BOUSSOLE Monthly Cruise Report

Cruise 91
October 08 - 11, 2009

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

Science Personnel: Jean De Vaugelas, Emilie Diamond, Marcelo Dottori, Kerstin Ebert, Yves Lamblard, Thomas Lorthiois, Alexandre Thirouard, Christophe.

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

Figure 1. Meeting near BOUSSOLE buoy of Tara and Tethys II.

BOUSSOLE project

ESA/ESRIN contract N° 17286/03/I-OL

Deliverable from WP#400/200

October 15, 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

The last day of the cruise, MOOSE samples collected on Tara (boat of Tara Expeditions) will be taken on board of Tethys II to bring them at the Laboratoire d'Océanographique de Villefranche.

Cruise Summary

All of the four cruise days were used. The first and the second days were used for optical and CTD casts with sampling at the BOUSSOLE site. The first day was also used for buoy data retrieval and the second day for plankton net sampling. The third day was used for cleaning the buoy optical sensors and performing dark measurements and for completing the transect. The fourth day was used for buoy data retrieval, for optical and CTD casts with sampling at the BOUSSOLE site and for taking Tara samples on board.

Thursday 08 October 2009

The first day, sea state was good with some whitecaps and low wind blowing. The sky was blue to partly overcast. When arrived at the BOUSSOLE site, the main operations of the day were to put back the light blaze on top of the buoy, to clean ARGOS and CISCO connectors and to retrieval buoy data. The first attempt of CISCO connection with the buoy failed but the second succeeded. 2 SPMR profiles, 1 Secchi disk and 1 CTD cast with water sampling were also performed.

Friday 09 October 2009

The second cruise day, sea state was good with low wind blowing. The sky was overcast with some rain at noon. On site, 1 CTD cast with water sampling, 7 SPMR profiles and 2 Secchi disk were performed. 2 plankton net samples were also collected

Saturday 10 October 2009

The third cruise day, sea state was good with very low wind blowing and the sky was overcast. When arrived on site, divers went at sea for cleaning buoy sensors. Neoprene caps were also put on the HS4 and on the transmissometers for acquiring three dark measurements. Then, 1 CTD cast with water sampling was performed on the BOUSSOLE site and 6 other casts were performed on the transect between the site and the port of Nice.

Sunday 11 October 2009

The last cruise day, sea state was good with low wind blowing and the sky was blue. When arrived on site, 3 SPMR profiles were performed. Then 1 CTD cast began but because of a problem of computer it has been stopped. Another CTD cast with water sampling was then normally performed. After lunch, Emilie Diamond got on Tara to take MOOSE samples and came back on Tethys II with Floriane Desprez and a cameraman from France3 who was filming samples exchange for reportage. When both went back on Tara, an attempt of SPMR profiles failed because of an overheating of the deck-unit. So, 1 CTD cast with water sampling and 1 Secchi disk were performed. A CISCO connection was also established for data retrieval before leaving.

Cruise Report

Thursday 08 October 2009 (UTC)

People on board: Emilie Diamond, Marcelo Dottori, Thomas Lorthiois and Alexandre Thirouard.

0610 Departure from the Nice port.
0925 Arrival at the BOUSSOLE site.
0940 Zodiac at sea for climbing on the buoy. A light blaze installed on the top of the buoy and CISCO and ARGOS connections cleaned.
1000 Lunch.
1115 Attempt CISCO connection with the buoy: unsuccessful.
1125 SPMR 01, 02.
1230 Secchi disk 01 (27 m).
1245 CTD 01, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC and Ap.
1335 Attempt of SPMR profiles: sky too unstable.
1415 CISCO connection with buoy and data retrieval.
1450 Niskin bottle for water sampling at 5 m for TSM.
1500 Departure to the Nice port.
1815 Arrival at the Nice port.

Friday 09 October 2009 (UTC)

People on board: Emilie Diamond and Thomas Lorthiois.

0410 Departure from the Nice port.
0725 Arrival at the BOUSSOLE site.
0730 CTD 02, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, Ap and TSM.
0800 SPMR 03, 04, 05, 06, 07.
0930 2 x Plankton net, 0-100 m.
0935 Secchi disk 02 (22 m).
1000 Lunch.
1100 SPMR 08, 09.
1145 Secchi disk 03 (25 m).
1150 Departure to the Nice port.
1500 Arrival at the Nice port.

Saturday 10 October 2009 (UTC)

People on board: Jean De Vaugelas, Emilie Diamond, Kerstin Ebert, Yves Lamblard and Christophe (diver).

0500 Departure from the Nice port.
0815 Arrival at the BOUSSOLE site.
0825 Diving on the buoy for cleaning instruments. Dark HS4 and transmissometers measurements at 08:30, 08:45 and 09:00.
0930 CTD 03, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, Ap and TSM.
1015 Departure to the first transect station.
1055 CTD 04, 400 m, station 01 (43°25'N 07°48'E).
1200 CTD 05, 400 m, station 02 (43°28'N 07°42'E).
1255 CTD 06, 400 m, station 03 (43°31'N 07°37'E).
1355 CTD 07, 400 m, station 04 (43°34'N 07°31'E).
1450 CTD 08, 400 m, station 05 (43°37'N 07°25'E).
1545 CTD 09, 400 m, station 06 (43°39'N 07°21'E).
1615 Departure to the Nice port.
1645 Arrival at the Nice port.

Sunday 11 October 2009 (UTC)

People on board: Emilie Diamond and Alexandre Thirouard.

0510 Departure from the Nice port.
0815 Arrival at the BOUSSOLE site.
0820 SPMR 10, 11, 12.
0915 CTD 10, 130 m: stopped because of computer problems.
0930 CTD 11, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, Ap and TSM.
1015 Lunch.
1130 Zodiac at sea for taking MOOSE samples from Tara.
1210 Attempt of SPMR profiles: problems with the deck unit.
1230 CTD 12, 400 m with water sampling at 200, 150, 80, 70, 60, 50, 40, 30, 20, 10 and 5 m for HPLC, Ap and TSM.
1310 Secchi disk 04 (25 m).
1315 CISCO connection with buoy and data retrieval.
1325 Departure to the Nice port.
1635 Arrival at the Nice port.

Calculated Swath paths for the MERIS Sensor (ESOV Software)

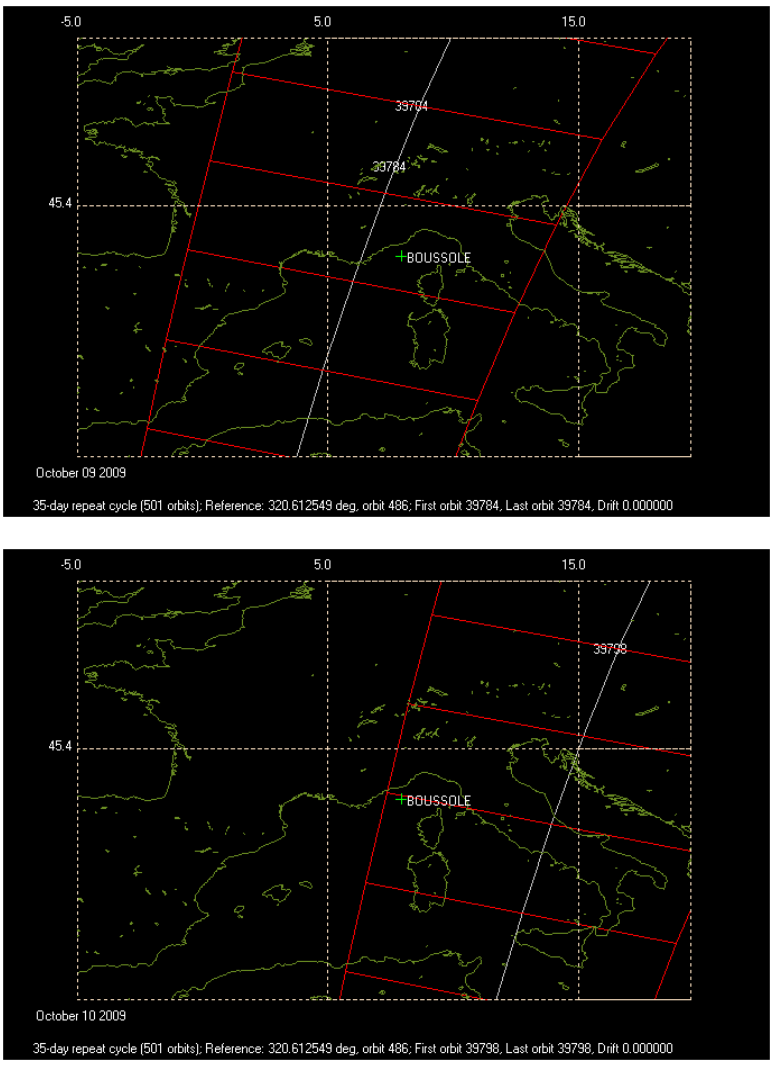
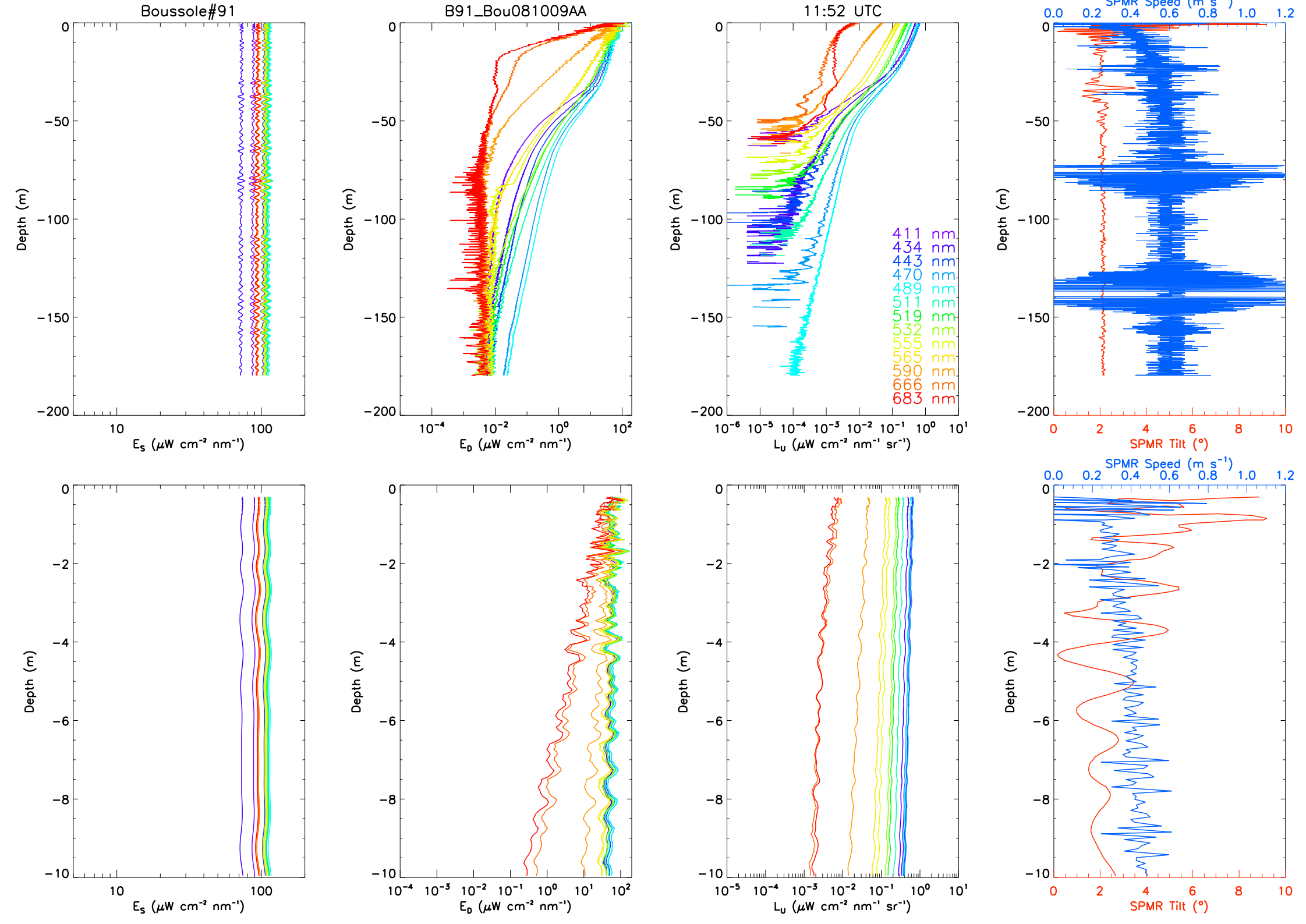


Figure 2. Calculated swath paths for MERIS (Esov software) above BOUSSOLE site for 9 and 10 October 2009.

