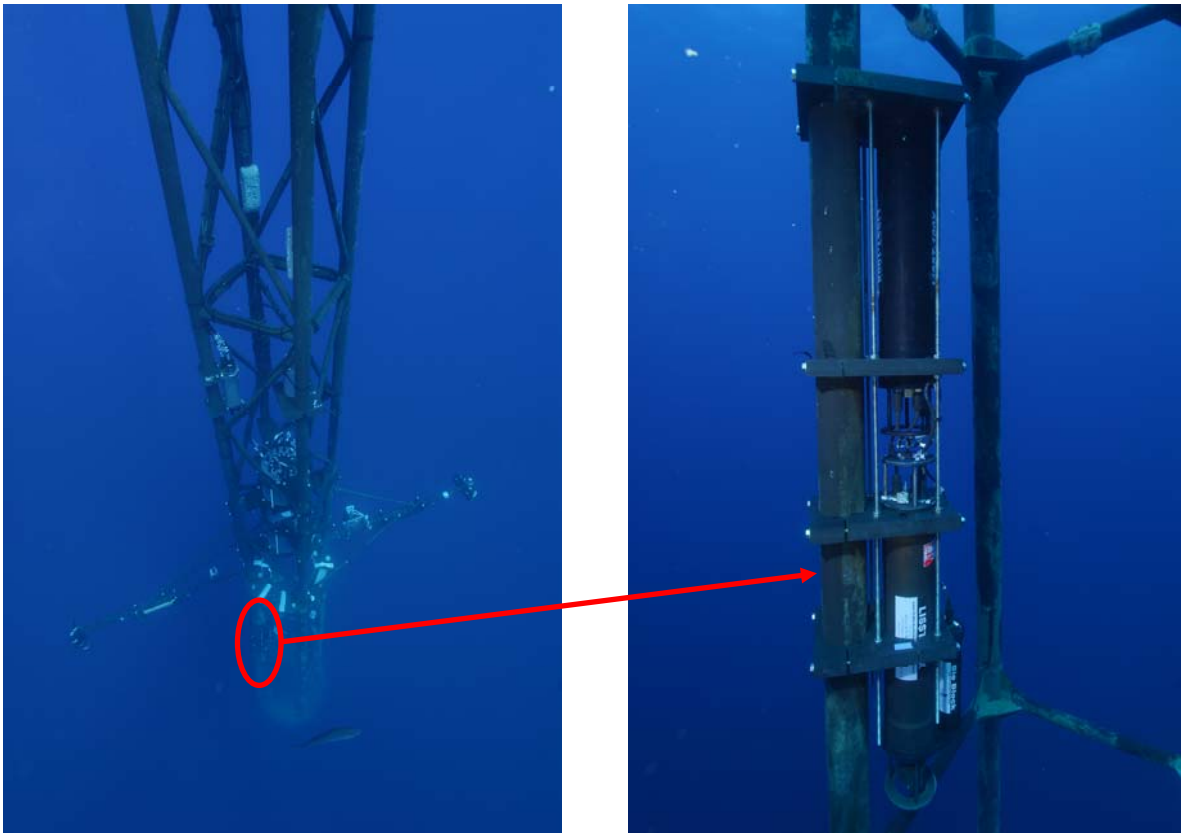
BOUSSOLE Monthly Cruise Report

Cruise 110
April 27 - 29, 2011

Duty Chief: Emilie Diamond (diamond@obs-vlfr.fr)
Vessel: R/V Téthys II
(Captain: Renaud Lebourhis)

Science Personnel: Laurent Coppola, Emilie Diamond, Christiane Dufresne, Yves Lamblard, Dominique Lefèvre, David Luquet, Grigor Obolensky, Didier Robin, Martina Sailerovà and Vincenzo Vellucci.

Laboratoire d'Océanographique de Villefranche (LOV), 06238 Villefranche sur mer cedex, FRANCE



The BOUSSOLE buoy onto which the LISST-100X (a multi-parameter system for in-situ observations of particle size distribution) was previously installed.

BOUSSOLE project

ESA/ESRIN contract N° 13226/10/I-NB

May 09, 2011

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

National Aeronautics and Space Administration, USA

Centre National de la Recherche Scientifique, France

Université Pierre & Marie Curie, France

Observatoire Océanologique de Villefranche/mer, France

Contents

Cruise Objectives

Routine operations

Multiple SPMR (SeaWiFS Profiling Multichannel Radiometer) profiles are to occur within about 3 hours of satellite overhead passes (of MERIS in particular) around solar noon, under optimal conditions: clear blue skies and flat, calm sea surface. Since April 2010, these radiometry profiles are performed with a Biospherical's C-OPS (Compact Optical Profiling System) on 0-200 m at the BOUSSOLE site. This instrument will eventually replace the SPMR/SMSR system. 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 SPMR or 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. A floating platform is to be used to support the SPMR Eu sensor approximately 20cm below the surface for up to 3 minutes of stable light field before a release mechanism triggers the release of the profiler to start a descent as normal. Multiple descents ideally will be started in this way and the data will be used to assess near-surface Eu extrapolation model calculations (this deployment mode has been used until 2007). CTD deployments are required at the start and end of the SPMR profiling day and around noon in the longer summer days or when there is a high possibility of a satellite matchup. In addition to the depth profile from the CTD, CDOM fluorometer, Chl fluorometer, AC9 (from July 2002) and Eco-BB3 (from June 2003), seawater samples are to be collected, filtered and stored in N_2 for HPLC pigment and particle absorption spectrophotometric filter analysis in the lab. Three replicates samples are to be collected at surface for total suspended matter (TSM) weighting in the lab. A gimbled PAR sensor positioned on the foredeck and operated from the CTD computer serves as a light field stability indicator during SPMR profiling (until summer of 2007).

For one day of each cruise, at the end of the optics measurements on site, there will be one CTD transect between the BOUSSOLE site and the Port of Nice. This transect consists of six fixed locations on-route from BOUSSOLE (see map in appendix). The time of day of this transect should be similar for each cruise, if possible to minimise influence of diurnal variability.

For one day of each cruise, three divers will check the underwater state of the buoy structure and instrumentation, take some pictures for archiving, clean the sensor optical surface, and then take again some pictures after cleaning. Divers will also put a neoprene cap on the HS4 and on the transmissometers for acquiring three dark measurements (started in 2009).

Further details about these operations and the 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

During this cruise, a transmission data system, via a freewave antenna, was tested from the BOUSSOLE site to the coast to compare with the current buoy CISCO system. The second day, Christiane Dufresne, an IFREMER intern, was on board during this cruise to deploy two lagrangian buoys. One of the LOV gliders, "Tintin", was recovered near the BOUSSOLE buoy the same day. The last day, Laurent Coppola, Martina Sailerovà and Dominique Lefèvre were on board to recover a MOOSE sampling line and to perform two plankton net profiles at the DYFAMED site to complete the MOOSE program (Mediterranean Ocean Observation multi-Sites on Environment).

Cruise Summary

All of the three cruise days were used during this mission for optical profiles and CTD casts with water sampling at the BOUSSOLE site. The first day was also used for completing the transect and the second day for diving operations, buoy data retrieval, for recovering a glider and deploying two lagrangian buoys. The last day, a part of the MOOSE program was also complete with two plankton net profiles and the attempt of a sampling line recovery.

Wednesday 27 April 2011

The first day, during the loading of our equipment, the hydraulic flexible of the ship crane broke. We lost nearly two hours to buy a new flexible before leaving. When on BOUSSOLE site, the sea was slight with a gentle breeze and the sky was blue to overcast. 1 CTD cast with water sampling and 1 SPMR profile were performed. After the first profile, when the SPMR went back up to the surface, the profiler cable was cut by the ship propellers by accident and the instrument was lost into the sea. Then, the CTD transect was completed.

Thursday 28 April 2011

The second day, the sea was slight with a gentle breeze, a blue sky and a good visibility. On the way, the LOV glider "Tintin" was recovered and two IFREMER lagrangian buoys were deployed. Some tests of free wave transmission were also attempted. When arrived at the BOUSSOLE site, divers went at sea to clean buoy instruments. They also put neoprene caps on the HS4 and on the transmissometers for acquiring three dark measurements. During the diving, other tests of free wave data transmission were attempted with success. Then, a connection with the buoy was established via the CISCO system but the connection was lost before downloading all the data. 1 Secchi disk, 6 C-OPS profiles, 1 CTD cast with water sampling and 3 sets of CIMEL measurements were also performed. Another attempt of CISCO connection with the buoy failed. Then, ARGOS and CISCO connectors on the top of the buoy were cleaned and a CISCO connection with the buoy was established for total data retrieval.

Friday 29 April 2011

The last day, the sea was slight with a moderate to fresh breeze and the sky was blue to overcast with a medium visibility. When on BOUSSOLE site, 6 C-OPS profiles, 1 CTD cast with water sampling and 1 Secchi disk were performed before going to the DYFAMED site to recover a sampling line. Unfortunately, the cable was broken and only the down part of the line was recovered. So there was some time left to perform two plankton net profiles to complete the MOOSE program.

Cruise Report

Wednesday 27 April 2011 (UTC)

People on board: Emilie Diamond and Grigor Obolensky.

0710 Departure from the Nice harbour.
1020 Arrival at the BOUSSOLE site.
1030 CTD 01, 400 m with water sampling at 200, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC and a_p.
1110 SPMR 01: cable cut in the propellers and profiler lost into the sea.
1145 Departure to the first transect station.
1220 CTD 02, 400 m, station 01 (43°25'N 07°48'E).
1320 CTD 03, 400 m, station 02 (43°28'N 07°42'E).
1420 CTD 04, 400 m, station 03 (43°31'N 07°37'E).
1520 CTD 05, 400 m, station 04 (43°34'N 07°31'E).
1620 CTD 06, 400 m, station 05 (43°37'N 07°25'E).
1710 CTD 07, 400 m, station 06 (43°39'N 07°21'E).
1735 Departure to the Nice harbour.
1805 Arrival at the Nice harbour.

Thursday 28 April 2011 (UTC)

People on board: Emilie Diamond, Christiane Dufresne, Grigor Obolensky, Vincenzo Vellucci and 3 divers.

0505 Departure from the Nice harbour.
0550 Recovery of the glider.
0630 Lagrangian buoy deployment.
0730 Lagrangian buoy deployment.
0730 Tests of freewave transmission system: successful.
0910 Arrival at the BOUSSOLE site.
0915 Diving on the buoy for cleaning instruments. Dark HS4 and transmissometers measurements at 09:45, 10:00 and 10:15.
0915 Tests of freewave transmission system: successful.

1015 CISCO connection with the buoy but incomplete data retrieval
1040 Secchi disk 01 (11.5 m).
1050 C-OPS 01, 02, 03, 04, 05, 06.
0945 CTD 08, 400 m with water sampling at 200, 150, 80, 70, 60, 40, 30, 20, 10 and 5 m for HPLC, a_p, TSM and CDOM.
1315 CISCO connection with the buoy: unsuccessful.
1325 CIMEL 01, 02, 03.
1350 Zodiac at sea for climbing on the buoy. Solar panels, optic sensors and CISCO and ARGOS connections cleaned.
1415 CISCO connection with the buoy and total data retrieval.
1430 Departure to the Nice harbour.
1735 Arrival at the Nice harbour.

Friday 29 April 2011 (UTC)

People on board: Laurent Coppola, Emilie Diamond, Dominique Lefèvre, Grigor Obolensky and Martina Sailerovà.

0400 Departure from the Nice harbour.
0725 Arrival at the BOUSSOLE site.
0730 C-OPS 07, 08, 09.
0820 CTD 09, 400 m with water sampling at 200, 150, 80, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, a_p and TSM.
0900 C-OPS 10, 11, 12.
1000 Secchi disk 02 (10 m).
1010 Departure to the DYFAMED site.
1100 Arrival at the DYFAMED site.
1140 Acoustic release of the MOOSE line.
1200 Recovery of the acoustic release system only.
1230 2 x Plankton net, 0-100 m.
1300 Departure to the Nice harbour.
1600 Arrival at the Nice harbour.

Problems identified during the cruise

- The first day, during the loading of our equipment, the hydraulic flexible of the ship crane broke. We lost nearly two hours to buy a new flexible before leaving.
- After the 1st SPMR profile, when the profiler went back up to the surface, its cable was cut by the ship propellers by accident and the instrument was lost into the sea.
- The first buoy data retrieval was incomplete because of an interruption of the CISCO connection.

Calculated Swath paths for the MERIS Sensor (Esov NG Software)

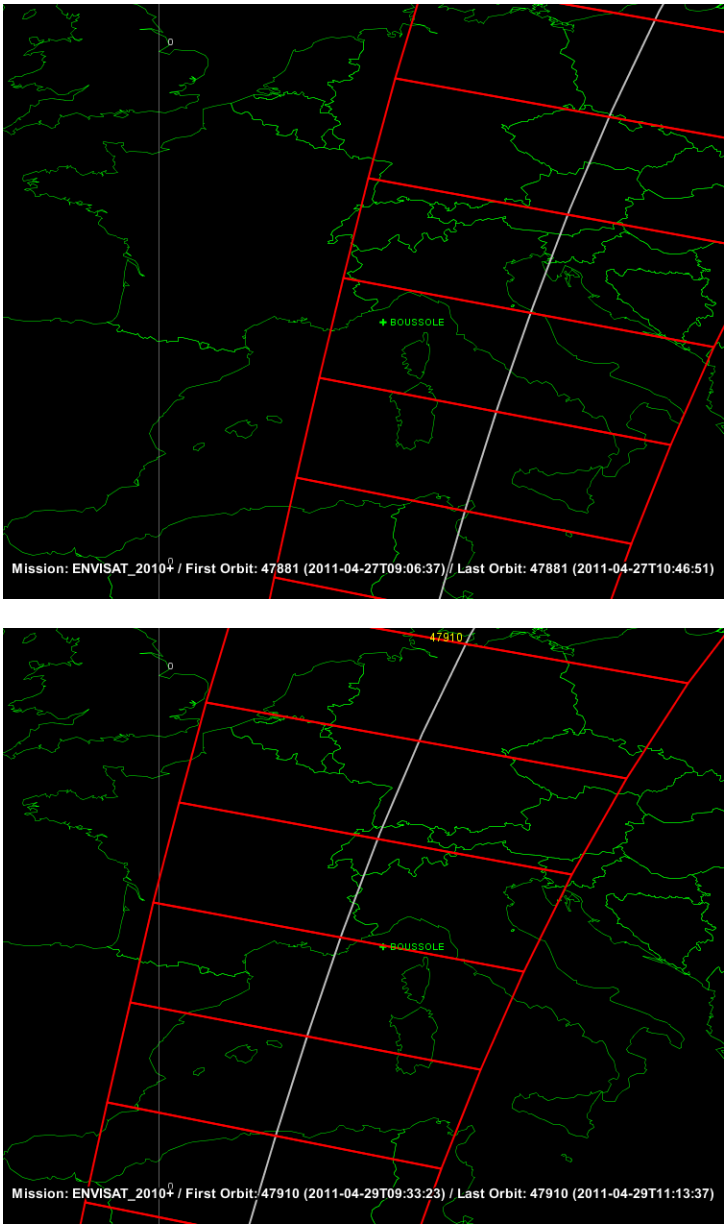
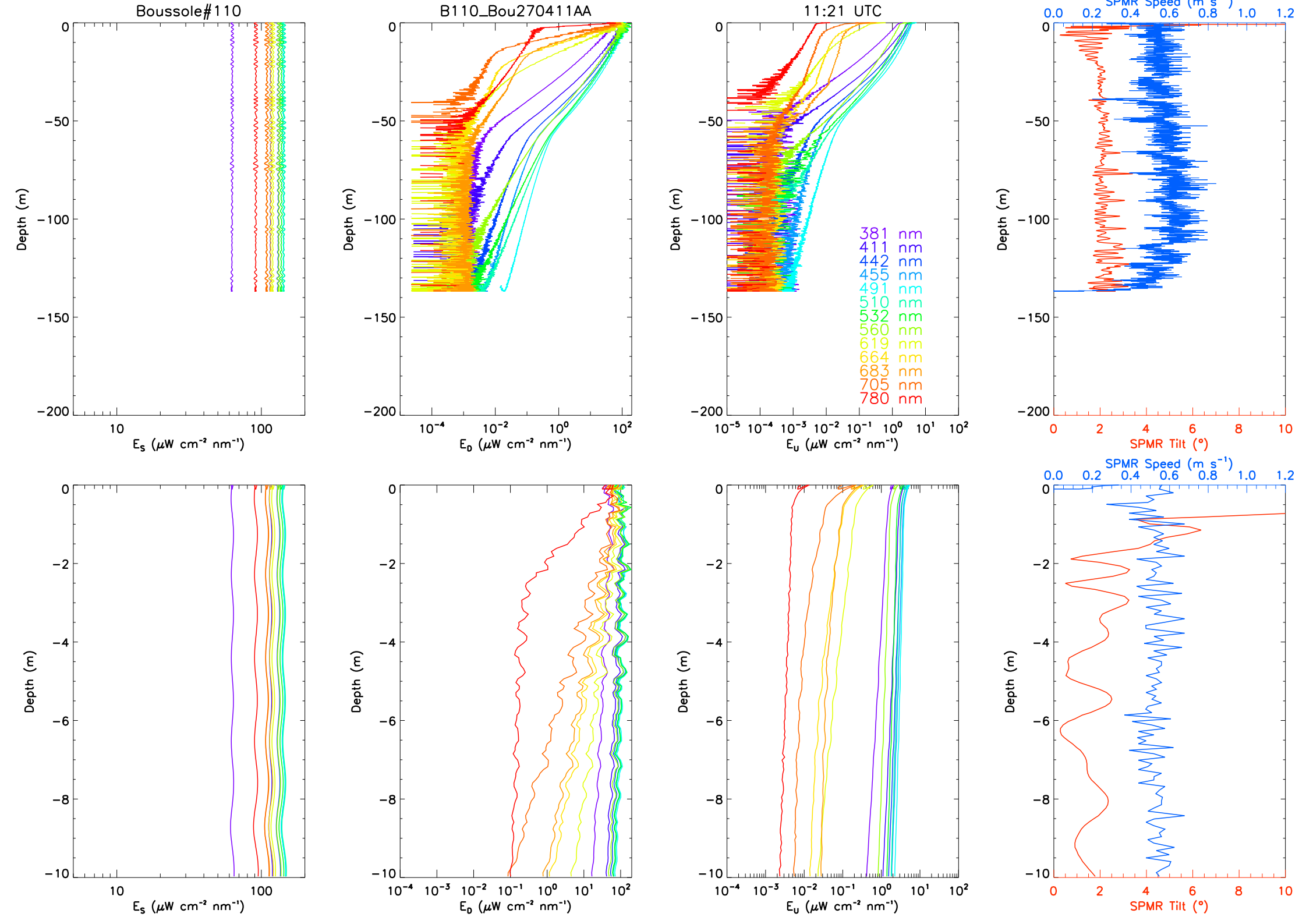


