Diagtool Report

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

25 avril 2022

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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 Eaustralia
- Mission : J2
- Git last tag : 0.9 Ajouter les rapports ssb
- Git changeset number : ddb8b8d-2022-04-25

2 Processing

2.1 sla formula

2.1.1 Wet_rad product ' sla

sla = ORBIT.ALTI.POE_GDR_E -
RANGE.ALTI -
MEAN_SEA_SURFACE.MODEL.CNESCLS15 -
SEA_STATE_BIAS.ALTI.NON_PARAMETRIC -
IONOSPHERIC_CORRECTION.MODEL.GIM -
WET_TROPOSPHERIC_CORRECTION.RAD -
DRY_TROPOSPHERIC_CORRECTION.MODEL.ECMWF_GAUSS -
DYNAMICAL_ATMOSPHERIC_CORRECTION.MODEL.MOG2D_HR -
OCEAN_TIDE_HEIGHT.MODEL.FES14B -
SOLID_EARTH_TIDE_HEIGHT.MODEL.CARTWRIGHT_TAYLER_71 -
POLE_TIDE_HEIGHT.MODEL.DESAI_2015_MPL2017

2.1.2 Wet_gpd product ' sla

sla = ORBIT.ALTI.POE_GDR_E -
RANGE.ALTI -
MEAN_SEA_SURFACE.MODEL.CNESCLS15 -
SEA_STATE_BIAS.ALTI.NON_PARAMETRIC -
IONOSPHERIC_CORRECTION.MODEL.GIM -
WET_TROPOSPHERIC_CORRECTION.GPD_PLUS -
DRY_TROPOSPHERIC_CORRECTION.MODEL.ECMWF_GAUSS -
DYNAMICAL_ATMOSPHERIC_CORRECTION.MODEL.MOG2D_HR -
OCEAN_TIDE_HEIGHT.MODEL.FES14B -
SOLID_EARTH_TIDE_HEIGHT.MODEL.CARTWRIGHT_TAYLER_71 -
POLE_TIDE_HEIGHT.MODEL.DESAI_2015_MPL2017

2.1.3 Wet_ecmwf product ' sla

sla = ORBIT.ALTI.POE_GDR_E -
RANGE.ALTI -
MEAN_SEA_SURFACE.MODEL.CNESCLS15 -
SEA_STATE_BIAS.ALTI.NON_PARAMETRIC -
IONOSPHERIC_CORRECTION.MODEL.GIM -
WET_TROPOSPHERIC_CORRECTION.MODEL.ECMWF_GAUSS -
DRY_TROPOSPHERIC_CORRECTION.MODEL.ECMWF_GAUSS -
DYNAMICAL_ATMOSPHERIC_CORRECTION.MODEL.MOG2D_HR -
OCEAN_TIDE_HEIGHT.MODEL.FES14B -
SOLID_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 satelitte 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 threashold of 3 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

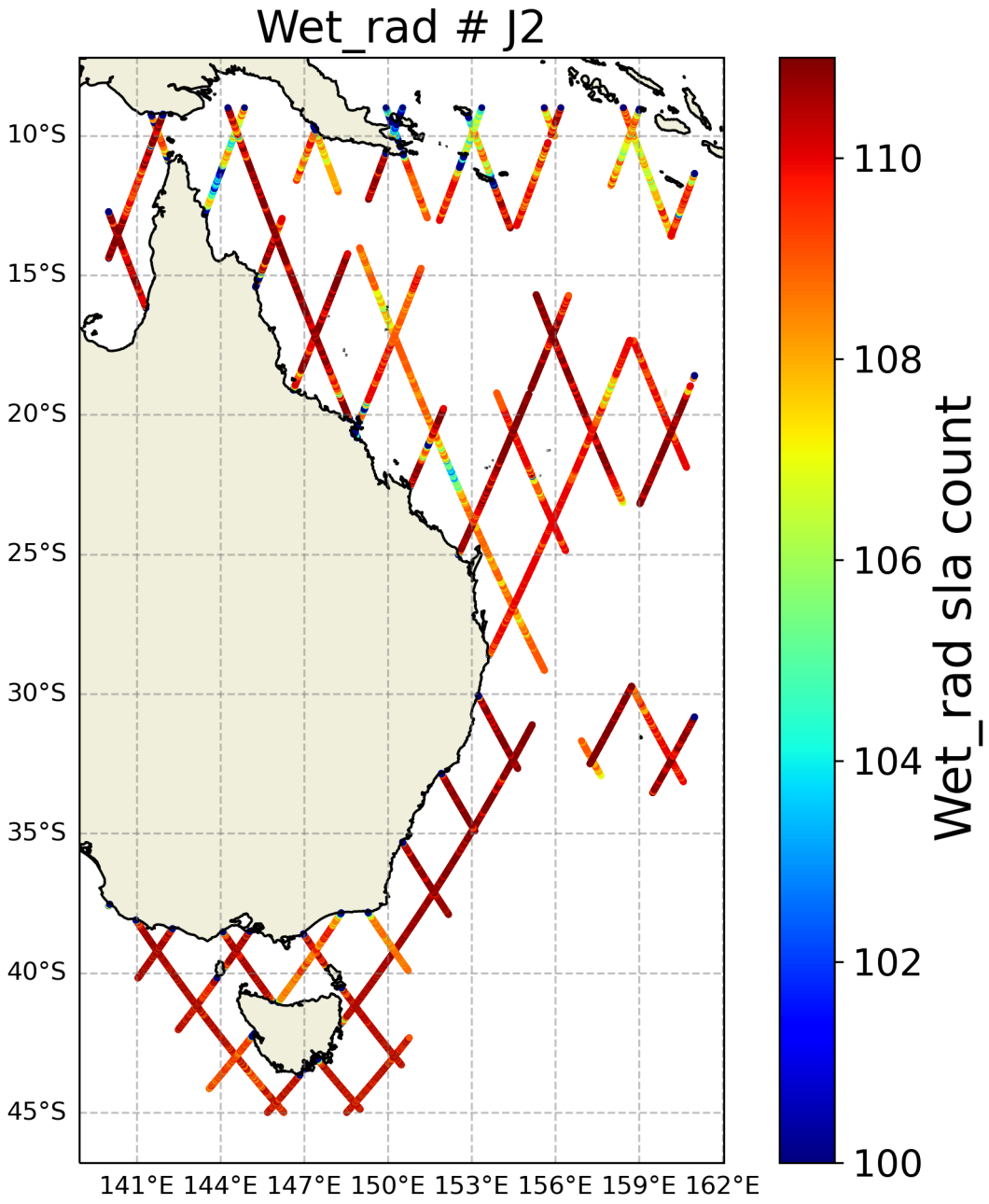

FIGURE 1 – Spatial coherence analysis of the count of the Wet_rad version of sla variable

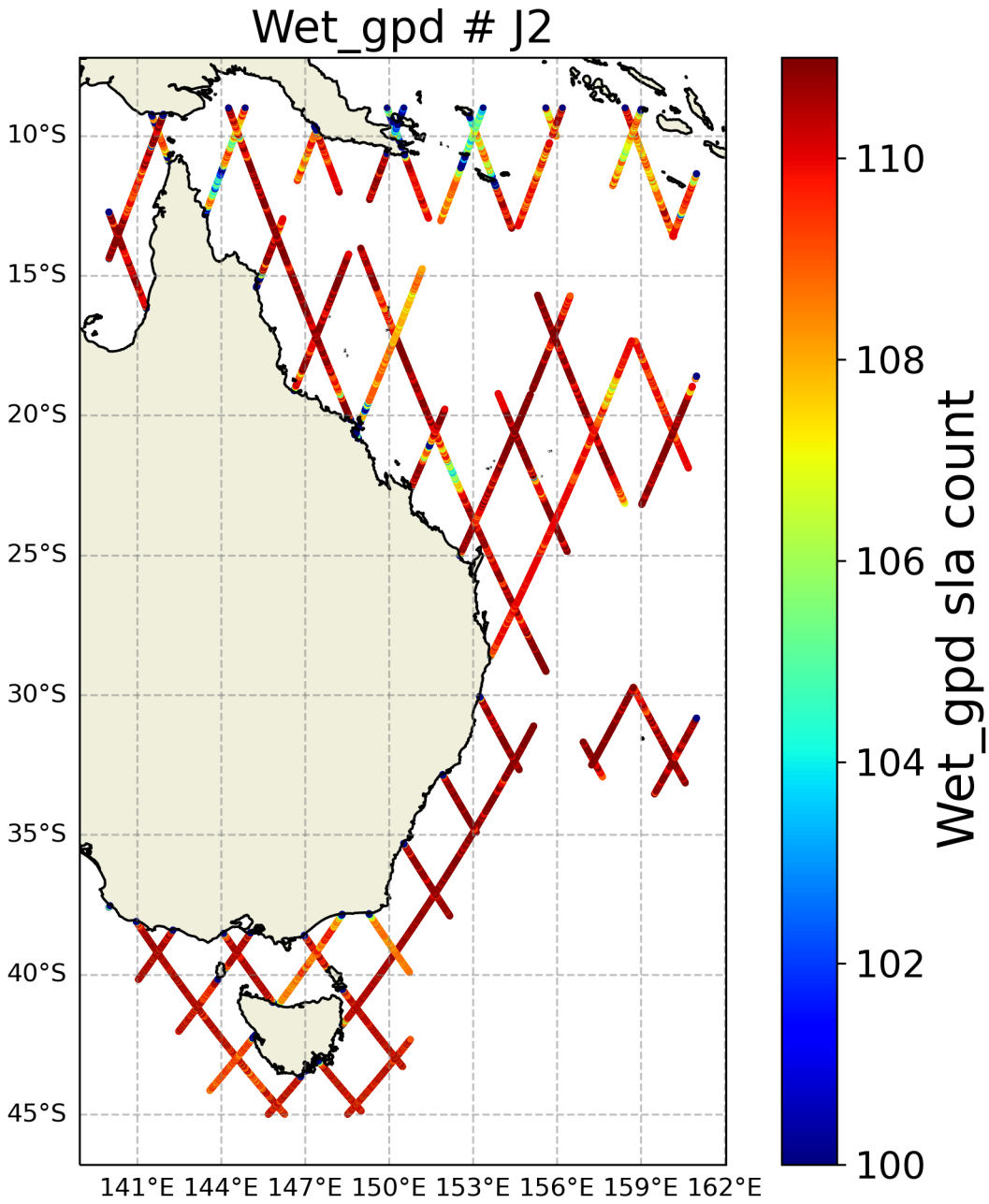

FIGURE 2 – Spatial coherence analysis of the count of the Wet_gpd version of sla variable

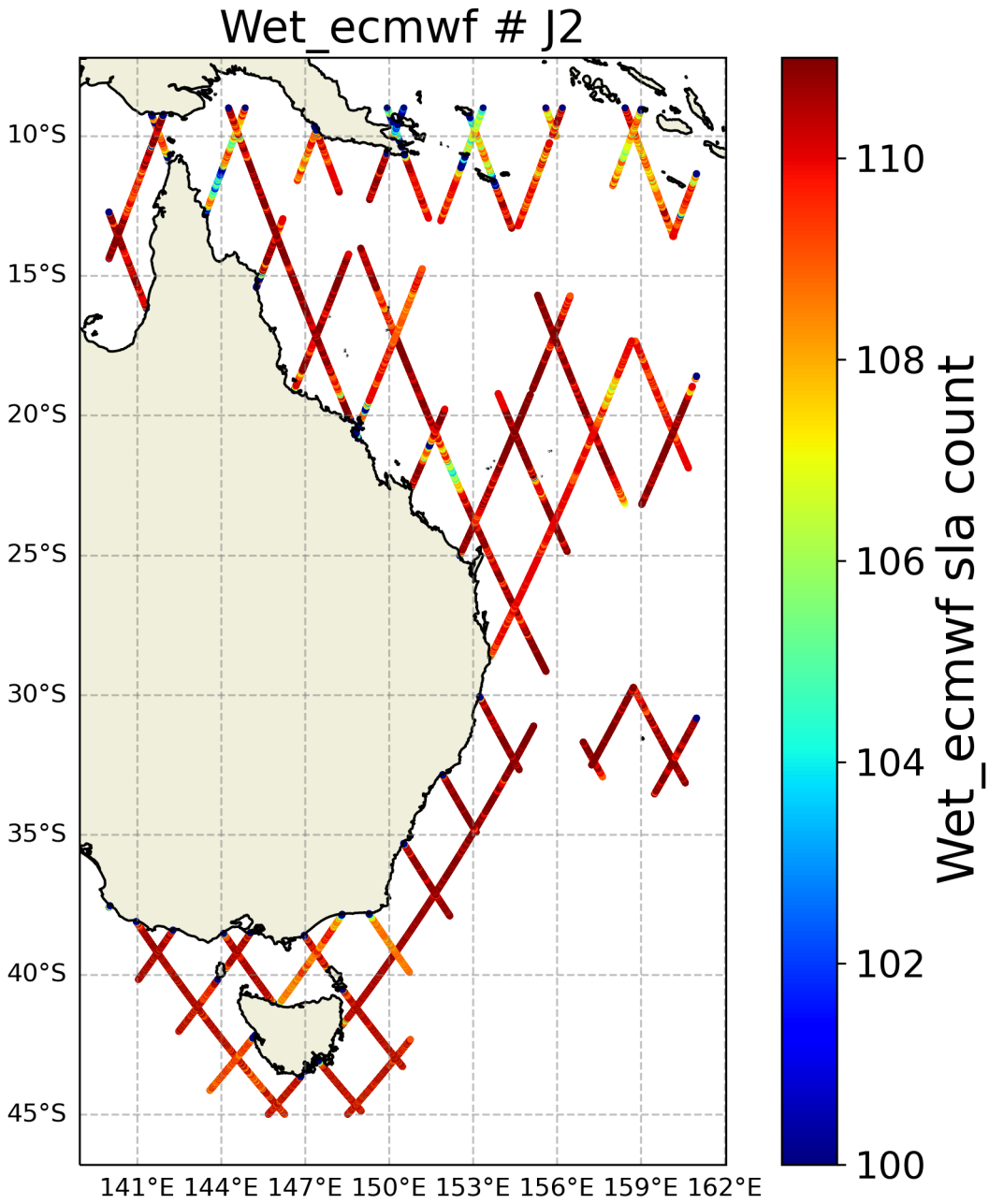

FIGURE 3 – Spatial coherence analysis of the count of the Wet_ecmwf version of sla variable

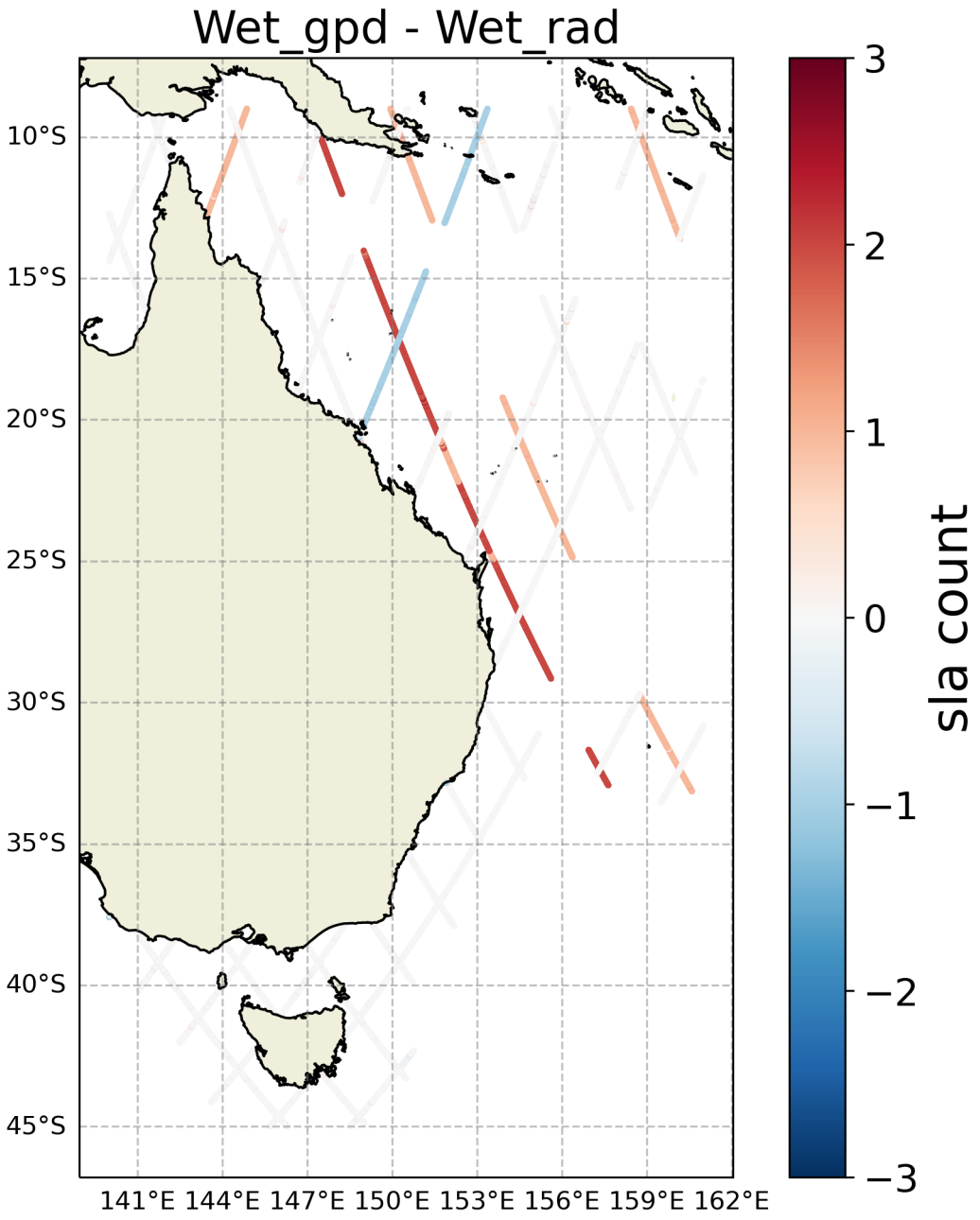

FIGURE 4 – Spatial coherence analysis of the Difference in sla 's count between Wet_gpd and Wet_rad

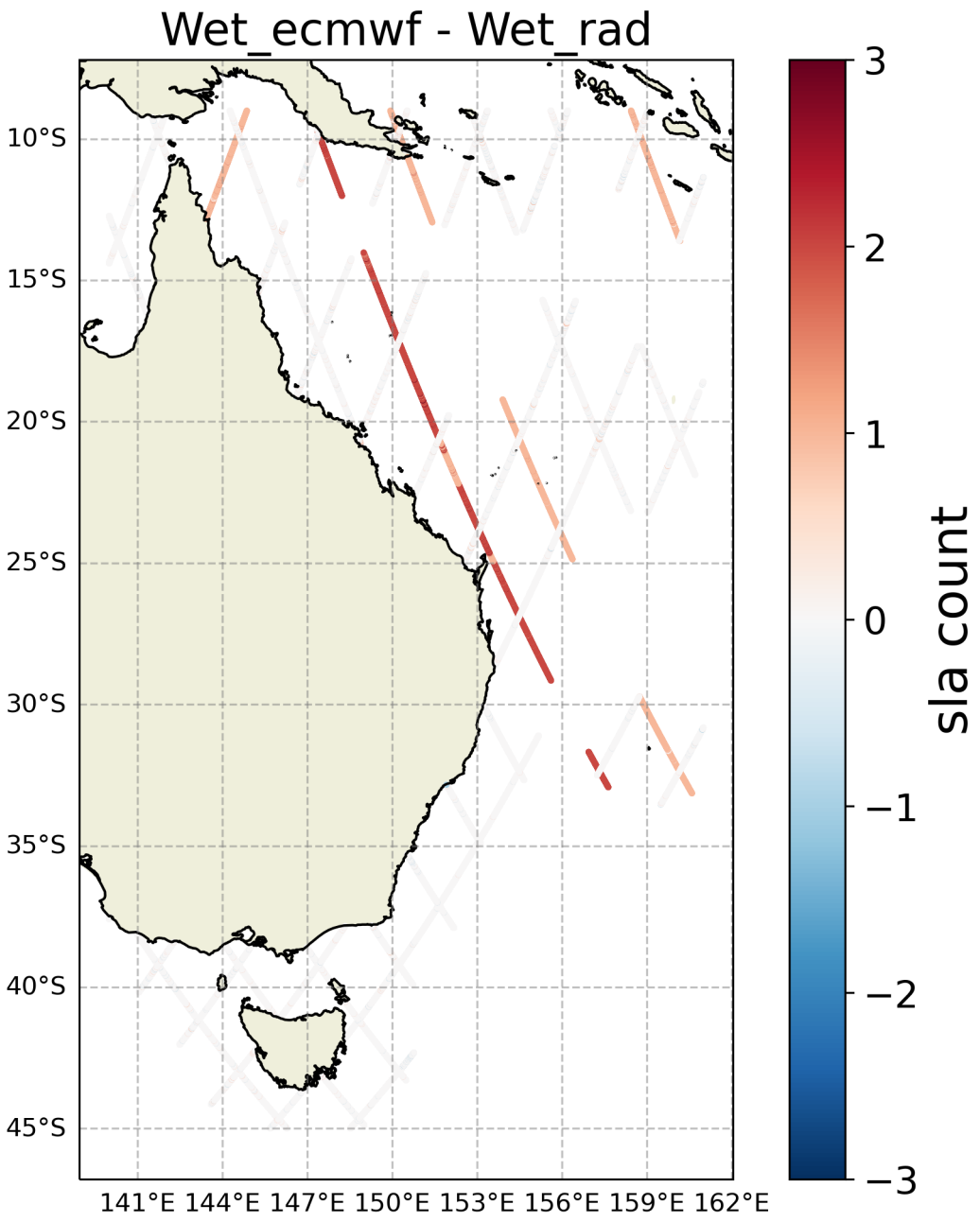

FIGURE 5 – Spatial coherence analysis of the Difference in sla 's count between Wet_ecmwf and Wet_rad

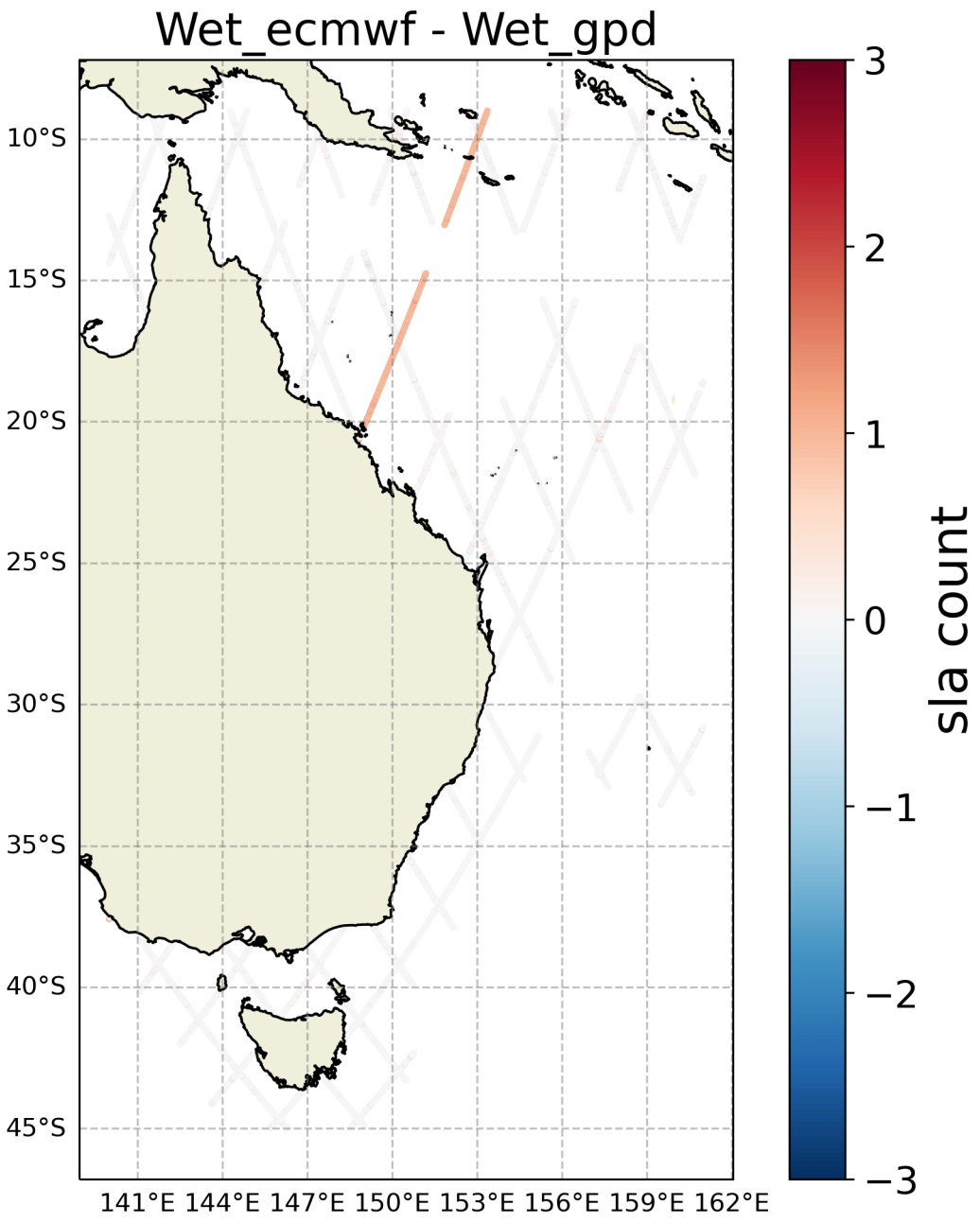

FIGURE 6 – Spatial coherence analysis of the Difference in sla 's count between Wet_ecmwf and Wet_gpd

3.1.2 sla 's std

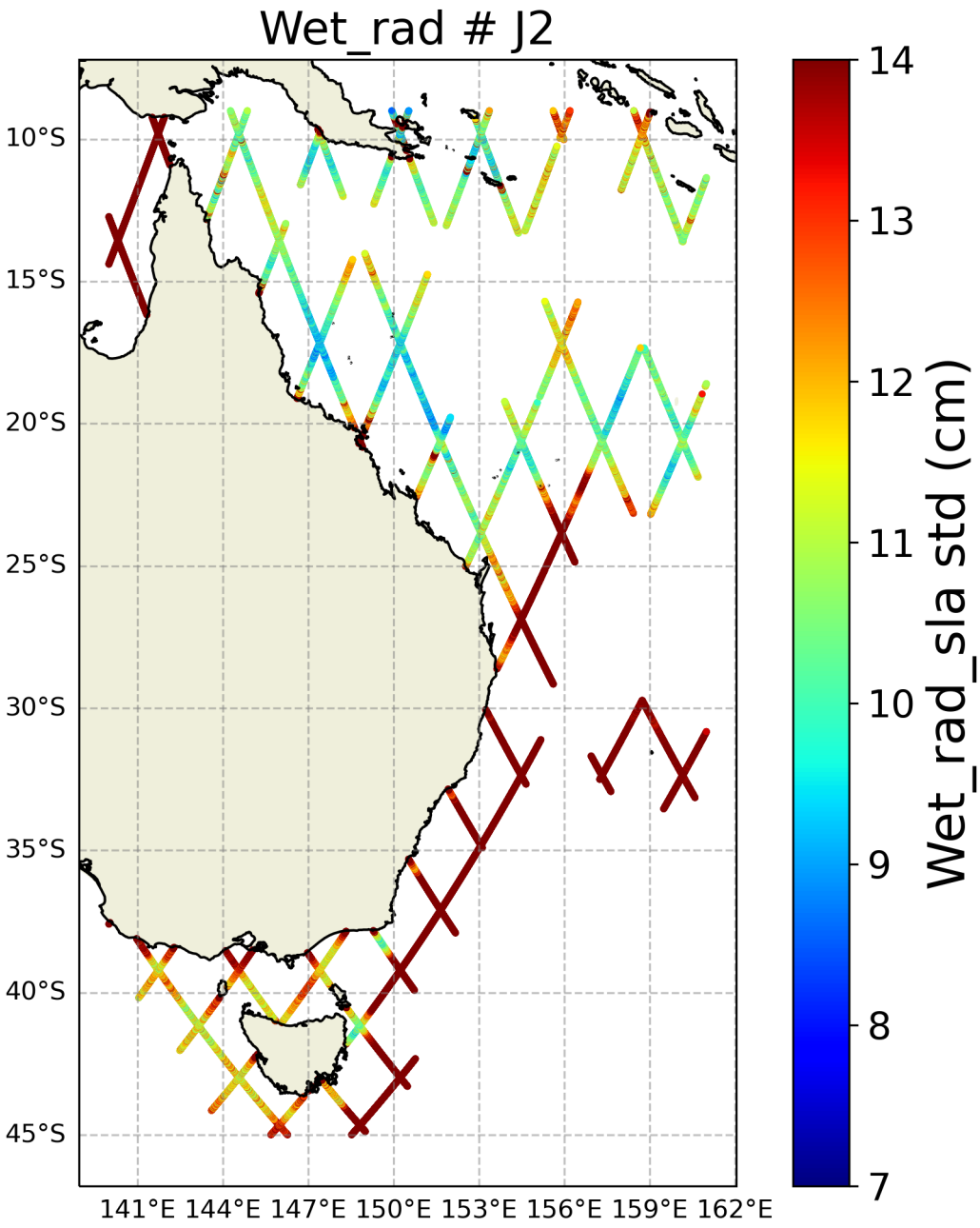

FIGURE 7 – Spatial coherence analysis of the std of the Wet_rad version of sla variable

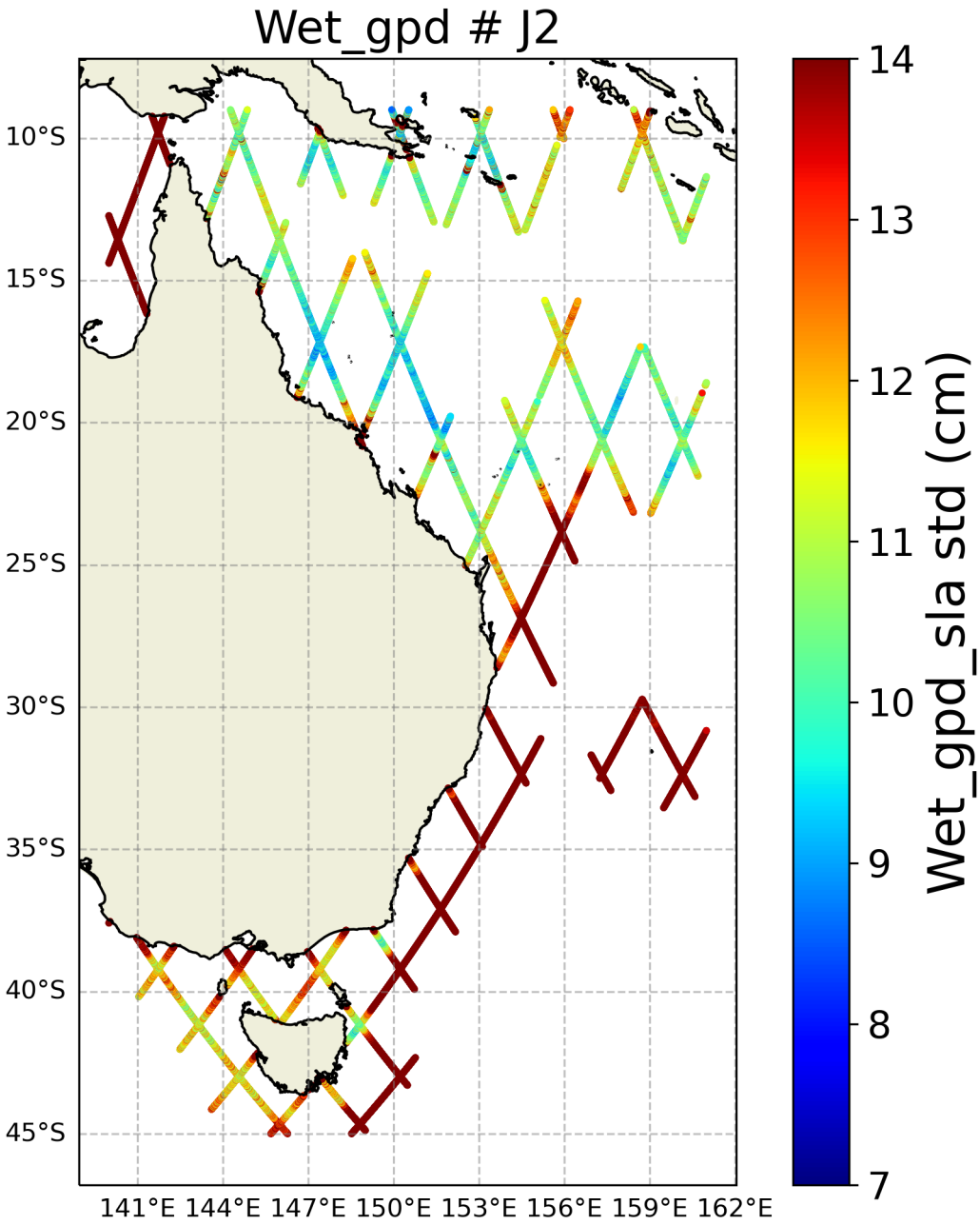

FIGURE 8 – Spatial coherence analysis of the std of the Wet_gpd version of sla variable

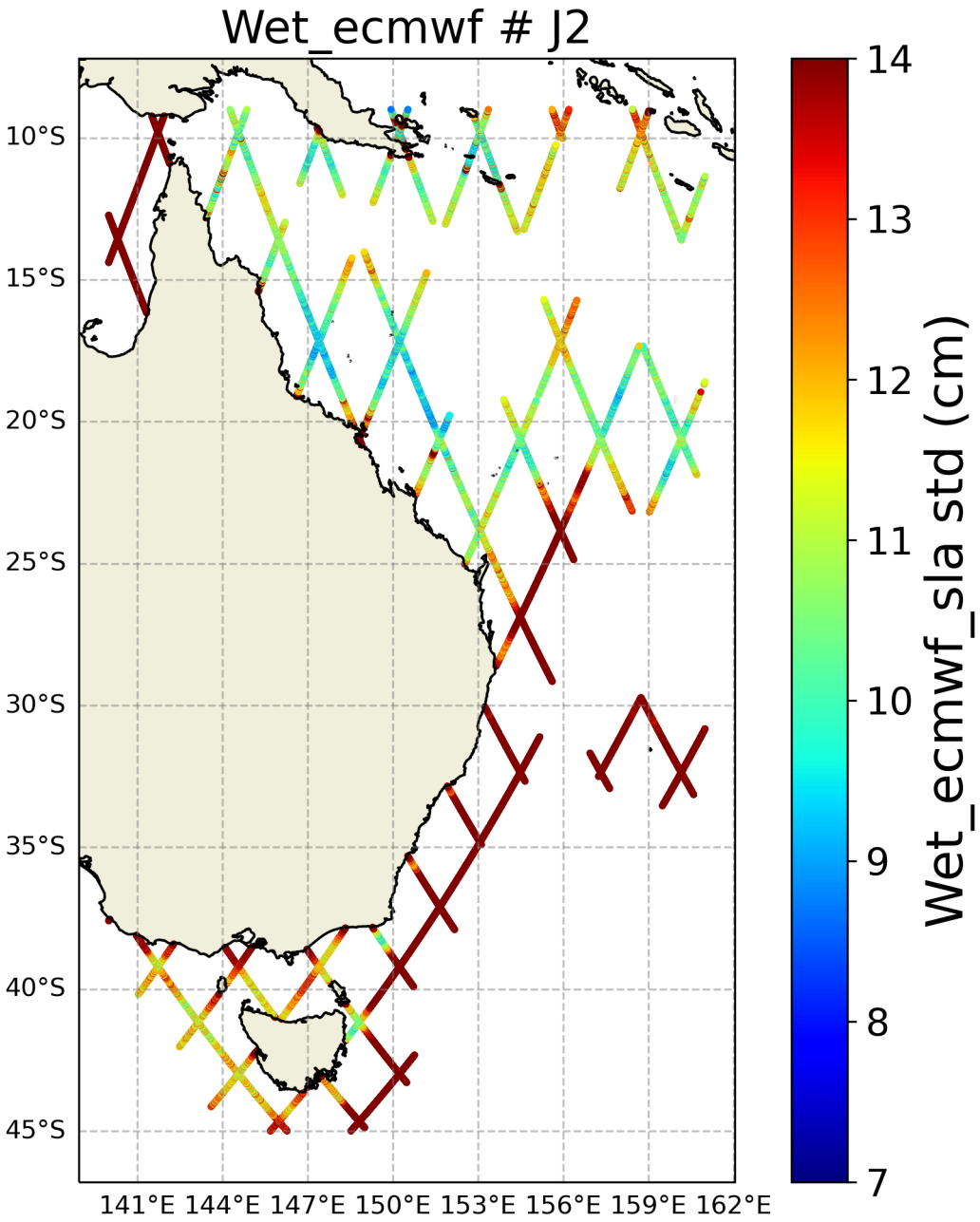

FIGURE 9 – Spatial coherence analysis of the std of the Wet_ecmwf version of sla variable

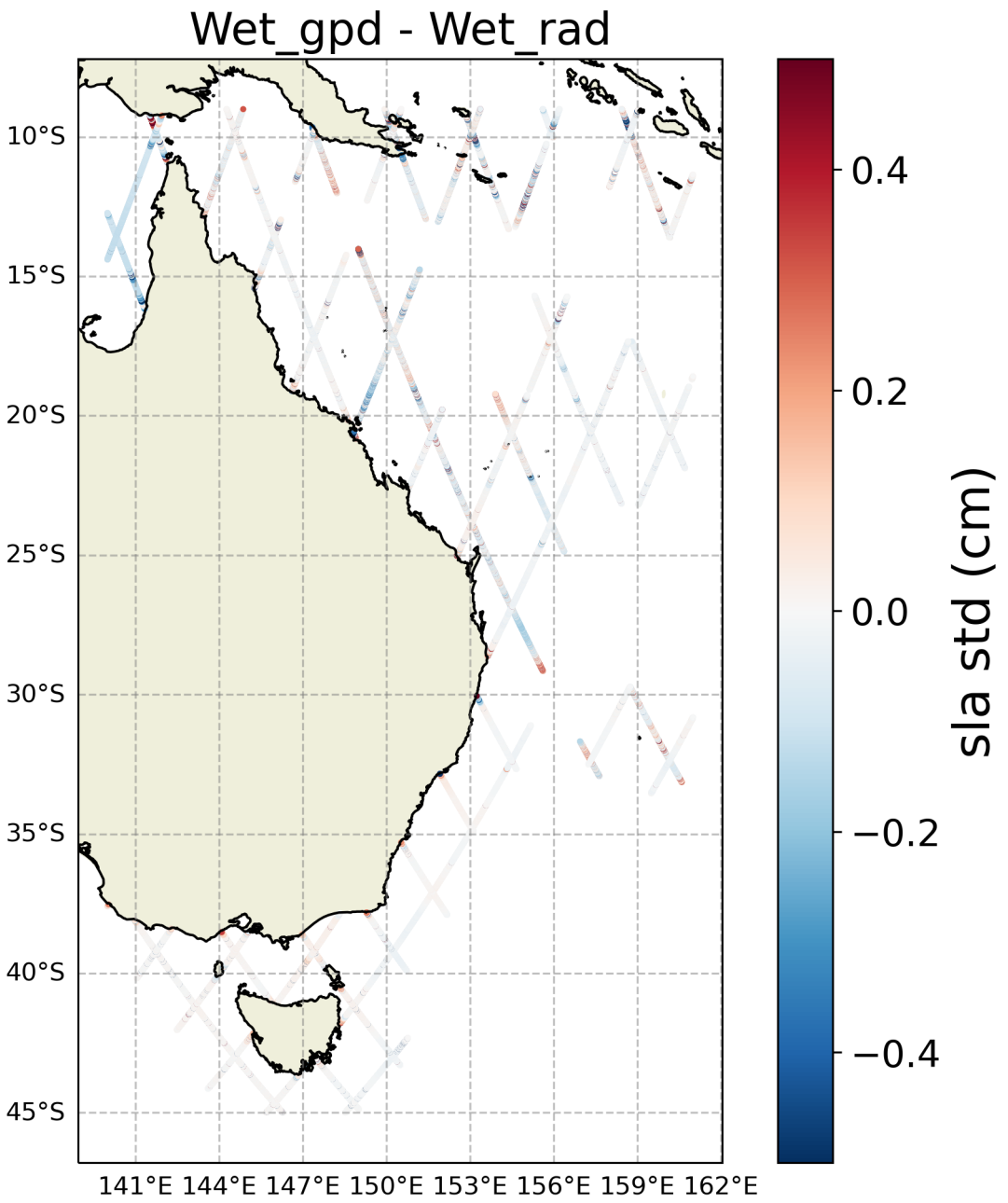

FIGURE 10 – Spatial coherence analysis of the Difference in sla 's std between Wet_gpd and Wet_rad

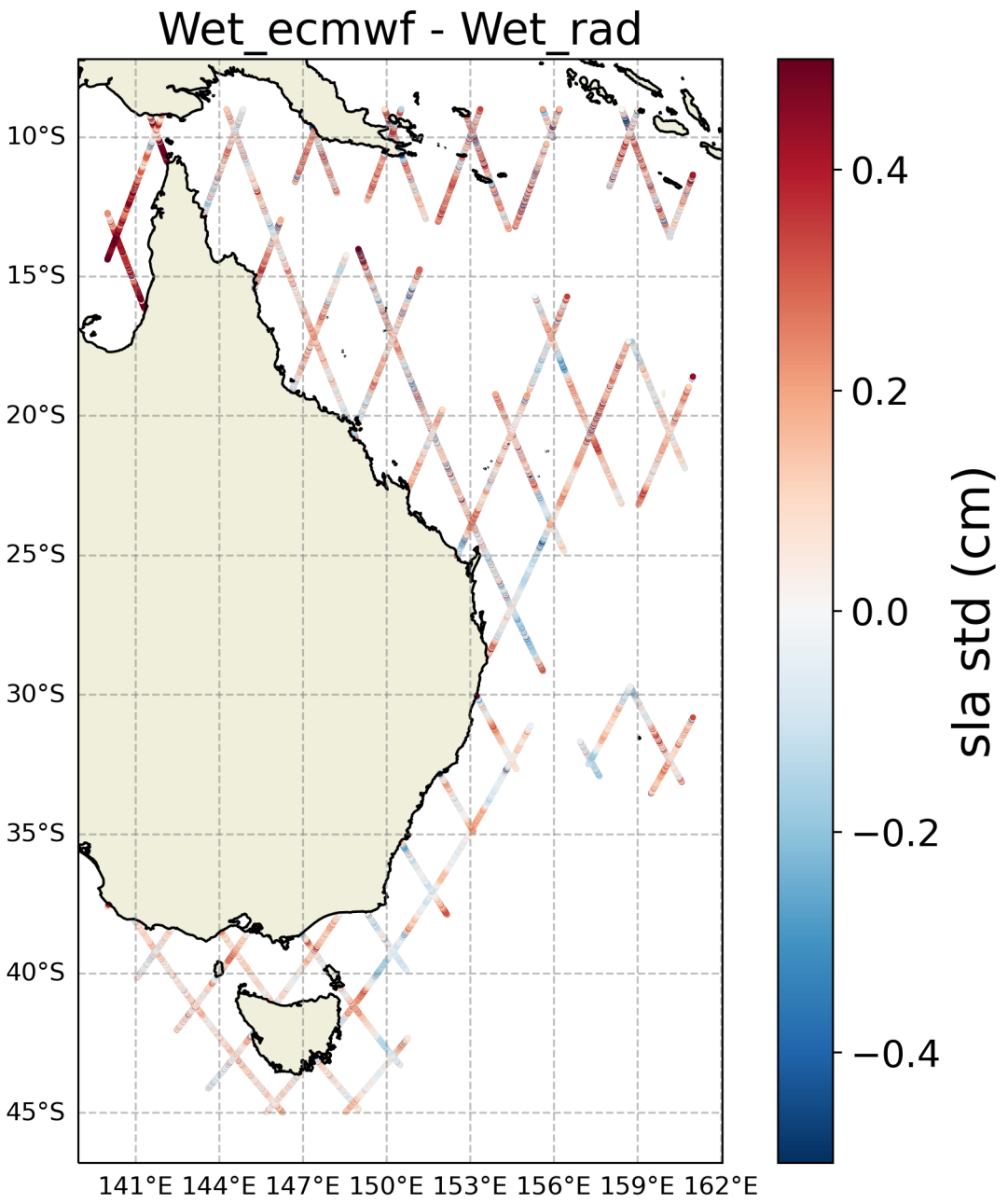

FIGURE 11 – Spatial coherence analysis of the Difference in sla 's std between Wet_ecmwf and Wet_rad

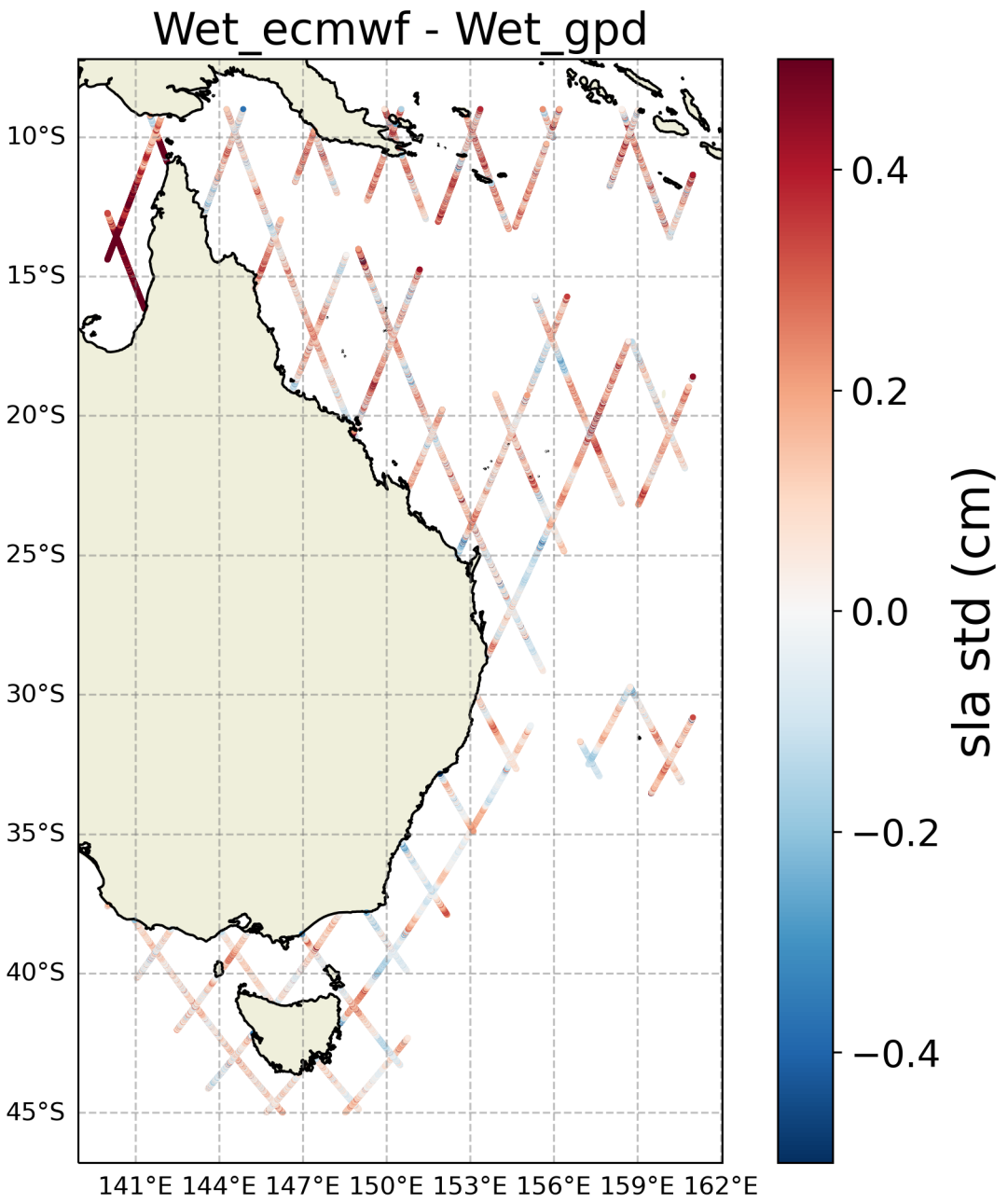

FIGURE 12 – Spatial coherence analysis of the Difference in sla 's std between Wet_ecmwf and Wet_gpd