Appendix

Cruise Summary Table for Boussole 91

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
	Bou081009black1				11:32	3:00																			
		Bou081009AA			11:52	5:21	180	43	21.795	7	53.446	blue	Sc & Ac	2	7	116	1016.5	84	good	22.5		calm	0.5		yes
		Bou081009AB			12:07	5:43	189	43	21.749	7	53.331	blue	Sc & Ac	2	7	116	1016.5	84	good	22.5		calm	0.5		yes
08/10/09	Bou081009black2				12:30	3:00																			
				Secchi01	12:30	4:00	17	43	22	7	54	blue		3					good			calm			
			CTDBOUS001	HPLC & Ap	12:54	28:00	400	43	21.936	7	53.673	blue		3	5	156	1016.5	77		22.8	22.8	calm			
				Niskin: TSM	14:50	5:00	5	43	22	7	54														
			CTDBOUS002	HPLC, Ap & TSM	07:35	22:00	400	43	22.207	7	53.435	overcast		7	11	259	1015.5	86		23.2	22.8	calm			no
	Bou091009black1				08:08	3:00																			
		Bou091009AB			08:17	1:55	53	43	22.335	7	52.970	overcast	Ns	7	7	350	1015.9	85	good	22.9		calm	0.3		no
		Bou091009AD			08:34	1:37	46	43	22.277	7	52.679	overcast	Ns	7	7	350	1015.9	85	good	22.9		calm	0.3		no
	Bou091009black2				09:22	3:00																			
	Bou091009black1				08:08	3:00																			
		Bou091009AG			08:47	4:51	156	43	22.224	7	52.424	overcast	Ns	8	4	335	1016.0	86	good	23.0		calm	0.3		no
09/10/09		Bou091009AH			08:57	4:33	153	43	22.219	7	52.290	overcast	Ns	8	4	335	1016.0	86	good	23.0		calm	0.3		no
		Bou091009AI			09:08	4:50	160	43	22.212	7	52.14	overcast	Ns	8	4	335	1016.0	86	good	23.0		calm	0.3		no
	Bou091009black2				09:22	3:00																			
				Secchi02	09:35	4:00	22	43	22	7	54	overcast		8					good			calm			no
	Bou091009black3				11:00	3:00																			
		Bou091009AJ			11:07	5:07	156	43	22.141	7	53.180	overcast	Ns	8	3	131	1016.1	89	good	21.5		calm	0.4		no