Figure 1. Calculated swath paths for MERIS (Esov NG software) above the BOUSSOLE site for the 27th and 29th of April 2011.

Appendices

Cruise Summary Table for Boussole 110

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")	satellite overpass		GMT (hour.min)	(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
			CTDBOUS001	HPLC & Ap	10:30	38:00	400	43	22.006	7	53.864	overcast		7	8	330	1011.4	70		17.0	15.6	calm			no
	Bou270411black1				11:06	3:00																			
		Bou270411AA			11:20	4:22	136.8	43	22.081	7	53.511	blue	Cu&St	3	8	112	1011.3	71	good	17.2		calm	0.6		no
			CTDBOUS002		12:23	23:00	400	43	25.000	7	48.000	blue		3	6	300	1010.8	74		17.5	16.0	calm			no
27/04/2011			CTDBOUS003		13:23	24:00	400	43	27.838	7	41.923	blue		3	9	270	1010.9	76		17.5	16.5	calm			no
			CTDBOUS004		14:23	22:00	400	43	30.895	7	36.446	overcast		8	10	306	1010.1	76		17.1	16.8	calm			no
			CTDBOUS005		15:18	26:00	400	43	33.770	7	30.672	overcast		8	10	300	1010.4	77		16.7	17.0	calm			no
			CTDBOUS006		16:19	21:00	400	43	37.000	7	25.000	overcast		8	10	300	1010.4	77		16.7	16.4	calm			no
			CTDBOUS007		17:10	23:00	400	43	38.995	7	20.997	overcast		8	6	34	1010.4	77		16.6	16.3	calm			no
				Secchi01	10:40	3:00	11.5	43	22	7	54	overcast		5					good			calm			no
	bou_c-ops_110428_1053_001_data.csv				10:54	2:49																			
		bou_c-ops_110428_1053_003_data.csv			11:07	2:57	51.8	43	21.923	7	54.176	blue	Cu&St	4	9	93	1010.1	67	good	16.0		calm	0.6		no
		bou_c-ops_110428_1053_004_data.csv			11:21	2:26	35.7	43	21.963	7	53.944	blue	Cu&St	4	9	93	1010.1	67	good	16.0		calm	0.6		no
		bou_c-ops_110428_1053_005_data.csv			11:32	3:04	54.8	43	22.110	7	53.672	blue	Cu&St	4	9	93	1010.1	67	good	16.0		calm	0.6		no
		bou_c-ops_110428_1053_008_data.csv			11:45	2:55	50.3	43	22.270	7	53.430	blue	Cu&St	4	9	93	1010.1	67	good	16.0		calm	0.6		few
28/04/11		bou_c-ops_110428_1053_009_data.csv			11:56	3:30	61.0	43	22.382	7	53.221	blue	Cu&St	4	9	93	1010.1	67	good	16.0		calm	0.6		few
		bou_c-ops_110428_1053_011_data.csv			12:11	3:46	66.8	43	22.582	7	53.018	blue	Cu&St	4	9	93	1010.1	67	good	16.0		calm	0.6		few
	bou_c-ops_110428_1053_012_data.csv				12:33	1:21																			
			CTDBOUS008	HPLC, Ap, TSM & CDOM	12:34	28:00	400	43	22.024	7	53.871	overcast		6	8	110	1010.1	70		16.2	15.9	calm			few
				CIMEL01	13:26	5:00		43	21.975	7	53.996	blue		3			1010.0		good						
				CIMEL02	13:31	4:00		43	21.936	7	53.930	blue		3			1010.0		good						
				CIMEL03	13:35	3:00		43	21.994	7	54.032	blue		3			1010.0		good						
	bou_c-ops_110329_0836_001_data				07:31	1:20																			
		bou_c-ops_110329_0836_002_data			07:36	3:54	71.1	43	22.286	7	53.638	variable	Ac&Cs	4	18	109	1008.2	76	medium	16.0		moved	1.0		yes
		bou_c-ops_110329_0836_003_data			07:47	3:35	48.5	43	22.380	7	53.323	variable	Ac&Cs	4	18	109	1008.2	76	medium	16.0		moved	1.0		yes
		bou_c-ops_110329_0836_004_data			07:58	4:09	77.9	43	22.406	7	53.015	variable	Ac&Cs	4	18	109	1008.2	76	medium	16.0		moved	1.0		yes
	bou_c-ops_110329_0836_008_data				08:20	1:29																			
			CTDBOUS009	HPLC, Ap & TSM	08:24	36:00	400	43	22.046	7	53.790	overcast		5	15	340	1008.2	80		16.0	15.7	moved			yes
29/04/11	bou_c-ops_110329_0836_001_data				09:00	1:20																			
		bou_c-ops_110329_0836_002_data			09:18	4:08	79.2	43	22.047	7	53.779	blue	Ac	3	12	117	1008.0	84	good	16.0		moved	1.2		yes
		bou_c-ops_110329_0836_003_data			09:29	3:16	49.3	43	22.056	7	53.517	blue	Ac	3	12	117	1008.0	84	good	16.0		moved	1.2		yes
		bou_c-ops_110329_0836_004_data			09:38	4:53	92.7	43	22.118	7	53.190	blue	Ac	3	12	117	1008.0	84	good	16.0		moved	1.2		yes
	bou_c-ops_110329_0836_008_data				10:06	1:17																			
				Secchi02	10:00	3:00	10	43	22	7	54	overcast		7					good			moved			yes


