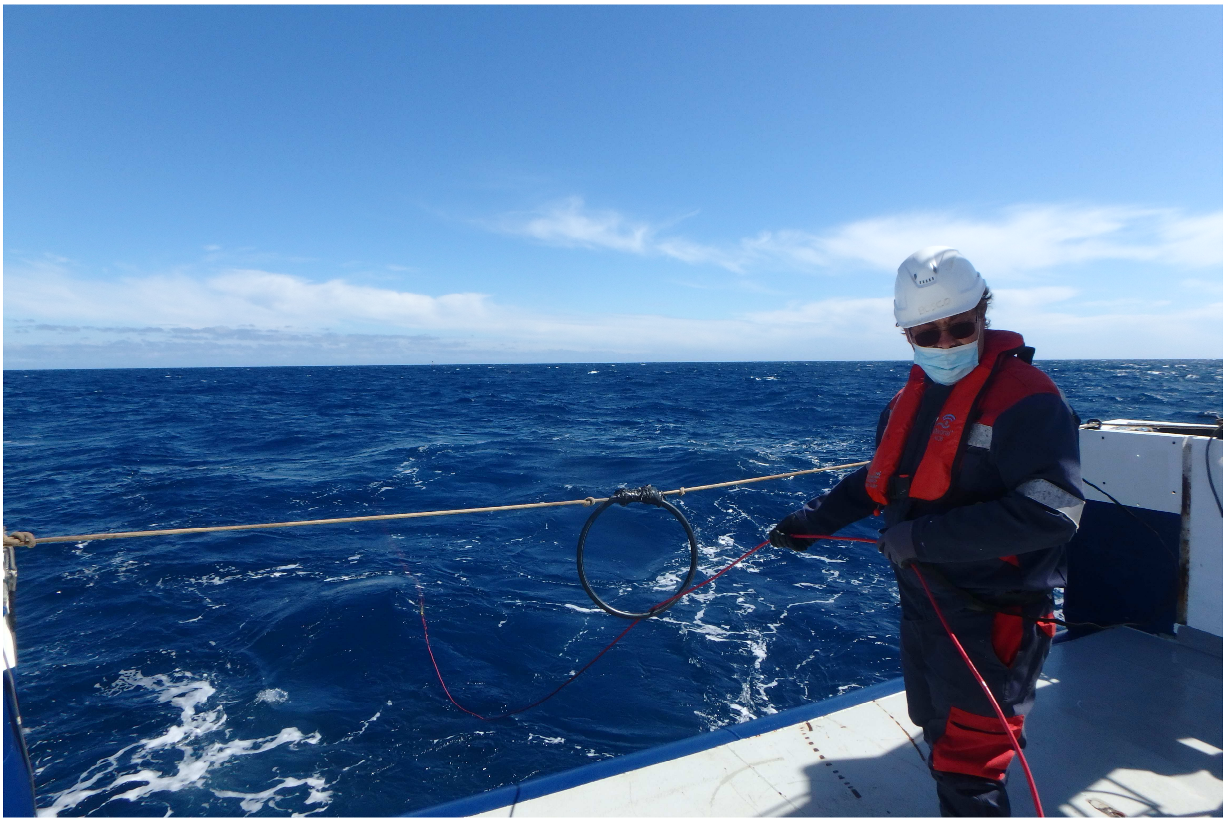
BOUSSOLE PROJECT

C-OPS Data catalogue for 2021

Cruise 226 to cruise 237

Institut de la Mer de Villefranche (IMEV), 06230 Villefranche sur mer, France



Deployment of the Biospherical COPS (Compact Optical Profiling System) from the deck of the R/V *Téthys II*

ESA/ESRIN contract N° 4000119096/17/I-BG

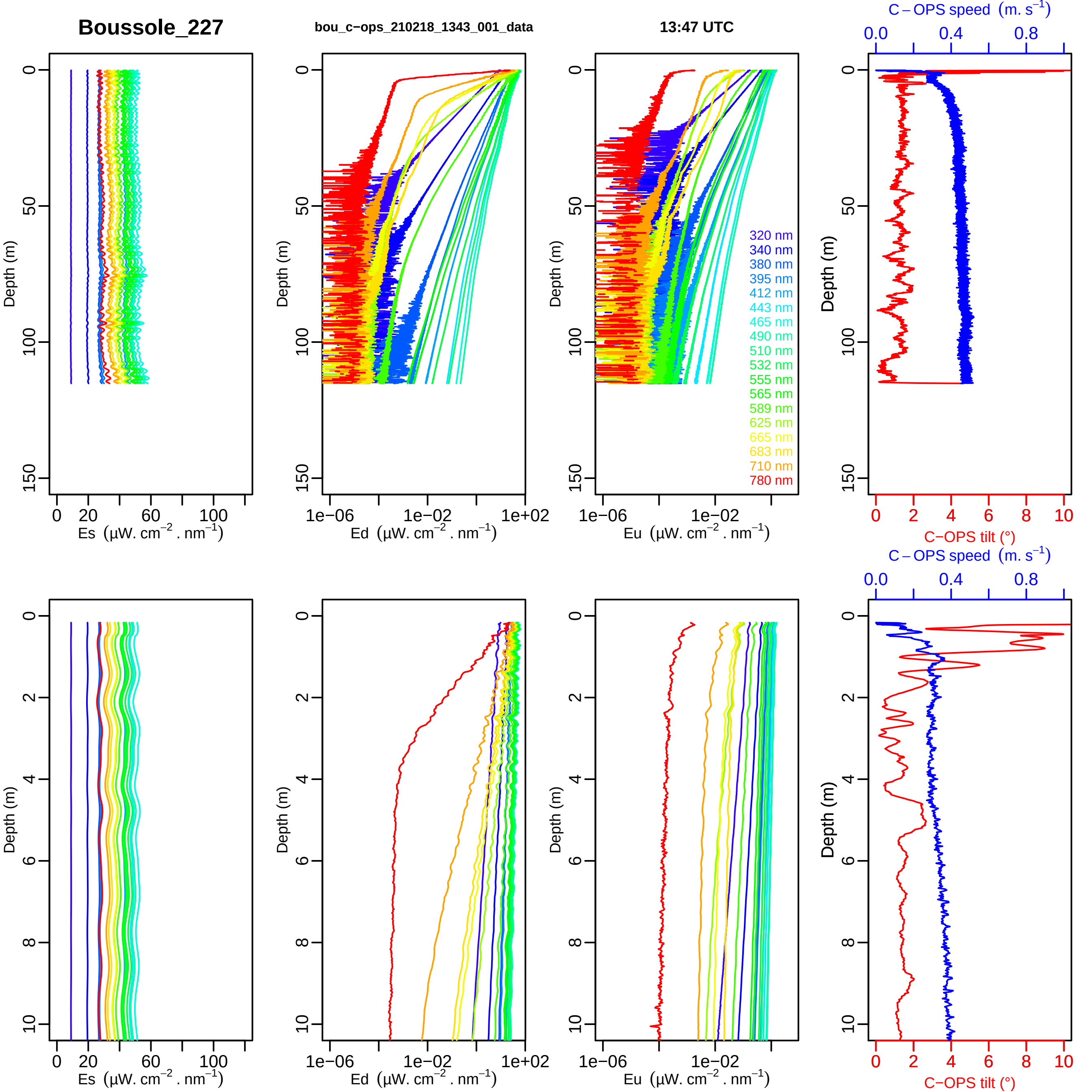
C-OPS parameters

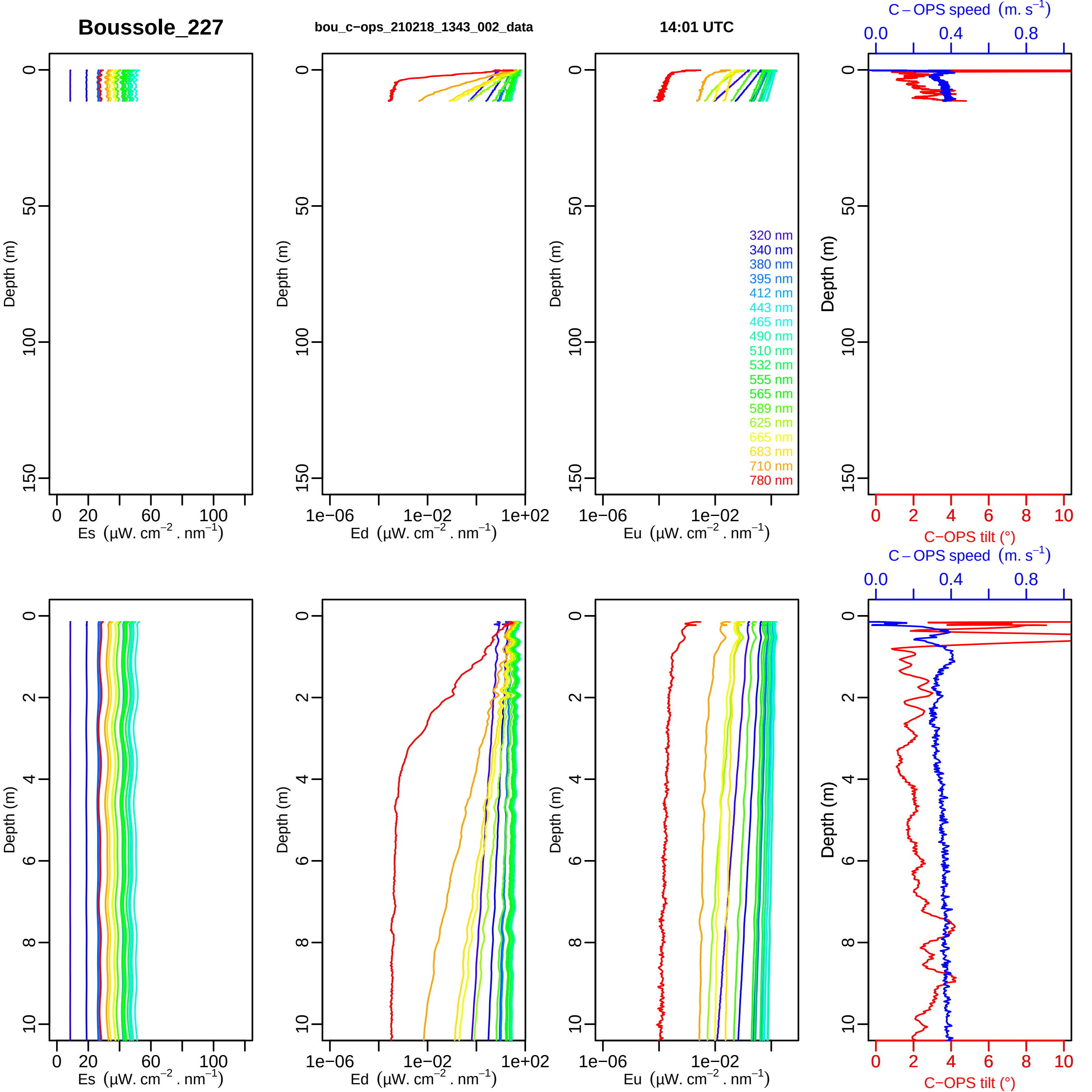
The C-OPS used during the BOUSSOLE cruises is equipped with Es, Ed and Eu* sensors.

This C-OPS system measures downward and upward irradiance at 18 wavelengths + PAR:
320, 340, 380, 395, 412, 443, 465, 490, 510, 532, 555, 565, 589, 625, 665, 683, 710, 780 nm and PAR.

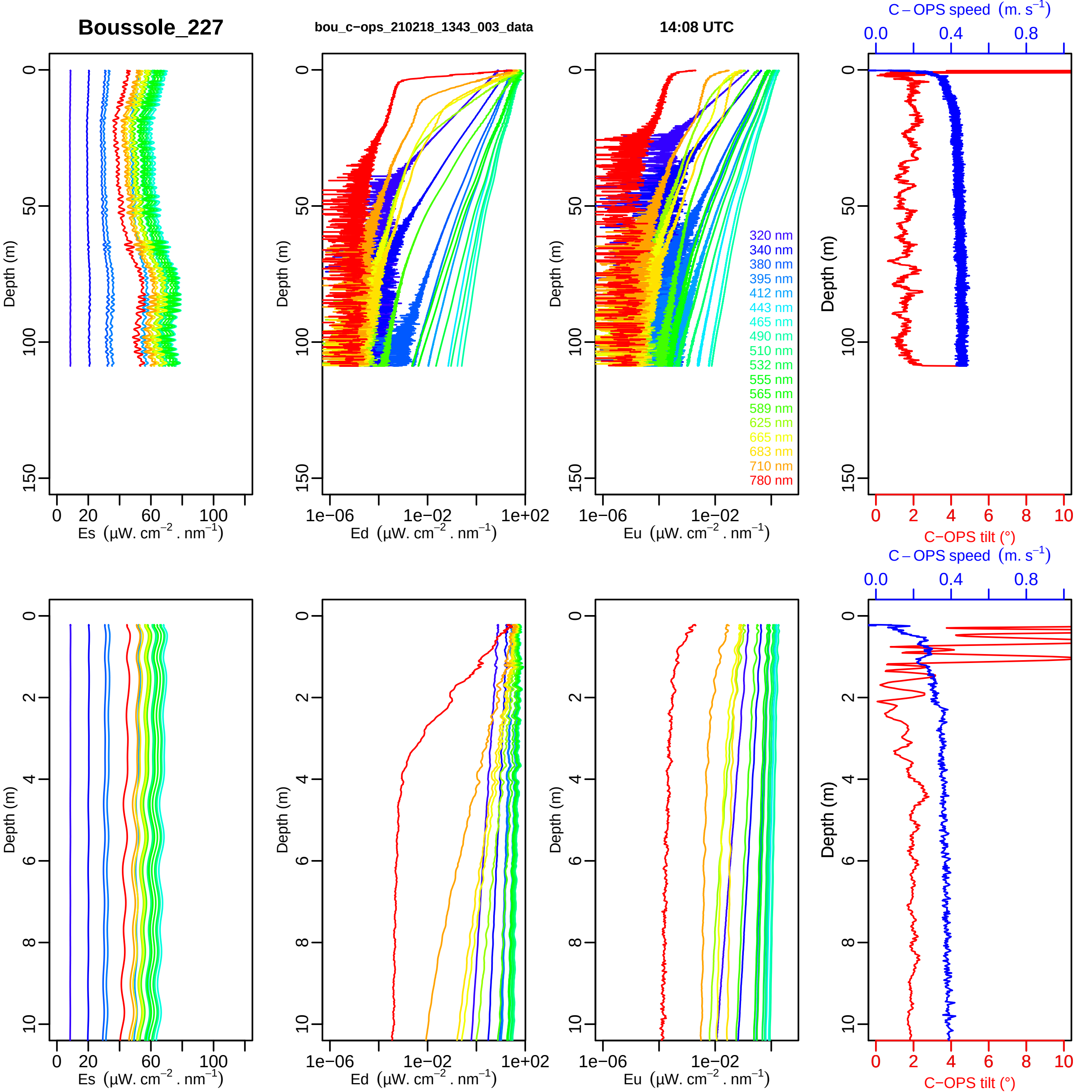
The plots presented in this catalogue are obtained from raw data and show the radiometric profiles in log scale, the absolute tilt records in water and the descent rate of the C-OPS.

*Es: downward surface irradiance
Eu: upward irradiance
Ed: downward irradiance


Boussole_227
bou_c−ops_210218_1343_001_data
13:47 UTC
C − OPS speed (m. s−1)
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



Boussole_227
bou_c−ops_210218_1343_002_data
14:01 UTC
C − OPS speed (m. s−1)
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm


Boussole_227
bou_c-ops_210218_1343_003_data
14:08 UTC
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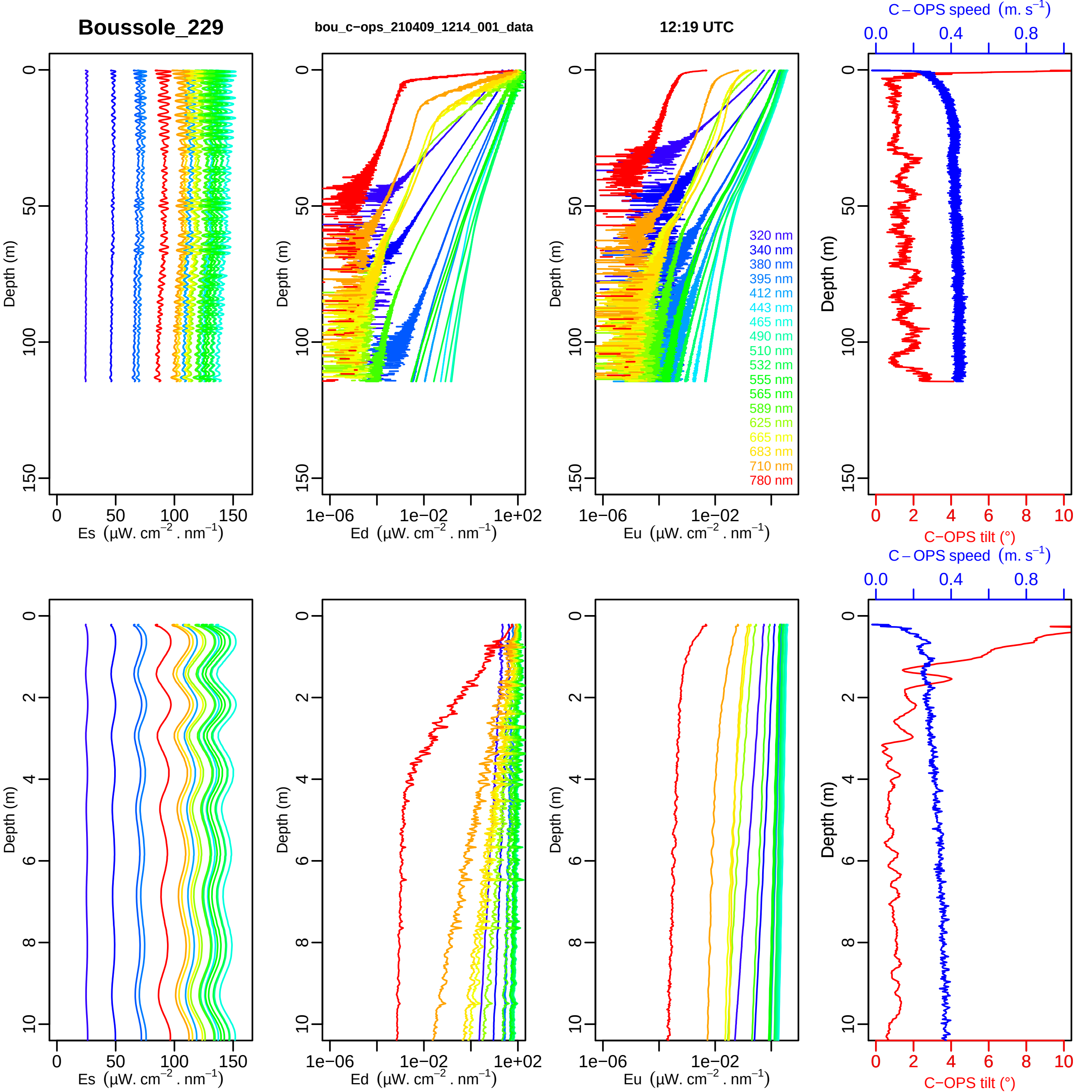
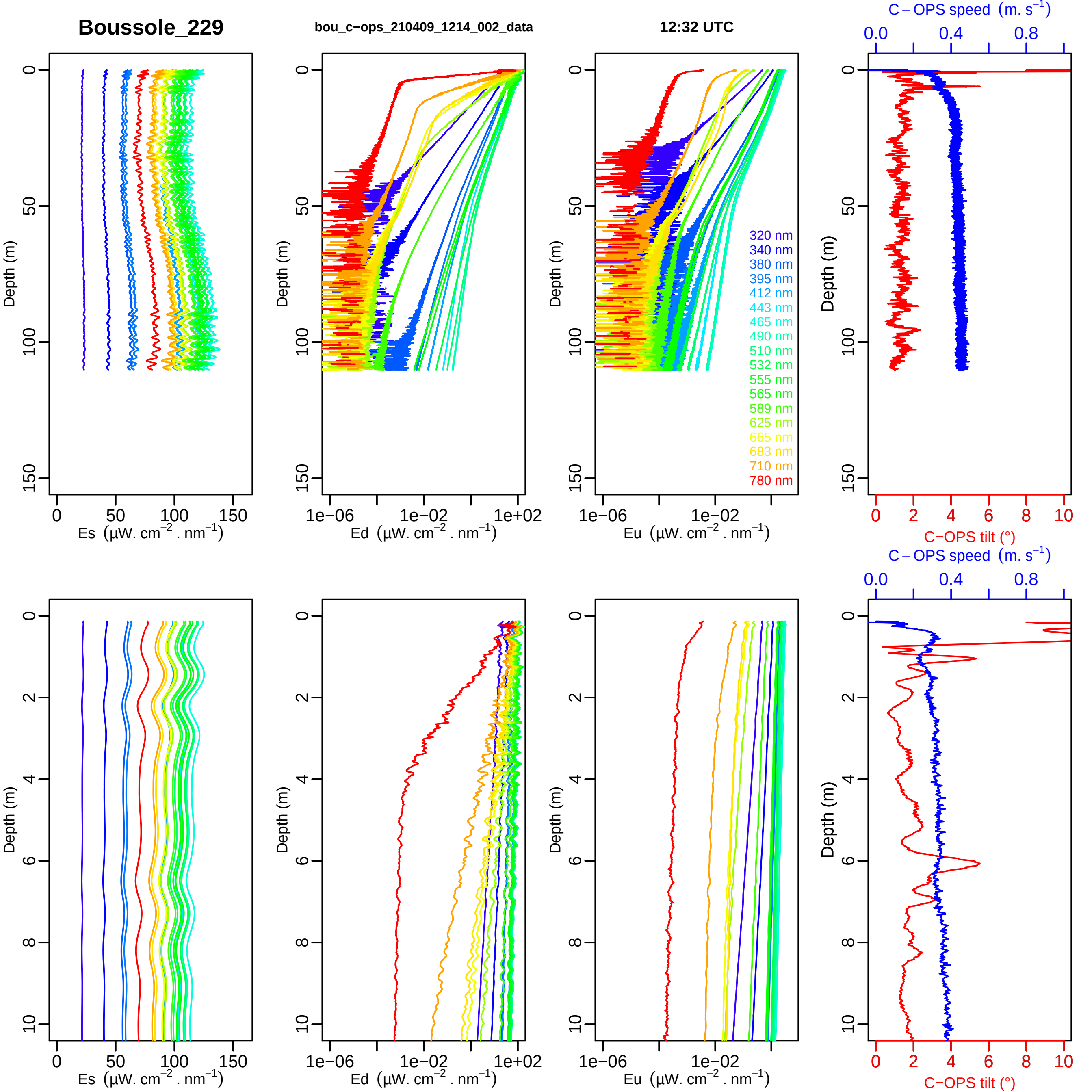
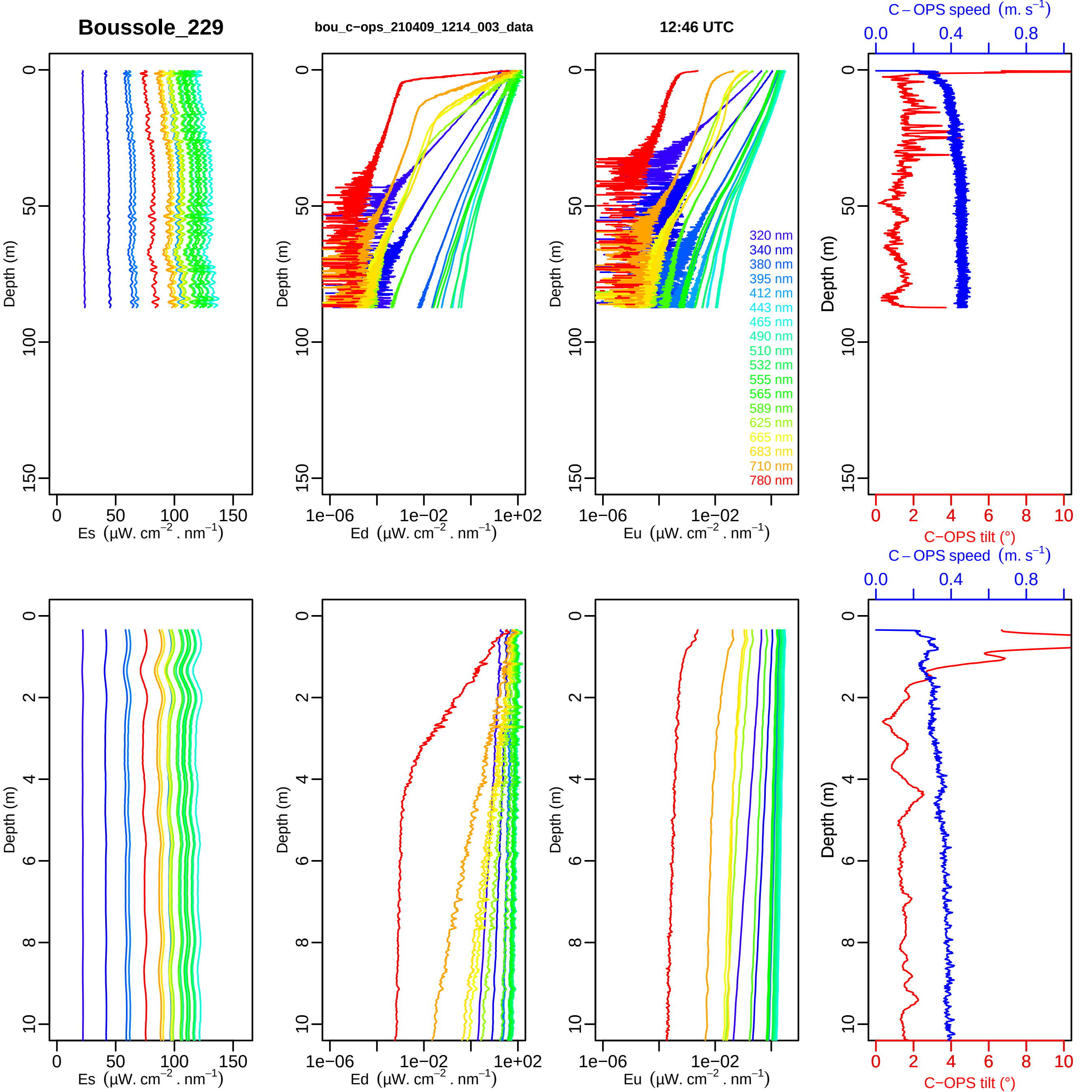
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



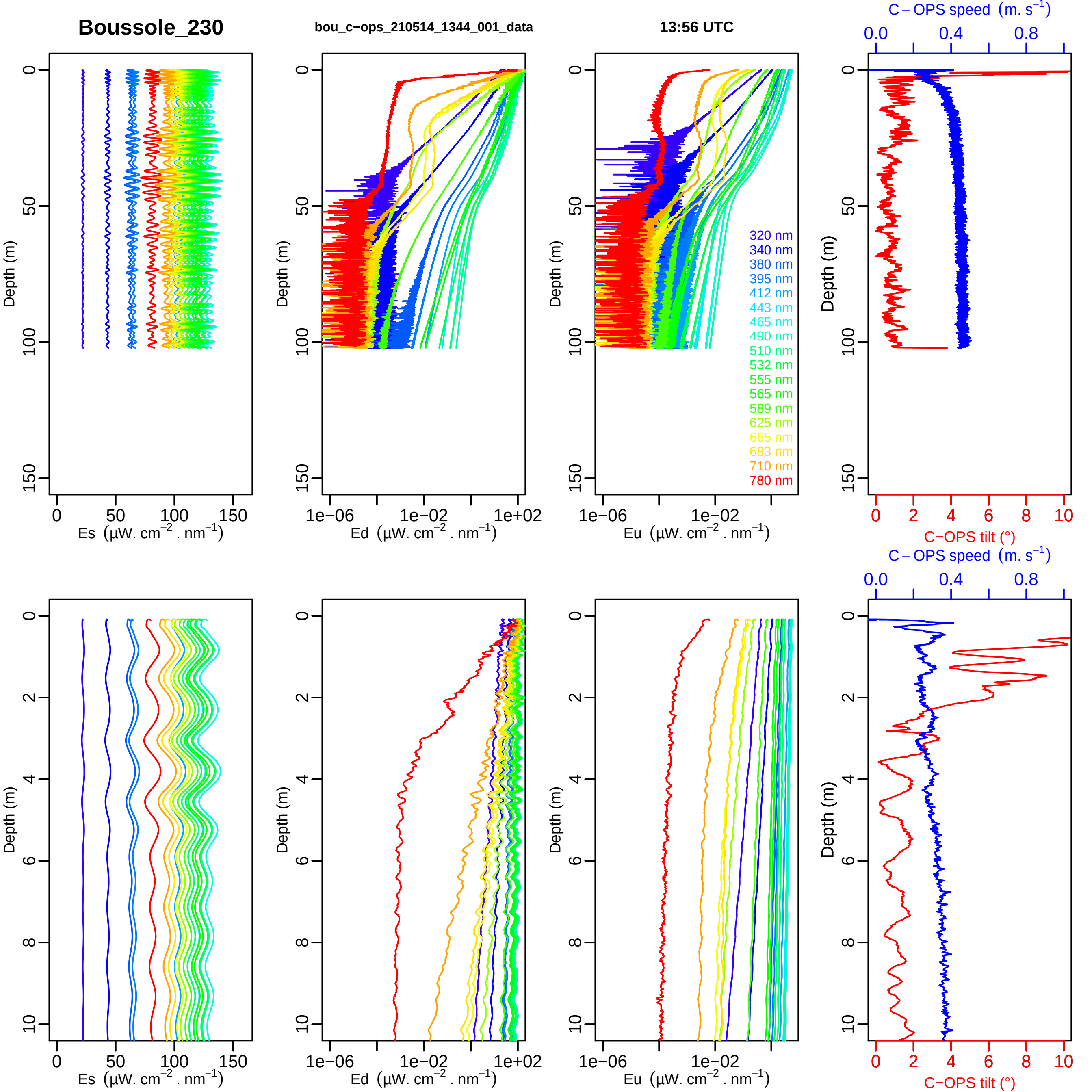
Boussole_229
bou_c−ops_210409_1214_001_data
12:19 UTC
Depth (m)
Es (µW. cm^{-2} . nm^{-1})
Ed (µW. cm^{-2} . nm^{-1})
Eu (µW. cm^{-2} . nm^{-1})
C − OPS speed (m. s^{-1})
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



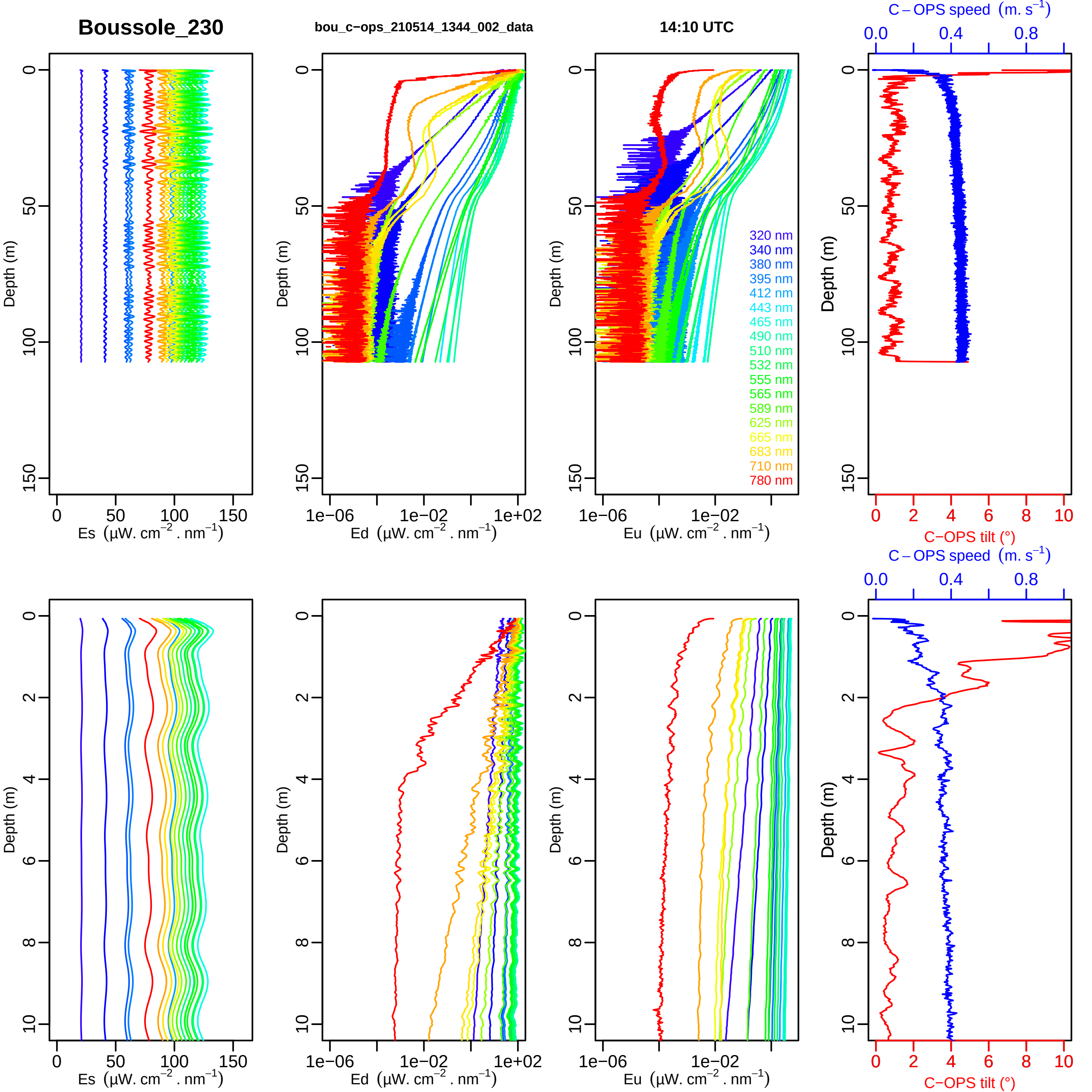
Boussole_229
bou_c−ops_210409_1214_002_data
12:32 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



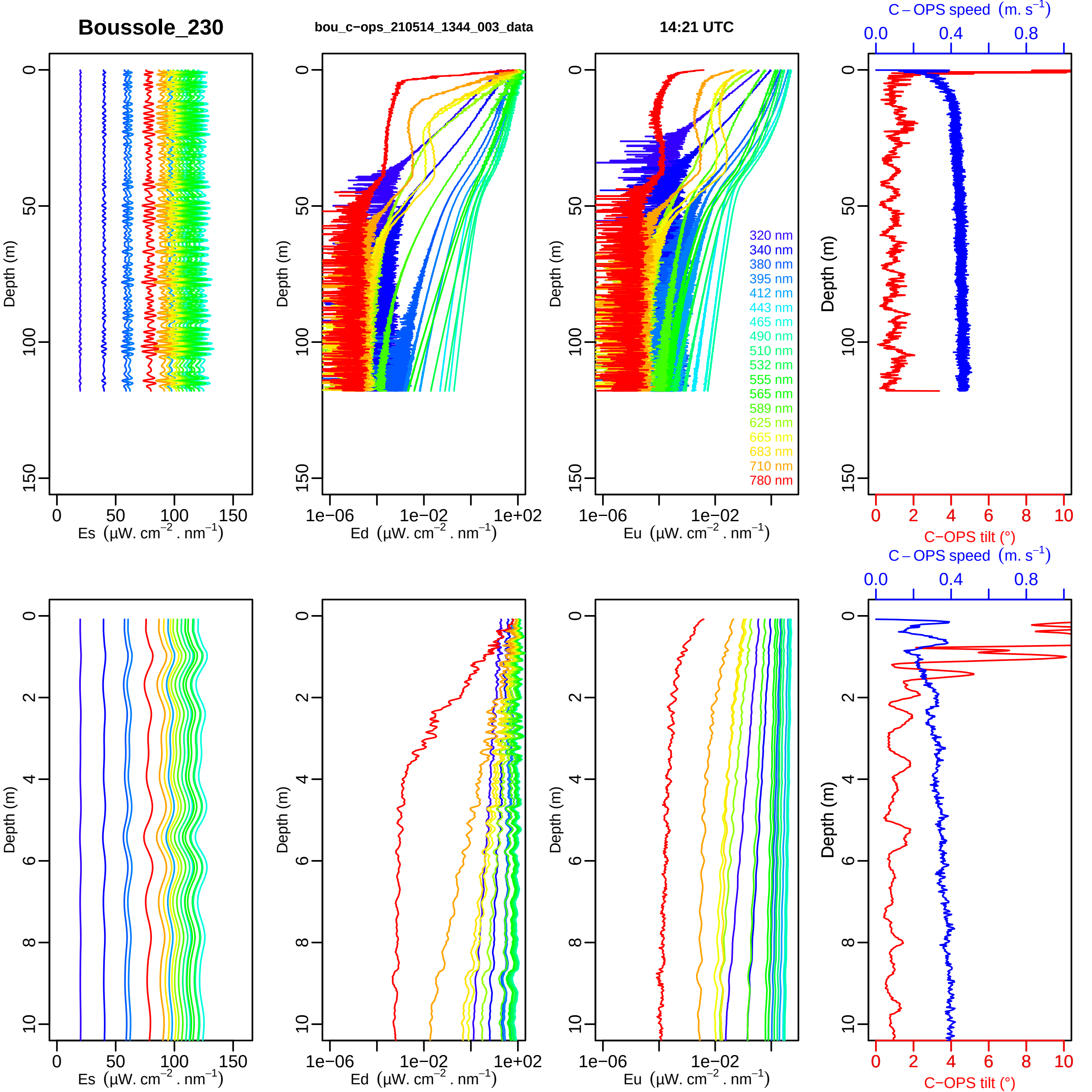
Boussole_229
bou_c−ops_210409_1214_003_data
12:46 UTC
C − OPS speed (m. s−1)
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