		Bou091009AK			11:20	4:45	151	43	22.141	7	53.069	overcast	Ns	8	3	131	1016.1	89	good	21.5		calm	0.4		no
	Bou091009black4				11:45	3:00																			
				Secchi03	11:45	4:00	25	43	22	7	54	overcast		8					good			calm			no
			CTDBOUS003	HPLC, Ap & TSM	09:45	26:00	400	43	22.076	7	53.684	overcast		7	2	225	1013.4	79		21.3	22.8	calm			no
			CTDBOUS004		11:05	26:00	400	43	25.171	7	47.858	overcast		6	6	219	1012.8	73		23.4	22.9	calm			no
			CTDBOUS005		12:04	26:00	400	43	28.000	7	41.870	overcast		4	5	271	1012.1	79		21.3	22.6	moved			no
10/10/09			CTDBOUS006		13:02	24:00	400	43	31.032	7	36.825	overcast		6	2	172	1012.0	78		22.2	22.9	moved			no
			CTDBOUS007		13:59	25:00	400	43	33.983	7	30.720	blue		3	7	230	1011.7	75		25.2	22.9	calm			no
			CTDBOUS008		14:55	27:00	400	43	37.038	7	24.869	blue		3	6	262	1011.9	78		22.7	22.9	calm			no
			CTDBOUS009		15:46	26:00	400	43	38.997	7	20.955	overcast		6	8	52	1011.8	78		21.8	23.0	calm			no
	Bou111009black1				08:23	3:00																			
		Bou111009AA			08:30	4:47	156	43	21.793	7	53.301	blue	Cc & Cs	1	4	86	1013.8	79	good	21.9		calm	0.6		no
		Bou111009AC			08:43	3:59	133	43	21.750	7	53.252	blue	Cc & Cs	1	4	86	1013.8	79	good	21.9		calm	0.6		no
		Bou111009AD			08:55	4:08	138	43	21.759	7	53.133	blue	Cc & Cs	1	4	86	1013.8	79	good	21.9		calm	0.6		no
11/10/09	Bou111009black2				09:08	3:00																			
			CTDBOUS010		09:18	5:00	130	43	21.595	7	53.188	blue		1	3	193	1013.7	76		22.3	22.8	calm			no
			CTDBOUS011	HPLC, Ap & TSM	09:37	24:00	400	43	21.567	7	53.21	blue		1	3	193	1013.7	76		22.3	22.8	calm			no