3.1.3 sla 's mean

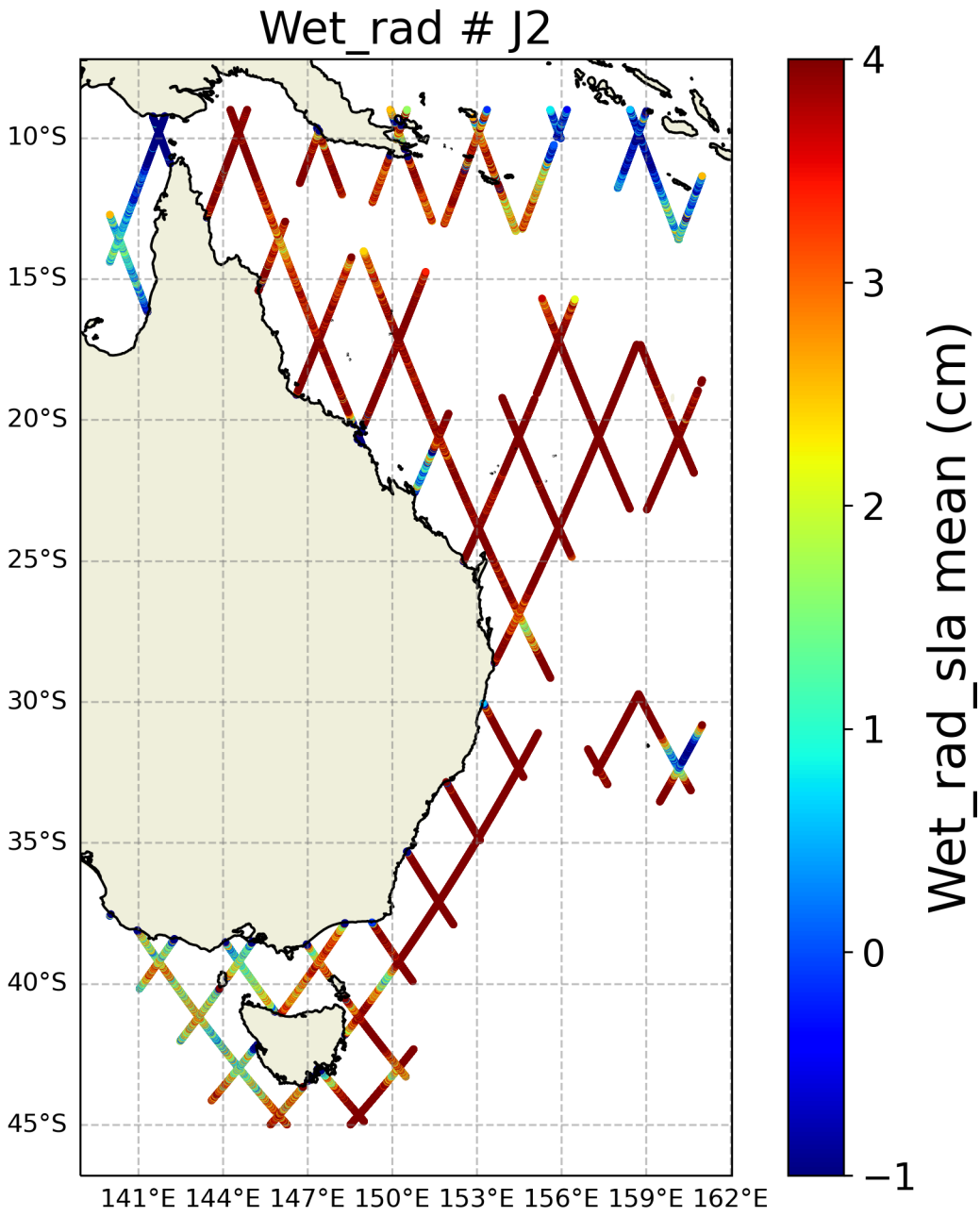

FIGURE 13 – Spatial coherence analysis of the mean of the Wet_rad version of sla variable

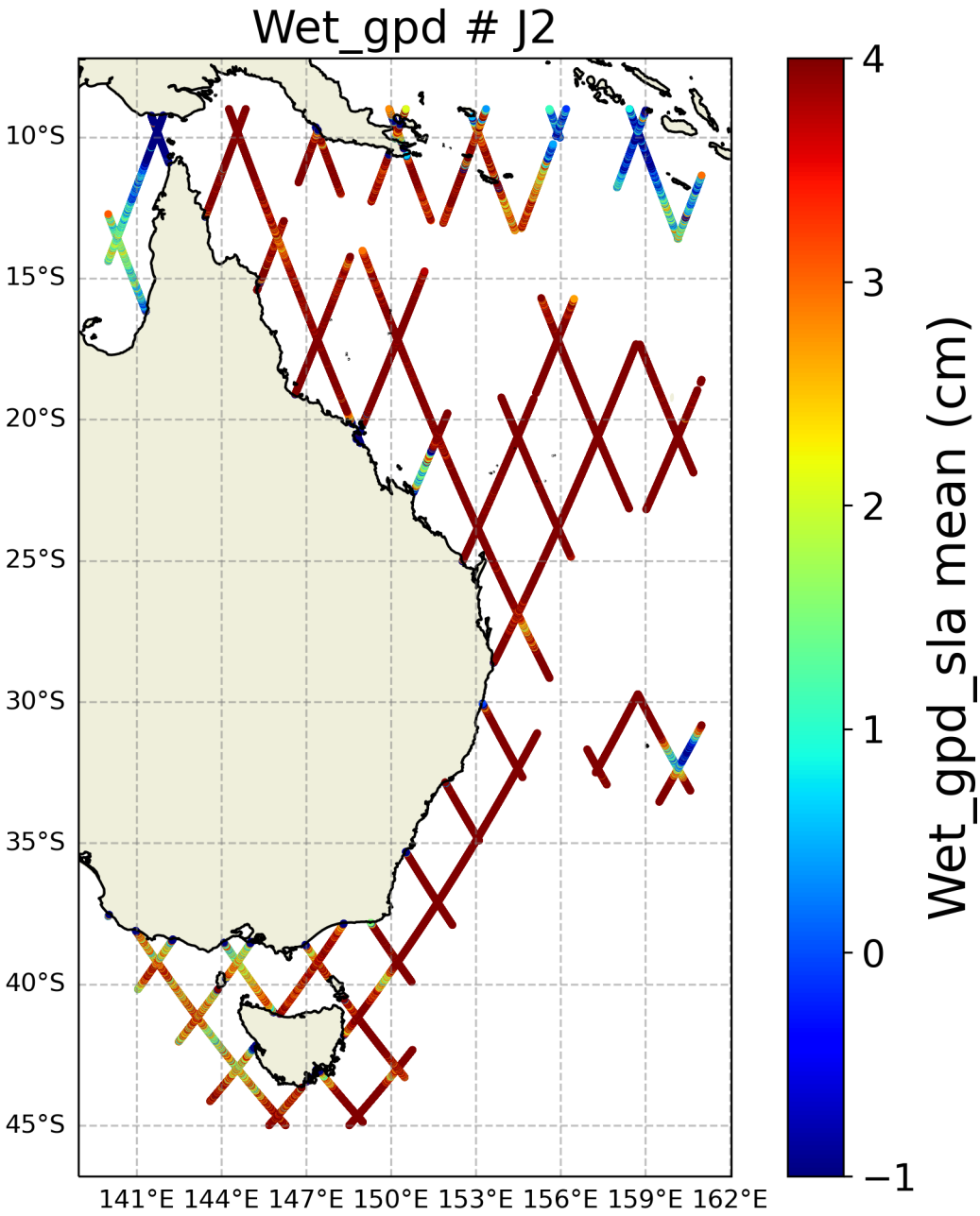

FIGURE 14 – Spatial coherence analysis of the mean of the Wet_gpd version of sla variable

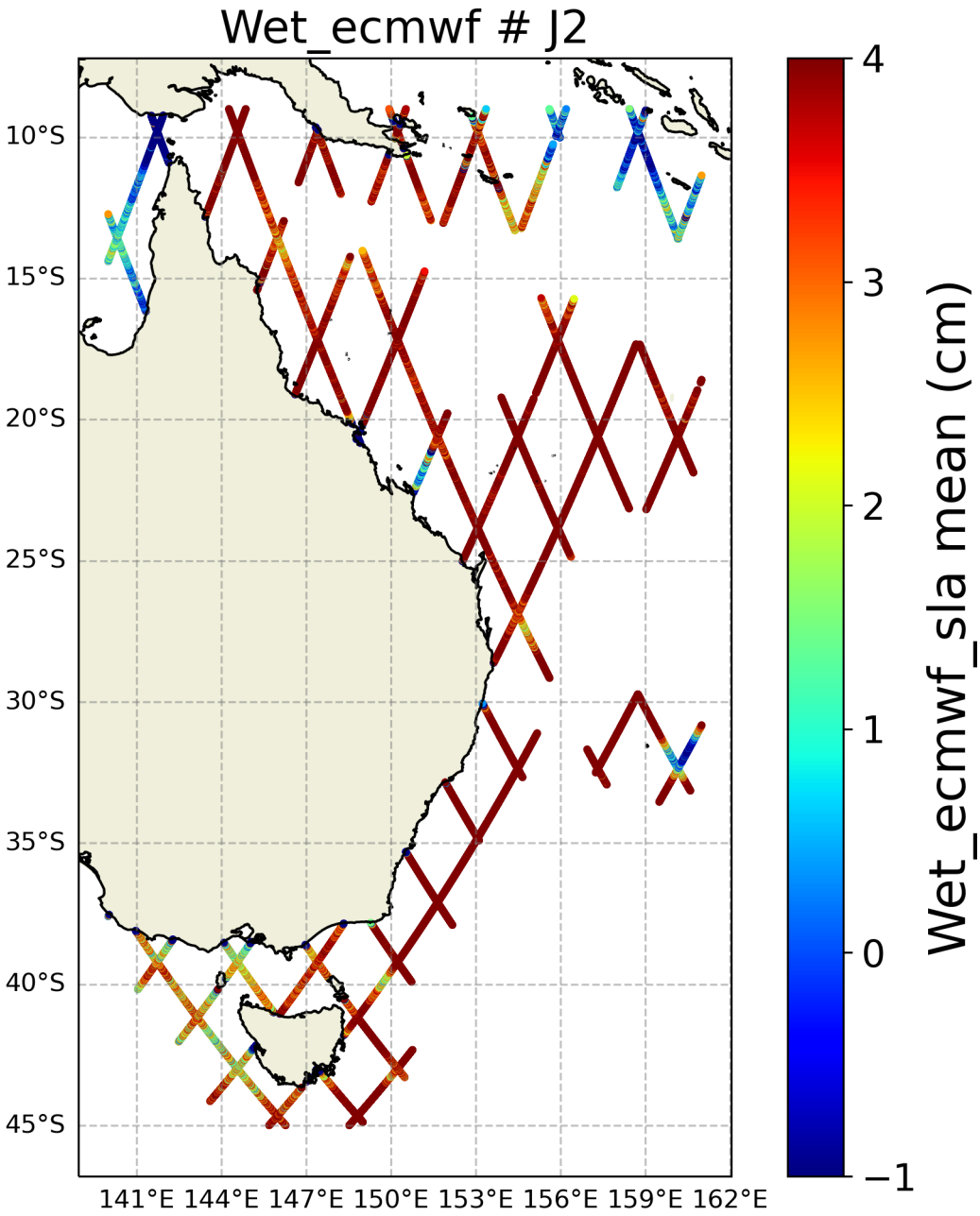

FIGURE 15 – Spatial coherence analysis of the mean of the Wet_ecmwf version of sla variable

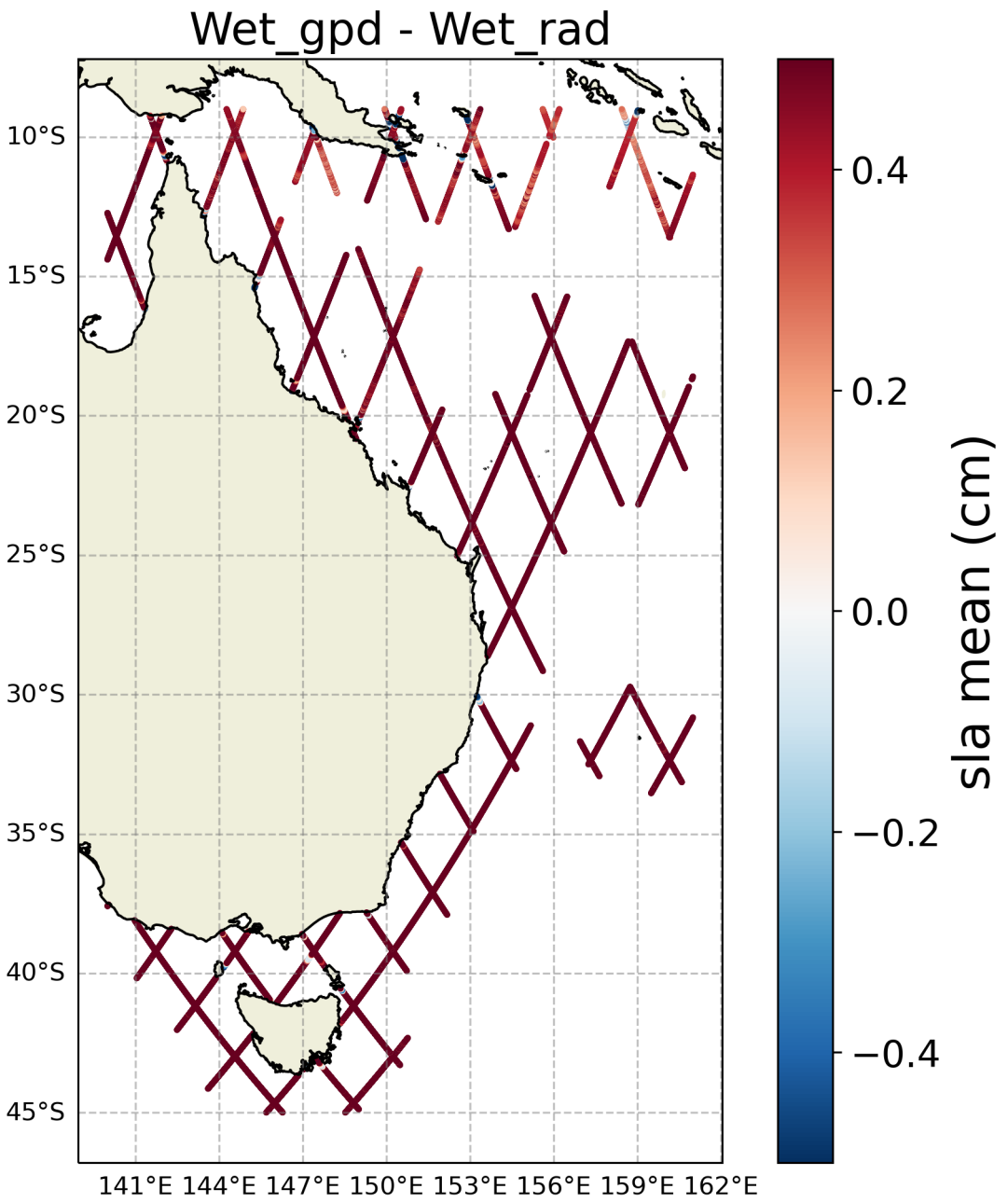

FIGURE 16 – Spatial coherence analysis of the Difference in sla 's mean between Wet_gpd and Wet_rad

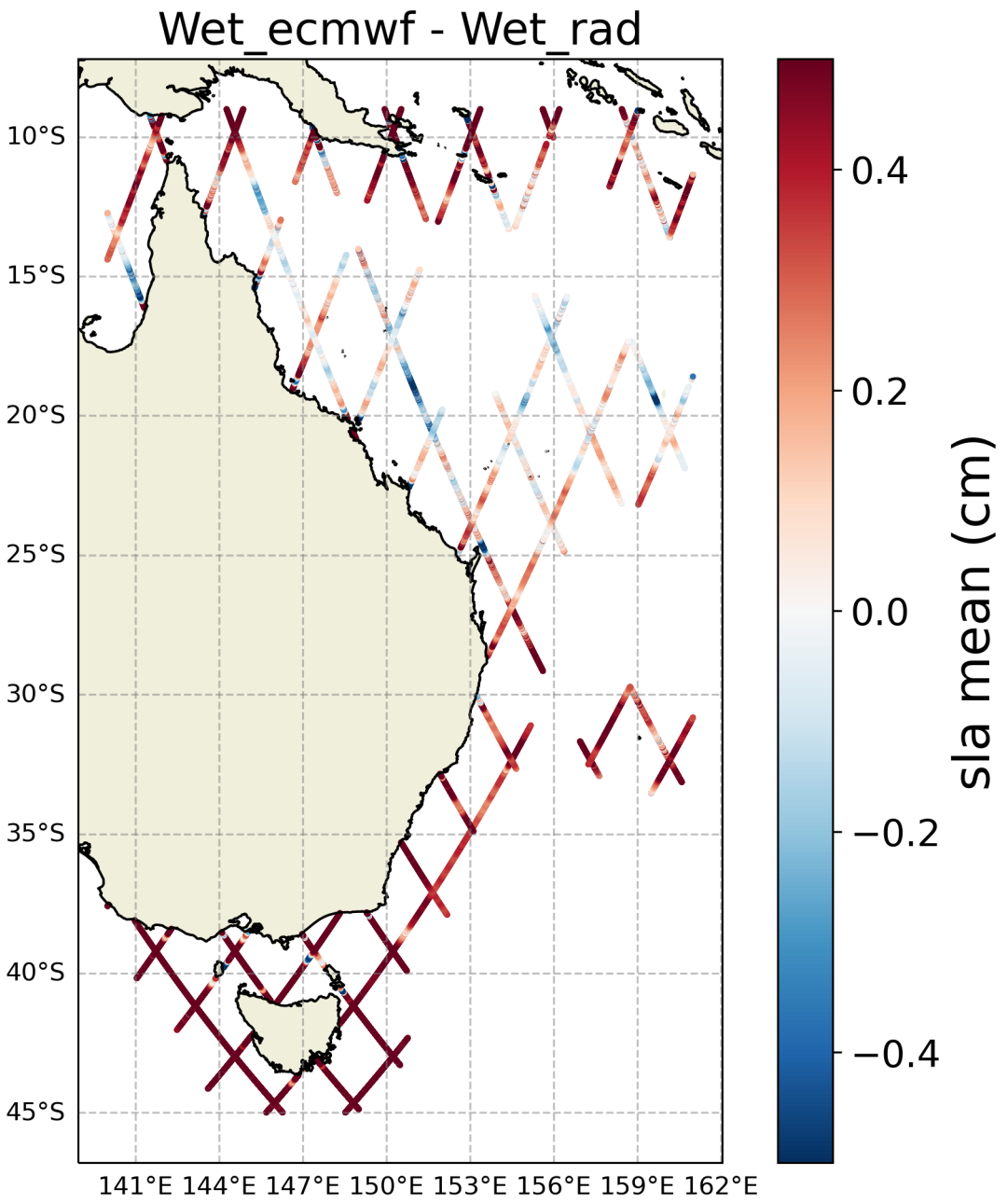

FIGURE 17 – Spatial coherence analysis of the Difference in sla 's mean between Wet_ecmwf and Wet_rad

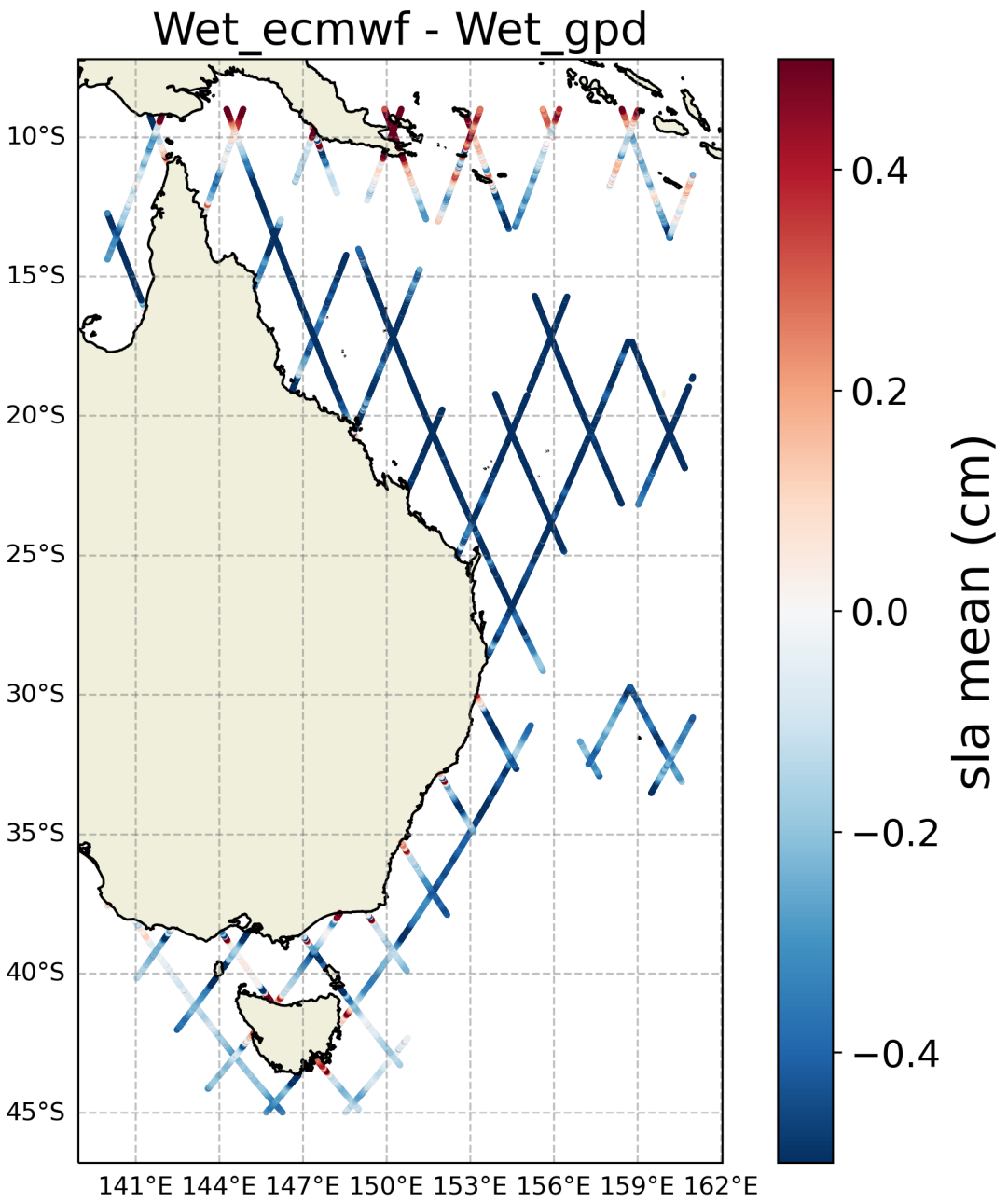

FIGURE 18 – Spatial coherence analysis of the Difference in sla 's mean between Wet_ecmwf and Wet_gpd

3.2 Wet

3.2.1 Wet 's count

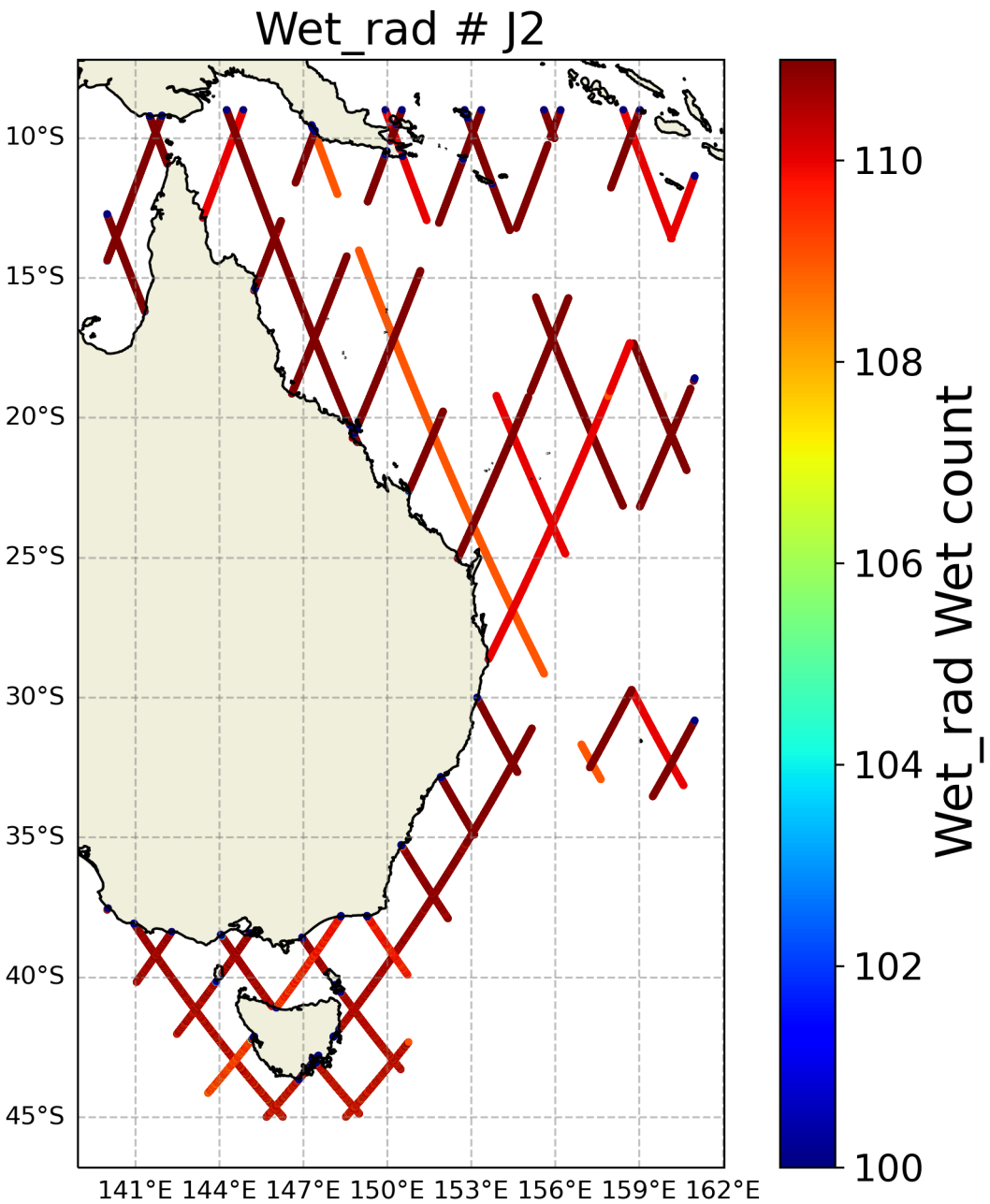

FIGURE 19 – Spatial coherence analysis of the count of the Wet_rad version of Wet variable

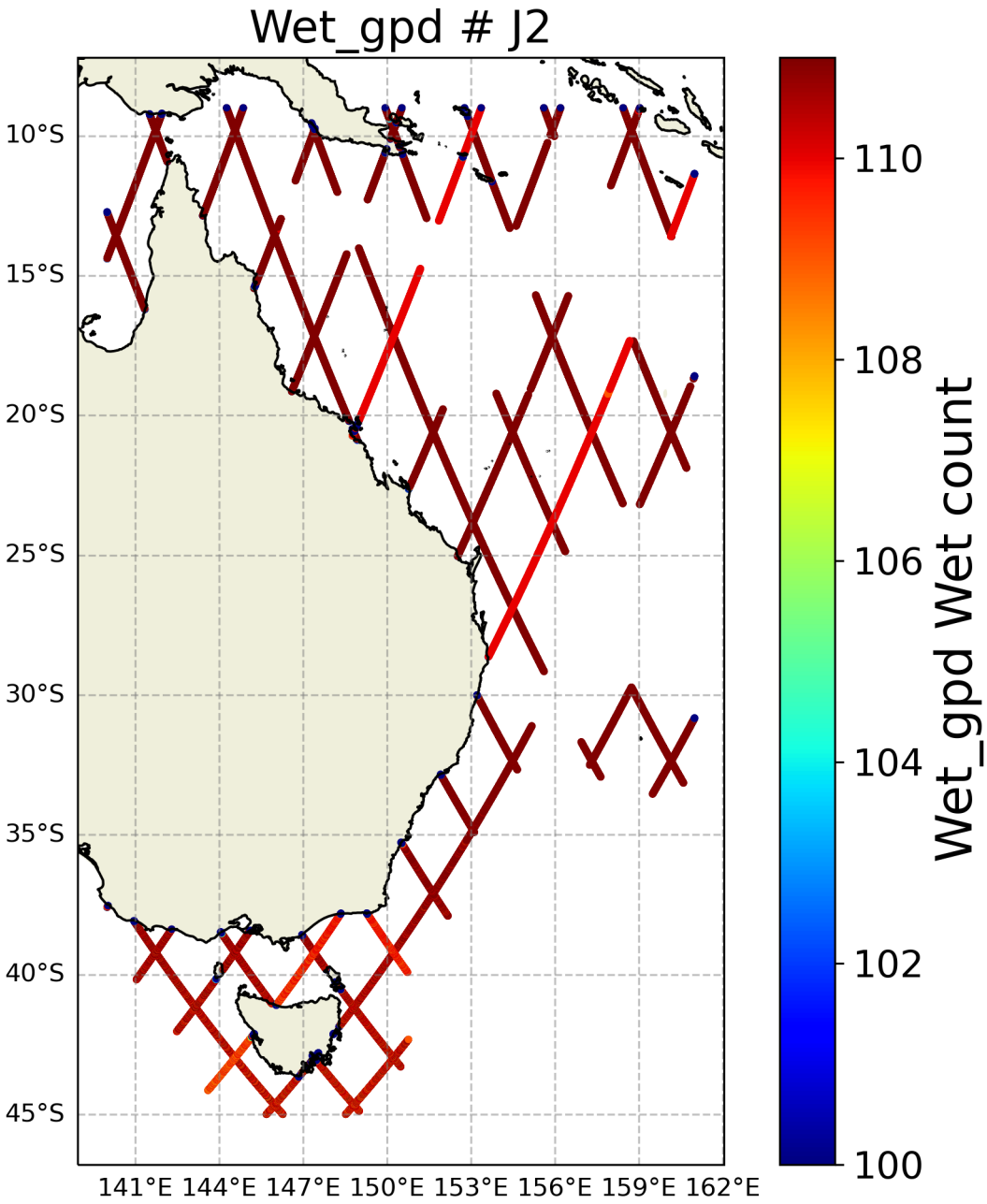

FIGURE 20 – Spatial coherence analysis of the count of the Wet_gpd version of Wet variable

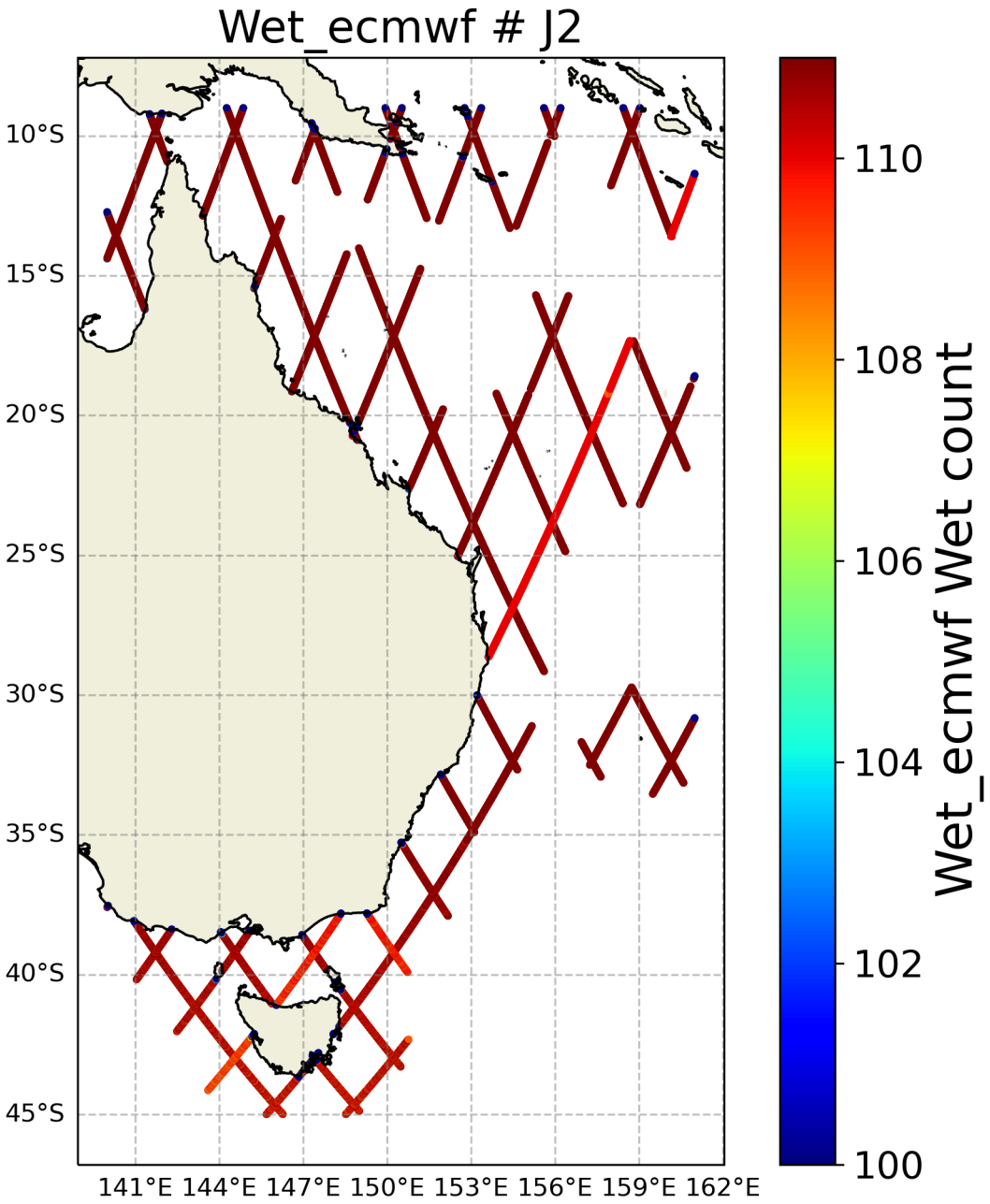

FIGURE 21 – Spatial coherence analysis of the count of the Wet_ecmwf version of Wet variable

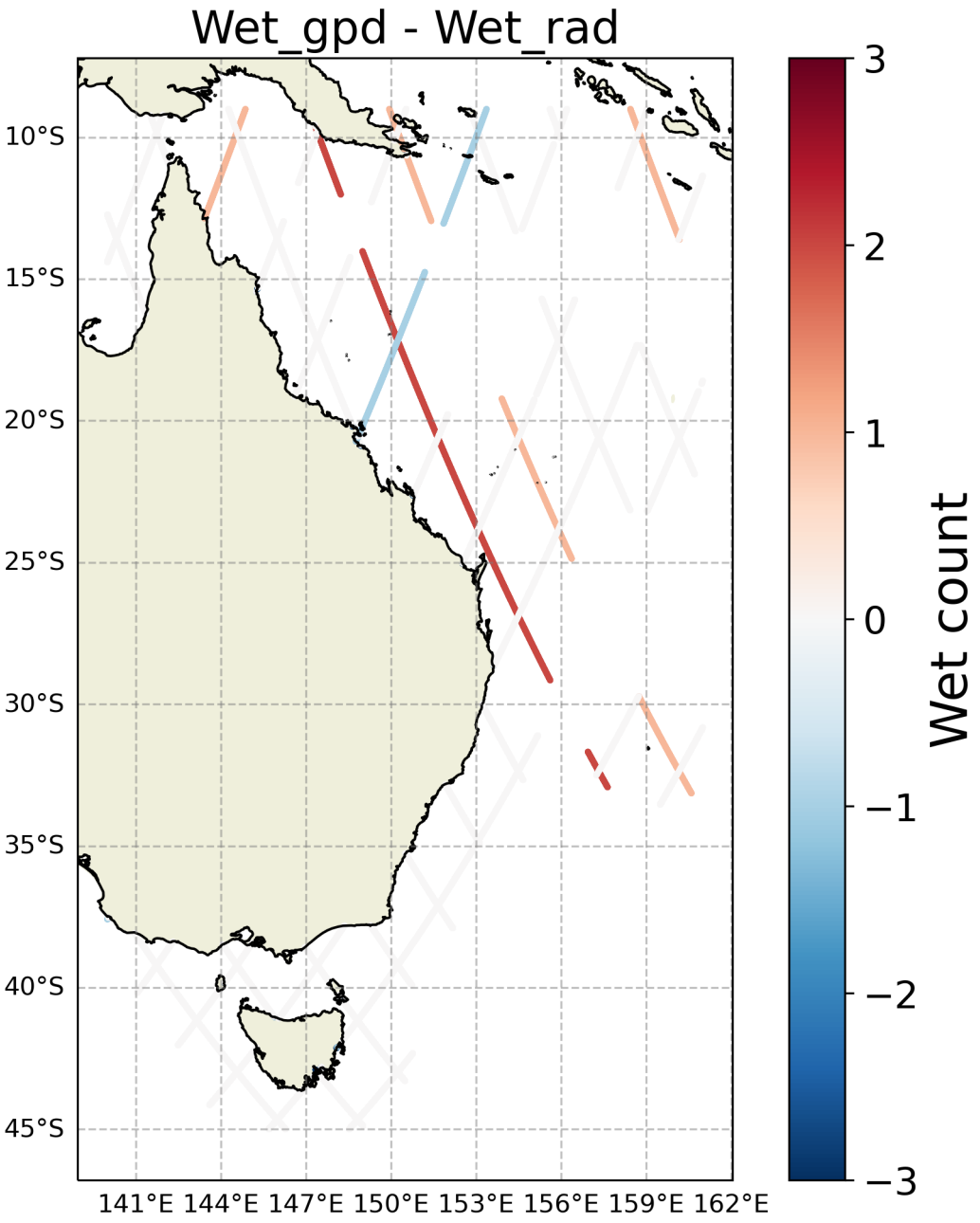

FIGURE 22 – Spatial coherence analysis of the Difference in Wet 's count between Wet_gpd and Wet_rad

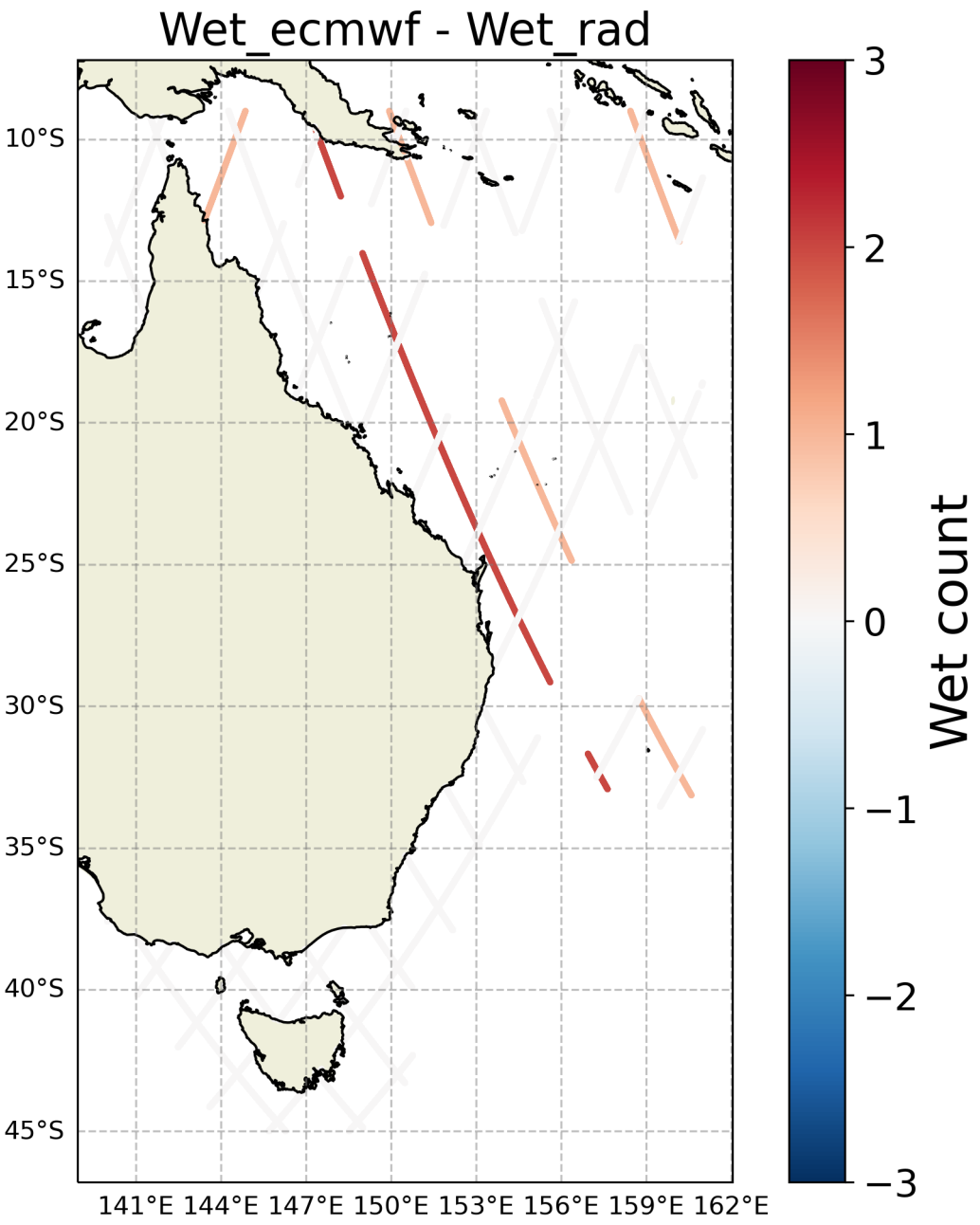

FIGURE 23 – Spatial coherence analysis of the Difference in Wet 's count between Wet_ecmwf and Wet_rad

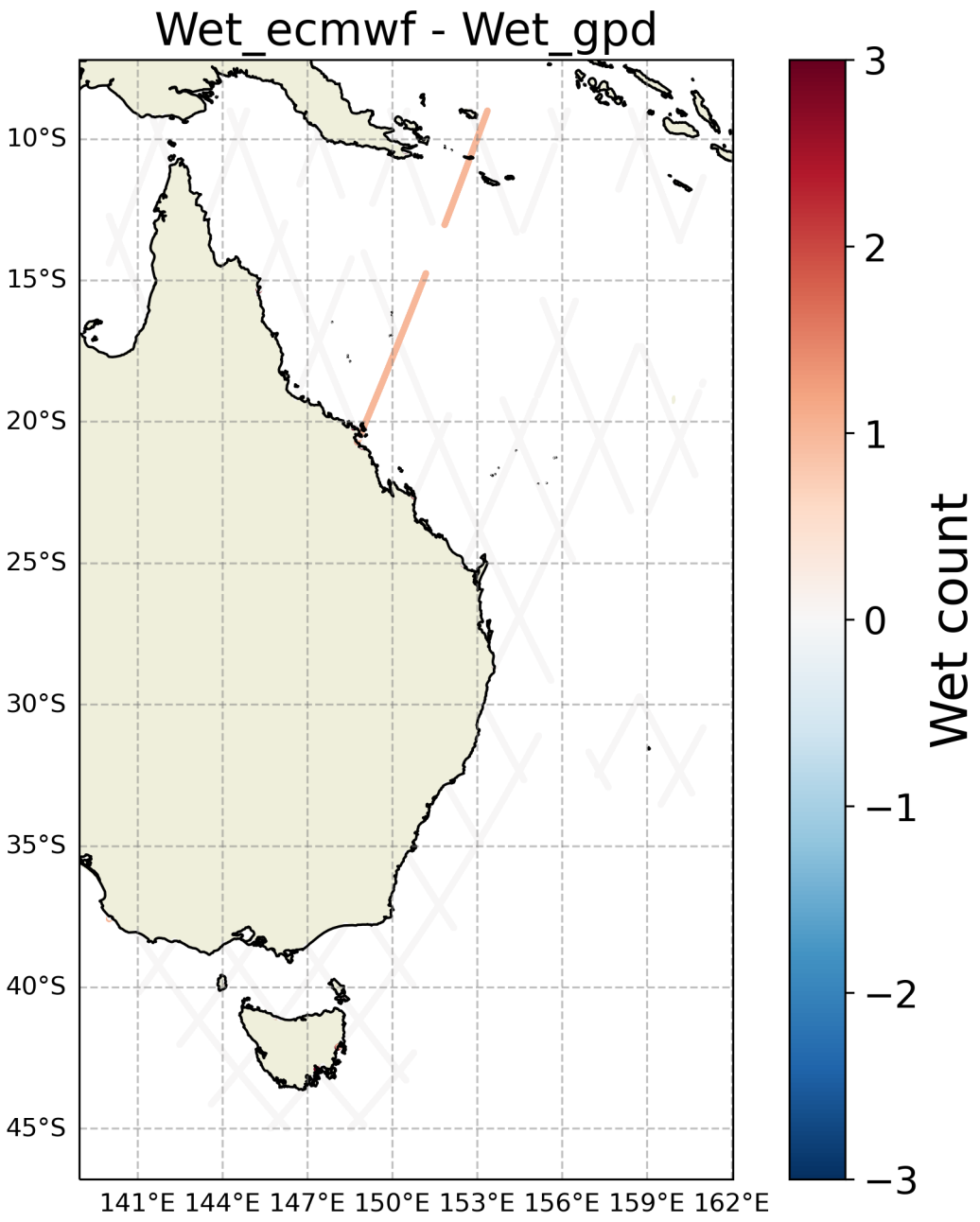

Figure 24 – Spatial coherence analysis of the Difference in Wet 's count between Wet_ecmwf and Wet_gpd

3.2.2 Wet 's std

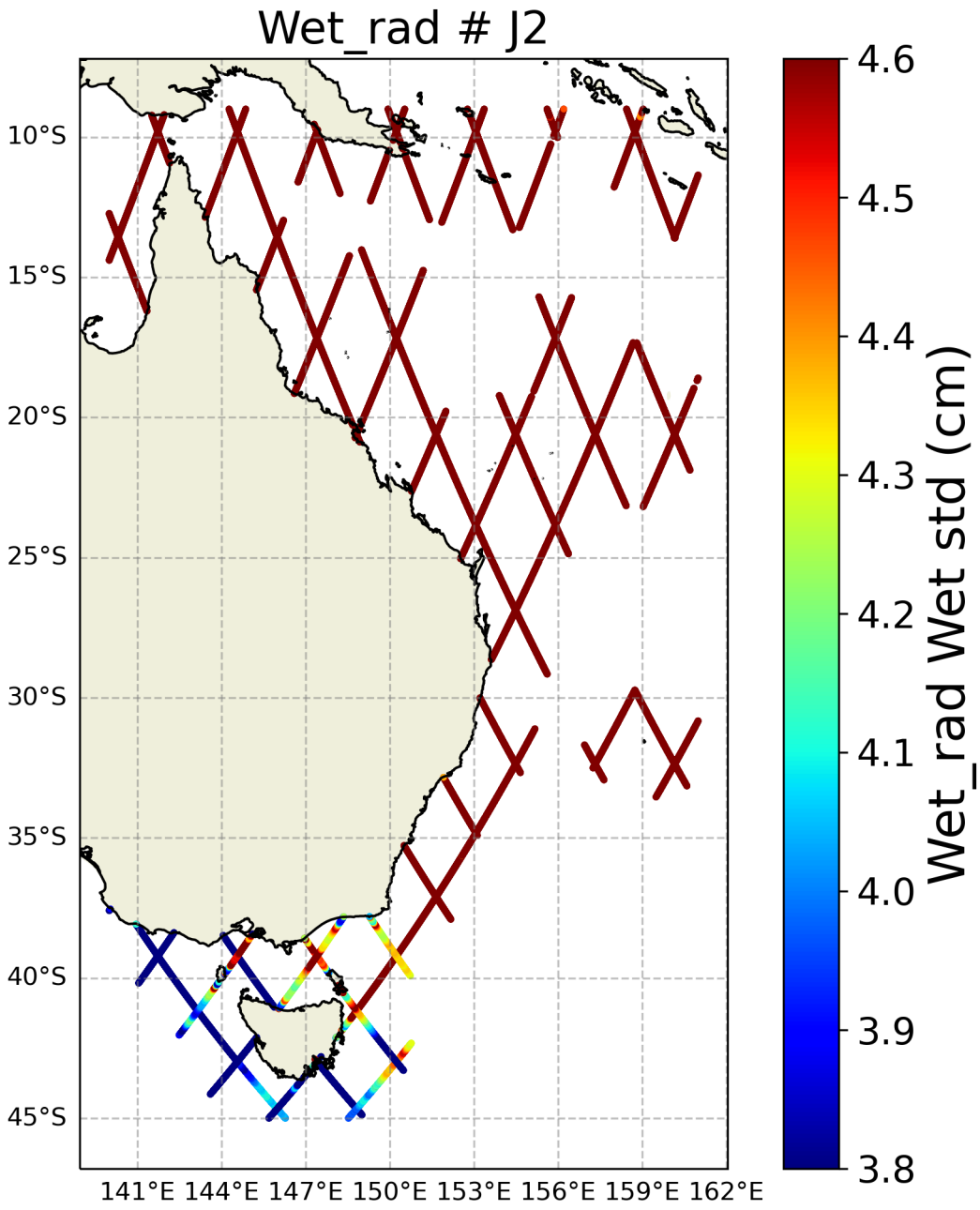

FIGURE 25 – Spatial coherence analysis of the std of the Wet_rad version of Wet variable

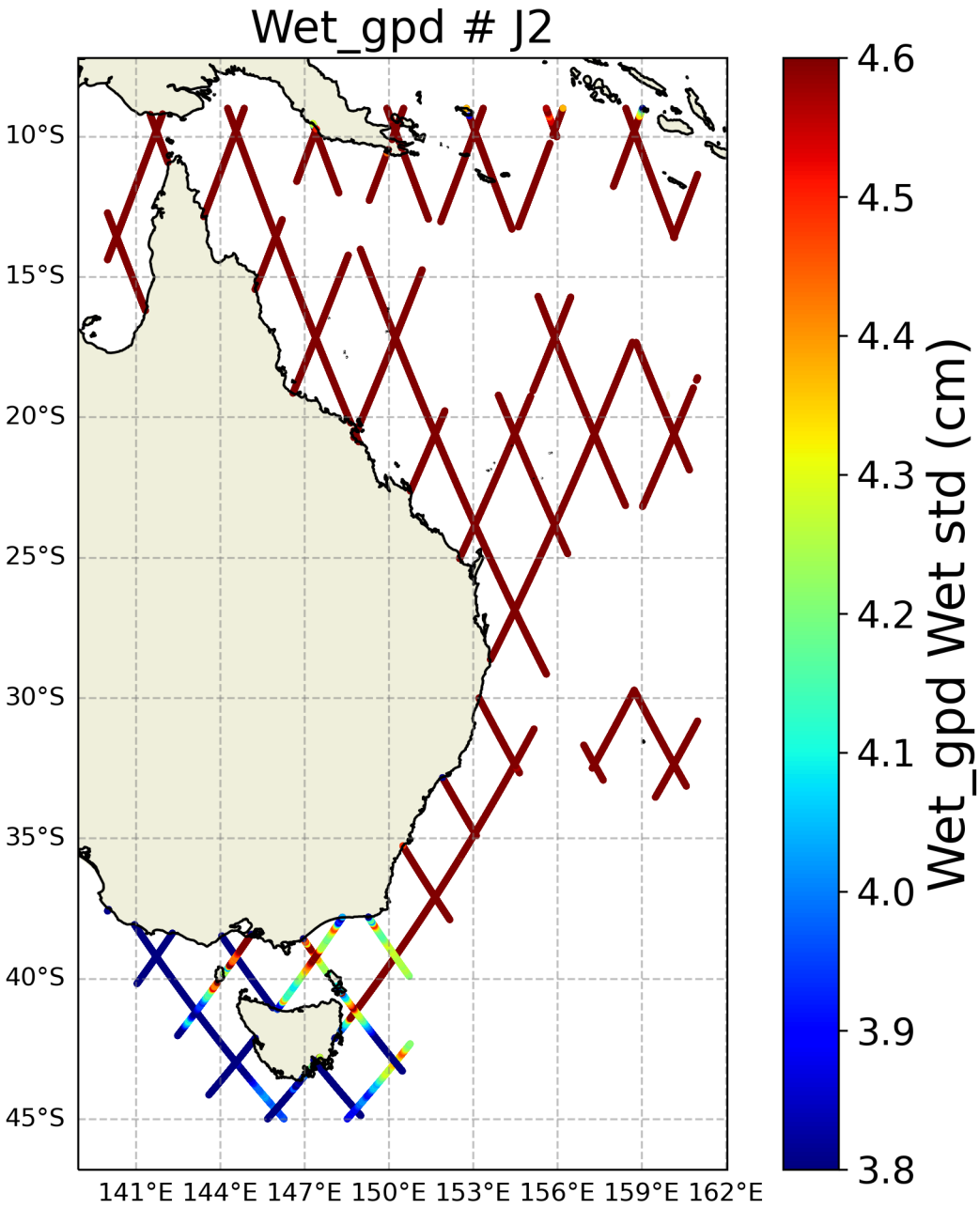

FIGURE 26 – Spatial coherence analysis of the std of the Wet_gpd version of Wet variable

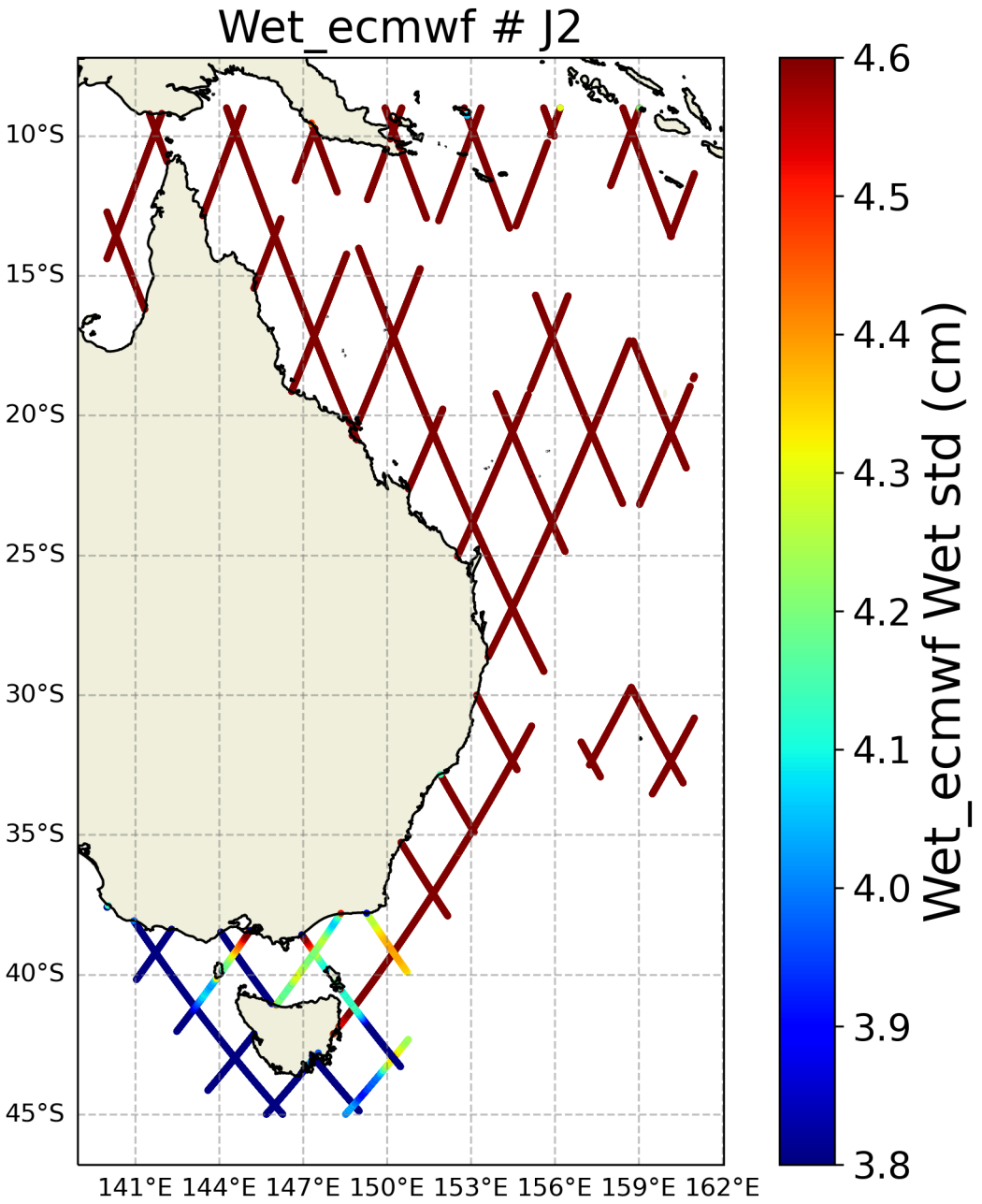

FIGURE 27 – Spatial coherence analysis of the std of the Wet_ecmwf version of Wet variable

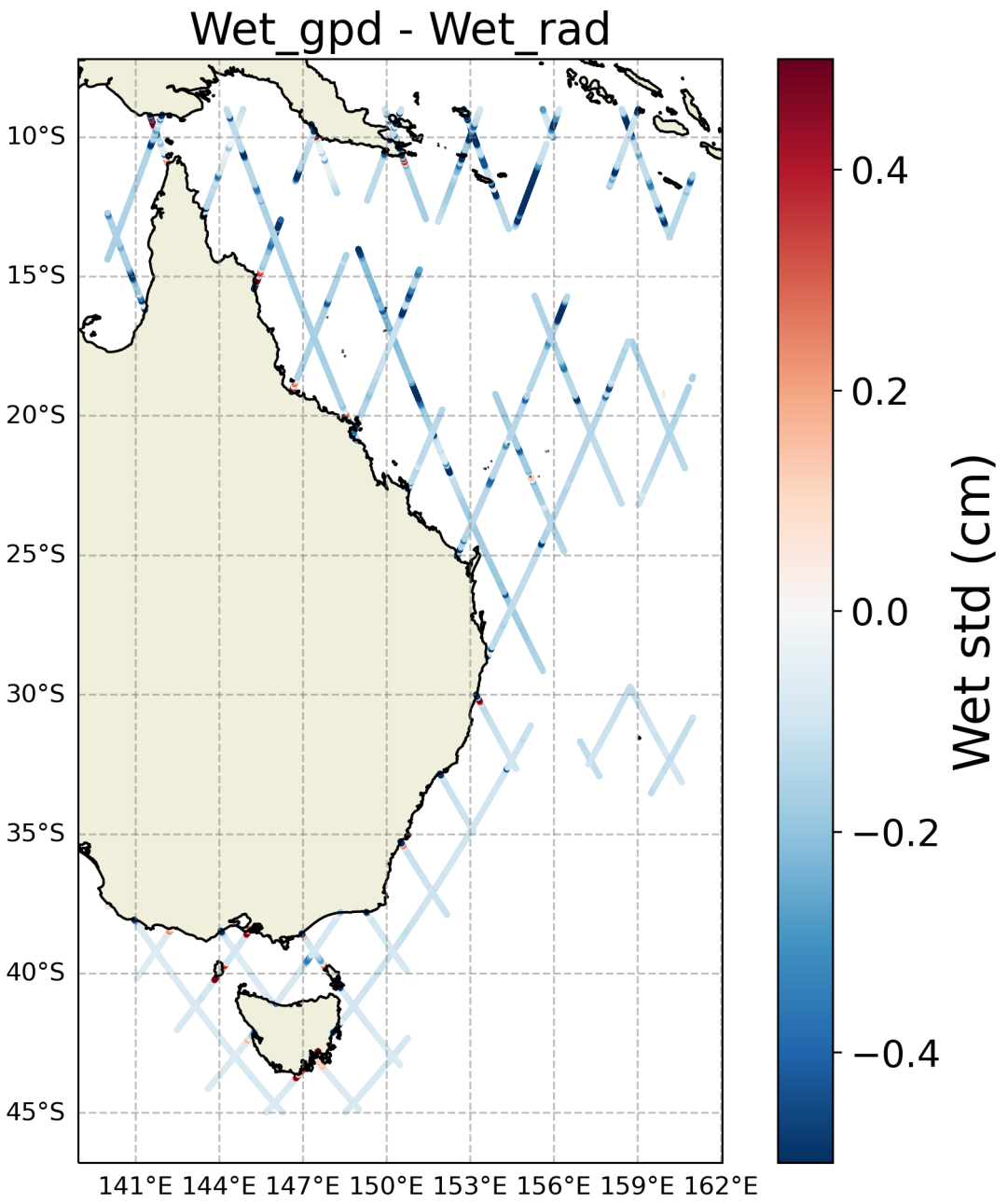

FIGURE 28 – Spatial coherence analysis of the Difference in Wet 's std between Wet_gpd and Wet_rad

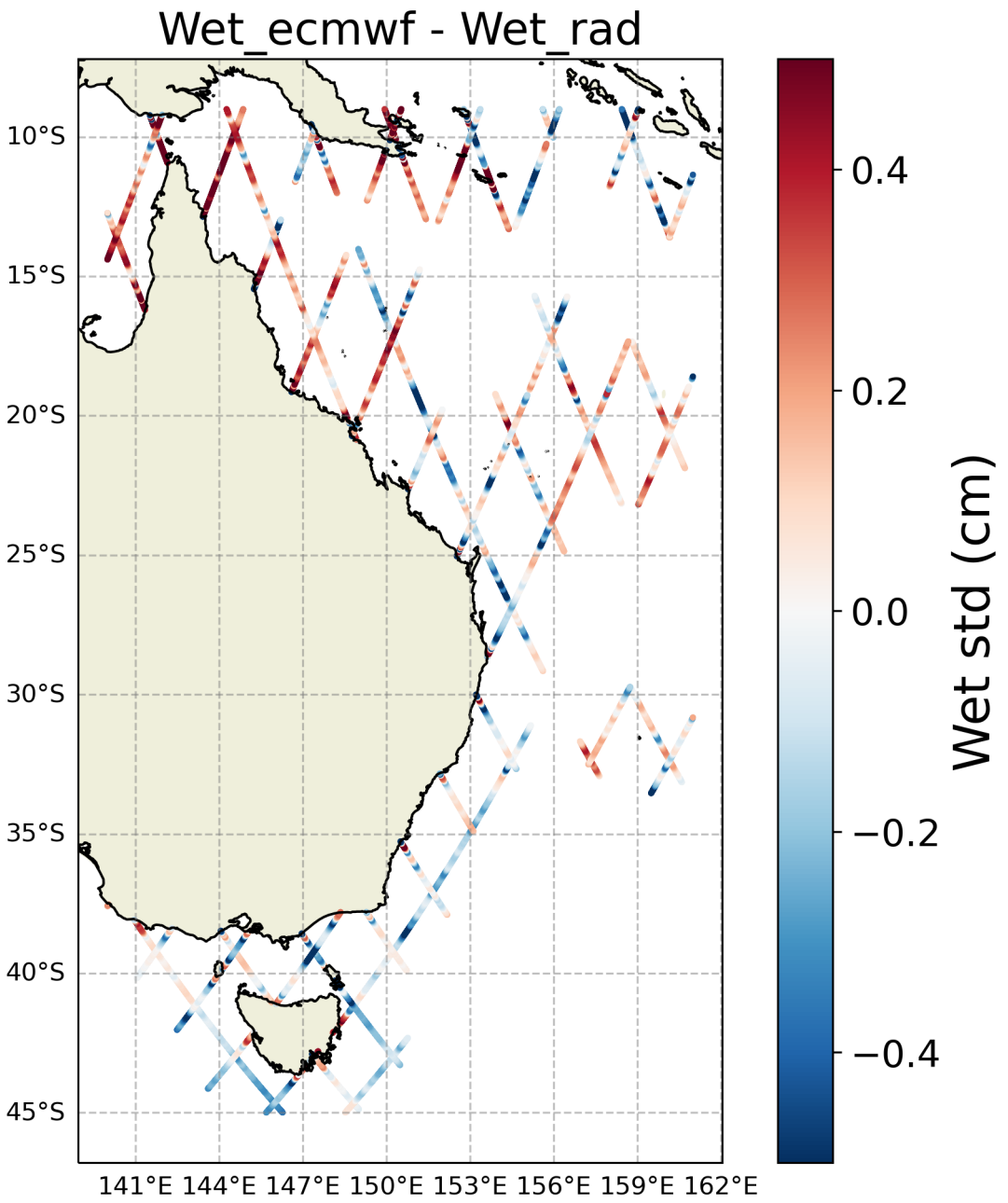

FIGURE 29 – Spatial coherence analysis of the Difference in Wet 's std between Wet_ecmwf and Wet_rad

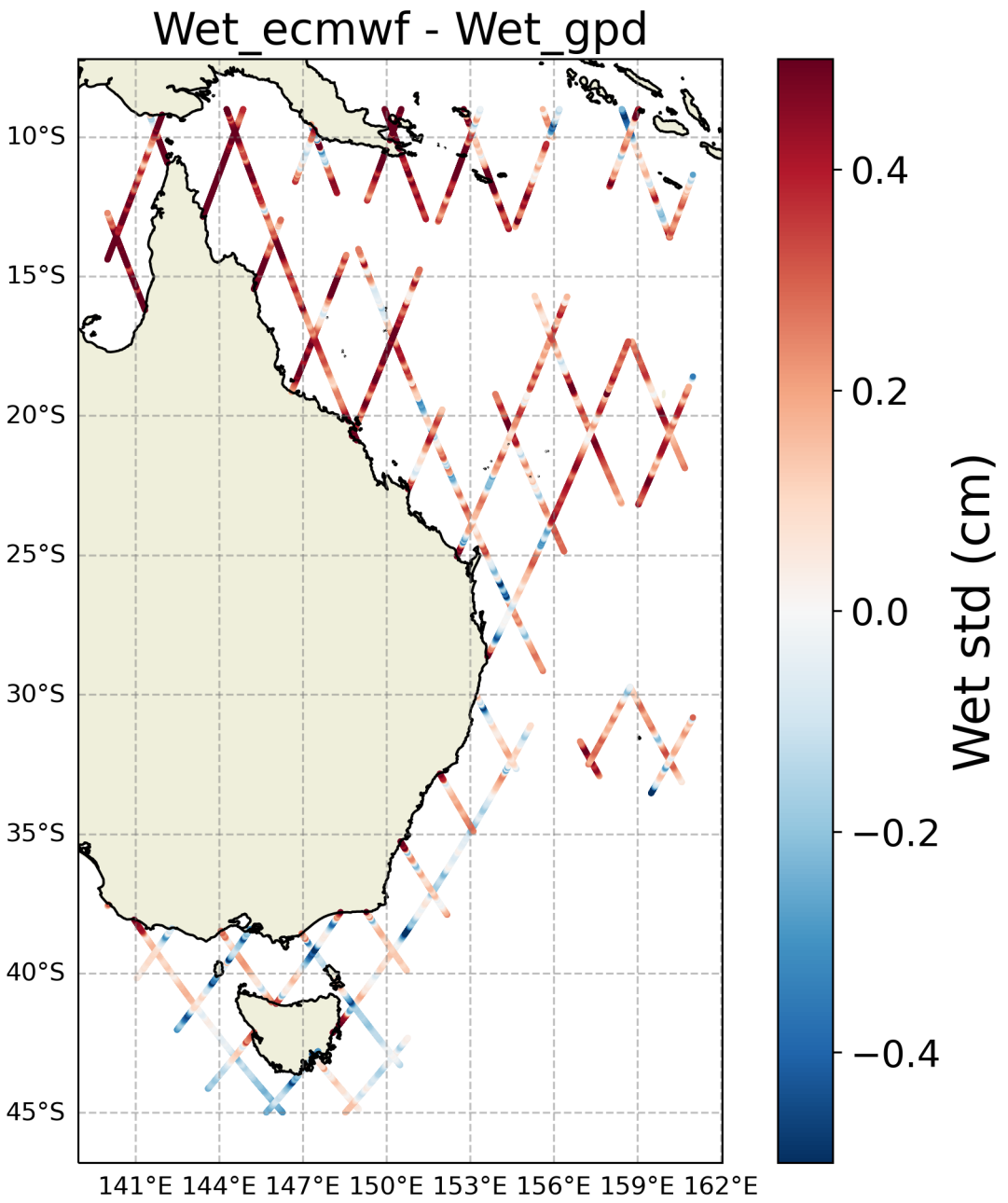

FIGURE 30 – Spatial coherence analysis of the Difference in Wet 's std between Wet_ecmwf and Wet_gpd

3.2.3 Wet 's mean

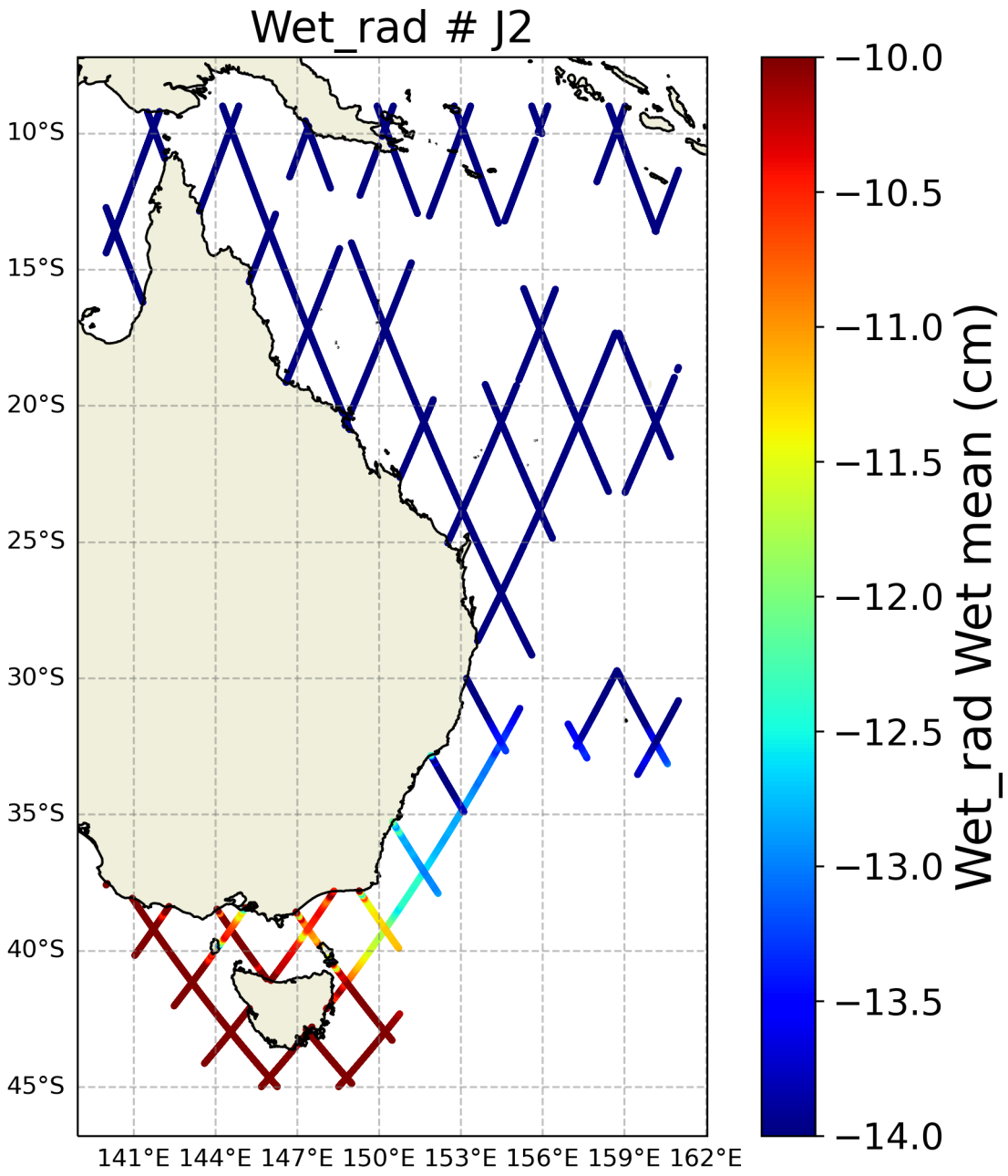

FIGURE 31 – Spatial coherence analysis of the mean of the Wet_rad version of Wet variable

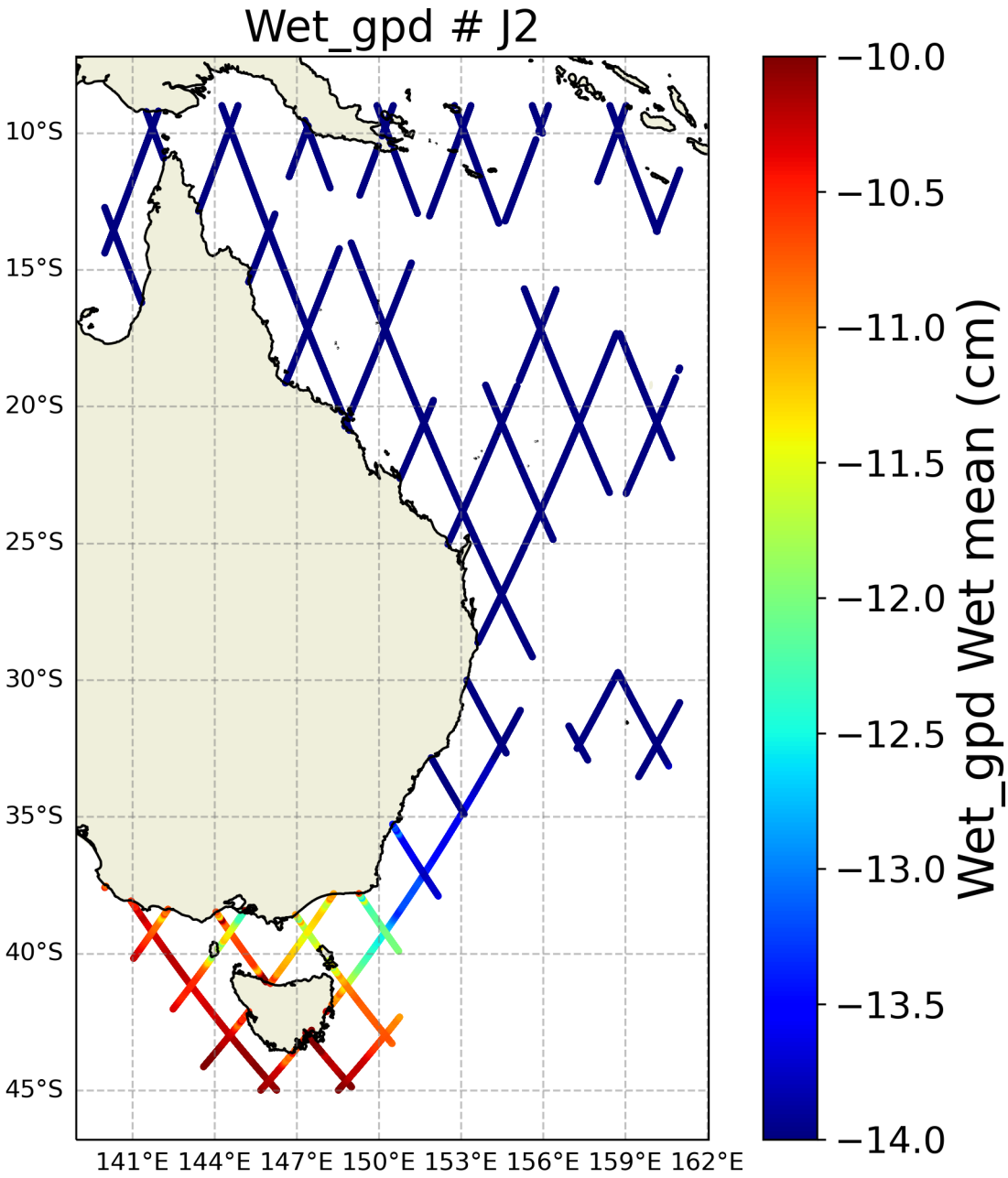

FIGURE 32 – Spatial coherence analysis of the mean of the Wet_gpd version of Wet variable

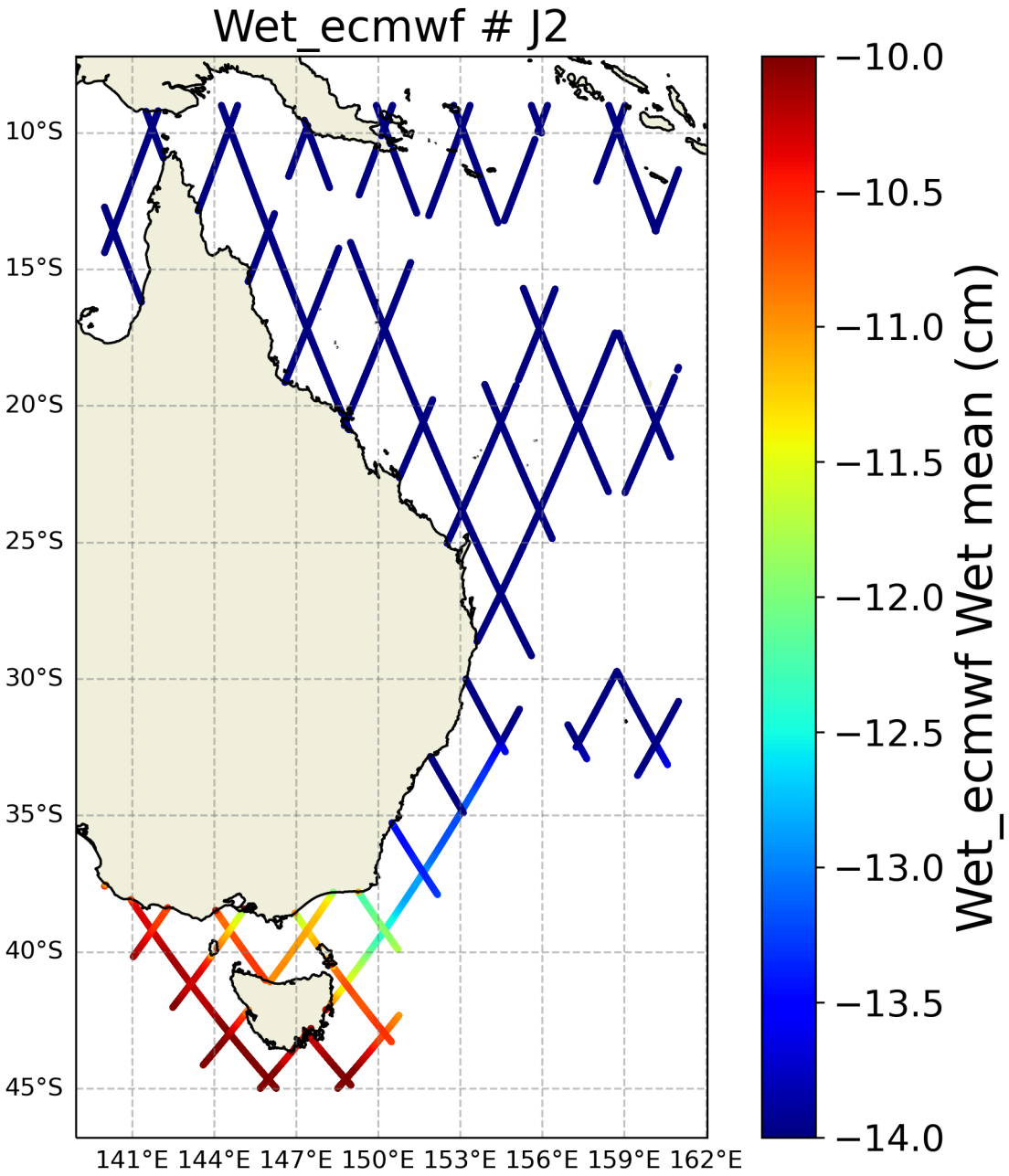

FIGURE 33 – Spatial coherence analysis of the mean of the Wet_ecmwf version of Wet variable

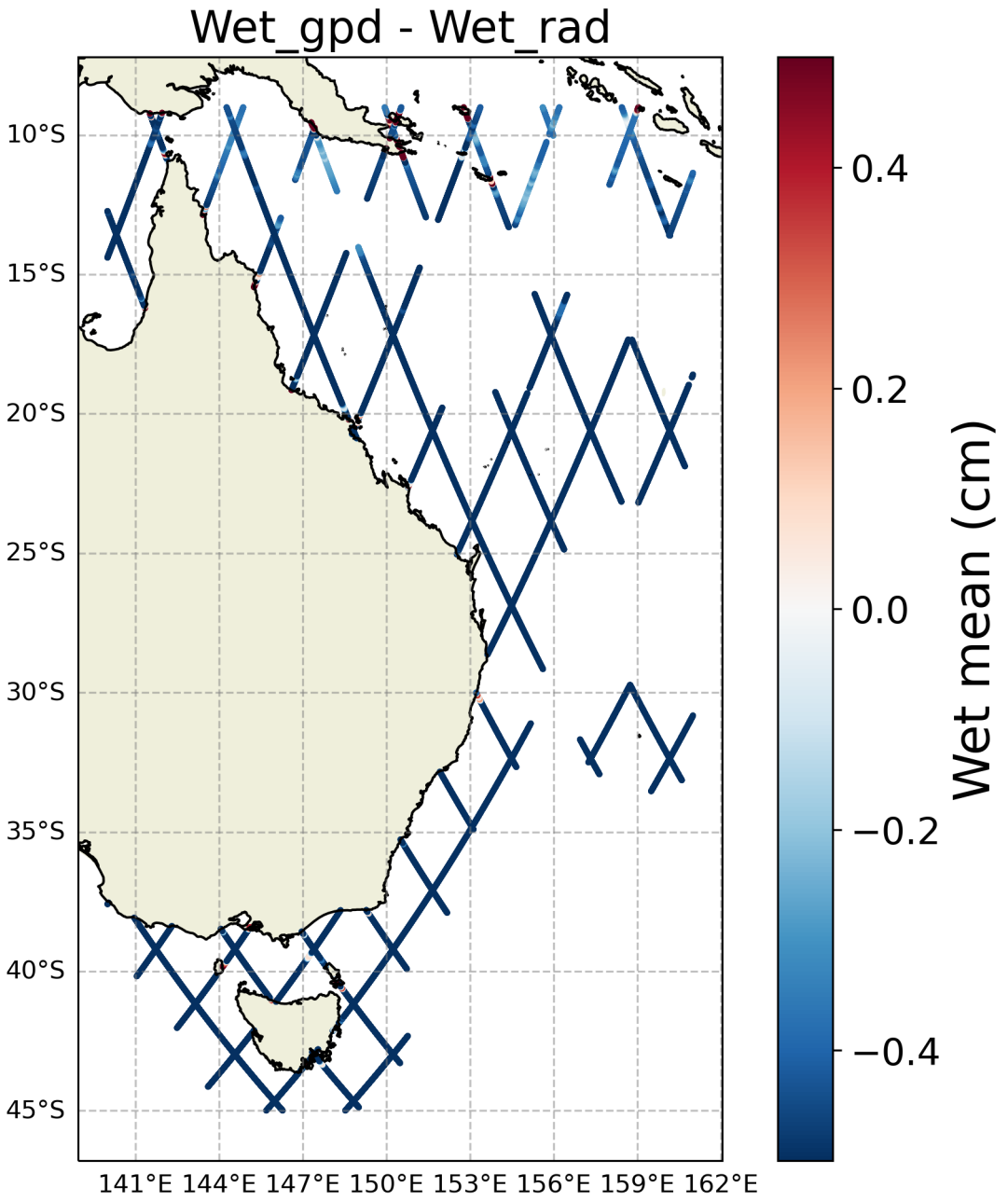

FIGURE 34 – Spatial coherence analysis of the Difference in Wet 's mean between Wet_gpd and Wet_rad

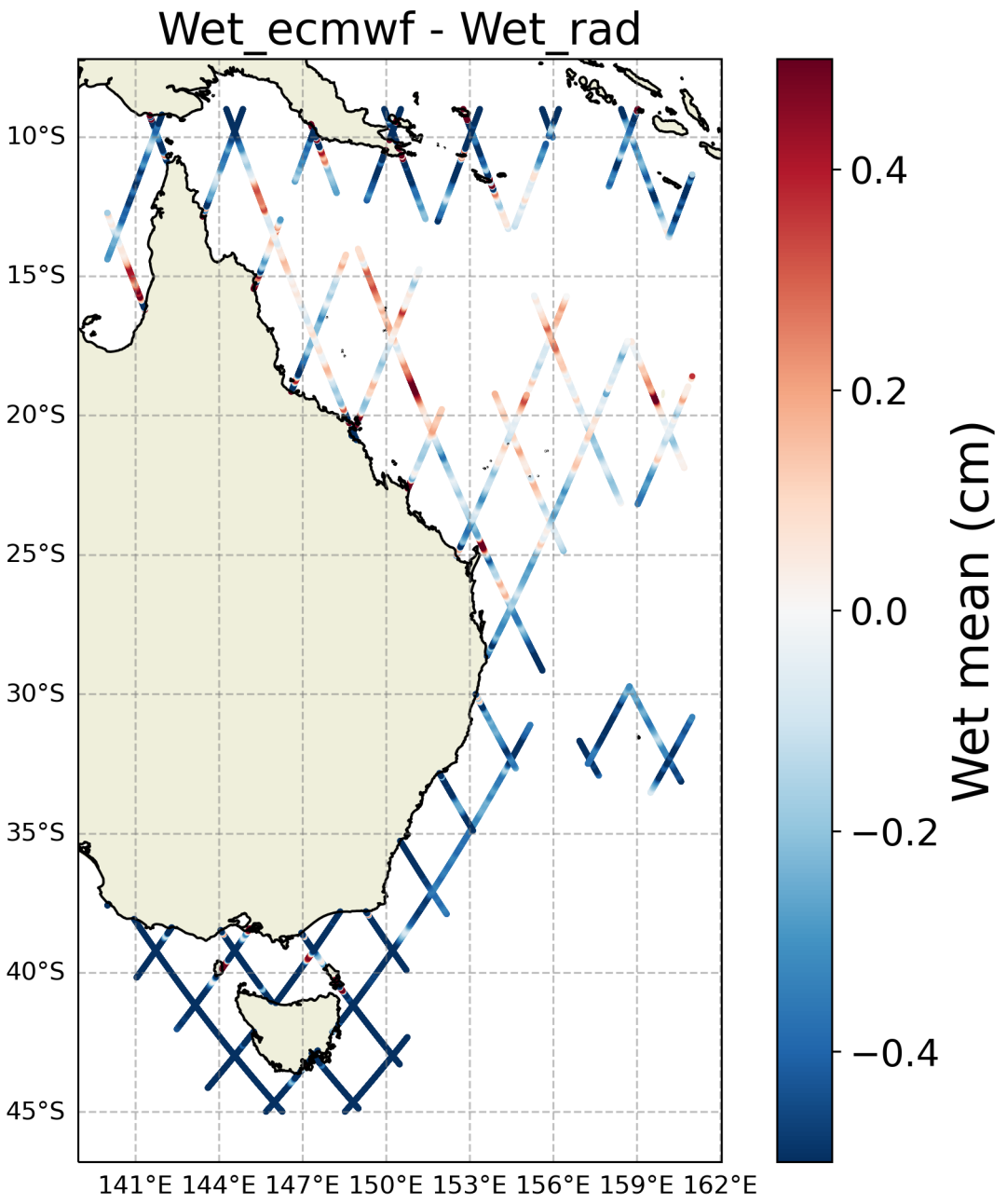

FIGURE 35 – Spatial coherence analysis of the Difference in Wet 's mean between Wet_ecmwf and Wet_rad

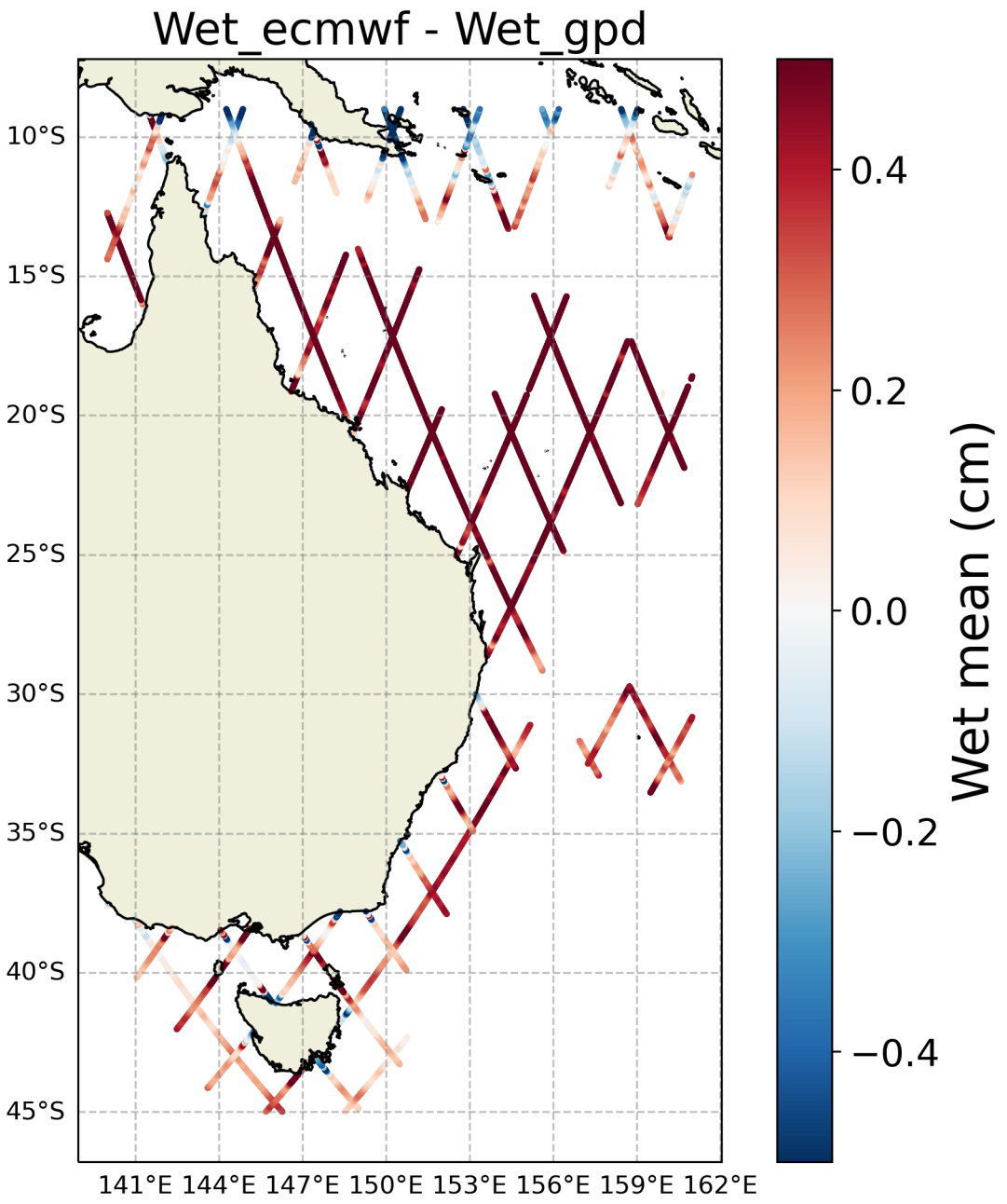

FIGURE 36 – Spatial coherence analysis of the Difference in Wet 's mean between Wet_ecmwf and Wet_gpd

4 Histograms

4.1 Wet

	min (cm)	max (cm)	mean (cm)	std (cm)
Wet_rad	-81.29	0.6	-19.286	9.28
Wet_gpd	-49.963	-3.121	-19.9	9.015
Wet_ecmwf	-44.61	-3.64	-19.559	9.191

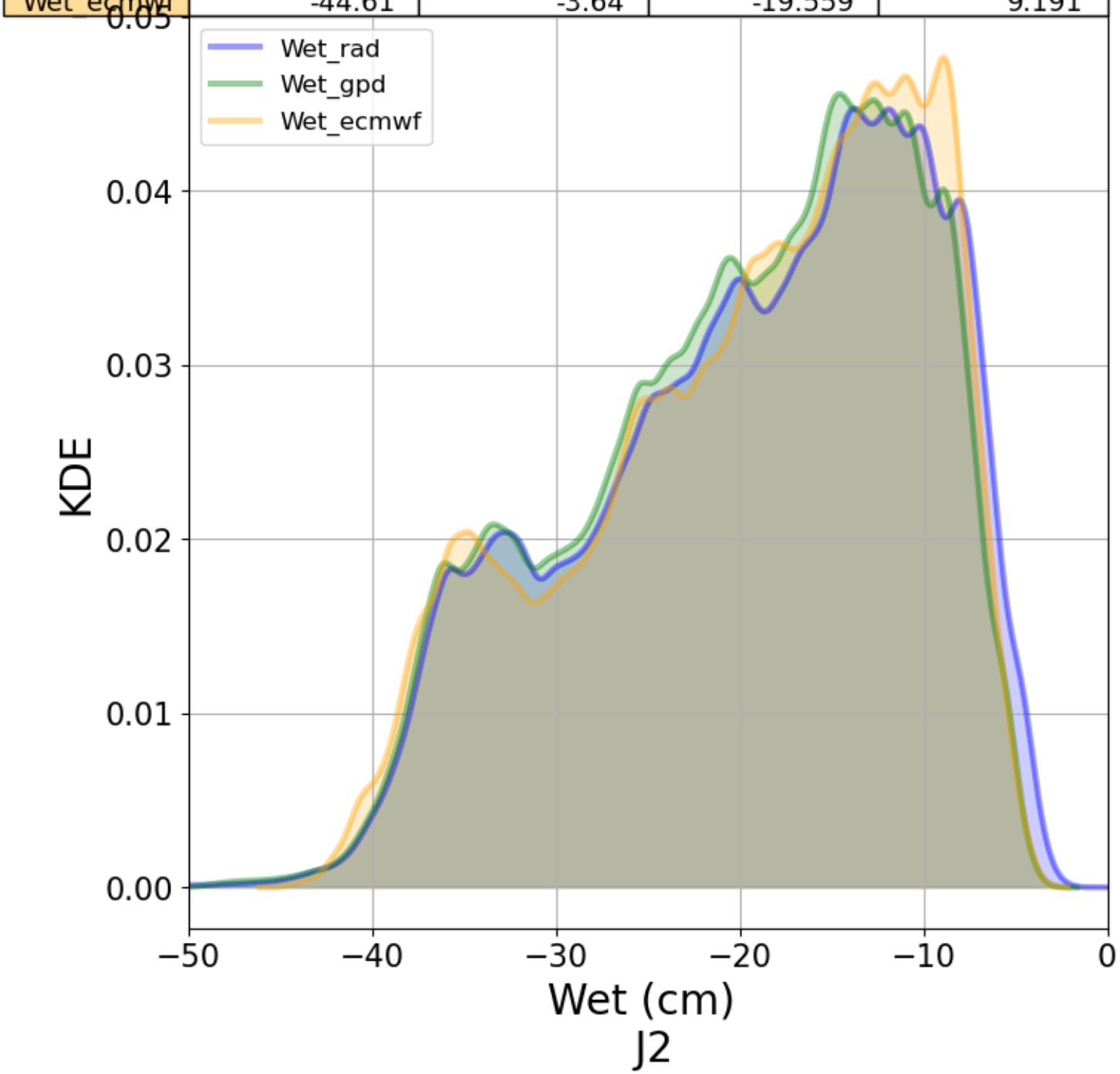

FIGURE 37 – Histogram of each of Wet version

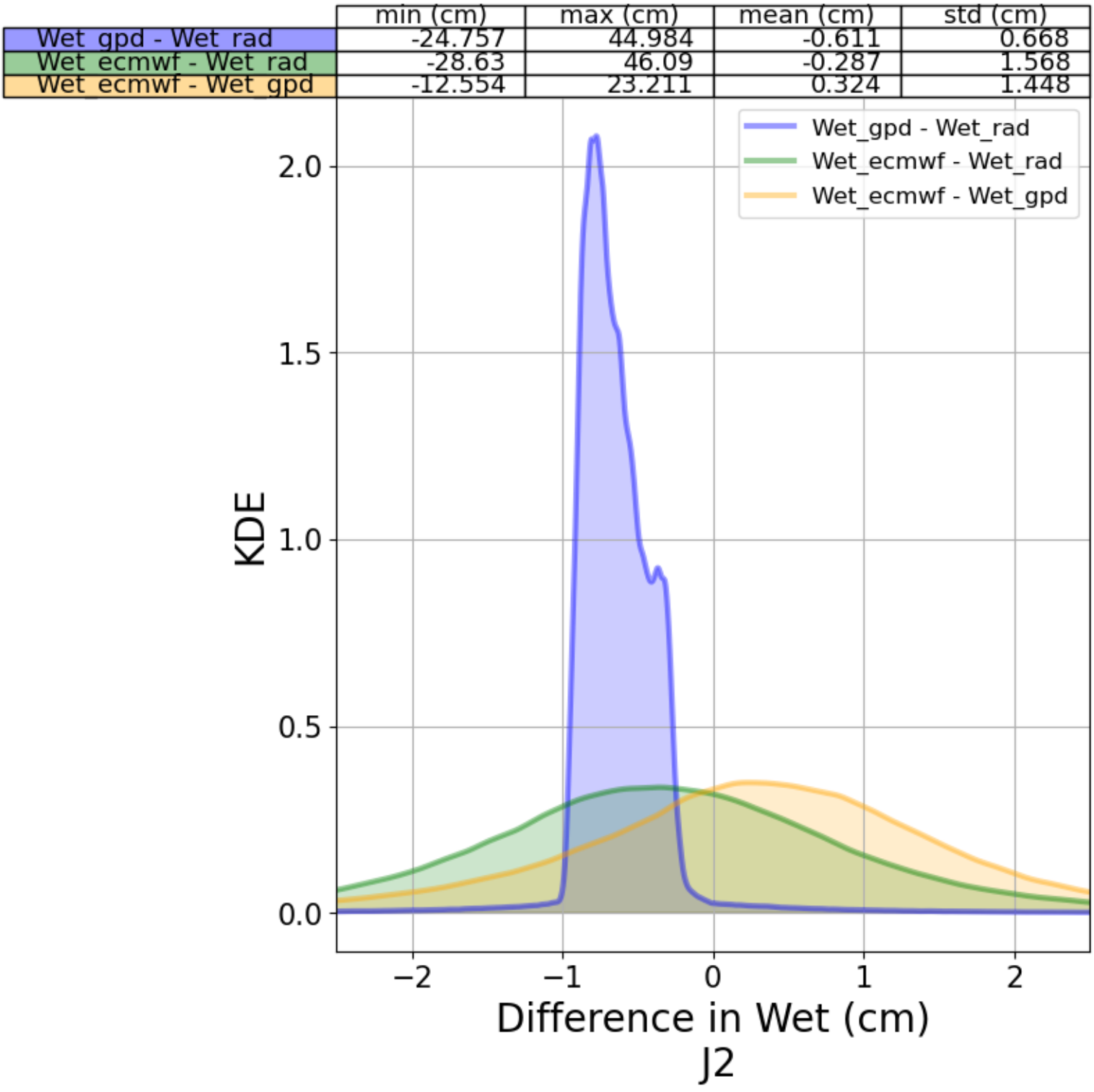

Figure 38 – Histograms of difference of each Wet version and reference one

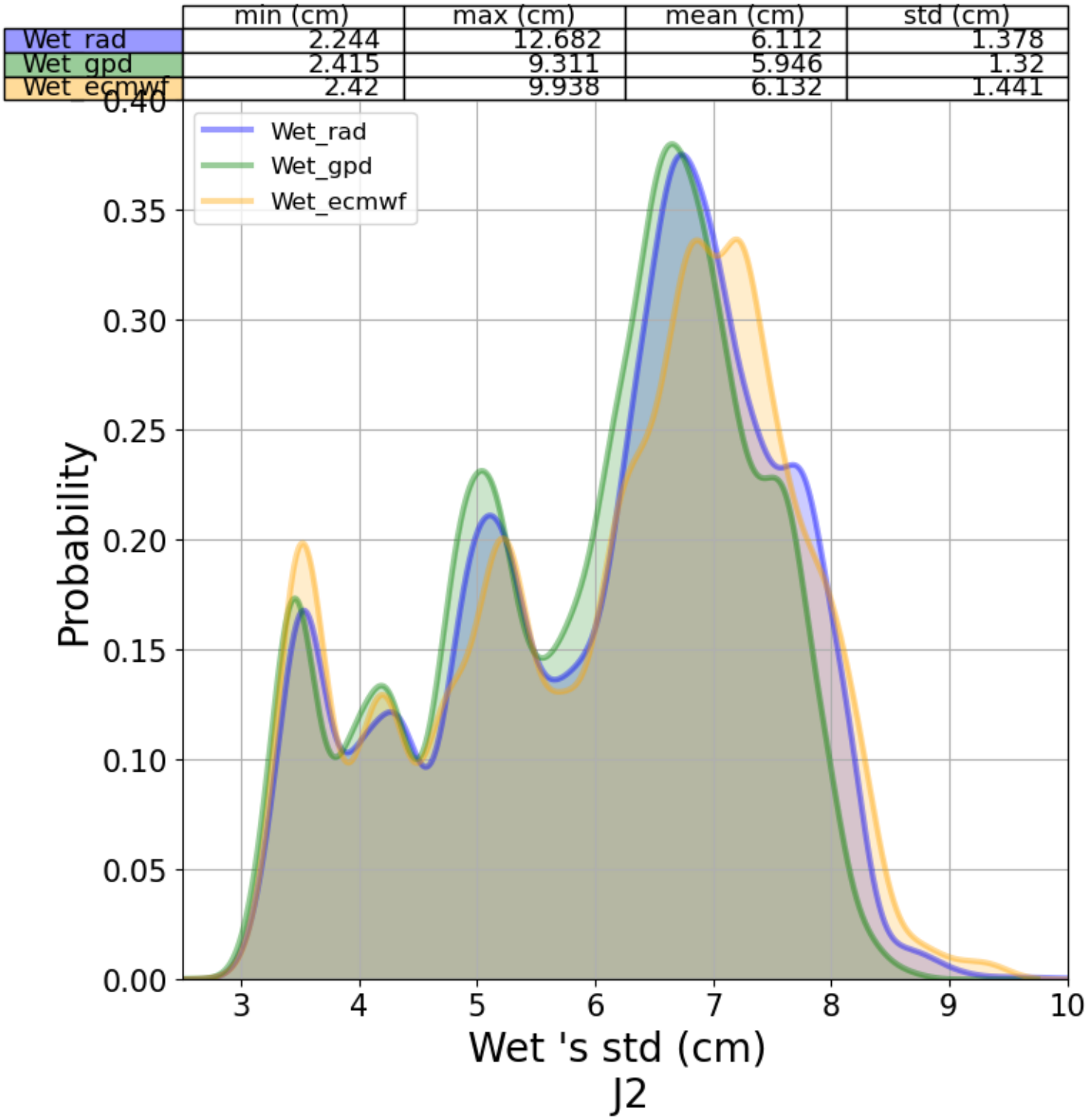

Figure 39 – Histograms of the standard deviation of each Wet version

4.2 sla

	min (cm)	max (cm)	mean (cm)	std (cm)
Wet_rad	-299.83	276.49	3.898	16.9
Wet_gpd	-299.956	278.175	4.535	16.889
Wet_ecmwf	-299.52	277.37	4.19	16.964

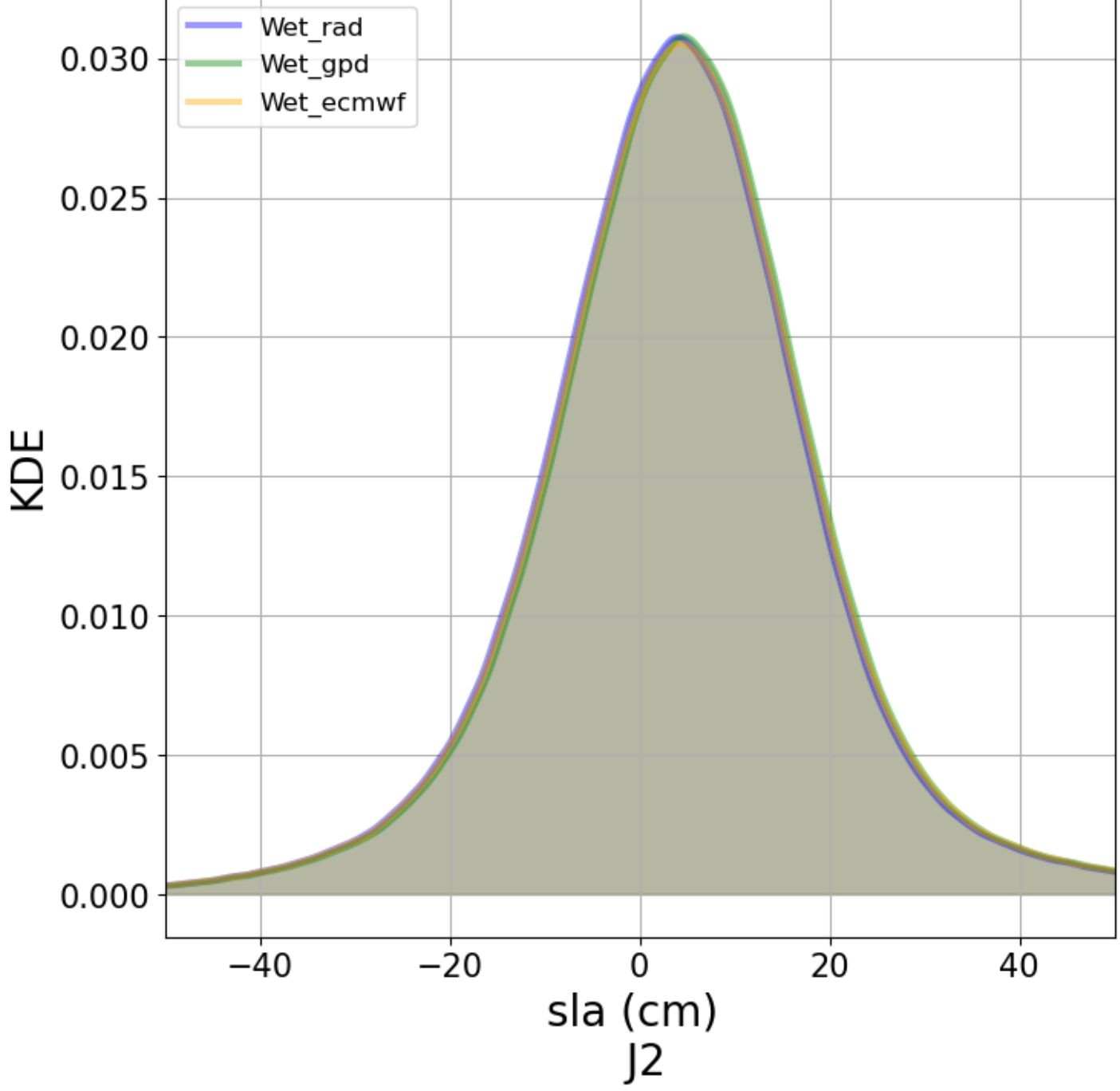

Figure 40 – Histogram of each of sla version

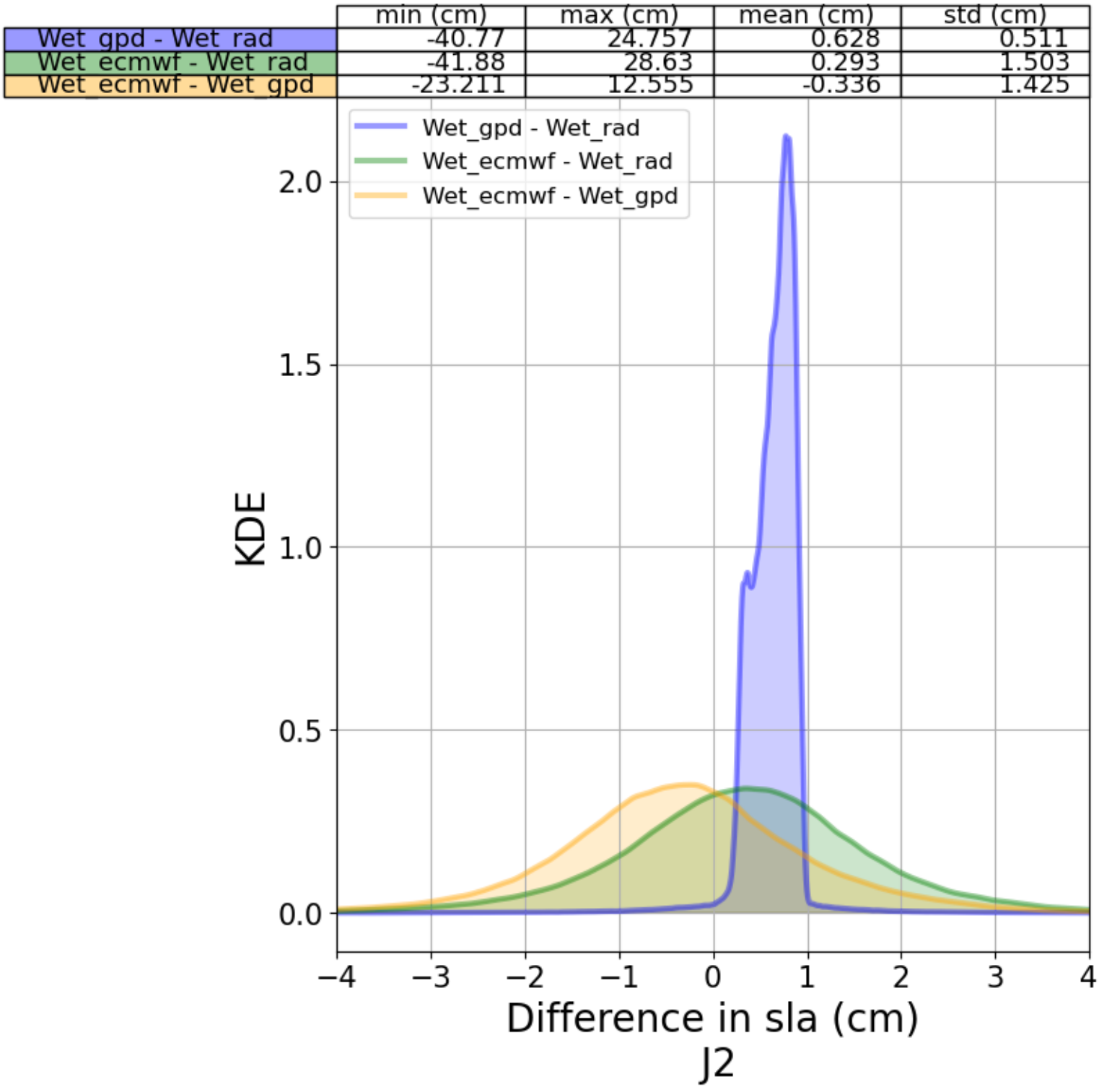

FIGURE 41 – Histograms of difference of each sla version and reference one

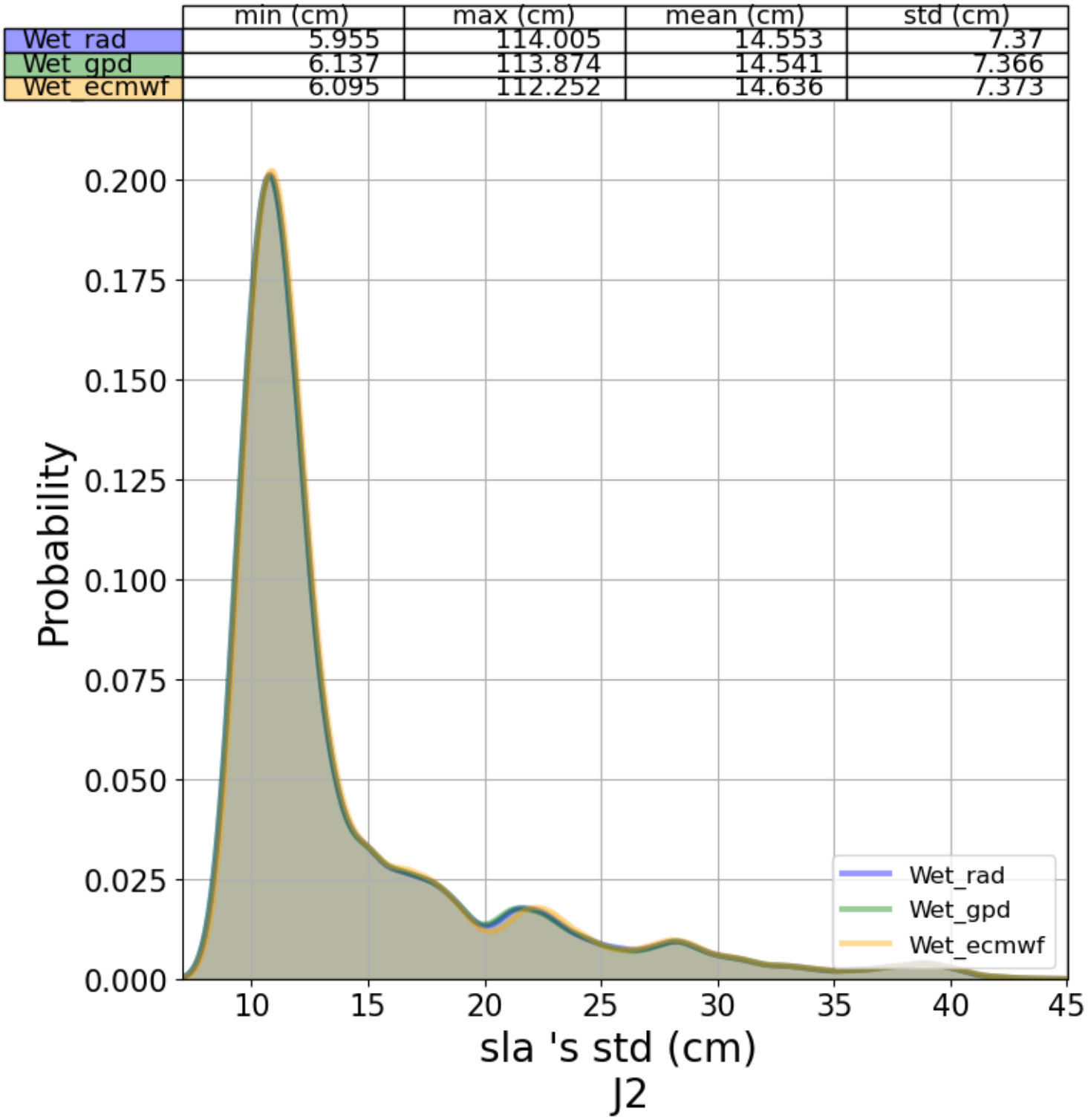

FIGURE 42 – Histograms of the standard deviation of each sla version

5 Along-track analysis

5.1 Wet

5.1.1 Wet 's count

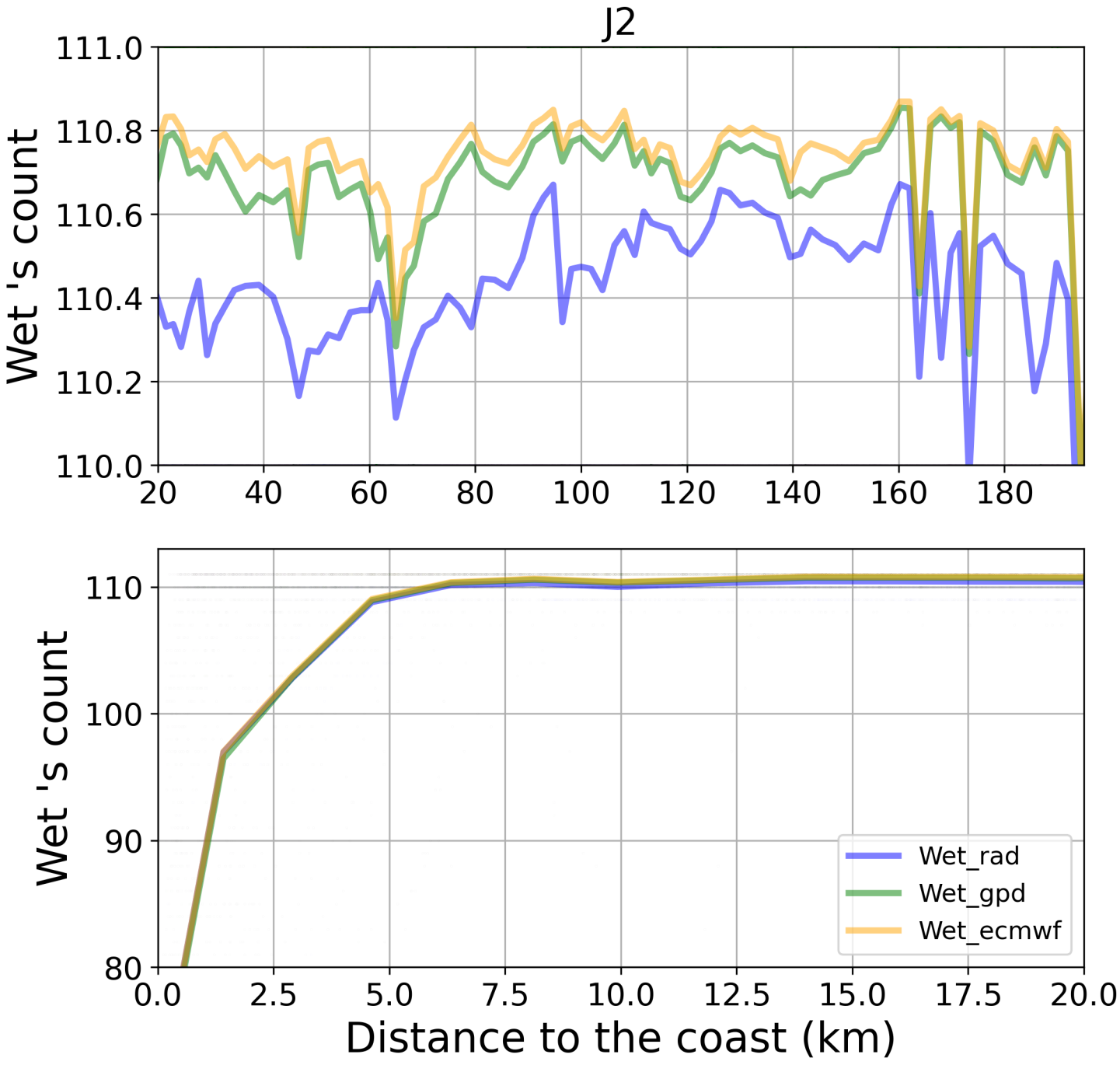

FIGURE 43 – Along-track analysis of Wet 's count

5.1.2 Wet 's std

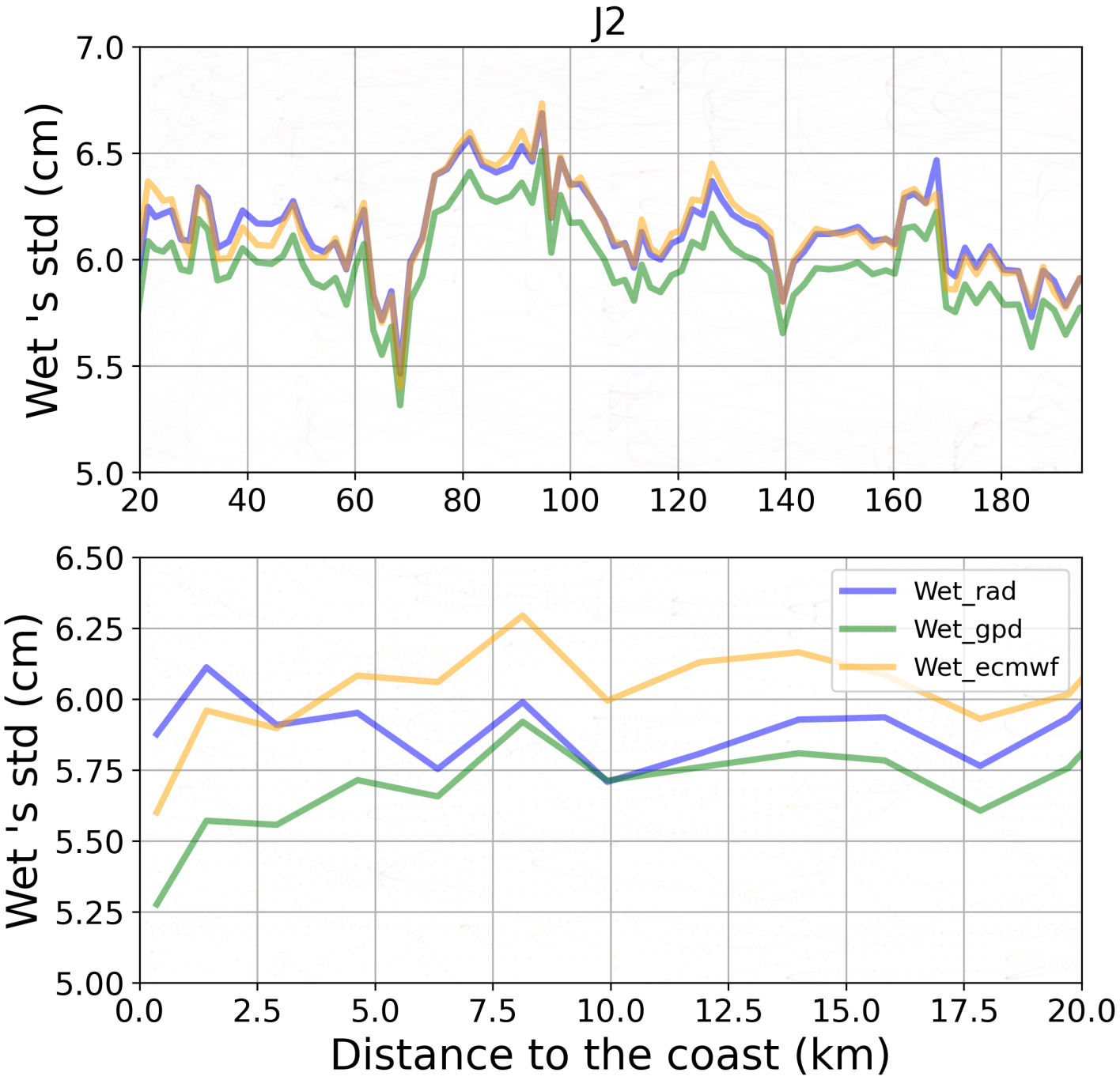

FIGURE 44 – Along-track analysis of Wet 's std

5.1.3 Wet 's mean

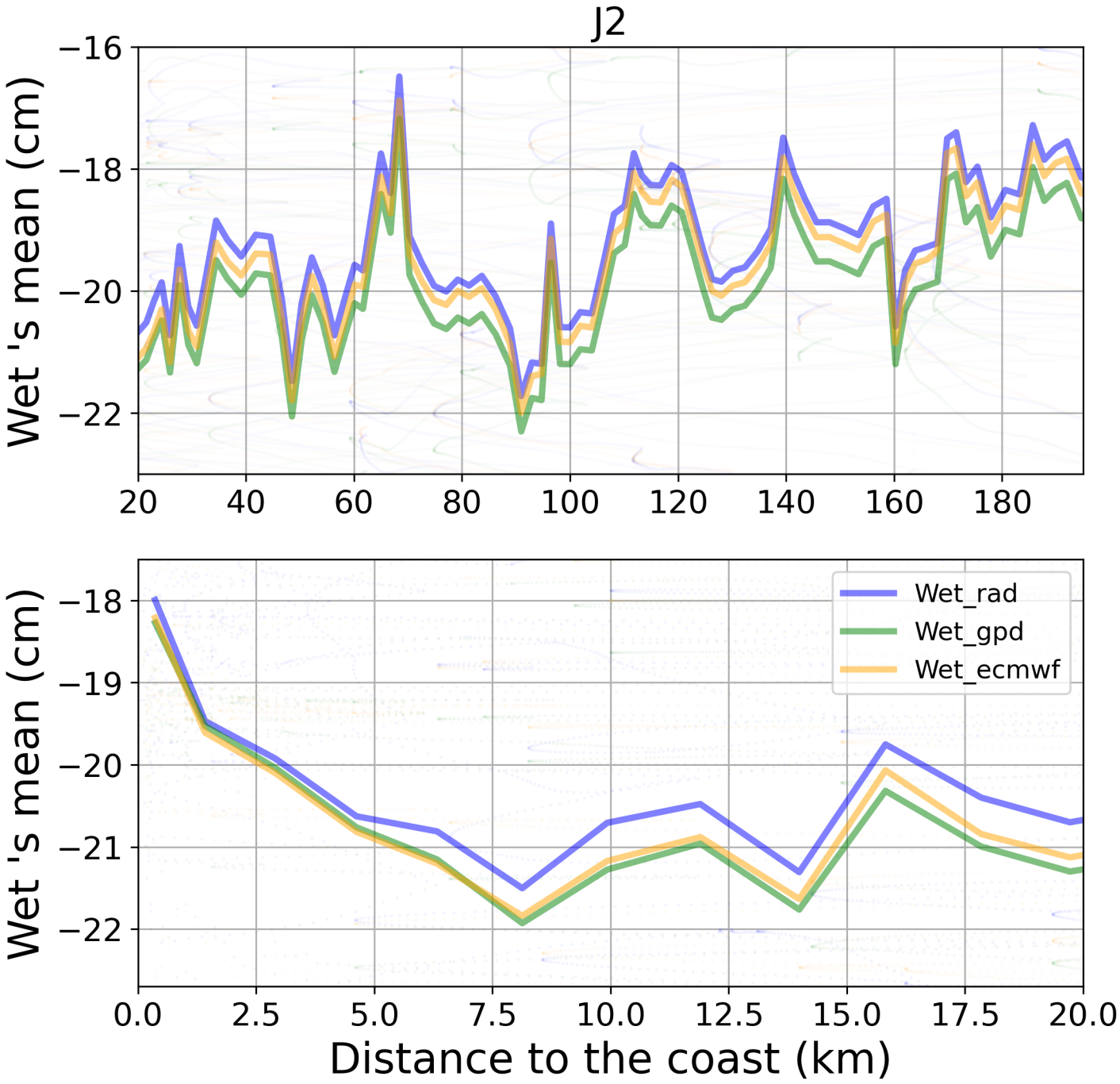

FIGURE 45 – Along-track analysis of Wet 's mean

5.2 sla

5.2.1 sla 's count

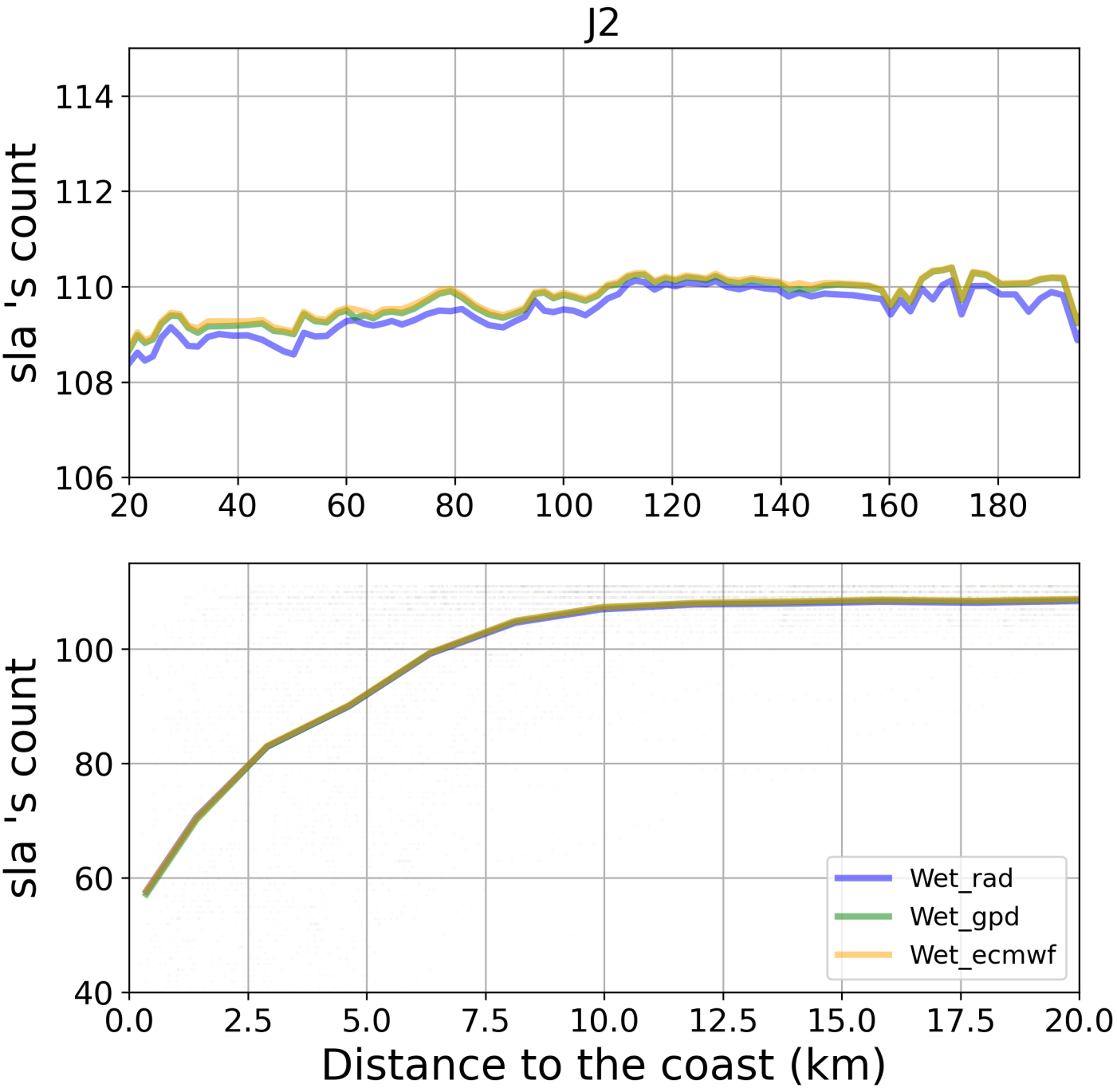

FIGURE 46 – Along-track analysis of sla 's count

5.2.2 sla 's std

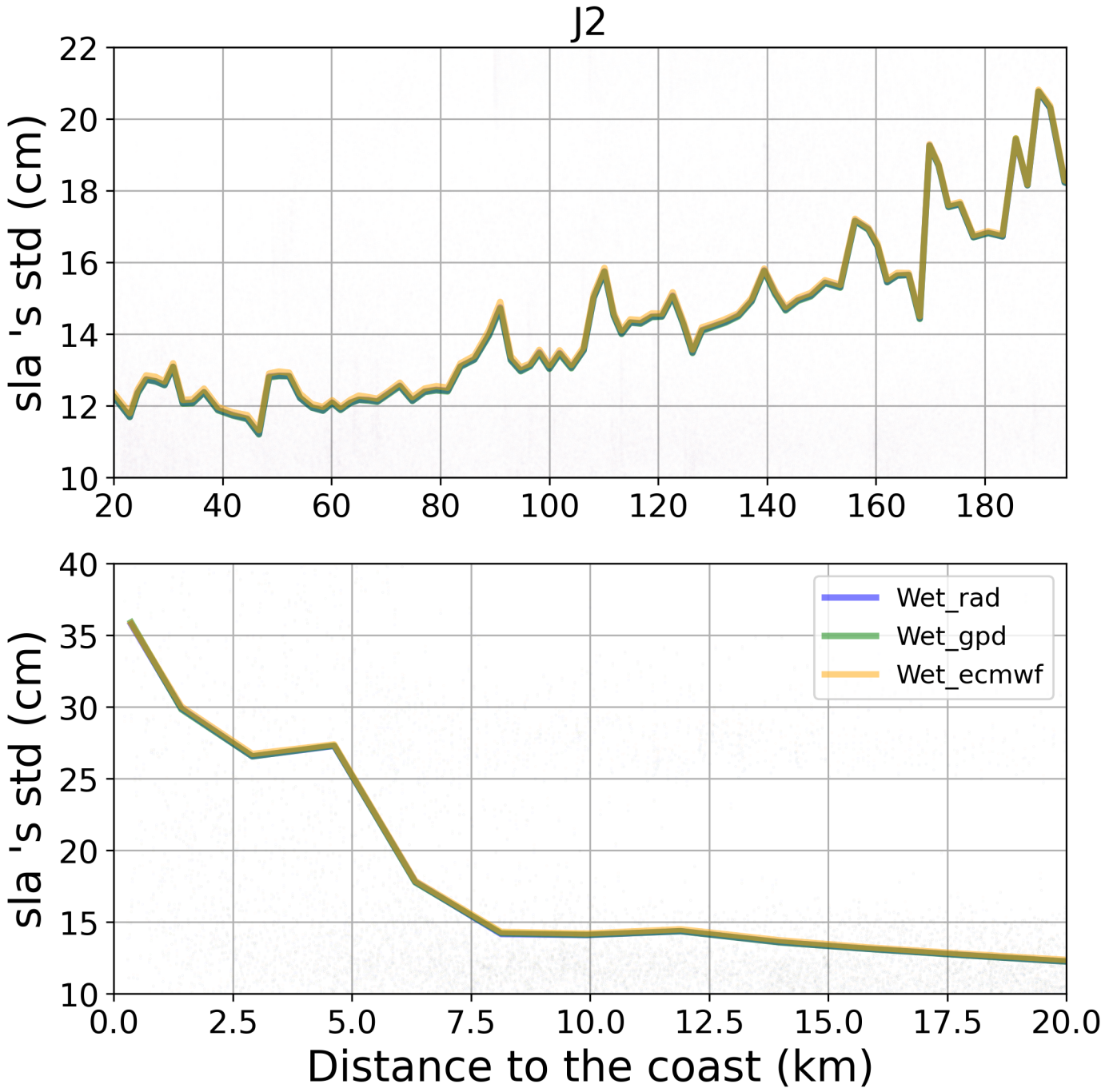

FIGURE 47 – Along-track analysis of sla 's std

5.2.3 sla 's mean

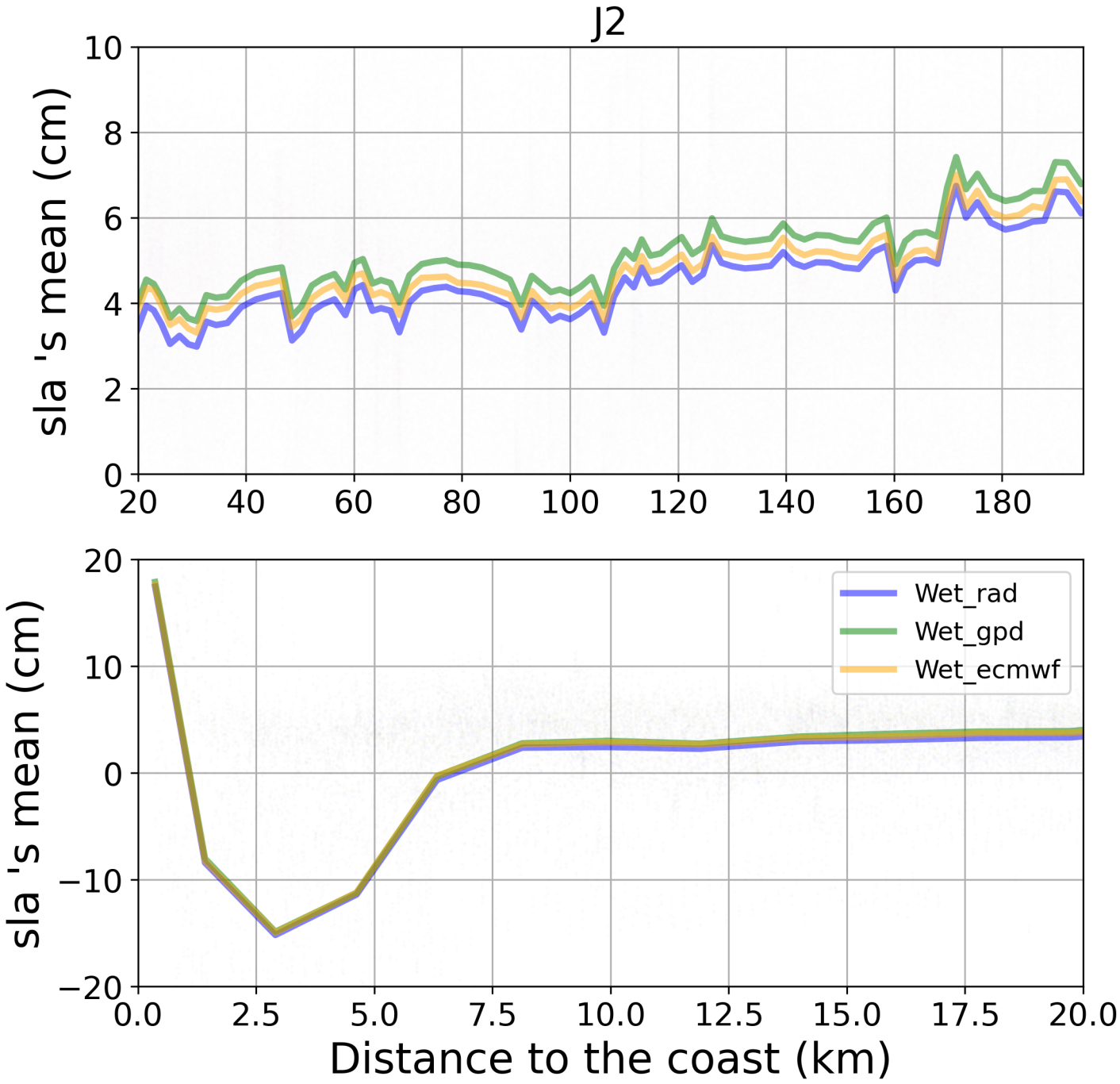

FIGURE 48 – Along-track analysis of sla 's mean

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 : Lorne_Jetty

- Nearest track to Lorne_Jetty station is the track number track88
- The area of interest is limited by :
  - A circle which it's center is the Lorne_Jetty tide gauge station location and has a Raduis of 40 Km
  - Maximum distance to the coast : 20 Km

6.1.1 correlation visualization in maps view % Lorne_Jetty tide gauge

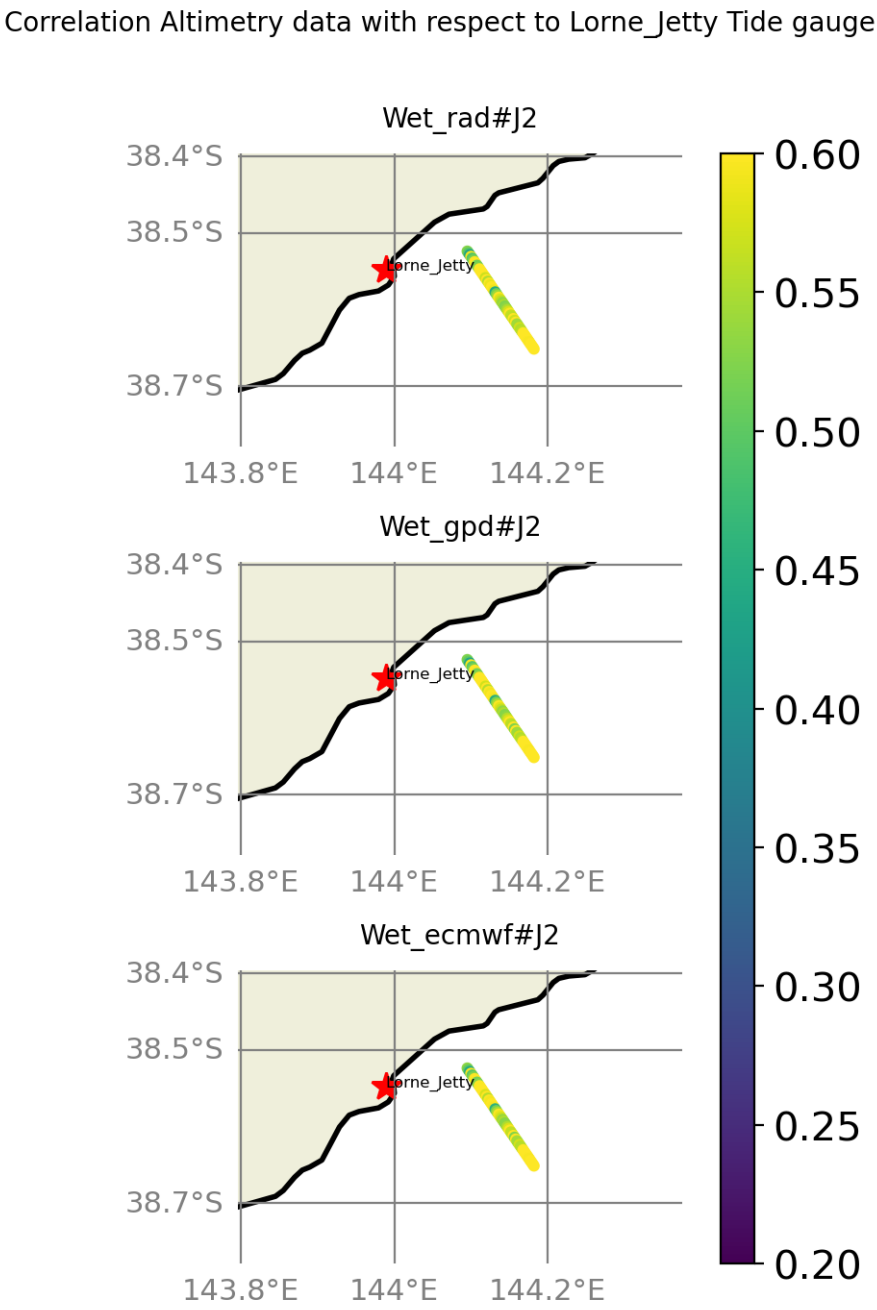

Figure 49 – correlation visualization in maps view % Lorne_Jetty tide gauge

6.1.2 rmsd visualization in maps view % Lorne_Jetty tide gauge

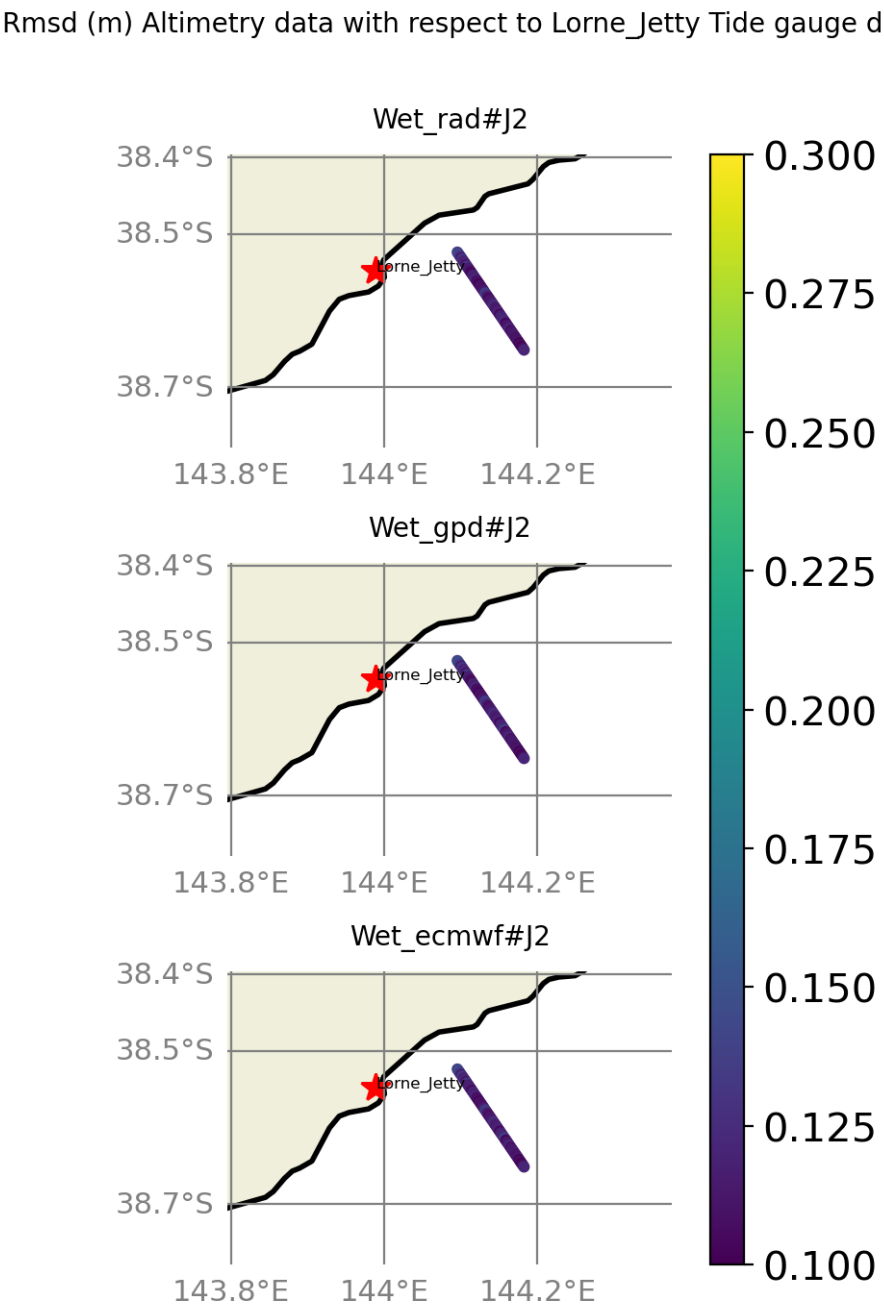

FIGURE 50 – rmsd visualization in maps view % Lorne_Jetty tide gauge

6.1.3 std visualization in maps view % Lorne_Jetty tide gauge

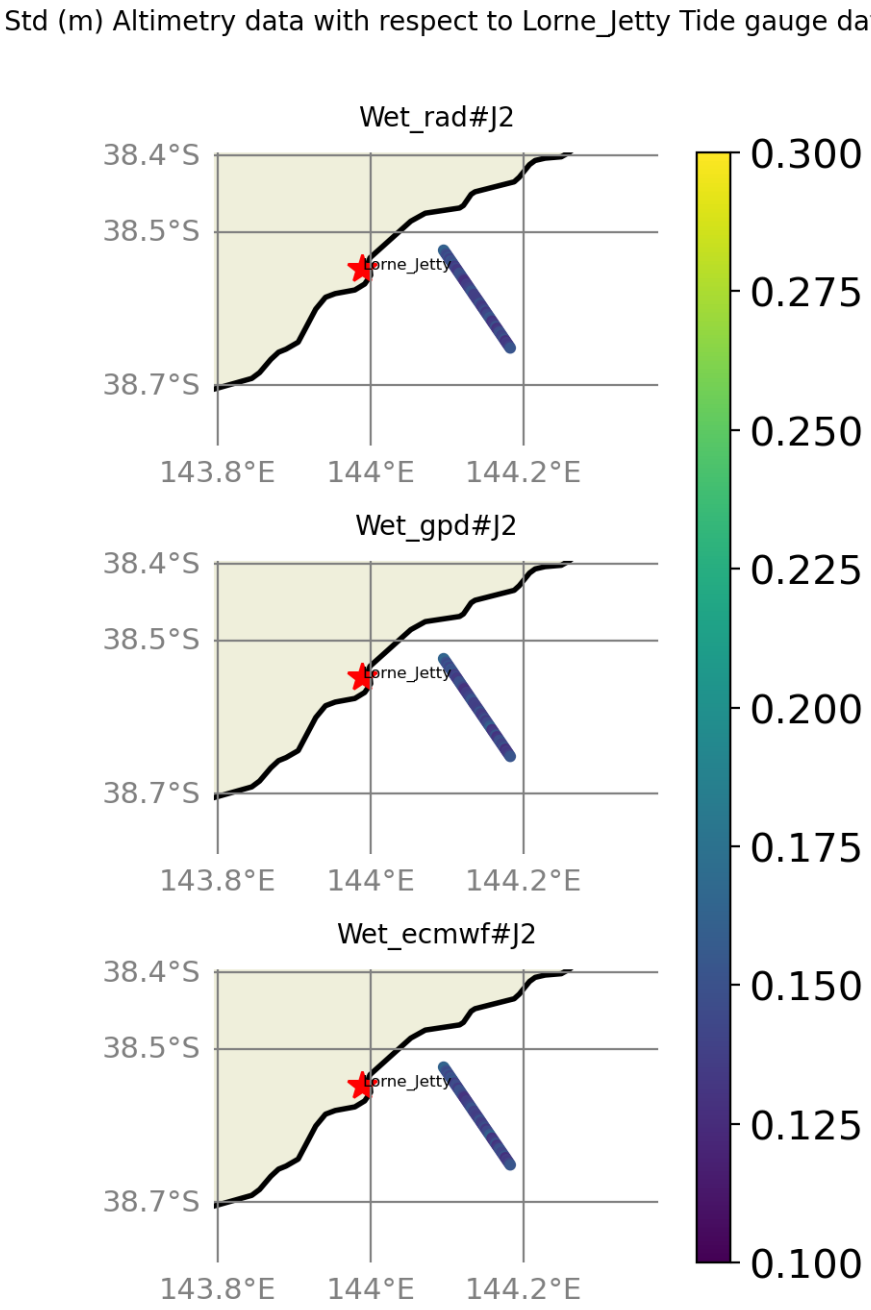

FIGURE 51 – std visualization in maps view % Lorne_Jetty tide gauge

6.1.4 valid_data_percent visualization in maps view % Lorne_Jetty tide gauge

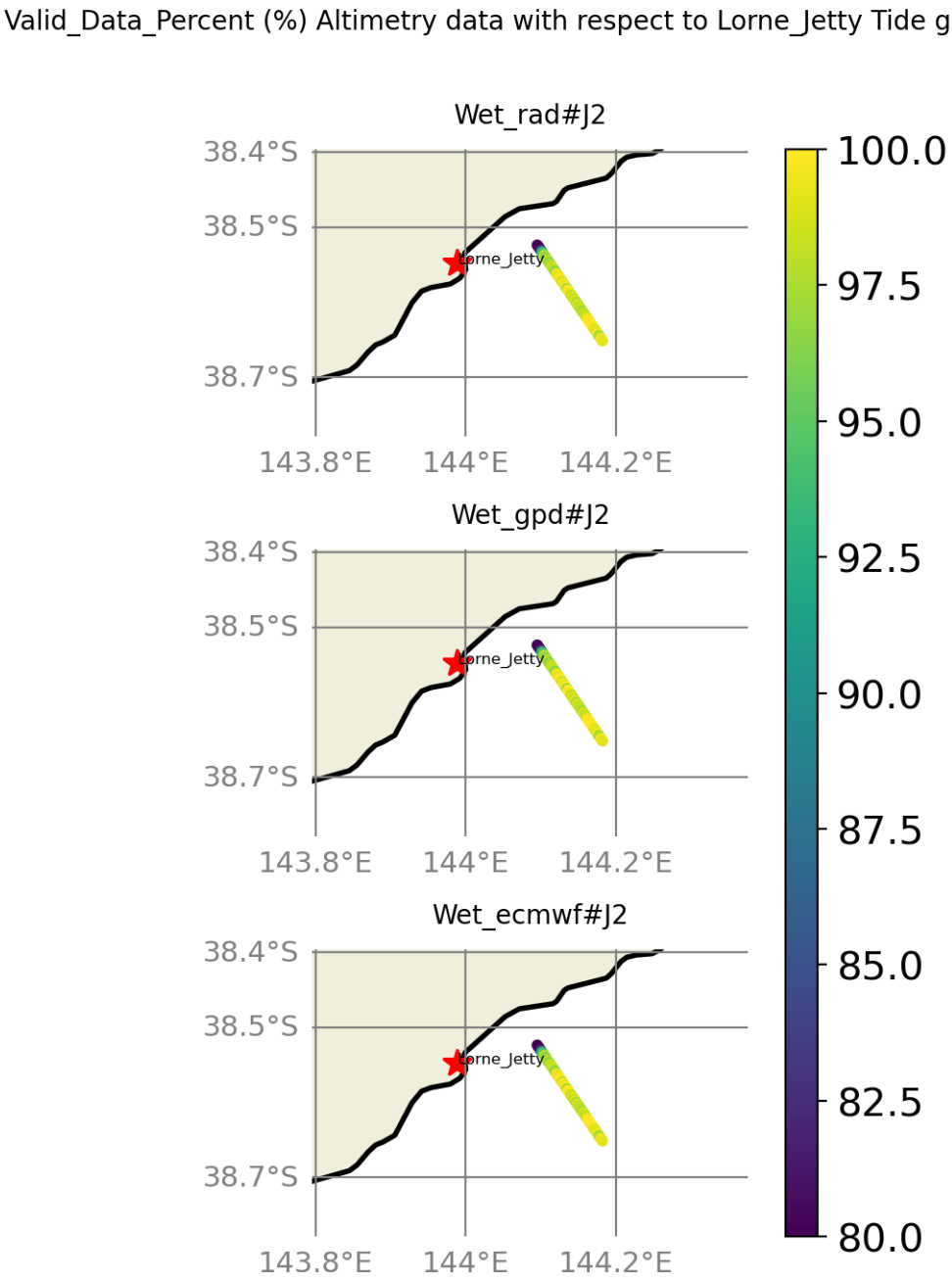

FIGURE 52 – valid_data_percent visualization in maps view % Lorne_Jetty tide gauge

6.1.5 Valid data (%) in function of distance to coast/Lorne_Jetty 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. $maxNB = 109$ 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.

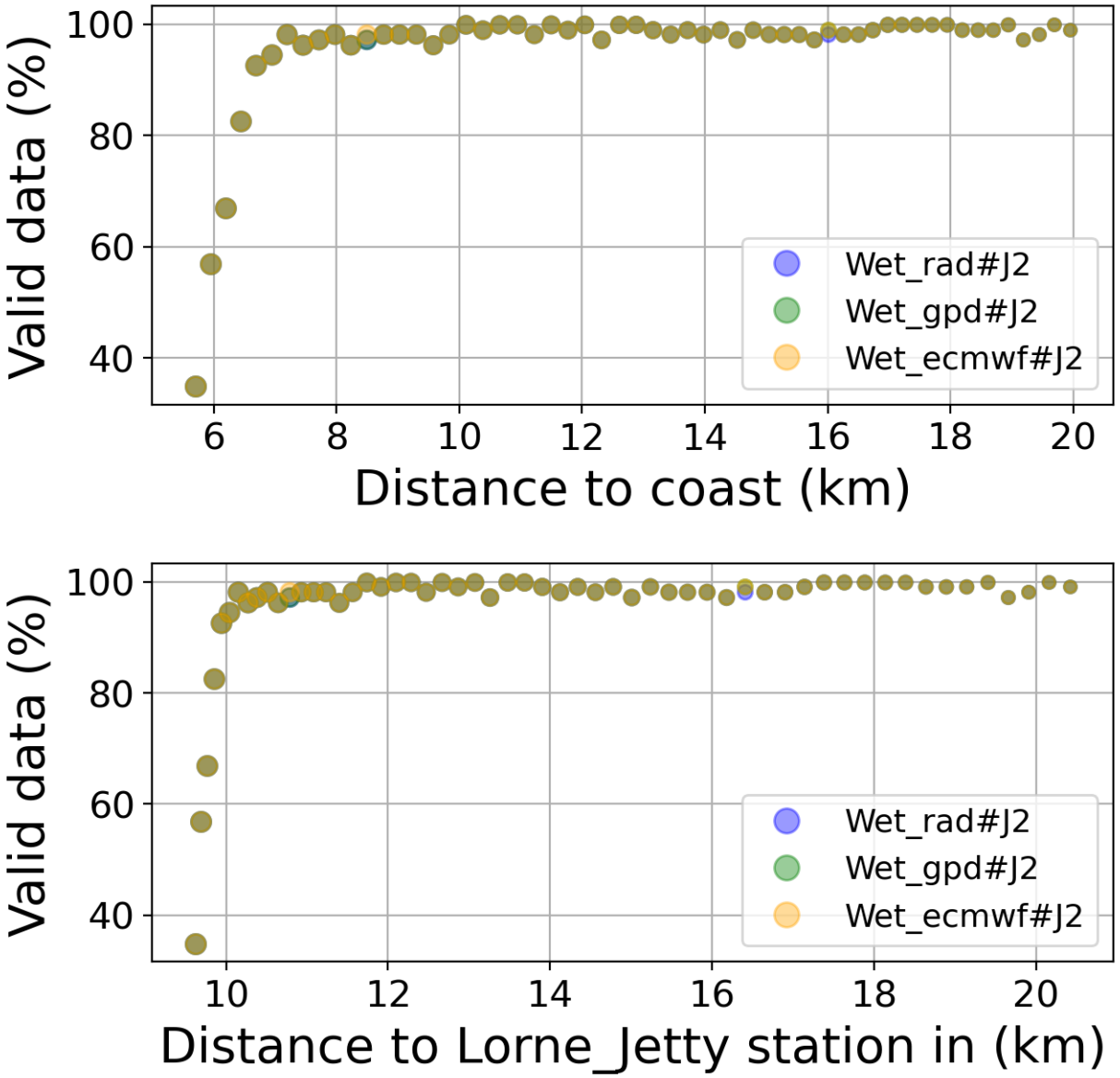

FIGURE 53 – Valid data (%) in function of distance to coast/Lorne_Jetty station

6.1.6 Std in function of distance to coast/Lorne_Jetty station

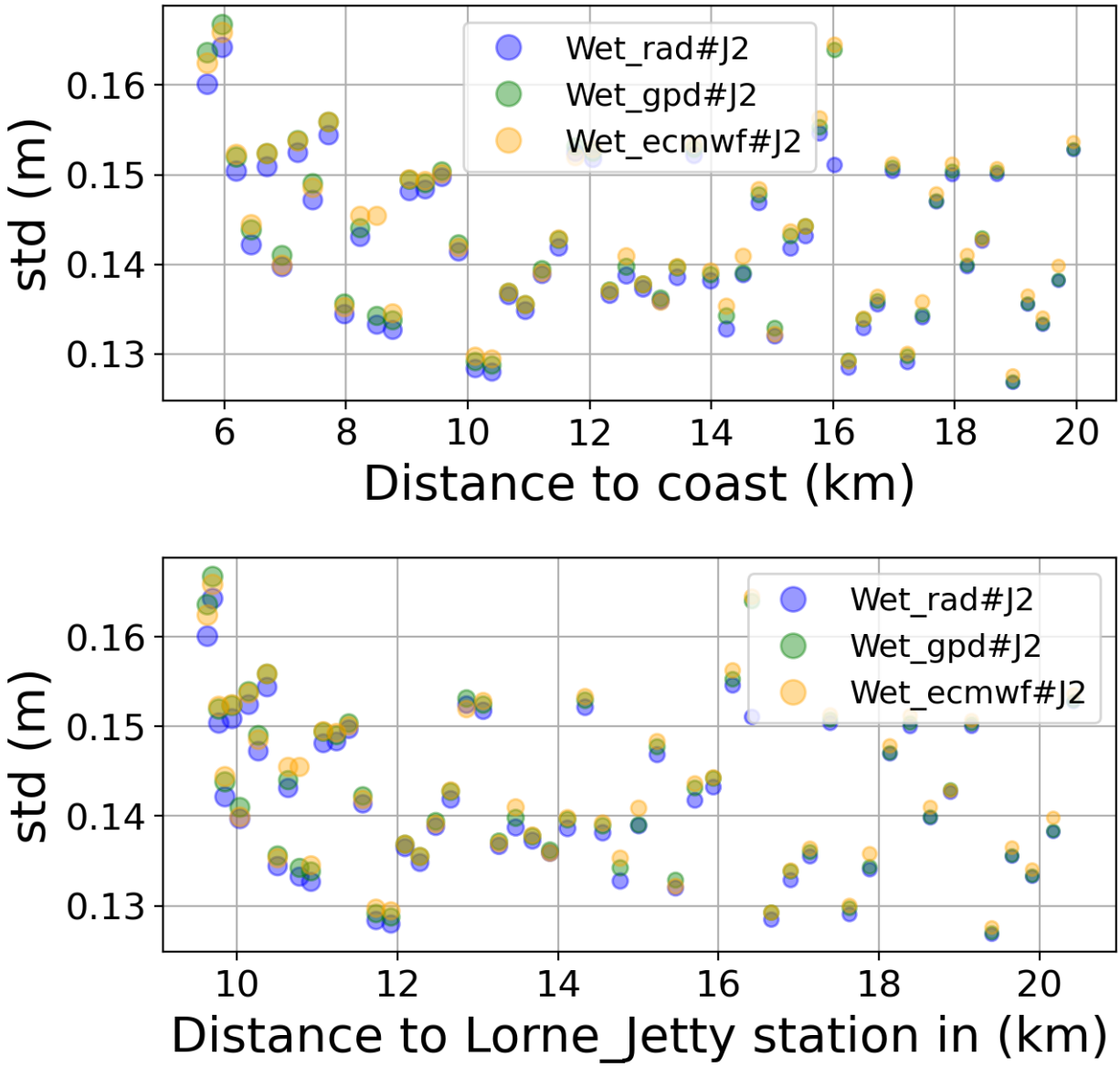

FIGURE 54 – Std in function of the distance to the coast/Lorne_Jetty station

6.1.7 Correlation in function of distance to coast/Lorne_Jetty station

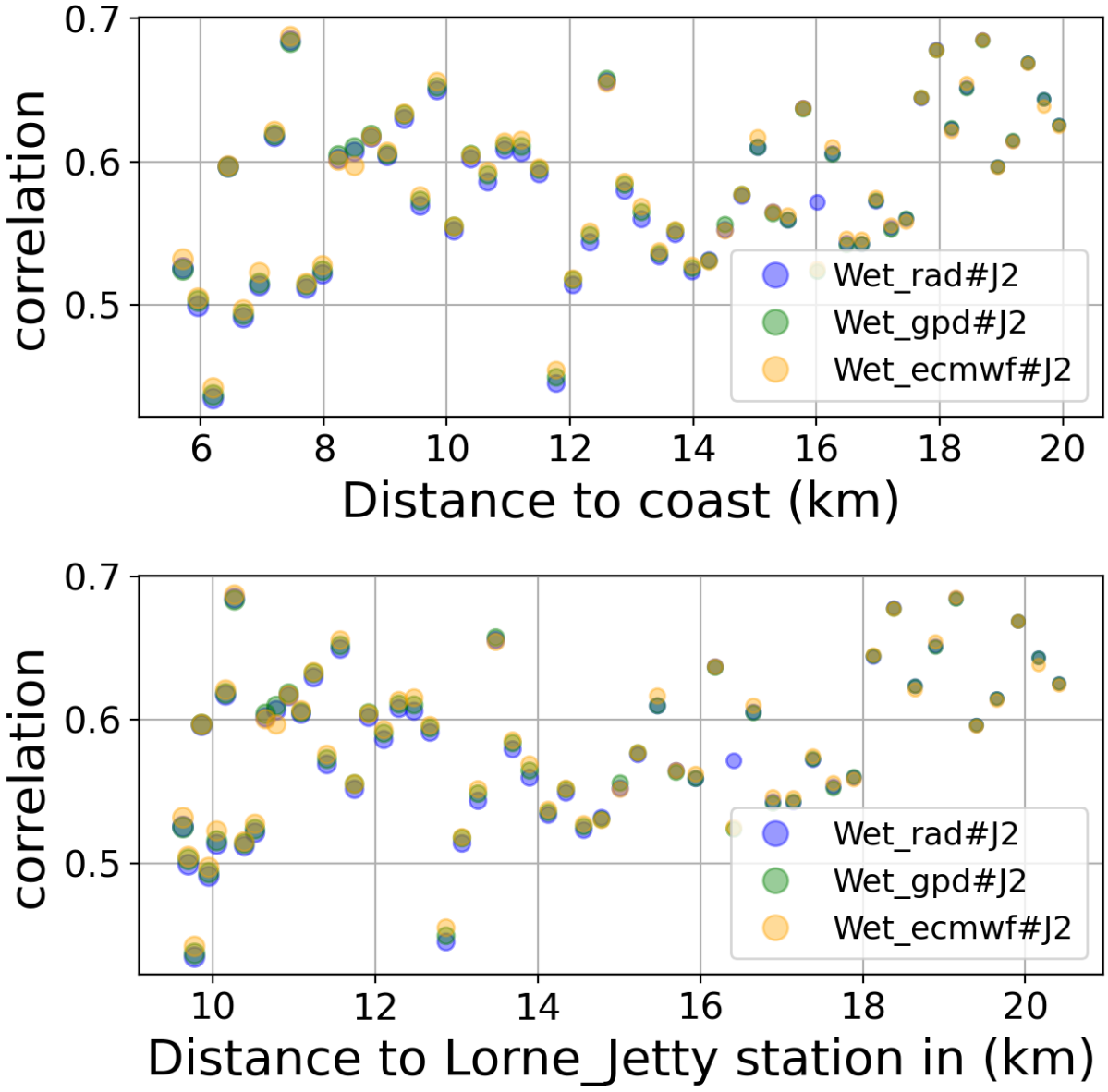

FIGURE 55 – Correlation in function of the distance to the coast/Lorne_Jetty station

6.1.8 Taylor Diagram

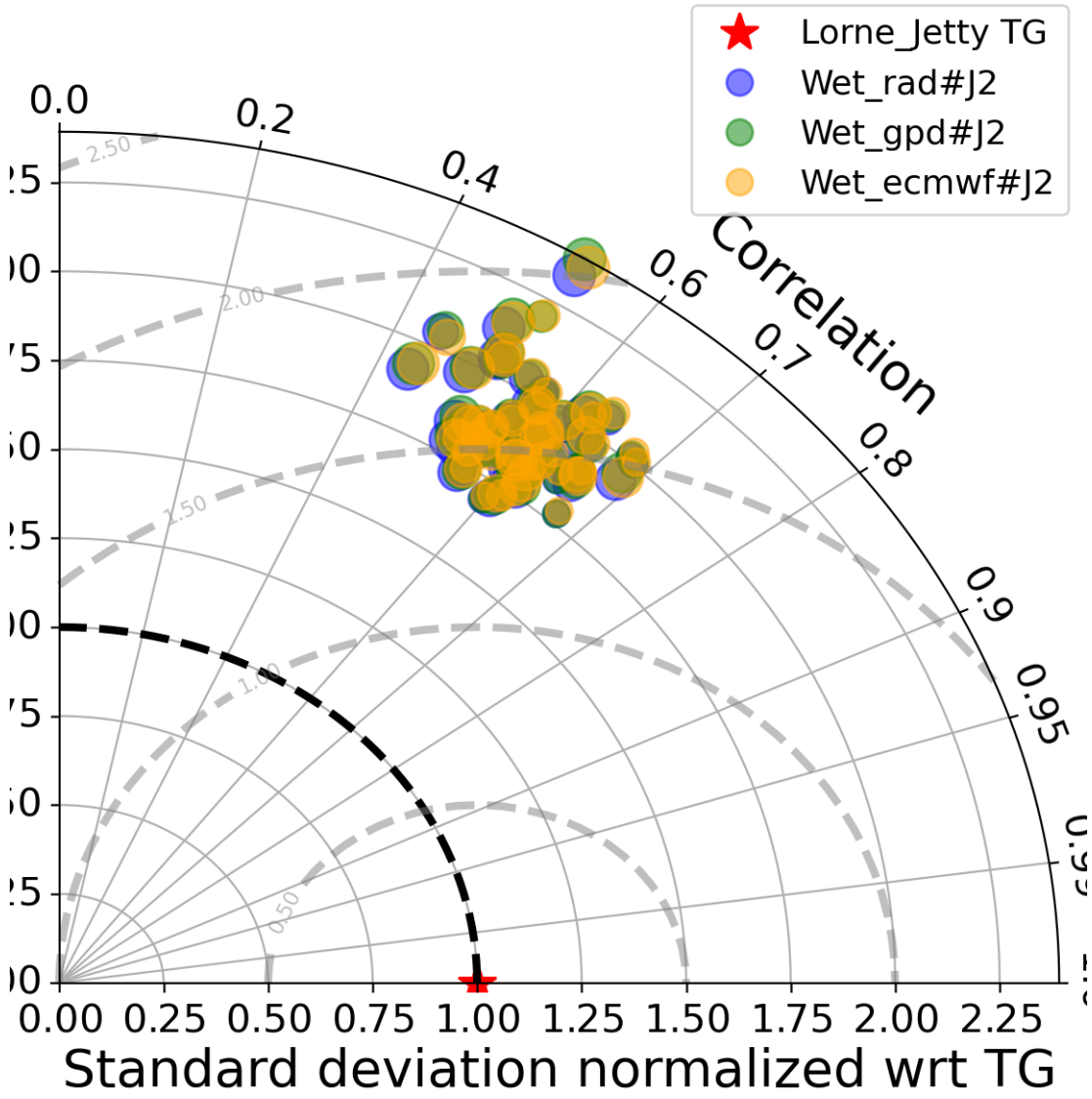

FIGURE 56 – Taylor diagram

6.1.9 Mean statistics table of products comparison with Lorne_Jetty 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	95.74	0.581	0.142	0.116
Wet_gpd#J2	95.757	0.582	0.143	0.117
Wet_ecmwf#J2	95.773	0.583	0.144	0.117

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 109 point.

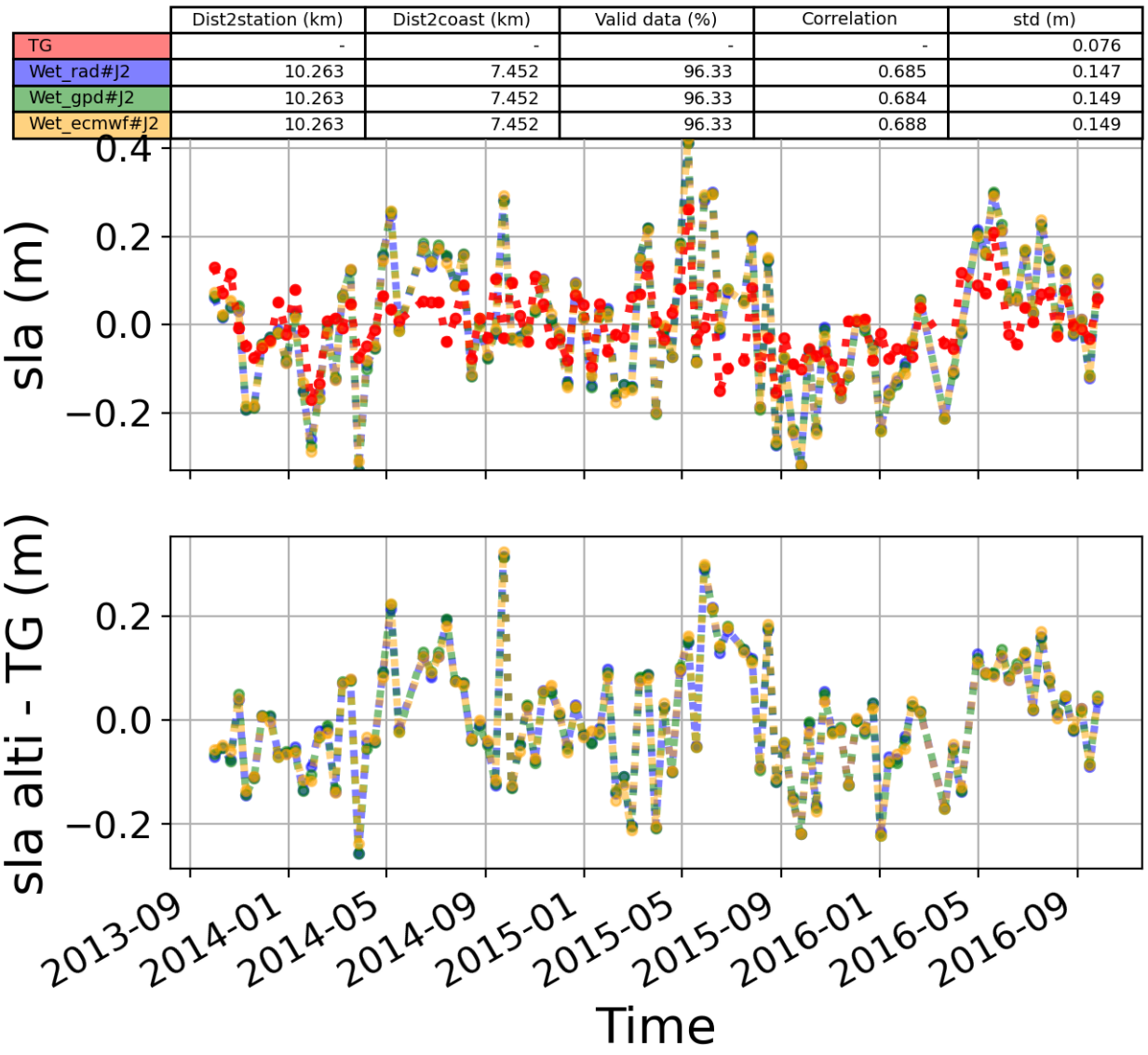

FIGURE 58 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

	Dist2station (km)	Dist2coast (km)	Valid data (%)	Correlation	std (m)
TG	-	-	-	-	0.075
Wet_rad#J2	19.142	18.689	99.083	0.685	0.15
Wet_gpd#J2	19.142	18.689	99.083	0.685	0.15
Wet_ecmwf#J2	19.142	18.689	99.083	0.686	0.151

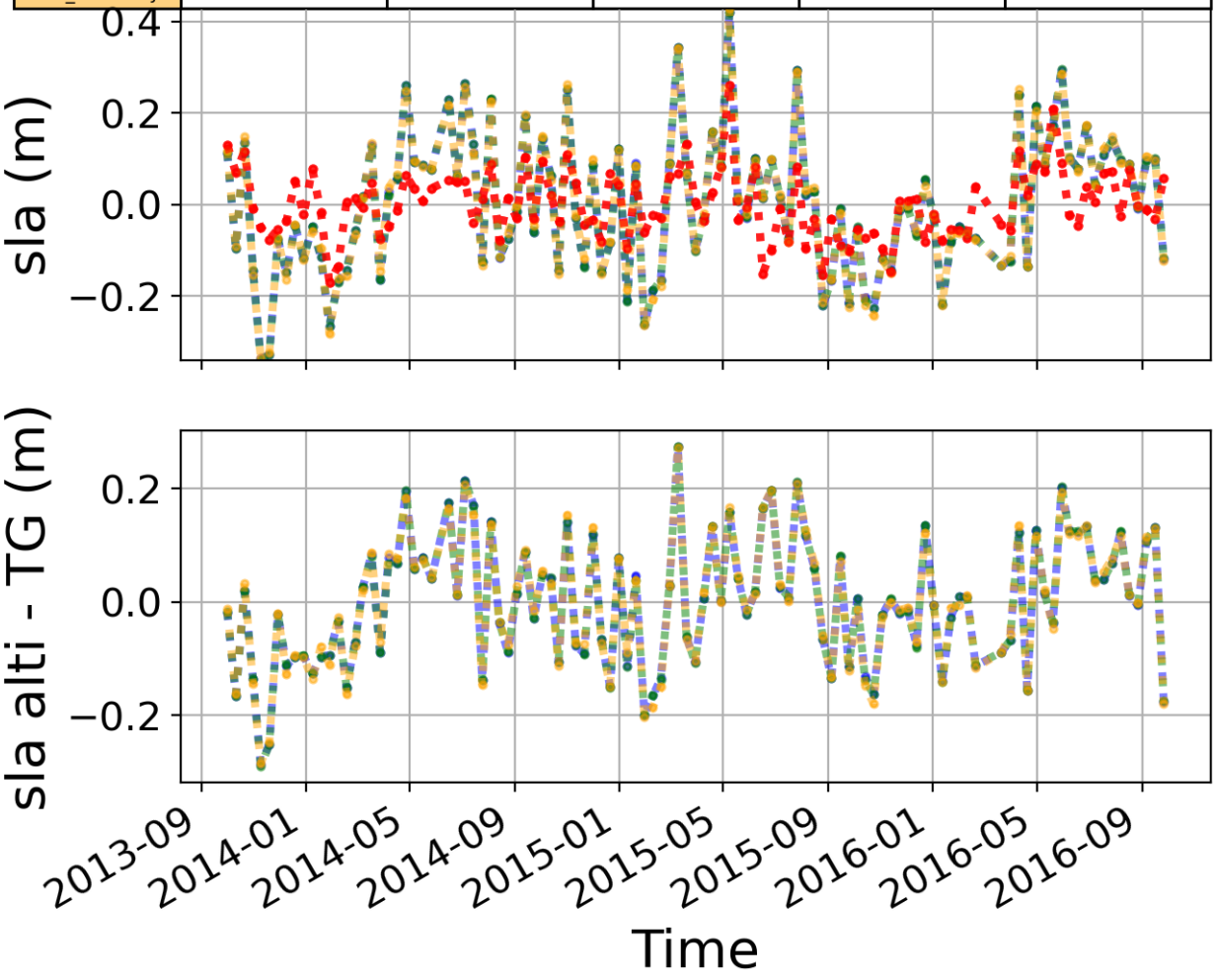

FIGURE 59 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.2 Station : Bundaberg

- Nearest track to Bundaberg station is the track number track149
- The area of interest is limited by :
  - A circle which it's center is the Bundaberg tide gauge station location and has a Raduis of 40 Km
  - Maximum distance to the coast : 20 Km

6.2.1 correlation visualization in maps view % Bundaberg tide gauge

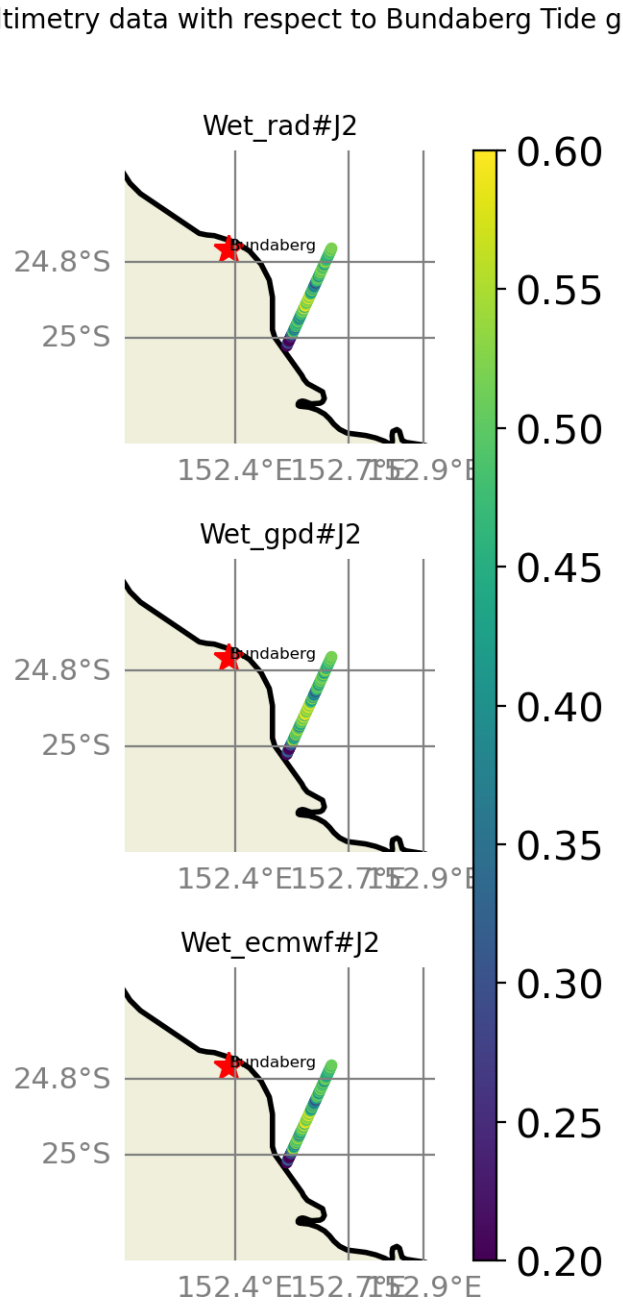

FIGURE 60 – correlation visualization in maps view % Bundaberg tide gauge

6.2.2 rmsd visualization in maps view % Bundaberg tide gauge

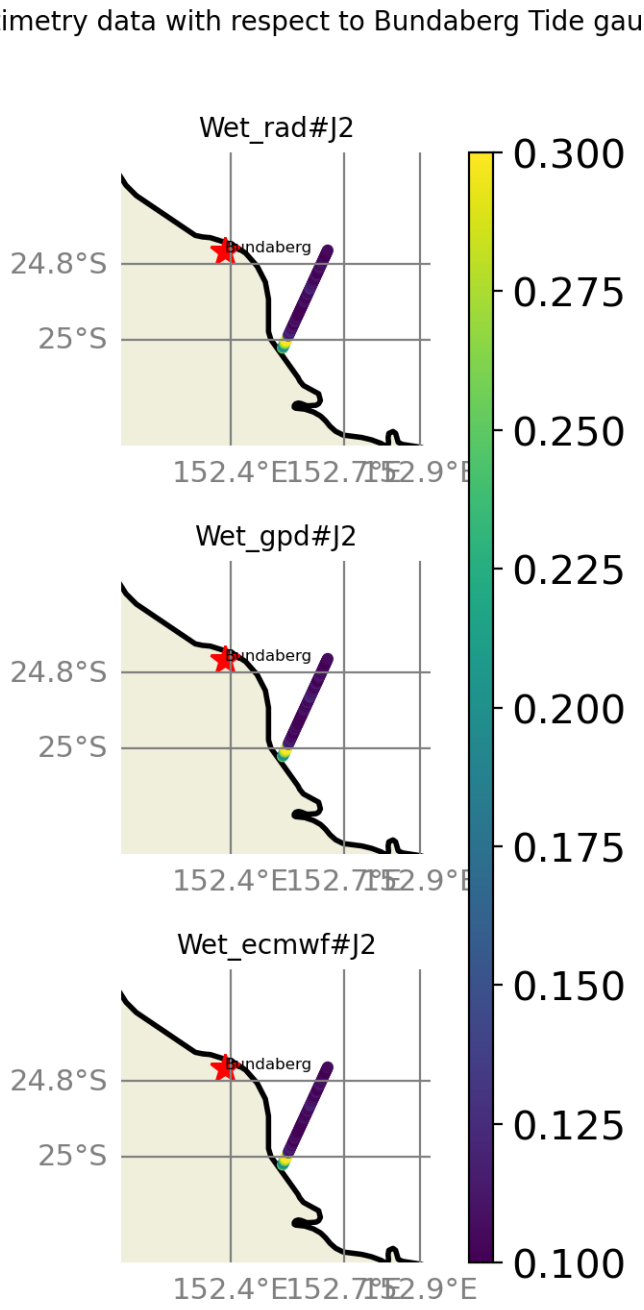

FIGURE 61 – rmsd visualization in maps view % Bundaberg tide gauge

6.2.3 std visualization in maps view % Bundaberg tide gauge

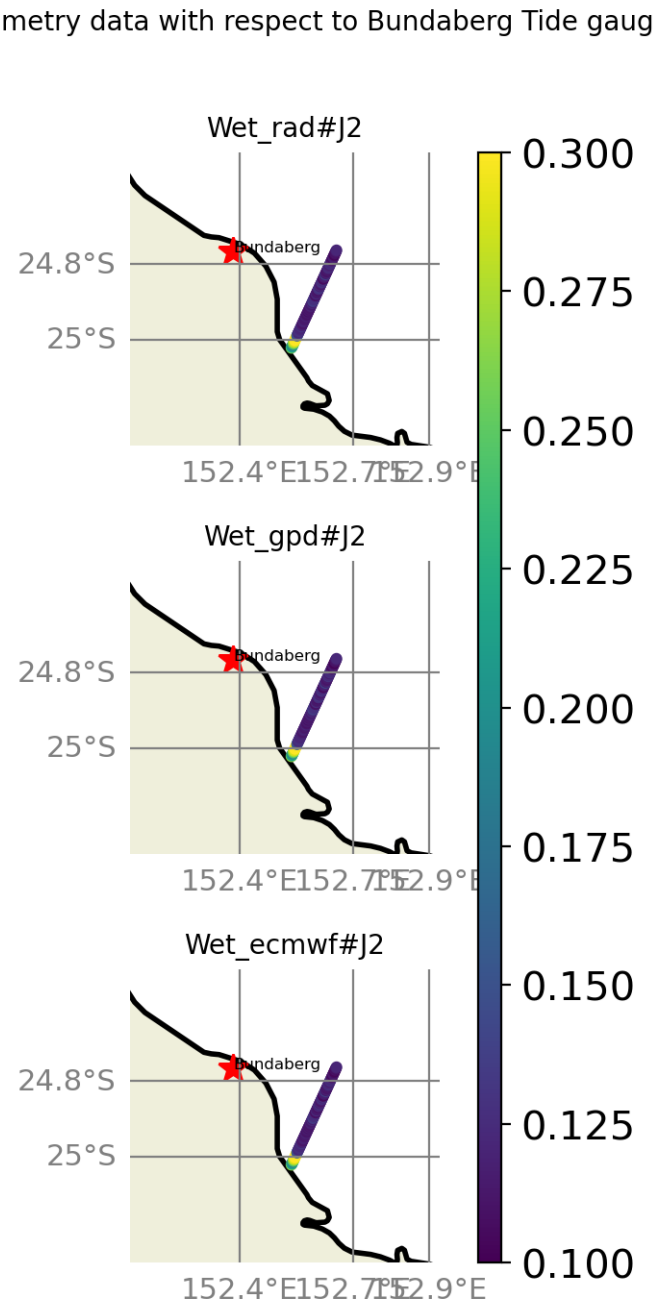

FIGURE 62 – std visualization in maps view % Bundaberg tide gauge

6.2.4 valid_data_percent visualization in maps view % Bundaberg tide gauge

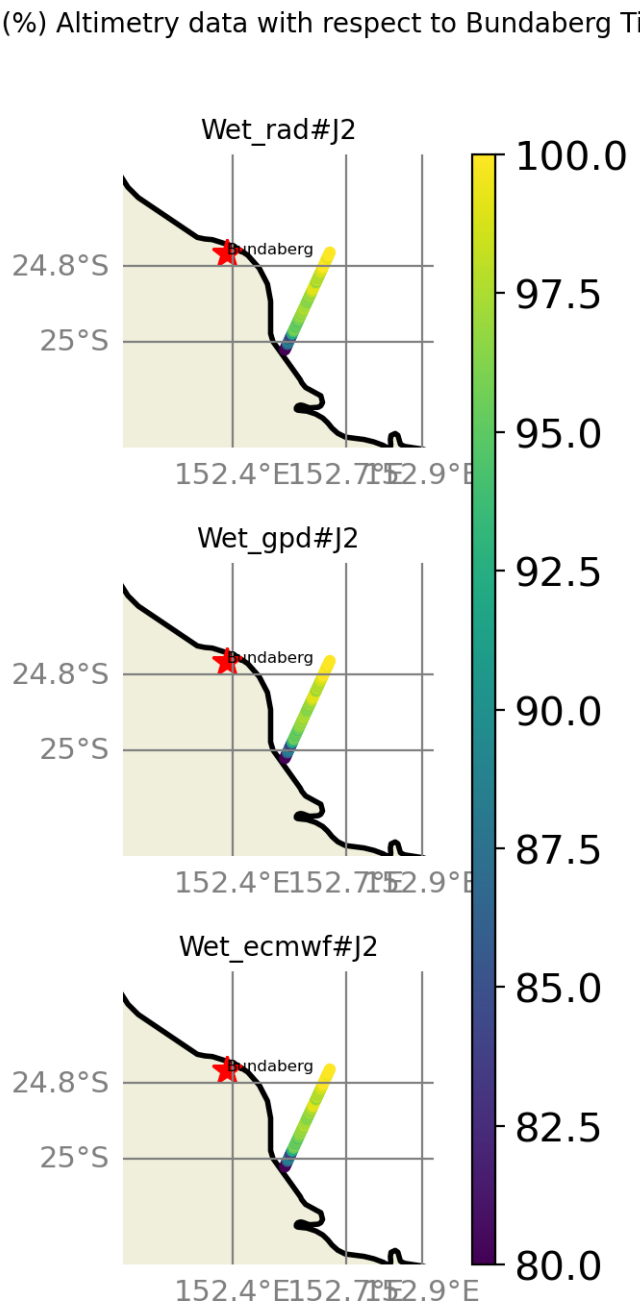

FIGURE 63 – valid_data_percent visualization in maps view % Bundaberg tide gauge

6.2.5 Valid data (%) in function of distance to coast/Bundaberg 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.

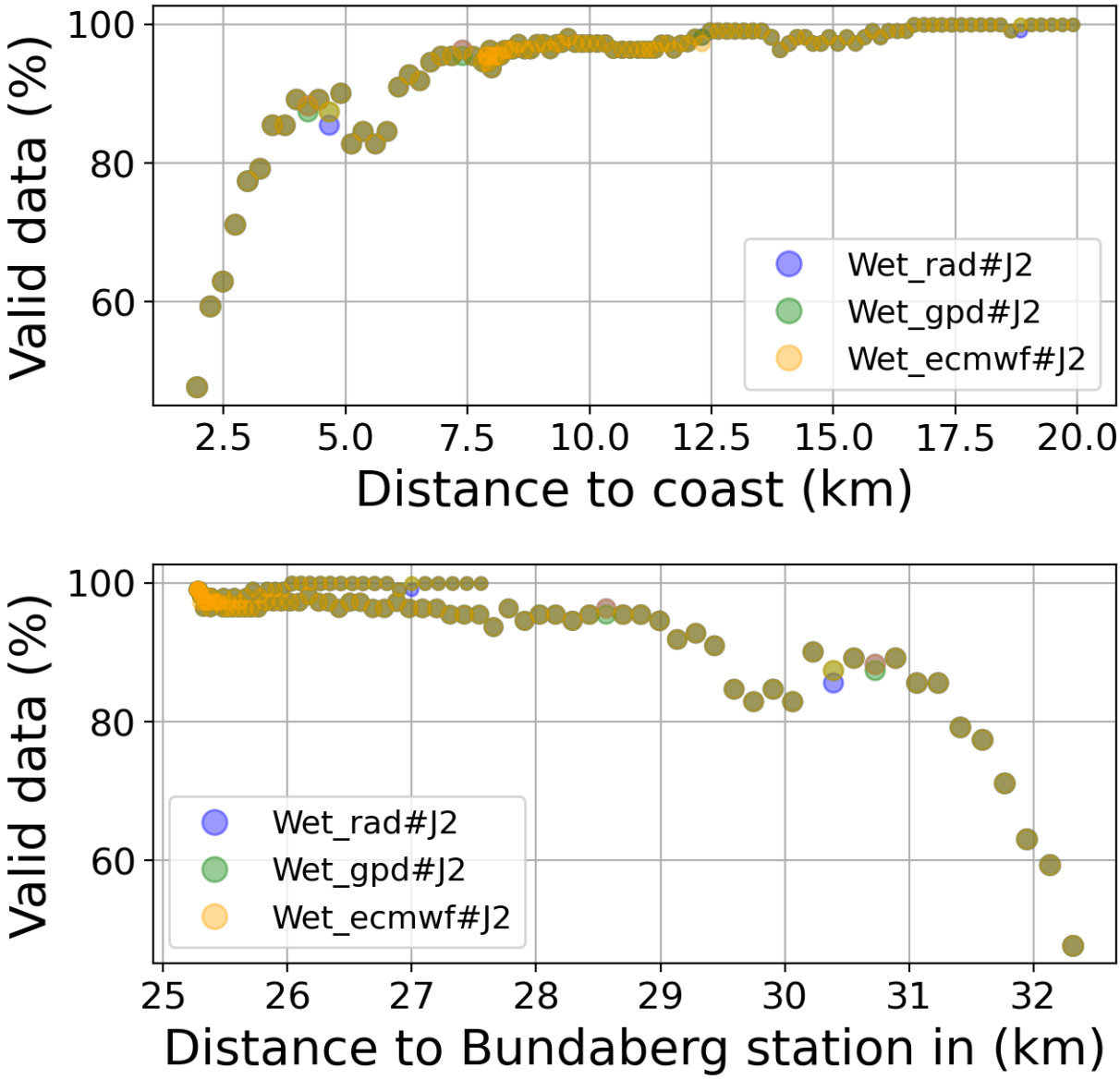

FIGURE 64 – Valid data (%) in function of distance to coast/Bundaberg station

6.2.6 Std in function of distance to coast/Bundaberg station

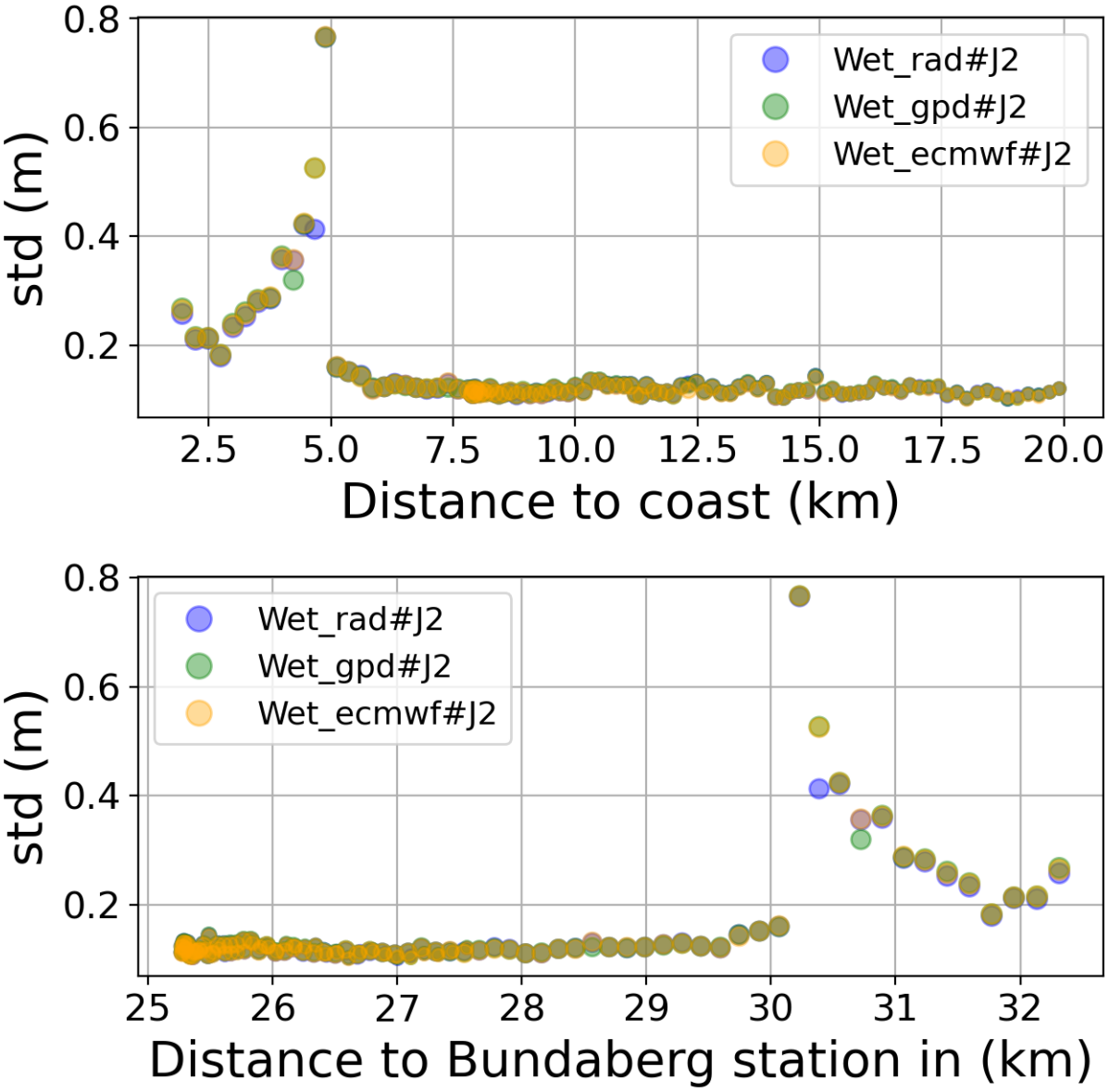

FIGURE 65 – Std in function of the distance to the coast/Bundaberg station

6.2.7 Correlation in function of distance to coast/Bundaberg station

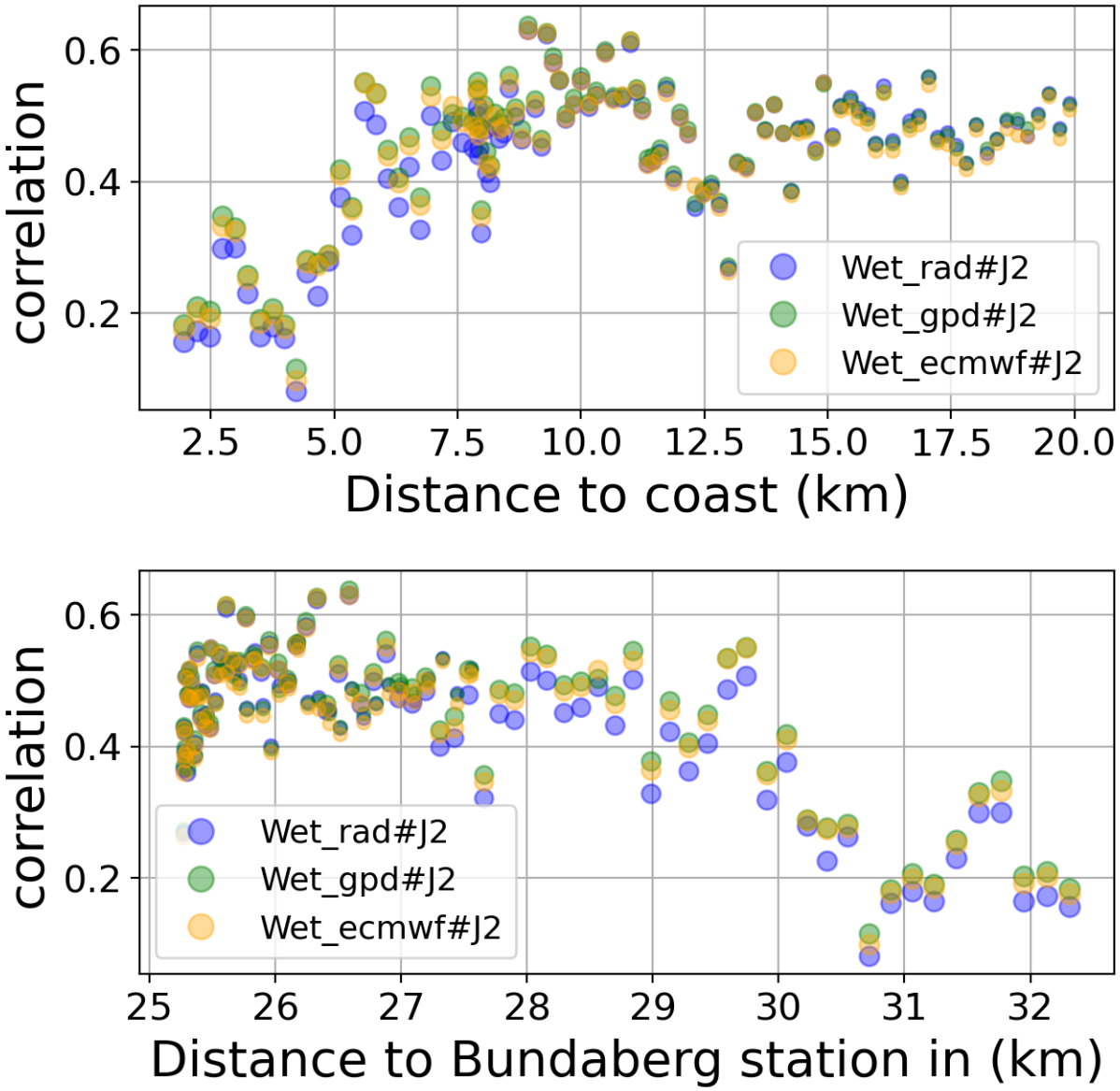

FIGURE 66 – Correlation in function of the distance to the coast/Bundaberg station

6.2.8 Taylor Diagram

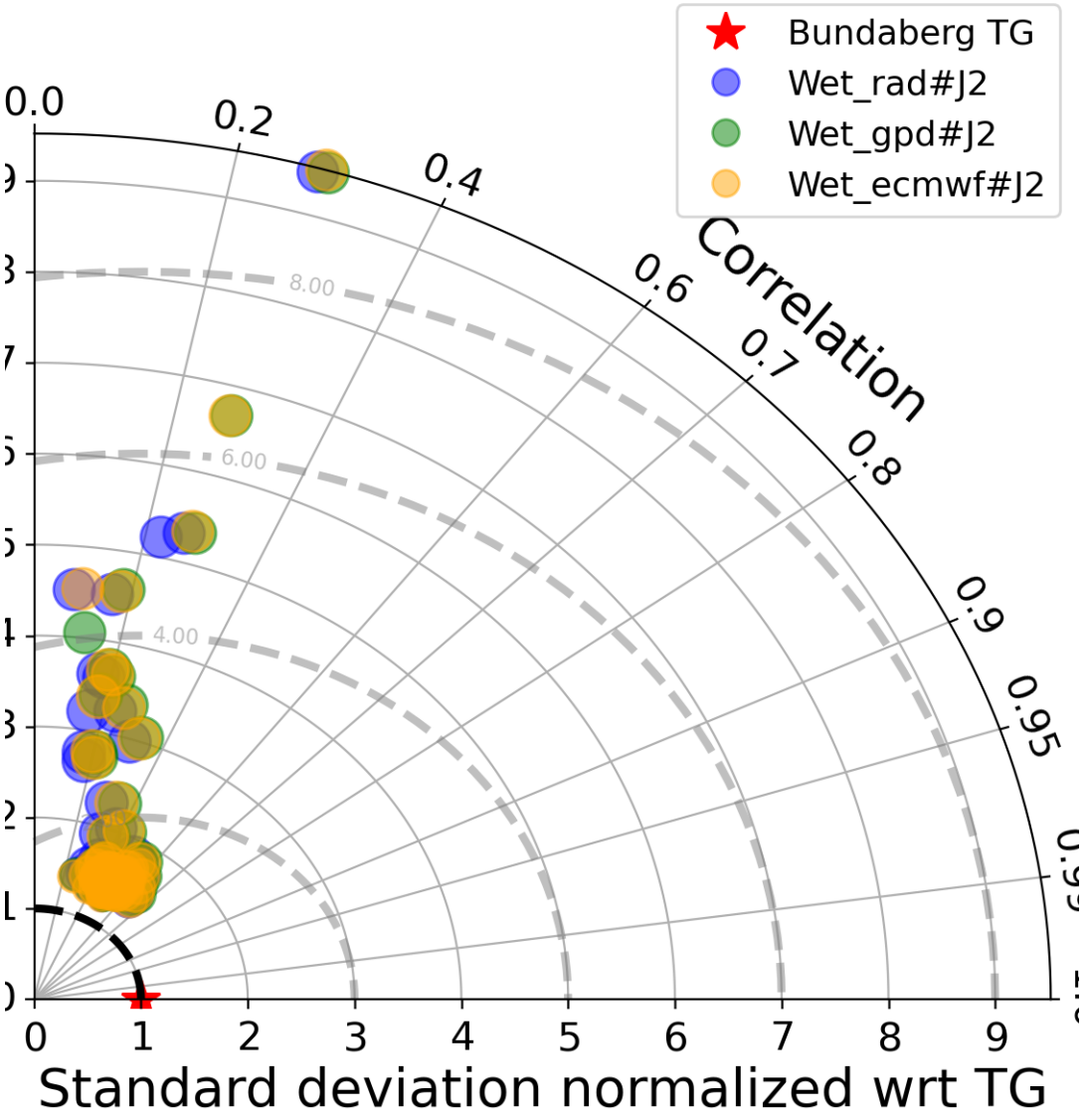

FIGURE 67 – Taylor diagram

6.2.9 Mean statistics table of products comparison with Bundaberg 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	94.544	0.441	0.145	0.134
Wet_gpd#J2	94.552	0.455	0.146	0.134
Wet_ecmwf#J2	94.561	0.448	0.146	0.134

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 111 point.

	Dist2station (km)	Dist2coast (km)	Valid data (%)	Correlation	std (m)
TG	-	-	-	-	0.078
Wet_rad#J2	26.586	8.918	97.297	0.631	0.115
Wet_gpd#J2	26.586	8.918	97.297	0.639	0.117
Wet_ecmwf#J2	26.586	8.918	97.297	0.63	0.117

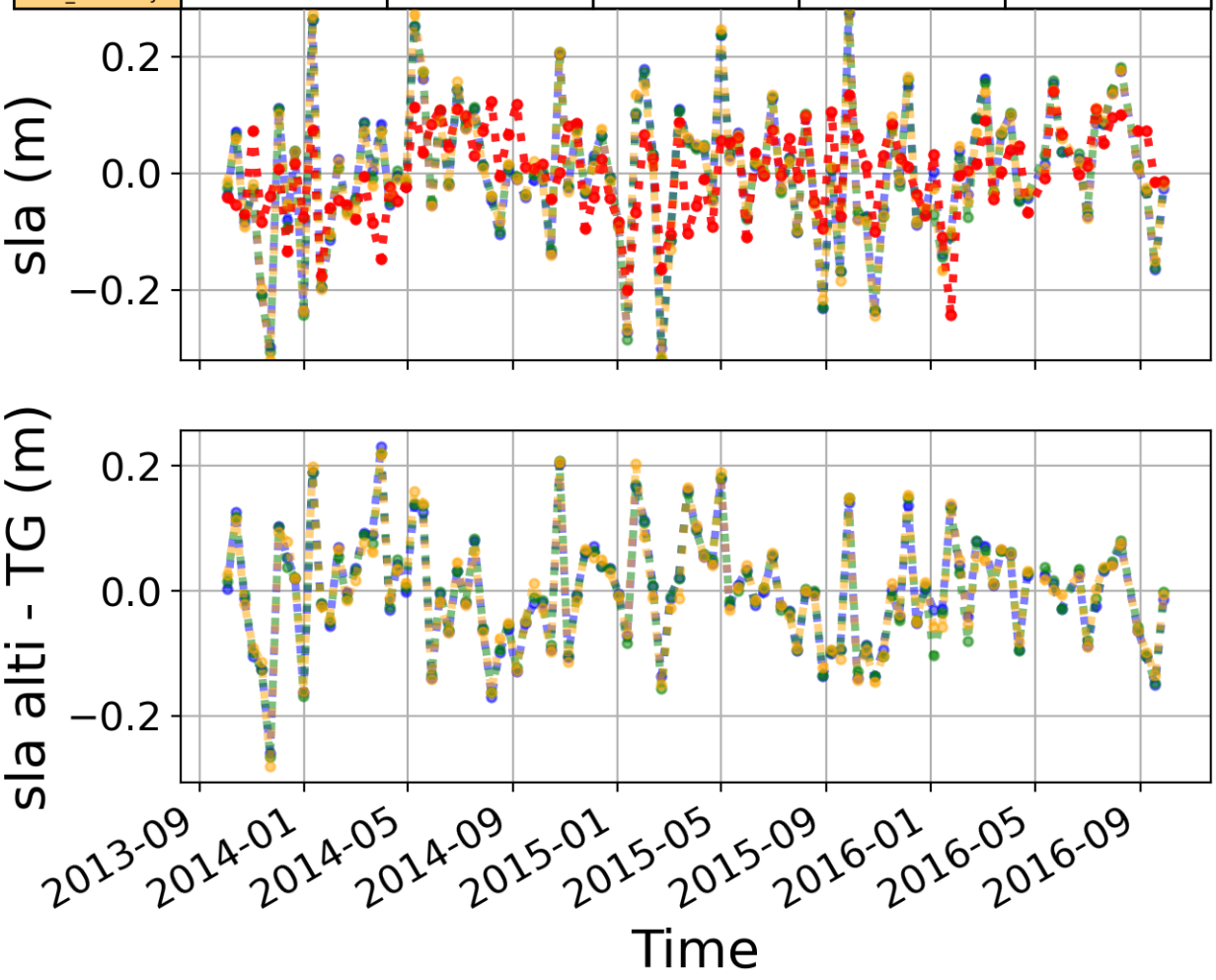

FIGURE 69 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.3 Station : Thursday_Island

- Nearest track to Thursday_Island station is the track number track138
- The area of interest is limited by :
  - A circle which it's center is the Thursday_Island 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 % Thursday_Island tide gauge

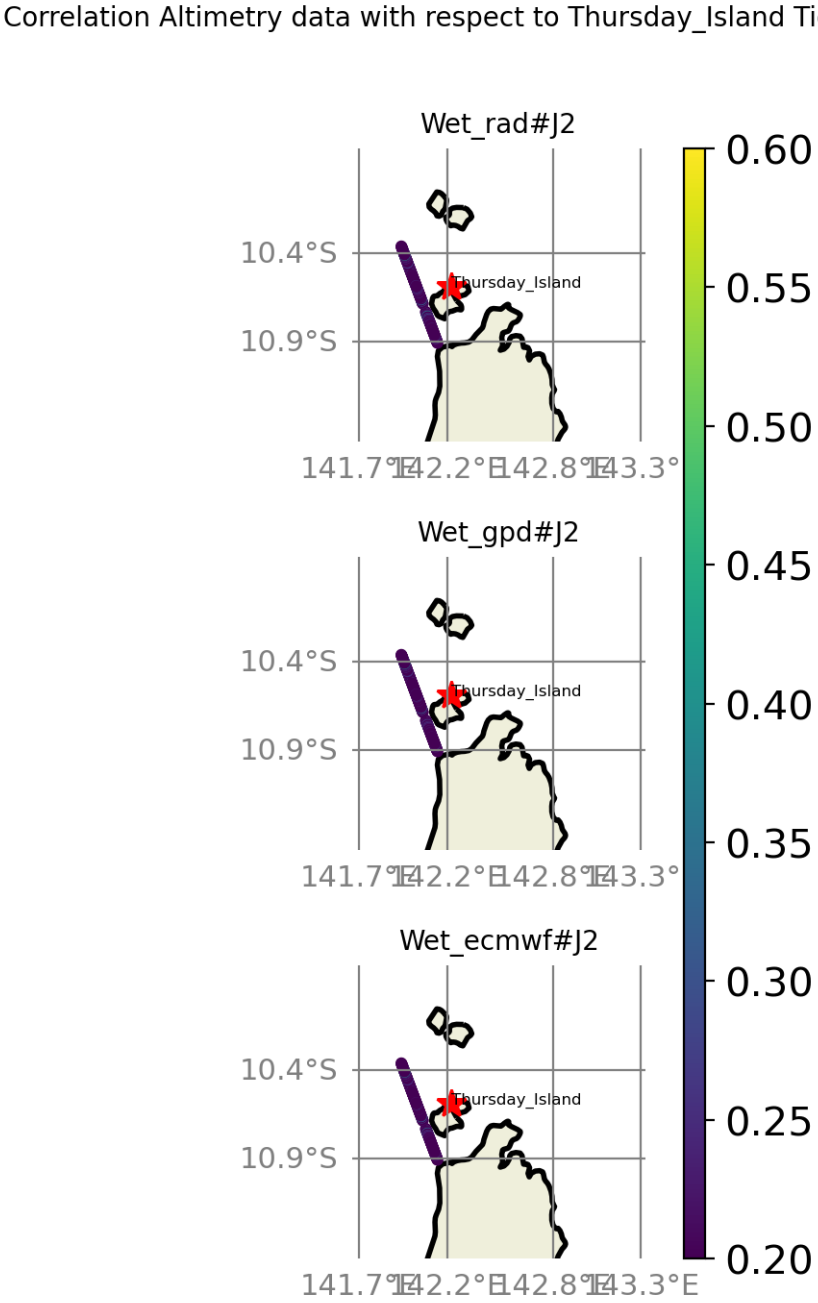

FIGURE 70 – correlation visualization in maps view % Thursday_Island tide gauge

6.3.2 rmsd visualization in maps view % Thursday_Island tide gauge

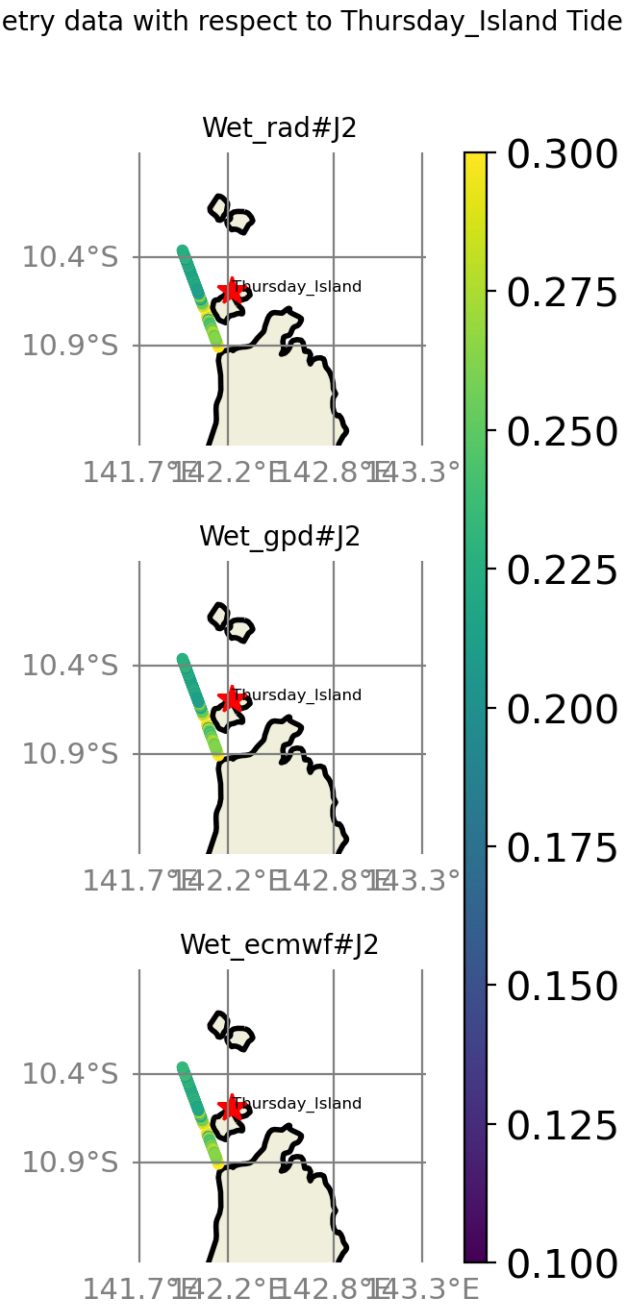

FIGURE 71 – rmsd visualization in maps view % Thursday_Island tide gauge

6.3.3 std visualization in maps view % Thursday_Island tide gauge

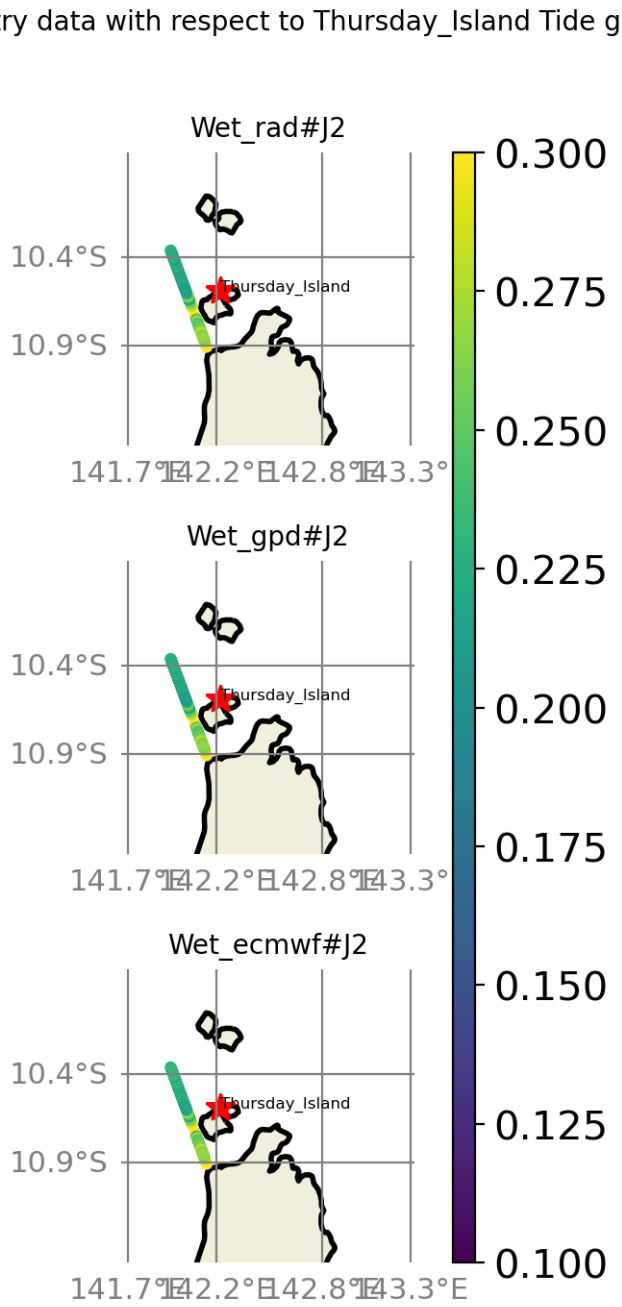

FIGURE 72 – std visualization in maps view % Thursday_Island tide gauge

6.3.4 valid_data_percent visualization in maps view % Thursday_Island tide gauge

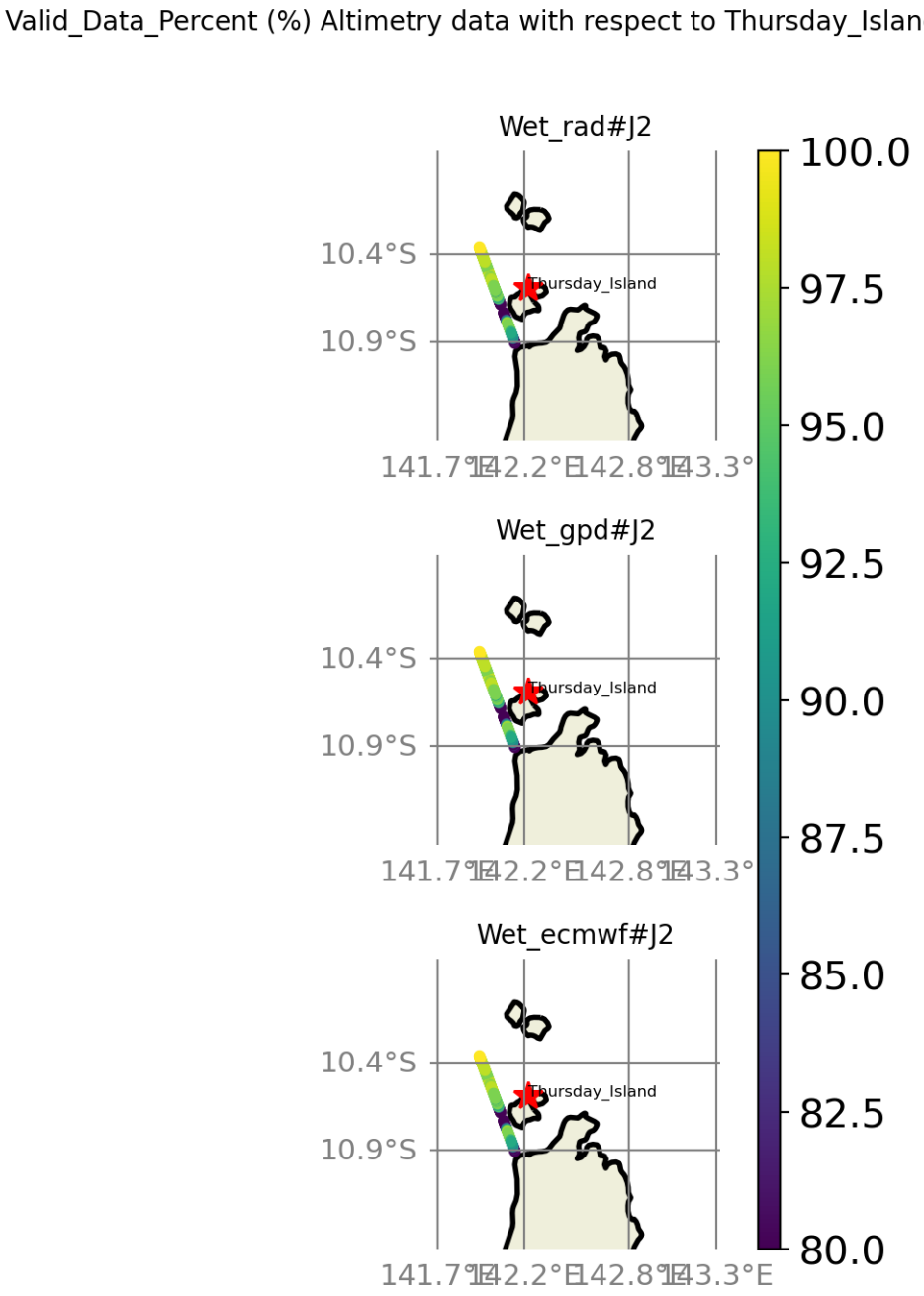

FIGURE 73 – valid_data_percent visualization in maps view % Thursday_Island tide gauge

6.3.5 Valid data (%) in function of distance to coast/Thursday_Island 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. $maxNB = 51$ 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.

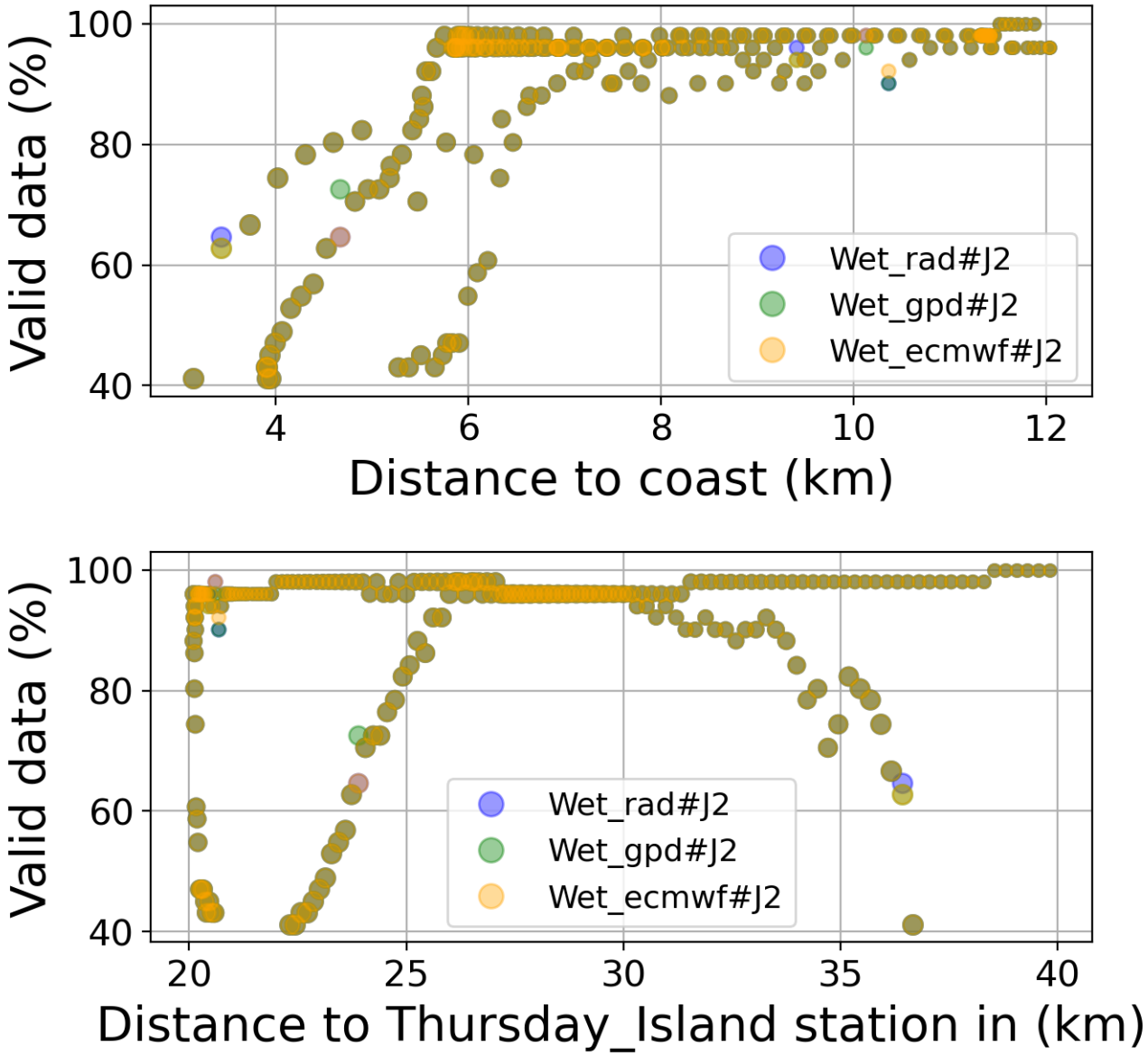

FIGURE 74 – Valid data (%) in function of distance to coast/Thursday_Island station

6.3.6 Std in function of distance to coast/Thursday_Island station

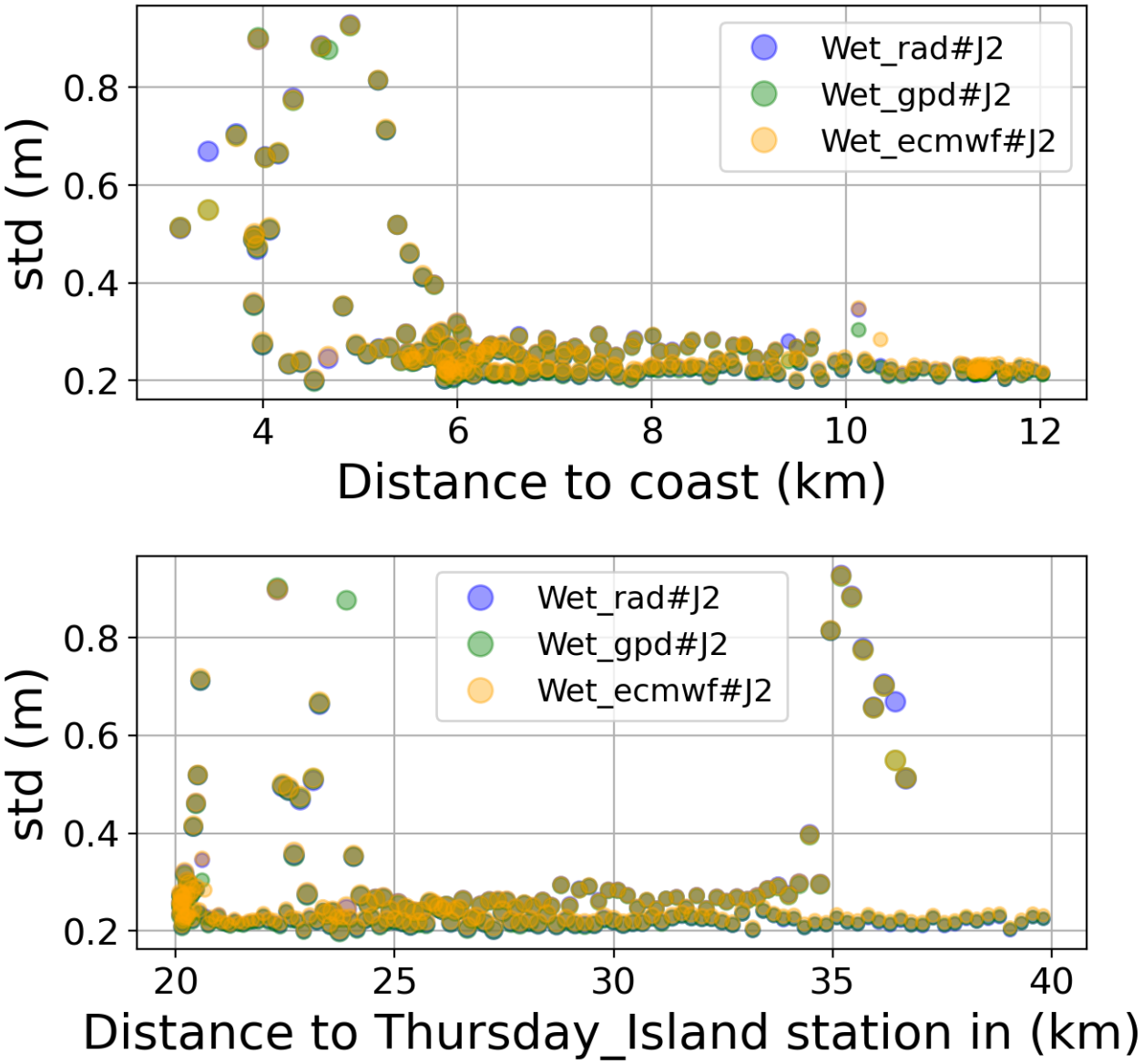

FIGURE 75 – Std in function of the distance to the coast/Thursday_Island station

6.3.7 Correlation in function of distance to coast/Thursday_Island station

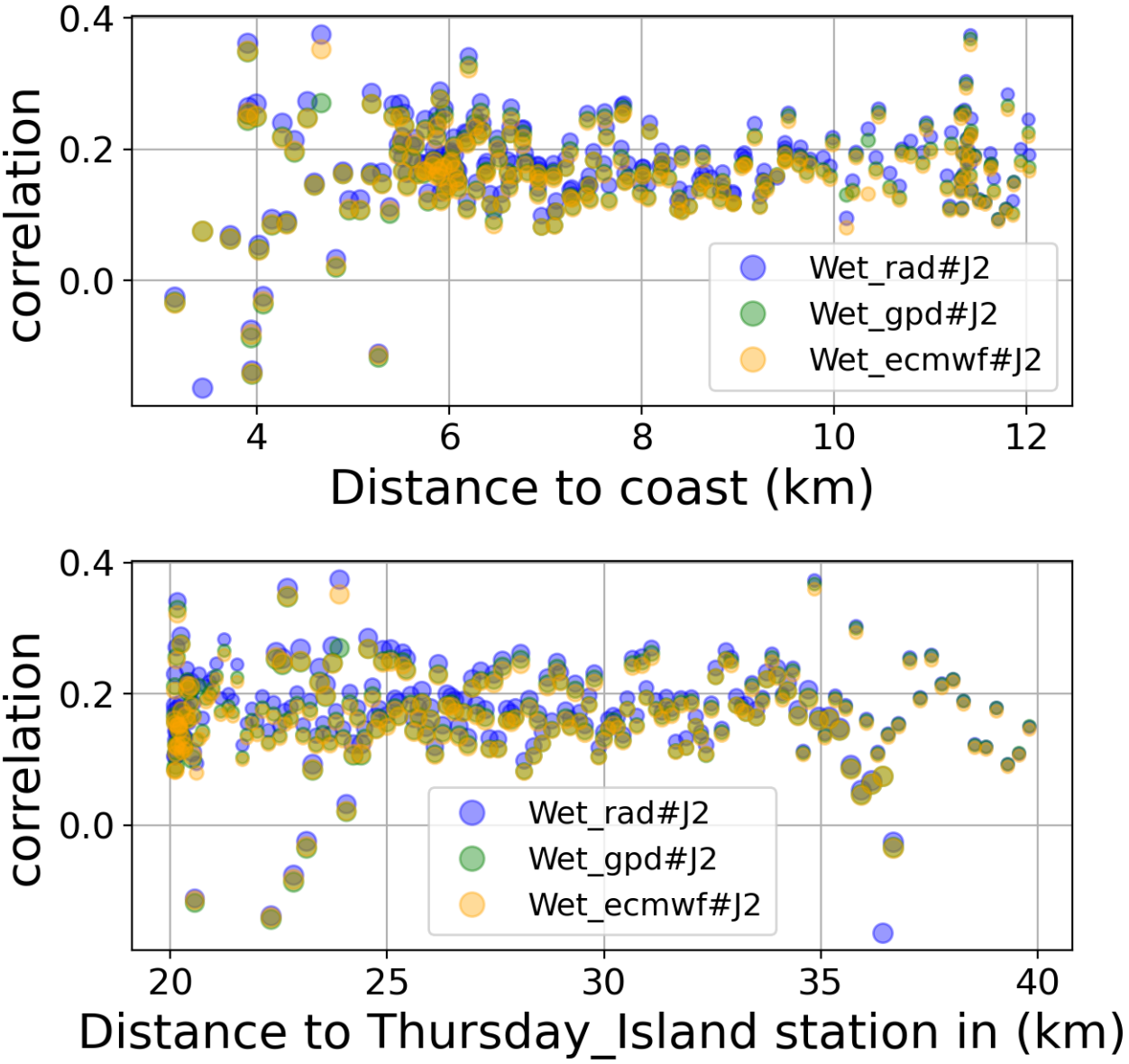

Figure 76 – Correlation in function of the distance to the coast/Thursday_Island station

6.3.8 Taylor Diagram

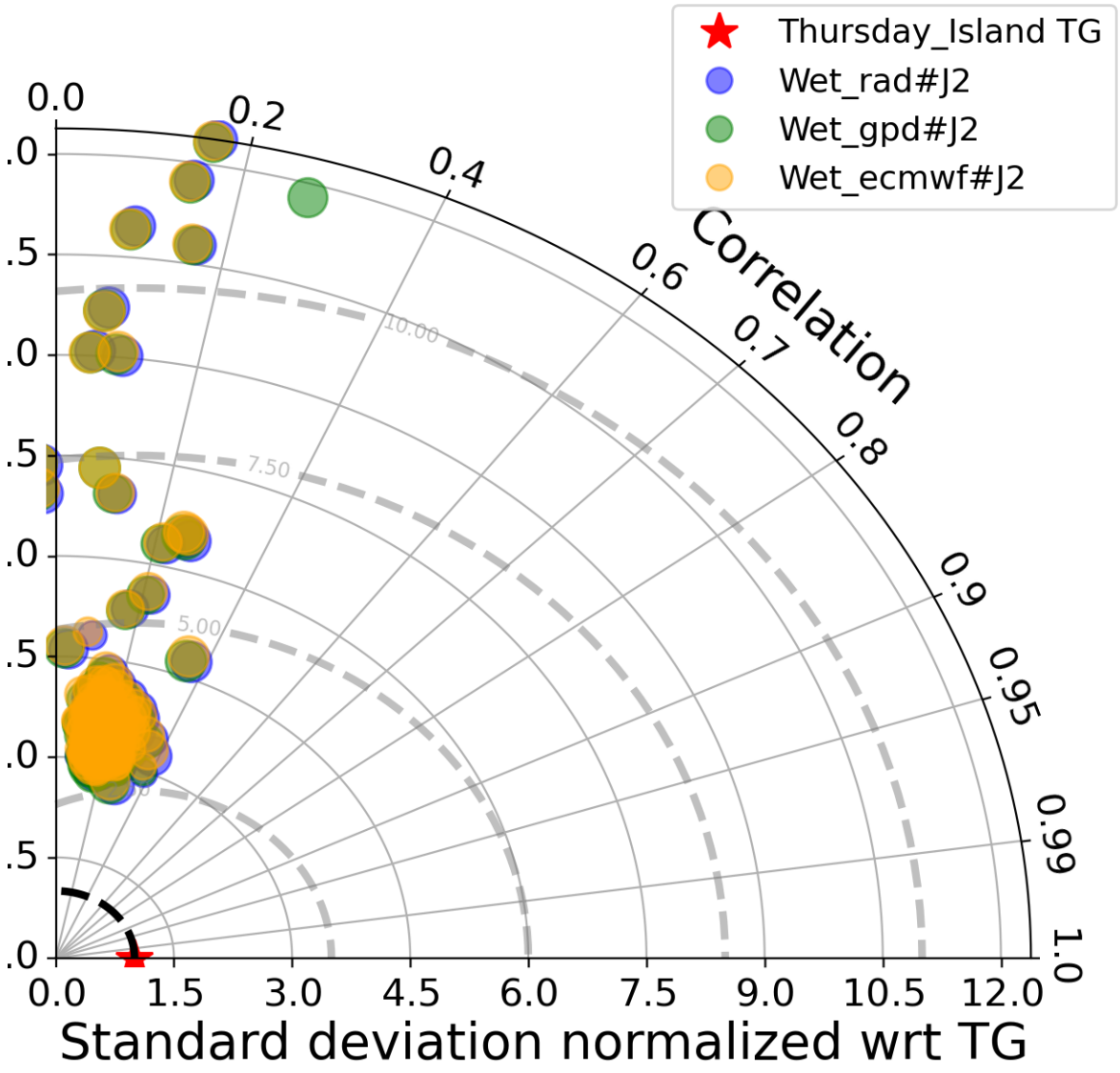

FIGURE 77 – Taylor diagram

6.3.9 Mean statistics table of products comparison with Thursday_Island 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	88.581	0.179	0.276	0.274
Wet_gpd#J2	88.591	0.168	0.277	0.276
Wet_ecmwf#J2	88.572	0.165	0.279	0.278

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 51 point.

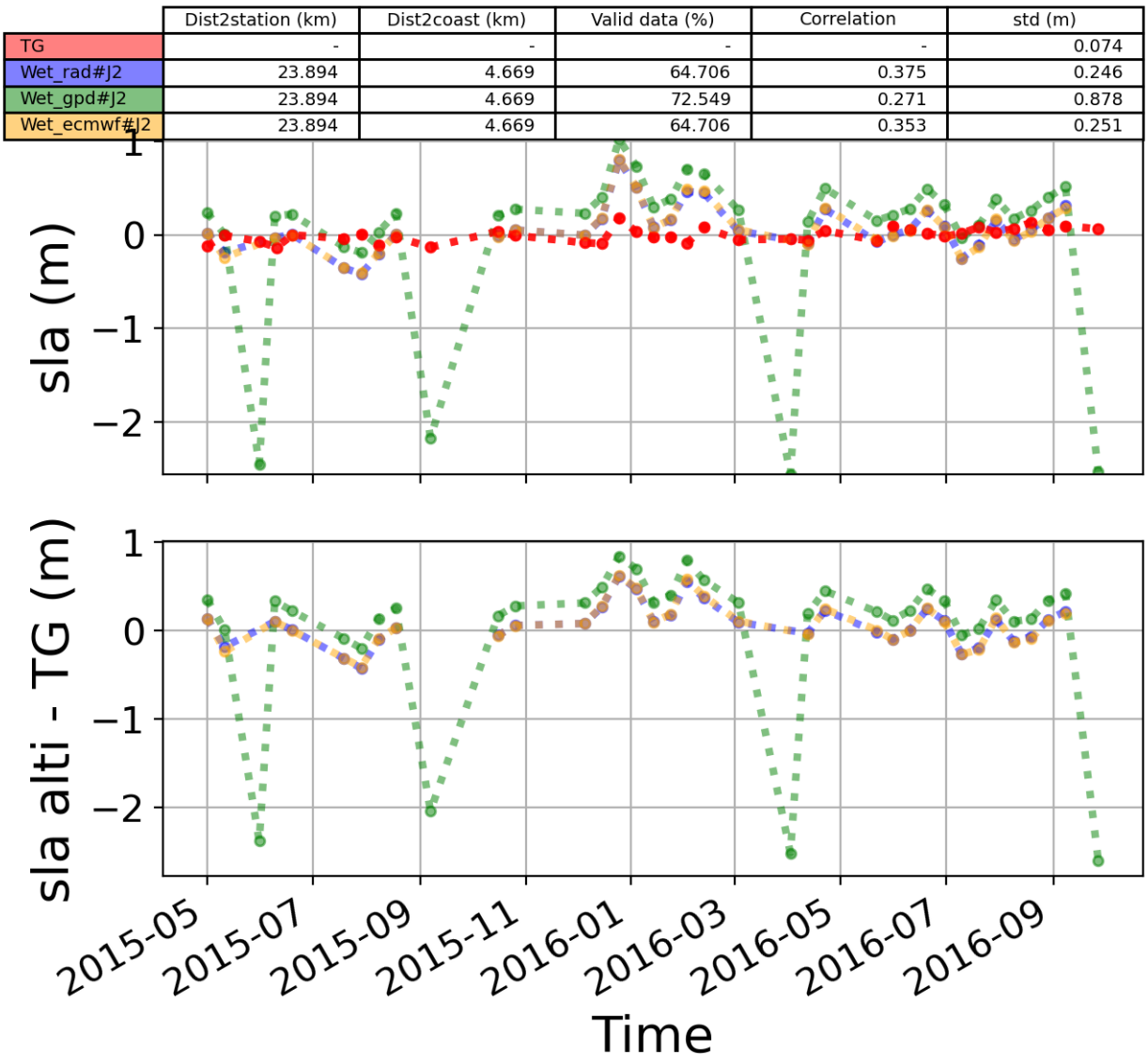

FIGURE 79 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

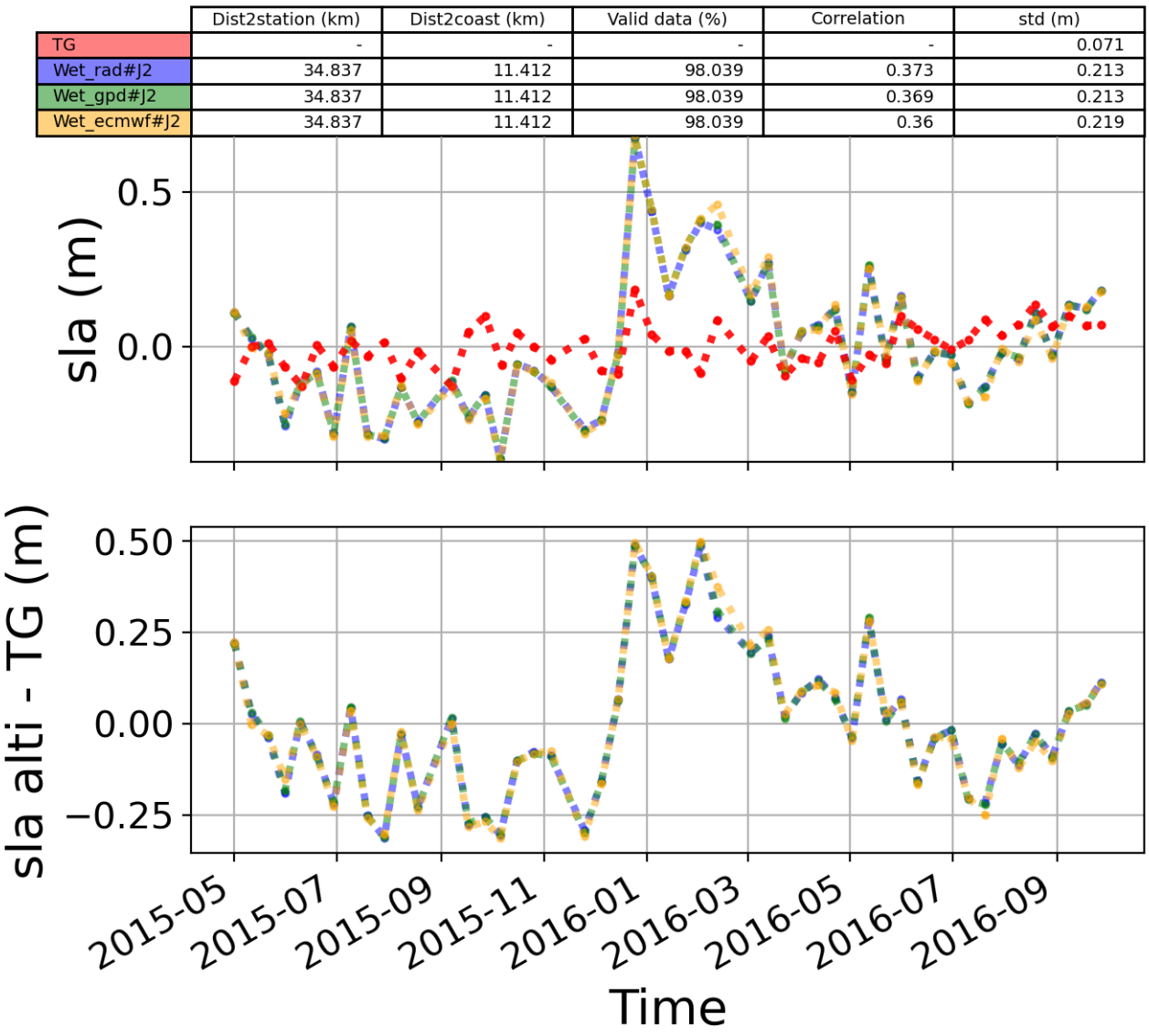

FIGURE 80 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.4 Station : Southport

- Nearest track to Southport station is the track number track47
- The area of interest is limited by :
  - A circle which it's center is the Southport tide gauge station location and has a Raduis of 40 Km
  - Maximum distance to the coast : 20 Km
  - Latitude limits : [-43.55, -43.2] °

6.4.1 correlation visualization in maps view % Southport tide gauge

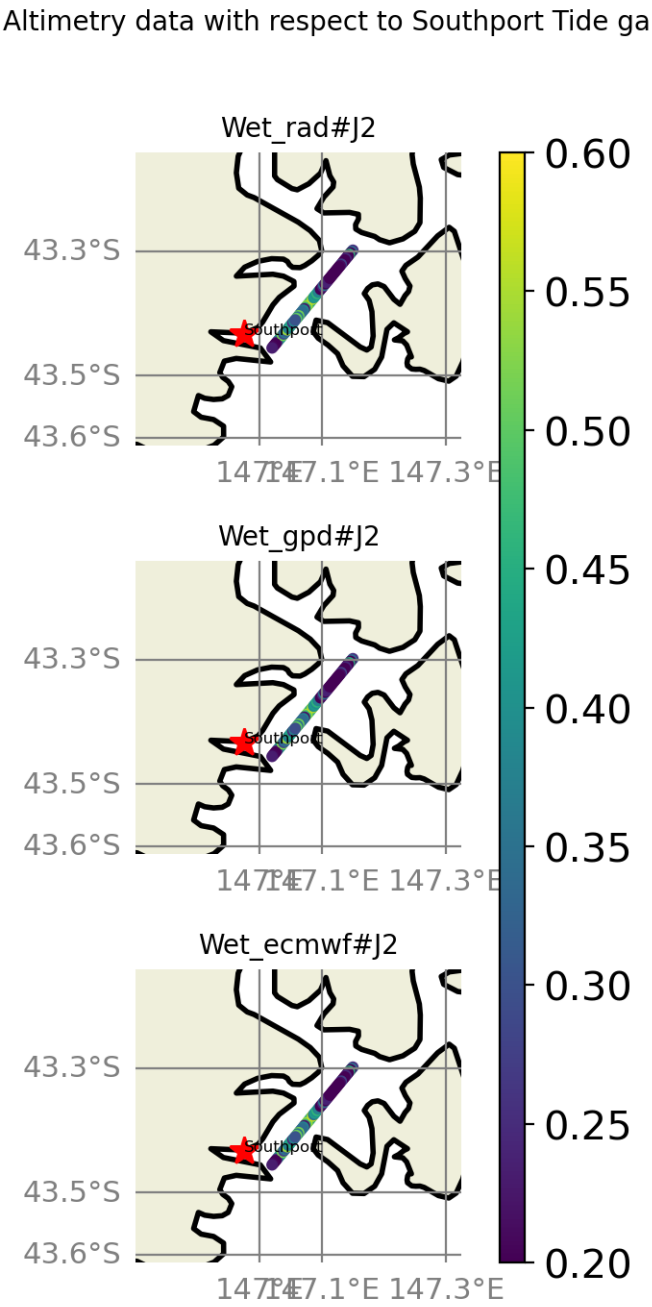

FIGURE 81 – correlation visualization in maps view % Southport tide gauge

6.4.2 rmsd visualization in maps view % Southport tide gauge

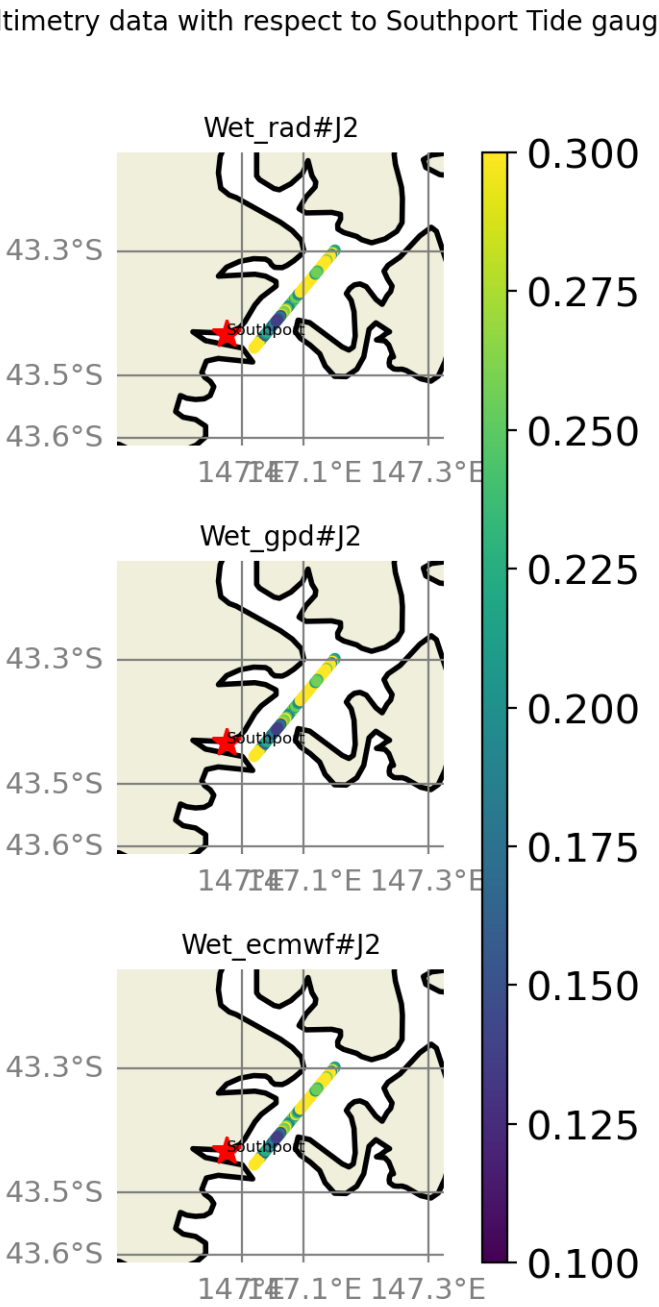

FIGURE 82 – rmsd visualization in maps view % Southport tide gauge

6.4.3 std visualization in maps view % Southport tide gauge

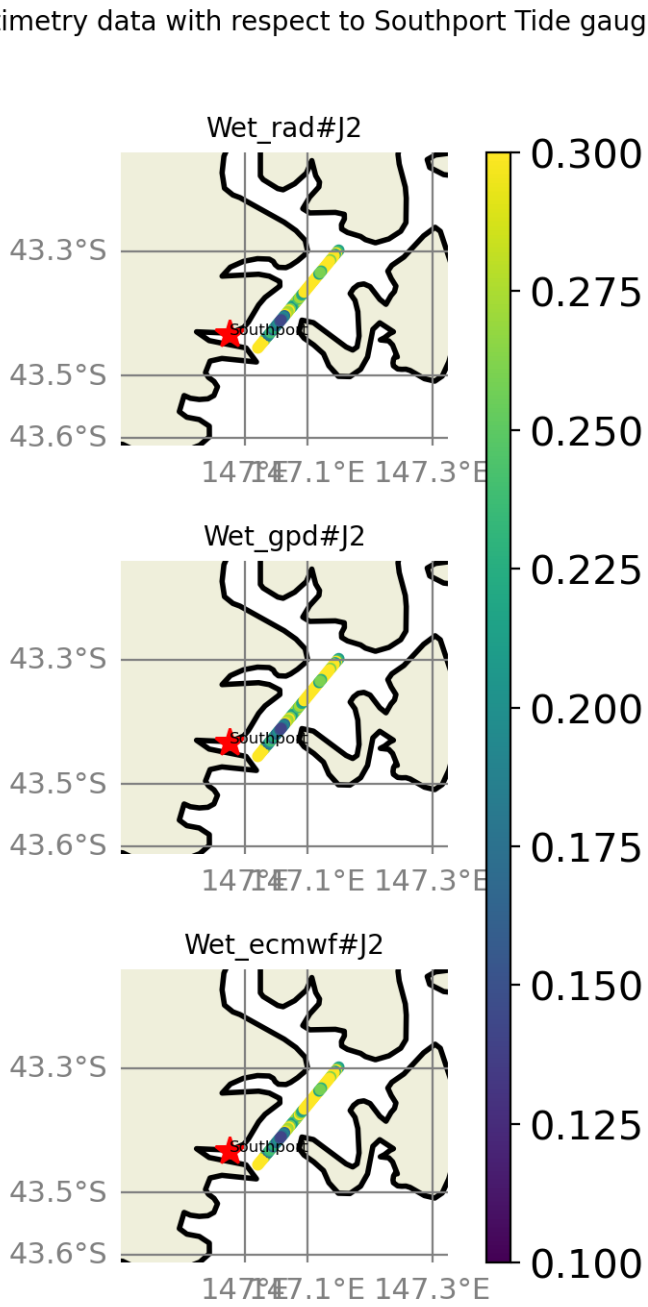

FIGURE 83 – std visualization in maps view % Southport tide gauge

6.4.4 valid_data_percent visualization in maps view % Southport tide gauge

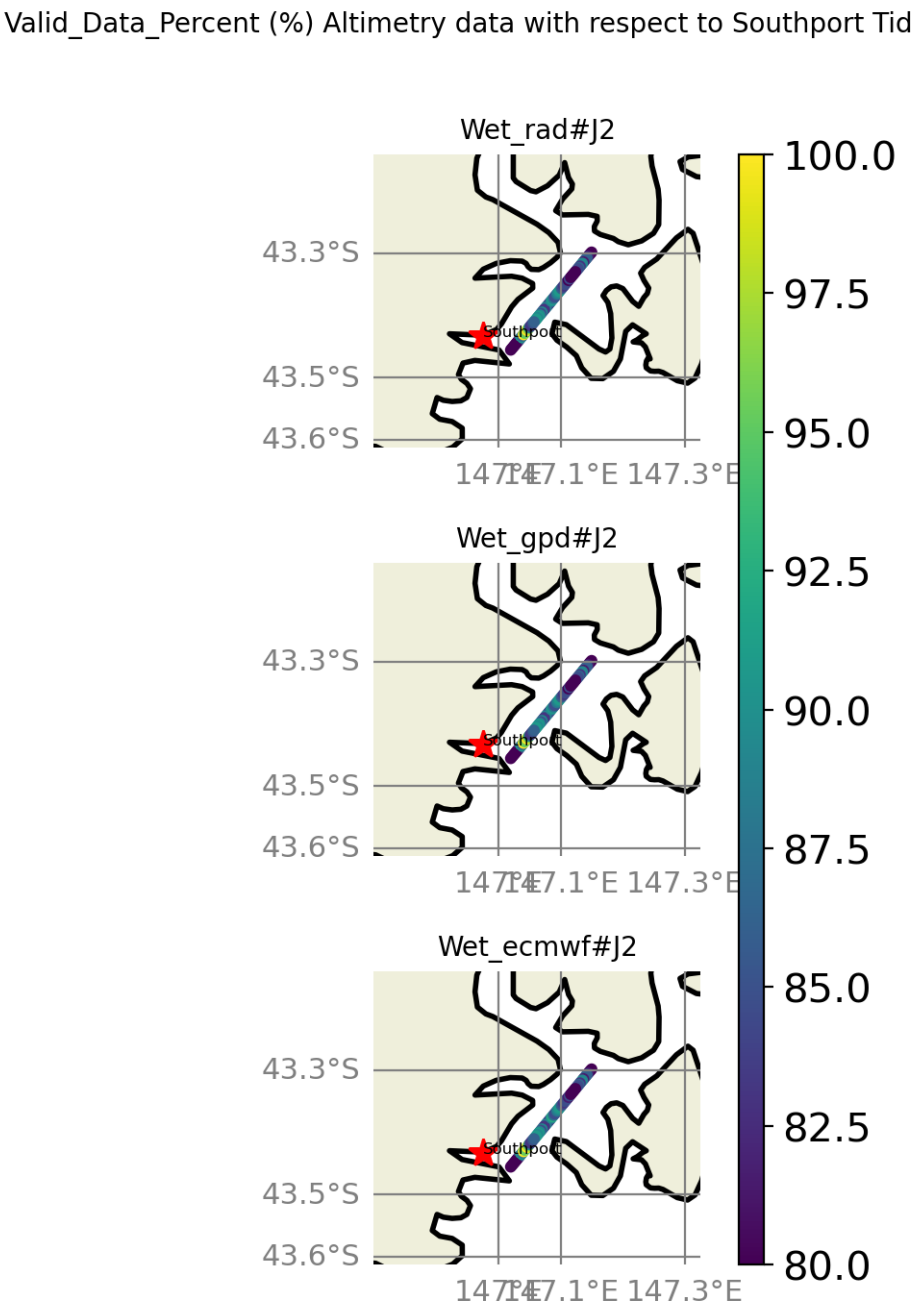

FIGURE 84 – valid_data_percent visualization in maps view % Southport tide gauge

6.4.5 Valid data (%) in function of distance to coast/Southport 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. $maxNB = 65$ 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.

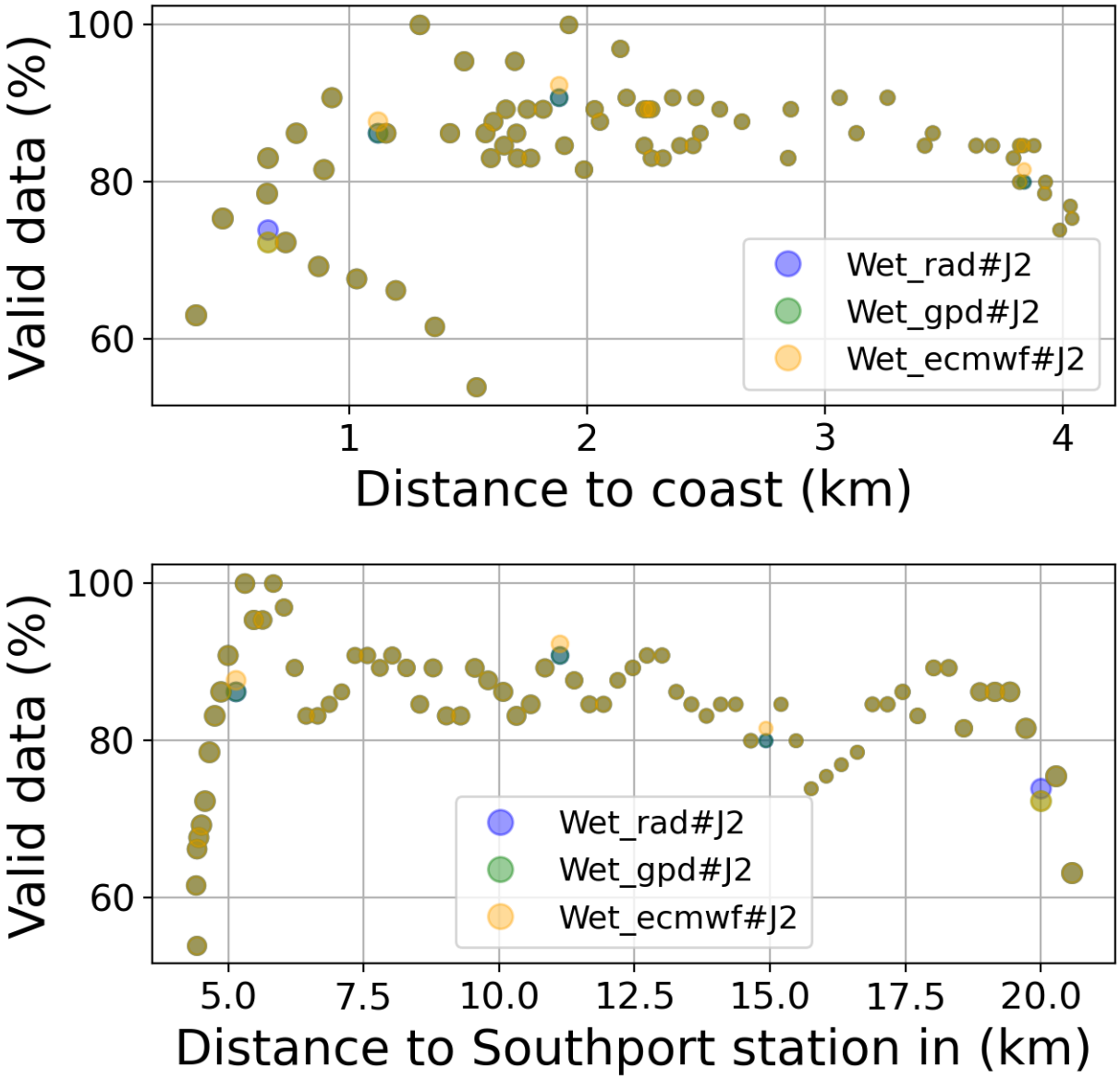

FIGURE 85 – Valid data (%) in function of distance to coast/Southport station

6.4.6 Std in function of distance to coast/Southport station

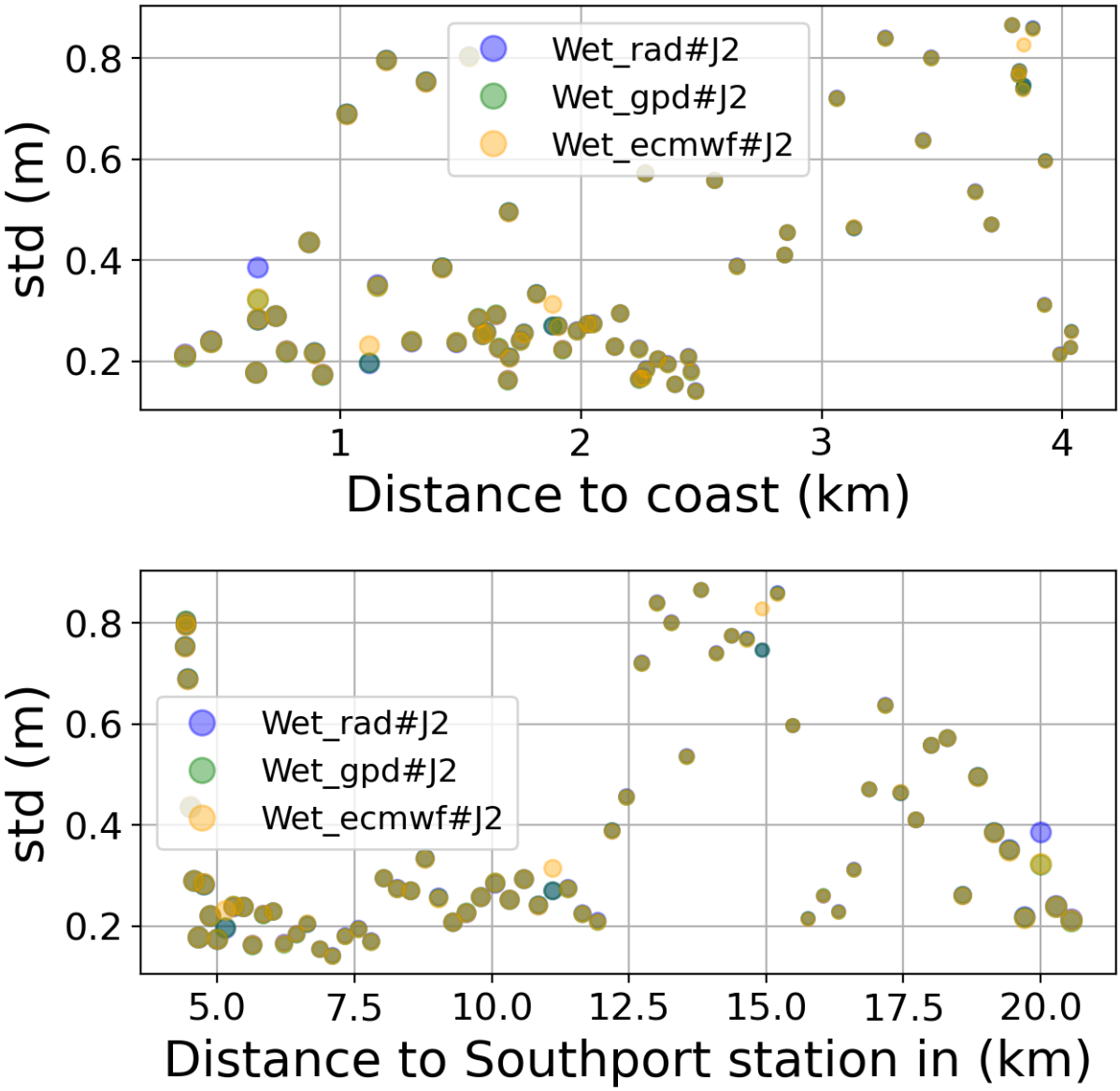

FIGURE 86 – Std in function of the distance to the coast/Southport station

6.4.7 Correlation in function of distance to coast/Southport station

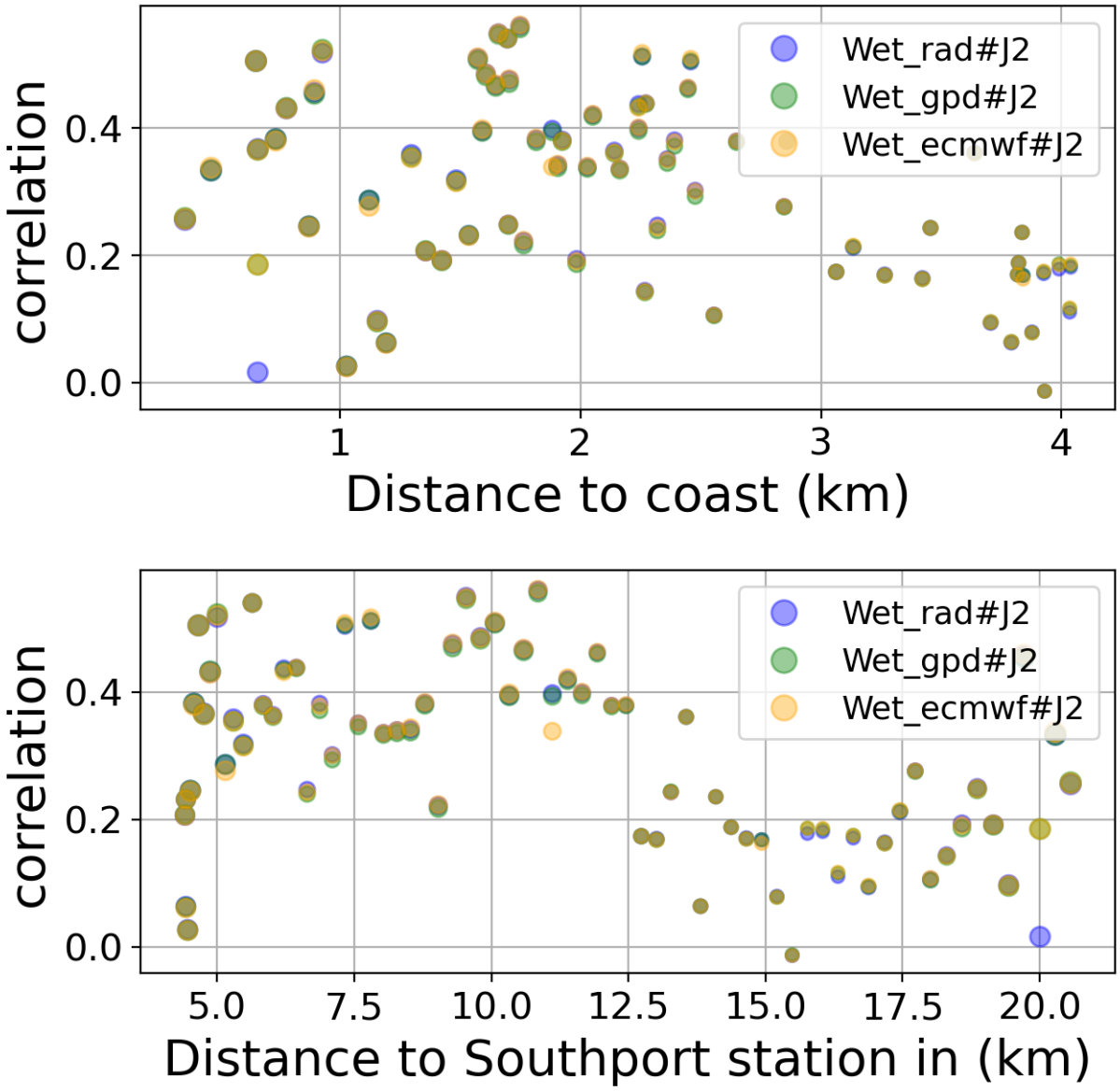

FIGURE 87 – Correlation in function of the distance to the coast/Southport station

6.4.8 Taylor Diagram

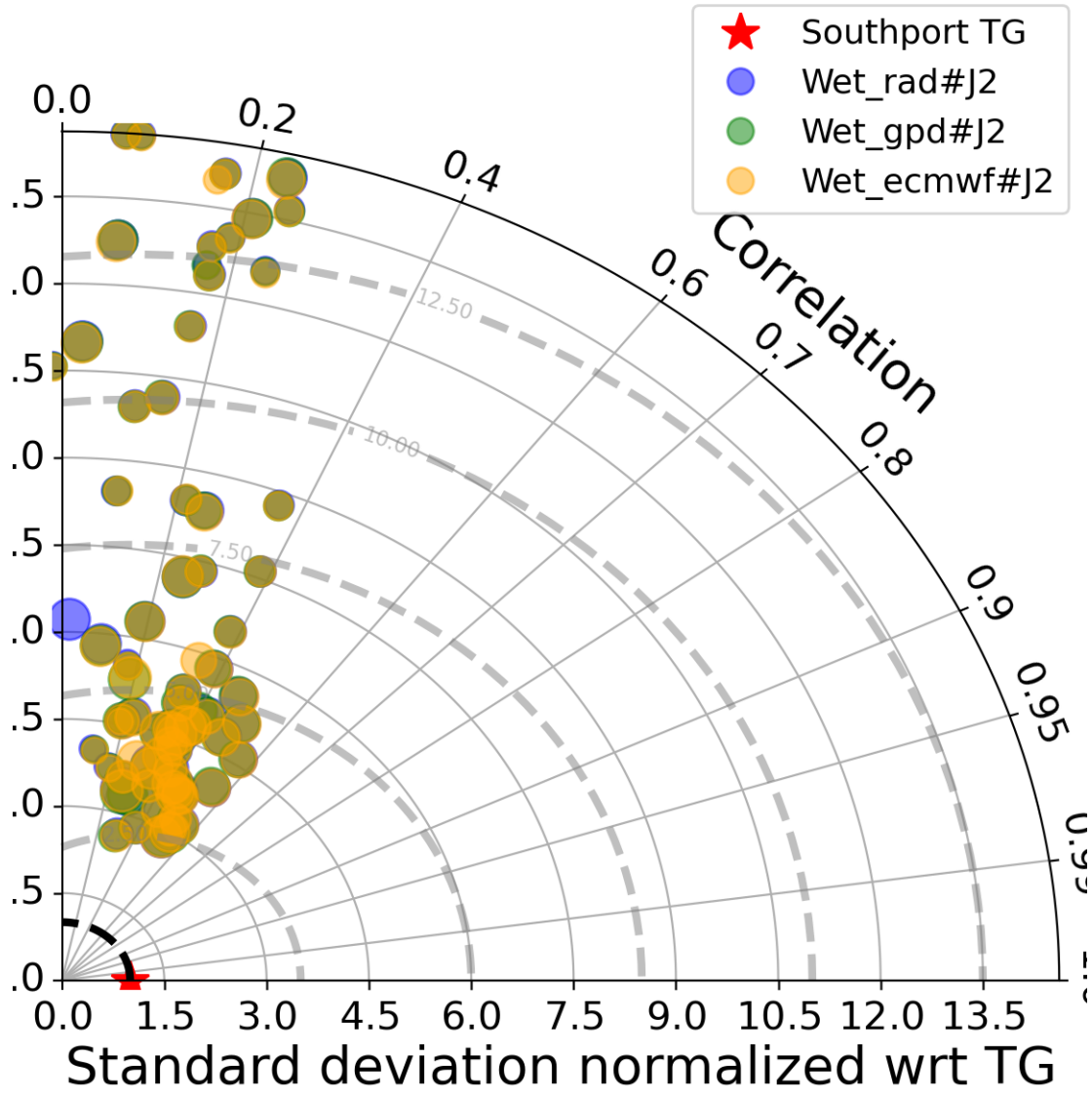

FIGURE 88 – Taylor diagram

6.4.9 Mean statistics table of products comparison with Southport 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	83.792	0.299	0.385	0.373
Wet_gpd#J2	83.77	0.3	0.383	0.372
Wet_ecmwf#J2	83.835	0.301	0.385	0.373

FIGURE 89 – 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 65 point.

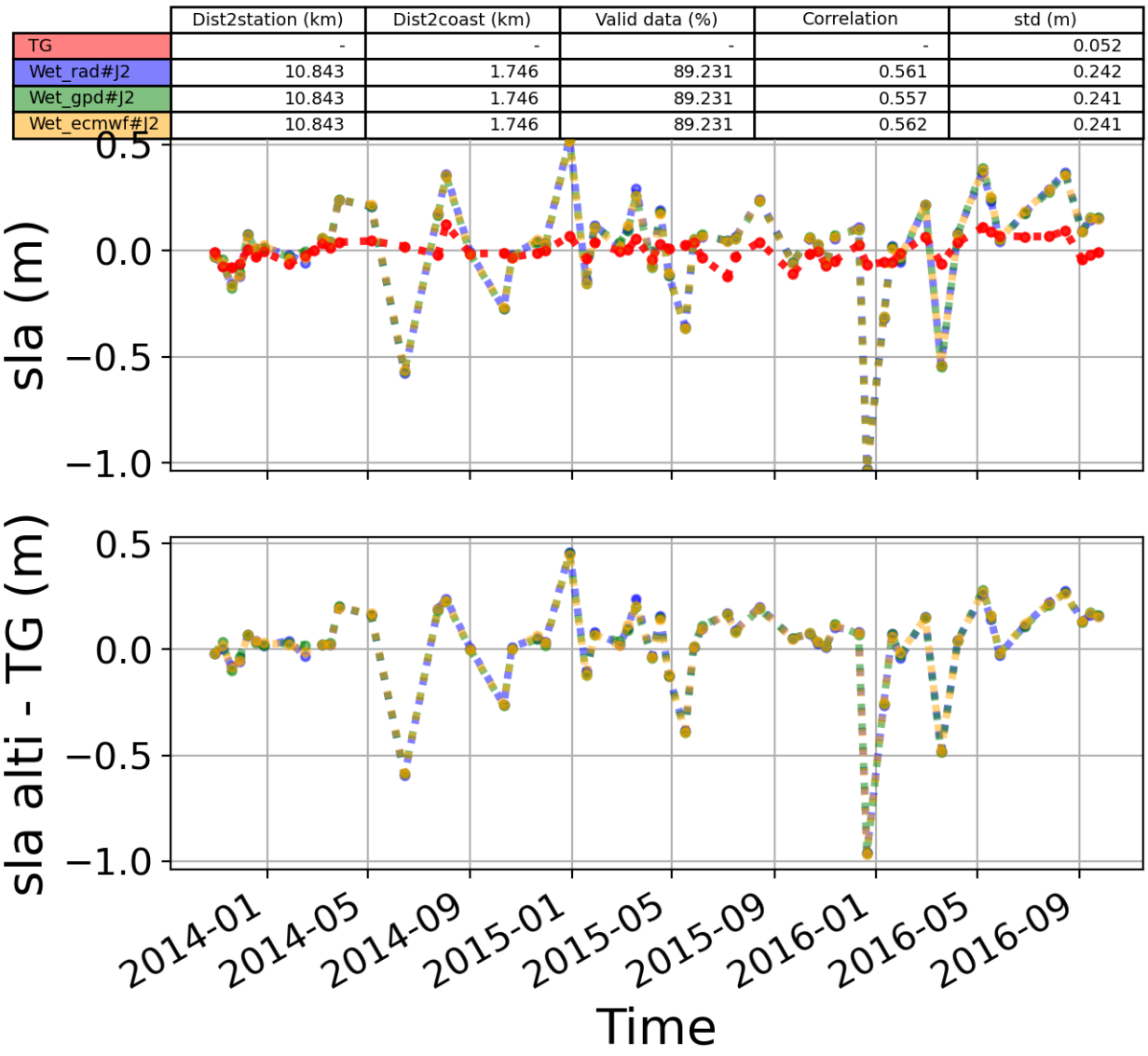

FIGURE 90 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.5 Station : Townsville

- Nearest track to Townsville station is the track number track175
- The area of interest is limited by :
  - A circle which it's center is the Townsville 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 % Townsville tide gauge

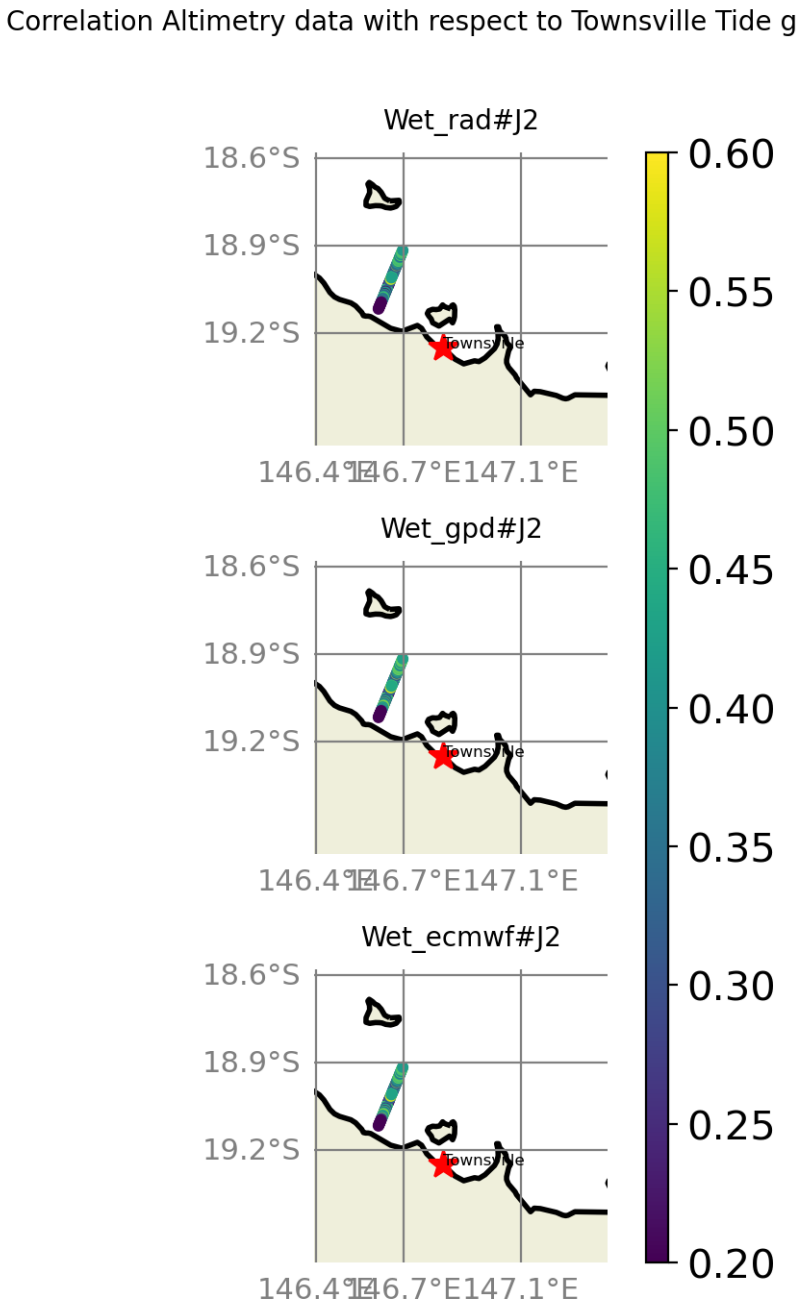

FIGURE 91 – correlation visualization in maps view % Townsville tide gauge

6.5.2 rmsd visualization in maps view % Townsville tide gauge

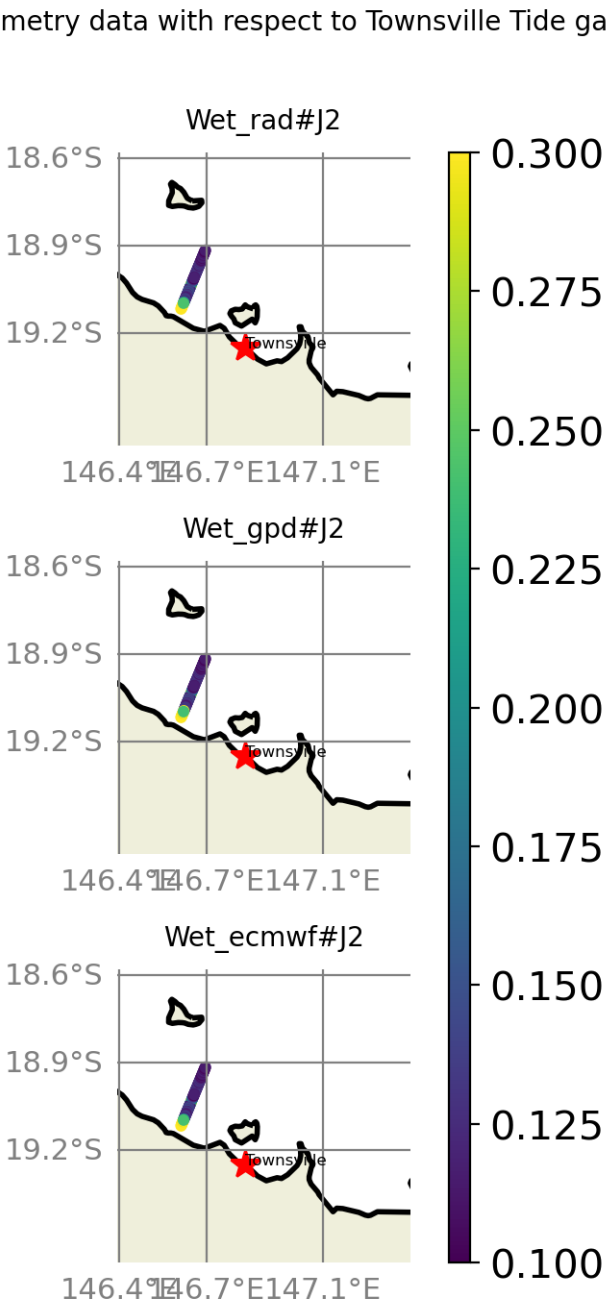

FIGURE 92 – rmsd visualization in maps view % Townsville tide gauge

6.5.3 std visualization in maps view % Townsville tide gauge

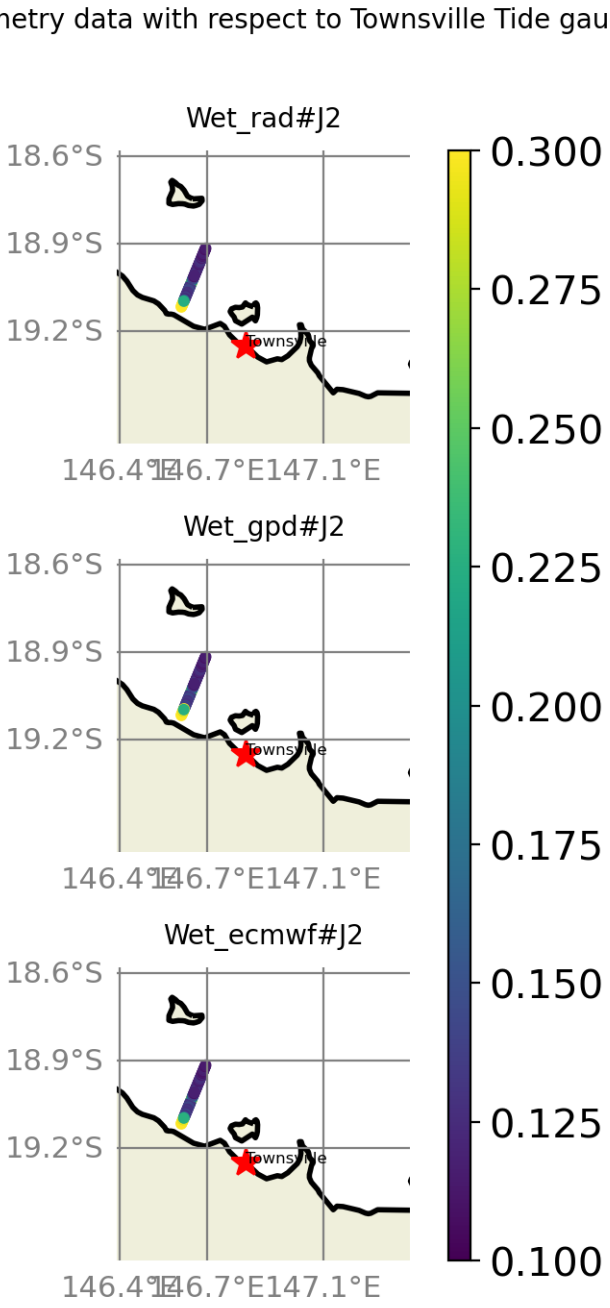

FIGURE 93 – std visualization in maps view % Townsville tide gauge

6.5.4 valid_data_percent visualization in maps view % Townsville tide gauge

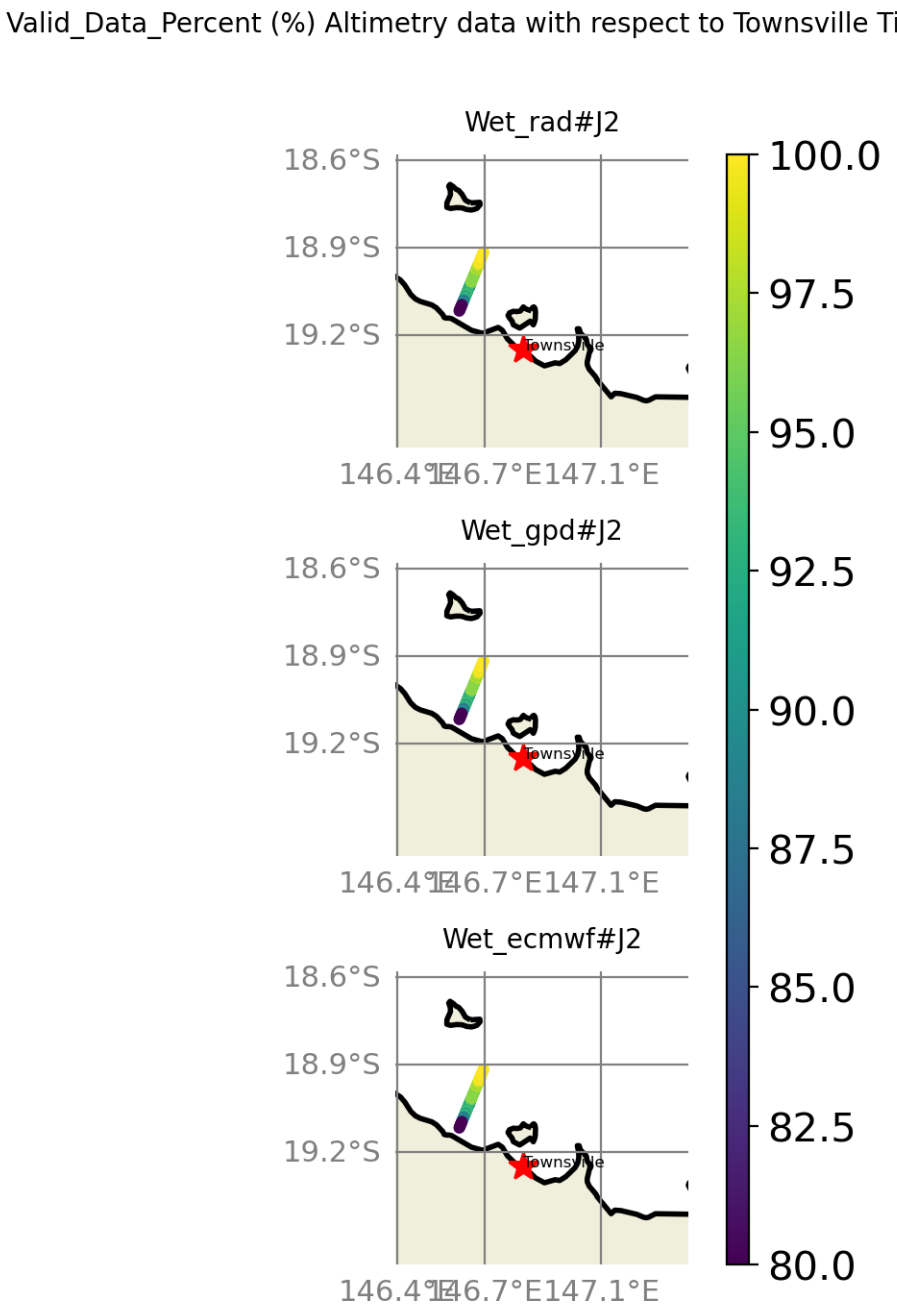

FIGURE 94 – valid_data_percent visualization in maps view % Townsville tide gauge

6.5.5 Valid data (%) in function of distance to coast/Townsville 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. $maxNB = 85$ 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.

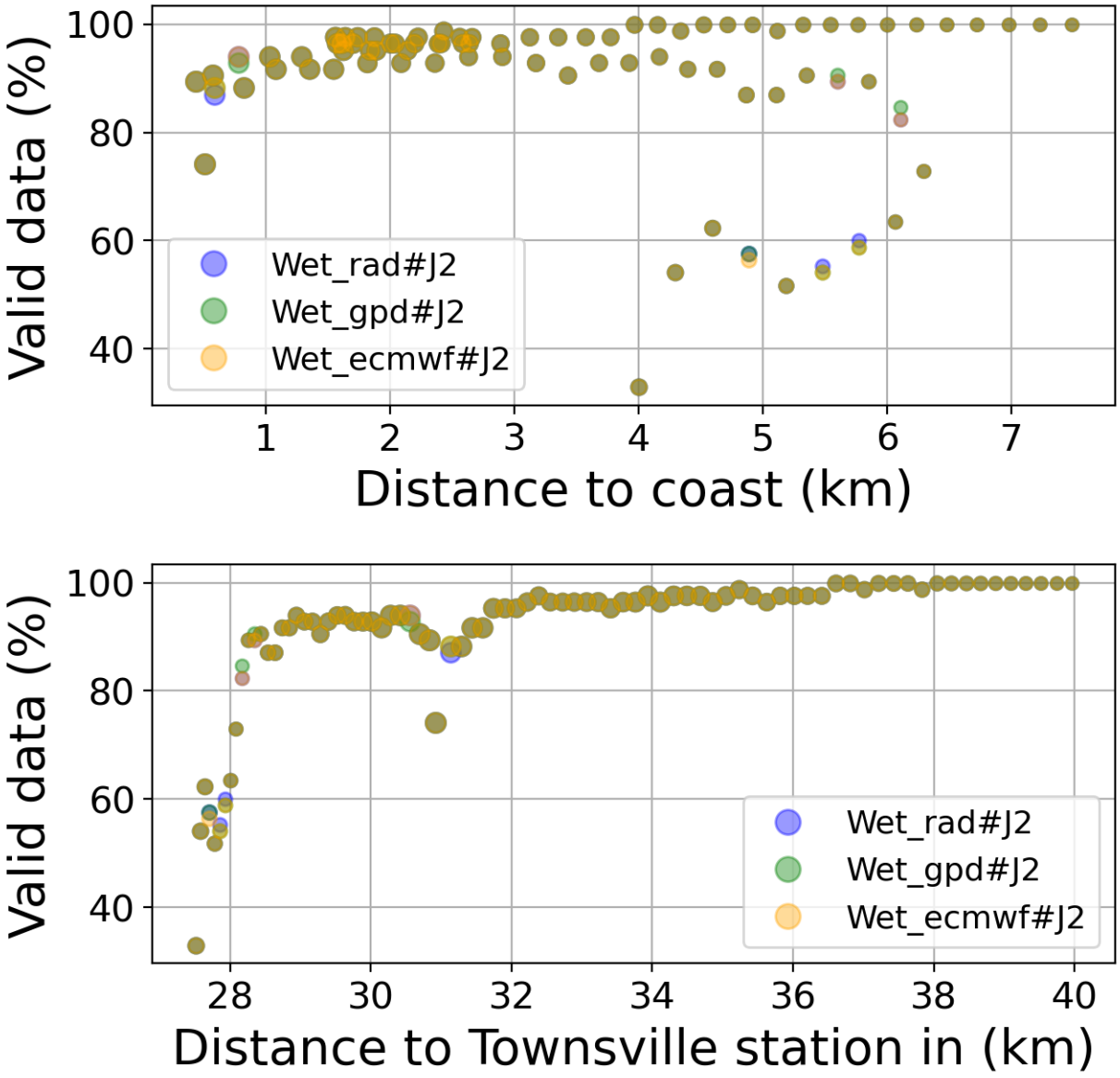

FIGURE 95 – Valid data (%) in function of distance to coast/Townsville station

6.5.6 Std in function of distance to coast/Townsville station

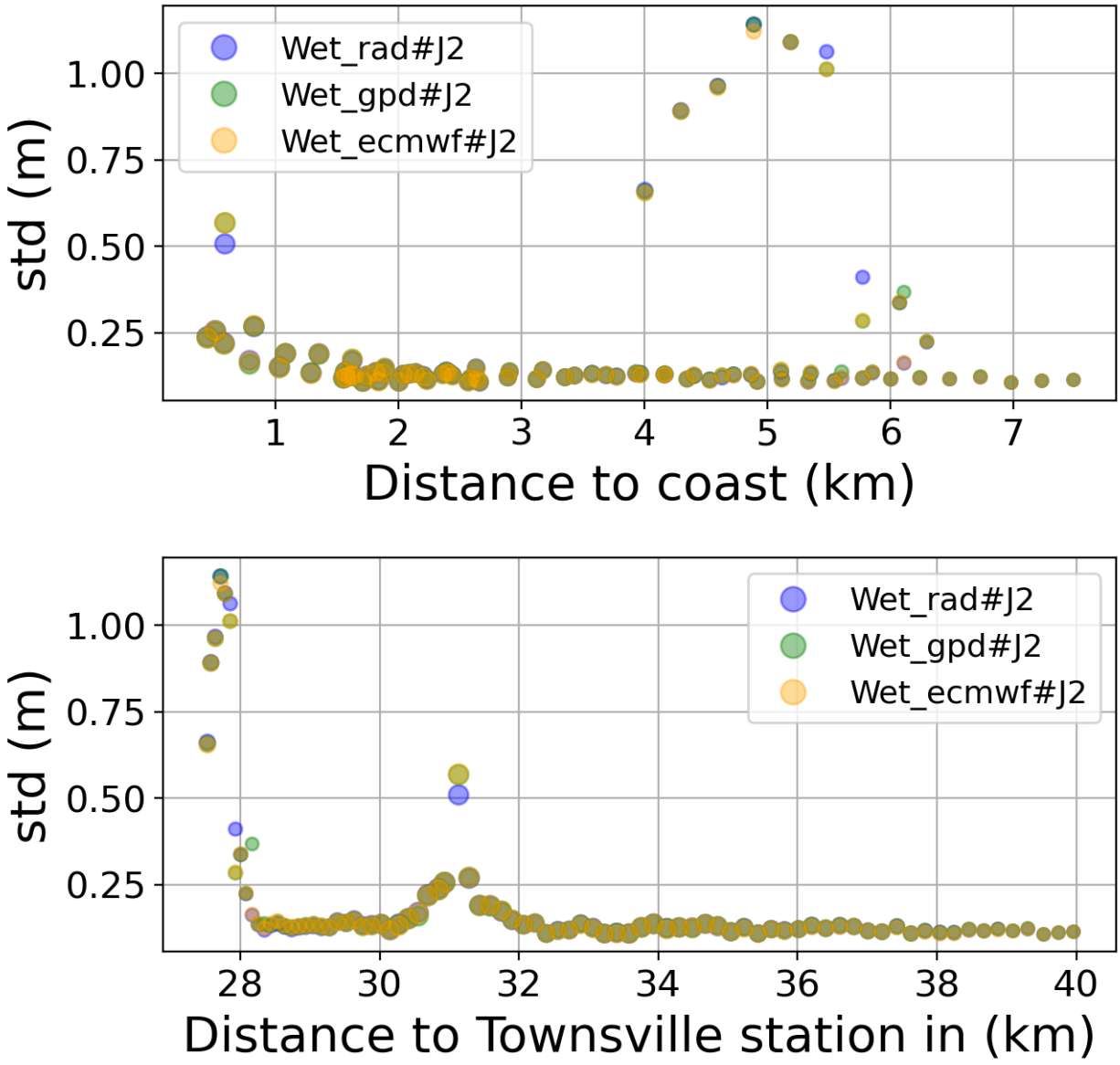

FIGURE 96 – Std in function of the distance to the coast/Townsville station

6.5.7 Correlation in function of distance to coast/Townsville station

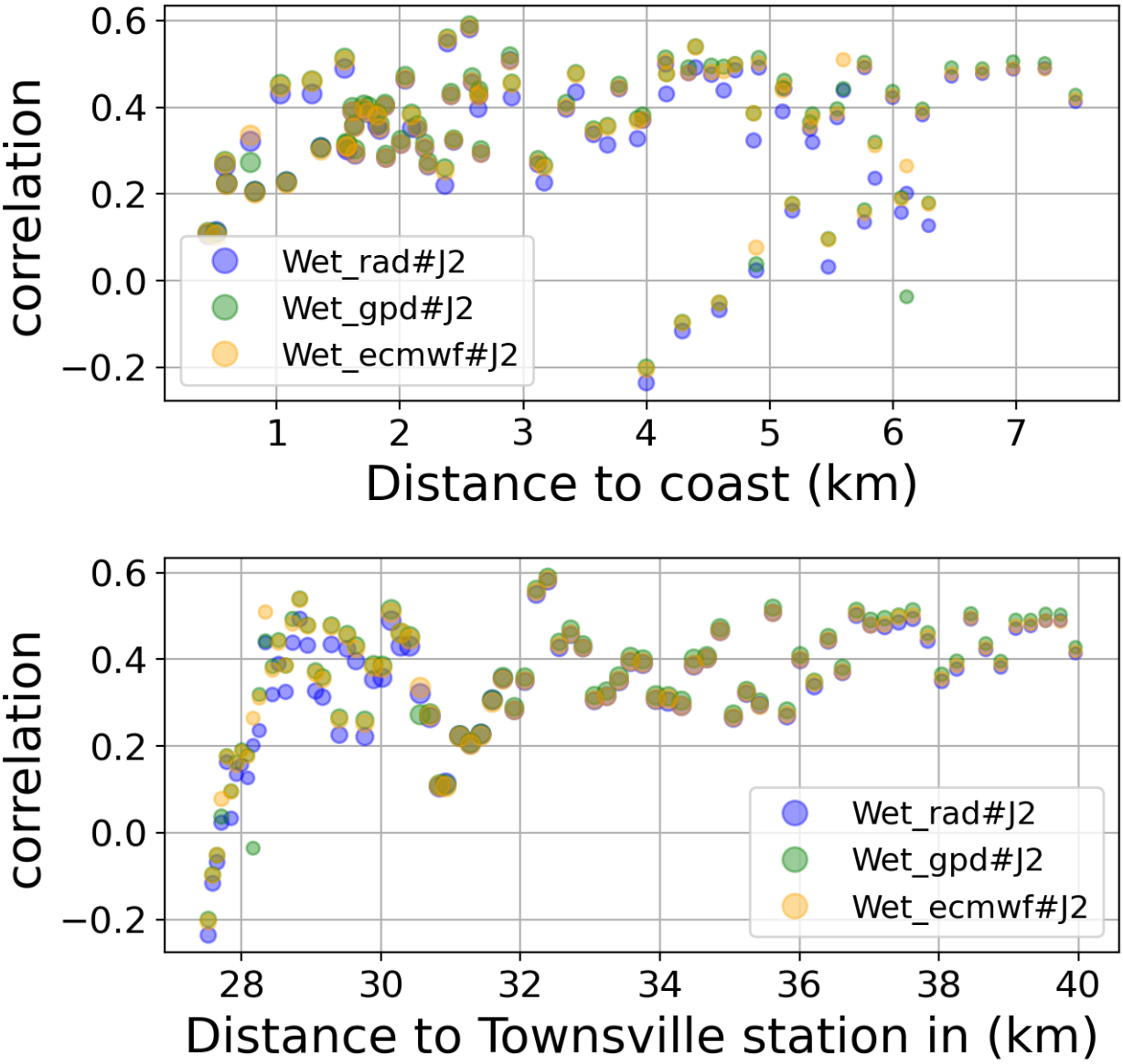

FIGURE 97 – Correlation in function of the distance to the coast/Townsville station

6.5.8 Taylor Diagram

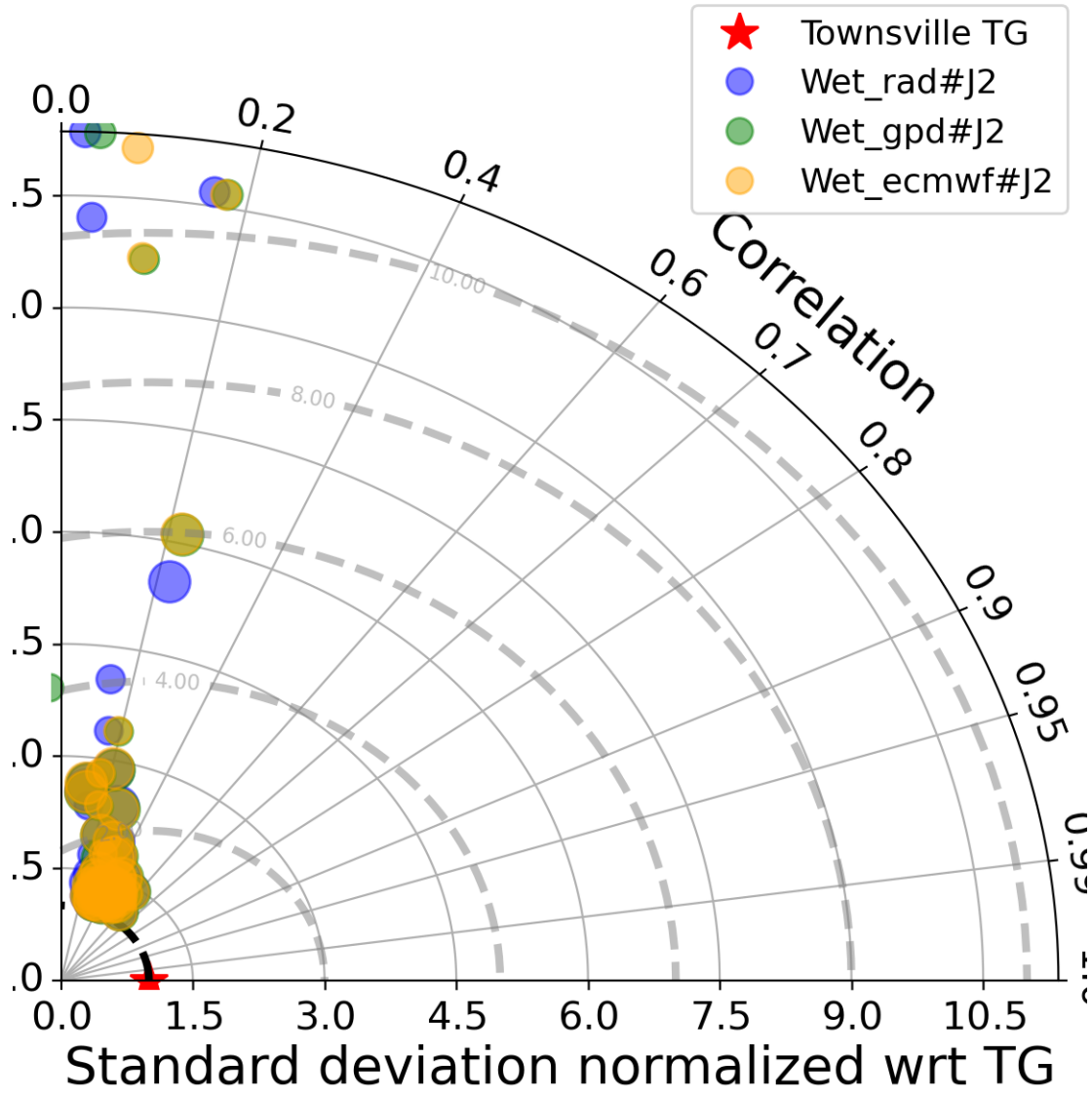

FIGURE 98 – Taylor diagram

6.5.9 Mean statistics table of products comparison with Townsville 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	90.861	0.335	0.208	0.209
Wet_gpd#J2	90.875	0.353	0.21	0.208
Wet_ecmwf#J2	90.832	0.352	0.207	0.206

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 85 point.

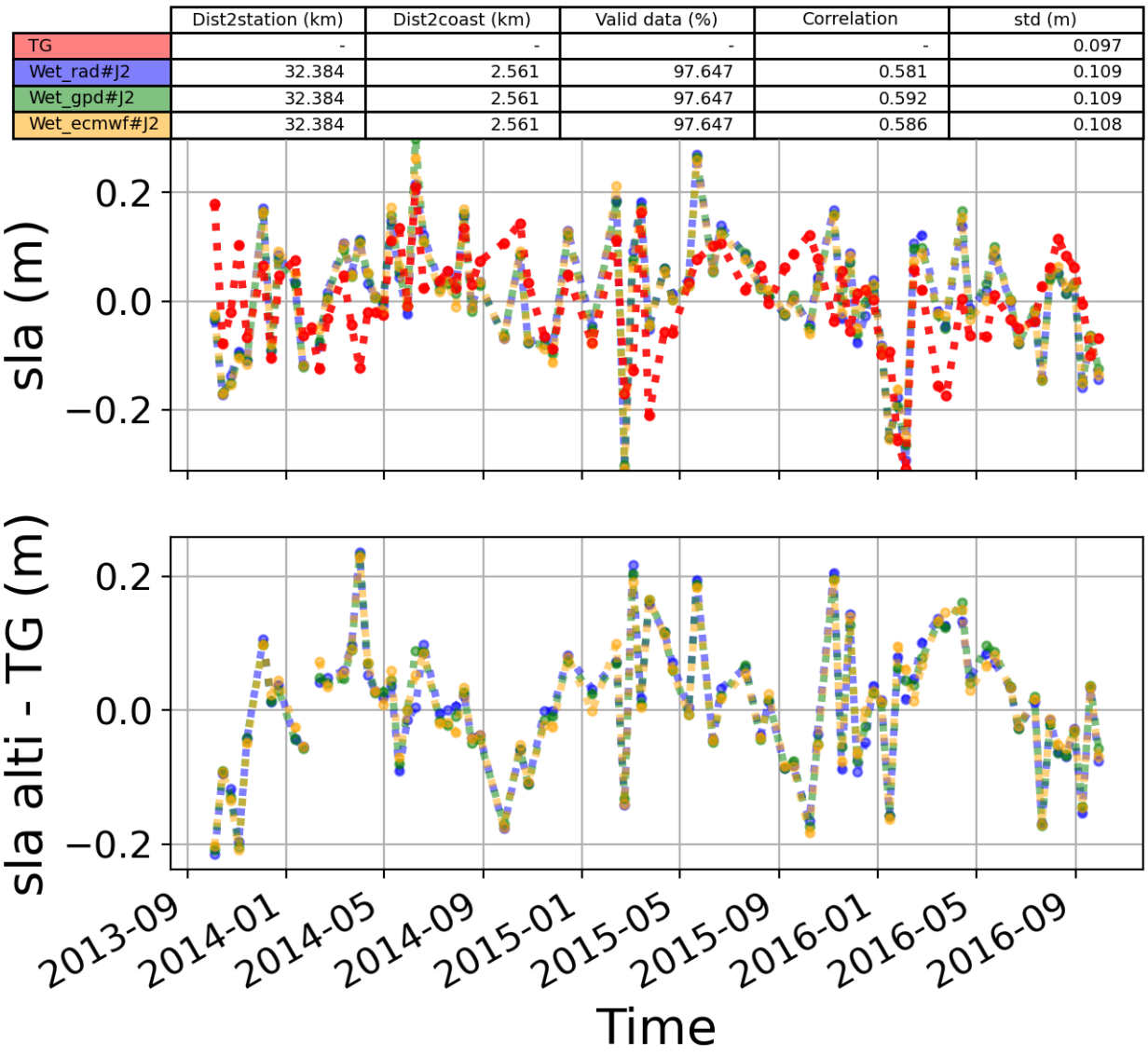

FIGURE 100 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.6 Station : Booby_island

- Nearest track to Booby_island station is the track number track138
- The area of interest is limited by :
  - A circle which it's center is the Booby_island 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 % Booby_island tide gauge

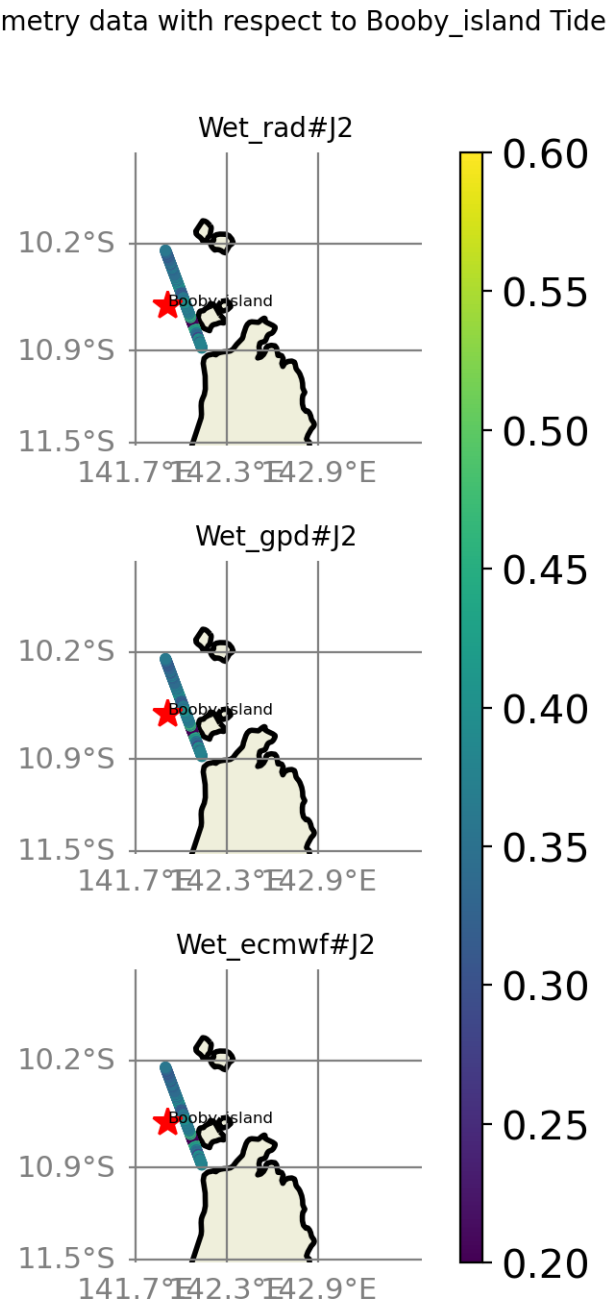

FIGURE 101 – correlation visualization in maps view % Booby_island tide gauge

6.6.2 rmsd visualization in maps view % Booby_island tide gauge

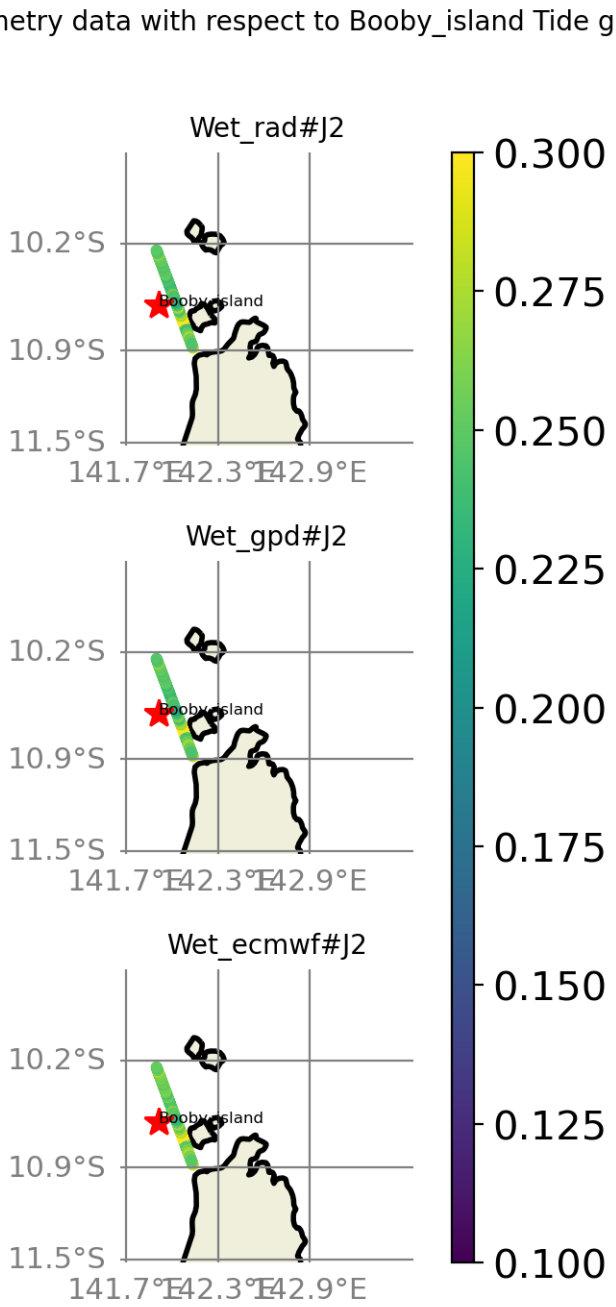

FIGURE 102 – rmsd visualization in maps view % Booby_island tide gauge

6.6.3 std visualization in maps view % Booby_island tide gauge

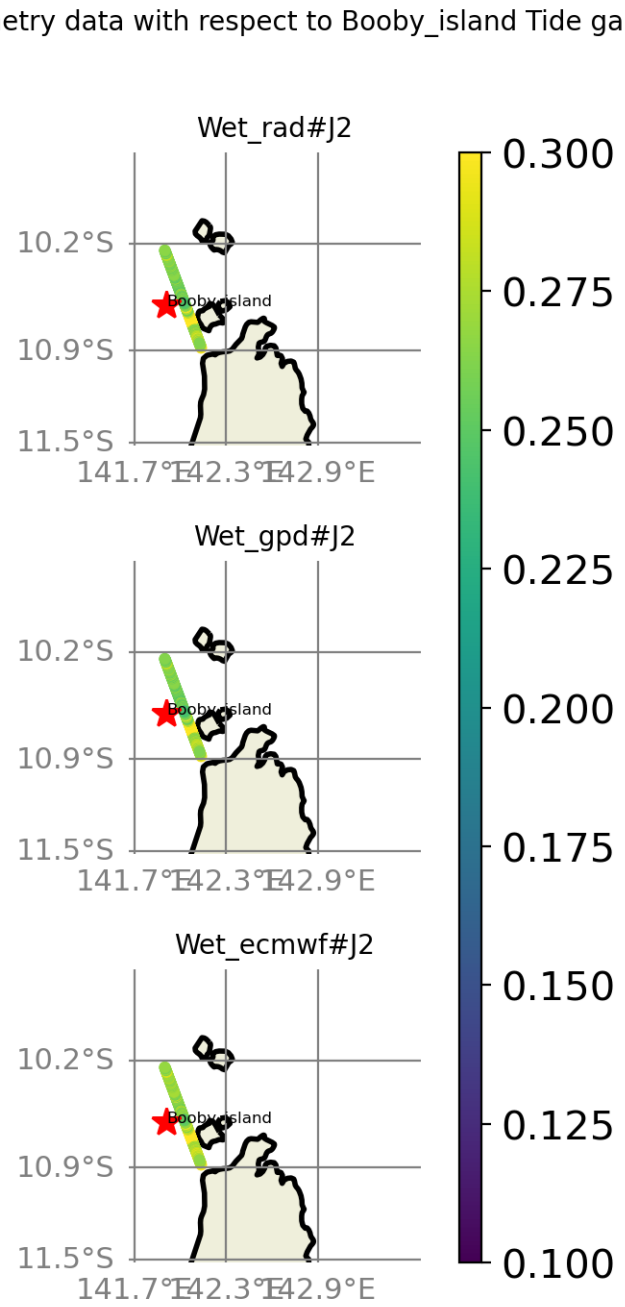

FIGURE 103 – std visualization in maps view % Booby_island tide gauge

6.6.4 valid_data_percent visualization in maps view % Booby_island tide gauge

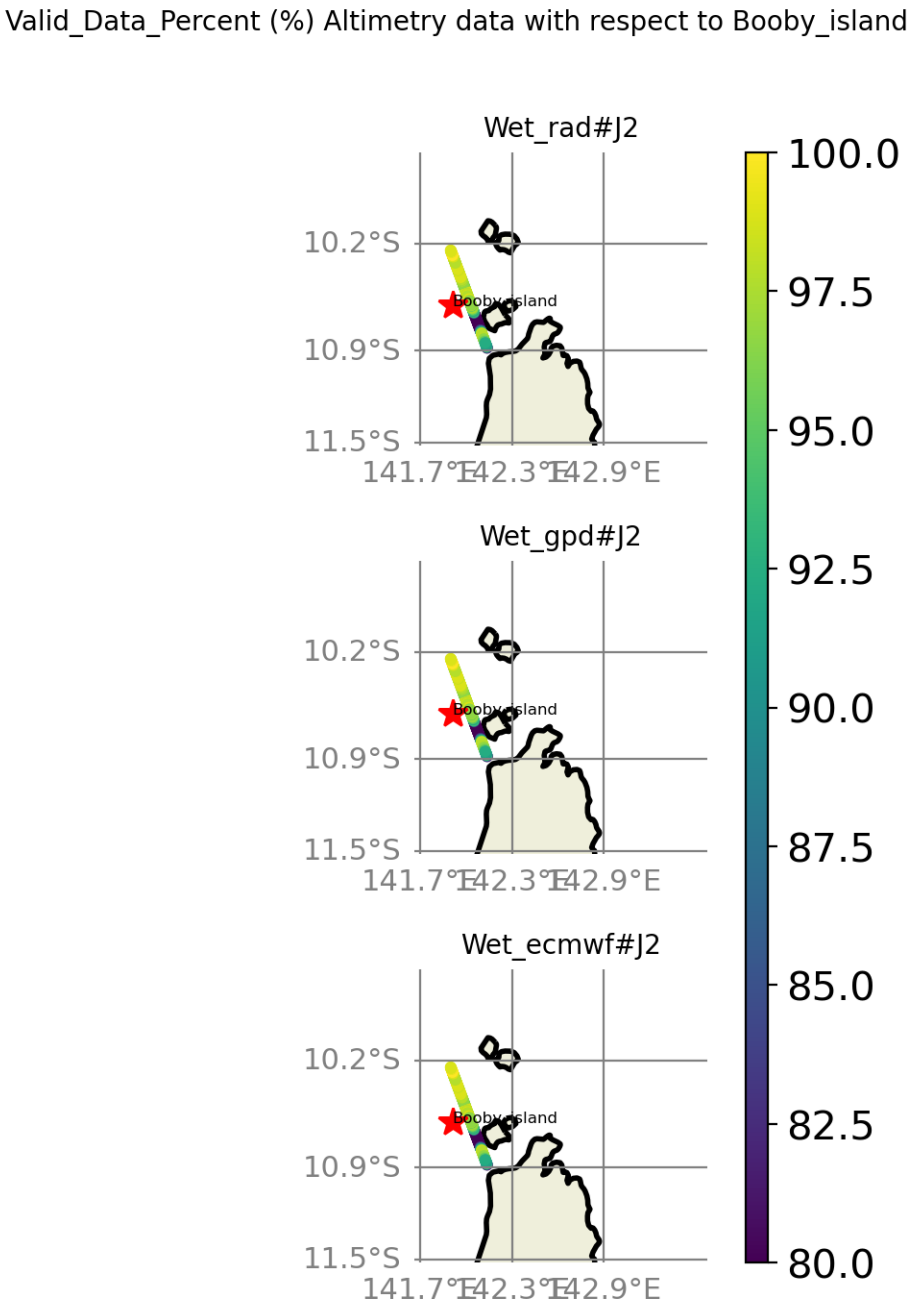

FIGURE 104 – valid_data_percent visualization in maps view % Booby_island tide gauge

6.6.5 Valid data (%) in function of distance to coast/Booby_island 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. $maxNB = 91$ 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.

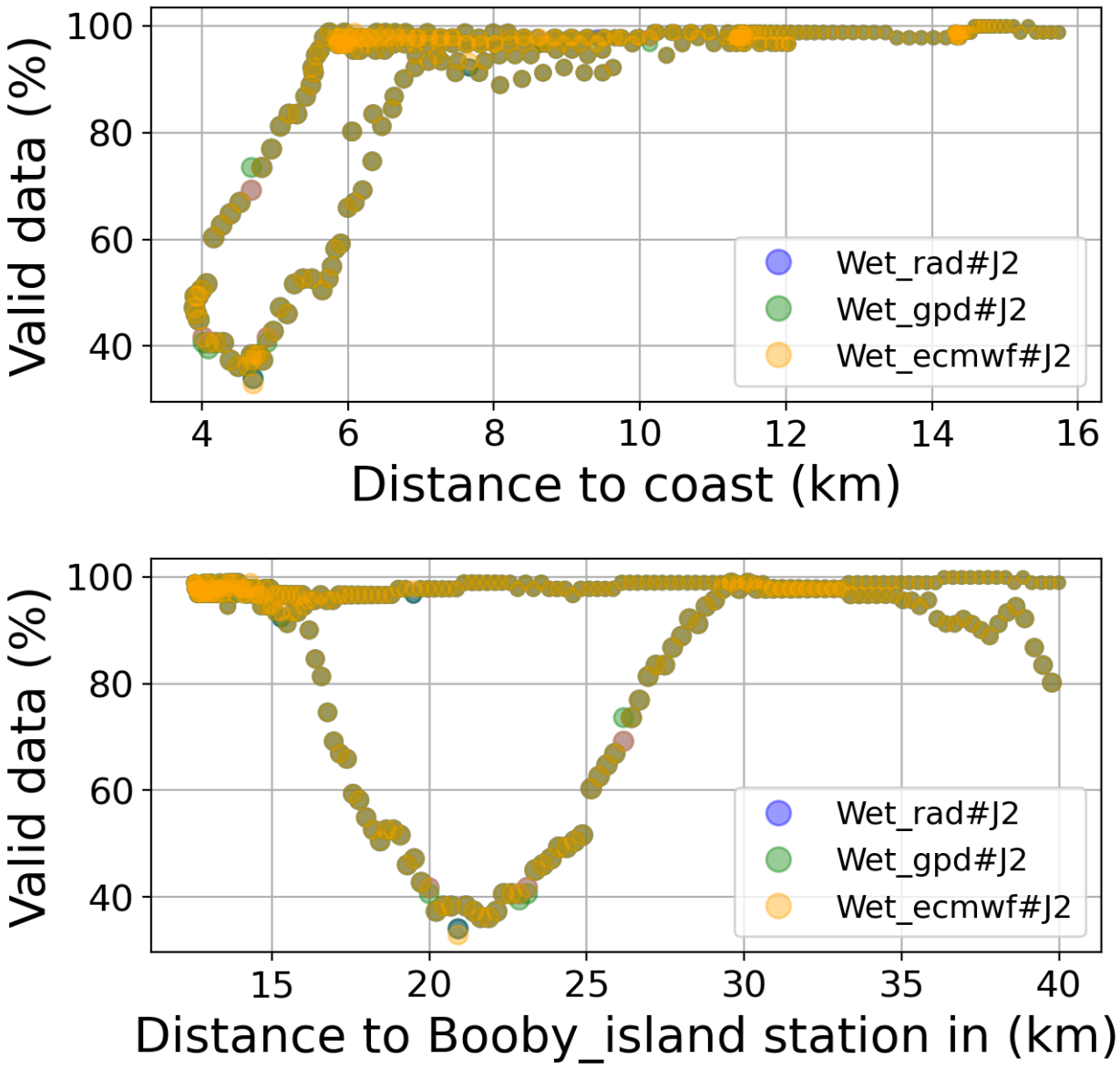

FIGURE 105 – Valid data (%) in function of distance to coast/Booby_island station

6.6.6 Std in function of distance to coast/Booby_island station

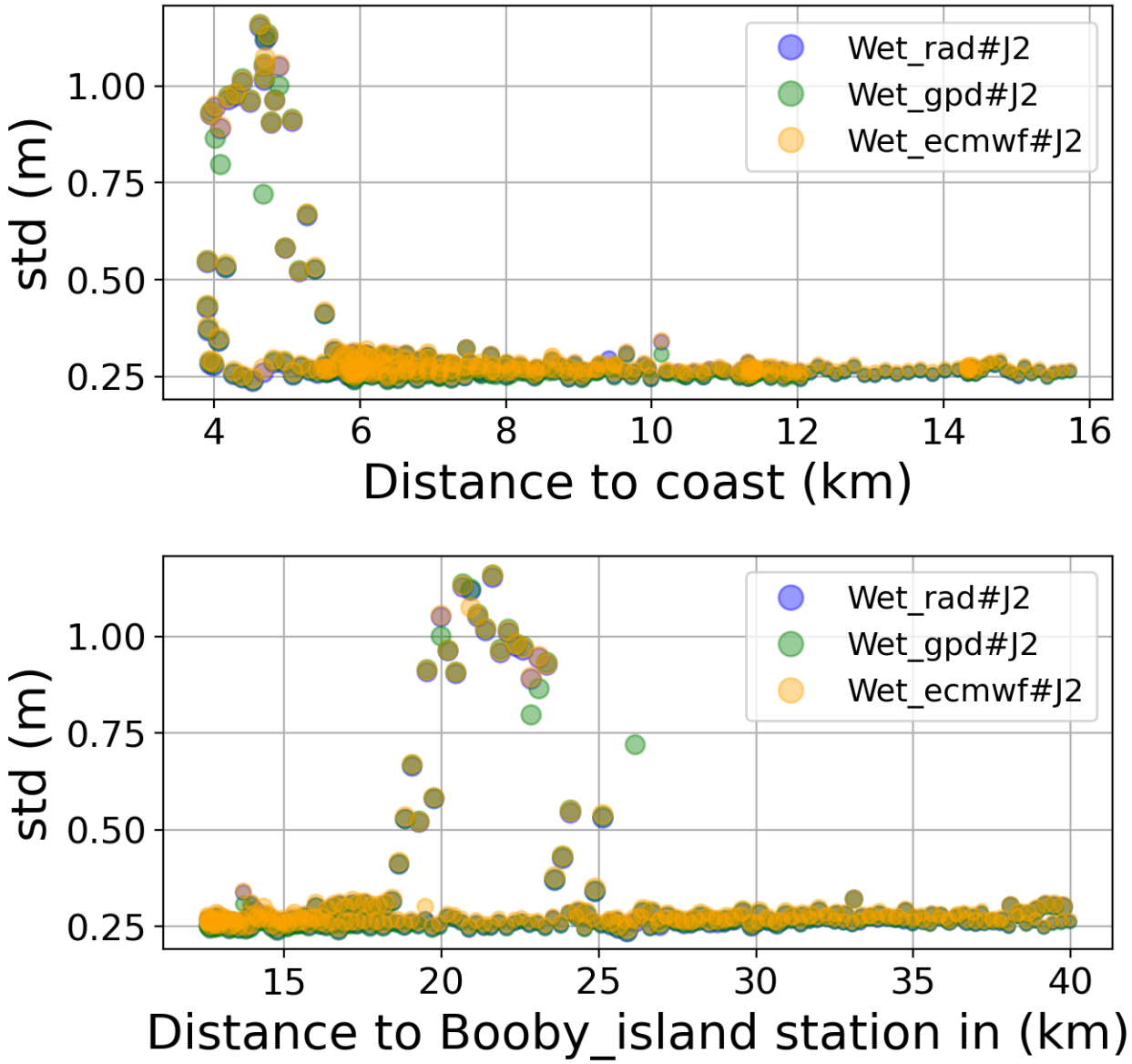

FIGURE 106 – Std in function of the distance to the coast/Booby_island station

6.6.7 Correlation in function of distance to coast/Booby_island station

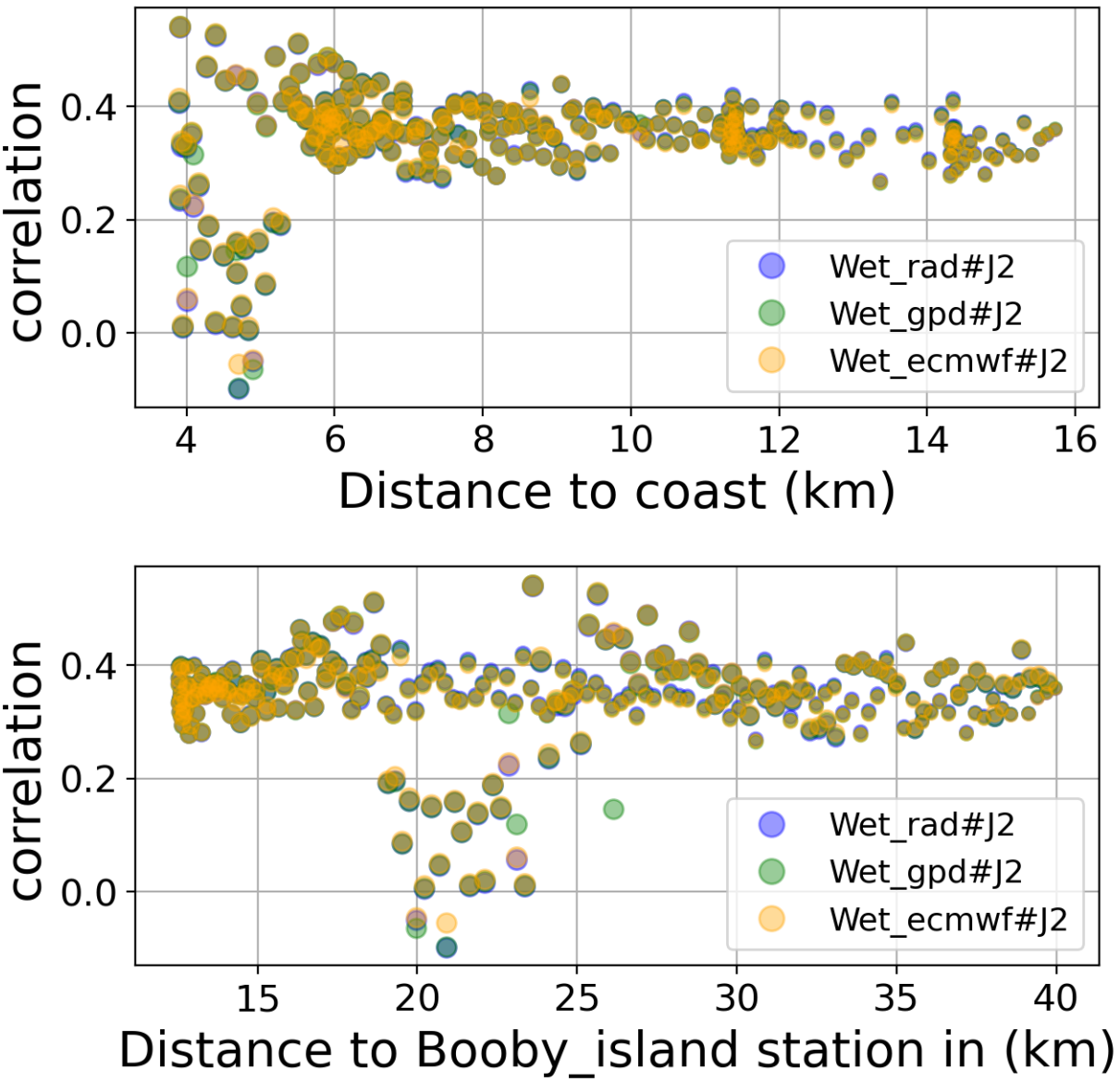

FIGURE 107 – Correlation in function of the distance to the coast/Booby_island station

6.6.8 Taylor Diagram

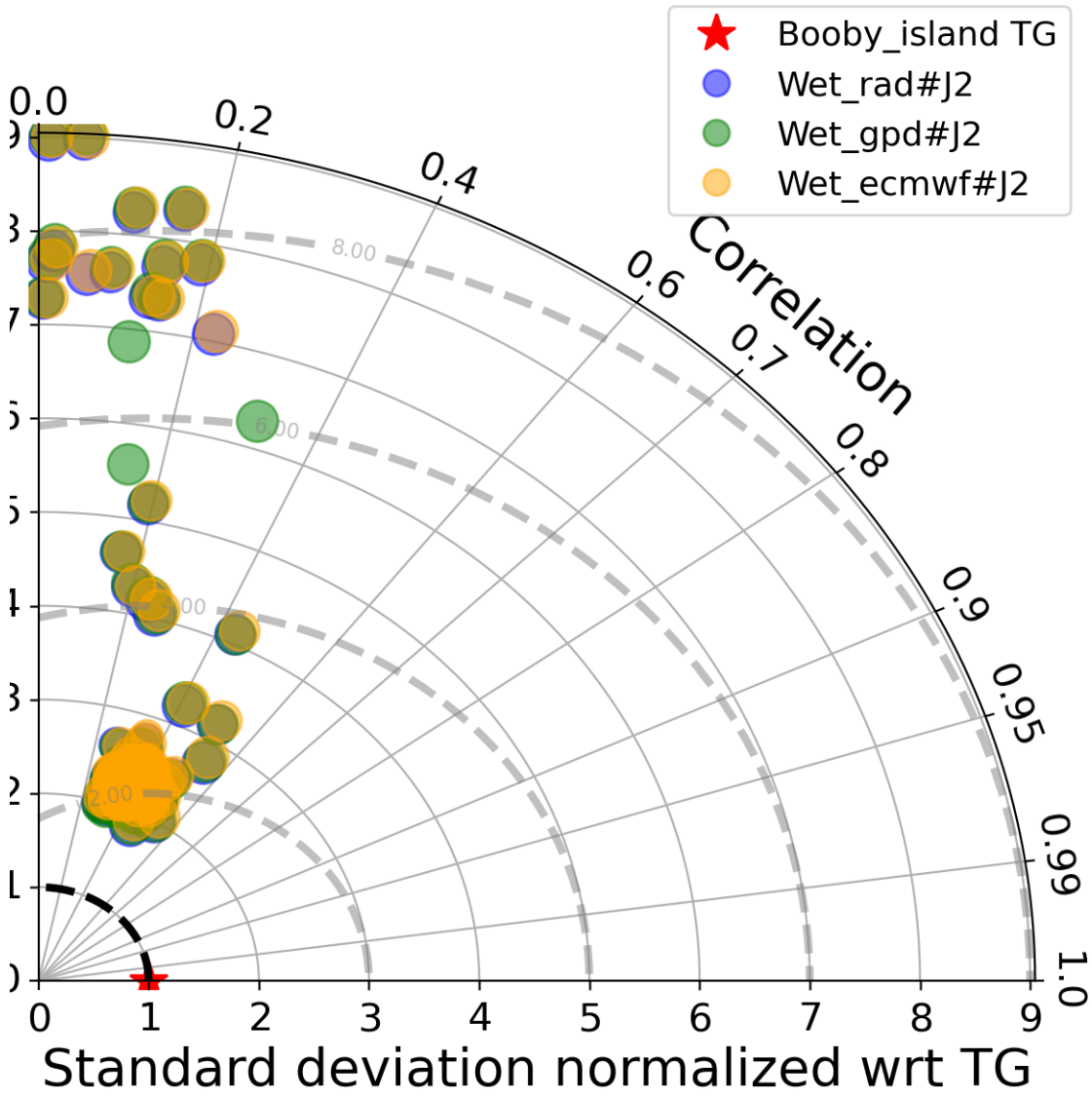

Figure 108 – Taylor diagram

6.6.9 Mean statistics table of products comparison with Booby_island 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	89.015	0.344	0.322	0.305
Wet_gpd#J2	89.011	0.342	0.322	0.306
Wet_ecmwf#J2	89.02	0.342	0.328	0.311

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 91 point.

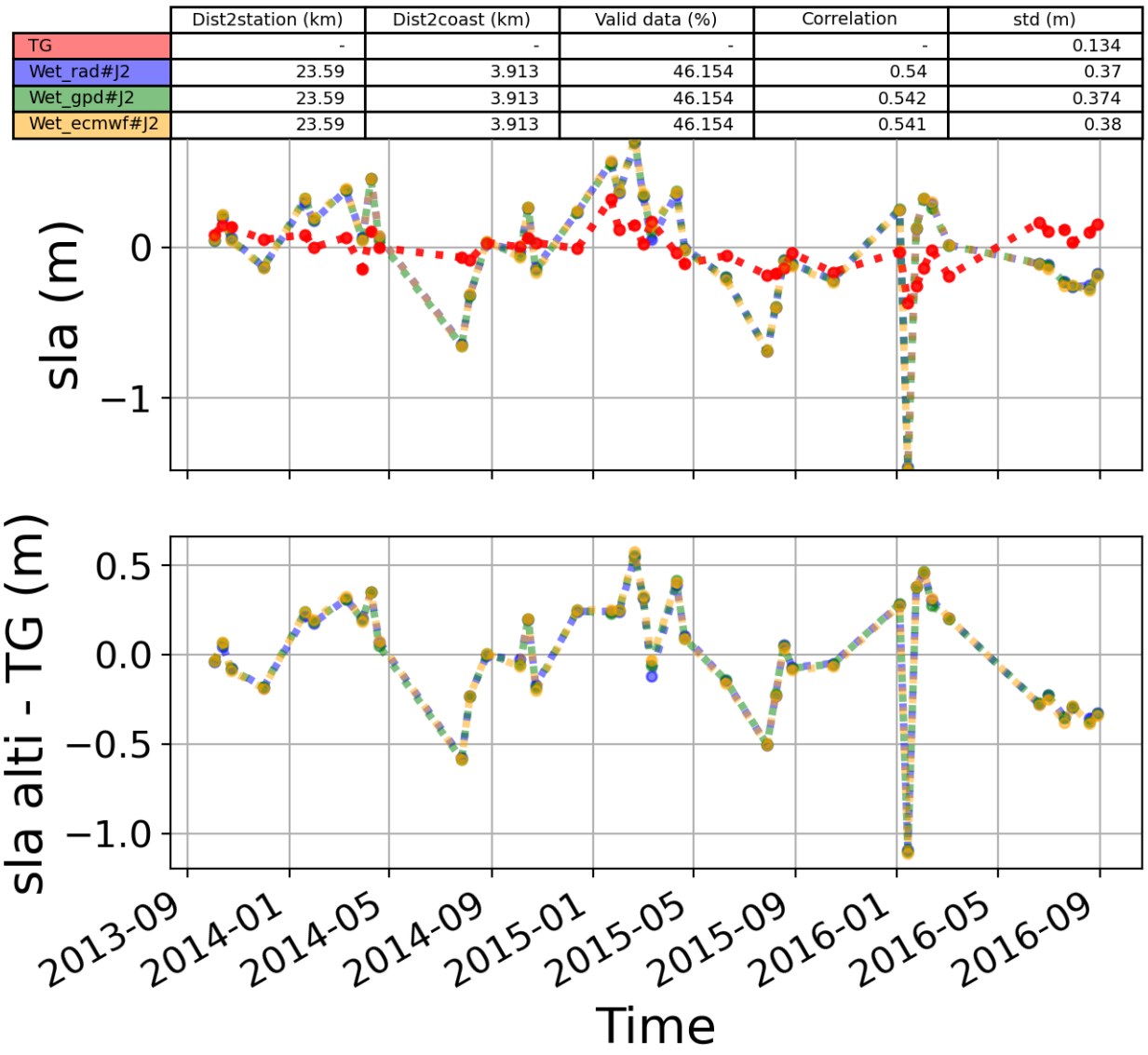

Figure 110 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie