BOUSSOLE Monthly Cruise Report

Cruise 93
December 07 - 10, 2009

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

Science Personnel: Jean De Vaugelas, Emilie Diamond, Renan Ferezou, Gilles Legoff, David Luquet, Stéphane Marchand, Nuria Miro, Didier Robin, Vincent Taillandier, Vincenzo Vellucci, Xiaogang Xing.

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

Figure 1. BOUSSOLE buoy with snow-covered Alps on background.

BOUSSOLE project

ESA/ESRIN contract N° 17286/03/I-OL

Deliverable from WP#400/200

December 18, 2009

Contents

Cruise Objectives

Routine operations

Multiple SPMR profiles are to occur within 1 hour of satellite overhead passes of MERIS around solar noon, under optimal conditions: clear blue skies and flat, calm sea surface. From October to December 2009, another SPMR will be used for profiles (SN 008 instead of SN 006). It will measure upwelling radiance and downwelling irradiance instead of up and down welling E. The reference will also be another SMSR (SN 021 instead of SN 006) but with an identical sensor. 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 and AC9, 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.

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.

Additional operations

Since it was deployed on October the 27th, the new buoy does not work. Changing the micro drive of Dacnet will be a priority when divers will be on board. During the mission, Vincent Taillandier will test a CTD for gliders program and Stéphane Marchand will be on board for testing several elephant seal CTD-fluorometer from the Centre d'Etudes Biologiques of Chizé. A CTD of Marc Picheral will also be tested once at 1000 m. One of the four days, Renan Ferezou and Gilles Legoff from Météo-France will be on board for their weather buoy maintenance.

Cruise Summary

All of the four cruise days were used but the second day was only used for testing the CTD-rosette near the coast because of bad weather. The first day was used for optical casts and water sampling with Niskin bottles at the BOUSSOLE site and for testing the CTD of Marc Picheral. The third day was used for optical casts and for completing the transect. The last day was used for diving to repair the BOUSSOLE buoy and for checking the Météo-France buoy.

Monday 07 December 2009

The first day, weather conditions allowed sampling, though not being optimal (H1/3 1.2 m, wind speed 15 kn, covered sky and medium visibility). When arrived on site, first, the CTD of Marc Picheral was tested at 1000 m before the weather conditions became too bad. After, 1 Secchi disk and 3 SPMR profiles were performed and water samples were collected by closing a Niskin bottle at 5, 10 and 20 m with a messenger on the hydrologic cable. Then the sea state was not good enough to continue.

Tuesday 08 December 2009

The second cruise day, sea state was not good enough to sample on BOUSSOLE site. The CTD-rosette was repaired the day before so this cruise day was used for testing it near the coast to be in shelter of waves. And it was working.

Wednesday 09 December 2009

The third cruise day, weather conditions allowed sampling, though not being optimal (H1/3 1.3 m, wind speed 14 kn but blue sky and excellent visibility). When arrived on site, 1 CTD cast with water sampling and 6 SPMR profiles were performed. Then 4 other CTD casts were performed on the transect between the site and the port of Nice (bad sea conditions not allowed a cast at the first station and there was a problem of connection with the CTD on the fifth station).

Thursday 10 December 2009

The last cruise day, sea state was good with low wind blowing and blue sky. When arrived on site, divers went at sea to take off the Dacnet and bring on board to change the micro drive of Dacnet with a new one. During this time, divers reinstalled the CLC and cleaned buoy optical sensors. ARGOS and CISCO connectors were also cleaned. Then, divers reinstalled the Dacnet on buoy but nothing happened except a shutter which shut down. After, divers went again at sea to reboot several times the Dacnet through the AK connector. But the attempt of direct connection with the buoy failed even with an external 12 V battery powering the Dacnet. The buoy still did not work so it was switched off. Then, 1 Secchi disk and 1 CTD cast with water sampling were performed. After, two employees of Météo-France repaired their weather buoy not far from BOUSSOLE site. Then, 1 CTD cast was performed at the first station to complete the transect.

Cruise Report

Monday 07 December 2009 (UTC)

People on board: Emilie Diamond, Stéphane Marchand.

0800 Departure from the Nice port.
1130 Arrival at the BOUSSOLE site.
1140 CTD of Marc Picheral, 1000 m
1200 Secchi disk 01 (17 m).
1220 SPMR 01, 02, 03.
1315 Niskin bottle for water sampling at 20, 10 and 5 m for HPLC, Ap and TSM.
1335 Departure to the Nice port.
1650 Arrival at the Nice port.

Tuesday 08 December 2009 (UTC)

People on board: Emilie Diamond, Stéphane Marchand and Vincent Taillandier.

1040 Departure from the Nice port.
1130 CTD test01 and test02, 400m, near the coast.
1155 CTD test03 and test04, 400m, near the coast.
1215 Lunch.
1315 CTD test doesn't work.
1330 Departure to the Nice port.
1350 Arrival at the Nice port.

Wednesday 09 December 2009 (UTC)

People on board: Emilie Diamond, Stéphane Marchand, Nuria Miro, Vincent Taillandier and Xiaogang Xing.

0600 Departure from the Nice port.
0920 Arrival at the BOUSSOLE site.
0925 CTD 01, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, Ap and TSM.
1030 SPMR 04, 05, 06.
1110 SPMR 07, 08, 09.
1200 Departure to the second transect station (sea state at the first station was too bad).

1305 CTD 02, 400 m, station 02 (43°28’N 07°42’E).
1355 CTD 03, 400 m, station 03 (43°31’N 07°37’E).
1450 CTD 04, 400 m, station 04 (43°34’N 07°31’E).
1545 CTD doesn’t work at station 05 (43°37’N 07°25’E).
1635 CTD 05, 400 m, station 06 (43°39’N 07°21’E).
1710 Departure to the Nice port.
1735 Arrival at the Nice port.

Thursday 10 December 2009 (UTC)

People on board: Jean De Vaugelas, Emilie Diamond, Renan Ferezou, Gilles Legoff, David Luquet, Didier Robin, Vincent Taillandier and Vincenzo Vellucci.

0515 Departure from the Nice port.
0830 Arrival at the BOUSSOLE site.
0845 Diving 1 on the buoy for taking off the Dacnet.
On board substitution of the Dacnet micro drive: connection OK after substitution.
Diving 2 on the buoy for reinstalling the CLC, for cleaning instruments and CISCO and ARGOS connections and for reinstalling the Dacnet: buoy switched on.
Diving 3 on the buoy for rebooting the Dacnet through the AK connector: attempt of direct connection with the buoy failed without and with a direct 12 V battery connection on Dacnet so buoy switched off.
1230 CTD 06, 400 m with water sampling at 150, 80, 70, 60, 40, 30, 20, 10 and 5 m for HPLC, Ap and TSM.
1250 Secchi disk 02 (18 m).
1300 Departure to Météo-France weather buoy.
1320 Météo-France weather buoy maintenance.
1345 Departure to the first transect station.
1400 CTD 07, 400 m, station 01 (43°25’N 07°48’E).
1425 Departure to the Nice port.
1755 Arrival at the Nice port.

Calculated Swath paths for the MERIS Sensor (ESOV Software)