			CTDBOUS012	HPLC, Ap & TSM	12:37	27:00	400	43	21.826	7	54.135	blue		1	2	89	1013.2	76		22.3	22.9	calm			no
				Secchi04	13:10	4:00	25	43	22	7	54	blue		1					good			calm			no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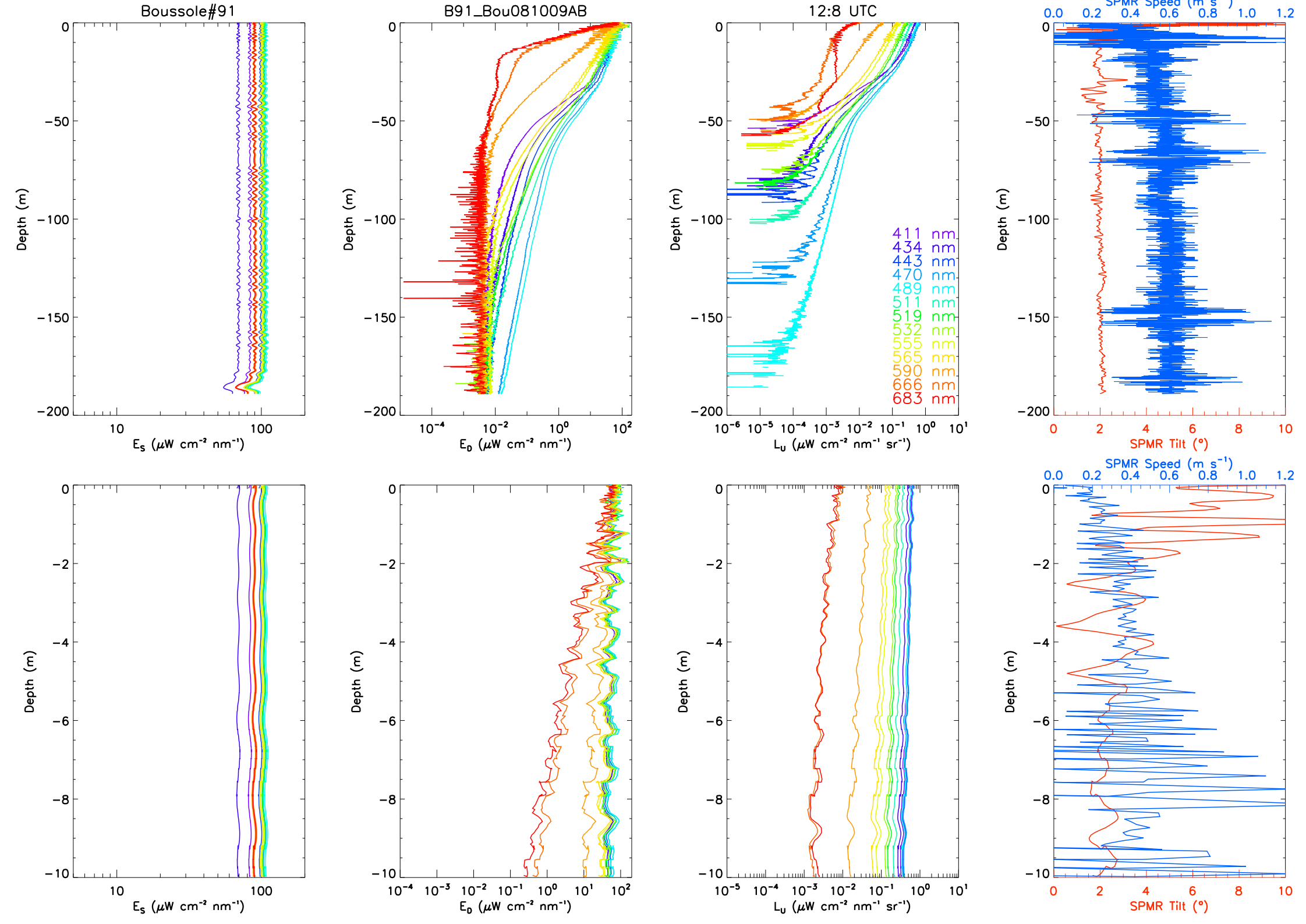
SPMR Tilt (°)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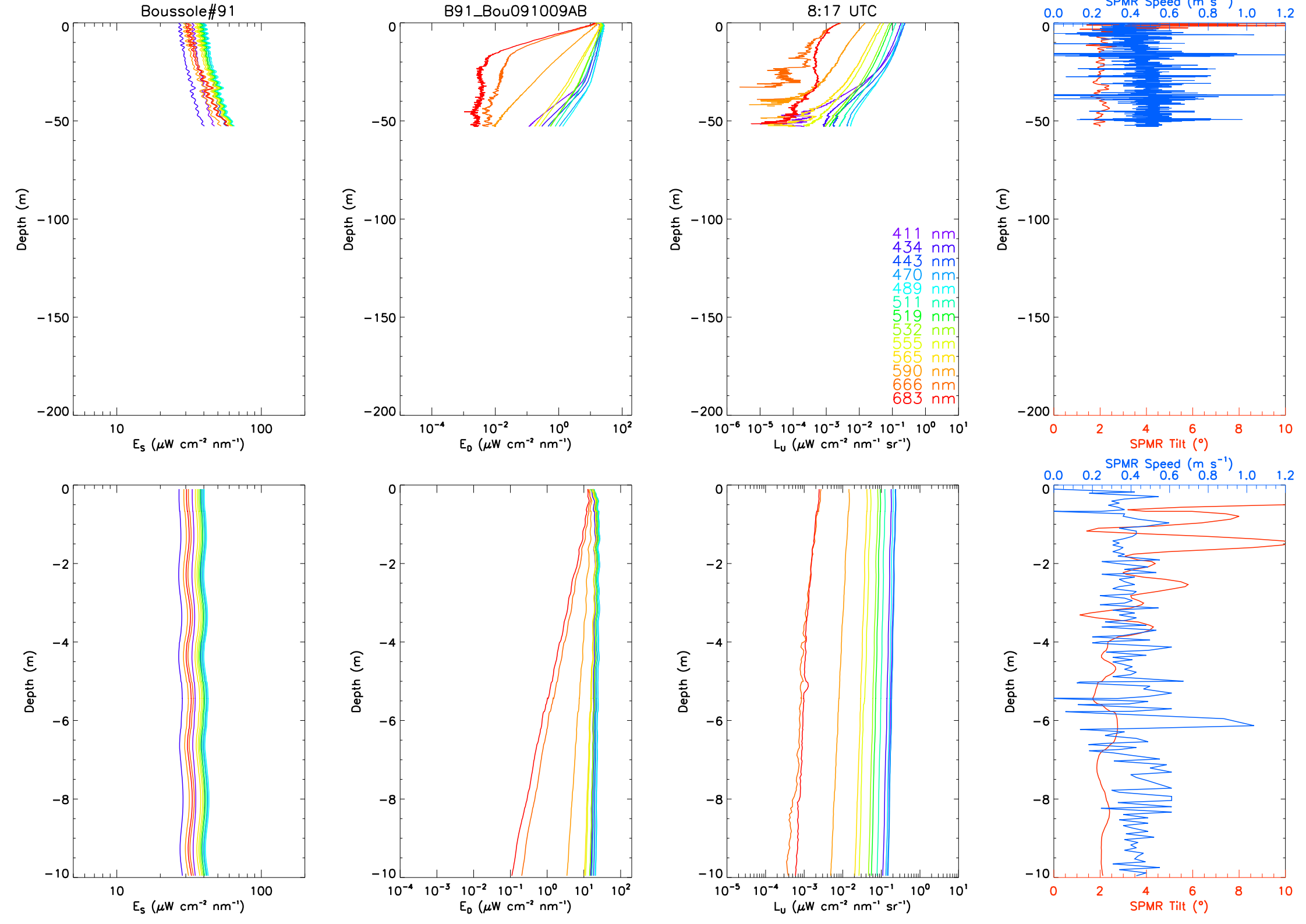
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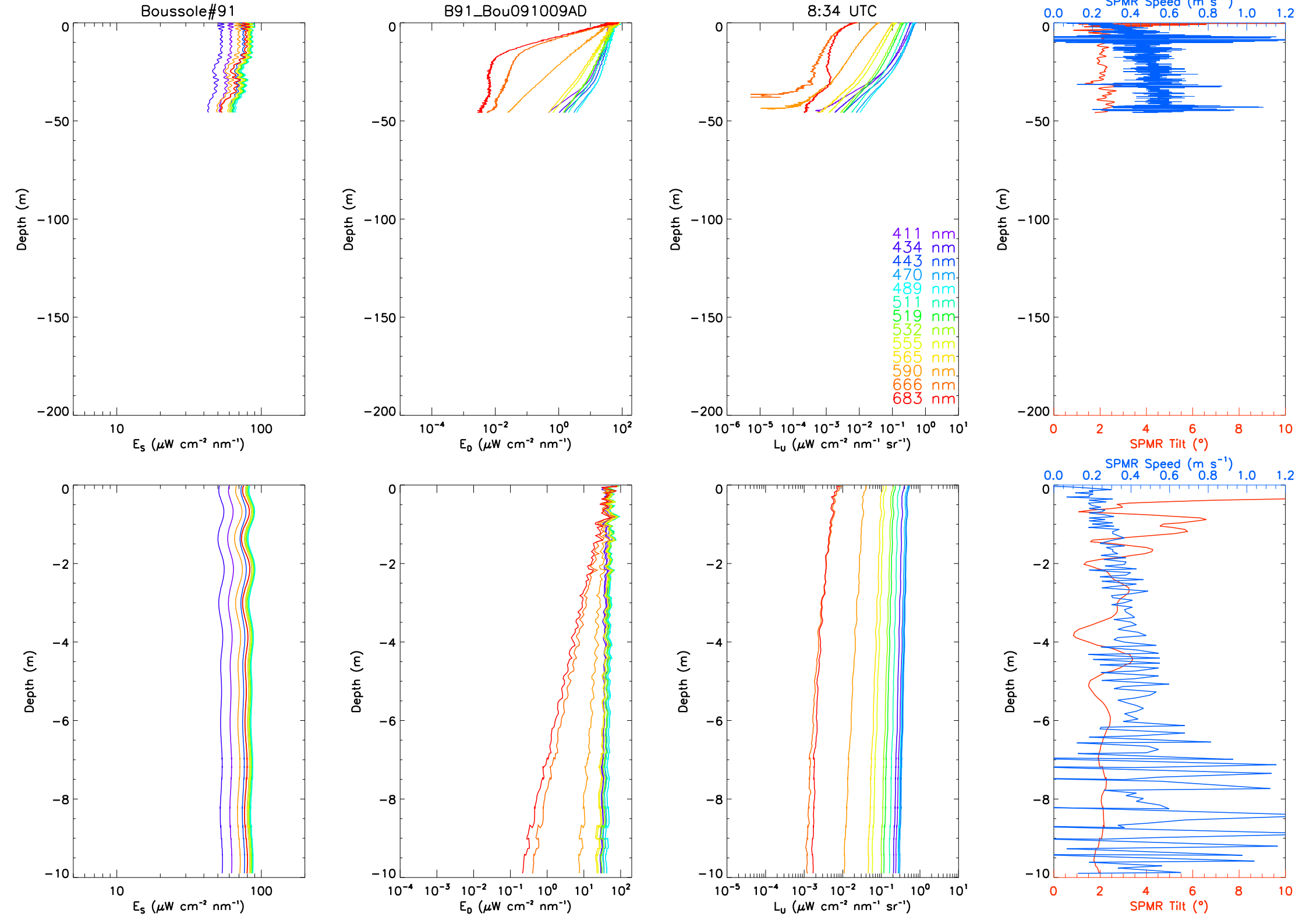
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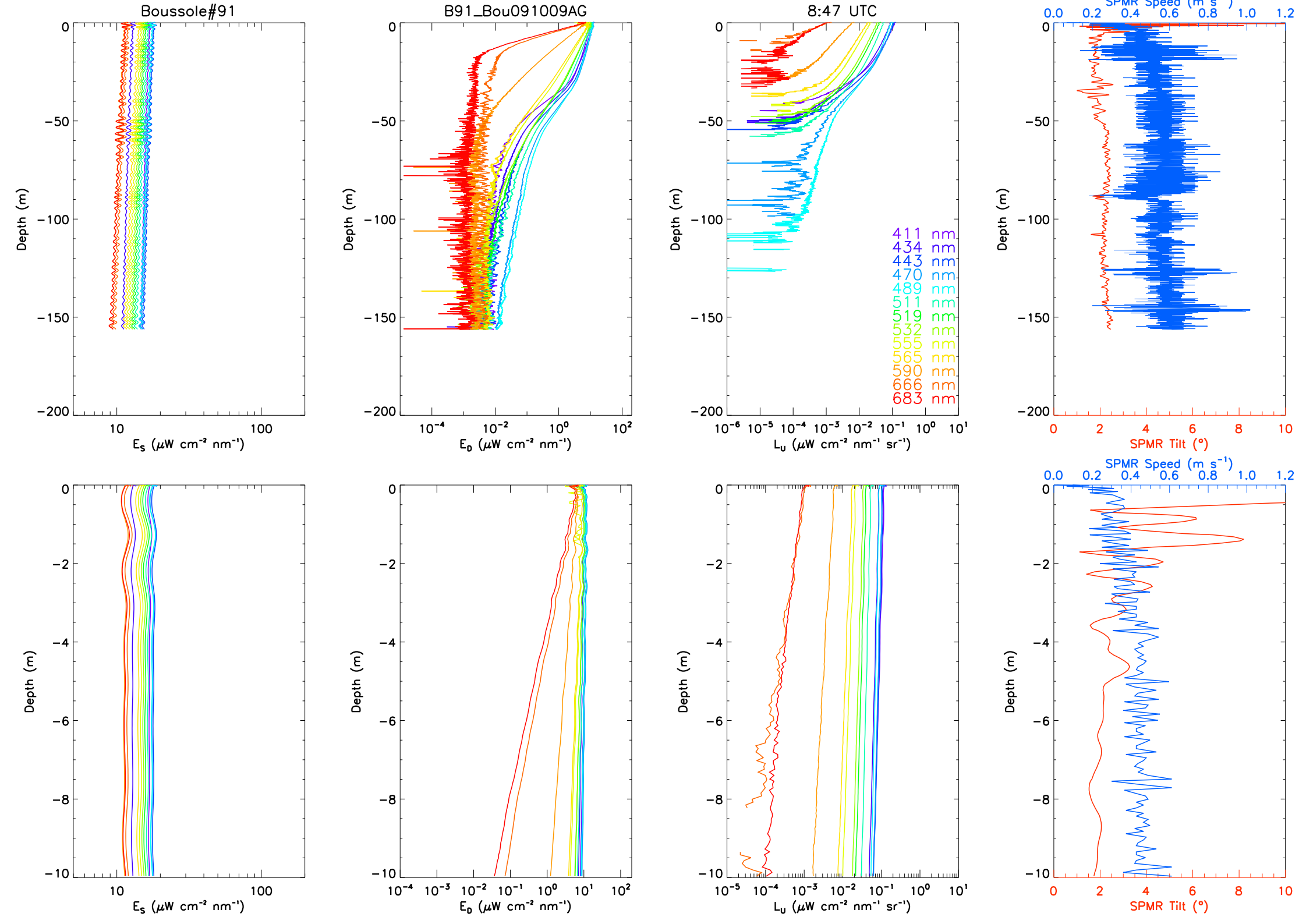
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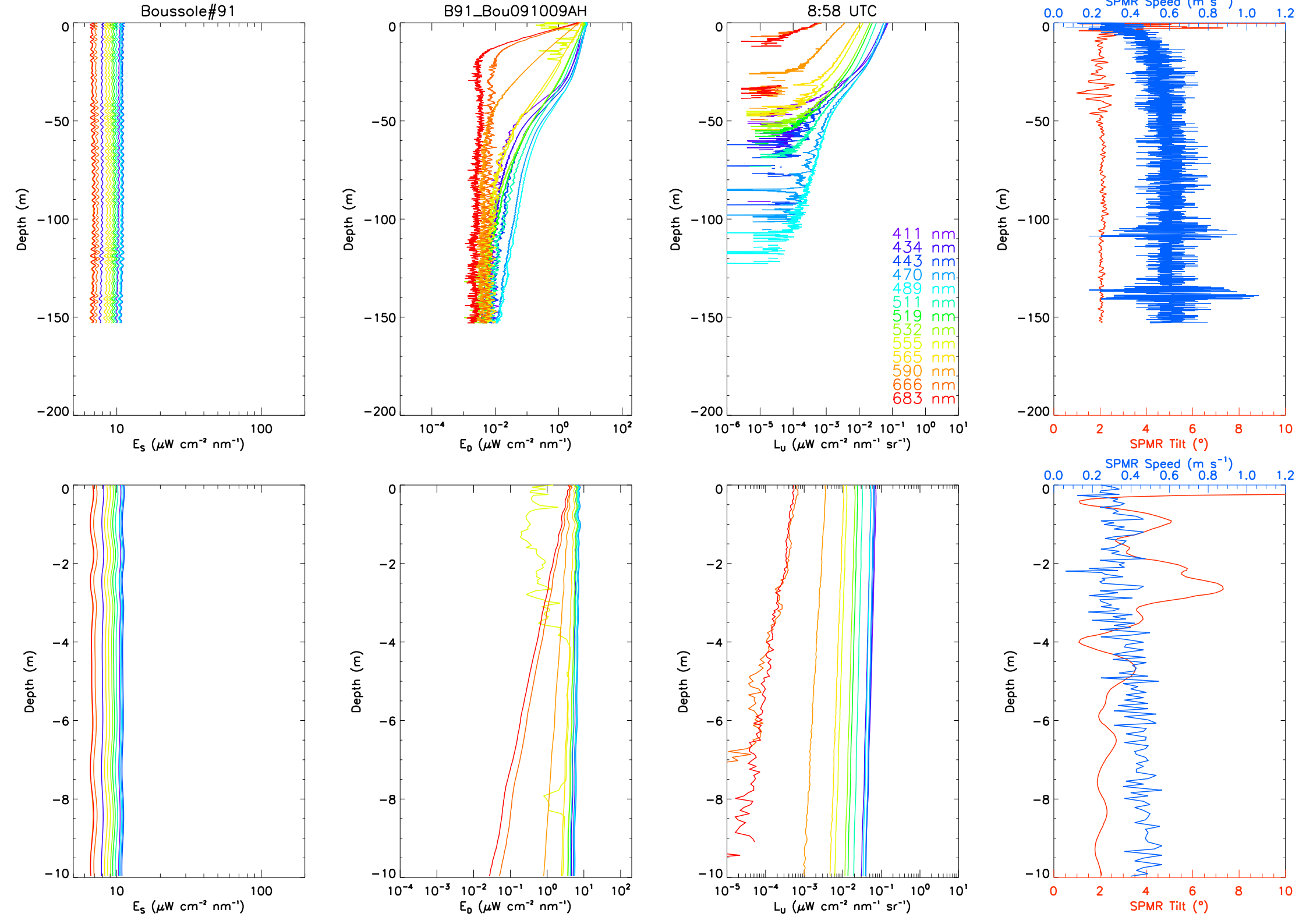
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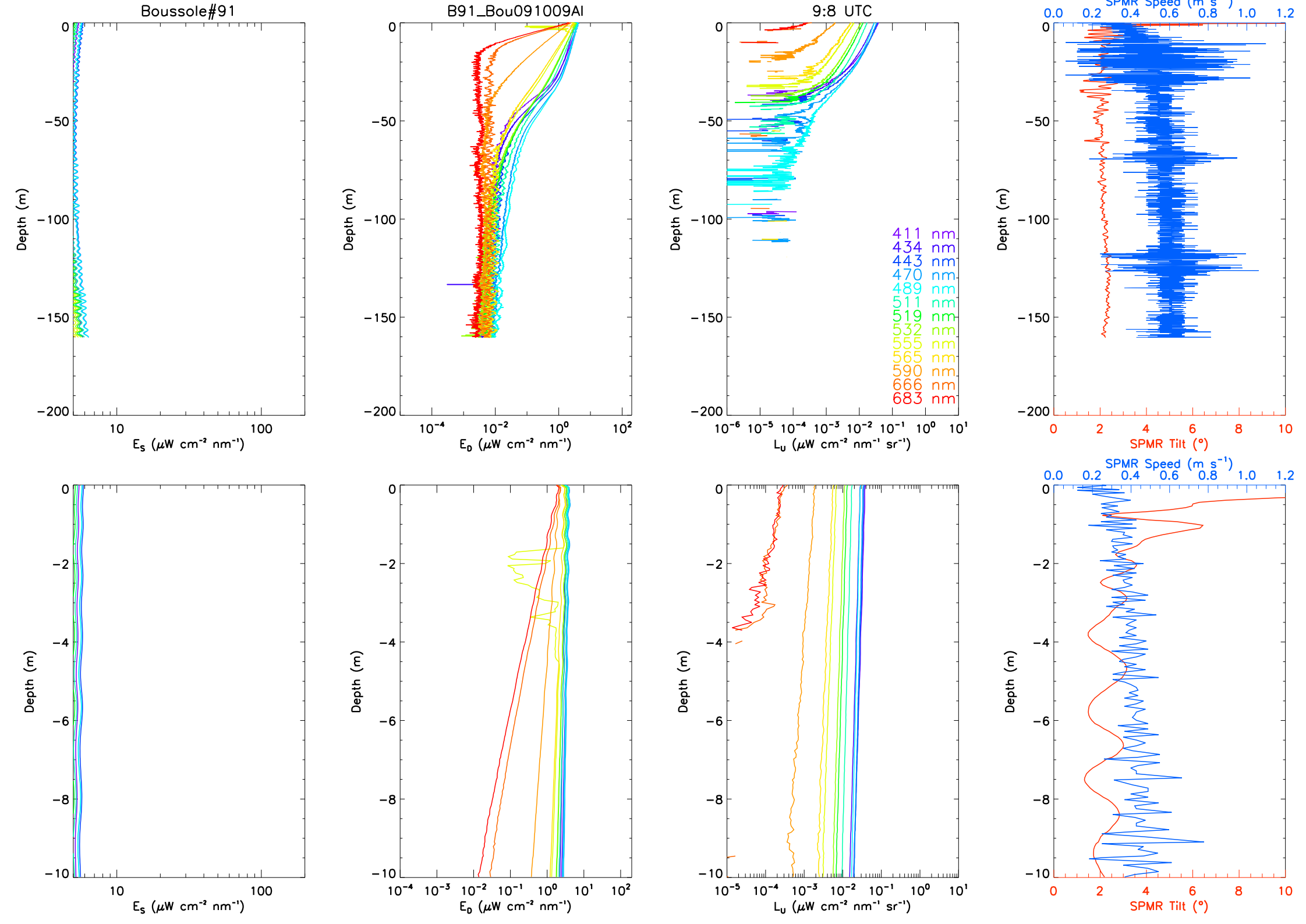
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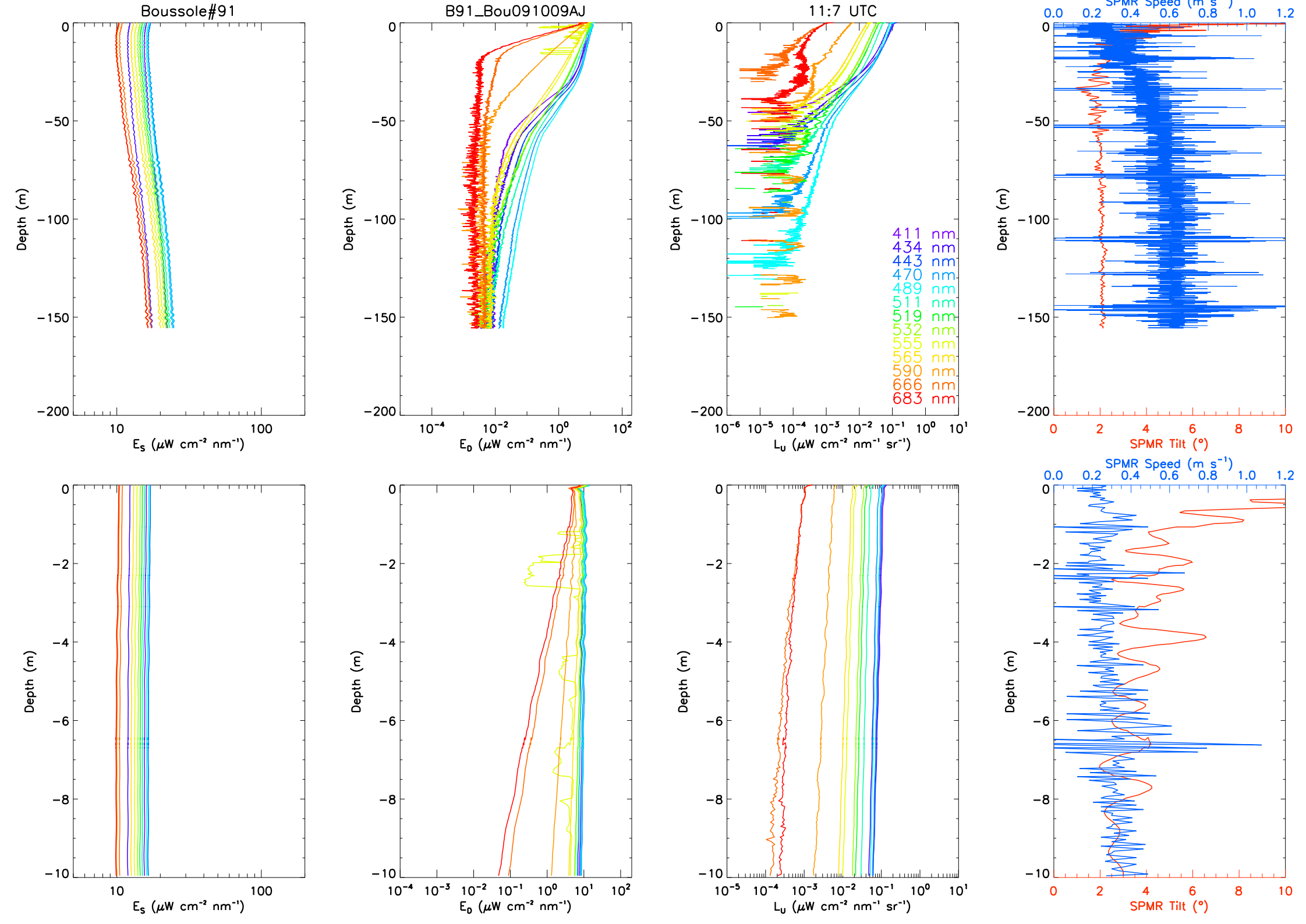
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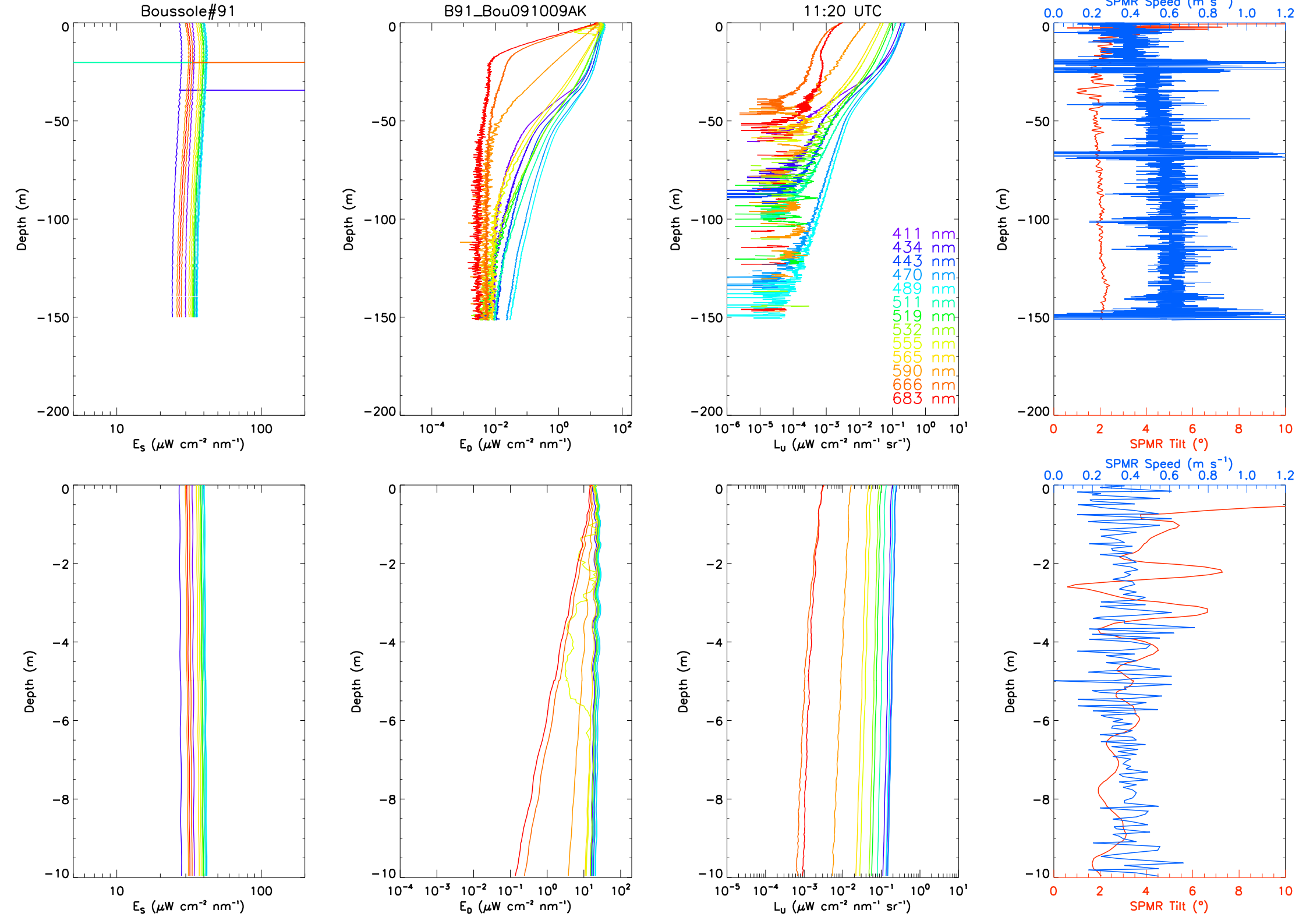
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565 nm
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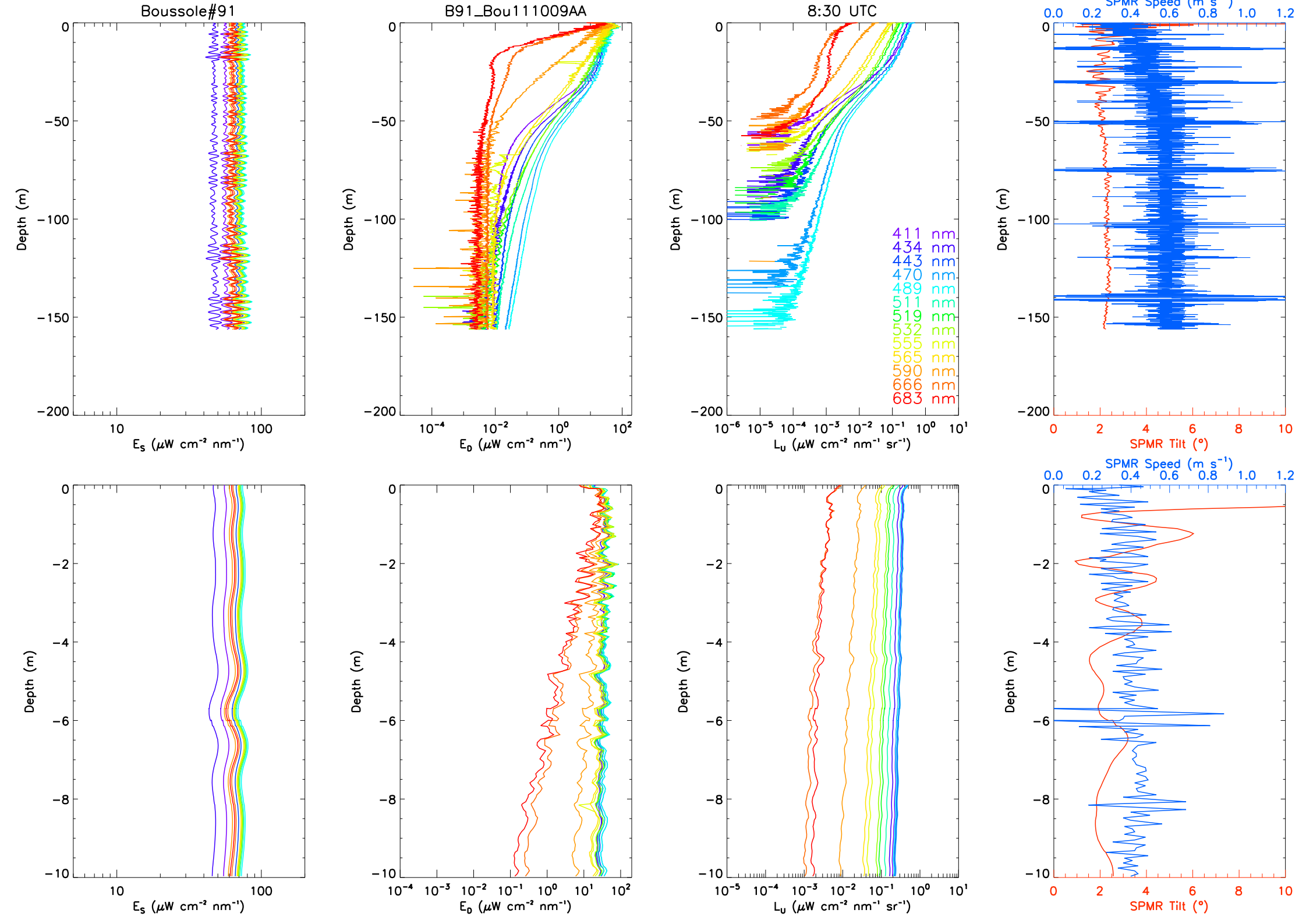
666 nm
683 nm
SPMR Speed (m s^{-1})
SPMR Tilt (°)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SPMR Speed (m s^{-1})
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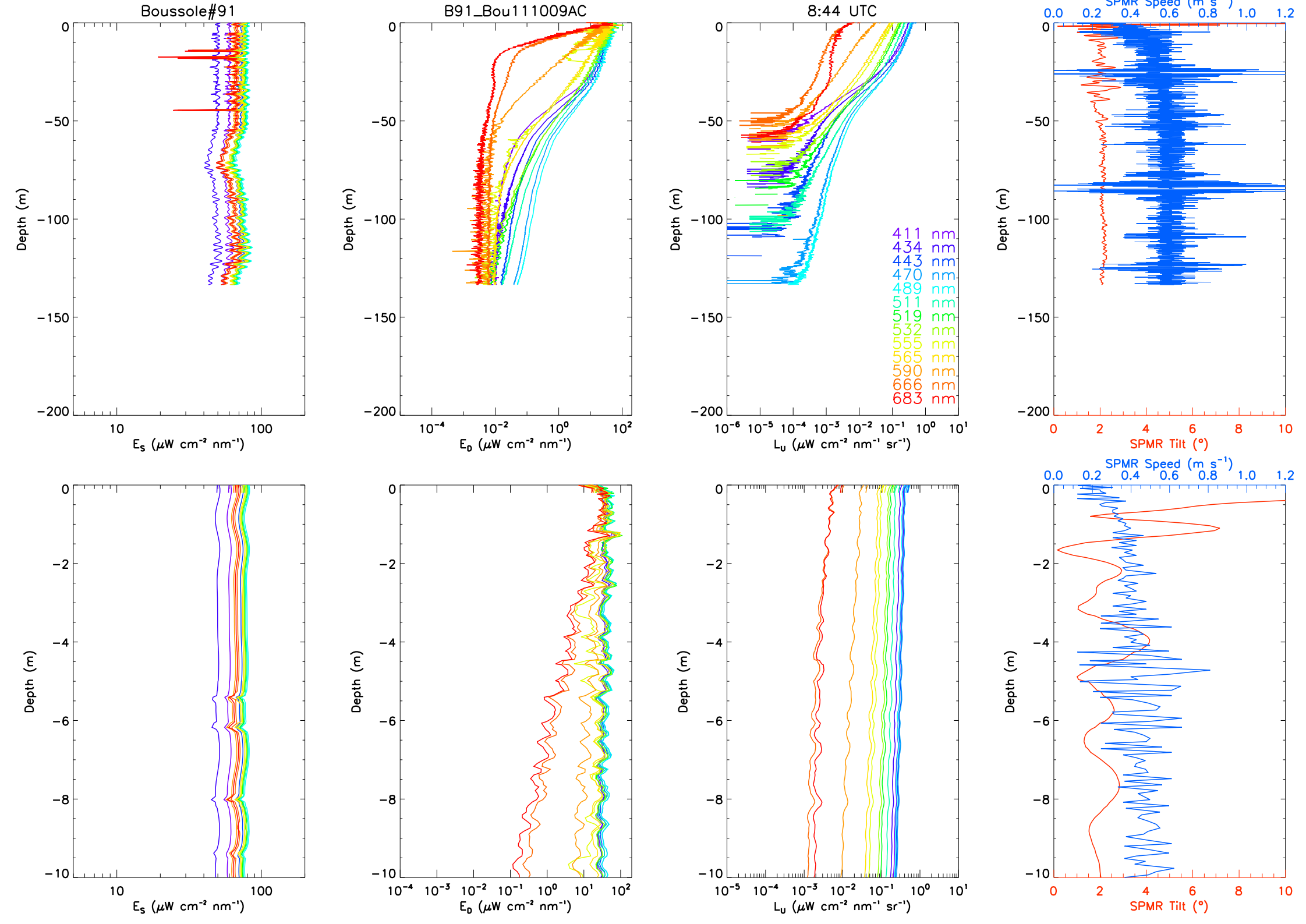
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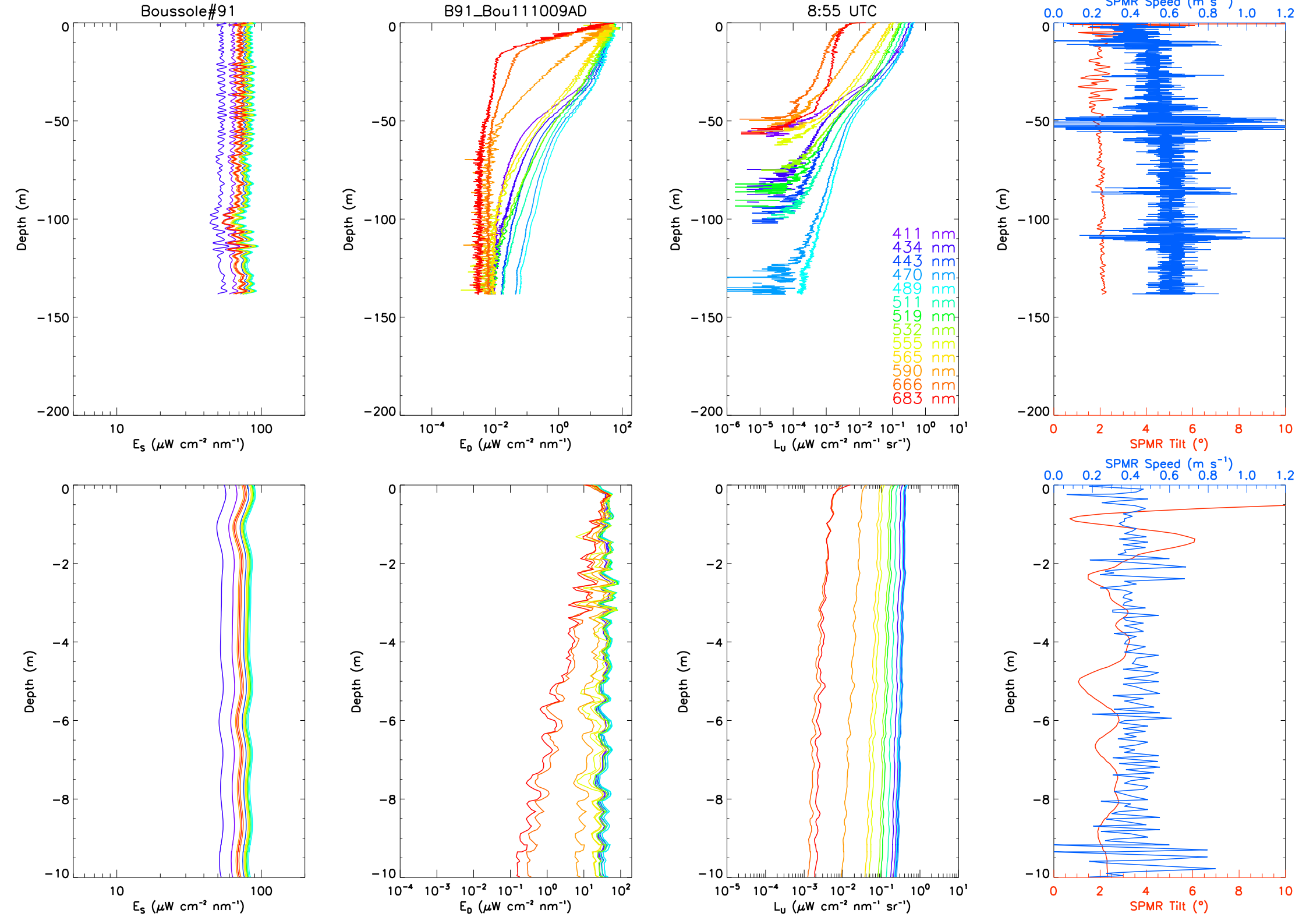
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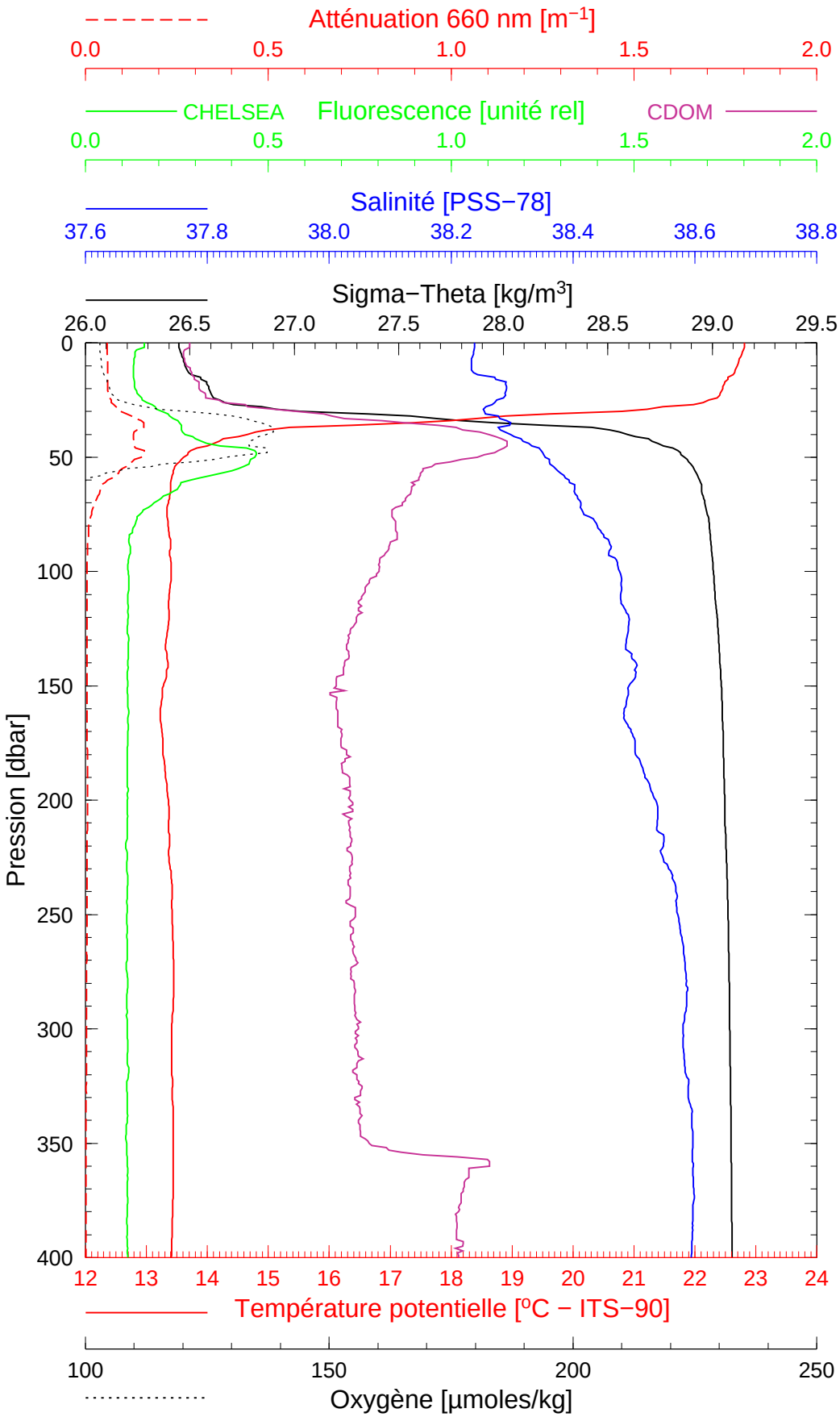
E_S (μW cm^{-2} nm^{-1})
E_D (μW cm^{-2} nm^{-1})
L_u (μW cm^{-2} nm^{-1} sr^{-1})
SPMR Speed (m s^{-1})
SPMR Tilt (°)
411 nm
434 nm
443 nm
470 nm
489 nm
511 nm
519 nm
532 nm
555 nm
565 nm
590 nm
666 nm
683 nm

BOUSSOLE 91 **08/10/2009** **BOUS091008_01**

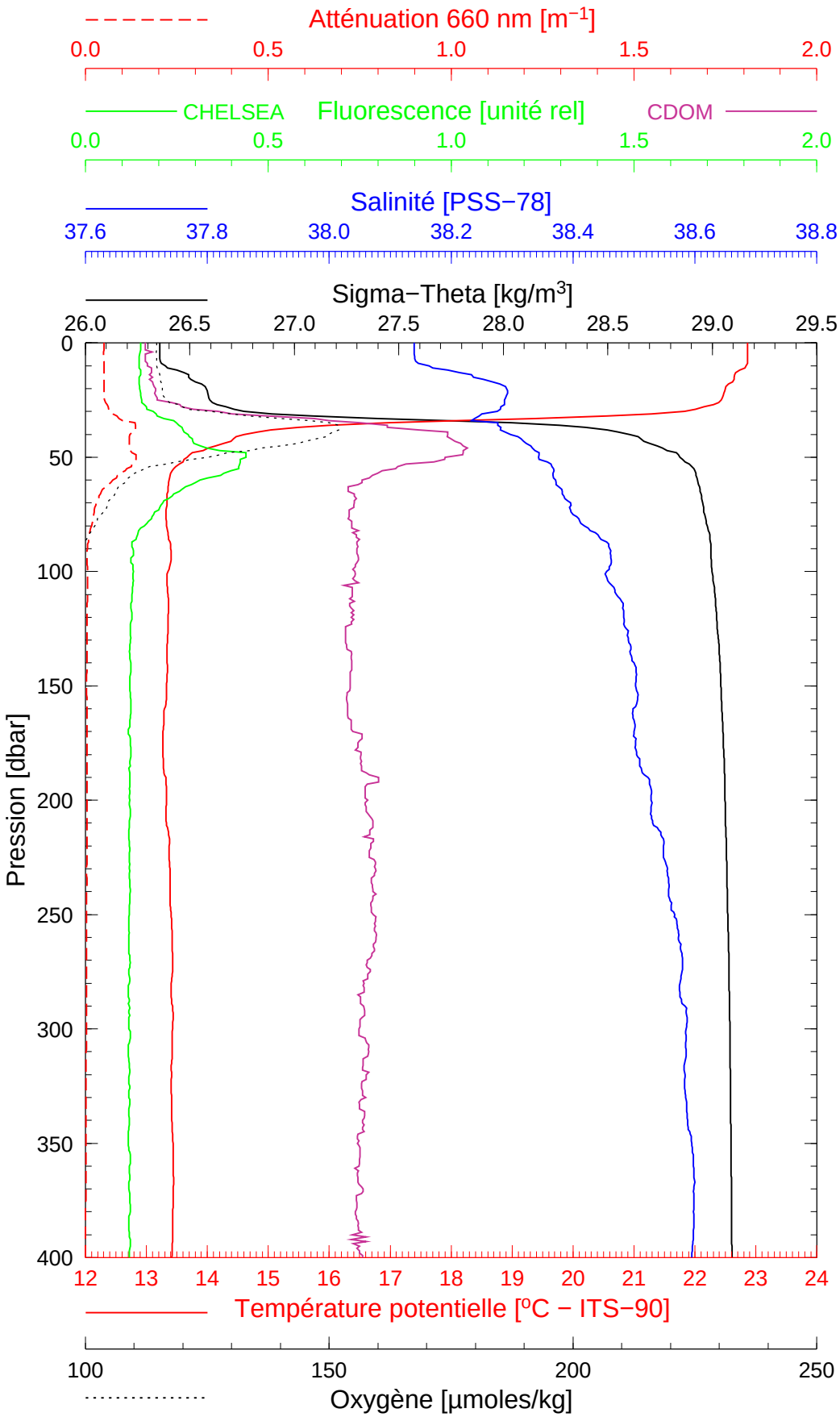
BOUS001



Date	*08/10/2009*	*Latitude*	*43°21.936*
Heure déb	*12h 54min [TU]*	*Longitude*	*07°53.673*

BOUSSOLE 91 **09/10/2009** **BOUS091009_01**

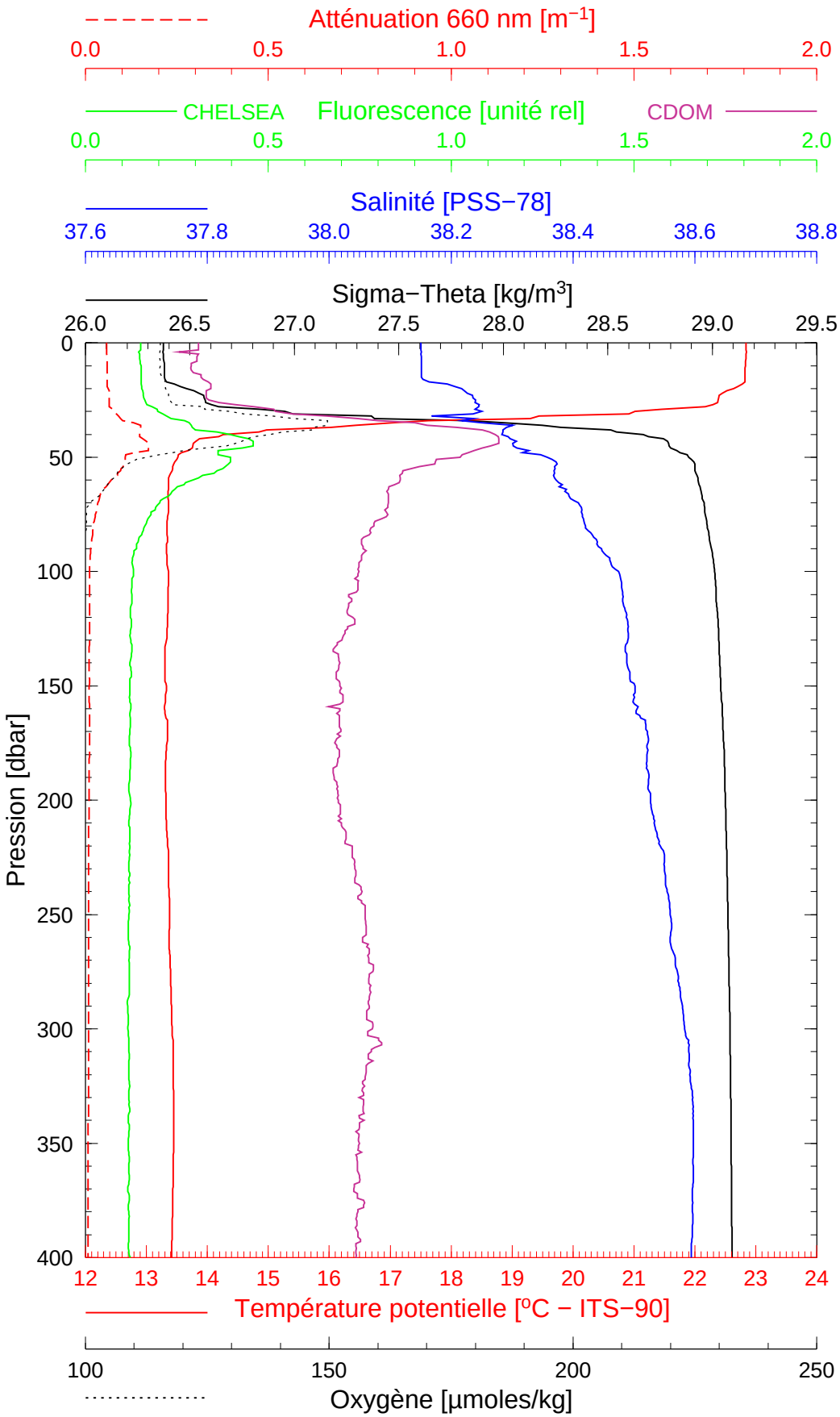
BOUS002



Date	*09/10/2009*	*Latitude*	*43°22.207*
Heure déb	*07h 35min [TU]*	*Longitude*	*07°53.435*

BOUSSOLE 91 **10/10/2009** **BOUS091010_01**

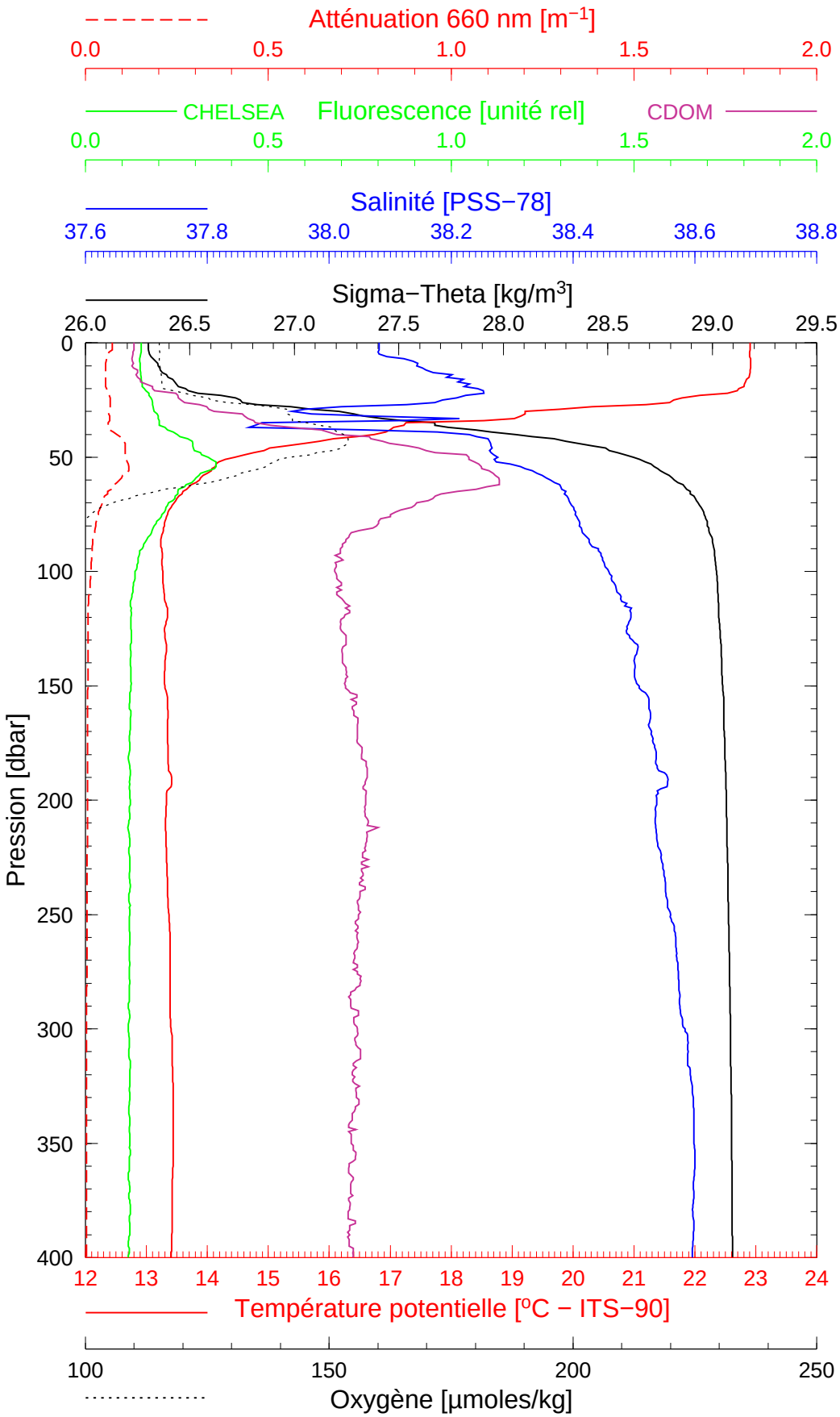
BOUS003



Date	*10/10/2009*	*Latitude*	*43°22.076*
Heure déb	*09h 45min [TU]*	*Longitude*	*07°53.684*

BOUSSOLE 91 **10/10/2009** **BOUS091010_02**

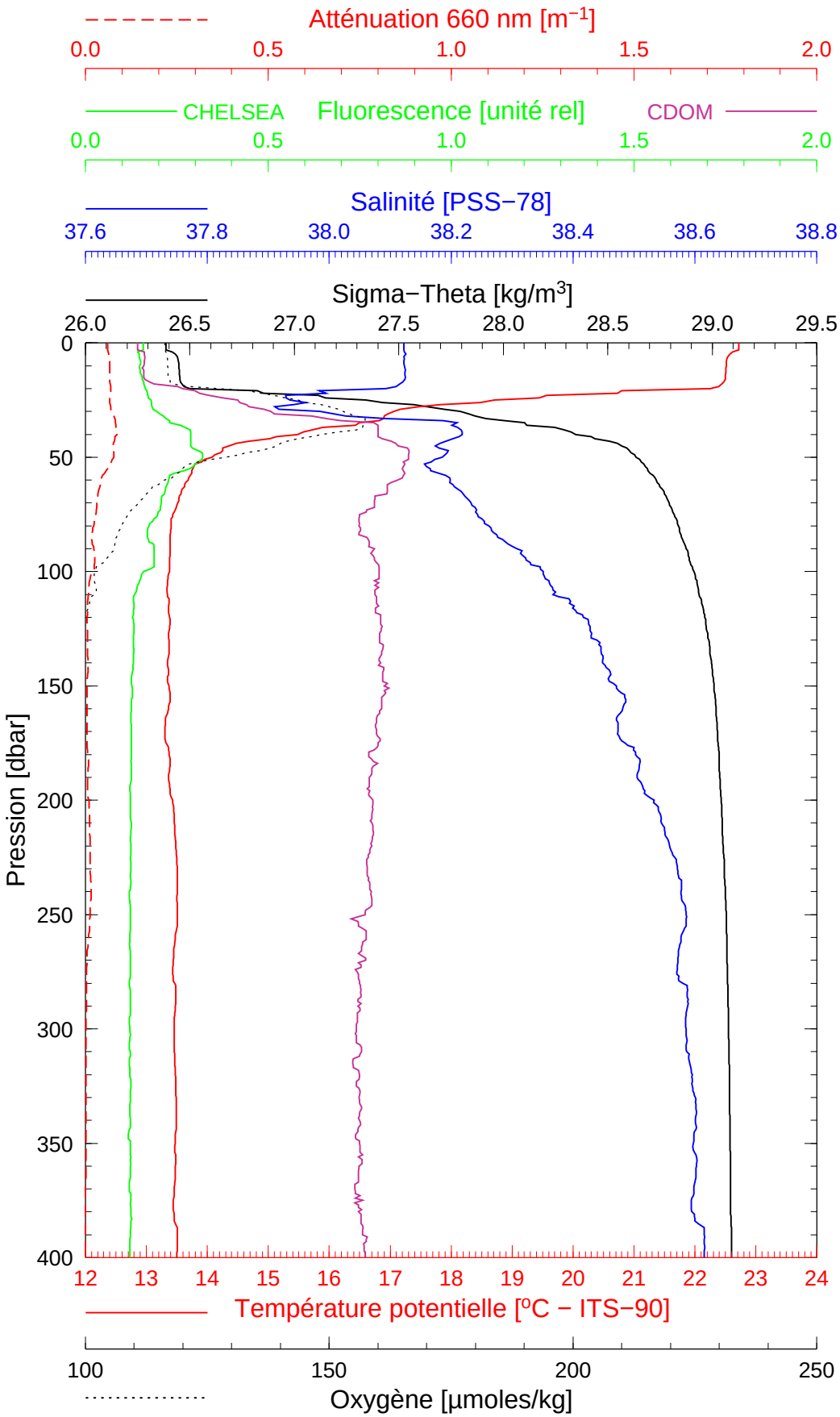
BOUS004



Date	*10/10/2009*	*Latitude*	*43°25.171*
Heure déb	*11h 05min [TU]*	*Longitude*	*07°47.858*

BOUSSOLE 91 **10/10/2009** **BOUS091010_03**

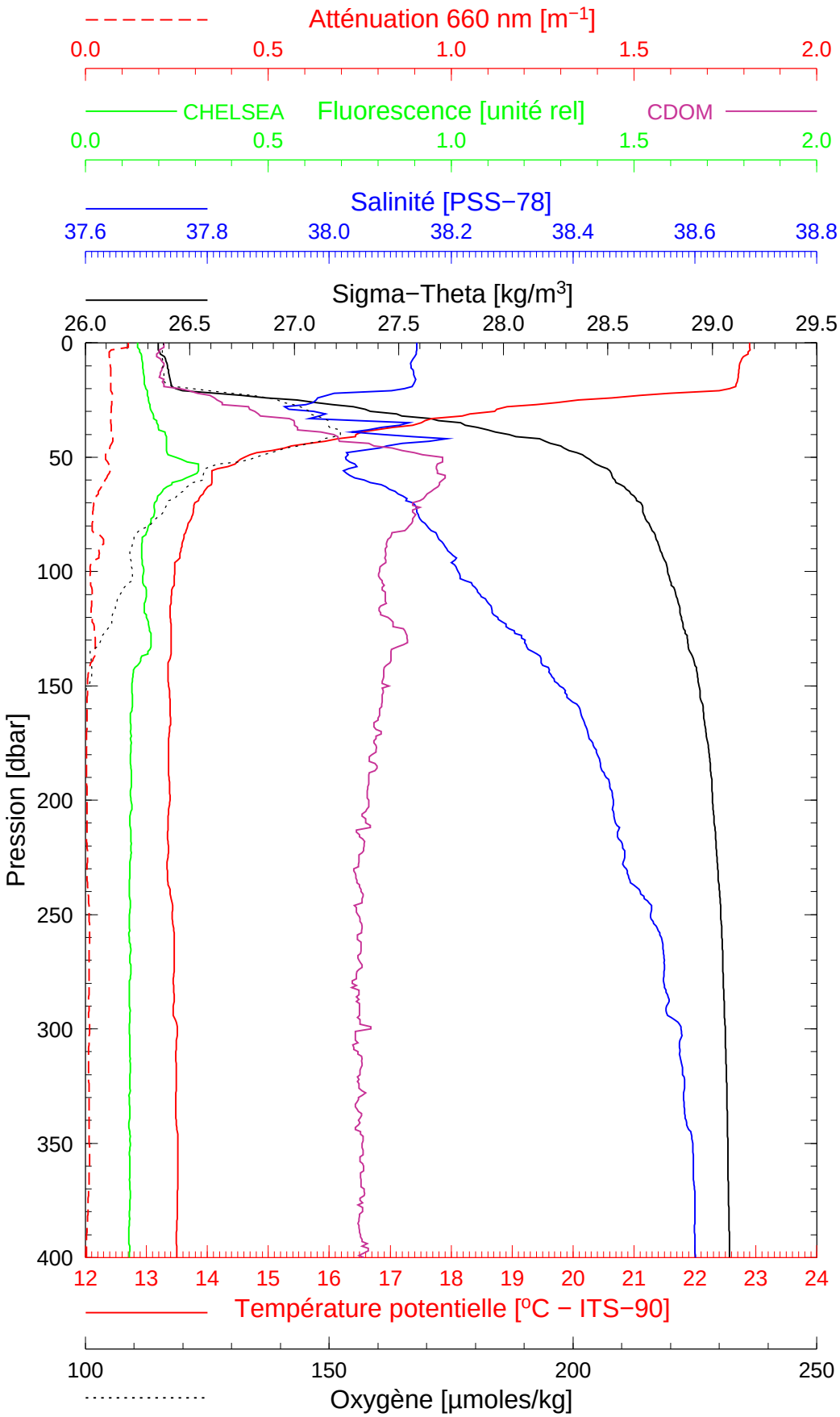
BOUS005



Date	*10/10/2009*	*Latitude*	*43°28.000*
Heure déb	*12h 04min [TU]*	*Longitude*	*07°41.870*

BOUSSOLE 91 **10/10/2009** **BOUS091010_04**

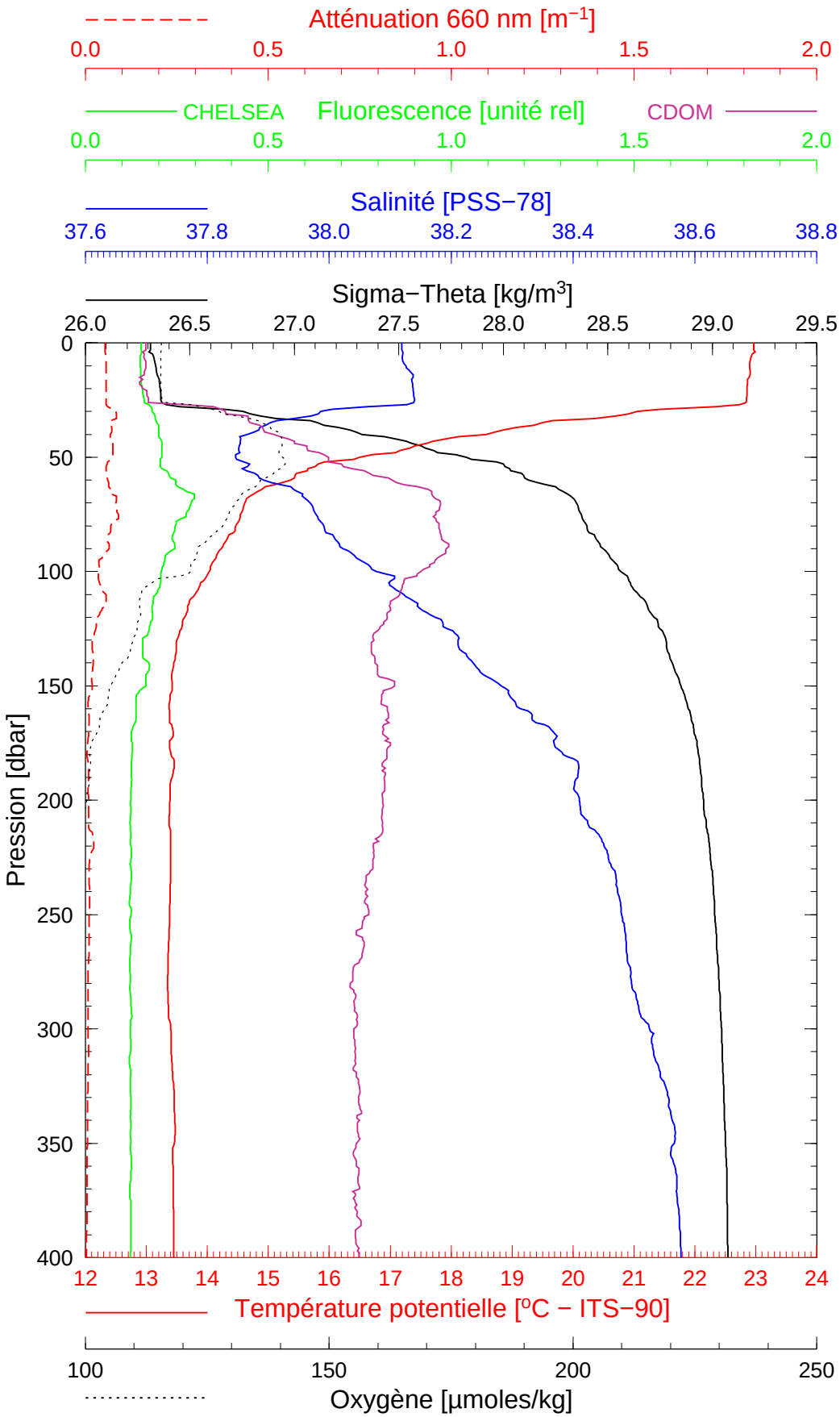
BOUS006



Date	*10/10/2009*	*Latitude*	*43°31.032*
Heure déb	*13h 02min [TU]*	*Longitude*	*07°36.825*

BOUSSOLE 91 **10/10/2009** **BOUS091010_05**

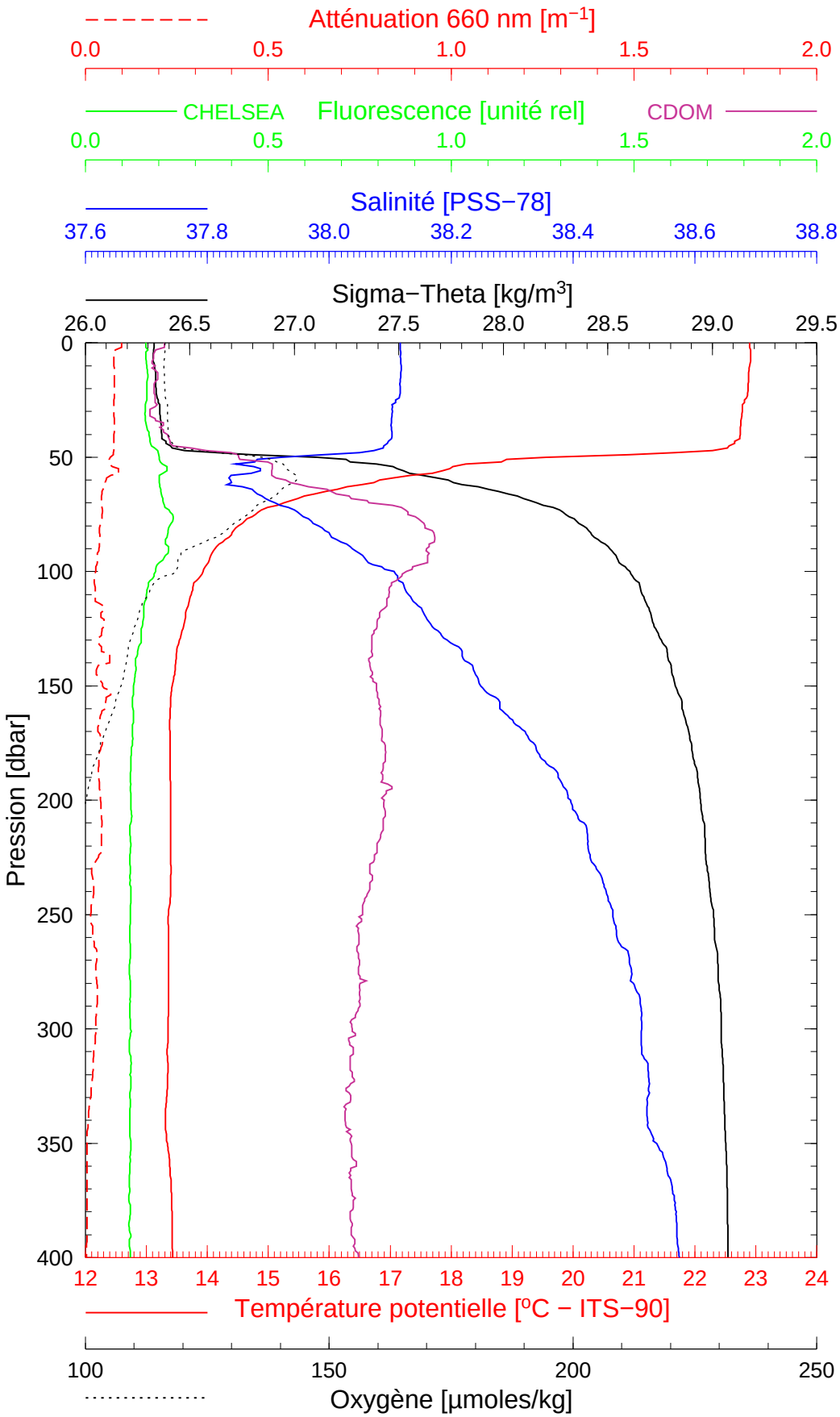
BOUS007



Date	*10/10/2009*	*Latitude*	*43°33.983*
Heure déb	*13h 59min [TU]*	*Longitude*	*07°30.720*

BOUSSOLE 91 **10/10/2009** **BOUS091010_06**

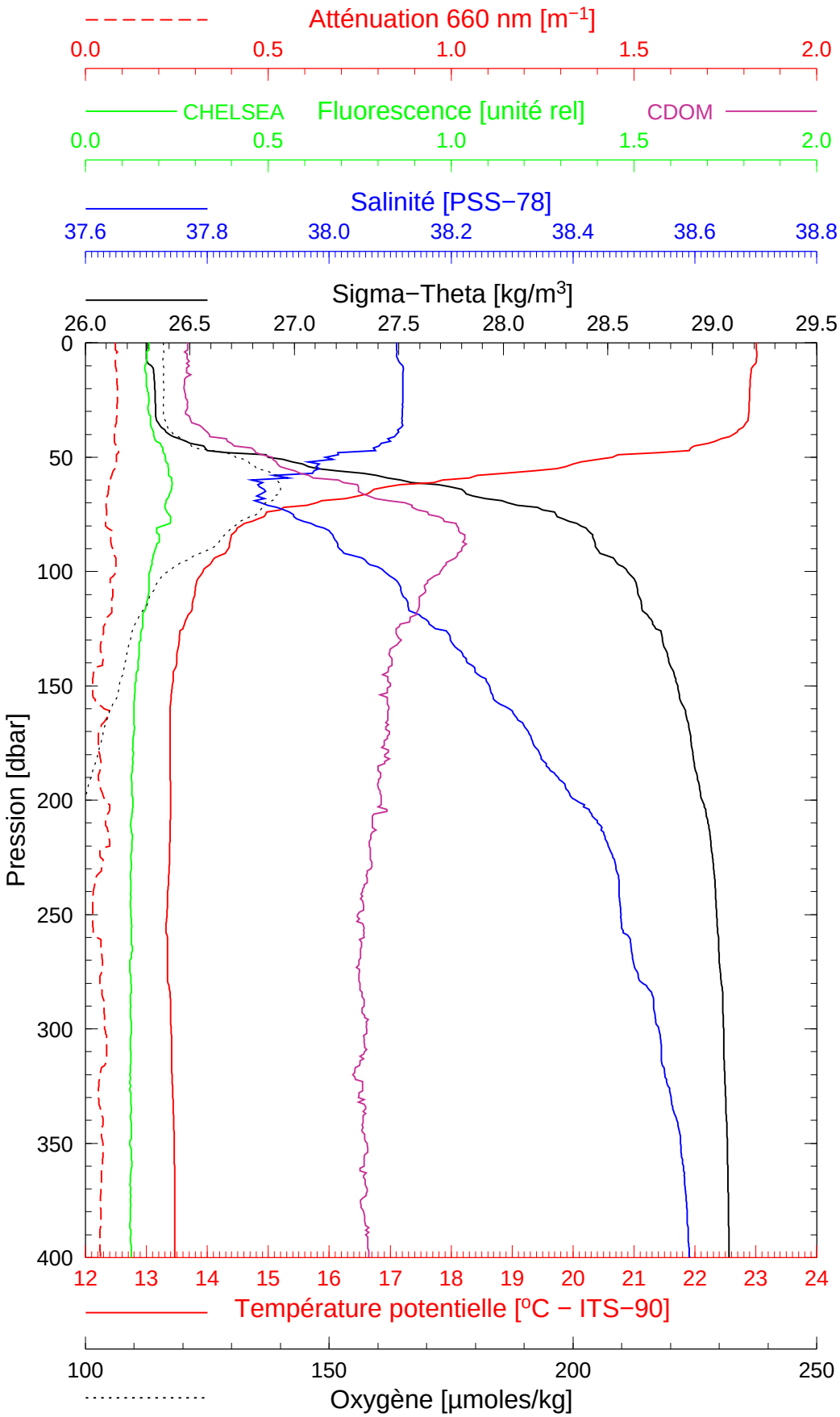
BOUS008



Date	*10/10/2009*	*Latitude*	*43°37.038*
Heure déb	*14h 55min [TU]*	*Longitude*	*07°24.869*

BOUSSOLE 91 **10/10/2009** **BOUS091010_07**

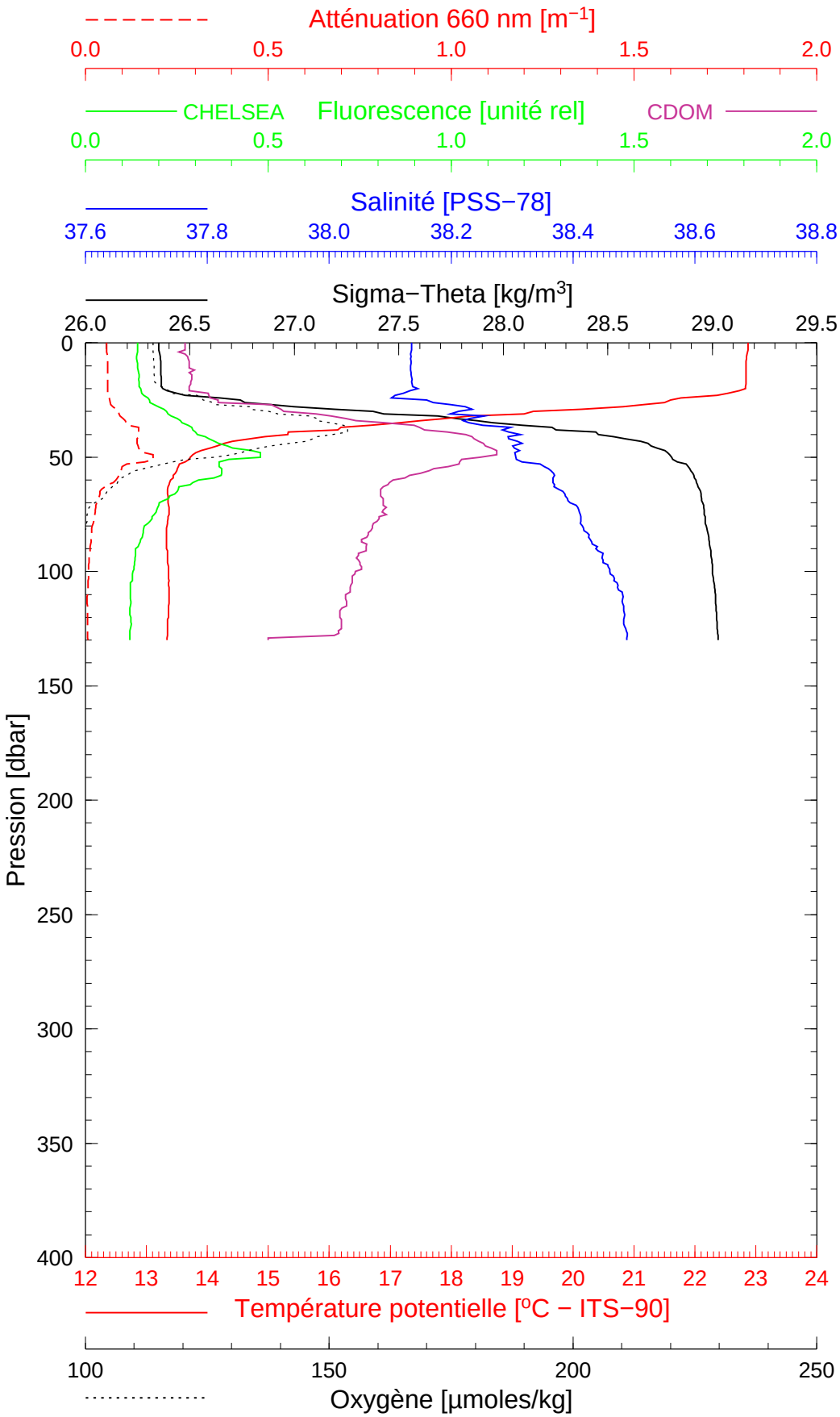
BOUS009



Date	*10/10/2009*	*Latitude*	*43°38.997*
Heure déb	*15h 46min [TU]*	*Longitude*	*07°20.955*

BOUSSOLE 91 **11/10/2009** **BOUS091011_01**

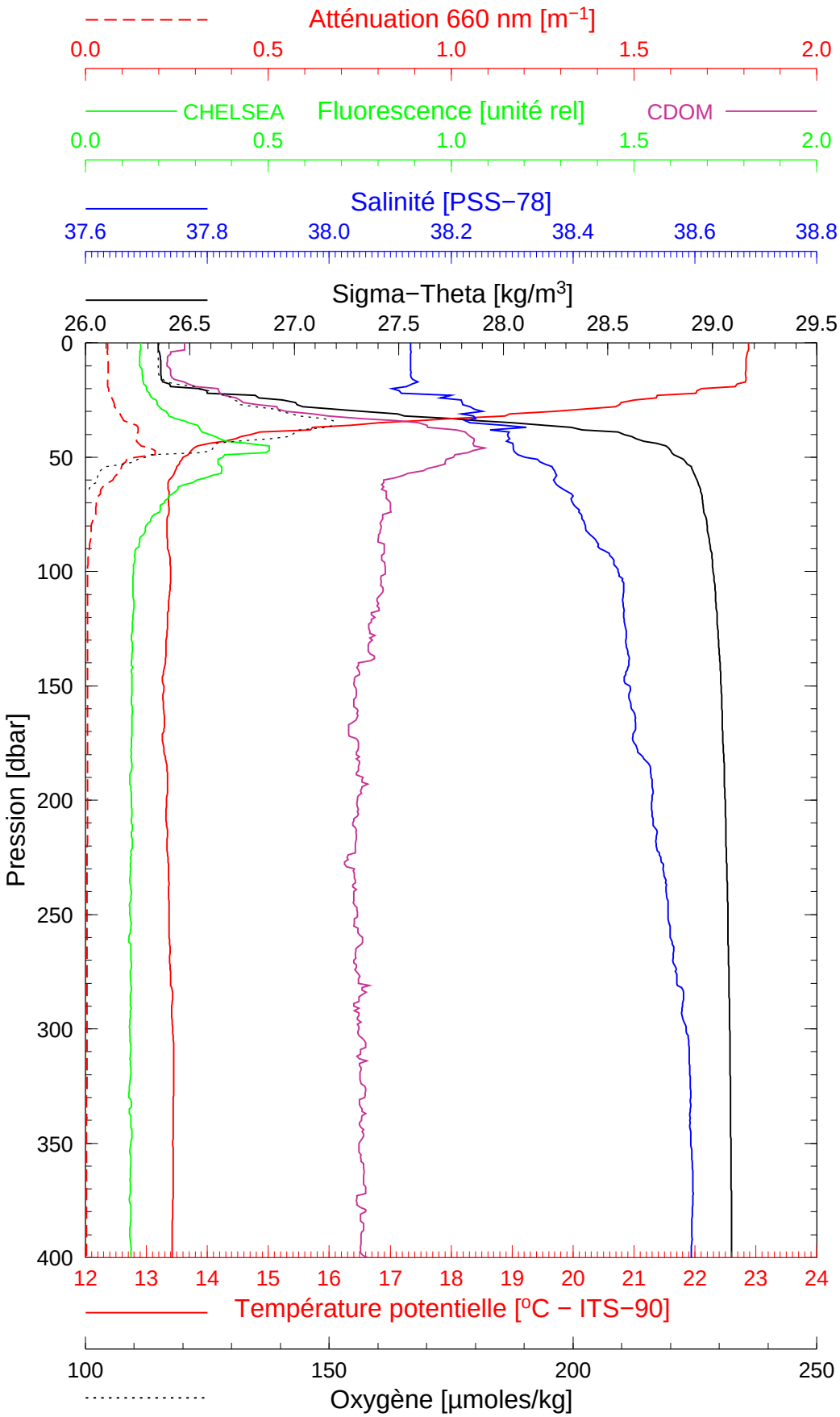
BOUS010



Date	*11/10/2009*	*Latitude*	*43°21.595*
Heure déb	*09h 18min [TU]*	*Longitude*	*07°53.188*

BOUSSOLE 91 **11/10/2009** **BOUS091011_02**

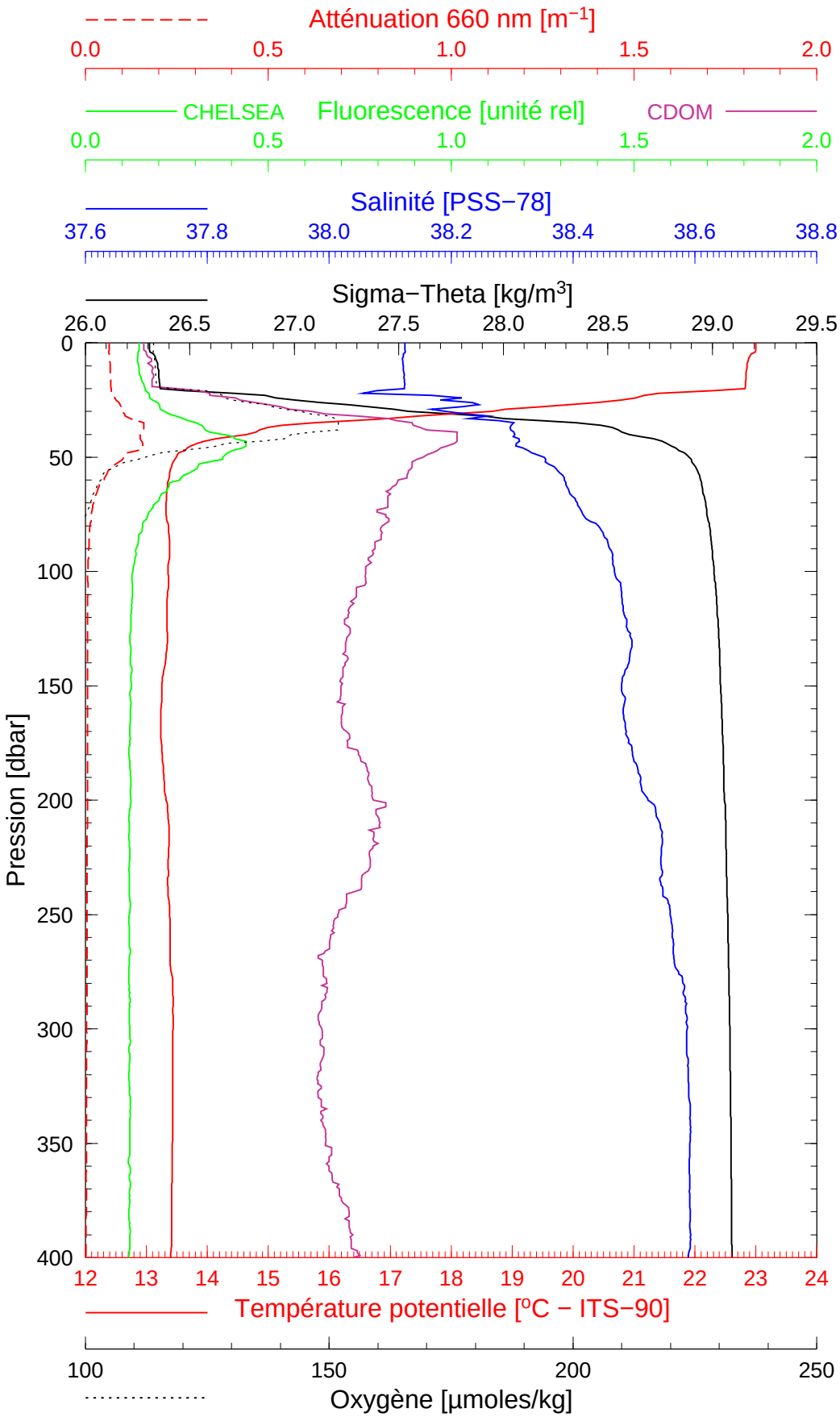
BOUS011



Date	*11/10/2009*	*Latitude*	*43°21.567*
Heure déb	*09h 37min [TU]*	*Longitude*	*07°53.210*

BOUSSOLE 91 **11/10/2009** **BOUS091011_03**

BOUS012



Date	*11/10/2009*	*Latitude*	*43°21.826*
Heure déb	*12h 37min [TU]*	*Longitude*	*07°54.135*