

DIAGTOOL REPORT



**Round Robin (GT cotier) : Tide. Eaustralia. J3.
fes14b struct vs fes14b unstruct vs fes14b unstruct
reg vs EOT20.**

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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 Tide used to calculate the sea level anomaly. Each version has been compared with a reference version. In this case the Fes14b_struct 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 : J3
- Git last tag :
- Git changeset number : 3b970d7-2022-07-05

2 Processing

2.1 sla formula

2.1.1 fes14b_struct product ' sla

```
sla = ORBIT.ALT.CNES_POE_F -
      RANGE.ALT -
      MEAN_SEA_SURFACE.MODEL.CNESCLS15 -
      SEA_STATE_BIAS.ALT -
      IONOSPHERIC_CORRECTION.MODEL.GIM -
      WET_TROPOSPHERIC_CORRECTION.RAD -
      DRY_TROPOSPHERIC_CORRECTION.MODEL.ECMWF -
      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
```

2.1.2 fes14b_unstruct product ' sla

```
sla = ORBIT.ALT.CNES_POE_F -
      RANGE.ALT -
      MEAN_SEA_SURFACE.MODEL.CNESCLS15 -
      SEA_STATE_BIAS.ALT -
      IONOSPHERIC_CORRECTION.MODEL.GIM -
      WET_TROPOSPHERIC_CORRECTION.RAD -
      DRY_TROPOSPHERIC_CORRECTION.MODEL.ECMWF -
      DYNAMICAL_ATMOSPHERIC_CORRECTION.MODEL.MOG2D_HR -
```

tide_FES2014b_unstruct -
 LOAD_TIDE.MODEL.FES14B -
 SOLID_EARTH_TIDE_HEIGHT.MODEL.CARTWRIGHT_TAYLER_71 -
 POLE_TIDE_HEIGHT.MODEL.DESAI_2015

2.1.3 fes14b_unstruct_reg product 'sla

sla = ORBIT.ALT.CNES_POE_F -
 RANGE.ALT -
 MEAN_SEA_SURFACE.MODEL.CNESCLS15 -
 SEA_STATE_BIAS.ALT -
 IONOSPHERIC_CORRECTION.MODEL.GIM -
 WET_TROPOSPHERIC_CORRECTION.RAD -
 DRY_TROPOSPHERIC_CORRECTION.MODEL.ECMWF -
 DYNAMICAL_ATMOSPHERIC_CORRECTION.MODEL.MOG2D_HR -
 tide_RegAT -
 LOAD_TIDE.MODEL.FES14B -
 SOLID_EARTH_TIDE_HEIGHT.MODEL.CARTWRIGHT_TAYLER_71 -
 POLE_TIDE_HEIGHT.MODEL.DESAI_2015

2.1.4 EOT20 product 'sla

sla = ORBIT.ALT.CNES_POE_F -
 RANGE.ALT -
 MEAN_SEA_SURFACE.MODEL.CNESCLS15 -
 SEA_STATE_BIAS.ALT -
 IONOSPHERIC_CORRECTION.MODEL.GIM -
 WET_TROPOSPHERIC_CORRECTION.RAD -
 DRY_TROPOSPHERIC_CORRECTION.MODEL.ECMWF -
 DYNAMICAL_ATMOSPHERIC_CORRECTION.MODEL.MOG2D_HR -
 tide_EOT20 -
 LOAD_TIDE.MODEL.FES14B -
 SOLID_EARTH_TIDE_HEIGHT.MODEL.CARTWRIGHT_TAYLER_71 -
 POLE_TIDE_HEIGHT.MODEL.DESAI_2015

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-serie 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

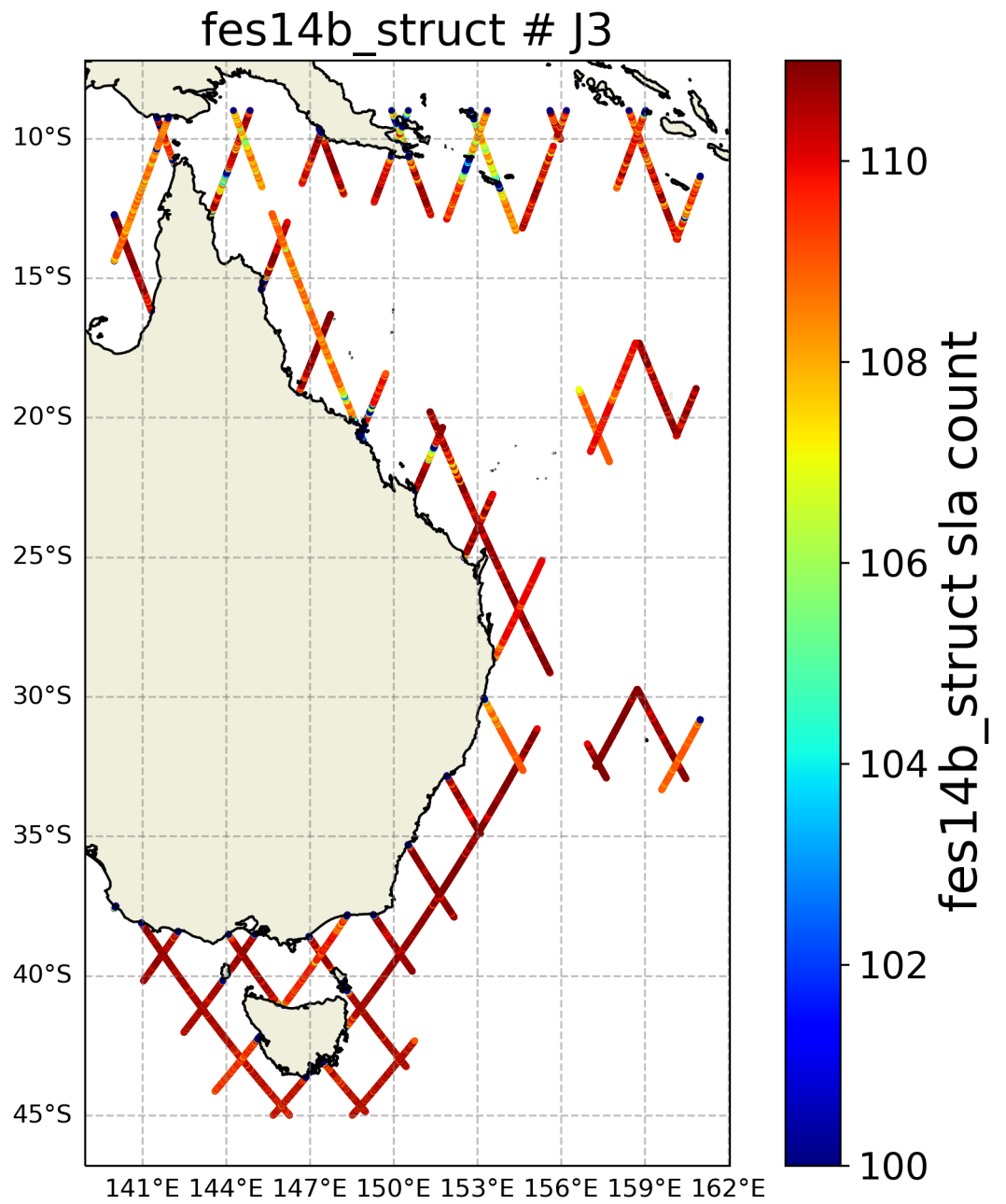


FIGURE 1 – Spatial coherence analysis of the count of the fes14b_struct version of sla variable

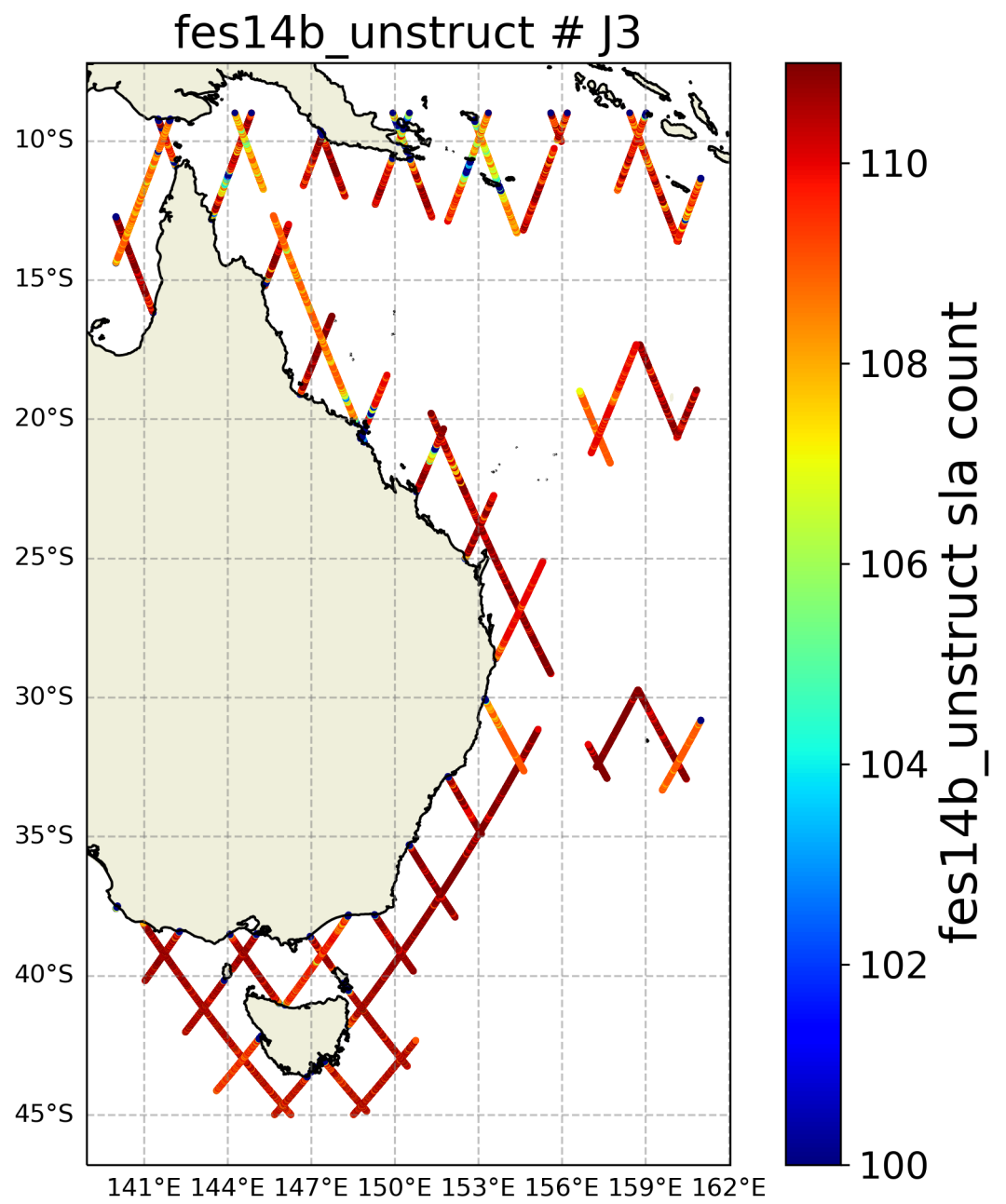


FIGURE 2 – Spatial coherence analysis of the count of the fes14b_unstruct version of sla variable

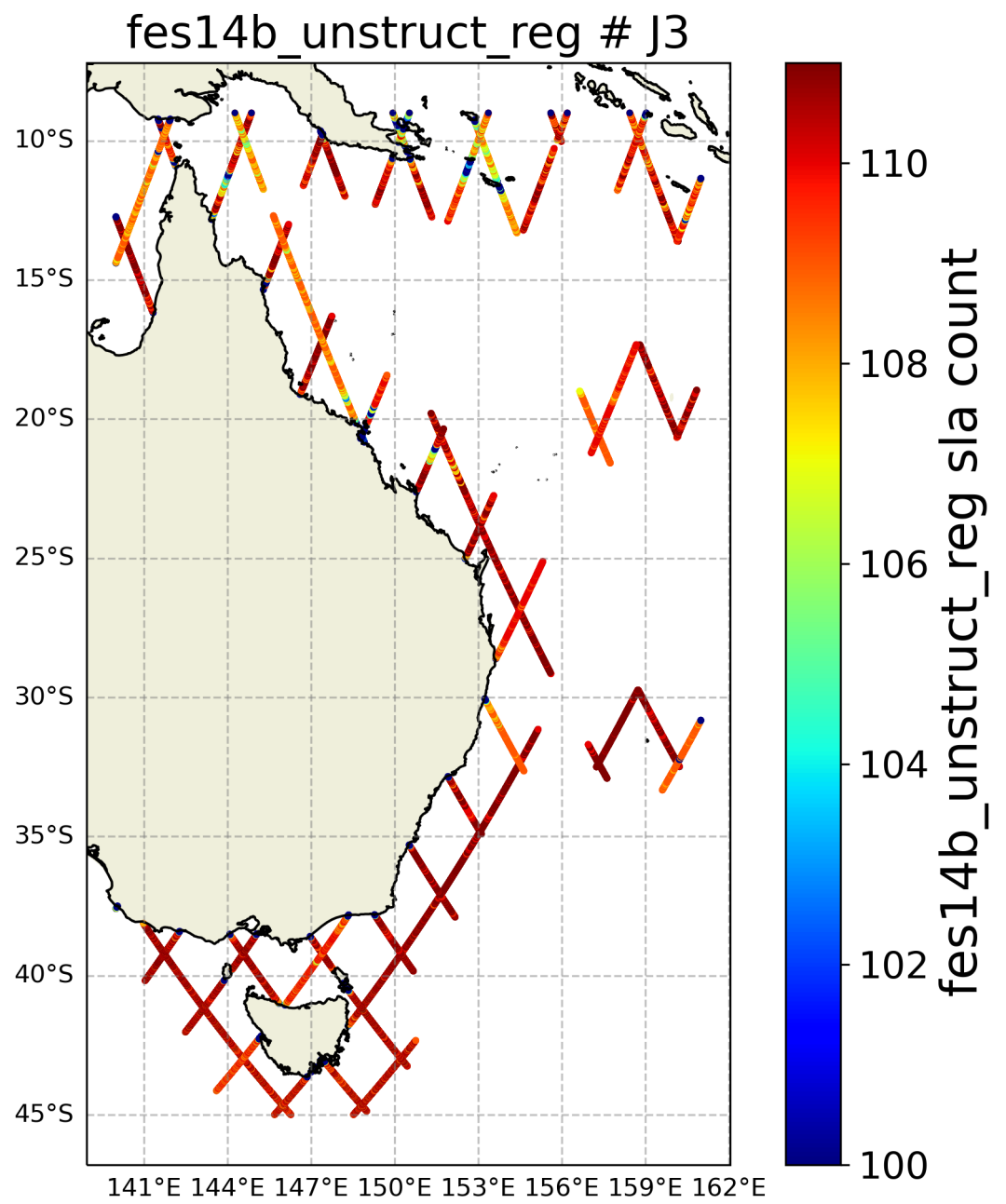


FIGURE 3 – Spatial coherence analysis of the count of the fes14b_unstruct_reg version of sla variable

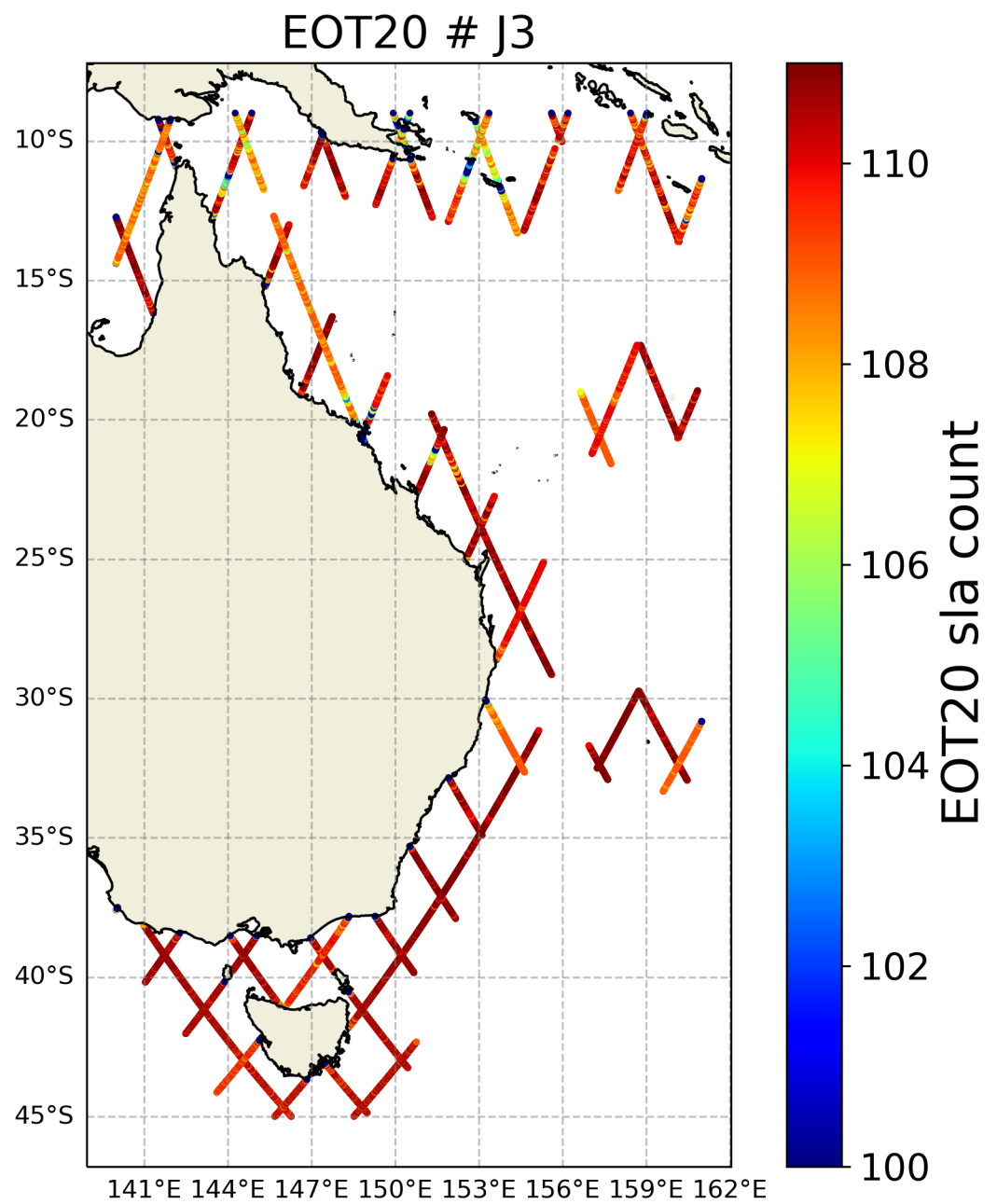


FIGURE 4 – Spatial coherence analysis of the count of the EOT20 version of sla variable

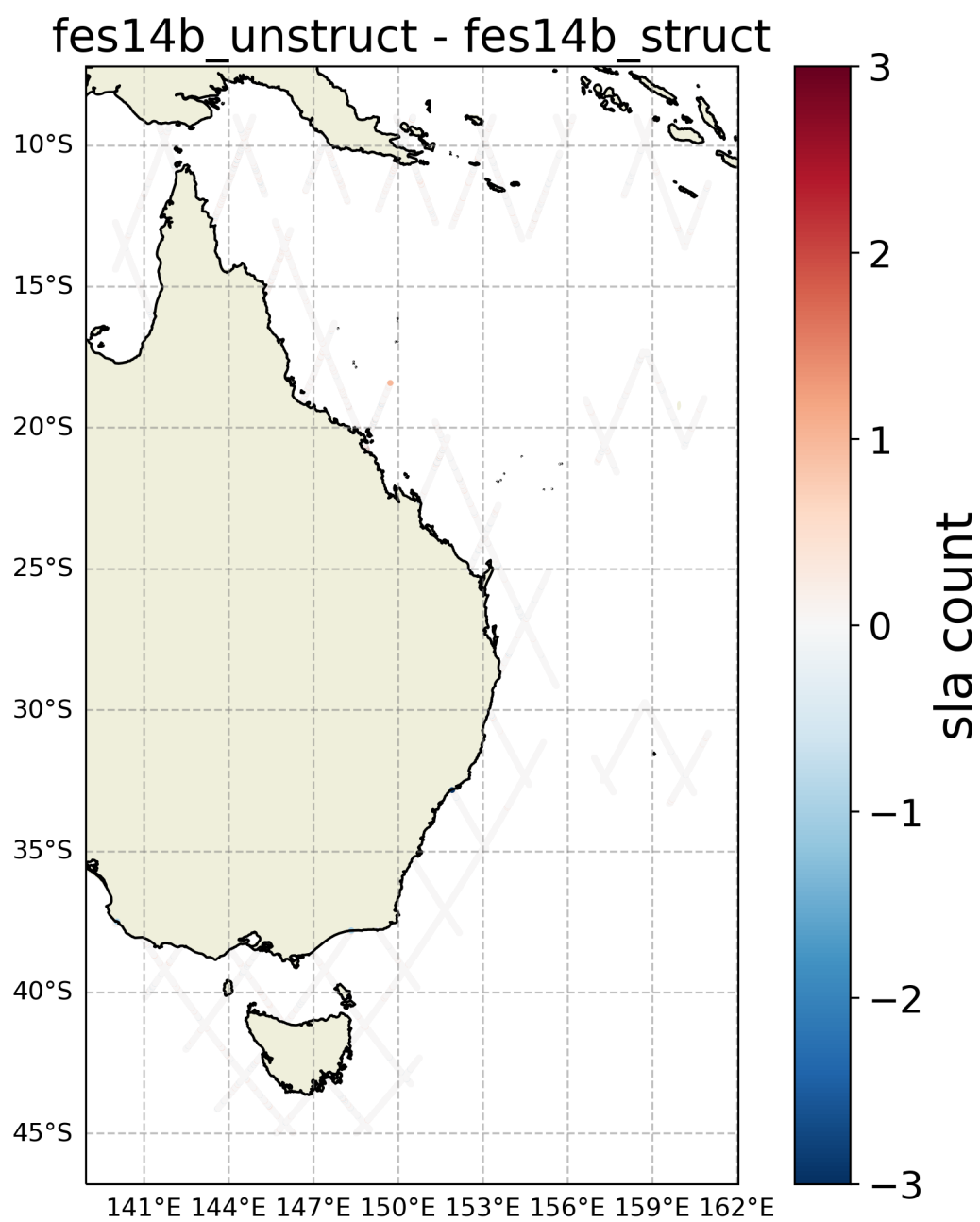


FIGURE 5 – Spatial coherence analysis of the Difference in sla 's count between fes14b_unstruct and fes14b_struct

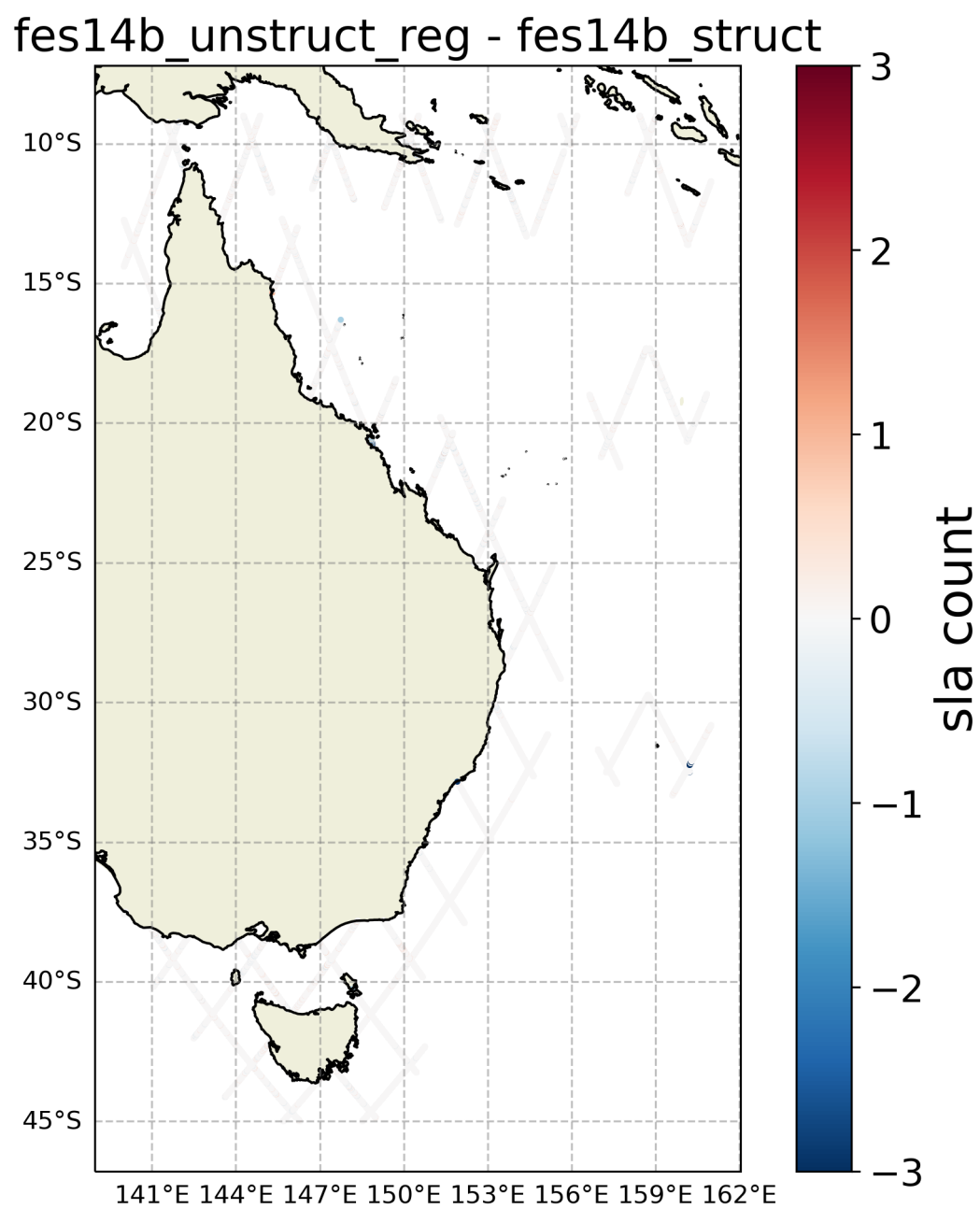


FIGURE 6 – Spatial coherence analysis of the Difference in sla 's count between fes14b_unstruct_reg and fes14b_struct

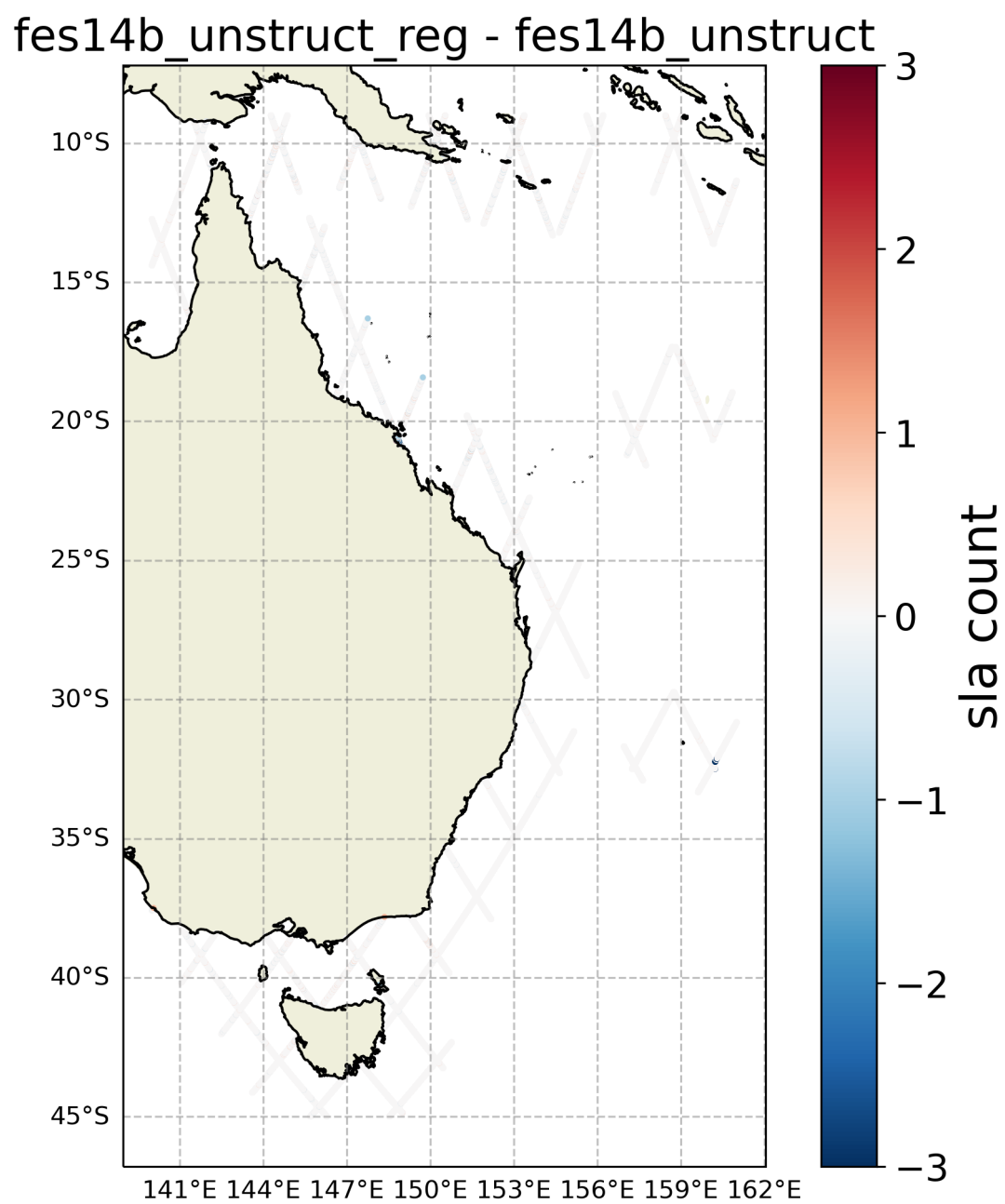


FIGURE 7 – Spatial coherence analysis of the Difference in sla 's count between fes14b_unstruct_reg and fes14b_unstruct

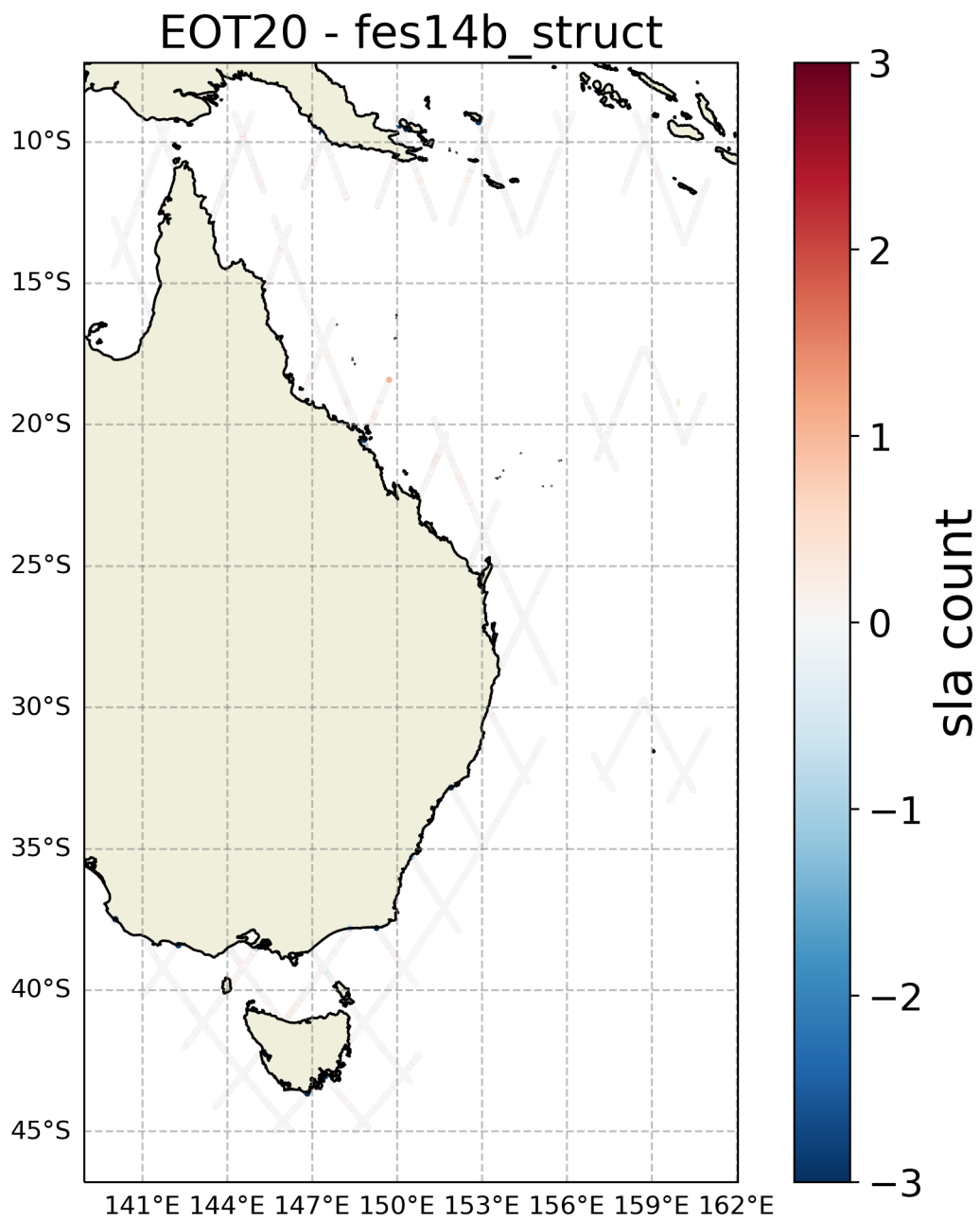


FIGURE 8 – Spatial coherence analysis of the Difference in sla 's count between EOT20 and fes14b_struct

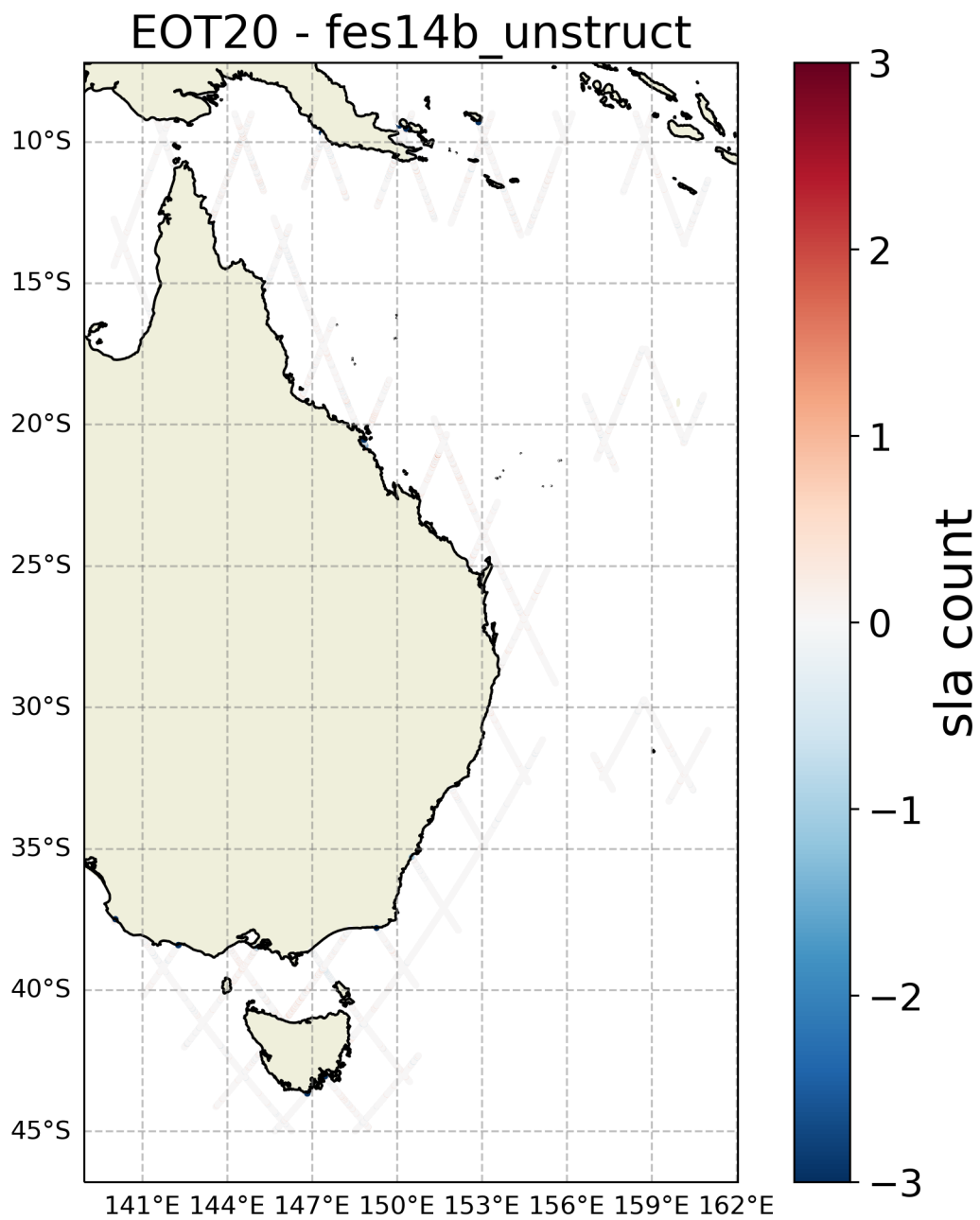


FIGURE 9 – Spatial coherence analysis of the Difference in sla 's count between EOT20 and fes14b_unstruct

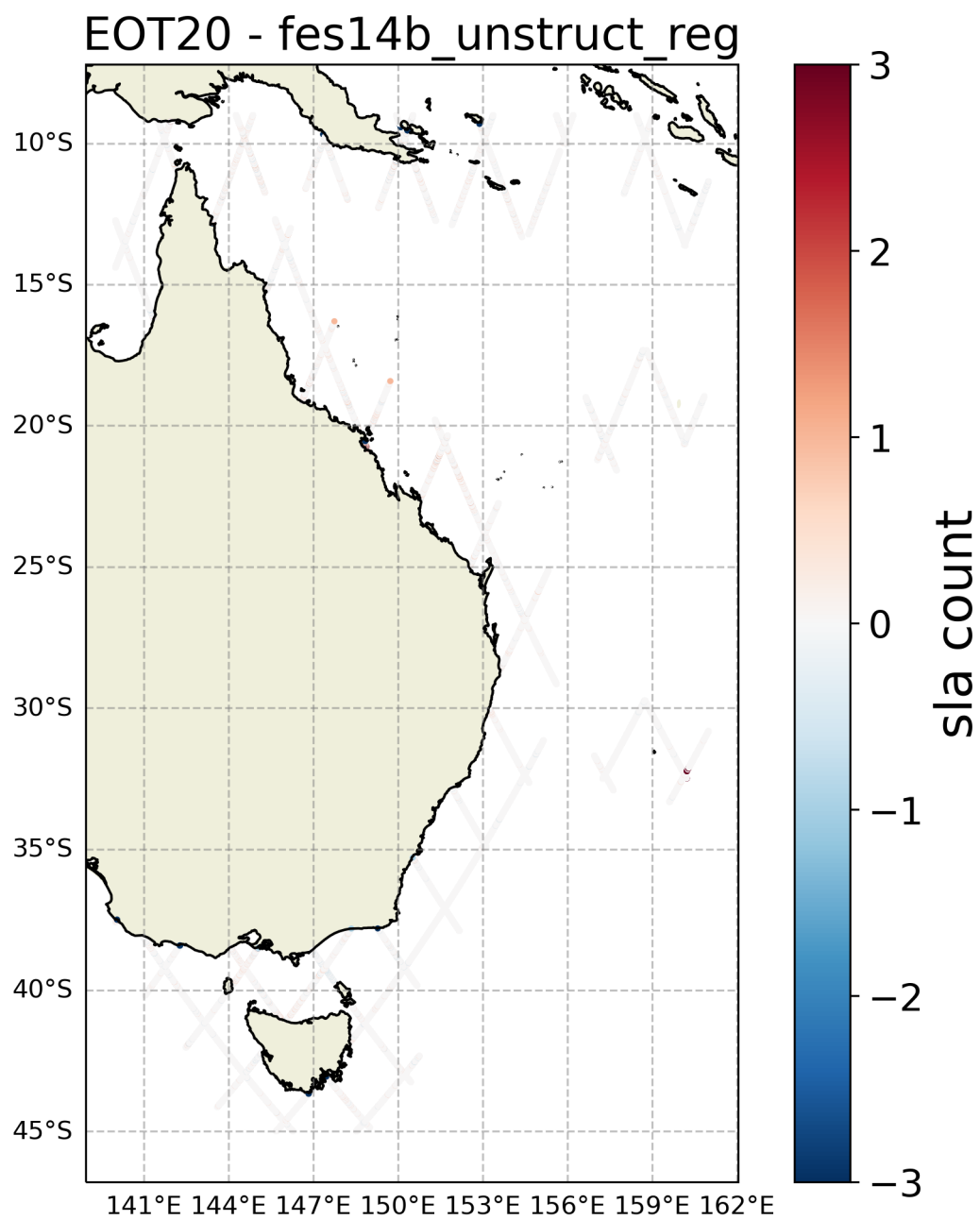


FIGURE 10 – Spatial coherence analysis of the Difference in sla 's count between EOT20 and fes14b_unstruct_reg

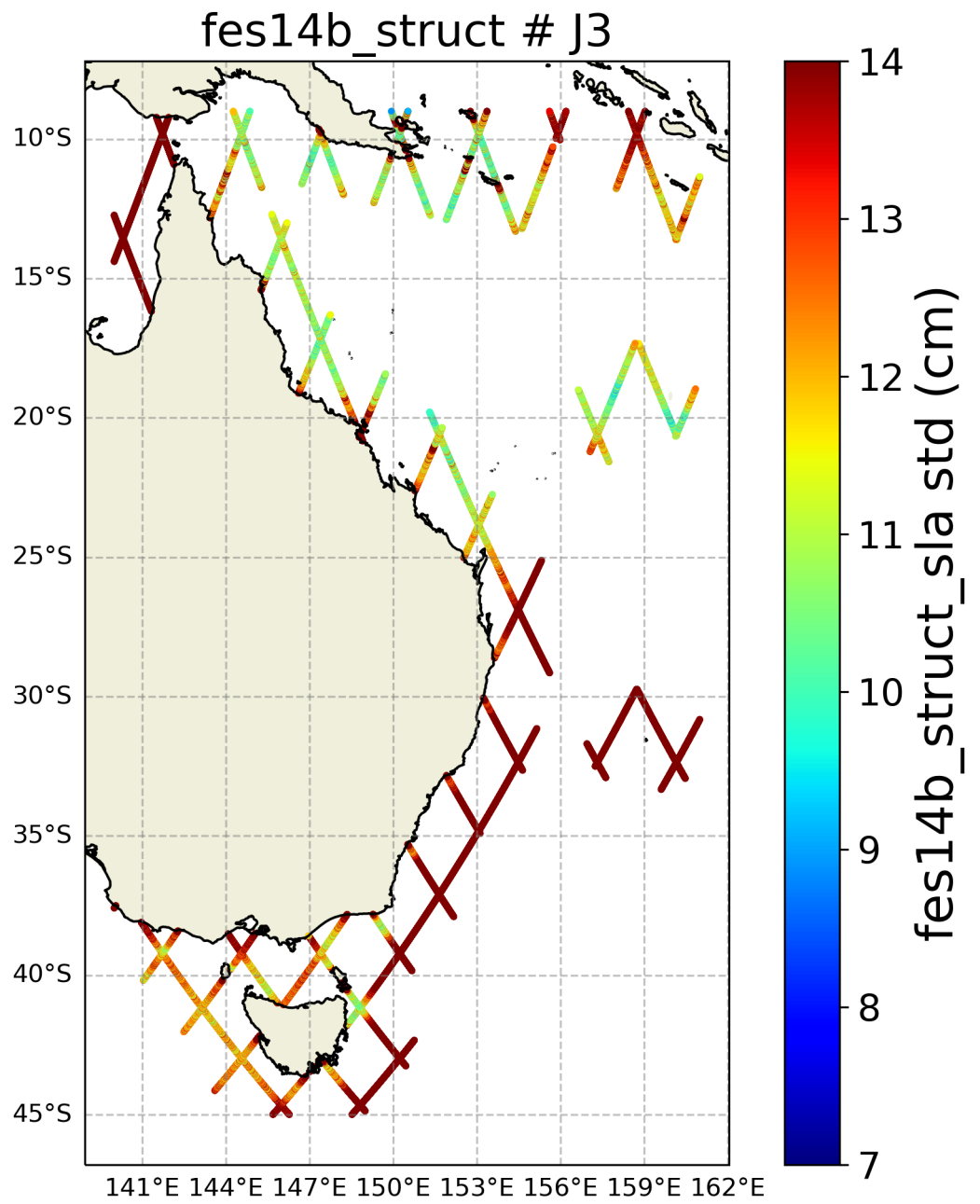


FIGURE 11 – Spatial coherence analysis of the std of the fes14b_struct version of sla variable

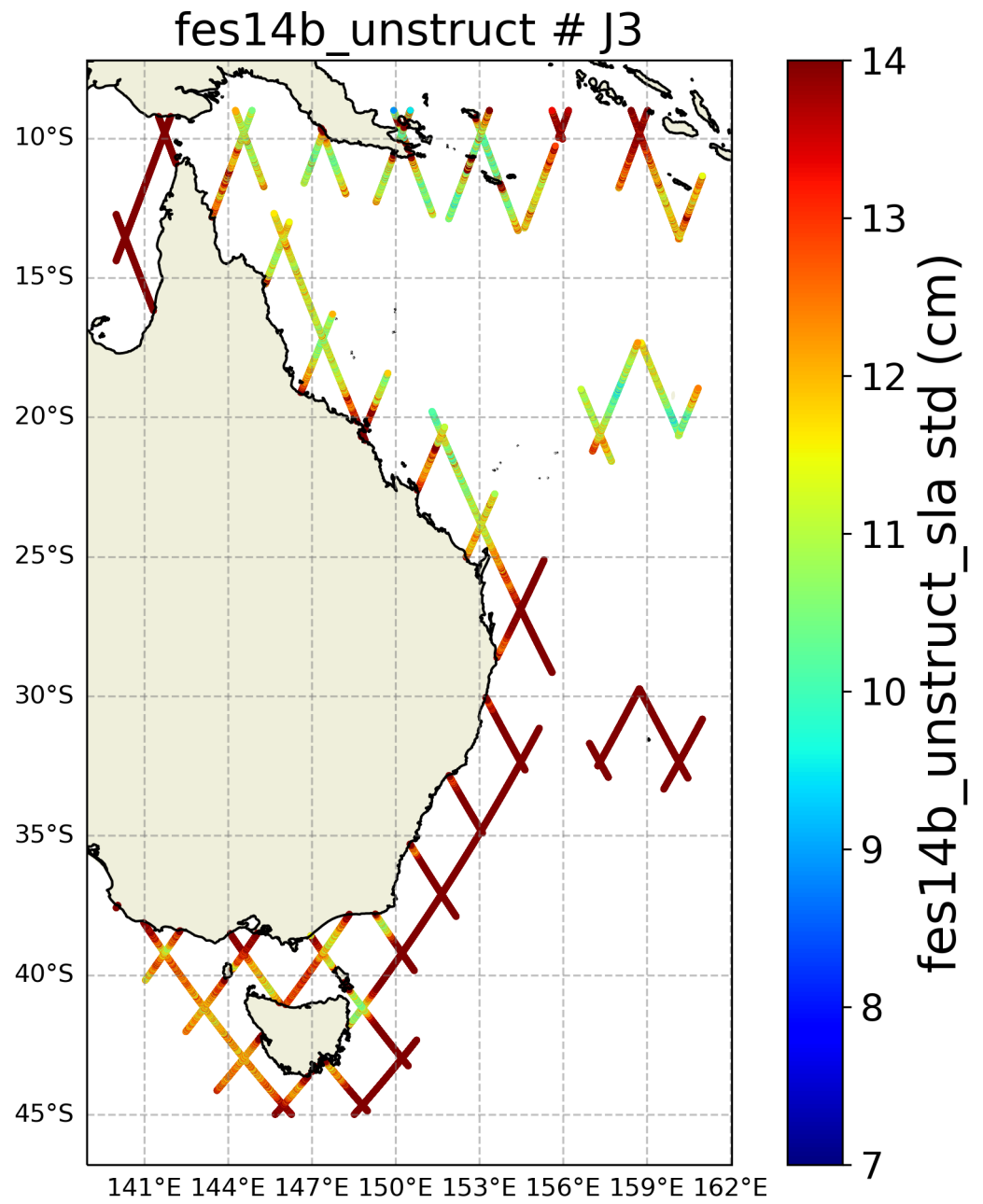


FIGURE 12 – Spatial coherence analysis of the std of the fes14b_unstruct version of sla variable

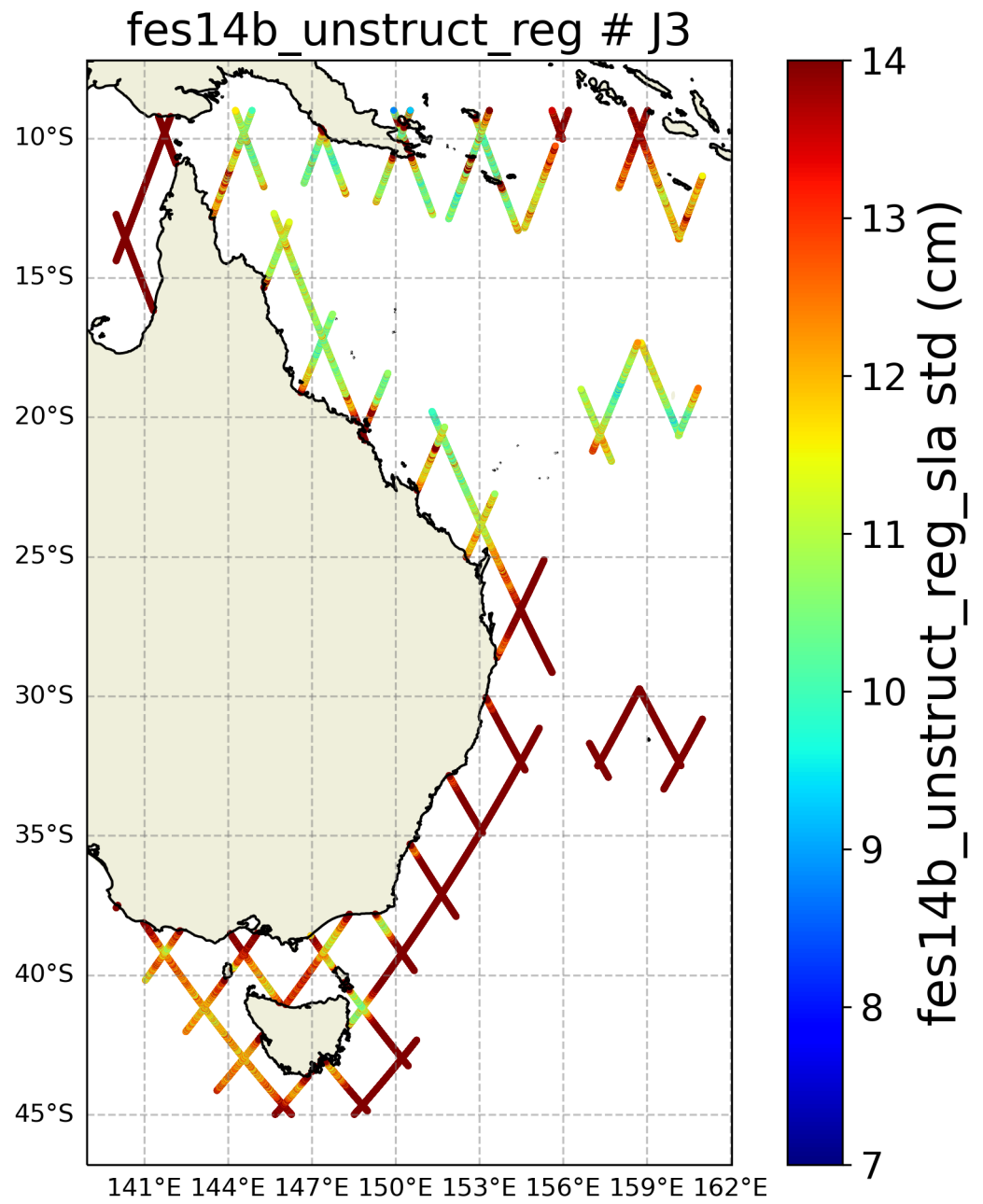


FIGURE 13 – Spatial coherence analysis of the std of the fes14b_unstruct_reg version of sla variable

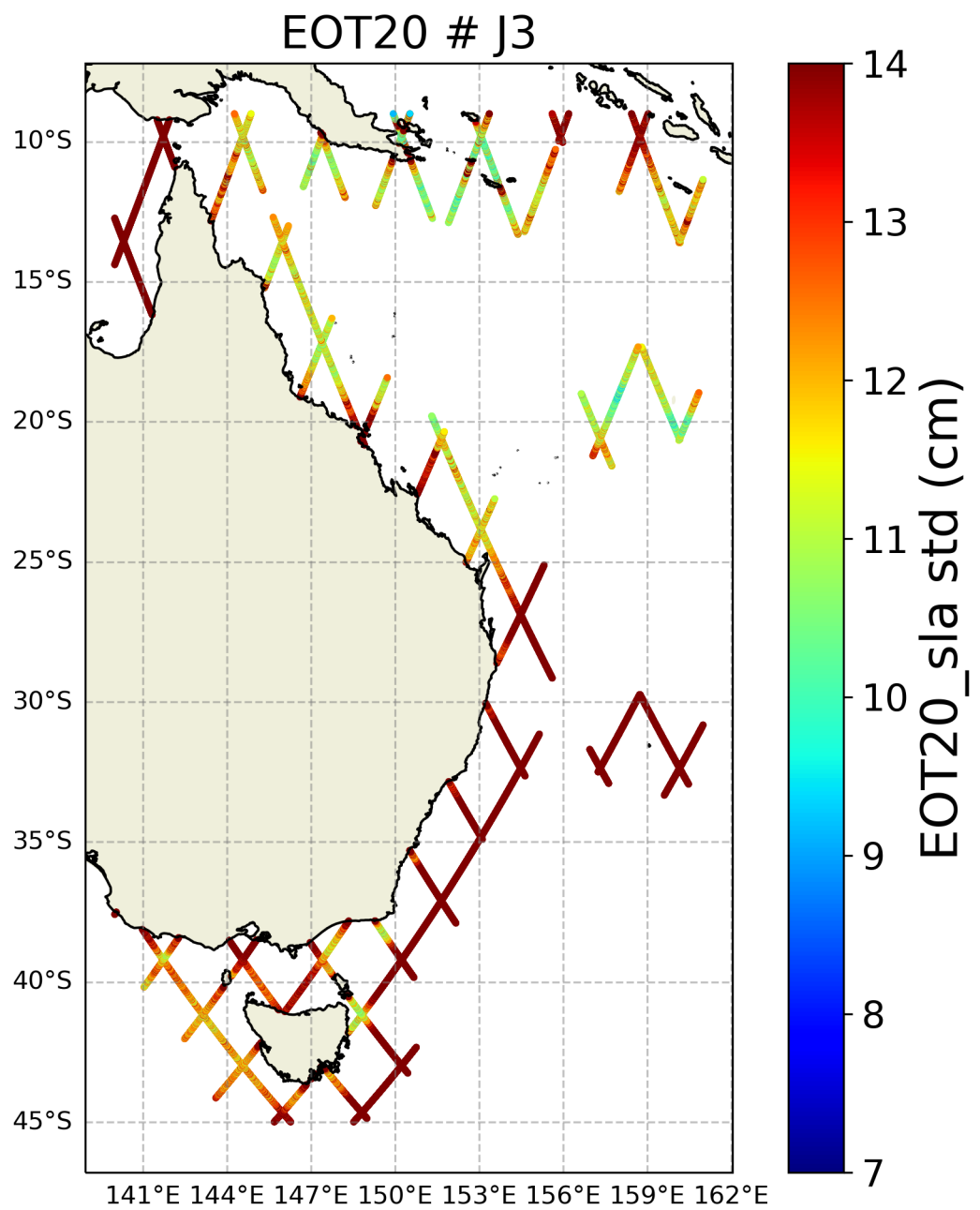


FIGURE 14 – Spatial coherence analysis of the std of the EOT20 version of sla variable

