

The BOUSSOLE project technical reports; report # 10-208, issue 1.

# BOUSSOLE Monthly Cruise Report

**Cruise 225**

**December 07-09, 2020**

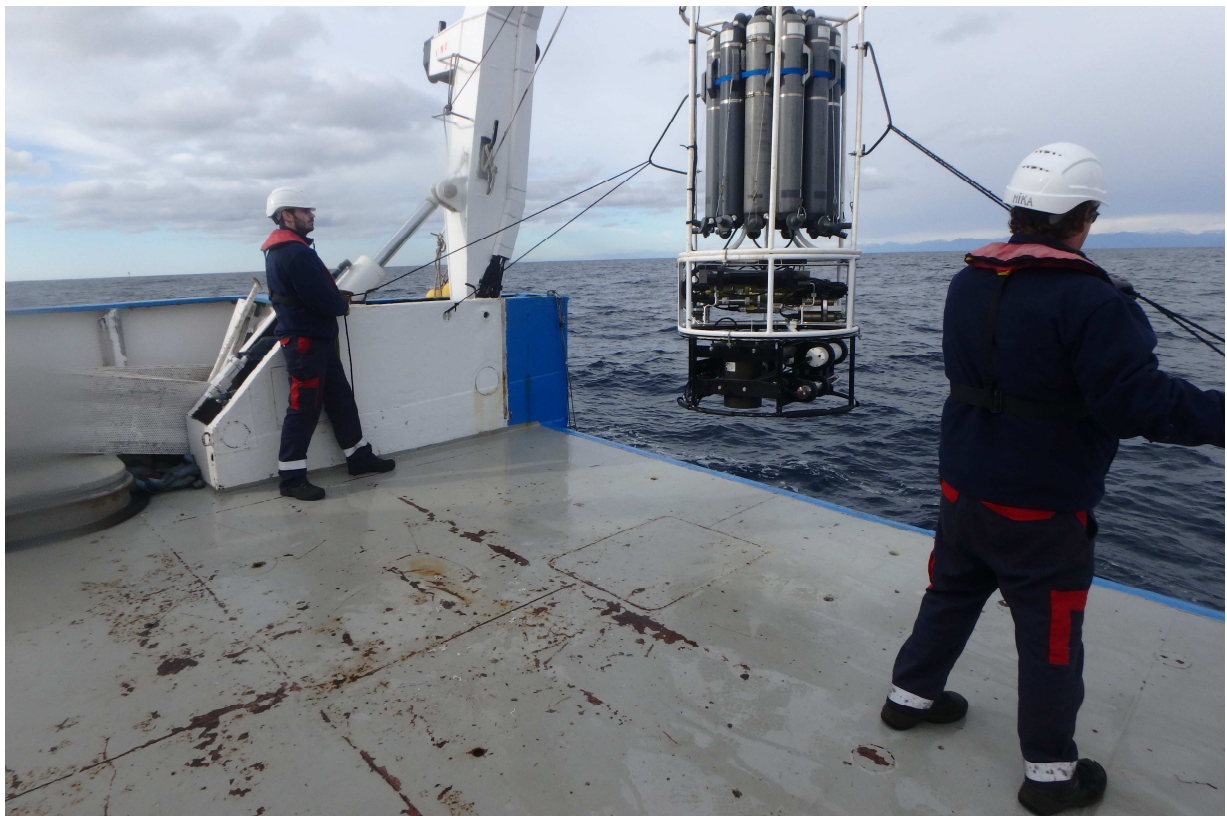
Duty Chief: Melek Golbol ([melek.golbol@imev-mer.fr](mailto:melek.golbol@imev-mer.fr))

Vessel: R/V Téthys II

(Captain: Dany Deneuve)

Science Personnel: Céline Dimier, Melek Golbol, Flavien Petit and Eduardo Soto Garcia.

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



Deployment of the CTD Rosette + IOP package from the deck of the R/V Téthys II at the BOUSSOLE site

**BOUSSOLE project**

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

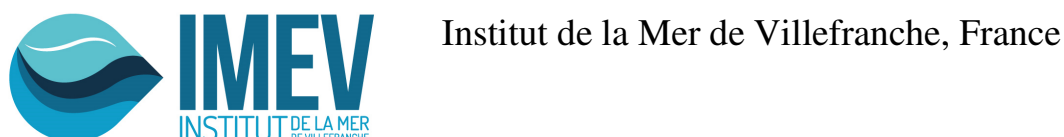
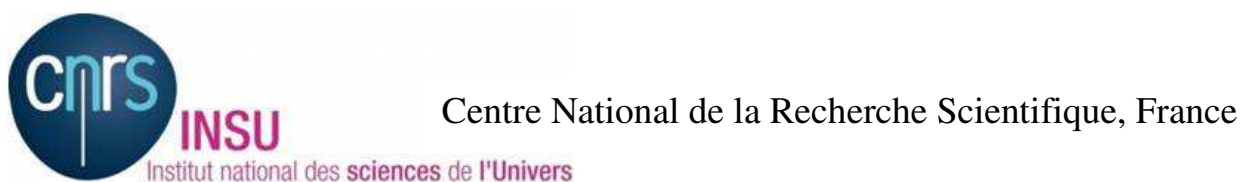
*December 18, 2020*



## 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
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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), 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). 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 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). 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<sub>2</sub> CARIOCA sensors and the two optodes installed on the buoy at 3 m and 10 m. Water samples are to be collected at four depths for metagenomic analyses of different types of *Synechococcus*, cytometry and nutrients (from March 2020). This operation is 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

Seawater are to be sampled at 3 depths for micro-, nano- and pico-phytoplankton analysis by microscopy and cytometry. This operation is part of the OBOO (*From Optics to Biodiversity in the world Open Oceans: application to BGC-Argo floats*) LEFE-CYBER (*Les Enveloppes Fluides et l'Environnement – Cycles Biogéochimiques, Environnement et Ressources*) project of the *Marine optics and remote sensing group* of the *Laboratoire d'Océanographie de Villefranche (LOV)*. In addition, three sensors were added to the Rosette CTD from September 2020 in the frame of this project: an Eco FLBB2 sensor which measures fluorescence (excitation at 470 nm, emission at 695 nm) and backscattering coefficient at 700 nm, an Eco 3X1M sensor which measures multispectral fluorescence (excitation at 440, 470 et 532 nm, emission at 695 nm) and a C-rover transmissometer which measures attenuation at 650 nm.

An "ECO V2 B206" sensor from the Sea-Bird Scientific Company was installed on the CTD for testing by the Marine optics and remote sensing group of the Laboratoire d'Océanographie de Villefranche (LOV-OMTAB). It

measures chlorophyll fluorescence at 470 and 440 nm, CDOM fluorescence and the backscattering coefficient bb at 700 nm.

## **Cruise Summary**

The two first days of the cruise were cancelled because of bad weather. BOUSSOLE operations were performed only the last day. It was used for CTD casts with water sampling, optical profiles and a Secchi disk. There were technical problems during the second CTD cast and the weather degradation did not allow us to properly stop the CTD at the given depths for dissolved matter absorption measurements by the a-Sphere.

### **Monday 7 December 2020**

Bad weather prevented departure from the Nice harbour.

### **Tuesday 8 December 2020**

Bad weather prevented departure from the Nice harbour.

### **Wednesday 9 December 2020**

The sea state was slight with a light to gentle breeze in the beginning of the cruise. The sky was overcast and the visibility was excellent. Firstly, a CTD cast with water sampling, 3 C-OPS profiles and a Secchi disk were performed at the BOUSSOLE site. Then, a second CTD was attempted but there were micro cuts in the communication between the CTD and deck unit during the descent. The CTD was brought to the surface and deployed again. Then, the CTD had to be stopped at 383 m during the descent because of a bug with the computer. The CTD was relaunched for the upcast. For this last CTD deployment, a 0.2µm filter was put on the a-Sphere absorption meter for the dissolved matter absorption measurements. The cast was stopped only at 3 depths during the ascent of the CTD (383, 150 and 80 m) because it was not possible to continue because the weather was degrading. Finally, water was sampled using a bucket for TSM measurements before returning to the Nice harbour.

Pictures taken during this cruise can be found at:

<https://photos.app.goo.gl/cTmfCbuJZsTZLh6N9>

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 7 December 2020**

Bad weather prevented departure from the Nice harbour.

### **Tuesday 8 December 2020**

Bad weather prevented departure from the Nice harbour.

### **Wednesday 9 December 2020 (UTC)**

People on board: Celine Dimier, Melek Golbol, Flavien Petit and Eduardo Soto Garcia.

0800 Departure from the Nice harbour.

1120 Arrival at the BOUSSOLE site.

1140 CTD 01, 400 m with water sampling at 400, 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5m for HPLC and a<sub>p</sub>.

1235 C-OPS 01, 02, 03.

1340 Secchi disk 01, 19 m.

1335 CTD 02, 383 m (downcast).  
1405 CTD 03, 382 m (upcast) with water sampling at 60, 40, 20 and 5 m for metagenomic, cytometry and nutrients analyses (EFFICACY project) and for phytoplankton microscopy, cytometry, PIC, POC and HPLC (OBOO project).  
1500 Surface sampling with bucket for TSM.  
1515 Departure to the Nice harbour.  
1825 Arrival to the Nice harbour.

## **Problems identified during the cruise**

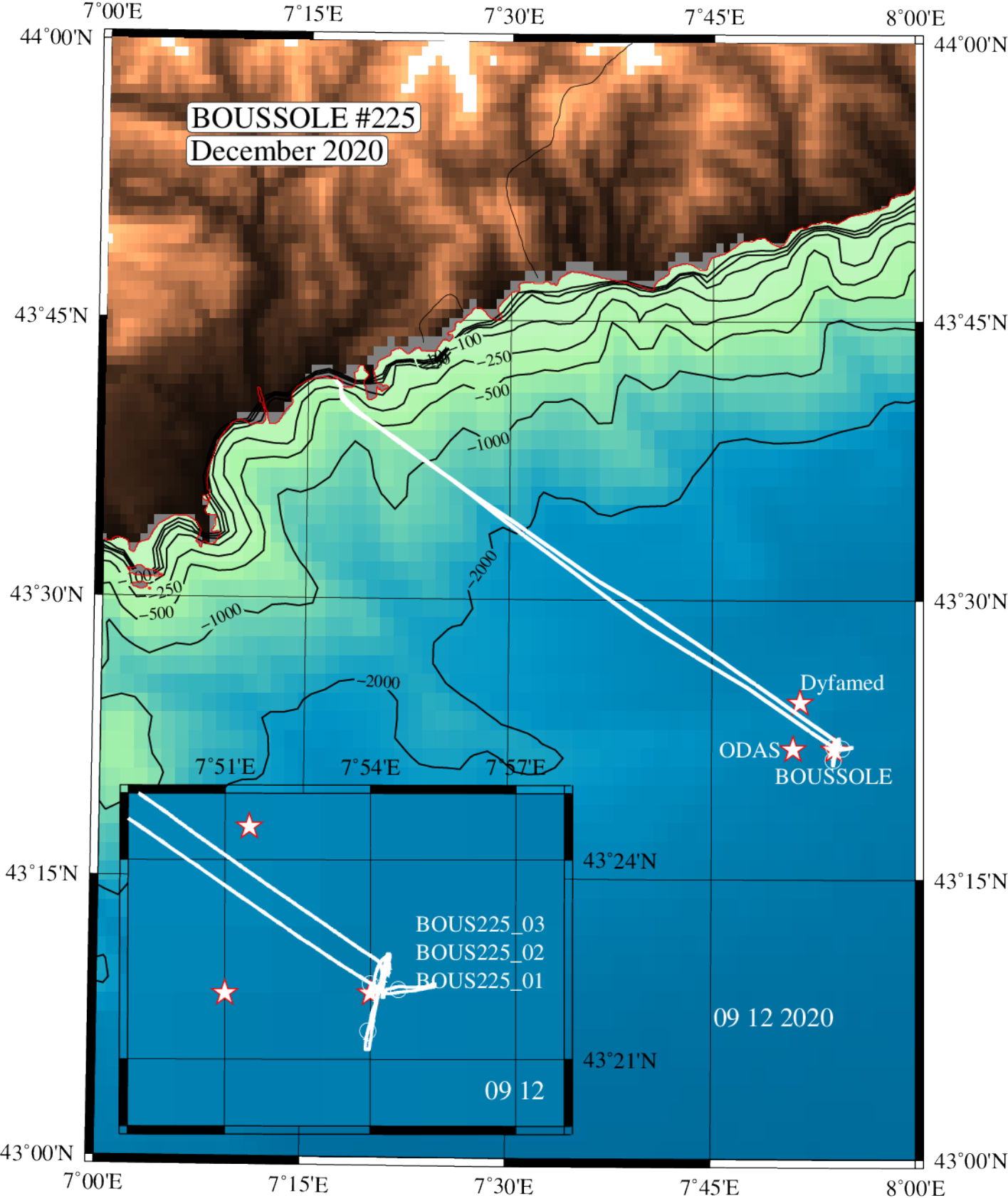
- Diving and maintenance operations of the buoy were not carried out because the buoy currently does not function.
- The oxygen sensor of the CTD did not function correctly during the first CTD cast.
- Problems appeared during the second CTD cast: there were micro cuts in the communication between the CTD and deck unit. The CTD was brought to the surface and deployed again. Then, the CTD had to be stopped at 383 m during the descent because of a bug with the computer and the CTD was relaunched for the upcast. Two files were recorded for this cast: CTD 02 for the downcast and CTD 03 for the upcast. This CTD could be stopped only at 3 depths during the ascent (383, 150 and 80 m) for the dissolved matter absorption measurements because weather became too rough.
- The cap of the backscattering meter could not be put on the sensor because this operation was planned for the third deployment. But the CTD could not be deployed again due to the arrival of bad weather. So, there was no dark measurements for this cruise. For the same reason, it was not possible to sample TSM with the CTD Rosette, so it was sampled using a bucket at the sea surface before the return to the Nice harbour.

# **Appendices**

Cruise Summary Table for Boussole 225

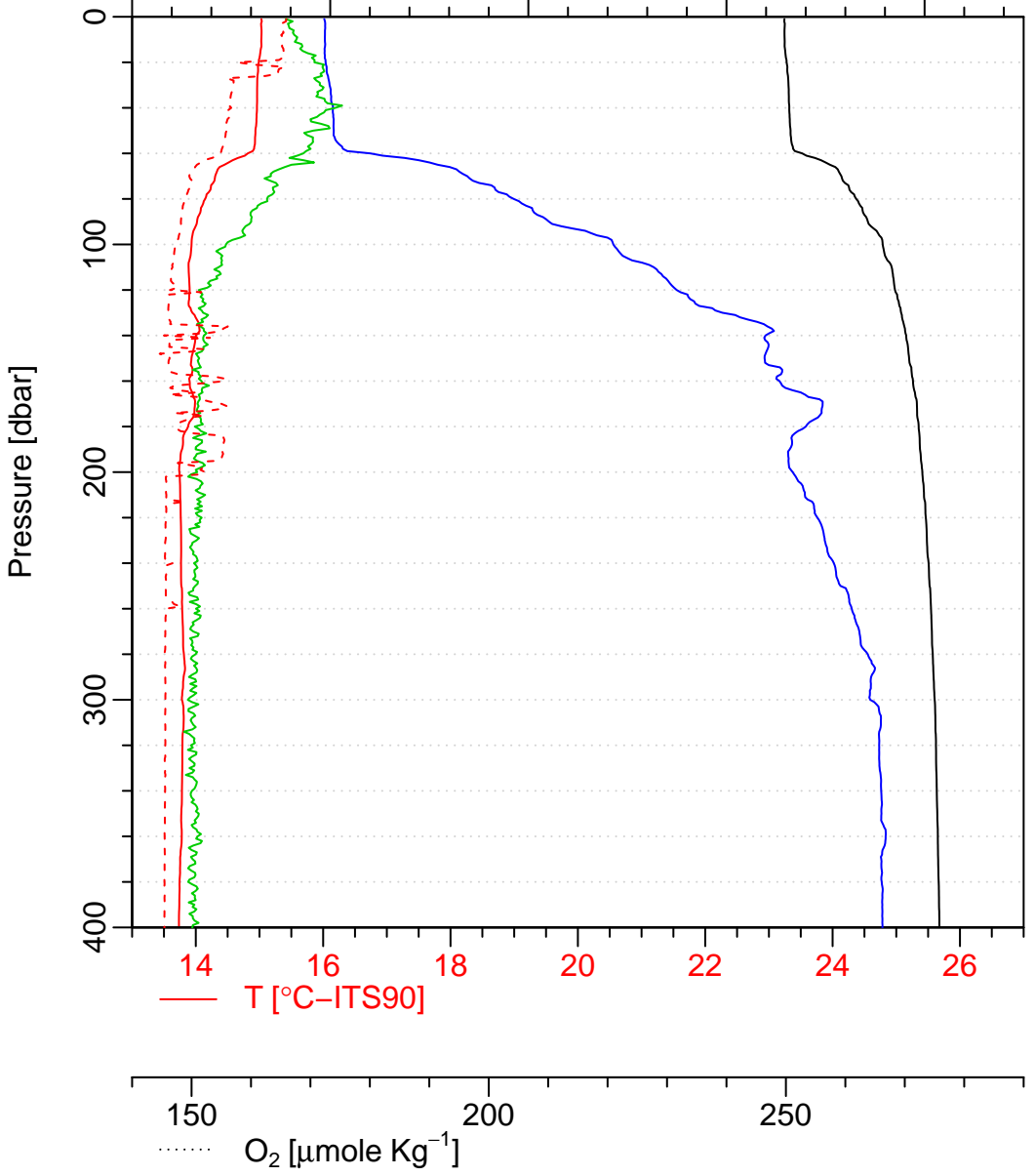
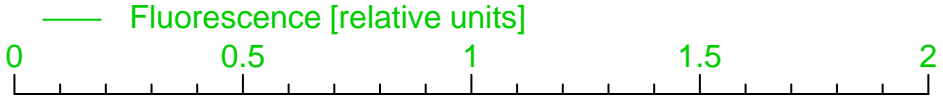
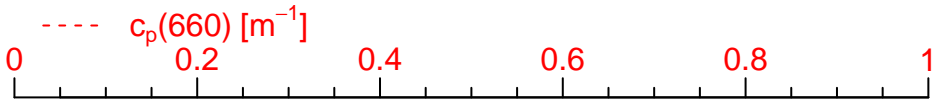
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07/12/20																								
08/12/20																								
09/12/20			BOUS225_01	HPLC, ap	11:38	36:00	400	43 22.052	7 54.578	overcast		7	9	281	1000.4	70		12	15.032	slight				
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				Secchi 01	13:40	4:00	19	43 22	7 54	overcast											slight			
			BOUS225_02			13:32	20:00	383	43 22.137	7 54.001	overcast		7	6	358	1000.9	69		11.7	14.919	slight			
			BOUS225_03	Metagenomics, Cyto, Nutrients & Phytofloat (HPLC, PIC, POC, Cyto, phyto)		14:05	14:29	382	43 21.429	7 53.951	overcast		7	22	28	1001.1	67		11.3	15.032	slight			
			Bucket for TSM		15:00	5:00	1	43 22	7 54	overcast										slight				





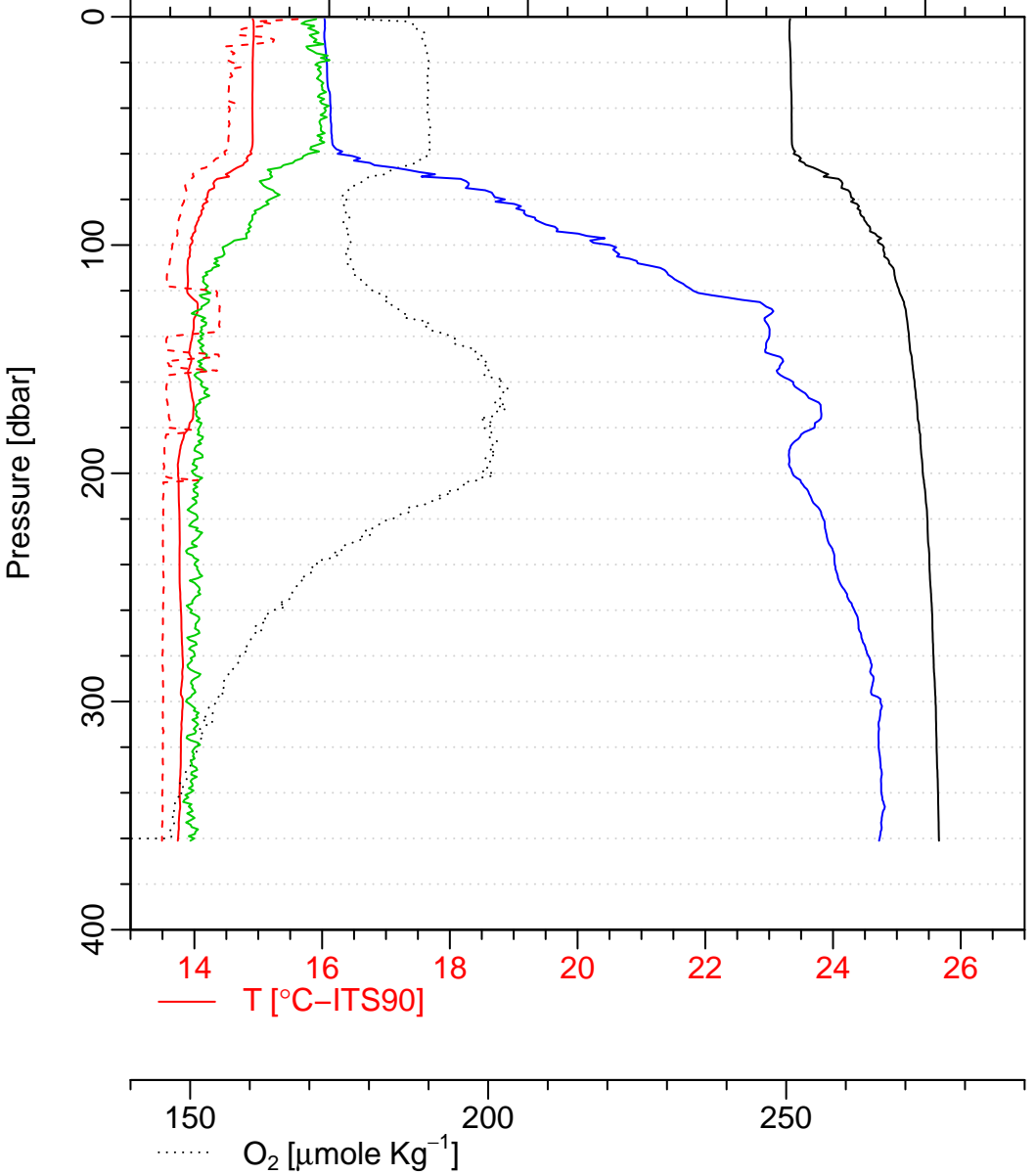
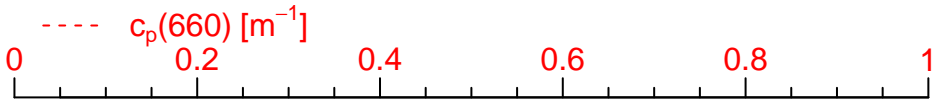
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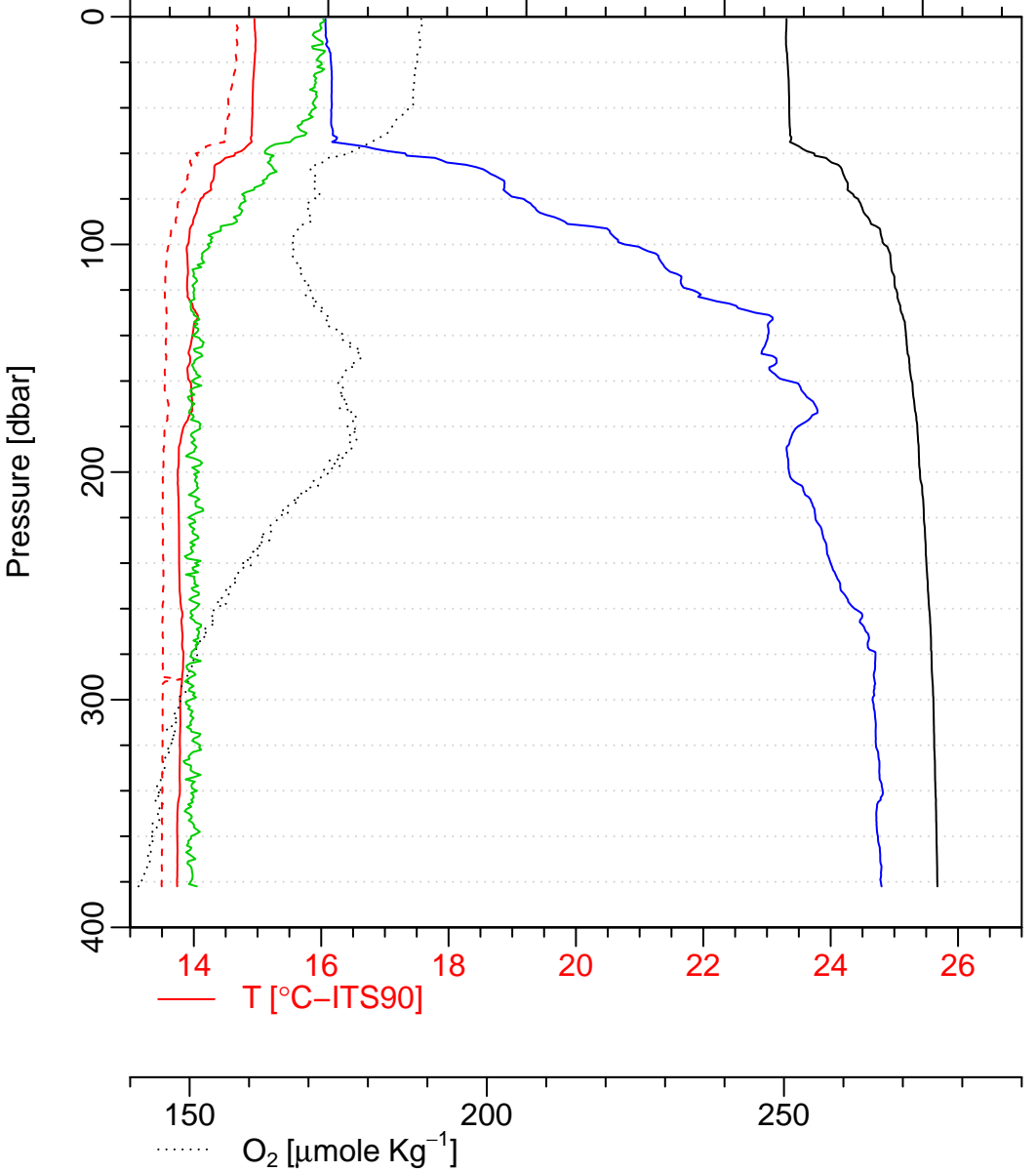
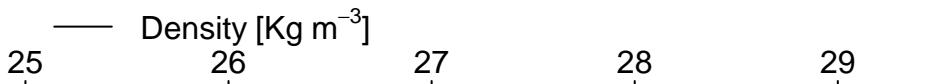
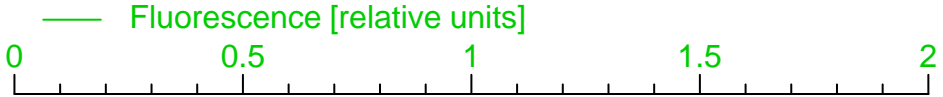
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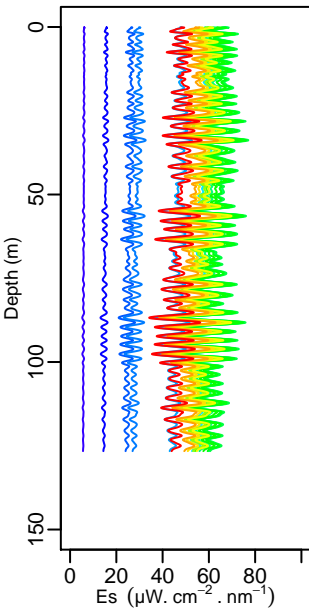
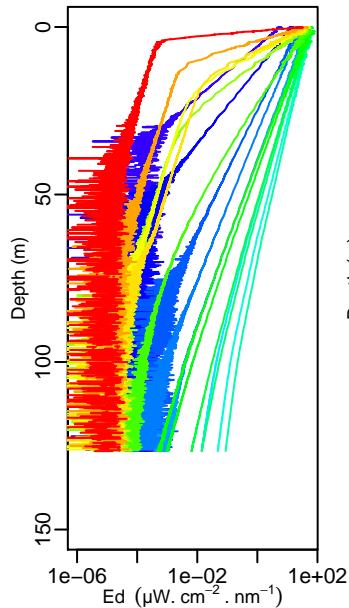
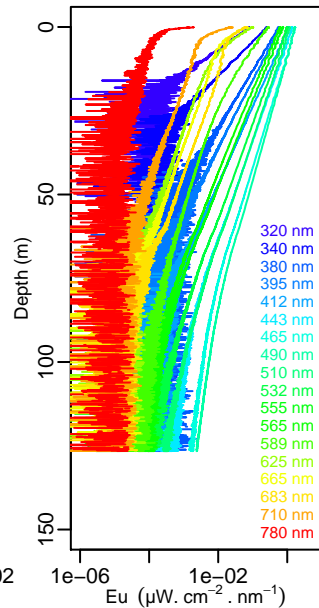
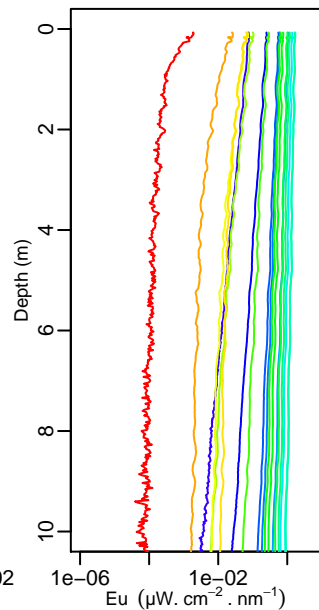
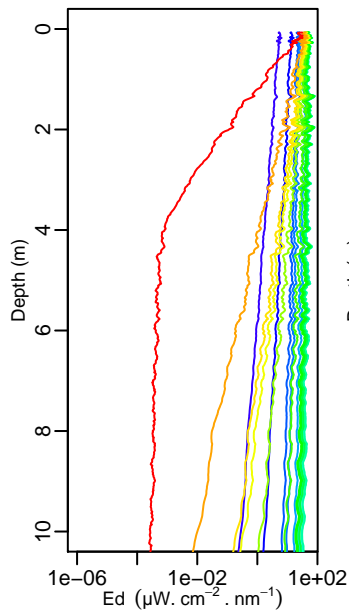
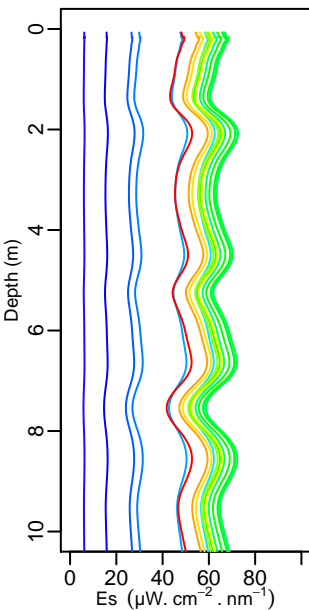
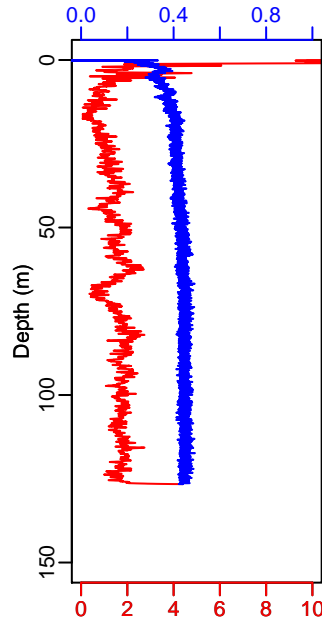
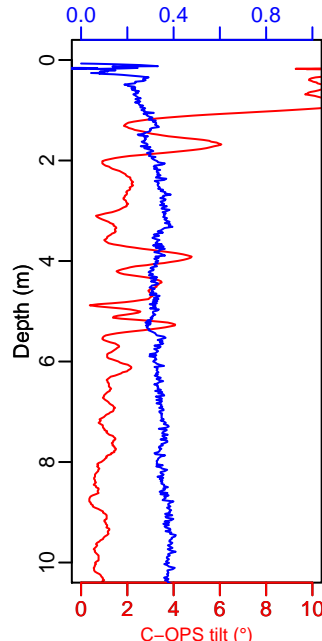
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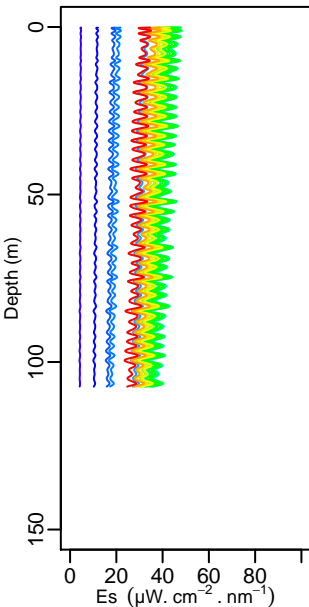
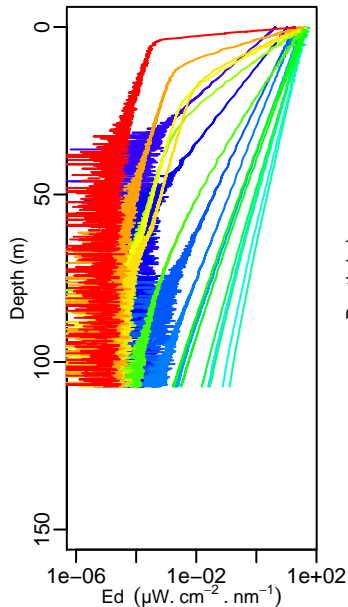
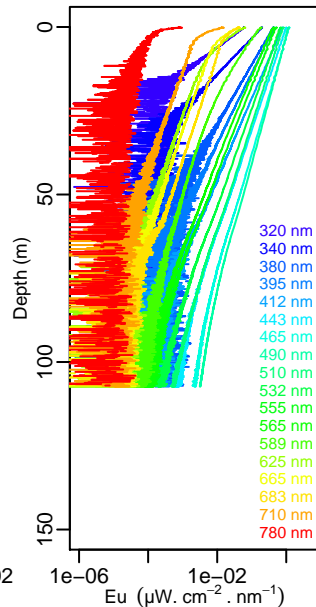
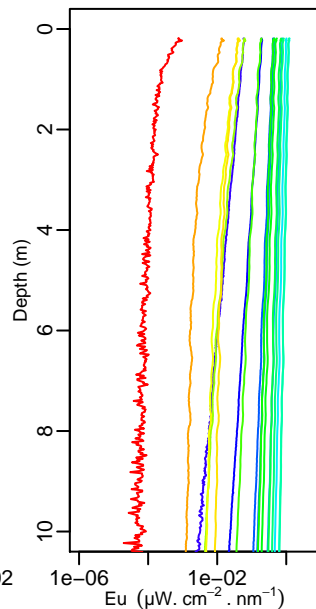
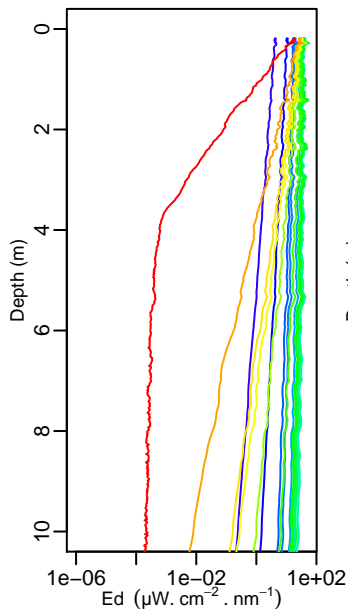
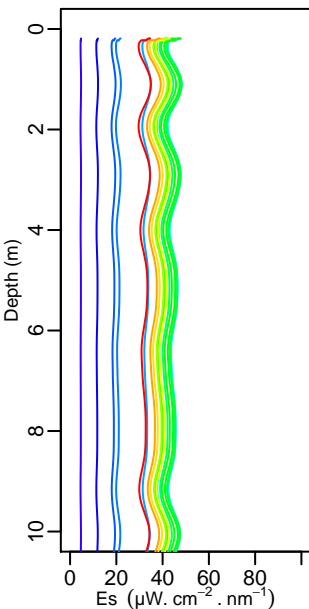
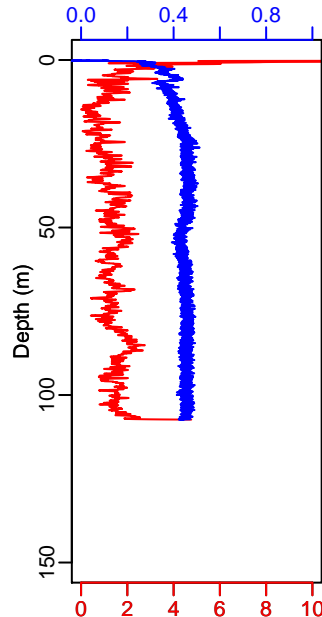
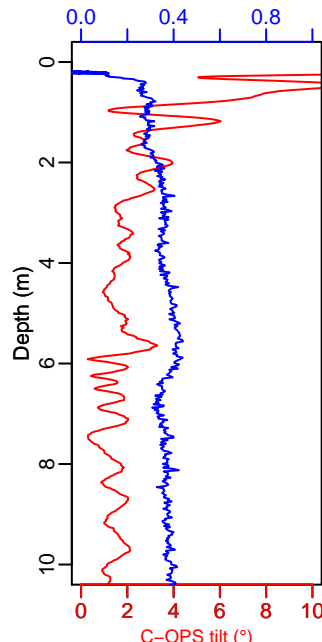


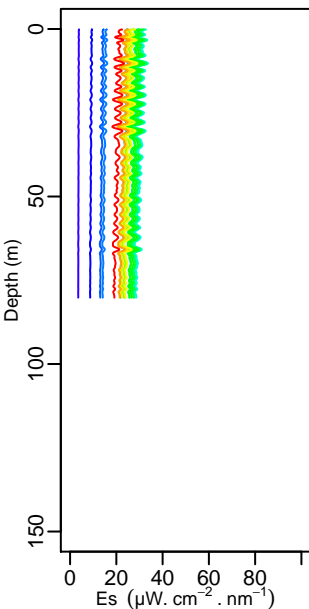
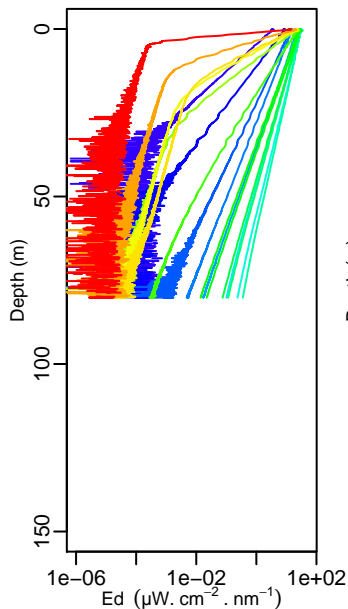
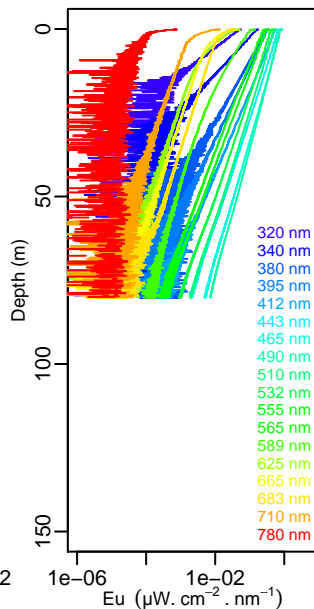
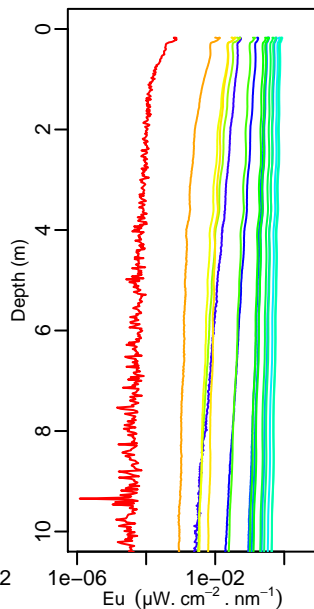
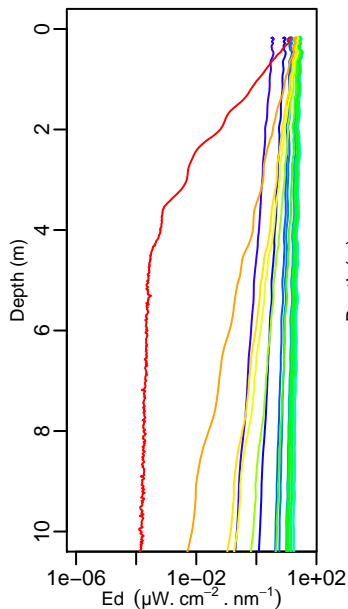
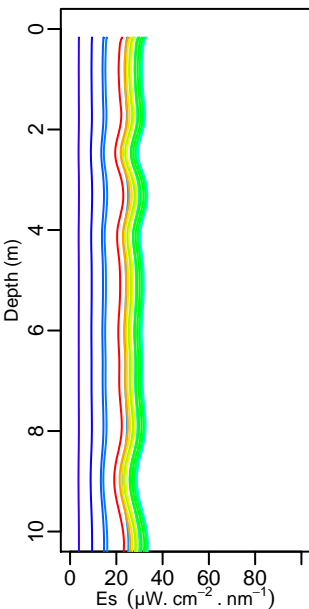
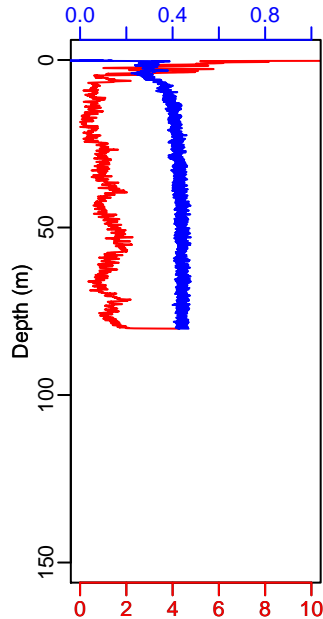
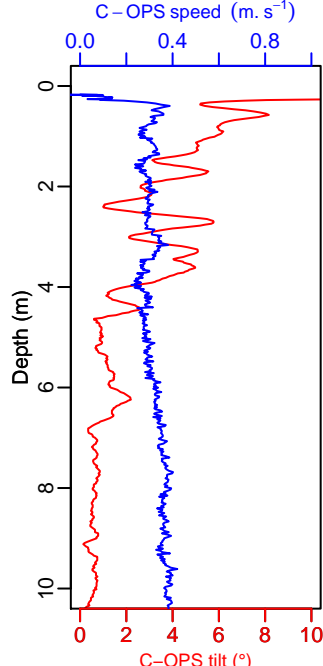
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