

DIAGTOOL REPORT



Round Robin (GT cotier) : Wet tropospheric correction. Medsea. J2. Wet rad vs Wet gpd vs Wet ecmwf.

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1 General description

- Figures and notes have been included in this report to evaluate different altimetry products.
- In order to test different version of the Wet tropospheric correction used to calculate the sea level anomaly. Each version has been compared with a reference version. In this case the Wet_rad is the reference one.
- The sea level anomaly has been calculated using each version of the variable and has been compared to the sea level anomaly calculated using the reference version.
- The region of study is Medsea
- Mission : J2
- Git last tag : 0.5 Mettre à jour les rapports de la wet, range et tide apres application de binning X-track
- Git changeset number : eb7869a-2022-04-08

2 Processing

2.1 sla formula

2.1.1 Wet_rad product ' sla

sla = ORBIT.ALT.PO_E - RANGE.ALT - MEAN_SEA_SURFACE.MODEL.CNESCLS15 - SEA_STATE_BIAS.ALT.NON_PARAM - IONOSPHERIC_CORRECTION.MODEL.GIM - WET_TROPOSPHERIC_CORRECTION.RAD - DRY_TROPOSPHERIC_CORRECTION.MODEL.DYNAMICAL_ATMOSPHERIC_CORRECTION.MODEL.MOG2D_HR - OCEAN_TIDE_HEIGHT.MODEL.FES14B - SO-LID_EARTH_TIDE_HEIGHT.MODEL.CARTWRIGHT_TAYLER_71 - POLE_TIDE_HEIGHT.MODEL.DESAI_2015_MPL2017

2.1.2 Wet_gpd product ' sla

sla = ORBIT.ALT.PO_E - RANGE.ALT - MEAN_SEA_SURFACE.MODEL.CNESCLS15 - SEA_STATE_BIAS.ALT.NON_PARAM - IONOSPHERIC_CORRECTION.MODEL.GIM - WET_TROPOSPHERIC_CORRECTION.GPD_PLUS - DRY_TROPOSPHERIC_CORRECTION.MODEL.DYNAMICAL_ATMOSPHERIC_CORRECTION.MODEL.MOG2D_HR - OCEAN_TIDE_HEIGHT.MODEL.FES14B - SO-LID_EARTH_TIDE_HEIGHT.MODEL.CARTWRIGHT_TAYLER_71 - POLE_TIDE_HEIGHT.MODEL.DESAI_2015_MPL2017

2.1.3 Wet_ecmwf product ' sla

sla = ORBIT.ALT.PO_E - RANGE.ALT - MEAN_SEA_SURFACE.MODEL.CNESCLS15 - SEA_STATE_BIAS.ALT.NON_PARAM - IONOSPHERIC_CORRECTION.MODEL.GIM - WET_TROPOSPHERIC_CORRECTION.MODEL.ECMWF_GAUSS - DRY_TROPOSPHERIC_CORRECTION.MODEL.DYNAMICAL_ATMOSPHERIC_CORRECTION.MODEL.MOG2D_HR - OCEAN_TIDE_HEIGHT.MODEL.FES14B - SO-LID_EARTH_TIDE_HEIGHT.MODEL.CARTWRIGHT_TAYLER_71 - POLE_TIDE_HEIGHT.MODEL.DESAI_2015_MPL2017

2.2 Binning

Each track has been divided to a set of sections, where the center of each section is separated by the sample frequency of the satellite times it's velocity.

The data located within the sections limits represent the altimetry time-series on which the statistics will be calculated and visualized in this report.

2.3 Filtering

- The sla has been filtered by a threshold of 1 m.
- Each sla time-serie has been filtred by a window of $[-4\sigma, 4\sigma]$, where σ is the standard deviation of the sla time serie

3 Spatial coherence analysis

3.1 sla

3.1.1 sla 's count

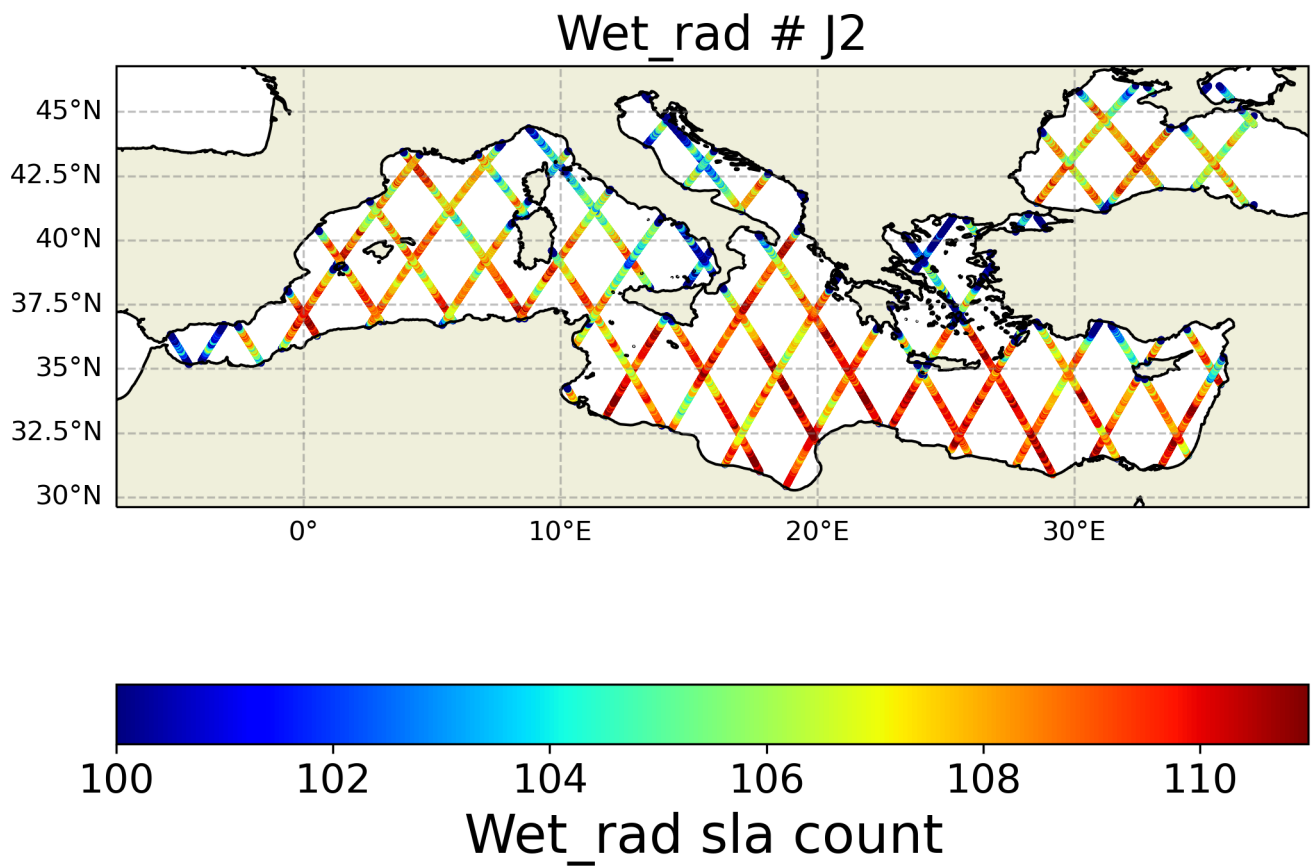


FIGURE 1 – Spatial coherence analysis of the count of the Wet_rad version of sla variable

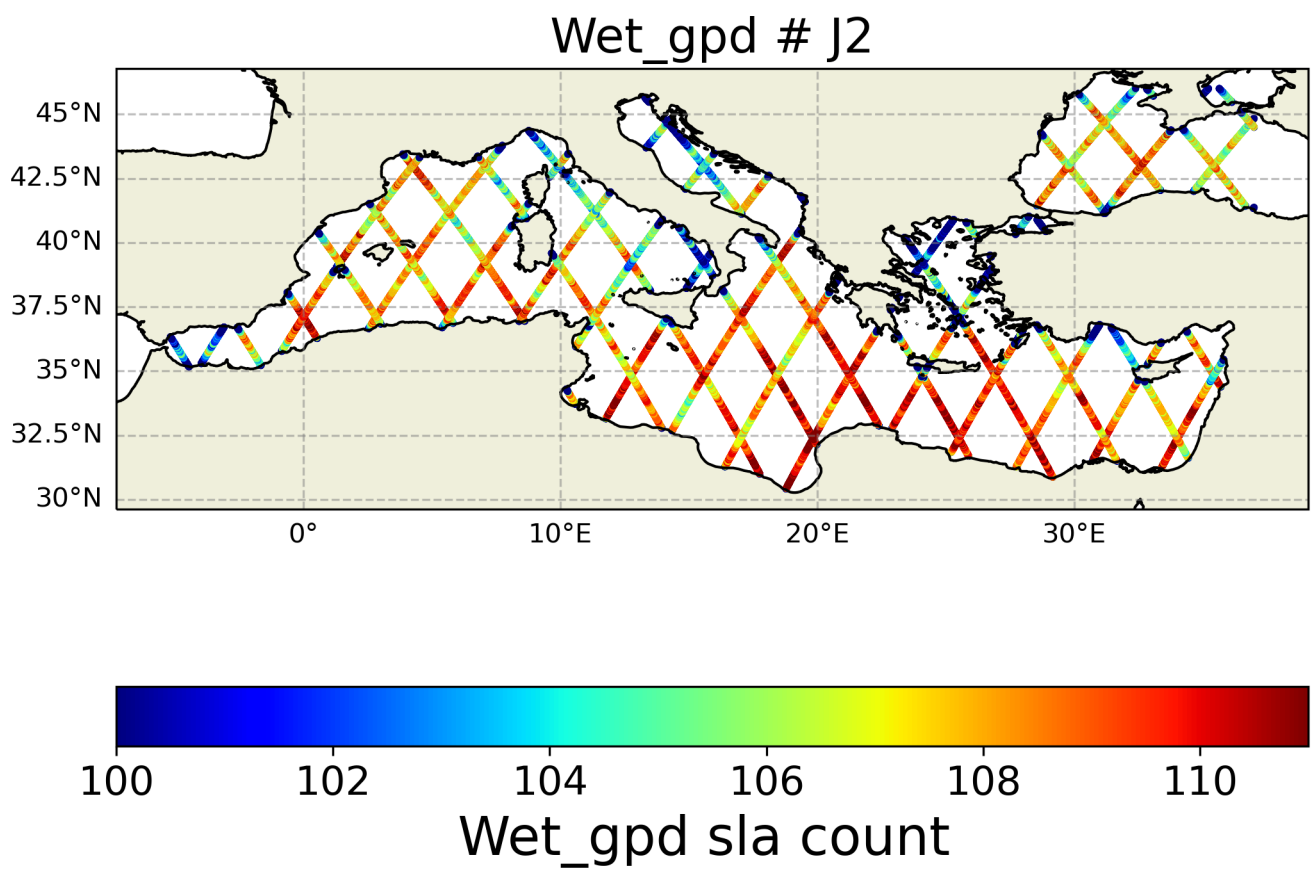


FIGURE 2 – Spatial coherence analysis of the count of the Wet_gpd version of sla variable

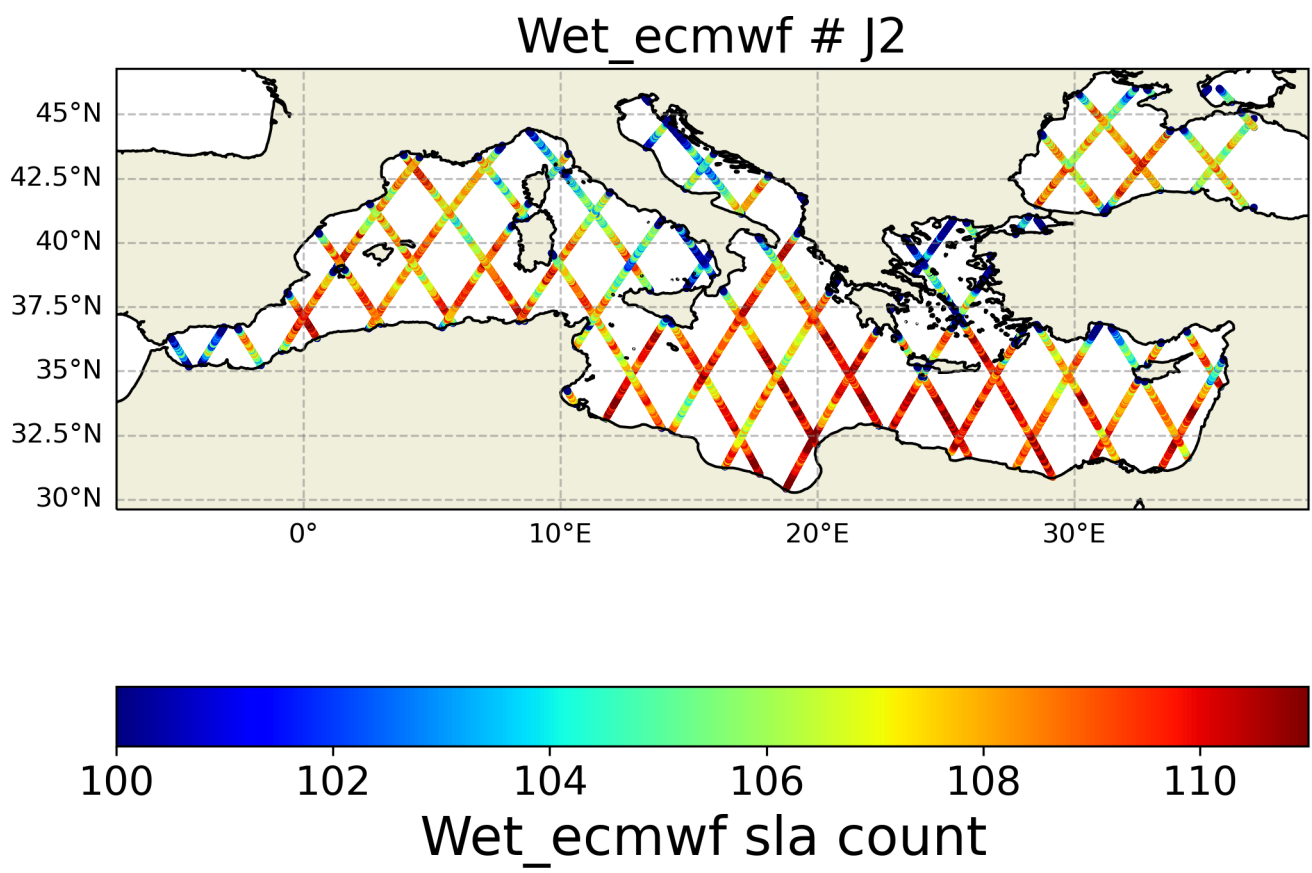


FIGURE 3 – Spatial coherence analysis of the count of the Wet_ecmwf version of sla variable

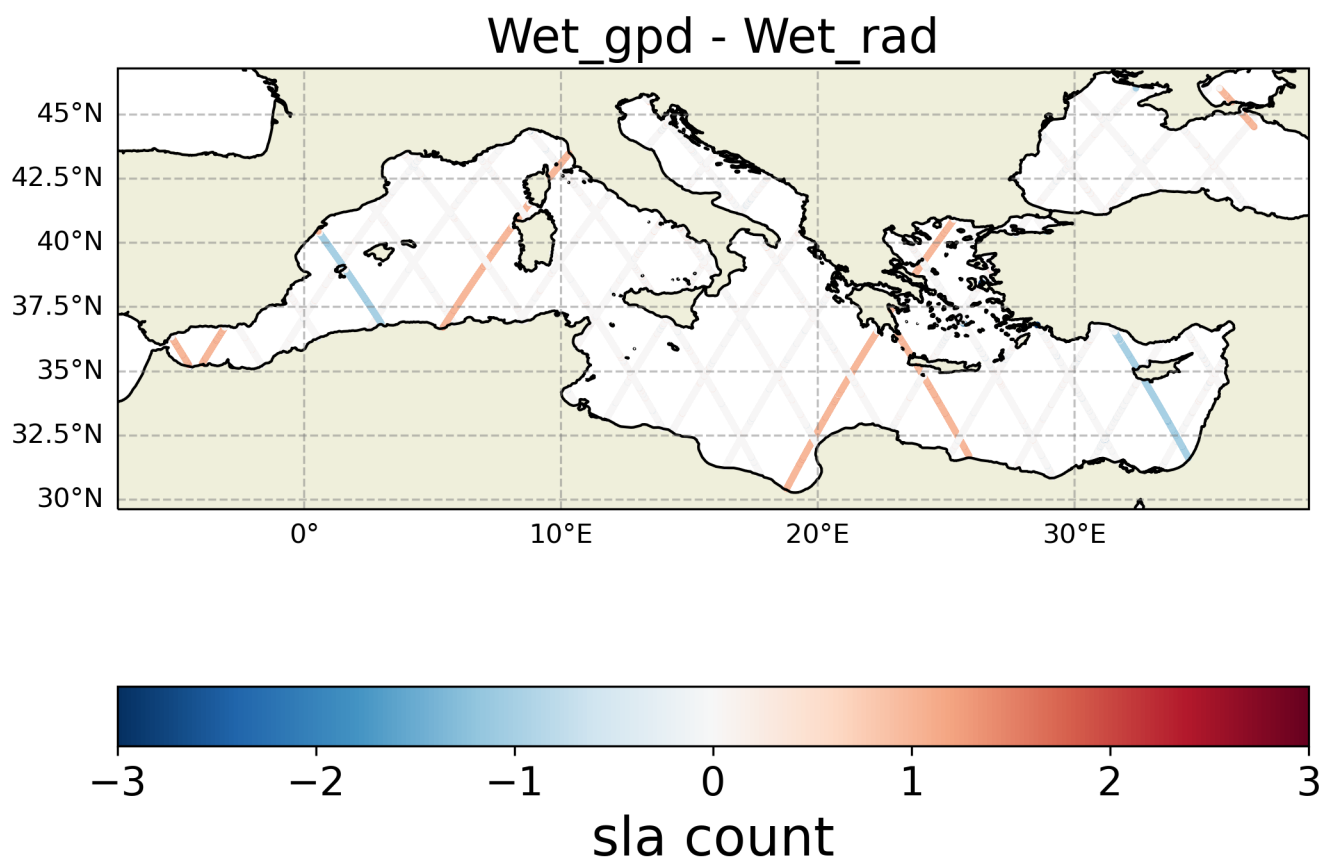


FIGURE 4 – Spatial coherence analysis of the Difference in sla 's count between Wet_gpd and Wet_rad

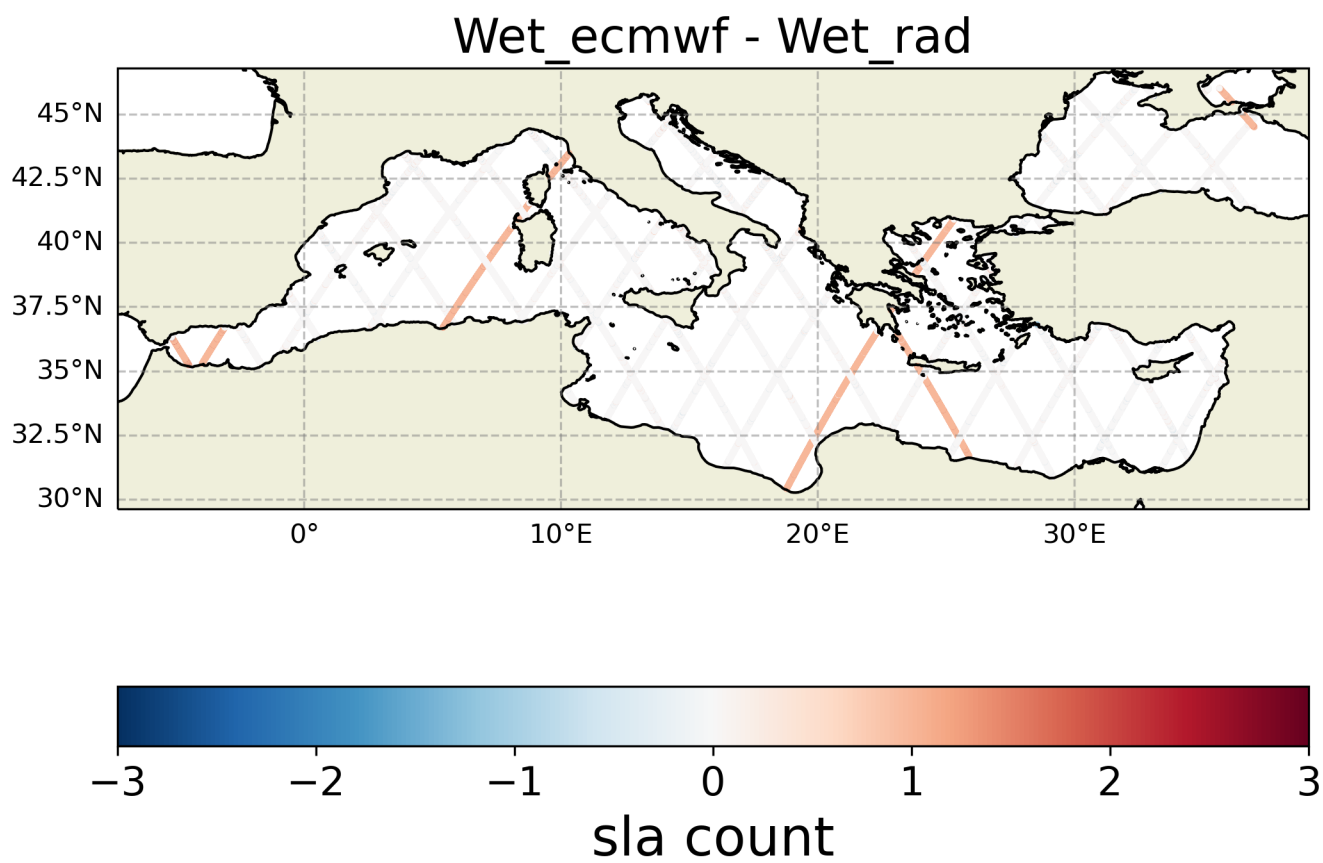


FIGURE 5 – Spatial coherence analysis of the Difference in sla 's count between Wet_ecmwf and Wet_rad

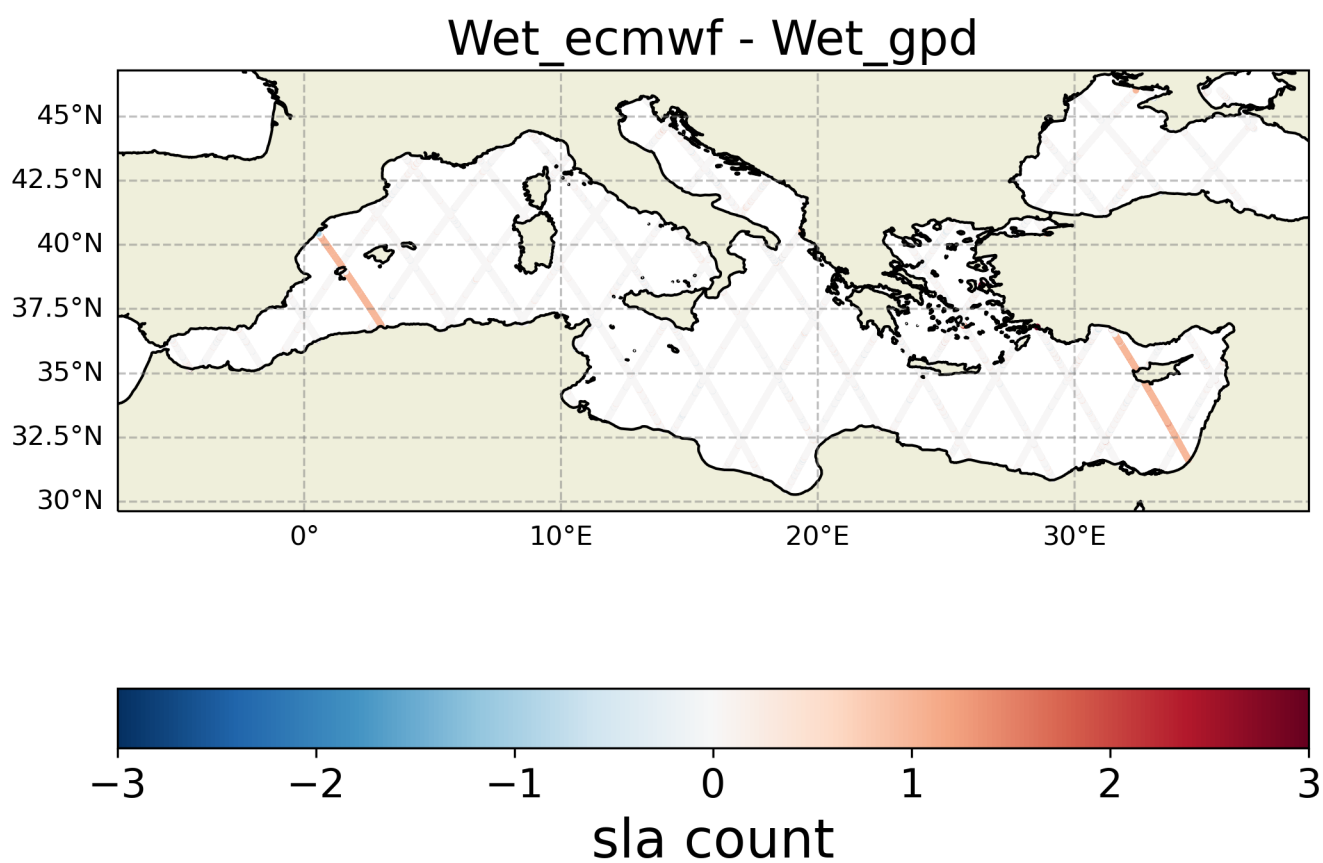


FIGURE 6 – Spatial coherence analysis of the Difference in sla 's count between Wet_ecmwf and Wet_gpd

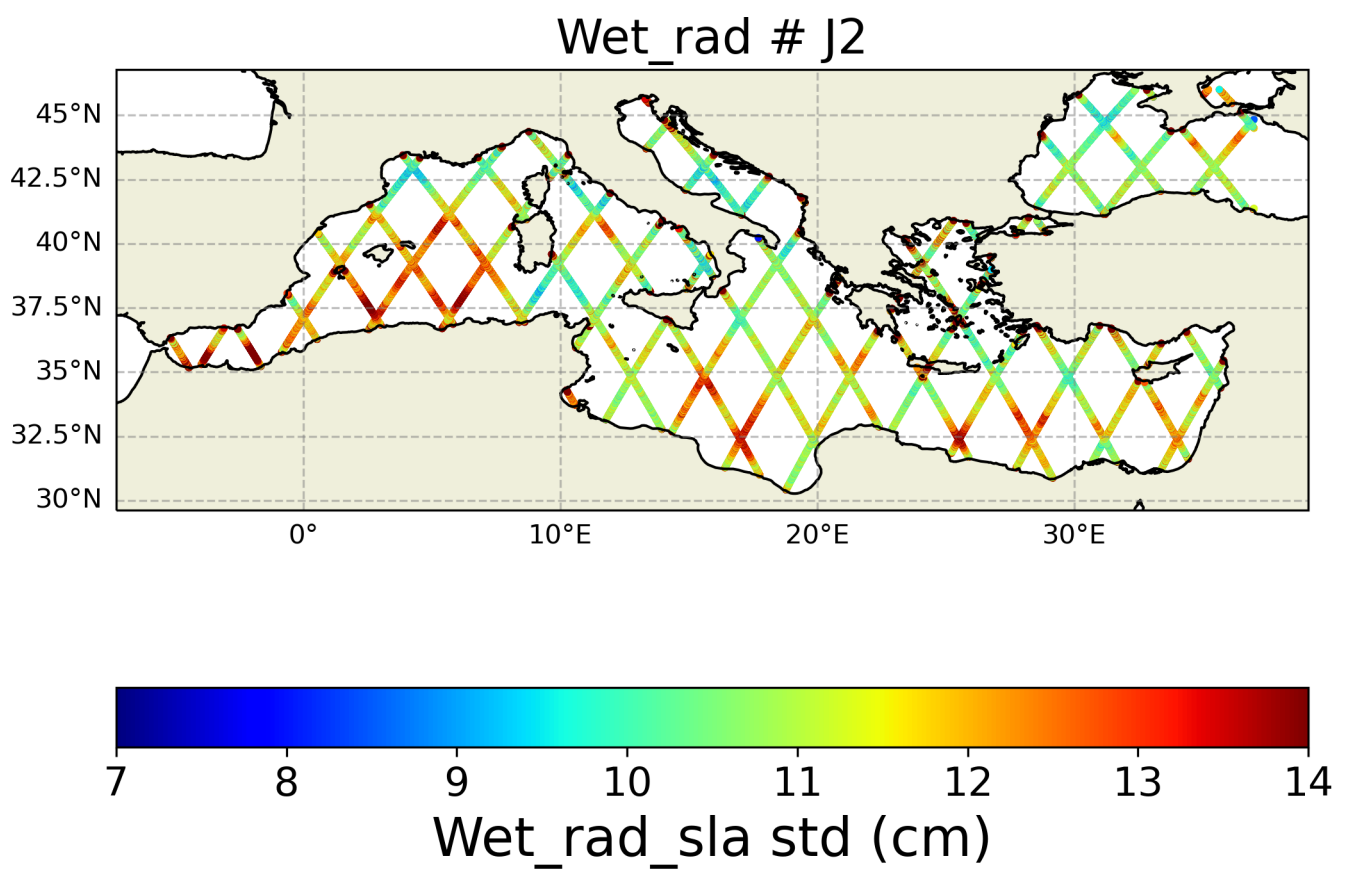


FIGURE 7 – Spatial coherence analysis of the std of the Wet_rad version of sla variable

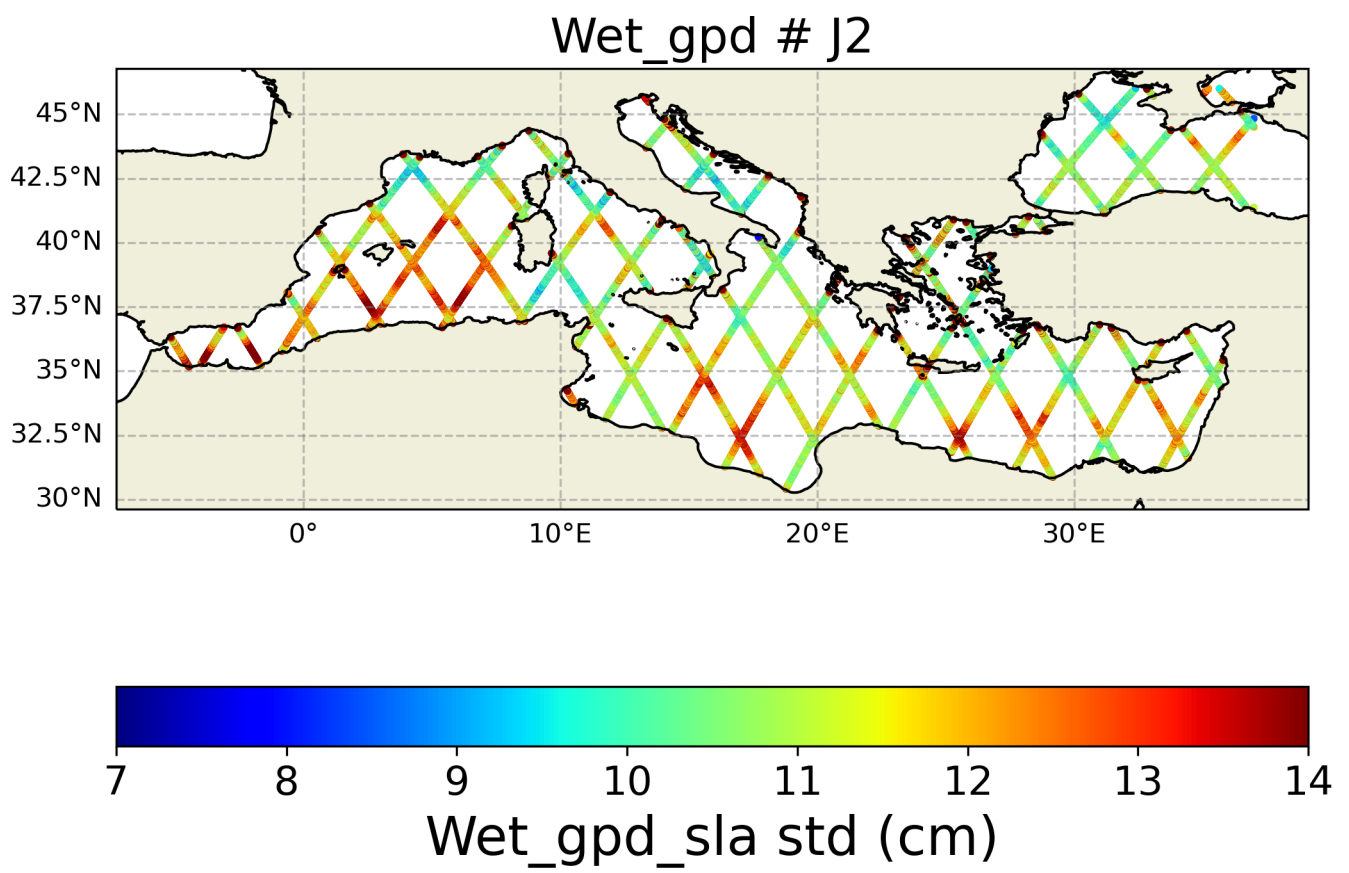


FIGURE 8 – Spatial coherence analysis of the std of the Wet_gpd version of sla variable

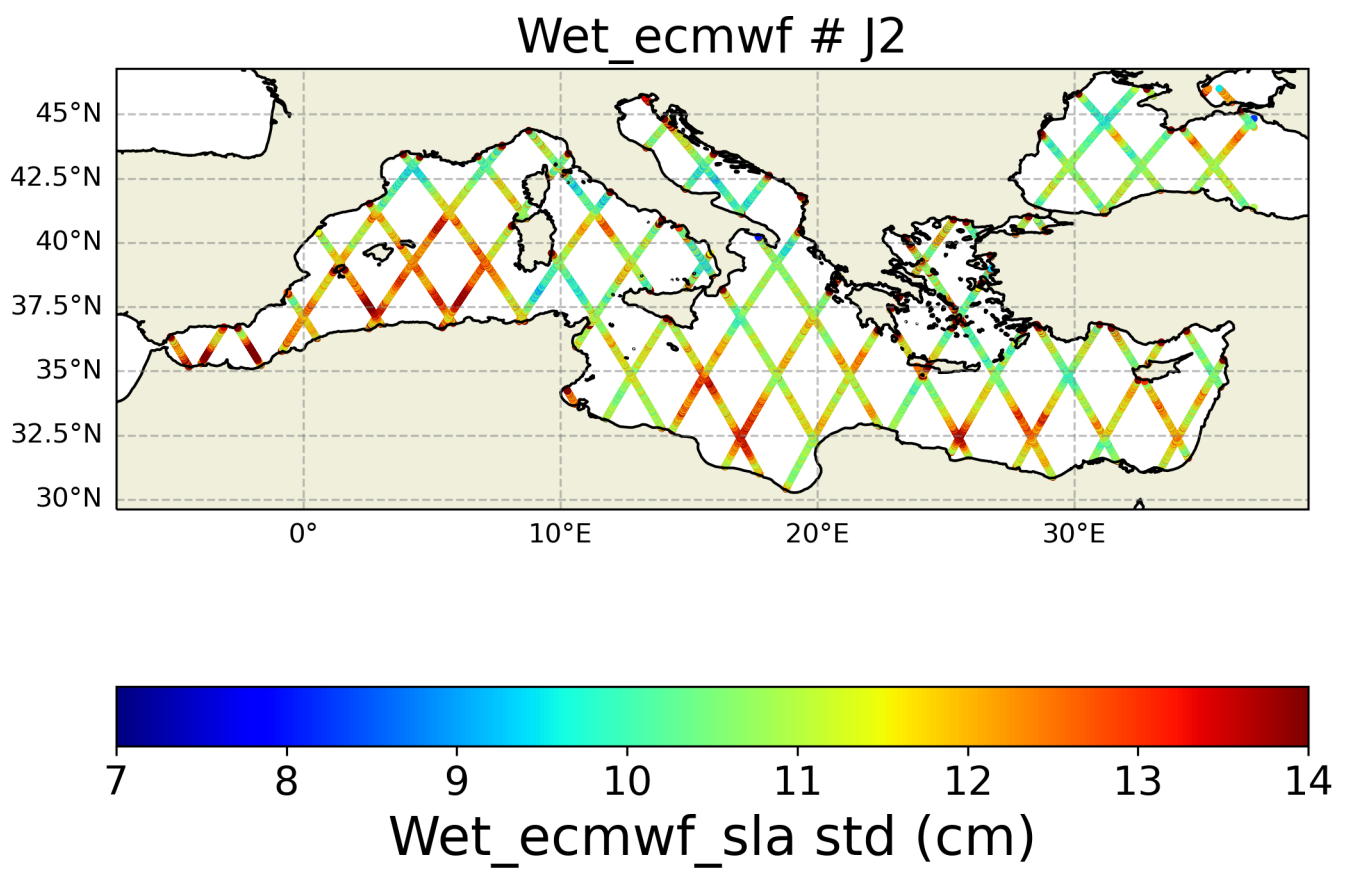


FIGURE 9 – Spatial coherence analysis of the std of the Wet_ecmwf version of sla variable

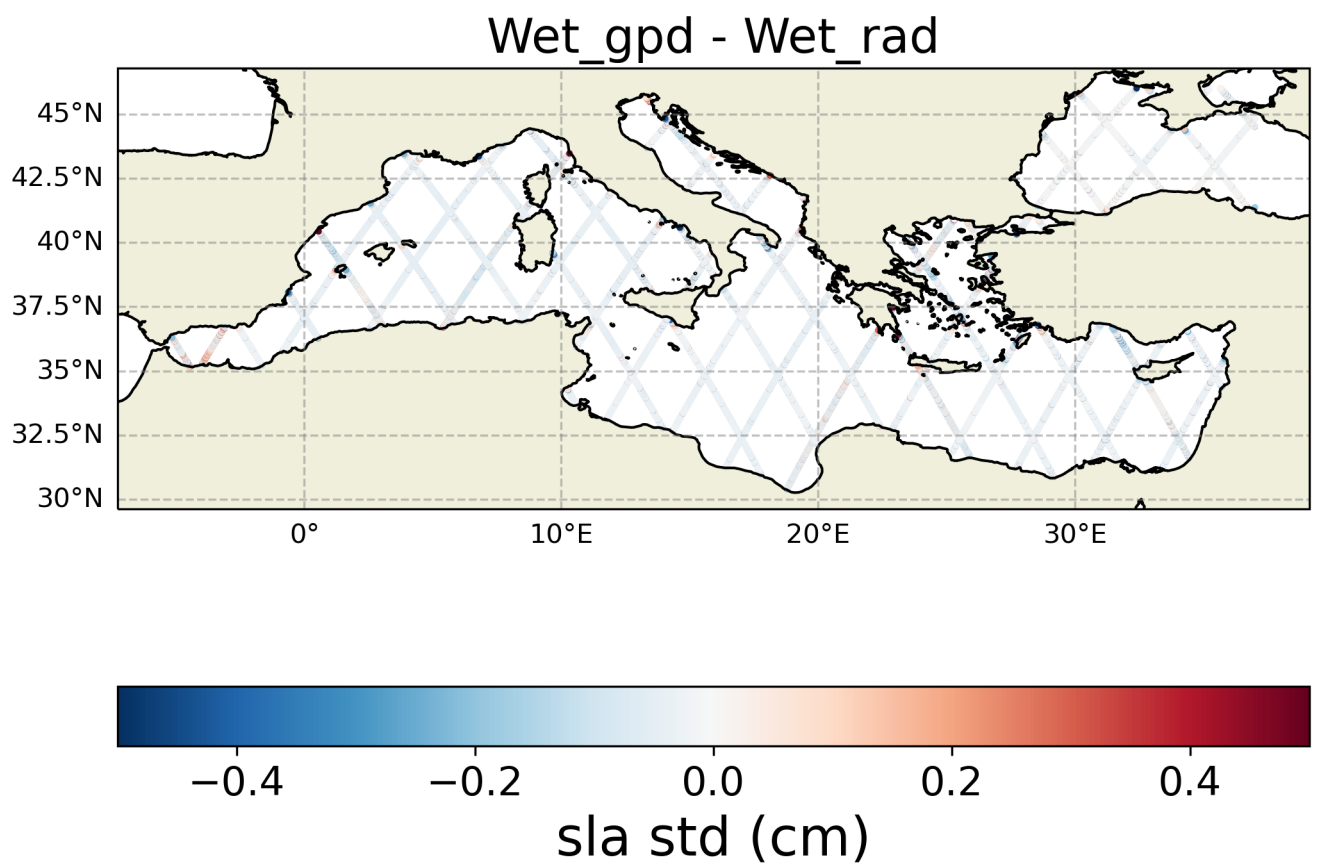


FIGURE 10 – Spatial coherence analysis of the Difference in sla 's std between Wet_gpd and Wet_rad

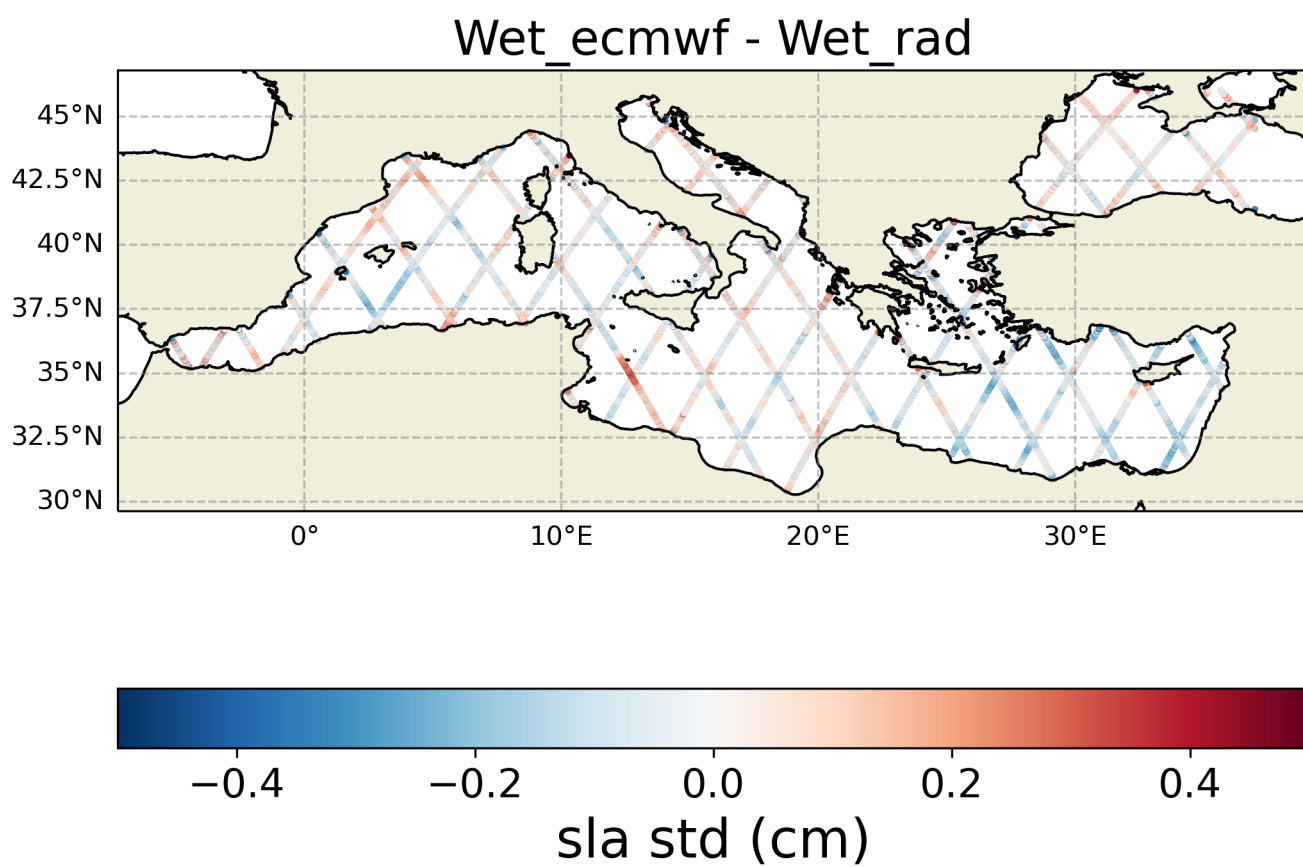


FIGURE 11 – Spatial coherence analysis of the Difference in sla 's std between Wet_ecmwf and Wet_rad

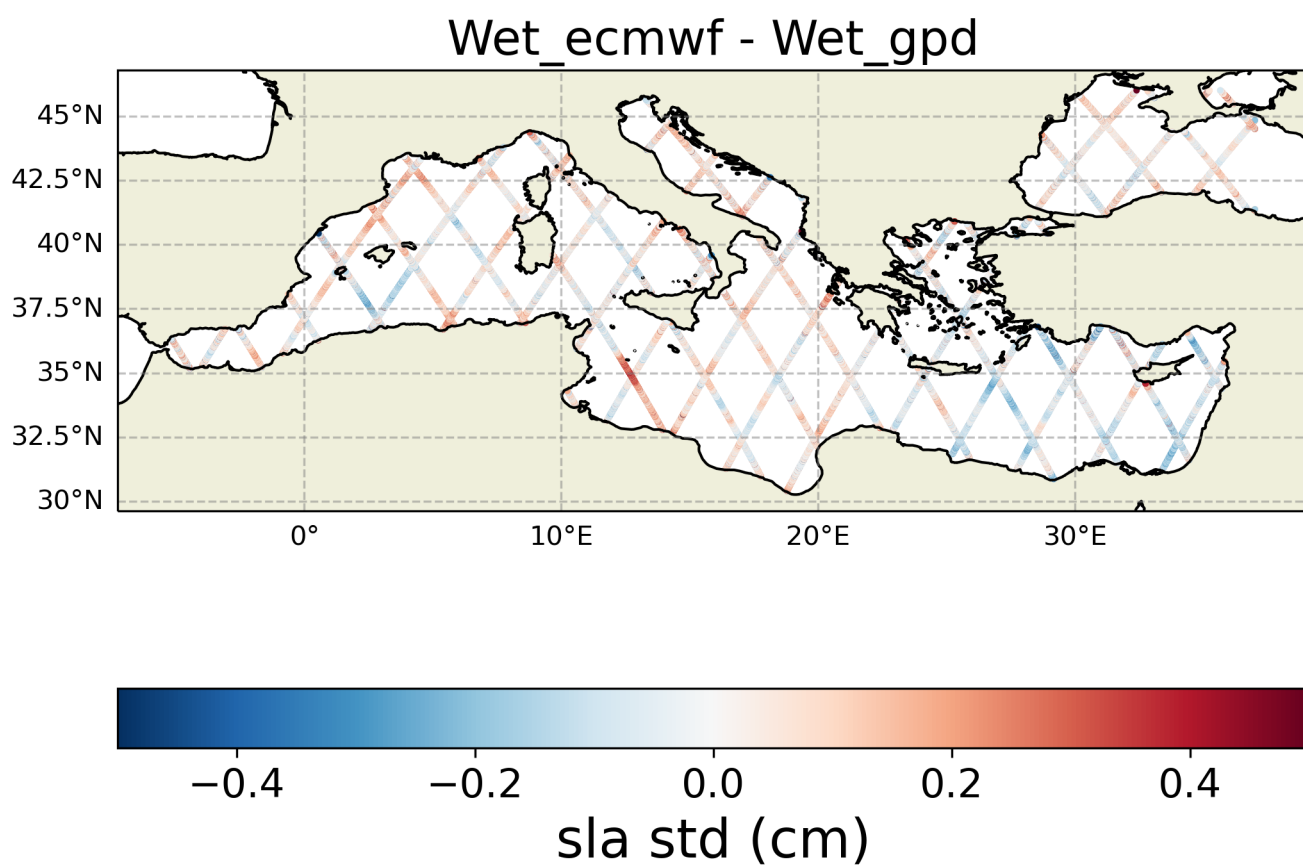


FIGURE 12 – Spatial coherence analysis of the Difference in sla 's std between Wet_ecmwf and Wet_gpd

3.1.3 sla's mean

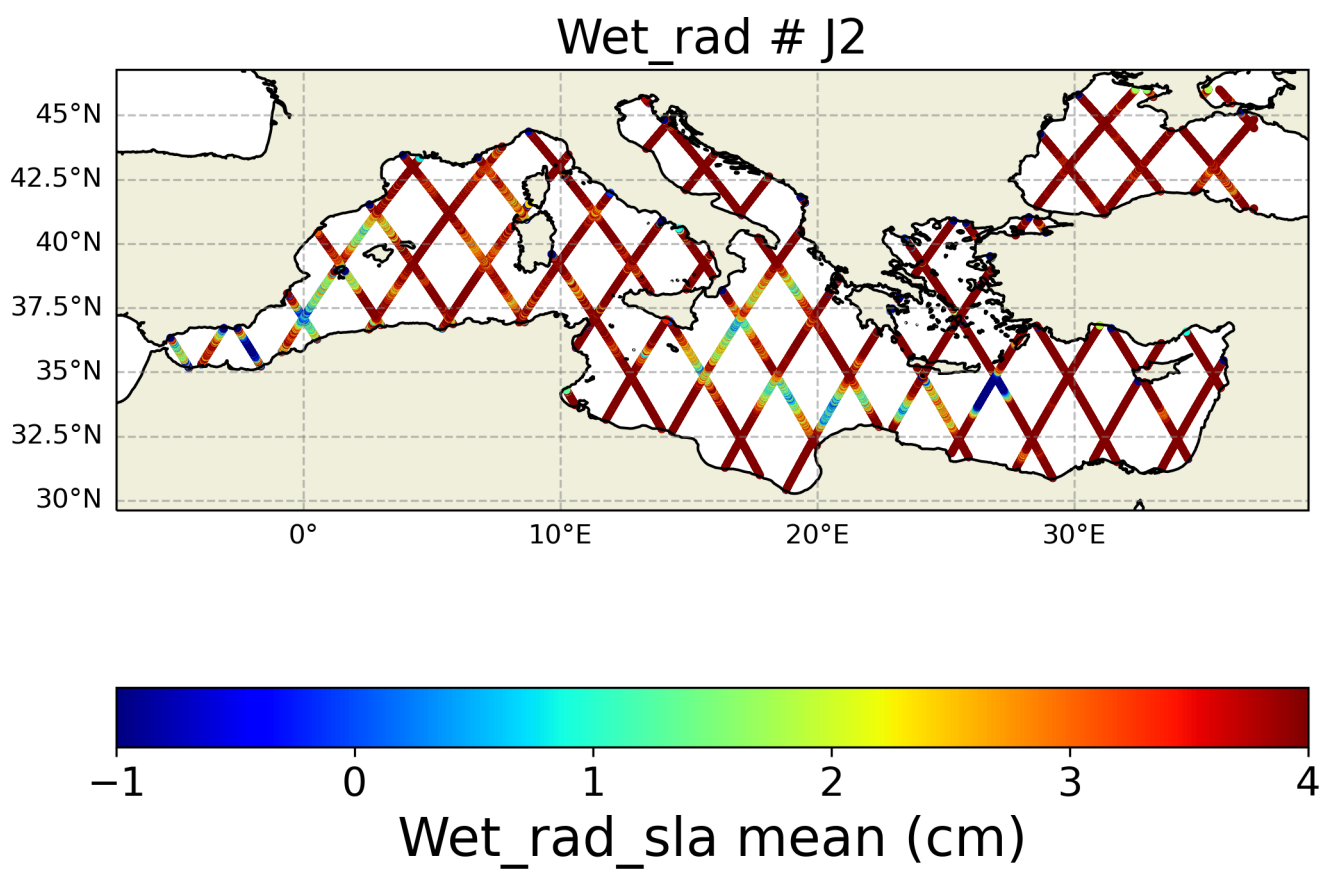


FIGURE 13 – Spatial coherence analysis of the mean of the Wet_rad version of sla variable

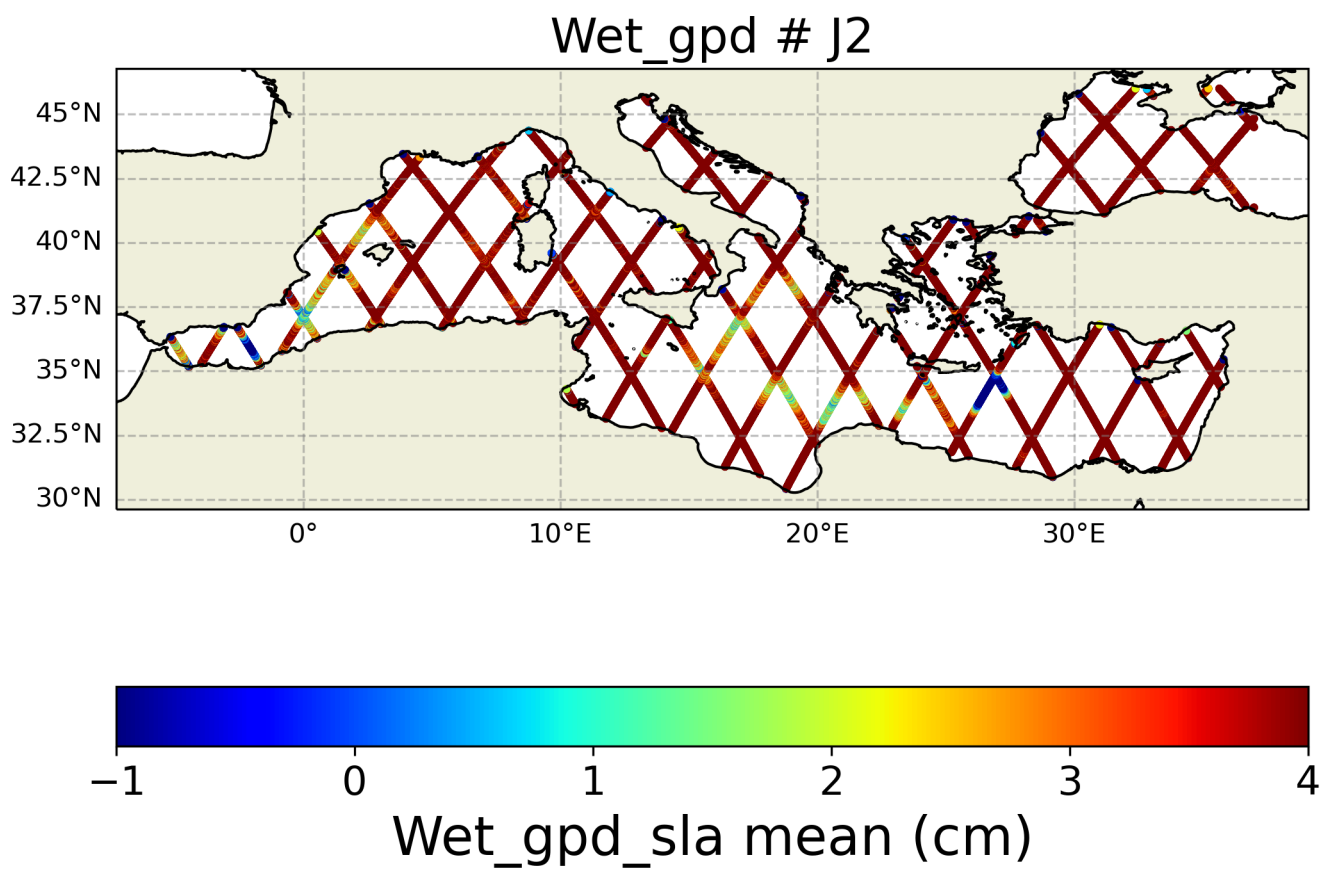


FIGURE 14 – Spatial coherence analysis of the mean of the Wet_gpd version of sla variable

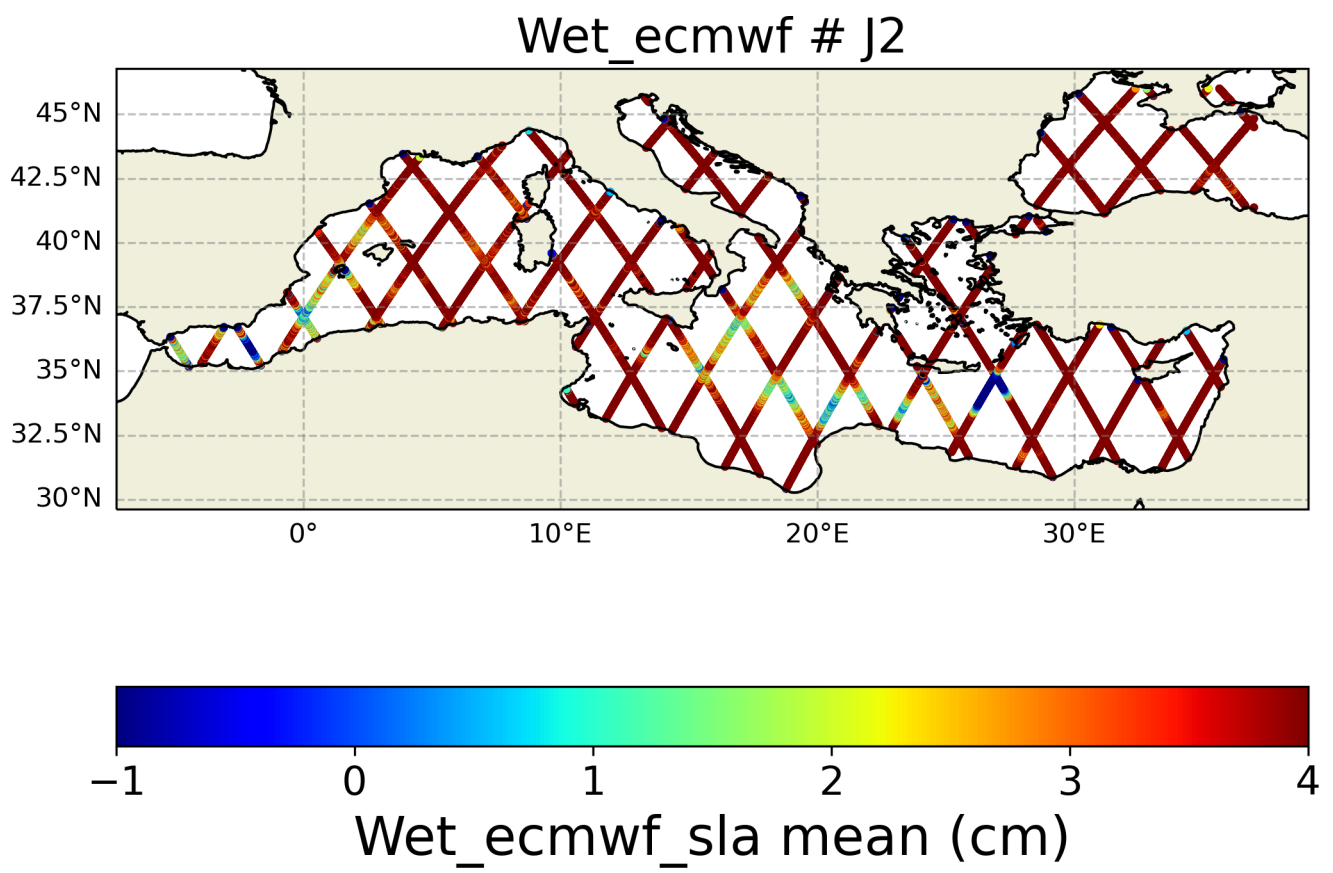


FIGURE 15 – Spatial coherence analysis of the mean of the Wet_ecmwf version of sla variable

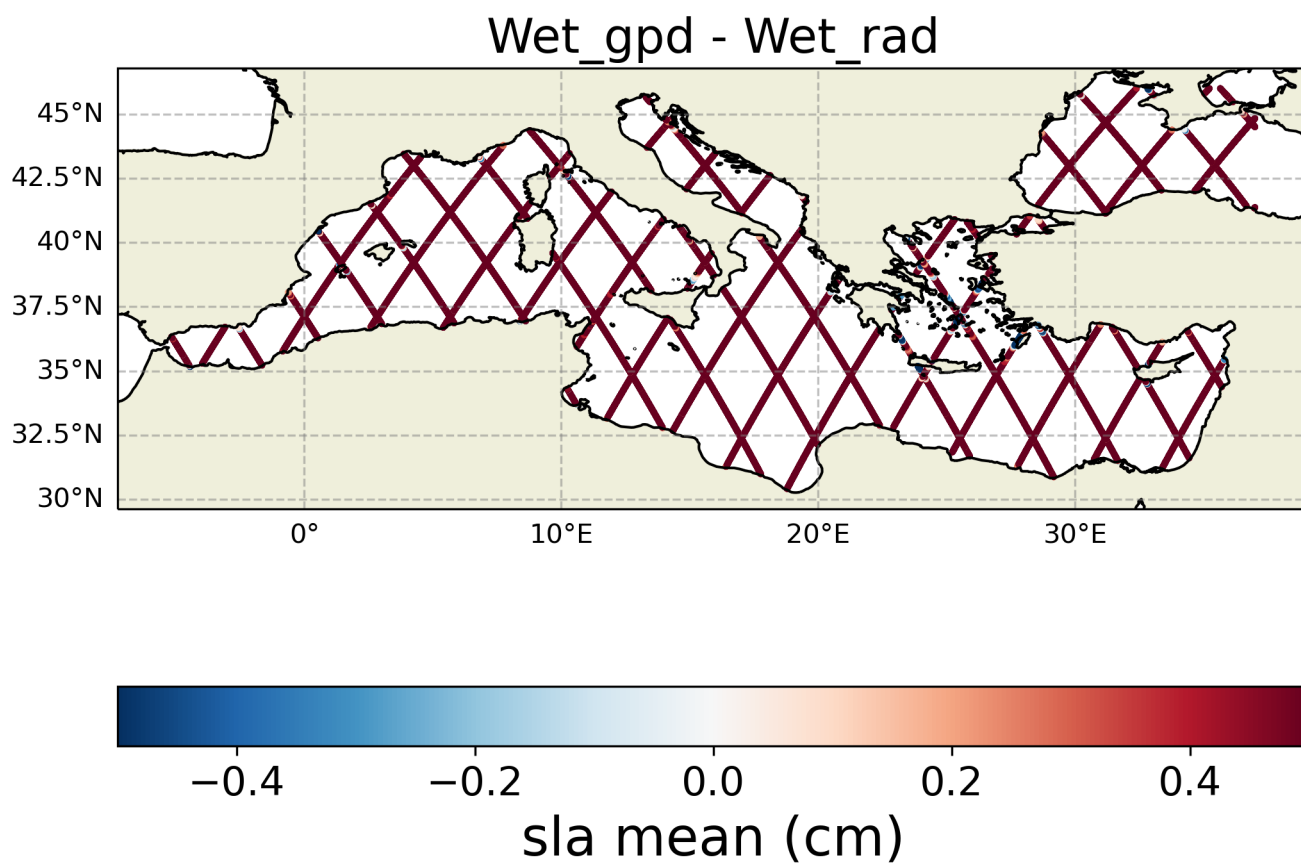


FIGURE 16 – Spatial coherence analysis of the Difference in sla 's mean between Wet_gpd and Wet_rad

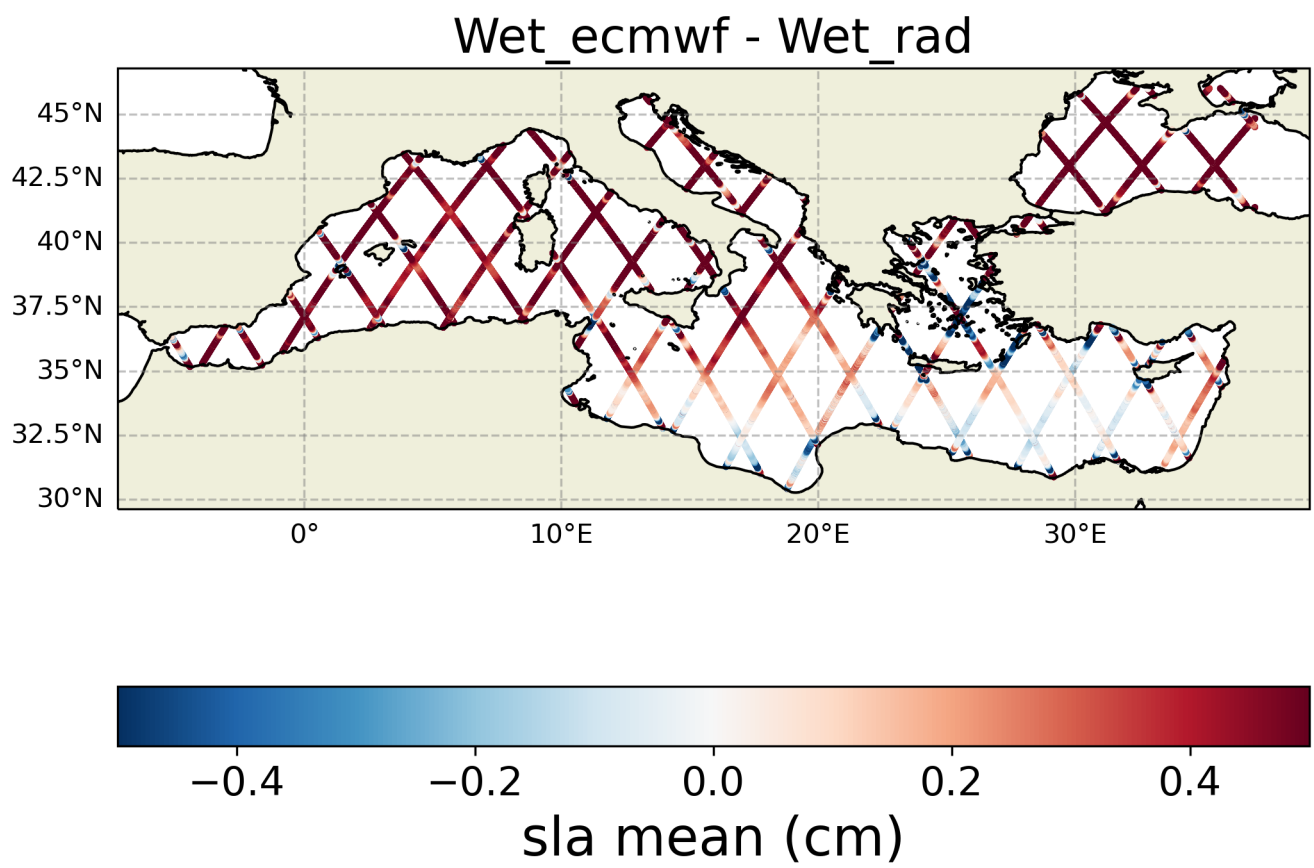


FIGURE 17 – Spatial coherence analysis of the Difference in sla 's mean between Wet_ecmwf and Wet_rad

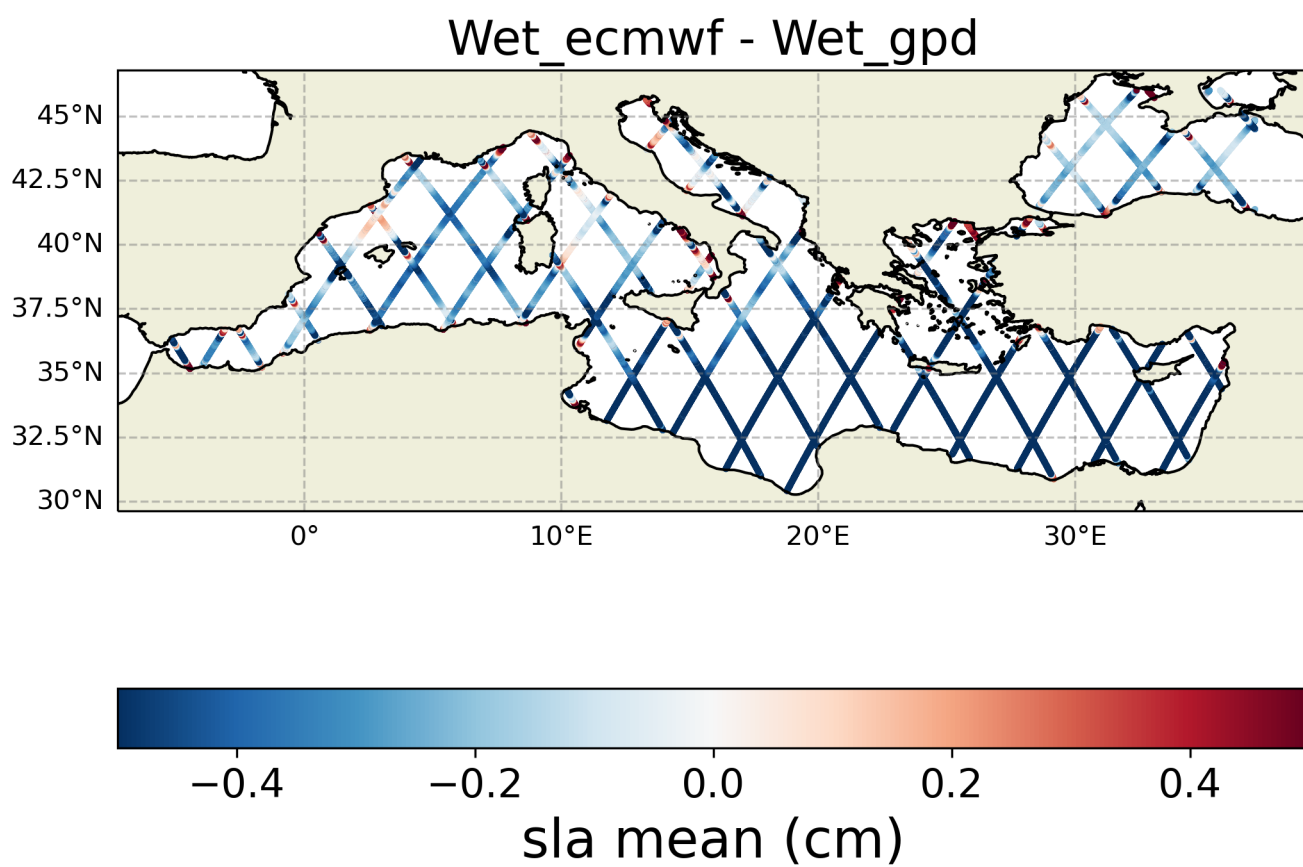


FIGURE 18 – Spatial coherence analysis of the Difference in sla 's mean between Wet_ecmwf and Wet_gpd

