

BOUSSOLE Monthly Cruise Report

Cruise 102

September 01 - 03, 2010

Duty Chiefs: Emilie Diamond (diamond@obs-vlfr.fr)

Vessel: R/V Téthys II

(Captain: Renaud Lebourhis)

Science Personnel: Emilie Diamond, David Luquet, Vincent Taillandier, Eric G and Eric V (divers).

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Figure 1. Buoy and its entire mooring substitution with the *Castor* ship from FOSELEV-MARINE.

BOUSSOLE project

ESA/ESRIN contract N° 17286/03/I-OL

Deliverable from WP#400/200

September 17, 2010



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Cruise Objectives

Routine operations

Multiple SPMR profiles are to occur within about 1 hour of satellite overhead passes of MERIS around solar noon, under optimal conditions: clear blue skies and flat, calm sea surface. From last mission, we restart deploying the SPMR SN 006 and its SMSR reference SN 006. From April 2010, we perform optical profiles with a Biospherical's C-OPS (Compact Optical Profiling System) on 0-200 m at the BOUSSOLE site. It will replace the SPMR/SMSR system at short-term. 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. 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 N₂ 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 gimbed 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. 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).

Additional operations

The *Castor* ship from FOSELEV-MARINE was at the BOUSSOLE site the last day to begin the substitution of the buoy and its entire mooring.

Cruise Summary

During this cruise, all the three cruise days were used. The first day was used for diving operations, optical profiles and atmospheric measurements. After, during the first CTD, the connection with the CTD cable of the *Téthys II* ship stopped. The cable was out of order, so we went back to the port of Nice for cable repair but people from DT-INSU of Toulon (Division Technique de l'Institut National des Sciences de l'Univers) could not come before the day after. The second day, the CTD cable was repaired and the CTD transect was partly done from the port of Nice to the Station 3. The last day was used for optical profiles, atmospheric measurements, CTD casts with water sampling at the BOUSSOLE site and for completing the transect.

Wednesday 01 September 2010

The first day, the sea was smooth with a moderate breeze and the sky was clear and blue. When arrived at the BOUSSOLE site, divers went at sea for cleaning the instruments and putting neoprene caps on the HS4 and on the transmissometers for acquiring three dark measurements. The connections on the top of the buoy were also cleaned and an attempt of direct connection failed. During this time, the CTD cable of the ship *Téthys II* was unrolled on 400 m to check it because it was repaired the day before at the DT-INSU of Toulon. Then, 1 set of CIMEL measurements and 3 C-OPS profiles were performed. After, we performed a CTD cast but near 180 m, the connection with the cable of the ship *Téthys II* broke down. We immediately called DT-INSU engineers and went back to the port of Nice for cable repair but finally, people from DT-INSU of Toulon could not come before the day after.

Thursday 02 September 2010

The second day, Nagib Bhairy and Yannick repaired the CTD cable which was broken near the splicing connection side. When finished, we began the CTD transect from the Station 6 to the Station 2. The sea state was smooth and the sky was blue to overcast.

Friday 03 September 2010

The last day, the sea was slight with a blue sky and a moderate breeze. When arrived at the BOUSSOLE site, the *Castor* ship was there and had already removed the top of the buoy. Near the site, 2CTD casts with water sampling, 1 Secchi disk, 6 C-OPS and 3 SPMR profiles and 1 set of CIMEL measurements were performed. After, the transect was completed from the Station 1 to the Station 2.

Cruise Report

Wednesday 01 September 2010 (UTC)

People on board: Emilie Diamond Vincent Taillandier and 3 divers.

- 0530 Departure from the Nice port.
- 0845 Arrival at the BOUSSOLE site.
- 0855 Diving on the buoy for cleaning instruments. Dark HS4 and transmissometers measurements at 09:15, 09:30 and 09:45.
- 0900 CTD cable unrolled.
- 0915 Attempt of direct connection with buoy: unsuccessful.
- 0940 CIMEL 01.
- 1005 C-OPS 01, 02, 03.
- 1110 CTD 01, 180 m: problem with the CTD cable.
- 1155 CTD 00, 40 m: same problem.
- 1210 Tests on CTD cable.
- 1225 Departure to the Nice port.
- 1530 Arrival at the Nice port.

Thursday 02 September 2010 (UTC)

People on board: Emilie Diamond and Vincent Taillandier.

- 0710 Beginning of CTD cable repair.
- 1300 Departure from the Nice port to the sixth transect station.
- 1330 CTD 02, 400 m, station 06 (43°39'N 07°21'E).
- 1425 CTD 03, 400 m, station 05 (43°37'N 07°25'E).
- 1545 CTD 04, 400 m, station 04 (43°34'N 07°31'E).
- 1655 CTD 05, 400 m, station 03 (43°31'N 07°37'E).
- 1725 Departure to the Nice port.
- 1905 Arrival at the Nice port.

Friday 03 September 2010 (UTC)

People on board: Emilie Diamond, Vincent Taillandier.

- 0400 Departure from the Nice port.
- 0720 Arrival at the BOUSSOLE site.
- 0730 CTD 06, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, Ap and CDOM.
- 0745 Secchi disk 01 (23 m).
- 0815 C-OPS 04, 05, 06.
- 0855 SPMR 01, 02, 03.
- 0940 C-OPS 07, 08, 09.
- 1050 CIMEL 02.
- 1105 CTD 07, 400 m with water sampling at 5 m for TSM.
- 1140 Departure to the first transect station.
- 1230 CTD 08, 400 m, station 01 (43°25'N 07°48'E).
- 1340 CTD 09, 400 m, station 02 (43°28'N 07°42'E).
- 1410 Departure to the Nice port.
- 1625 Arrival at the Nice port.

Problems identified during the cruise

- The first day, the CTD cable of *Téthys II* ship was out of order and was repaired the morning after, so two half days were lost.
- The closing system of the 5th bottle Niskin on the CTD rosette was broken, so the Ac9 was at the place of the 5th bottle instead of 12th.

Calculated Swath paths for the MERIS Sensor (ESOV Software)

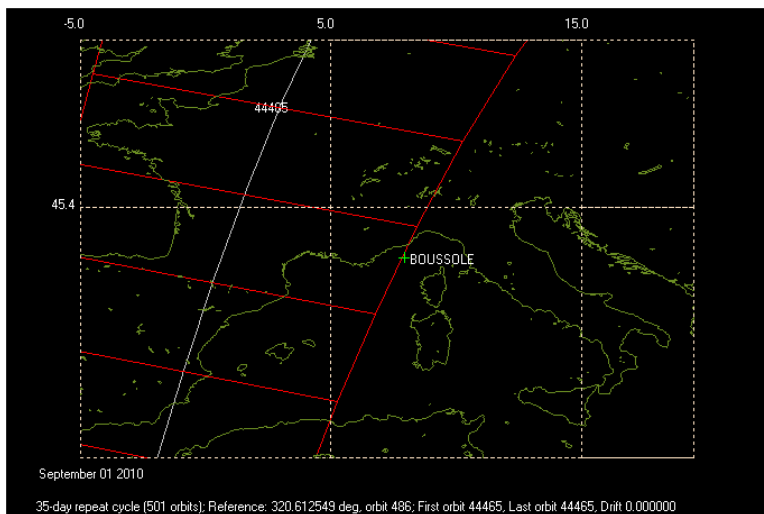
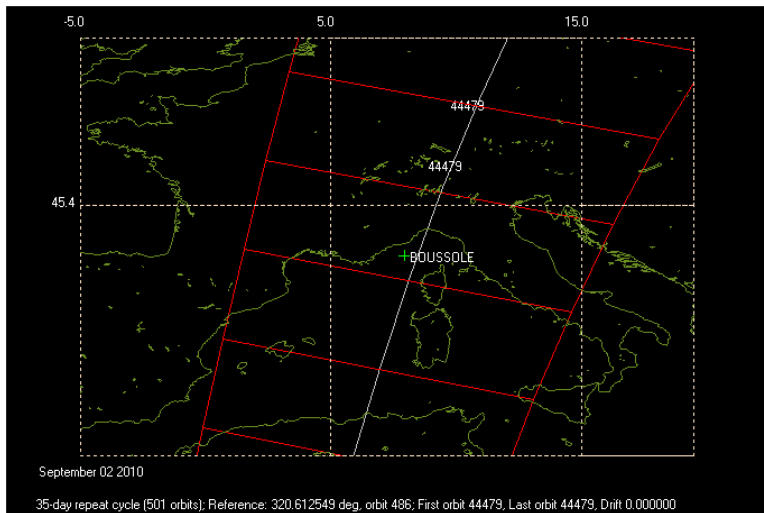


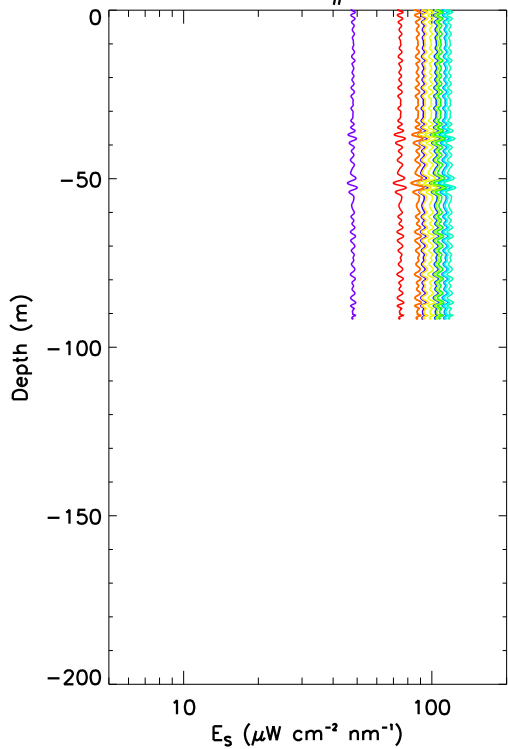
Figure 2. Calculated swath paths for MERIS (Esov software) above BOUSSOLE site for 1st and 2nd September 2010.

Appendix

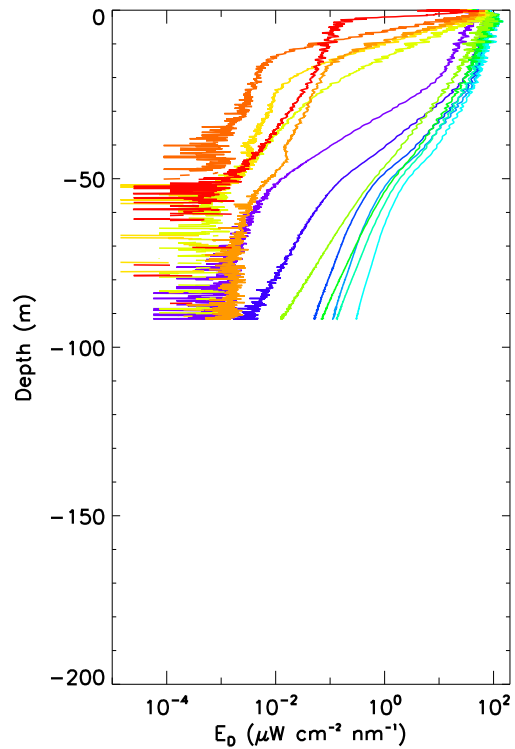
Cruise Summary Table for Boussole 102

Date	Black names		Profile names		CTD notées / satellite overpass	Other sensors	Start Time GMT (hour.min)	Duration (min.sec)	Depth max (meter)	Latitude (N)		Longitude		Sky	Clouds	Quantity (#/8)	Weather		Humidity (%)	Visibility	T air	T water	Sea	Sea Swell H (m)	Swell dir.	Whitecaps			
	(file ext: ".raw")	(file extension: ".raw")								(Degree)	(Minute)	(Degree)	(Minute)				Wind sp. (kn)	Wind dir.									Atm. Pressure (hPa)		
01/09/10	bou_c-ops_100901	1016	001_data			CIMEL01	9:41	9:00		43	22	7	54	blue		0			1014.0	66	excellent								
			1016_002_data				10:20	1:18																					
			1016_003_data				10:27	4:09	96	43	22.236	7	54.216	blue	None	0	11	255	1014.0	66	excellent	22.2		22.8	calm	0.6		some	
			1016_004_data				10:41	4:00	97	43	22.397	7	54.144	blue	None	0	11	255	1014.0	66	excellent	22.2		22.8	calm	0.6		some	
			1016_005_data				10:51	4:11	99	43	22.502	7	54.005	blue	None	0	11	255	1014.0	66	excellent	22.2		22.8	calm	0.6		some	
							11:10	1:24																					
02/09/10						CTDBOUS001	11:21	8:00	180	43	22.026	7	54.047	blue		0	9	228	1014.0	66		22.6	22.8	calm			few		
						CTDBOUS000	11:56	1:30	40	43	22.080	7	54.100	blue		0	10	104	1013.9	63		22.5	22.8	calm			few		
						CTDBOUS002	13:33	27:00	400	43	39.074	7	21.000	blue		3	5	102	1015.1	77		22.7	23.3	calm			no		
						CTDBOUS003	14:33	25:00	400	43	37.000	7	25.100	blue		3	8	109	1014.9	78		22.7	23.5	calm			no		
						CTDBOUS004	15:45	27:00	400	43	33.850	7	31.460	overcast		5	8	136	1014.8	81		22.4	23.5	calm			no		
			CTDBOUS005	17:00	24:00	400	43	30.996	7	37.755	overcast		6	9	104	1014.6	84		22.3	22.9	calm			no					
03/09/10						CTDBOUS006	07:31	42:00	400	43	22.494	7	53.547	blue		1	10	110	1015.1	72		22.9	22.6	calm			few		
						HPLC, Ap & CDOM	07:45	3:00	23	43	22	7	54	blue		1						good						few	
						Secchi01	08:15	1:16																					
			bou_c-ops_100903_0814_001_data				08:27	3:33	82	43	22.531	7	52.217	blue	Cs	1	10	154	1015.7	74	good	22.7		22.7	calm	0.8		yes	
			bou_c-ops_100903_0814_002_data				08:37	3:27	80	43	22.542	7	51.948	blue	Cs	1	10	154	1015.7	74	good	22.7		22.7	calm	0.8		yes	
			bou_c-ops_100903_0814_003_data				08:49	3:33	82	43	22.517	7	51.555	blue	Cs	1	10	154	1015.7	74	good	22.7		22.7	calm	0.8		yes	
			bou_c-ops_100903_0814_004_data				09:03	1:15																					
			bou_c-ops_100903_0814_005_data				09:03	1:15																					
			Bou030910black1				08:57	3:00																					
			Bou030910AA				09:21	2:54	92	43	22.367	7	52.564	blue	Cs	1	14	104	1015.8	65	good	22.6		22.6	calm	0.8		yes	
			Bou030910AB				09:28	3:00	111	43	22.424	7	52.317	blue	Cs	1	14	104	1015.8	65	good	22.6		22.6	calm	0.8		yes	
			Bou030910AC				09:37	2:54	106	43	22.502	7	52.111	blue	Cs	1	14	104	1015.8	65	good	22.6		22.6	calm	0.8		yes	
			Bou030910black2				09:49	3:00																					
			bou_c-ops_100903_0943_001_data				09:44	1:19																					
			bou_c-ops_100903_0943_002_data				10:04	2:44	59	43	22.555	7	52.744	blue	None	0	14	128	1015.7	68	good	22.4		22.4	calm	0.8		yes	
			bou_c-ops_100903_0943_003_data				10:12	3:22	78	43	22.617	7	52.450	blue	None	0	14	128	1015.7	68	good	22.4		22.4	calm	0.8		yes	
			bou_c-ops_100903_0943_004_data				10:22	3:29	79	43	22.698	7	52.161	blue	None	0	14	128	1015.7	68	good	22.4		22.4	calm	0.8		yes	
bou_c-ops_100903_0943_005_data				10:35	4:57																								
				10:52	6:00				43	22.394	7	53.653	blue		0			1015.6		good									
				11:13	25:00	400	43	22.430	7	53.018	blue		0	13	97	1015.4	63			23.0	22.6	calm			yes				
				12:31	25:00	400	43	25.025	7	48.082	blue		0	7	93	1015.2	66			23.6	22.8	calm			few				
				13:40	25:00	400	43	27.948	7	41.937	blue		0	6	90	1014.9	79			23.5	22.9	calm			few				

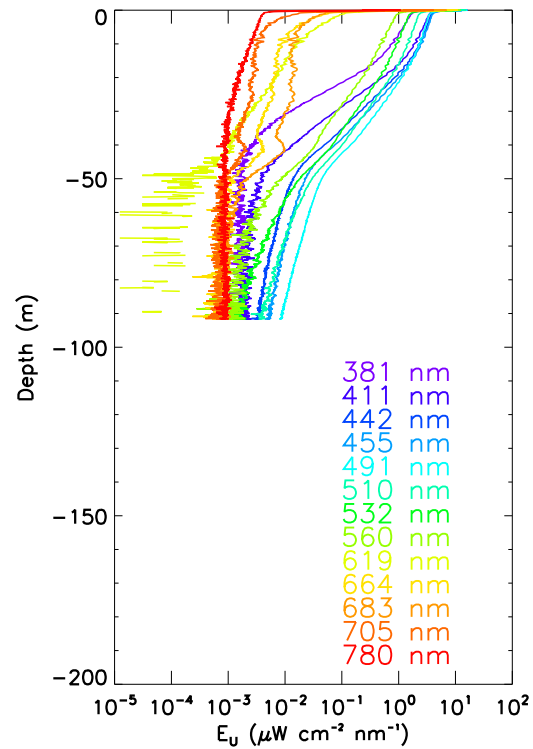
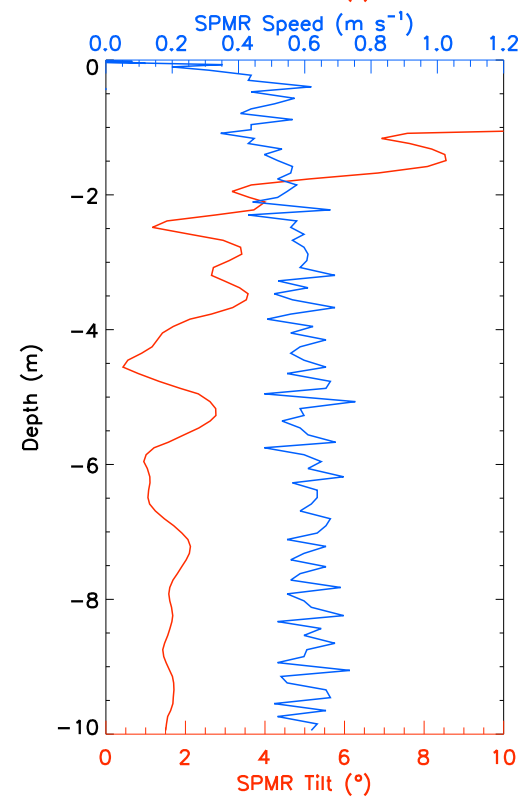
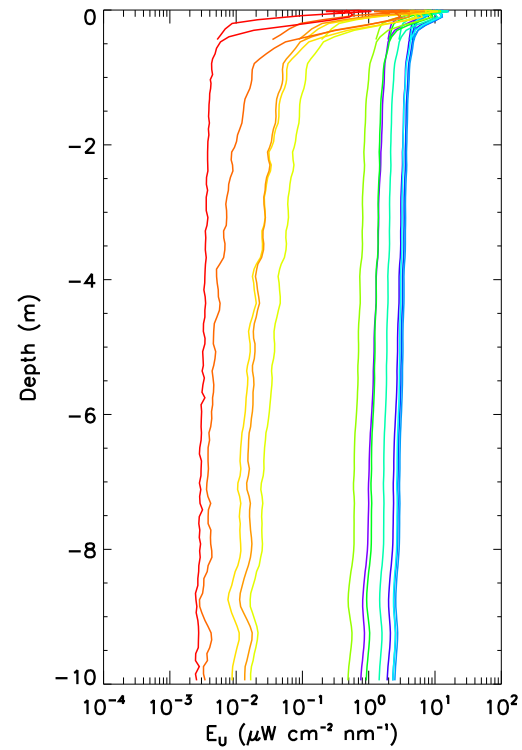
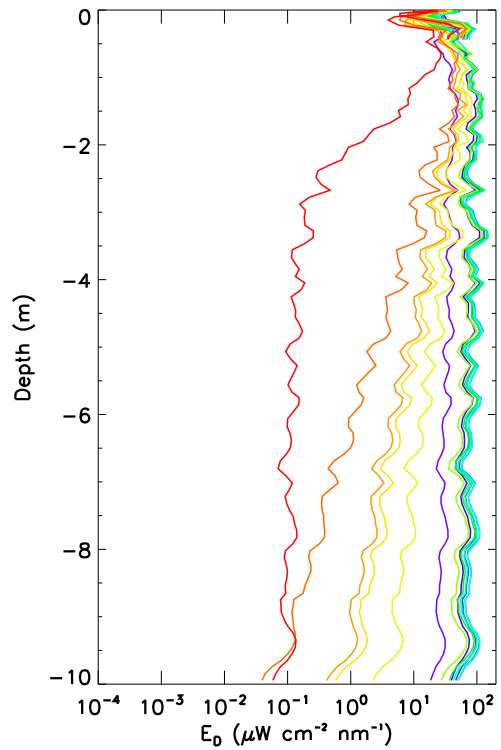
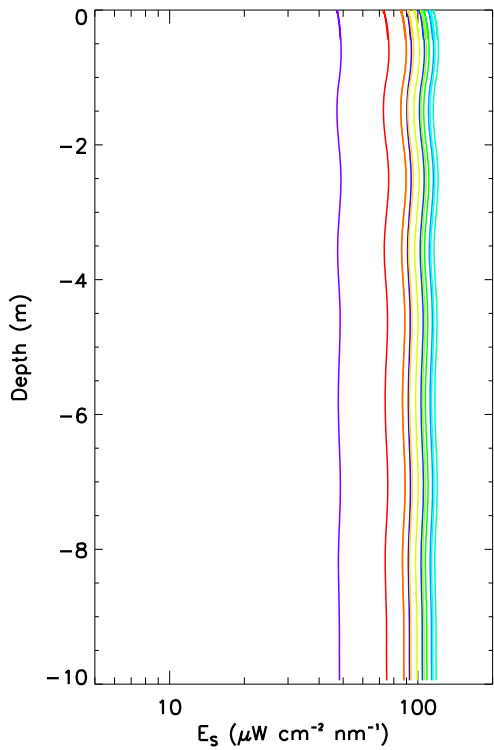
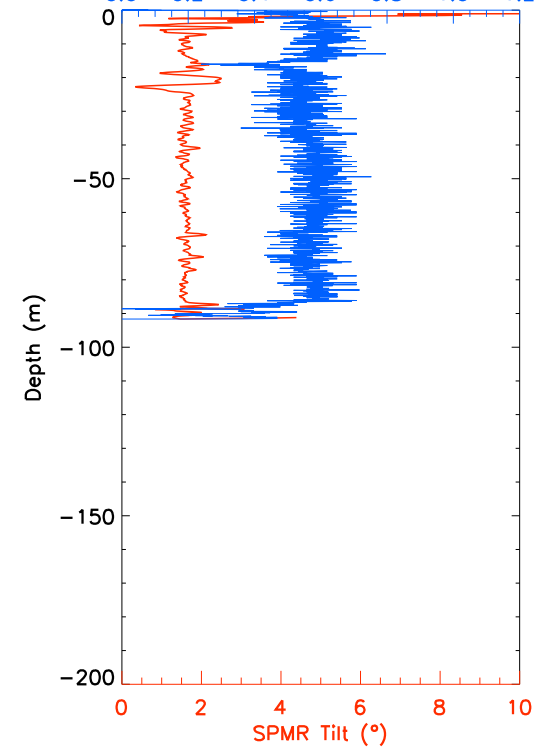
Boussole#102

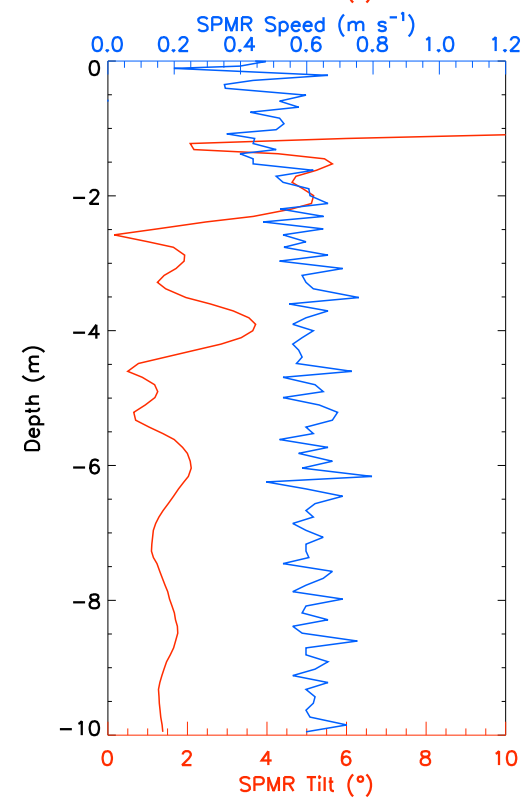
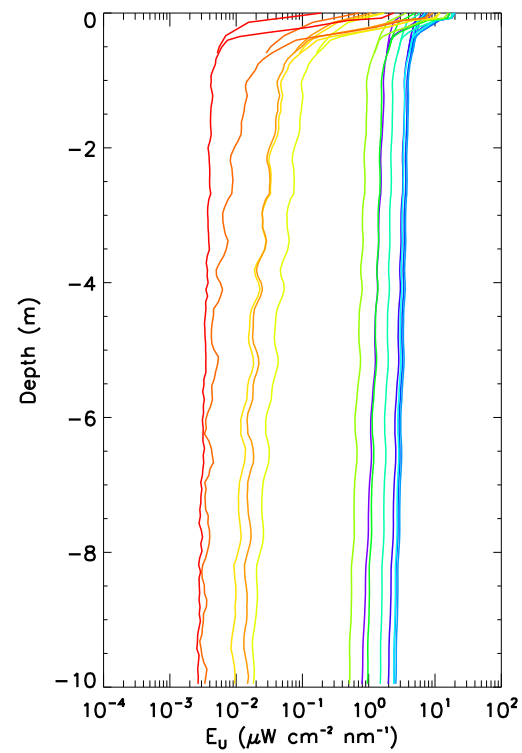
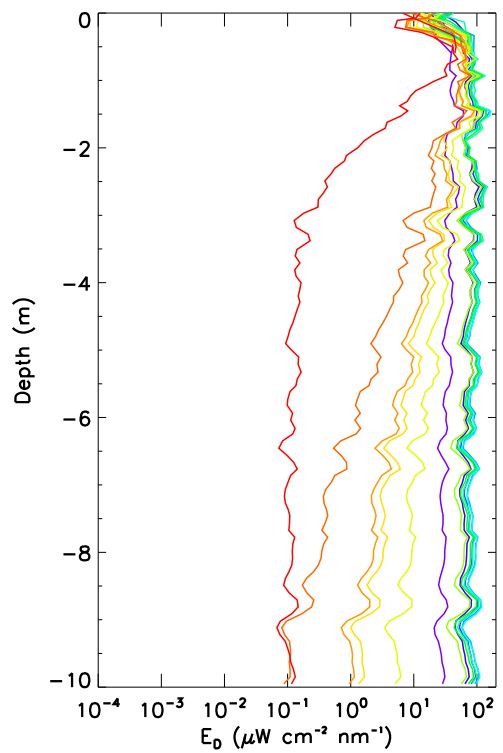
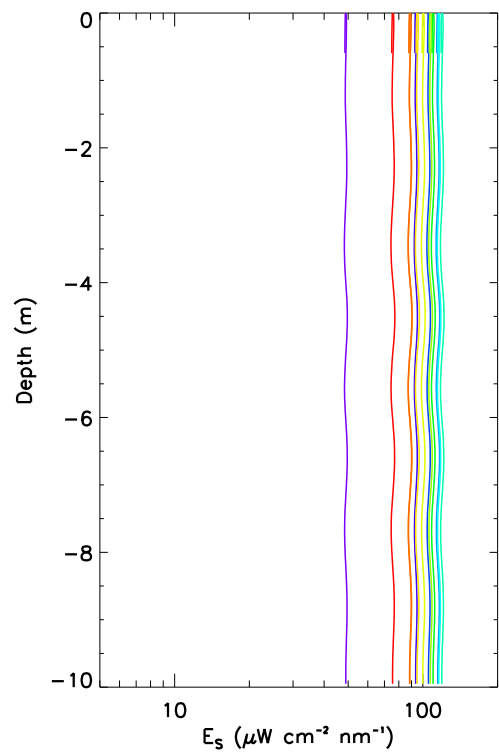
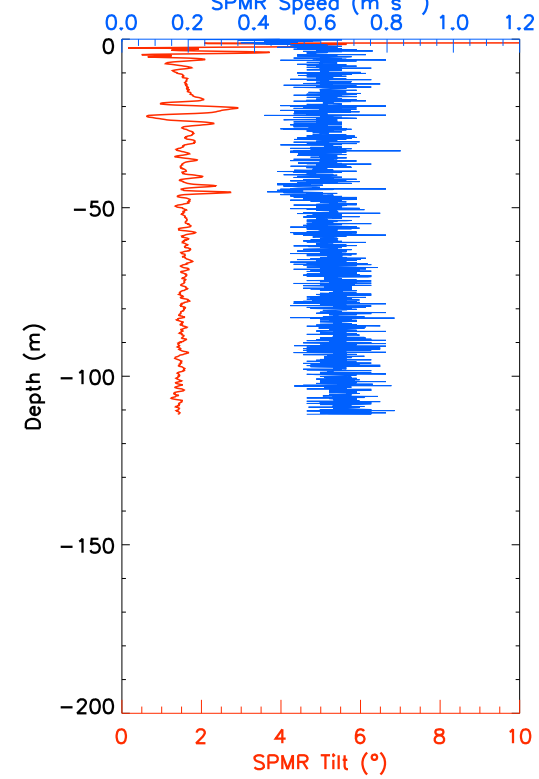
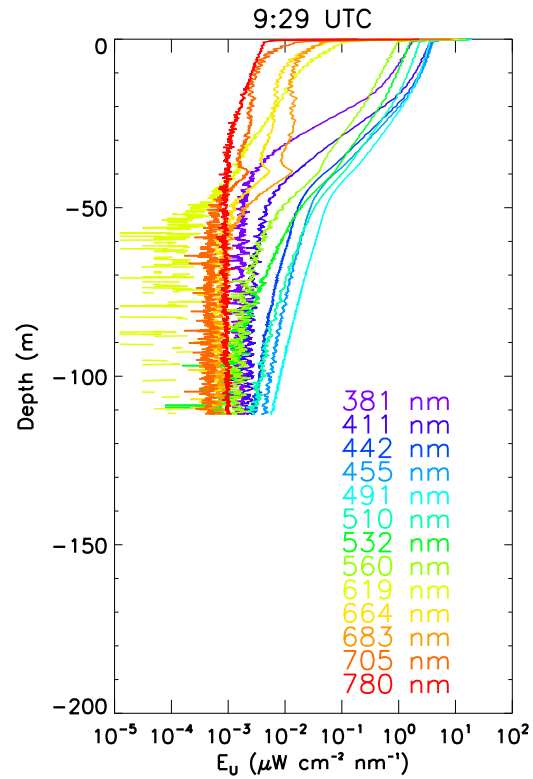
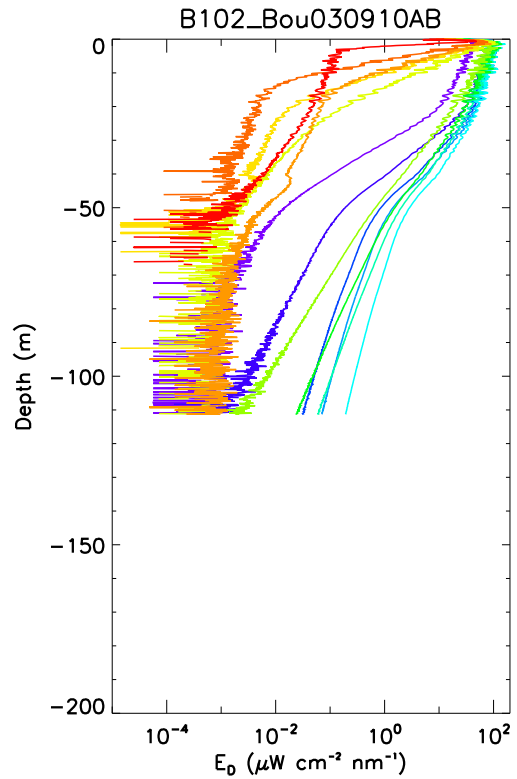
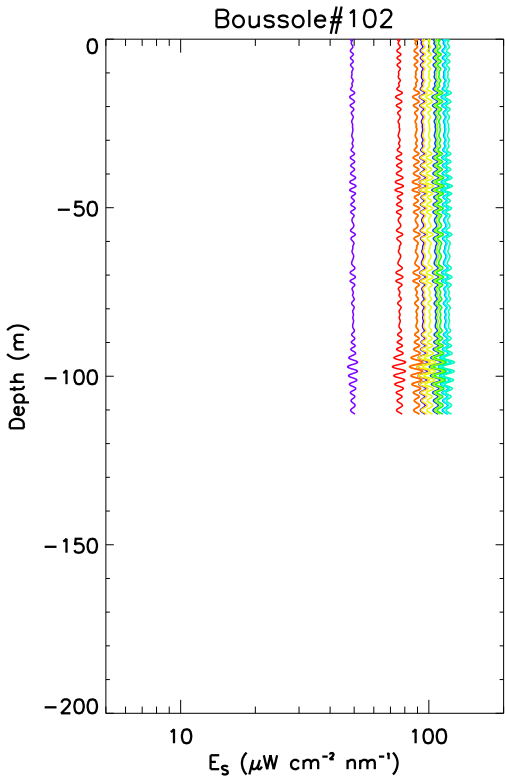


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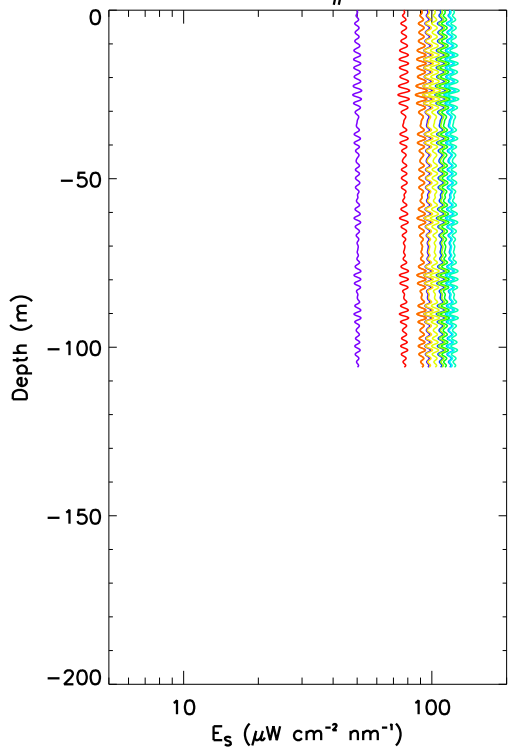


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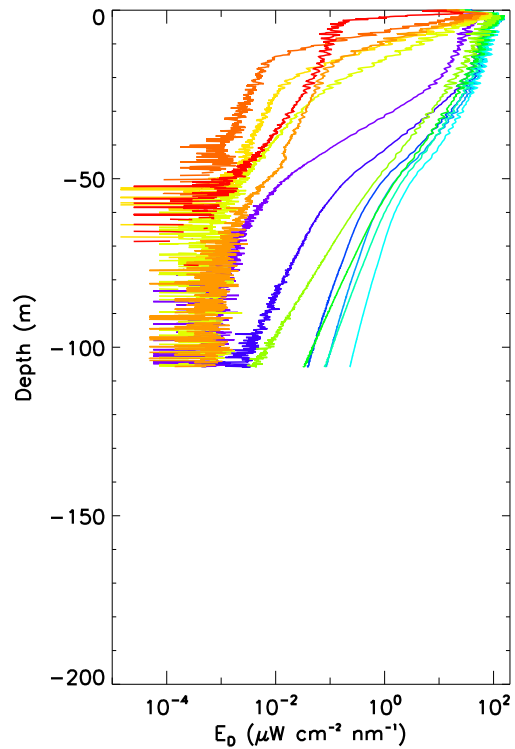
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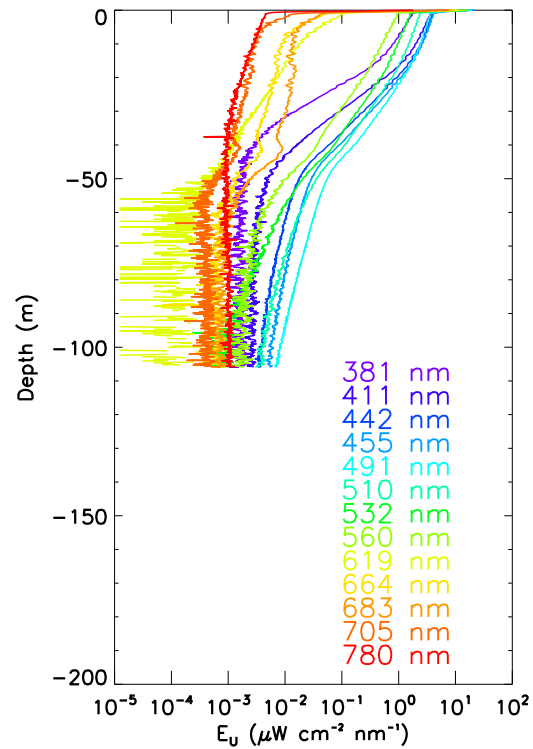
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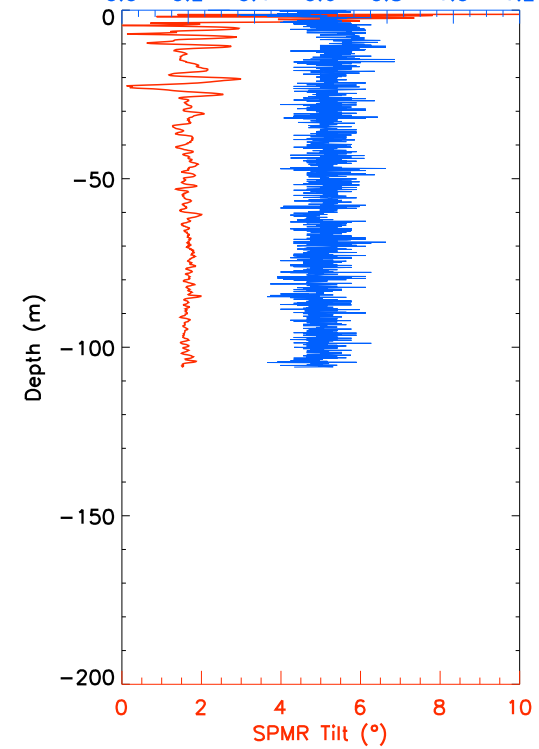
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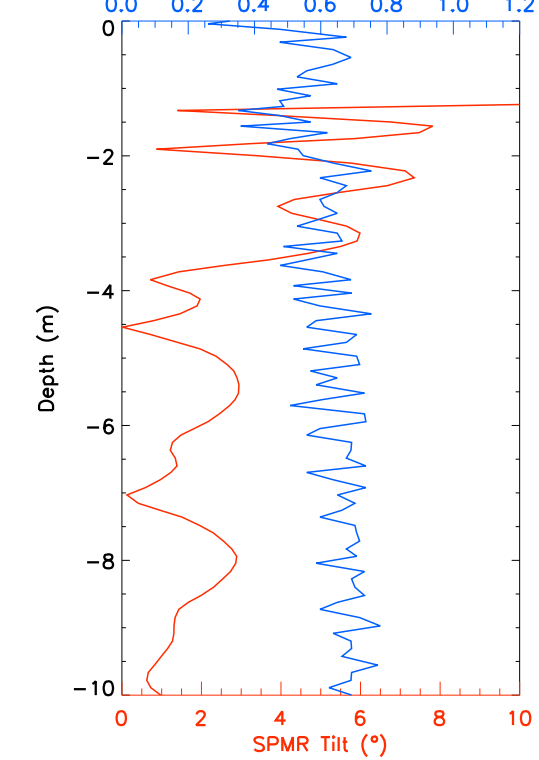
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 E_s ($\mu\text{W cm}^{-2} \text{nm}^{-1}$) E_0 ($\mu\text{W cm}^{-2} \text{nm}^{-1}$) E_u ($\mu\text{W cm}^{-2} \text{nm}^{-1}$)SPMR Tilt ($^\circ$) E_s ($\mu\text{W cm}^{-2} \text{nm}^{-1}$) E_0 ($\mu\text{W cm}^{-2} \text{nm}^{-1}$) E_u ($\mu\text{W cm}^{-2} \text{nm}^{-1}$)SPMR Tilt ($^\circ$)

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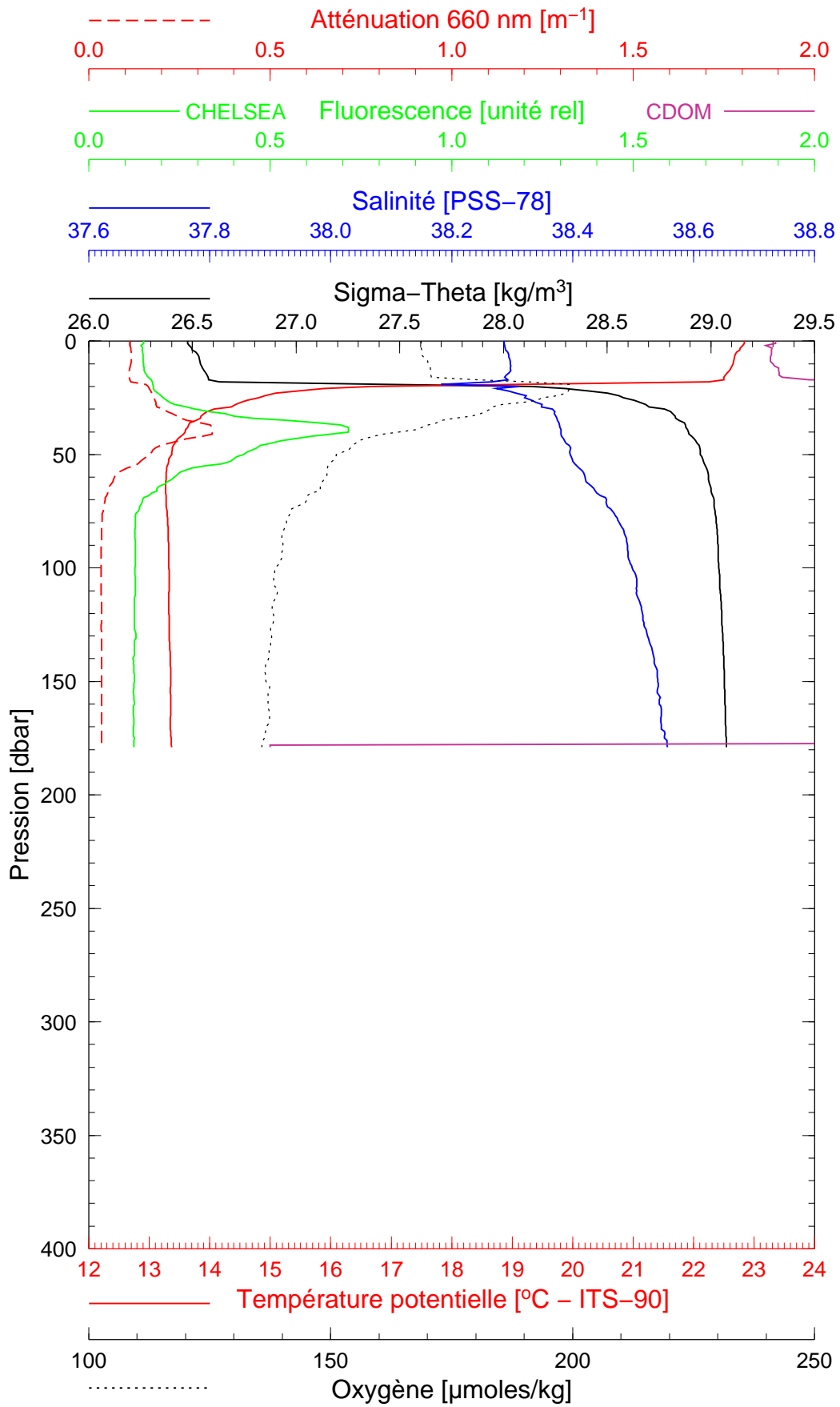


BOUSSOLE 102

01/09/2010

BOUS100901_01

BOUS001



Date 01/09/2010
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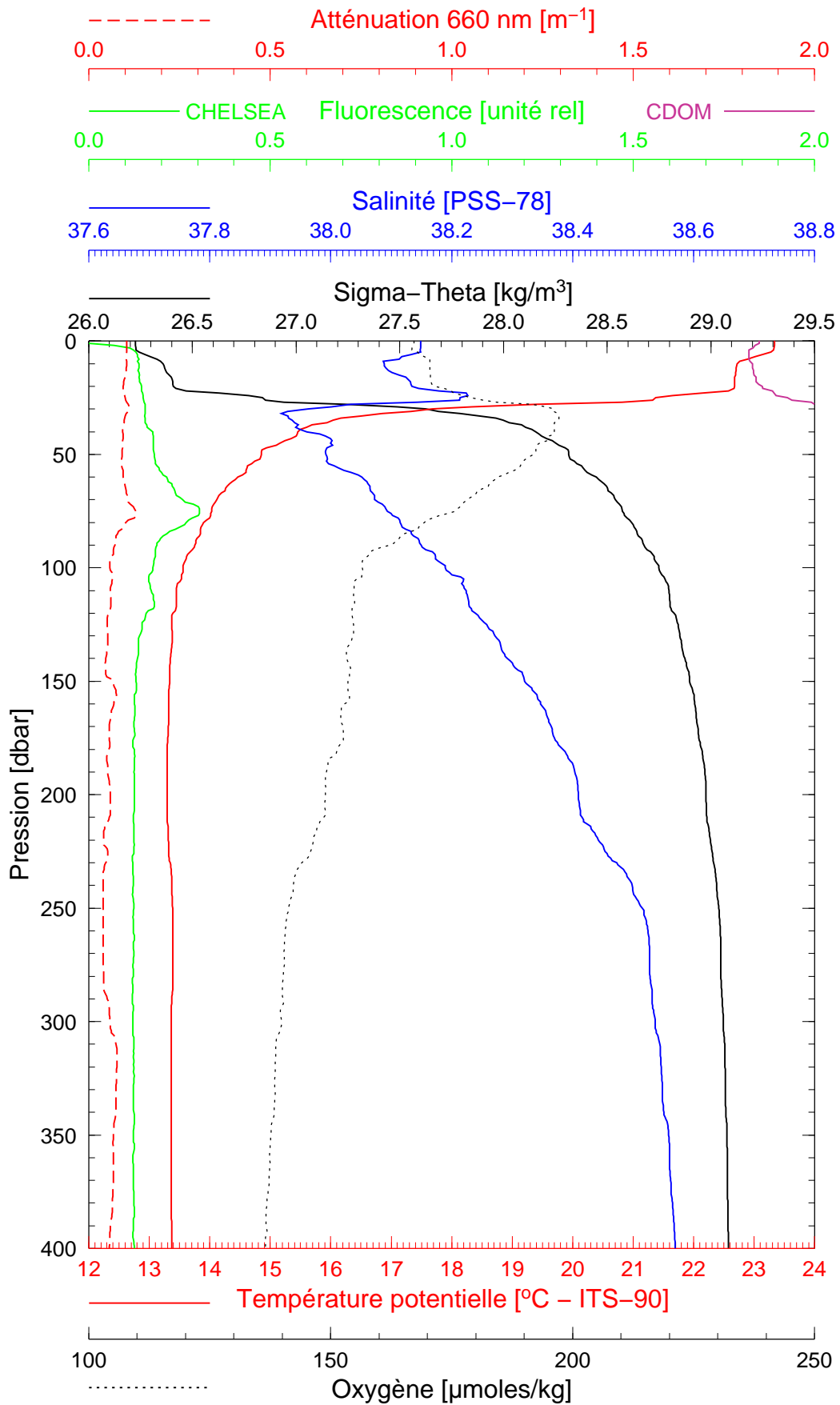
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Longitude 07°54.047 E

BOUSSOLE 102

02/09/2010

BOUS100902_01

BOUS002



Date 02/09/2010

Latitude 43°39.074 N

Heure déb 13h 33min [TU]

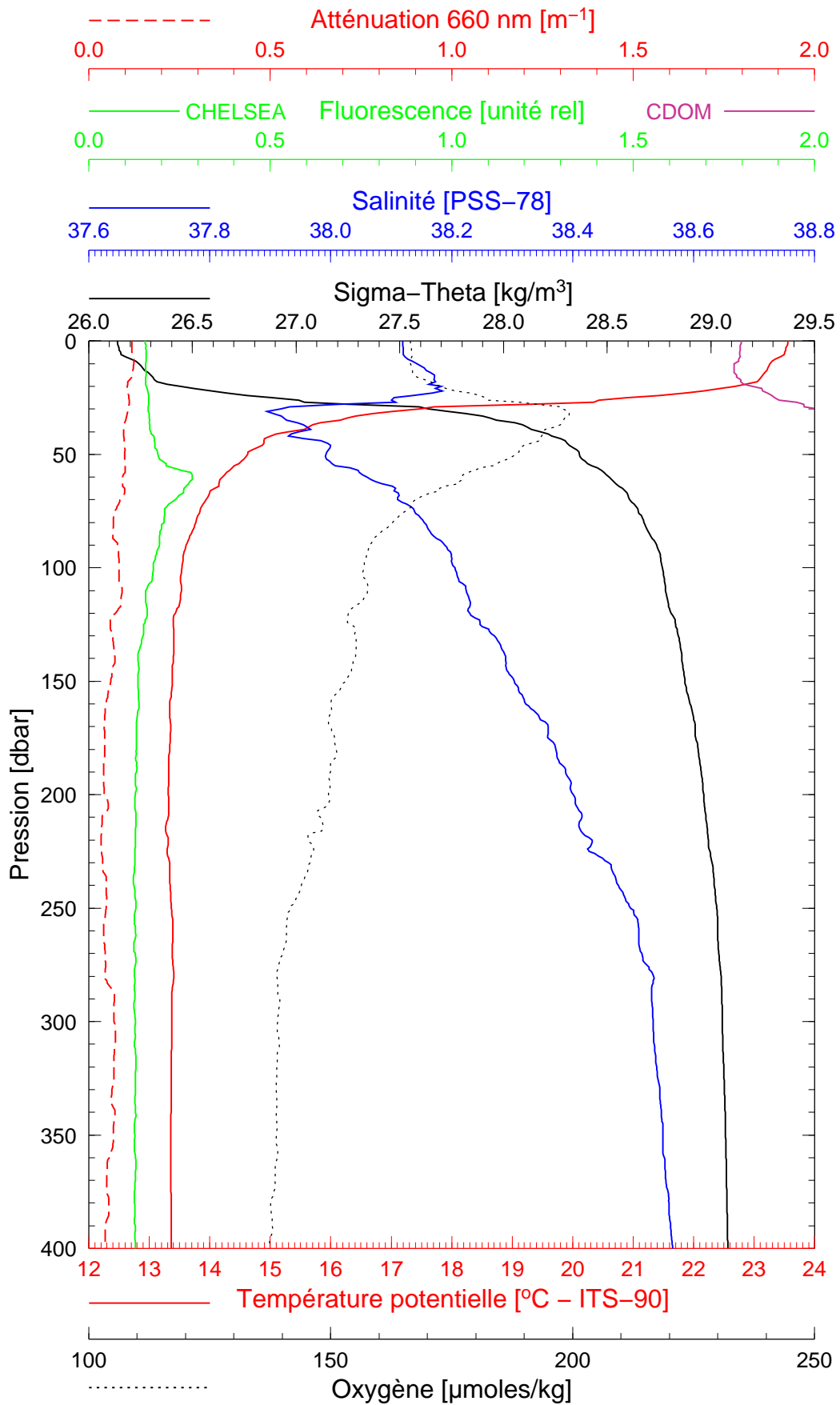
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BOUSSOLE 102

02/09/2010

BOUS100902_02

BOUS003



Date 02/09/2010

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Latitude 43°37.000 N

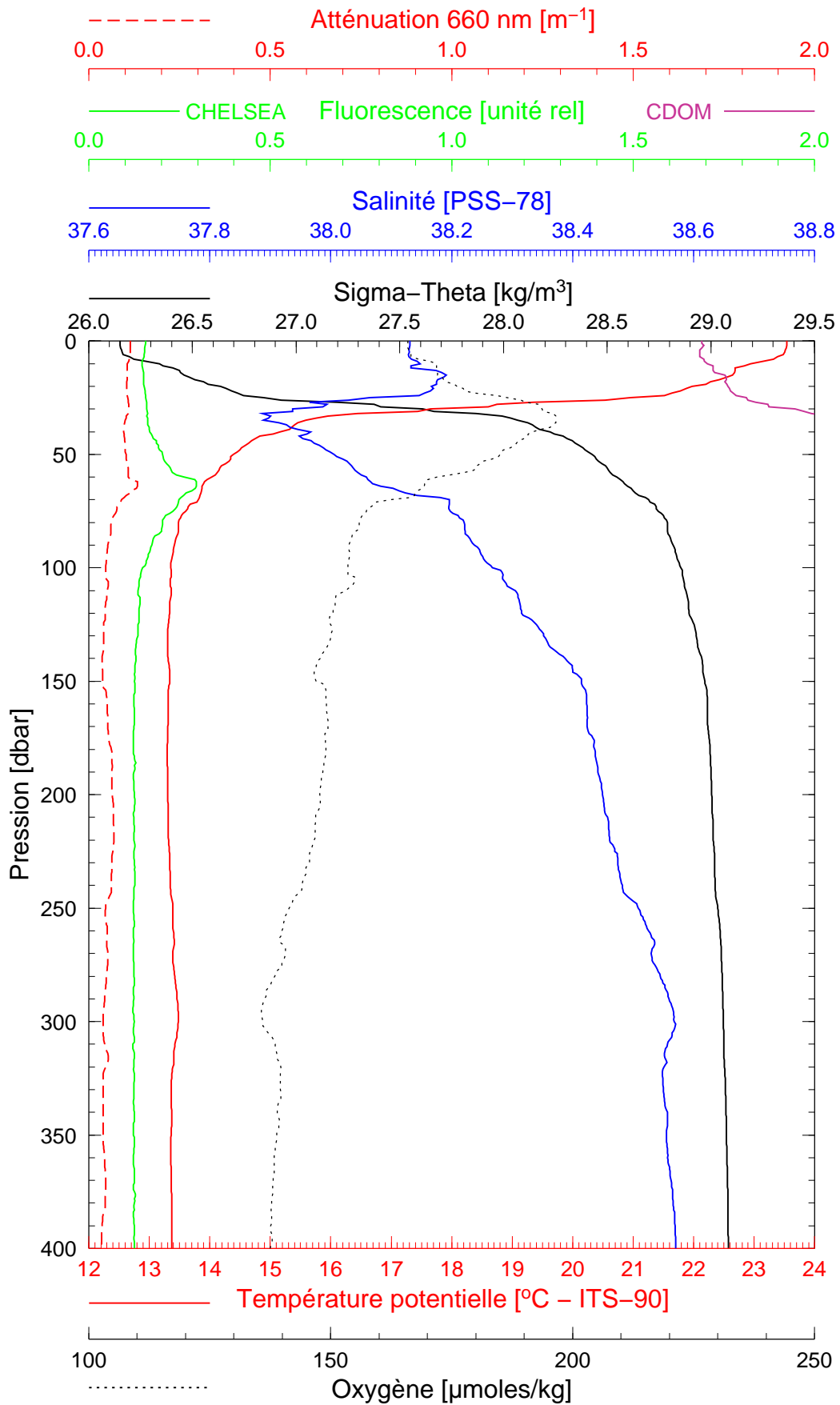
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BOUSSOLE 102

02/09/2010

BOUS100902_03

BOUS004



Date 02/09/2010

Latitude 43°33.850 N

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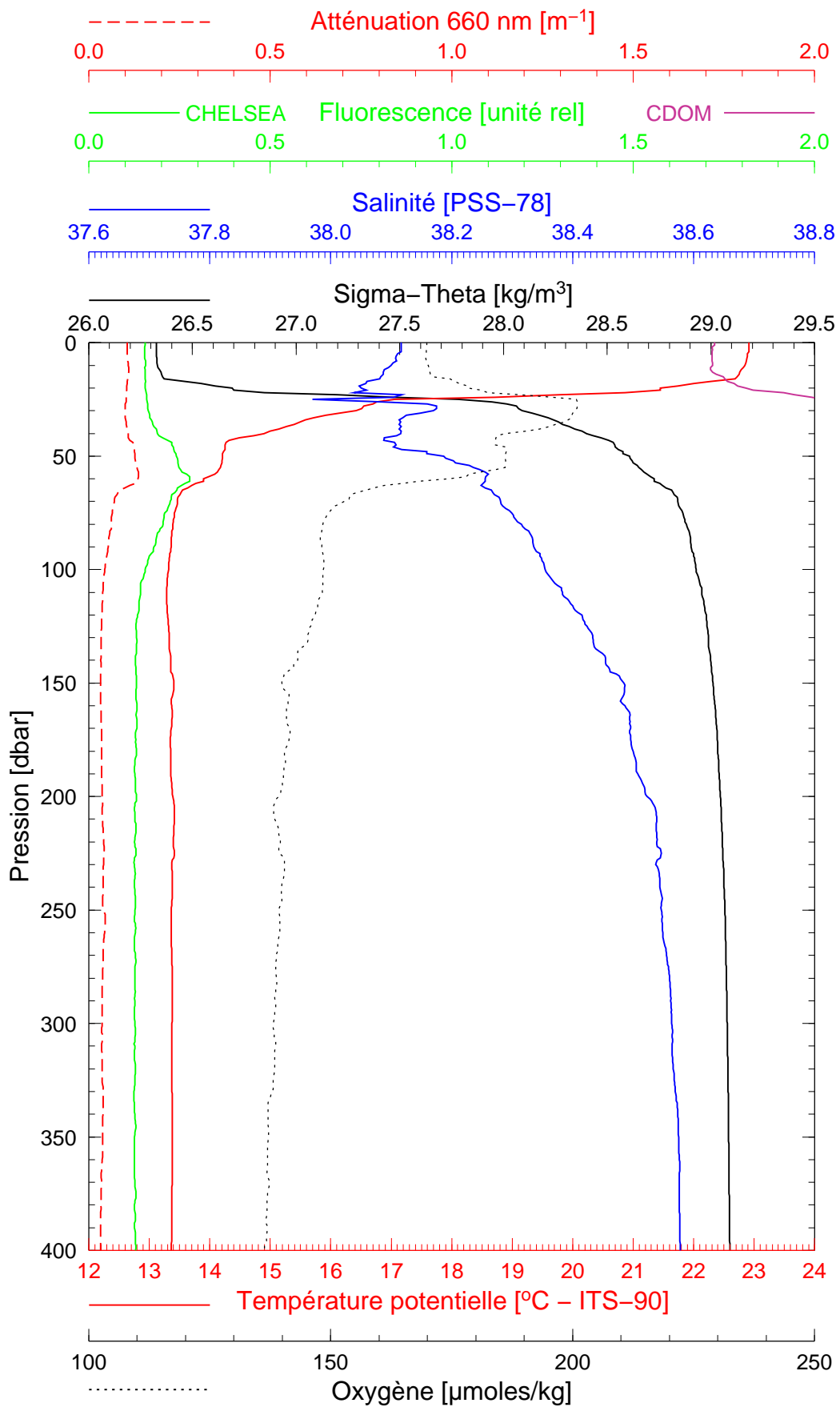
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BOUSSOLE 102

02/09/2010

BOUS100902_04

BOUS005



Date 02/09/2010
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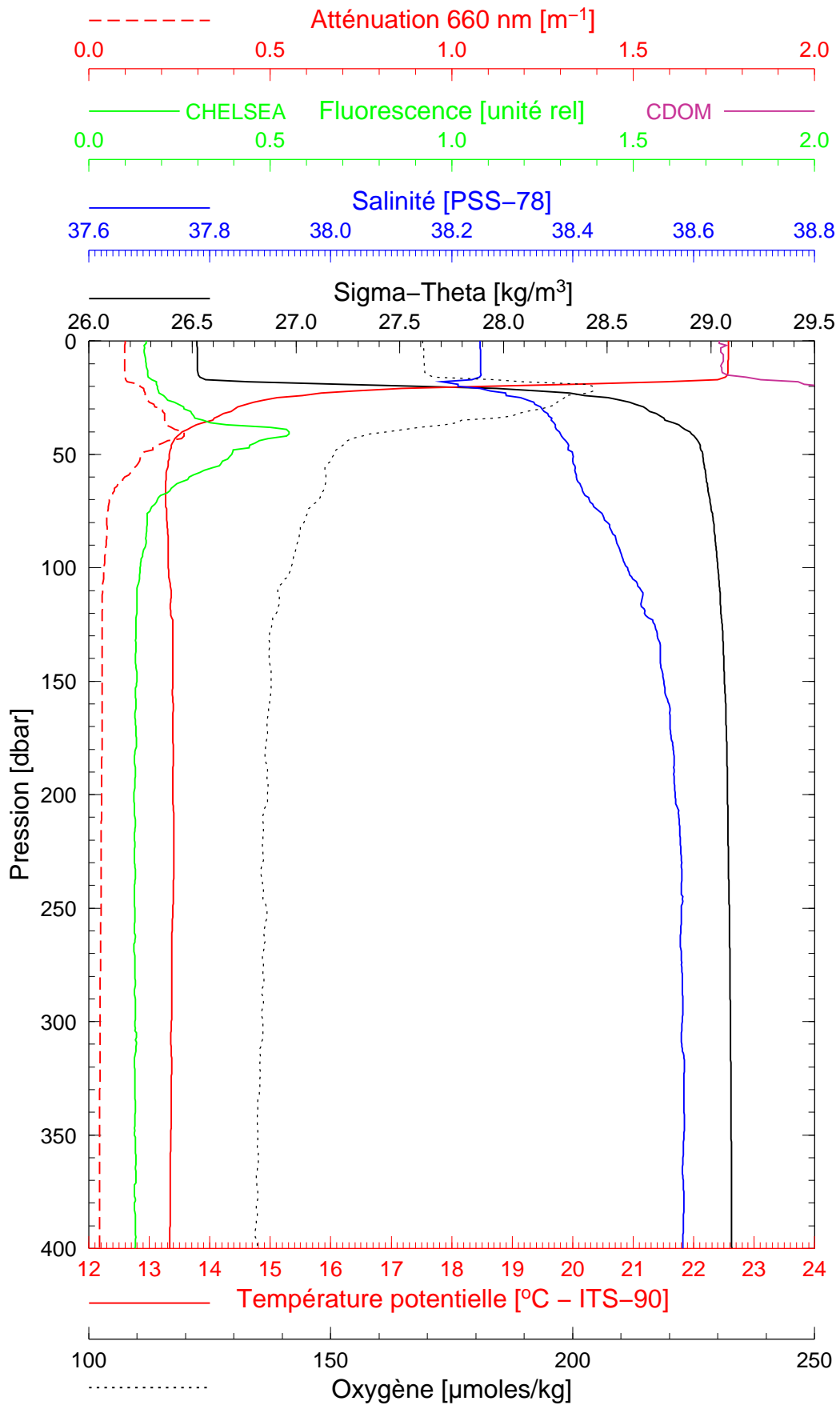
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BOUSOLE 102

03/09/2010

BOUS100903_01

BOUS006



Date 03/09/2010
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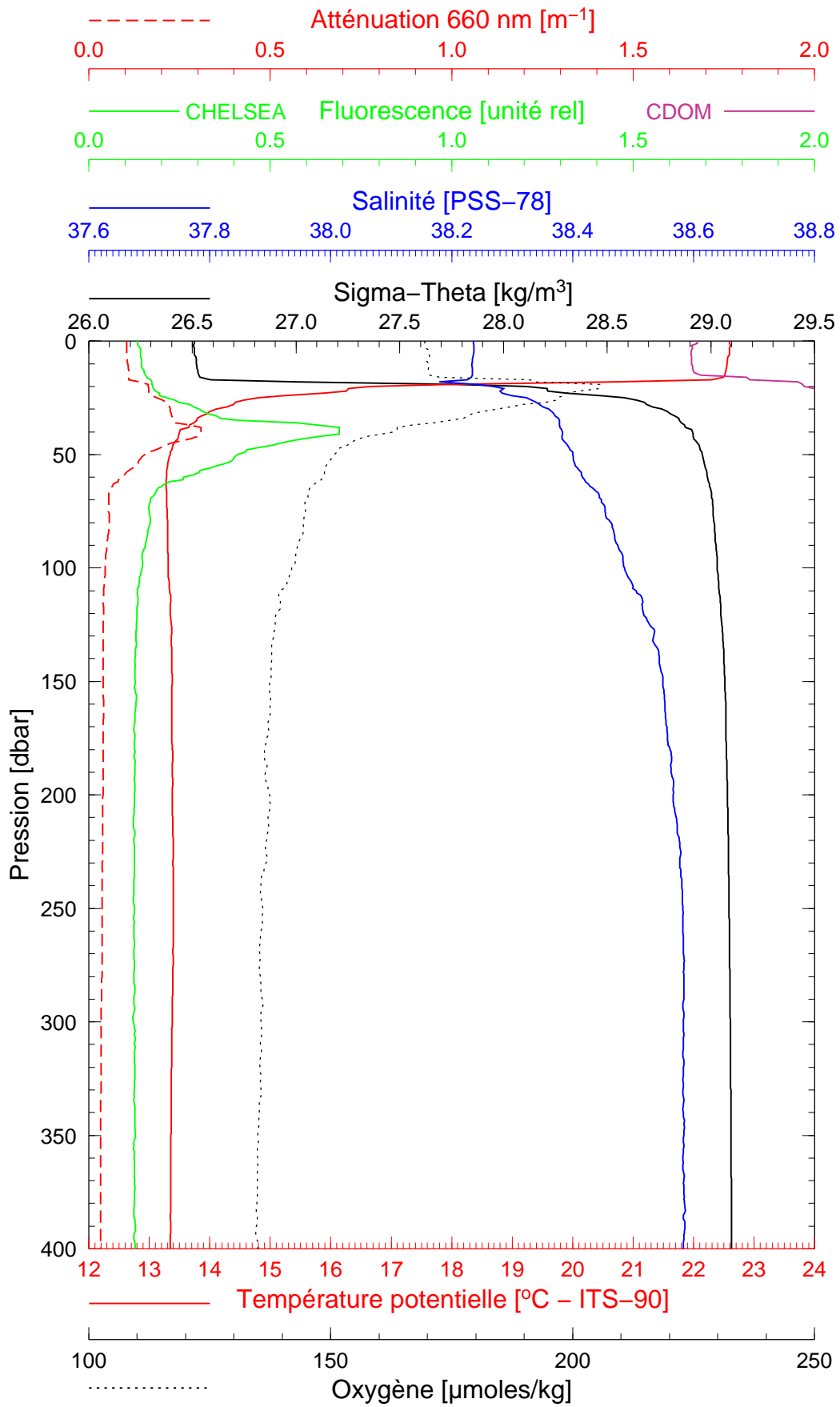
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BOUSSOLE 102

03/09/2010

BOUS100903_02

BOUS007



Date 03/09/2010

Latitude 43°22.430 N

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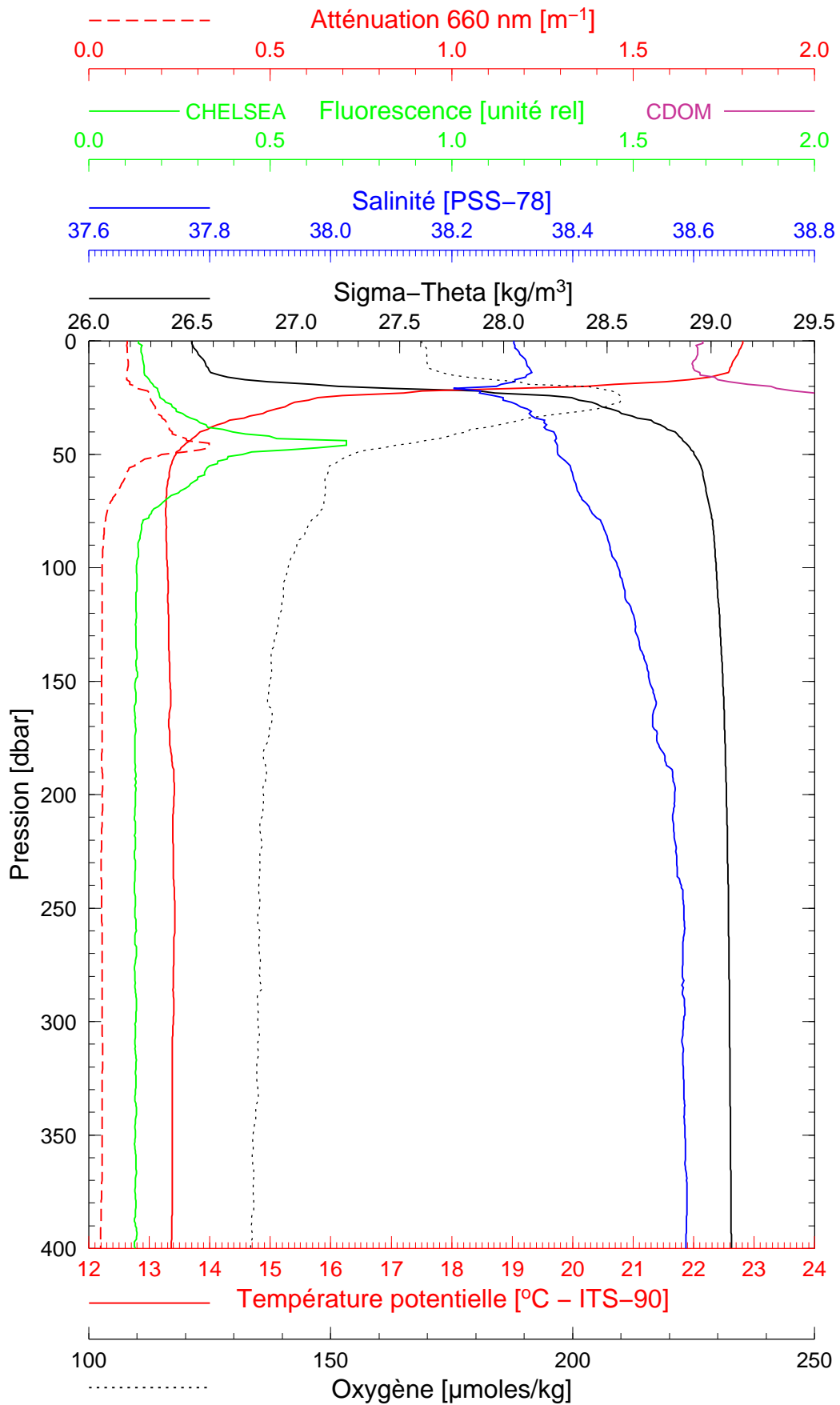
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BOUSSOLE 102

03/09/2010

BOUS100903_03

BOUS008



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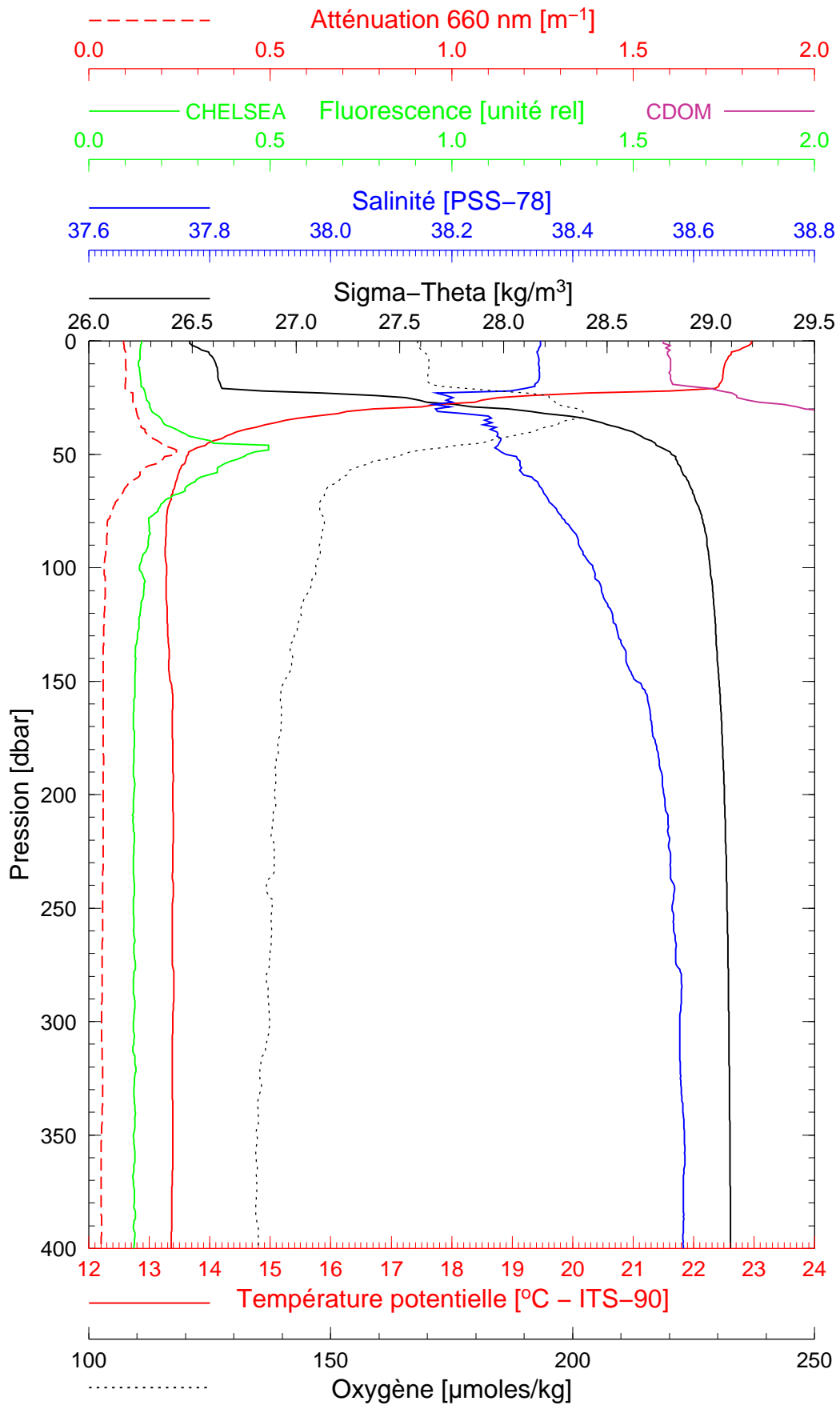
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BOUSSOLE 102

03/09/2010

BOUS100903_04

BOUS009



Date 03/09/2010

Latitude 43°27.948 N

Heure déb 13h 40min [TU]

Longitude 07°41.937 E