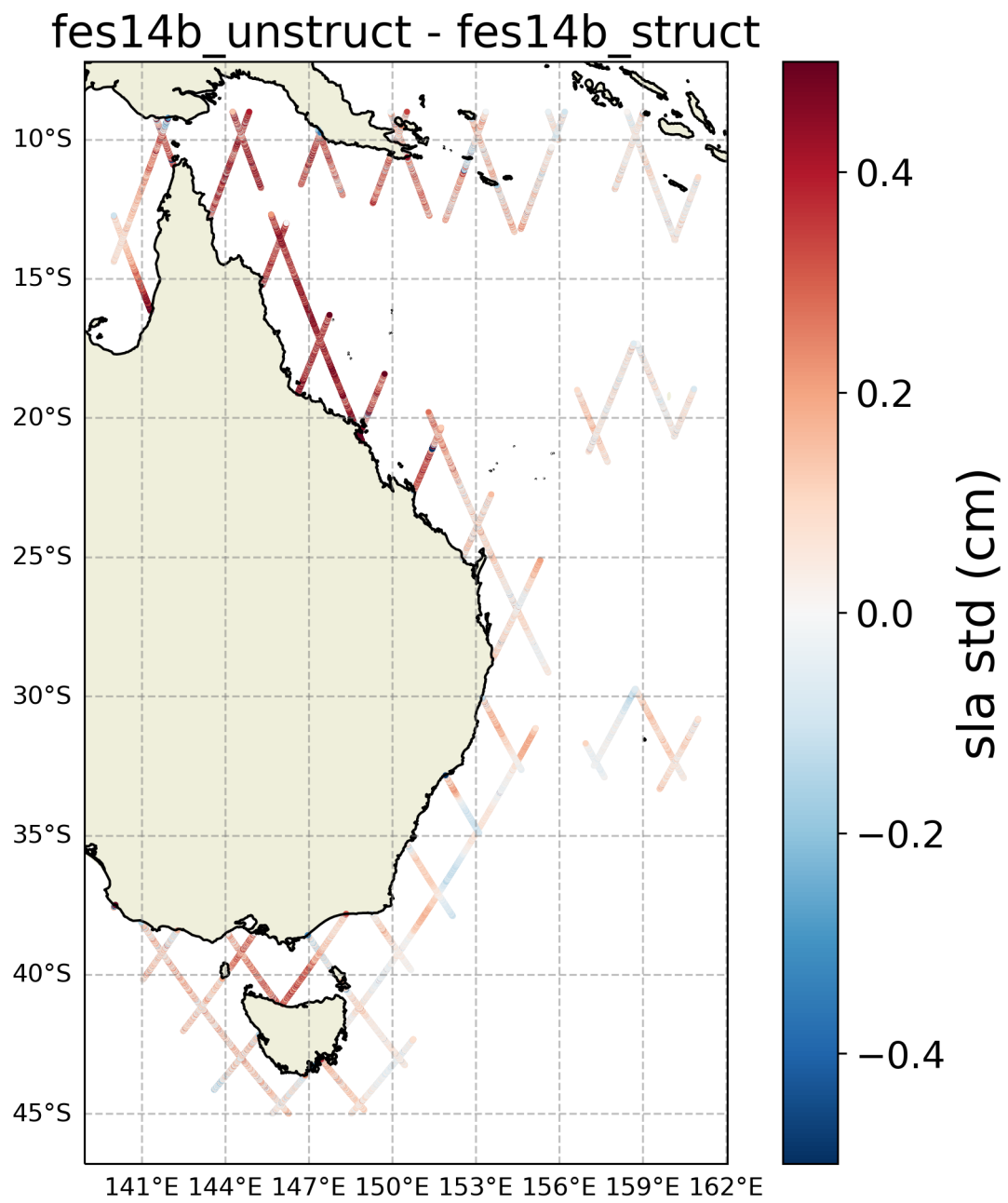


FIGURE 15 – Spatial coherence analysis of the Difference in sla 's std between fes14b_unstruct and fes14b_struct

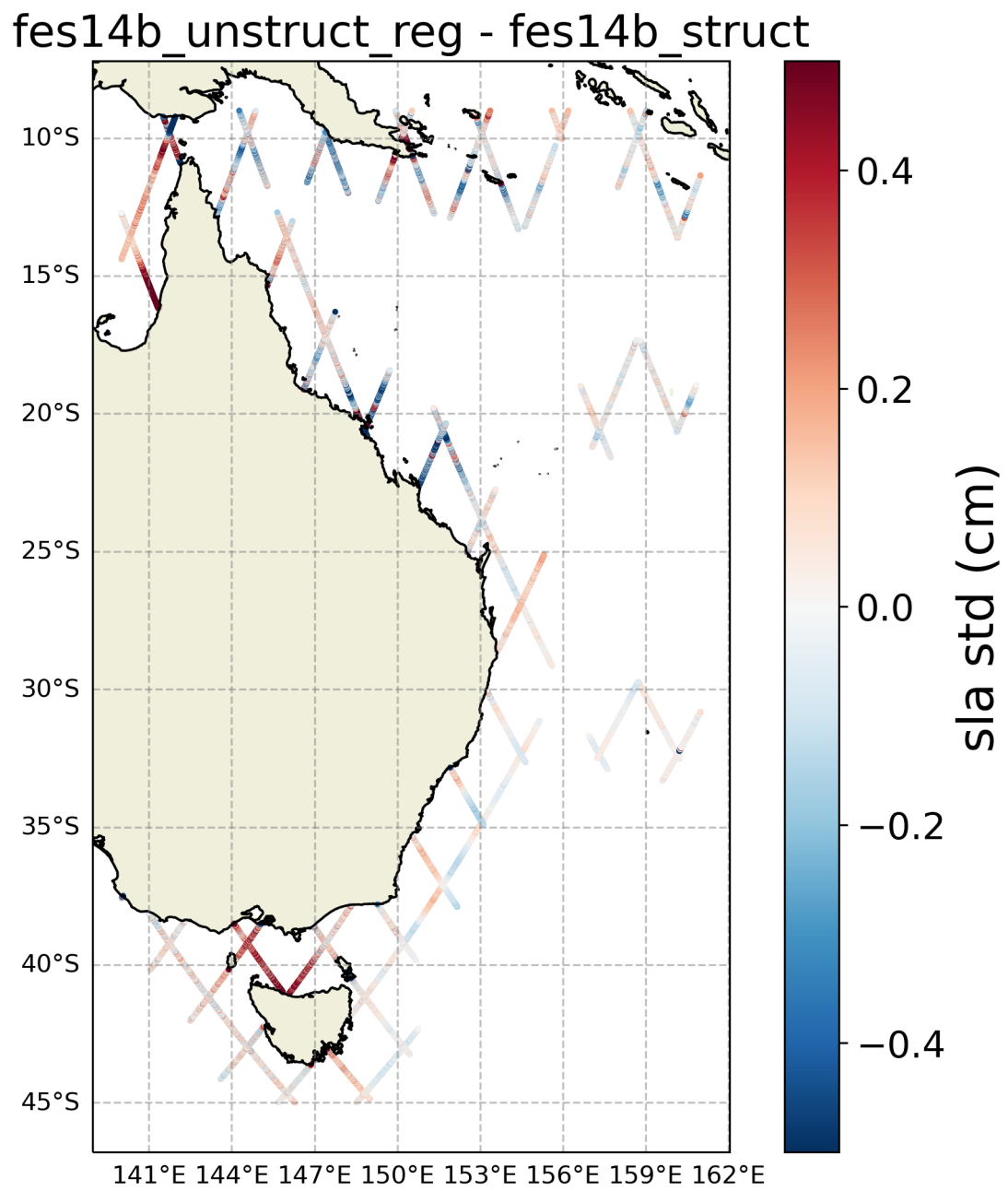


FIGURE 16 – Spatial coherence analysis of the Difference in sla 's std between fes14b_unstruct_reg and fes14b_struct

fes14b_unstruct_reg - fes14b_unstruct

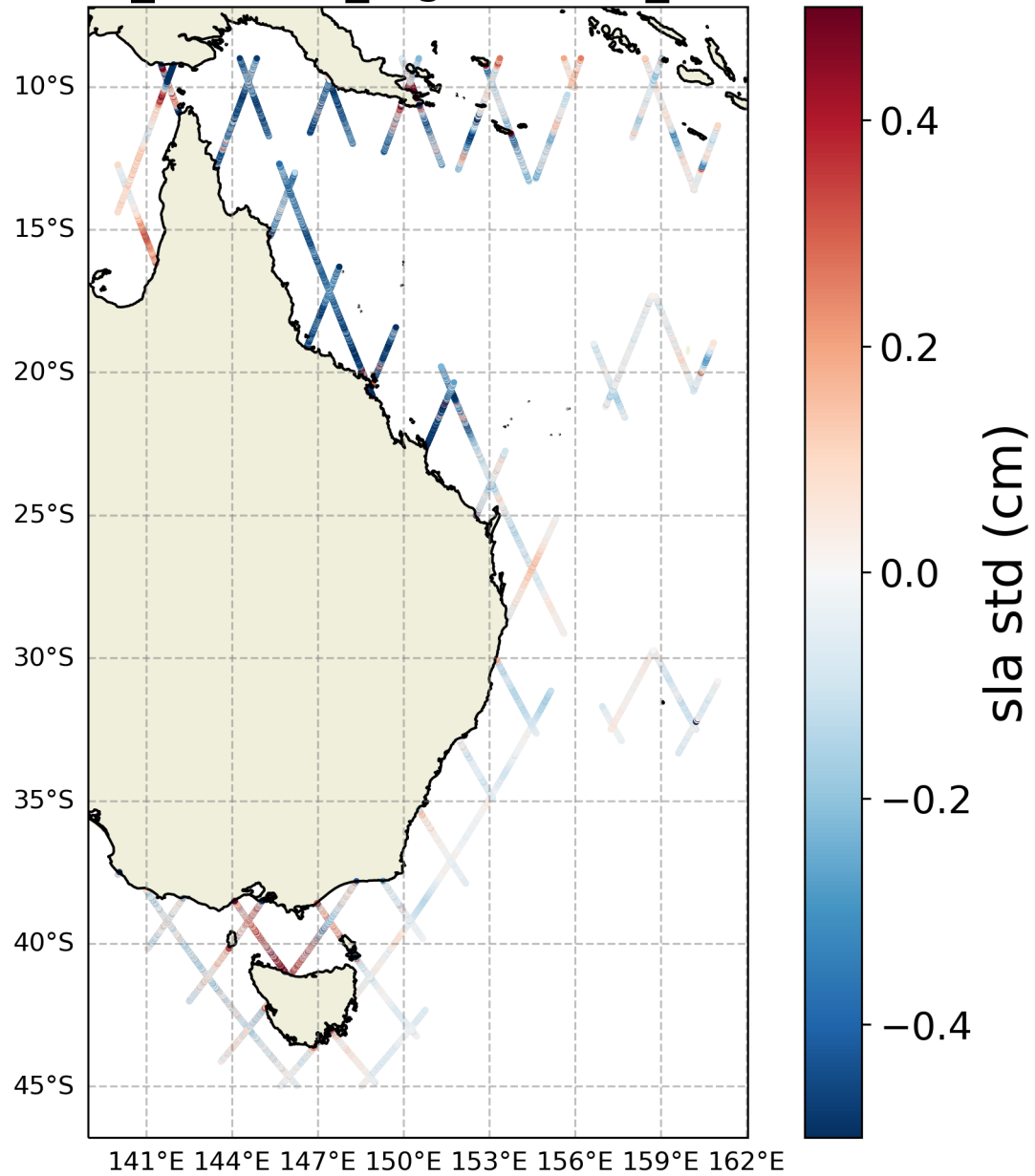


FIGURE 17 – Spatial coherence analysis of the Difference in sla 's std between fes14b_unstruct_reg and fes14b_unstruct

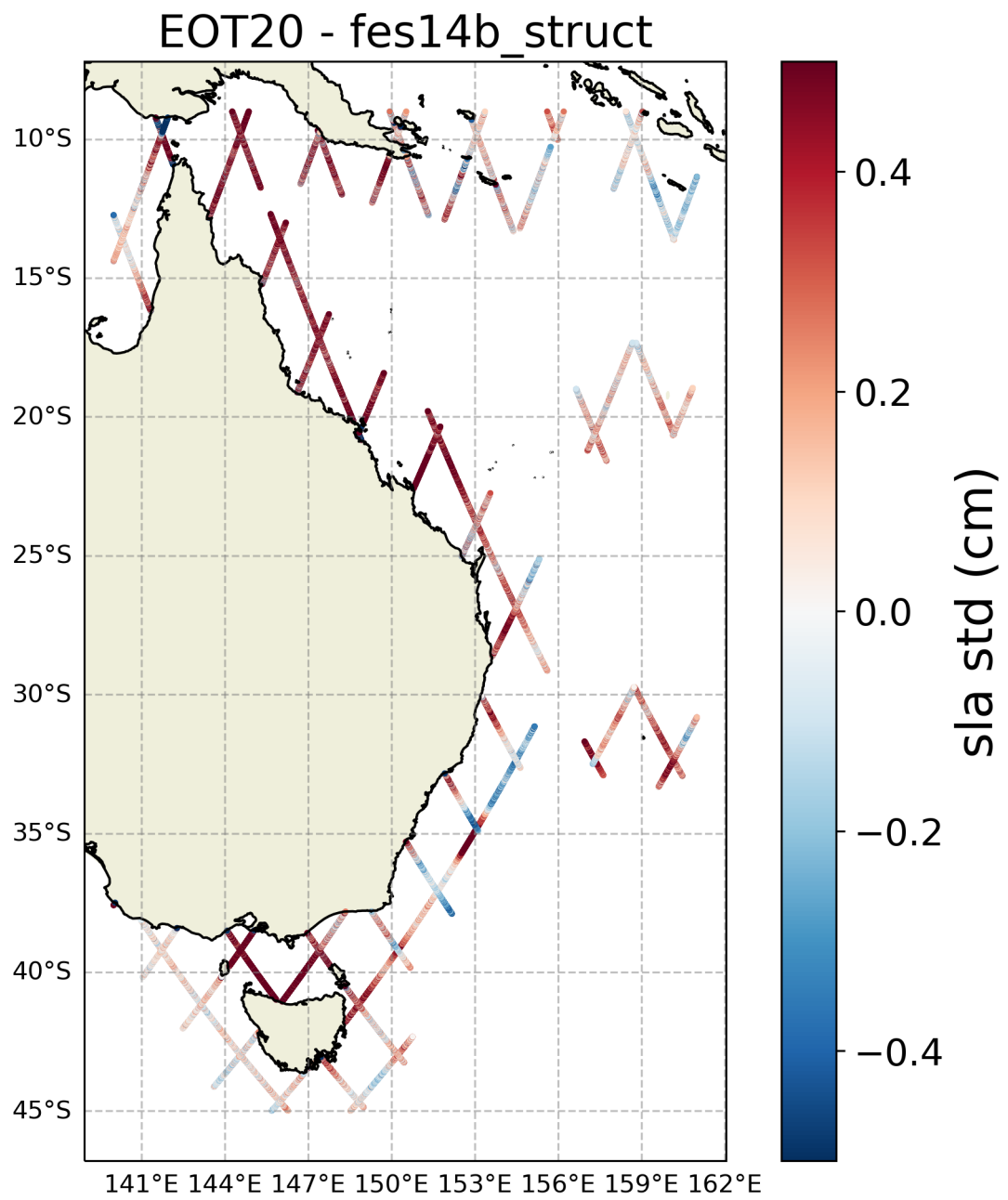


FIGURE 18 – Spatial coherence analysis of the Difference in sla 's std between EOT20 and fes14b_struct

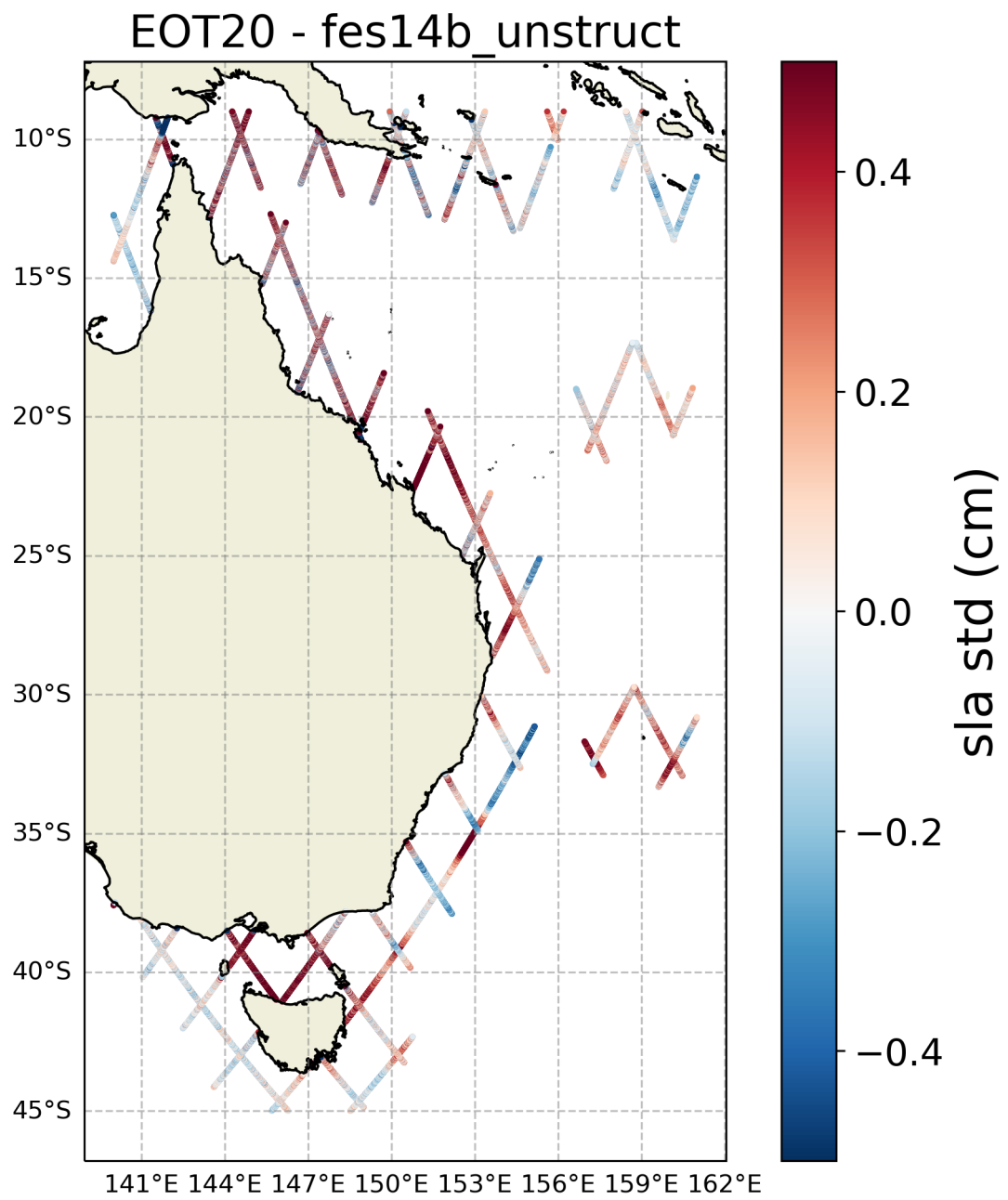


FIGURE 19 – Spatial coherence analysis of the Difference in sla 's std between EOT20 and fes14b_unstruct

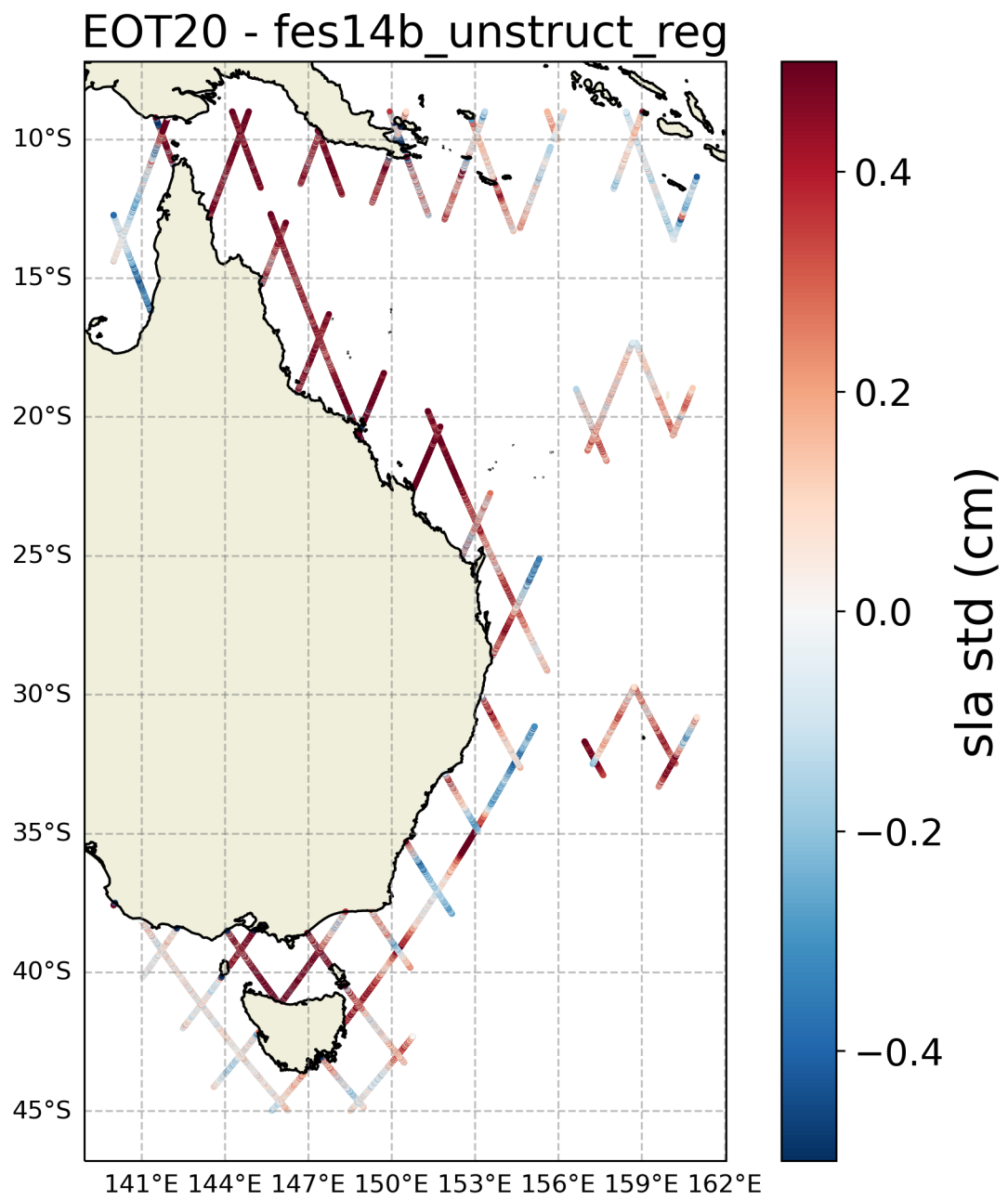


FIGURE 20 – Spatial coherence analysis of the Difference in sla 's std between EOT20 and fes14b_unstruct_reg

3.1.3 sla's mean

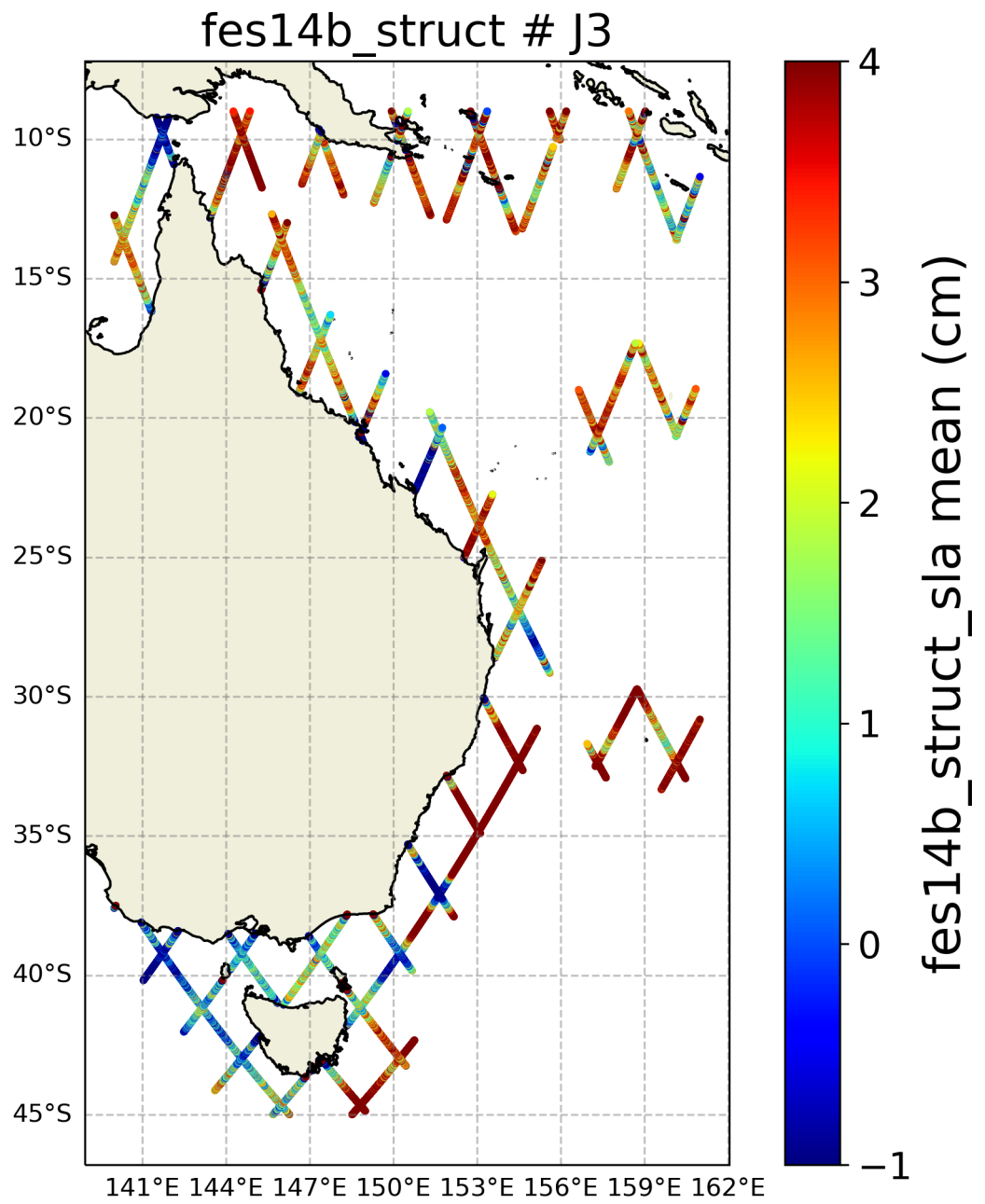


FIGURE 21 – Spatial coherence analysis of the mean of the fes14b_struct version of sla variable

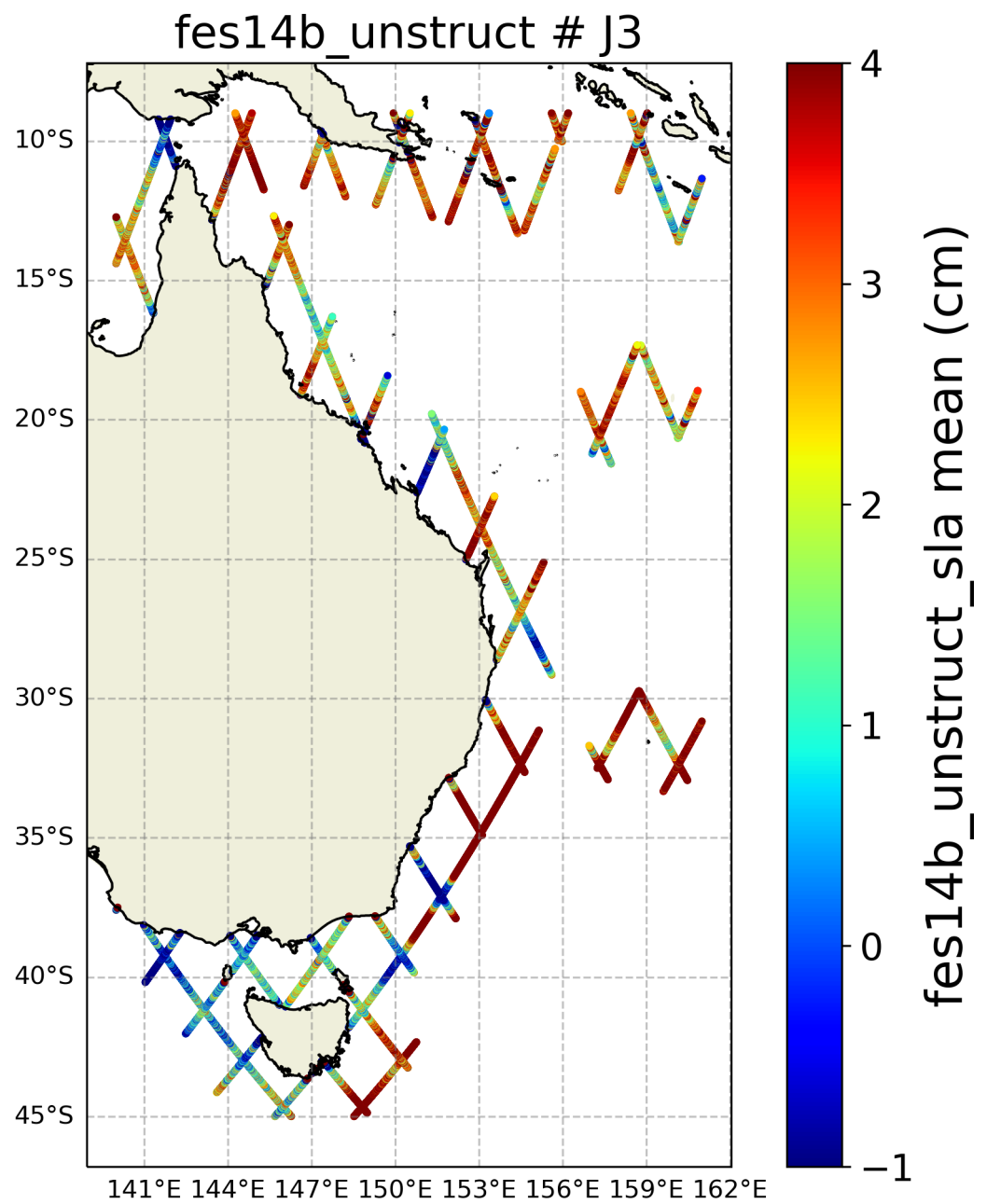


FIGURE 22 – Spatial coherence analysis of the mean of the fes14b_unstruct version of sla variable

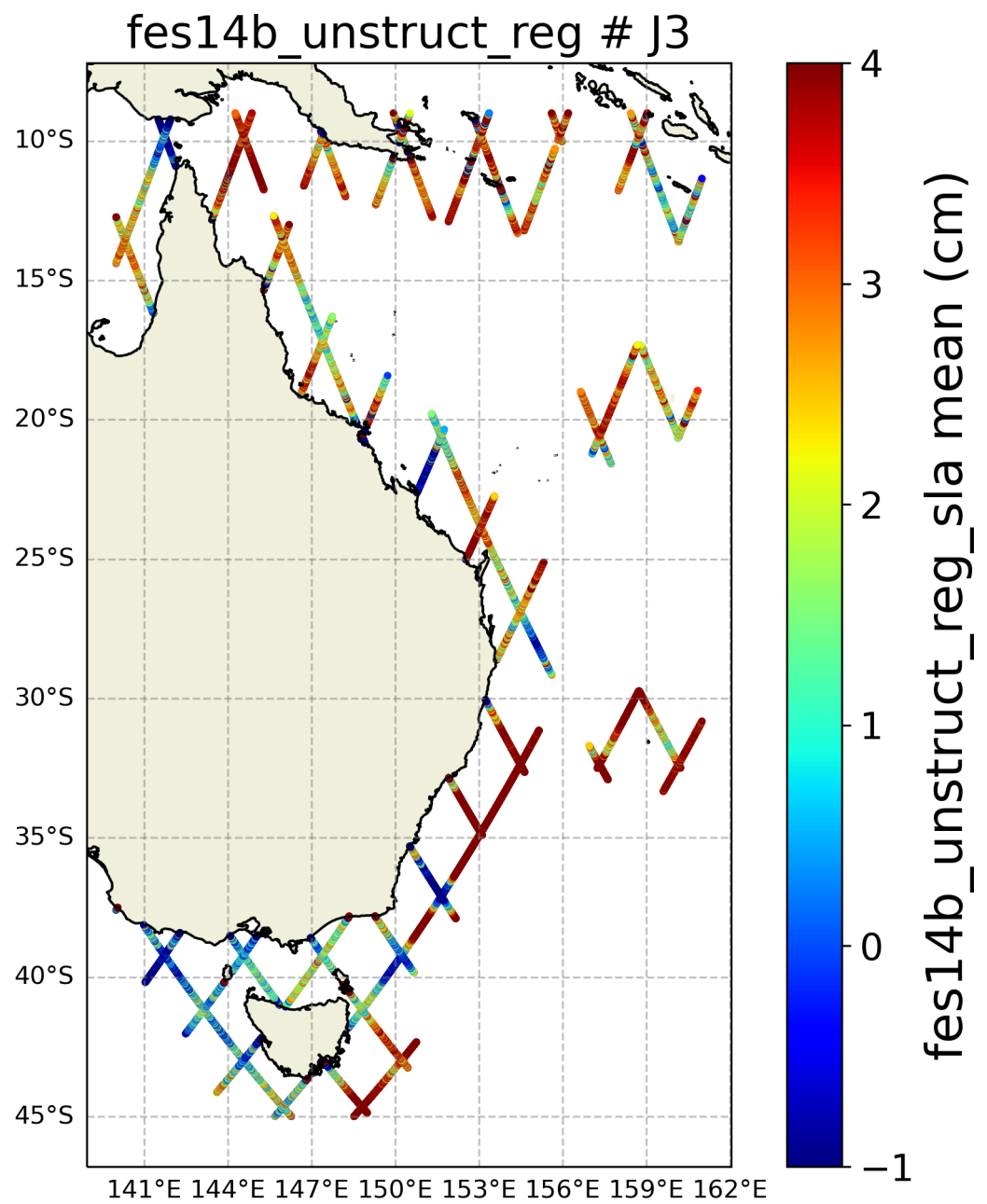


FIGURE 23 – Spatial coherence analysis of the mean of the fes14b_unstruct_reg version of sla variable

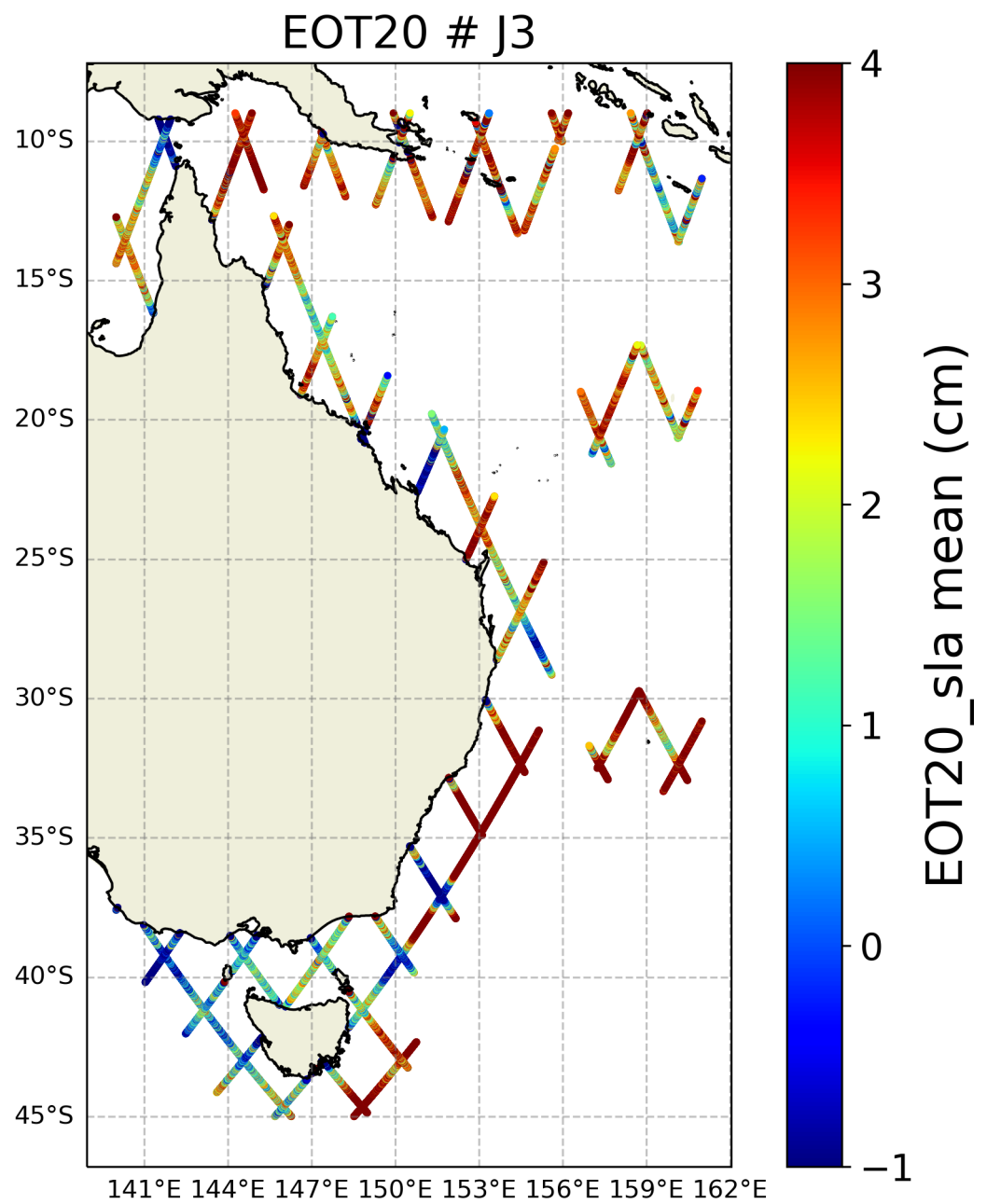


FIGURE 24 – Spatial coherence analysis of the mean of the EOT20 version of sla variable

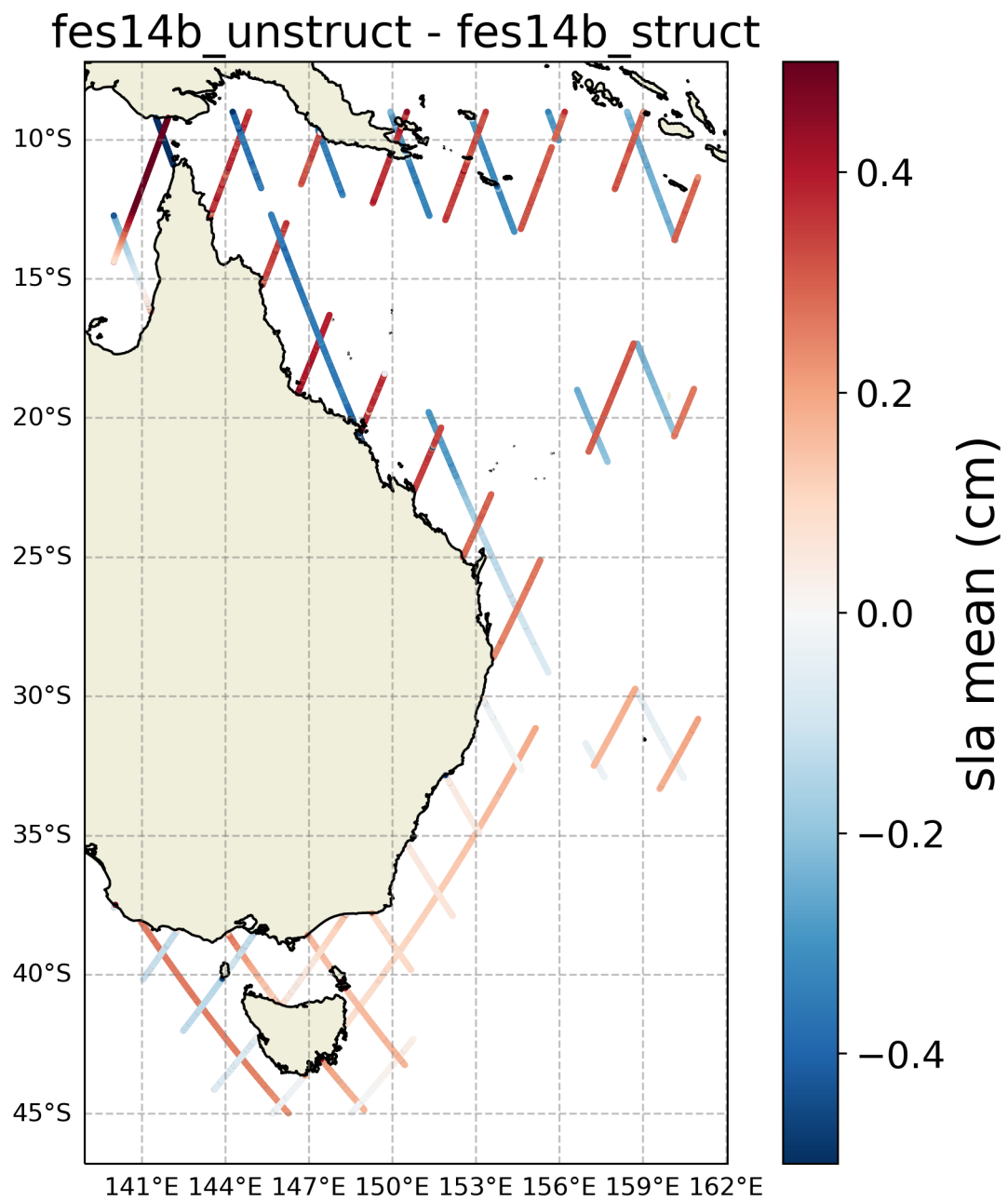


FIGURE 25 – Spatial coherence analysis of the Difference in sla 's mean between fes14b_unstruct and fes14b_struct

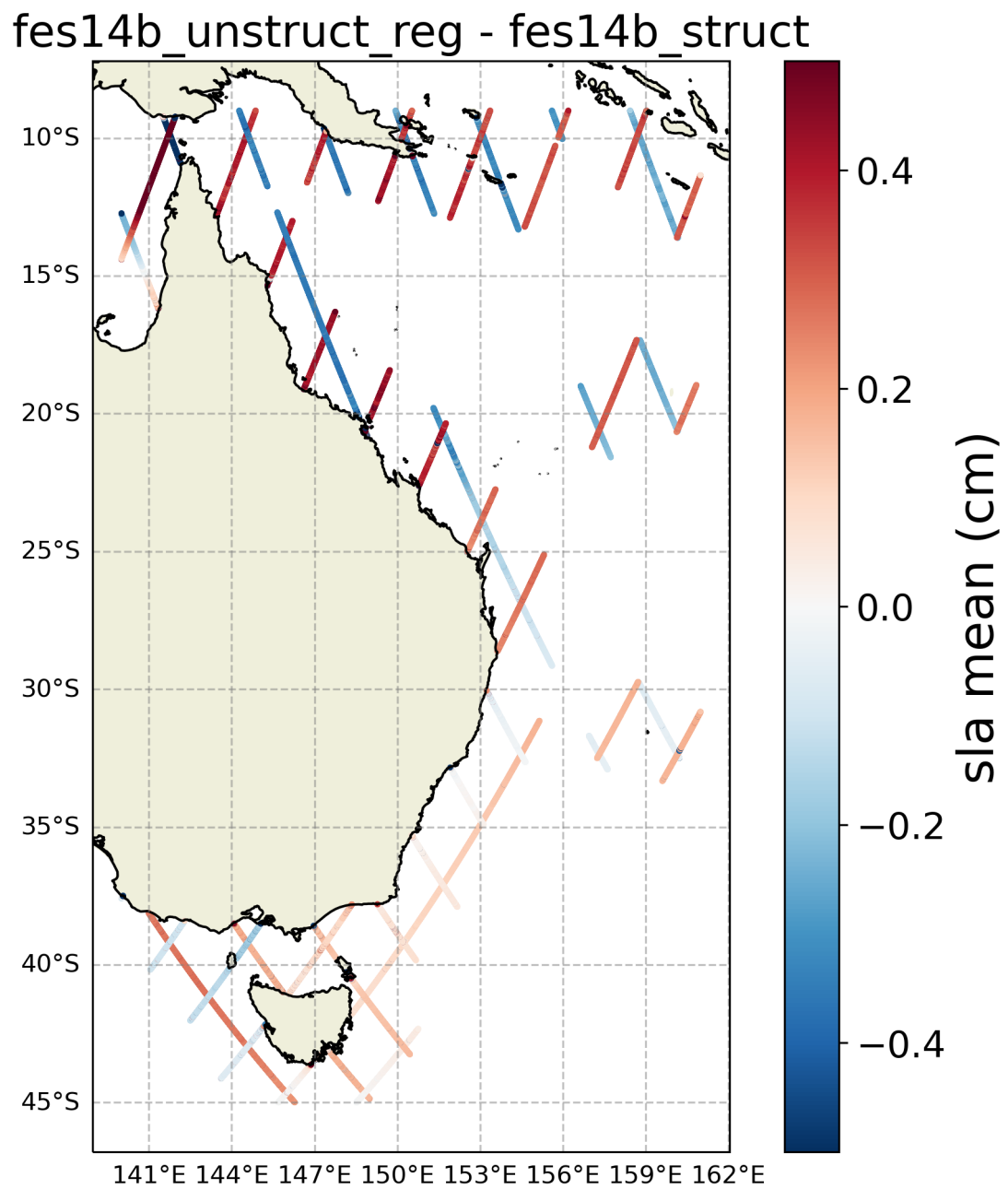


FIGURE 26 – Spatial coherence analysis of the Difference in sla 's mean between fes14b_unstruct_reg and fes14b_struct

fes14b_unstruct_reg - fes14b_unstruct

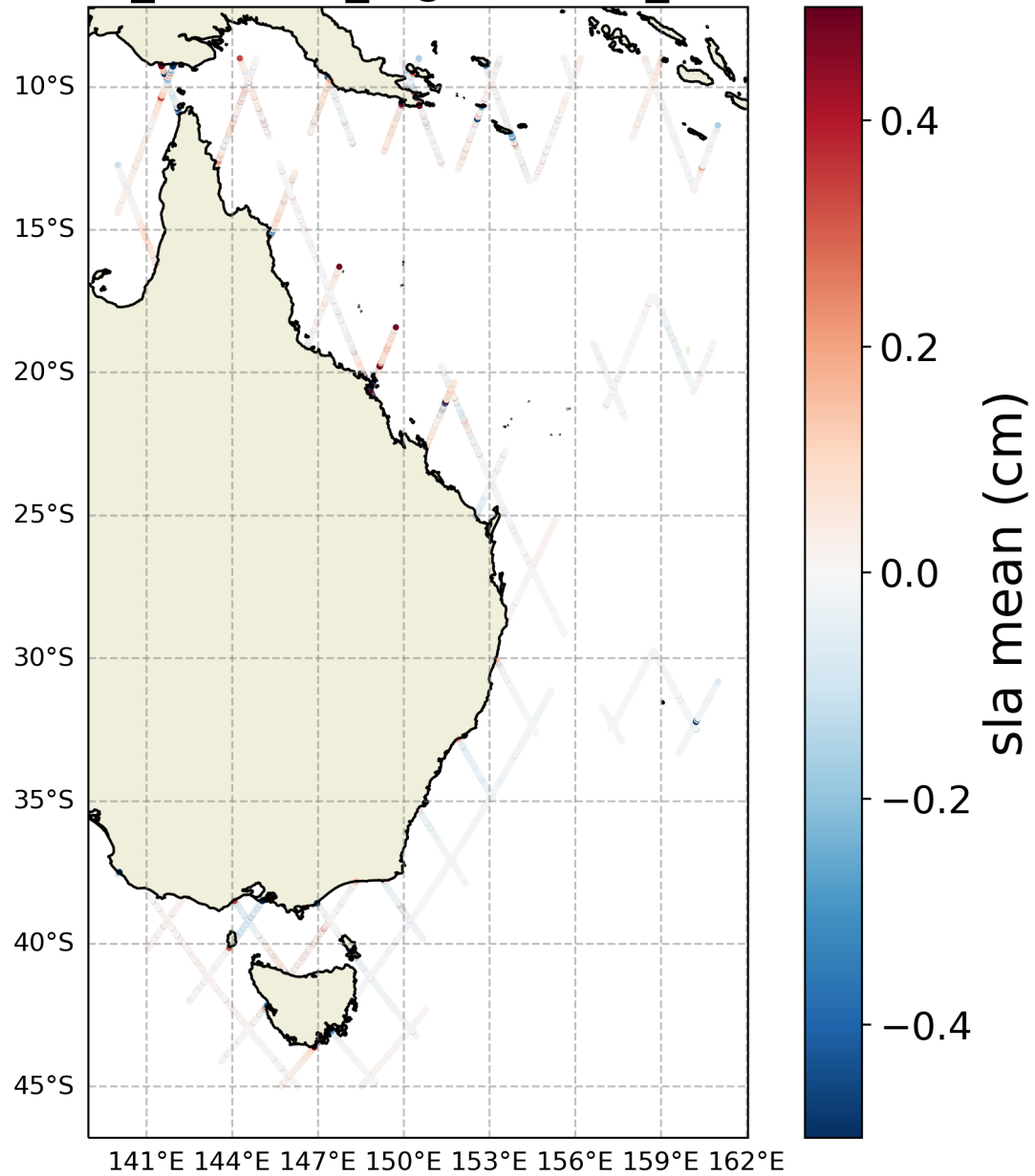


FIGURE 27 – Spatial coherence analysis of the Difference in sla 's mean between fes14b_unstruct_reg and fes14b_unstruct

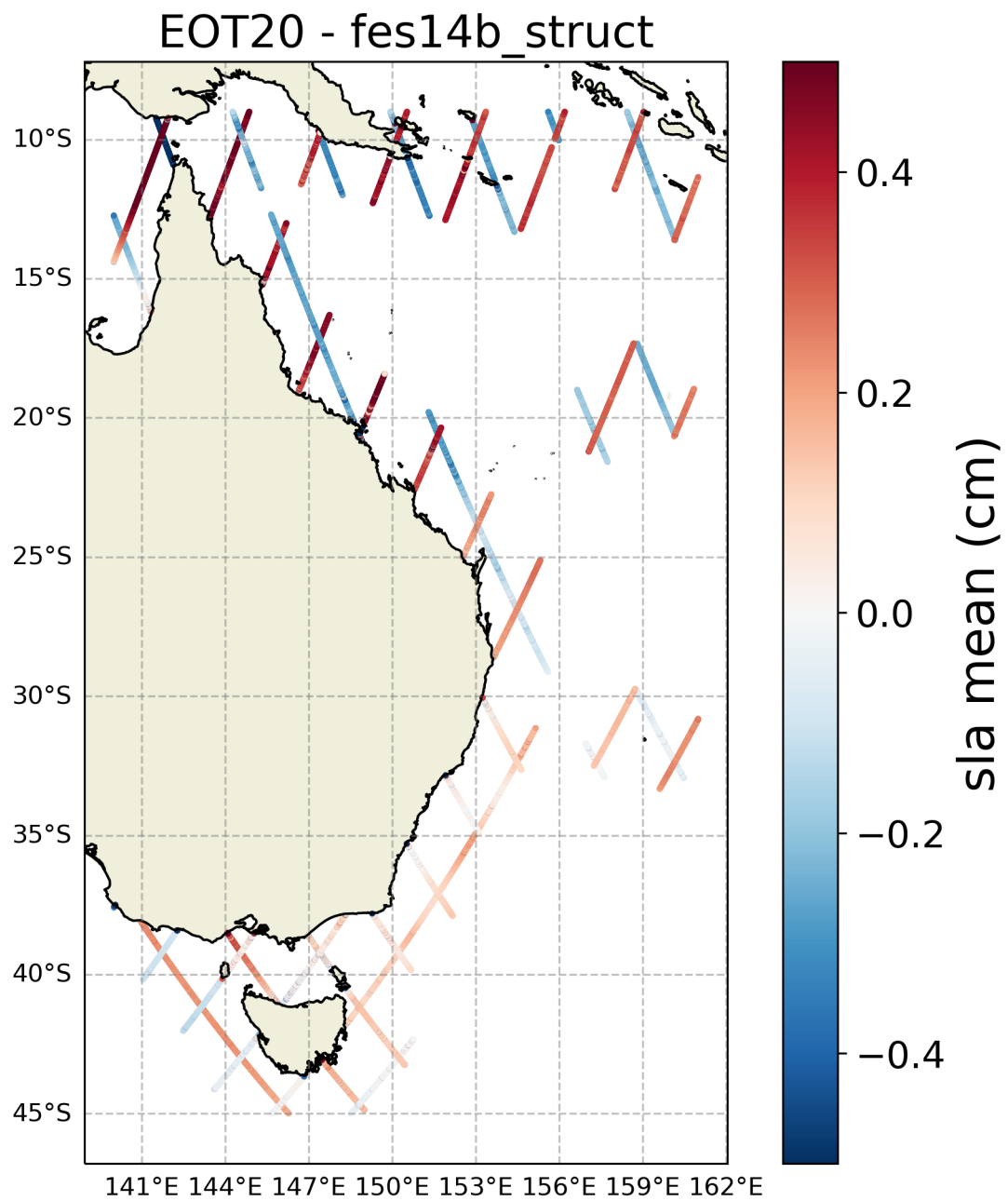


FIGURE 28 – Spatial coherence analysis of the Difference in sla 's mean between EOT20 and fes14b_struct

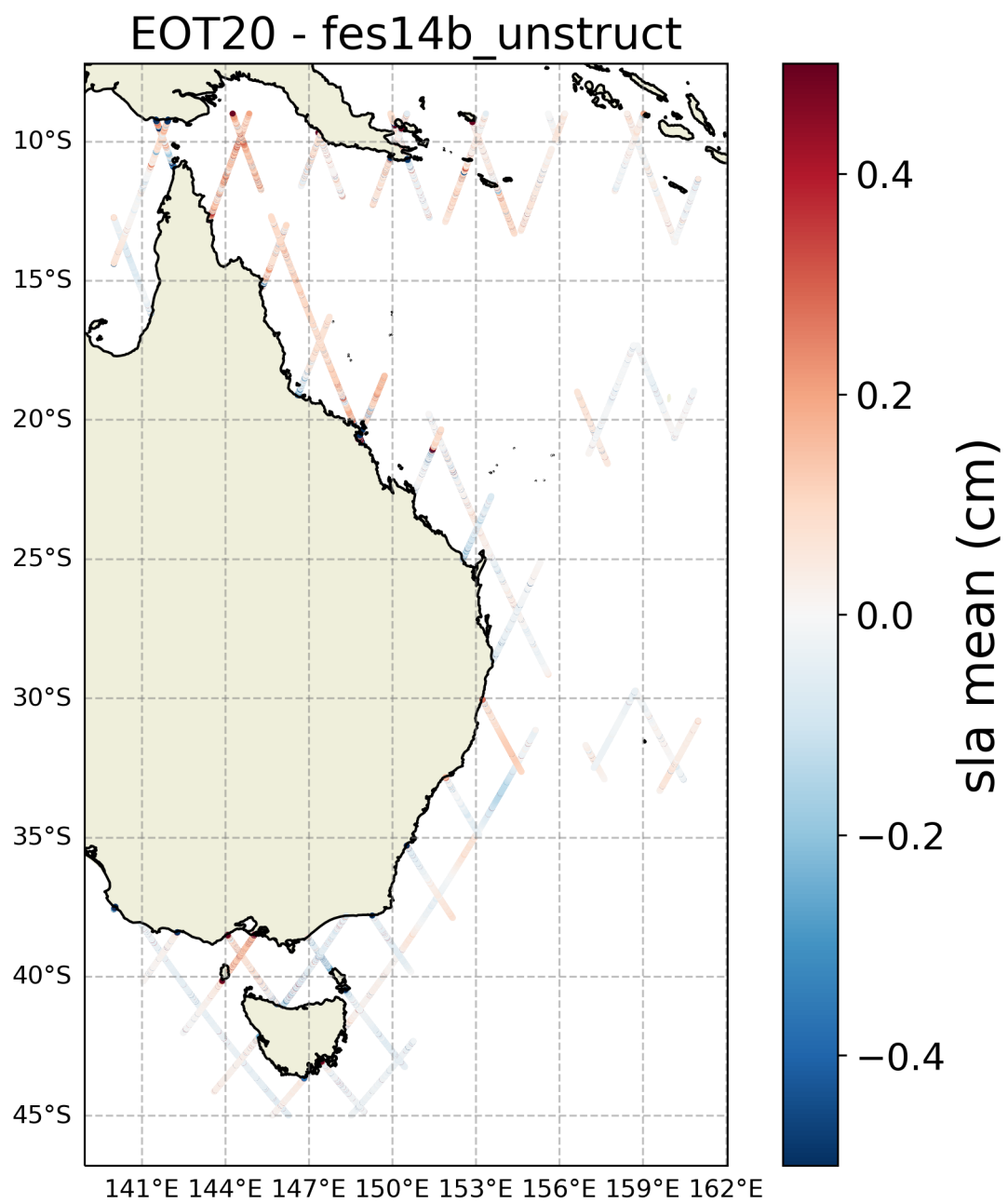


FIGURE 29 – Spatial coherence analysis of the Difference in sla 's mean between EOT20 and fes14b_unstruct

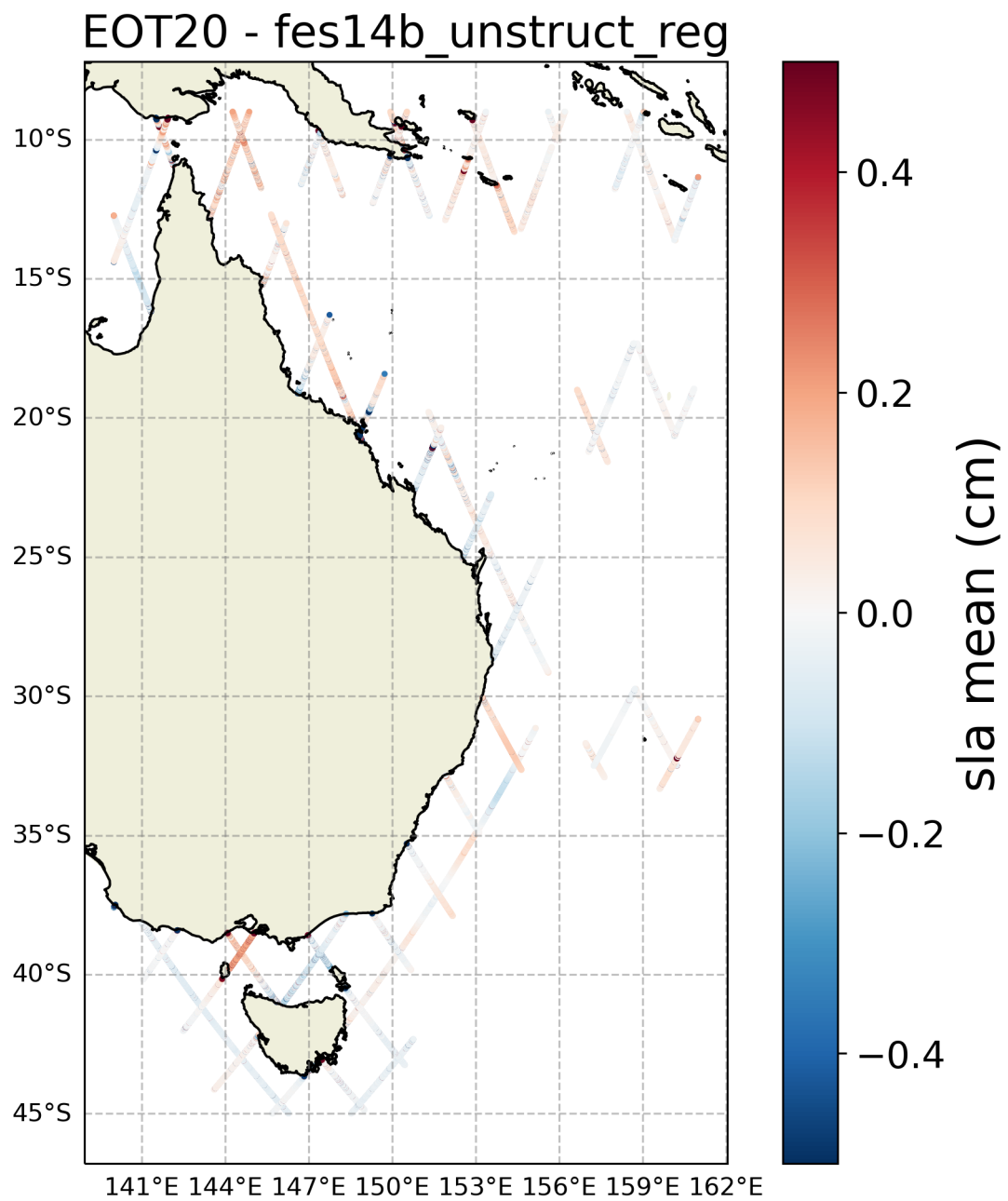


FIGURE 30 – Spatial coherence analysis of the Difference in sla 's mean between EOT20 and fes14b_unstruct_reg

3.2 Tide

3.2.1 Tide's count

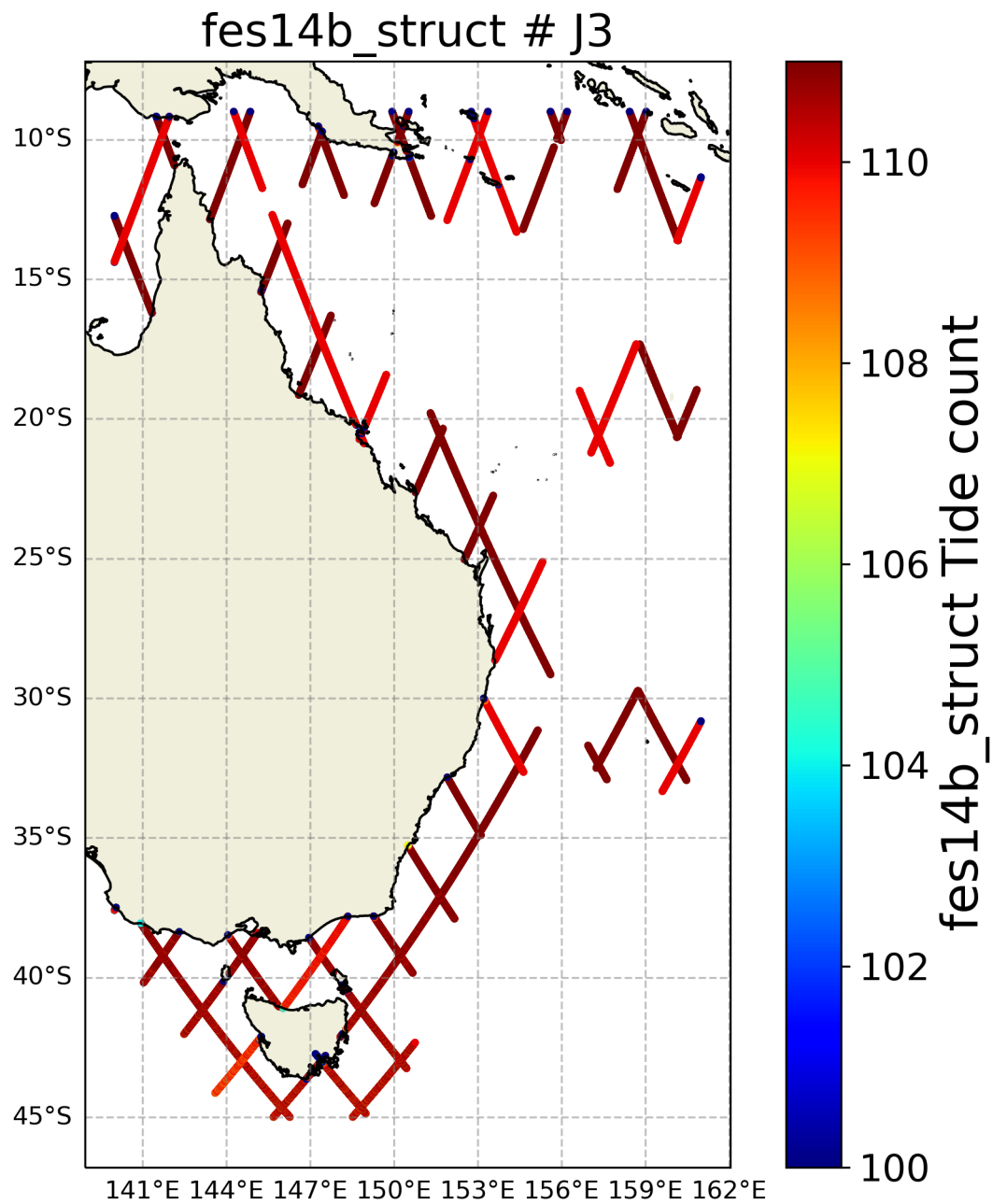


FIGURE 31 – Spatial coherence analysis of the count of the fes14b_struct version of Tide variable

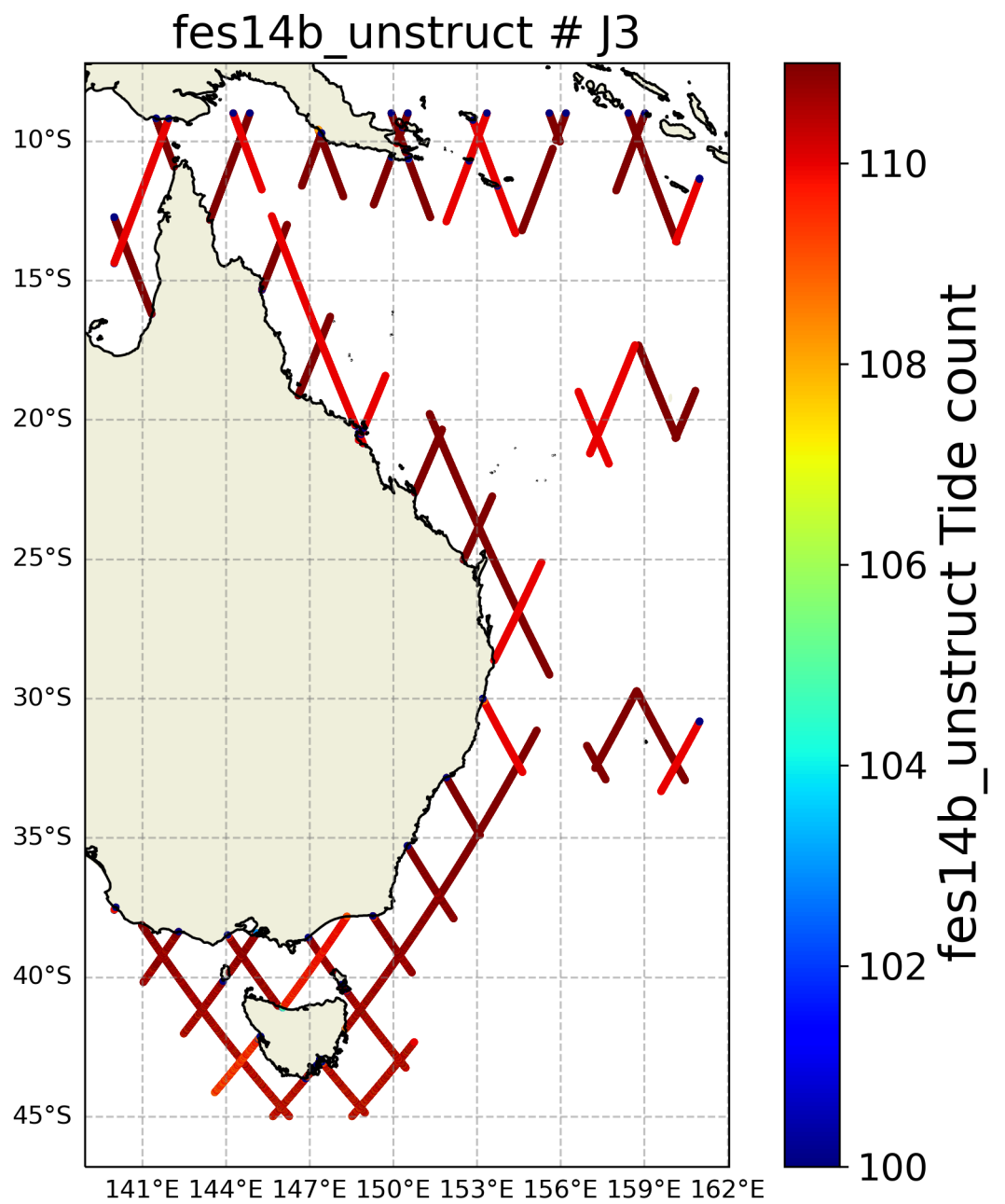


FIGURE 32 – Spatial coherence analysis of the count of the fes14b_unstruct version of Tide variable

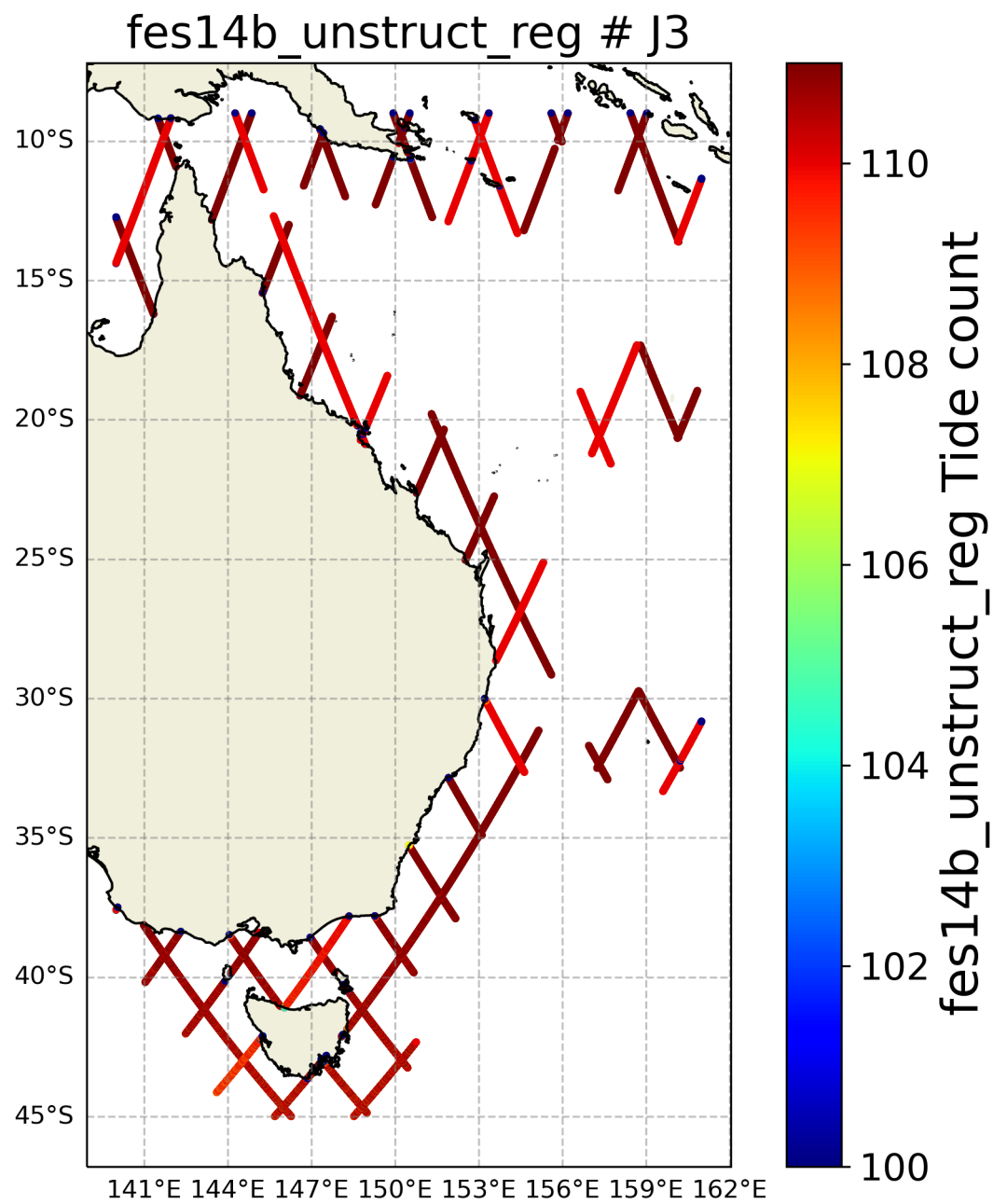


FIGURE 33 – Spatial coherence analysis of the count of the fes14b_unstruct_reg version of Tide variable

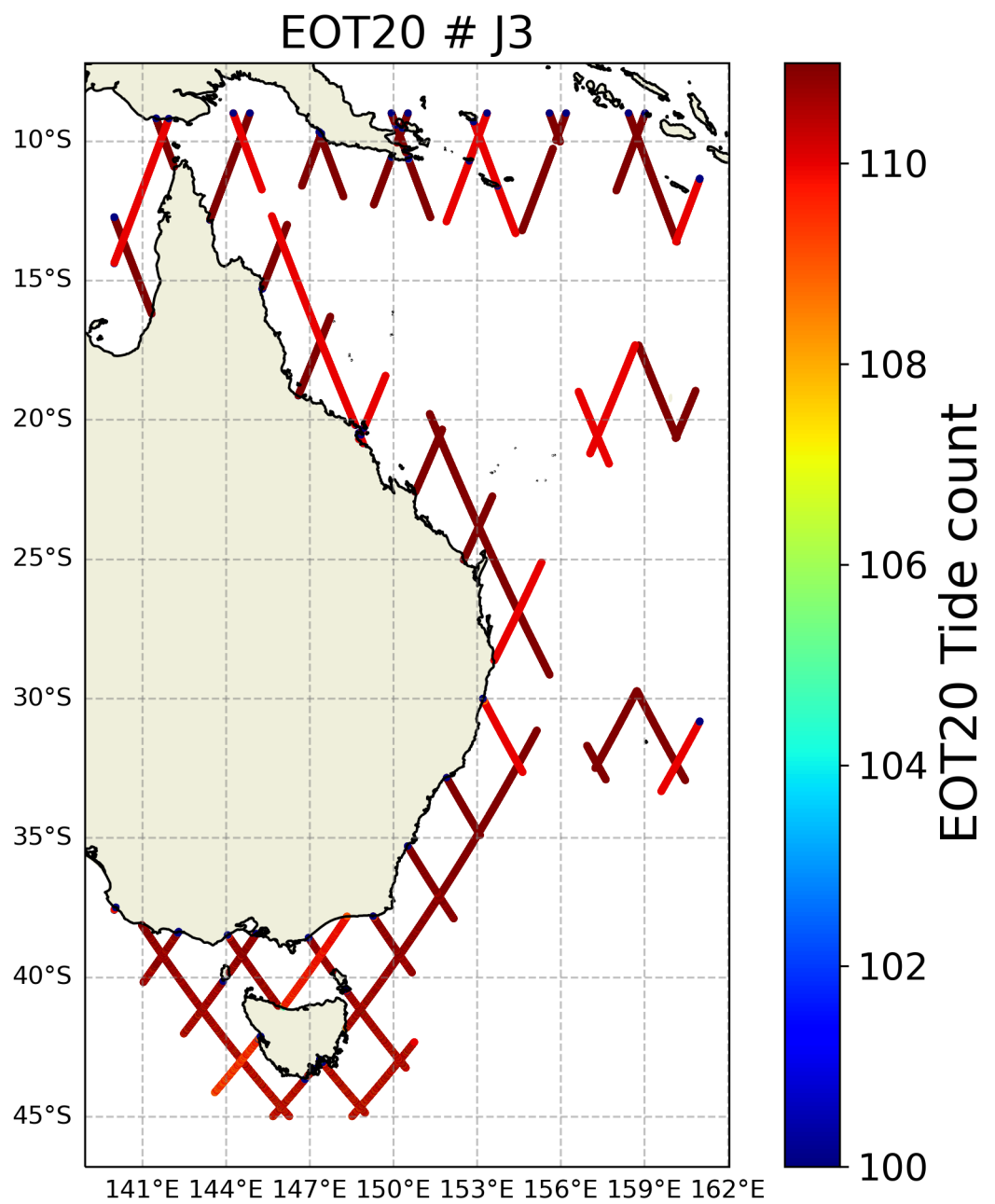


FIGURE 34 – Spatial coherence analysis of the count of the EOT20 version of Tide variable

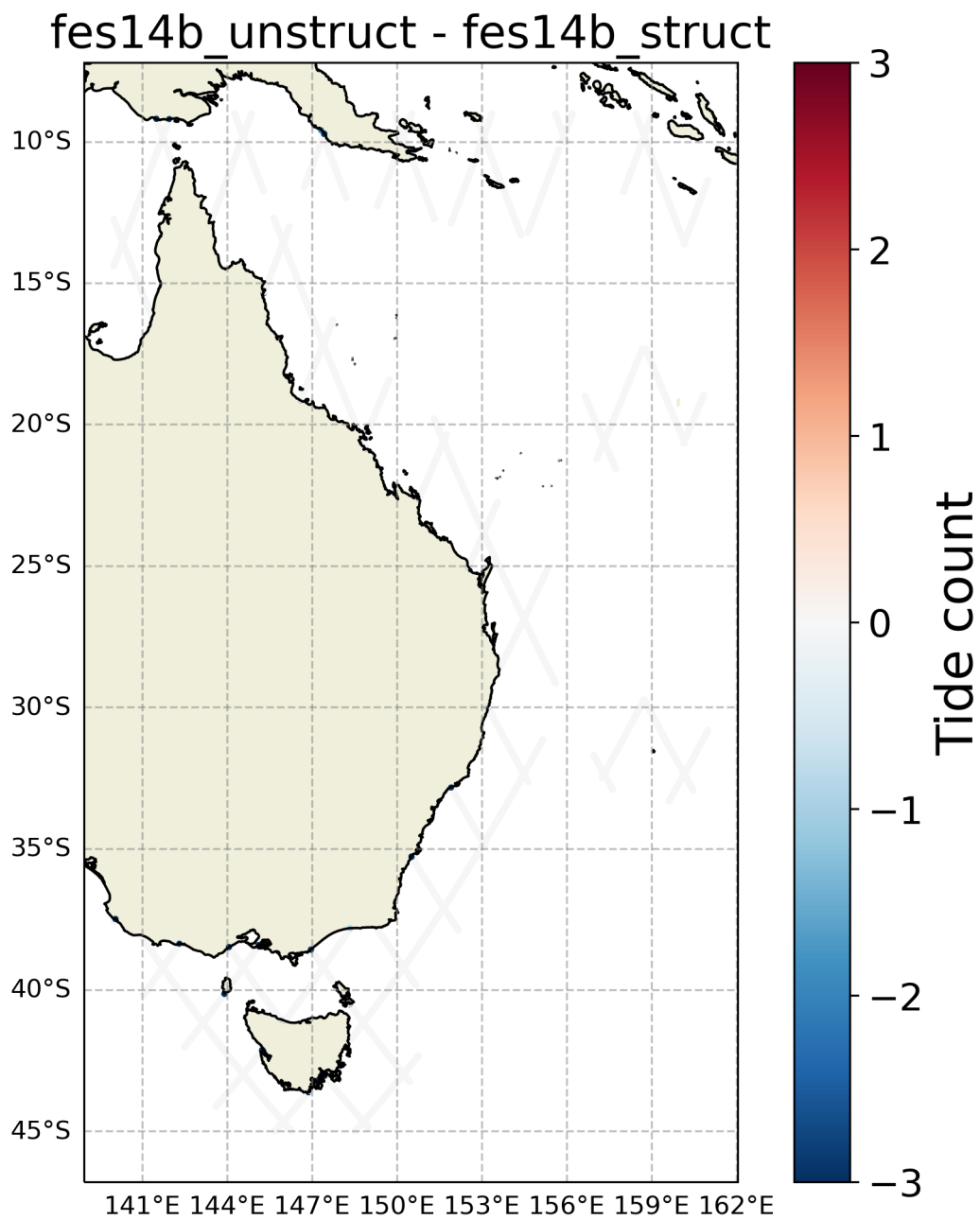


FIGURE 35 – Spatial coherence analysis of the Difference in Tide 's count between fes14b_unstruct and fes14b_struct

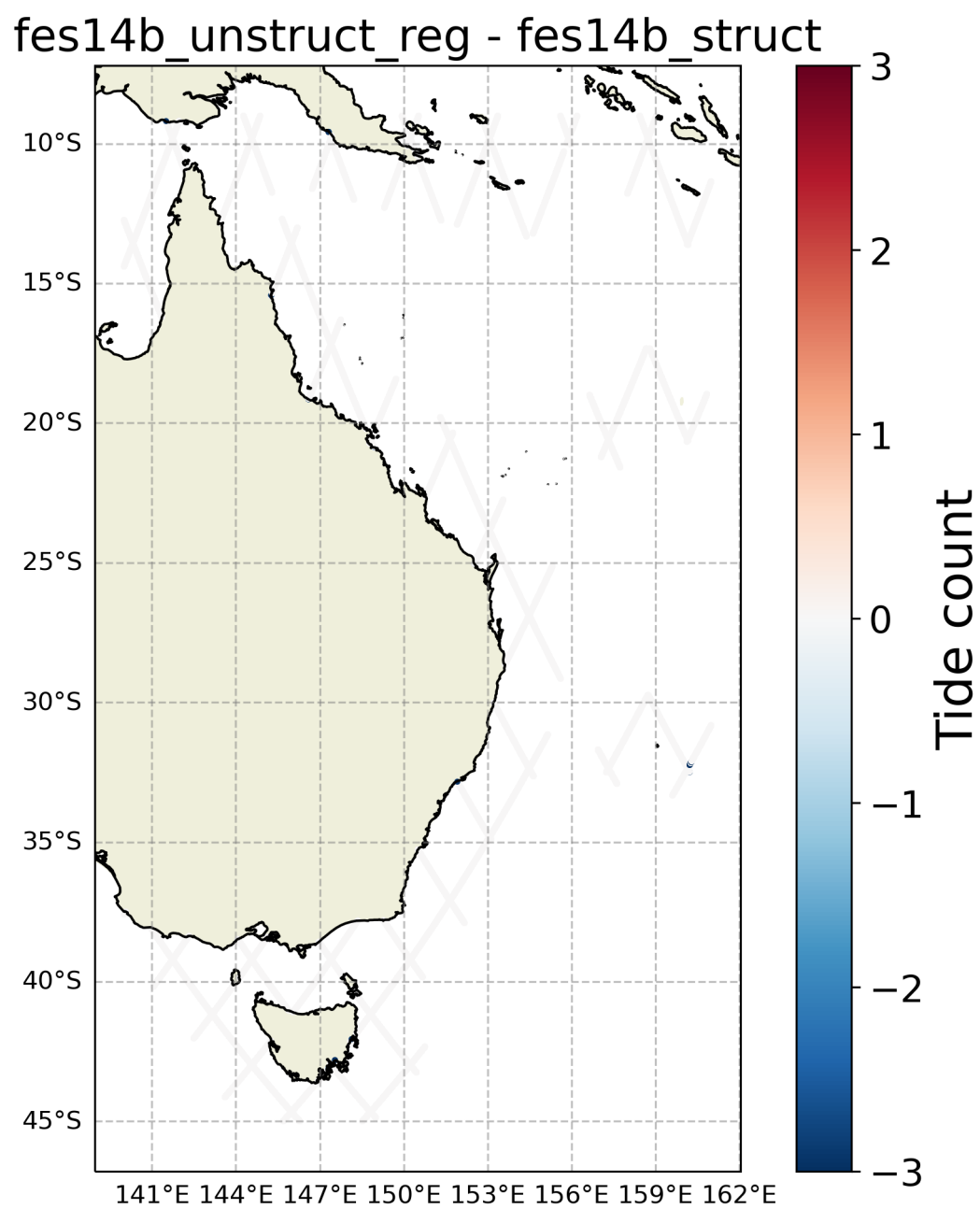


FIGURE 36 – Spatial coherence analysis of the Difference in Tide 's count between fes14b_unstruct_reg and fes14b_struct

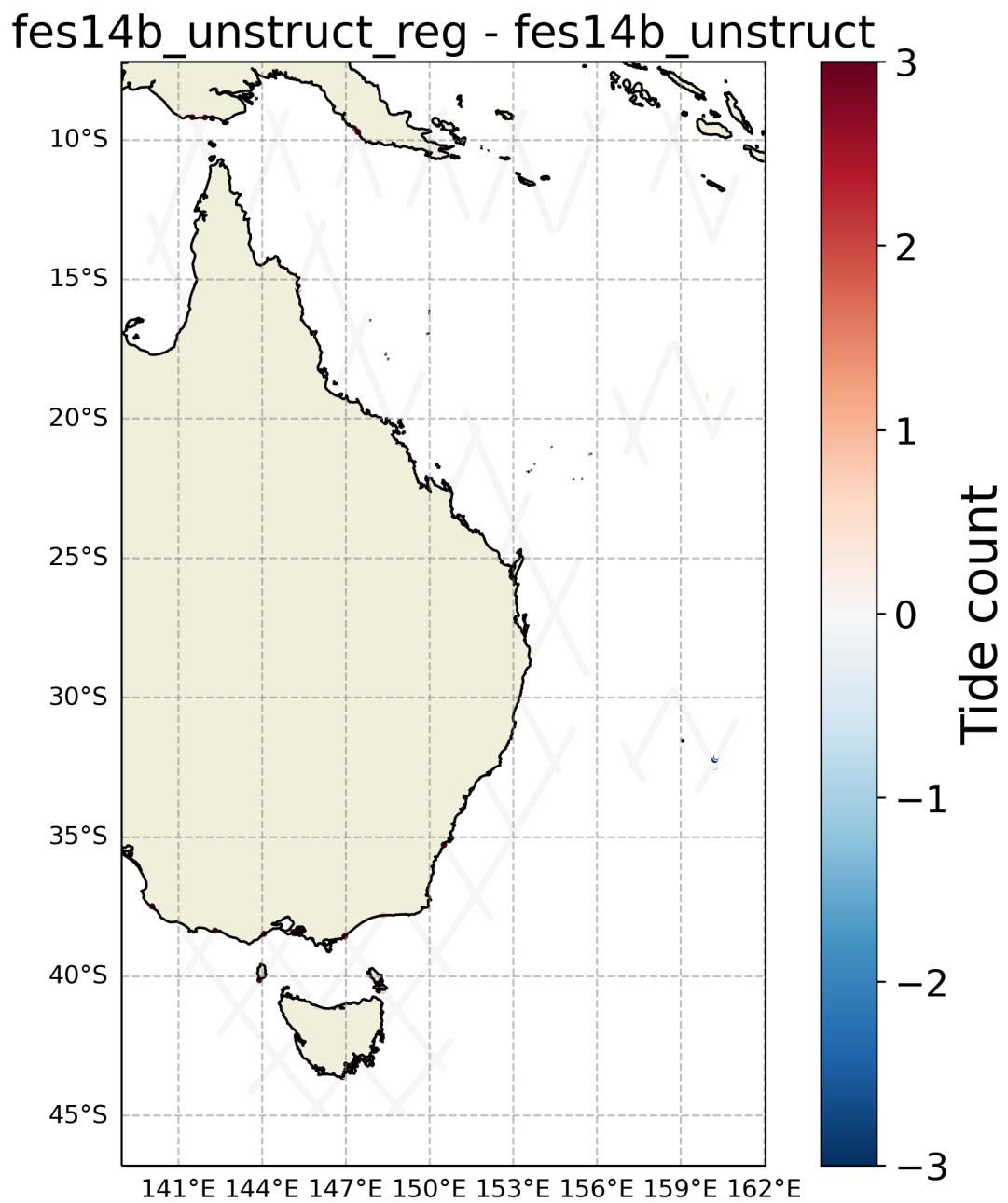


FIGURE 37 – Spatial coherence analysis of the Difference in Tide 's count between fes14b_unstruct_reg and fes14b_unstruct

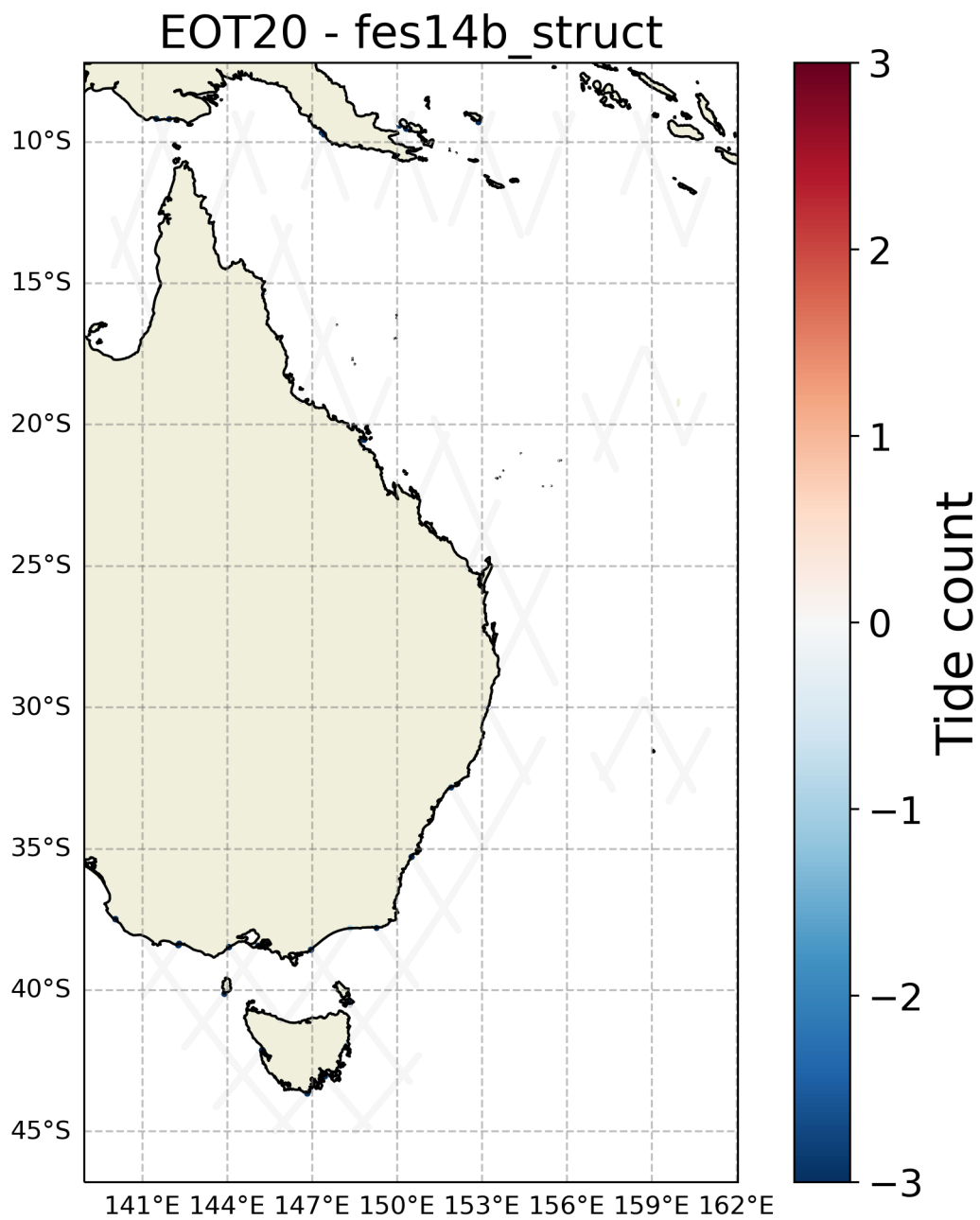


FIGURE 38 – Spatial coherence analysis of the Difference in Tide 's count between EOT20 and fes14b_struct

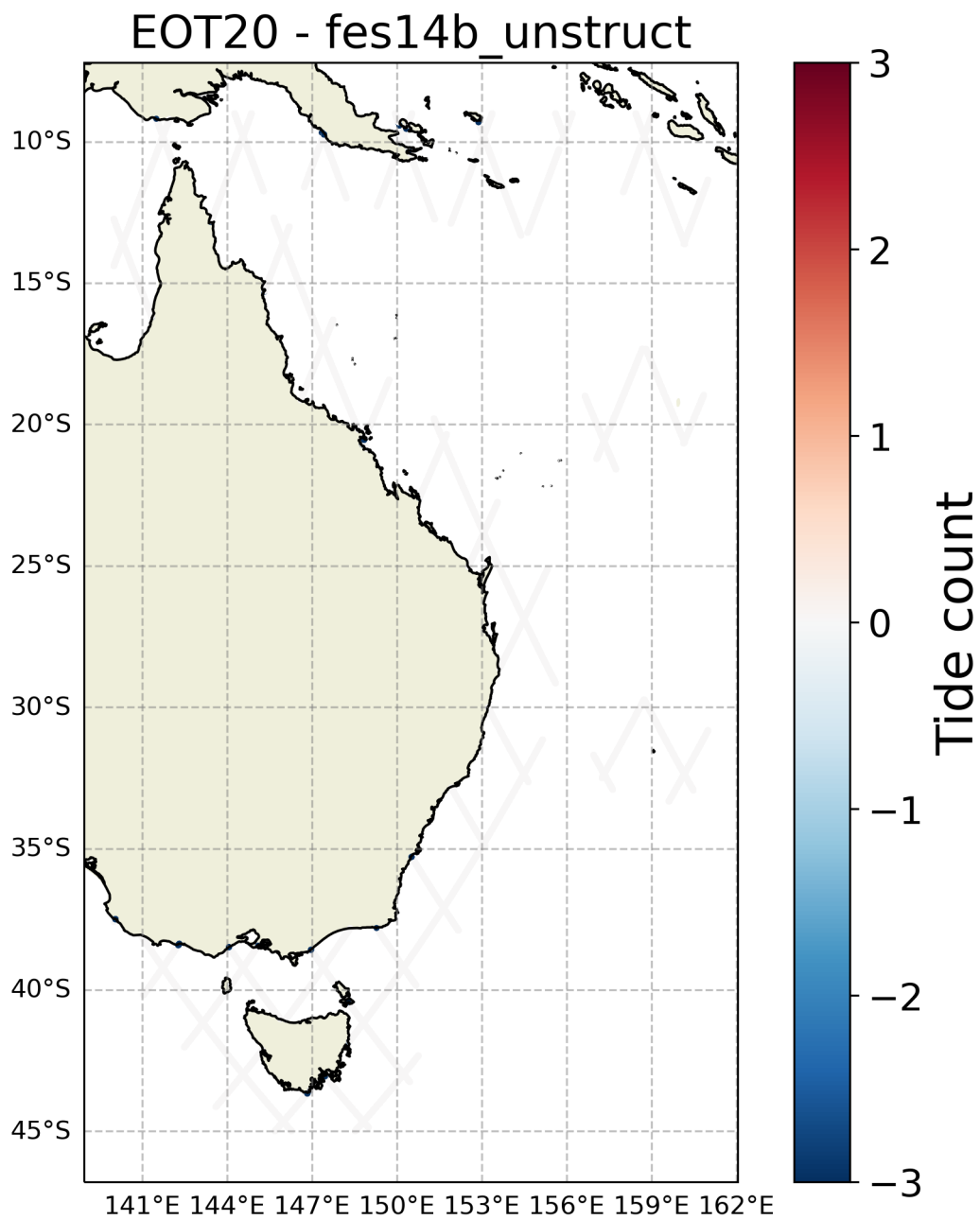


FIGURE 39 – Spatial coherence analysis of the Difference in Tide 's count between EOT20 and fes14b_unstruct

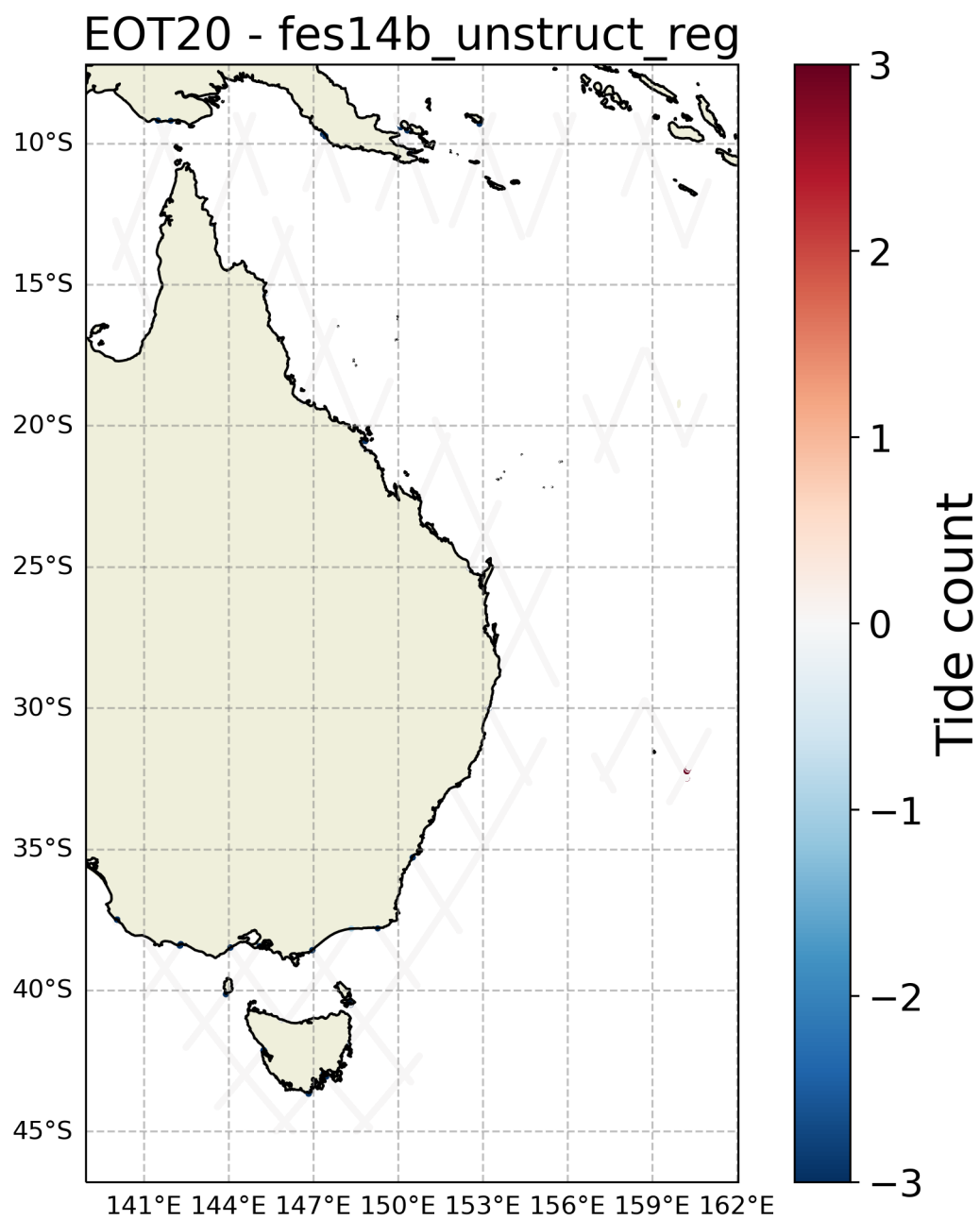


FIGURE 40 – Spatial coherence analysis of the Difference in Tide 's count between EOT20 and fes14b_unstruct_reg

3.2.2 Tide's std

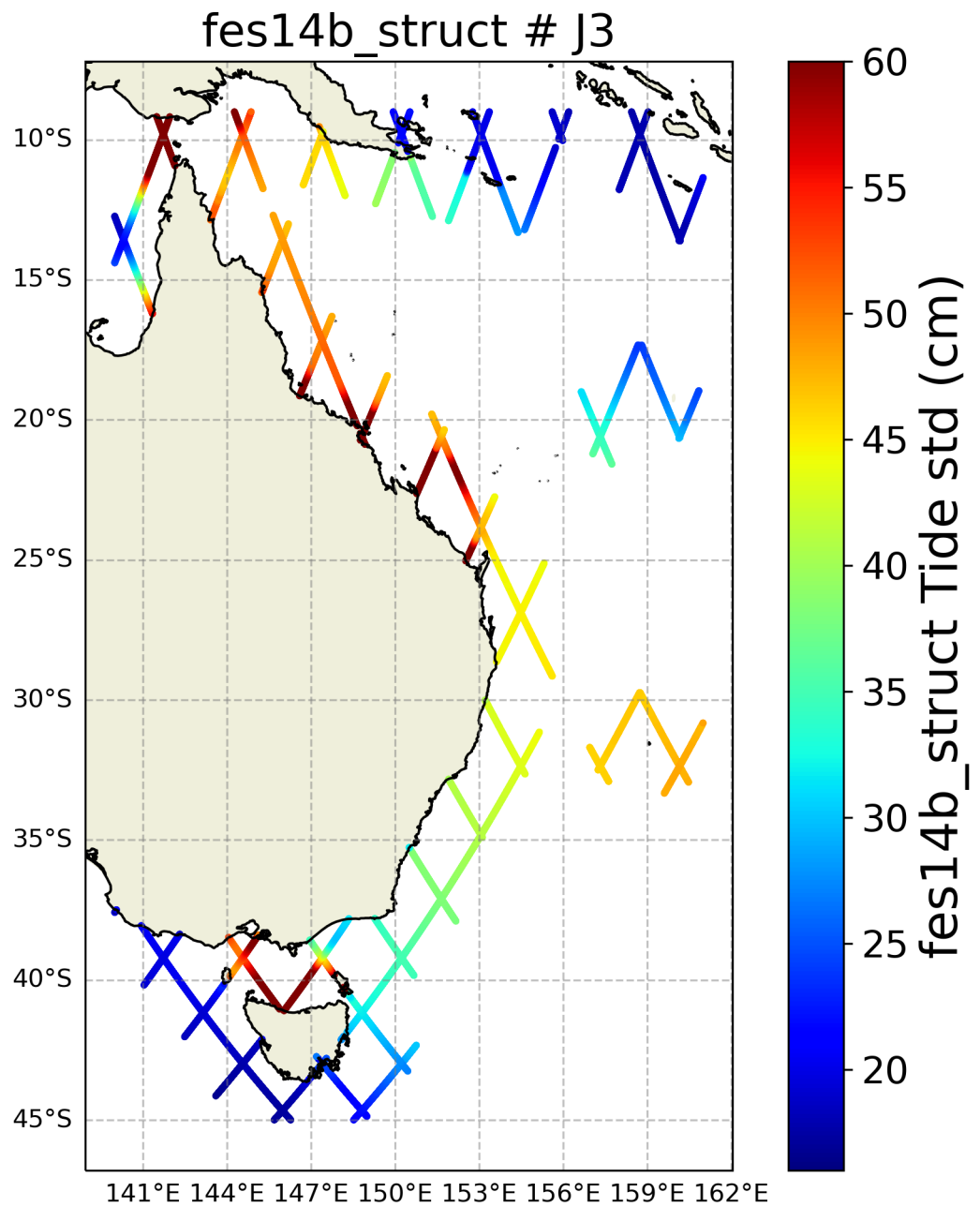


FIGURE 41 – Spatial coherence analysis of the std of the fes14b_struct version of Tide variable

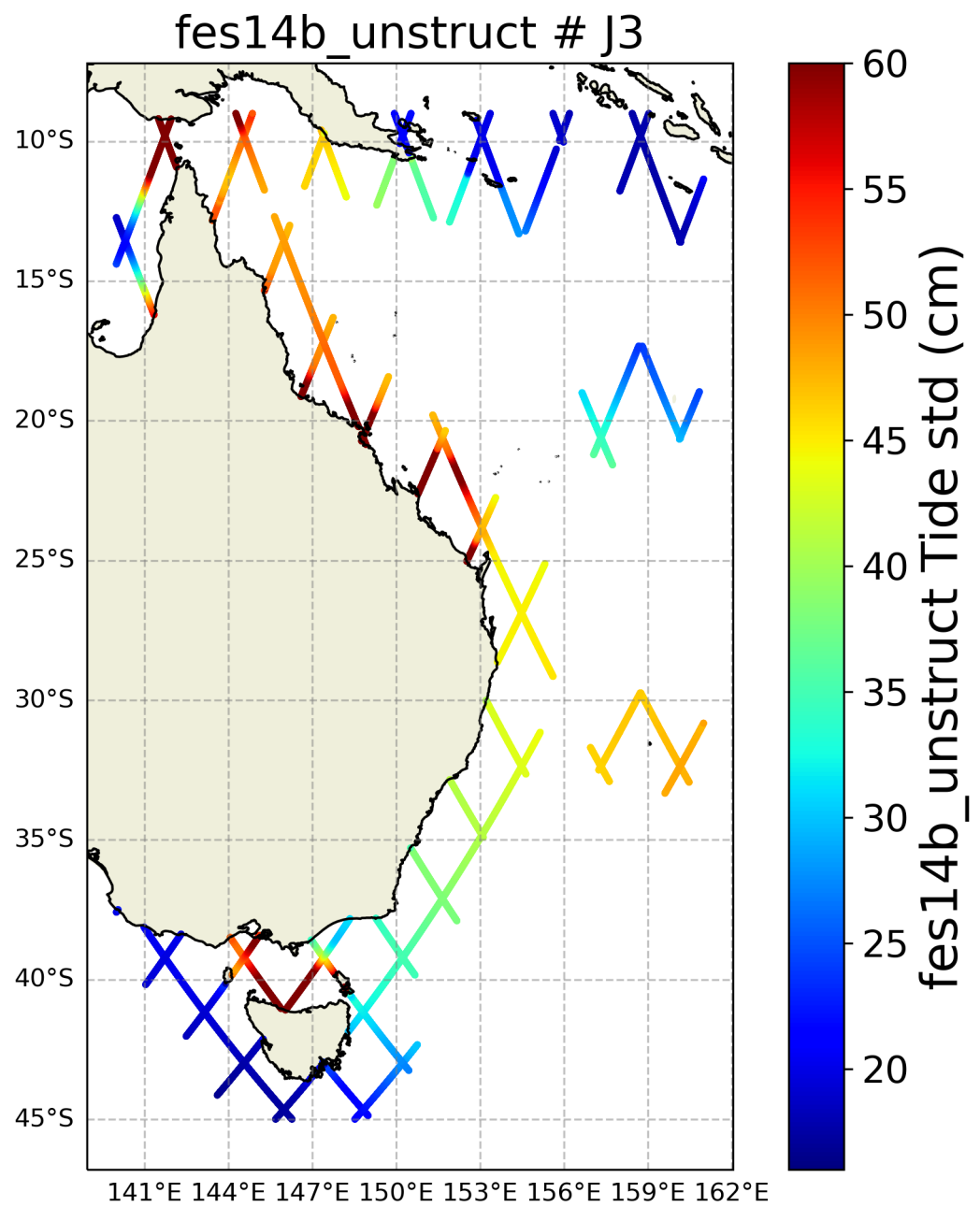


FIGURE 42 – Spatial coherence analysis of the std of the fes14b_unstruct version of Tide variable

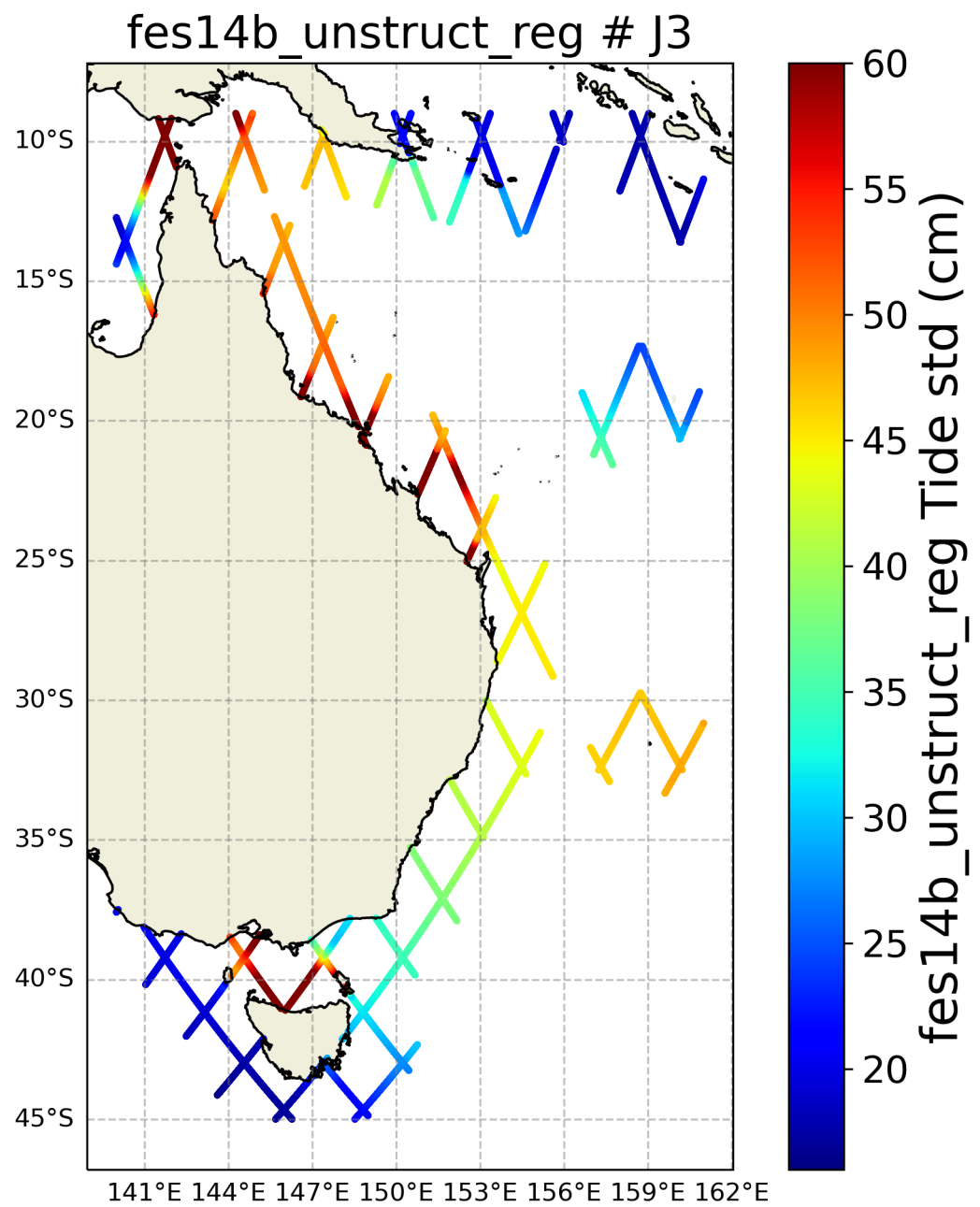


FIGURE 43 – Spatial coherence analysis of the std of the fes14b_unstruct_reg version of Tide variable

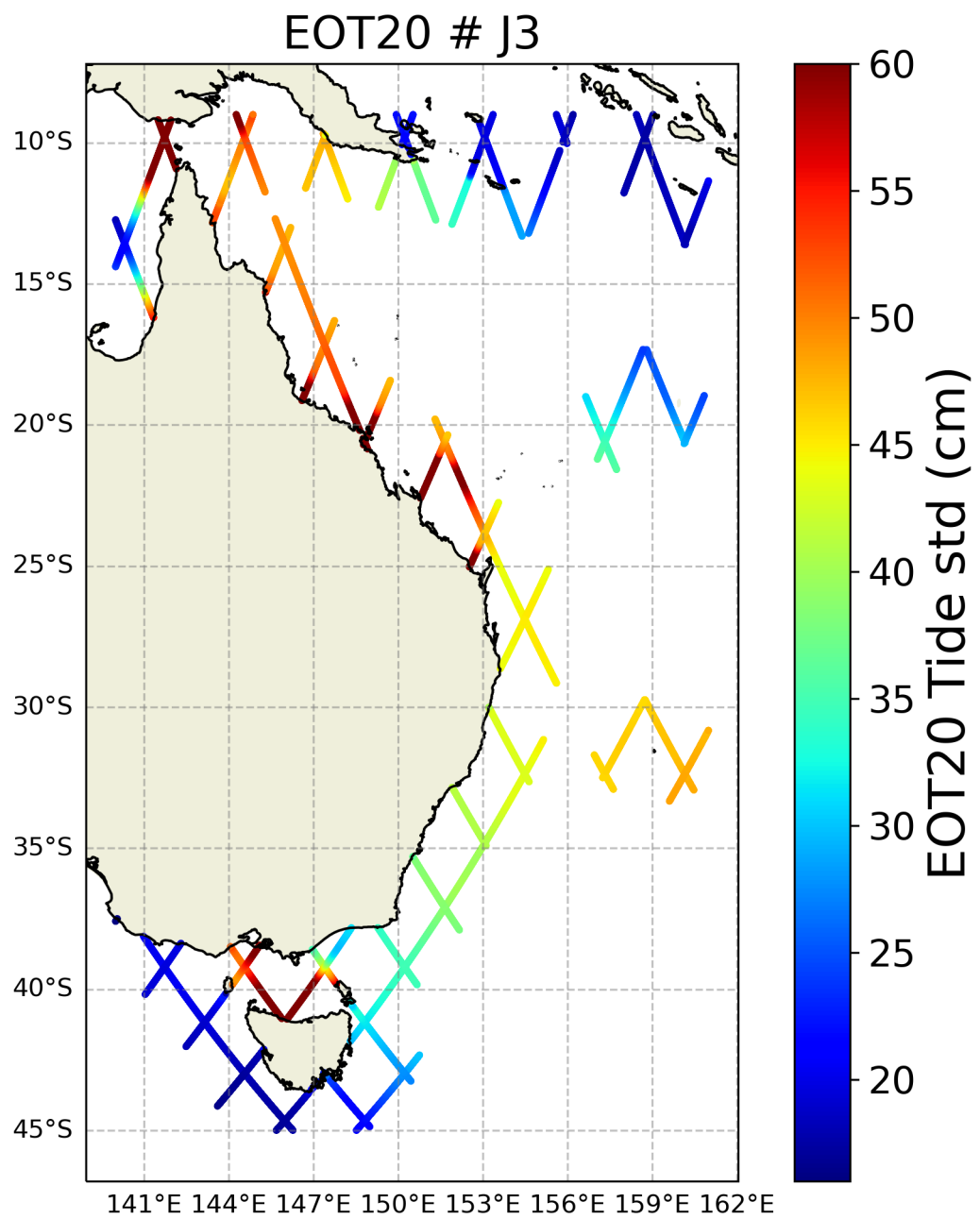


FIGURE 44 – Spatial coherence analysis of the std of the EOT20 version of Tide variable

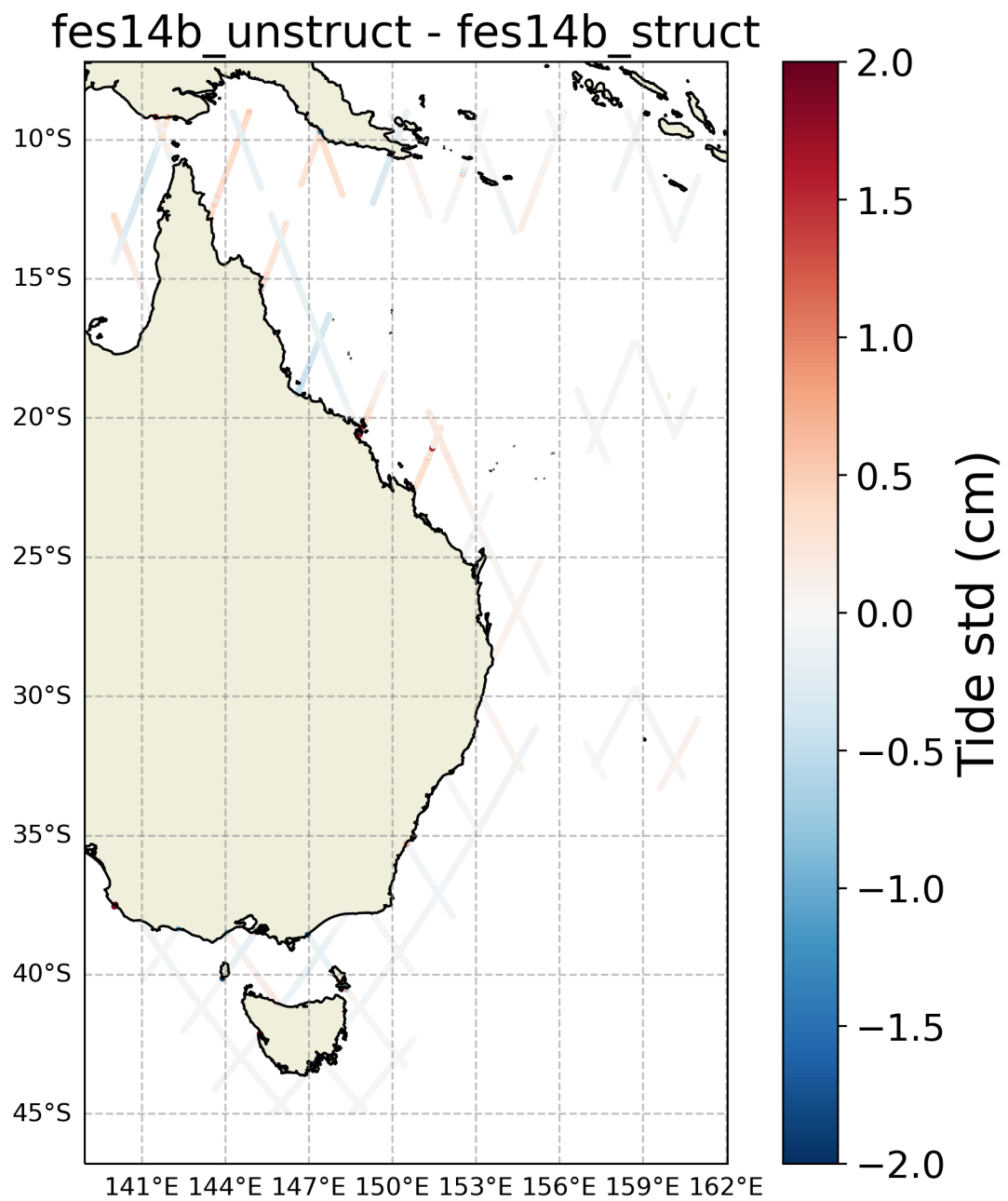


FIGURE 45 – Spatial coherence analysis of the Difference in Tide 's std between fes14b_unstruct and fes14b_struct

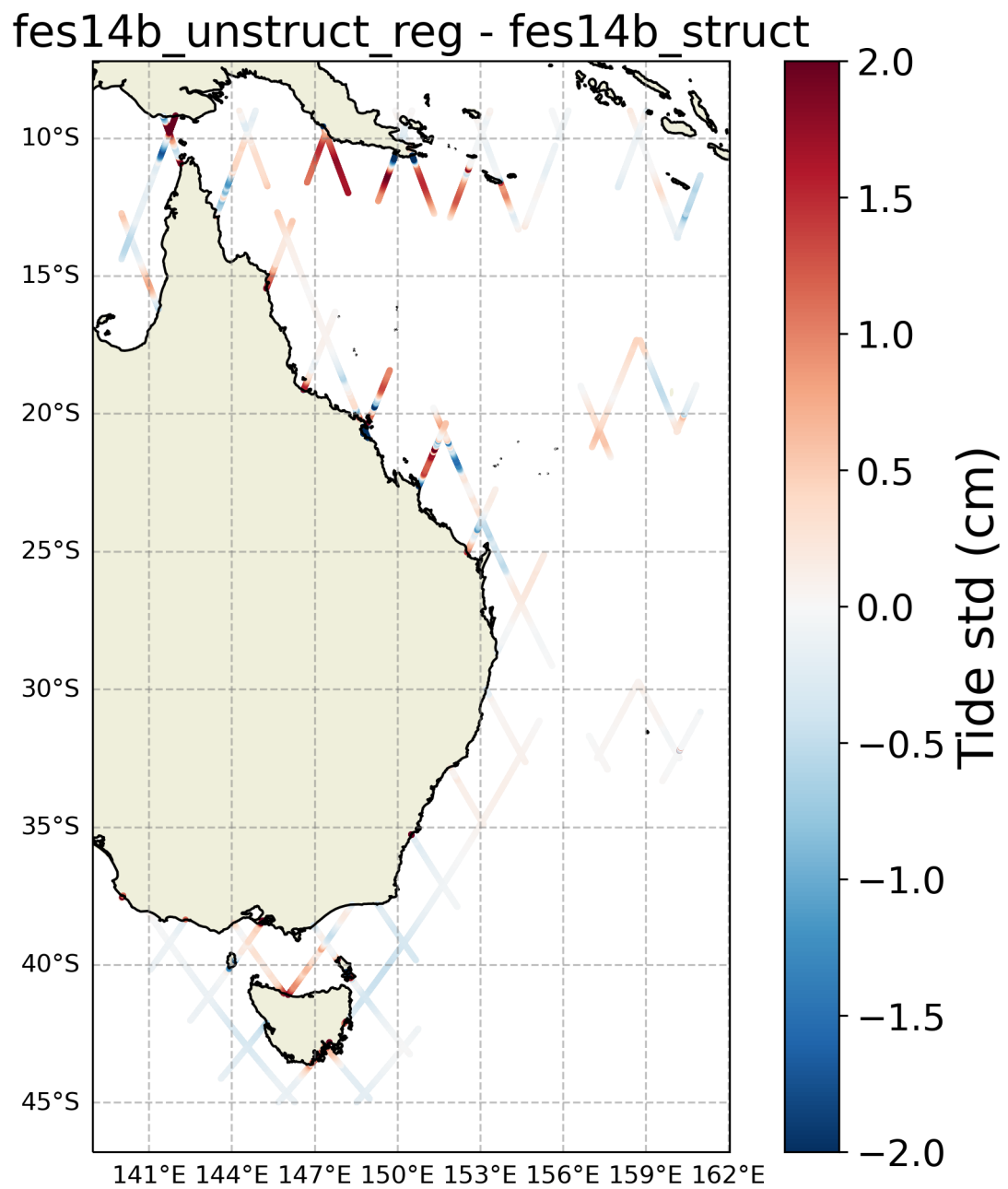


FIGURE 46 – Spatial coherence analysis of the Difference in Tide 's std between fes14b_unstruct_reg and fes14b_struct

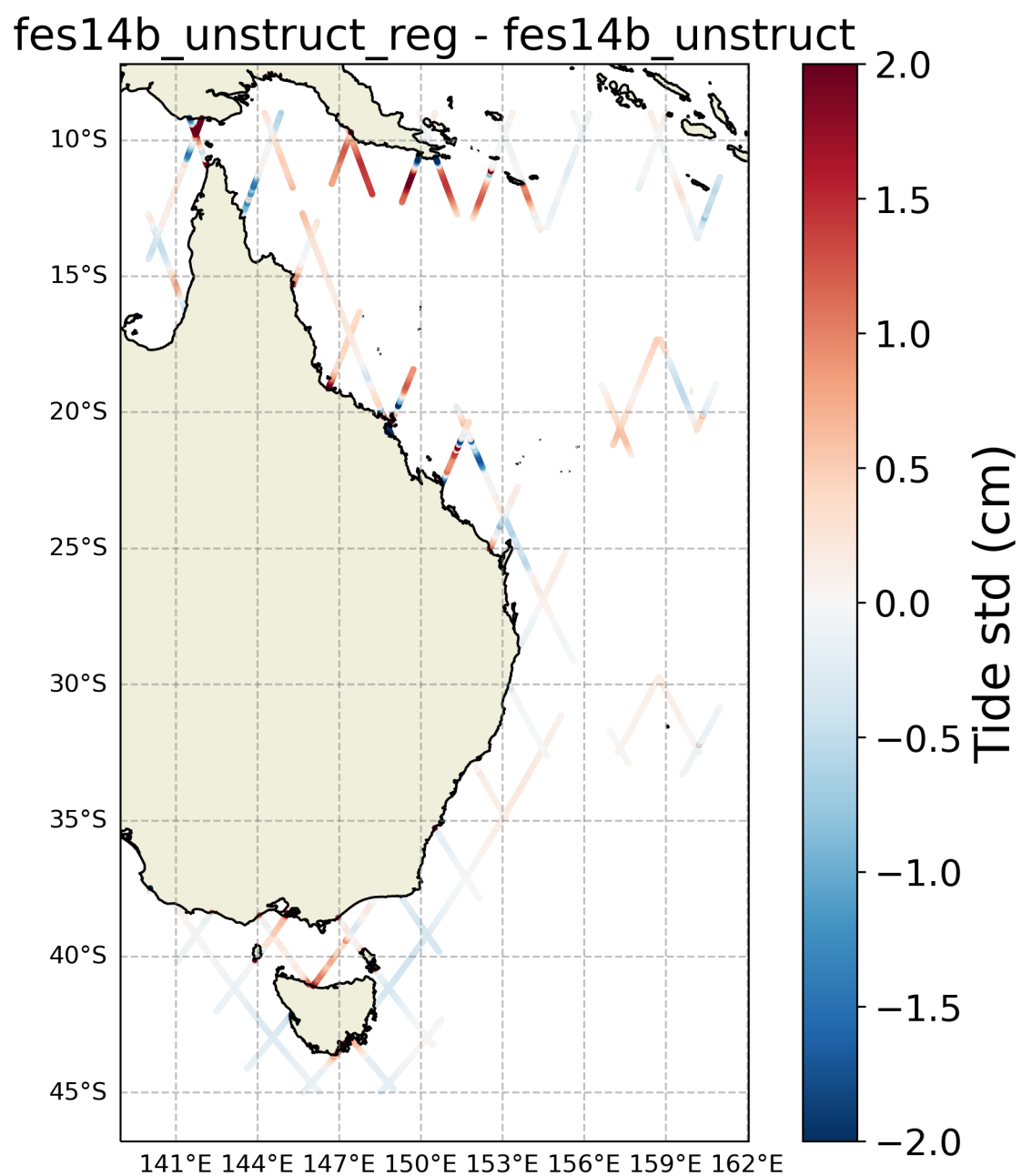


FIGURE 47 – Spatial coherence analysis of the Difference in Tide 's std between fes14b_unstruct_reg and fes14b_unstruct

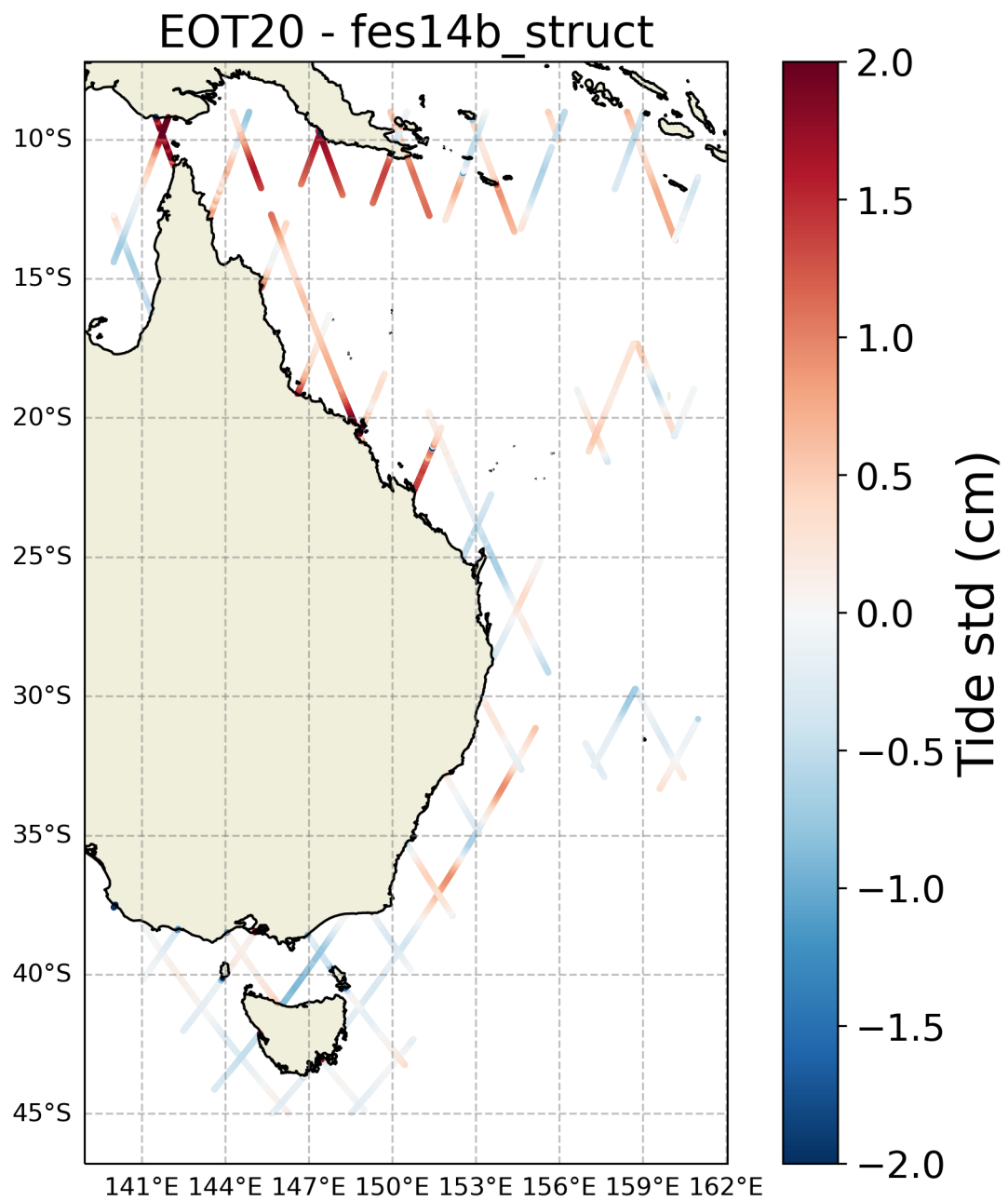


FIGURE 48 – Spatial coherence analysis of the Difference in Tide 's std between EOT20 and fes14b_struct

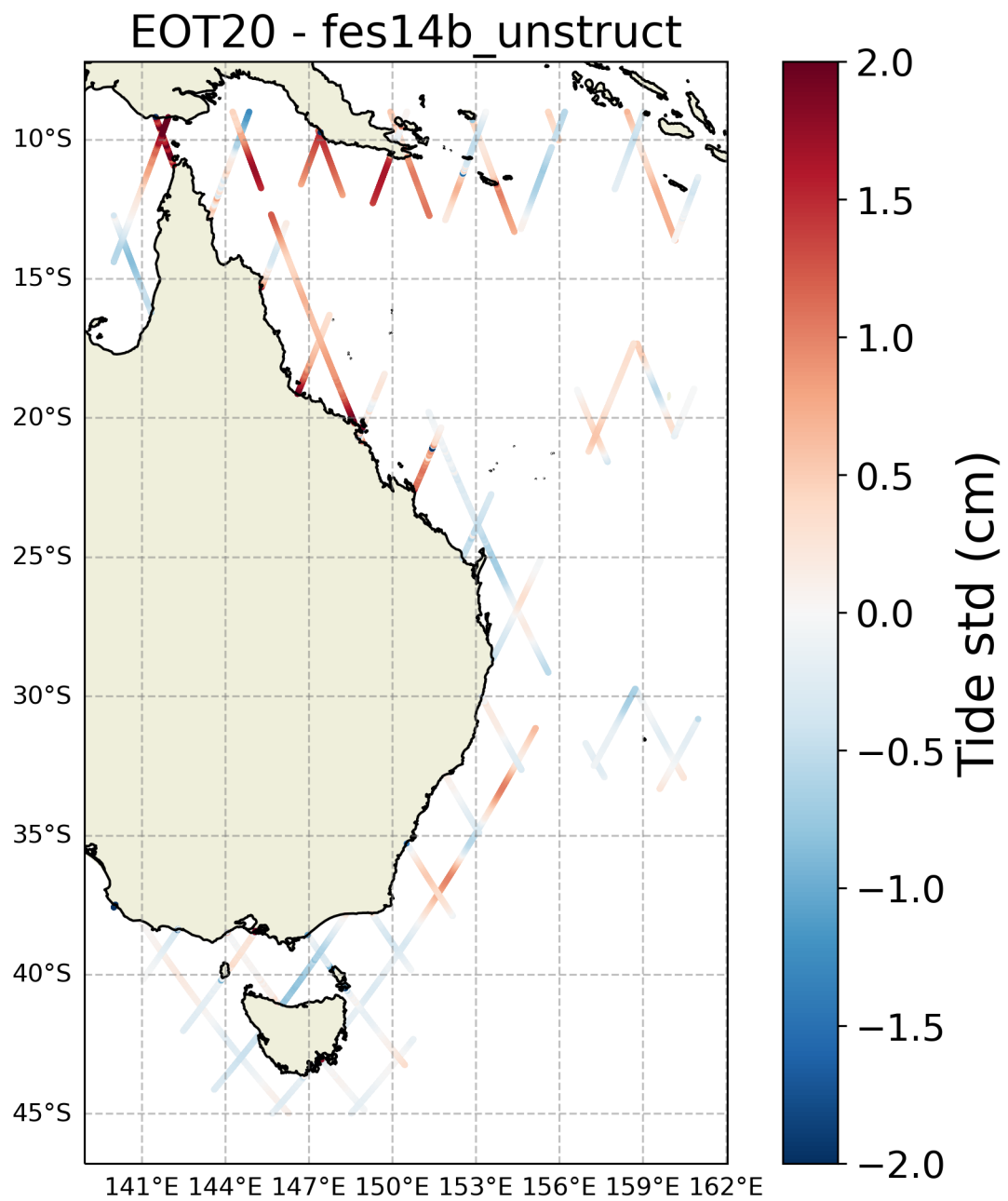


FIGURE 49 – Spatial coherence analysis of the Difference in Tide 's std between EOT20 and fes14b_unstruct

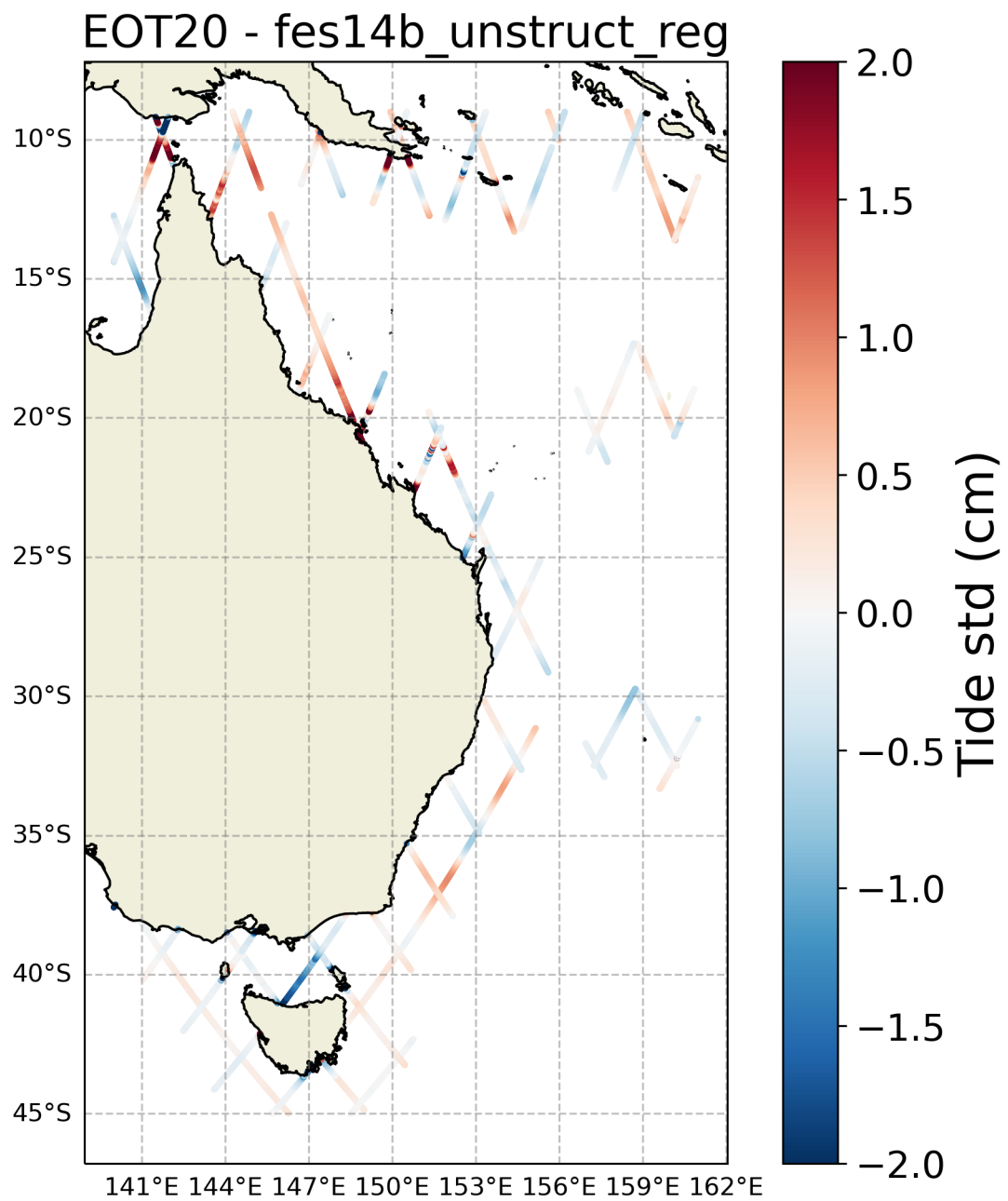


FIGURE 50 – Spatial coherence analysis of the Difference in Tide 's std between EOT20 and fes14b_unstruct_reg

3.2.3 Tide's mean

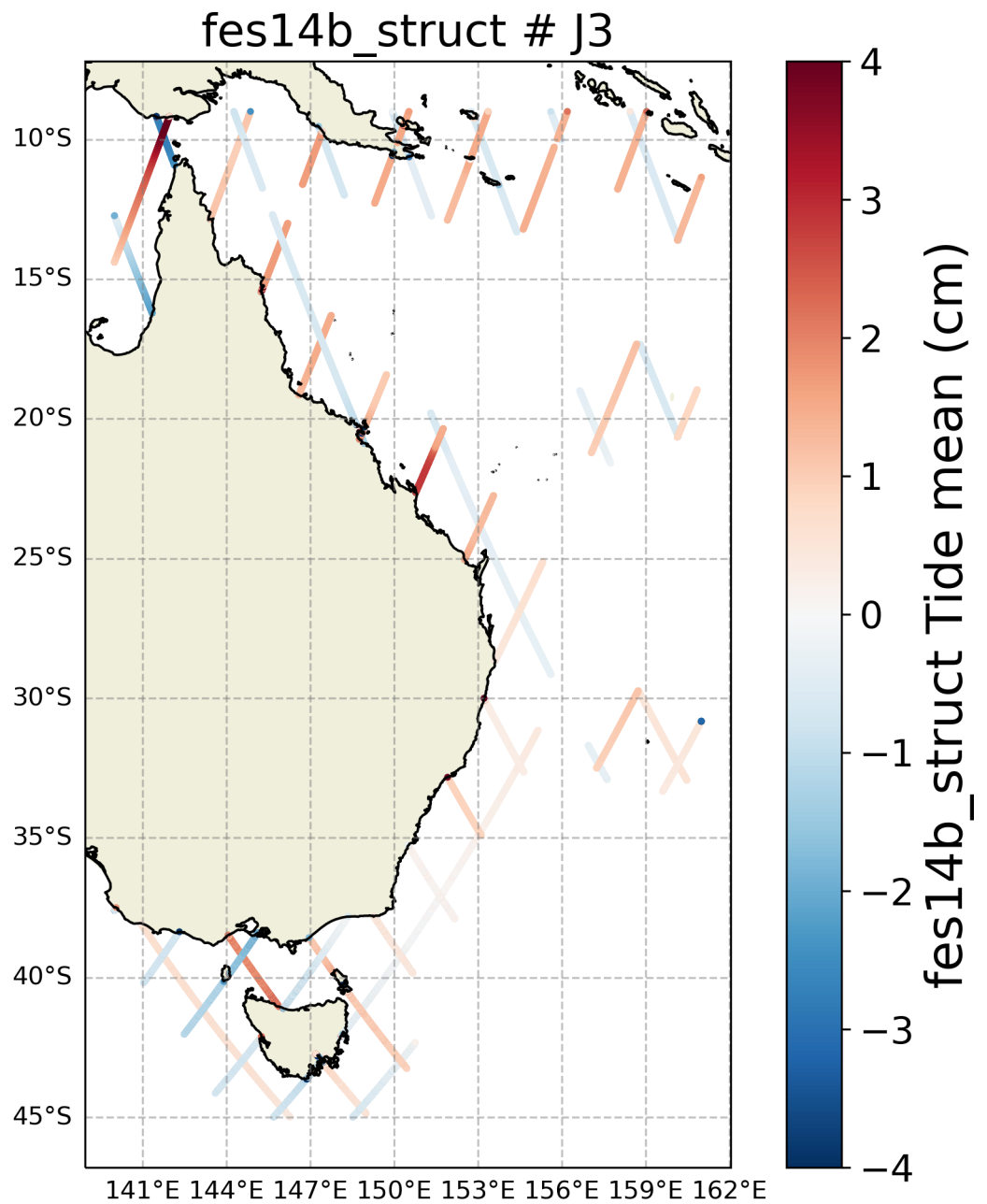


FIGURE 51 – Spatial coherence analysis of the mean of the fes14b_struct version of Tide variable

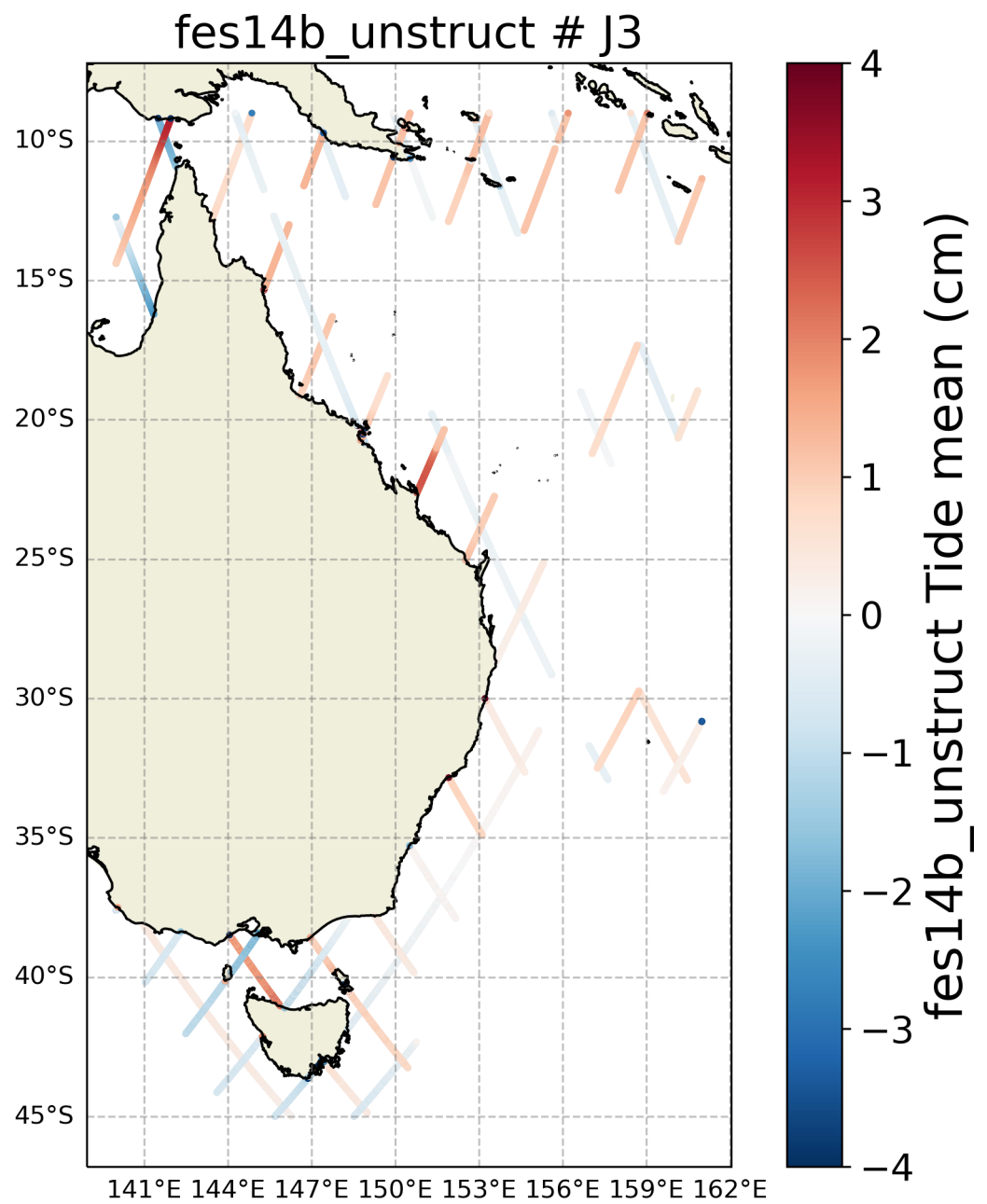


FIGURE 52 – Spatial coherence analysis of the mean of the fes14b_unstruct version of Tide variable

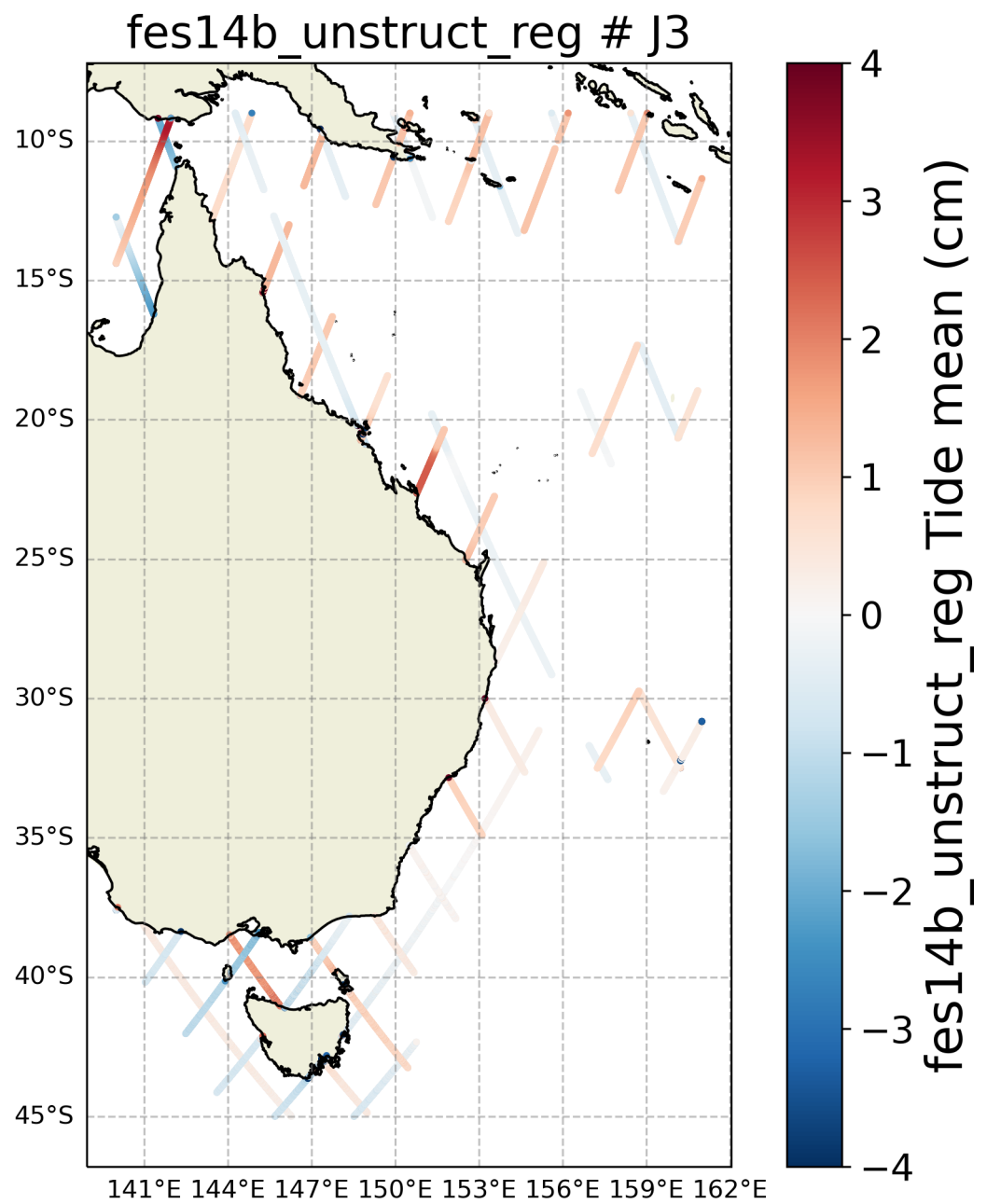


FIGURE 53 – Spatial coherence analysis of the mean of the fes14b_unstruct_reg version of Tide variable

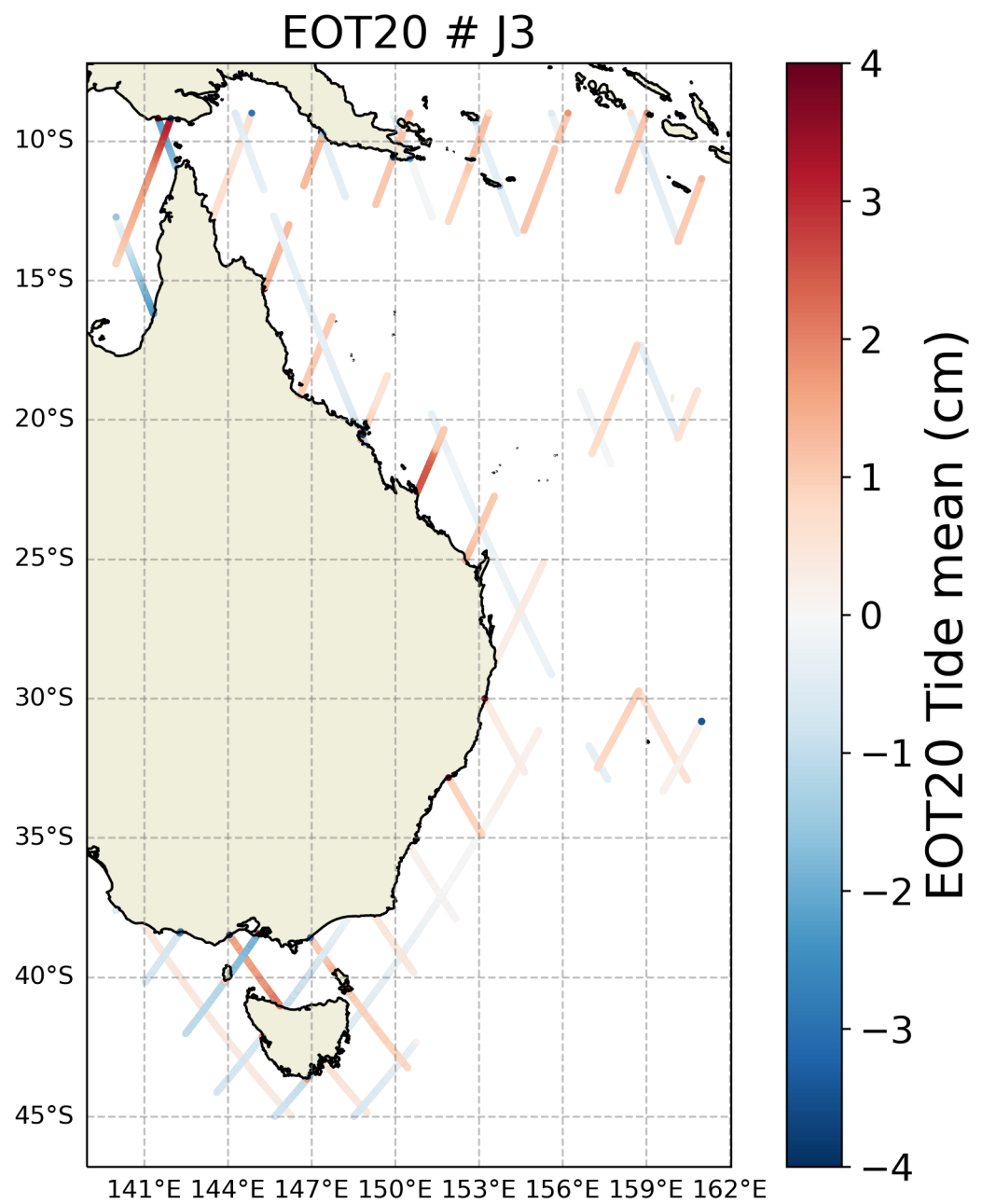


FIGURE 54 – Spatial coherence analysis of the mean of the EOT20 version of Tide variable

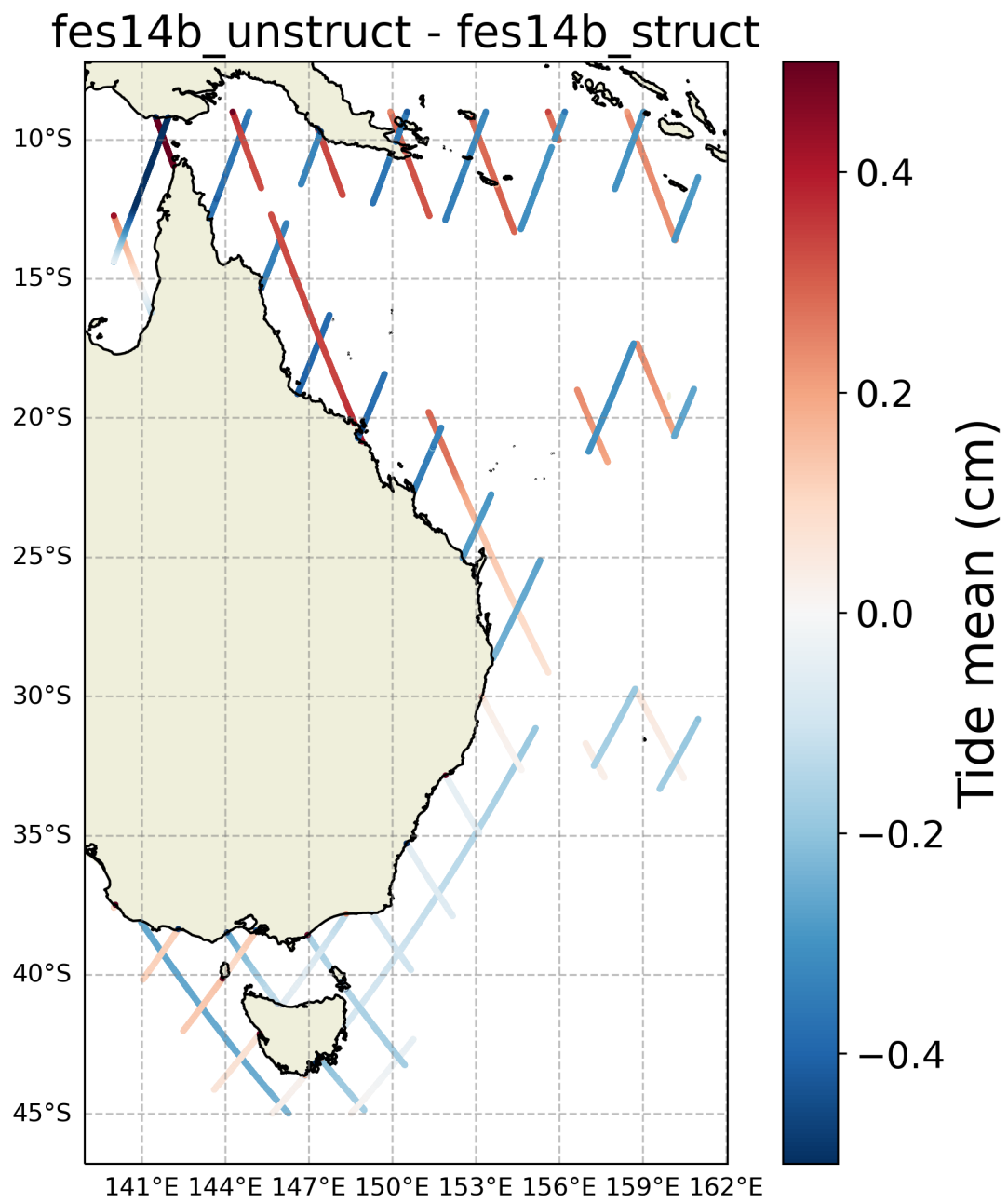


FIGURE 55 – Spatial coherence analysis of the Difference in Tide 's mean between fes14b_unstruct and fes14b_struct

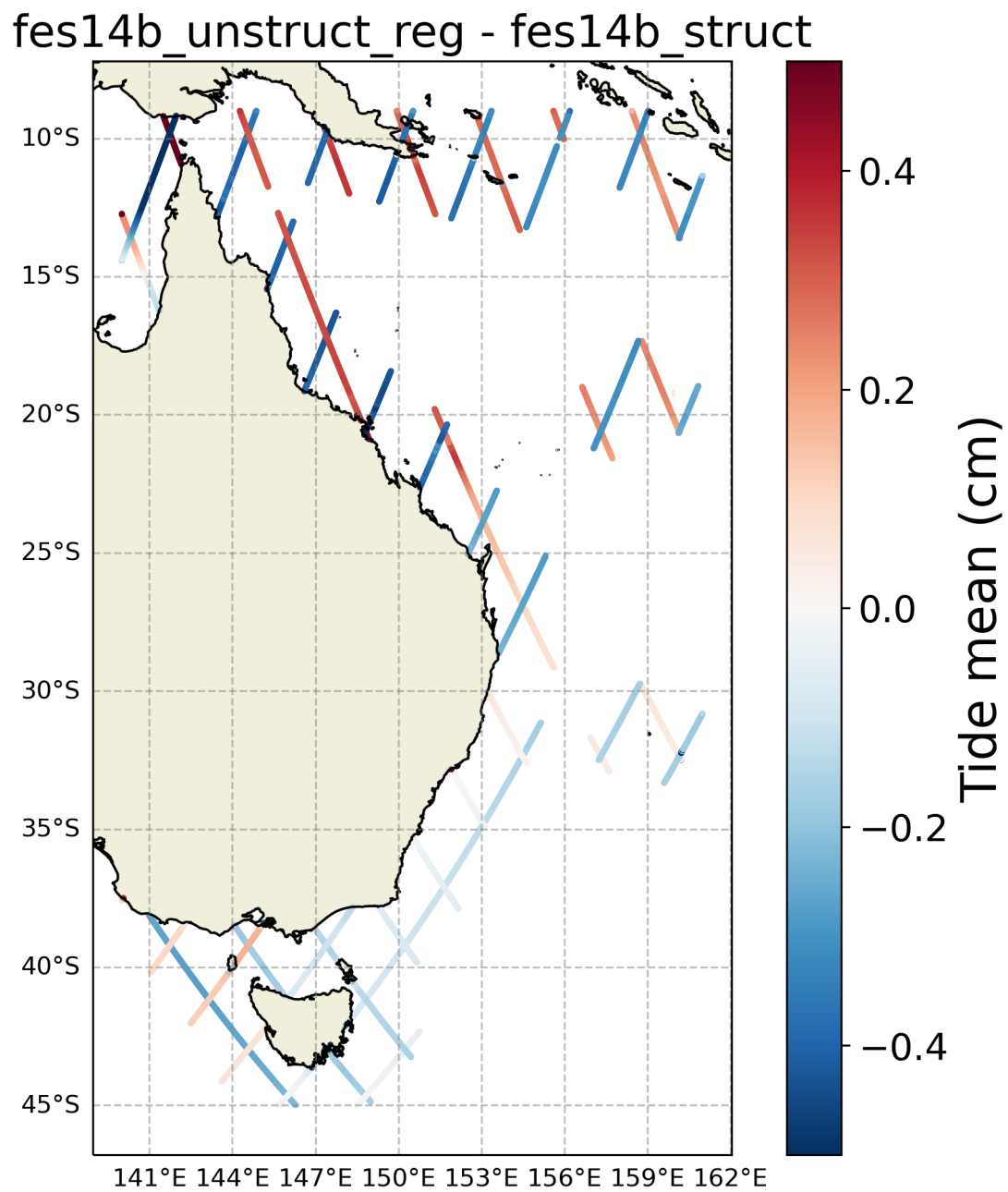


FIGURE 56 – Spatial coherence analysis of the Difference in Tide 's mean between fes14b_unstruct_reg and fes14b_struct

fes14b_unstruct_reg - fes14b_unstruct

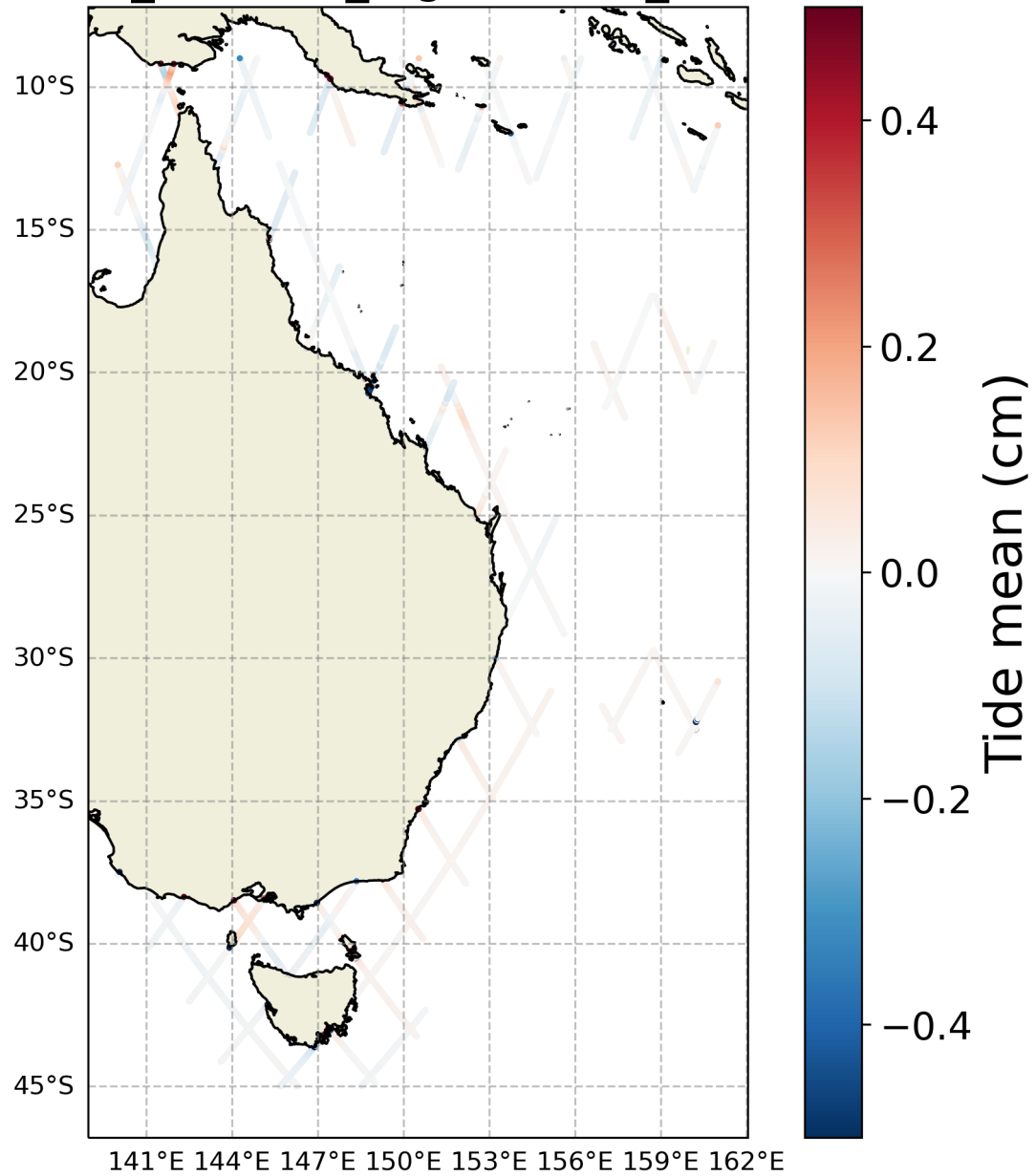


FIGURE 57 – Spatial coherence analysis of the Difference in Tide 's mean between fes14b_unstruct_reg and fes14b_unstruct

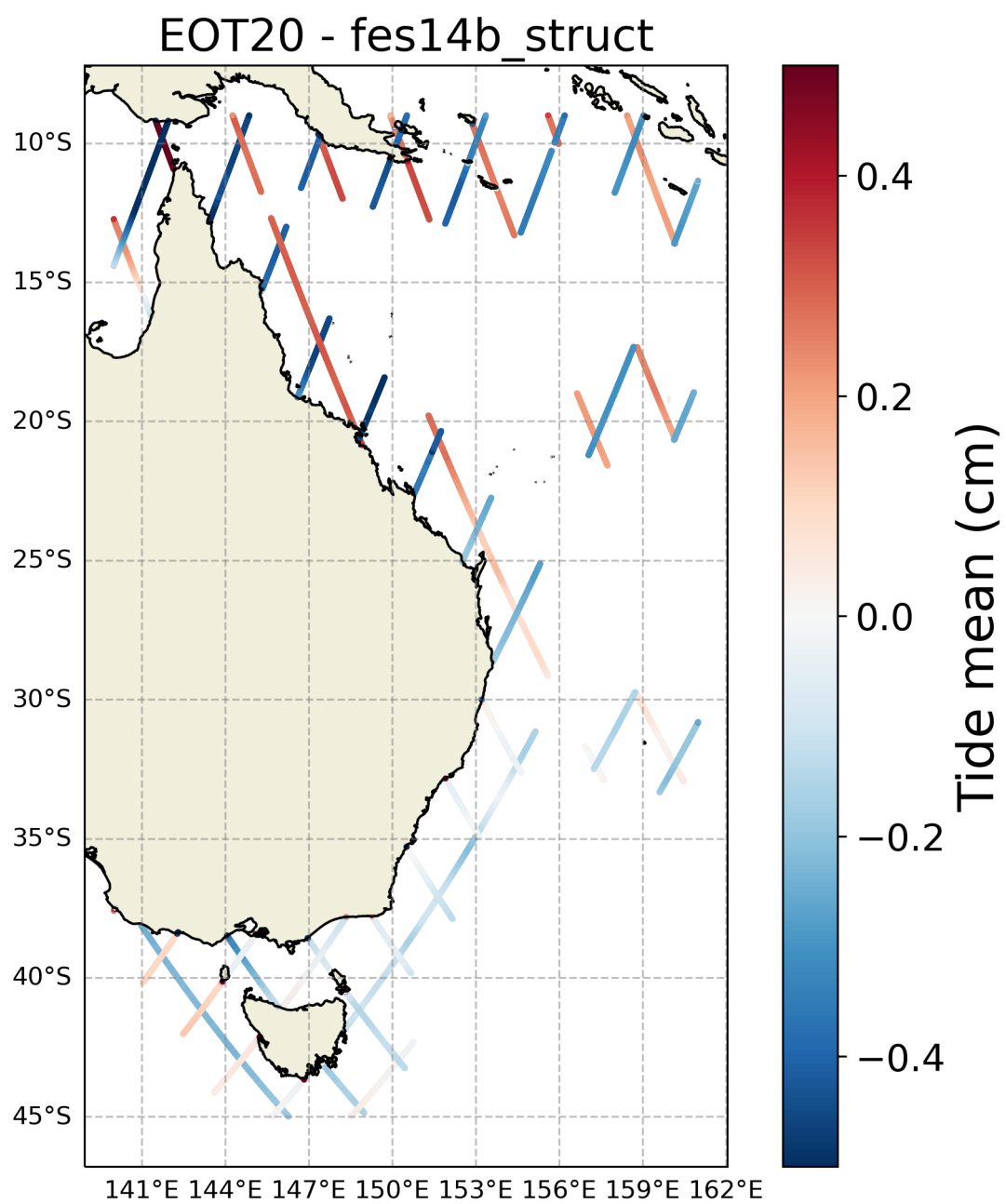


FIGURE 58 – Spatial coherence analysis of the Difference in Tide 's mean between EOT20 and fes14b_struct

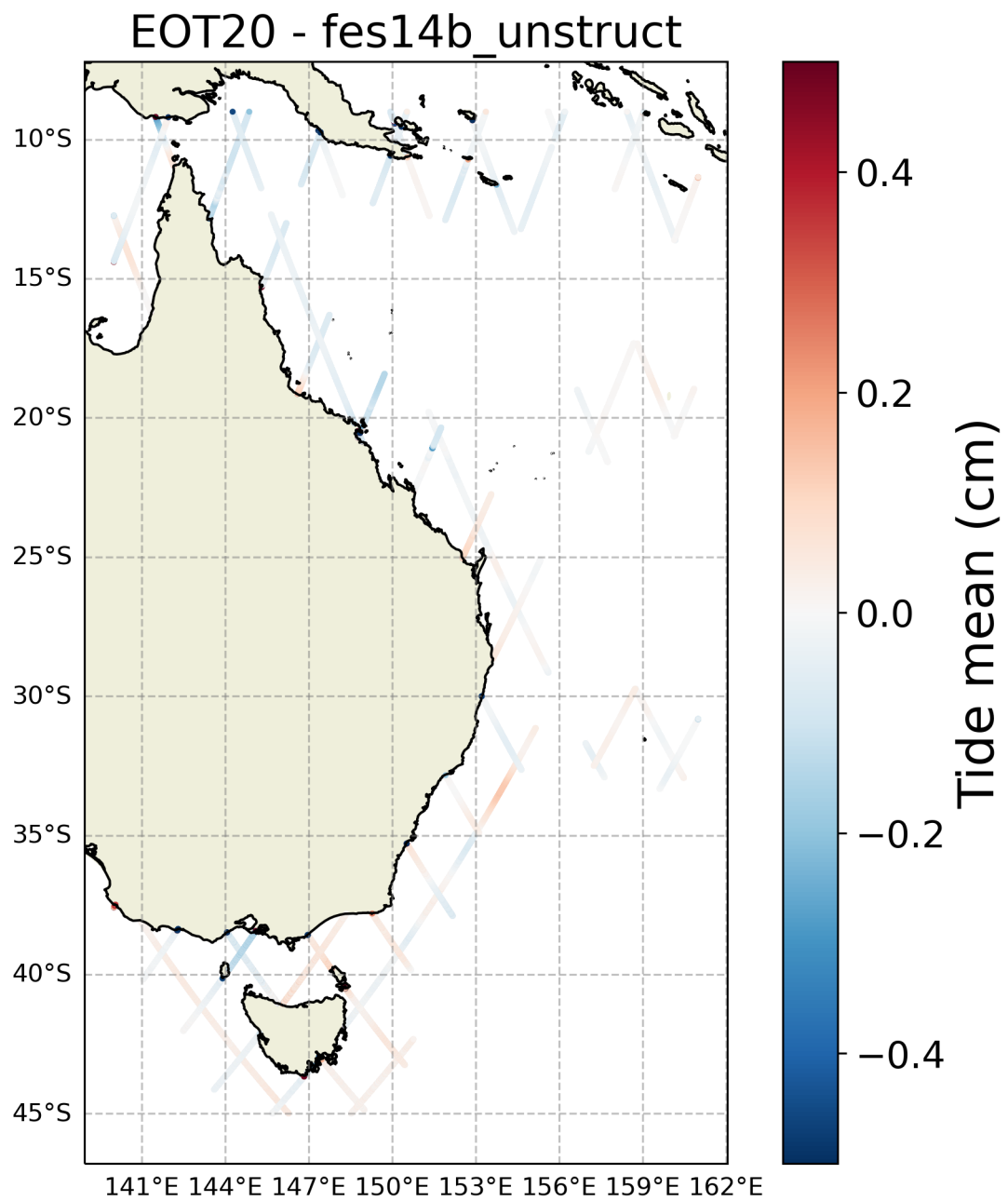


FIGURE 59 – Spatial coherence analysis of the Difference in Tide 's mean between EOT20 and fes14b_unstruct

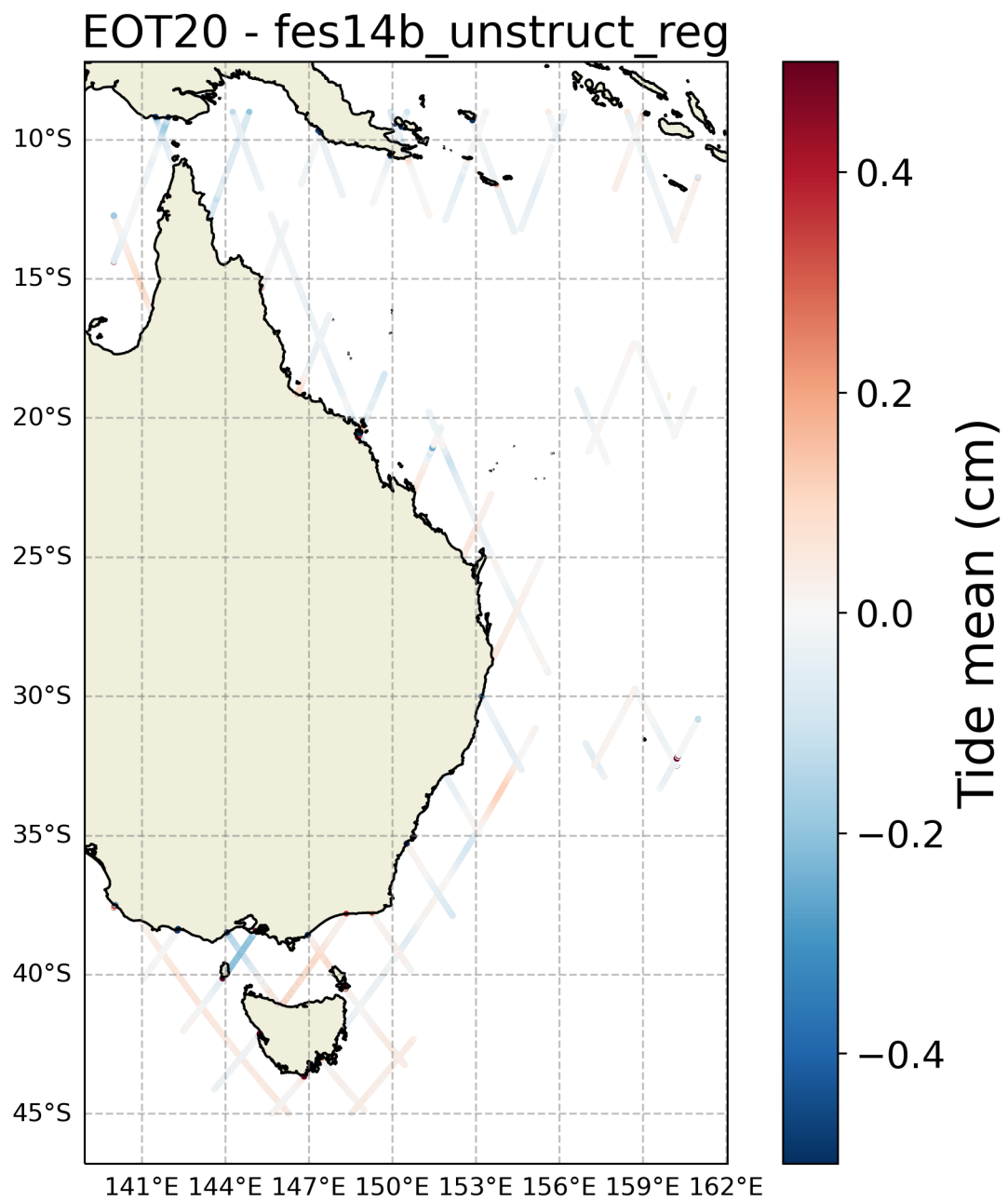


FIGURE 60 – Spatial coherence analysis of the Difference in Tide 's mean between EOT20 and fes14b_unstruct_reg

4 Histograms

4.1 Tide

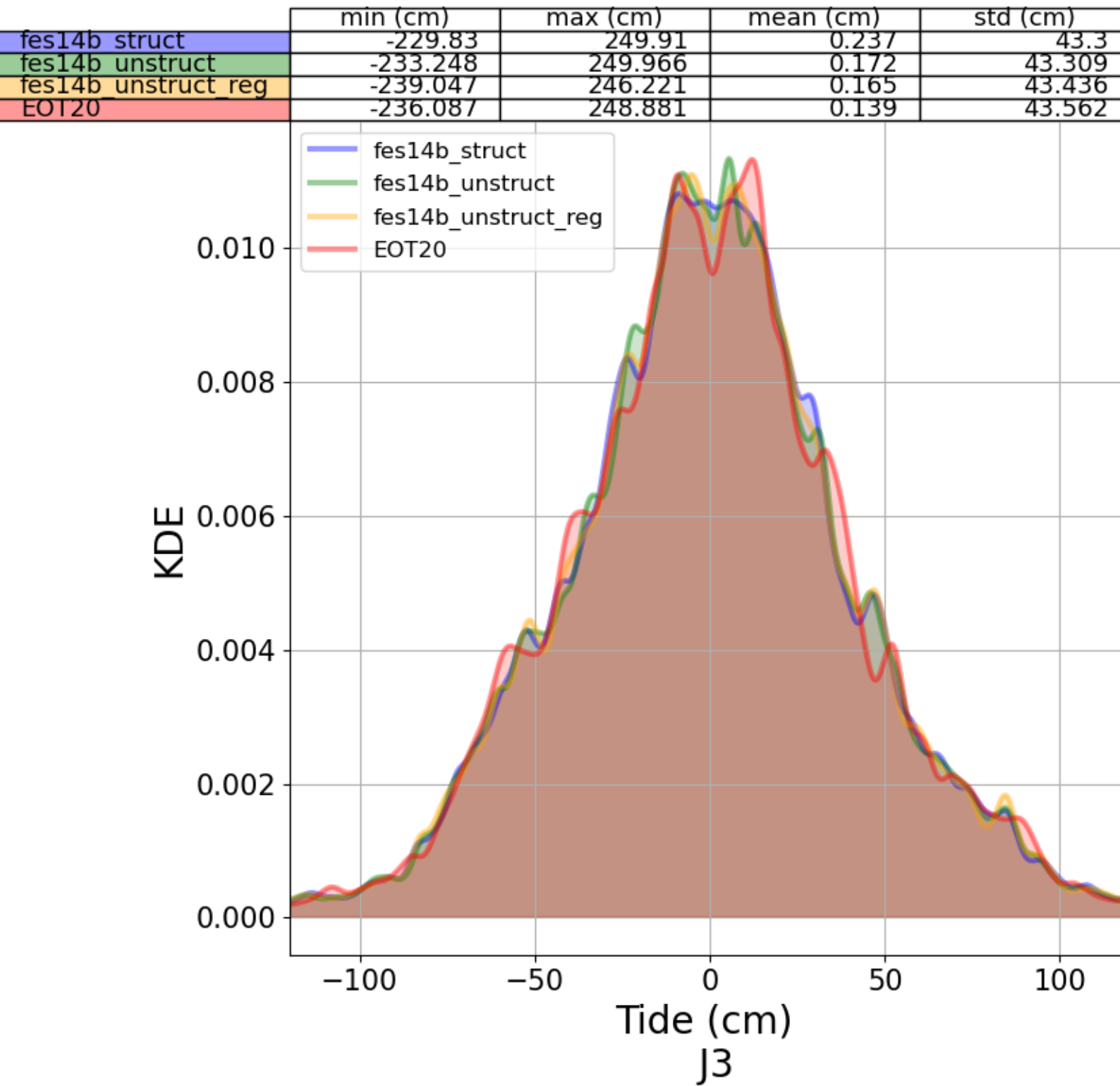


FIGURE 61 – Histogram of each of Tide version

	min (cm)	max (cm)	mean (cm)	std (cm)
4b unstruct - fes14b struct	-82.05	47.095	-0.062	1.0
4b unstruct reg - fes14b struct	-96.095	140.419	-0.065	2.0
20 - fes14b struct	-104.116	52.86	-0.073	3.0
4b unstruct reg - fes14b unstruct	-58.812	54.008	-0.003	2.0
20 - fes14b unstruct	-50.464	46.529	-0.011	3.0
20 - fes14b unstruct reg	-52.019	57.169	-0.009	3.0

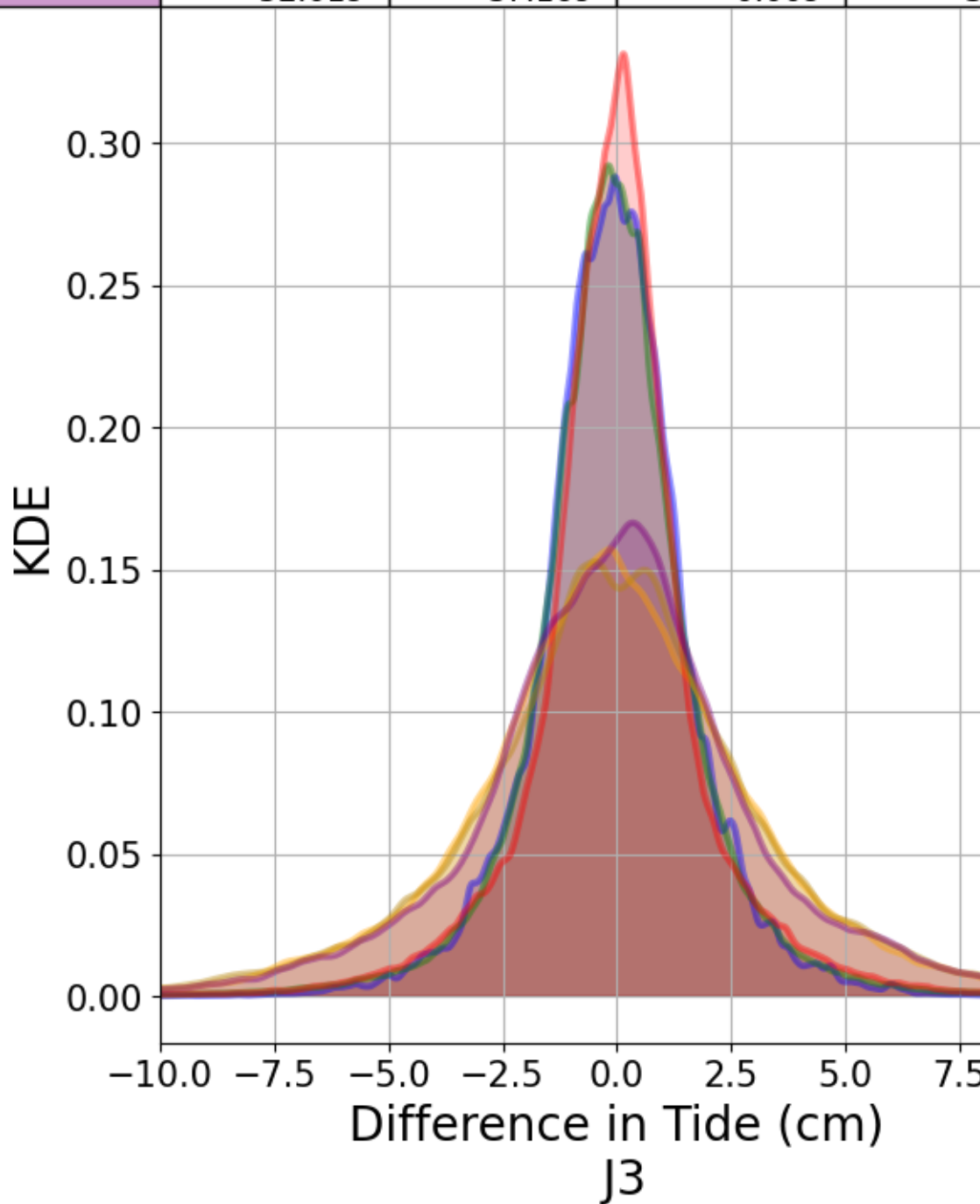


FIGURE 62 – Histograms of difference of each Tide version and reference one

	min (cm)	max (cm)	mean (cm)	std (cm)
fes14b struct	16.369	128.773	38.971	17.824
fes14b unstruct	16.39	129.205	38.973	17.816
fes14b unstruct reg	16.284	125.907	39.033	17.888
EOT20	0.836	134.462	39.074	17.908

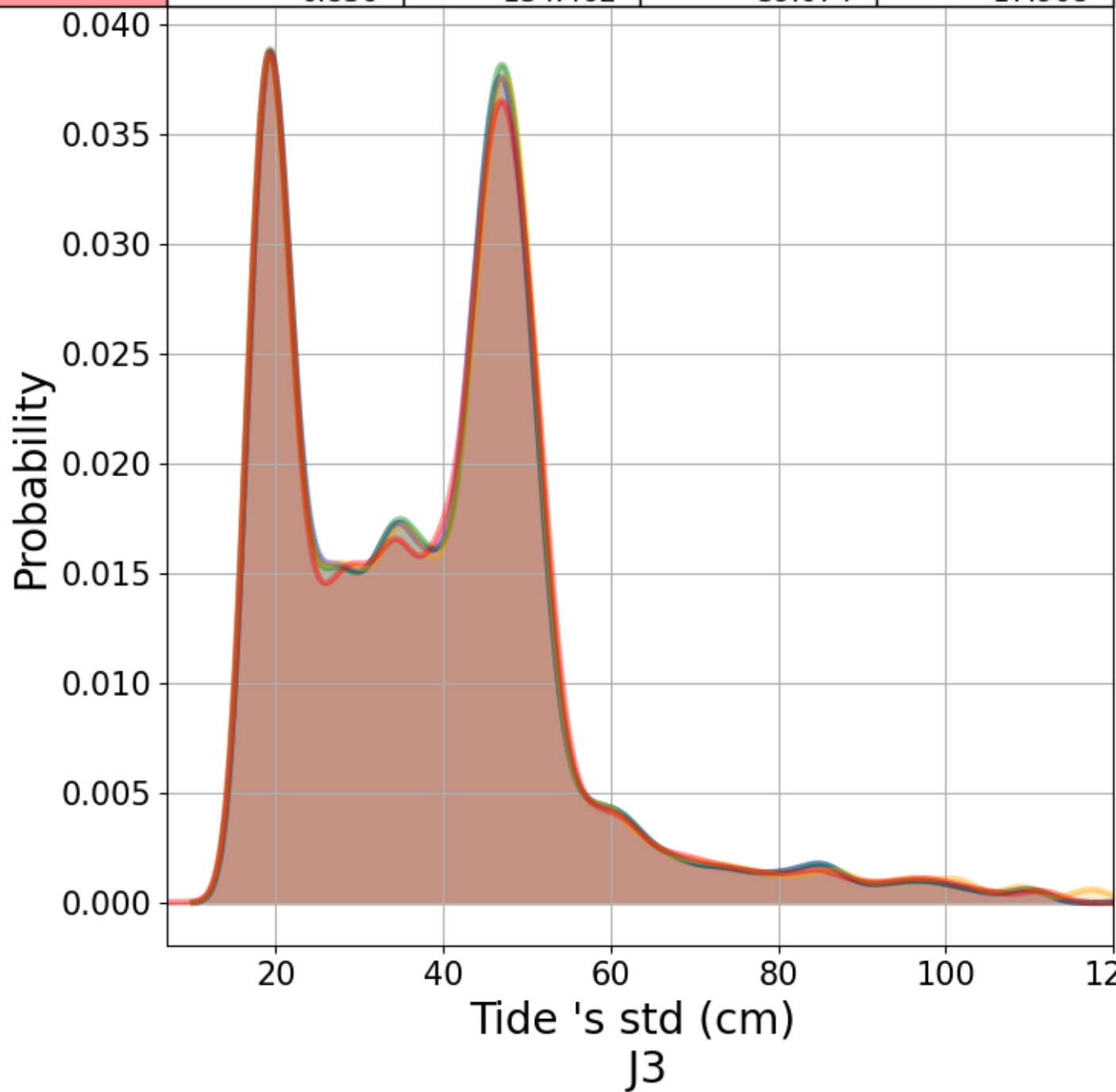


FIGURE 63 – Histograms of the standard deviation of each Tide version

4.2 sla

5 Along-track analysis

5.1 Tide

5.1.1 Tide 's count

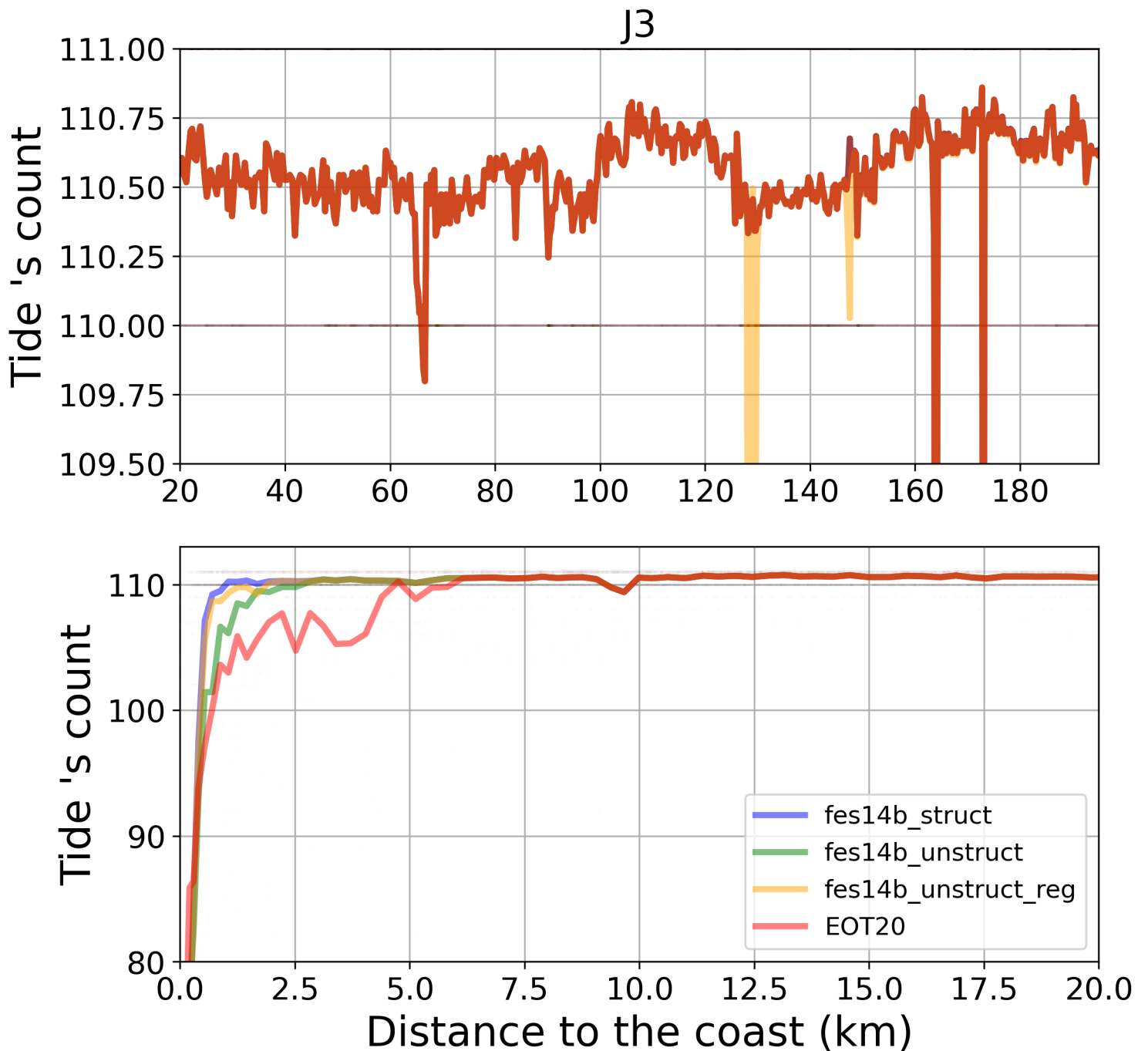


FIGURE 64 – Along-track analysis of Tide 's count

J3

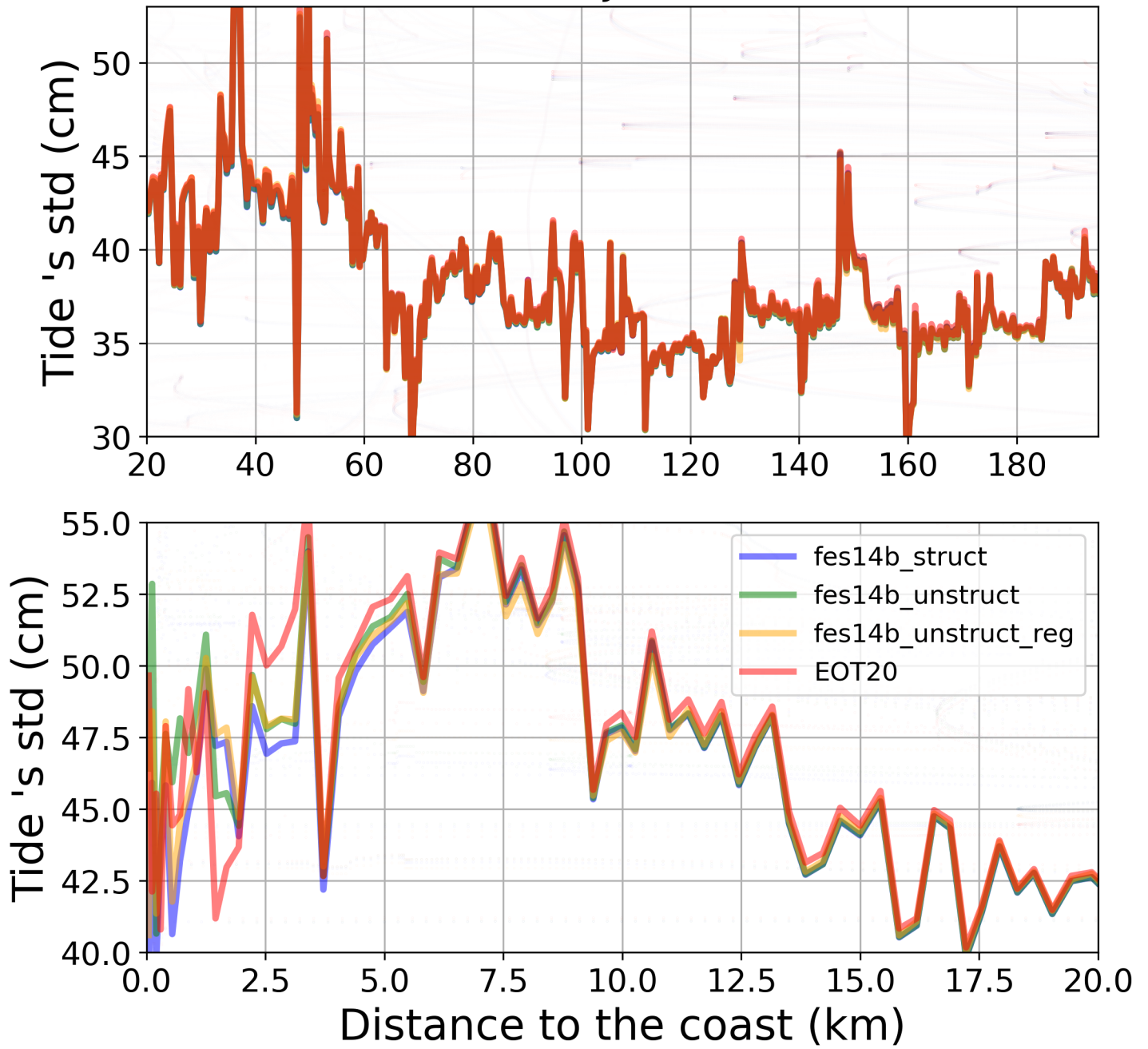


FIGURE 65 – Along-track analysis of Tide 's std

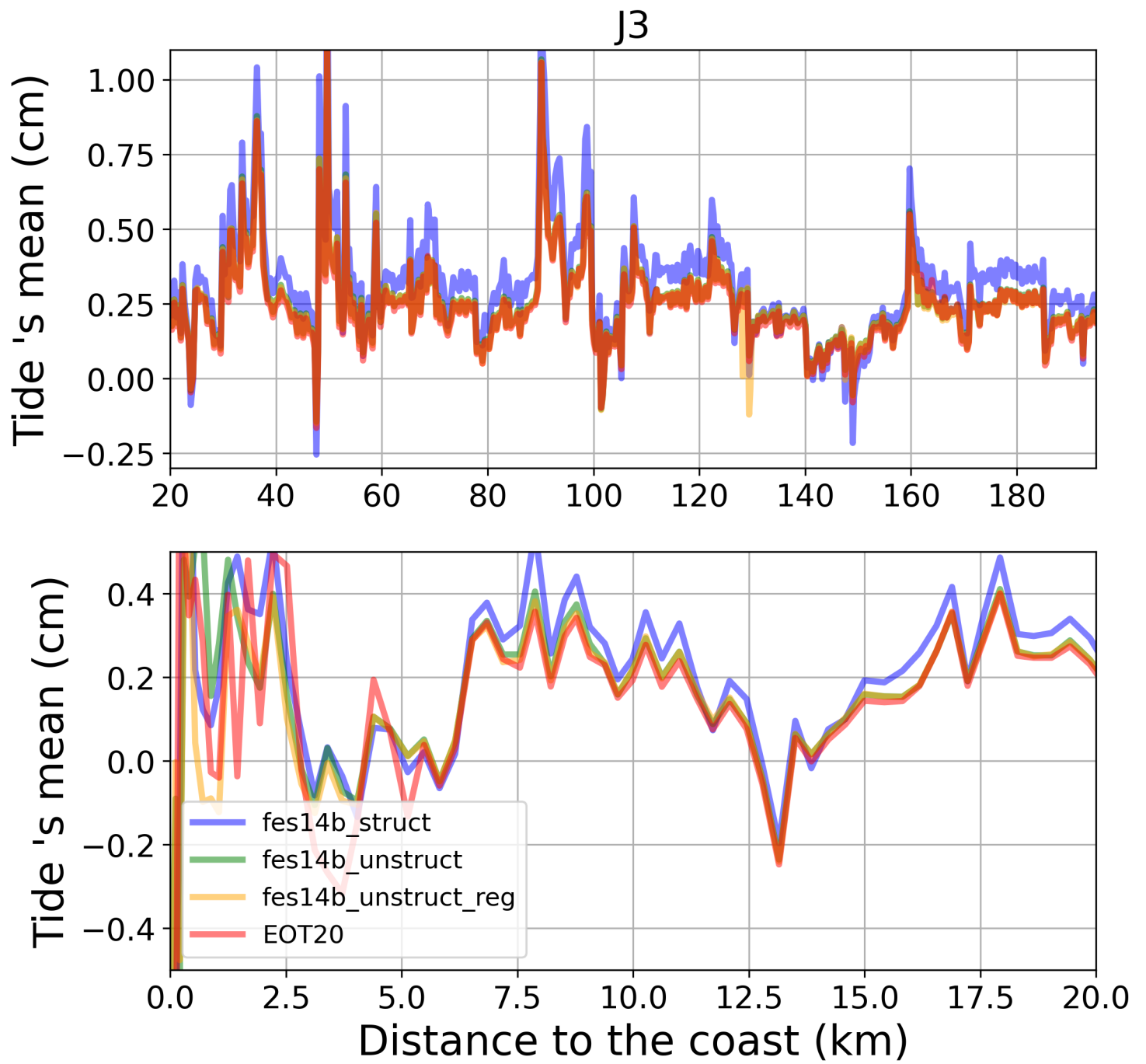


FIGURE 66 – Along-track analysis of Tide 's mean

5.2 sla

5.2.1 sla 's count

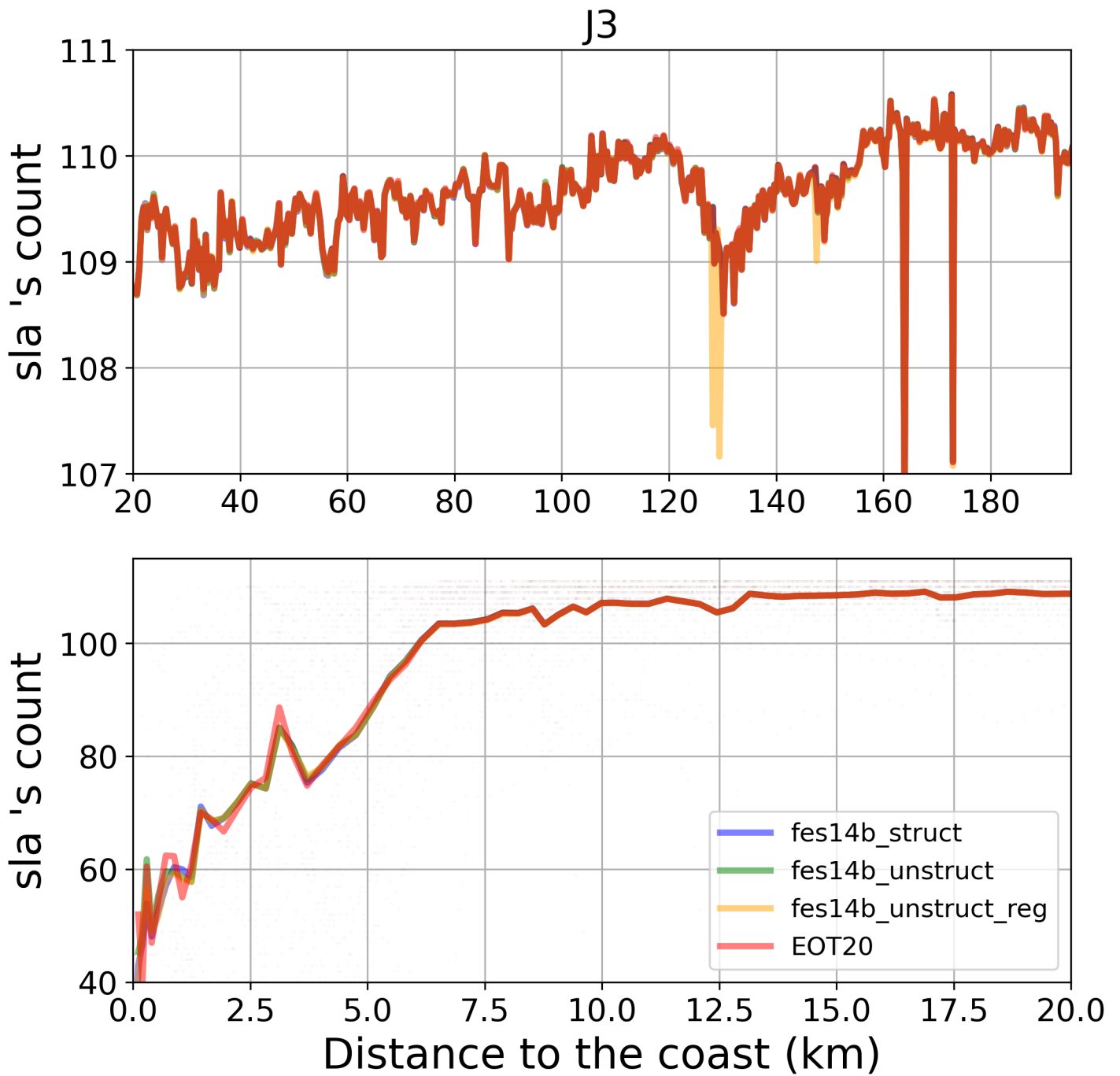


FIGURE 67 – Along-track analysis of sla 's count

J3

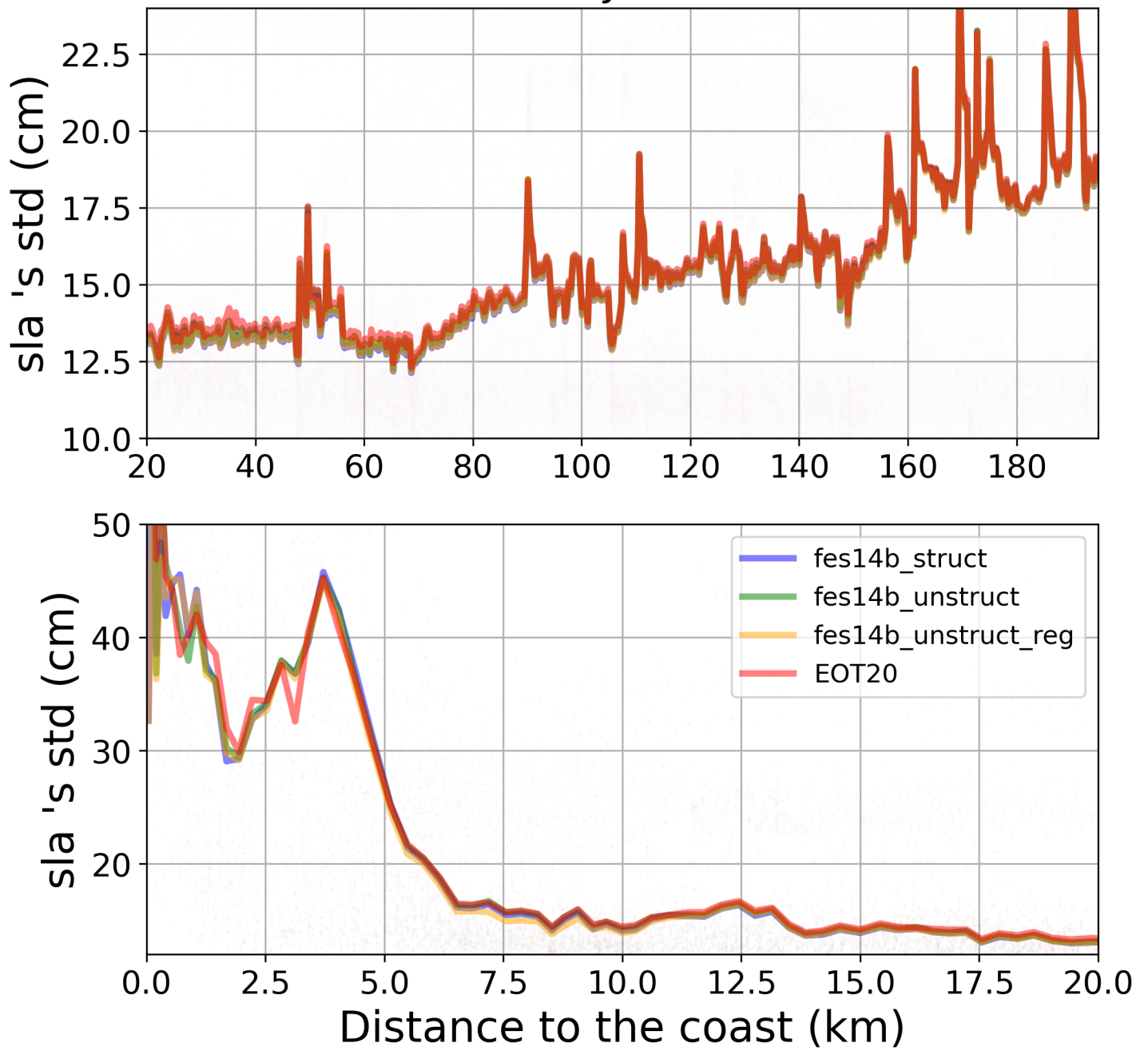


FIGURE 68 – Along-track analysis of sla 's std

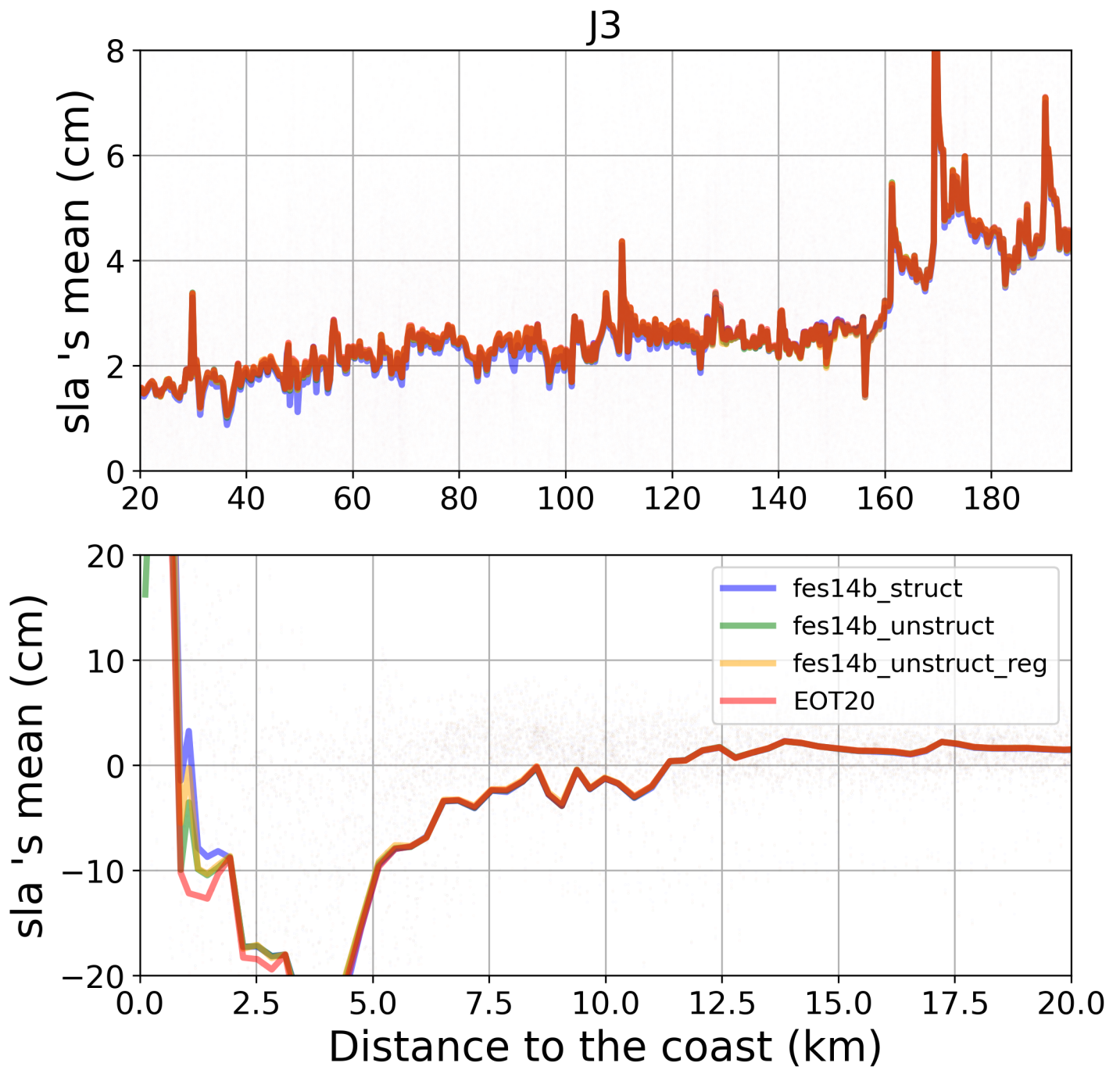


FIGURE 69 – Along-track analysis of sla 's mean

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 Radius of 40 Km
 - Maximum distance to the coast : 20 Km

6.1.1 correlation visualization in maps view % Lorne_Jetty tide gauge

Correlation Altimetry data with respect to Lorne_Jetty Tide gauge data

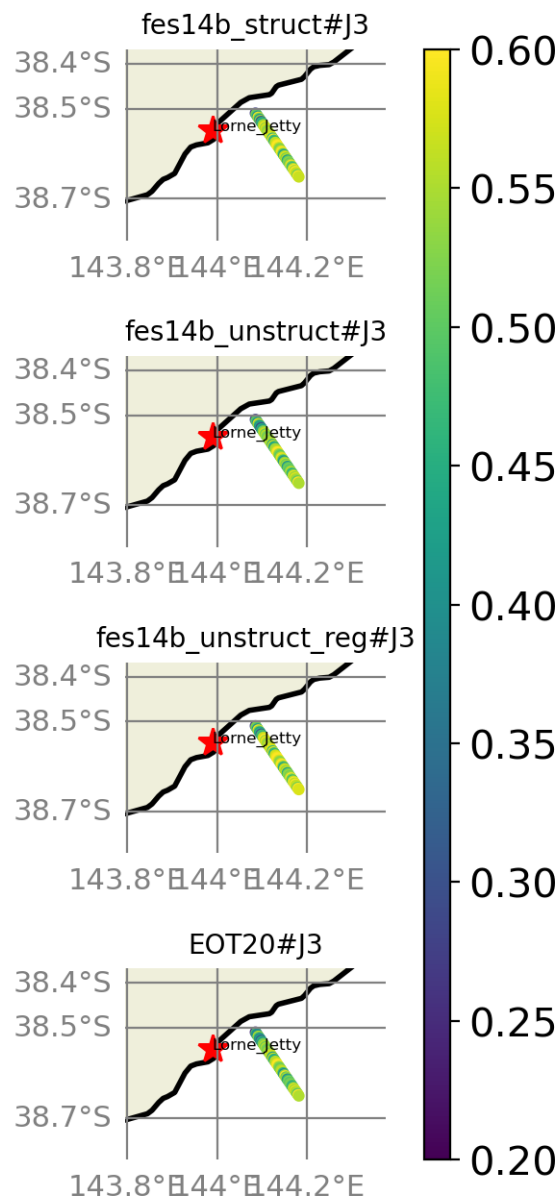


FIGURE 70 – correlation visualization in maps view % Lorne_Jetty tide gauge

6.1.2 rmsd visualization in maps view % Lorne_Jetty tide gauge

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

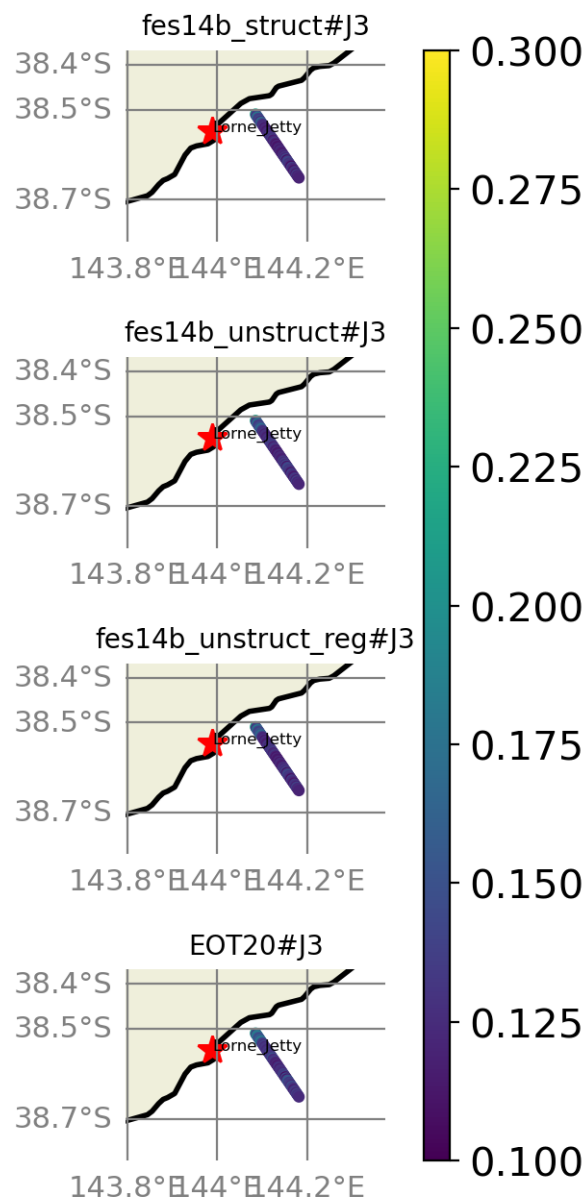


FIGURE 71 – rmsd visualization in maps view % Lorne_Jetty tide gauge

6.1.3 std visualization in maps view % Lorne_Jetty tide gauge

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

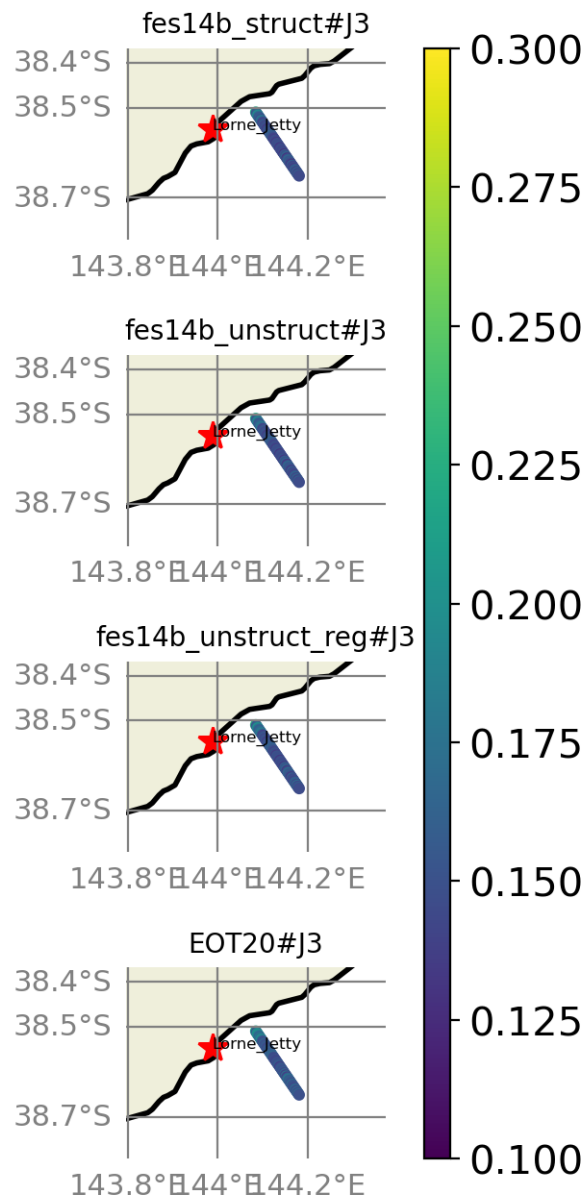


FIGURE 72 – std visualization in maps view % Lorne_Jetty tide gauge

6.1.4 valid_data_percent visualization in maps view % Lorne_Jetty tide gauge

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

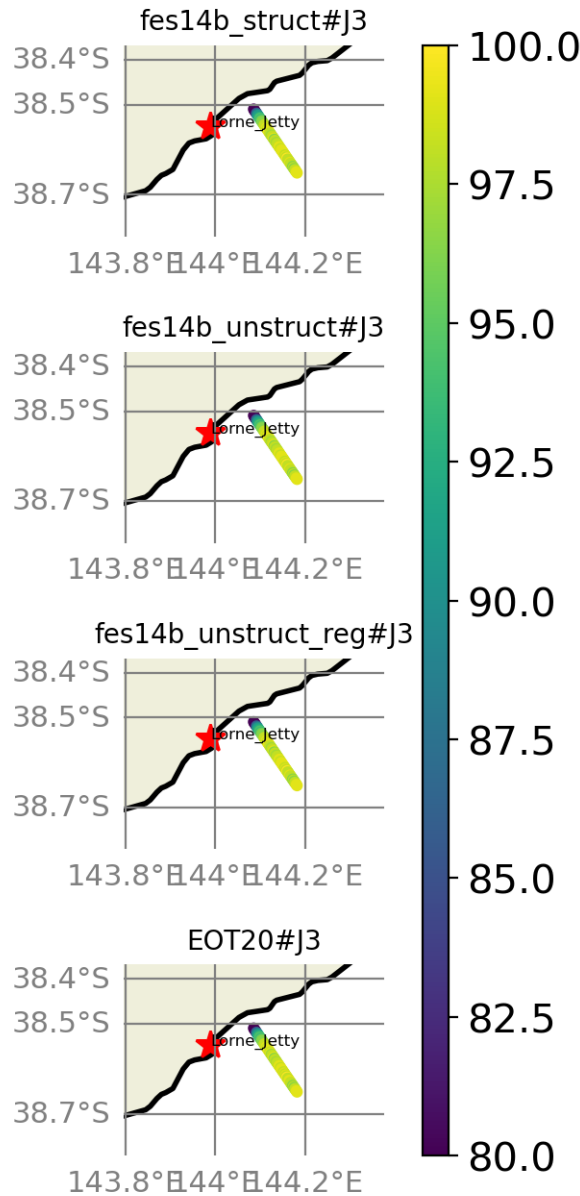


FIGURE 73 – valid_data_percent visualization in maps view % Lorne_Jetty tide gauge

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 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. $maxNB = 109$ 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.