3.2 Wet

3.2.1 Wet 's count

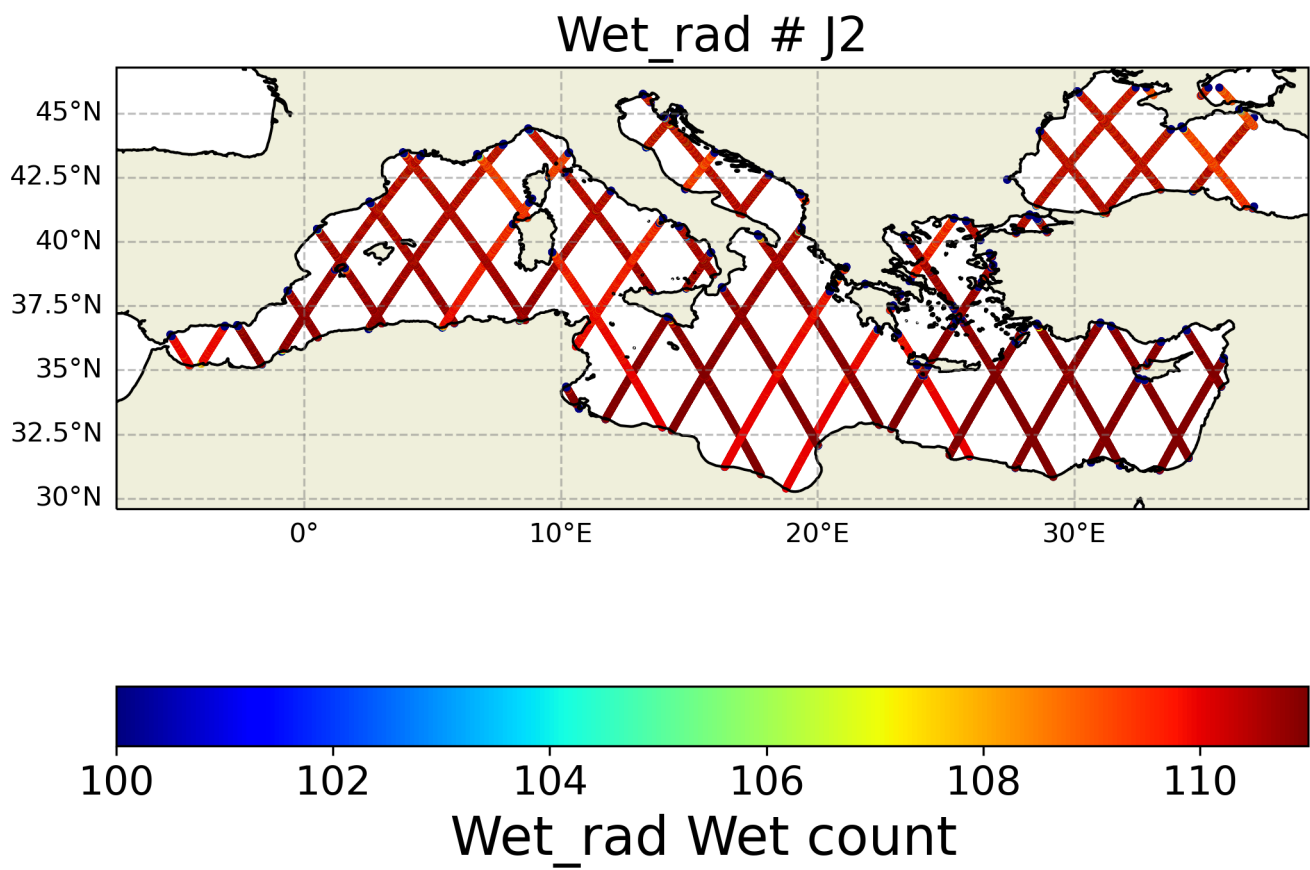


FIGURE 19 – Spatial coherence analysis of the count of the Wet_rad version of Wet variable

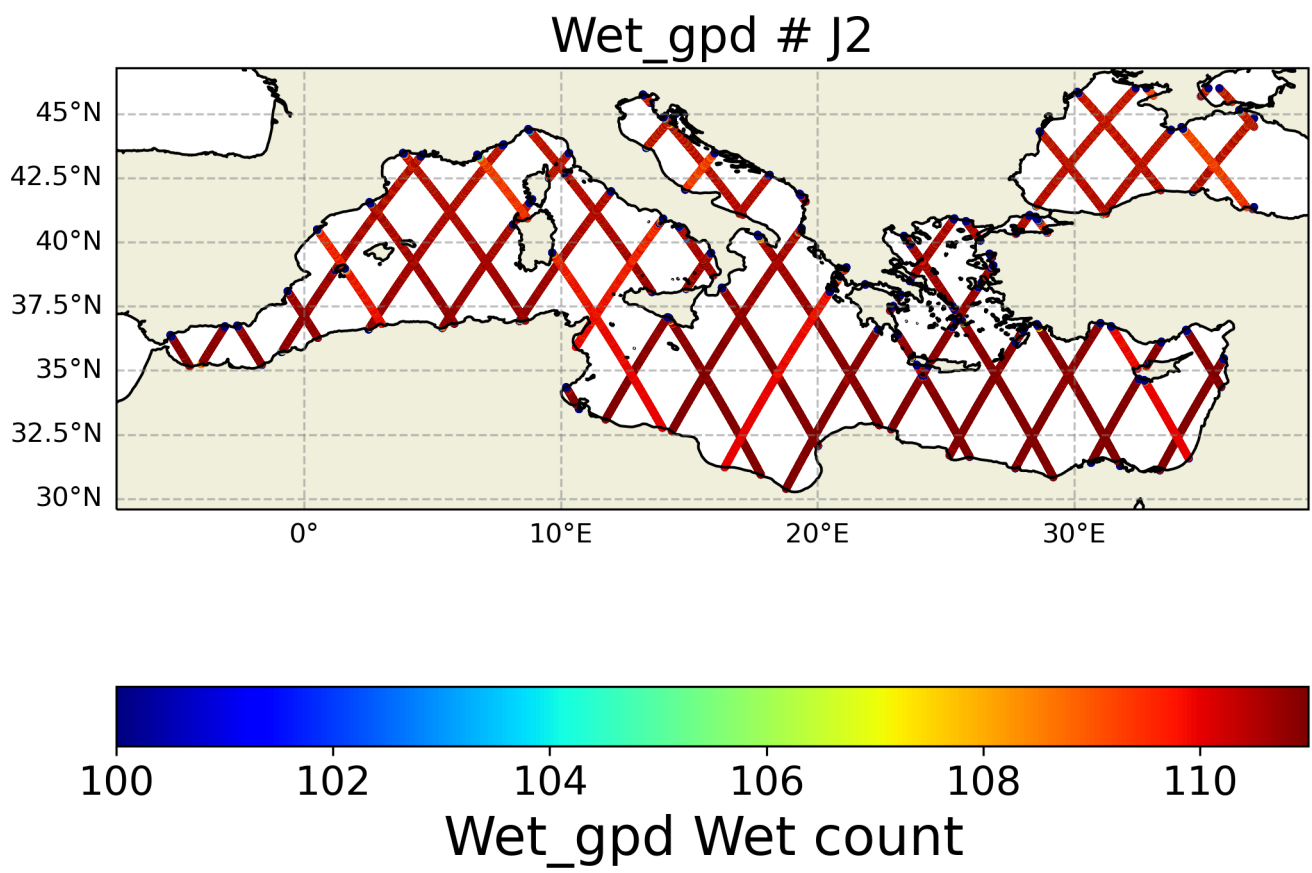


FIGURE 20 – Spatial coherence analysis of the count of the Wet_gpd version of Wet variable

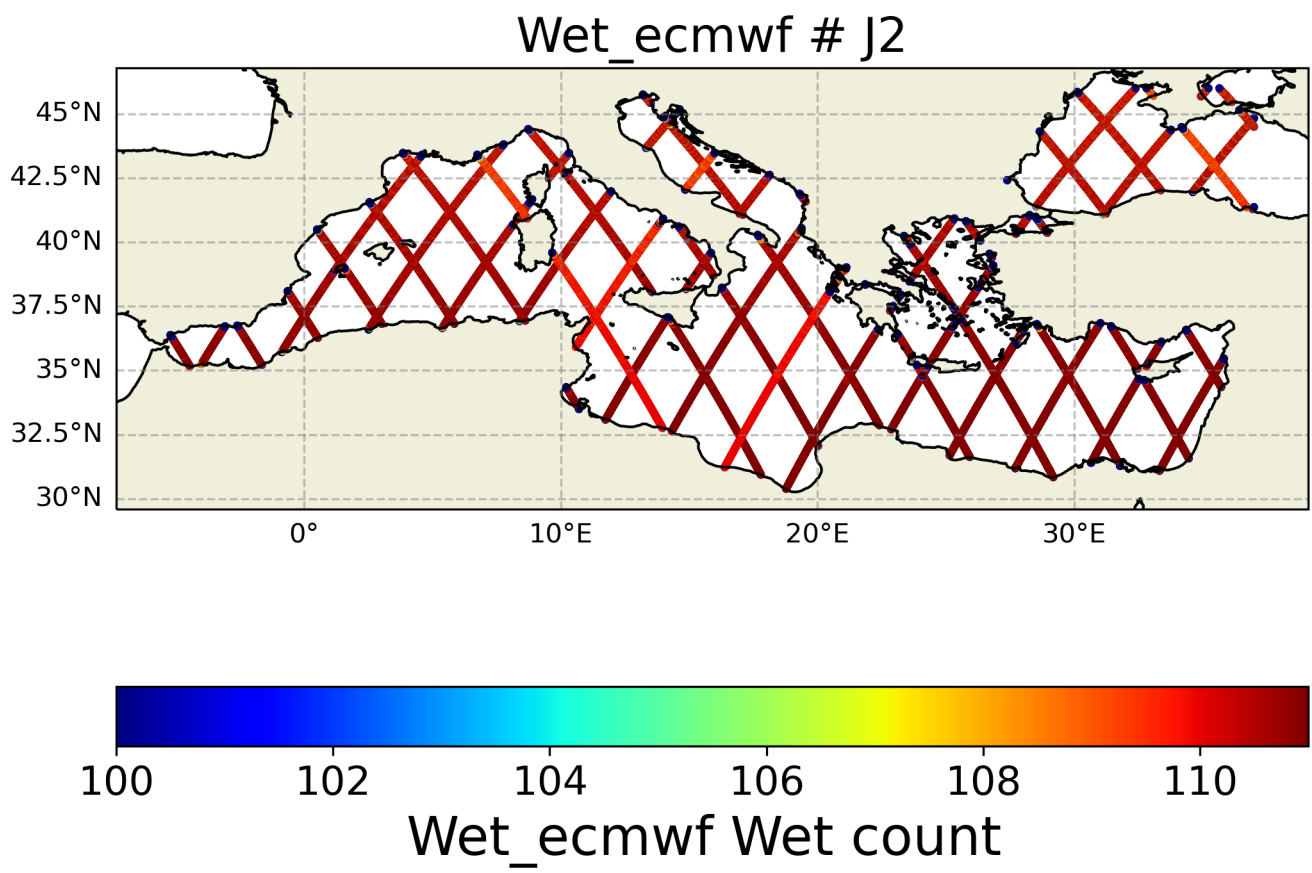


FIGURE 21 – Spatial coherence analysis of the count of the Wet_ecmwf version of Wet variable

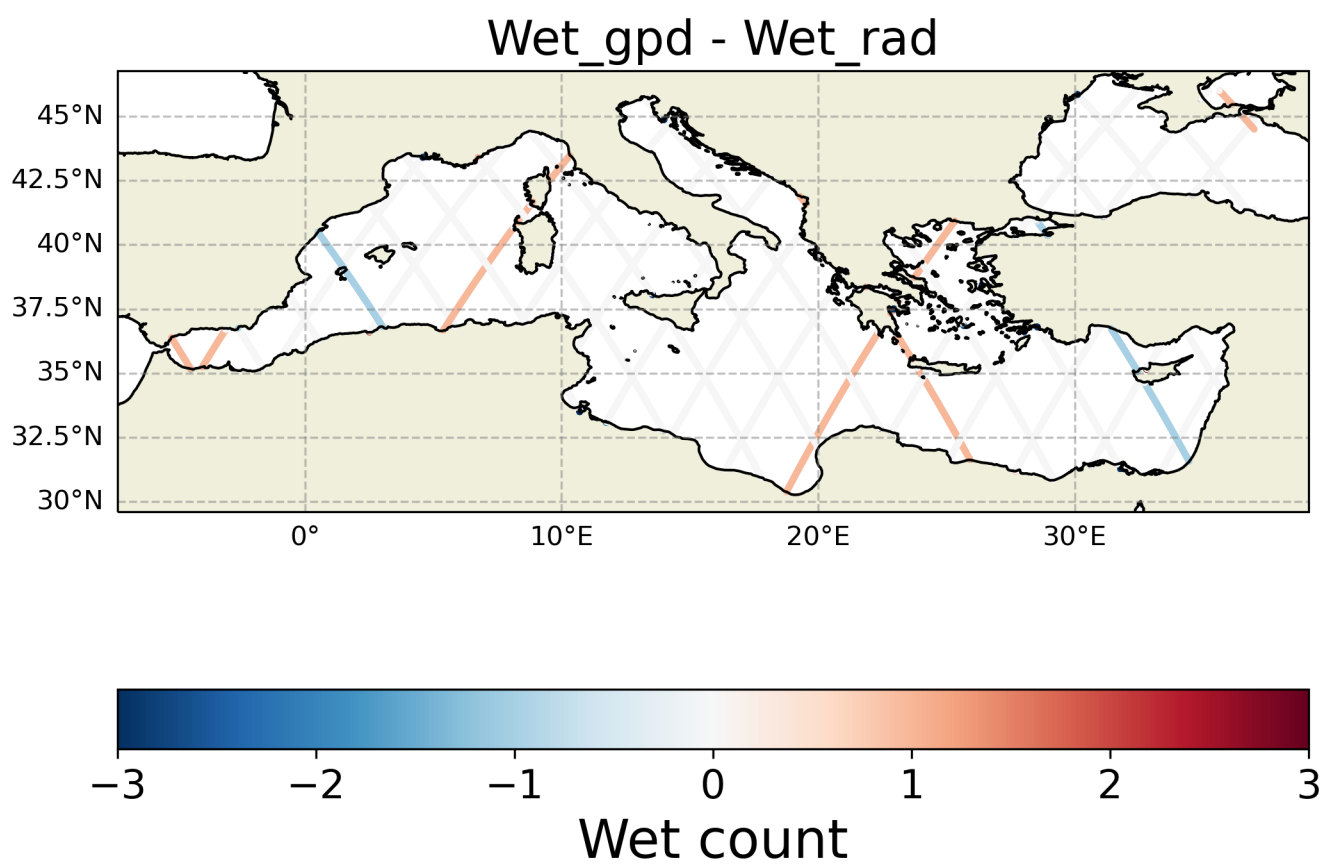


FIGURE 22 – Spatial coherence analysis of the Difference in Wet 's count between Wet_gpd and Wet_rad

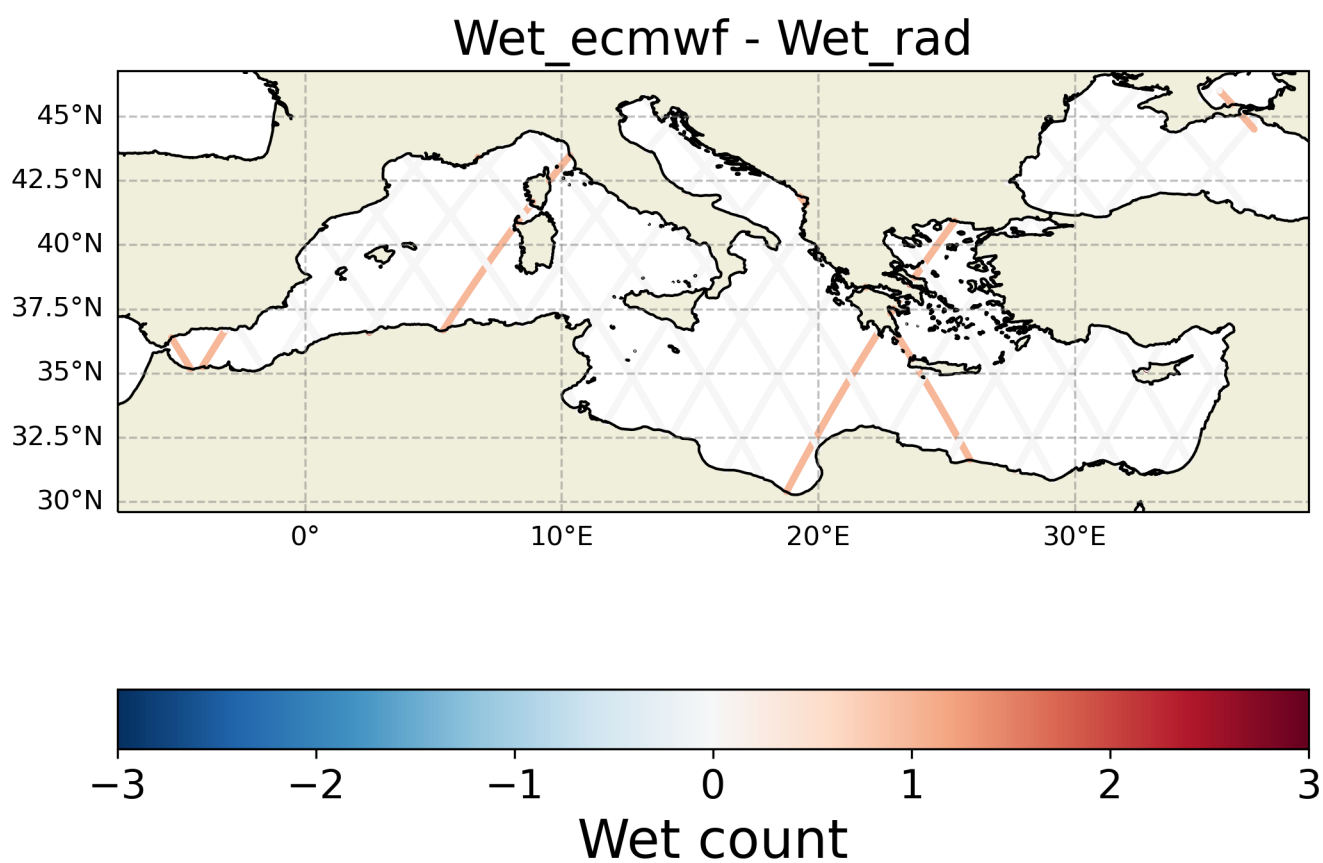


FIGURE 23 – Spatial coherence analysis of the Difference in Wet 's count between Wet_ecmwf and Wet_rad

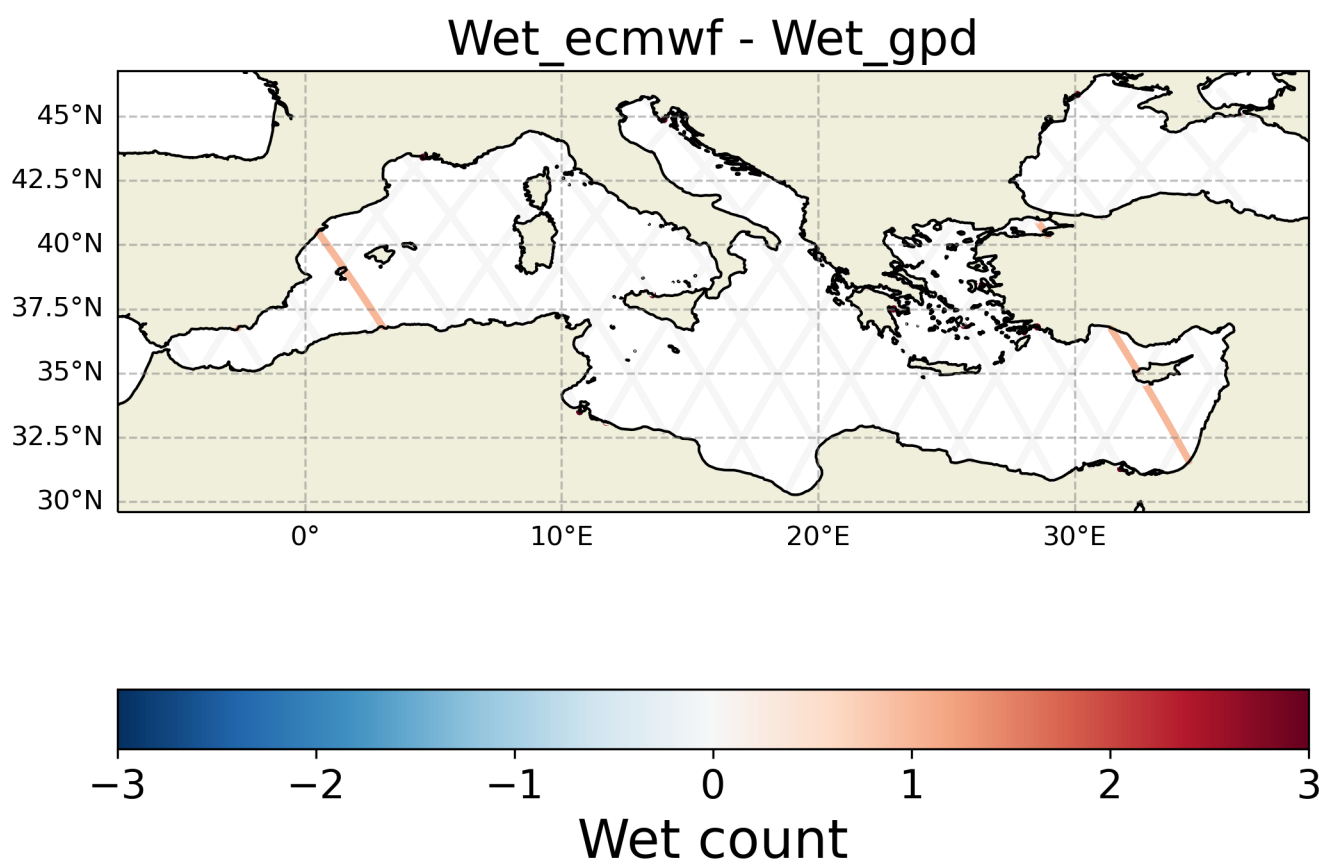


FIGURE 24 – Spatial coherence analysis of the Difference in Wet 's count between Wet_ecmwf and Wet_gpd

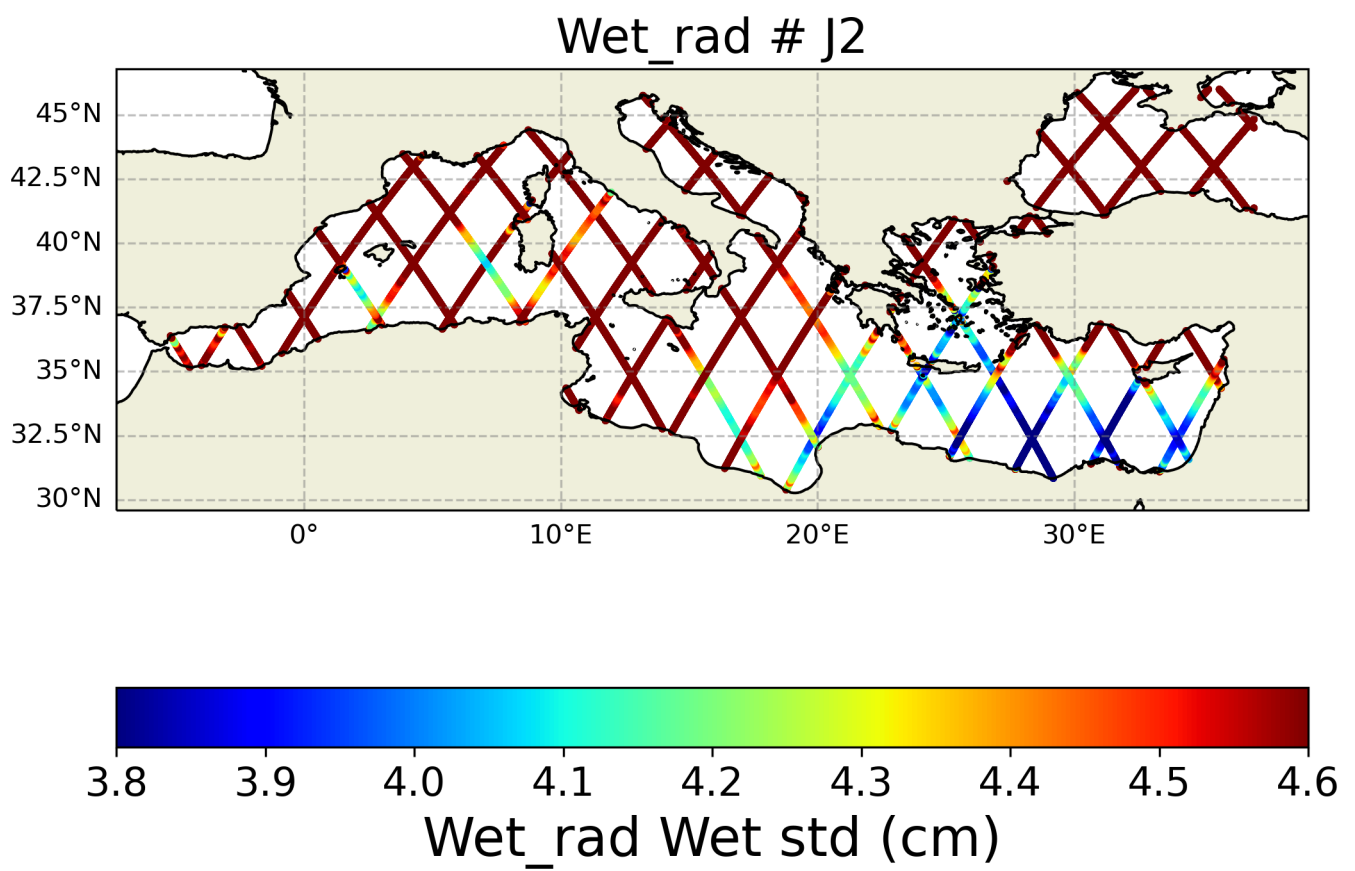


FIGURE 25 – Spatial coherence analysis of the std of the Wet_rad version of Wet variable

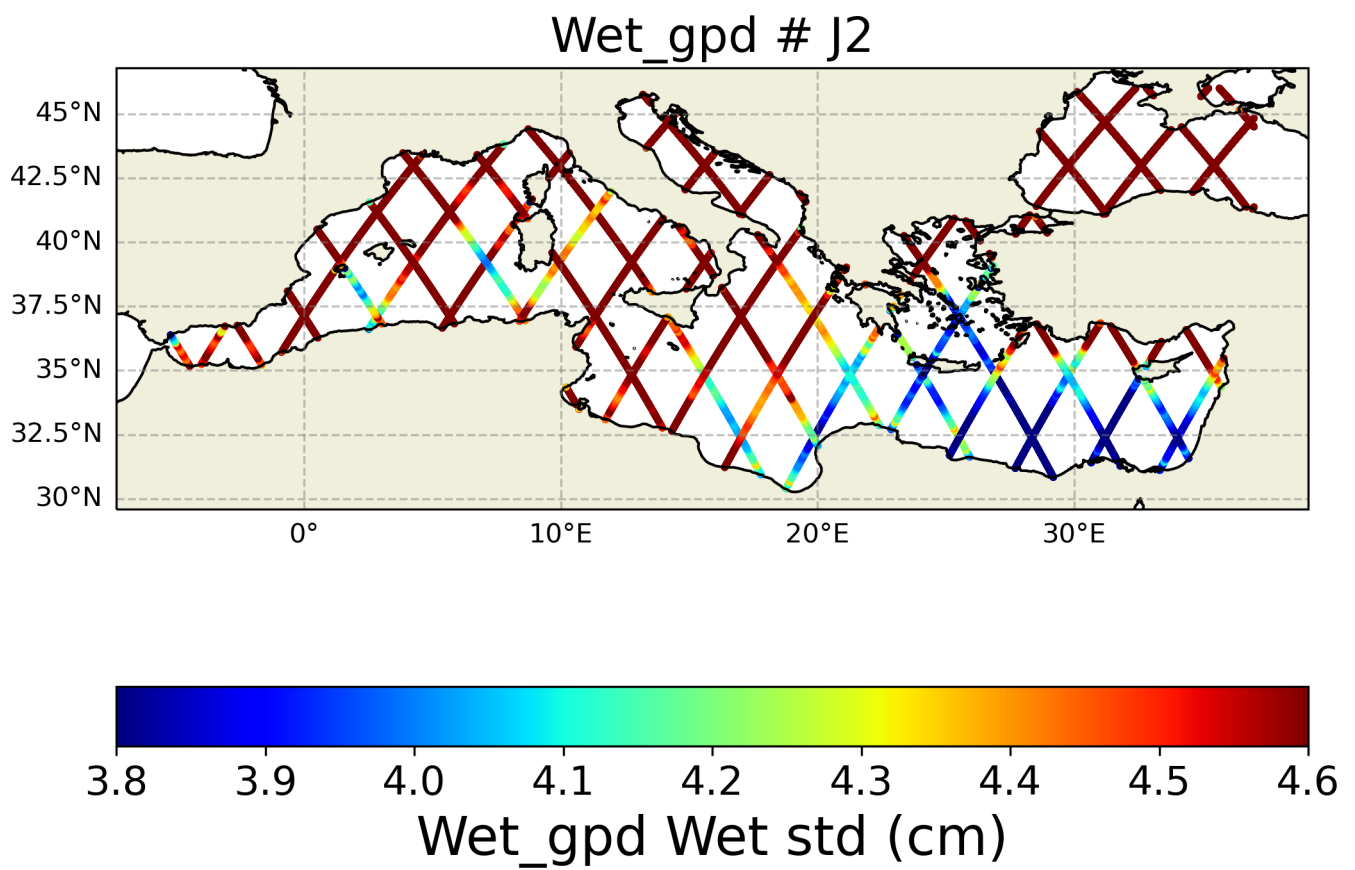


FIGURE 26 – Spatial coherence analysis of the std of the Wet_gpd version of Wet variable

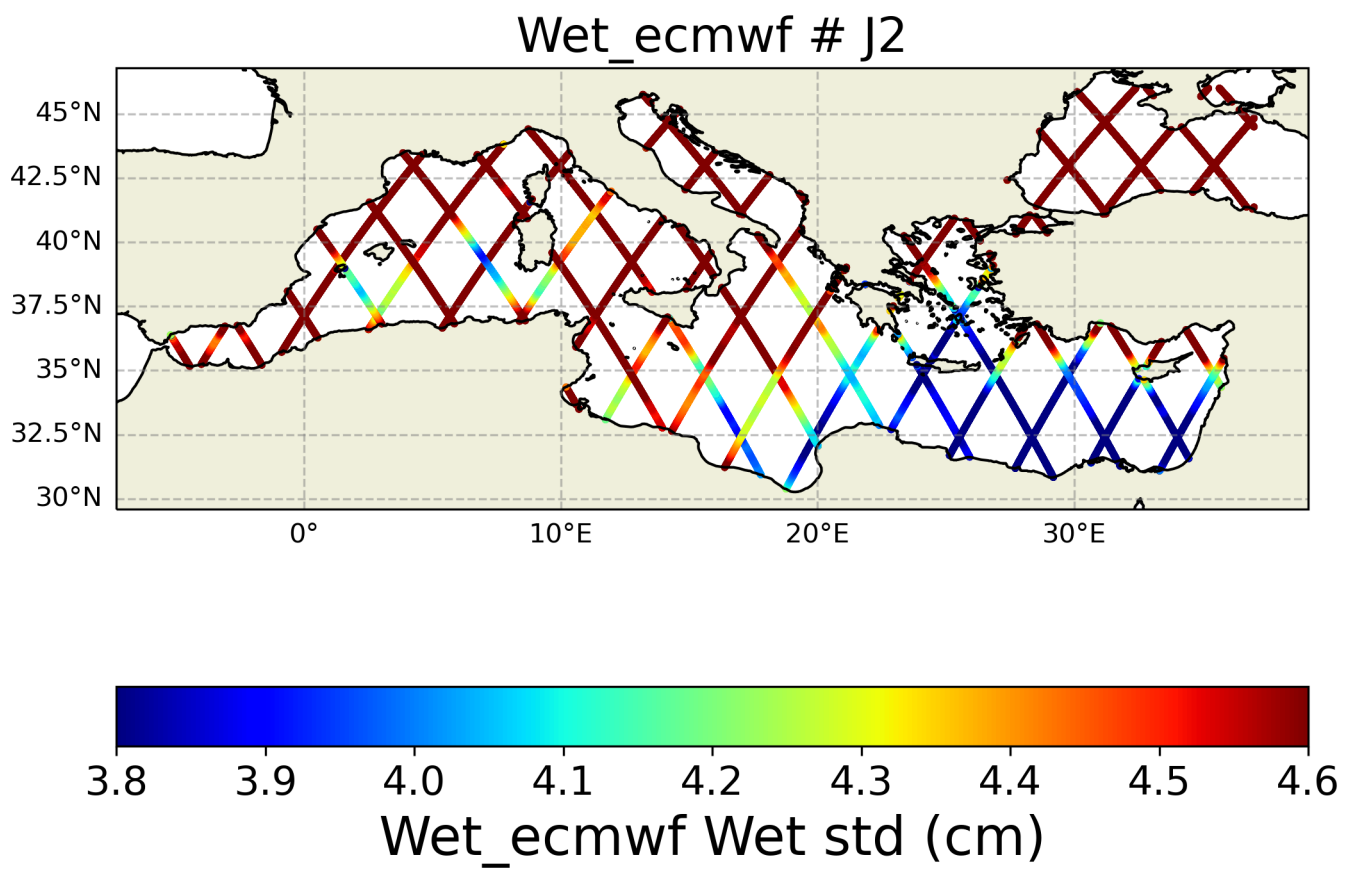


FIGURE 27 – Spatial coherence analysis of the std of the Wet_ecmwf version of Wet variable

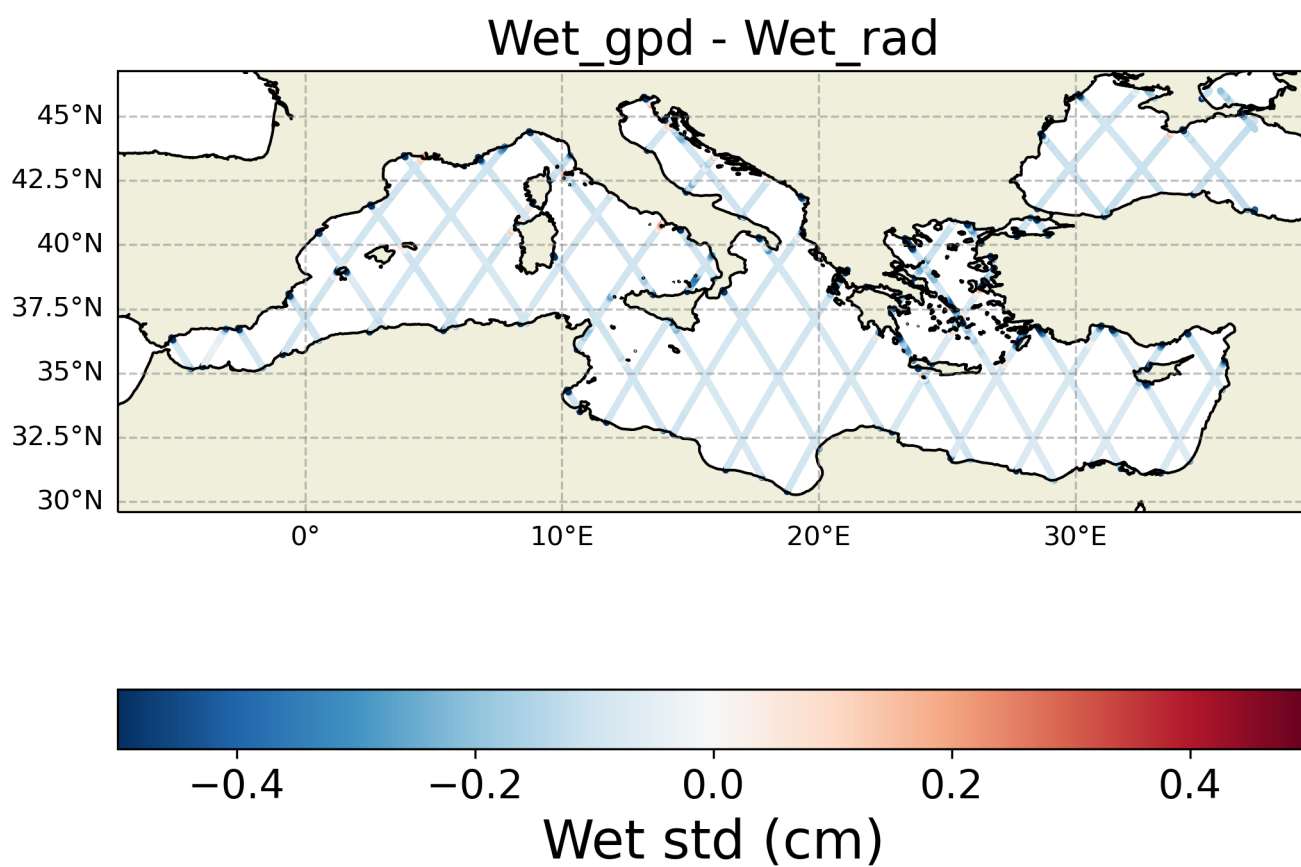


FIGURE 28 – Spatial coherence analysis of the Difference in Wet 's std between Wet_gpd and Wet_rad

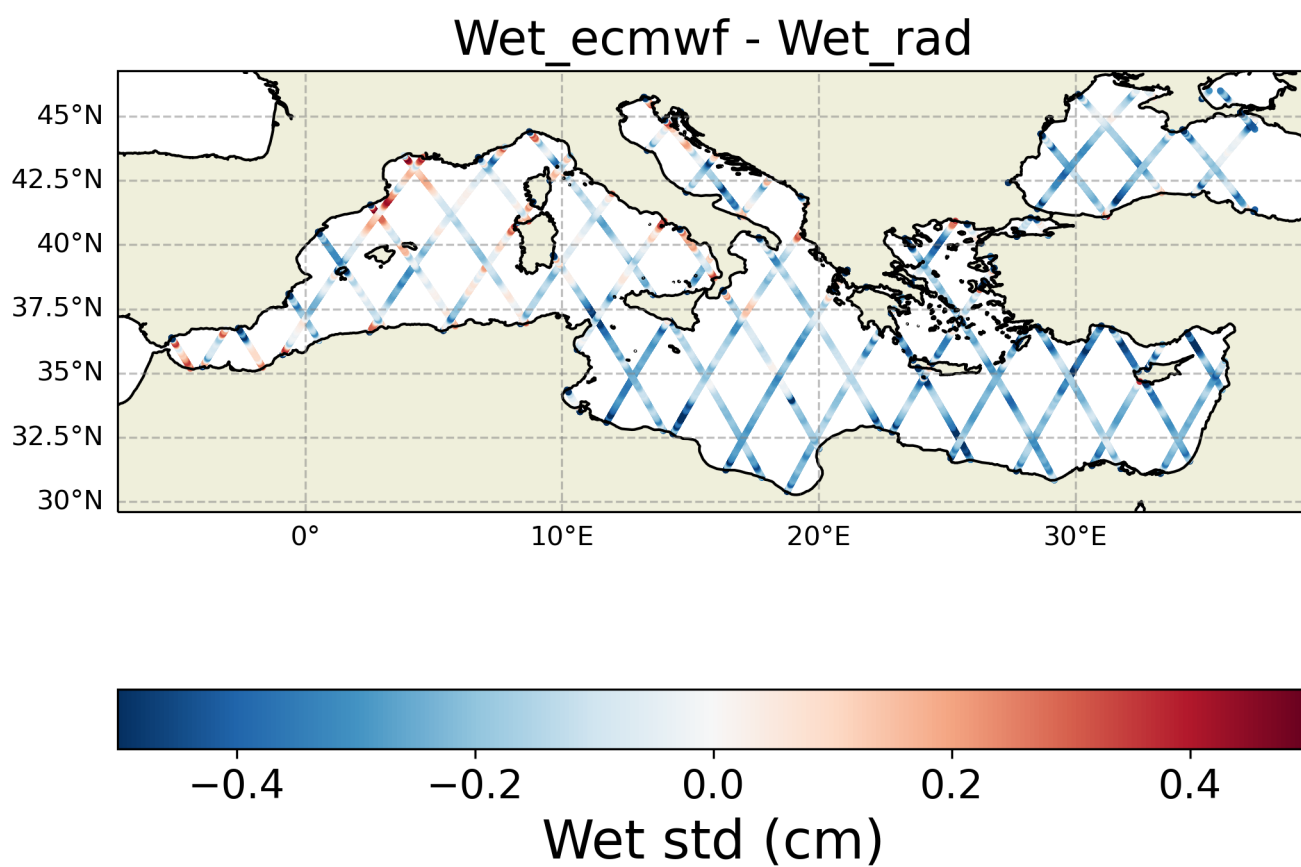


FIGURE 29 – Spatial coherence analysis of the Difference in Wet 's std between Wet_ecmwf and Wet_rad

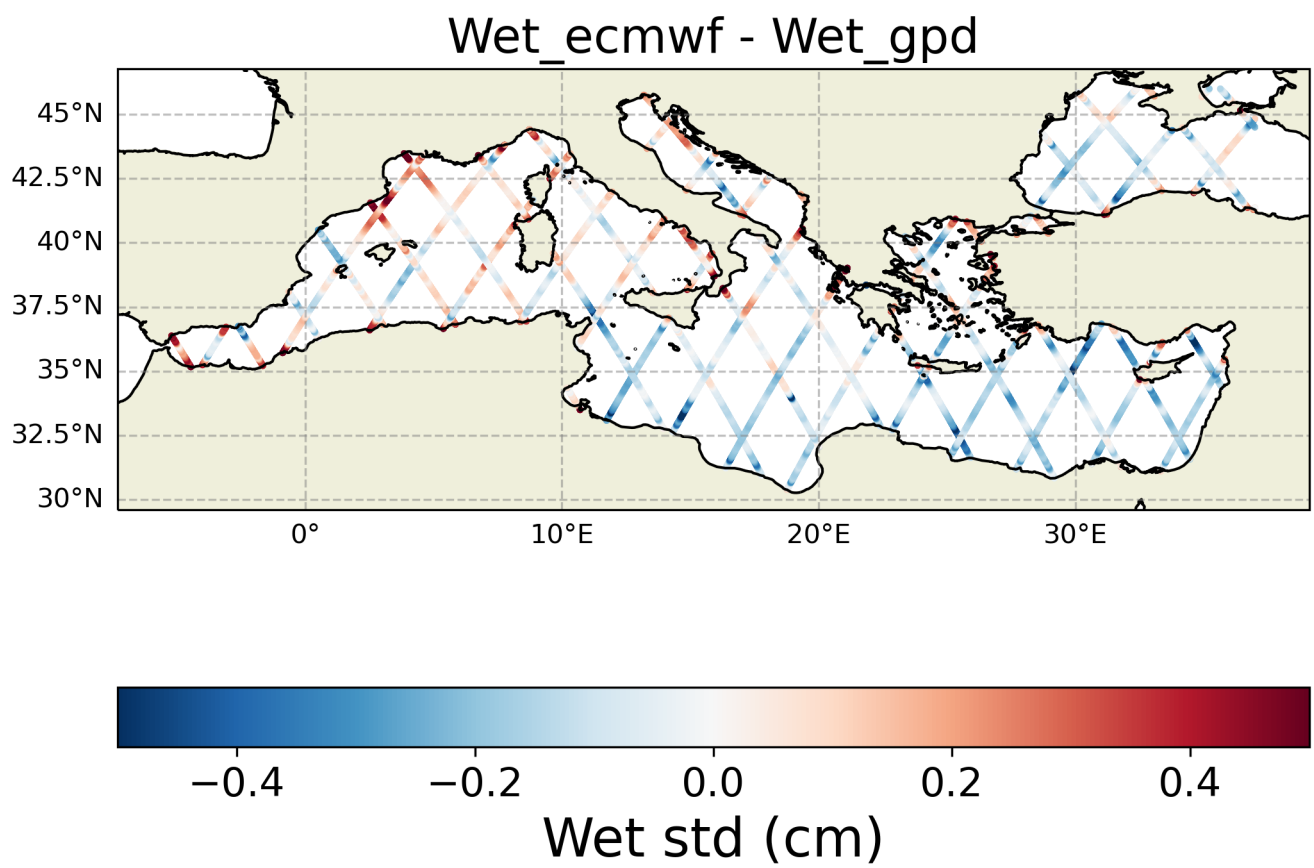


FIGURE 30 – Spatial coherence analysis of the Difference in Wet 's std between Wet_ecmwf and Wet_gpd

3.2.3 Wet 's mean

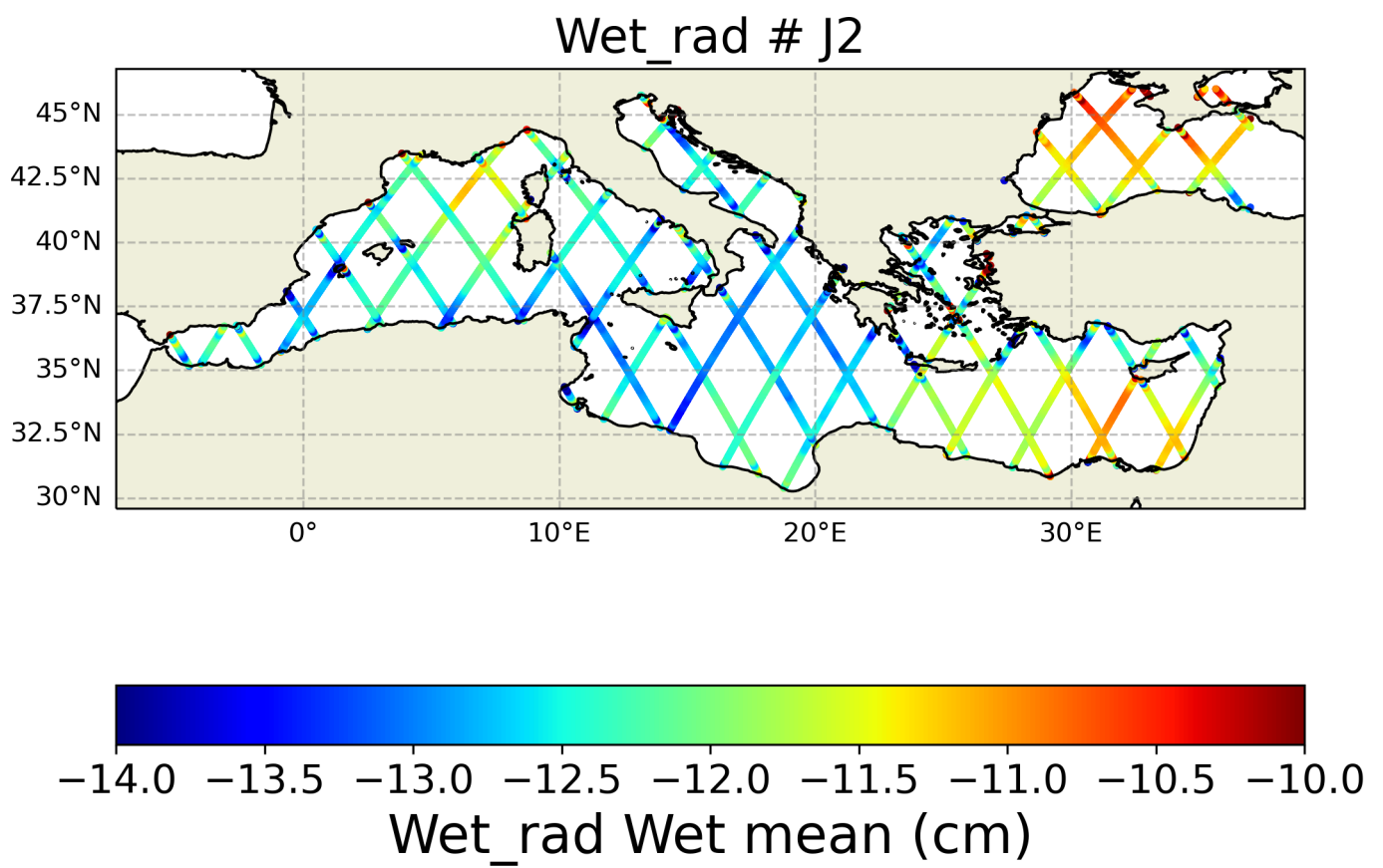


FIGURE 31 – Spatial coherence analysis of the mean of the Wet_rad version of Wet variable

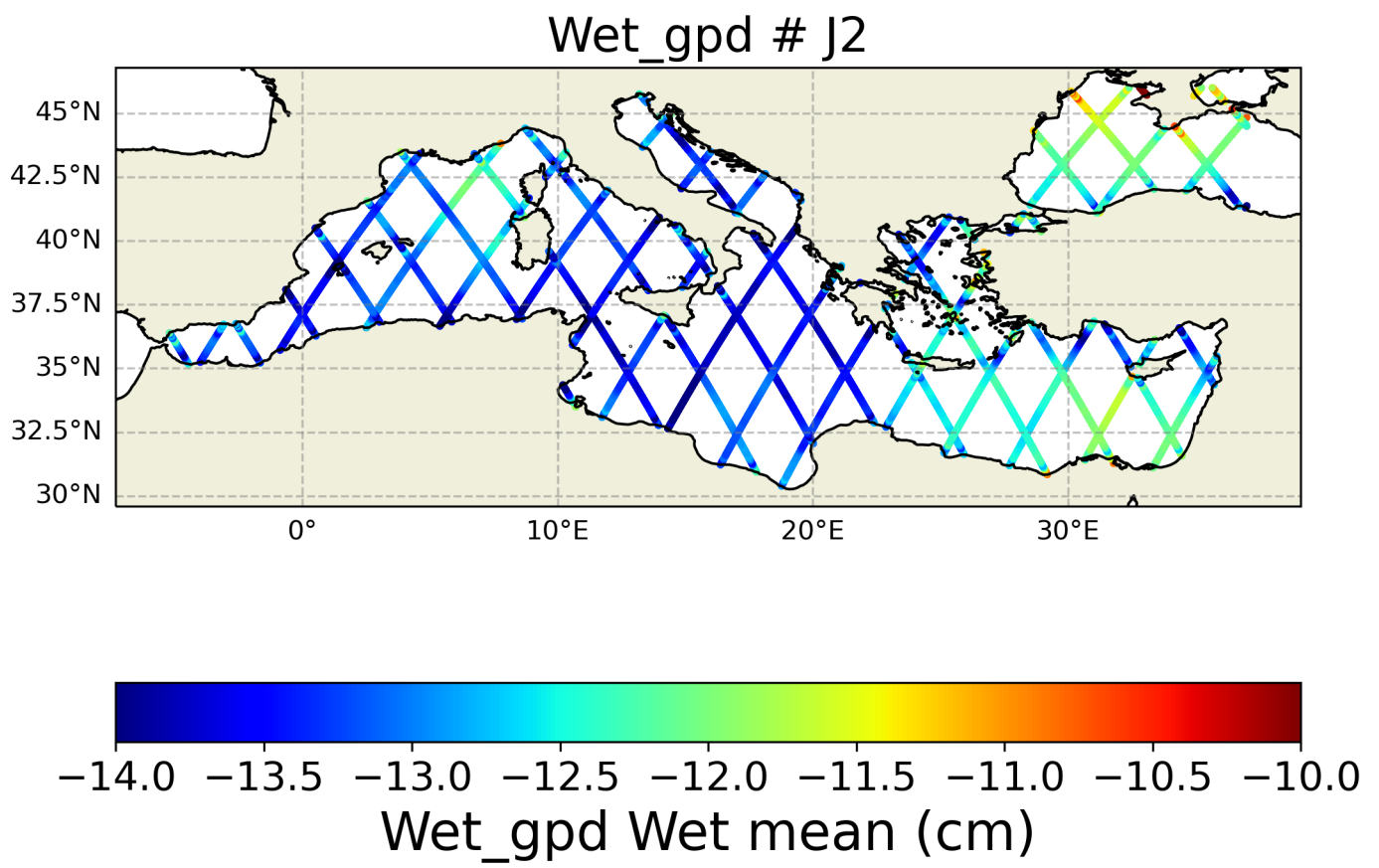


FIGURE 32 – Spatial coherence analysis of the mean of the Wet_gpd version of Wet variable

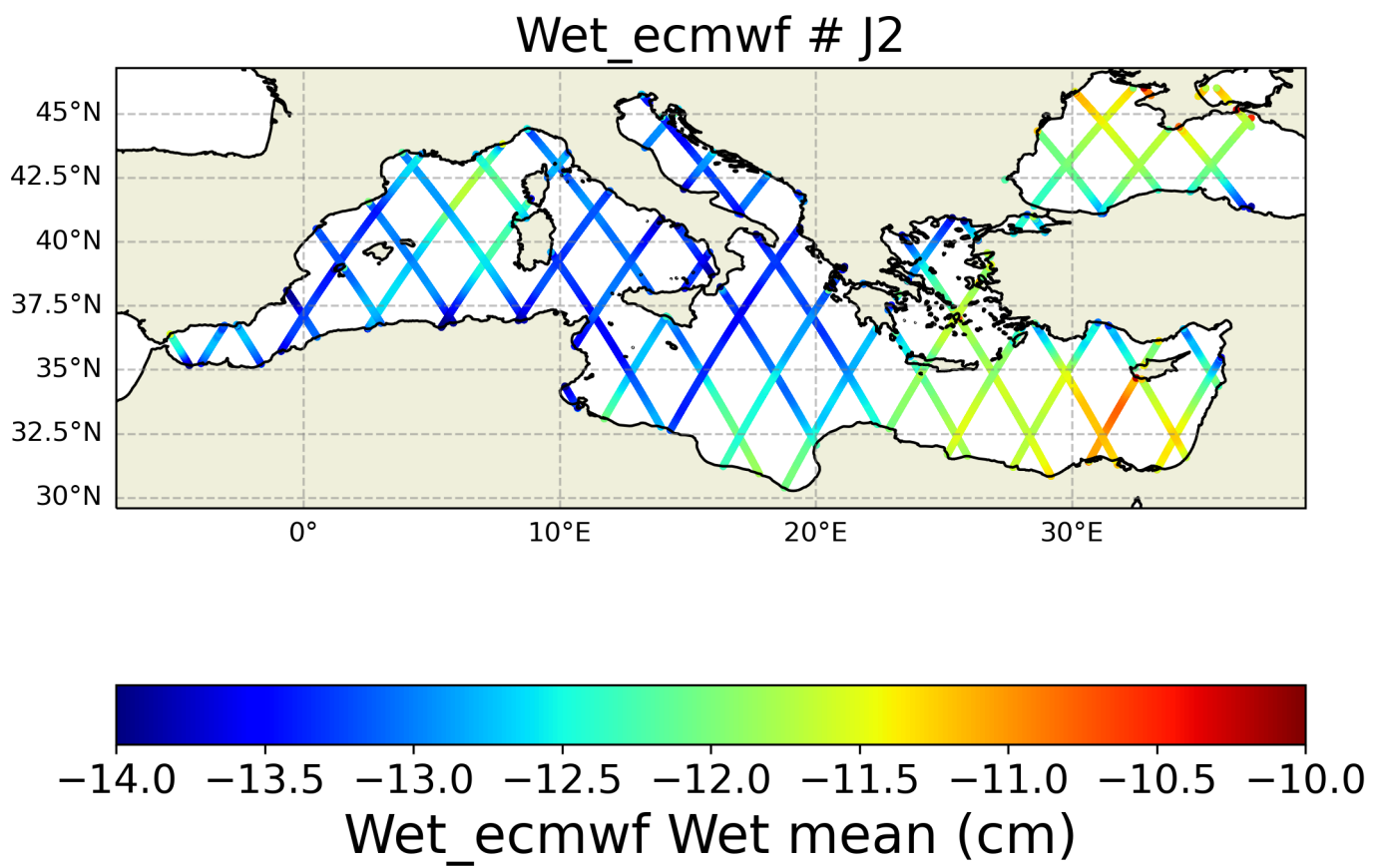


FIGURE 33 – Spatial coherence analysis of the mean of the Wet_ecmwf version of Wet variable

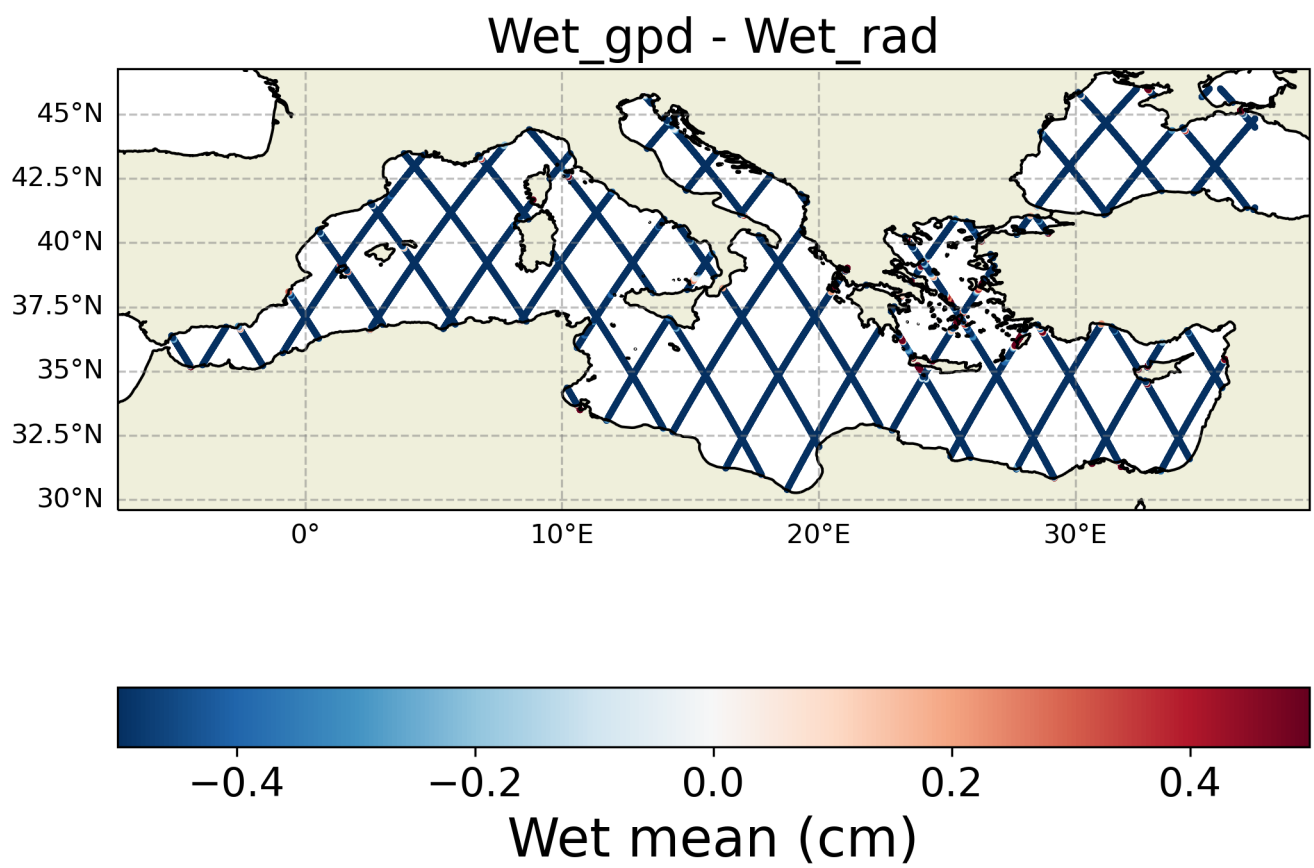


FIGURE 34 – Spatial coherence analysis of the Difference in Wet 's mean between Wet_gpd and Wet_rad

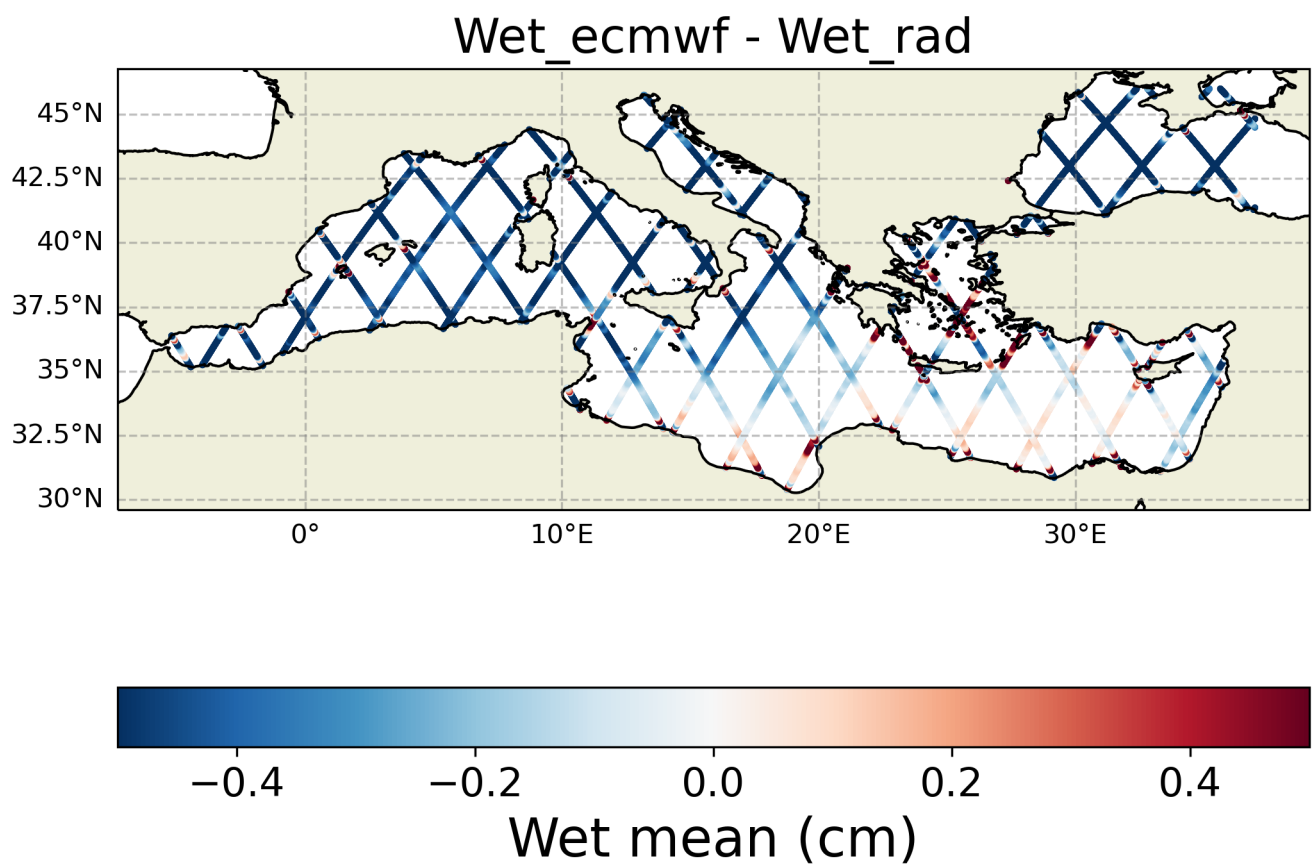


FIGURE 35 – Spatial coherence analysis of the Difference in Wet 's mean between Wet_ecmwf and Wet_rad

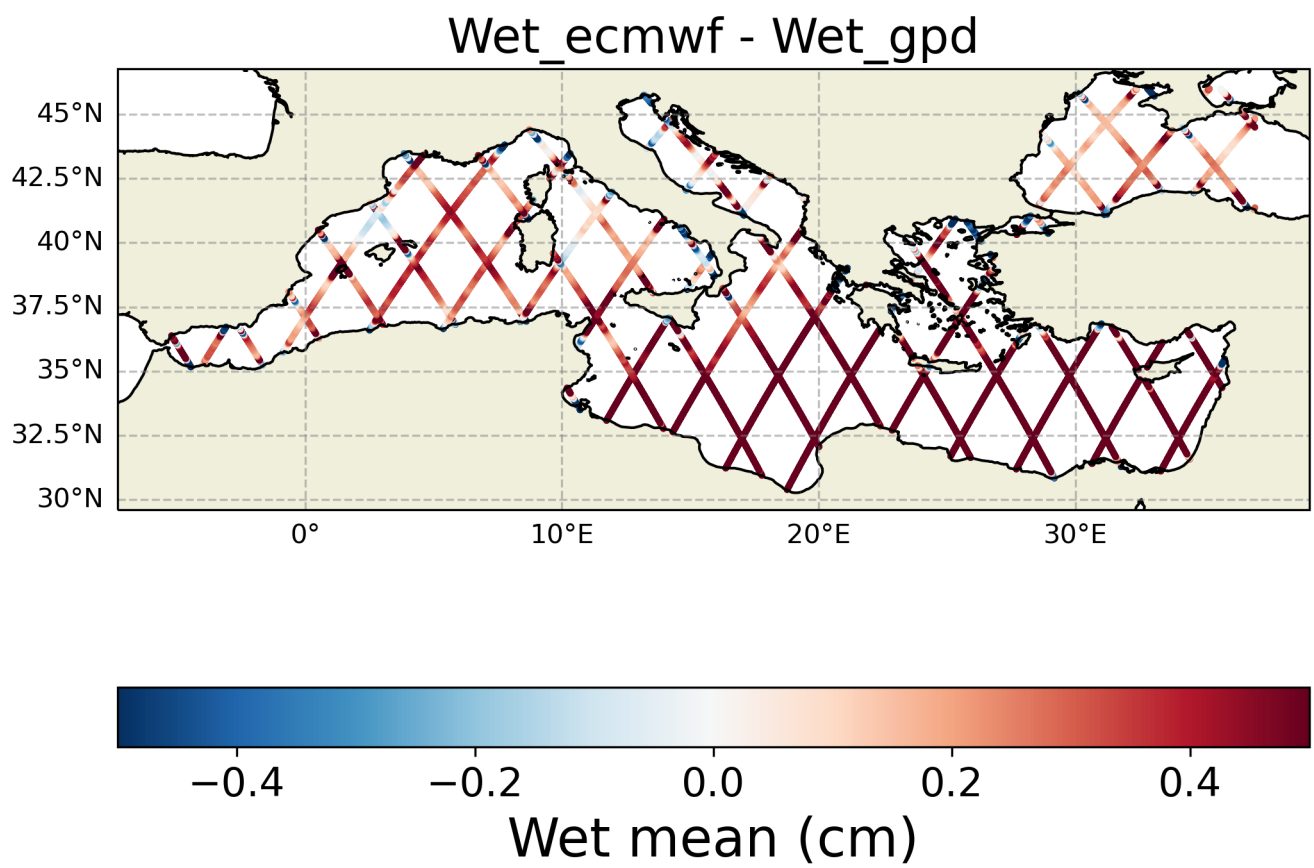


FIGURE 36 – Spatial coherence analysis of the Difference in Wet 's mean between Wet_ecmwf and Wet_gpd

4 Histograms

4.1 Wet

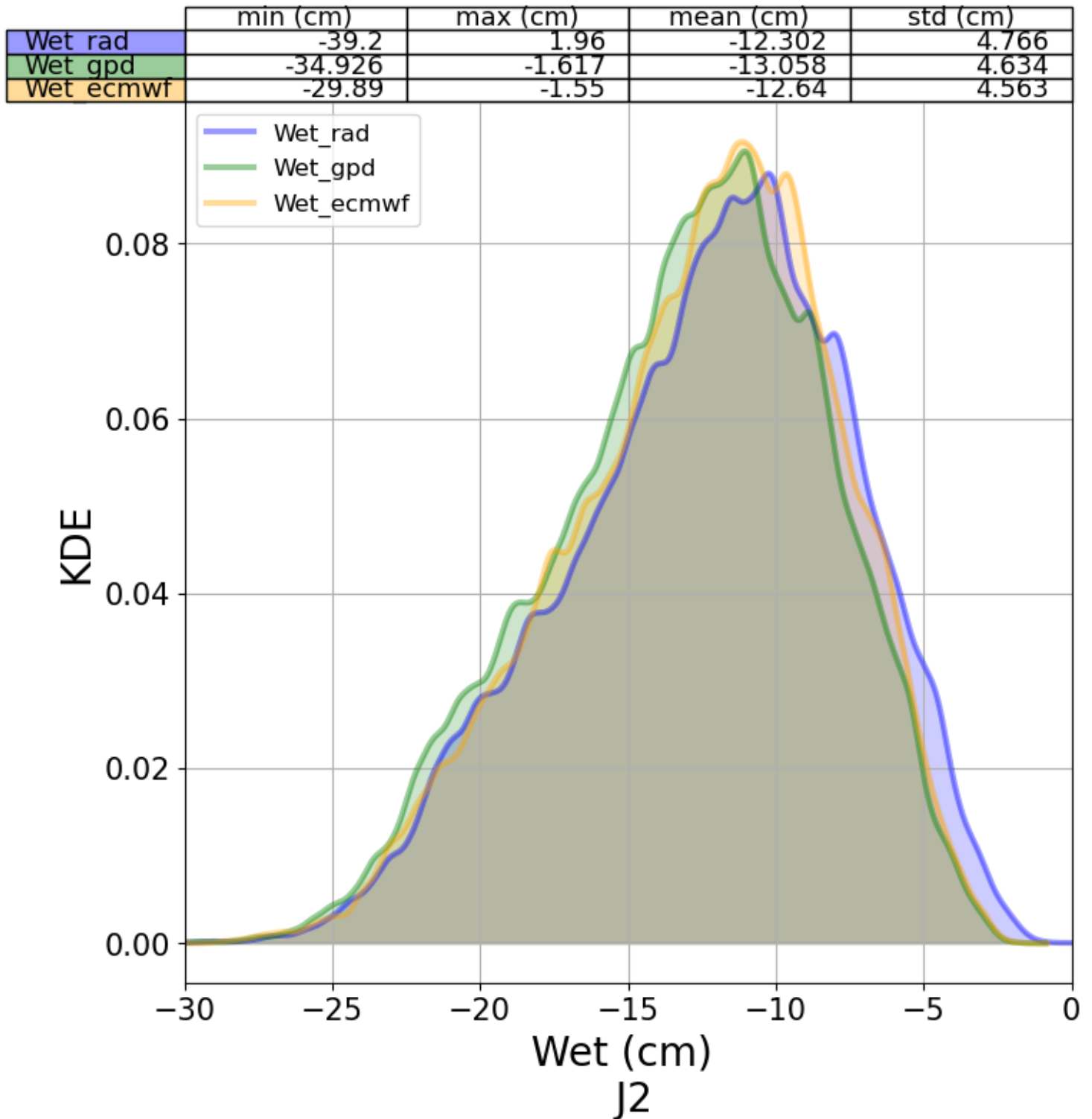


FIGURE 37 – Histogram of each of Wet version

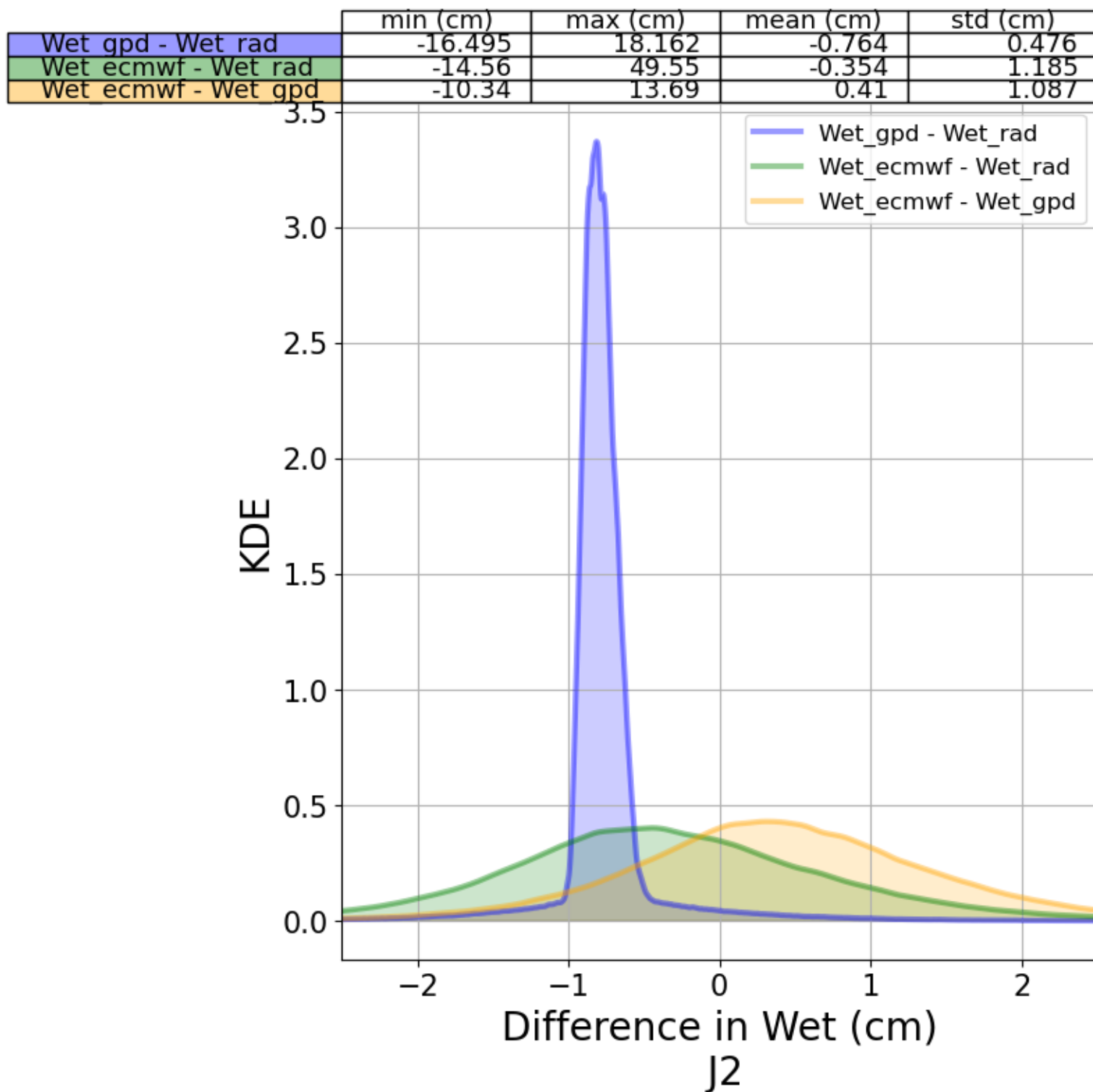


FIGURE 38 – Histograms of difference of each Wet version and reference one

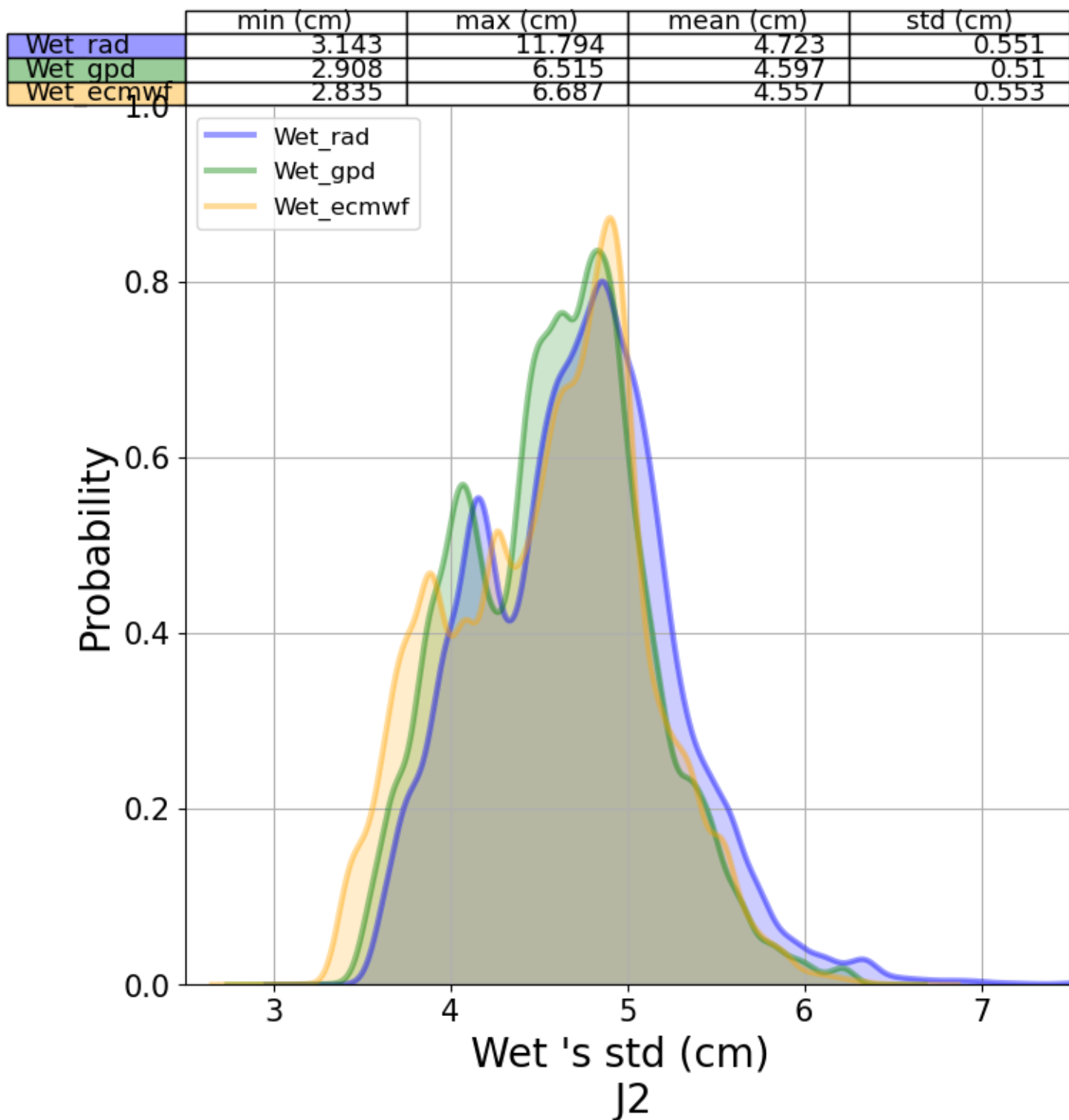


FIGURE 39 – Histograms of the standard deviation of each Wet version

4.2 sla

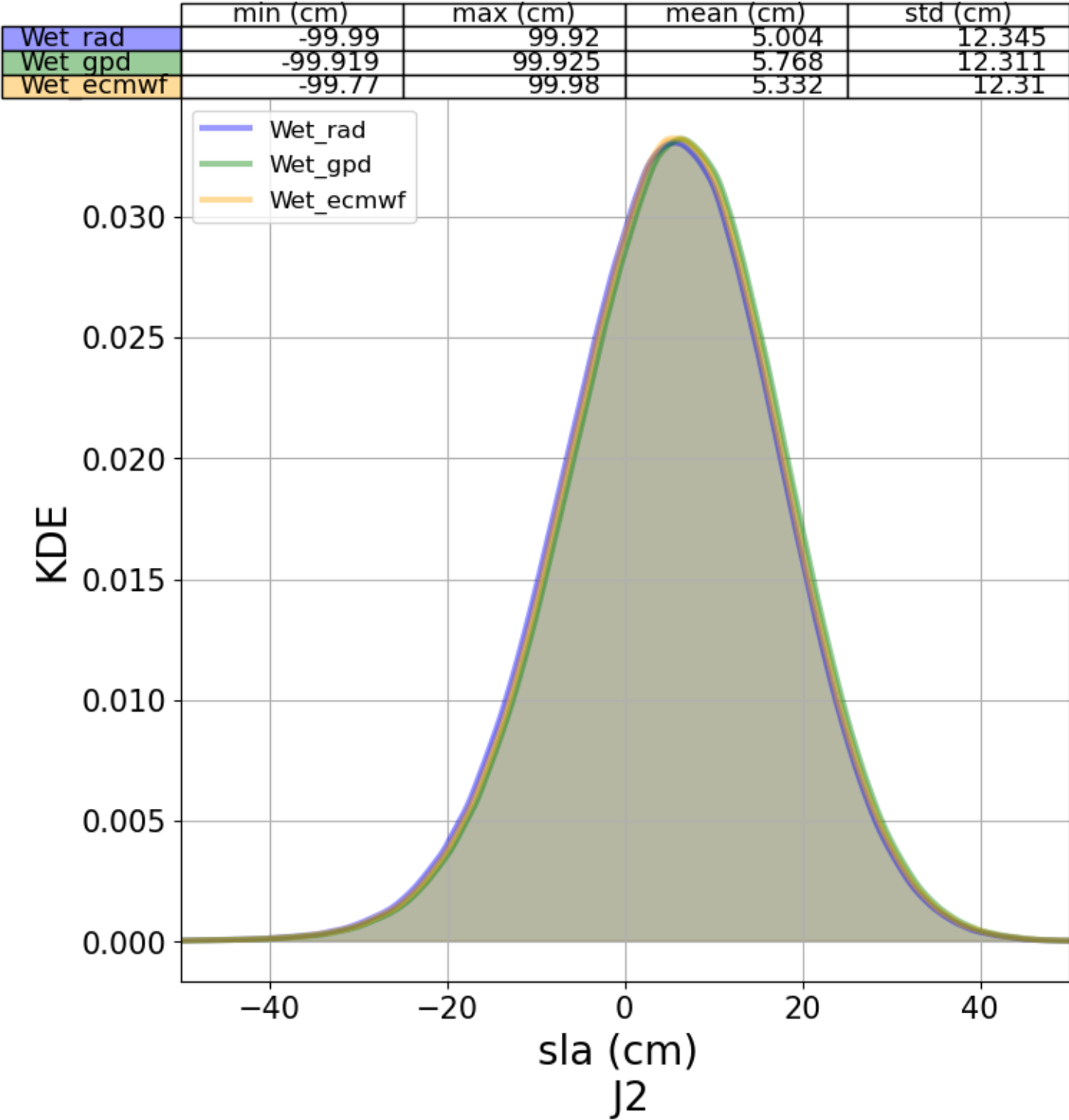


FIGURE 40 – Histogram of each of sla version

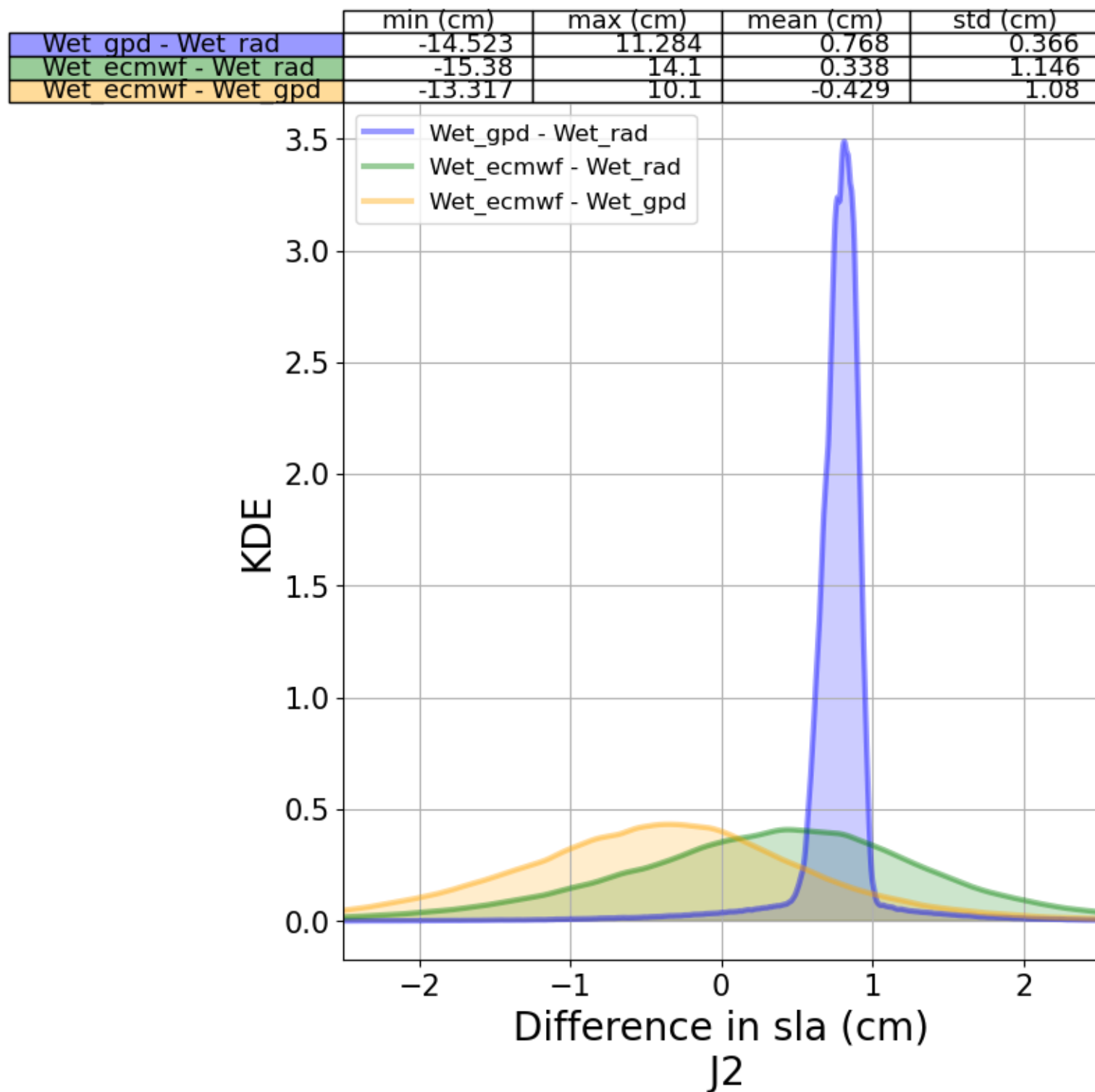


FIGURE 41 – Histograms of difference of each sla version and reference one

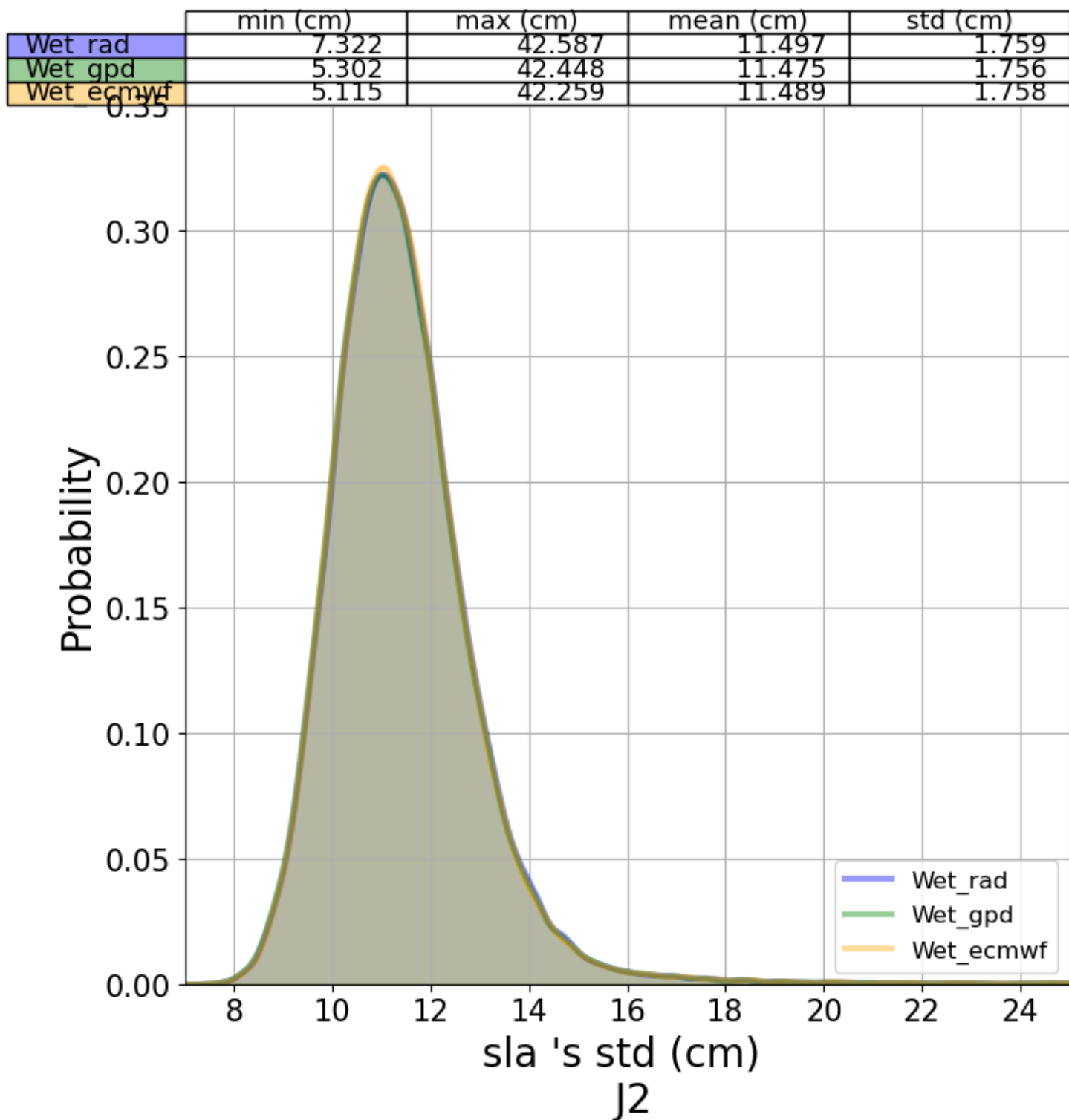


FIGURE 42 – Histograms of the standard deviation of each sla version

5 Along-track analysis

5.1 Wet

5.1.1 Wet 's count

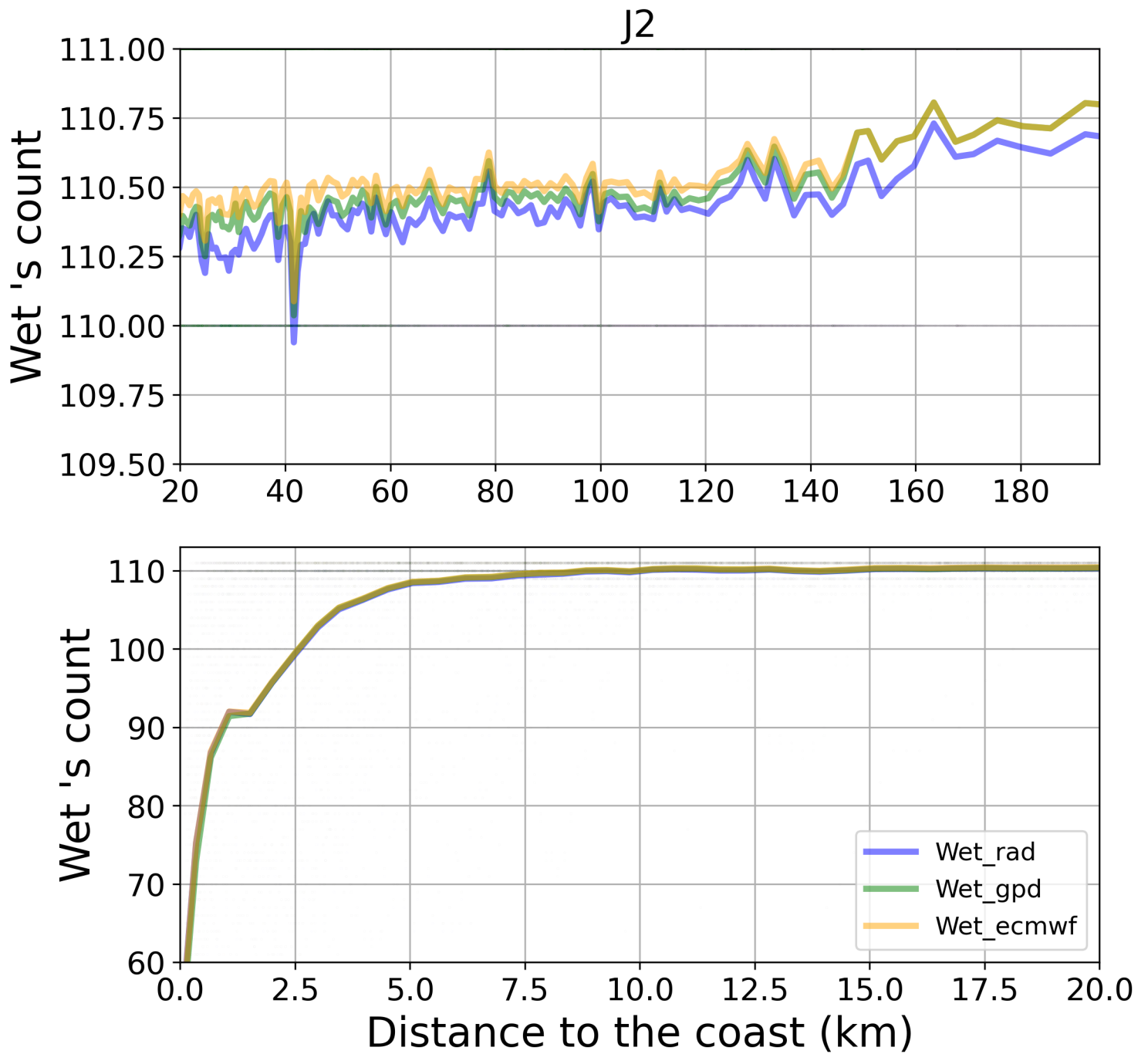


FIGURE 43 – Along-track analysis of Wet 's count

J2

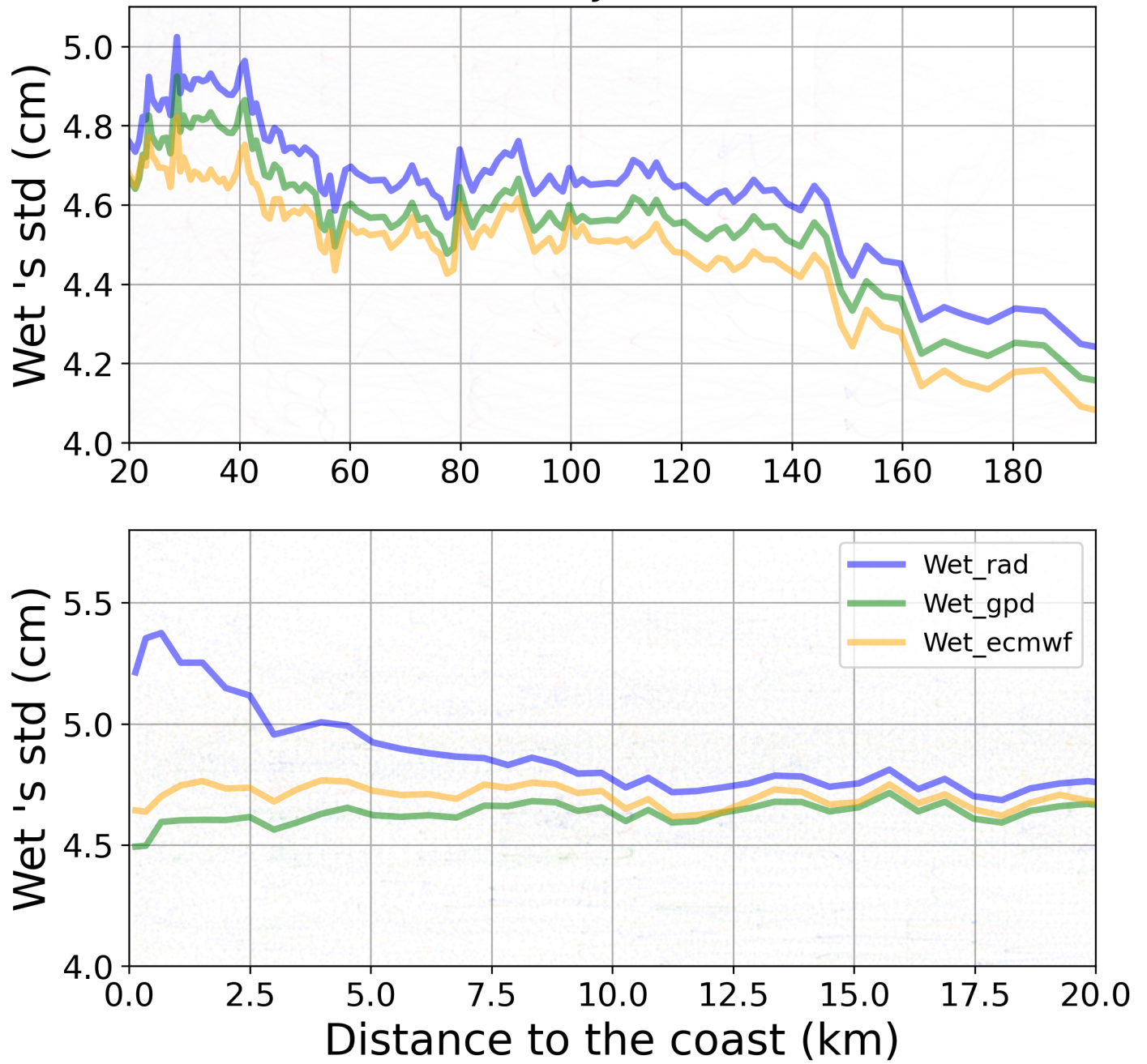


FIGURE 44 – Along-track analysis of Wet 's std

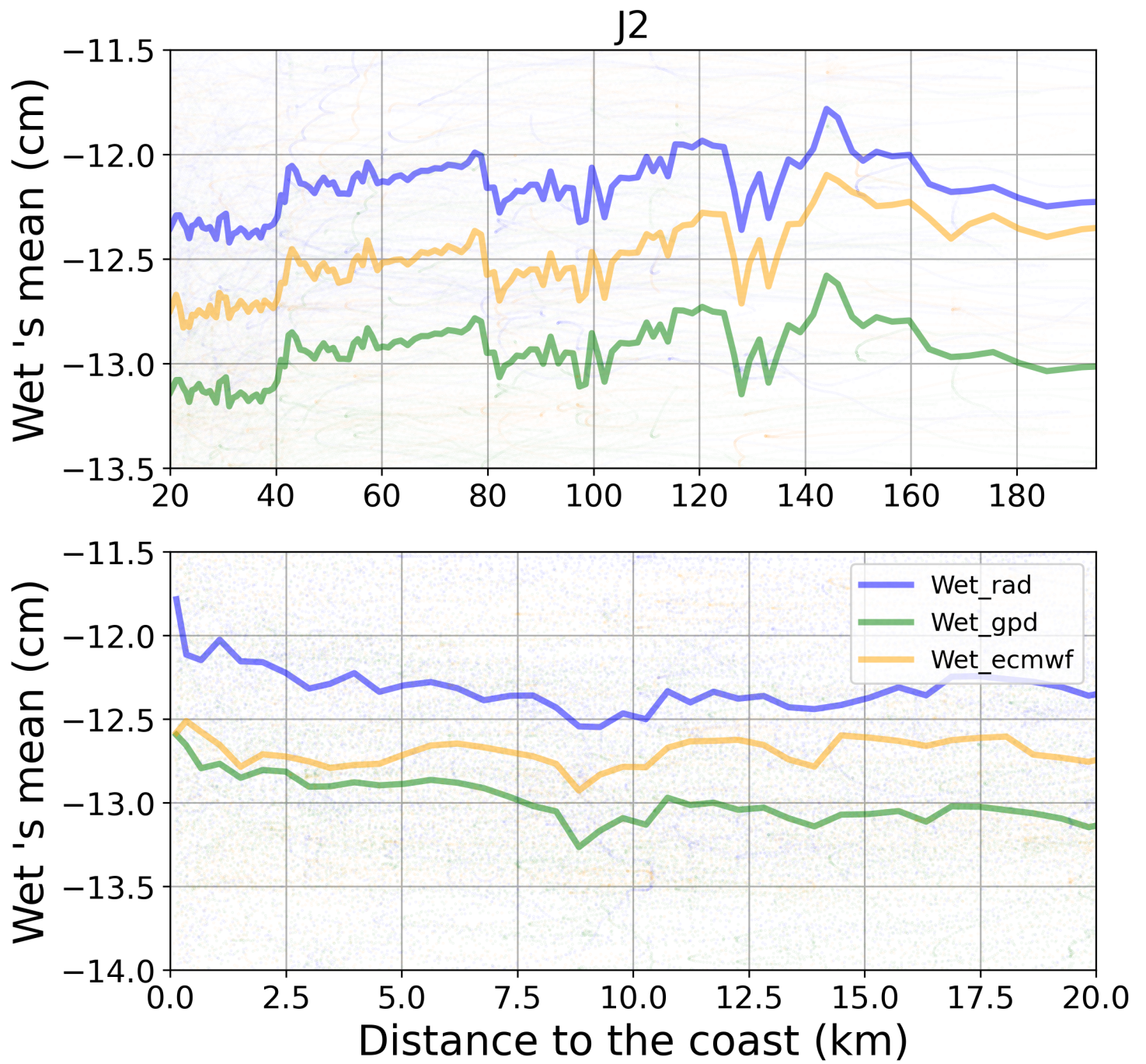


FIGURE 45 – Along-track analysis of Wet 's mean

5.2 sla

5.2.1 sla 's count

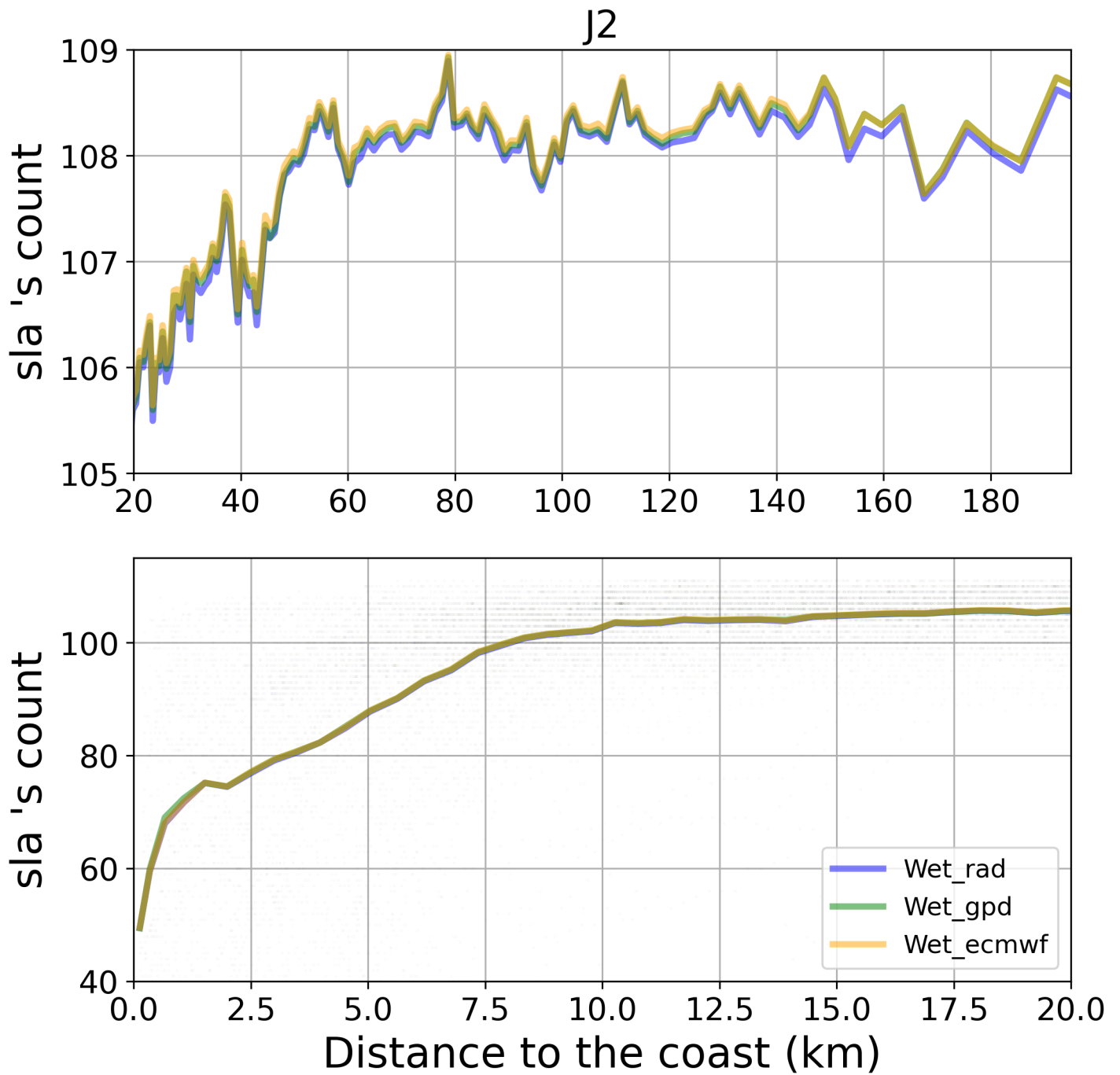


FIGURE 46 – Along-track analysis of sla 's count

J2

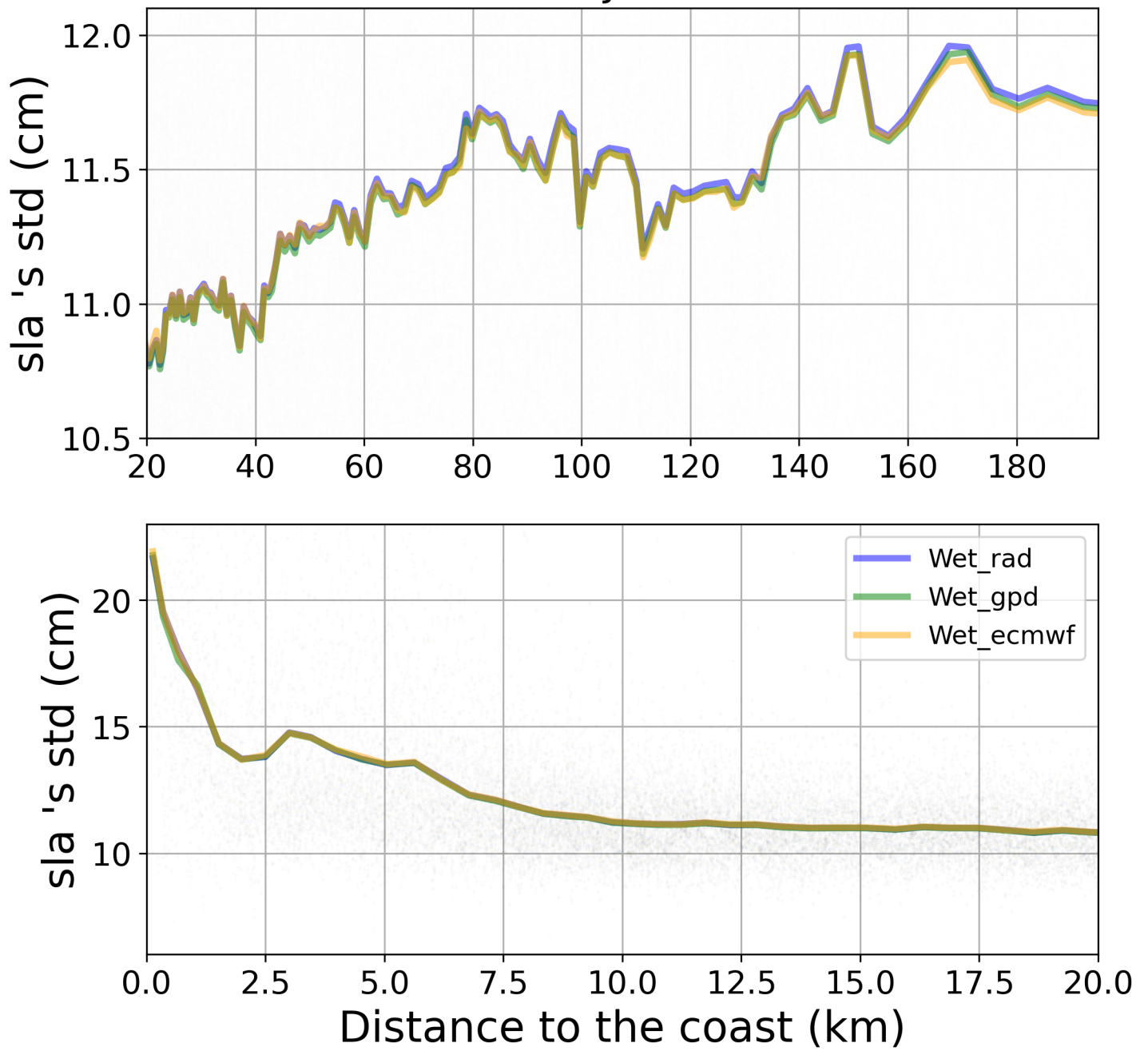


FIGURE 47 – Along-track analysis of sla 's std

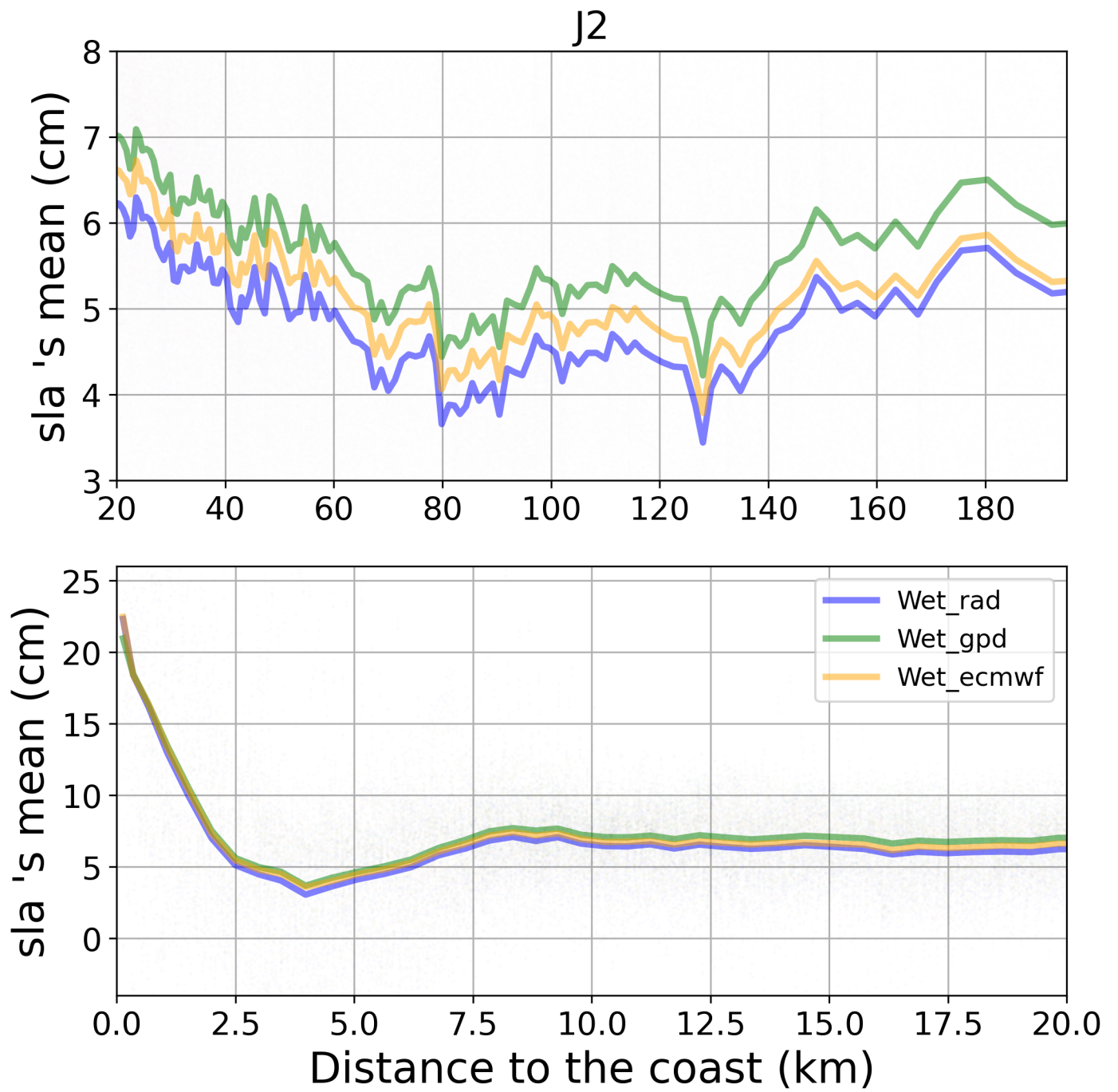


FIGURE 48 – Along-track analysis of sla 's mean

6 Comparison with Insitu Data (Tide Gauge)

The size of the marker representing each point in the figures below increase by getting closer to the coast

6.1 Station : SETE

- Nearest track to SETE station is the track number track146
- The area of interest is limited by :
 - A circle which it's center is the SETE tide gauge station location and has a Radius of 40 Km
 - Maximum distance to the coast : 20 Km

6.1.1 correlation visualization in maps view % SETE tide gauge

Correlation Altimetry data with respect to SETE Tide gauge data

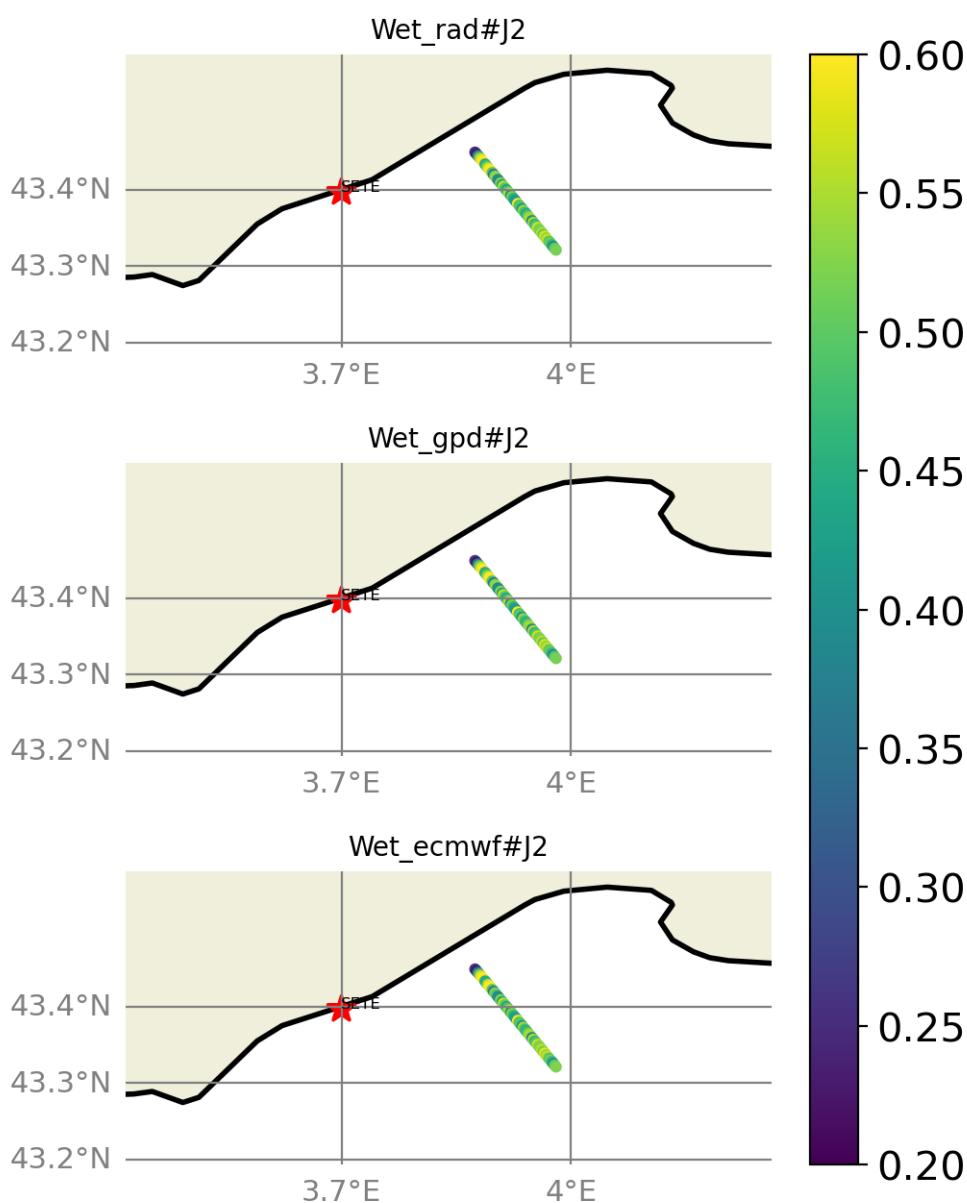


FIGURE 49 – correlation visualization in maps view % SETE tide gauge

6.1.2 rmsd visualization in maps view % SETE tide gauge

Rmsd (m) Altimetry data with respect to SETE Tide gauge data

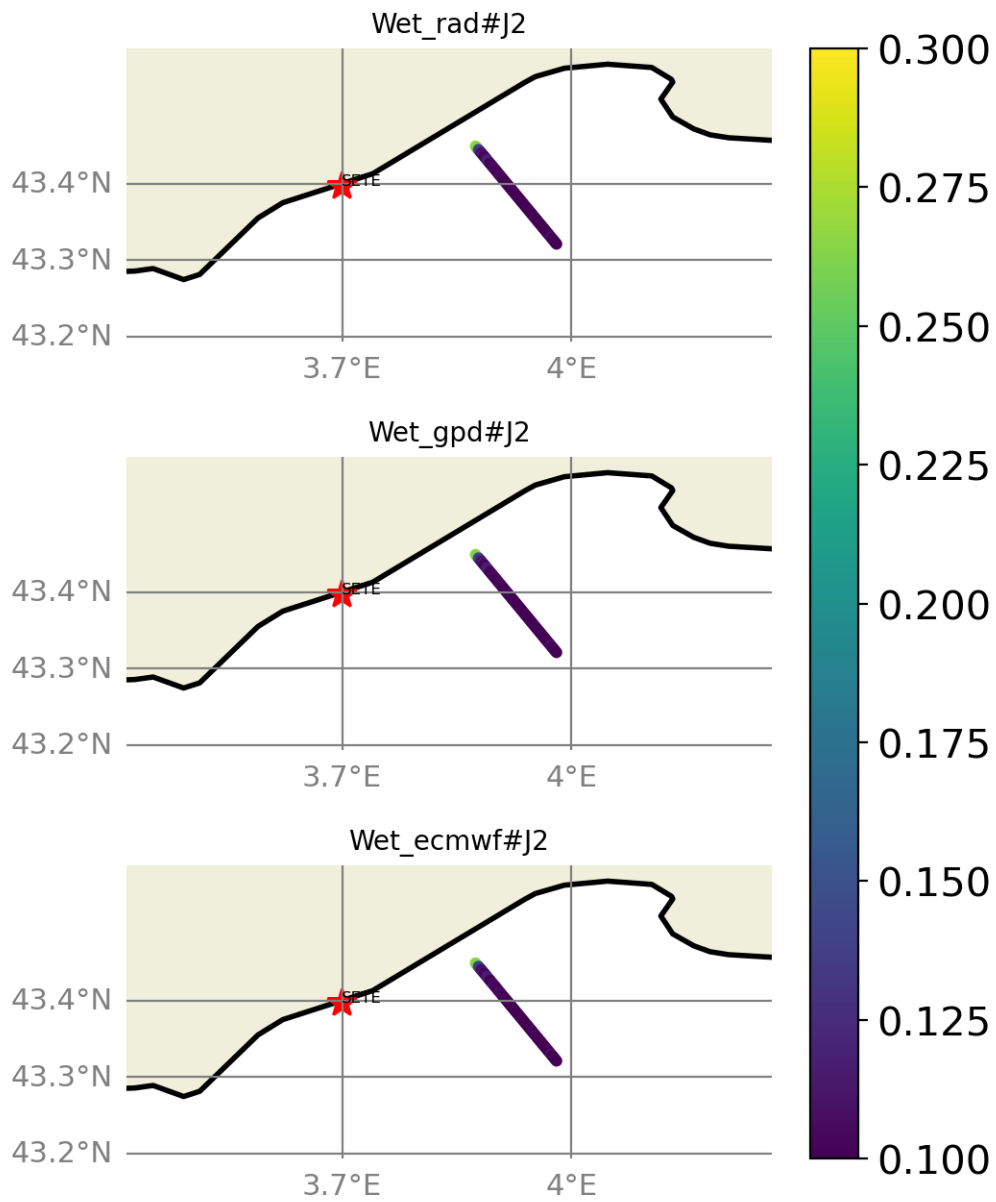


FIGURE 50 – rmsd visualization in maps view % SETE tide gauge

6.1.3 std visualization in maps view % SETE tide gauge

Std (m) Altimetry data with respect to SETE Tide gauge data

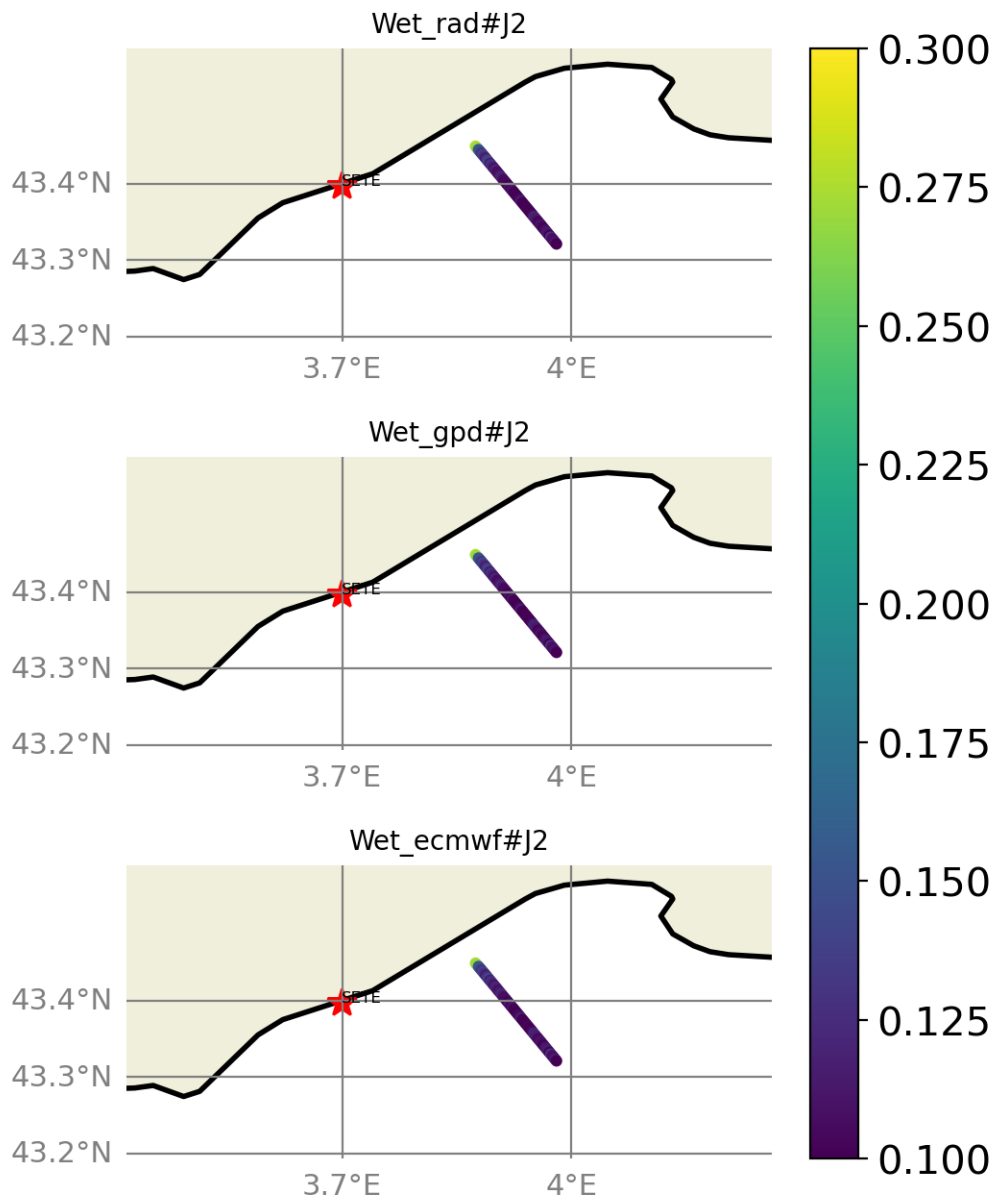


FIGURE 51 – std visualization in maps view % SETE tide gauge

6.1.4 valid_data_percent visualization in maps view % SETE tide gauge

Valid_Data_Percent (%) Altimetry data with respect to SETE Tide gauge data

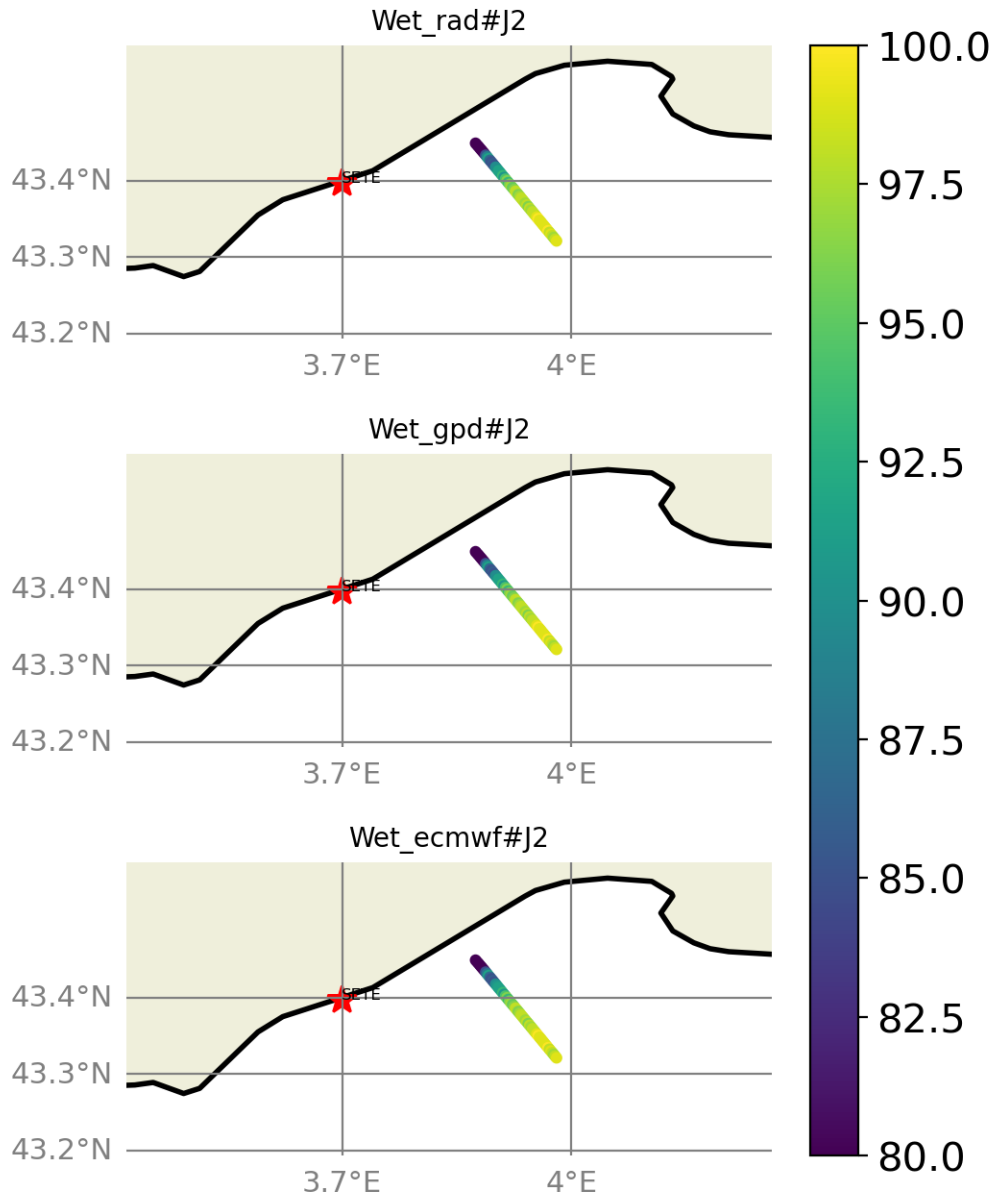


FIGURE 52 – valid_data_percent visualization in maps view % SETE tide gauge

6.1.5 Valid data (%) in function of distance to coast/SETE station

The formula to calculate the percentage of valid data in each time serie is;

$$pvd_i = \frac{nvd_i}{maxNB}, i = 1, np$$

Where pvd and nvd are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 106$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

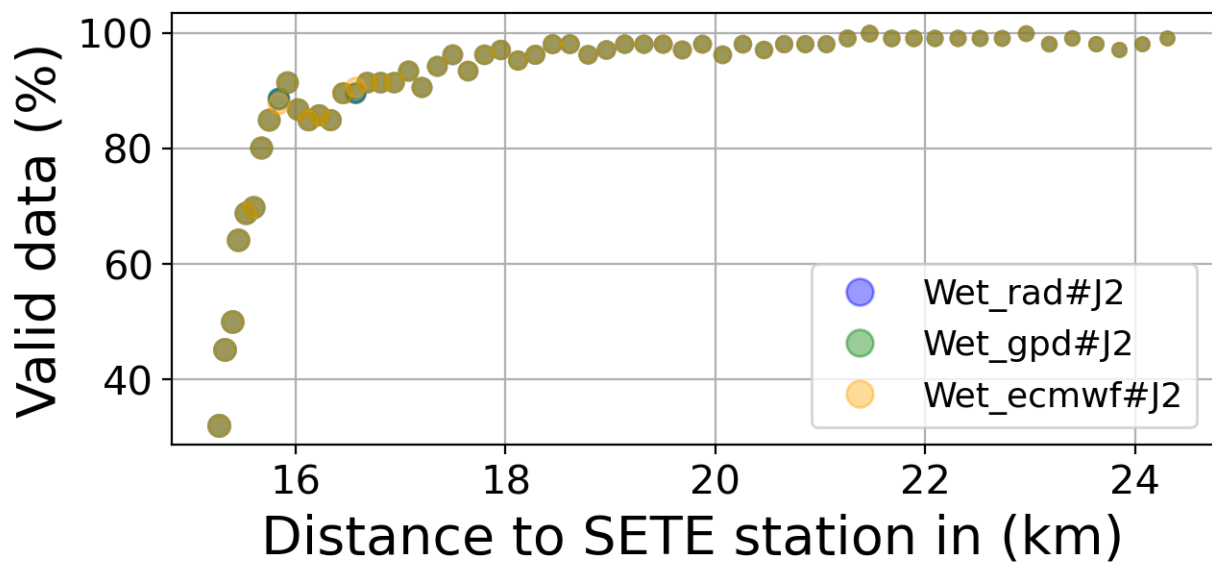
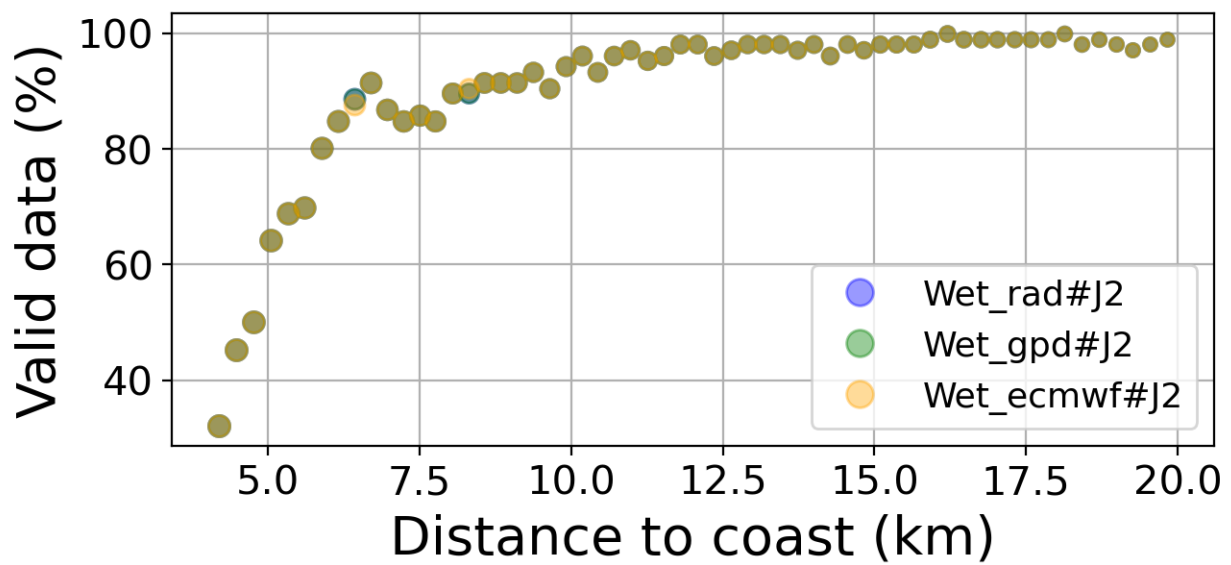


FIGURE 53 – Valid data (%) in function of distance to coast/SETE station

6.1.6 Std in function of distance to coast/SETE station

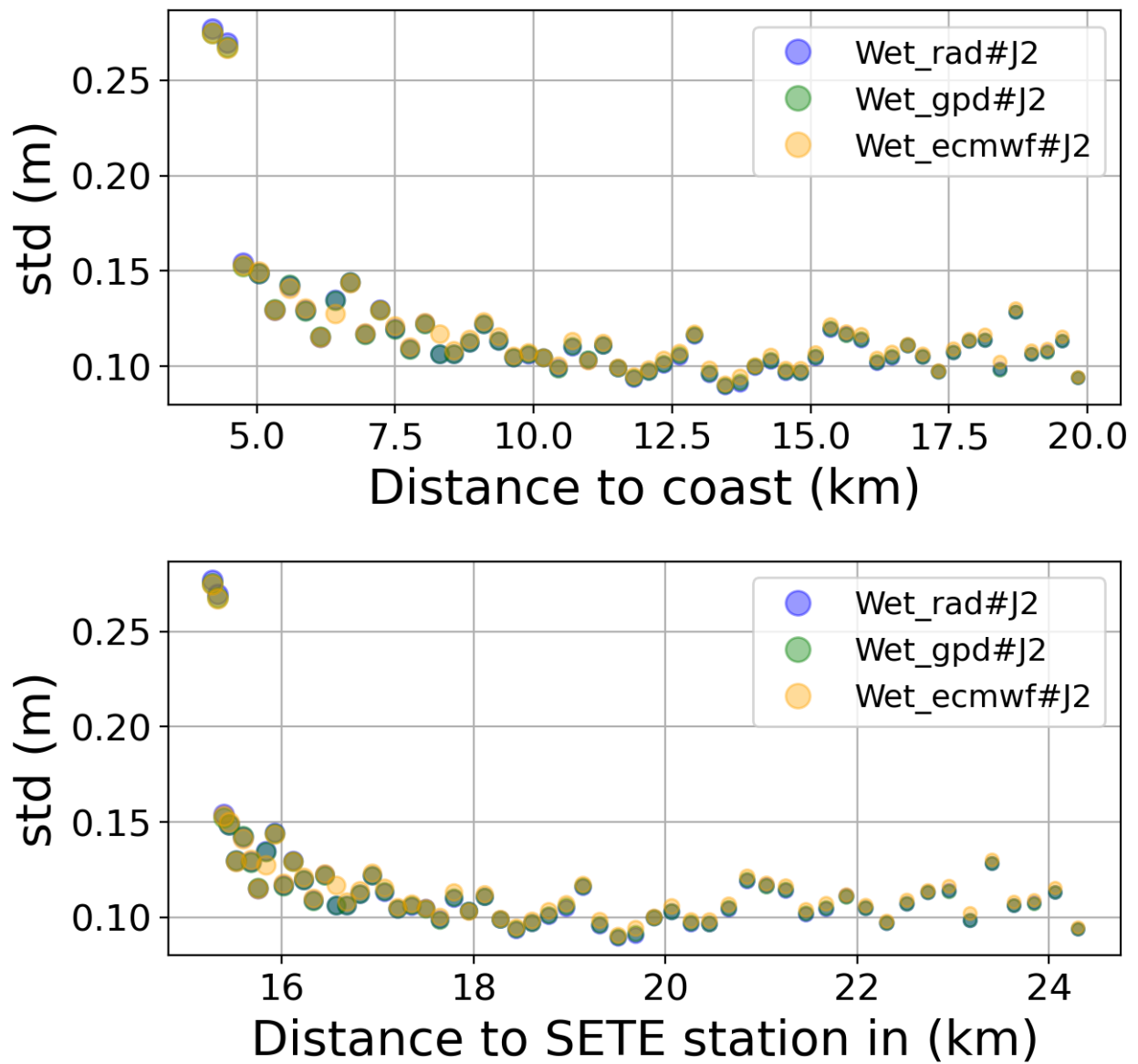


FIGURE 54 – Std in function of the distance to the coast/SETE station

6.1.7 Correlation in function of distance to coast/SETE station

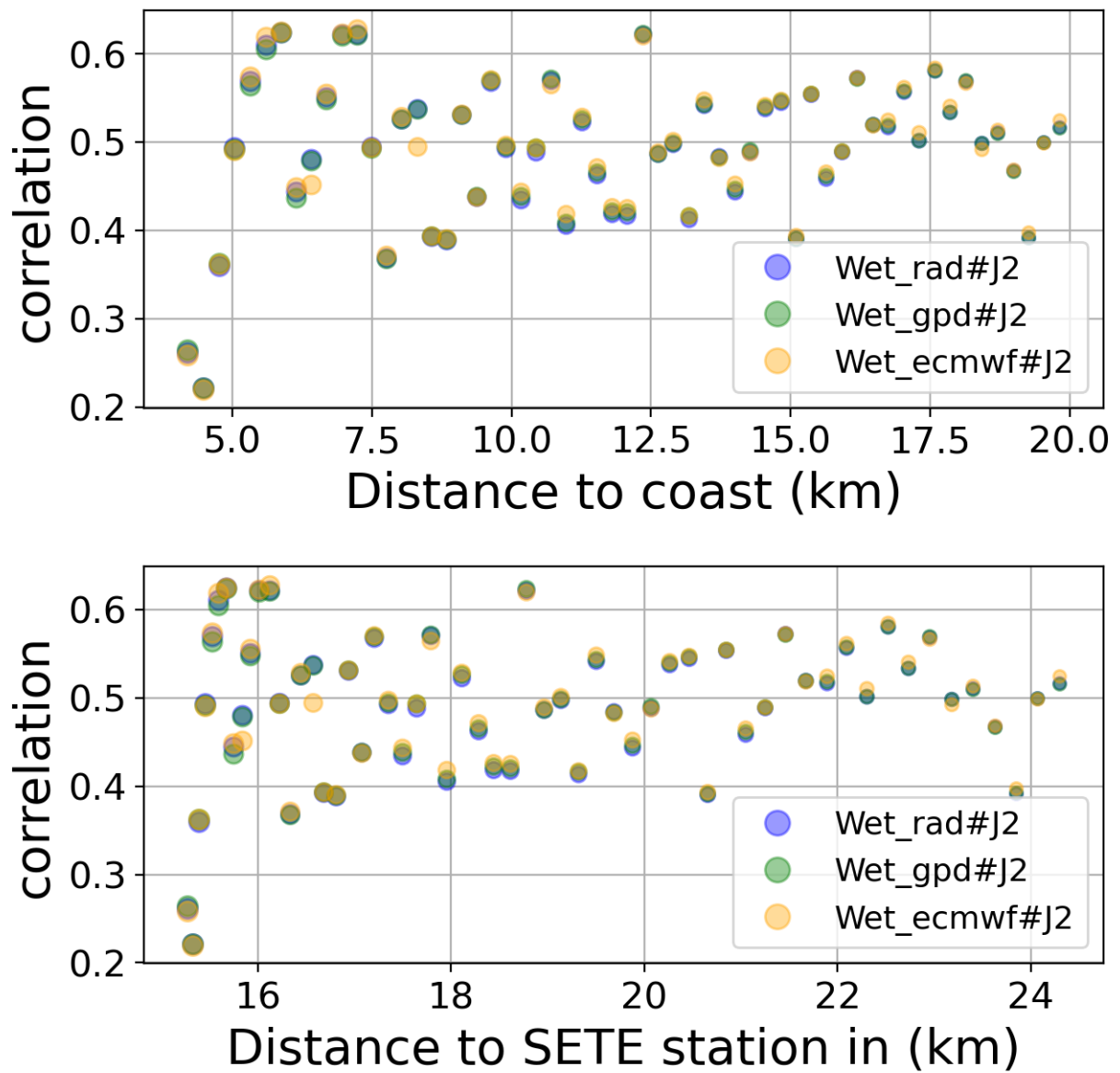


FIGURE 55 – Correlation in function of the distance to the coast/SETE station

6.1.8 Taylor Diagram

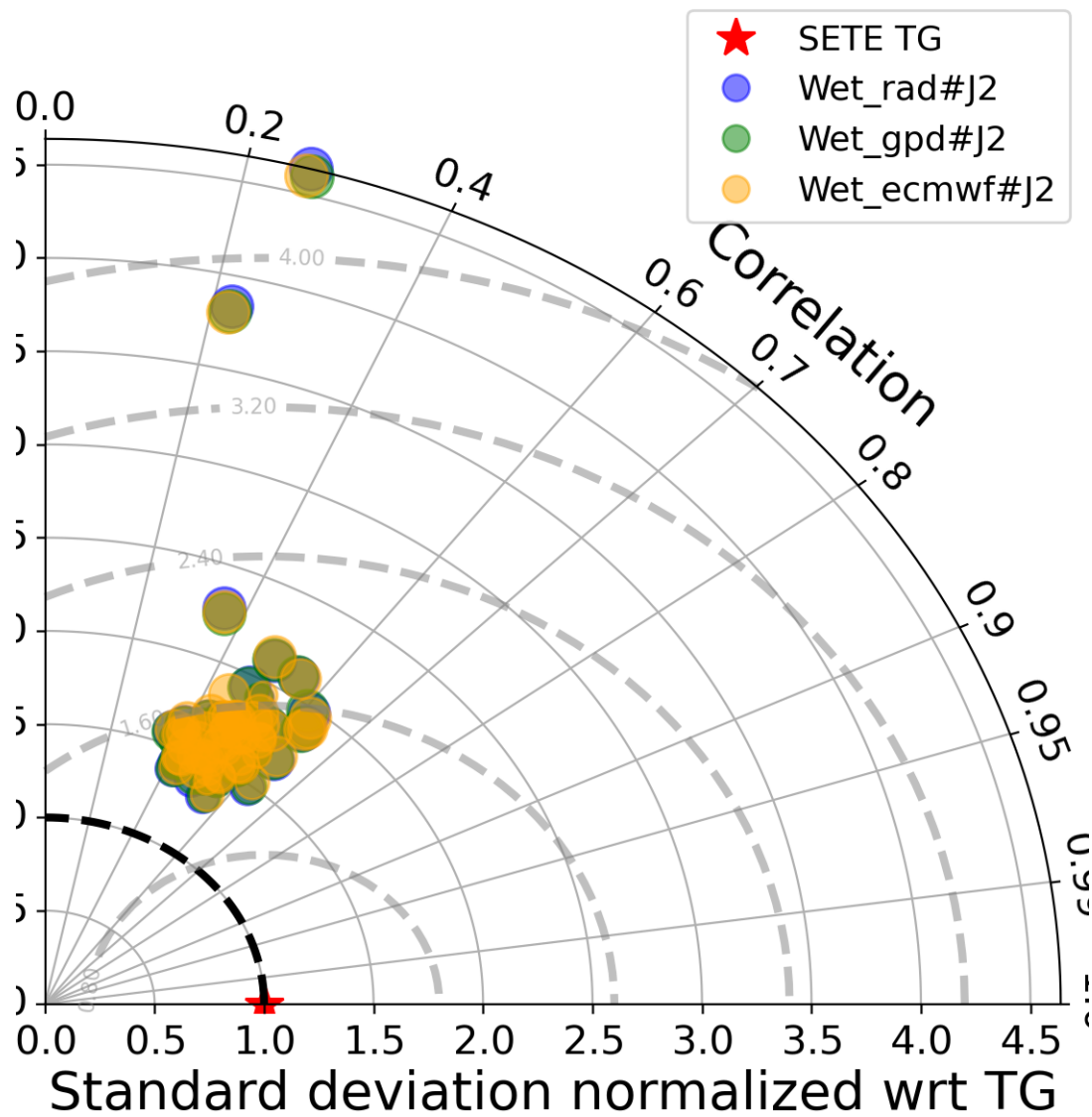


FIGURE 56 – Taylor diagram

6.1.9 Mean statistics table of products comparison with SETE tide gauge data

The table below contains the mean statistics of the common points between the different products in the selected area.