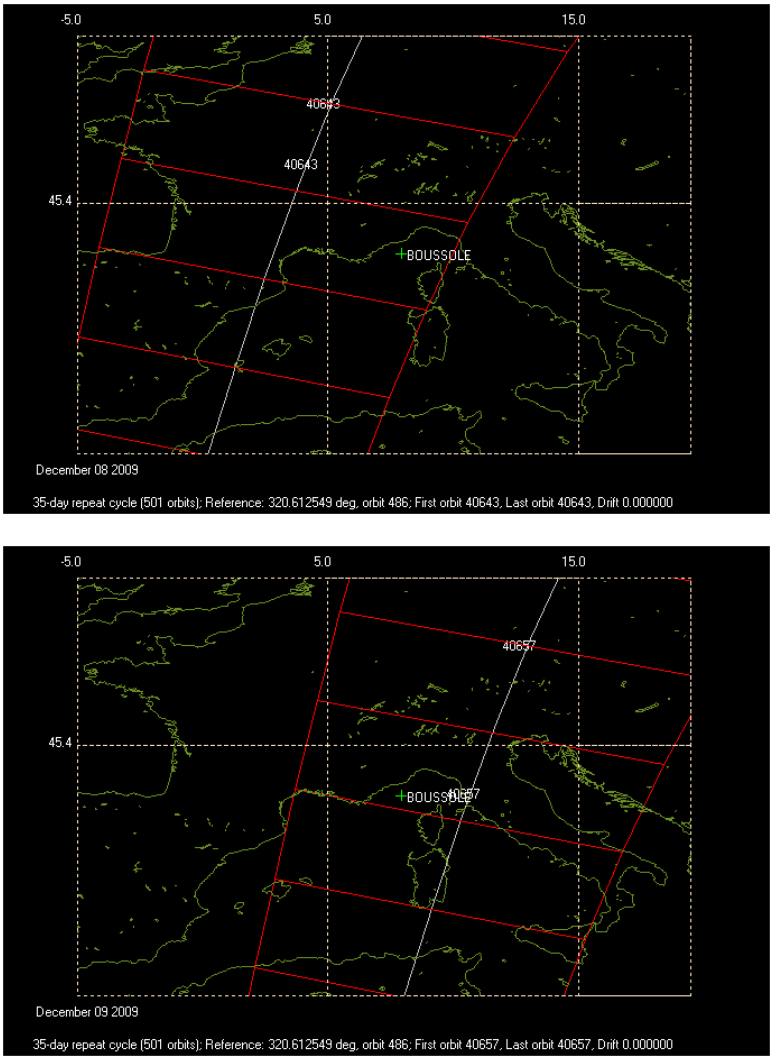
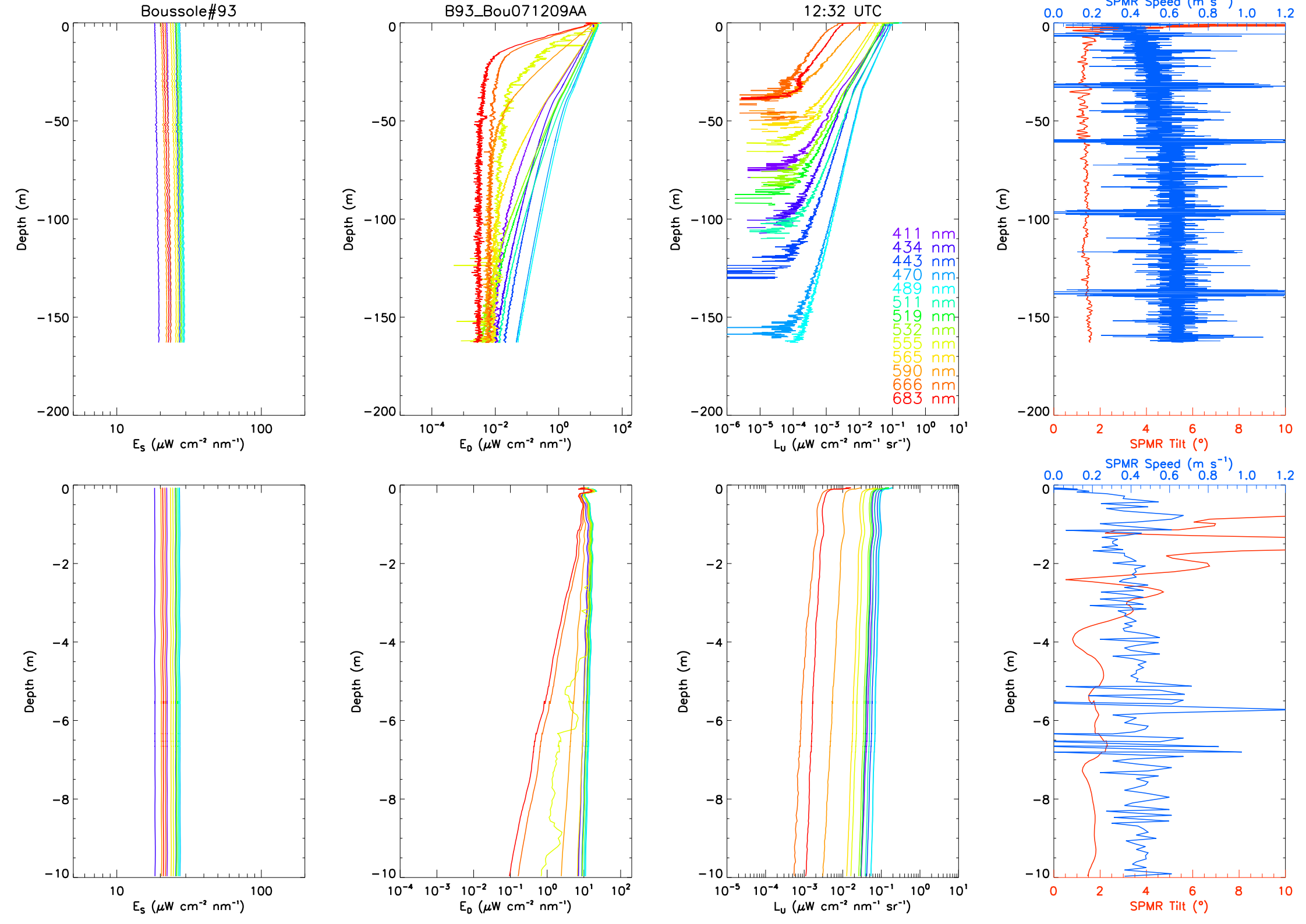


Figure 2. Calculated swath paths for MERIS (Esov software) above BOUSSOLE site for 08 and 09 December 2009.

Appendix

Cruise Summary Table for Boussole 93

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
07/12/09			CTD000		11:40	35:00	1000	43	22.200	7	53.652	overcast		8	13	98	1016.7	92		14.8		moved			yes
				Secchi01	12:00	4:00	17	43	22	7	54	overcast		8					medium			moved			yes
	Bou071209black1				12:26	3:00																			
		Bou071209AA			12:32	4:45	163	43	22.262	7	54.149	overcast	Cb & Ns	8	15	100	1015.8	91	medium	15.2		moved	1.2		yes
		Bou071209AB			12:43	3:02	100	43	22.412	7	54.255	overcast	Cb & Ns	8	15	100	1015.8	91	medium	15.2		moved	1.2		yes
		Bou071209AC			12:51	4:35	158	43	22.523	7	54.405	overcast	Cb & Ns	8	15	100	1015.8	91	medium	15.2		moved	1.2		yes
	Bou071209black2				13:04	3:00																			
				Niskin: HPLC, Ap & TSM	13:15	20:00	5 to 20	43	23.119	7	54.789	overcast		7	11	104	1015.7	92		15.3		moved			yes
08/12/09	Bad weather																								
09/12/09			CTDBOUS001	HPLC, Ap & TSM	09:30	25:00	400	43	21.985	7	53.526	blue		1	14	119	1021.1	42		15.3	14.6	moved			yes
	Bou091209black1				10:32	3:00																			
		Bou091209AA			10:40	3:14	85	43	21.956	7	53.183	blue	Sc	1	14	175	1021.2	41	excellent	15.4		moved	1.2		yes
		Bou091209AB			10:50	3:12	92	43	21.827	7	52.803	blue	Sc	1	14	175	1021.2	41	excellent	15.4		moved	1.2		yes
		Bou091209AC			10:59	2:57	80	43	21.685	7	52.468	blue	Sc	1	14	175	1021.2	41	excellent	15.4		moved	1.2		yes
	Bou091209black2				11:11	3:00																			
	Bou091209black3				11:14	3:00																			
		Bou091209AD			11:24	4:02	144	43	21.923	7	52.316	blue	Sc	1	16	320	1020.8	45	excellent	15.2		moved	1		yes
		Bou091209AE			11:34	3:46	128	43	22.049	7	52.431	blue	Sc	1	16	320	1020.8	45	excellent	15.2		moved	1		yes
		Bou091209AF			11:44	3:12	113	43	22.159	7	52.550	blue	Sc	1	16	320	1020.8	45	excellent	15.2		moved	1		yes
	Bou091209black4				11:57	3:00																			
			CTDBOUS002		13:08	20:00	400	43	27.954	7	41.838	blue		1	7	250	1020.9	51		15.4	15.1	moved			yes
			CTDBOUS003		14:00	19:00	400	43	30.970	7	36.954	blue		1	10	104	1020.9	53		15.1	15.1	calm			no
			CTDBOUS004		14:54	18:00	400	43	33.946	7	30.815	blue		1	11	112	1021.2	51		15.4	16.4	calm			no
			CTDBOUS005		16:48	20:00	400	43	37.079	7	21.057	night		1	8	303	1022.2	43		15.5	16.5	calm			no
10/12/09			CTDBOUS006	HPLC, Ap & TSM	12:31	21:00	400	43	21.936	7	54.14	blue		2	6	109	1023.2	67		13.8	14.6	calm			no
				Secchi02	12:50	4:00	18	43	22	7	54	blue		2					good			calm			no
			CTDBOUS007		14:03	18:00	400	43	24.992	7	47.91	blue		4	6	250	1022.4	66		14.9	14.9	calm			no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434 nm
443 nm
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532 nm
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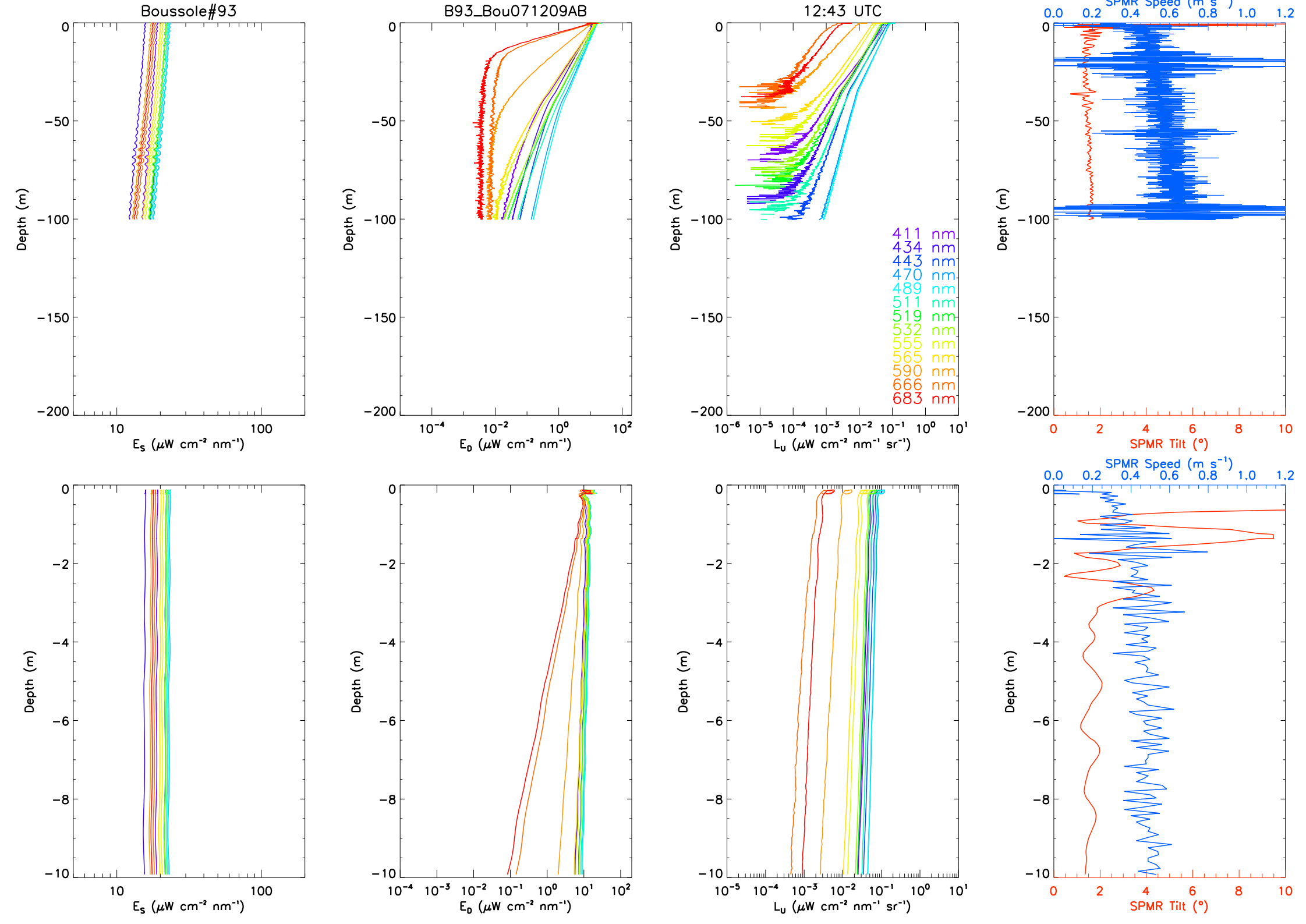
565 nm
590 nm
666 nm
683 nm
SPMR Speed (m s^{-1})
SPMR Tilt (°)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443 nm
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590 nm
666 nm
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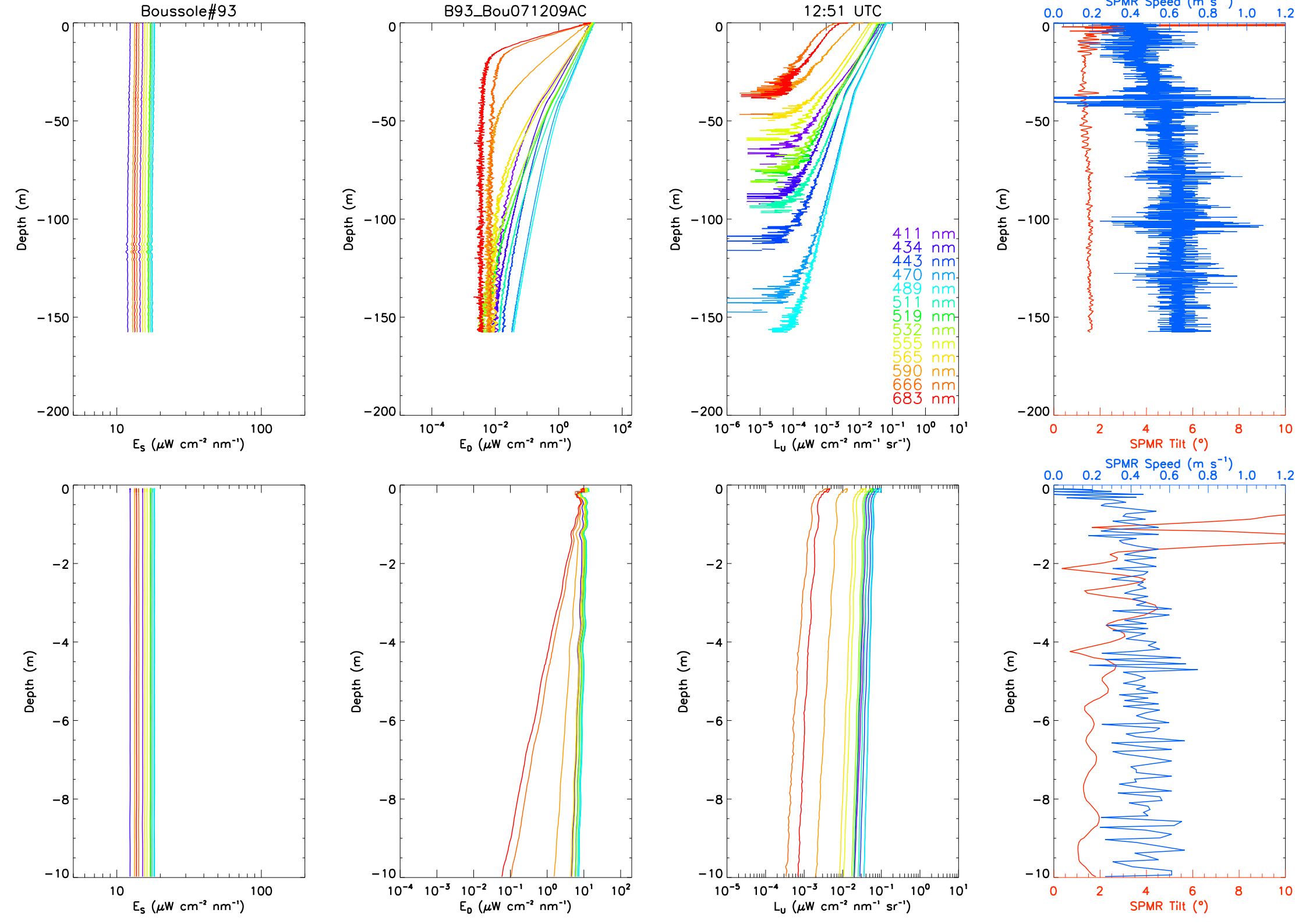
SPMR Speed (m s^{-1})
SPMR Tilt (°)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443 nm
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590 nm
666 nm
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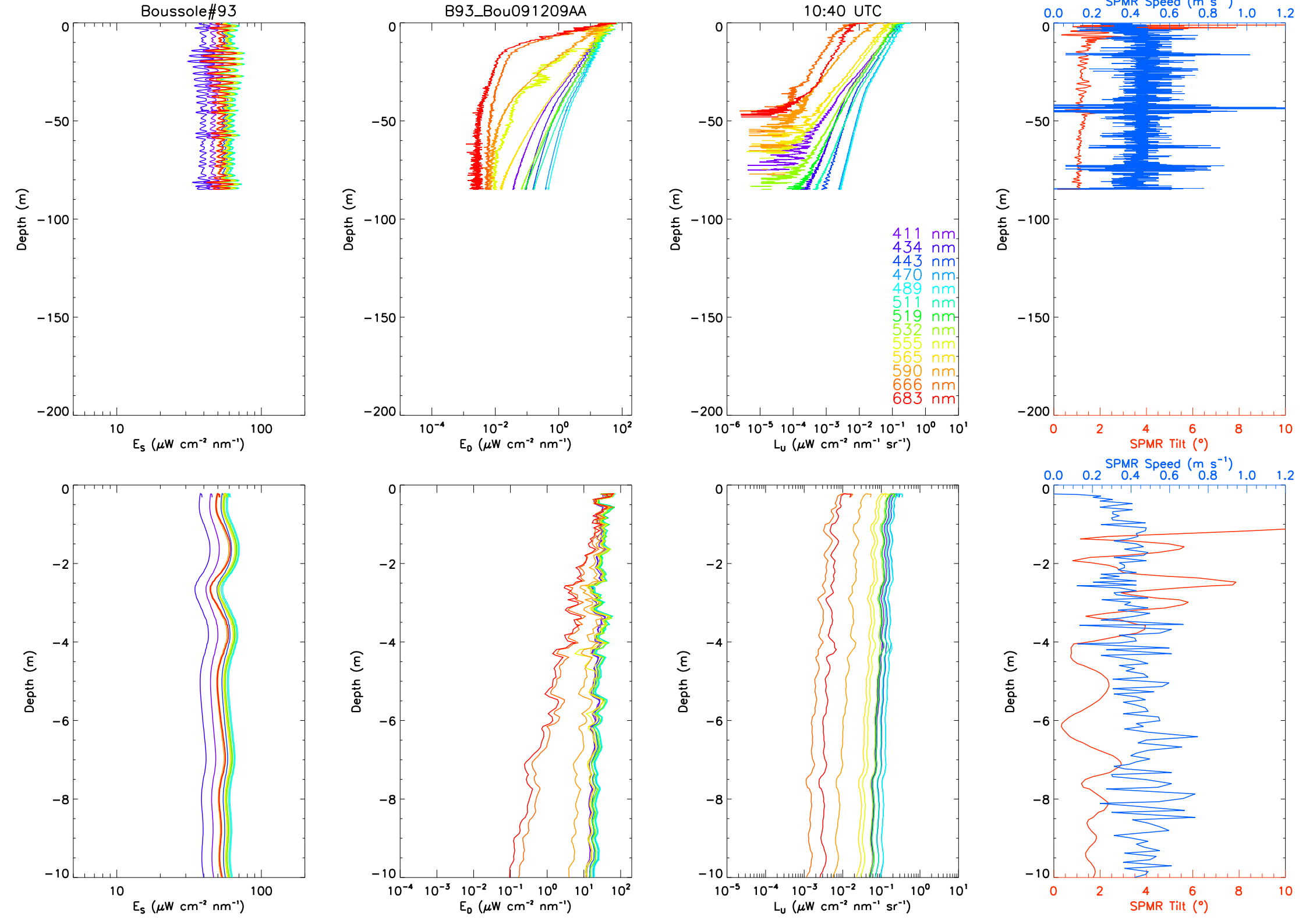
SPMR Speed (m s^{-1})
SPMR Tilt (°)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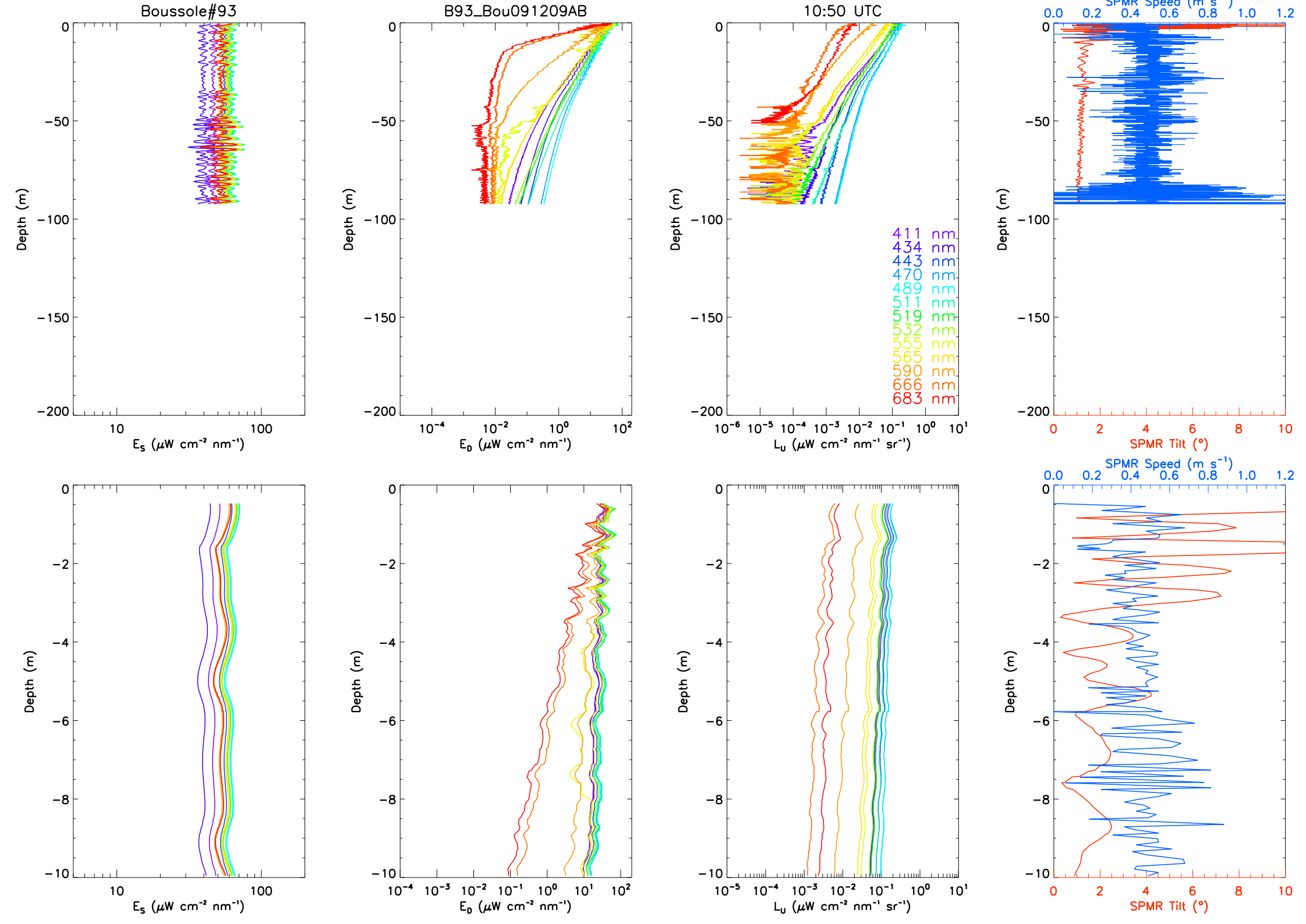
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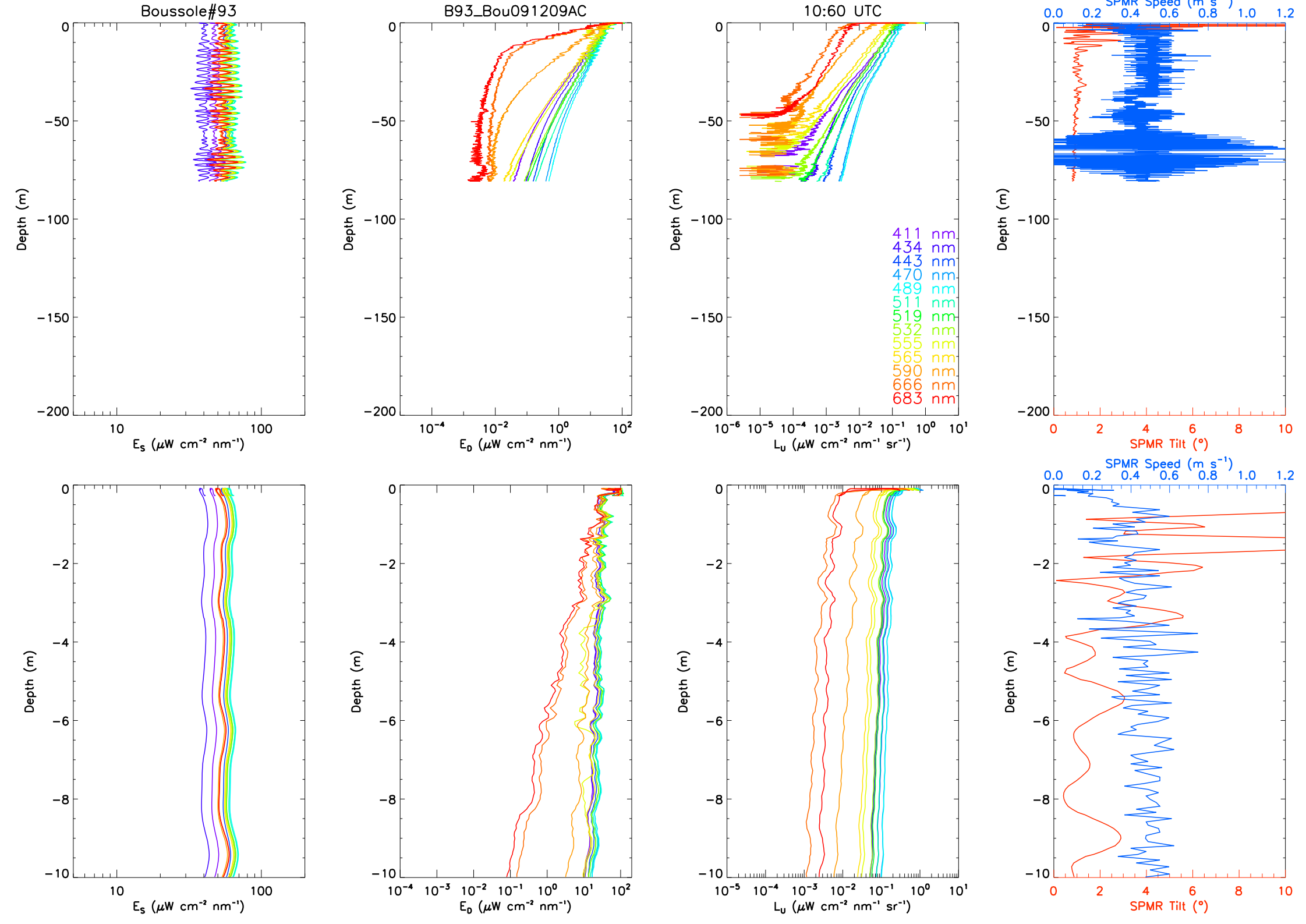
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L_u (μW cm^{-2} nm^{-1} sr^{-1})
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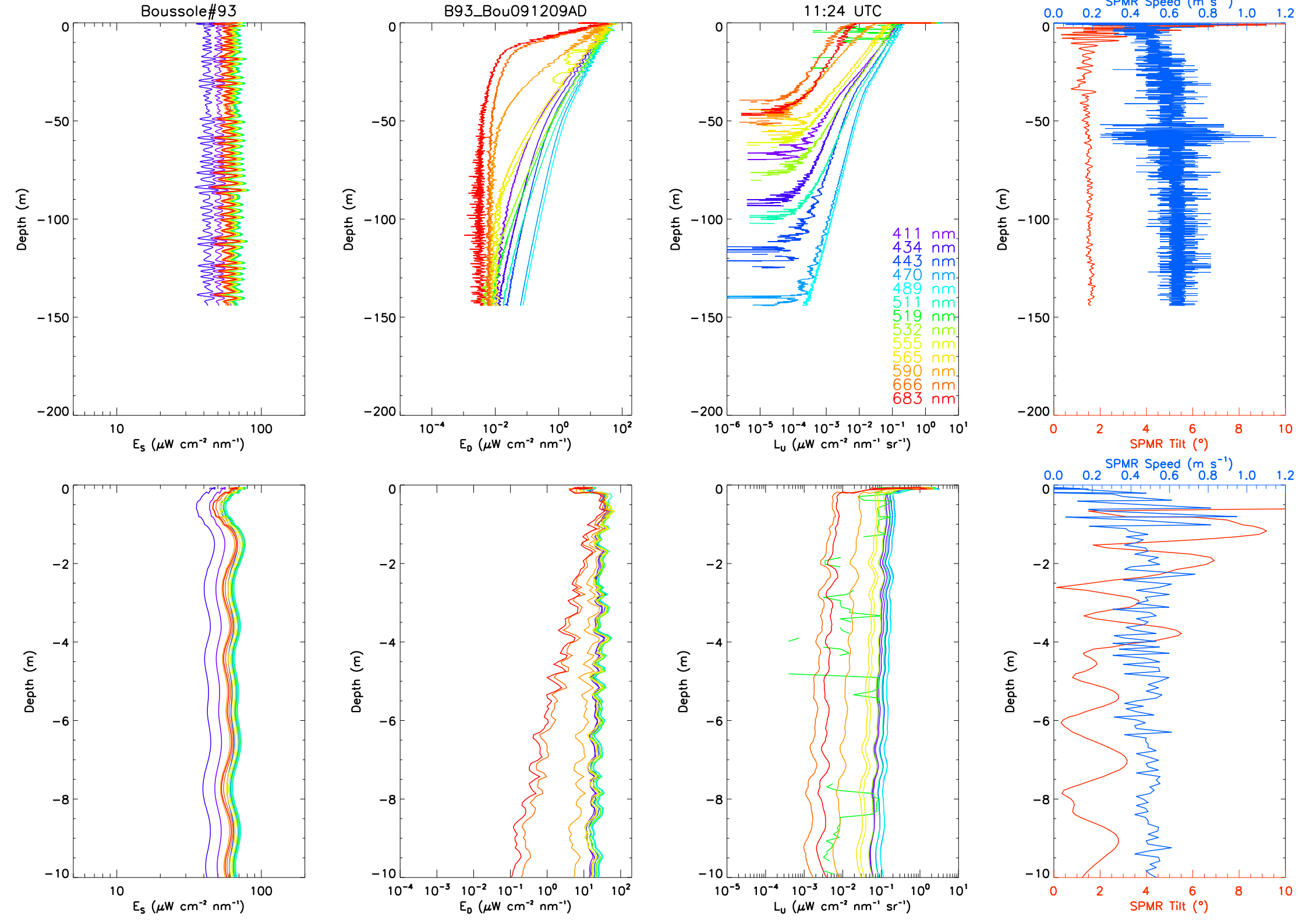
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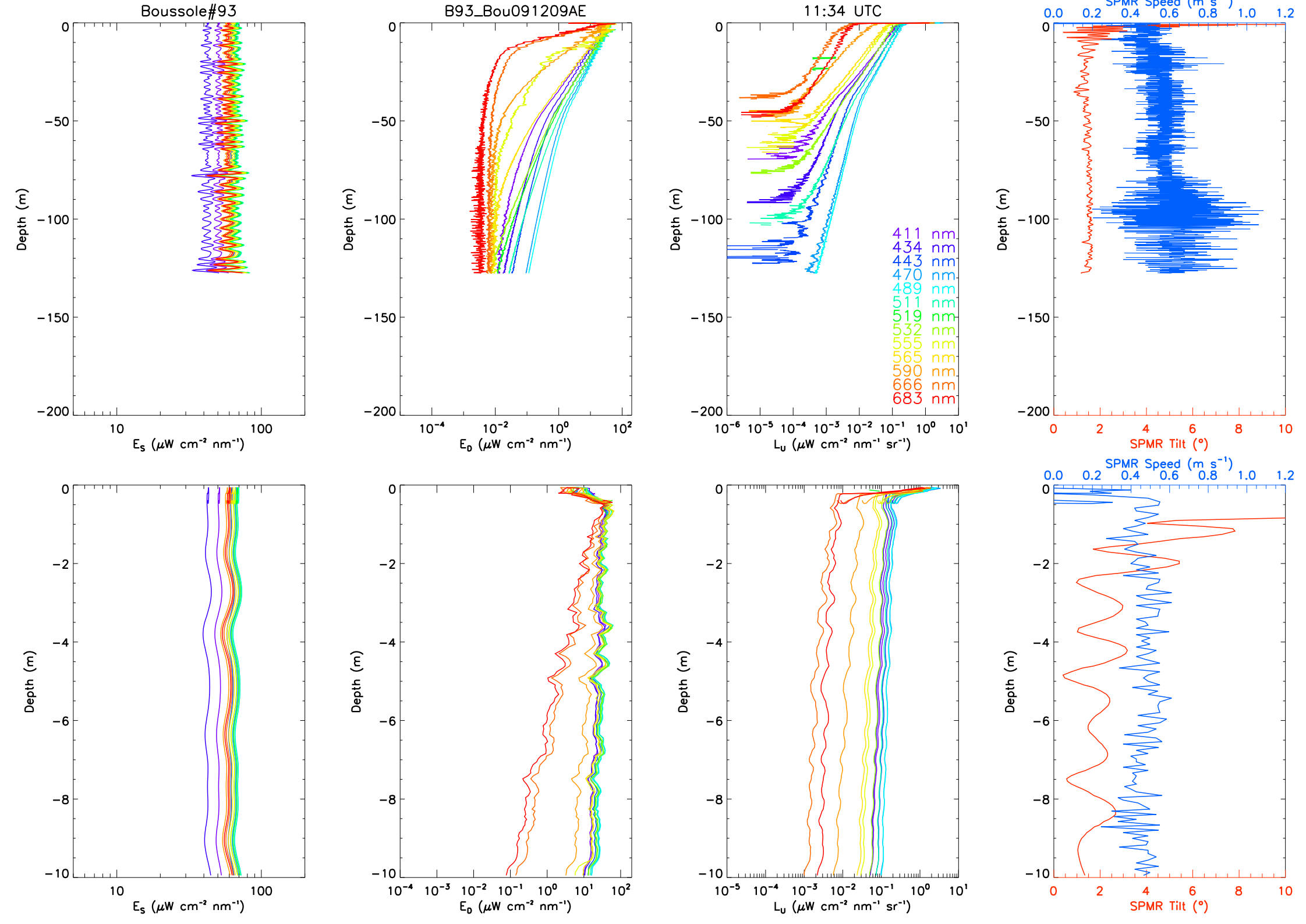
SPMR Speed (m s^{-1})
SPMR Tilt (°)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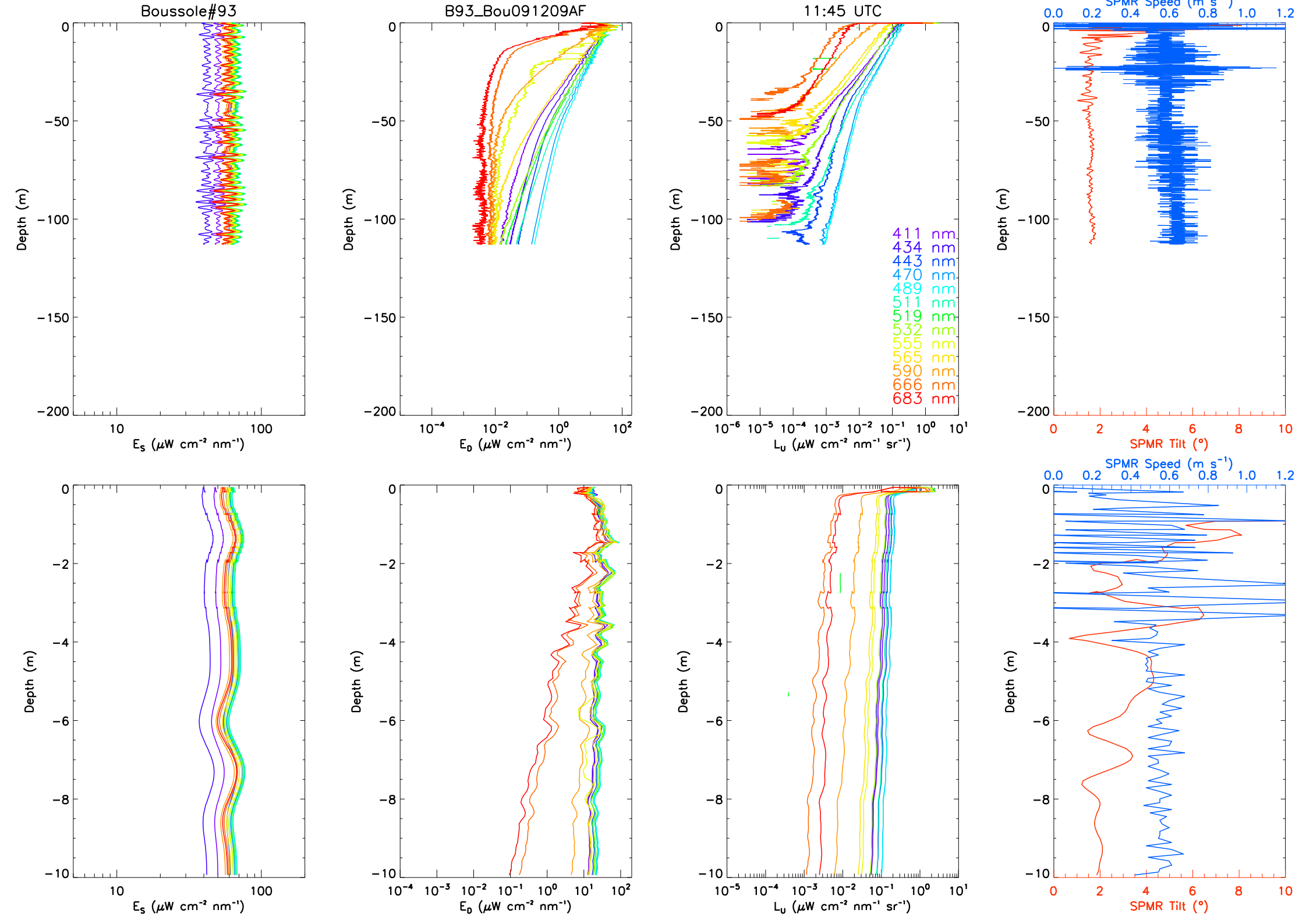
SPMR Speed (m s^{-1})
SPMR Tilt (°)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470 nm
489 nm
511 nm
519 nm
532 nm
555 nm
565 nm
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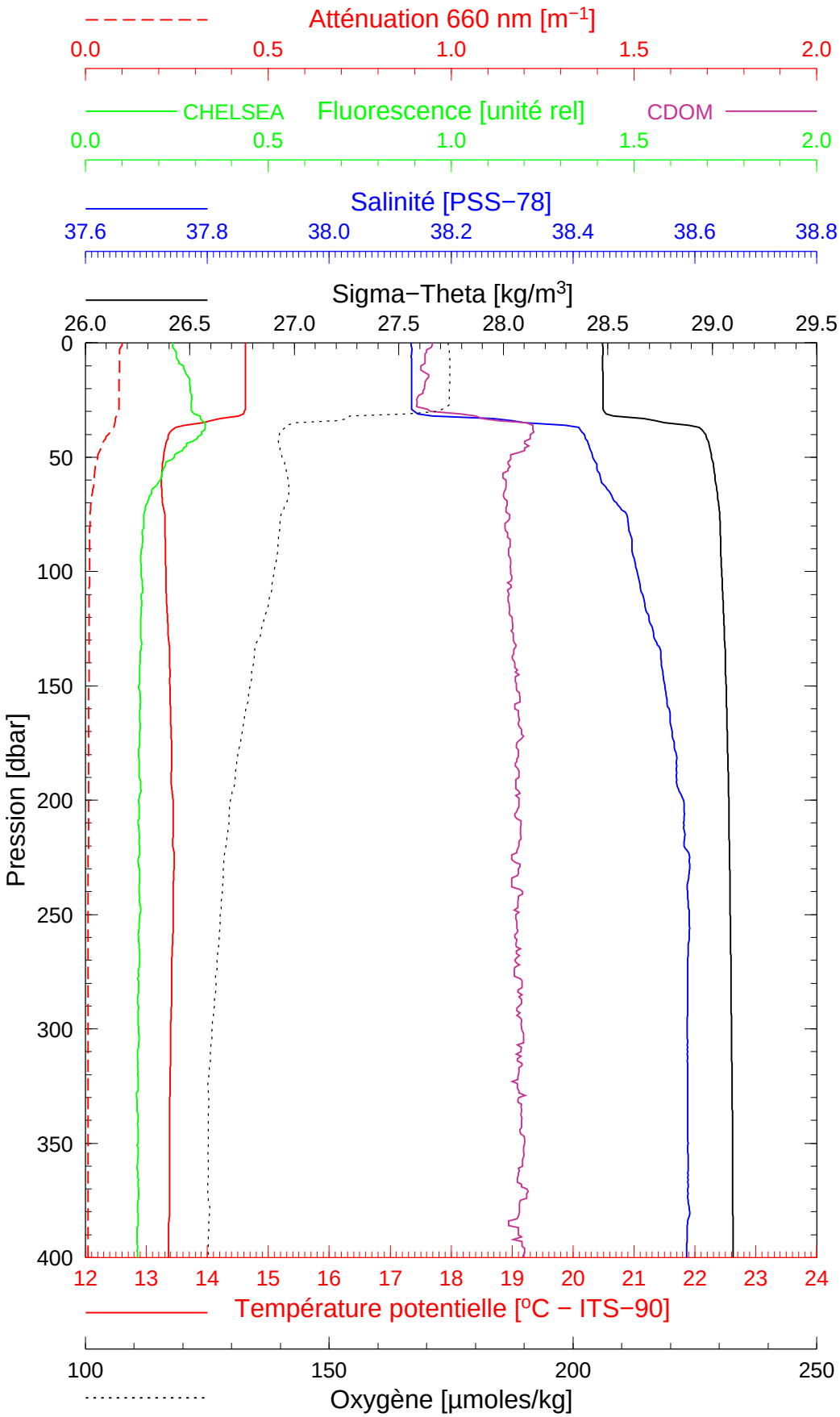
683 nm
SPMR Speed (m s^{-1})
SPMR Tilt (°)