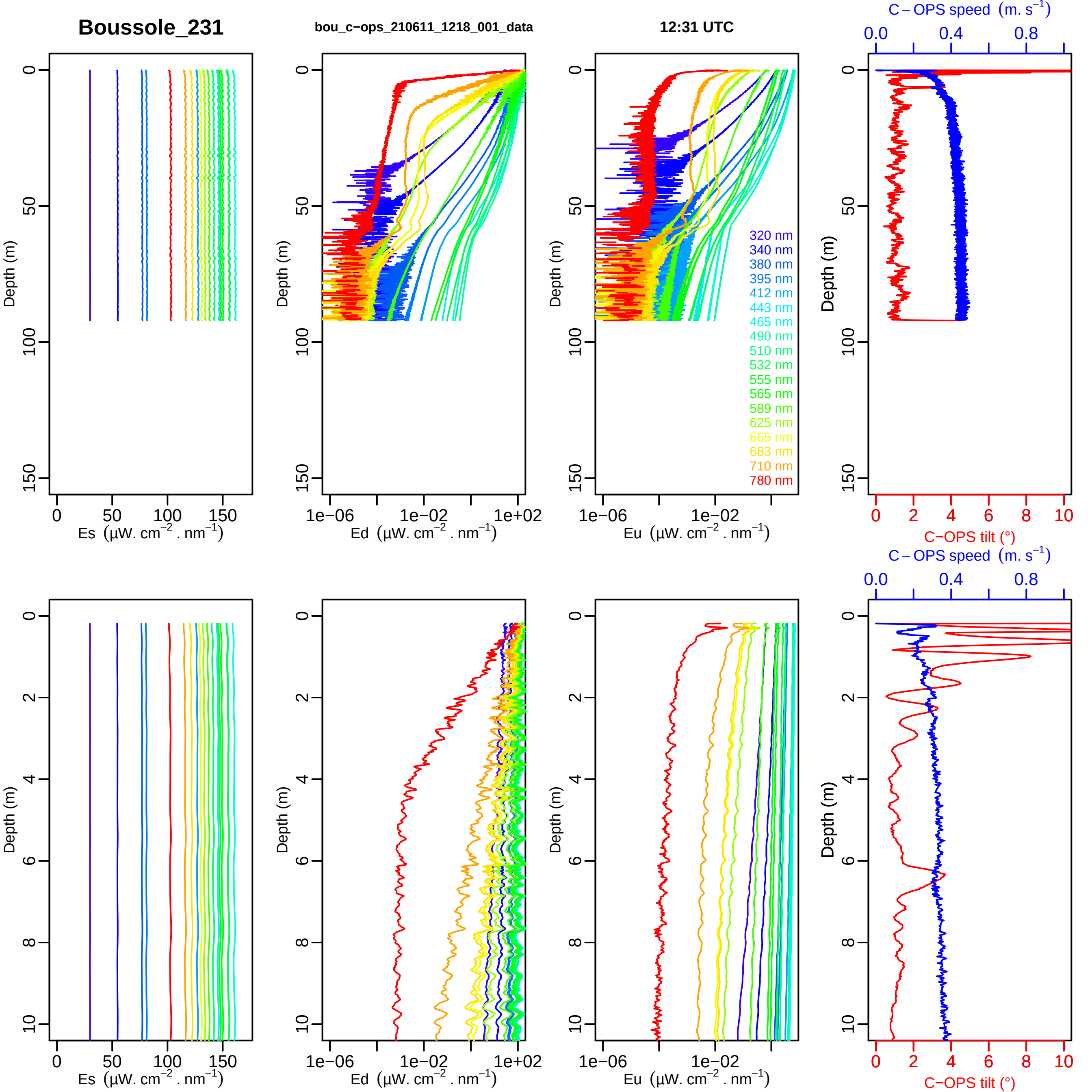
Boussole_230
bou_c-ops_210514_1344_001_data
13:56 UTC
C – OPS speed (m. s−1)
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



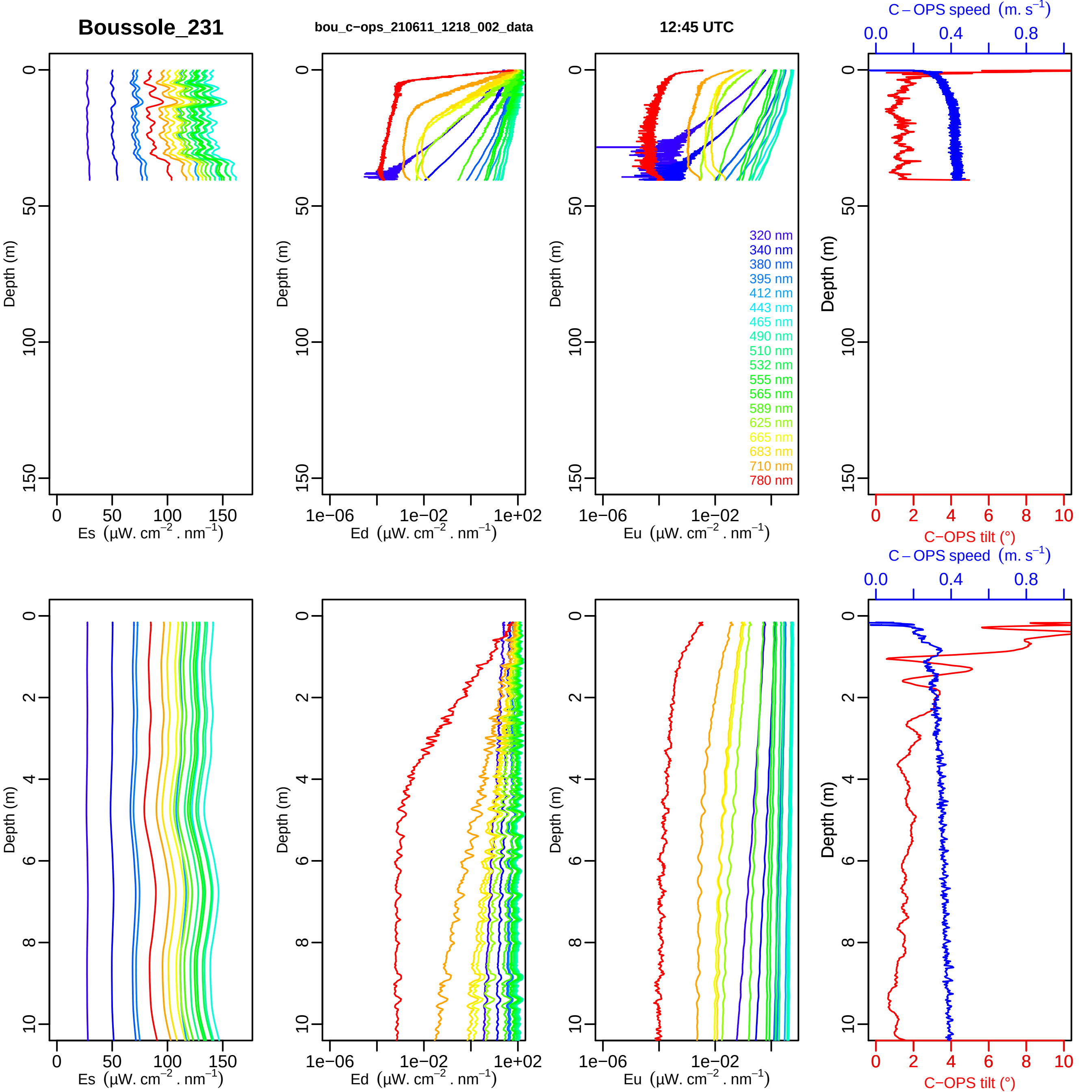
Boussole_230
bou_c−ops_210514_1344_002_data
14:10 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



Boussole_230
bou_c−ops_210514_1344_003_data
14:21 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



Boussole_231
bou_c−ops_210611_1218_001_data
12:31 UTC
C − OPS speed (m. s−1)
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



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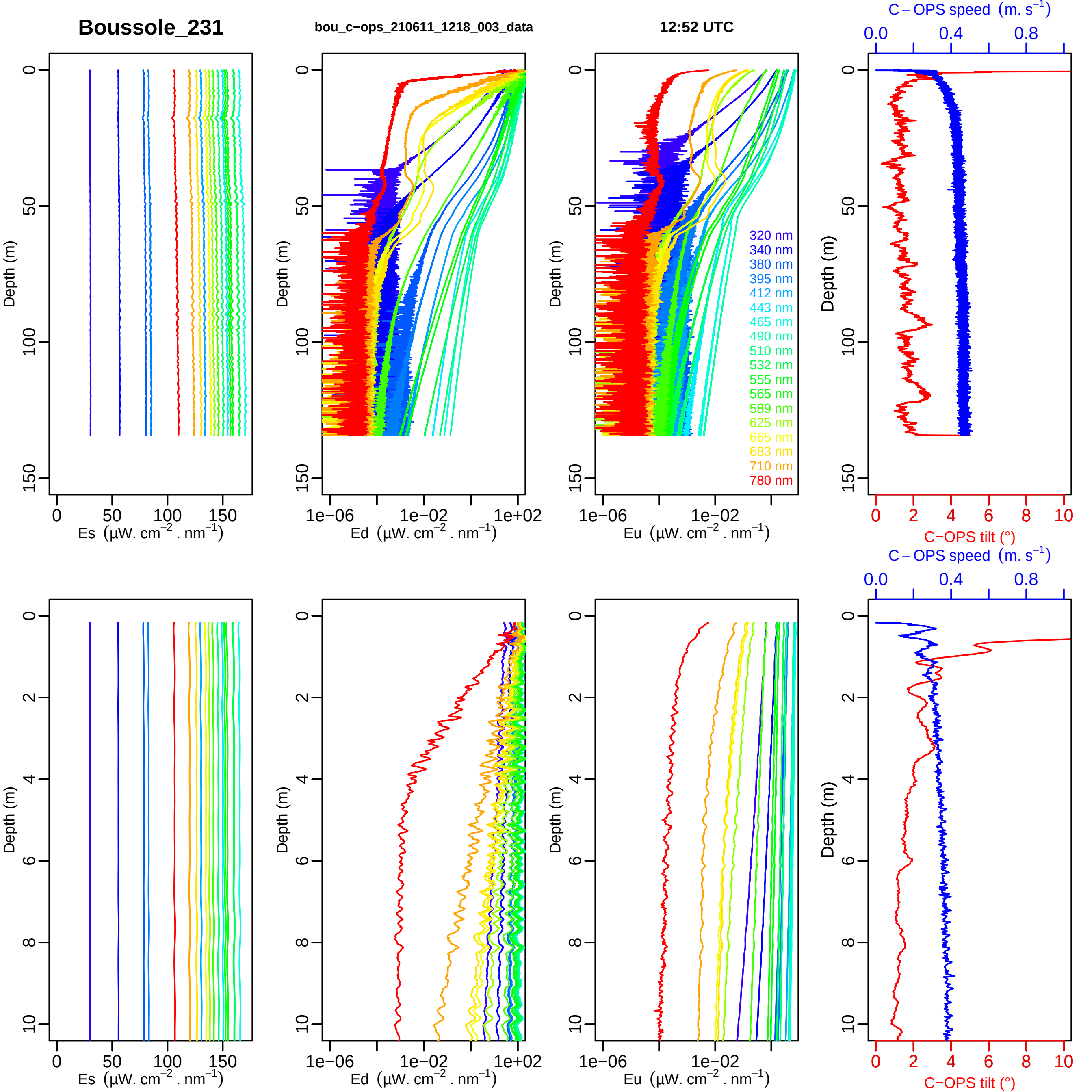
bou_c−ops_210611_1218_002_data
12:45 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm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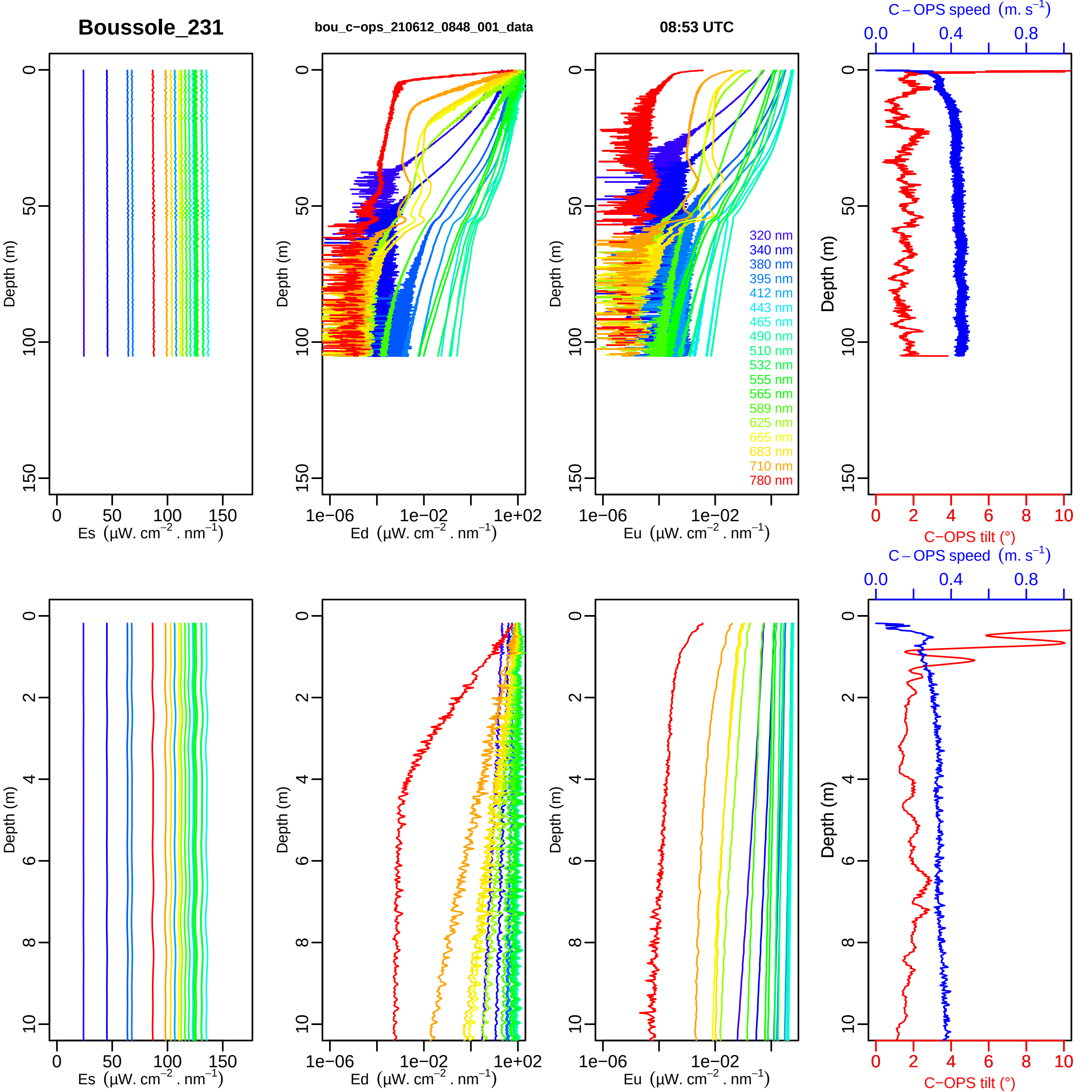
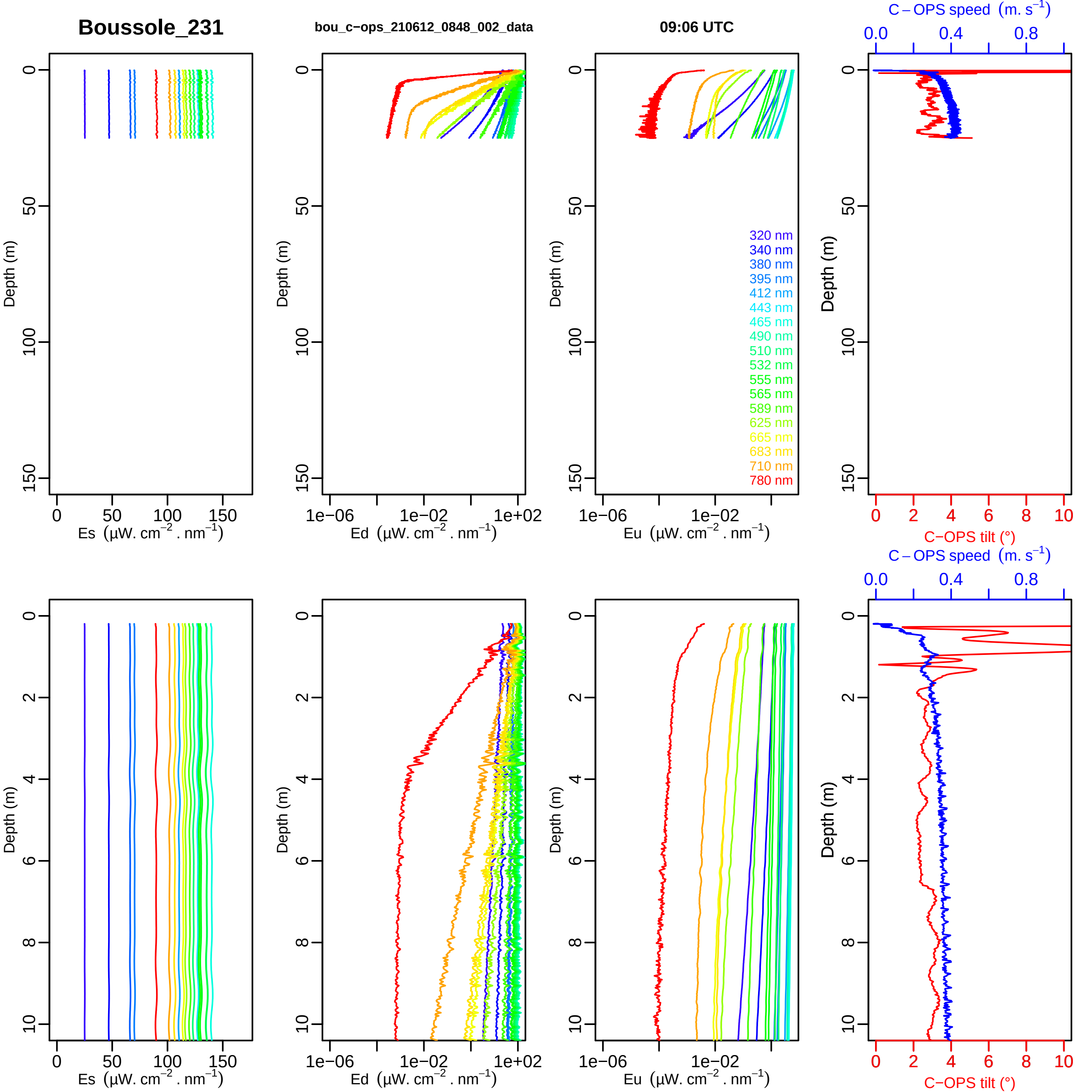
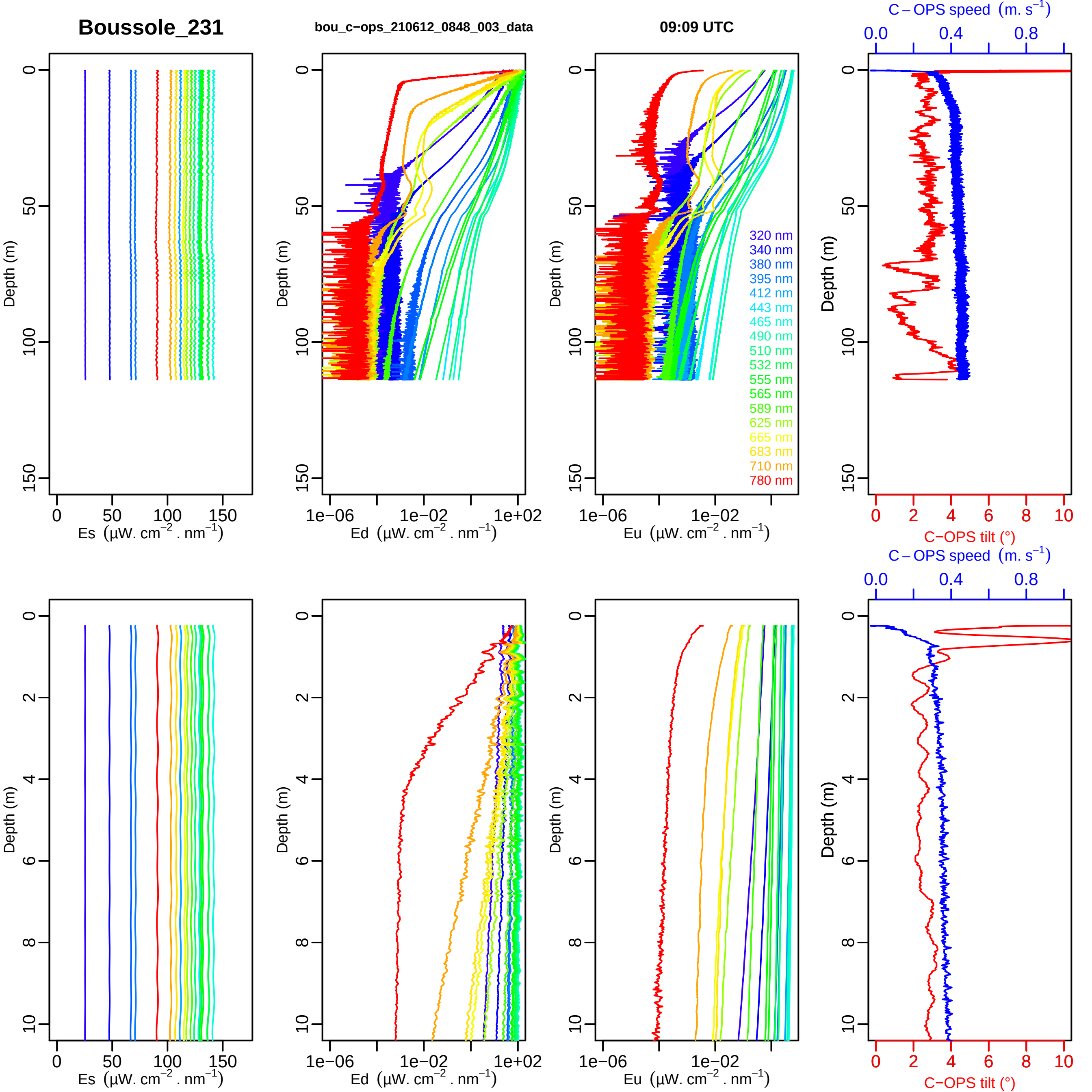
C − OPS speed (m. s−1)
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