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
Wet_rad#J2	90.908	0.492	0.117	0.103
Wet_gpd#J2	90.908	0.492	0.117	0.103
Wet_ecmwf#J2	90.908	0.493	0.118	0.104

FIGURE 57 – Mean statistics table of the common points in the altimetry products

6.1.10 The most correlated sla altimetry Time series with the tide gauge sla time serie

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 106 point.

	Dist2station (km)	Dist2coast (km)	Valid data (%)	Correlation	std (m)
TG	-	-	-	-	0.068
Wet_rad#J2	16.12	7.228	84.906	0.622	0.13
Wet_gpd#J2	16.12	7.228	84.906	0.621	0.129
Wet_ecmwf#J2	16.12	7.228	84.906	0.628	0.129

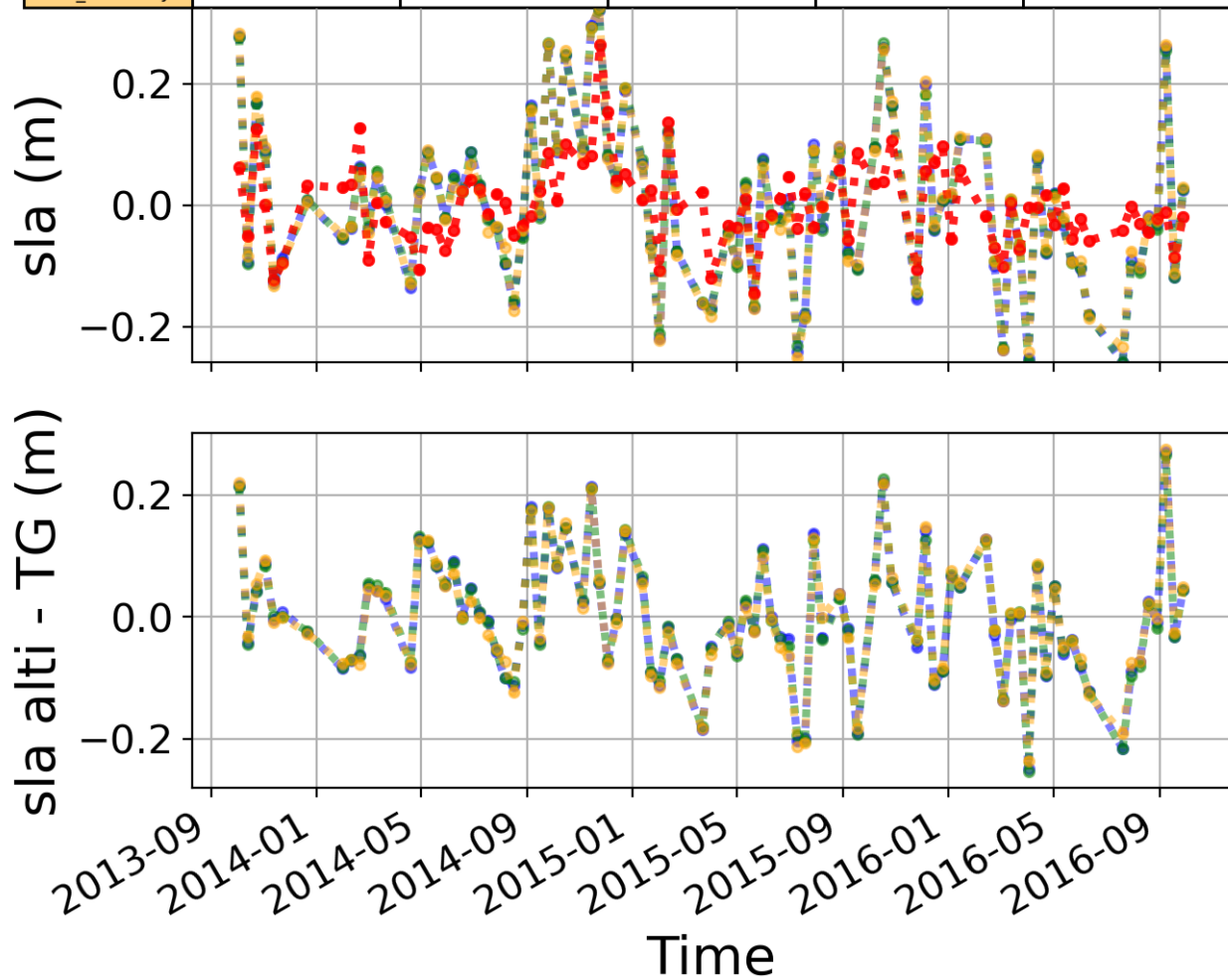


FIGURE 58 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

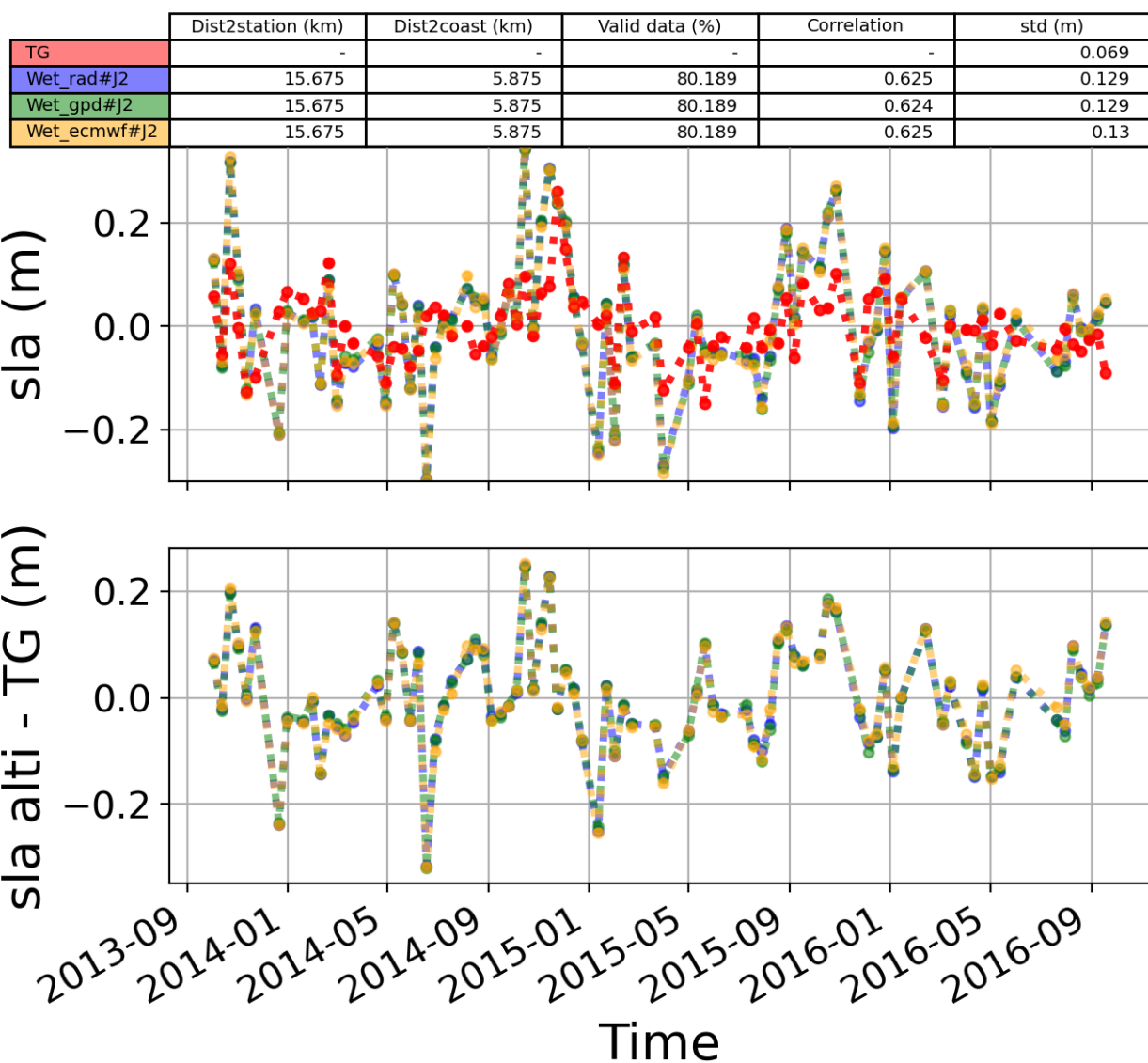


FIGURE 59 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.2 Station : Mentès

- Nearest track to Mentès station is the track number track109
- The area of interest is limited by :
 - A circle which it's center is the Mentès tide gauge station location and has a Radius of 40 Km
 - Maximum distance to the coast : 20 Km
 - Latitude limits : $[38.5, 39]^\circ$

6.2.1 correlation visualization in maps view % Mentès tide gauge

Correlation Altimetry data with respect to Mentès Tide gauge data

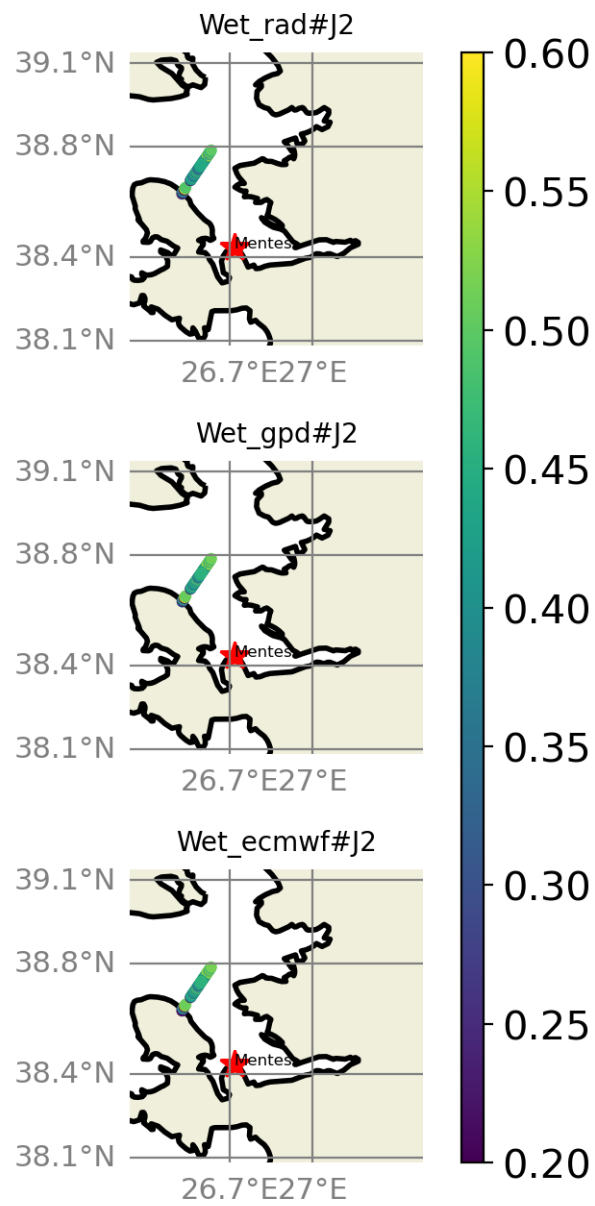


FIGURE 60 – correlation visualization in maps view % Mentès tide gauge

6.2.2 rmsd visualization in maps view % Mentès tide gauge

Rmsd (m) Altimetry data with respect to Mentès Tide gauge data

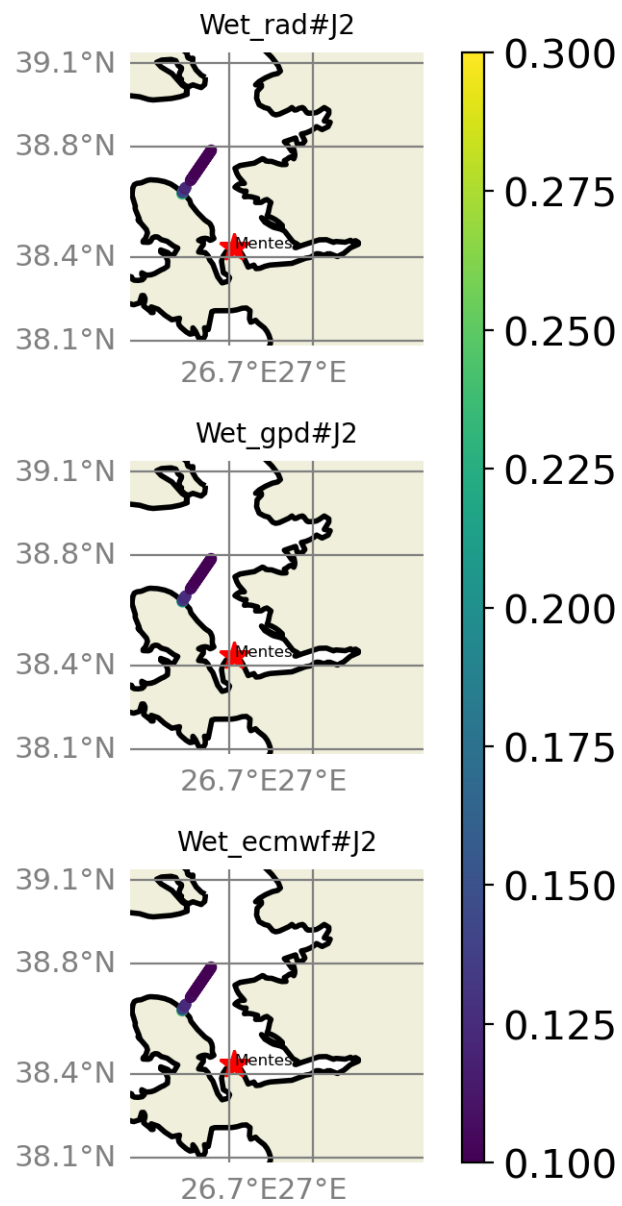


FIGURE 61 – rmsd visualization in maps view % Mentès tide gauge

6.2.3 std visualization in maps view % Mentès tide gauge

Std (m) Altimetry data with respect to Mentès Tide gauge data

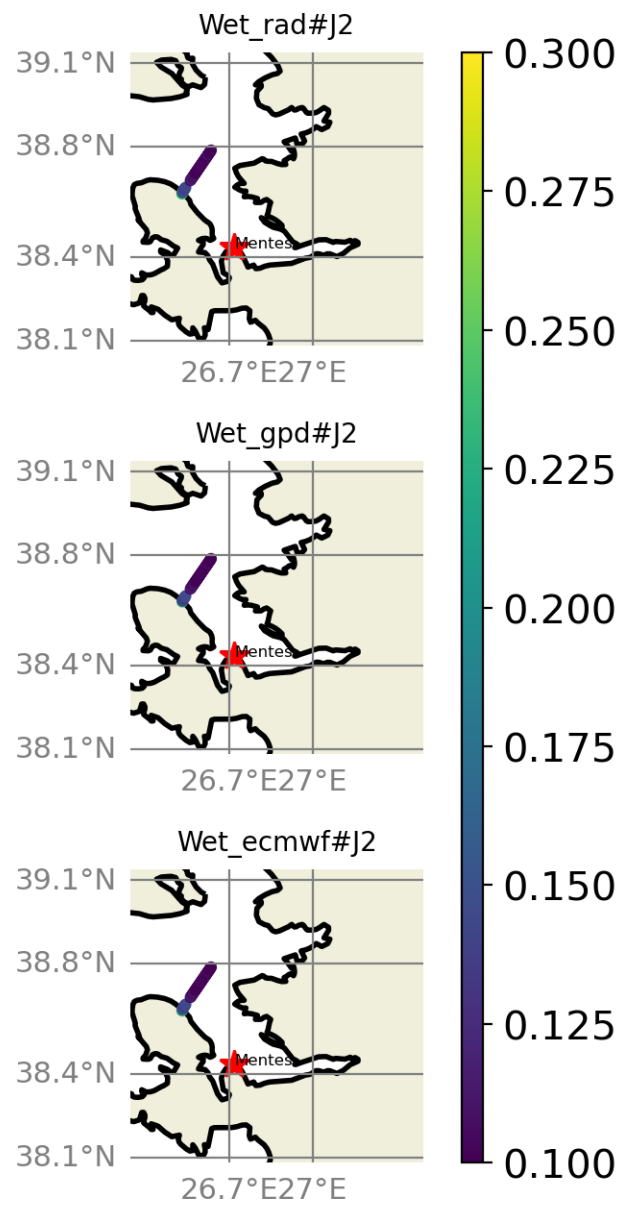


FIGURE 62 – std visualization in maps view % Mentès tide gauge

6.2.4 valid_data_percent visualization in maps view % Mentos tide gauge

Valid_Data_Percent (%) Altimetry data with respect to Mentos Tide gauge data

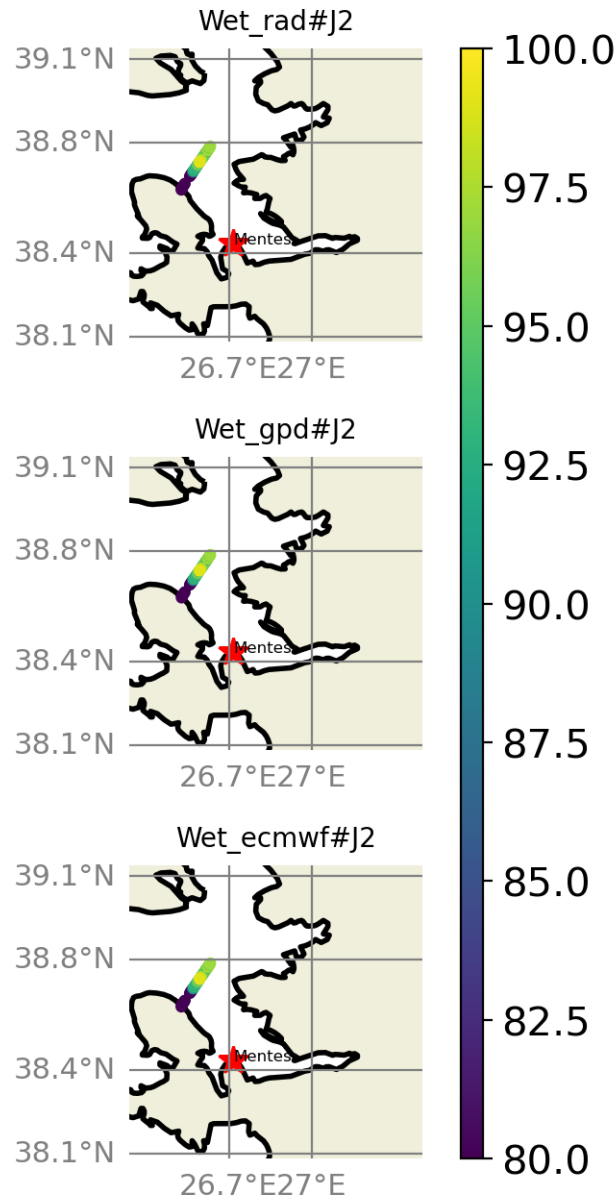


FIGURE 63 – valid_data_percent visualization in maps view % Mentos tide gauge

6.2.5 Valid data (%) in function of distance to coast/Mentos station

The formula to calculate the percentage of valid data in each time serie is;

$$pvd_i = \frac{nvd_i}{maxNB}, i = 1, np$$

Where pvd and nvd are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 101$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

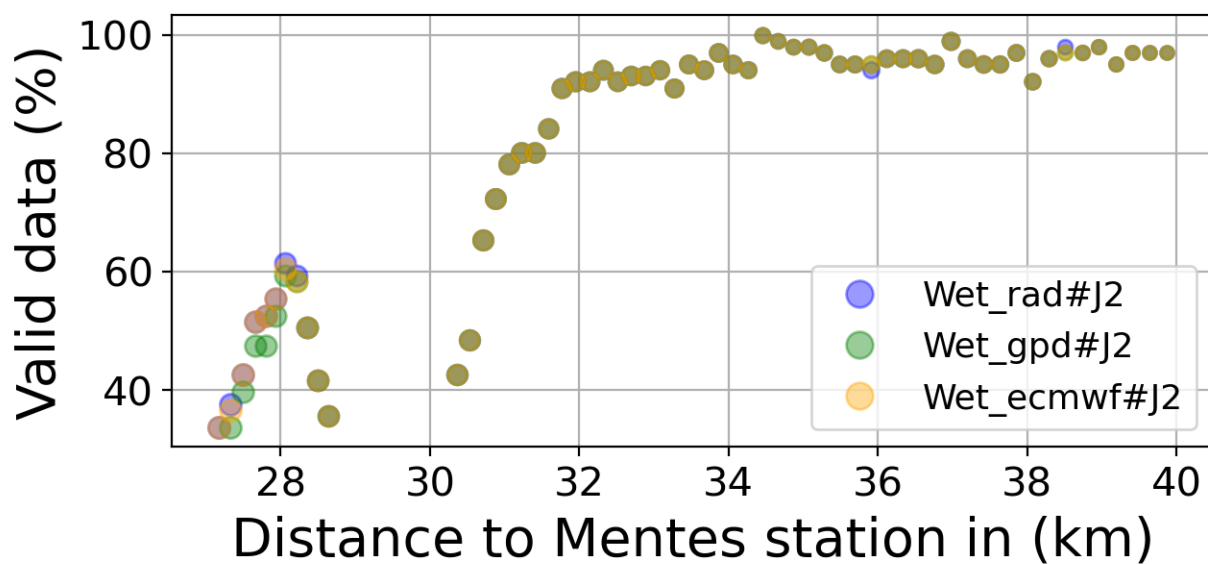
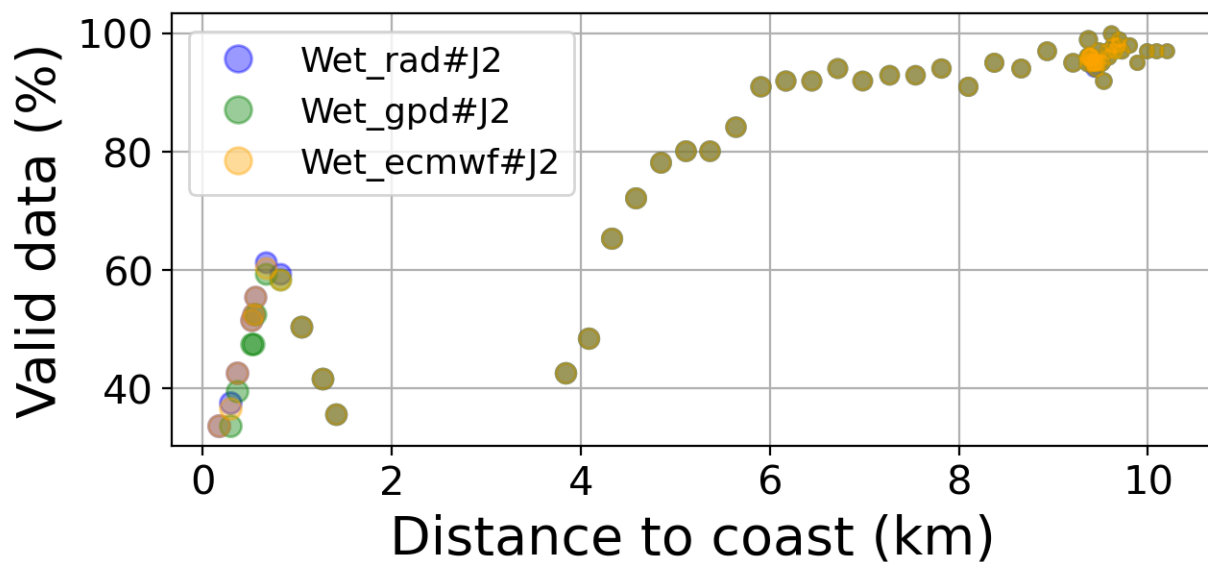


FIGURE 64 – Valid data (%) in function of distance to coast/Mentos station

6.2.6 Std in function of distance to coast/Mentes station

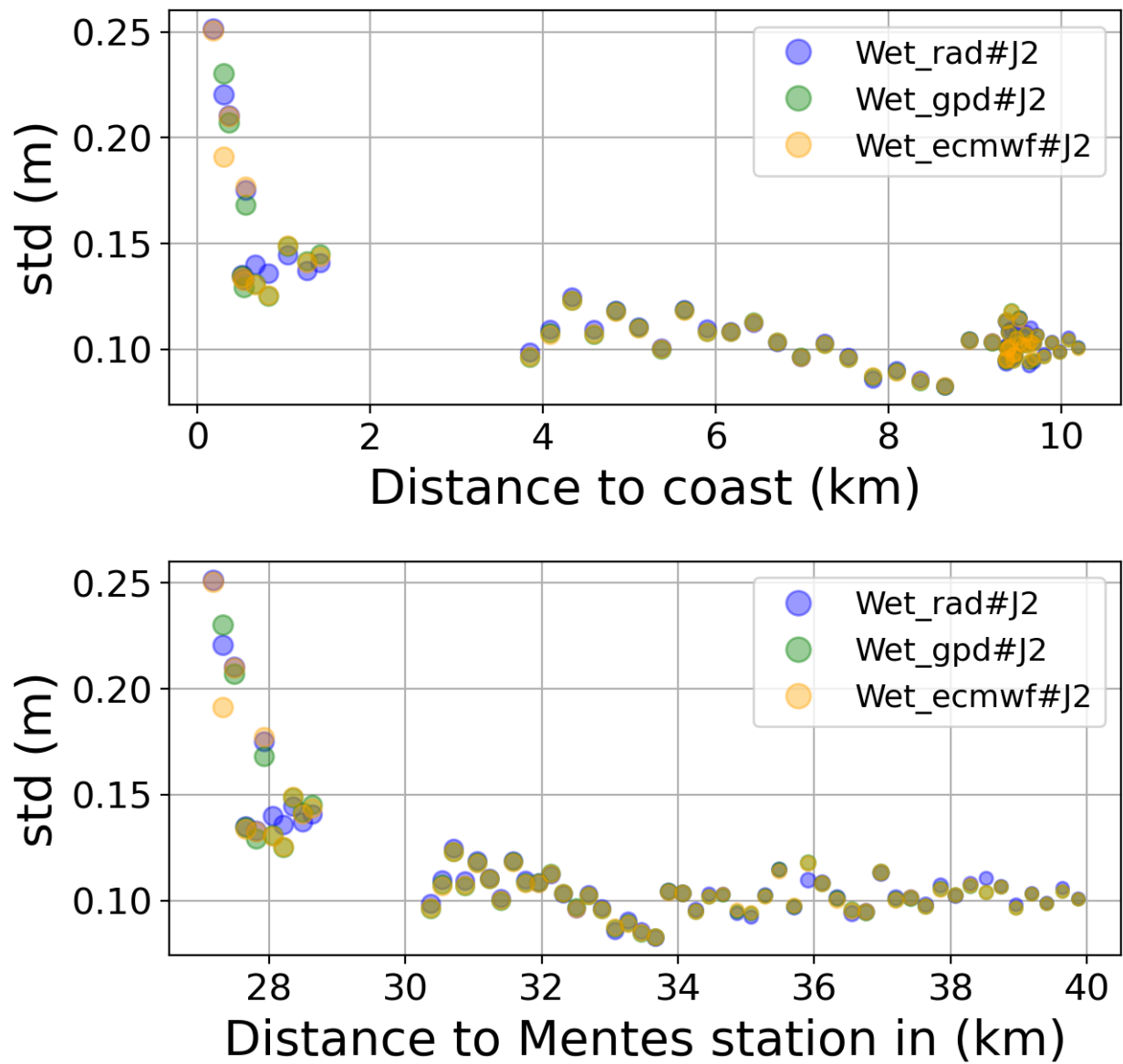


FIGURE 65 – Std in function of the distance to the coast/Mentes station

6.2.7 Correlation in function of distance to coast/Mentes station

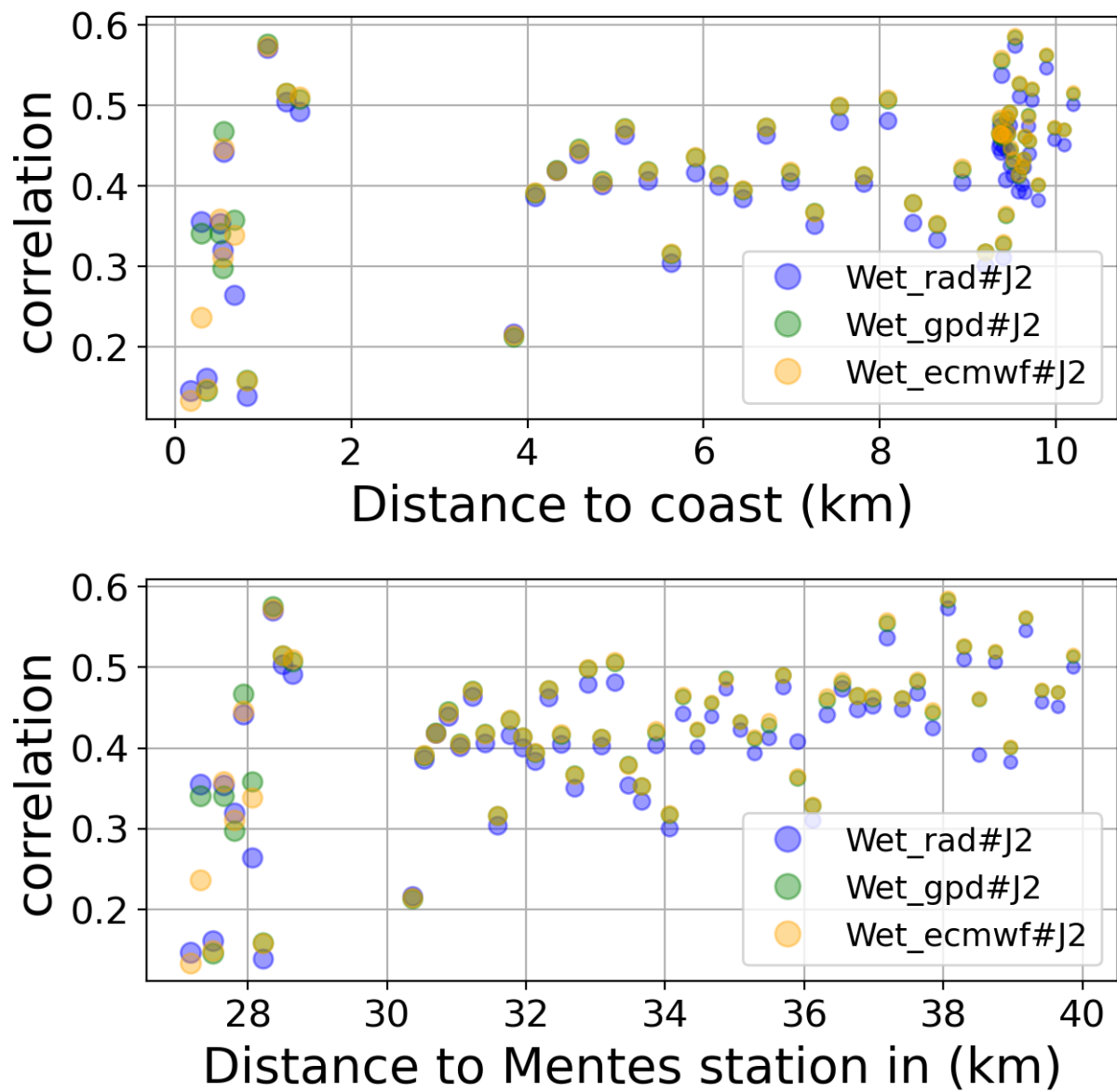


FIGURE 66 – Correlation in function of the distance to the coast/Mentes station

6.2.8 Taylor Diagram

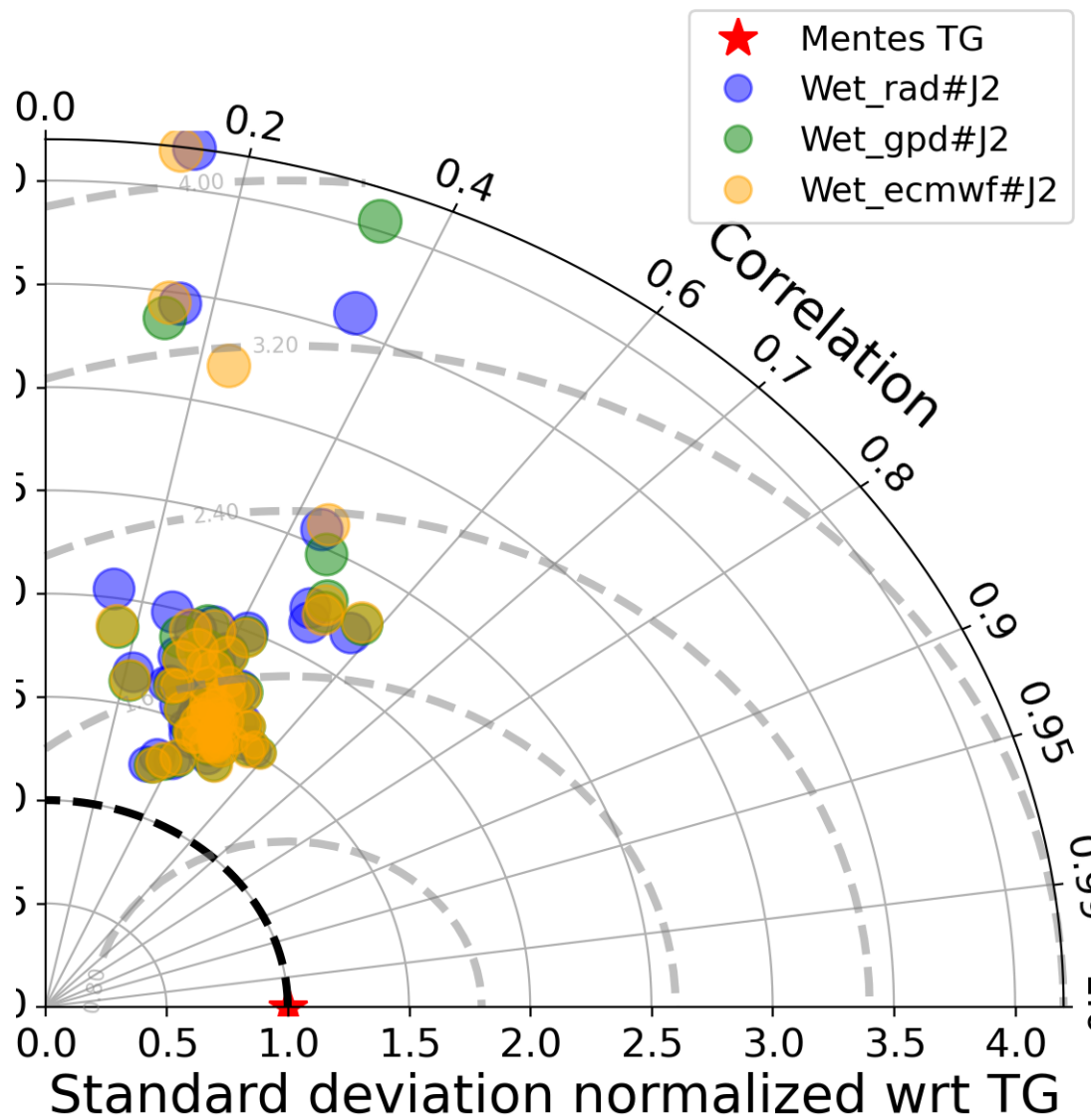


FIGURE 67 – Taylor diagram

6.2.9 Mean statistics table of products comparison with Mentos tide gauge data

The table below contains the mean statistics of the common points between the different products in the selected area.

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
Wet_rad#J2	83.732	0.414	0.112	0.105
Wet_gpd#J2	83.356	0.427	0.112	0.103
Wet_ecmwf#J2	83.68	0.426	0.111	0.103

FIGURE 68 – Mean statistics table of the common points in the altimetry products

6.2.10 The most correlated sla altimetry Time series with the tide gauge sla time serie

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 101 point.

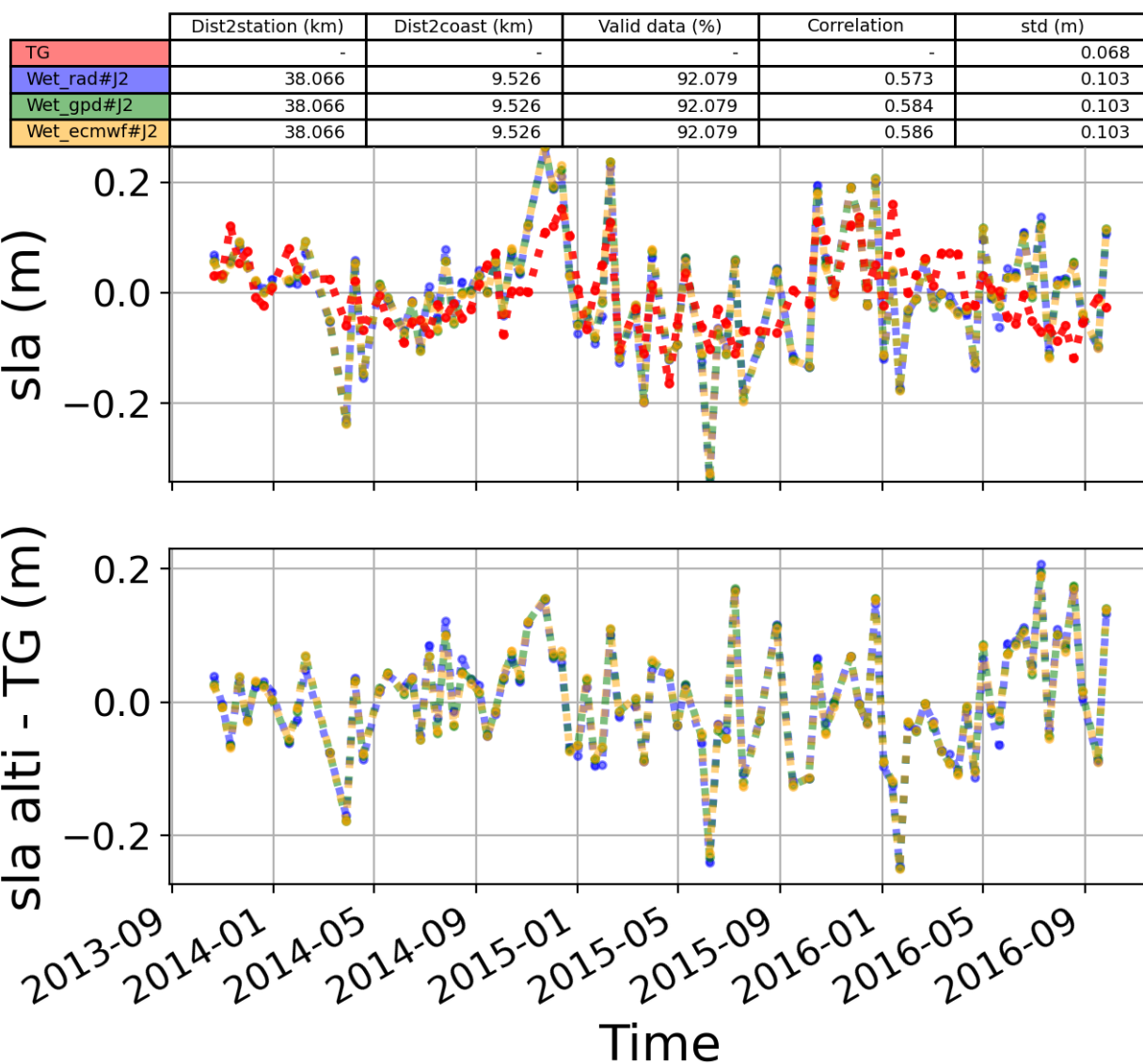


FIGURE 69 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.3 Station : Ibiza

- Nearest track to Ibiza station is the track number track248
- The area of interest is limited by :
 - A circle which it's center is the Ibiza tide gauge station location and has a Raduis of 40 Km
 - Maximum distance to the coast : 20 Km
 - Latitude limits : $[38.6, 39.05]^\circ$

6.3.1 correlation visualization in maps view % Ibiza tide gauge

Correlation Altimetry data with respect to Ibiza Tide gauge data

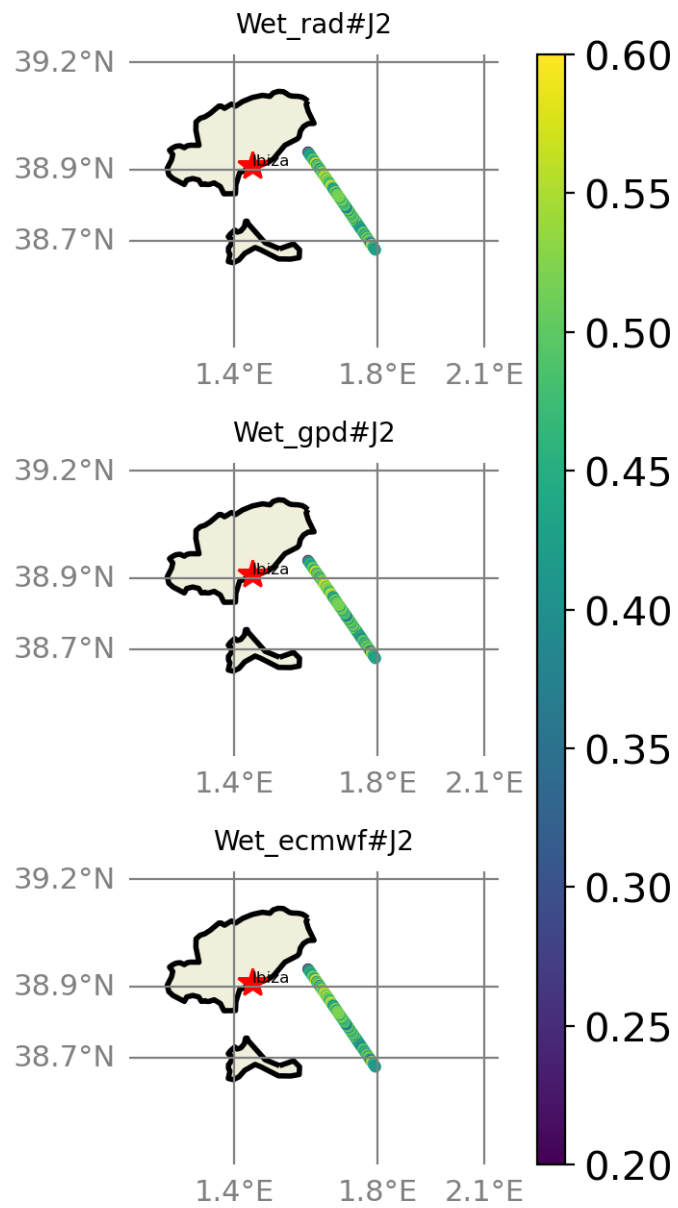


FIGURE 70 – correlation visualization in maps view % Ibiza tide gauge

6.3.2 rmsd visualization in maps view % Ibiza tide gauge

Rmsd (m) Altimetry data with respect to Ibiza Tide gauge data

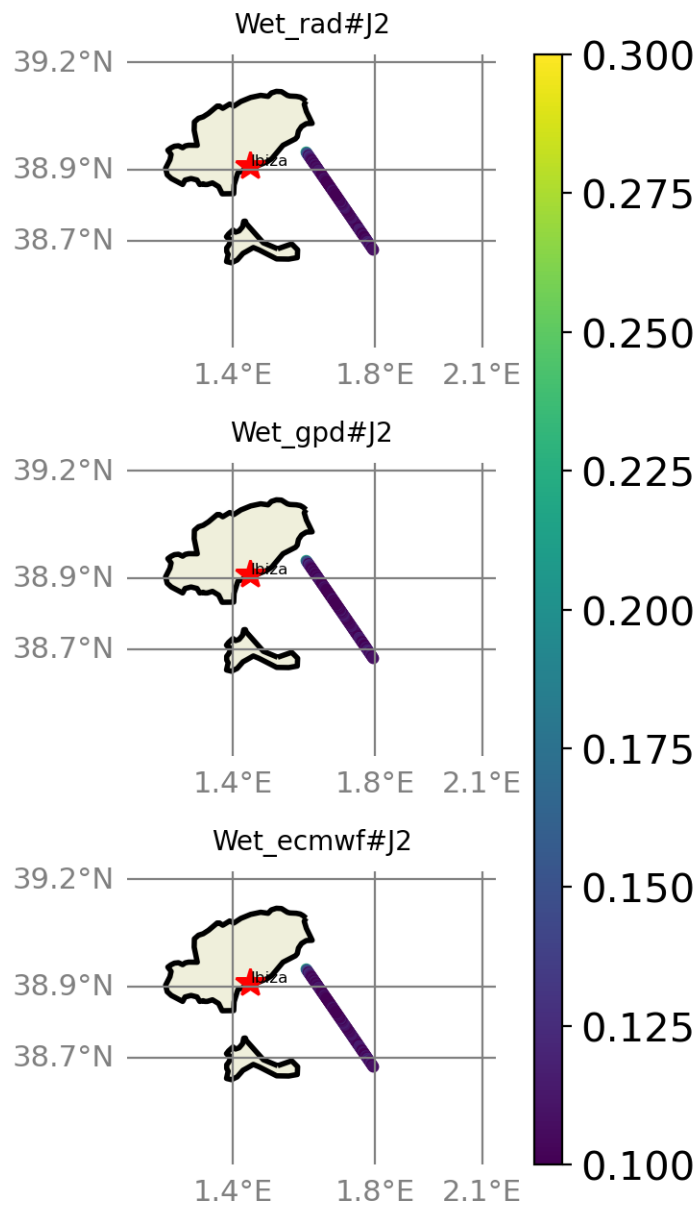


FIGURE 71 – rmsd visualization in maps view % Ibiza tide gauge

6.3.3 std visualization in maps view % Ibiza tide gauge

Std (m) Altimetry data with respect to Ibiza Tide gauge data

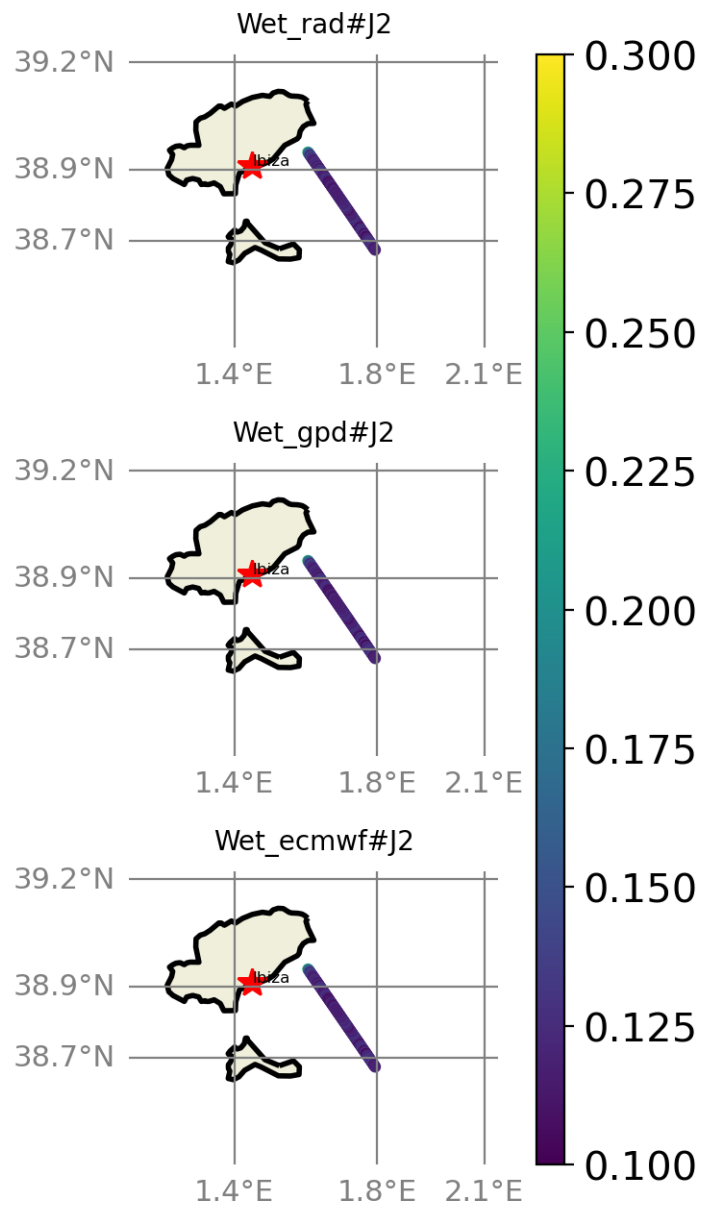


FIGURE 72 – std visualization in maps view % Ibiza tide gauge

6.3.4 valid_data_percent visualization in maps view % Ibiza tide gauge

Valid_Data_Percent (%) Altimetry data with respect to Ibiza Tide gauge data

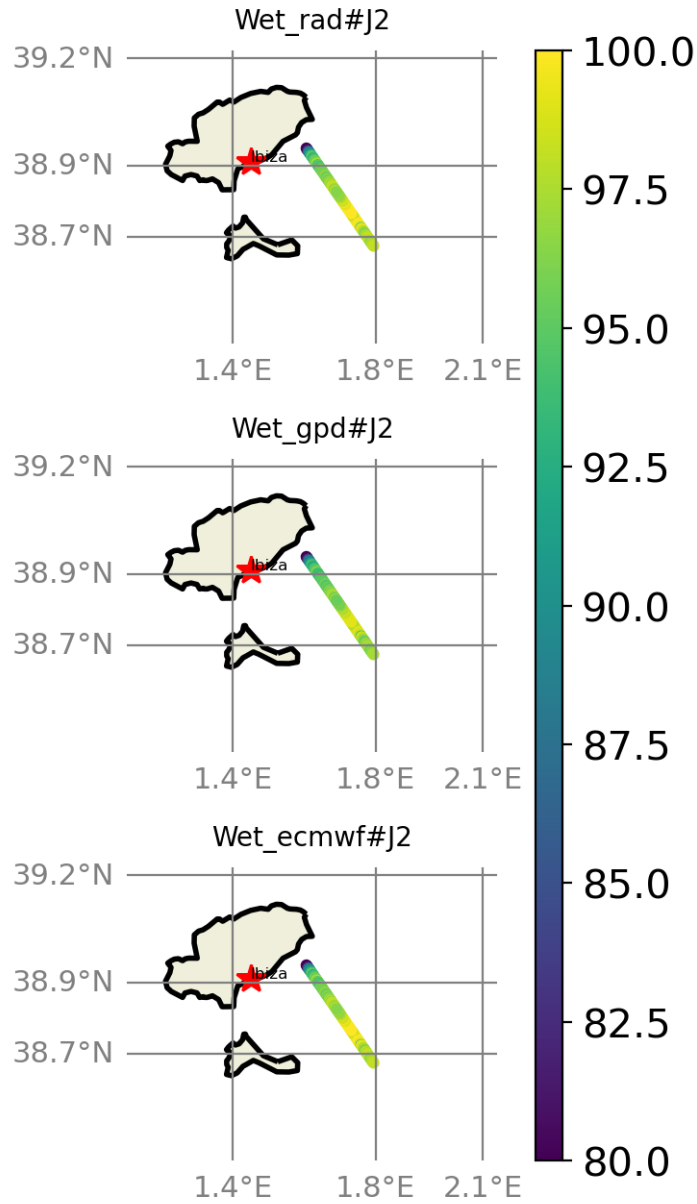


FIGURE 73 – valid_data_percent visualization in maps view % Ibiza tide gauge

6.3.5 Valid data (%) in function of distance to coast/Ibiza station

The formula to calculate the percentage of valid data in each time serie is;

$$pvd_i = \frac{nvd_i}{maxNB}, i = 1, np$$

Where pvd and nvd are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 110$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

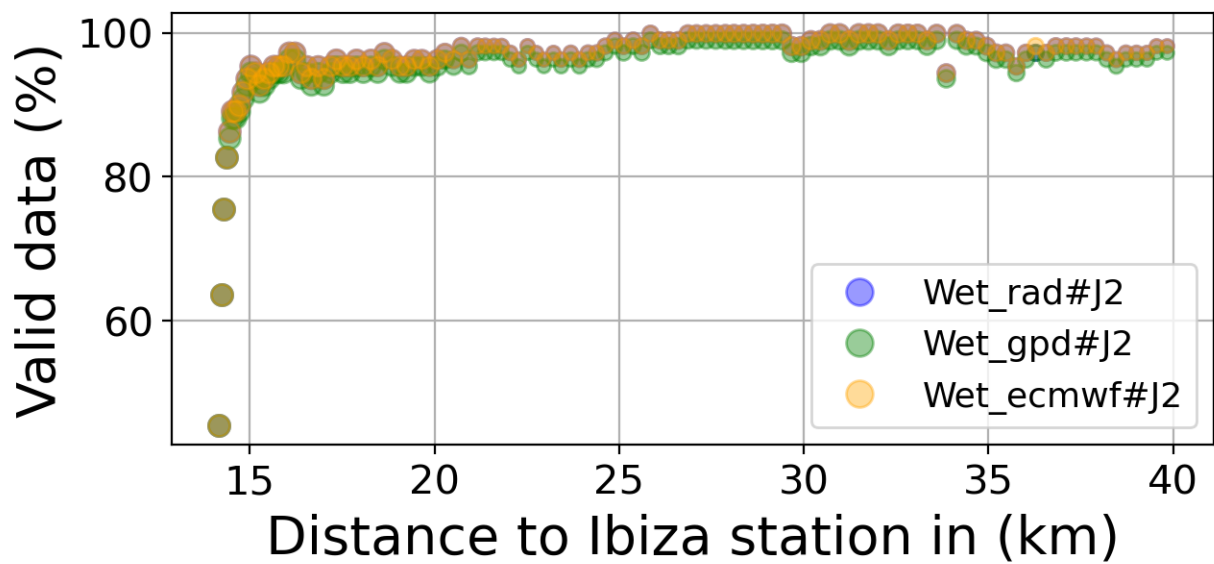
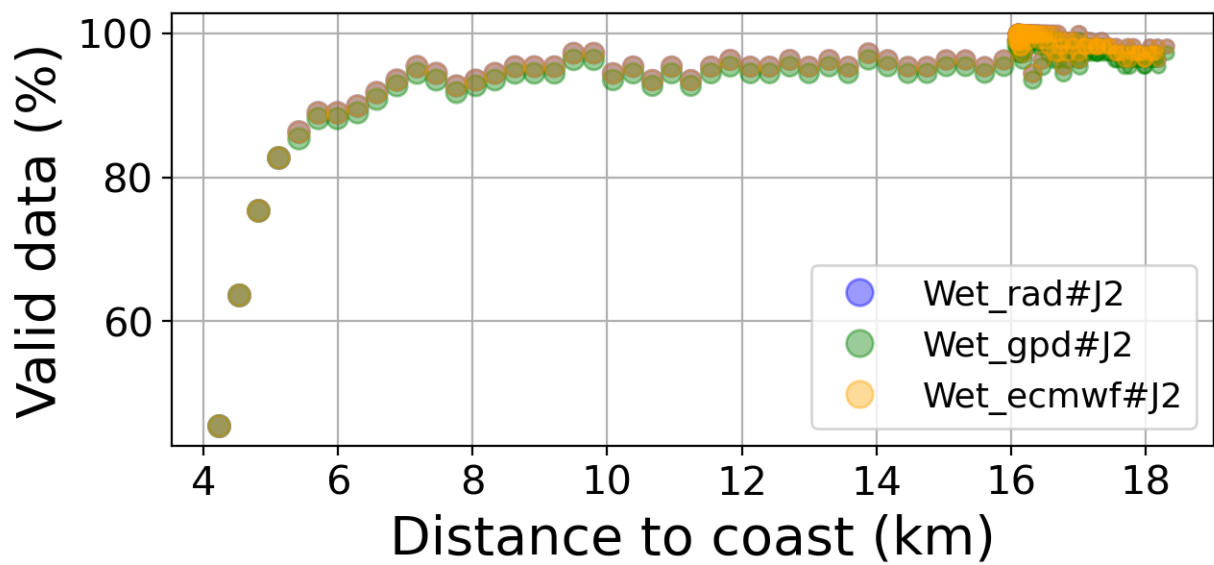


FIGURE 74 – Valid data (%) in function of distance to coast/Ibiza station

6.3.6 Std in function of distance to coast/Ibiza station

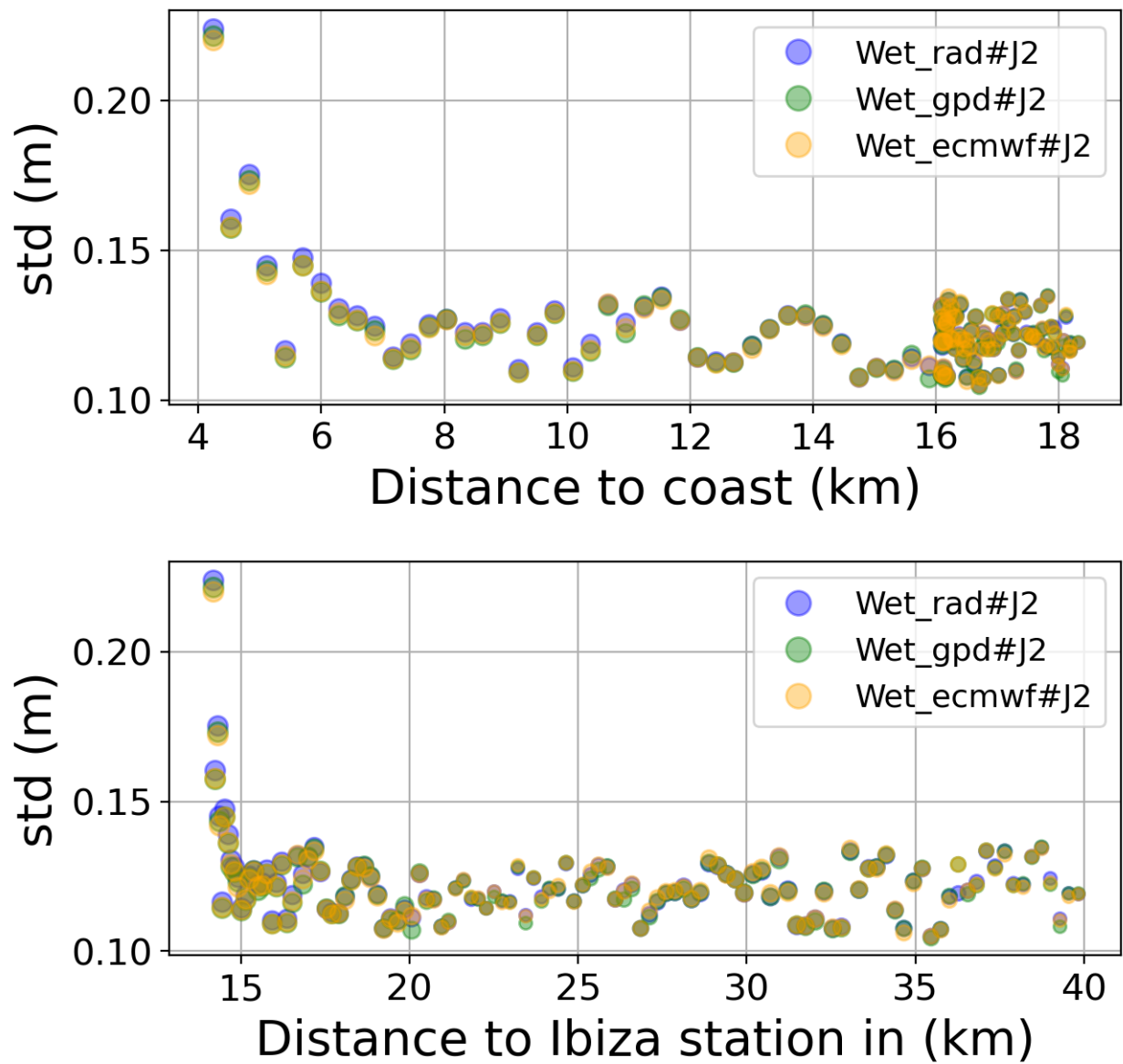


FIGURE 75 – Std in function of the distance to the coast/Ibiza station

6.3.7 Correlation in function of distance to coast/Ibiza station

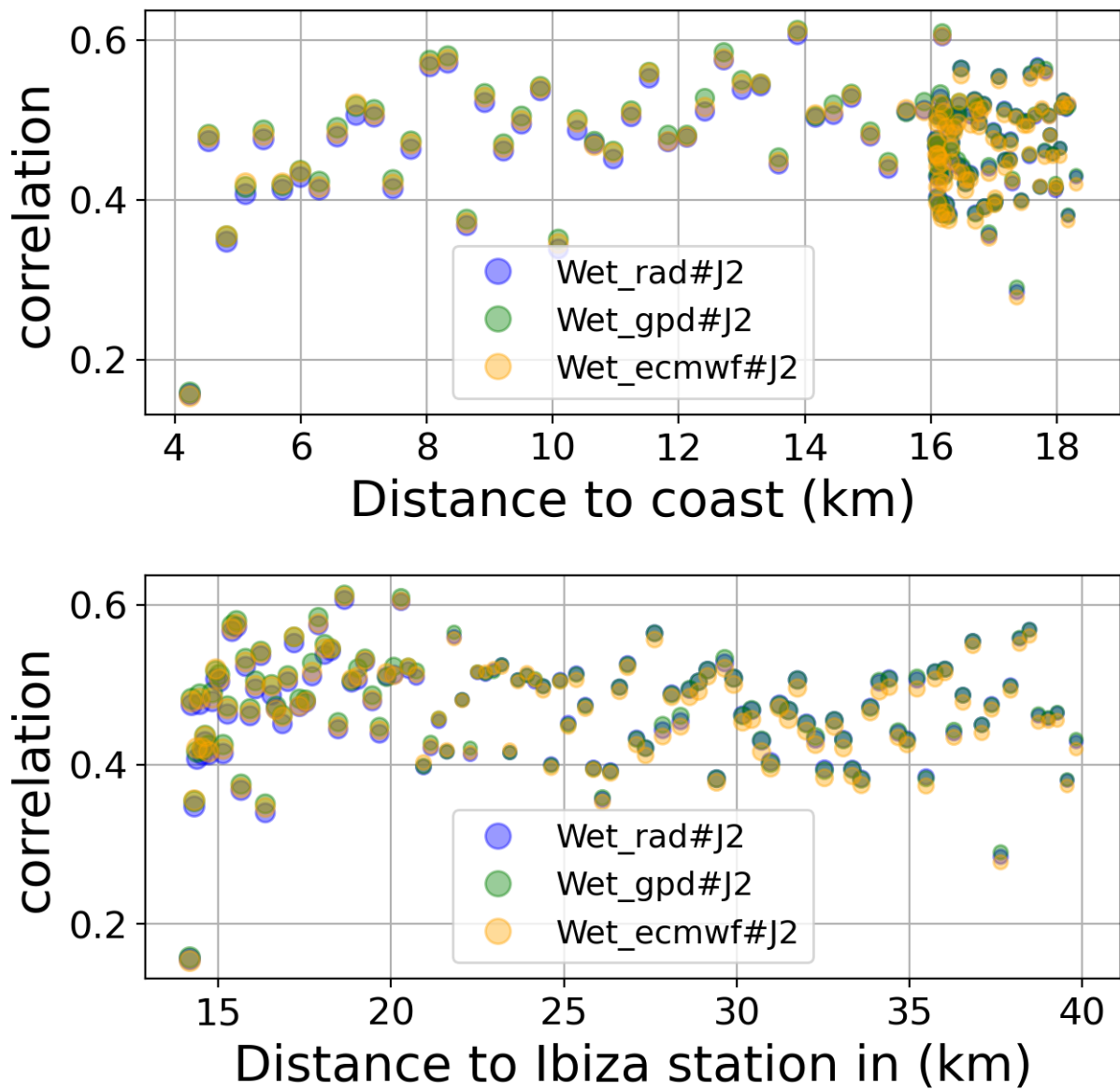


FIGURE 76 – Correlation in function of the distance to the coast/Ibiza station

6.3.8 Taylor Diagram

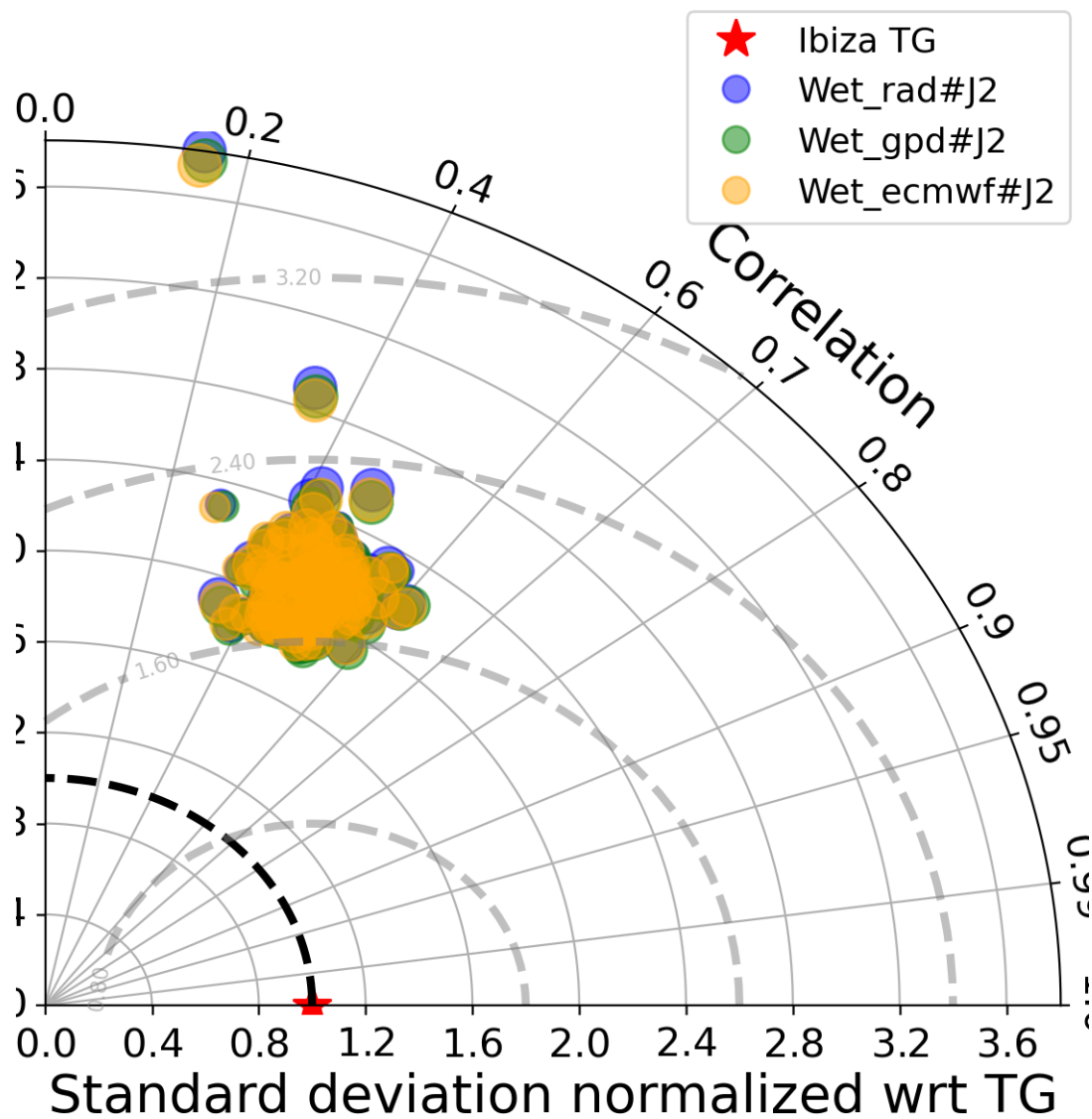


FIGURE 77 – Taylor diagram

6.3.9 Mean statistics table of products comparison with Ibiza tide gauge data

The table below contains the mean statistics of the common points between the different products in the selected area.

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
Wet_rad#J2	96.157	0.47	0.123	0.109
Wet_gpd#J2	95.286	0.474	0.122	0.108
Wet_ecmwf#J2	96.165	0.468	0.123	0.108

FIGURE 78 – Mean statistics table of the common points in the altimetry products

6.3.10 The most correlated sla altimetry Time series with the tide gauge sla time serie

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 110 point.

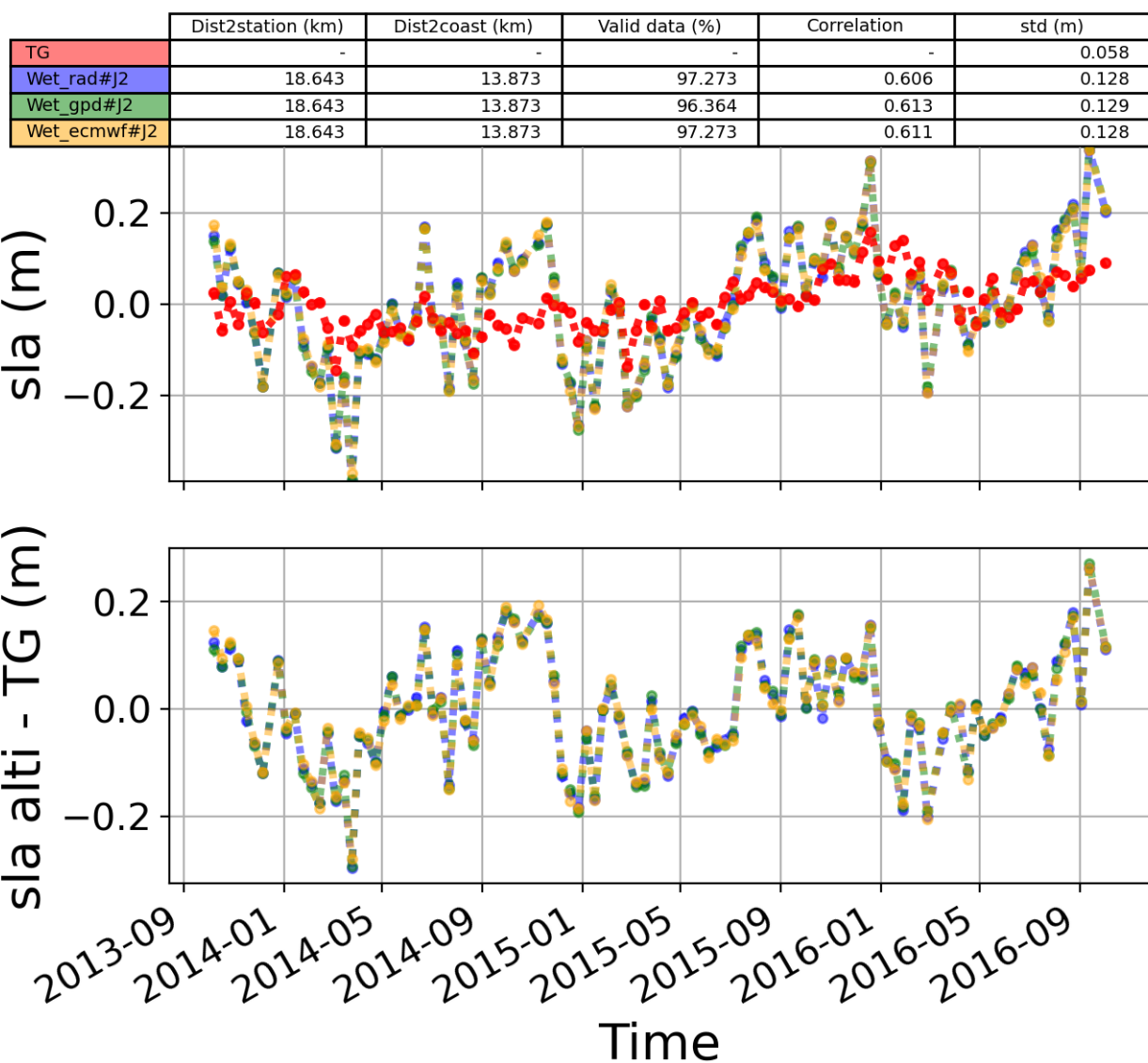


FIGURE 79 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.4 Station : LA_FIGUEIRETTE

- Nearest track to LA_FIGUEIRETTE station is the track number track222
- The area of interest is limited by :
 - A circle which it's center is the LA_FIGUEIRETTE tide gauge station location and has a Raduis of 40 Km
 - Maximum distance to the coast : 20 Km

6.4.1 correlation visualization in maps view % LA_FIGUEIRETTE tide gauge

Correlation Altimetry data with respect to LA_FIGUEIRETTE Tide gauge data

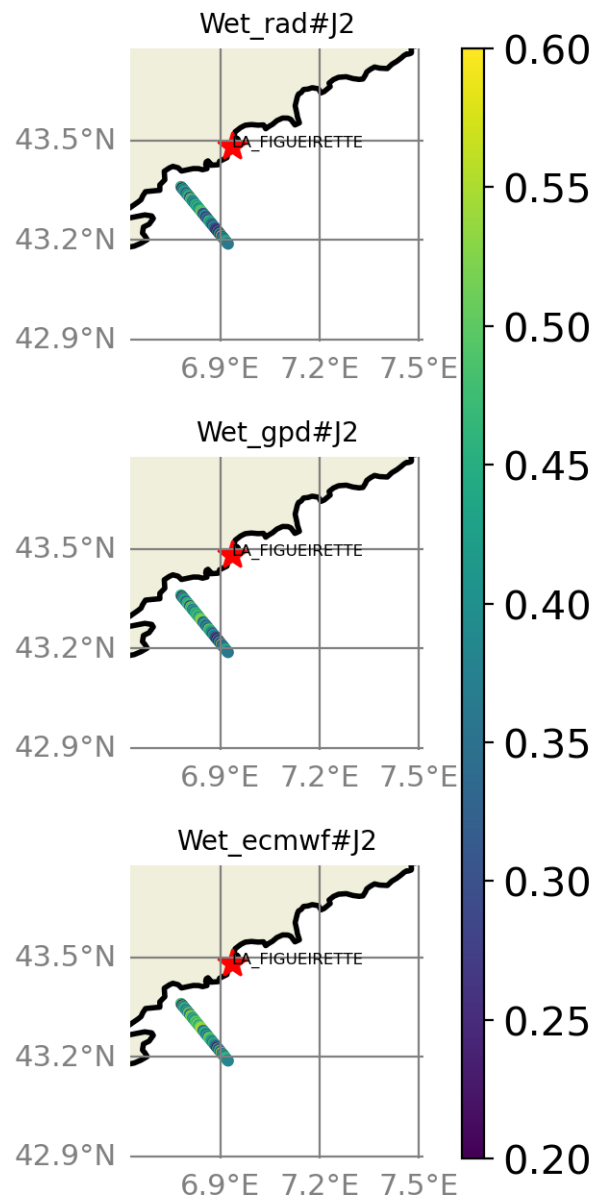


FIGURE 80 – correlation visualization in maps view % LA_FIGUEIRETTE tide gauge

6.4.2 rmsd visualization in maps view % LA_FIGUEIRETTE tide gauge

Rmsd (m) Altimetry data with respect to LA_FIGUEIRETTE Tide gauge data

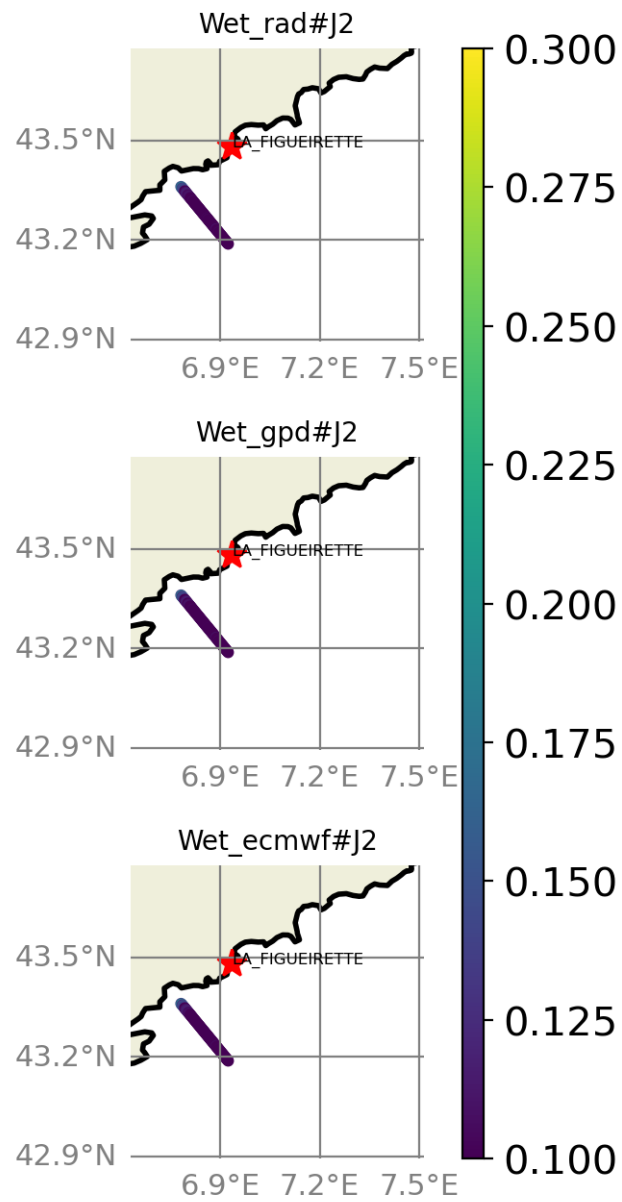


FIGURE 81 – rmsd visualization in maps view % LA_FIGUEIRETTE tide gauge

6.4.3 std visualization in maps view % LA_FIGUEIRETTE tide gauge

Std (m) Altimetry data with respect to LA_FIGUEIRETTE Tide gauge data

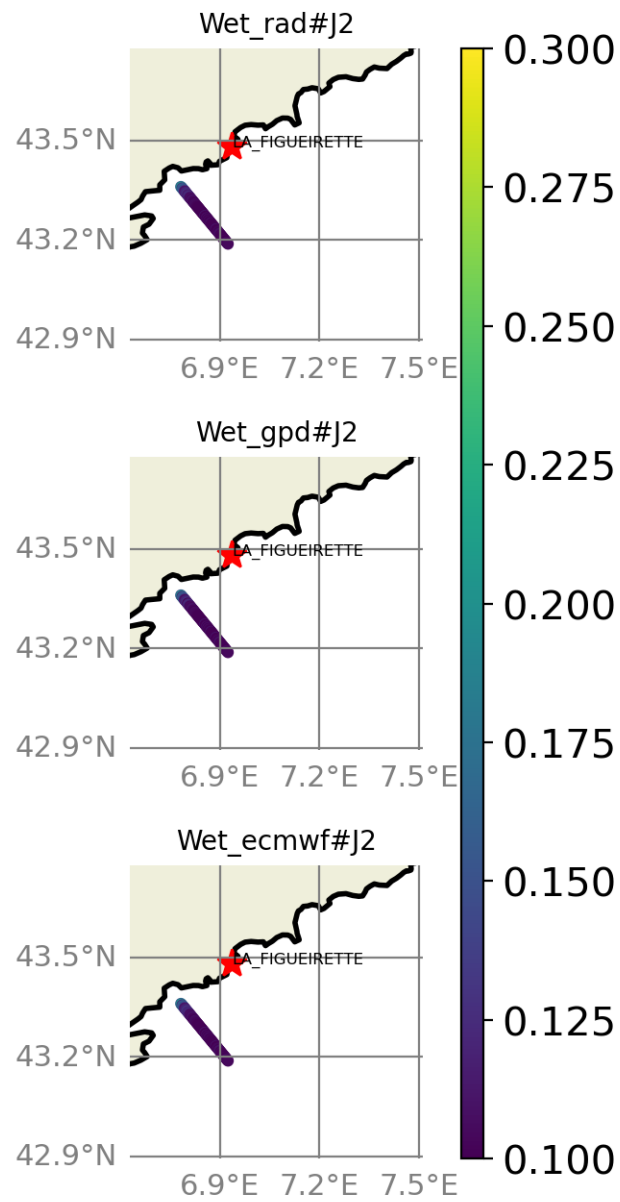


FIGURE 82 – std visualization in maps view % LA_FIGUEIRETTE tide gauge

6.4.4 valid_data_percent visualization in maps view % LA_FIGUEIRETTE tide gauge

Valid_Data_Percent (%) Altimetry data with respect to LA_FIGUEIRETTE Tide gauge data

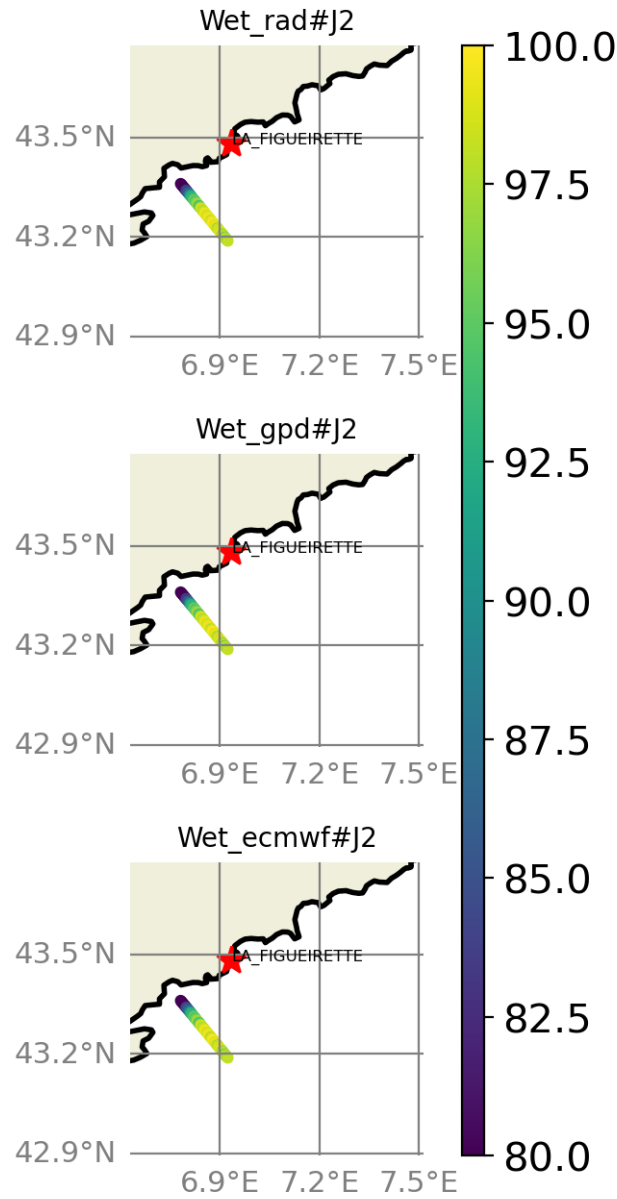


FIGURE 83 – valid_data_percent visualization in maps view % LA_FIGUEIRETTE tide gauge

6.4.5 Valid data (%) in function of distance to coast/LA_FIGUEIRETTE station

The formula to calculate the percentage of valid data in each time serie is ;

$$pvd_i = \frac{nvd_i}{maxNB}, i = 1, np$$

Where pvd and nvd are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 108$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

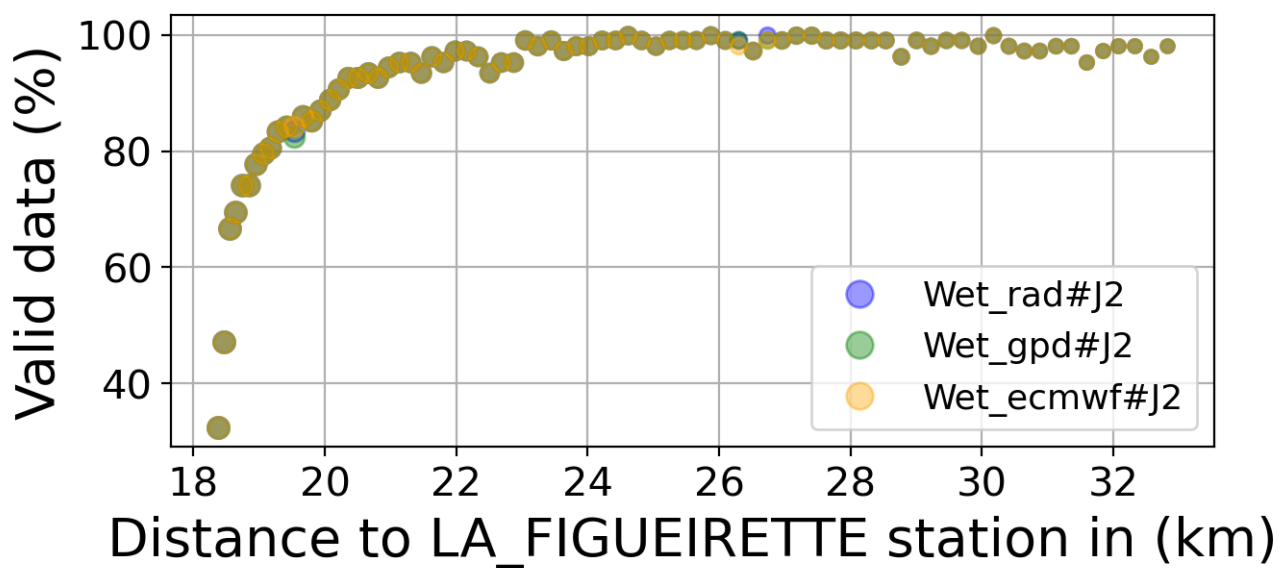
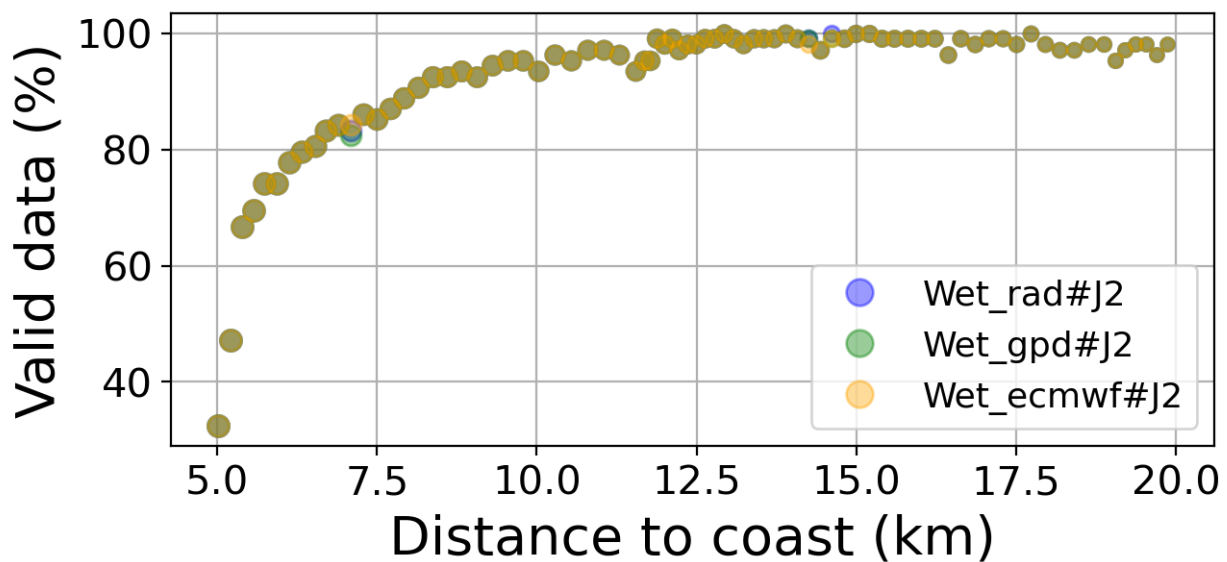


FIGURE 84 – Valid data (%) in function of distance to coast/LA_FIGUEIRETTE station

6.4.6 Std in function of distance to coast/LA_FIGUEIRETTE station

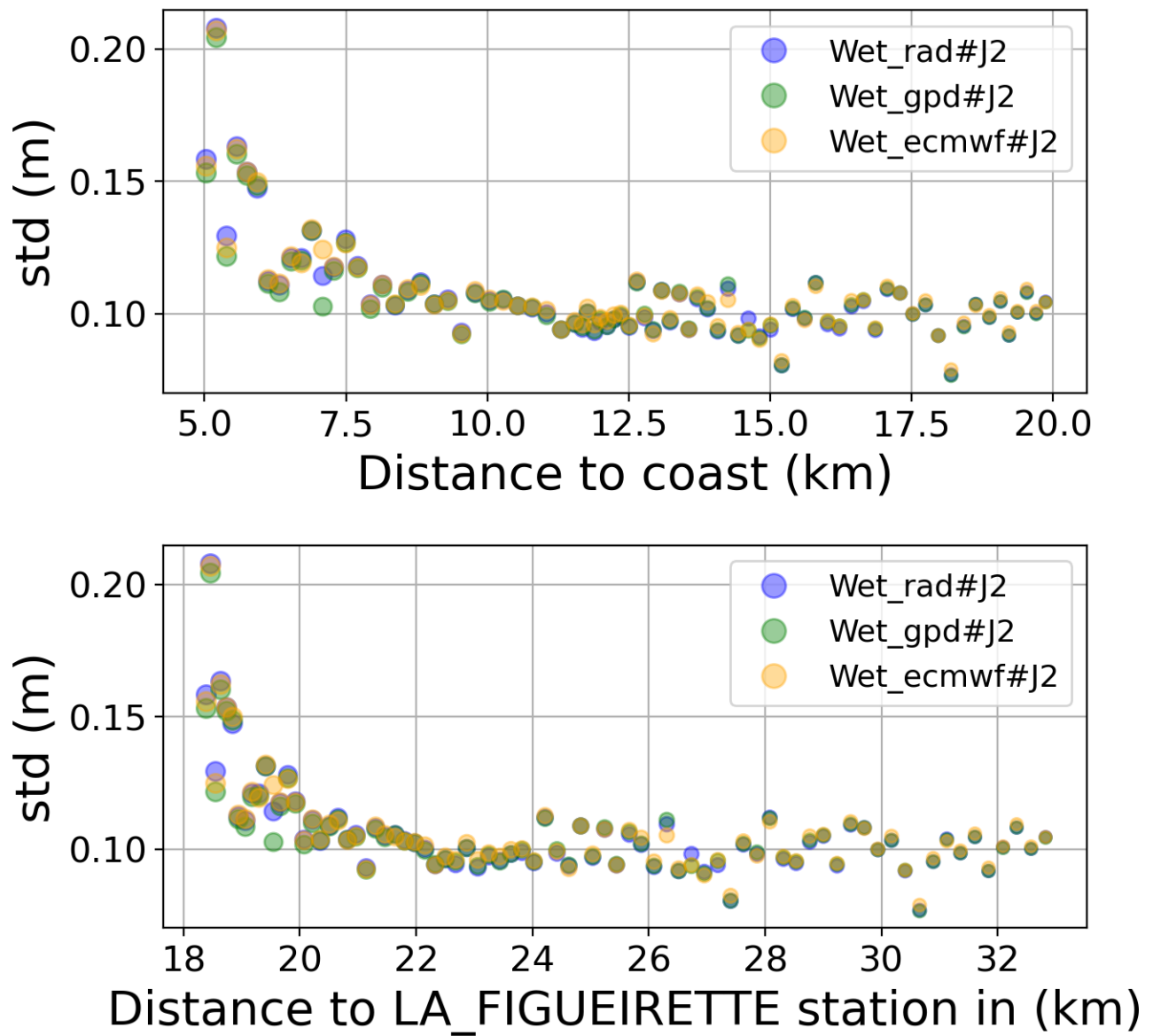


FIGURE 85 – Std in function of the distance to the coast/LA_FIGUEIRETTE station

6.4.7 Correlation in function of distance to coast/LA_FIGUEIRETTE station

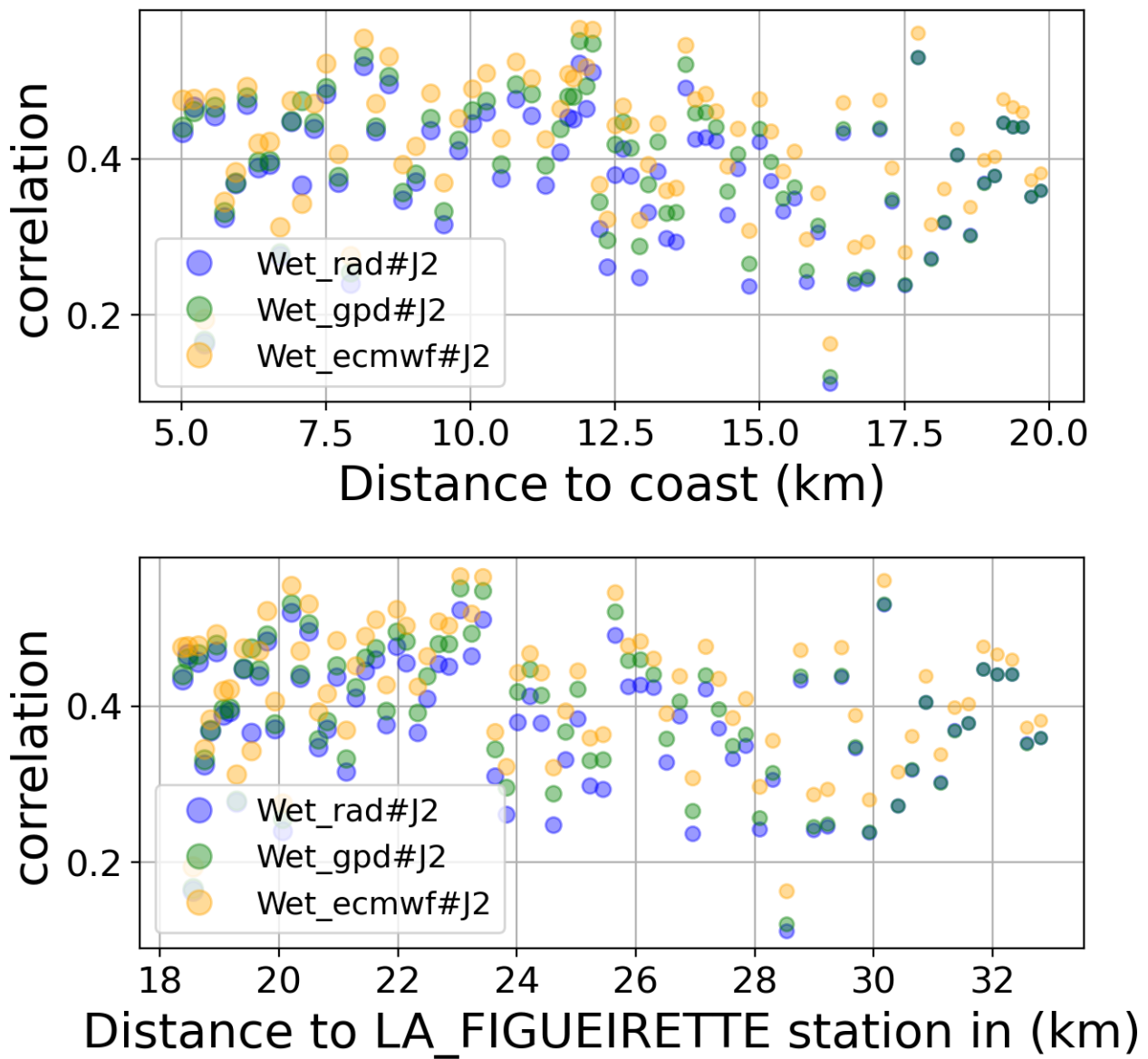


FIGURE 86 – Correlation in function of the distance to the coast/LA_FIGUEIRETTE station

6.4.8 Taylor Diagram

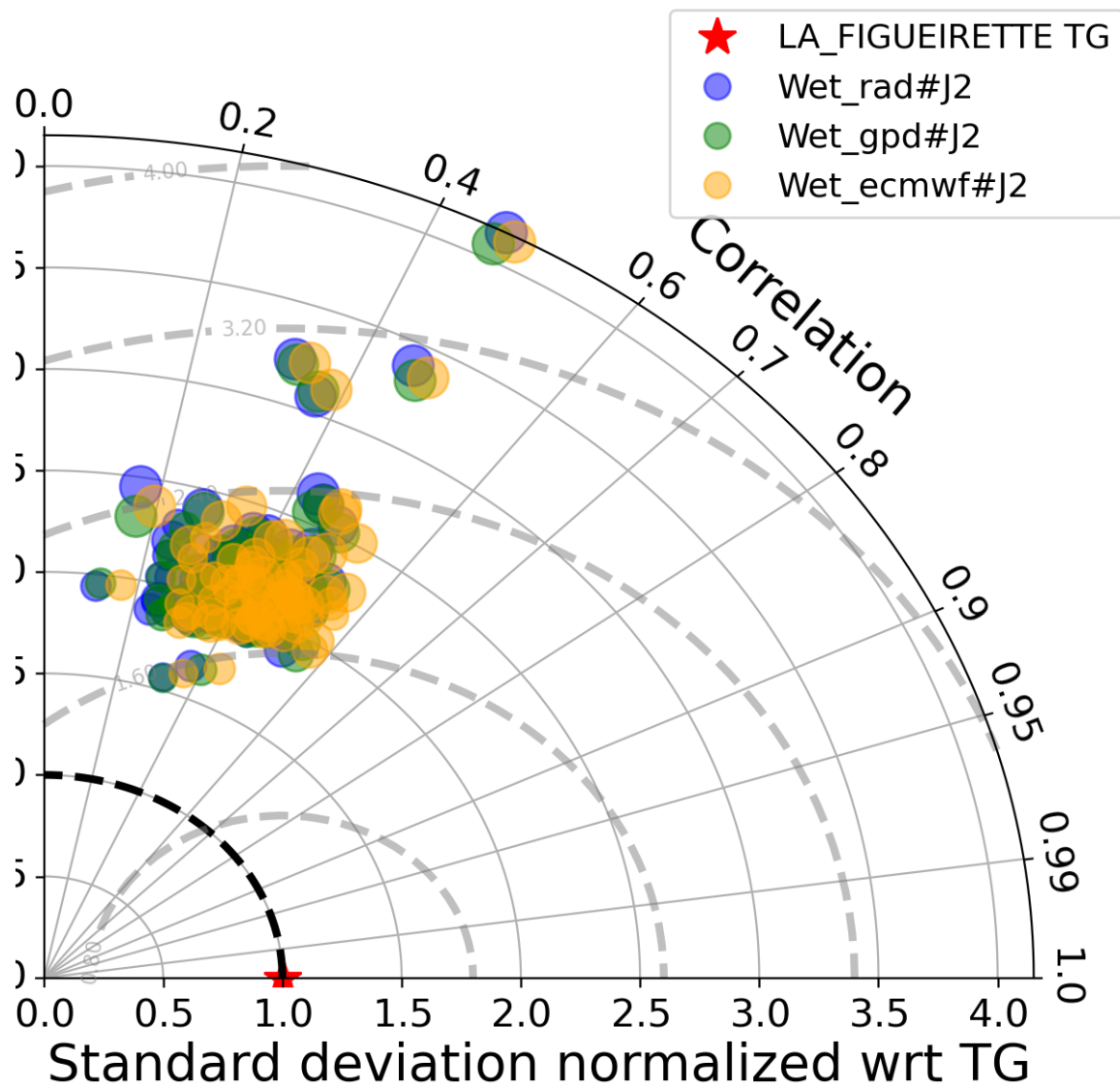


FIGURE 87 – Taylor diagram

6.4.9 Mean statistics table of products comparison with LA_FIGUEIRETTE tide gauge data

The table below contains the mean statistics of the common points between the different products in the selected area.

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
Wet_rad#J2	92.842	0.379	0.107	0.1
Wet_gpd#J2	92.818	0.395	0.106	0.098
Wet_ecmwf#J2	92.83	0.422	0.107	0.098

FIGURE 88 – Mean statistics table of the common points in the altimetry products

6.4.10 The most correlated sla altimetry Time series with the tide gauge sla time serie

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 108 point.

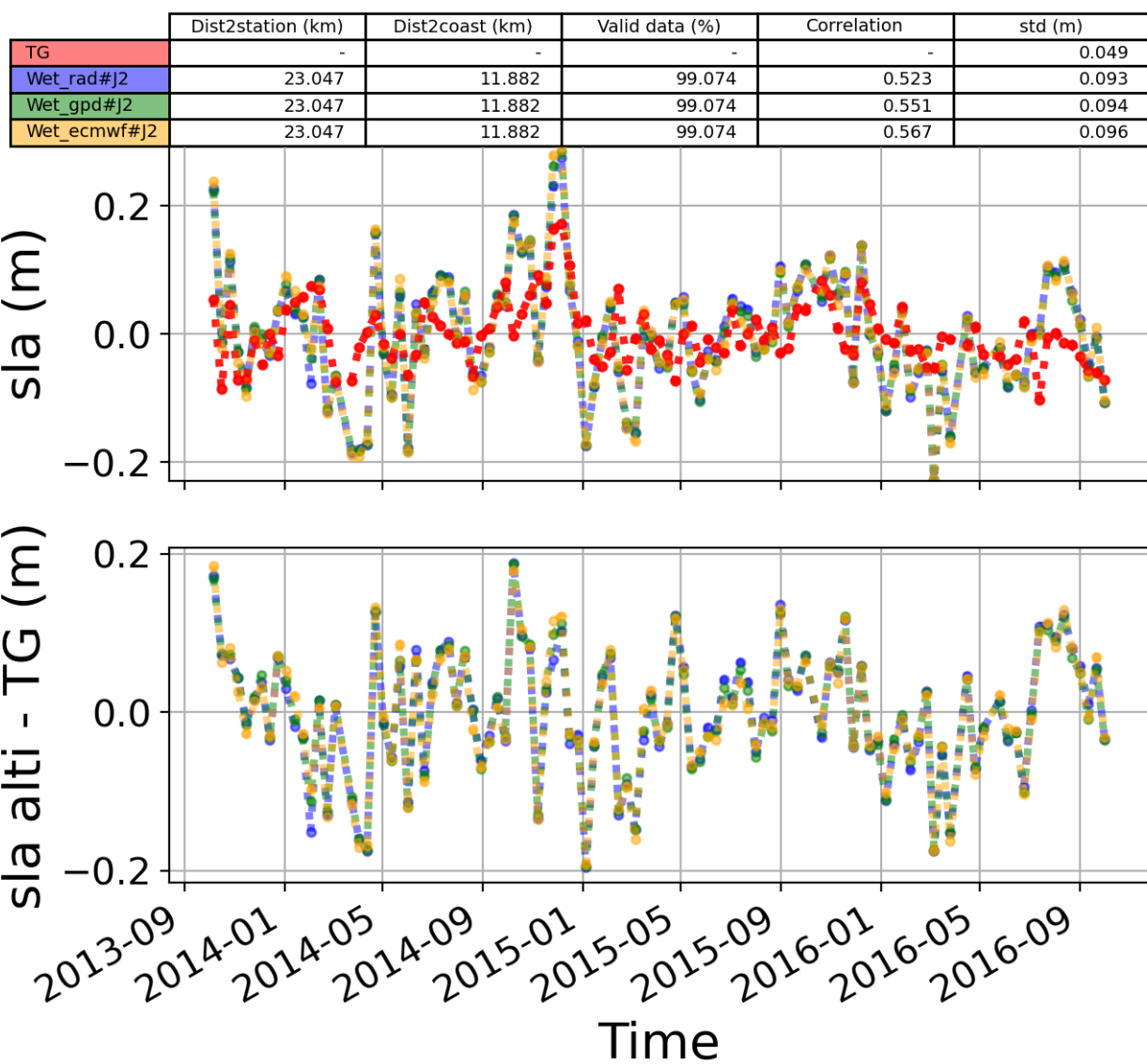


FIGURE 89 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

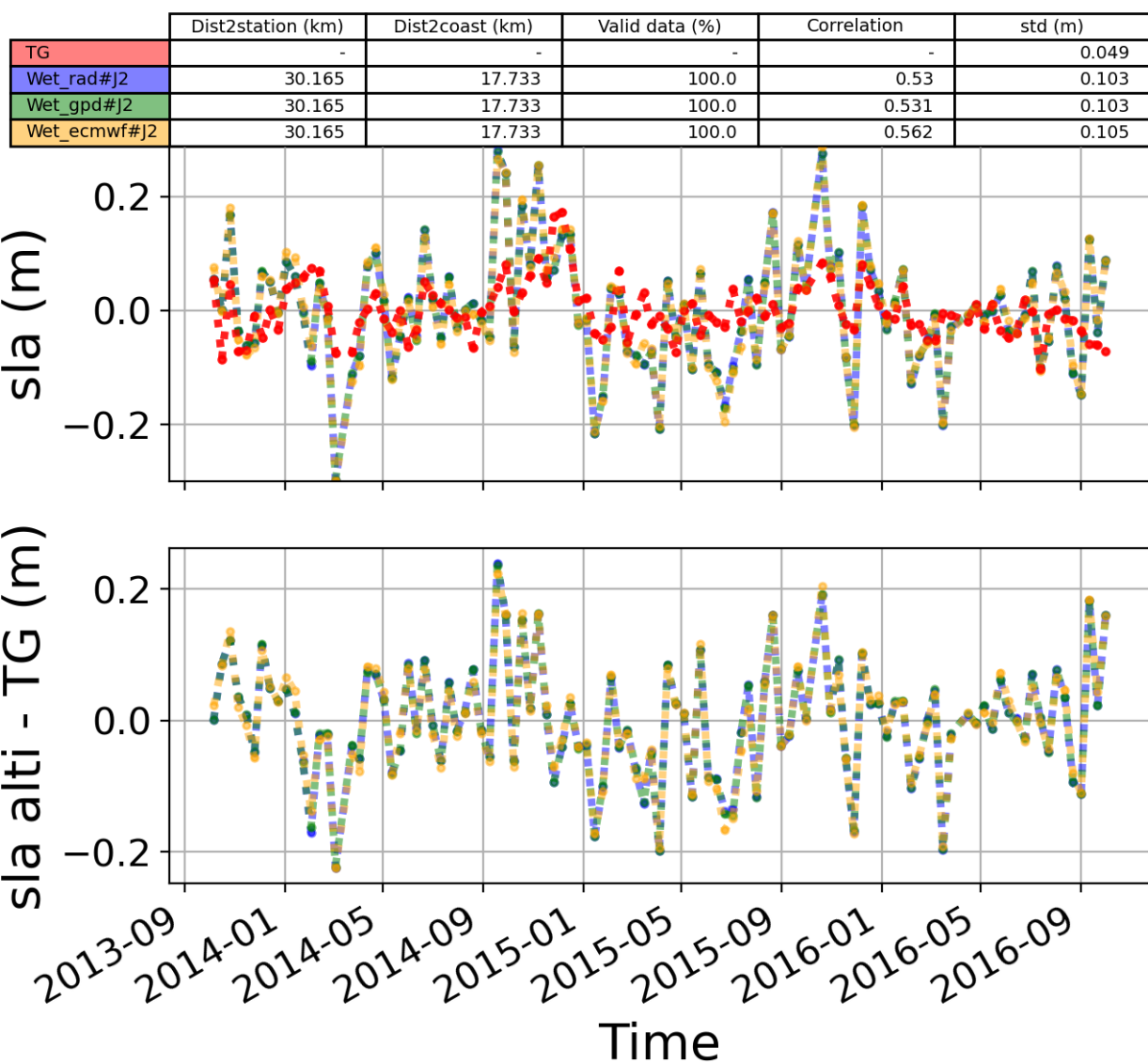


FIGURE 90 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.5 Station : Ancona

- Nearest track to Ancona station is the track number track161
- The area of interest is limited by :
 - A circle which it's center is the Ancona tide gauge station location and has a Raduis of 40 Km
 - Maximum distance to the coast : 20 Km

6.5.1 correlation visualization in maps view % Ancona tide gauge

Correlation Altimetry data with respect to Ancona Tide gauge data

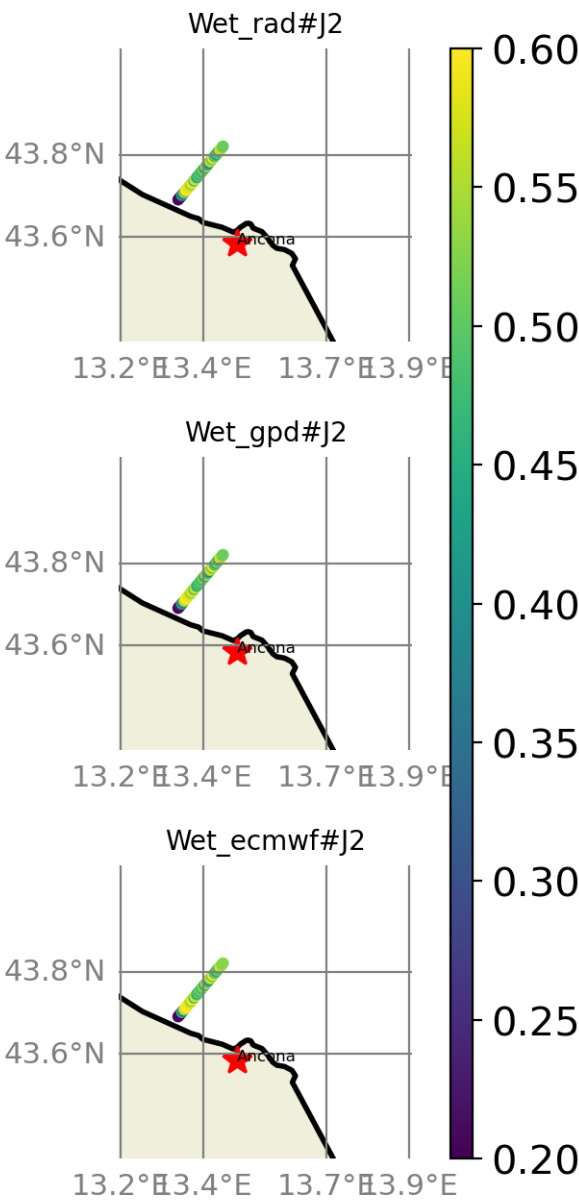


FIGURE 91 – correlation visualization in maps view % Ancona tide gauge

6.5.2 rmsd visualization in maps view % Ancona tide gauge

Rmsd (m) Altimetry data with respect to Ancona Tide gauge data

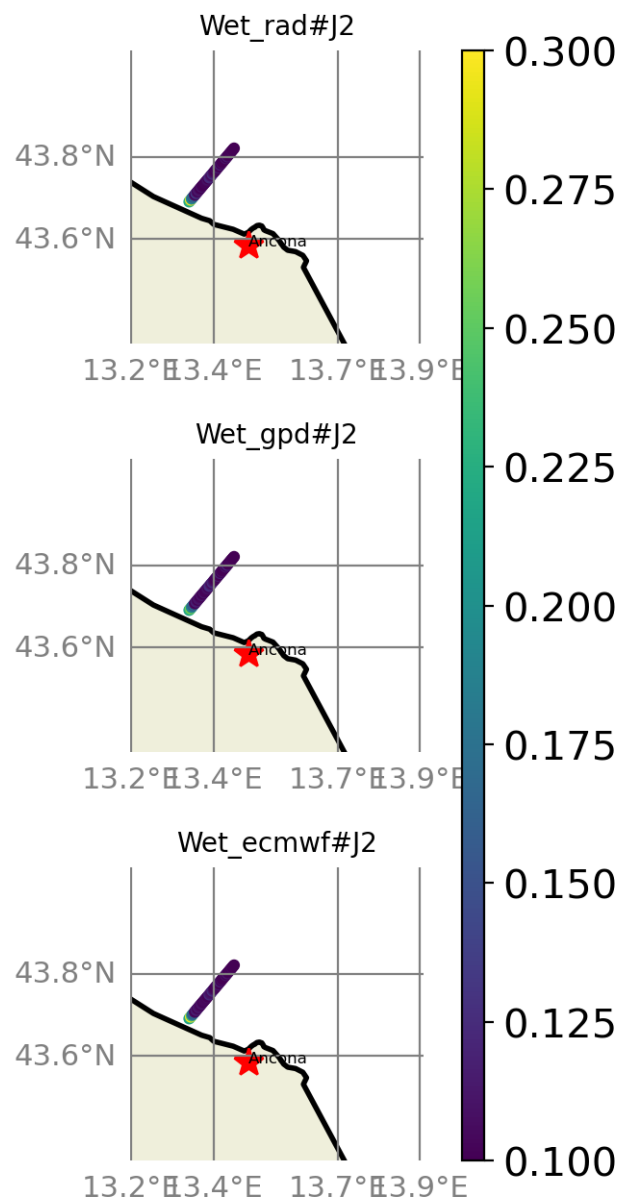


FIGURE 92 – rmsd visualization in maps view % Ancona tide gauge

6.5.3 std visualization in maps view % Ancona tide gauge

Std (m) Altimetry data with respect to Ancona Tide gauge data

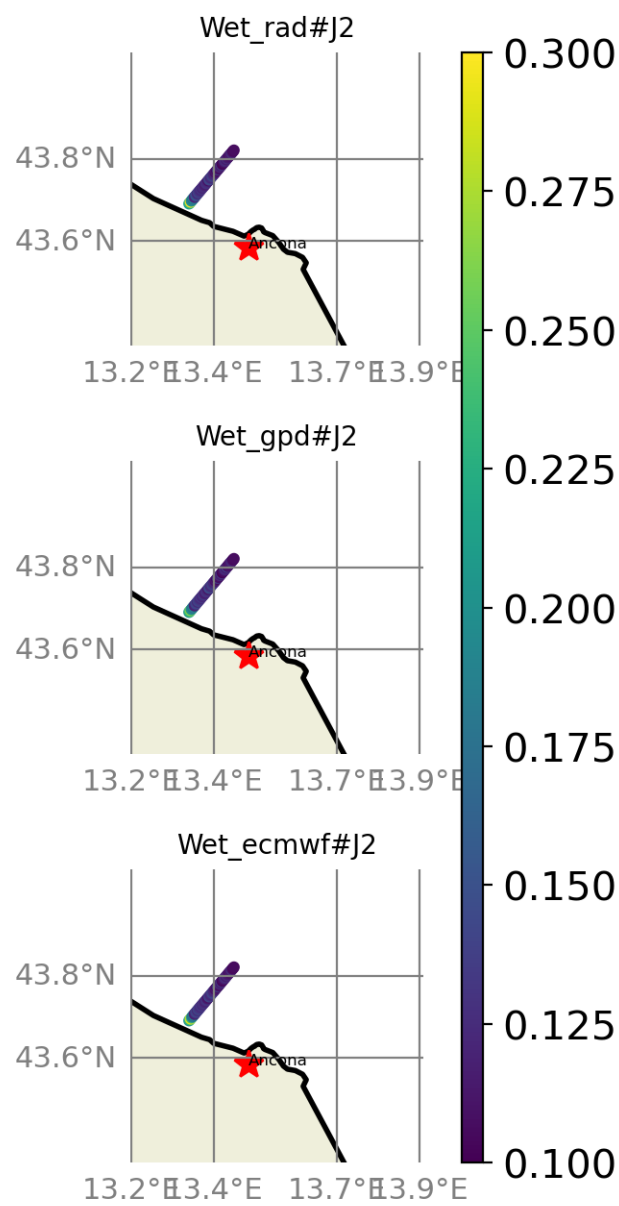


FIGURE 93 – std visualization in maps view % Ancona tide gauge

6.5.4 valid_data_percent visualization in maps view % Ancona tide gauge

Valid_Data_Percent (%) Altimetry data with respect to Ancona Tide gauge data

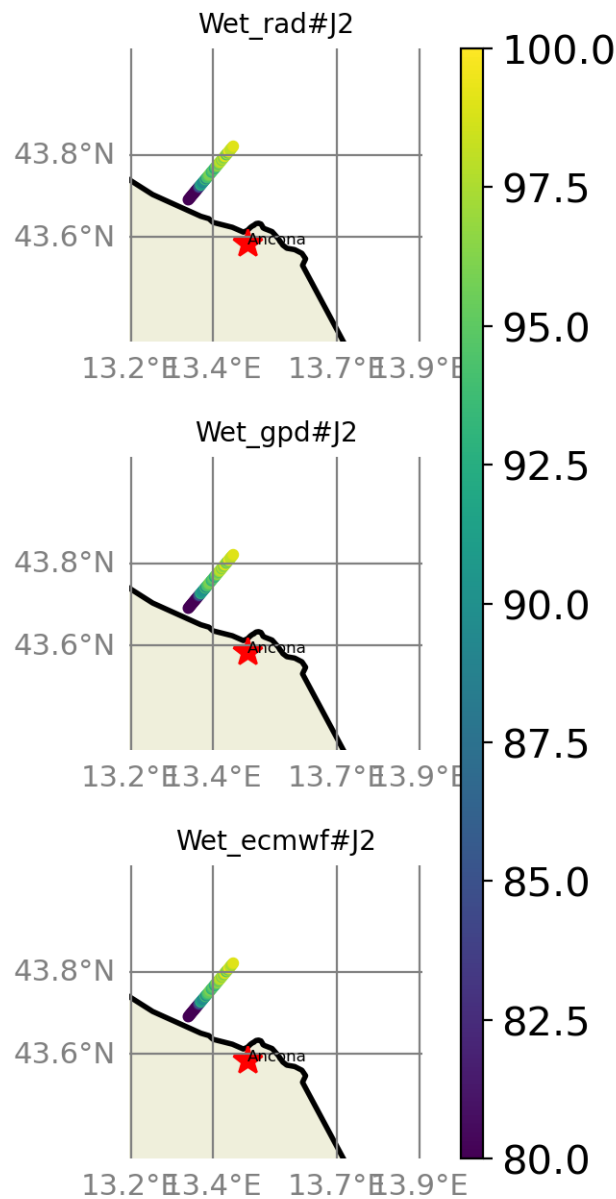


FIGURE 94 – valid_data_percent visualization in maps view % Ancona tide gauge

6.5.5 Valid data (%) in function of distance to coast/Ancona station

The formula to calculate the percentage of valid data in each time serie is;

$$pvd_i = \frac{nvd_i}{maxNB}, i = 1, np$$

Where pvd and nvd are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 100$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

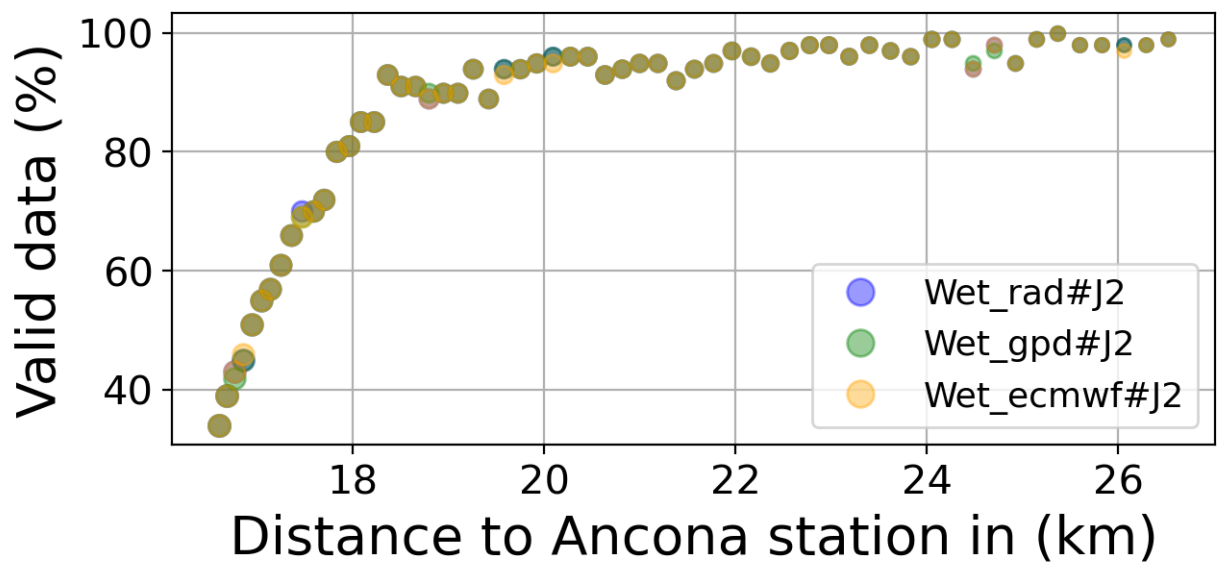
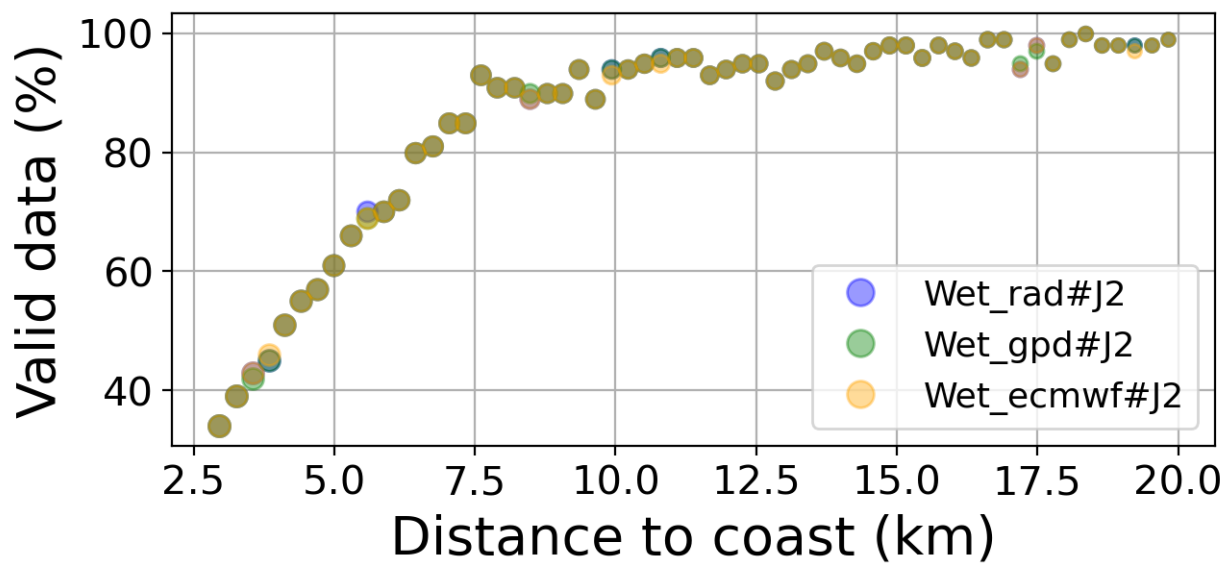


FIGURE 95 – Valid data (%) in function of distance to coast/Ancona station

6.5.6 Std in function of distance to coast/Ancona station

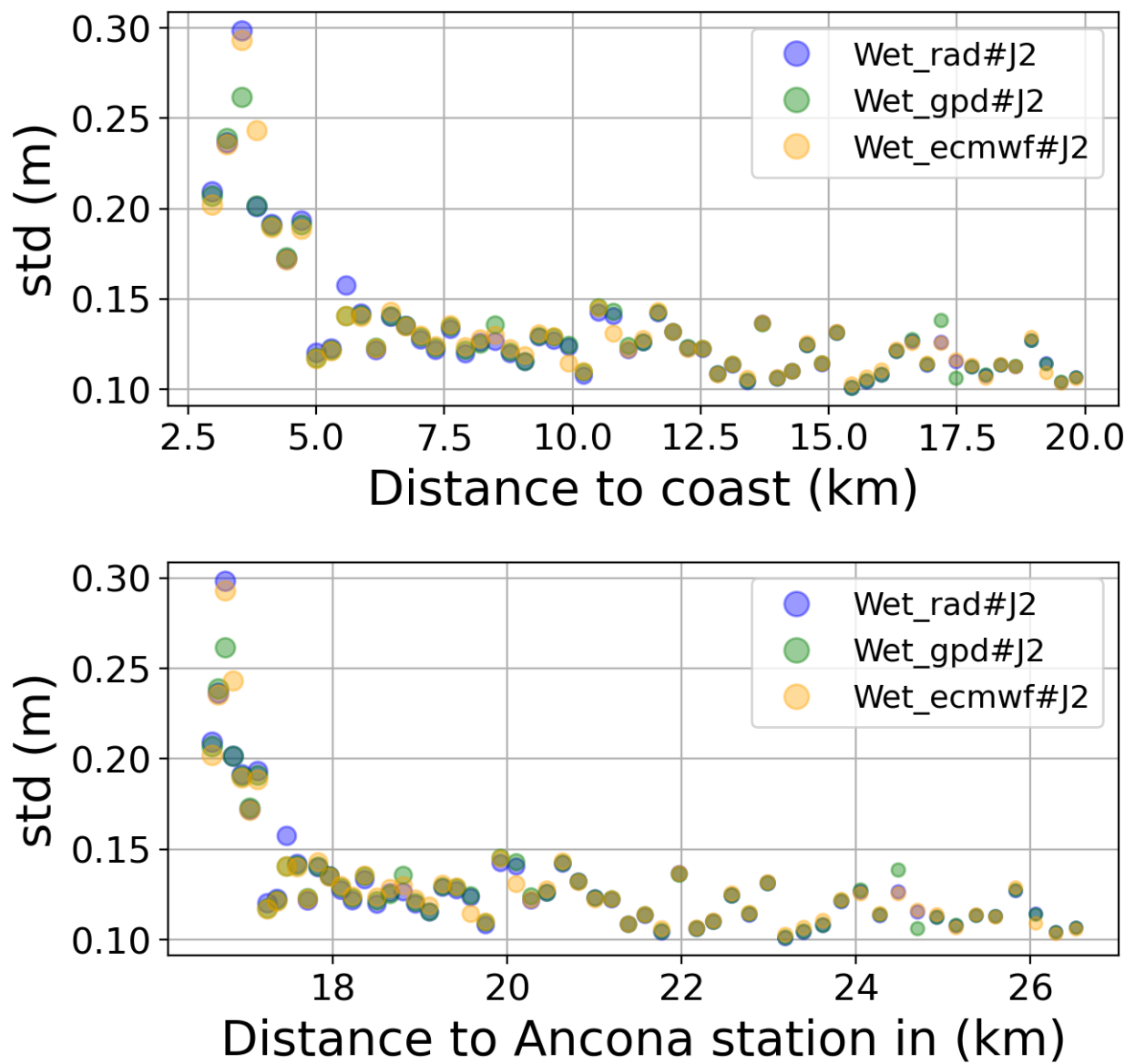


FIGURE 96 – Std in function of the distance to the coast/Ancona station

6.5.7 Correlation in function of distance to coast/Ancona station

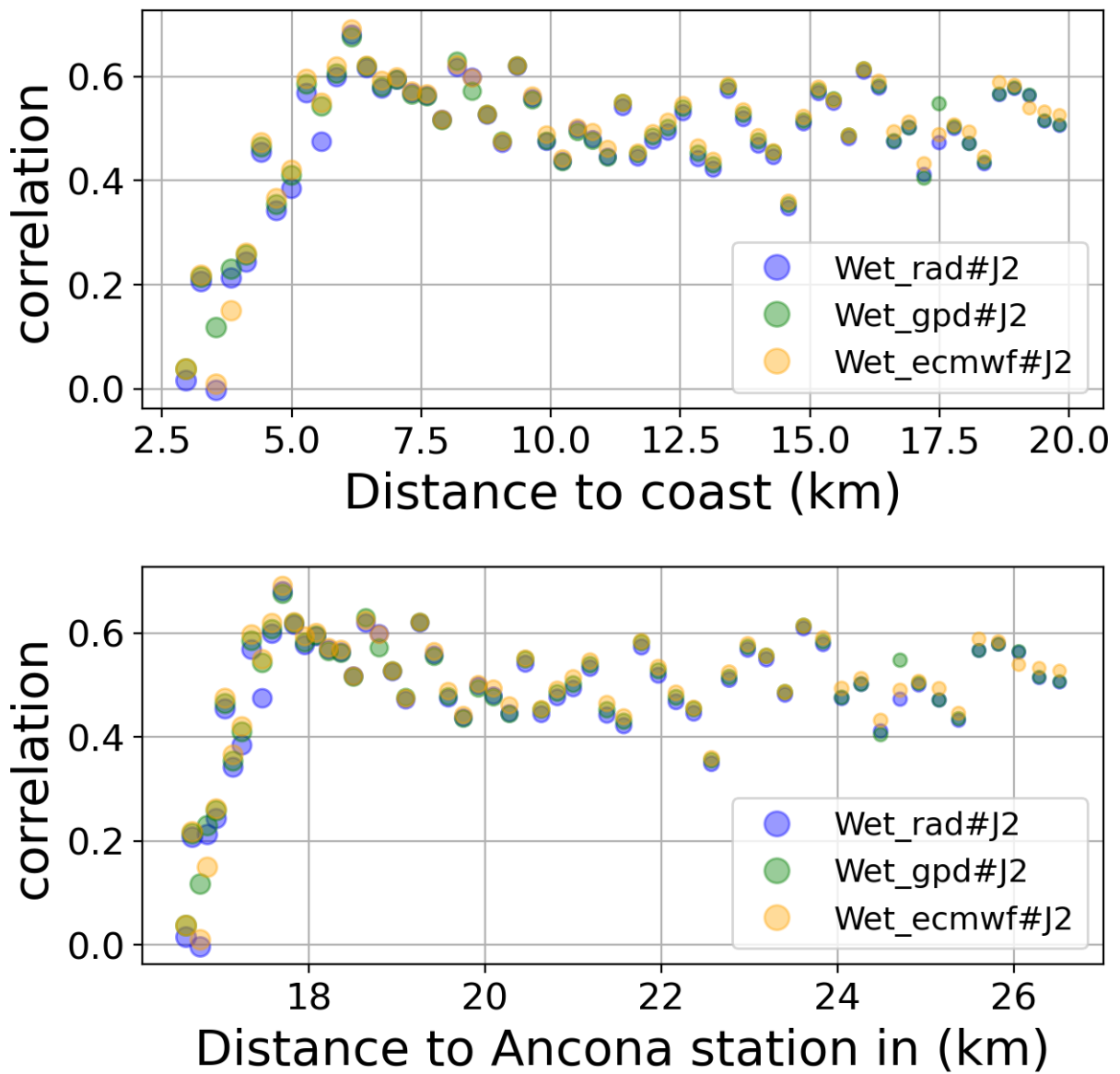


FIGURE 97 – Correlation in function of the distance to the coast/Ancona station

6.5.8 Taylor Diagram

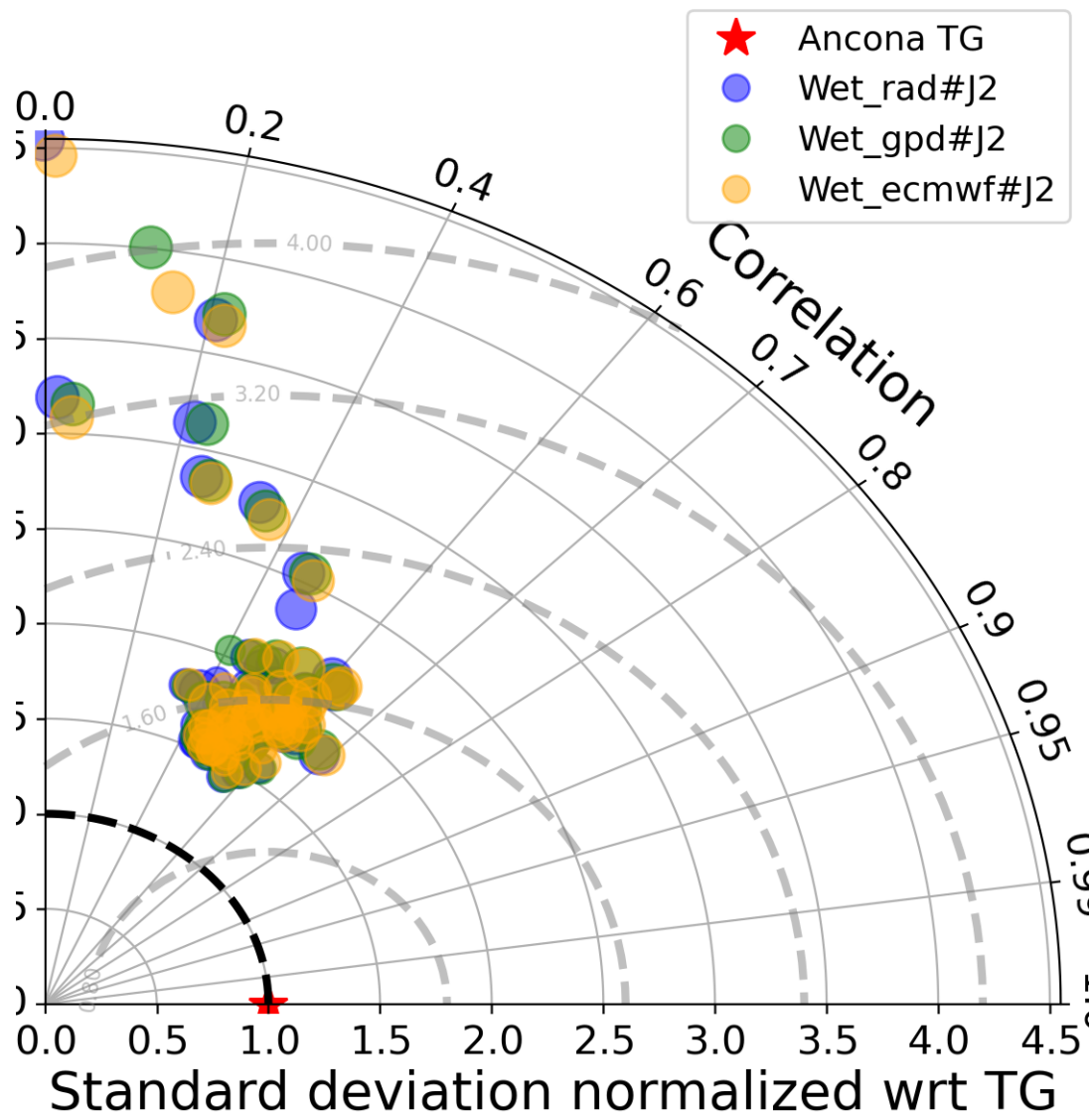


FIGURE 98 – Taylor diagram

6.5.9 Mean statistics table of products comparison with Ancona tide gauge data

The table below contains the mean statistics of the common points between the different products in the selected area.

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
Wet_rad#J2	86.322	0.481	0.133	0.117
Wet_gpd#J2	86.305	0.489	0.133	0.116
Wet_ecmwf#J2	86.271	0.493	0.133	0.117

FIGURE 99 – Mean statistics table of the common points in the altimetry products

6.5.10 The most correlated sla altimetry Time series with the tide gauge sla time serie

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 100 point.

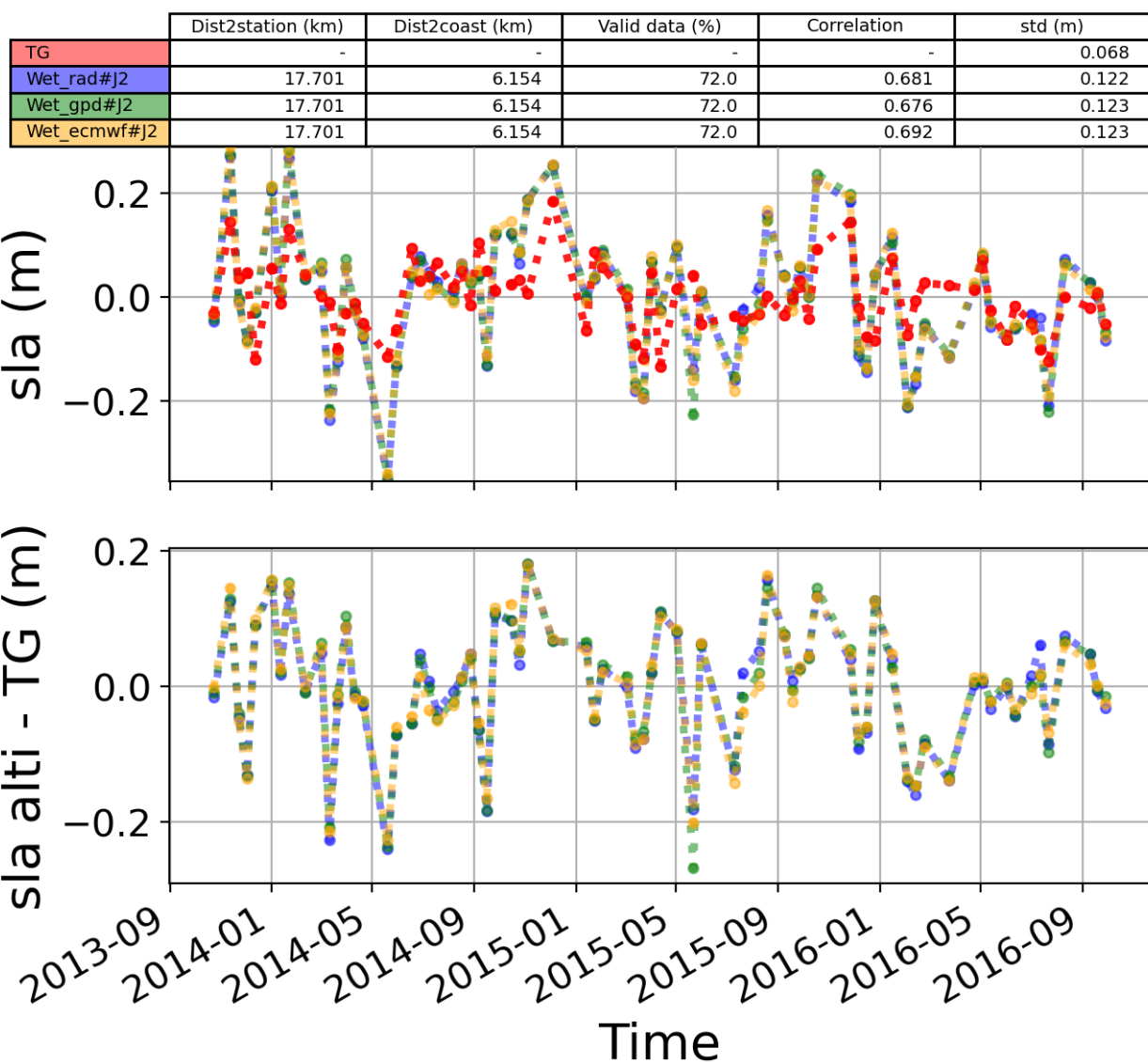


FIGURE 100 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.6 Station : Livourne

- Nearest track to Livourne station is the track number track85
- The area of interest is limited by :
 - A circle which it's center is the Livourne tide gauge station location and has a Raduis of 40 Km
 - Maximum distance to the coast : 20 Km

6.6.1 correlation visualization in maps view % Livourne tide gauge

Correlation Altimetry data with respect to Livourne Tide gauge data

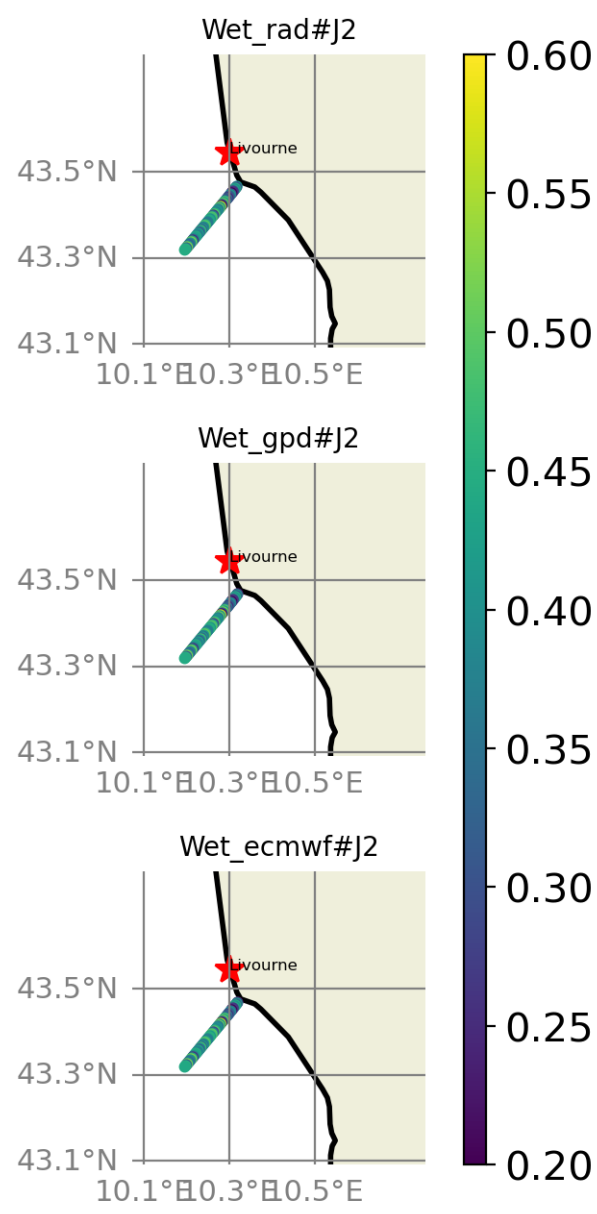


FIGURE 101 – correlation visualization in maps view % Livourne tide gauge

6.6.2 rmsd visualization in maps view % Livourne tide gauge

Rmsd (m) Altimetry data with respect to Livourne Tide gauge data

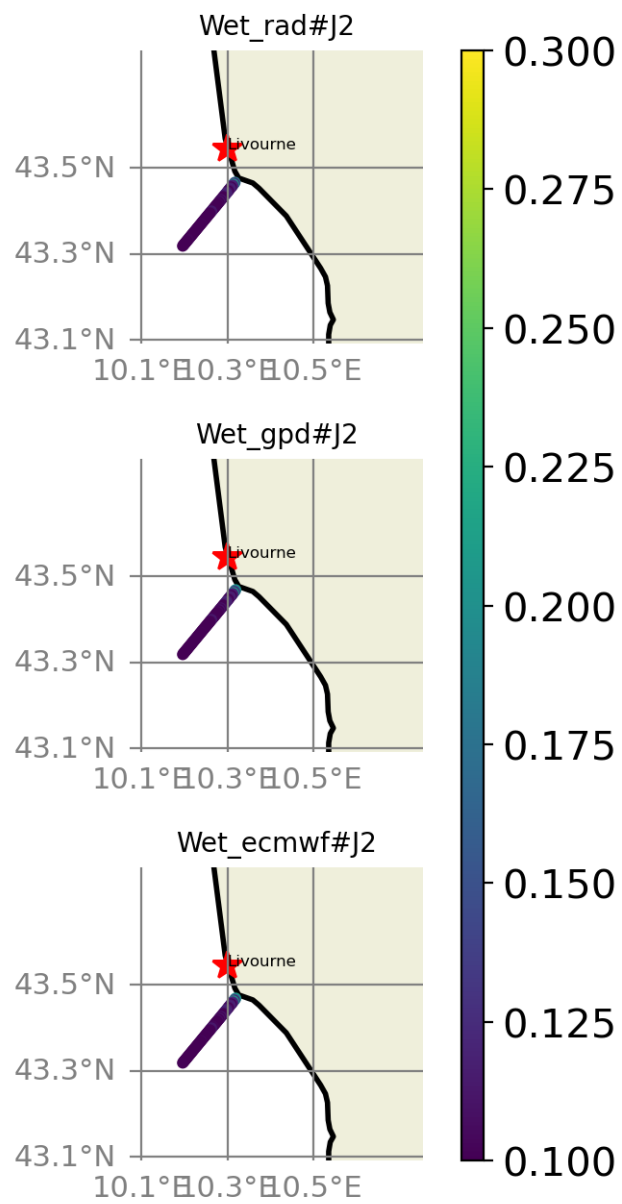


FIGURE 102 – rmsd visualization in maps view % Livourne tide gauge

6.6.3 std visualization in maps view % Livourne tide gauge

Std (m) Altimetry data with respect to Livourne Tide gauge data

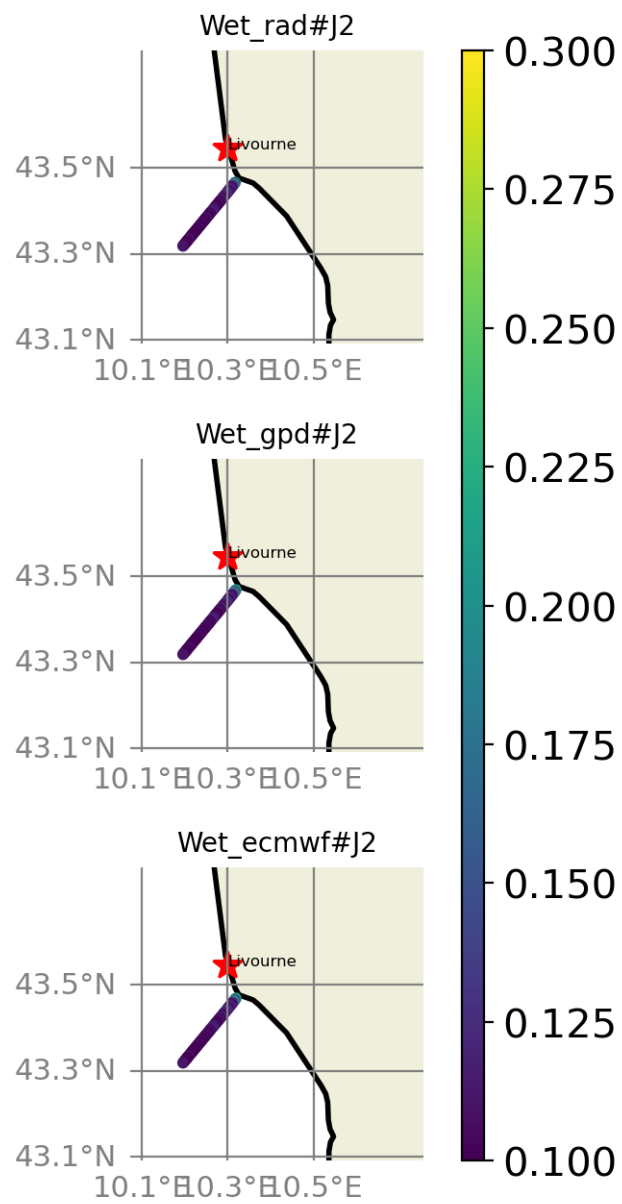


FIGURE 103 – std visualization in maps view % Livourne tide gauge

6.6.4 valid_data_percent visualization in maps view % Livourne tide gauge

Valid_Data_Percent (%) Altimetry data with respect to Livourne Tide gauge data

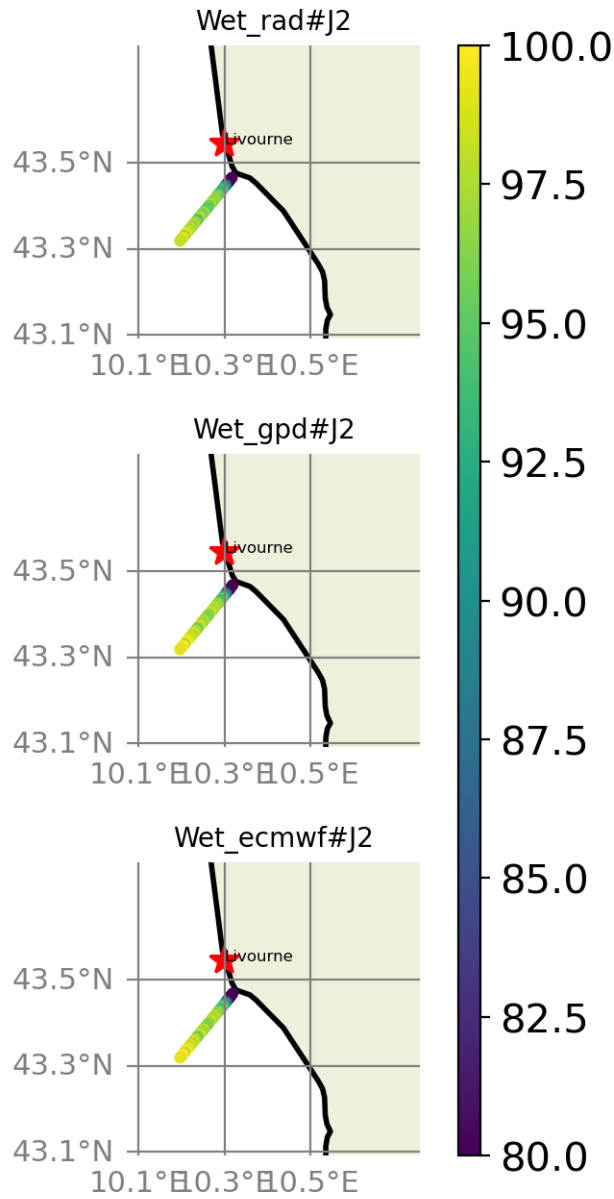


FIGURE 104 – valid_data_percent visualization in maps view % Livourne tide gauge

6.6.5 Valid data (%) in function of distance to coast/Livourne station

The formula to calculate the percentage of valid data in each time serie is ;

$$pvd_i = \frac{nvd_i}{maxNB}, i = 1, np$$

Where pvd and nvd are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 108$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

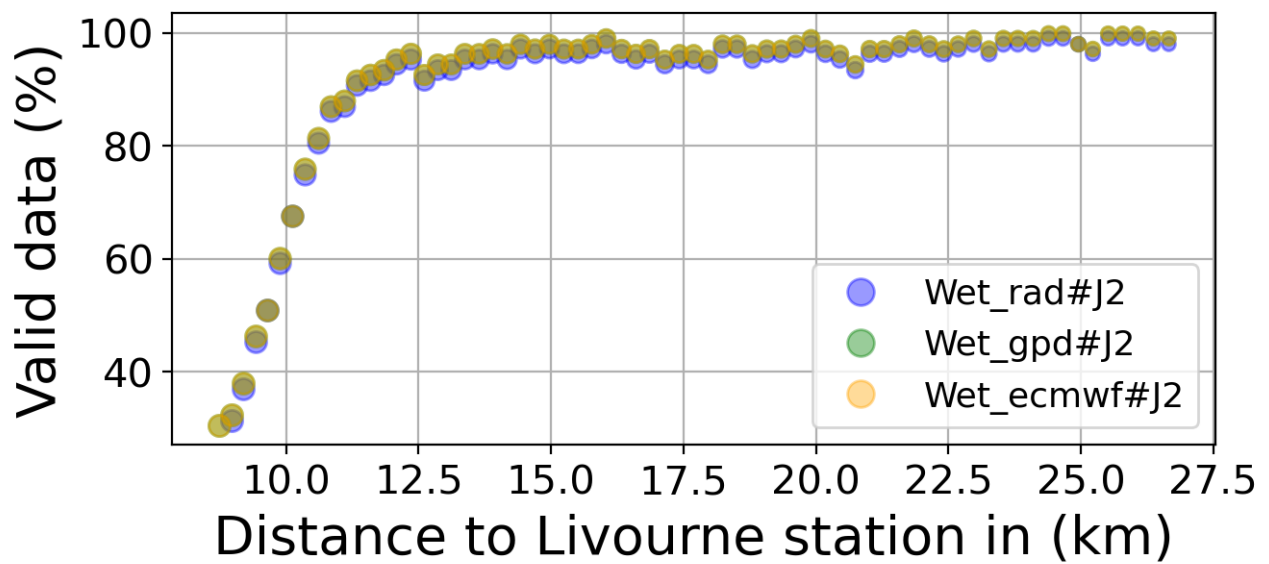
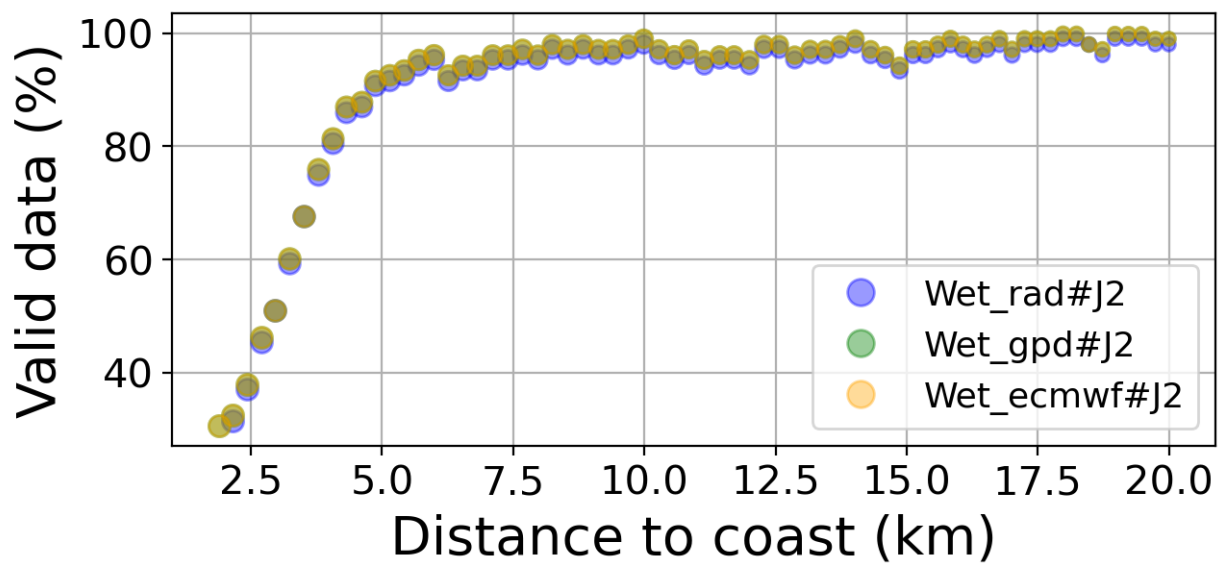


FIGURE 105 – Valid data (%) in function of distance to coast/Livourne station

6.6.6 Std in function of distance to coast/Livourne station

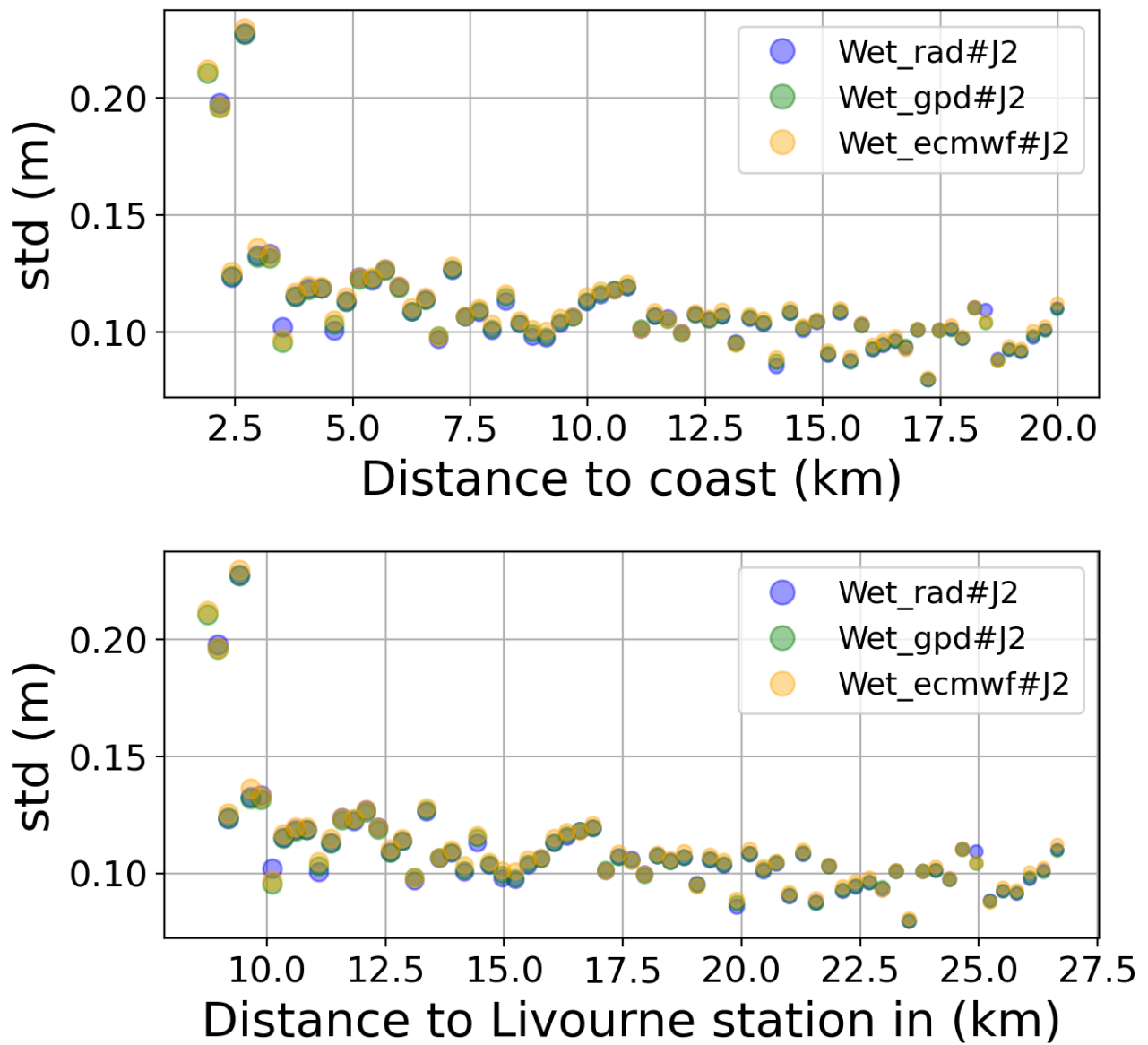


FIGURE 106 – Std in function of the distance to the coast/Livourne station

6.6.7 Correlation in function of distance to coast/Livourne station

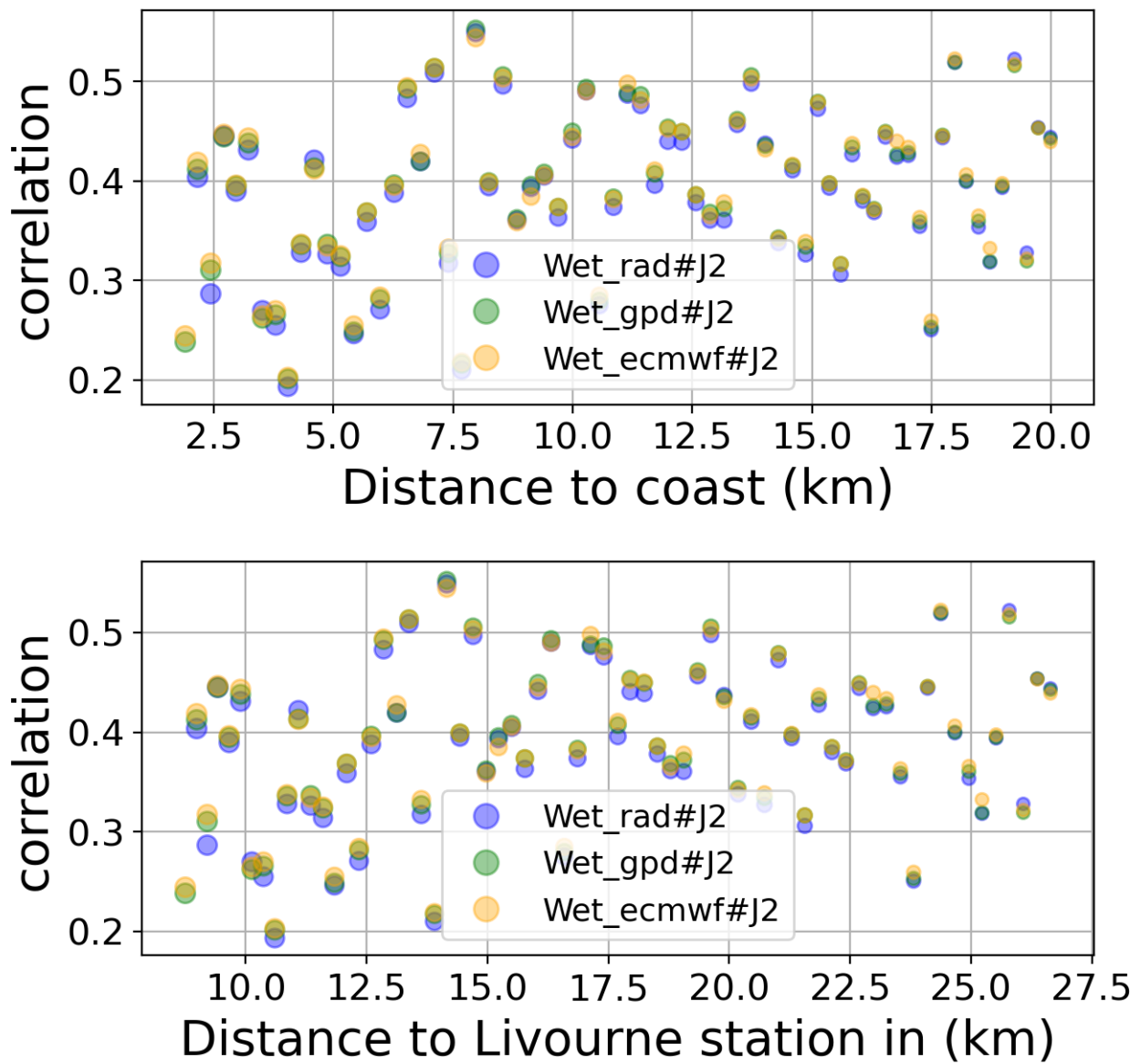


FIGURE 107 – Correlation in function of the distance to the coast/Livourne station

6.6.8 Taylor Diagram

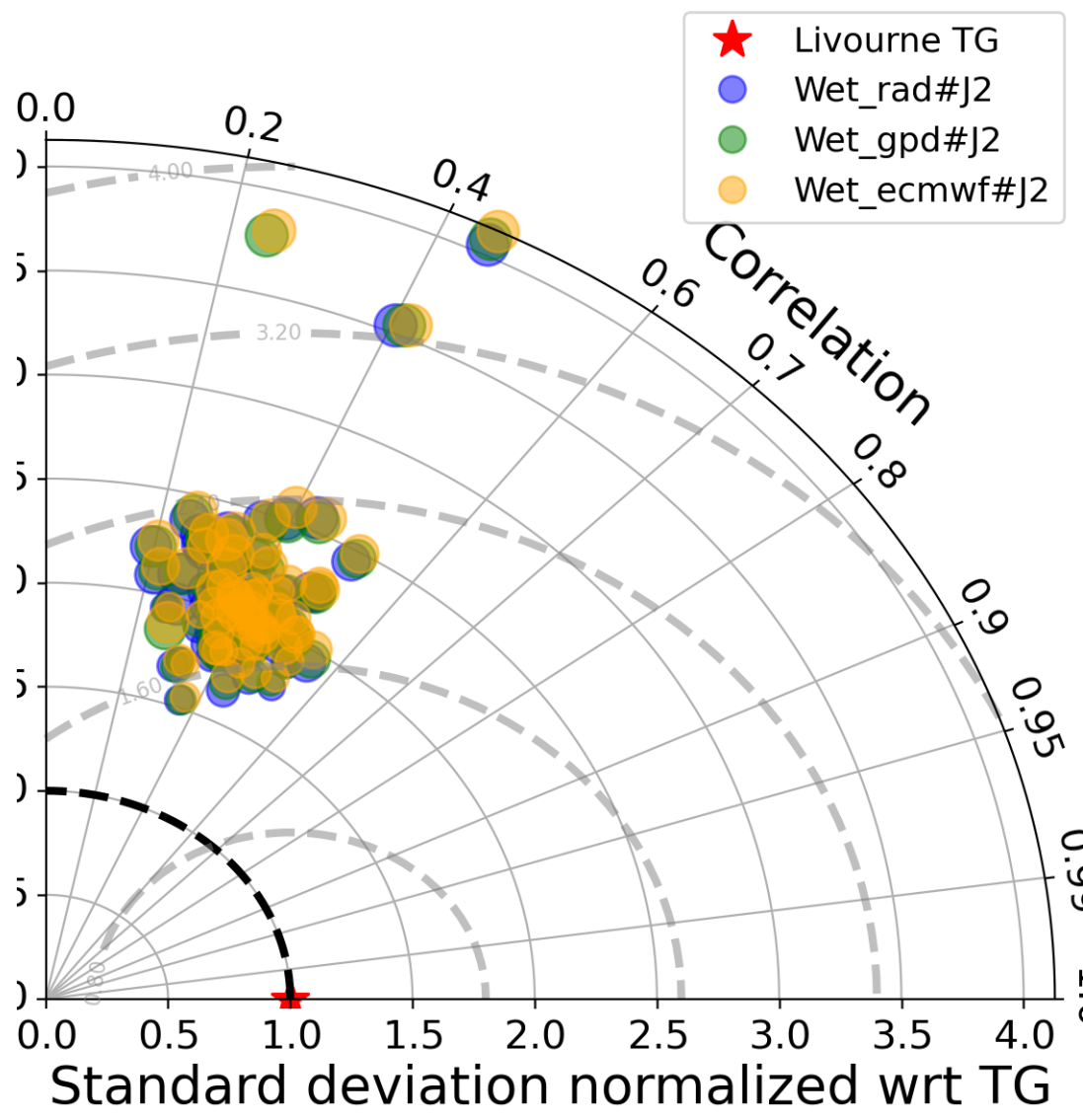


FIGURE 108 – Taylor diagram

6.6.9 Mean statistics table of products comparison with Livourne tide gauge data

The table below contains the mean statistics of the common points between the different products in the selected area.

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
Wet_rad#J2	91.183	0.389	0.109	0.101
Wet_gpd#J2	92.067	0.394	0.109	0.101
Wet_ecmwf#J2	92.067	0.395	0.11	0.102

FIGURE 109 – Mean statistics table of the common points in the altimetry products

6.6.10 The most correlated sla altimetry Time series with the tide gauge sla time serie

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 108 point.

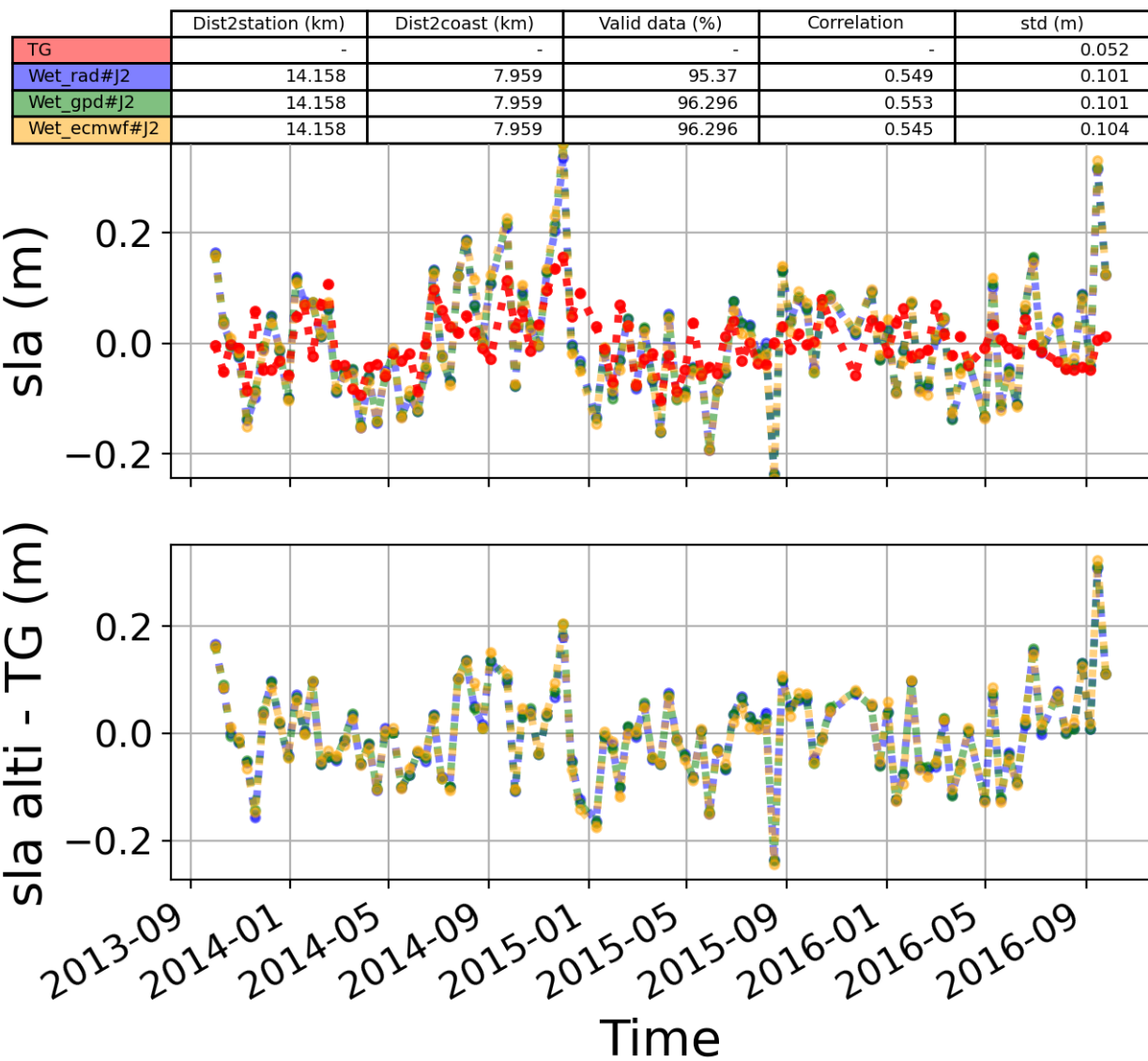


FIGURE 110 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.7 Station : MONACO_FONTVIEILLE

- Nearest track to MONACO_FONTVIEILLE station is the track number track9
- The area of interest is limited by :
 - A circle which it's center is the MONACO_FONTVIEILLE tide gauge station location and has a Radius of 40 Km

6.7.1 correlation visualization in maps view % MONACO_FONTVIEILLE tide gauge

Correlation Altimetry data with respect to MONACO_FONTVIEILLE Tide gauge data

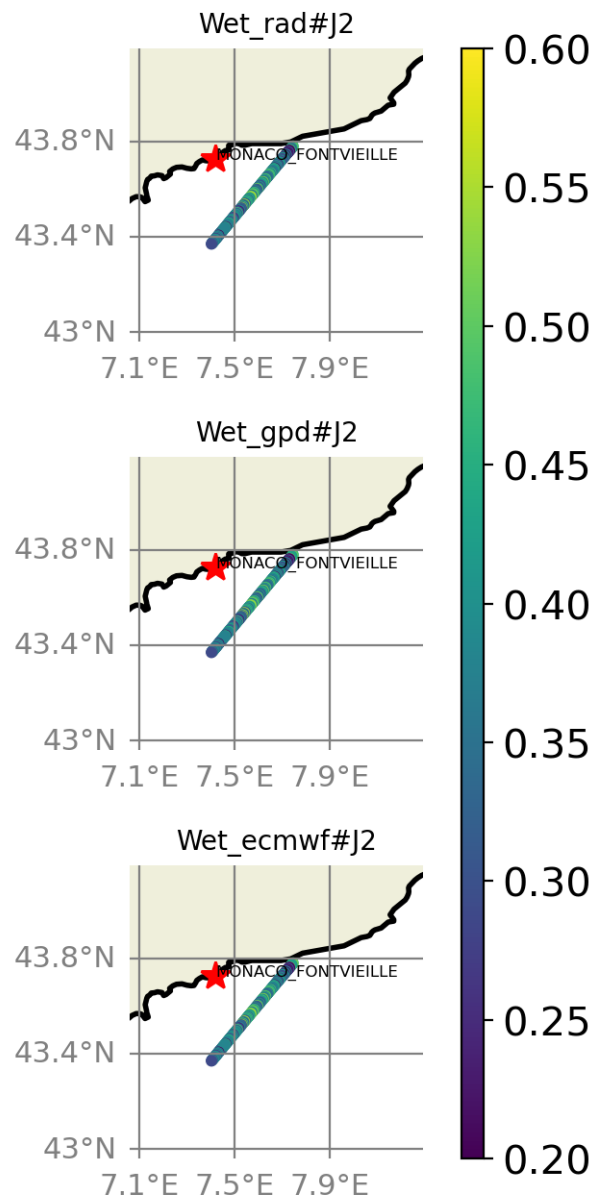


FIGURE 111 – correlation visualization in maps view % MONACO_FONTVIEILLE tide gauge

6.7.2 rmsd visualization in maps view % MONACO_FONTVIEILLE tide gauge

Rmsd (m) Altimetry data with respect to MONACO_FONTVIEILLE Tide gauge data

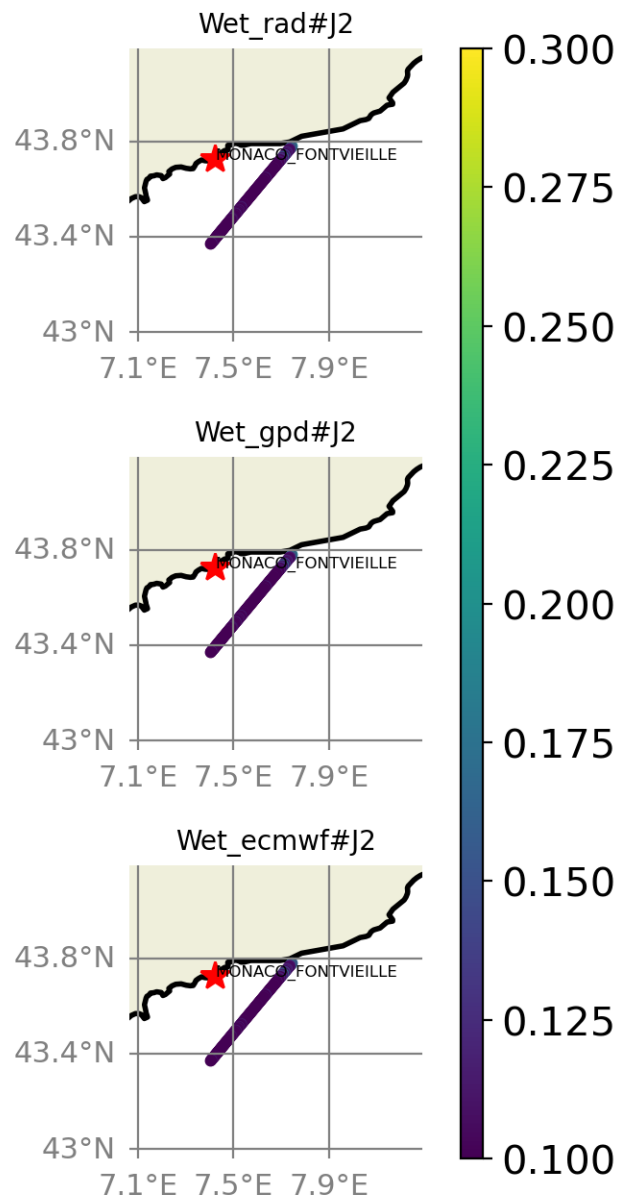


FIGURE 112 – rmsd visualization in maps view % MONACO_FONTVIEILLE tide gauge

6.7.3 std visualization in maps view % MONACO_FONTVIEILLE tide gauge

Std (m) Altimetry data with respect to MONACO_FONTVIEILLE Tide gauge data

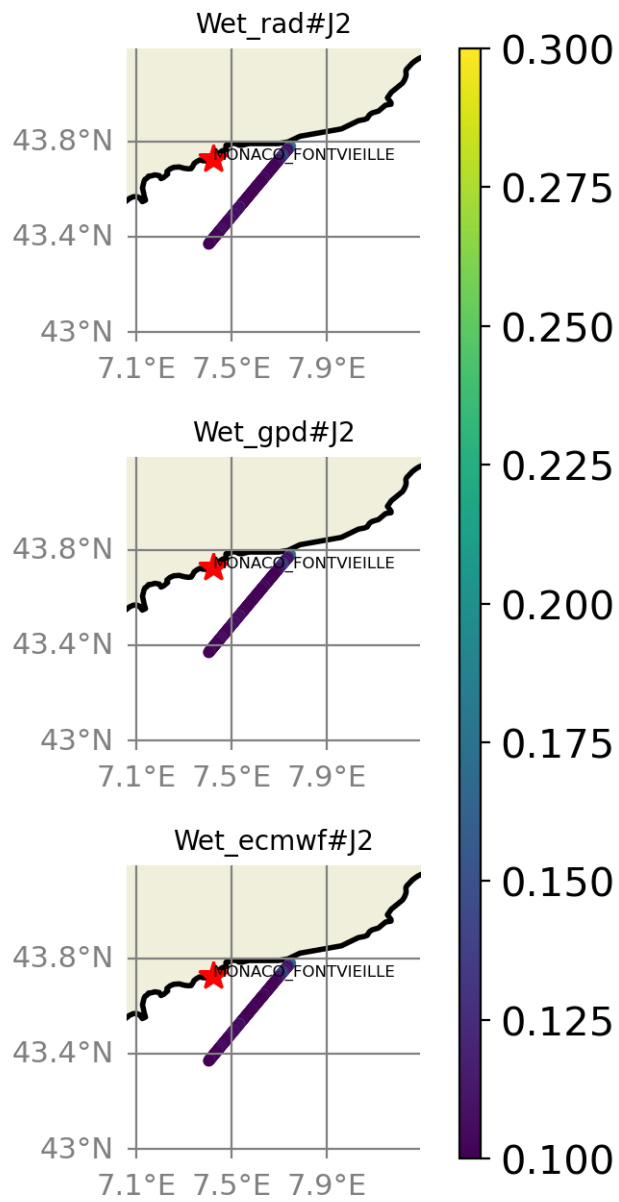


FIGURE 113 – std visualization in maps view % MONACO_FONTVIEILLE tide gauge

6.7.4 valid_data_percent visualization in maps view % MONACO_FONTVIEILLE tide gauge

Valid_Data_Percent (%) Altimetry data with respect to MONACO_FONTVIEILLE Tide gauge data

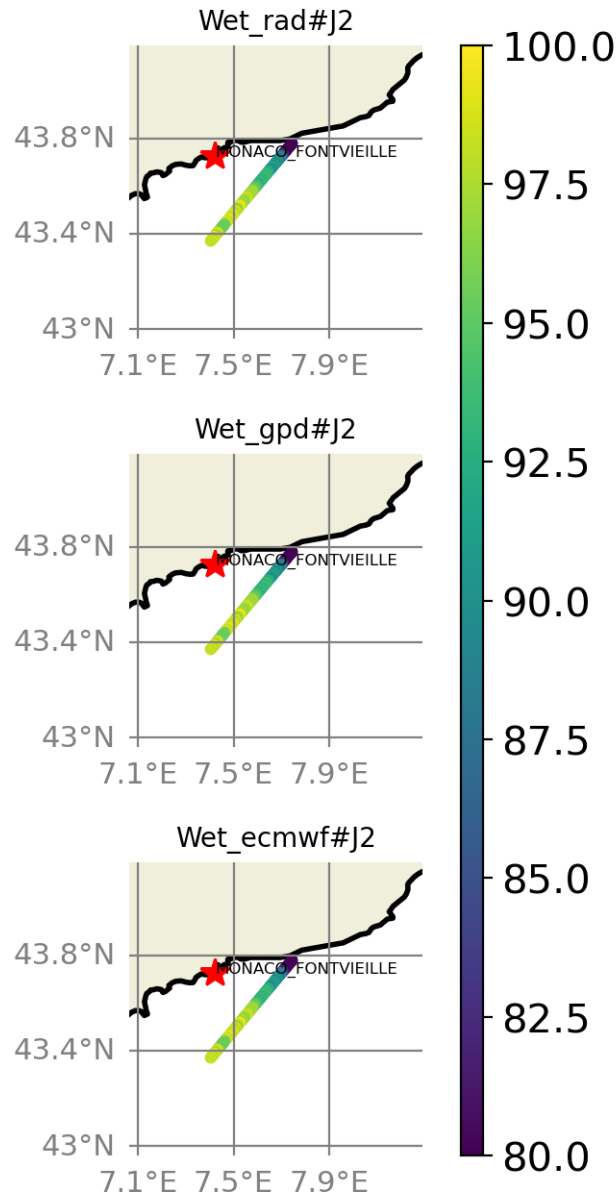


FIGURE 114 – valid_data_percent visualization in maps view % MONACO_FONTVIEILLE tide gauge

6.7.5 Valid data (%) in function of distance to coast/MONACO_FONTVIEILLE station

The formula to calculate the percentage of valid data in each time series is;

$$pvd_i = \frac{nvd_i}{maxNB}, i = 1, np$$

Where pvd and nvd are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time series, respectively in the time series, i is the index of the time series, np is the number of the selected altimetry time series. $maxNB = 107$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time series.

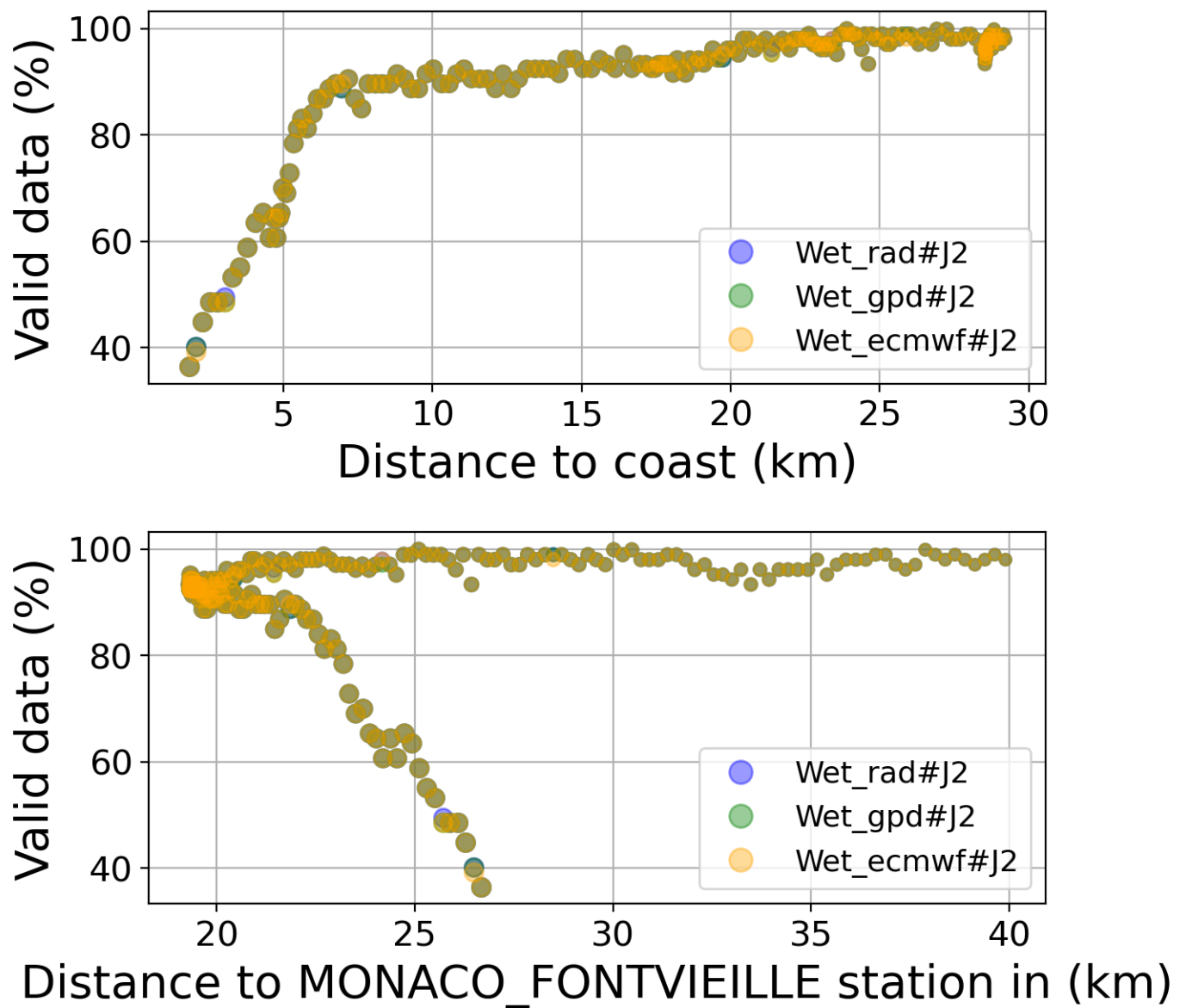


FIGURE 115 – Valid data (%) in function of distance to coast/MONACO_FONTVIEILLE station

6.7.6 Std in function of distance to coast/MONACO_FONTVIEILLE station

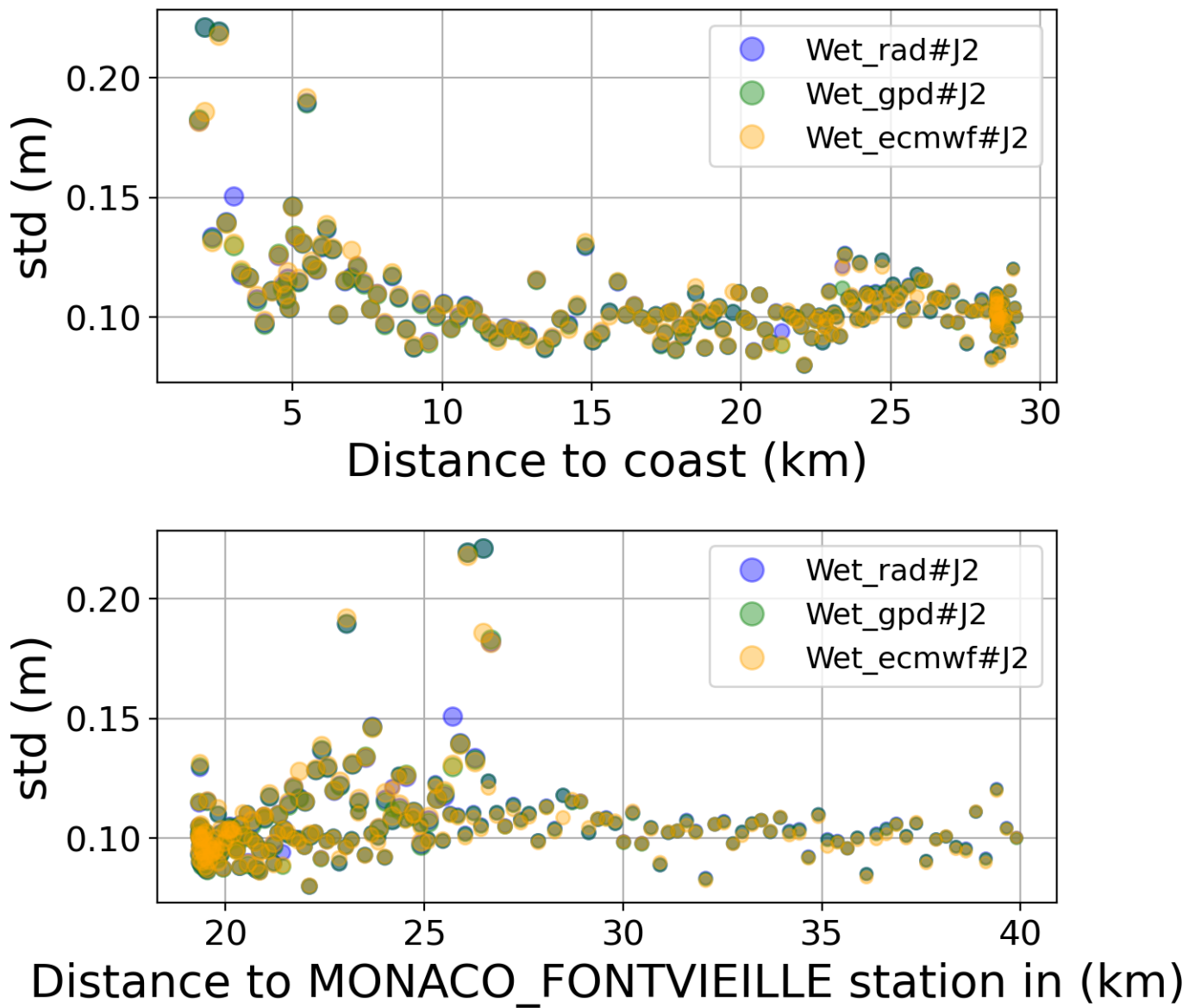


FIGURE 116 – Std in function of the distance to the coast/MONACO_FONTVIEILLE station

6.7.7 Correlation in function of distance to coast/MONACO_FONTVIEILLE station

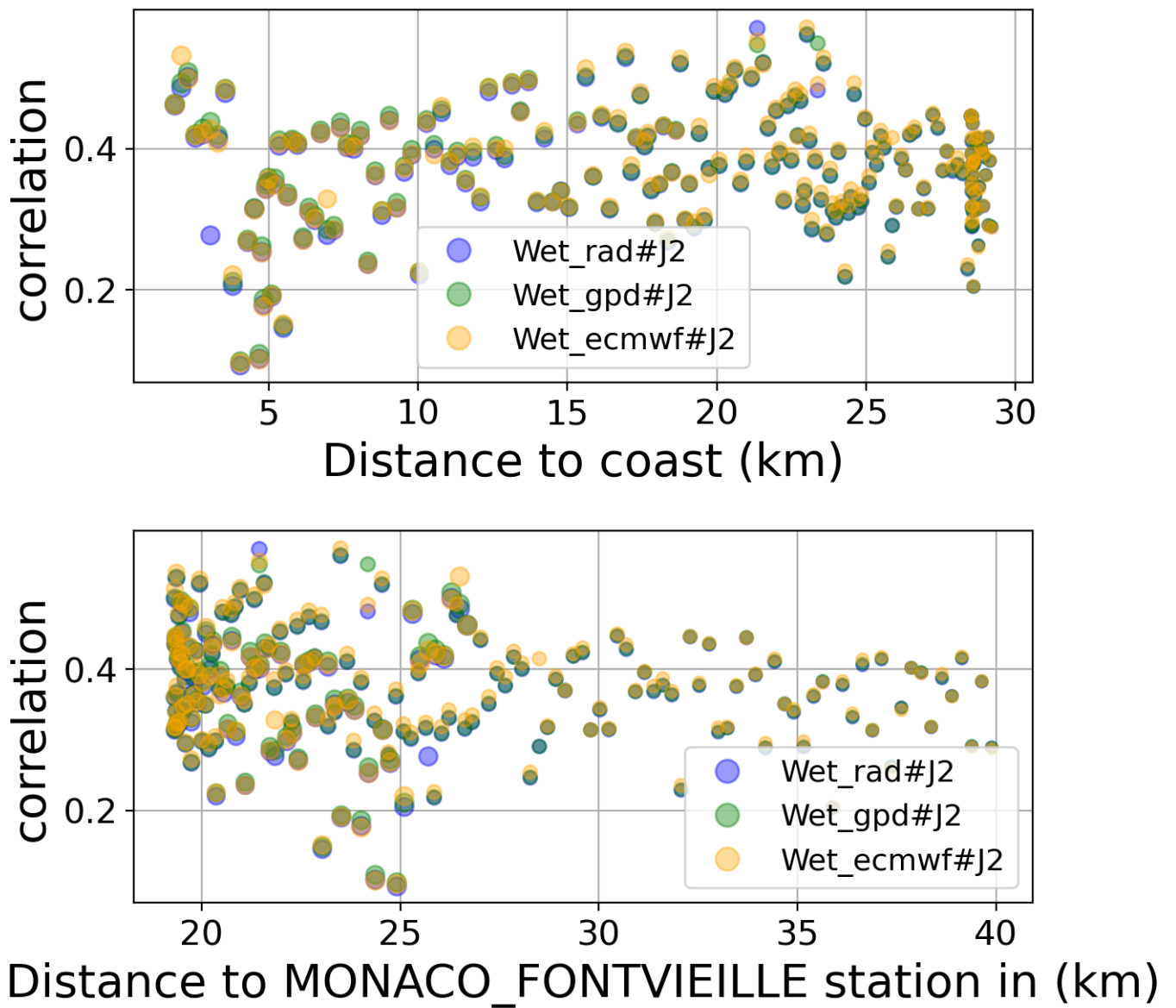


FIGURE 117 – Correlation in function of the distance to the coast/MONACO_FONTVIEILLE station

6.7.8 Taylor Diagram

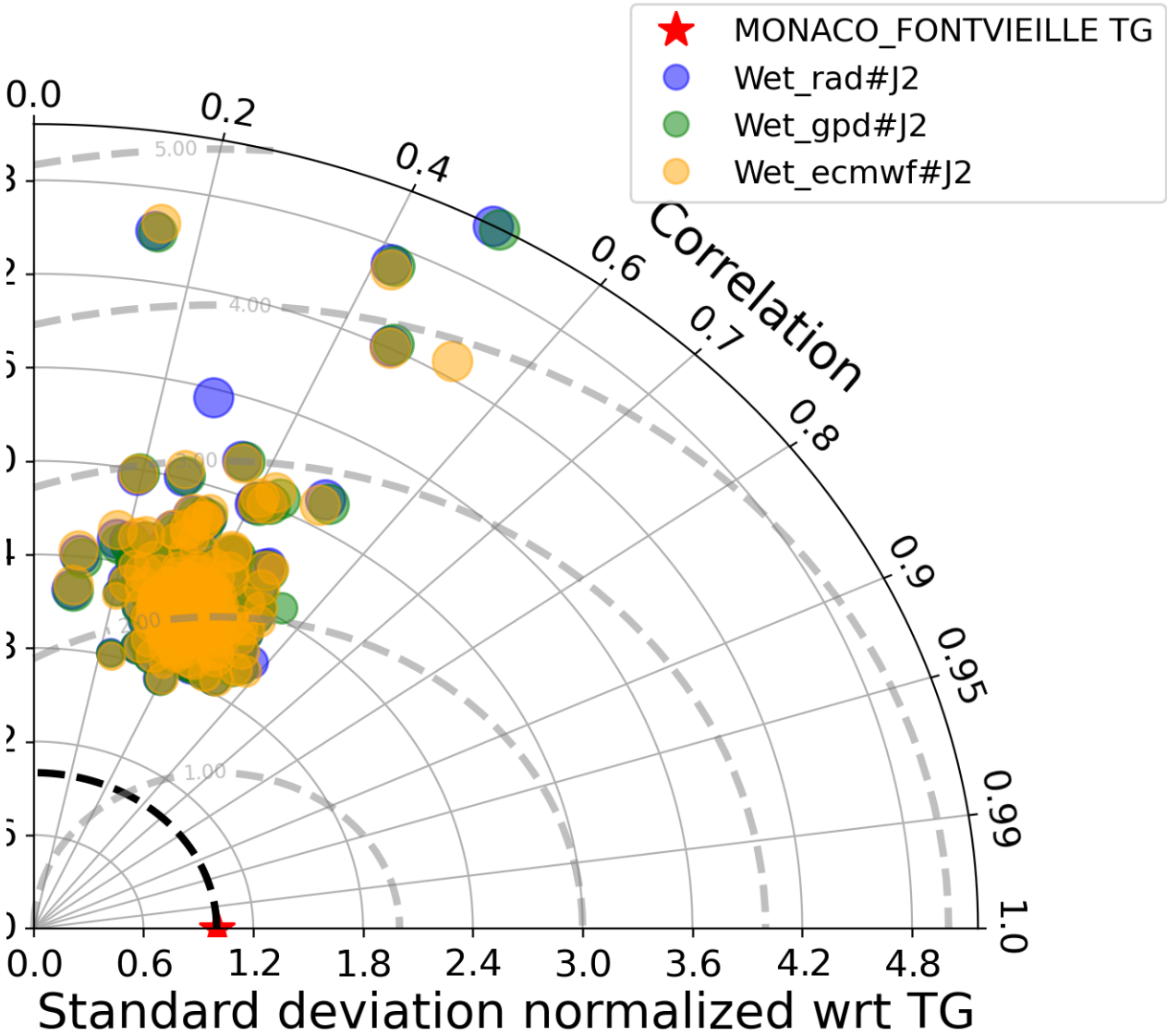


FIGURE 118 – Taylor diagram

6.7.9 Mean statistics table of products comparison with MONACO_FONTVIEILLE tide gauge data

The table below contains the mean statistics of the common points between the different products in the selected area.

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
Wet_rad#J2	91.015	0.371	0.107	0.1
Wet_gpd#J2	91.0	0.375	0.106	0.099
Wet_ecmwf#J2	91.005	0.377	0.106	0.099

FIGURE 119 – Mean statistics table of the common points in the altimetry products

6.7.10 The most correlated sla altimetry Time series with the tide gauge sla time serie

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 107 point.

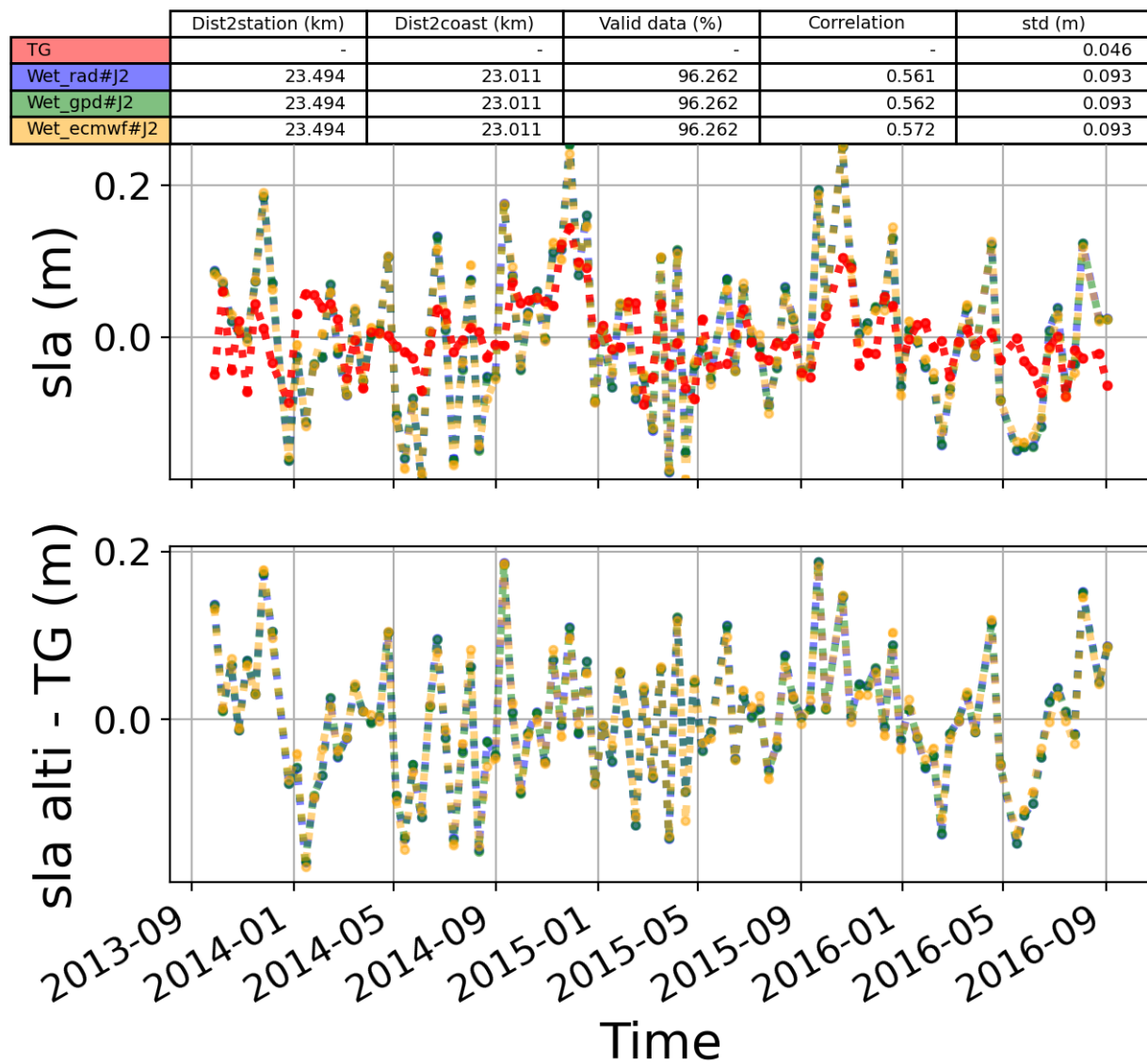


FIGURE 120 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

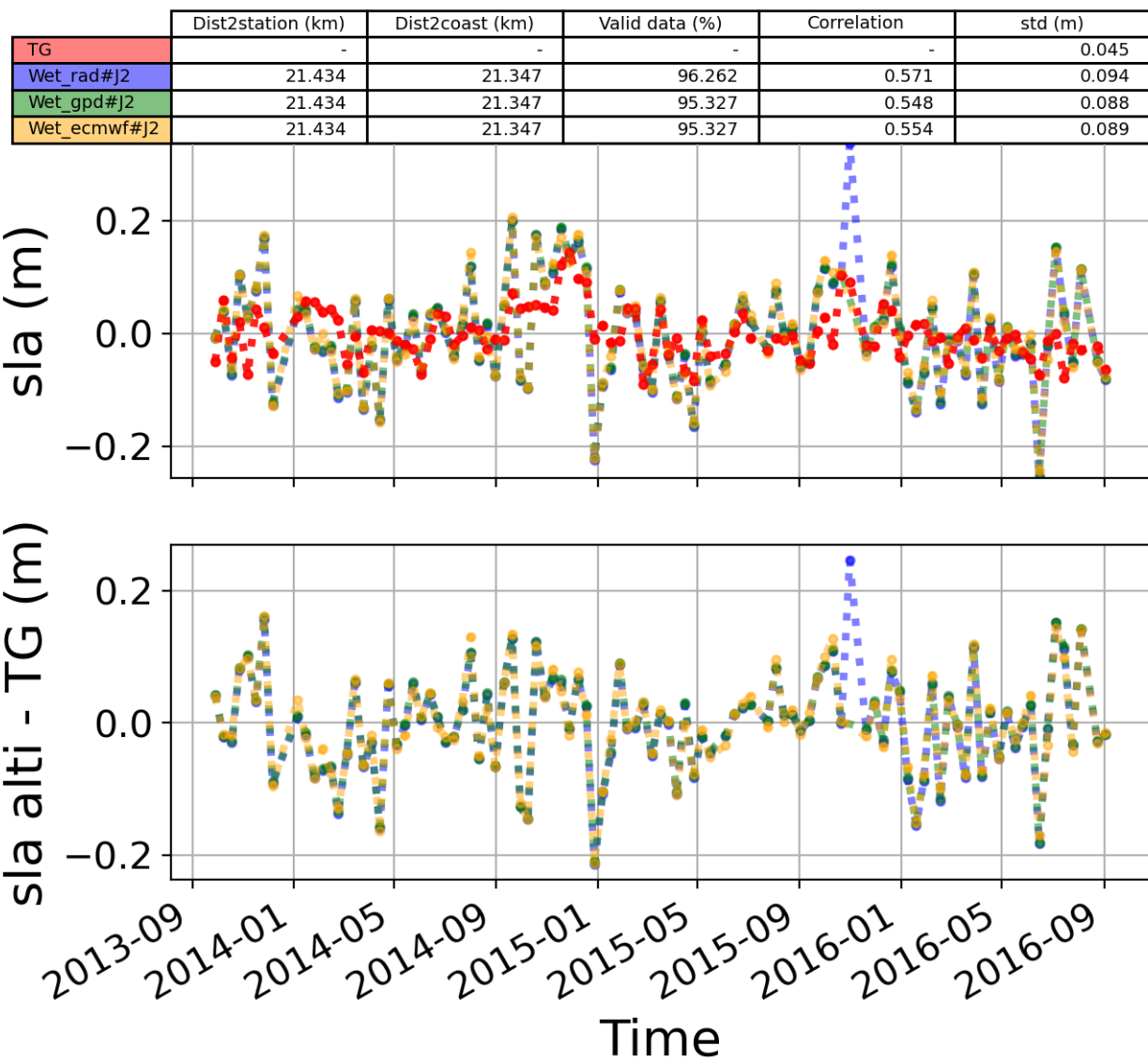


FIGURE 121 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.8 Station : Erdemli

- Nearest track to Erdemli station is the track number track68
- The area of interest is limited by :
 - A circle which it's center is the Erdemli tide gauge station location and has a Raduis of 40 Km

6.8.1 correlation visualization in maps view % Erdemli tide gauge

Correlation Altimetry data with respect to Erdemli Tide gauge data

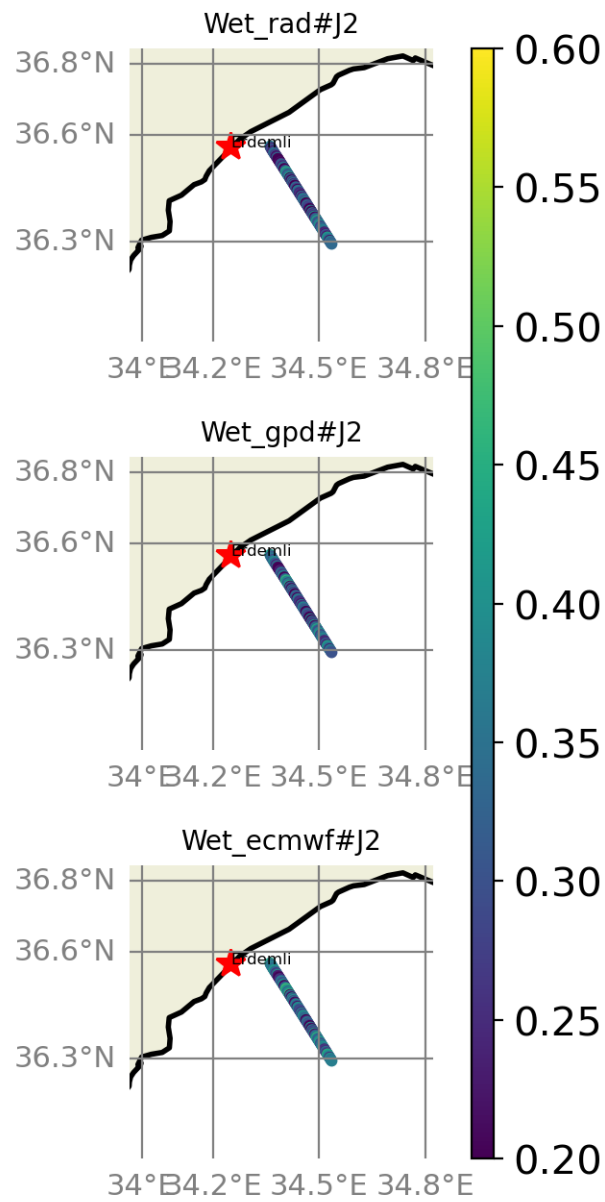


FIGURE 122 – correlation visualization in maps view % Erdemli tide gauge

6.8.2 rmsd visualization in maps view % Erdemli tide gauge

Rmsd (m) Altimetry data with respect to Erdemli Tide gauge data

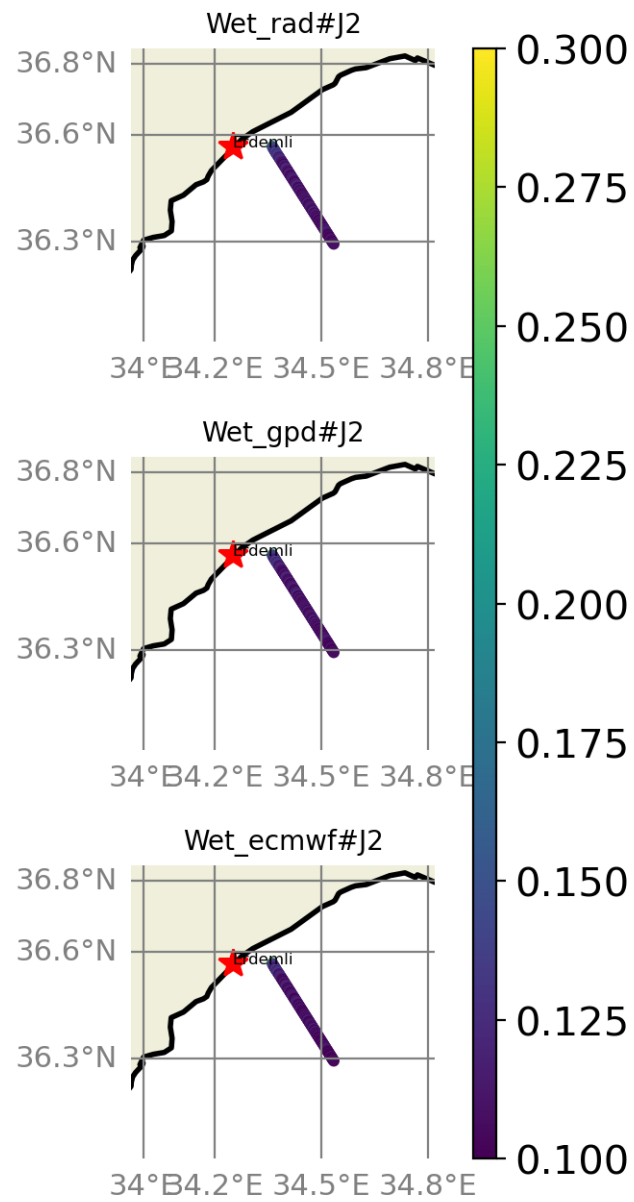


FIGURE 123 – rmsd visualization in maps view % Erdemli tide gauge

6.8.3 std visualization in maps view % Erdemli tide gauge

Std (m) Altimetry data with respect to Erdemli Tide gauge data

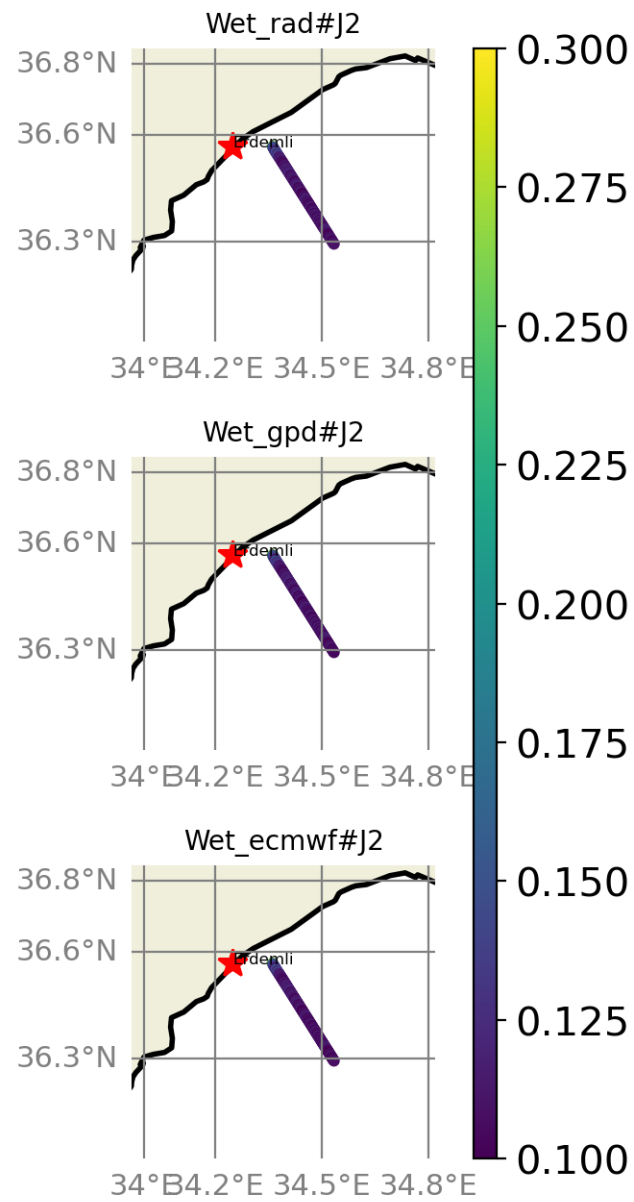


FIGURE 124 – std visualization in maps view % Erdemli tide gauge

6.8.4 valid_data_percent visualization in maps view % Erdemli tide gauge

Valid_Data_Percent (%) Altimetry data with respect to Erdemli Tide gauge data

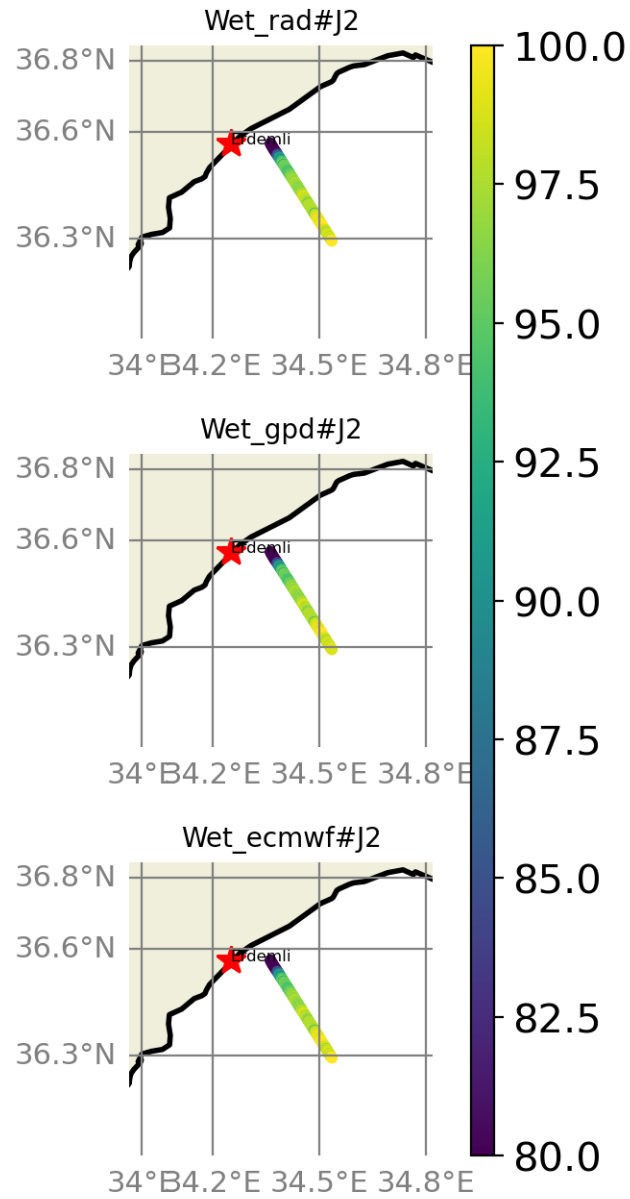


FIGURE 125 – valid_data_percent visualization in maps view % Erdemli tide gauge

6.8.5 Valid data (%) in function of distance to coast/Erdemli station

The formula to calculate the percentage of valid data in each time serie is ;

$$pvd_i = \frac{nvd_i}{maxNB}, i = 1, np$$

Where pvd and nvd are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 87$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

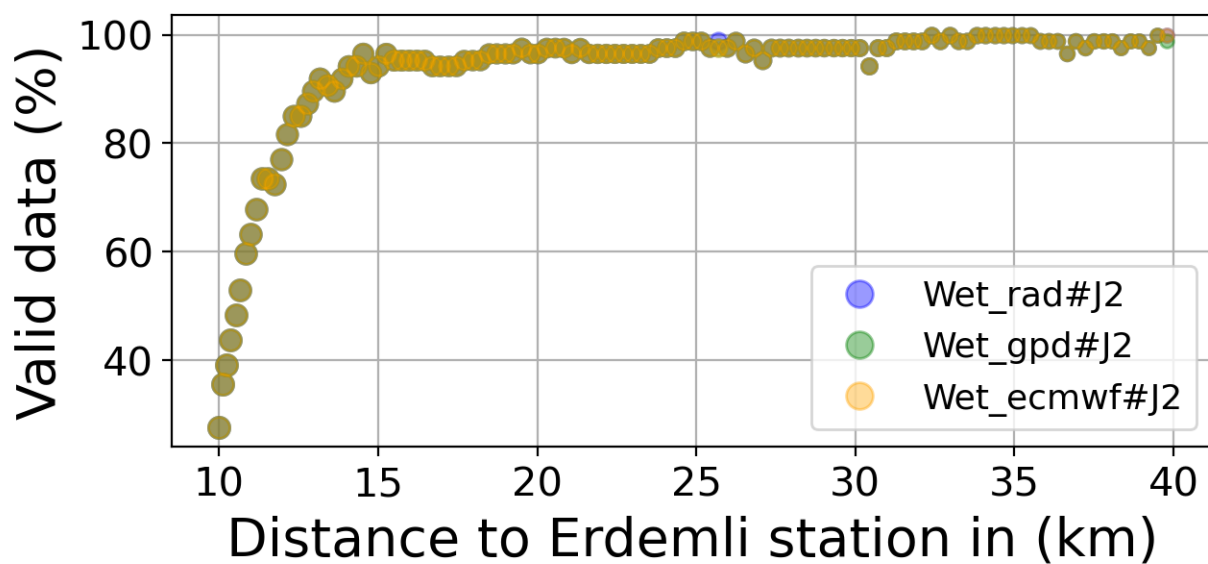
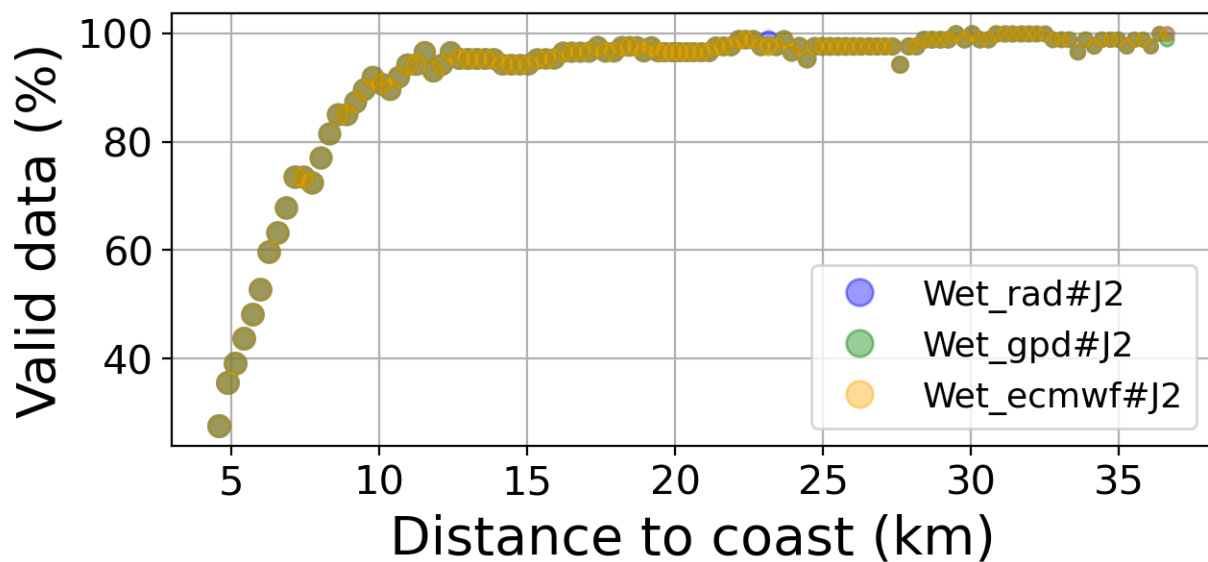


FIGURE 126 – Valid data (%) in function of distance to coast/Erdemli station

6.8.6 Std in function of distance to coast/Erdemli station

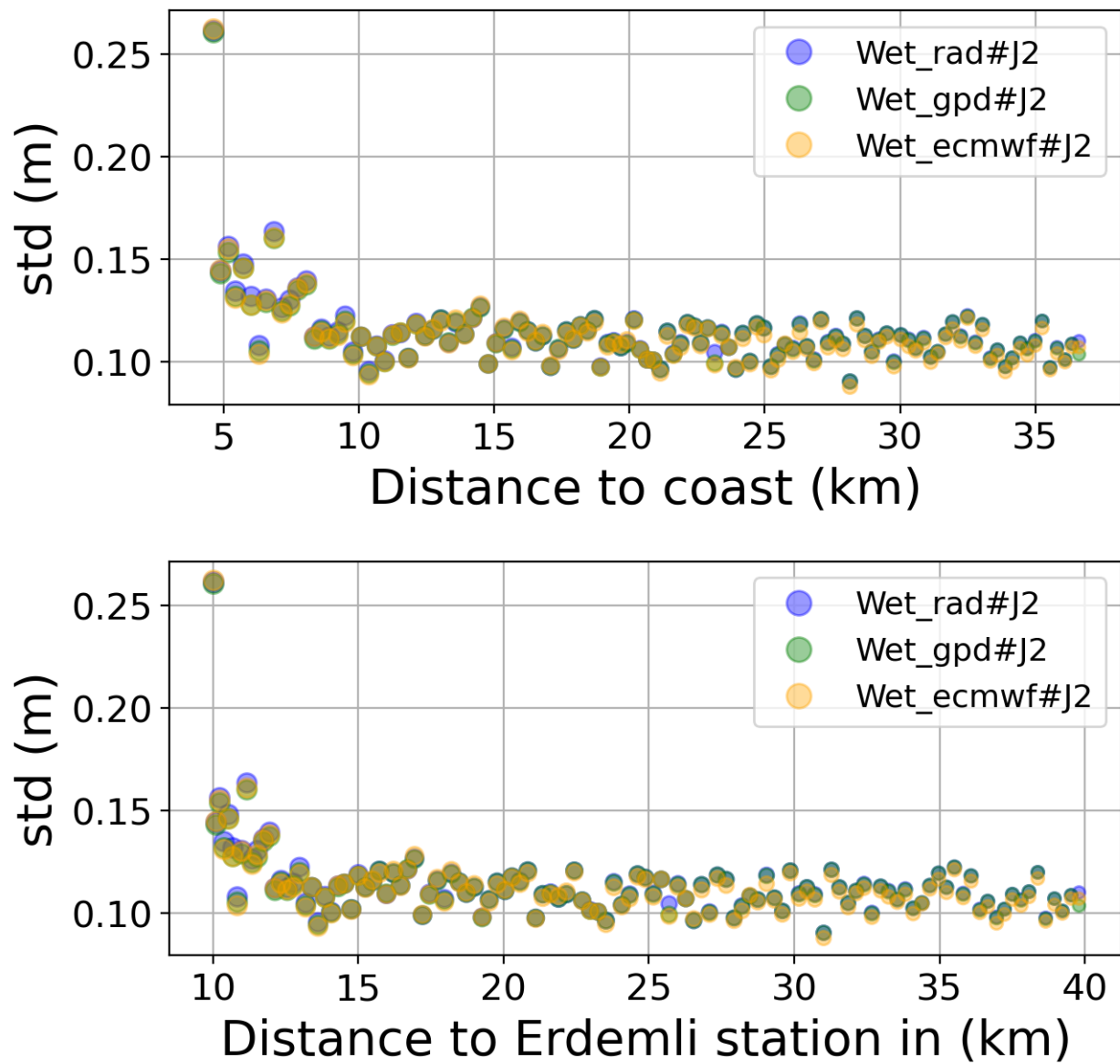


FIGURE 127 – Std in function of the distance to the coast/Erdemli station

6.8.7 Correlation in function of distance to coast/Erdemli station

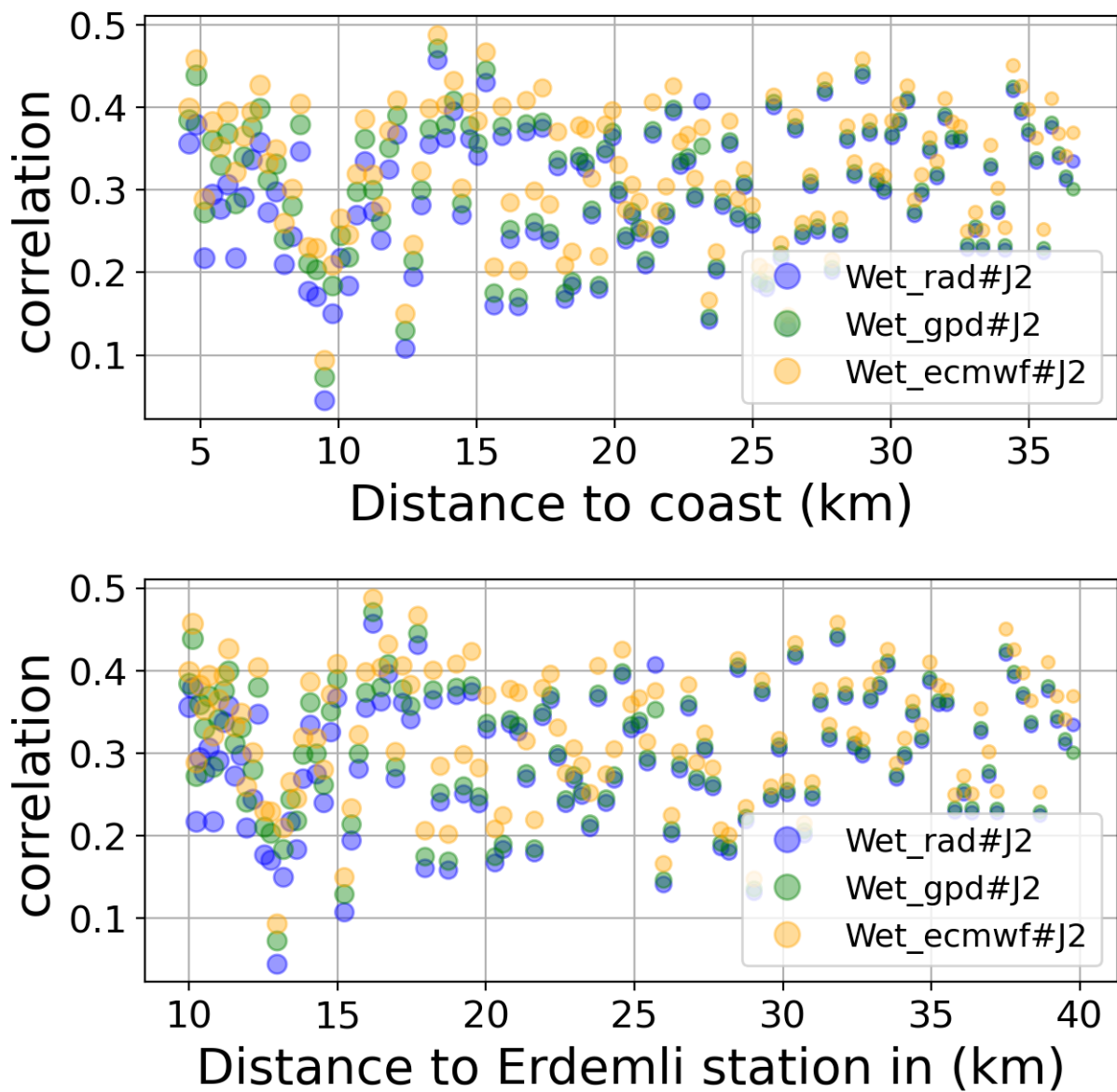


FIGURE 128 – Correlation in function of the distance to the coast/Erdemli station

6.8.8 Taylor Diagram

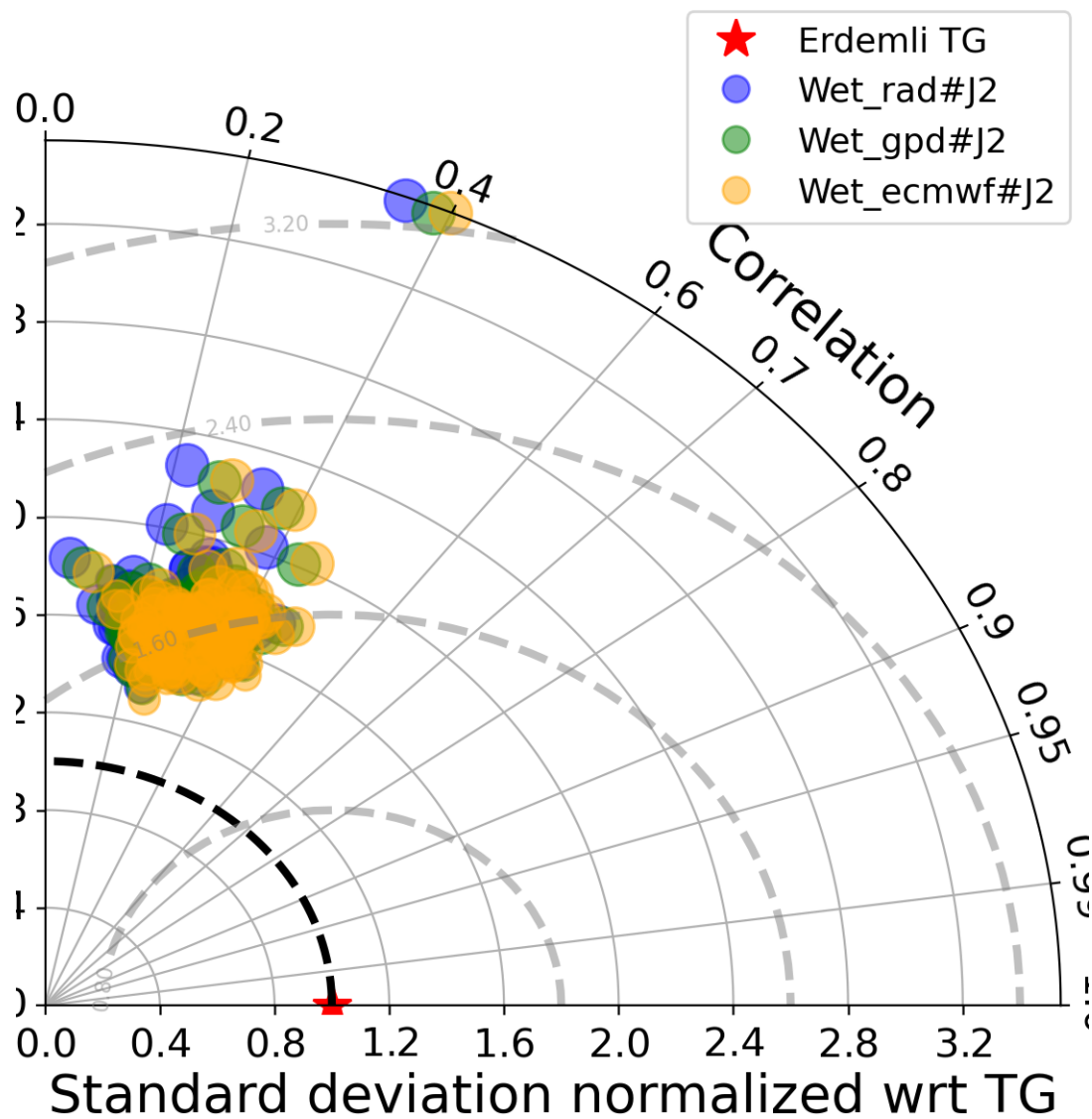


FIGURE 129 – Taylor diagram

6.8.9 Mean statistics table of products comparison with Erdemli tide gauge data

The table below contains the mean statistics of the common points between the different products in the selected area.

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
Wet_rad#J2	92.217	0.292	0.114	0.115
Wet_gpd#J2	92.198	0.305	0.114	0.114
Wet_ecmwf#J2	92.207	0.328	0.113	0.111

FIGURE 130 – Mean statistics table of the common points in the altimetry products

6.8.10 The most correlated sla altimetry Time series with the tide gauge sla time serie

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 87 point.

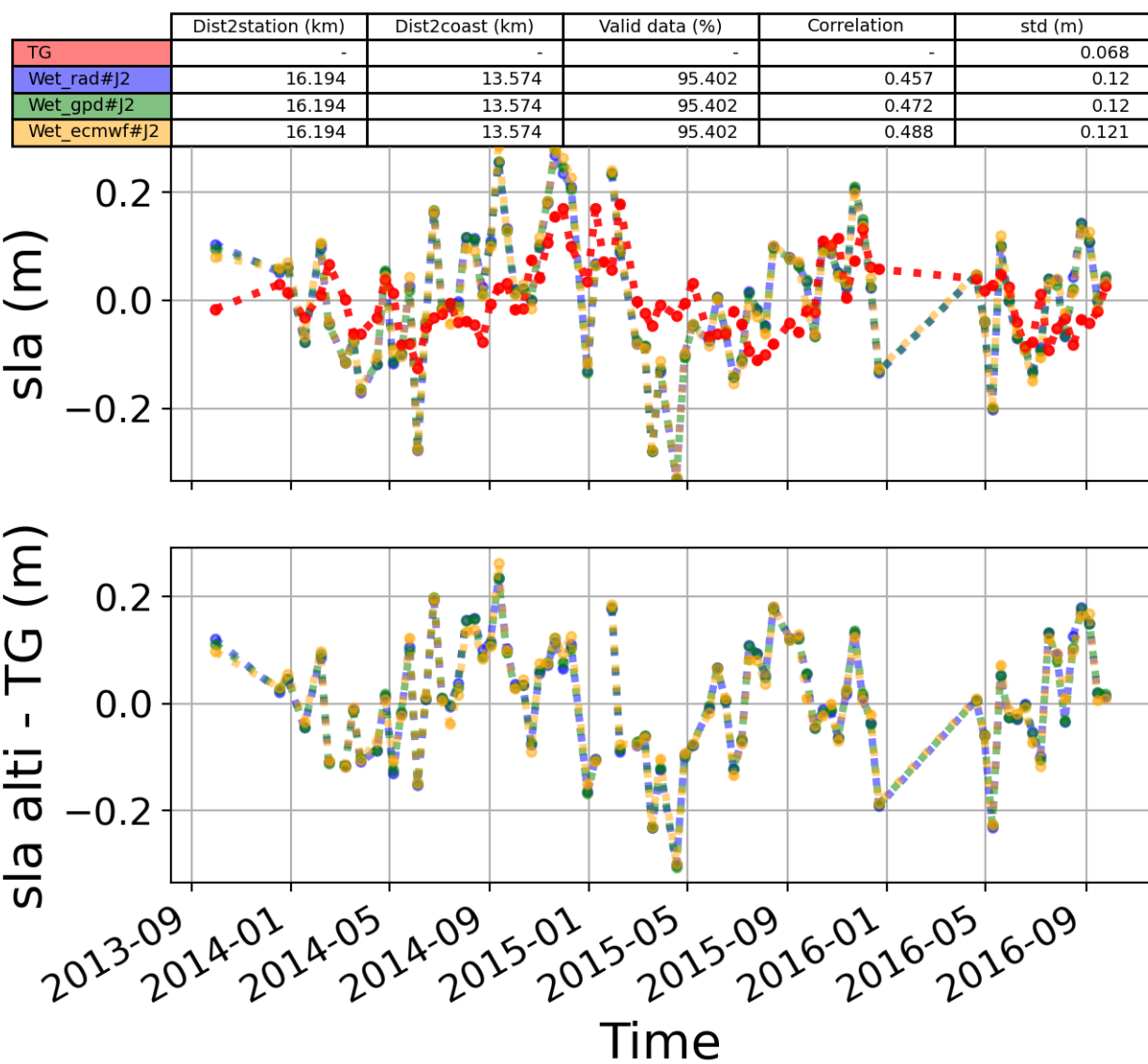


FIGURE 131 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.9 Station : Almeria

- Nearest track to Almeria station is the track number track96
- The area of interest is limited by :
 - A circle which it's center is the Almeria tide gauge station location and has a Raduis of 40 Km

6.9.1 correlation visualization in maps view % Almeria tide gauge

Correlation Altimetry data with respect to Almeria Tide gauge data

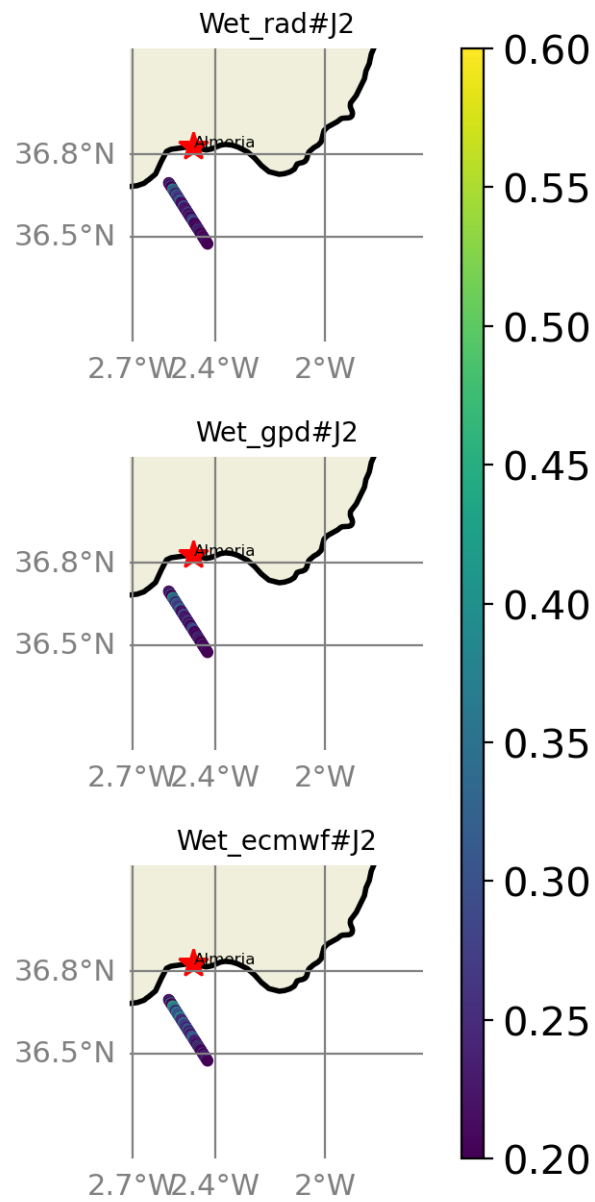


FIGURE 132 – correlation visualization in maps view % Almeria tide gauge

6.9.2 rmsd visualization in maps view % Almeria tide gauge

Rmsd (m) Altimetry data with respect to Almeria Tide gauge data

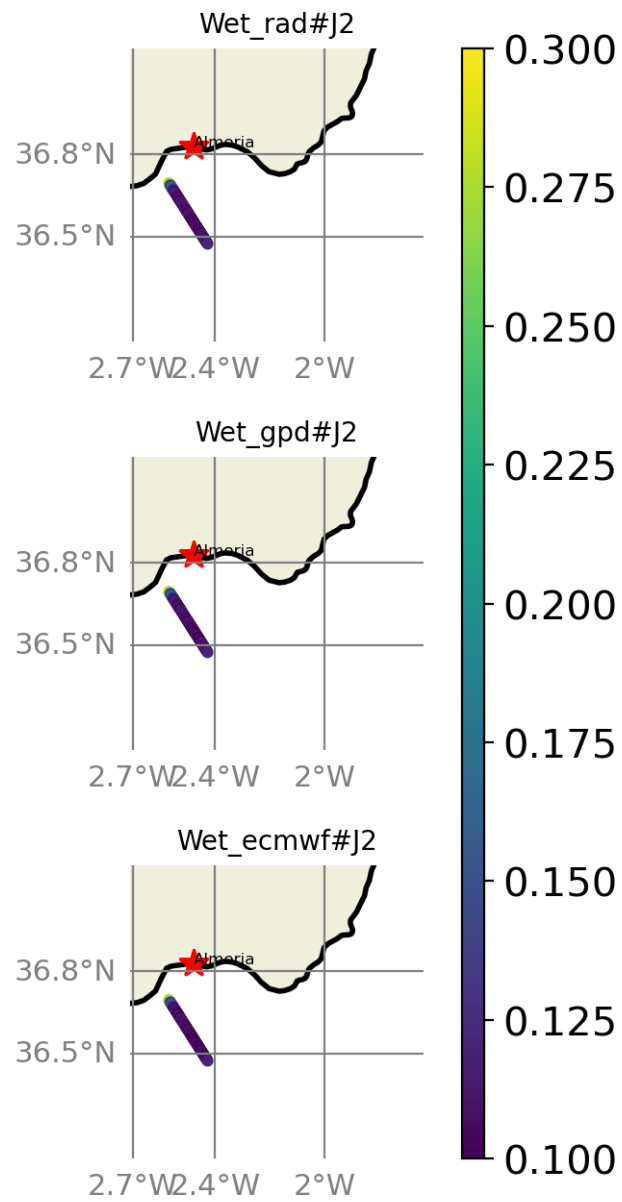


FIGURE 133 – rmsd visualization in maps view % Almeria tide gauge

6.9.3 std visualization in maps view % Almeria tide gauge

Std (m) Altimetry data with respect to Almeria Tide gauge data

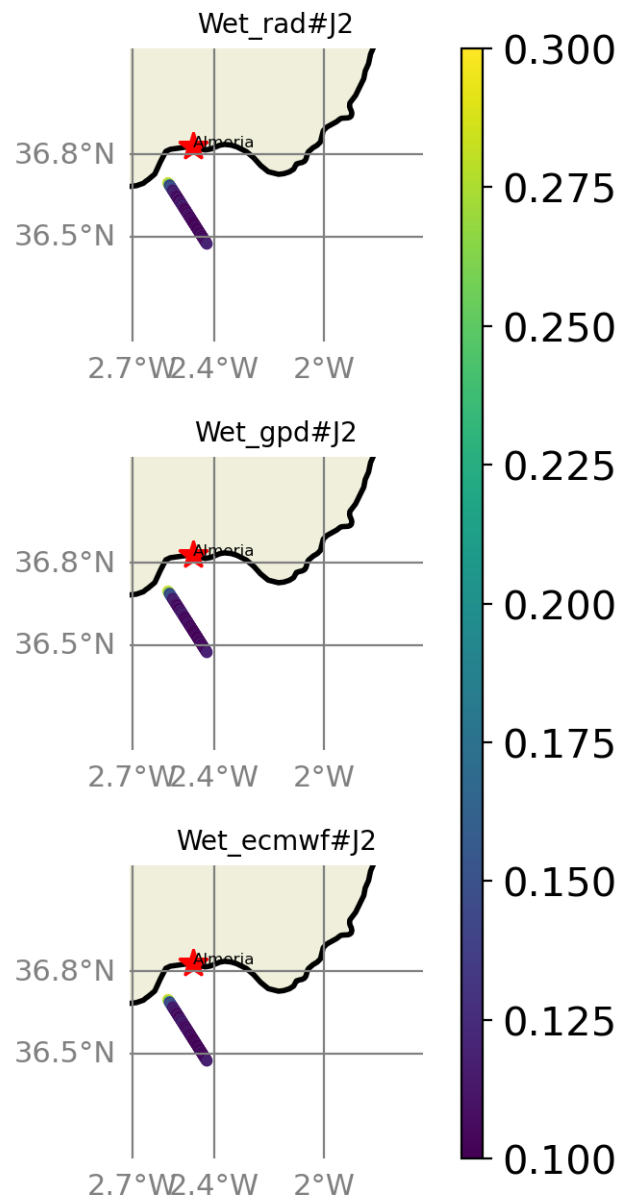


FIGURE 134 – std visualization in maps view % Almeria tide gauge

6.9.4 valid_data_percent visualization in maps view % Almeria tide gauge

Valid_Data_Percent (%) Altimetry data with respect to Almeria Tide gauge data

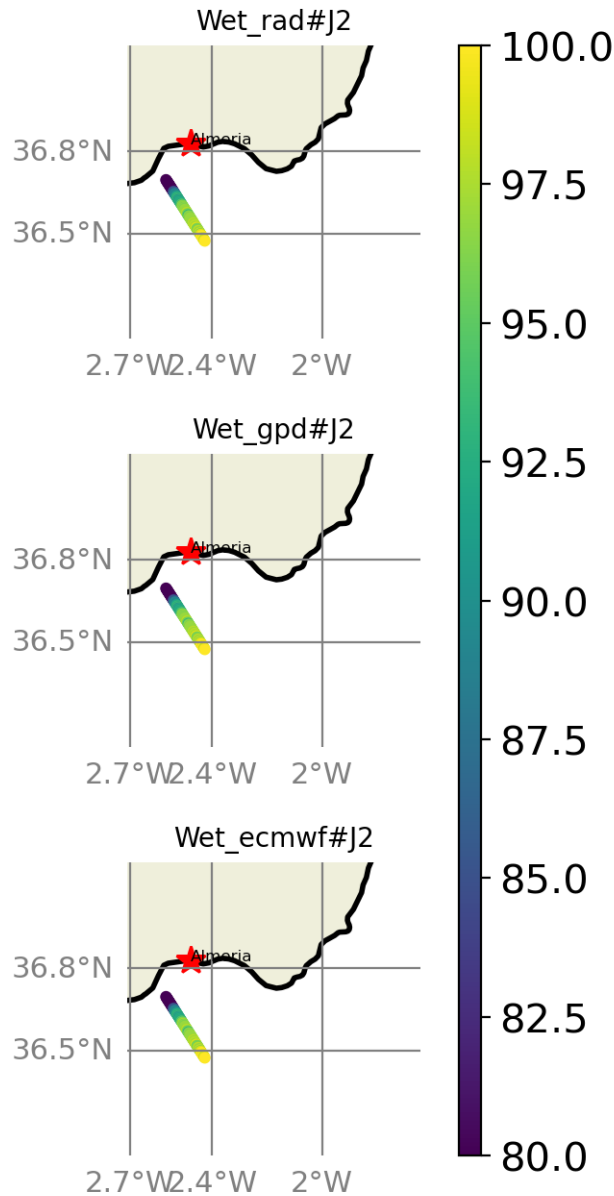


FIGURE 135 – valid_data_percent visualization in maps view % Almeria tide gauge

6.9.5 Valid data (%) in function of distance to coast/Almeria station

The formula to calculate the percentage of valid data in each time serie is;

$$pvd_i = \frac{nvd_i}{maxNB}, i = 1, np$$

Where pvd and nvd are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 97$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

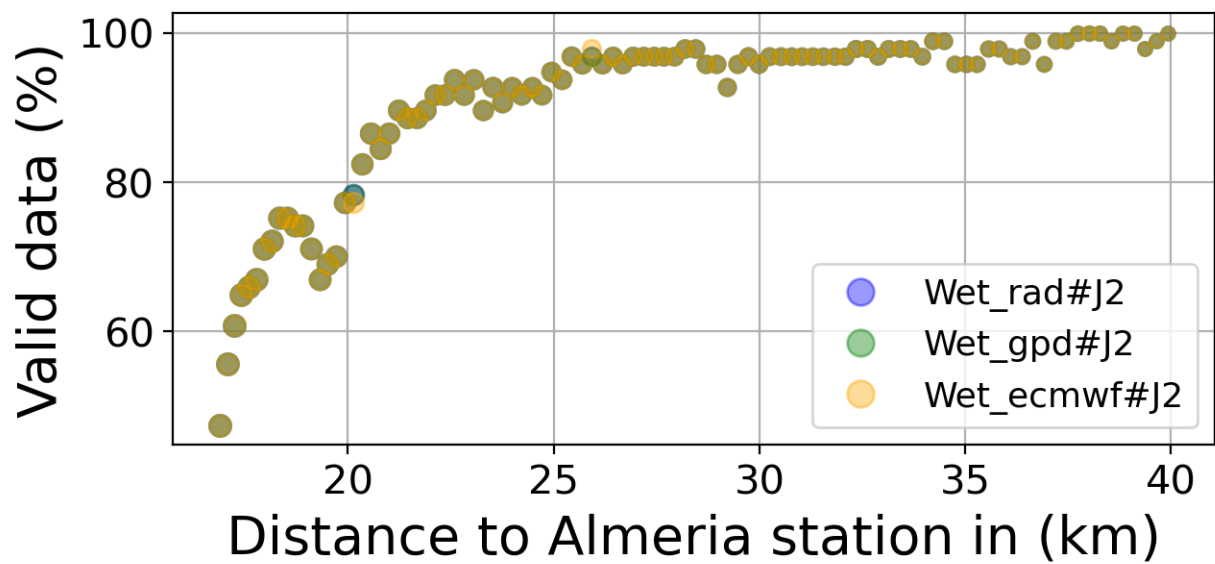
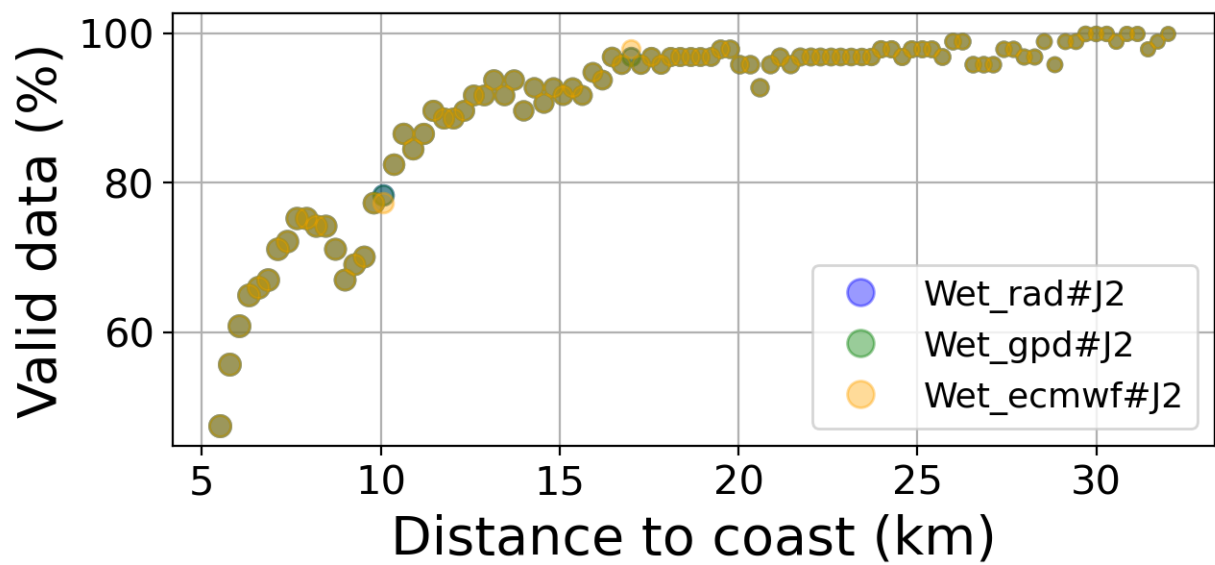


FIGURE 136 – Valid data (%) in function of distance to coast/Almeria station

6.9.6 Std in function of distance to coast/Almeria station

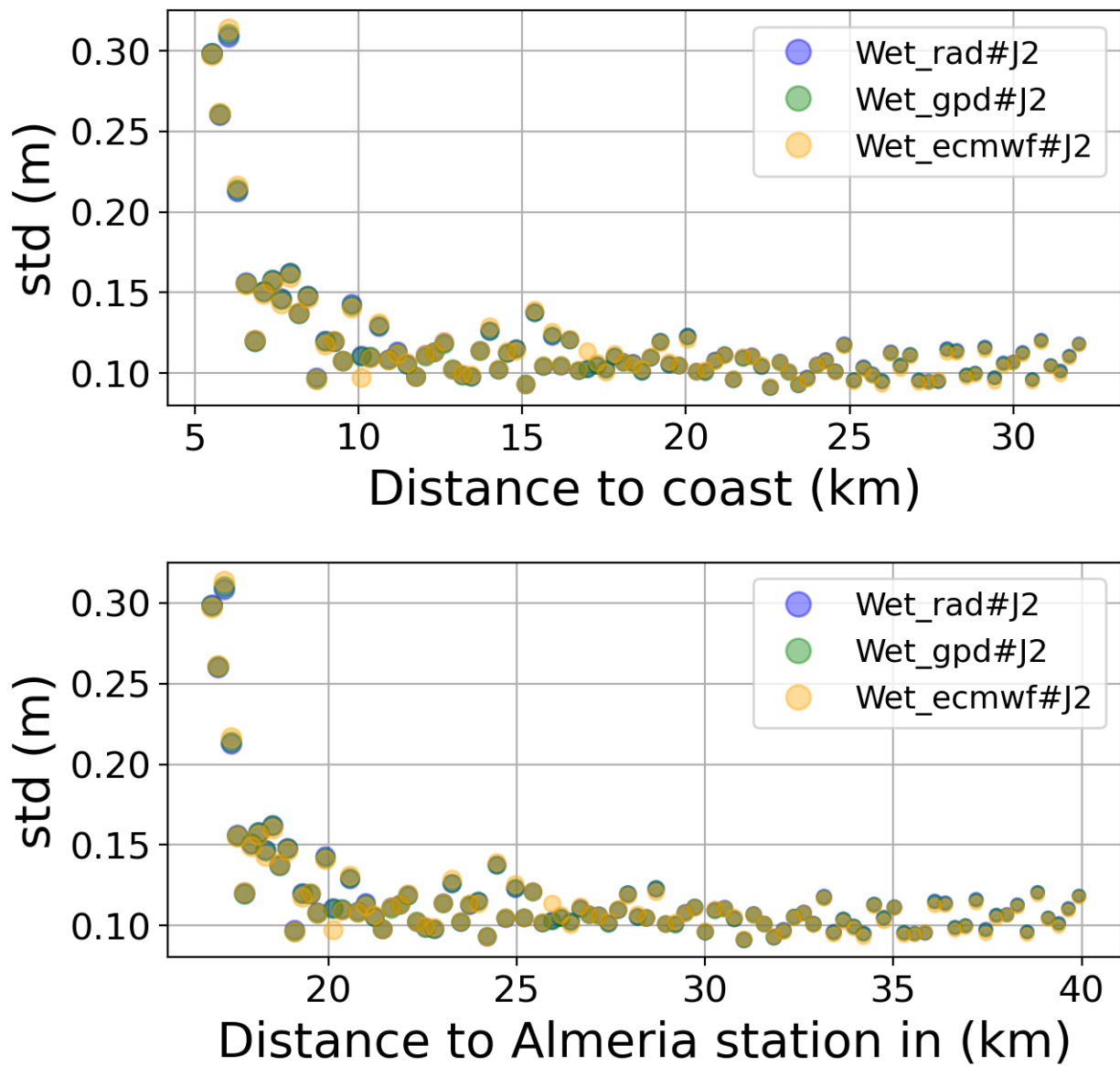


FIGURE 137 – Std in function of the distance to the coast/Almeria station

6.9.7 Correlation in function of distance to coast/Almeria station

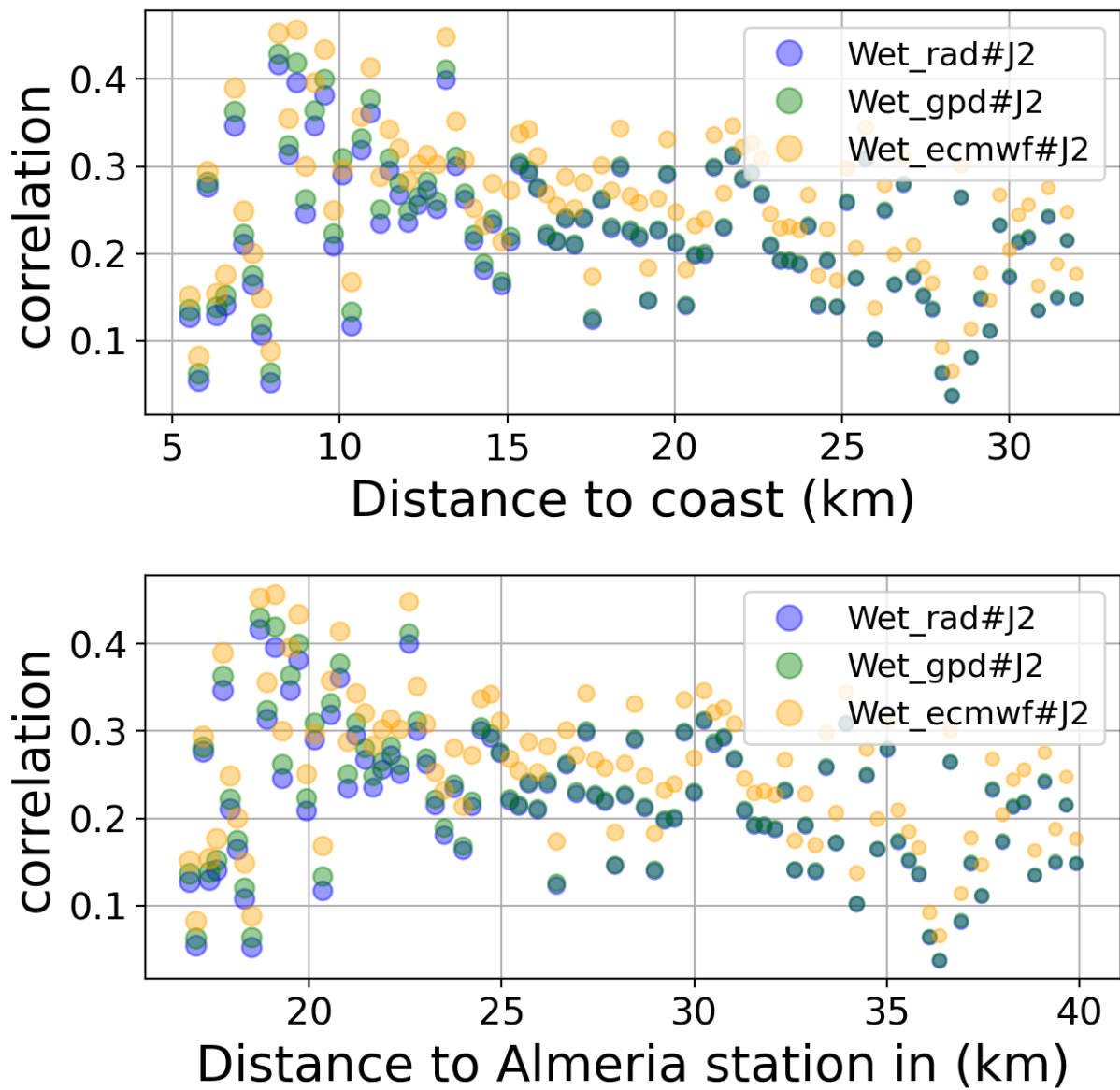


FIGURE 138 – Correlation in function of the distance to the coast/Almeria station

6.9.8 Taylor Diagram

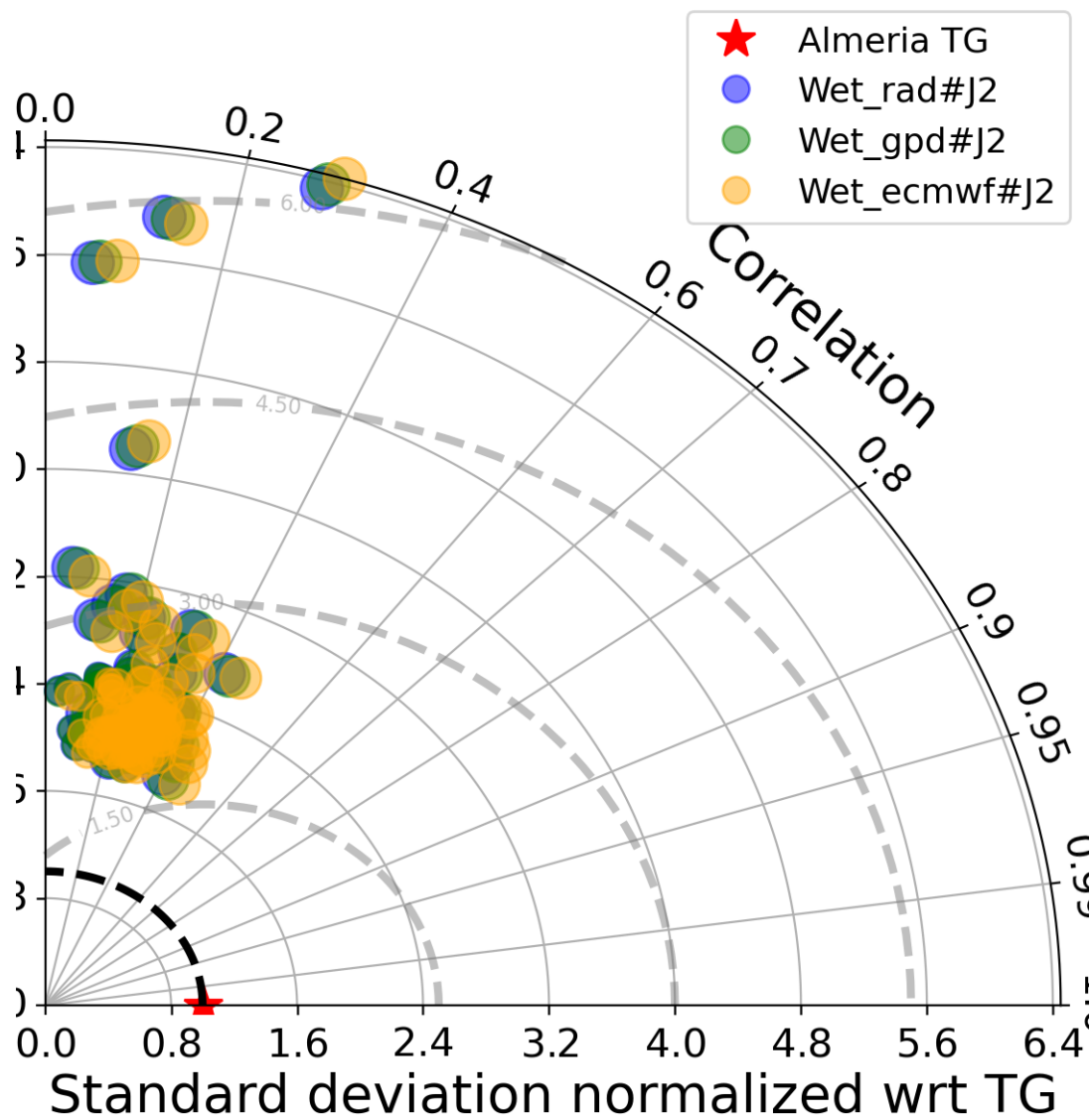


FIGURE 139 – Taylor diagram

6.9.9 Mean statistics table of products comparison with Almeria tide gauge data

The table below contains the mean statistics of the common points between the different products in the selected area.

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
Wet_rad#J2	90.442	0.22	0.118	0.118
Wet_gpd#J2	90.442	0.226	0.118	0.117
Wet_ecmwf#J2	90.442	0.26	0.118	0.116

FIGURE 140 – Mean statistics table of the common points in the altimetry products

6.9.10 The most correlated sla altimetry Time series with the tide gauge sla time serie

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 97 point.

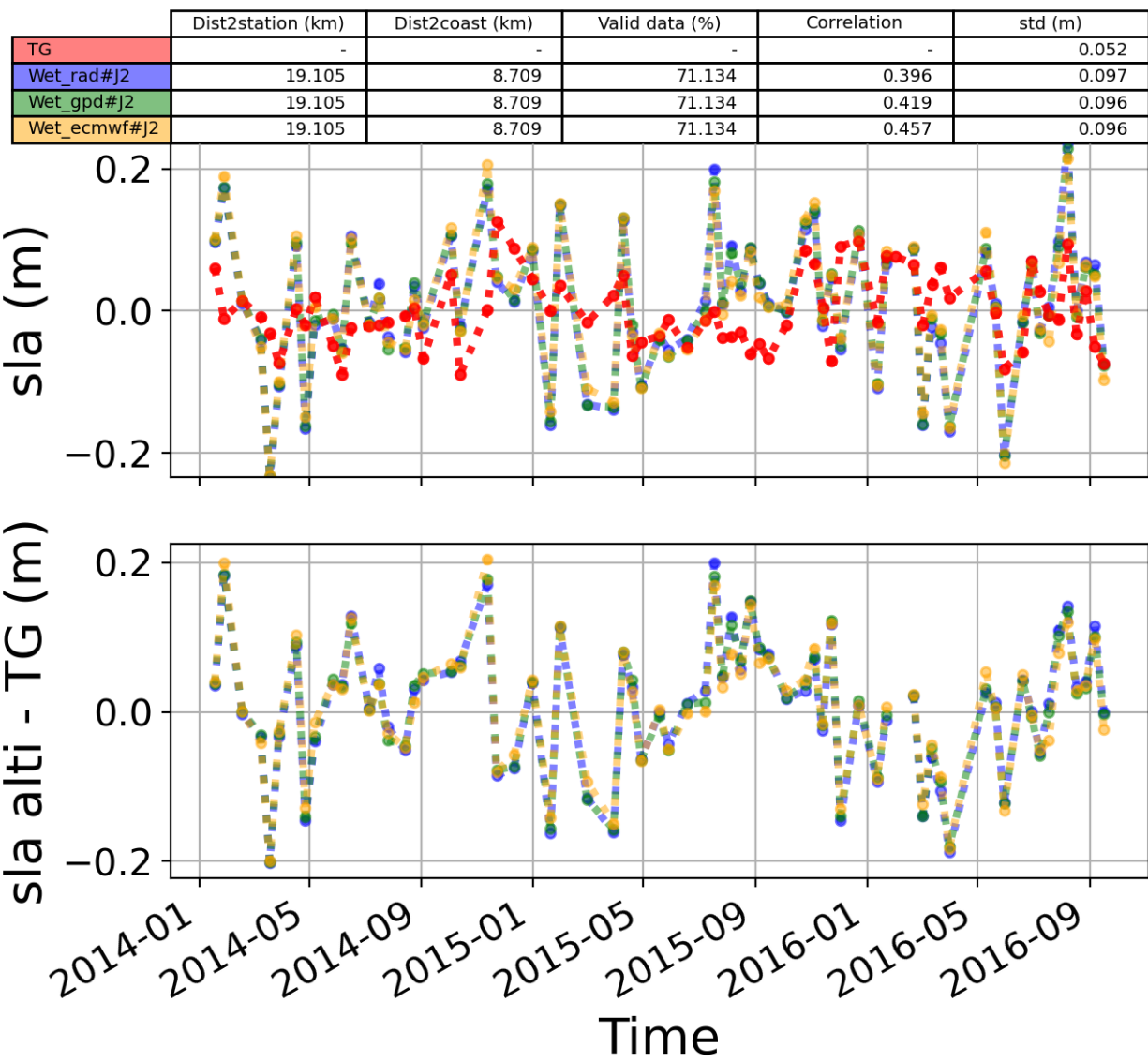


FIGURE 141 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

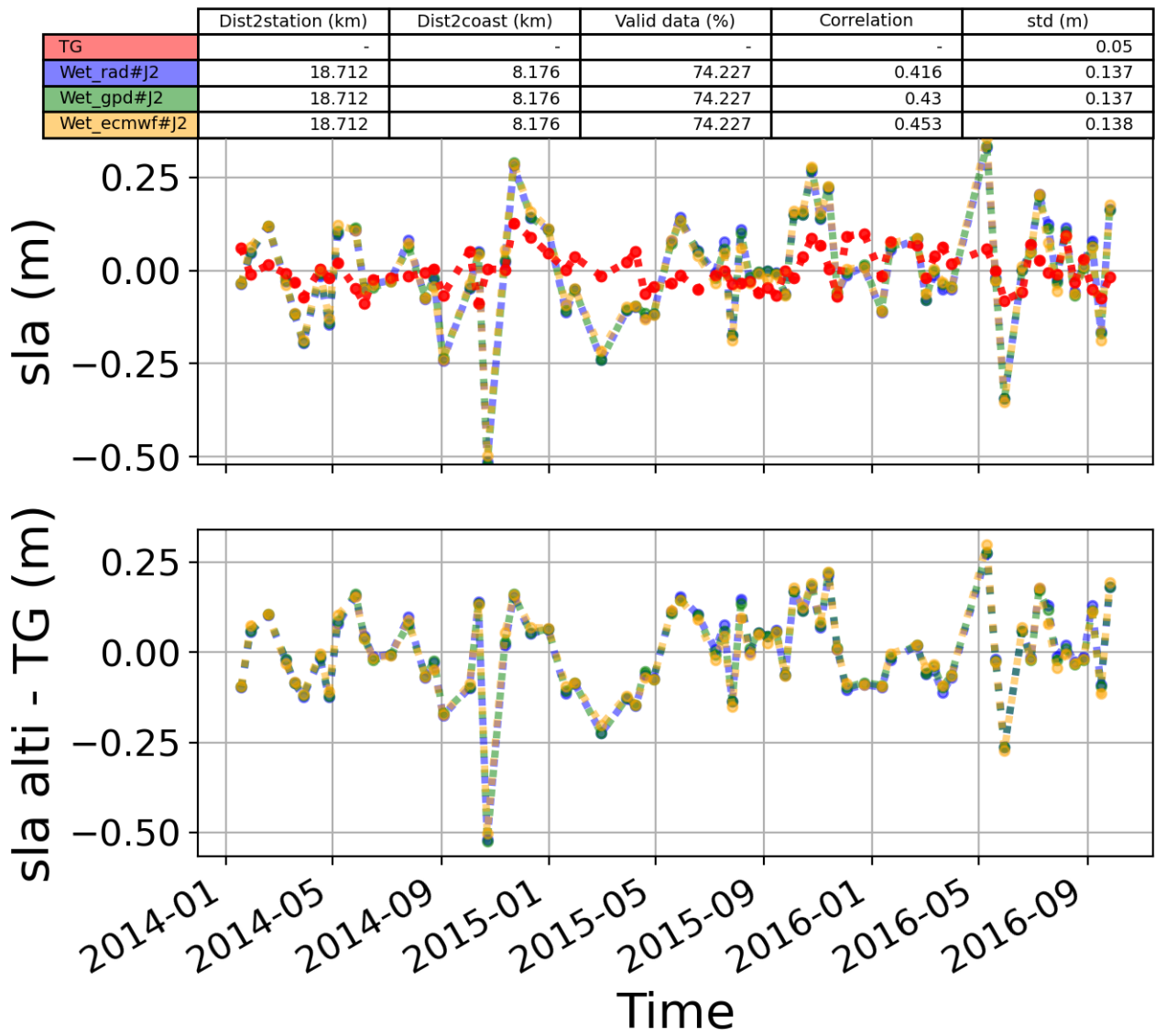


FIGURE 142 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.10 Station : Civitavecchia

- Nearest track to Civitavecchia station is the track number track161
- The area of interest is limited by :
 - A circle which it's center is the Civitavecchia tide gauge station location and has a Raduis of 40 Km

6.10.1 correlation visualization in maps view % Civitavecchia tide gauge

Correlation Altimetry data with respect to Civitavecchia Tide gauge data

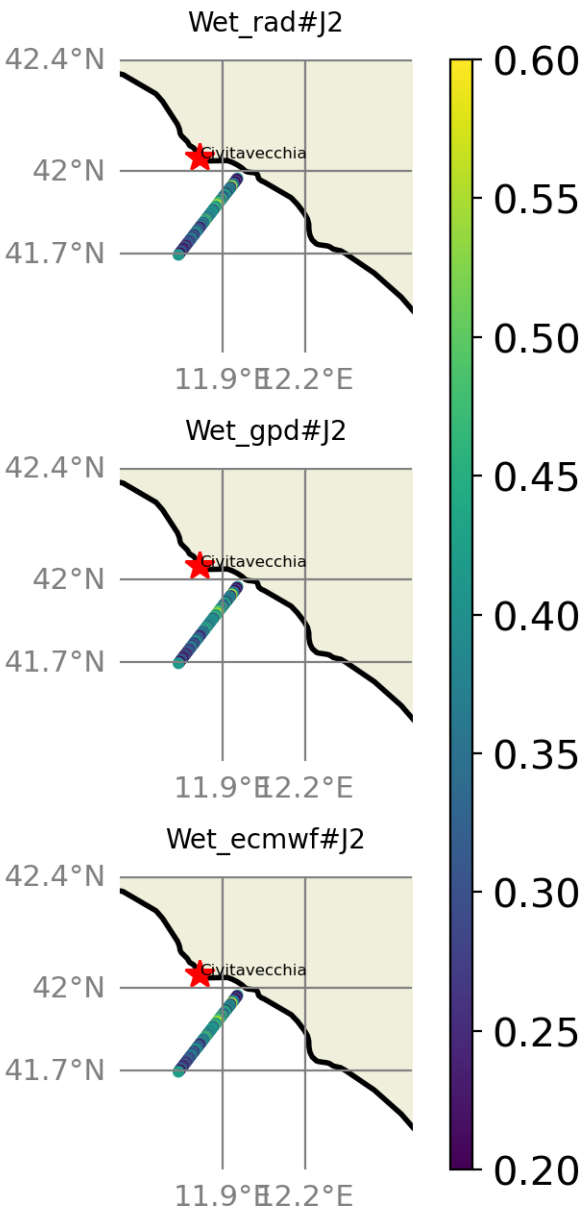


FIGURE 143 – correlation visualization in maps view % Civitavecchia tide gauge

6.10.2 rmsd visualization in maps view % Civitavecchia tide gauge

Rmsd (m) Altimetry data with respect to Civitavecchia Tide gauge data

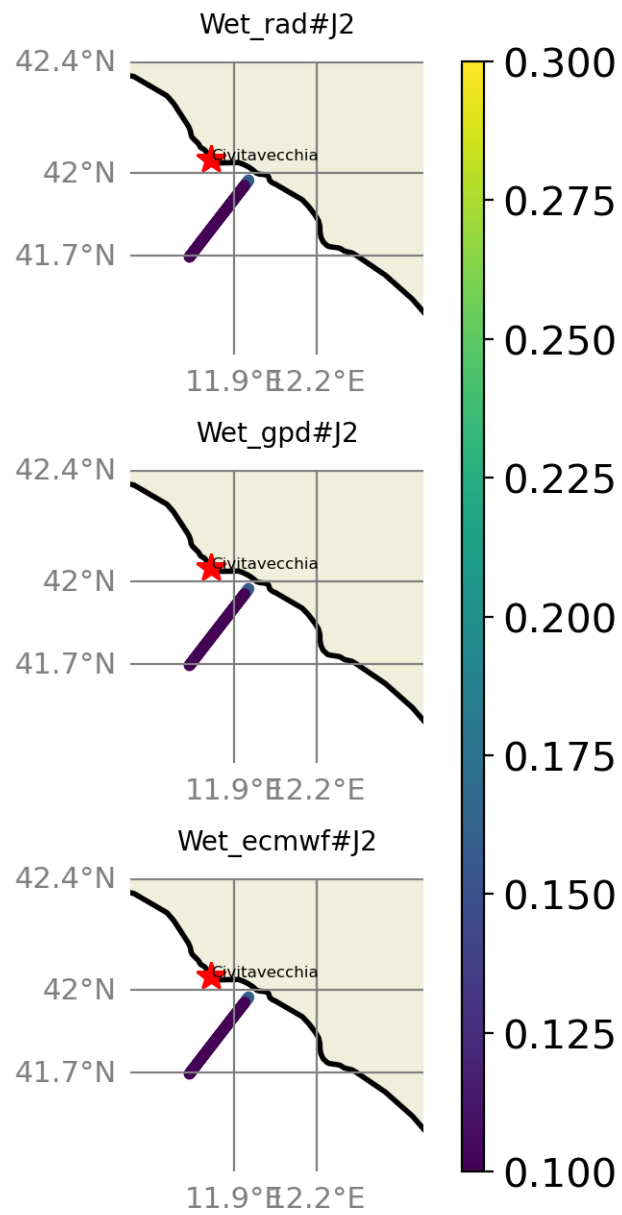


FIGURE 144 – rmsd visualization in maps view % Civitavecchia tide gauge

6.10.3 std visualization in maps view % Civitavecchia tide gauge

Std (m) Altimetry data with respect to Civitavecchia Tide gauge data

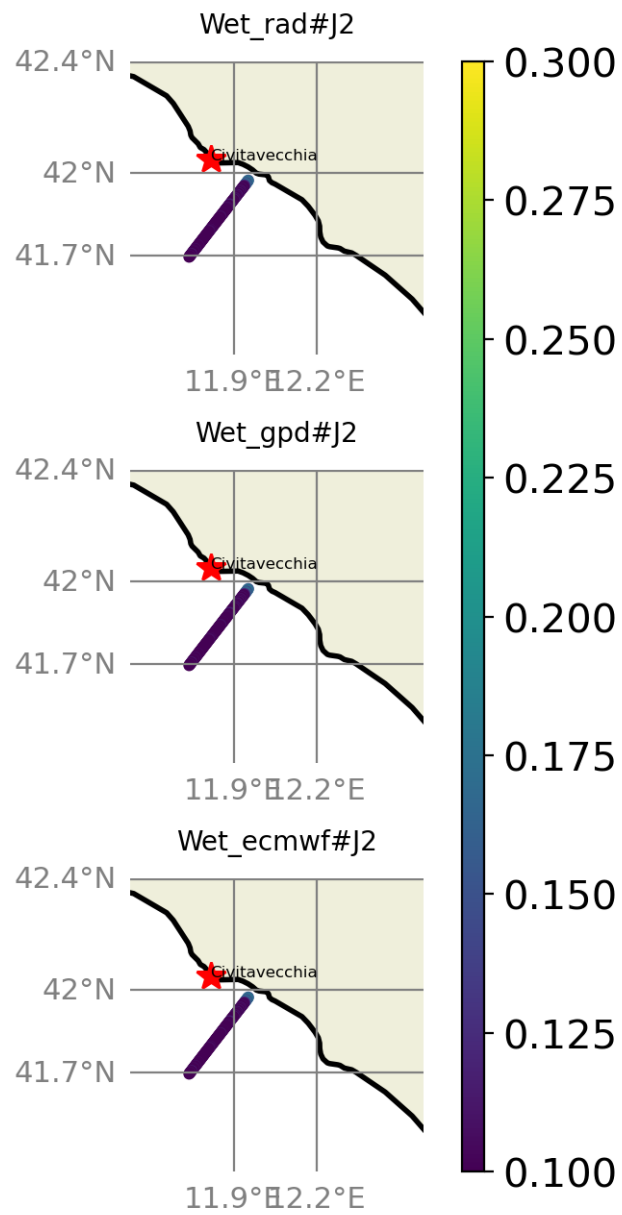


FIGURE 145 – std visualization in maps view % Civitavecchia tide gauge

6.10.4 valid_data_percent visualization in maps view % Civitavecchia tide gauge

Valid_Data_Percent (%) Altimetry data with respect to Civitavecchia Tide gauge data

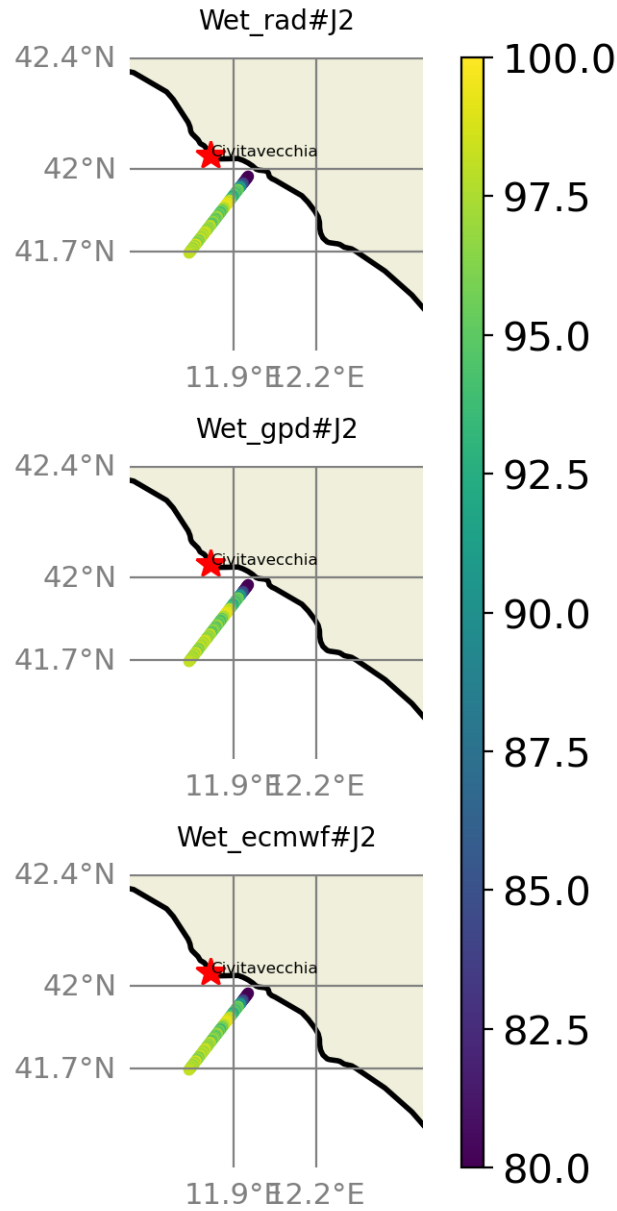


FIGURE 146 – valid_data_percent visualization in maps view % Civitavecchia tide gauge

6.10.5 Valid data (%) in function of distance to coast/Civitavecchia station

The formula to calculate the percentage of valid data in each time series is;

$$pvd_i = \frac{nvd_i}{maxNB}, i = 1, np$$

Where pvd and nvd are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time series, respectively in the time series, i is the index of the time series, np is the number of the selected altimetry time series. $maxNB = 107$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time series.

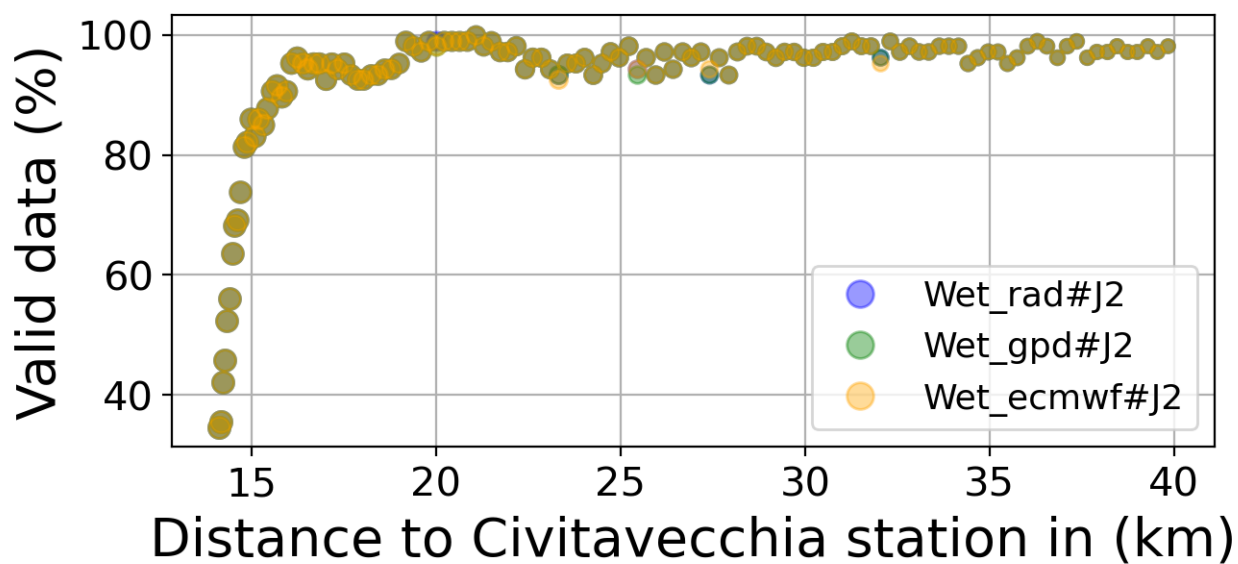
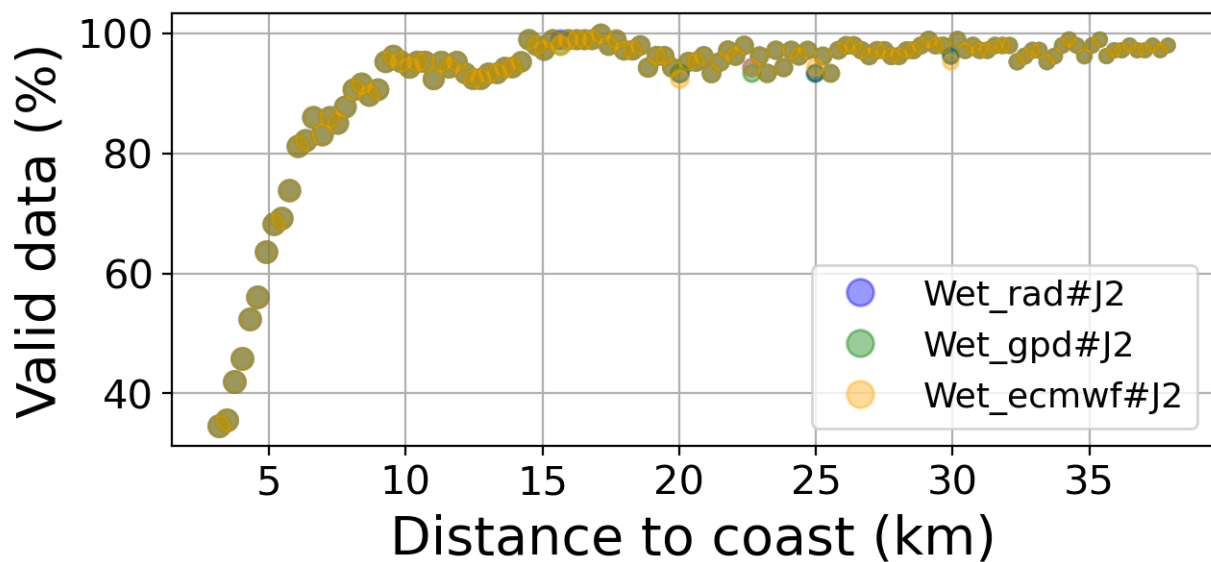


FIGURE 147 – Valid data (%) in function of distance to coast/Civitavecchia station

6.10.6 Std in function of distance to coast/Civitavecchia station

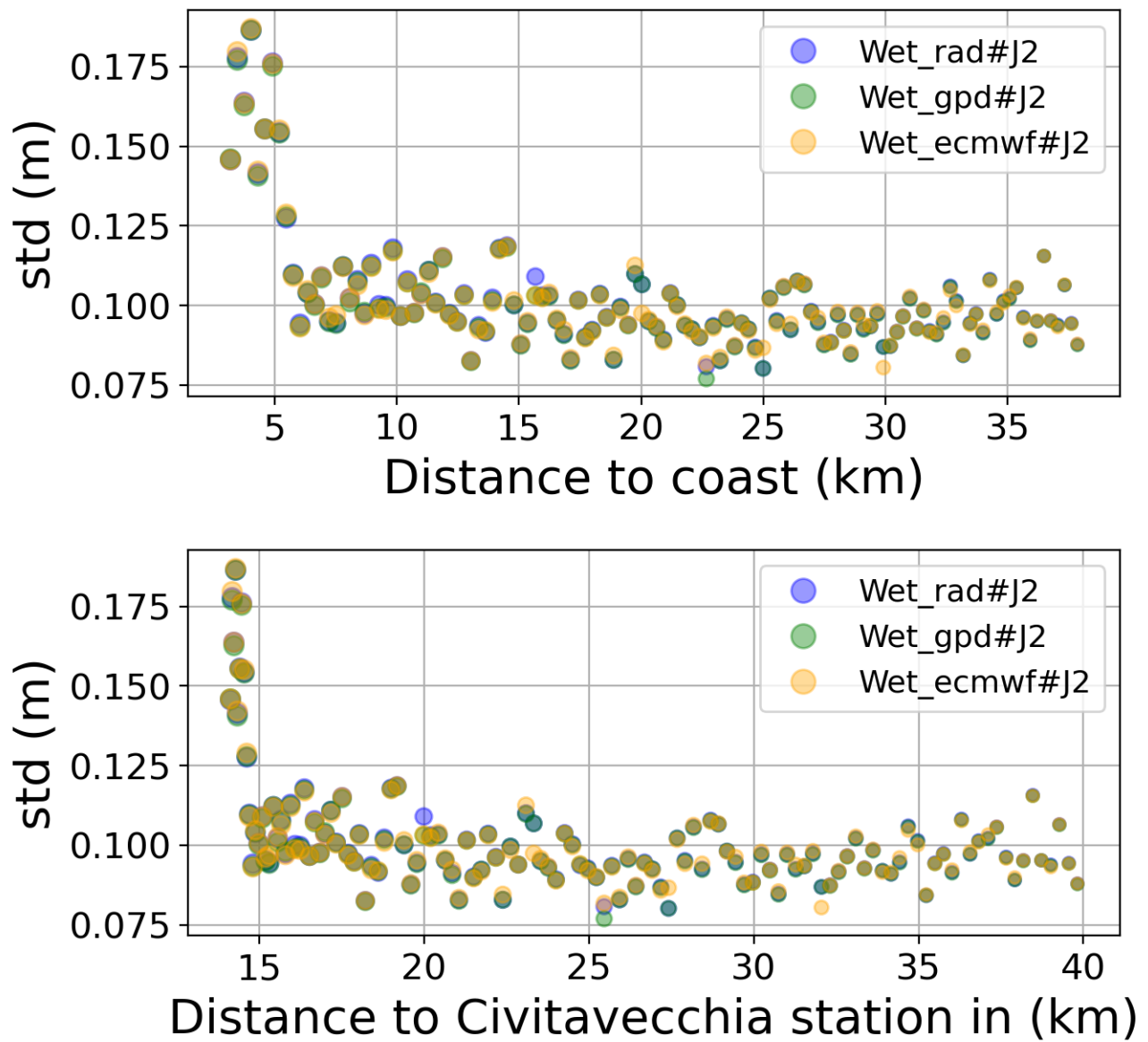


FIGURE 148 – Std in function of the distance to the coast/Civitavecchia station

6.10.7 Correlation in function of distance to coast/Civitavecchia station

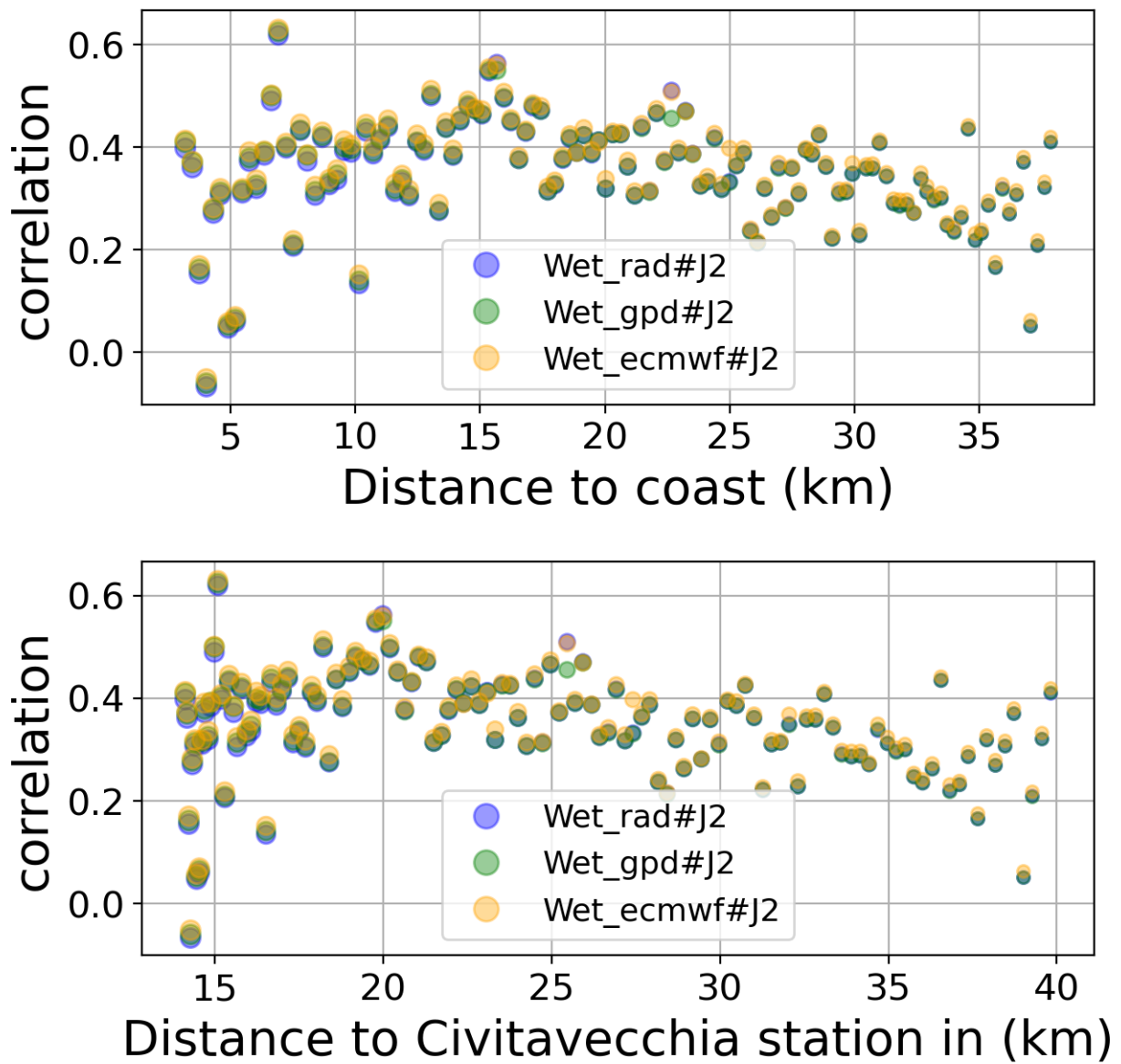


FIGURE 149 – Correlation in function of the distance to the coast/Civitavecchia station

6.10.8 Taylor Diagram

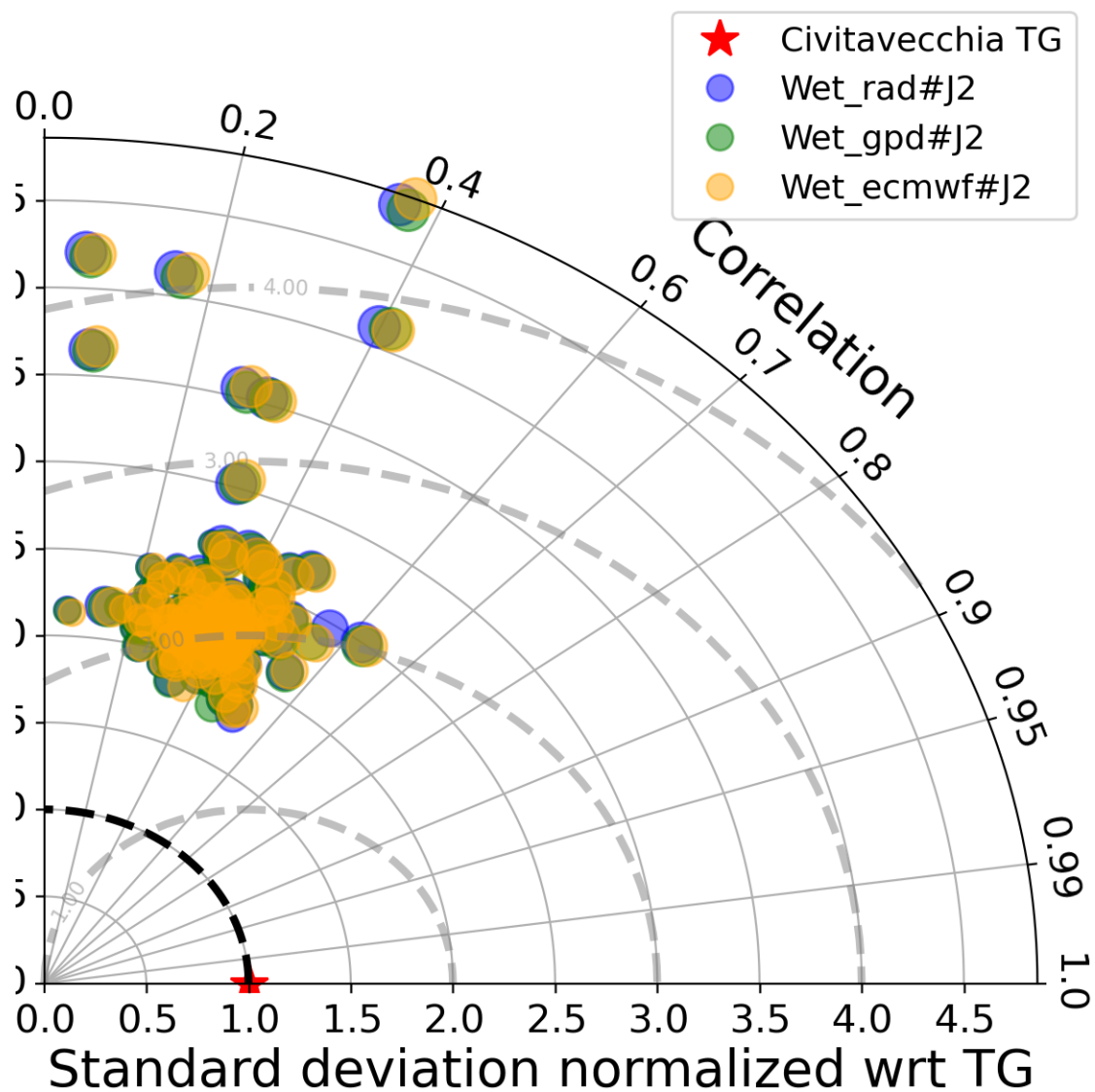


FIGURE 150 – Taylor diagram

6.10.9 Mean statistics table of products comparison with Civitavecchia tide gauge data

The table below contains the mean statistics of the common points between the different products in the selected area.

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
Wet_rad#J2	92.265	0.347	0.102	0.096
Wet_gpd#J2	92.25	0.349	0.102	0.096
Wet_ecmwf#J2	92.25	0.357	0.102	0.096

FIGURE 151 – Mean statistics table of the common points in the altimetry products

6.10.10 The most correlated sla altimetry Time series with the tide gauge sla time serie

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 107 point.

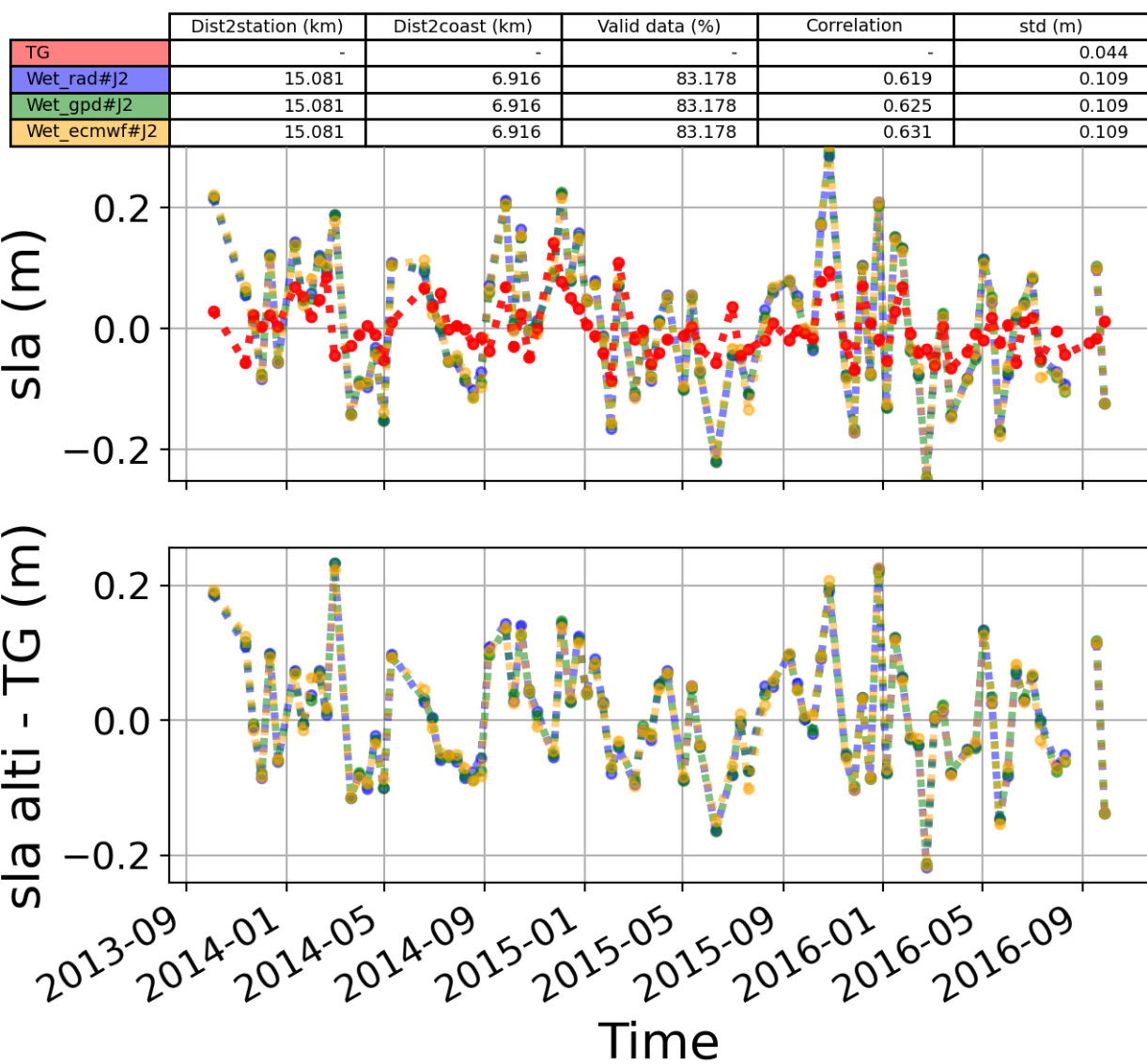


FIGURE 152 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.11 Station : FOS-SUR-MER

- Nearest track to FOS-SUR-MER station is the track number track187
- The area of interest is limited by :
 - A circle which it's center is the FOS-SUR-MER tide gauge station location and has a Raduis of 40 Km

6.11.1 correlation visualization in maps view % FOS-SUR-MER tide gauge

Correlation Altimetry data with respect to FOS-SUR-MER Tide gauge data

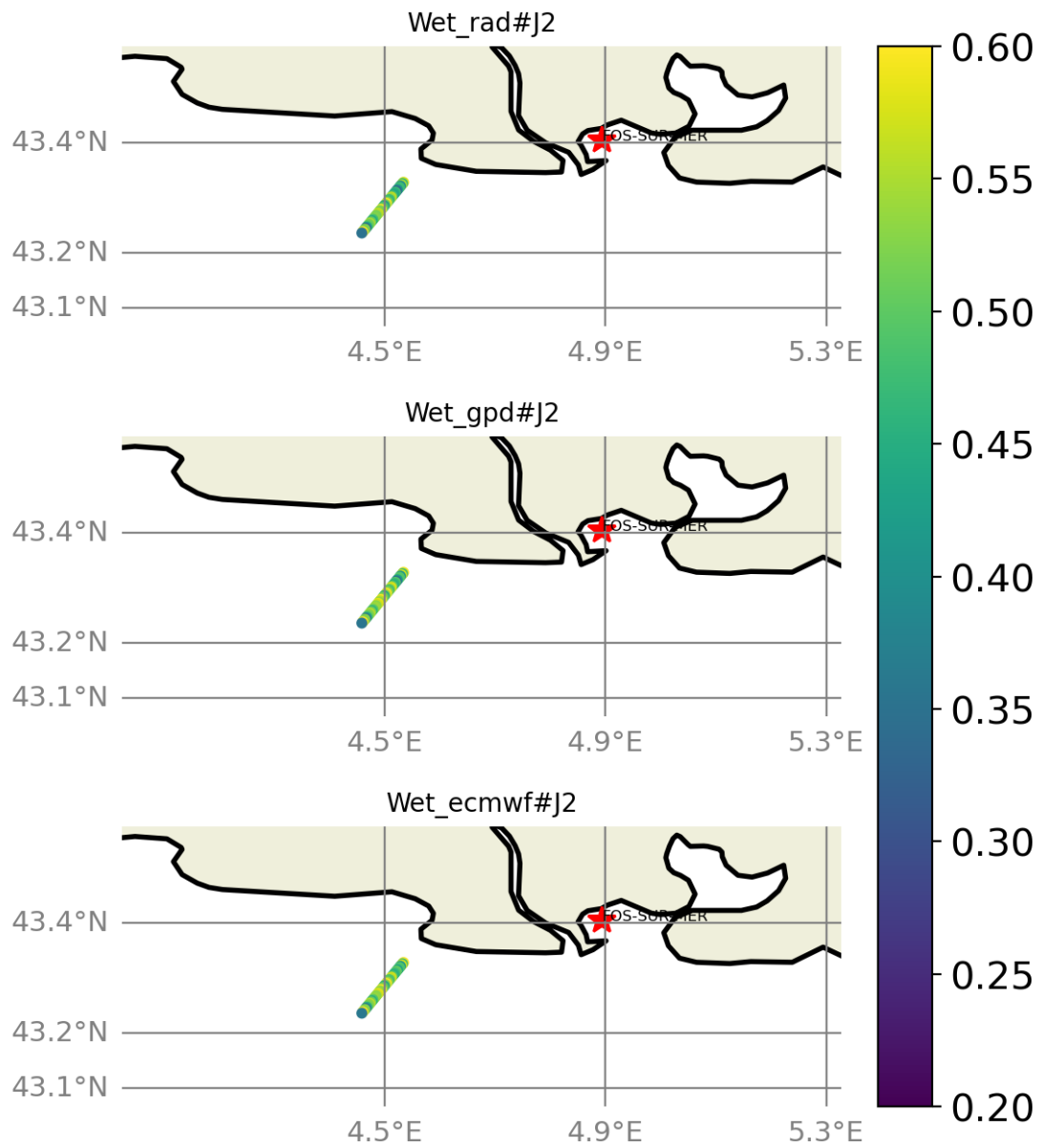


FIGURE 153 – correlation visualization in maps view % FOS-SUR-MER tide gauge

6.11.2 rmsd visualization in maps view % FOS-SUR-MER tide gauge

Rmsd (m) Altimetry data with respect to FOS-SUR-MER Tide gauge data

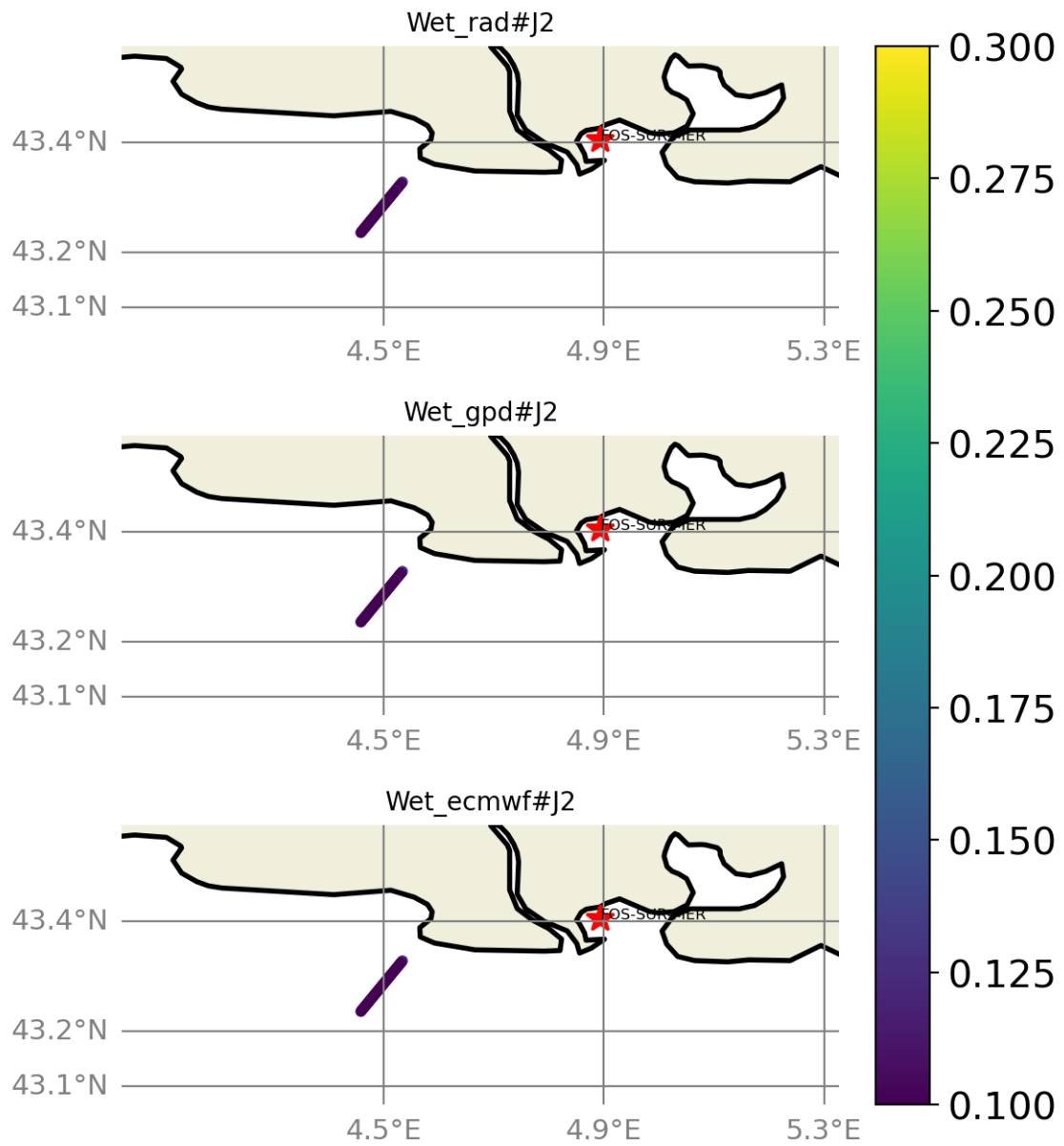


FIGURE 154 – rmsd visualization in maps view % FOS-SUR-MER tide gauge

6.11.3 std visualization in maps view % FOS-SUR-MER tide gauge

Std (m) Altimetry data with respect to FOS-SUR-MER Tide gauge data

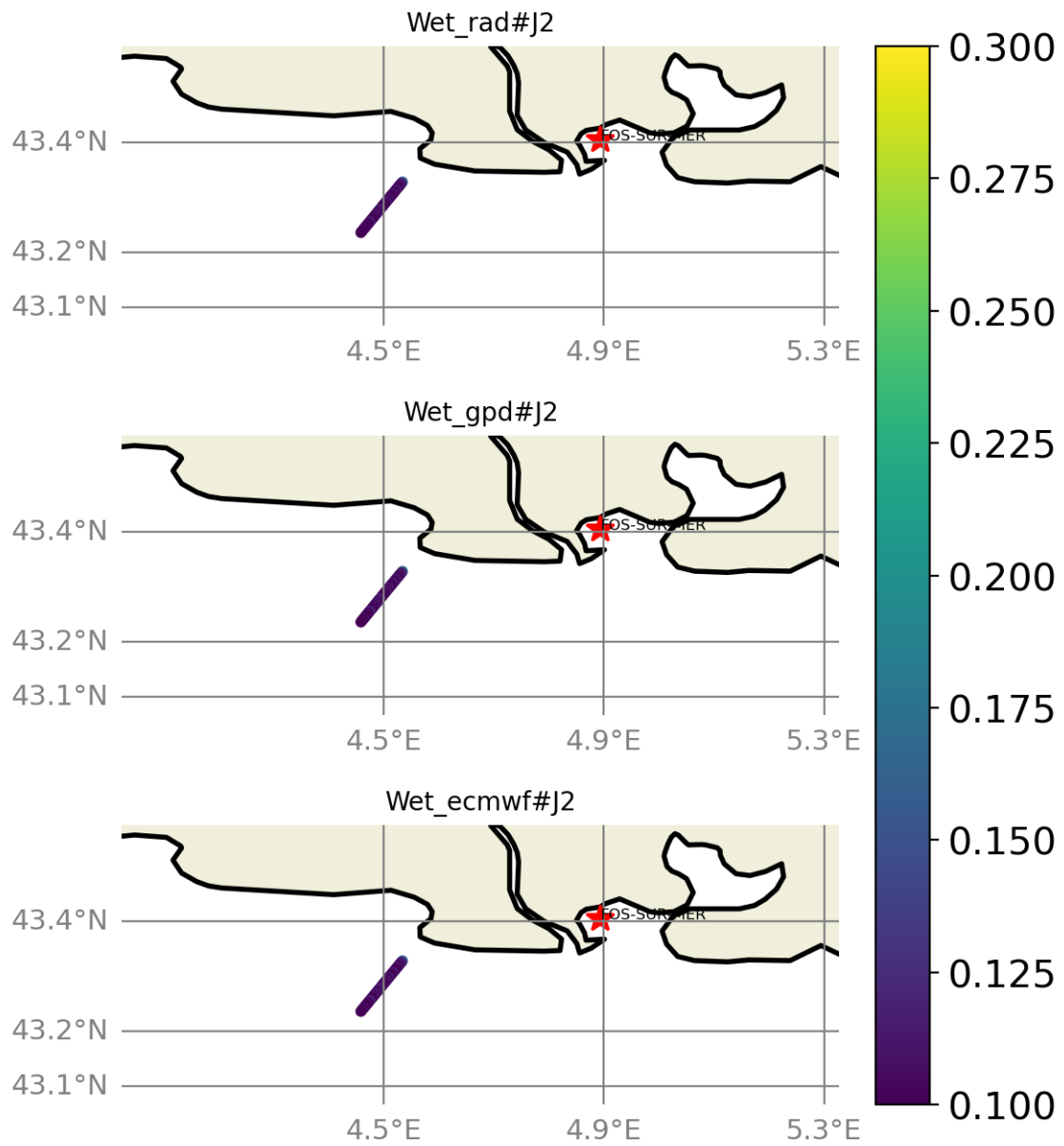


FIGURE 155 – std visualization in maps view % FOS-SUR-MER tide gauge

6.11.4 valid_data_percent visualization in maps view % FOS-SUR-MER tide gauge

Valid_Data_Percent (%) Altimetry data with respect to FOS-SUR-MER Tide gauge data

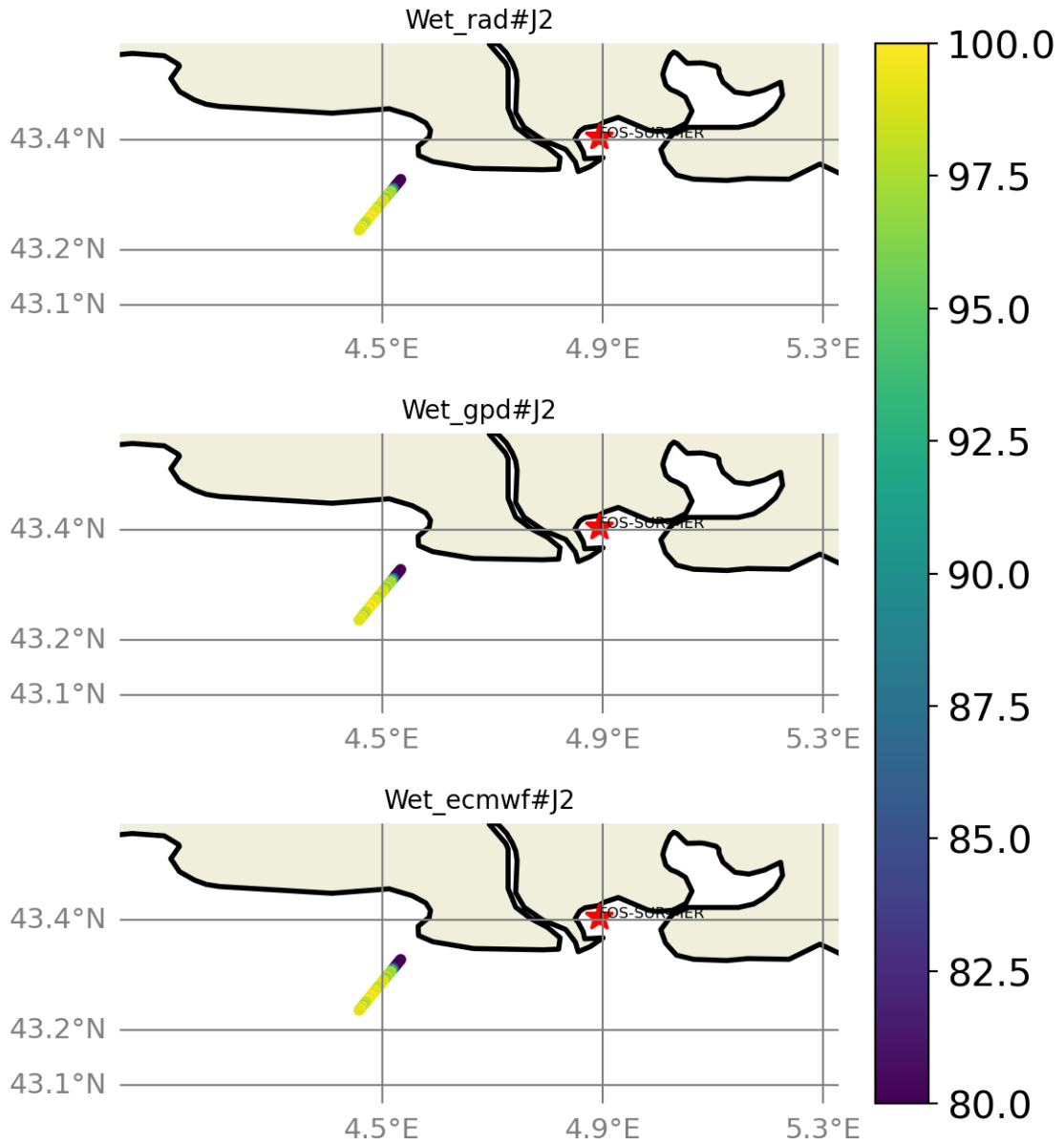


FIGURE 156 – valid_data_percent visualization in maps view % FOS-SUR-MER tide gauge

6.11.5 Valid data (%) in function of distance to coast/FOS-SUR-MER station

The formula to calculate the percentage of valid data in each time serie is;

$$pvd_i = \frac{nvd_i}{maxNB}, i = 1, np$$

Where pvd and nvd are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 103$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

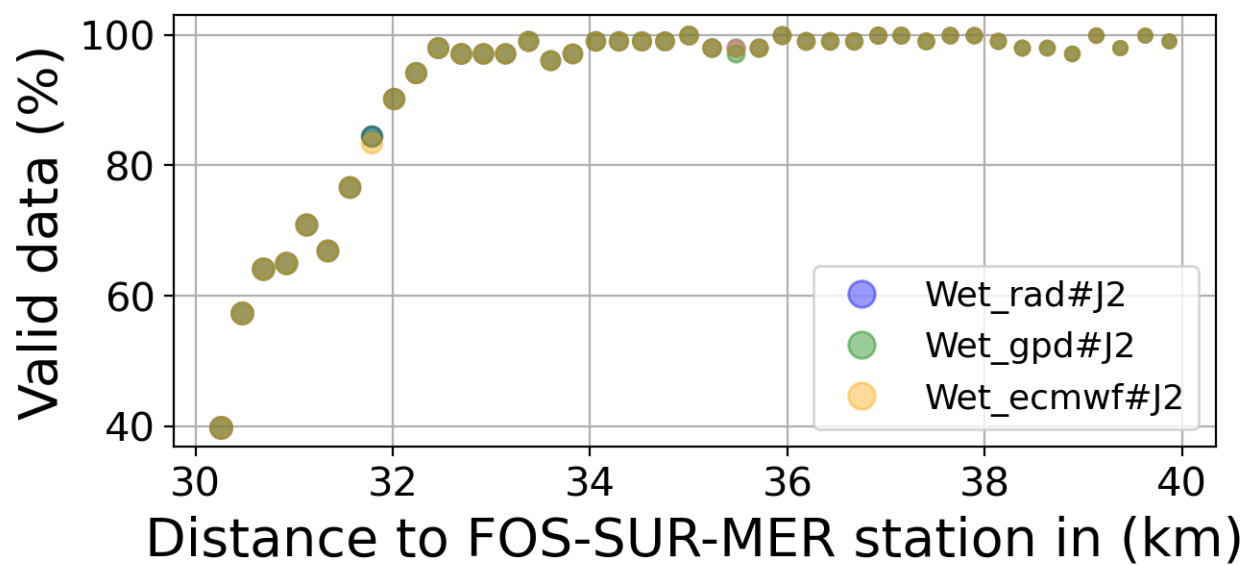
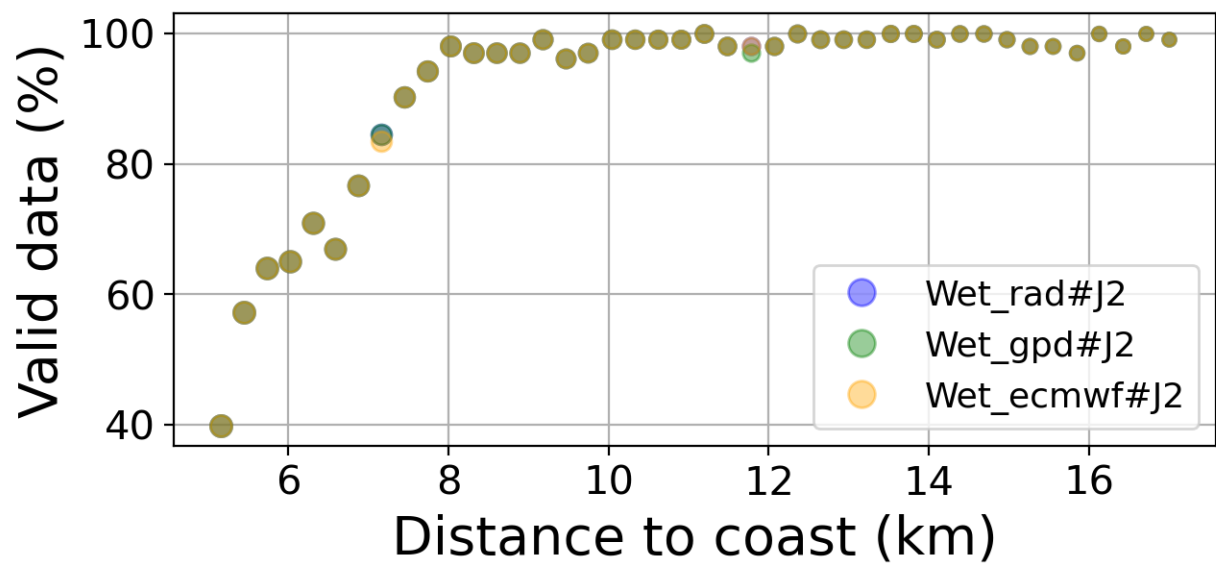


FIGURE 157 – Valid data (%) in function of distance to coast/FOS-SUR-MER station

6.11.6 Std in function of distance to coast/FOS-SUR-MER station

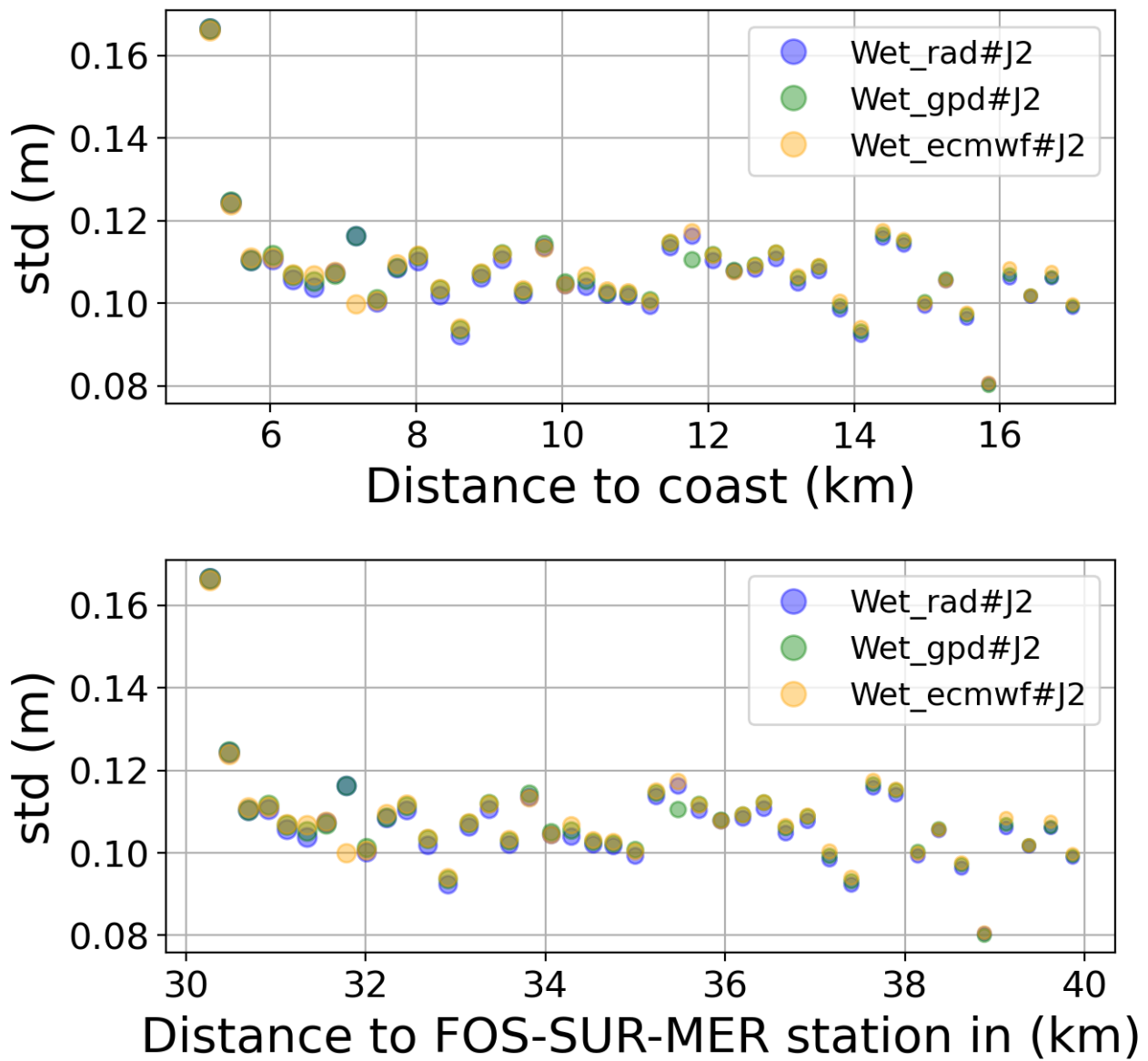


FIGURE 158 – Std in function of the distance to the coast/FOS-SUR-MER station

6.11.7 Correlation in function of distance to coast/FOS-SUR-MER station

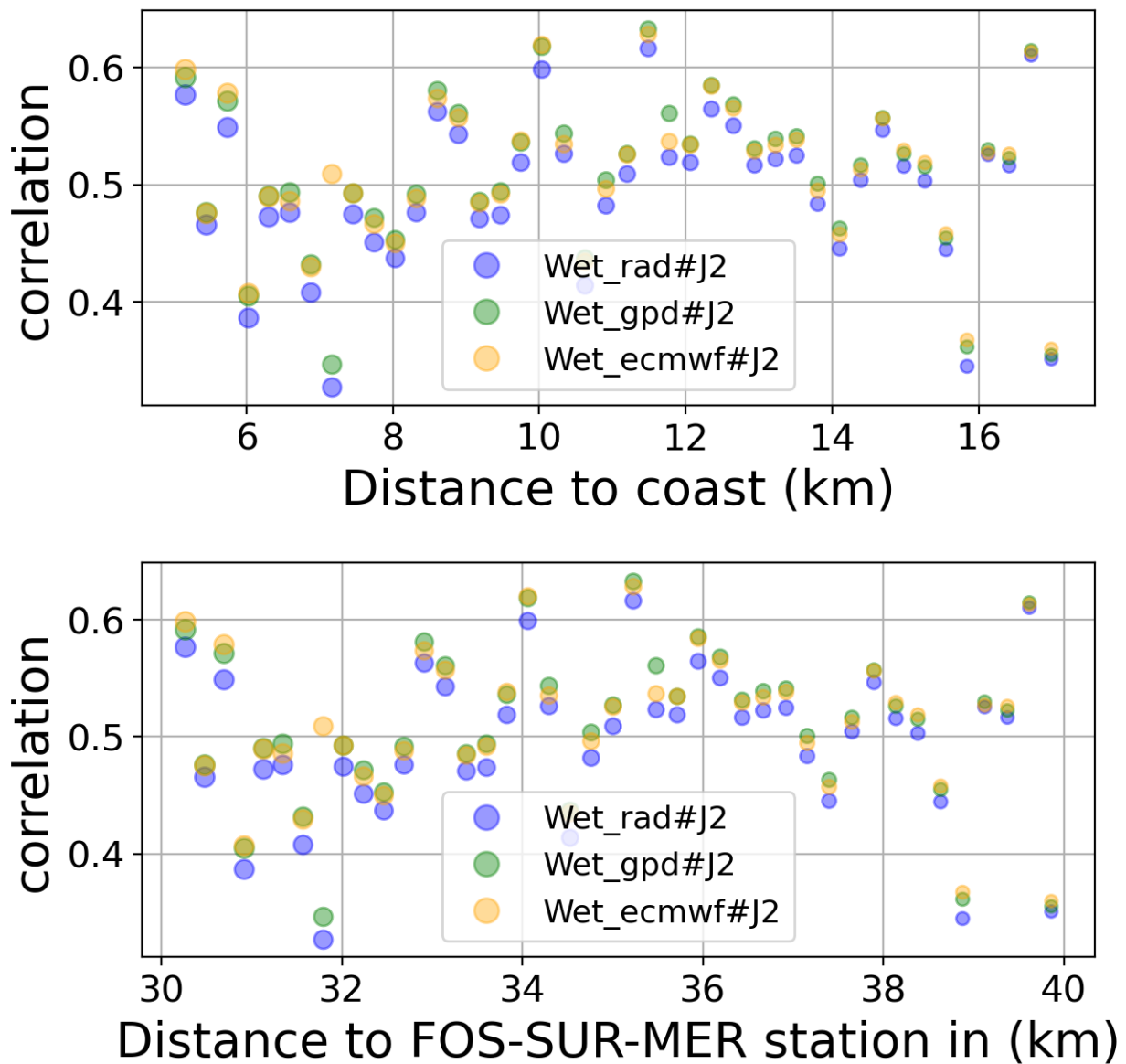


FIGURE 159 – Correlation in function of the distance to the coast/FOS-SUR-MER station

6.11.8 Taylor Diagram

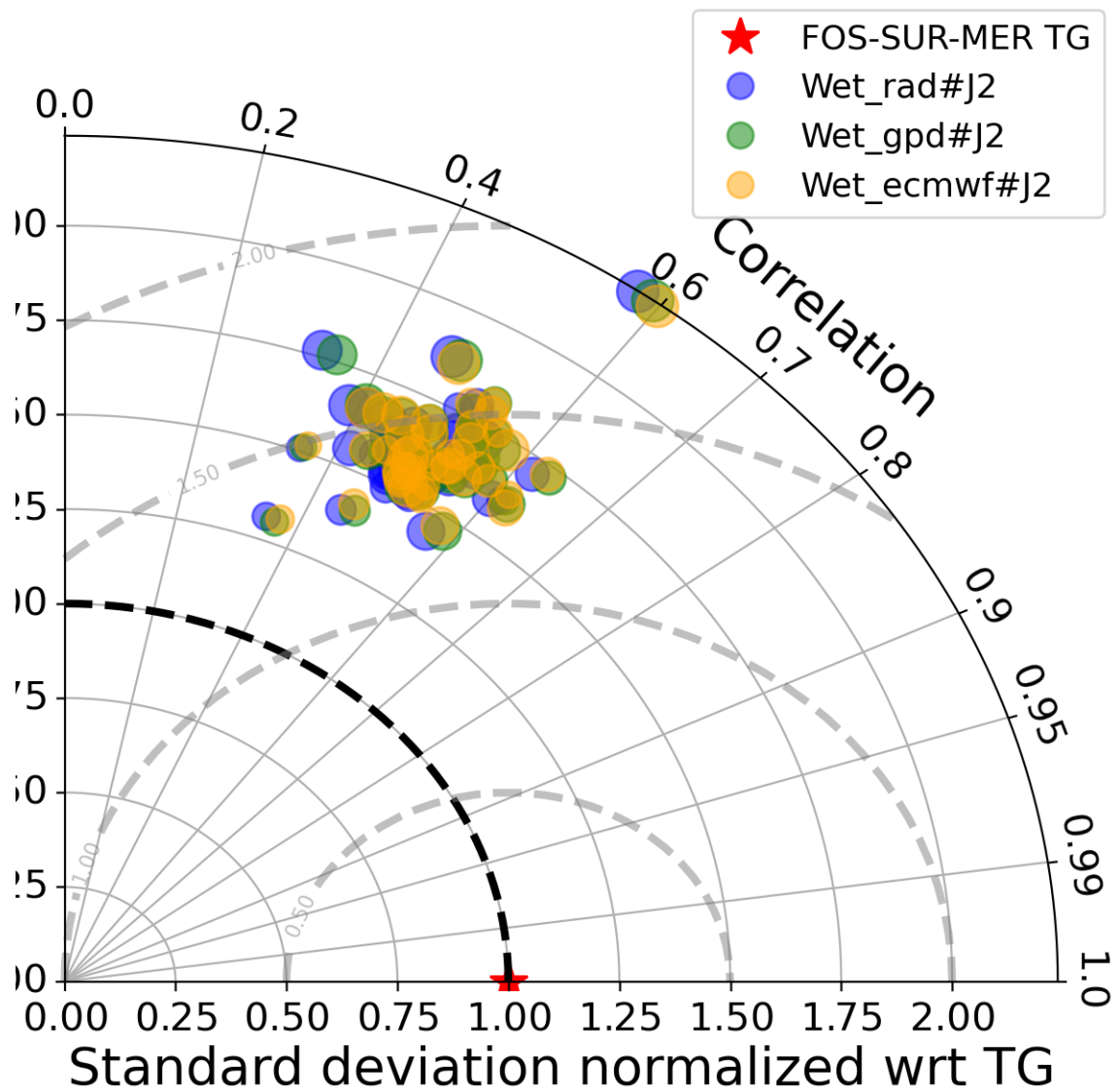


FIGURE 160 – Taylor diagram

6.11.9 Mean statistics table of products comparison with FOS-SUR-MER tide gauge data

The table below contains the mean statistics of the common points between the different products in the selected area.

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
Wet_rad#J2	92.071	0.494	0.107	0.094
Wet_gpd#J2	92.048	0.51	0.108	0.093
Wet_ecmwf#J2	92.048	0.512	0.108	0.093

FIGURE 161 – Mean statistics table of the common points in the altimetry products

6.11.10 The most correlated sla altimetry Time series with the tide gauge sla time serie

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 103 point.

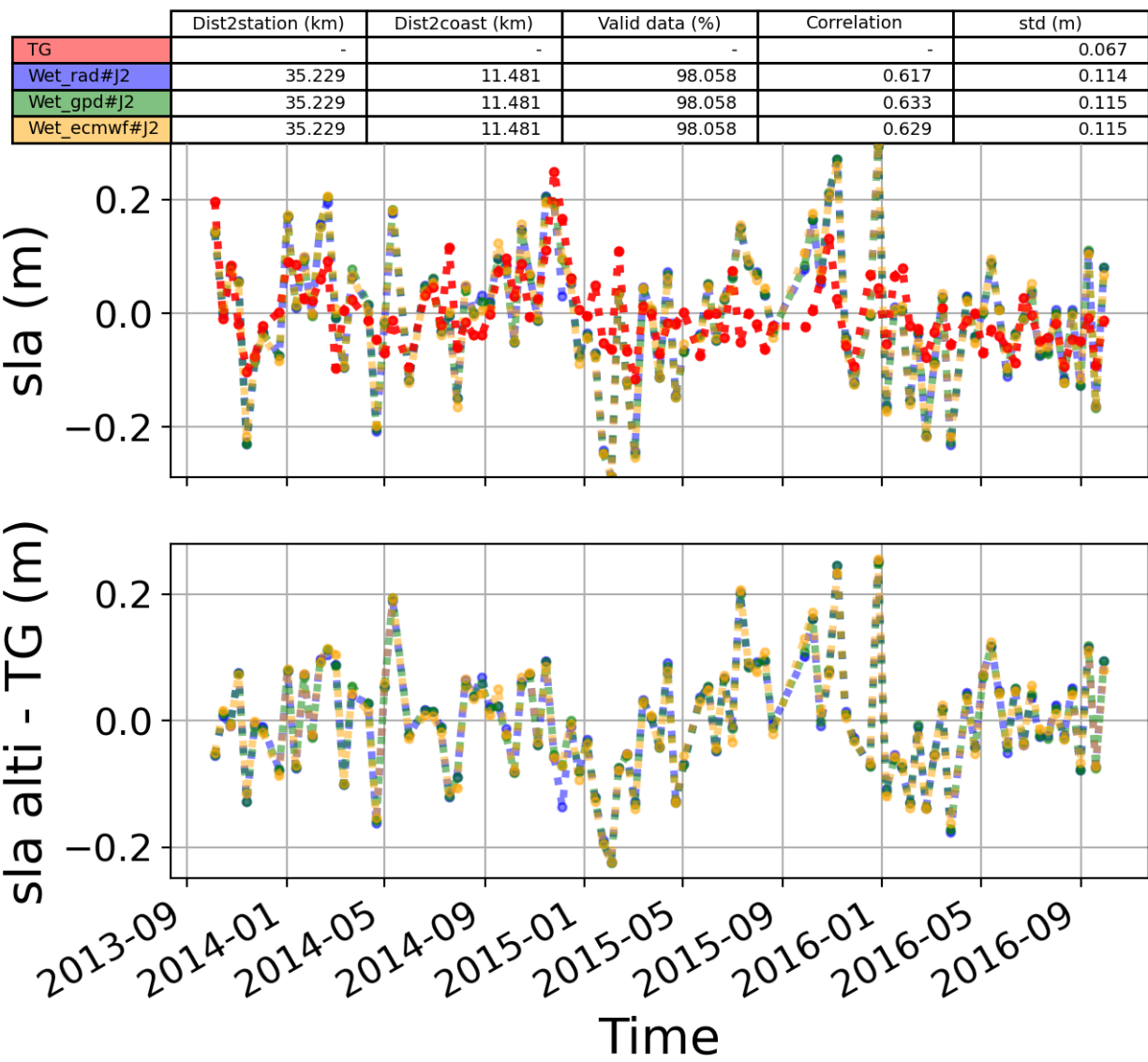


FIGURE 162 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie