Diagtool Report

Round Robin (GT cotier) : Ionospheric correction. Nea. J2. Iono filtered vs Iono gim.

11 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 Ionospheric correction used to calculate the sea level anomaly. Each version has been compared with a reference version. In this case the Iono_gim is the reference one.
- The sea level anomaly has been calculated using each version of the variable and has been compared to the sea level anomaly calculated using the reference version.
- The region of study is Nea
- Mission : J2
- Git last tag : 0.7 Appliquer le flag à l'adaptive
- Git changeset number : b8633aa-2022-04-11

2 Processing

2.1 sla formula

2.1.1 Iono_filtered product ' sla

sla = ORBIT.ALTI.POE_GDR_E -
RANGE.ALTI -
MEAN_SEA_SURFACE.MODEL.CNESCLS15 -
SEA_STATE_BIAS.ALTI.NON_PARAMETRIC -
IONOSPHERIC_CORRECTION.ALTI.FILTR_ITER -
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 Iono_gim 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

2.2 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

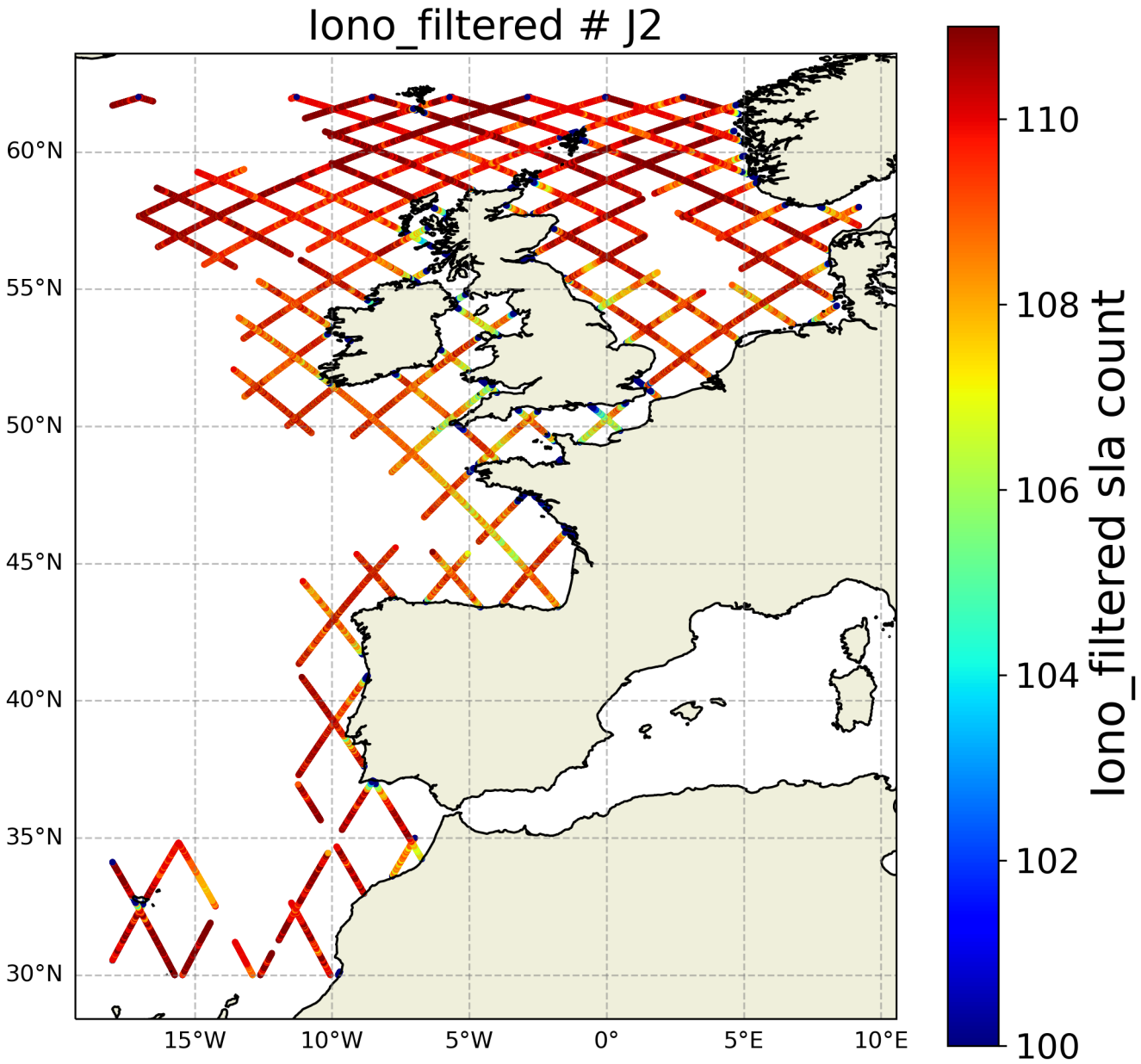

FIGURE 1 – Spatial coherence analysis of the count of the Iono_filtered version of sla variable

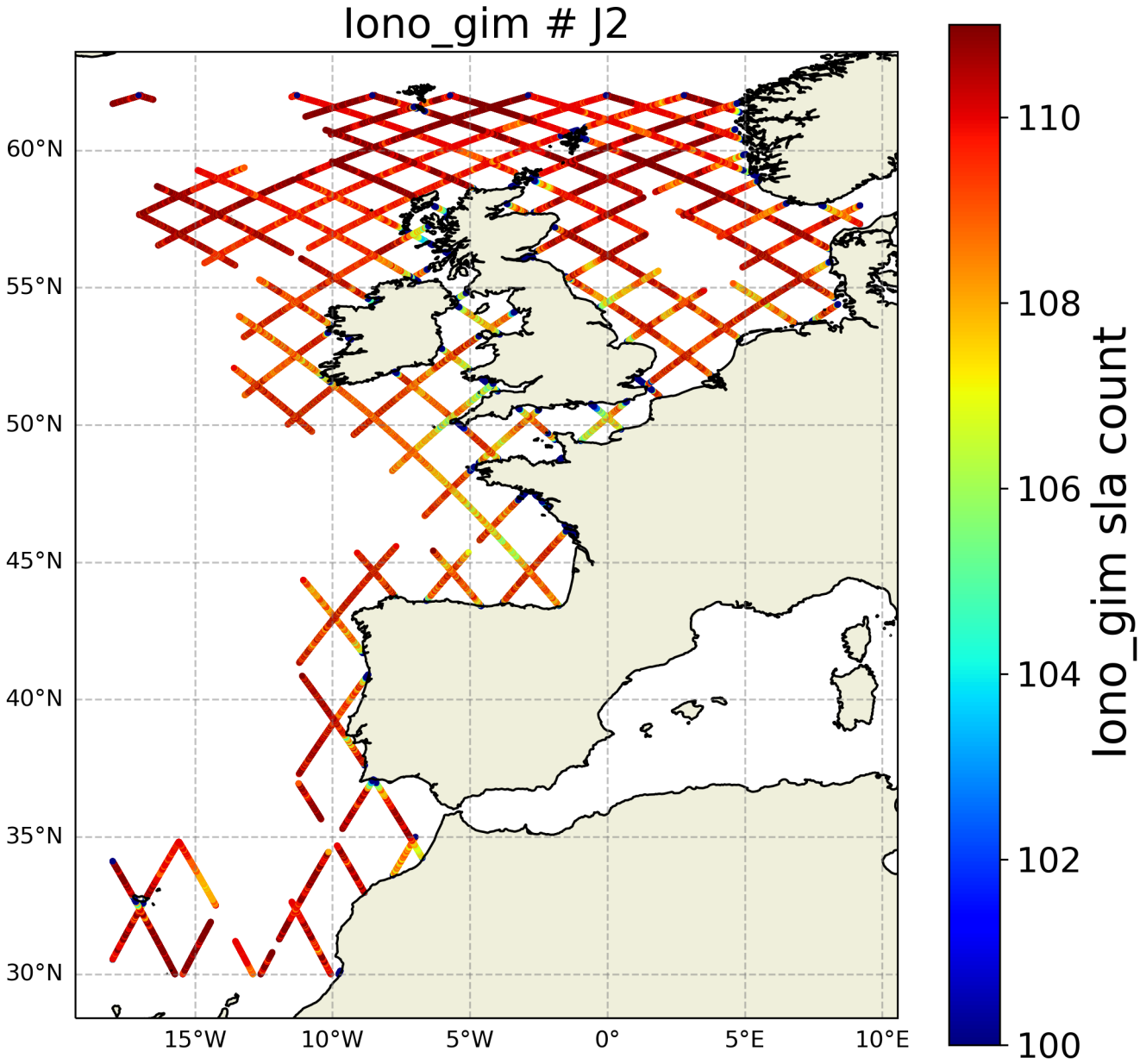

FIGURE 2 – Spatial coherence analysis of the count of the Iono_gim version of sla variable

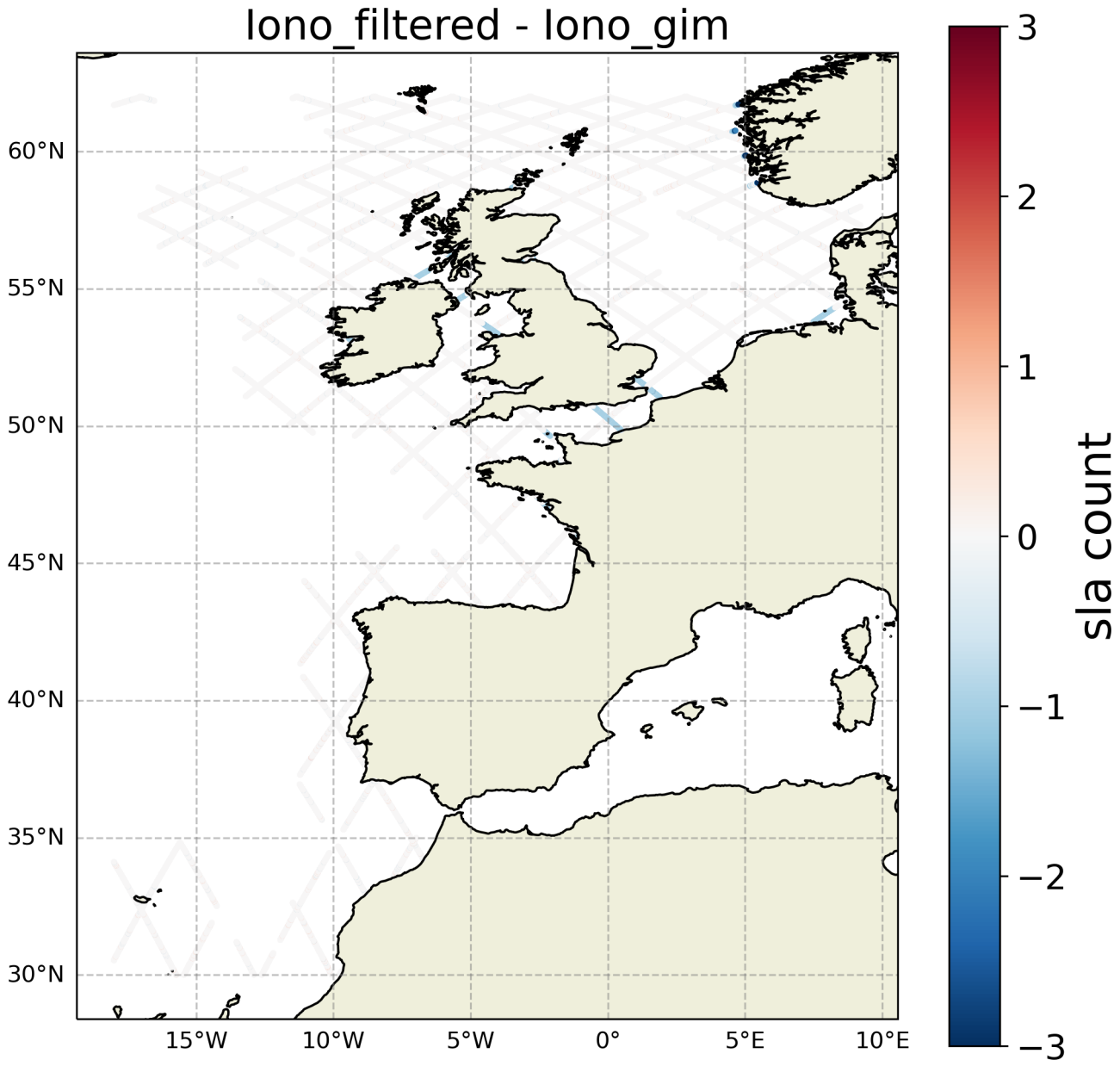

FIGURE 3 – Spatial coherence analysis of the Difference in sla 's count between Iono_filtered and Iono_gim

3.1.2 sla 's std

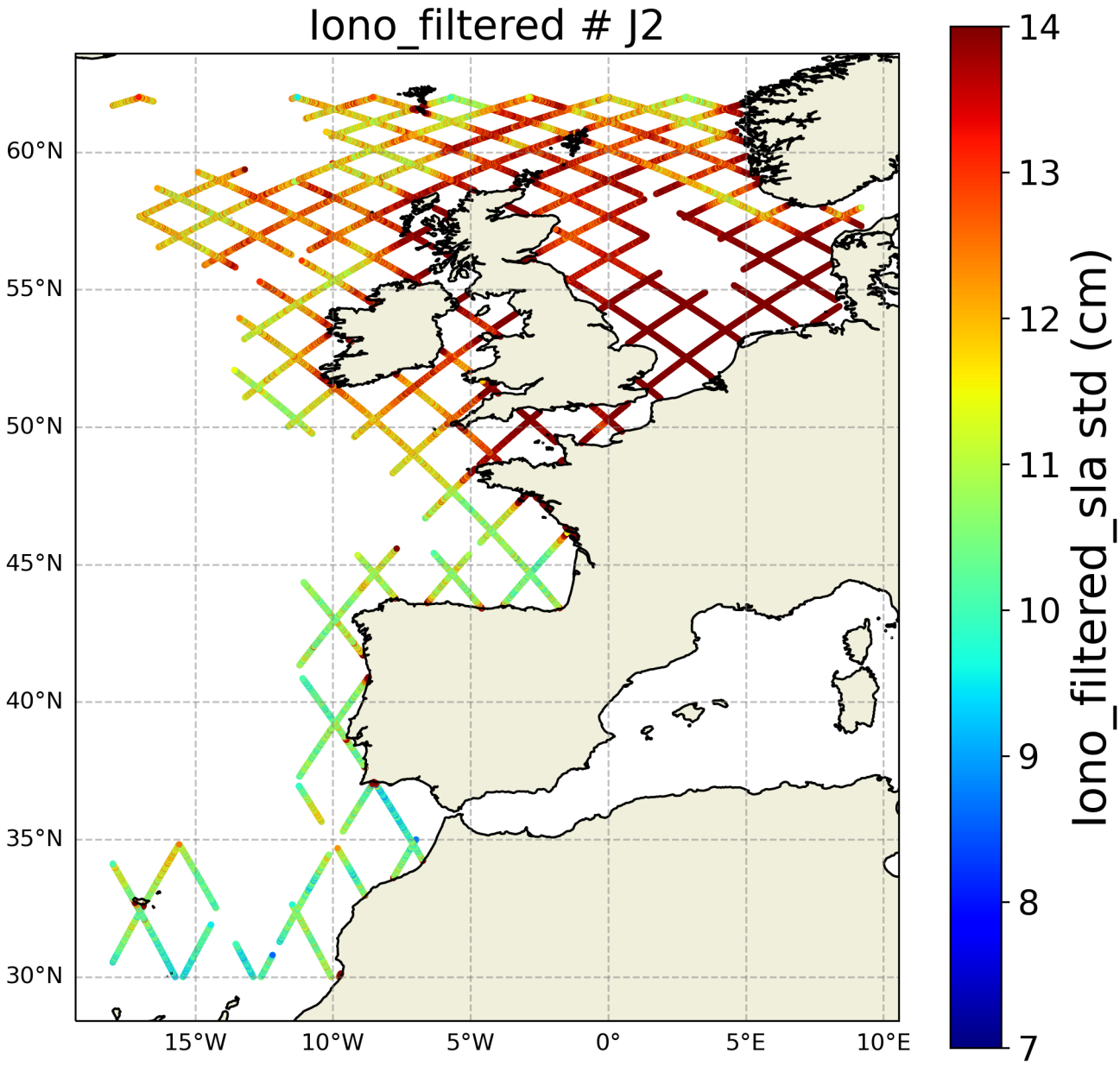

FIGURE 4 – Spatial coherence analysis of the std of the Iono_filtered version of sla variable

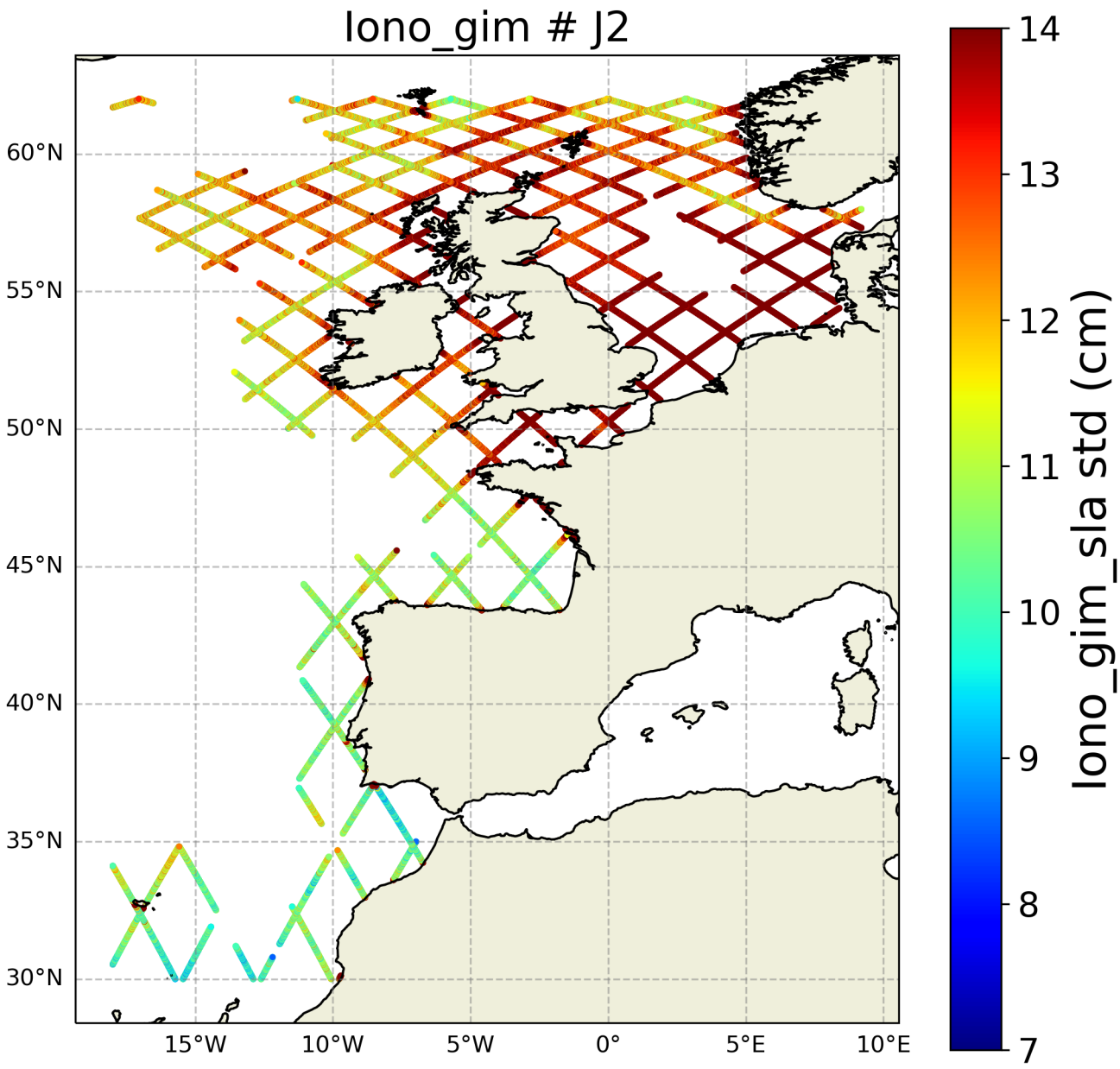

FIGURE 5 – Spatial coherence analysis of the std of the Iono_gim version of sla variable

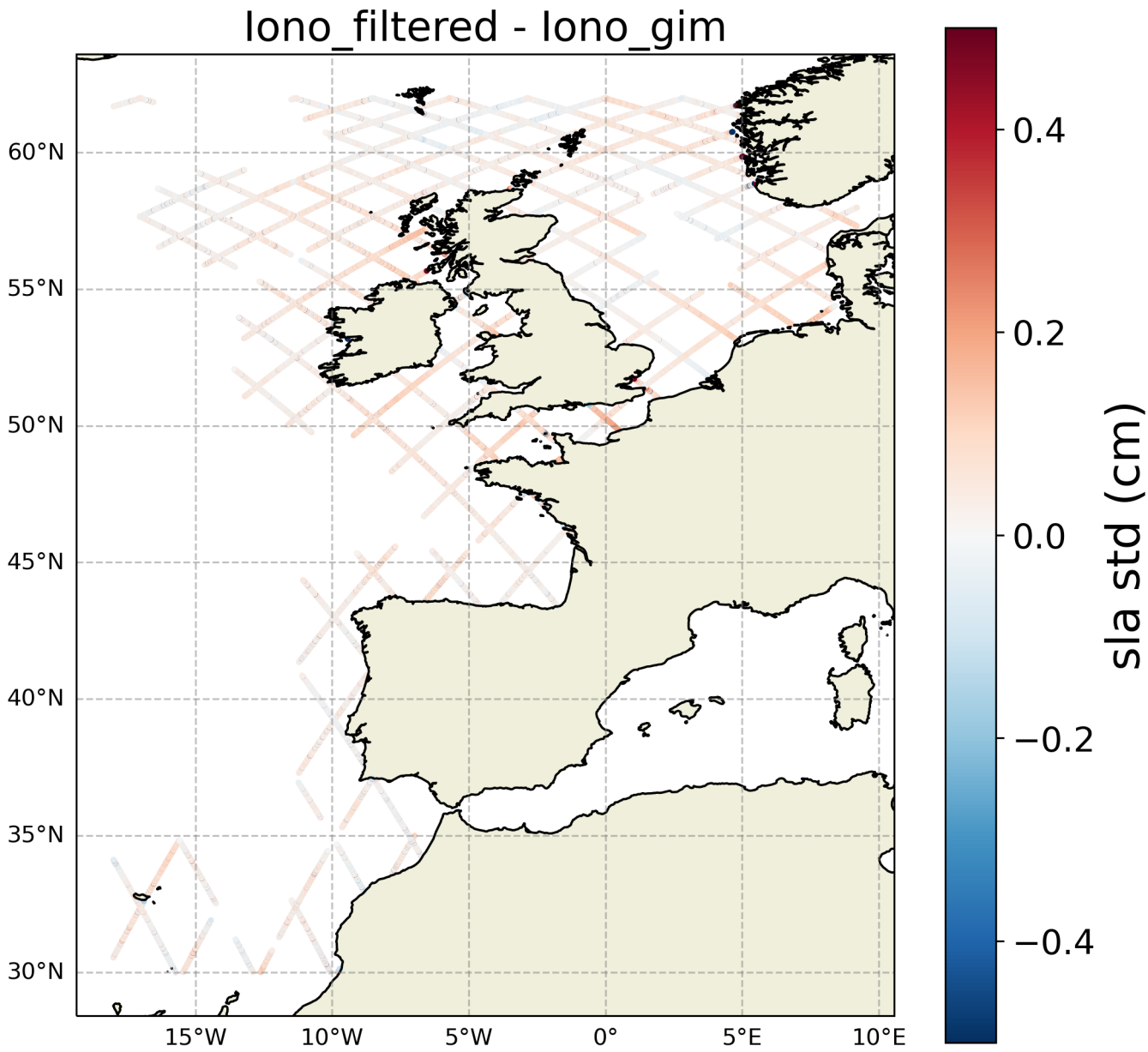

FIGURE 6 – Spatial coherence analysis of the Difference in sla 's std between Iono_filtered and Iono_gim

3.1.3 sla 's mean

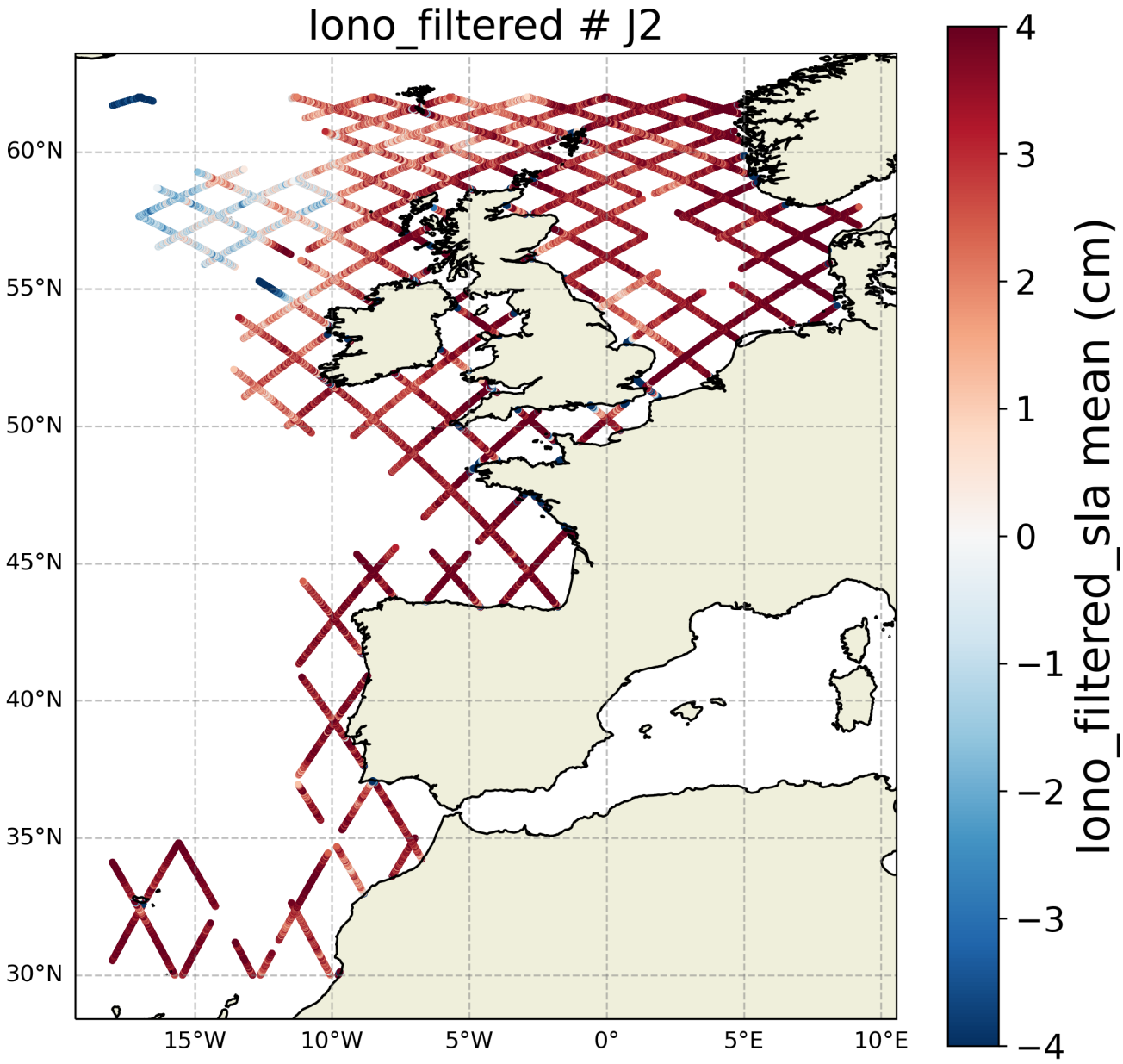

FIGURE 7 – Spatial coherence analysis of the mean of the Iono_filtered version of sla variable

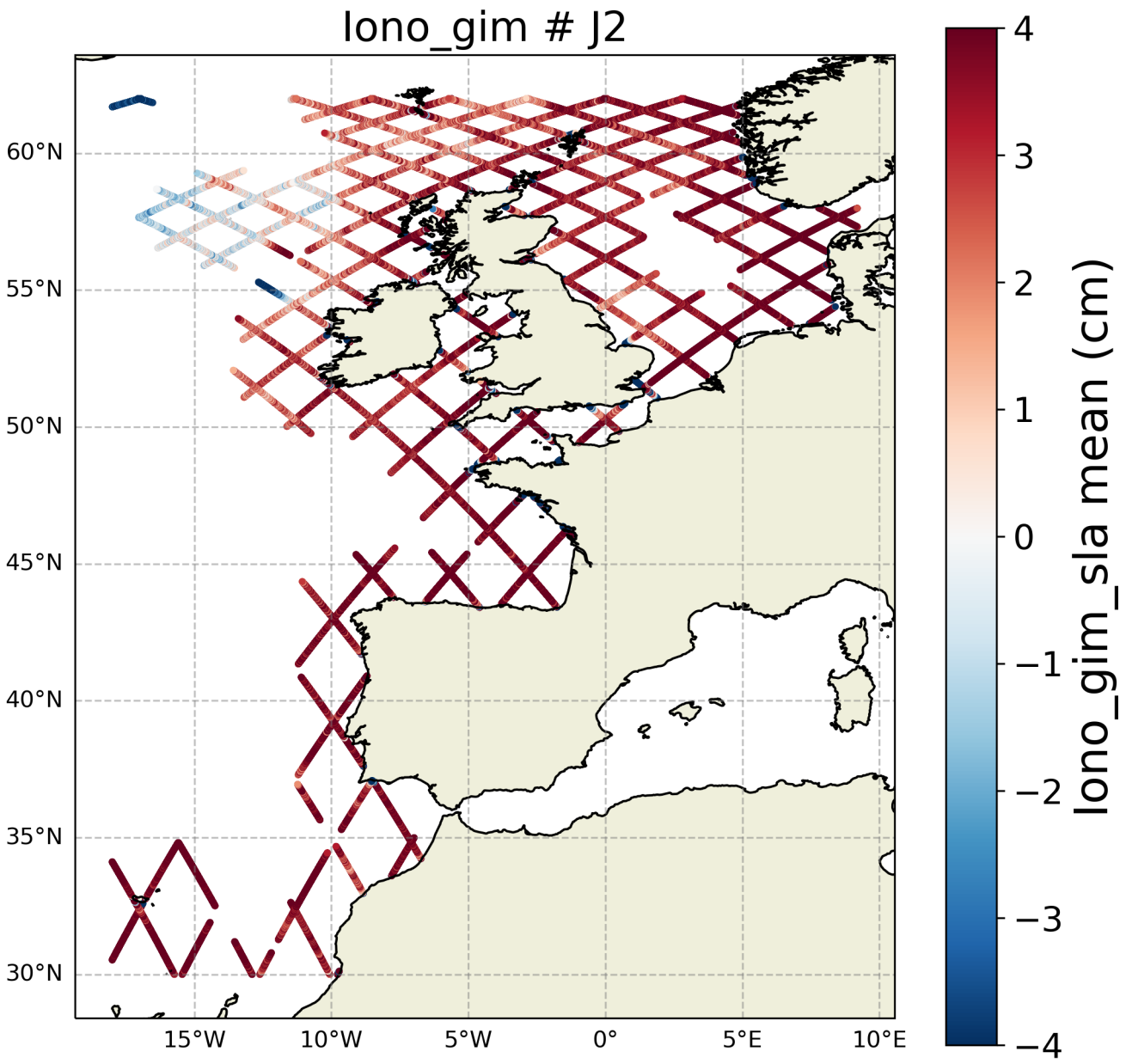

FIGURE 8 – Spatial coherence analysis of the mean of the Iono_gim version of sla variable

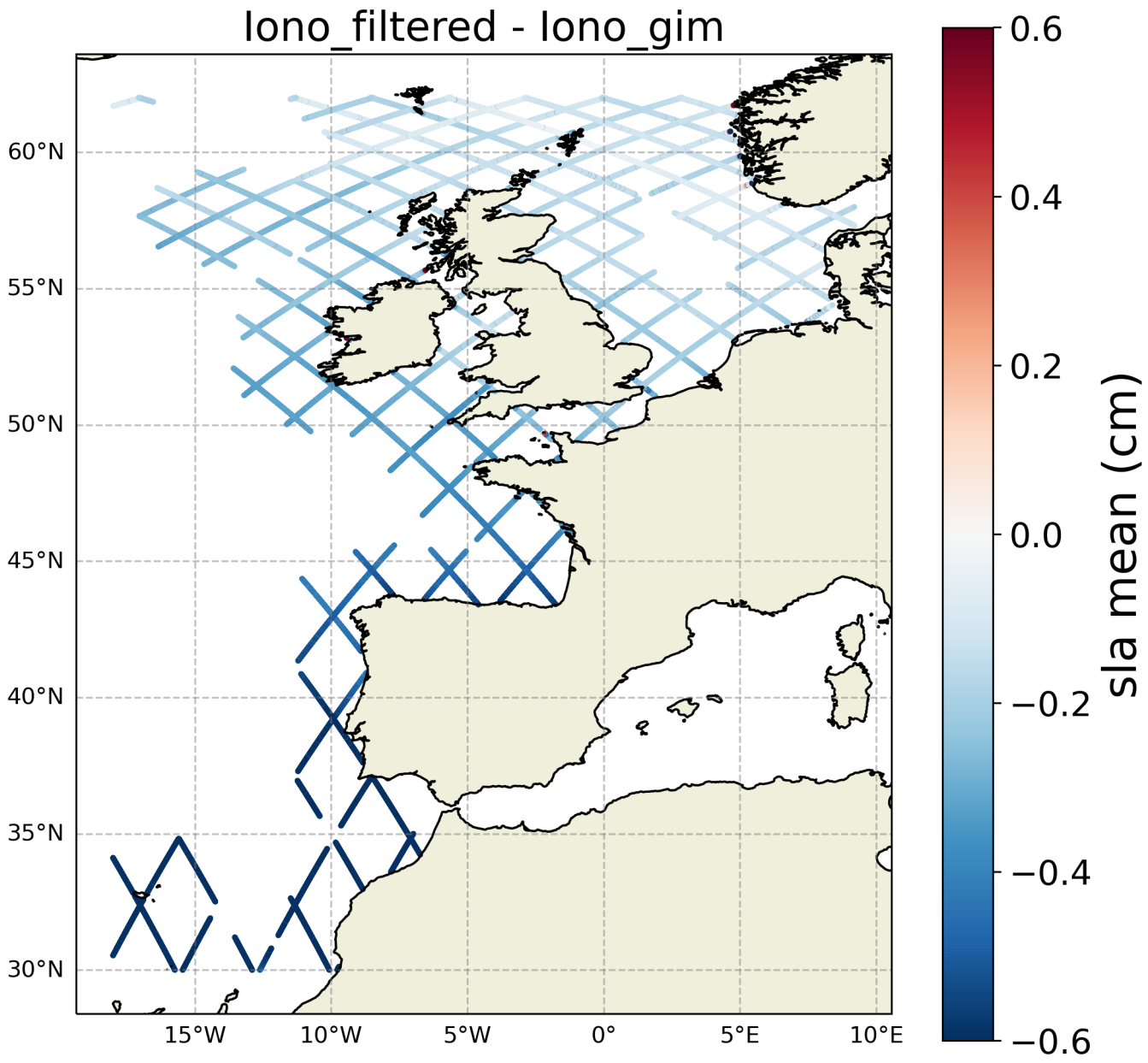

FIGURE 9 – Spatial coherence analysis of the Difference in sla 's mean between Iono_filtered and Iono_gim

3.2 Iono

3.2.1 Iono 's count

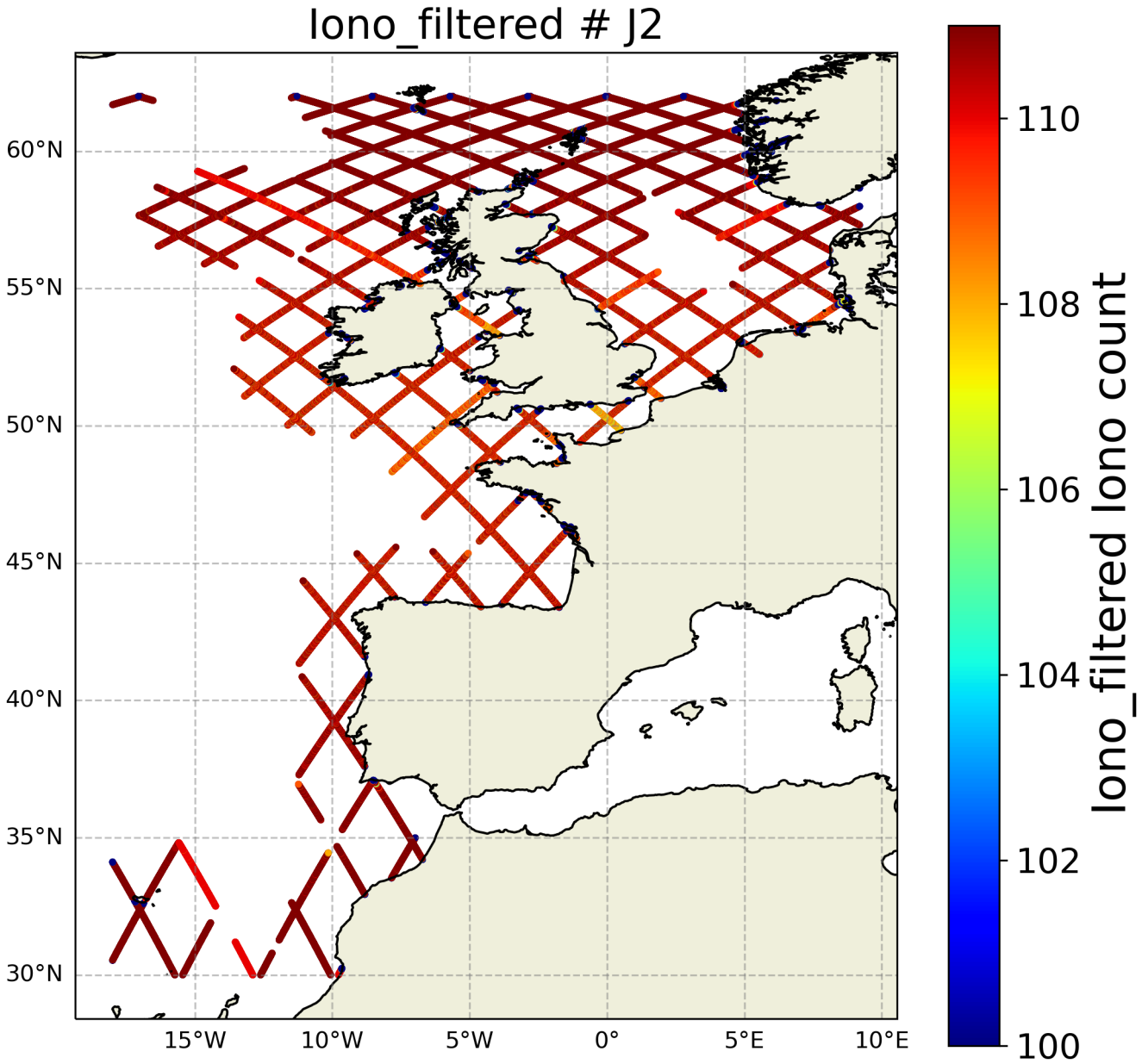

FIGURE 10 – Spatial coherence analysis of the count of the Iono_filtered version of Iono variable

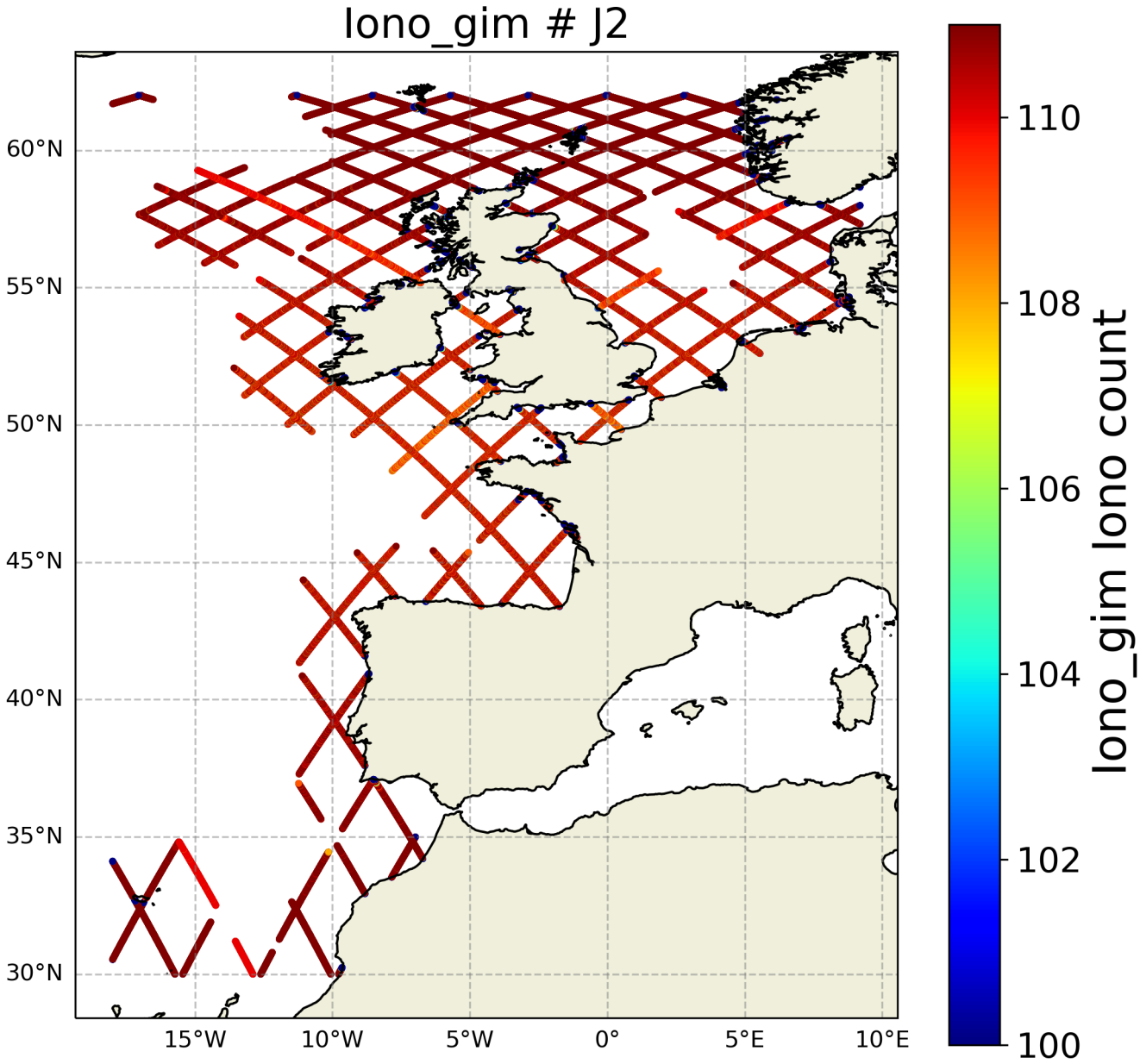

FIGURE 11 – Spatial coherence analysis of the count of the Iono_gim version of Iono variable

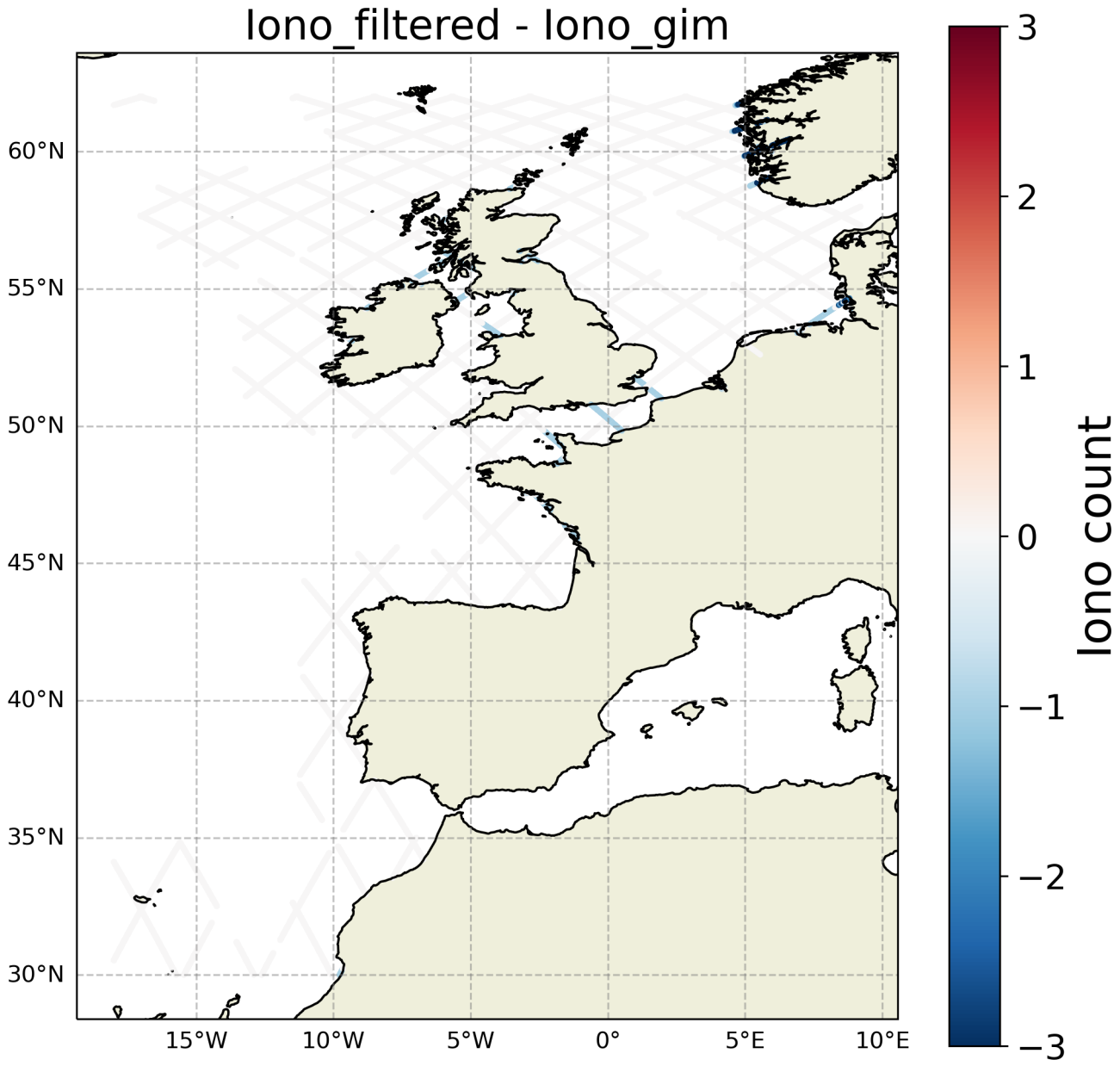

Figure 12 – Spatial coherence analysis of the Difference in Iono 's count between Iono_filtered and Iono_gim

3.2.2 Iono 's std

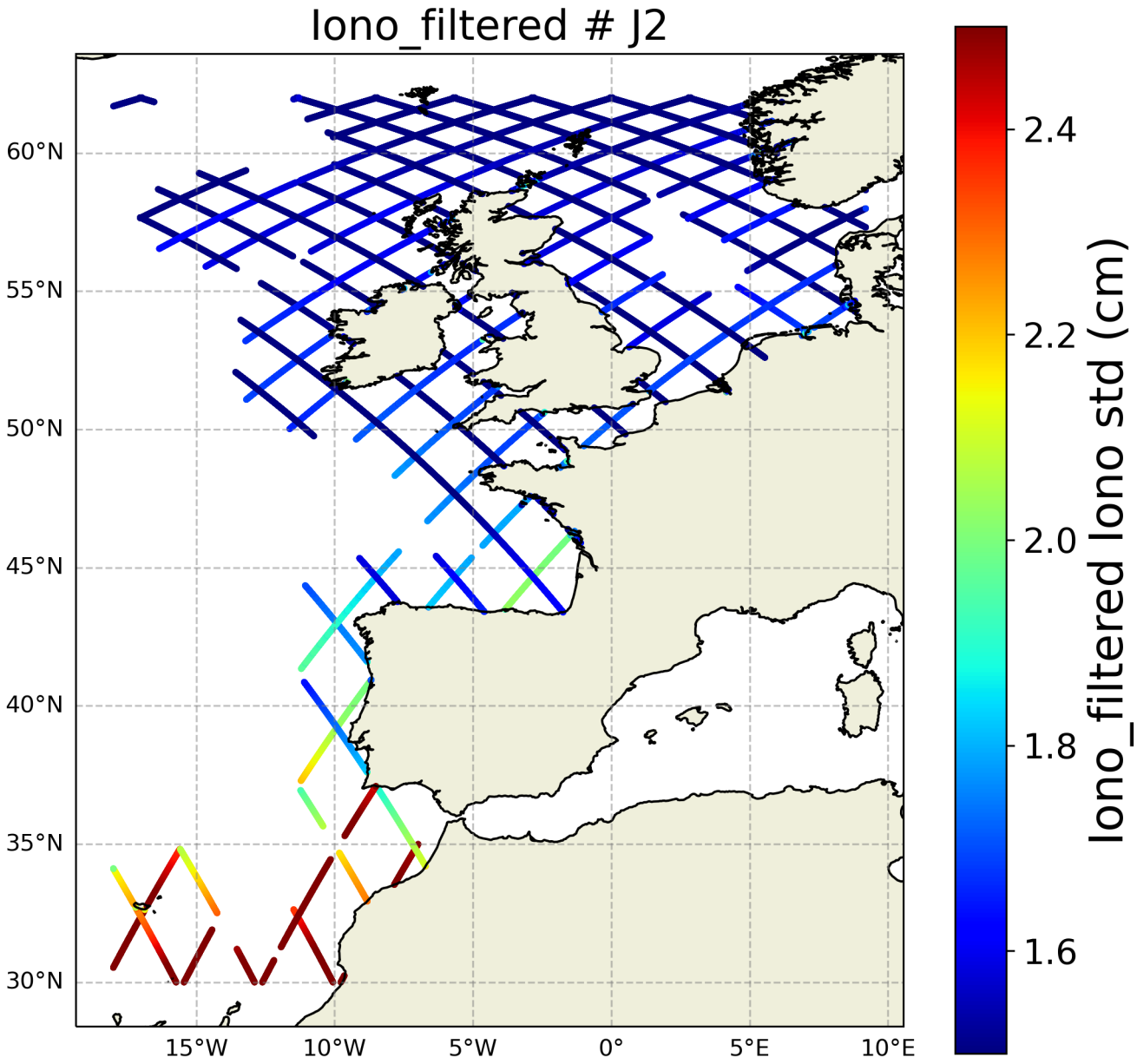

FIGURE 13 – Spatial coherence analysis of the std of the Iono_filtered version of Iono variable

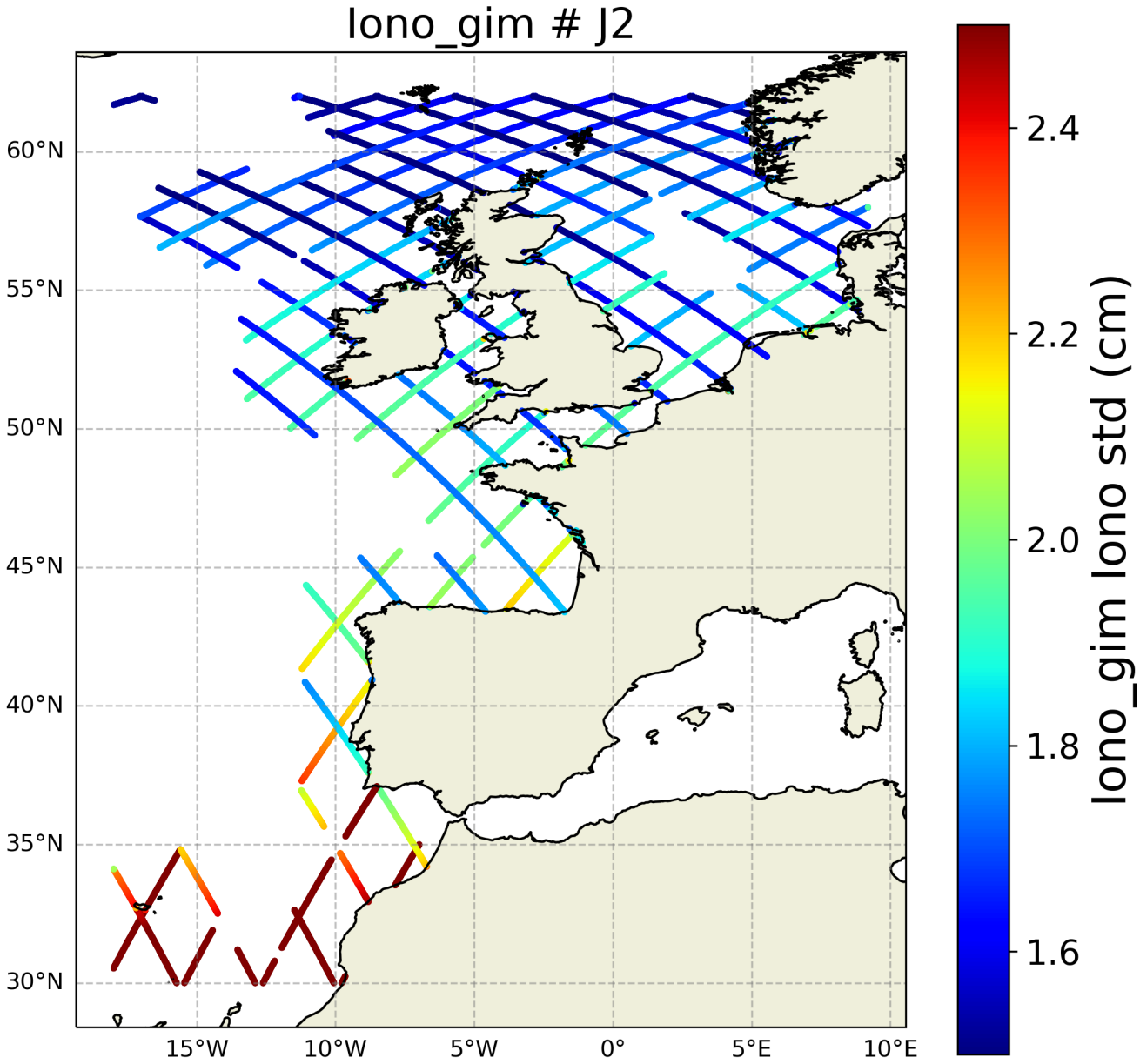

FIGURE 14 – Spatial coherence analysis of the std of the Iono_gim version of Iono variable

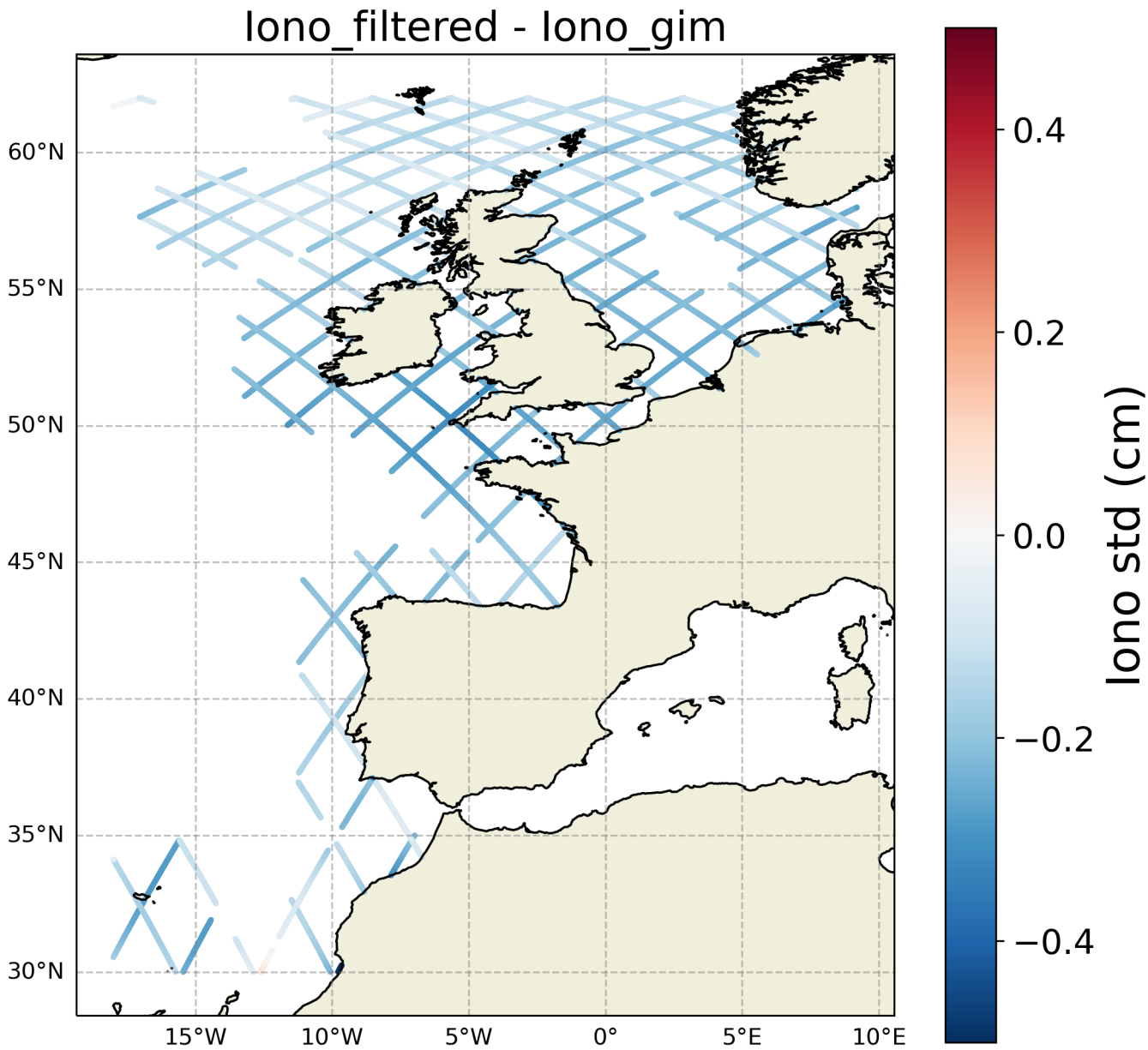

FIGURE 15 – Spatial coherence analysis of the Difference in Iono 's std between Iono_filtered and Iono_gim

3.2.3 Iono 's mean

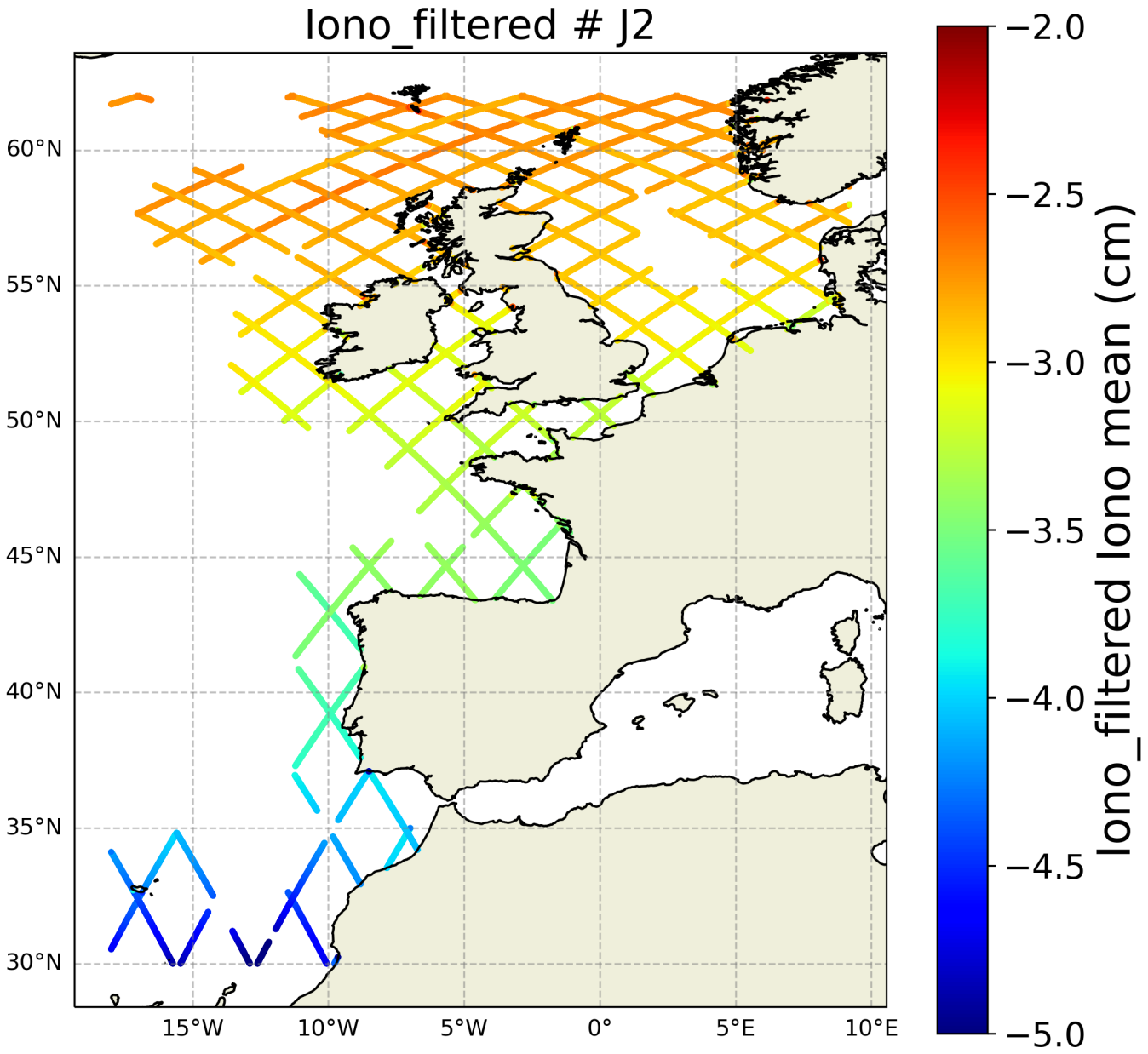

FIGURE 16 – Spatial coherence analysis of the mean of the Iono_filtered version of Iono variable

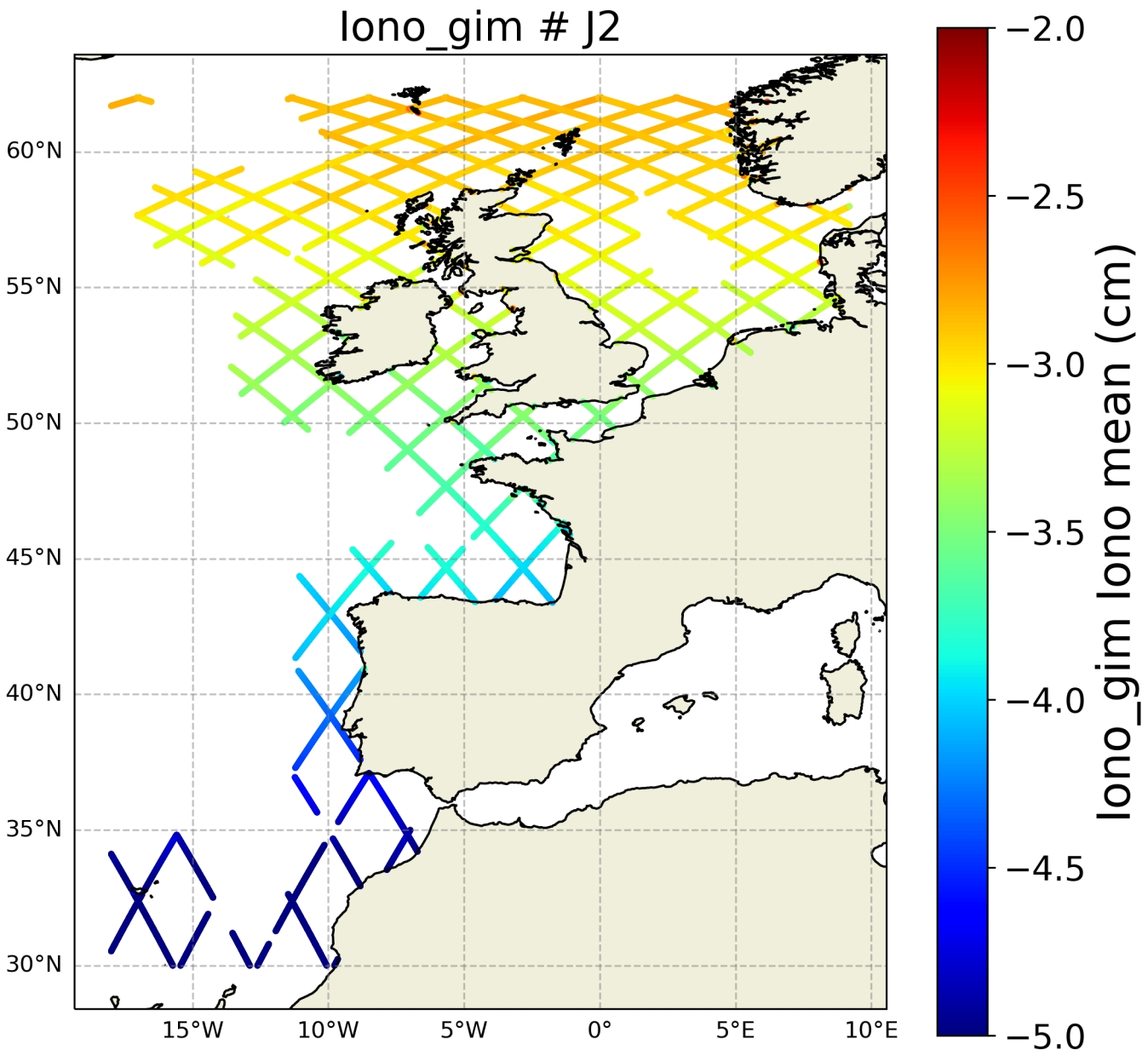

FIGURE 17 – Spatial coherence analysis of the mean of the Iono_gim version of Iono variable

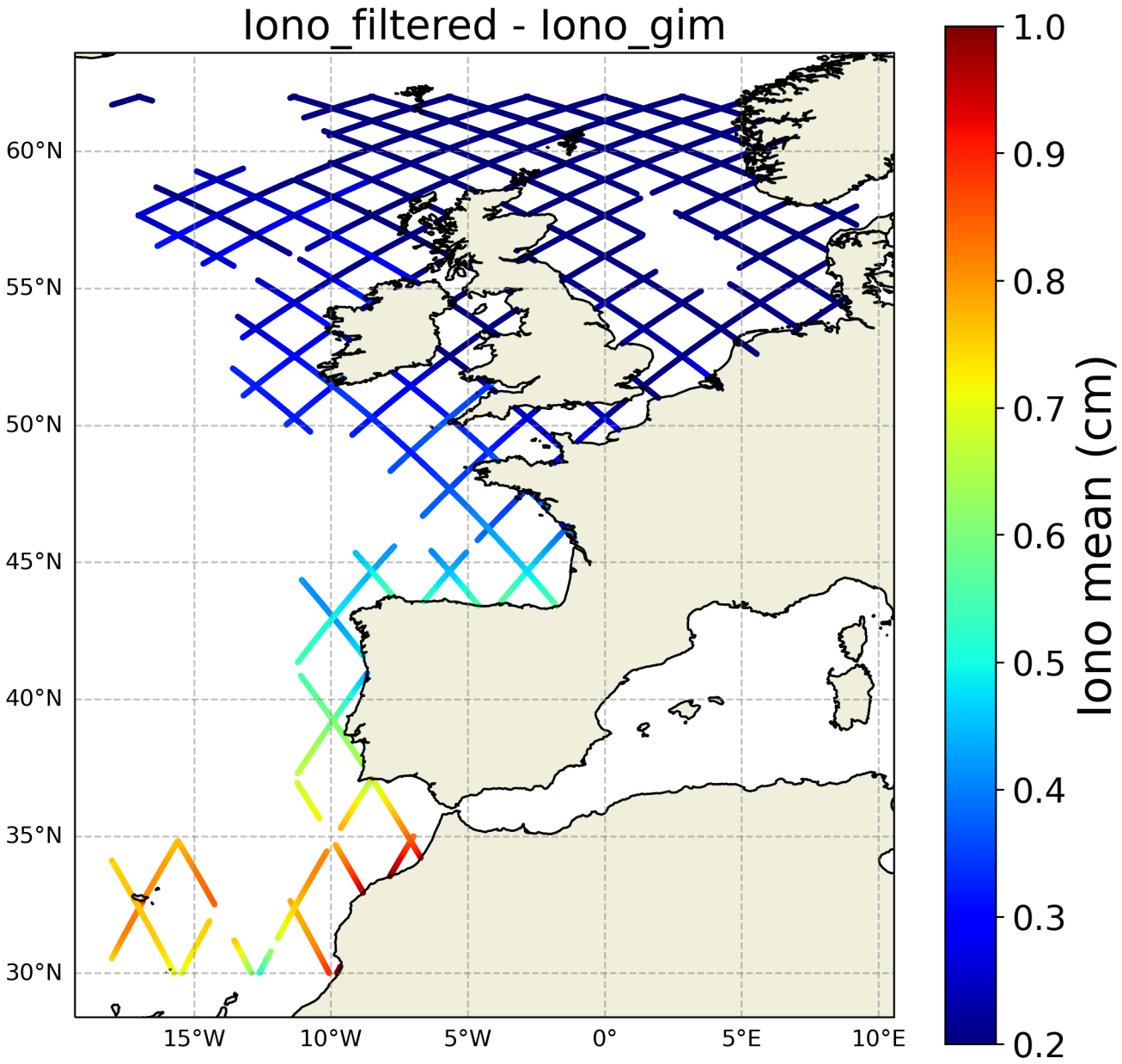

FIGURE 18 – Spatial coherence analysis of the Difference in Iono 's mean between Iono_filtered and Iono_gim

4 Histograms

4.1 Iono

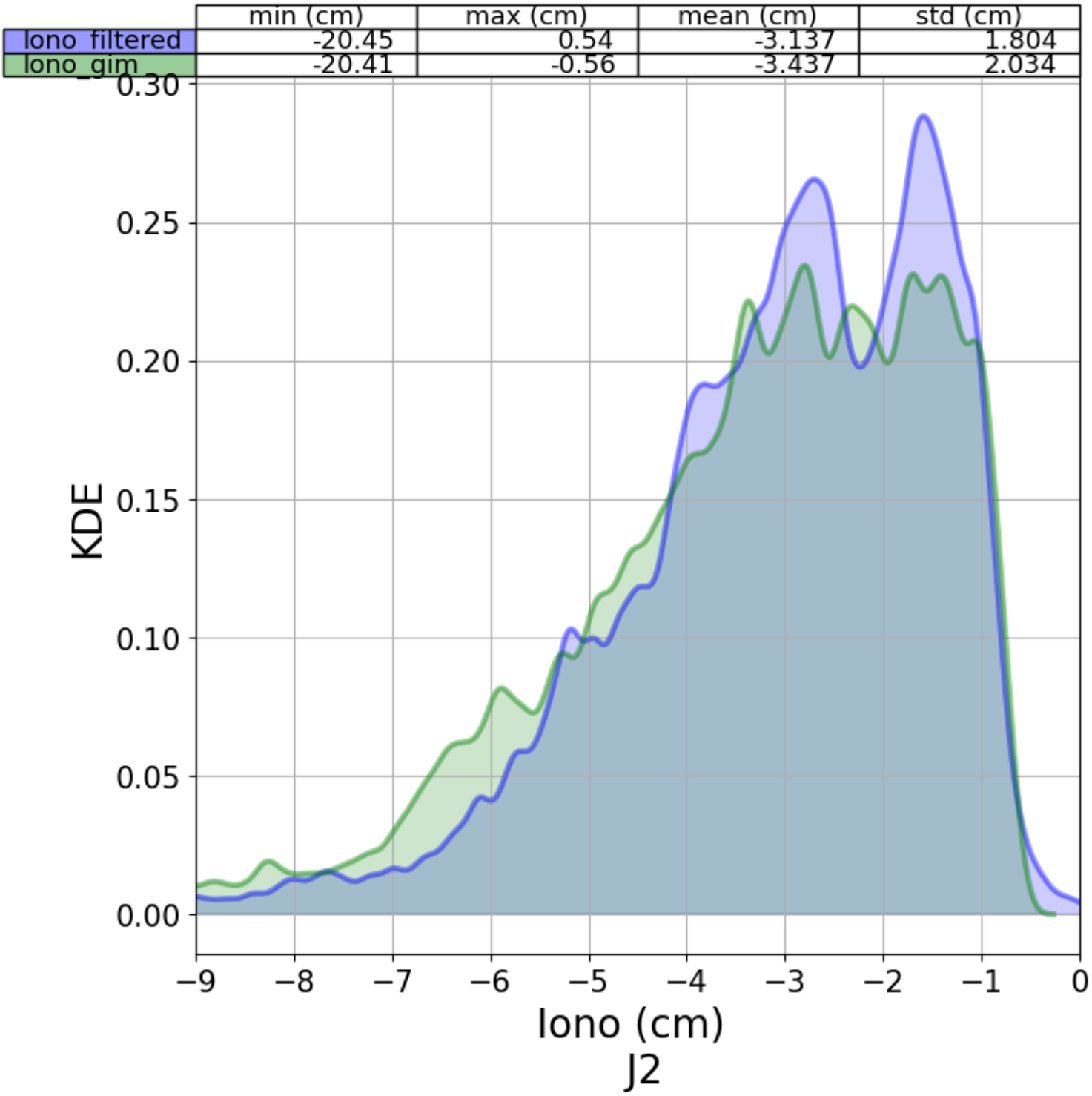

FIGURE 19 – Histogram of each of Iono version

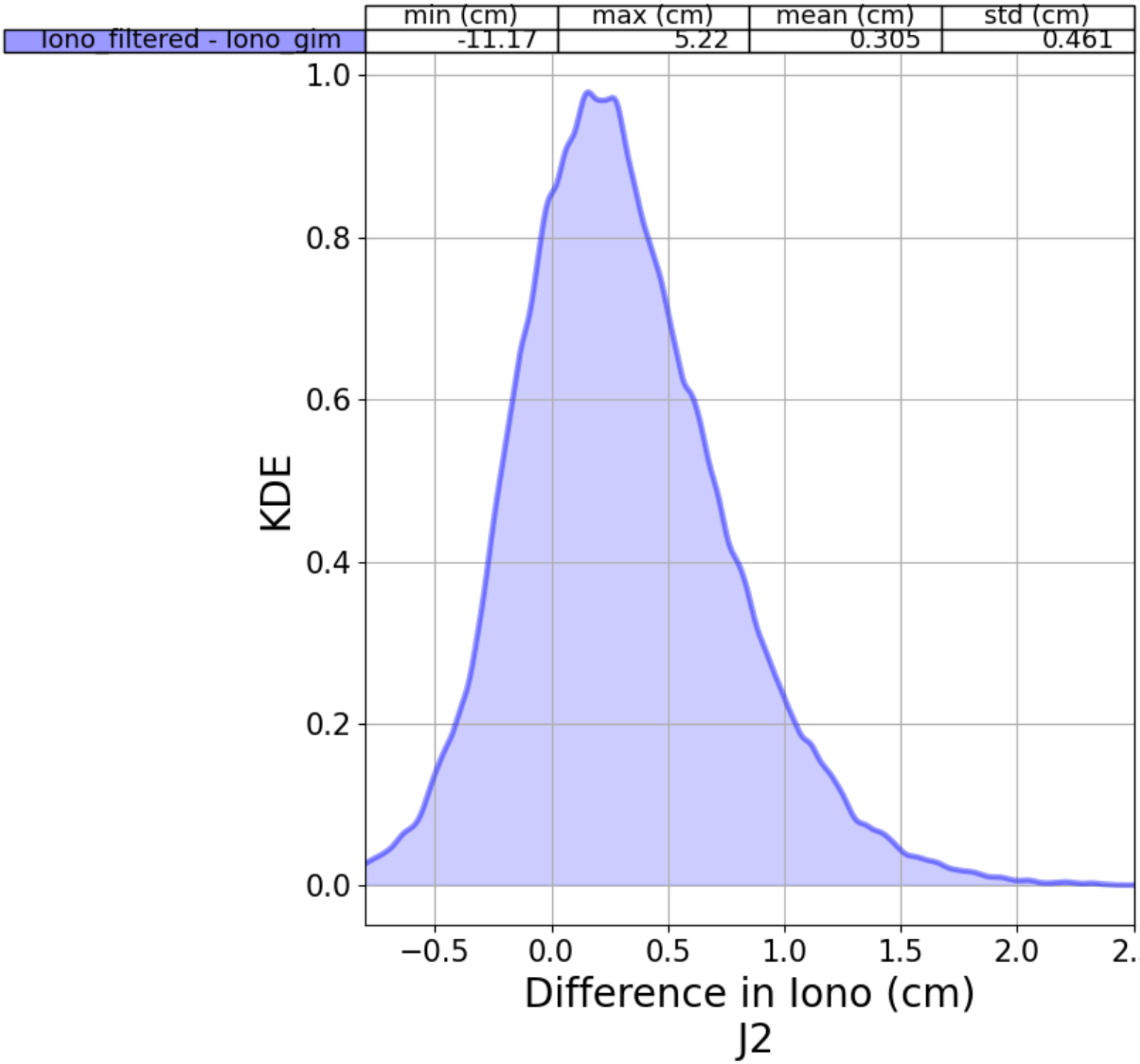

Figure 20 – Histograms of difference of each Iono version and reference one

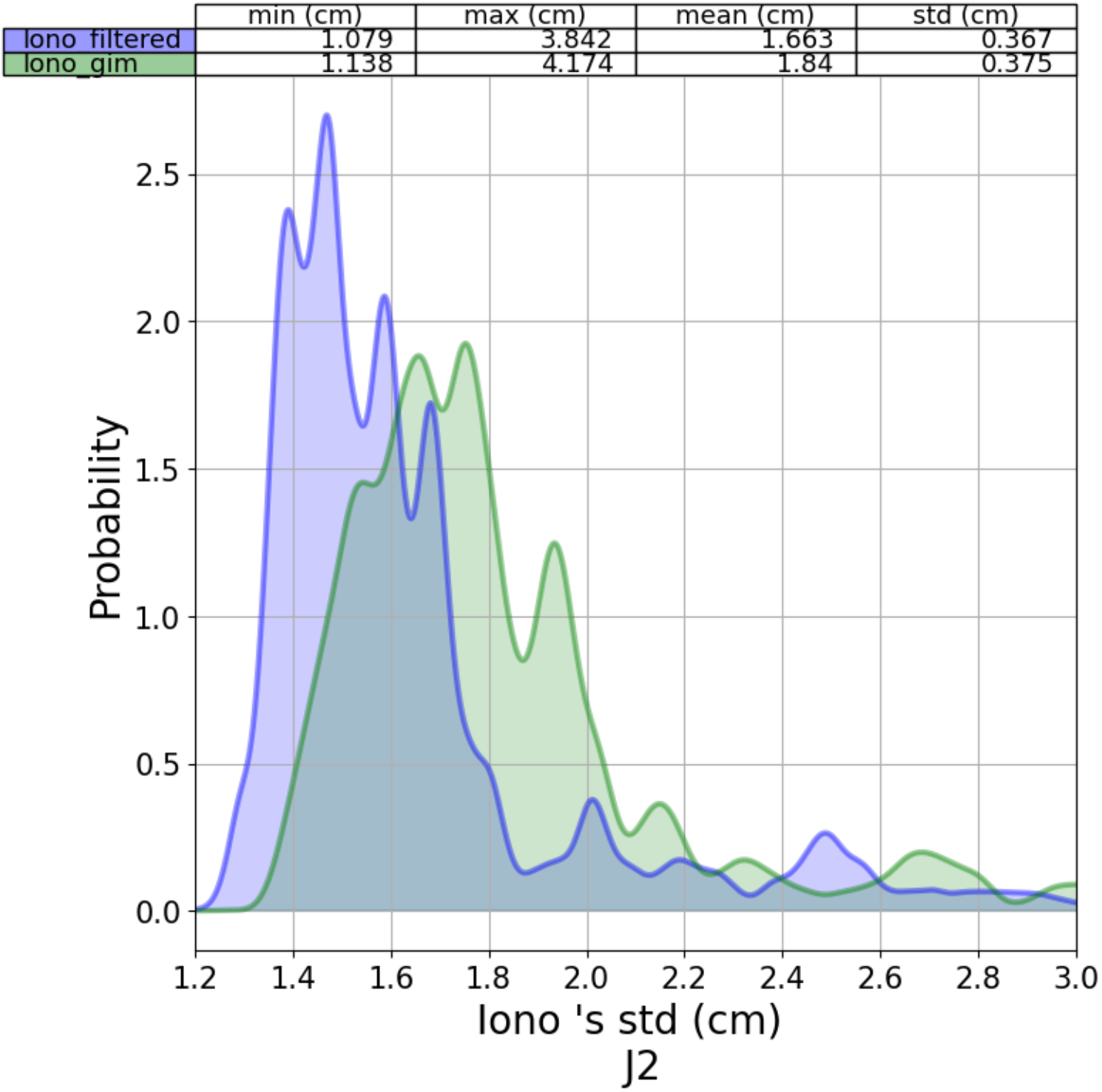

Figure 21 – Histograms of the standard deviation of each Iono version

4.2 sla

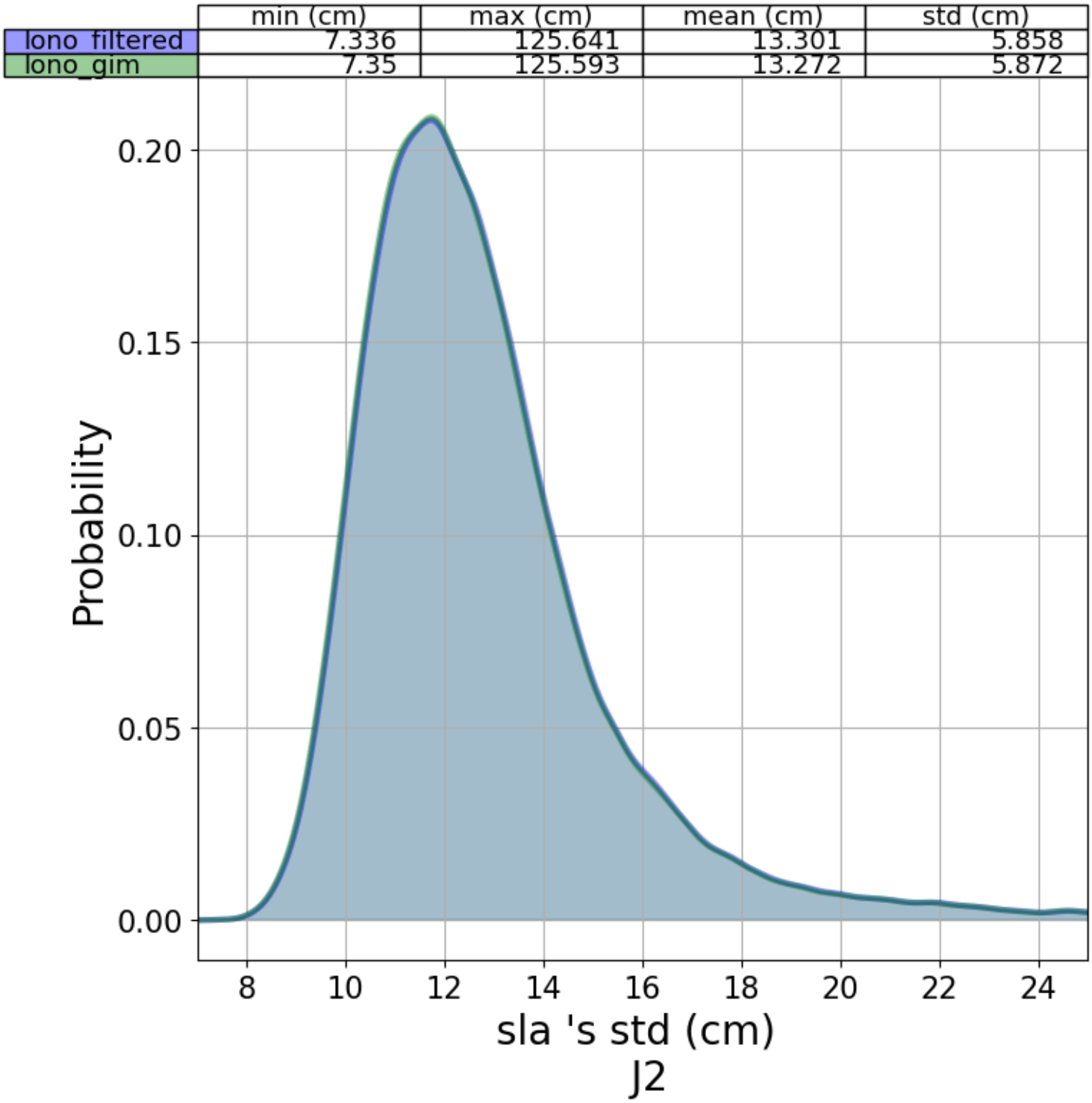

FIGURE 22 – Histograms of the standard deviation of each sla version

5 Along-track analysis

5.1 Iono

5.1.1 Iono 's count

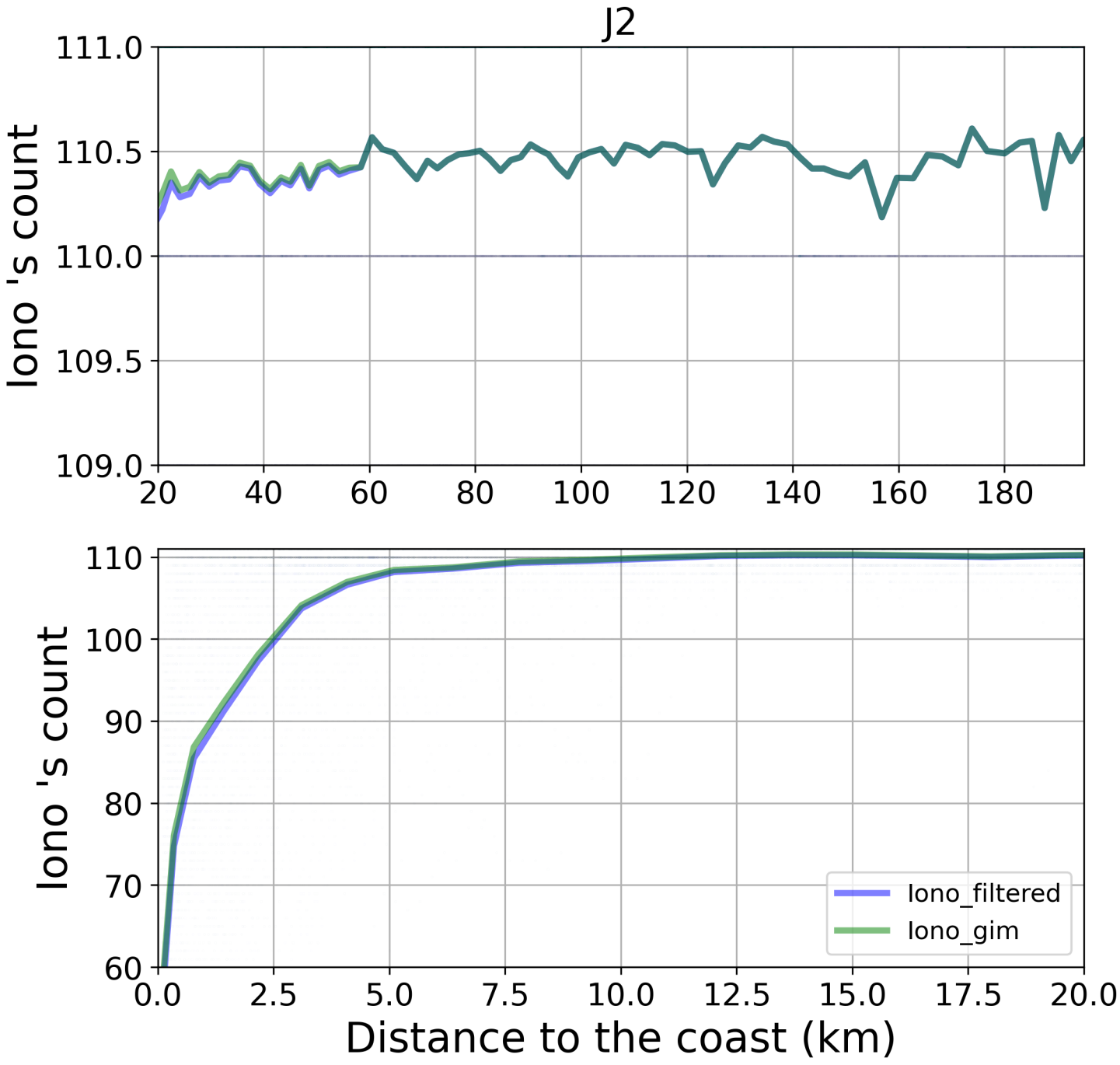

FIGURE 23 – Along-track analysis of Iono 's count

5.1.2 Iono 's std

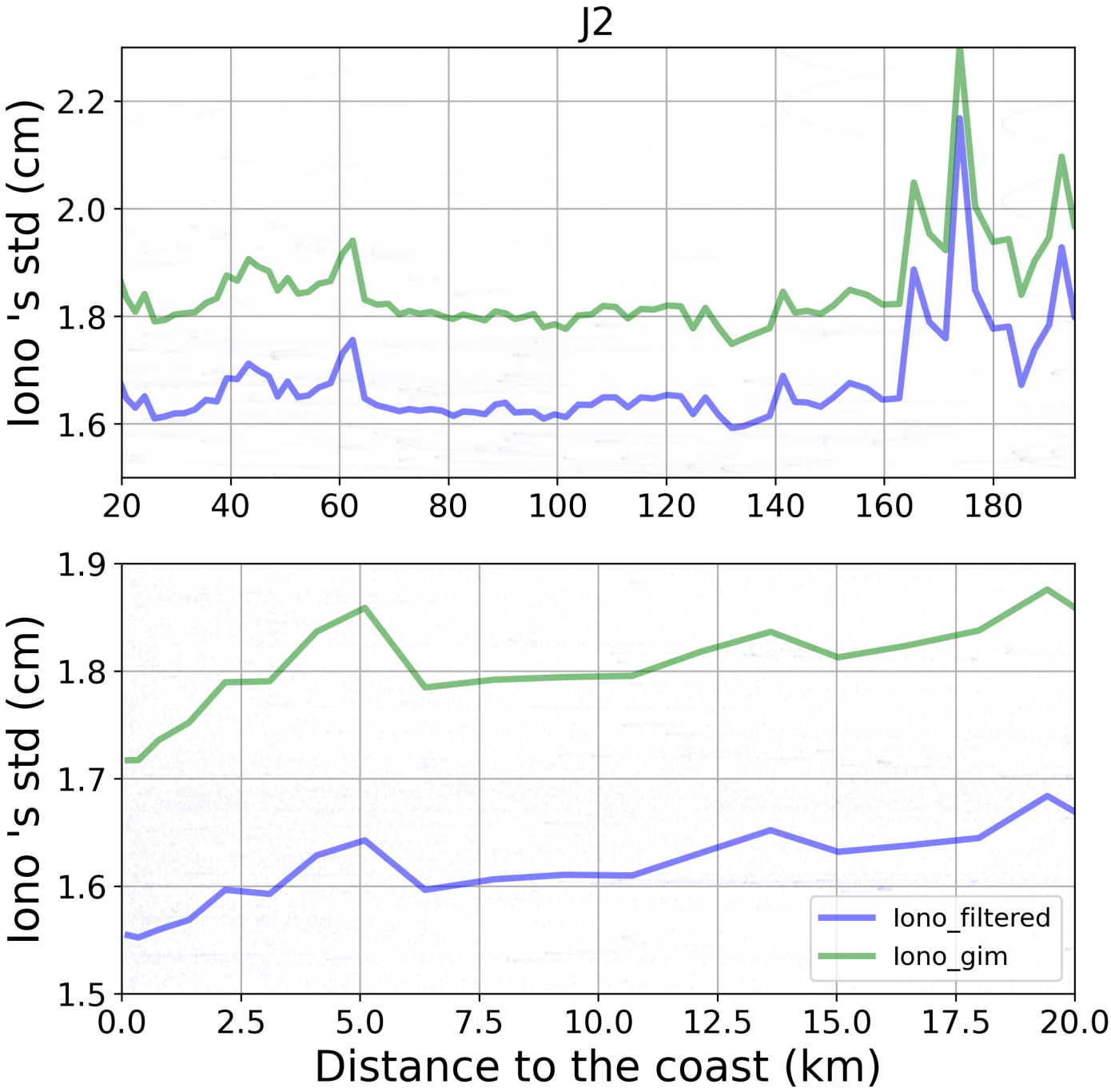

FIGURE 24 – Along-track analysis of Iono 's std

5.1.3 Iono 's mean

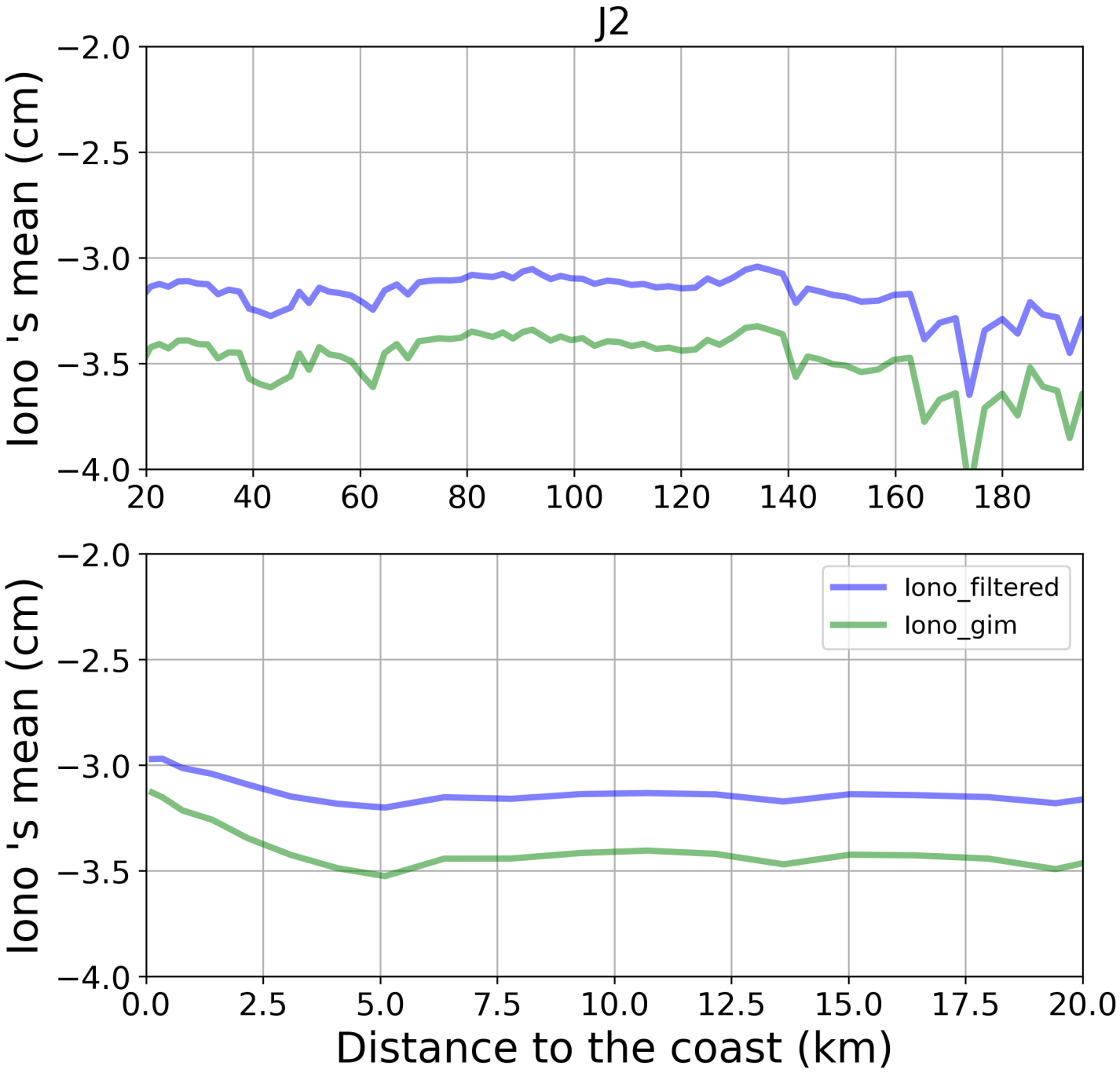

FIGURE 25 – Along-track analysis of Iono 's mean

5.2 sla

5.2.1 sla 's count

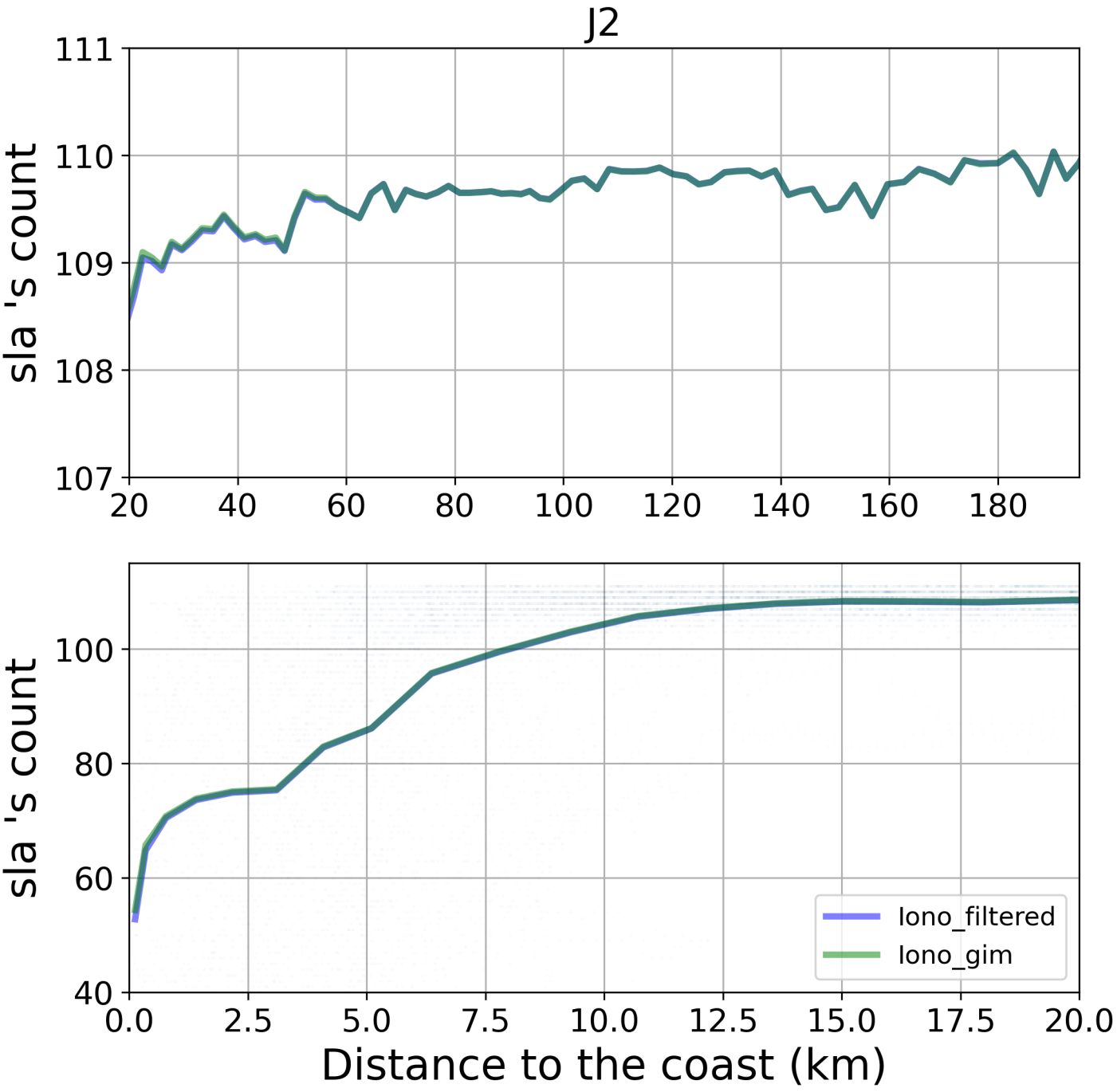

Figure 26 – Along-track analysis of sla 's count

5.2.2 sla 's std

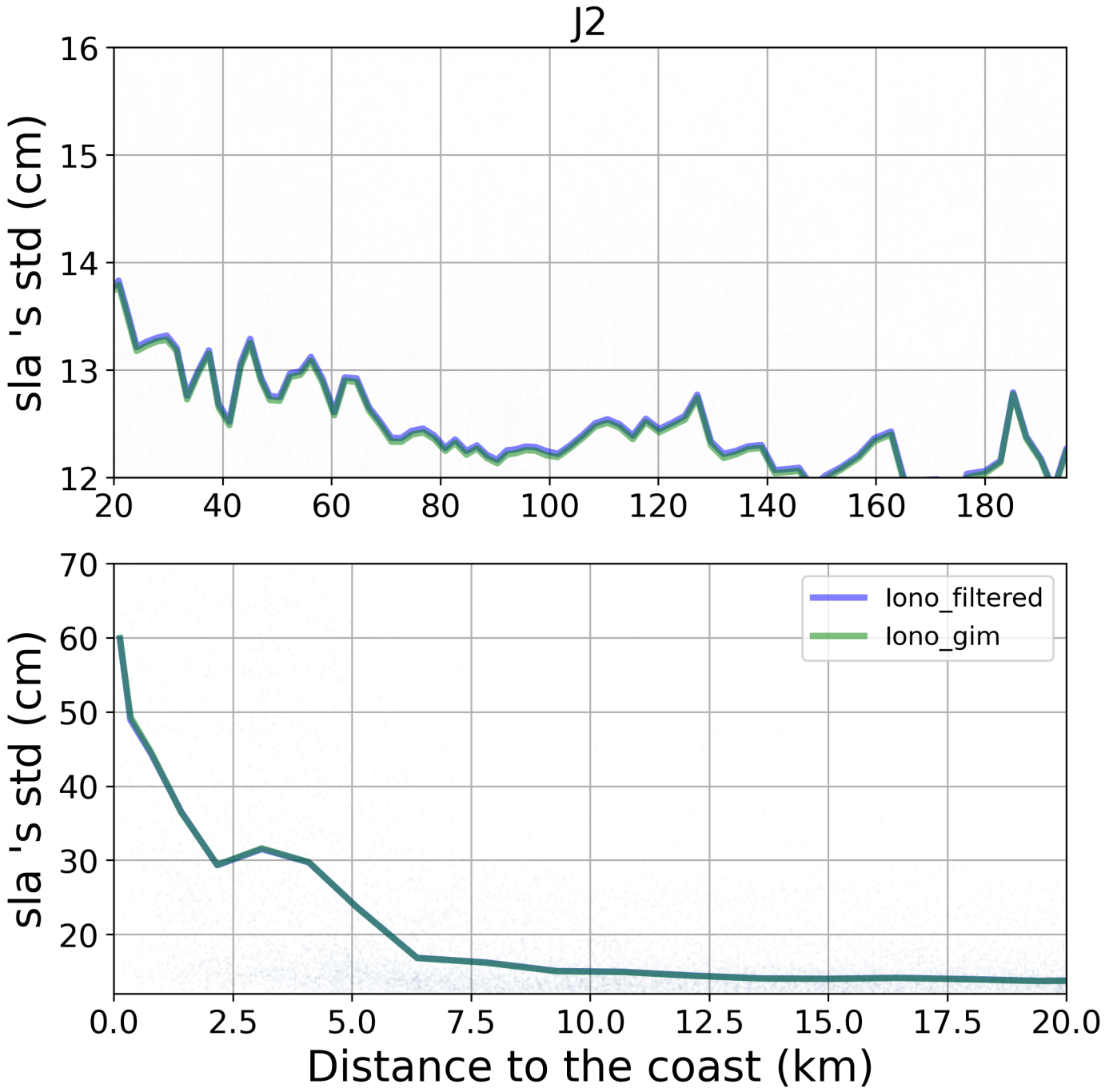

Figure 27 – Along-track analysis of sla 's std

5.2.3 sla 's mean

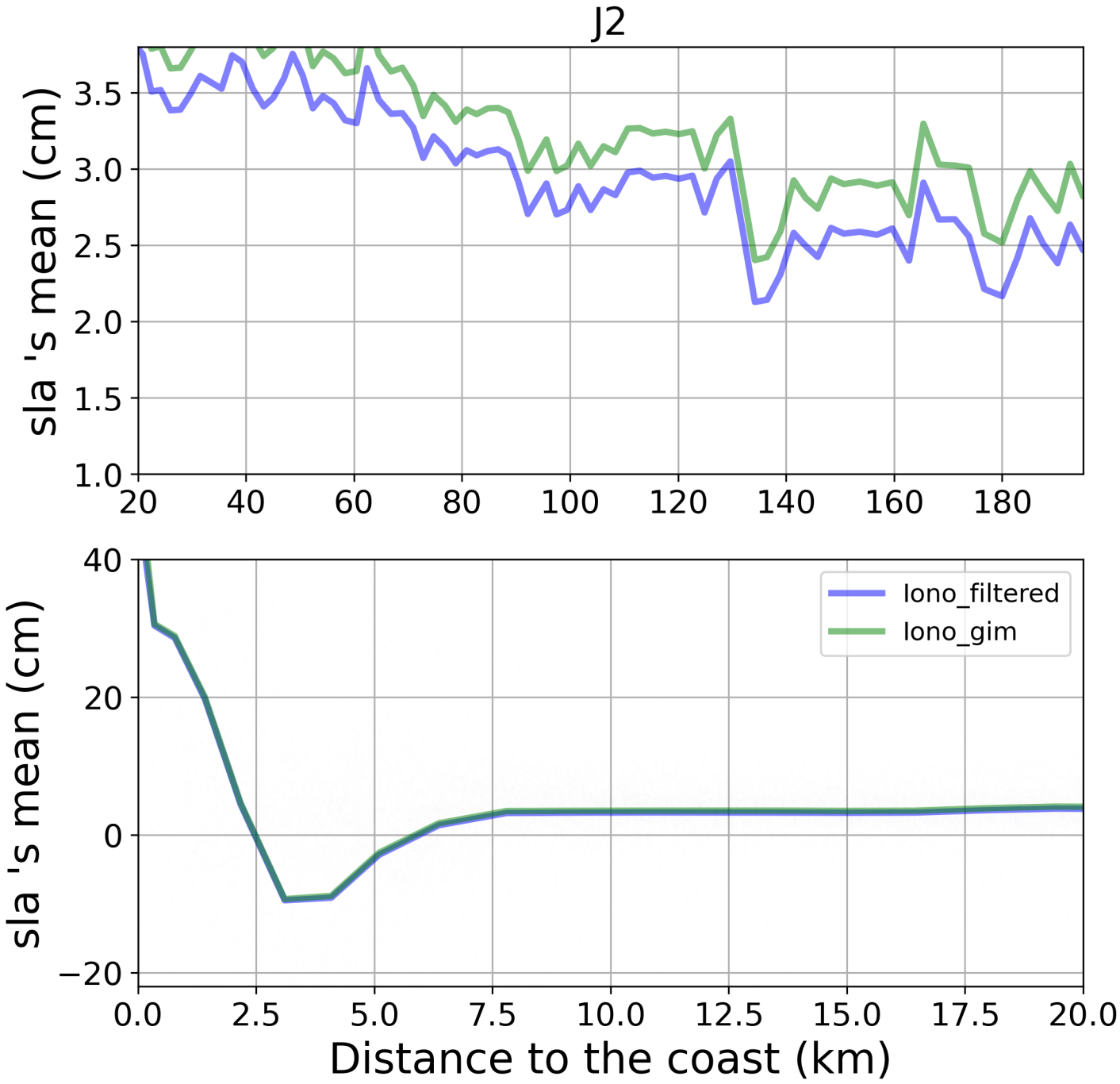

FIGURE 28 – Along-track analysis of sla 's mean

6 Comparison with Insitu Data (Tide Gauge)

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

6.1 Station : HERBAUDIERE

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

6.1.1 correlation visualization in maps view % HERBAUDIERE tide gauge

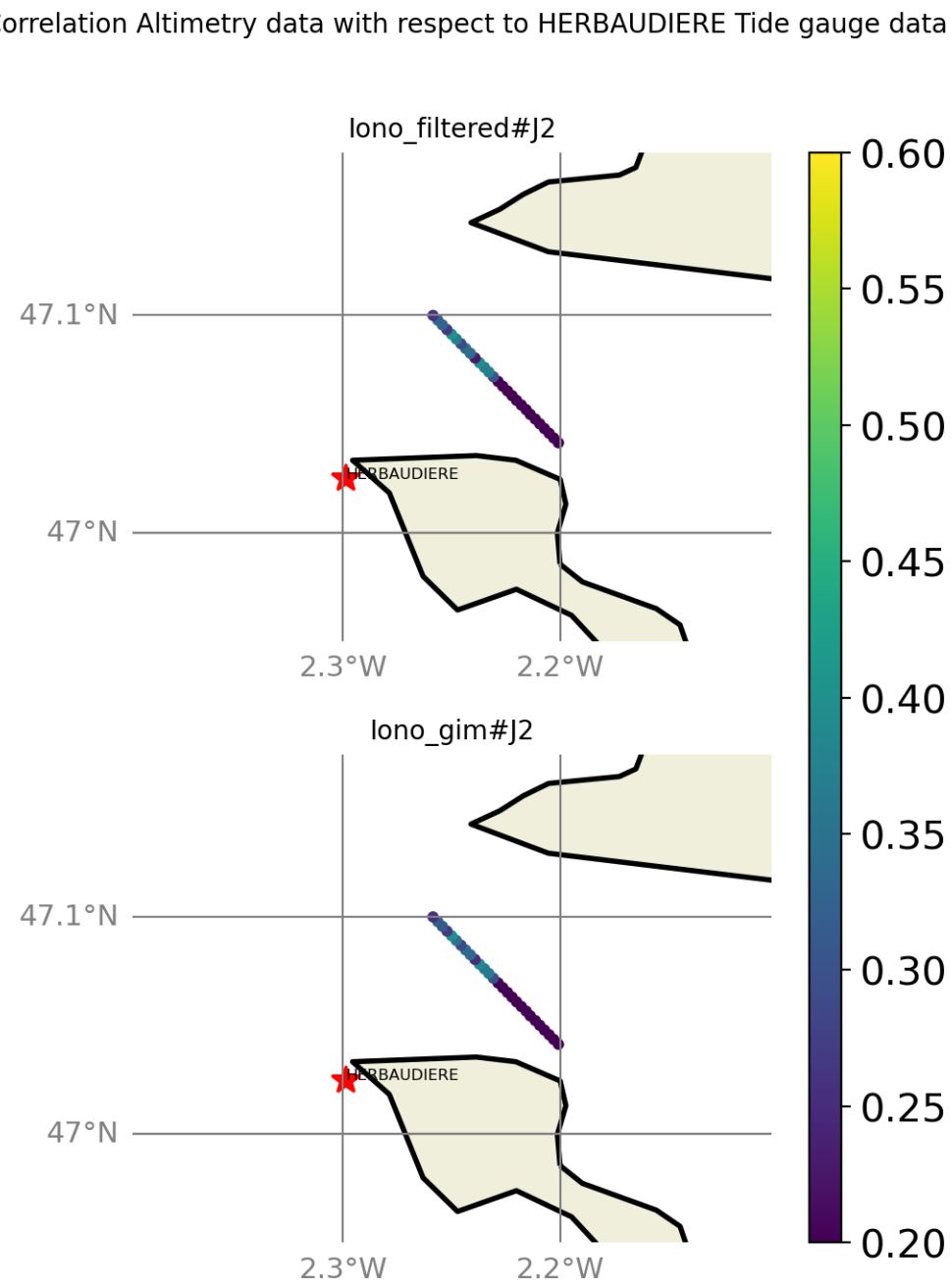

Figure 29 – correlation visualization in maps view % HERBAUDIERE tide gauge

6.1.2 rmsd visualization in maps view % HERBAUDIERE tide gauge

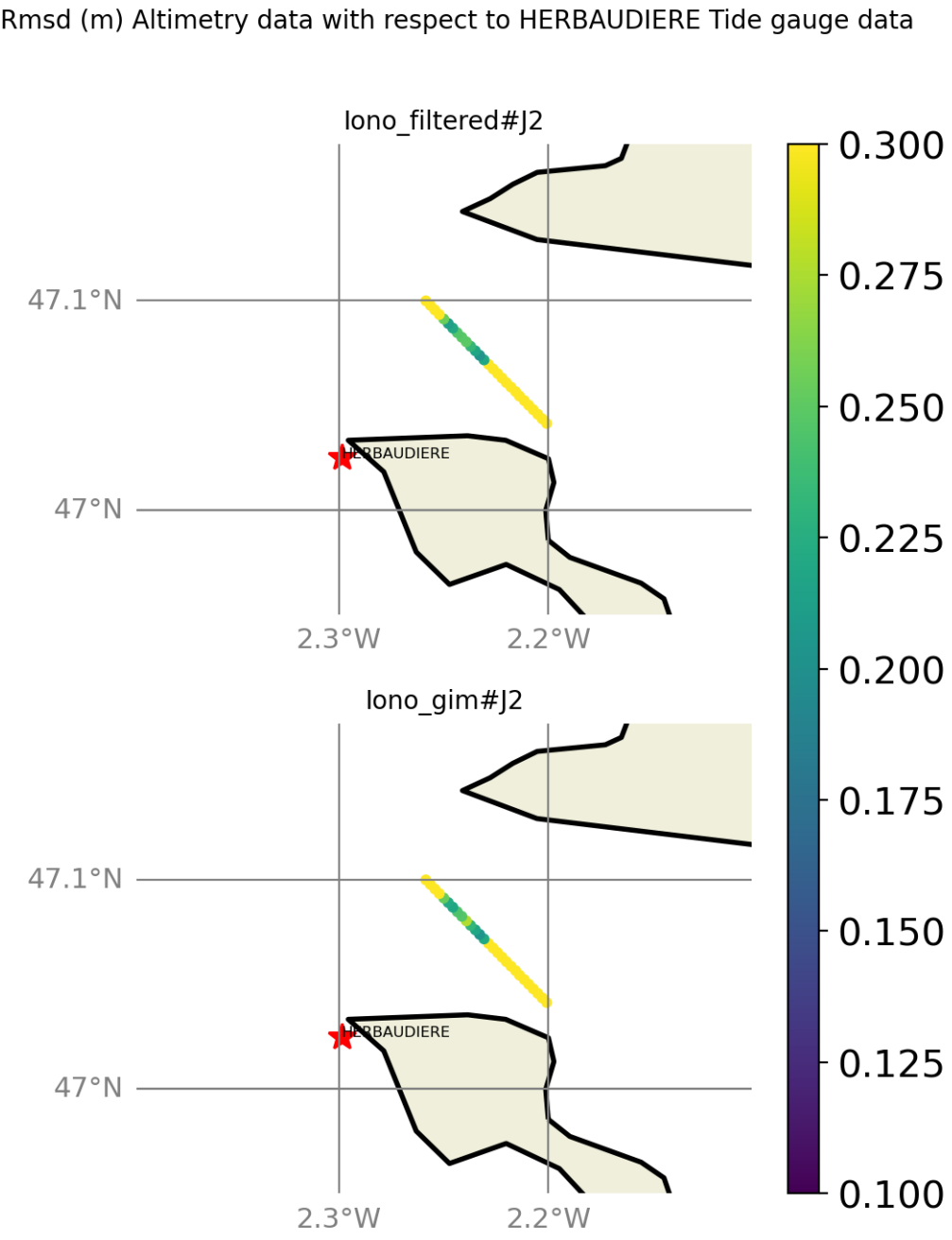

FIGURE 30 – rmsd visualization in maps view % HERBAUDIERE tide gauge

6.1.3 std visualization in maps view % HERBAUDIERE tide gauge

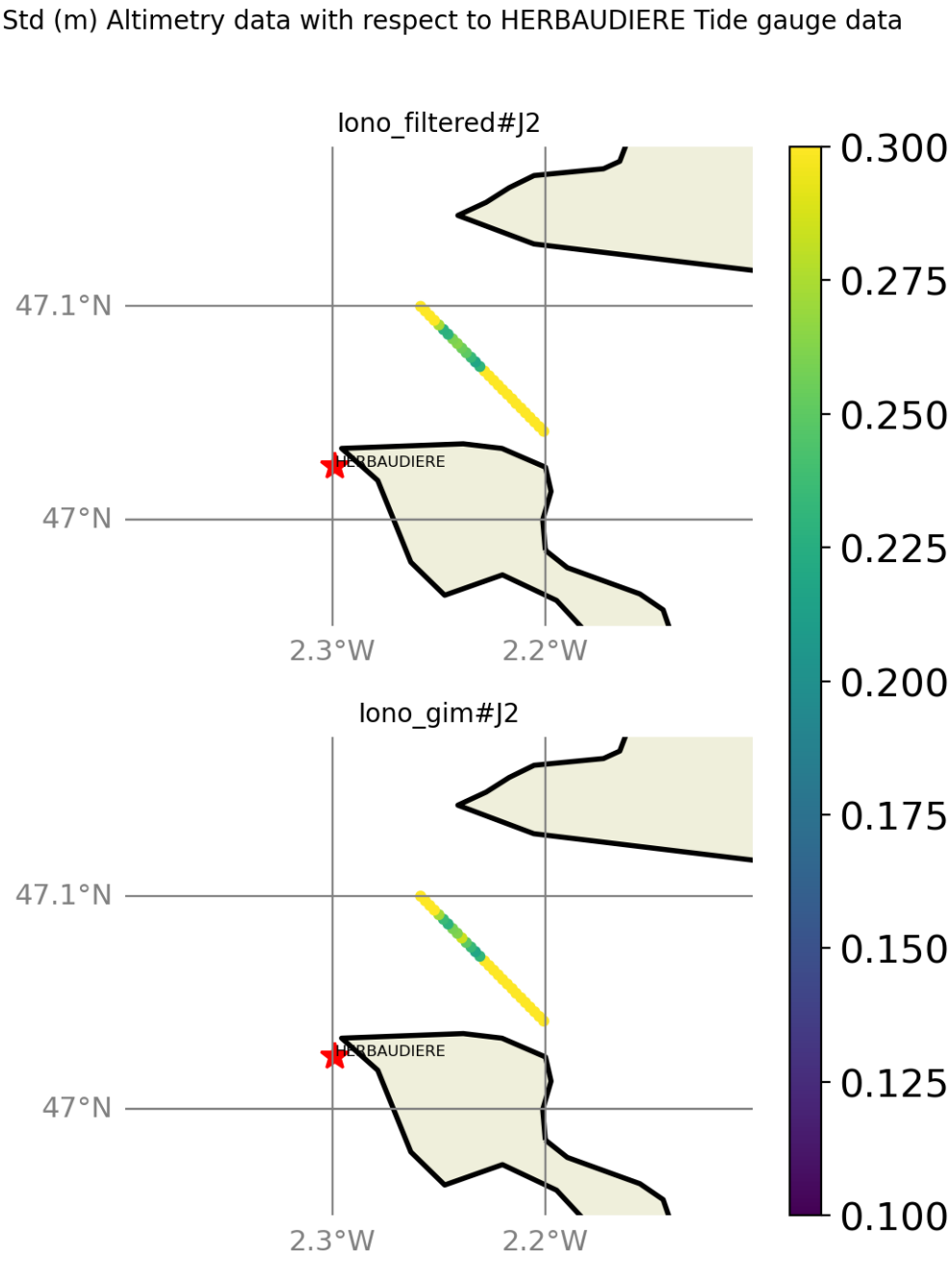

FIGURE 31 – std visualization in maps view % HERBAUDIERE tide gauge

6.1.4 valid_data_percent visualization in maps view % HERBAUDIERE tide gauge

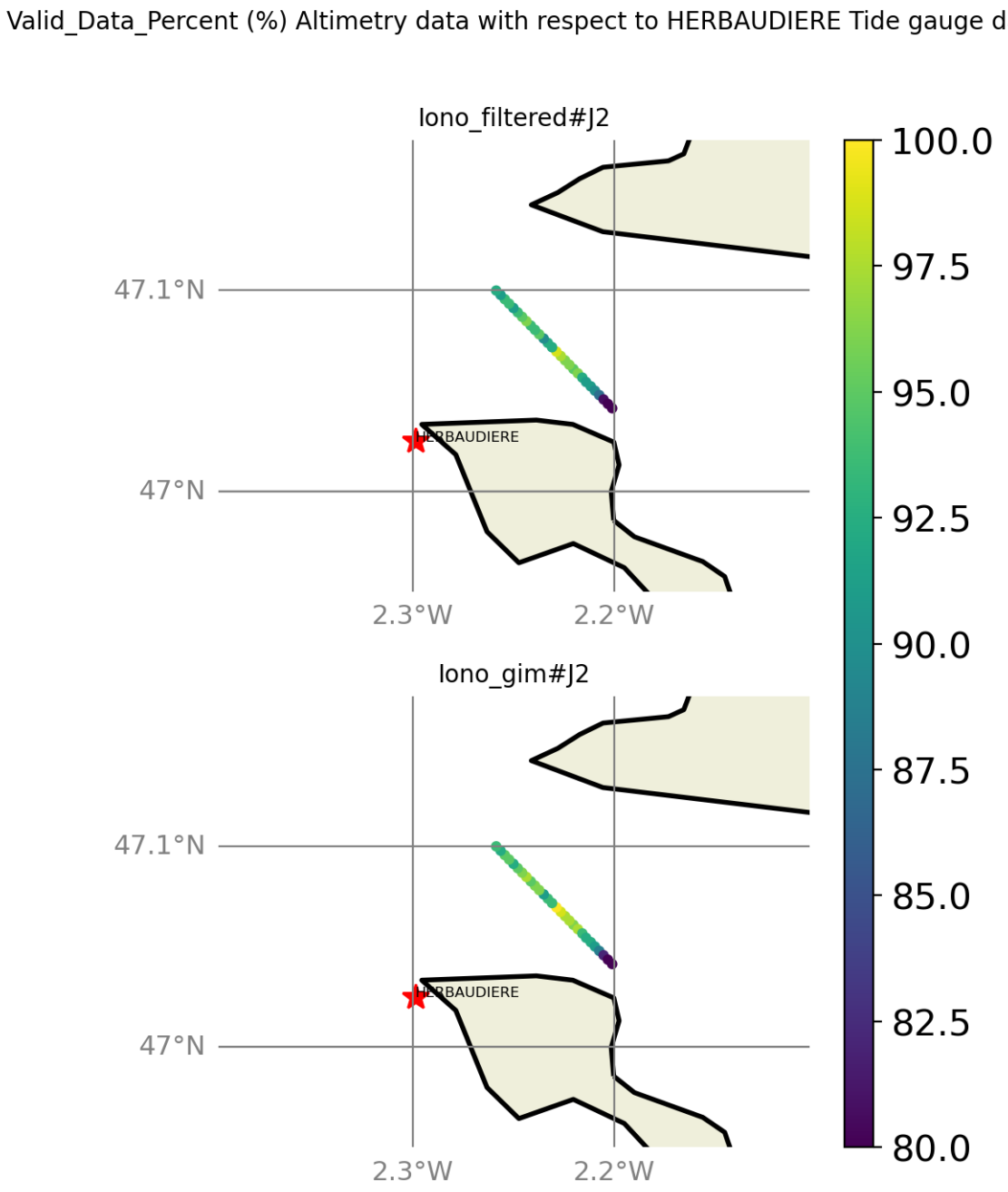

FIGURE 32 – valid_data_percent visualization in maps view % HERBAUDIERE tide gauge

