Diagtool Report

Round Robin (GT cotier) : Ionospheric correction. Medsea. 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 Medsea
- 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 1 m.
— Each sla time-serie has been filtred by a window of $[-4\sigma, 4\sigma]$, where σ is the standard deviation of the sla time serie

3 Spatial coherence analysis

3.1 sla

3.1.1 sla 's count

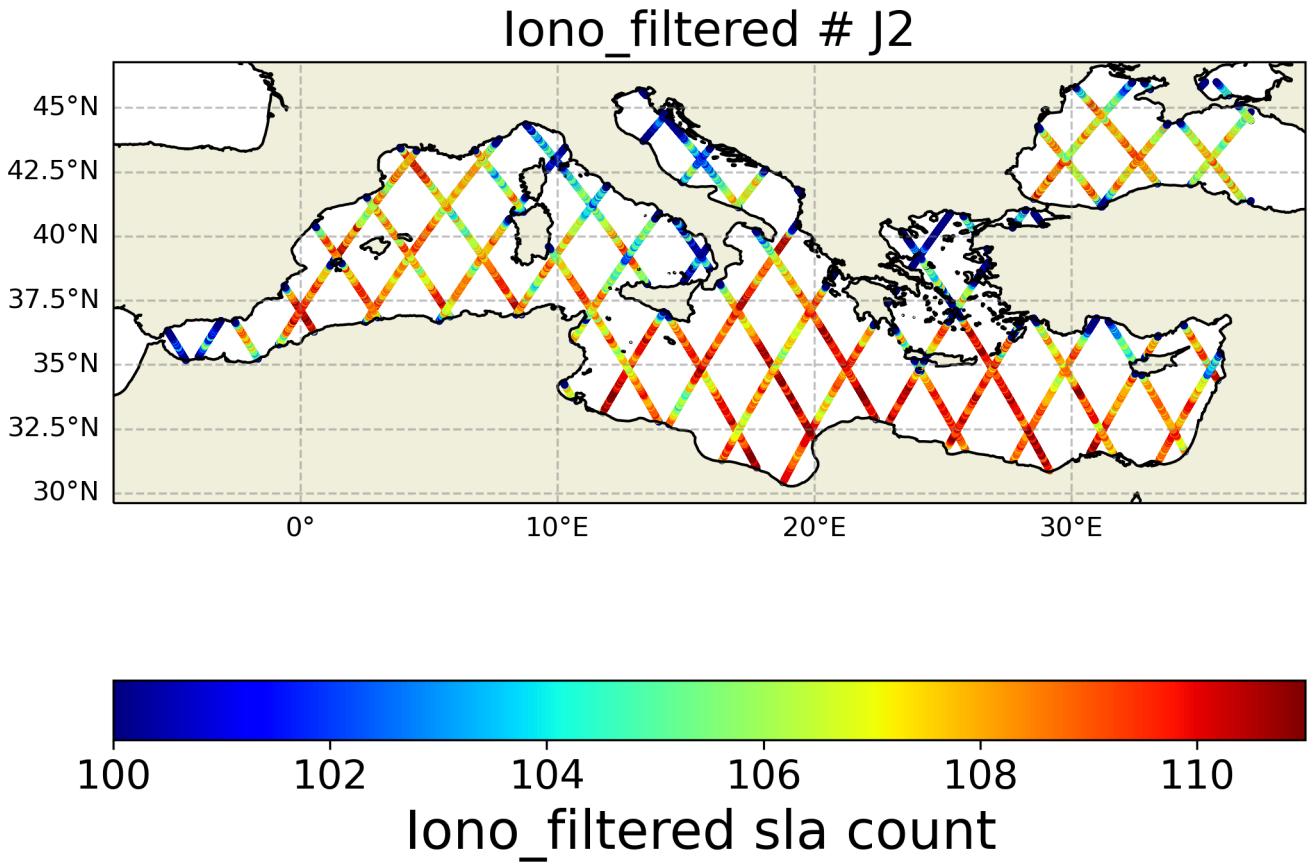

FIGURE 1 – Spatial coherence analysis of the count of the Iono_filtered version of sla variable

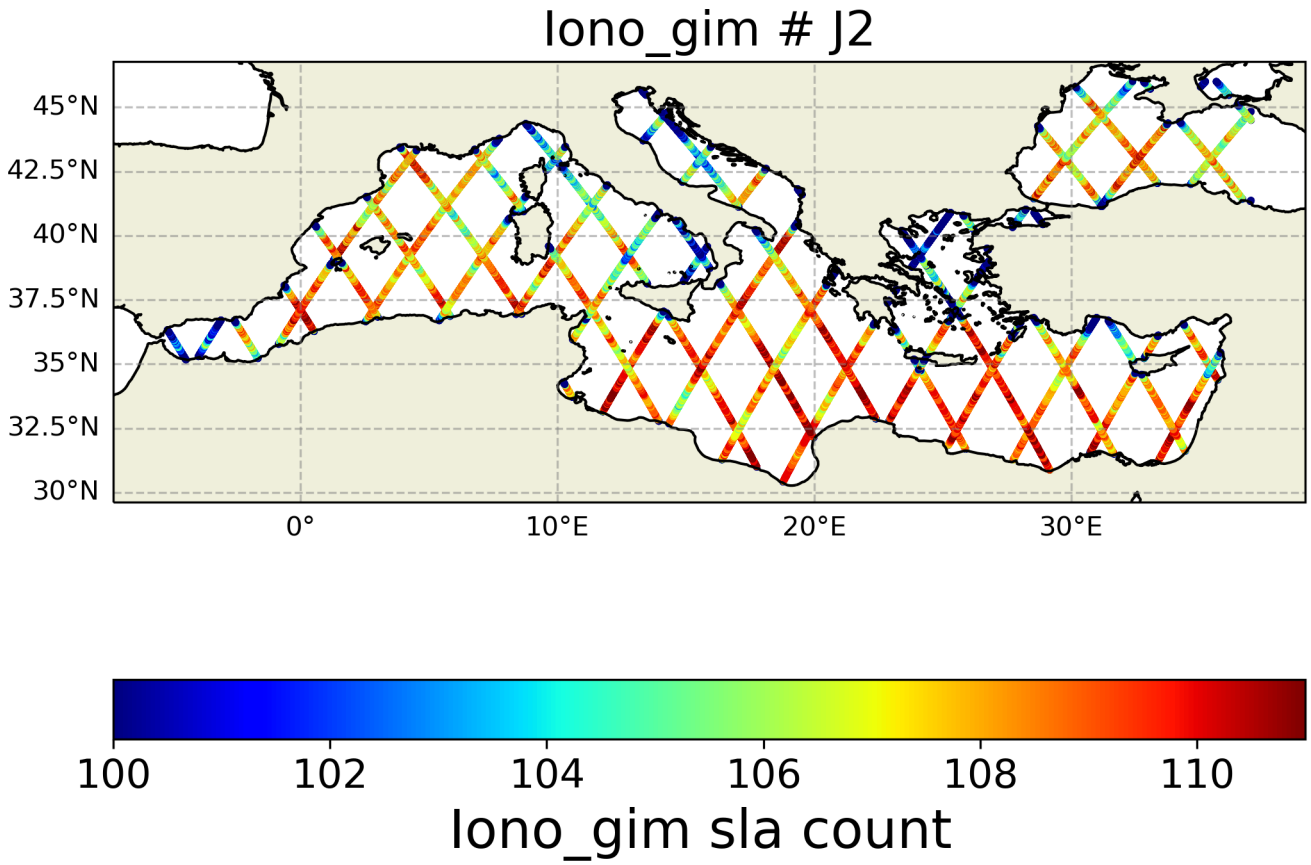

FIGURE 2 – Spatial coherence analysis of the count of the Iono_gim version of sla variable

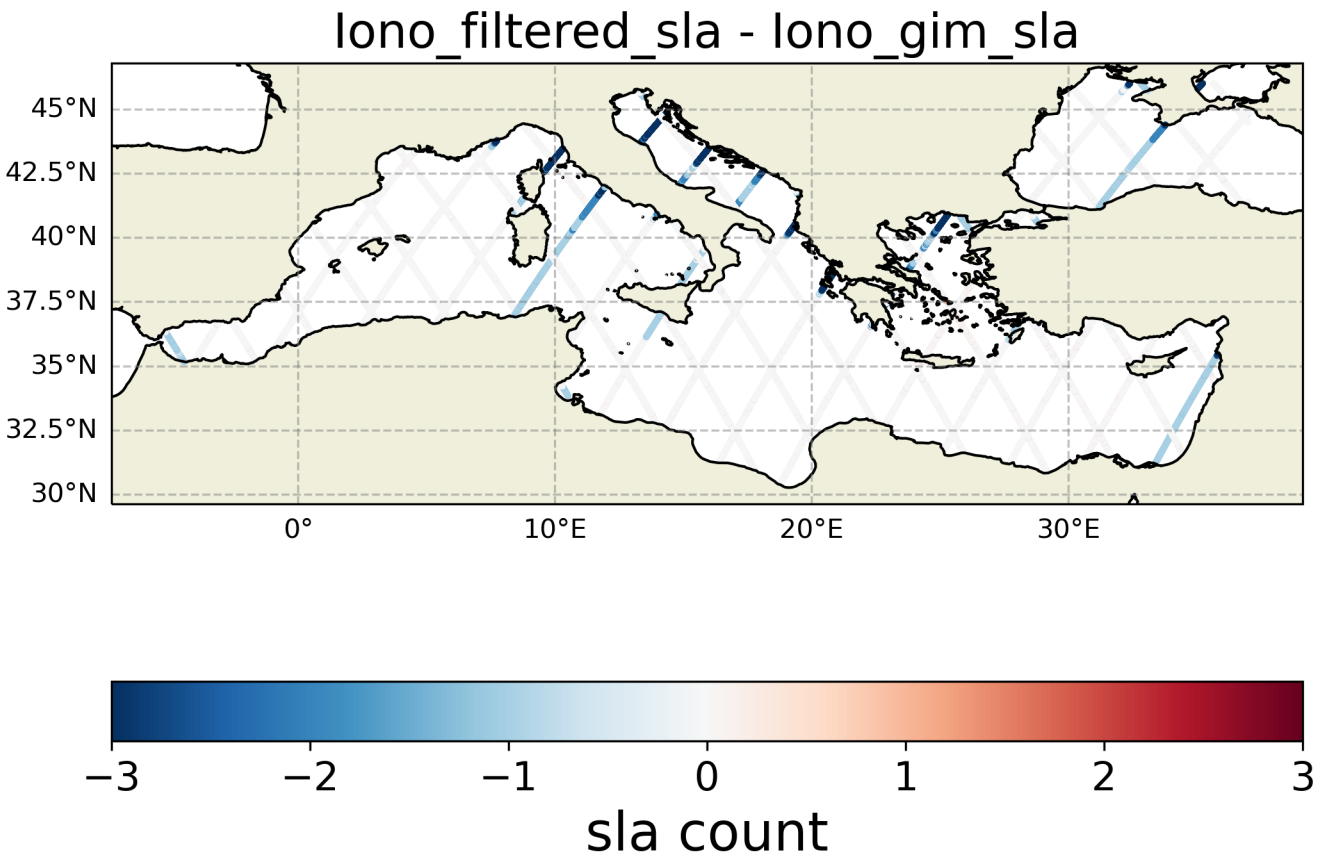

FIGURE 3 – Spatial coherence analysis of the Difference in sla 's count between Iono_filtered and Iono_gim

3.1.2 sla 's std

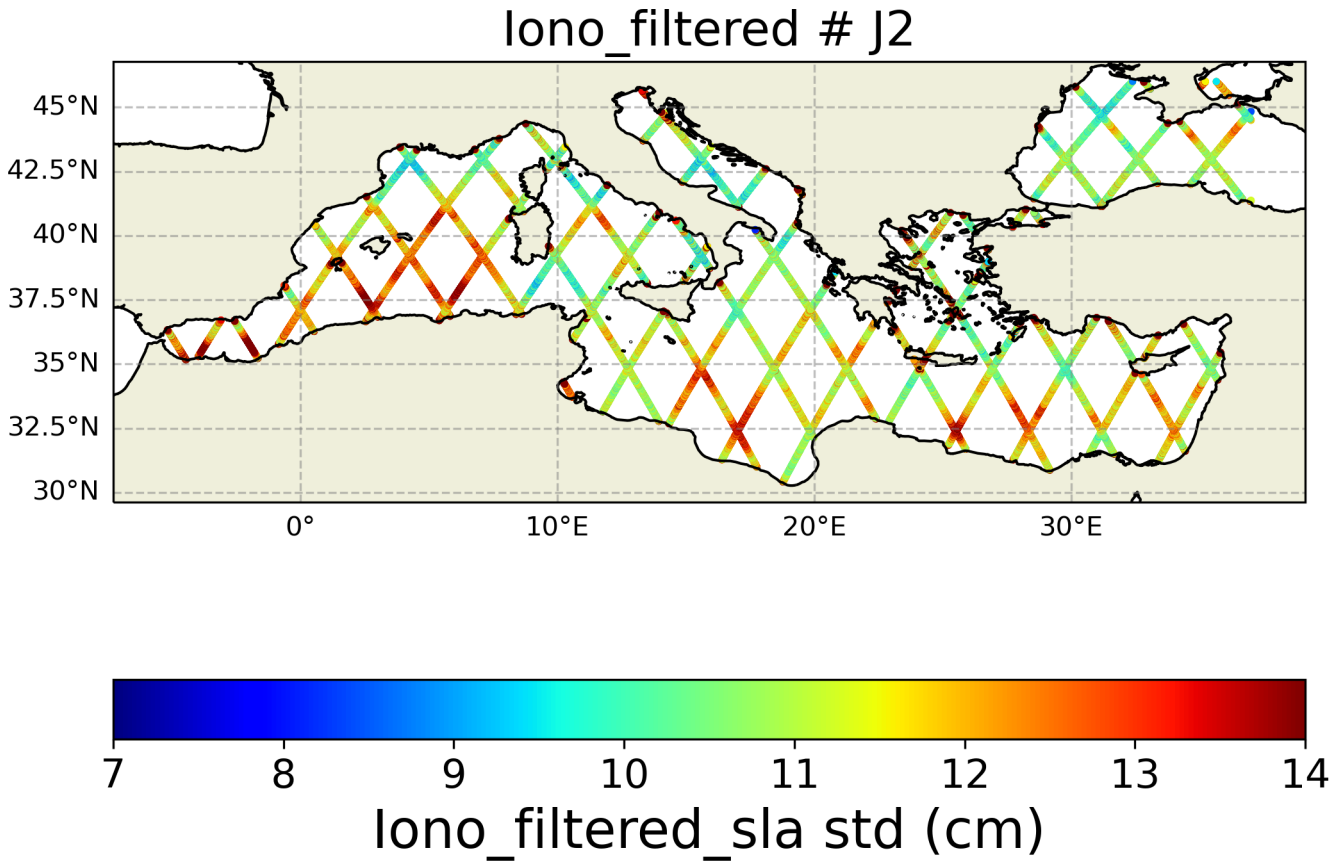

FIGURE 4 – Spatial coherence analysis of the std of the Iono_filtered version of sla variable

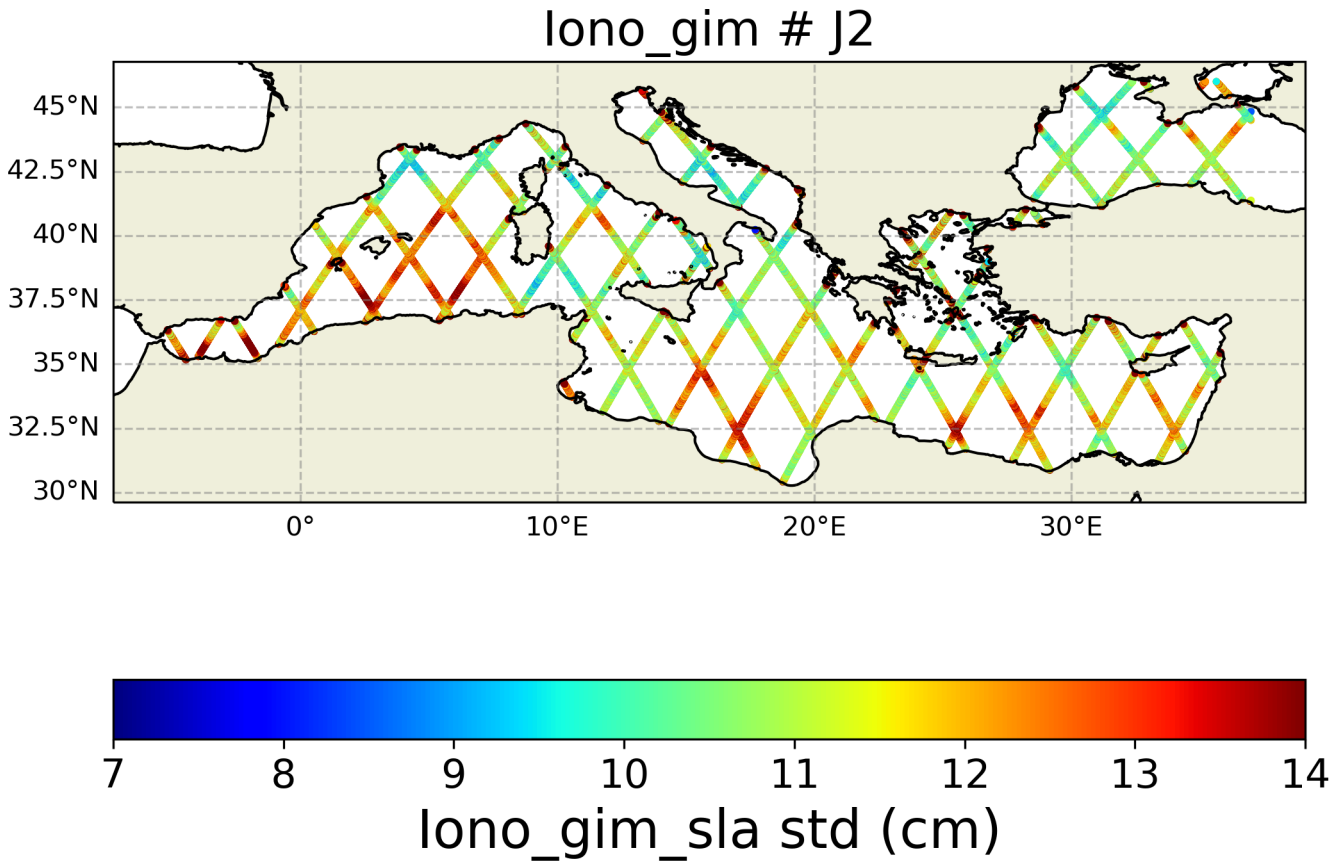

FIGURE 5 – Spatial coherence analysis of the std of the Iono_gim version of sla variable

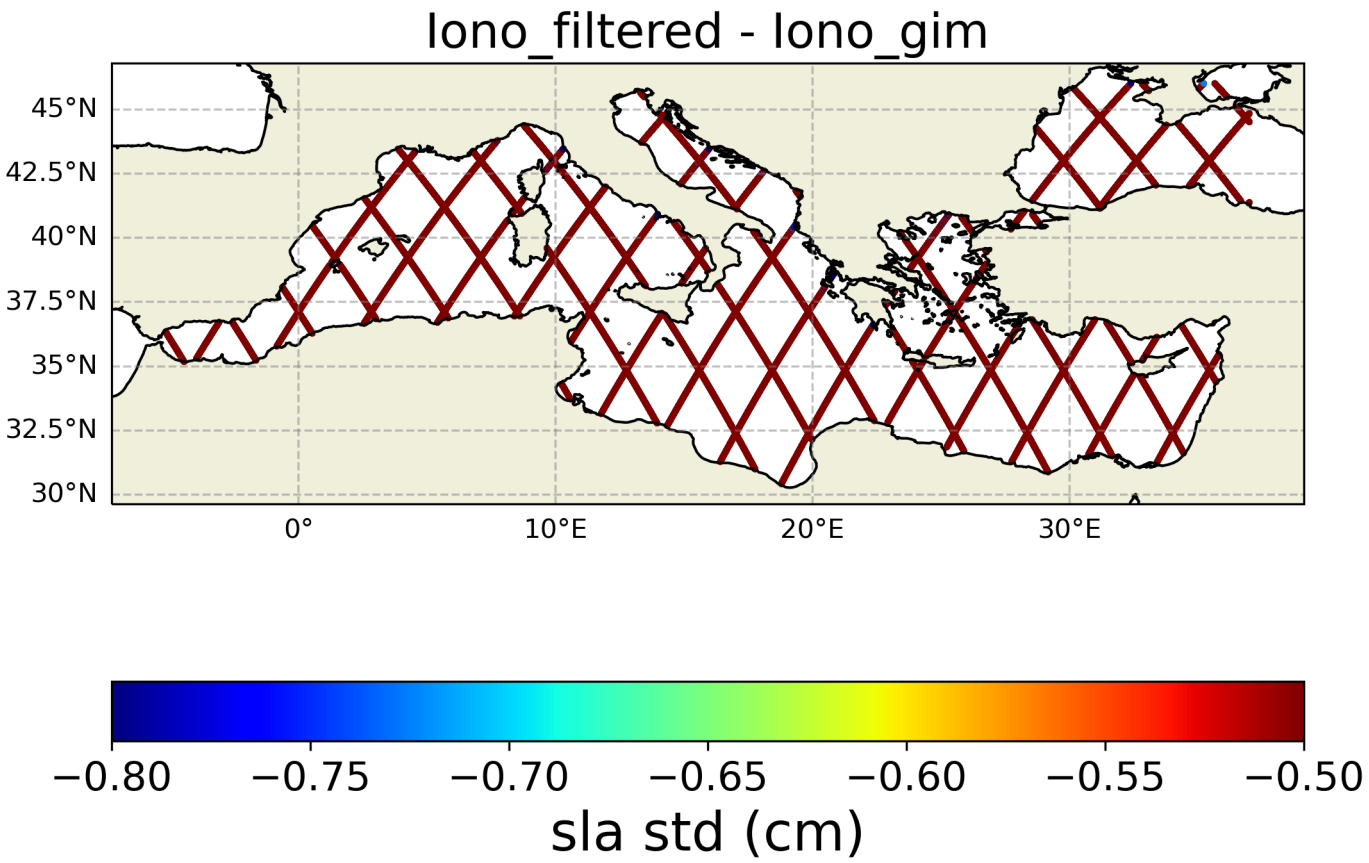

FIGURE 6 – Spatial coherence analysis of the Difference in sla 's std between Iono_filtered and Iono_gim

3.1.3 sla 's mean

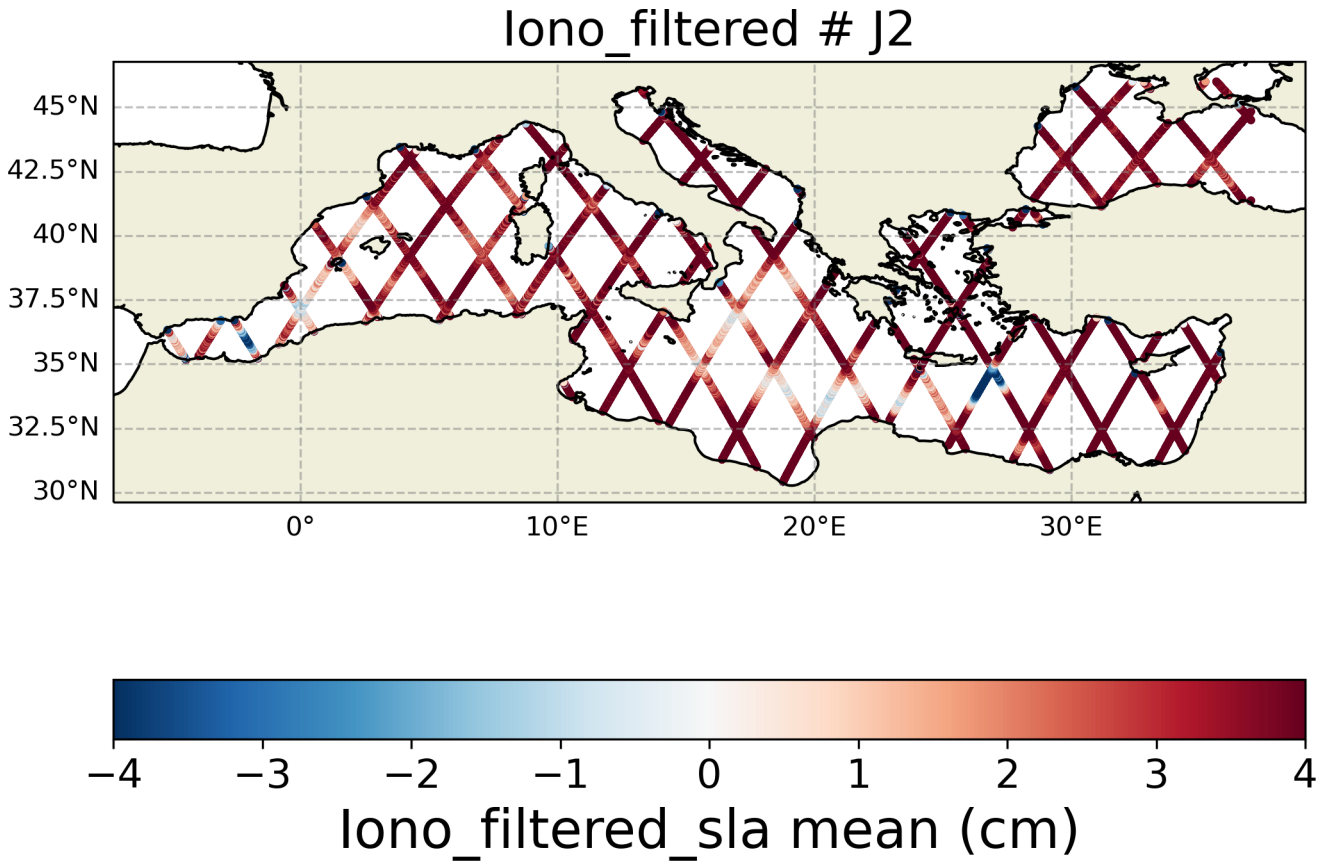

FIGURE 7 – Spatial coherence analysis of the mean of the Iono_filtered version of sla variable

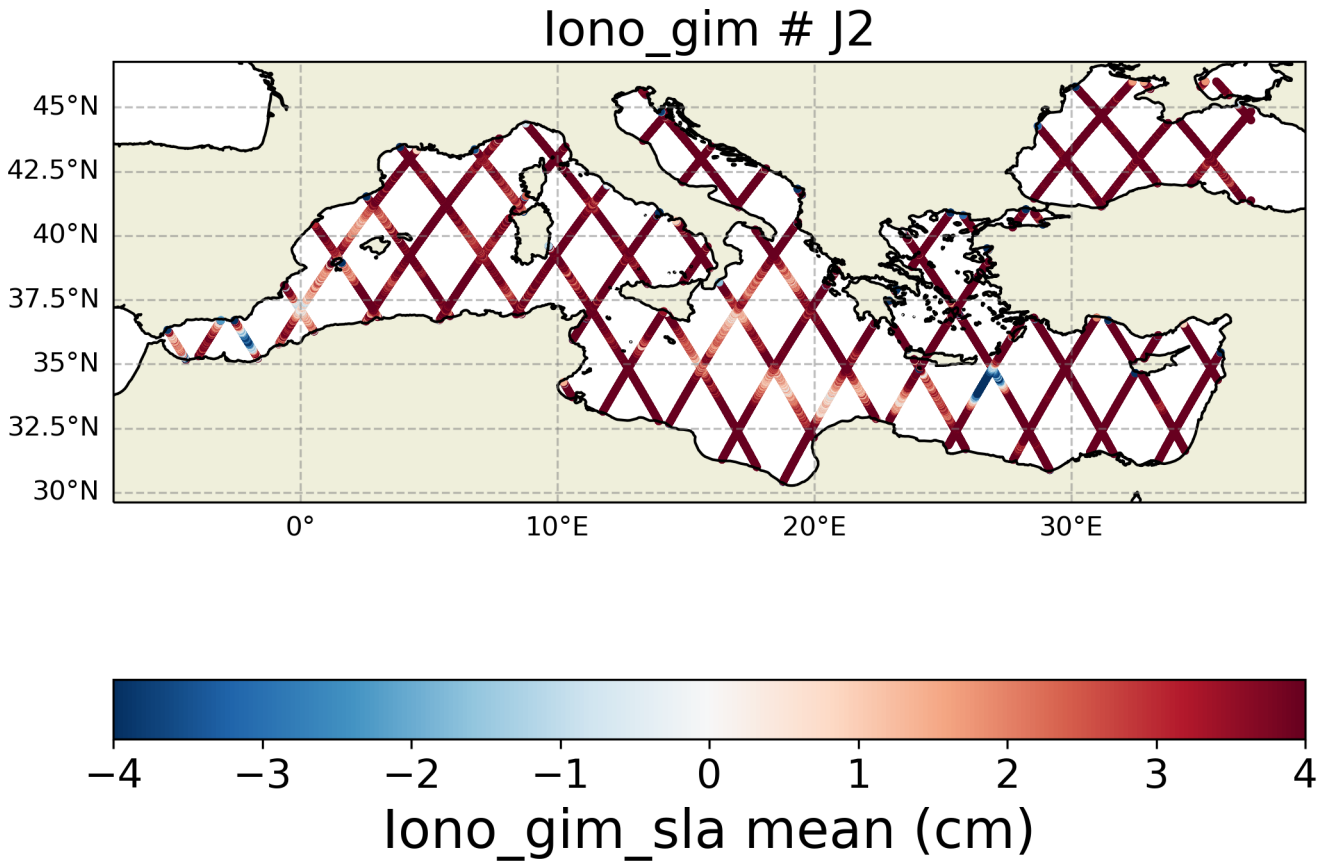

FIGURE 8 – Spatial coherence analysis of the mean of the Iono_gim version of sla variable

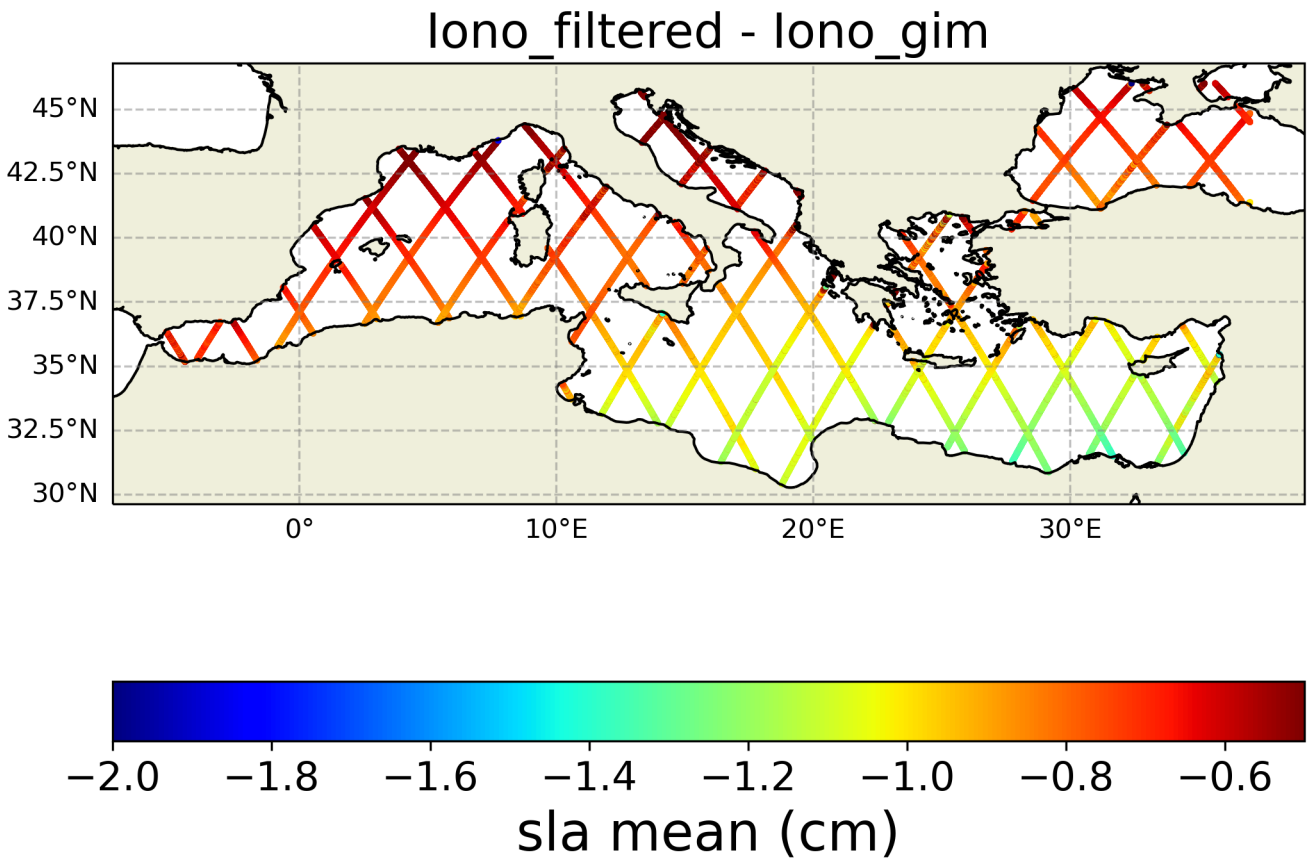

FIGURE 9 – Spatial coherence analysis of the Difference in sla 's mean between Iono_filtered and Iono_gim

3.2 Iono

3.2.1 Iono 's count

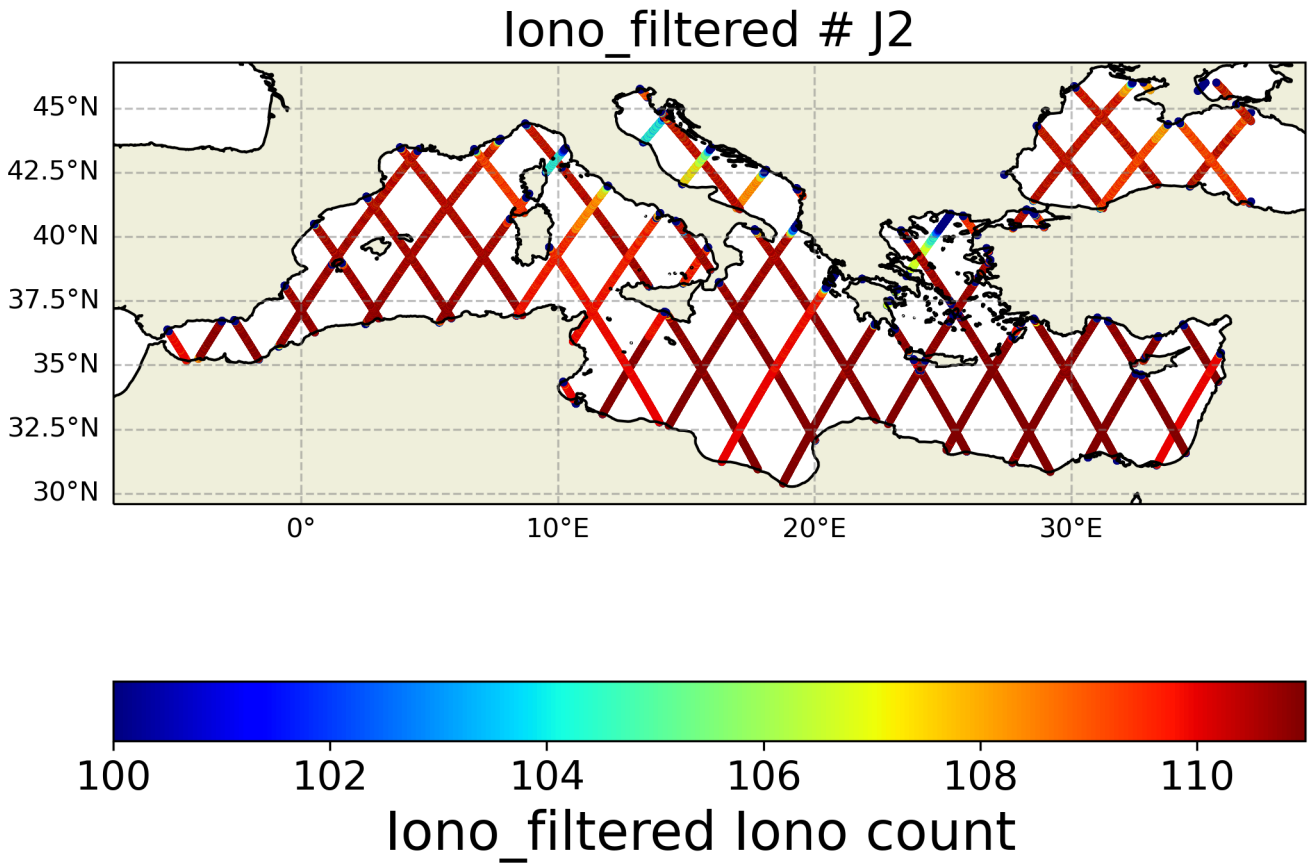

FIGURE 10 – Spatial coherence analysis of the count of the Iono_filtered version of Iono variable

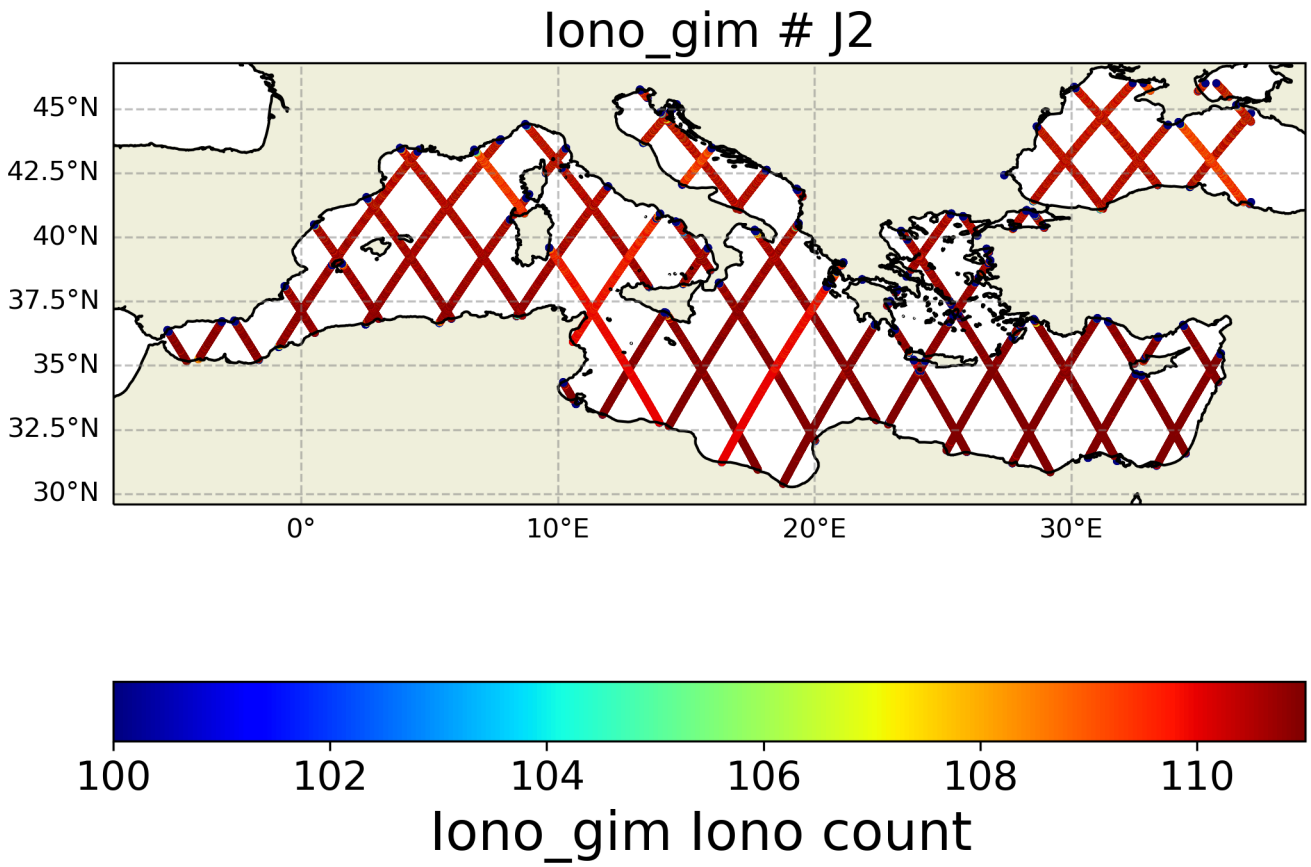

FIGURE 11 – Spatial coherence analysis of the count of the Iono_gim version of Iono variable

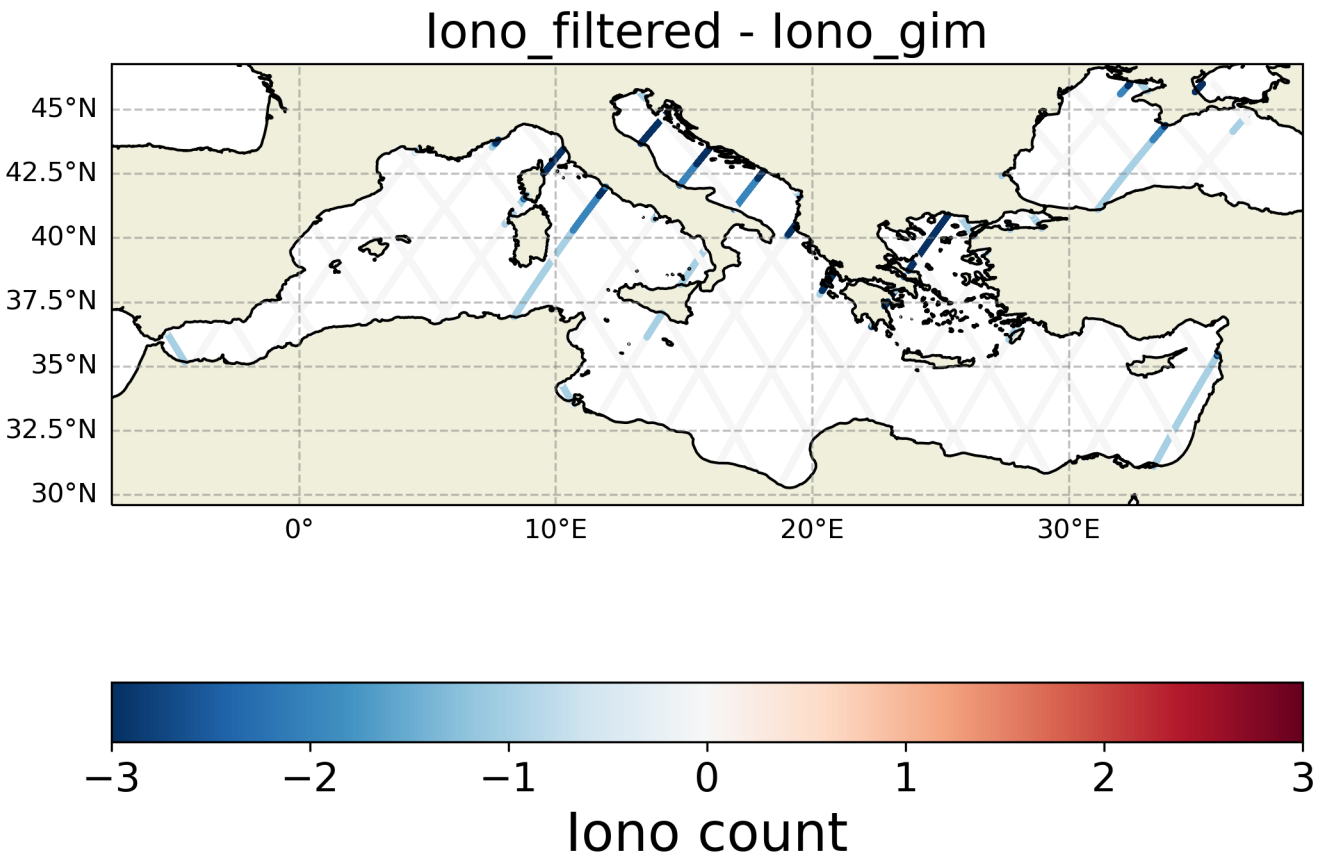

FIGURE 12 – Spatial coherence analysis of the Difference in Iono 's count between Iono_filtered and Iono_gim

3.2.2 Iono 's std

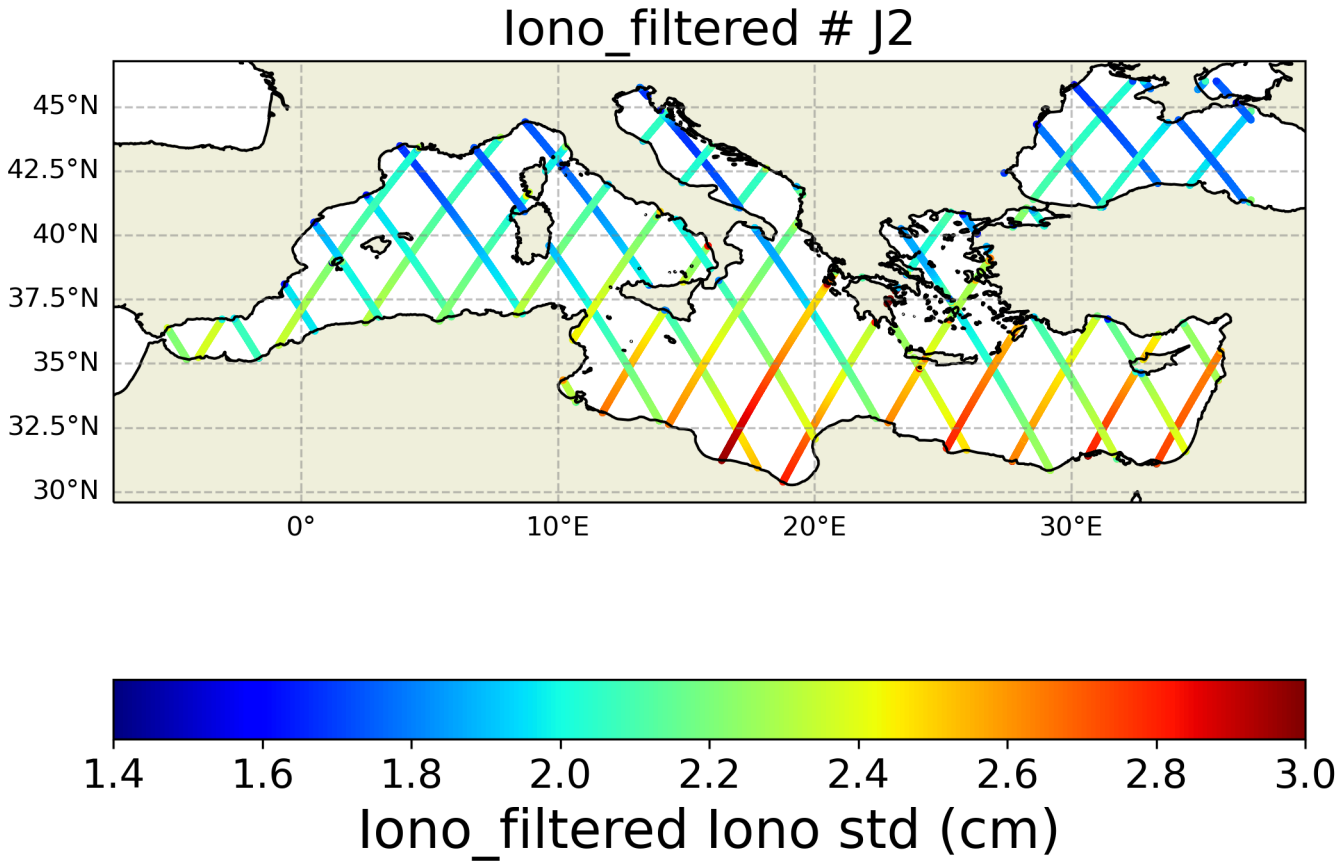

FIGURE 13 – Spatial coherence analysis of the std of the Iono_filtered version of Iono variable

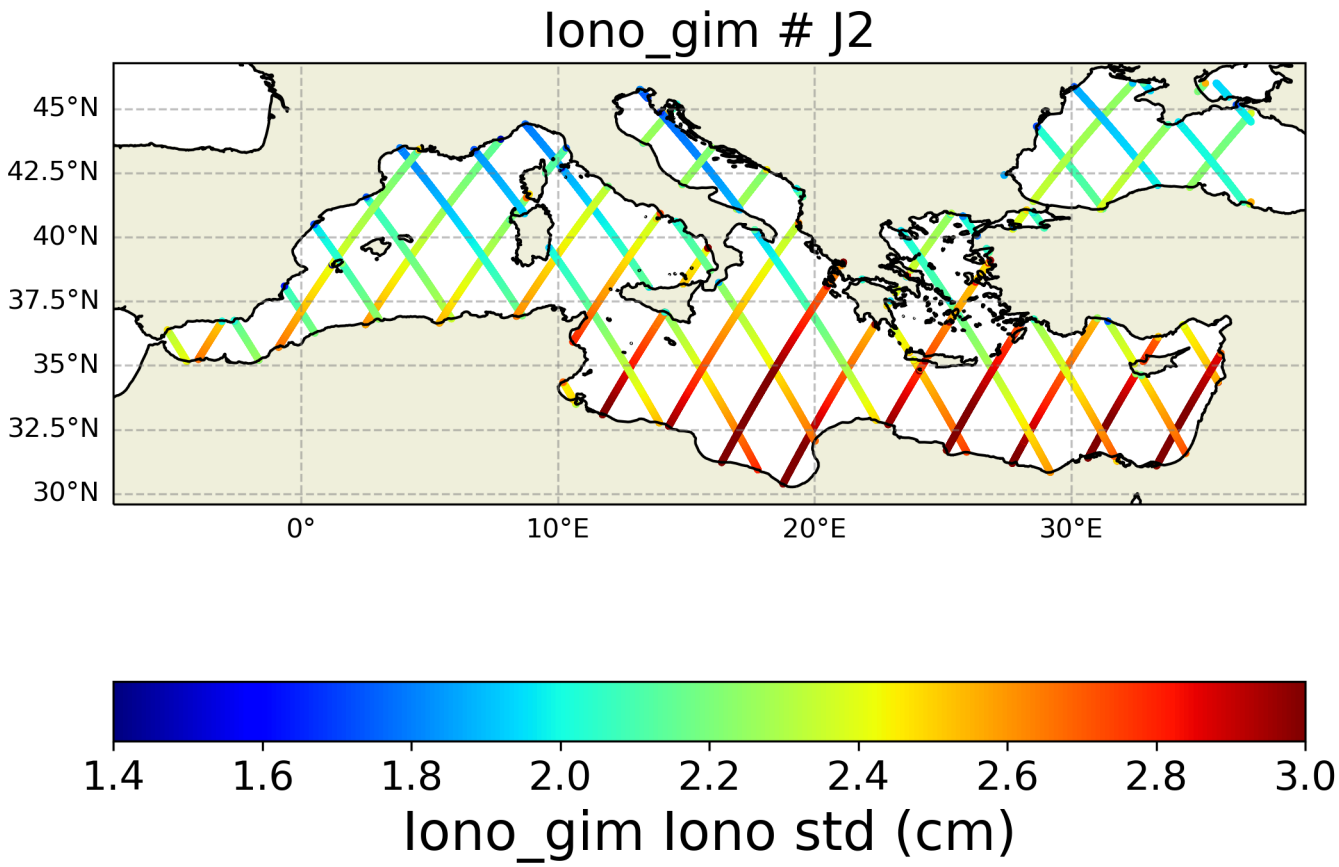

FIGURE 14 – Spatial coherence analysis of the std of the Iono_gim version of Iono variable

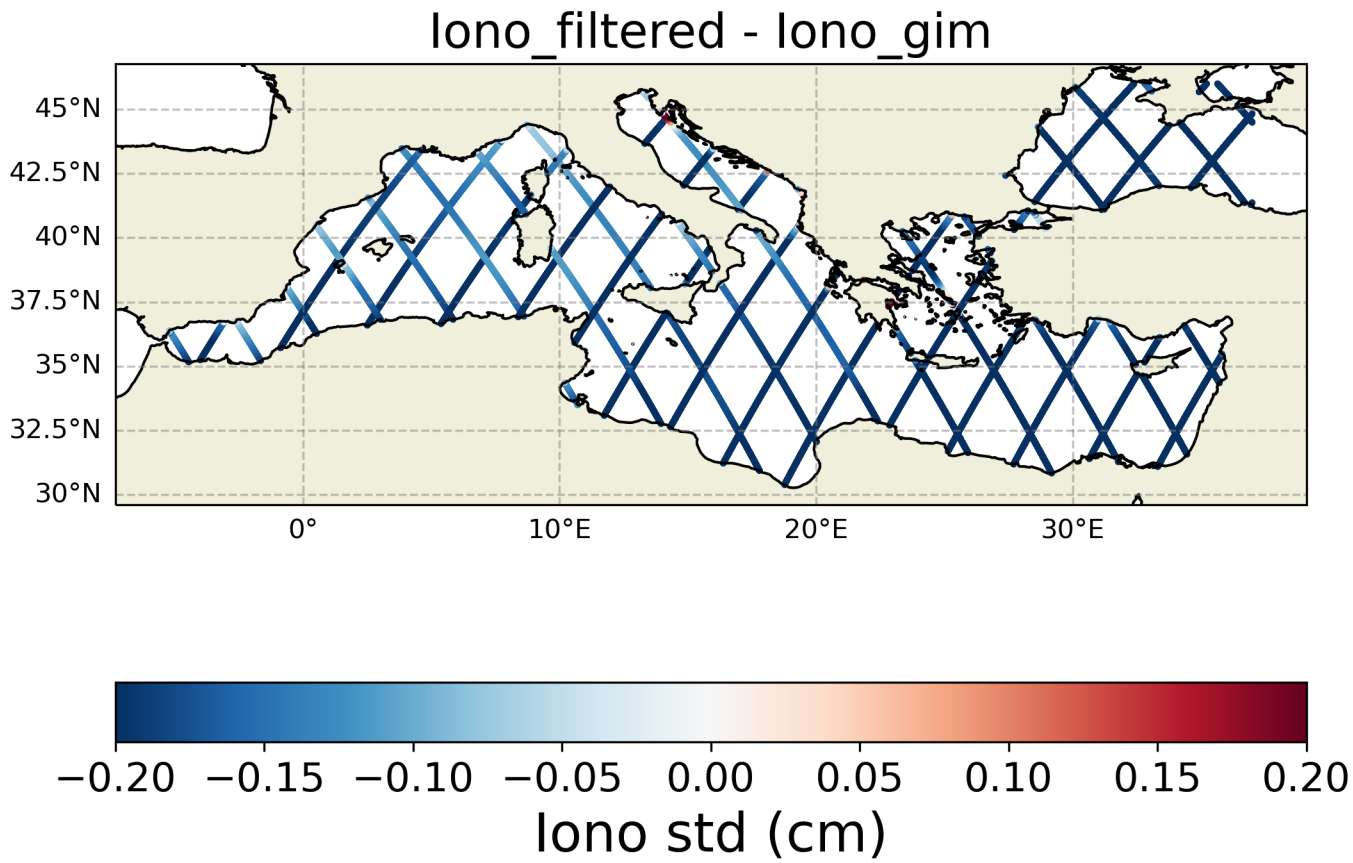

FIGURE 15 – Spatial coherence analysis of the Difference in Iono 's std between Iono_filtered and Iono_gim

3.2.3 Iono 's mean

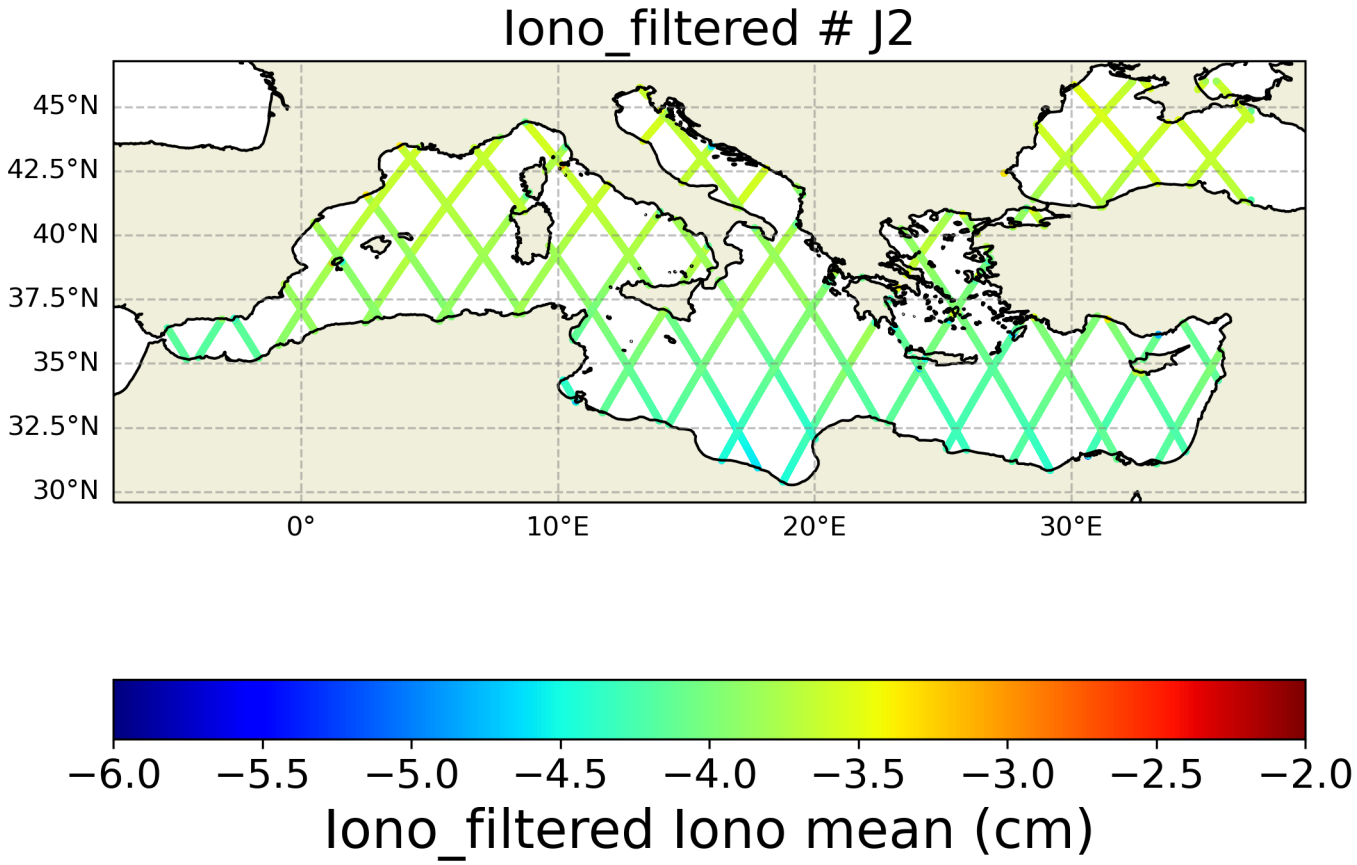

FIGURE 16 – Spatial coherence analysis of the mean of the Iono_filtered version of Iono variable

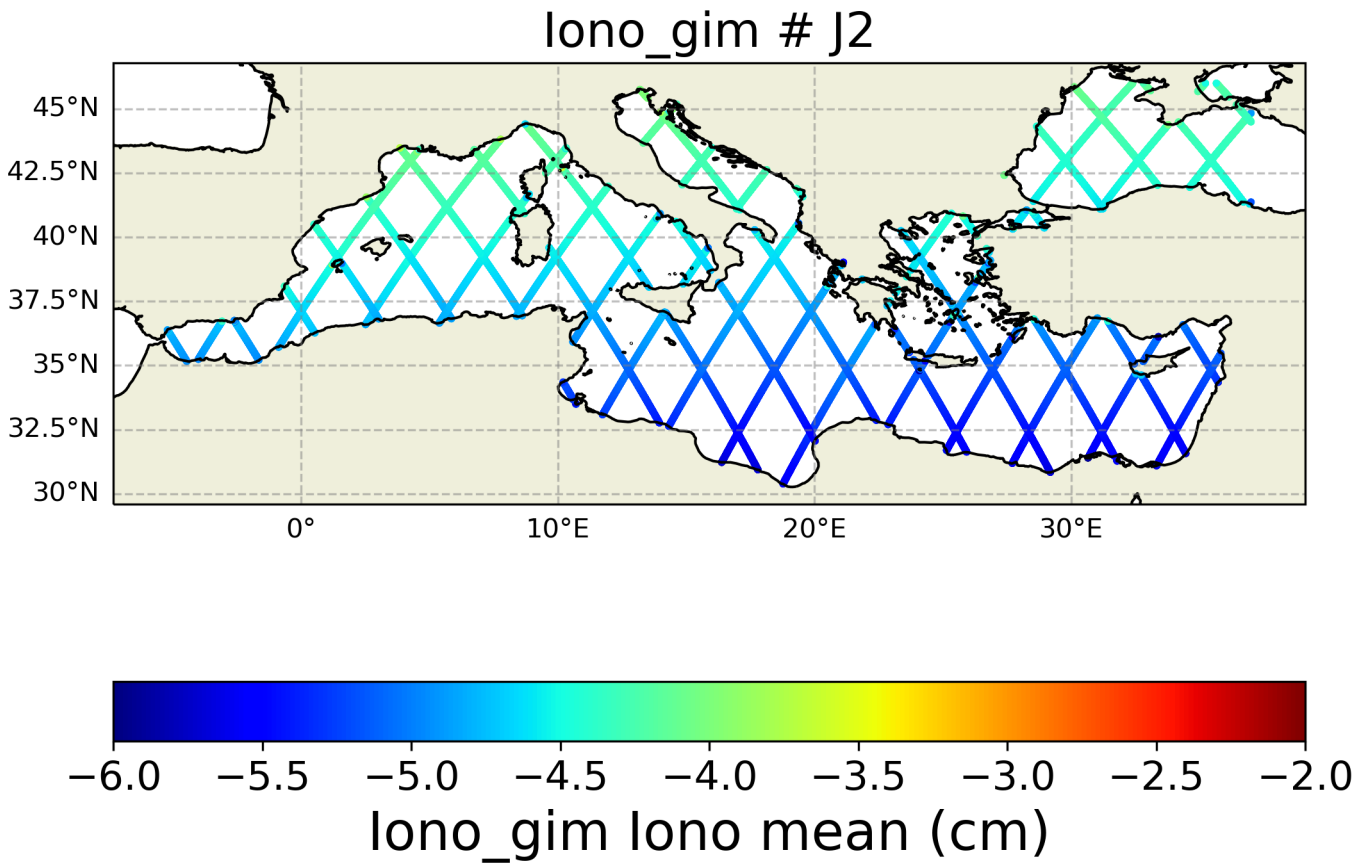

FIGURE 17 – Spatial coherence analysis of the mean of the Iono_gim version of Iono variable

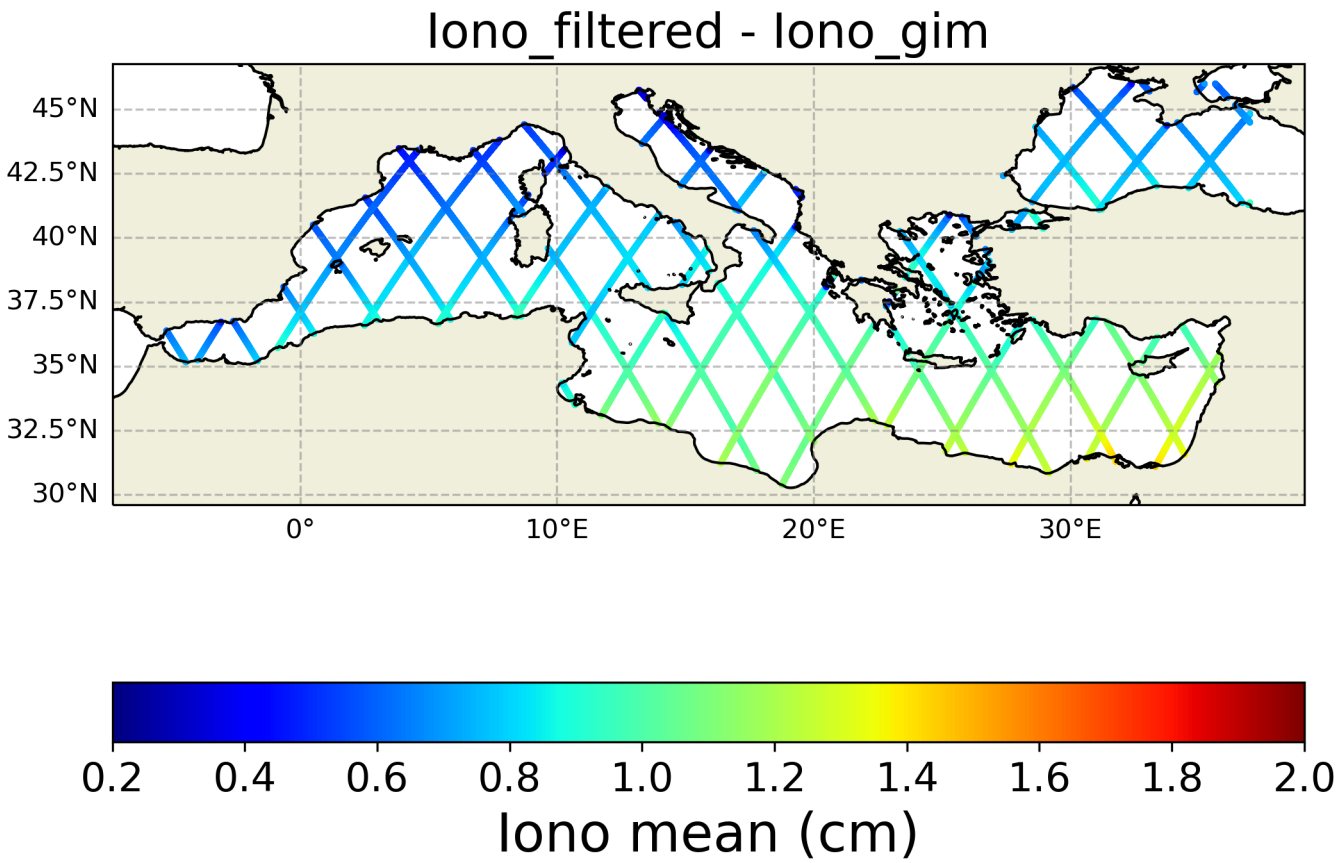

FIGURE 18 – Spatial coherence analysis of the Difference in Iono 's mean between Iono_filtered and Iono_gim

4 Histograms

4.1 Iono

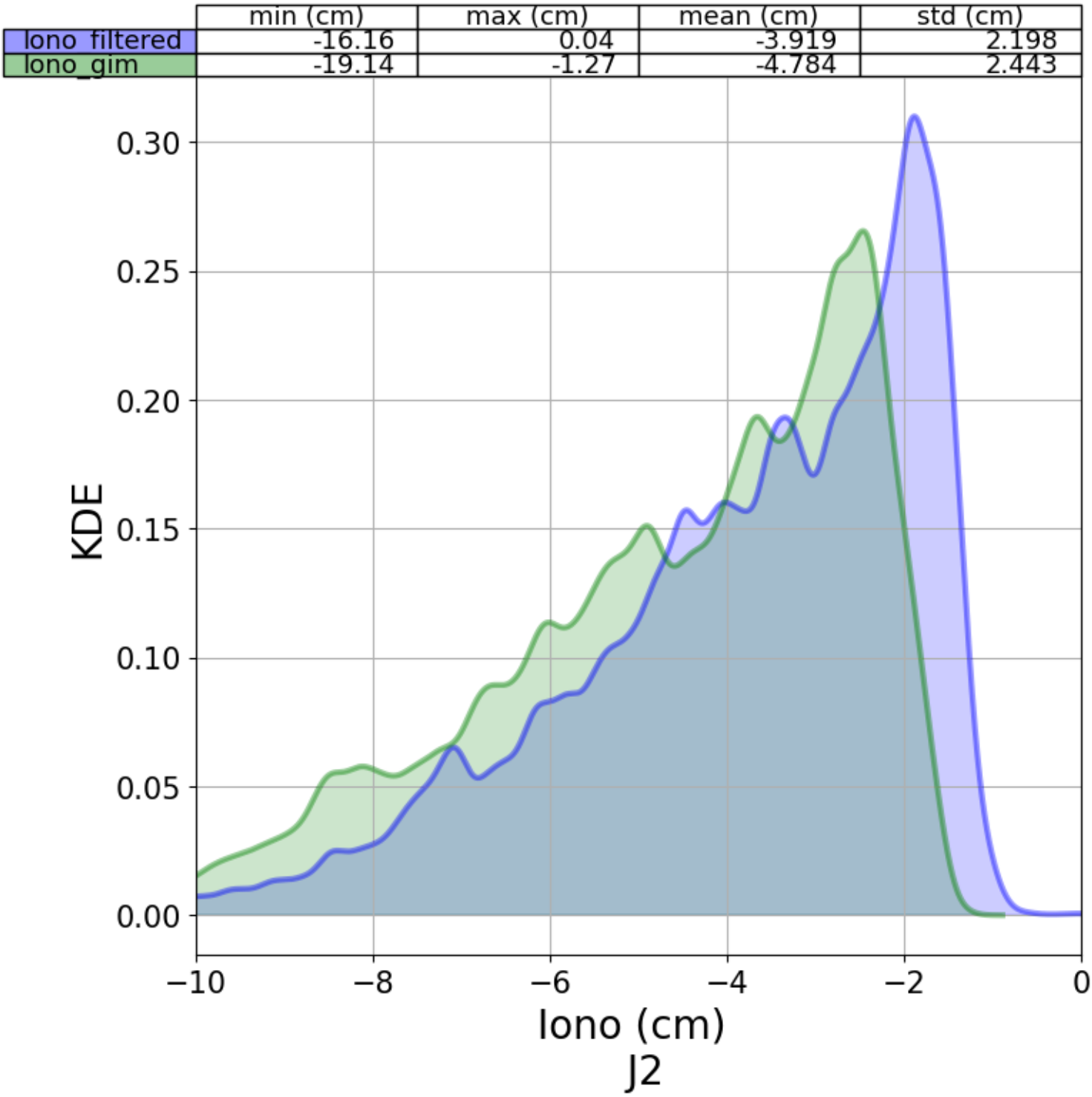

FIGURE 19 – Histogram of each of Iono version

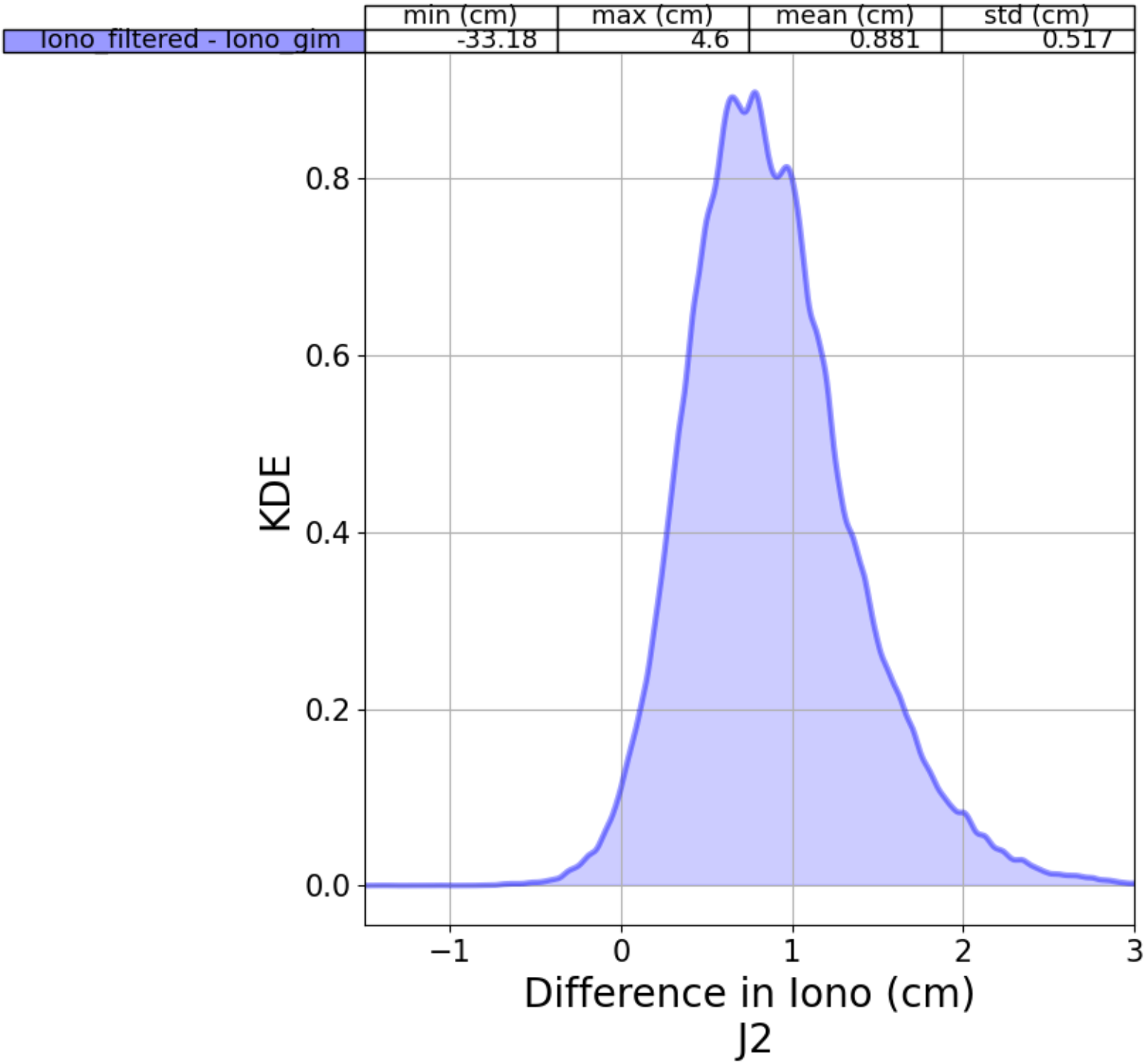

Figure 20 – Histograms of difference of each Iono version and reference one

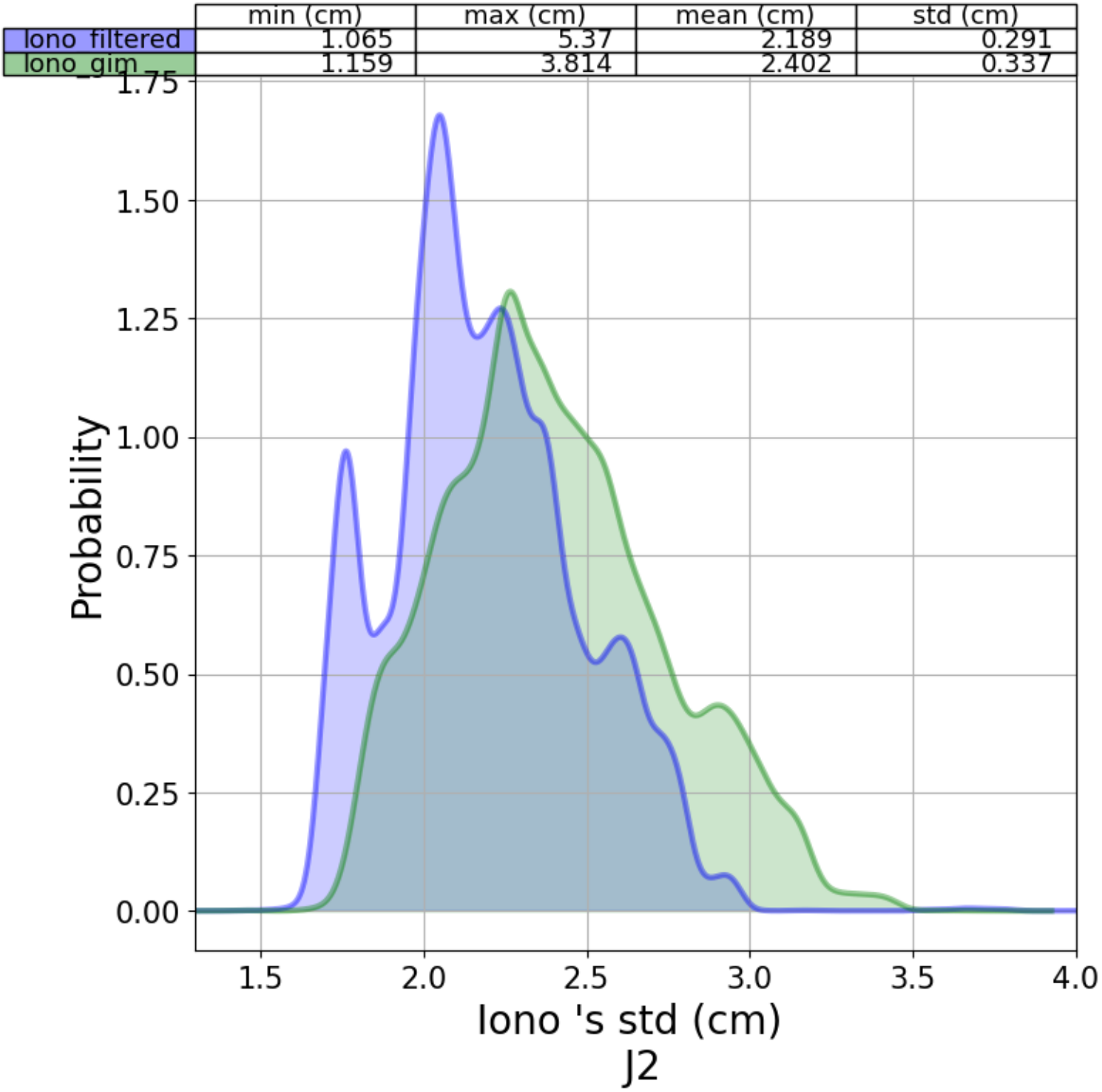

Figure 21 – Histograms of the standard deviation of each Iono version

4.2 sla

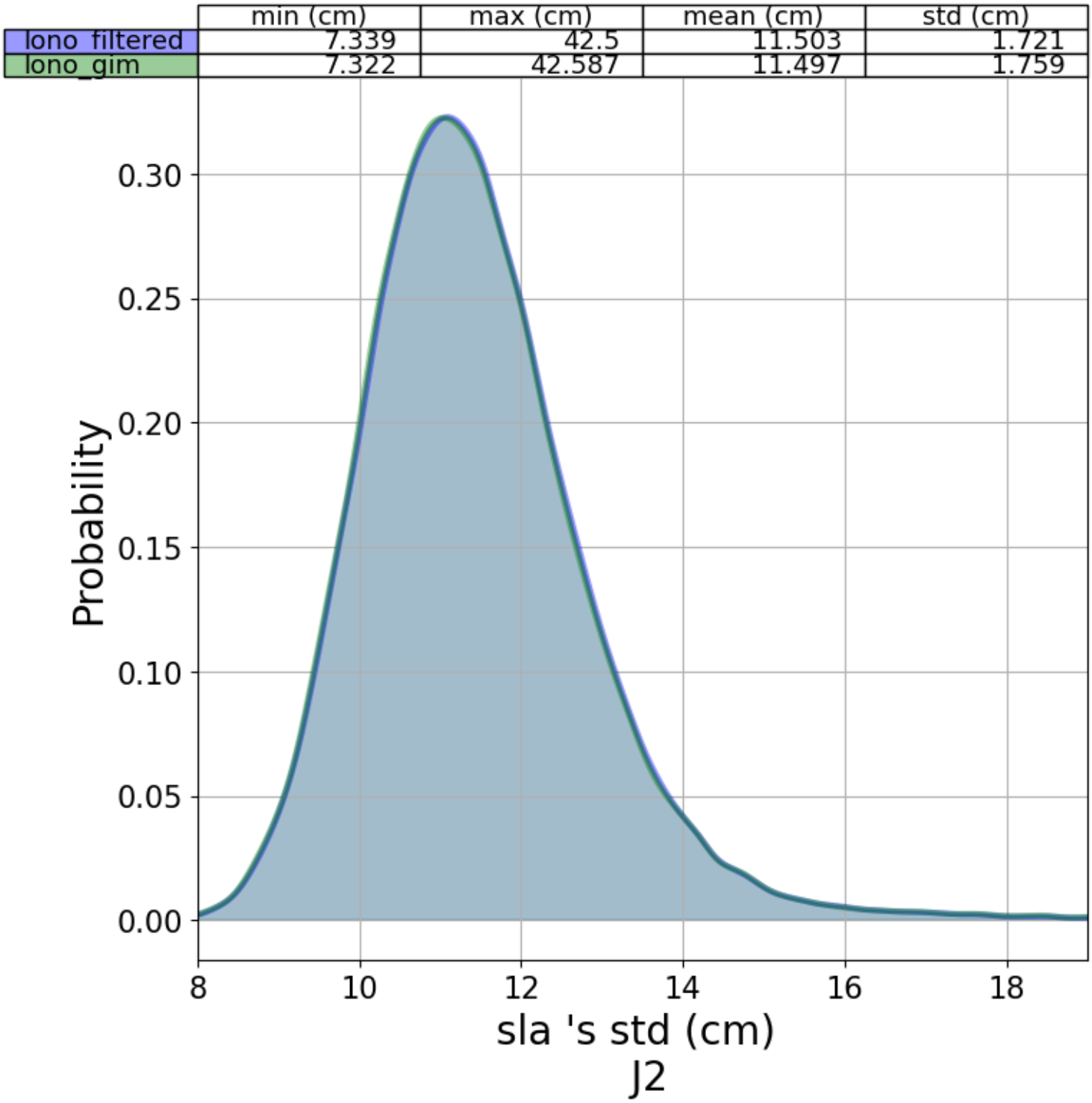

FIGURE 22 – Histograms of the standard deviation of each sla version

5 Along-track analysis

5.1 Iono

5.1.1 Iono 's count

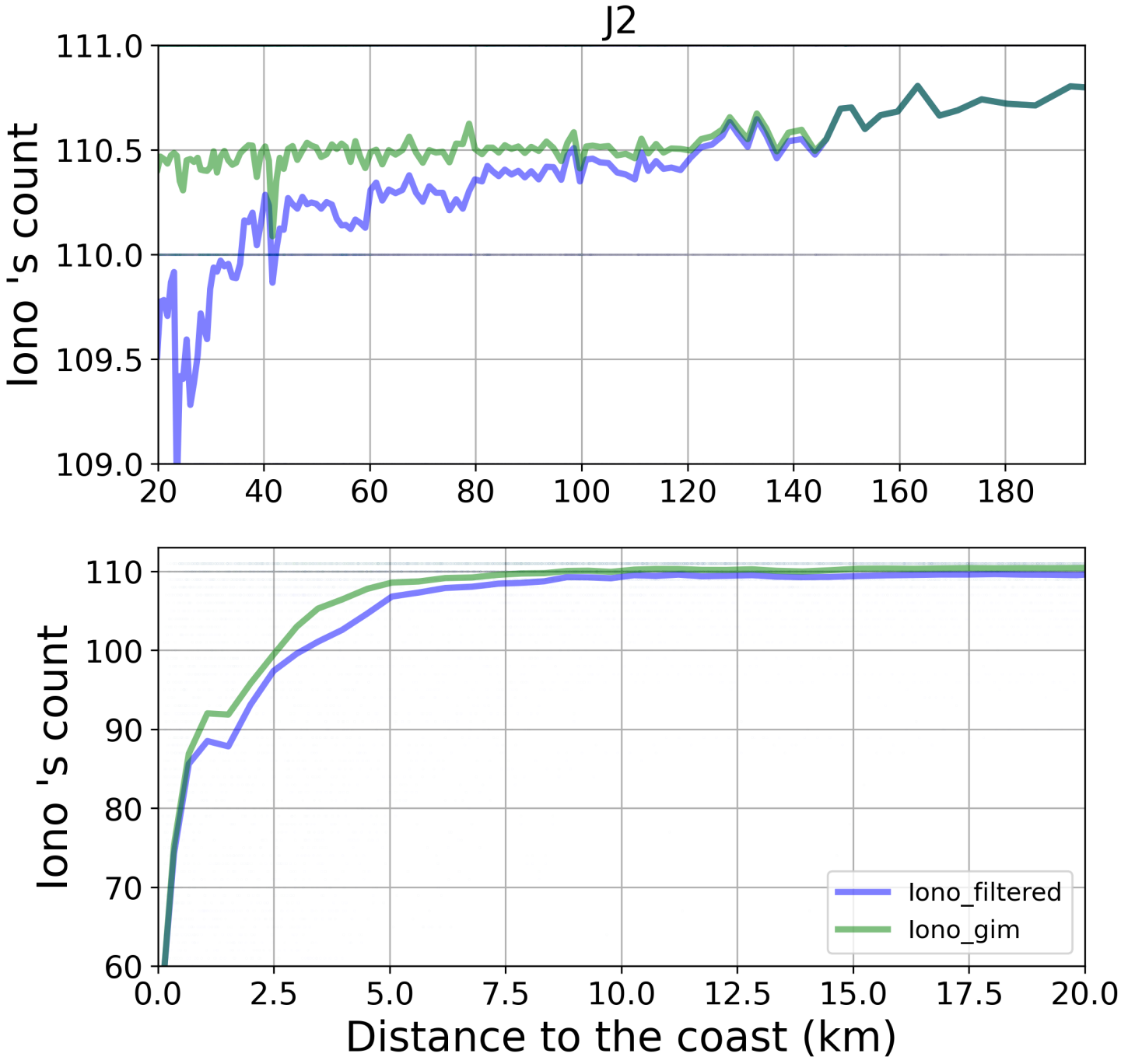

FIGURE 23 – Along-track analysis of Iono 's count

5.1.2 Iono 's std

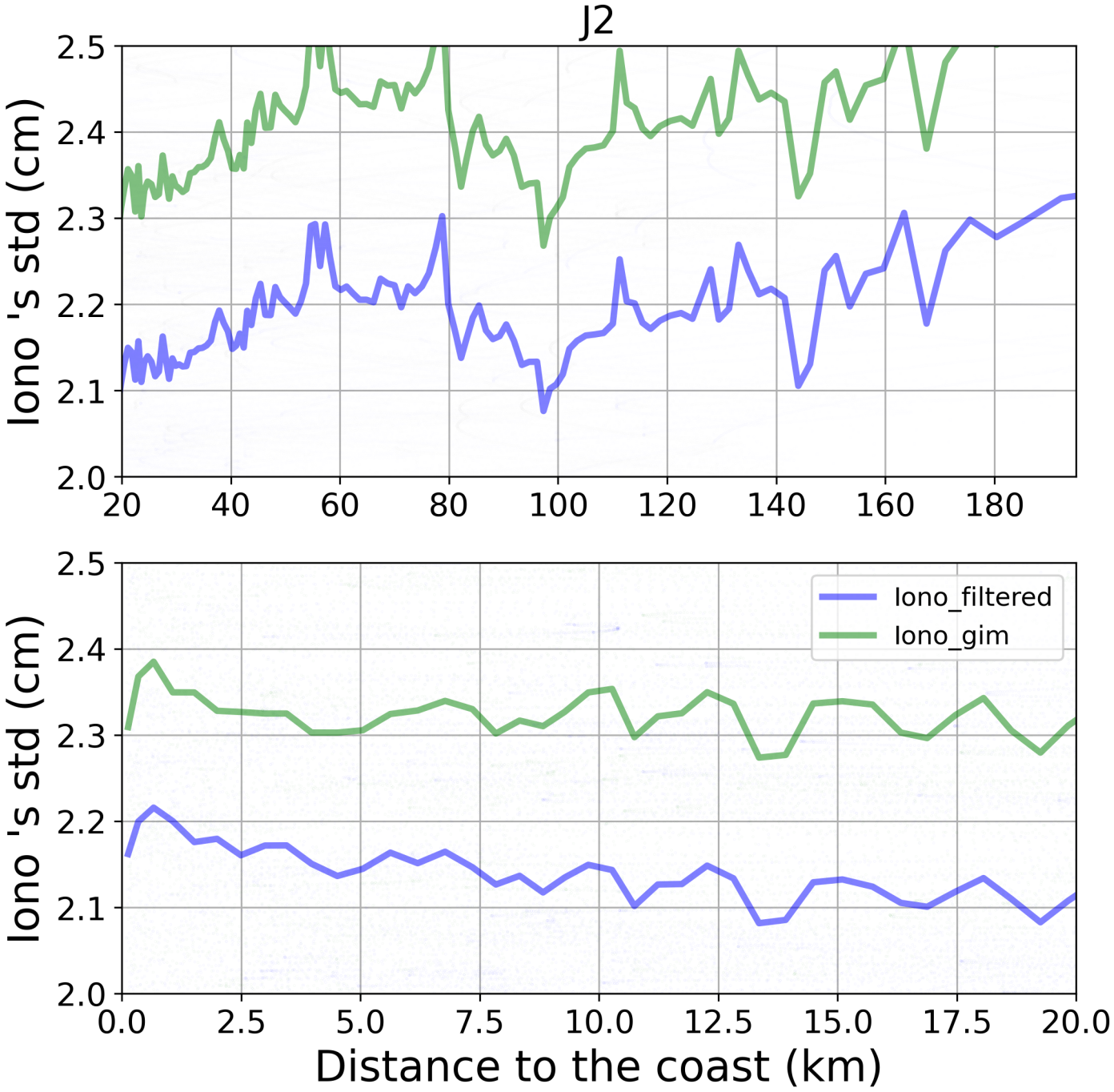

FIGURE 24 – Along-track analysis of Iono 's std

5.1.3 Iono 's mean

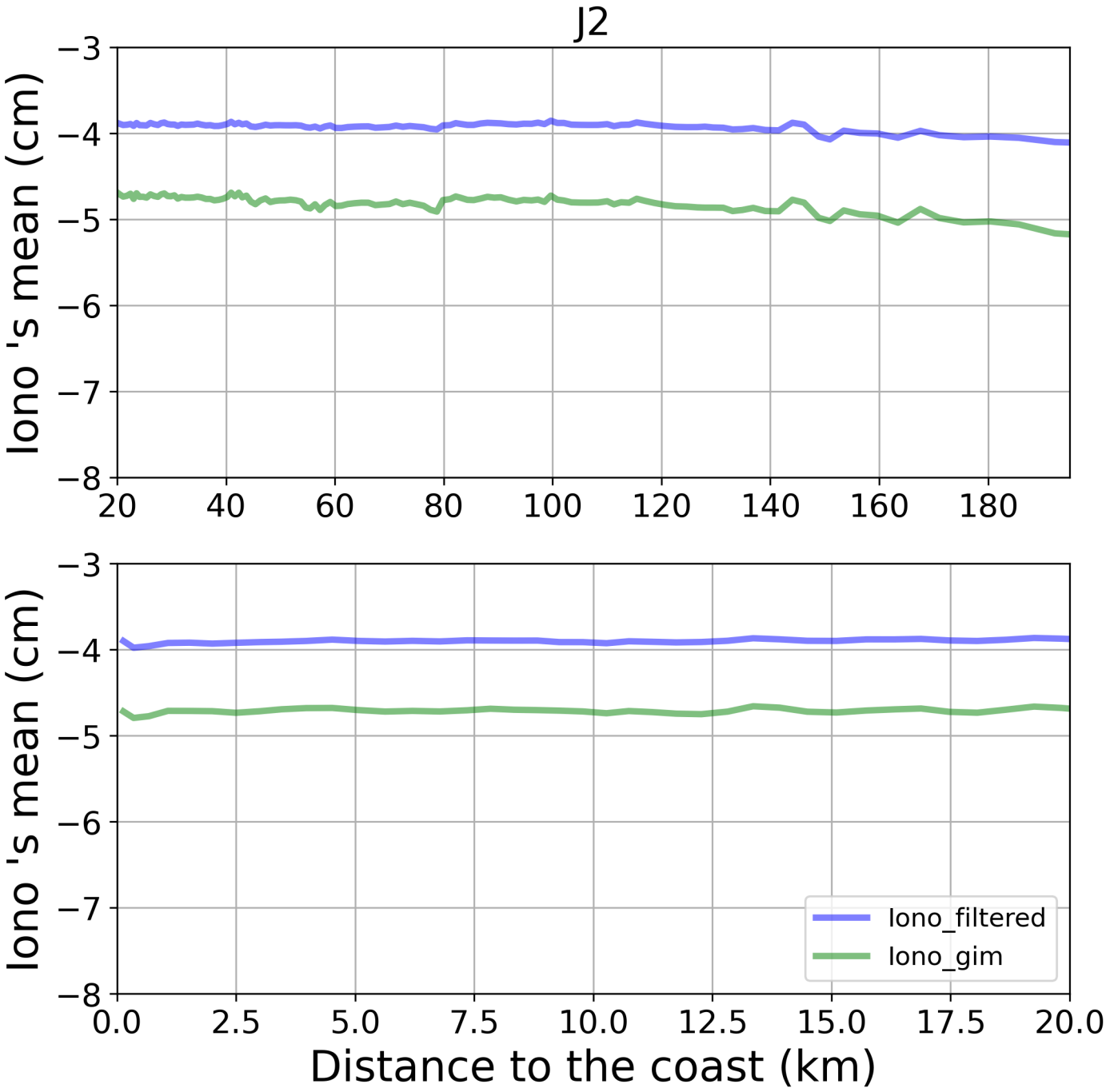

FIGURE 25 – Along-track analysis of Iono 's mean

5.2 sla

5.2.1 sla 's count

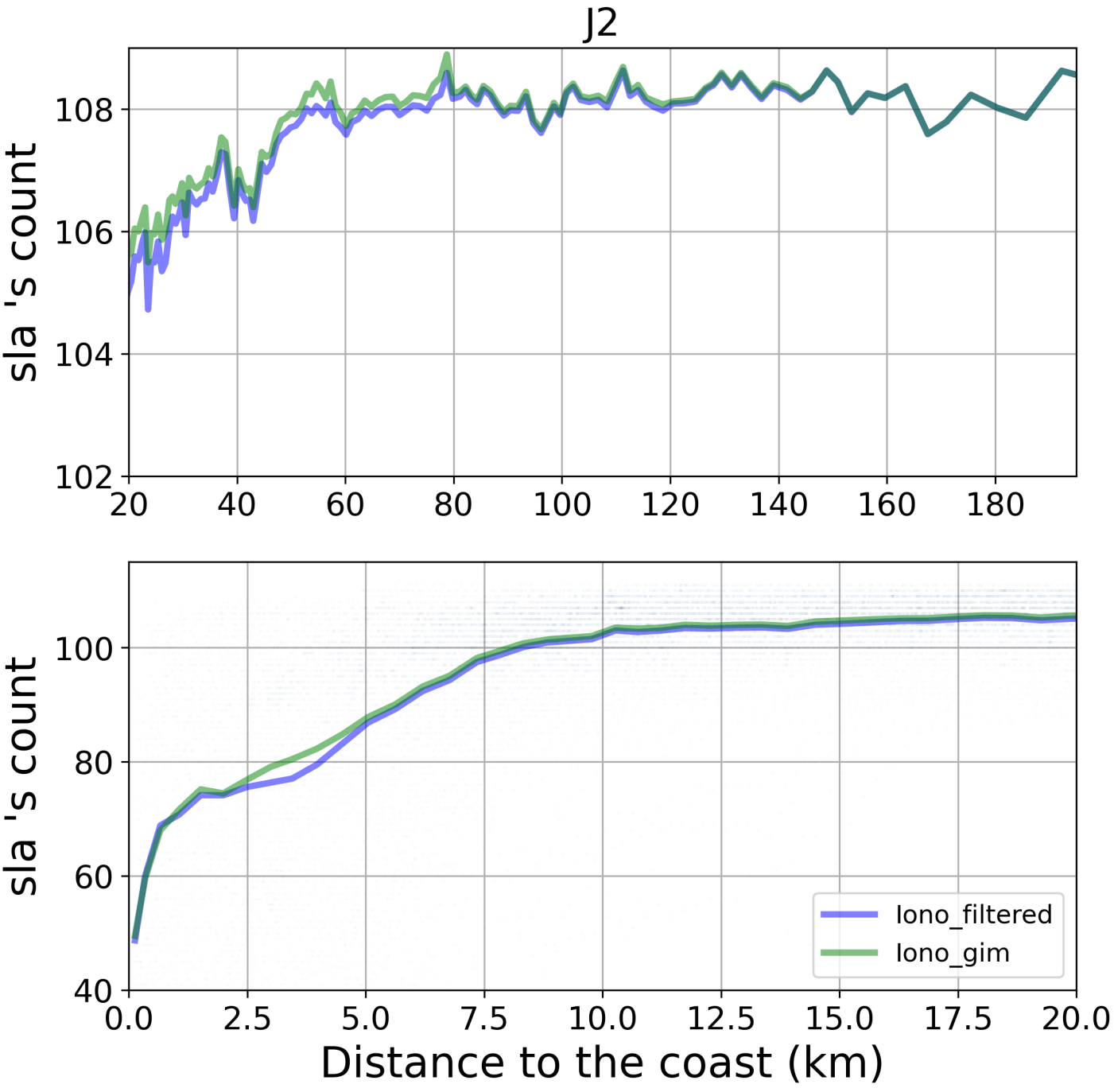

Figure 26 – Along-track analysis of sla 's count

5.2.2 sla 's std

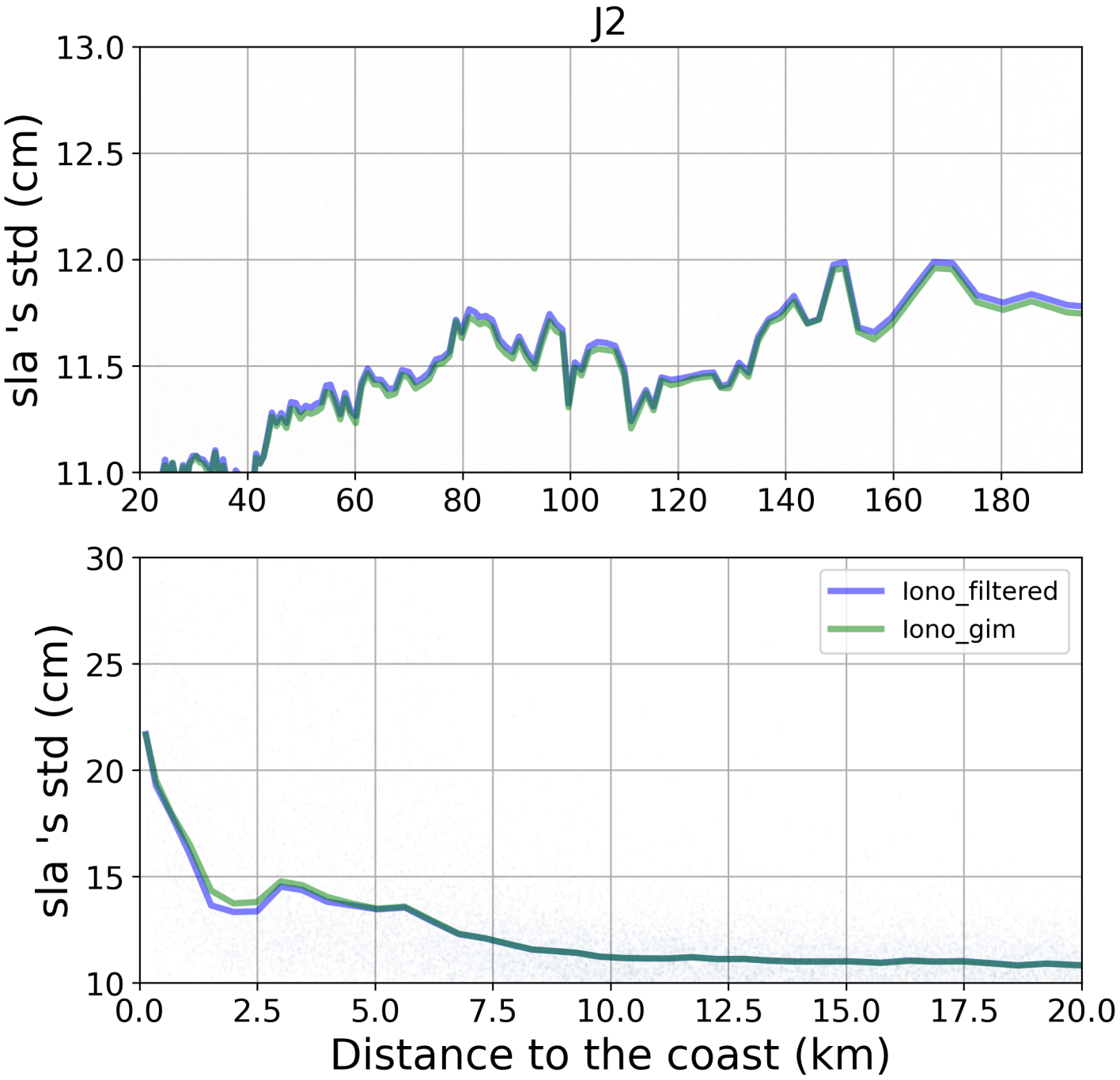

FIGURE 27 – Along-track analysis of sla 's std

5.2.3 sla 's mean

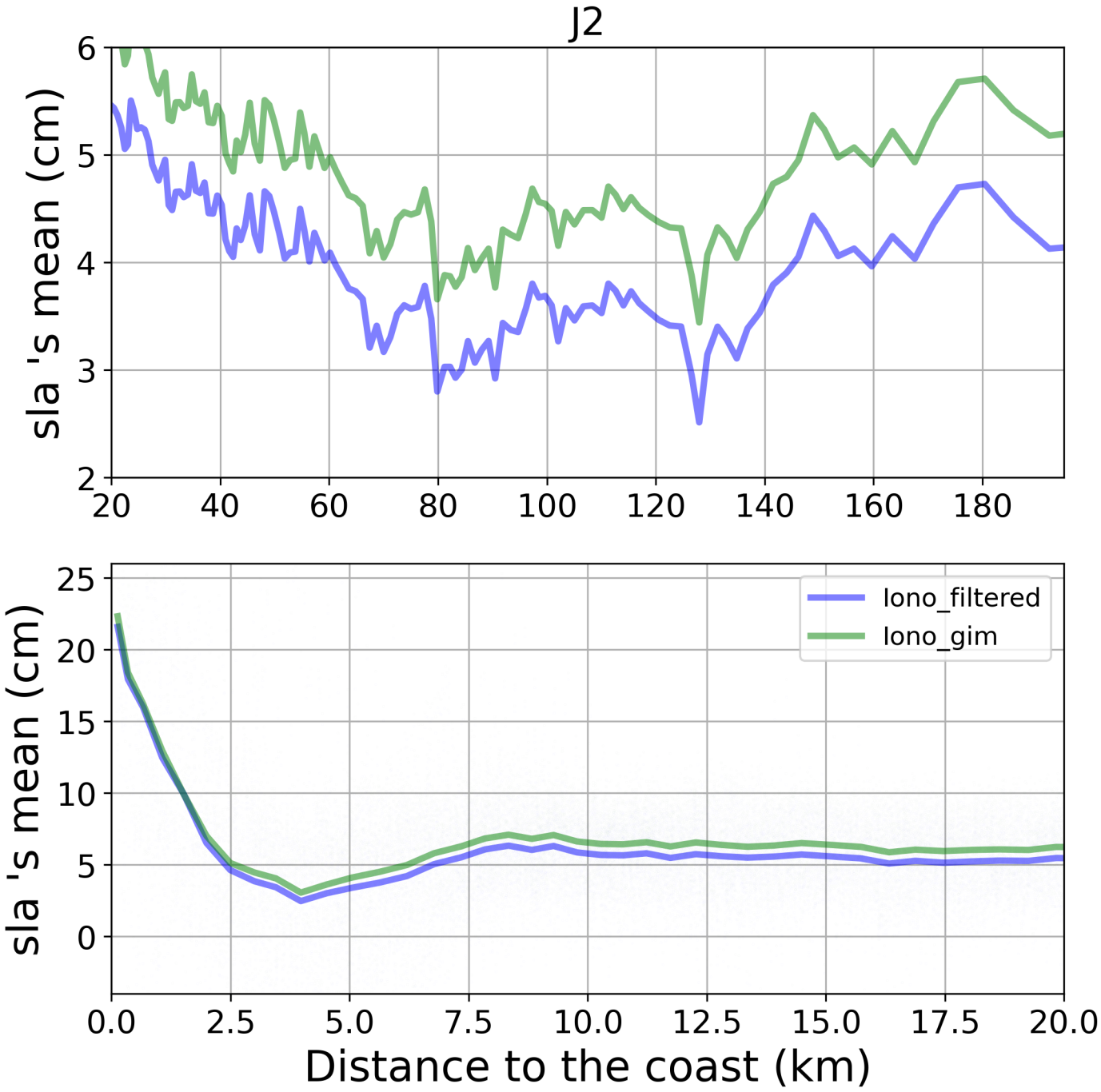

Figure 28 – Along-track analysis of sla 's mean

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 coast

6.1 Station : SETE

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

6.1.1 correlation visualization in maps view % SETE tide gauge

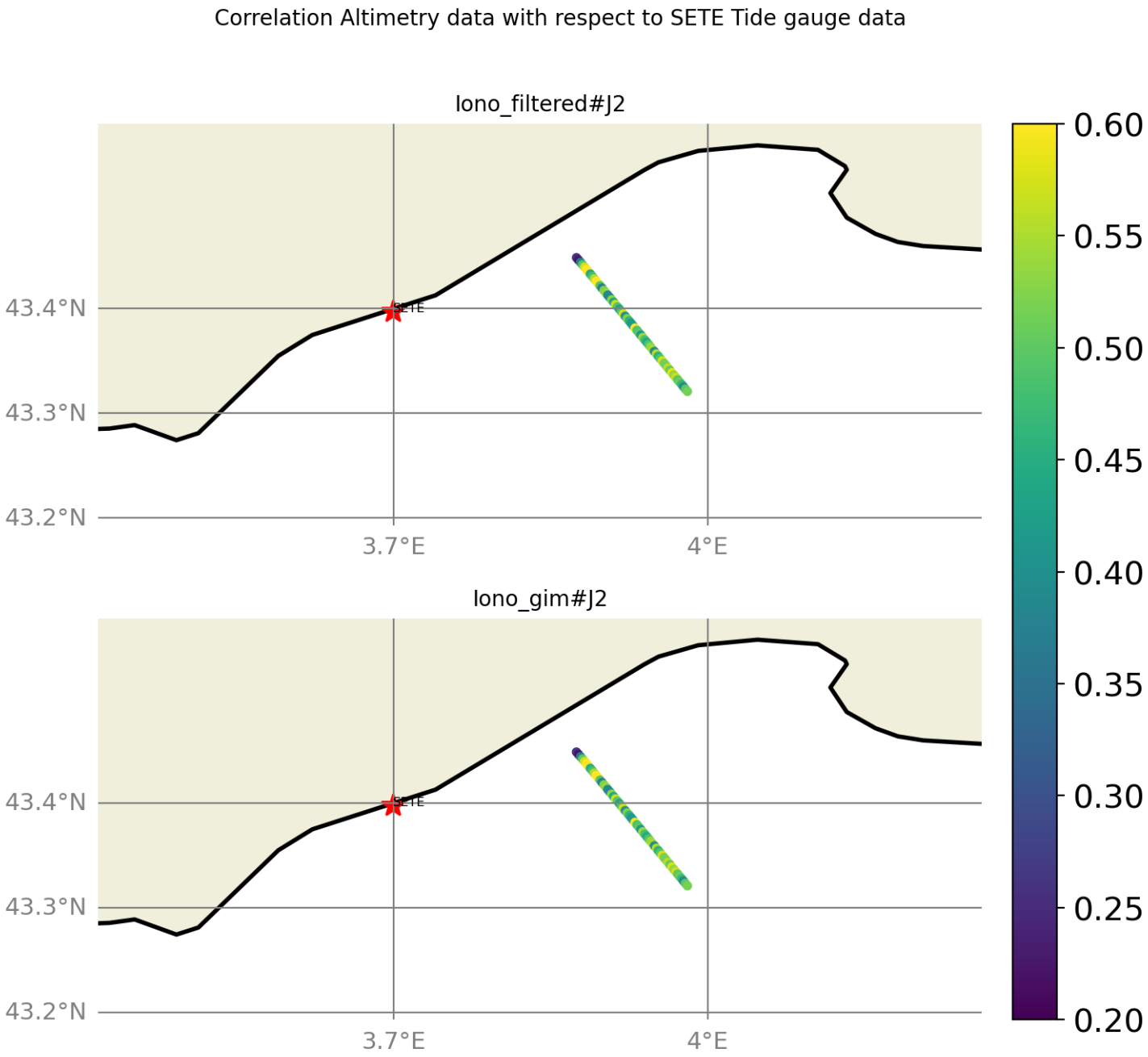

FIGURE 29 – correlation visualization in maps view % SETE tide gauge

6.1.2 rmsd visualization in maps view % SETE tide gauge

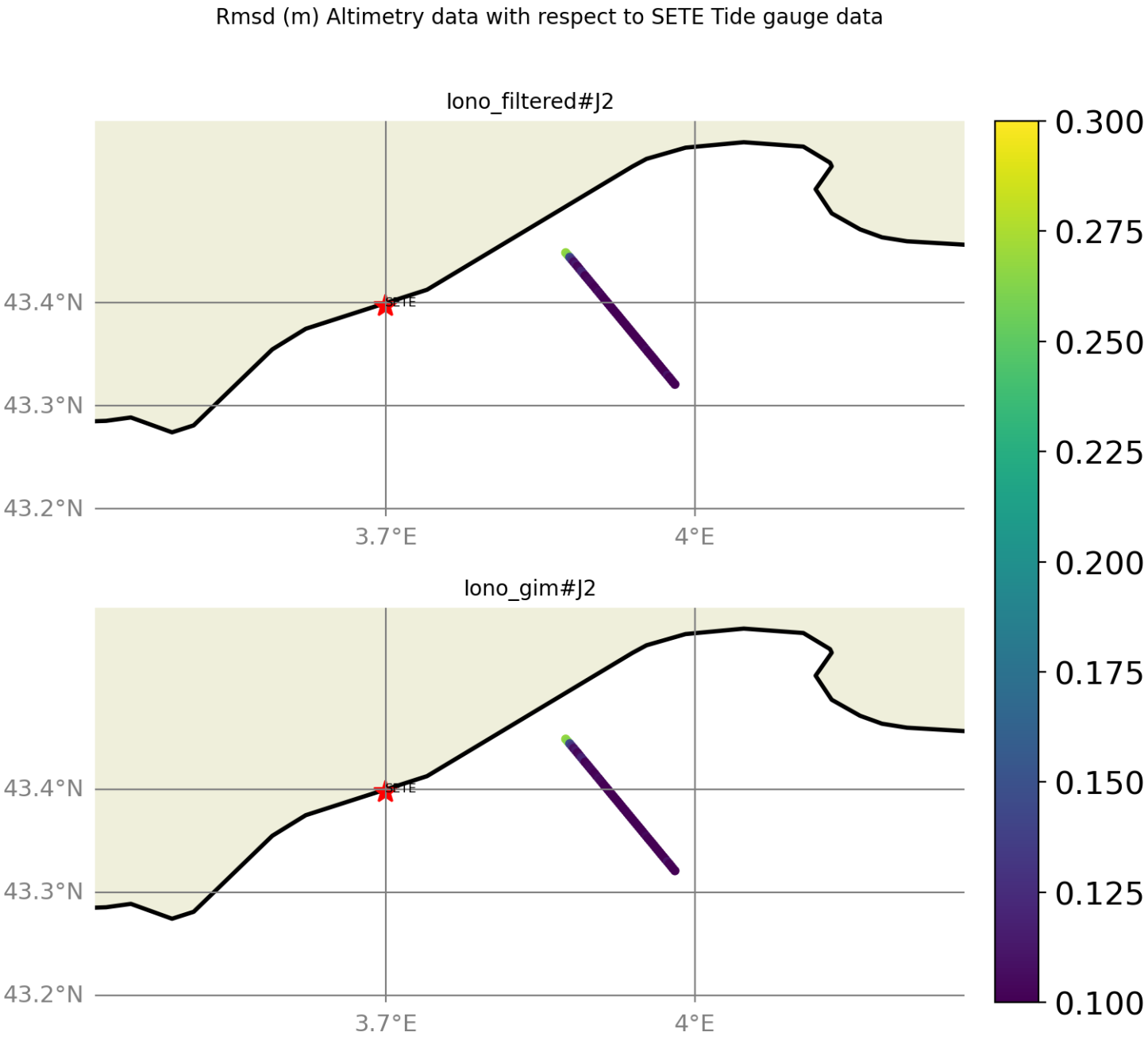

FIGURE 30 – rmsd visualization in maps view % SETE tide gauge

6.1.3 std visualization in maps view % SETE tide gauge

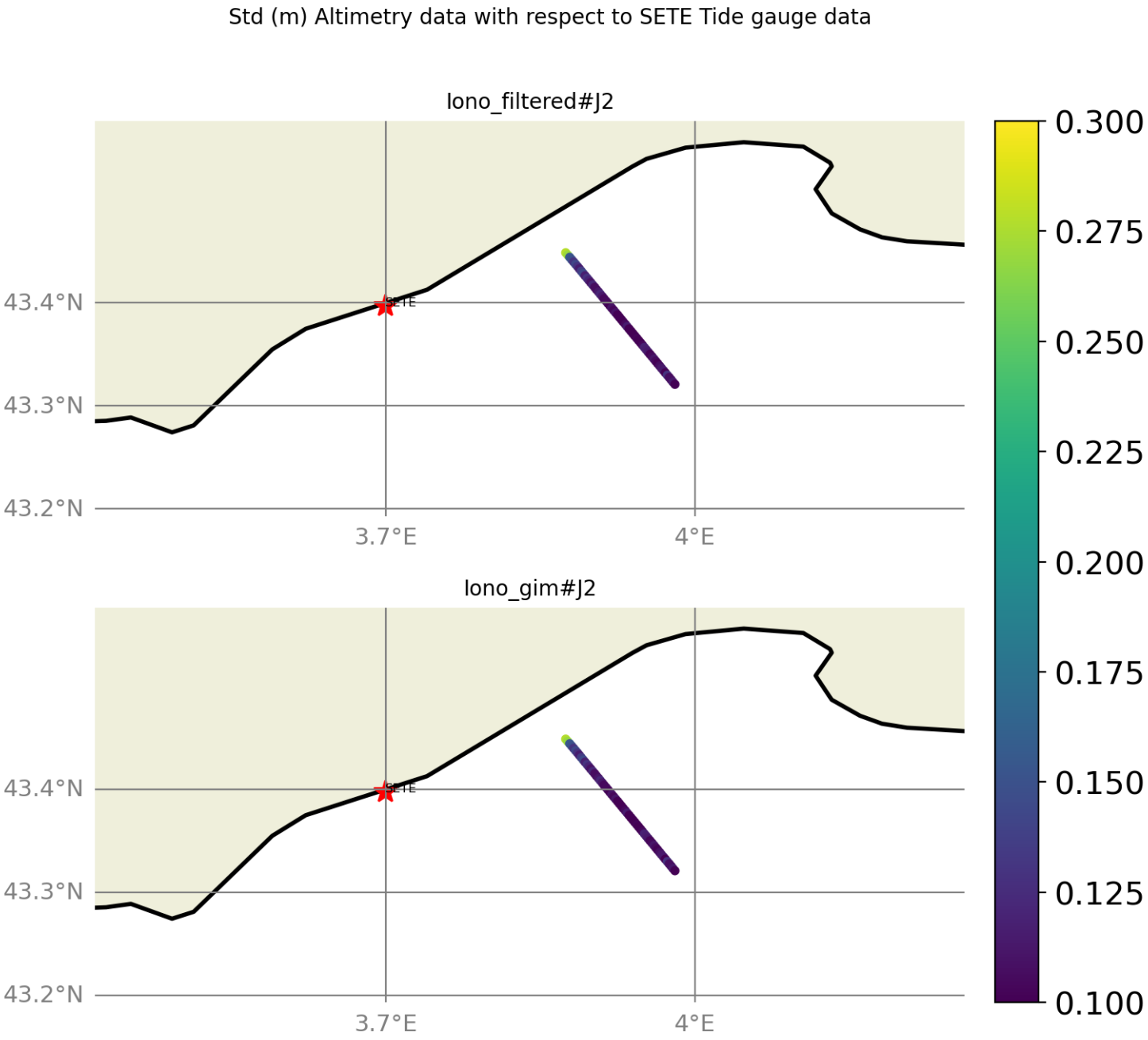

Figure 31 – std visualization in maps view % SETE tide gauge

6.1.4 valid_data_percent visualization in maps view % SETE tide gauge

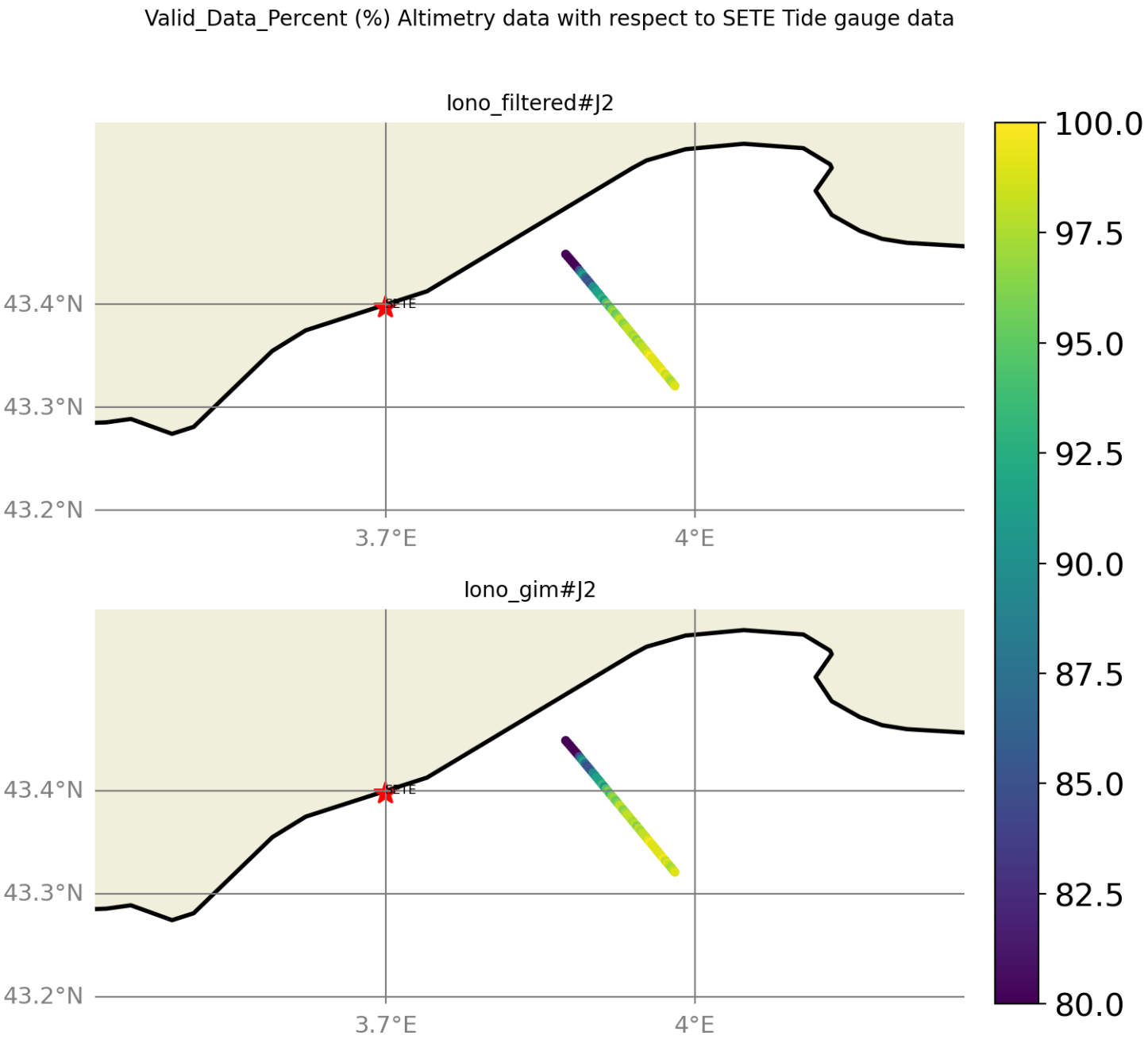

FIGURE 32 – valid_data_percent visualization in maps view % SETE tide gauge

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

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

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

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

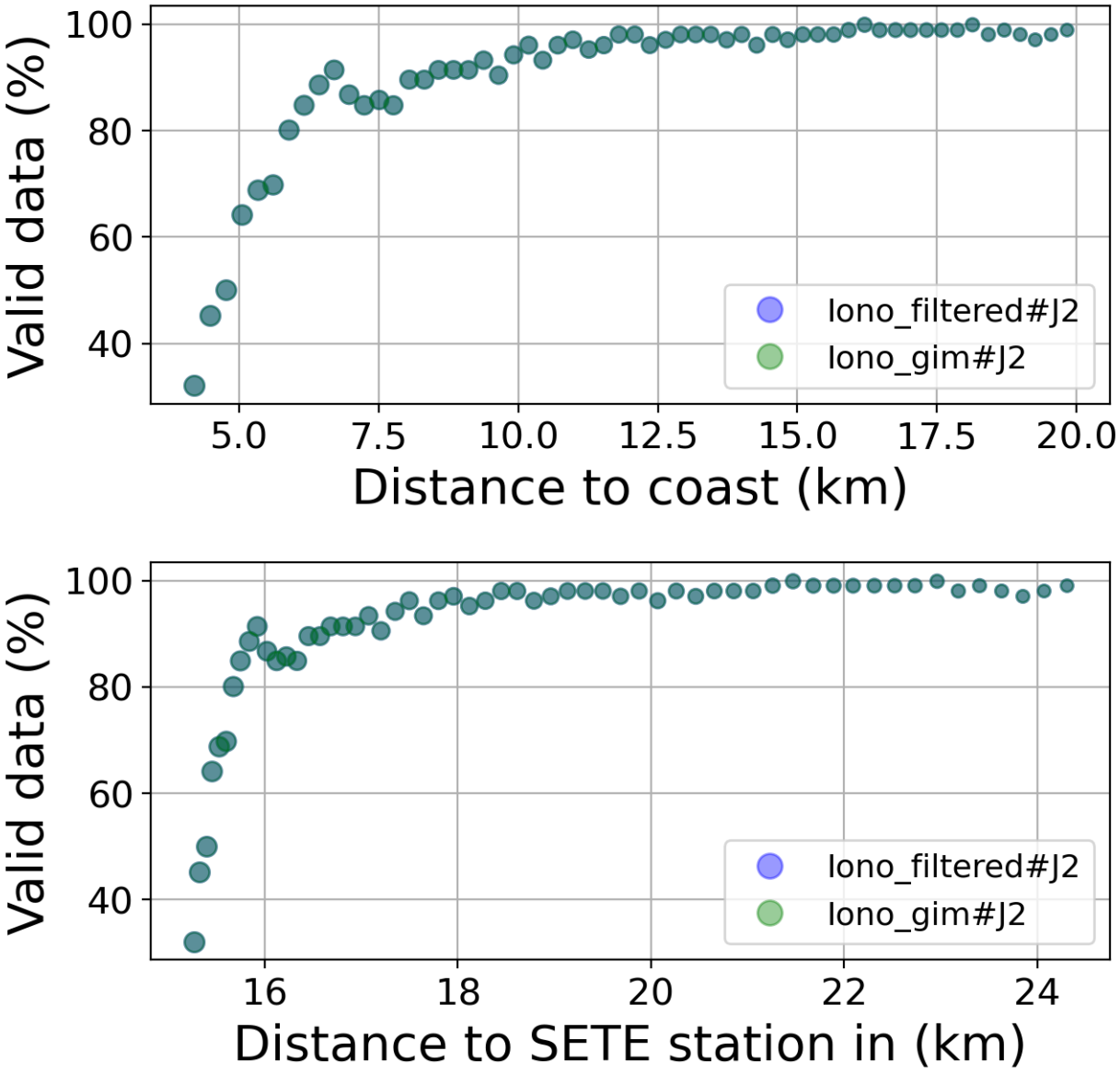

Figure 33 – Valid data (%) in function of distance to coast/SETE station

6.1.6 Std in function of distance to coast/SETE station

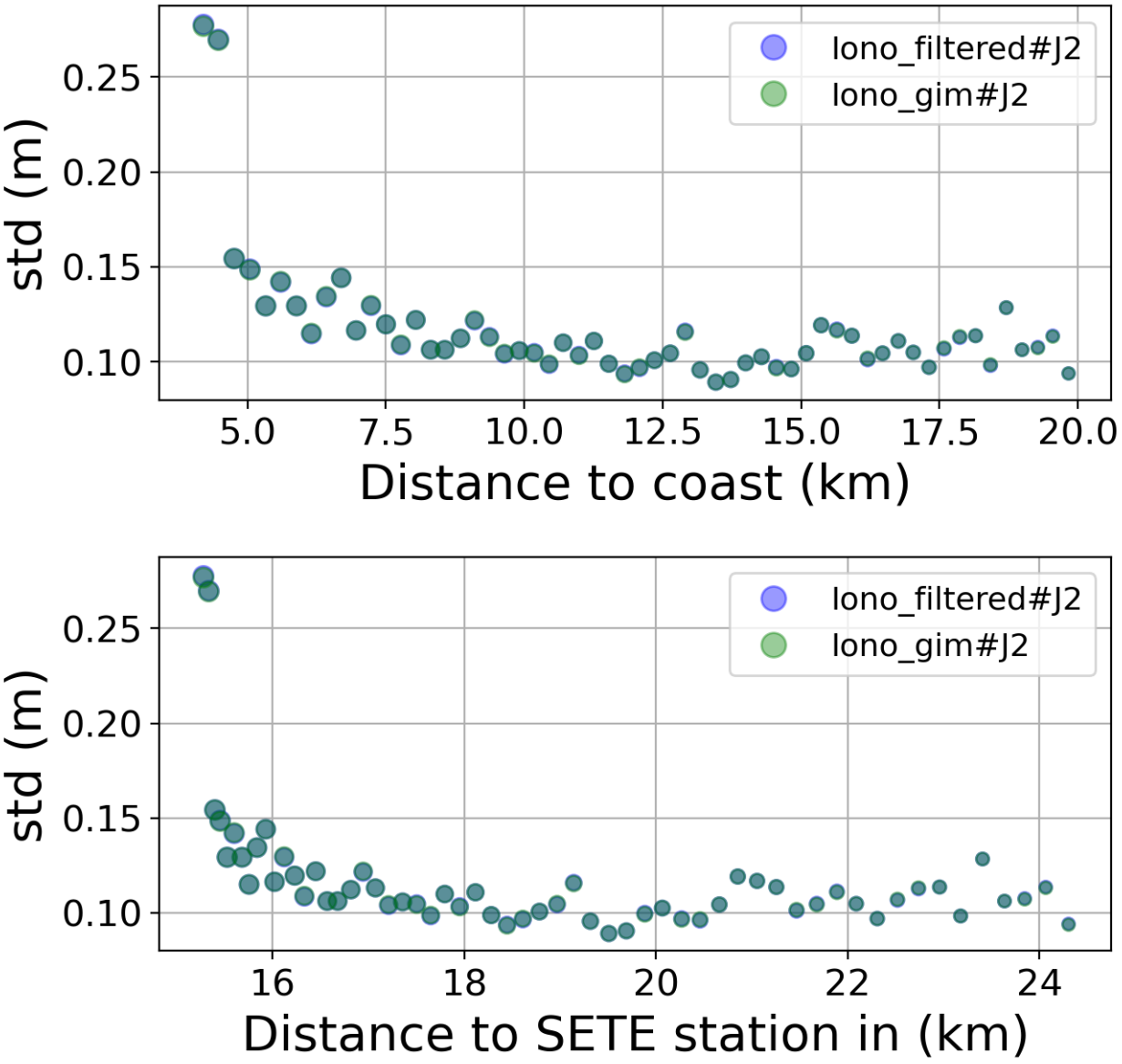

FIGURE 34 – Std in function of the distance to the coast/SETE station

6.1.7 Correlation in function of distance to coast/SETE station

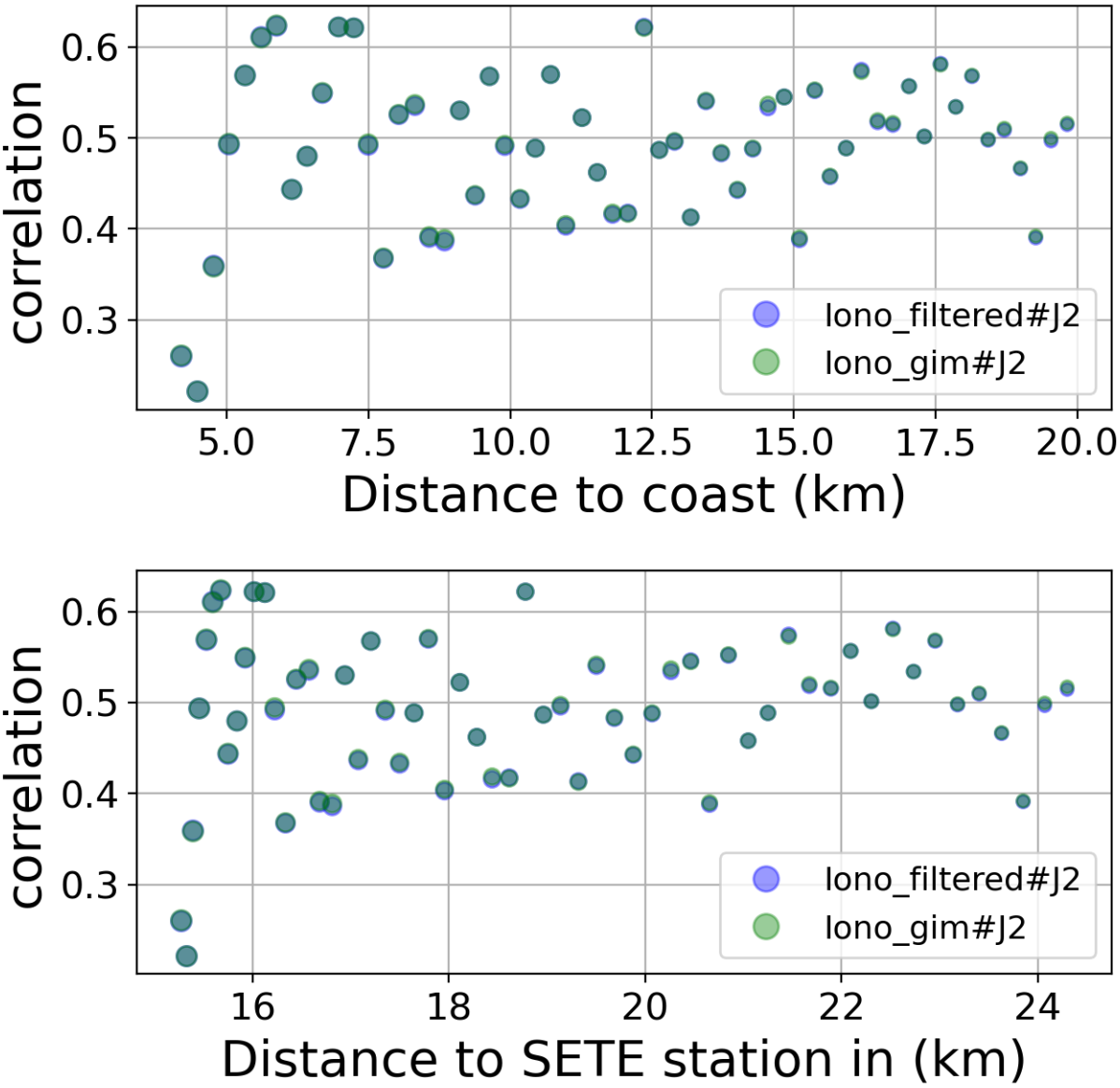

FIGURE 35 – Correlation in function of the distance to the coast/SETE station

6.1.8 Taylor Diagram

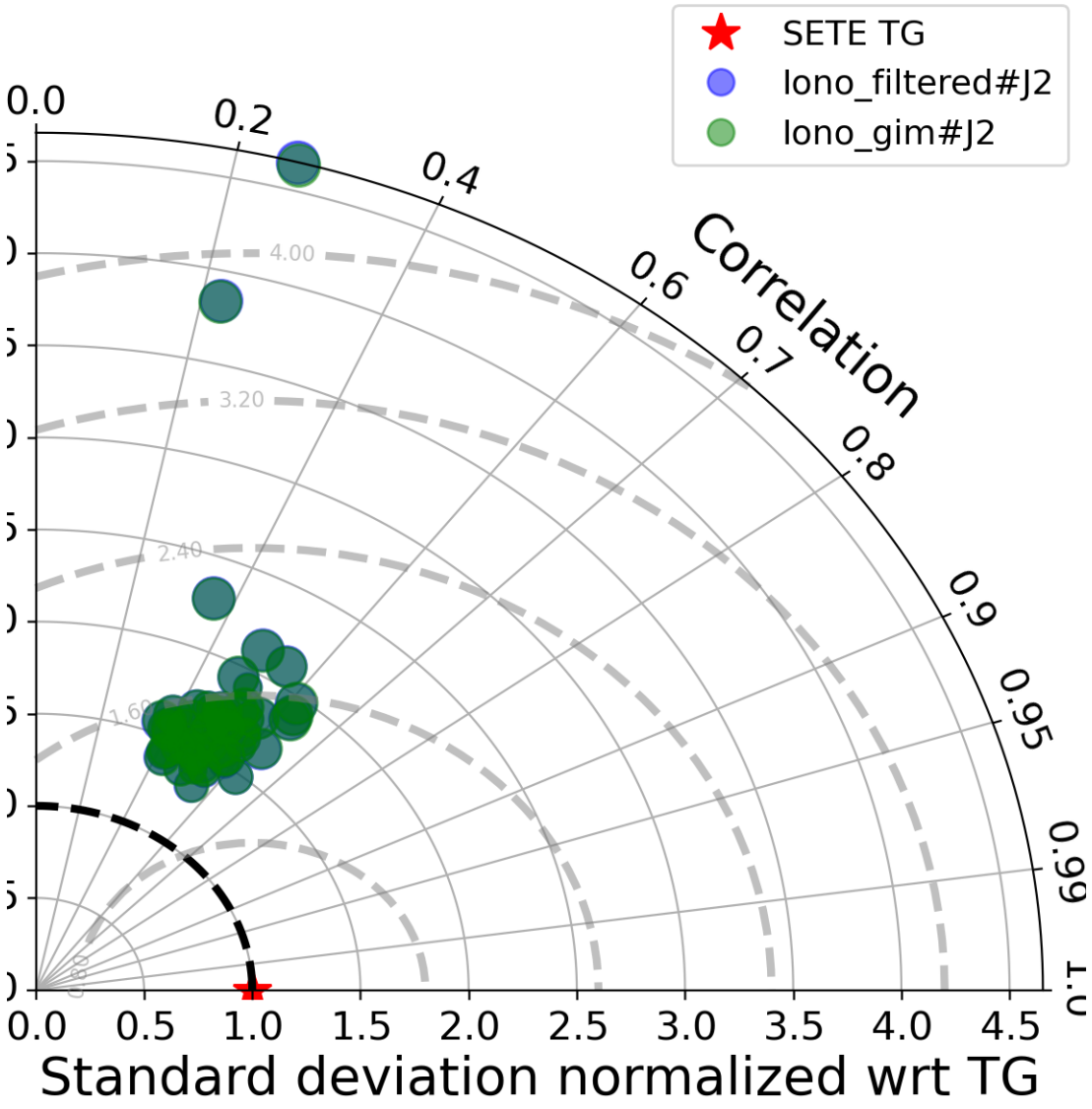

FIGURE 36 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	90.908	0.491	0.117	0.103
Iono_gim#J2	90.908	0.492	0.117	0.103

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 106 point.

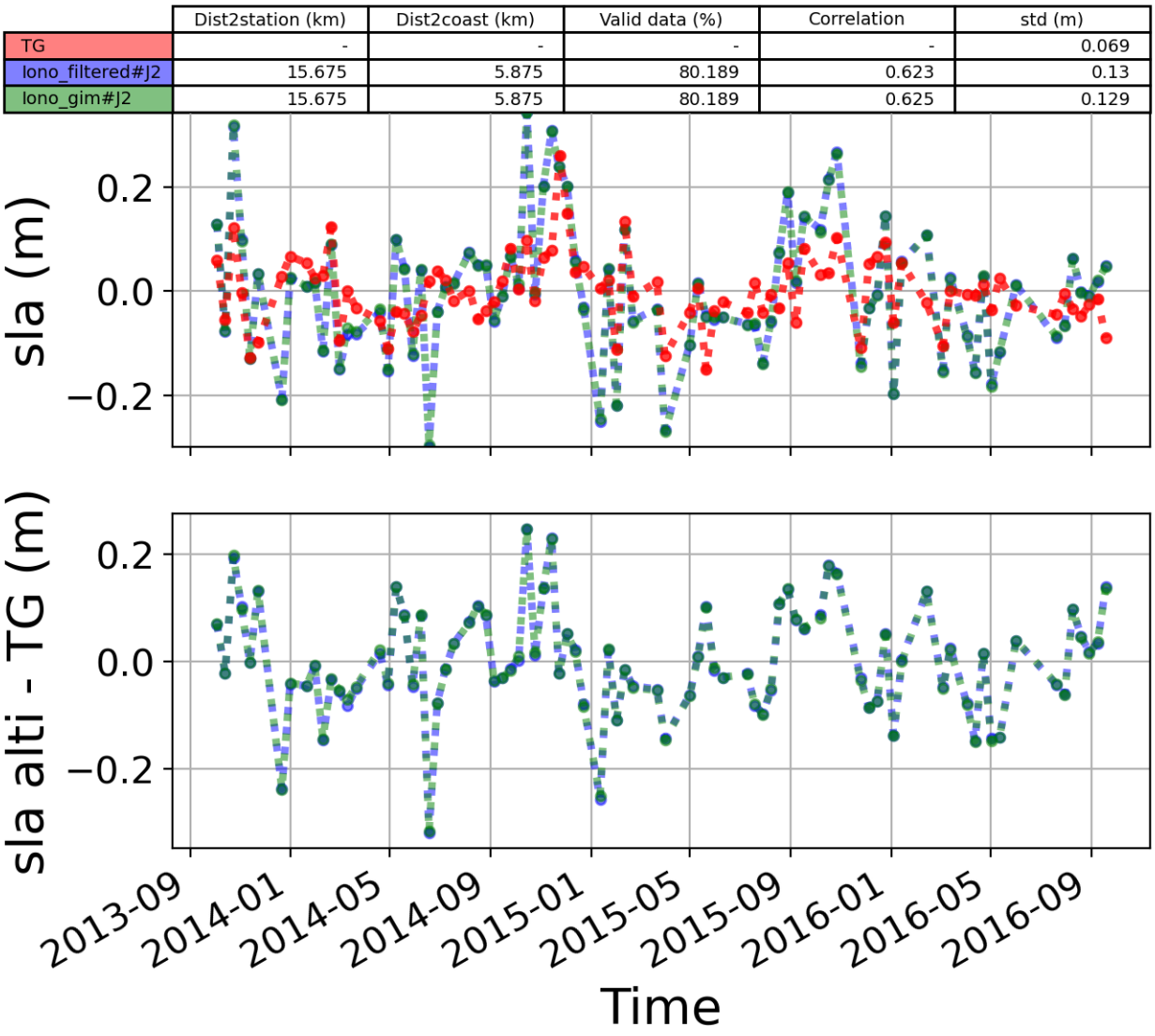

FIGURE 38 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

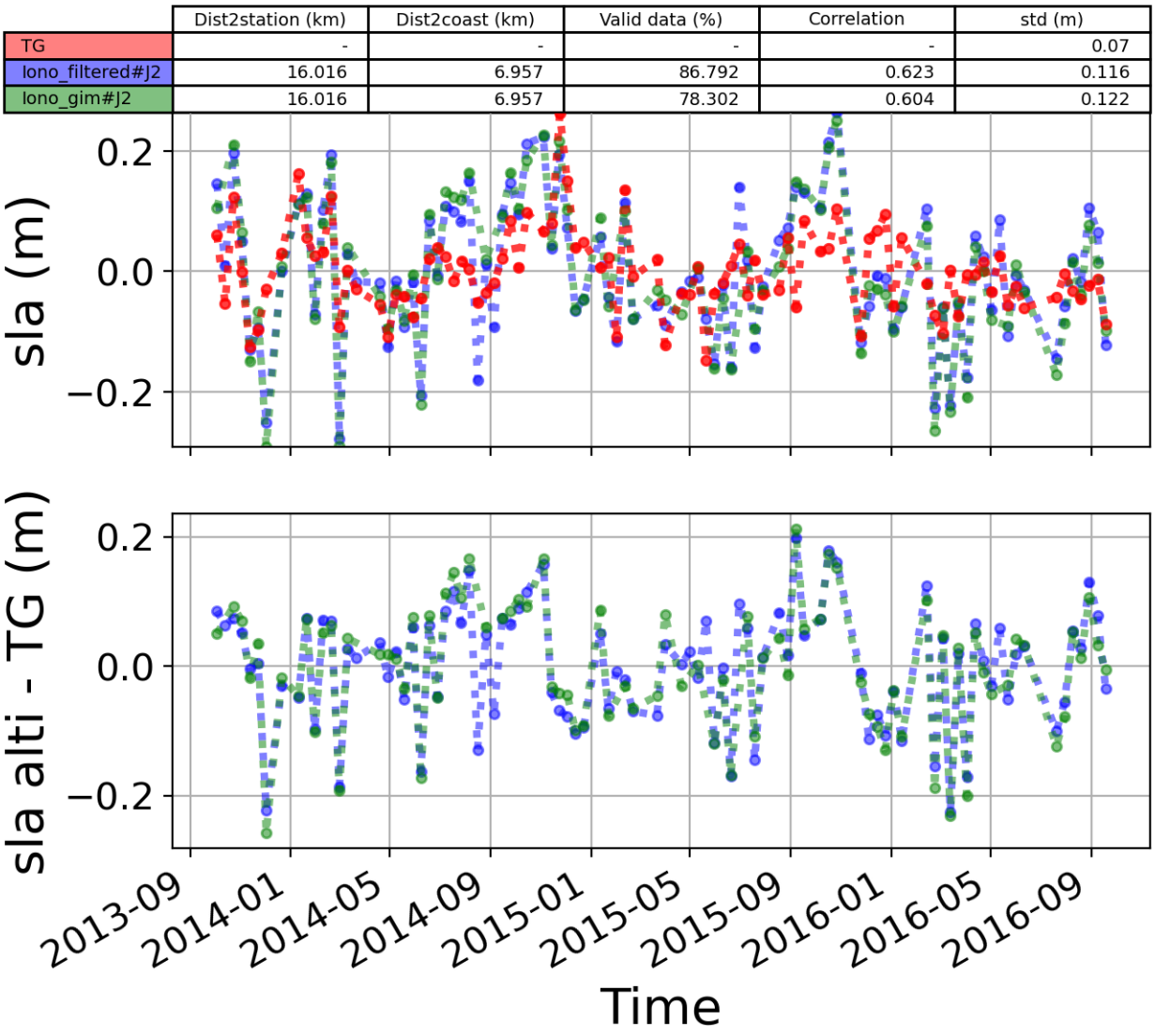

FIGURE 39 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.2 Station : Mentes

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

6.2.1 correlation visualization in maps view % Mentes tide gauge

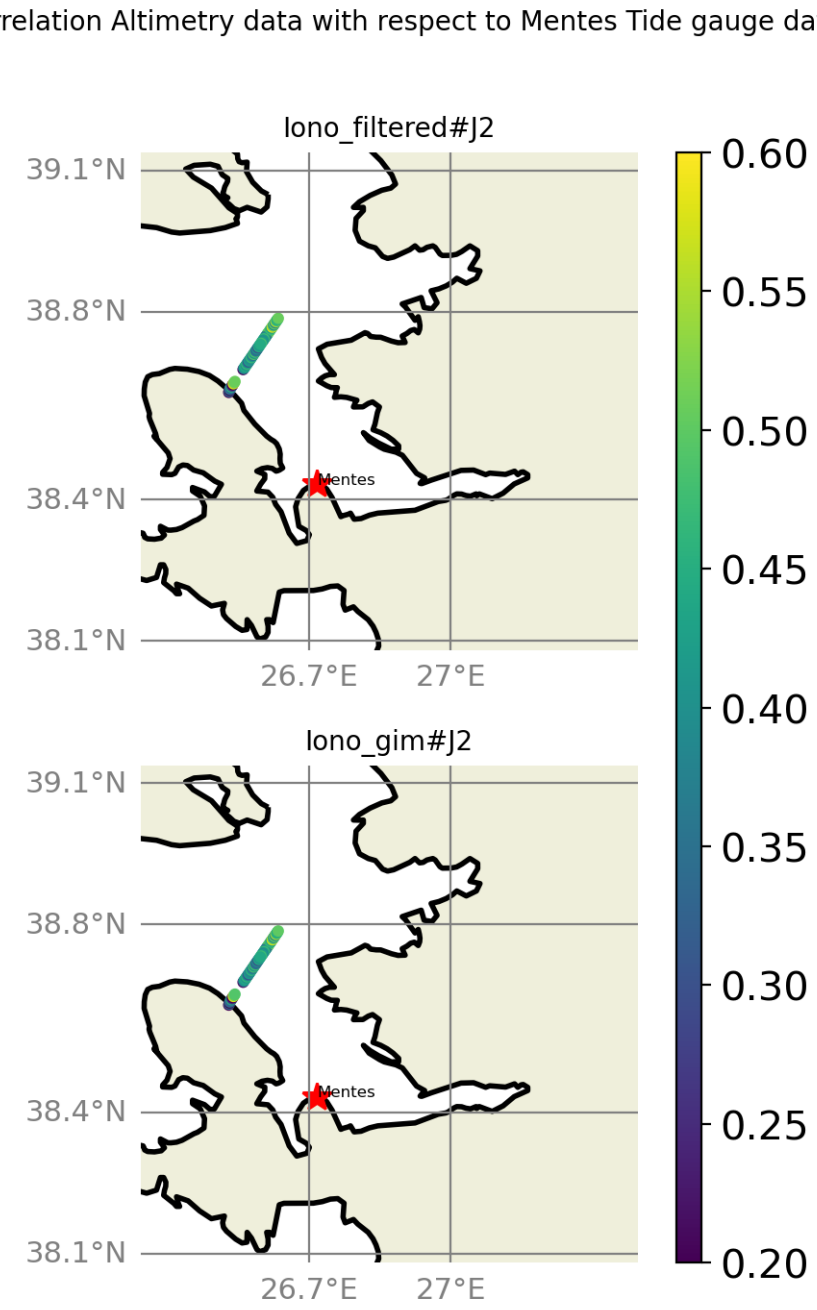

FIGURE 40 – correlation visualization in maps view % Mentes tide gauge

6.2.2 rmsd visualization in maps view % Mentes tide gauge

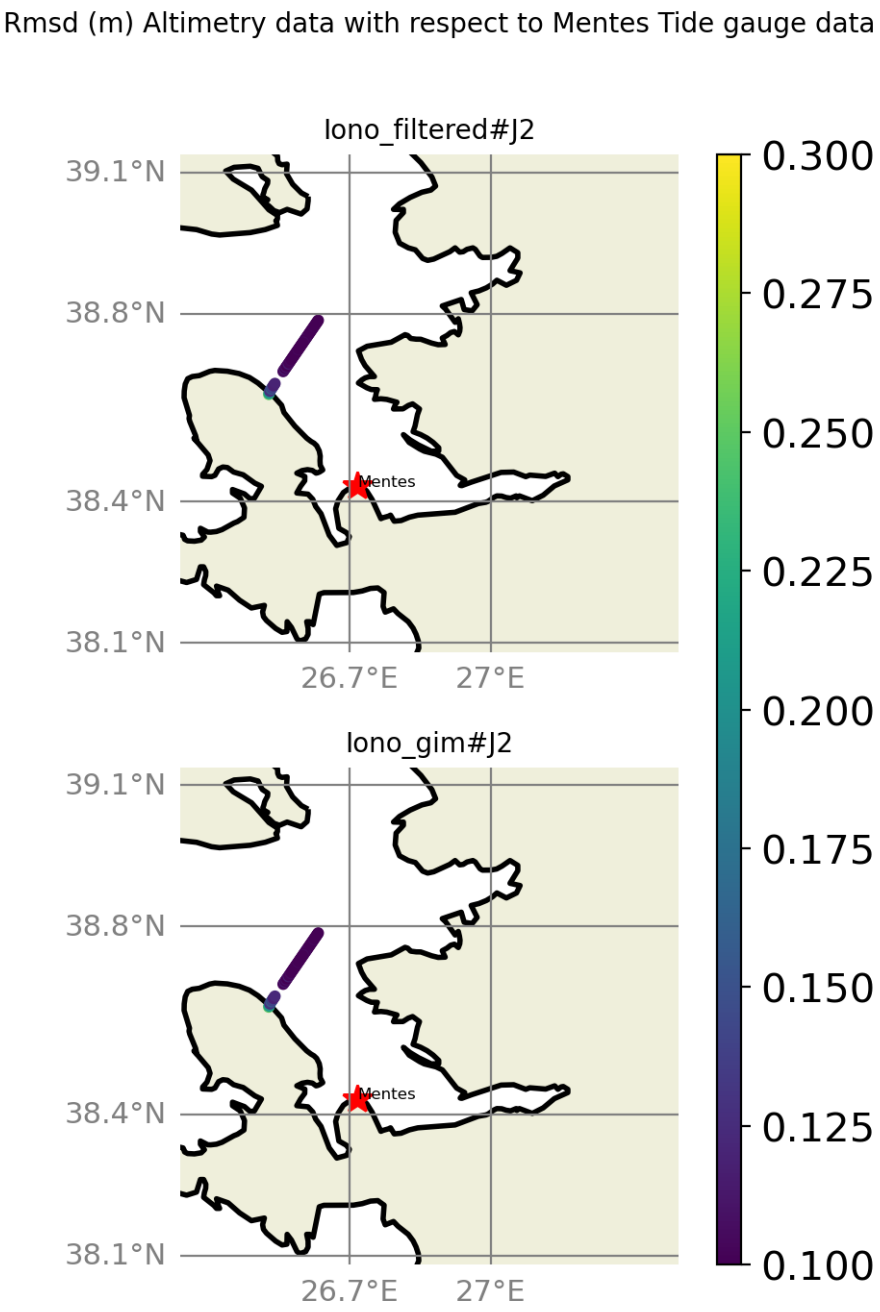

Figure 41 – rmsd visualization in maps view % Mentes tide gauge

6.2.3 std visualization in maps view % Mentes tide gauge

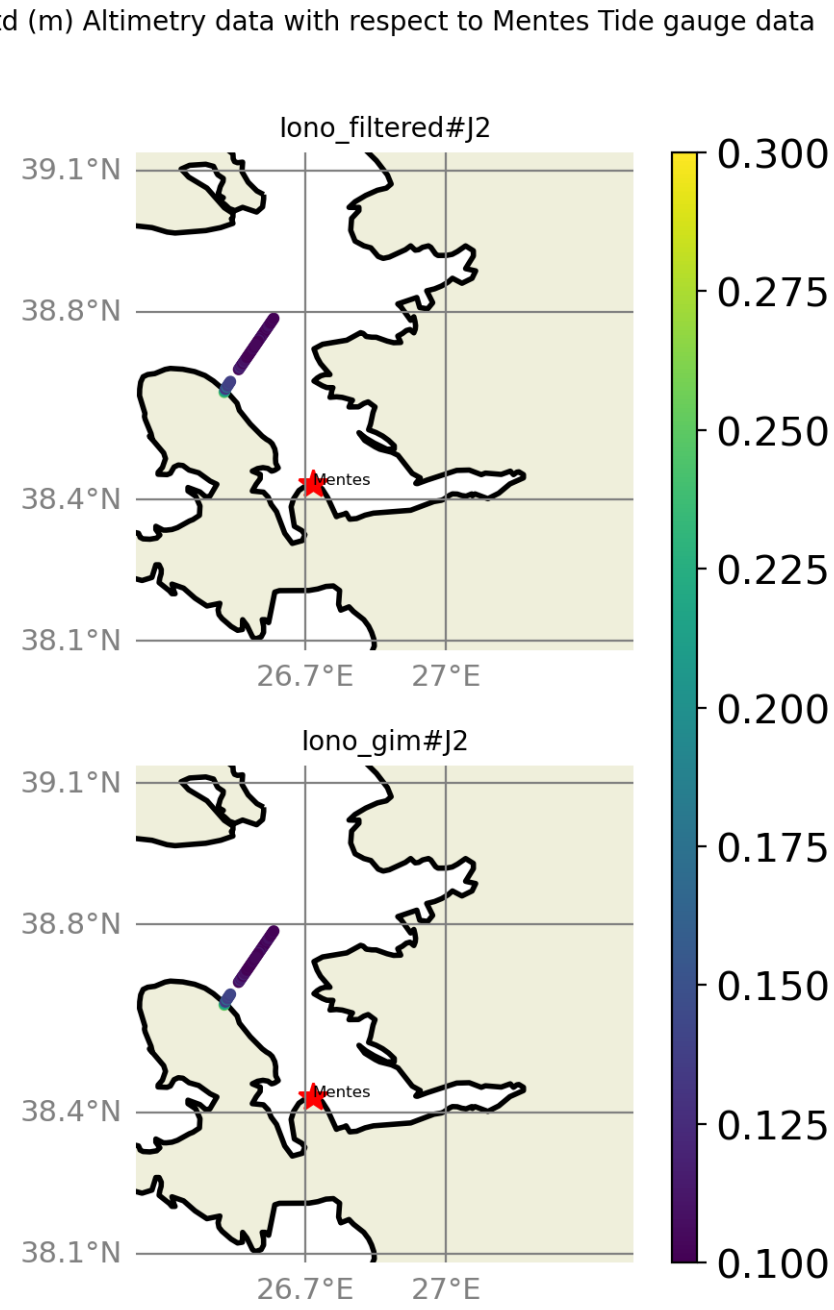

FIGURE 42 – std visualization in maps view % Mentes tide gauge

6.2.4 valid_data_percent visualization in maps view % Mentes tide gauge

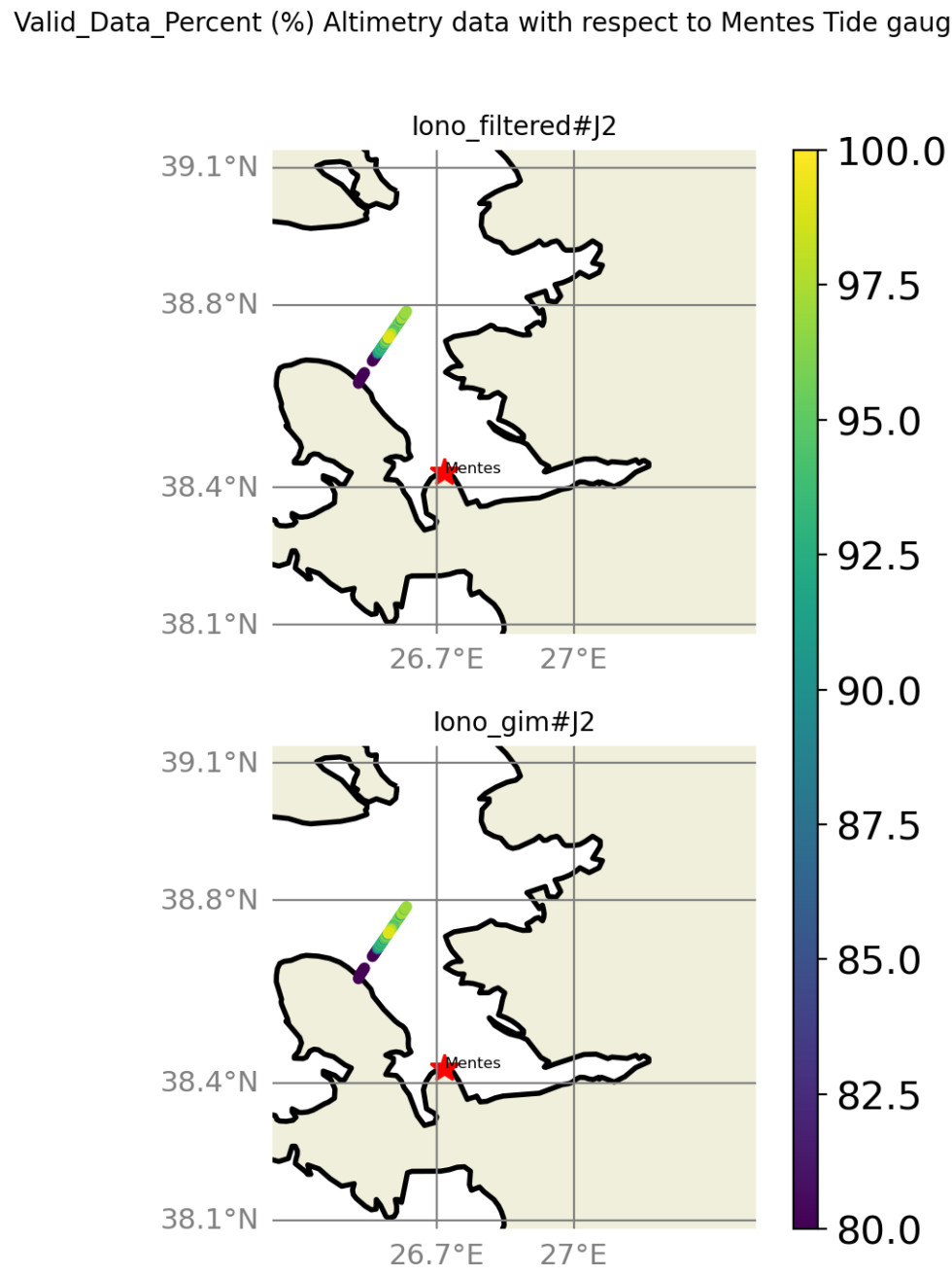

FIGURE 43 – valid_data_percent visualization in maps view % Mentes tide gauge

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

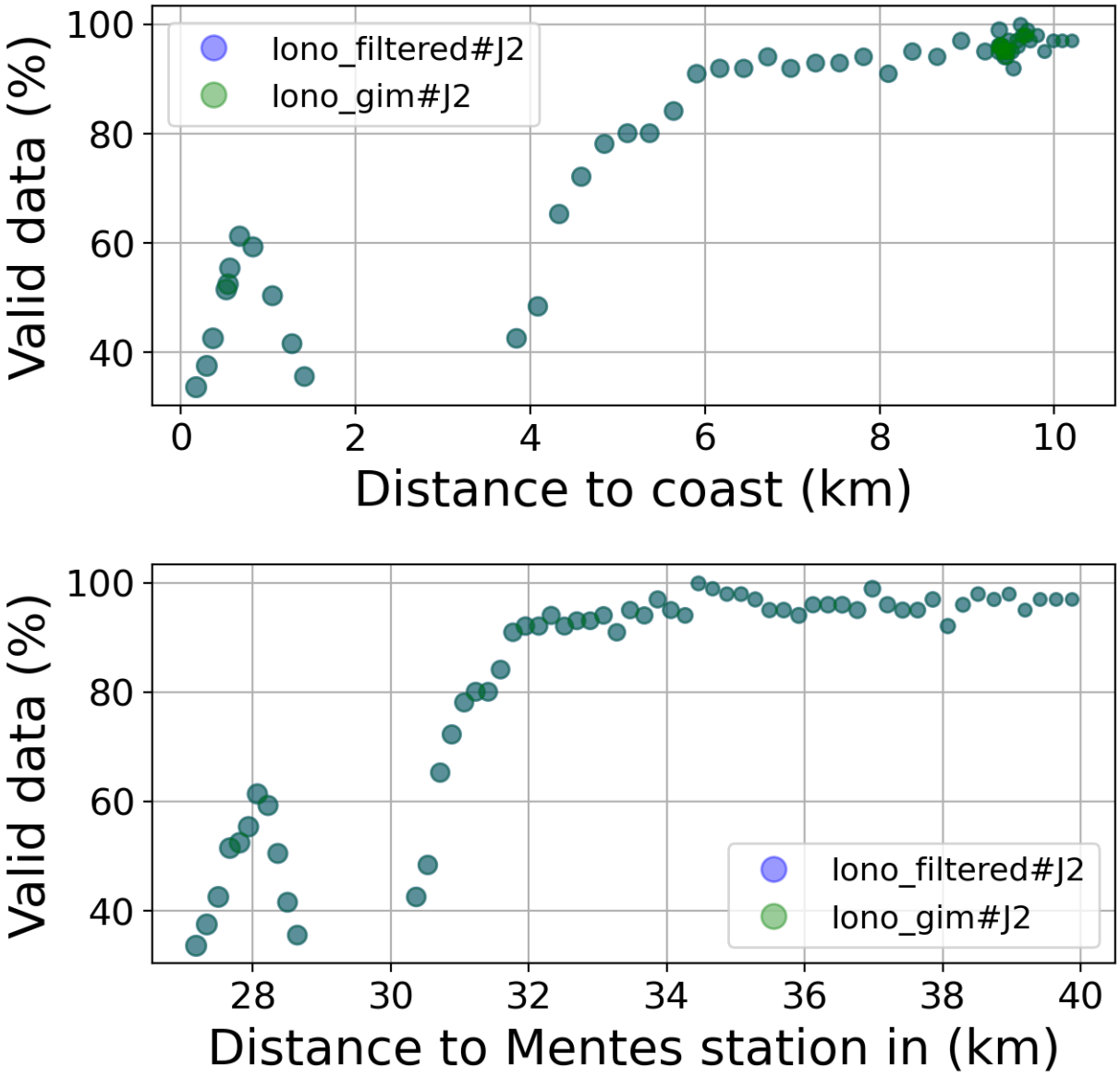

FIGURE 44 – Valid data (%) in function of distance to coast/Mentes station

6.2.6 Std in function of distance to coast/Mentes station

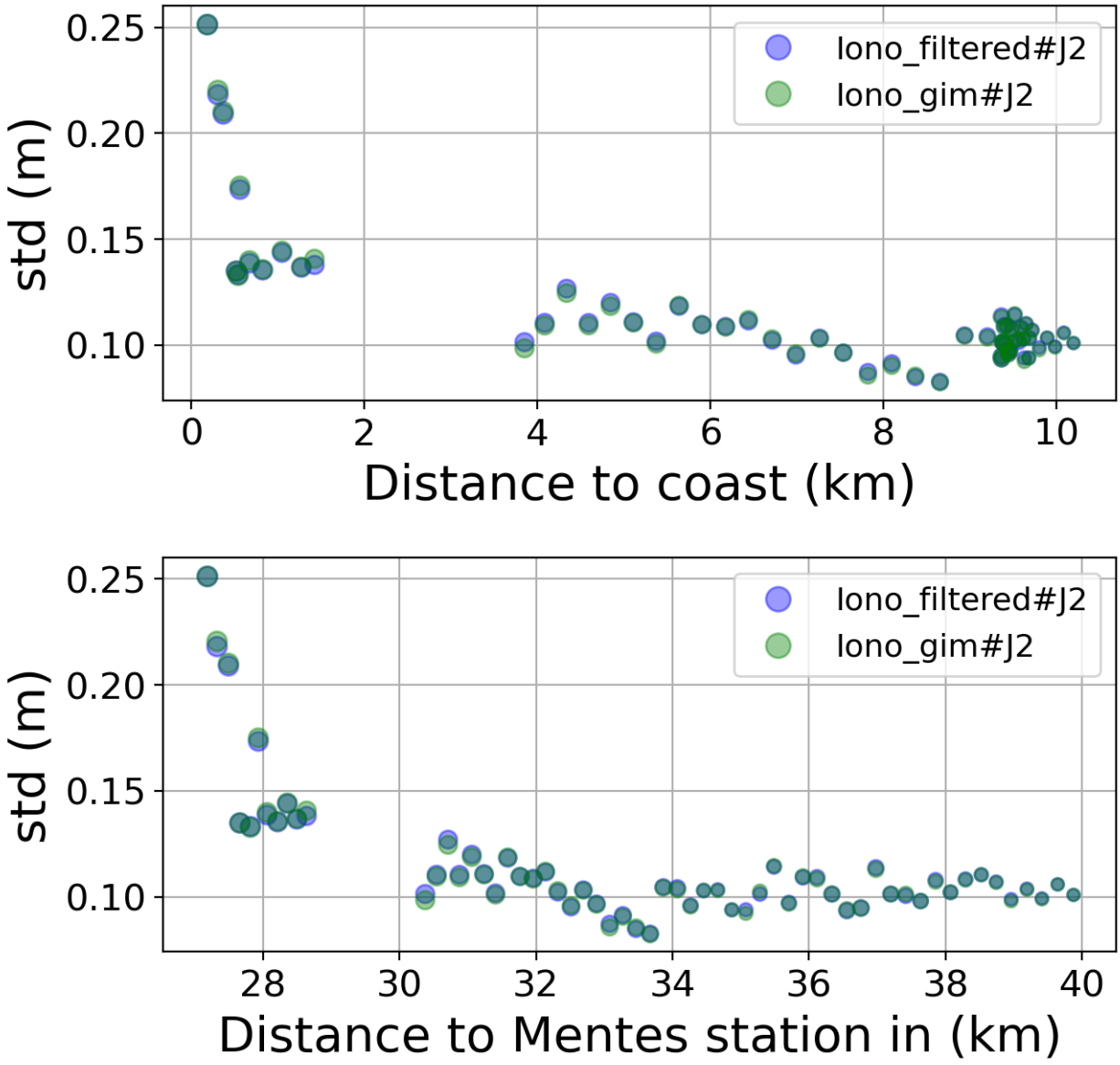

FIGURE 45 – Std in function of the distance to the coast/Mentes station

6.2.7 Correlation in function of distance to coast/Mentes station

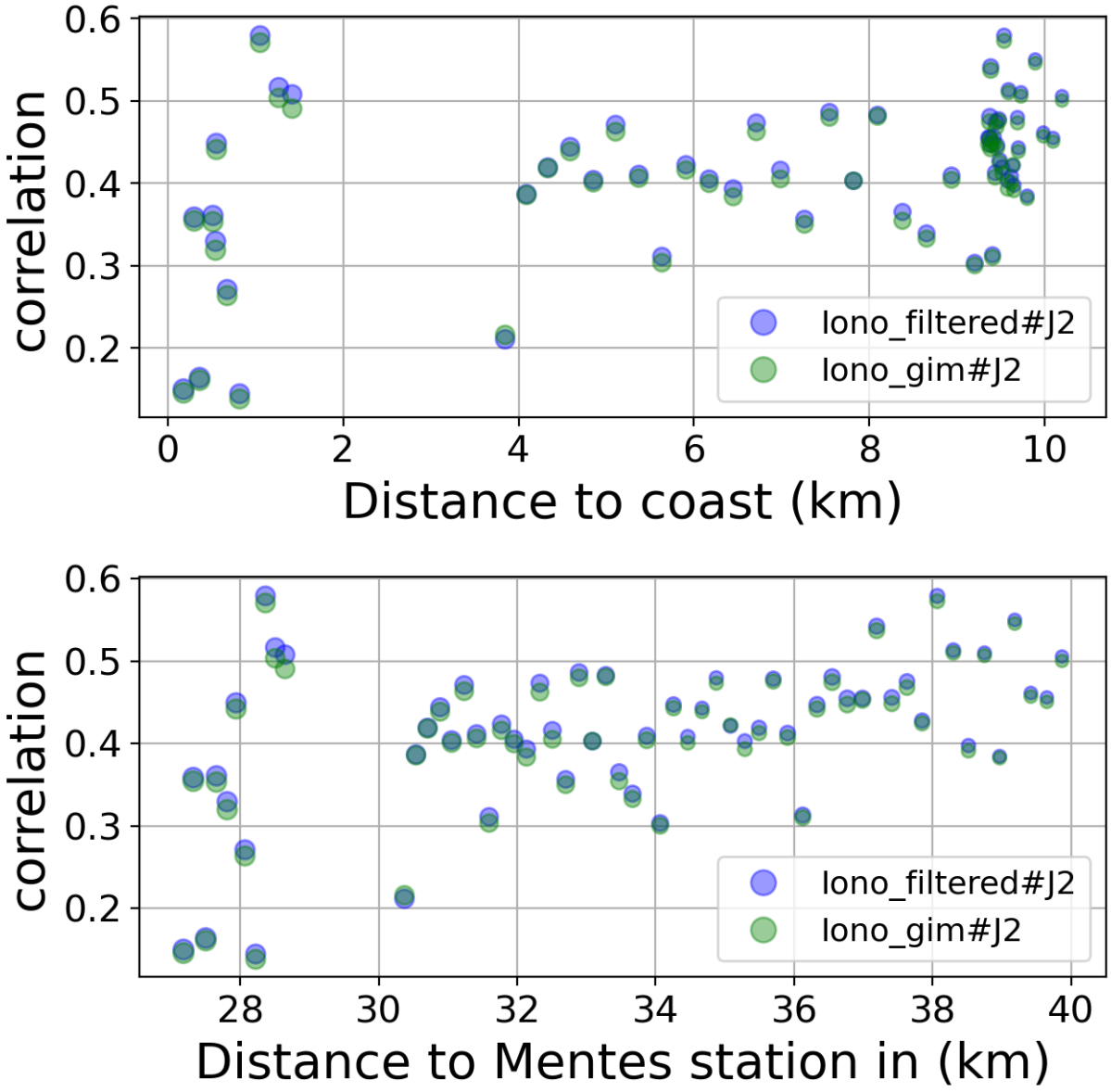

Figure 46 – Correlation in function of the distance to the coast/Mentes station

6.2.8 Taylor Diagram

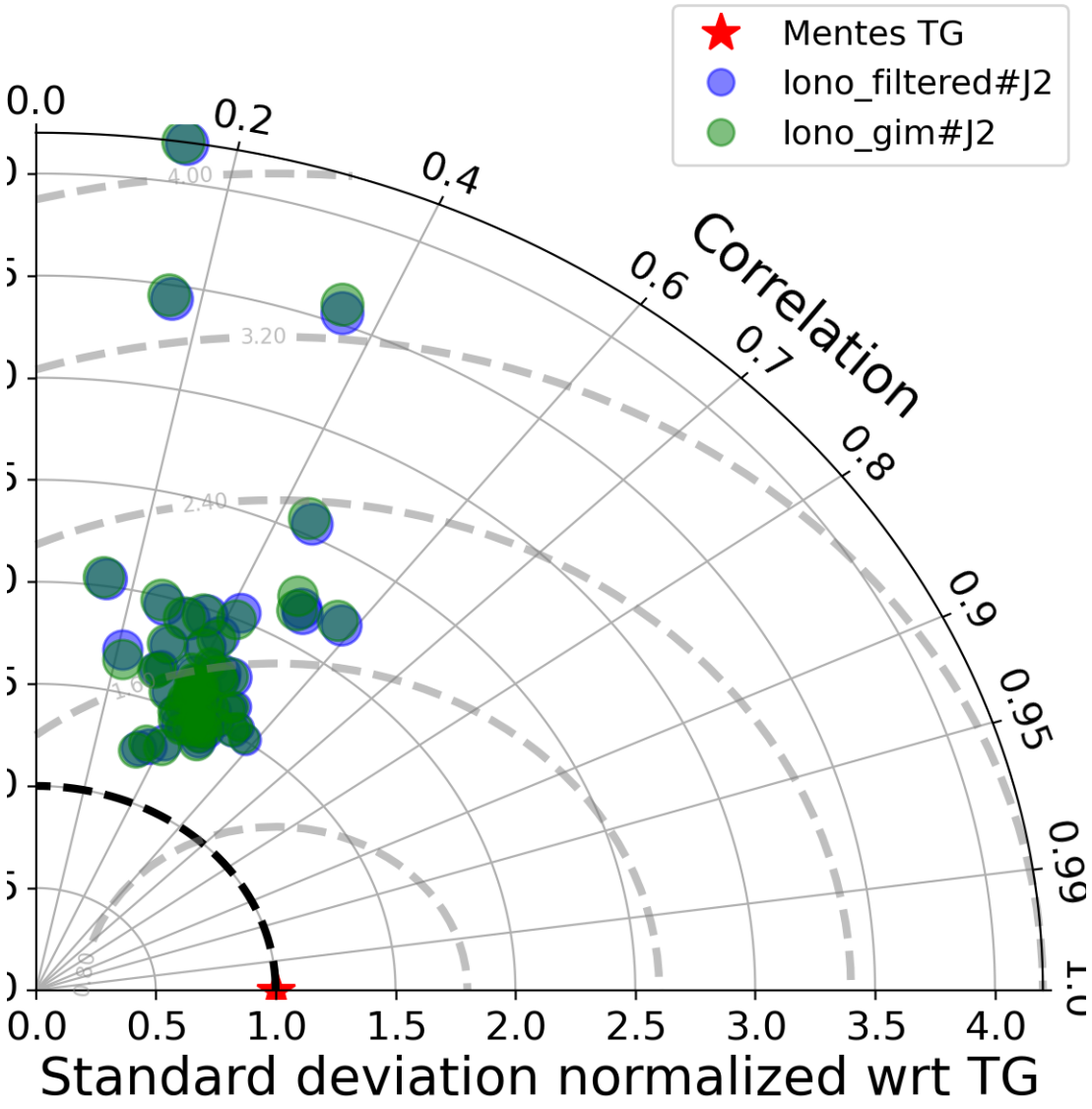

FIGURE 47 – Taylor diagram

6.2.9 Mean statistics table of products comparison with Mentes 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	82.883	0.415	0.115	0.107
Iono_gim#J2	82.883	0.409	0.115	0.107

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 101 point.

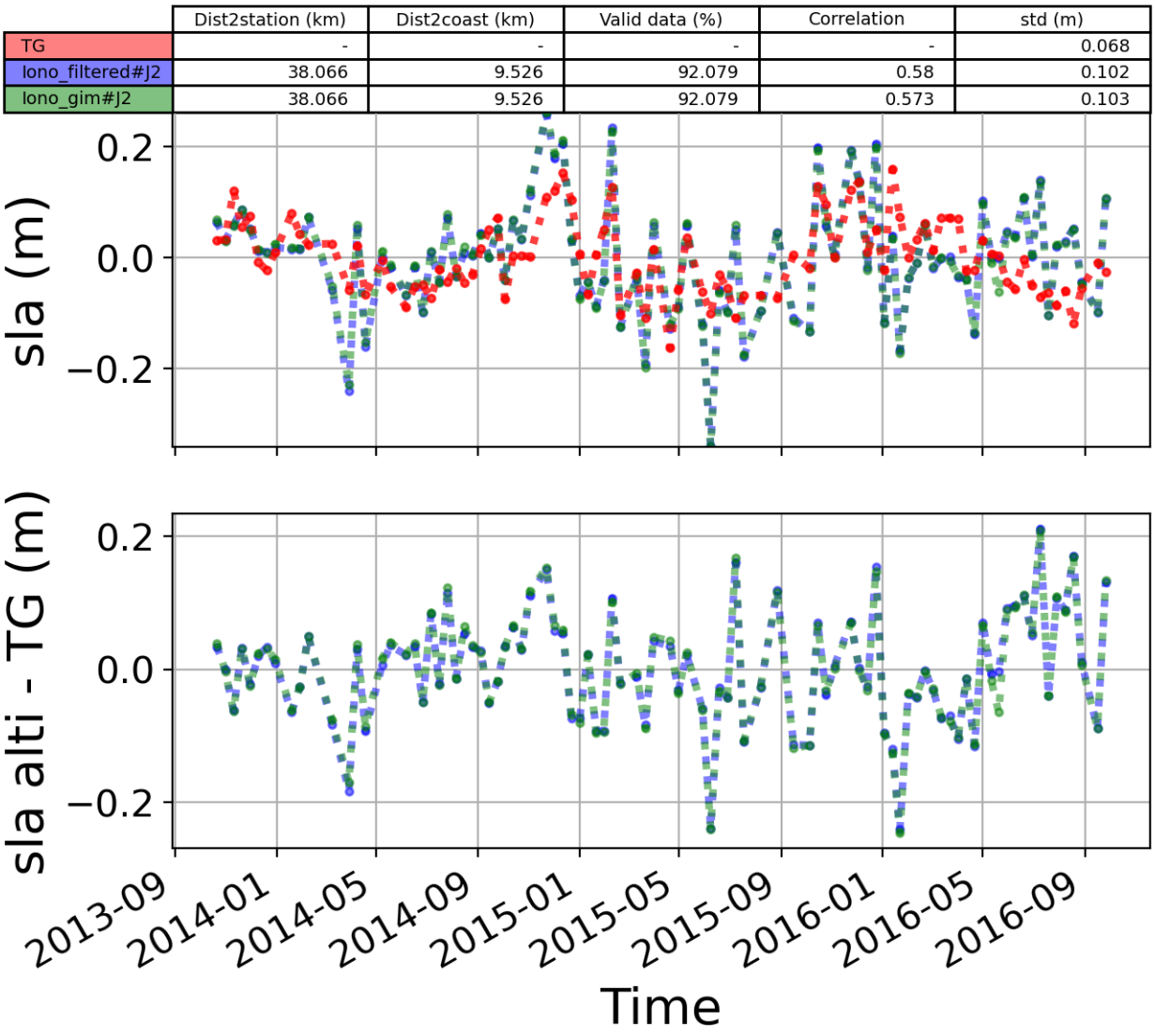

FIGURE 49 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

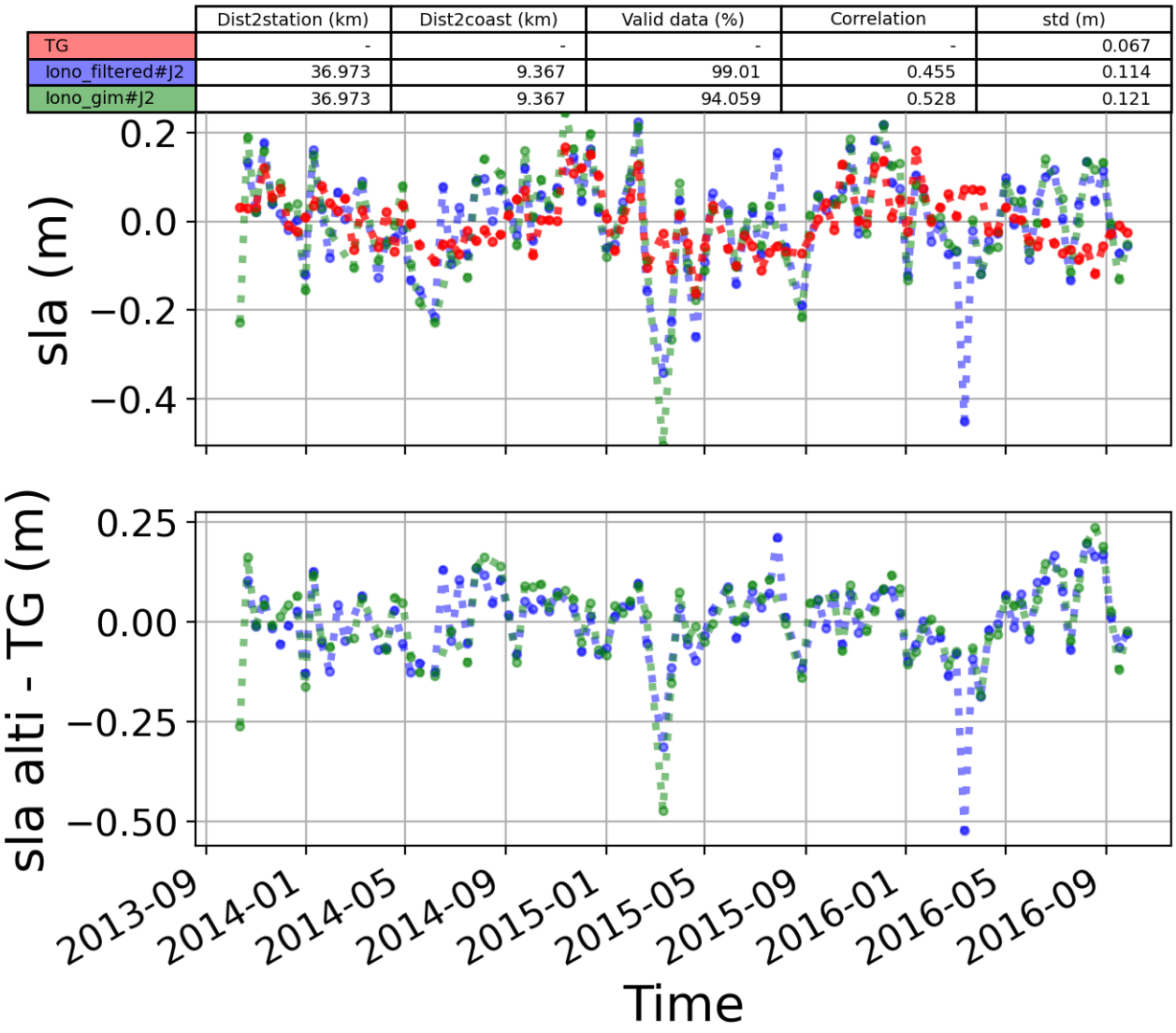

FIGURE 50 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.3 Station : Ibiza

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

6.3.1 correlation visualization in maps view % Ibiza tide gauge

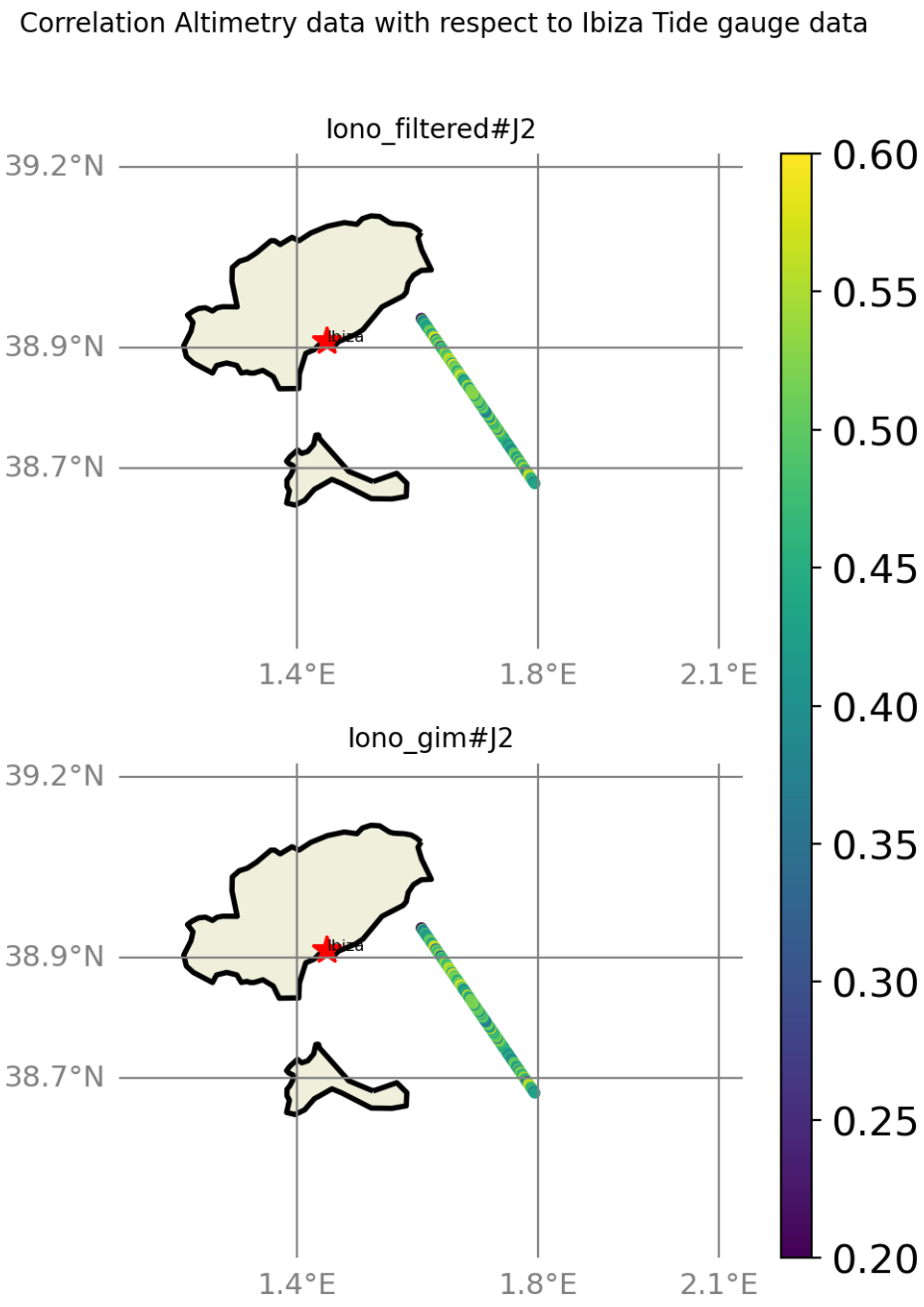

FIGURE 51 – correlation visualization in maps view % Ibiza tide gauge

6.3.2 rmsd visualization in maps view % Ibiza tide gauge

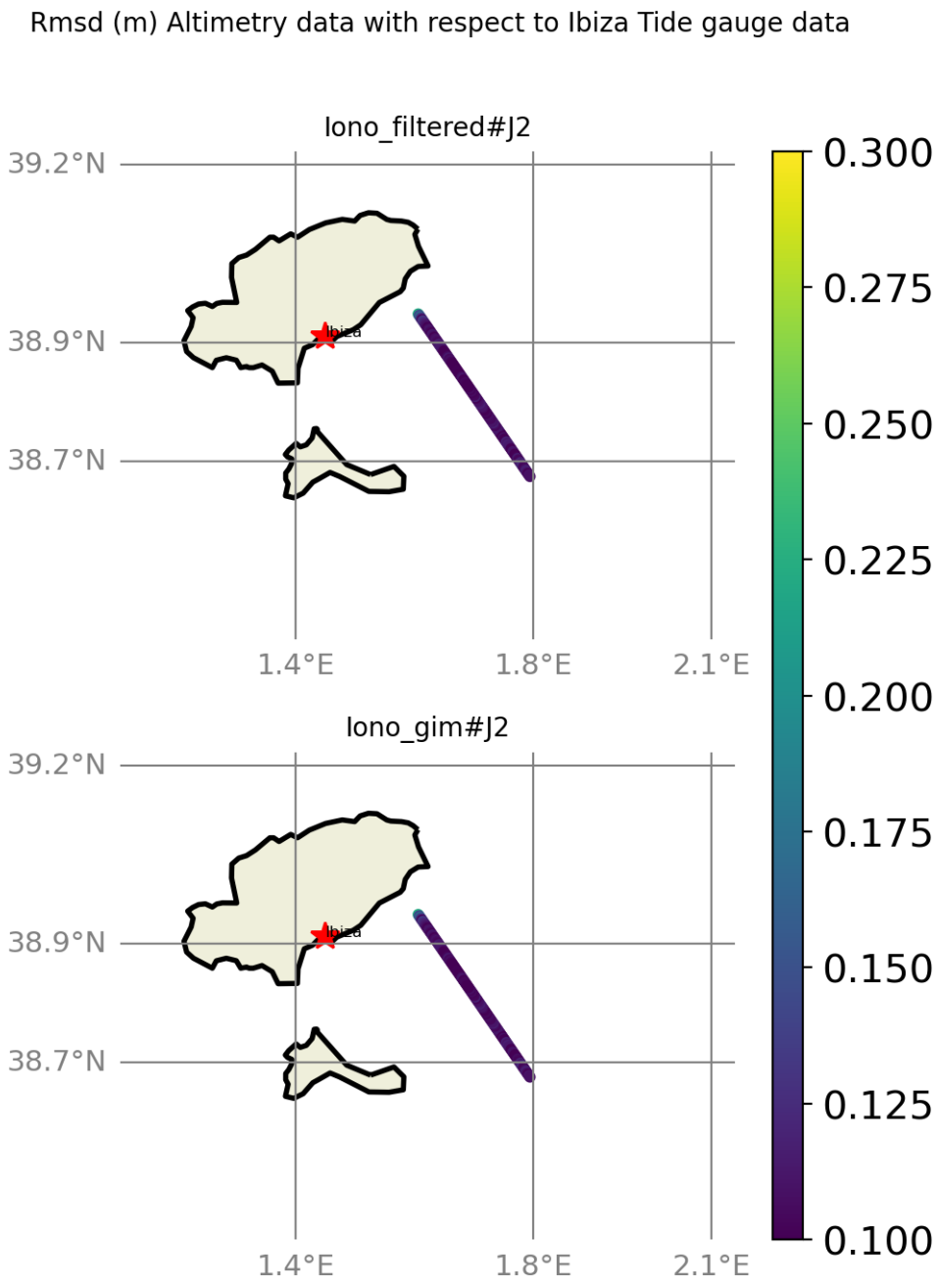

FIGURE 52 – rmsd visualization in maps view % Ibiza tide gauge

6.3.3 std visualization in maps view % Ibiza tide gauge

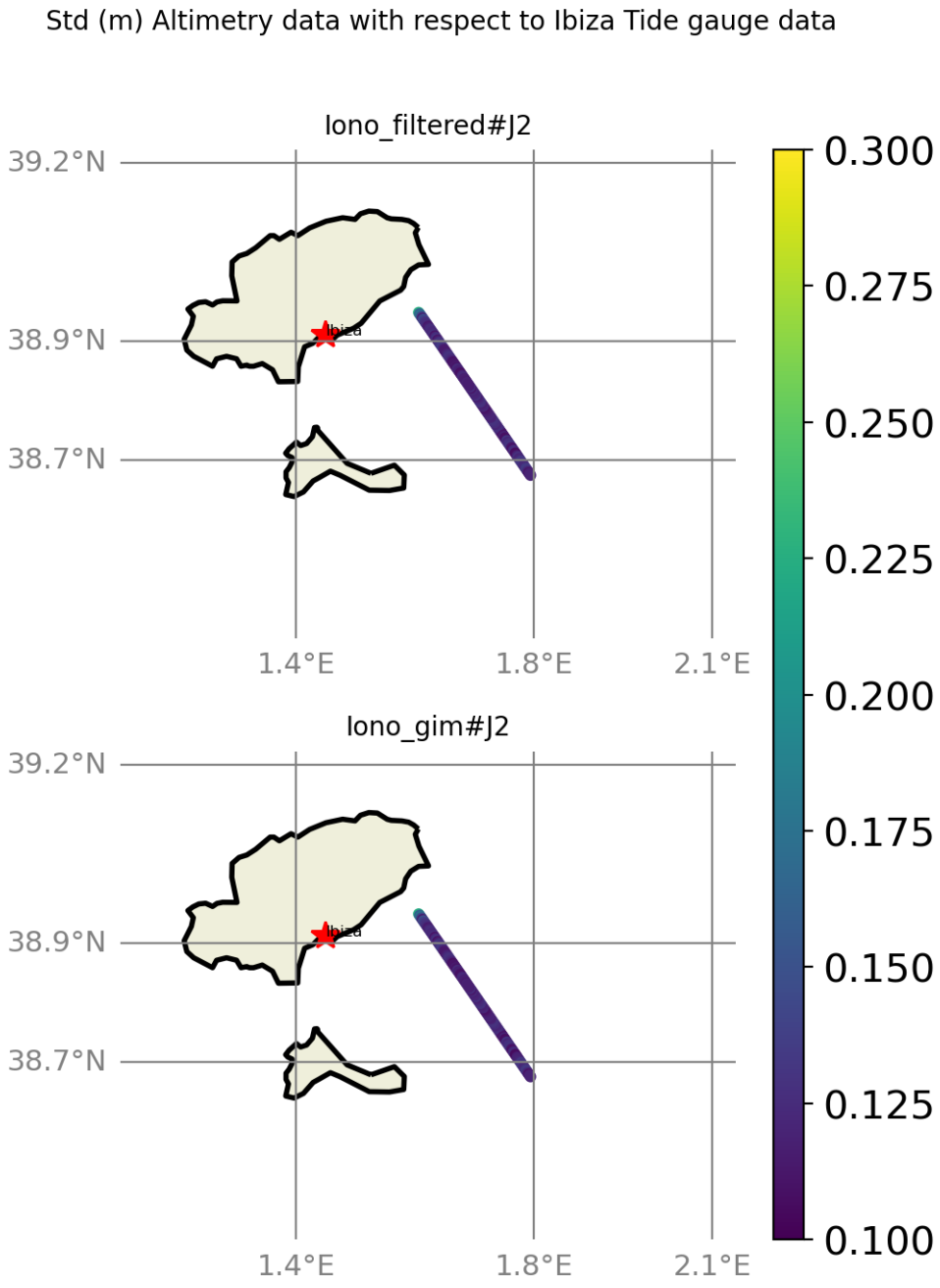

FIGURE 53 – std visualization in maps view % Ibiza tide gauge

6.3.4 valid_data_percent visualization in maps view % Ibiza tide gauge

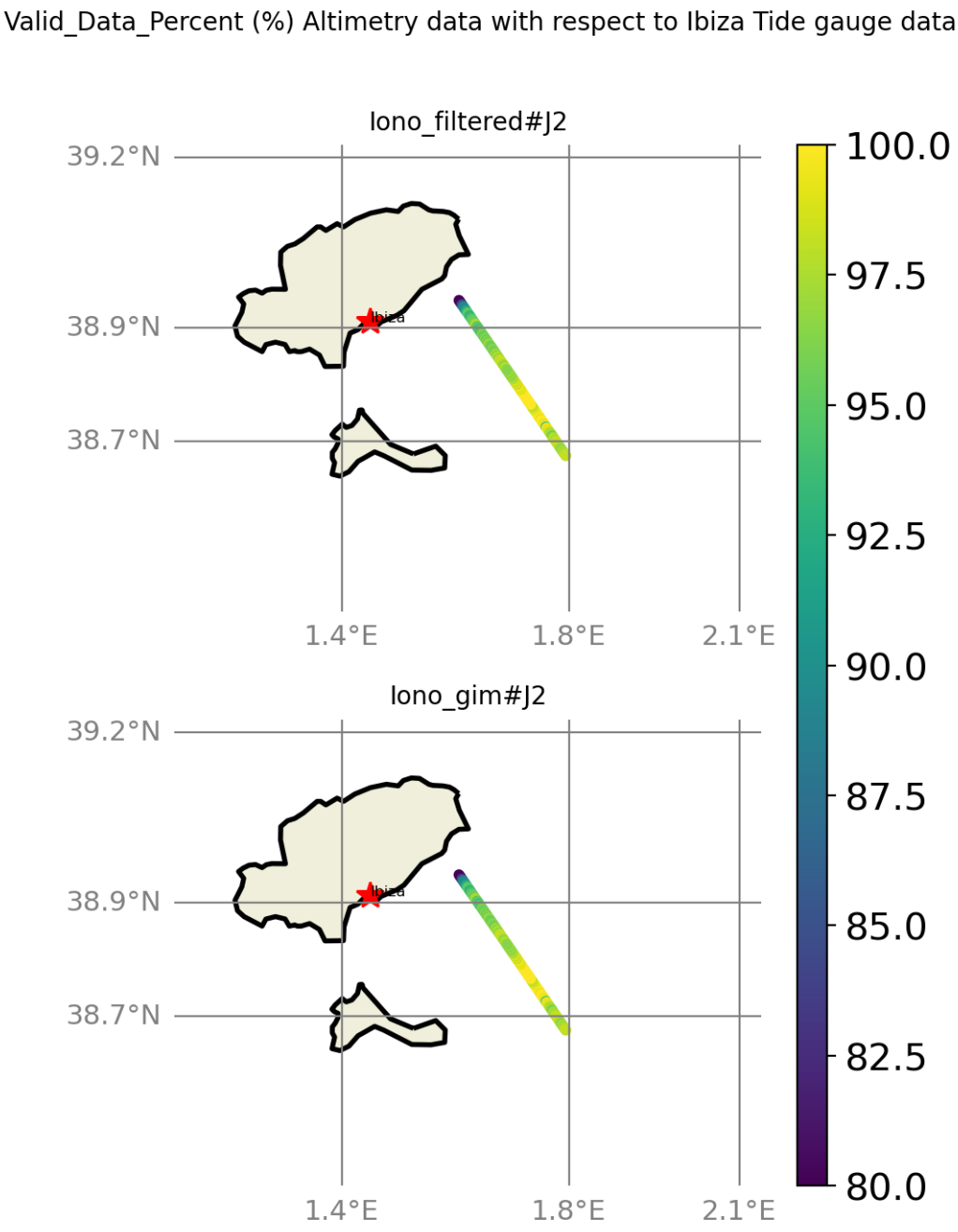

FIGURE 54 – valid_data_percent visualization in maps view % Ibiza tide gauge

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

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

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

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

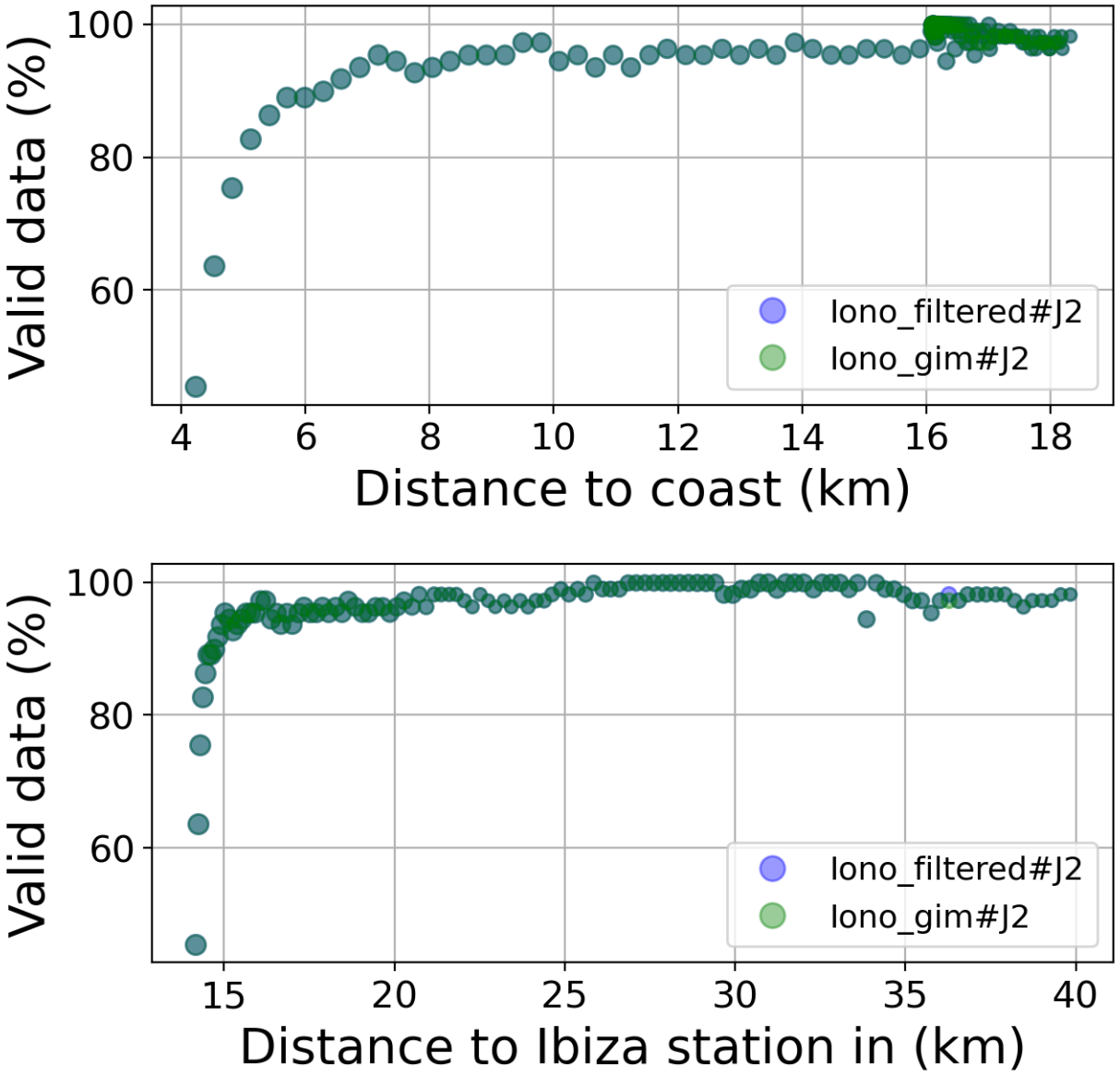

Figure 55 – Valid data (%) in function of distance to coast/Ibiza station

6.3.6 Std in function of distance to coast/Ibiza station

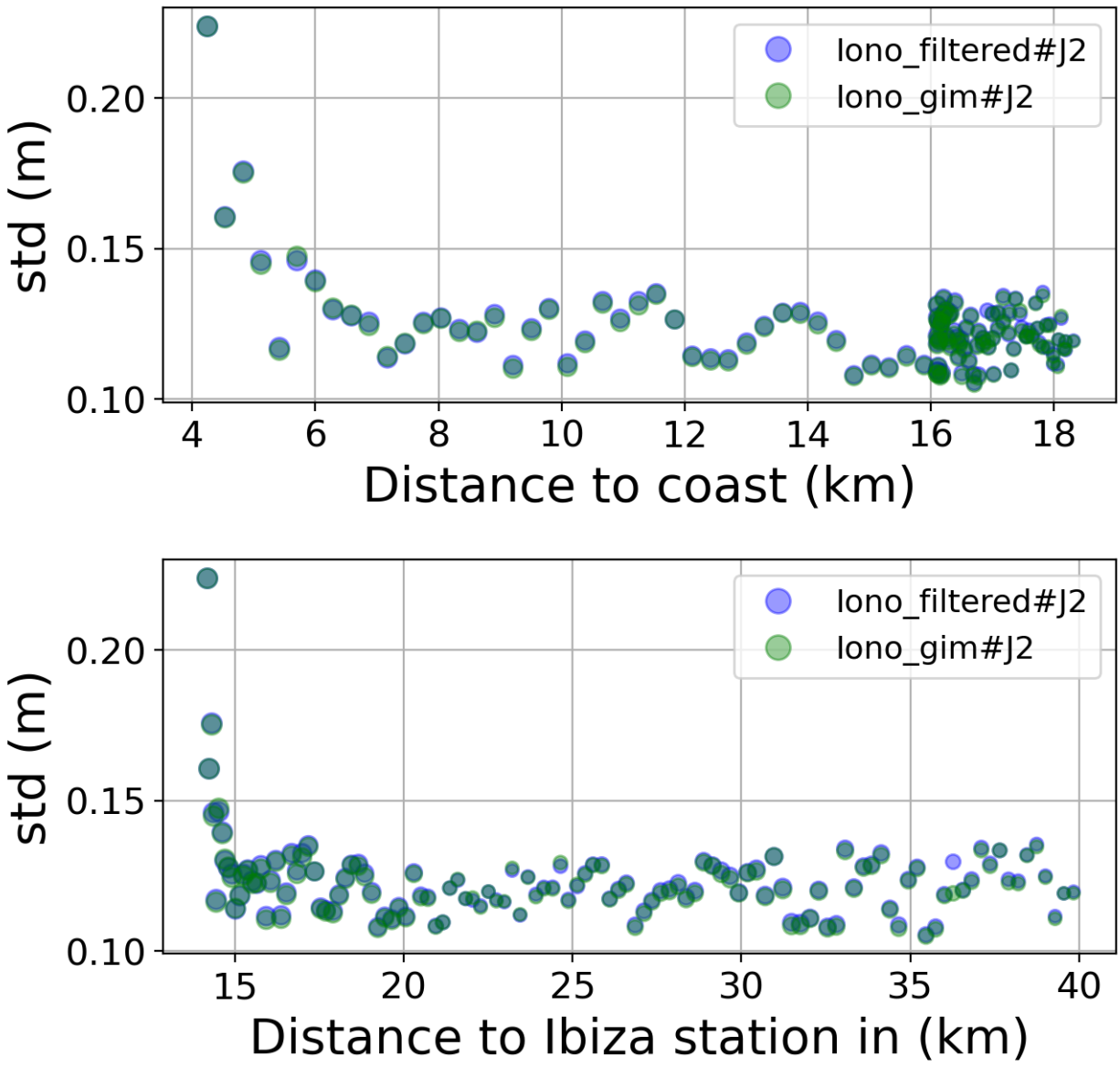

FIGURE 56 – Std in function of the distance to the coast/Ibiza station

6.3.7 Correlation in function of distance to coast/Ibiza station

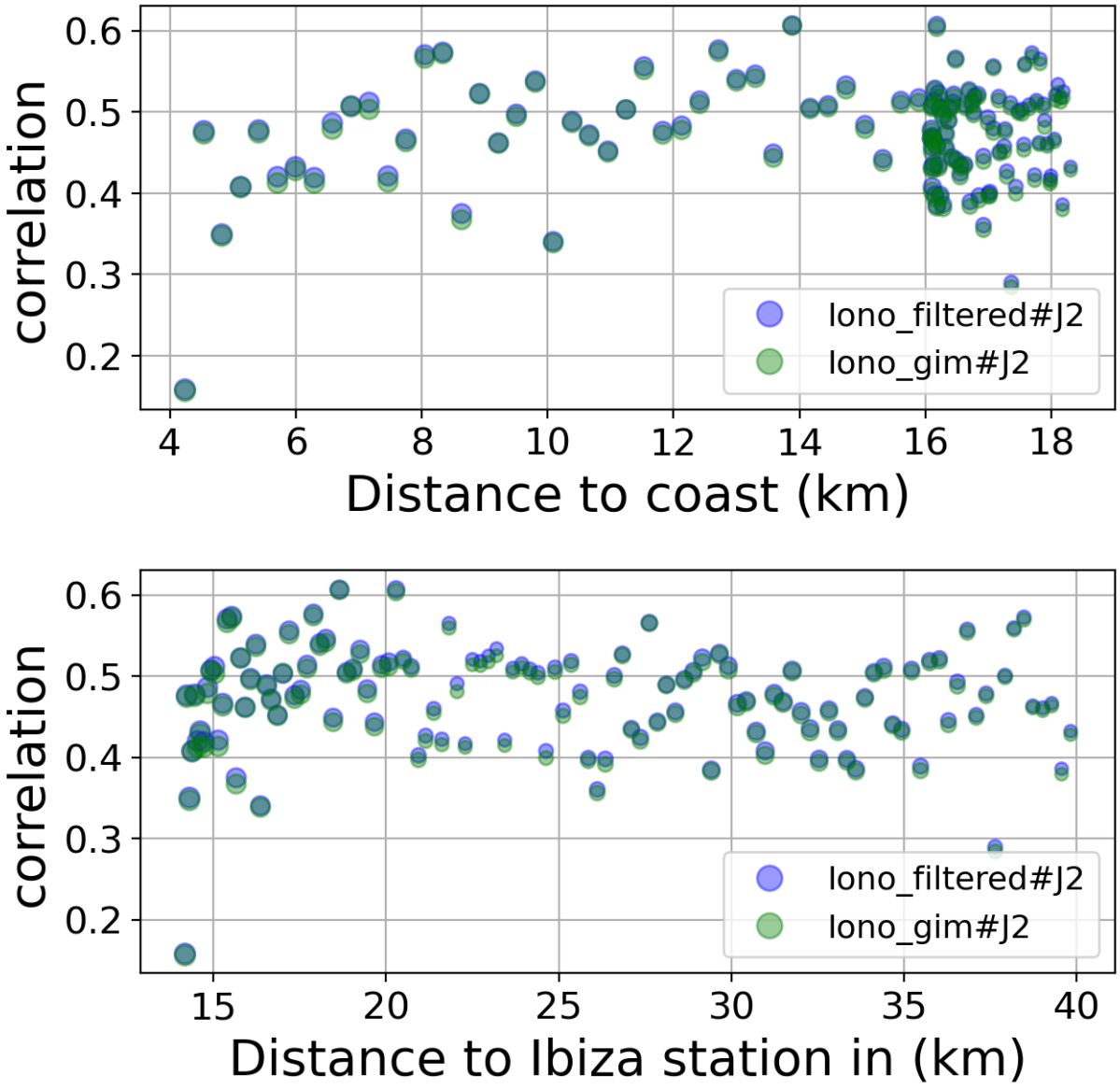

Figure 57 – Correlation in function of the distance to the coast/Ibiza station

6.3.8 Taylor Diagram

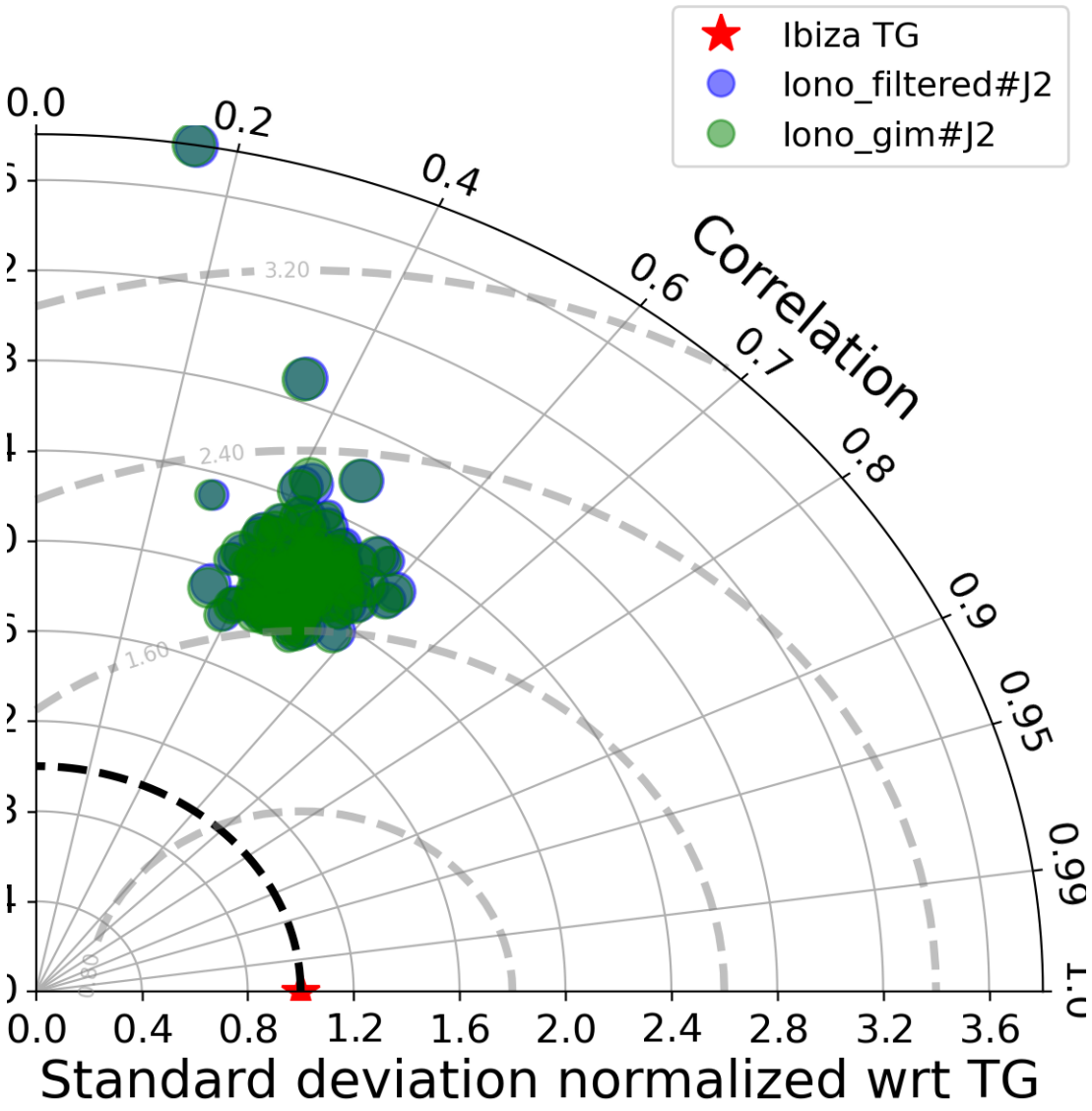

FIGURE 58 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	96.165	0.474	0.124	0.109
Iono_gim#J2	96.157	0.47	0.123	0.109

Figure 59 – Mean statistics table of the common points in the altimetry products

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

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

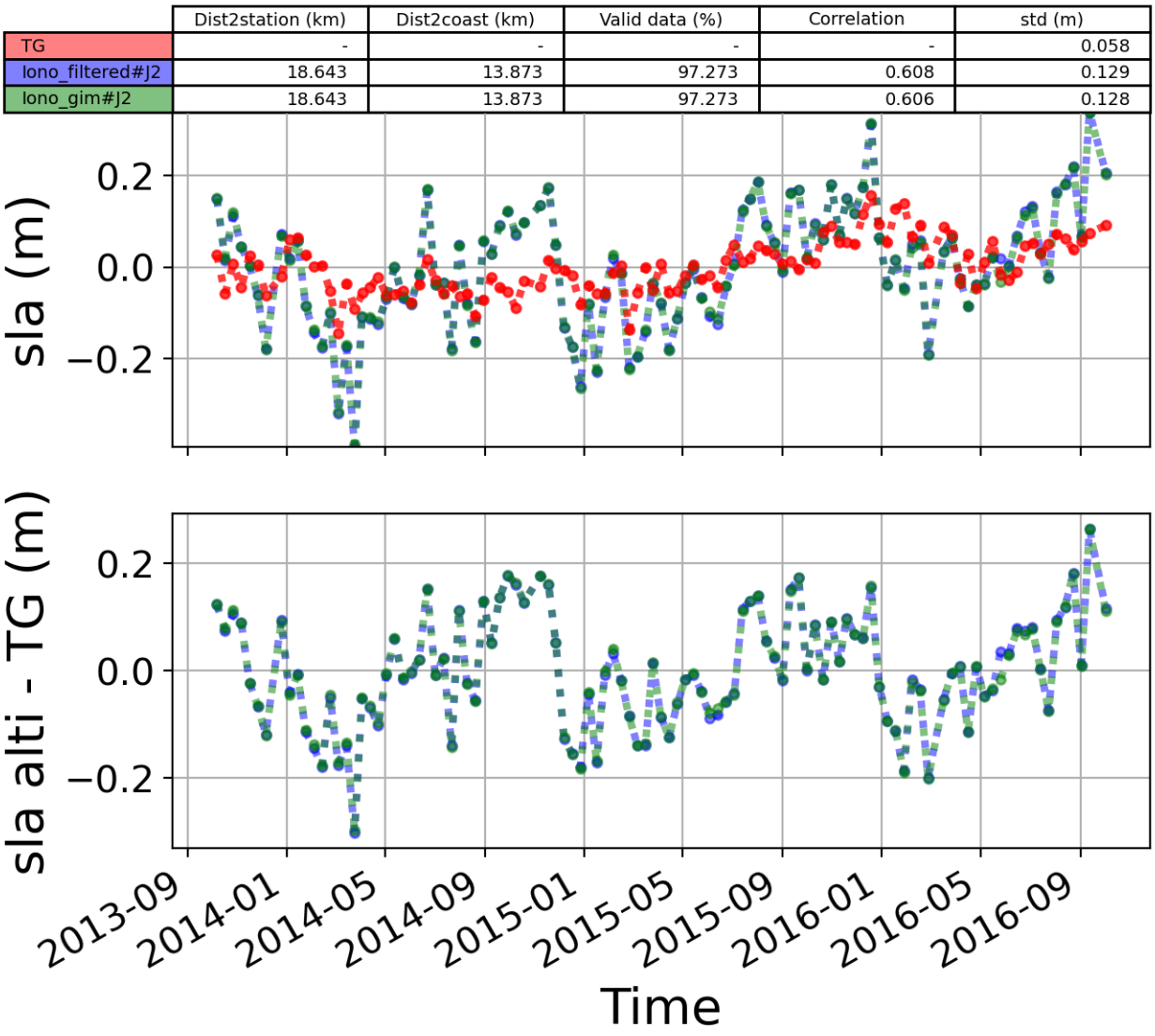

FIGURE 60 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

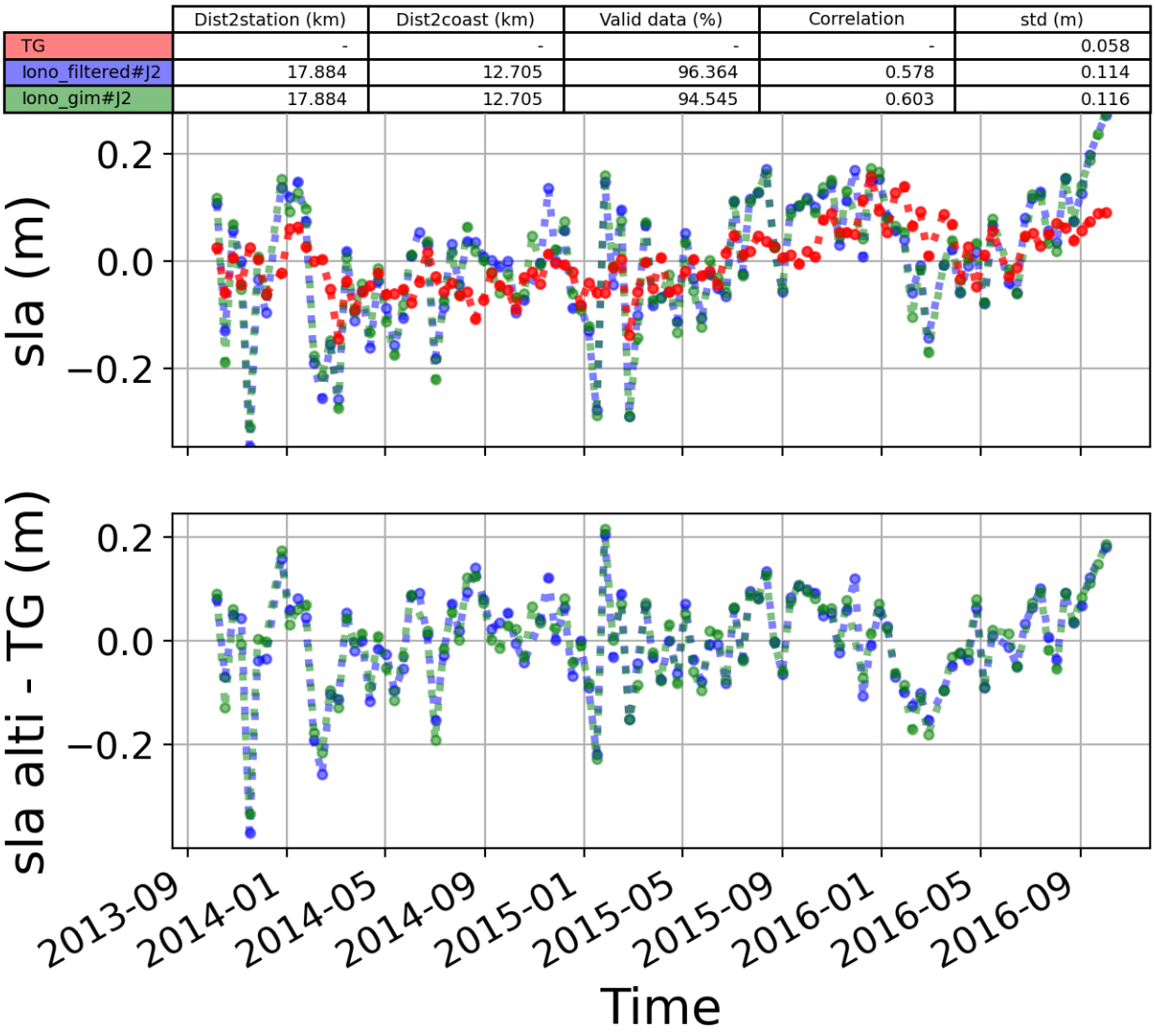

FIGURE 61 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.4 Station : LA_FIGUEIRETTE

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

6.4.1 correlation visualization in maps view % LA_FIGUEIRETTE tide gauge

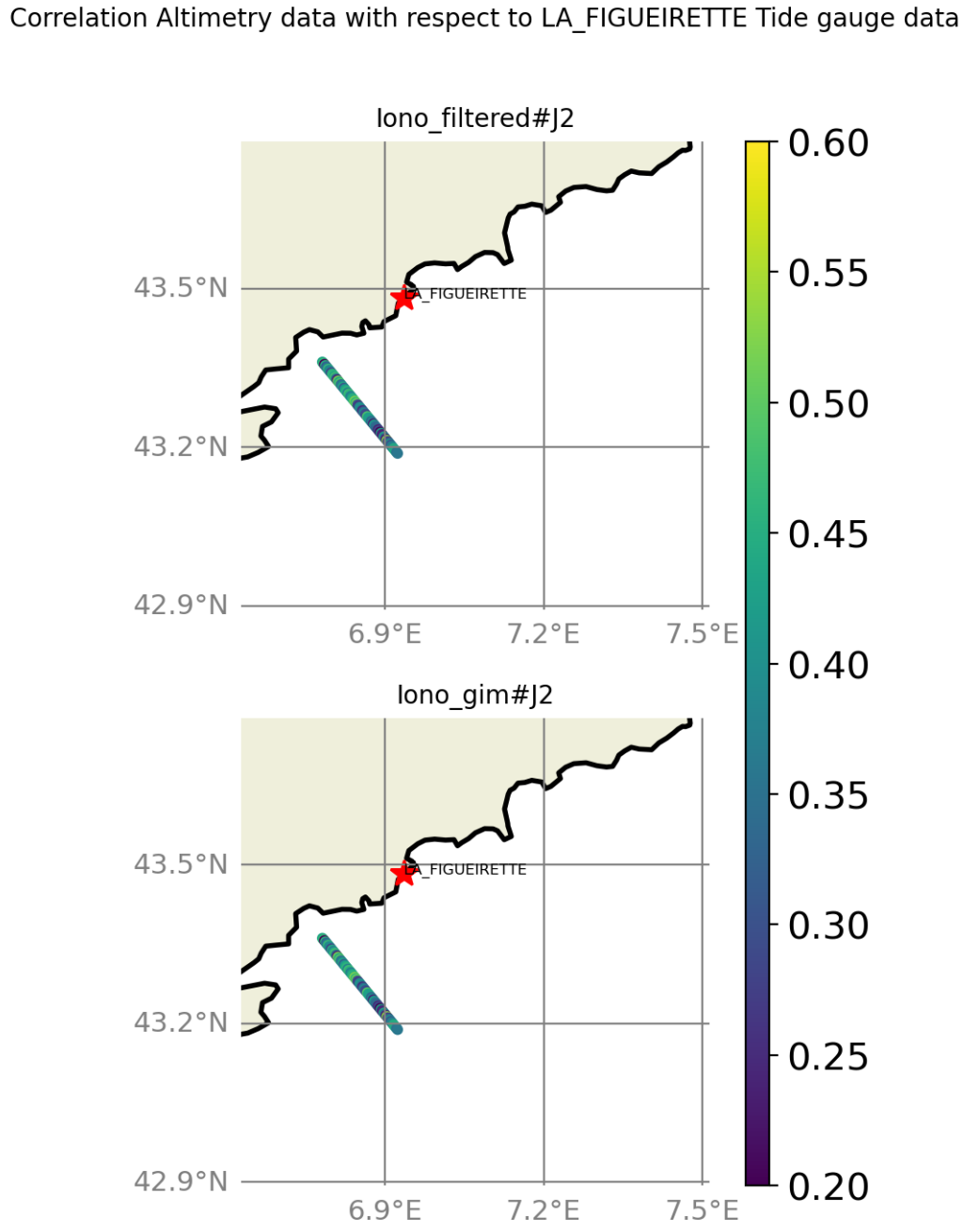

FIGURE 62 – correlation visualization in maps view % LA_FIGUEIRETTE tide gauge

6.4.2 rmsd visualization in maps view % LA_FIGUEIRETTE tide gauge

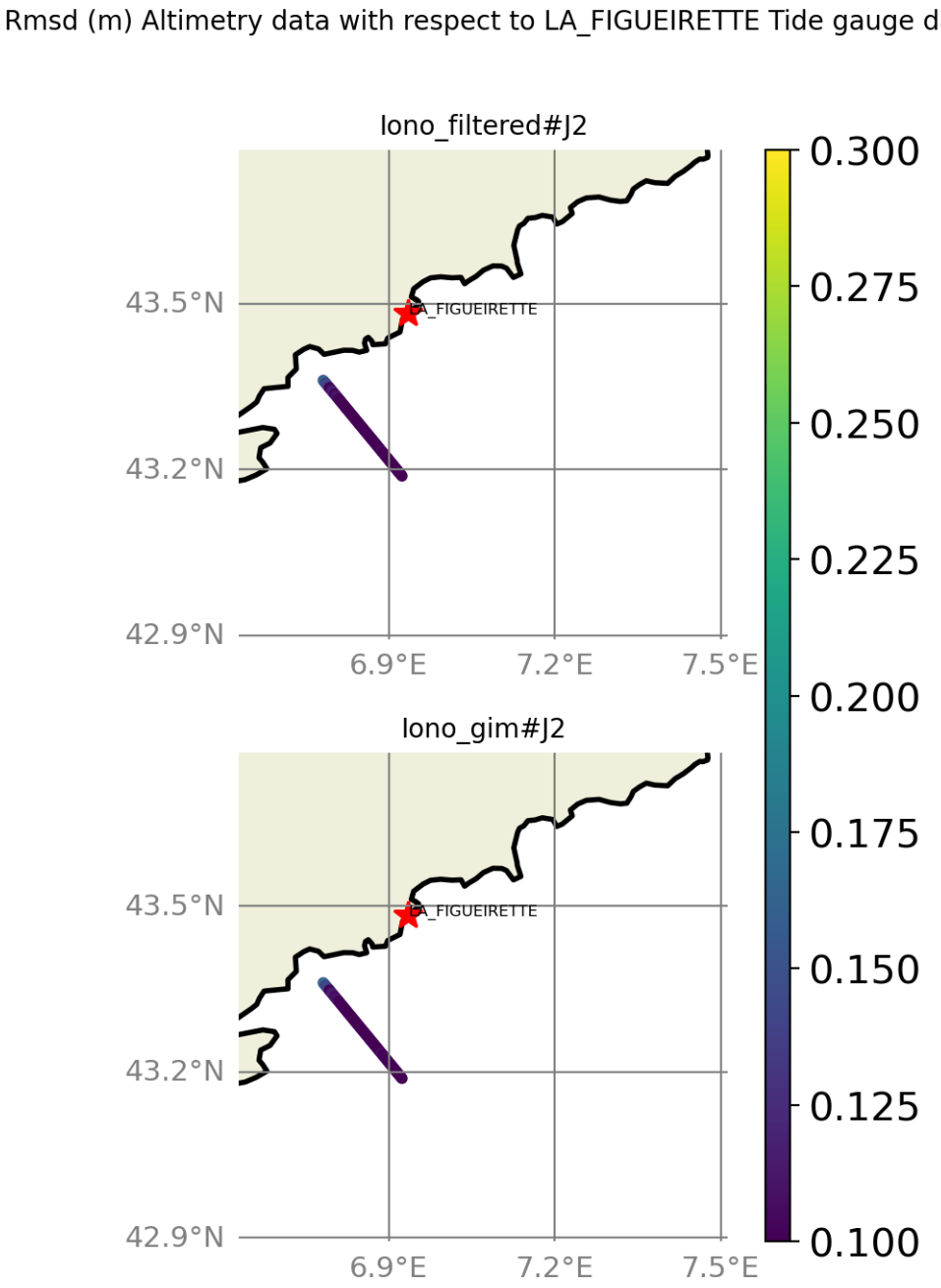

FIGURE 63 – rmsd visualization in maps view % LA_FIGUEIRETTE tide gauge

6.4.3 std visualization in maps view % LA_FIGUEIRETTE tide gauge

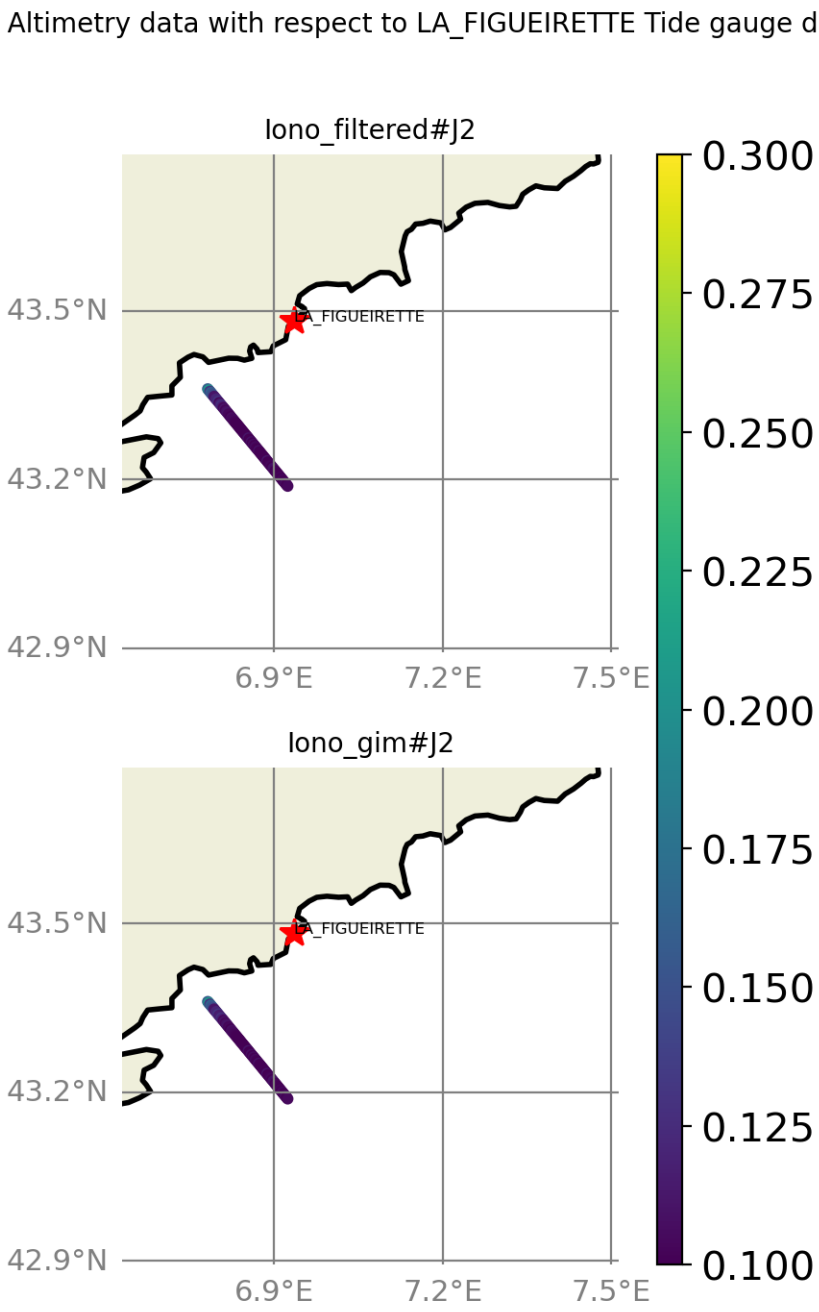

FIGURE 64 – std visualization in maps view % LA_FIGUEIRETTE tide gauge

6.4.4 valid_data_percent visualization in maps view % LA_FIGUEIRETTE tide gauge

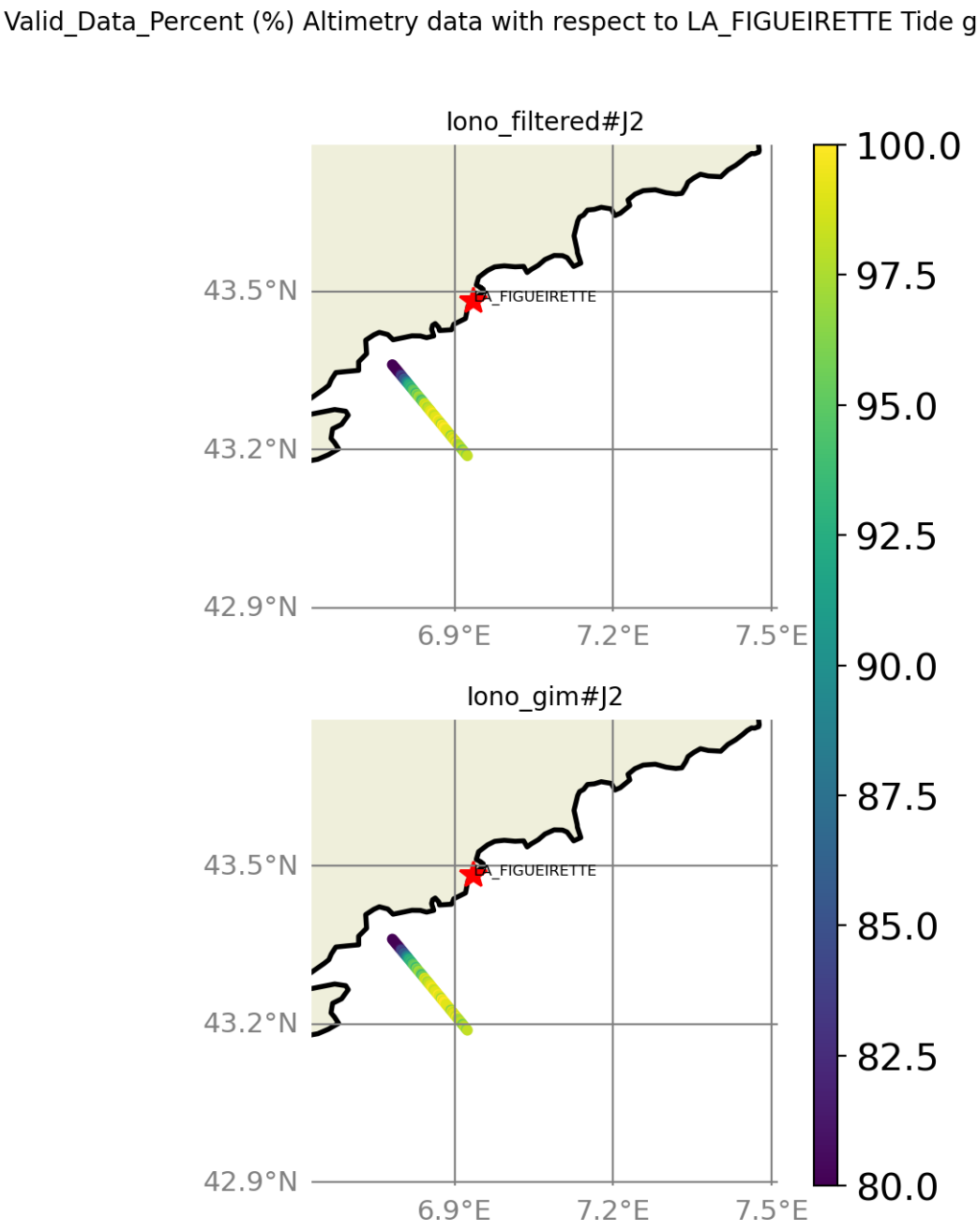

FIGURE 65 – valid_data_percent visualization in maps view % LA_FIGUEIRETTE tide gauge

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

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

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

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

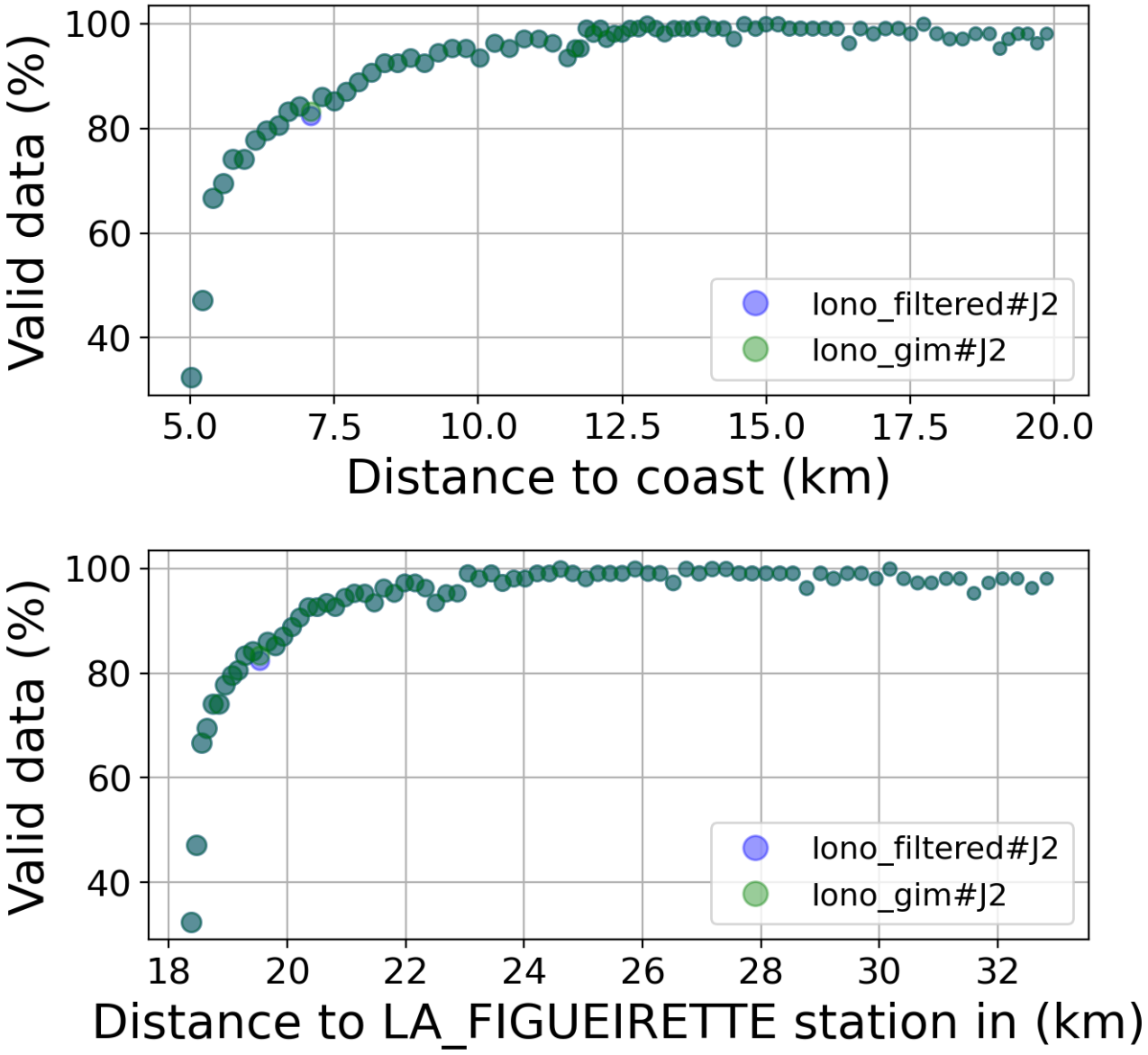

FIGURE 66 – Valid data (%) in function of distance to coast/LA_FIGUEIRETTE station

6.4.6 Std in function of distance to coast/LA_FIGUEIRETTE station

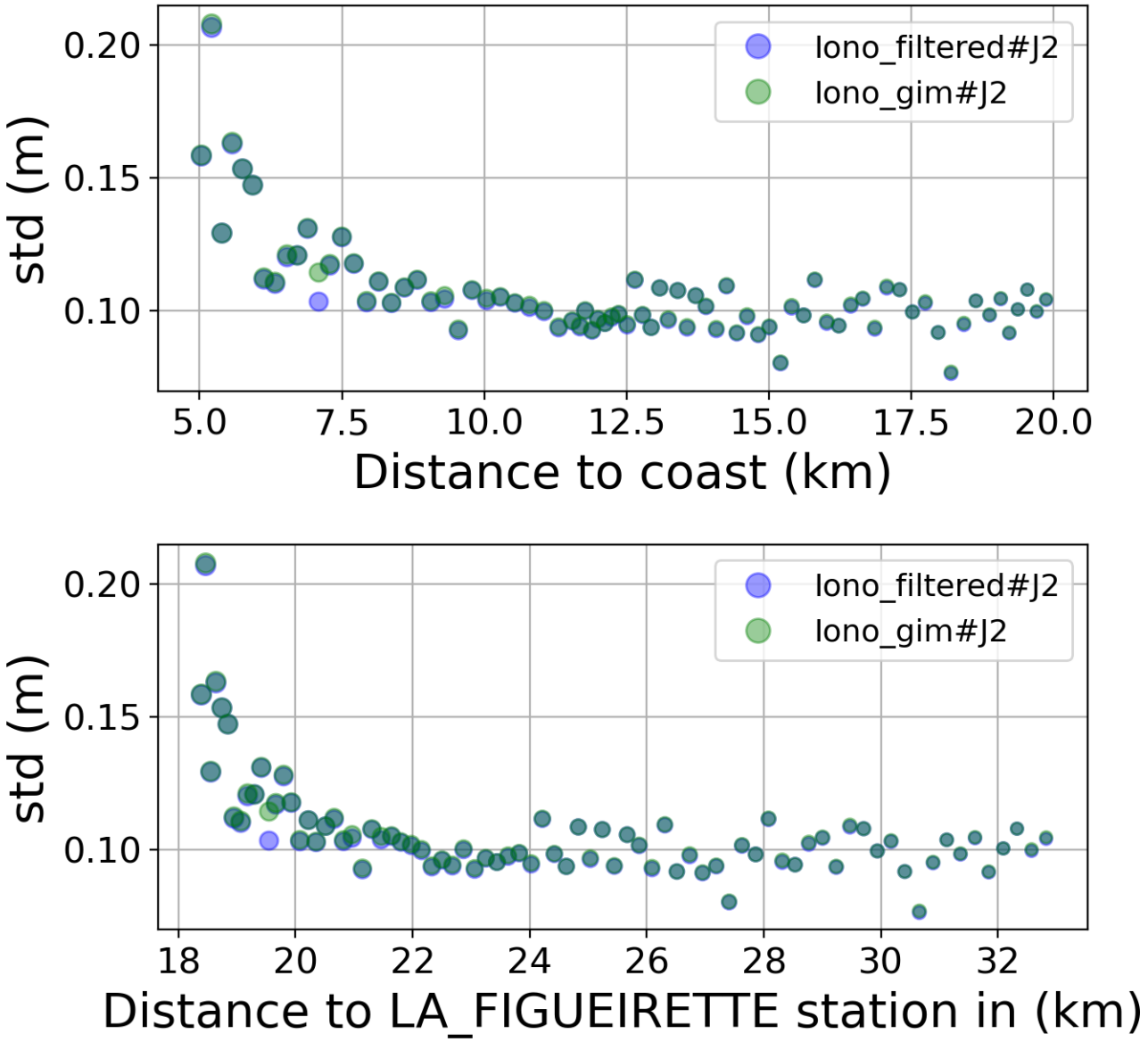

FIGURE 67 – Std in function of the distance to the coast/LA_FIGUEIRETTE station

6.4.7 Correlation in function of distance to coast/LA_FIGUEIRETTE station

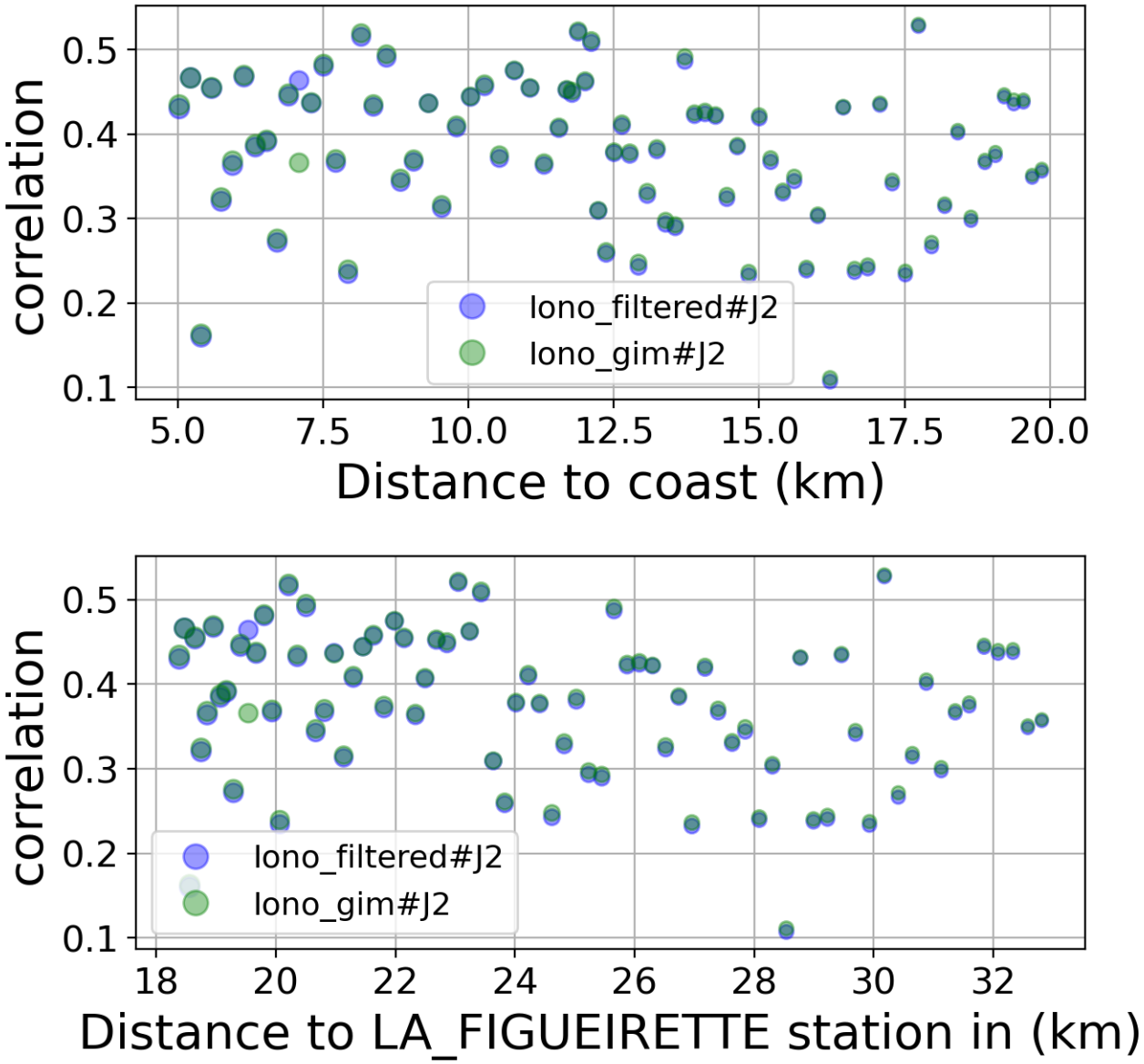

FIGURE 68 – Correlation in function of the distance to the coast/LA_FIGUEIRETTE station

6.4.8 Taylor Diagram

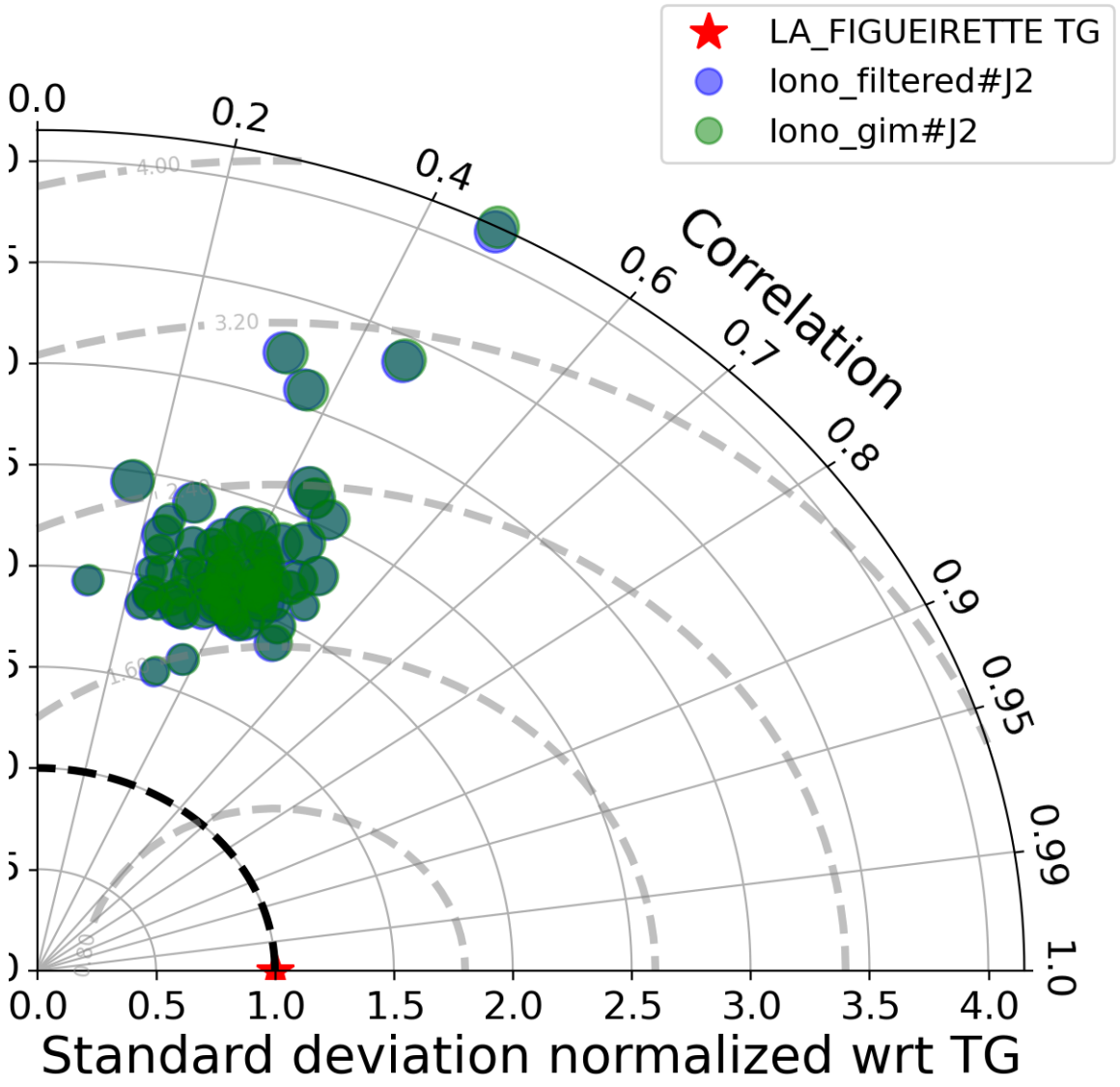

FIGURE 69 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	92.83	0.377	0.106	0.099
Iono_gim#J2	92.842	0.379	0.107	0.1

Figure 70 – 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.

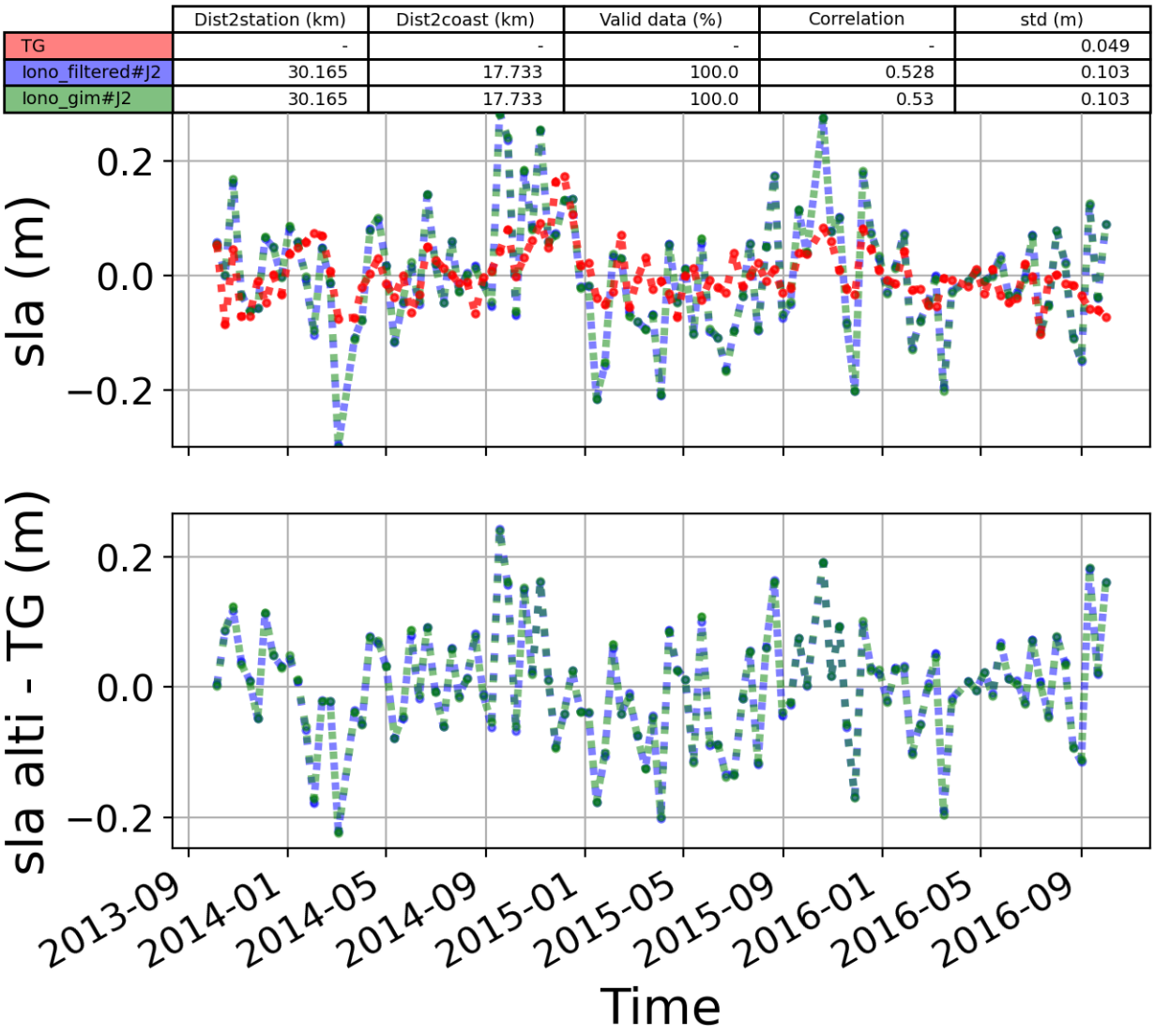

FIGURE 71 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

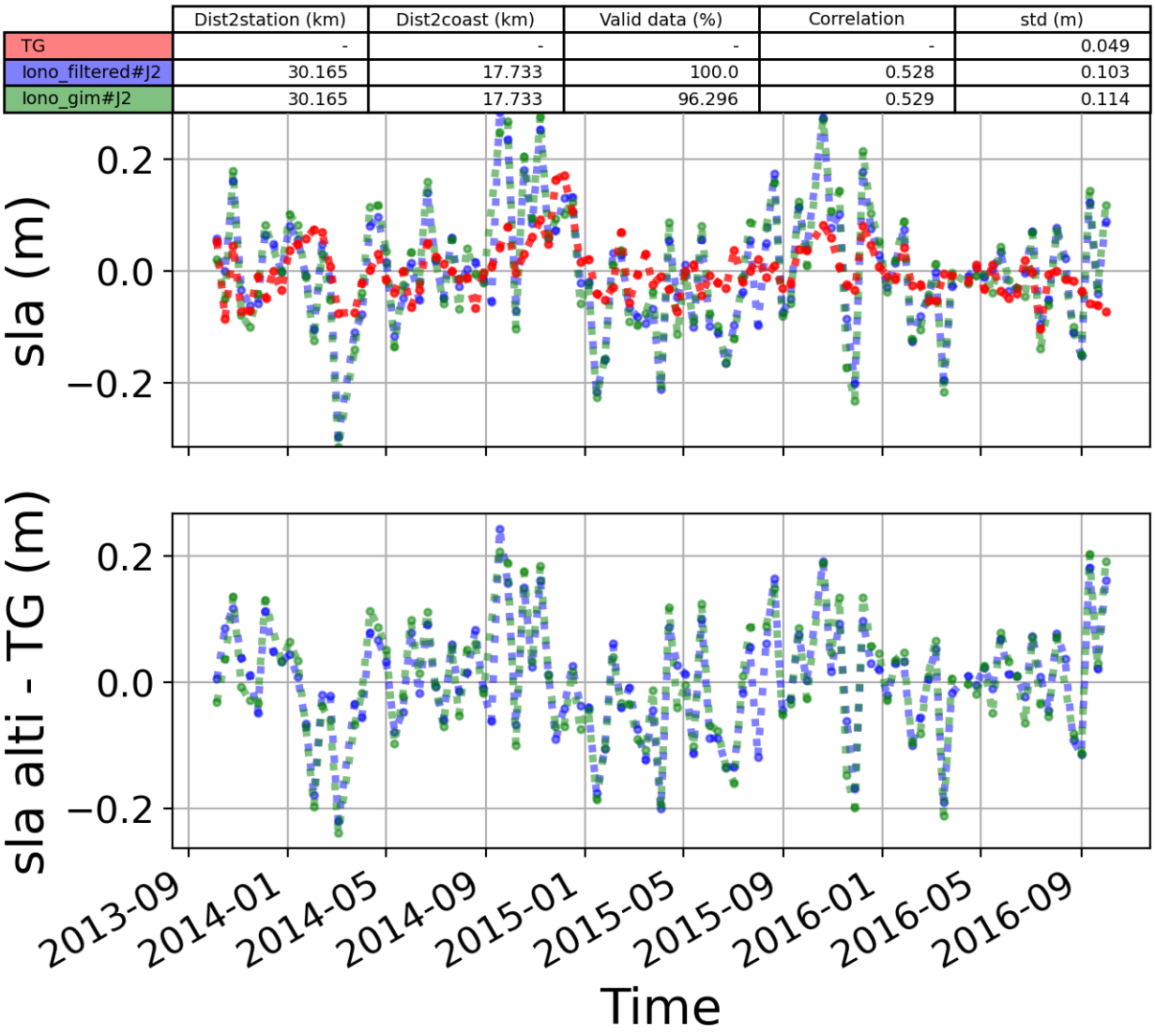

FIGURE 72 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.5 Station : Ancona

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

6.5.1 correlation visualization in maps view % Ancona tide gauge

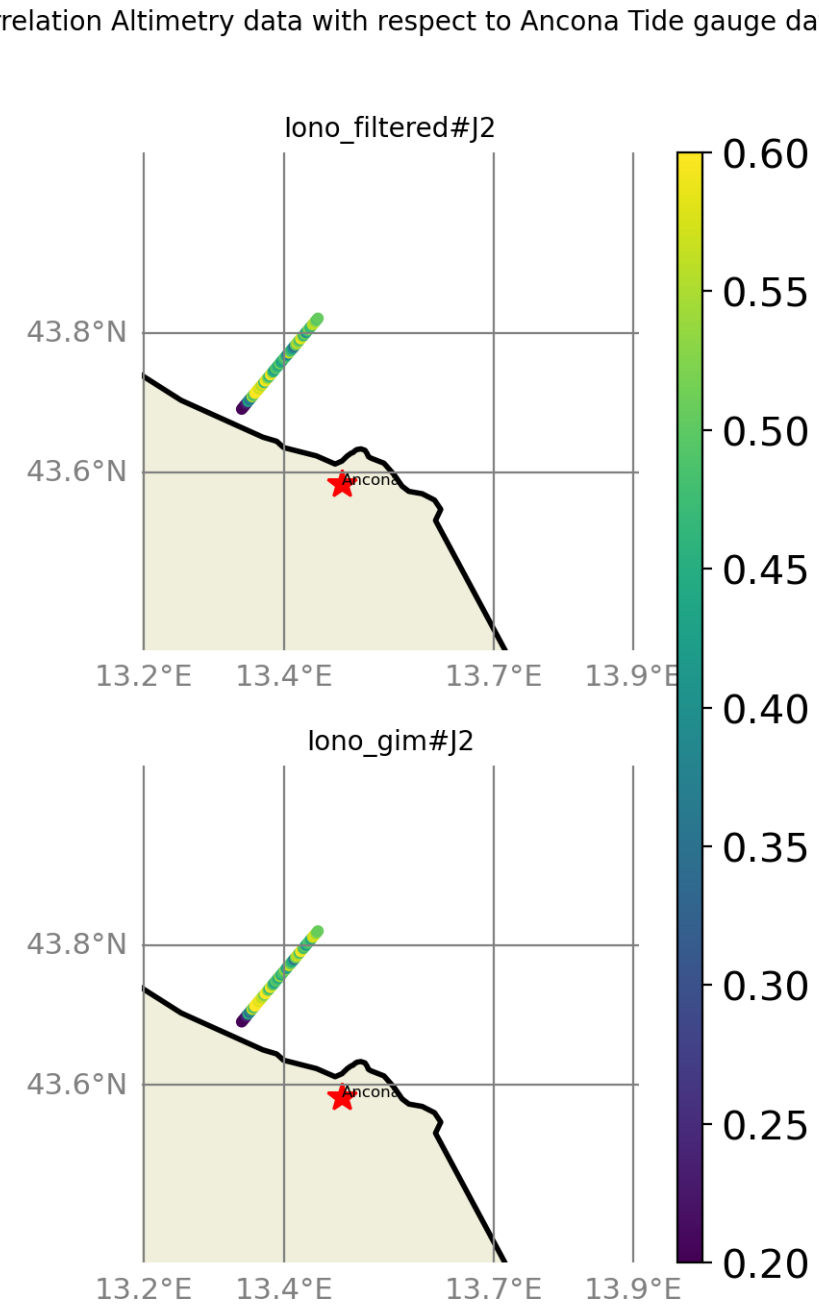

FIGURE 73 – correlation visualization in maps view % Ancona tide gauge

6.5.2 rmsd visualization in maps view % Ancona tide gauge

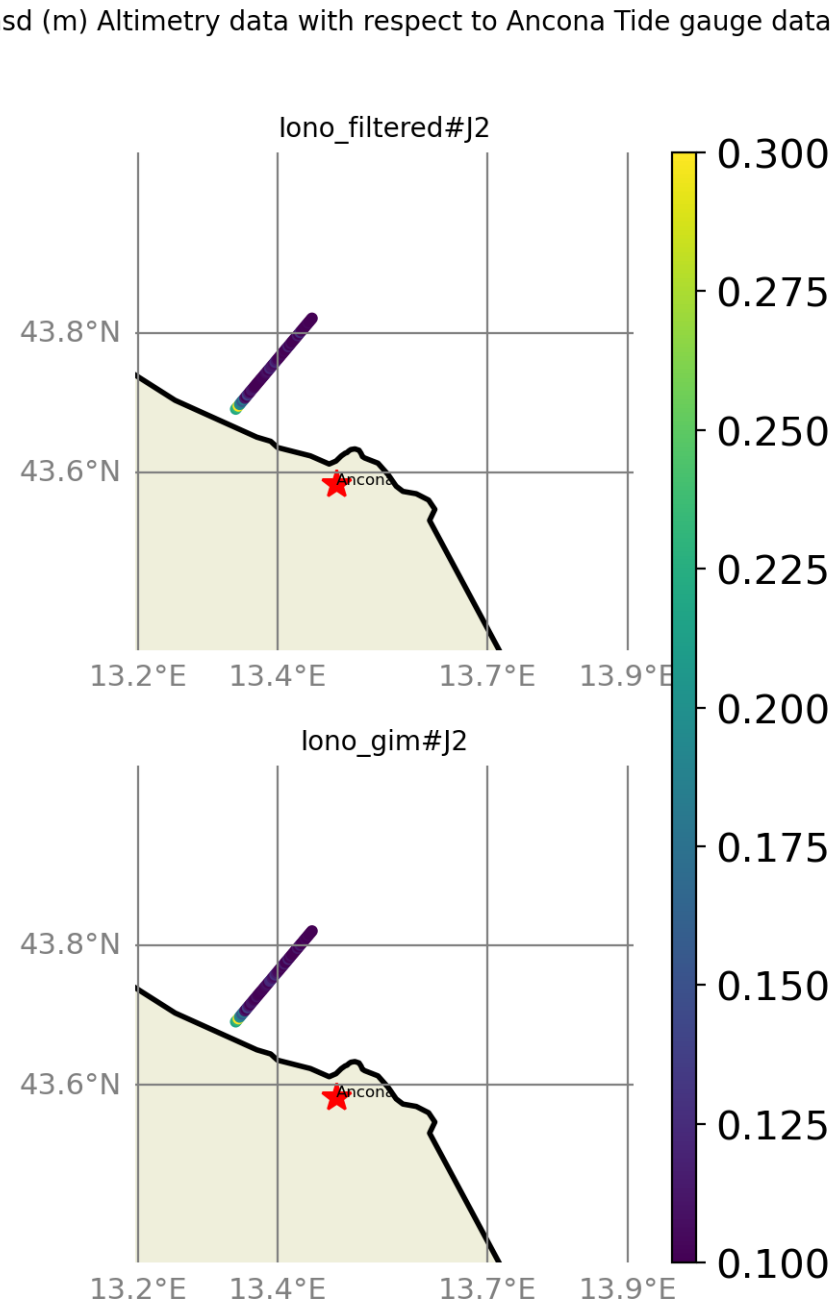

Figure 74 – rmsd visualization in maps view % Ancona tide gauge

6.5.3 std visualization in maps view % Ancona tide gauge

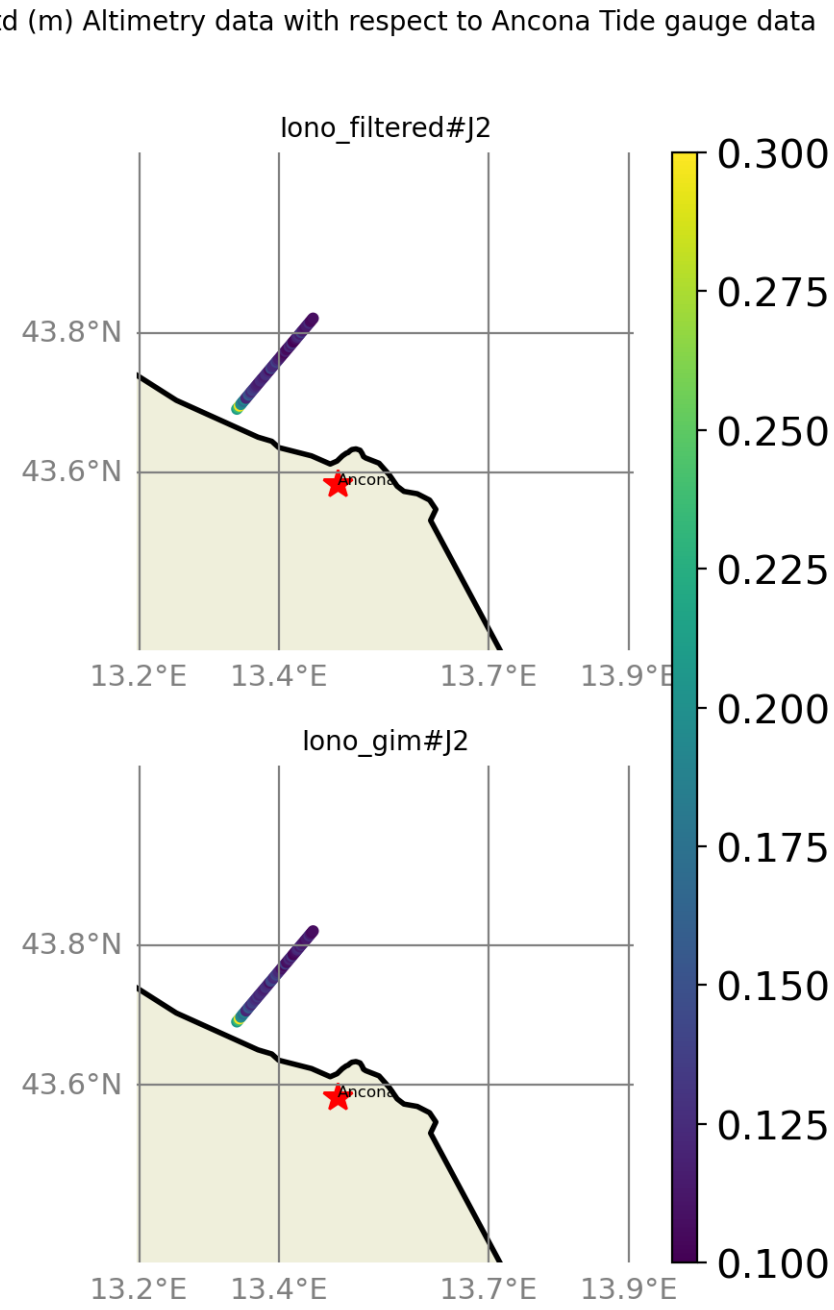

FIGURE 75 – std visualization in maps view % Ancona tide gauge

6.5.4 valid_data_percent visualization in maps view % Ancona tide gauge

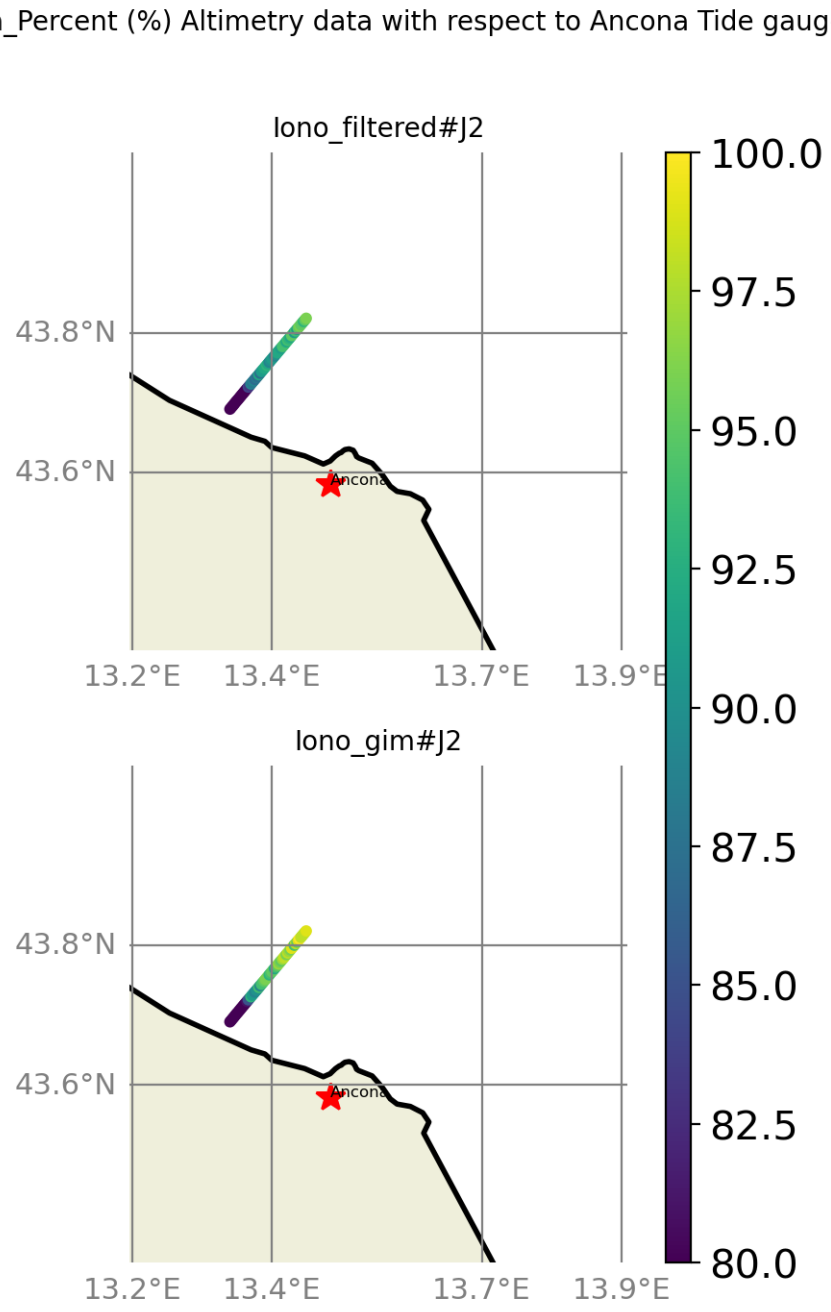

FIGURE 76 – valid_data_percent visualization in maps view % Ancona tide gauge

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

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

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

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

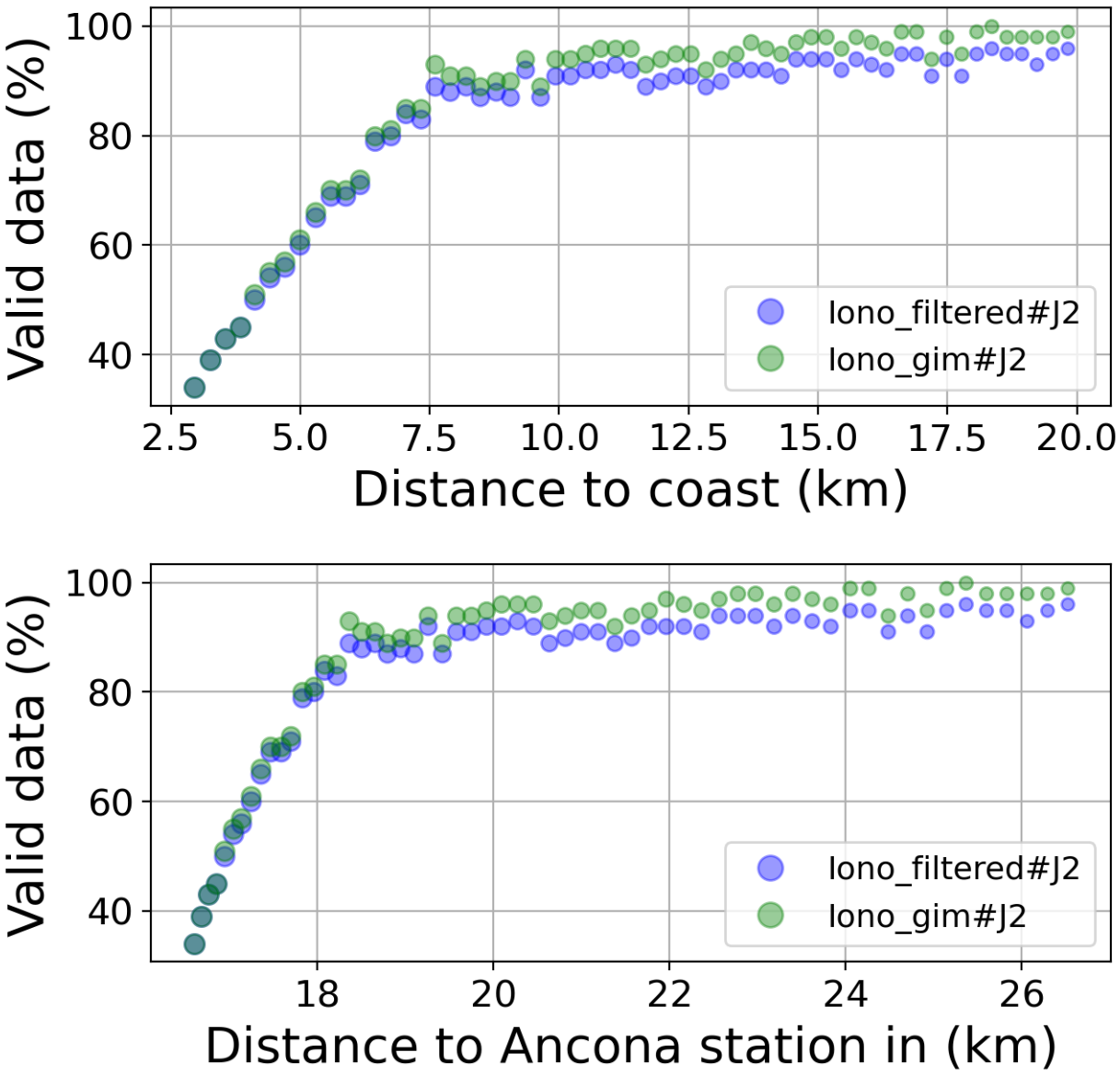

FIGURE 77 – Valid data (%) in function of distance to coast/Ancona station

6.5.6 Std in function of distance to coast/Ancona station

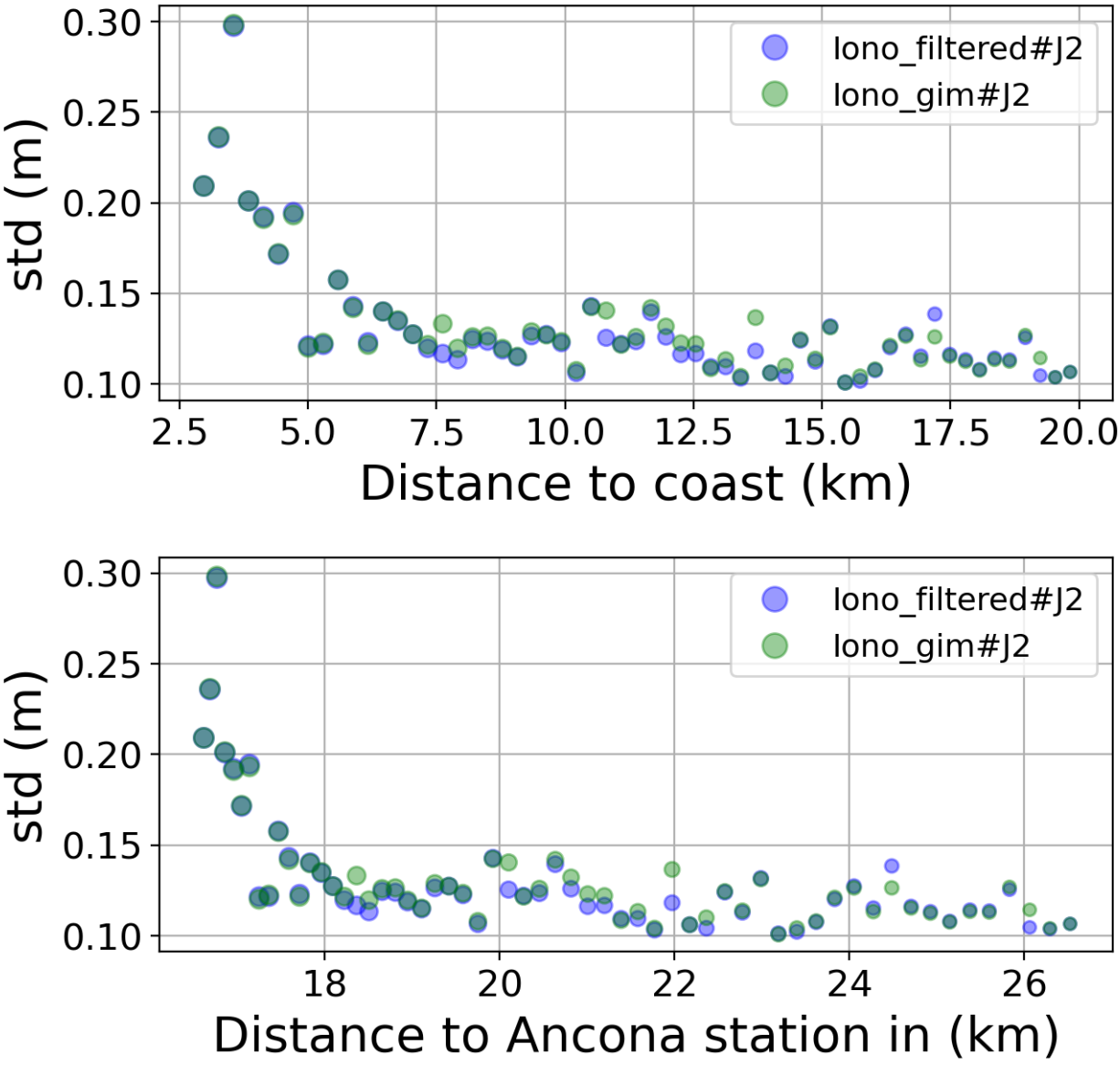

Figure 78 – Std in function of the distance to the coast/Ancona station

6.5.7 Correlation in function of distance to coast/Ancona station

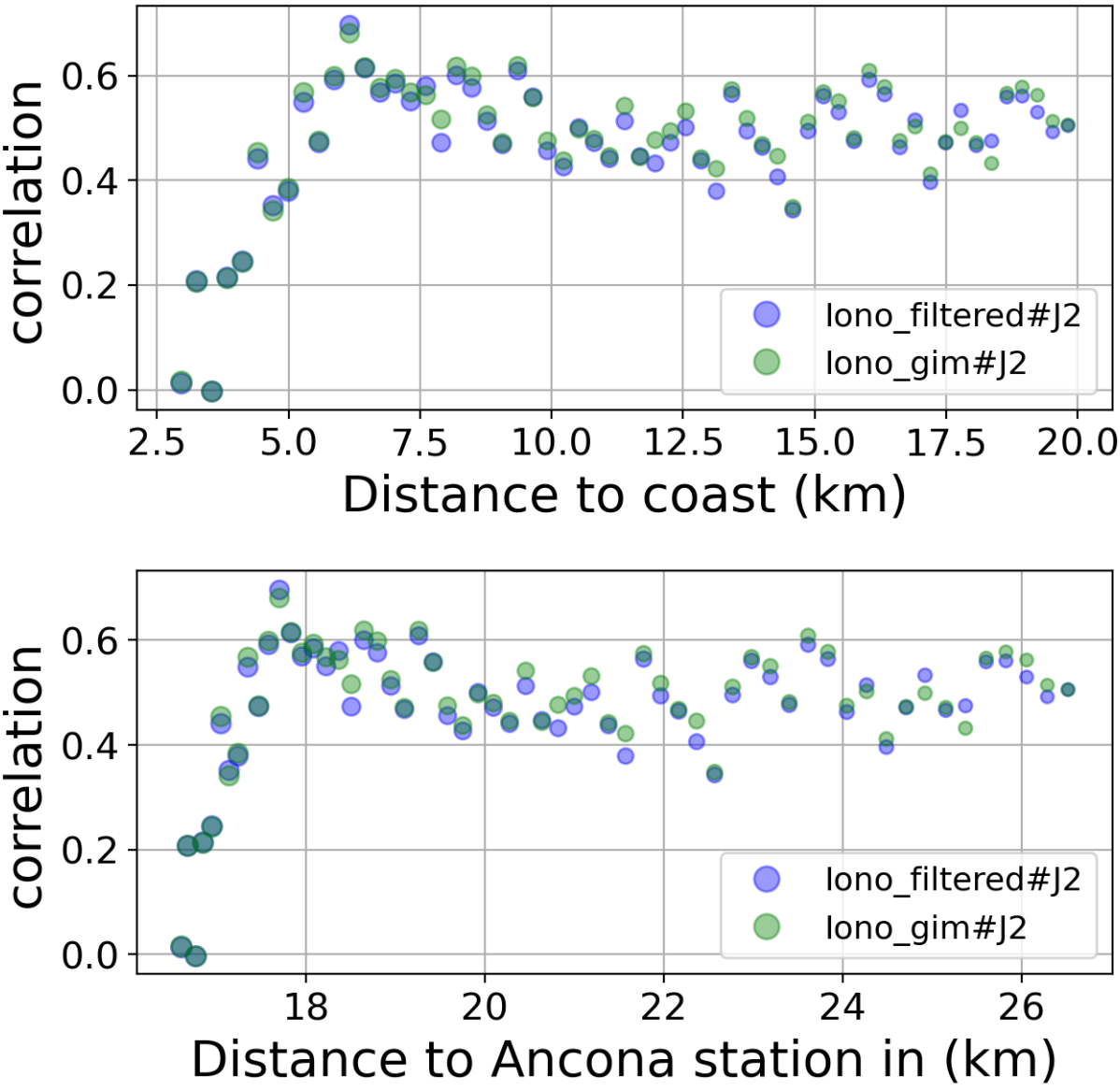

Figure 79 – Correlation in function of the distance to the coast/Ancona station

6.5.8 Taylor Diagram

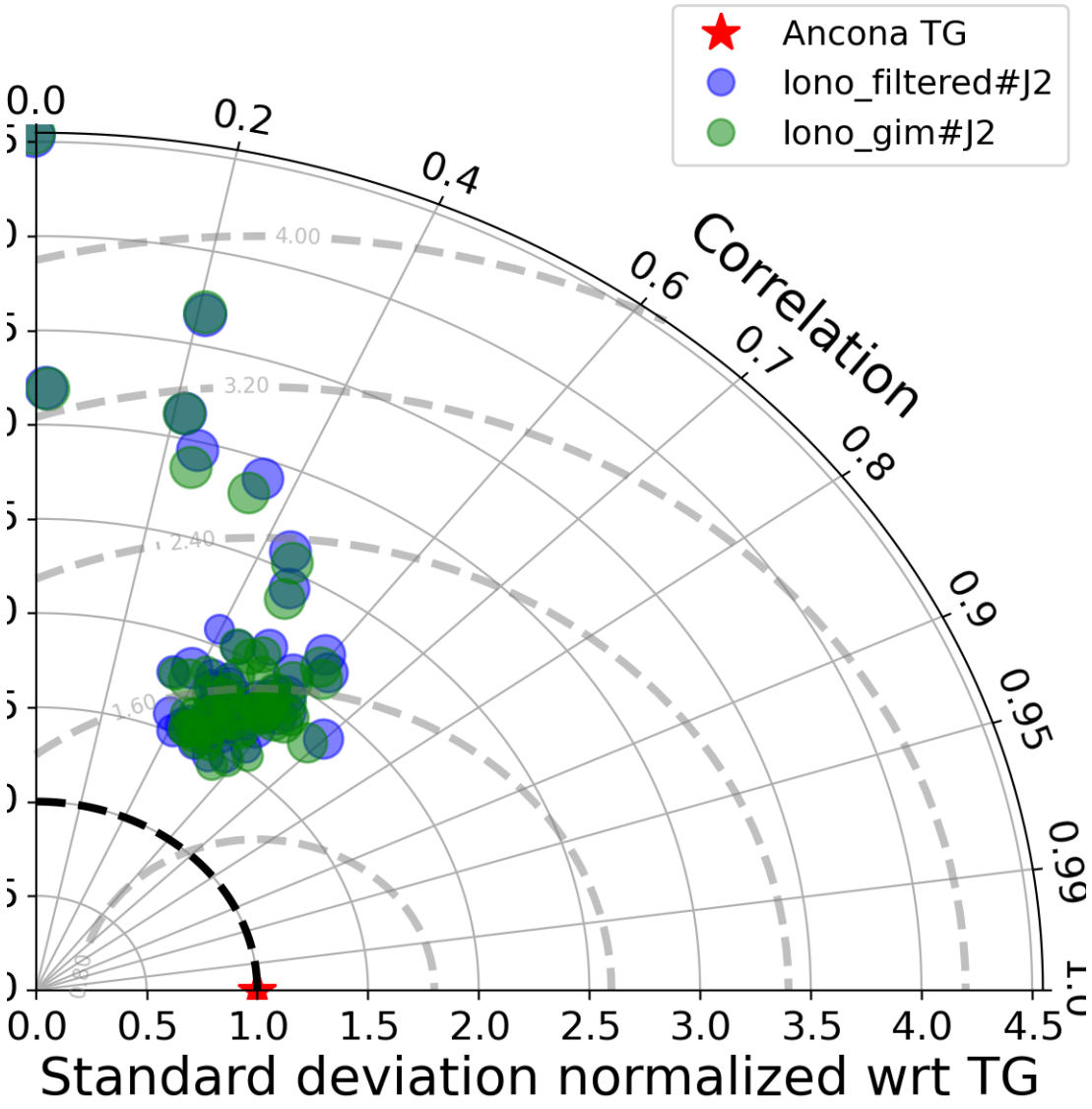

FIGURE 80 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	83.559	0.472	0.131	0.117
Iono_gim#J2	86.322	0.481	0.133	0.117

Figure 81 – Mean statistics table of the common points in the altimetry products

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

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

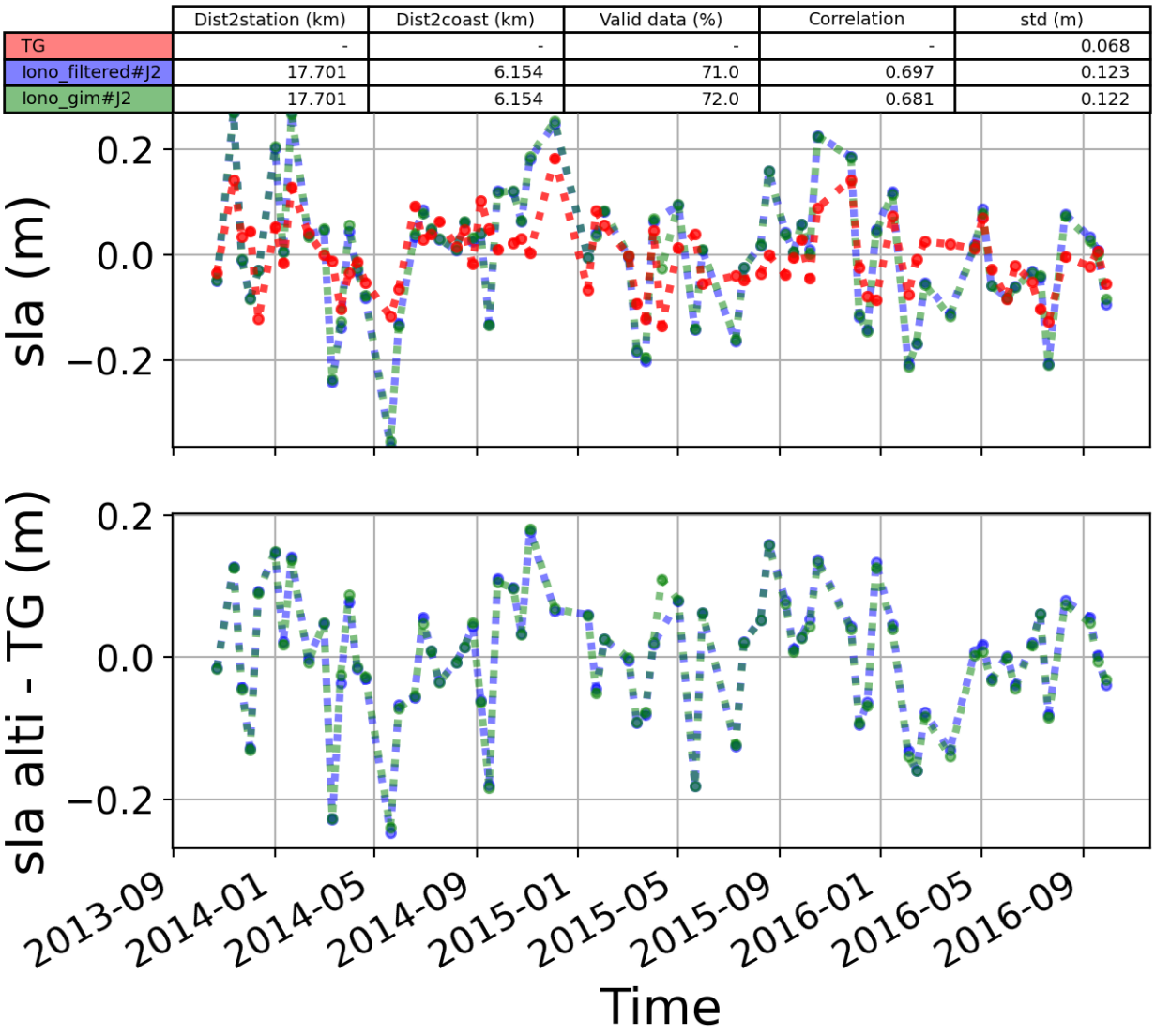

FIGURE 82 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

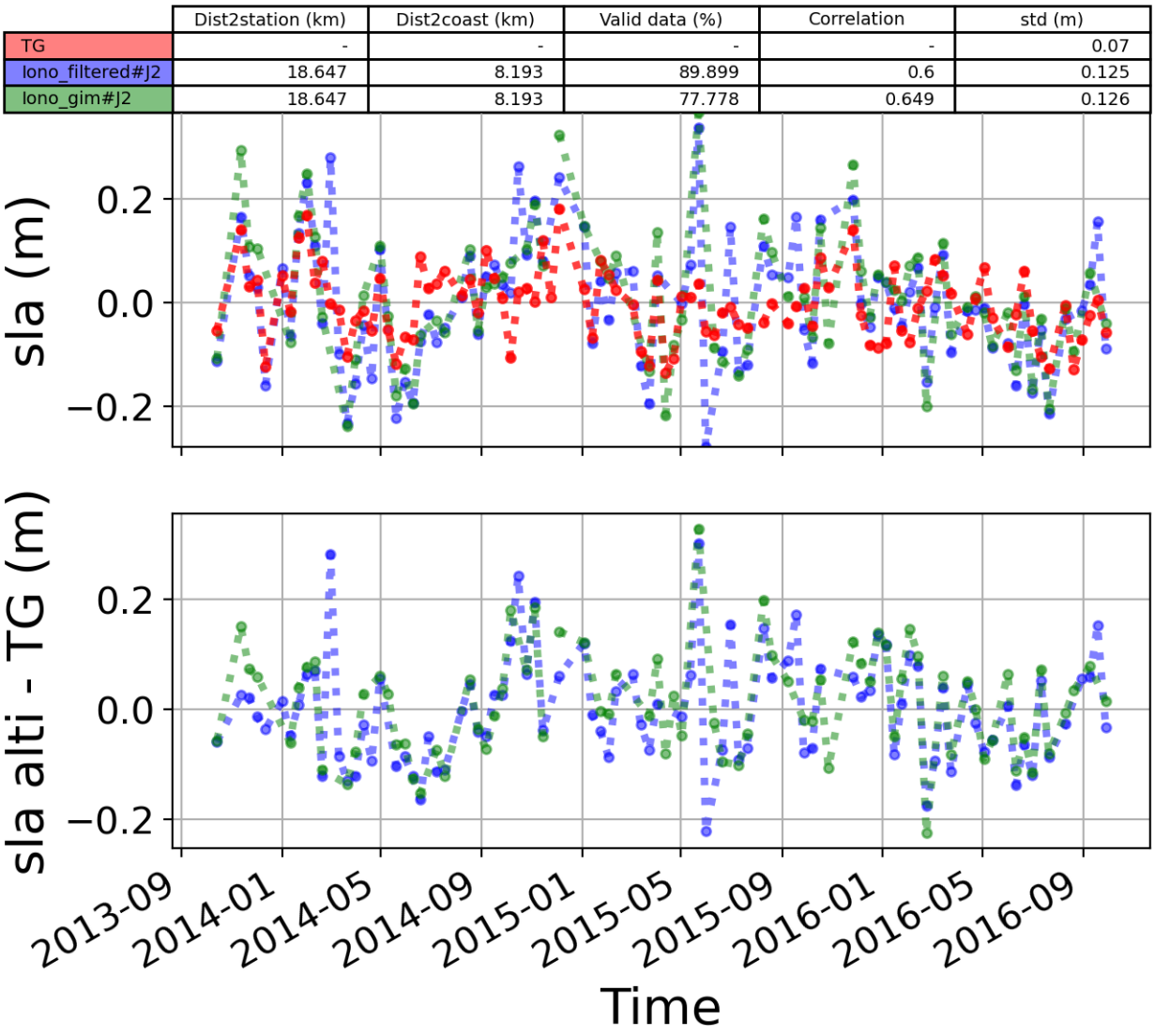

FIGURE 83 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.6 Station : Livourne

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

6.6.1 correlation visualization in maps view % Livourne tide gauge

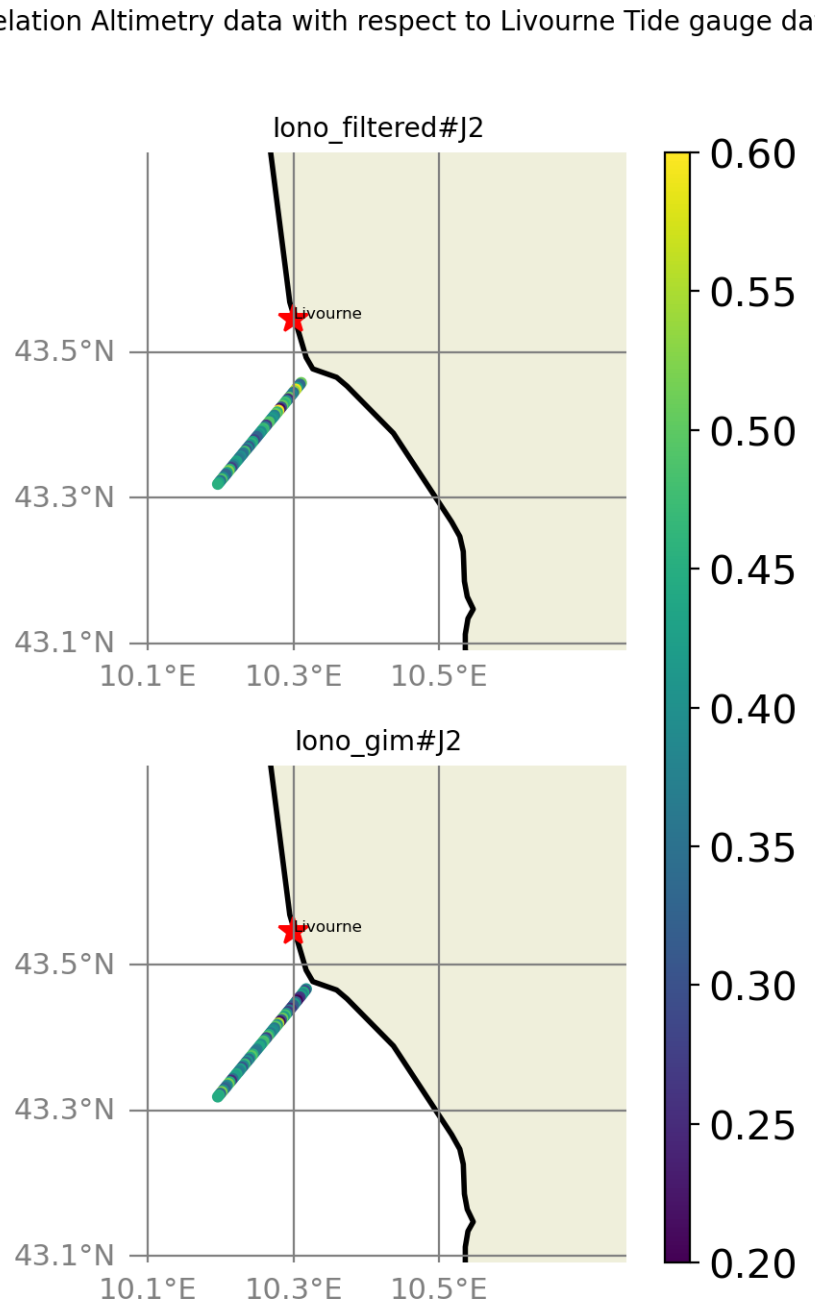

FIGURE 84 – correlation visualization in maps view % Livourne tide gauge

6.6.2 rmsd visualization in maps view % Livourne tide gauge

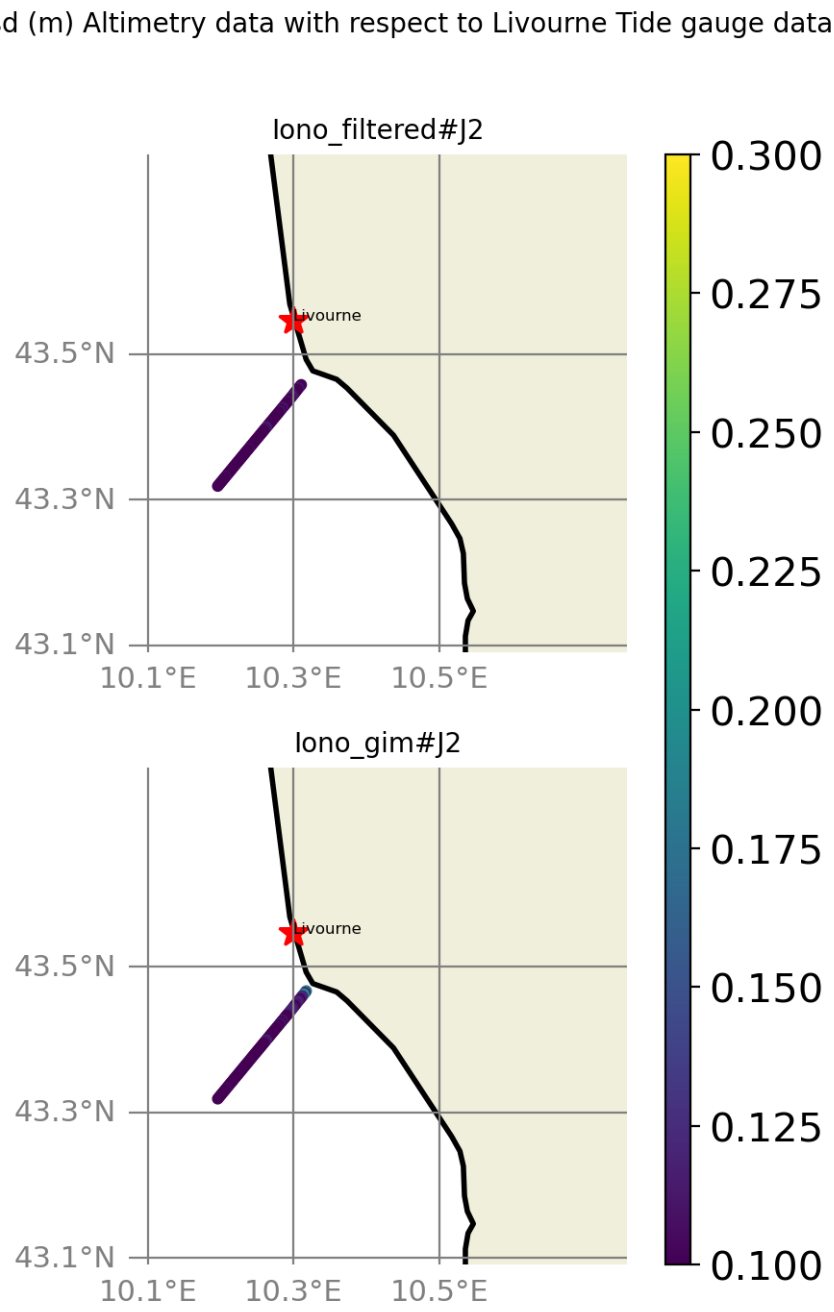

FIGURE 85 – rmsd visualization in maps view % Livourne tide gauge

6.6.3 std visualization in maps view % Livourne tide gauge

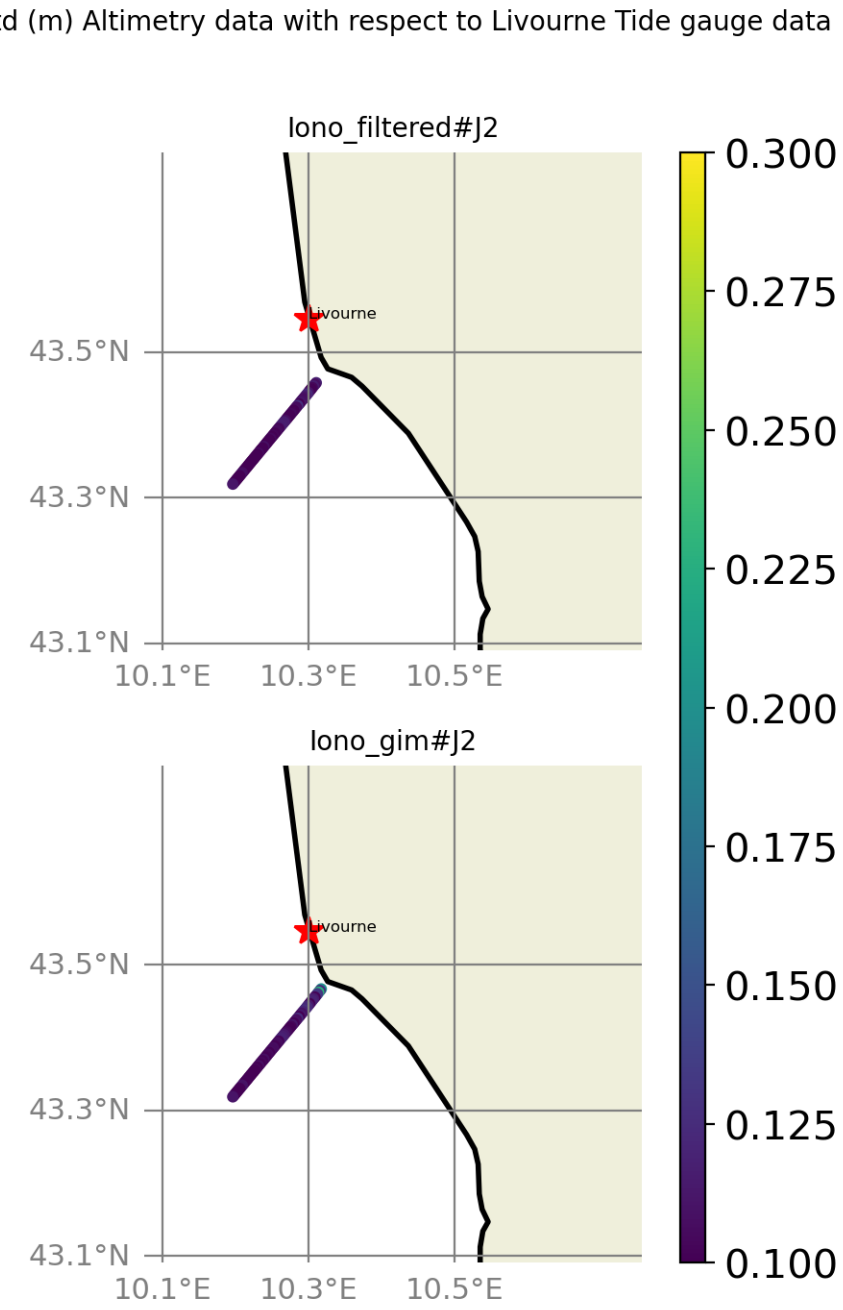

FIGURE 86 – std visualization in maps view % Livourne tide gauge

6.6.4 valid_data_percent visualization in maps view % Livourne tide gauge

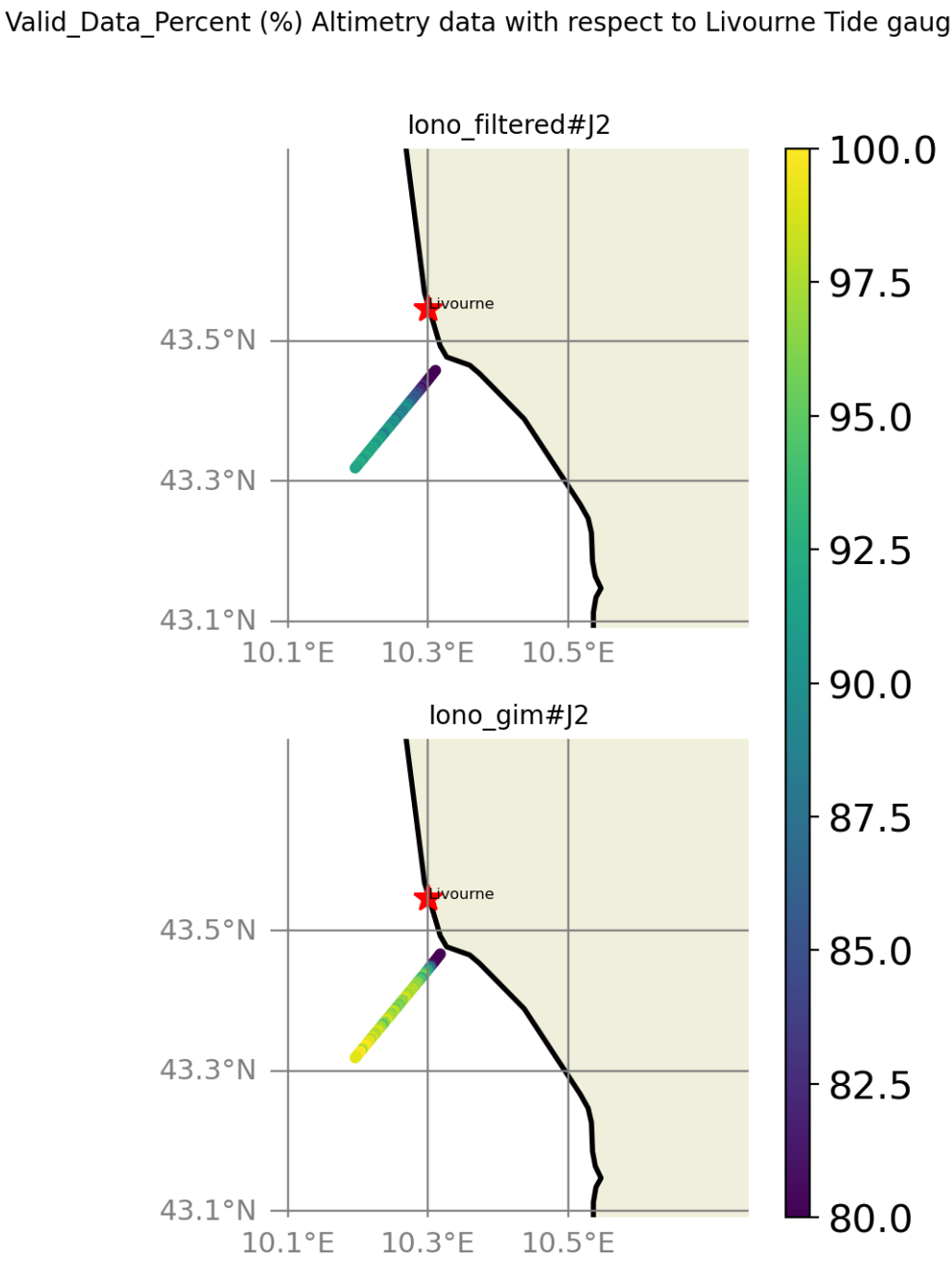

FIGURE 87 – valid_data_percent visualization in maps view % Livourne tide gauge

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

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

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

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

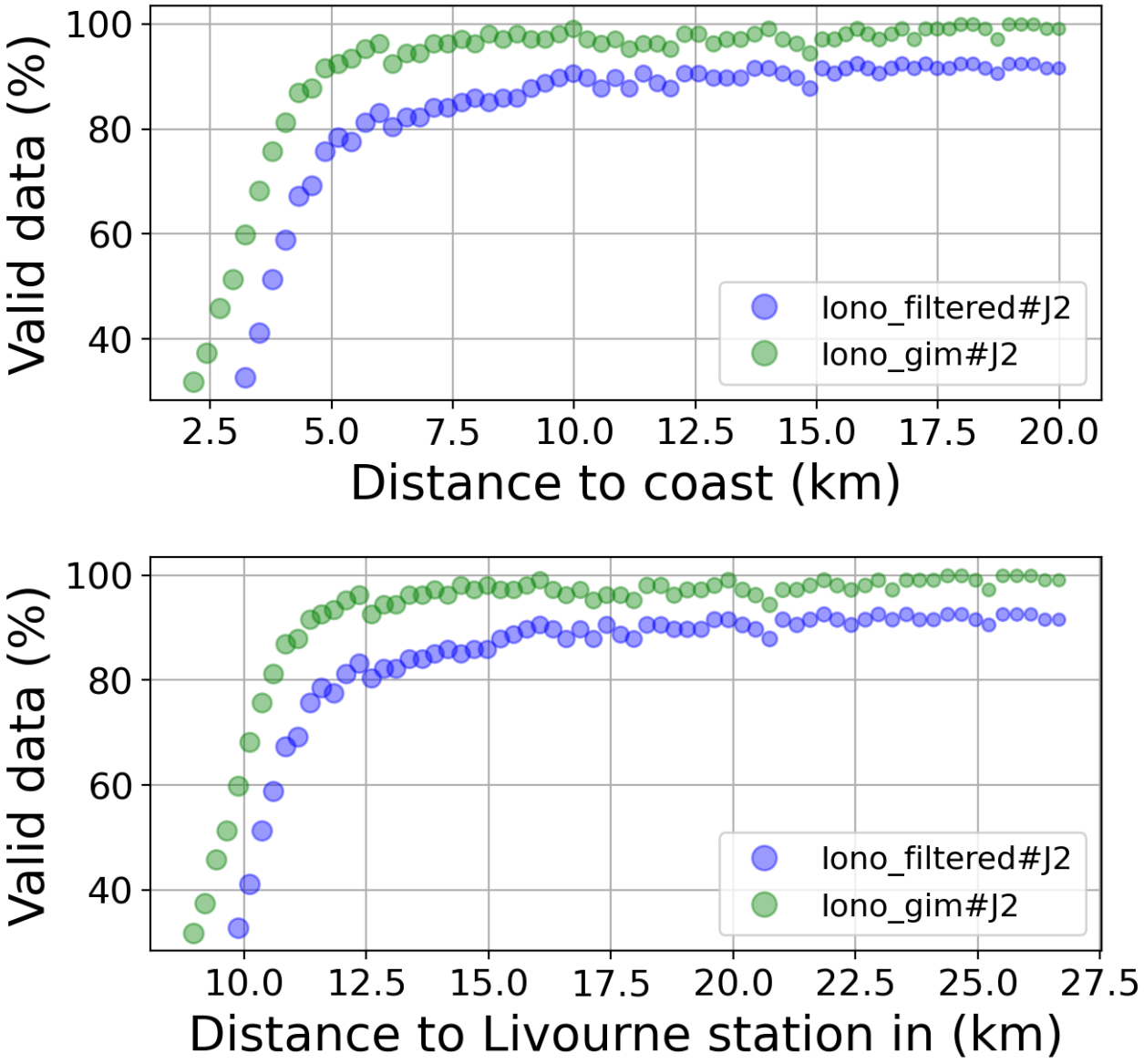

FIGURE 88 – Valid data (%) in function of distance to coast/Livourne station

6.6.6 Std in function of distance to coast/Livourne station

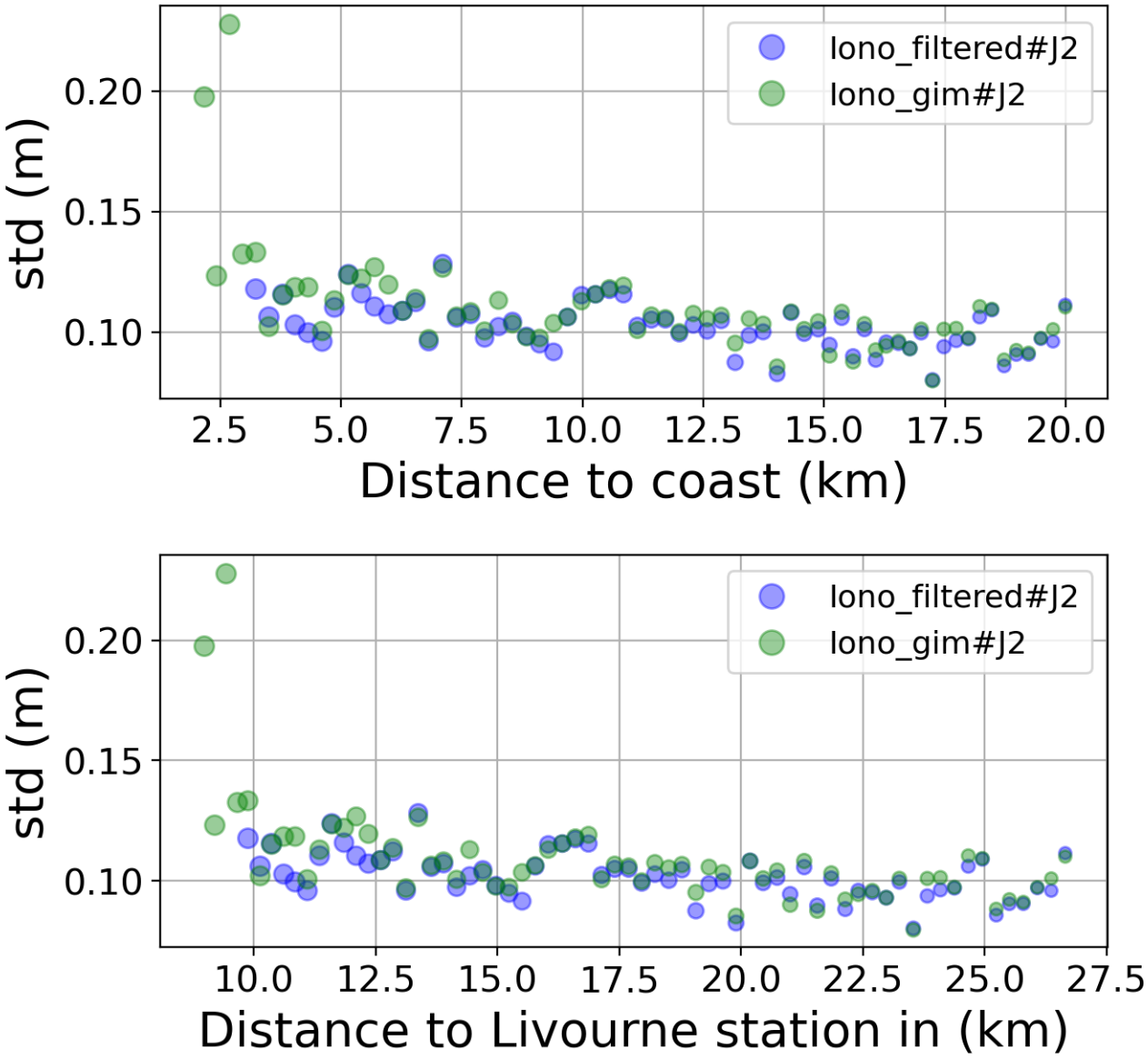

Figure 89 – Std in function of the distance to the coast/Livourne station

6.6.7 Correlation in function of distance to coast/Livourne station

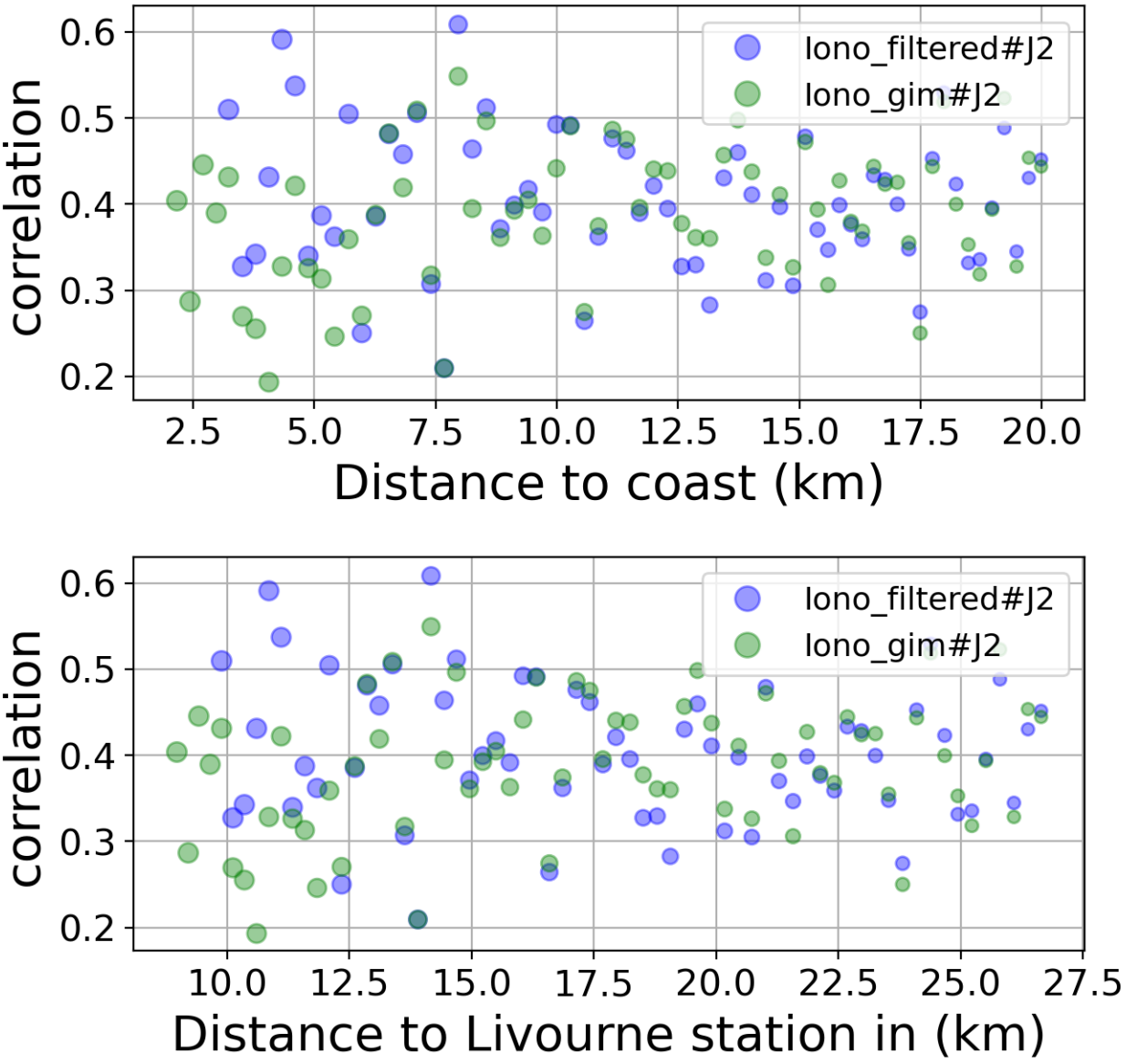

FIGURE 90 – Correlation in function of the distance to the coast/Livourne station

6.6.8 Taylor Diagram

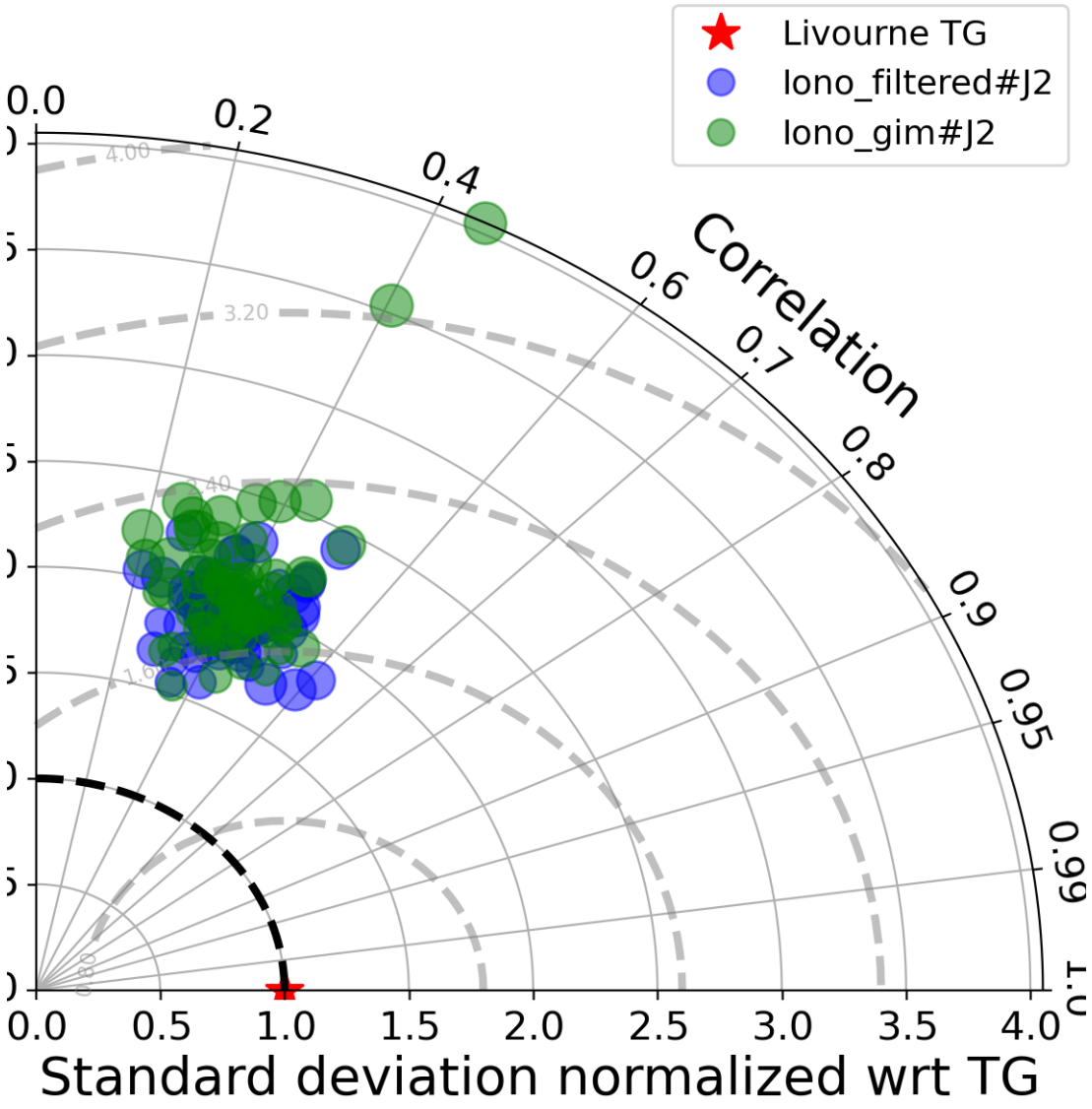

FIGURE 91 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	85.195	0.405	0.102	0.094
Iono_gim#J2	95.238	0.389	0.105	0.098

Figure 92 – 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 107 point.

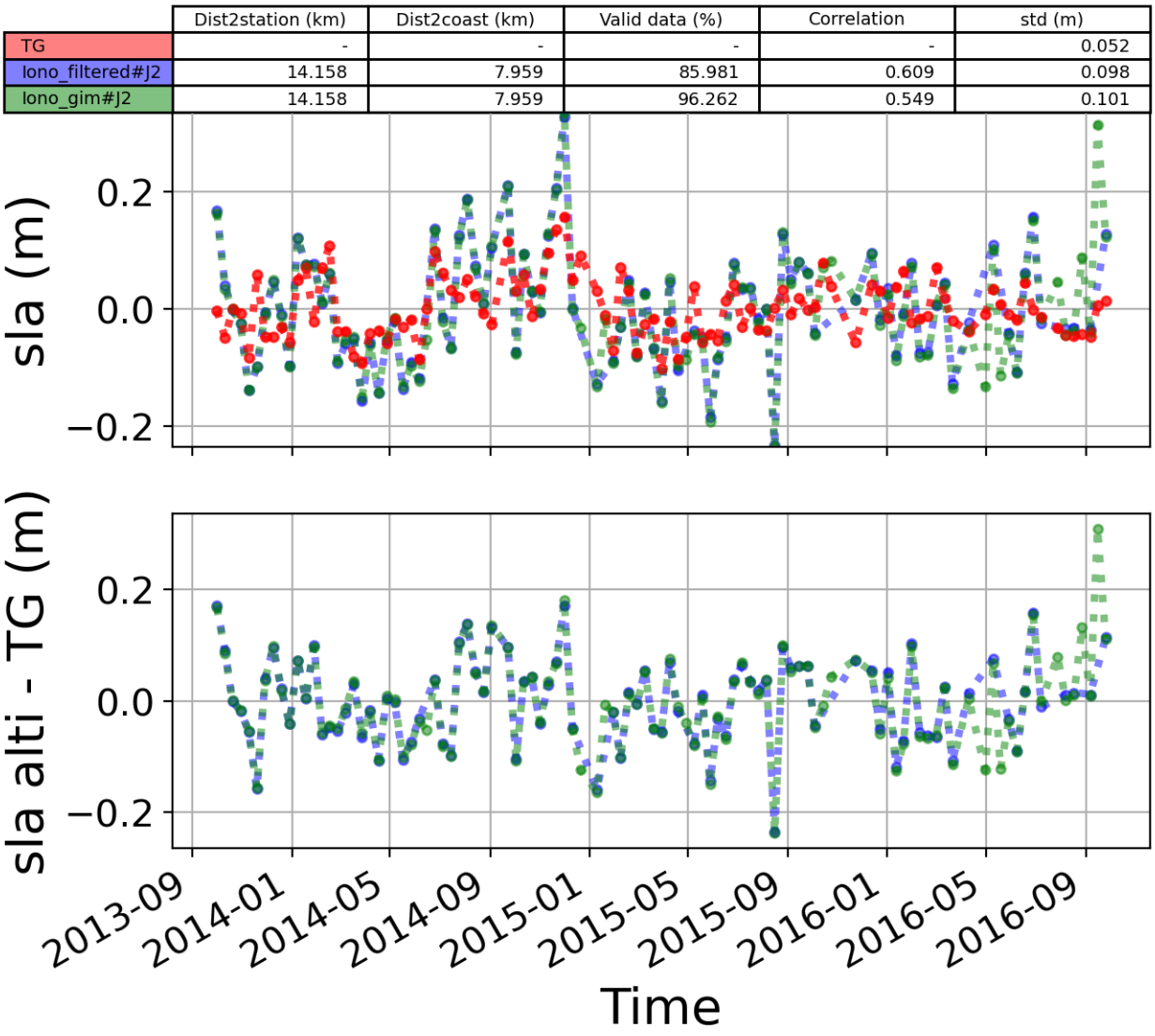

FIGURE 93 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

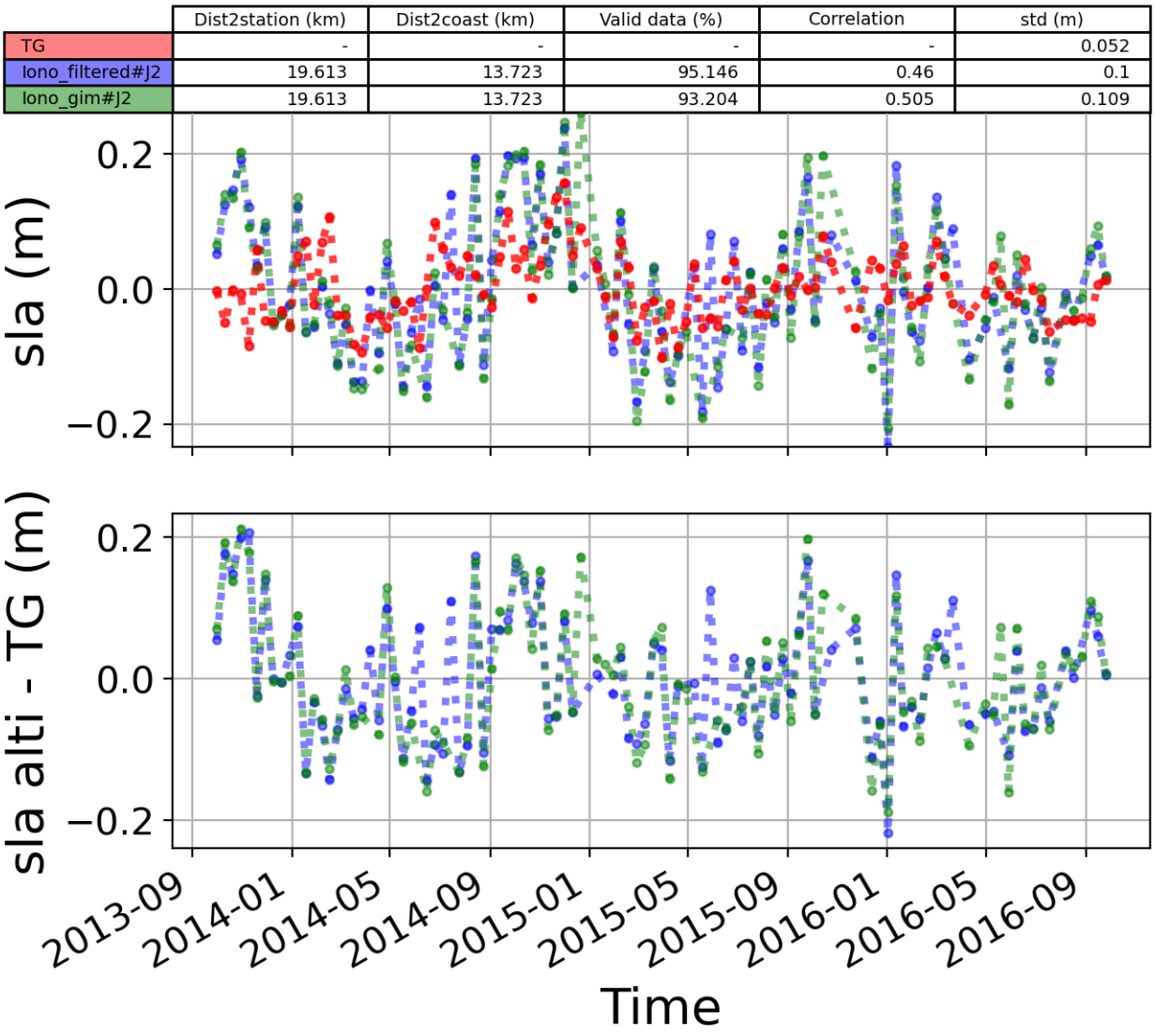

FIGURE 94 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.7 Station : MONACO_FONTVIEILLE

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

6.7.1 correlation visualization in maps view % MONACO_FONTVIEILLE tide gauge

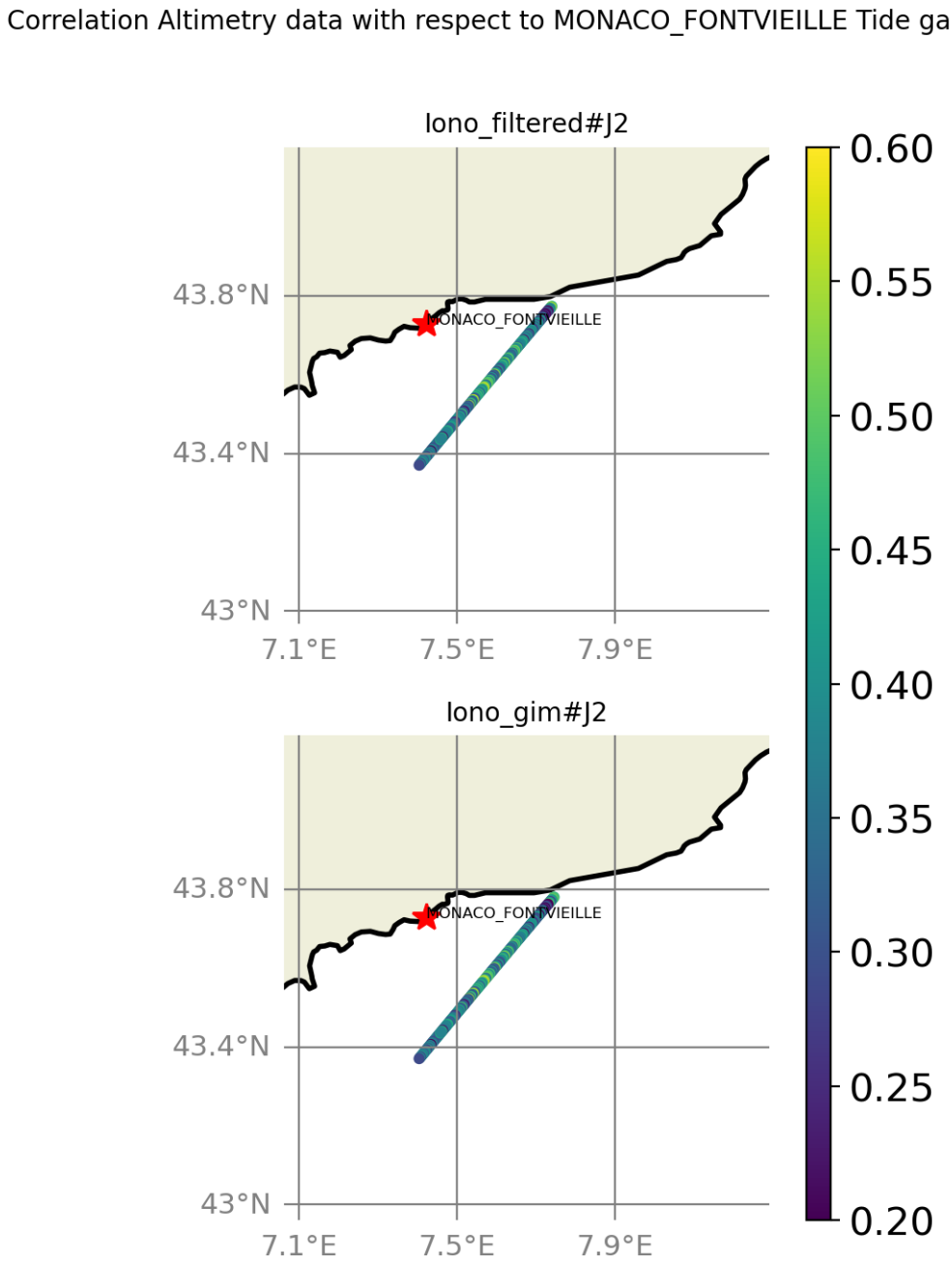

FIGURE 95 – correlation visualization in maps view % MONACO_FONTVIEILLE tide gauge

6.7.2 rmsd visualization in maps view % MONACO_FONTVIEILLE tide gauge

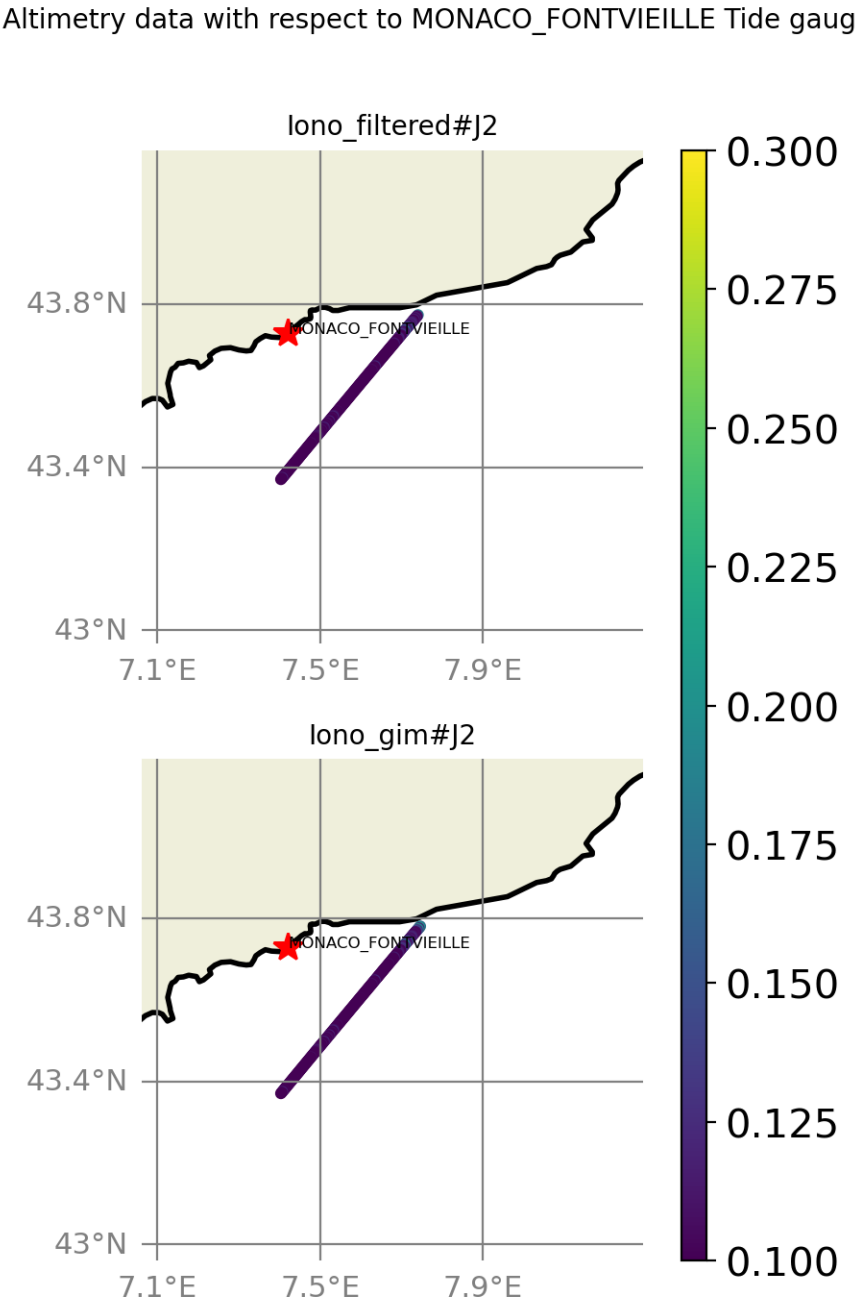

FIGURE 96 – rmsd visualization in maps view % MONACO_FONTVIEILLE tide gauge

6.7.3 std visualization in maps view % MONACO_FONTVIEILLE tide gauge

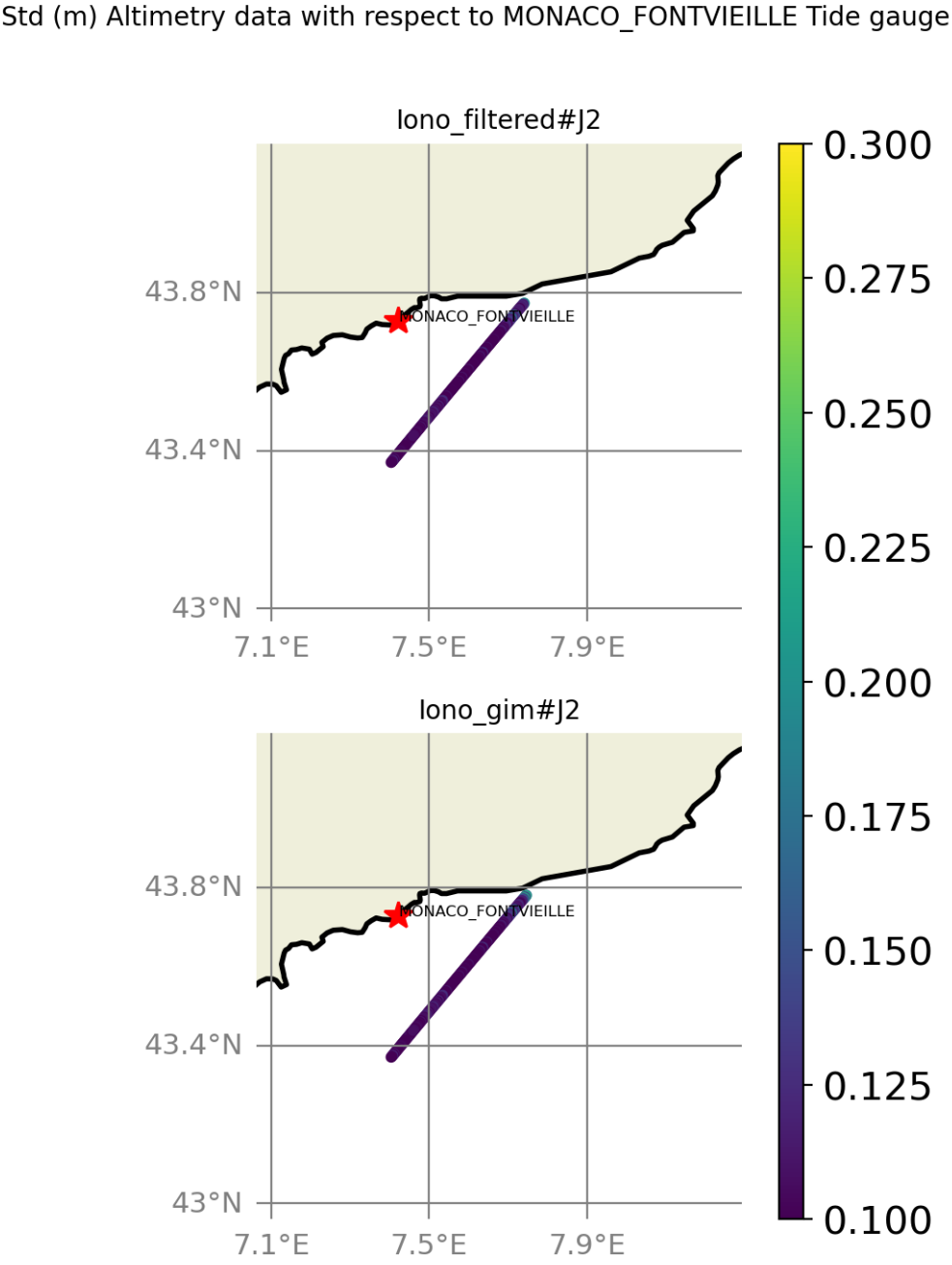

Figure 97 – std visualization in maps view % MONACO_FONTVIEILLE tide gauge

6.7.4 valid_data_percent visualization in maps view % MONACO_FONTVIEILLE tide gauge

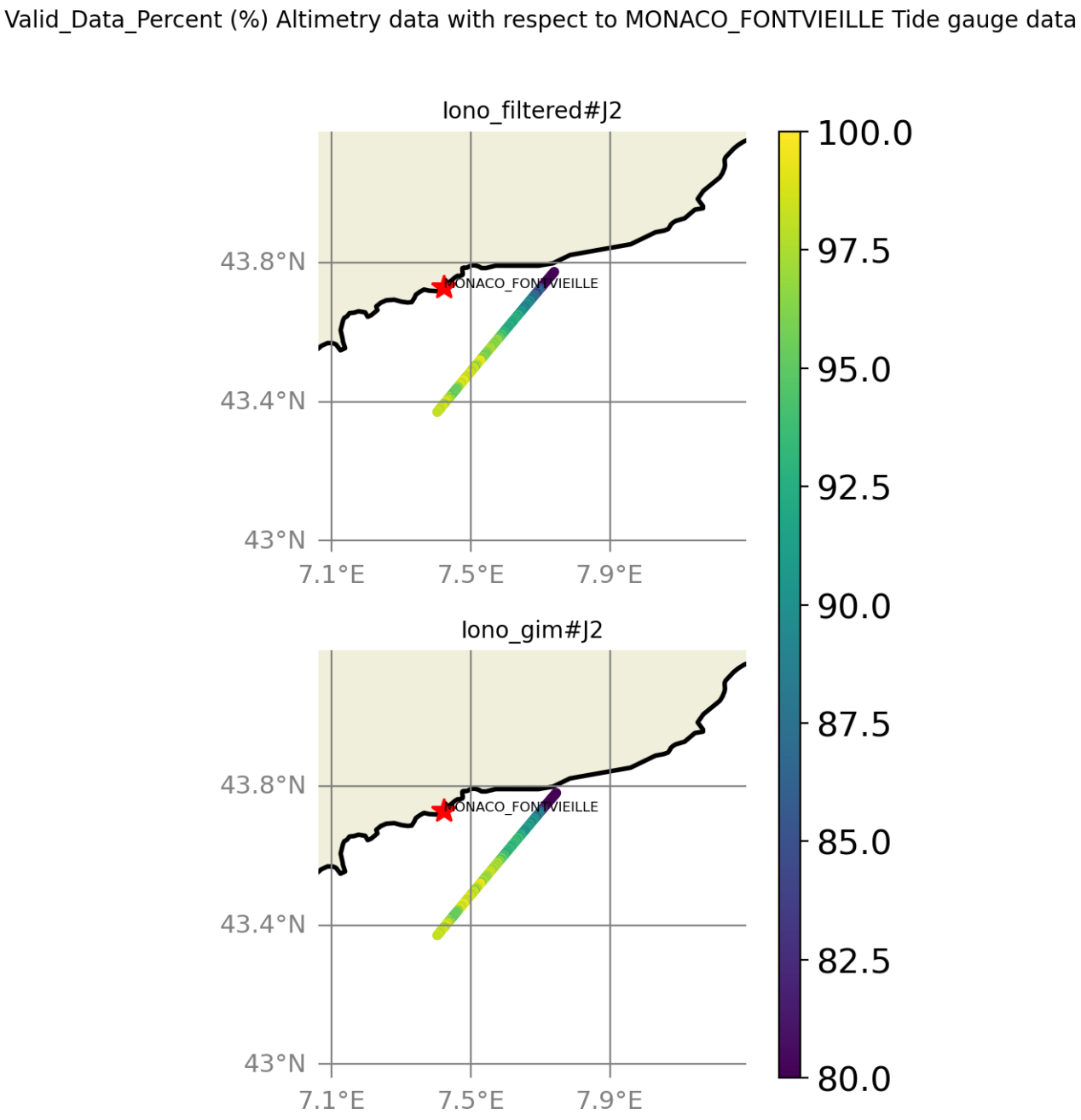

FIGURE 98 – valid_data_percent visualization in maps view % MONACO_FONTVIEILLE tide gauge

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

The formula to calculate the percentage of valid data in each time 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. $maxNB = 107$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

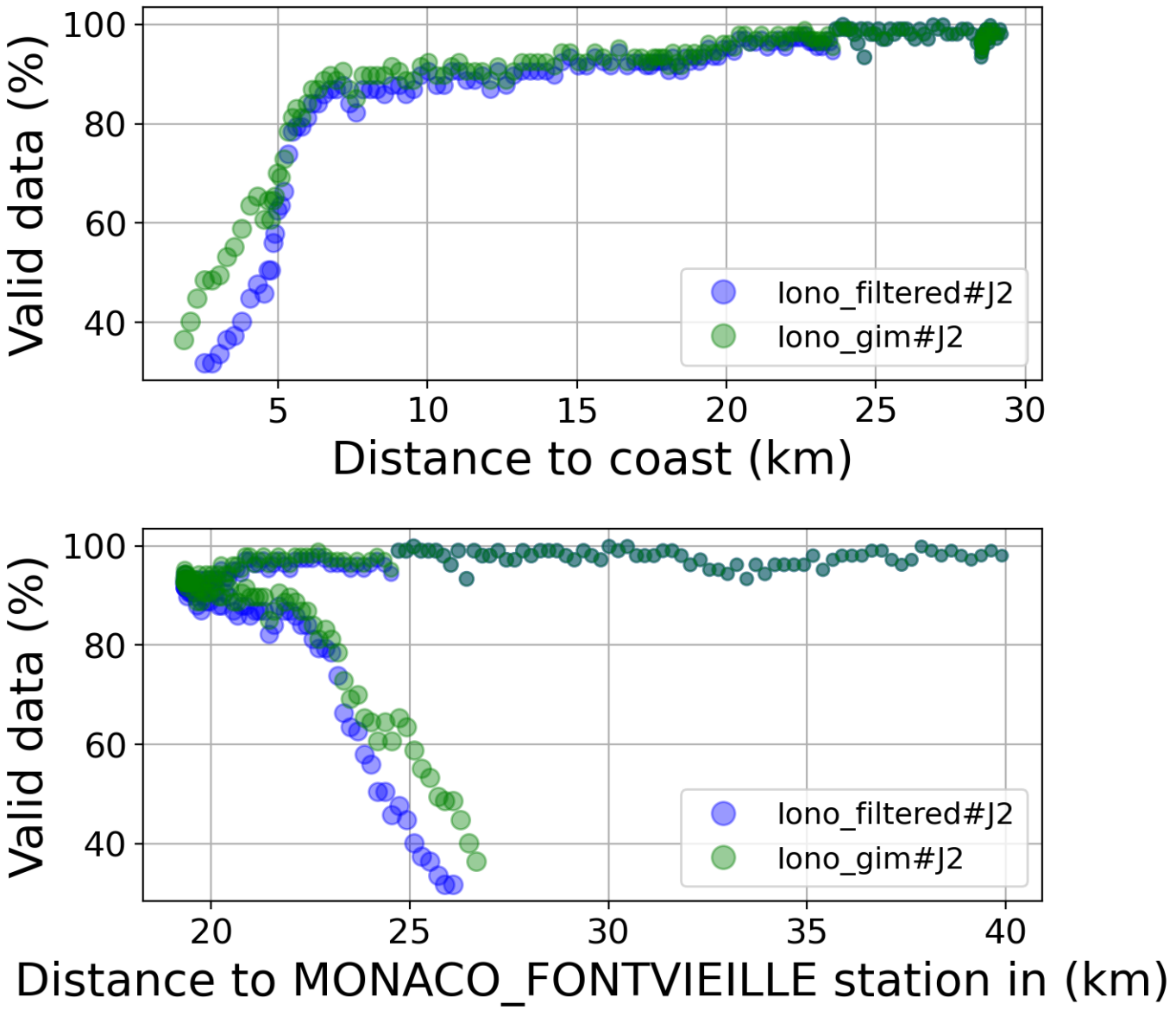

Figure 99 – Valid data (%) in function of distance to coast/MONACO_FONTVIEILLE station

6.7.6 Std in function of distance to coast/MONACO_FONTVIEILLE station

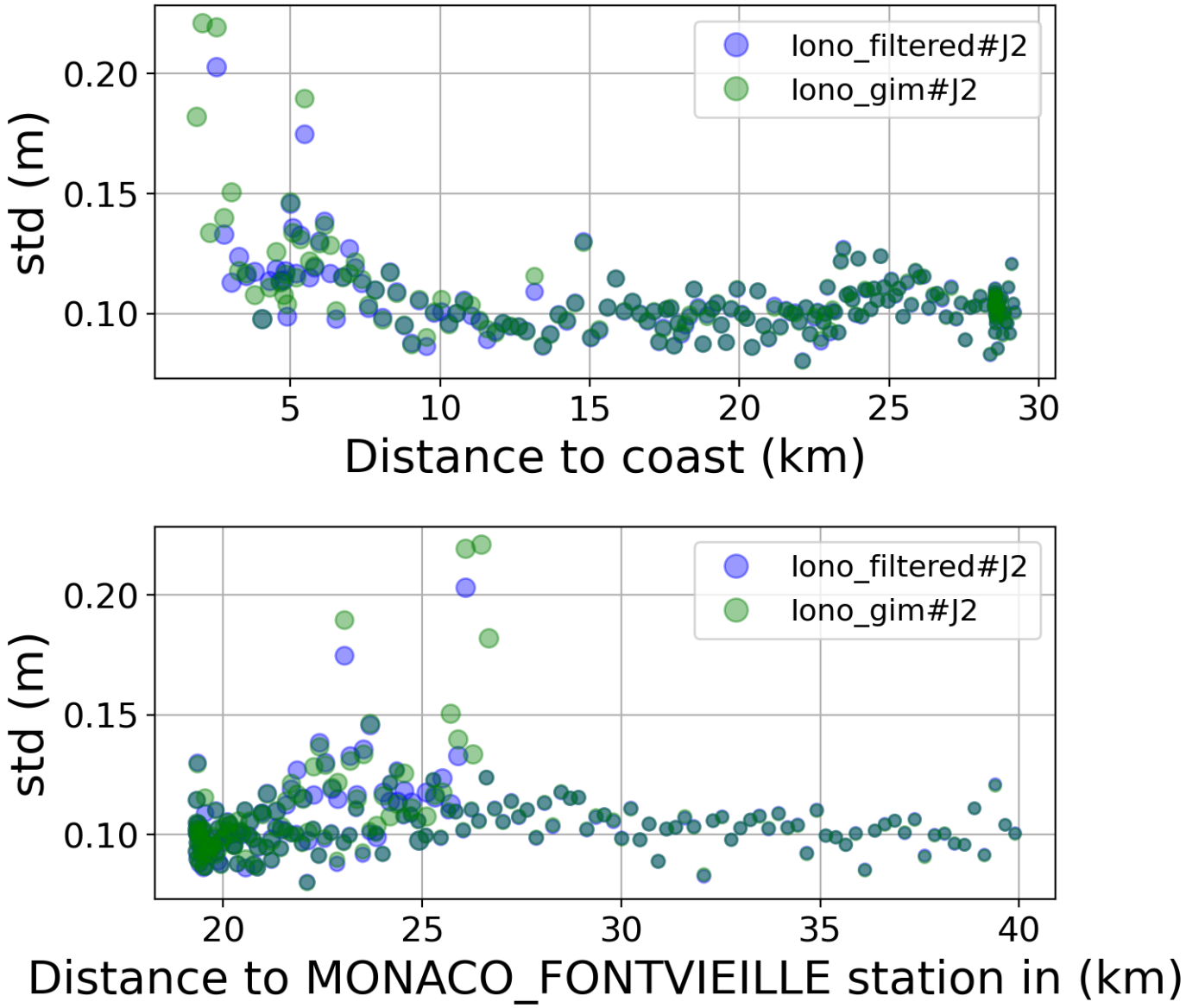

FIGURE 100 – Std in function of the distance to the coast/MONACO_FONTVIEILLE station

6.7.7 Correlation in function of distance to coast/MONACO_FONTVIEILLE station

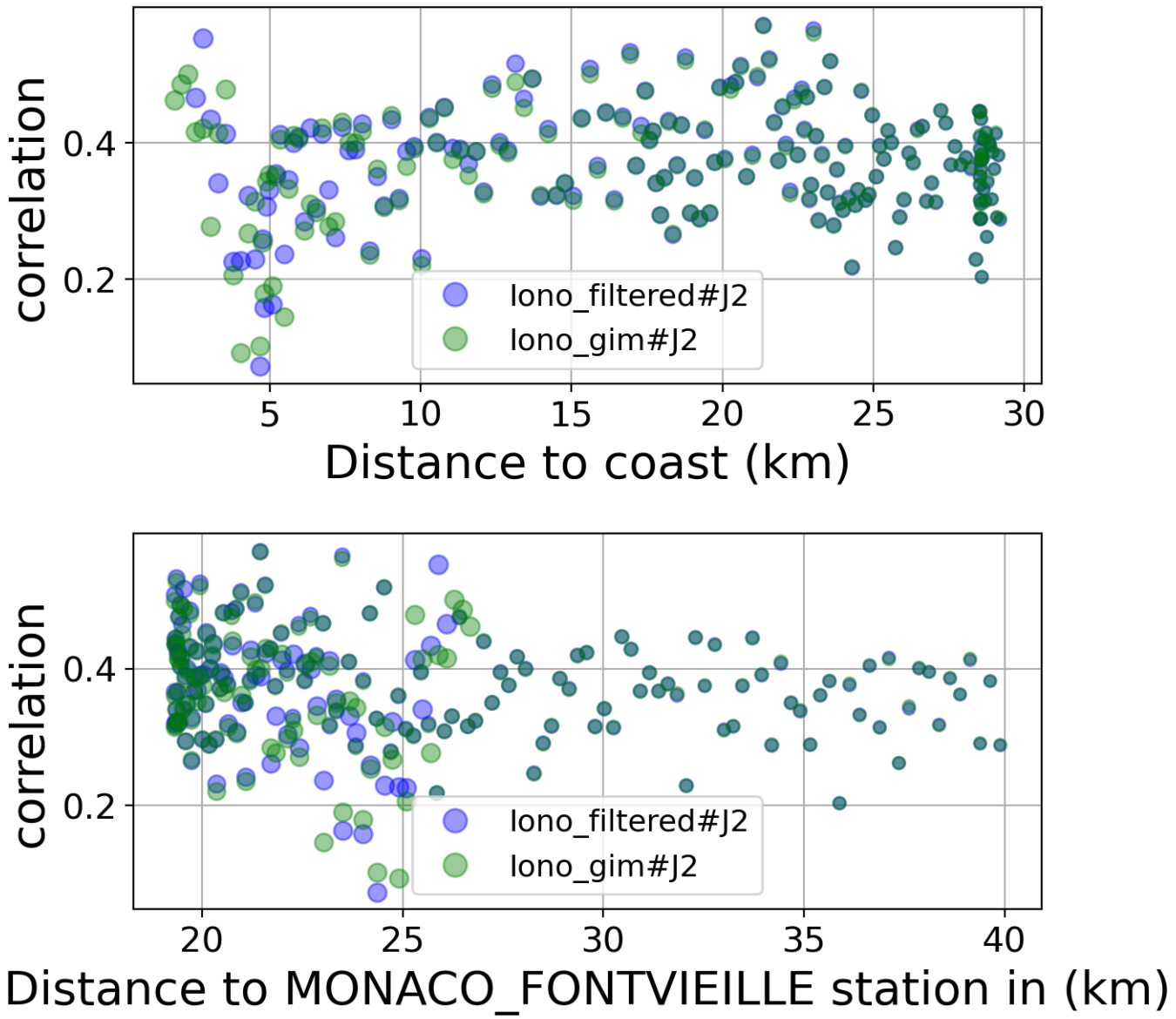

FIGURE 101 – Correlation in function of the distance to the coast/MONACO_FONTVIEILLE station

6.7.8 Taylor Diagram

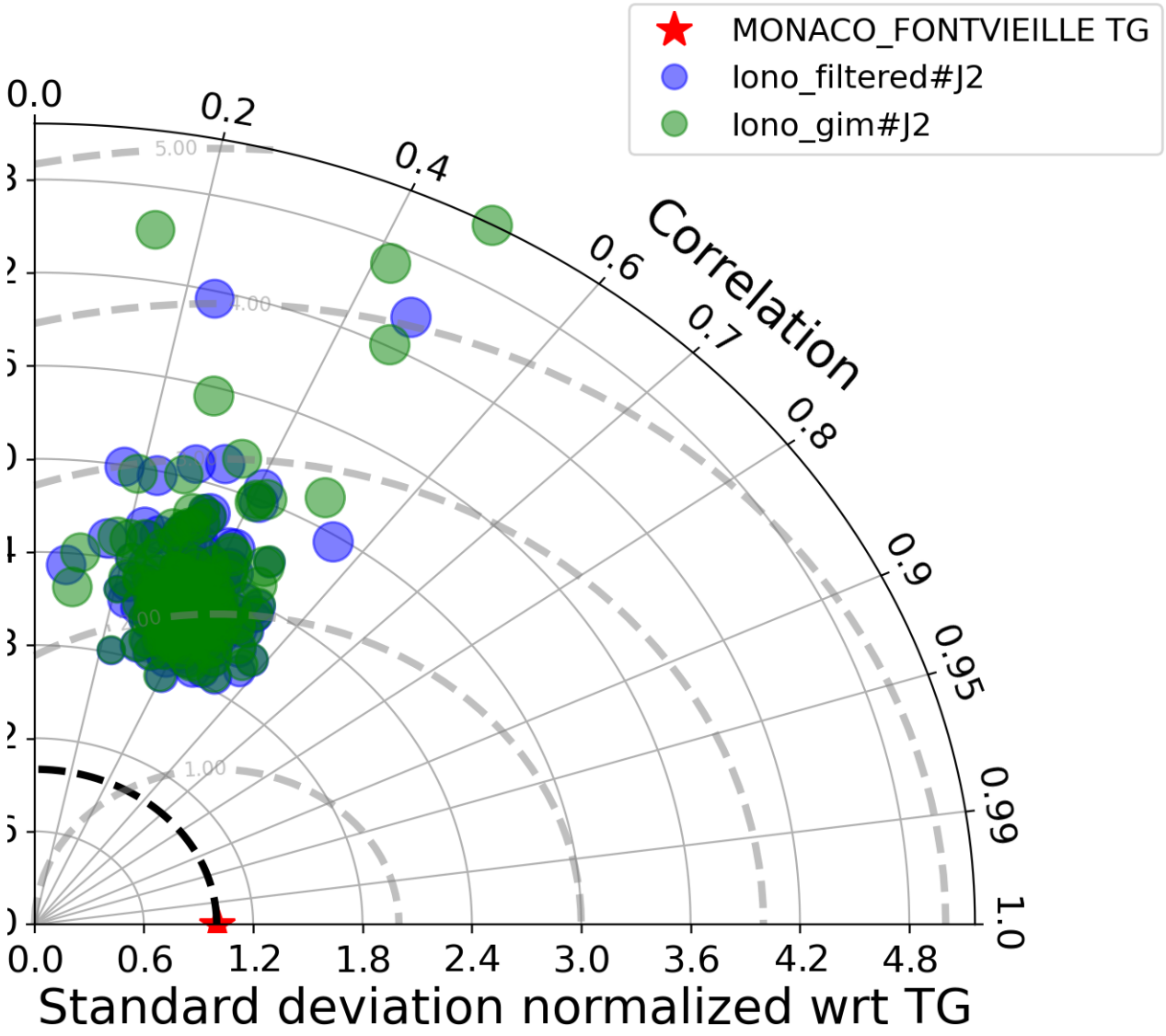

Figure 102 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	89.875	0.373	0.105	0.098
Iono_gim#J2	91.852	0.369	0.106	0.099

FIGURE 103 – Mean statistics table of the common points in the altimetry products

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

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

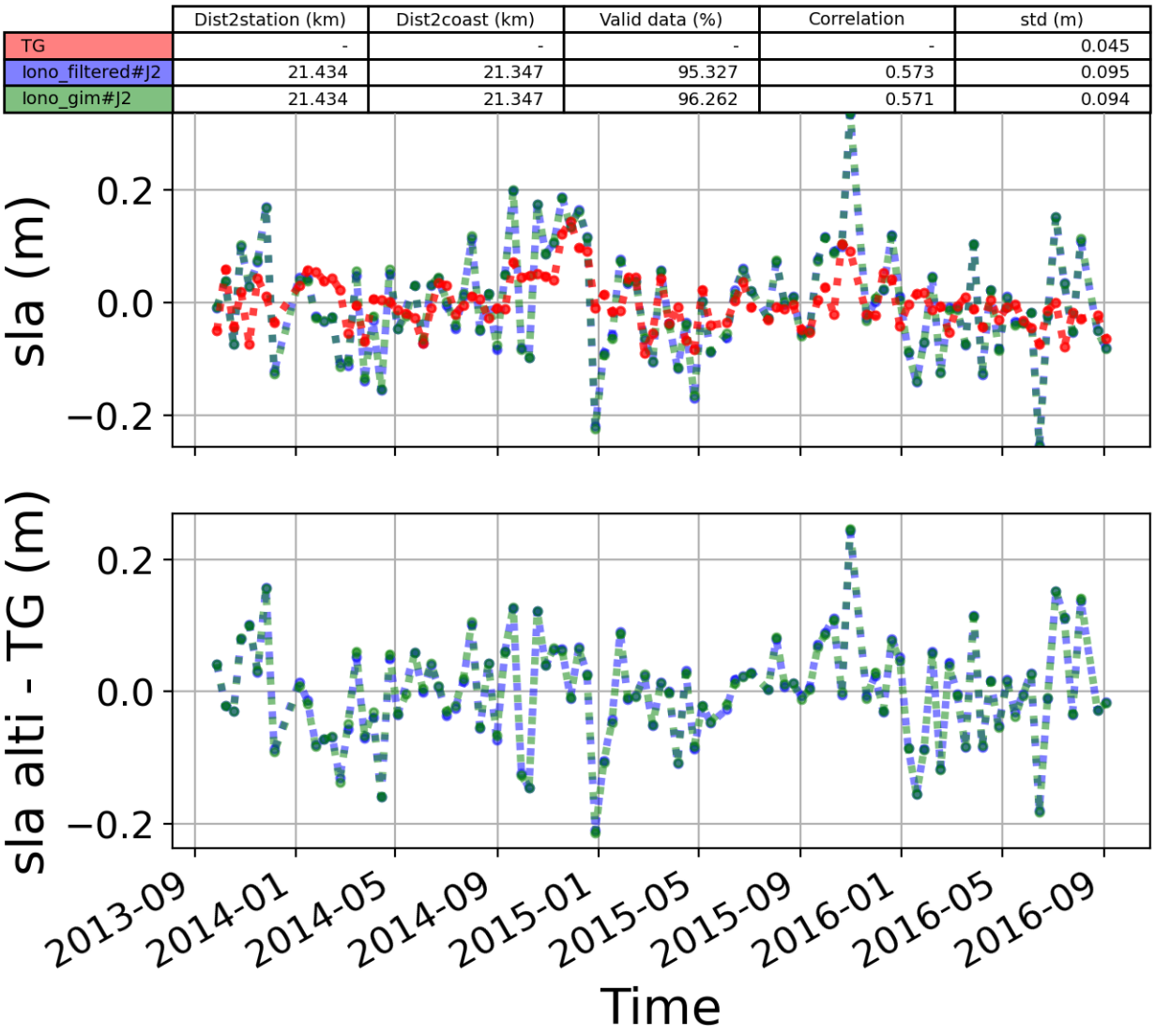

FIGURE 104 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

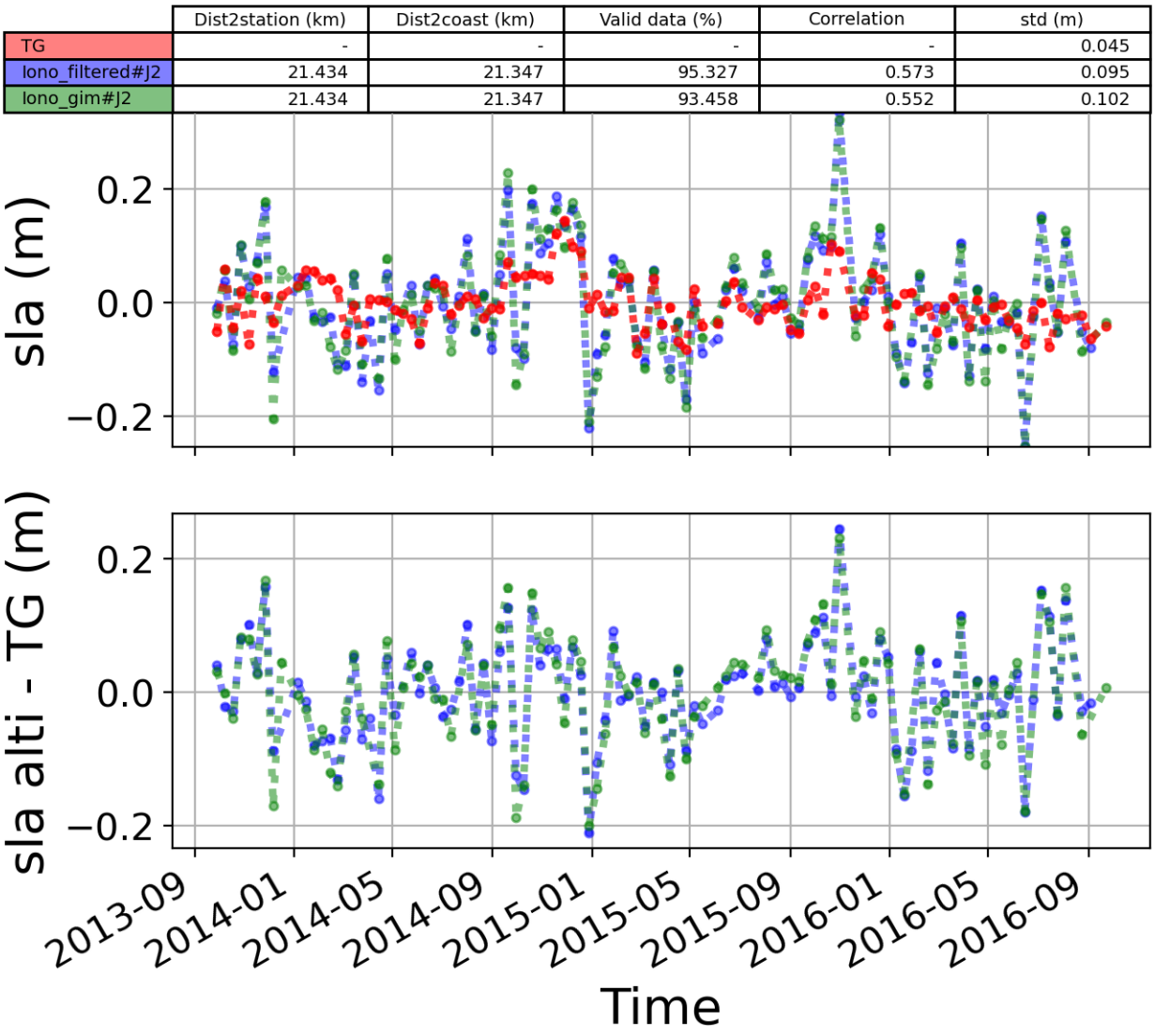

FIGURE 105 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.8 Station : Erdemli

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

6.8.1 correlation visualization in maps view % Erdemli tide gauge

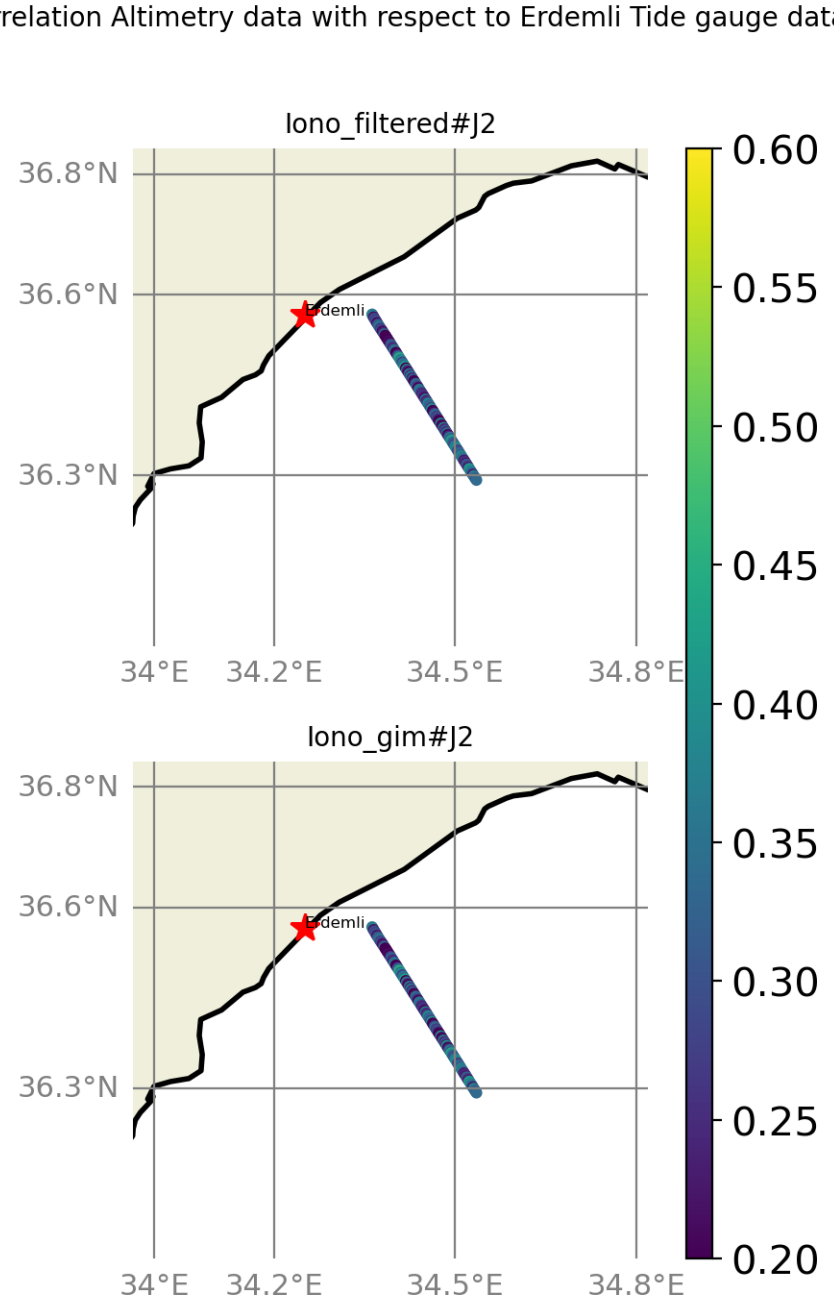

FIGURE 106 – correlation visualization in maps view % Erdemli tide gauge

6.8.2 rmsd visualization in maps view % Erdemli tide gauge

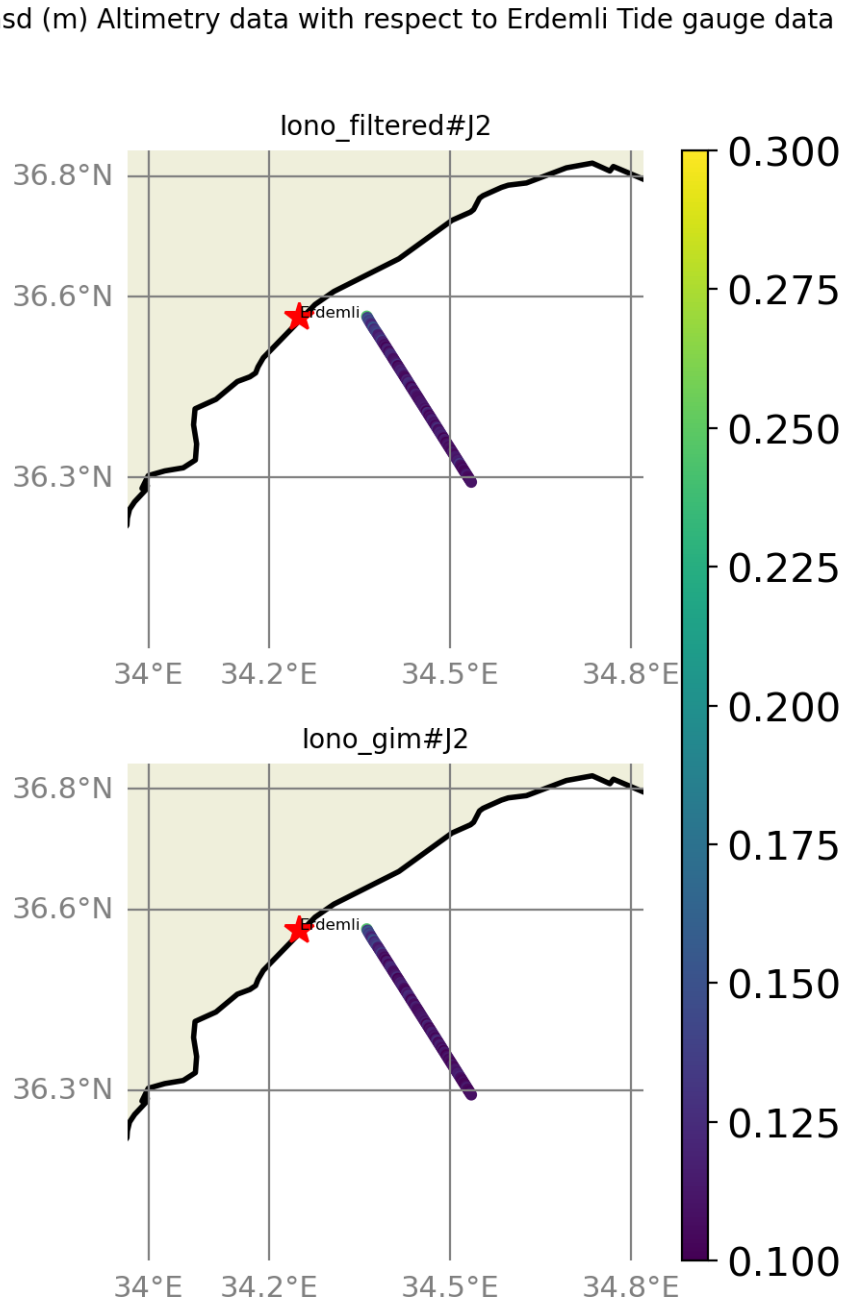

FIGURE 107 – rmsd visualization in maps view % Erdemli tide gauge

6.8.3 std visualization in maps view % Erdemli tide gauge

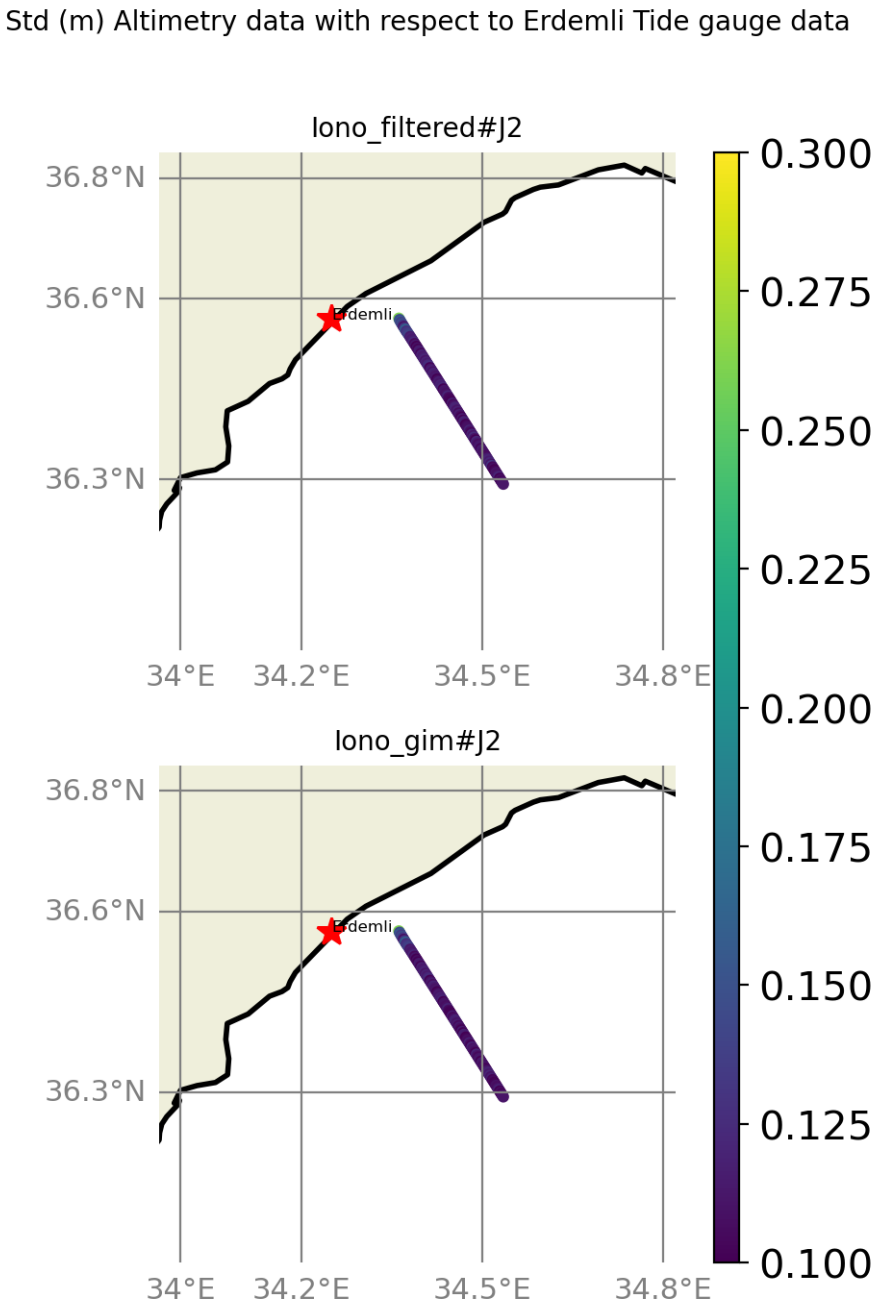

Figure 108 – std visualization in maps view % Erdemli tide gauge

6.8.4 valid_data_percent visualization in maps view % Erdemli tide gauge

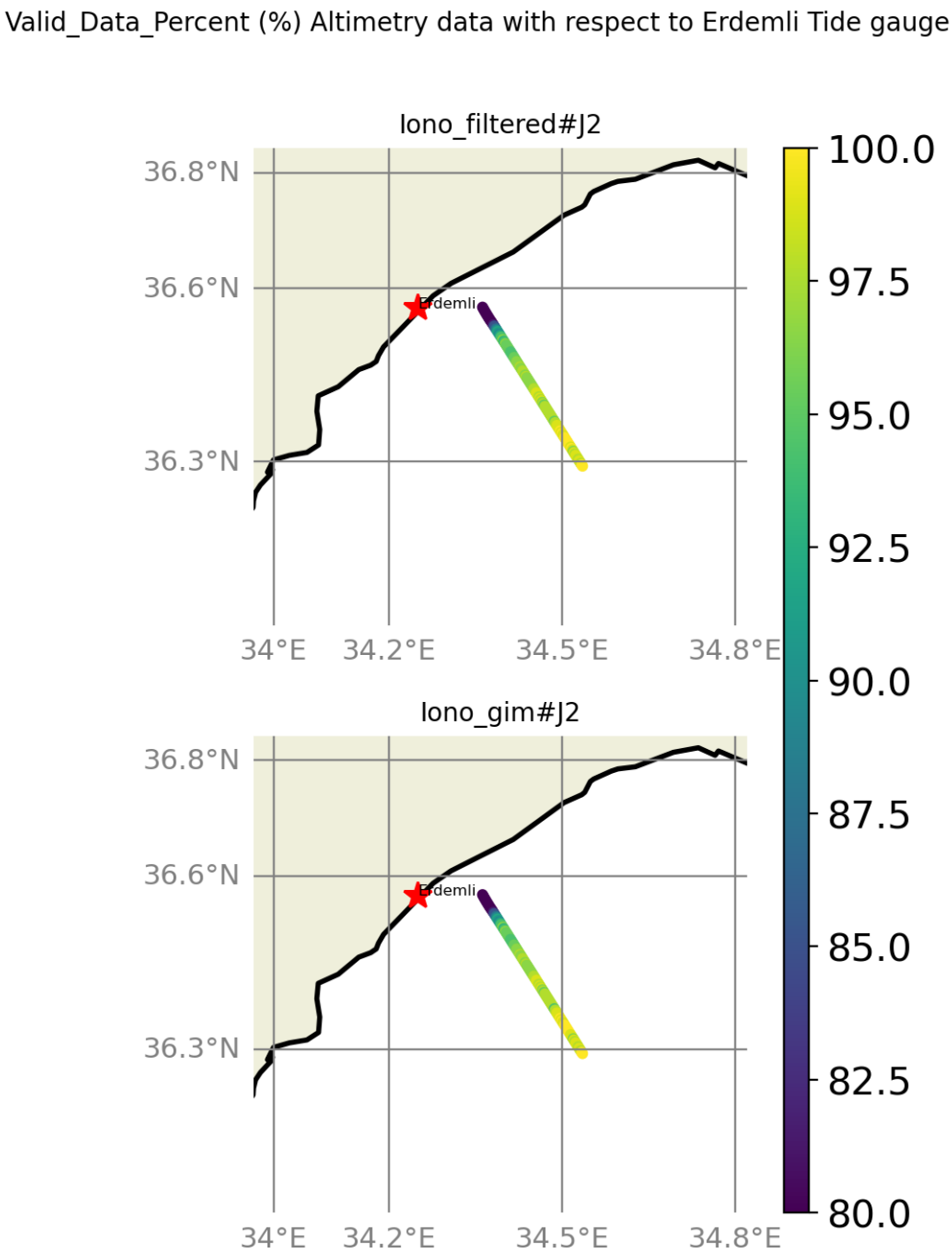

FIGURE 109 – valid_data_percent visualization in maps view % Erdemli tide gauge

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

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

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

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

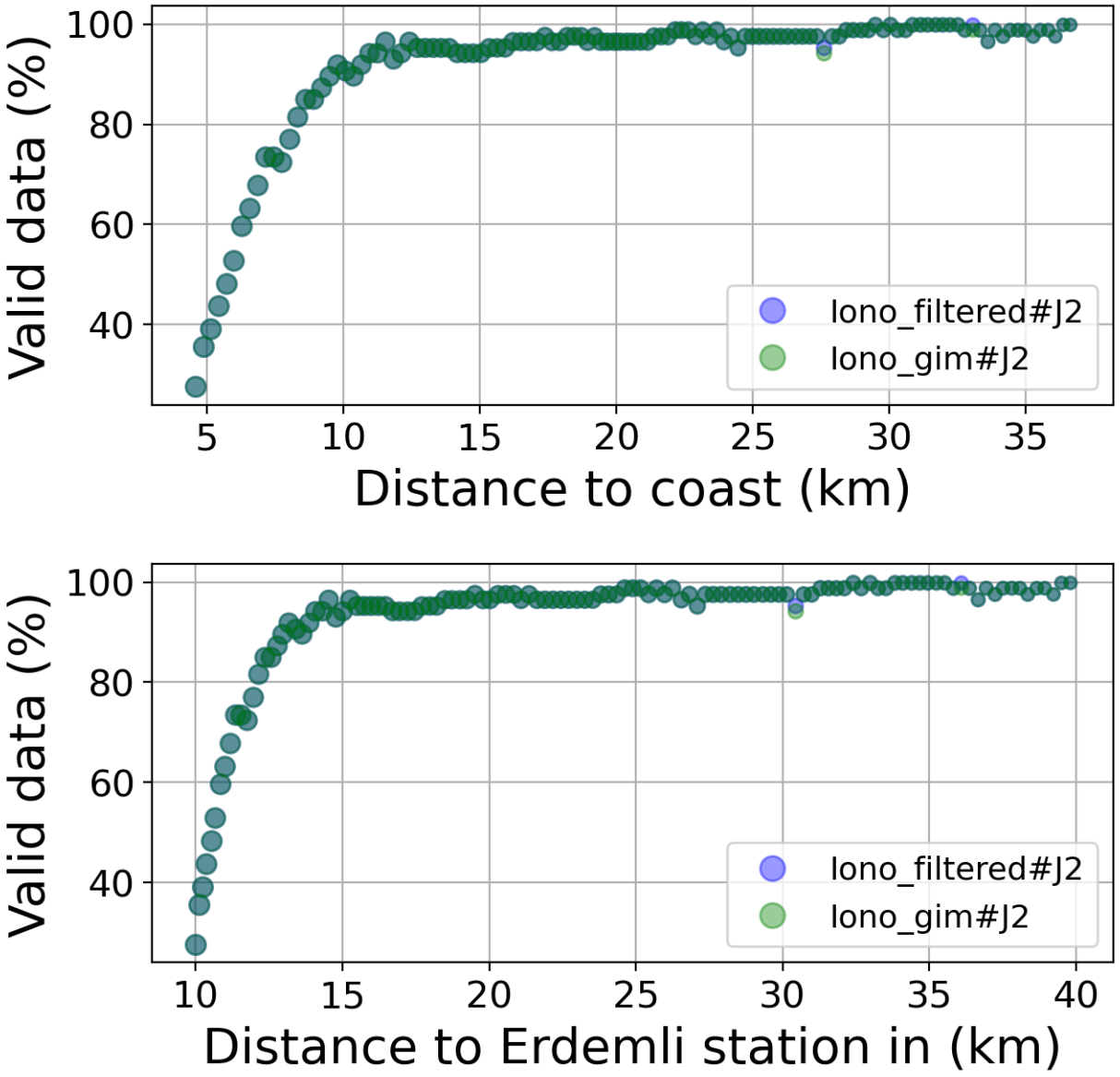

FIGURE 110 – Valid data (%) in function of distance to coast/Erdemli station

6.8.6 Std in function of distance to coast/Erdemli station

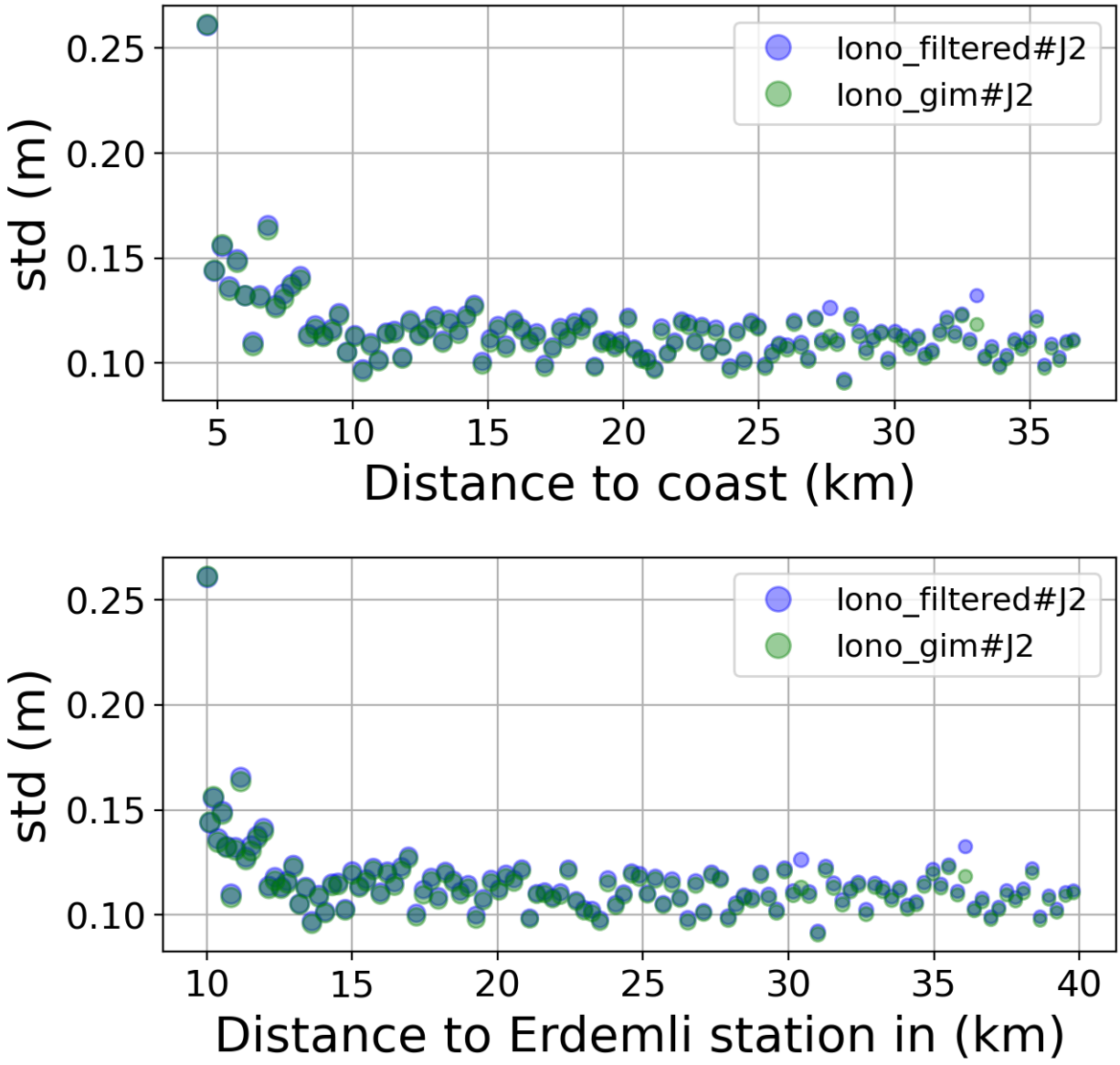

Figure 111 – Std in function of the distance to the coast/Erdemli station

6.8.7 Correlation in function of distance to coast/Erdemli station

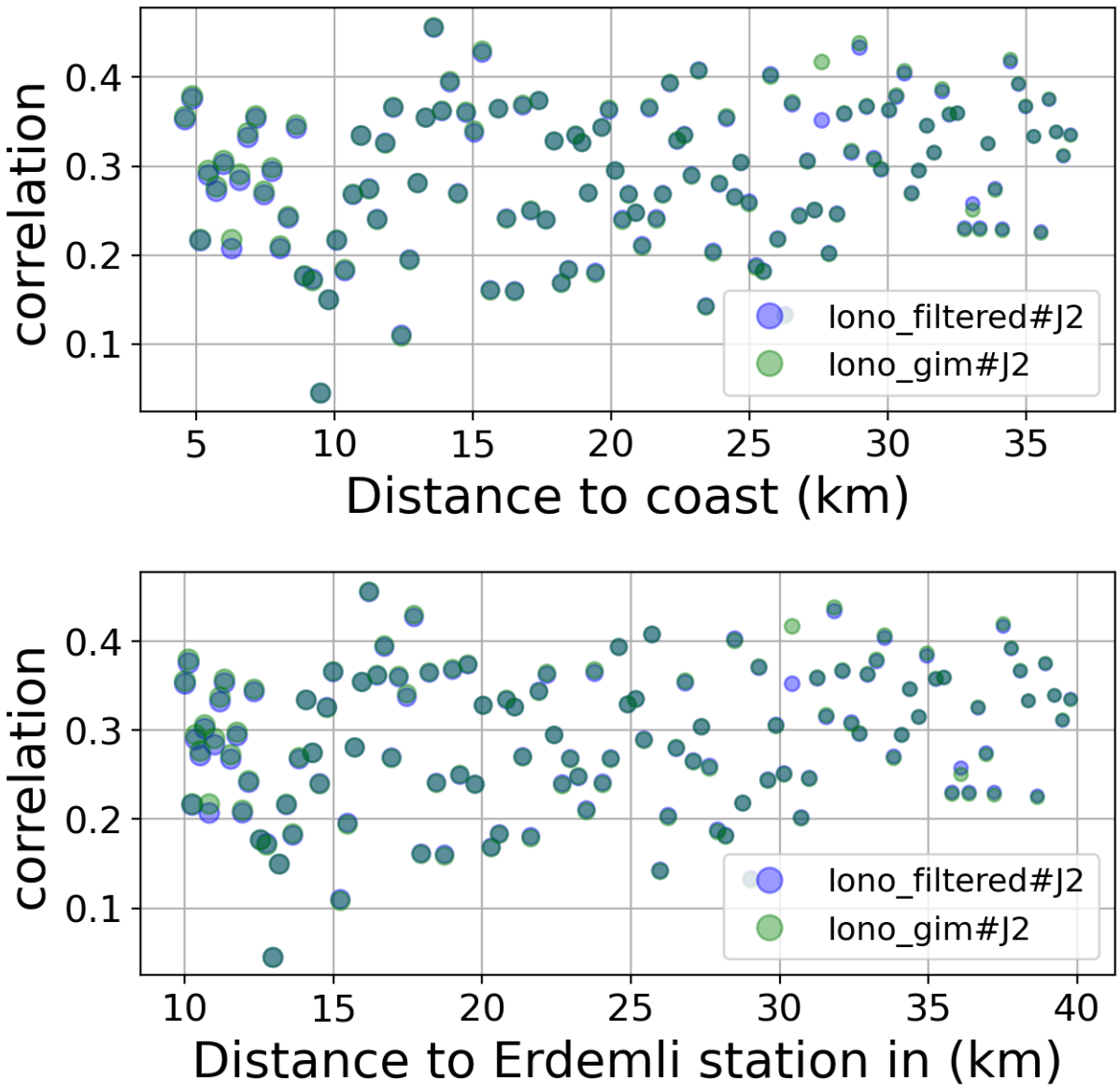

FIGURE 112 – Correlation in function of the distance to the coast/Erdemli station

6.8.8 Taylor Diagram

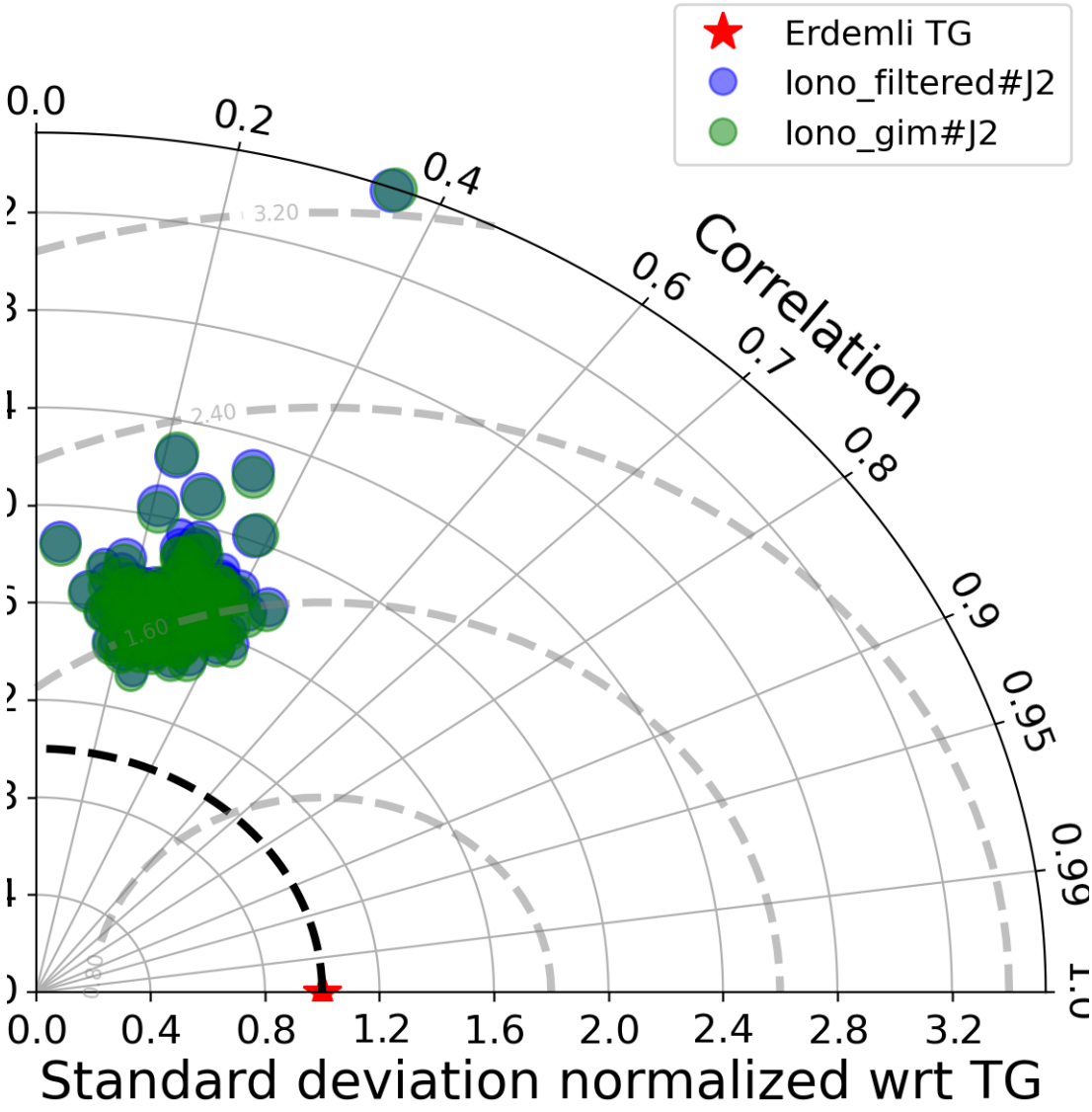

Figure 113 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	92.237	0.291	0.116	0.116
Iono_gim#J2	92.217	0.292	0.114	0.115

FIGURE 114 – Mean statistics table of the common points in the altimetry products

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

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

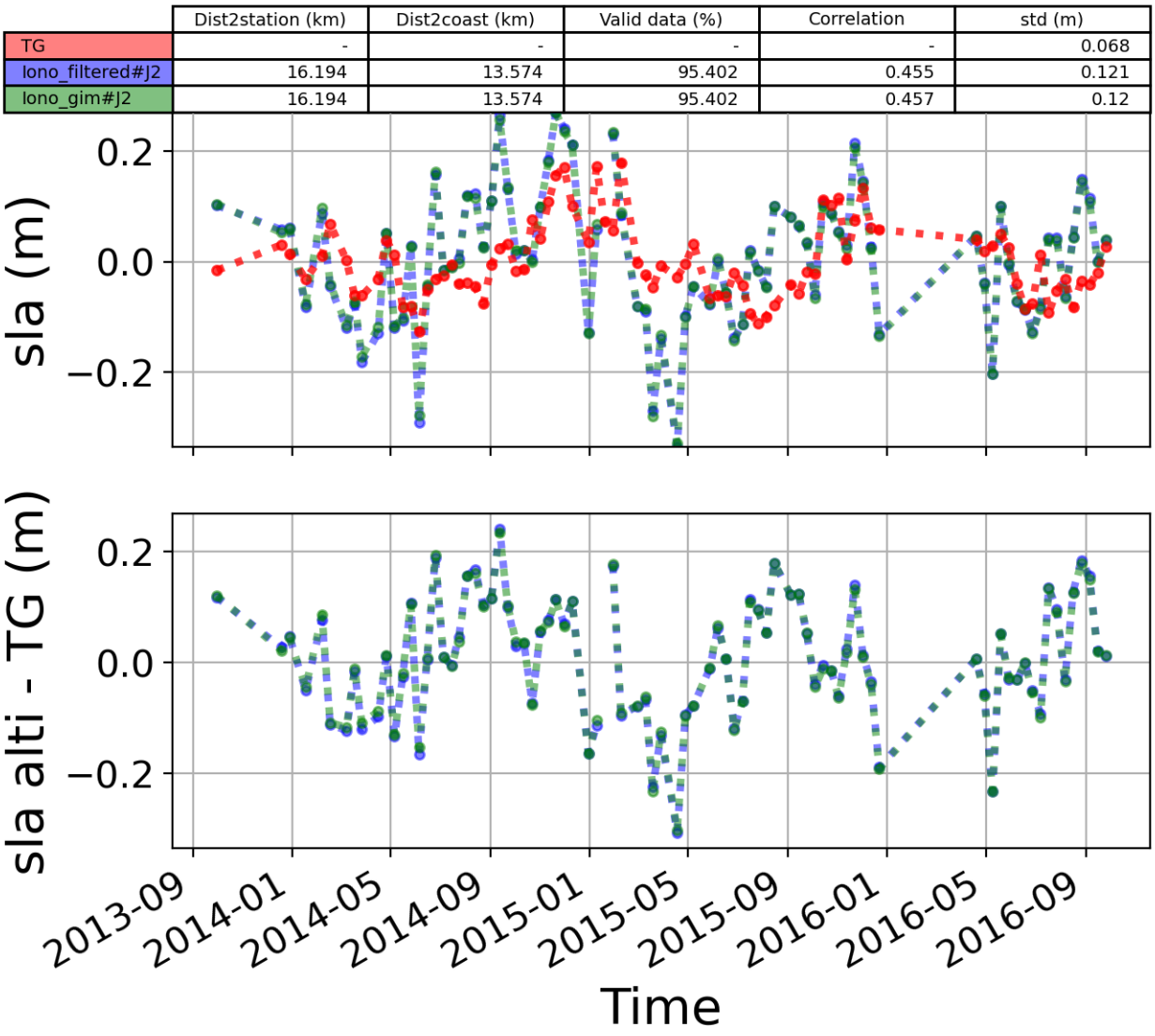

FIGURE 115 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.9 Station : Almeria

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

6.9.1 correlation visualization in maps view % Almeria tide gauge

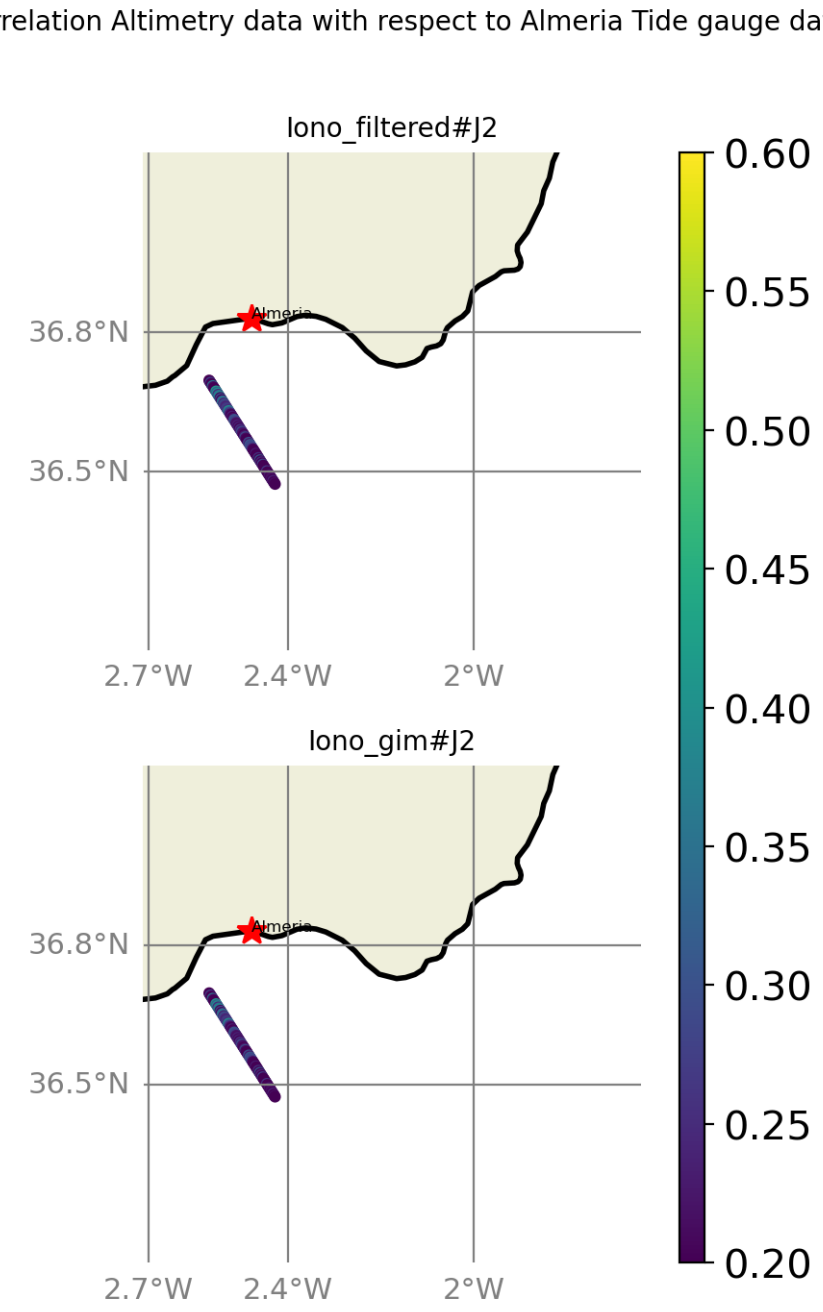

FIGURE 116 – correlation visualization in maps view % Almeria tide gauge

6.9.2 rmsd visualization in maps view % Almeria tide gauge

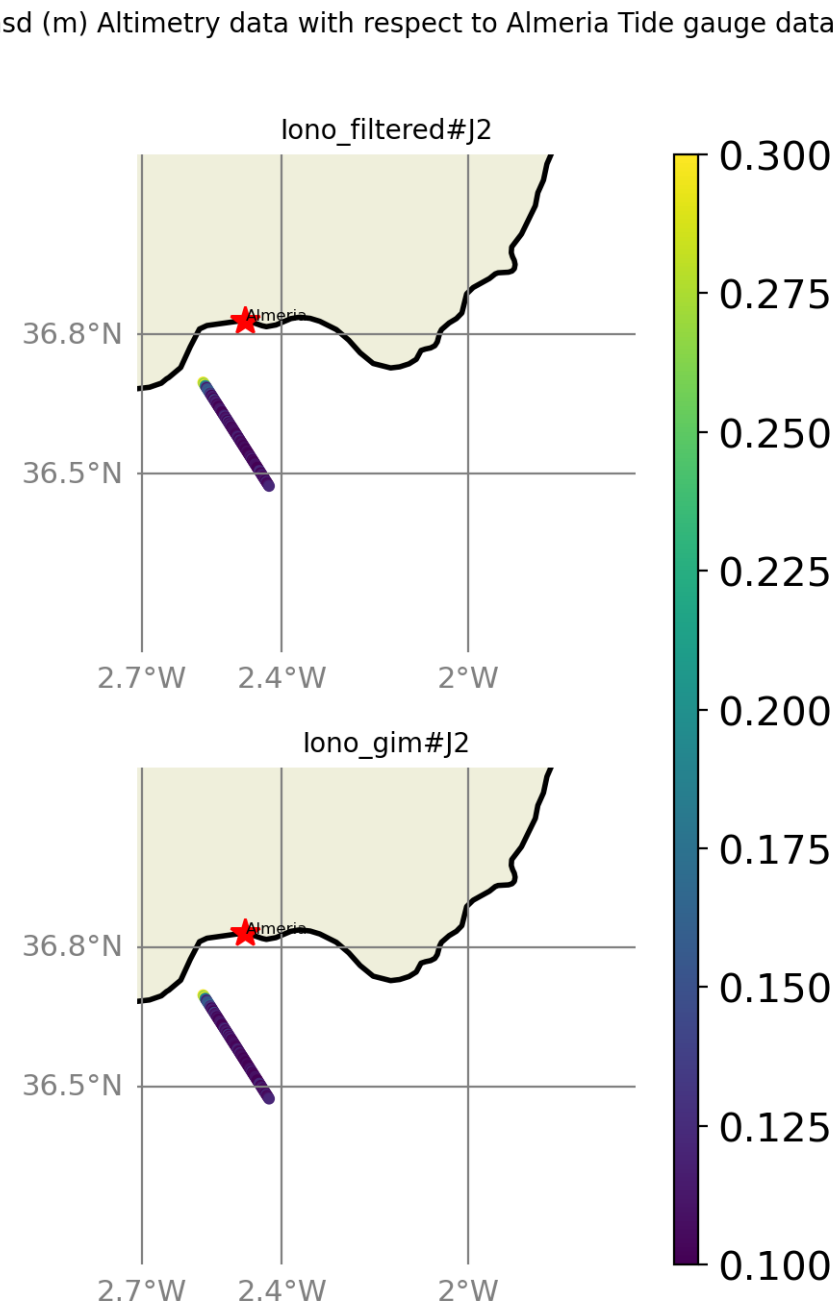

FIGURE 117 – rmsd visualization in maps view % Almeria tide gauge

6.9.3 std visualization in maps view % Almeria tide gauge

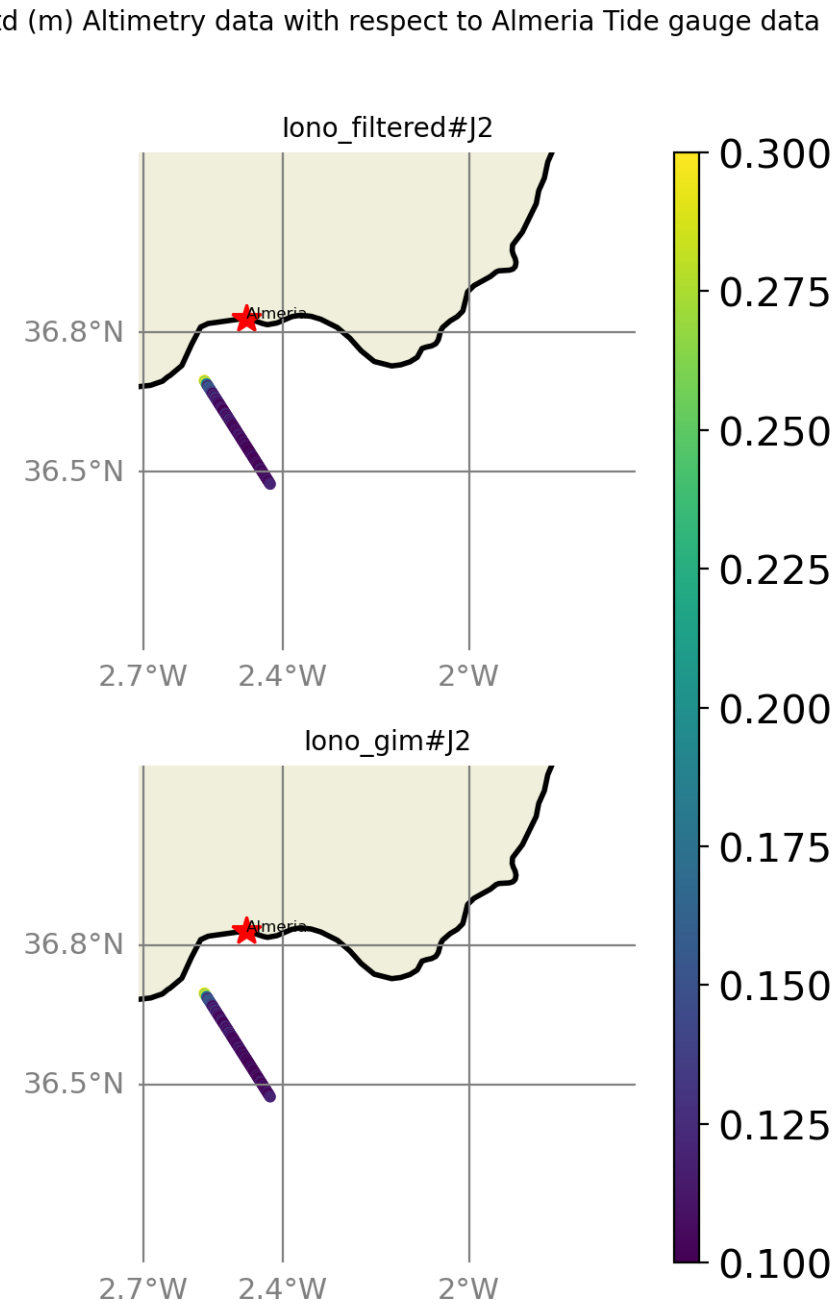

Figure 118 – std visualization in maps view % Almeria tide gauge

6.9.4 valid_data_percent visualization in maps view % Almeria tide gauge

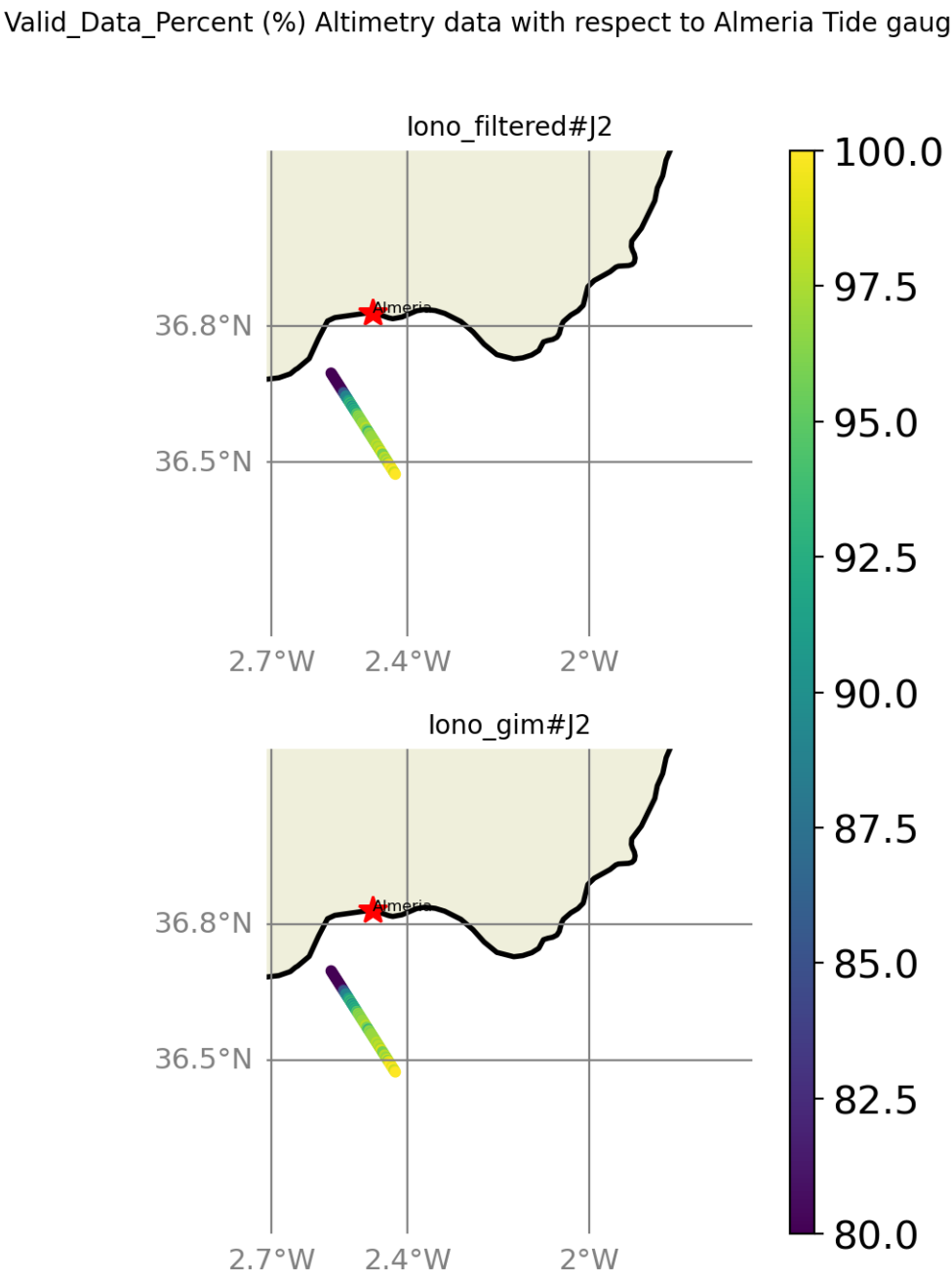

FIGURE 119 – valid_data_percent visualization in maps view % Almeria tide gauge

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

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

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

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

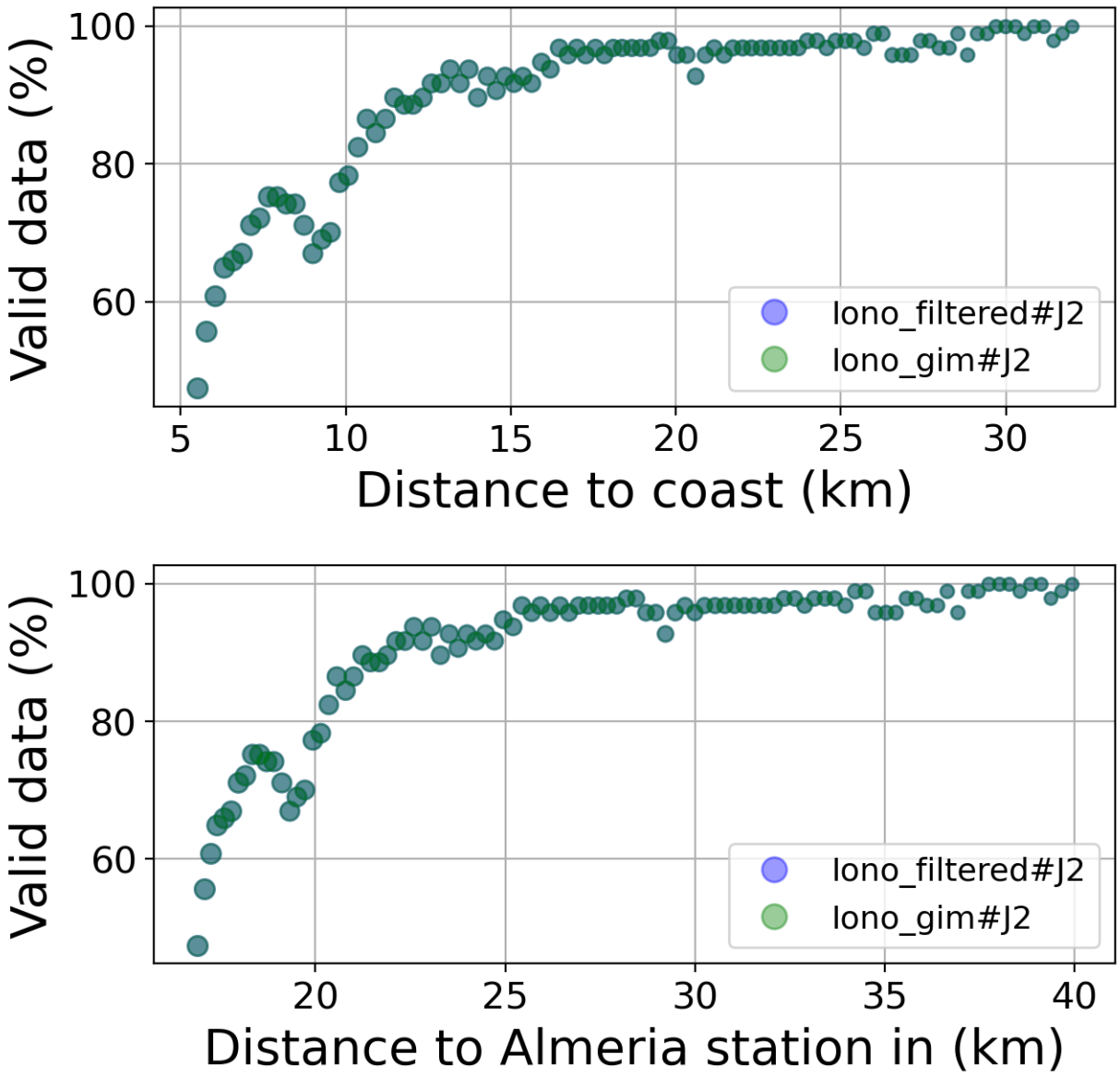

FIGURE 120 – Valid data (%) in function of distance to coast/Almeria station

6.9.6 Std in function of distance to coast/Almeria station

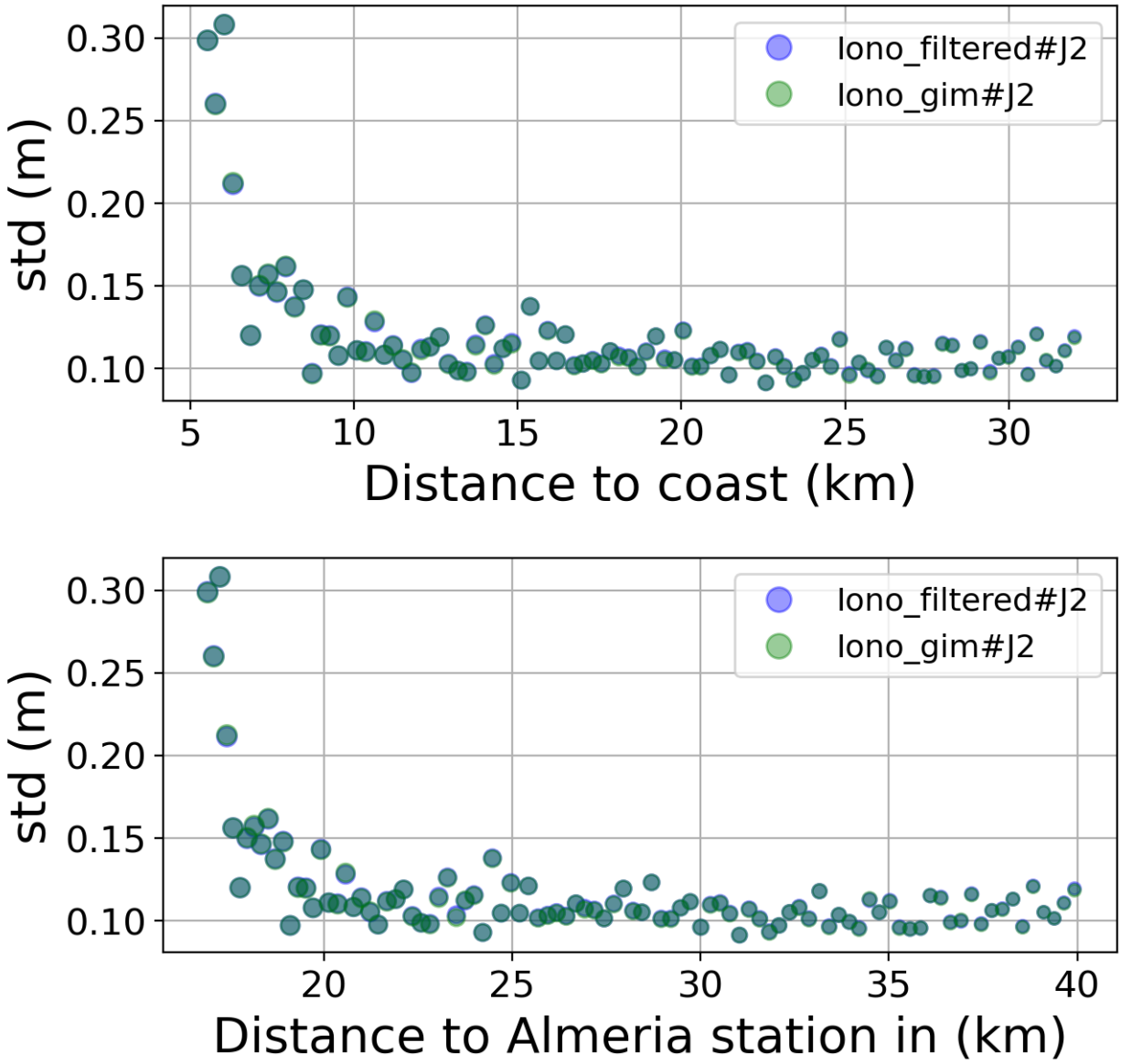

FIGURE 121 – Std in function of the distance to the coast/Almeria station

6.9.7 Correlation in function of distance to coast/Almeria station

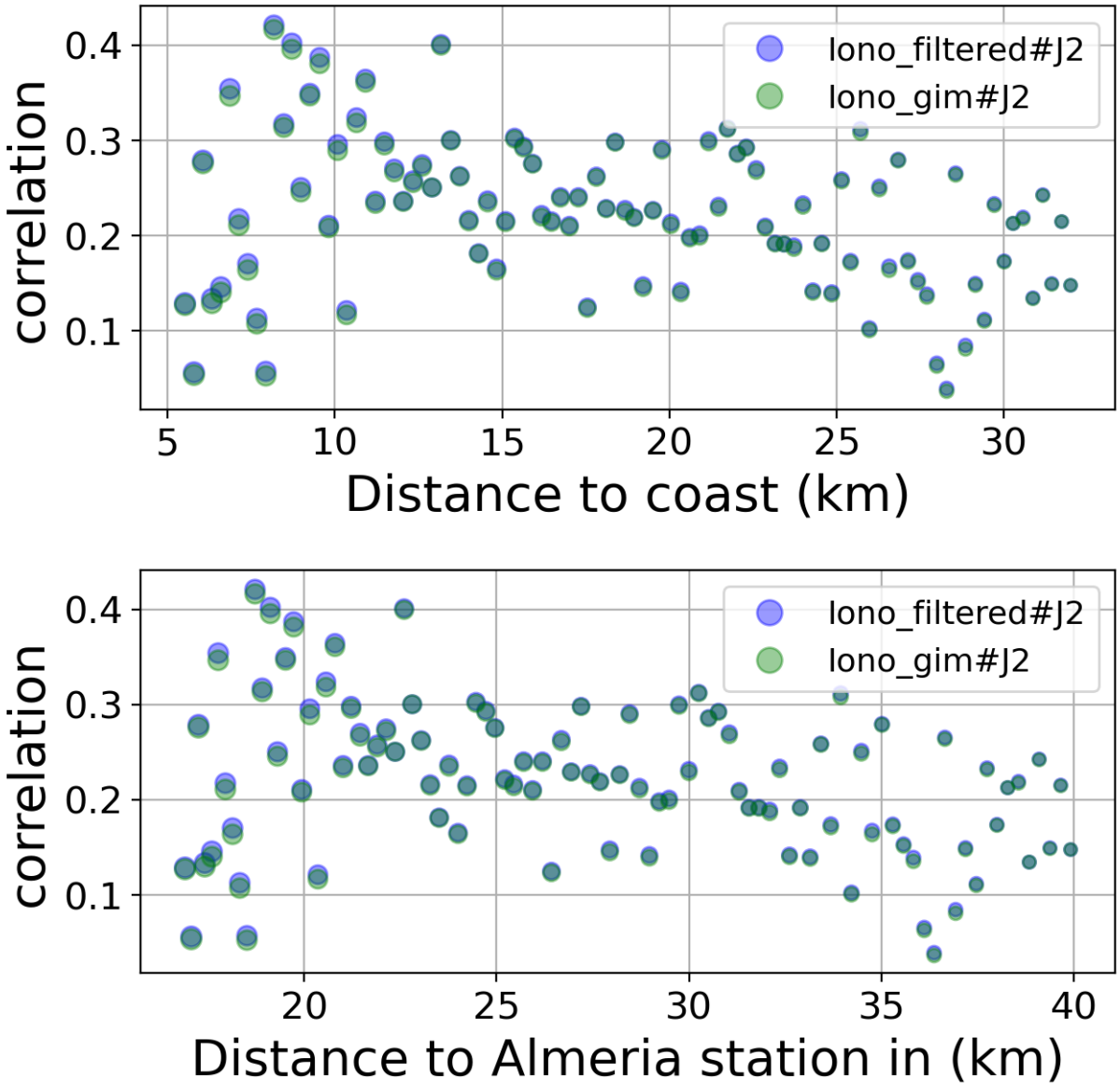

FIGURE 122 – Correlation in function of the distance to the coast/Almeria station

6.9.8 Taylor Diagram

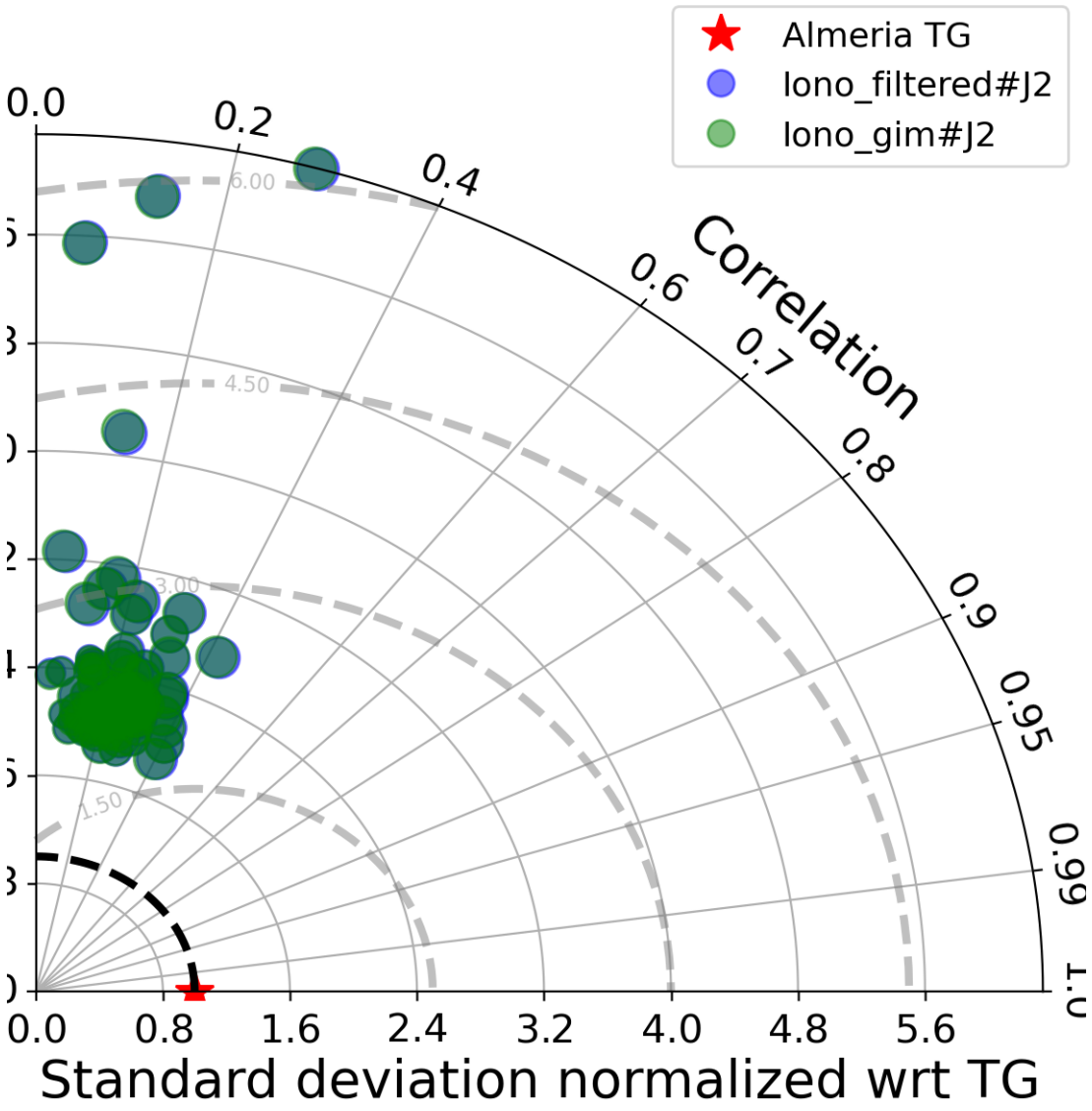

FIGURE 123 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	90.442	0.223	0.118	0.118
Iono_gim#J2	90.442	0.22	0.118	0.118

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 97 point.

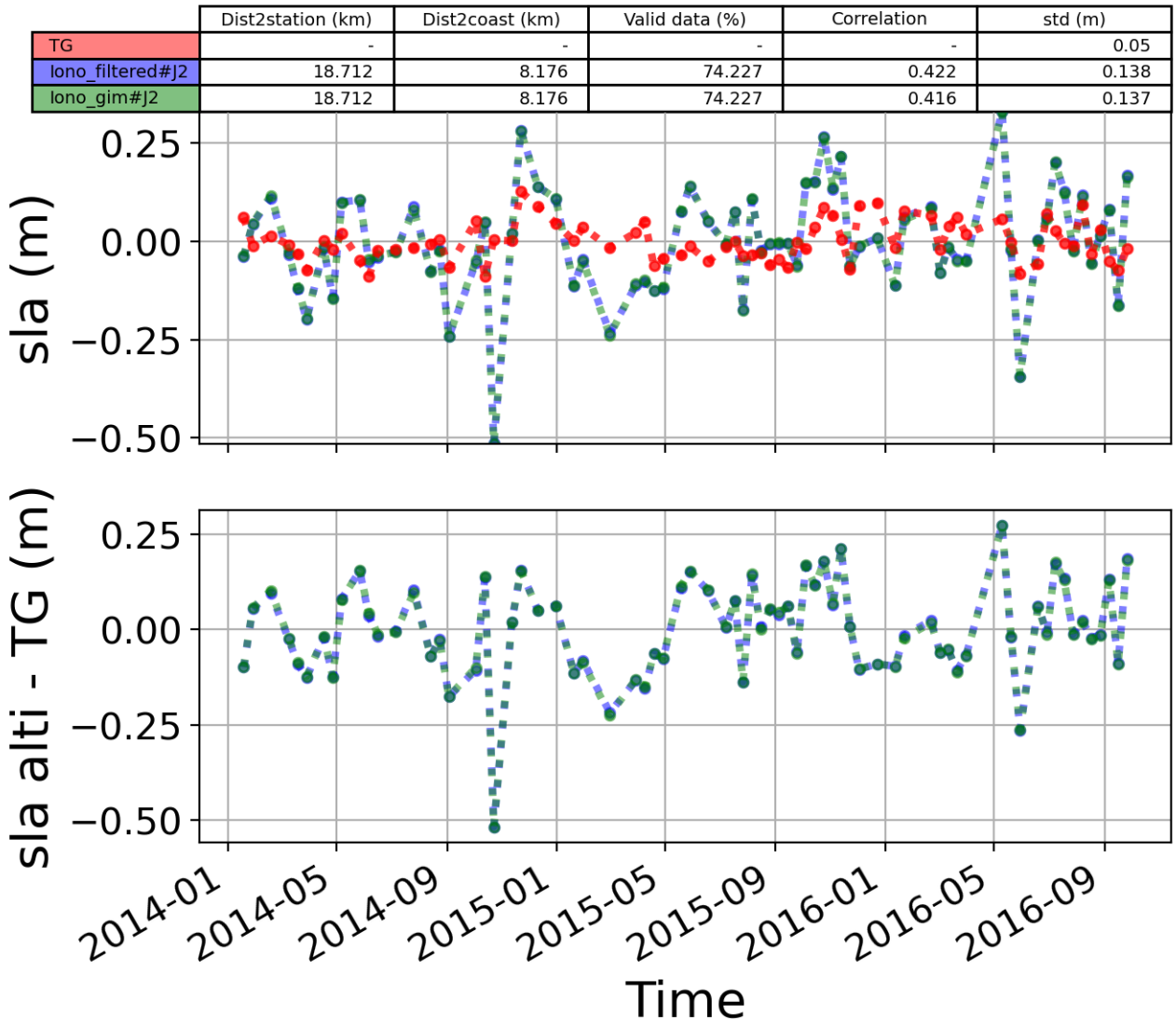

FIGURE 125 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

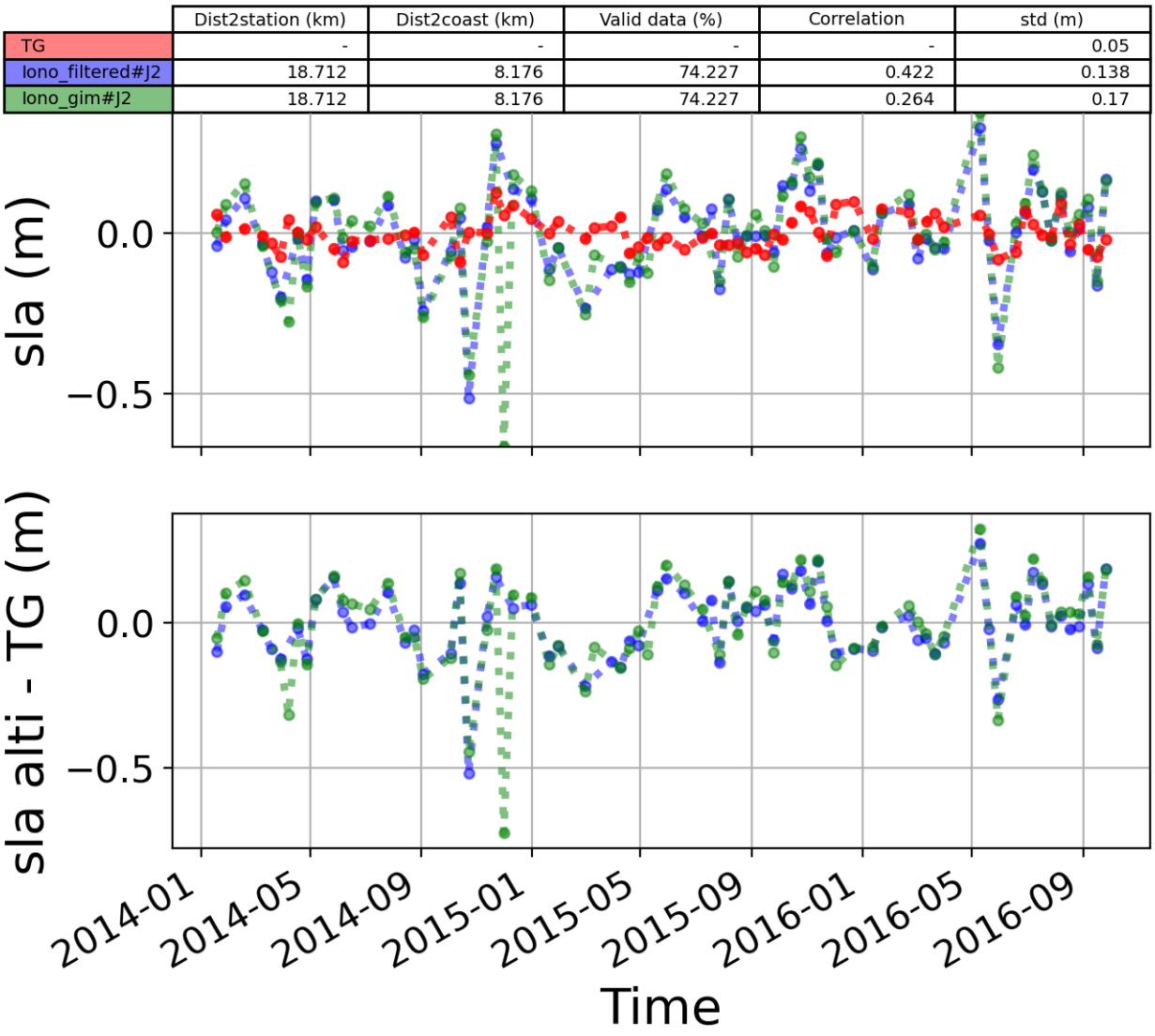

FIGURE 126 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.10 Station : Civitavecchia

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

6.10.1 correlation visualization in maps view % Civitavecchia tide gauge

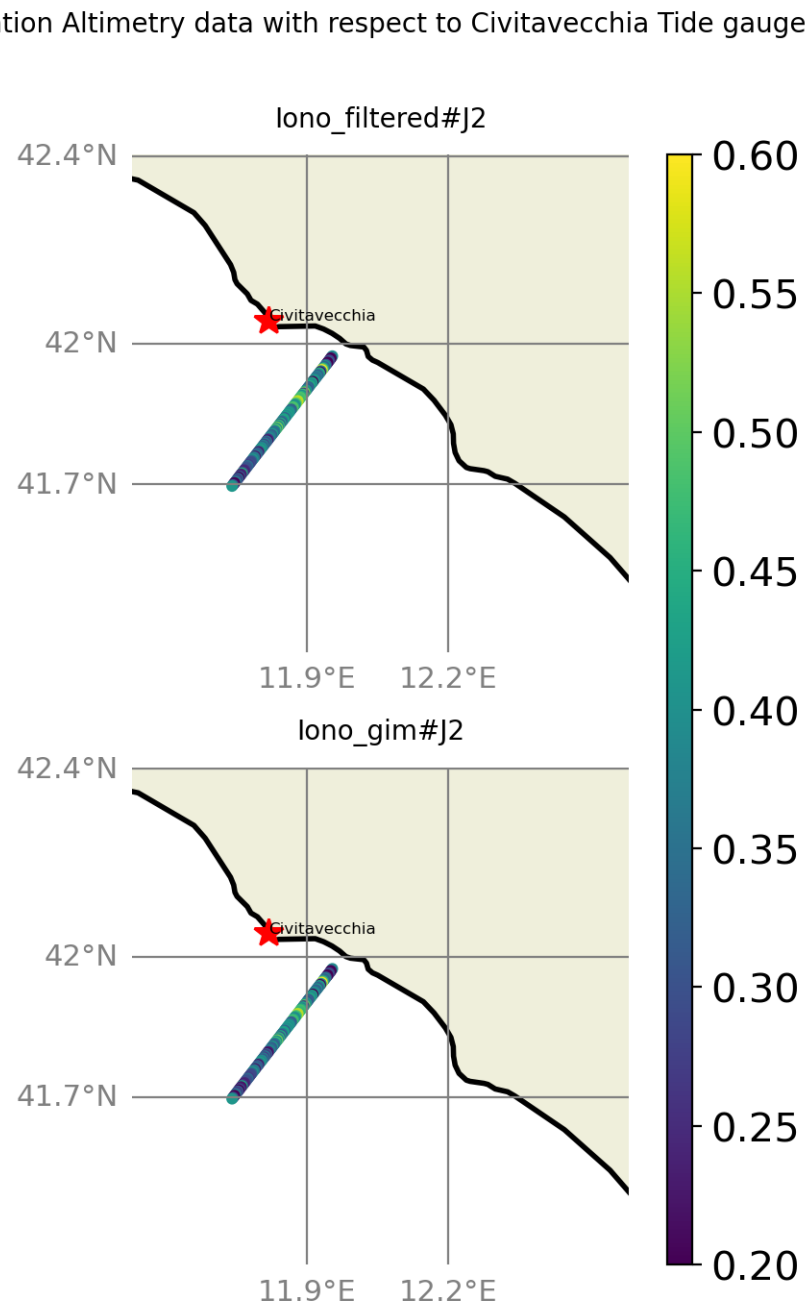

FIGURE 127 – correlation visualization in maps view % Civitavecchia tide gauge

6.10.2 rmsd visualization in maps view % Civitavecchia tide gauge

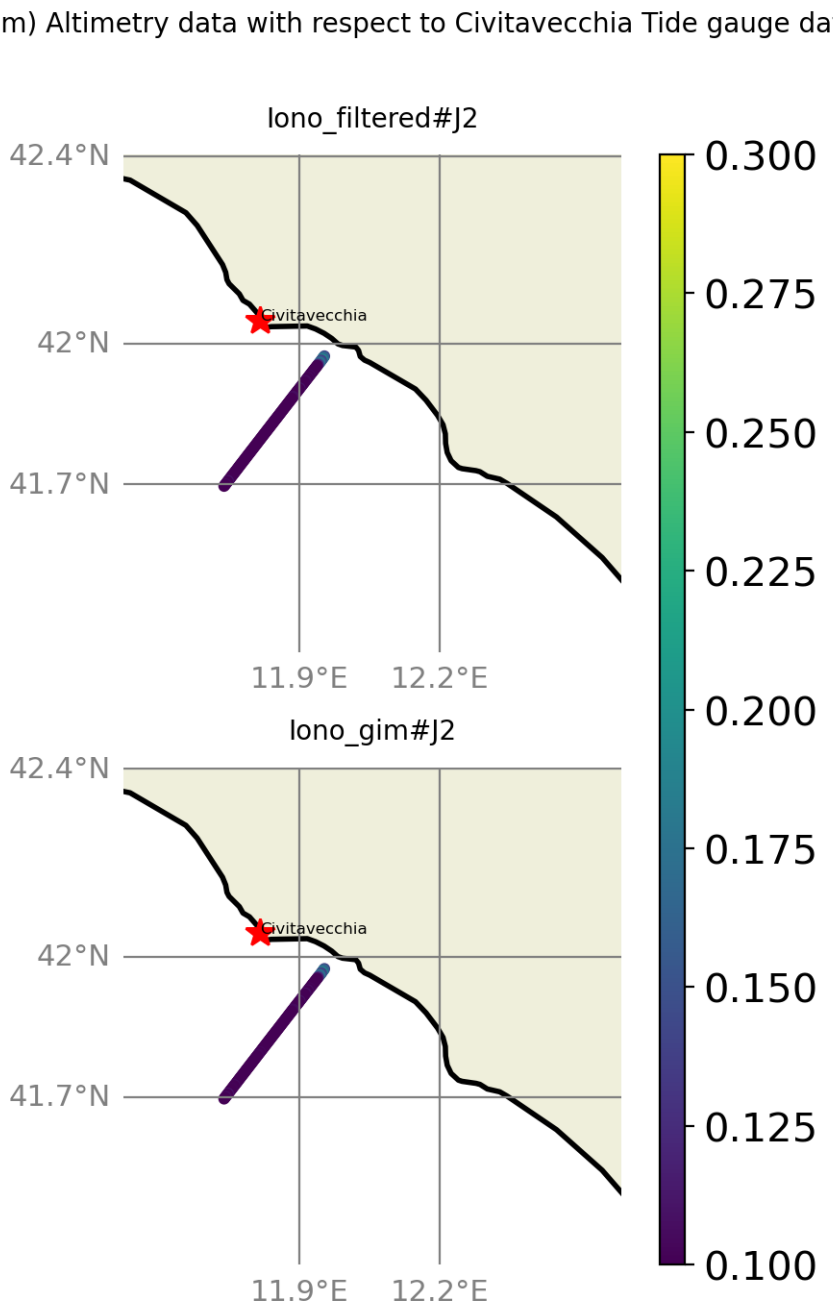

FIGURE 128 – rmsd visualization in maps view % Civitavecchia tide gauge

6.10.3 std visualization in maps view % Civitavecchia tide gauge

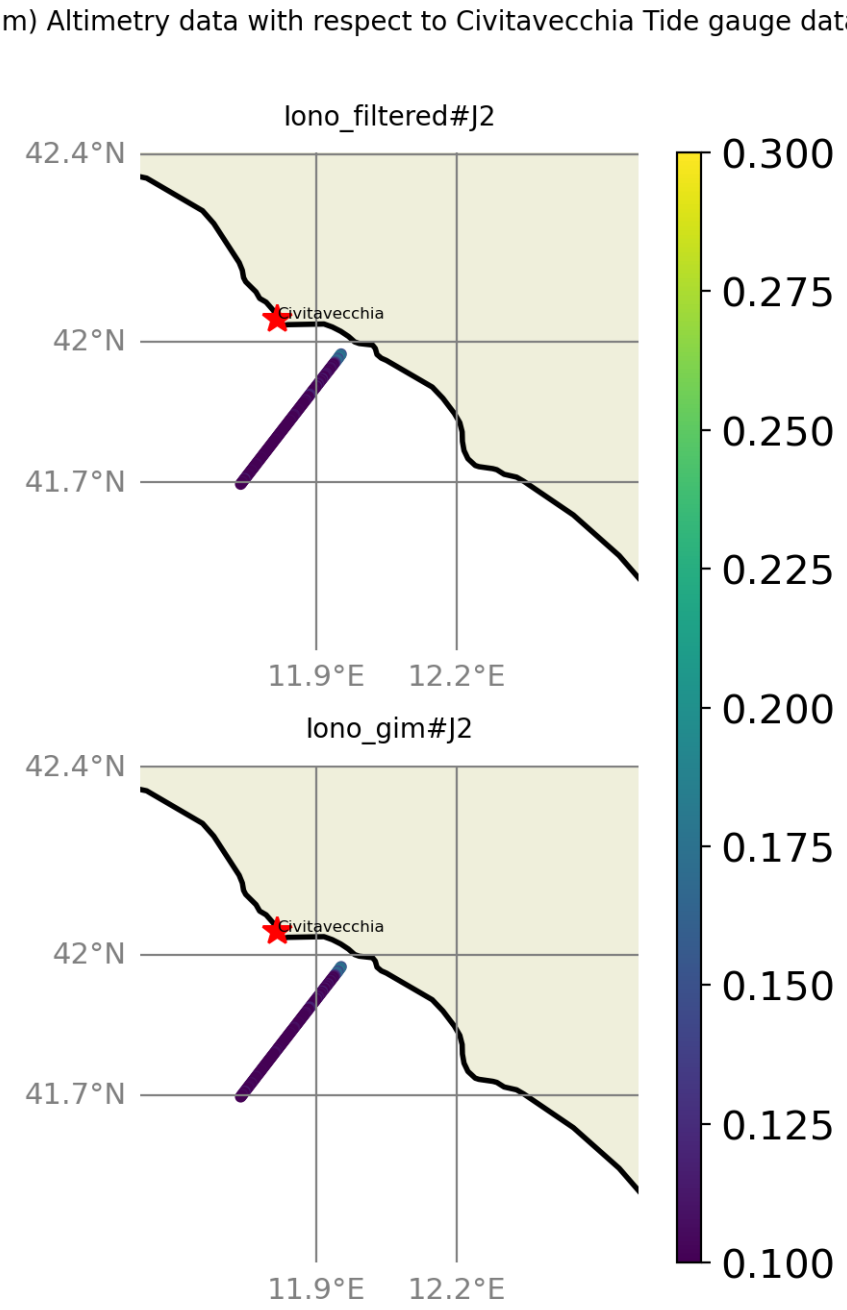

FIGURE 129 – std visualization in maps view % Civitavecchia tide gauge

6.10.4 valid_data_percent visualization in maps view % Civitavecchia tide gauge

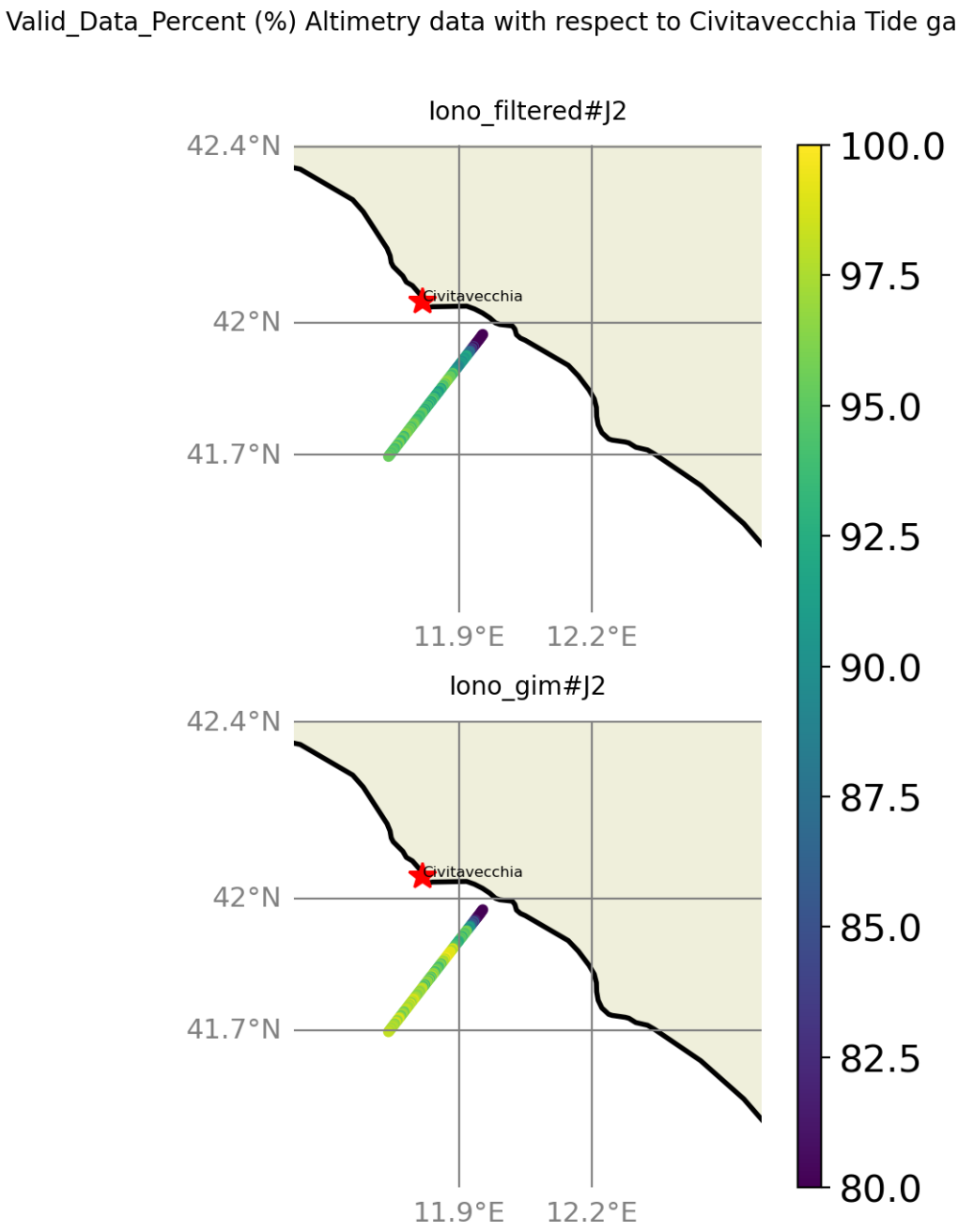

FIGURE 130 – valid_data_percent visualization in maps view % Civitavecchia tide gauge

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

The formula to calculate the percentage of valid data in each time 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. $maxNB = 107$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

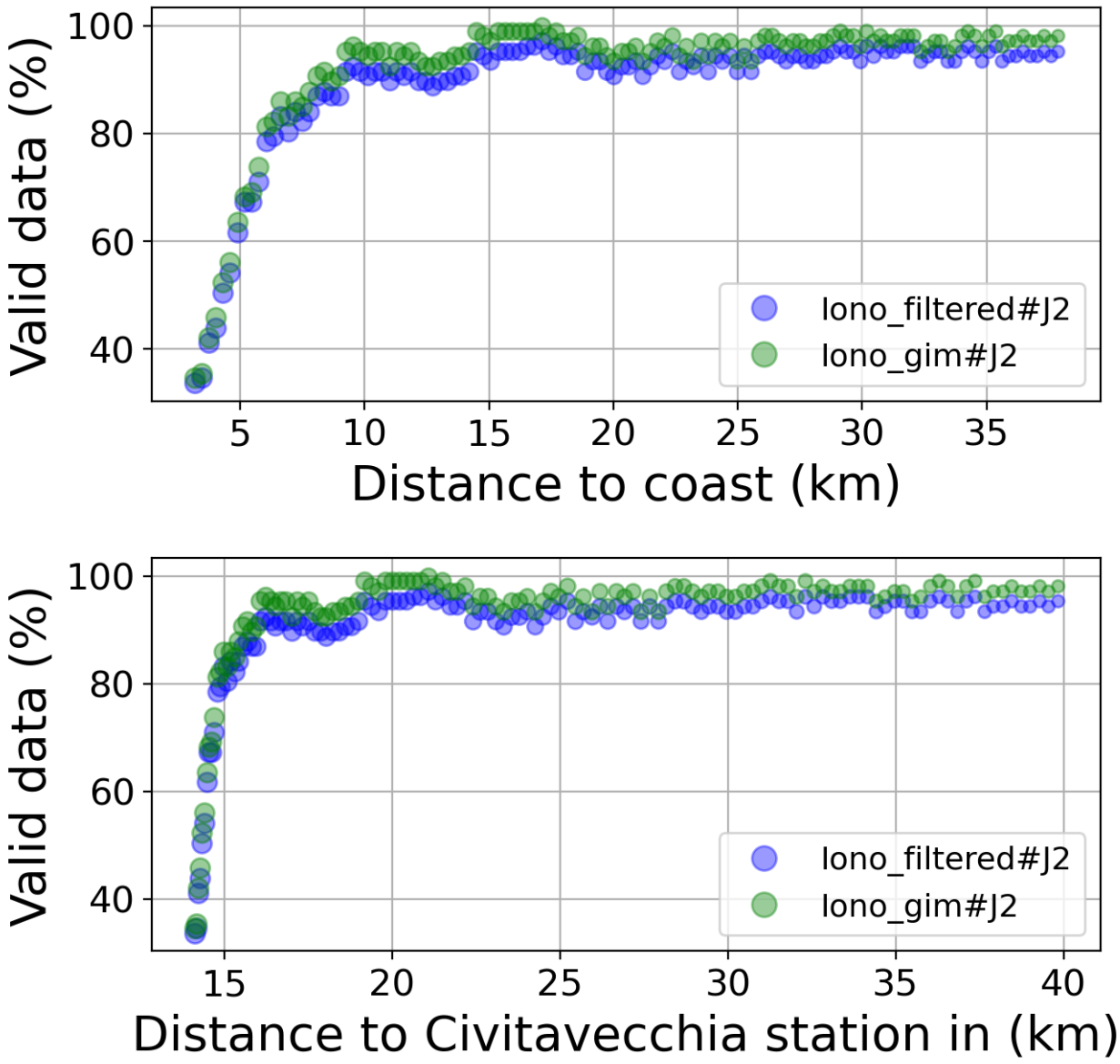

FIGURE 131 – Valid data (%) in function of distance to coast/Civitavecchia station

6.10.6 Std in function of distance to coast/Civitavecchia station

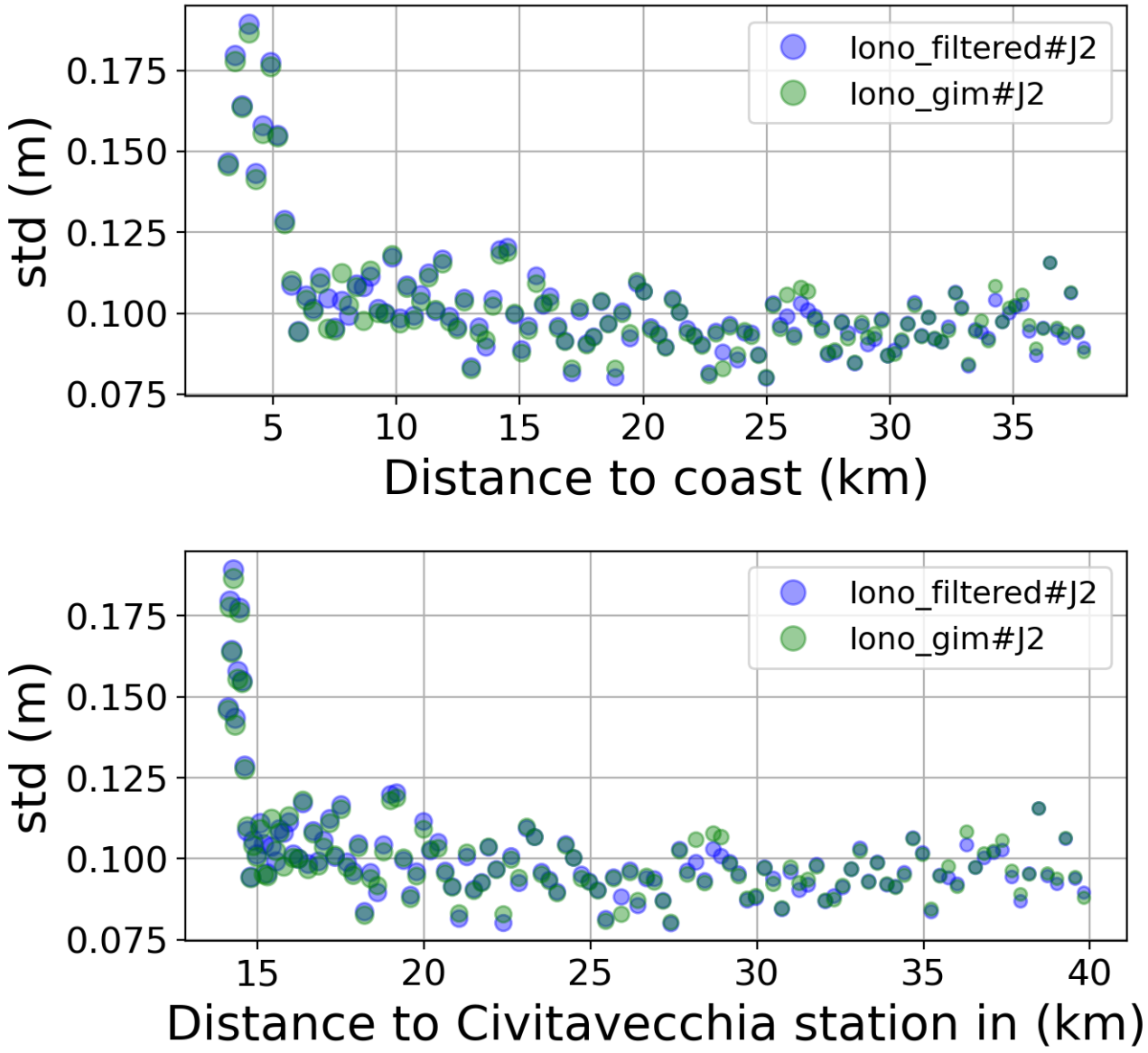

FIGURE 132 – Std in function of the distance to the coast/Civitavecchia station

6.10.7 Correlation in function of distance to coast/Civitavecchia station

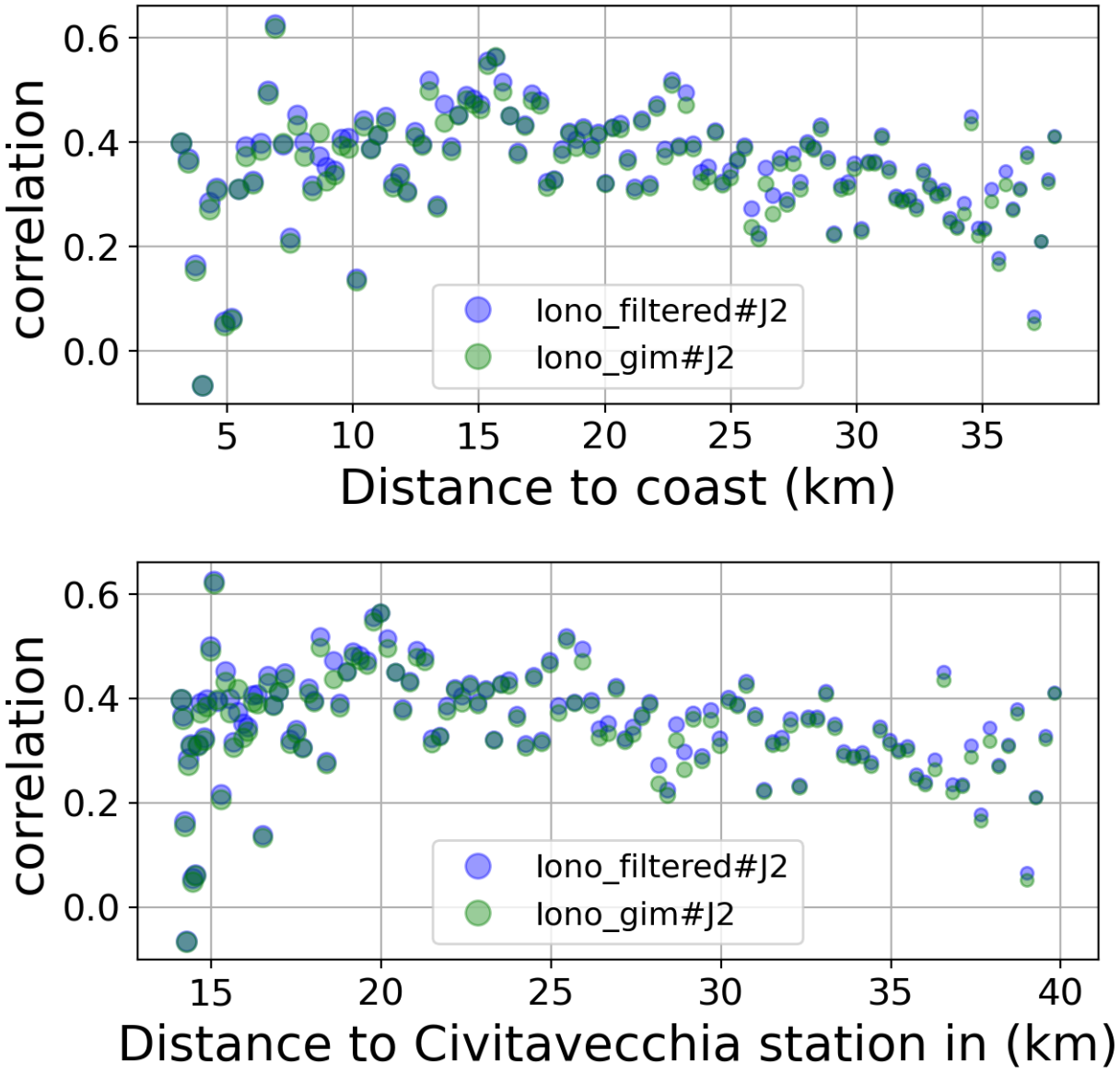

FIGURE 133 – Correlation in function of the distance to the coast/Civitavecchia station

6.10.8 Taylor Diagram

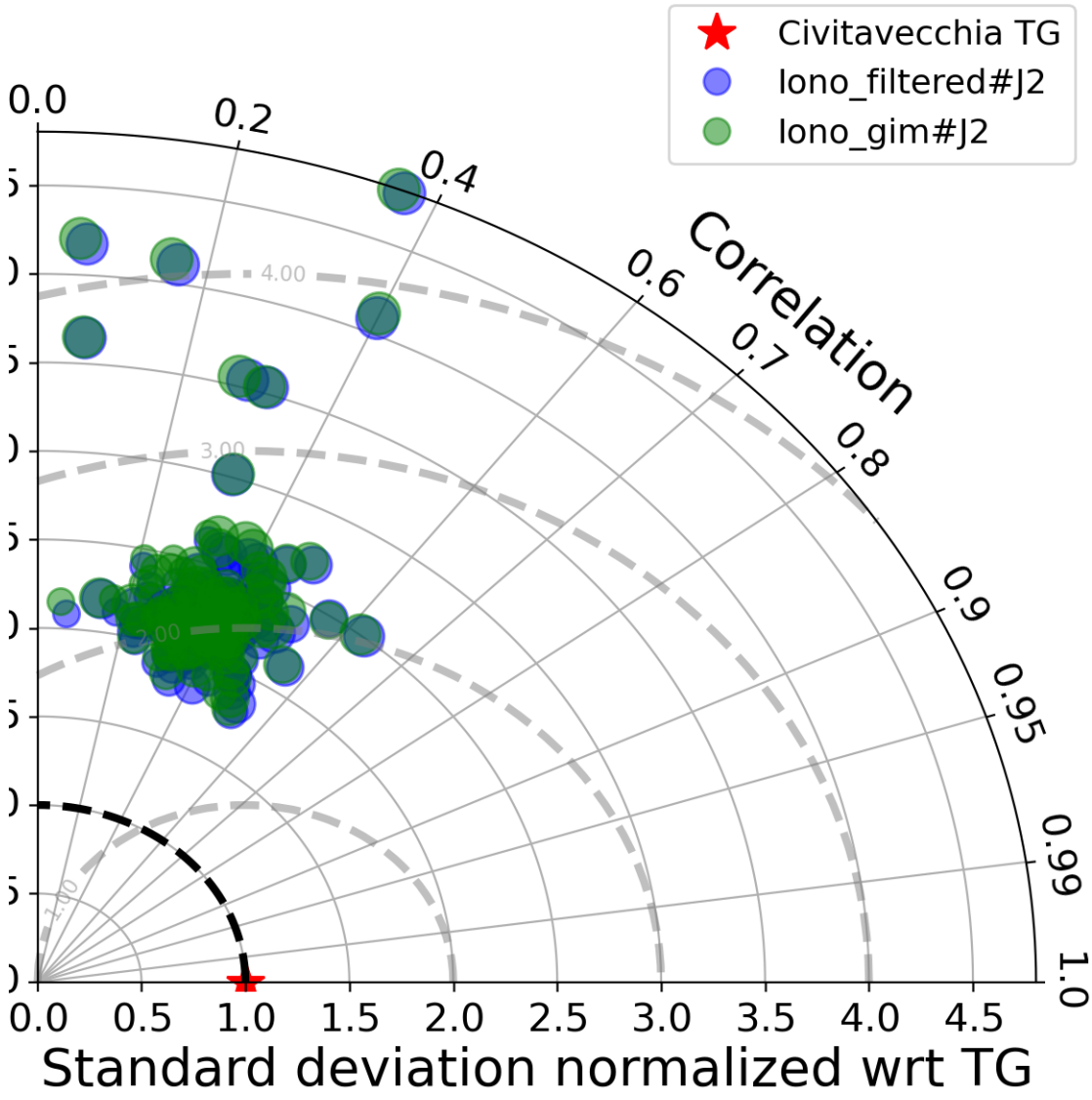

Figure 134 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	89.484	0.356	0.102	0.096
Iono_gim#J2	92.265	0.347	0.102	0.096

Figure 135 – Mean statistics table of the common points in the altimetry products

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

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

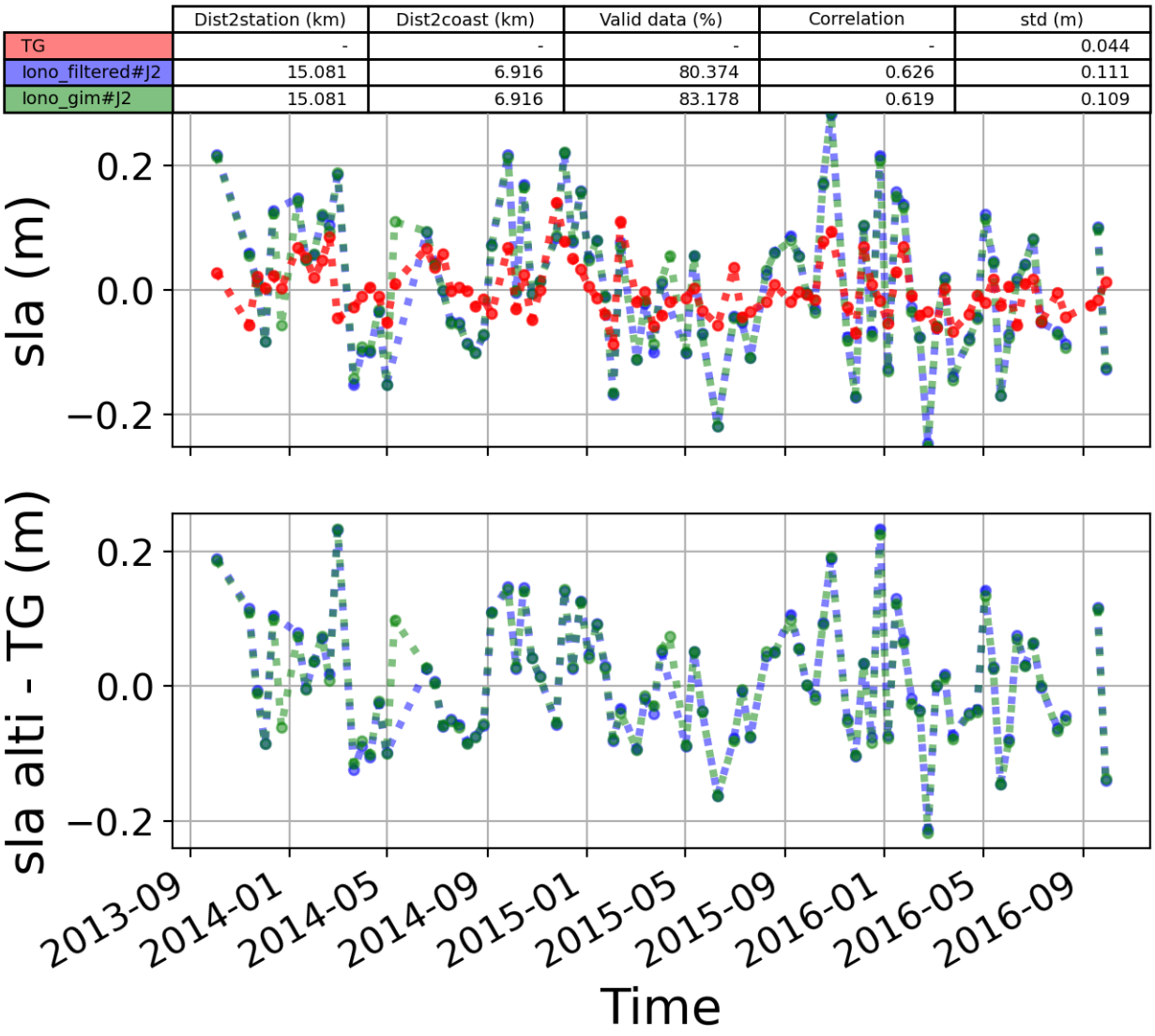

FIGURE 136 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

6.11 Station : FOS-SUR-MER

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

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

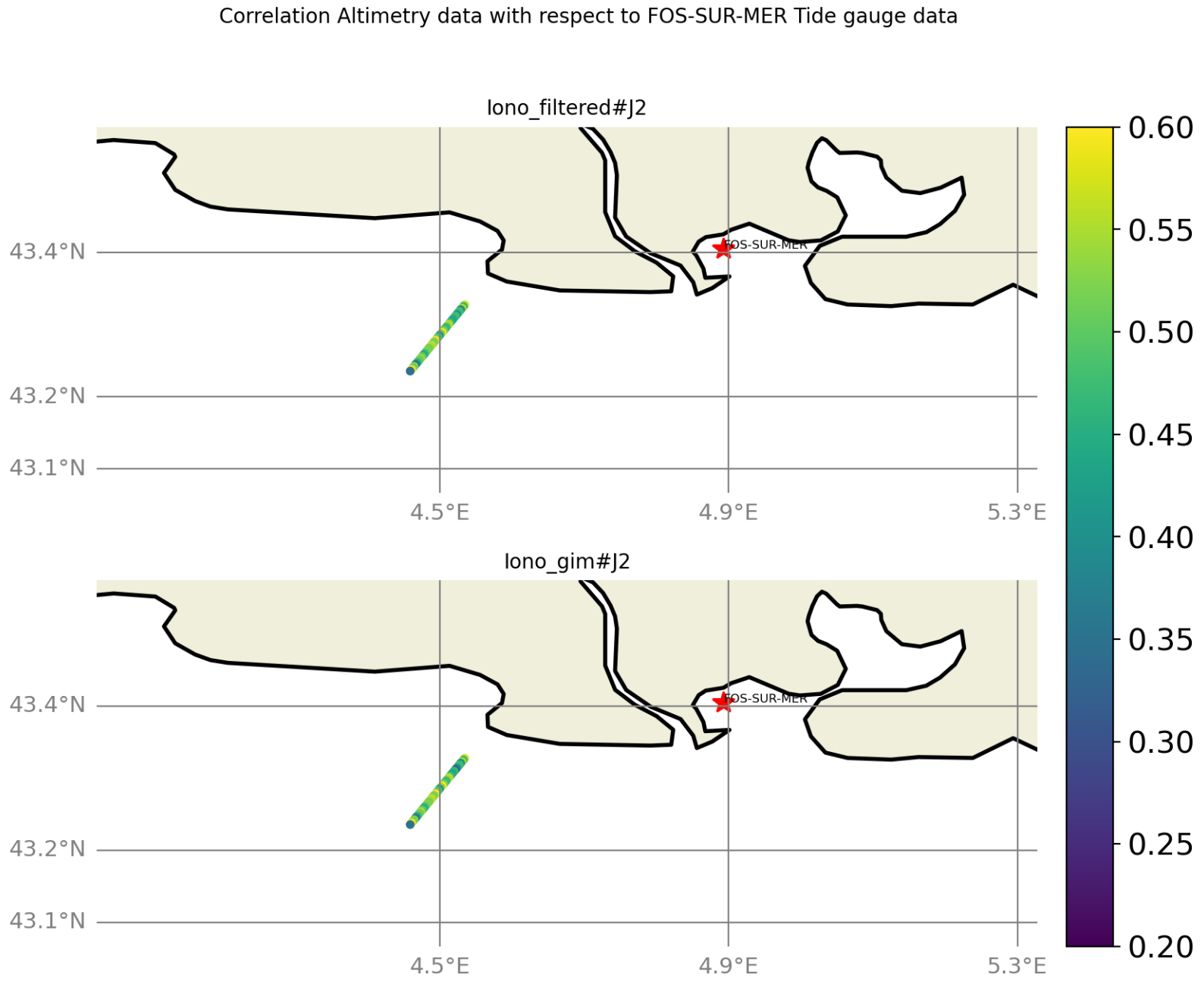

FIGURE 137 – correlation visualization in maps view % FOS-SUR-MER tide gauge

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

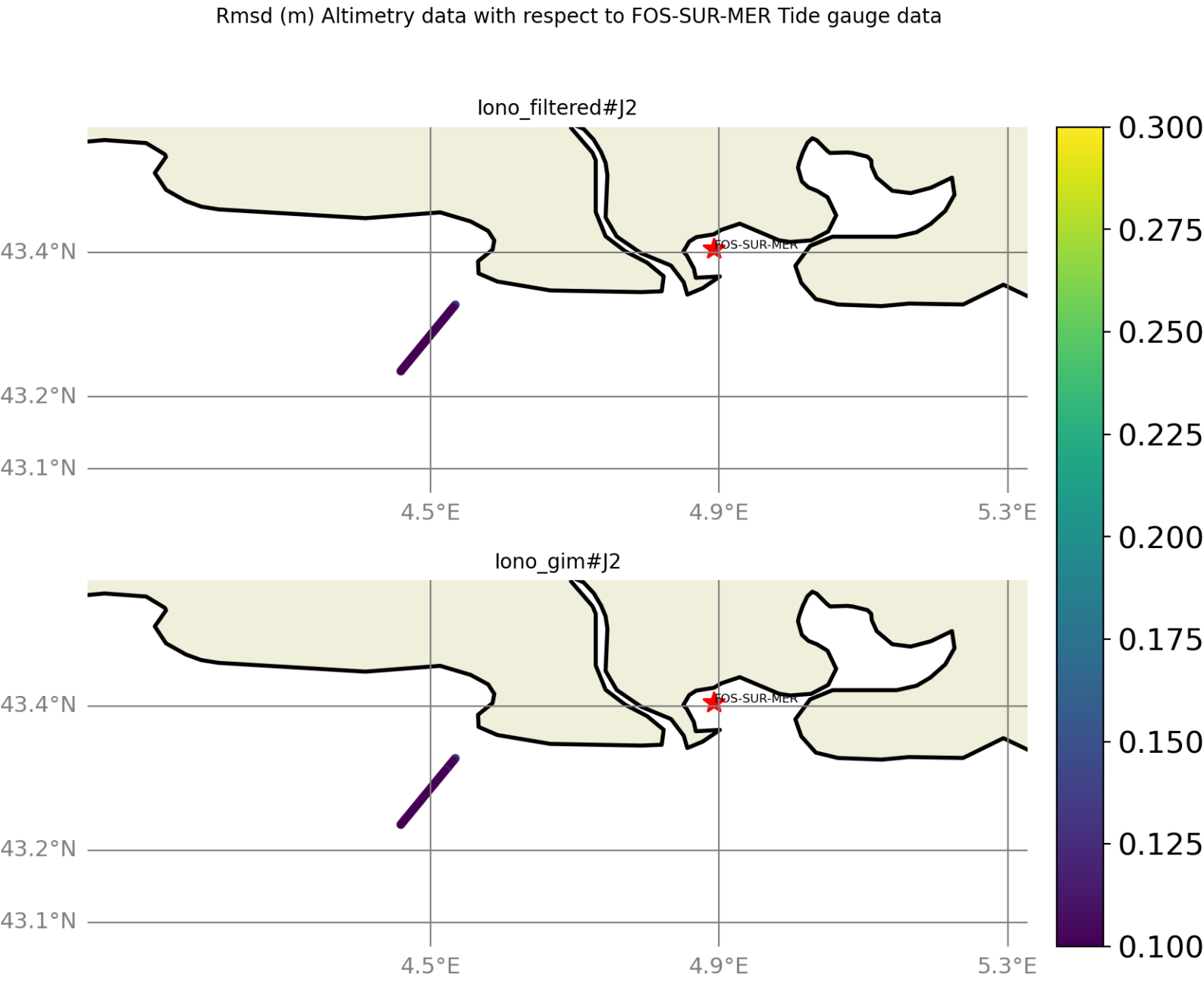

FIGURE 138 – rmsd visualization in maps view % FOS-SUR-MER tide gauge

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

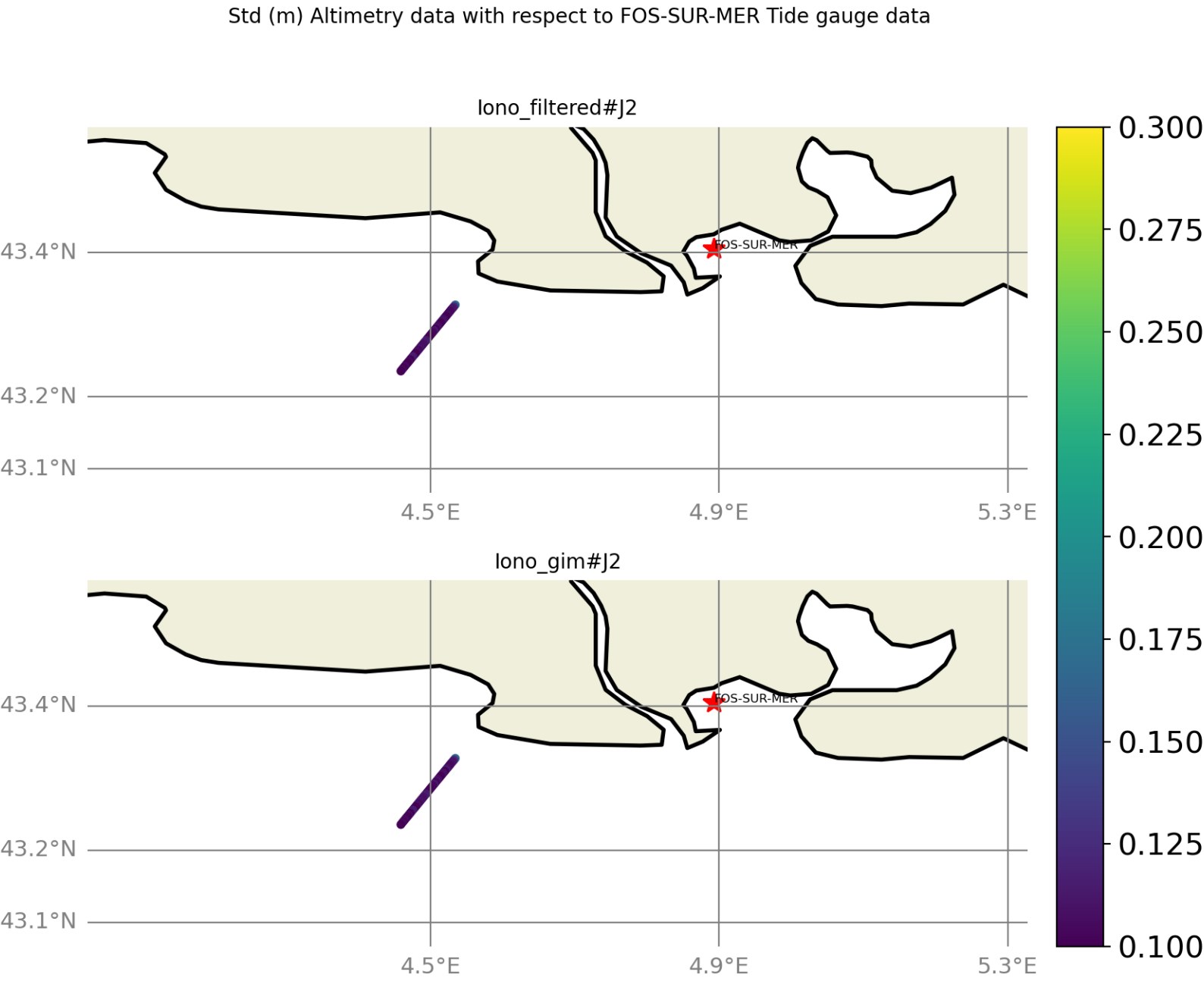

FIGURE 139 – std visualization in maps view % FOS-SUR-MER tide gauge

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

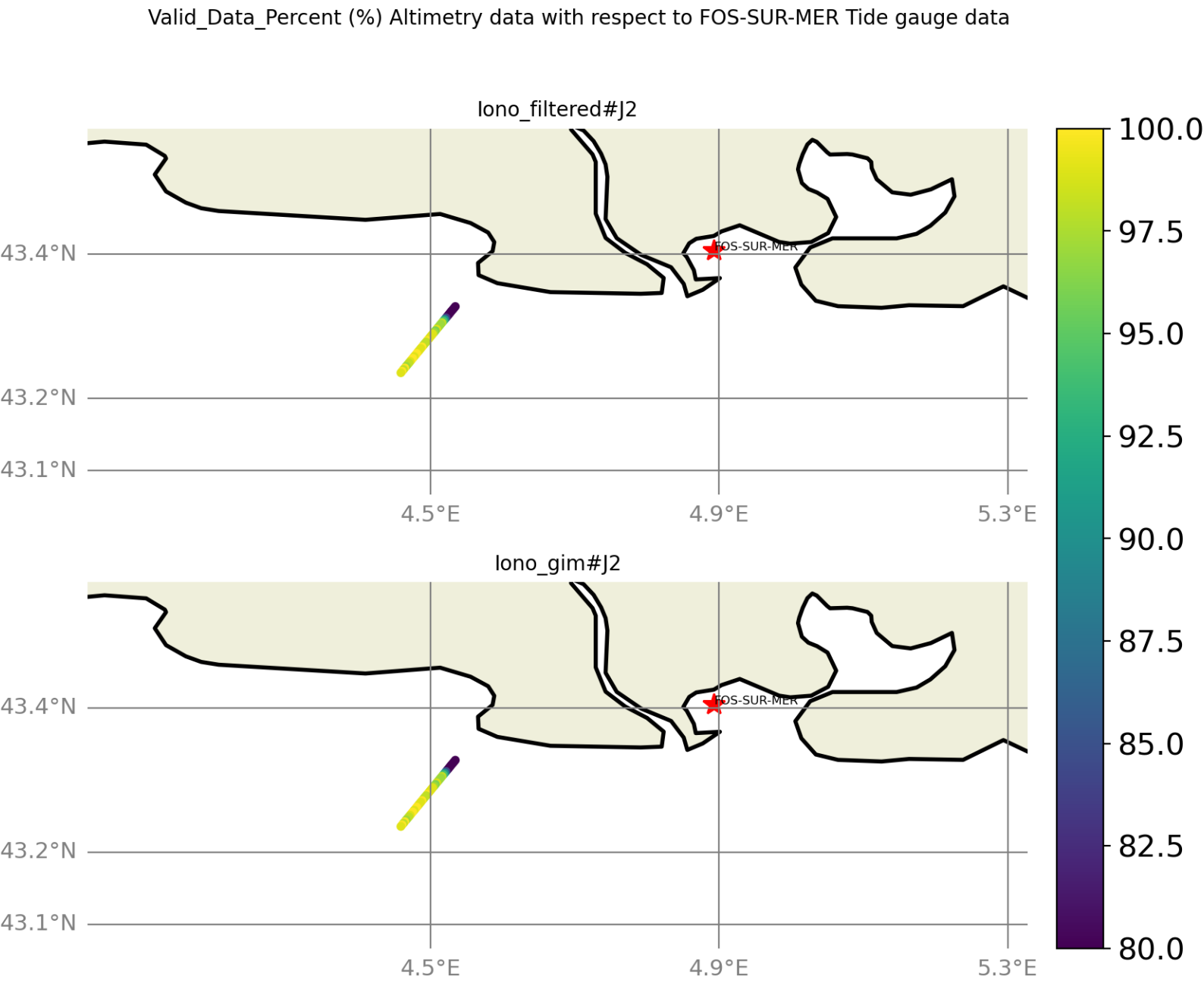

FIGURE 140 – valid_data_percent visualization in maps view % FOS-SUR-MER tide gauge

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

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

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

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

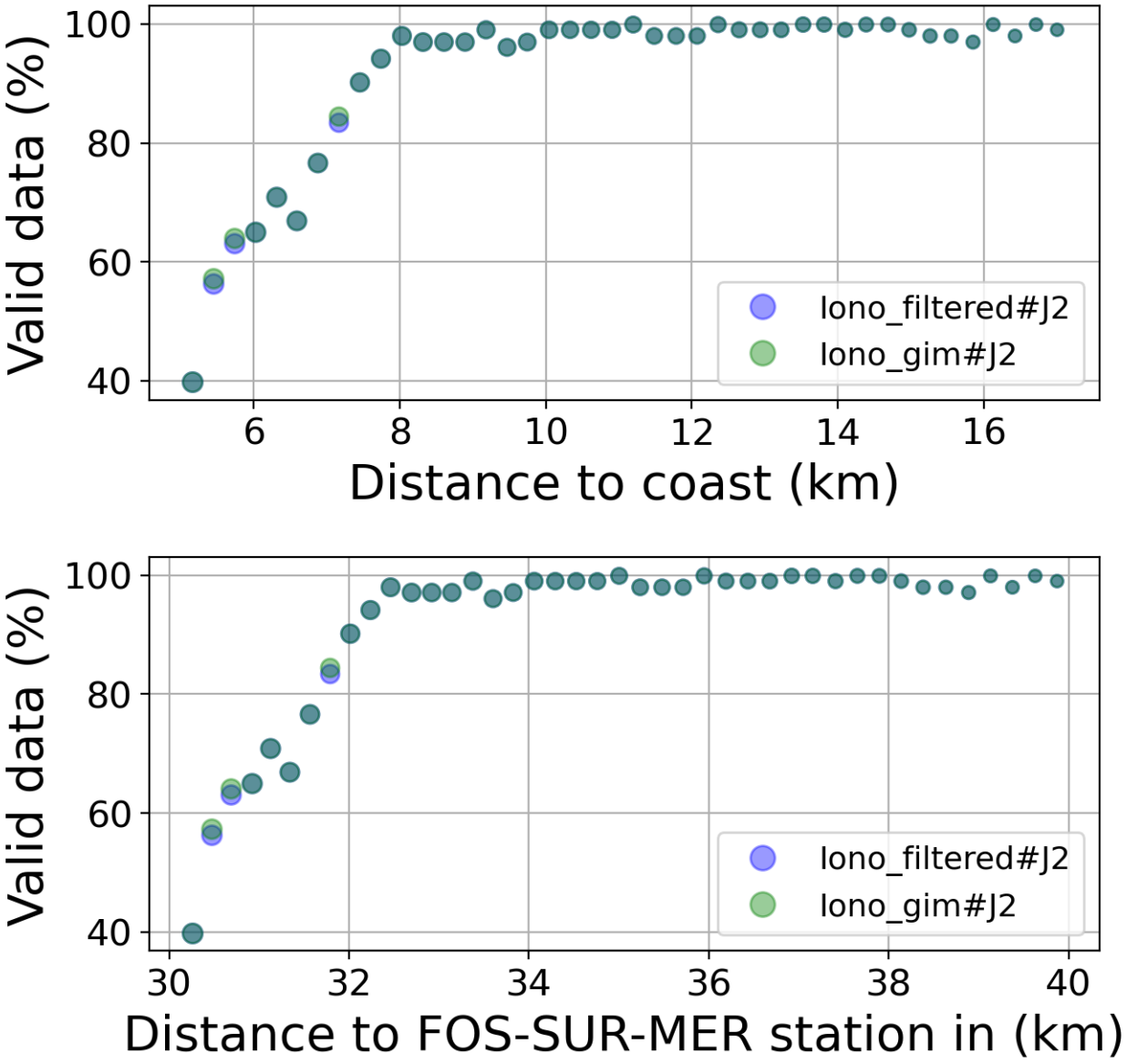

Figure 141 – Valid data (%) in function of distance to coast/FOS-SUR-MER station

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

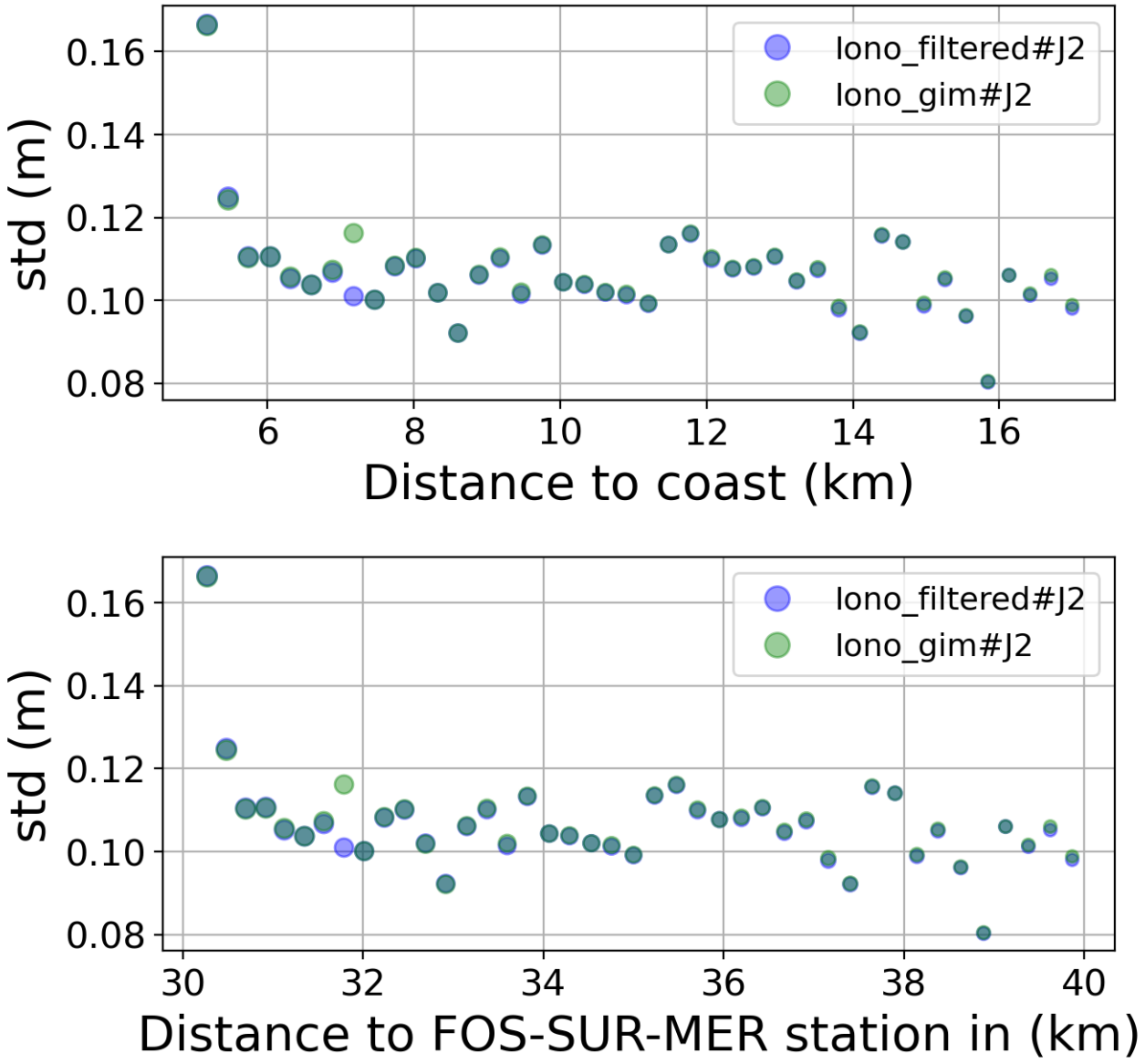

FIGURE 142 – Std in function of the distance to the coast/FOS-SUR-MER station

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

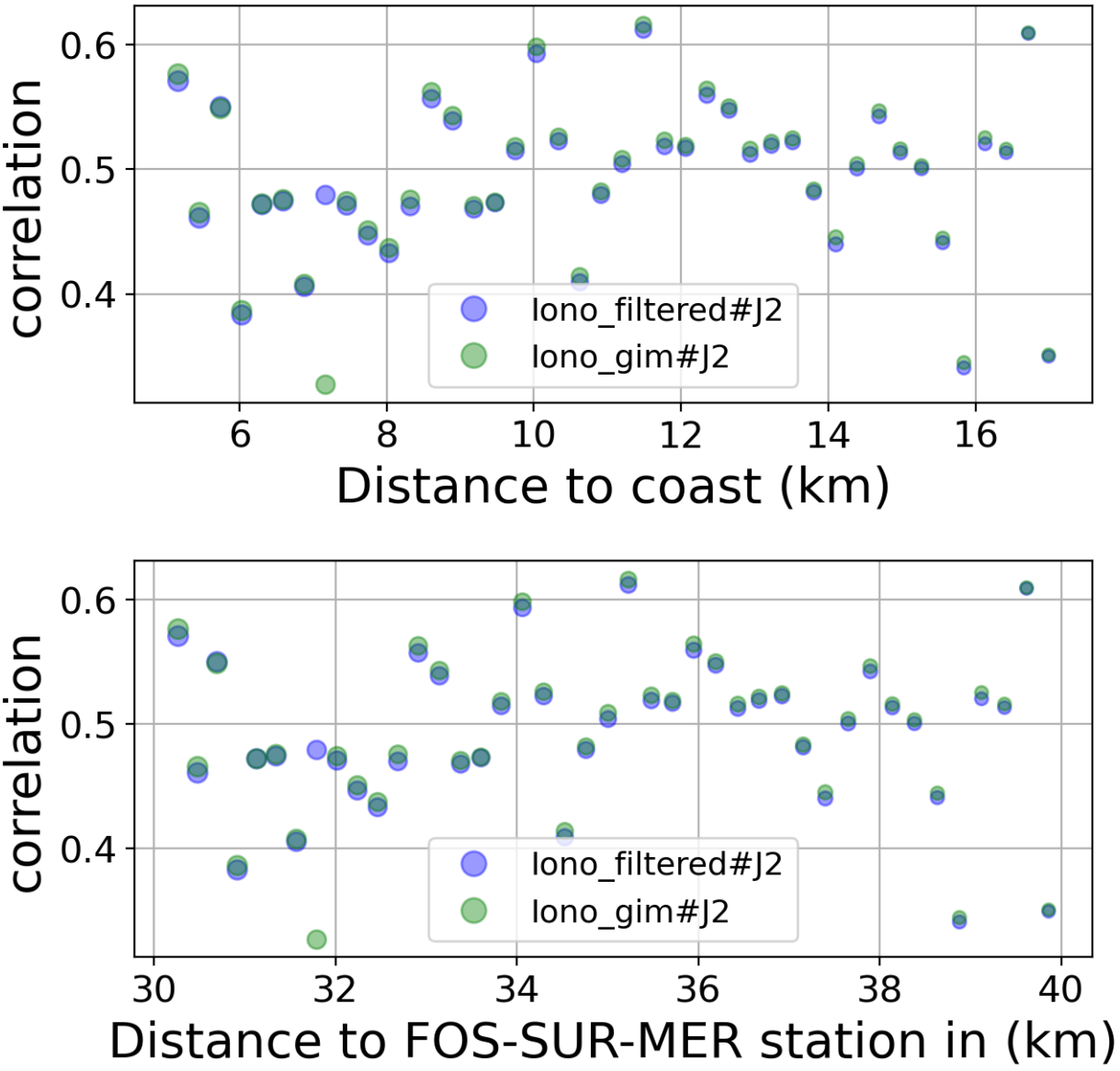

Figure 143 – Correlation in function of the distance to the coast/FOS-SUR-MER station

6.11.8 Taylor Diagram

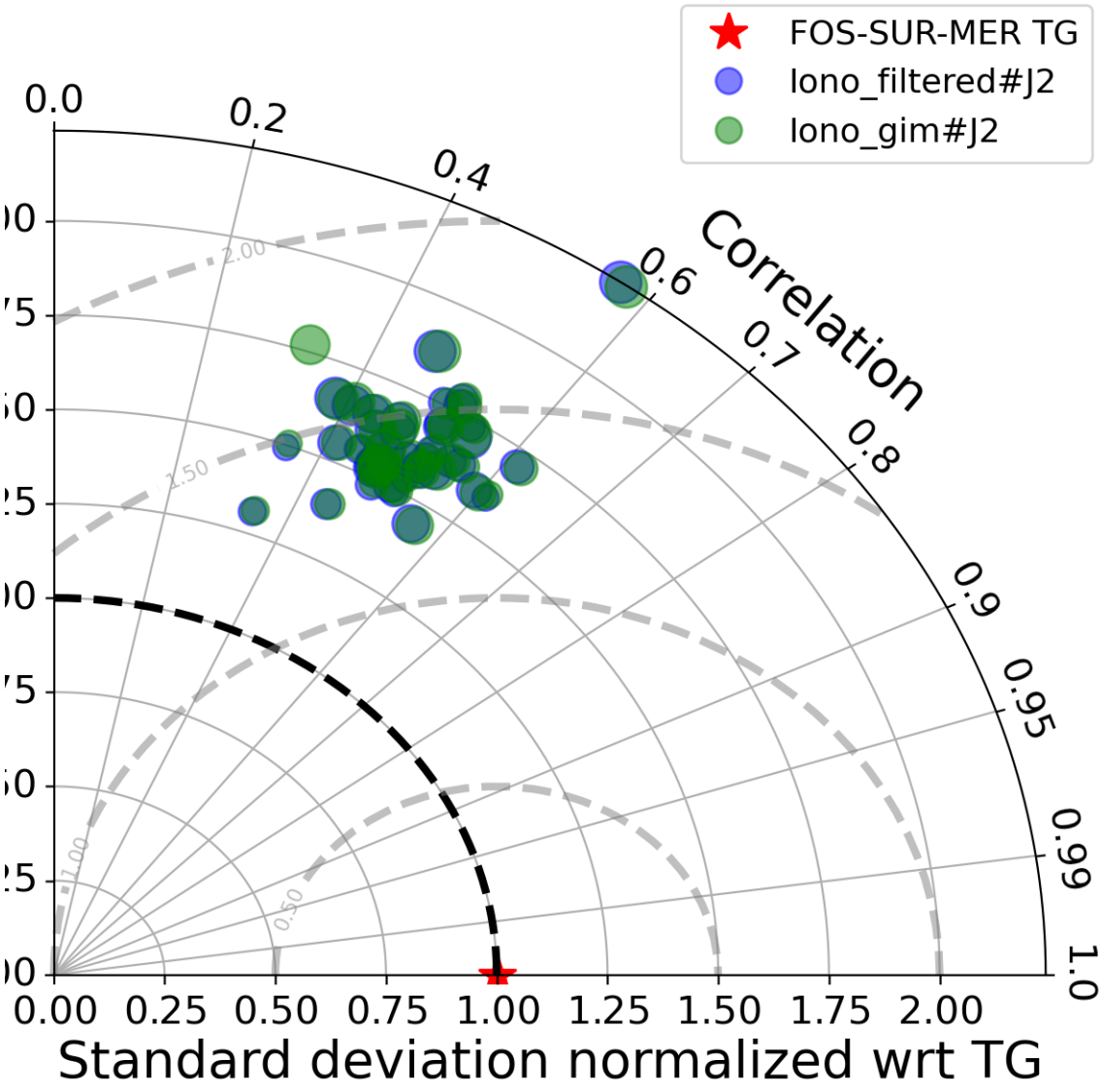

Figure 144 – Taylor diagram

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

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

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
iono_filtered#J2	92.002	0.494	0.107	0.094
Iono_gim#J2	92.071	0.494	0.107	0.094

Figure 145 – Mean statistics table of the common points in the altimetry products

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

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

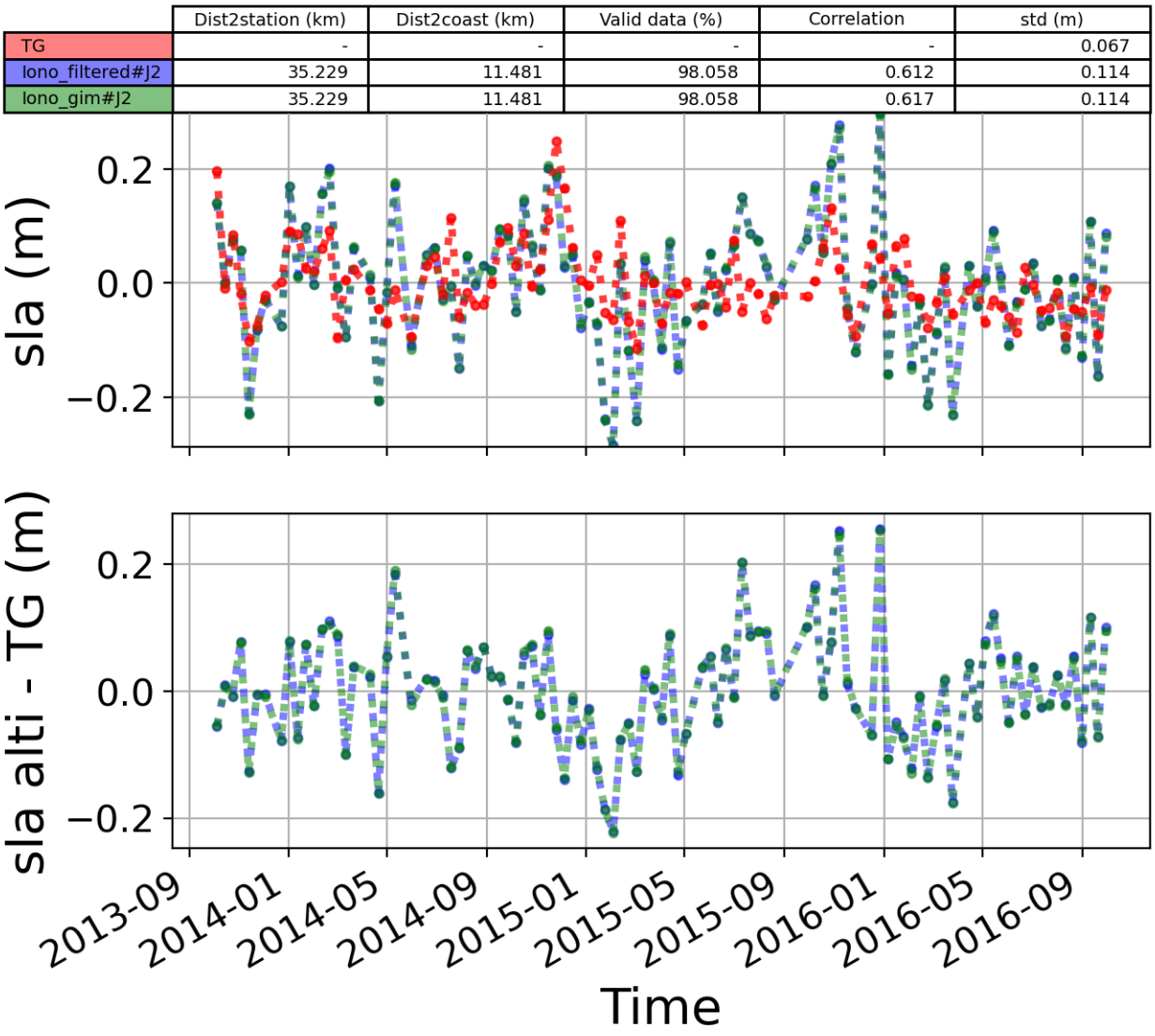

FIGURE 146 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie