BOUSSOLE Monthly Cruise Report

Cruise 94
February 12 - 15, 2010

Duty Chiefs: Emilie Diamond (diamond@obs-vlfr.fr)
Vessel: R/V Téthys II
(Captain: Alain Stephan)

Science Personnel: Florent Besson, Floriane Desprez, Jean De Vaugelas, Emilie Diamond, Yves Lamblard, David Luquet, Vincent Taillandier, Vincenzo Vellucci, Cyril, Romain.

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Figure 1. a) The glider fixed on the CTD-rosette. b) New colours of the Téthys II. c) One of the two tilt sensors fixed on the buoy. d) A buoy solar panel damaged. e) Snow of the eve on Nice. f) Change of Dacnet micro drive.

BOUSSOLE project

ESA/ESRIN contract N° 17286/03/I-OL

Deliverable from WP#400/200

February 22, 2010

Contents

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 October 2009 to March 2010, another SPMR will be used for profiles (SN 008 instead of SN 006). It will measure upwelling radiance and downward irradiance instead of upward and downward irradiance. The reference will also be another SMSR (SN 021 instead of SN 006). 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 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 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. 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

Since the 1st of February 2010, the buoy did not send any data. Changing the micro drive of Dacnet was a priority when divers were on board. During the mission, Vincent Taillandier intercalibrated a CTD and a glider on the CTD-rosette. A CTD of Marc Picheral was also tested once at 1000 m. The MOOSE cruise day (Mediterranean Ocean Observation multi-Sites on Environment) was cancelled because of the weather so Floriane Desprez completed the MOOSE programs with a deep CTD cast with water sampling the last day.

Cruise Summary

Only two of the four cruise days were used to go to BOUSSOLE site. The first day, the cable of the ship *Téthys II* was out of order so people from DT-INSU (Division Technique de l'Institut National des Sciences de l'Univers) came from Toulon to repair it during the afternoon. The second day was only used for diving operations on the buoy. The third day, sea state wasn't good enough to reach the BOUSSOLE site so the CTD-rosette was just tested near the coast with another CTD and a glider installed on it for intercalibration. The last day was used for other diving operations, for optical and CTD casts with sampling at the BOUSSOLE site and for completing the transect with also sampling for MOOSE program at the Station 1.

Friday 12 February 2010

The first day, weather conditions were good (H1/3 0.6 m, blue sky and excellent visibility). Because it snowed on Nice the day before so the heavy Geoazur equipment was still on board, awaiting for the transporter blocked by the snow. At 10 o'clock, they arrived to get off their equipment, but during this time, we noticed that the CTD cable of the boat didn't work. We immediately called DT-INSU engineers who asked us to perform several tests. We began tour route to the BOUSSOLE site during our tests but the cable still didn't work. We called back DT-INSU engineers to come on board to repair the cable. When waiting for them, the CTD of Marc Picheral was

tested at 1000 m with the hydraulic cable at Station 5 before going back to Nice. Carl Gojak and Nagib Bhairy finally arrived from DT-INSU and repaired the CTD cable which was broken near the splicing connection side.

Saturday 13 February 2010

The second cruise day, sea state was not good enough to sample on the BOUSSOLE site. Only diving operations on the buoy were possible this day (cleaning, checking immersed ARGOS beacons, installing tilt sensors). When on board, immersed ARGOS beacons transmitted several times their position. The ARGOS beacons are essential to locate the buoy in case of drift due to a collision with a boat for example. After this security check, beacons were reinstalled on the buoy at -20 m. One of the solar panels of the buoy was damaged but this one can't be changed.

Sunday 14 February 2010

The third cruise day, weather conditions didn't allow sampling at BOUSSOLE (H1/3 1.5 m and overcast sky). During the afternoon, 1 CTD-rosette cast with another CTD and a glider fixed on the rosette was performed at Station 6 for intercalibration. Weather conditions allowed the test, though not being optimal.

Monday 15 February 2010

The last cruise day, sea state was good but the sky was overcast. When arrived on site, divers went at sea to take off the Dacnet and bring it on board to replace its micro drive by a new one. Then, a direct connection worked and the Dacnet shut down correctly through the AK connector. During this time, 1 CTD cast with water sampling was performed, after which divers reinstalled the Dacnet and switched on the buoy. Nothing happened, however the buoy did not restart. The ARGOS beacon on the buoy's head was also changed and ARGOS and CISCO connectors were cleaned. Then, 1 SPMR cast and a Secchi disk were performed. There was a connection problem with the SMSR so no reference measurement was performed. 4 other CTD casts were performed on the transect between the site and the port of Nice, including one at 1000 m with water sampling to complete the MOOSE program.

Cruise Report

Friday 12 February 2010 (UTC)

People on board: Emilie Diamond and Vincent Taillandier.

0800 Loading of BOUSSOLE equipment on board: problem of connection with the CTD-rosette.
0900 Unloading of GéoAzur equipment.
1000 Departure from the Nice port.
1050 Arrival at the station 05 and call of engineers of DT-INSU about CTD.
1100 CTD of Marc Picheral, 1000 m.
1130 Departure to the Nice port.
1225 Arrival at the Nice port.
1330 Repair of CTD cable.

