

DIAGTOOL REPORT



Round Robin (GT cotier) : Wet tropospheric correction. Nea. 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 Nea
- 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_GDR_E - RANGE.ALT.I - MEAN_SEA_SURFACE.MODEL.CNESCLS15 - SEA_STATE_BIAS.ALT.I.NON_PARAM
- IONOSPHERIC_CORRECTION.MODEL.GIM - WET_TROPOSPHERIC_CORRECTION.RAD - DRY_TROPOSPHERIC_CORRECTION
- 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.ALTITUDE_POE_GDR_E - RANGE.ALTITUDE - MEAN_SEA_SURFACE.MODEL.CNESCLS15 - SEA_STATE_BIAS.ALTITUDE_NON_PARAMETERS - 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.ALTITUDE_POE_GDR_E - RANGE.ALTITUDE - MEAN_SEA_SURFACE.MODEL.CNESCLS15 - SEA_STATE_BIAS.ALTITUDE_NON_PARAMETERS - 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 3 m.
- Each sla time-series has been filtered 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

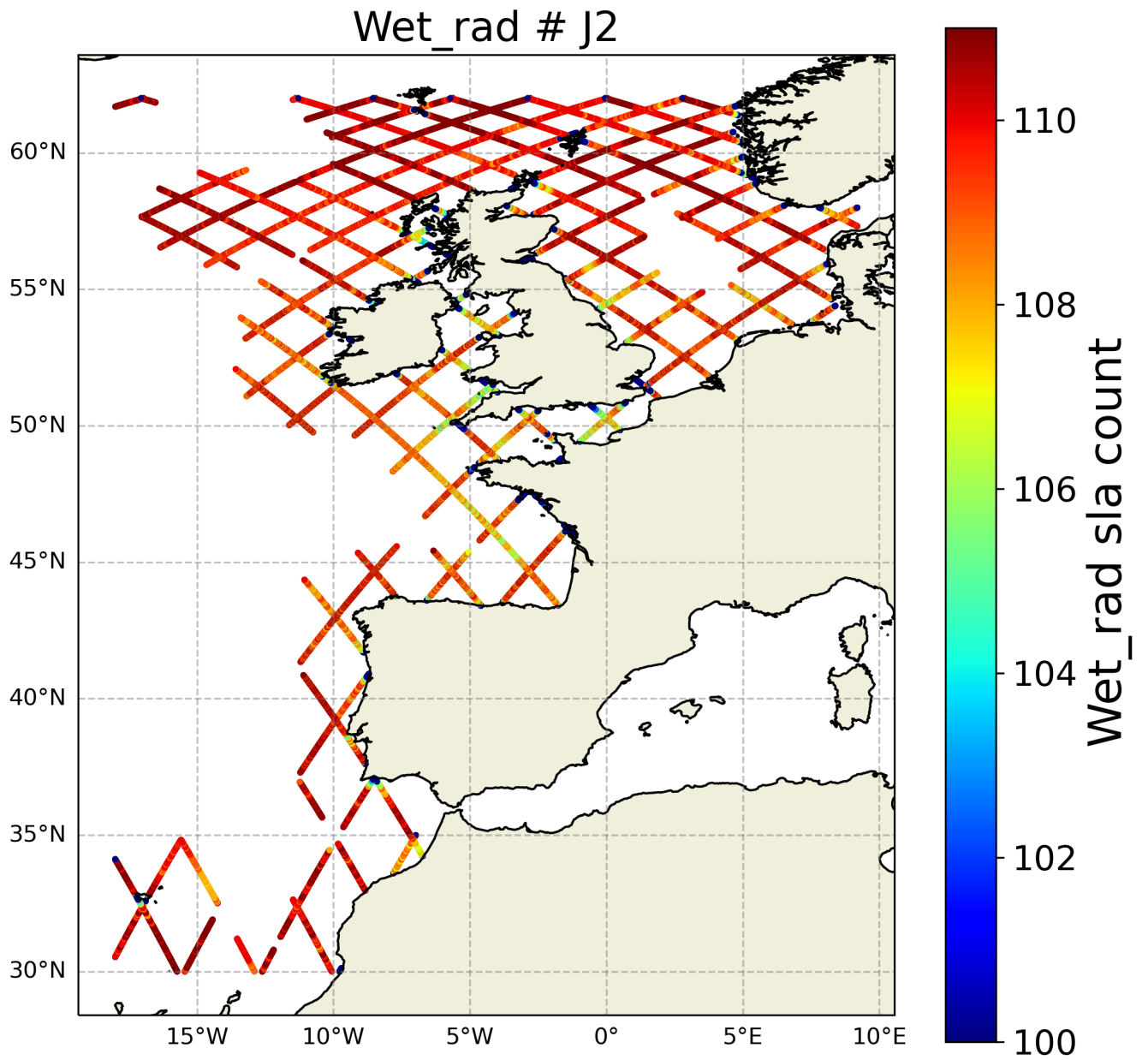


FIGURE 1 – Spatial coherence analysis of the count of the Wet_rad version of sla variable

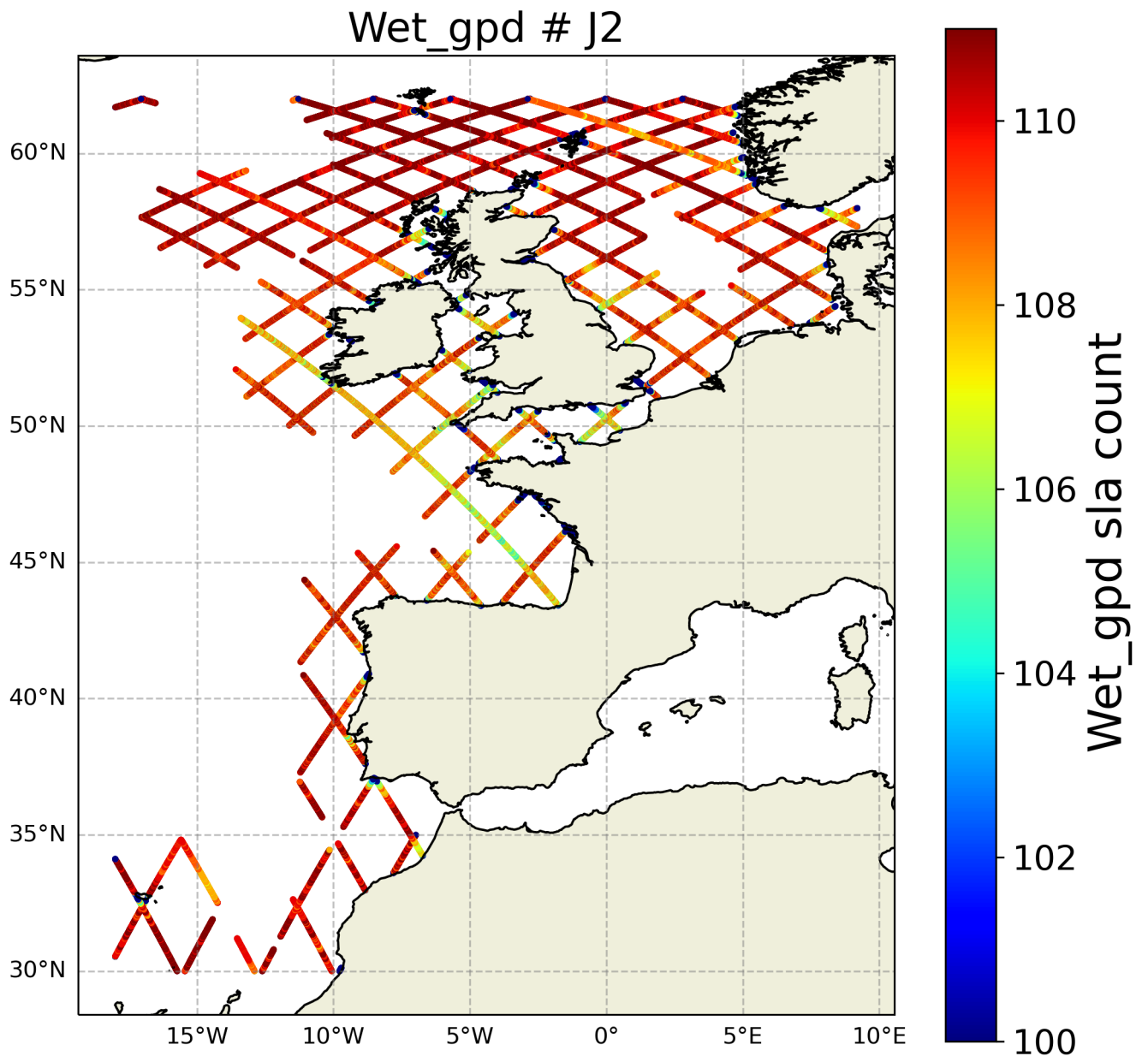


FIGURE 2 – Spatial coherence analysis of the count of the Wet_gpd version of sla variable

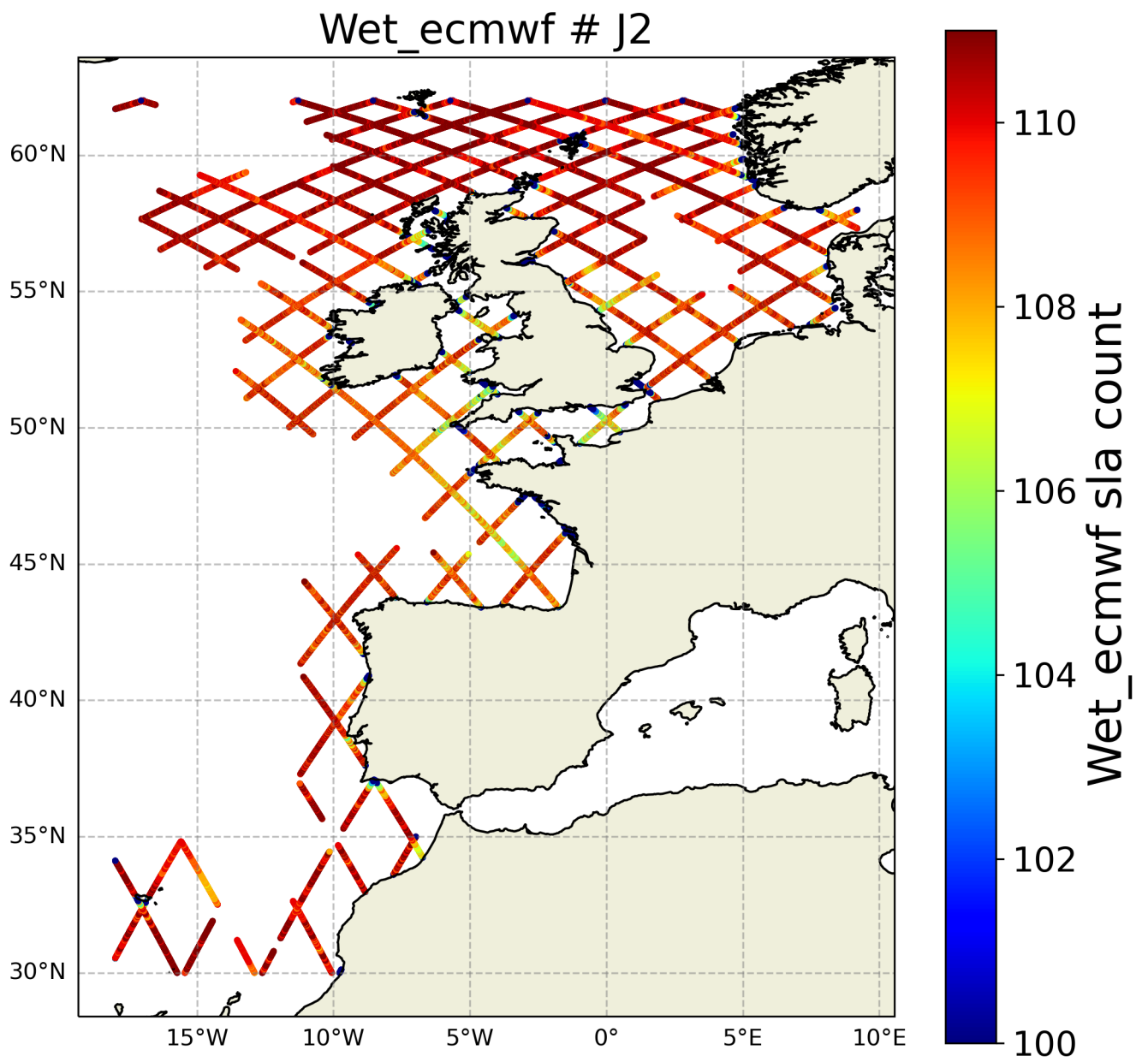


FIGURE 3 – Spatial coherence analysis of the count of the Wet_ecmwf version of sla variable

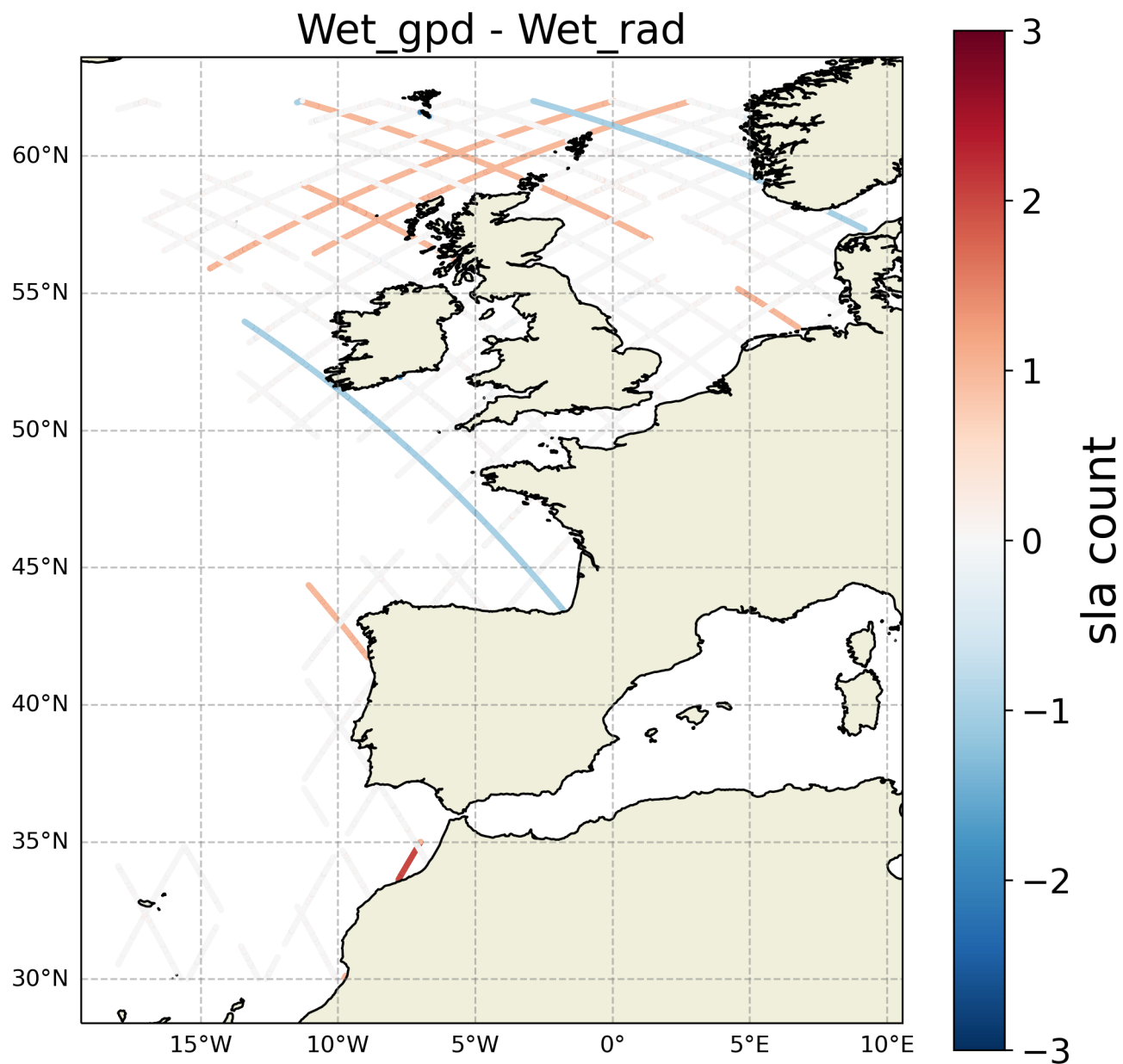


FIGURE 4 – Spatial coherence analysis of the Difference in sla 's count between Wet_gpd and Wet_rad

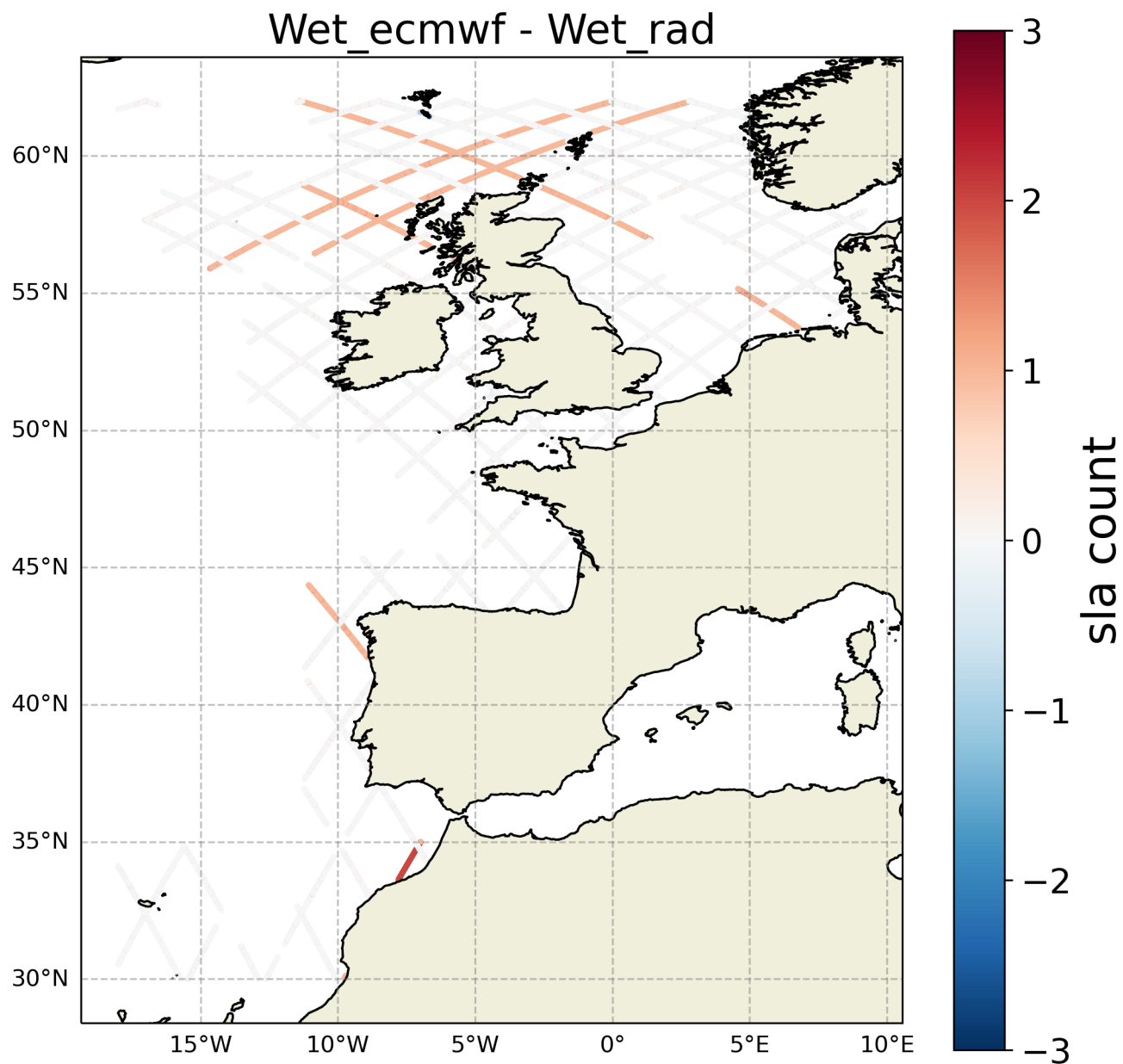


FIGURE 5 – Spatial coherence analysis of the Difference in sla 's count between Wet_ecmwf and Wet_rad

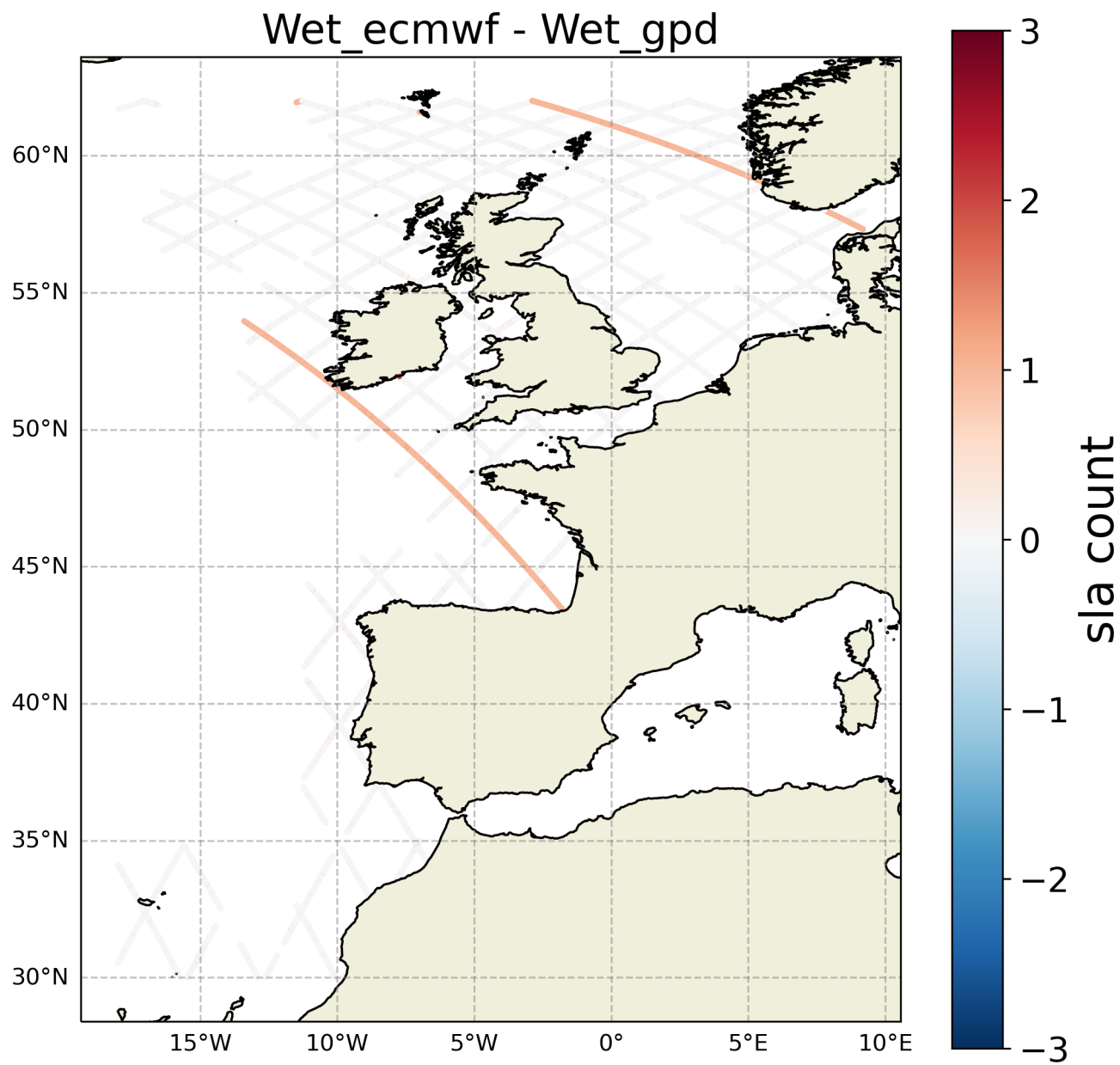


FIGURE 6 – Spatial coherence analysis of the Difference in sla 's count between Wet_ecmwf and Wet_gpd

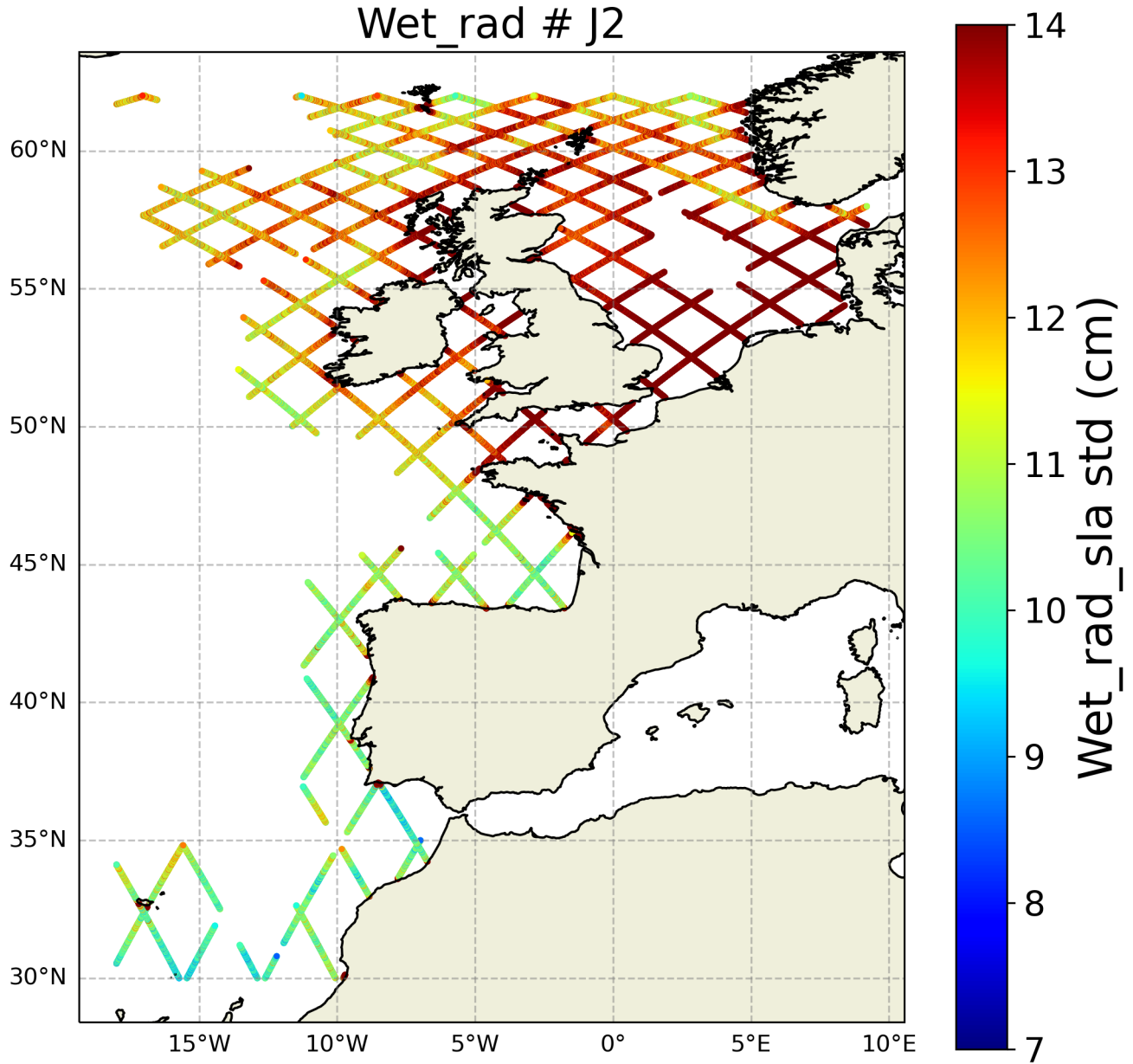


FIGURE 7 – Spatial coherence analysis of the std of the Wet_rad version of sla variable

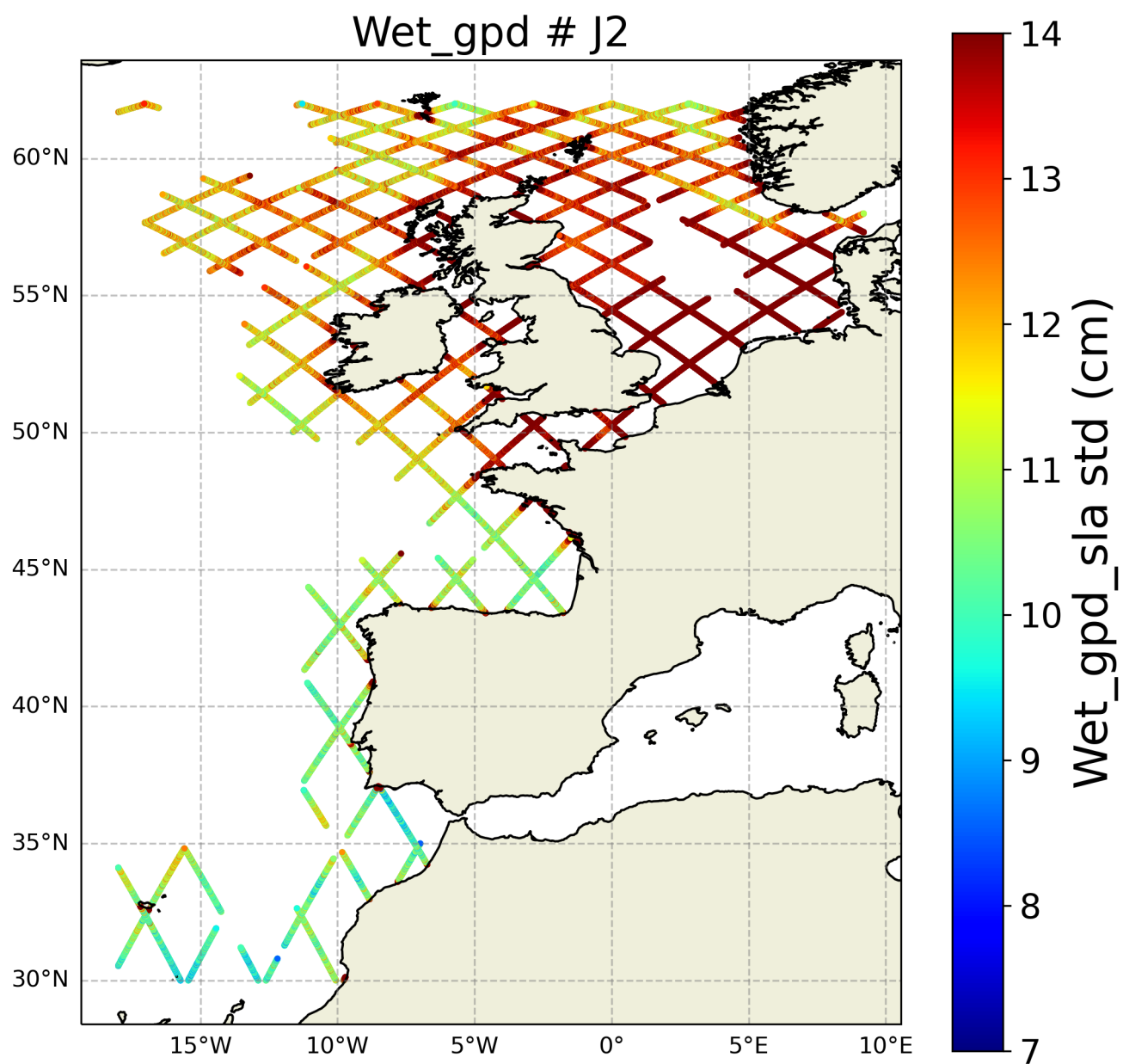


FIGURE 8 – Spatial coherence analysis of the std of the Wet_gpd version of sla variable

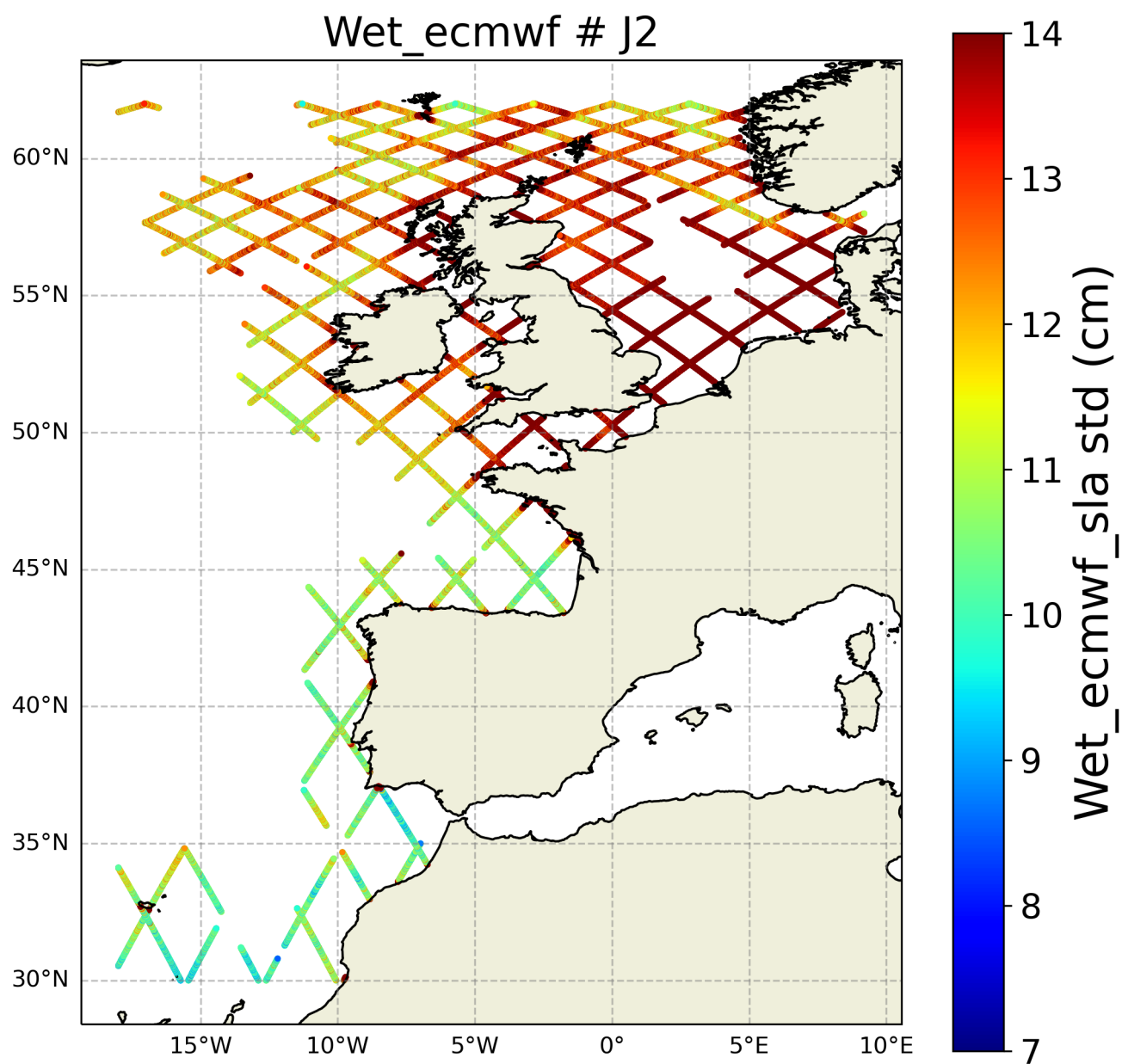


FIGURE 9 – Spatial coherence analysis of the std of the Wet_ecmwf version of sla variable

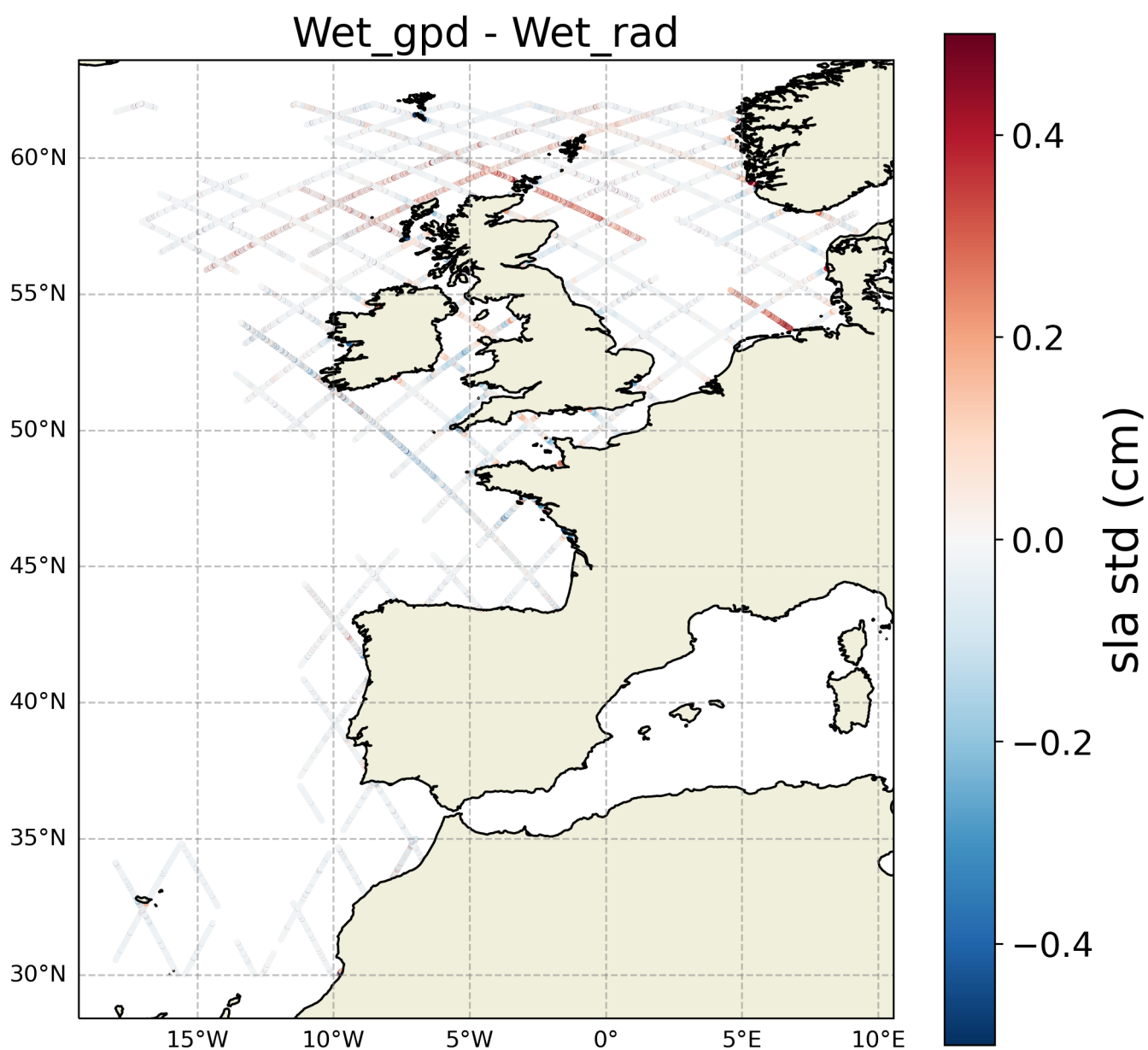


FIGURE 10 – Spatial coherence analysis of the Difference in sla 's std between Wet_gpd and Wet_rad

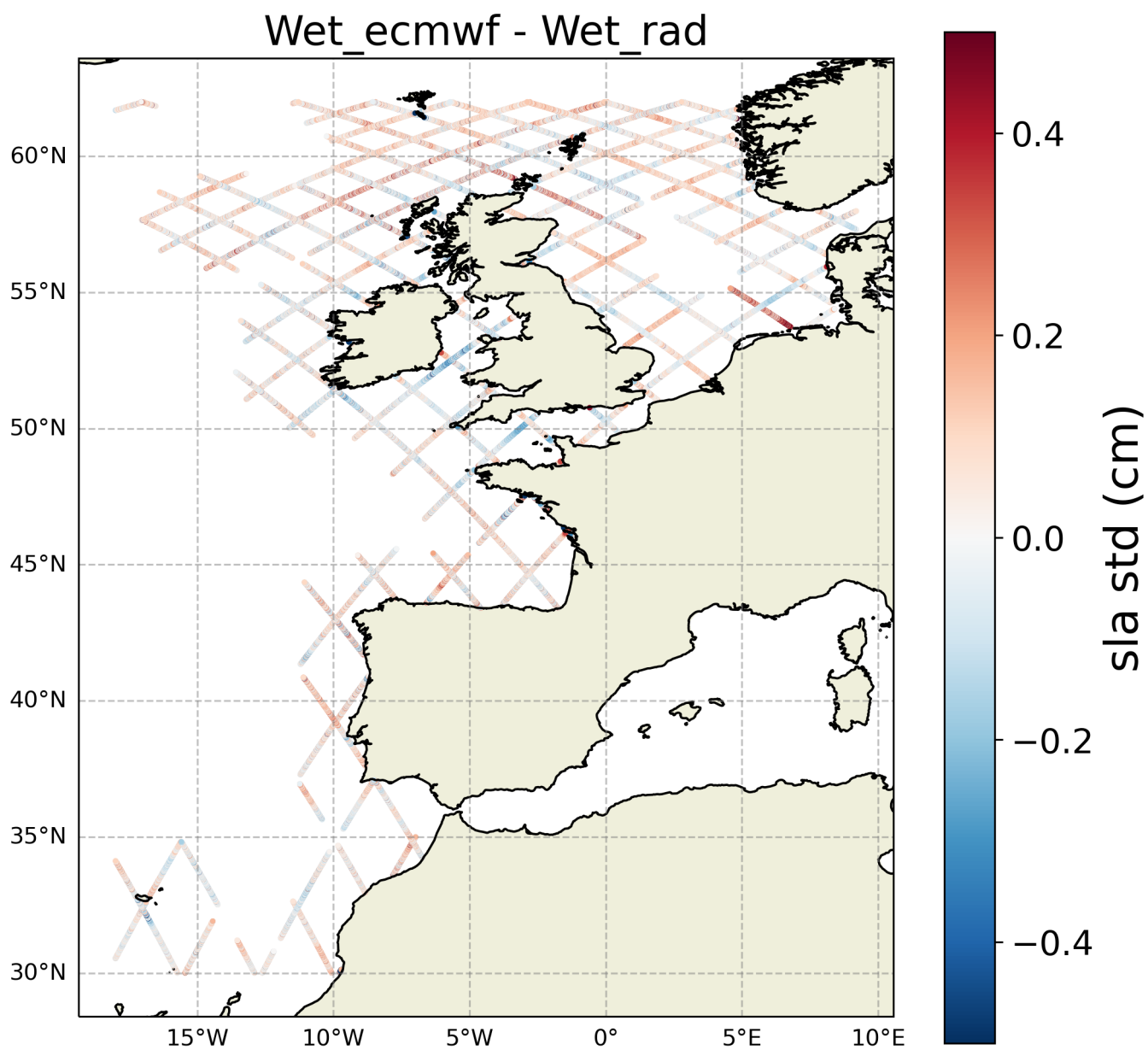


FIGURE 11 – Spatial coherence analysis of the Difference in sla 's std between Wet_ecmwf and Wet_rad

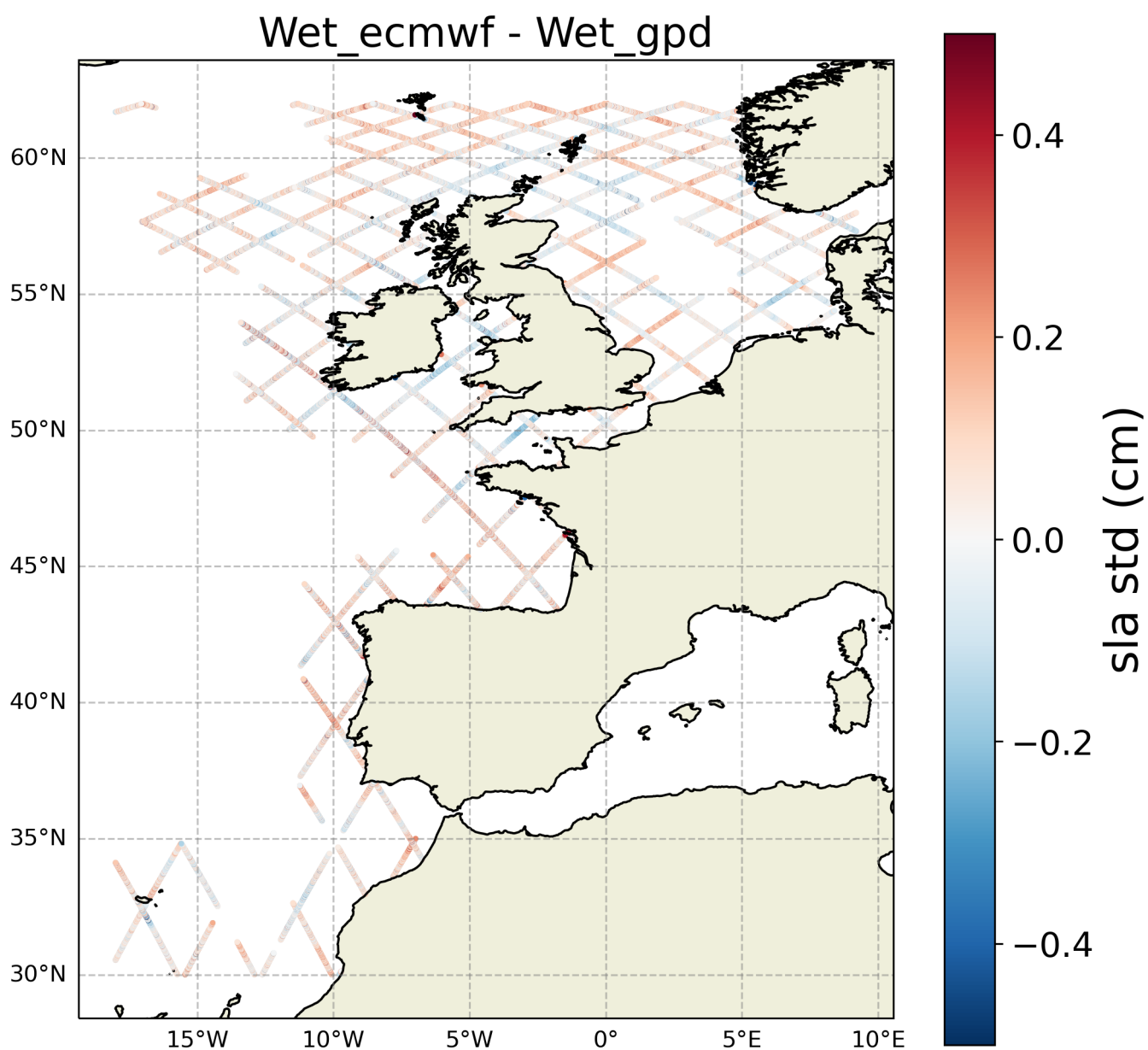


FIGURE 12 – Spatial coherence analysis of the Difference in sla 's std between Wet_ecmwf and Wet_gpd

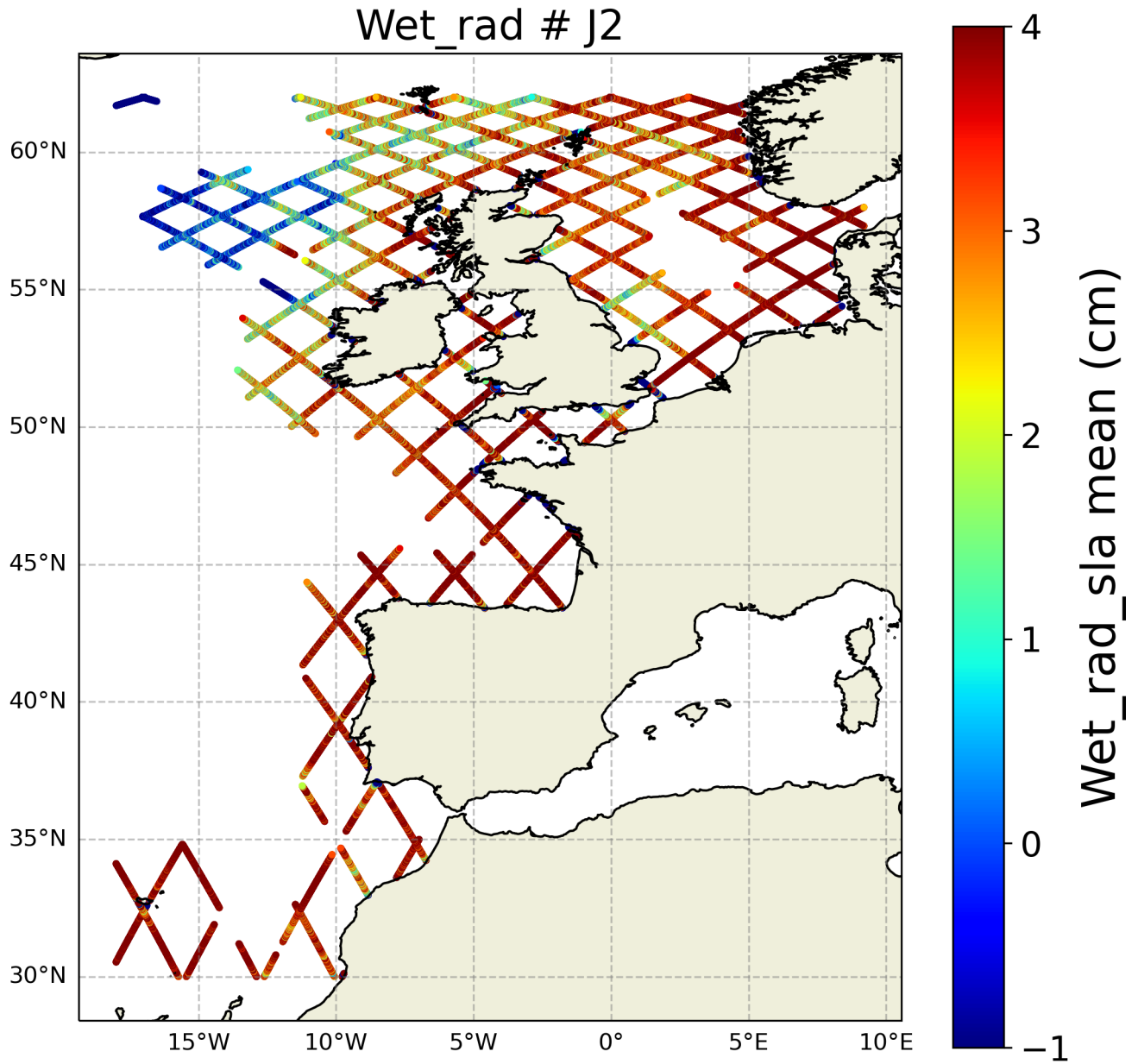


FIGURE 13 – Spatial coherence analysis of the mean of the Wet_rad version of sla variable

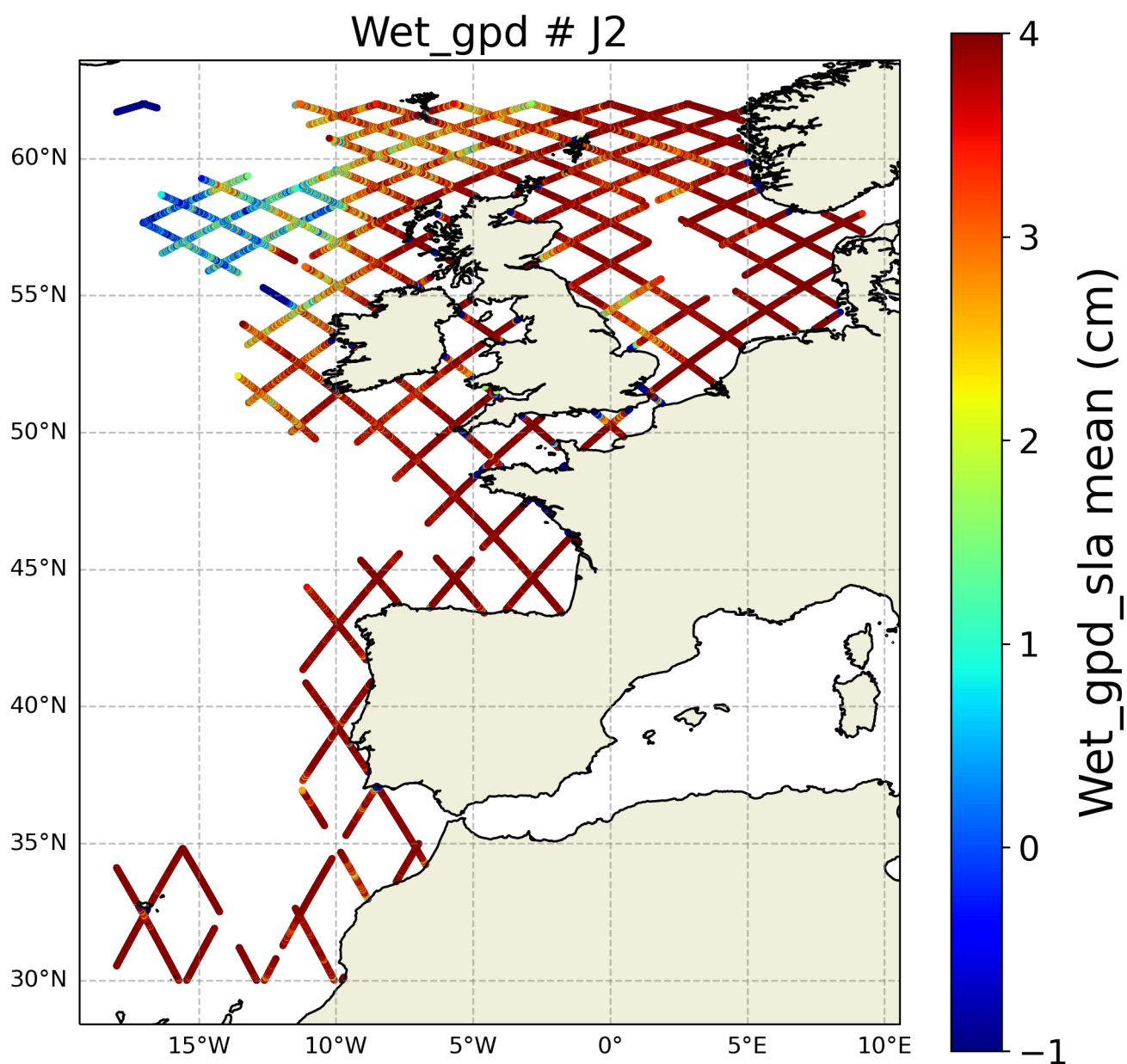


FIGURE 14 – Spatial coherence analysis of the mean of the Wet_gpd version of sla variable

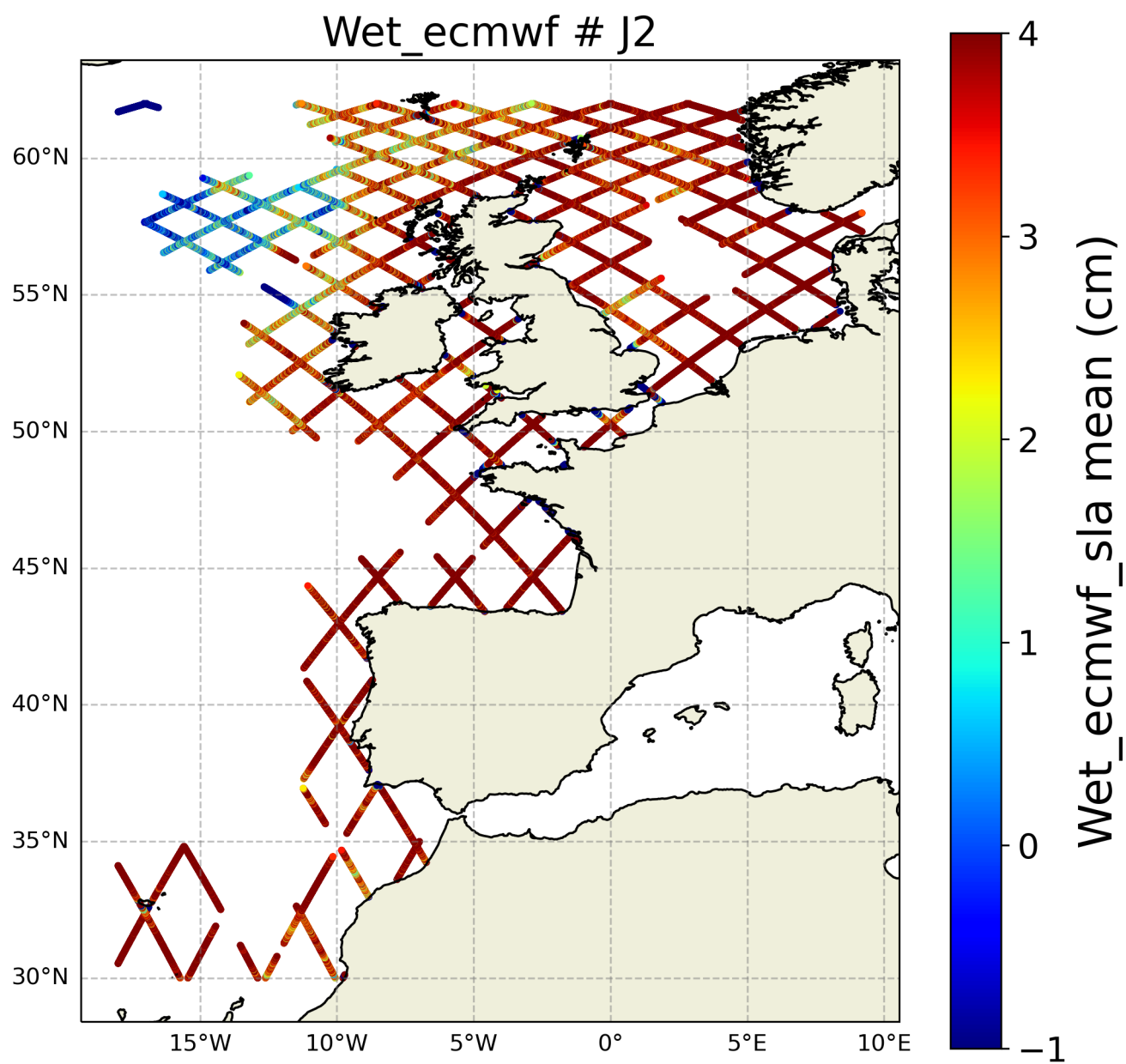


FIGURE 15 – Spatial coherence analysis of the mean of the Wet_ecmwf version of sla variable

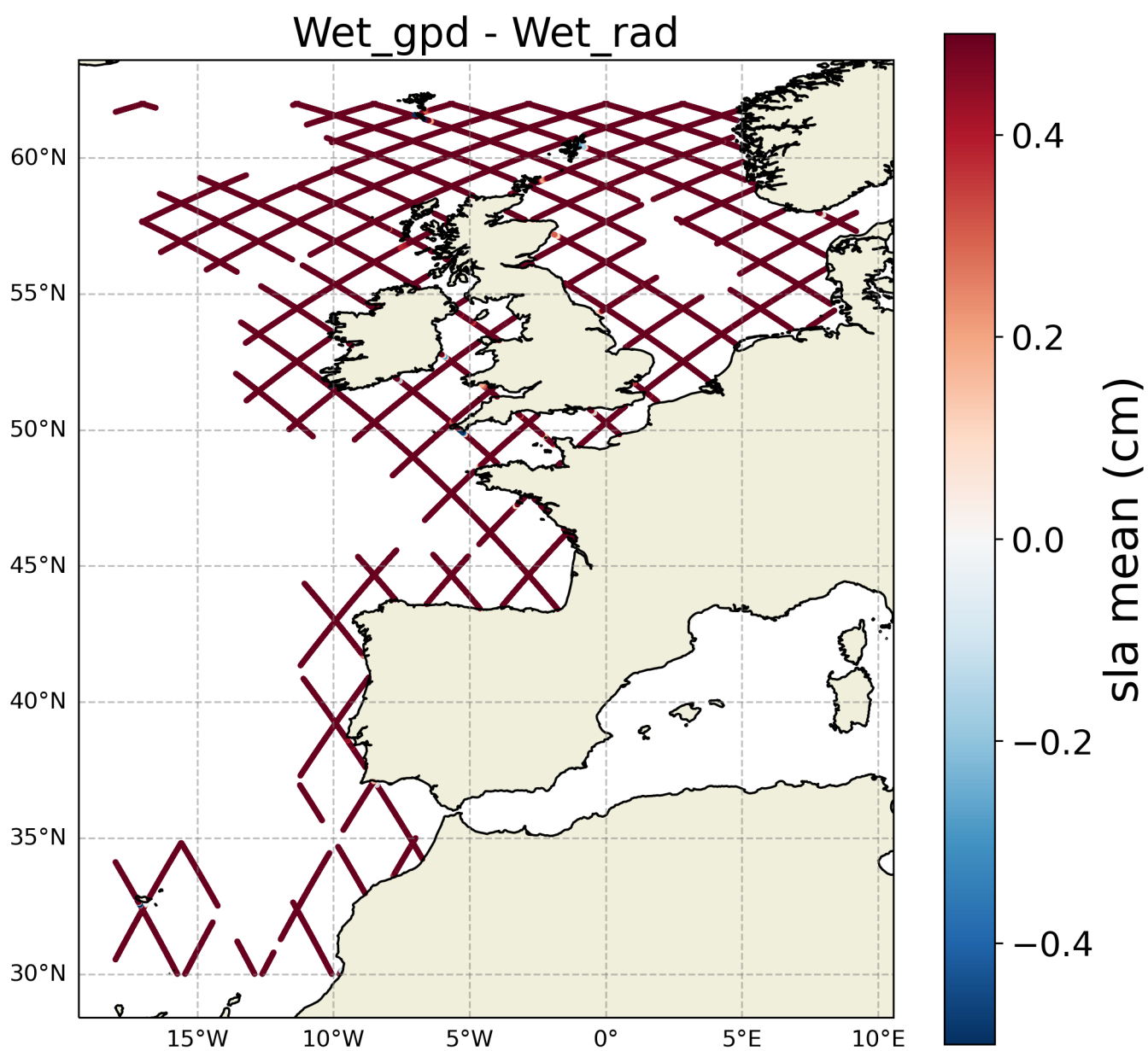


FIGURE 16 – Spatial coherence analysis of the Difference in sla 's mean between Wet_gpd and Wet_rad

