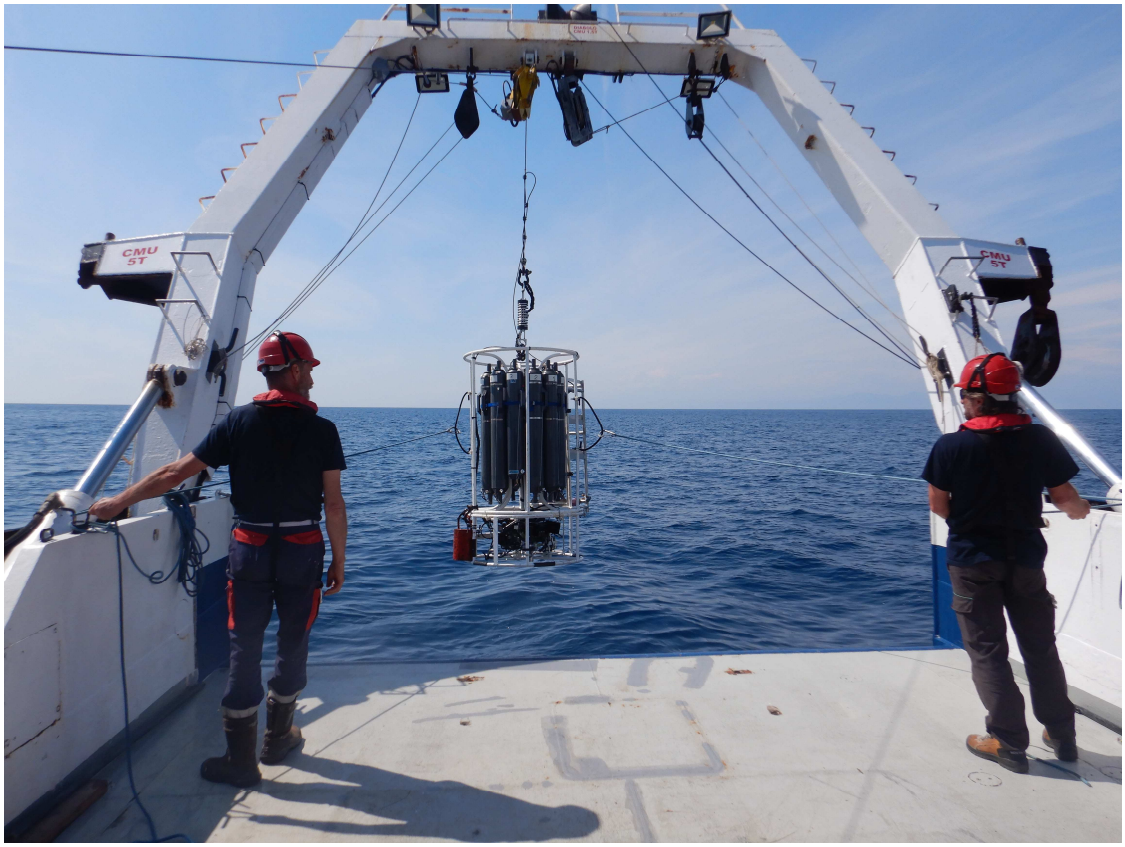
BOUSSOLE Monthly Cruise Report

Cruise 242
May 02-04, 2022

Duty Chief: Melek Golbol (melek.golbol@imev-mer.fr)
Vessel: R/V Téthys II
(Captain: Arnaud Behoteguy)

Science Personnel: Matthieu Bressac, Emilie Diamond-Riquier, Louis Petiteau, and Paco Stil

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



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

BOUSSOLE project

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

May 20, 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

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), 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 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 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_2 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, nutrients and metagenomics 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)

Additional operations

No additional operations.

Cruise Summary

A failure on the R/V *Téthys II* appeared during the return of the DYFAMED cruise, the day before BOUSSOLE cruise. So, the BOUSSOLE cruise planned on May 3-4th was cancelled. Nevertheless, CTD data acquired during the DYFAMED cruise day on May 2nd could be used for the BOUSSOLE program.
This day was used for MOOSE/DYFAMED operations, which include zooplankton nets, Manta nets and a deep CTD cast and for the recovery of a drifting mooring line named RESPIRE in the frame of the SEAMER project from the *Laboratoire de Villefranche-sur-Mer*.

Monday 02 May 2022

The sea state was smooth with a light breeze. The sky was blue. Firstly, the drifting mooring line was recovered. Then, a Manta horizontal net was performed during the way to DYFAMED site and two triple vertical zooplankton nets were performed when arrived at the DYFAMED site. Finally, a deep CTD cast with water sampling was performed before returning to the Nice harbour.

Tuesday 03 May 2022

Failure of the *R/V Téthys II*.

Wednesday 04 May 2022

Failure of the *R/V Téthys II*.

Pictures taken during this cruise can be found at:
https://photos.app.goo.gl/UNczoj7F3FZSik6p6

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

Cruise Report

Monday 02 May 2022 (UTC)

People on board: Matthieu Bressac, Emilie Diamond-Riquier, Louis Petiteau, and Paco Stil.

0545 Departure from the Nice harbour.
0650 Arrival at the RESPIRE drifting mooring site (43°30.110'N, 7°18.085'E).
0655 Recovery of the RESPIRE drifting mooring line.
0720 Departure to the DYFAMED site.
0940 Manta horizontal net.
1015 Arrival at the DYFAMED site.
1020 Zooplankton triple vertical nets x 2 (100 and 200m).
1110 CTD 01, 2350 m with water sampling.
1315 Departure to the Nice harbour.
1605 Arrival to the Nice harbour.

Tuesday 03 May 2022

Failure of the *R/V Téthys II*.

Wednesday 04 May 2022

Failure of the *R/V Téthys II*.

Problems identified during the cruise

- BOUSSOLE operations could not be performed during this cruise due to a failure on the R/V *Téthys II.* Nevertheless, the CTD data acquired at the DYFAMED site will be used for the BOUSSOLE data base. The water sampling for HPLC, ap, TSM, metagenomics, nutrients and cytometry could not be performed because the failure of the ship was not anticipated.

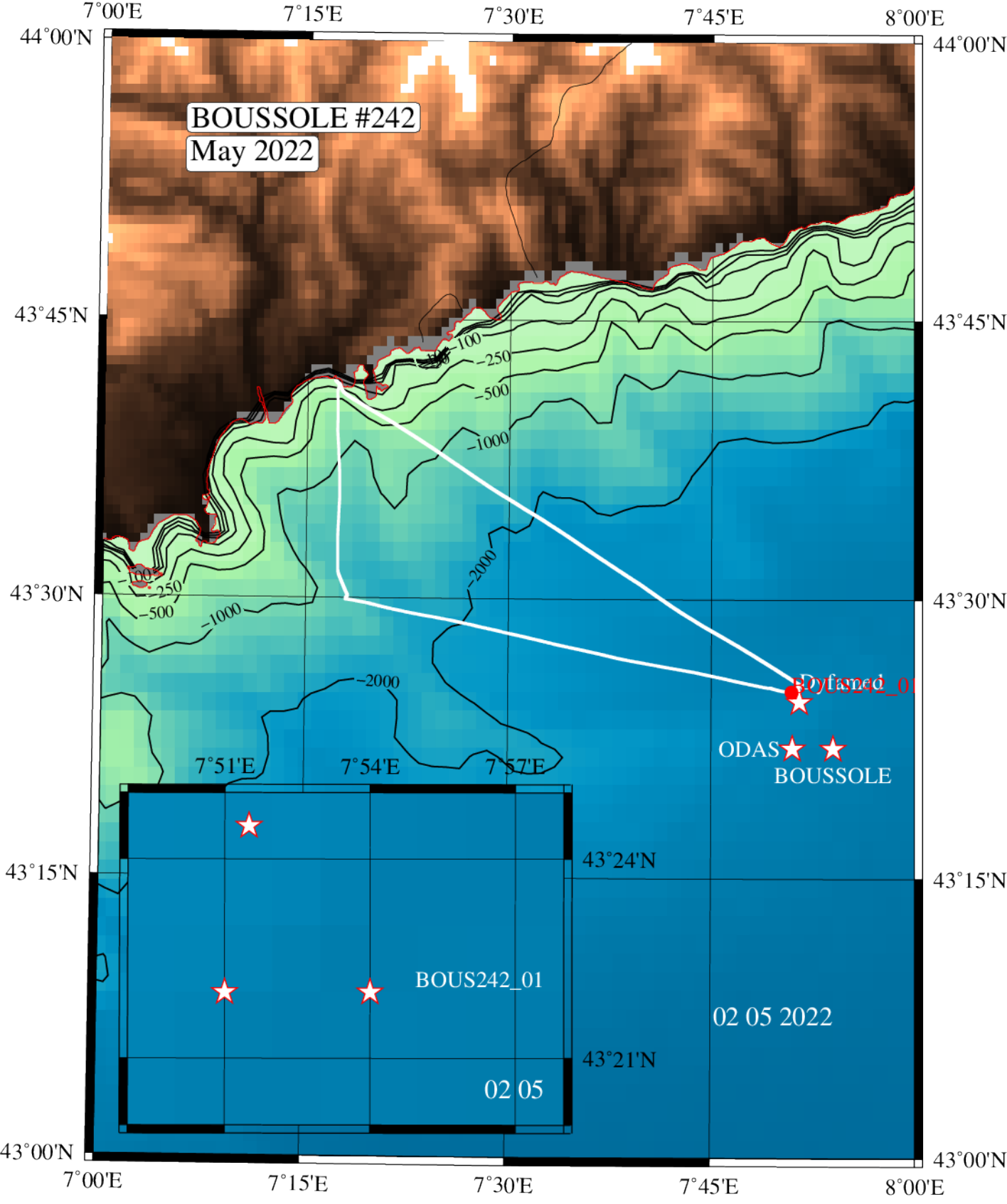
- CTD 01: there were some spikes in the temperature, salinity and oxygen data acquired during the downcast. So, the upcast data were processed and used for the data base.

- The ship fluorometer is now out of service. It is not repairable because of its obsolescence. It will be replaced during the works planned on the R/V *Téthys* in 2023.

Appendices

Cruise Summary Table for Boussole 242

Date	Black names	Profile names	CTD notées	Other sensors	Start Time	Duration	Depth max	Latitude (N)		longitude					Weather			Visibility				Sea		
	(file ext: ".raw")	(file extension: ".raw")			GMT (hour.min)	(hour.min.sec)	(meter)	(Degree)	(Minute)	(Degree)	(Minute)	Sky	Clouds	Quantity (#/8)	Wind sp. (kn)	Wind dir.	Atm. Pressure (hPa)	Humidity (%)		T air	T water	Sea	Swell H (m)	Swell dir.	Whitecaps
02/05/22			BOUS242_01		11:28	1:46:00	2354	43	25.05	7	50.936	blue		1	3.8	204	1013.6	73.7		17.3	17.50	smooth			
03/05/22	Failure of R/V Téthys II																							
04/05/22	Failure of R/V Téthys II																							



GMT 2022 Oct 06 16:07:39

bous242_01

Date = 02/05/2022
Heure debut [TU] = 11:28
Longitude = 007 50.936 E
Latitude = 43 25.050 N