BOUSSOLE 93 **09/12/2009** **BOUS091209_01**

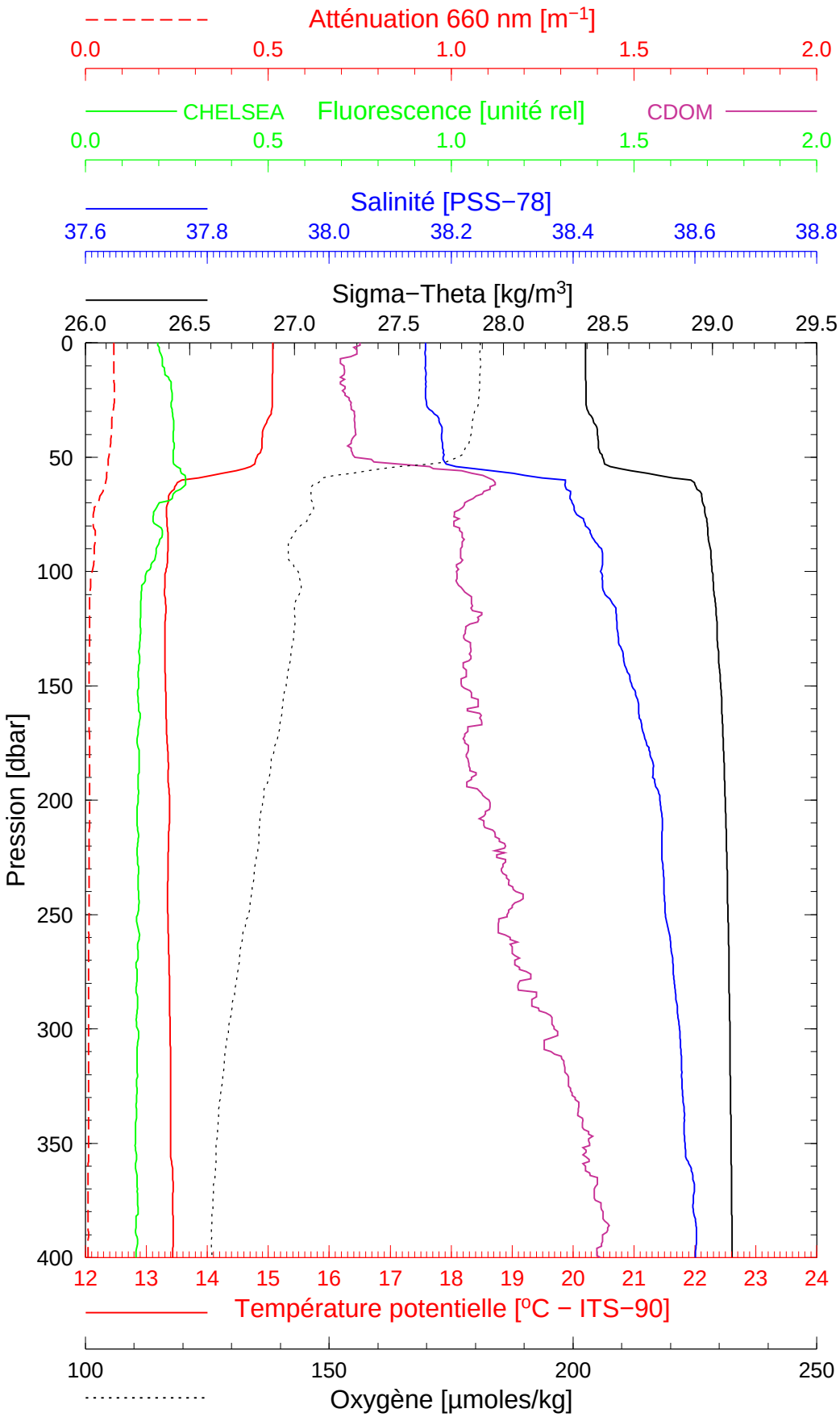
BOUS001



Date	*09/12/2009*	*Latitude*	*43°21.985*
Heure déb	*09h 30min [TU]*	*Longitude*	*07°53.526*

BOUSSOLE 93 **09/12/2009** **BOUS091209_02**

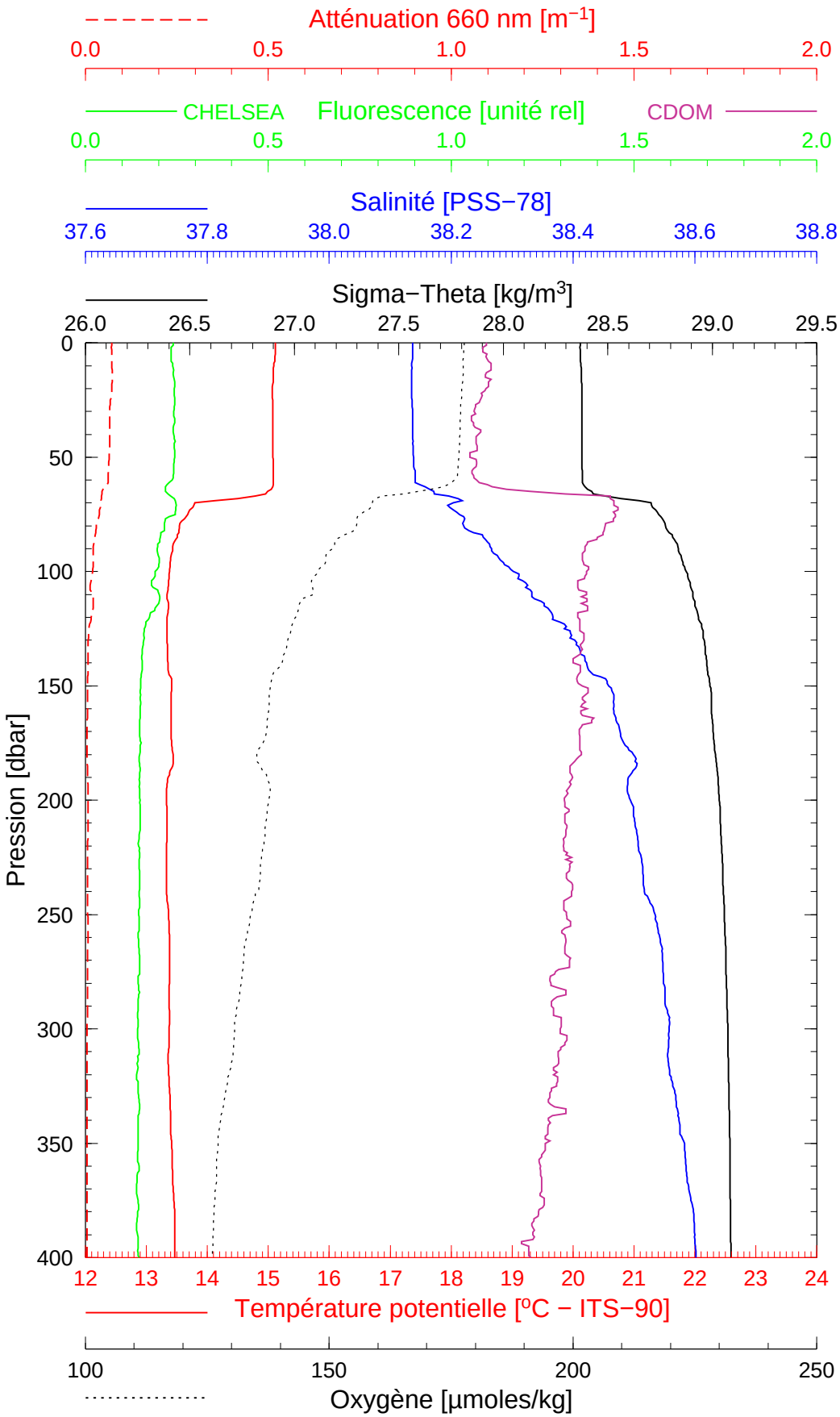
BOUS002



Date	*09/12/2009*	*Latitude*	*43°27.954*
Heure déb	*13h 08min [TU]*	*Longitude*	*07°41.838*

BOUSSOLE 93 **09/12/2009** **BOUS091209_03**

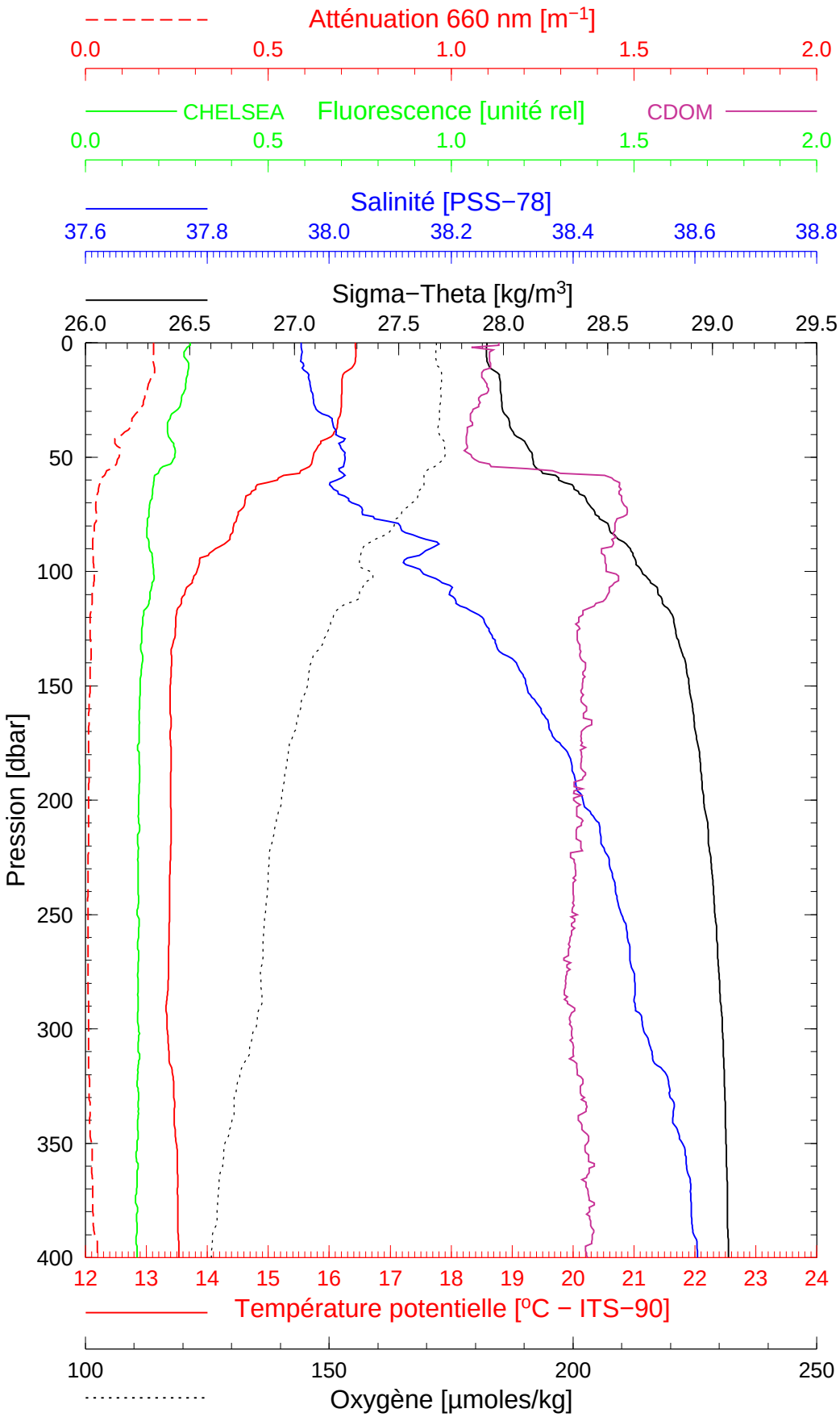
BOUS003



Date	*09/12/2009*	*Latitude*	*43°30.970*
Heure déb	*14h 00min [TU]*	*Longitude*	*07°36.954*

BOUSSOLE 93 **09/12/2009** **BOUS091209_04**

BOUS004



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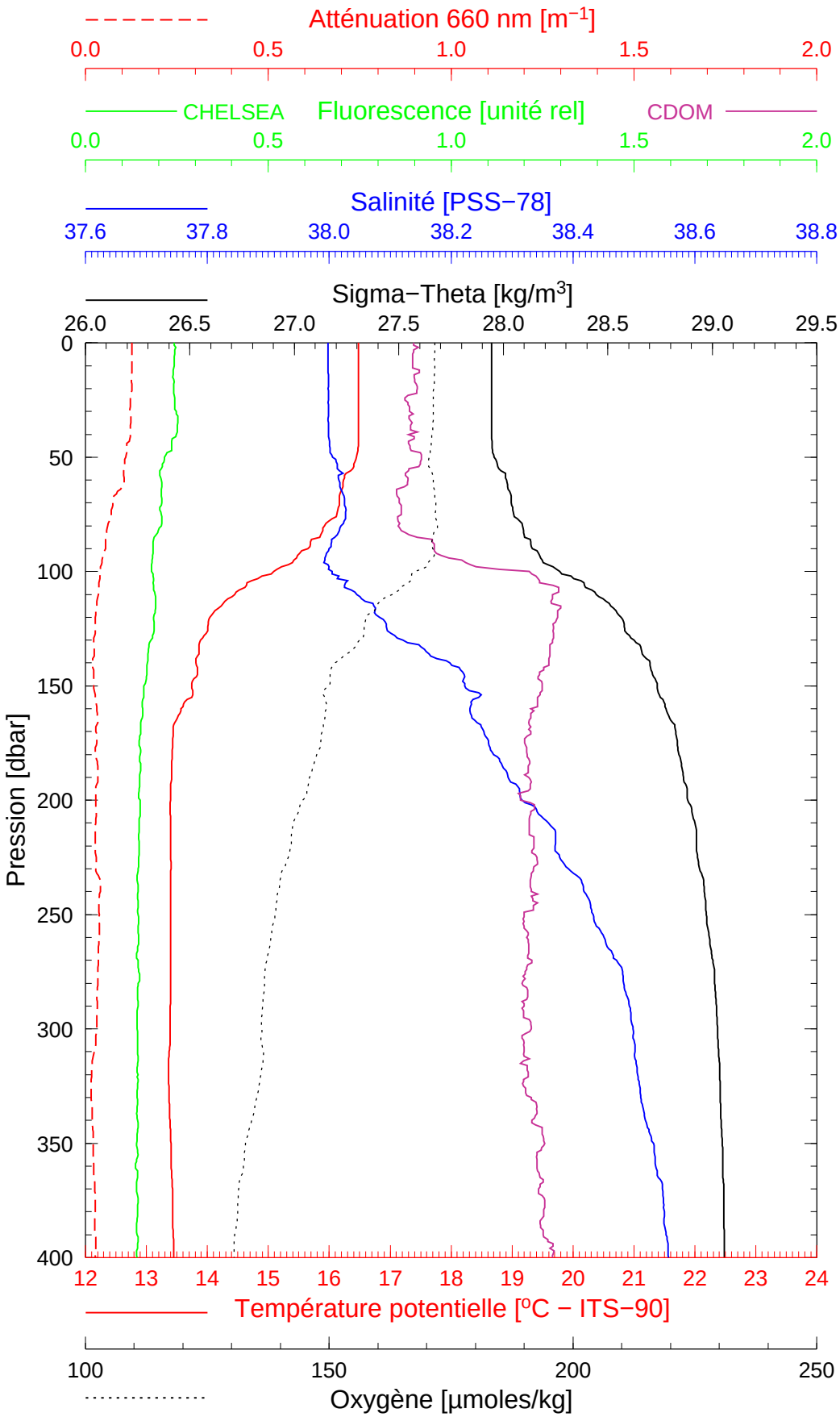
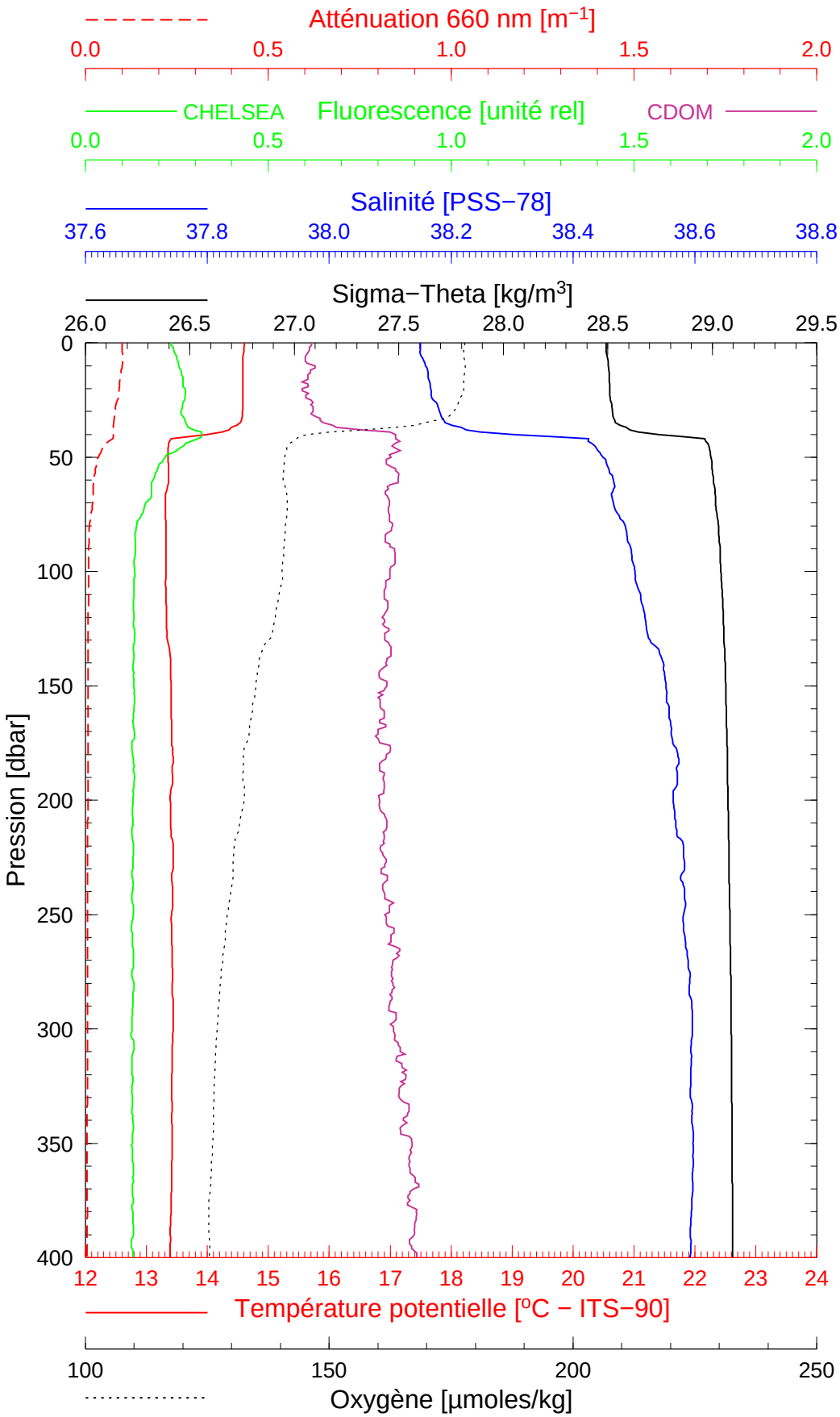
BOUS005



Date	*09/12/2009*	*Latitude*	*43°39.079*
Heure déb	*16h 48min [TU]*	*Longitude*	*07°21.057*

BOUSSOLE 93 **09/12/2009** **BOUS091210_01**

BOUS006



Date	*09/12/2009*	*Latitude*	*43°21.936*
Heure déb	*12h 31min [TU]*	*Longitude*	*07°54.140*

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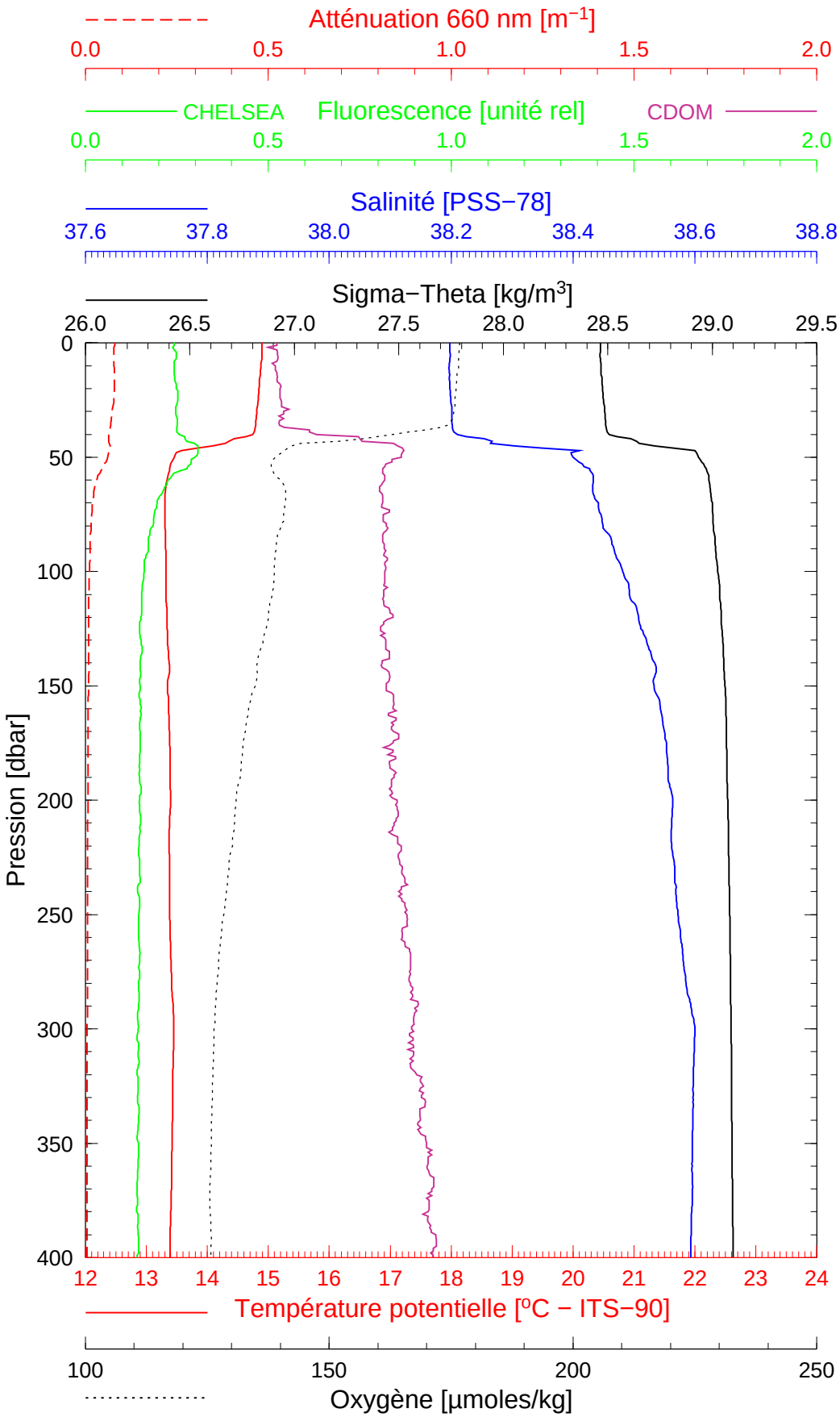
BOUS007



Date	*09/12/2009*	*Latitude*	*43°24.992*
Heure déb	*14h 03min [TU]*	*Longitude*	*07°47.910*