Saturday 13 February 2010 (UTC)

People on board: Jean De Vaugelas, Emilie Diamond, Yves Lamblard, Vincent Taillandier, Vincenzo Vellucci, Cyril and Romain (divers).

0540 Departure from the Nice port.
0850 Arrival at the BOUSSOLE site.
0900 Diving 1 for installing two tilt sensors at 9 m, cleaning the buoy and taking off the immersed ARGOS beacons. On board, waiting for beacons signal: OK.
0915 Attempted CISCO connection with the buoy: unsuccessful.
1100 Attempt of SPMR profiles: no connection with the SMSR.
1215 Attempted CISCO connection with the buoy: unsuccessful.
1430 Diving 2 for reinstalling the Argos beacons and for rebooting the Dacnet through AK connector: doesn't work.
1550 Departure to the Nice port.
1850 Arrival at the Nice port.

Sunday 14 February 2010 (UTC)

People on board: Emilie Diamond and Vincent Taillandier.

1550 Departure from the Nice port.
1620 Arrival at the station 06.
1630 CTD 01, 700 m with another CTD and a glider fixed on it.
1700 Departure to the Nice port.
1730 Arrival at the Nice port.

Monday 15 February 2010 (UTC)

People on board: Florent Besson, Floriane Desprez, Emilie Diamond, Yves Lamblard, David Luquet, Vincent Taillandier, Vincenzo Vellucci and Romain (diver).

0700 Departure from the Nice port.
1005 Arrival at the BOUSSOLE site.
1015 Diving 1 on the buoy for taking off the Dacnet.
1025 CTD 02, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, Ap, TSM and CDOM.
1100 On board substitution of the Dacnet micro drive: connection OK after substitution.
1300 Diving 2 on the buoy for reinstalling the Dacnet: buoy switched on, for changing ARGOS beacon on buoy head and for cleaning CISCO and ARGOS connections.
1345 SPMR 01 (without SMSR).
1425 Secchi disk 01 (15 m).
1430 Departure to the first transect station.
1500 CTD 03, 1000 m, station 01 (43°25'N 07°48'E) with water sampling for MOOSE.
1640 CTD 04, 400 m, station 03 (43°31'N 07°37'E).
1805 CTD 05, 400 m, station 05 (43°37'N 07°25'E).
1855 CTD 06, 400 m, station 06 (43°39'N 07°21'E).
1925 Departure to the Nice port.
1945 Arrival at the Nice port.

Problems identified during the cruise

- The first day, the CTD cable of Téthys II was out of order and was repaired in the afternoon, so one cruise day was lost.
- The second and the third days, sea state was not good enough to sample on the BOUSSOLE site. Only diving was possible the second day.
- One of the solar panels of the buoy was damaged but can't be changed.
- The BOUSSOLE buoy still did not work after the first diving so divers came back the last day to change the Dacnet micro drive.
- The last day, the SMSR did not connect with the computer so there was no reference during optical profiles.

Calculated Swath paths for the MERIS Sensor (ESOV Software)

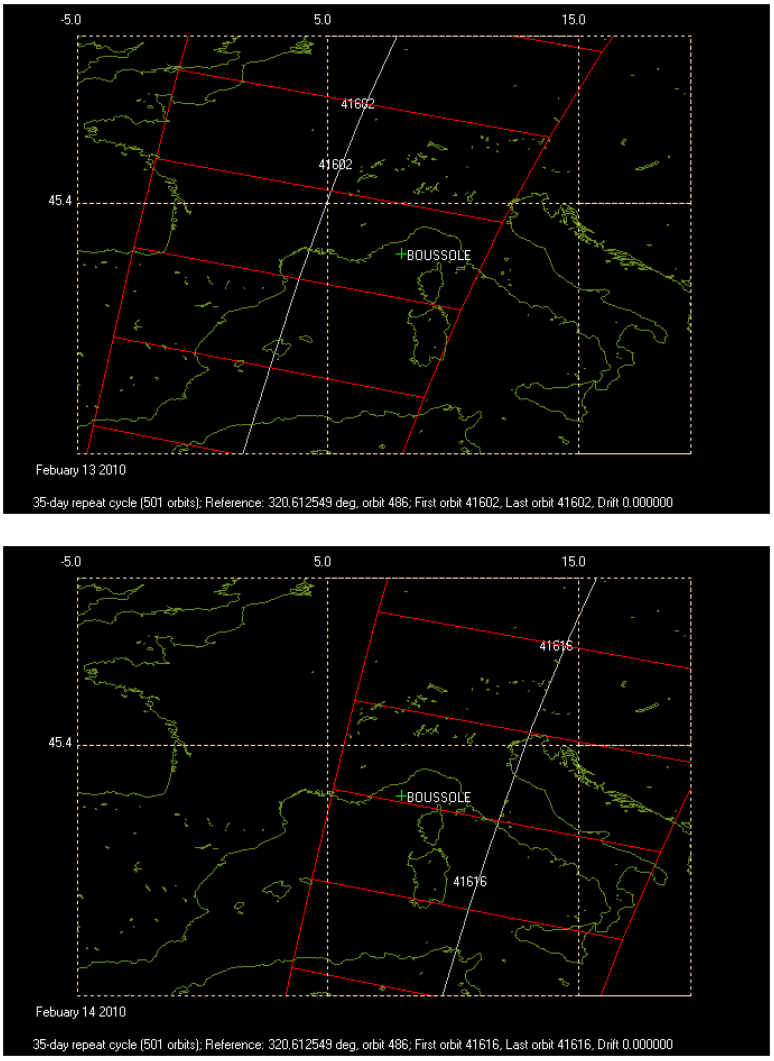
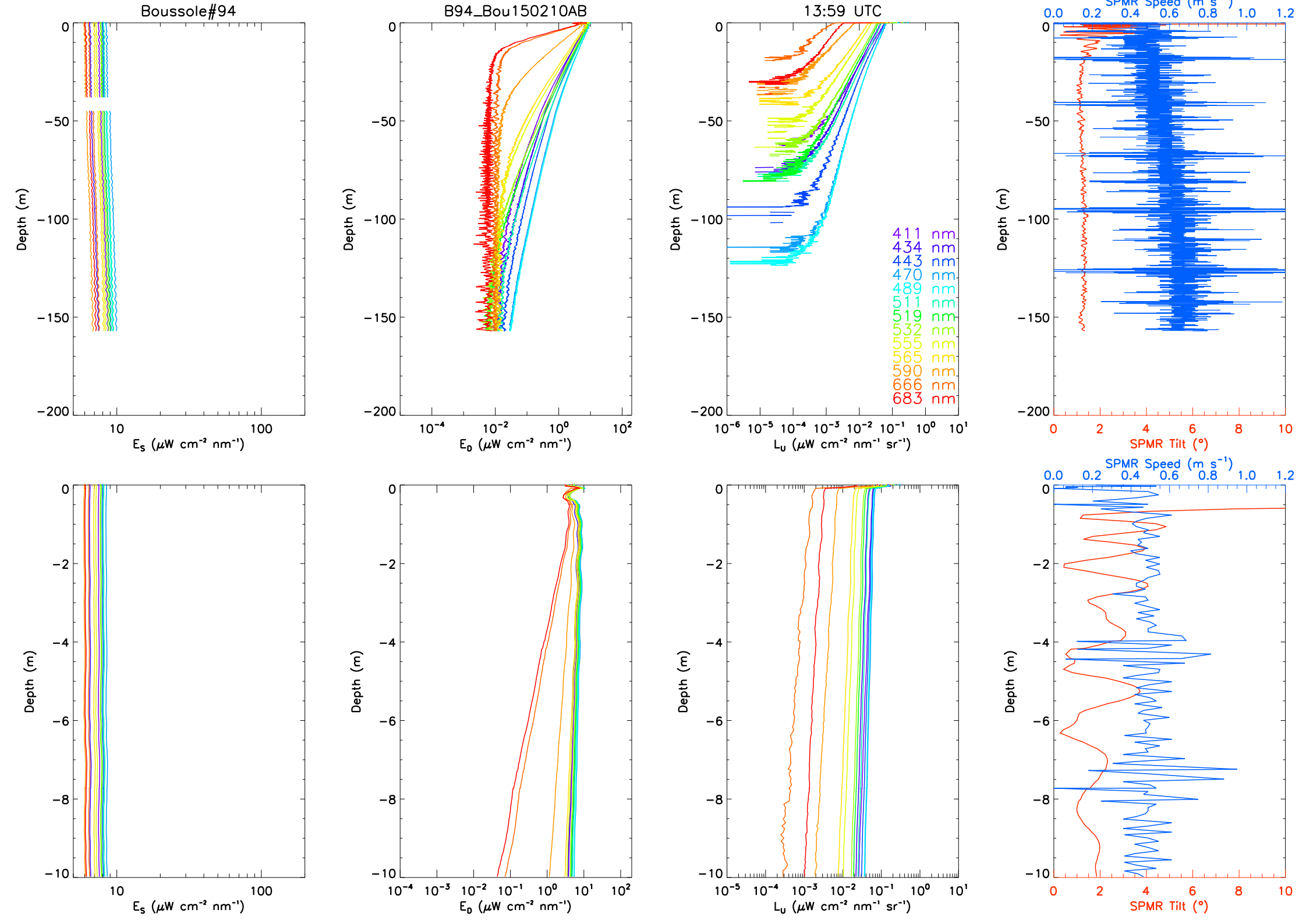


Figure 2. Calculated swath paths for MERIS (Esov software) above BOUSSOLE site for 13 and 14 February 2010.