Boussole_231
bou_c−ops_210612_0848_001_data
08:53 UTC
C − OPS speed (m. s−1)
C−OPS tilt (°)
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



Boussole_231
bou_c-ops_210612_0848_002_data
09:06 UTC
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
Depth (m)
C−OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



Boussole_231
bou_c−ops_210612_0848_003_data
09:09 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
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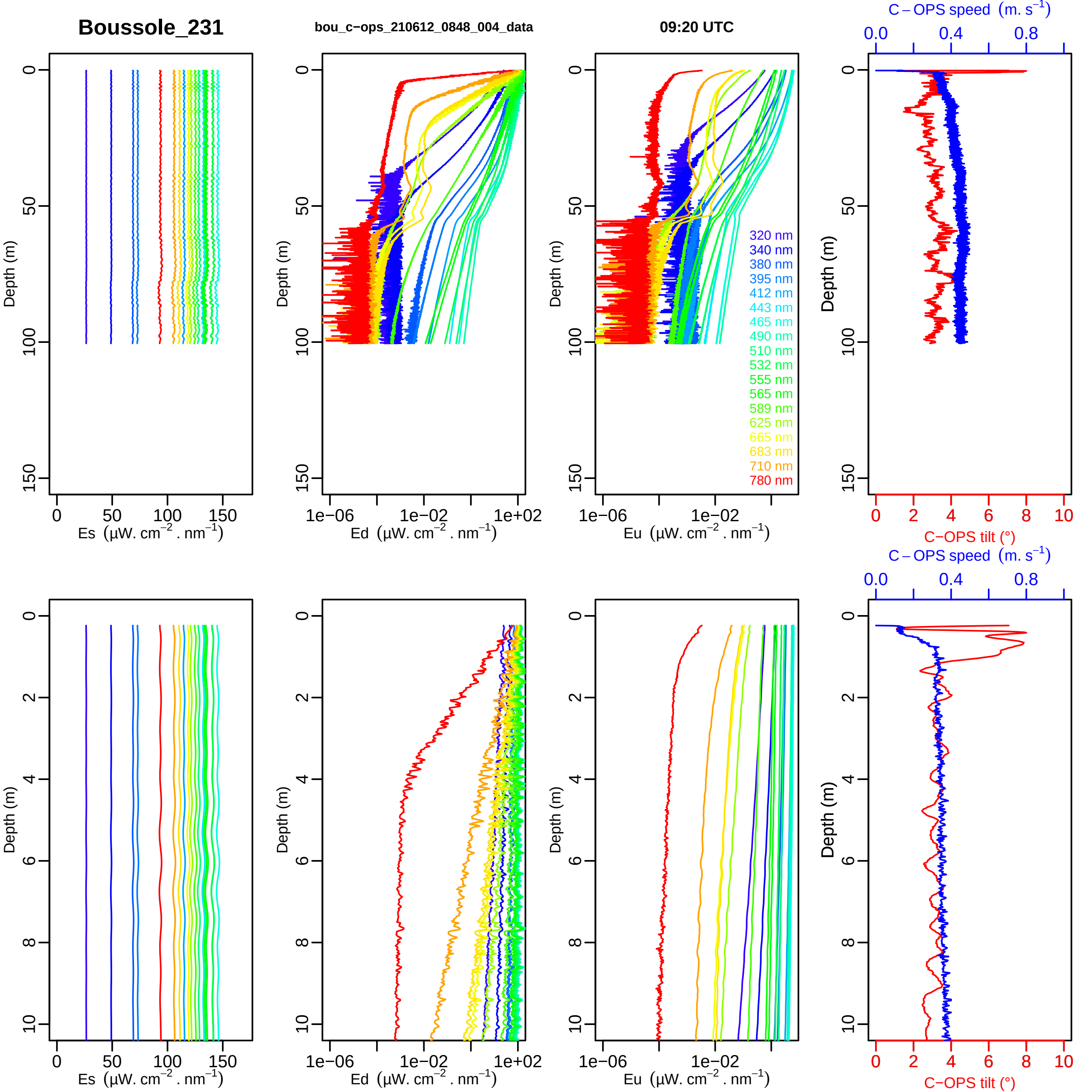
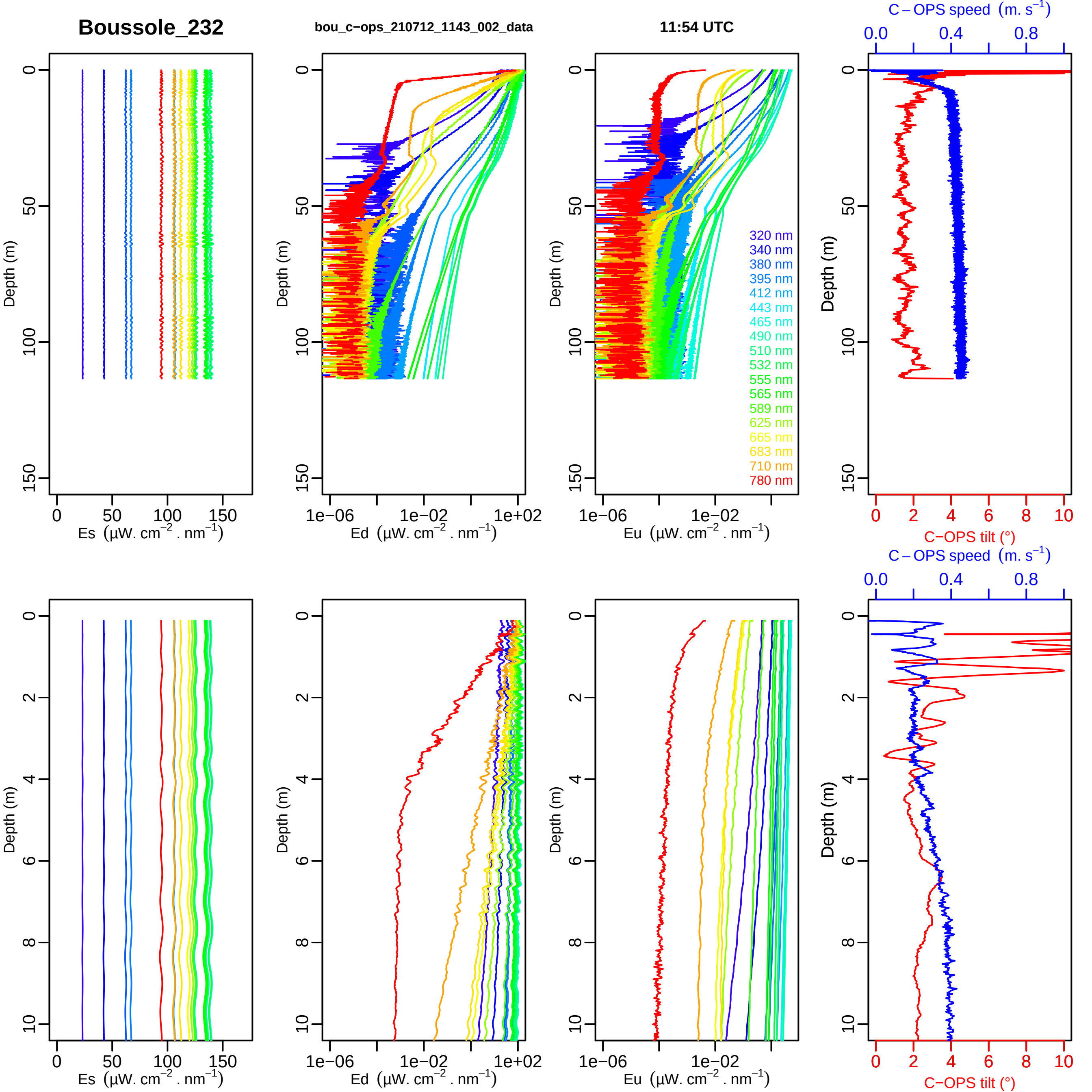
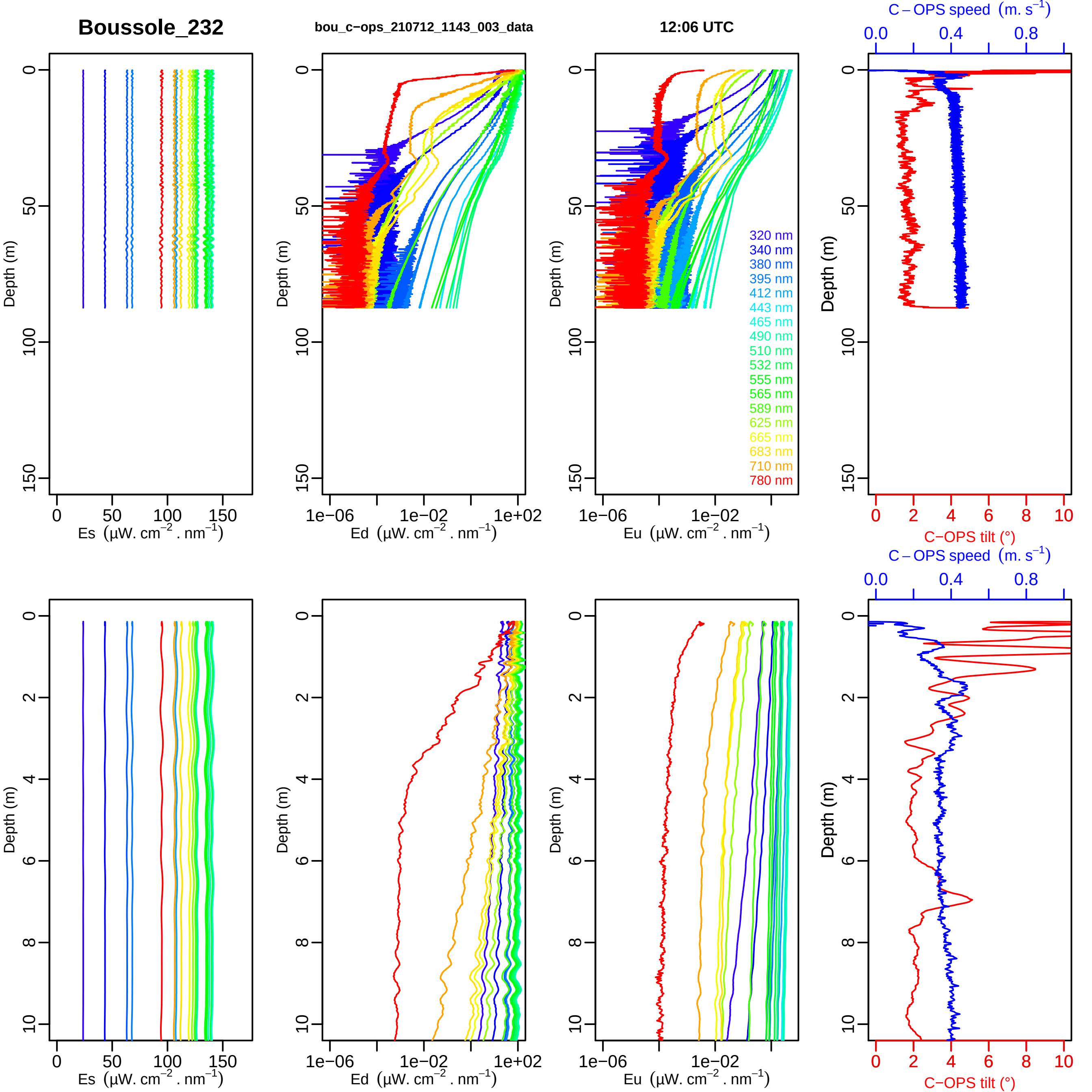
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



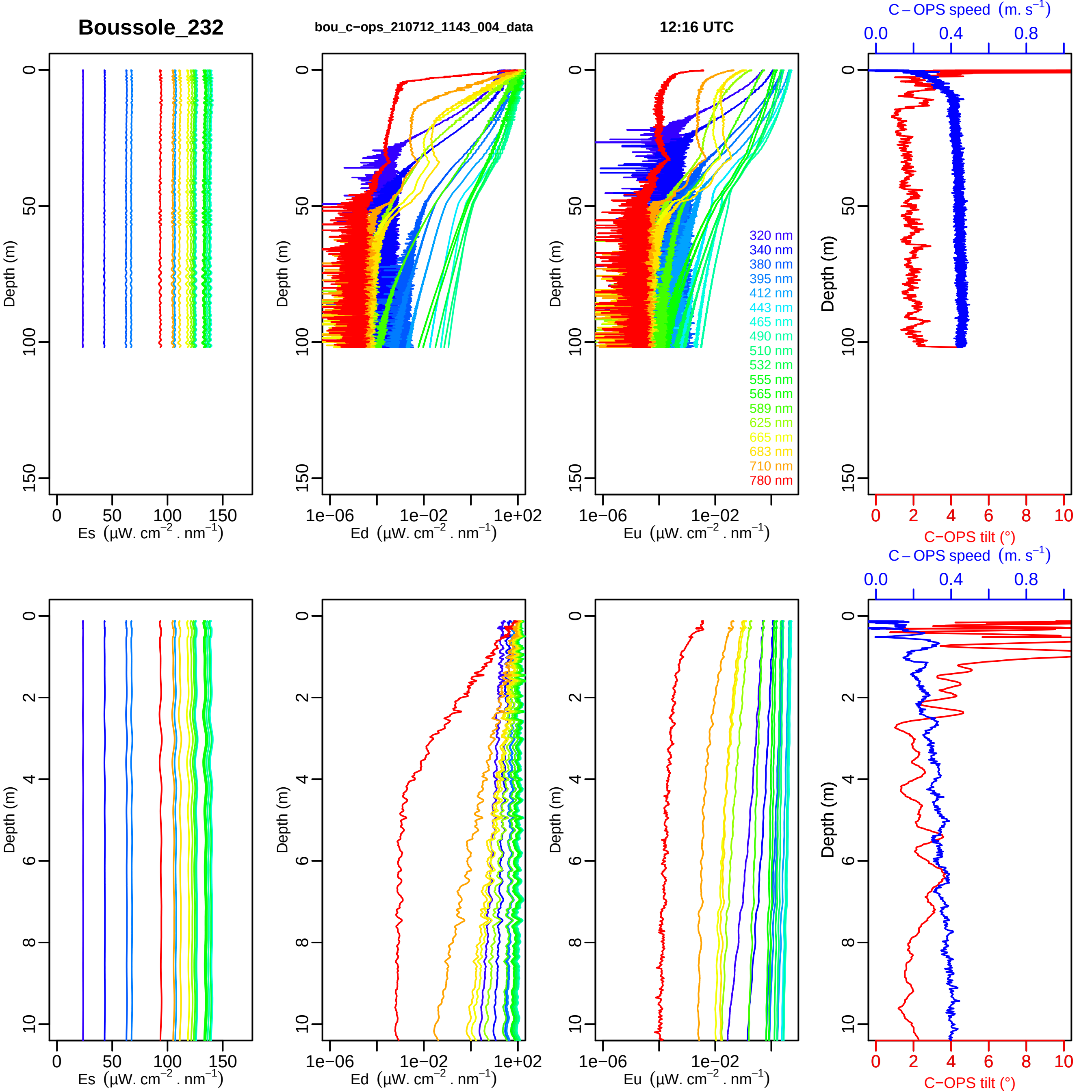
Boussole_231
bou_c−ops_210612_0848_004_data
09:20 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm

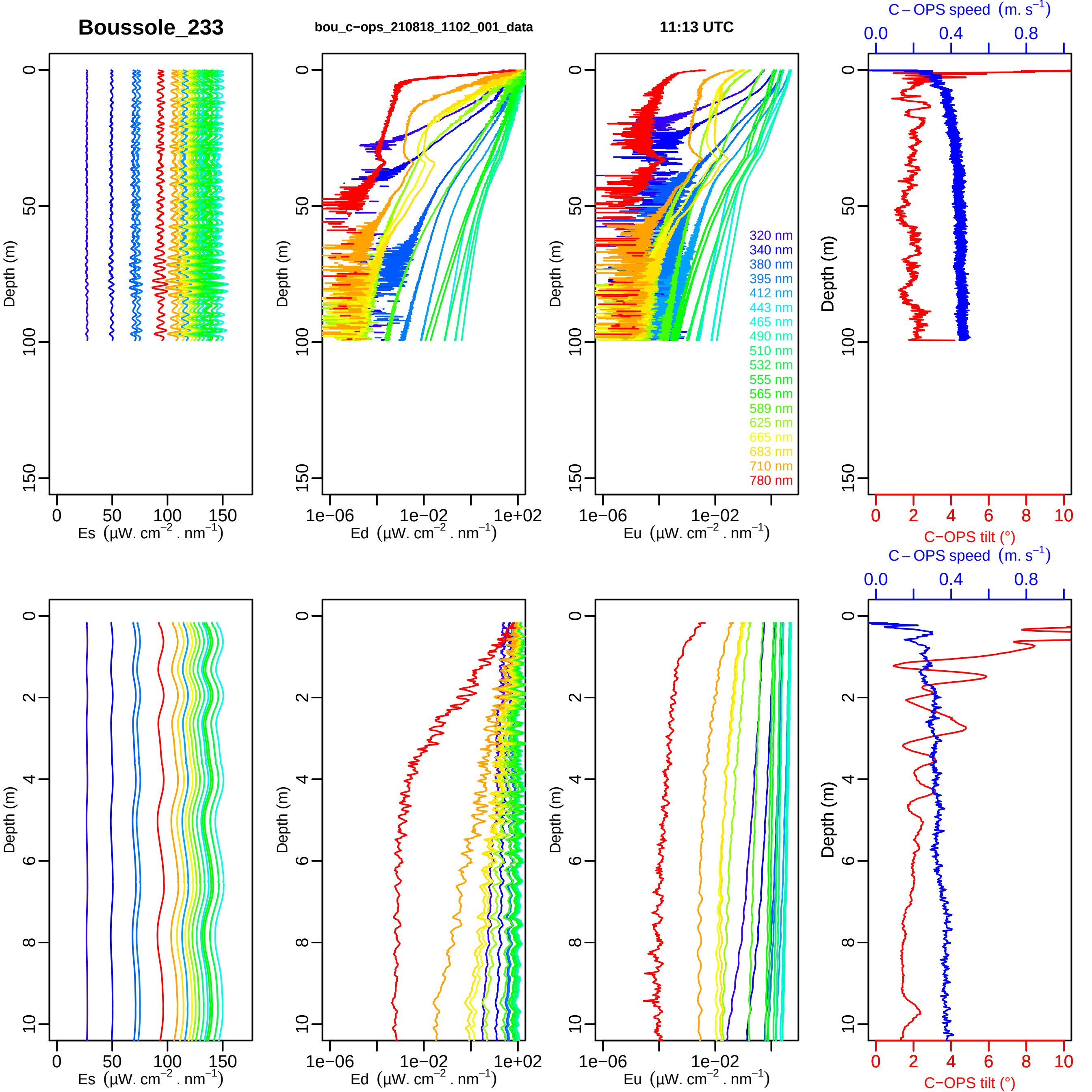


Boussole_232
bou_c−ops_210712_1143_002_data
11:54 UTC
C − OPS speed (m. s−1)
C−OPS tilt (°)
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



Boussole_232
bou_c−ops_210712_1143_003_data
12:06 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm
C − OPS speed (m. s−1)
C−OPS tilt (°)


Boussole_232
bou_c−ops_210712_1143_004_data
12:16 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



Boussole_233
bou_c−ops_210818_1102_001_data
11:13 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
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589 nm
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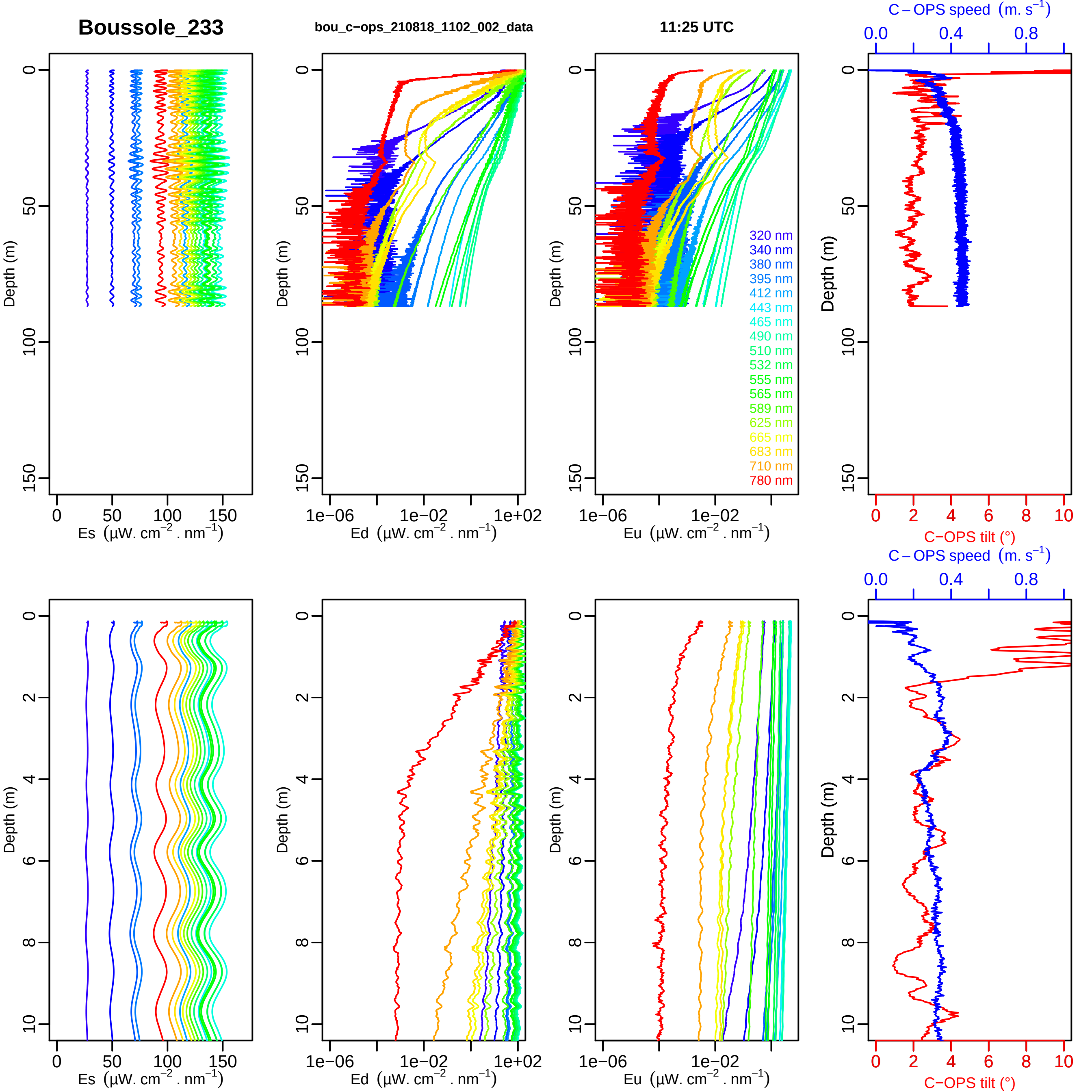
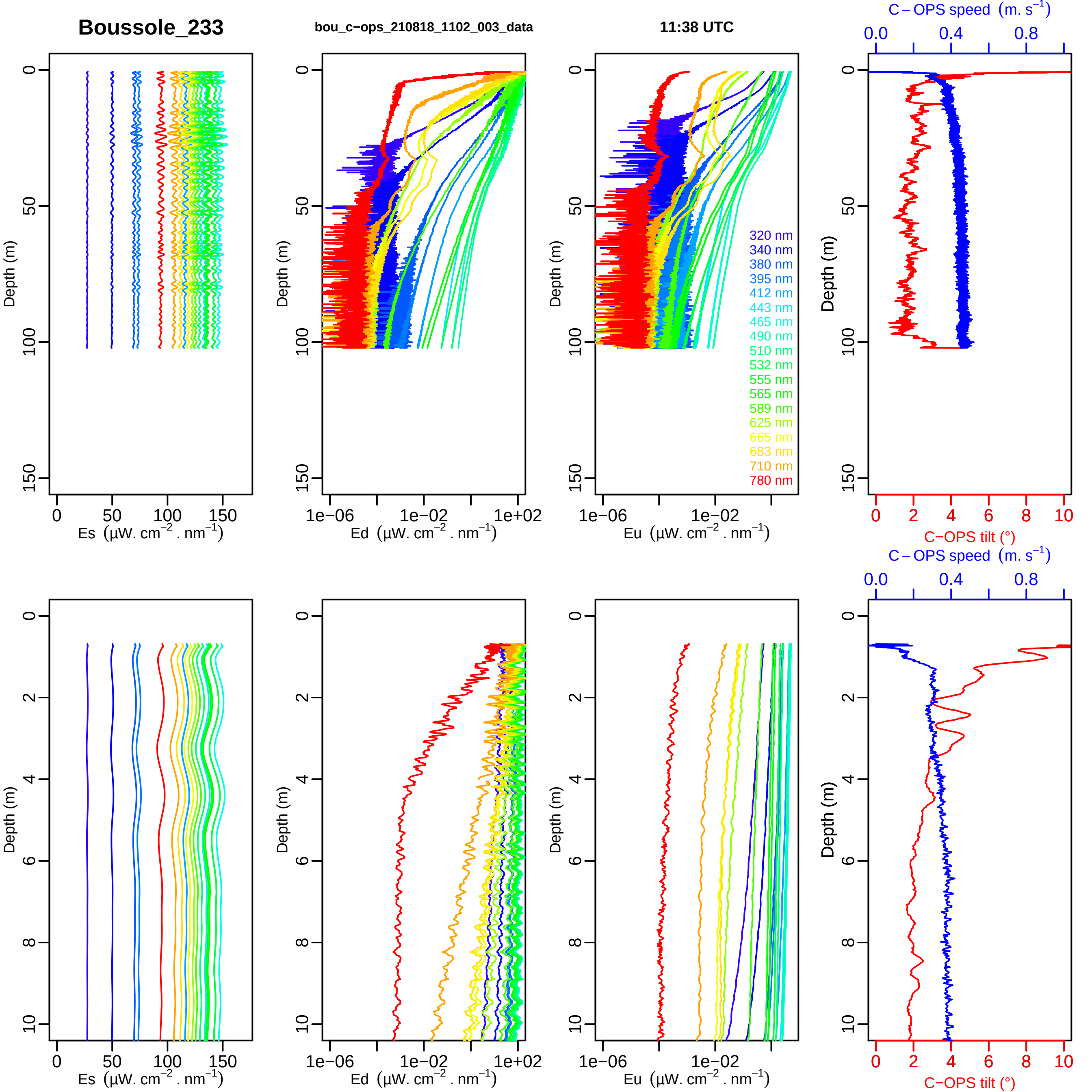
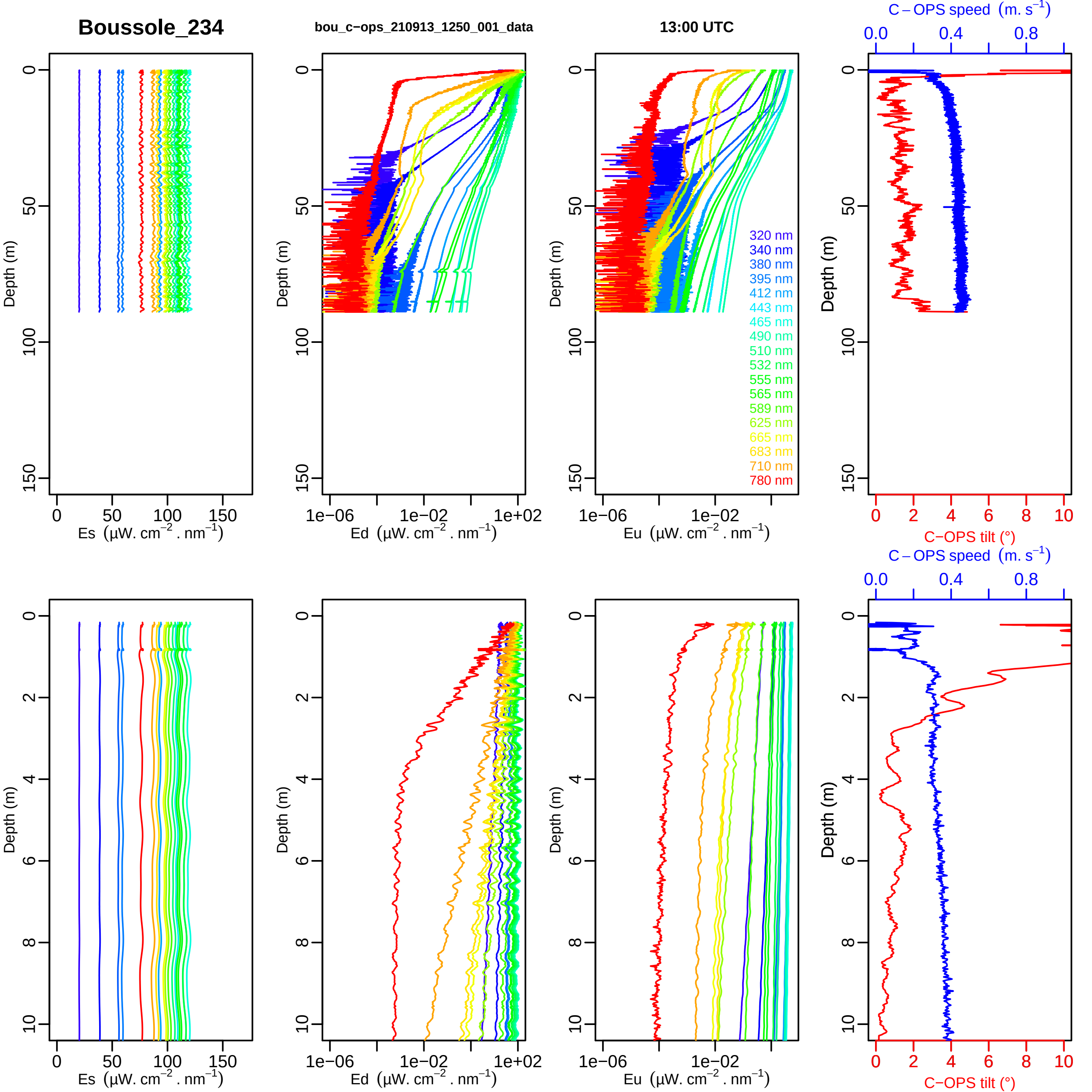
665 nm
683 nm
710 nm
780 nm

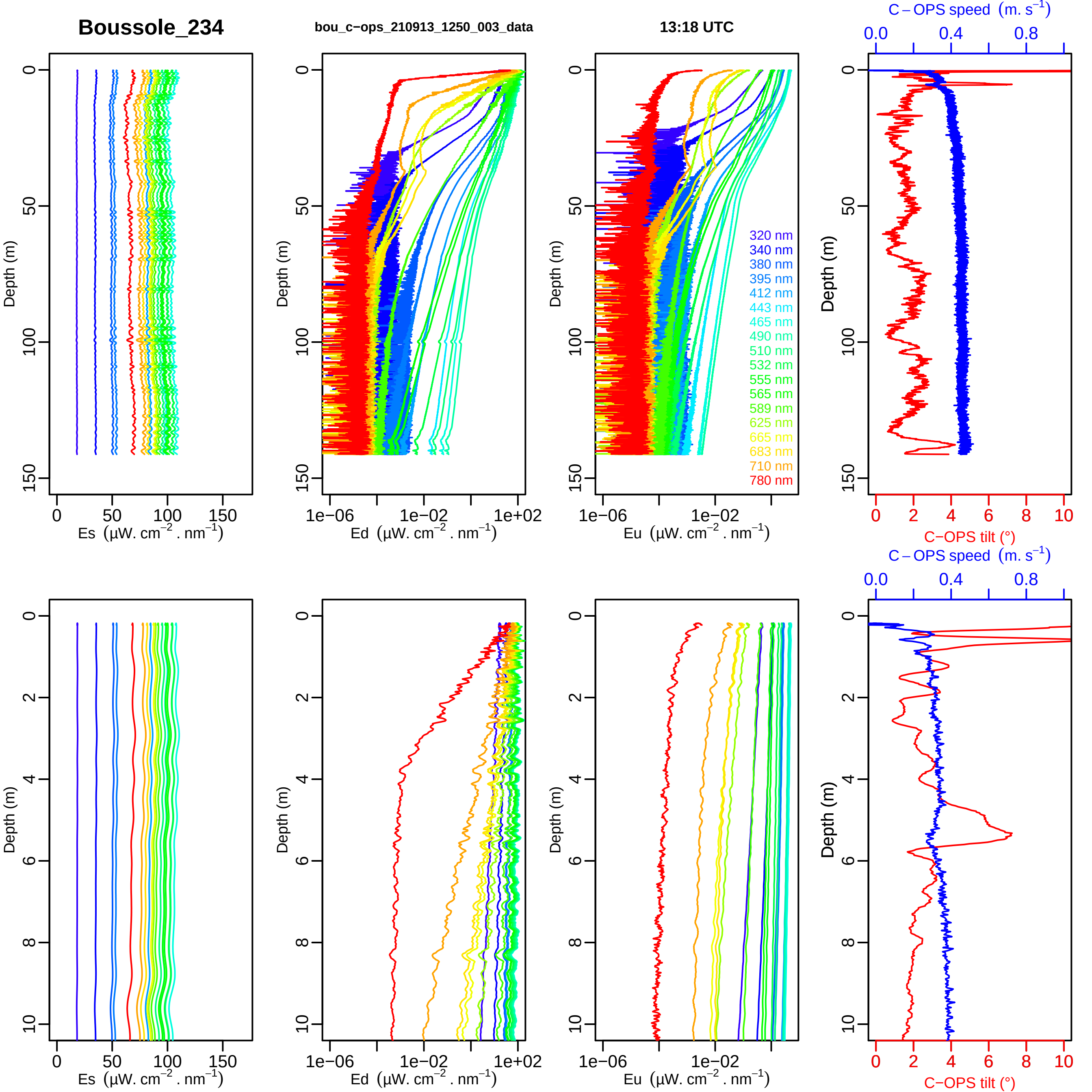


Boussole_233
bou_c−ops_210818_1102_002_data
11:25 UTC
C − OPS speed (m. s−1)
C−OPS tilt (°)
Depth (m)
Es (μW. cm−2 . nm−1)
Ed (μW. cm−2 . nm−1)
Eu (μW. cm−2 . nm−1)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm

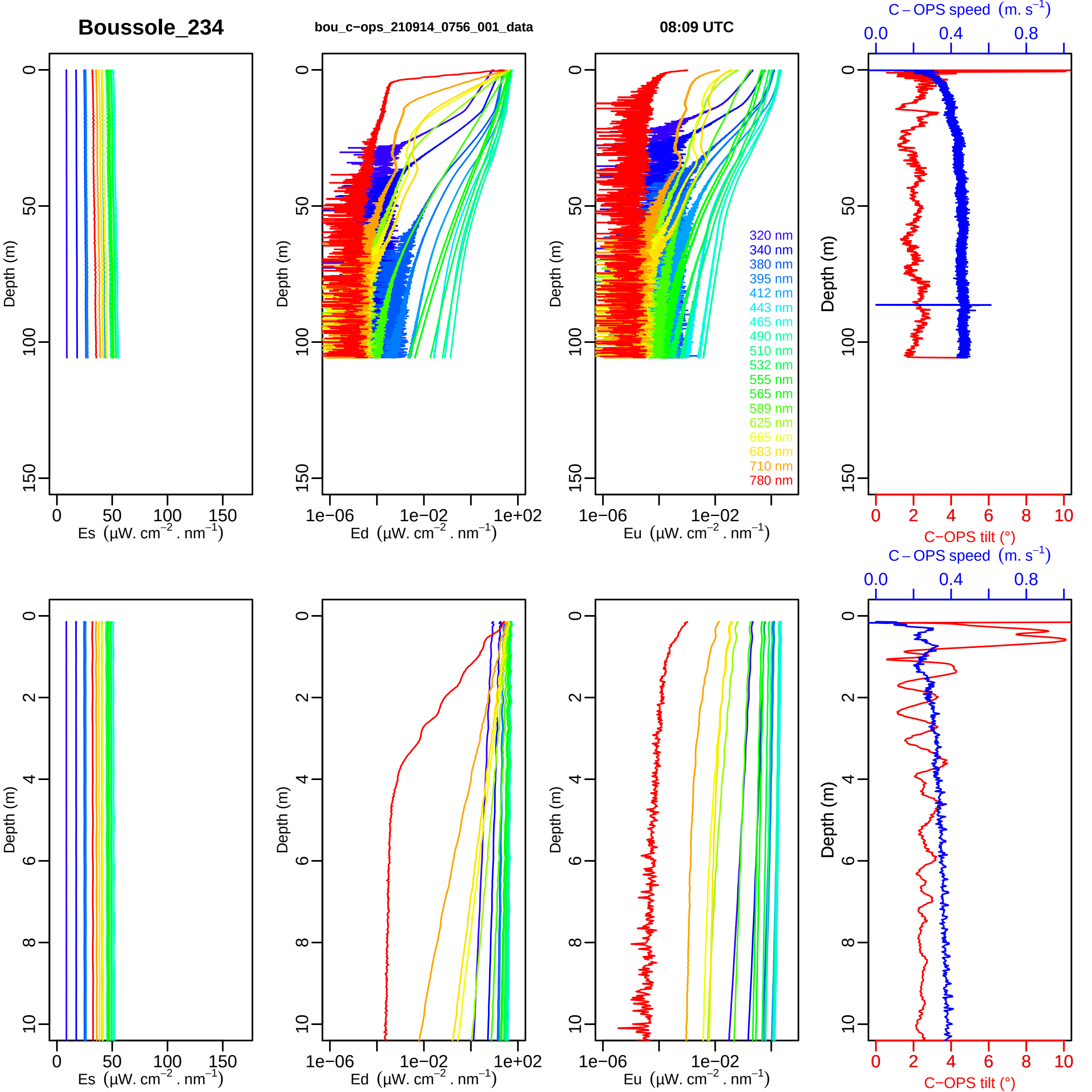


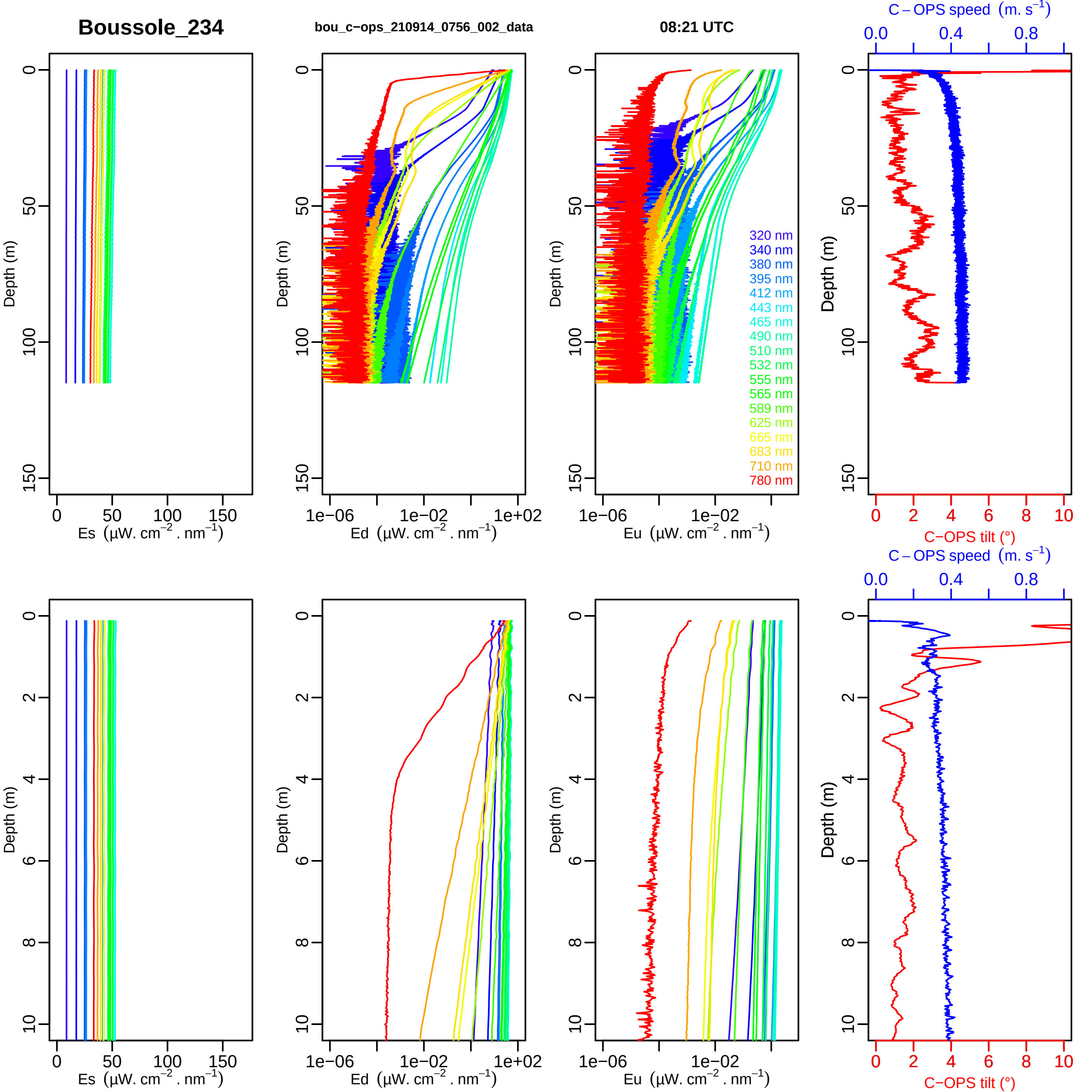
Boussole_233
bou_c−ops_210818_1102_003_data
11:38 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm


Boussole_234
bou_c−ops_210913_1250_001_data
13:00 UTC
C − OPS speed (m. s−1)
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm

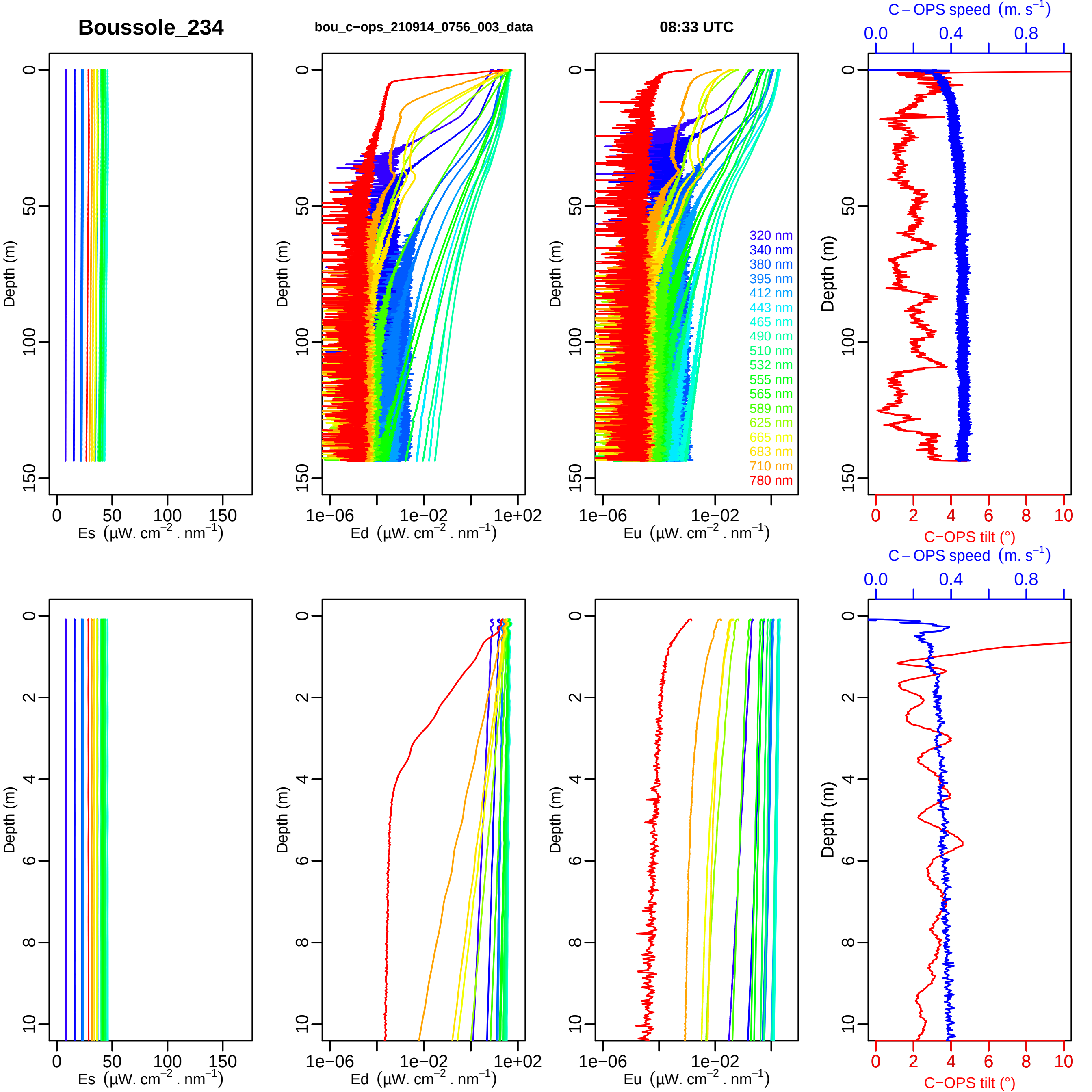


Boussole_234
bou_c−ops_210913_1250_003_data
13:18 UTC
Depth (m)
Es (µW. cm⁻² . nm⁻¹)
Ed (µW. cm⁻² . nm⁻¹)
Eu (µW. cm⁻² . nm⁻¹)
C − OPS speed (m. s⁻¹)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm

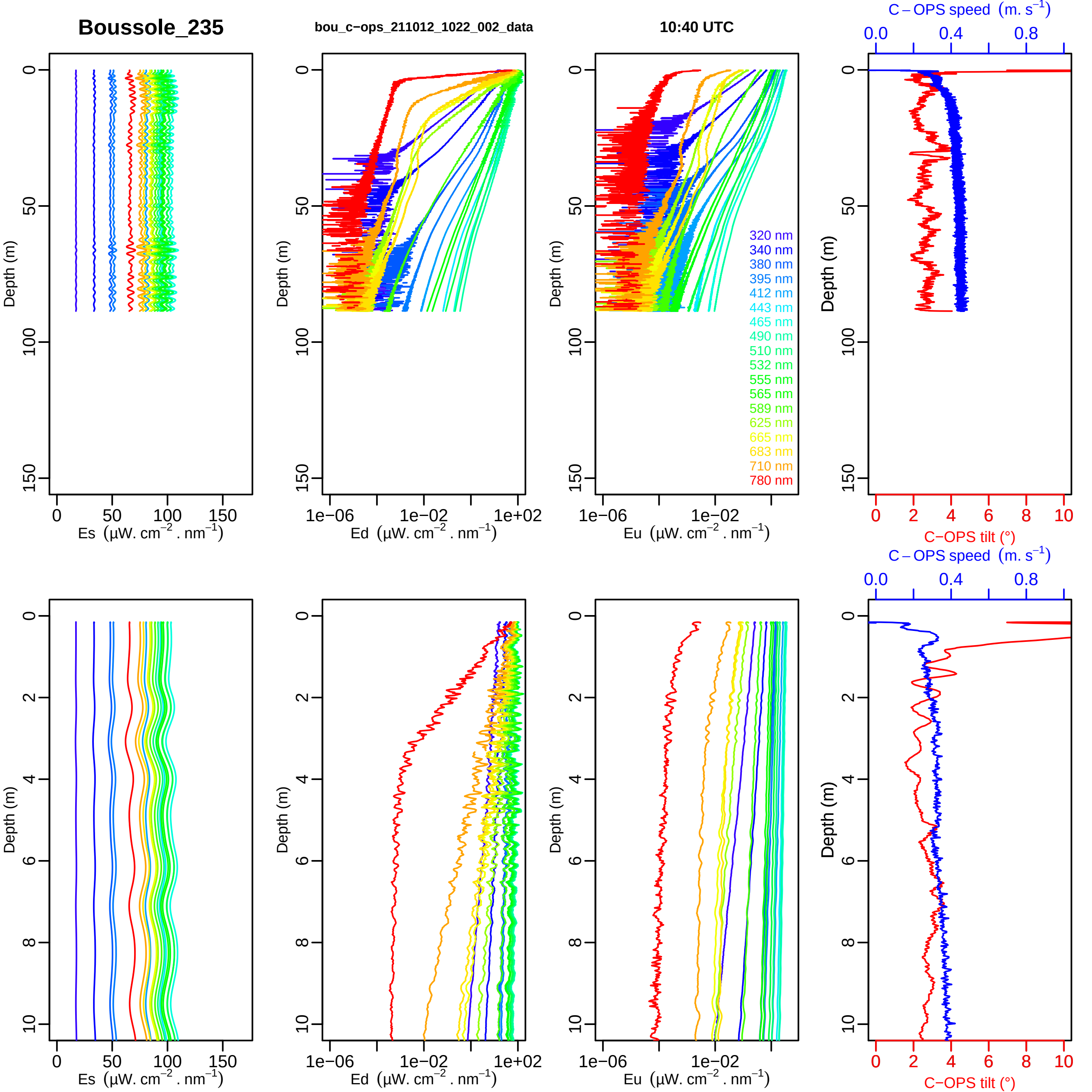

Boussole_234
bou_c−ops_210914_0756_001_data
08:09 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



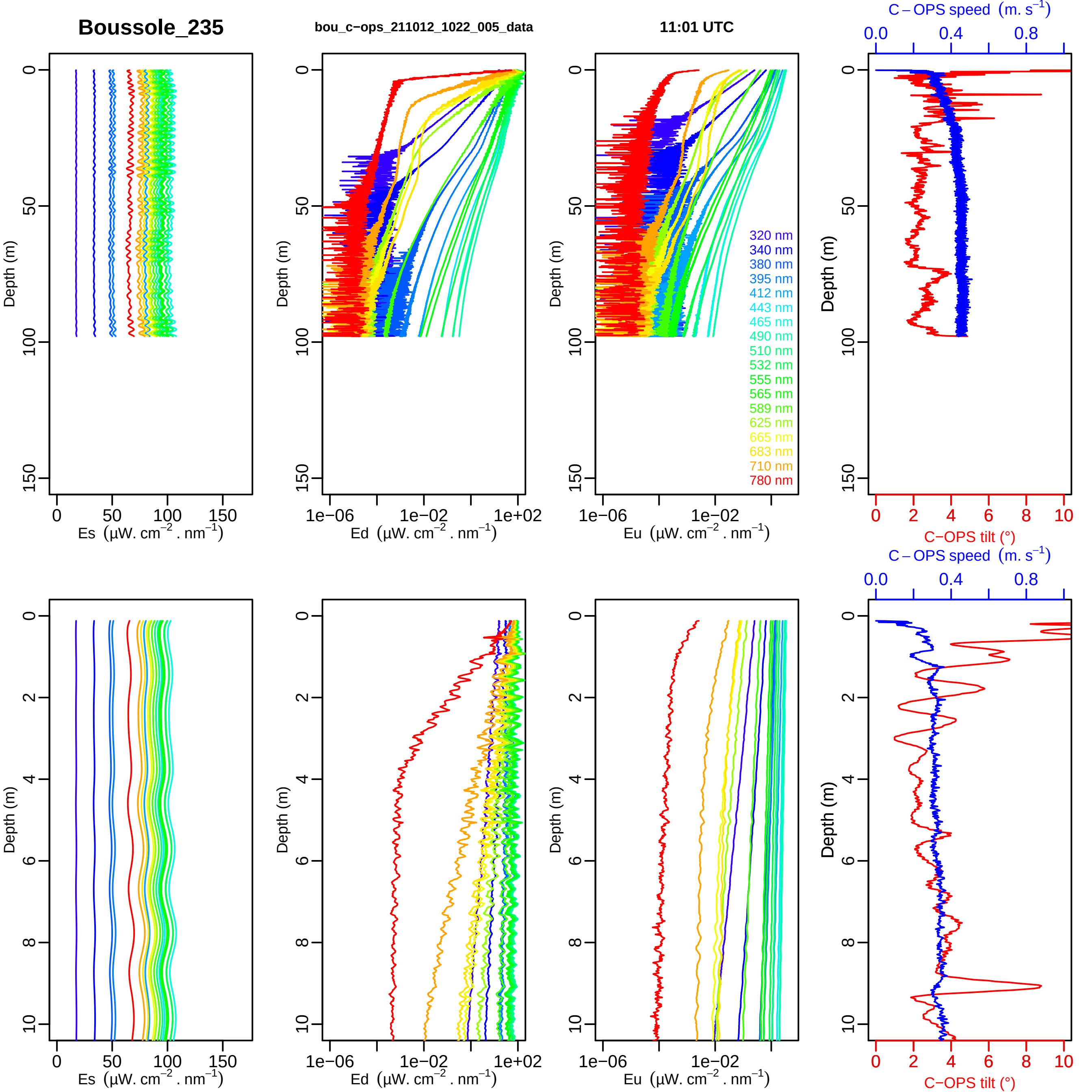
Boussole_234
bou_c−ops_210914_0756_002_data
08:21 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



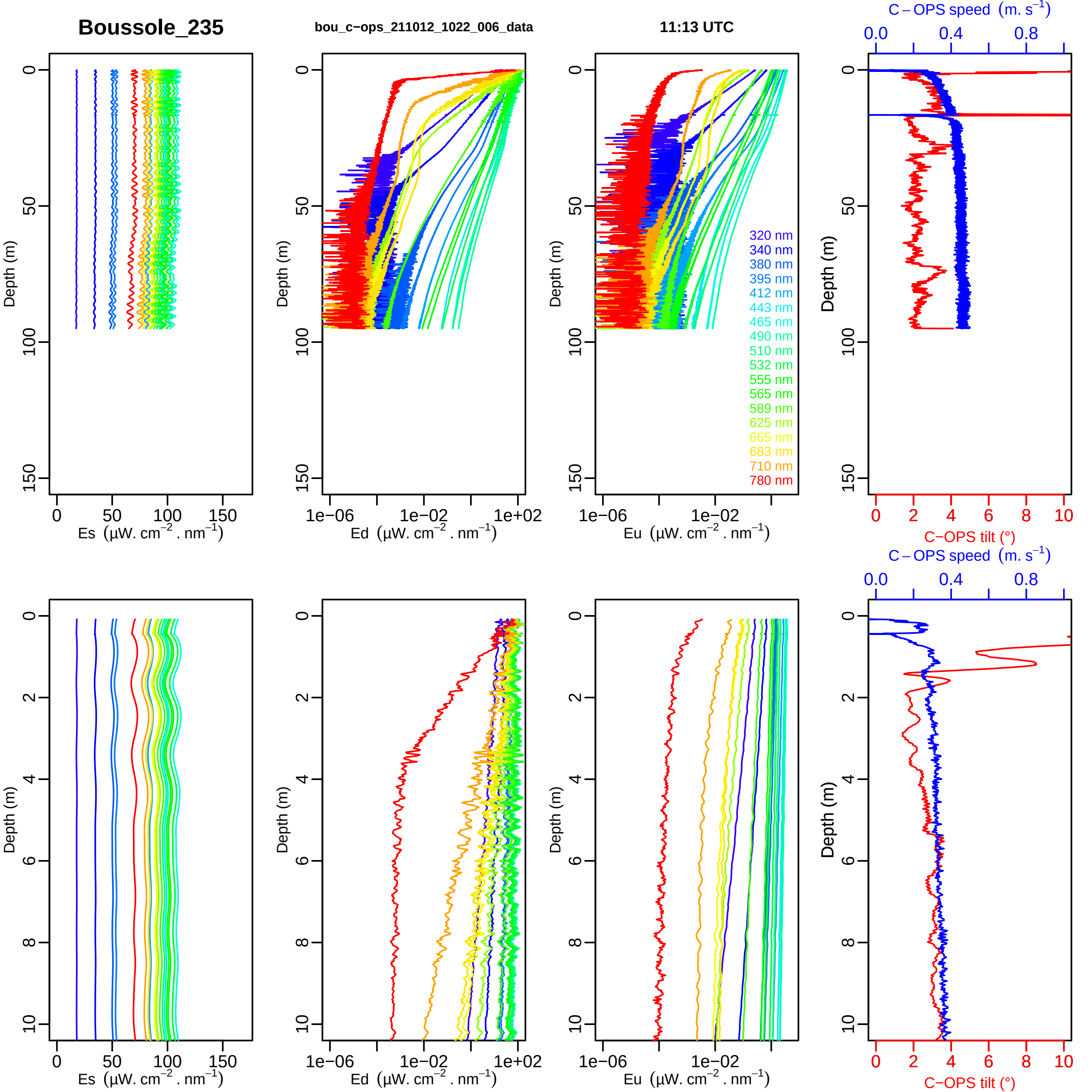
Boussole_234
bou_c−ops_210914_0756_003_data
08:33 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm
C − OPS speed (m. s−1)
C−OPS tilt (°)



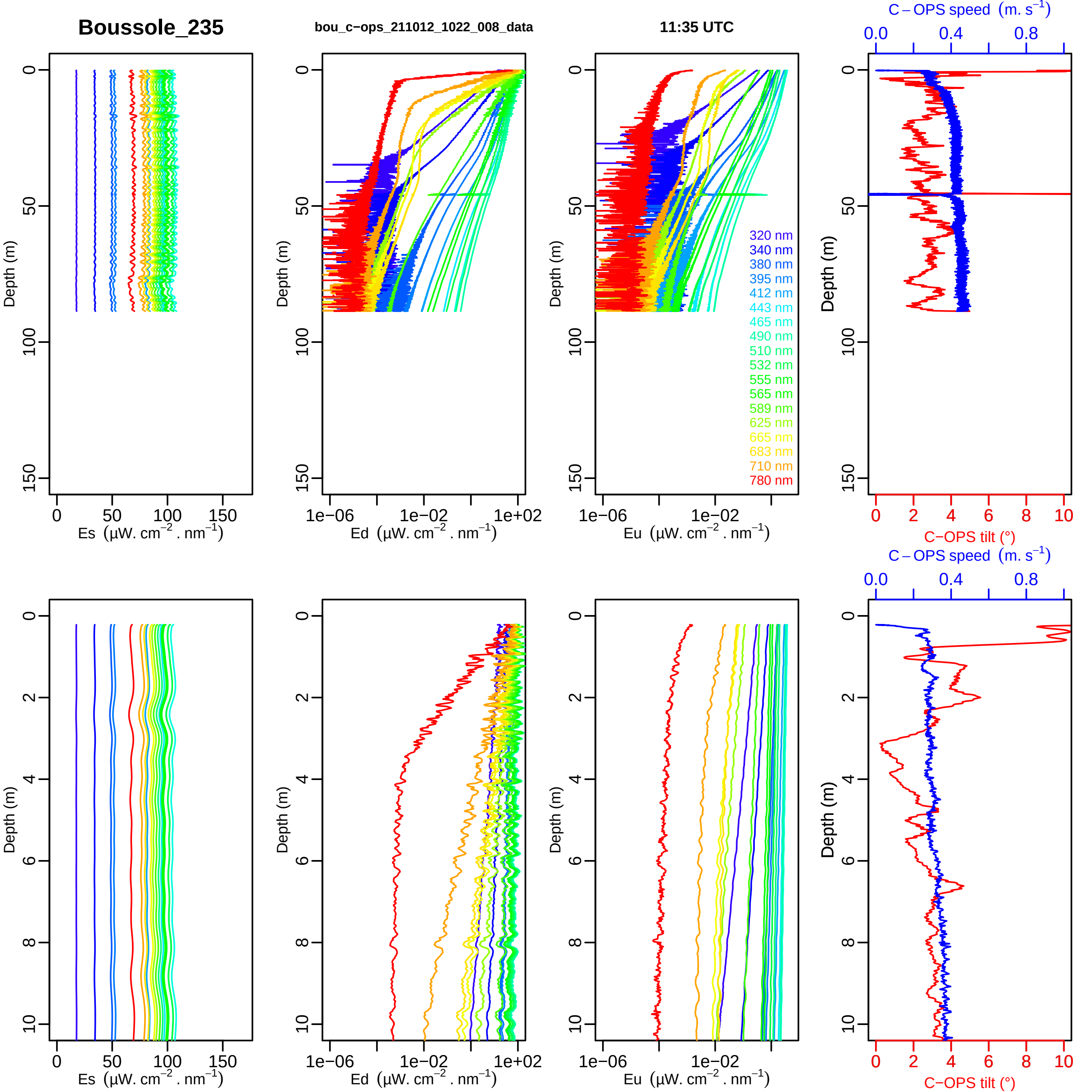
Boussole_235
bou_c−ops_211012_1022_002_data
10:40 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm

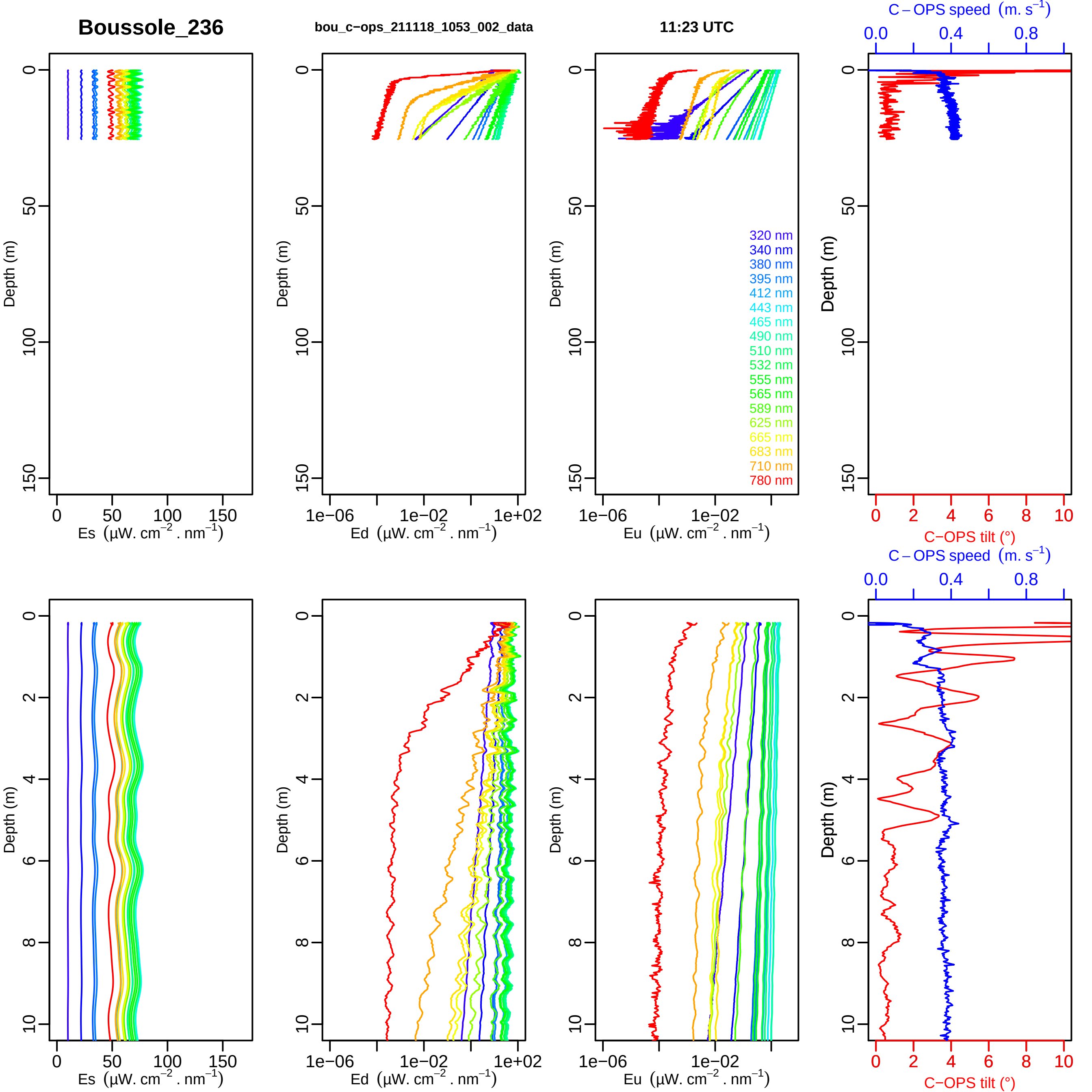


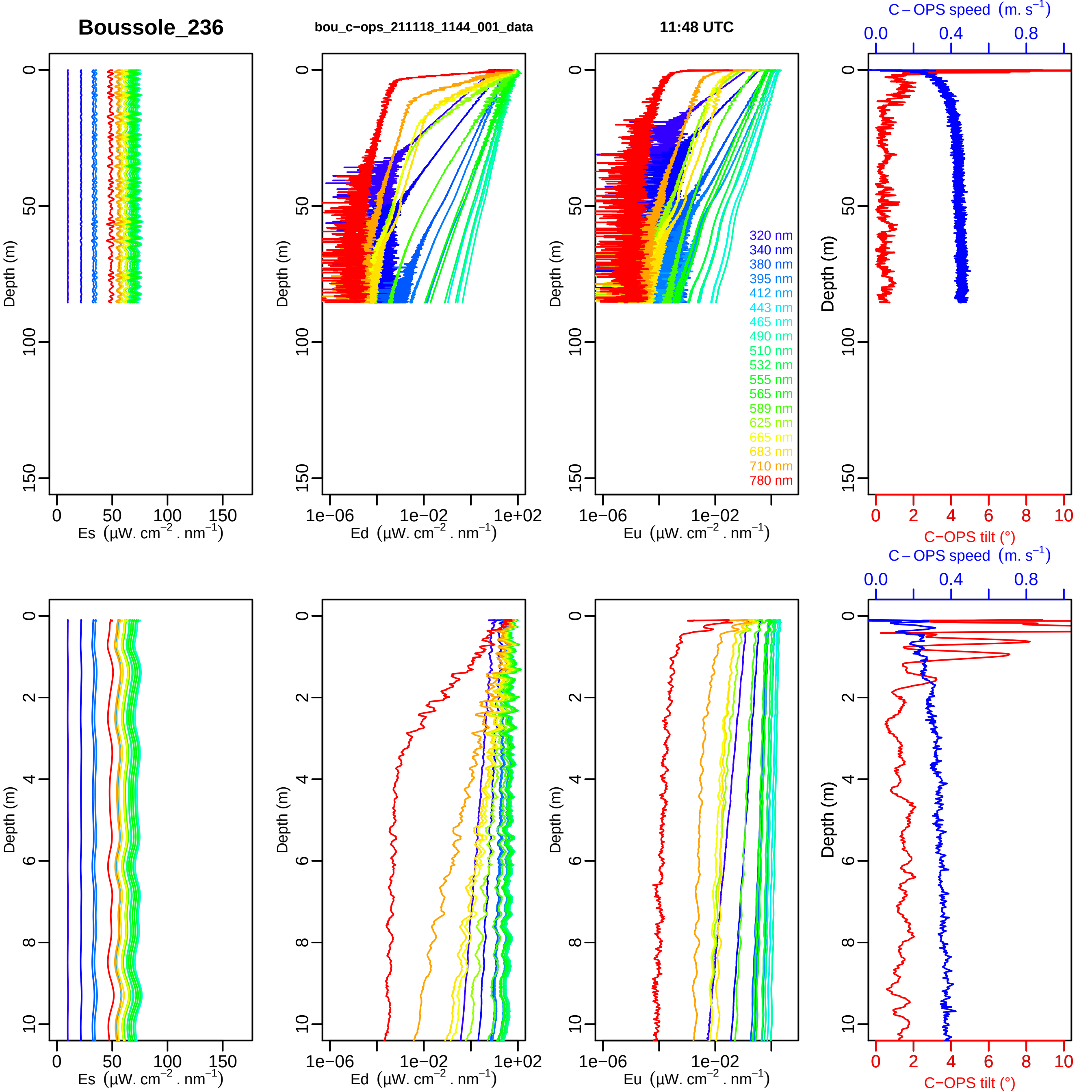
Boussole_235
bou_c−ops_211012_1022_005_data
11:01 UTC
C − OPS speed (m. s−1)
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



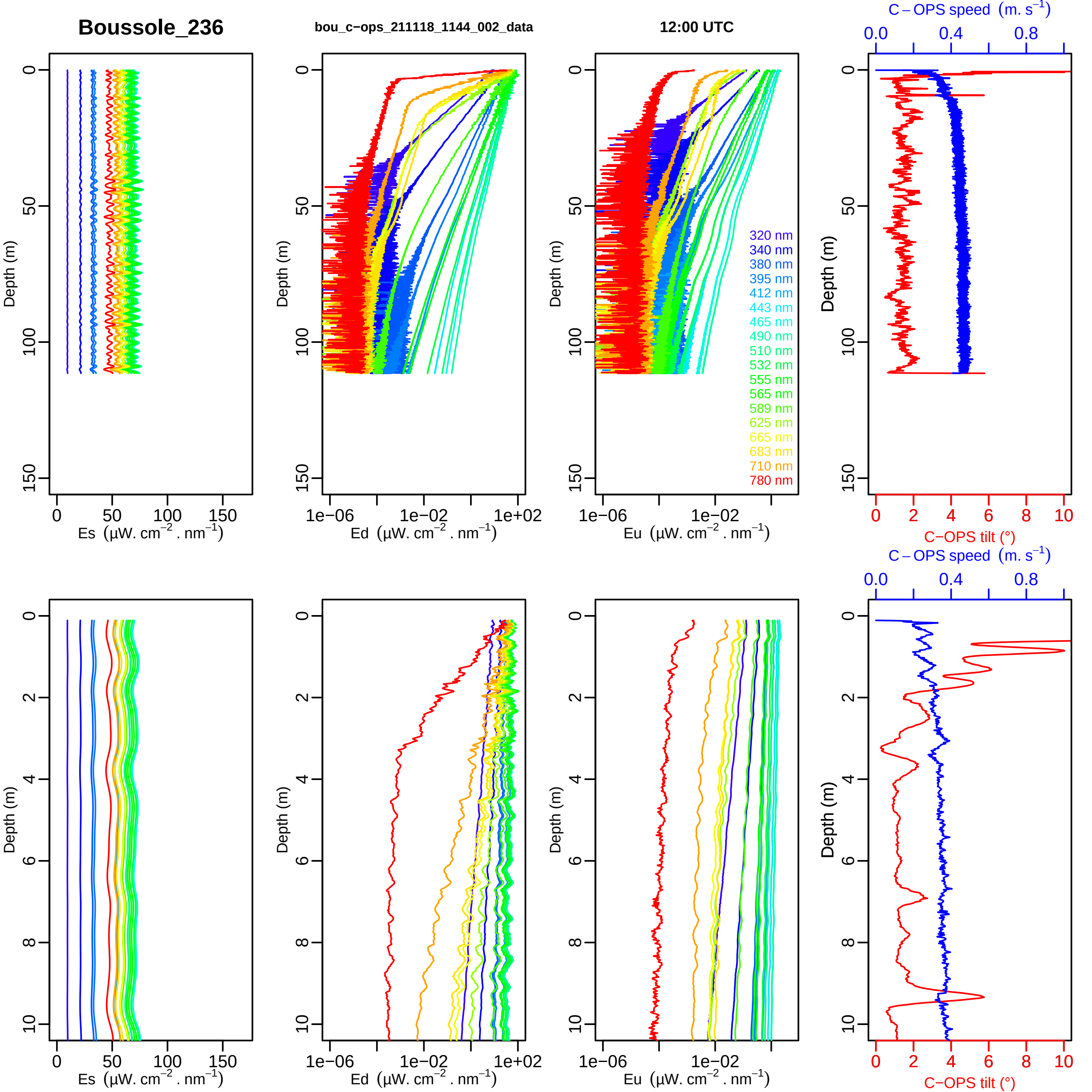
Boussole_235
bou_c−ops_211012_1022_006_data
11:13 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm


Boussole_235
bou_c−ops_211012_1022_008_data
11:35 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm

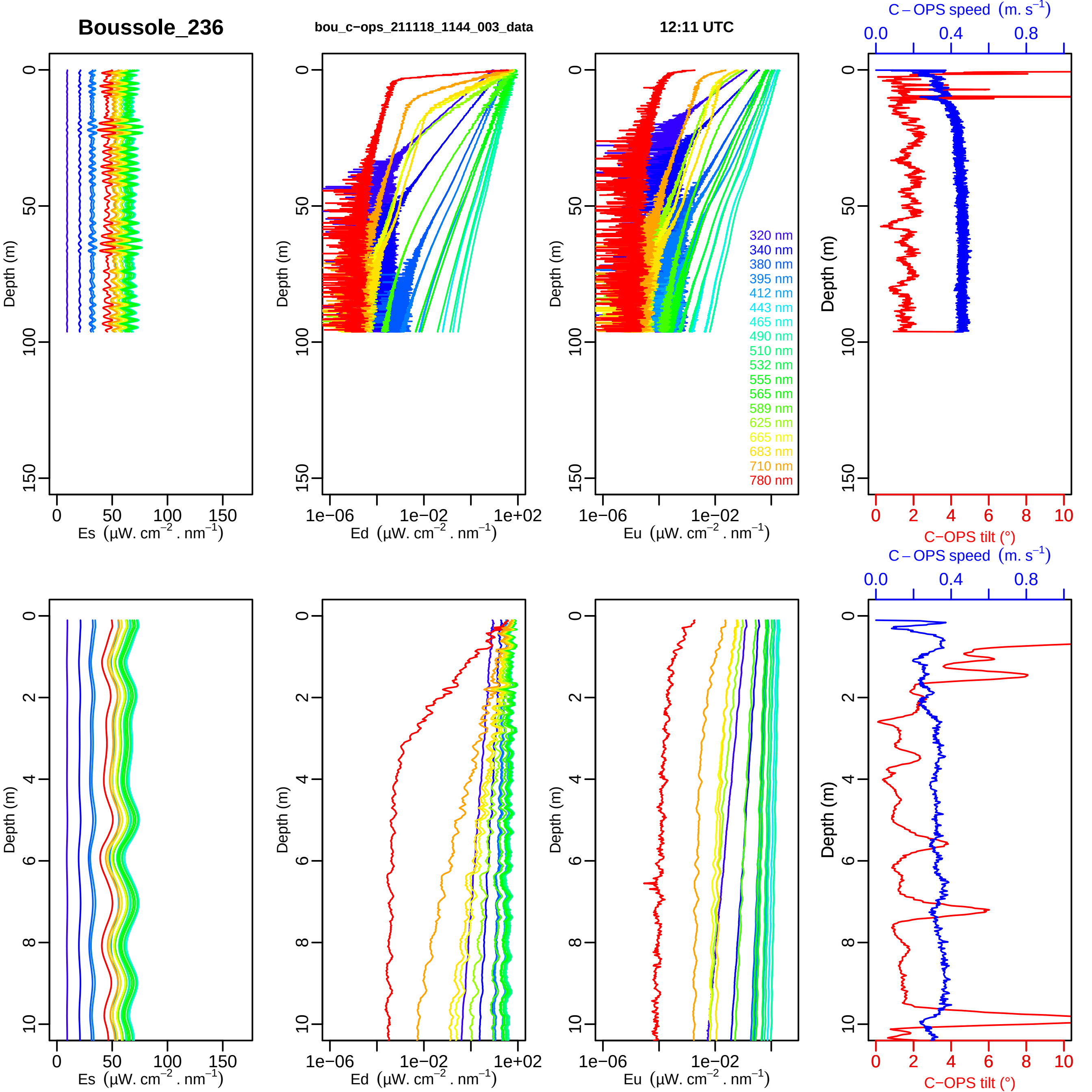

Boussole_236
bou_c−ops_211118_1053_002_data
11:23 UTC
C − OPS speed (m. s−1)
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



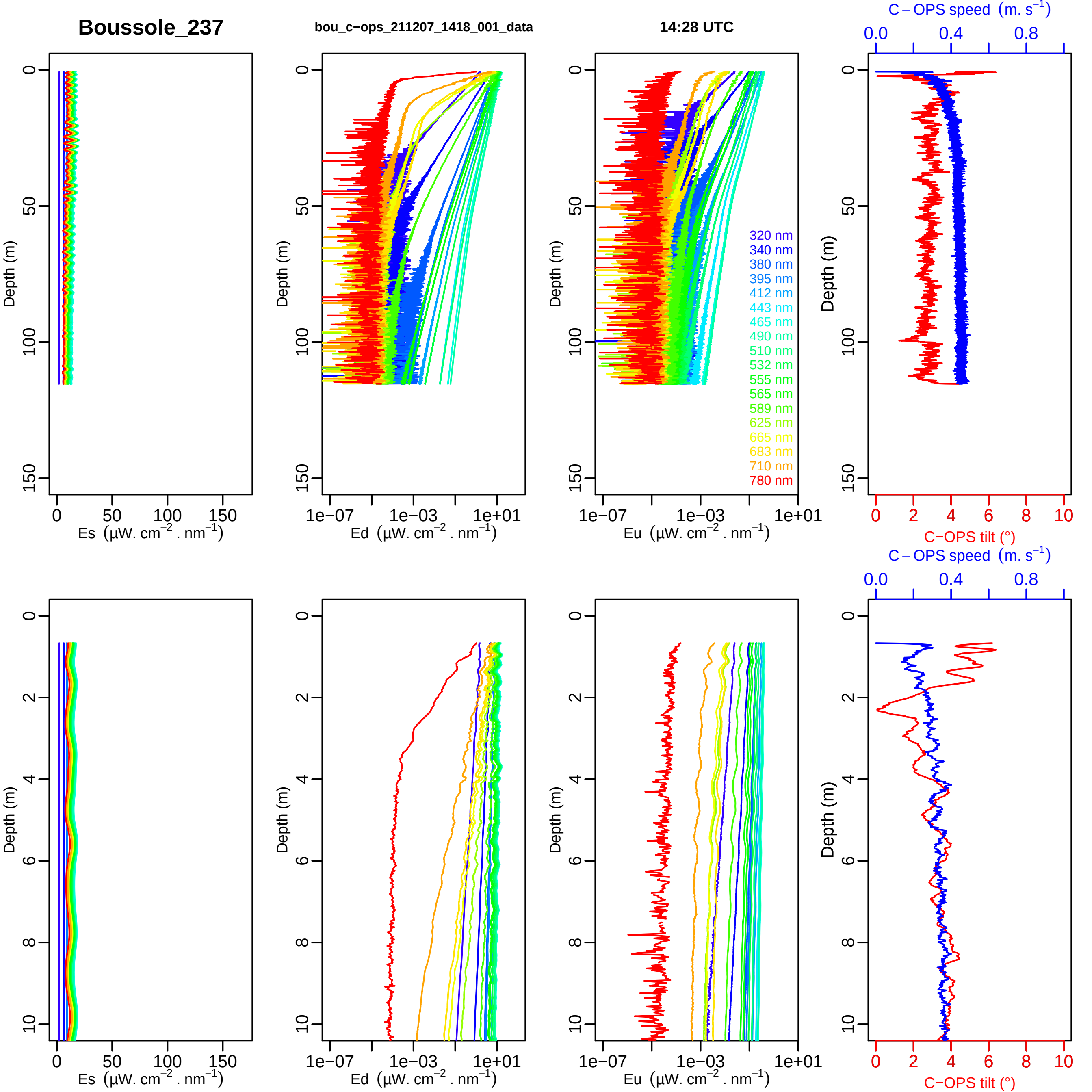
Boussole_236
bou_c−ops_211118_1144_001_data
11:48 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm

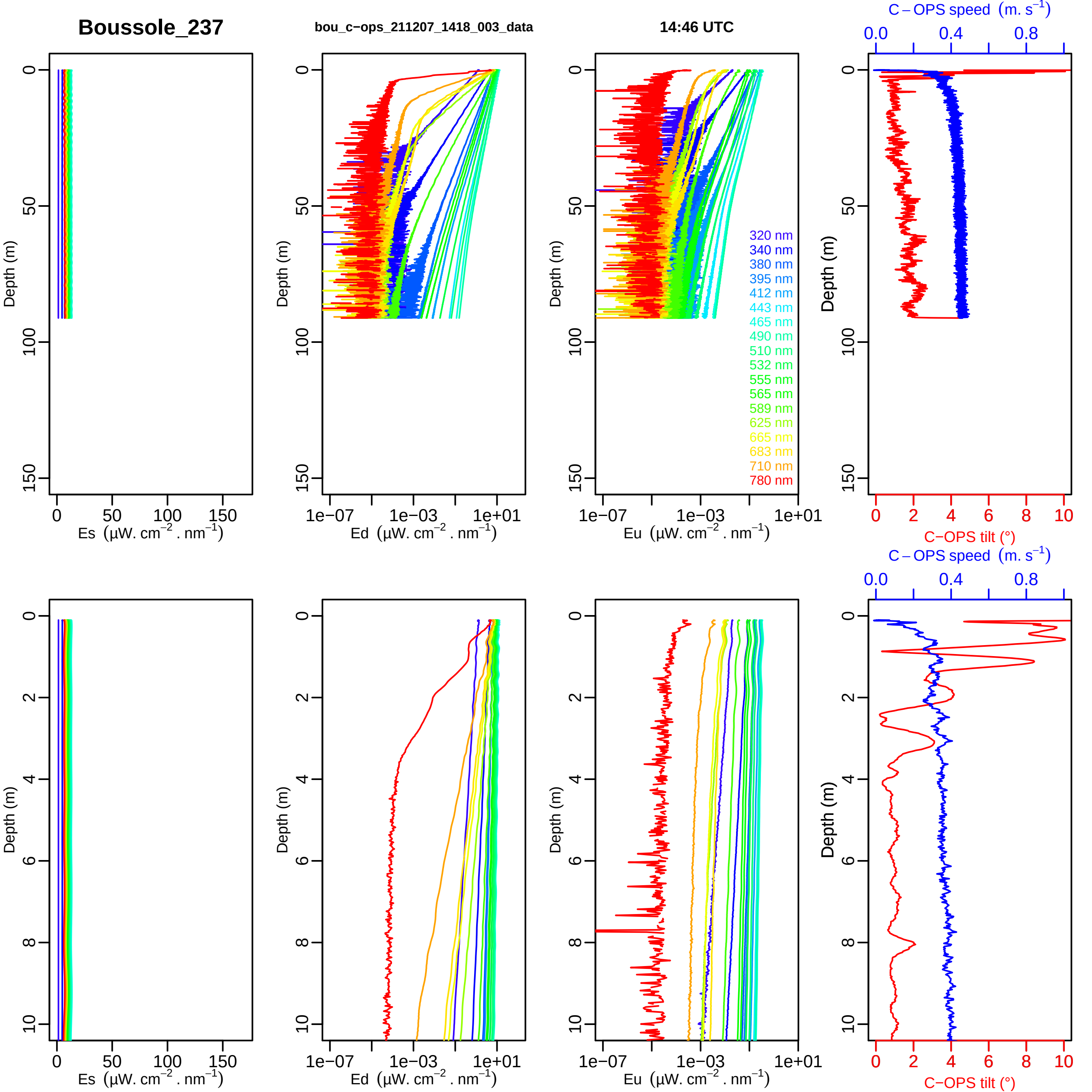


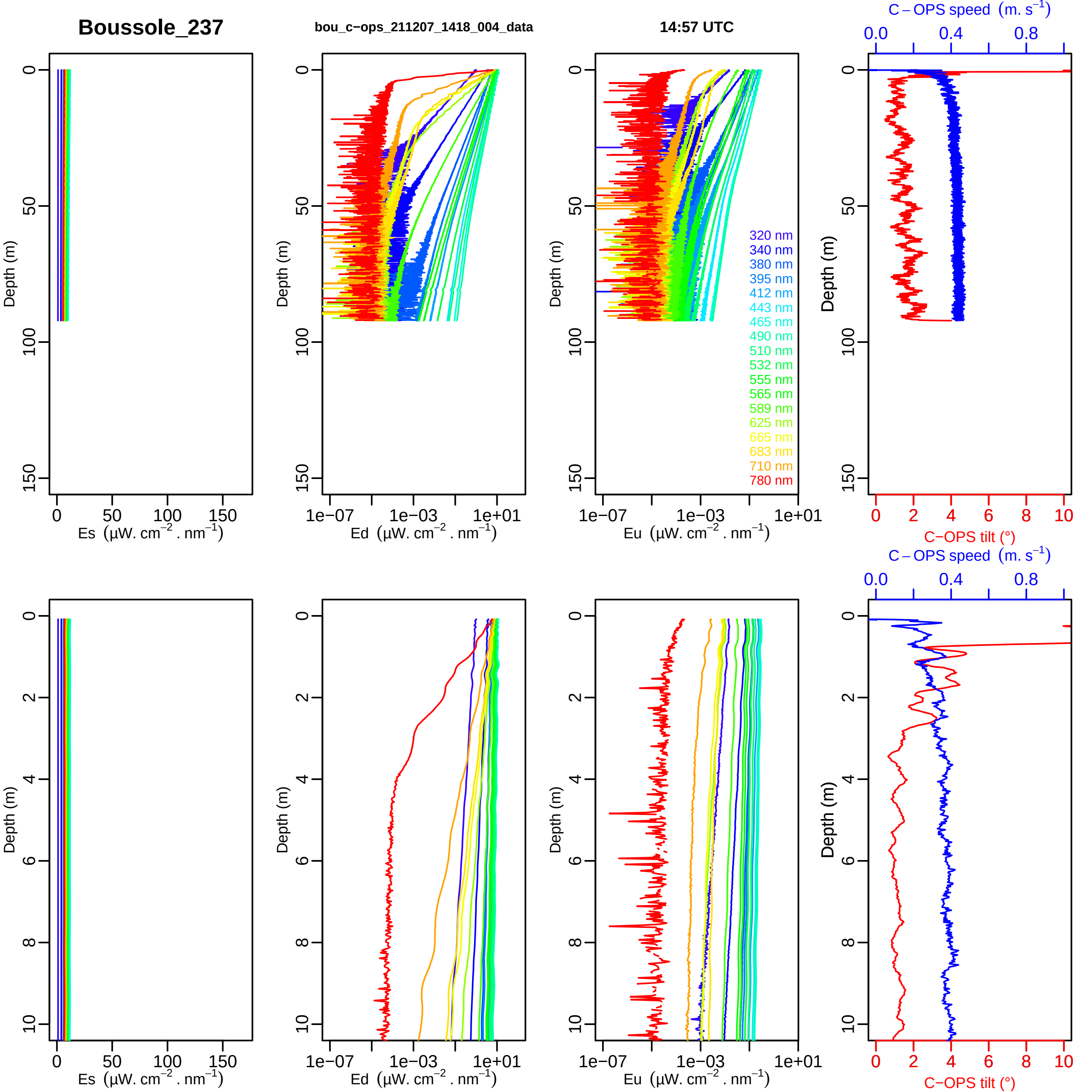
Boussole_236
bou_c−ops_211118_1144_002_data
12:00 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



Boussole_236
bou_c−ops_211118_1144_003_data
12:11 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm


Boussole_237
bou_c−ops_211207_1418_001_data
14:28 UTC
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C − OPS speed (m. s−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm


Boussole_237
bou_c−ops_211207_1418_003_data
14:46 UTC
C − OPS speed (m. s−1)
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm



Boussole_237
bou_c−ops_211207_1418_004_data
14:57 UTC
C − OPS speed (m. s−1)
Depth (m)
Es (µW. cm−2 . nm−1)
Ed (µW. cm−2 . nm−1)
Eu (µW. cm−2 . nm−1)
C−OPS tilt (°)
320 nm
340 nm
380 nm
395 nm
412 nm
443 nm
465 nm
490 nm
510 nm
532 nm
555 nm
565 nm
589 nm
625 nm
665 nm
683 nm
710 nm
780 nm

Problems identified during the cruises

BOUSSOLE #226
The optical profiles could not be performed because the C-OPS was still under calibration at Biospherical.

BOUSSOLE #227
COPS 02: the profile was stopped at 10 m depth because the instrument was too much tilted.

BOUSSOLE #228
The second day, the C-OPS measurements were not optimal because of the bad sky conditions during the acquisition: the sky was cloudy with unstable irradiance. Some profiles had to be stopped early during the acquisition.

BOUSSOLE #229
C-OPS measurements were not optimal because the sky became hazy after the first cast with unstable surface irradiance.

BOUSSOLE #230
No problems.

BOUSSOLE#231
The second day, the C-OPS 02 profile had to be stopped early because of the unstable irradiance (cloudy sky). So, a fourth profile was performed.

BOUSSOLE#232
No problems.

BOUSSOLE#233
No problems.

BOUSSOLE #234
The first day, it was not possible to perform a third C-OPS profile because the sky became cloudy with unstable irradiance.

BOUSSOLE #235
Several C-OPS profiles were performed at the BOUSSOLE site but only four of them were kept because the C-OPS was too much tilted during the descent for the other profiles.

BOUSSOLE #236
The first C-OPS profile (COPS #01) was deployed only down to 25 m because shadows appeared on the surface radiometer, probably because of an incorrect orientation of the ship with respect to the sun. However, three other good-quality C-OPS profiles were performed at the BOUSSOLE site.

BOUSSOLE #237
Four C-OPS profiles were performed at the BOUSSOLE site but only three of them were kept because the C-OPS was too much tilted during the descent for the second profile.

The C-OPS profiles were performed belatedly in the day because we had to delay the departure from Nice harbour due to bad weather during the morning. During the last C-OPS profile, the sun elevation was low.