Boussole#110
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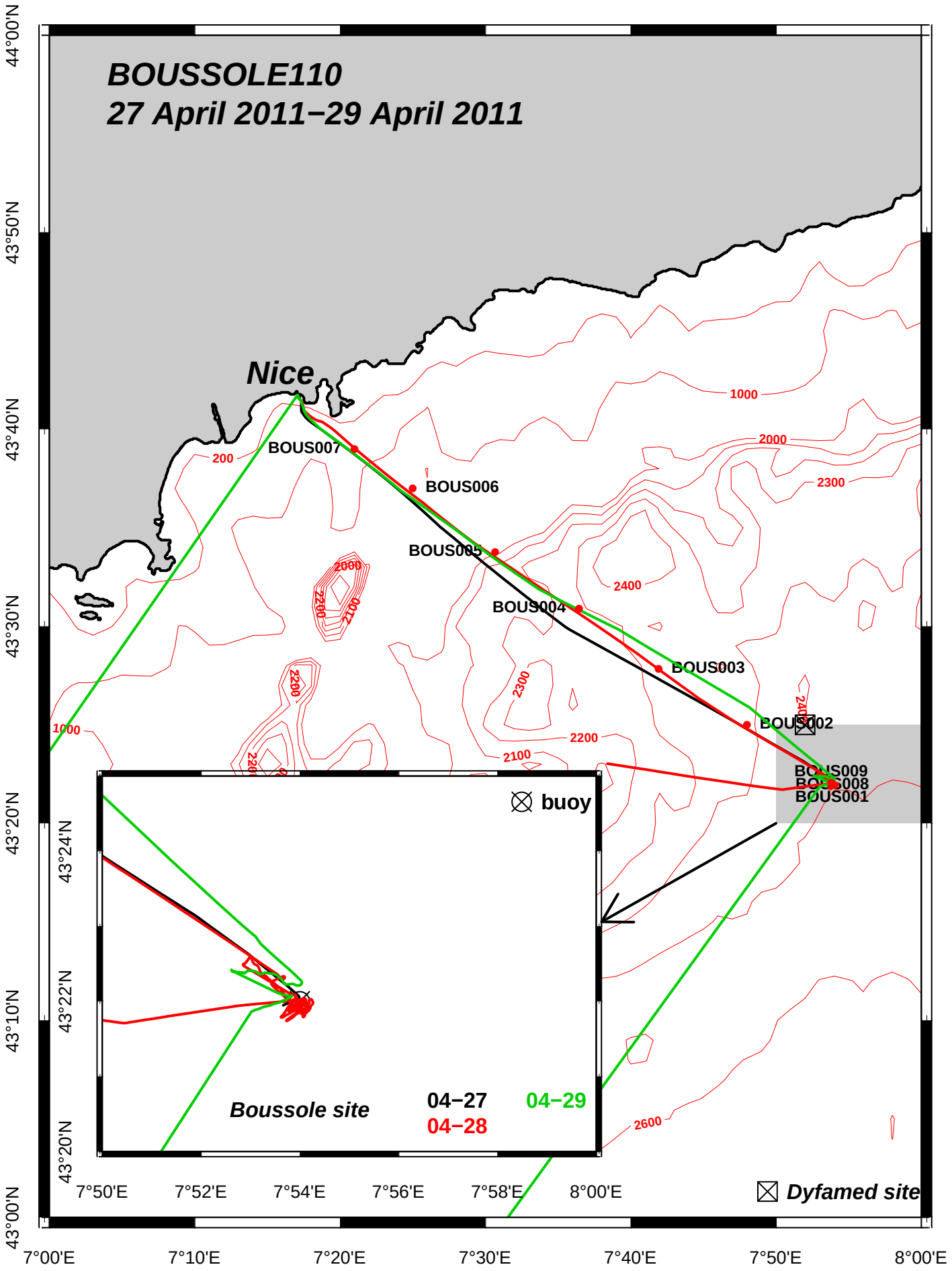
11:21 UTC
Depth (m)
E_S (μW cm^{-2} nm^{-1})
E_D (μW cm^{-2} nm^{-1})
E_U (μW cm^{-2} nm^{-1})
381 nm
411 nm
442 nm
455 nm
491 nm
510 nm
532 nm
560 nm
619 nm
664 nm
683 nm
705 nm
780 nm
SPMR Speed (m s^{-1})
SPMR Tilt (°)


BOUSSOLE110
27 April 2011−29 April 2011
Nice
BOUS007
BOUS006
BOUS005
BOUS004
BOUS003
BOUS002
BOUS009
BOUS008
BOUS001
200
1000
2000
2300
2400
2600
2200
2100
buoy
Boussole site
04−27
04−28
04−29
Dyfamed site
44°00'N
43°50'N
43°40'N
43°30'N
43°20'N
43°10'N
43°00'N
7°00'E
7°10'E
7°20'E
7°30'E
7°40'E
7°50'E
8°00'E
43°24'N
43°22'N
43°20'N
7°50'E
7°52'E
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7°56'E
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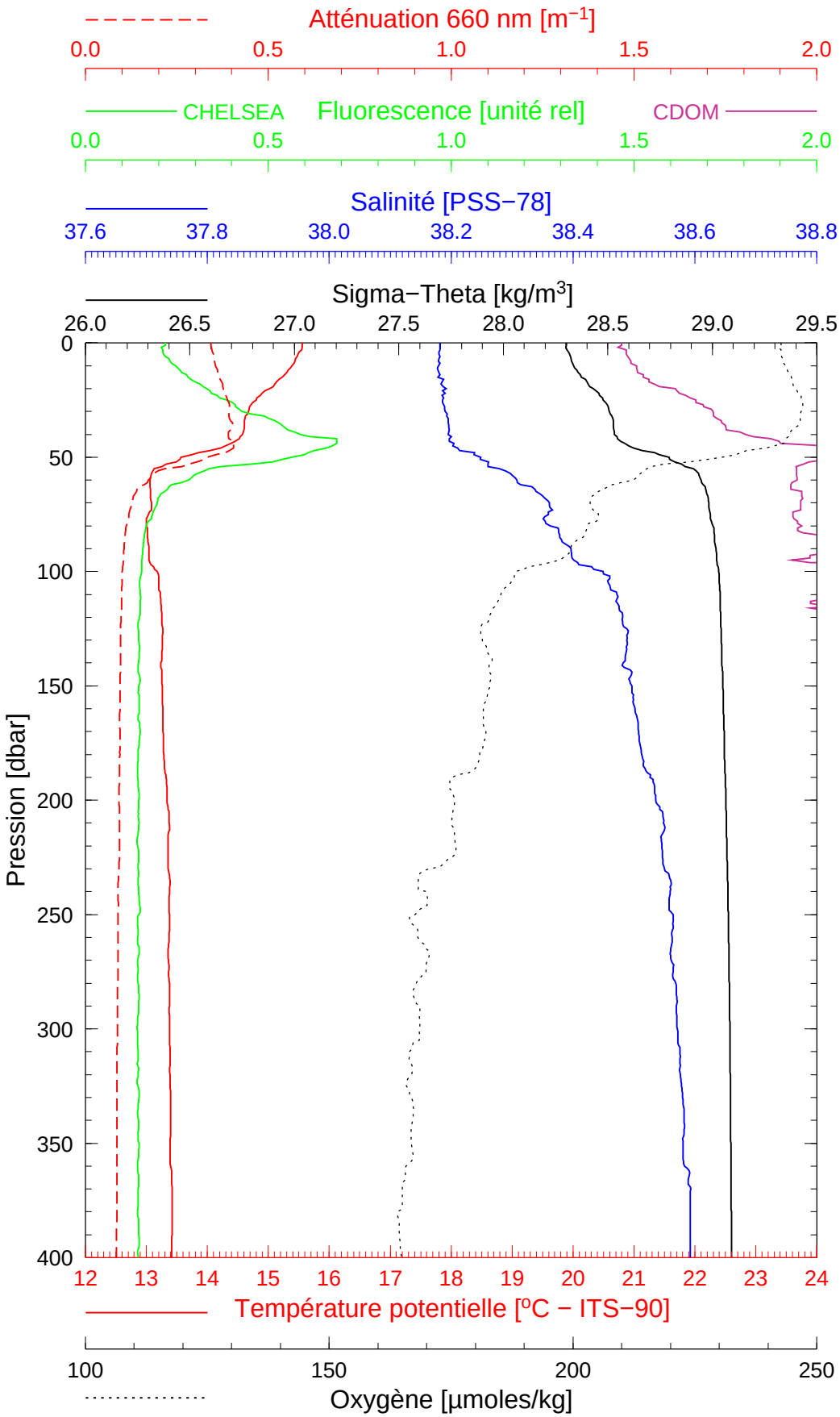
8°00'E

BOUSSOLE 110 **27/04/2011** **BOUS110427_01**

BOUS001



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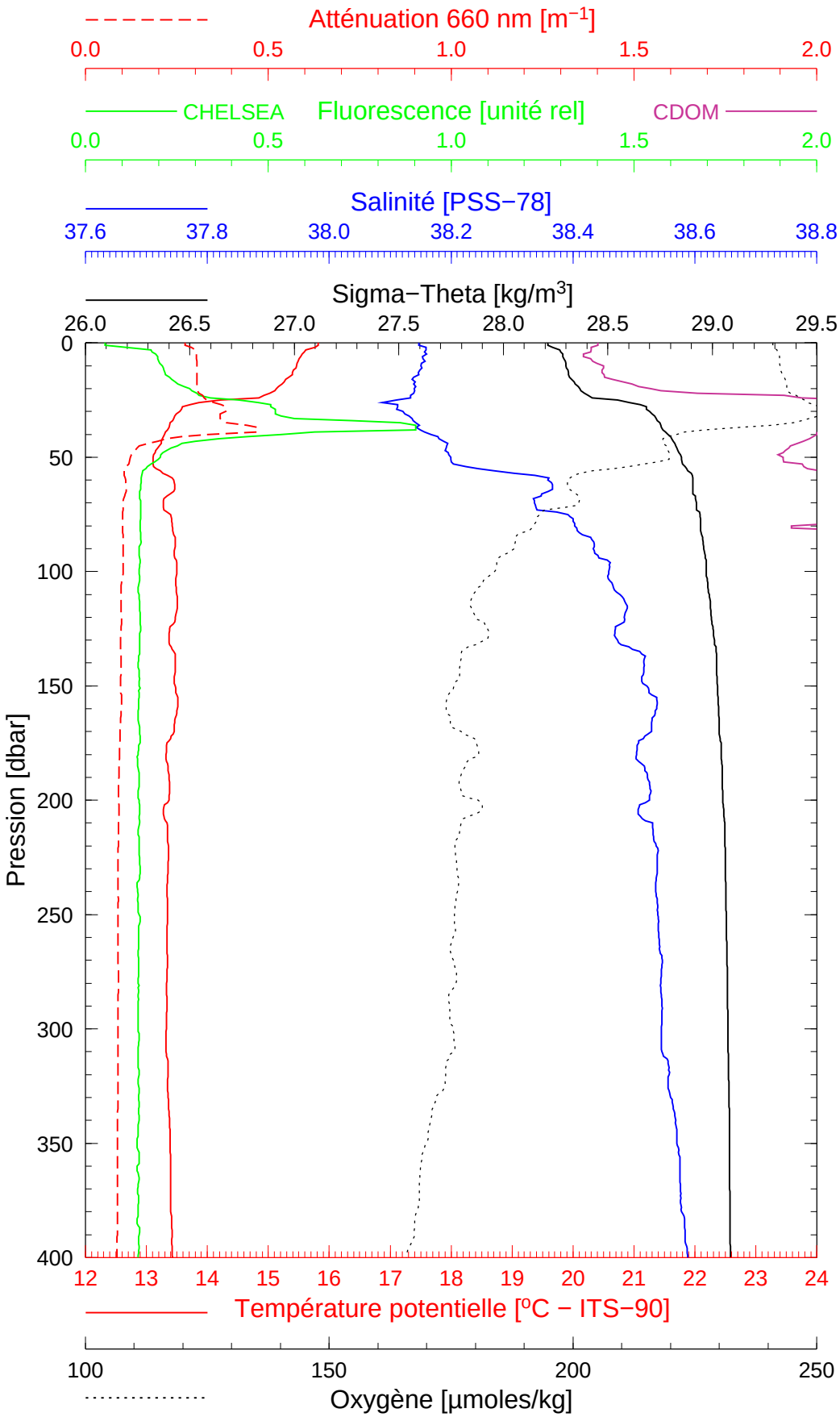

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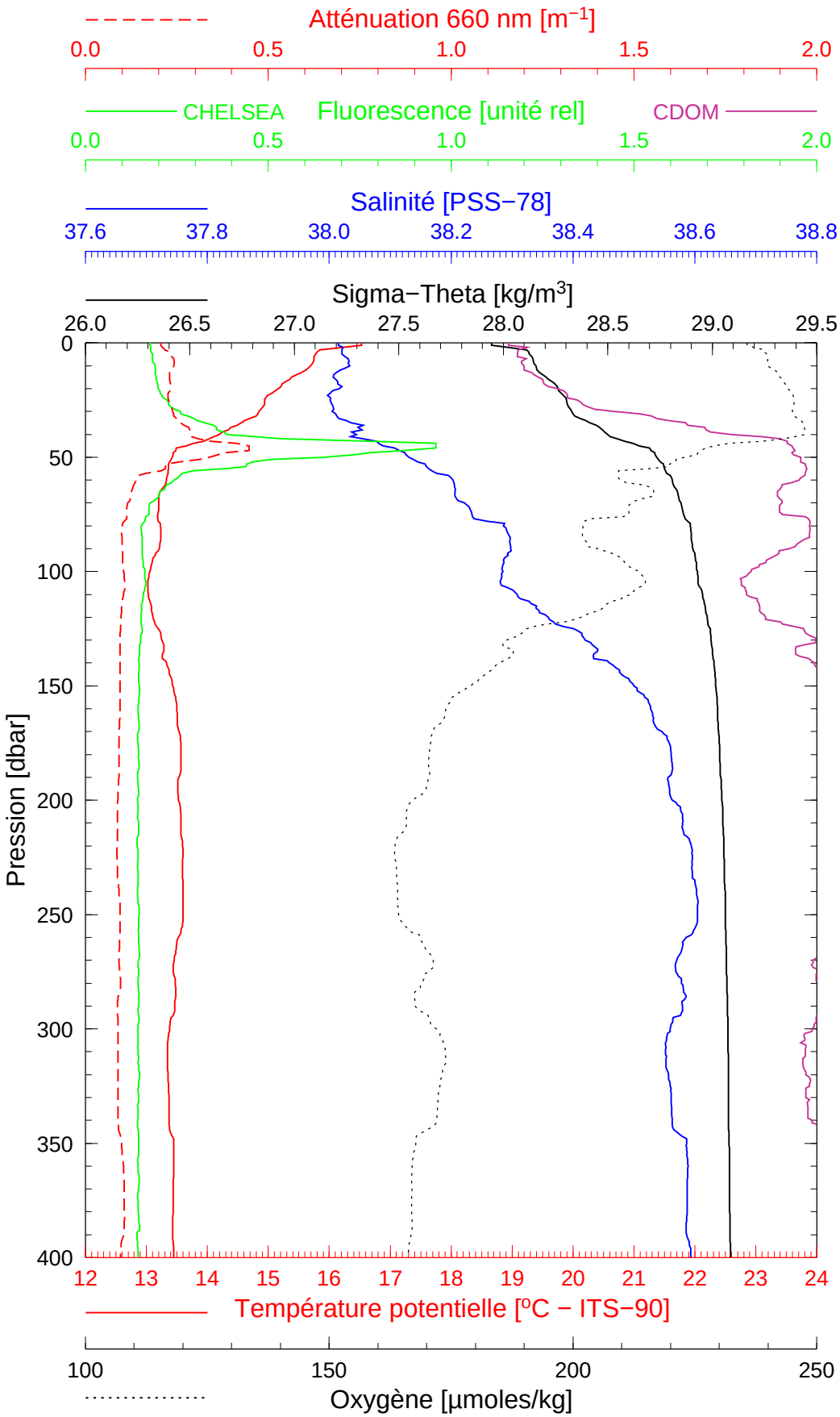
BOUS003



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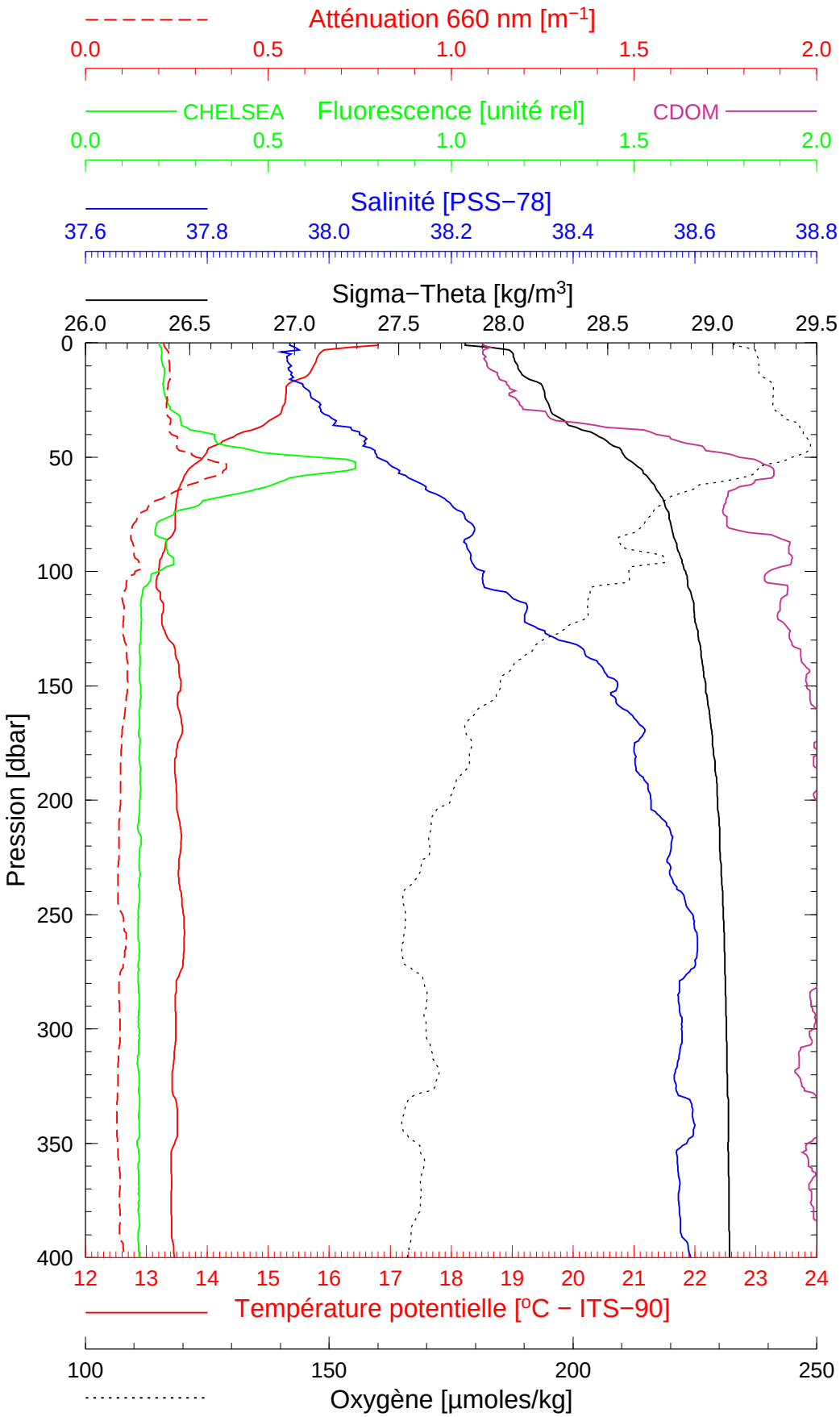

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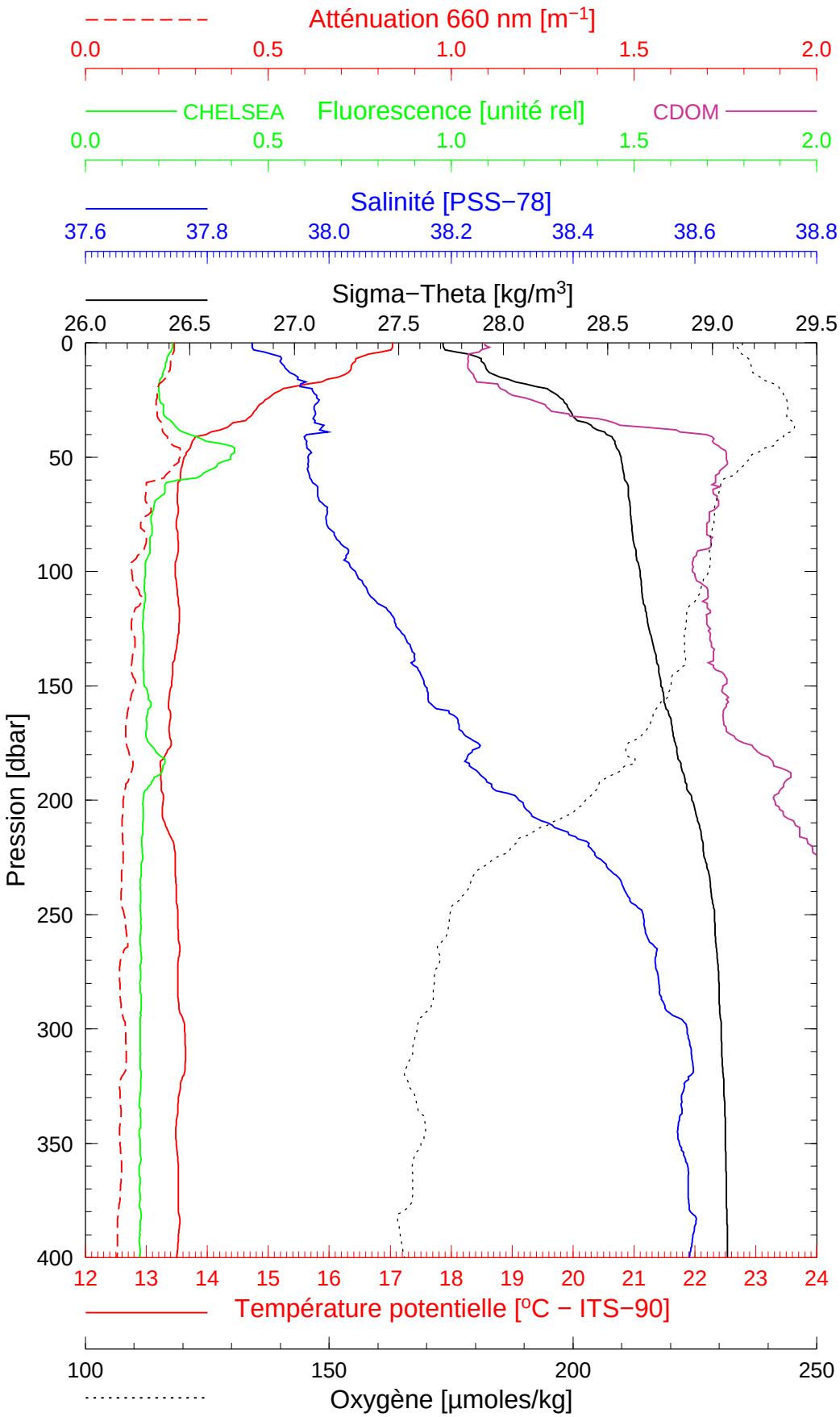
BOUS005



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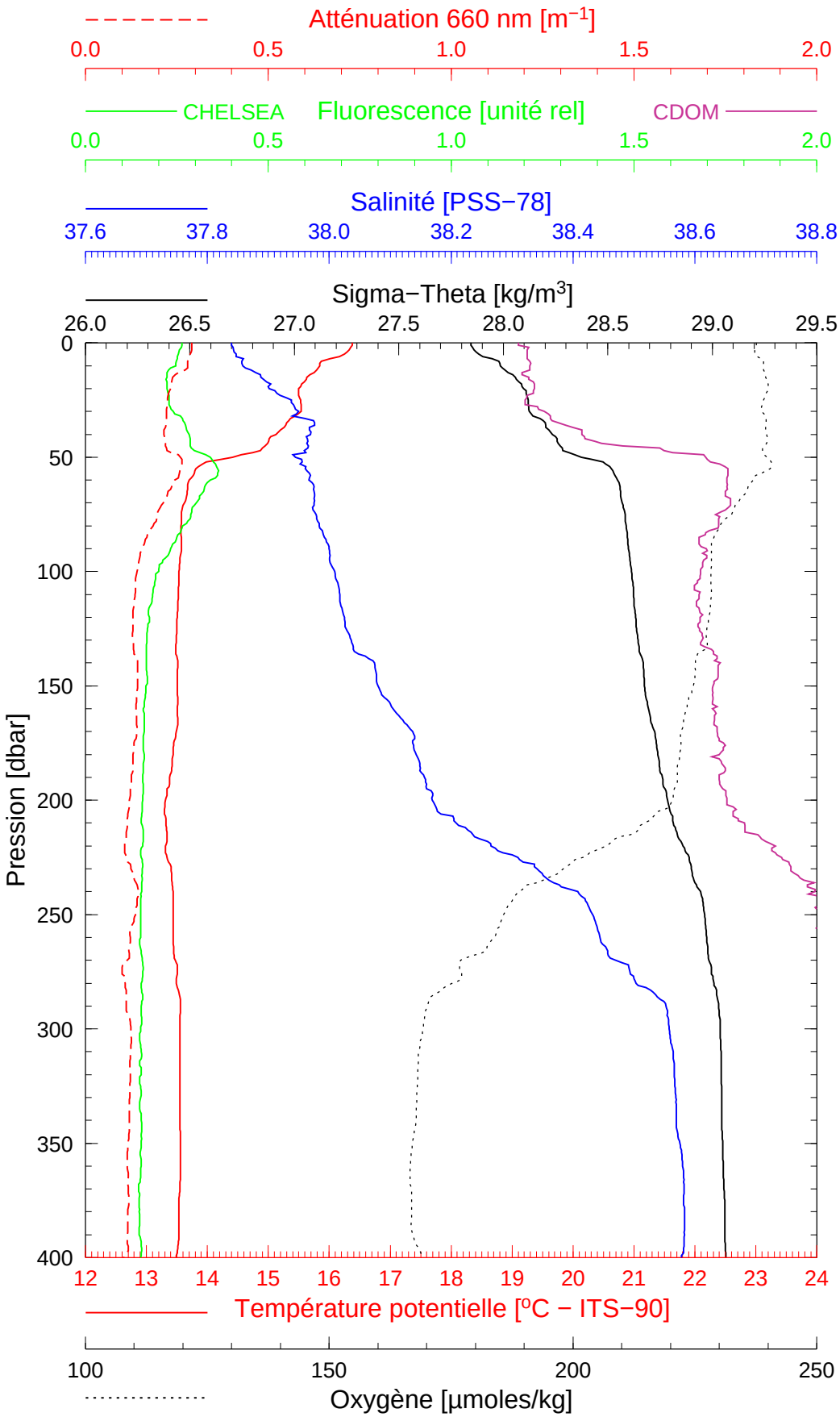
BOUSSOLE 110 **27/04/2011** **BOUS110427_06**

BOUS006



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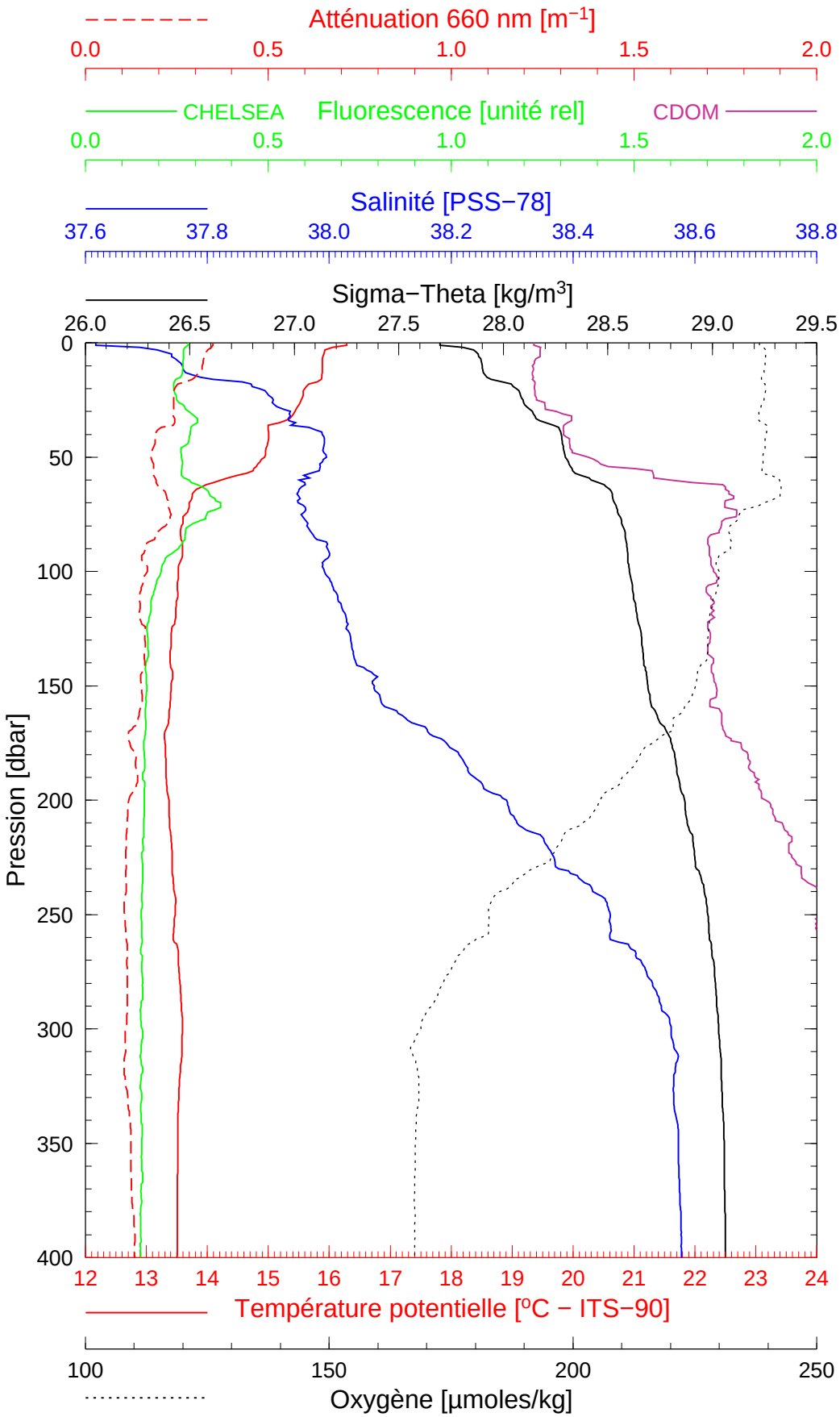

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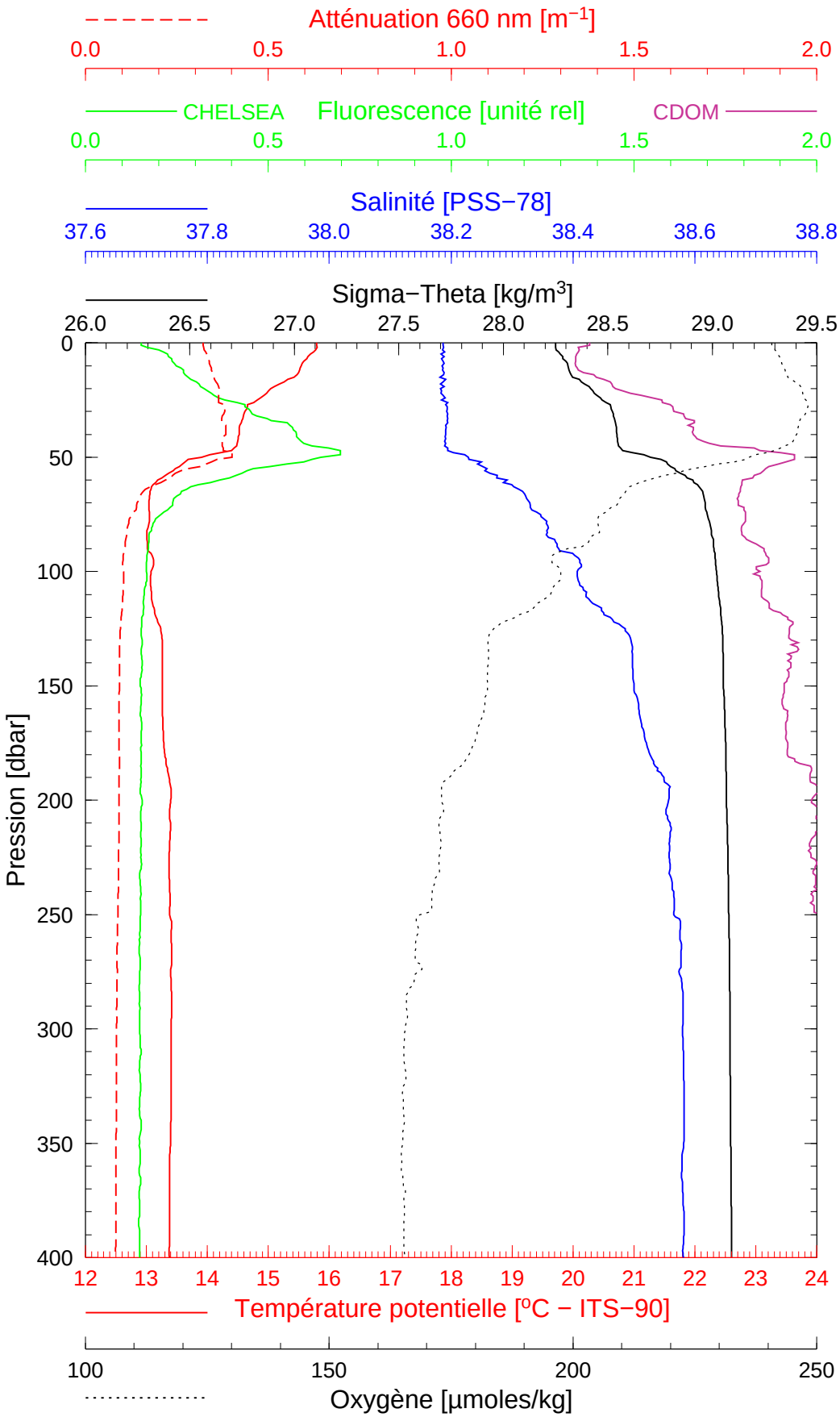

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BOUSSOLE 110 **29/04/2011** **BOUS110429_01**

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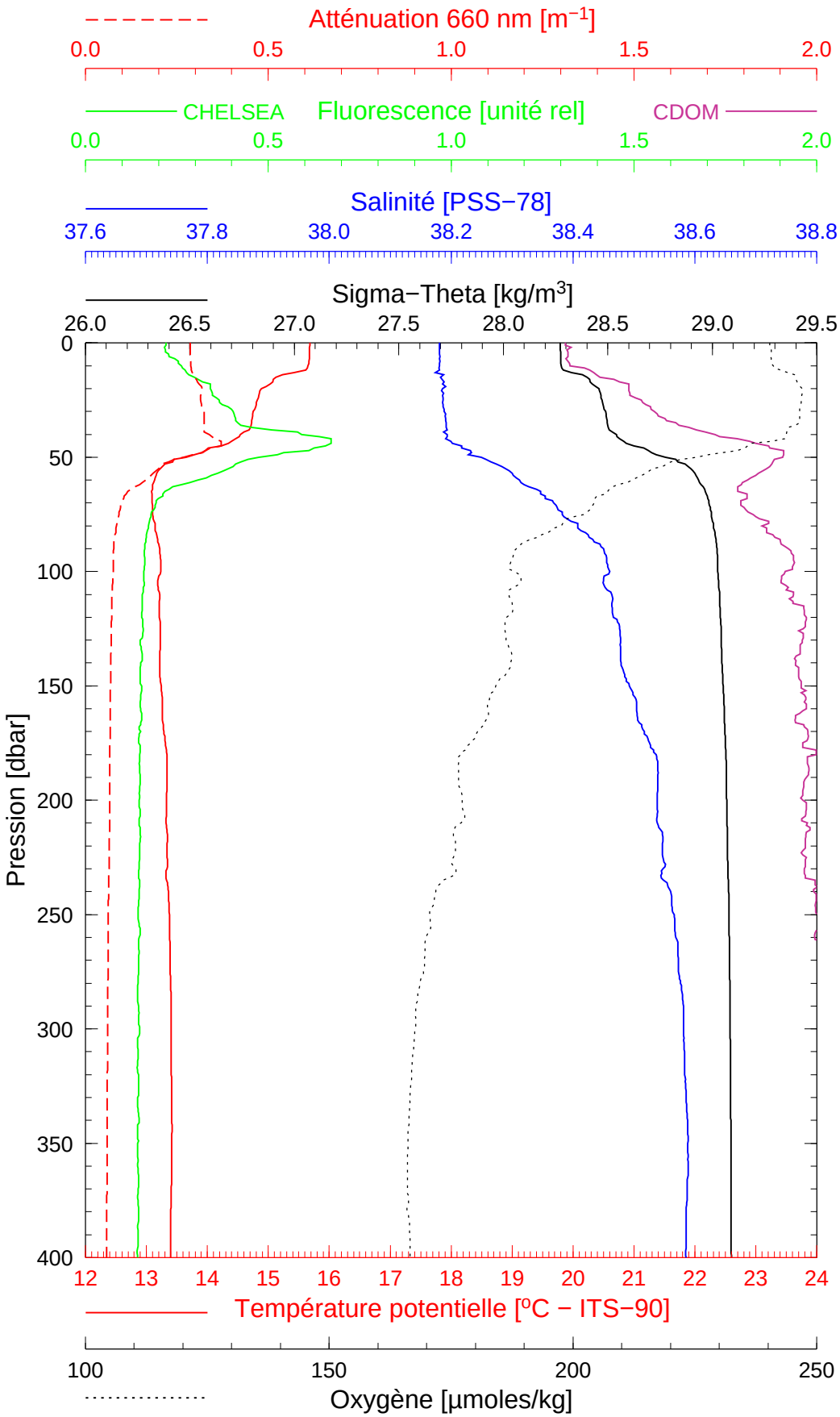

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