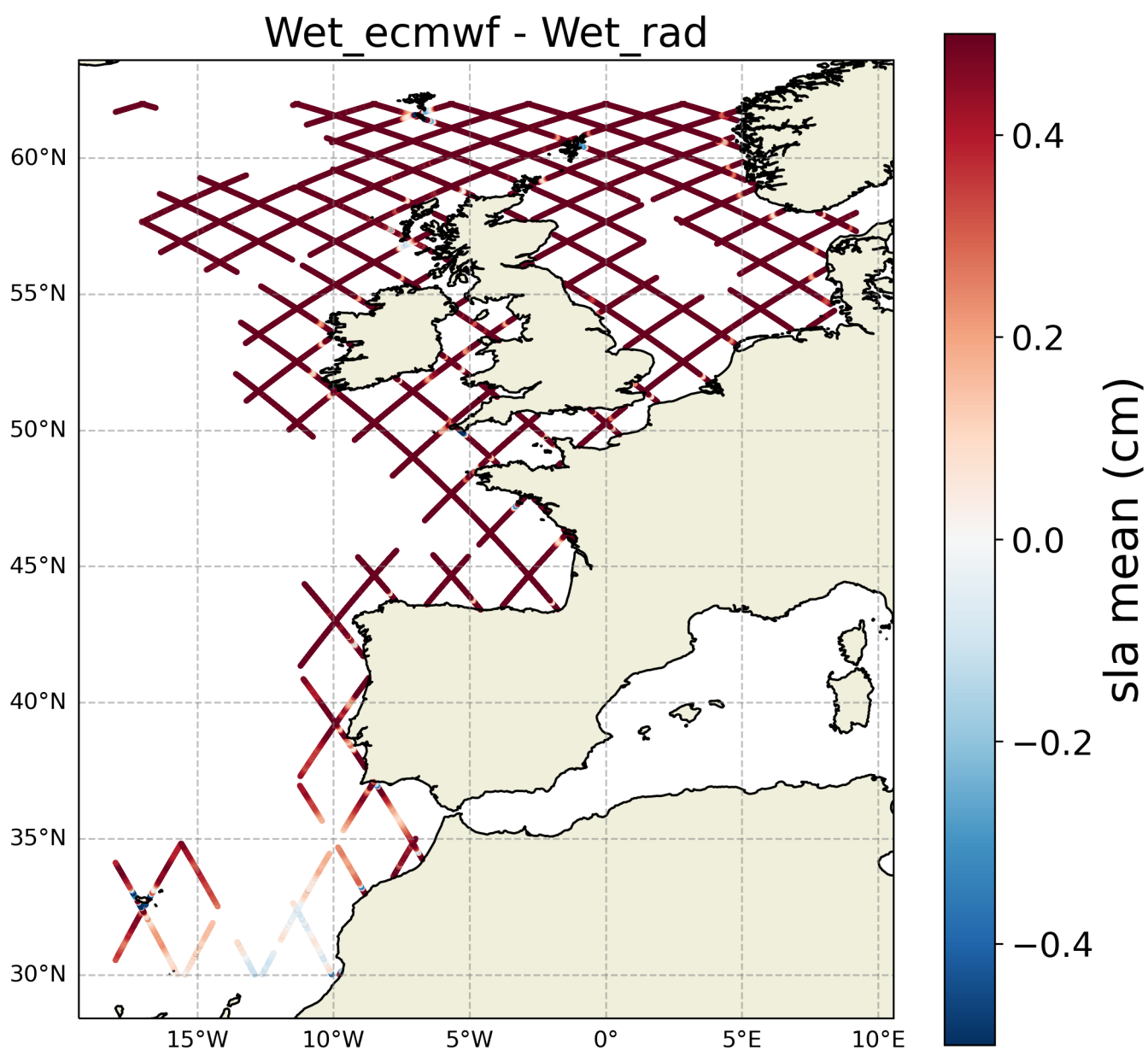


FIGURE 17 – Spatial coherence analysis of the Difference in sla 's mean between Wet_ecmwf and Wet_rad

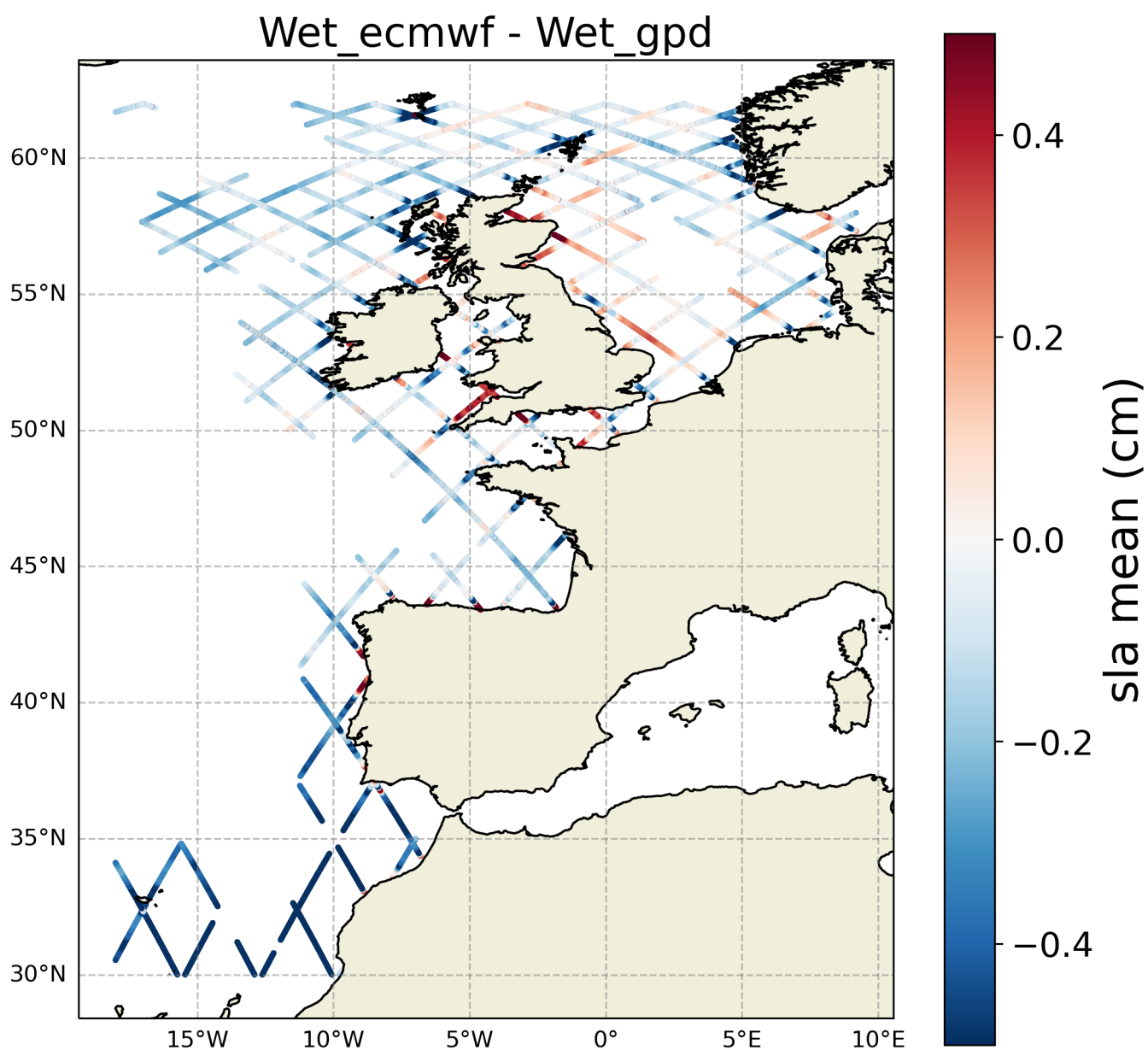


FIGURE 18 – Spatial coherence analysis of the Difference in sla 's mean between Wet_ecmwf and Wet_gpd

3.2 Wet

3.2.1 Wet 's count

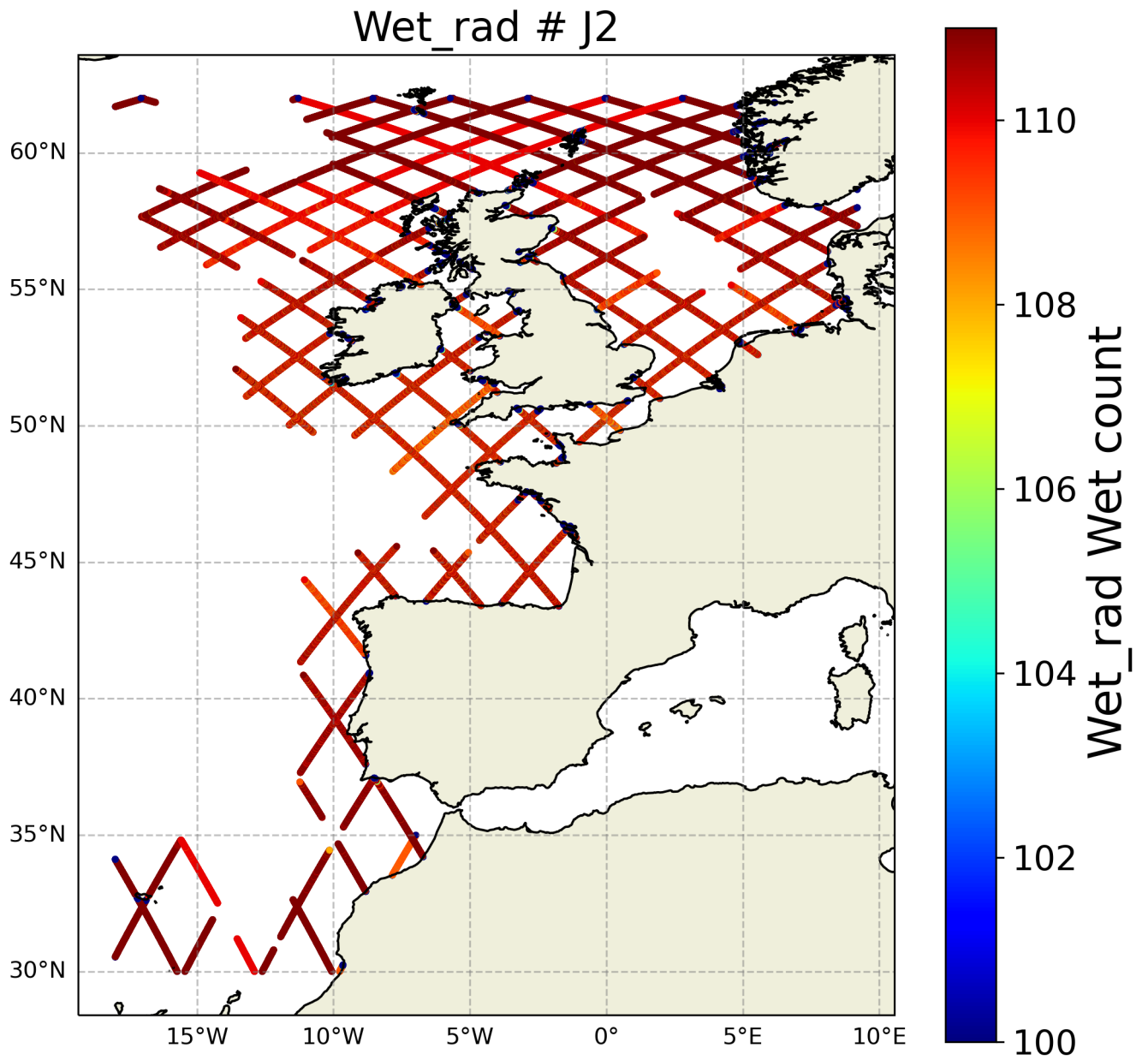


FIGURE 19 – Spatial coherence analysis of the count of the Wet_rad version of Wet variable

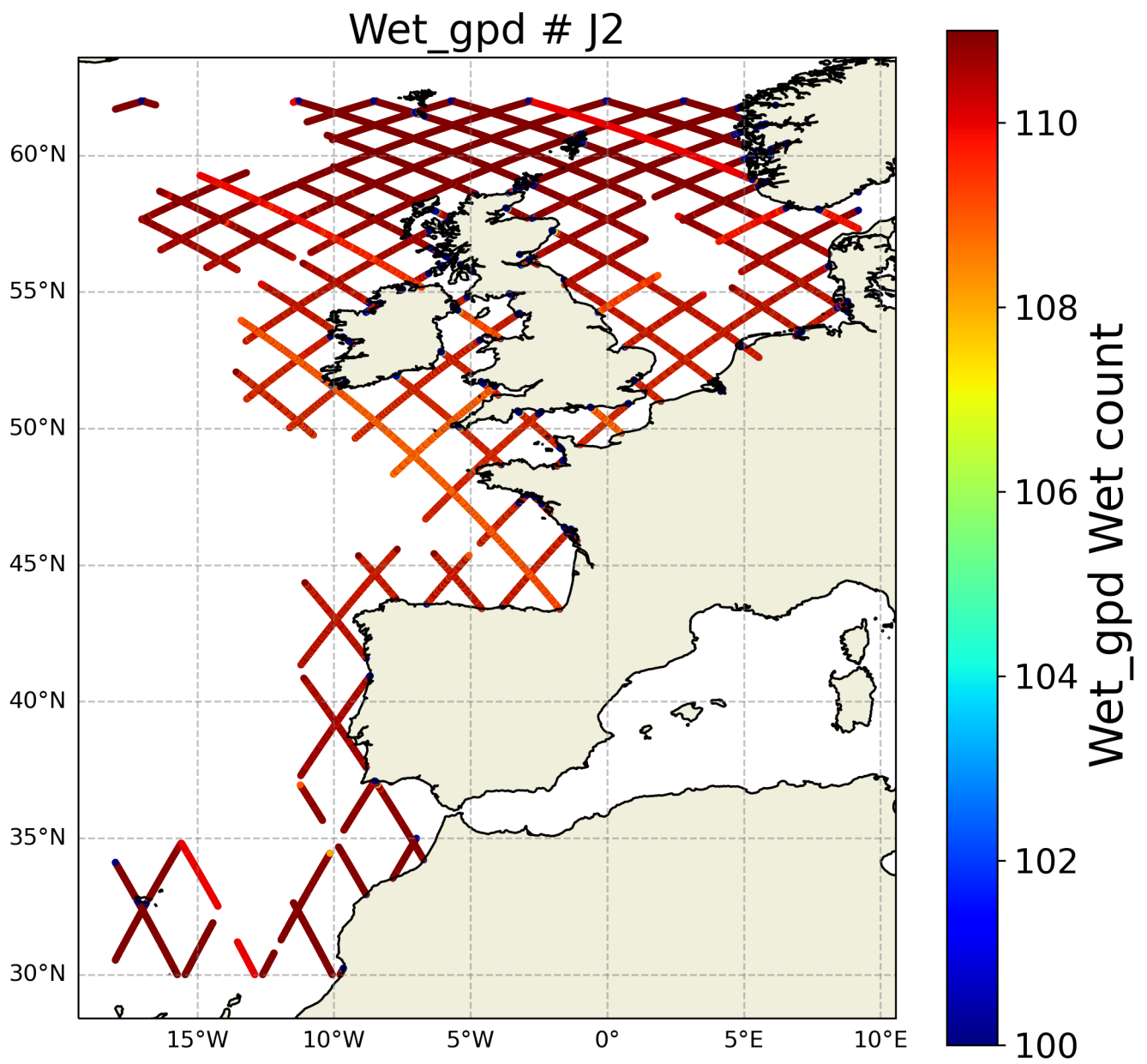


FIGURE 20 – Spatial coherence analysis of the count of the Wet_gpd version of Wet variable

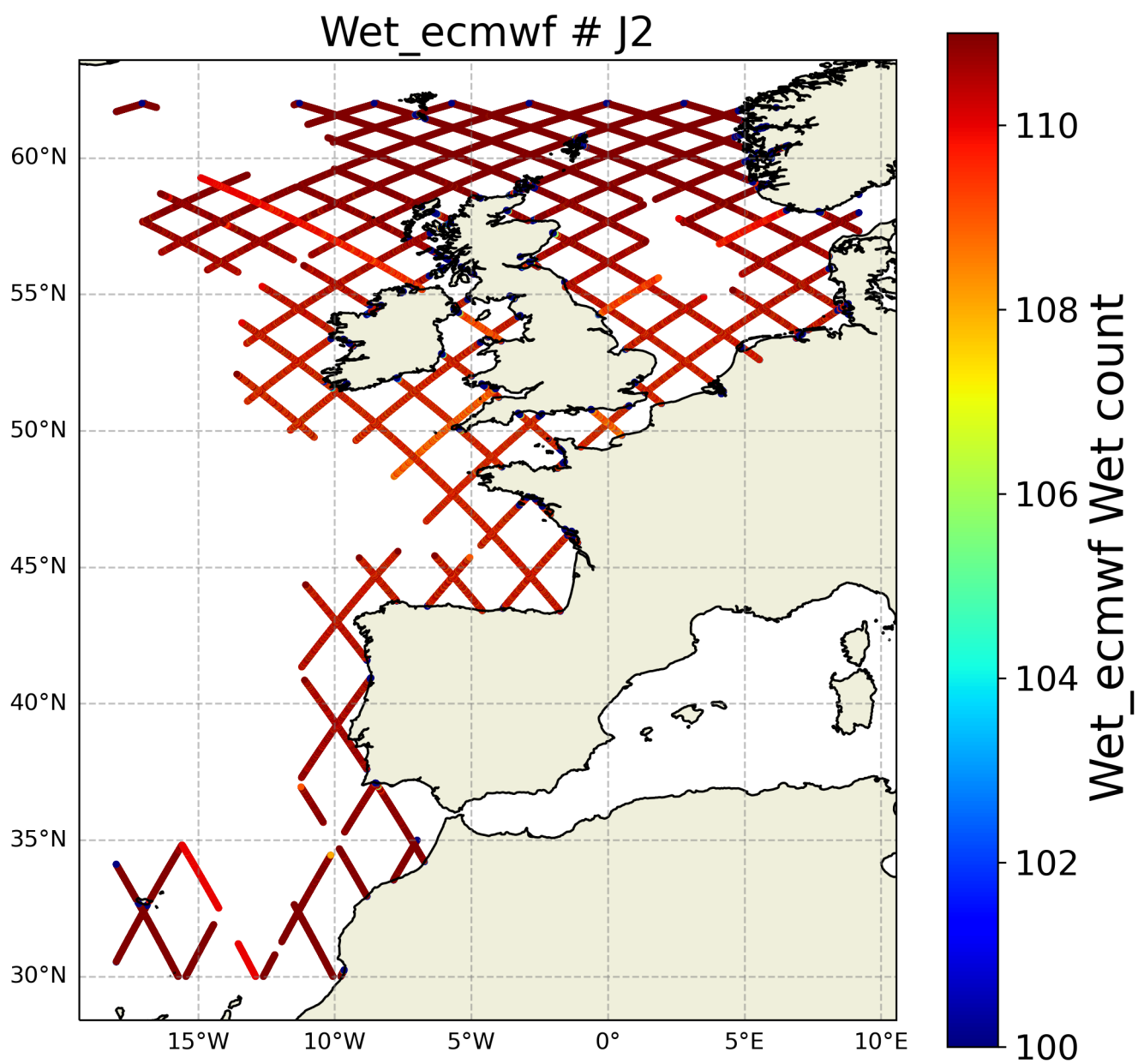


FIGURE 21 – Spatial coherence analysis of the count of the Wet_ecmwf version of Wet variable

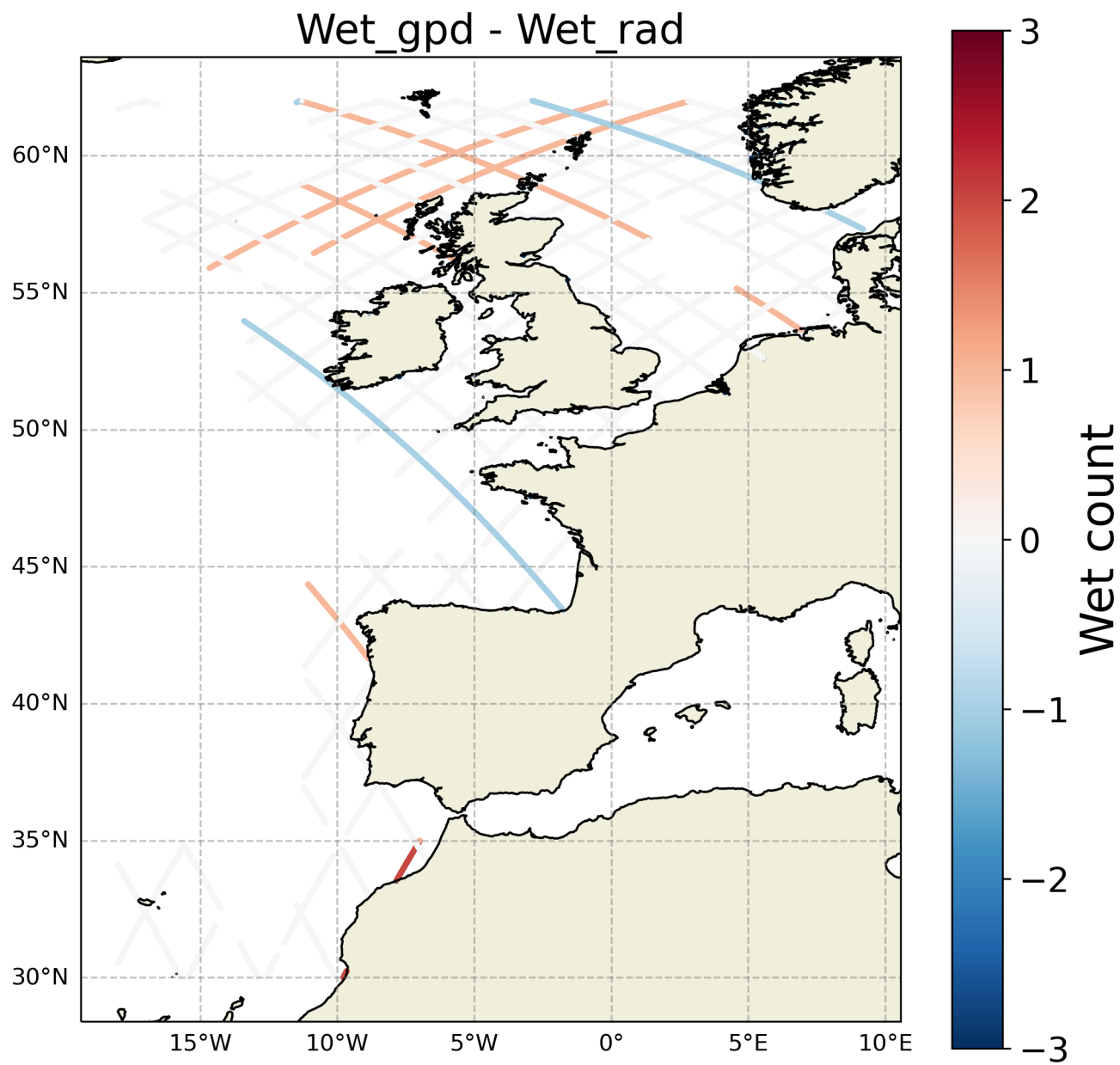


FIGURE 22 – Spatial coherence analysis of the Difference in Wet 's count between Wet_{gpd} and Wet_{rad}

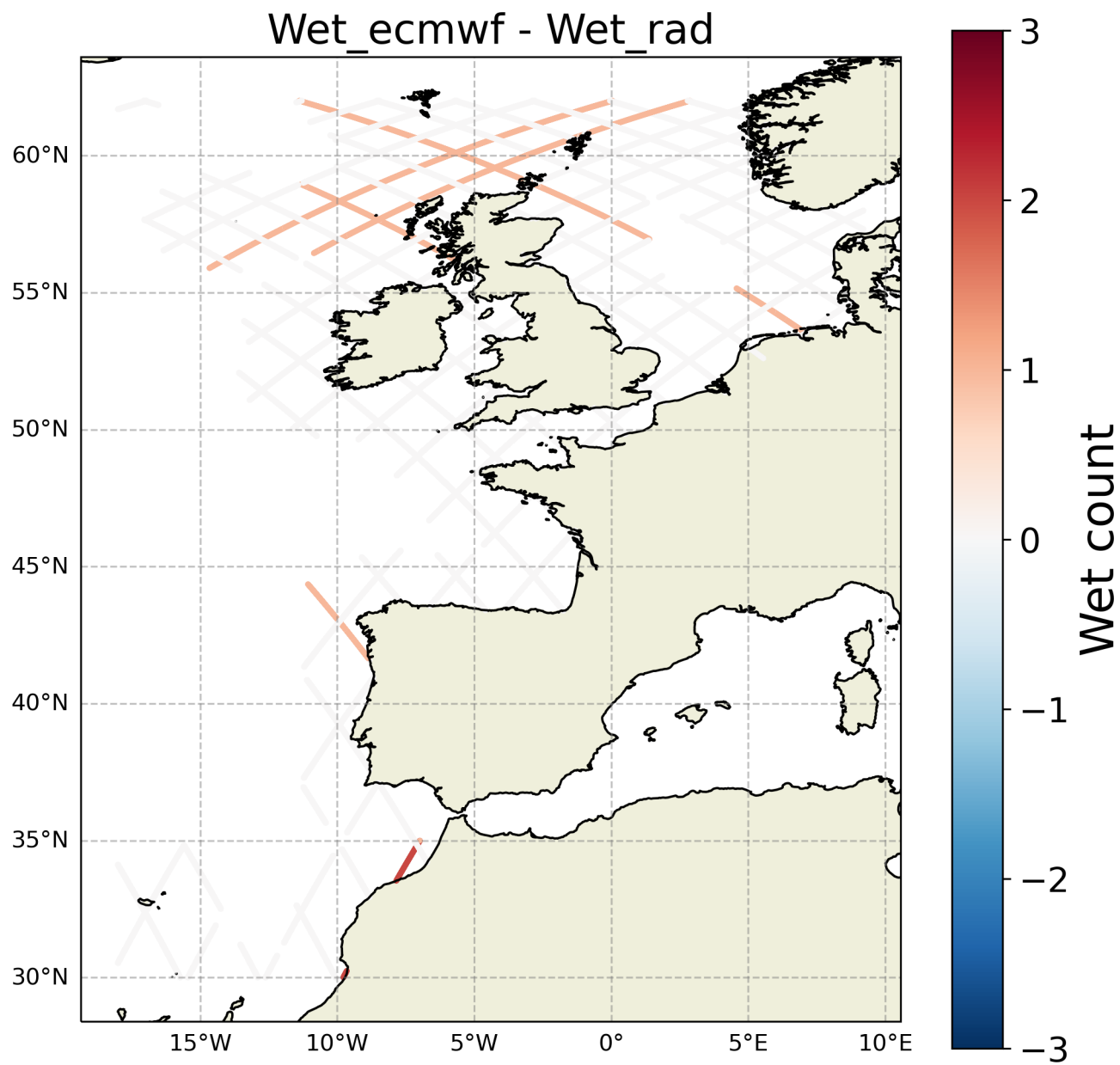


FIGURE 23 – Spatial coherence analysis of the Difference in Wet 's count between Wet_ecmwf and Wet_rad

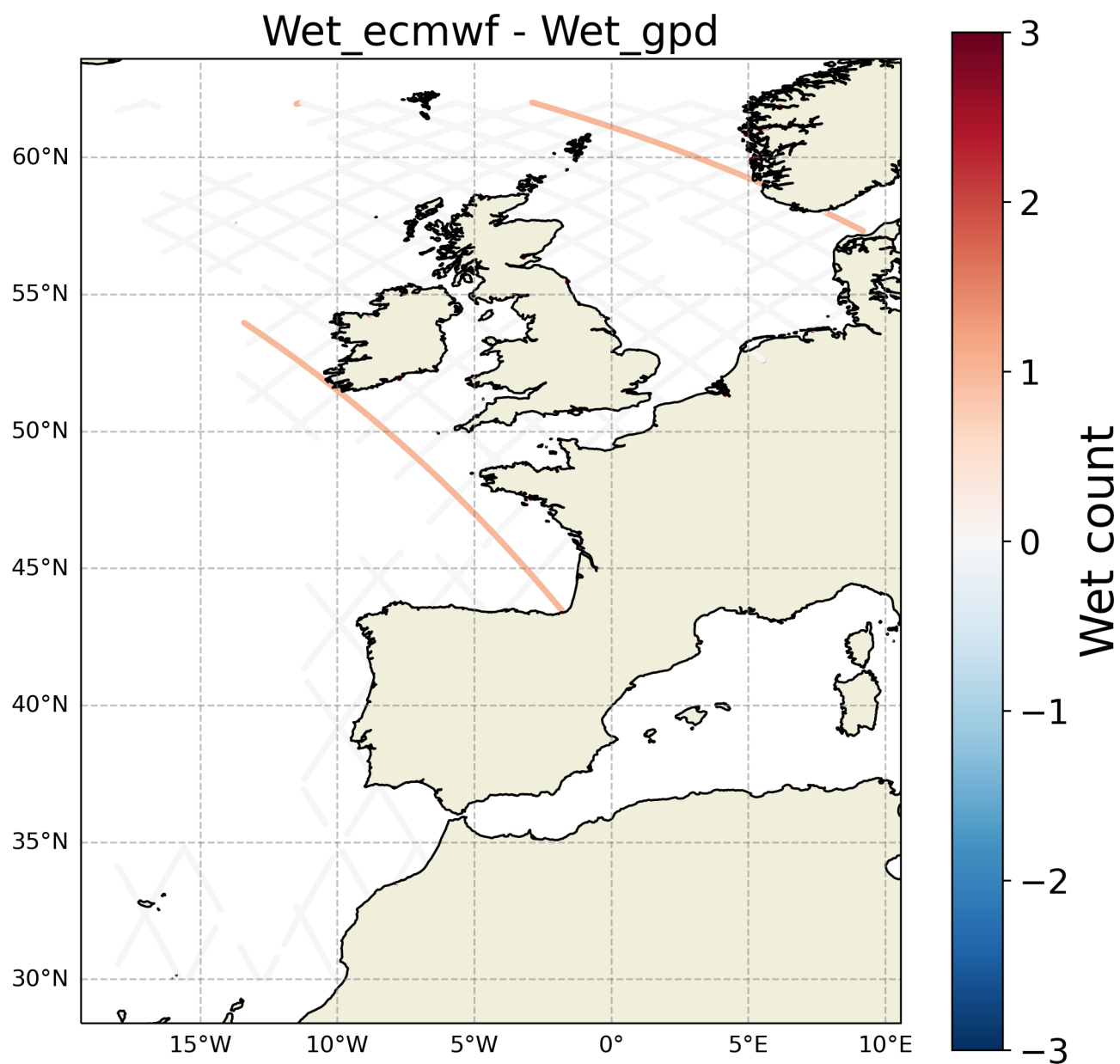


FIGURE 24 – Spatial coherence analysis of the Difference in Wet 's count between Wet_ecmwf and Wet_gpd

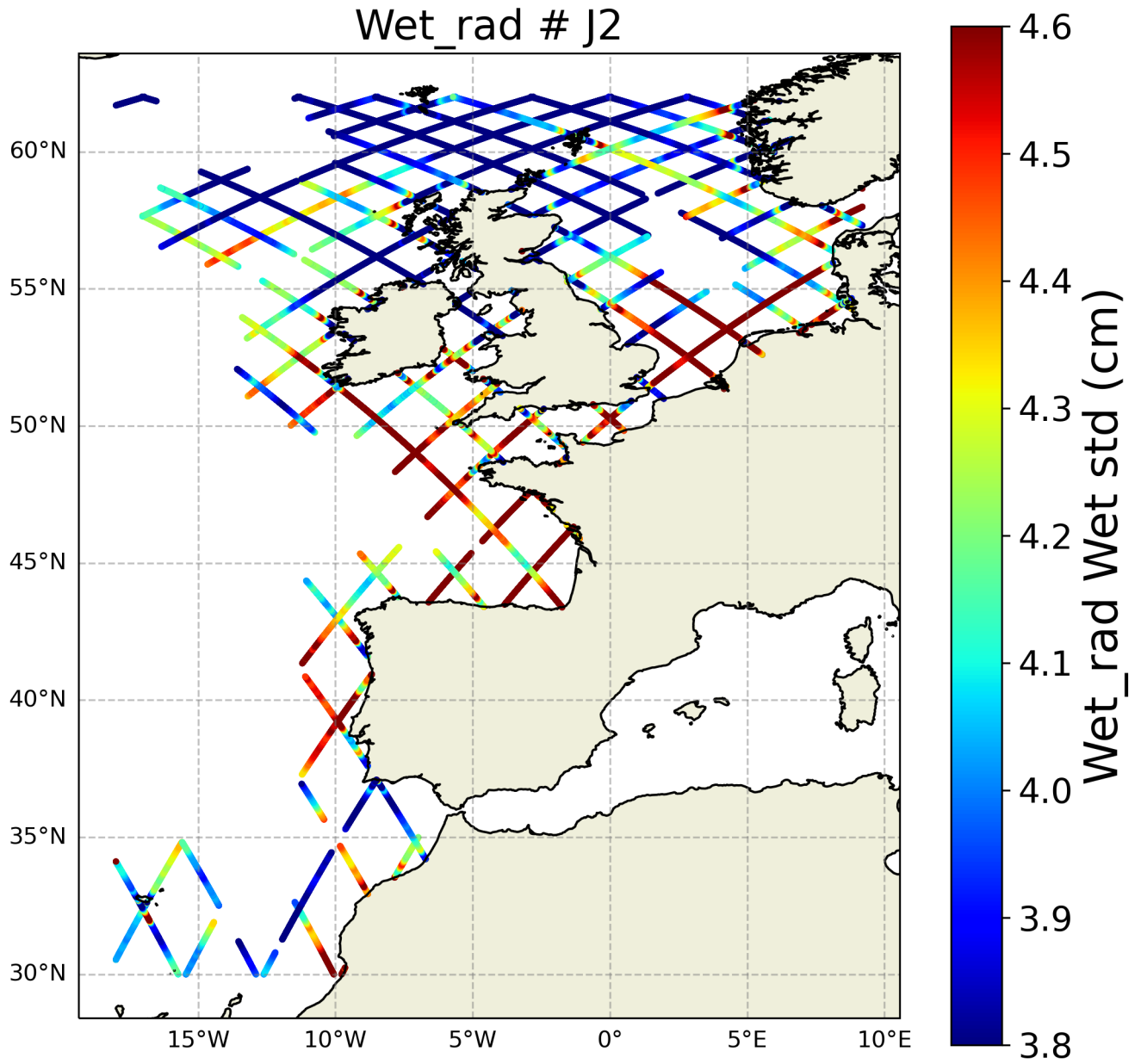


FIGURE 25 – Spatial coherence analysis of the std of the Wet_rad version of Wet variable

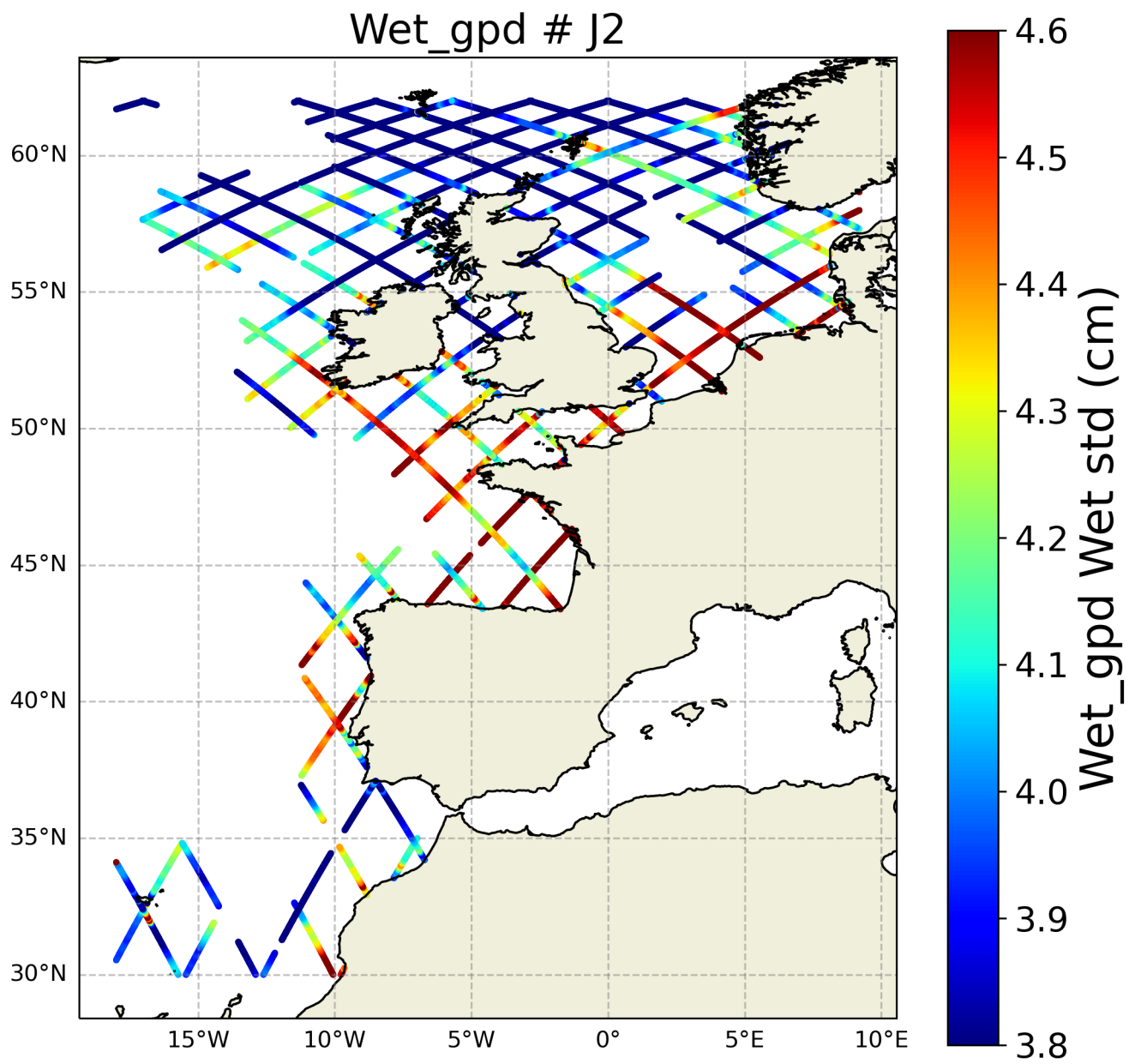


FIGURE 26 – Spatial coherence analysis of the std of the Wet_gpd version of Wet variable

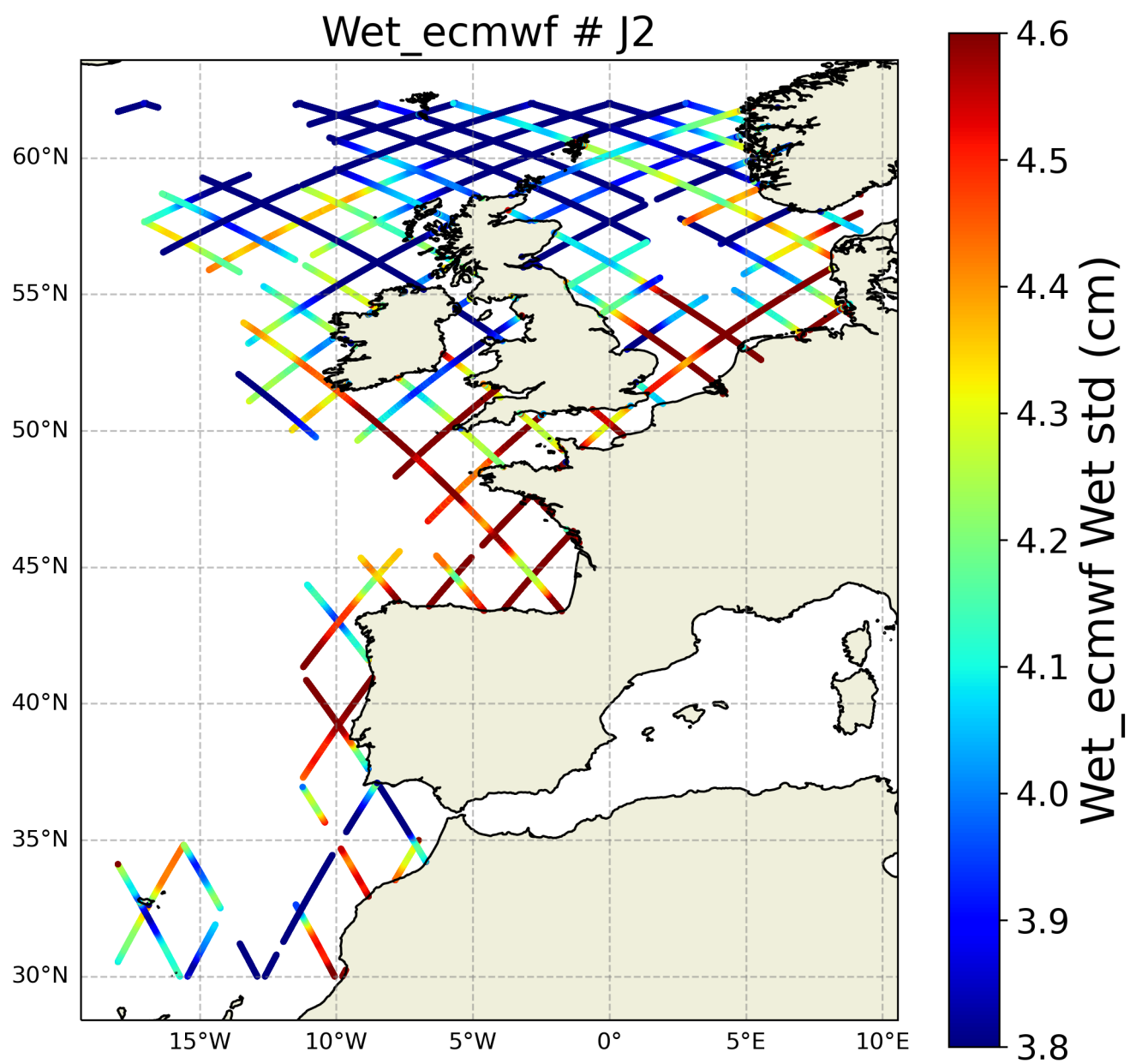


FIGURE 27 – Spatial coherence analysis of the std of the Wet_ecmwf version of Wet variable

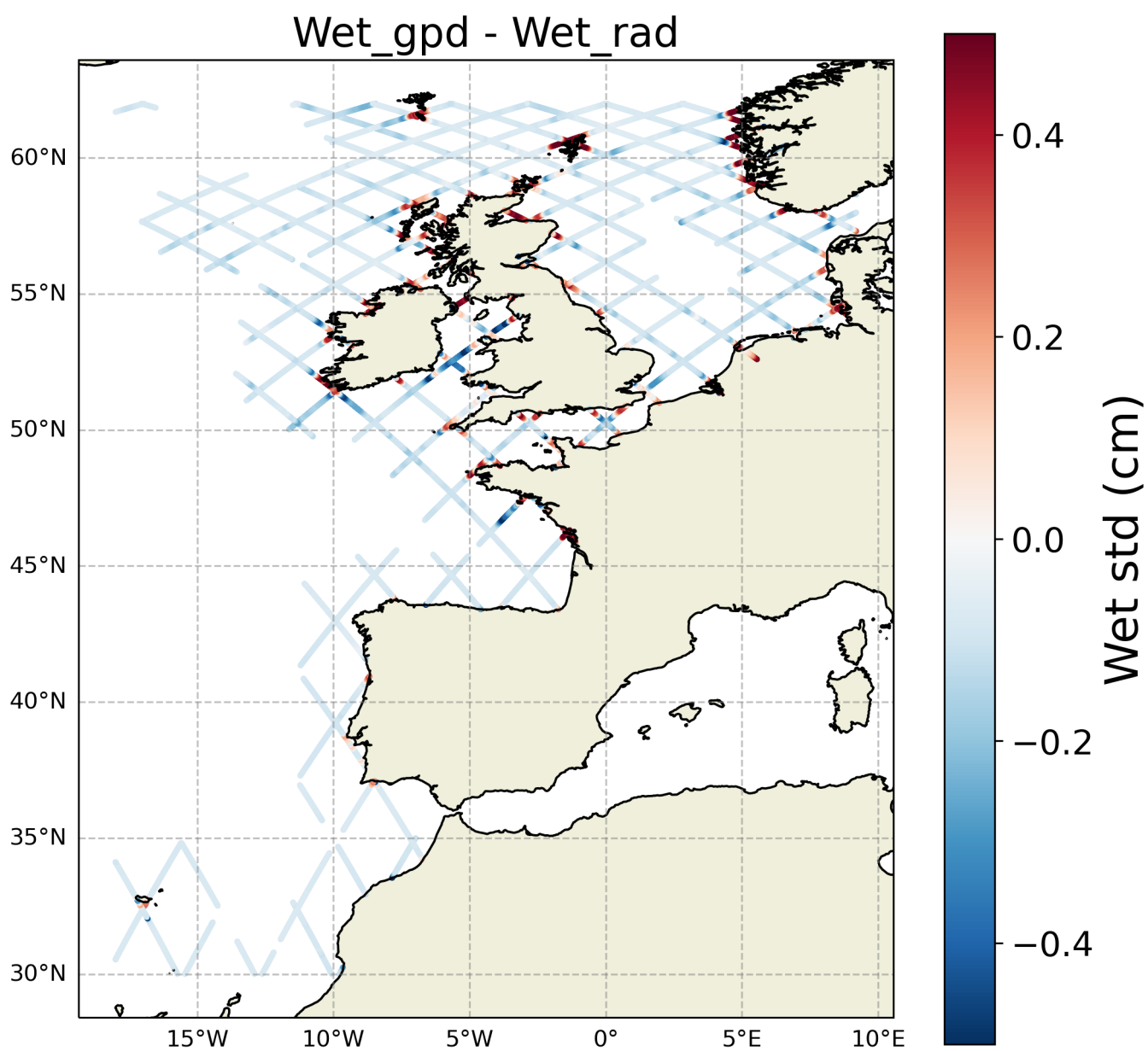


FIGURE 28 – Spatial coherence analysis of the Difference in Wet 's std between Wet_gpd and Wet_rad

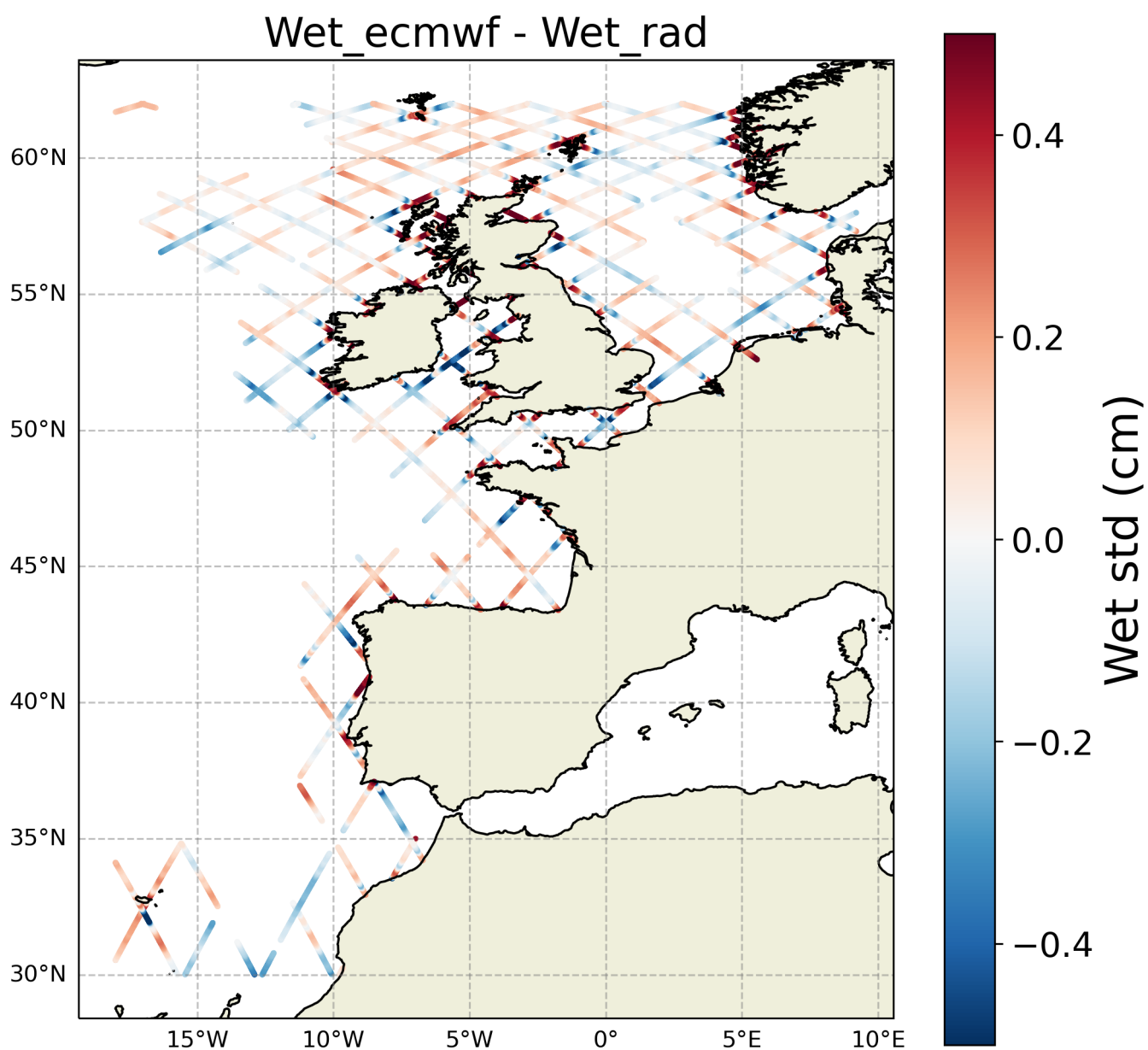


FIGURE 29 – Spatial coherence analysis of the Difference in Wet 's std between Wet_ecmwf and Wet_rad

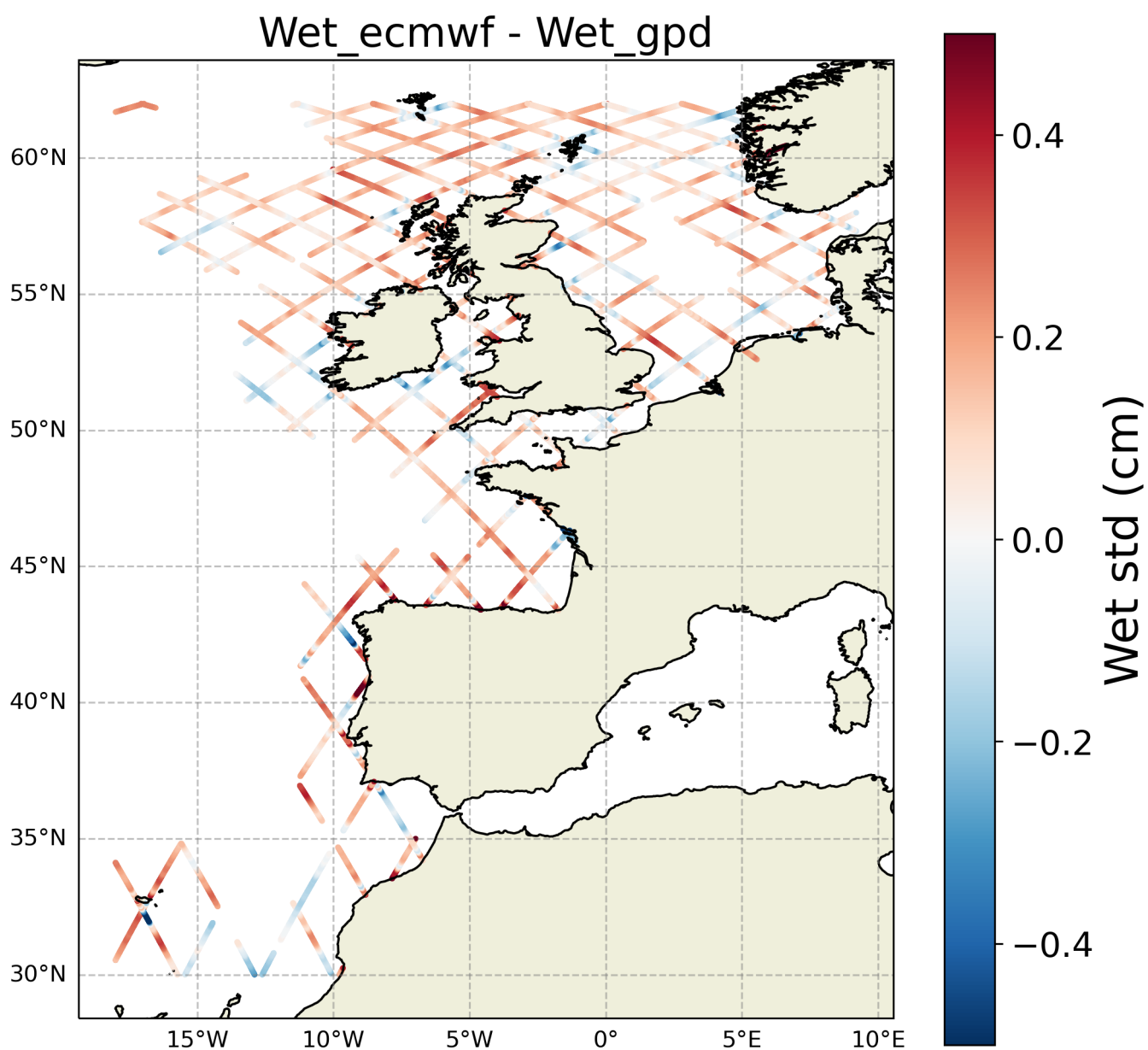


FIGURE 30 – Spatial coherence analysis of the Difference in Wet 's std between Wet_ecmwf and Wet_gpd

3.2.3 Wet 's mean

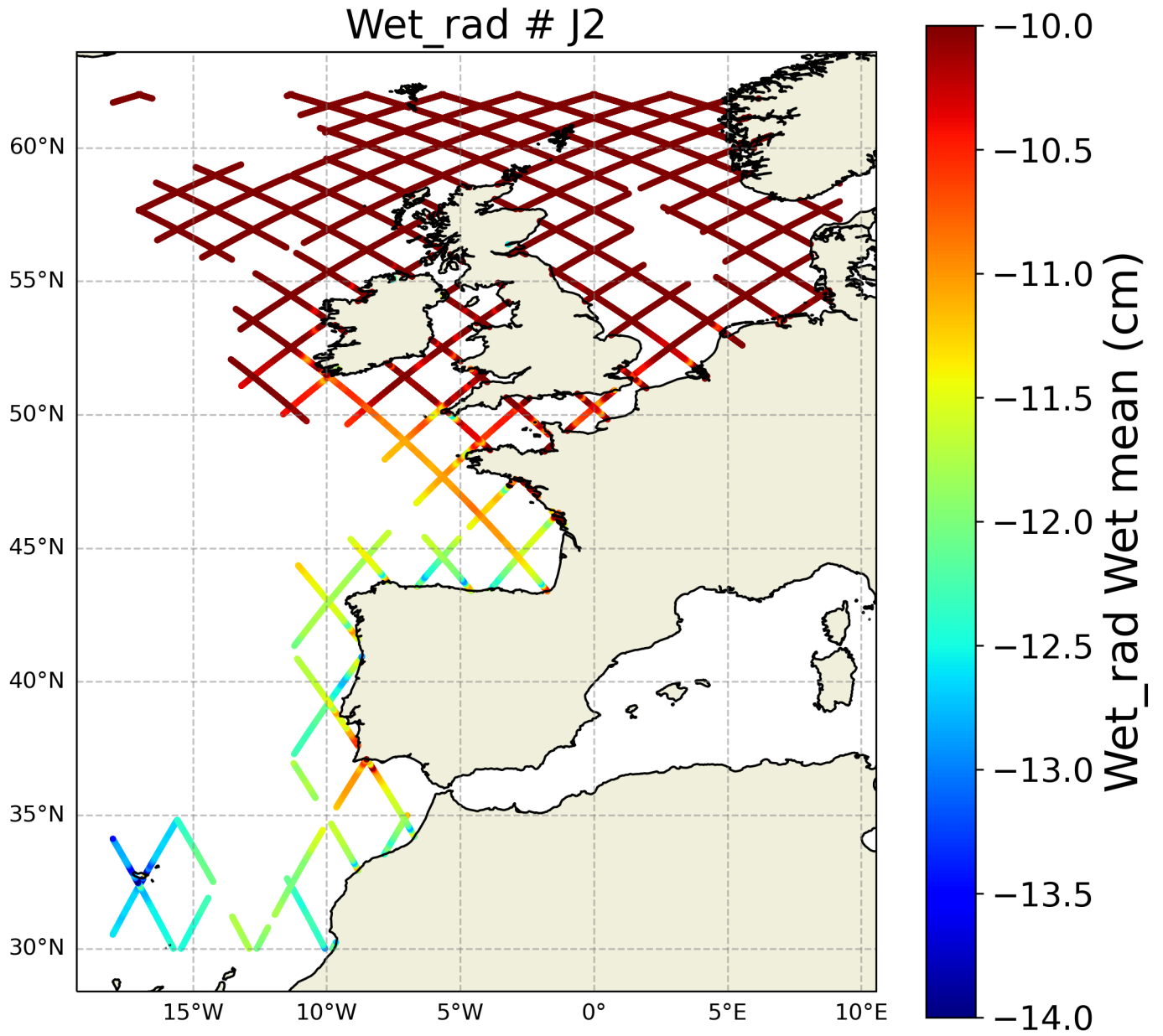


FIGURE 31 – Spatial coherence analysis of the mean of the Wet_rad version of Wet variable

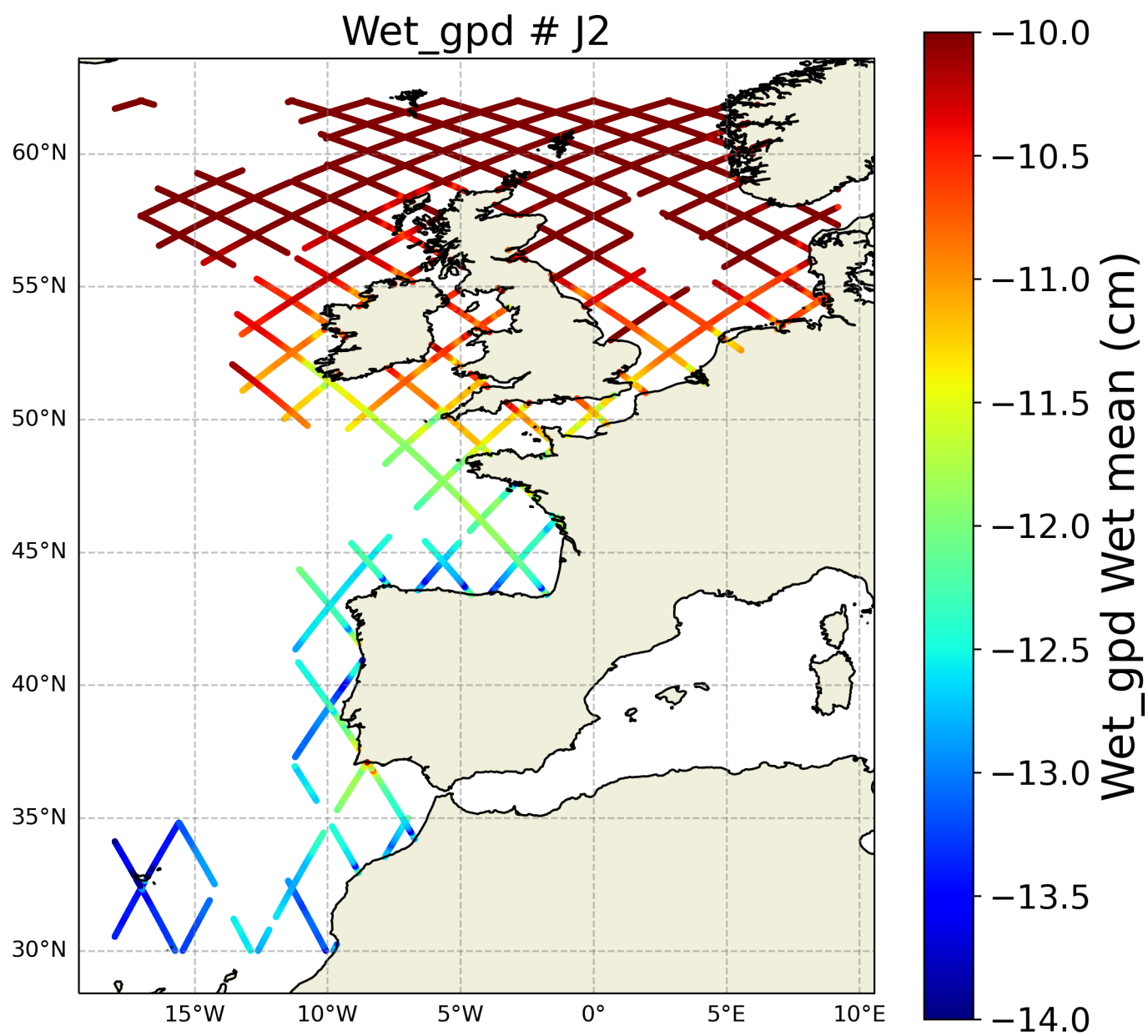


FIGURE 32 – Spatial coherence analysis of the mean of the Wet_gpd version of Wet variable

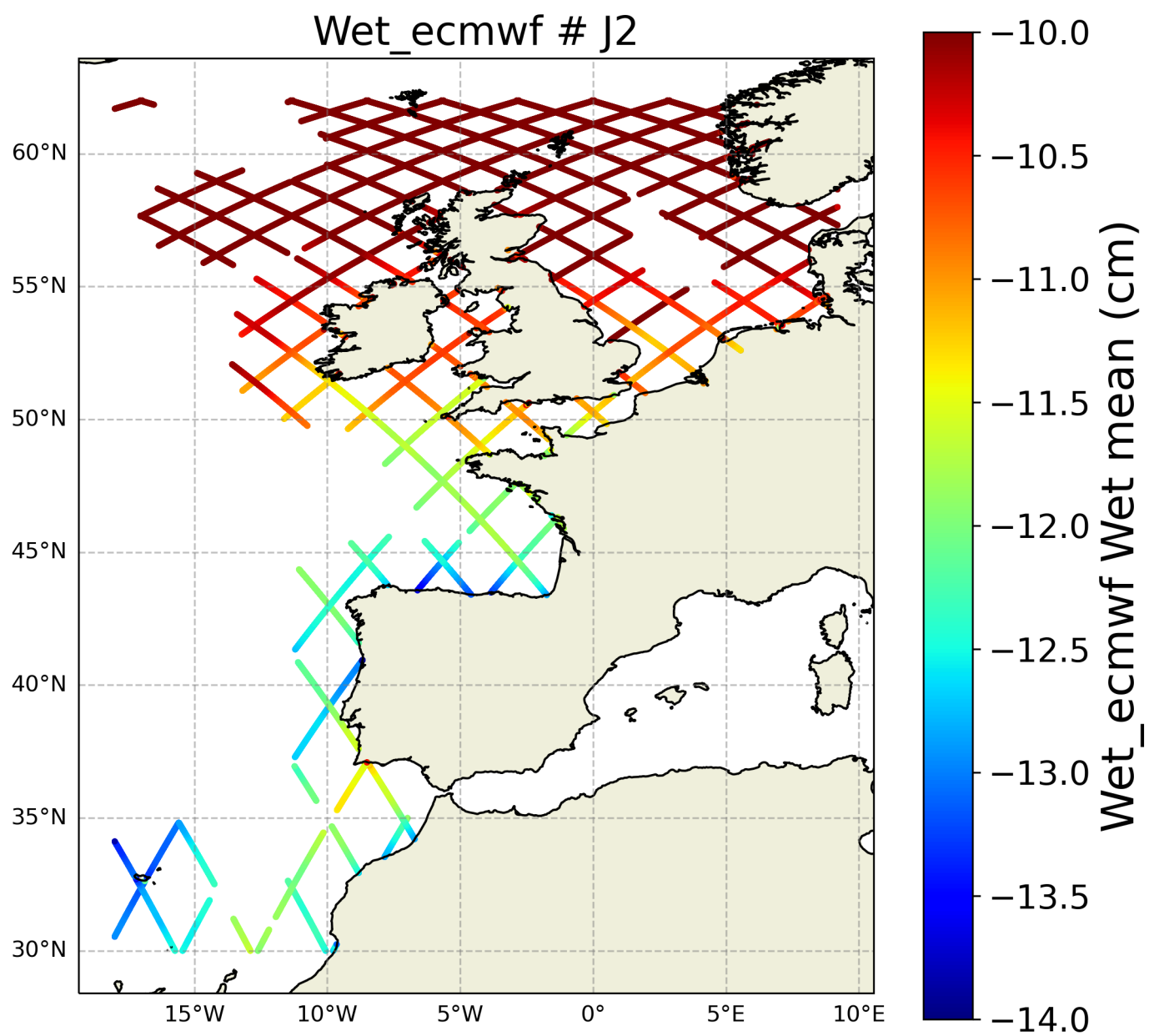


FIGURE 33 – Spatial coherence analysis of the mean of the Wet_ecmwf version of Wet variable

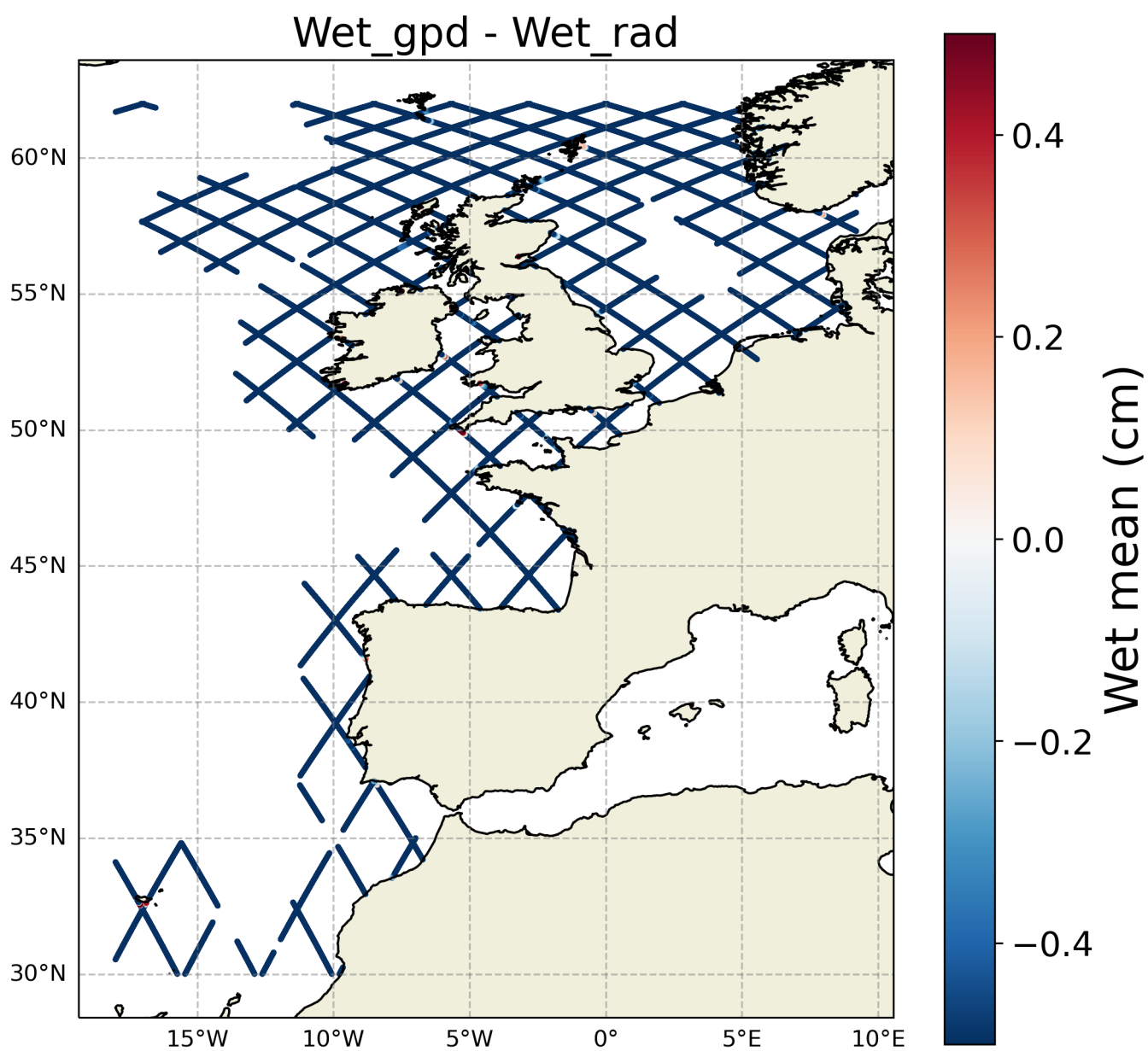


FIGURE 34 – Spatial coherence analysis of the Difference in Wet 's mean between Wet_gpd and Wet_rad

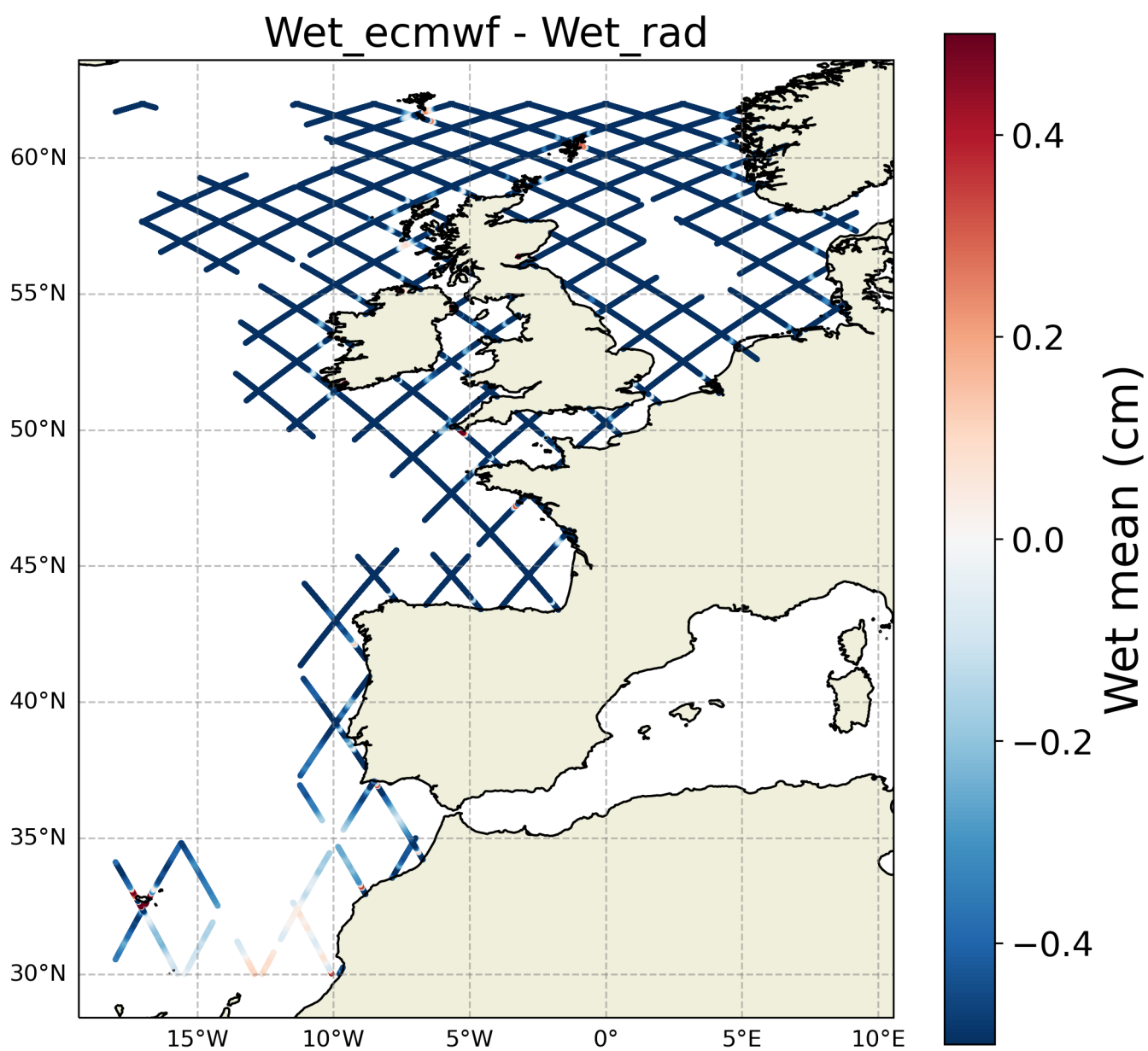


FIGURE 35 – Spatial coherence analysis of the Difference in Wet 's mean between Wet_ecmwf and Wet_rad

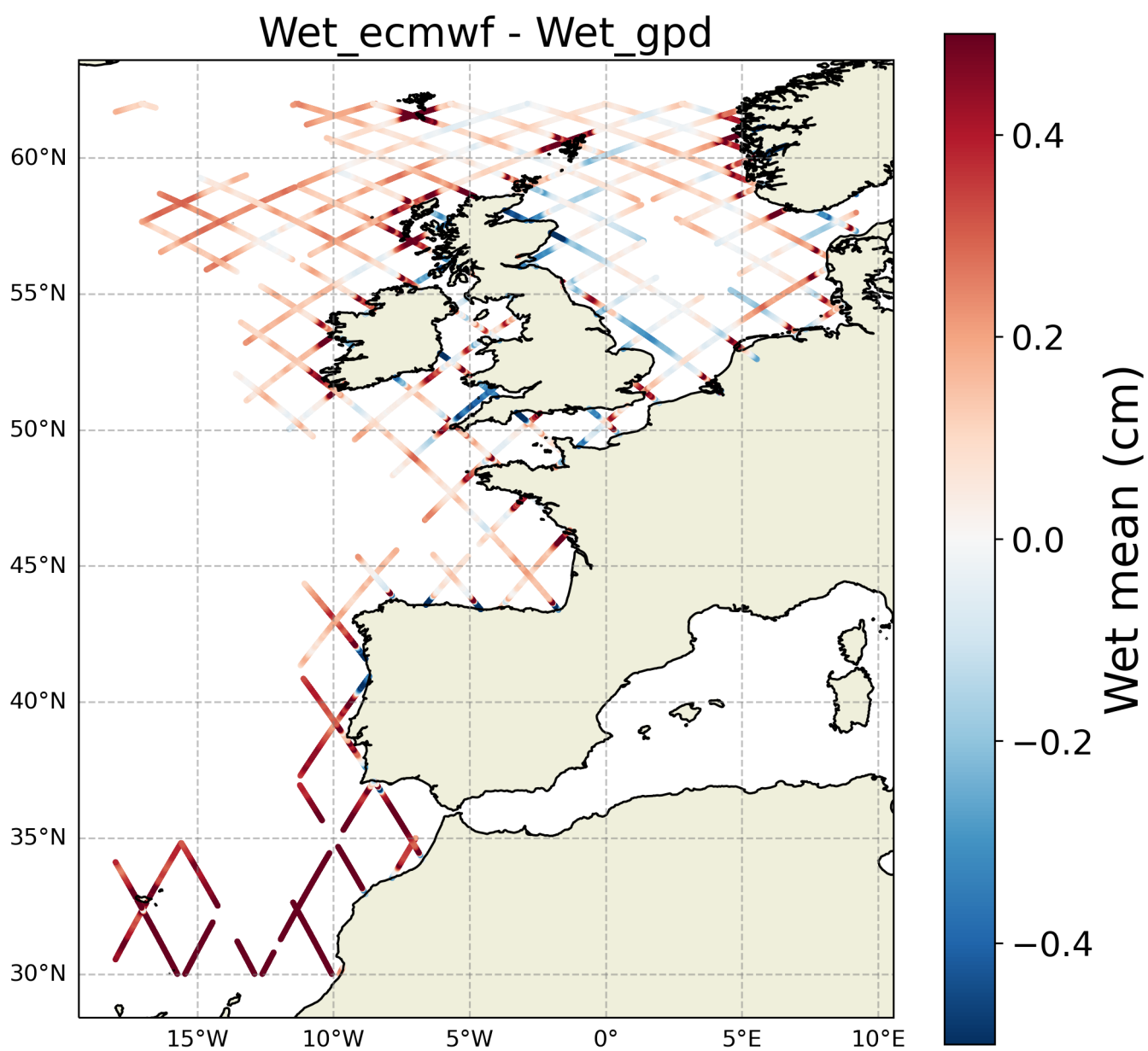


FIGURE 36 – Spatial coherence analysis of the Difference in Wet 's mean between Wet_ecmwf and Wet_gpd

4 Histograms

4.1 Wet

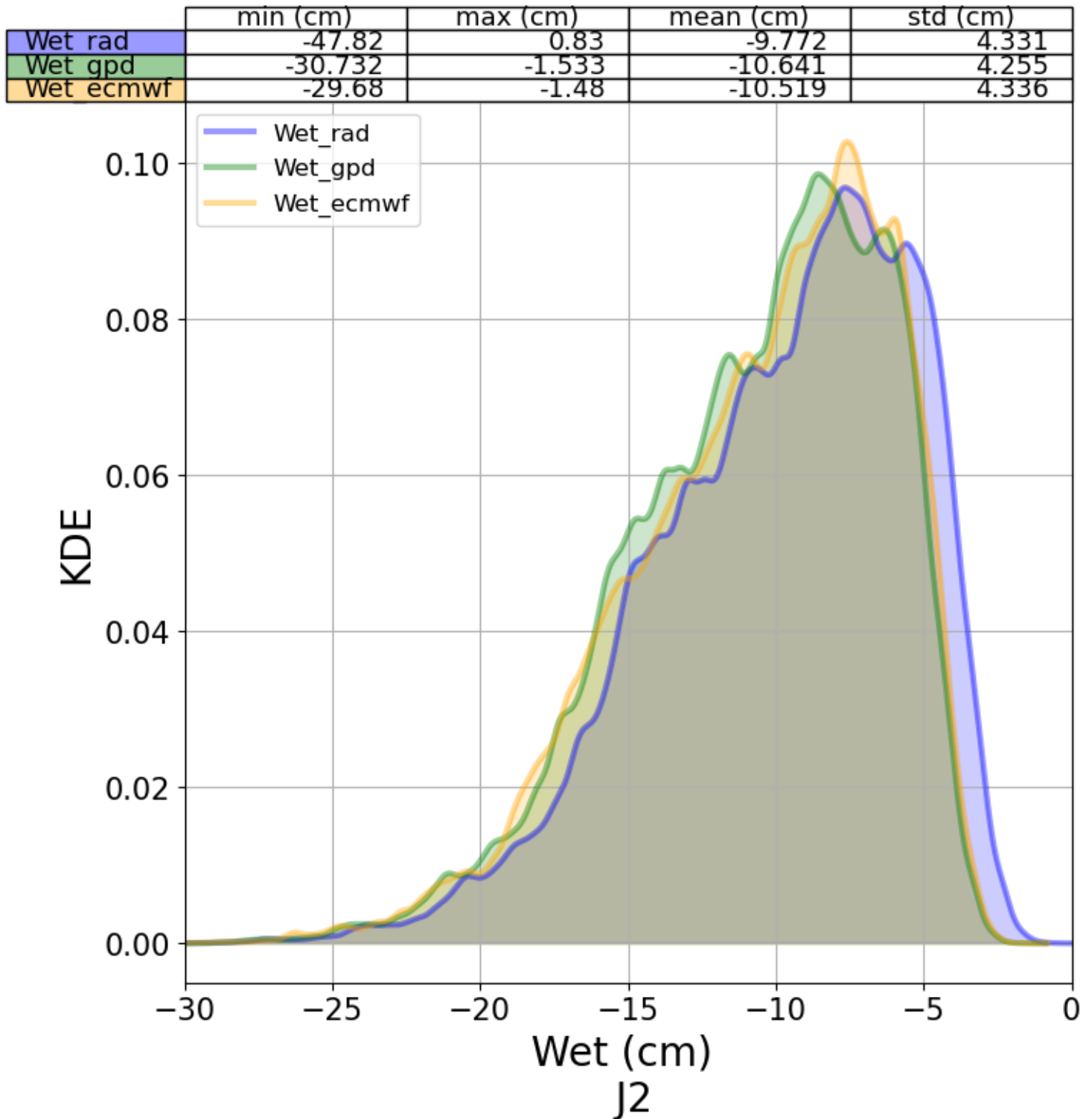


FIGURE 37 – Histogram of each of Wet version

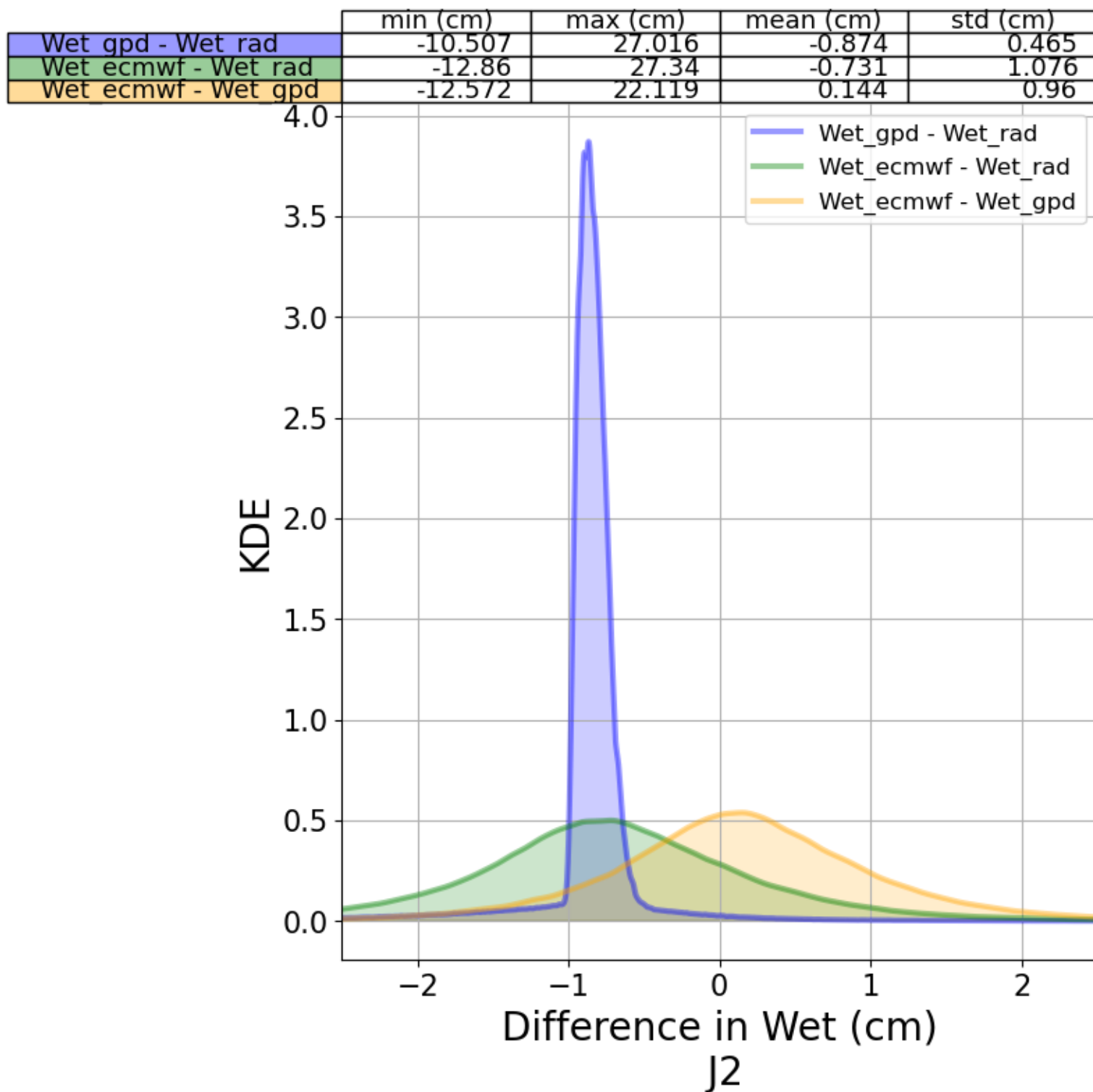


FIGURE 38 – Histograms of difference of each Wet version and reference one

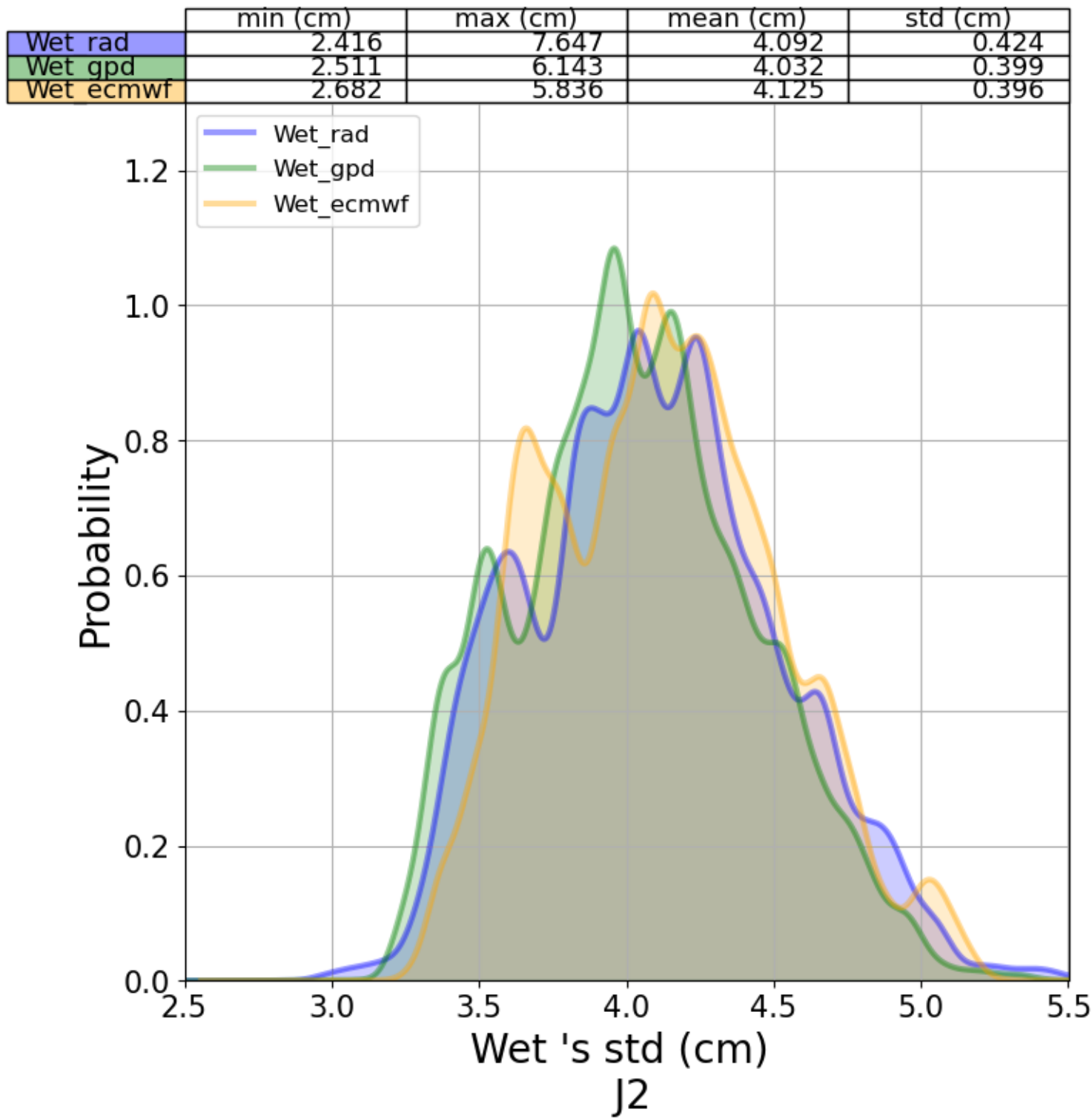


FIGURE 39 – Histograms of the standard deviation of each Wet version

4.2 sla

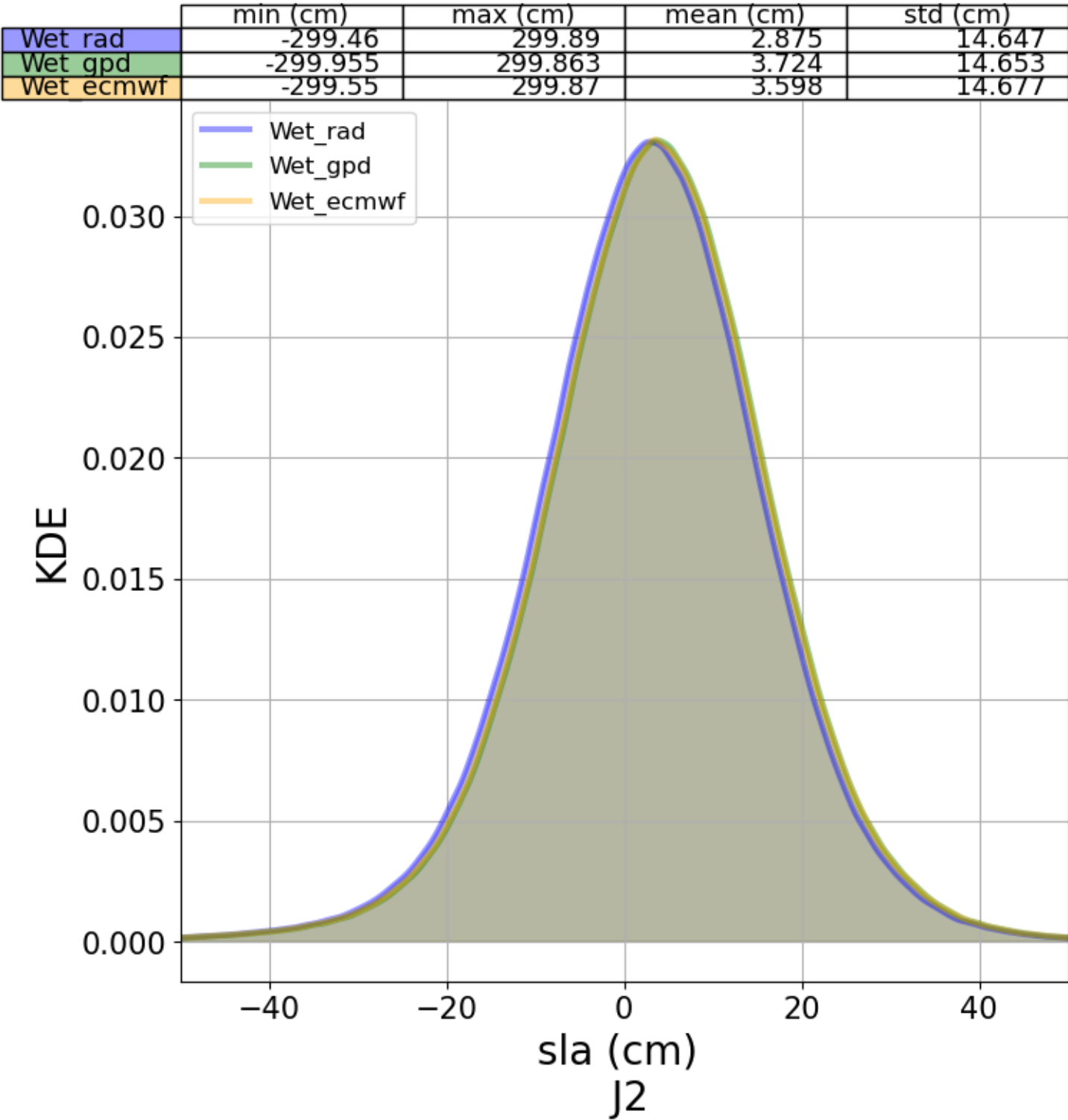


FIGURE 40 – Histogram of each of sla version

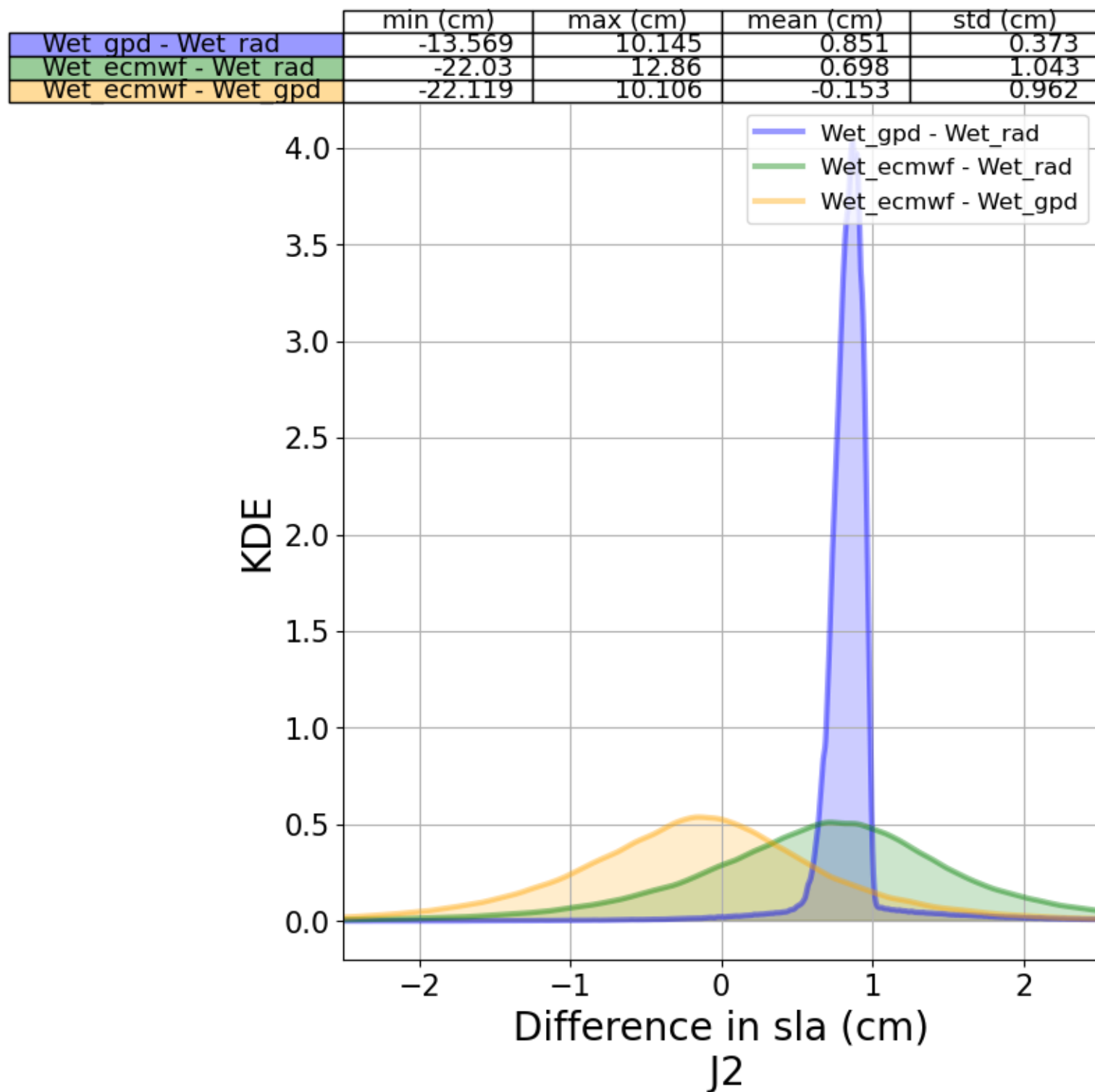


FIGURE 41 – Histograms of difference of each sla version and reference one

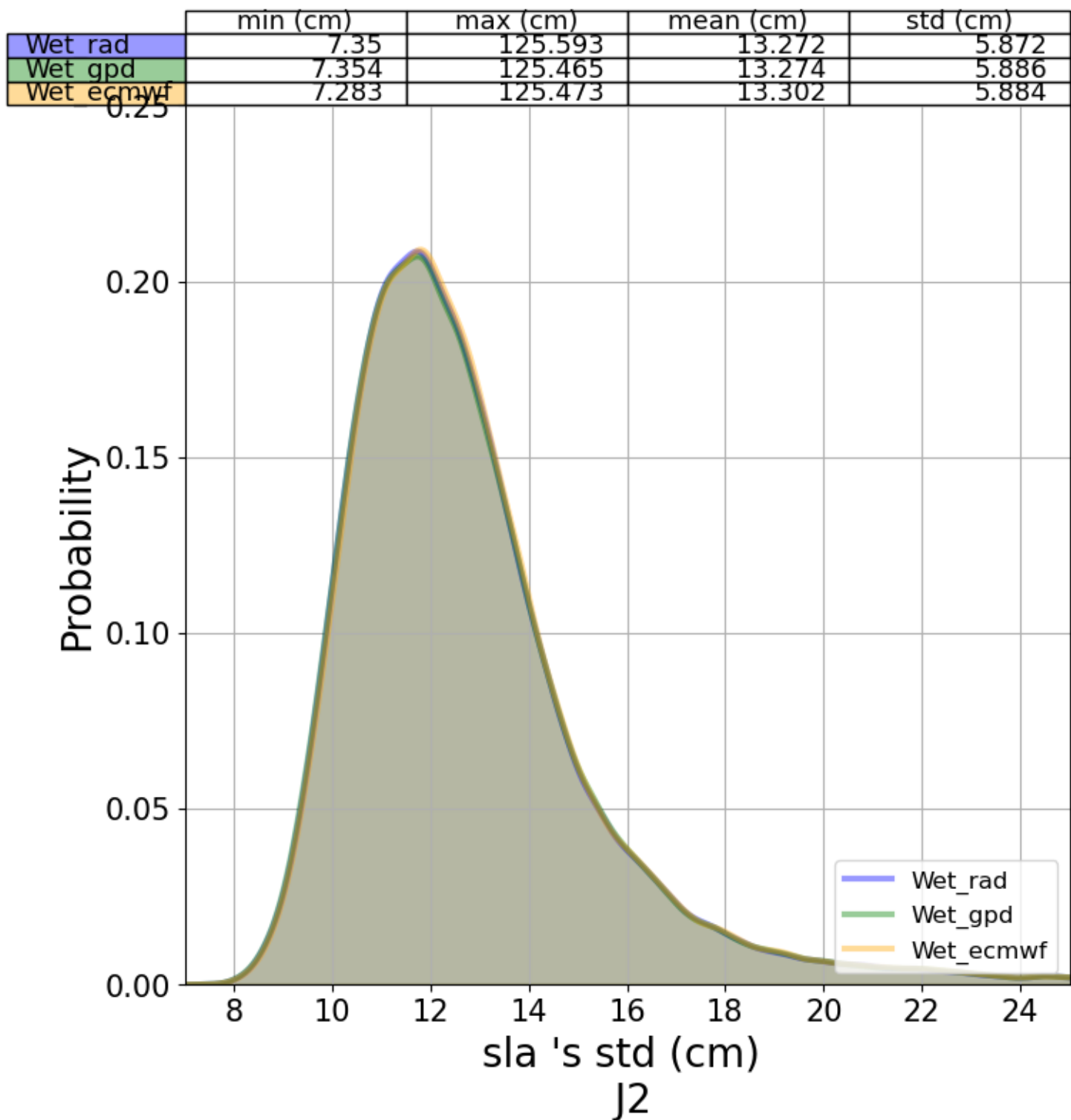


FIGURE 42 – Histograms of the standard deviation of each sla version

5 Along-track analysis

5.1 Wet

5.1.1 Wet 's count

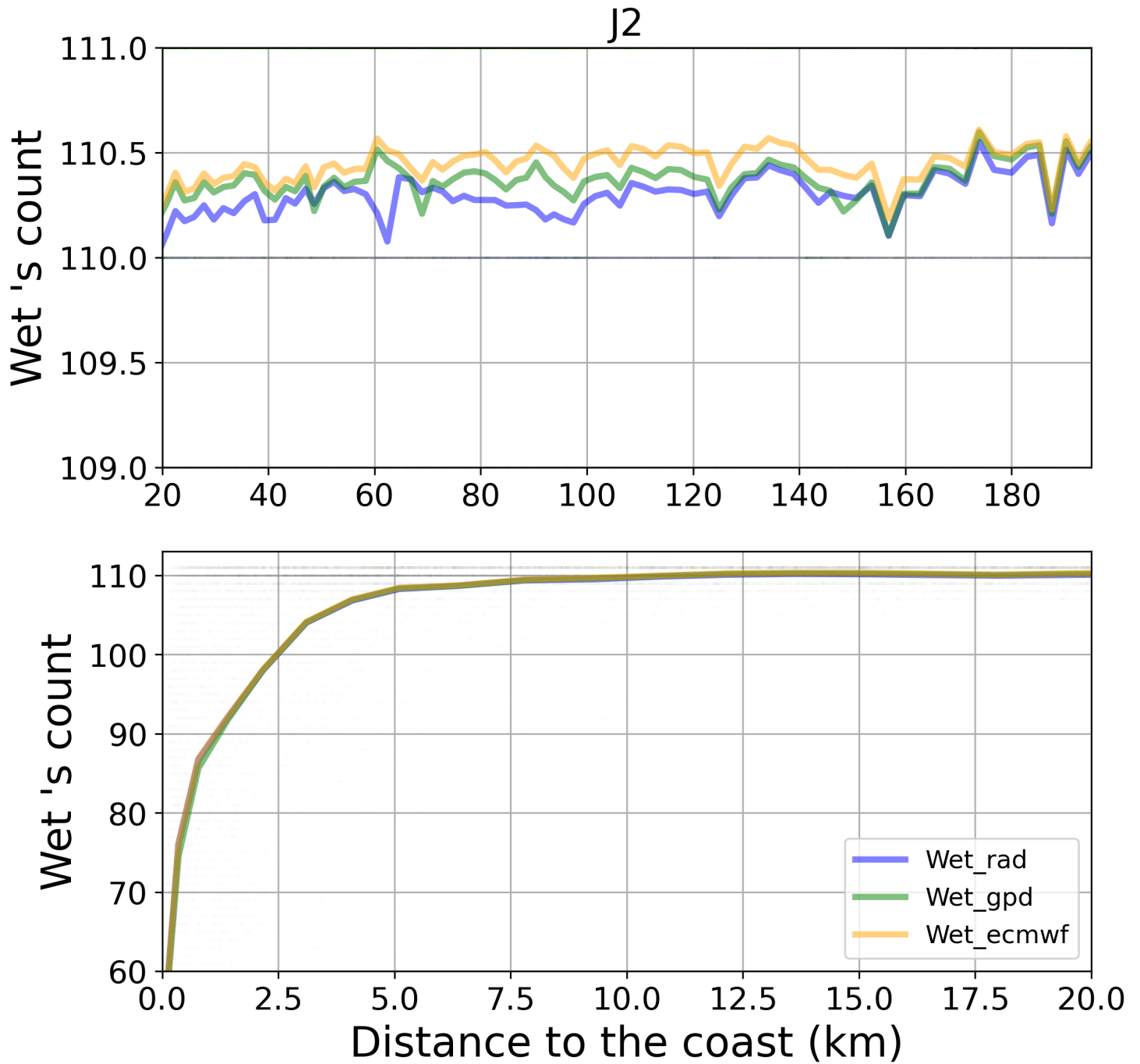


FIGURE 43 – Along-track analysis of Wet 's count

J2

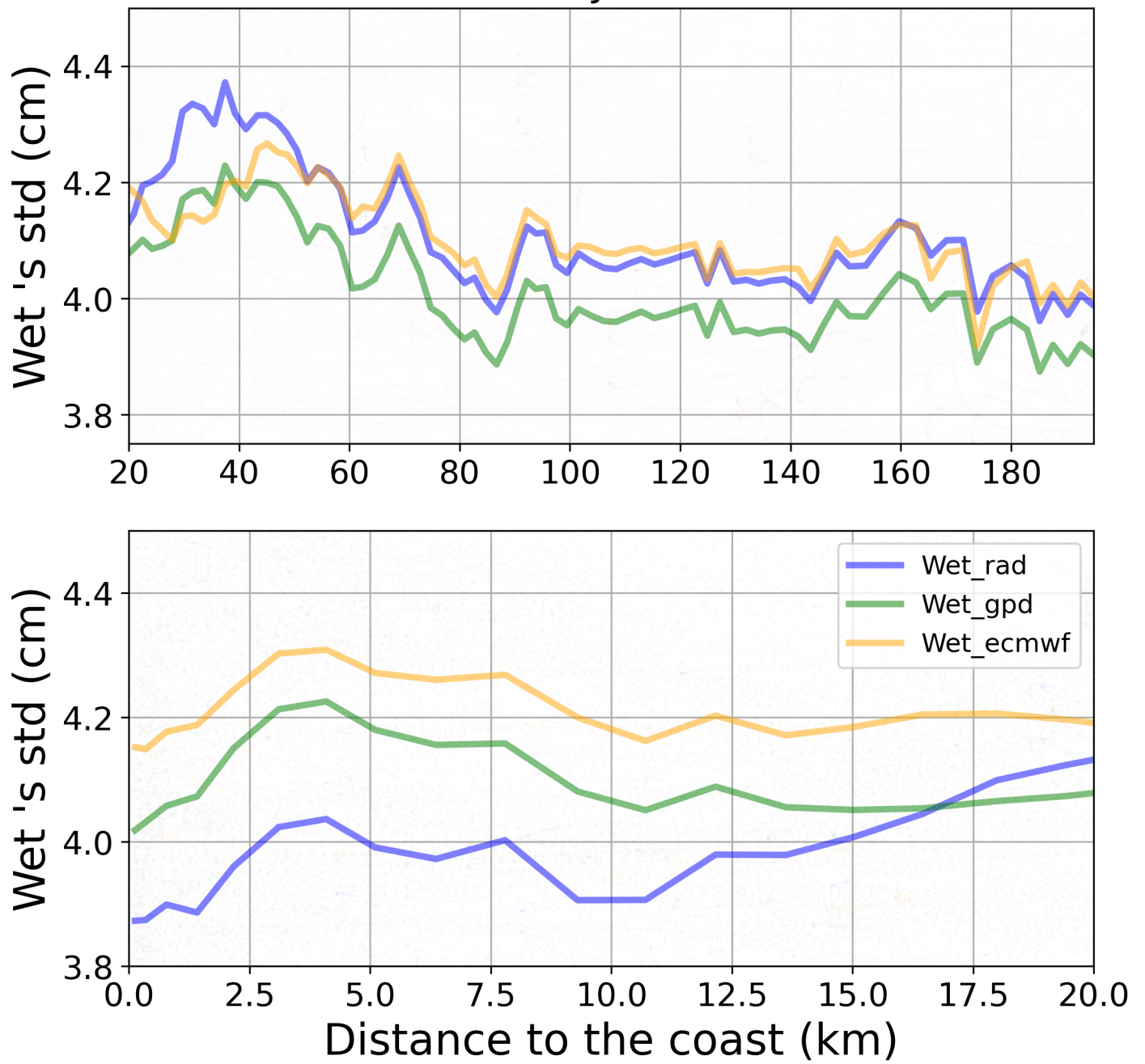


FIGURE 44 – Along-track analysis of Wet 's std

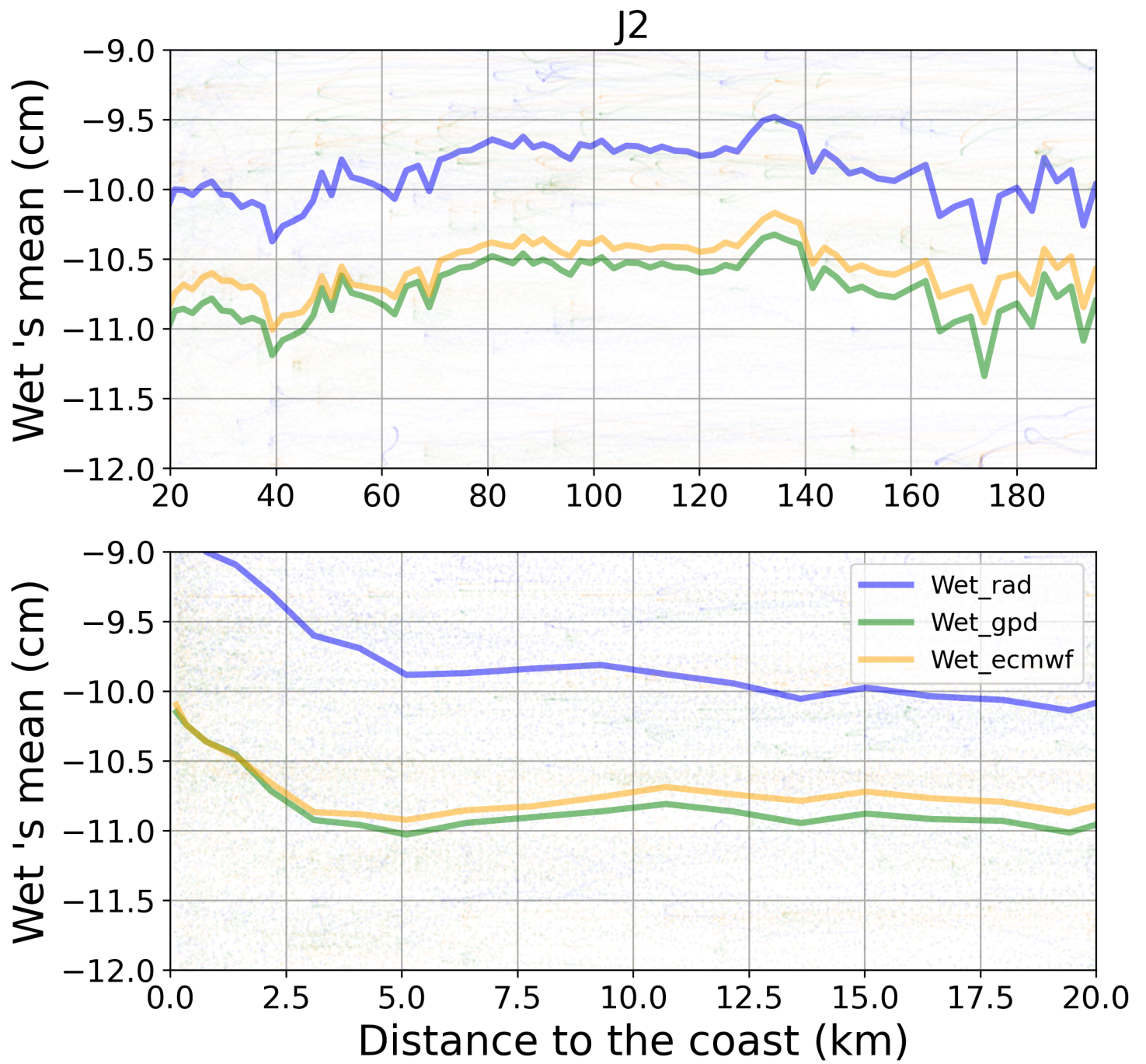


FIGURE 45 – Along-track analysis of Wet 's mean

5.2 sla

5.2.1 sla 's count

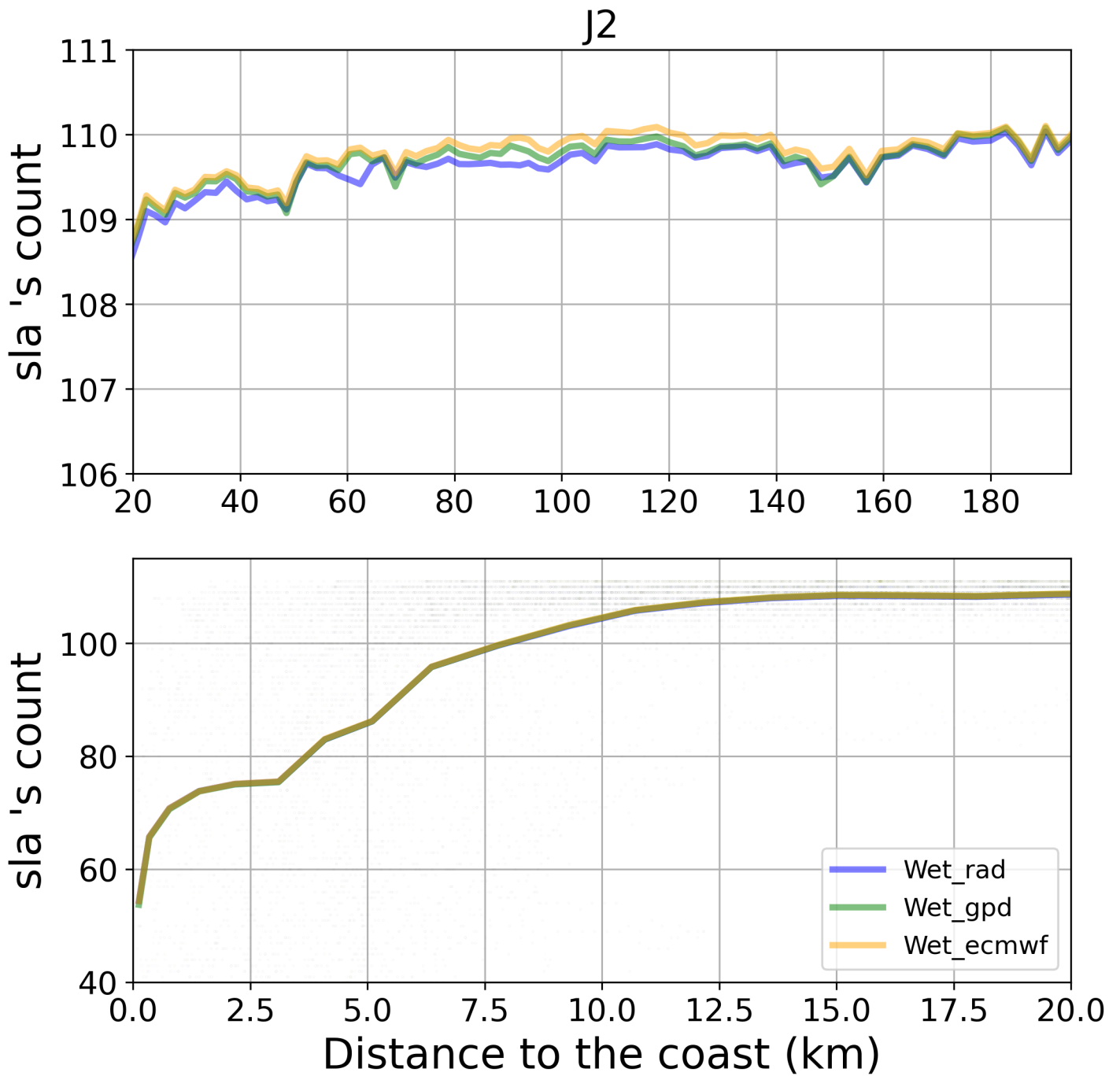


FIGURE 46 – Along-track analysis of sla 's count

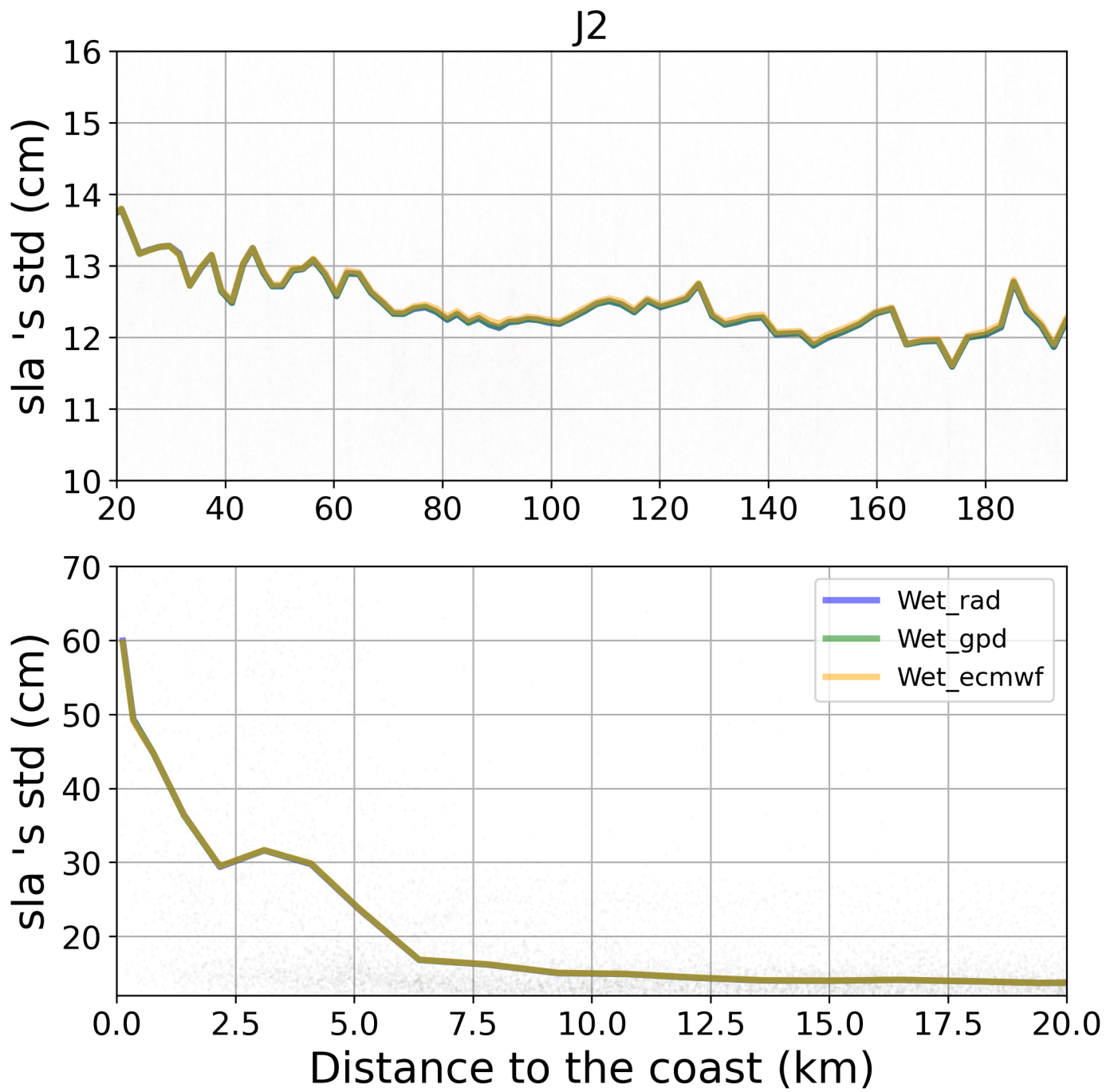


FIGURE 47 – Along-track analysis of sla 's std

J2

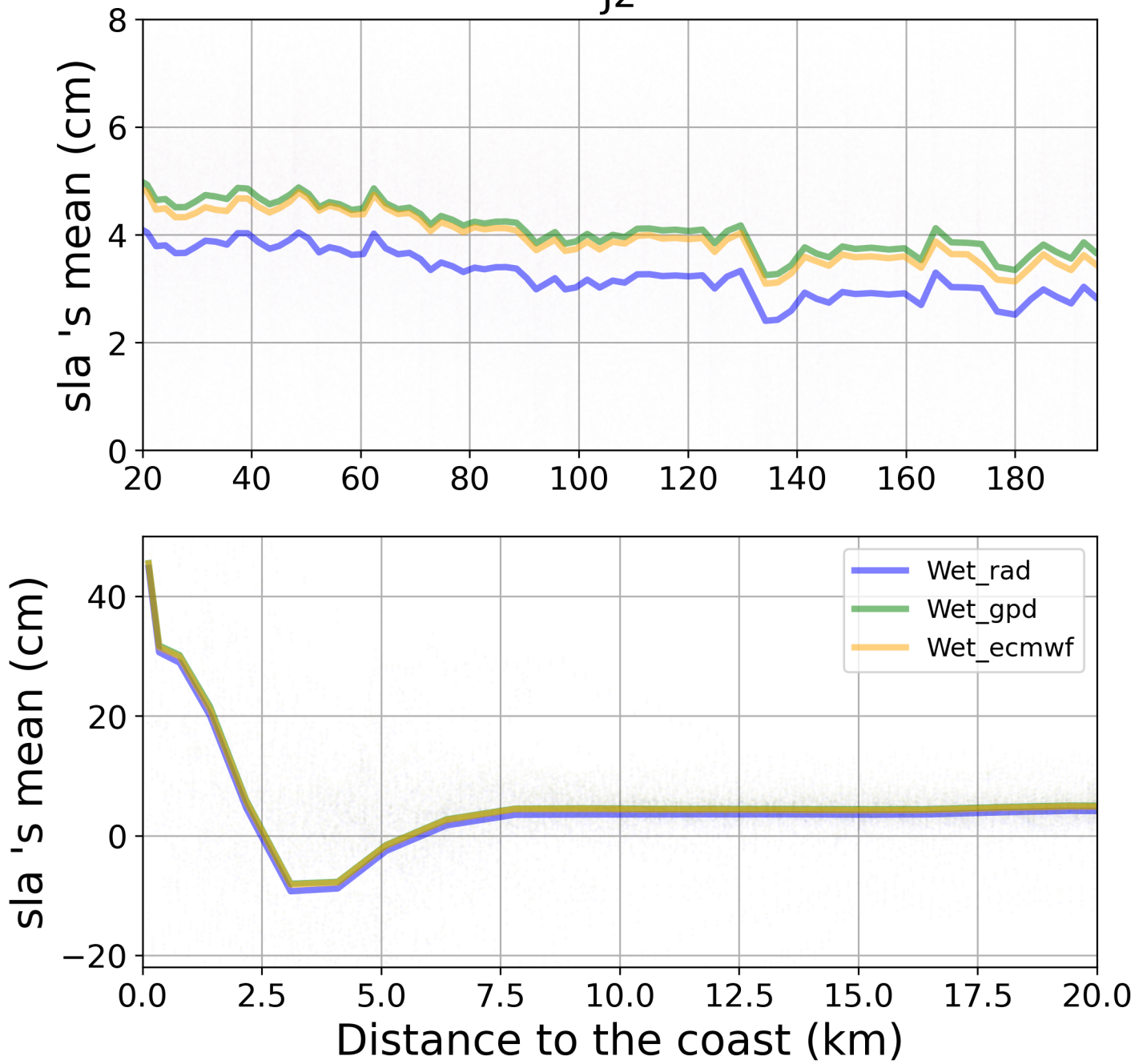


FIGURE 48 – Along-track analysis of sla 's mean

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 tide Gauge station

6.1 Station : HERBAUDIÈRE

- Nearest track to HERBAUDIÈRE station is the track number track70
- The area of interest is limited by :
 - A circle which it's center is the HERBAUDIÈRE tide gauge station location and has a Radius of 40 Km
 - Maximum distance to the coast : 20 Km
 - Latitude limits : [None, 47.1] °

6.1.1 correlation visualization in maps view % HERBAUDIÈRE tide gauge

Correlation Altimetry data with respect to HERBAUDIÈRE Tide gauge data

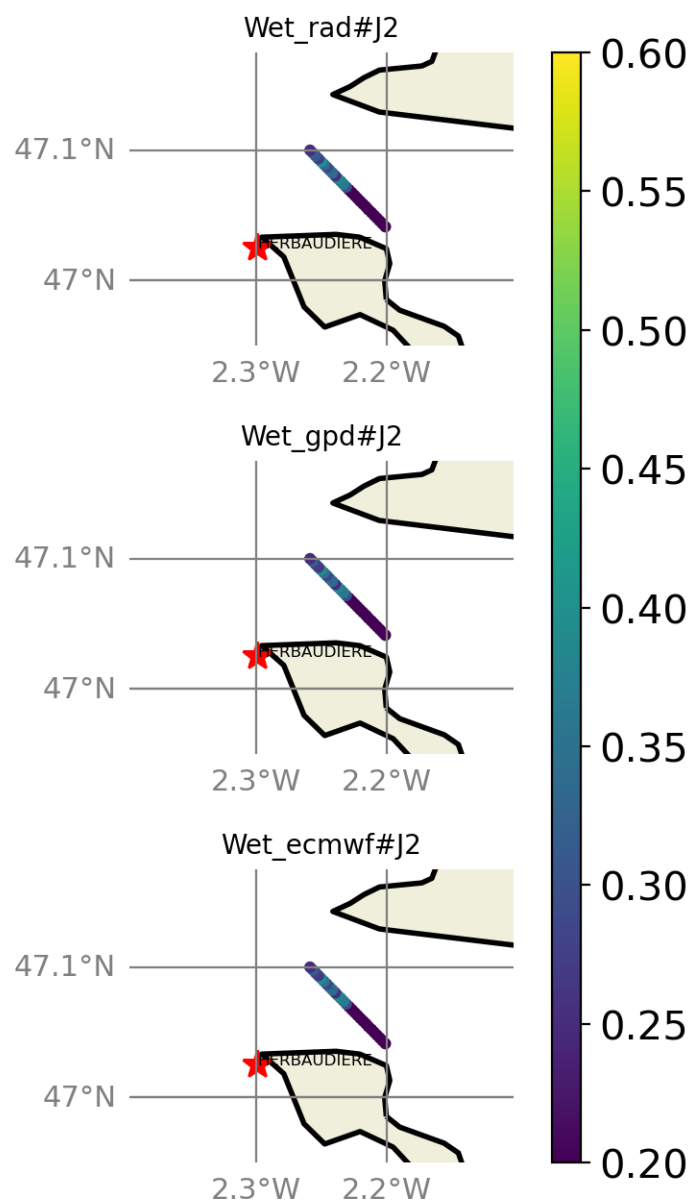


FIGURE 49 – correlation visualization in maps view % HERBAUDIÈRE tide gauge

6.1.2 rmsd visualization in maps view % HERBAUDIÈRE tide gauge

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

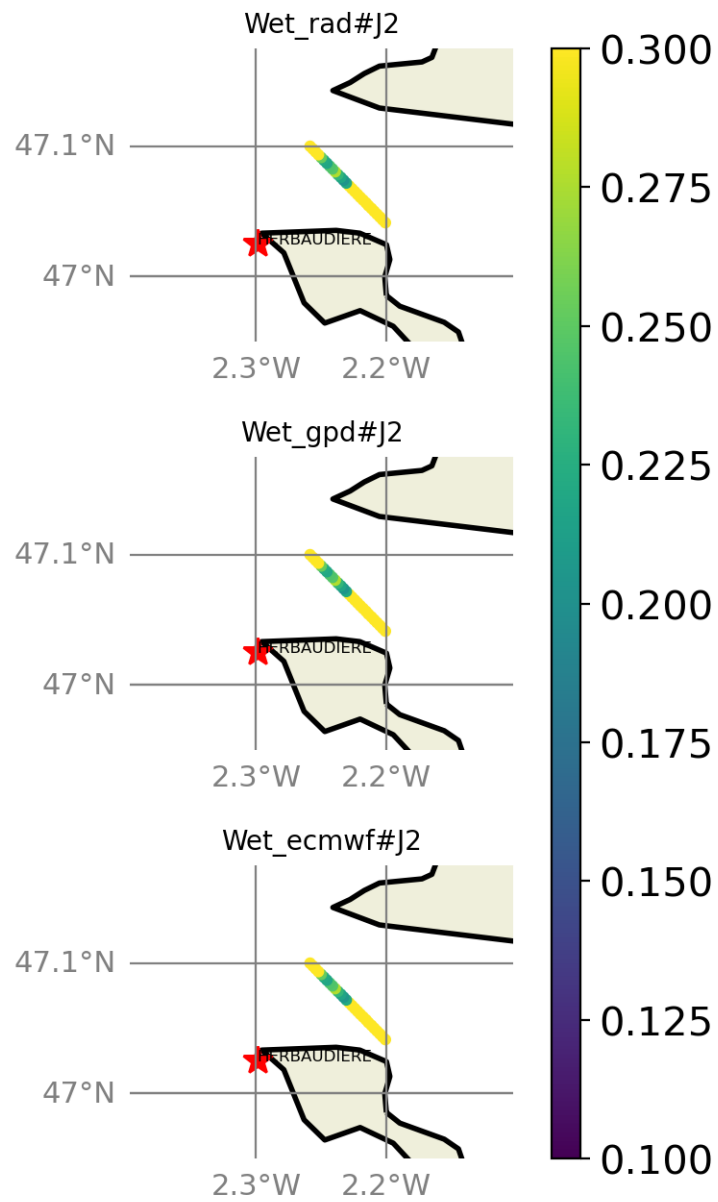


FIGURE 50 – rmsd visualization in maps view % HERBAUDIÈRE tide gauge

6.1.3 std visualization in maps view % HERBAUDIÈRE tide gauge

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

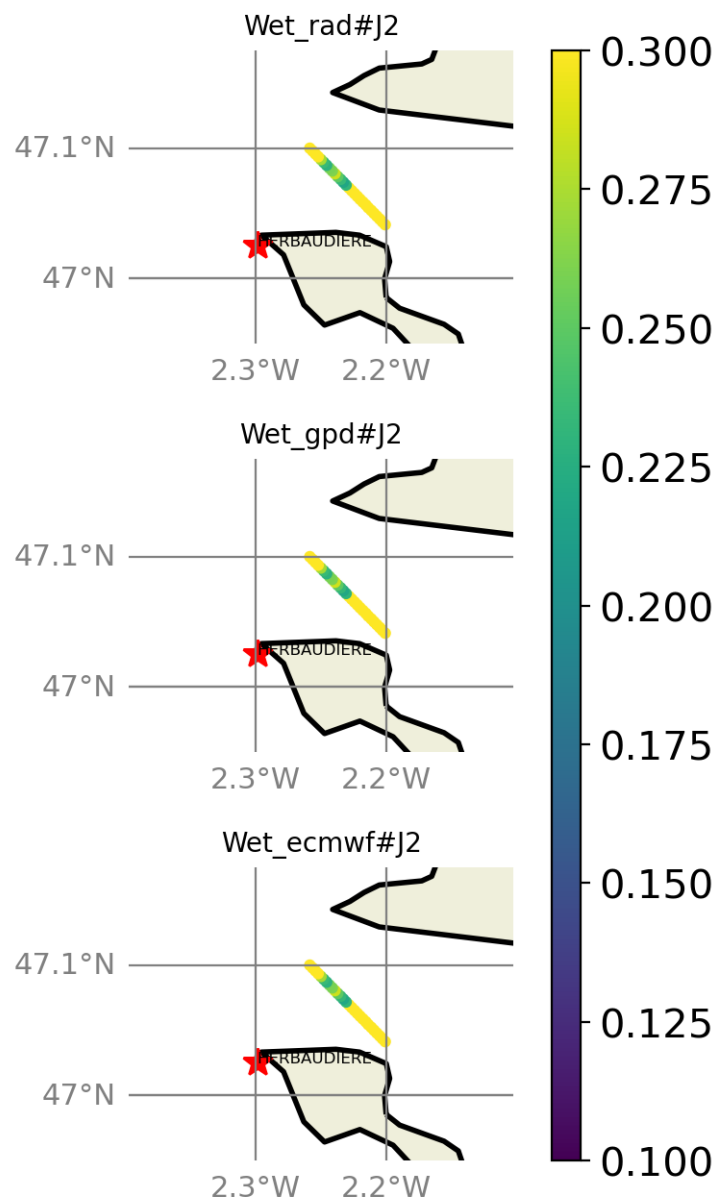


FIGURE 51 – std visualization in maps view % HERBAUDIÈRE tide gauge

6.1.4 valid_data_percent visualization in maps view % HERBAUDIERE tide gauge

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

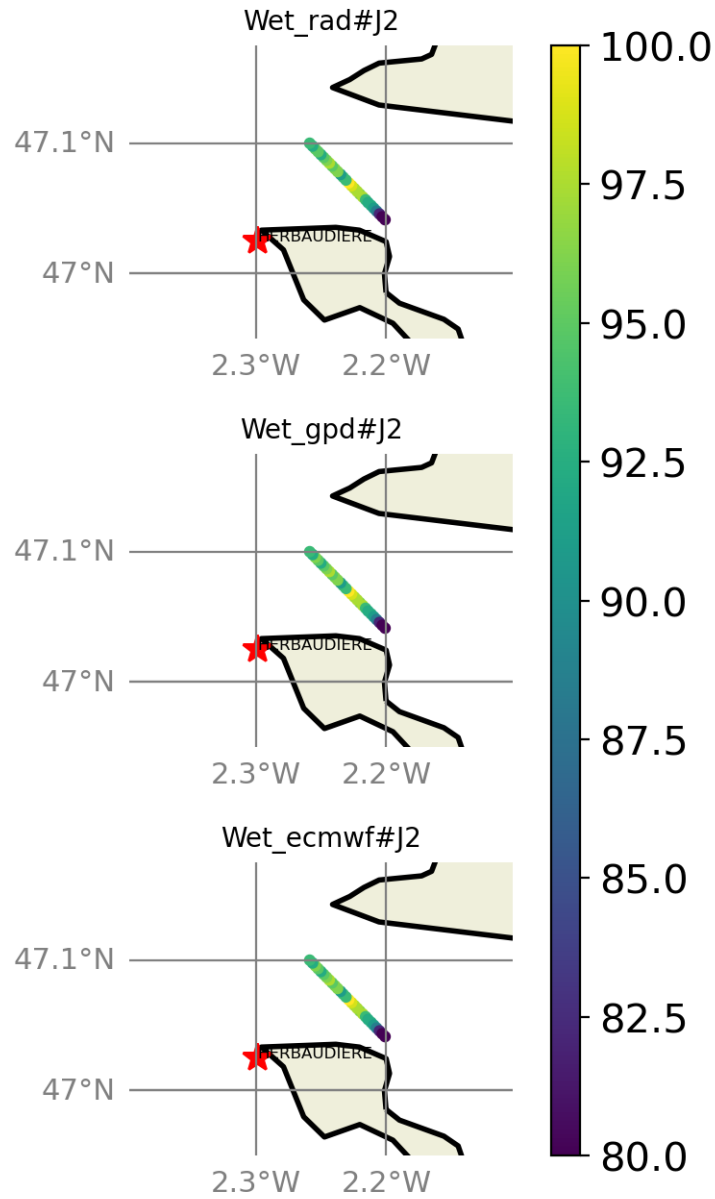


FIGURE 52 – valid_data_percent visualization in maps view % HERBAUDIERE tide gauge

6.1.5 Valid data (%) in function of distance to coast/HERBAUDIERE 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. $maxNB = 78$ 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.

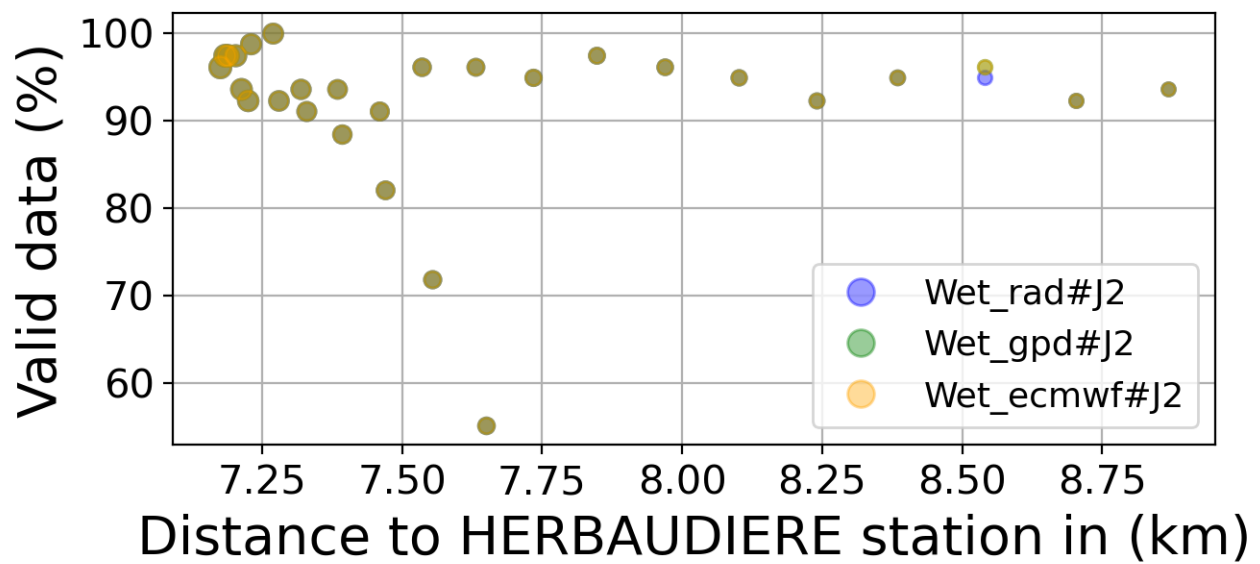
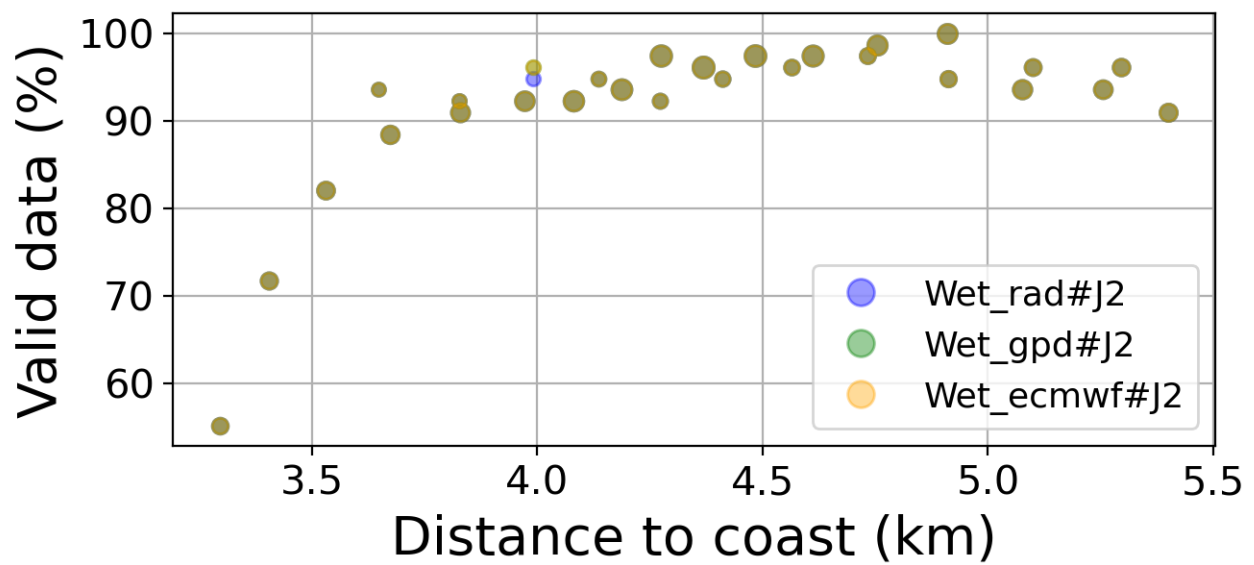


FIGURE 53 – Valid data (%) in function of distance to coast/HERBAUDIÈRE station

6.1.6 Std in function of distance to coast/HERBAUDIÈRE station

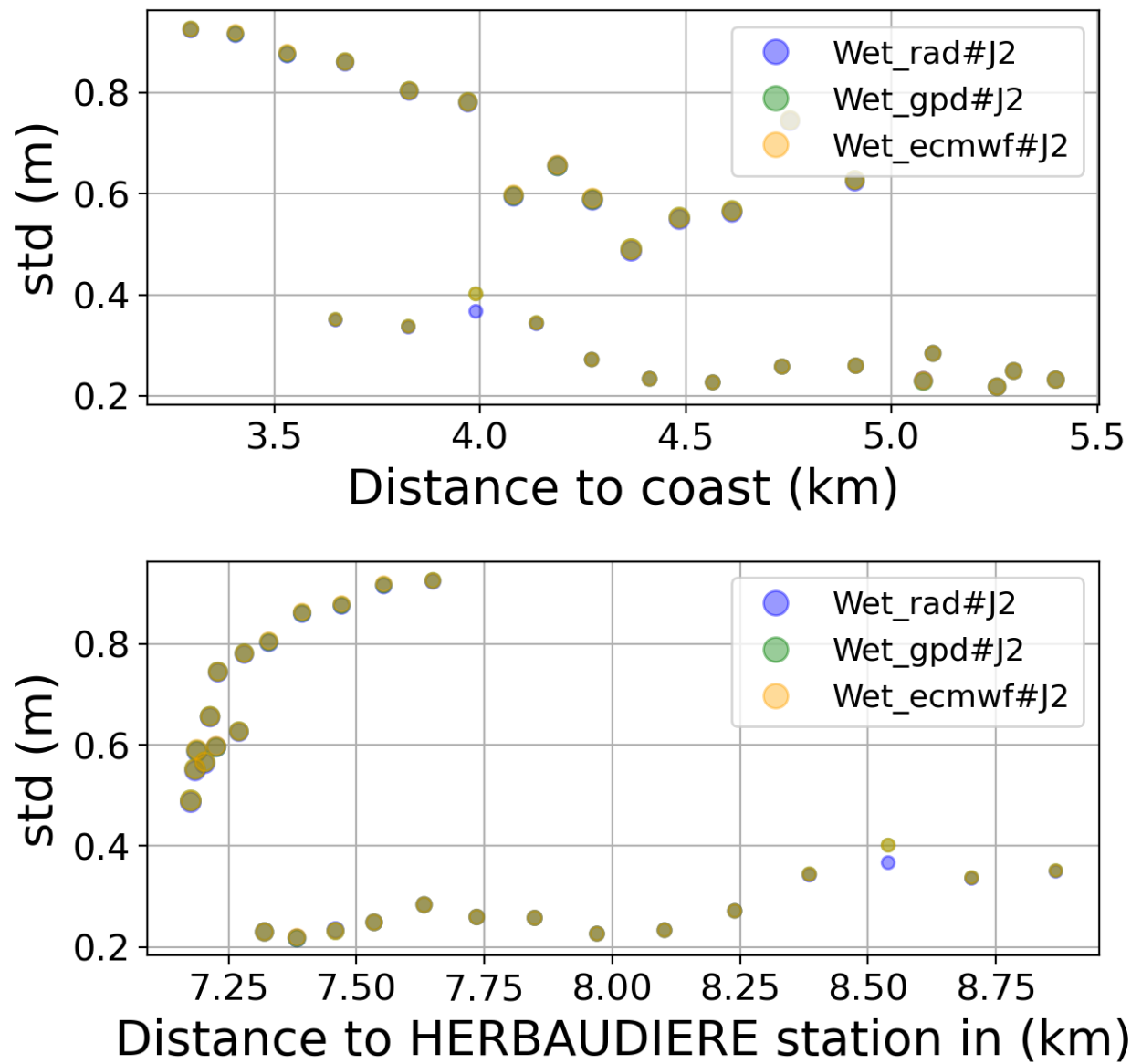


FIGURE 54 – Std in function of the distance to the coast/HERBAUDIÈRE station

6.1.7 Correlation in function of distance to coast/HERBAUDIÈRE station

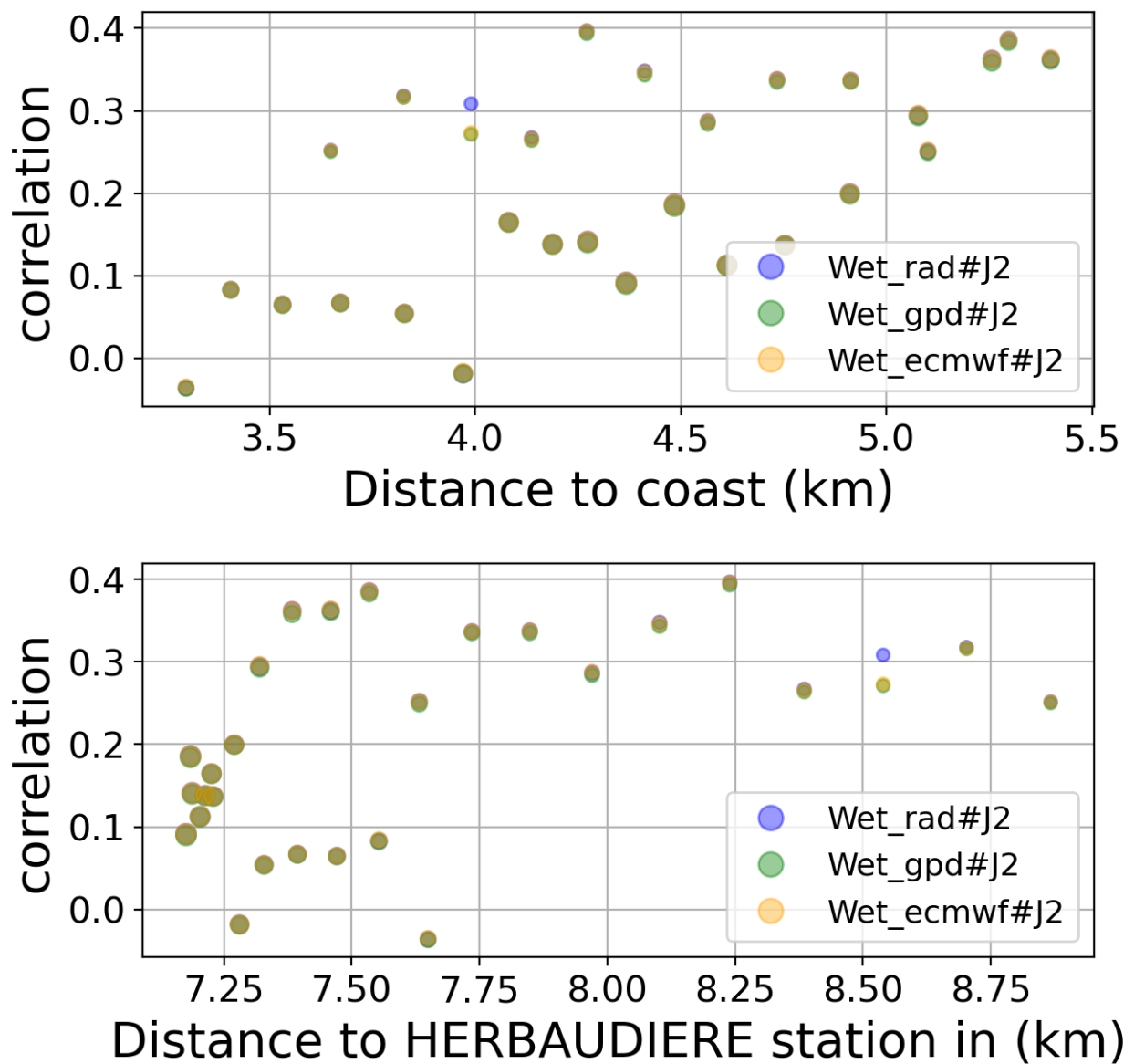


FIGURE 55 – Correlation in function of the distance to the coast/HERBAUDIÈRE station

6.1.8 Taylor Diagram

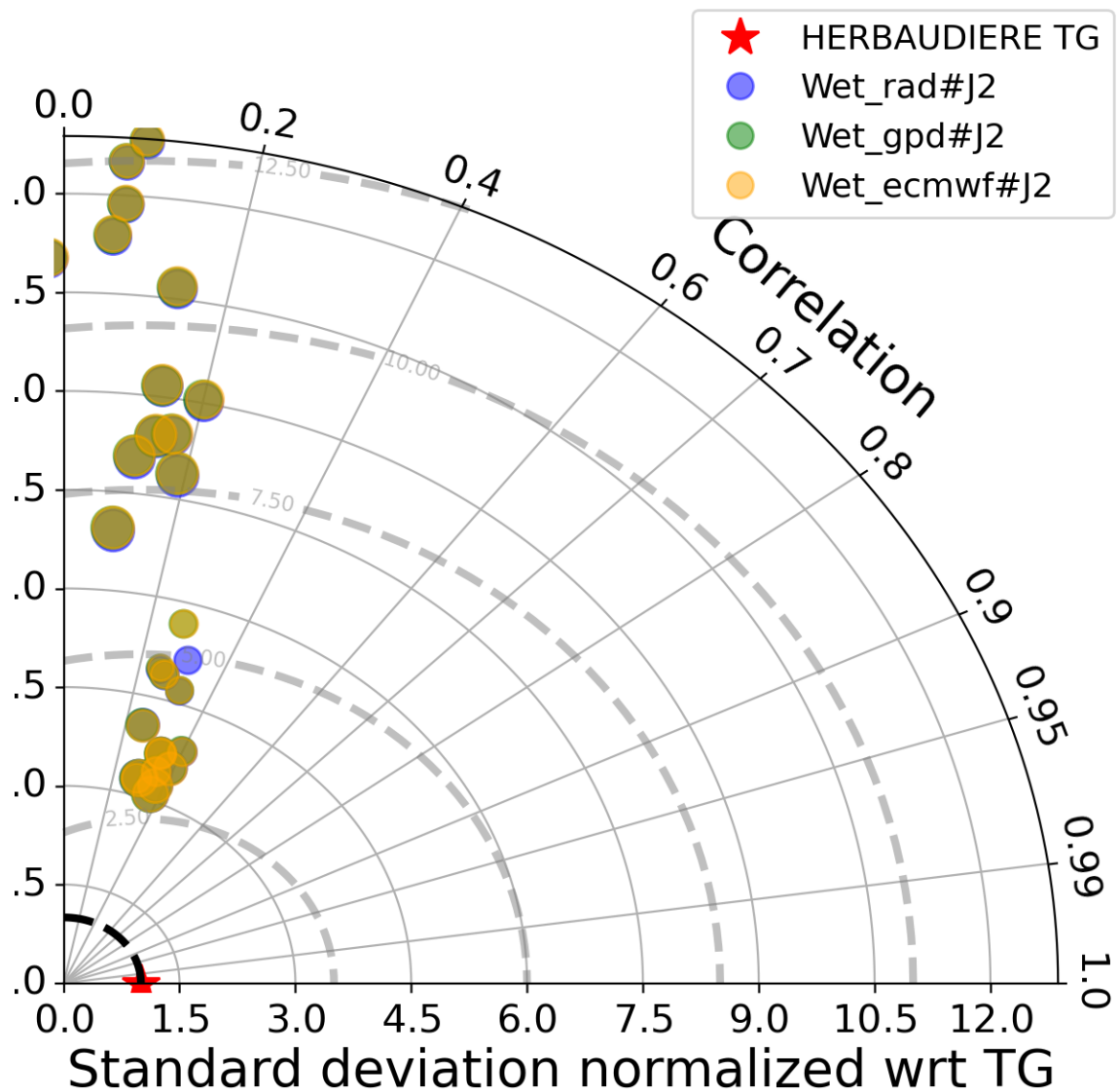


FIGURE 56 – Taylor diagram

6.1.9 Mean statistics table of products comparison with HERBAUDIERS 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	91.987	0.211	0.494	0.486
Wet_gpd#J2	92.033	0.208	0.497	0.488
Wet_ecmwf#J2	92.033	0.21	0.497	0.489

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 78 point.

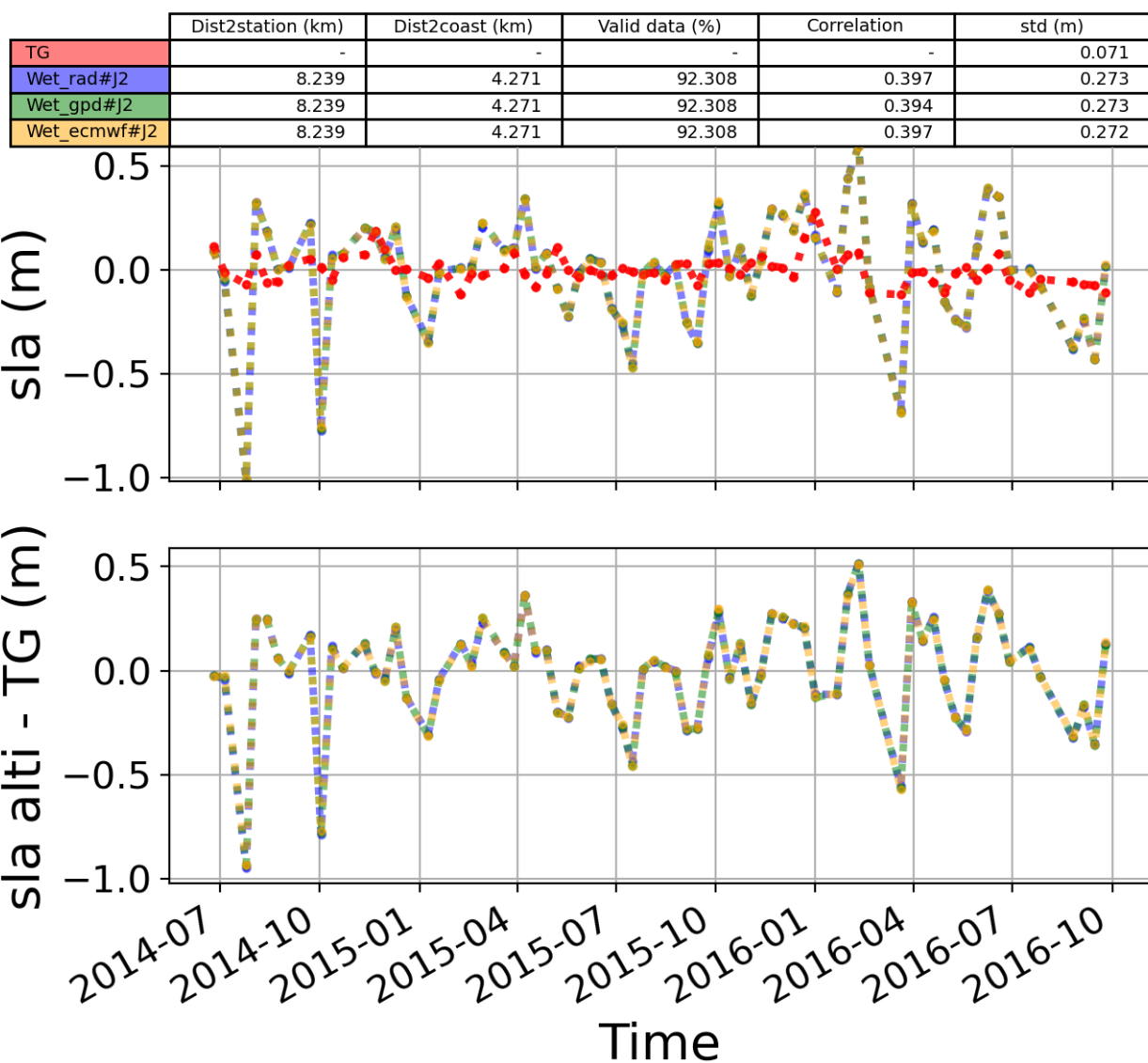


FIGURE 58 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.2 Station : Llandudno

- Nearest track to Llandudno station is the track number track222
- The area of interest is limited by :
 - A circle which it's center is the Llandudno tide gauge station location and has a Raduis of 40 Km
 - Maximum distance to the coast : 20 Km
 - Latitude limits : [None, 53.4] °

6.2.1 correlation visualization in maps view % Llandudno tide gauge

Correlation Altimetry data with respect to Llandudno Tide gauge data

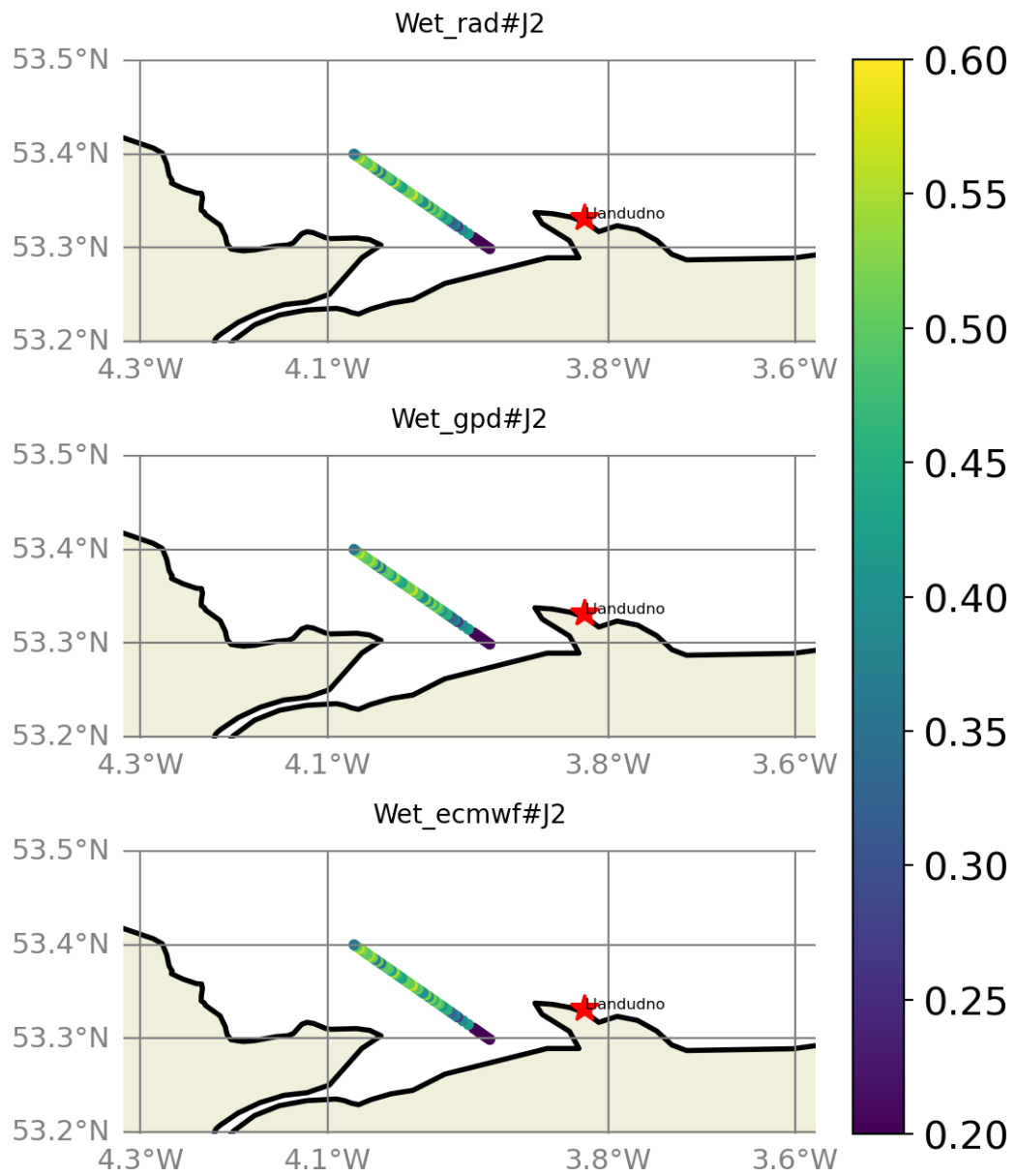


FIGURE 59 – correlation visualization in maps view % Llandudno tide gauge

6.2.2 rmsd visualization in maps view % Llandudno tide gauge

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

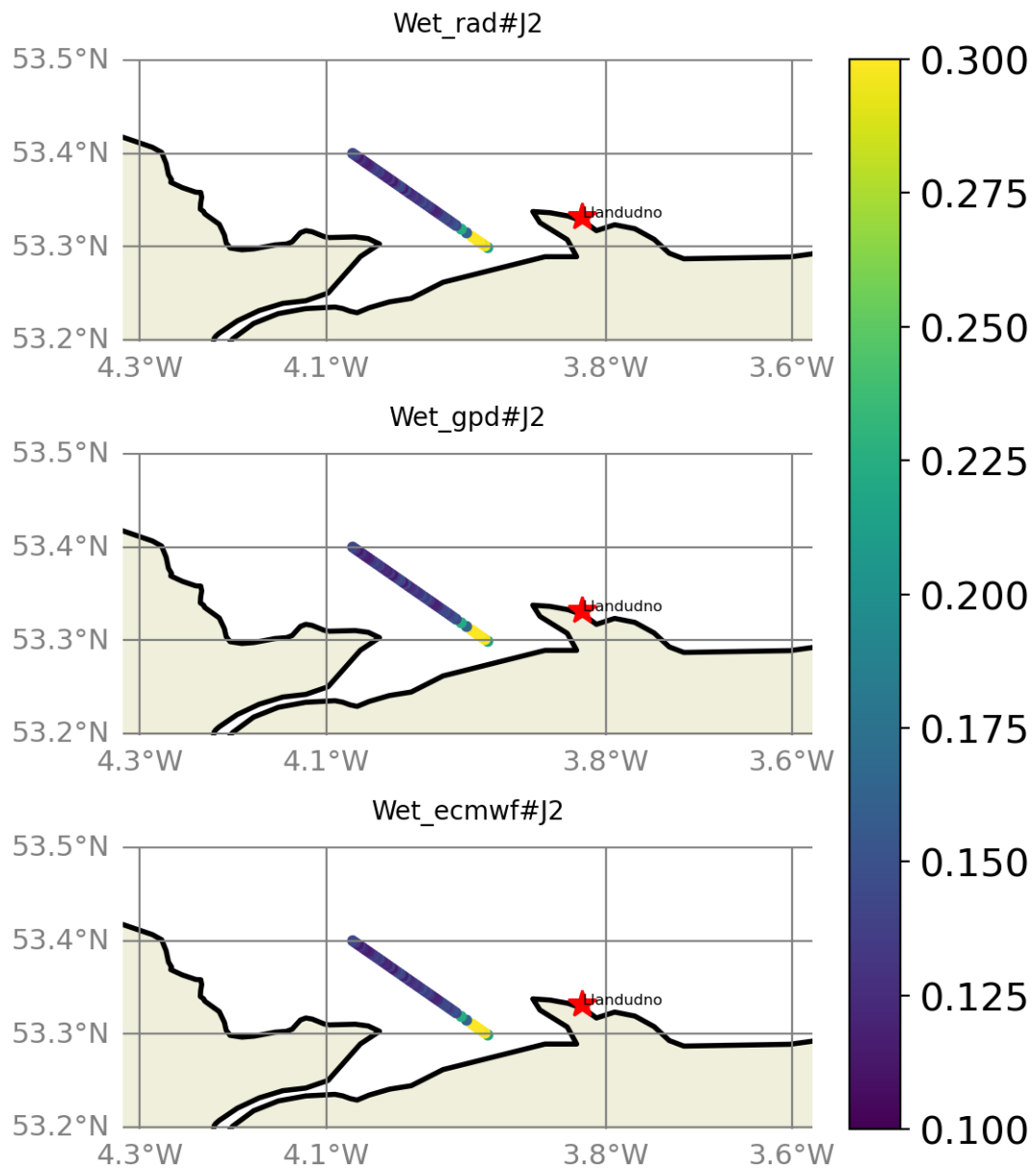


FIGURE 60 – rmsd visualization in maps view % Llandudno tide gauge

6.2.3 std visualization in maps view % Llandudno tide gauge

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

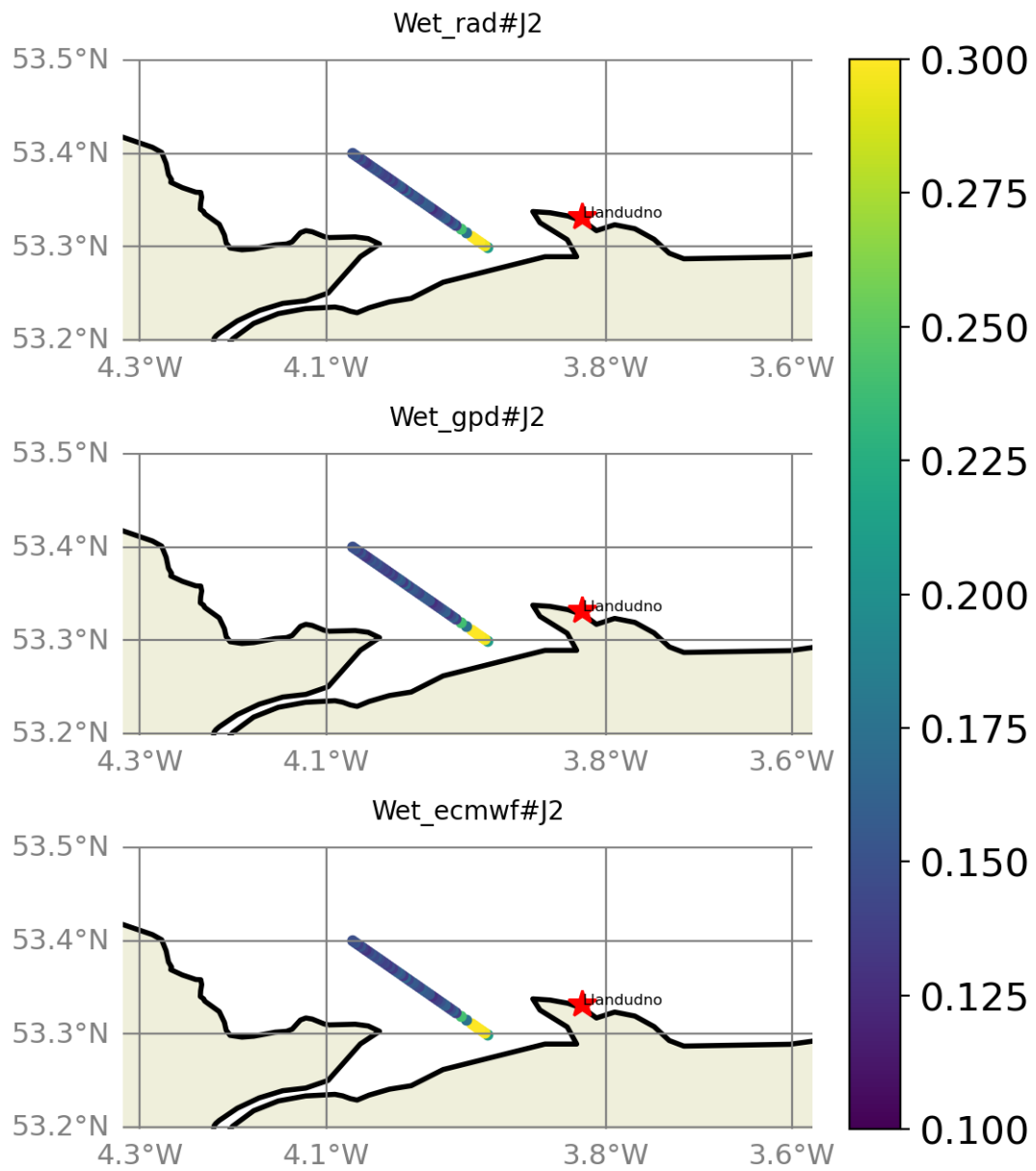


FIGURE 61 – std visualization in maps view % Llandudno tide gauge

6.2.4 valid_data_percent visualization in maps view % Llandudno tide gauge

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

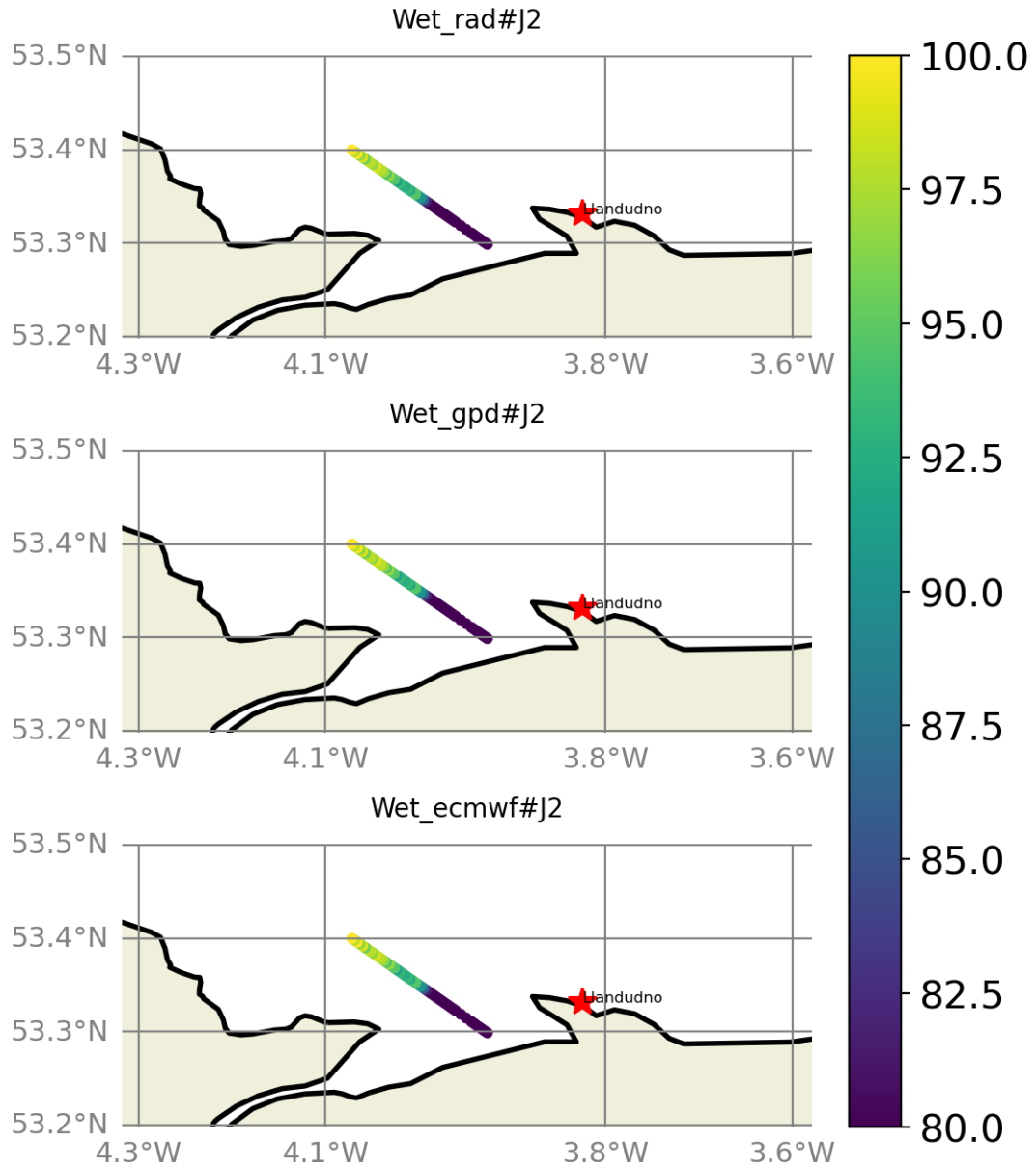


FIGURE 62 – valid_data_percent visualization in maps view % Llandudno tide gauge

6.2.5 Valid data (%) in function of distance to coast/Llandudno 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. $maxNB = 93$ 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.

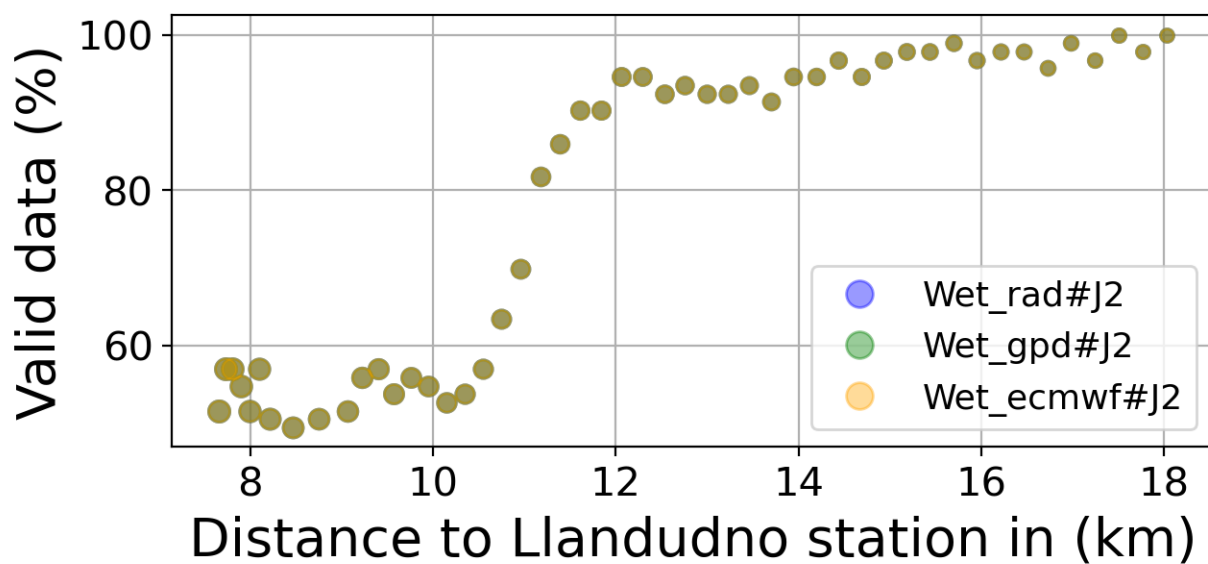
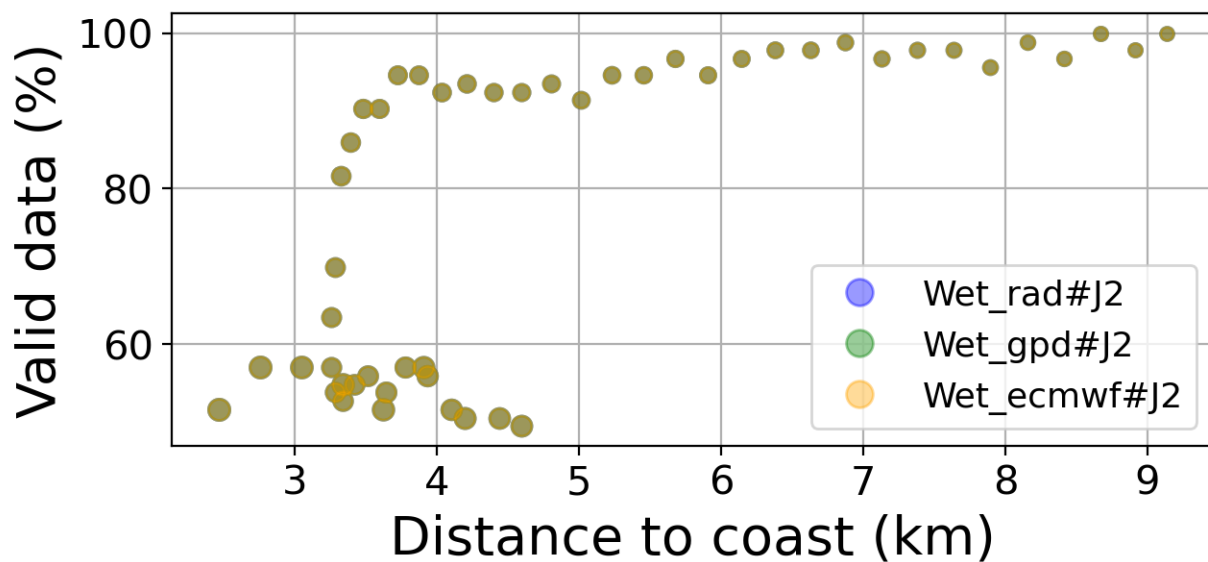


FIGURE 63 – Valid data (%) in function of distance to coast/Llandudno station

6.2.6 Std in function of distance to coast/Llandudno station

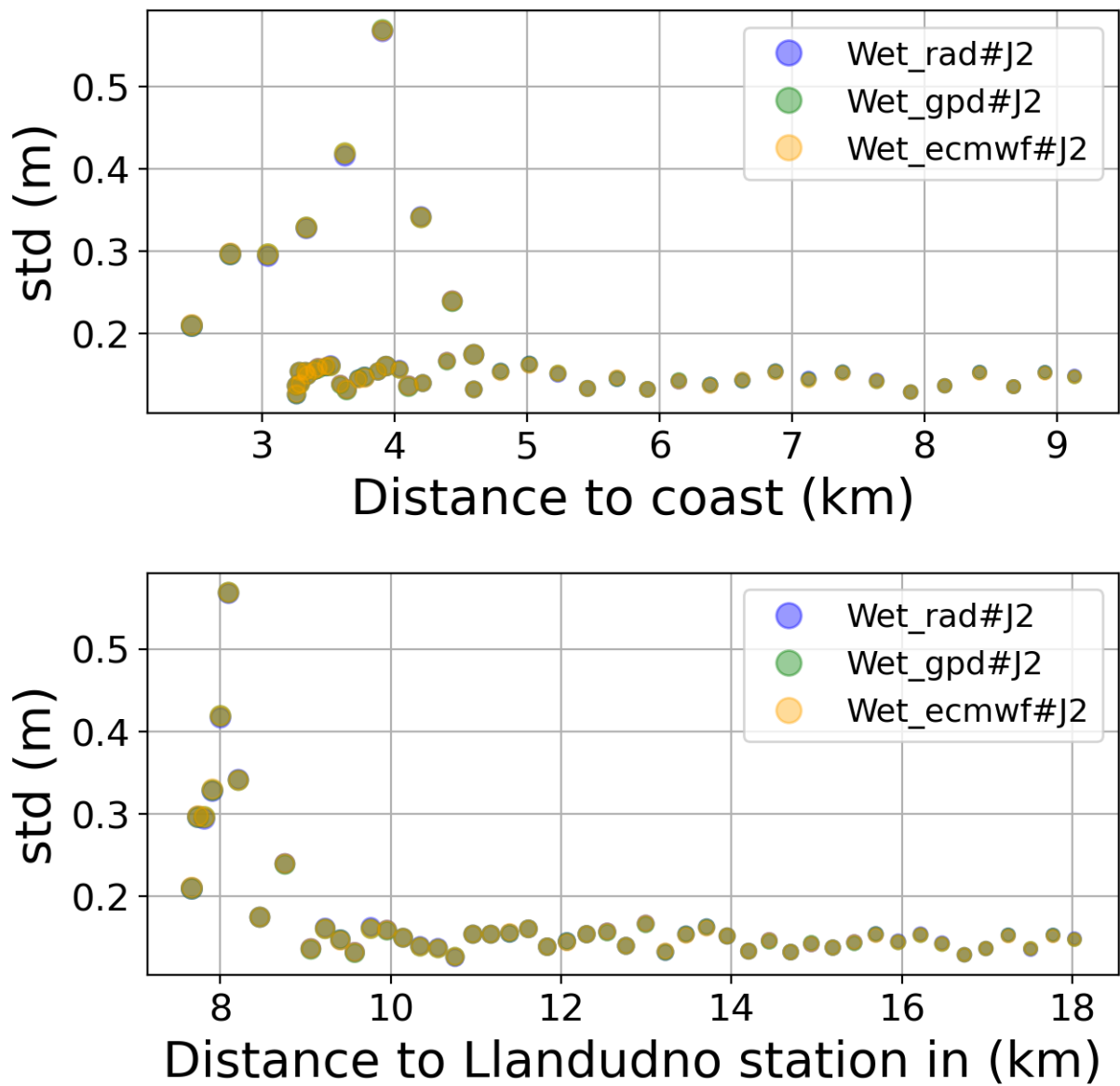


FIGURE 64 – Std in function of the distance to the coast/Llandudno station

6.2.7 Correlation in function of distance to coast/Llandudno station

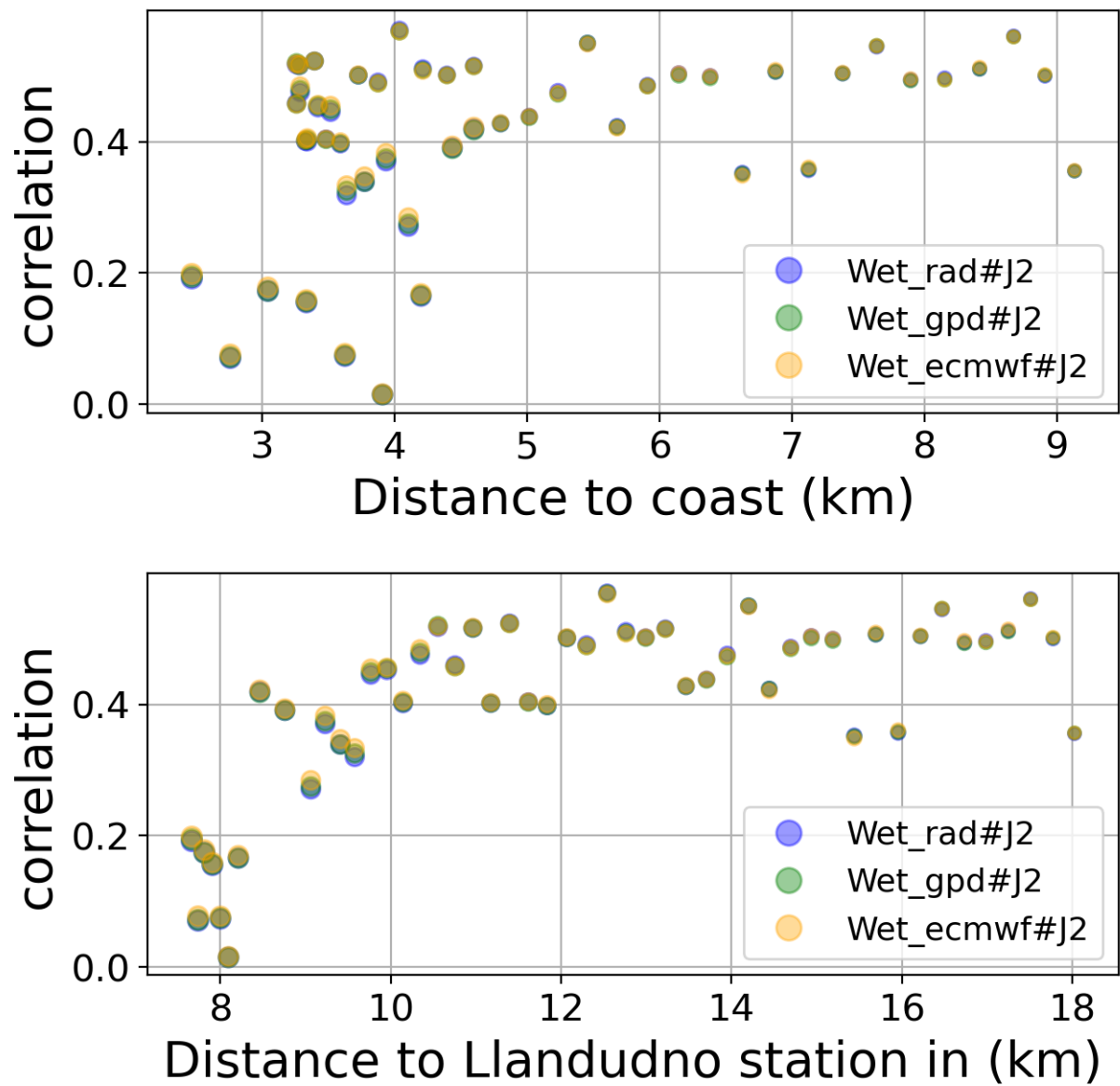


FIGURE 65 – Correlation in function of the distance to the coast/Llandudno station

6.2.8 Taylor Diagram

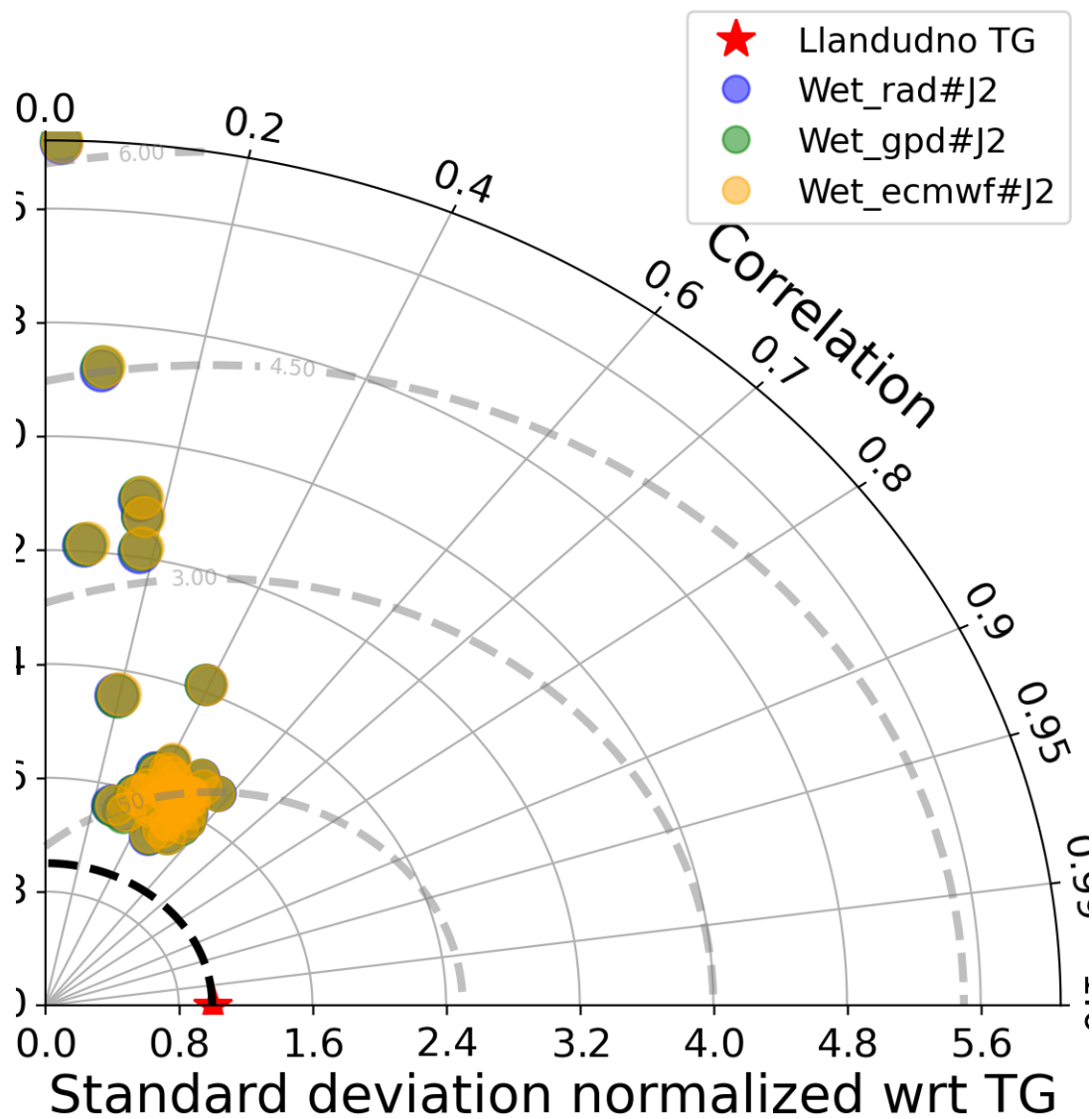


FIGURE 66 – Taylor diagram

6.2.9 Mean statistics table of products comparison with Llandudno 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	78.626	0.409	0.179	0.167
Wet_gpd#J2	78.626	0.41	0.179	0.167
Wet_ecmwf#J2	78.626	0.412	0.179	0.167

FIGURE 67 – 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 93 point.

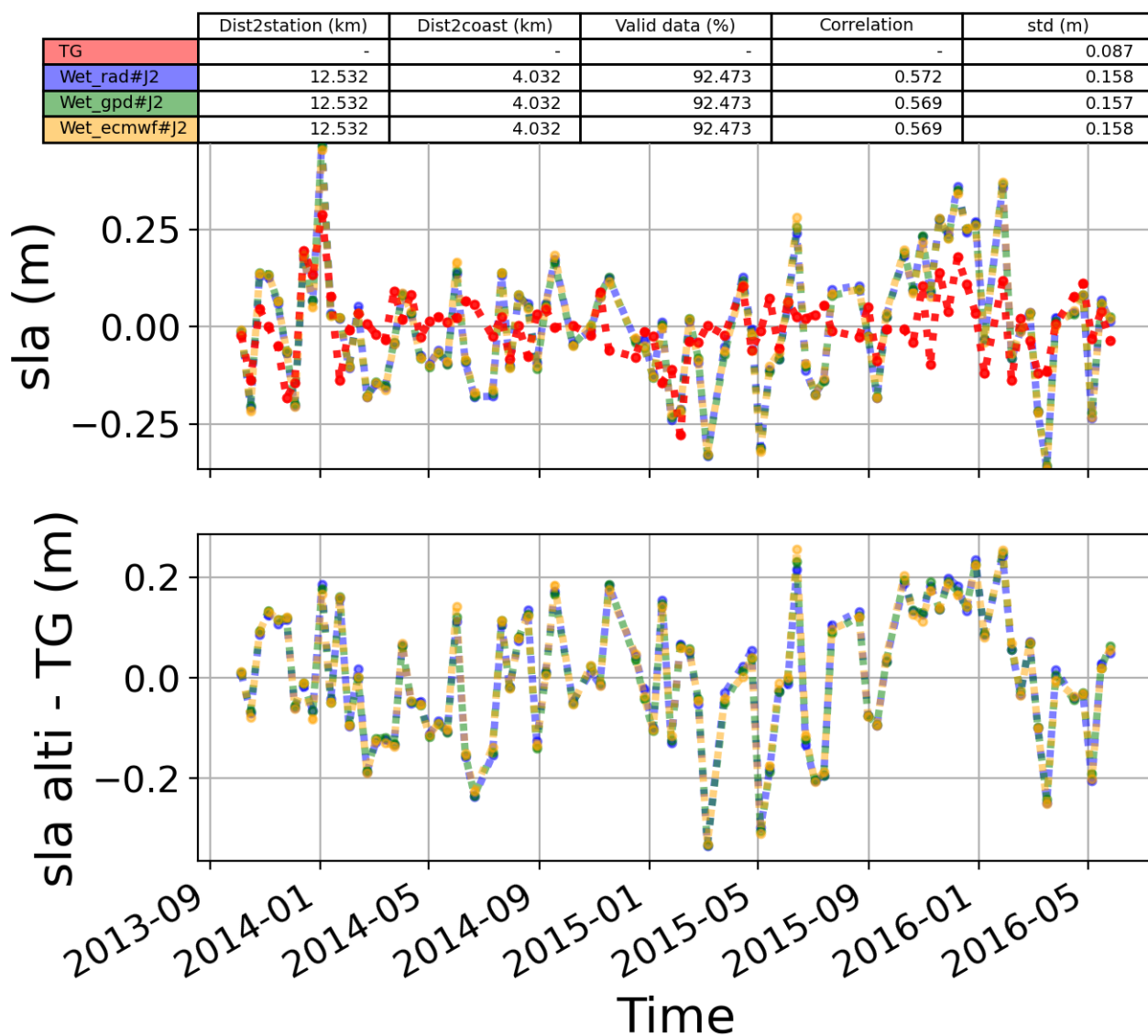


FIGURE 68 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.3 Station : Newhaven

- Nearest track to Newhaven station is the track number track137
- The area of interest is limited by :
 - A circle which it's center is the Newhaven tide gauge station location and has a Raduis of 40 Km
 - Maximum distance to the coast : 20 Km

6.3.1 correlation visualization in maps view % Newhaven tide gauge

Correlation Altimetry data with respect to Newhaven Tide gauge data

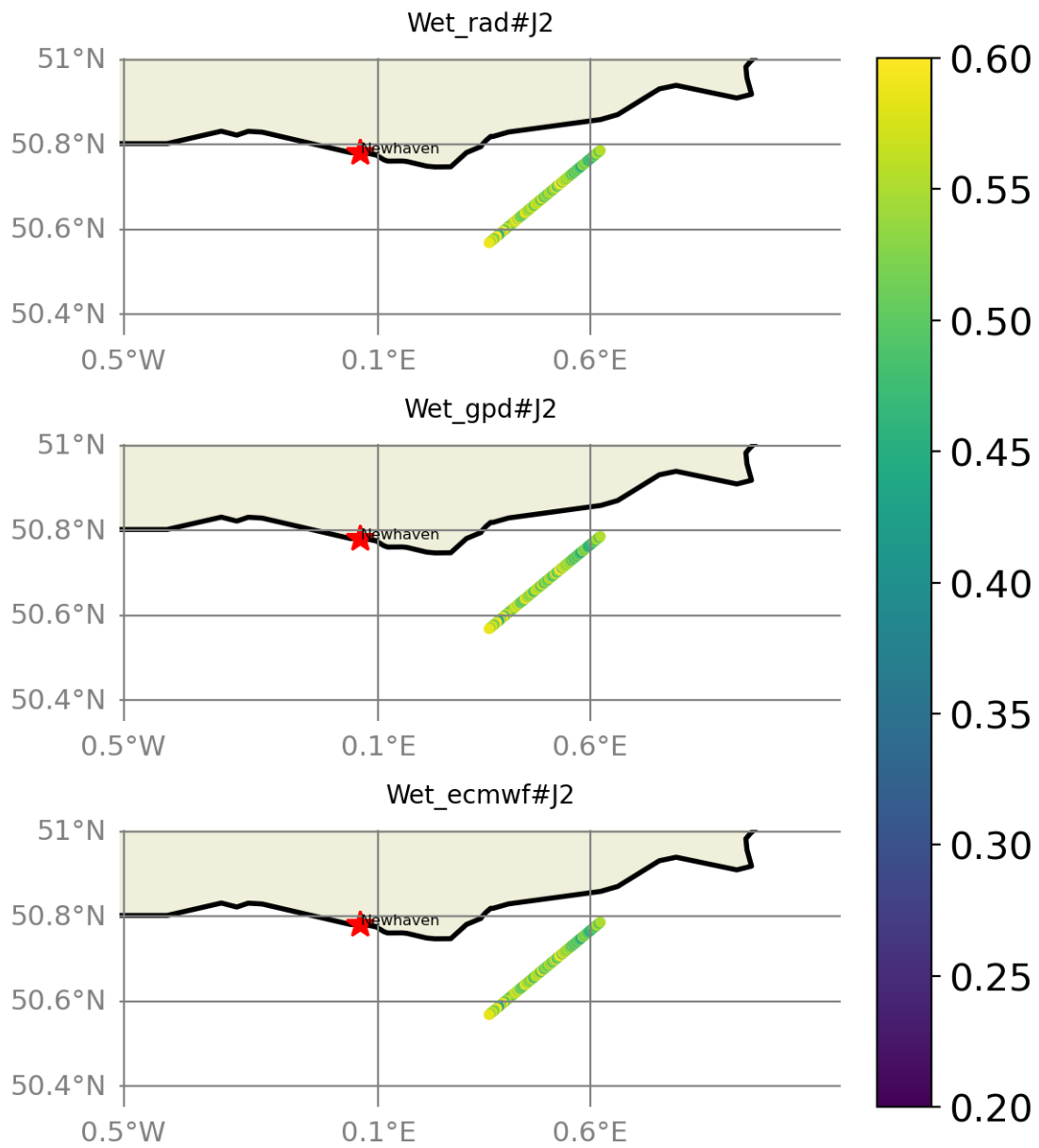


FIGURE 69 – correlation visualization in maps view % Newhaven tide gauge

6.3.2 rmsd visualization in maps view % Newhaven tide gauge

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

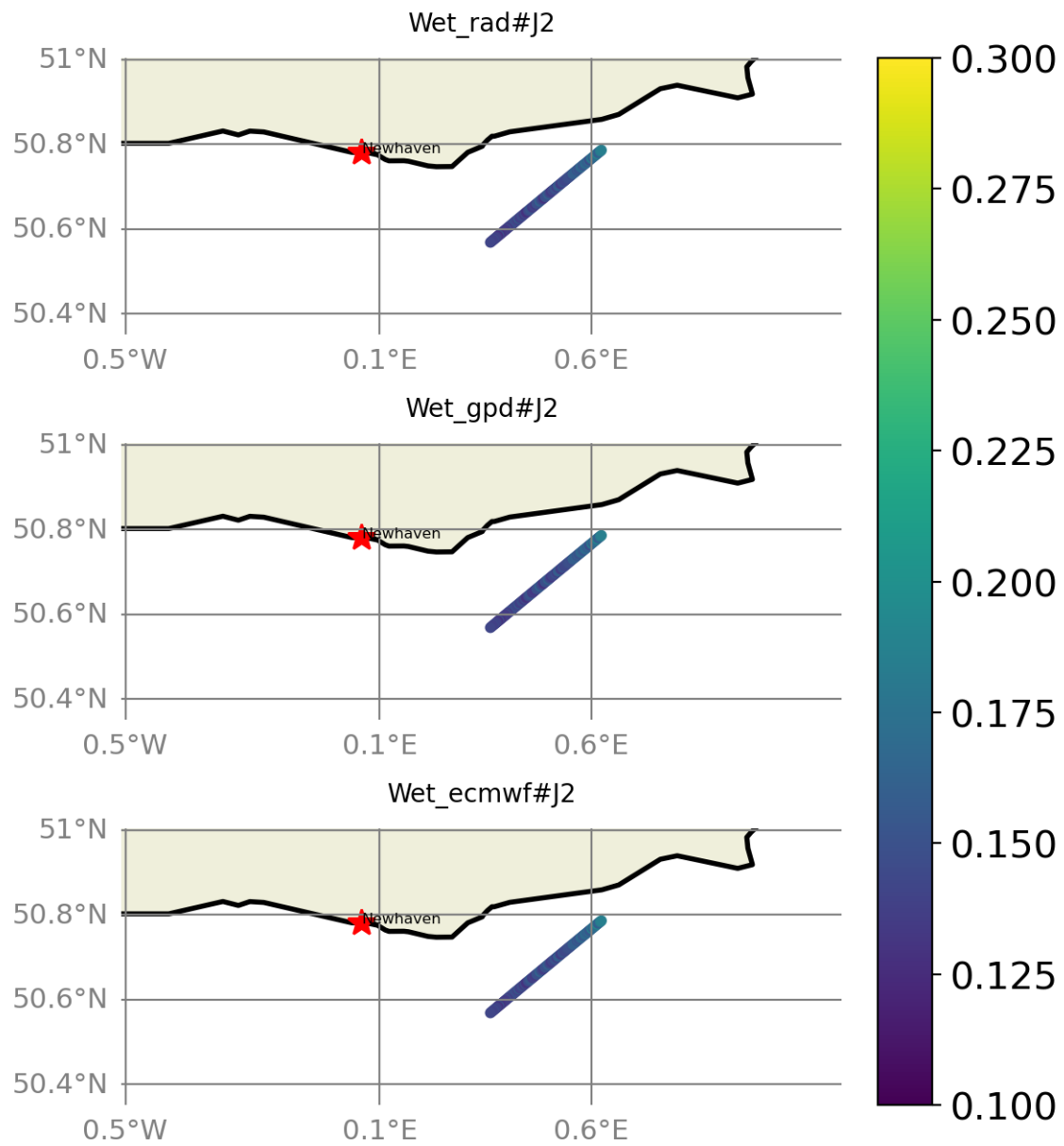


FIGURE 70 – rmsd visualization in maps view % Newhaven tide gauge

6.3.3 std visualization in maps view % Newhaven tide gauge

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

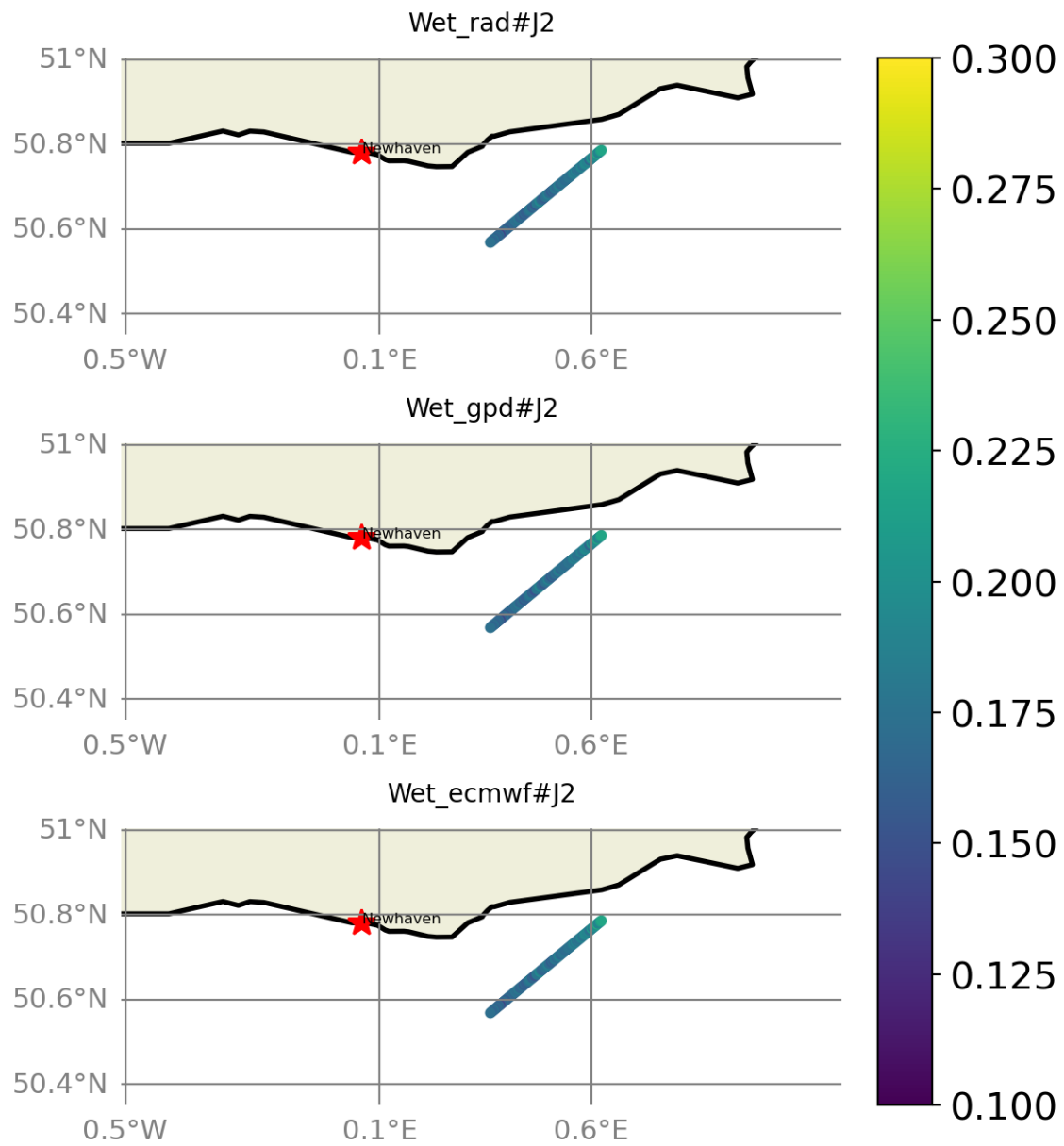


FIGURE 71 – std visualization in maps view % Newhaven tide gauge

6.3.4 valid_data_percent visualization in maps view % Newhaven tide gauge

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

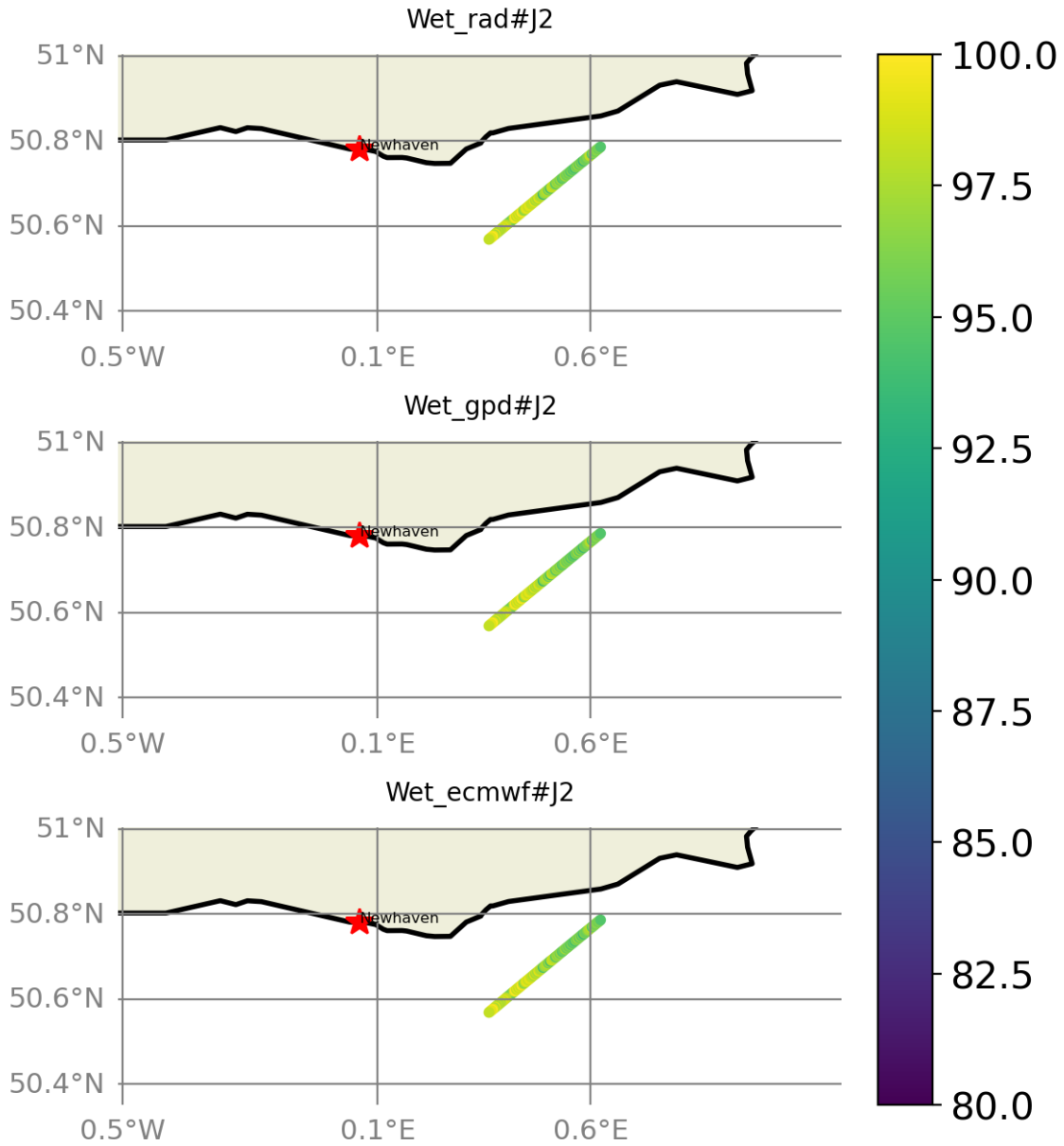


FIGURE 72 – valid_data_percent visualization in maps view % Newhaven tide gauge

6.3.5 Valid data (%) in function of distance to coast/Newhaven 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. $maxNB = 111$ 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.

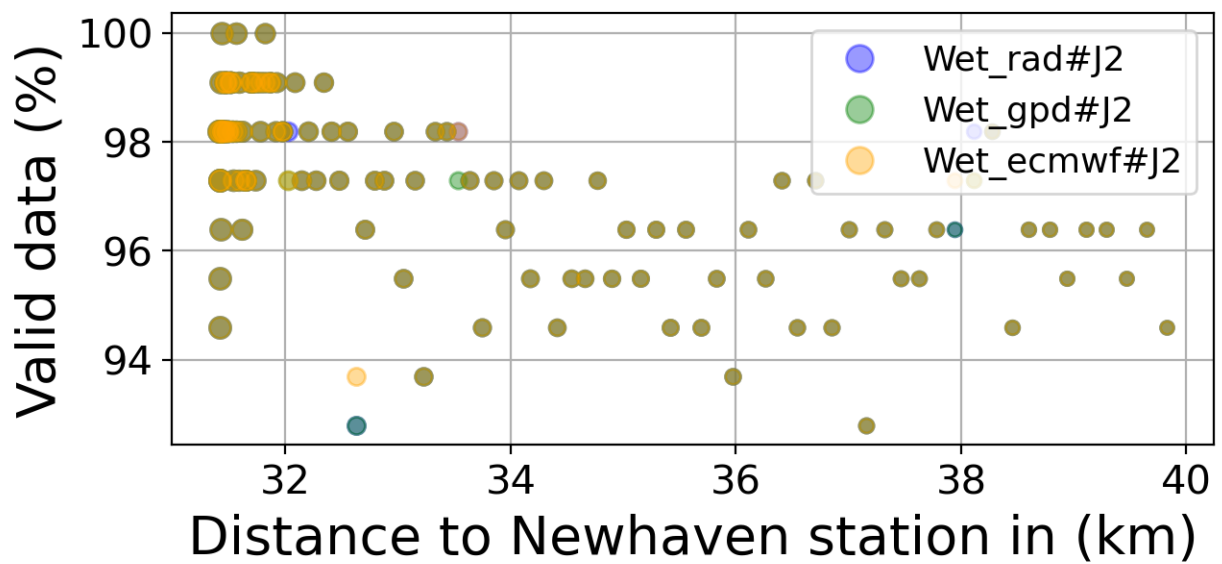
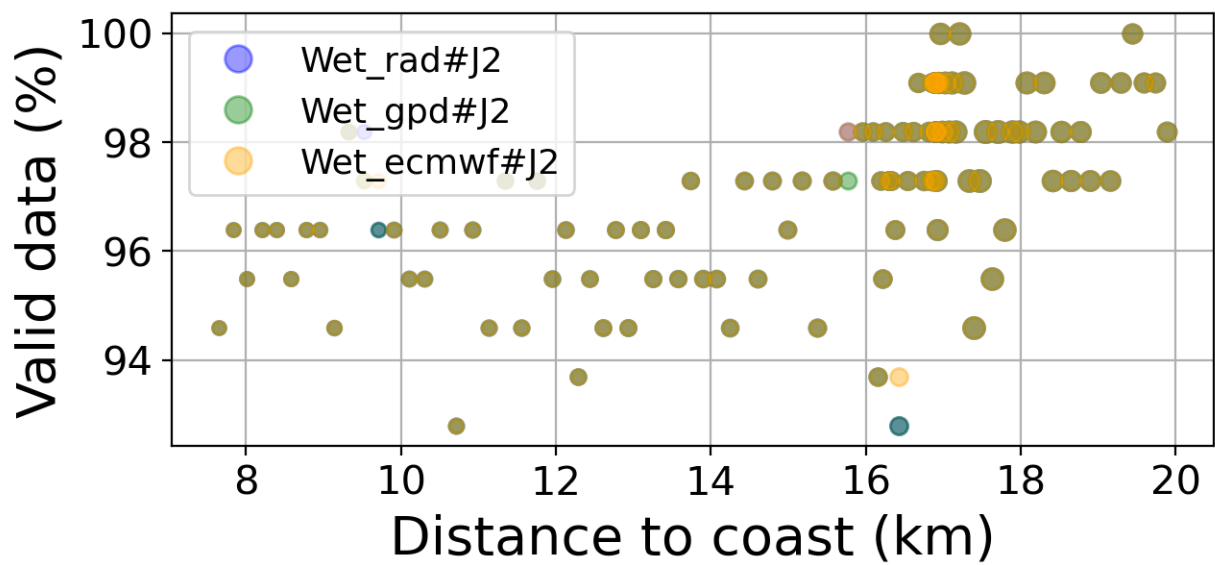


FIGURE 73 – Valid data (%) in function of distance to coast/Newhaven station

6.3.6 Std in function of distance to coast/Newhaven station

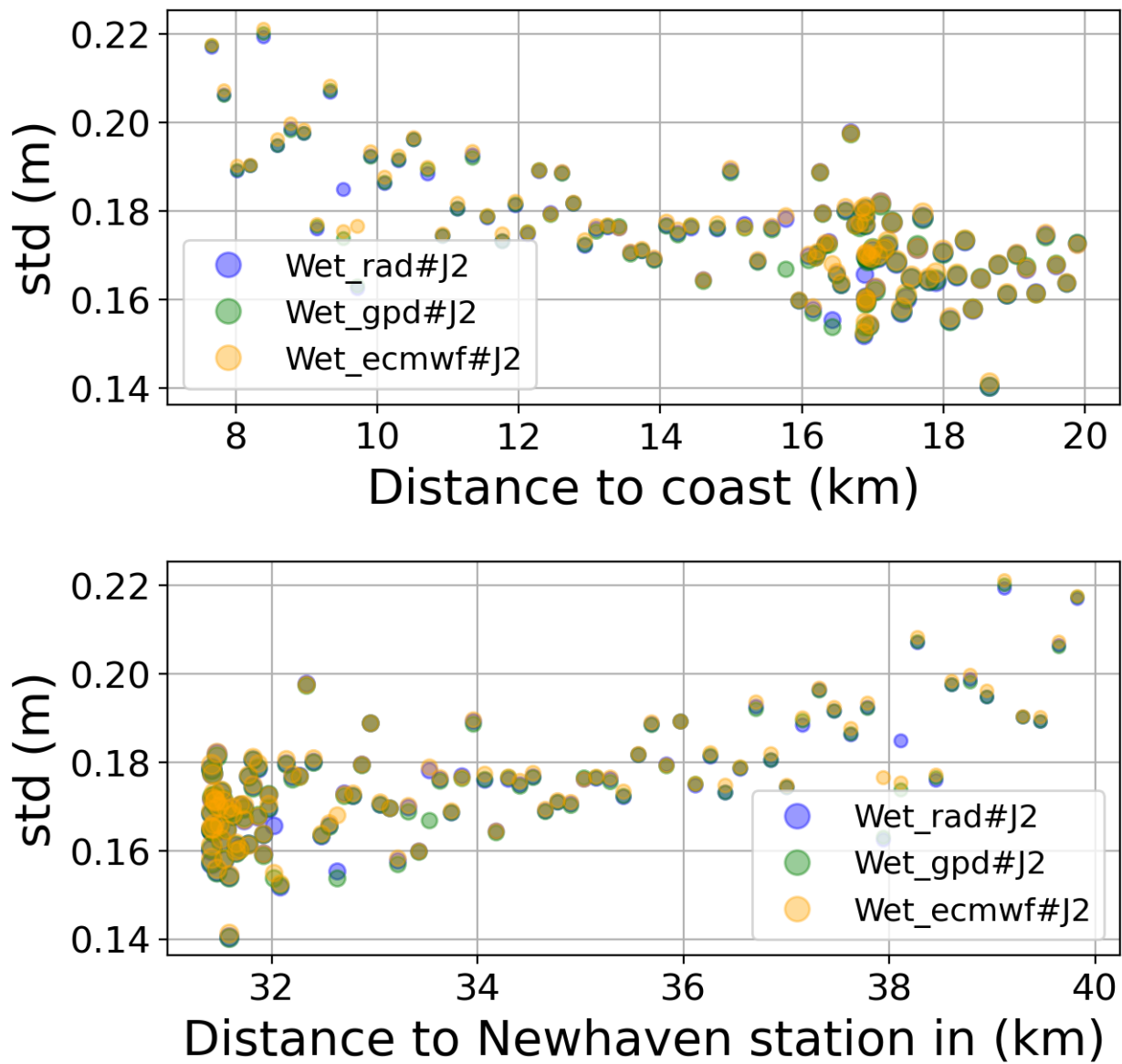


FIGURE 74 – Std in function of the distance to the coast/Newhaven station

6.3.7 Correlation in function of distance to coast/Newhaven station

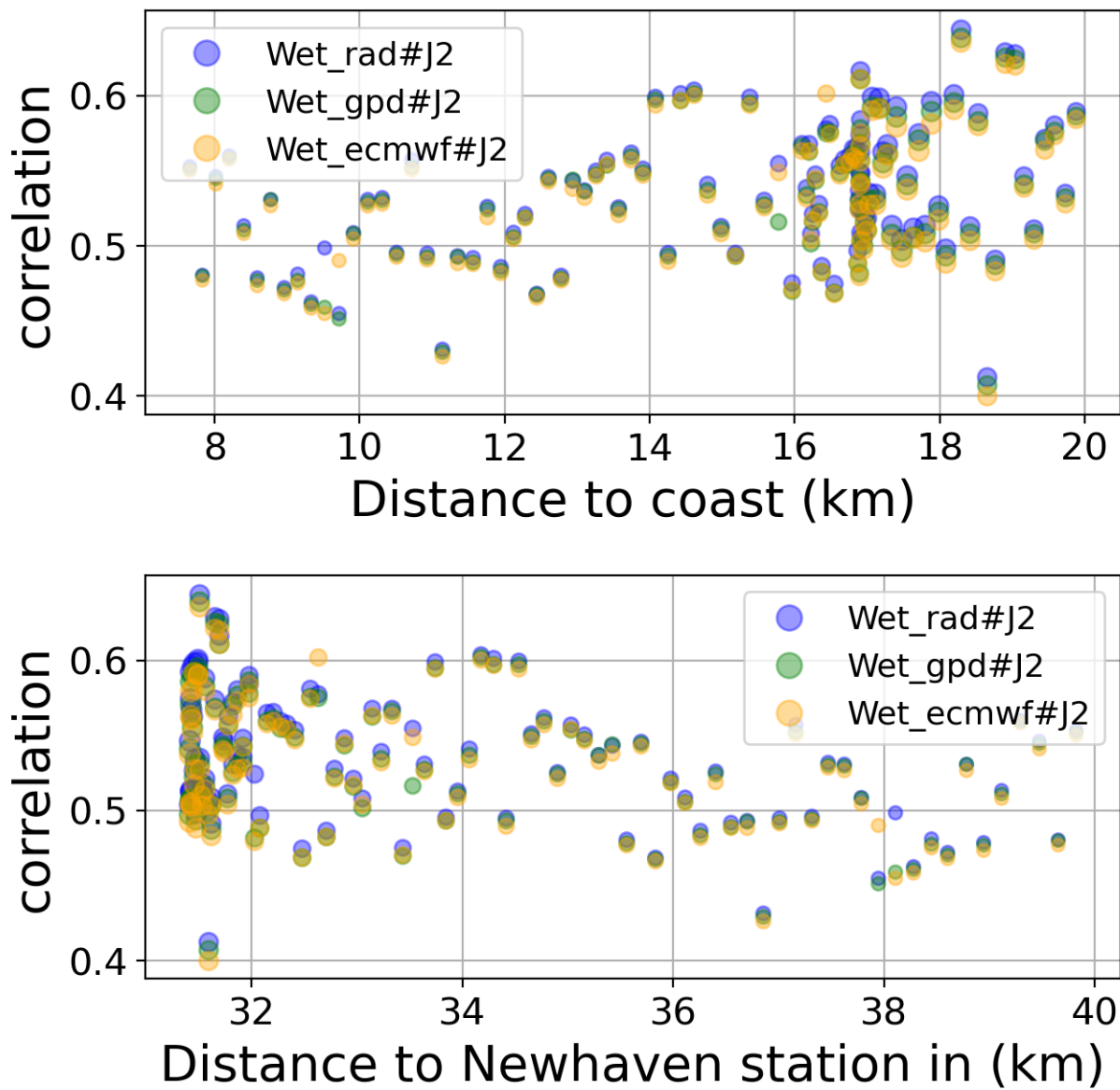


FIGURE 75 – Correlation in function of the distance to the coast/Newhaven station

6.3.8 Taylor Diagram

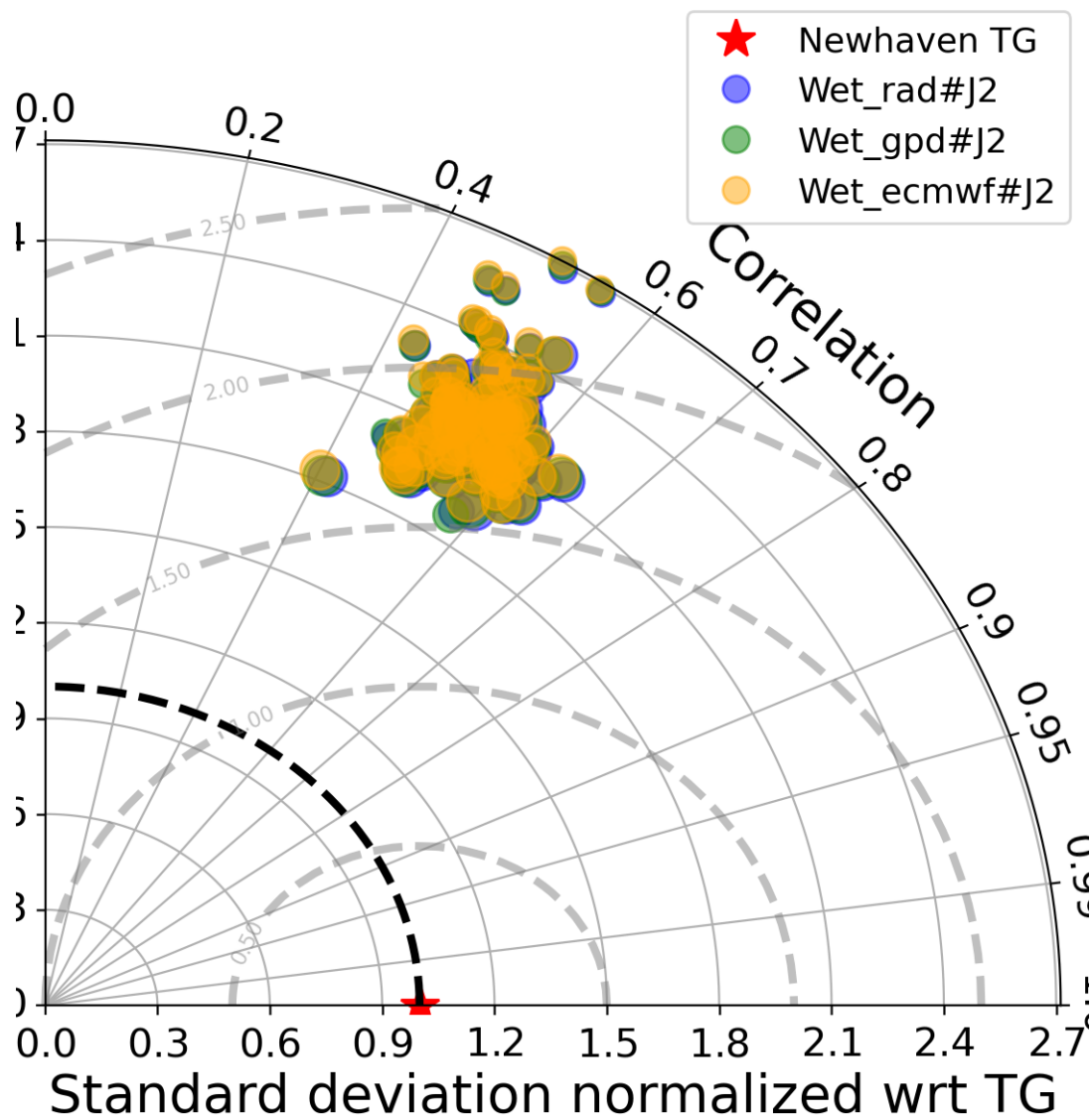


FIGURE 76 – Taylor diagram

6.3.9 Mean statistics table of products comparison with Newhaven 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	97.102	0.536	0.175	0.148
Wet_gpd#J2	97.076	0.532	0.175	0.148
Wet_ecmwf#J2	97.102	0.53	0.175	0.149

FIGURE 77 – 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 111 point.

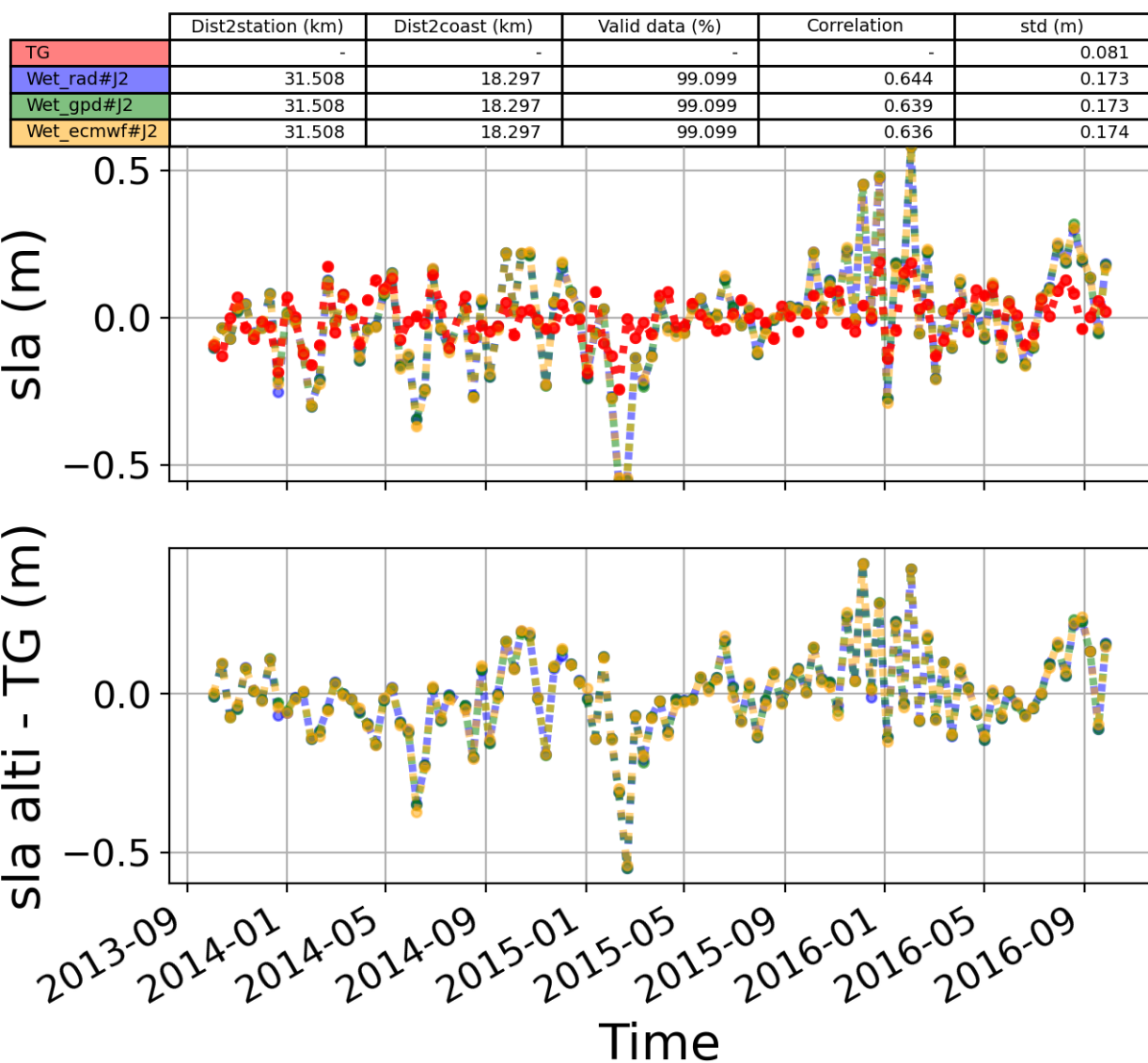


FIGURE 78 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.4 Station : CALAIS

- Nearest track to CALAIS station is the track number track44
- The area of interest is limited by :
 - A circle which it's center is the CALAIS tide gauge station location and has a Raduis of 40 Km
 - Maximum distance to the coast : 14 Km
 - Latitude limits : $[50.8, 51.21]^\circ$

6.4.1 correlation visualization in maps view % CALAIS tide gauge

Correlation Altimetry data with respect to CALAIS Tide gauge data

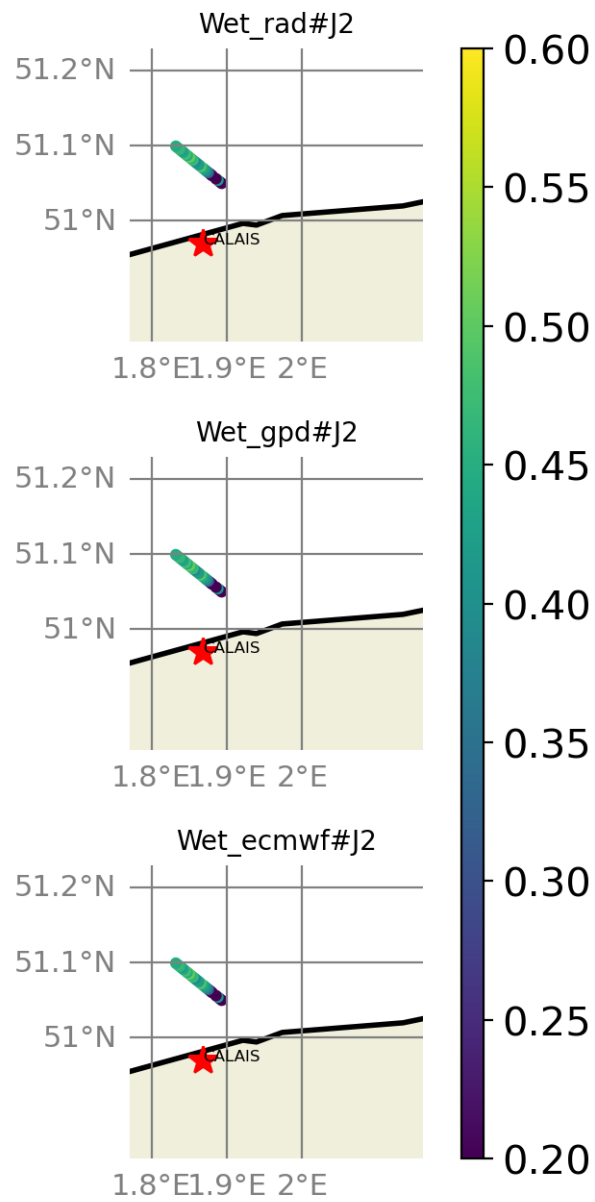


FIGURE 79 – correlation visualization in maps view % CALAIS tide gauge

6.4.2 rmsd visualization in maps view % CALAIS tide gauge

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

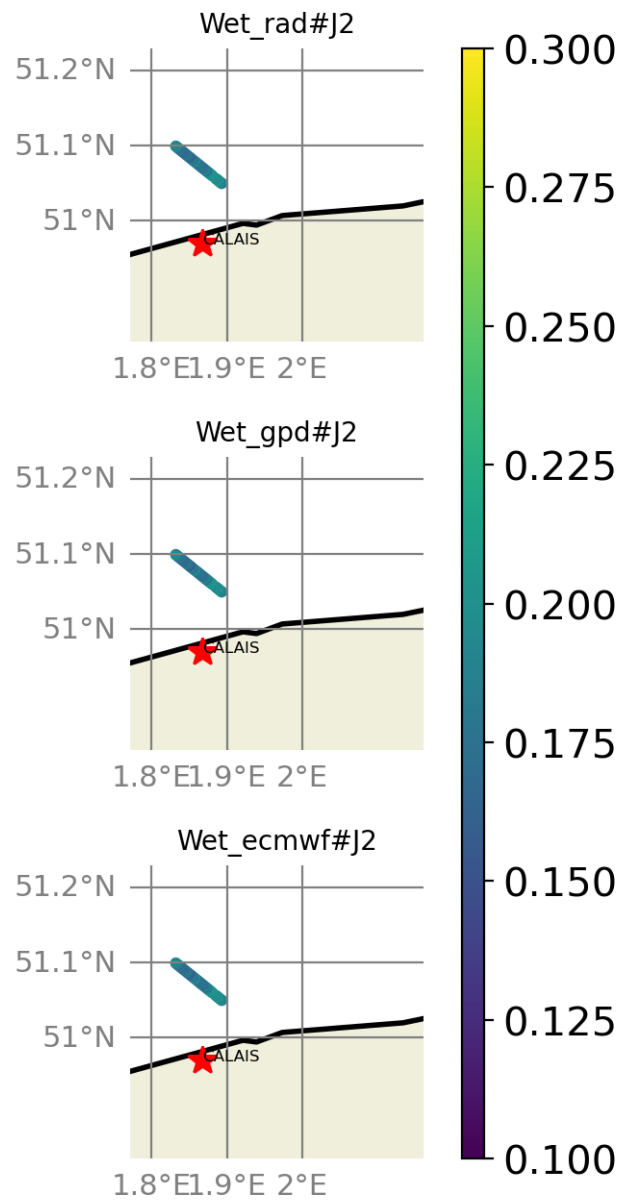


FIGURE 80 – rmsd visualization in maps view % CALAIS tide gauge

6.4.3 std visualization in maps view % CALAIS tide gauge

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

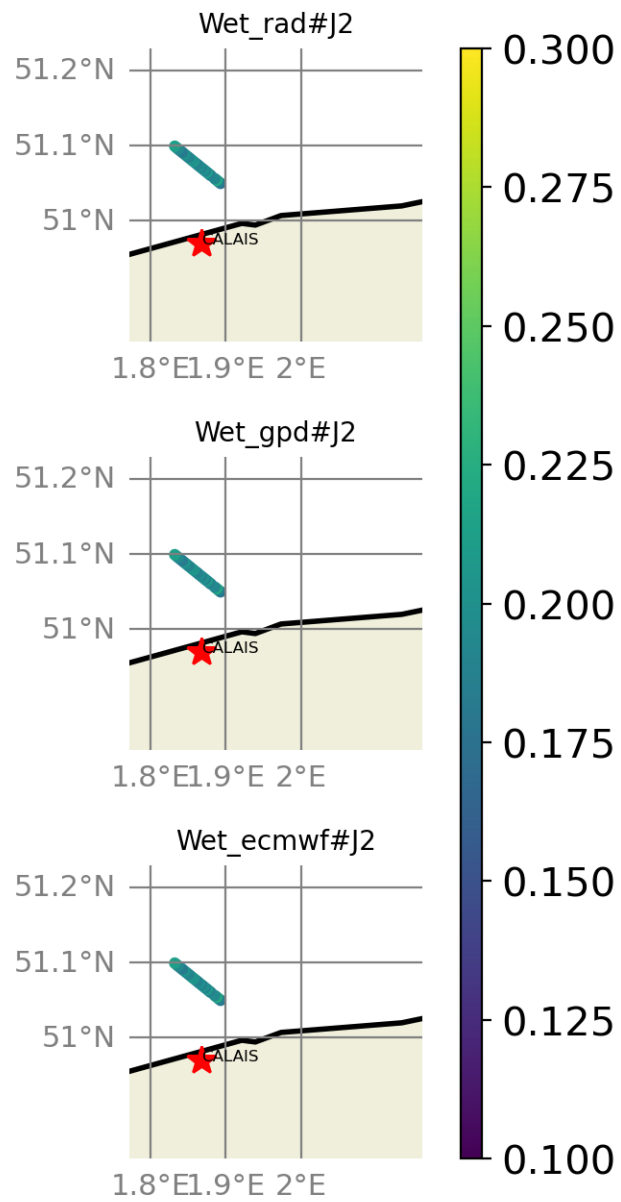


FIGURE 81 – std visualization in maps view % CALAIS tide gauge

6.4.4 valid_data_percent visualization in maps view % CALAIS tide gauge

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

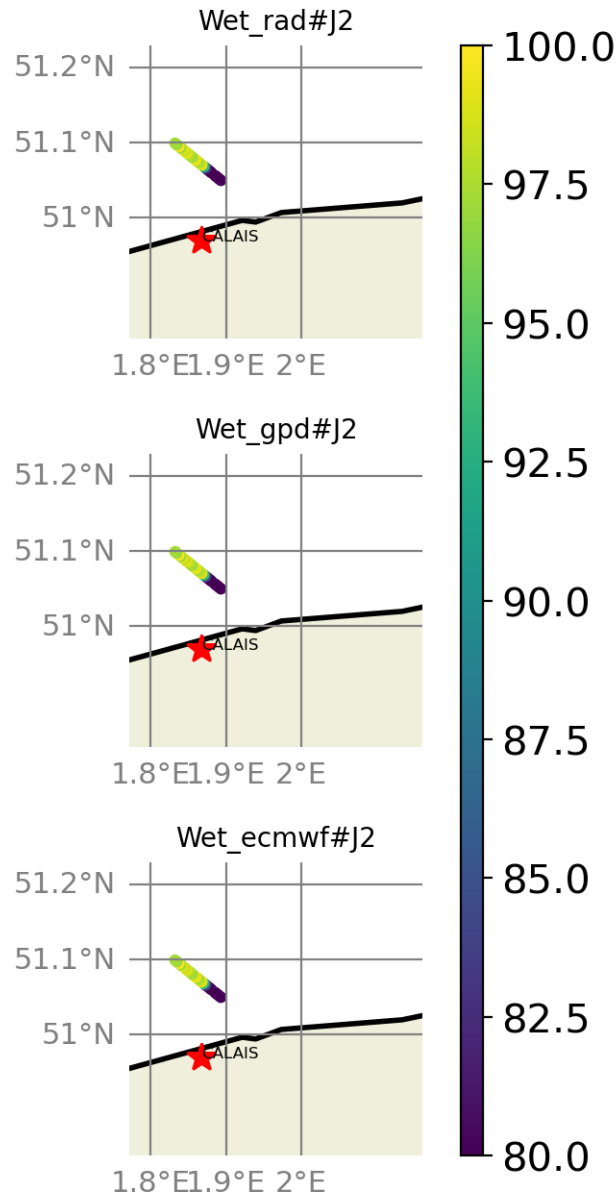


FIGURE 82 – valid_data_percent visualization in maps view % CALAIS tide gauge

6.4.5 Valid data (%) in function of distance to coast/CALAIS 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.

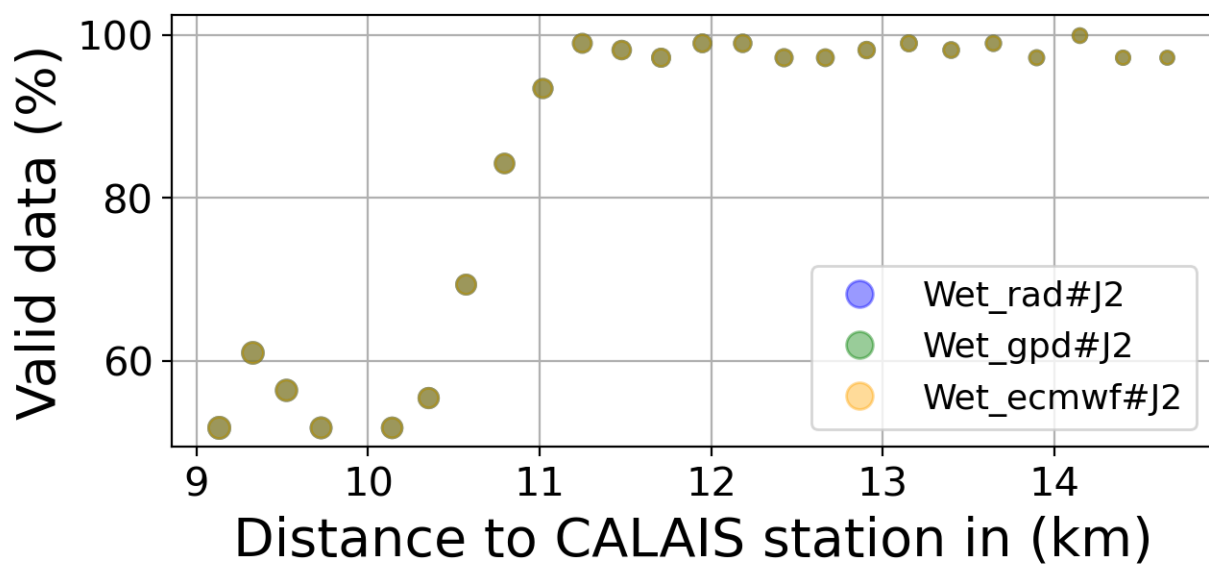
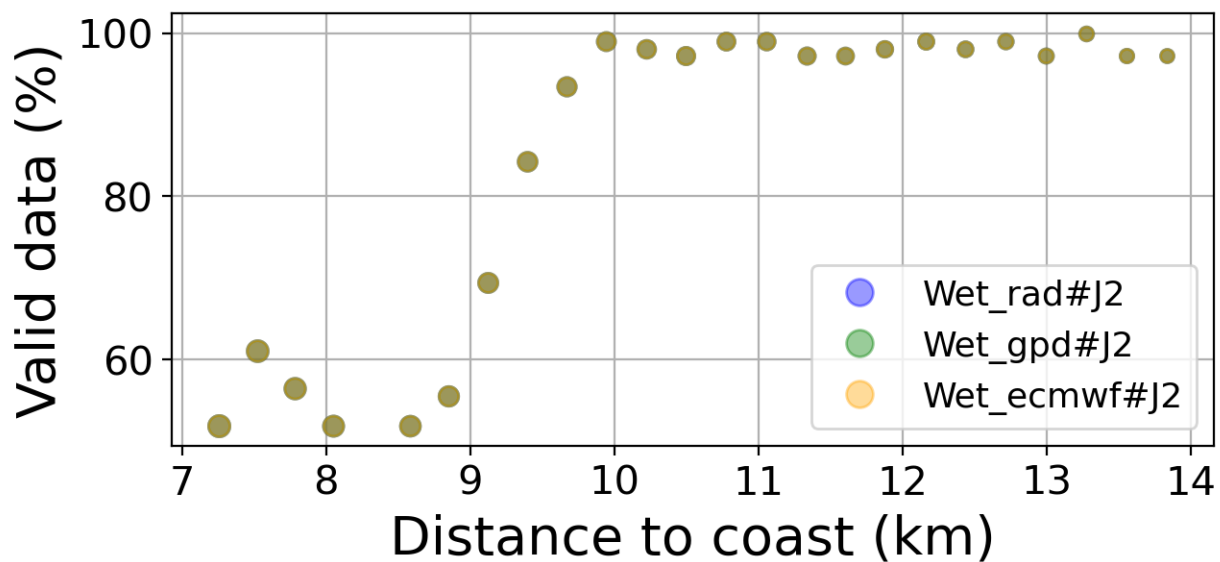


FIGURE 83 – Valid data (%) in function of distance to coast/CALAIS station

6.4.6 Std in function of distance to coast/CALAIS station

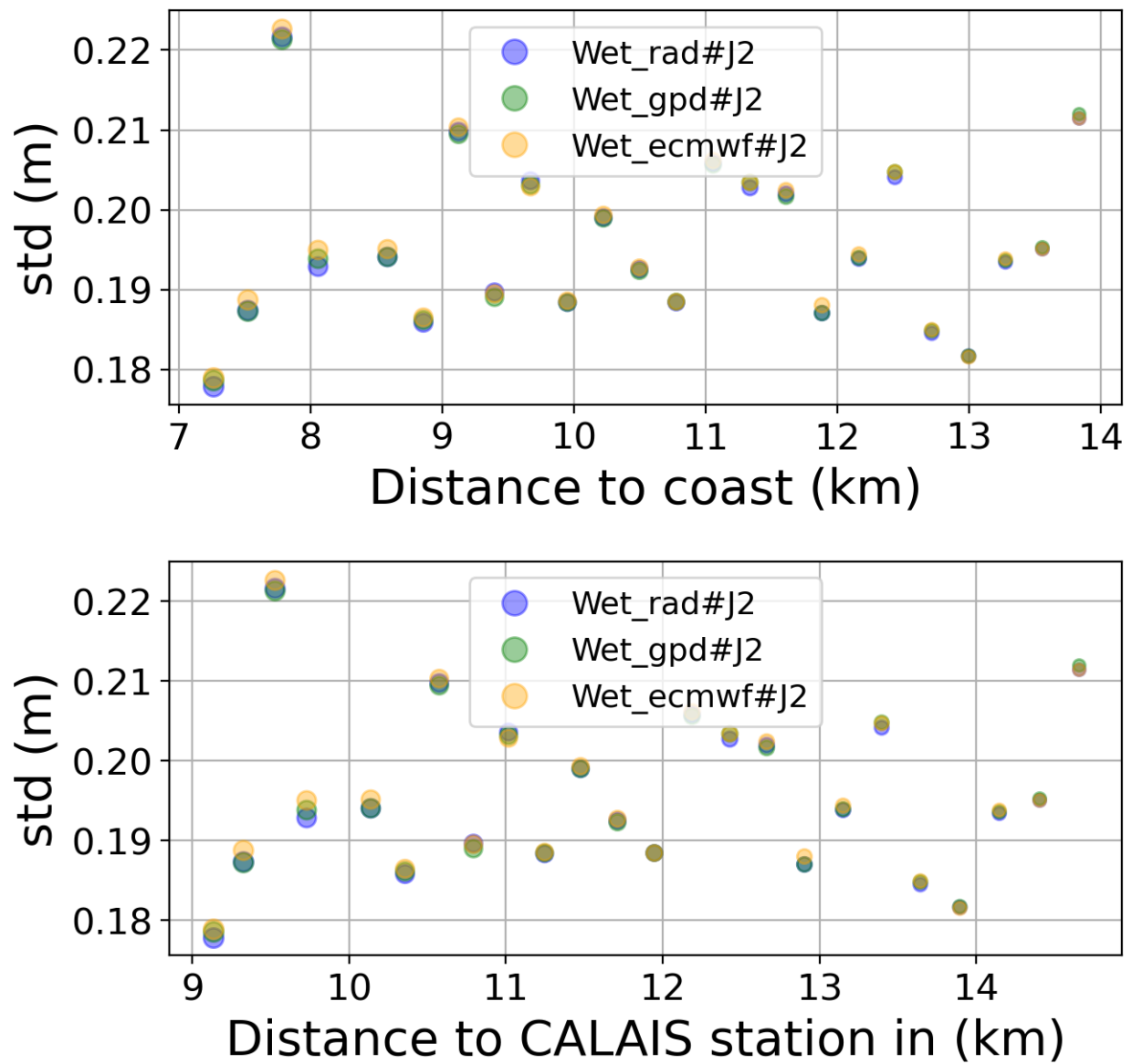


FIGURE 84 – Std in function of the distance to the coast/CALAIS station

6.4.7 Correlation in function of distance to coast/CALAIS station

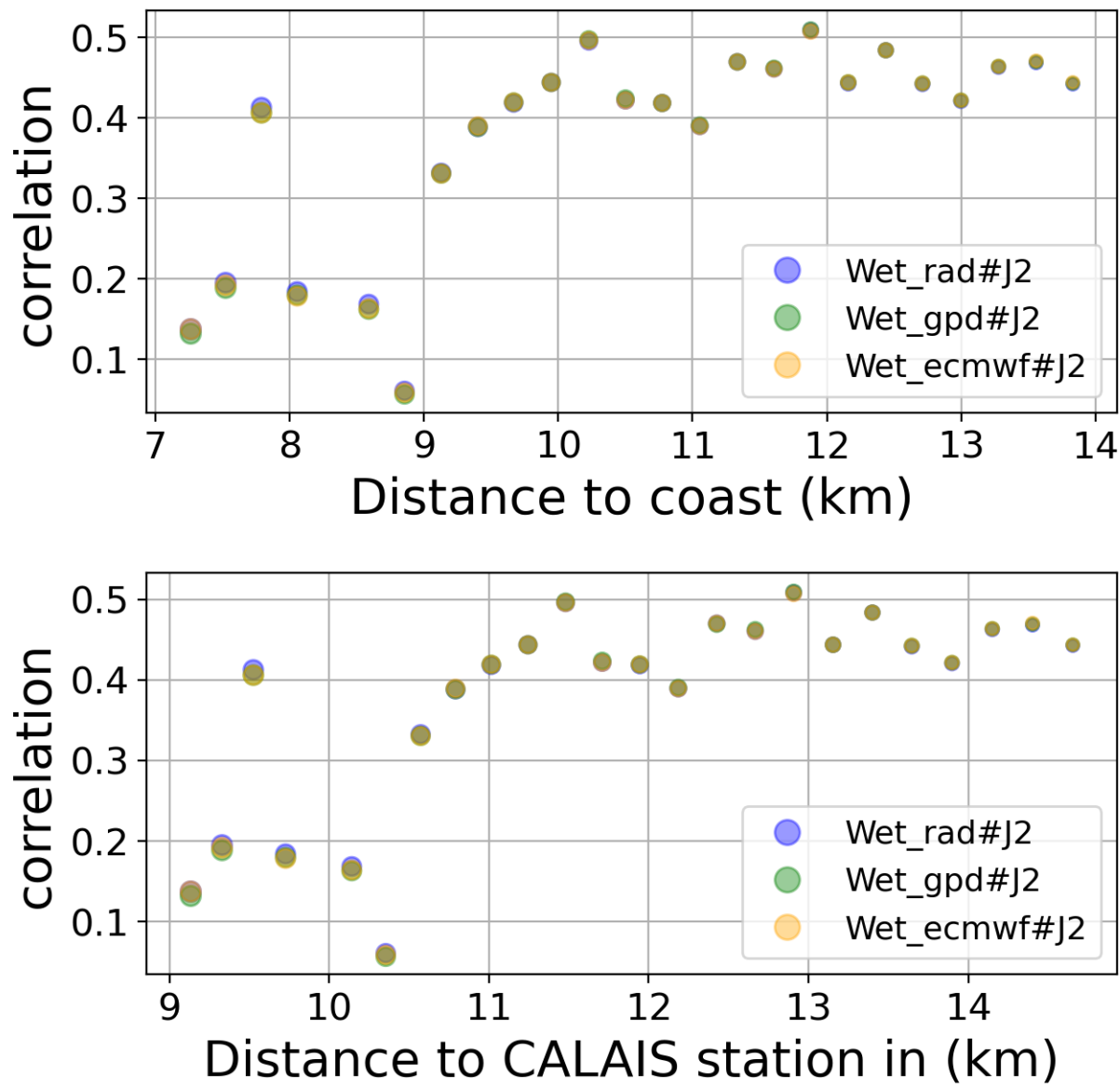


FIGURE 85 – Correlation in function of the distance to the coast/CALAIS station

6.4.8 Taylor Diagram

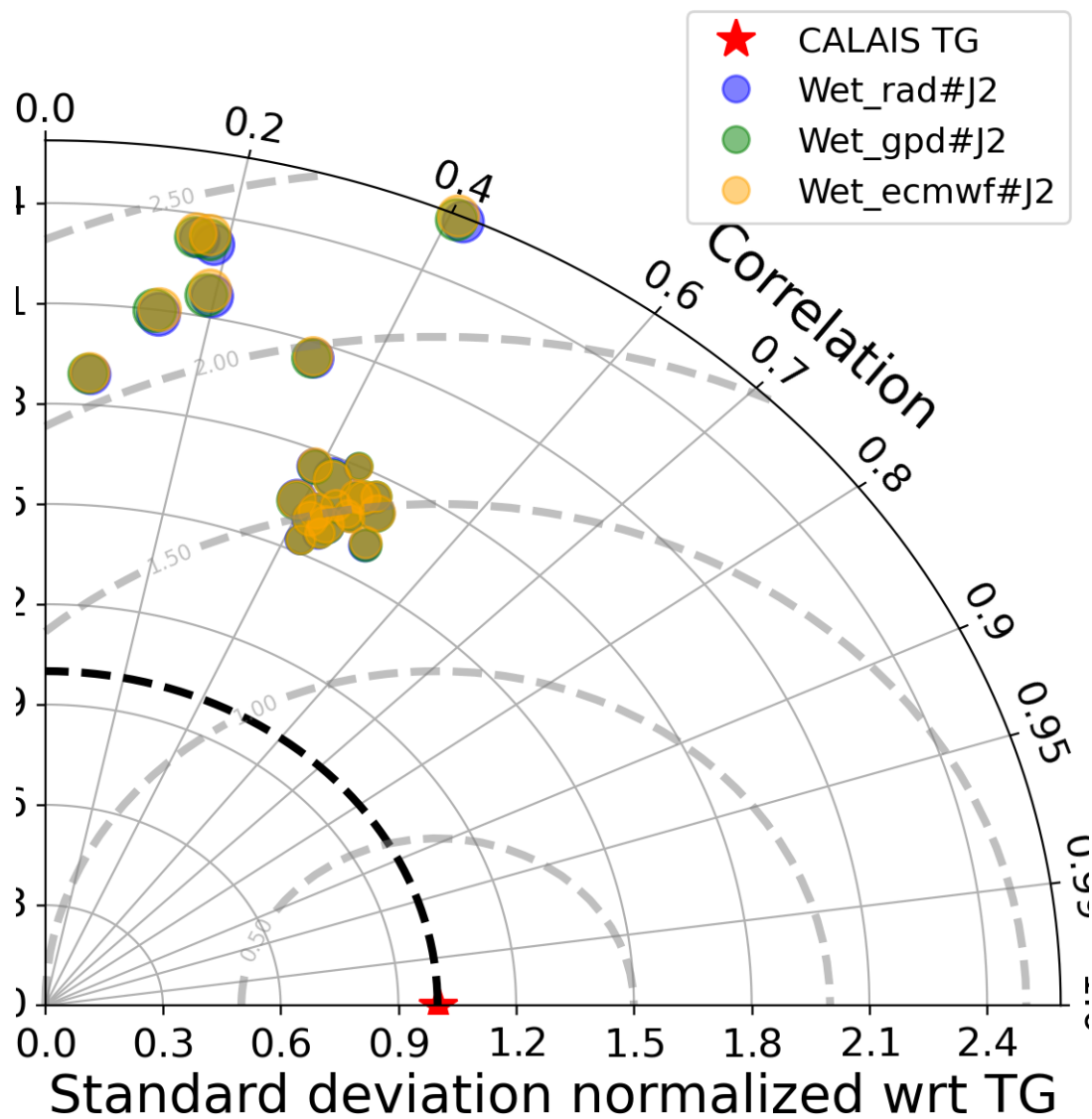


FIGURE 86 – Taylor diagram

6.4.9 Mean statistics table of products comparison with CALAIS 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	85.378	0.378	0.196	0.183
Wet_gpd#J2	85.378	0.378	0.196	0.183
Wet_ecmwf#J2	85.378	0.378	0.196	0.184

FIGURE 87 – 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.

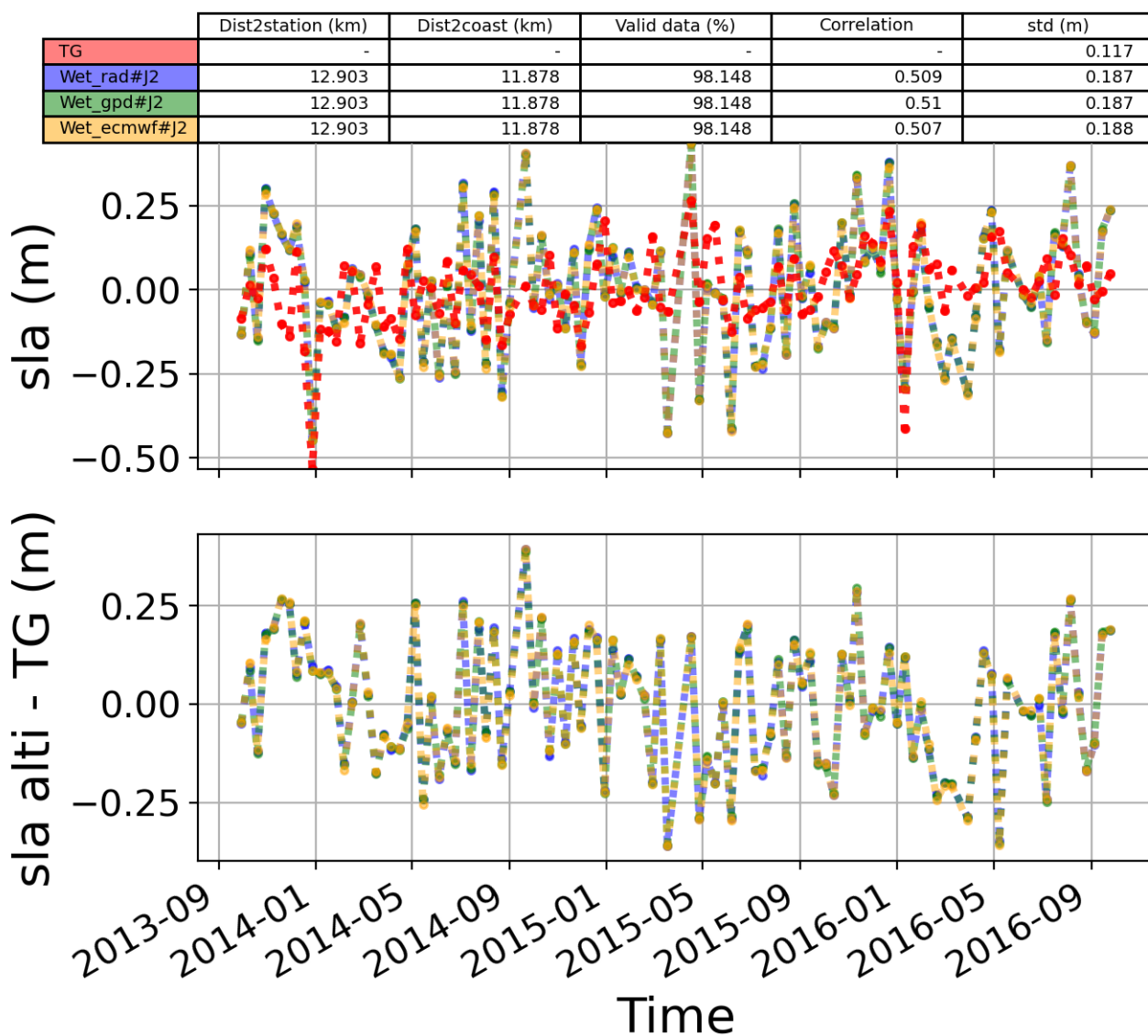


FIGURE 88 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.5 Station : Portpatrick

- Nearest track to Portpatrick station is the track number track87
- The area of interest is limited by :
 - A circle which it's center is the Portpatrick 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 % Portpatrick tide gauge

Correlation Altimetry data with respect to Portpatrick Tide gauge data

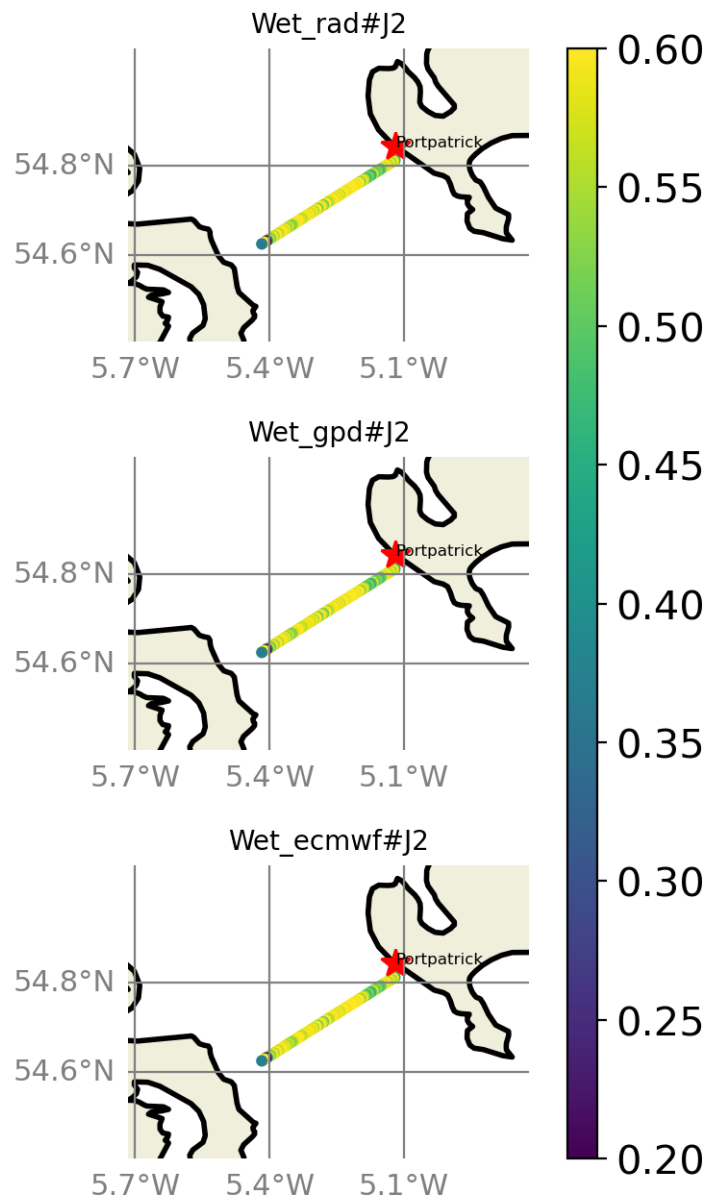


FIGURE 89 – correlation visualization in maps view % Portpatrick tide gauge

6.5.2 rmsd visualization in maps view % Portpatrick tide gauge

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

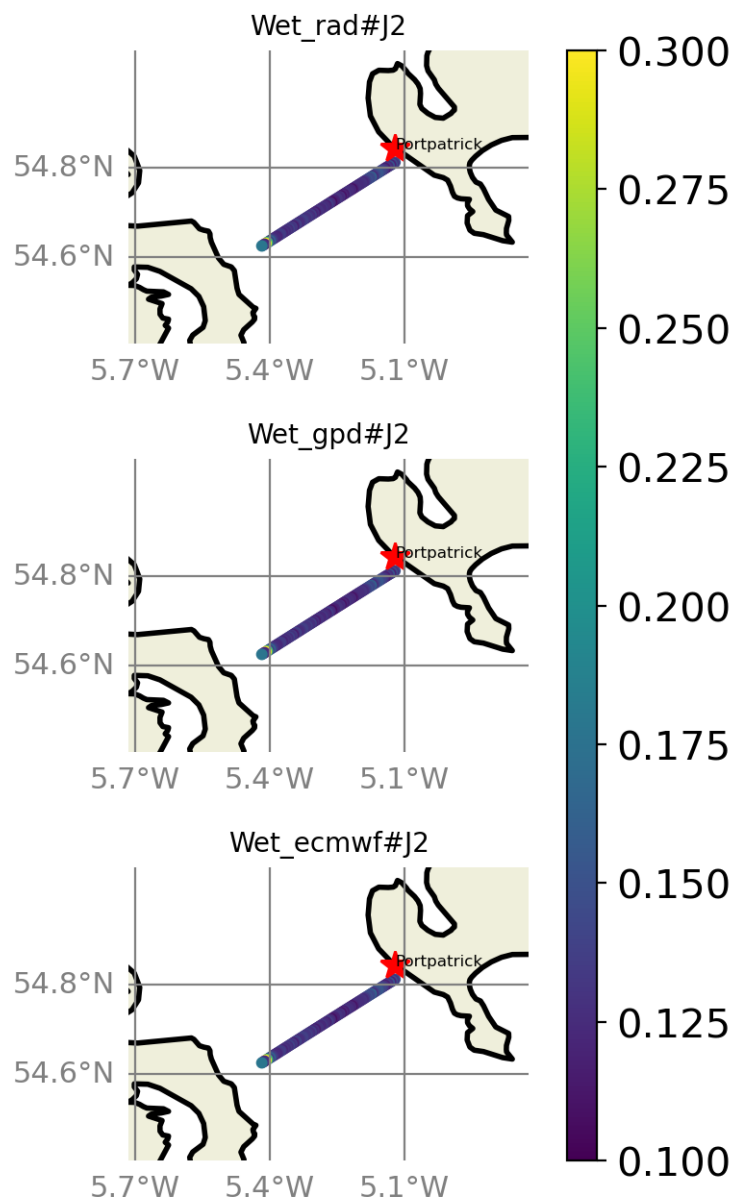


FIGURE 90 – rmsd visualization in maps view % Portpatrick tide gauge

6.5.3 std visualization in maps view % Portpatrick tide gauge

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

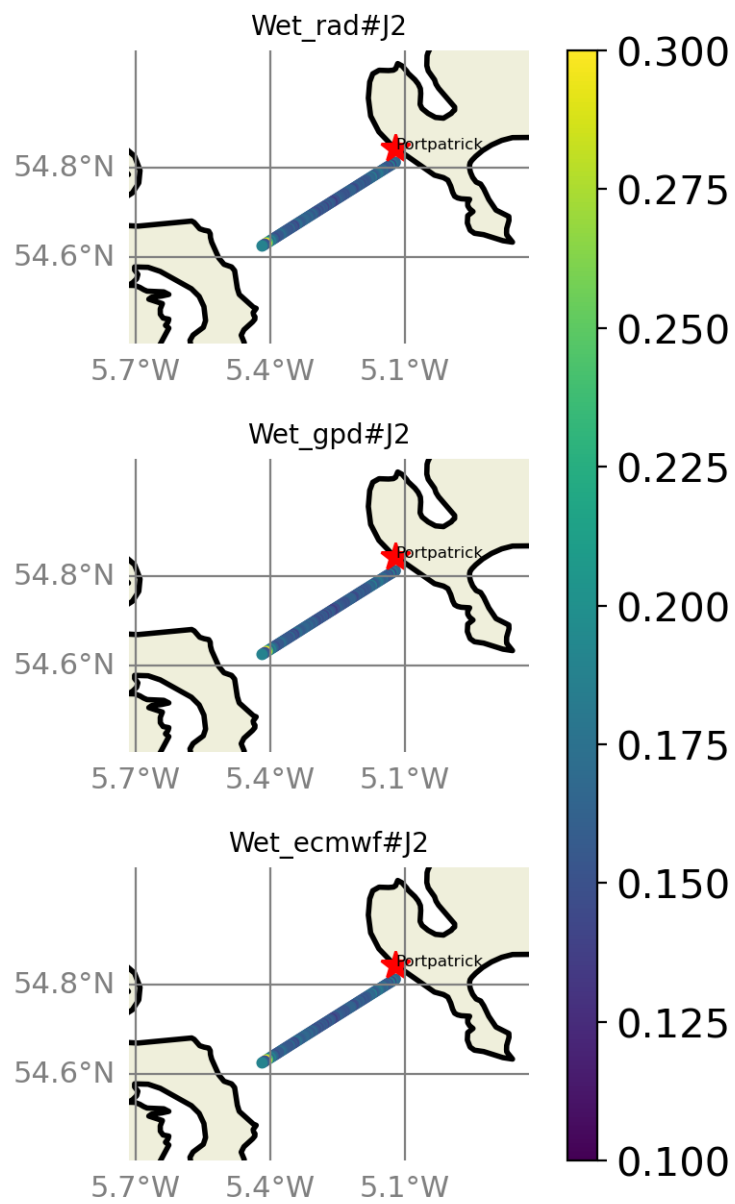


FIGURE 91 – std visualization in maps view % Portpatrick tide gauge

6.5.4 valid_data_percent visualization in maps view % Portpatrick tide gauge

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

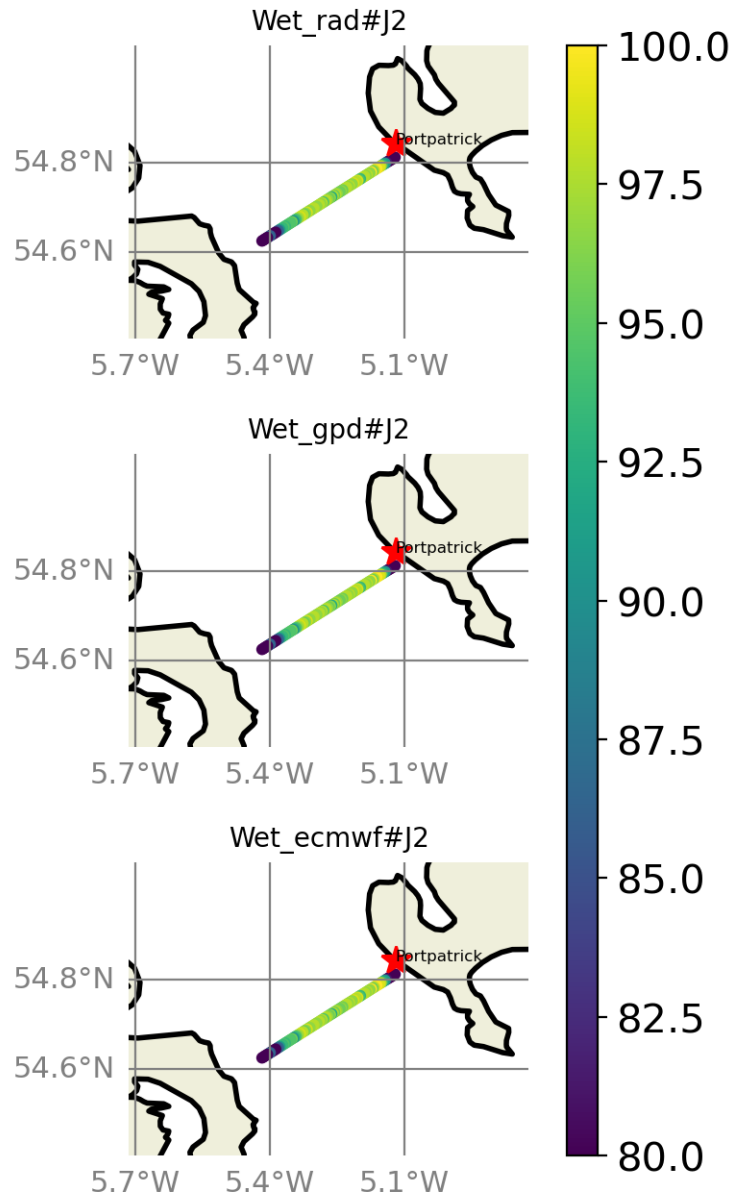


FIGURE 92 – valid_data_percent visualization in maps view % Portpatrick tide gauge

6.5.5 Valid data (%) in function of distance to coast/Portpatrick 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 serie, respectively in the time series, i is the index of the time series, np is the number of the selected altimetry time series. $maxNB = 91$ 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.

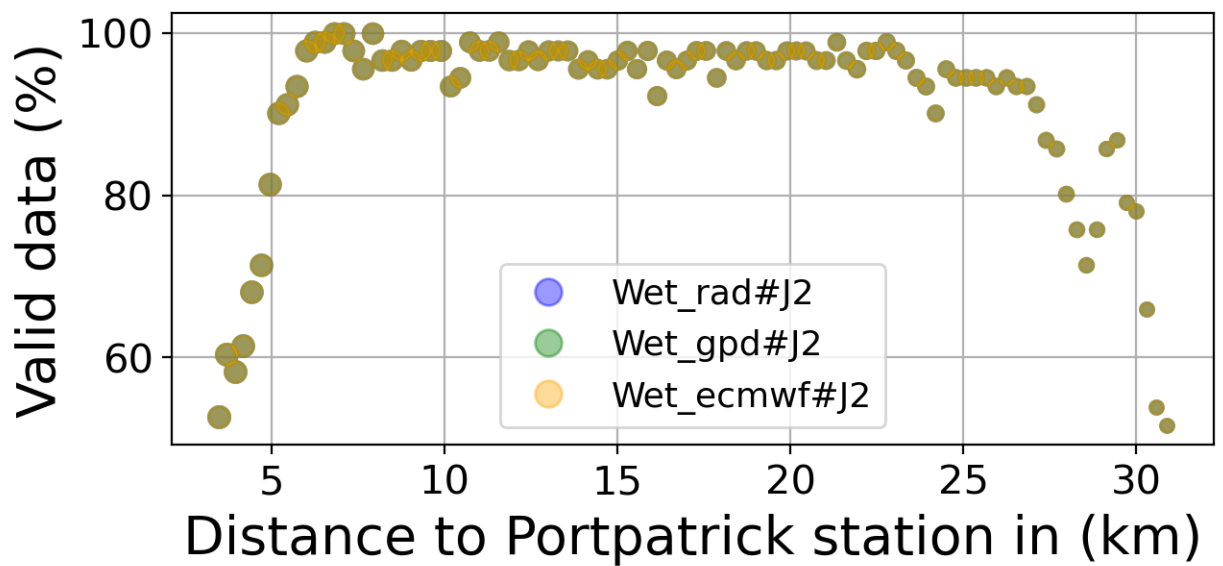
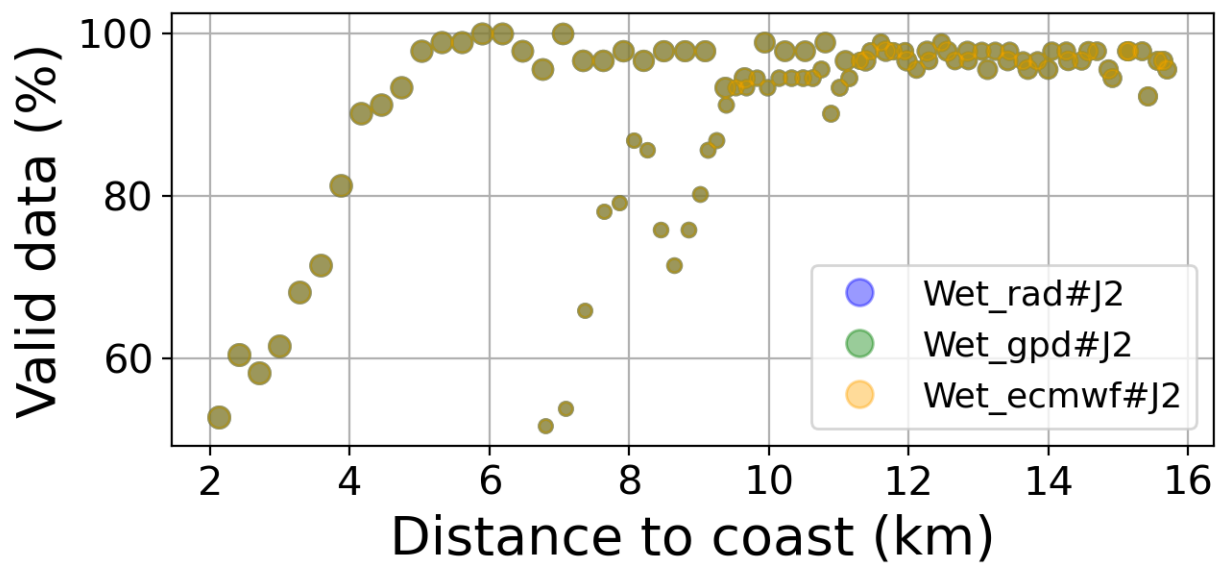


FIGURE 93 – Valid data (%) in function of distance to coast/Portpatrick station

6.5.6 Std in function of distance to coast/Portpatrick station

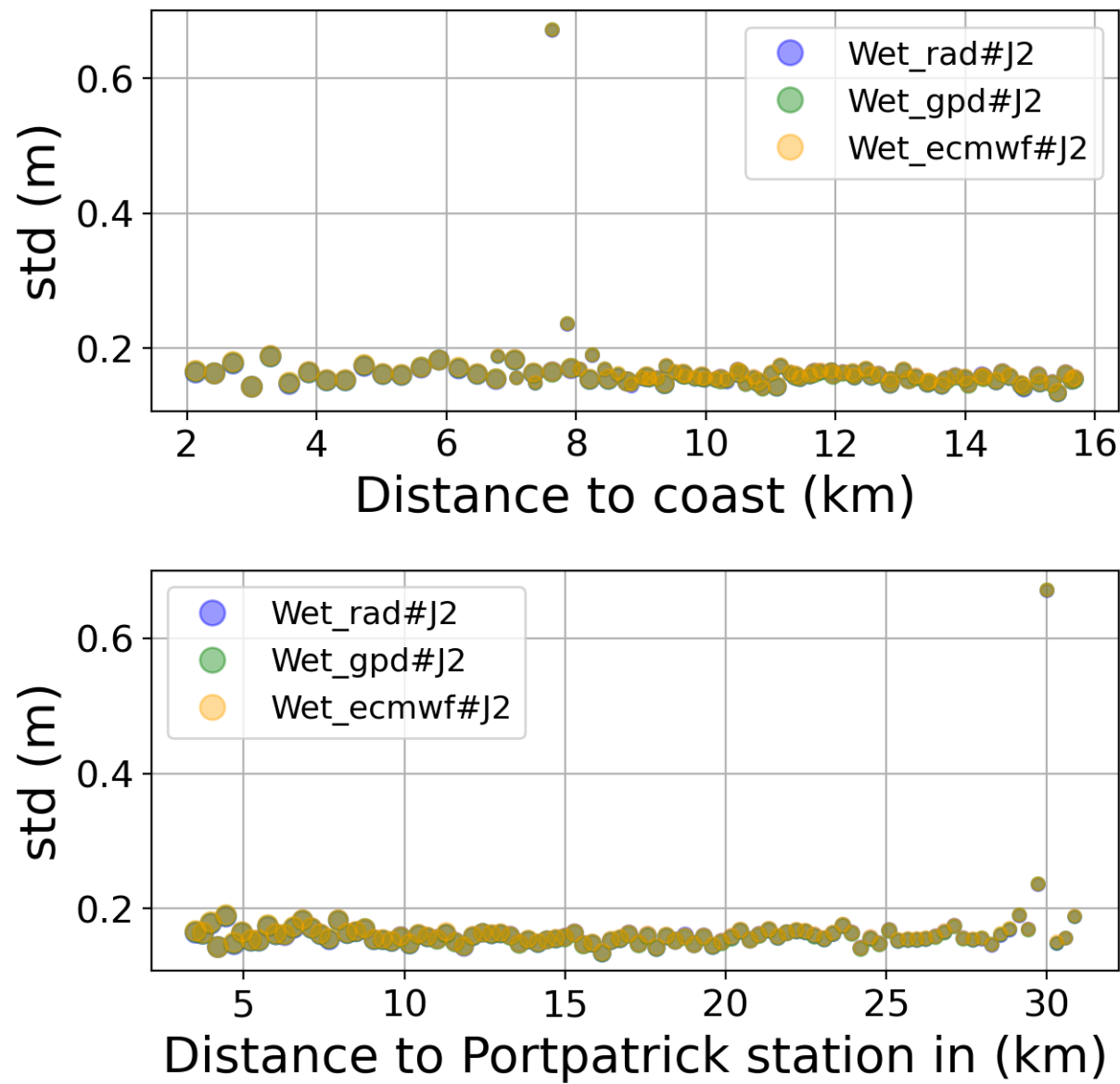


FIGURE 94 – Std in function of the distance to the coast/Portpatrick station

6.5.7 Correlation in function of distance to coast/Portpatrick station

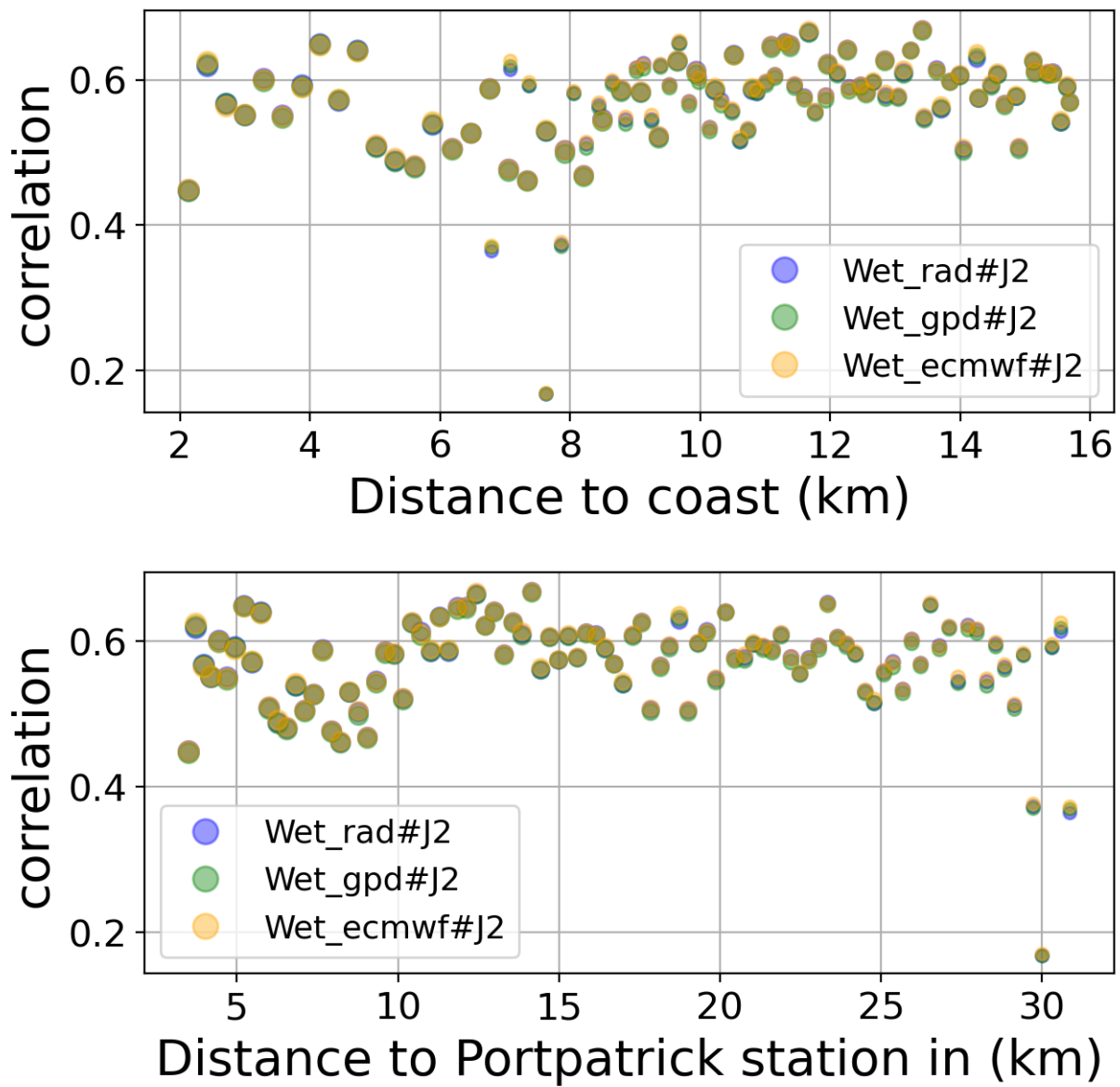


FIGURE 95 – Correlation in function of the distance to the coast/Portpatrick station

6.5.8 Taylor Diagram

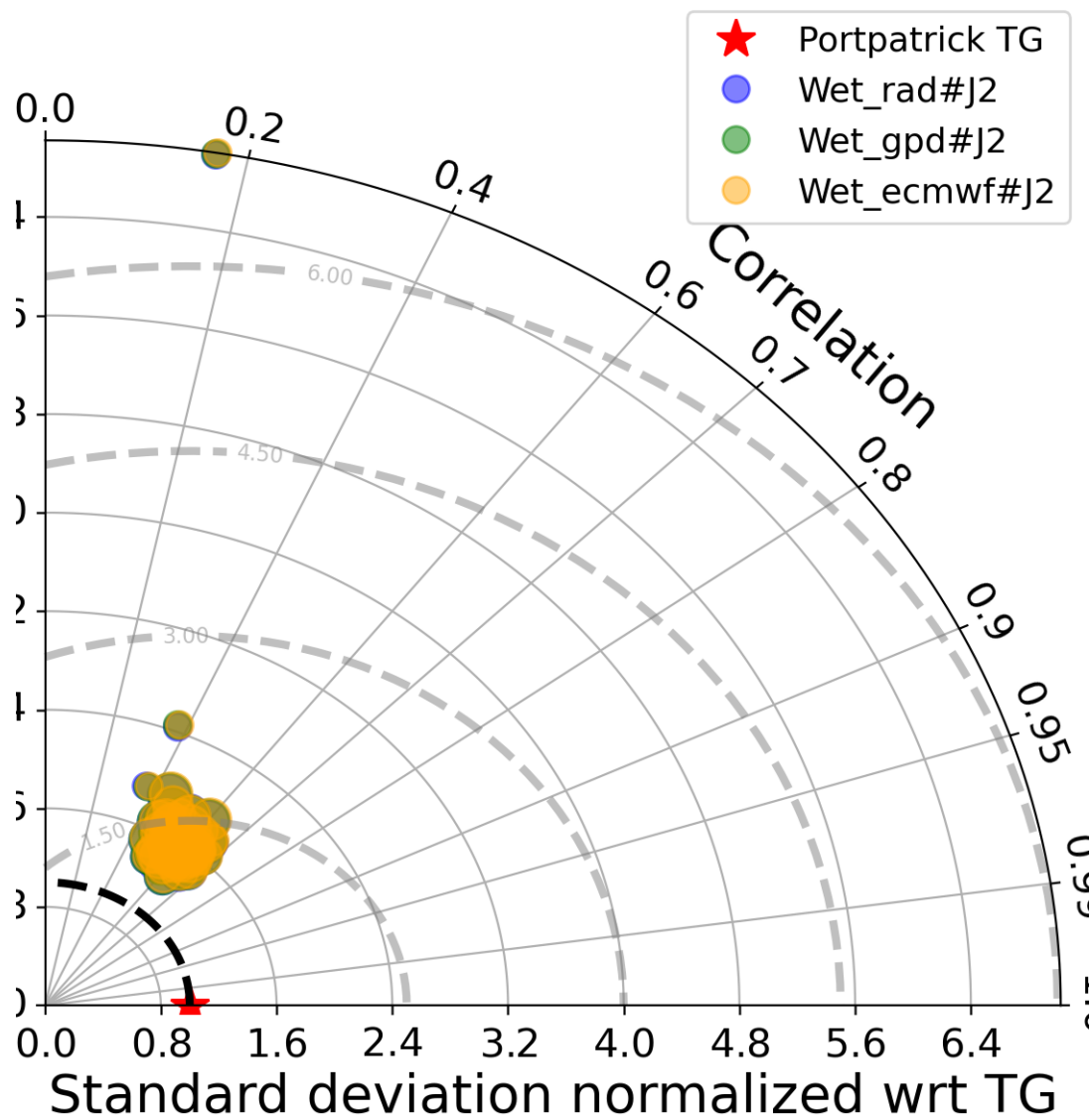


FIGURE 96 – Taylor diagram

6.5.9 Mean statistics table of products comparison with Portpatrick 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	91.321	0.571	0.166	0.137
Wet_gpd#J2	91.321	0.569	0.165	0.137
Wet_ecmwf#J2	91.321	0.572	0.167	0.138

FIGURE 97 – 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 91 point.

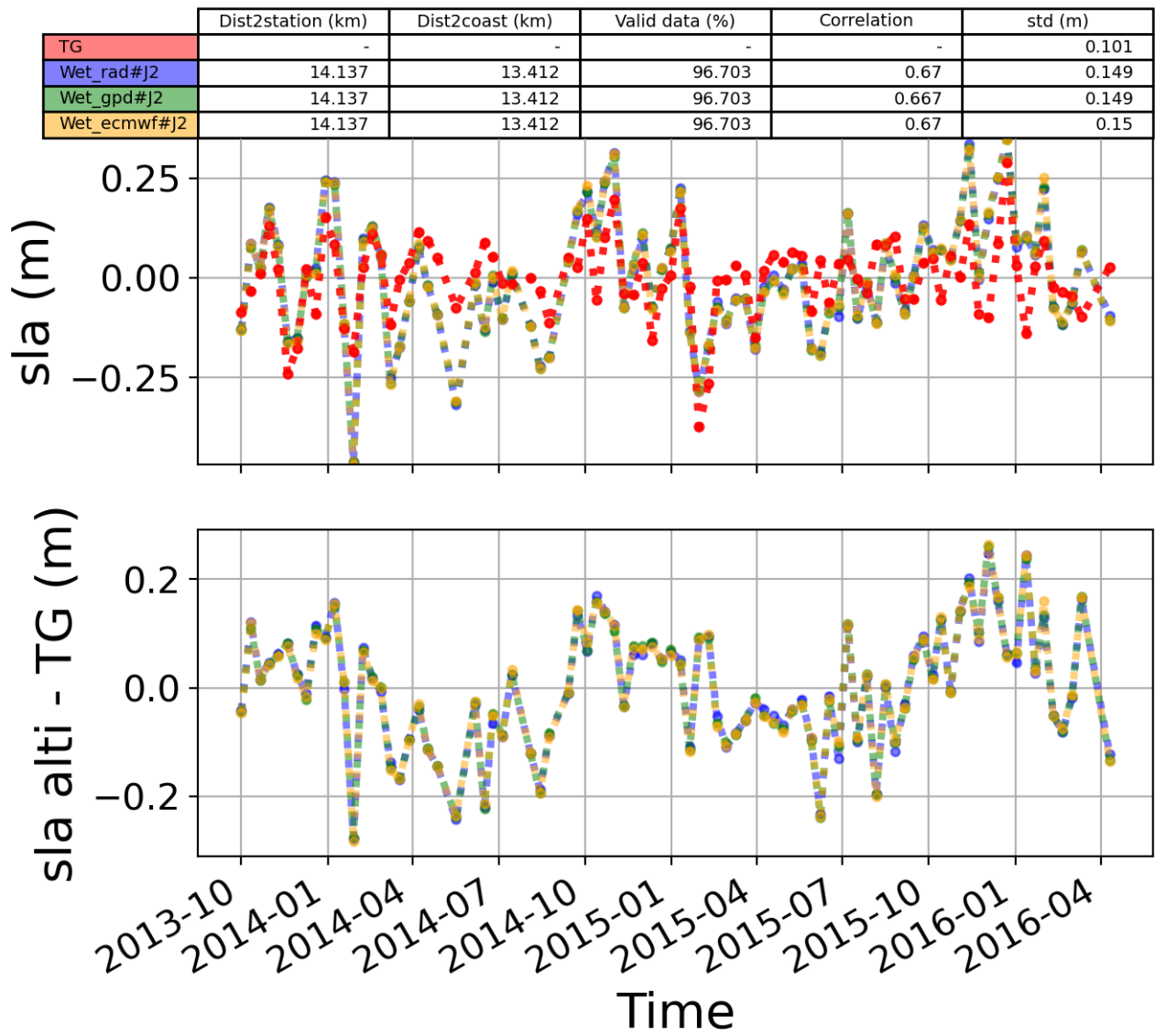


FIGURE 98 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.6 Station : Newlyn

- Nearest track to Newlyn station is the track number track70
- The area of interest is limited by :
 - A circle which it's center is the Newlyn tide gauge station location and has a Raduis of 40 Km
 - Maximum distance to the coast : 20 Km
 - Latitude limits : [49.8, 50.06] °

6.6.1 correlation visualization in maps view % Newlyn tide gauge

Correlation Altimetry data with respect to Newlyn Tide gauge data

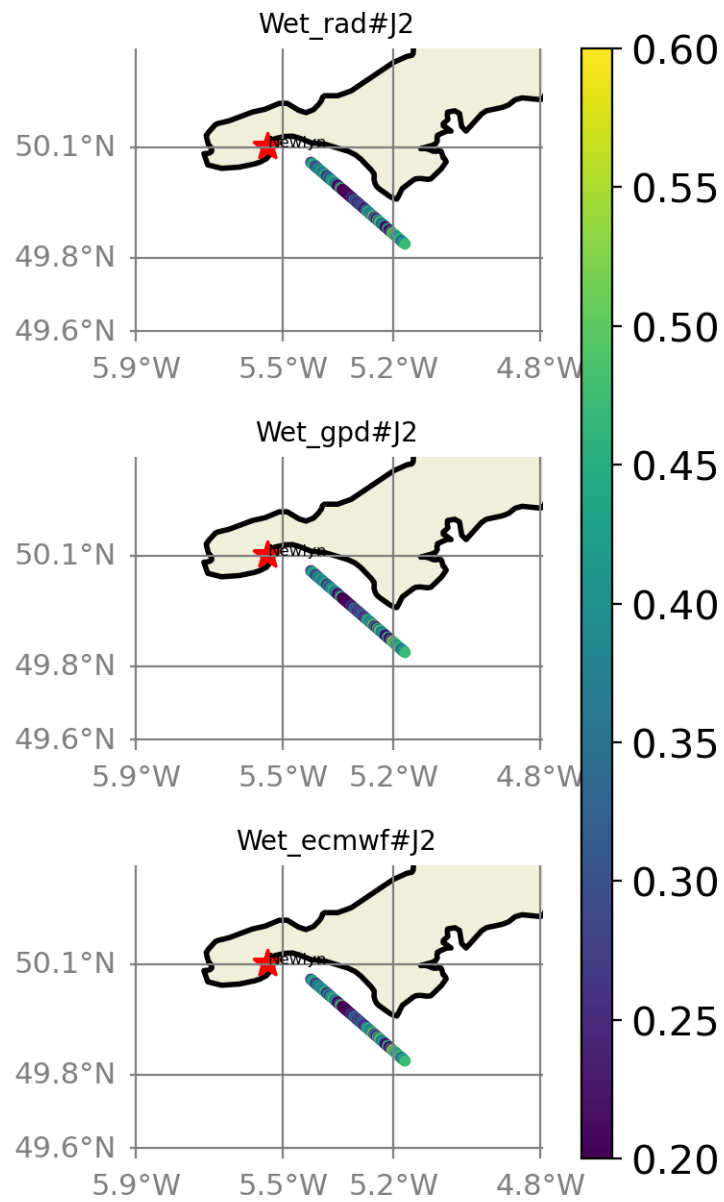


FIGURE 99 – correlation visualization in maps view % Newlyn tide gauge

6.6.2 rmsd visualization in maps view % Newlyn tide gauge

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

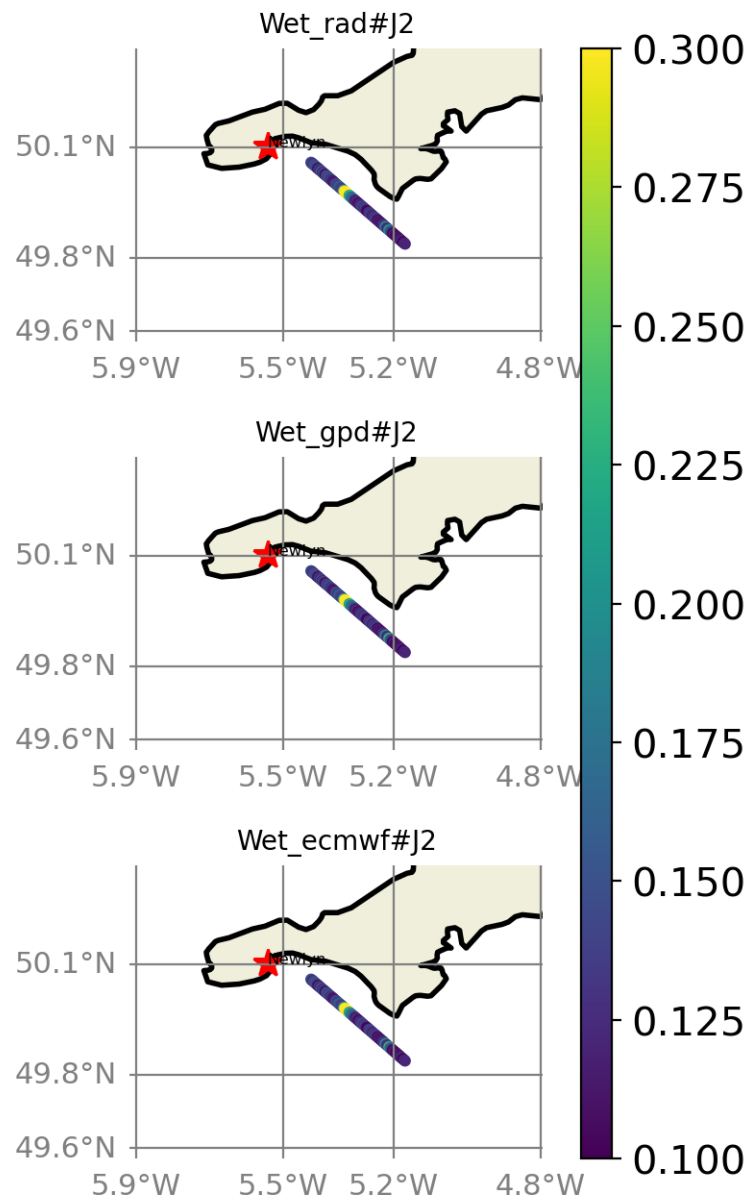


FIGURE 100 – rmsd visualization in maps view % Newlyn tide gauge

6.6.3 std visualization in maps view % Newlyn tide gauge

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

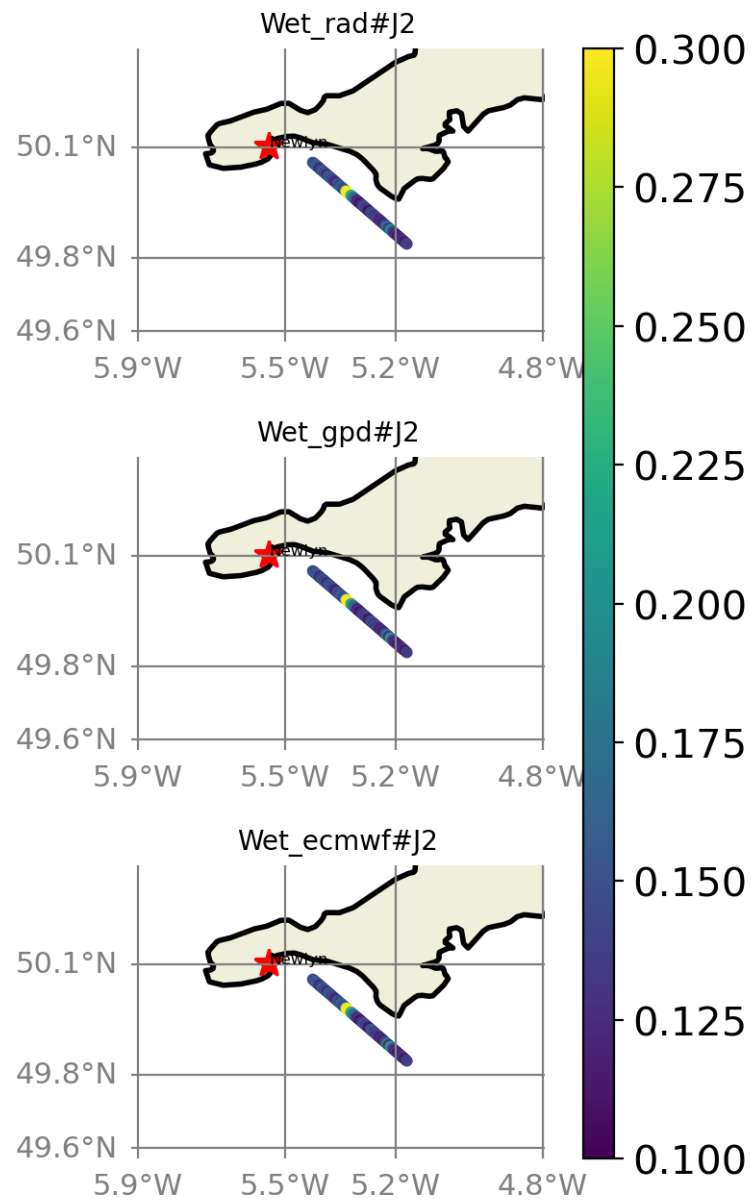


FIGURE 101 – std visualization in maps view % Newlyn tide gauge

6.6.4 valid_data_percent visualization in maps view % Newlyn tide gauge

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

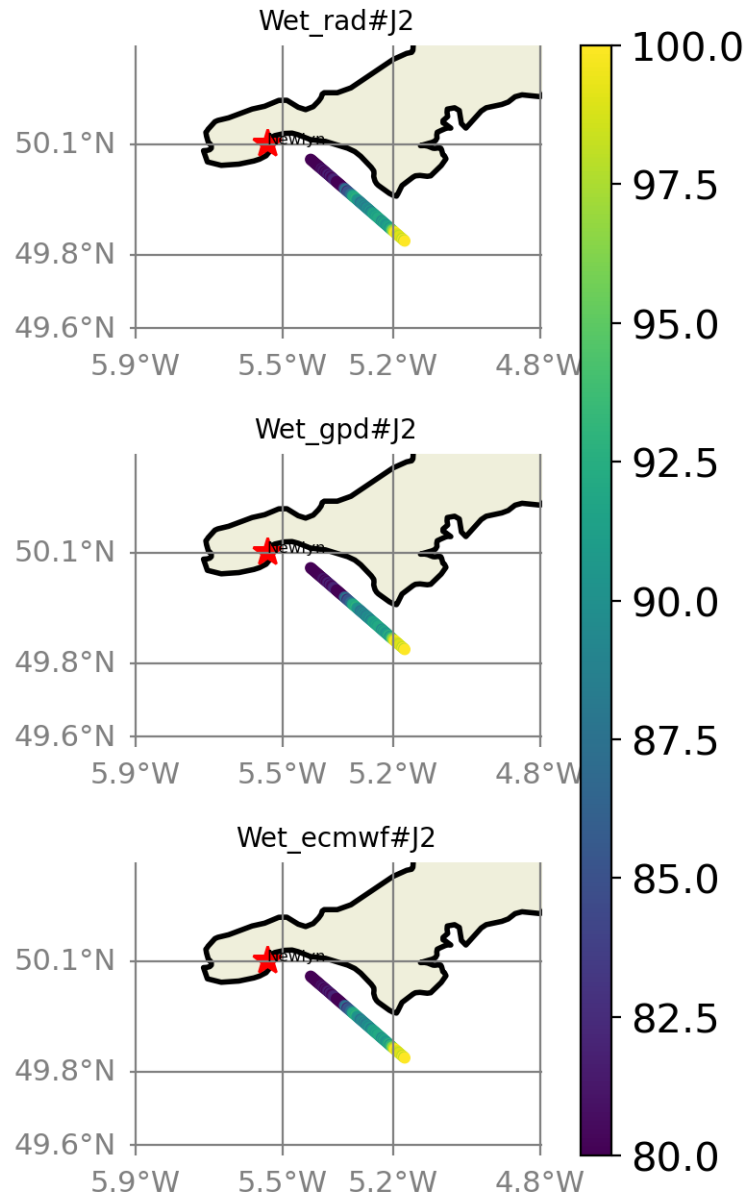


FIGURE 102 – valid_data_percent visualization in maps view % Newlyn tide gauge

6.6.5 Valid data (%) in function of distance to coast/Newlyn 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.

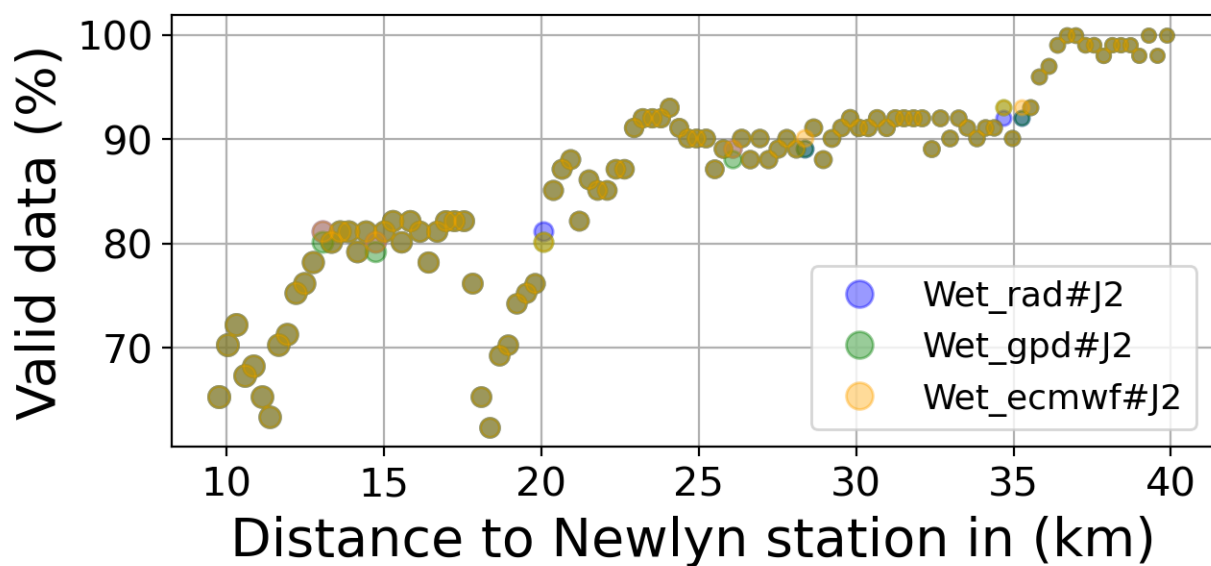
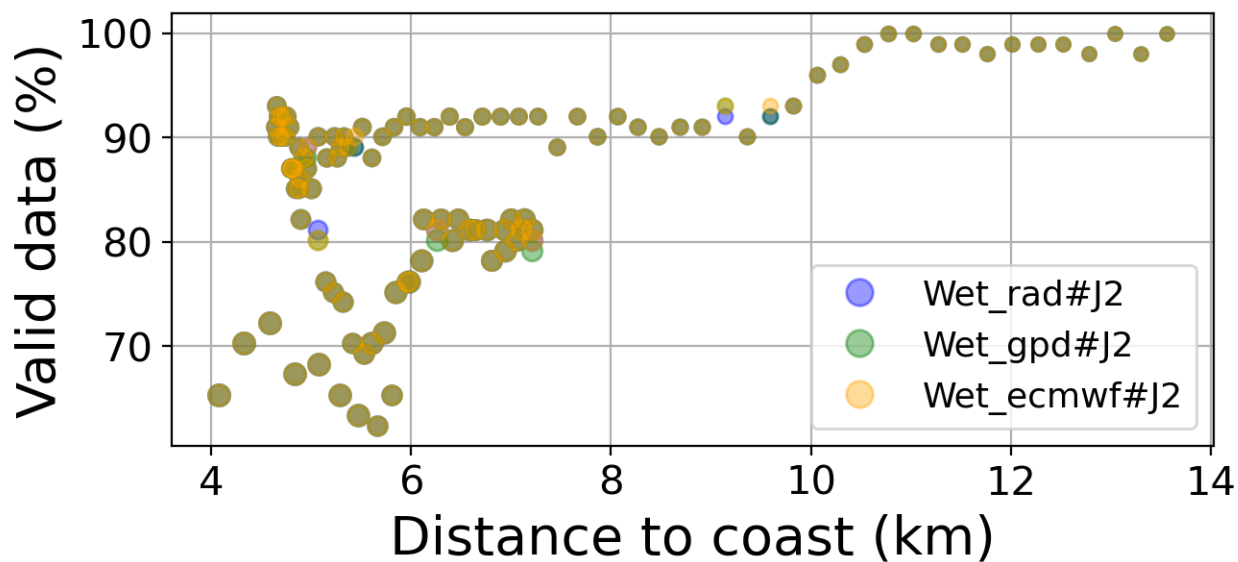


FIGURE 103 – Valid data (%) in function of distance to coast/Newlyn station

6.6.6 Std in function of distance to coast/Newlyn station

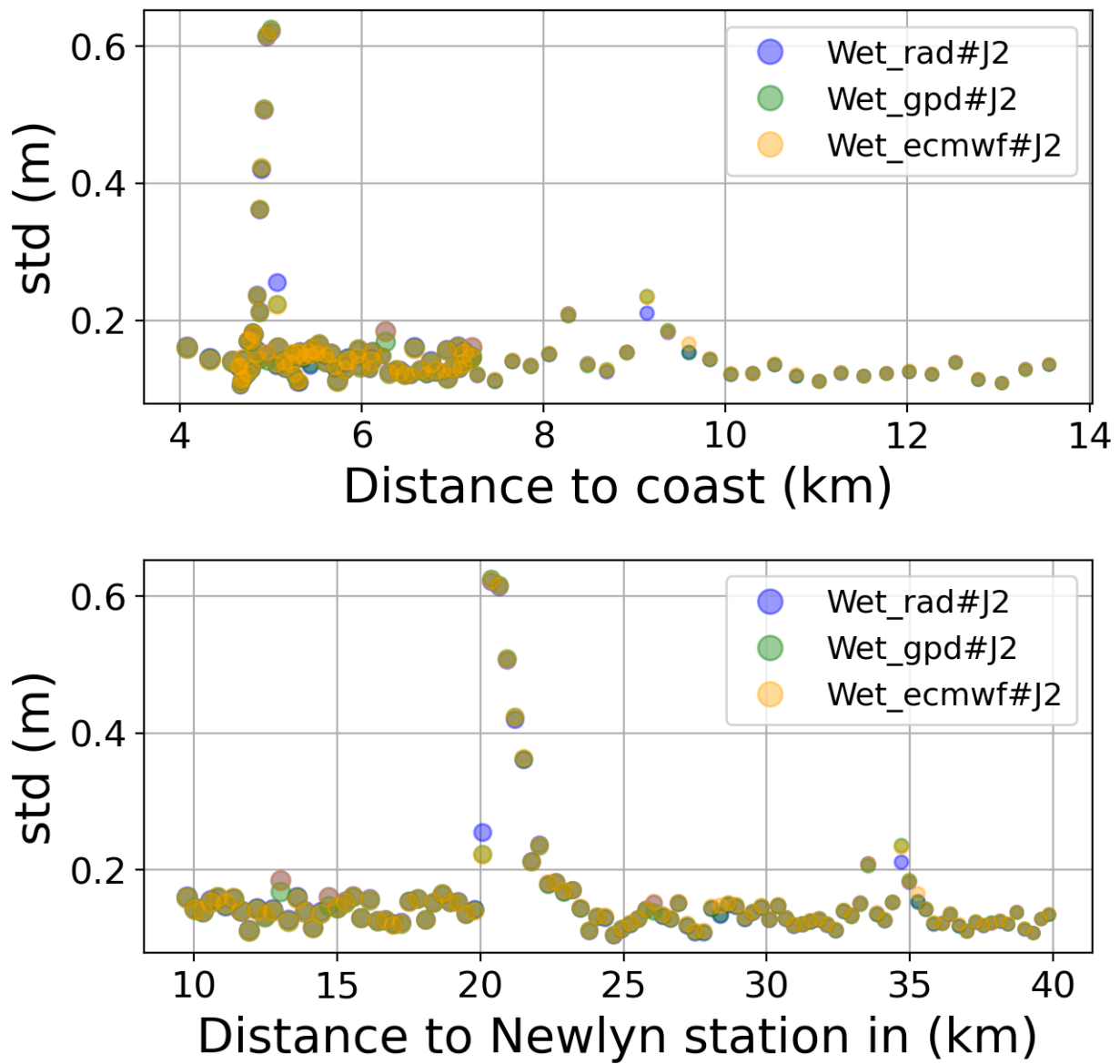


FIGURE 104 – Std in function of the distance to the coast/Newlyn station

6.6.7 Correlation in function of distance to coast/Newlyn station

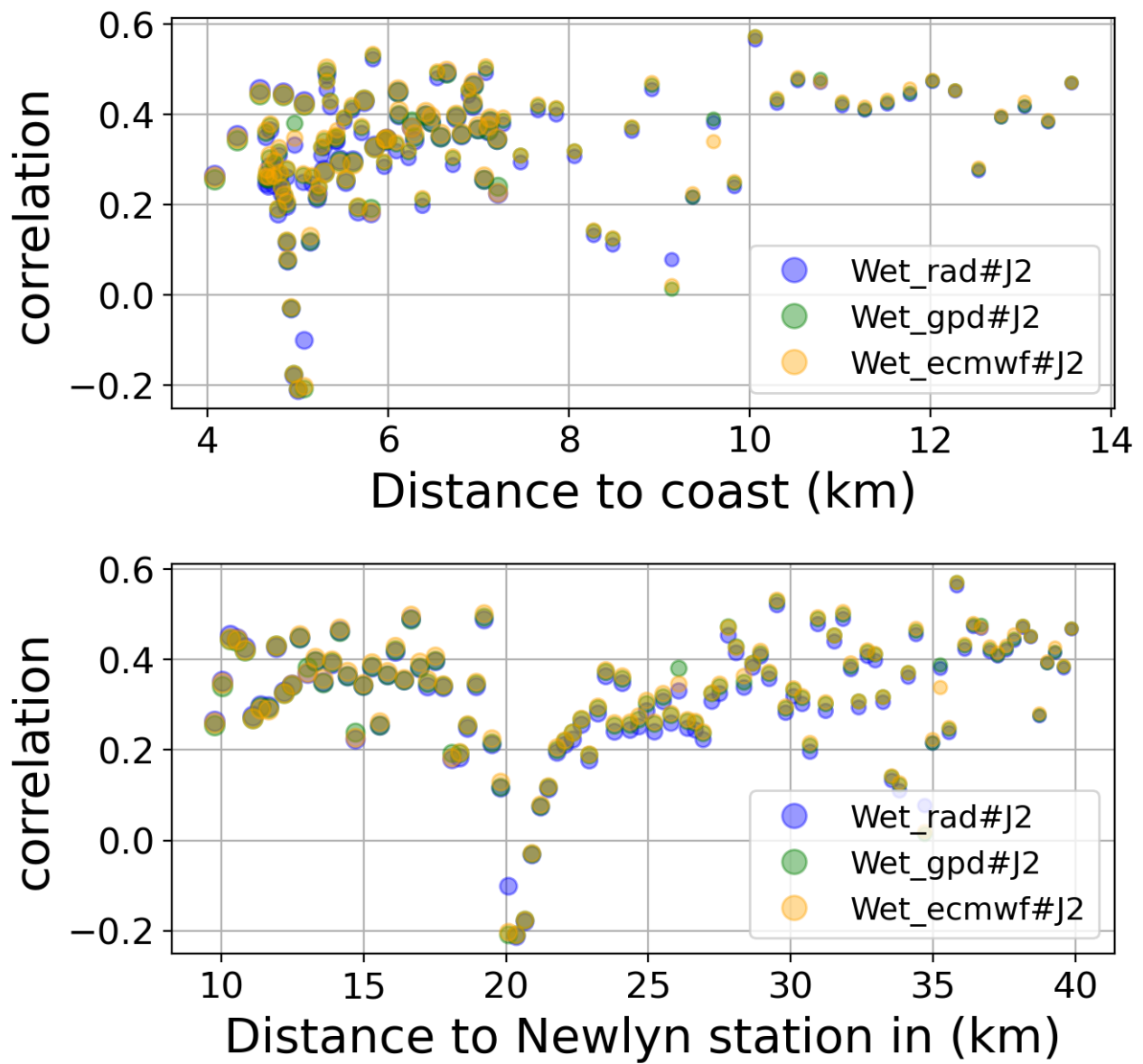


FIGURE 105 – Correlation in function of the distance to the coast/Newlyn station

6.6.8 Taylor Diagram

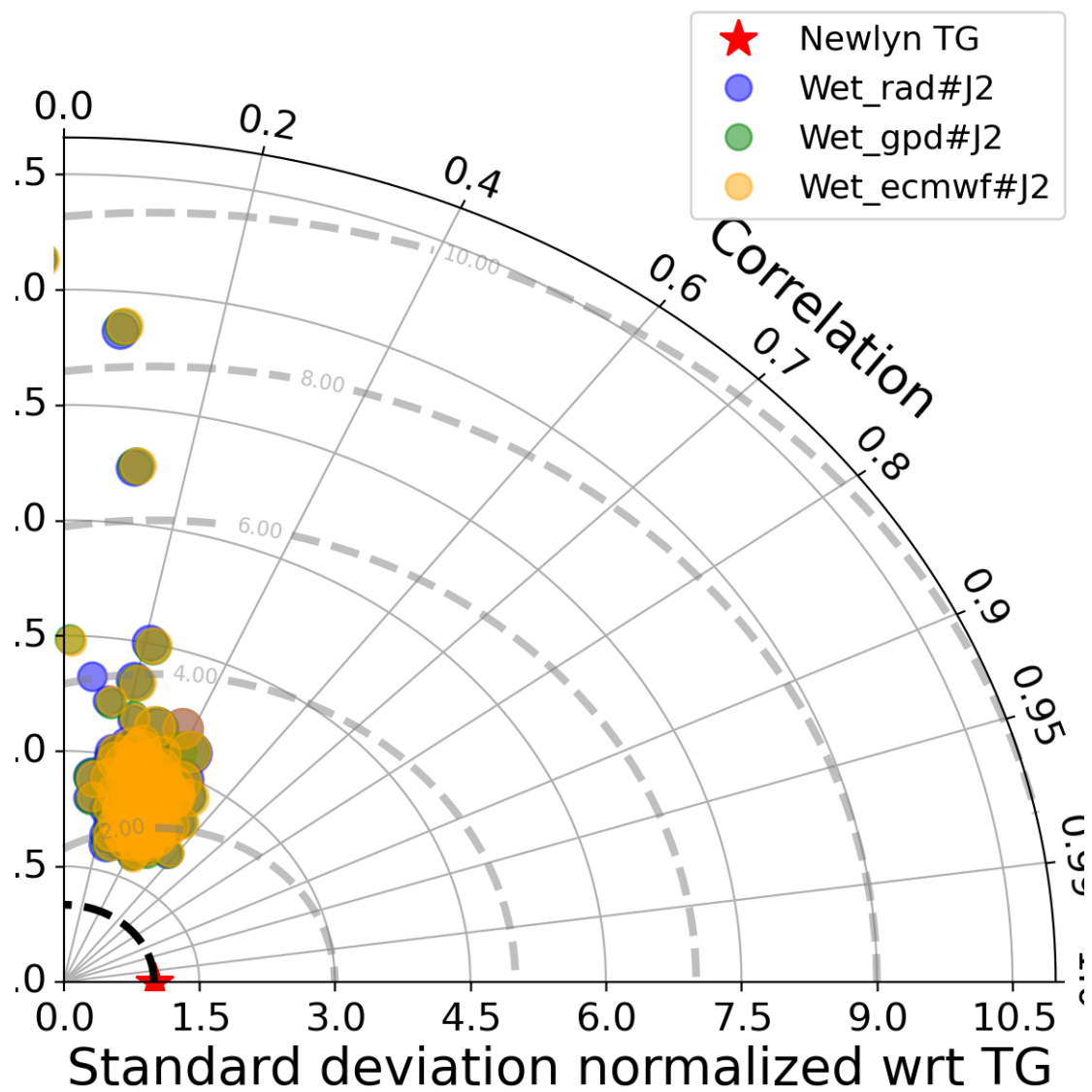


FIGURE 106 – Taylor diagram

6.6.9 Mean statistics table of products comparison with Newlyn 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	86.046	0.317	0.159	0.152
Wet_gpd#J2	86.018	0.322	0.159	0.152
Wet_ecmwf#J2	86.065	0.325	0.16	0.152

FIGURE 107 – 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 101 point.

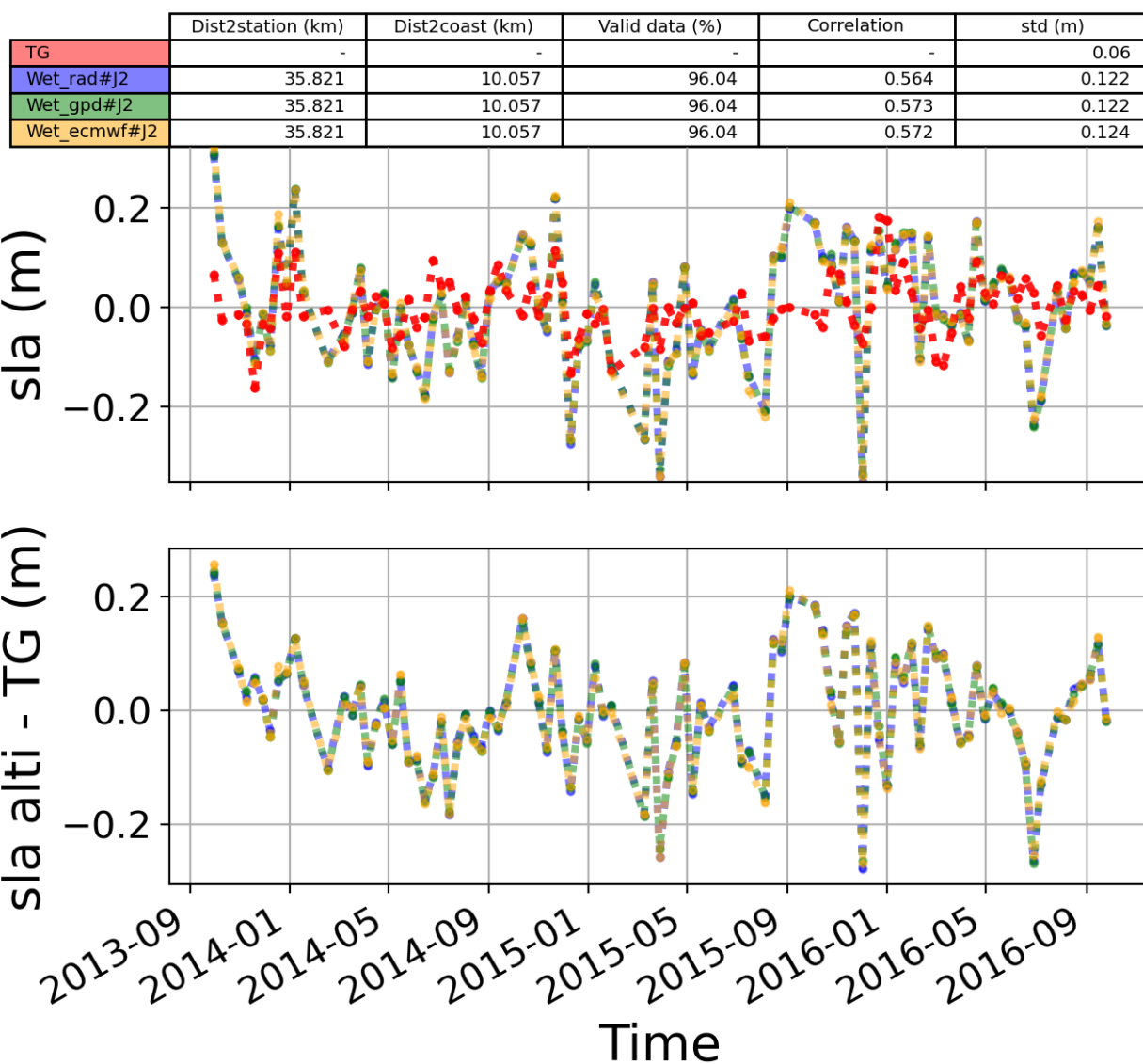


FIGURE 108 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.7 Station : LE_CONQUET

- Nearest track to LE_CONQUET station is the track number track61
- The area of interest is limited by :
 - A circle which it's center is the LE_CONQUET tide gauge station location and has a Radius of 40 Km
 - Maximum distance to the coast : 20 Km

6.7.1 correlation visualization in maps view % LE_CONQUET tide gauge

Correlation Altimetry data with respect to LE_CONQUET Tide gauge data

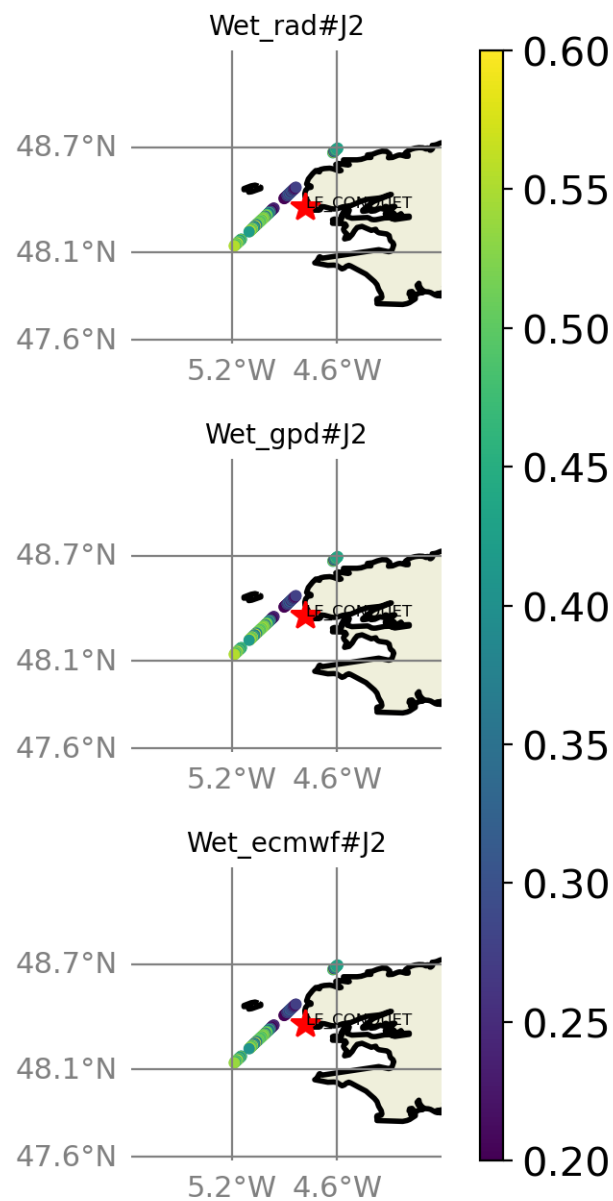


FIGURE 109 – correlation visualization in maps view % LE_CONQUET tide gauge

6.7.2 rmsd visualization in maps view % LE_CONQUET tide gauge

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

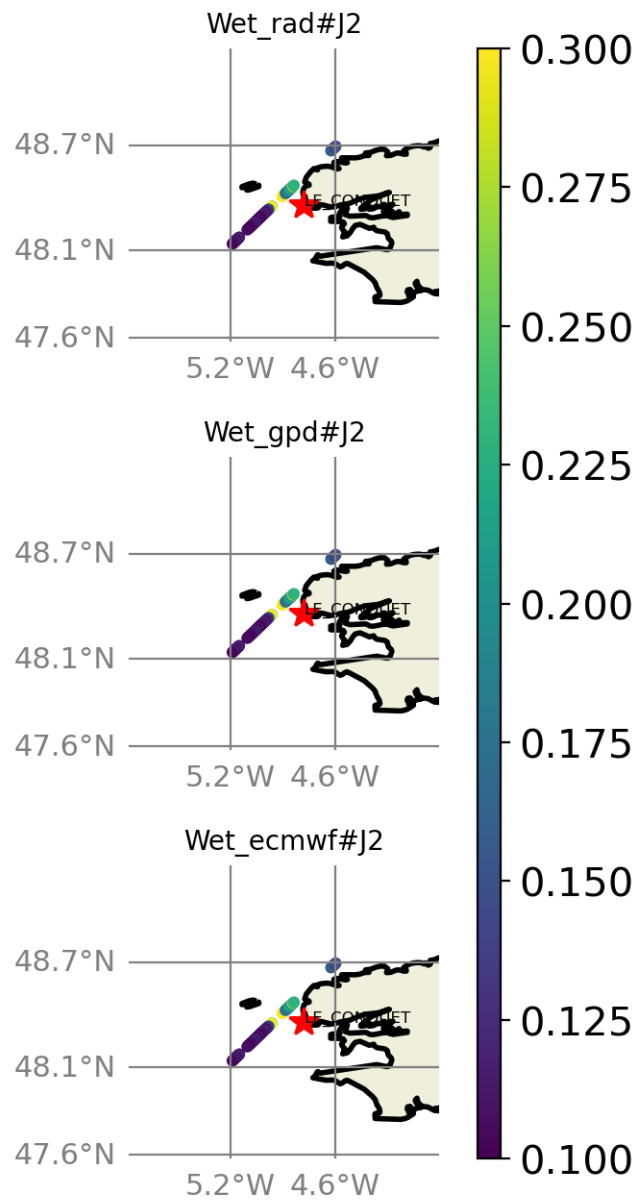


FIGURE 110 – rmsd visualization in maps view % LE_CONQUET tide gauge

6.7.3 std visualization in maps view % LE_CONQUET tide gauge

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

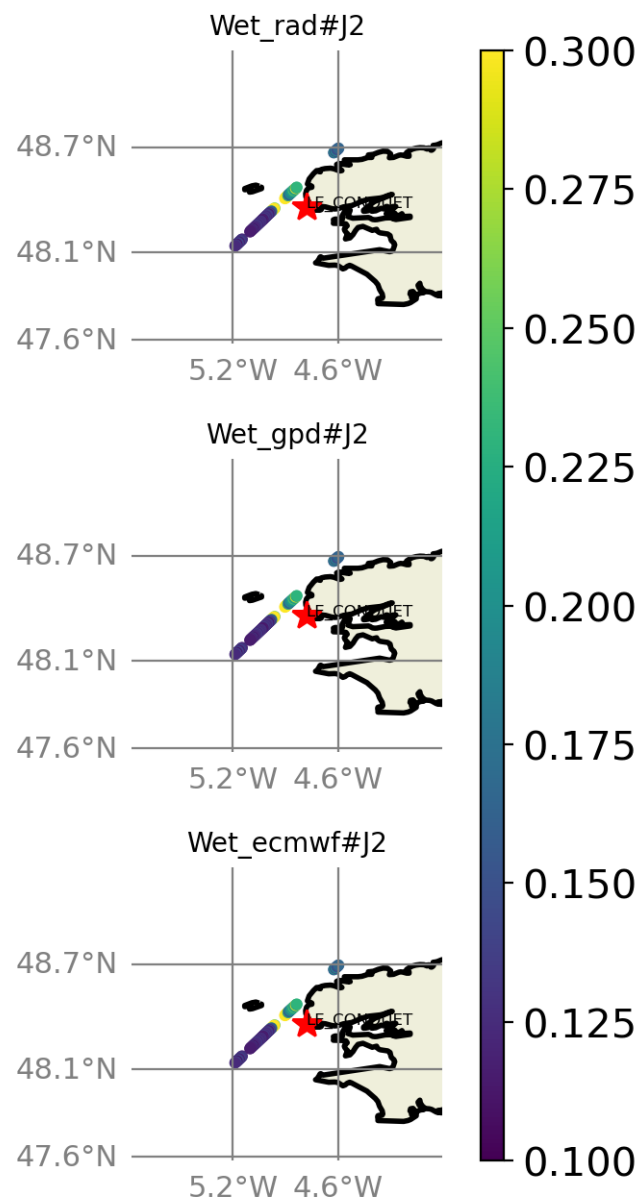


FIGURE 111 – std visualization in maps view % LE_CONQUET tide gauge

6.7.4 valid_data_percent visualization in maps view % LE_CONQUET tide gauge

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

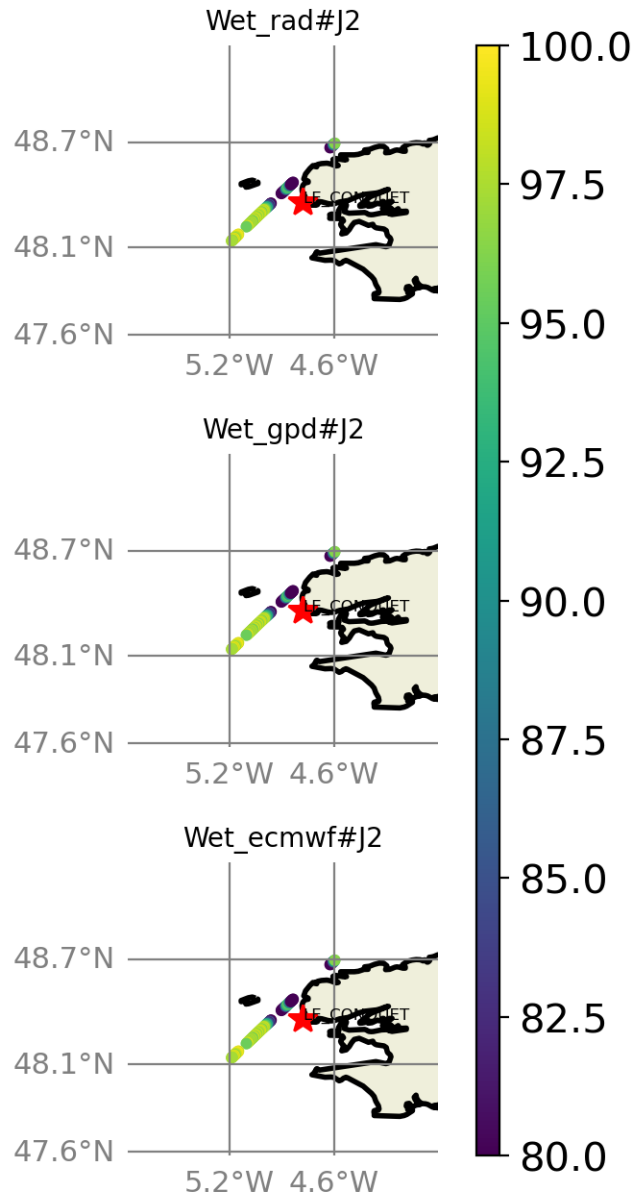


FIGURE 112 – valid_data_percent visualization in maps view % LE_CONQUET tide gauge

6.7.5 Valid data (%) in function of distance to coast/LE_CONQUET 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. $maxNB = 111$ 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.

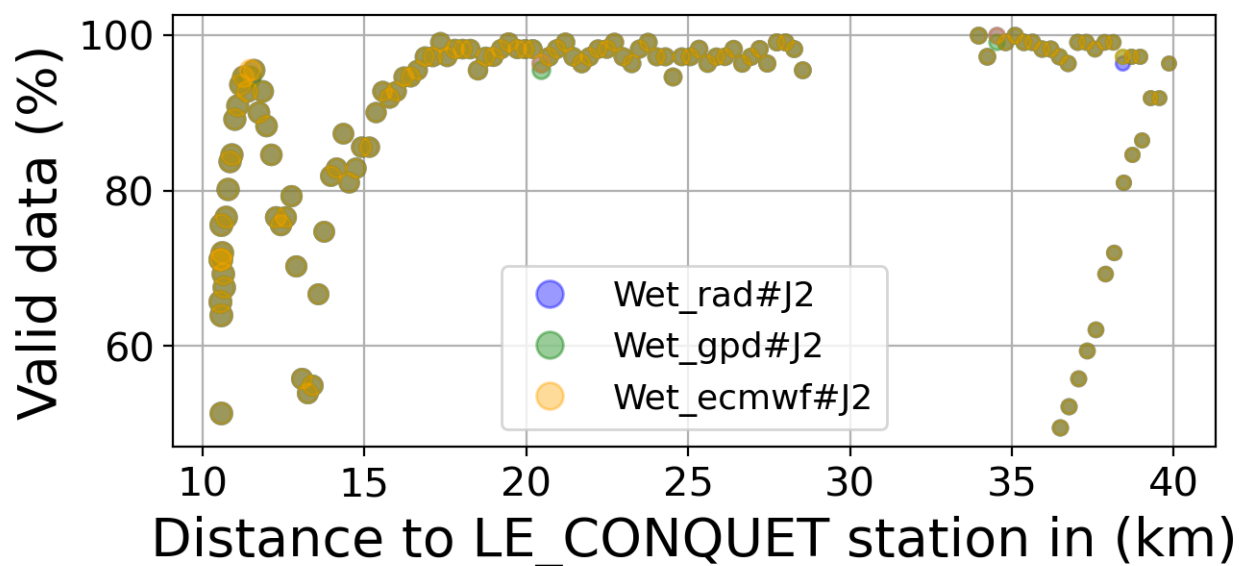
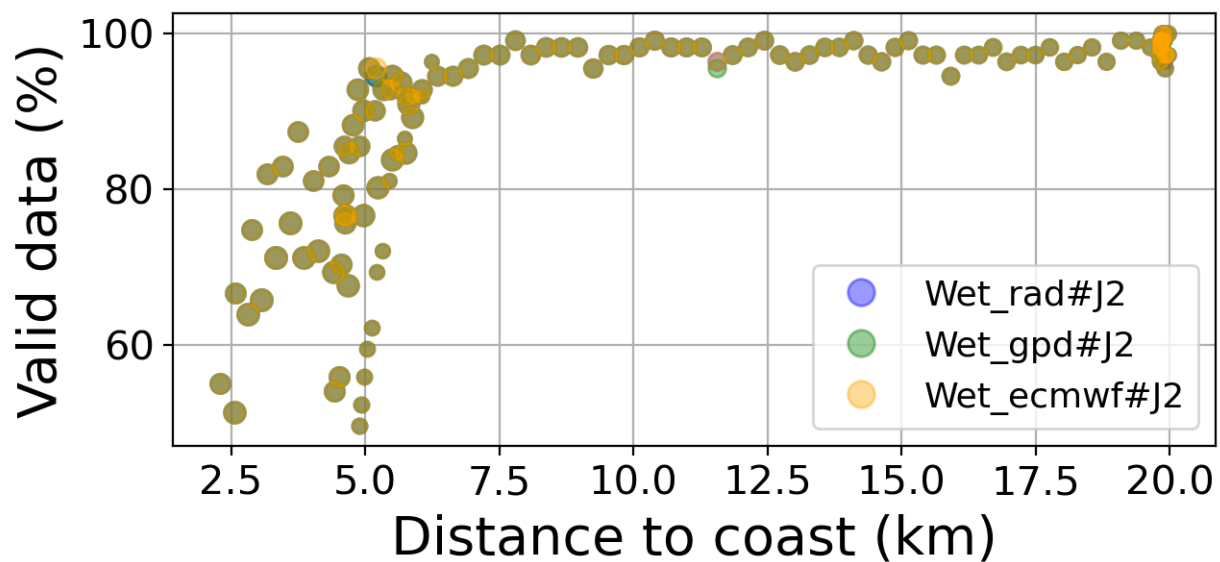


FIGURE 113 – Valid data (%) in function of distance to coast/LE_CONQUET station

6.7.6 Std in function of distance to coast/LE_CONQUET station

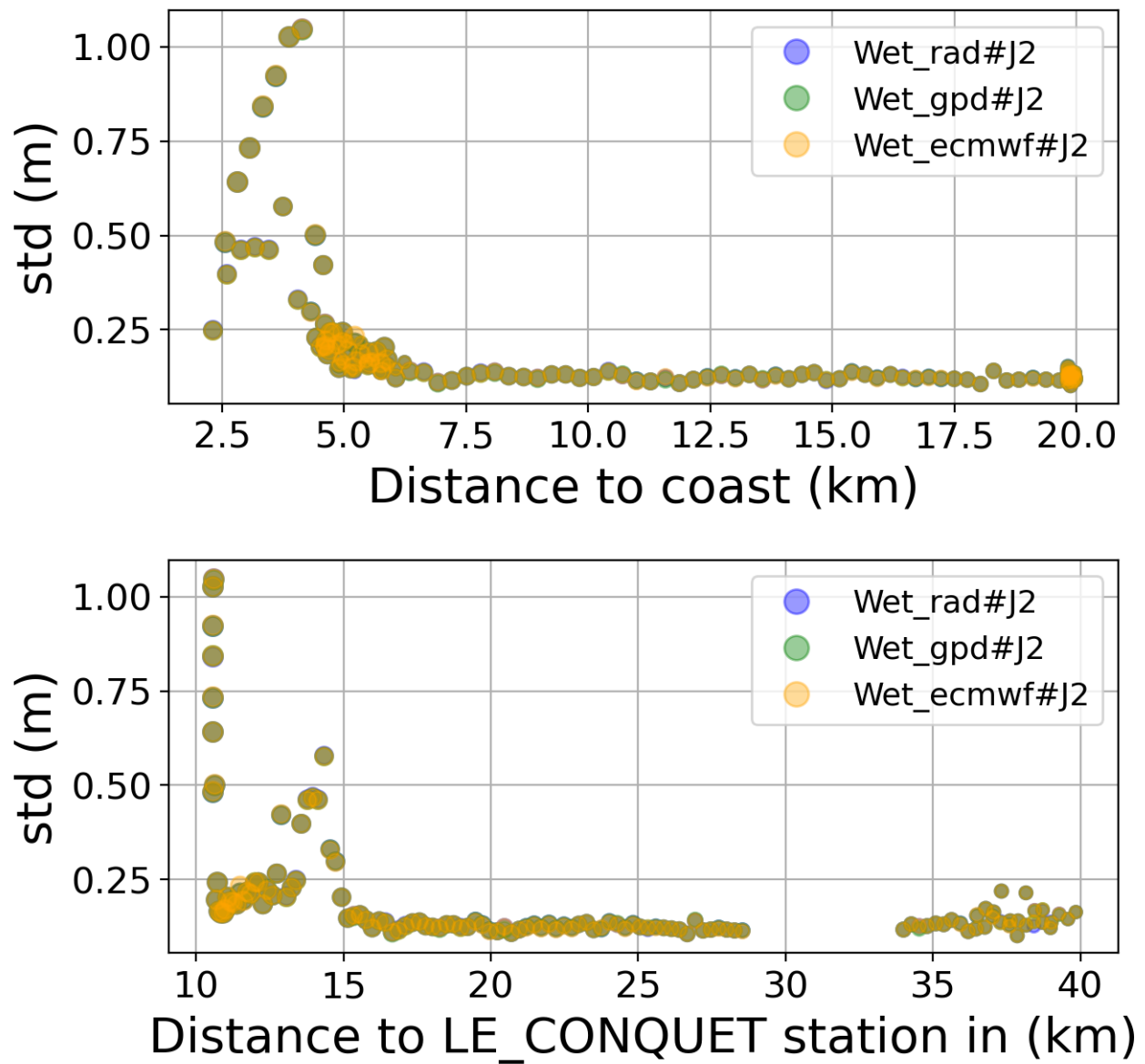


FIGURE 114 – Std in function of the distance to the coast/LE_CONQUET station

6.7.7 Correlation in function of distance to coast/LE_CONQUET station

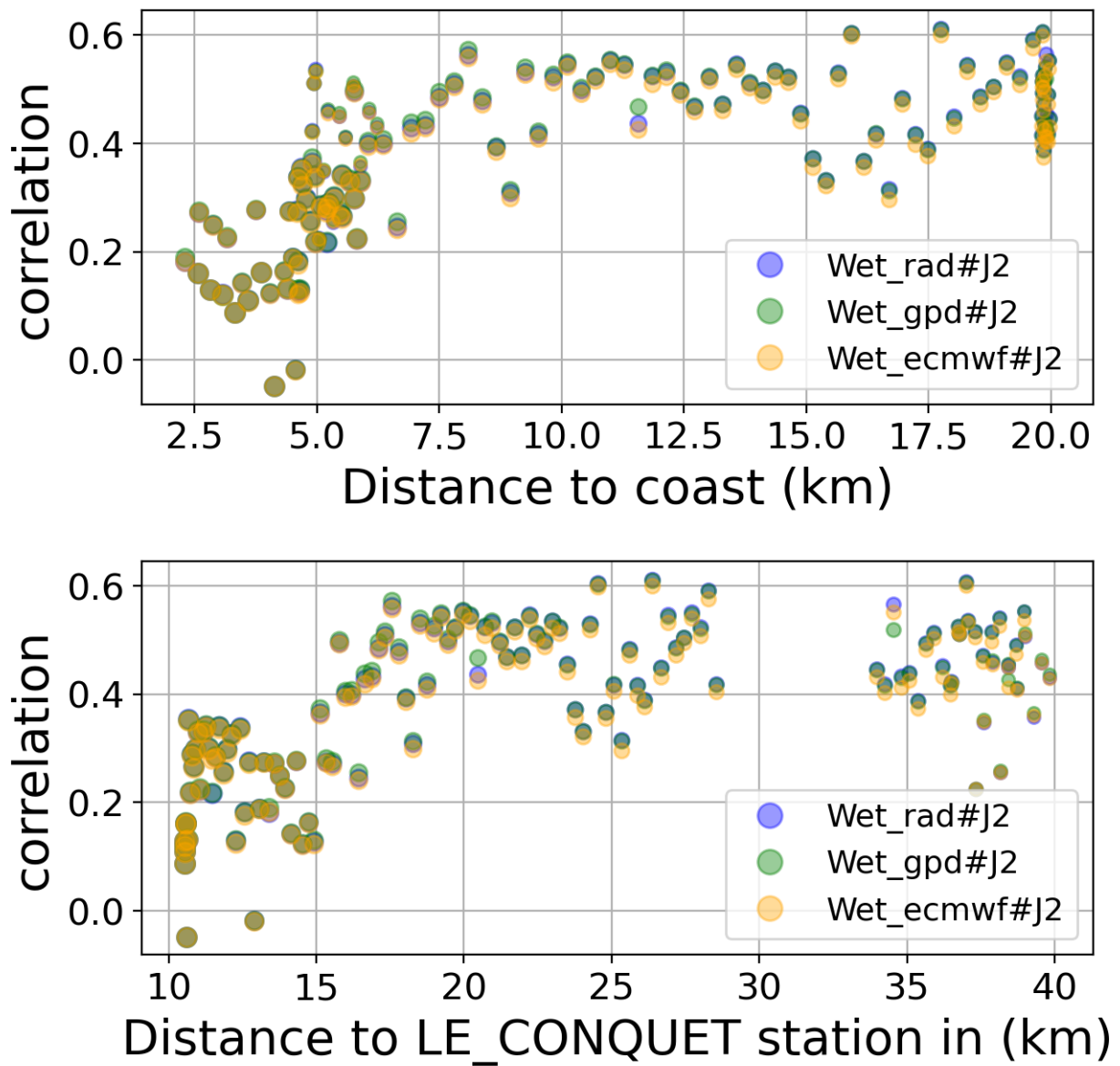


FIGURE 115 – Correlation in function of the distance to the coast/LE_CONQUET station

6.7.8 Taylor Diagram

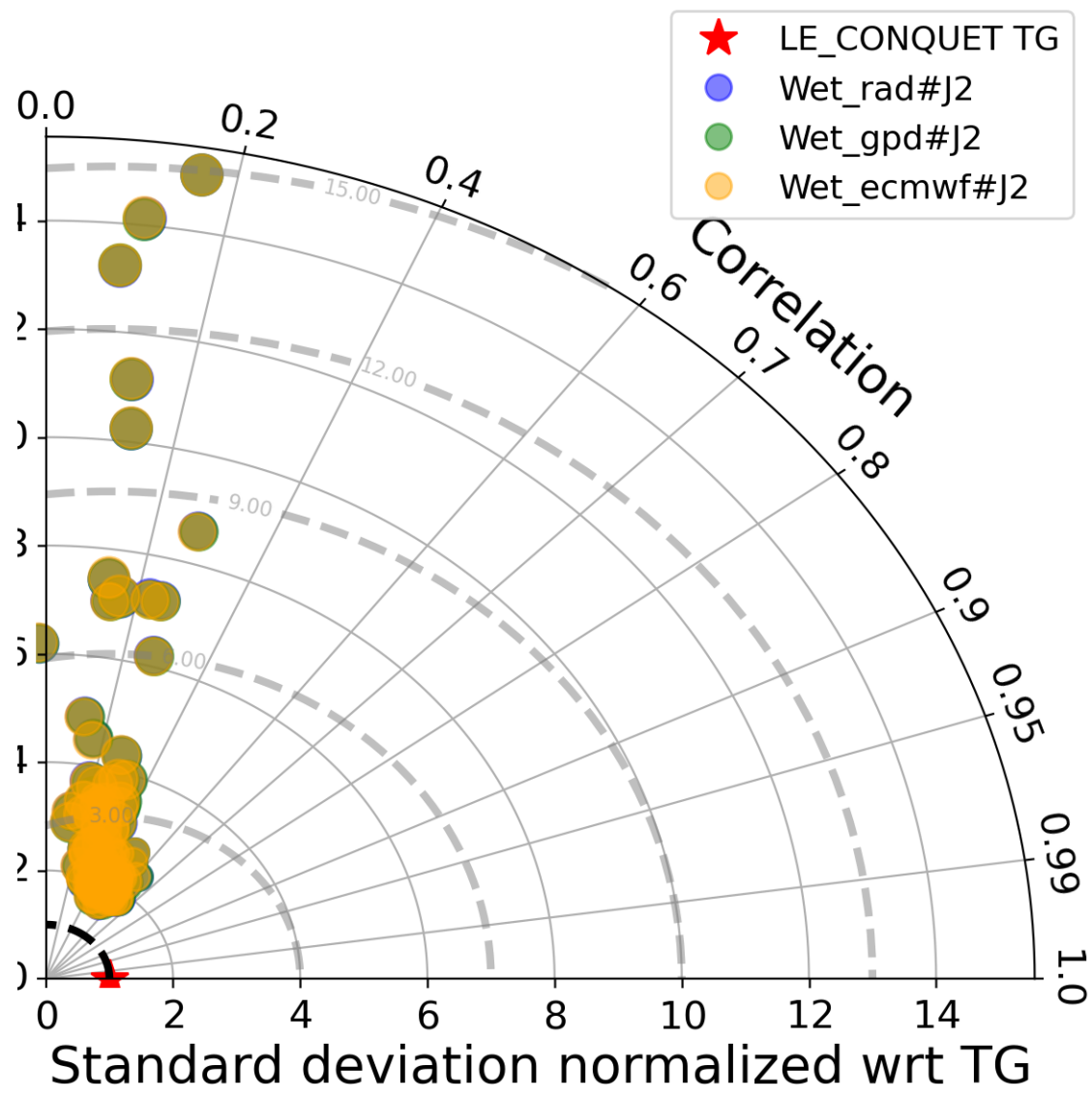


FIGURE 116 – Taylor diagram

6.7.9 Mean statistics table of products comparison with LE_CONQUET 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	88.785	0.386	0.207	0.195
Wet_gpd#J2	88.778	0.387	0.206	0.195
Wet_ecmwf#J2	88.799	0.379	0.207	0.195

FIGURE 117 – 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 111 point.

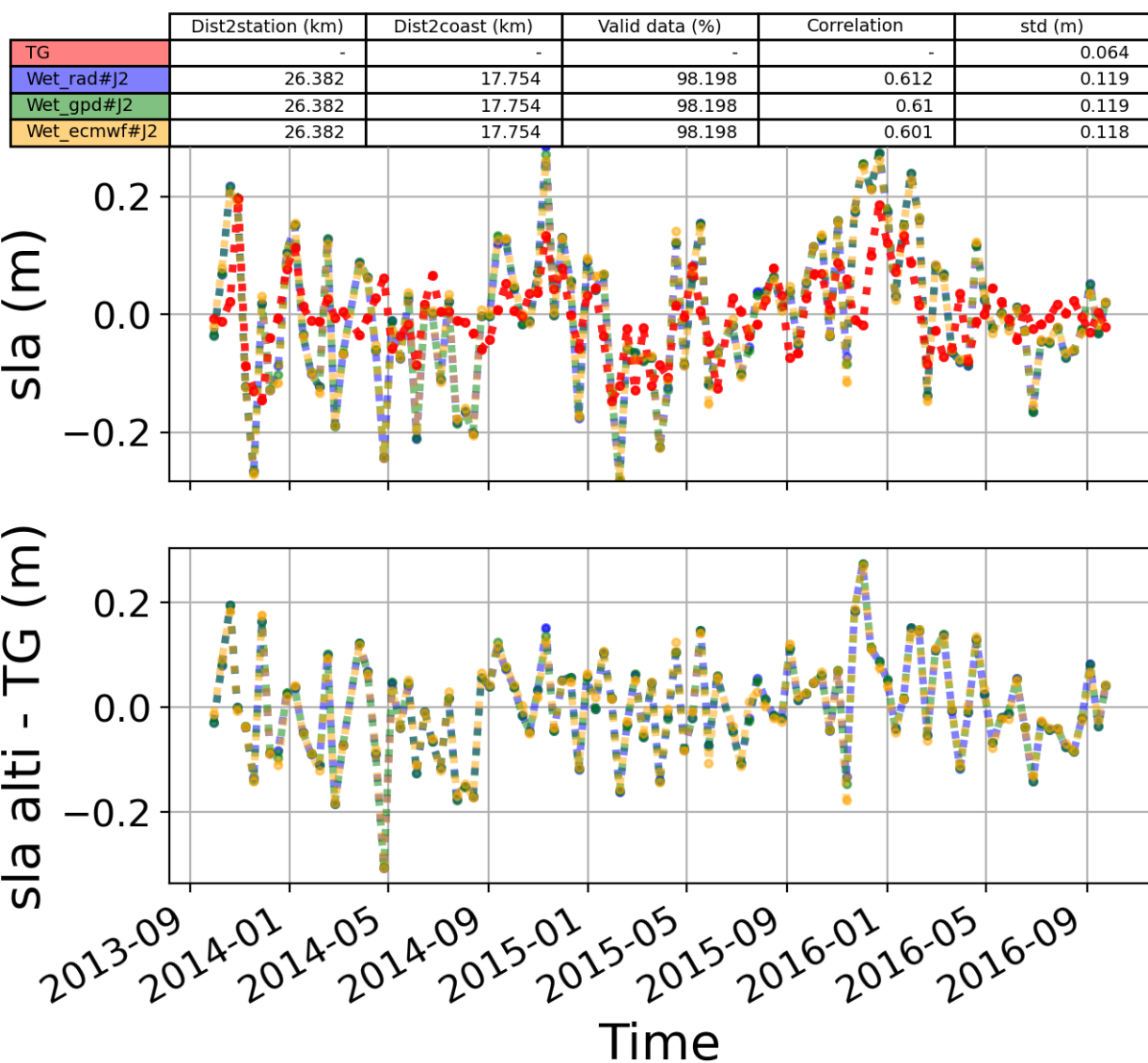


FIGURE 118 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.8 Station : Holyhead

- Nearest track to Holyhead station is the track number track163
- The area of interest is limited by :
 - A circle which it's center is the Holyhead tide gauge station location and has a Raduis of 40 Km
 - Maximum distance to the coast : 20 Km

6.8.1 correlation visualization in maps view % Holyhead tide gauge

Correlation Altimetry data with respect to Holyhead Tide gauge data

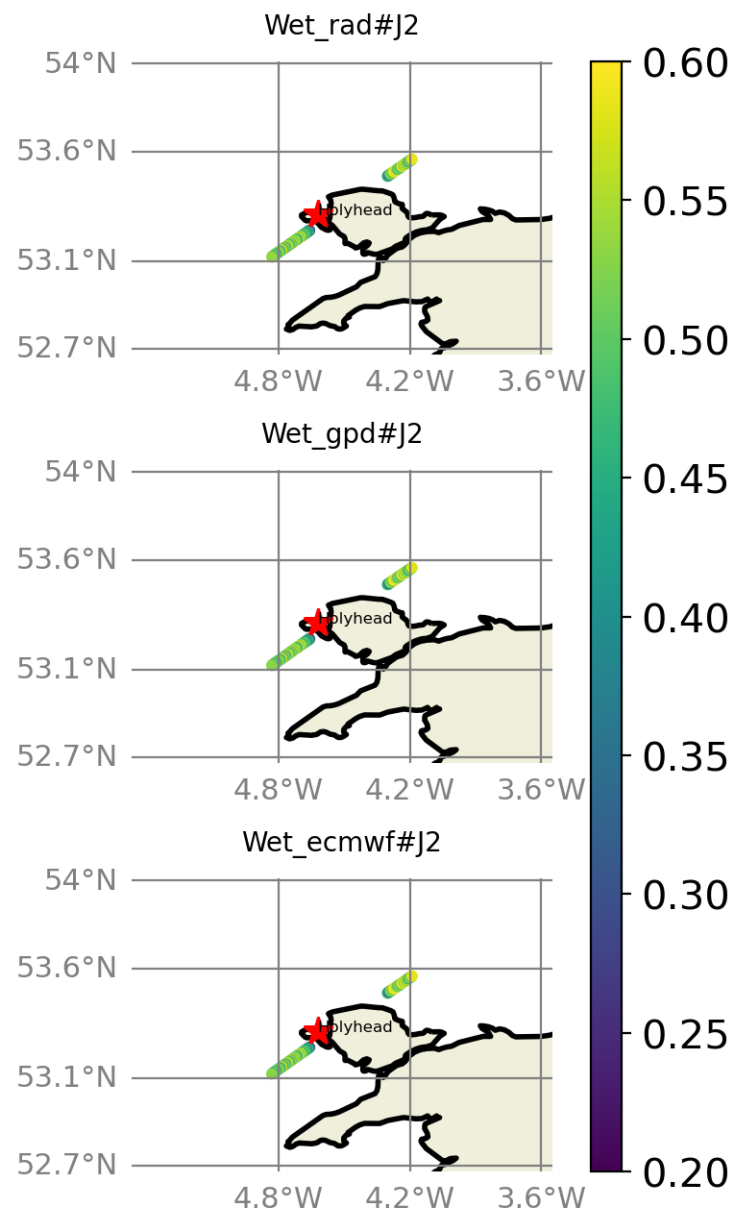


FIGURE 119 – correlation visualization in maps view % Holyhead tide gauge

6.8.2 rmsd visualization in maps view % Holyhead tide gauge

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

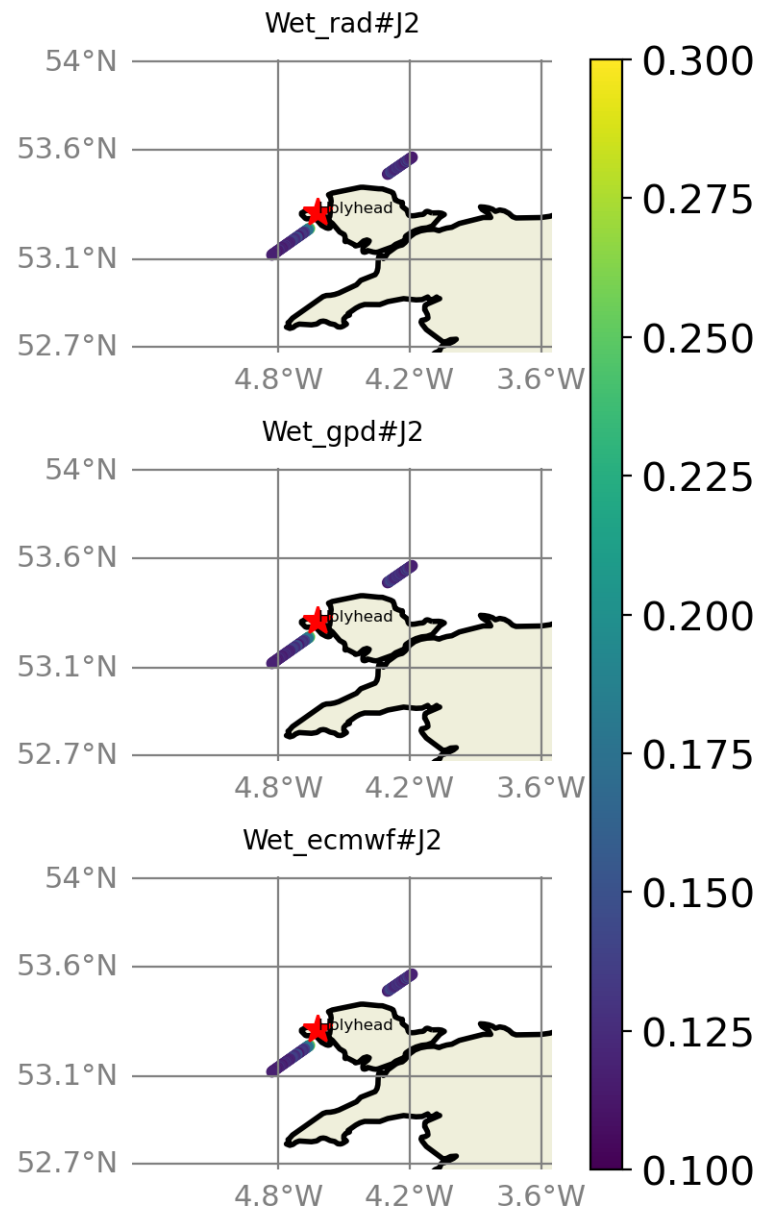


FIGURE 120 – rmsd visualization in maps view % Holyhead tide gauge

6.8.3 std visualization in maps view % Holyhead tide gauge

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

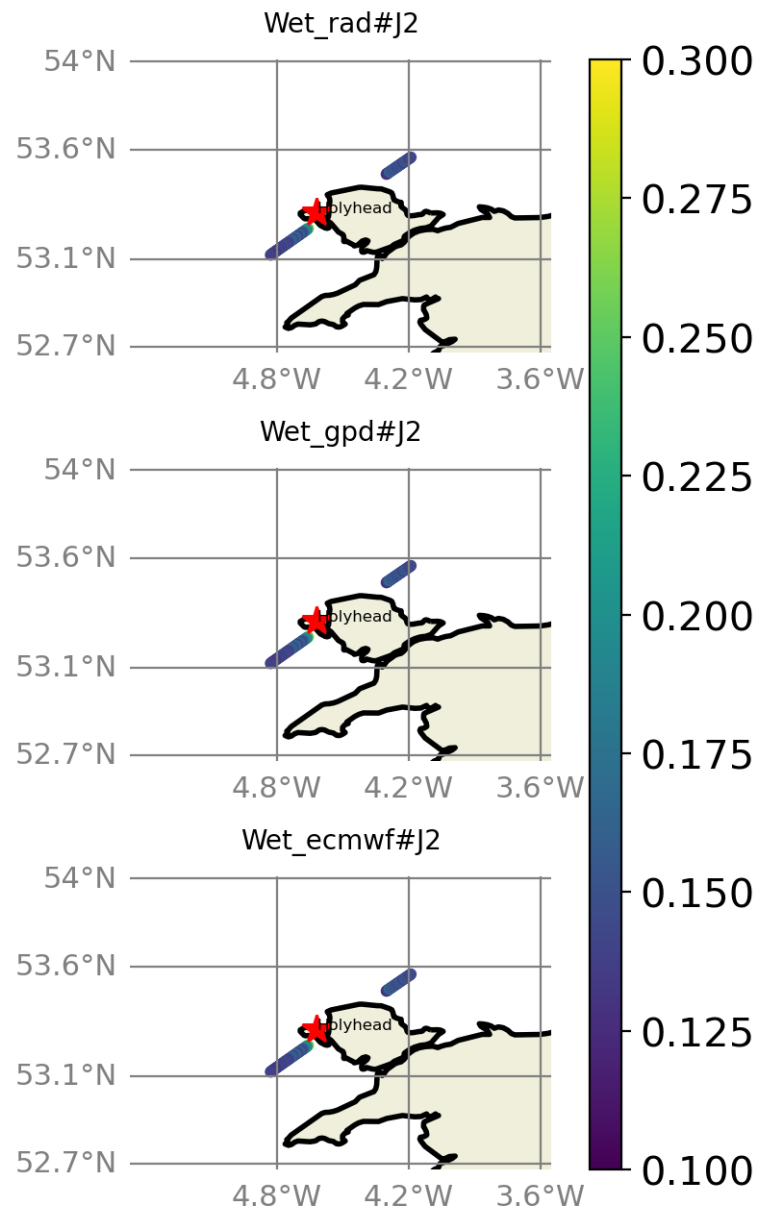


FIGURE 121 – std visualization in maps view % Holyhead tide gauge

6.8.4 valid_data_percent visualization in maps view % Holyhead tide gauge

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

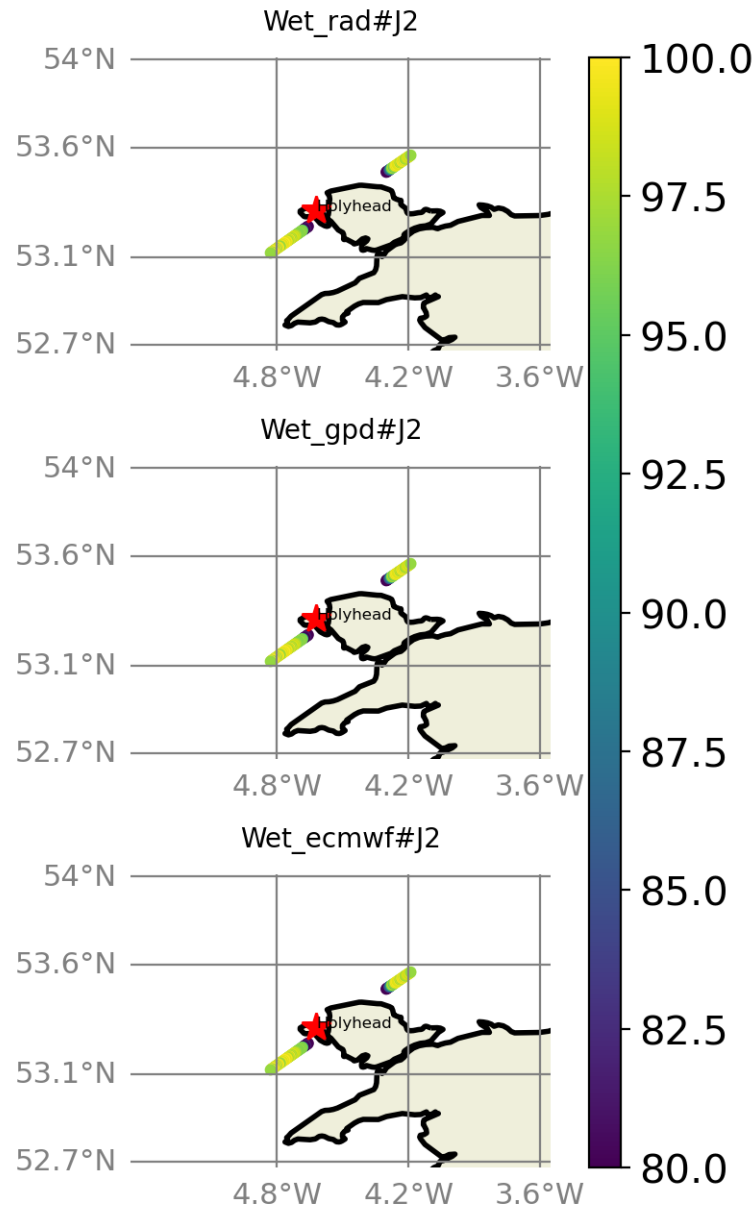


FIGURE 122 – valid_data_percent visualization in maps view % Holyhead tide gauge

6.8.5 Valid data (%) in function of distance to coast/Holyhead 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. $maxNB = 95$ 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.

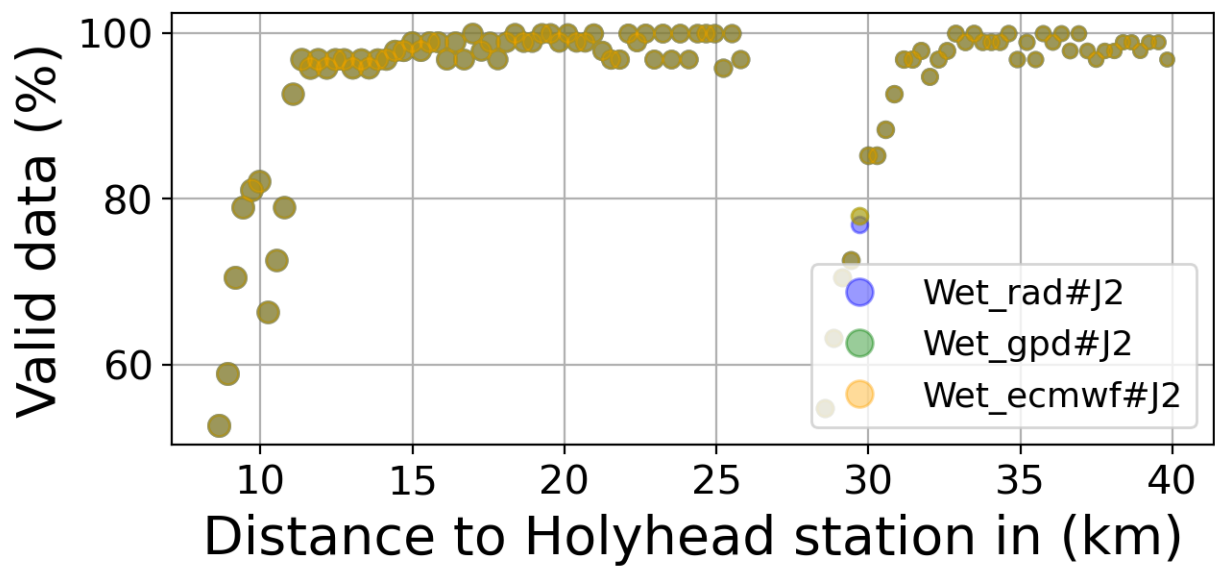
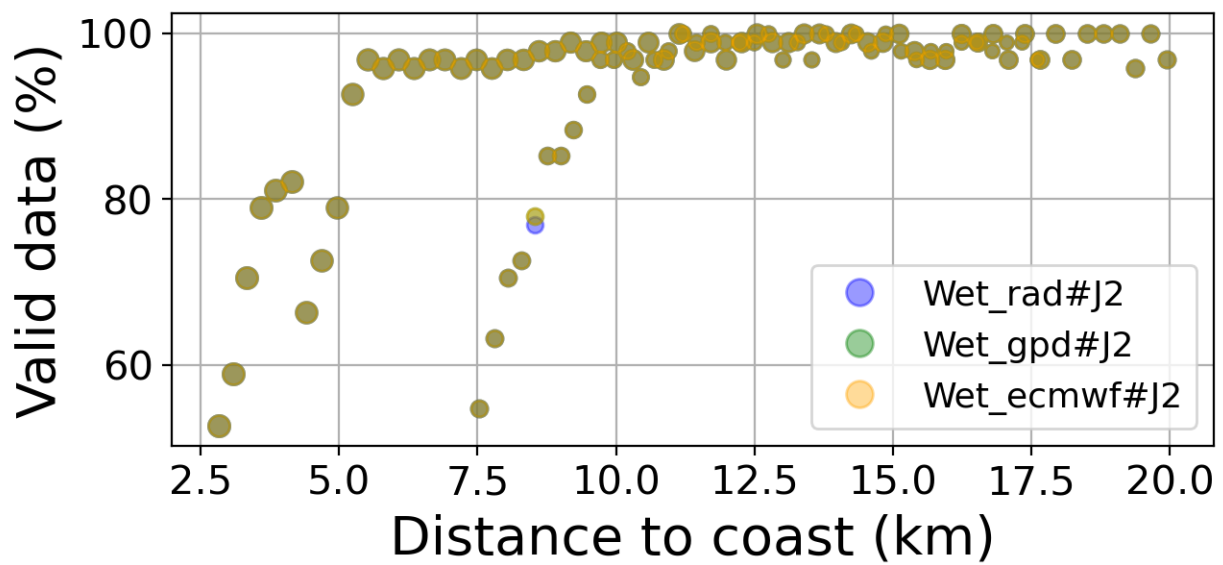


FIGURE 123 – Valid data (%) in function of distance to coast/Holyhead station

6.8.6 Std in function of distance to coast/Holyhead station

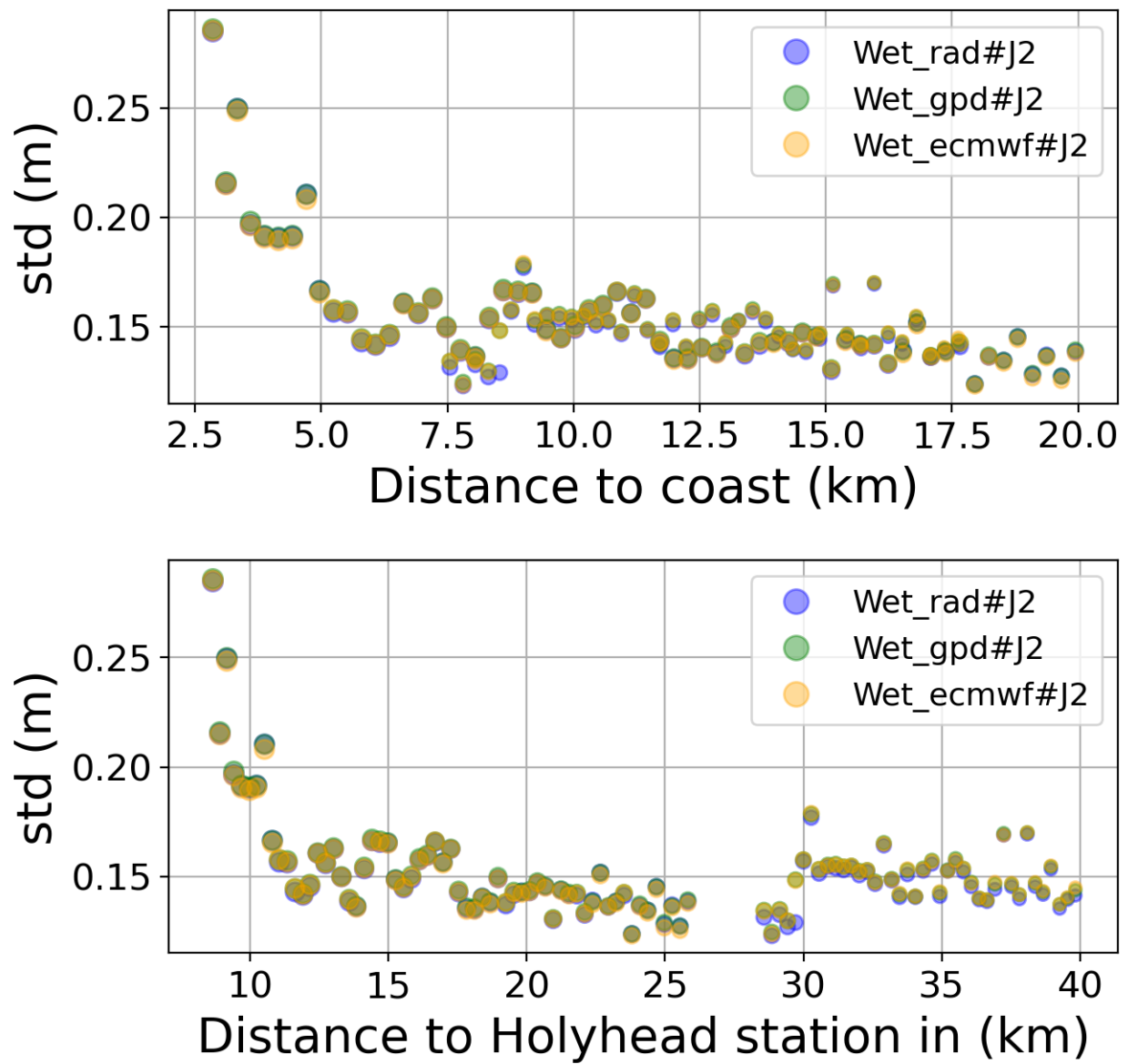


FIGURE 124 – Std in function of the distance to the coast/Holyhead station

6.8.7 Correlation in function of distance to coast/Holyhead station

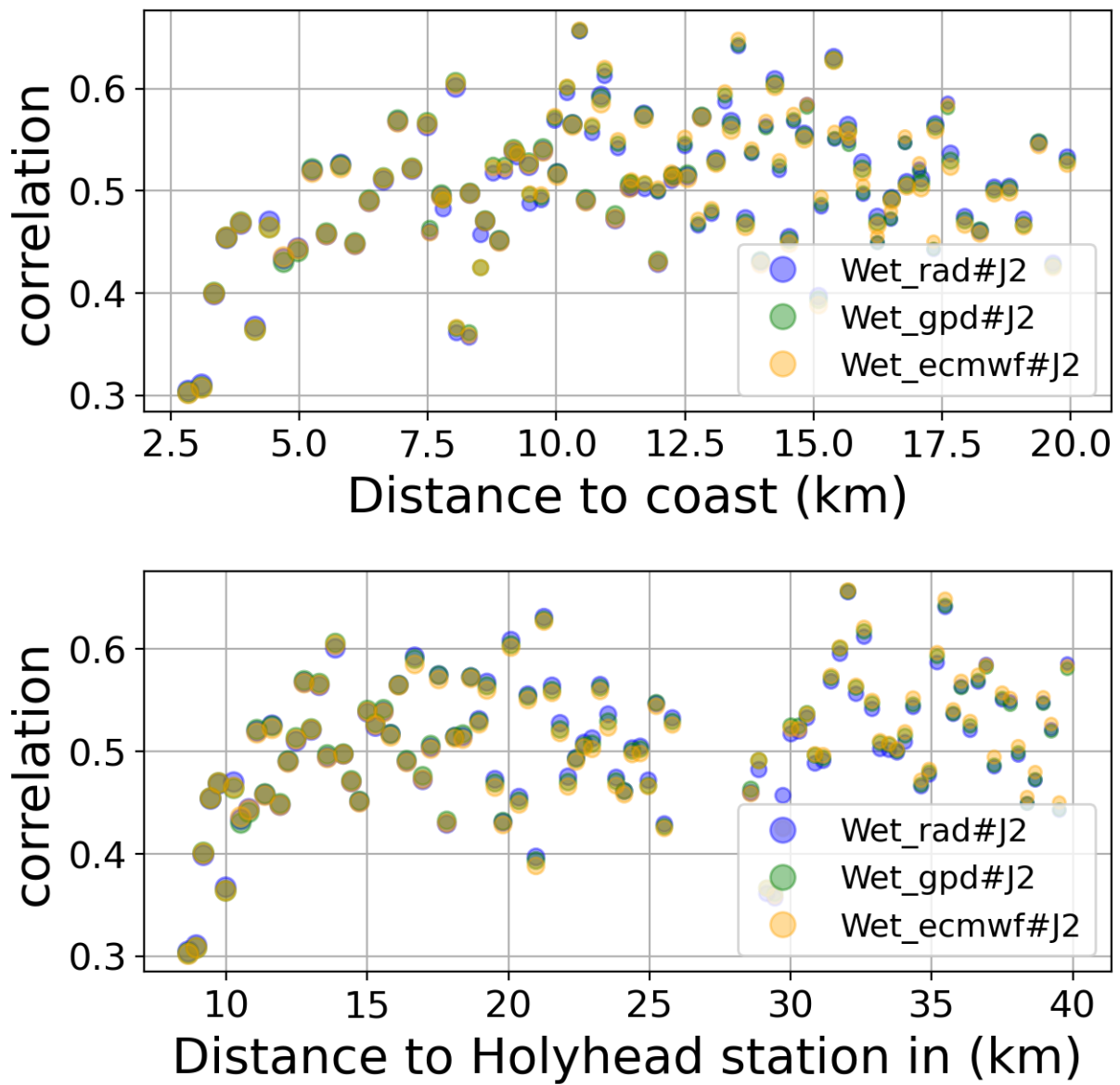


FIGURE 125 – Correlation in function of the distance to the coast/Holyhead station

6.8.8 Taylor Diagram

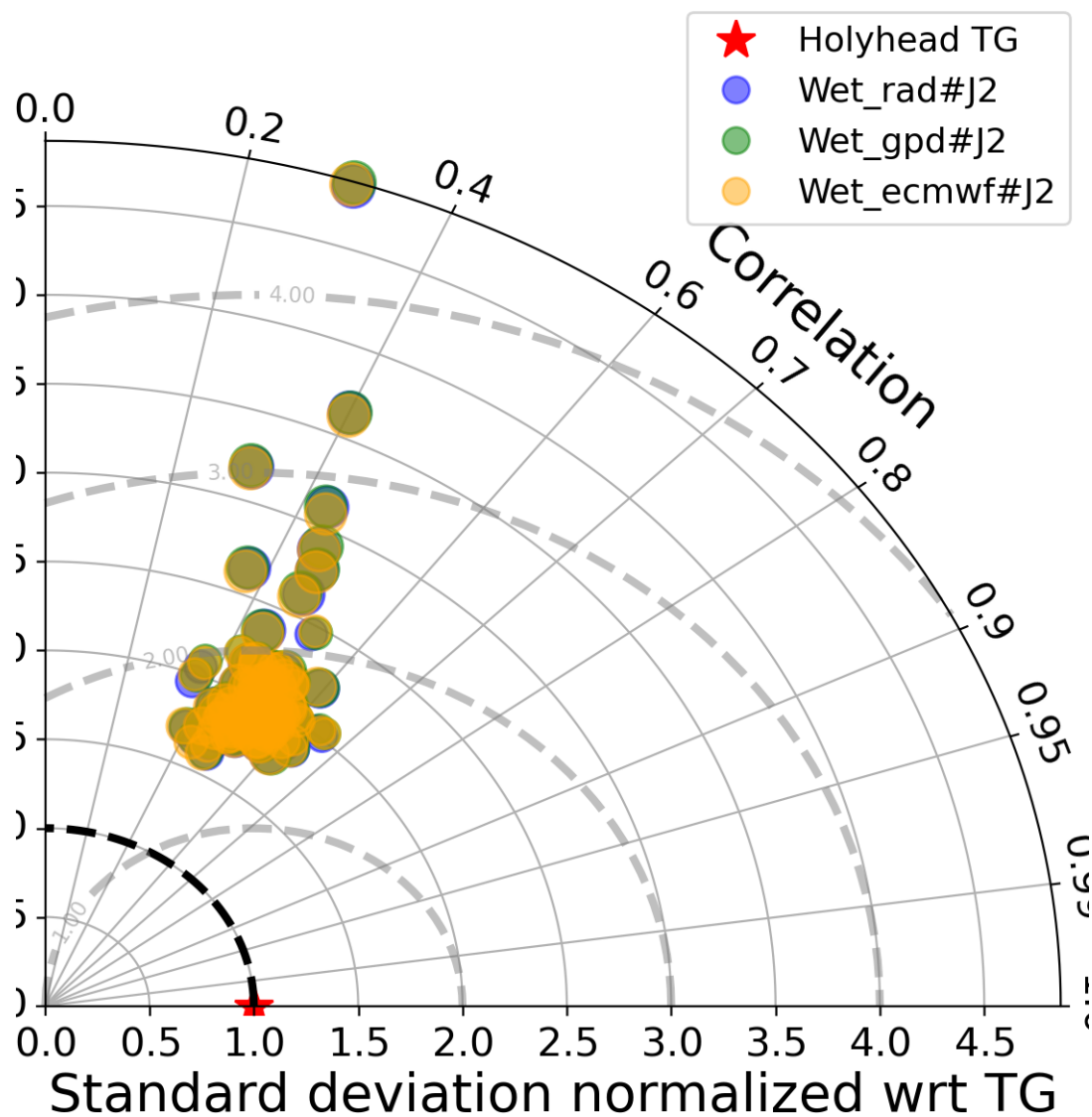


FIGURE 126 – Taylor diagram

6.8.9 Mean statistics table of products comparison with Holyhead 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	93.891	0.507	0.152	0.131
Wet_gpd#J2	93.901	0.507	0.153	0.132
Wet_ecmwf#J2	93.901	0.507	0.153	0.132

FIGURE 127 – 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 95 point.

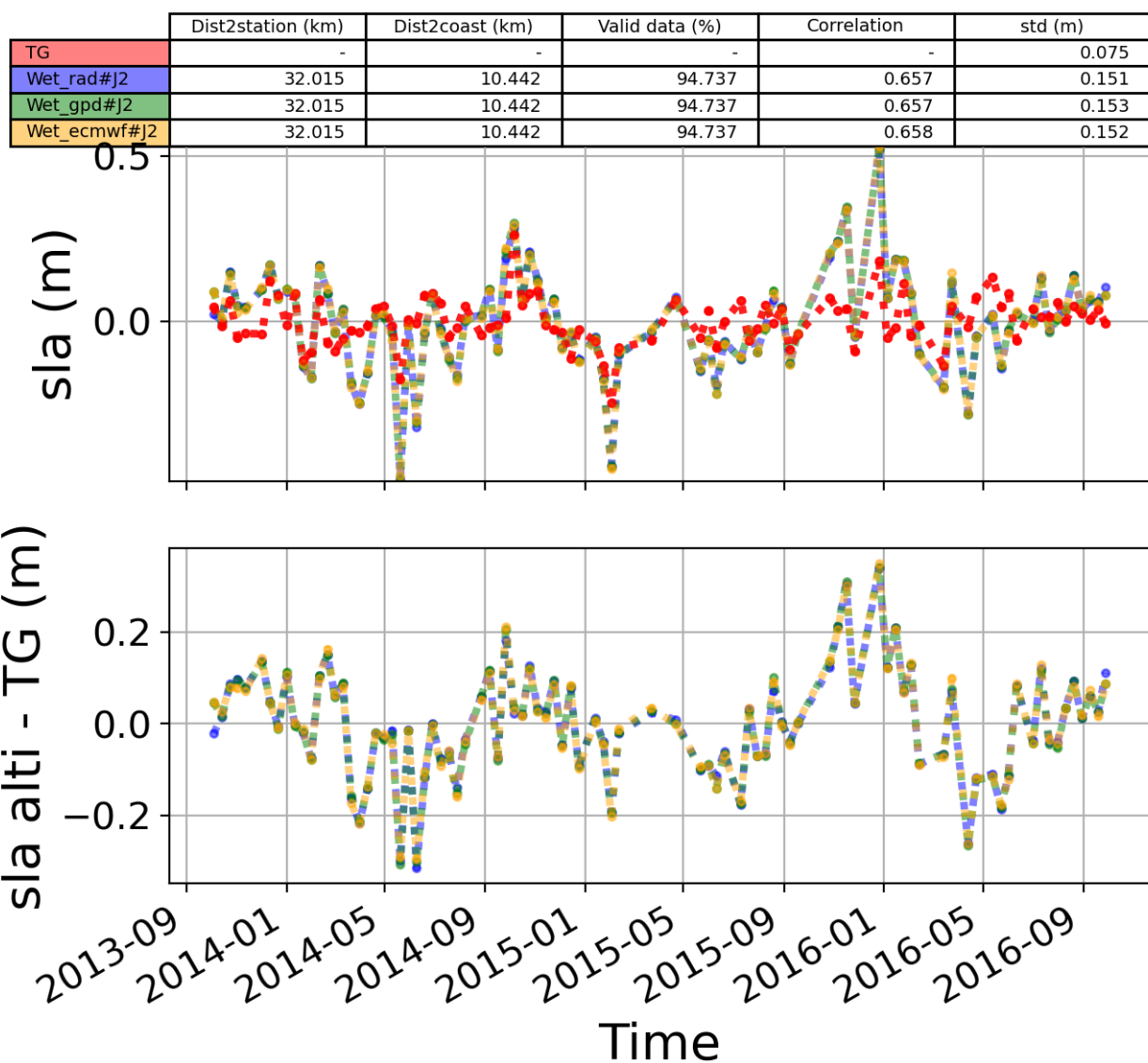


FIGURE 128 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.9 Station : LE_CROUESTY

- Nearest track to LE_CROUESTY station is the track number track137
- The area of interest is limited by :
 - A circle which it's center is the LE_CROUESTY tide gauge station location and has a Raduis of 40 Km
 - Maximum distance to the coast : 20 Km

6.9.1 correlation visualization in maps view % LE_CROUESTY tide gauge

Correlation Altimetry data with respect to LE_CROUESTY Tide gauge data

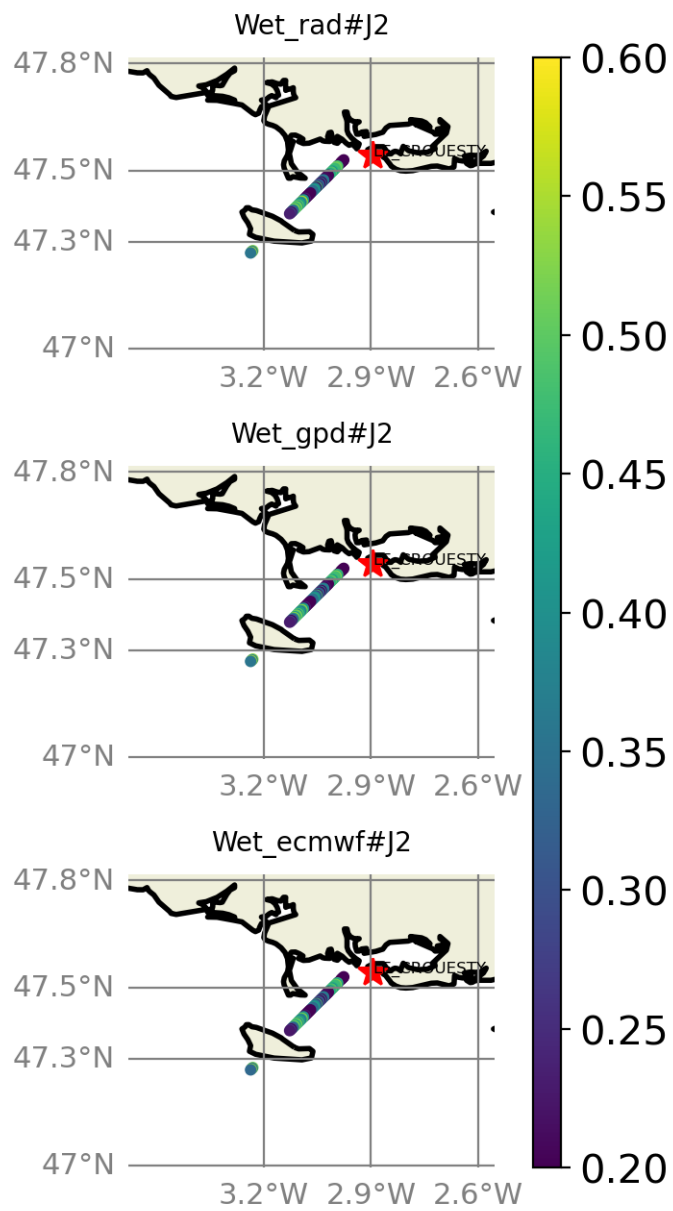


FIGURE 129 – correlation visualization in maps view % LE_CROUESTY tide gauge

6.9.2 rmsd visualization in maps view % LE_CROUESTY tide gauge

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

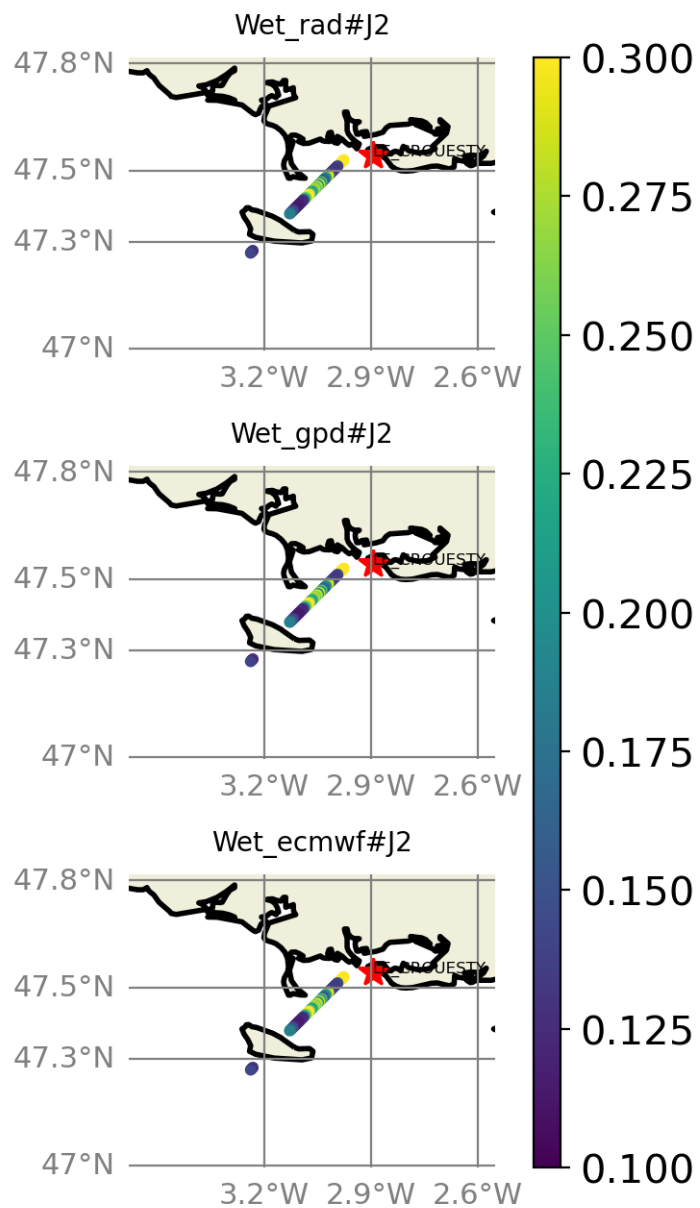


FIGURE 130 – rmsd visualization in maps view % LE_CROUESTY tide gauge

6.9.3 std visualization in maps view % LE_CROUESTY tide gauge

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

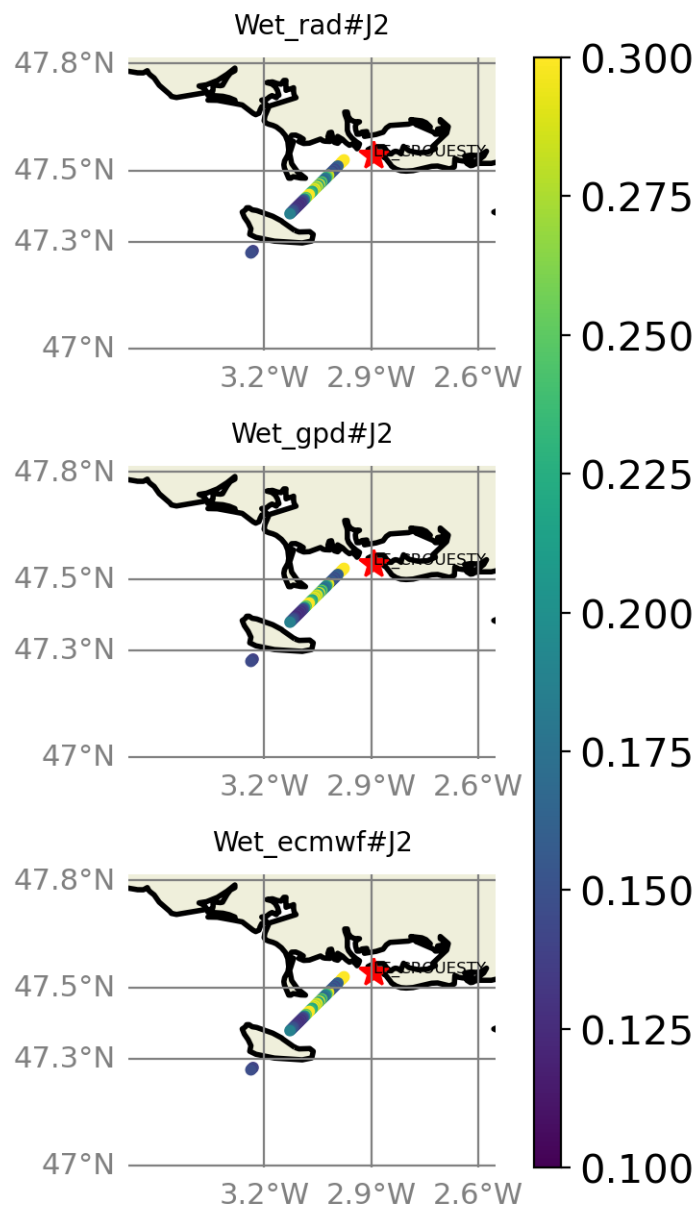


FIGURE 131 – std visualization in maps view % LE_CROUESTY tide gauge

6.9.4 valid_data_percent visualization in maps view % LE_CROUESTY tide gauge

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

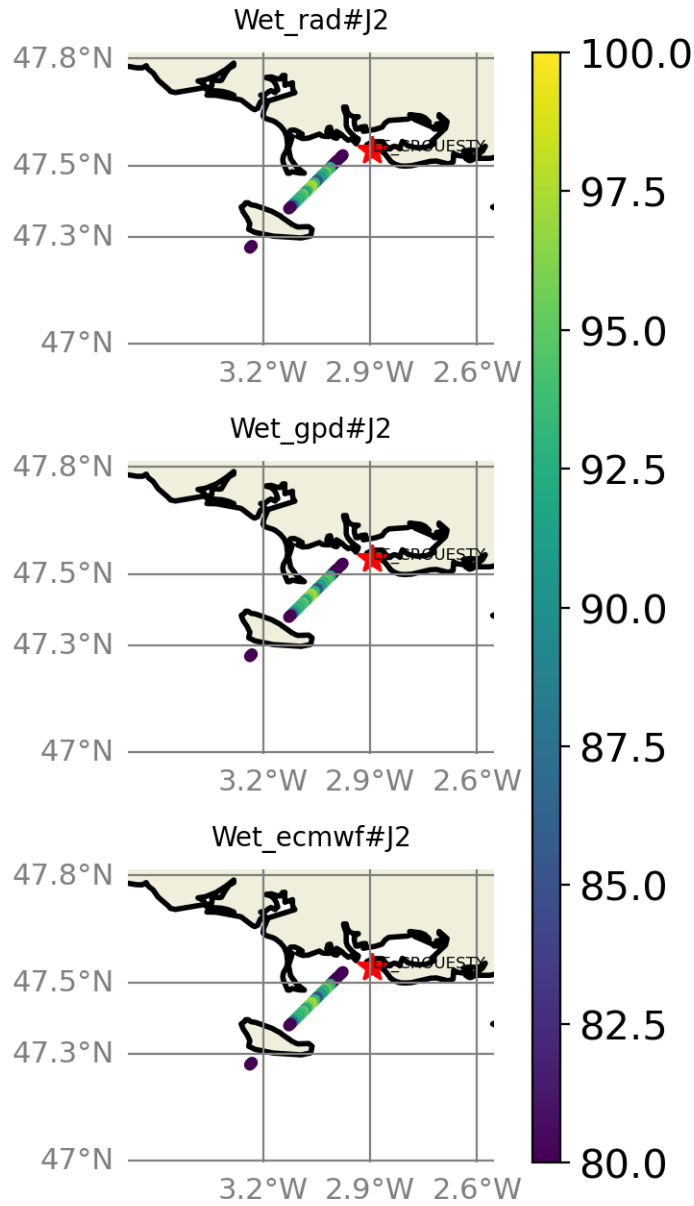


FIGURE 132 – valid_data_percent visualization in maps view % LE_CROUESTY tide gauge

6.9.5 Valid data (%) in function of distance to coast/LE_CROUESTY 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. $maxNB = 105$ 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.

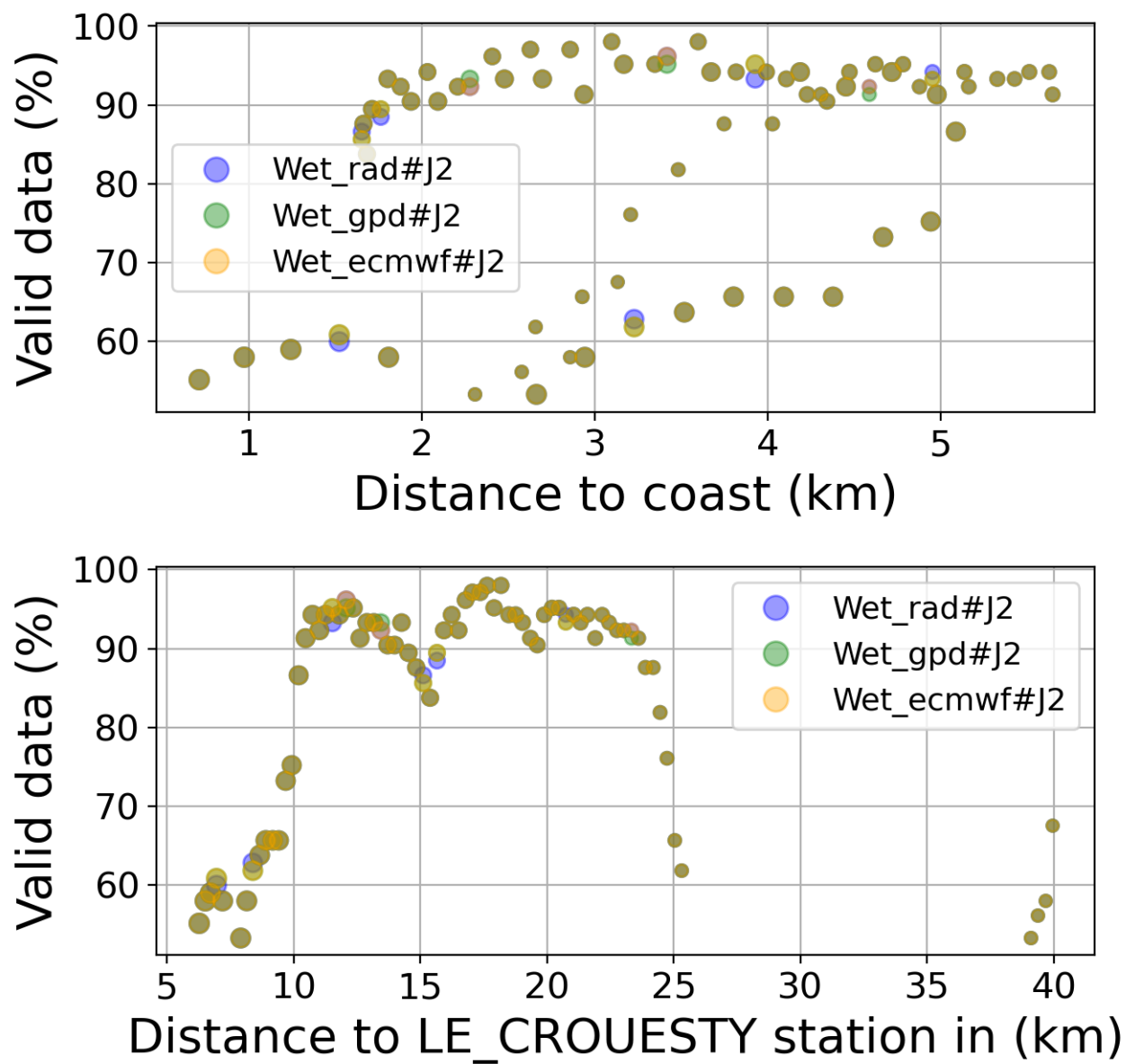


FIGURE 133 – Valid data (%) in function of distance to coast/LE_CROUESTY station

6.9.6 Std in function of distance to coast/LE_CROUESTY station

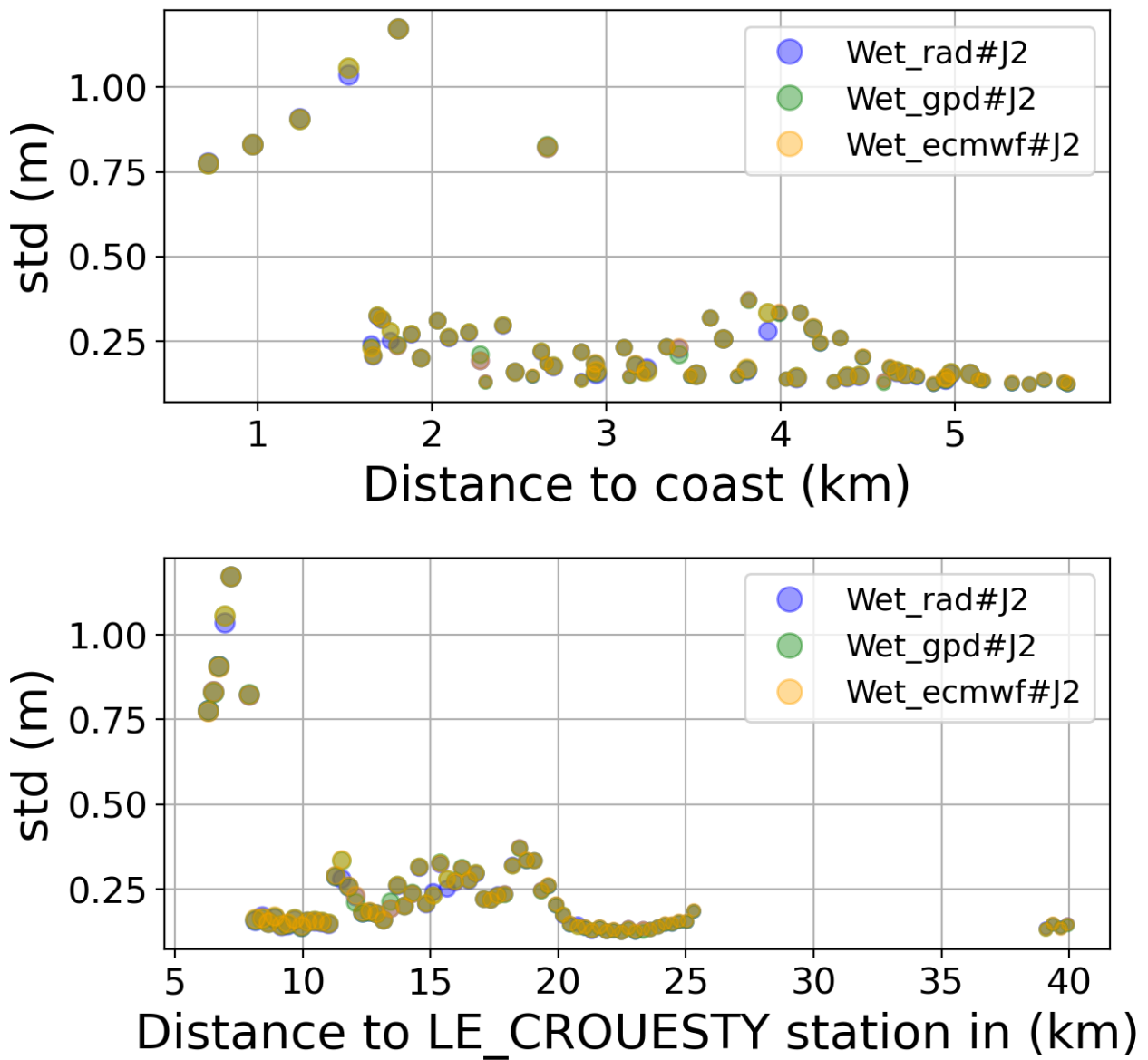


FIGURE 134 – Std in function of the distance to the coast/LE_CROUESTY station

6.9.7 Correlation in function of distance to coast/LE_CROUESTY station

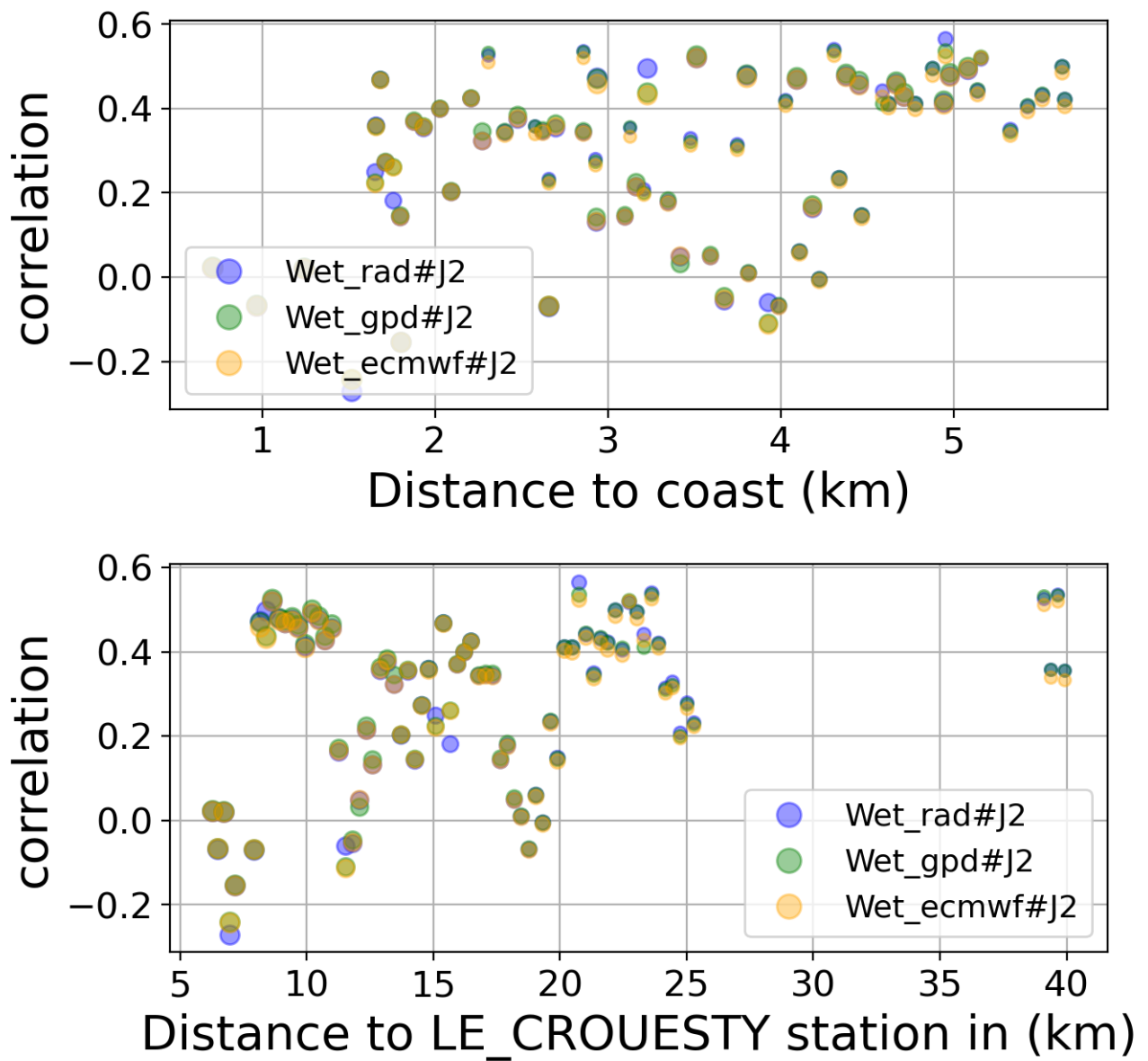


FIGURE 135 – Correlation in function of the distance to the coast/LE_CROUESTY station

6.9.8 Taylor Diagram

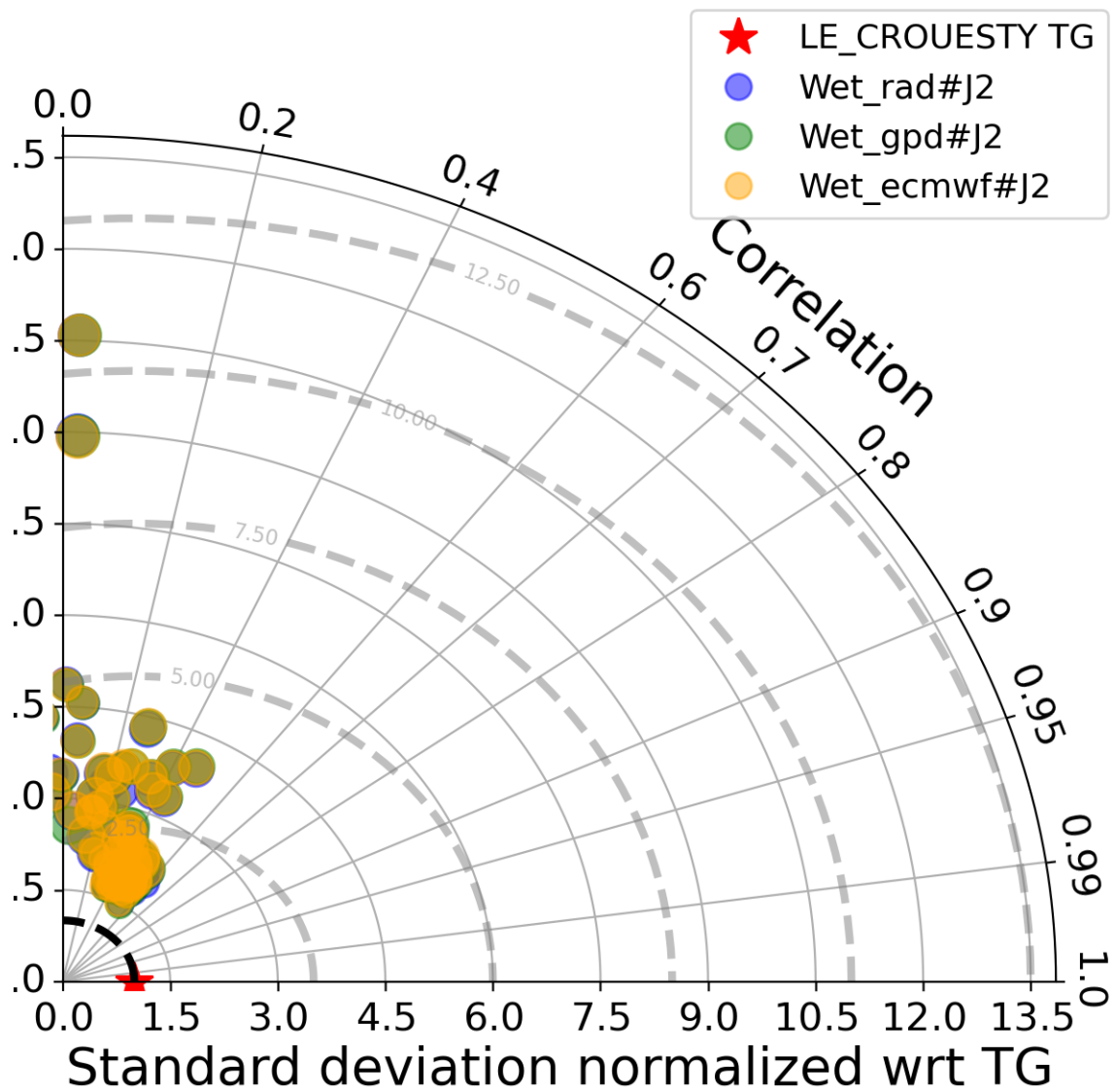


FIGURE 136 – Taylor diagram

6.9.9 Mean statistics table of products comparison with LE_CROUESTY 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	83.875	0.293	0.257	0.25
Wet_gpd#J2	83.875	0.294	0.259	0.252
Wet_ecmwf#J2	83.888	0.287	0.26	0.253

FIGURE 137 – 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 105 point.

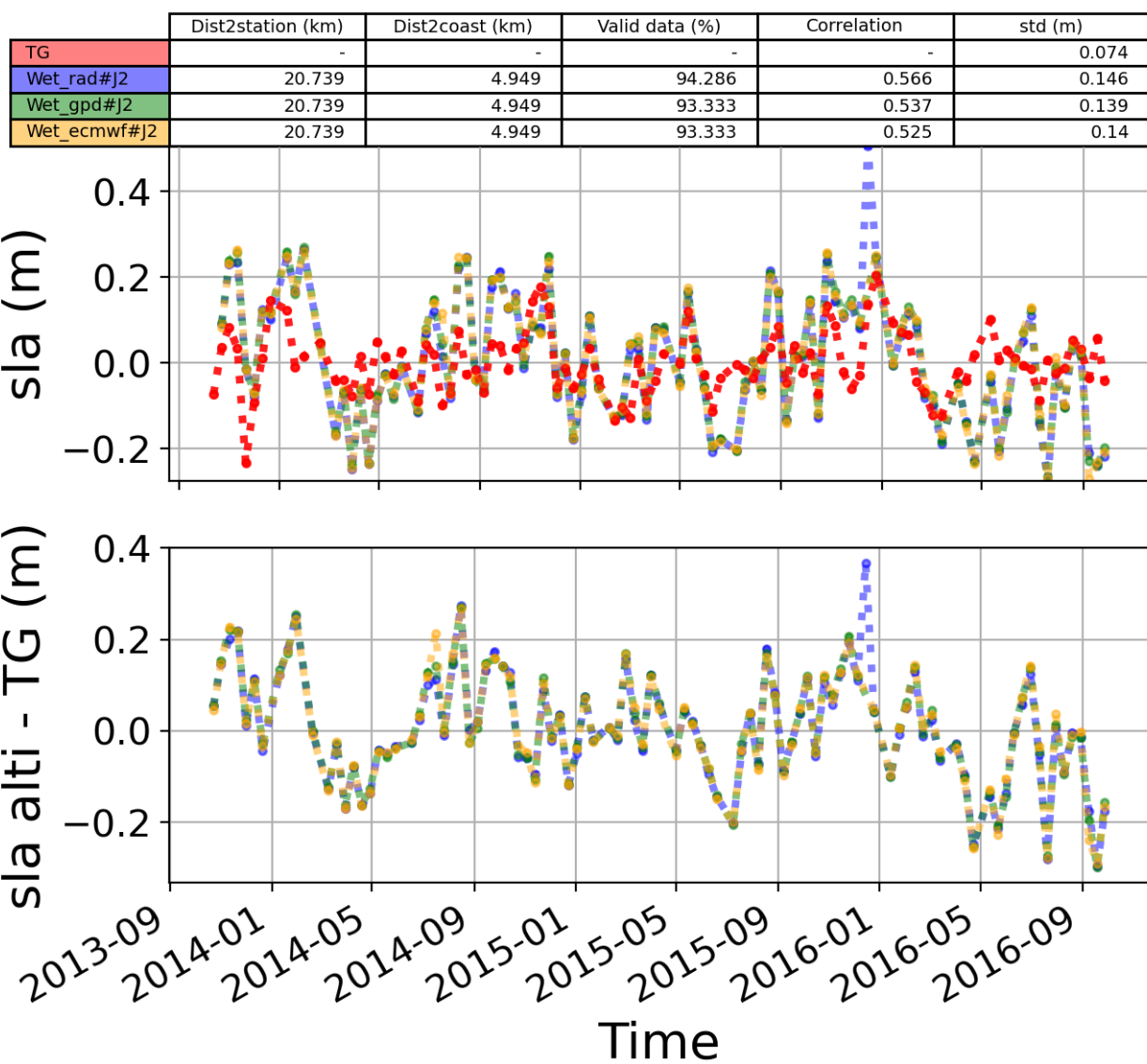


FIGURE 138 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

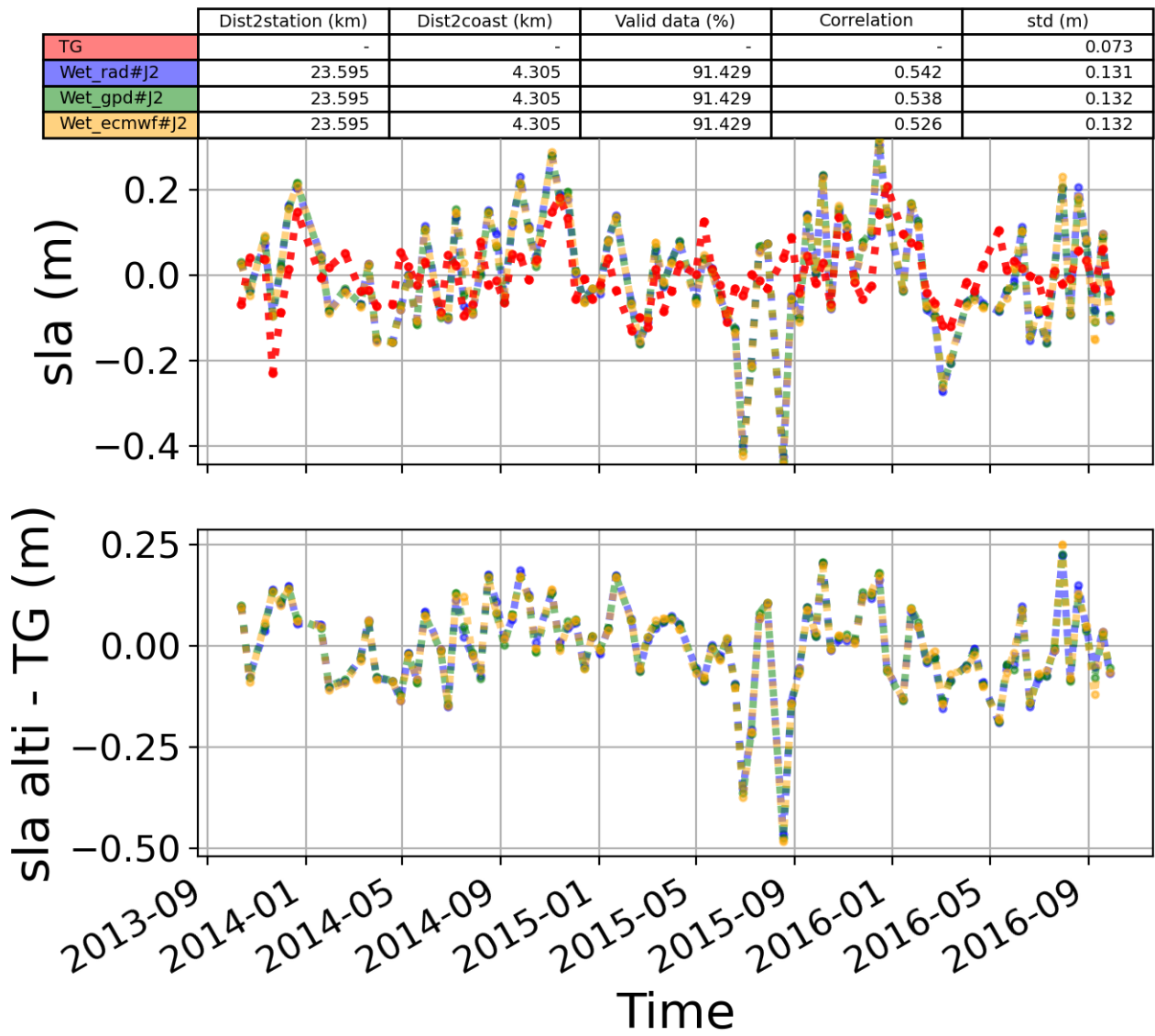


FIGURE 139 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.10 Station : North_Shields

- Nearest track to North_Shields station is the track number track120
- The area of interest is limited by :
 - A circle which it's center is the North_Shields tide gauge station location and has a Raduis of 40 Km
 - Maximum distance to the coast : 20 Km

6.10.1 correlation visualization in maps view % North_Shields tide gauge

Correlation Altimetry data with respect to North_Shields Tide gauge data

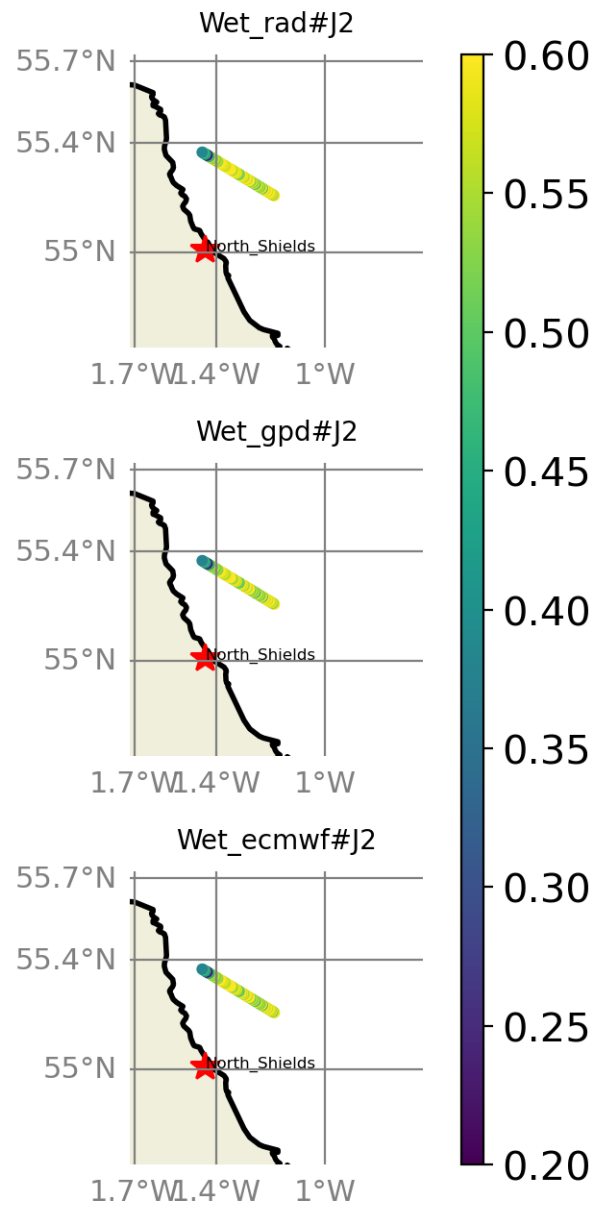


FIGURE 140 – correlation visualization in maps view % North_Shields tide gauge

6.10.2 rmsd visualization in maps view % North_Shields tide gauge

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

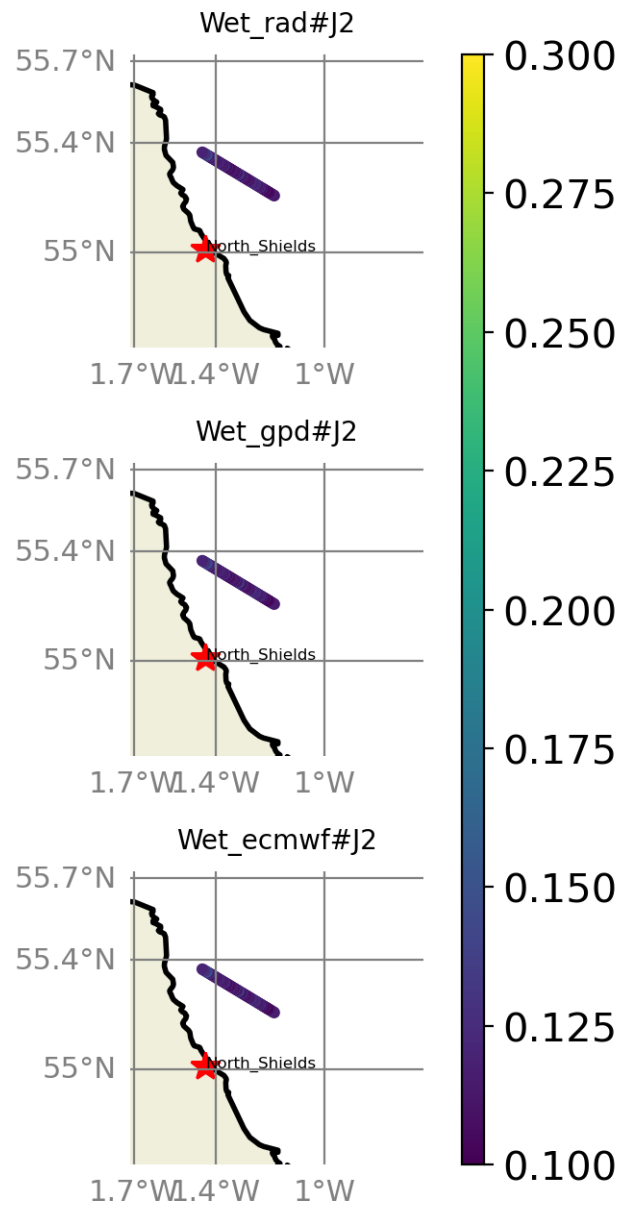


FIGURE 141 – rmsd visualization in maps view % North_Shields tide gauge

6.10.3 std visualization in maps view % North_Shields tide gauge

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

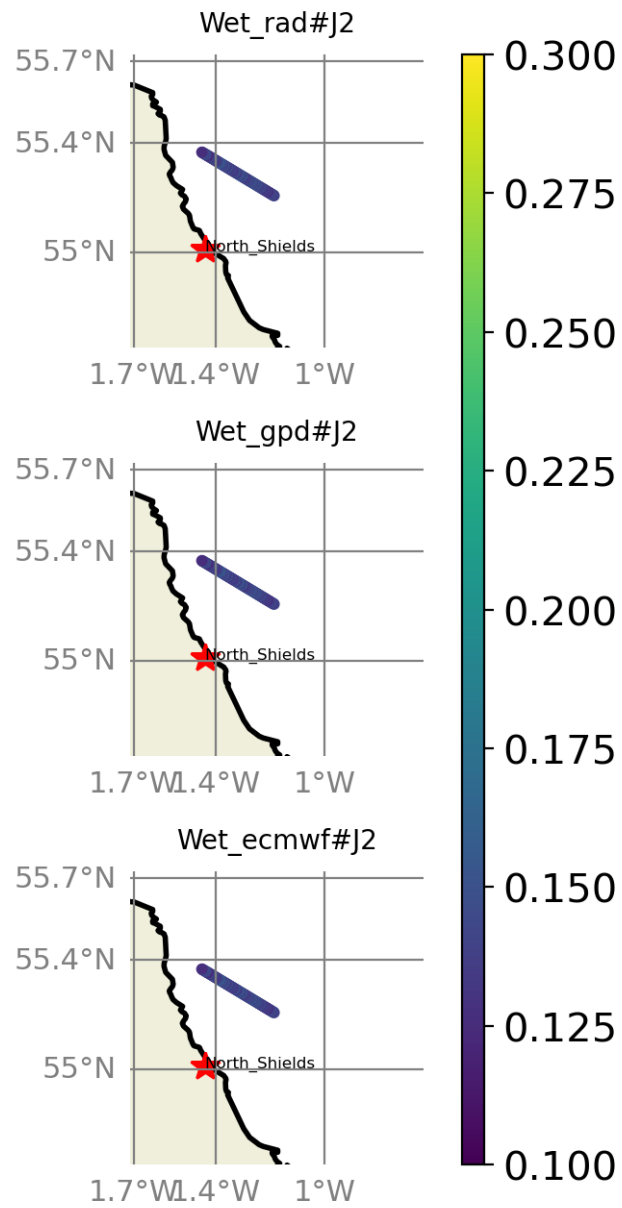


FIGURE 142 – std visualization in maps view % North_Shields tide gauge

6.10.4 valid_data_percent visualization in maps view % North_Shields tide gauge

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

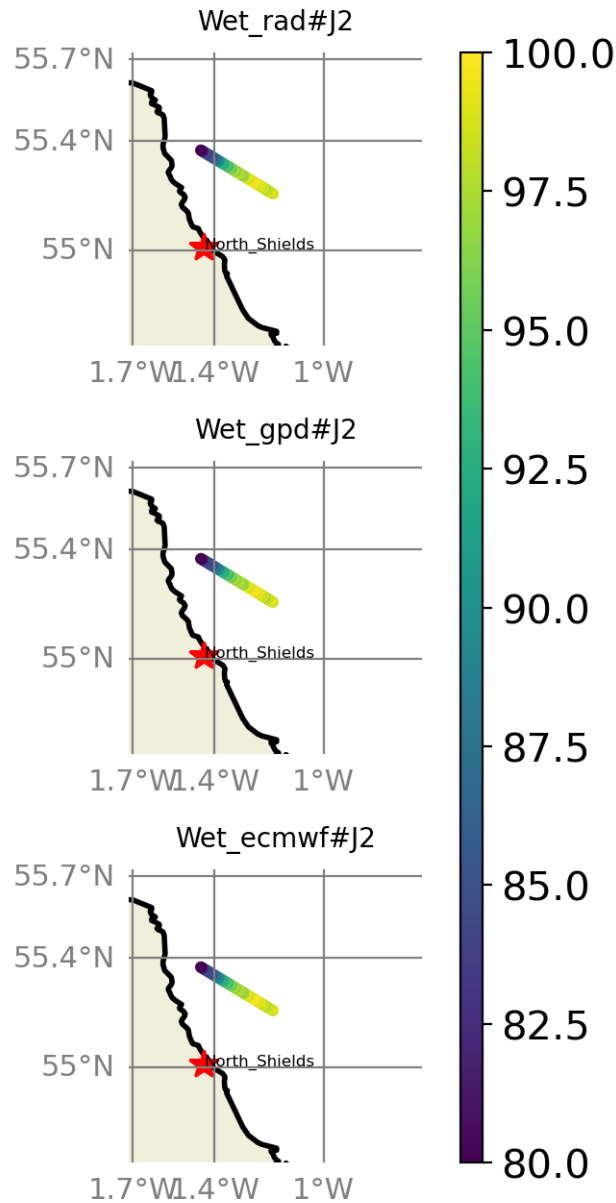


FIGURE 143 – valid_data_percent visualization in maps view % North_Shields tide gauge

6.10.5 Valid data (%) in function of distance to coast/North_Shields 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. $maxNB = 105$ 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.

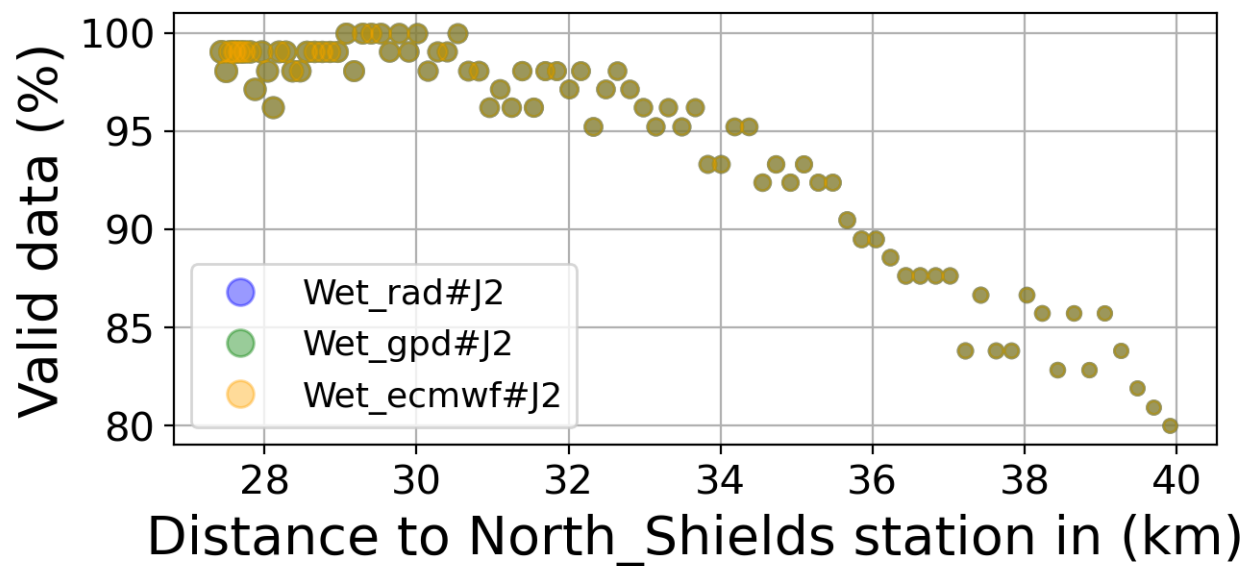
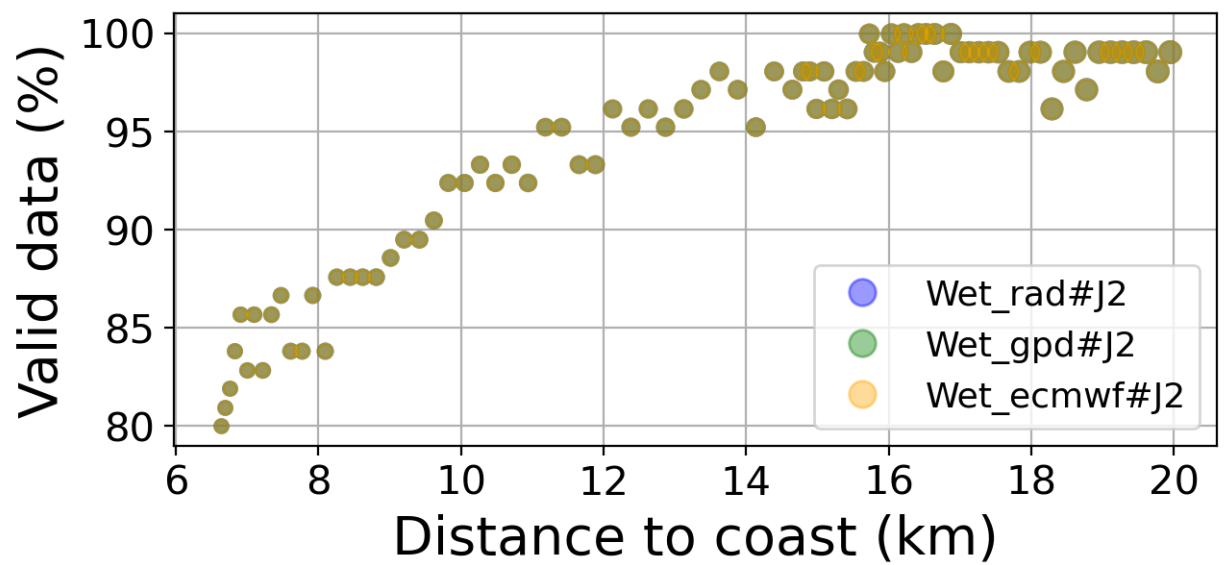


FIGURE 144 – Valid data (%) in function of distance to coast/North_Shields station

6.10.6 Std in function of distance to coast/North_Shields station

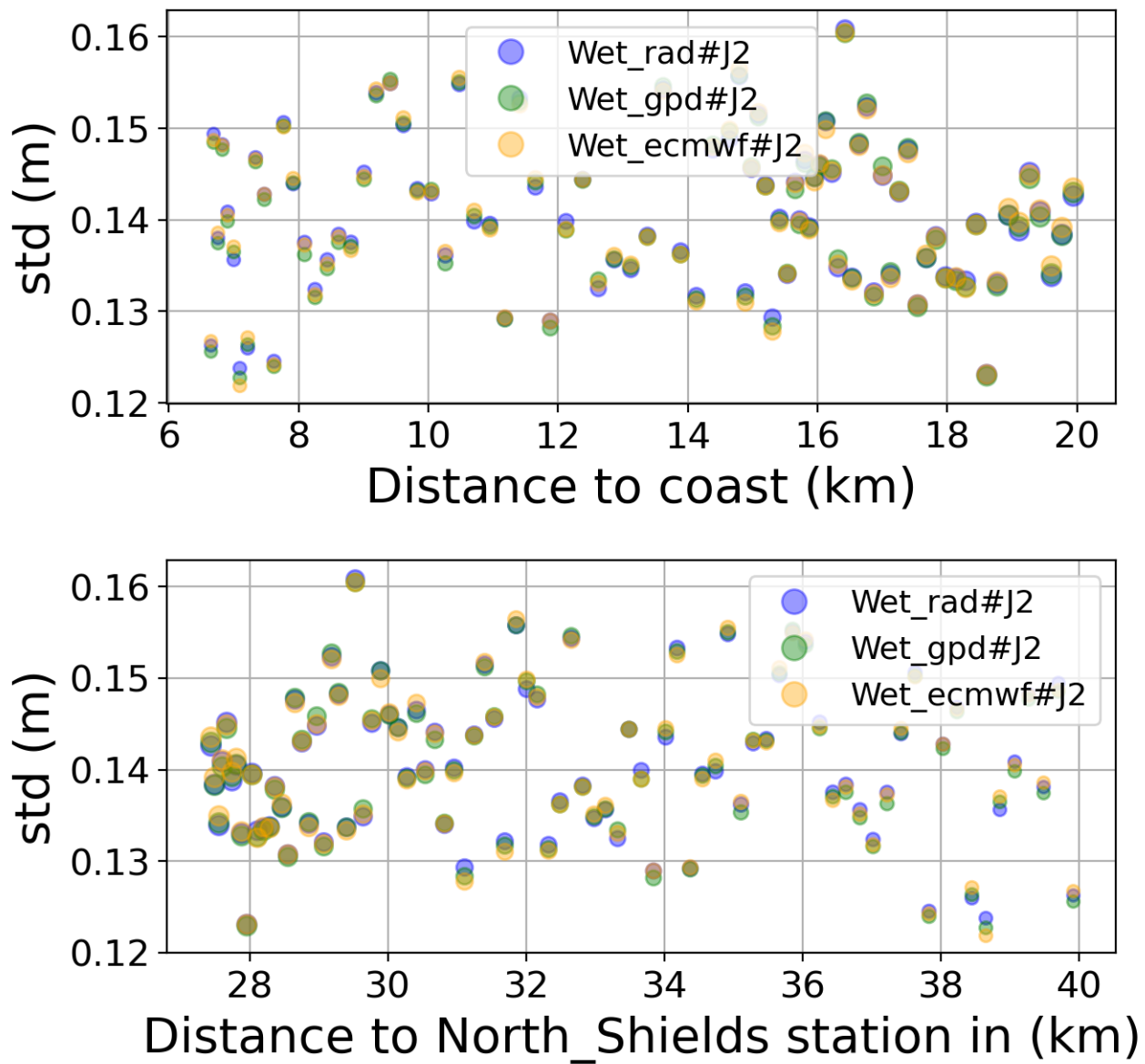


FIGURE 145 – Std in function of the distance to the coast/North_Shields station

6.10.7 Correlation in function of distance to coast/North_Shields station

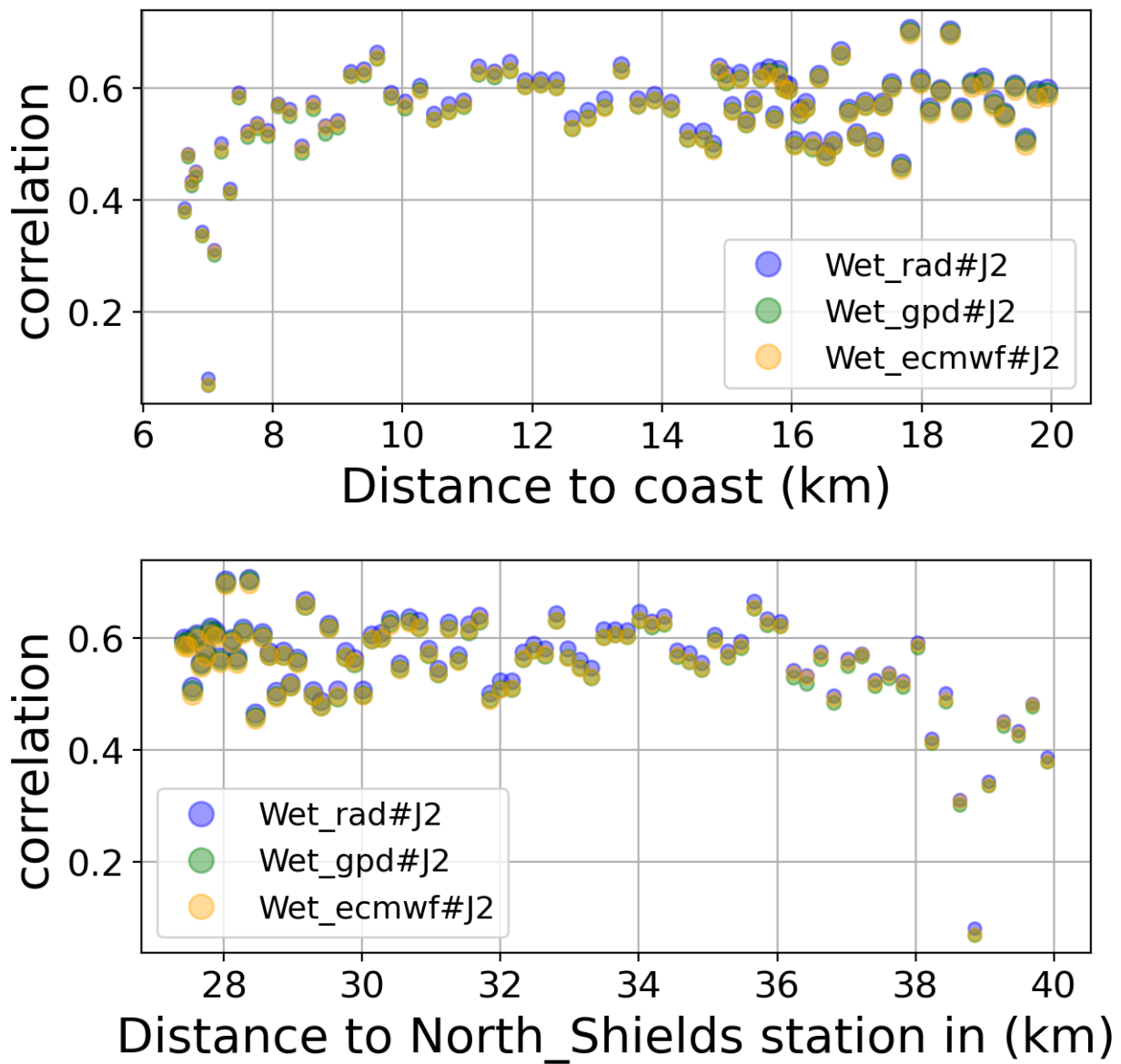


FIGURE 146 – Correlation in function of the distance to the coast/North_Shields station

6.10.8 Taylor Diagram

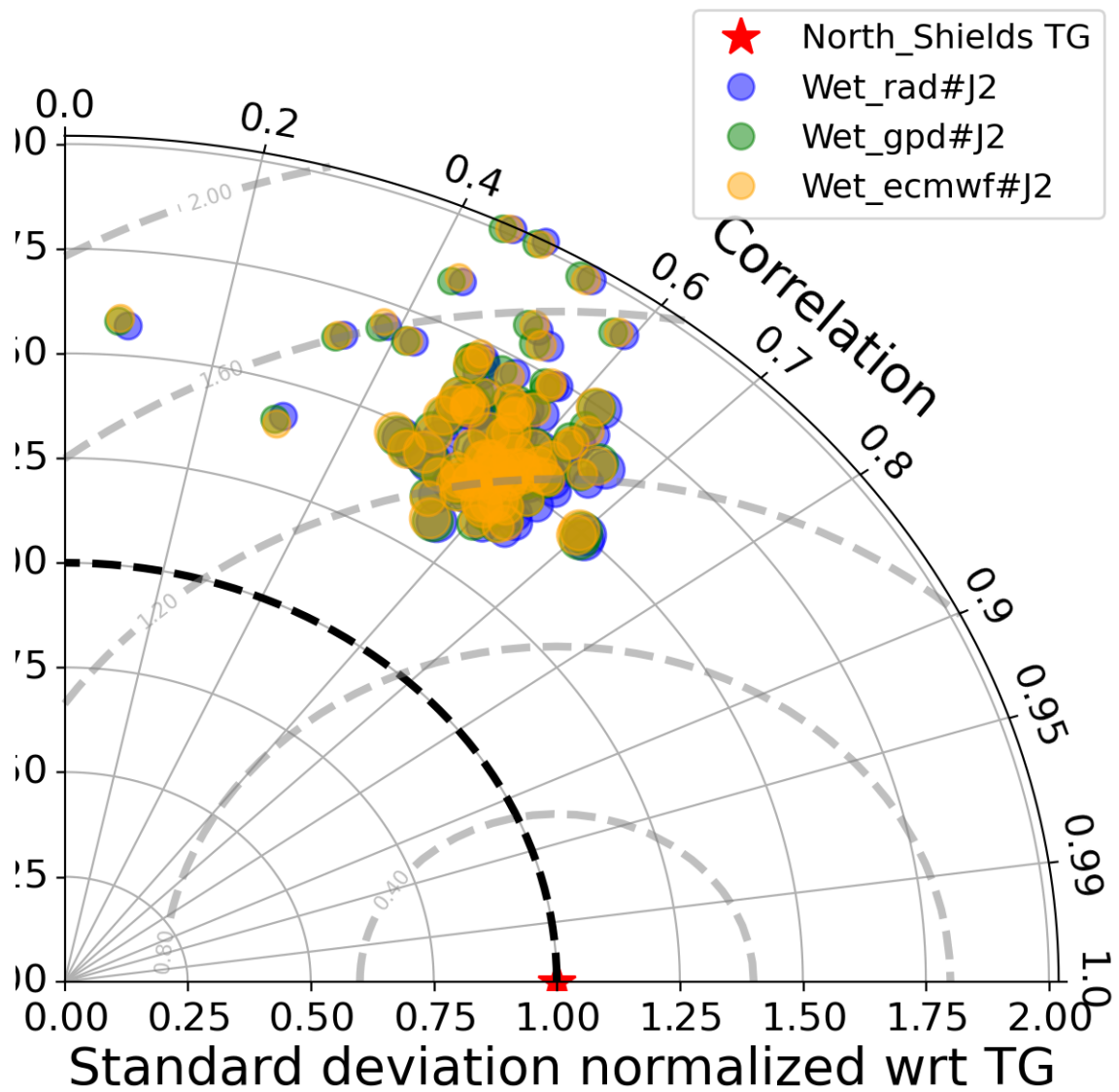


FIGURE 147 – Taylor diagram

6.10.9 Mean statistics table of products comparison with North_Shields 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	94.342	0.561	0.141	0.116
Wet_gpd#J2	94.342	0.551	0.14	0.117
Wet_ecmwf#J2	94.342	0.552	0.141	0.118

FIGURE 148 – 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 105 point.

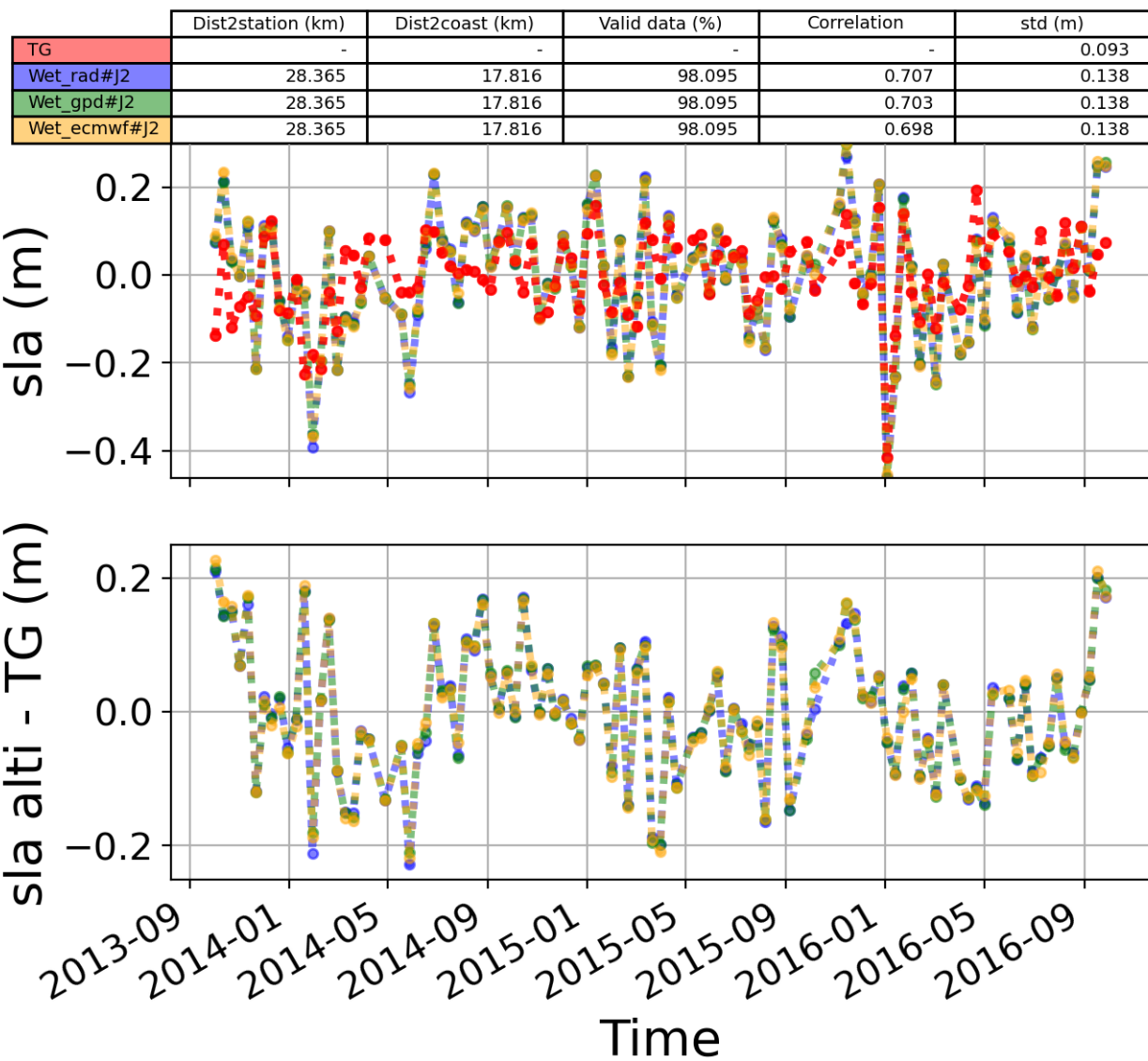


FIGURE 149 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie