

The BOUSSOLE project technical reports; report # 10-238, issue 1.

BOUSSOLE Monthly Cruise Report

Cruise 255

June 08, 2023

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

Vessel: R/V Sagitta III
(Captain: Jean-Yves Carval)

Science Personnel: Eva Delcamp, Céline Dimier and Melek Golbol

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



The underwater structure of the BOUSSOLE buoy seen in clearly waters

BOUSSOLE project

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

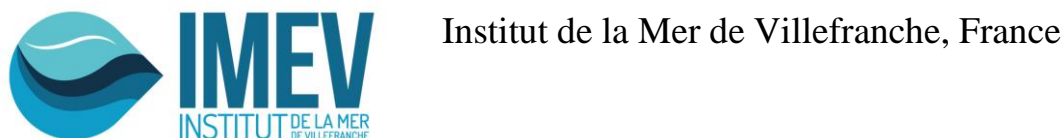
June 21, 2023



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



Contents

1. Cruise Objectives
2. Cruise Summary
3. Cruise Report
4. Problems identified during the cruise

Appendices

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. 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 µm 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 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 pCO₂ CARIOCA, the DO and pH sensors installed on the buoy at 3 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 BOUSSOLE cruise took place on the R/V *Sagitta III* due to the unavailability of both the R/V *Téthys II* and R/V *L'Europe*. Only one day was allocated to BOUSSOLE operations, which included a CTD cast with water sampling, IOP casts, a Secchi disk and Niskin bottles deployment at the BOUSSOLE site. It was not possible to perform optical profiles due to a technical problem.

Thursday 8 June 2023

The sea state was smooth with a calm to light breeze. The sky was blue and the visibility was good. Firstly, C-OPS profiles were attempted two times but failed: the communication between the deck-unit and the computer was lost due to an unknown reason after the deployment. Then an IOP cast was performed at 400 m depth at the BOUSSOLE site but failed because the IOP package was not switched ON correctly before its deployment. The IOP package was switched ON and was redeployed. A second IOP cast was performed at 50 m depth with a cap

put on the backscattering meter for dark measurements. The IOP package could not be affixed as usually with the main rosette-CTD for the deployment because of the heavyweight in relation to the gantry of the R/V *Sagitta III*. Then a CTD cast with water sampling and a Secchi disk were performed at the BOUSSOLE site. The carousel water sampler installed on the rosette-CTD for this cruise was smaller than the one commonly used on the BOUSSOLE cruises. So, two Niskin bottles of 12 L and 6 L were deployed at 5 m for HPLC, a_p , TSM and pH because there was not enough water in the Niskins, before returning to the Villefranche-sur-Mer harbour.

Pictures taken during this cruise can be found at:

<https://photos.app.goo.gl/hooiAX5vb1V7q7h47>

Data from the BOUSSOLE cruises and buoy are available at:

http://www.obs-vlfr.fr/Boussole/html/boussole_data/login_form.php

Cruise Report

Thursday 8 June 2023 (UTC)

People on board: Eva Delcamp, Céline Dimier and Melek Golbol

0640 Departure from the Villefranche-sur-Mer harbour.
0845 Arrival at the BOUSSOLE site.
0900 Attempts of C-OPS profiles: failed.
0925 Attempt of IOP profile: failed.
0940 IOP 01, 400 m.
1000 IOP 02, 50 m (with cap on the HS6).
1025 CTD 01, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a_p , DO and TA/TC.
1035 Secchi 01, 32 m.
1050 Niskin 01, 5 m for pH and TSM.
1055 Niskin 02, 5 m for HPLC and a_p .
1100 Departure to the Nice harbour.
1400 Arrival at the Nice harbour.

Problems identified during the cruise

- This cruise took on the R/V *Sagitta III* because of the unavailability of both the R/V *Téthys II* and R/V *L'Europe*, so the operations were reduced:
 - the carousel water sampler installed on the rosette-CTD for this cruise was smaller than the one commonly used on the BOUSSOLE cruises. So, two Niskins were deployed separately because there was not enough water in the Niskin bottles from the rosette to sample for all parameters.
 - the IOP package was deployed independently because it could not be affixed with the rosette-CTD due to the heavyweight of the whole instrumentation in relation to the gantry.
 - the time available for operations was reduced according to the working time of the crew.
- C-OPS profiles could not be performed because of a technical problem: the communication between the deck-unit and the computer was lost after two attempts of deployment due to an unknown reason. It was not possible to perform other tests because of the lack of time. It will be tested in the lab.

Appendices

Cruise Summary Table for Boussole 255

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.						Whitecaps		
08/06/23				IOP01	9:40	0:18:00	400	43	22.064	7	53.991	blue		2	3.1	331	1014	NA	good			smooth				
				IOP02 (dark HSE)	10:00	0:05:00	50	43	22	7	54	blue		2					good			smooth				
			BOUS255_01	HPLC, s _w , DO & TA/TC	10:12	0:30:00	400	43	22.07	7	53.965	blue		1	0.1	80	1014	NA	good	23.7	22.6	smooth				
				Secchi 01	10:33	0:04:00	32	43	22	7	54	blue		1						good			smooth			
				Niskin01 (TSM & pH)	10:50	0:04:00	5	43	22	7	54	blue		2						good			smooth			
				Niskin02 (HPLC at 5 m)	10:55	0:04:00	5	43	22	7	54	blue		2						good			smooth			

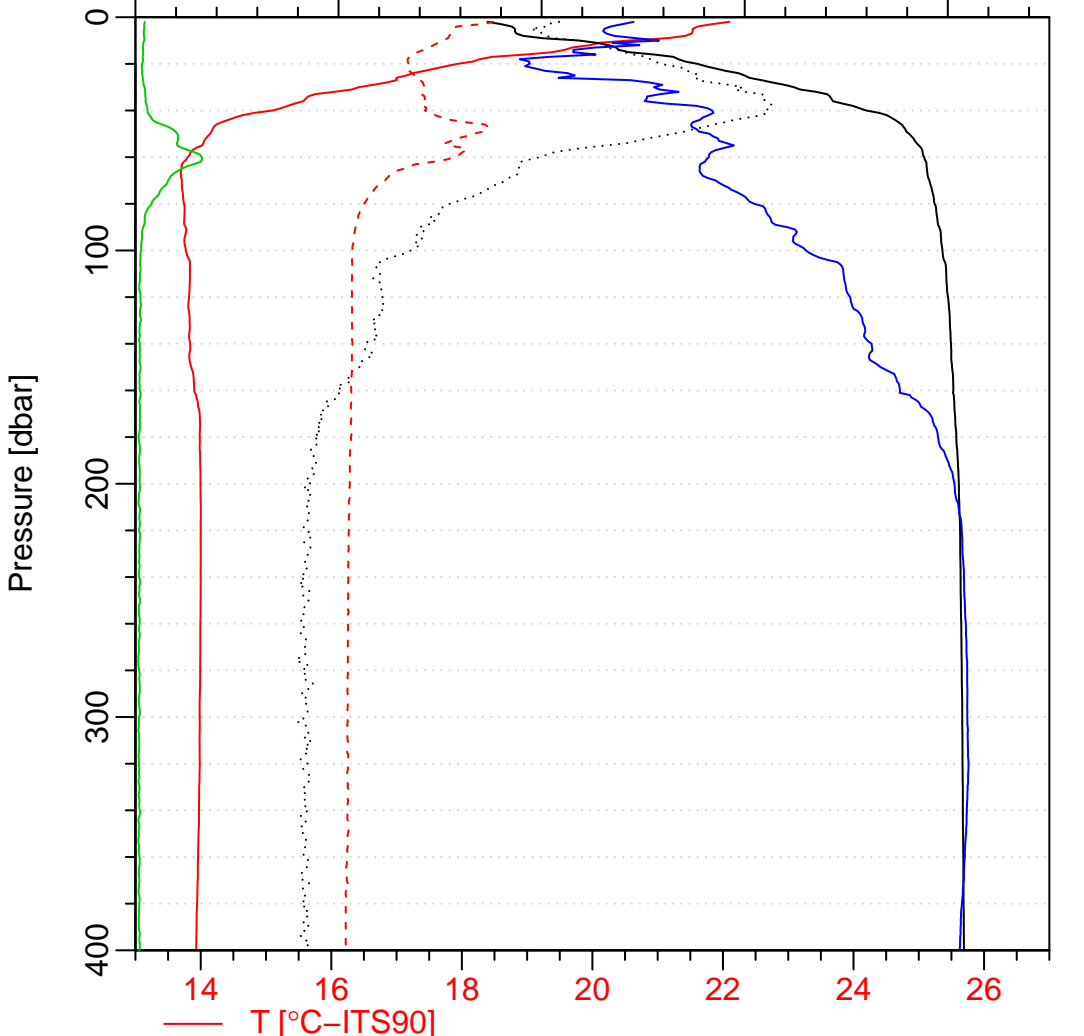
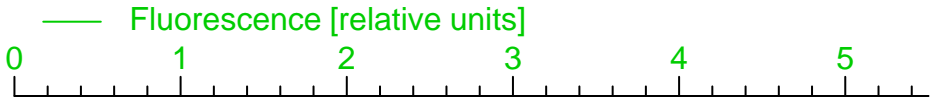
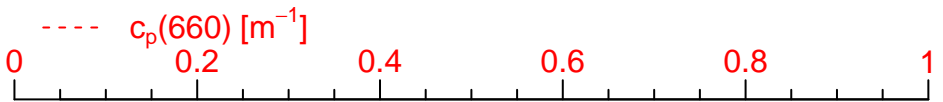
bous255_01

Date = 08/06/2023

Heure debut [TU] = 10:12

Longitude = 007 53.965 E

Latitude = 43 22.070 N



— T [$^{\circ}C-ITS90$]

..... O_2 [$\mu mole\ Kg^{-1}$]

