# BOUSSOLE Monthly Cruise Report

## Cruise 258
## September 01-02, 2023

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

Science Personnel: Melek Golbol and Paco Stil

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

An ARVOR V2 profiling float prototype was deployed at the BOUSSOLE site for testing

**BOUSSOLE project**

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

*September 06, 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

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

# 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. 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.

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

The first day, an ARVOR V2 profiling float prototype was deployed at the BOUSSOLE site for testing by NKE Instrumentation. It is equipped with a Seabird SBE 41 Argo CTD.
The Manta net was deployed en route between BOUSSOLE and DYFAMED for the MOOSE program.
The deployment of the new DYFAMED mooring line took place in July 2023: the detection of the DYFAMED mooring with the depth sounder of the R/V *Téthys II* was planned during this cruise for checking it for the MOOSE program.

# Cruise Summary

The first day was used to perform CTD casts with water sampling, optical profiles, a Secchi disk and to deploy the ARVOR profiling float at the BOUSSOLE site. This day was also used to deploy the Manta net and to detect the DYFAMED mooring with the depth sounder of the ship for the MOOSE program. Then, we stayed on the DYFAMED site for the night. The second day was used to check again the DYFAMED mooring and to perform the deep CTD cast for the MOOSE program. It was not possible to perform other operations because of a technical problem on the R/V *Téthys II:* a leak was detected in the hydraulic system and we had to return to the Nice harbour.

## Friday 01 September 2023

The sea state was slight with a light to gentle breeze. The sky was cloudy and the visibility was good. Firstly, a CTD cast with water sampling and five C-OPS profiles were performed at the BOUSSOLE site. Only four out of five profiles were kept because of the unstable irradiance for one of them. Then, a CTD cast with water sampling was performed at the BOUSSOLE site with a cap put on the backscattering meter for dark measurements and a 0.2 µm filter put on the a-Sphere absorption meter for the dissolved matter absorption measurements. This cast was stopped at 10 depths during the ascent of the CTD. Finally, a Secchi disk was performed before returning to the Nice harbour. Then, a Secchi disk was performed and the ARVOR profiling float was deployed at the BOUSSOLE site before the departure to the DYFAMED site. The Manta net was deployed during the way to DYFAMED. When arriving, the detection of the DYFAMED mooring was performed. We stayed at the DYFAMED site for the night.

## Saturday 02 September 2023

The sea state was smooth with a light breeze. Firstly, the detection of the DYFAMED mooring was performed early in the morning. Then, a deep CTD cast was performed for the MOOSE program. During the ascent of the CTD, a leak was detected of the hydraulic circuit of the R/V *Téthys II* and we had to recover the CTD onboard immediately, to stop all the operations and to turn back to the Nice harbour.

Pictures taken during this cruise can be found at:
https://photos.app.goo.gl/ZxkuE3Yo2Q2o4FAt8

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 01 September 2023 (UTC)

People on board: Melek Golbol and Paco Stil

0705 Departure from the Nice harbour.
1030 Arrival at the BOUSSOLE site.
1035 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 $a_p$.
1100 C-OPS 01, 02, 03, 04.
1200 CTD 02, 400 m with water sampling at 5 m for TSM (with a 0.2 µm filter on a-Sphere and with 2 minutes stop at 400, 150 m and 7 minutes stop at 80, 60, 50, 40, 30, 20, 10 et 5 m) (with cap on the HS6).
1350 Secchi 01, 22 m.
1410 Profiling float deployment (43°22.485'N, 07°54.774'E).
1425 Departure to the DYFAMED site.
Manta horizontal net deployment.
1455 Recovery of Manta horizontal net.
1510 Start of detection of the DYFAMED mooring line.
1620 End of detection of the DYFAMED mooring line.

## Saturday 02 September 2023 (UTC)

People on board: Melek Golbol and Paco Stil

0330 Detection of the DYFAMED mooring line.
0535 Deep CTD cast (MOOSE program).
0630 Detection of a leak in the hydraulic circuit of the R/V *Téthys II*.
Recovery of the CTD and end of operations.
0700 Departure to the Nice harbour.
1000 Arrival at the Nice harbour.

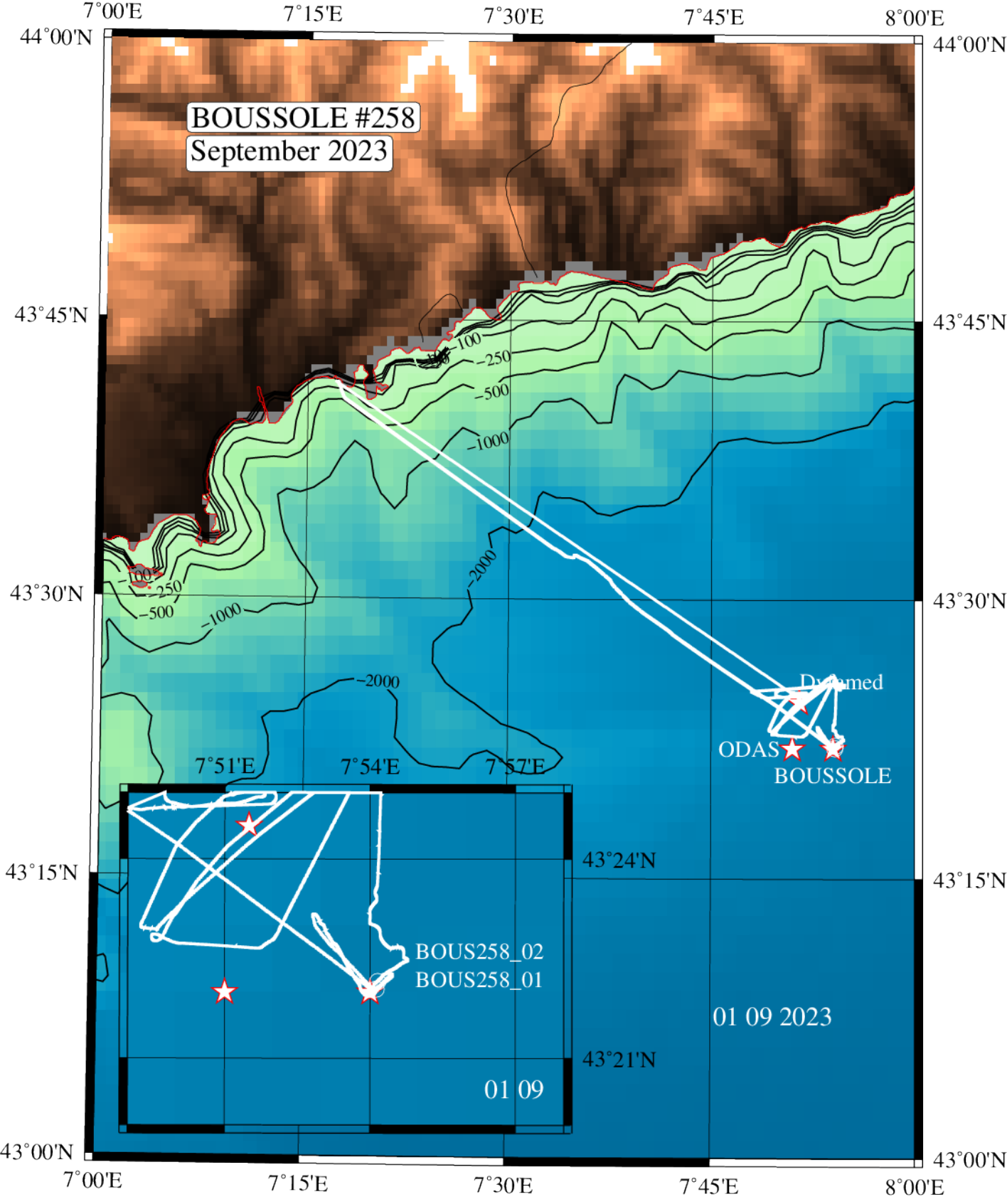
# Problems identified during the cruise

- BOUSSOLE operations could not be performed the second day. At the beginning of the day, a leak was detected on the hydraulic system during the ascent of the deep CTD cast for MOOSE program. The CTD was recovered urgently, all the operations had to be stopped and we returned to the Nice harbour.

# Appendices

Cruise Summary Table for Boussole 258

| 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) | (hour.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 |
| 01/09/23 | | | BOUS258_01 | HPLC & ap | 10:32 | 0:38:00 | 400 | 43 | 22.042 | 7 | 54.130 | cloudy | | 6 | 8 | 210 | 1019 | 78 | | 22.1 | 23.7 | slight | | | |
| | | bou_c-ops_230901_1114_001_data.csv | | | 11:27 | 0:03:35 | 87 | 43 | 22.26 | 7 | 53.643 | blue | Cs, Cc, Cu | 3 | 6 | 220 | 1019 | 78.2 | good | 22.1 | | slight | 0.7 | | few |
| | | bou_c-ops_230901_1114_002_data.csv | | | 11:37 | 0:02:36 | 62 | 43 | 22.455 | 7 | 7.53.487 | blue | Cs, Cc, Cu | 3 | 6 | 220 | 1019 | 78.2 | good | 22.1 | | slight | 0.7 | | few |
| | | bou_c-ops_230901_1114_003_data.csv | | | 11:45 | 0:03:48 | 95 | 43 | 22.701 | 7 | 53.303 | blue | Cs, Cc, Cu | 3 | 6 | 220 | 1019 | 78.2 | good | 22.1 | | slight | 0.7 | | few |
| | | bou_c-ops_230901_1114_005_data.csv | | | 12:02 | 0:03:58 | 99 | 43 | 22.978 | 7 | 53.056 | blue | Cs, Cc, Cu | 3 | 6 | 220 | 1019 | 78.2 | good | 22.1 | | slight | 0.7 | | few |
| | | | BOUS258_02 | TSM | 12:41 | 1:27:00 | 400 | 43 | 22.16 | 7 | 54.161 | blue | | 2 | 8 | 220 | 1019 | 75 | | 22.5 | 23.8 | slight | | | |
| | | | | Secchi 01 | 13:50 | 0:04:00 | 22 | 43 | 22 | 7 | 54 | blue | | 2 | | | | | good | | | slight | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| 02/09/23 | MOOSE-DYFAMED operations | | | | | | | | | | | | | | | | | | | | | | | |




GMT 2023 Oct 24 16:21:59

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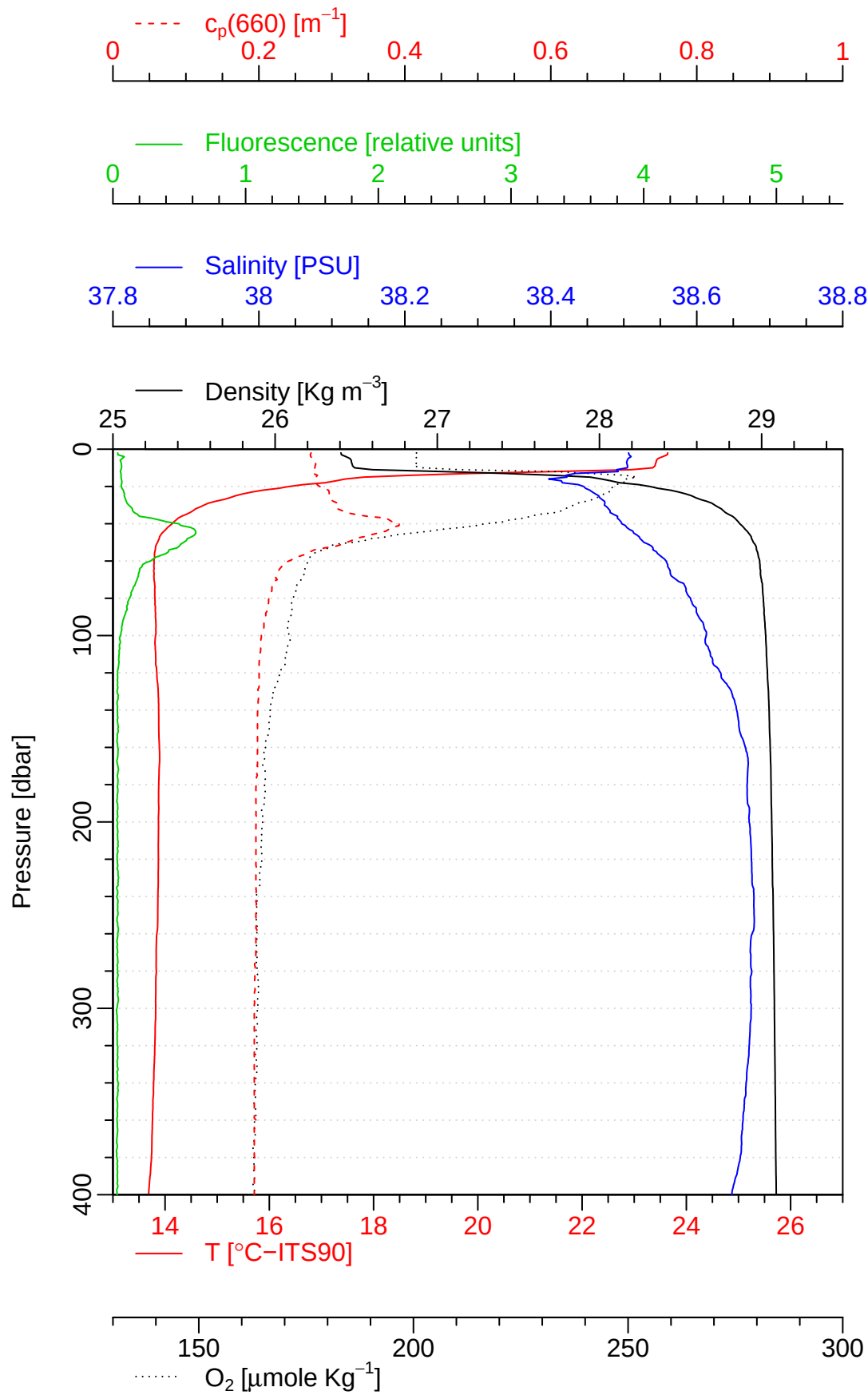
Latitude = 43 22.042 N



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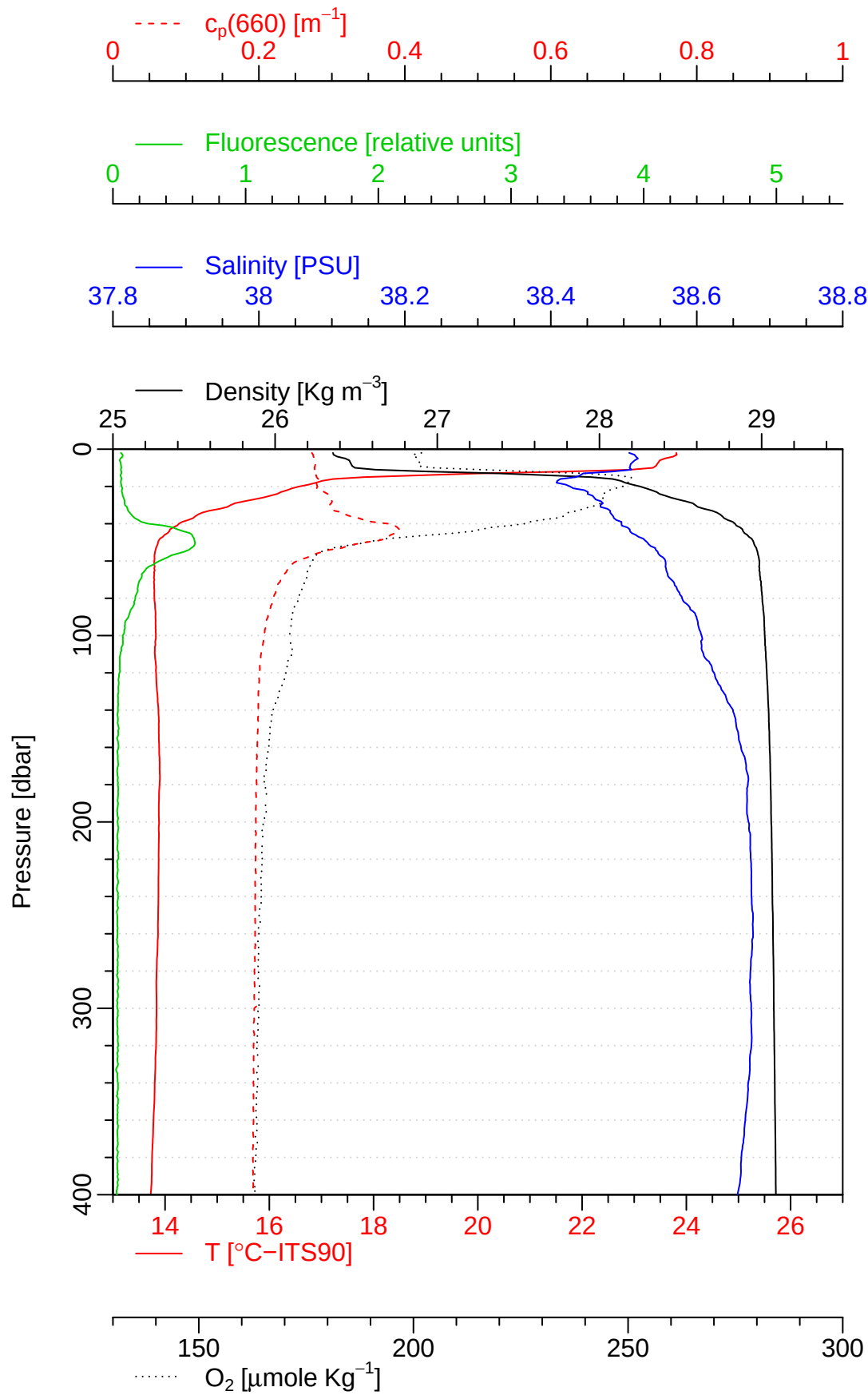

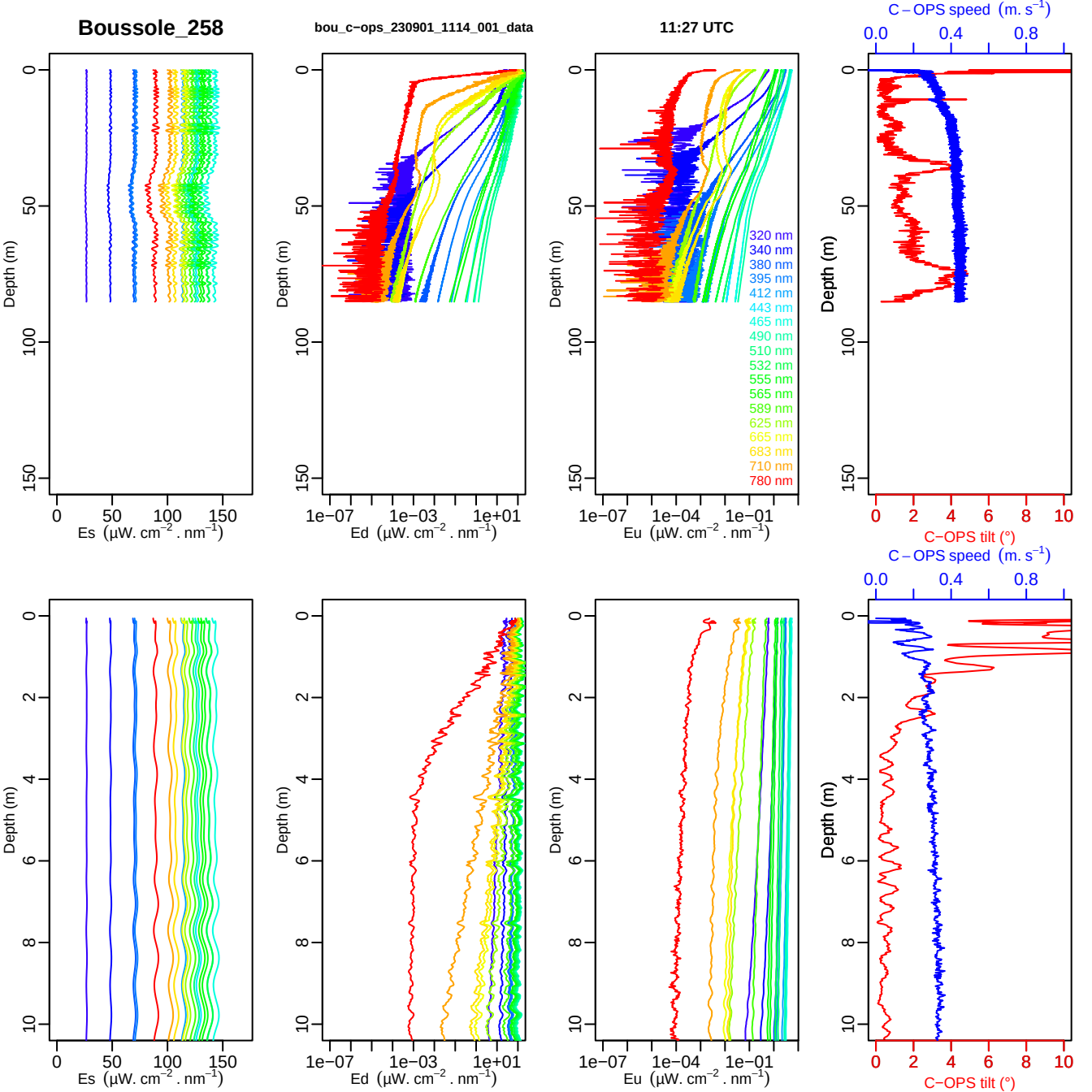
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Ed (µW. cm⁻². nm⁻¹)
Eu (µW. cm⁻². nm⁻¹)
C – OPS speed (m. s⁻¹)
C–OPS tilt (°)
320 nm
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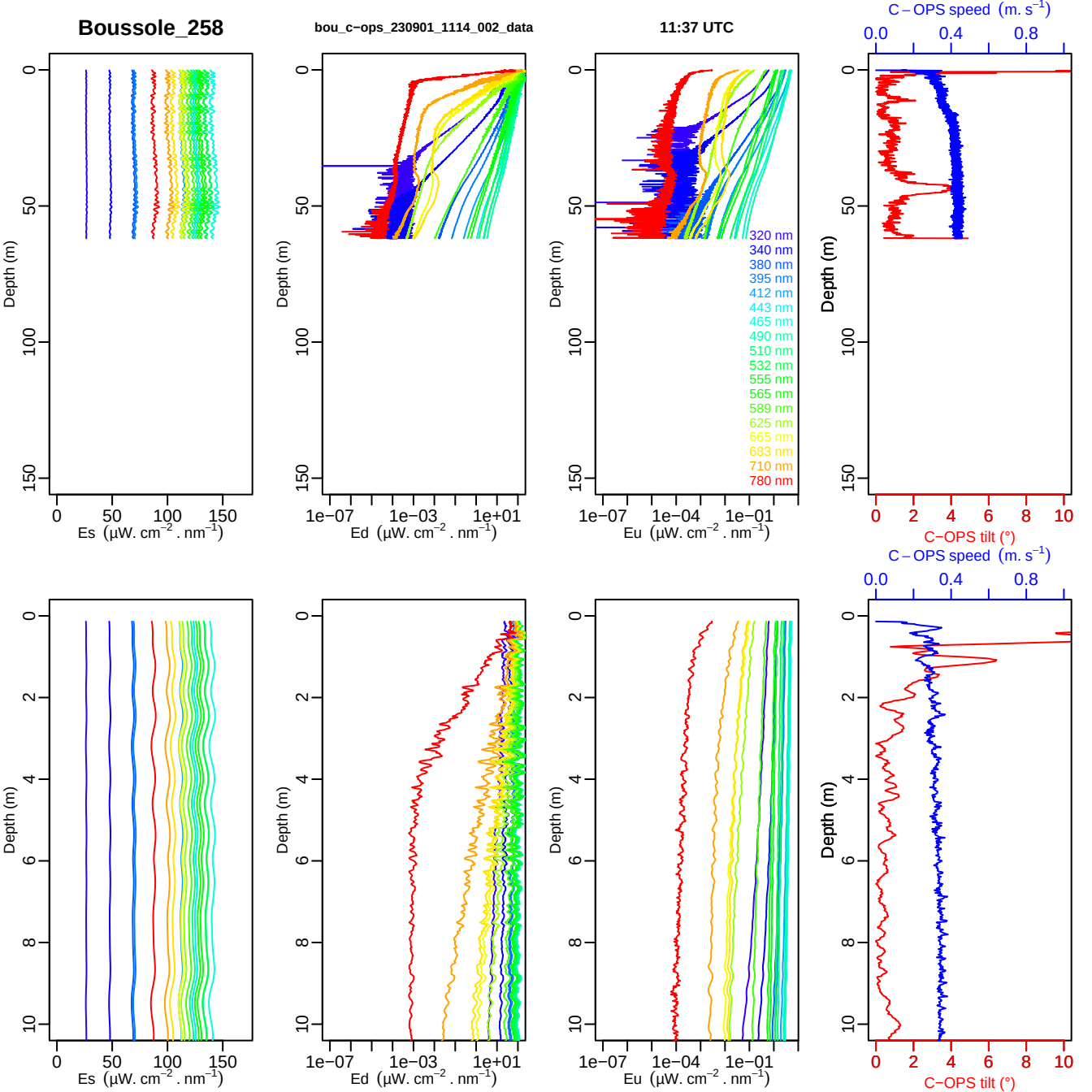
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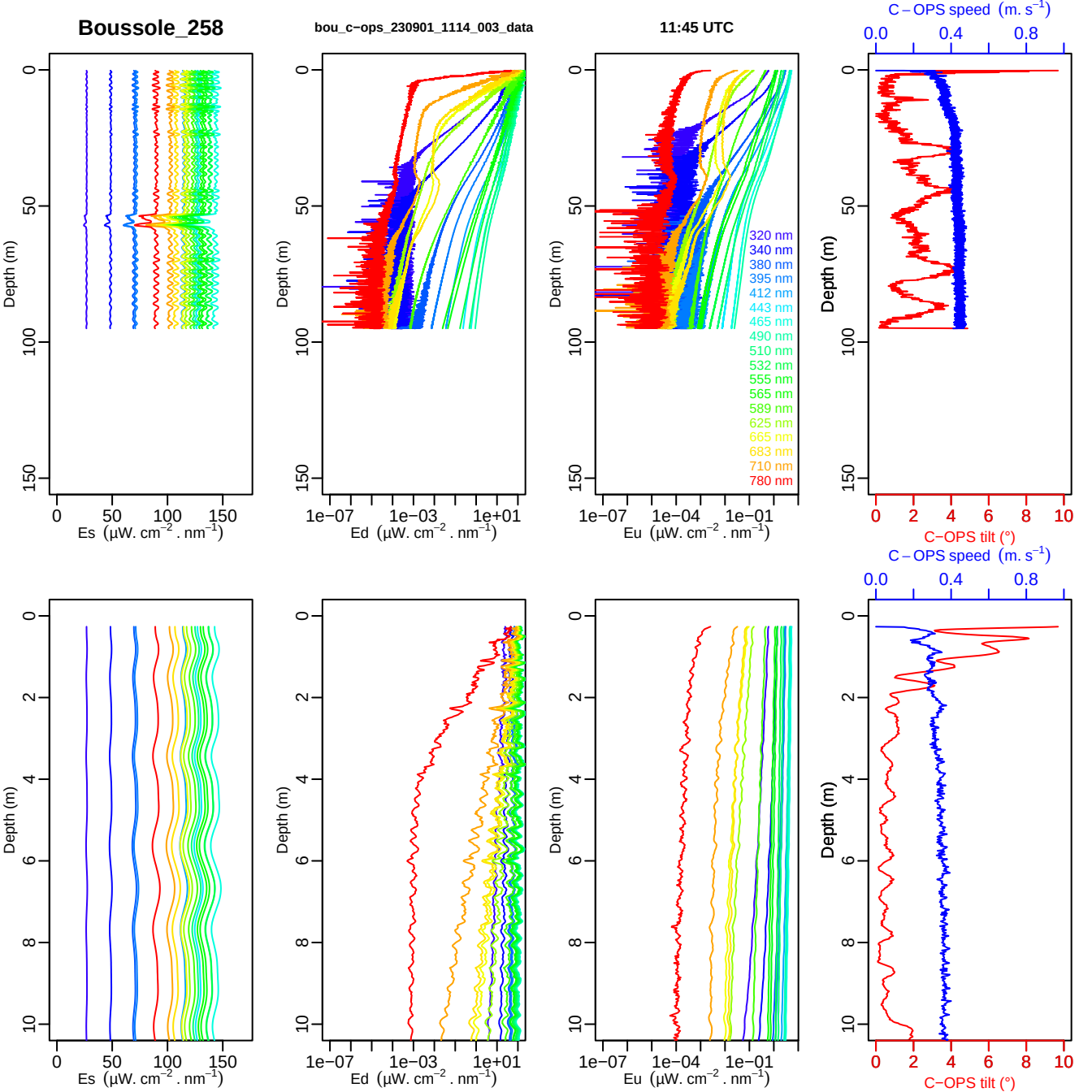
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Ed (µW. cm⁻². nm⁻¹)
Eu (µW. cm⁻². nm⁻¹)
C-OPS speed (m. s⁻¹)
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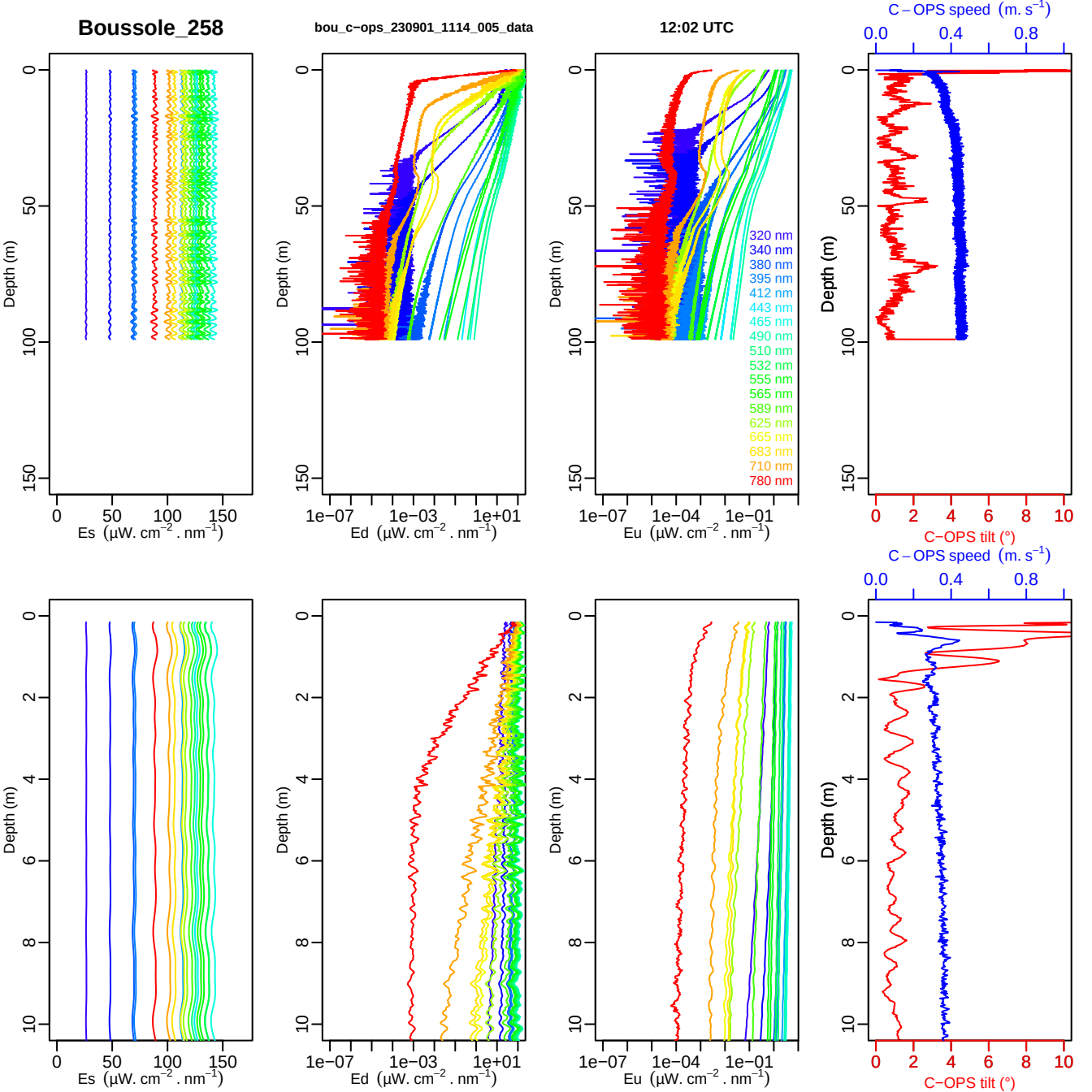
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12:02 UTC
Depth (m)
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Eu (µW. cm⁻². nm⁻¹)
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