Appendix

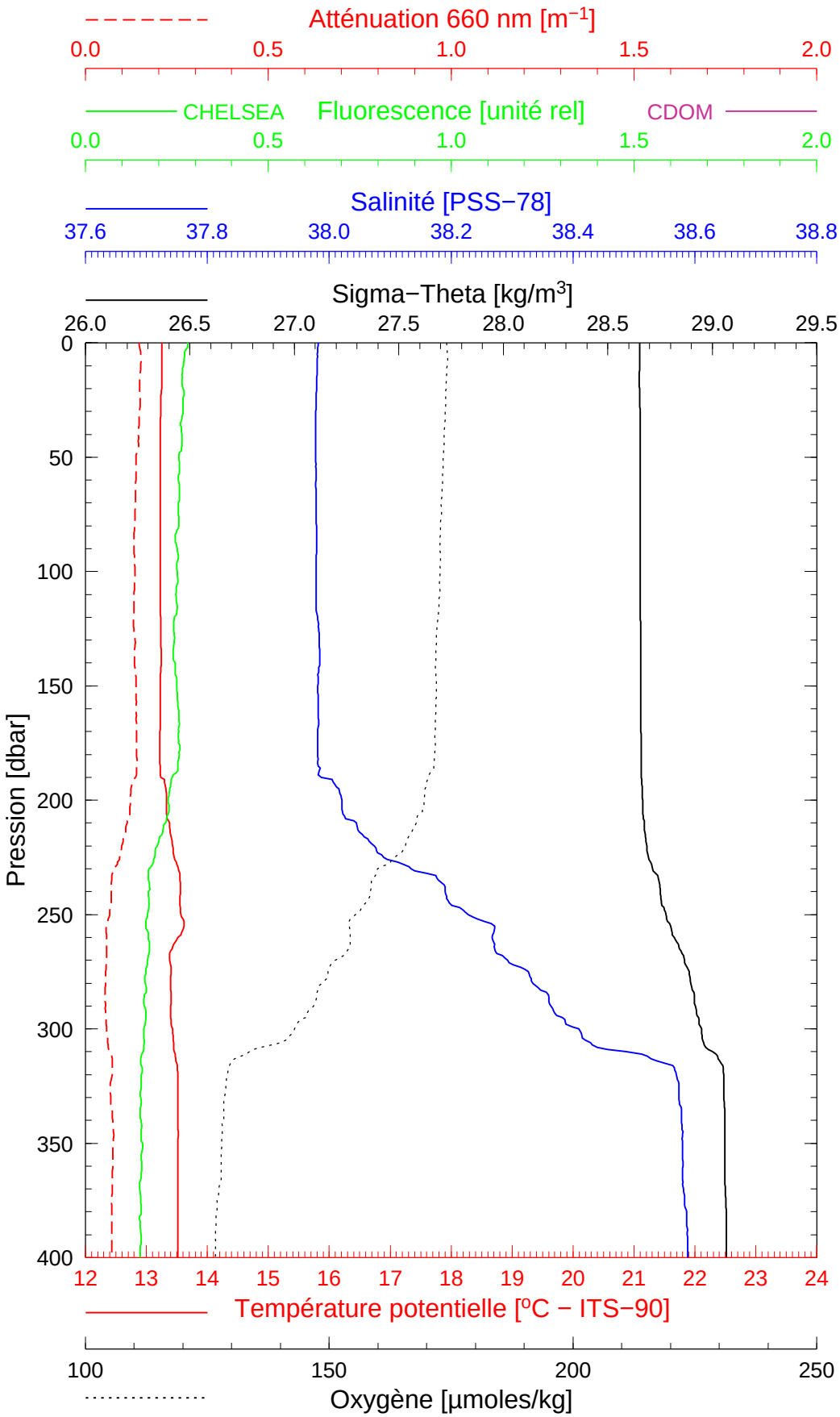
Cruise Summary Table for Boussole 94

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
12/02/10	Boat CTD cable out of order so was repaired this day																							
13/02/10	Bad weather so only diving																							
14/02/10			CTDBOUS001		16:35	23:00	700	43	38.707	7	21.56	overcast		7			1005	58			13.3	moved			yes
15/02/10			CTDBOUS002	HPLC, Ap, TSM & CDOM	10:25	23:00	400	43	22.078	7	53.958	overcast		7			1006	65			12.8	calm			no
	Bou150210black1				13:48	3:00																			
		Bou150210surfAA			13:54	1:18	up surface	43	22.134	7	53.776	overcast	Cu & Ns	7			1005	67	medium			calm	0.7		no
		Bou150210AB			13:59	4:31	157	43	22.205	7	53.780	overcast	Cu & Ns	7			1005	67	medium			calm	0.7		no
		Bou150210surfAC			14:18	3:00	up surface	43	22.279	7	53.589	overcast	Cu & Ns	7			1005	67	medium			calm	0.7		no
	Bou150210black2				14:21	3:00																			
				Secchi01	14:25	3:00	15	43	22	7	54	overcast		7					medium			calm			no
			CTDBOUS003		15:03	34:00	1000	43	24.873	7	48.016	overcast		8			1005	68			12.9	calm			no
			CTDBOUS004		16:43	17:00	400	43	31.000	7	37.100	overcast		8			1005	69			12.8	calm			no
			CTDBOUS005		18:07	27:00	400	43	37.000	7	24.800	night		7			1005	70			13.2	calm			no
			CTDBOUS006		18:59	20:00	400	43	39.003	7	20.966	night		6			1005	71			13.2	calm			no


Boussole#94
B94_Bou150210AB
13:59 UTC
Depth (m)
E_S (μW cm^{-2} nm^{-1})
E_D (μW cm^{-2} nm^{-1})
L_u (μW cm^{-2} nm^{-1} sr^{-1})
SPMR Speed (m s^{-1})
SPMR Tilt (°)
411 nm
434 nm
443 nm
470 nm
489 nm
511 nm
519 nm
532 nm
555 nm
565 nm
590 nm
666 nm
683 nm

BOUSSOLE 94 **14/02/2010** **BOUS100214_01**

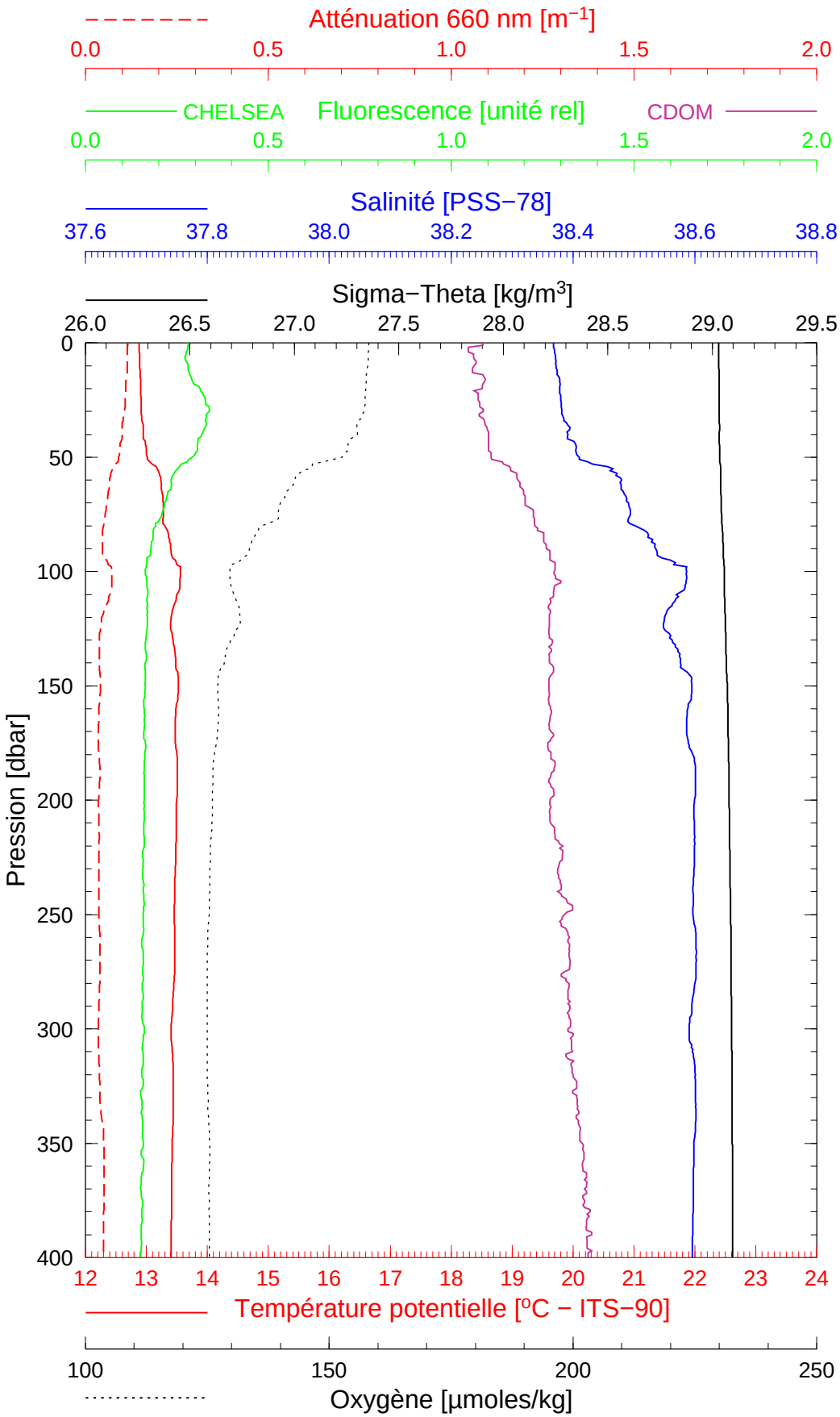
BOUS001



Date	*14/02/2010*	*Latitude*	*43°38.707*
Heure déb	*16h 35min [TU]*	*Longitude*	*07°21.560*

BOUSSOLE 94 **15/02/2010** **BOUS100215_01**

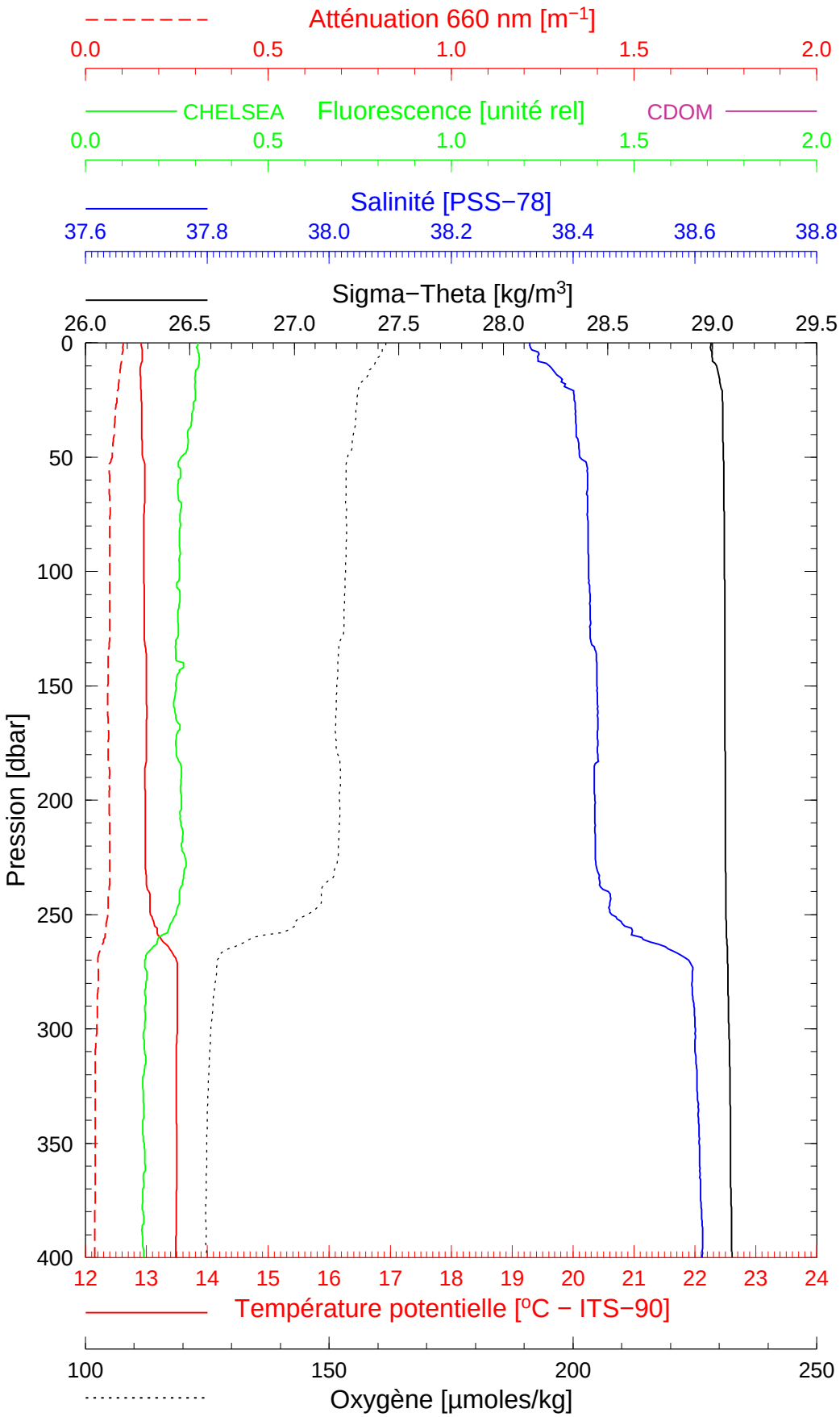
BOUS002



Date	*15/02/2010*	*Latitude*	*43°22.078*
Heure déb	*10h 25min [TU]*	*Longitude*	*07°53.958*

BOUSSOLE 94 **15/02/2010** **BOUS100215_02**

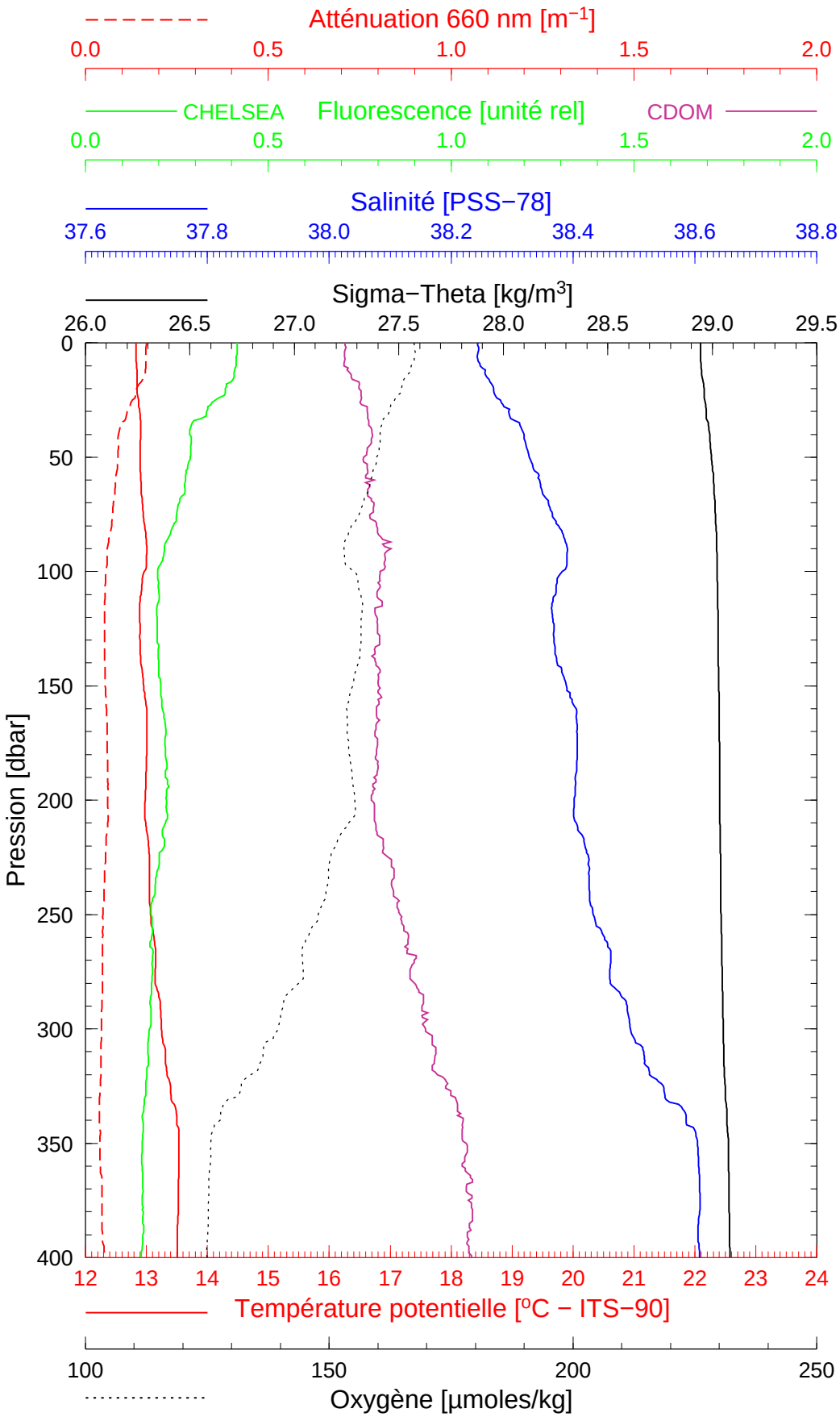
BOUS003



Date	*15/02/2010*	*Latitude*	*43°24.873*
Heure déb	*15h 03min [TU]*	*Longitude*	*07°48.016*

BOUSSOLE 94 **15/02/2010** **BOUS100215_03**

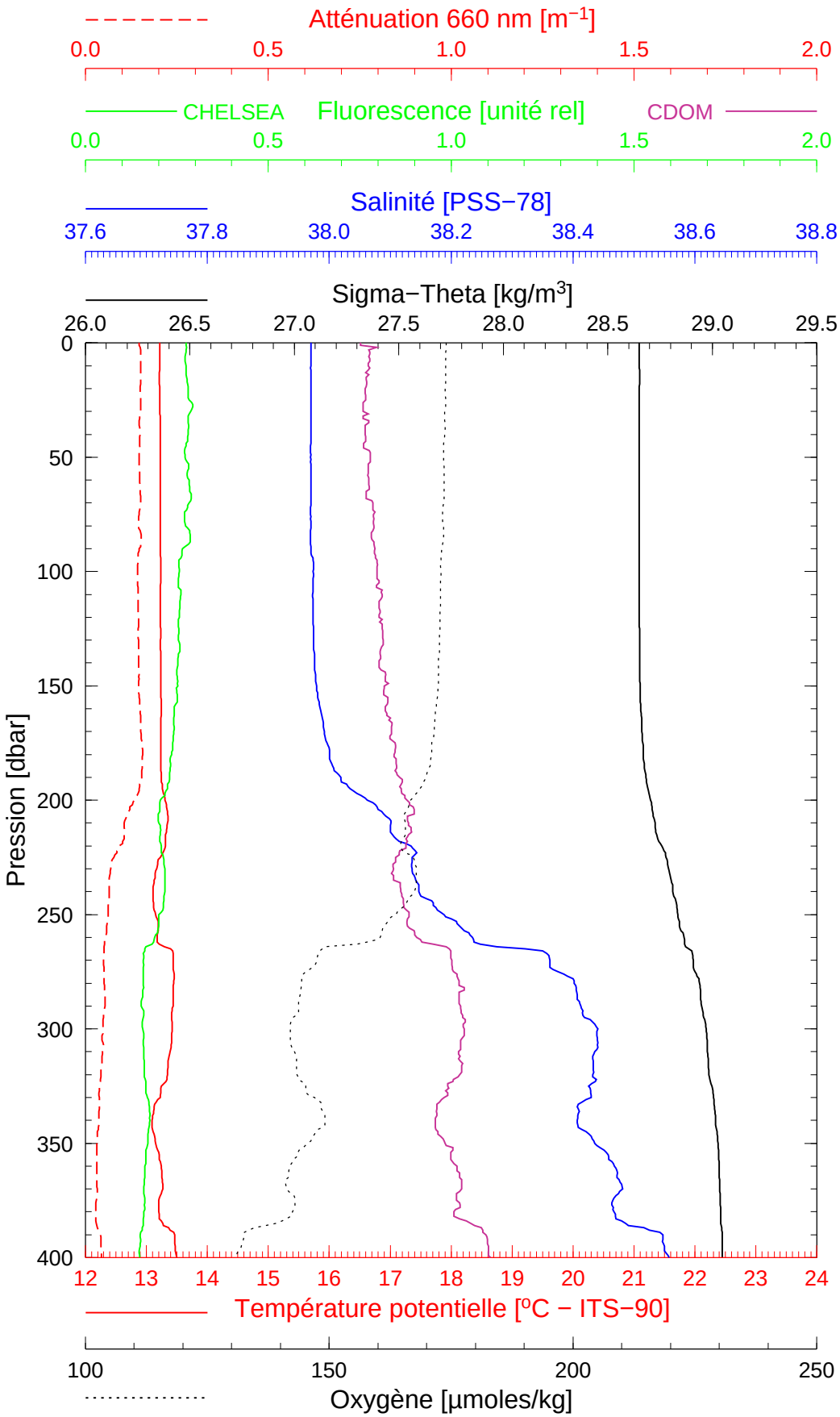
BOUS004



Date	*15/02/2010*	*Latitude*	*43°31.000*
Heure déb	*16h 43min [TU]*	*Longitude*	*07°37.100*

BOUSSOLE 94 **15/02/2010** **BOUS100215_04**

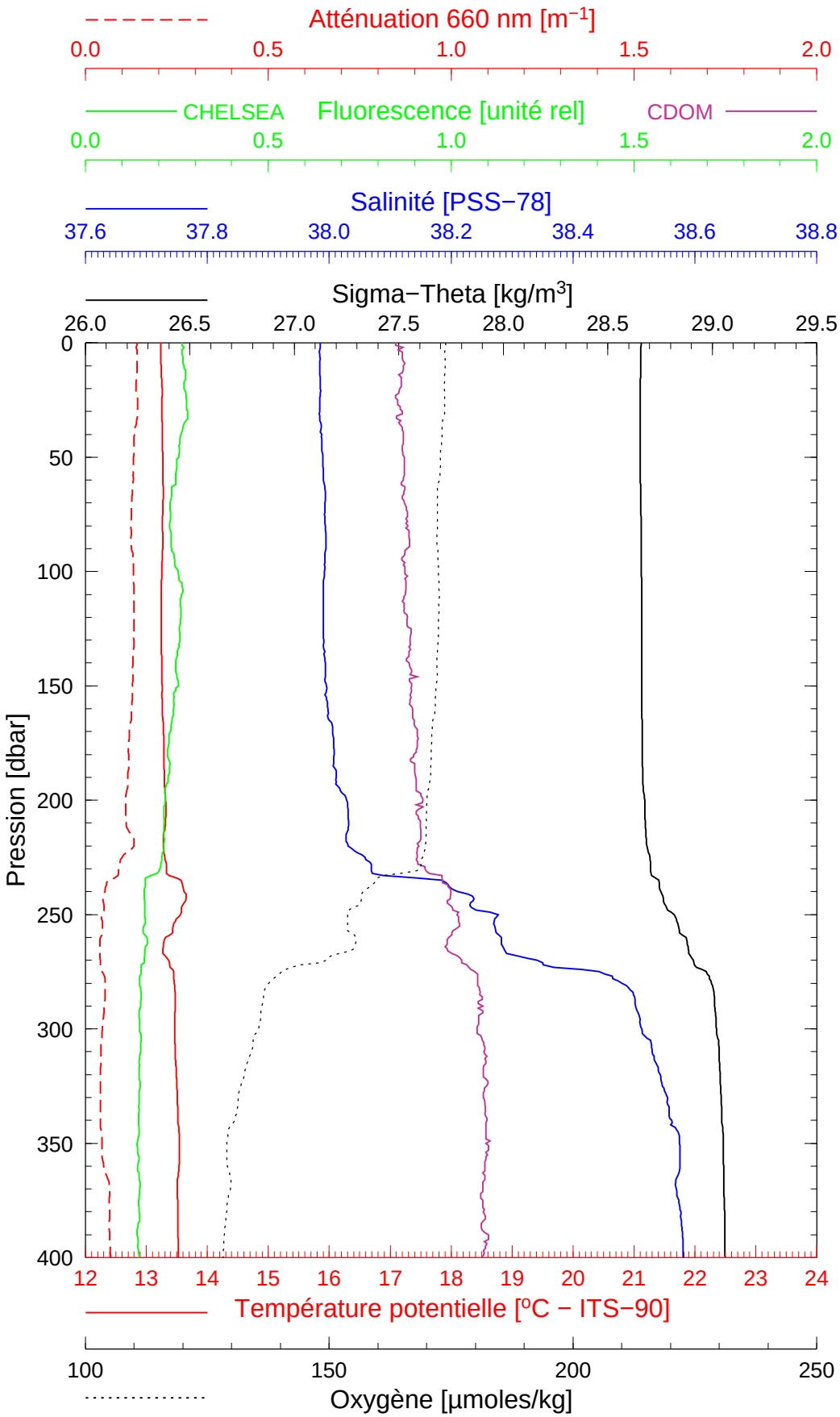
BOUS005



Date	*15/02/2010*	*Latitude*	*43°37.000*
Heure déb	*18h 07min [TU]*	*Longitude*	*07°24.800*

BOUSSOLE 94 **15/02/2010** **BOUS100215_05**

BOUS006



Date	*15/02/2010*	*Latitude*	*43°39.003*
Heure déb	*18h 59min [TU]*	*Longitude*	*07°20.966*