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

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

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

Where *pvd* and *nvd* are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 78$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

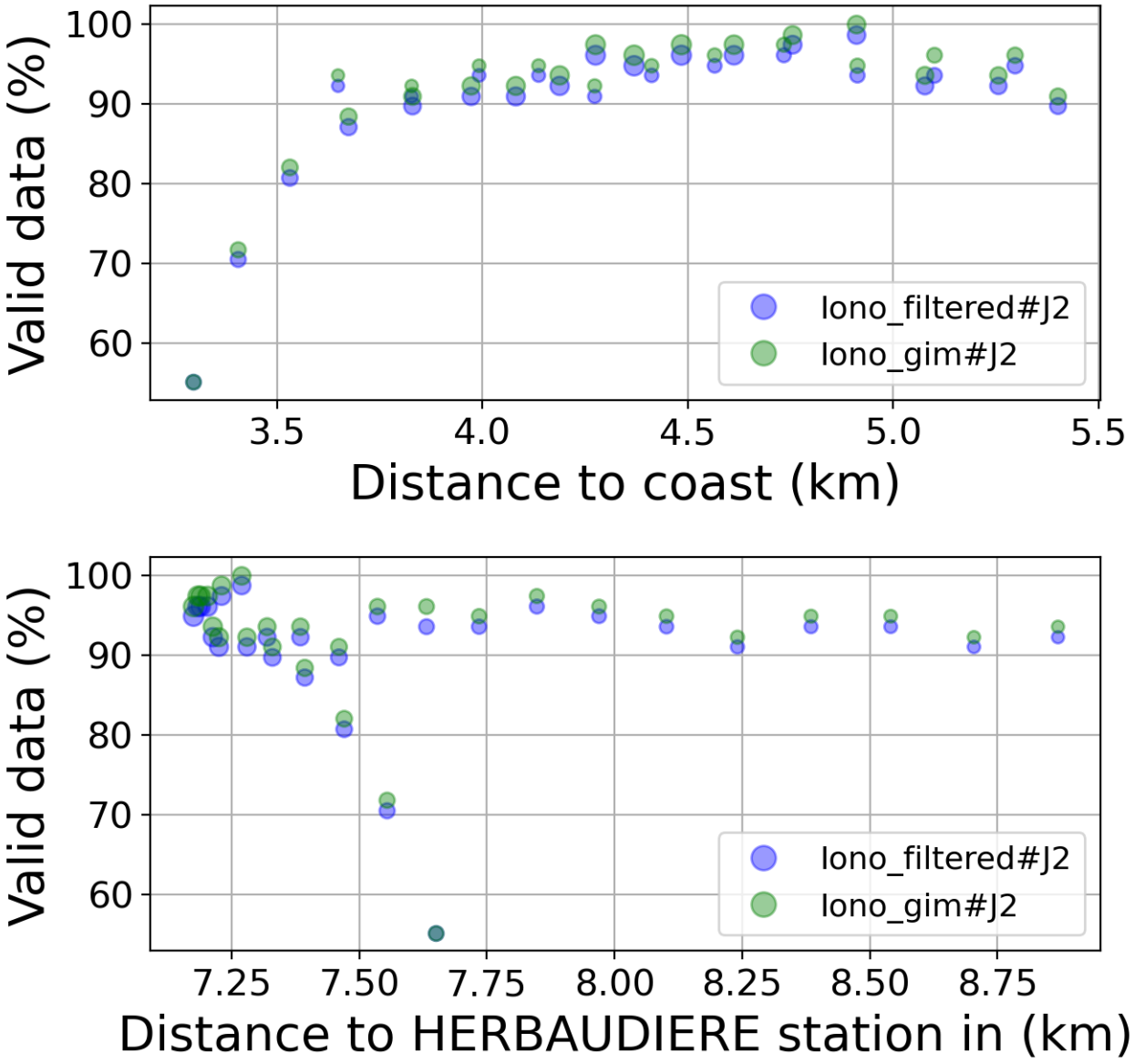

Figure 33 – Valid data (%) in function of distance to coast/HERBAUDIERE station

6.1.6 Std in function of distance to coast/HERBAUDIERE station

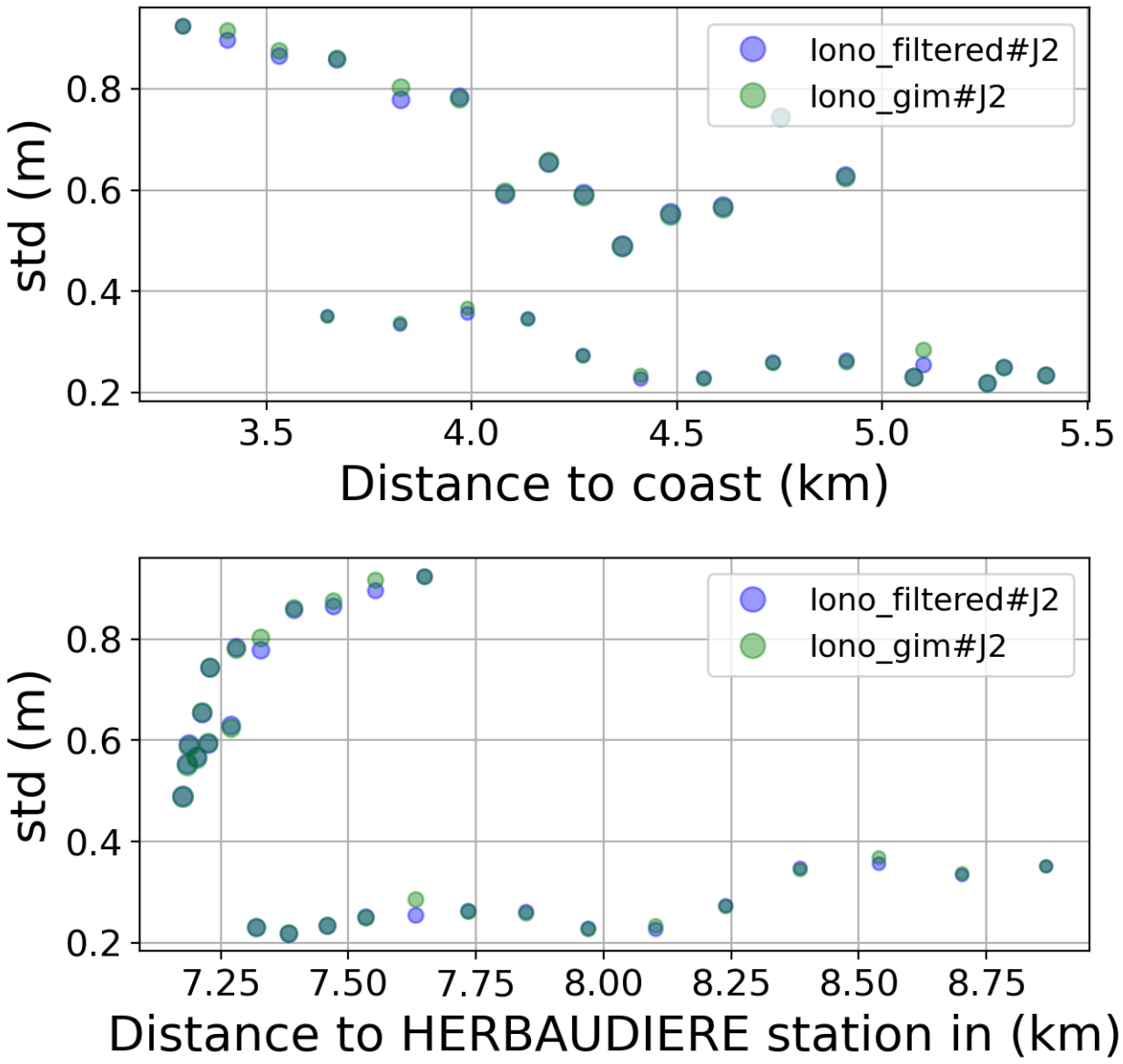

FIGURE 34 – Std in function of the distance to the coast/HERBAUDIERE station

6.1.7 Correlation in function of distance to coast/HERBAUDIERE station

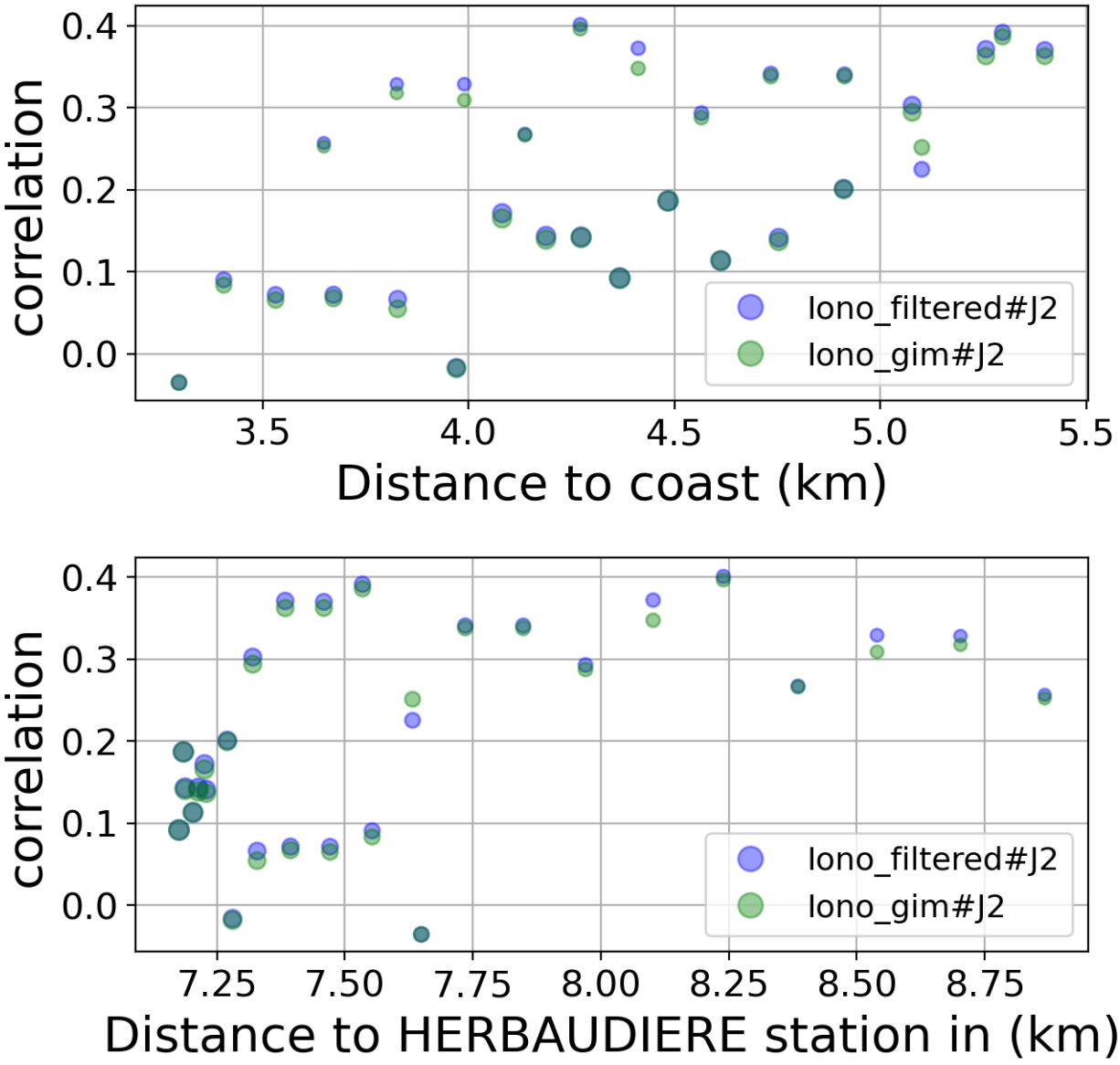

FIGURE 35 – Correlation in function of the distance to the coast/HERBAUDIERE station

6.1.8 Taylor Diagram

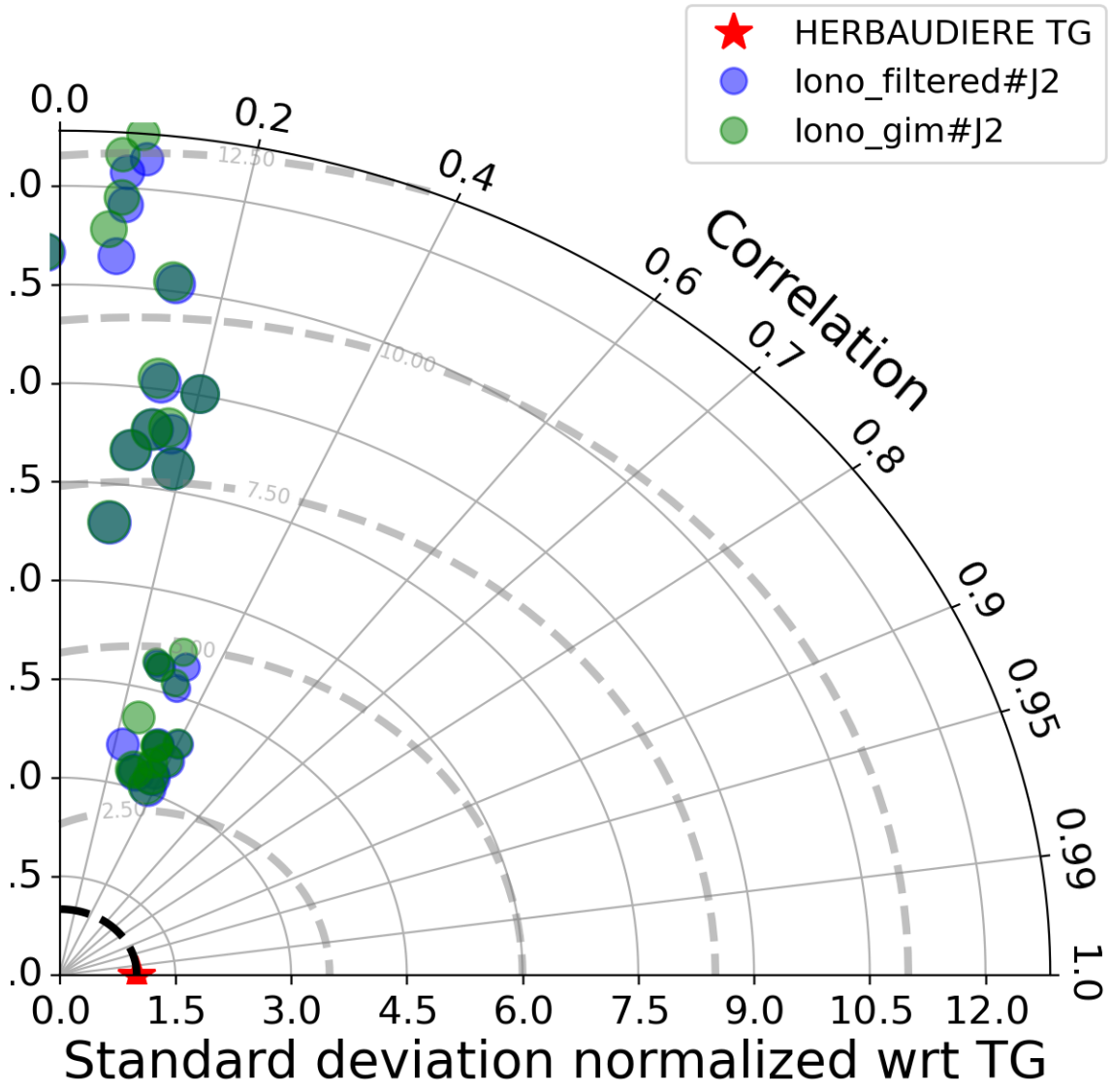

FIGURE 36 – Taylor diagram

6.1.9 Mean statistics table of products comparison with HERBAUDIERE 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)
iono_filtered#J2	90.705	0.216	0.492	0.483
Iono_gim#J2	91.987	0.211	0.494	0.486

Figure 37 – Mean statistics table of the common points in the altimetry products

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

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 78 point.

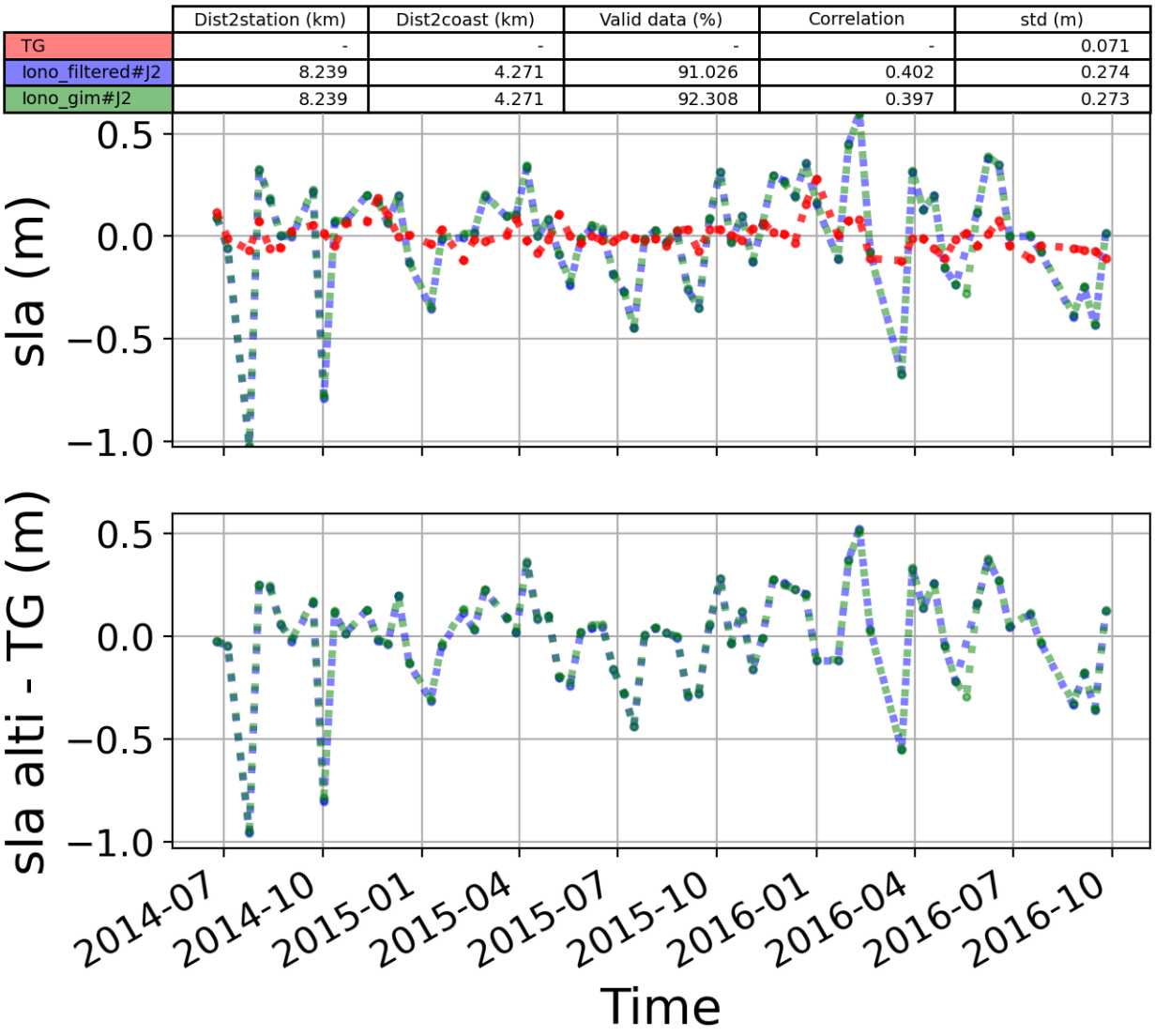

FIGURE 38 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

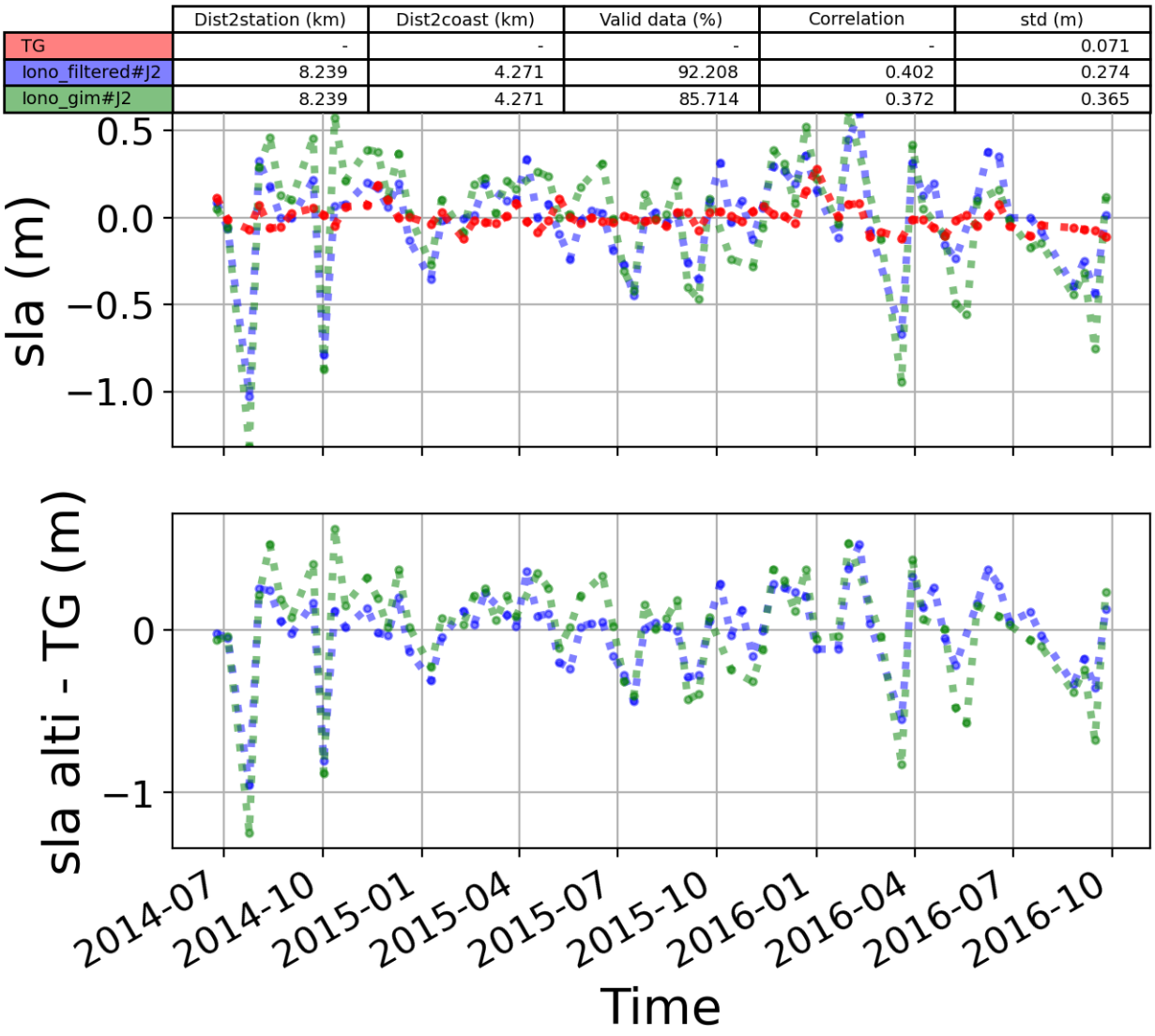

FIGURE 39 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.2 Station : Llandudno

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

6.2.1 correlation visualization in maps view % Llandudno tide gauge

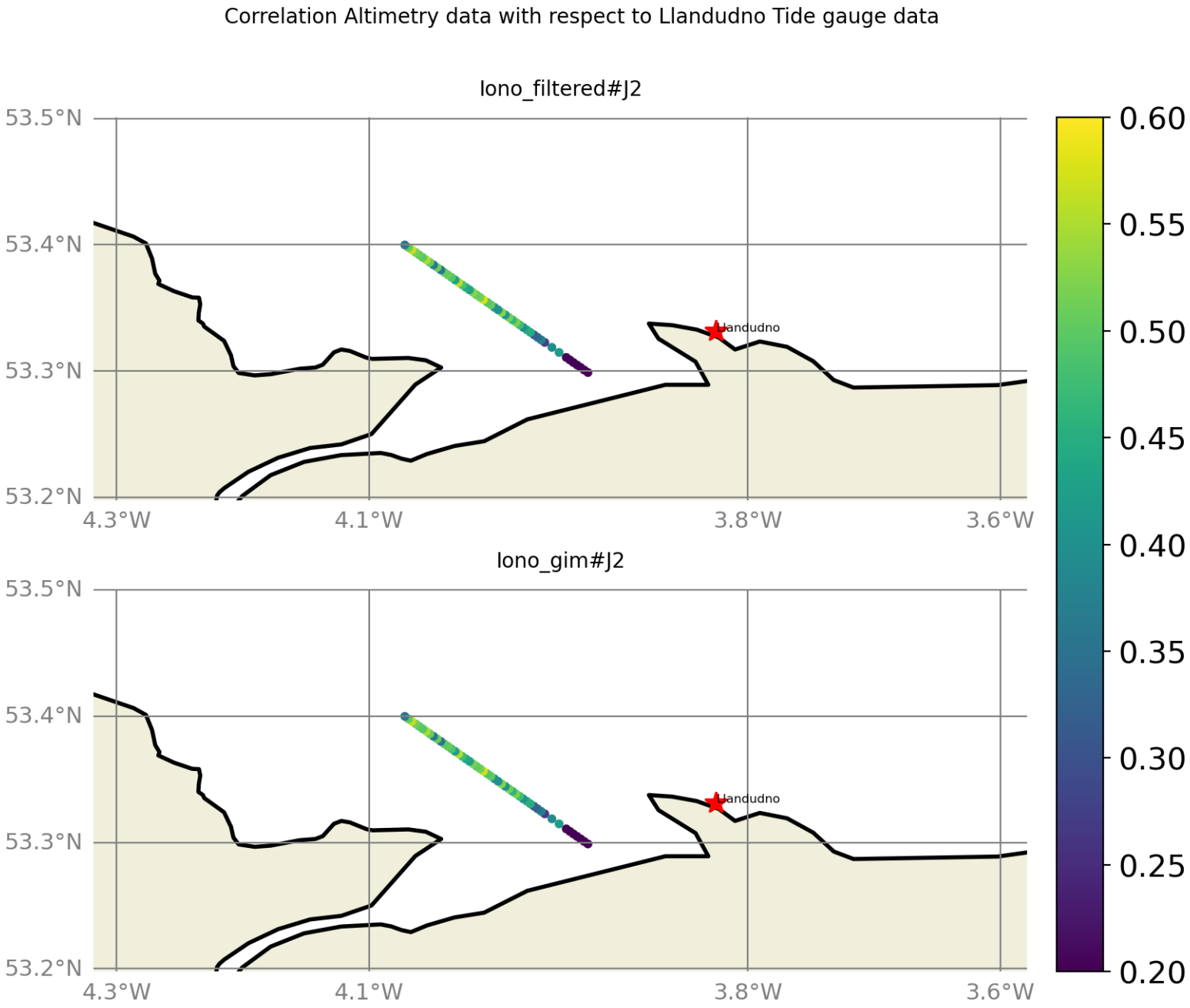

FIGURE 40 – correlation visualization in maps view % Llandudno tide gauge

6.2.2 rmsd visualization in maps view % Llandudno tide gauge

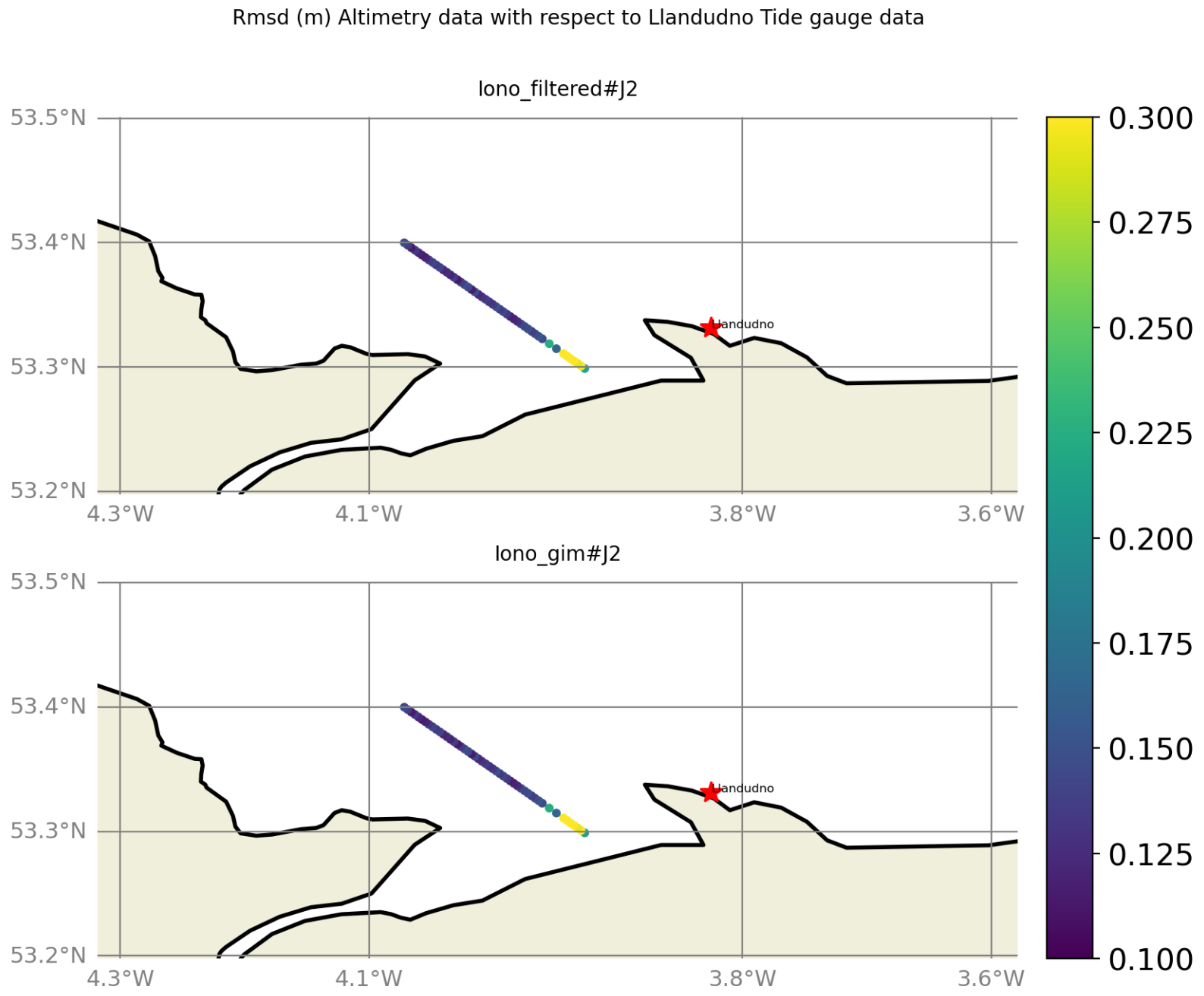

FIGURE 41 – rmsd visualization in maps view % Llandudno tide gauge

6.2.3 std visualization in maps view % Llandudno tide gauge

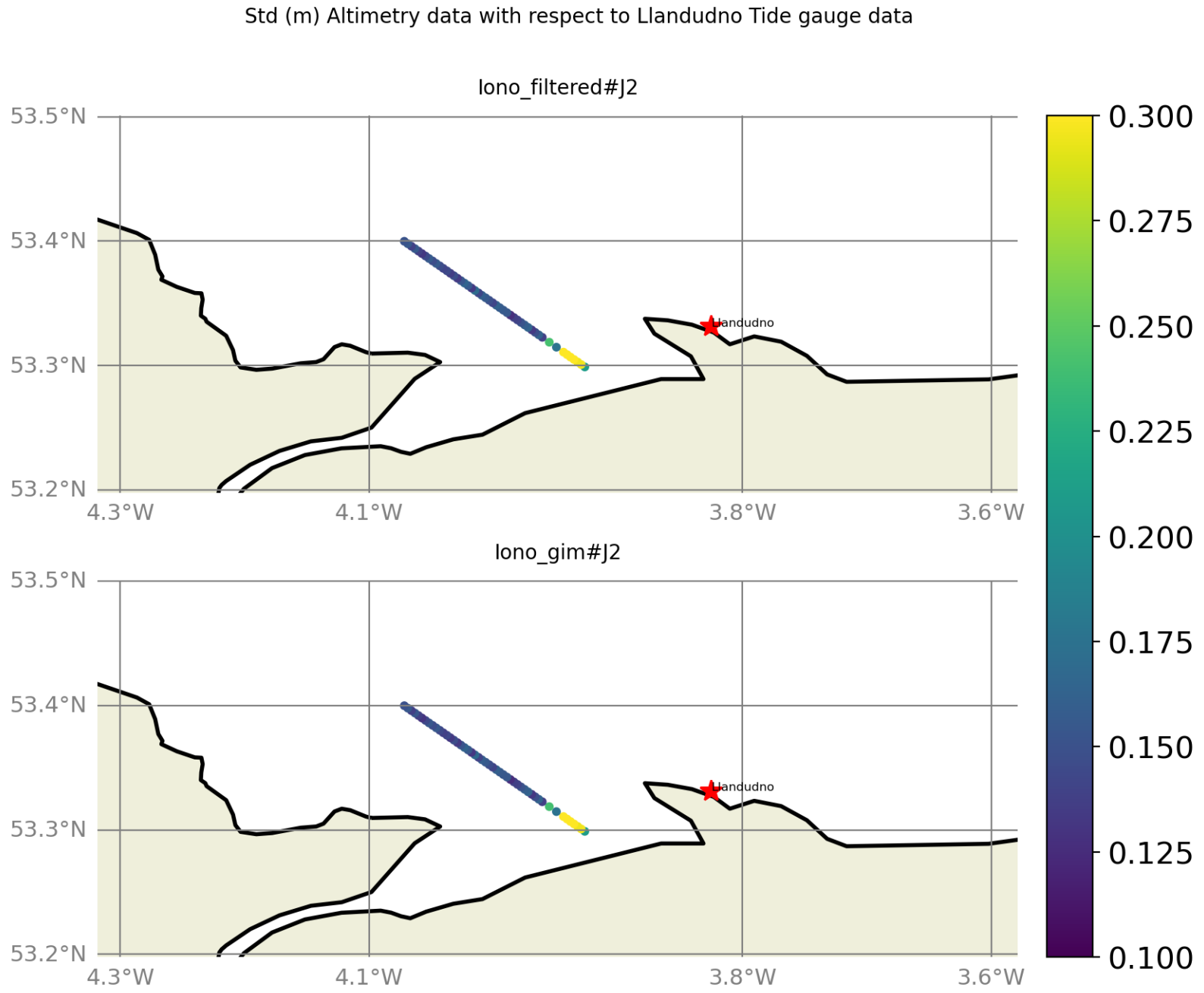

FIGURE 42 – std visualization in maps view % Llandudno tide gauge

6.2.4 valid_data_percent visualization in maps view % Llandudno tide gauge

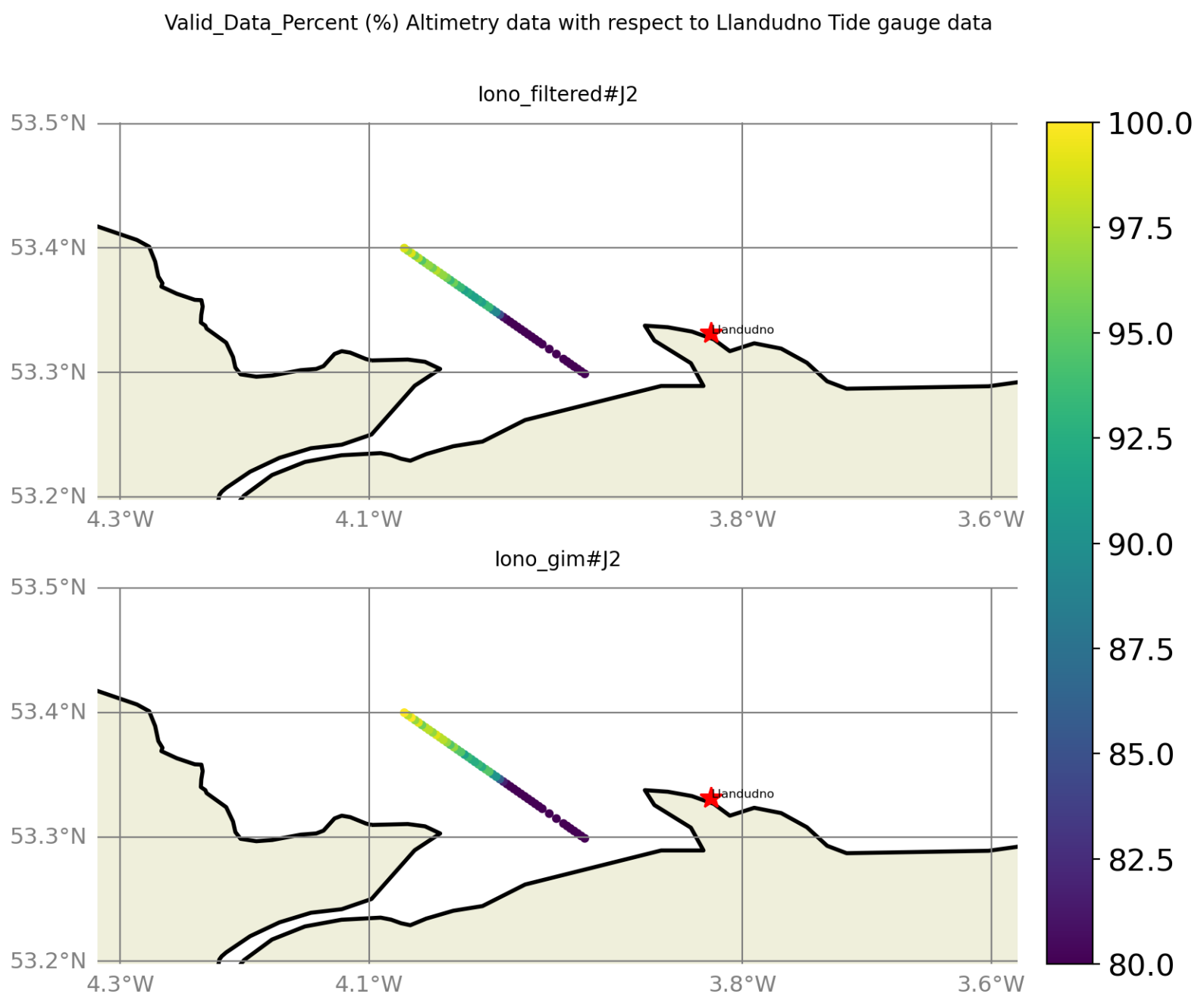

FIGURE 43 – valid_data_percent visualization in maps view % Llandudno tide gauge

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

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

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

Where *pvd* and *nvd* are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 93$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

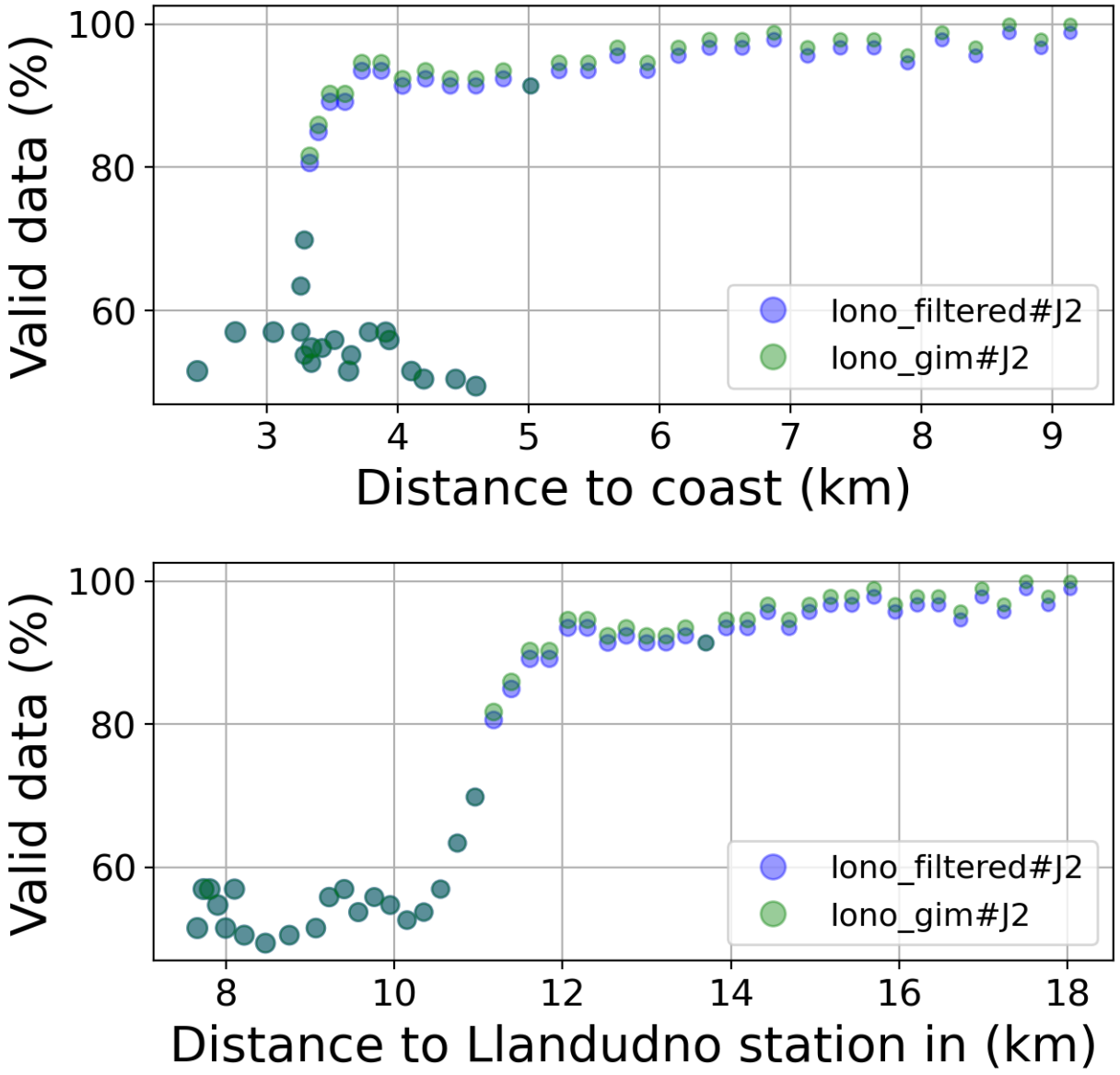

FIGURE 44 – Valid data (%) in function of distance to coast/Llandudno station

6.2.6 Std in function of distance to coast/Llandudno station

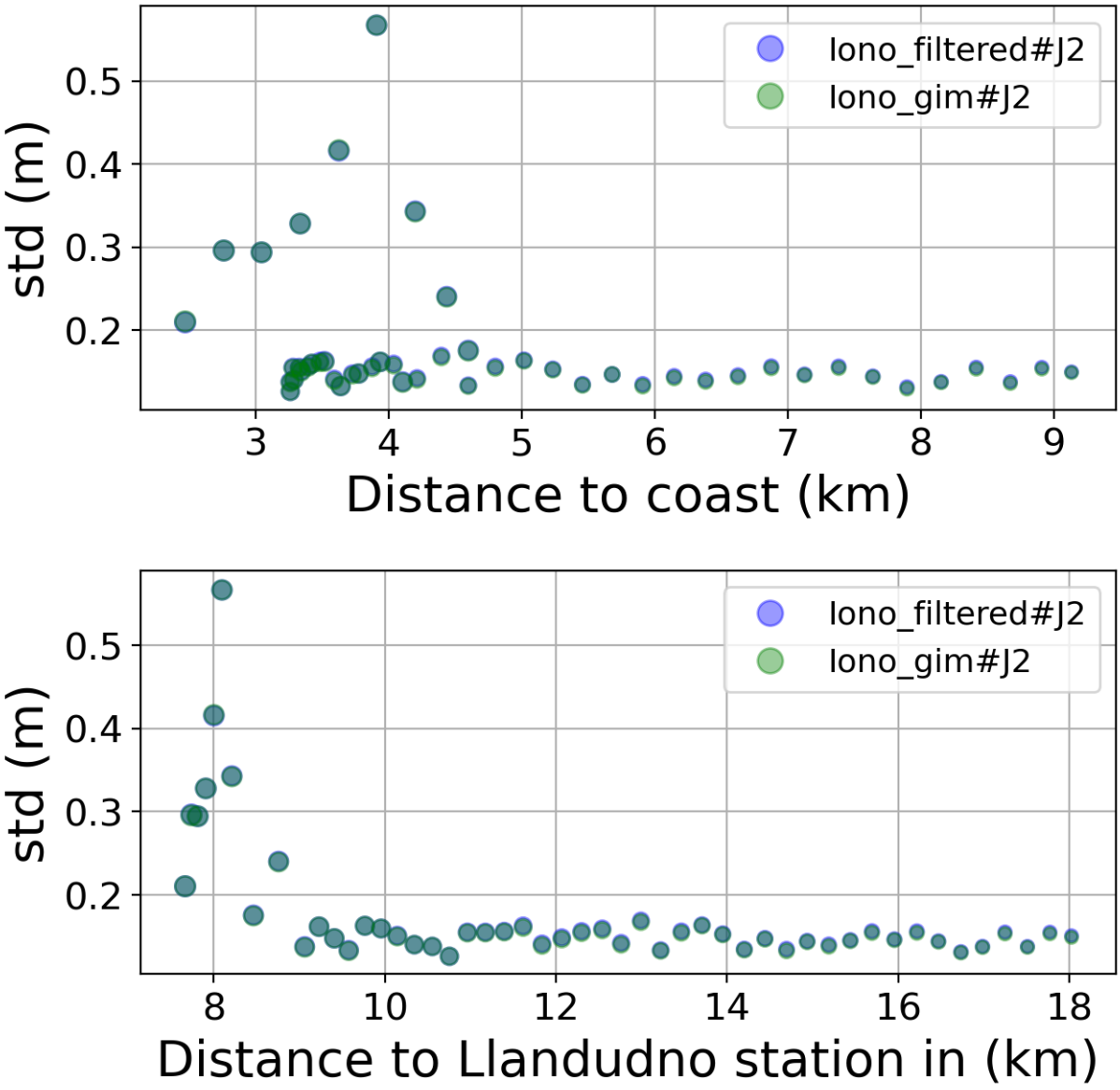

FIGURE 45 – Std in function of the distance to the coast/Llandudno station

6.2.7 Correlation in function of distance to coast/Llandudno station

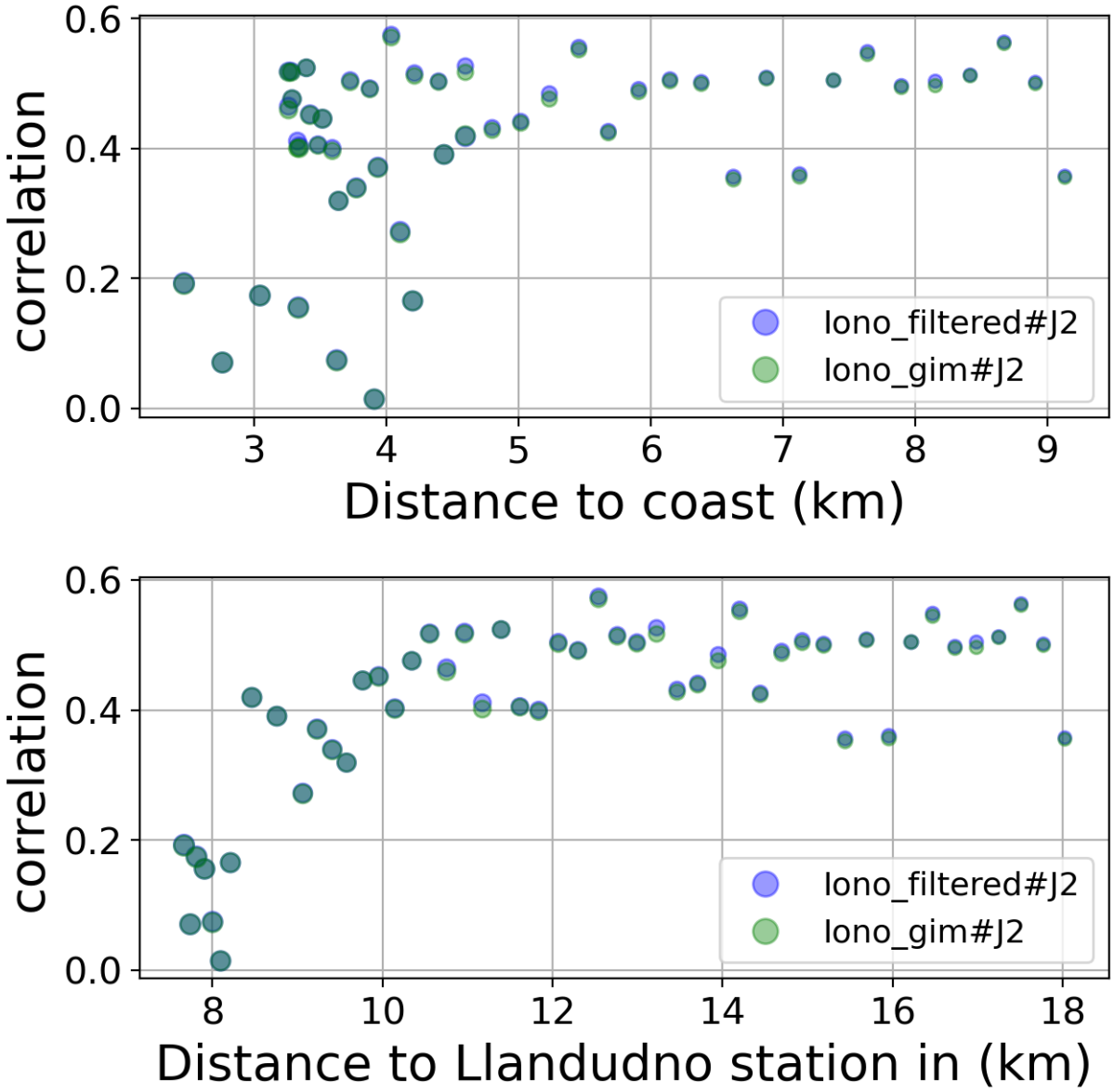

FIGURE 46 – Correlation in function of the distance to the coast/Llandudno station

6.2.8 Taylor Diagram

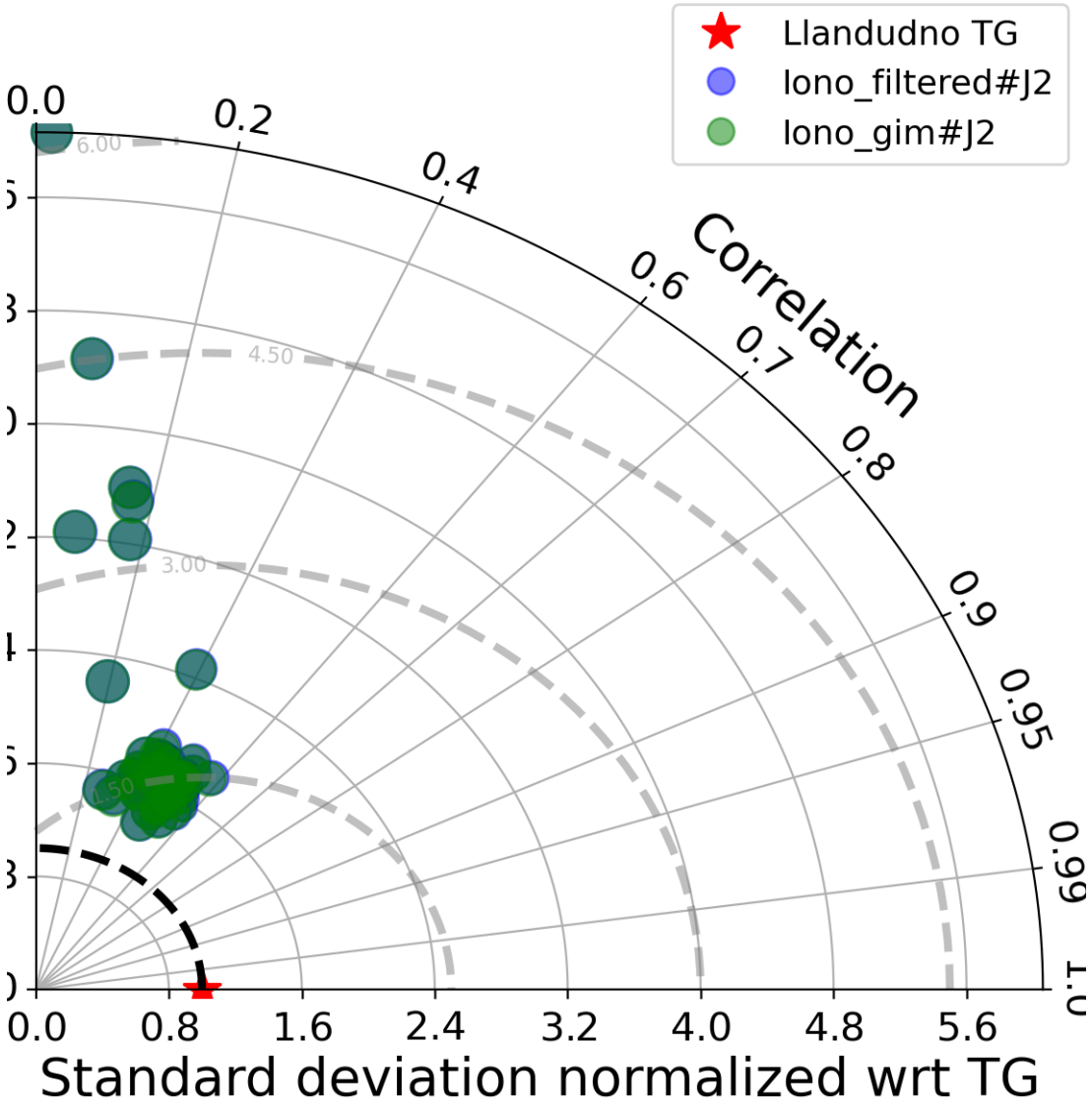

FIGURE 47 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	78.012	0.412	0.18	0.168
Iono_gim#J2	78.626	0.409	0.179	0.167

Figure 48 – Mean statistics table of the common points in the altimetry products

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

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 93 point.

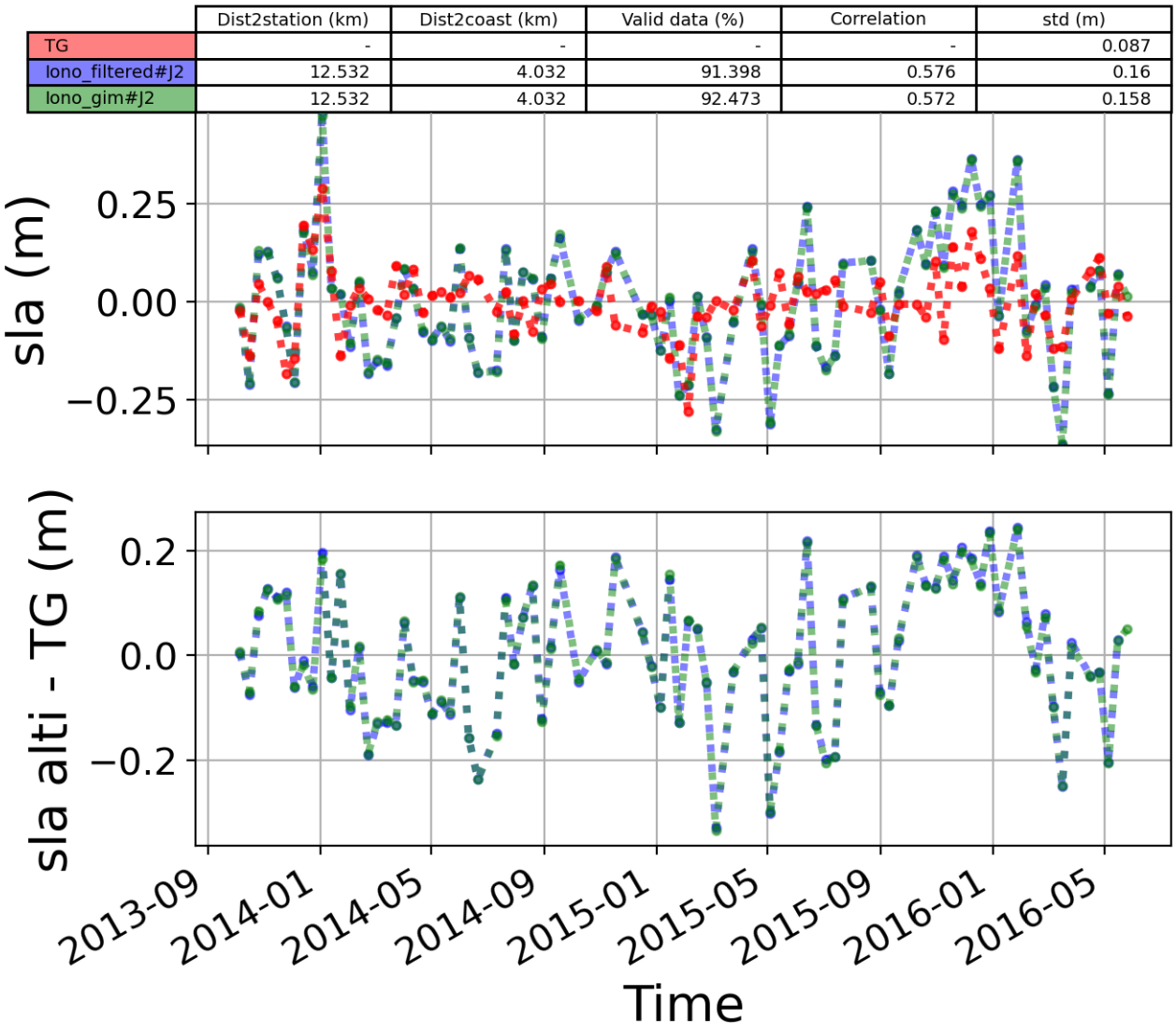

FIGURE 49 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.3 Station : Newhaven

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

6.3.1 correlation visualization in maps view % Newhaven tide gauge

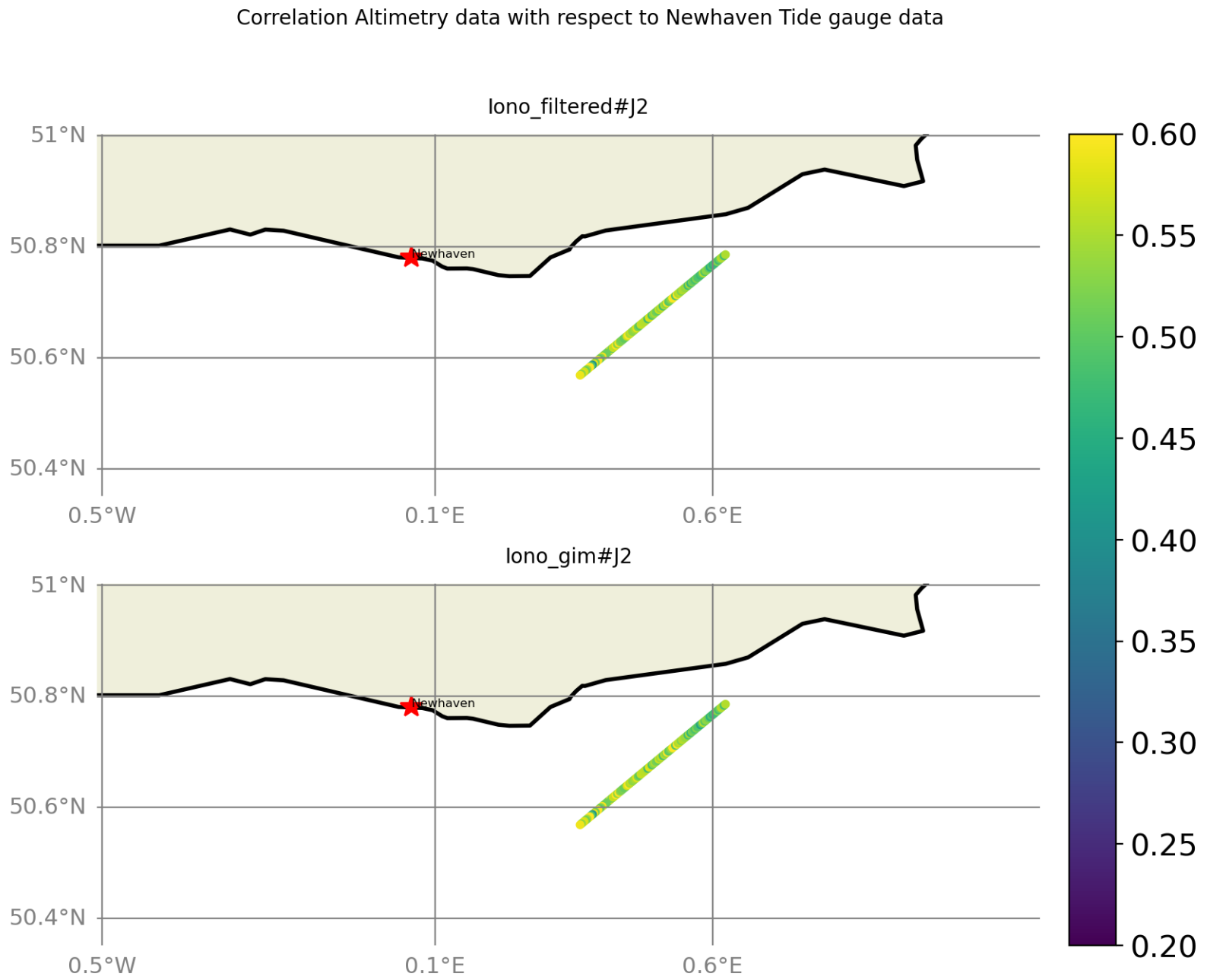

FIGURE 50 – correlation visualization in maps view % Newhaven tide gauge

6.3.2 rmsd visualization in maps view % Newhaven tide gauge

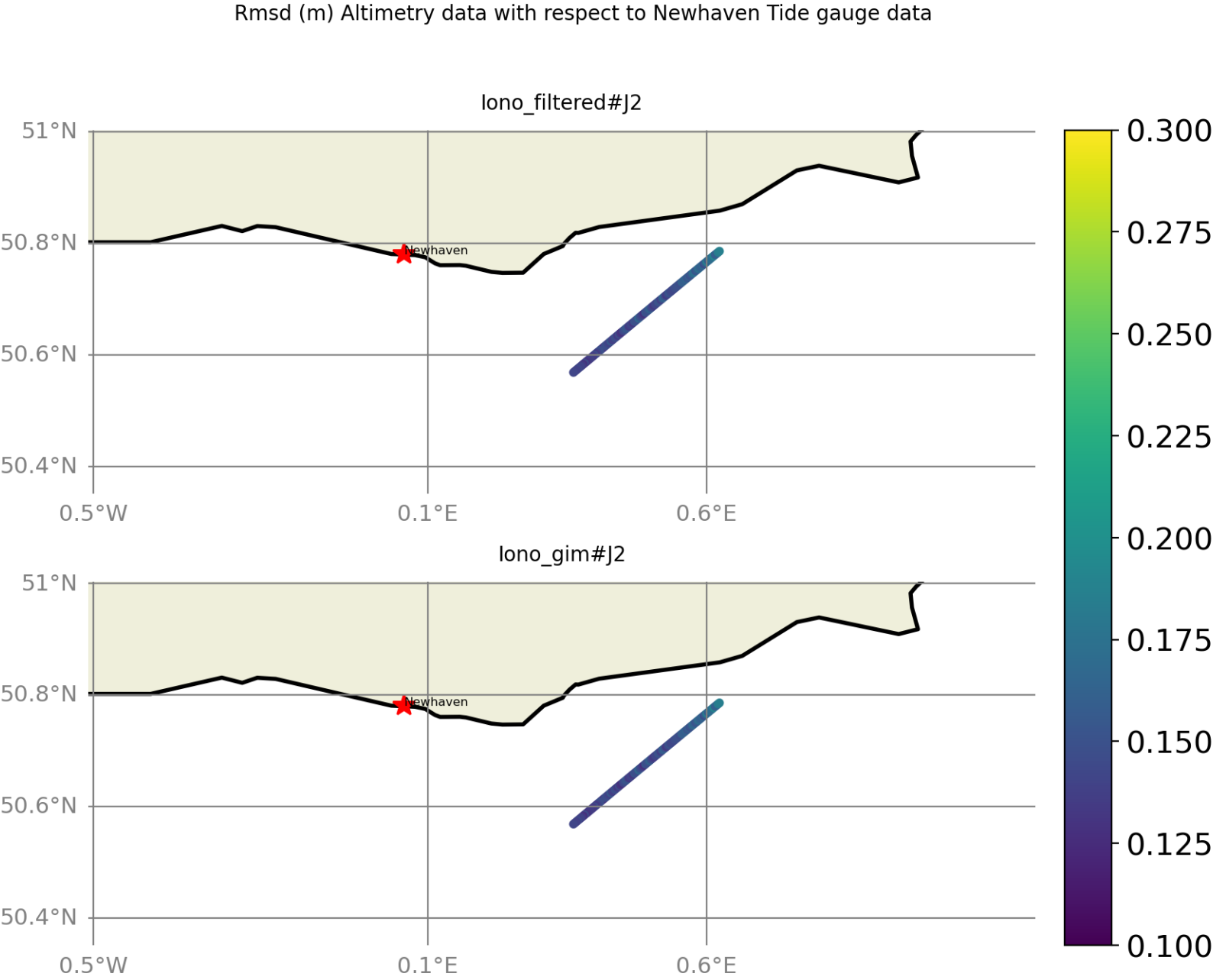

FIGURE 51 – rmsd visualization in maps view % Newhaven tide gauge

6.3.3 std visualization in maps view % Newhaven tide gauge

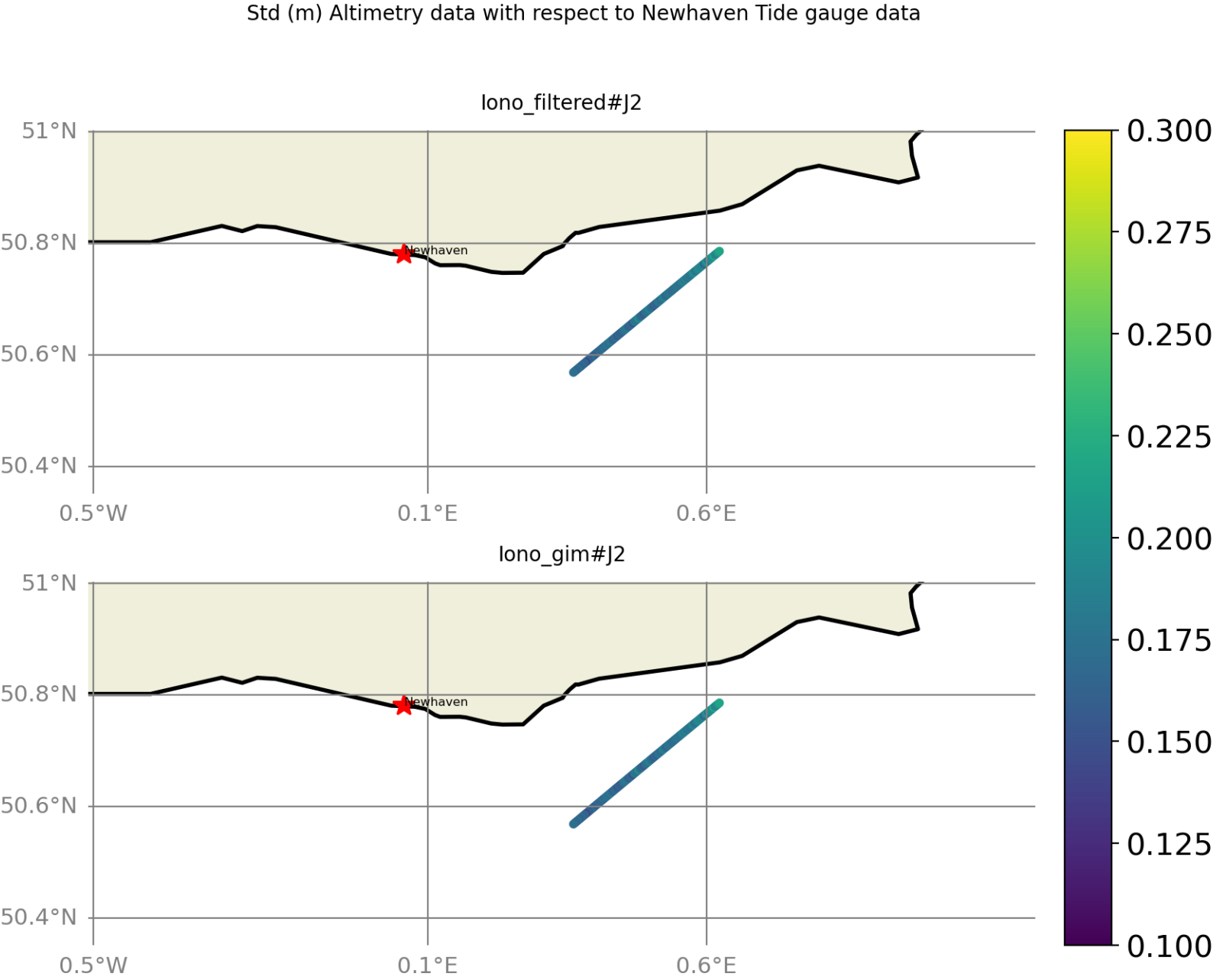

FIGURE 52 – std visualization in maps view % Newhaven tide gauge

6.3.4 valid_data_percent visualization in maps view % Newhaven tide gauge

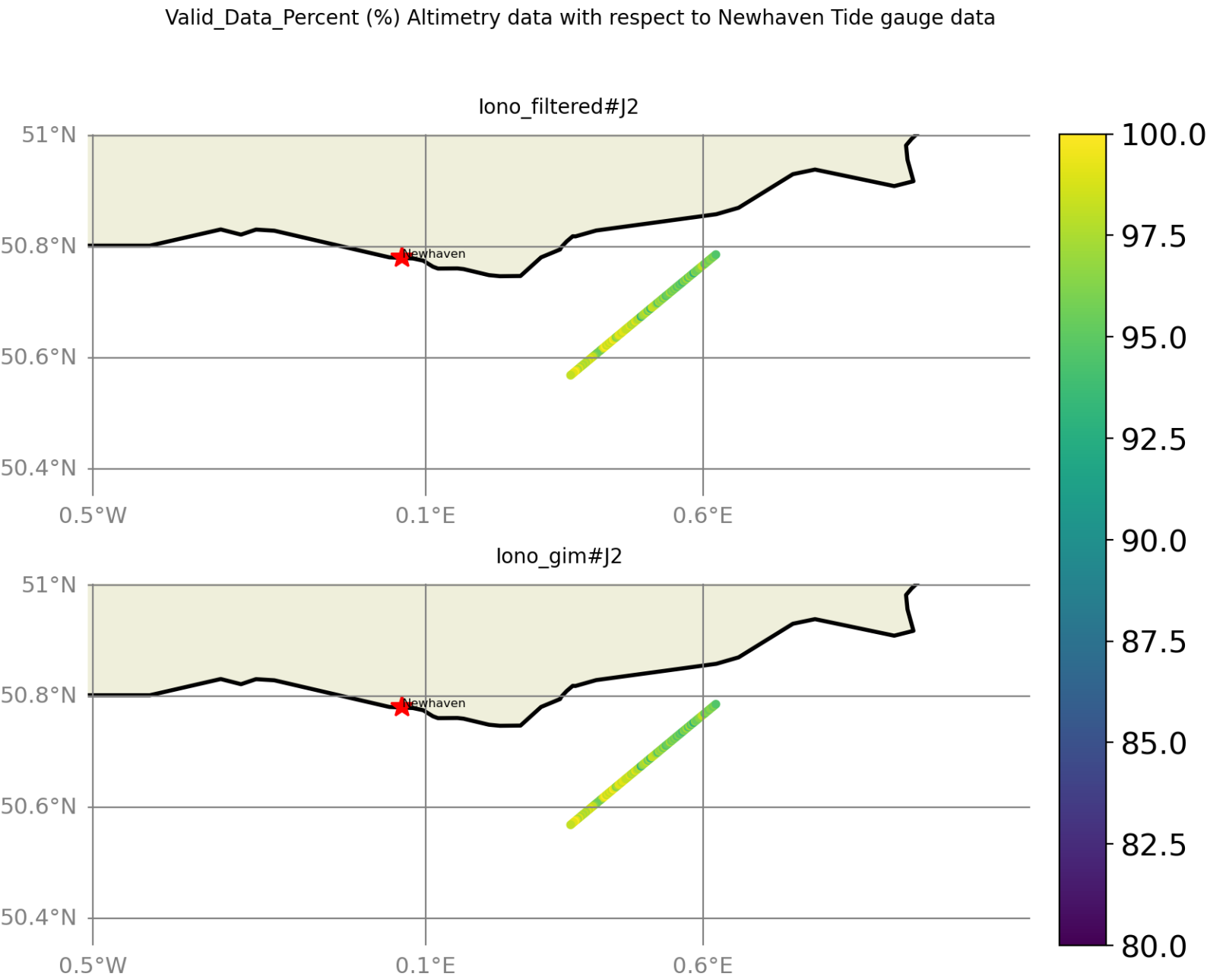

FIGURE 53 – valid_data_percent visualization in maps view % Newhaven tide gauge

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

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

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

Where *pvd* and *nvd* are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 111$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

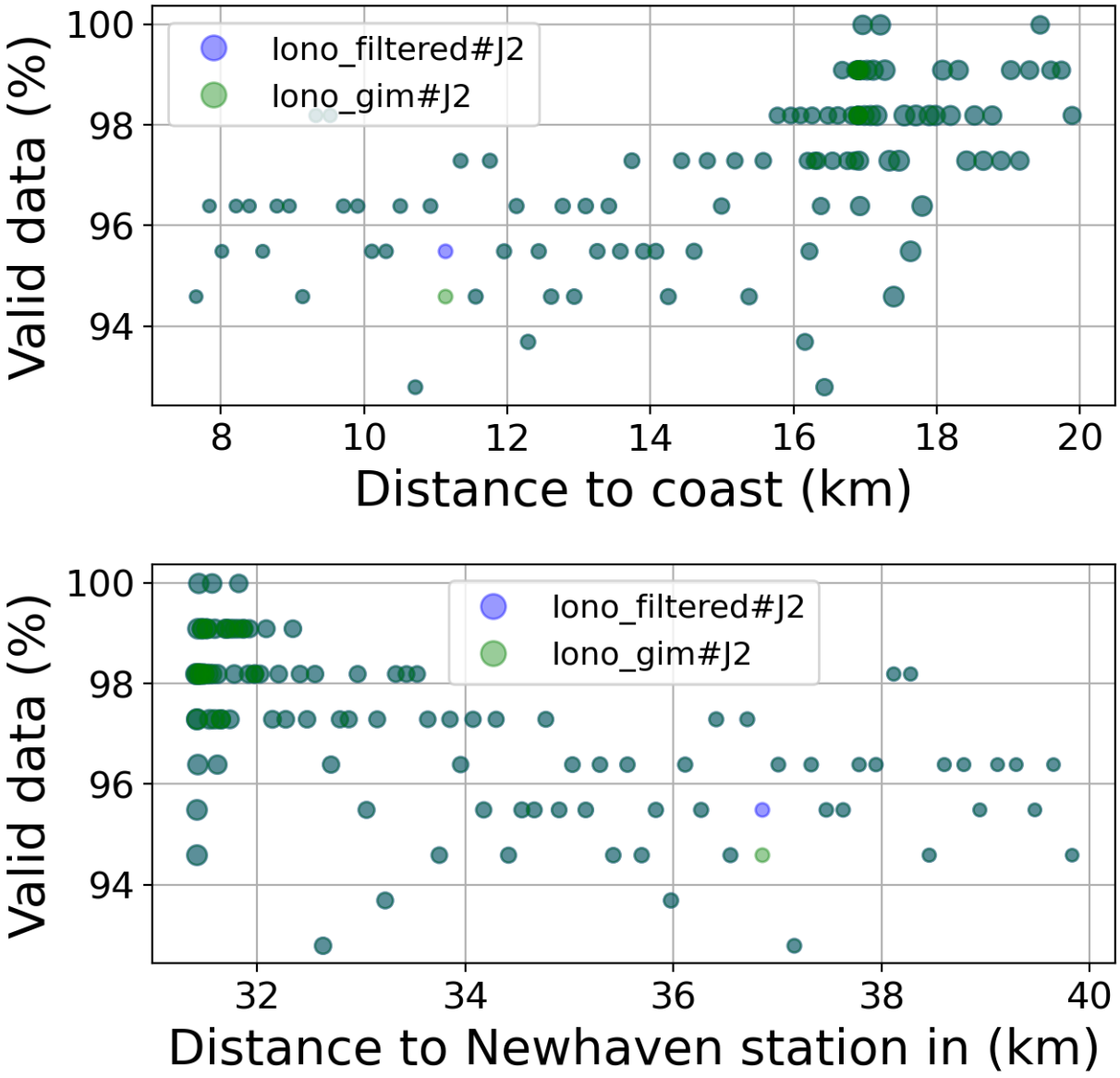

FIGURE 54 – Valid data (%) in function of distance to coast/Newhaven station

6.3.6 Std in function of distance to coast/Newhaven station

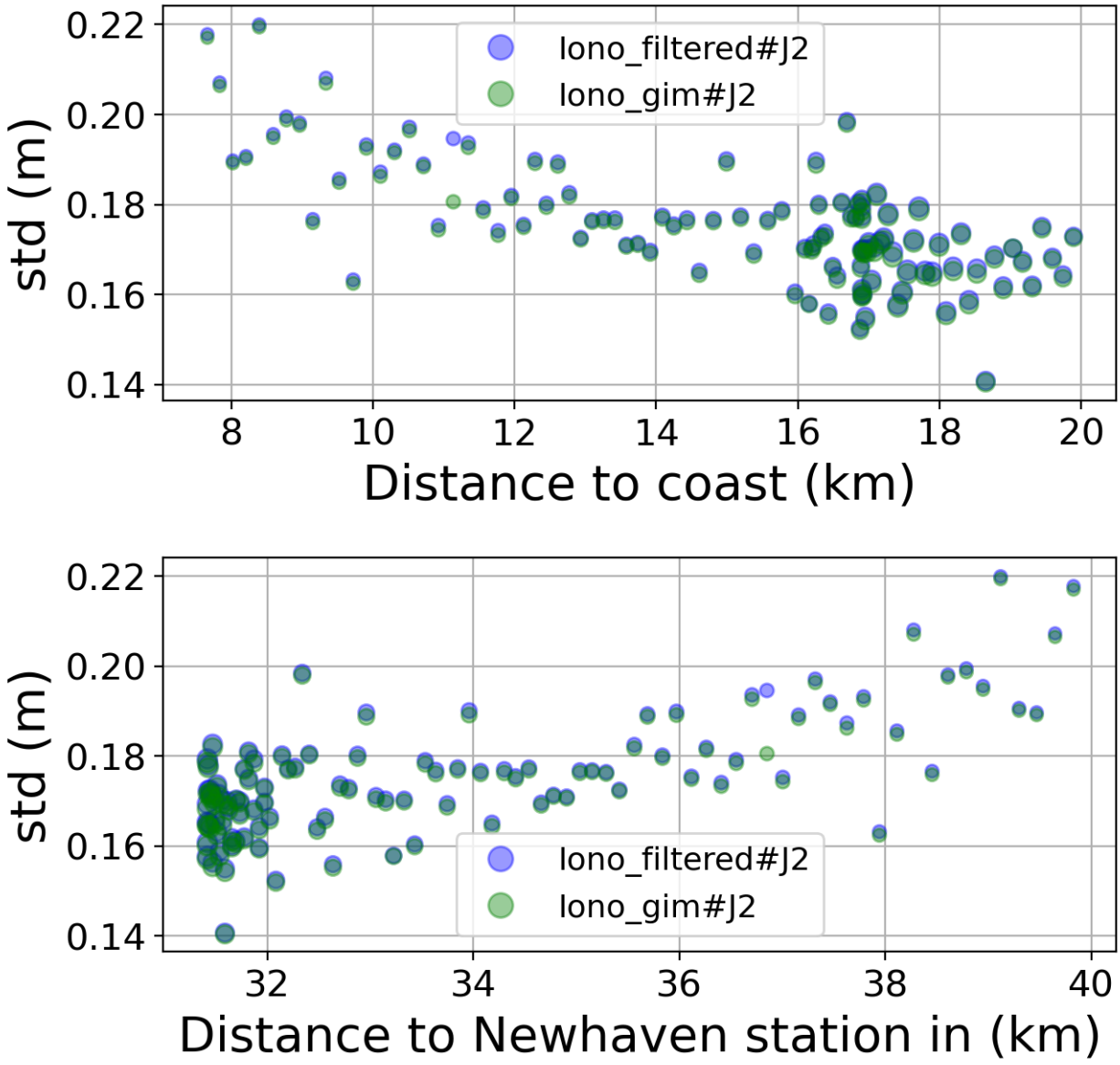

FIGURE 55 – Std in function of the distance to the coast/Newhaven station

6.3.7 Correlation in function of distance to coast/Newhaven station

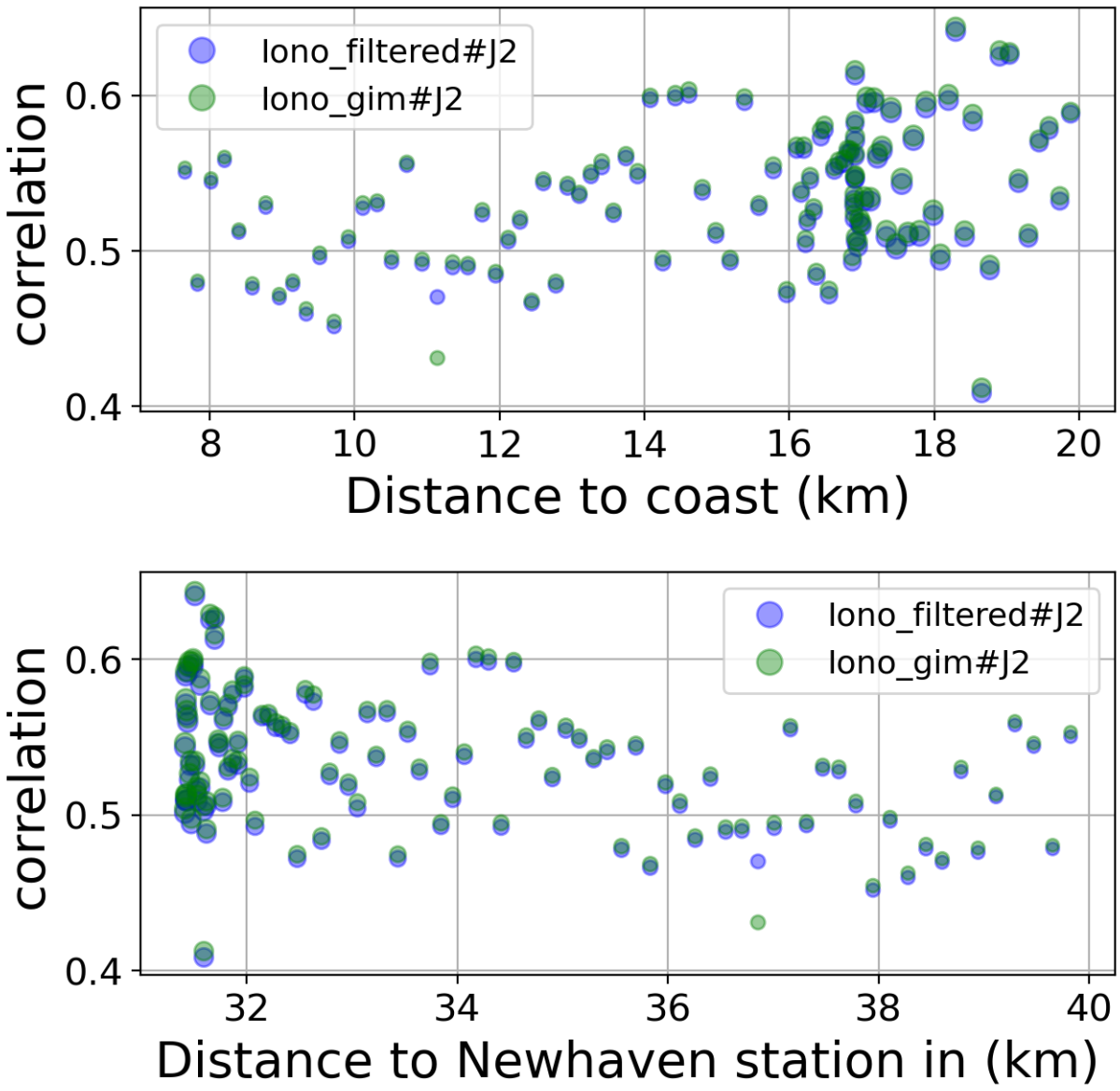

FIGURE 56 – Correlation in function of the distance to the coast/Newhaven station

6.3.8 Taylor Diagram

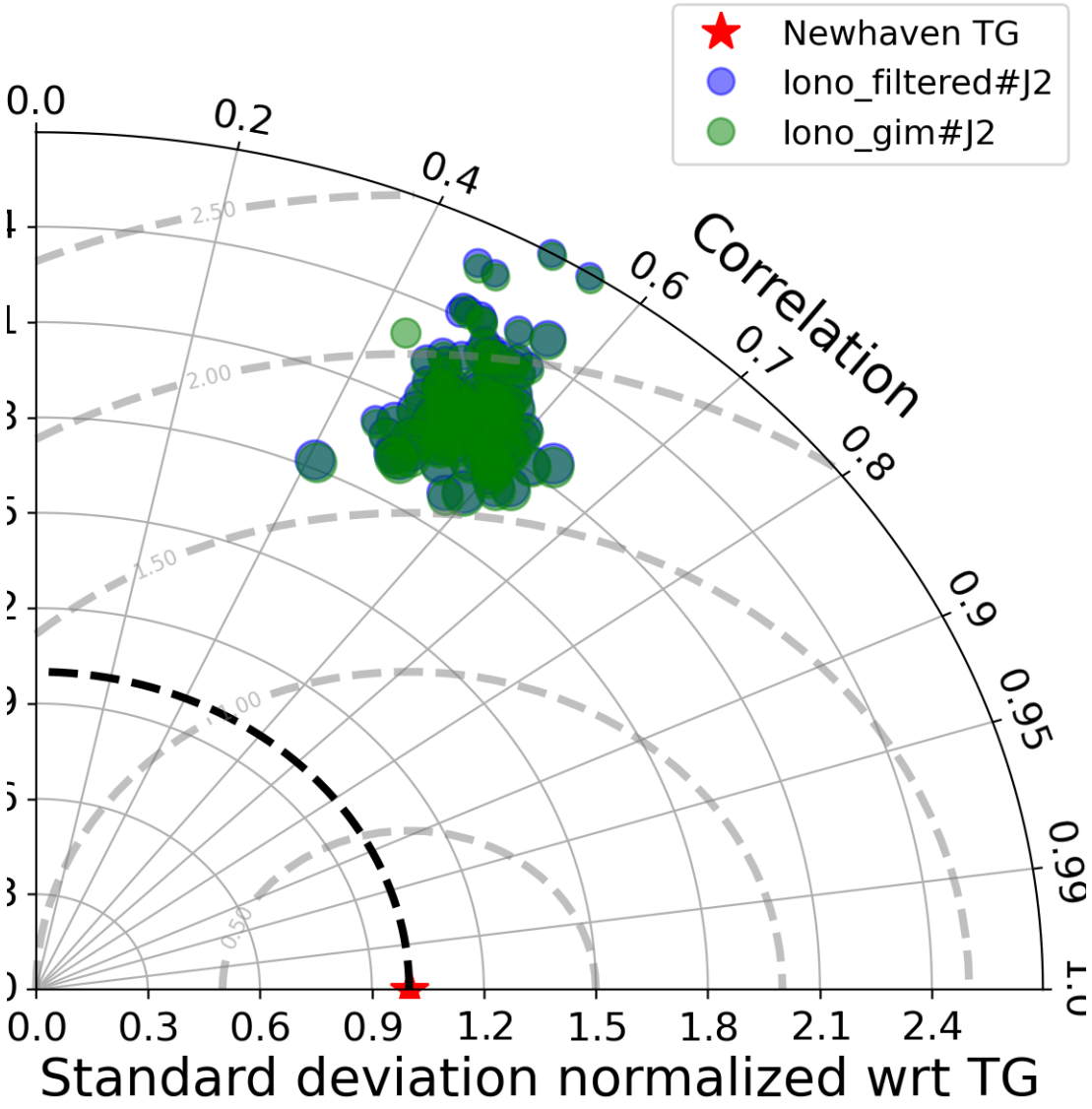

FIGURE 57 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
dno_filtered#J2	97.11	0.534	0.176	0.149
Iono_gim#J2	97.102	0.536	0.175	0.148

Figure 58 – Mean statistics table of the common points in the altimetry products

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

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 111 point.

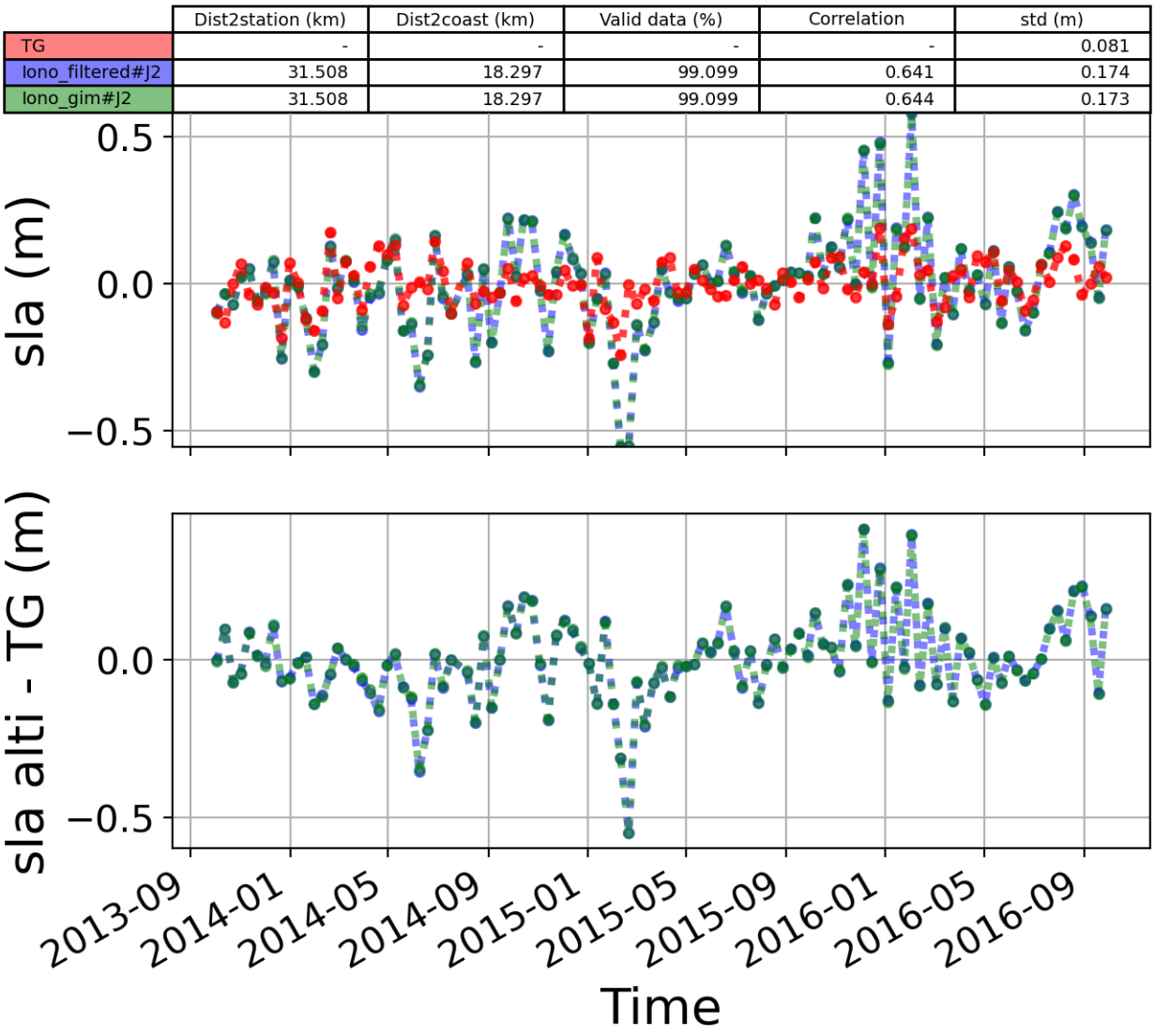

FIGURE 59 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

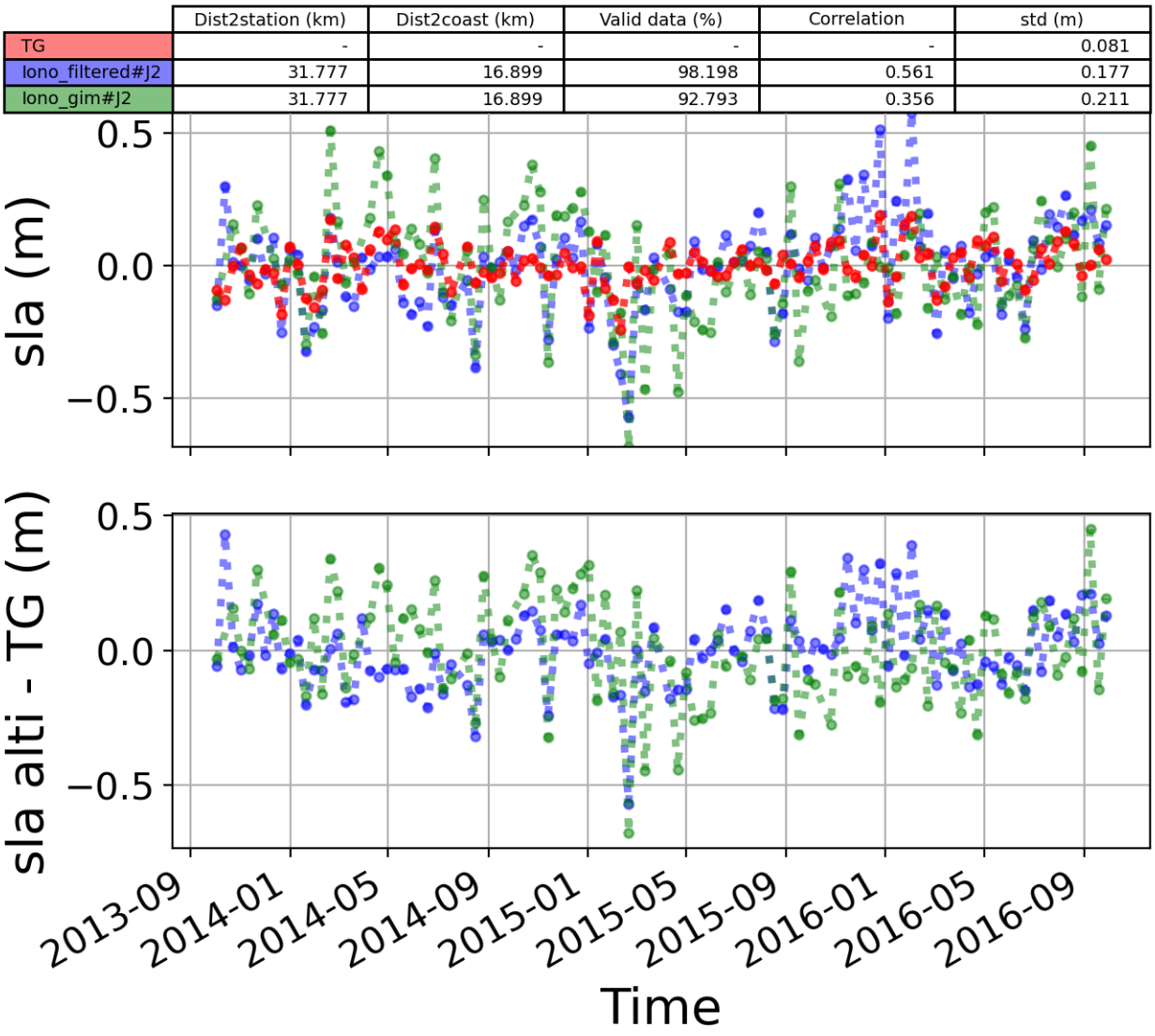

FIGURE 60 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.4 Station : CALAIS

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

6.4.1 correlation visualization in maps view % CALAIS tide gauge

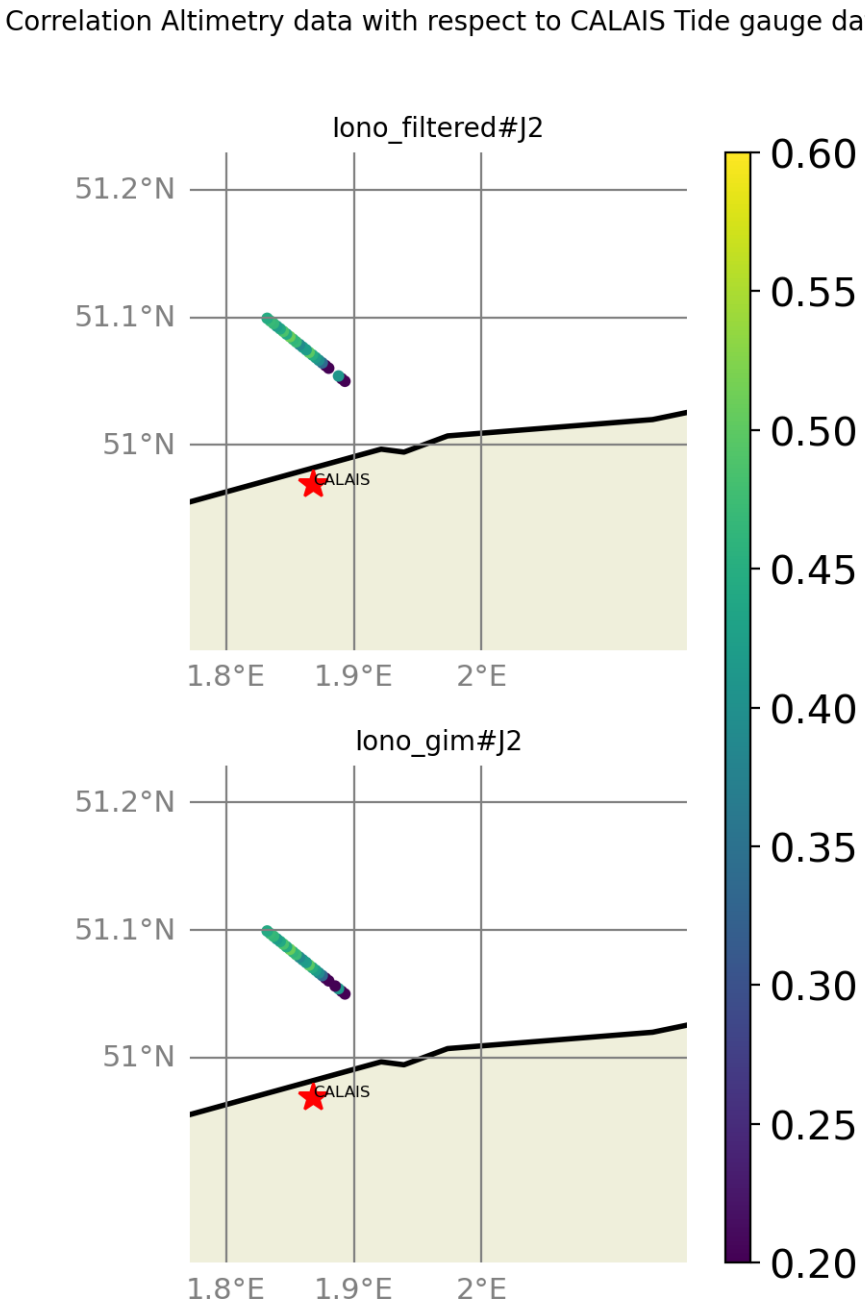

FIGURE 61 – correlation visualization in maps view % CALAIS tide gauge

6.4.2 rmsd visualization in maps view % CALAIS tide gauge

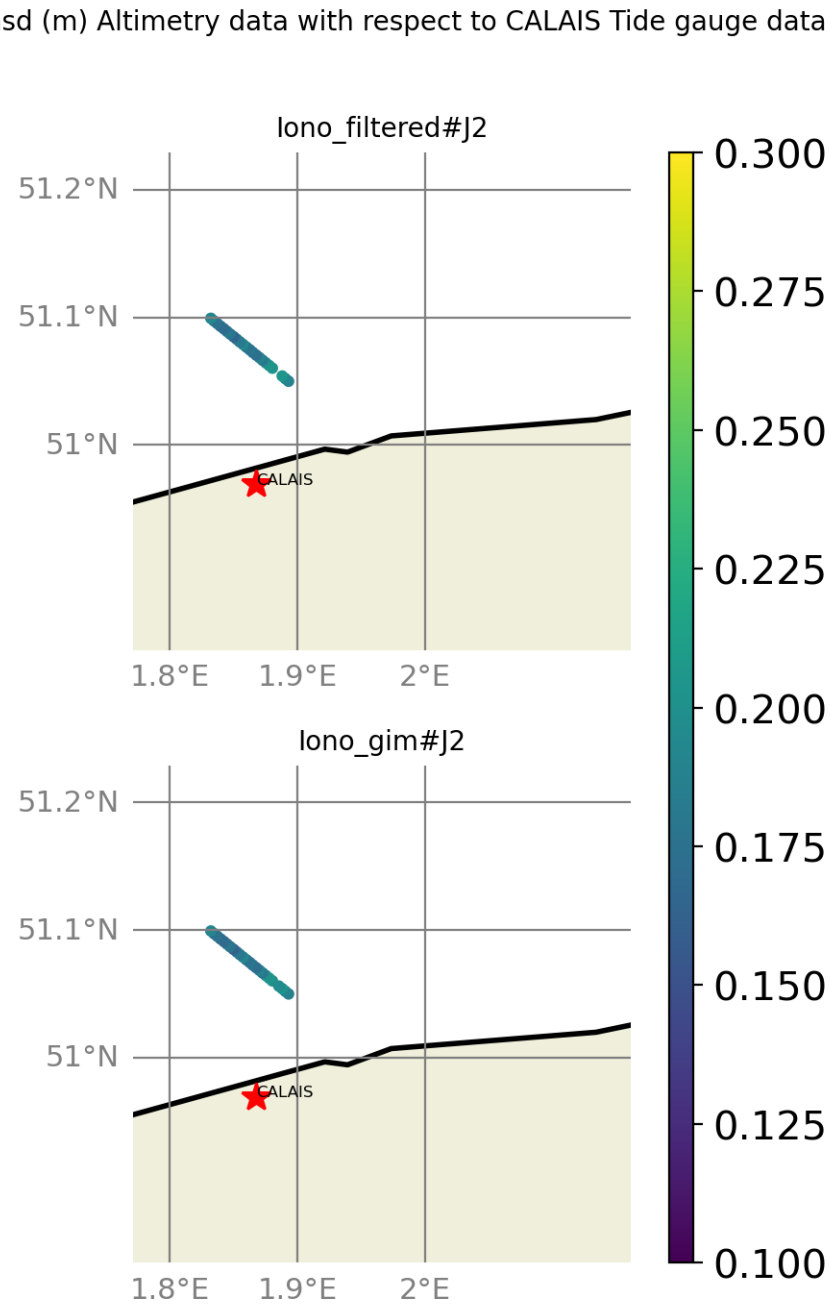

FIGURE 62 – rmsd visualization in maps view % CALAIS tide gauge

6.4.3 std visualization in maps view % CALAIS tide gauge

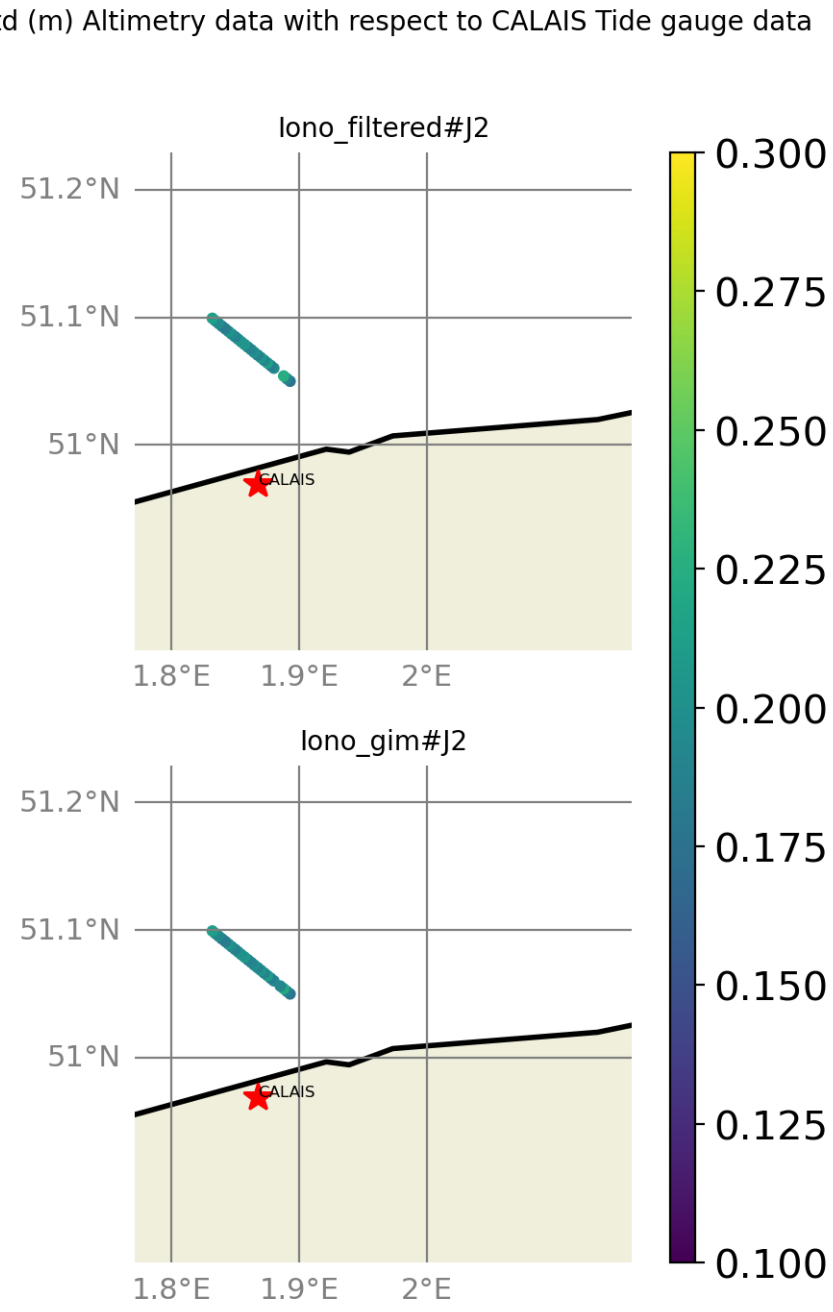

FIGURE 63 – std visualization in maps view % CALAIS tide gauge

6.4.4 valid_data_percent visualization in maps view % CALAIS tide gauge

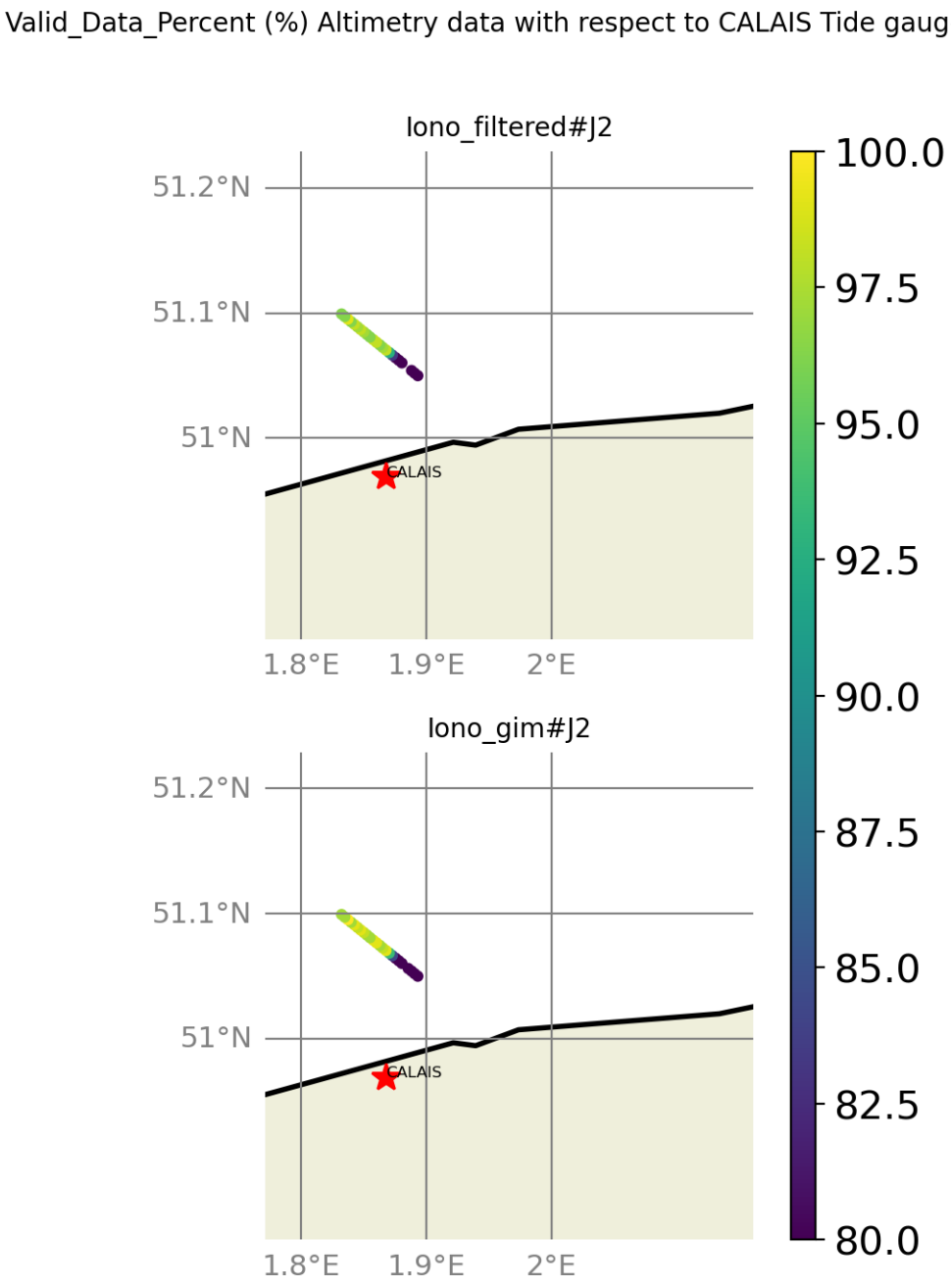

FIGURE 64 – valid_data_percent visualization in maps view % CALAIS tide gauge

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

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

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

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

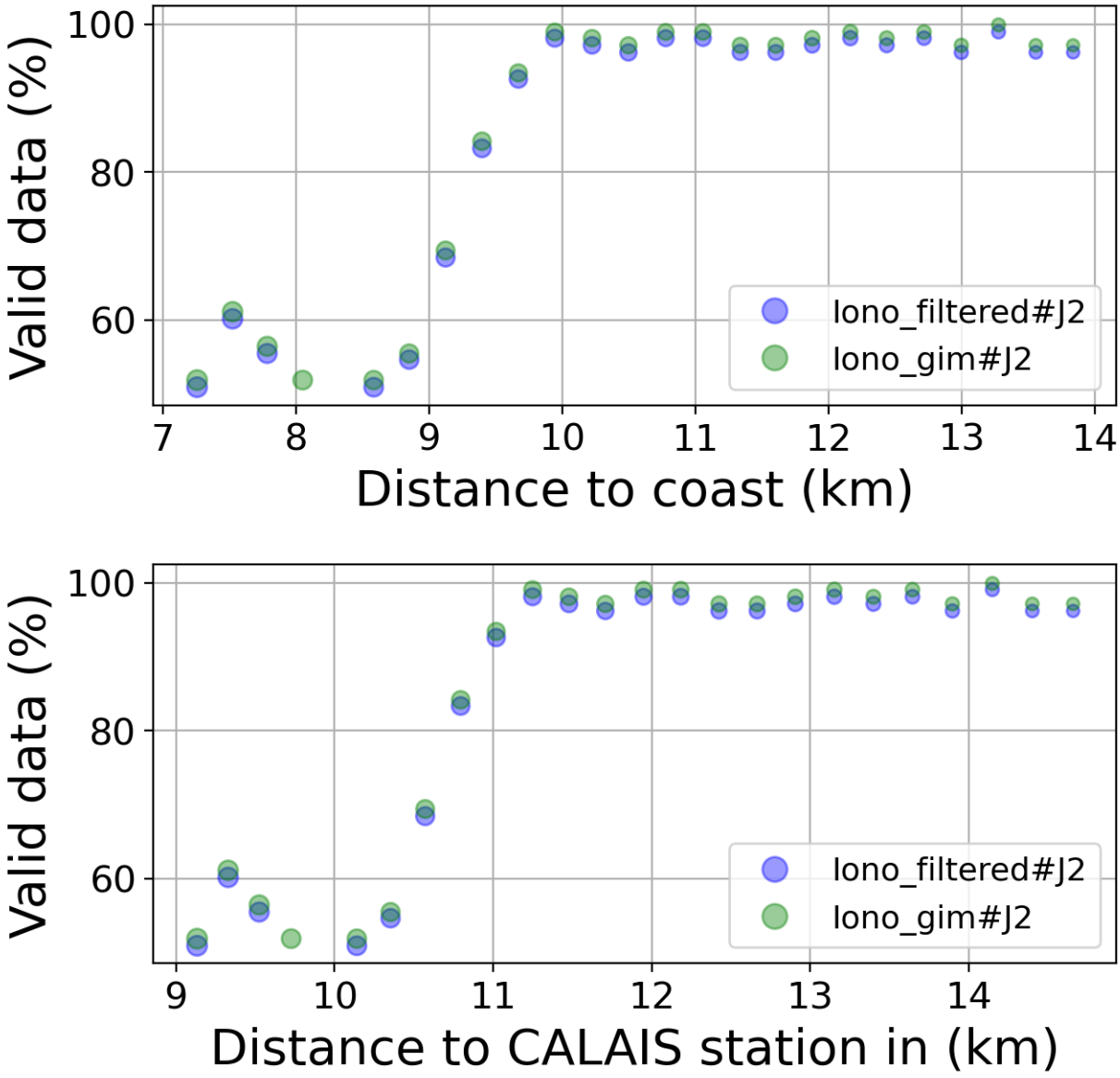

FIGURE 65 – Valid data (%) in function of distance to coast/CALAIS station

6.4.6 Std in function of distance to coast/CALAIS station

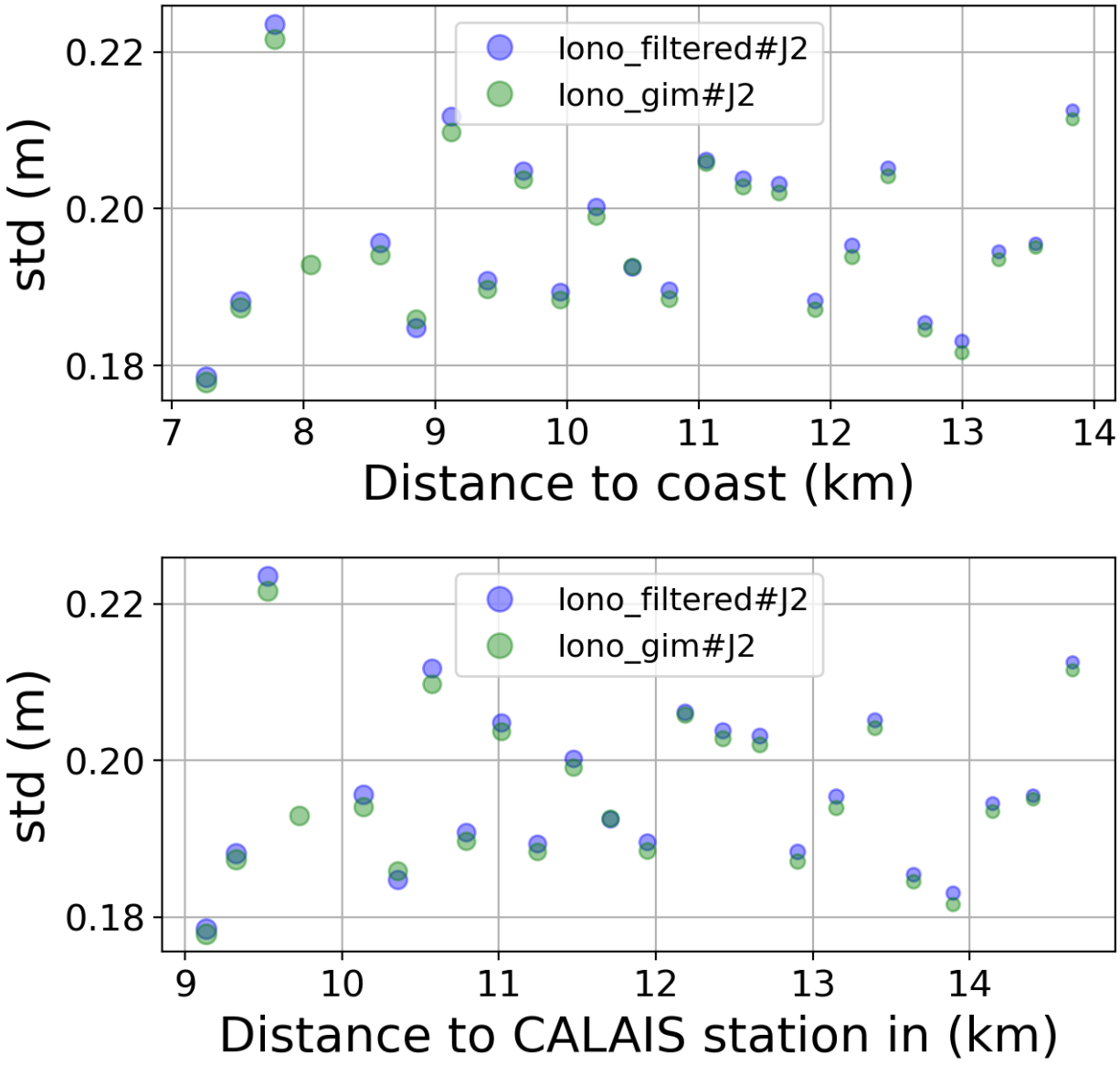

Figure 66 – Std in function of the distance to the coast/CALAIS station

6.4.7 Correlation in function of distance to coast/CALAIS station

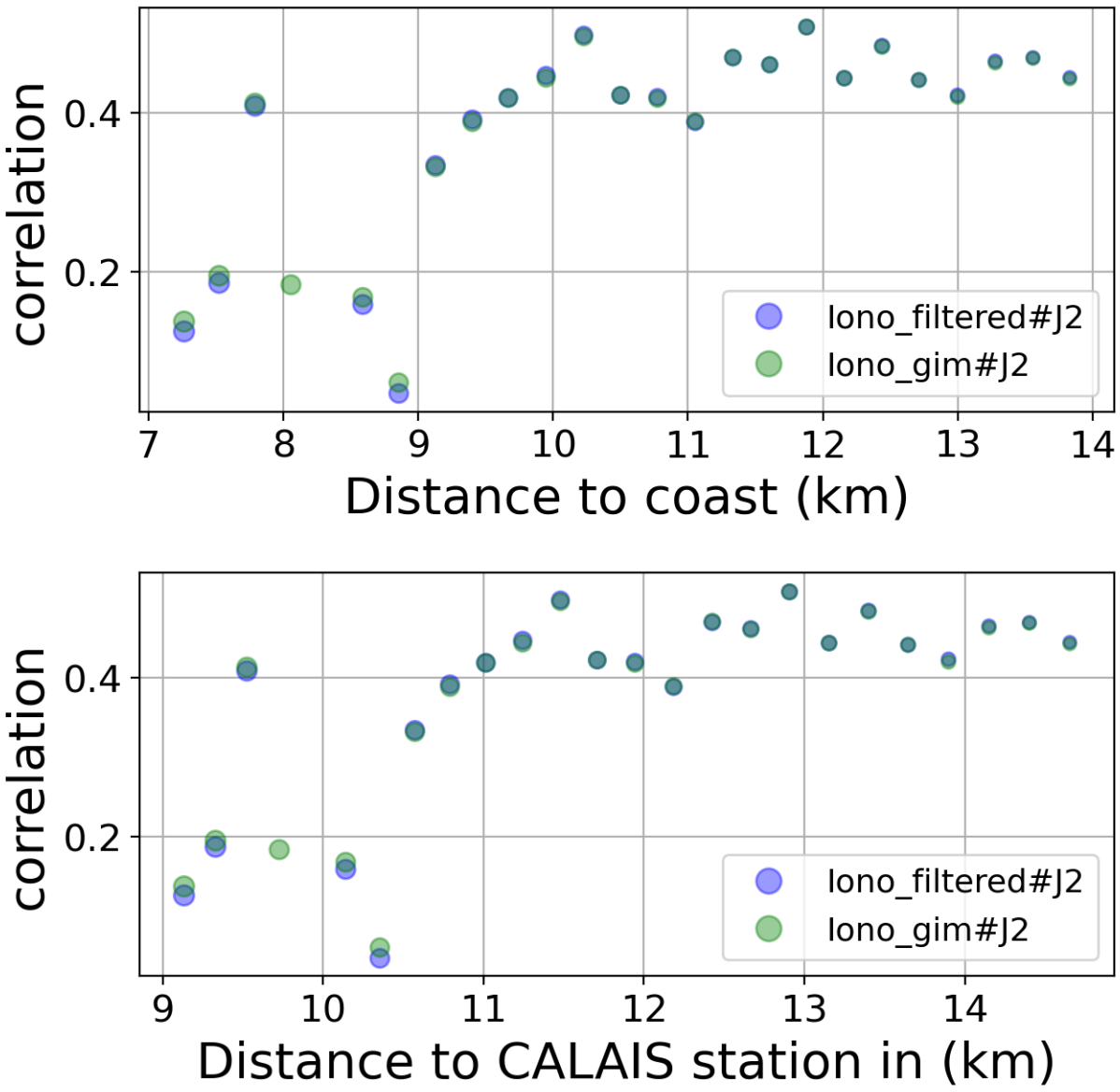

FIGURE 67 – Correlation in function of the distance to the coast/CALAIS station

6.4.8 Taylor Diagram

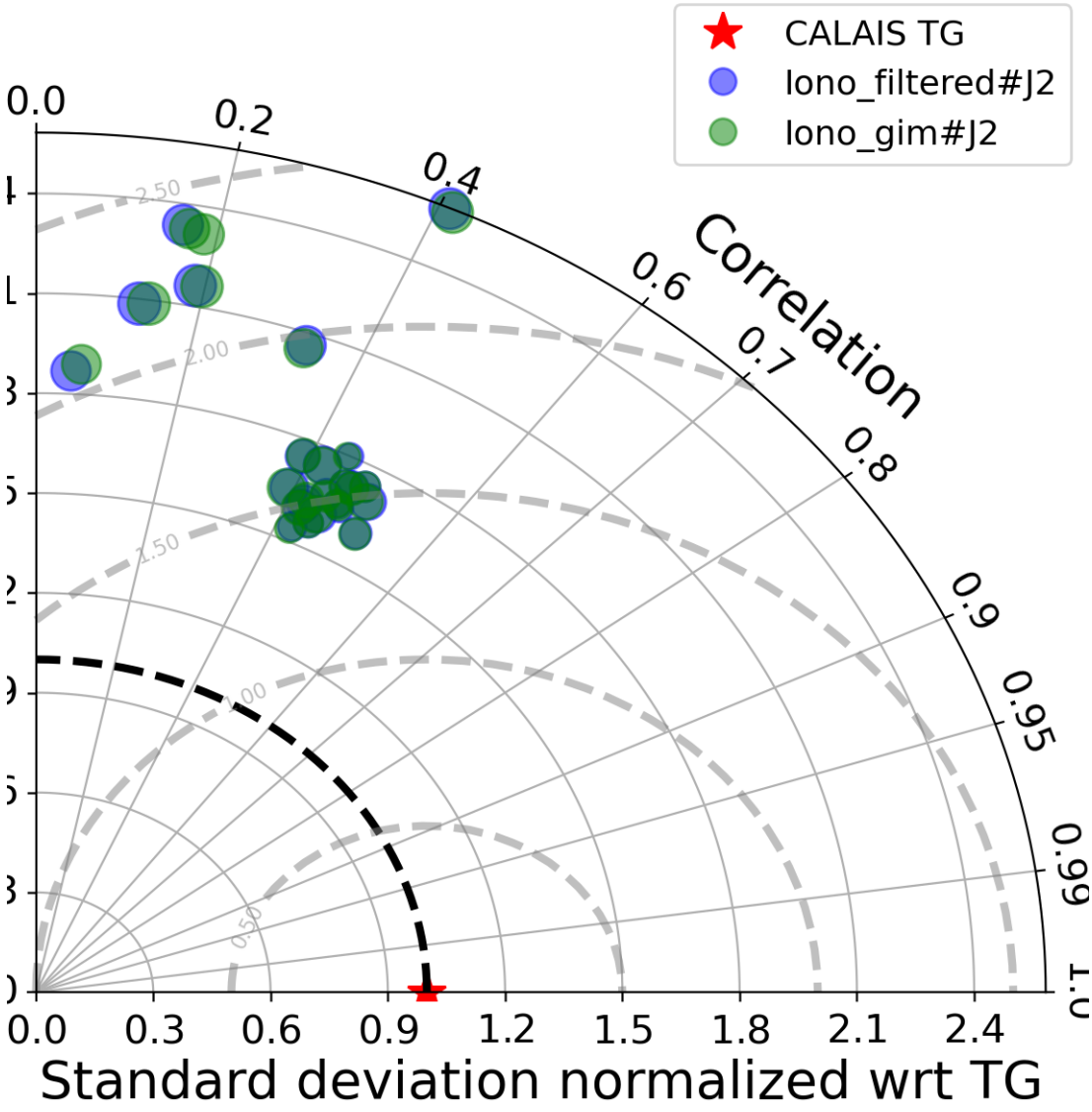

FIGURE 68 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	85.91	0.386	0.197	0.184
Iono_gim#J2	86.836	0.387	0.196	0.183

Figure 69 – Mean statistics table of the common points in the altimetry products

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

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

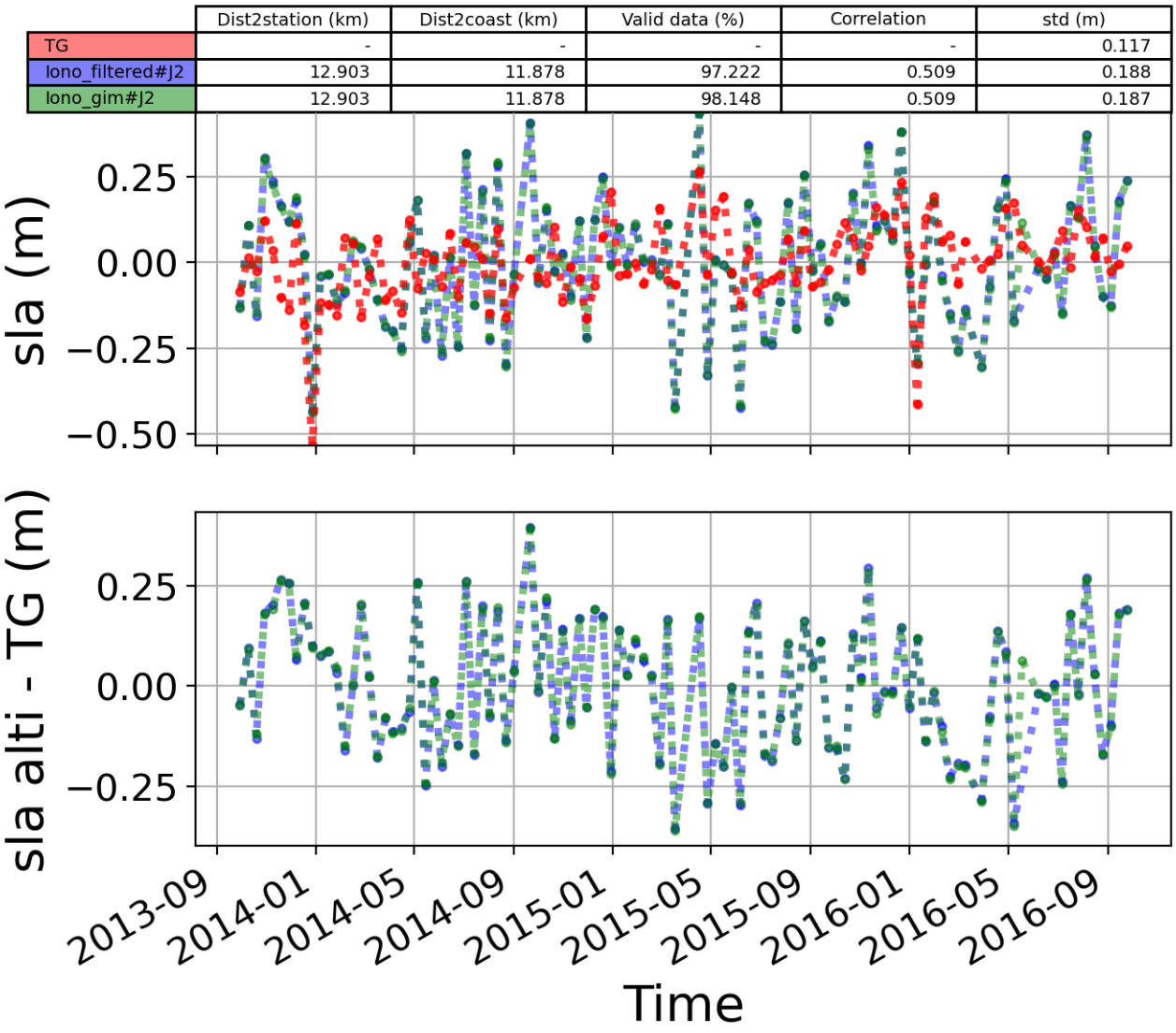

FIGURE 70 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

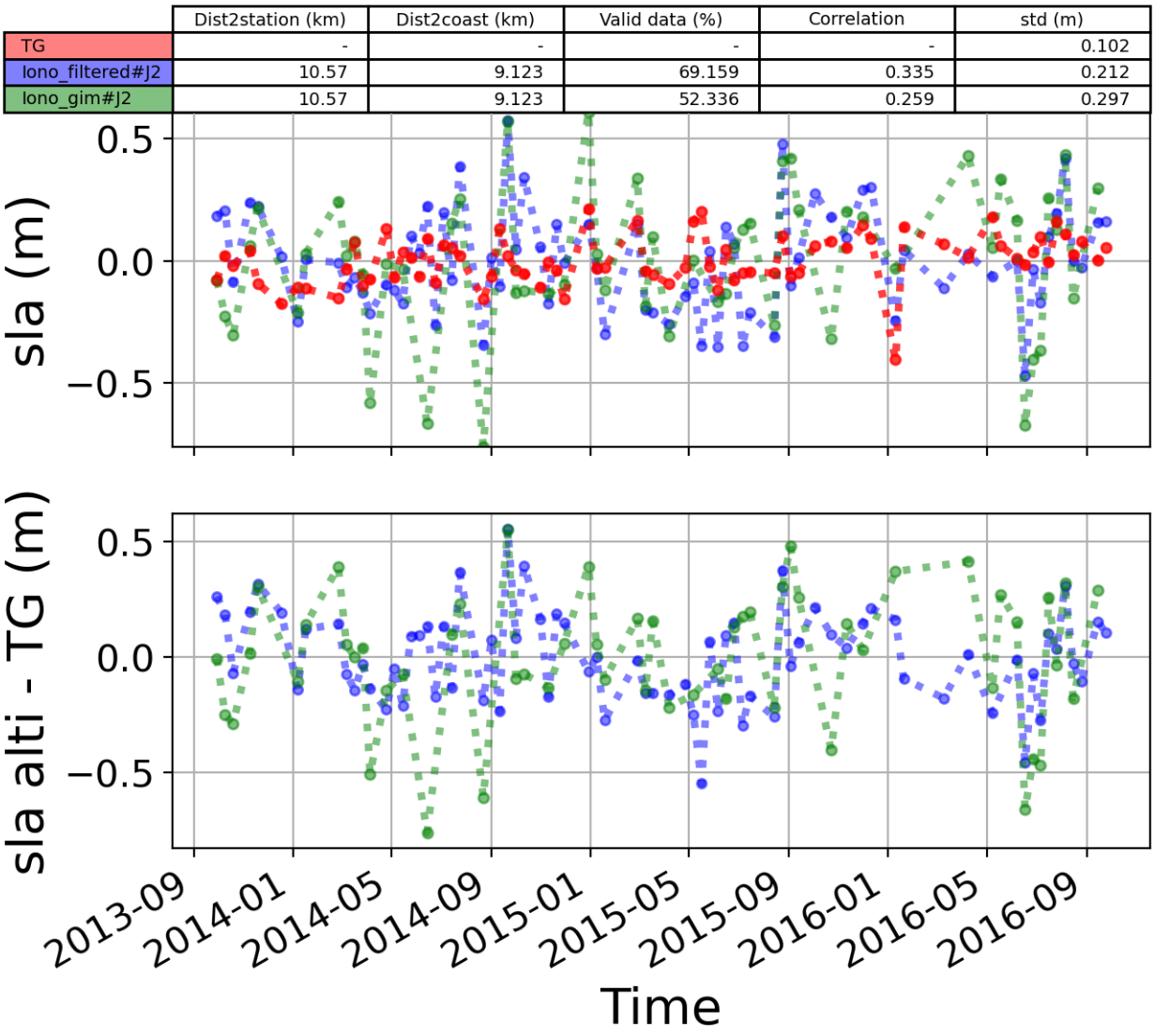

FIGURE 71 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.5 Station : Portpatrick

- Nearest track to Portpatrick station is the track number track87
- The area of interest is limited by :
  - A circle which it's center is the Portpatrick tide gauge station location and has a Raduis of 40 Km
  - Maximum distance to the coast : 20 Km

6.5.1 correlation visualization in maps view % Portpatrick tide gauge

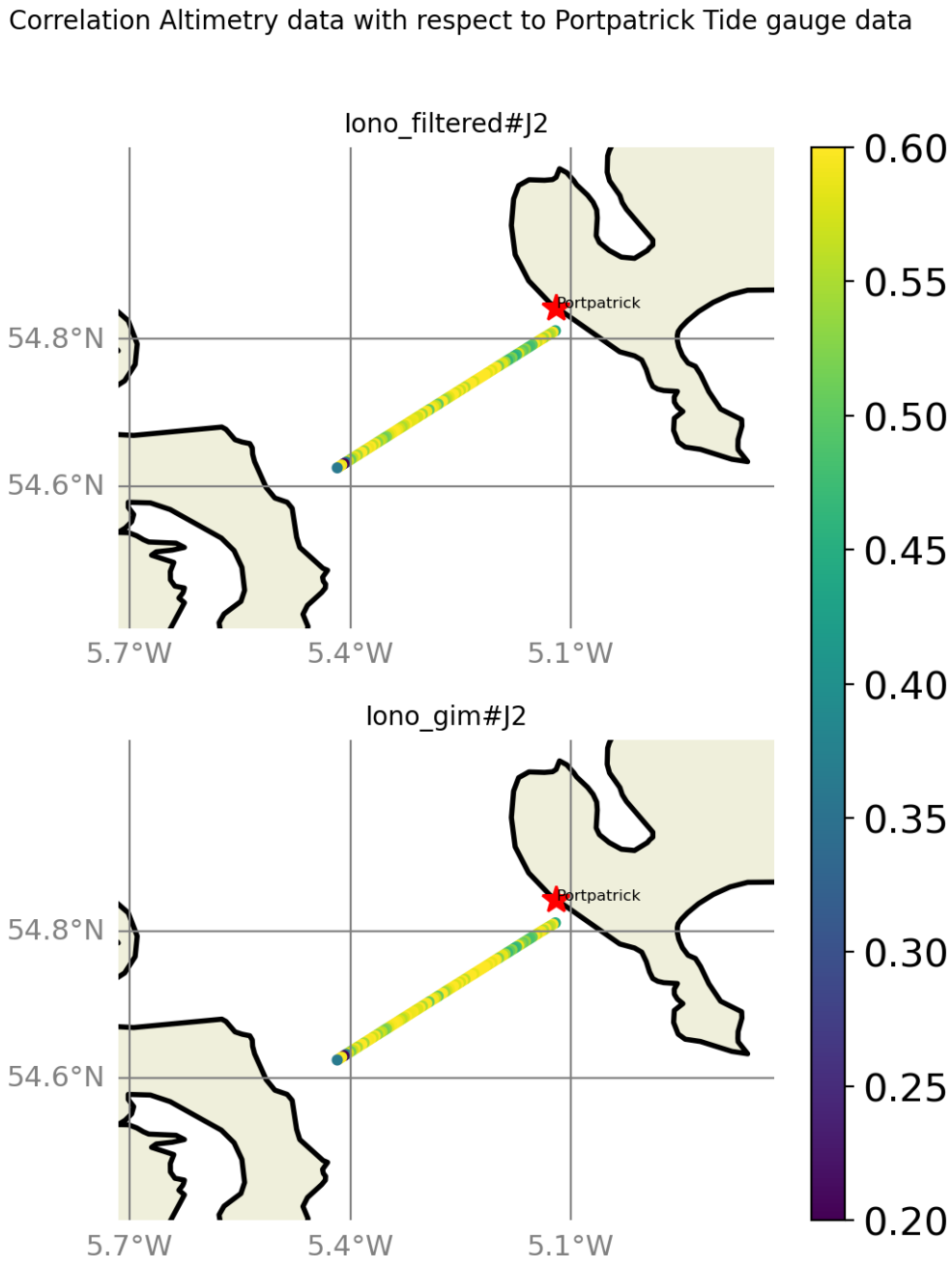

FIGURE 72 – correlation visualization in maps view % Portpatrick tide gauge

6.5.2 rmsd visualization in maps view % Portpatrick tide gauge

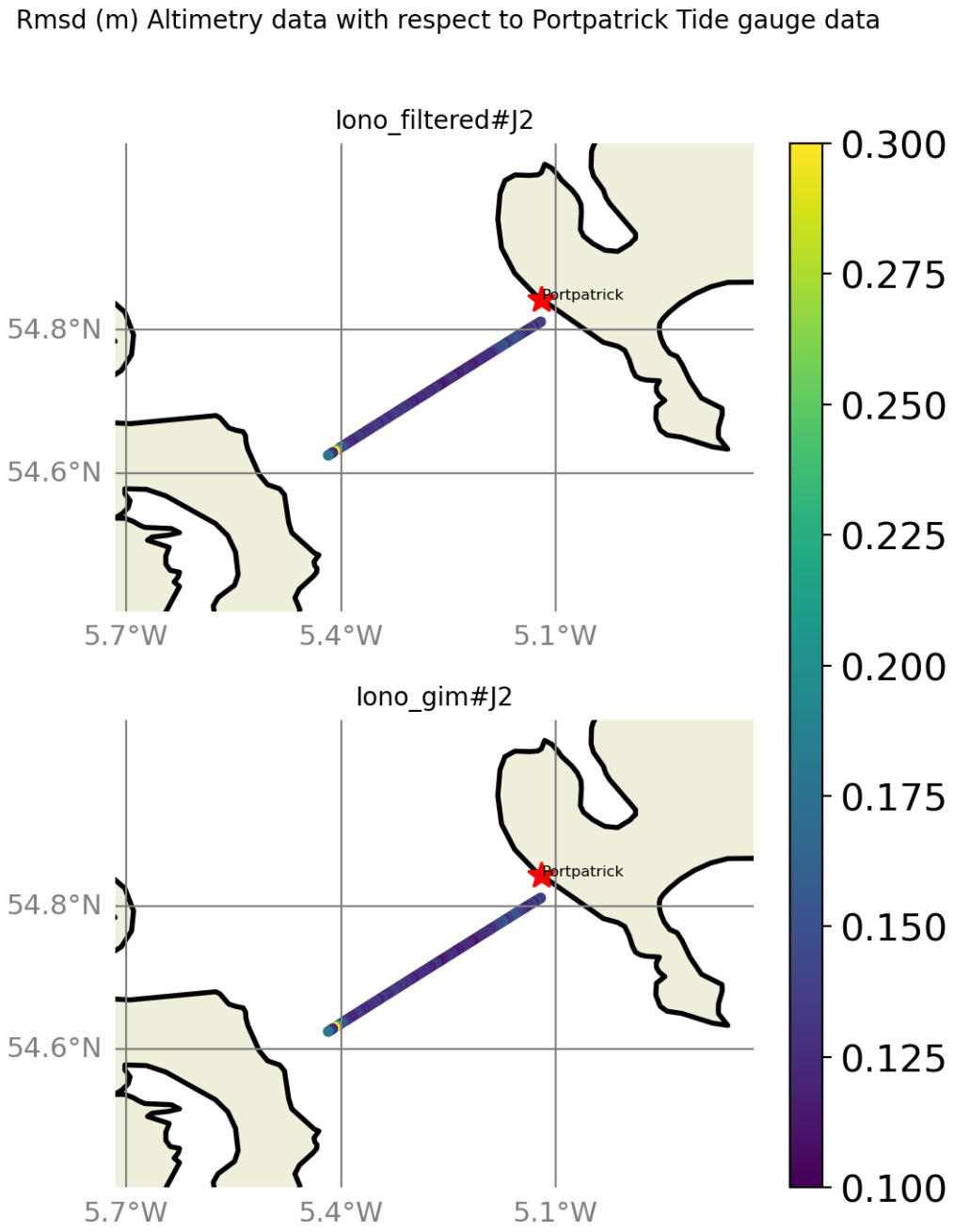

FIGURE 73 – rmsd visualization in maps view % Portpatrick tide gauge

6.5.3 std visualization in maps view % Portpatrick tide gauge

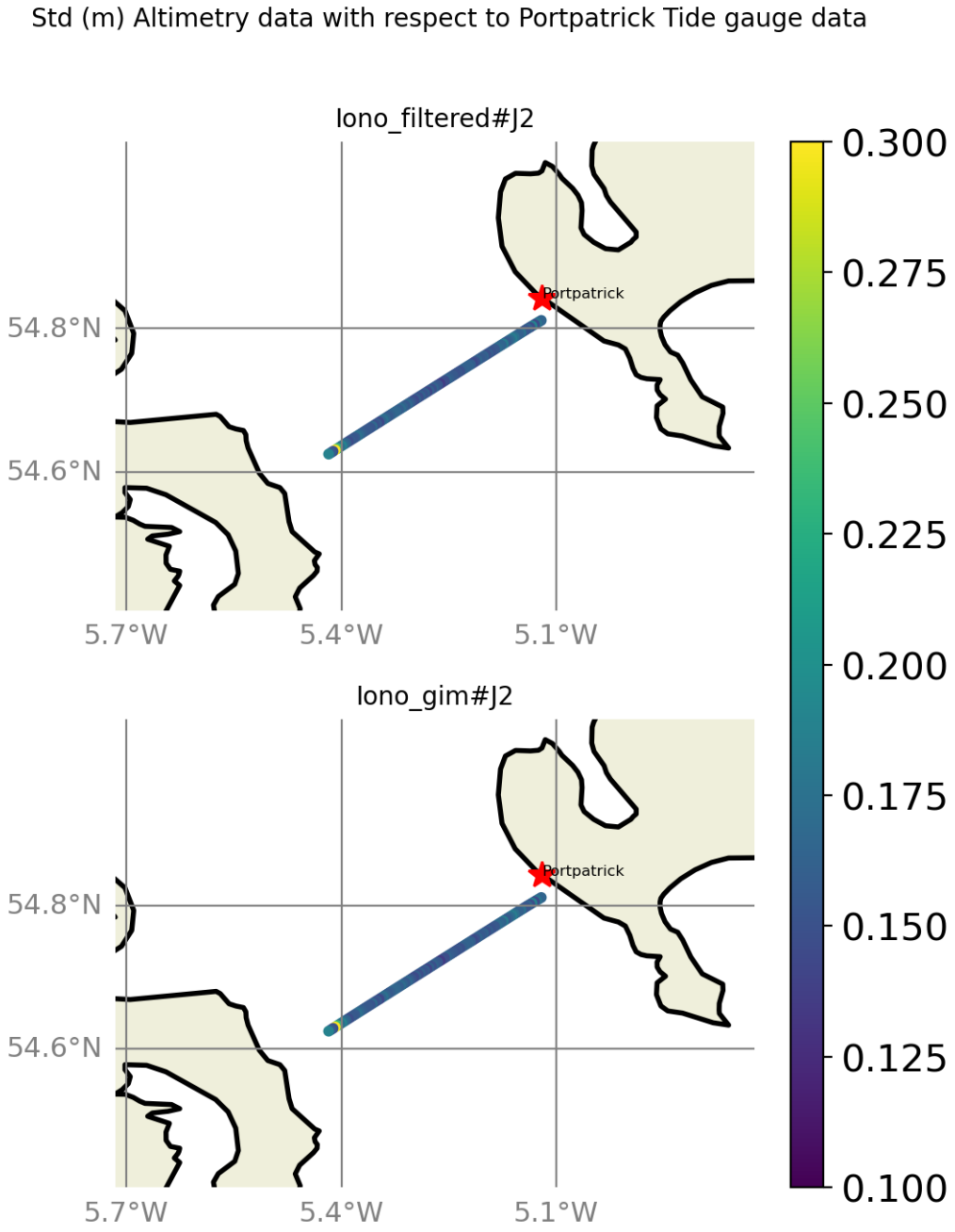

FIGURE 74 – std visualization in maps view % Portpatrick tide gauge

6.5.4 valid_data_percent visualization in maps view % Portpatrick tide gauge

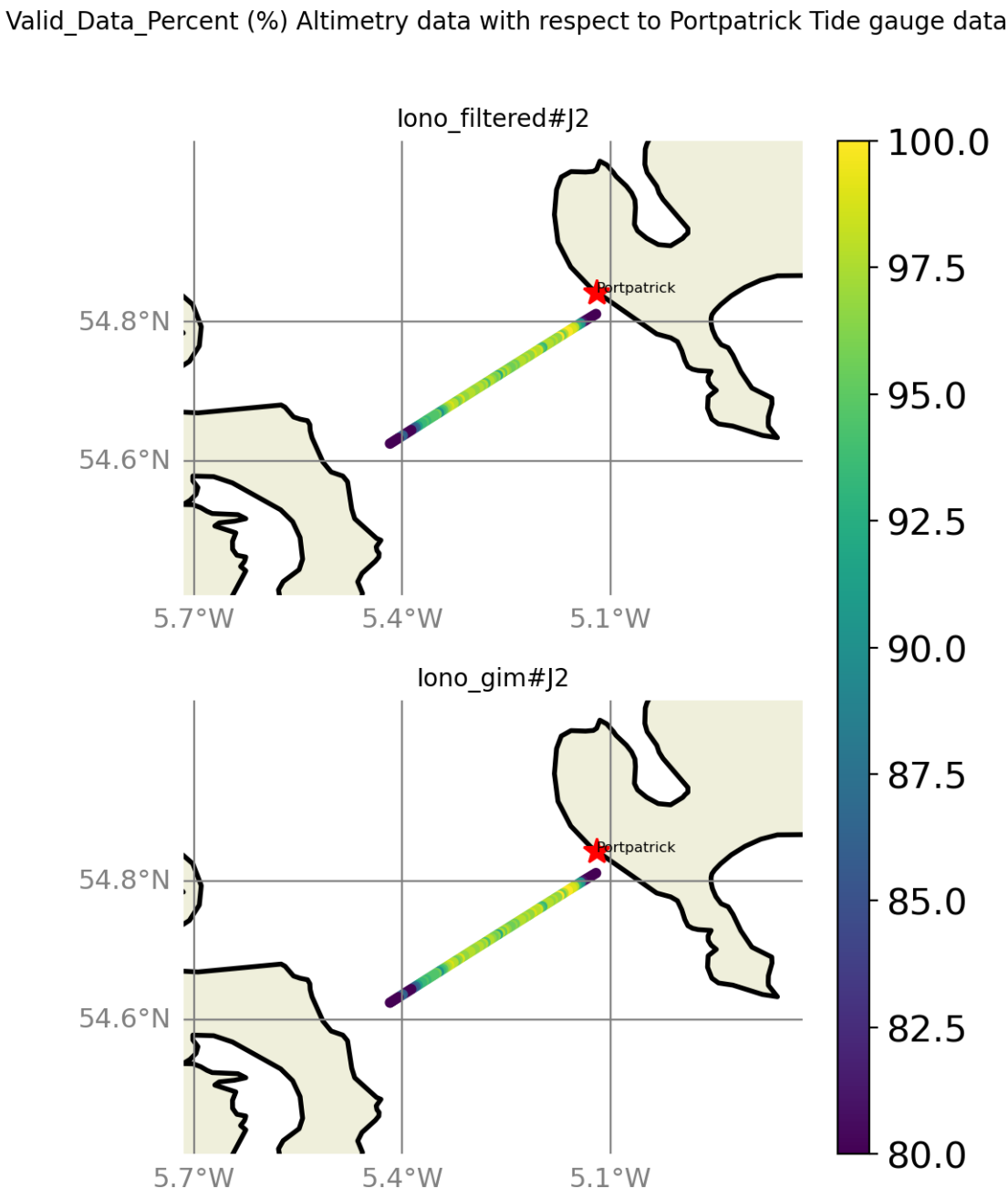

FIGURE 75 – valid_data_percent visualization in maps view % Portpatrick tide gauge

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

The formula to calculate the percentage of valid data in each time 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.

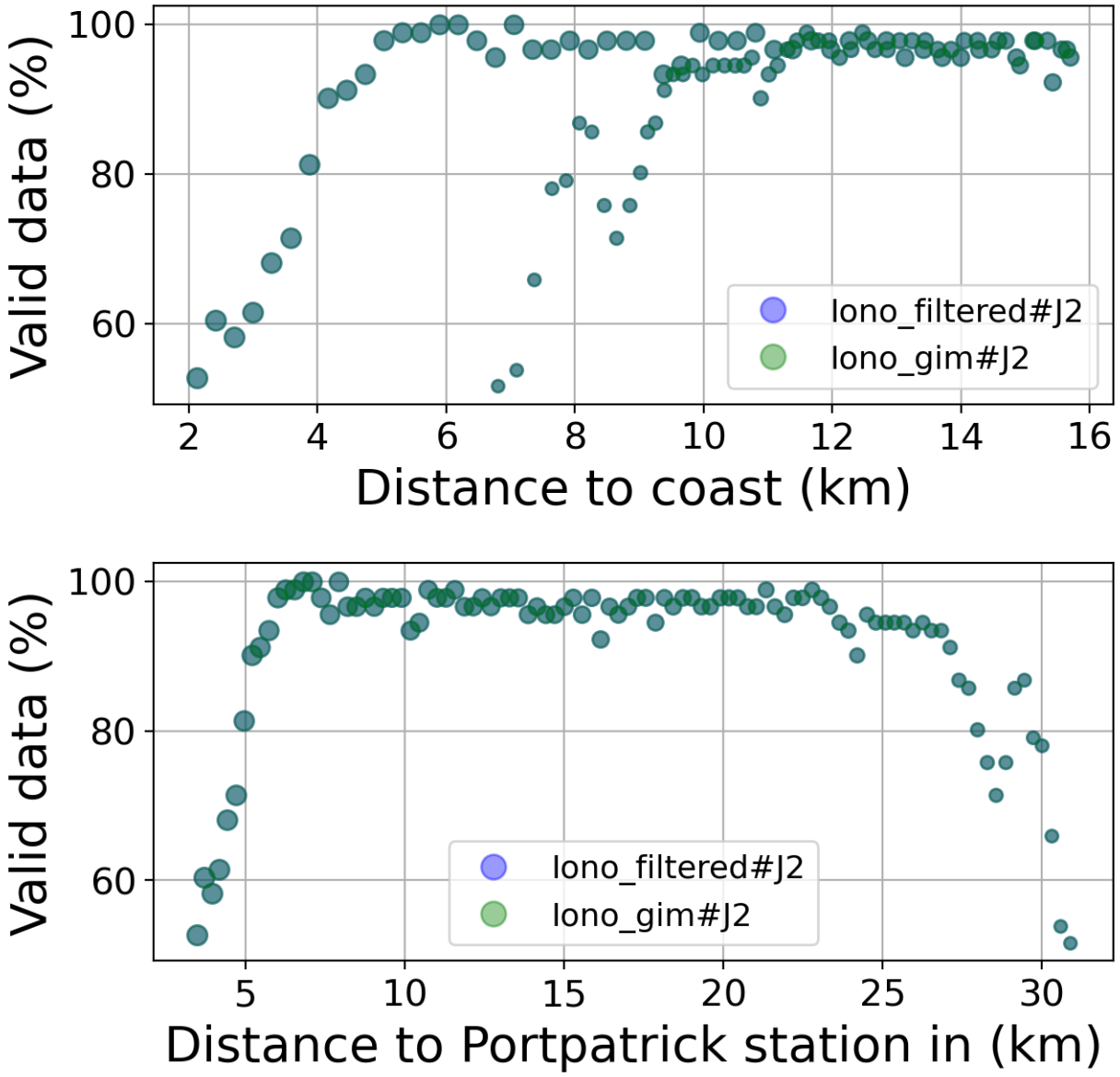

Figure 76 – Valid data (%) in function of distance to coast/Portpatrick station

6.5.6 Std in function of distance to coast/Portpatrick station

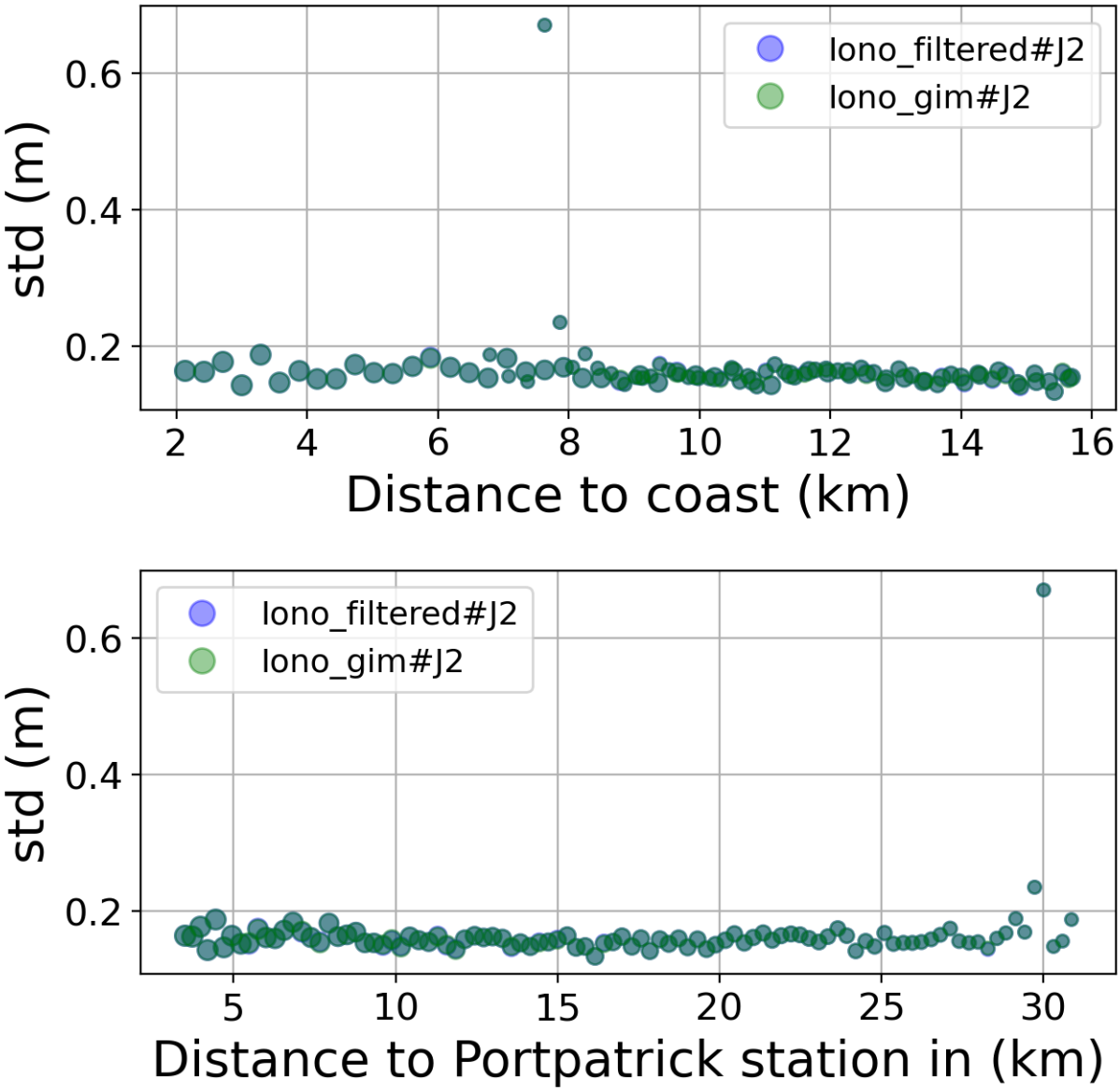

FIGURE 77 – Std in function of the distance to the coast/Portpatrick station

6.5.7 Correlation in function of distance to coast/Portpatrick station

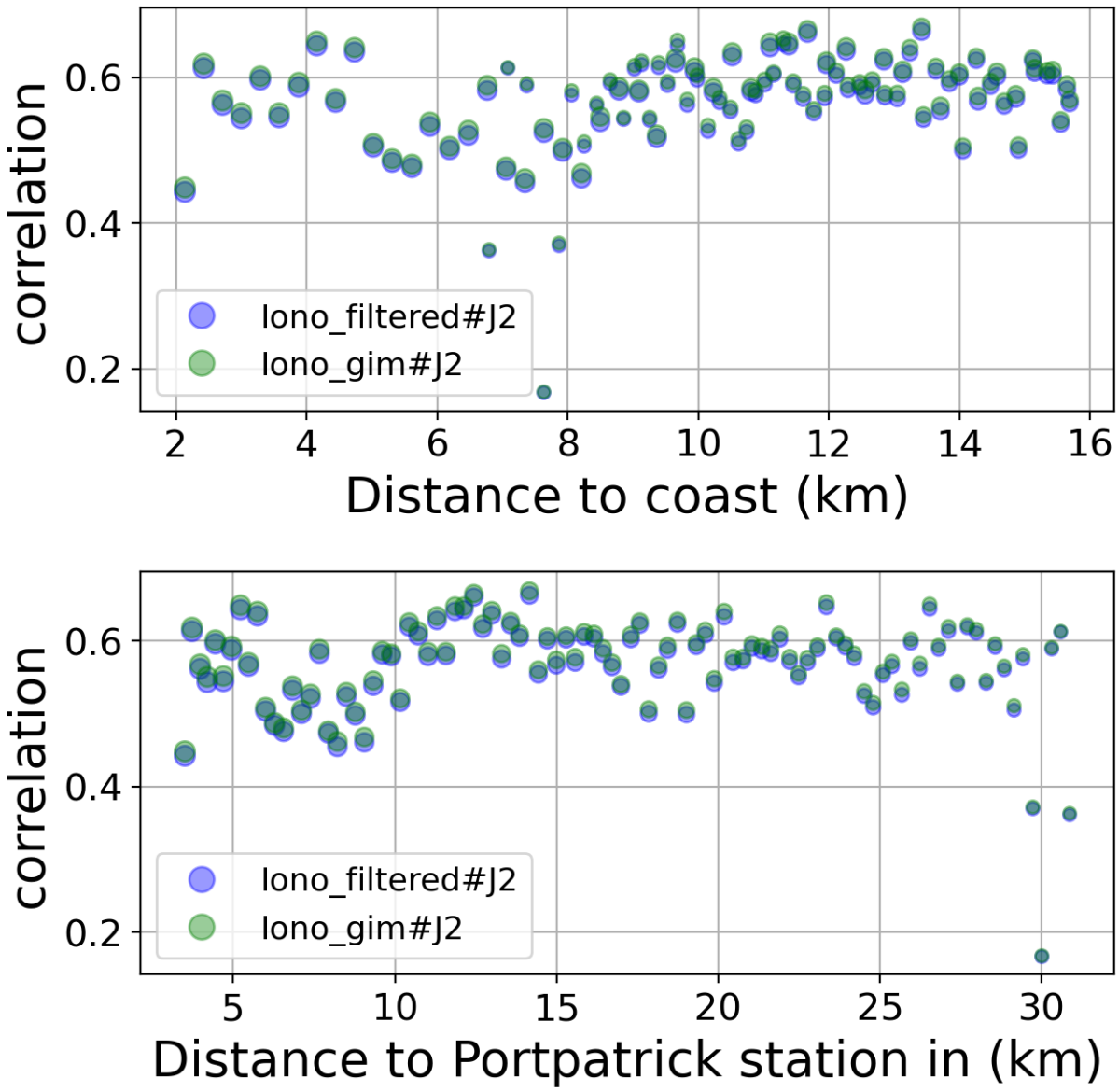

Figure 78 – Correlation in function of the distance to the coast/Portpatrick station

6.5.8 Taylor Diagram

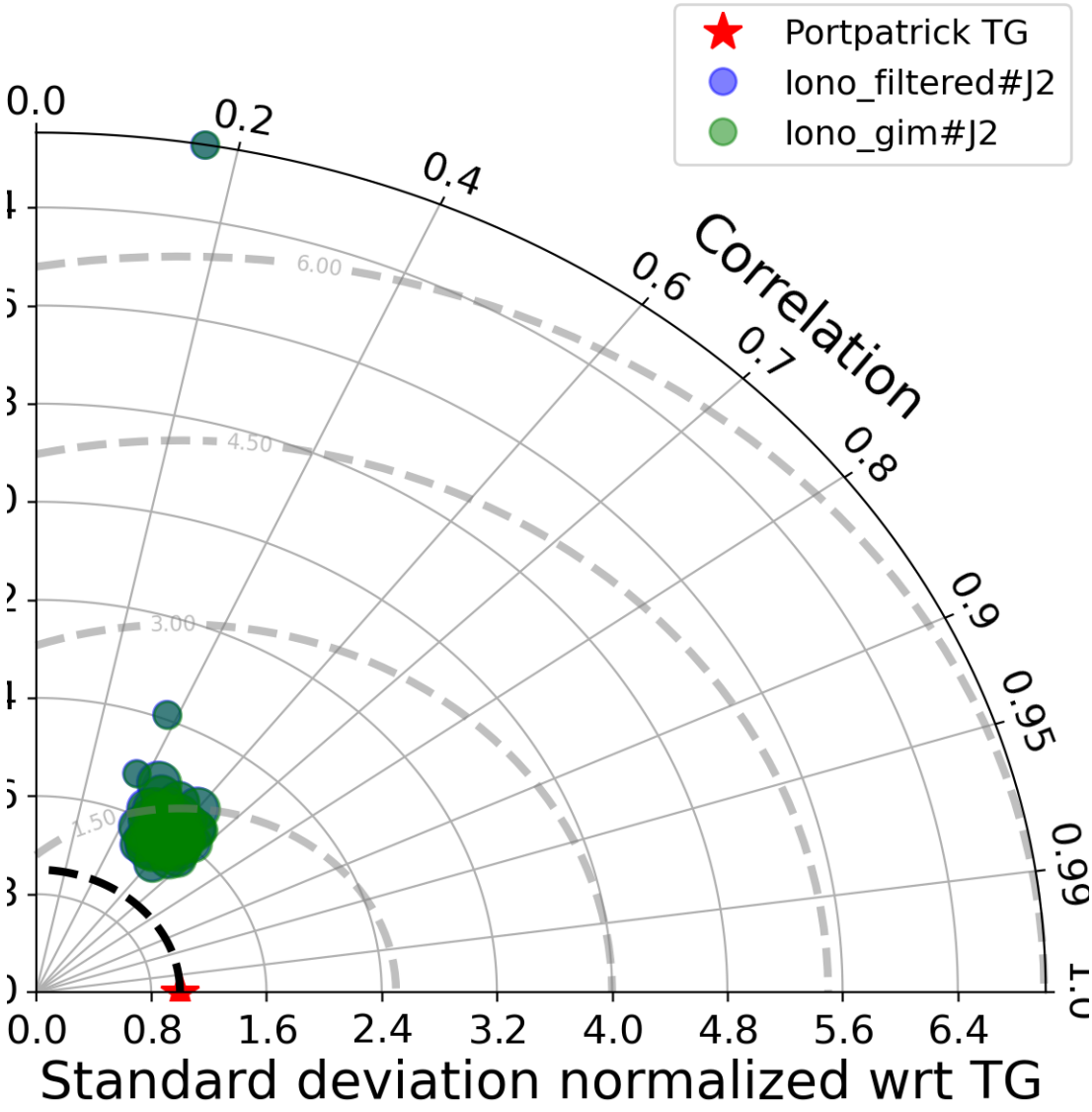

FIGURE 79 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	91.321	0.565	0.166	0.138
Iono_gim#J2	91.321	0.571	0.166	0.137

Figure 80 – Mean statistics table of the common points in the altimetry products

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

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 91 point.

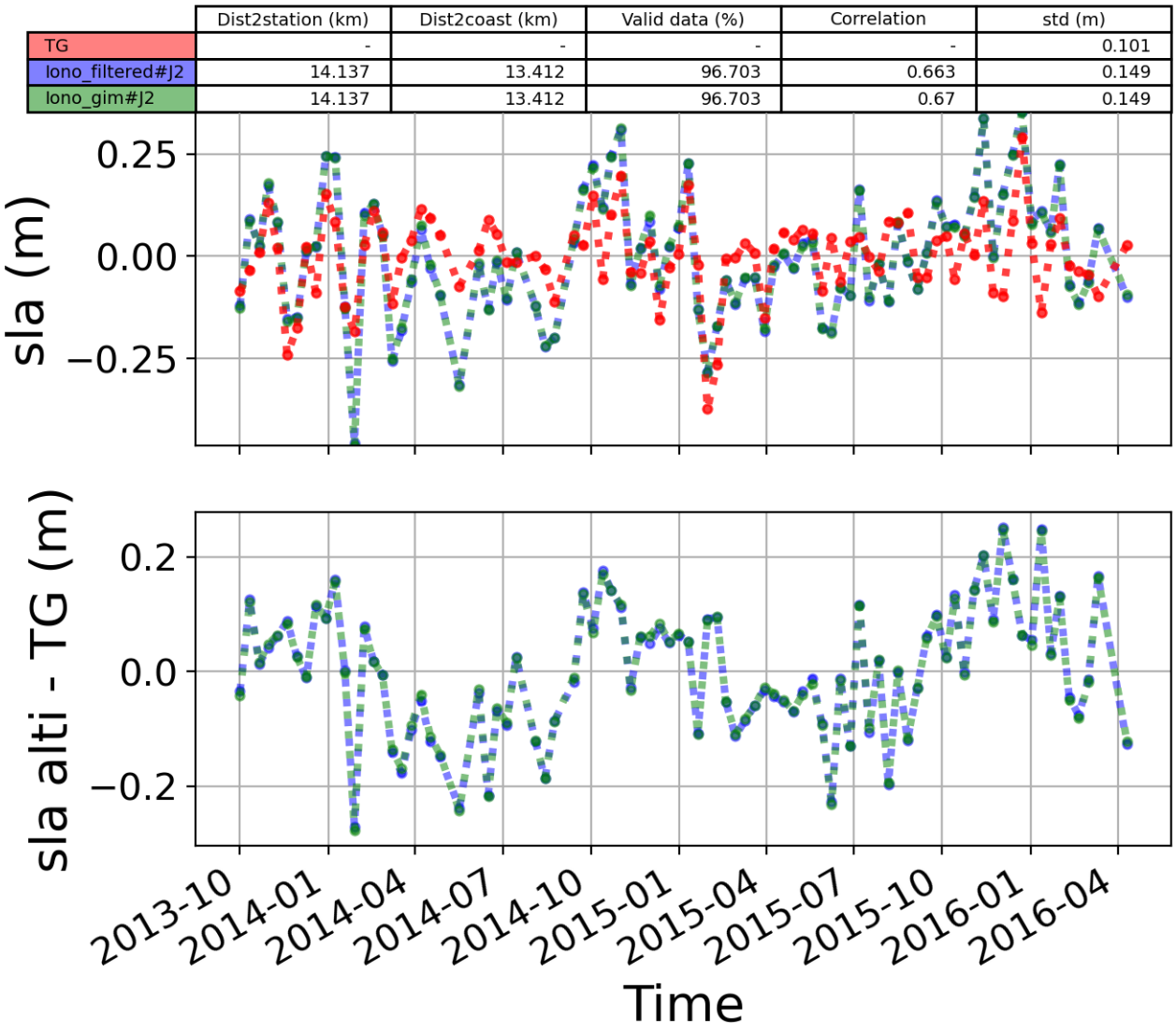

FIGURE 81 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

	Dist2station (km)	Dist2coast (km)	Valid data (%)	Correlation	std (m)
TG	-	-	-	-	0.101
Iono_filtered#J2	5.729	4.731	92.391	0.635	0.175
Iono_gim#J2	5.729	4.731	86.957	0.581	0.194

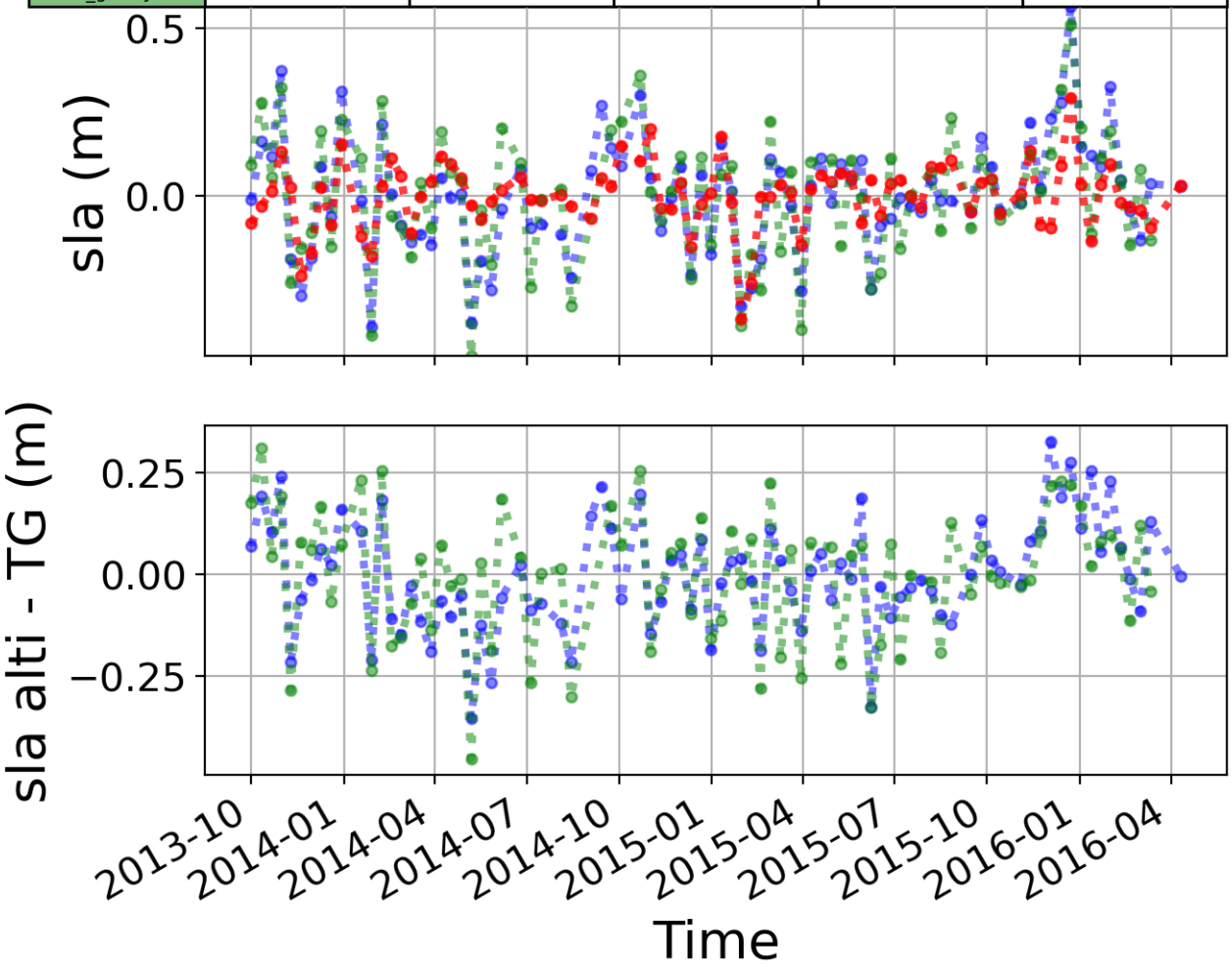

FIGURE 82 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.6 Station : Newlyn

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

6.6.1 correlation visualization in maps view % Newlyn tide gauge

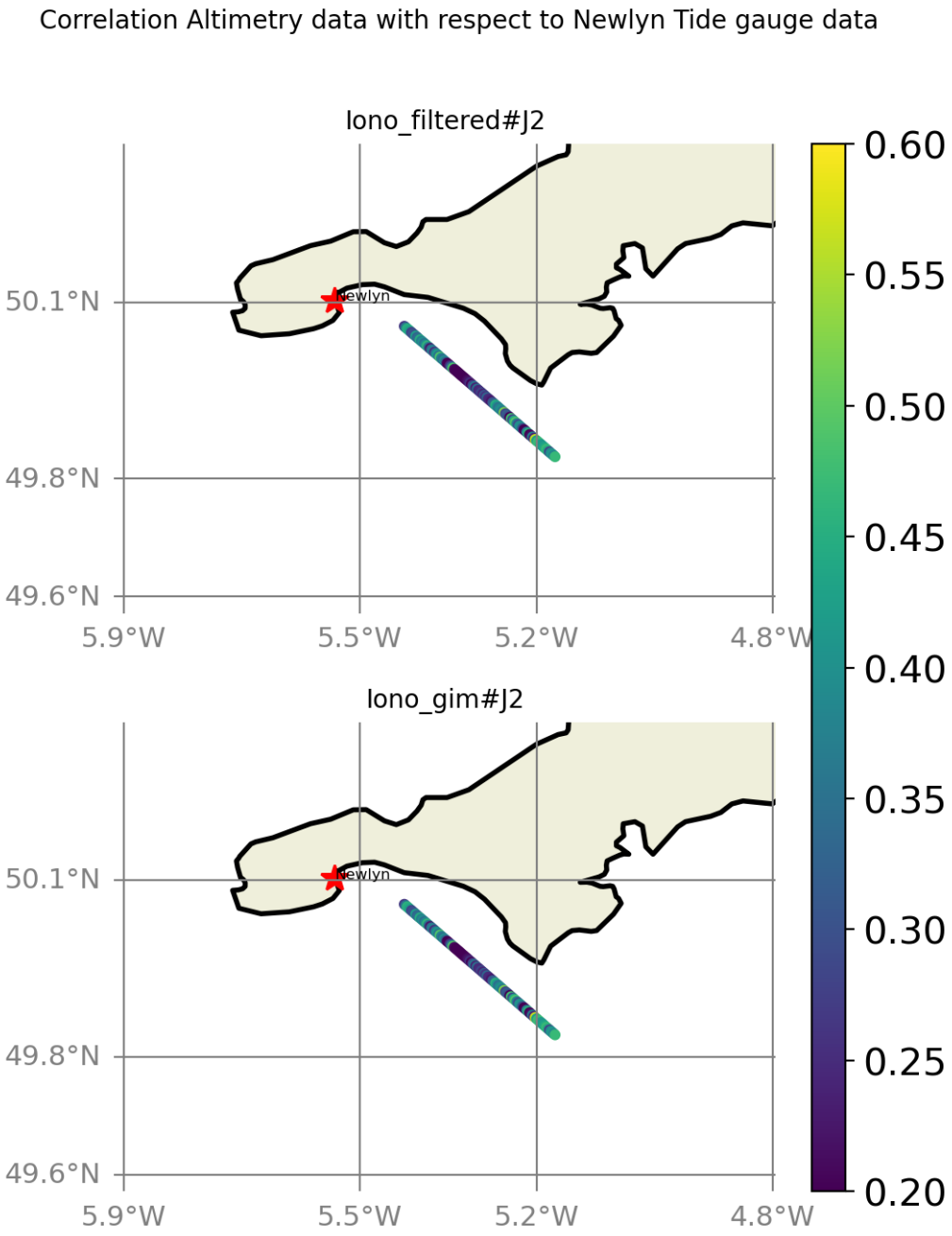

FIGURE 83 – correlation visualization in maps view % Newlyn tide gauge

6.6.2 rmsd visualization in maps view % Newlyn tide gauge

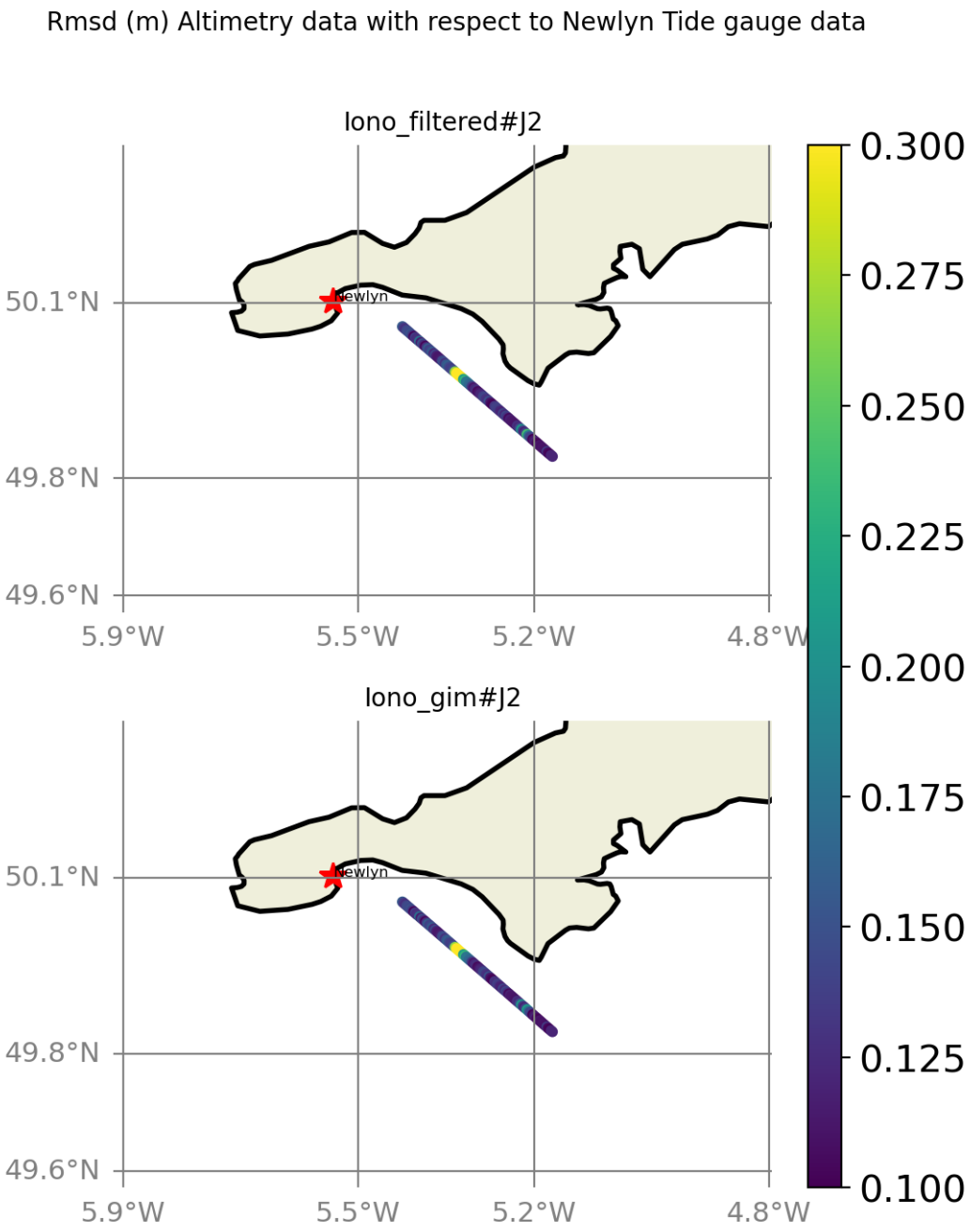

FIGURE 84 – rmsd visualization in maps view % Newlyn tide gauge

6.6.3 std visualization in maps view % Newlyn tide gauge

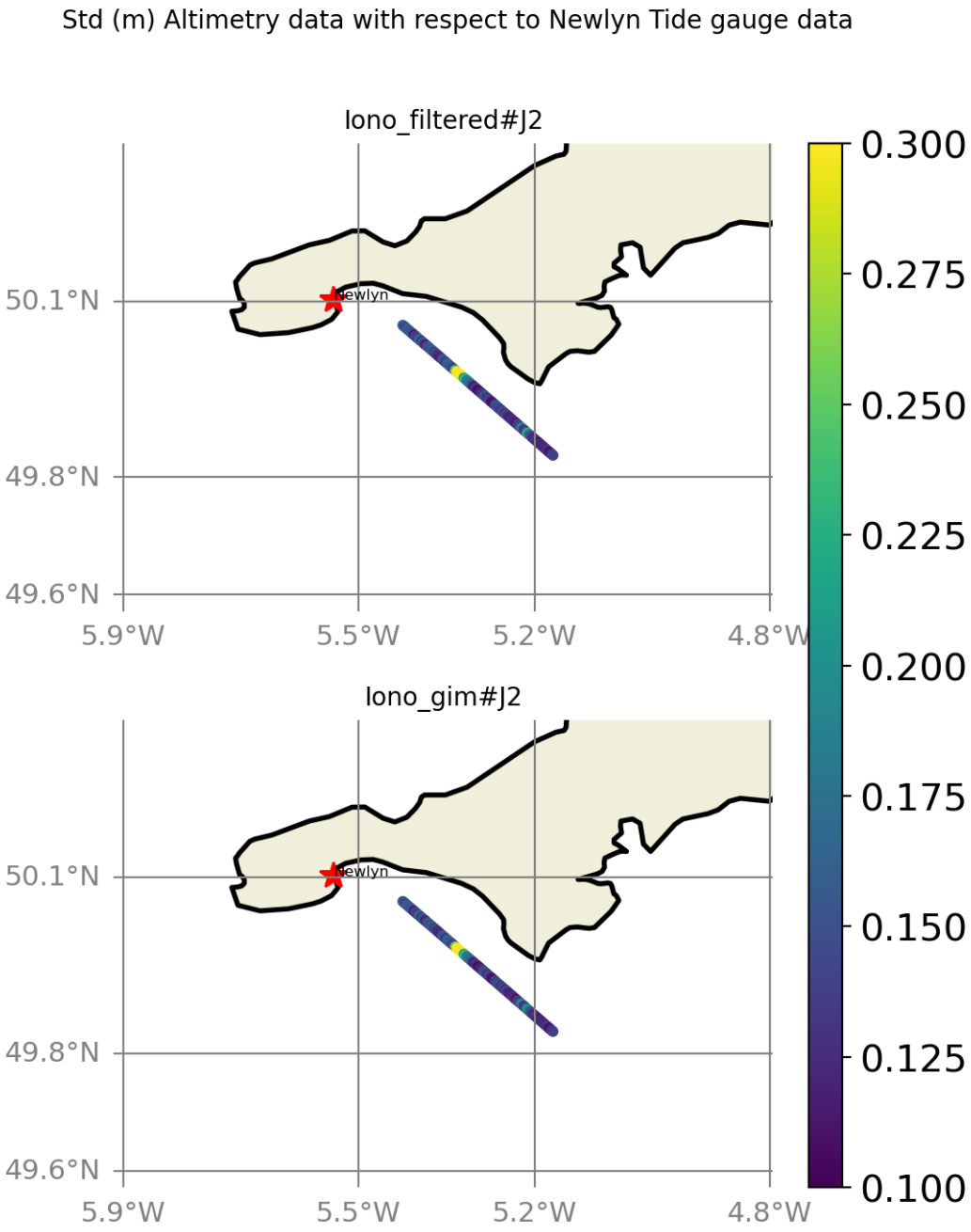

FIGURE 85 – std visualization in maps view % Newlyn tide gauge

6.6.4 valid_data_percent visualization in maps view % Newlyn tide gauge

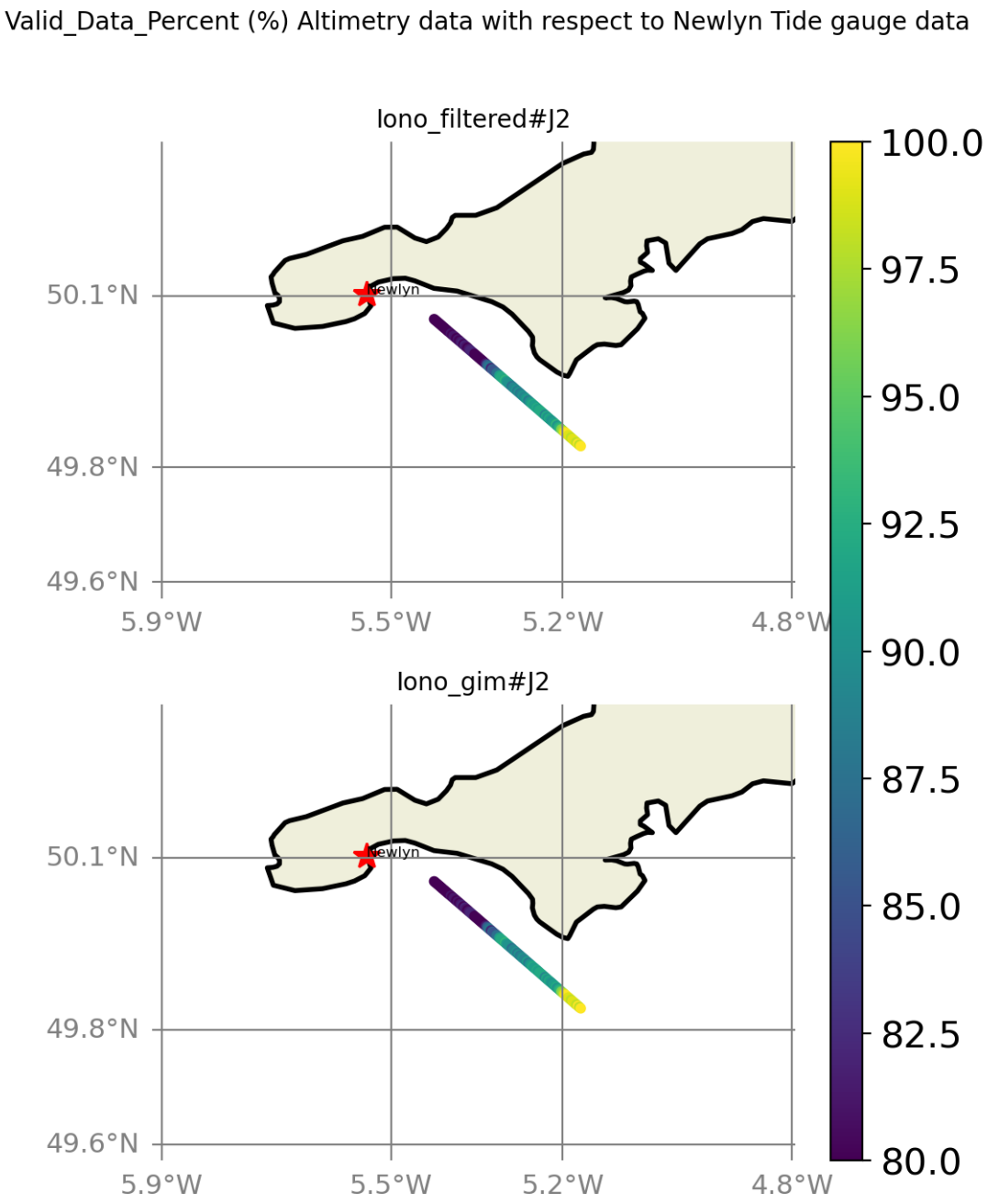

FIGURE 86 – valid_data_percent visualization in maps view % Newlyn tide gauge

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

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

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

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

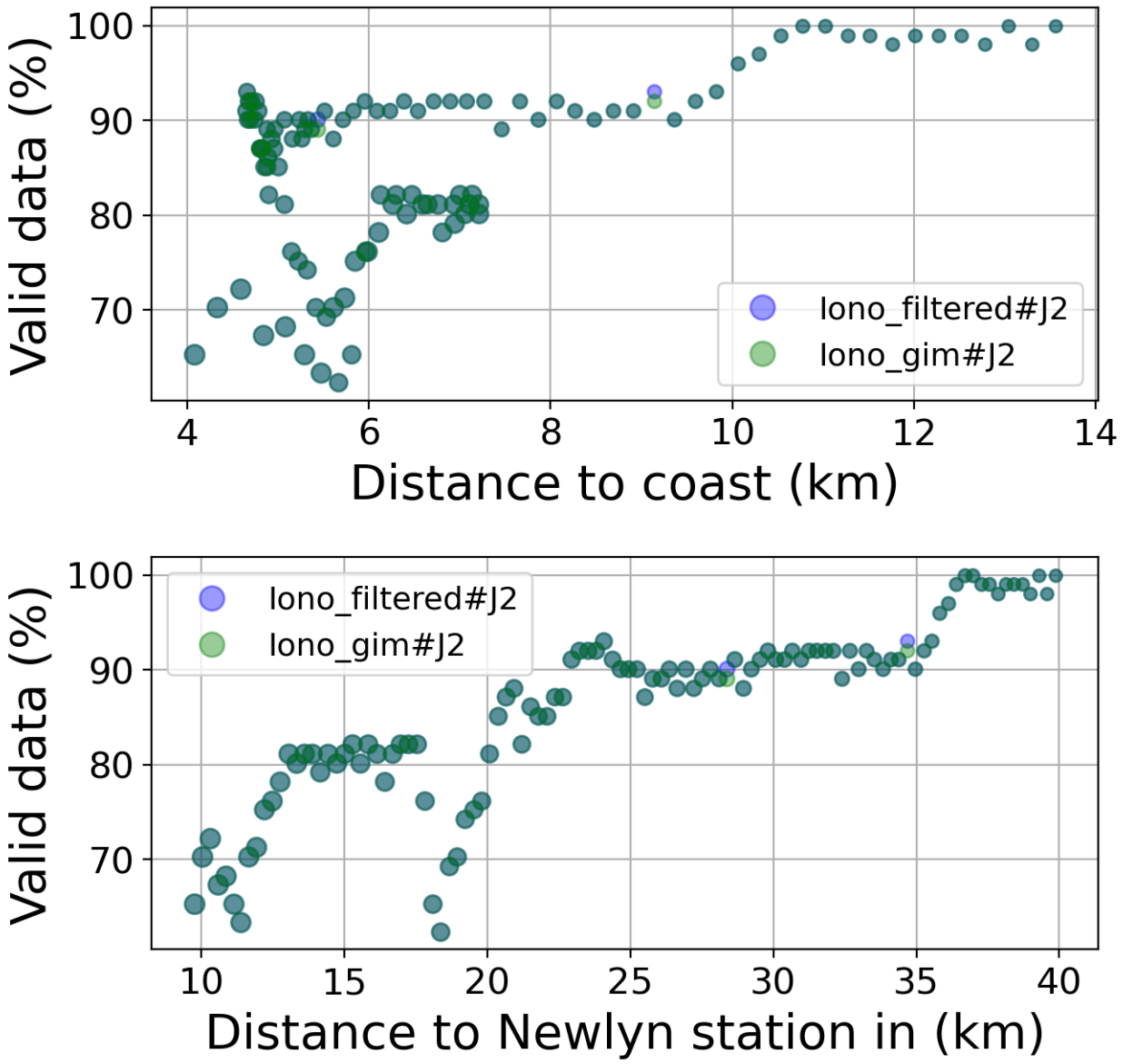

FIGURE 87 – Valid data (%) in function of distance to coast/Newlyn station

6.6.6 Std in function of distance to coast/Newlyn station

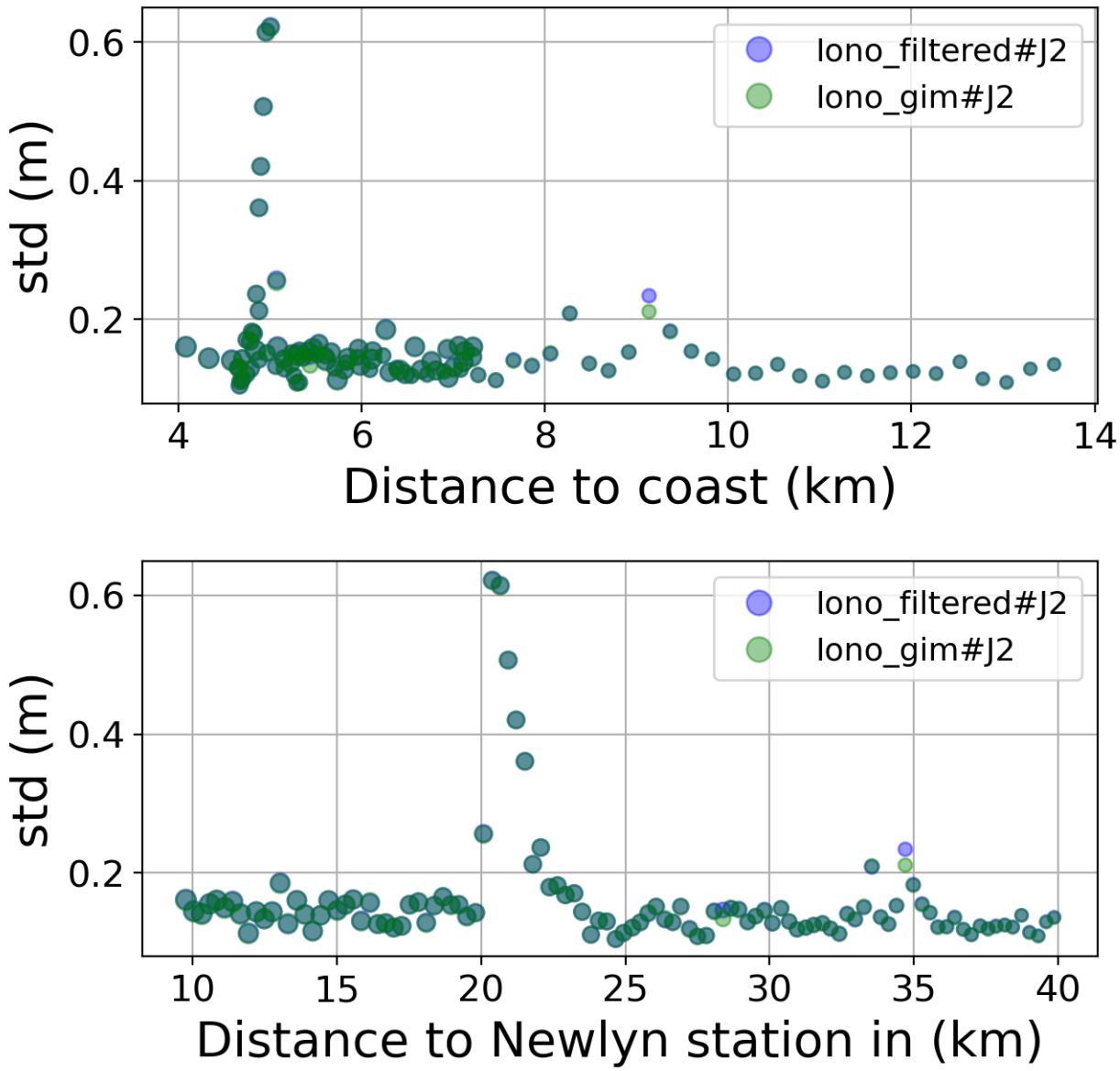

Figure 88 – Std in function of the distance to the coast/Newlyn station

6.6.7 Correlation in function of distance to coast/Newlyn station

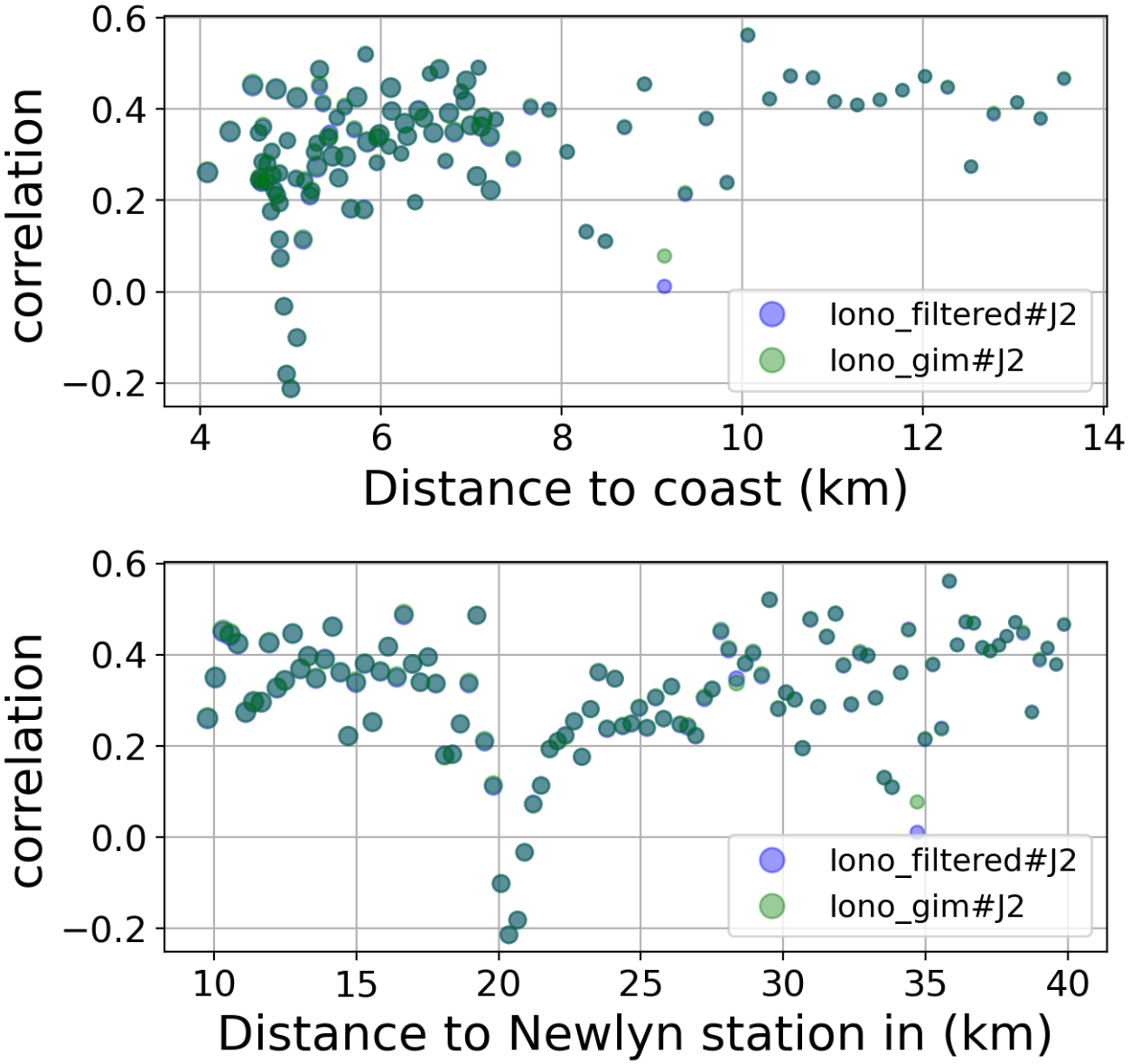

FIGURE 89 – Correlation in function of the distance to the coast/Newlyn station

6.6.8 Taylor Diagram

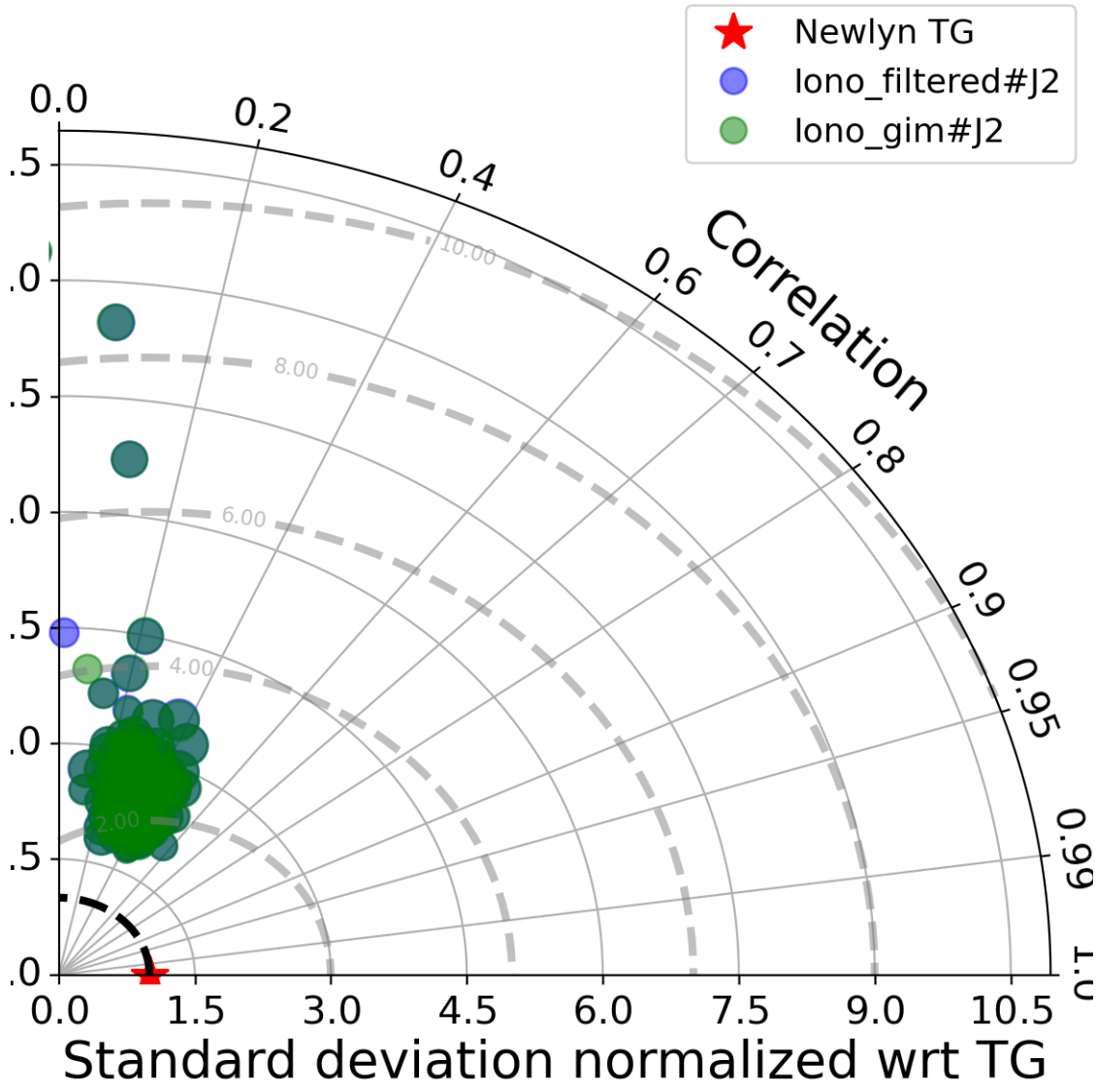

FIGURE 90 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
dno_filtered#J2	86.065	0.316	0.16	0.153
Iono_gim#J2	86.046	0.317	0.159	0.152

Figure 91 – Mean statistics table of the common points in the altimetry products

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

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

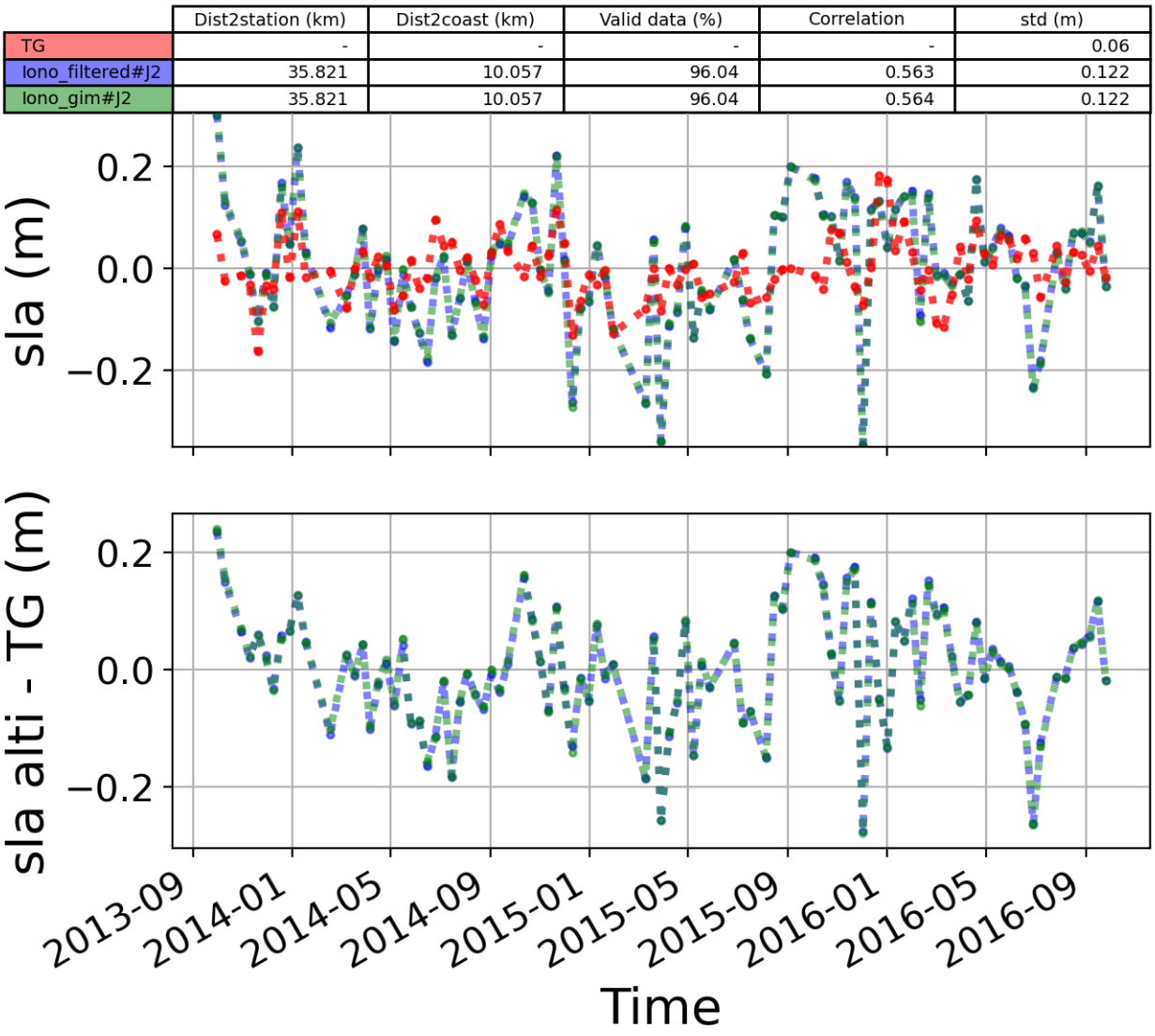

FIGURE 92 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

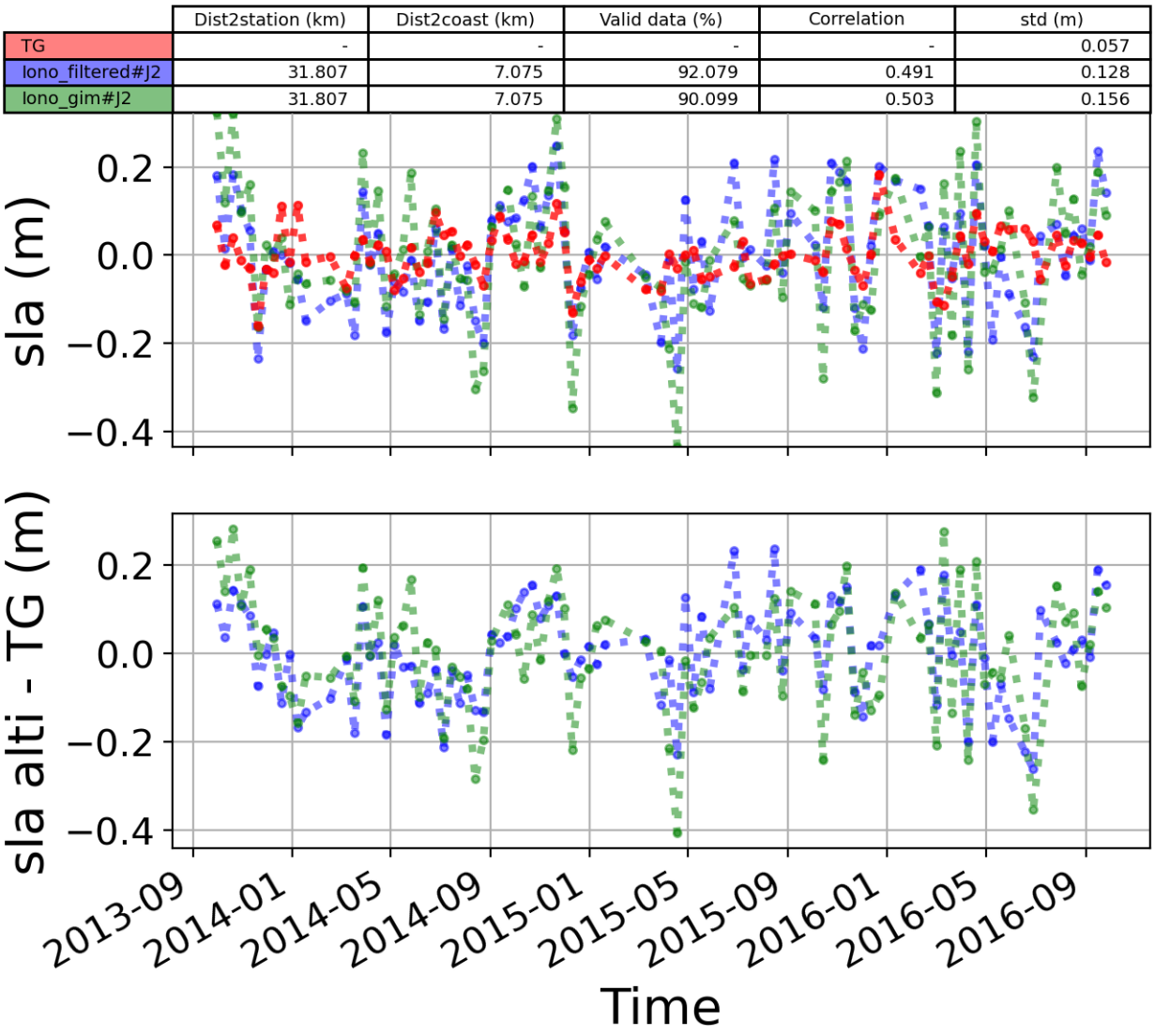

FIGURE 93 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.7 Station : LE_CONQUET

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

6.7.1 correlation visualization in maps view % LE_CONQUET tide gauge

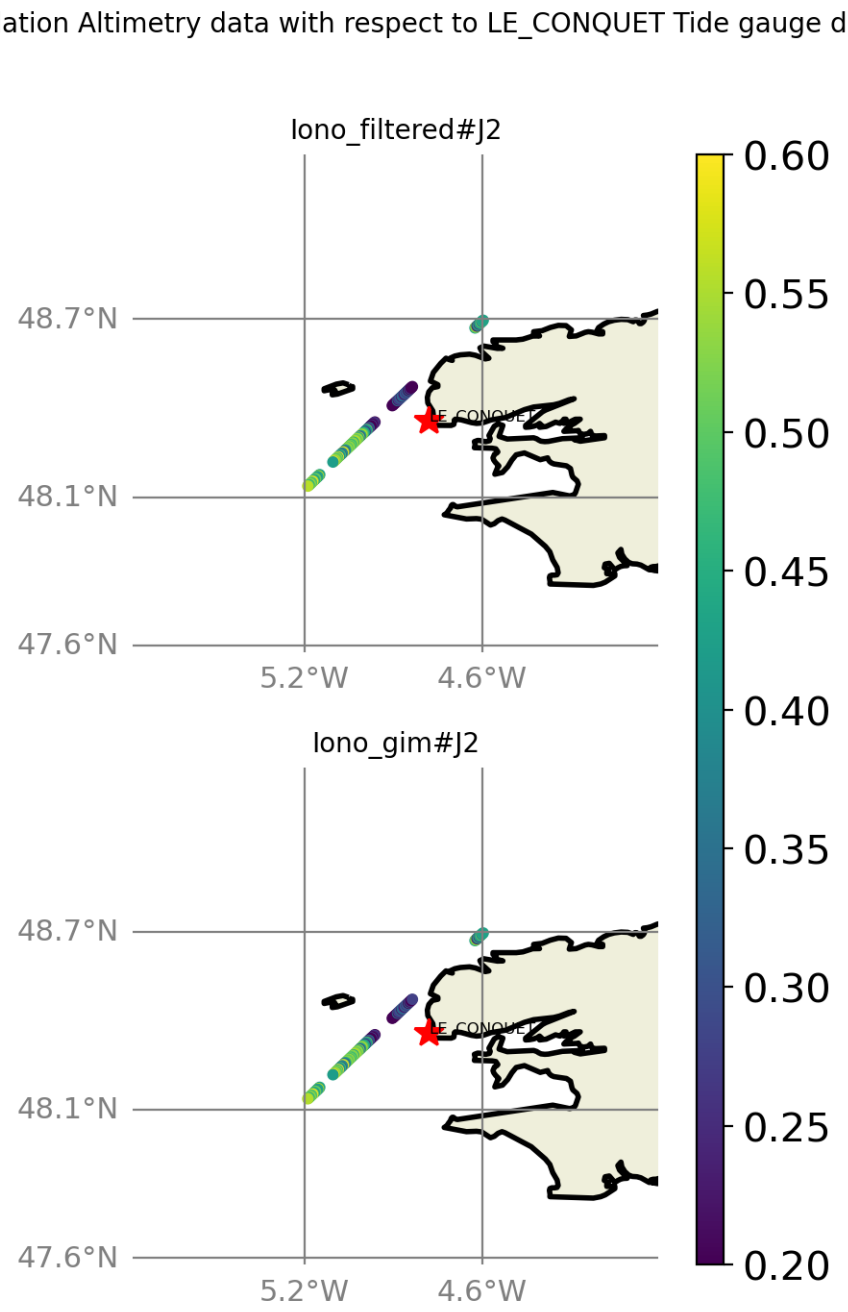

FIGURE 94 – correlation visualization in maps view % LE_CONQUET tide gauge

6.7.2 rmsd visualization in maps view % LE_CONQUET tide gauge

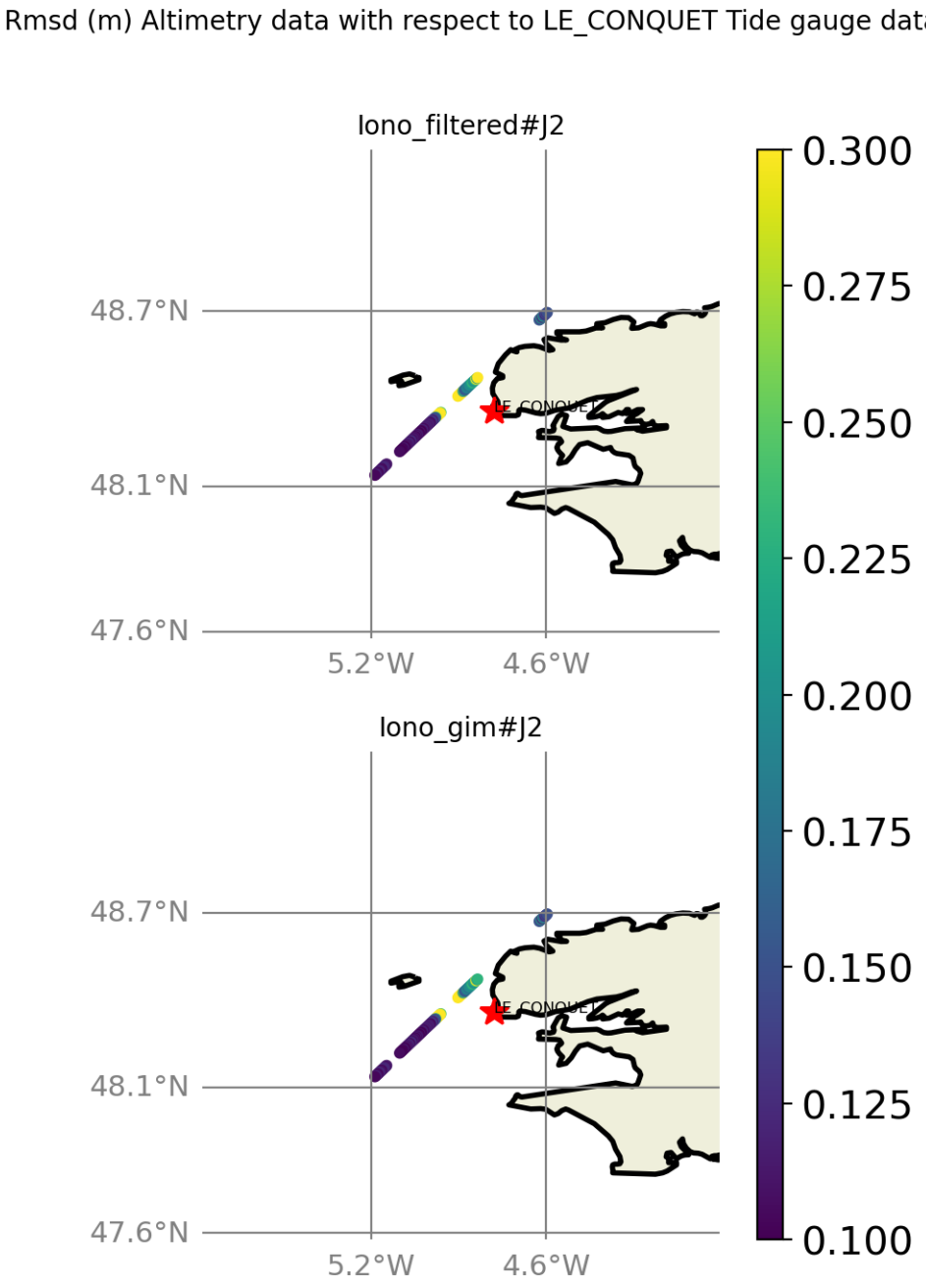

FIGURE 95 – rmsd visualization in maps view % LE_CONQUET tide gauge

6.7.3 std visualization in maps view % LE_CONQUET tide gauge

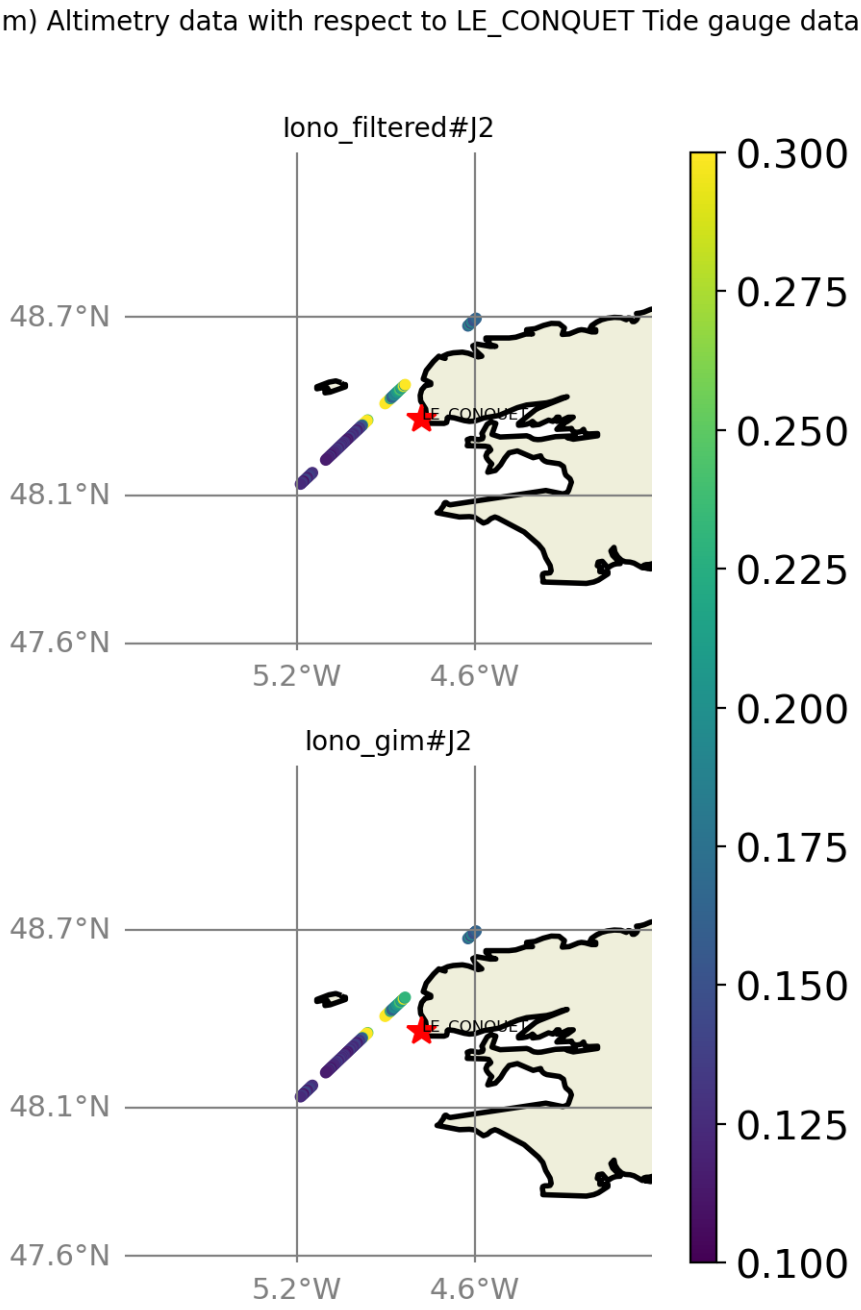

Figure 96 – std visualization in maps view % LE_CONQUET tide gauge

6.7.4 valid_data_percent visualization in maps view % LE_CONQUET tide gauge

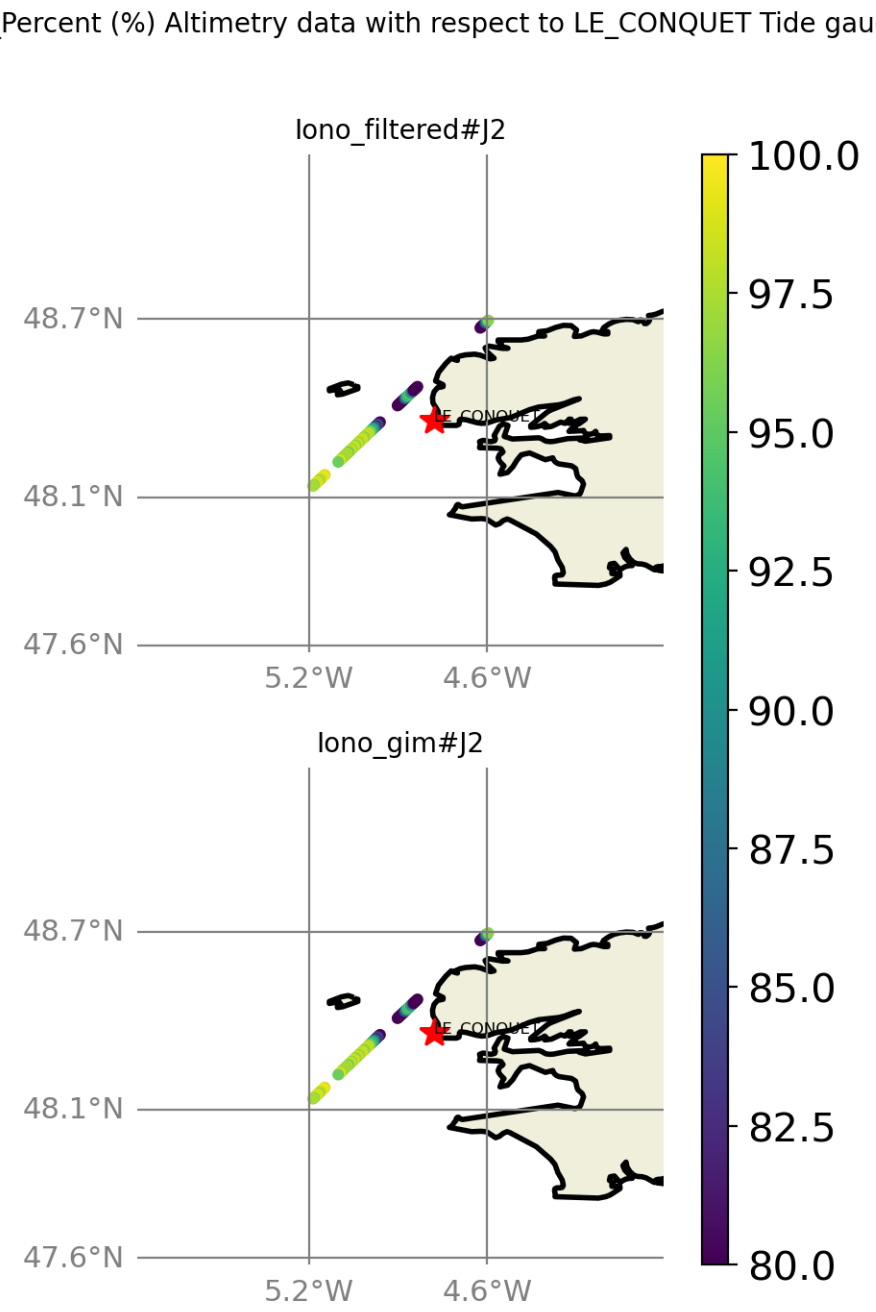

FIGURE 97 – valid_data_percent visualization in maps view % LE_CONQUET tide gauge

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

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

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

Where *pvd* and *nvd* are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 111$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

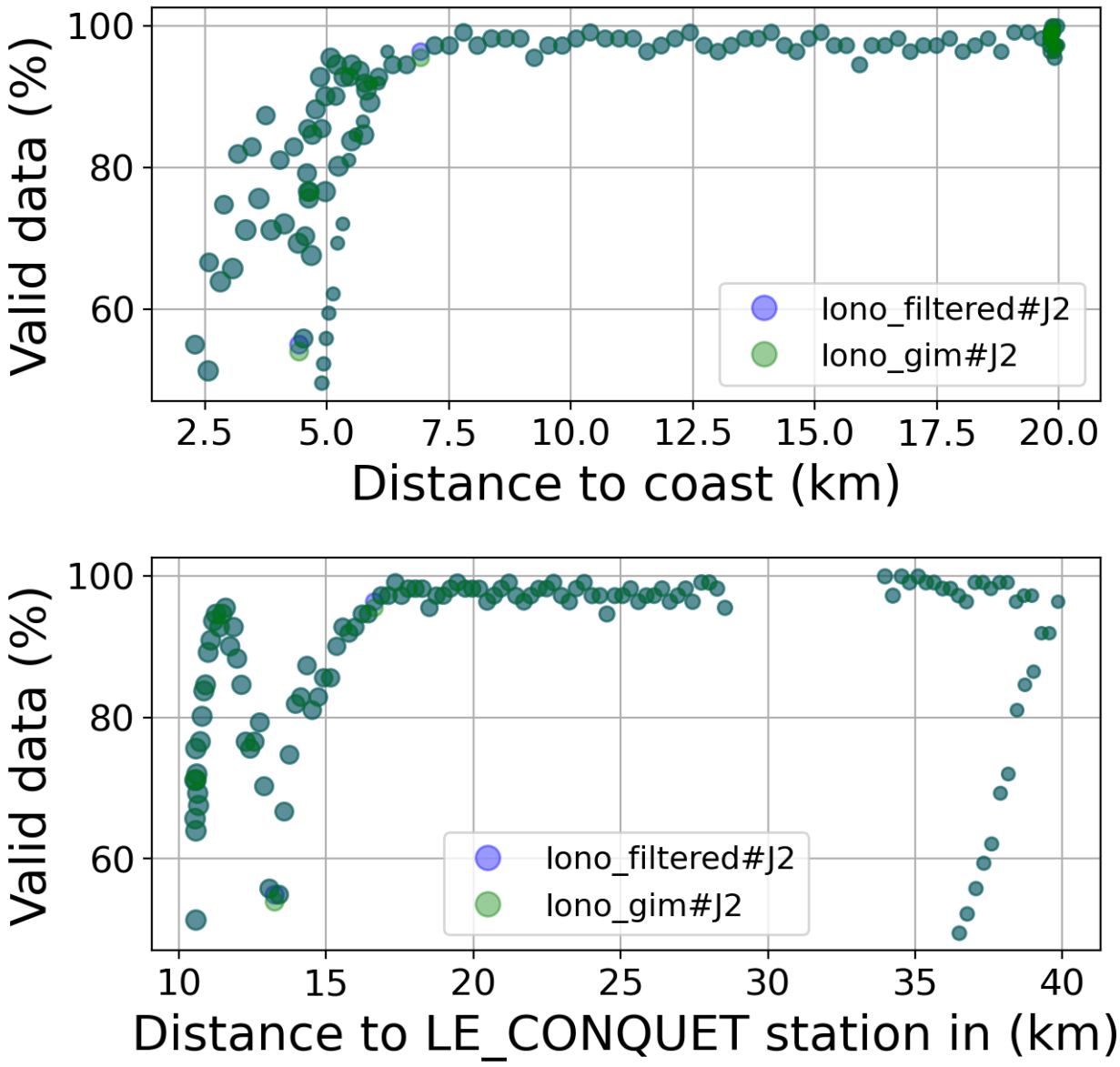

Figure 98 – Valid data (%) in function of distance to coast/LE_CONQUET station

6.7.6 Std in function of distance to coast/LE_CONQUET station

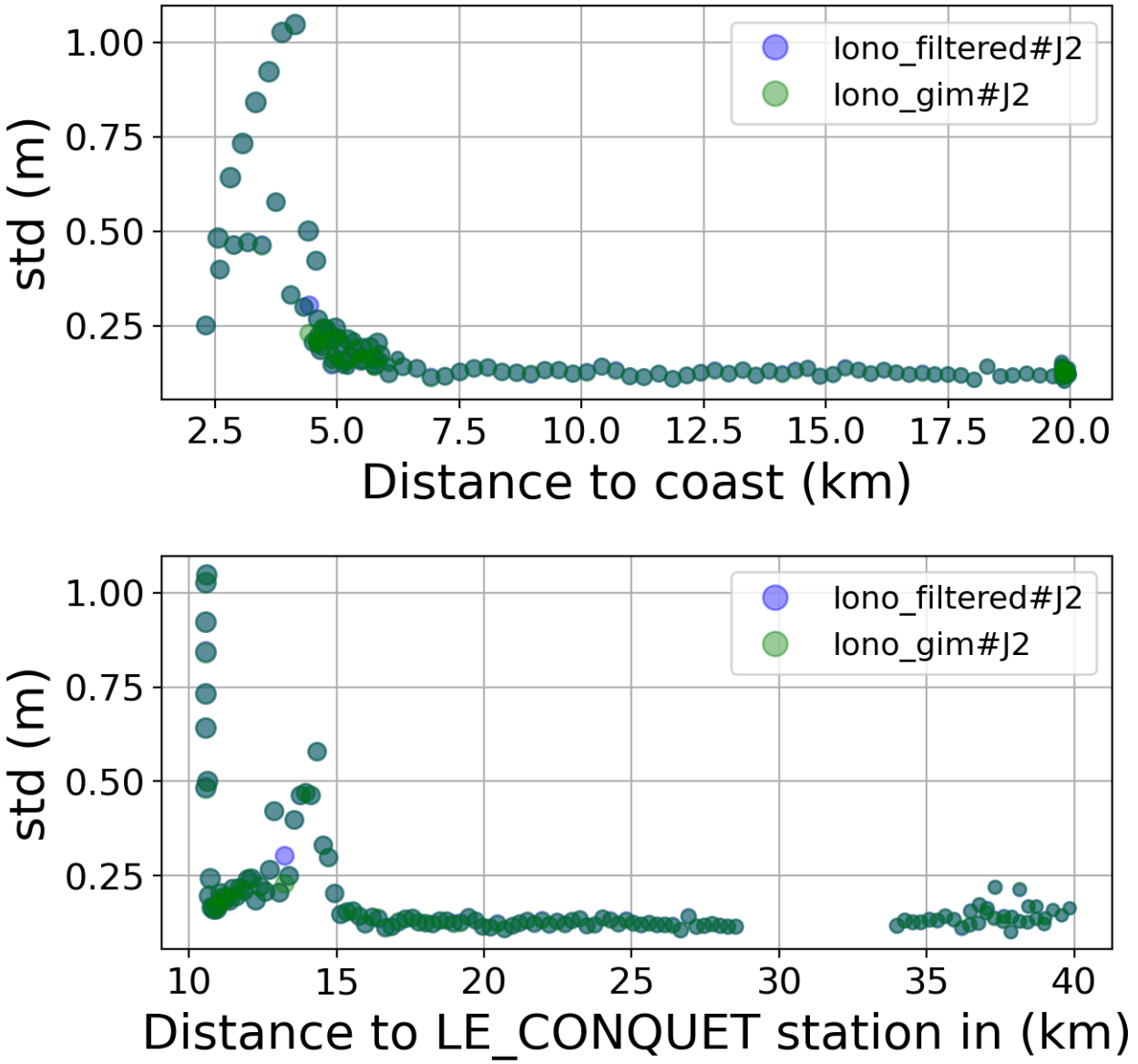

FIGURE 99 – Std in function of the distance to the coast/LE_CONQUET station

6.7.7 Correlation in function of distance to coast/LE_CONQUET station

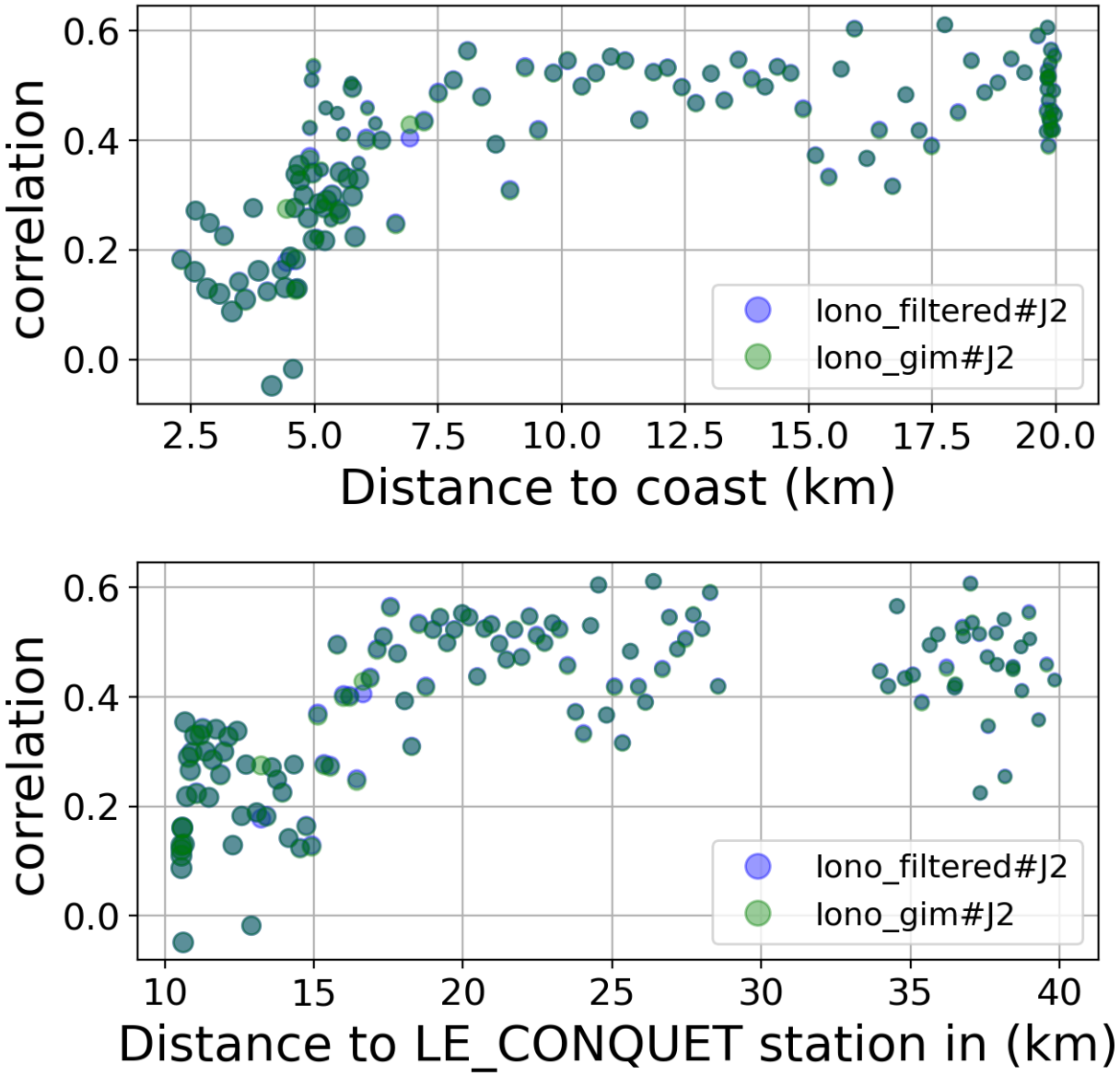

FIGURE 100 – Correlation in function of the distance to the coast/LE_CONQUET station

6.7.8 Taylor Diagram

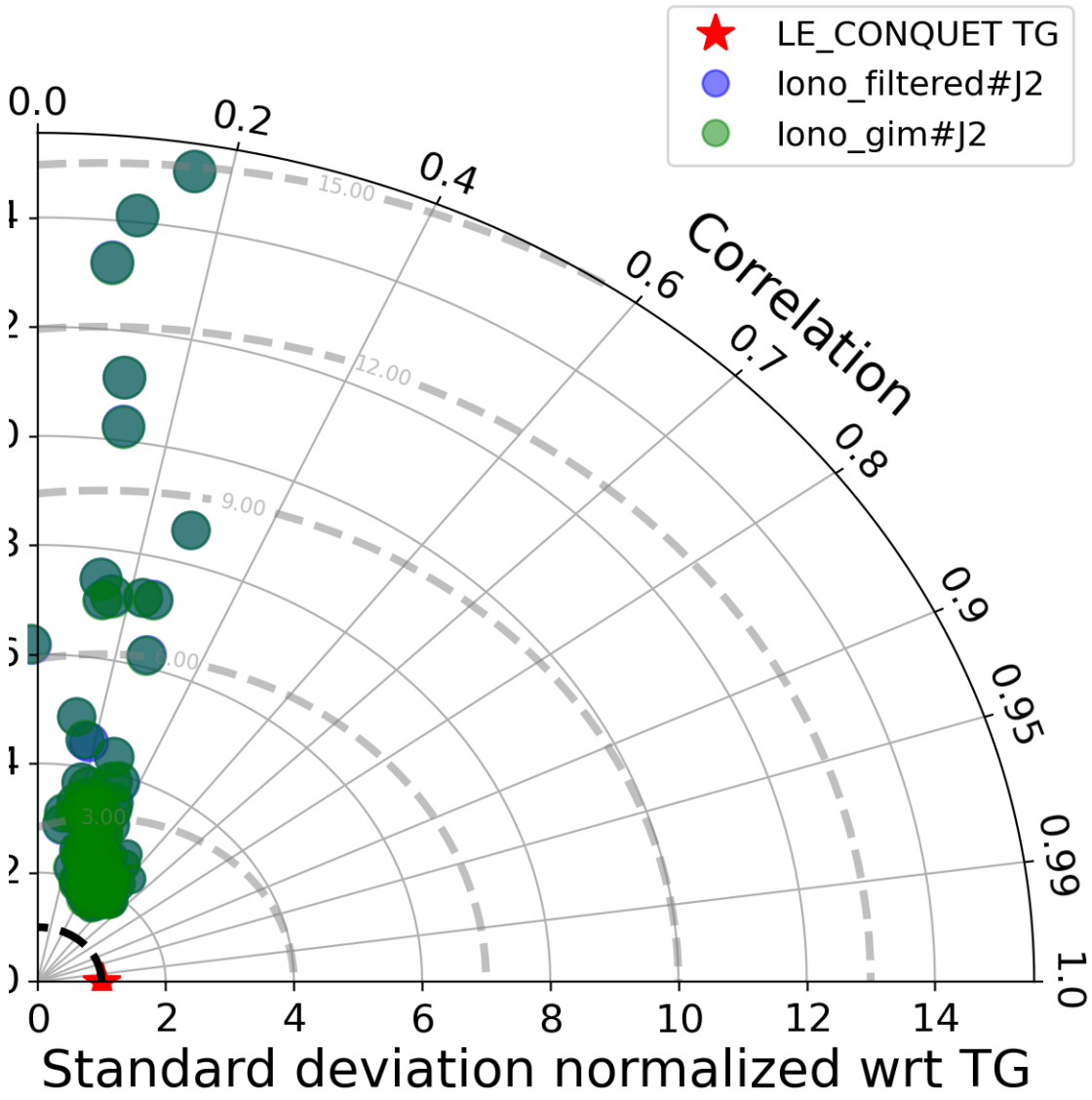

Figure 101 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	88.799	0.386	0.207	0.196
Iono_gim#J2	88.785	0.386	0.207	0.195

FIGURE 102 – Mean statistics table of the common points in the altimetry products

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

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 111 point.