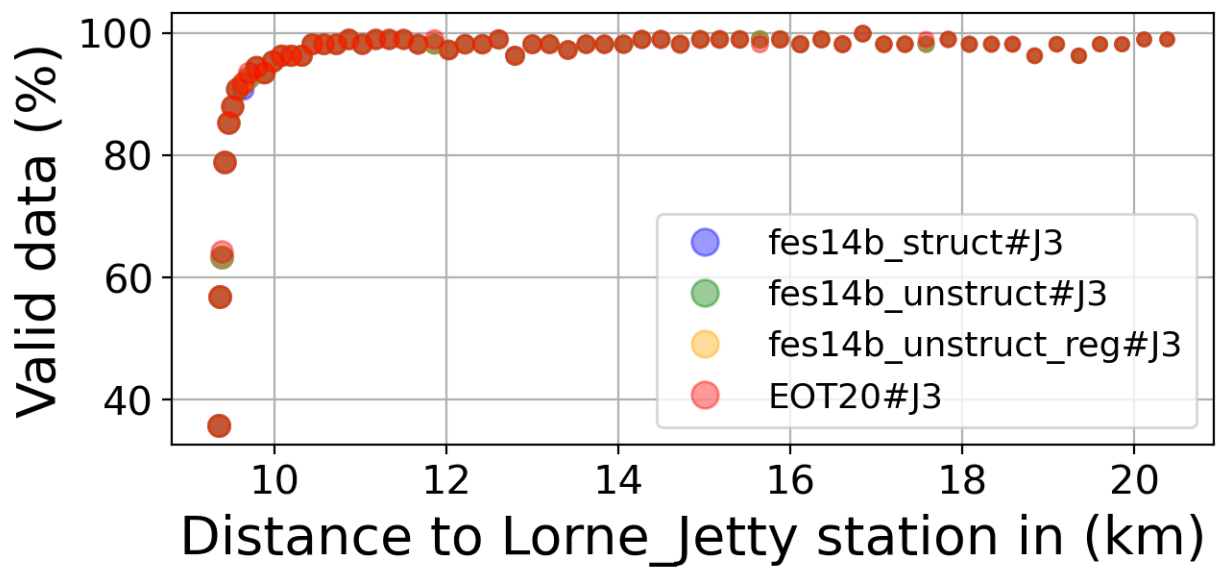
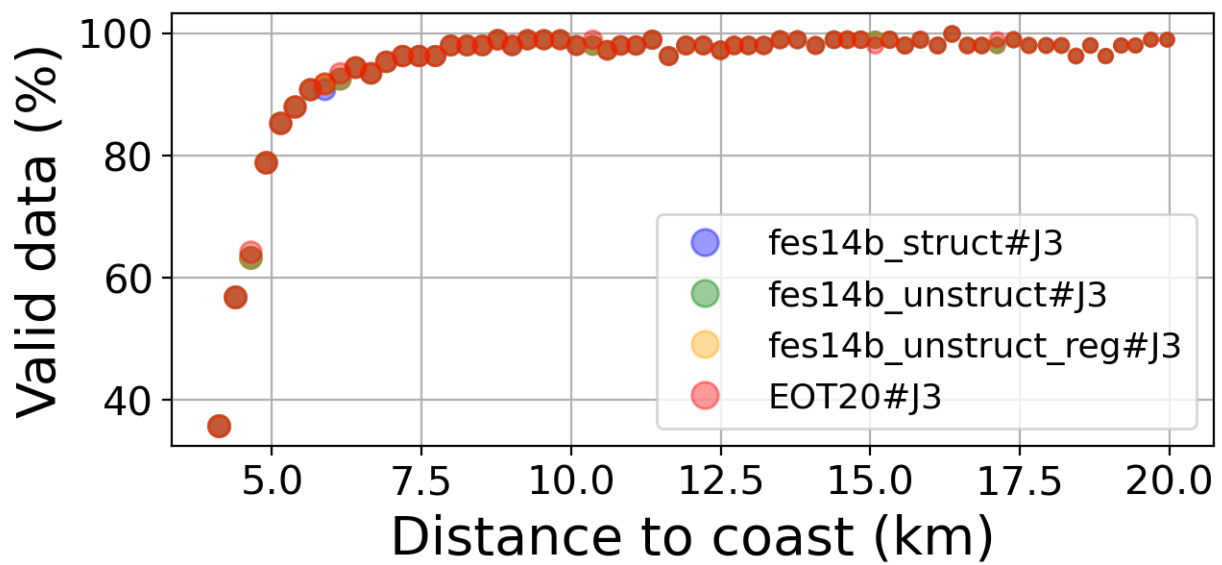


FIGURE 74 – Valid data (%) in function of distance to coast/Lorne_Jetty station

6.1.6 Std in function of distance to coast/Lorne_Jetty station

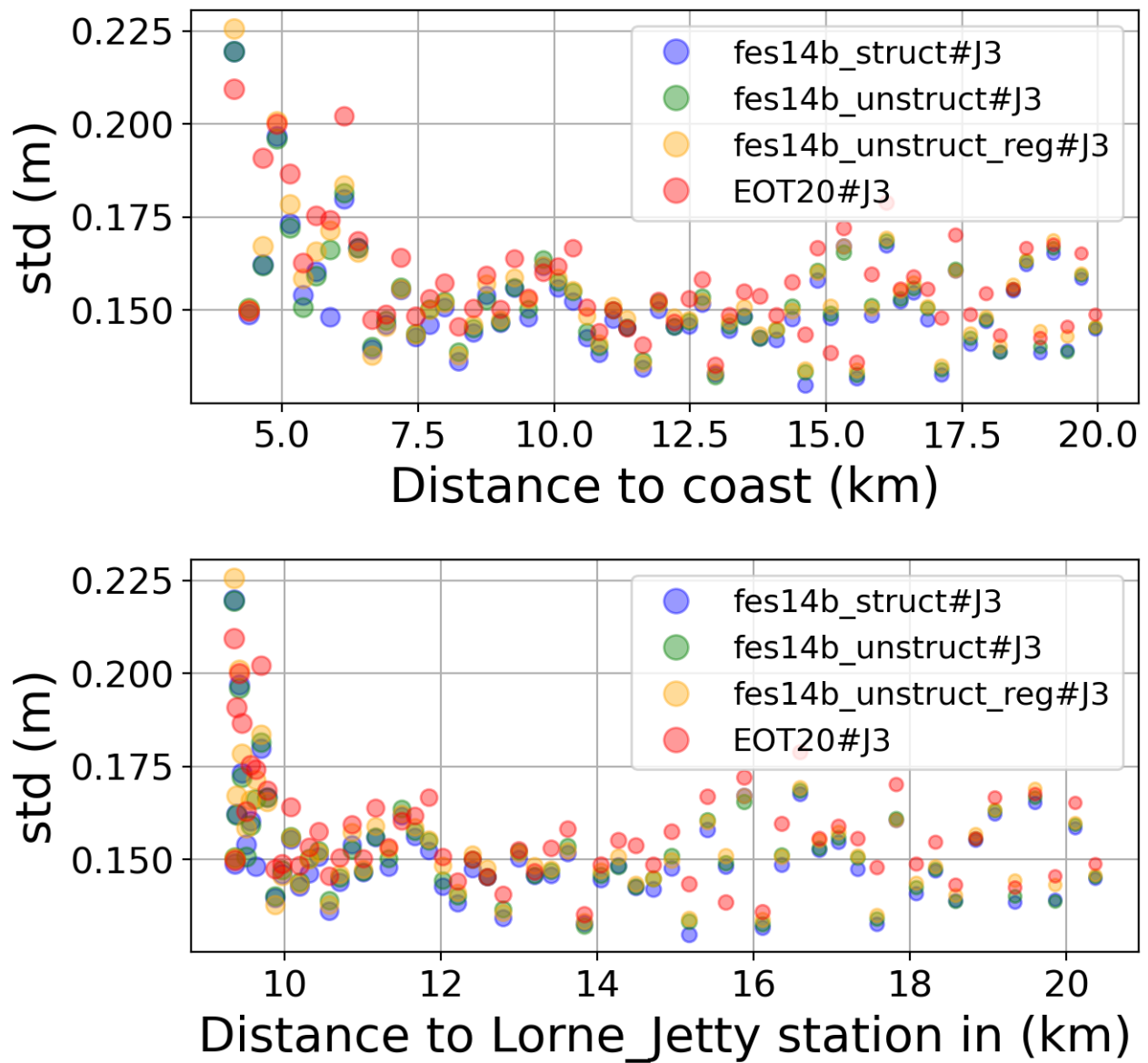


FIGURE 75 – Std in function of the distance to the coast/Lorne_Jetty station

6.1.7 Correlation in function of distance to coast/Lorne_Jetty station

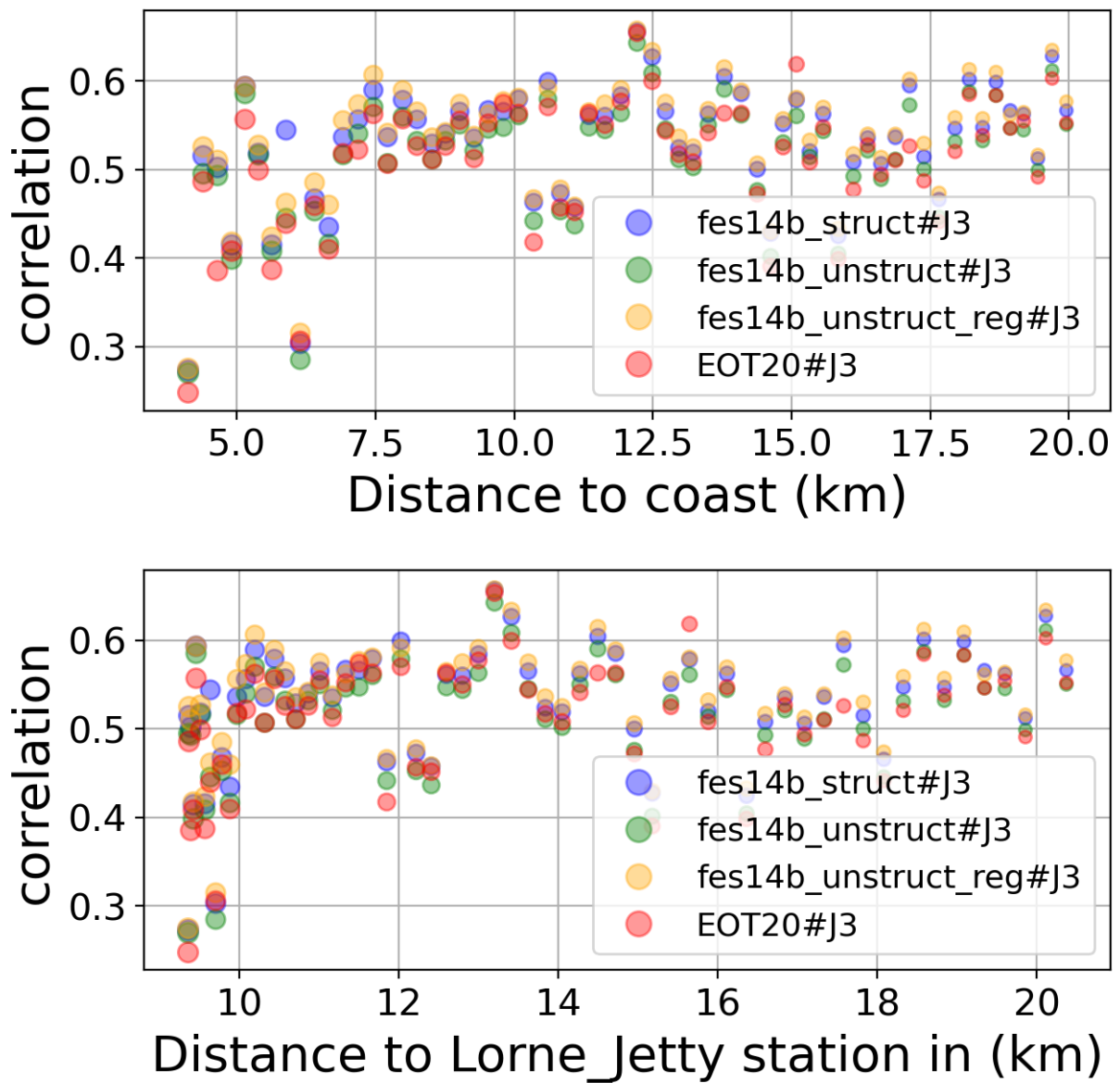


FIGURE 76 – Correlation in function of the distance to the coast/Lorne_Jetty station

6.1.8 Taylor Diagram

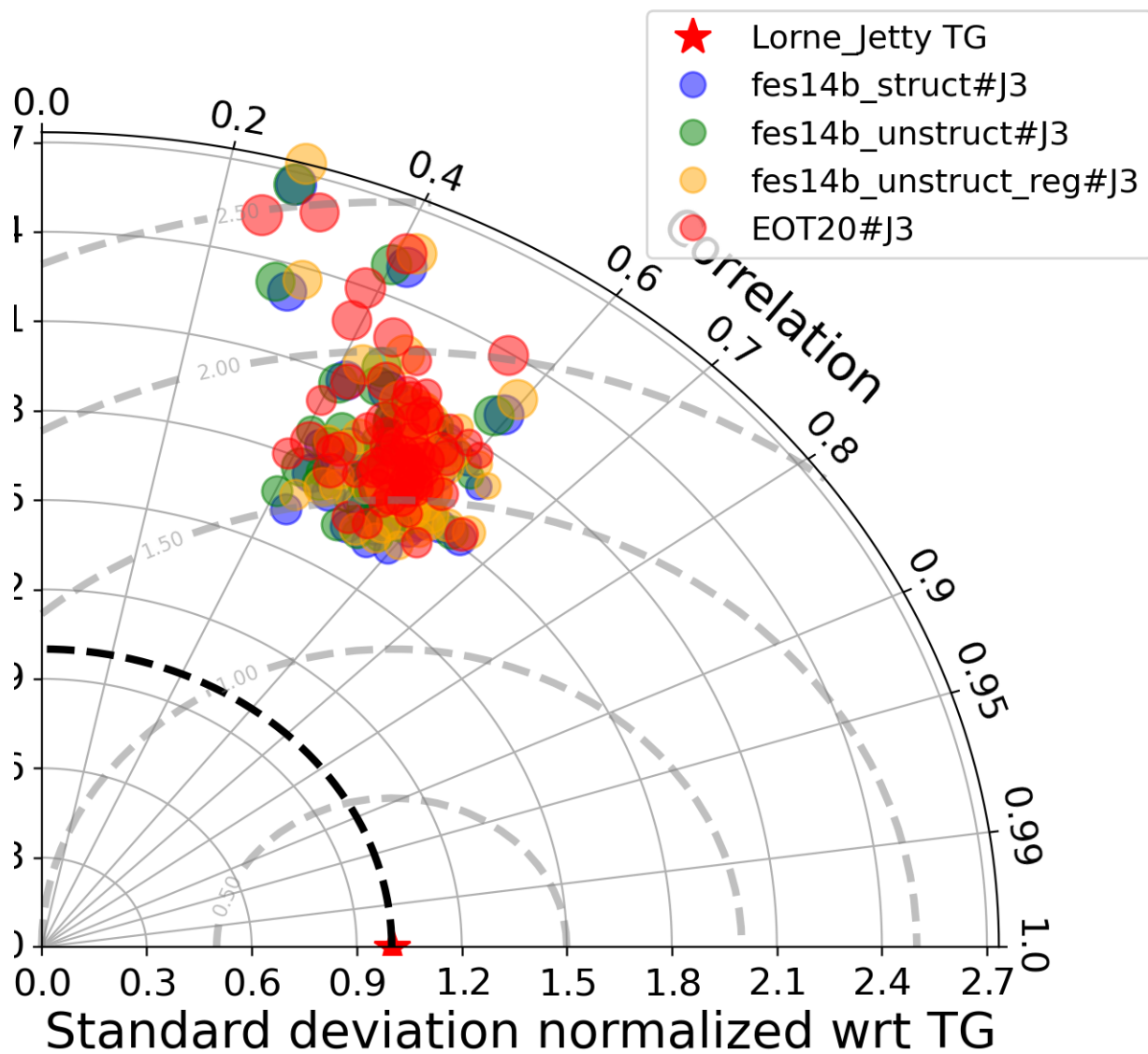


FIGURE 77 – Taylor diagram

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)
fes14b_struct#j3	94.806	0.531	0.152	0.129
fes14b_unstruct#j3	94.821	0.513	0.153	0.131
fes14b_unstruct_reg#j3	94.821	0.537	0.154	0.13
EOT20#j3	94.865	0.509	0.158	0.136

FIGURE 78 – 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.

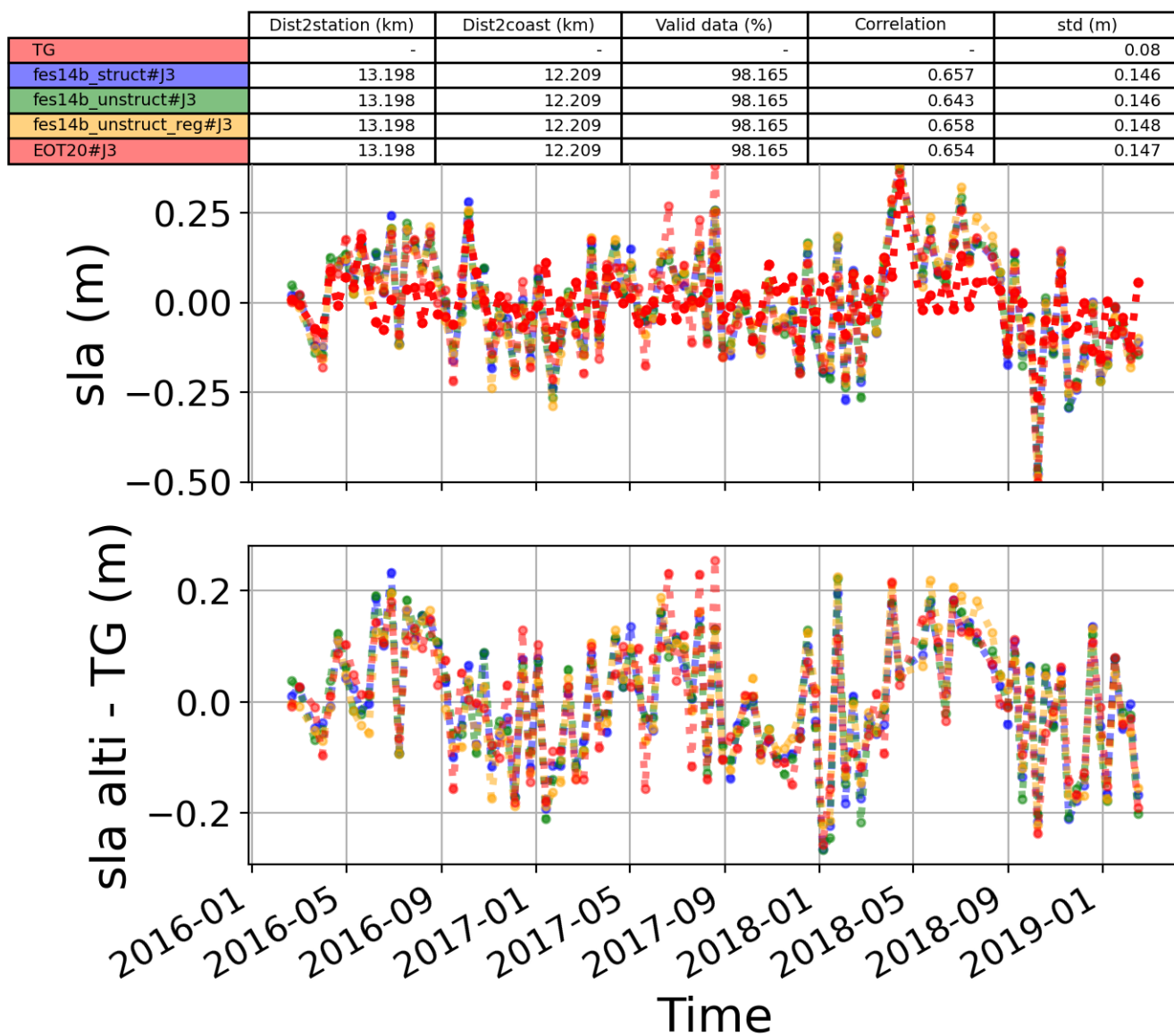


FIGURE 79 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

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

Correlation Altimetry data with respect to Bundaberg Tide gauge data

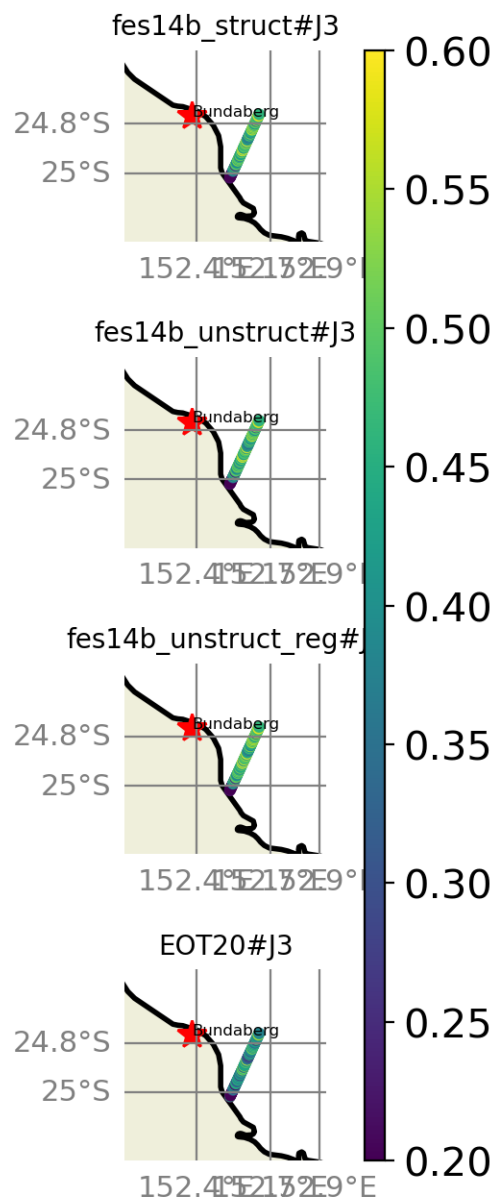


FIGURE 80 – correlation visualization in maps view % Bundaberg tide gauge

6.2.2 rmsd visualization in maps view % Bundaberg tide gauge

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

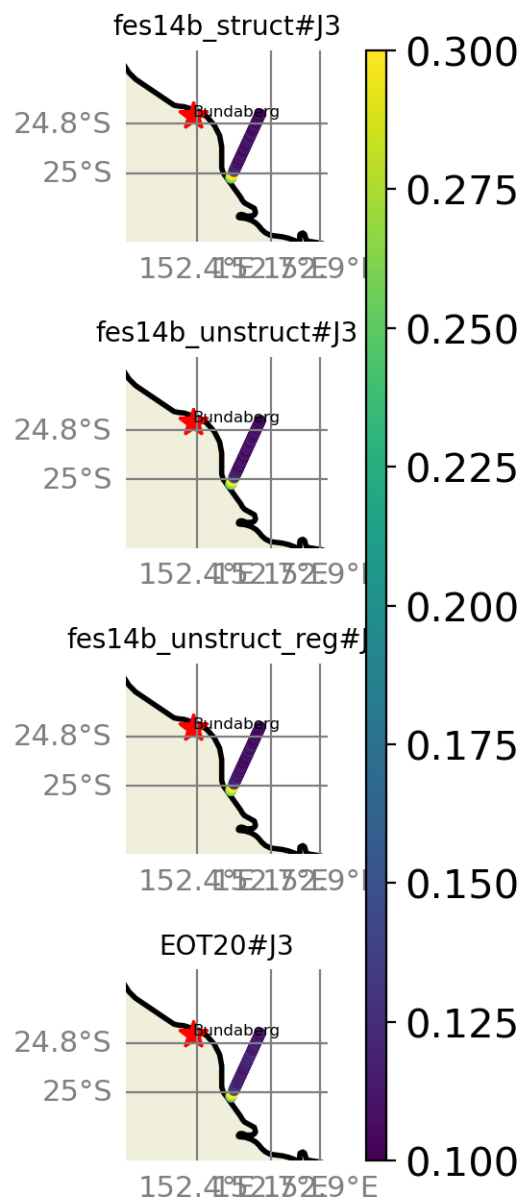


FIGURE 81 – rmsd visualization in maps view % Bundaberg tide gauge

6.2.3 std visualization in maps view % Bundaberg tide gauge

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

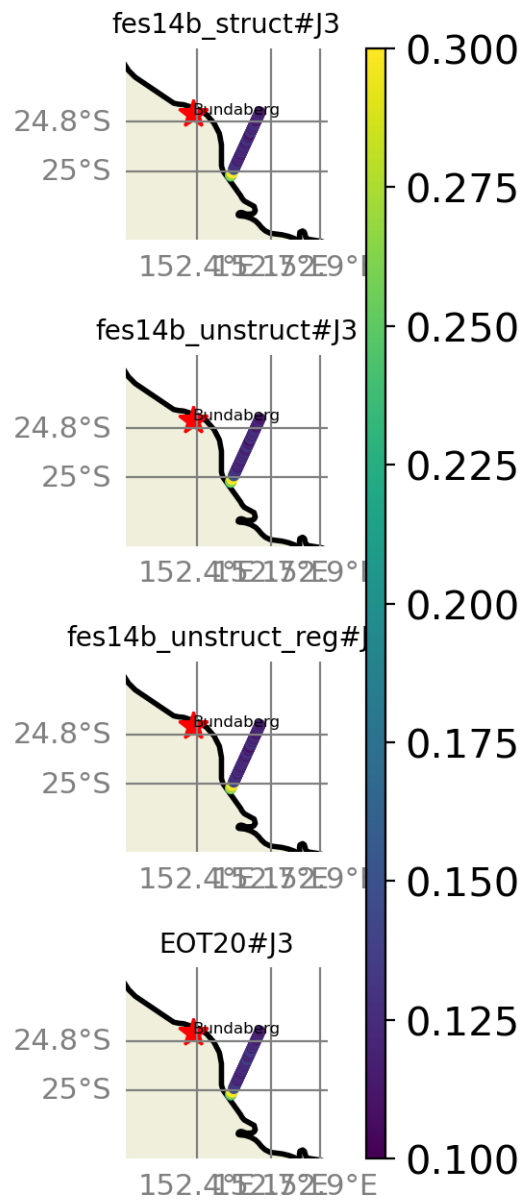


FIGURE 82 – std visualization in maps view % Bundaberg tide gauge

6.2.4 valid_data_percent visualization in maps view % Bundaberg tide gauge

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

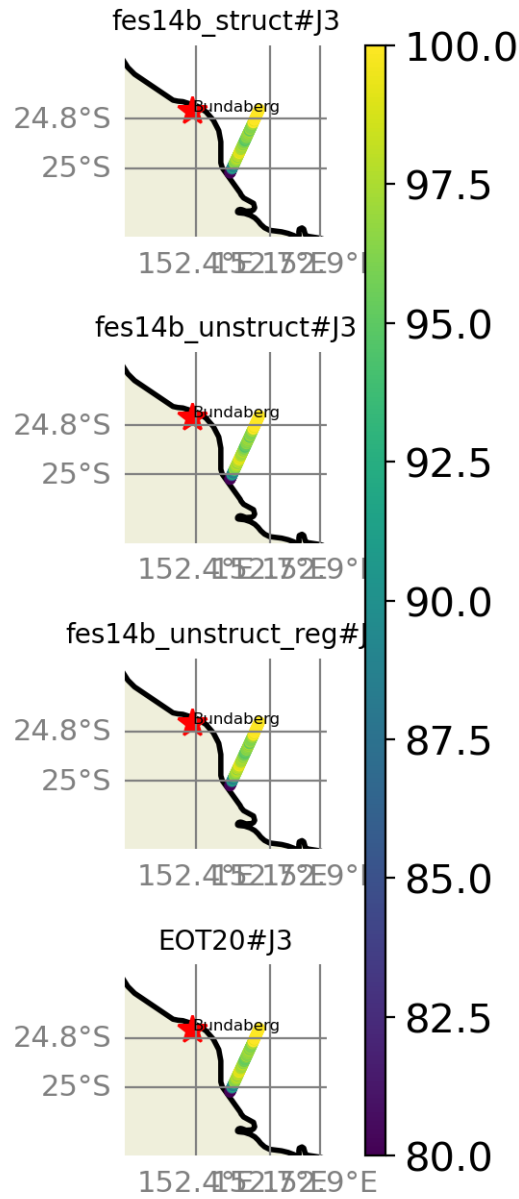


FIGURE 83 – valid_data_percent visualization in maps view % Bundaberg tide gauge

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. $maxNB = 105$ 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.

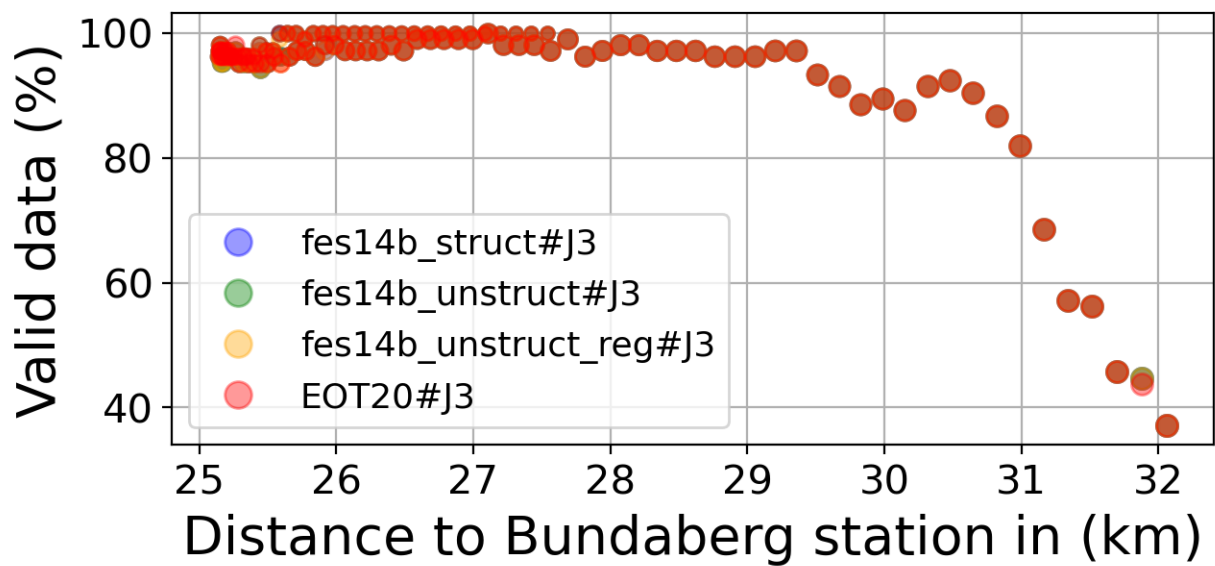
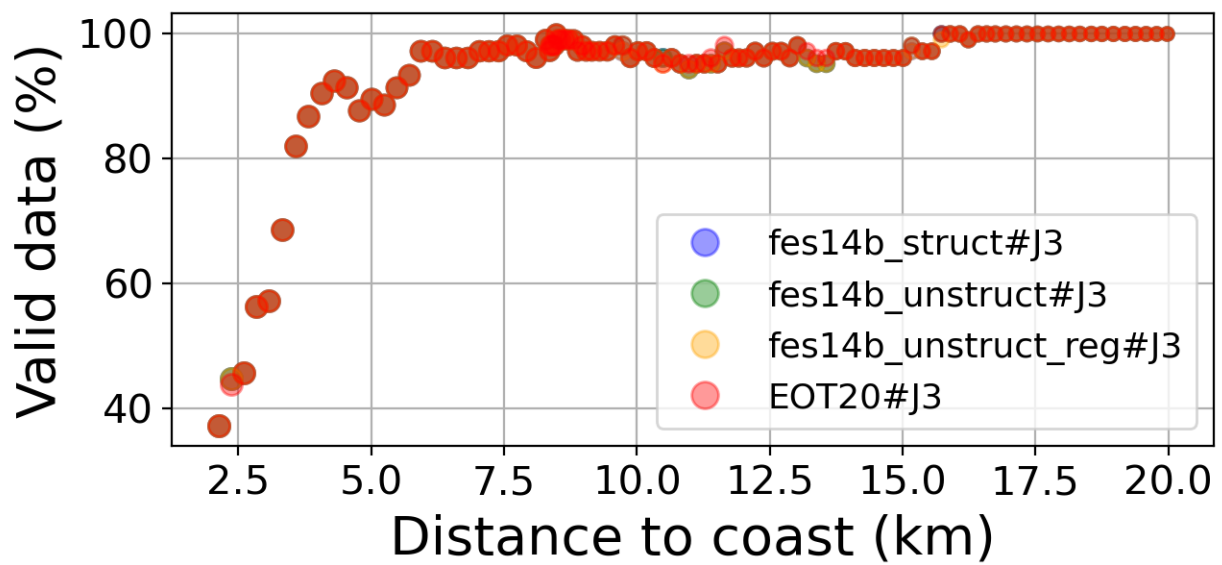


FIGURE 84 – Valid data (%) in function of distance to coast/Bundaberg station

6.2.6 Std in function of distance to coast/Bundaberg station

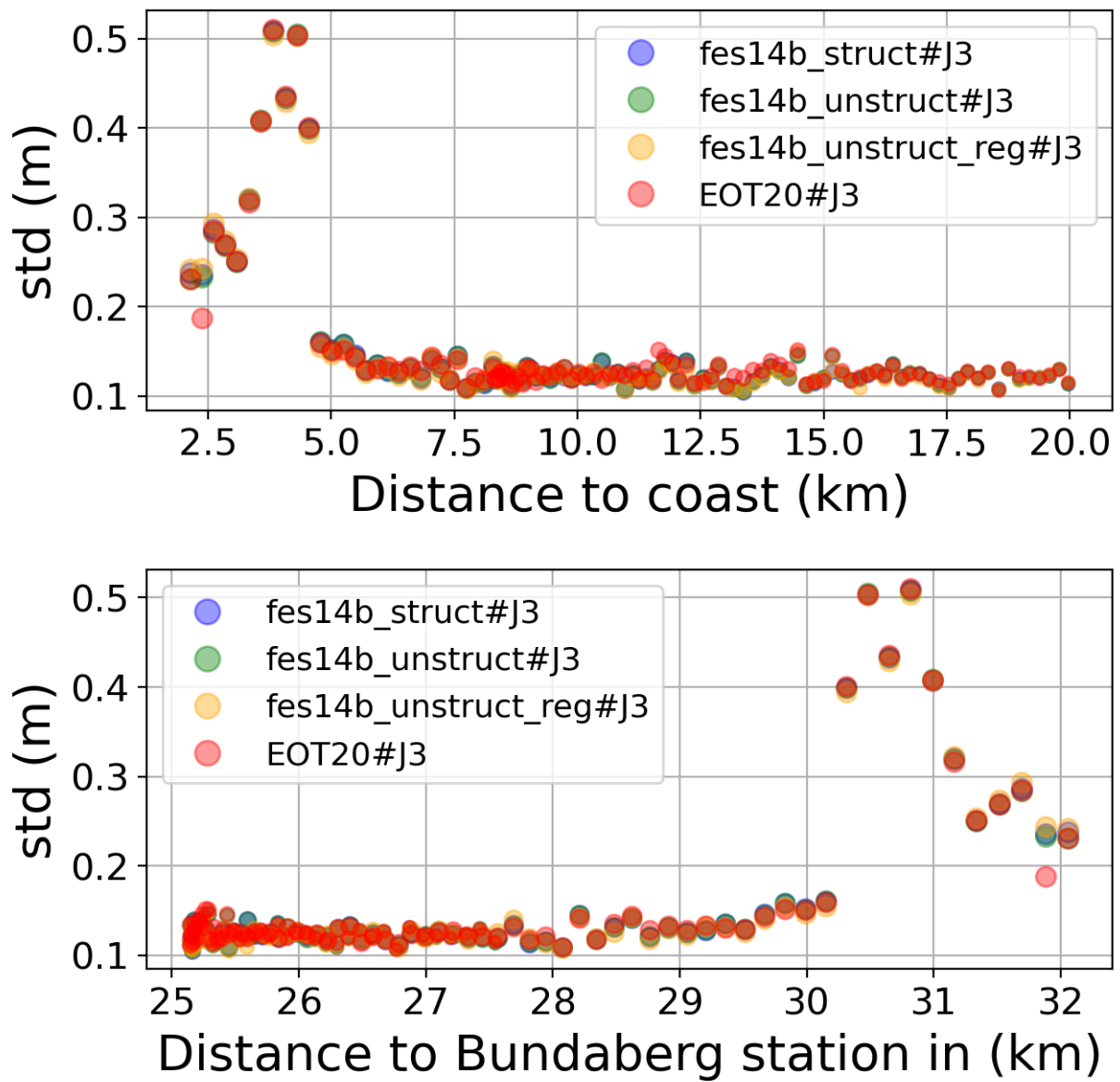


FIGURE 85 – Std in function of the distance to the coast/Bundaberg station

6.2.7 Correlation in function of distance to coast/Bundaberg station

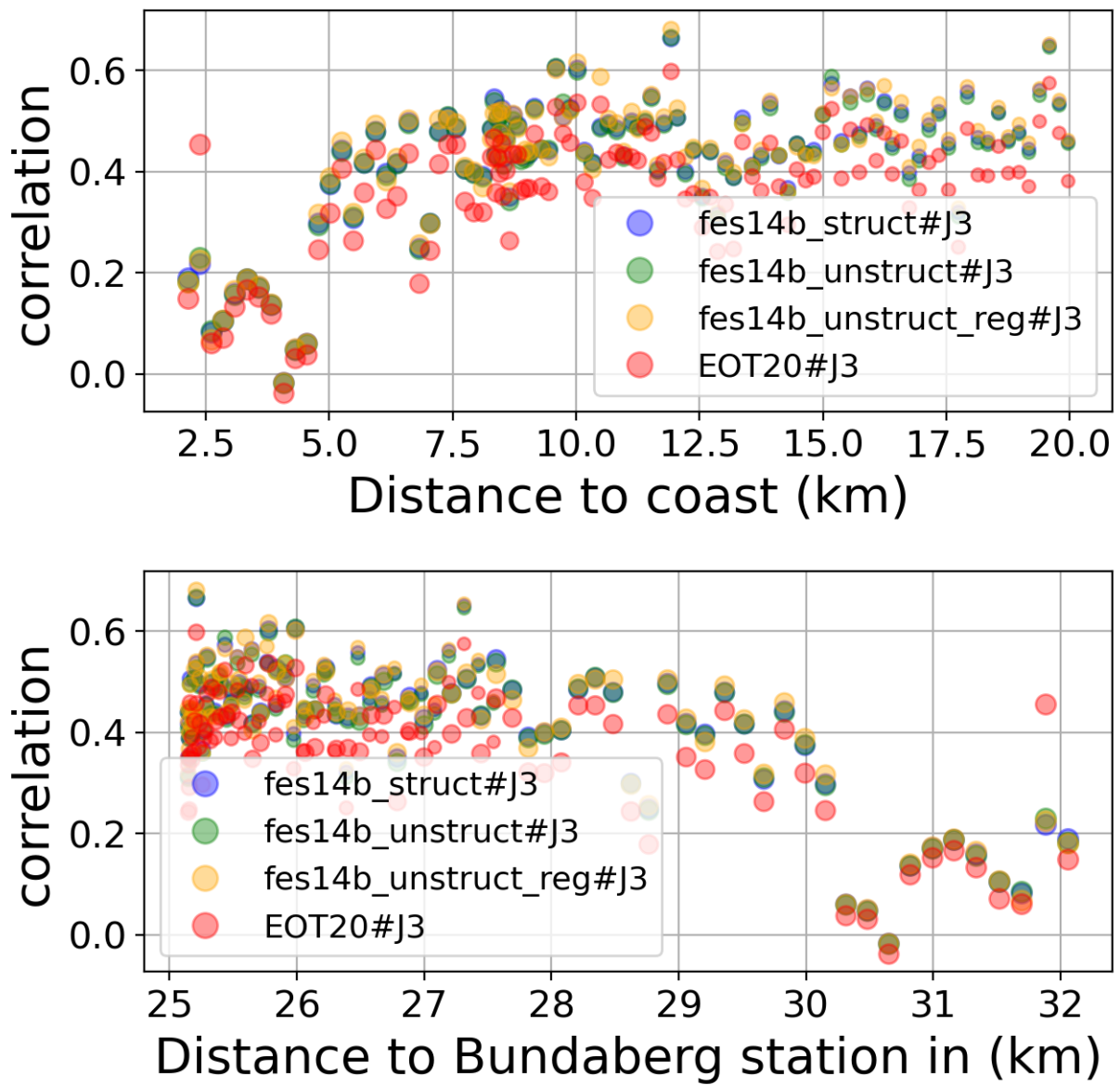


FIGURE 86 – Correlation in function of the distance to the coast/Bundaberg station

6.2.8 Taylor Diagram

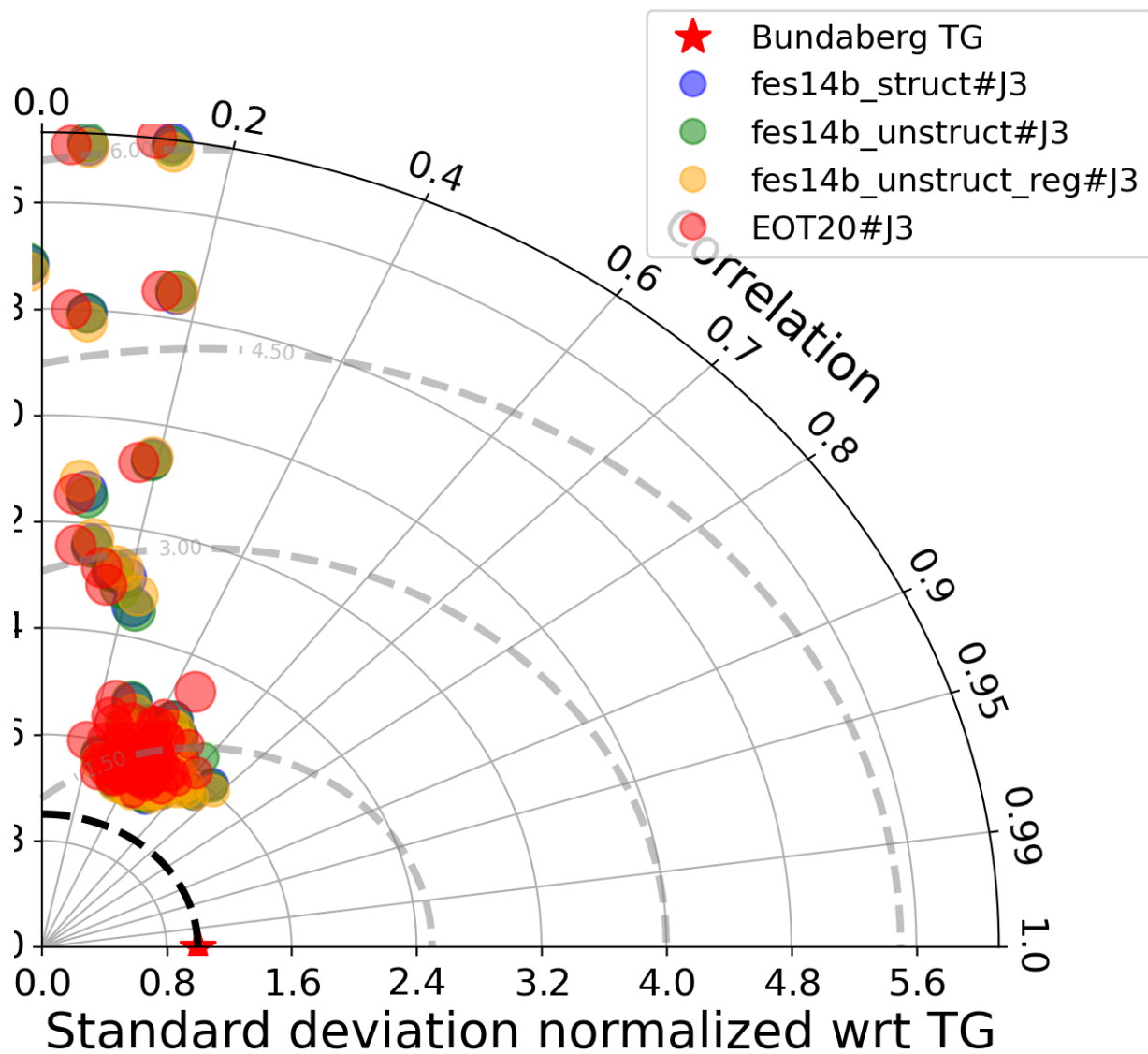


FIGURE 87 – Taylor diagram

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)
fes14b_struct#j3	94.313	0.429	0.148	0.138
fes14b_unstruct#j3	94.331	0.425	0.148	0.138
fes14b_unstruct_reg#j3	94.295	0.433	0.147	0.137
EOT20#j3	94.367	0.372	0.149	0.144

FIGURE 88 – 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 105 point.

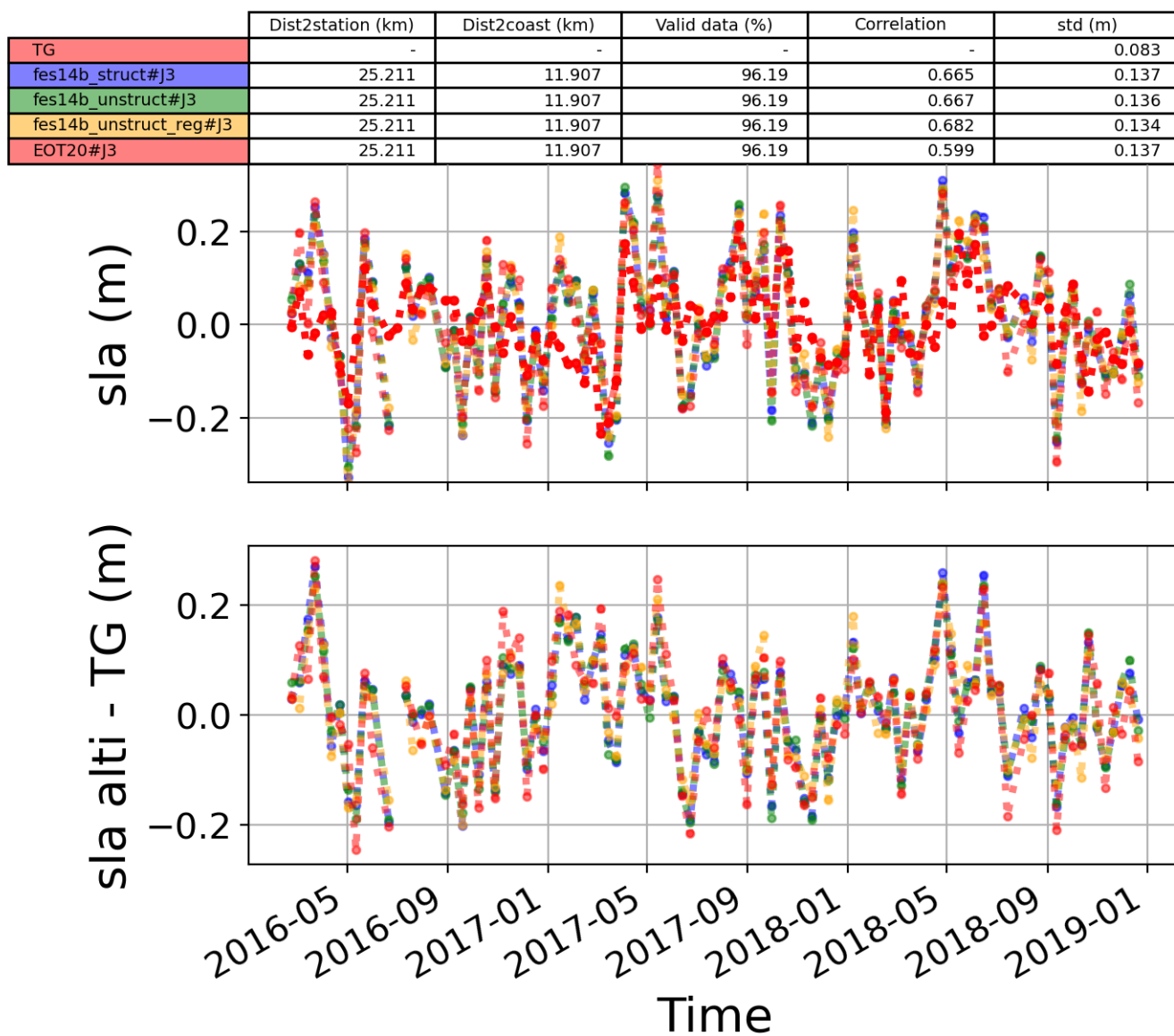


FIGURE 89 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

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

Correlation Altimetry data with respect to Thursday_Island Tide gauge data

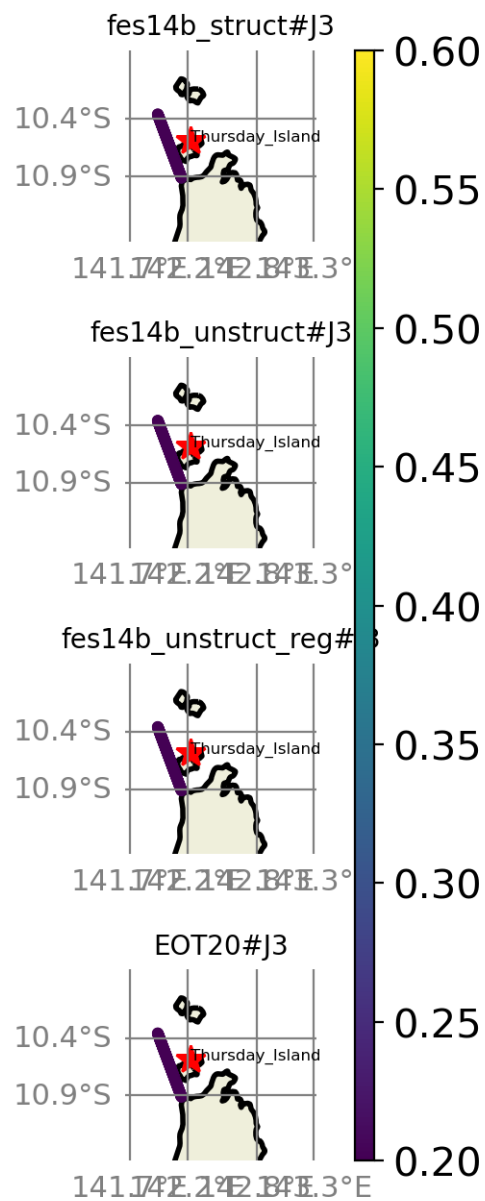


FIGURE 90 – correlation visualization in maps view % Thursday_Island tide gauge

6.3.2 rmsd visualization in maps view % Thursday_Island tide gauge

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

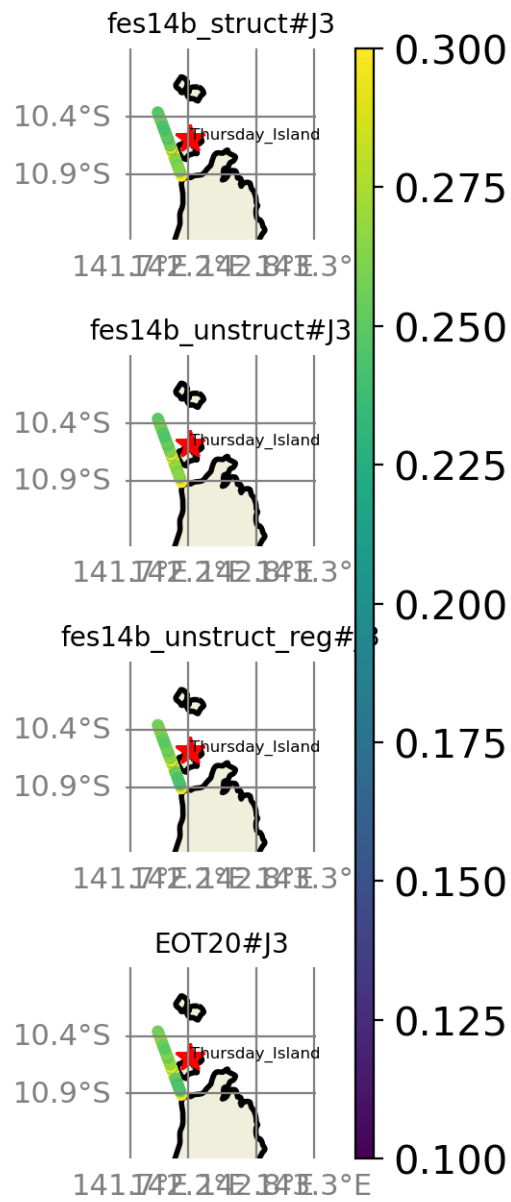


FIGURE 91 – rmsd visualization in maps view % Thursday_Island tide gauge

6.3.3 std visualization in maps view % Thursday_Island tide gauge

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

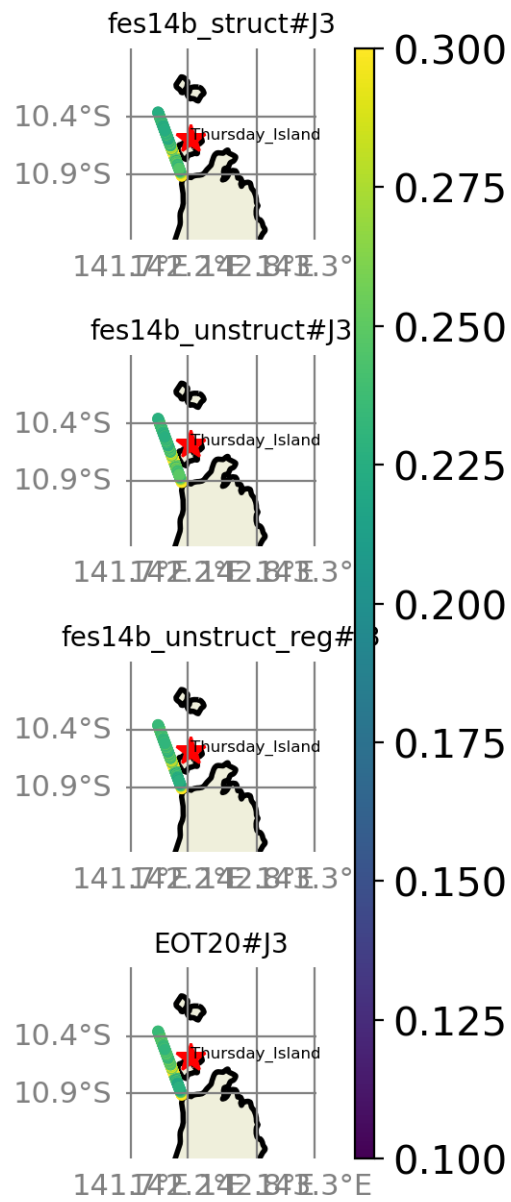


FIGURE 92 – std visualization in maps view % Thursday_Island tide gauge

6.3.4 valid_data_percent visualization in maps view % Thursday_Island tide gauge

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

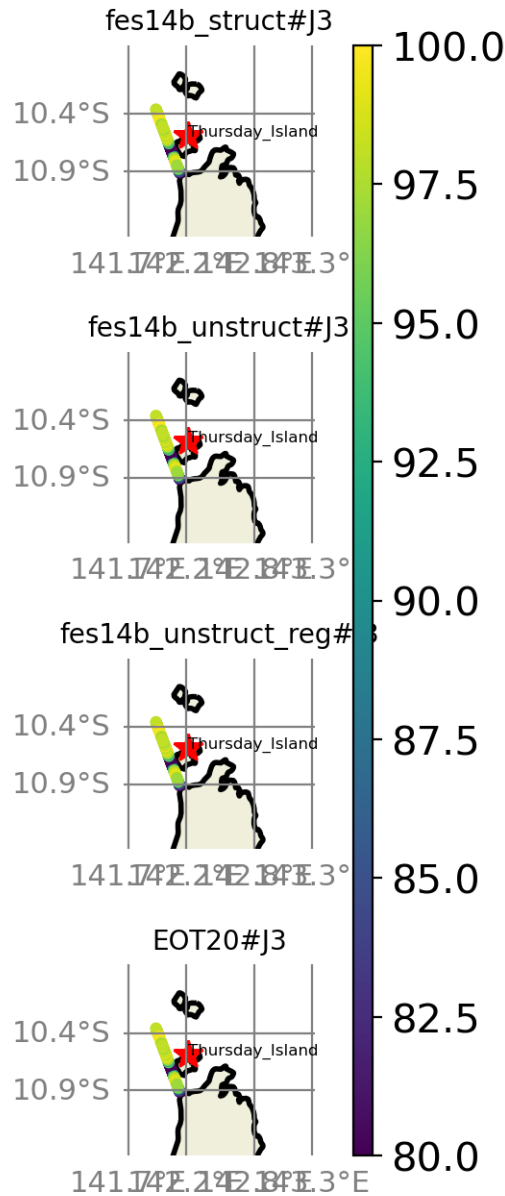


FIGURE 93 – valid_data_percent visualization in maps view % Thursday_Island tide gauge

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

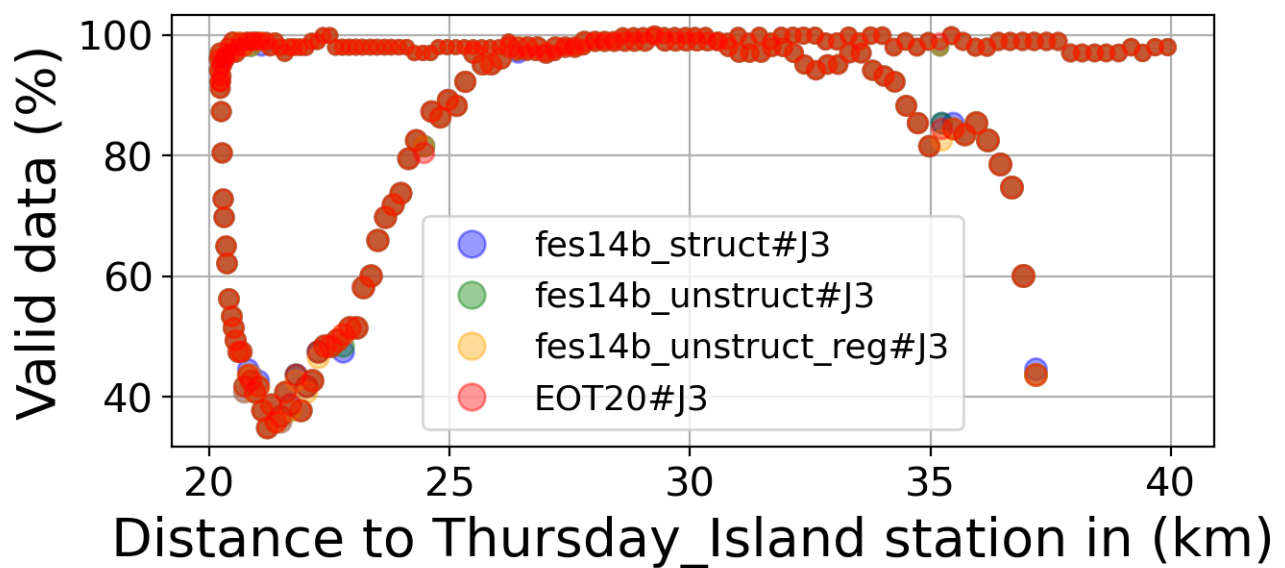
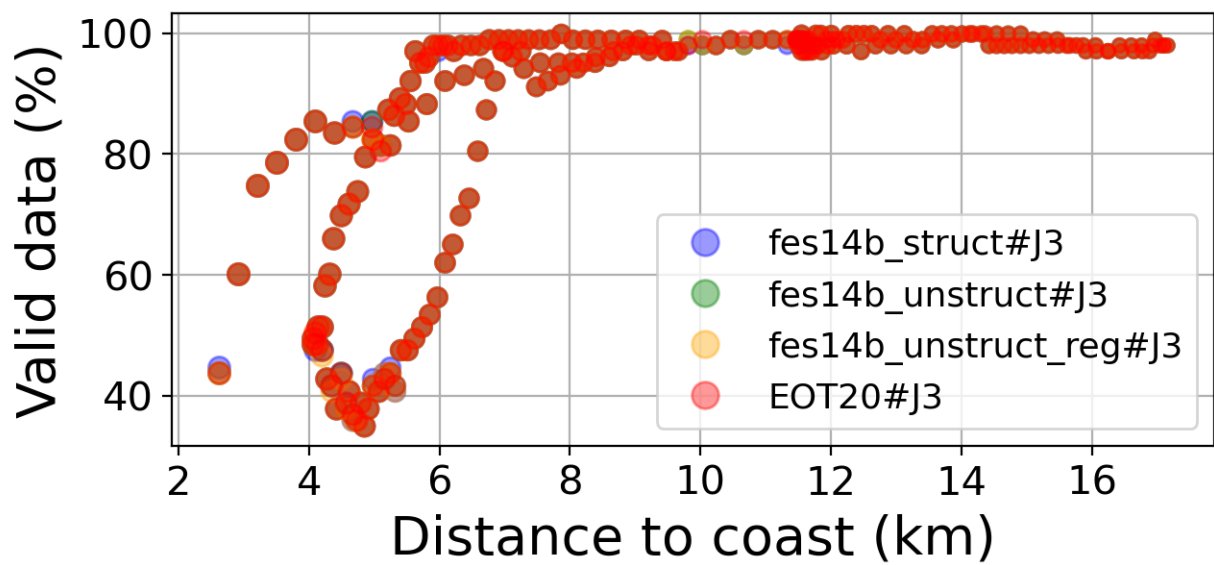


FIGURE 94 – Valid data (%) in function of distance to coast/Thursday_Island station

6.3.6 Std in function of distance to coast/Thursday_Island station

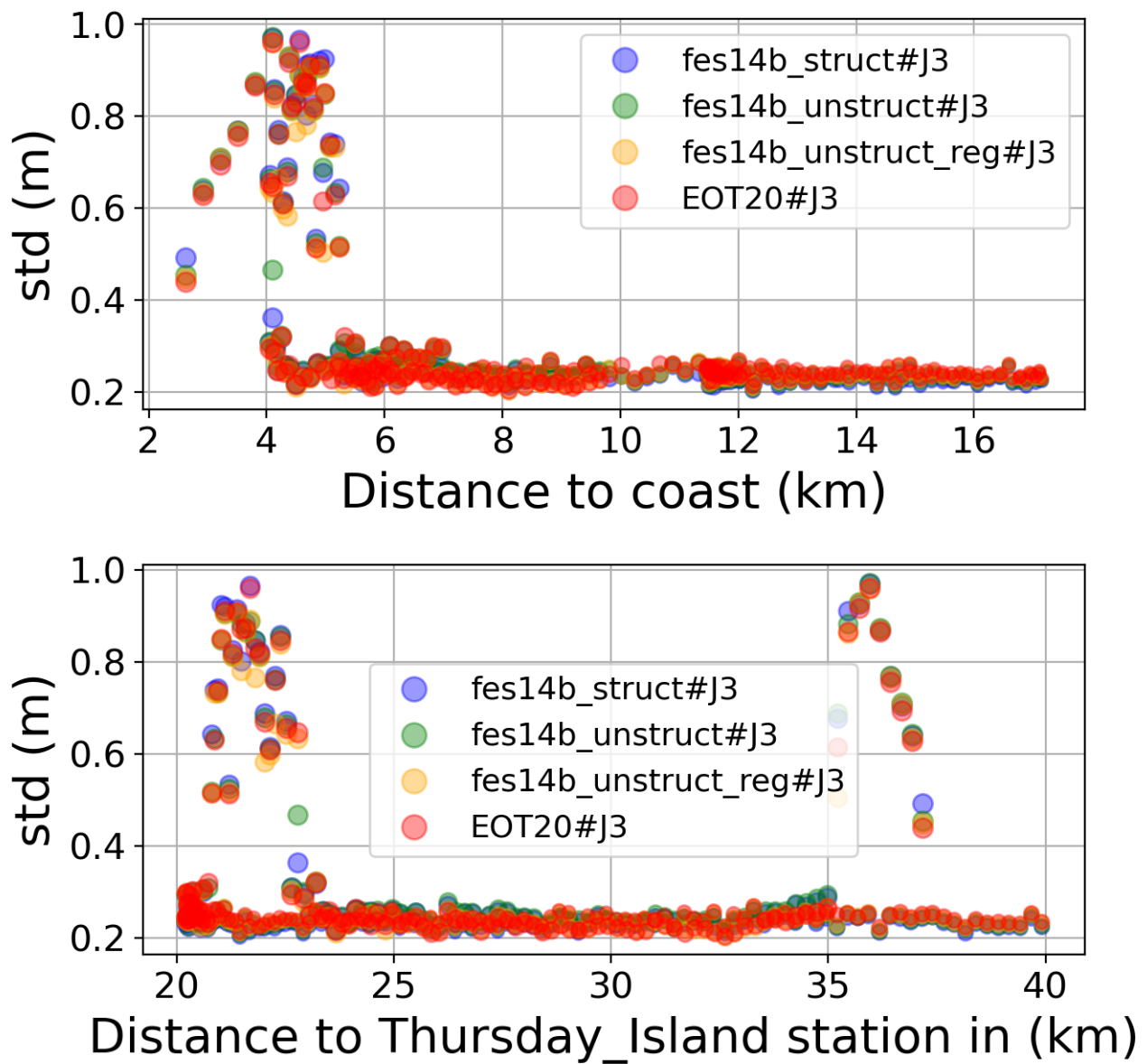


FIGURE 95 – Std in function of the distance to the coast/Thursday_Island station

6.3.7 Correlation in function of distance to coast/Thursday_Island station

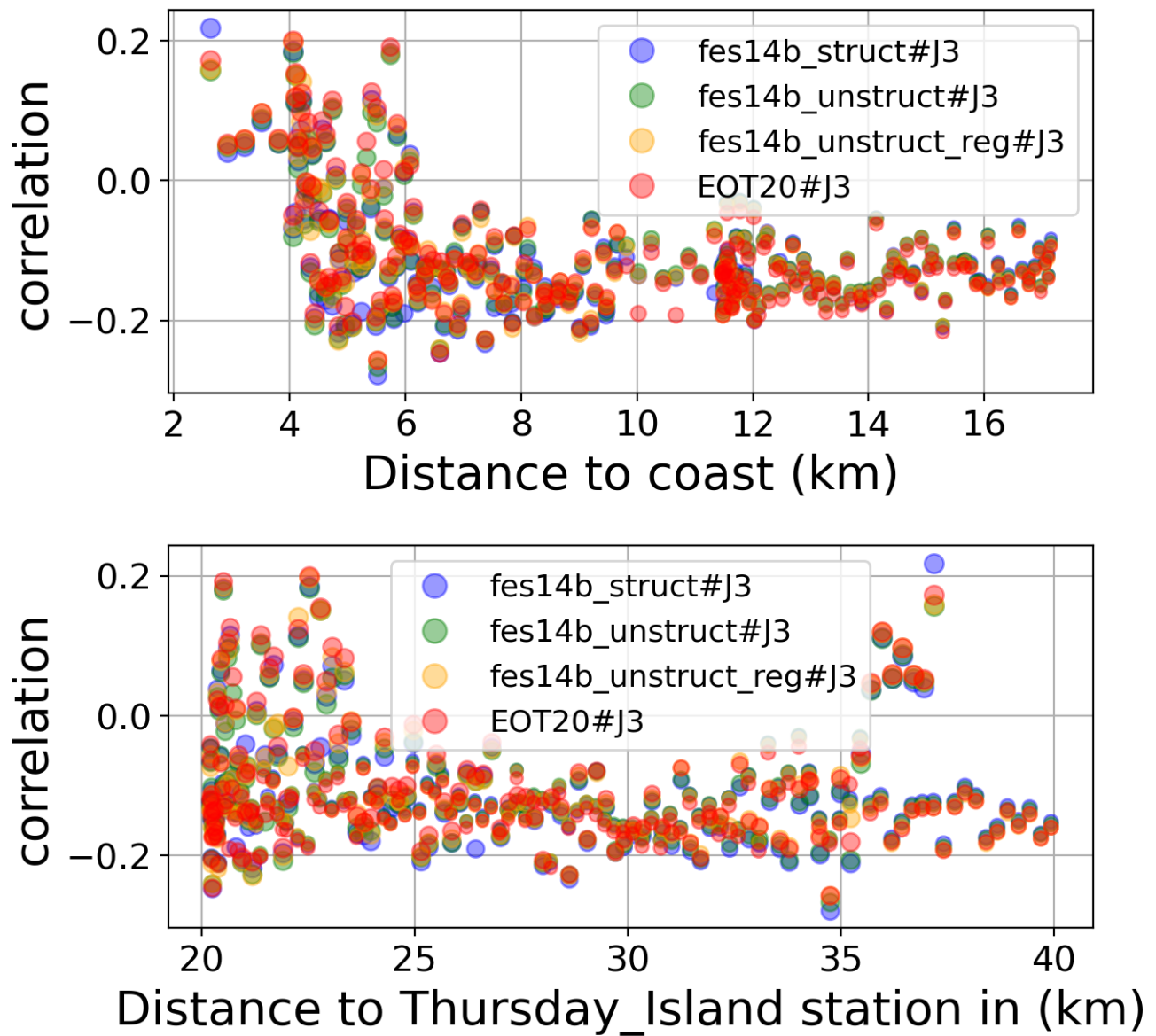


FIGURE 96 – Correlation in function of the distance to the coast/Thursday_Island station

6.3.8 Taylor Diagram

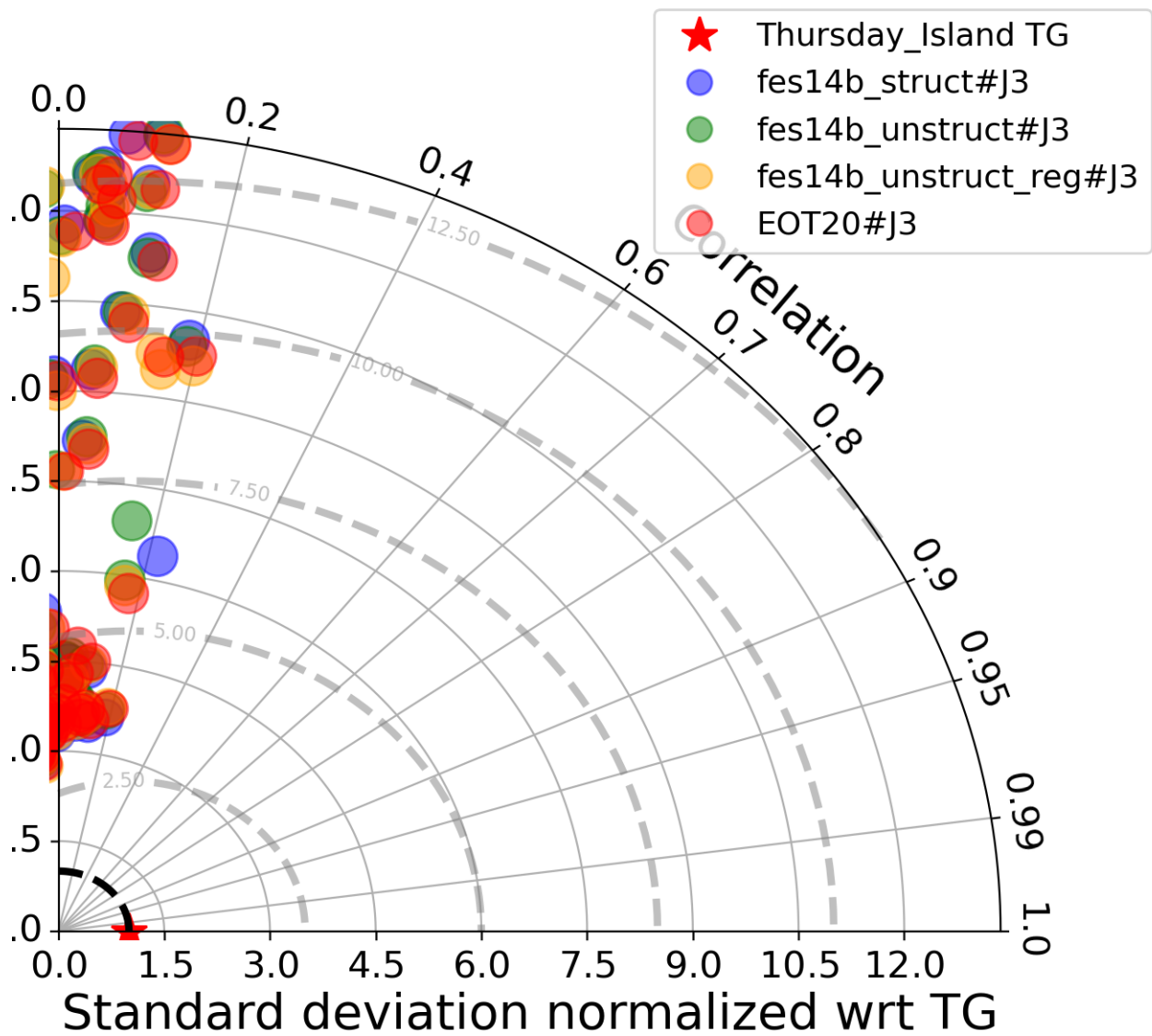


FIGURE 97 – Taylor diagram

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)
fes14b_struct#j3	87.984	-0.11	0.306	0.324
fes14b_unstruct#j3	87.984	-0.108	0.308	0.326
fes14b_unstruct_reg#j3	87.962	-0.107	0.304	0.321
EOT20#j3	87.997	-0.106	0.308	0.325

FIGURE 98 – 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 103 point.

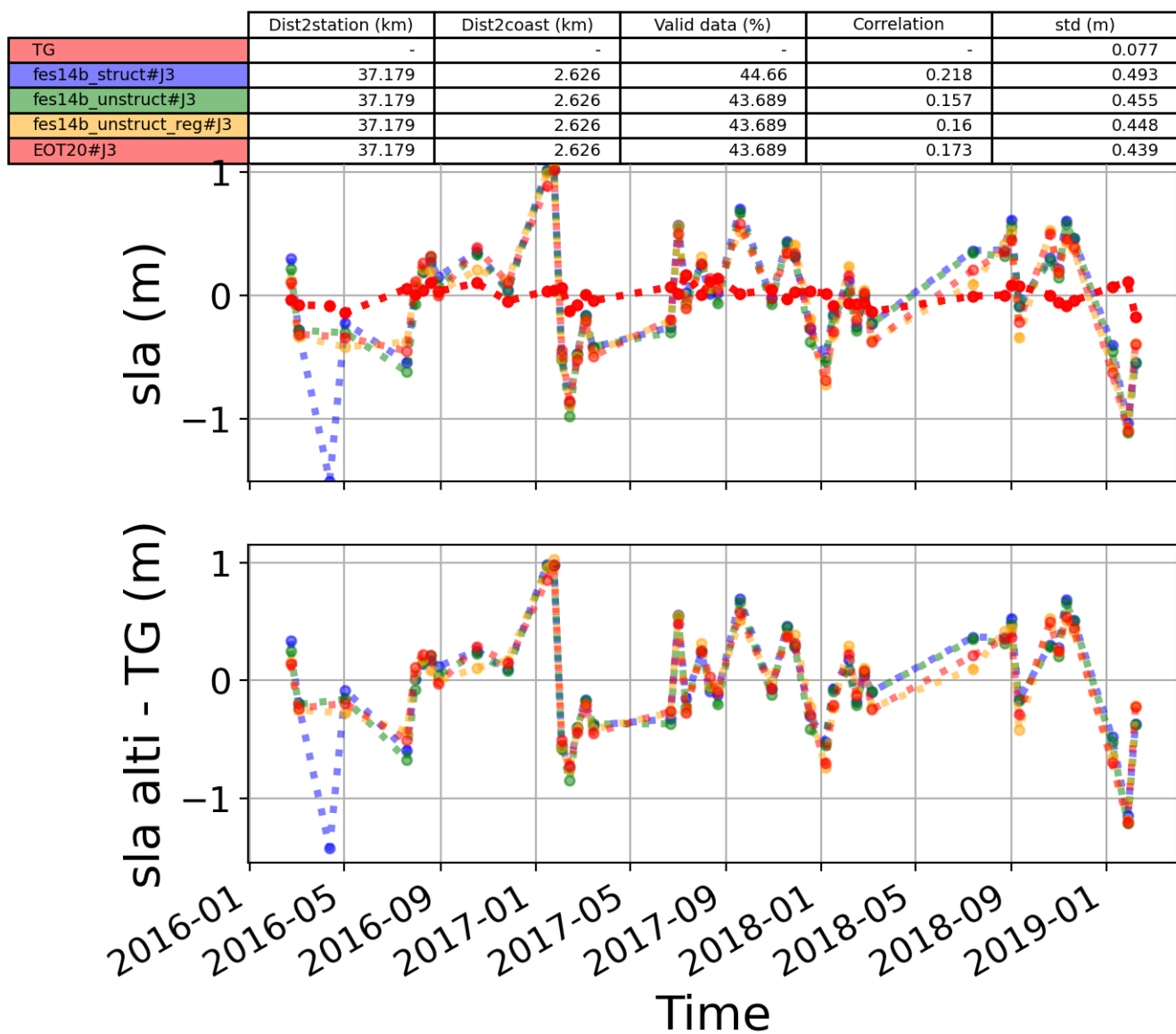


FIGURE 99 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

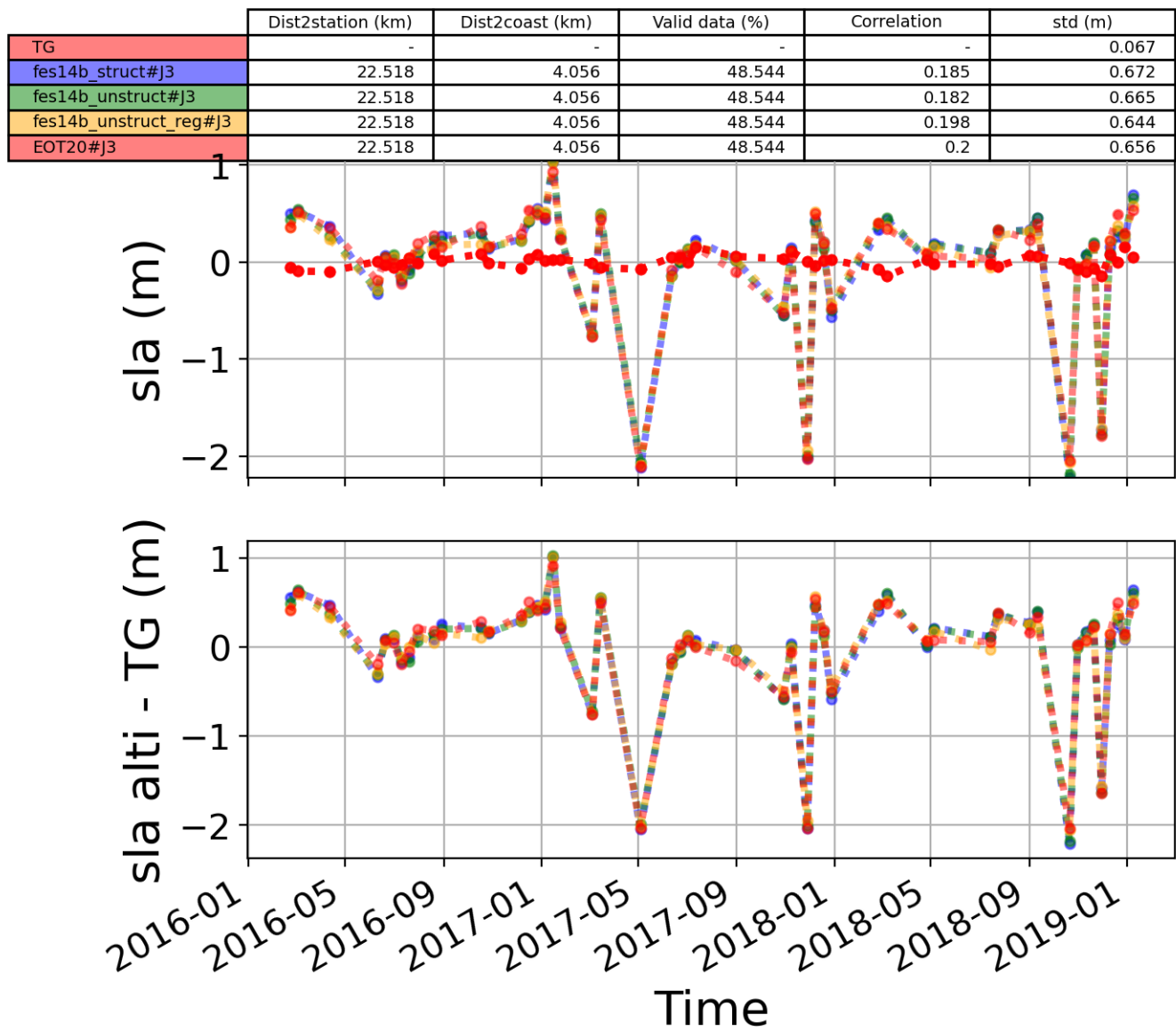


FIGURE 100 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

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 : $[-43.55, -43.2]^\circ$

6.4.1 correlation visualization in maps view % Southport tide gauge

Correlation Altimetry data with respect to Southport Tide gauge data

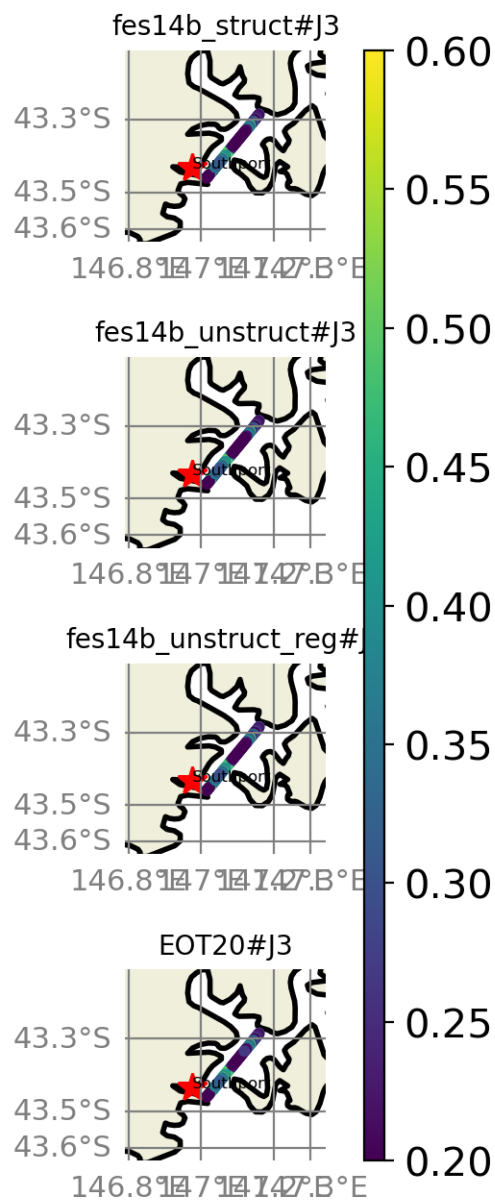


FIGURE 101 – correlation visualization in maps view % Southport tide gauge

6.4.2 rmsd visualization in maps view % Southport tide gauge

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

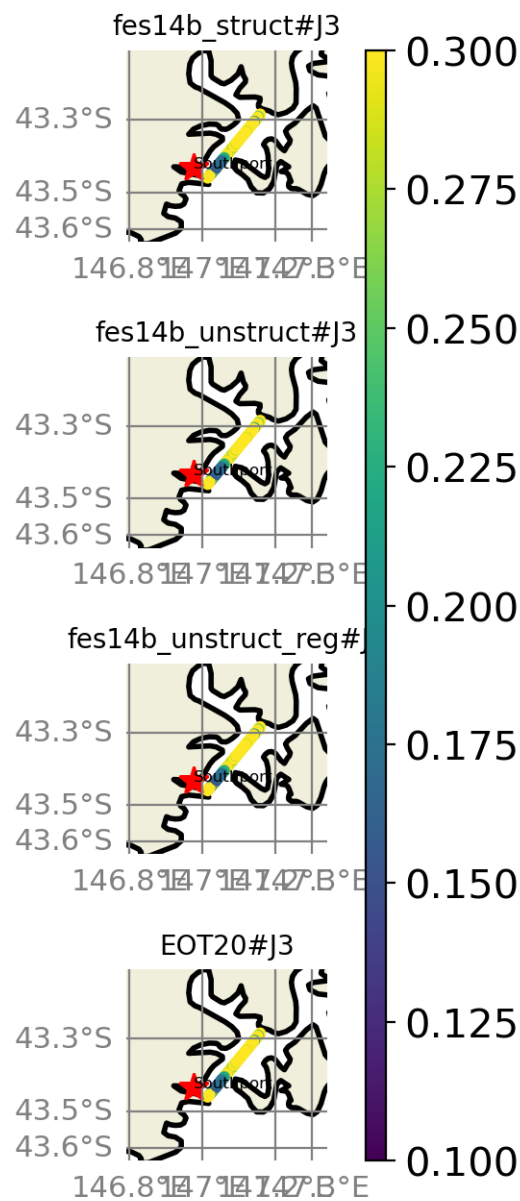


FIGURE 102 – rmsd visualization in maps view % Southport tide gauge

6.4.3 std visualization in maps view % Southport tide gauge

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

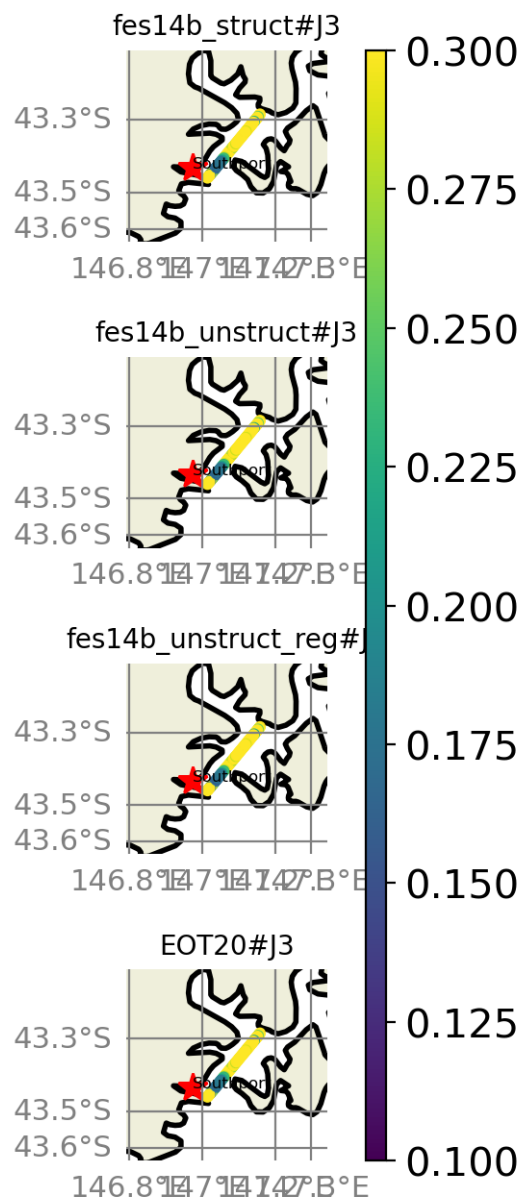


FIGURE 103 – std visualization in maps view % Southport tide gauge

6.4.4 valid_data_percent visualization in maps view % Southport tide gauge

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

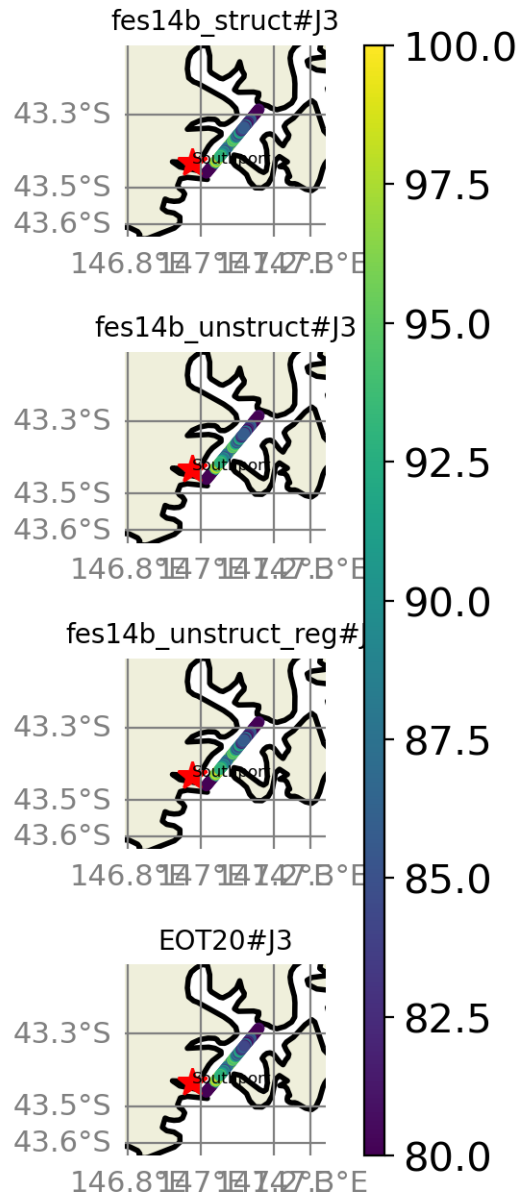


FIGURE 104 – valid_data_percent visualization in maps view % Southport tide gauge

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 series is;

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

Where pvd and nvd are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time series, respectively in the time series, i is the index of the time series, np is the number of the selected altimetry time series. $maxNB = 70$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time series.

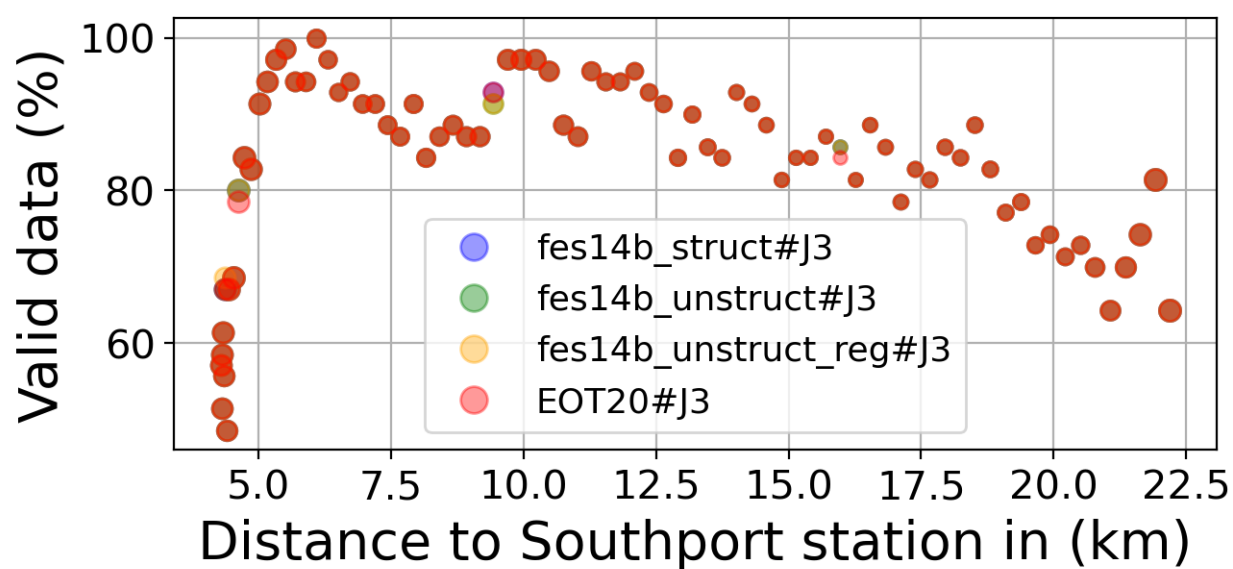
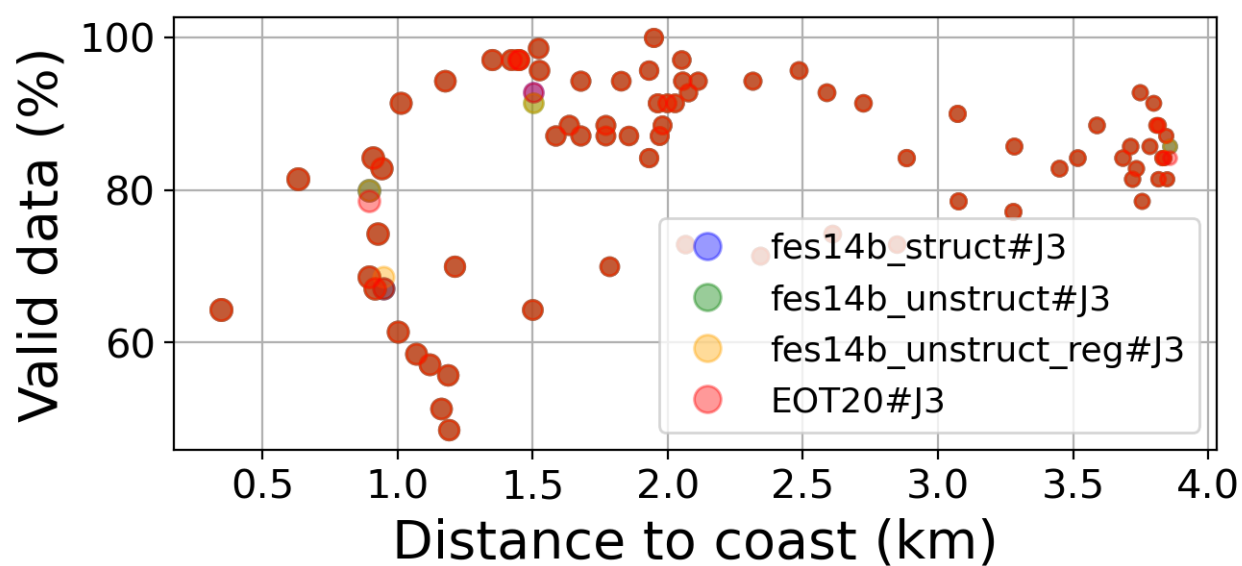


FIGURE 105 – Valid data (%) in function of distance to coast/Southport station

6.4.6 Std in function of distance to coast/Southport station

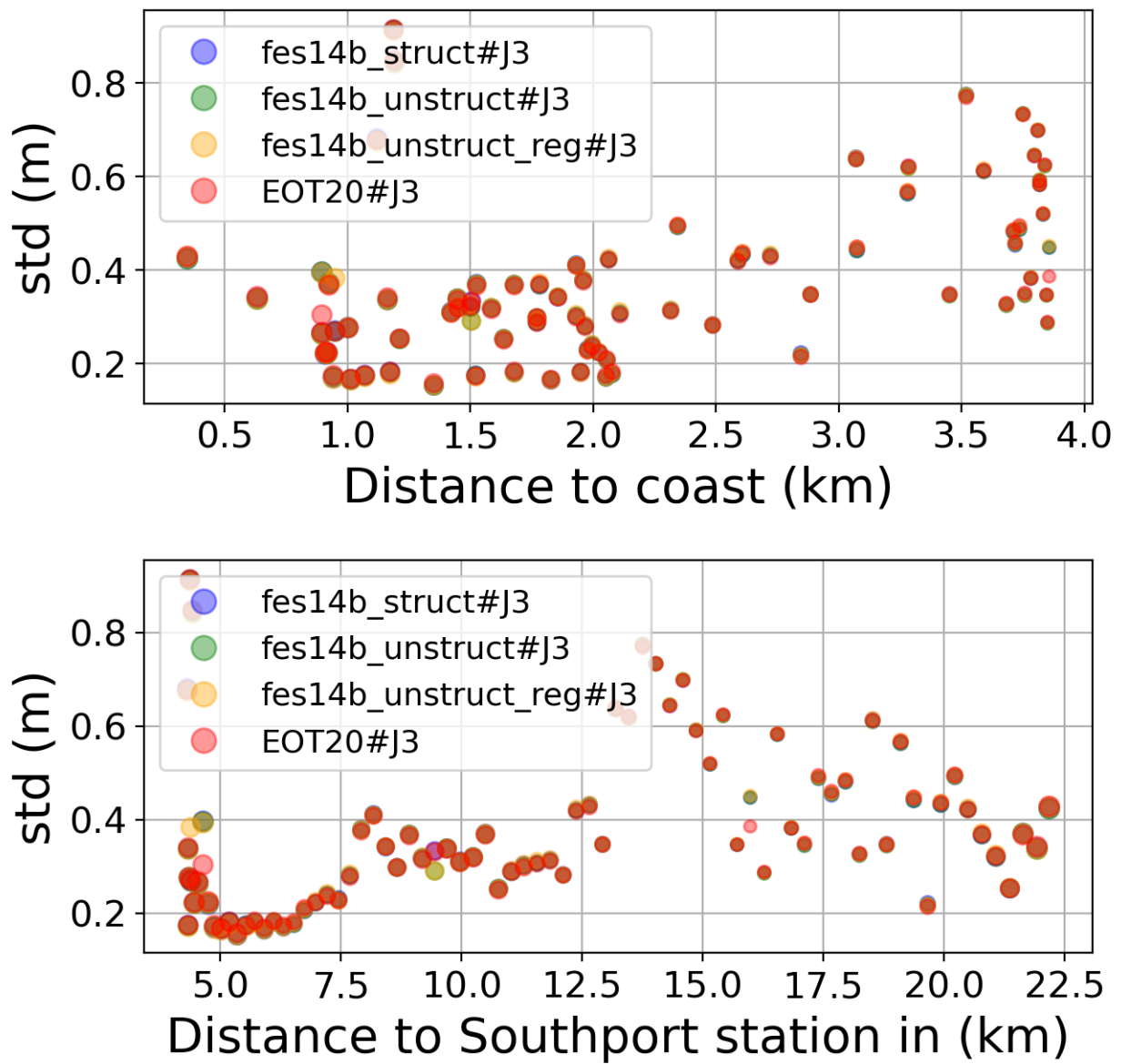


FIGURE 106 – Std in function of the distance to the coast/Southport station

6.4.7 Correlation in function of distance to coast/Southport station

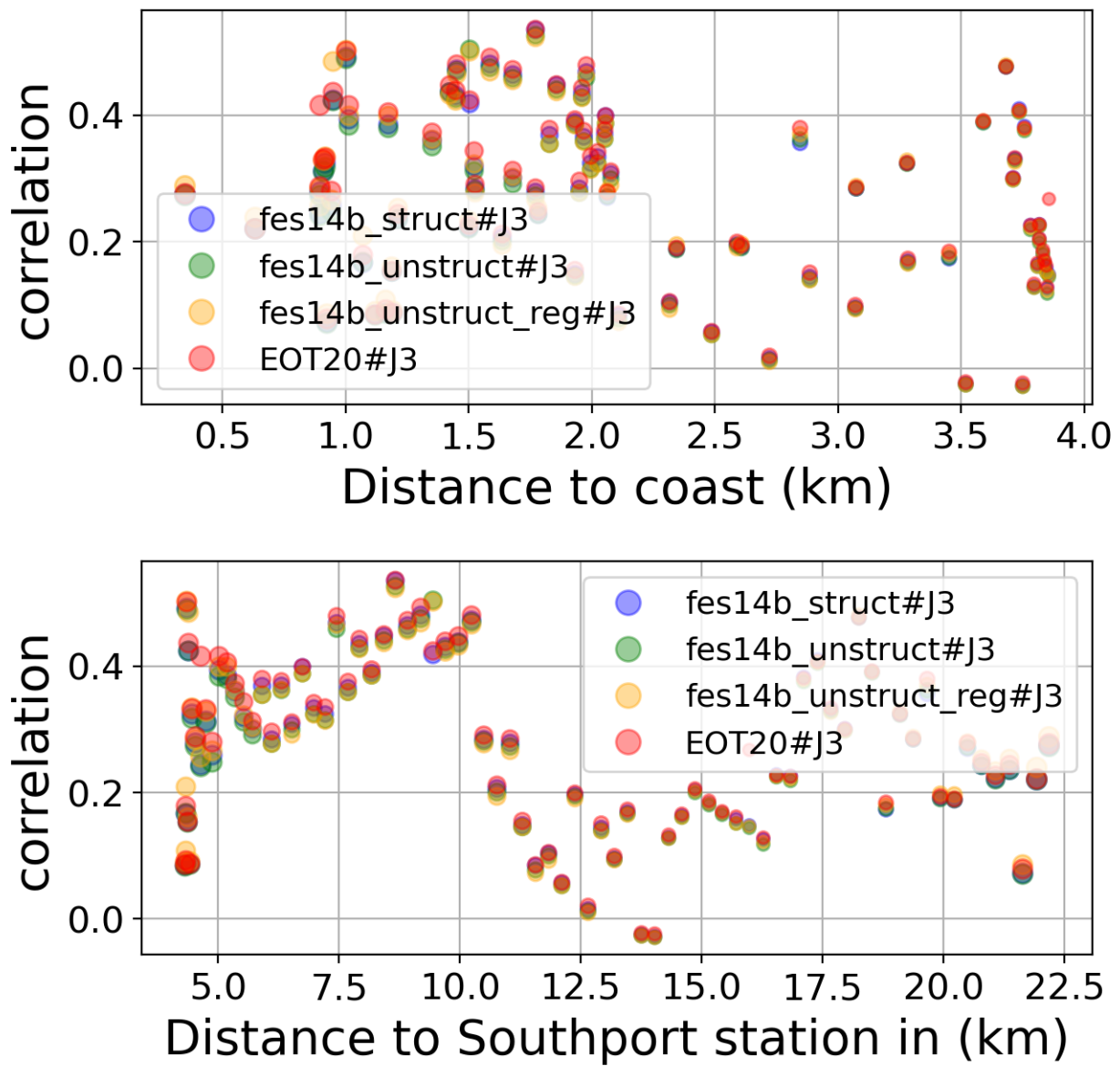


FIGURE 107 – Correlation in function of the distance to the coast/Southport station

6.4.8 Taylor Diagram

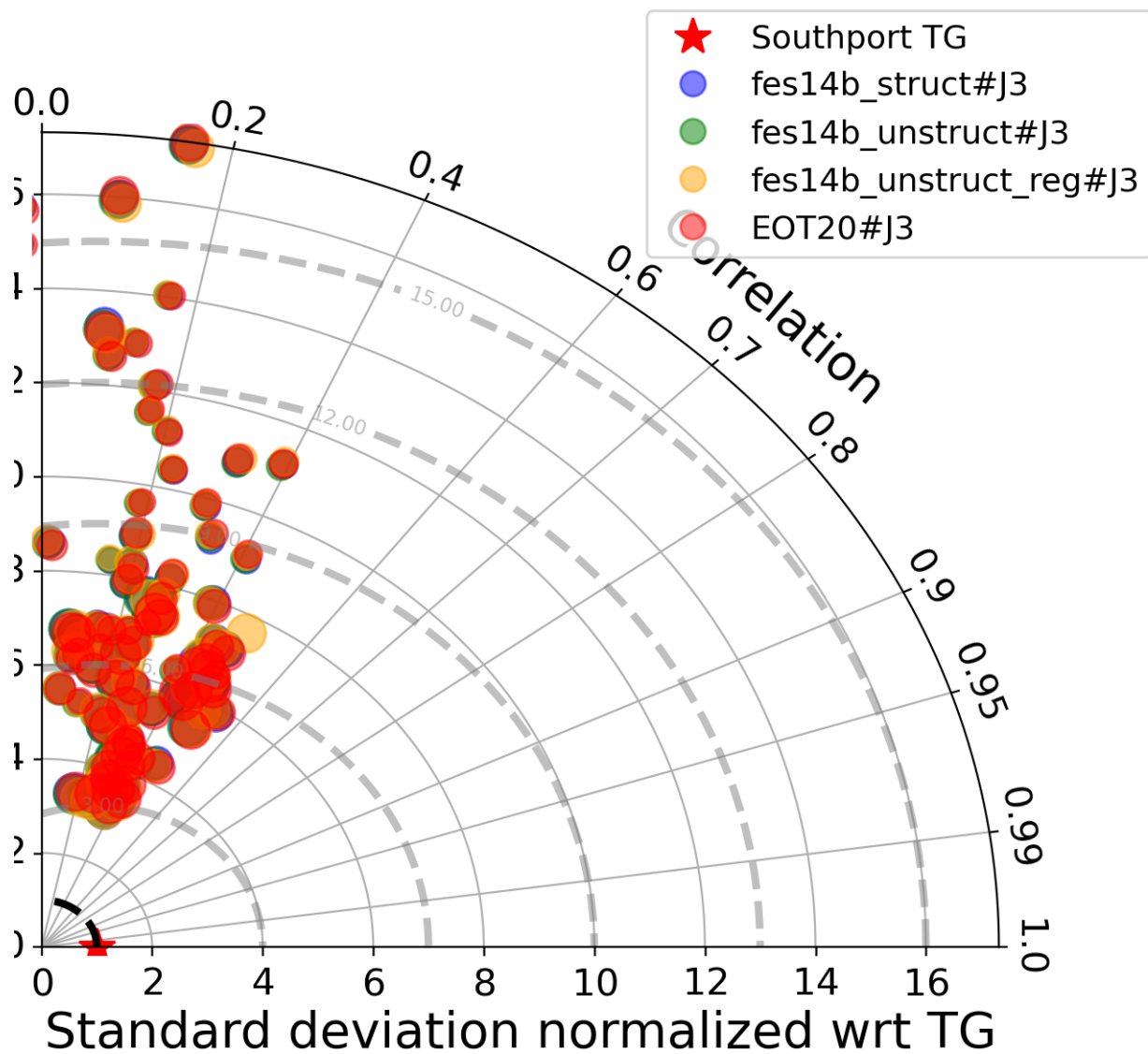


FIGURE 108 – Taylor diagram

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)
fes14b_struct#j3	83.454	0.269	0.379	0.369
fes14b_unstruct#j3	83.436	0.266	0.378	0.368
fes14b_unstruct_reg#j3	83.454	0.271	0.38	0.371
EOT20#j3	83.418	0.279	0.377	0.367

FIGURE 109 – 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 70 point.

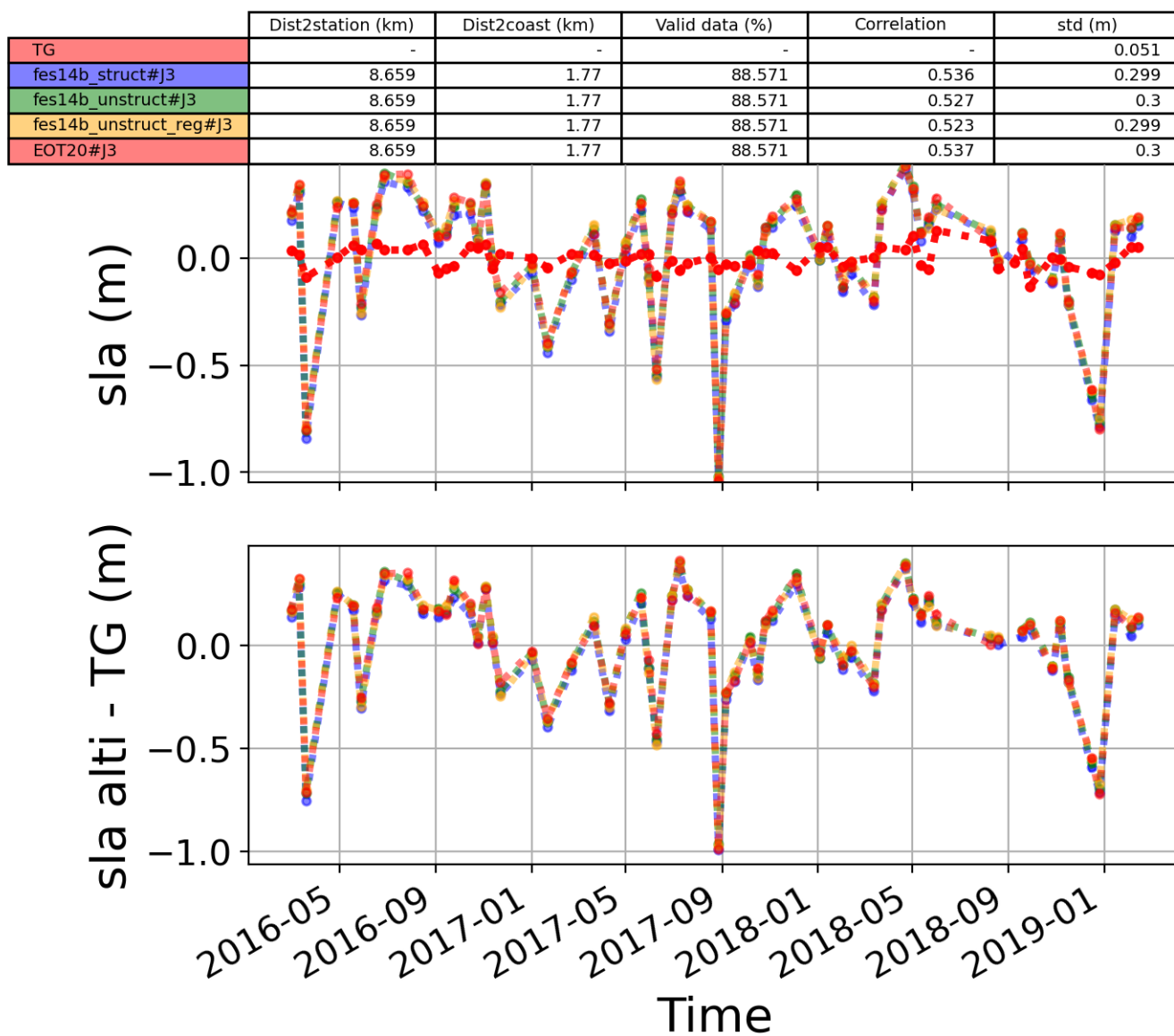


FIGURE 110 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

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

Correlation Altimetry data with respect to Townsville Tide gauge data

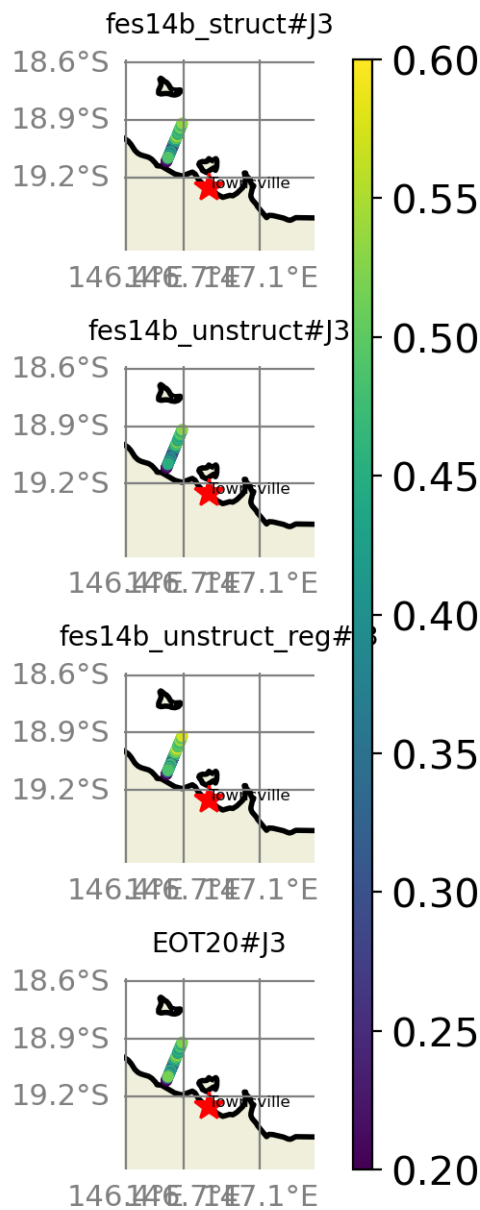


FIGURE 111 – correlation visualization in maps view % Townsville tide gauge

6.5.2 rmsd visualization in maps view % Townsville tide gauge

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

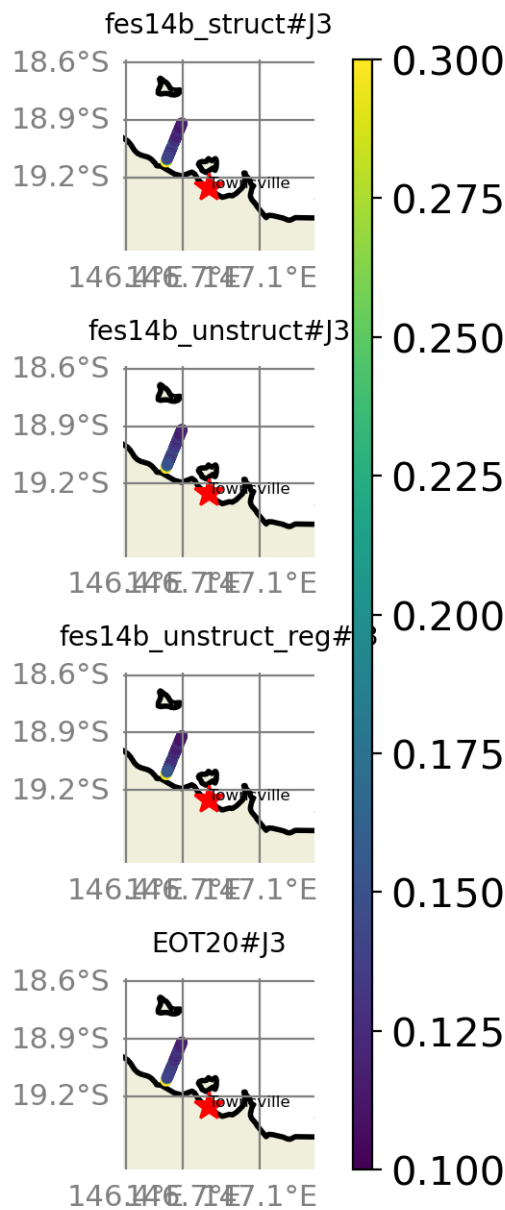


FIGURE 112 – rmsd visualization in maps view % Townsville tide gauge

6.5.3 std visualization in maps view % Townsville tide gauge

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

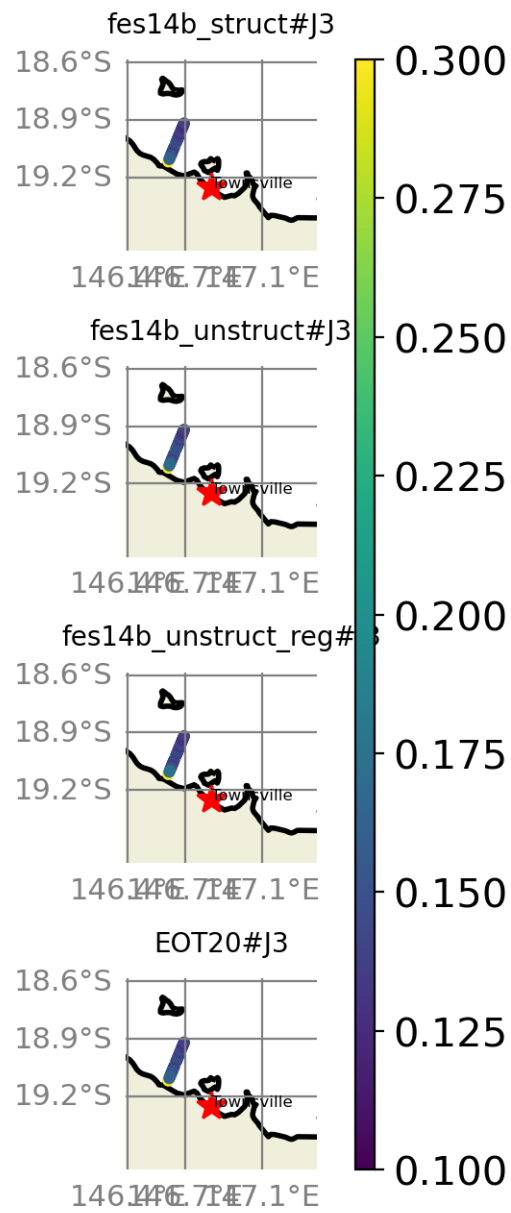


FIGURE 113 – std visualization in maps view % Townsville tide gauge

6.5.4 valid_data_percent visualization in maps view % Townsville tide gauge

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

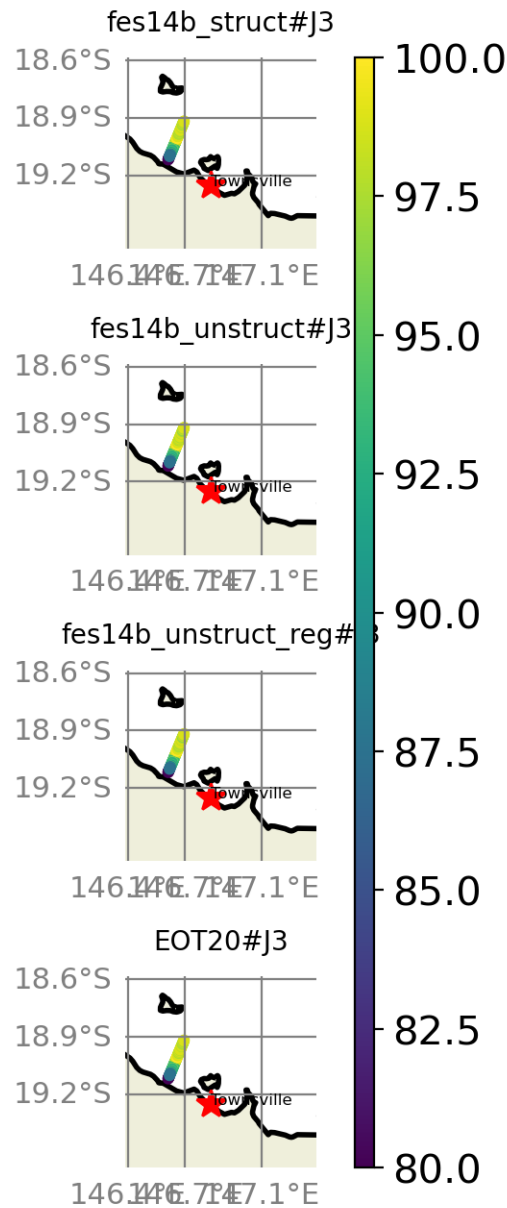


FIGURE 114 – valid_data_percent visualization in maps view % Townsville tide gauge

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 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 serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 80$ 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.

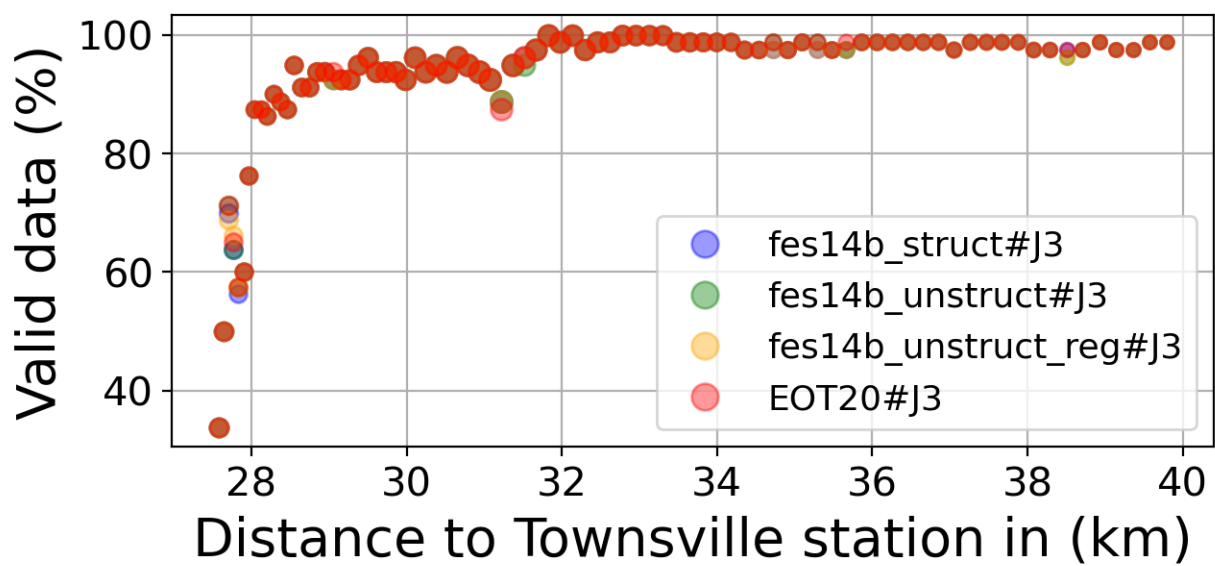
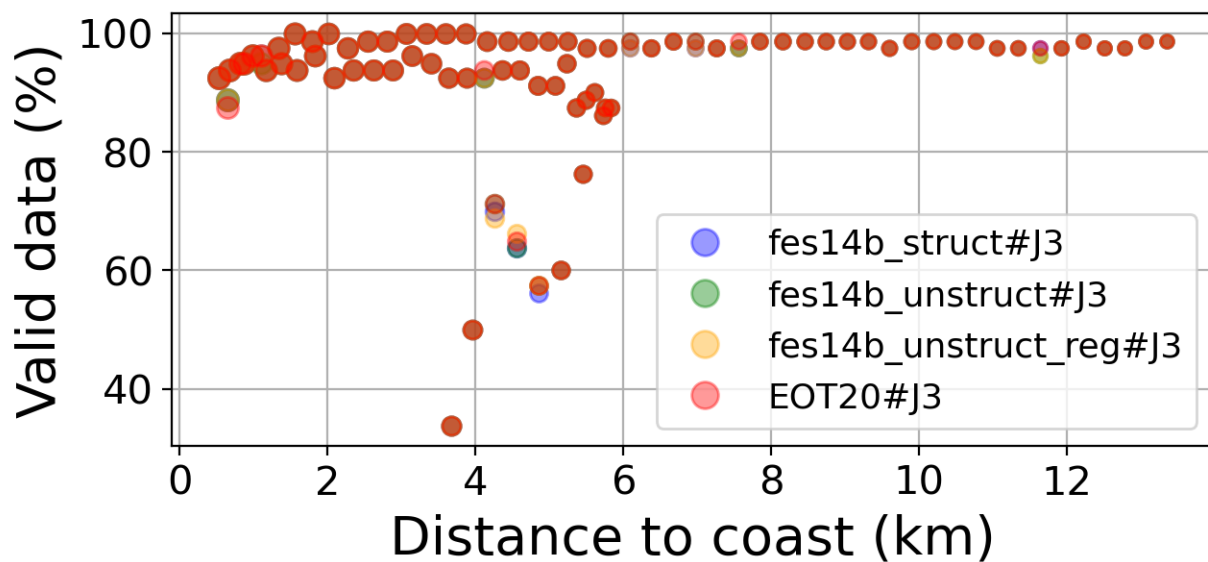


FIGURE 115 – Valid data (%) in function of distance to coast/Townsville station

6.5.6 Std in function of distance to coast/Townsville station

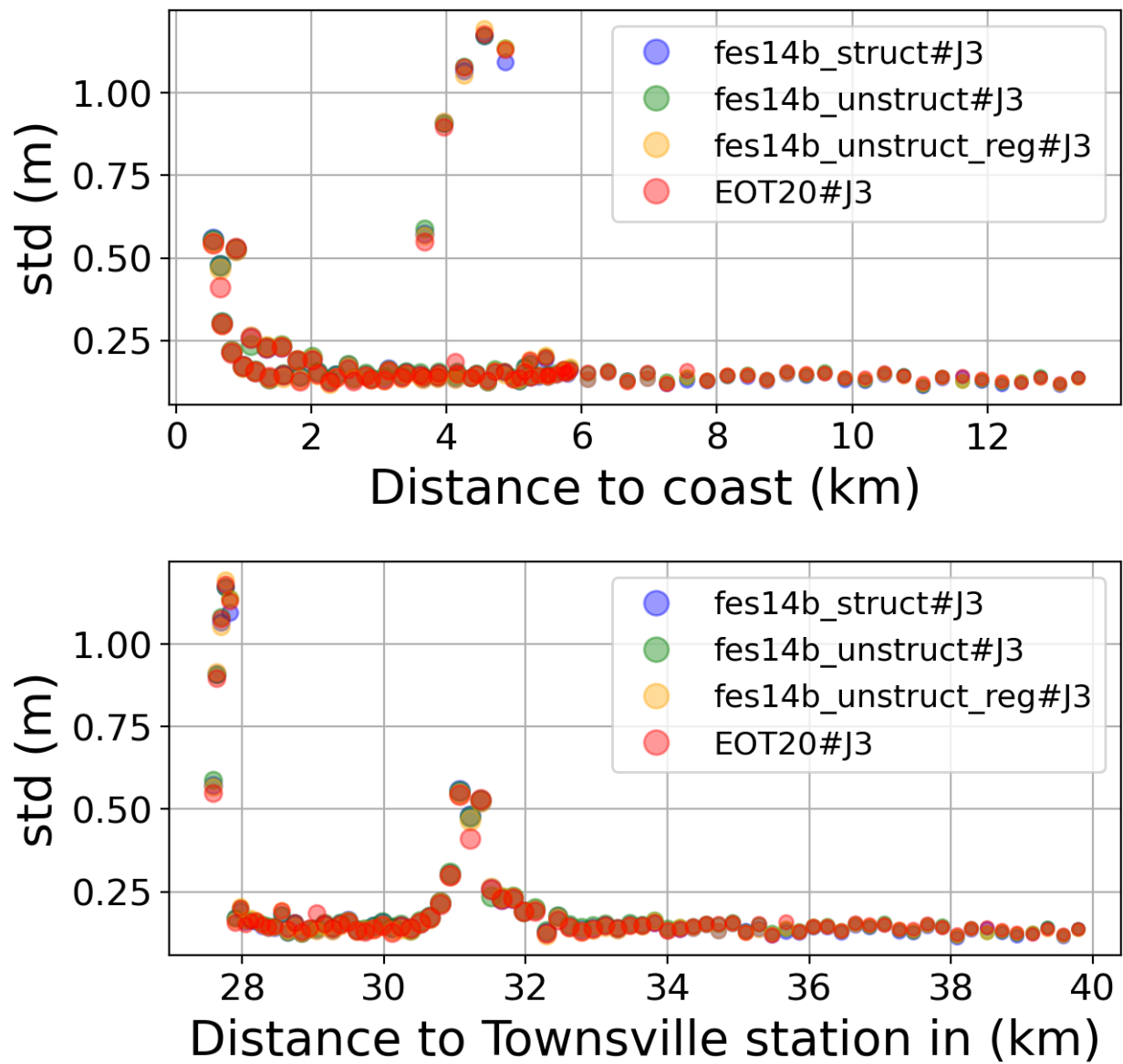


FIGURE 116 – Std in function of the distance to the coast/Townsville station

6.5.7 Correlation in function of distance to coast/Townsville station

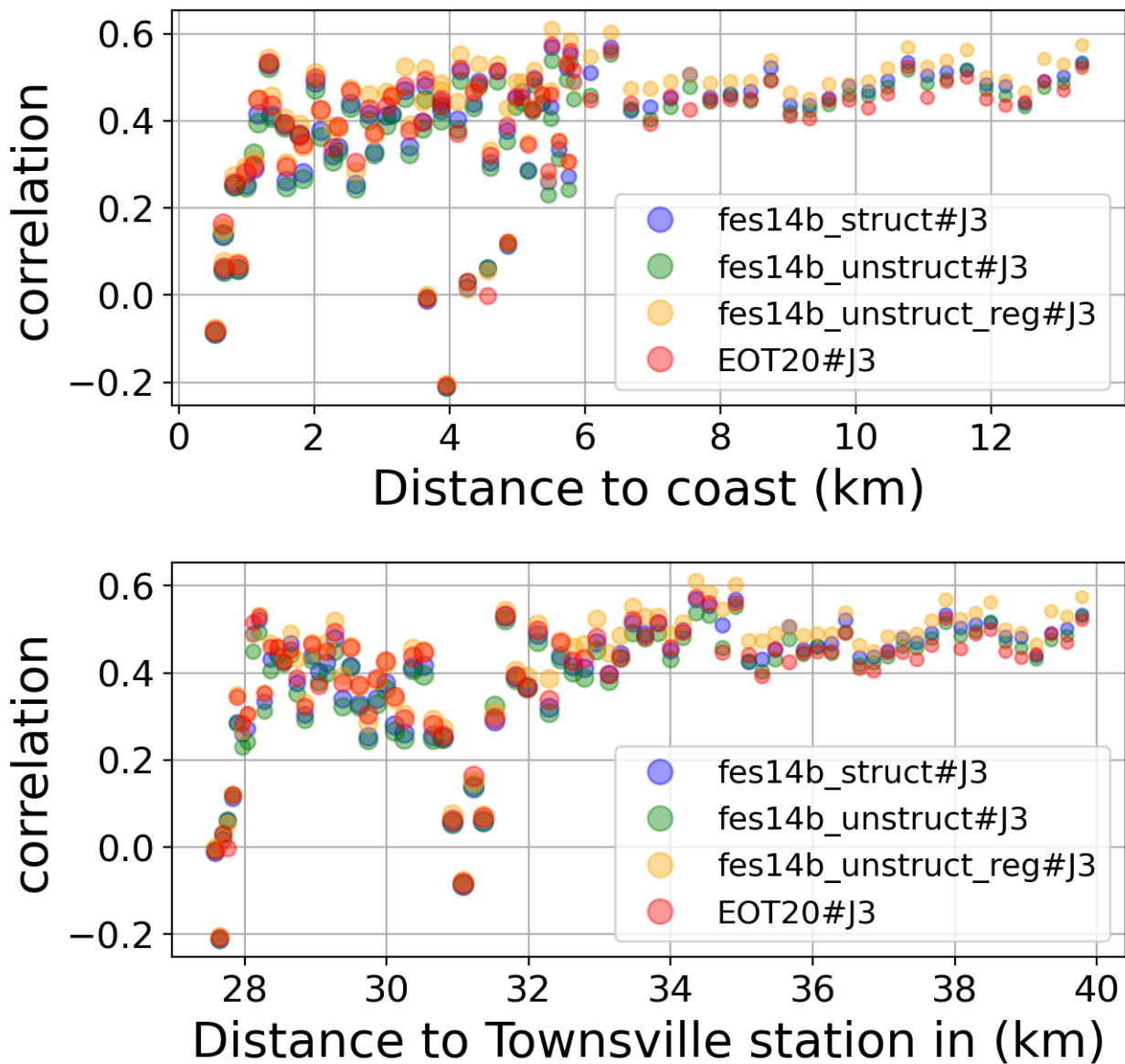


FIGURE 117 – Correlation in function of the distance to the coast/Townsville station

6.5.8 Taylor Diagram

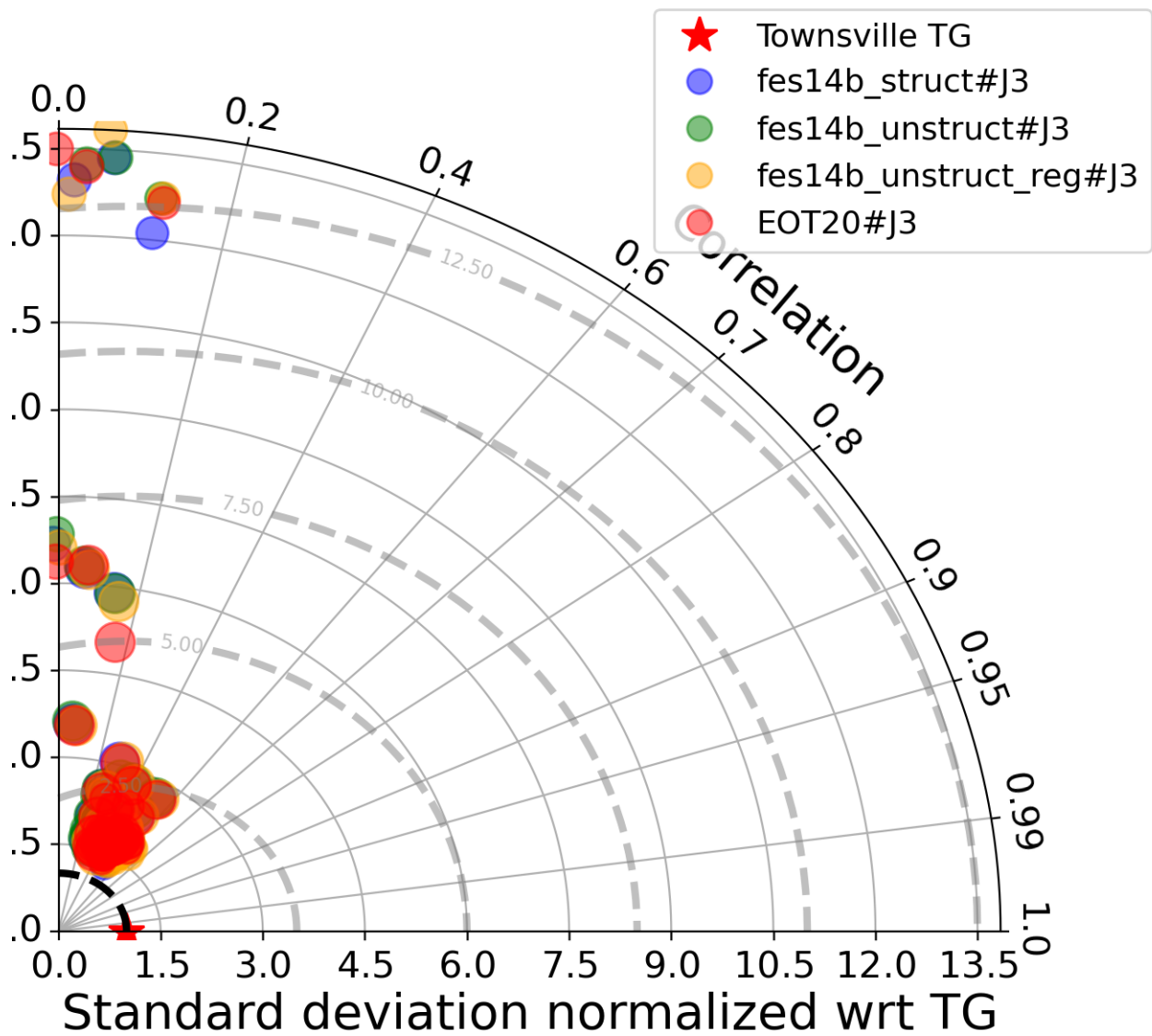


FIGURE 118 – Taylor diagram

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)
fes14b_struct#j3	92.851	0.385	0.214	0.203
fes14b_unstruct#j3	92.881	0.371	0.218	0.208
fes14b_unstruct_reg#j3	92.866	0.414	0.214	0.201
EOT20#j3	92.942	0.388	0.216	0.204

FIGURE 119 – 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 80 point.

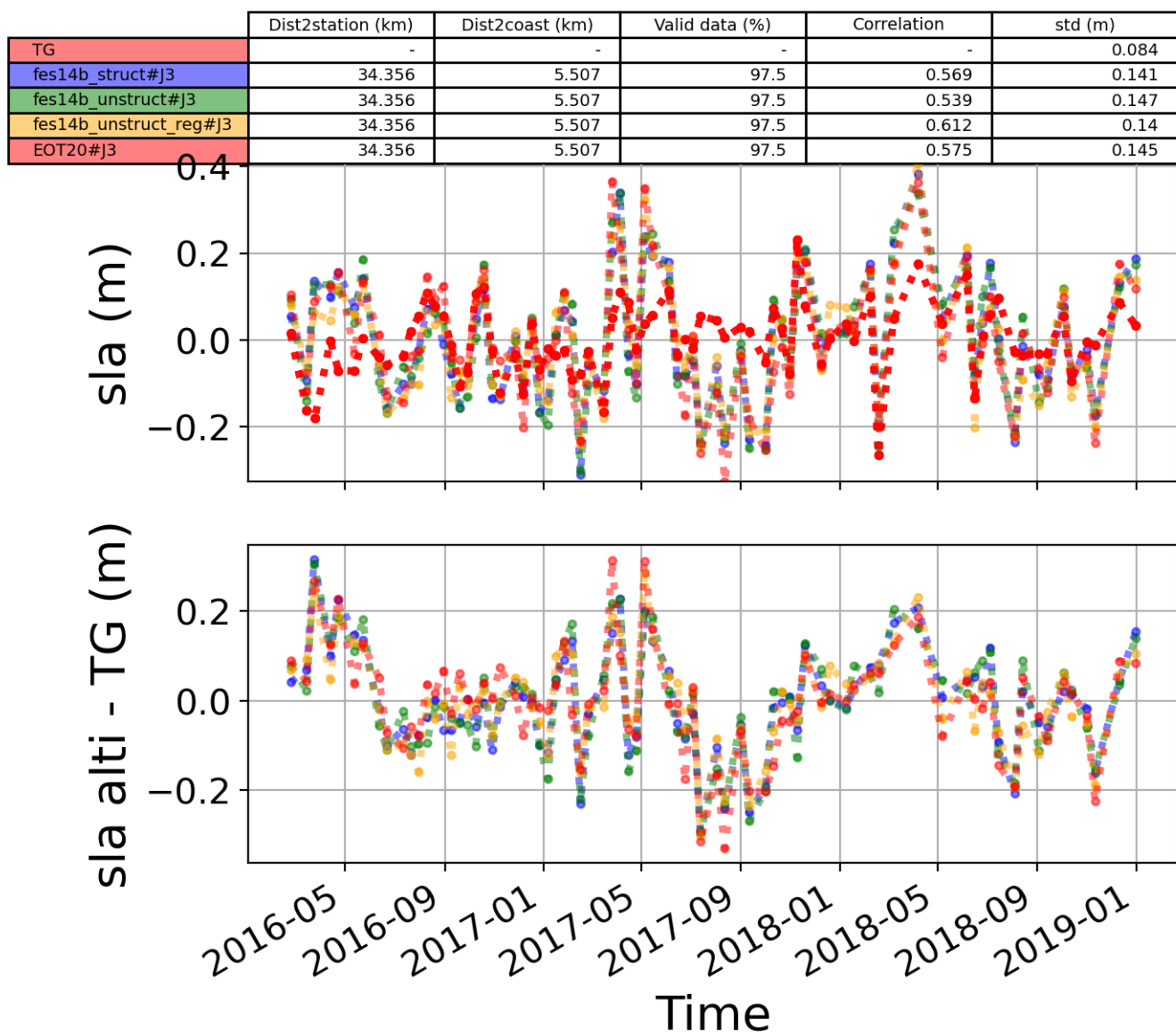


FIGURE 120 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

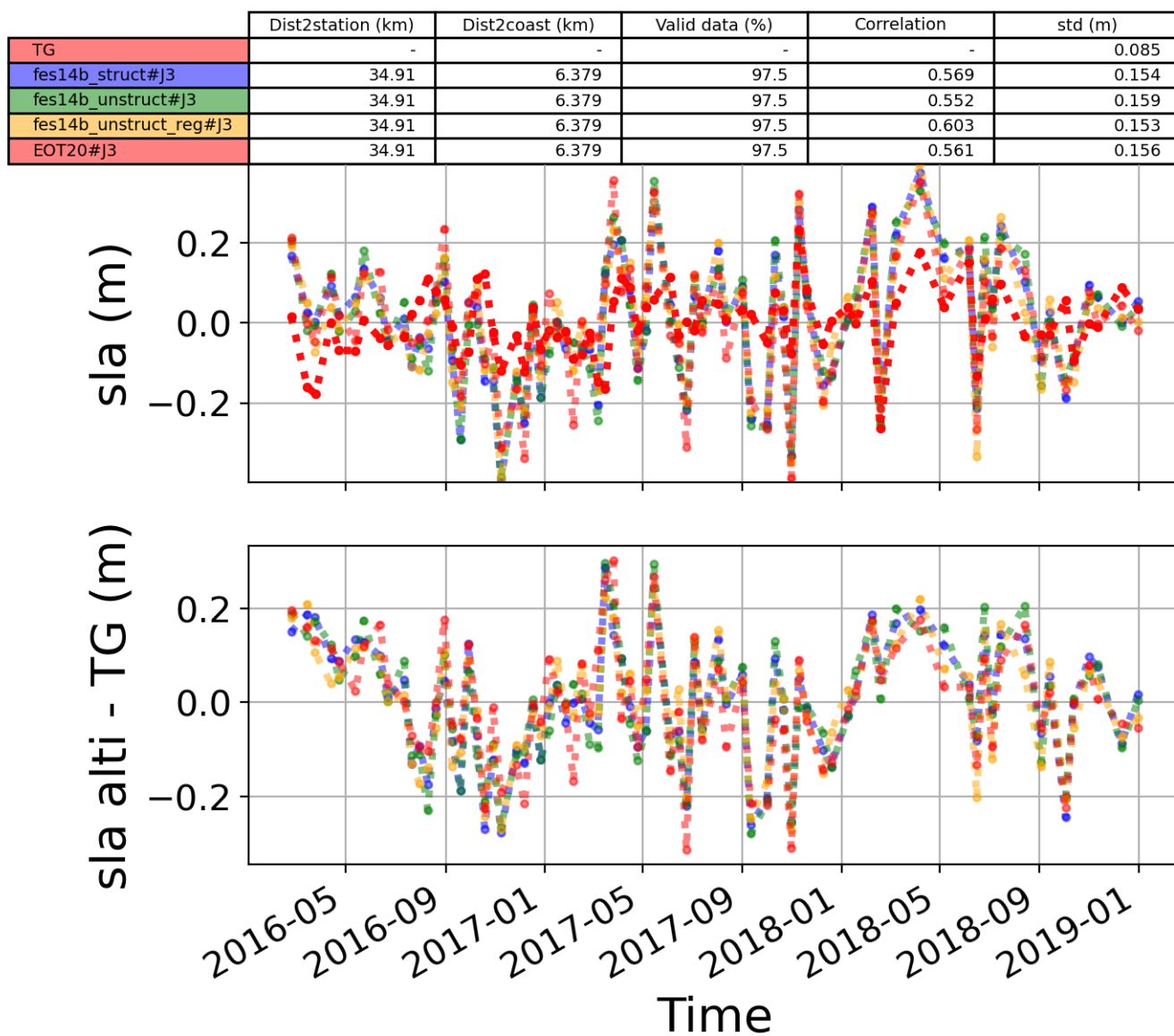


FIGURE 121 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.6 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

Correlation Altimetry data with respect to Booby_island Tide gauge data

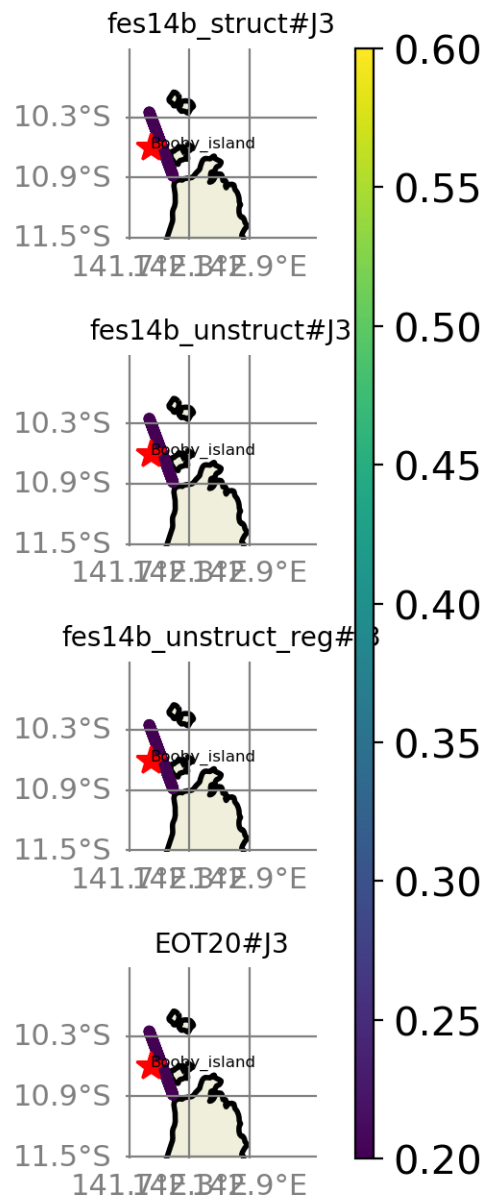


FIGURE 122 – correlation visualization in maps view % Booby_island tide gauge

6.6.2 rmsd visualization in maps view % Booby_island tide gauge

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

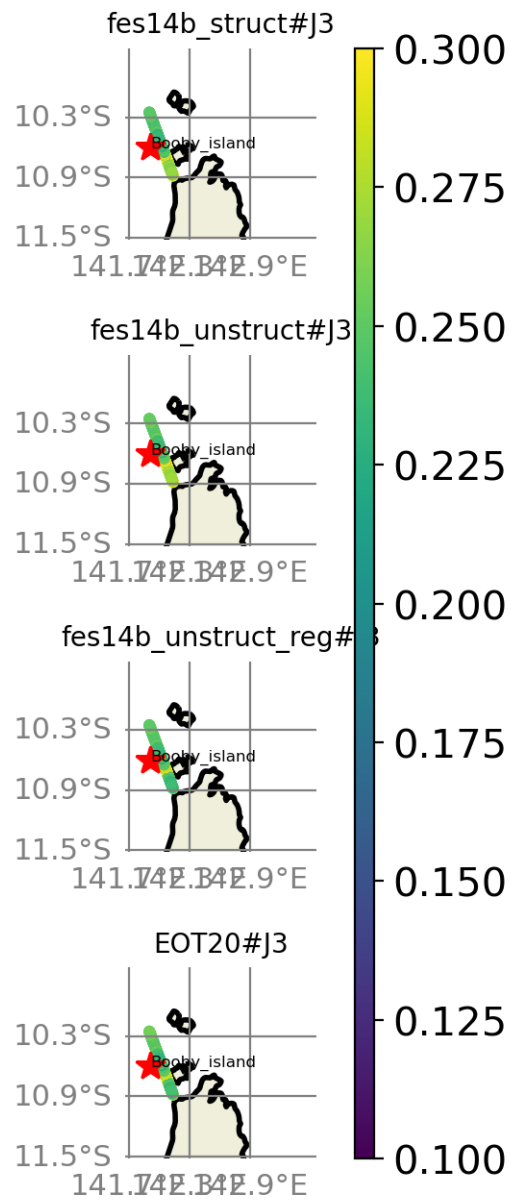


FIGURE 123 – rmsd visualization in maps view % Booby_island tide gauge

6.6.3 std visualization in maps view % Booby_island tide gauge

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

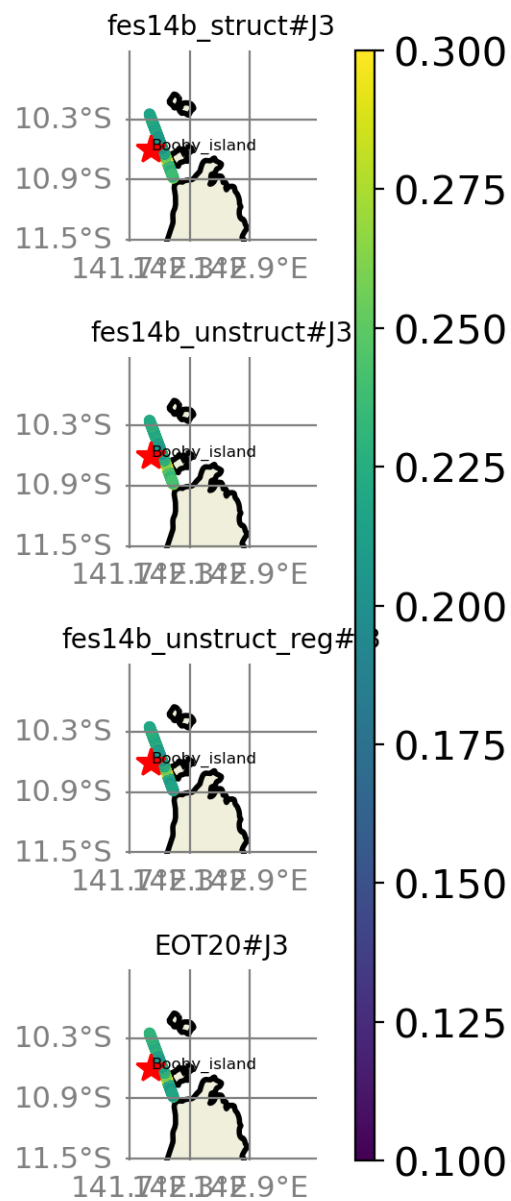


FIGURE 124 – std visualization in maps view % Booby_island tide gauge

6.6.4 valid_data_percent visualization in maps view % Booby_island tide gauge

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

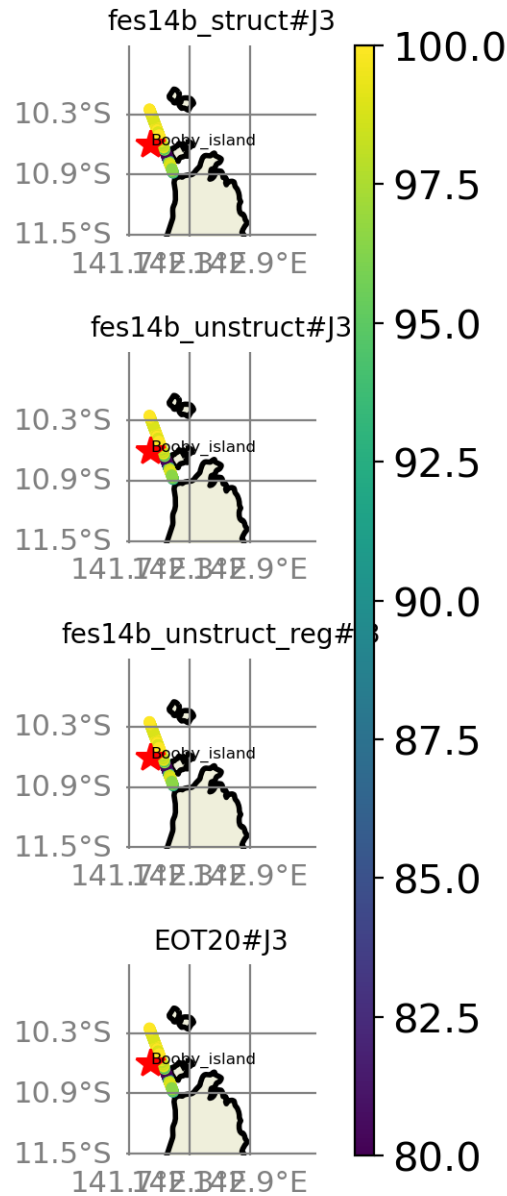


FIGURE 125 – valid_data_percent visualization in maps view % Booby_island tide gauge

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 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 serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 86$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

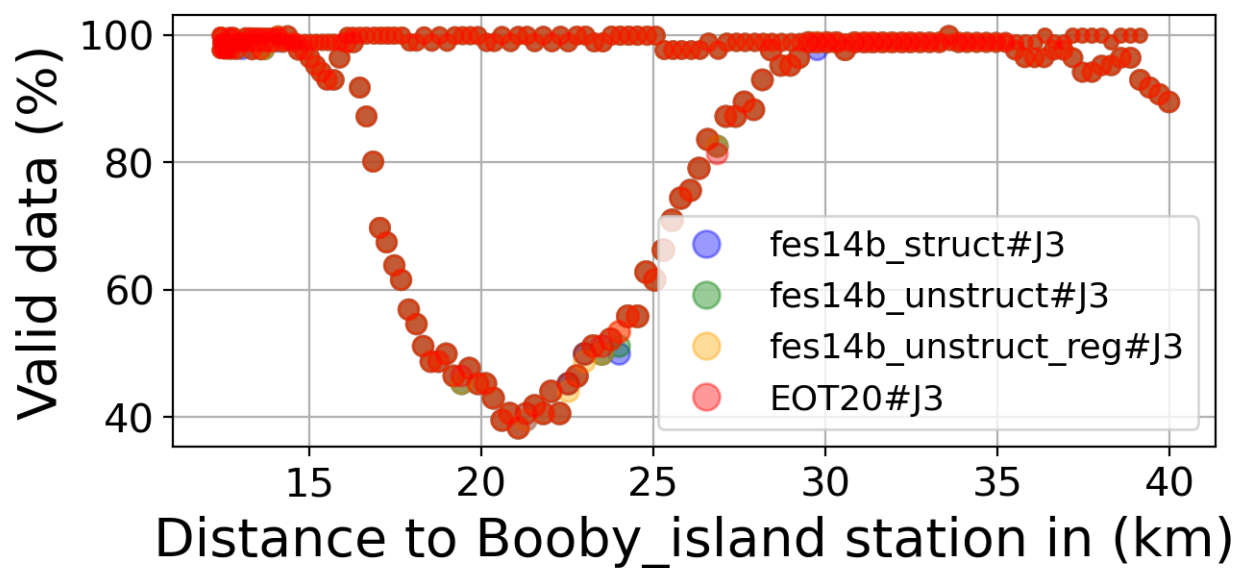
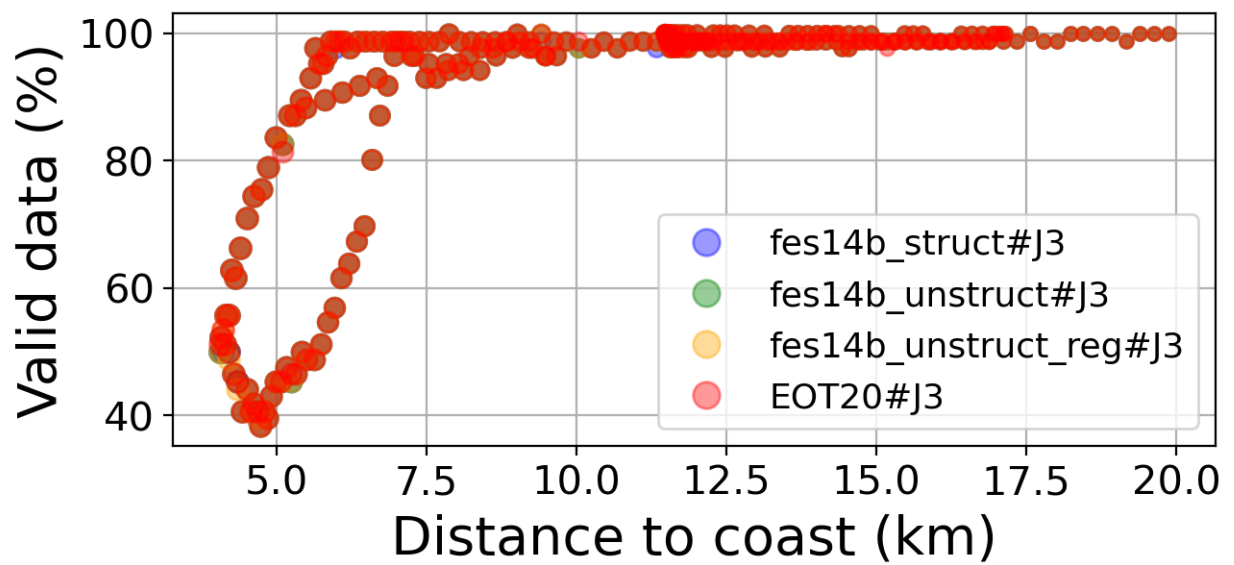


FIGURE 126 – Valid data (%) in function of distance to coast/Booby_island station

6.6.6 Std in function of distance to coast/Booby_island station

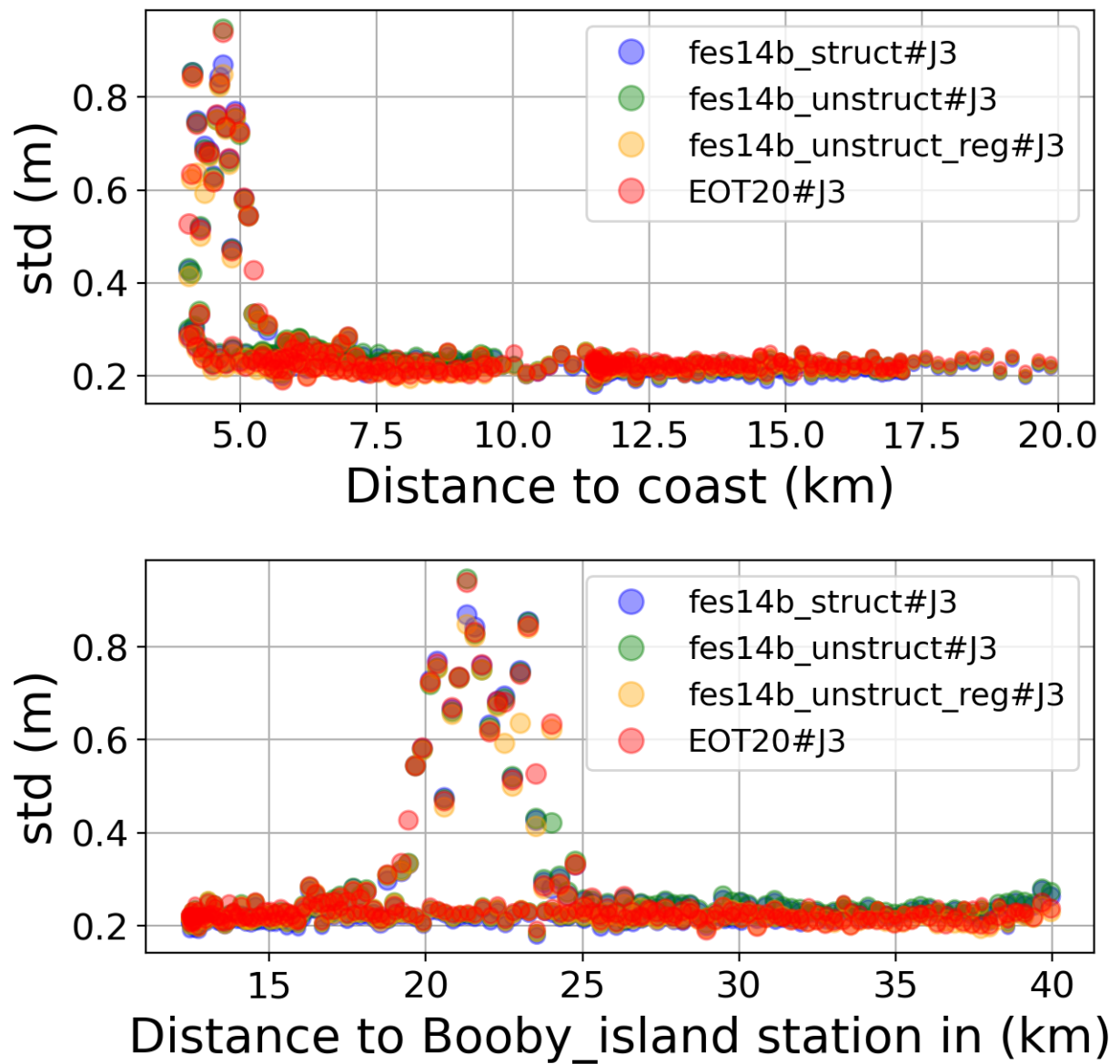


FIGURE 127 – Std in function of the distance to the coast/Booby_island station

6.6.7 Correlation in function of distance to coast/Booby_island station

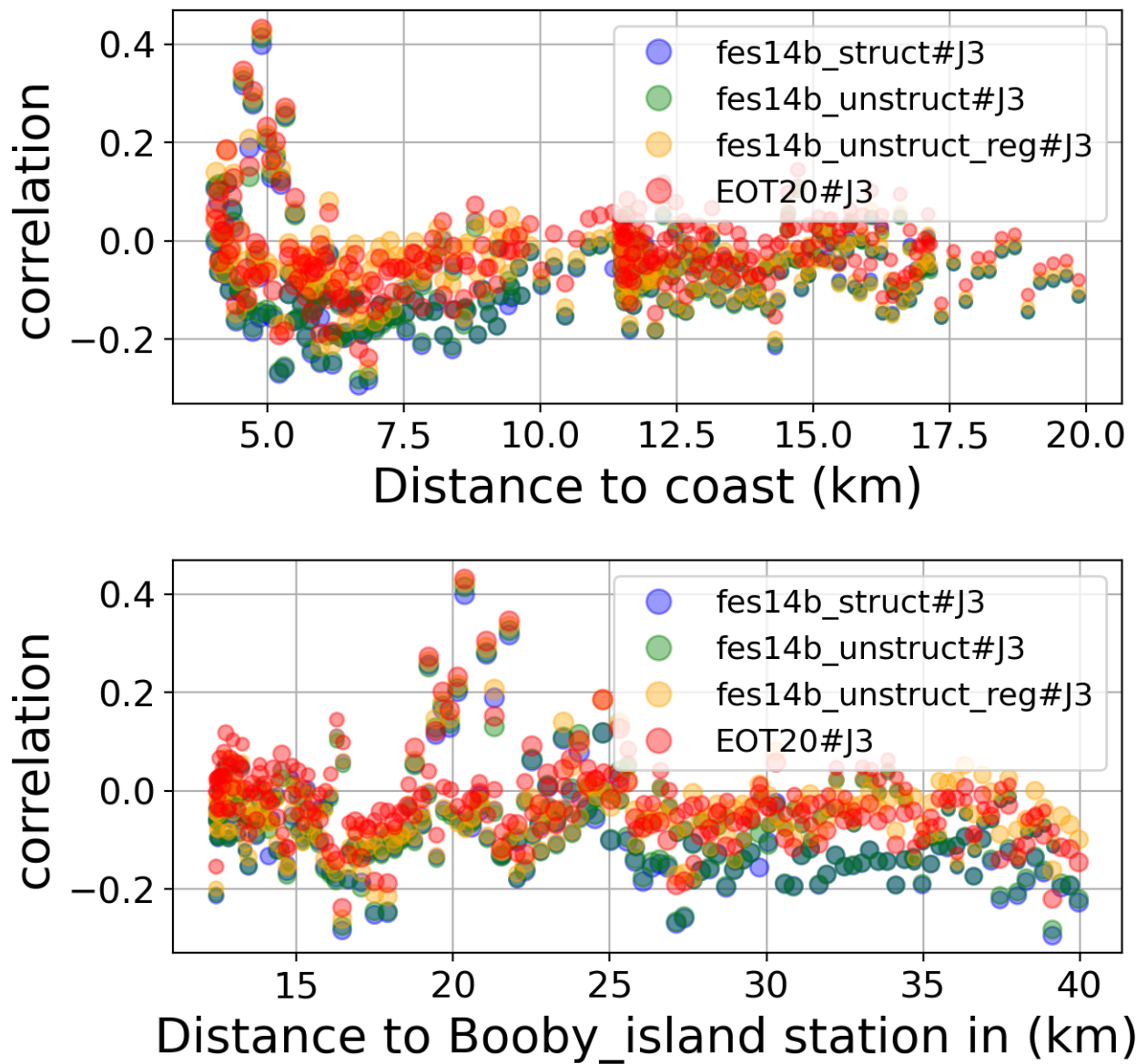


FIGURE 128 – Correlation in function of the distance to the coast/Booby_island station

6.6.8 Taylor Diagram

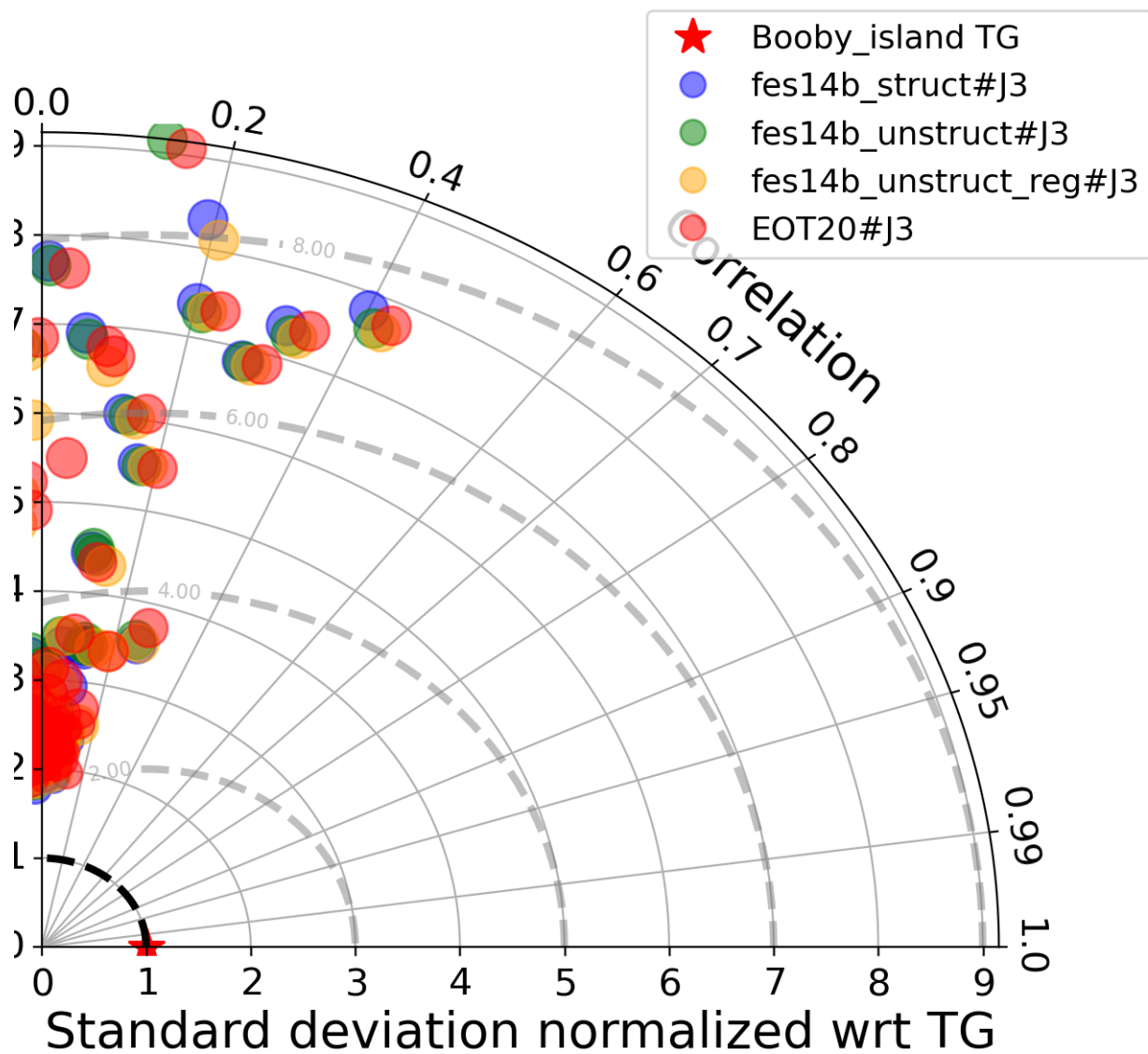


FIGURE 129 – Taylor diagram

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)
fes14b_struct#j3	90.935	-0.071	0.256	0.282
fes14b_unstruct#j3	90.958	-0.071	0.261	0.287
fes14b_unstruct_reg#j3	90.953	-0.038	0.255	0.278
EOT20#j3	90.971	-0.02	0.261	0.282

FIGURE 130 – 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 86 point.

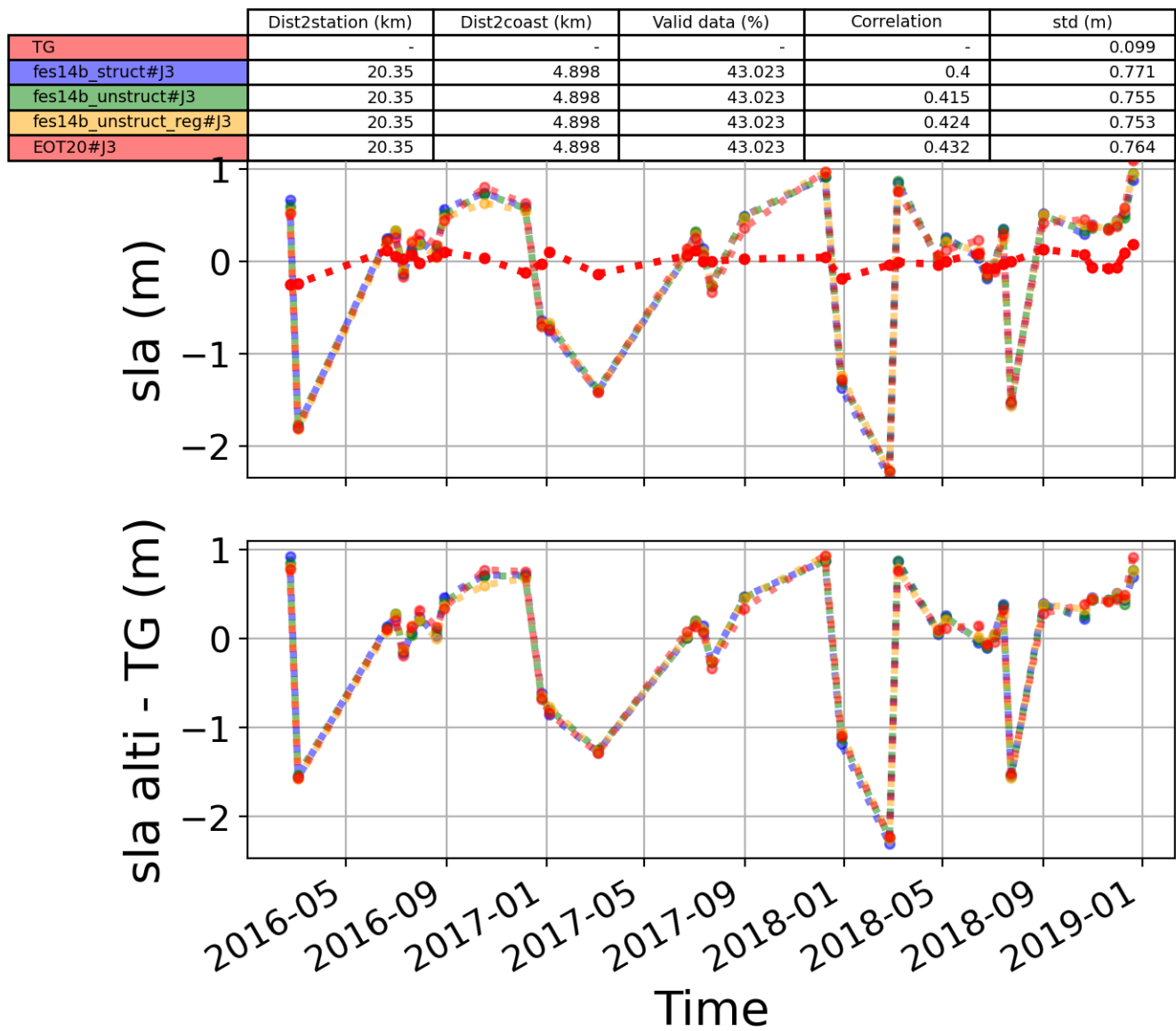


FIGURE 131 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie