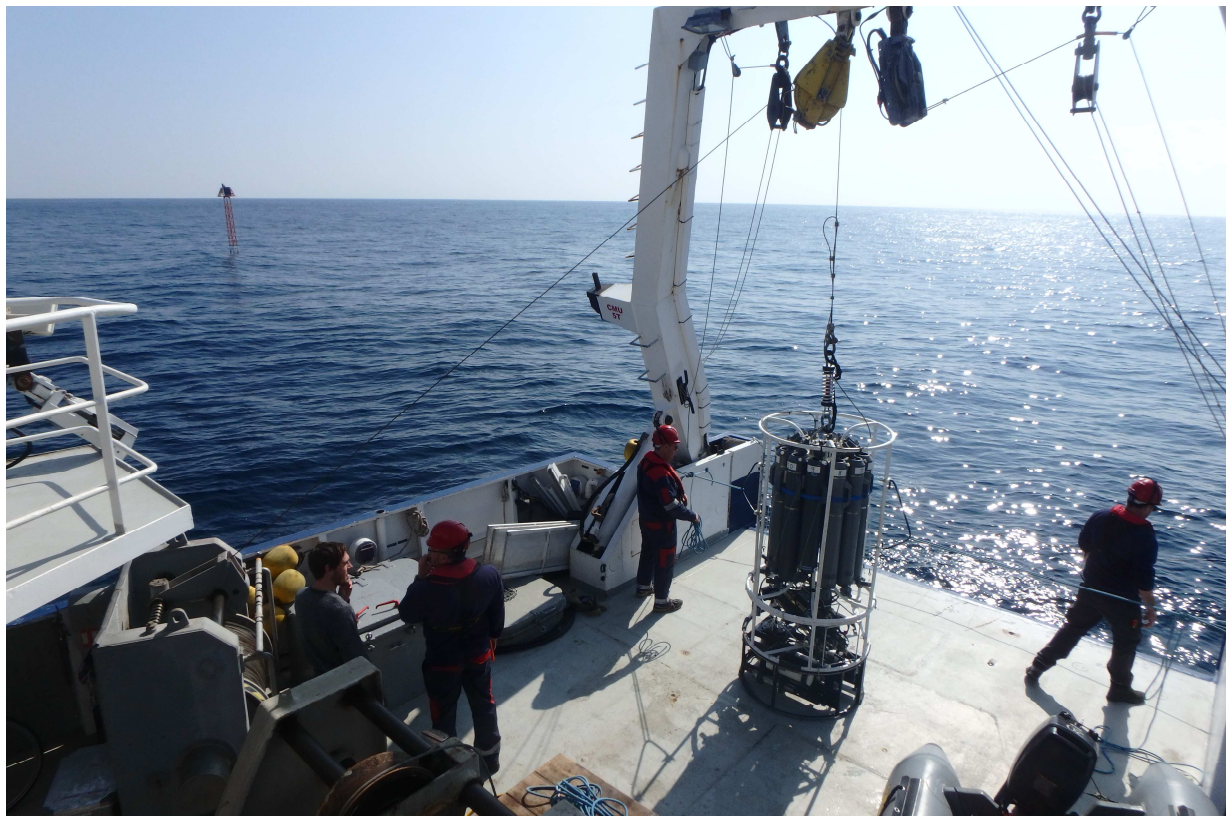
Duty Chief: Melek Golbol ([melek.golbol@imev-mer.fr](mailto:melek.golbol@imev-mer.fr))

Vessel: R/V *Téthys II*

(Captain: Dany Deneuve)

Science Personnel: Ewen Ancel, Cyril Debost, Elsa Dor, Melek Golbol, Pablo Liger, Emilie Riquier Diamond, Elsa Simon and Paco Stil.

*Institut de la Mer de Villefranche (IMEV), 06230 Villefranche-sur-Mer, France*



A view of the aft deck of the R/V *Téthys II* before the deployment of the CTD Rosette at the BOUSSOLE site.

**BOUSSOLE project**

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

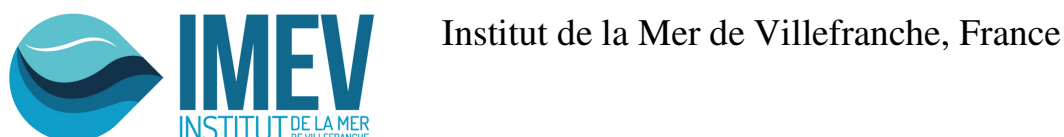
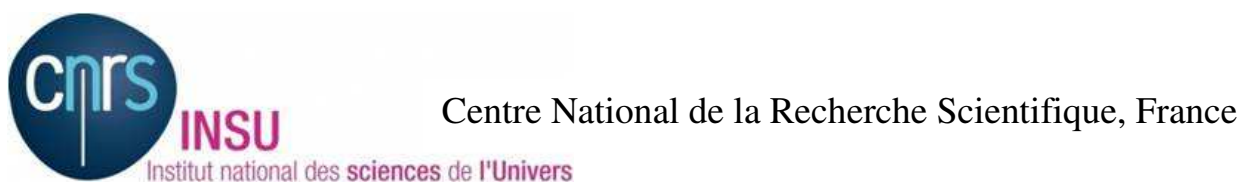
*March 22, 2022*



## 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), handheld CIMEL sun photometer measurements are to be performed consecutively where possible with C-OPS profiles. If sea conditions are poor but sky is good, handheld 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  $\mu\text{m}$  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 replicate 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).

### Projects-specific operations

In addition, water samples are to be collected at 5 m depth for dissolved oxygen (DO), total alkalinity (TA) and total inorganic carbon (TC) analysis (from March 2014) and pH analysis (from October 2021). The TA/TC samples will be processed by the National service for such analyses (SNAPOCO – LOCEAN in Paris). The DO and pH samples will be analysed in the *Institut de la Mer de Villefranche* by the MOOSE team. The results will allow checking the data collected by the pCO<sub>2</sub> CARIOCA sensors, the optode and the pH sensor installed on the buoy at 3 m.

Water samples are to be collected at four depths for metagenomic analyses of different types of *Synechococcus*, cytometry and nutrients (from March 2020). Additional samples for cytometry analyses are to be collected at ten depths during the BOUSSOLE CTD sampling (from November 2021). These operations are part of the EFFICACY ANR project in collaboration with the *Roscoff Biological Station*. The aim is to study the distribution of different types of *Synechococcus* populations characterized by distinct pigmentation and adaptation to the colour of light. It includes two years of cytometry and metagenomic sampling at the BOUSSOLE site.

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](http://www.obs-vlfr.fr/Boussole/html/publications/pubs/BOUSSOLE_TM_214147.pdf))

### Additional operations

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 SeapHOx installed on the buoy at 3 m depth for the MOOSE program was recovered in order to download data. It combines a pH sensor with a Sea-Bird SBE37 MicroCAT CTD+DO sensor.

It appeared during a previous cruise that the light beacon on top of the buoy was faulty. So, a new one was installed.

## Cruise Summary

The first day was planned for the MOOSE DYFAMED program but some BOUSSOLE operations were performed, like diving maintenance on the buoy and sea water sampling. The second and the fourth days were cancelled because of bad weather.

The third day was used for CTD casts with water sampling, for CIMEL measurements, for buoy maintenance and for a Secchi disk at the BOUSSOLE site.

### Monday 07 March 2022

The sea state was smooth with a gentle breeze. The sky was cloudy. Firstly, a CTD cast with water sampling was performed at the BOUSSOLE site down to 10 m depth in order to sample for DO and pH analyses. Then, divers went at sea to recover the optode and the SeapHOx at 3 m depth and to take pictures. Nevertheless, data could not be downloaded. So, the SeapHOx was not reinstalled on the buoy. The other diving operations were not performed during this cruise because the buoy is currently not working. Then a Manta net, two zooplankton nets and a deep CTD cast were performed at the DYFAMED site for the MOOSE program before returning to the Nice harbour.

### Tuesday 08 March 2022

Bad weather prevented departure from the Nice harbour.

### Wednesday 09 March 2022

The sea state was smooth with a light to moderate breeze. The sky was blue. Firstly, a CTD cast with water sampling was performed at the BOUSSOLE site. In the meantime, CIMEL measurements were performed. Then, the dinghy was deployed in order to replace the light beacon on the top of the buoy. The old beacon could not be recovered but the new one was installed close to the old one.

Then a Secchi disk and two CTD casts were performed with water sampling before returning to Nice harbour. For the CTD 02 cast, a 0.2 $\mu$ m filter was put on the a-Sphere absorption meter for the dissolved matter absorption measurements and a cap was put on the backscattering meter for dark measurements. This cast was stopped at 10 depths during the ascent of the CTD.

### Thursday 10 March 2022

Bad weather prevented departure from the Nice harbour.

Pictures taken during this cruise can be found at:

<https://photos.app.goo.gl/U6NdSLRQwmqDQT7X6>

Data from the BOUSSOLE cruises and buoy are available at:

[http://www.obs-vlfr.fr/Boussole/html/boussole\\_data/login\\_form.php](http://www.obs-vlfr.fr/Boussole/html/boussole_data/login_form.php)

## Cruise Report

### Monday 07 March 2022 (UTC)

People on board: Cyril Debost (diver), Elsa Dor (student), Pablo Liger (diver), Emilie Riquier Diamond and Paco Stil.

0700 Departure to the BOUSSOLE site.  
1020 Arrival at the BOUSSOLE site.  
1025 CTD 00, 10 m with water sampling at 5 m for O<sub>2</sub> and pH.  
1045 Diving operations: recovery of optode and SeapHOx sensor.  
1145 Departure to the DYFAMED site.  
1205 Manta net (MOOSE program)  
1245 Arrival at the DYFAMED site.  
1250 Zooplankton nets x2, 100 m and 200 m (MOOSE program).  
1330 Deep CTD cast, MOOSE 161 (MOOSE program)

1520 Departure to the Nice harbour.  
1820 Arrival to the Nice harbour.

## Tuesday 08 March 2022

Bad weather prevented departure from the Nice harbour.

## Wednesday 09 March 2022 (UTC)

People on board: Ewen Ancel, Elsa Dor, Melek Golbol, Elsa Simon and Paco Stil.

0830 Departure to the BOUSSOLE site.  
1150 Arrival at the BOUSSOLE site.  
1205 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 TA/TC.  
1210 CIMEL 01, 02, 03.  
1300 Buoy surface maintenance: installation of the light.  
1355 CTD 02, 400 m with water sampling at 60, 40, 20 and 5 m for TSM, metagenomic, nutrients and cytometry.  
1455 Secchi disk, 16 m.  
1620 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 cytometry.  
1700 Departure to the Nice harbour.  
2015 Arrival to the Nice harbour.

## Thursday 10 March 2022

Bad weather prevented departure from the Nice harbour.

## Problems identified during the cruise

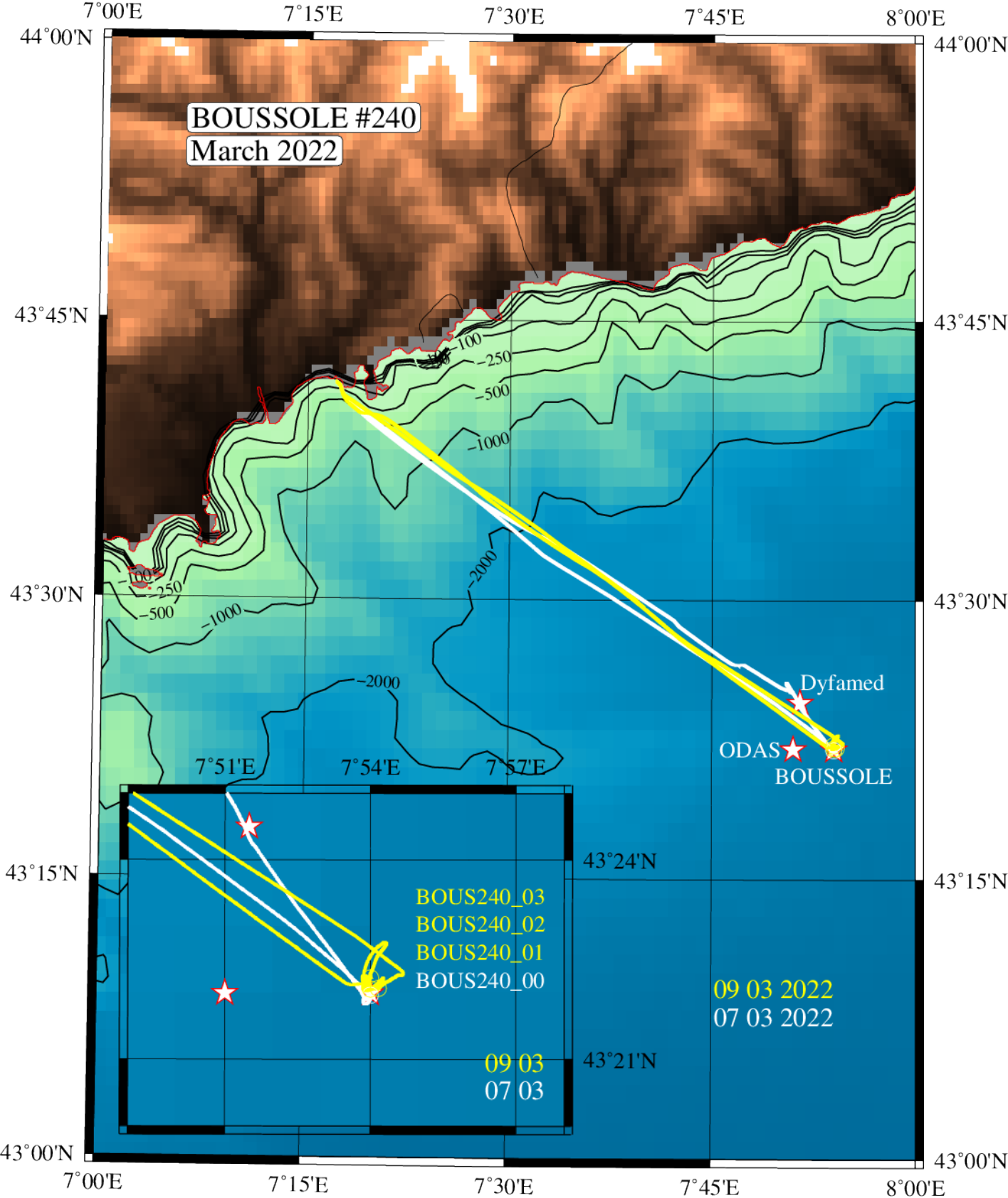
- C-OPS profiles could not be performed during this cruise because the instruments were sent to Biospherical Instruments Inc. for calibration. The calibrations were finished but unfortunately the radiometers could not be received in time for the cruise due to shipping delays.
- Data could not be downloaded from the SeapHOx. So, it was not reinstalled on the buoy. It will be checked in the lab and reinstalled during the next cruise.

# **Appendices**

Cruise Summary Table for Boussole 240

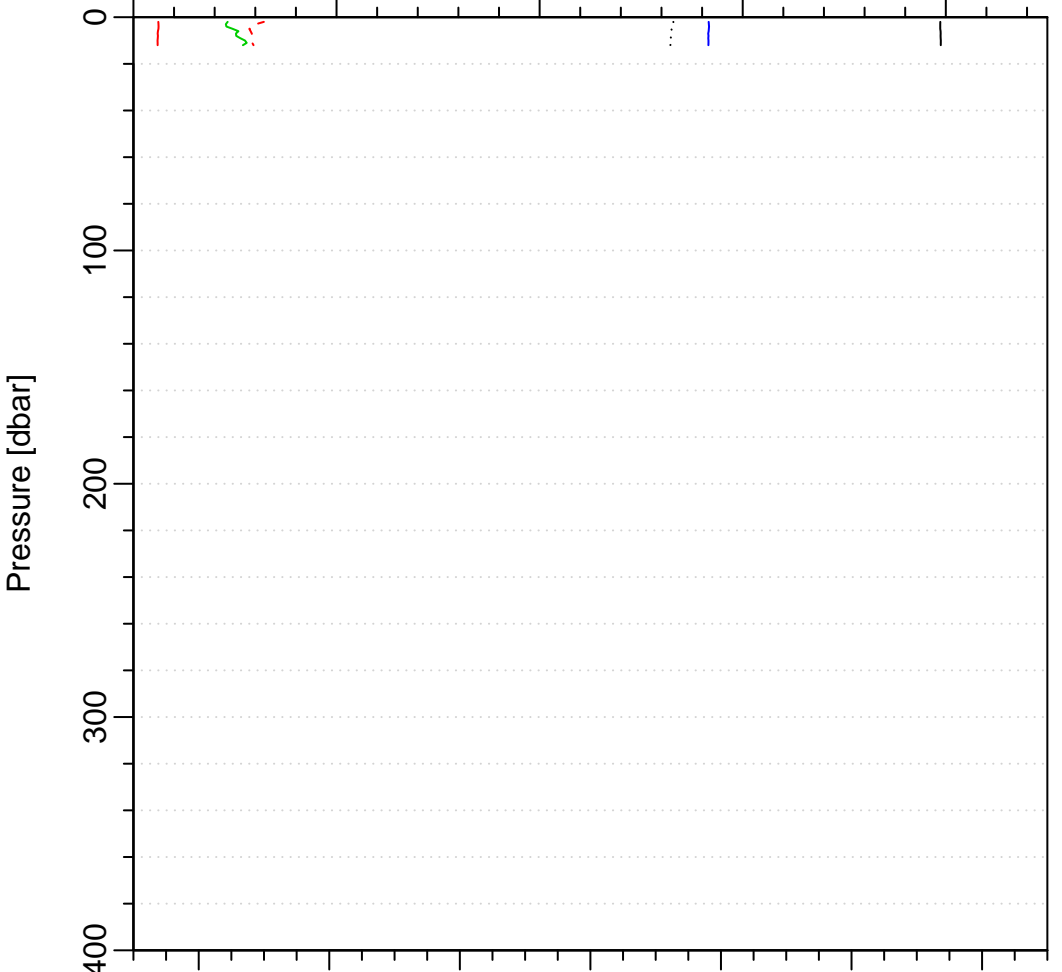
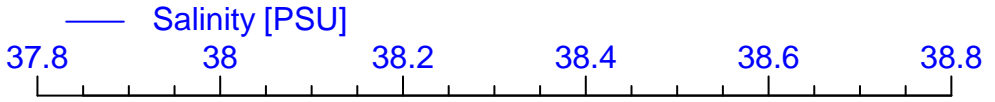
Date	Black names (file ext: ".raw")	Profile names (file extension: ".raw")	CTD notées	Other sensors	Start Time		Depth max (meter)	Latitude (N)			longitude		Sky	Clouds	Quantity (#/8)	Weather		Atm. Pressure (hPa)	Humidity (%)	Visibility	T air	T water	Sea	
					GMT (hour,min)	(hour,min,sec)		(Degree)	(Minute)	(Degree)	(Minute)	Wind sp. (kn)				Wind dir.	Sea						Swell H (m)	Swell dir.
07/03/22			BOUS240_00	O <sub>2</sub> & pH	10:27	00:03:00	10	43	21.966	7	54.000	cloudy		3	8	50	1017	53		10.5	13.39	smooth		
08/03/22	Bad weather																							
09/03/22			BOUS240_01	HPLC. ap & TA/TC	12:03	00:35:00	400	43	22.056	7	54.008	blue		0	4	170	1024	48		11.8	13.57	smooth		
				CIMEL01	12:12	0:04:00		43	22.085	7	53.985	blue		0			1024							
				CIMEL02	12:17	0:04:00		43	22.085	7	53.985	blue		0			1024							
				CIMEL03	12:22	0:04:00		43	22.085	7	53.985	blue		0			1024							
				BOUS240_02	TSM, metagenomics, cyto & nutrients	13:56	1:27:00	400	43	22.226	7	54.004	blue		0	7.5	204	1023	48		12.2	13.50	smooth	
				Secchi 01	14:55	0:04:00	16	43	22	7	54	blue		0					excellent					
			BOUS240_03	HPLC. ap & cyto	16:23	0:35:00	400	43	22.065	7	54.166	blue		0	11.6	223	1022	59.5		11.8	13.50	smooth		
10/03/22	Bad weather																							





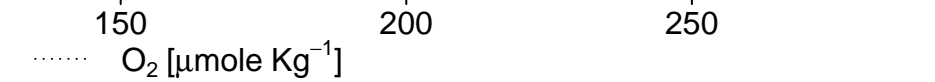
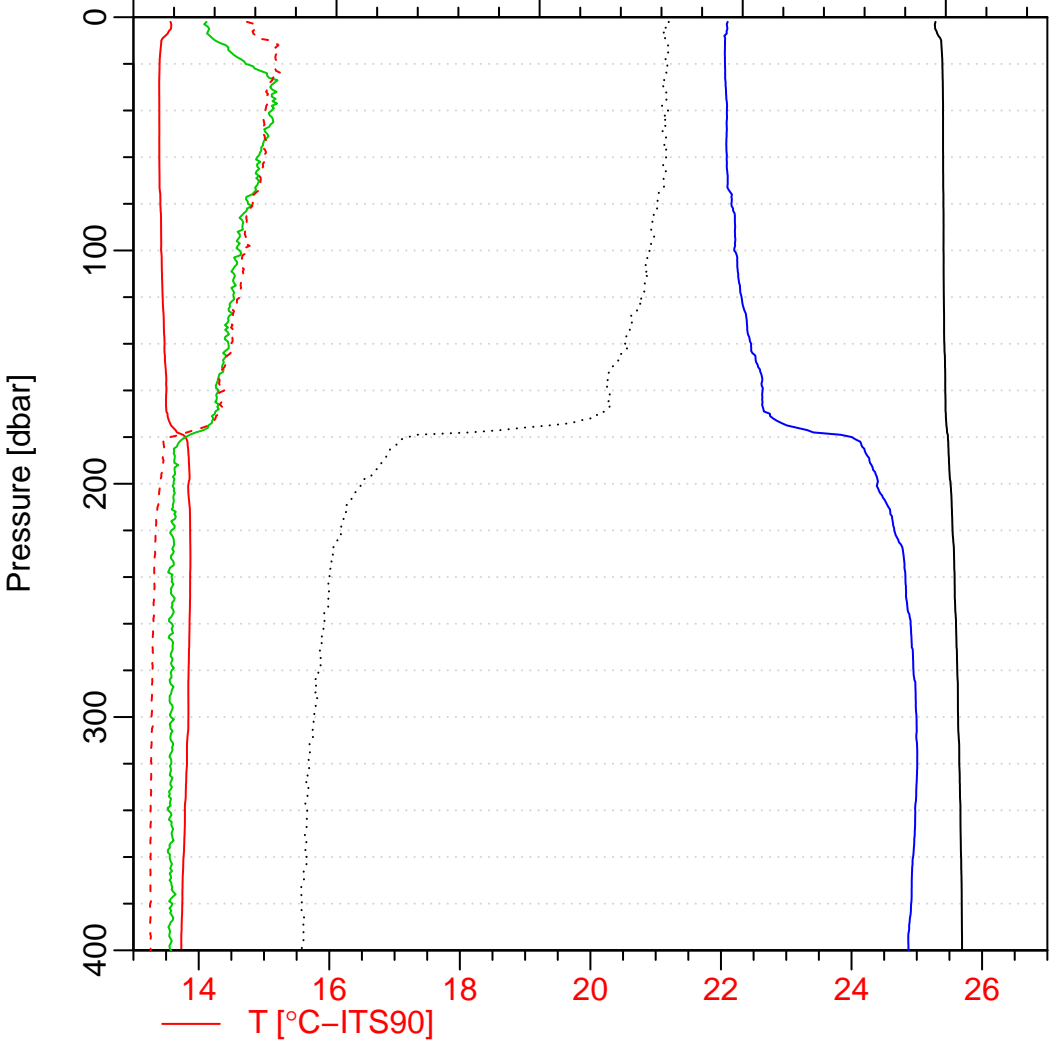
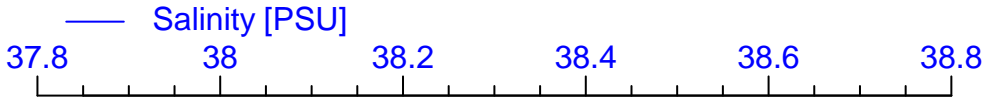
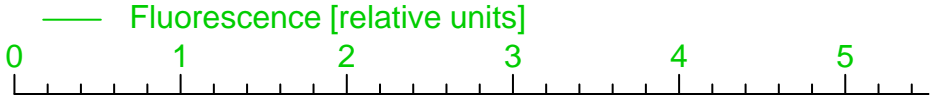
# bous240\_00

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Heure debut [TU] = 10:27  
Longitude = 007 54.000 E  
Latitude = 43 21.966 N



bous240\_01

Date = 09/03/2022  
Heure debut [TU] = 12:03  
Longitude = 007 54.008 E  
Latitude = 43 22.056 N



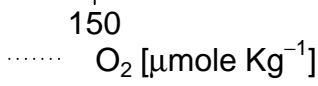
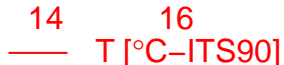
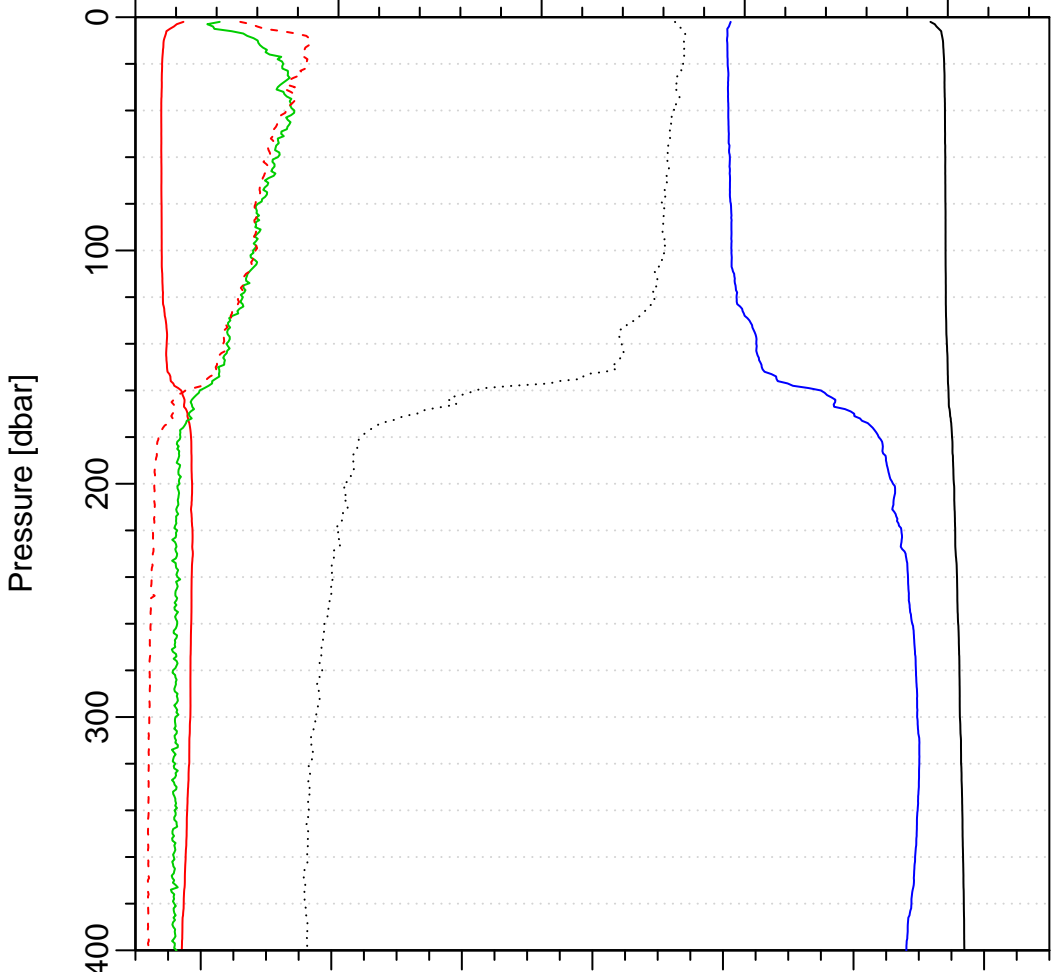
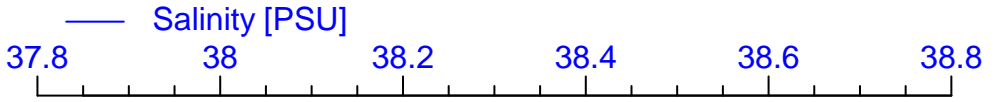
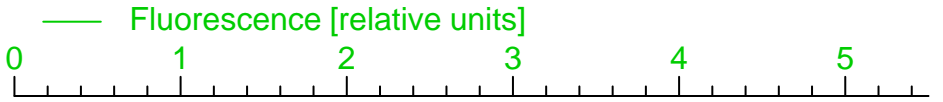
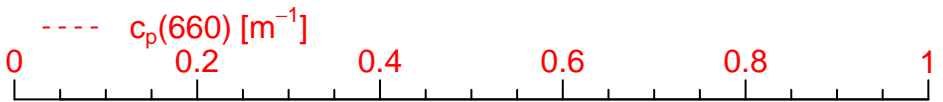
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Latitude = 43 22.226 N



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Latitude = 43 22.065 N