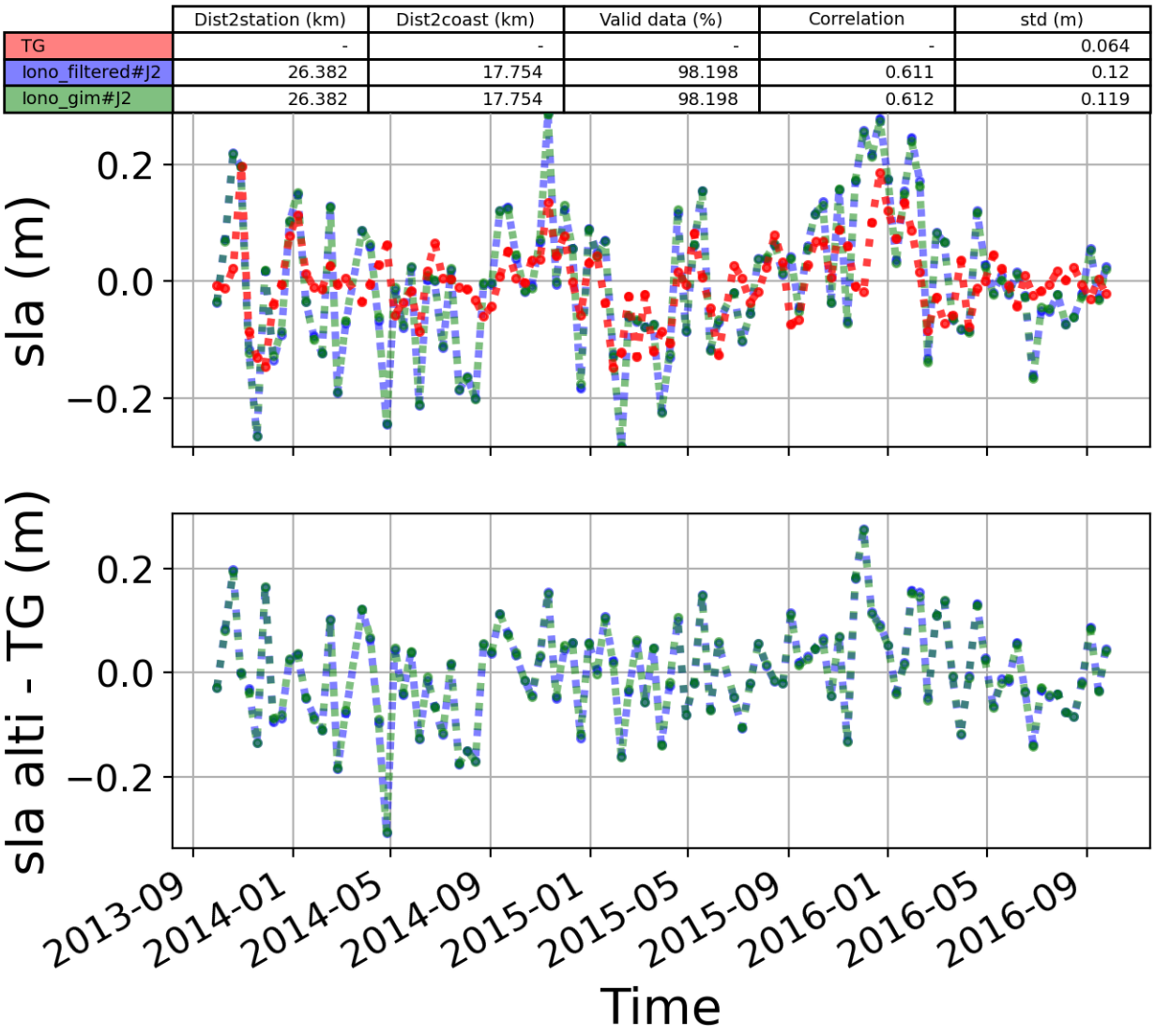

FIGURE 103 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

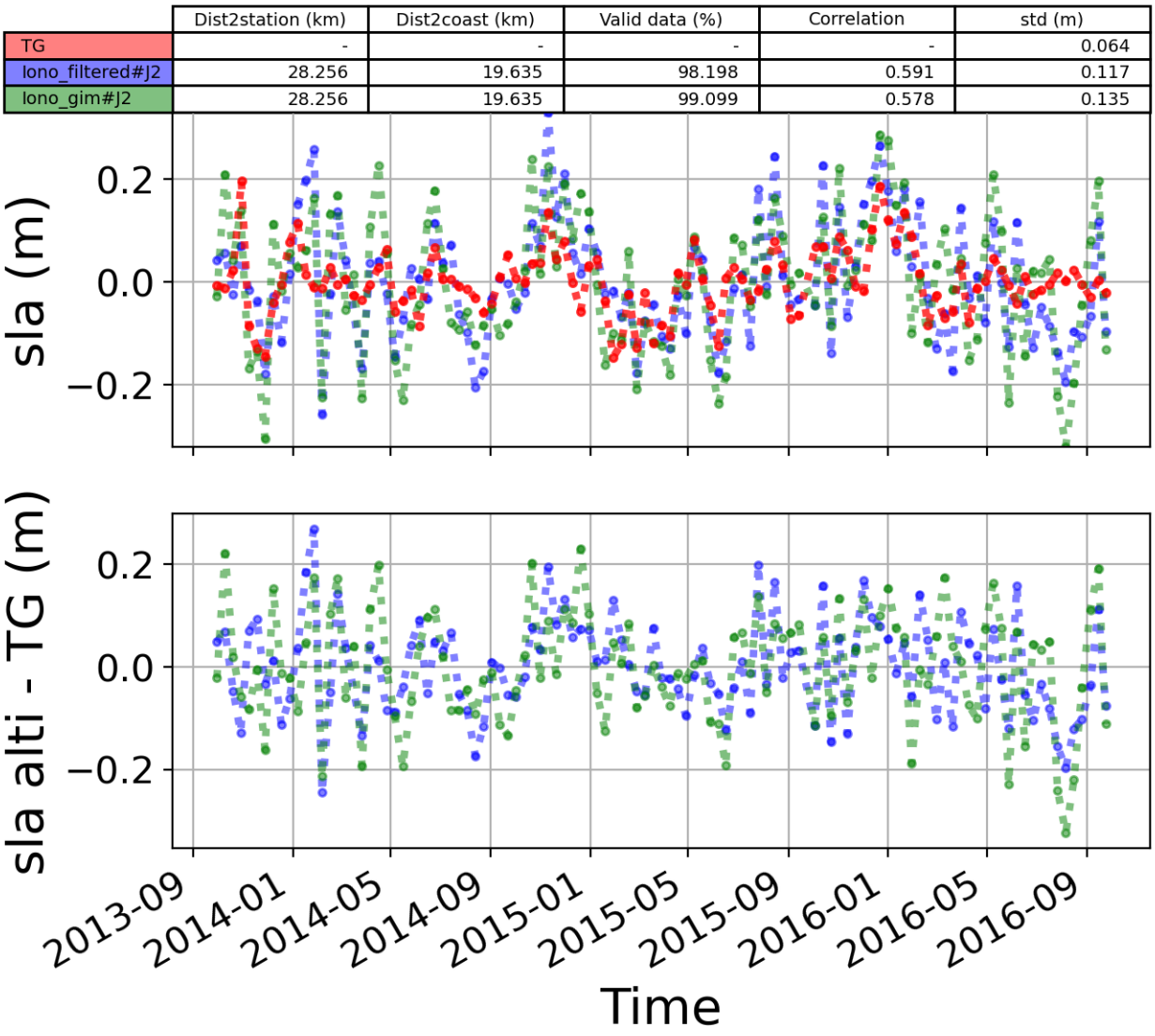

FIGURE 104 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.8 Station : Holyhead

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

6.8.1 correlation visualization in maps view % Holyhead tide gauge

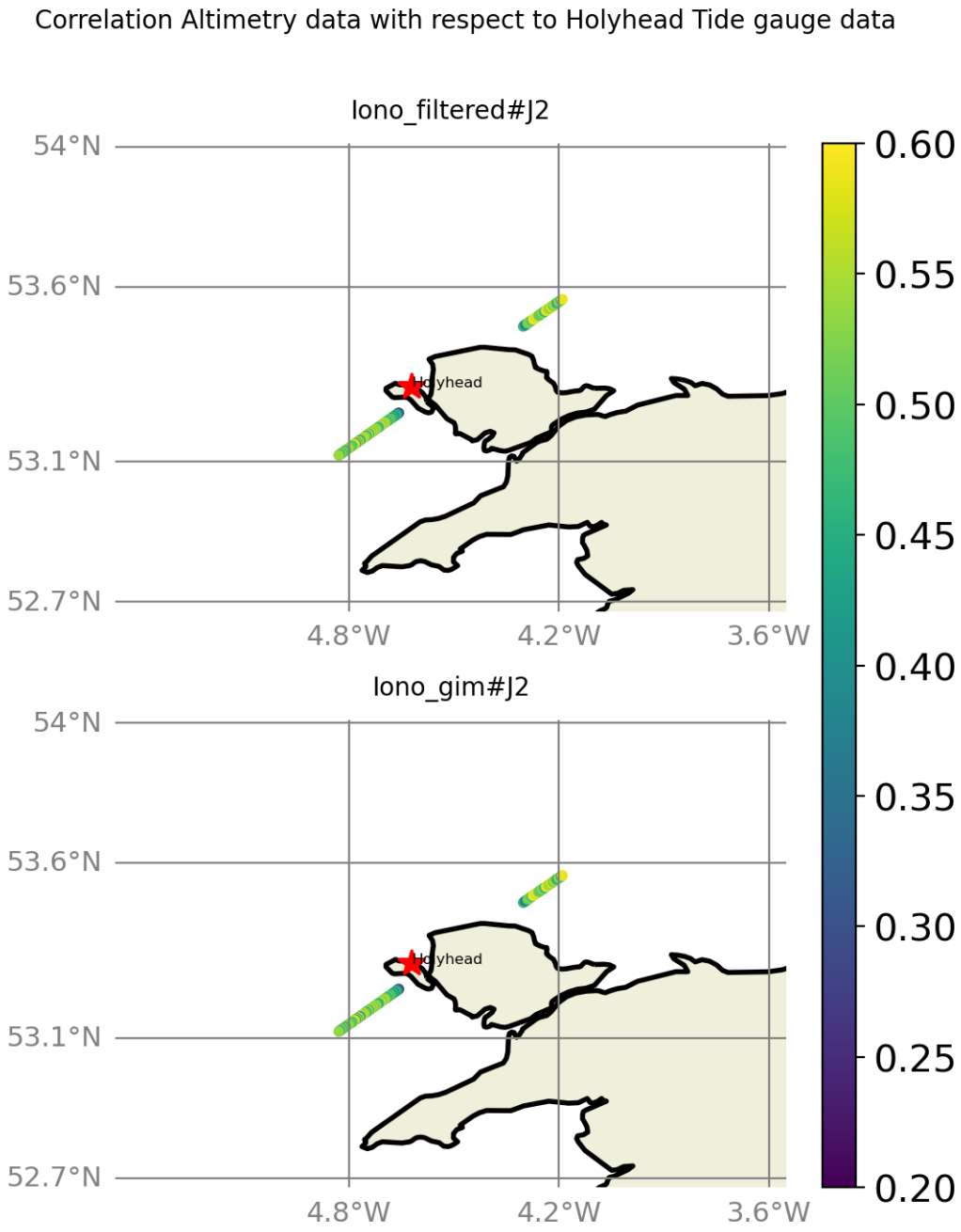

FIGURE 105 – correlation visualization in maps view % Holyhead tide gauge

6.8.2 rmsd visualization in maps view % Holyhead tide gauge

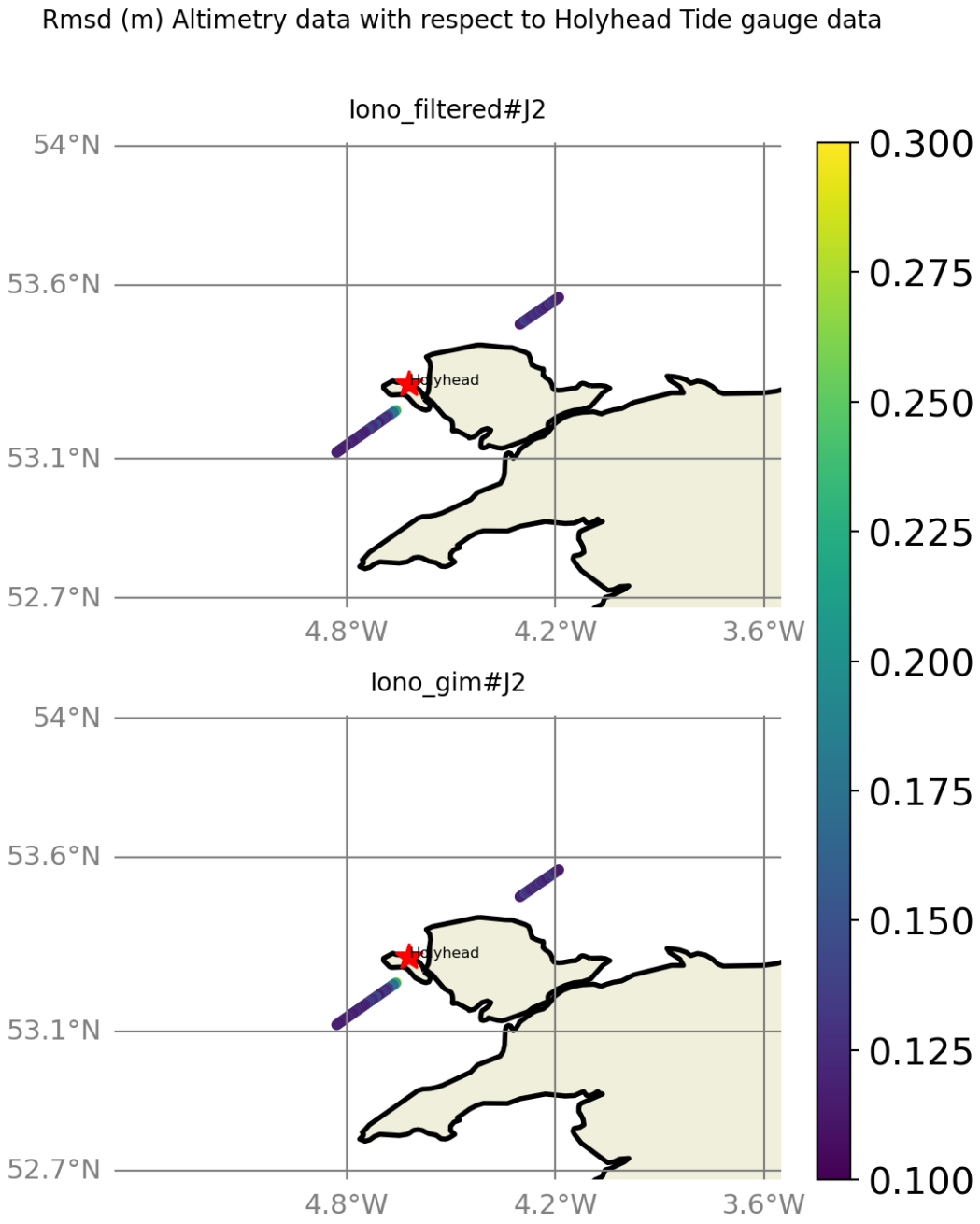

FIGURE 106 – rmsd visualization in maps view % Holyhead tide gauge

6.8.3 std visualization in maps view % Holyhead tide gauge

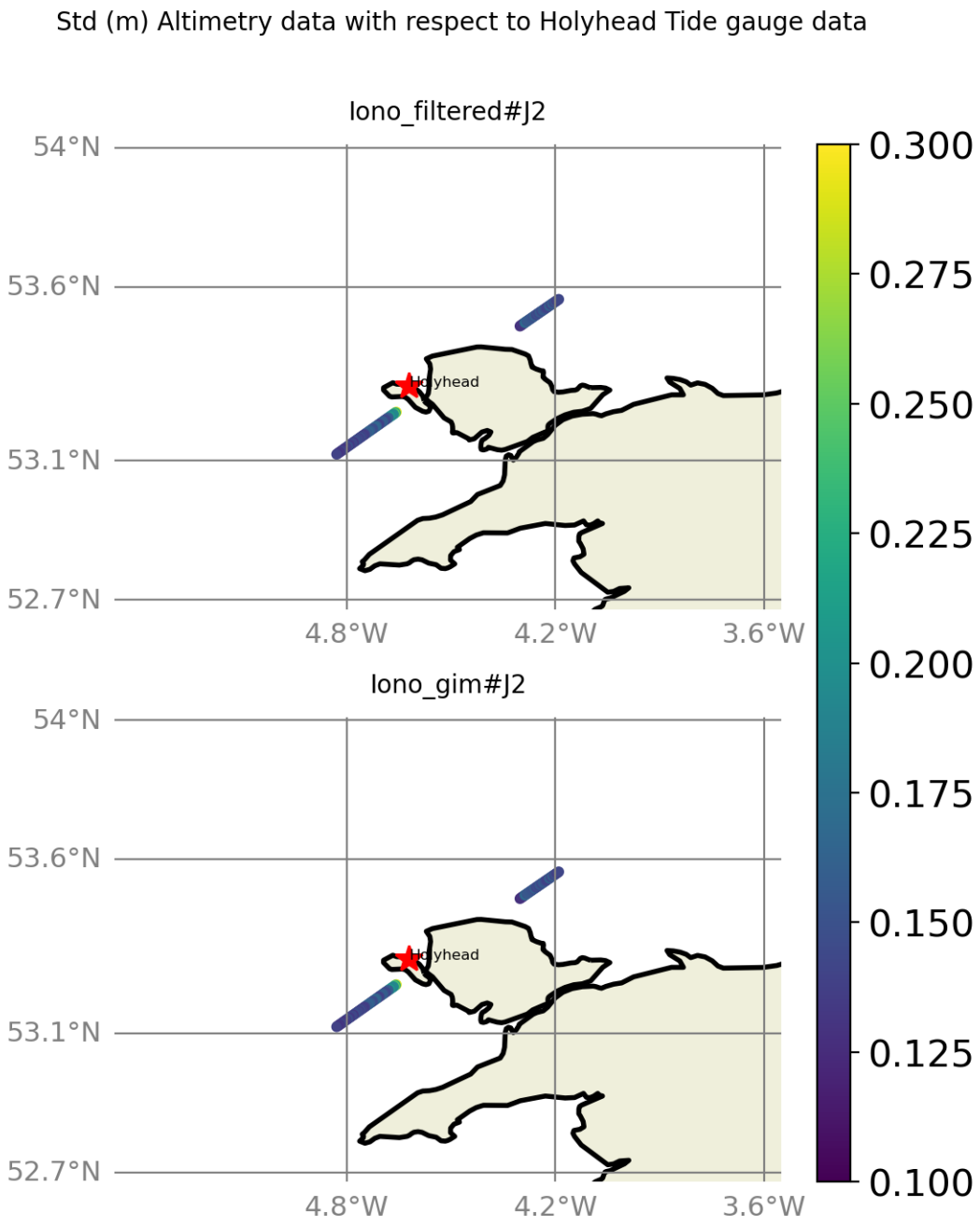

FIGURE 107 – std visualization in maps view % Holyhead tide gauge

6.8.4 valid_data_percent visualization in maps view % Holyhead tide gauge

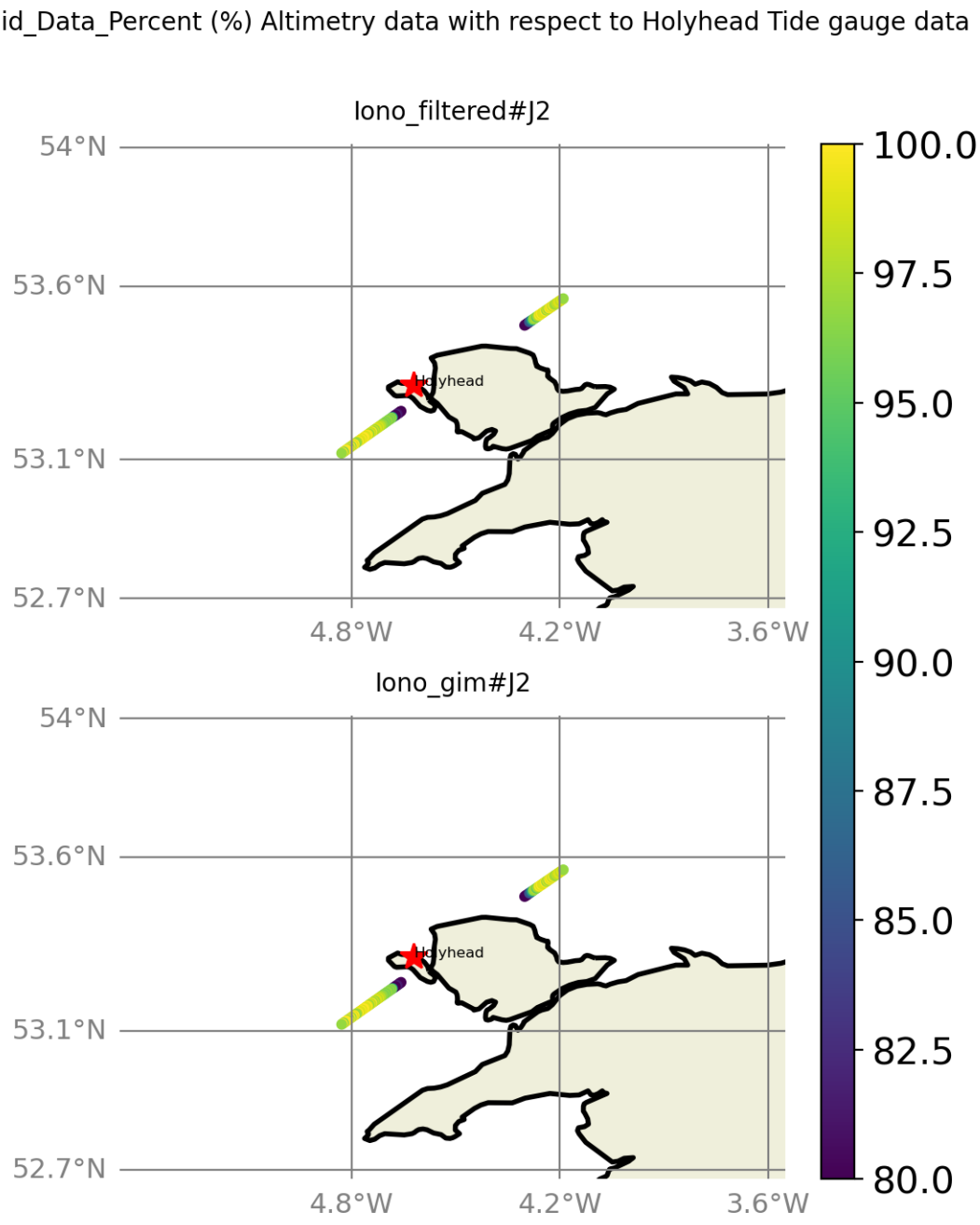

FIGURE 108 – valid_data_percent visualization in maps view % Holyhead tide gauge

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

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

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

Where *pvd* and *nvd* are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 95$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

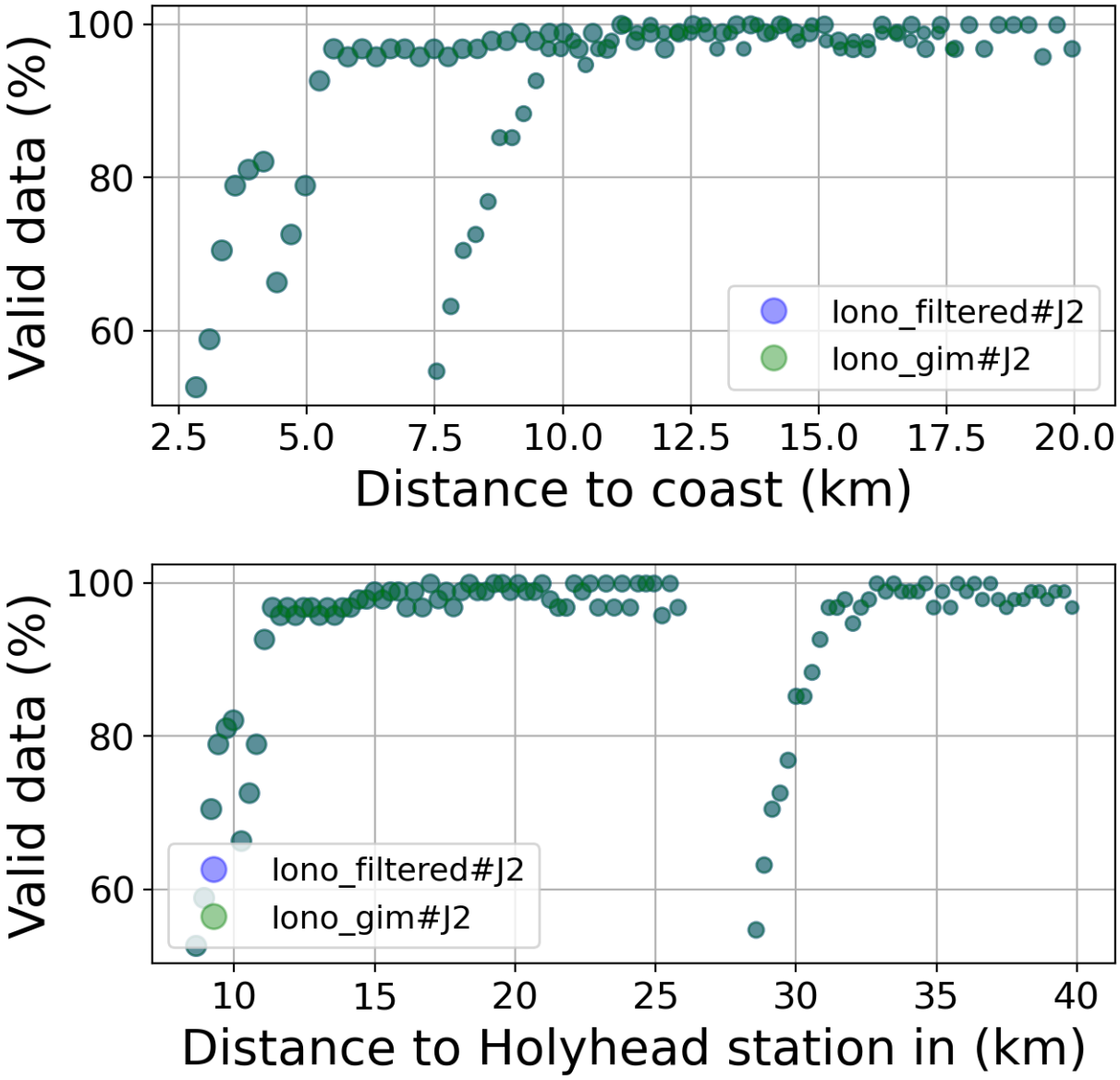

Figure 109 – Valid data (%) in function of distance to coast/Holyhead station

6.8.6 Std in function of distance to coast/Holyhead station

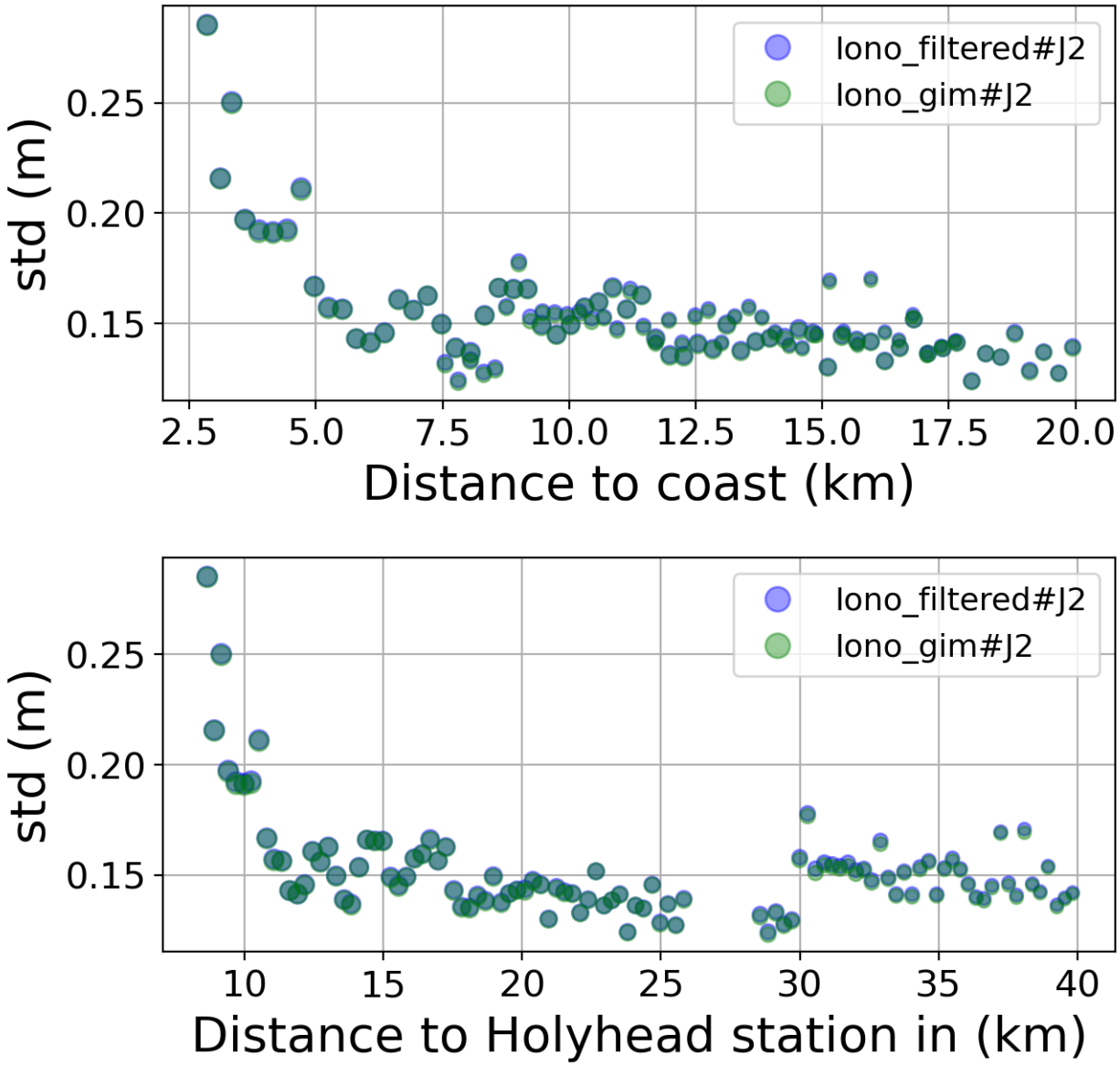

FIGURE 110 – Std in function of the distance to the coast/Holyhead station

6.8.7 Correlation in function of distance to coast/Holyhead station

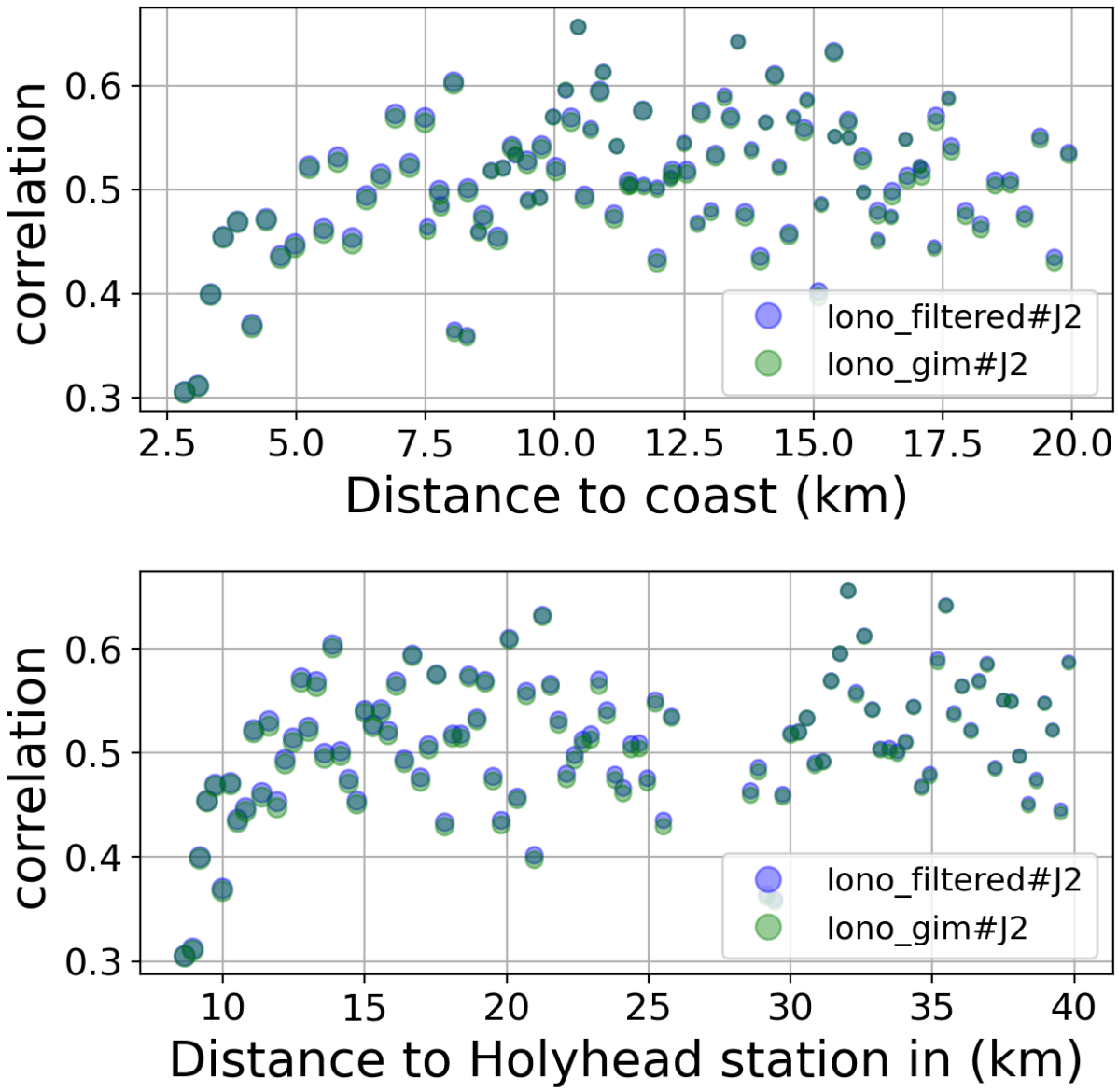

Figure 111 – Correlation in function of the distance to the coast/Holyhead station

6.8.8 Taylor Diagram

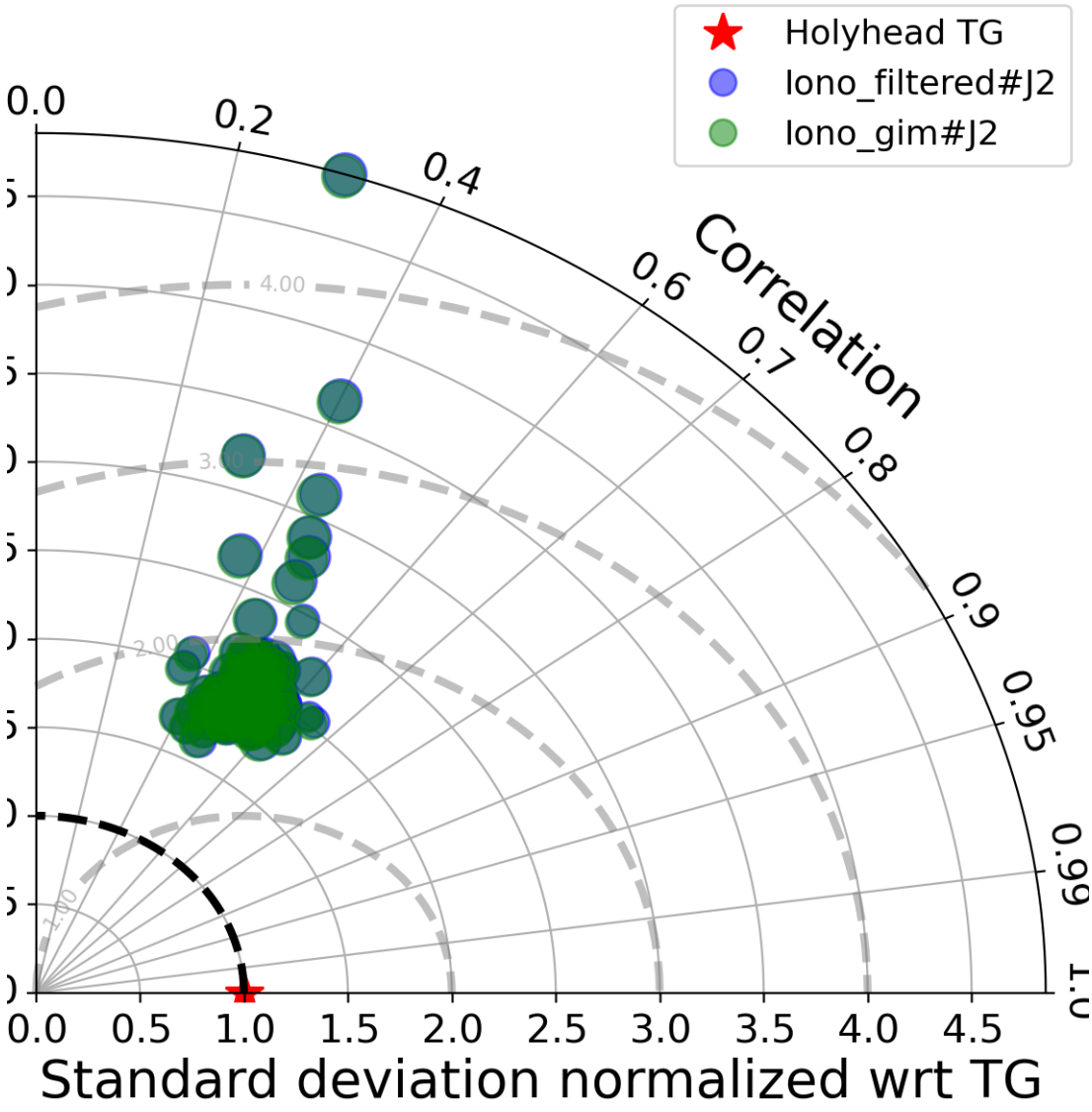

Figure 112 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	93.891	0.51	0.153	0.132
Iono_gim#J2	93.891	0.507	0.152	0.131

FIGURE 113 – Mean statistics table of the common points in the altimetry products

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

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 95 point.

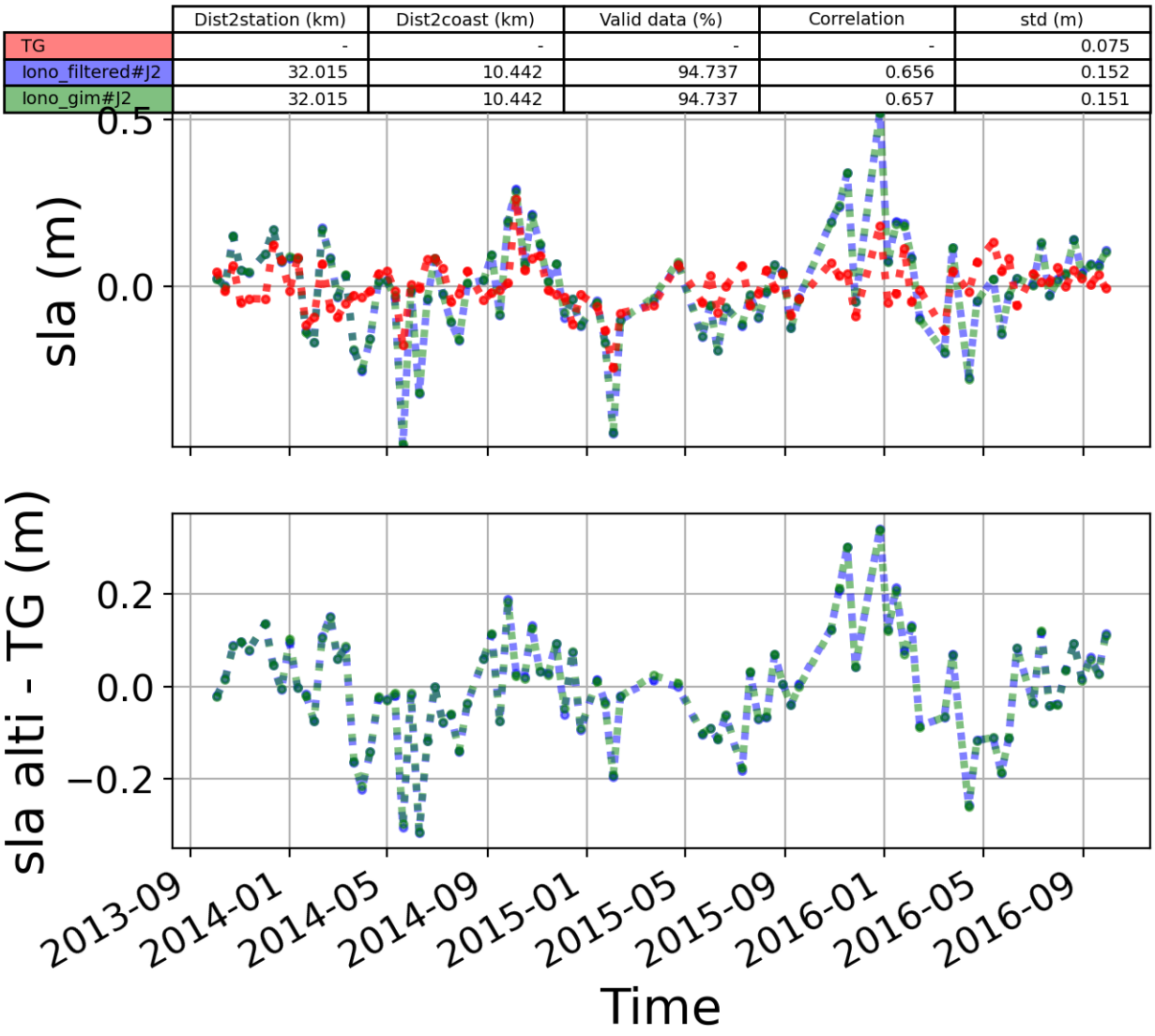

FIGURE 114 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

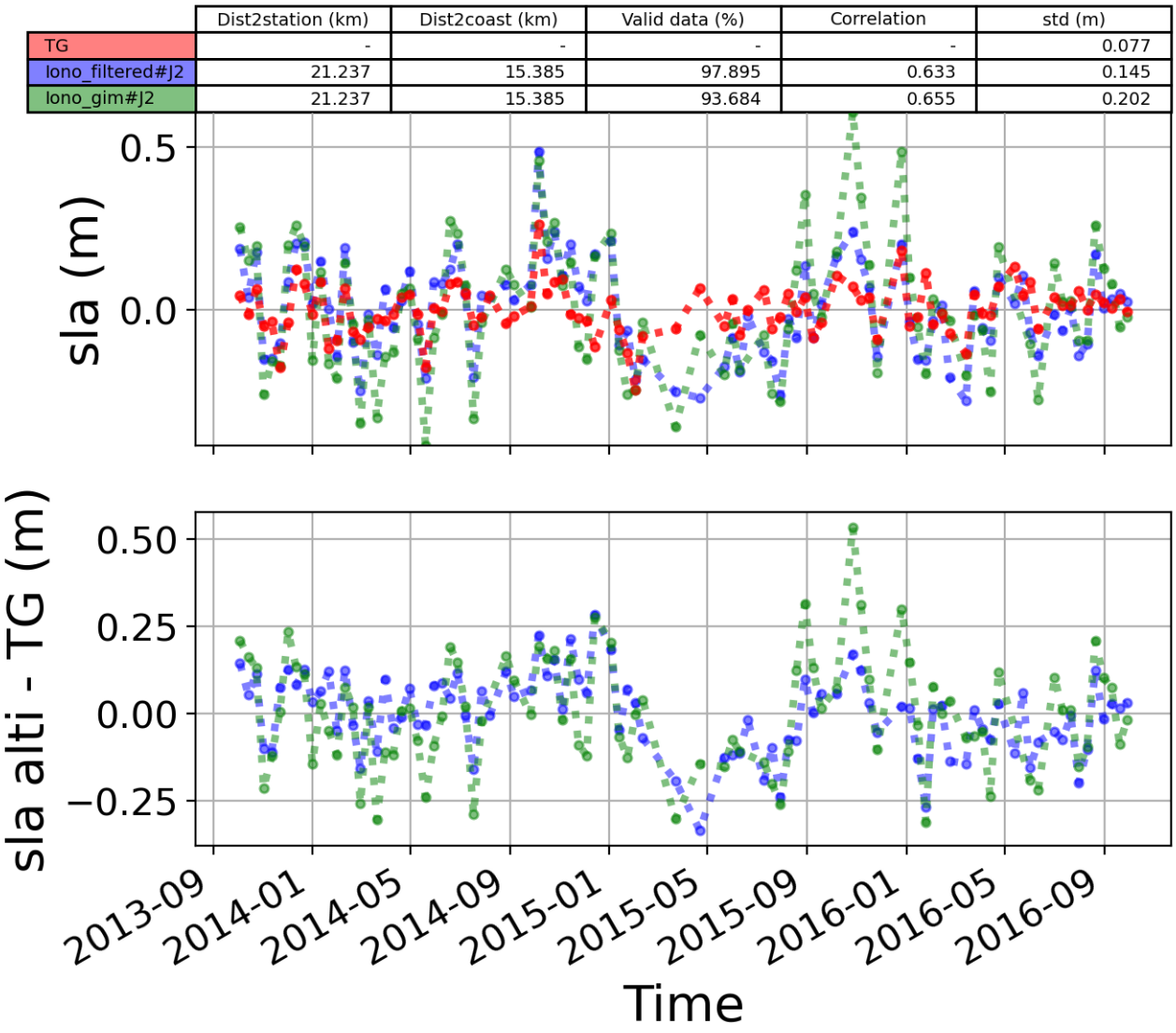

FIGURE 115 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.9 Station : LE_CROUESTY

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

6.9.1 correlation visualization in maps view % LE_CROUESTY tide gauge

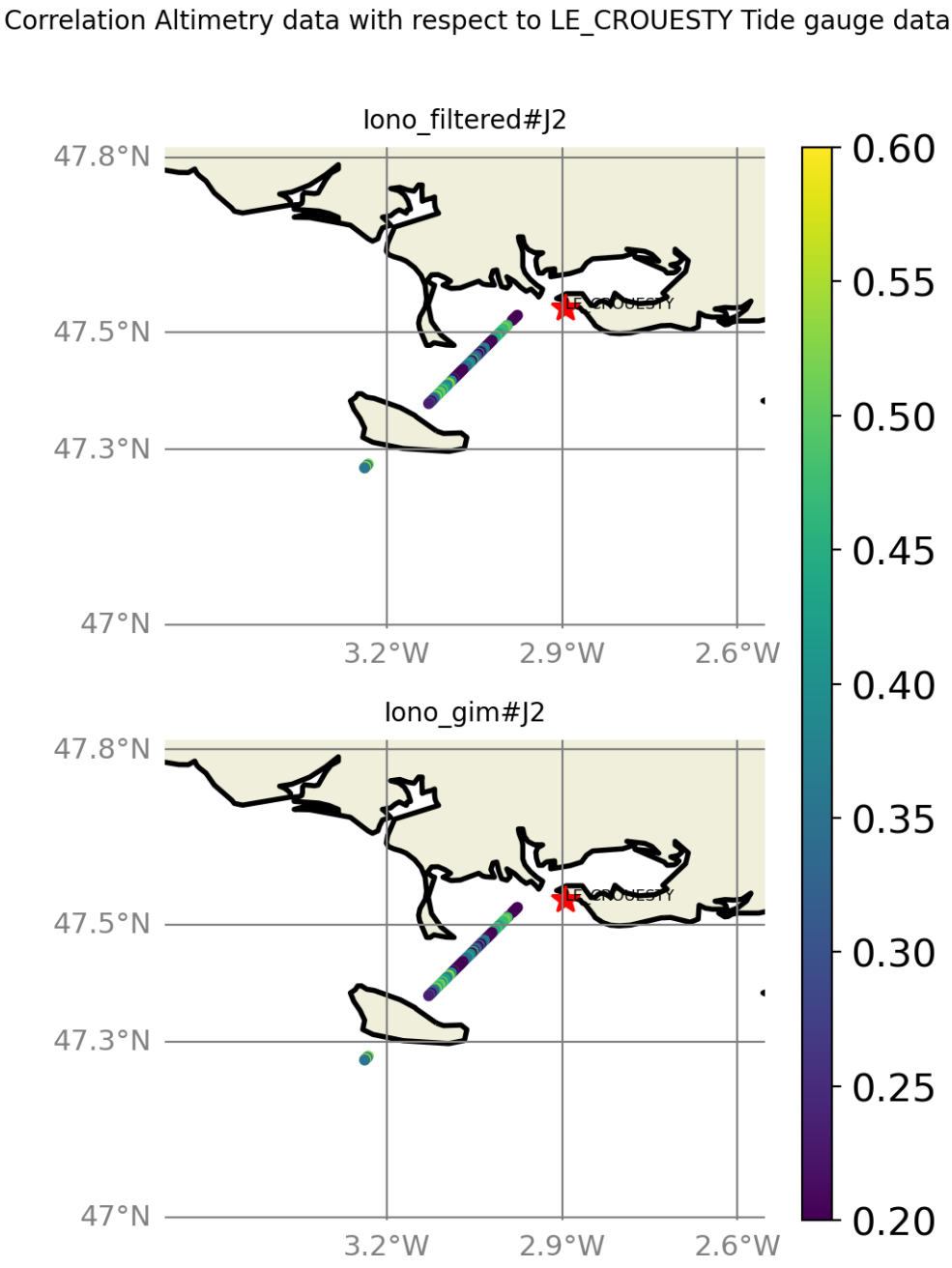

Figure 116 – correlation visualization in maps view % LE_CROUESTY tide gauge

6.9.2 rmsd visualization in maps view % LE_CROUESTY tide gauge

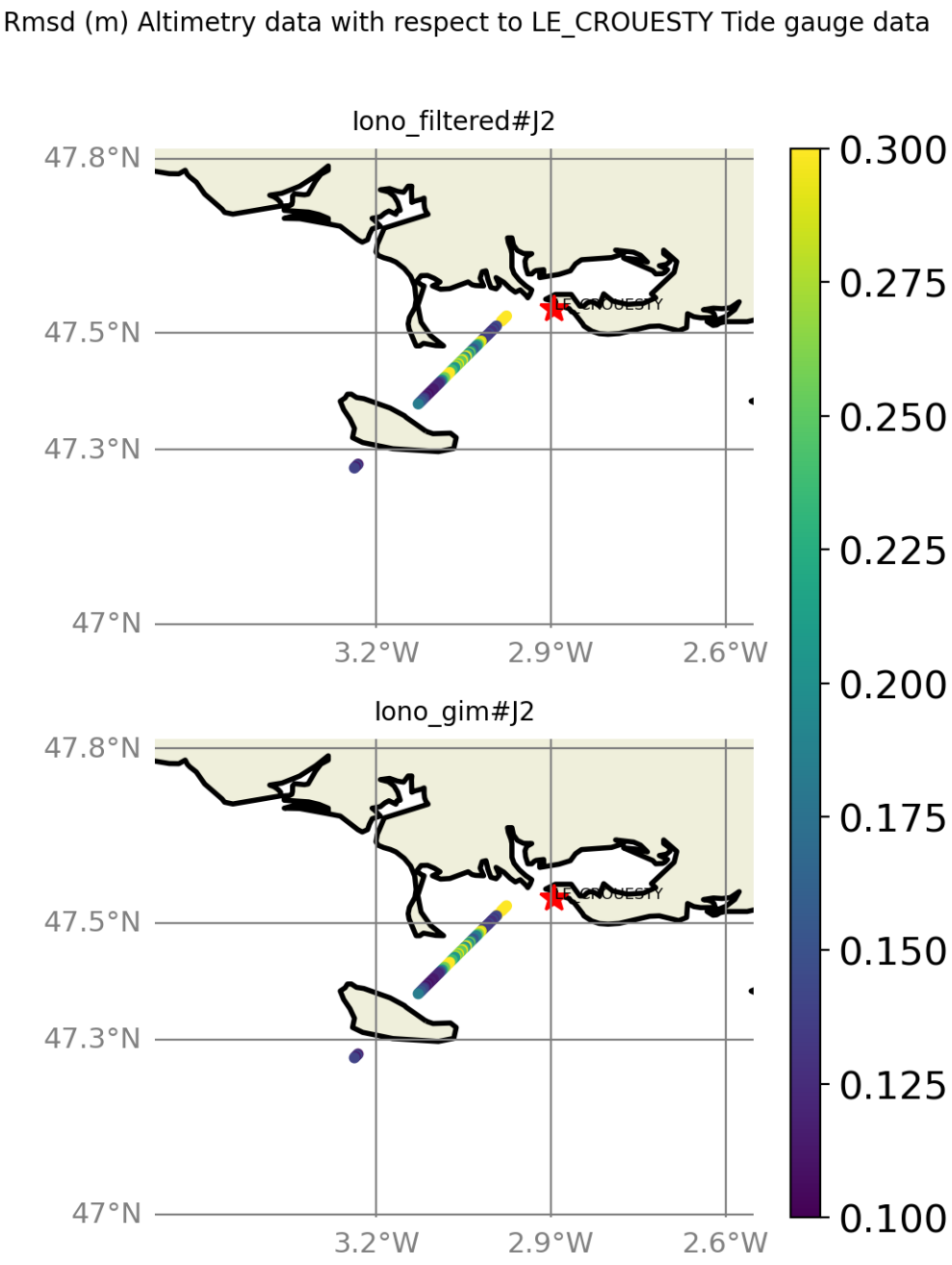

FIGURE 117 – rmsd visualization in maps view % LE_CROUESTY tide gauge

6.9.3 std visualization in maps view % LE_CROUESTY tide gauge

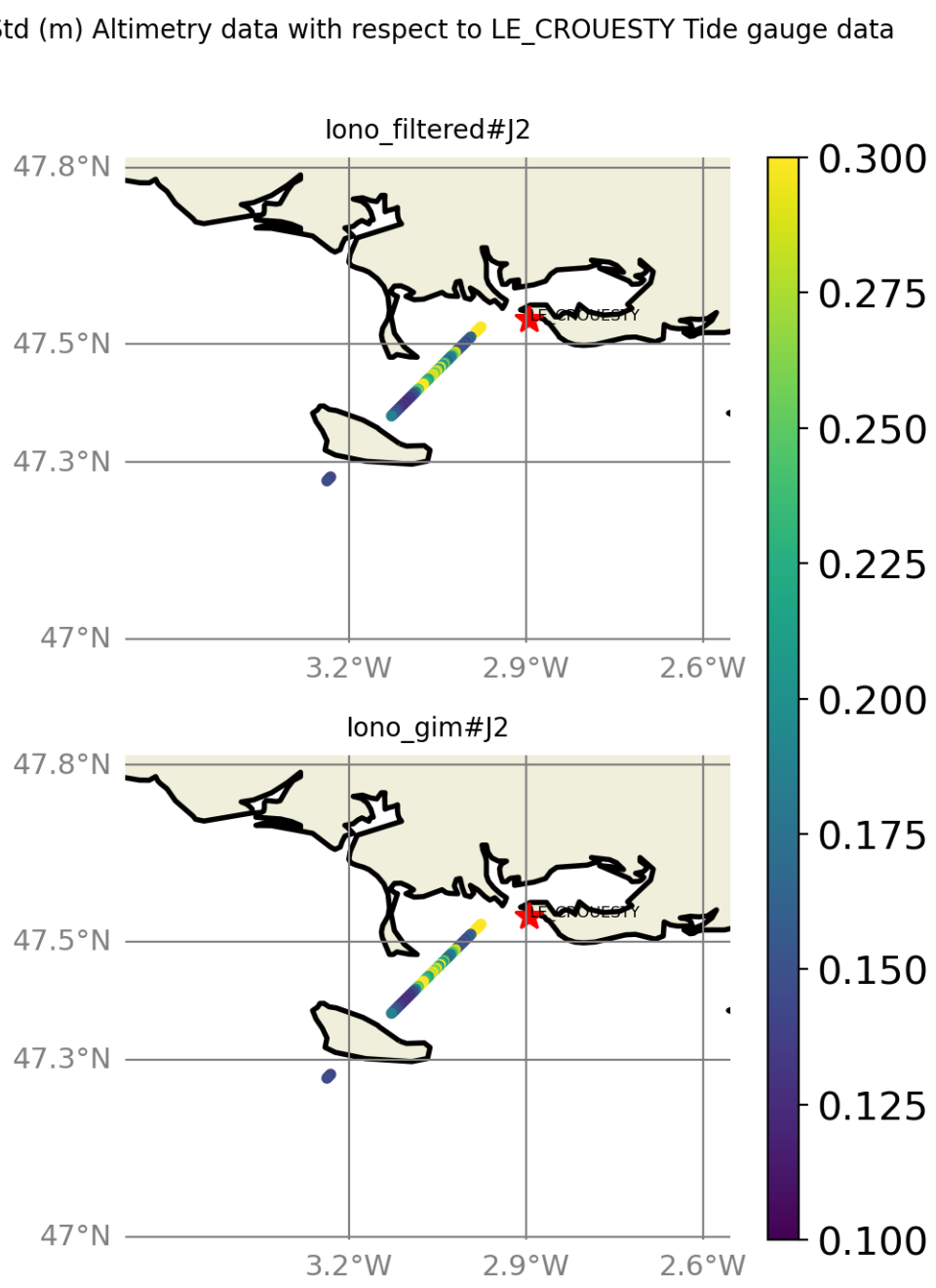

Figure 118 – std visualization in maps view % LE_CROUESTY tide gauge

6.9.4 valid_data_percent visualization in maps view % LE_CROUESTY tide gauge

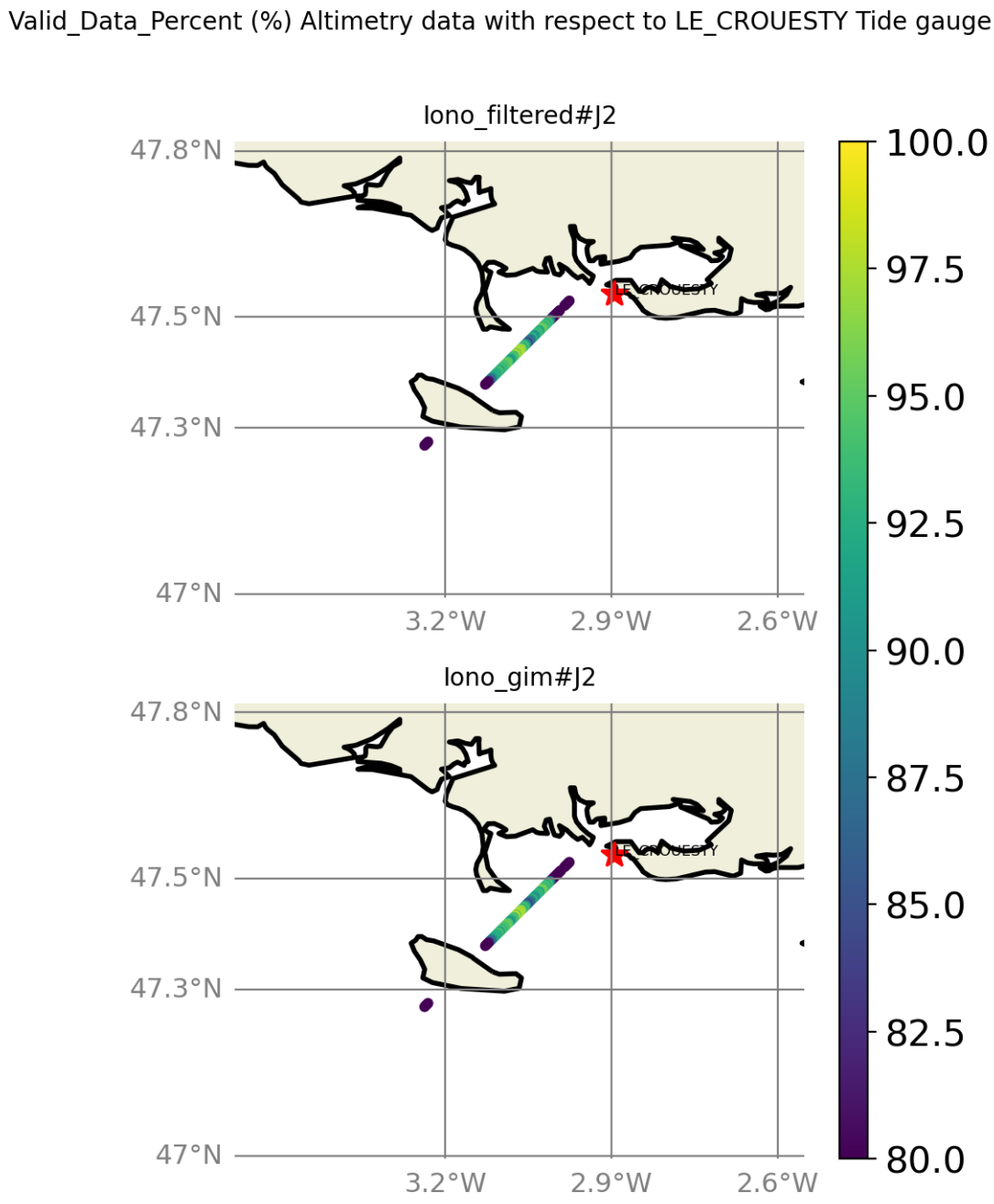

FIGURE 119 – valid_data_percent visualization in maps view % LE_CROUESTY tide gauge

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

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

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

Where *pvd* and *nvd* are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 105$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

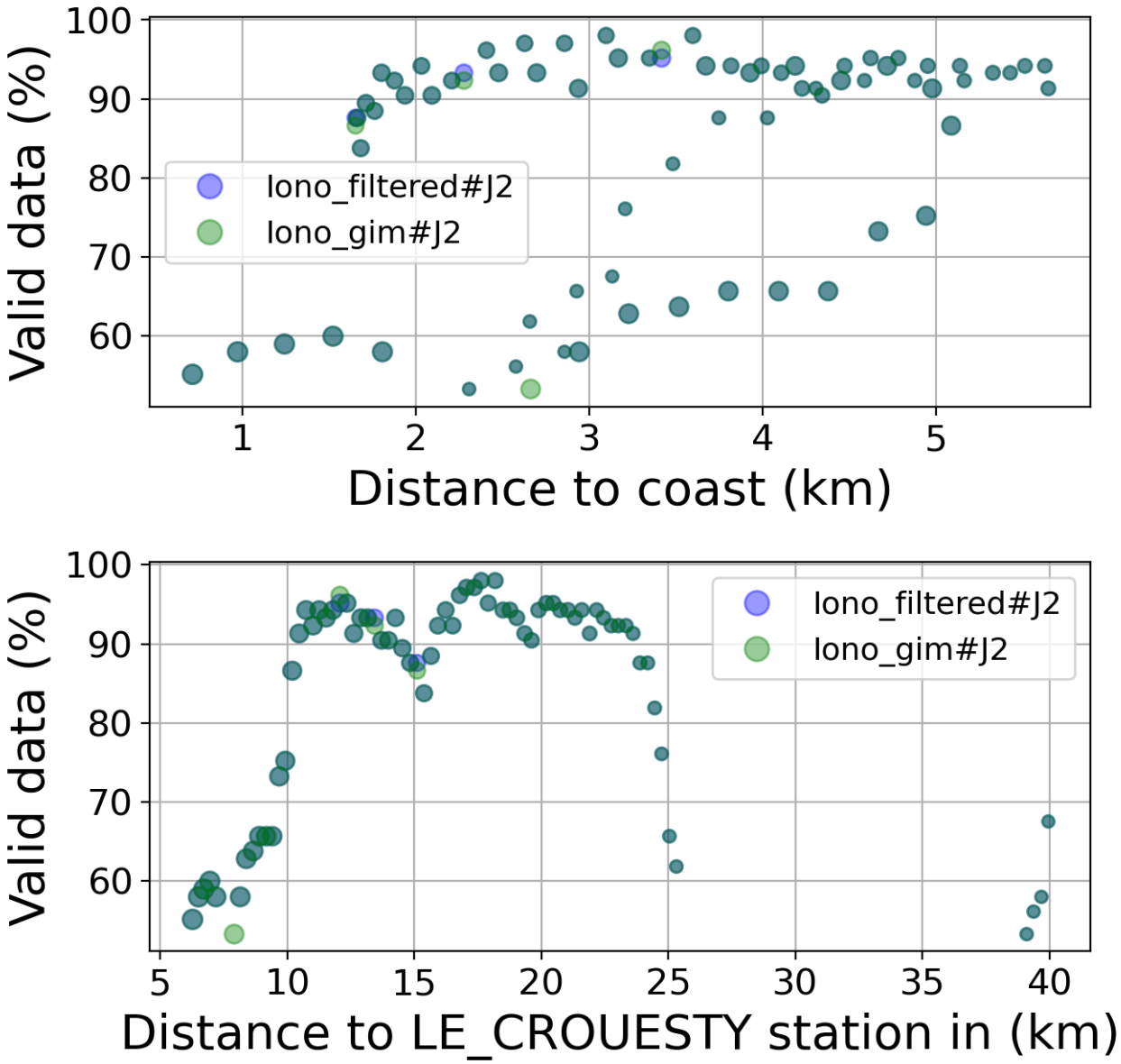

FIGURE 120 – Valid data (%) in function of distance to coast/LE_CROUESTY station

6.9.6 Std in function of distance to coast/LE_CROUESTY station

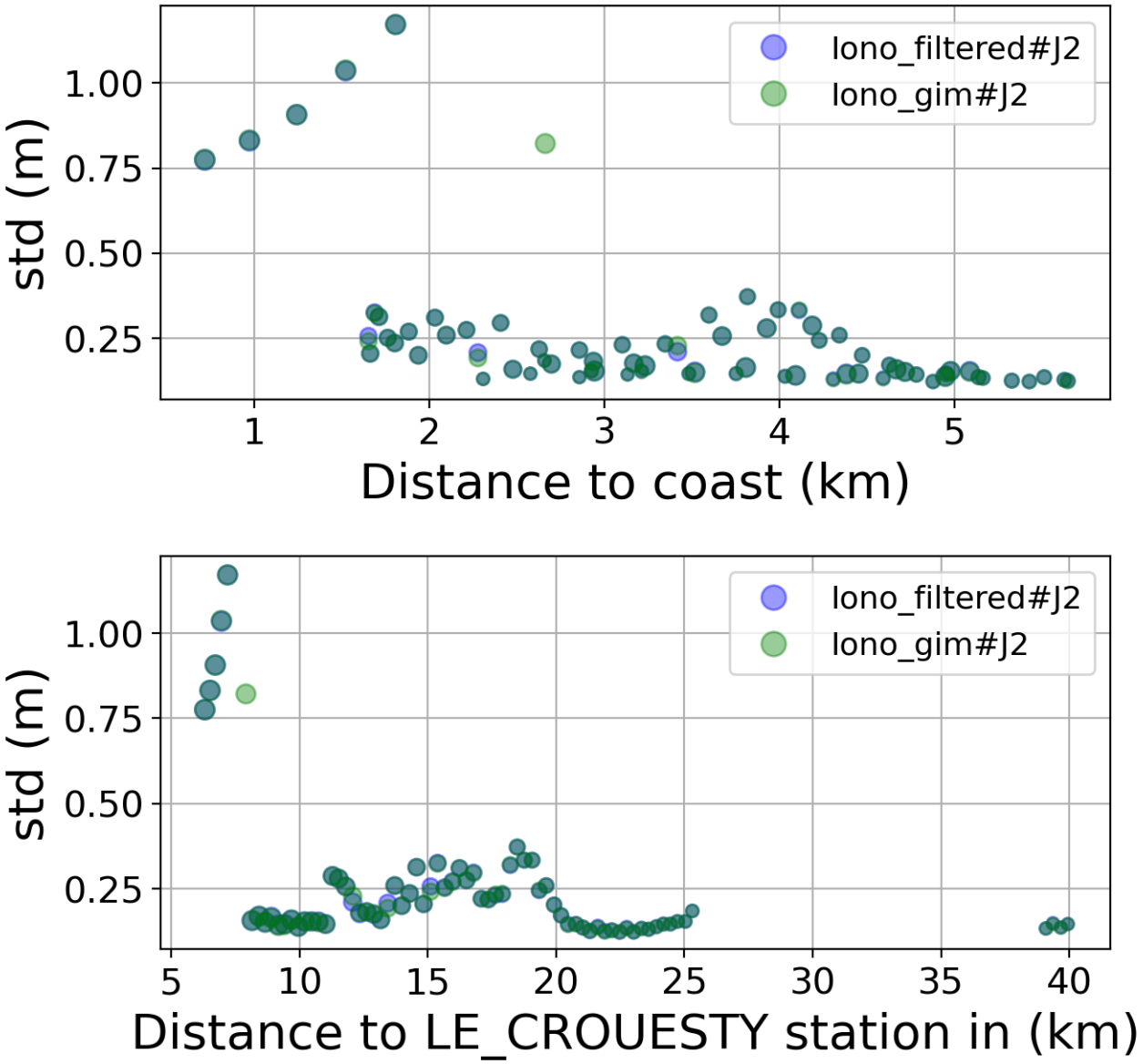

FIGURE 121 – Std in function of the distance to the coast/LE_CROUESTY station

6.9.7 Correlation in function of distance to coast/LE_CROUESTY station

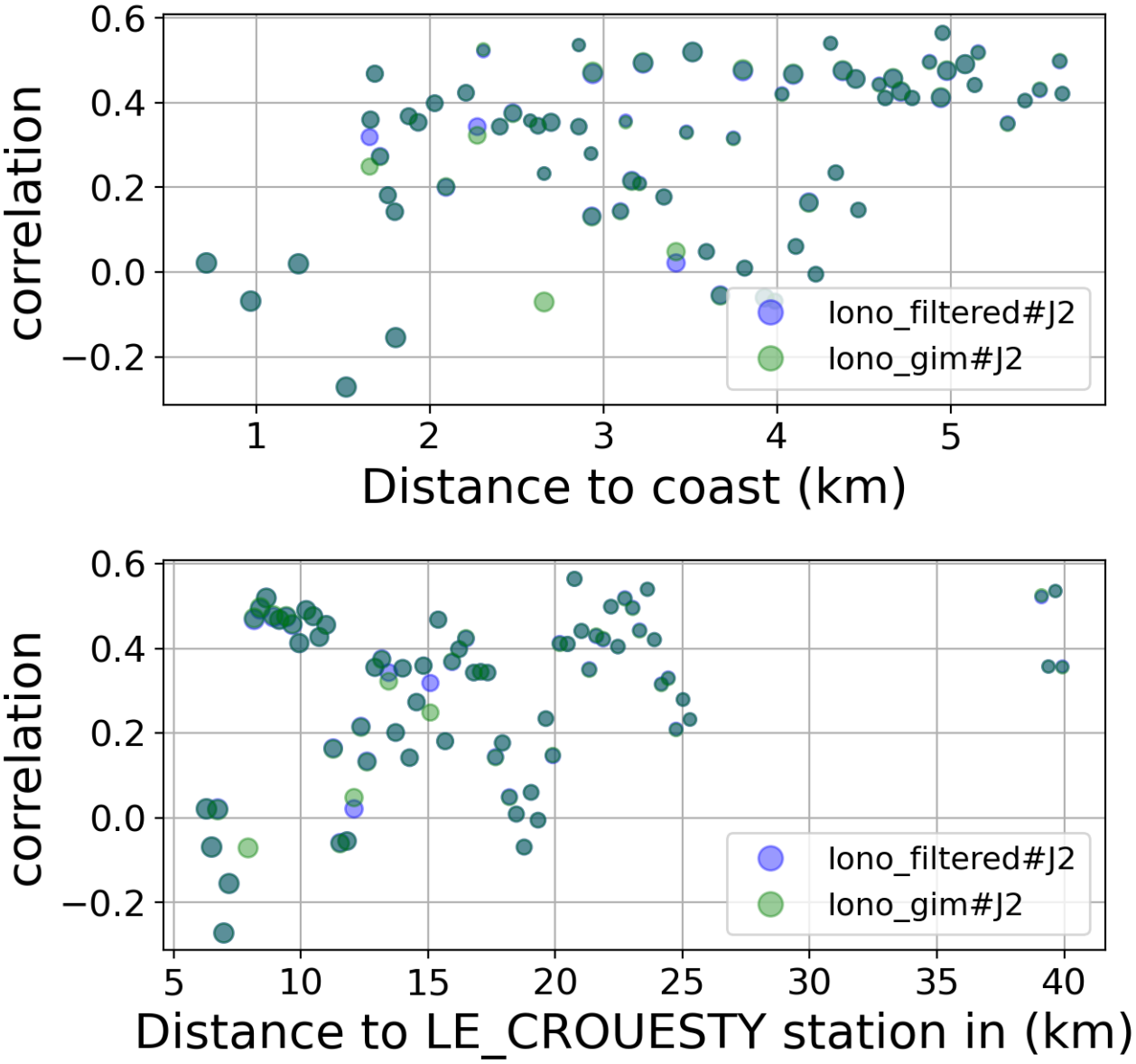

Figure 122 – Correlation in function of the distance to the coast/LE_CROUESTY station

6.9.8 Taylor Diagram

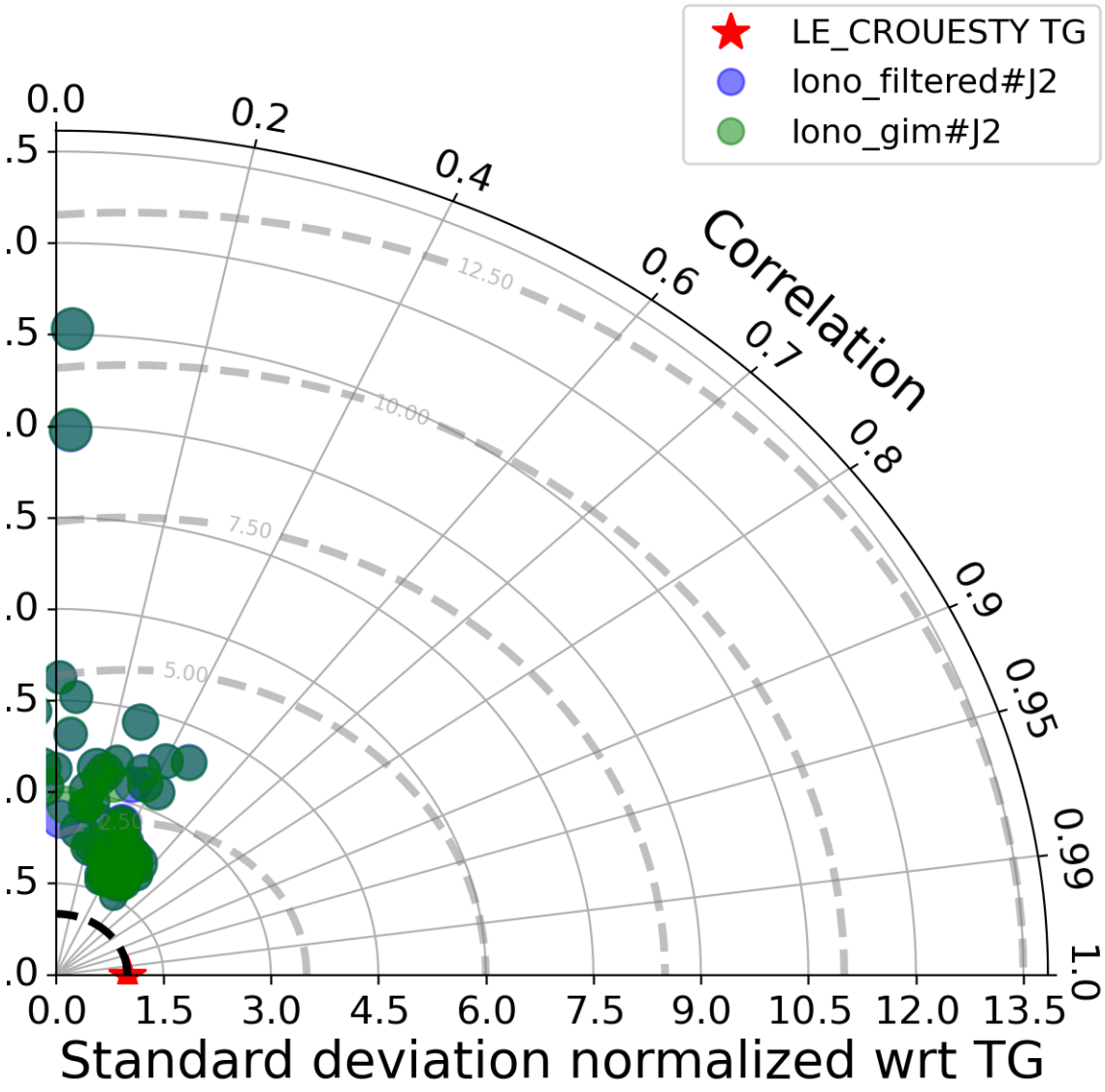

Figure 123 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	84.312	0.298	0.25	0.242
Iono_gim#J2	84.299	0.298	0.25	0.242

Figure 124 – Mean statistics table of the common points in the altimetry products

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

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 105 point.

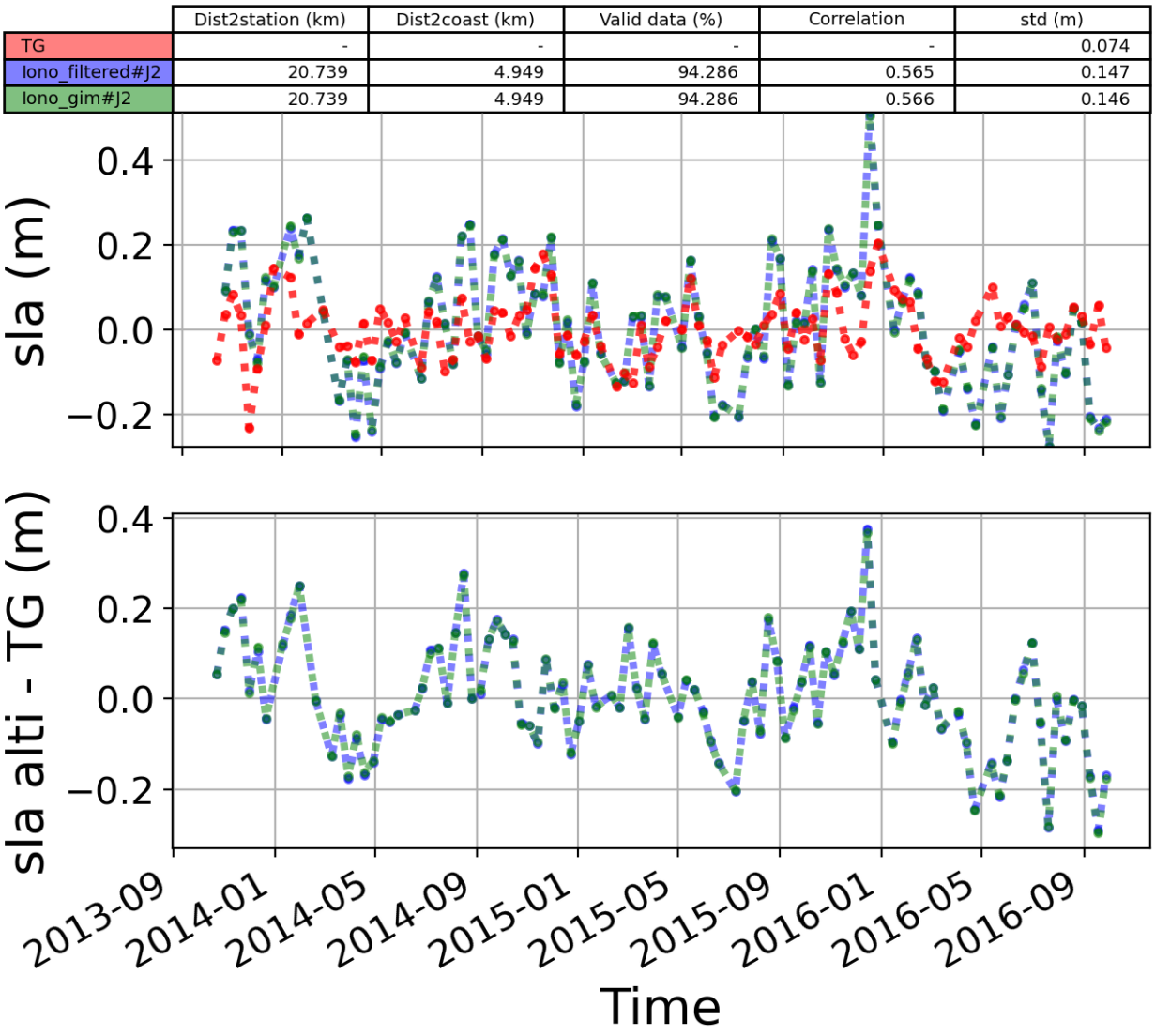

FIGURE 125 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.10 Station : North_Shields

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

6.10.1 correlation visualization in maps view % North_Shields tide gauge

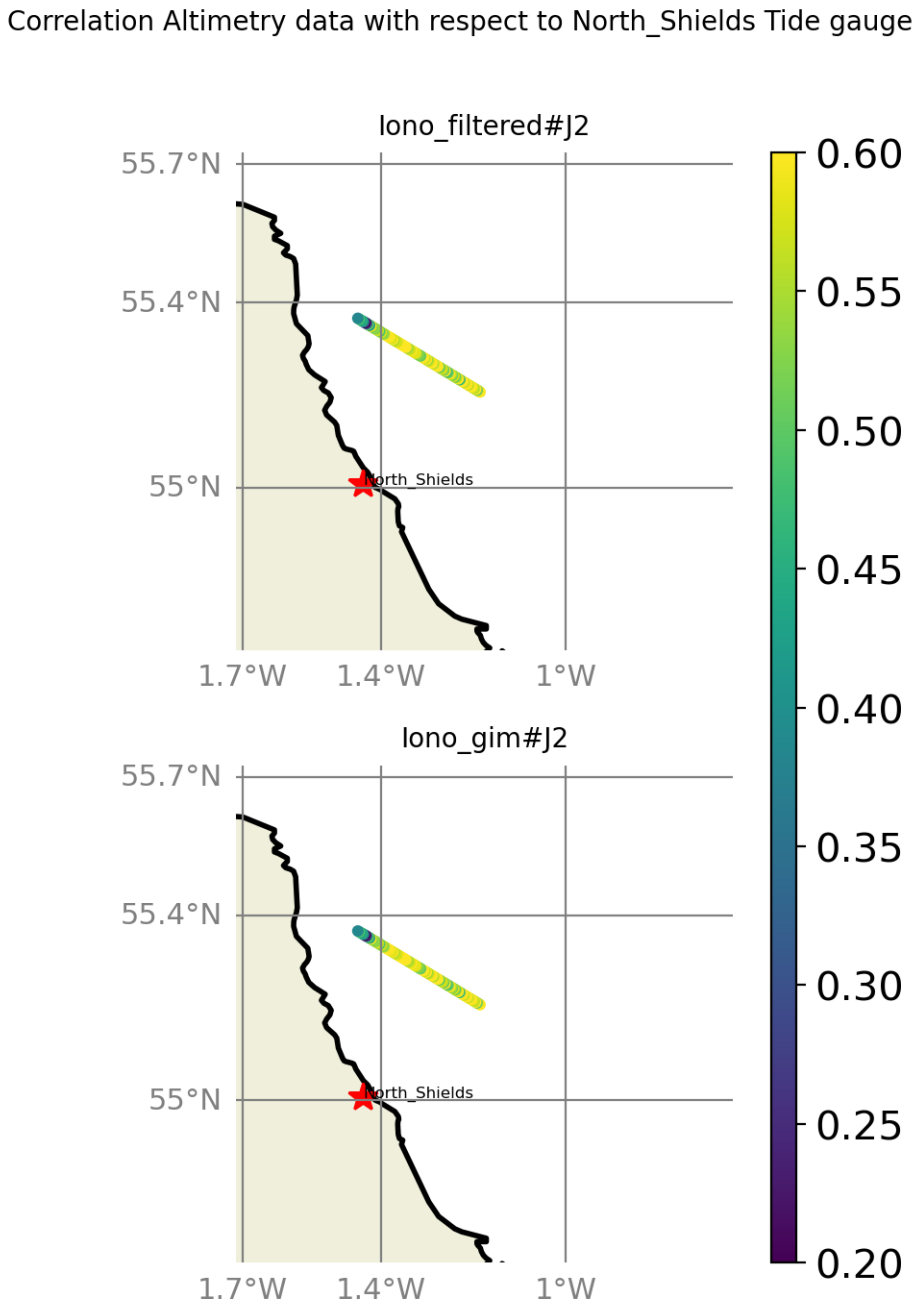

FIGURE 126 – correlation visualization in maps view % North_Shields tide gauge

6.10.2 rmsd visualization in maps view % North_Shields tide gauge

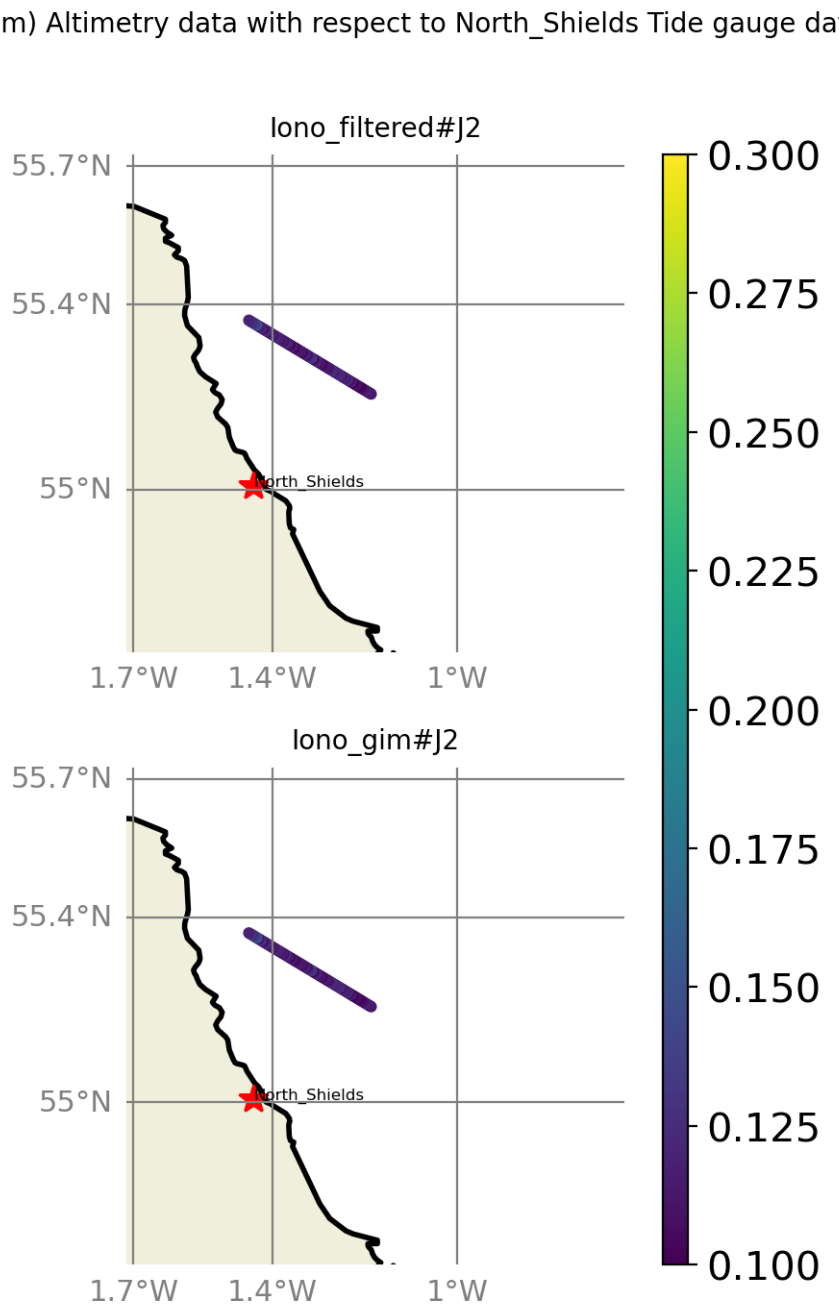

FIGURE 127 – rmsd visualization in maps view % North_Shields tide gauge

6.10.3 std visualization in maps view % North_Shields tide gauge

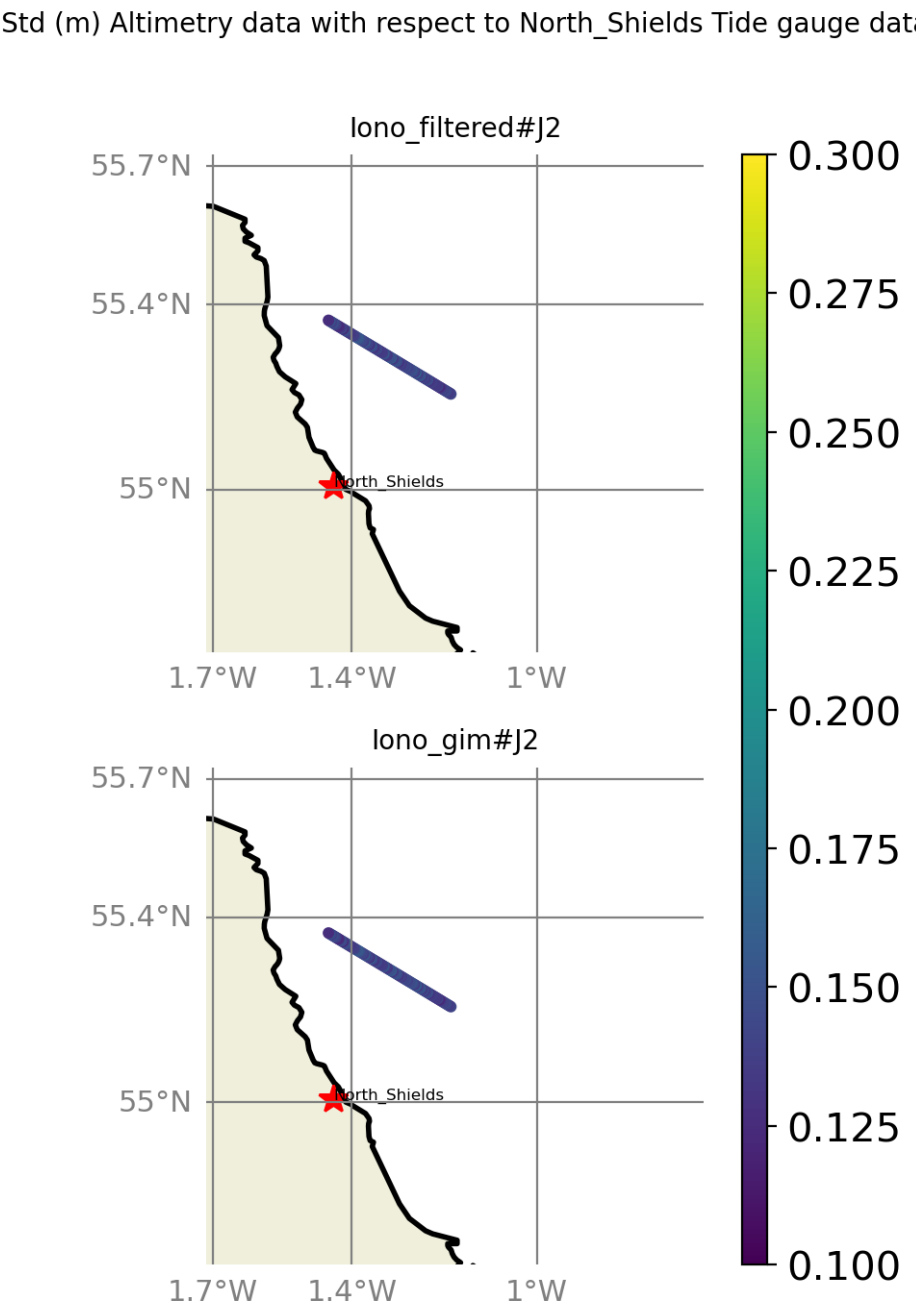

Figure 128 – std visualization in maps view % North_Shields tide gauge

6.10.4 valid_data_percent visualization in maps view % North_Shields tide gauge

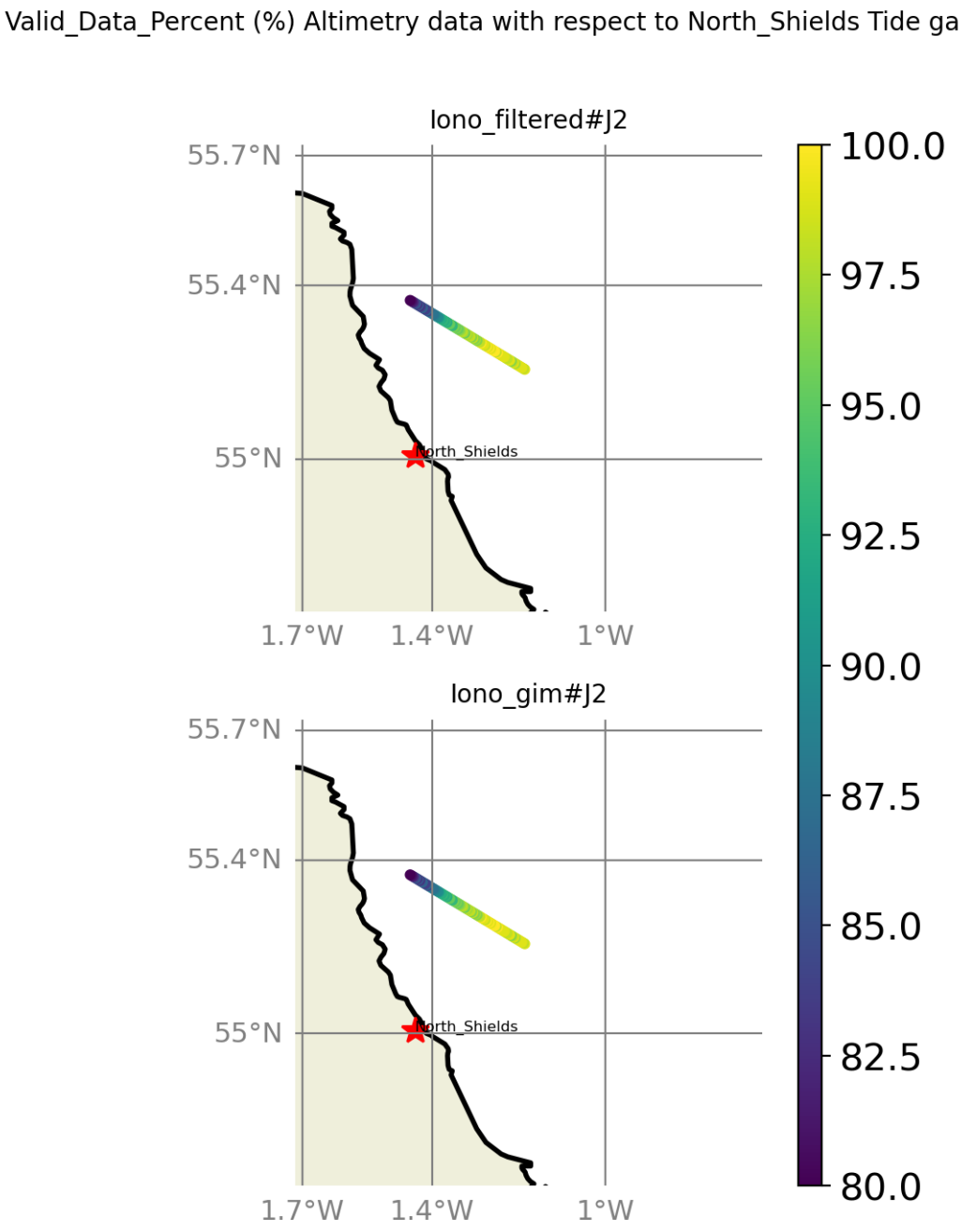

FIGURE 129 – valid_data_percent visualization in maps view % North_Shields tide gauge

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

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

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

Where *pvd* and *nvd* are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time serie, i is the index of the time serie, np is the number of the selected altimetry time series. $maxNB = 105$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

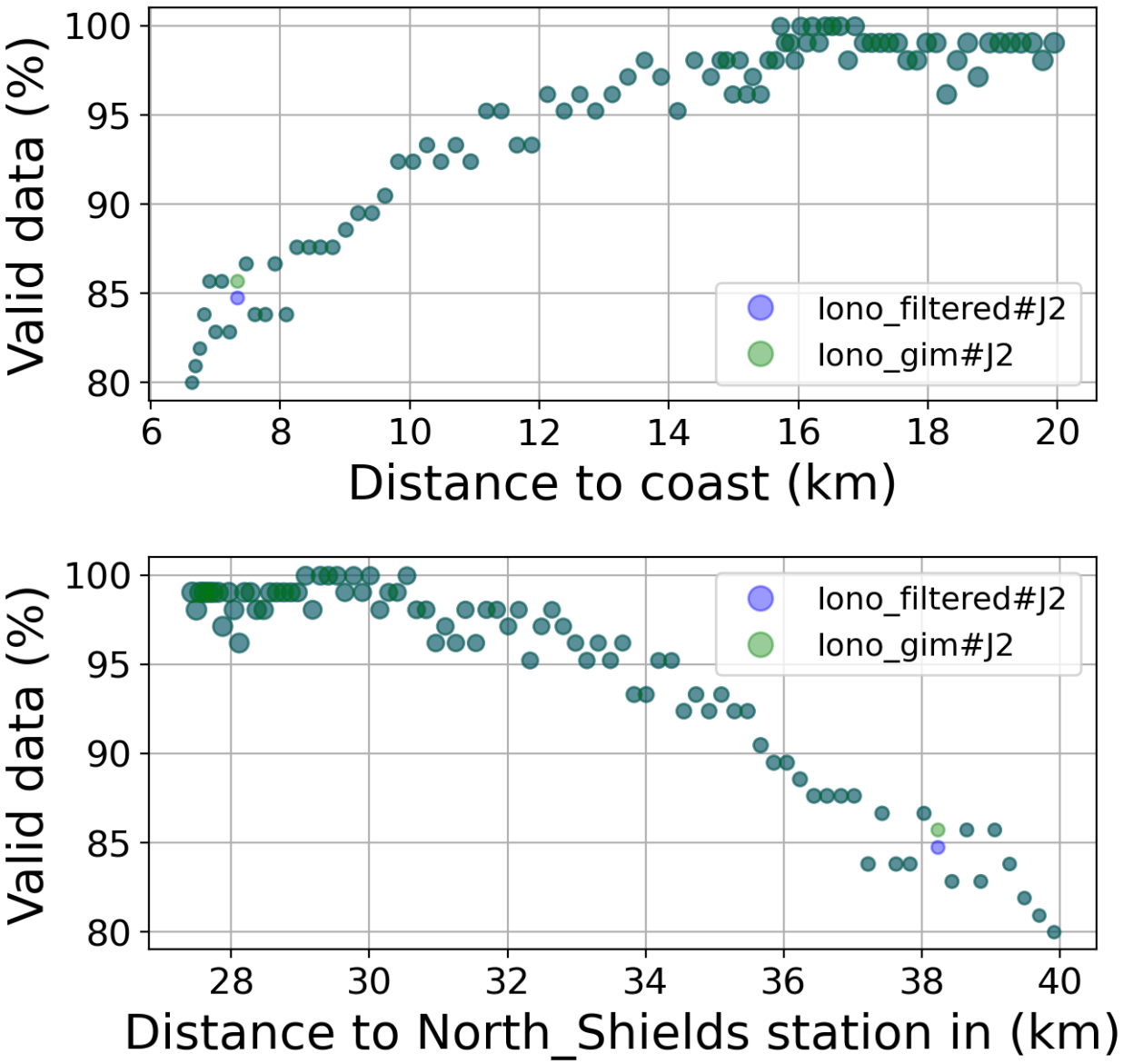

Figure 130 – Valid data (%) in function of distance to coast/North_Shields station

6.10.6 Std in function of distance to coast/North_Shields station

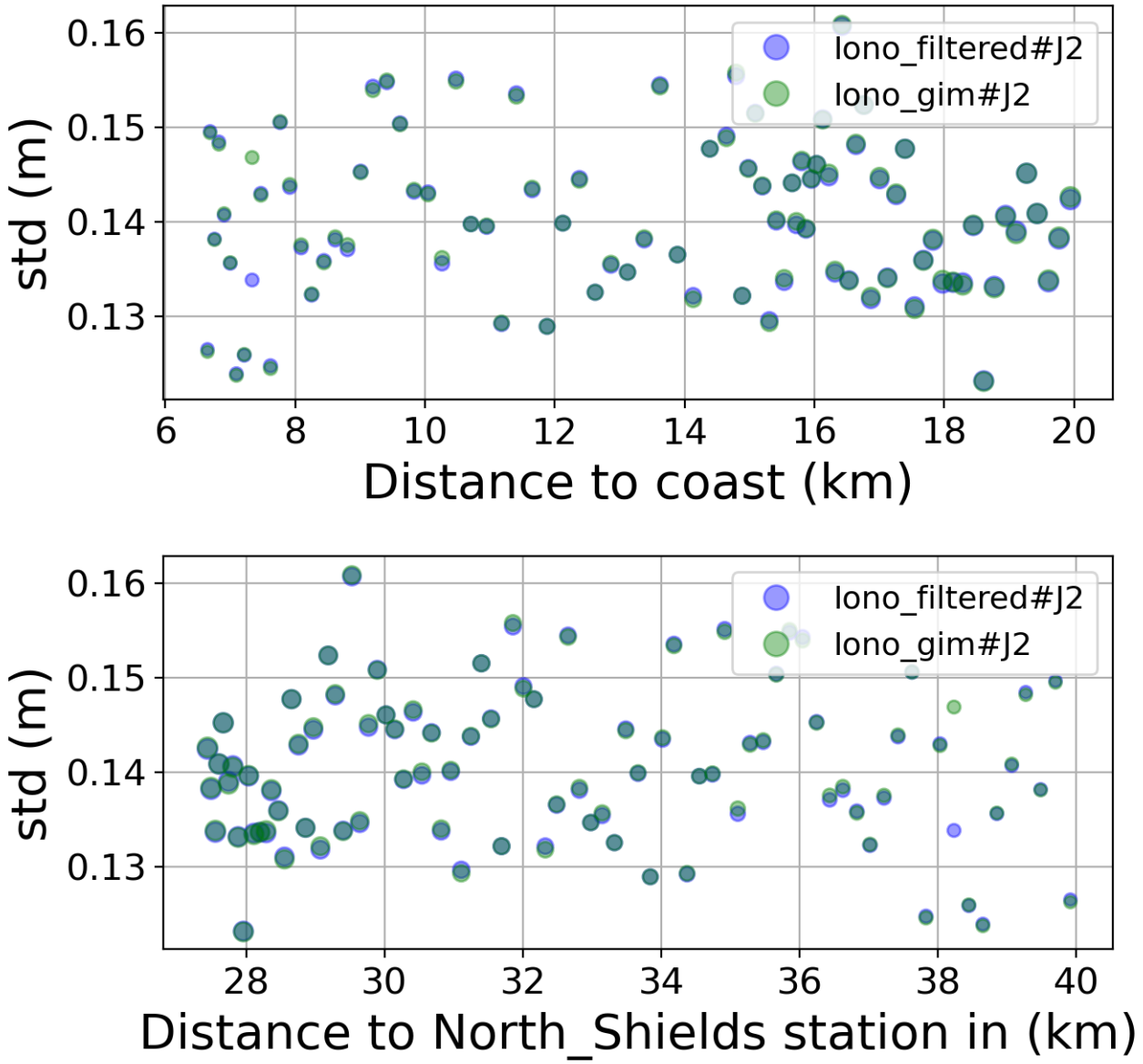

Figure 131 – Std in function of the distance to the coast/North_Shields station

6.10.7 Correlation in function of distance to coast/North_Shields station

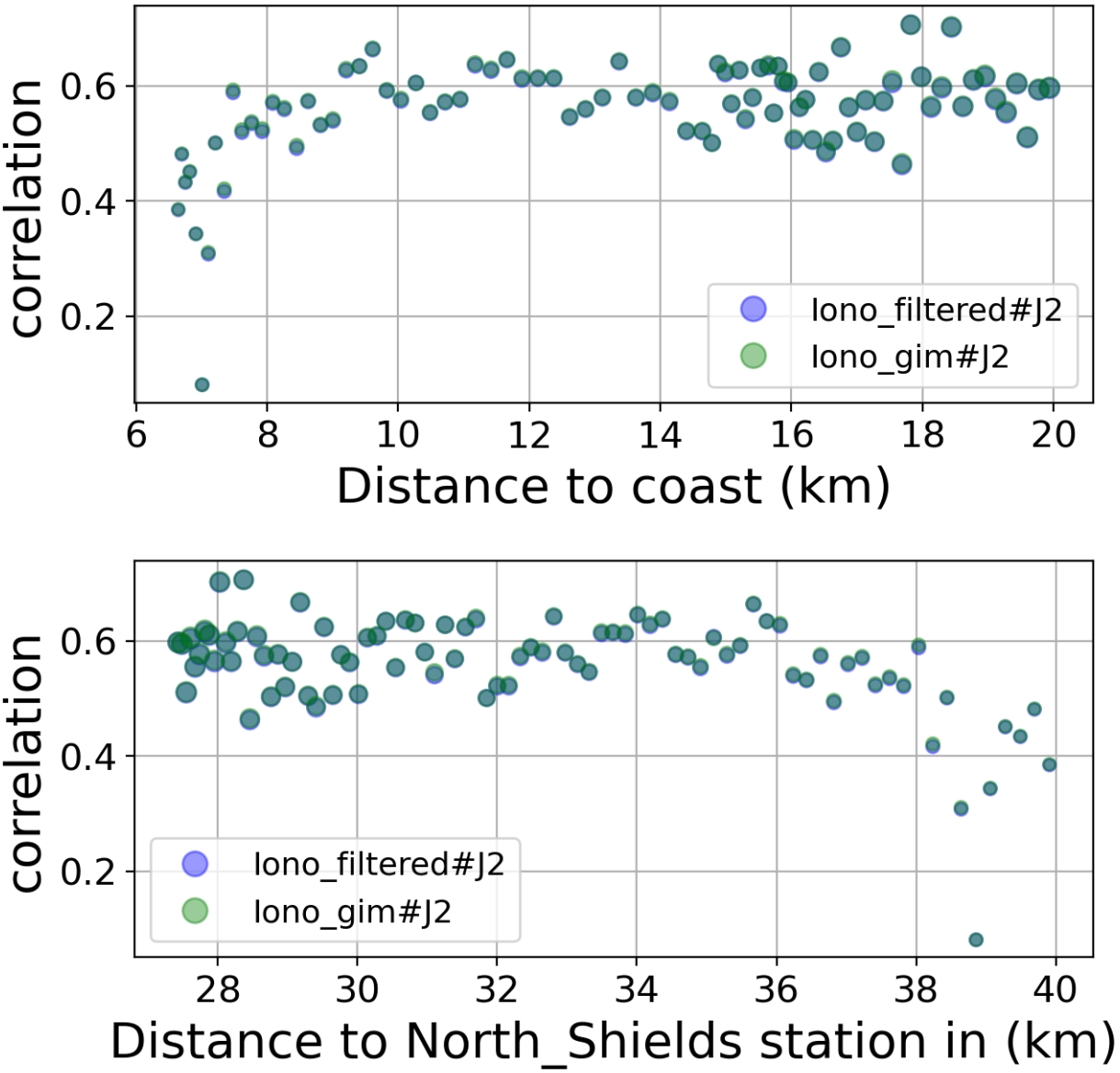

FIGURE 132 – Correlation in function of the distance to the coast/North_Shields station

6.10.8 Taylor Diagram

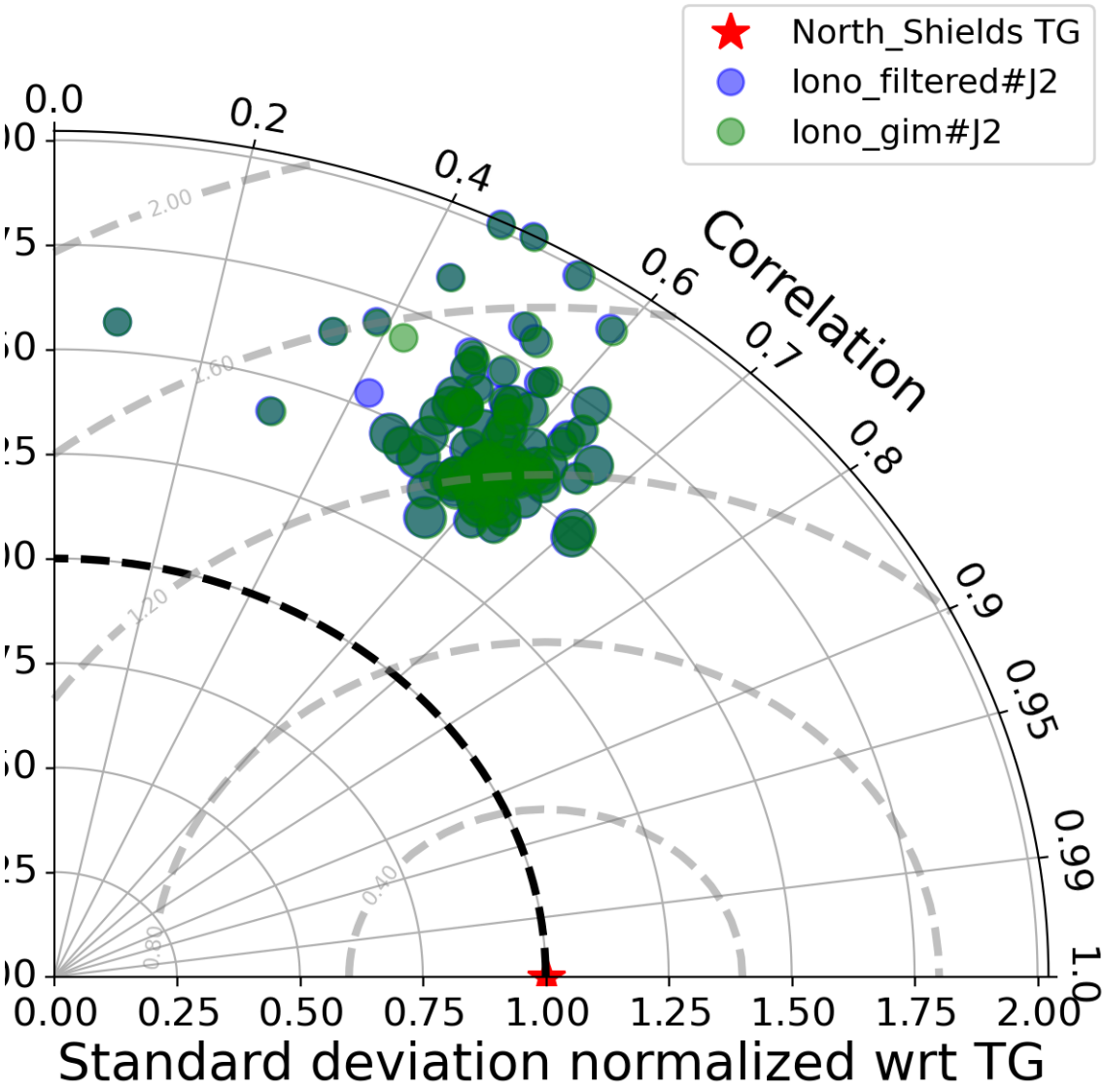

Figure 133 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	94.331	0.559	0.14	0.117
Iono_gim#J2	94.342	0.561	0.141	0.116

FIGURE 134 – Mean statistics table of the common points in the altimetry products

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

The maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie is 105 point.

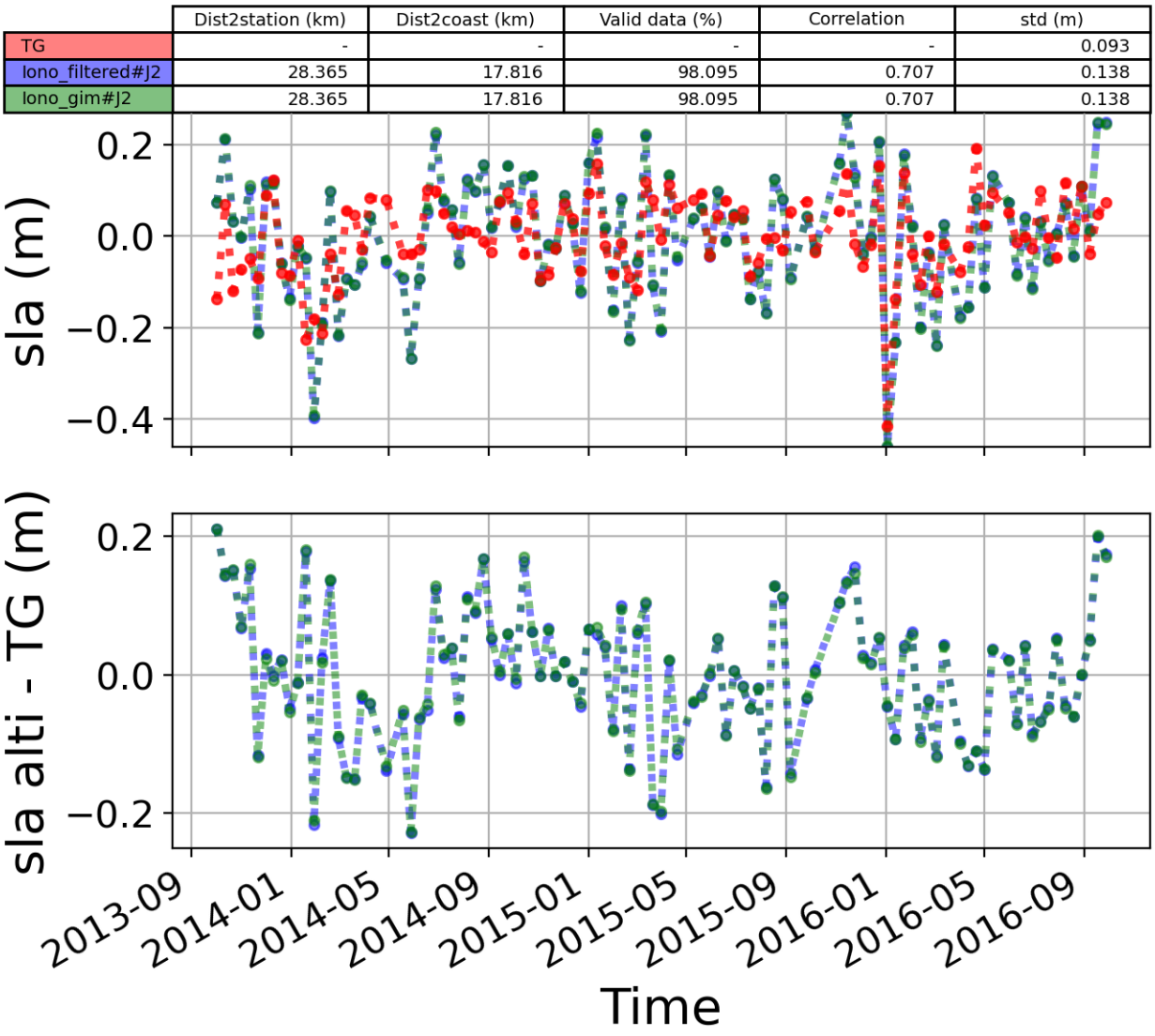

FIGURE 135 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

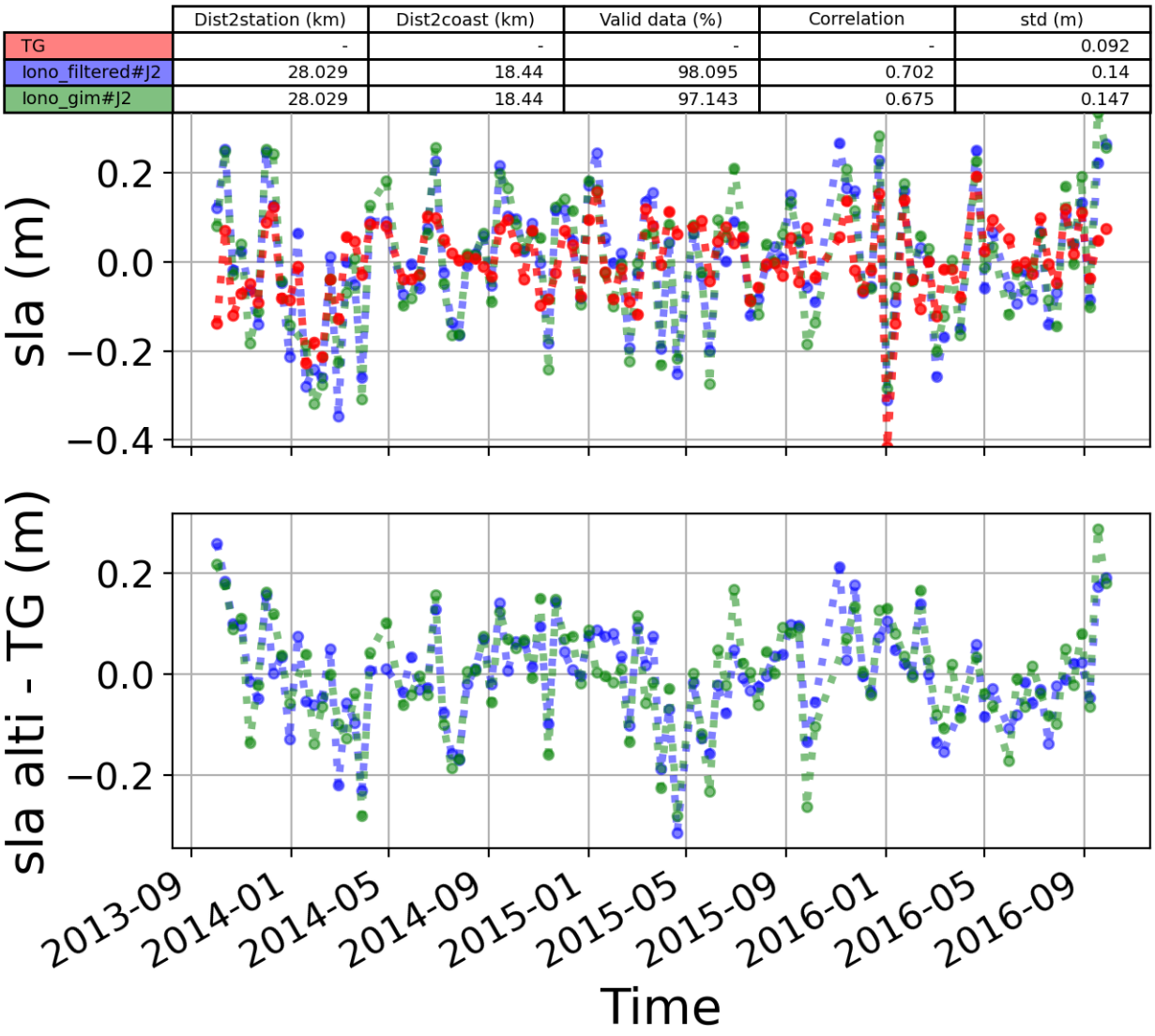

FIGURE 136 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie