

DIAGTOOL REPORT



Round Robin (GT cotier) : Range. Nea. J3. Mle4 vs Adaptive vs Ales.

7 juillet 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 Range used to calculate the sea level anomaly. Each version has been compared with a reference version. In this case the Mle4 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 : J3
- Git last tag :
- Git changeset number : 3b970d7-2022-07-05

2 Processing

2.1 sla formula

2.1.1 Mle4 product ' sla

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

2.1.2 Adaptive product 'sla'

sla = ORBIT.ALTI.CNES_POE_F -
RANGE.ALTI.RTK_ADAPTIVE_PROTO -
MEAN_SEA_SURFACE.MODEL.CNESCLS15 -
SEA_STATE_BIAS.ALTI.ADAPTIVE_PROTO -
IONOSPHERIC_CORRECTION.MODEL.GIM -
WET_TROPOSPHERIC_CORRECTION.RAD -
DRY_TROPOSPHERIC_CORRECTION.MODEL.ECMWF -
DYNAMICAL_ATMOSPHERIC_CORRECTION.MODEL.MOG2D_HR -
OCEAN_TIDE_HEIGHT.MODEL.FES14B -
SOLID_EARTH_TIDE_HEIGHT.MODEL.CARTWRIGHT_TAYLER_71 -
POLE_TIDE_HEIGHT.MODEL.DESAI_2015

2.1.3 Ales product 'sla'

sla = ORBIT.ALTI.CNES_POE_F -
range_20hz_ales -
MEAN_SEA_SURFACE.MODEL.CNESCLS15 -
sea_state_bias_20hz_ales -
IONOSPHERIC_CORRECTION.MODEL.GIM -
WET_TROPOSPHERIC_CORRECTION.RAD -
DRY_TROPOSPHERIC_CORRECTION.MODEL.ECMWF -
DYNAMICAL_ATMOSPHERIC_CORRECTION.MODEL.MOG2D_HR -
OCEAN_TIDE_HEIGHT.MODEL.FES14B -
SOLID_EARTH_TIDE_HEIGHT.MODEL.CARTWRIGHT_TAYLER_71 -
POLE_TIDE_HEIGHT.MODEL.DESAI_2015

2.2 Binning

Each track has been divided to a set of sections, where the center of each section is separated by the sample frequency of the satellite times its velocity.

The data located within the sections limits represent the altimetry time-series on which the statistics will be calculated and visualized in this report.

2.3 Filtering

- The sla has been filtered by a threshold of 3 m.
- Each sla time-series has been filtered by a window of $[-4\sigma, 4\sigma]$, where σ is the standard deviation of the sla time serie

3 Spatial coherence analysis

3.1 sla

3.1.1 sla 's count

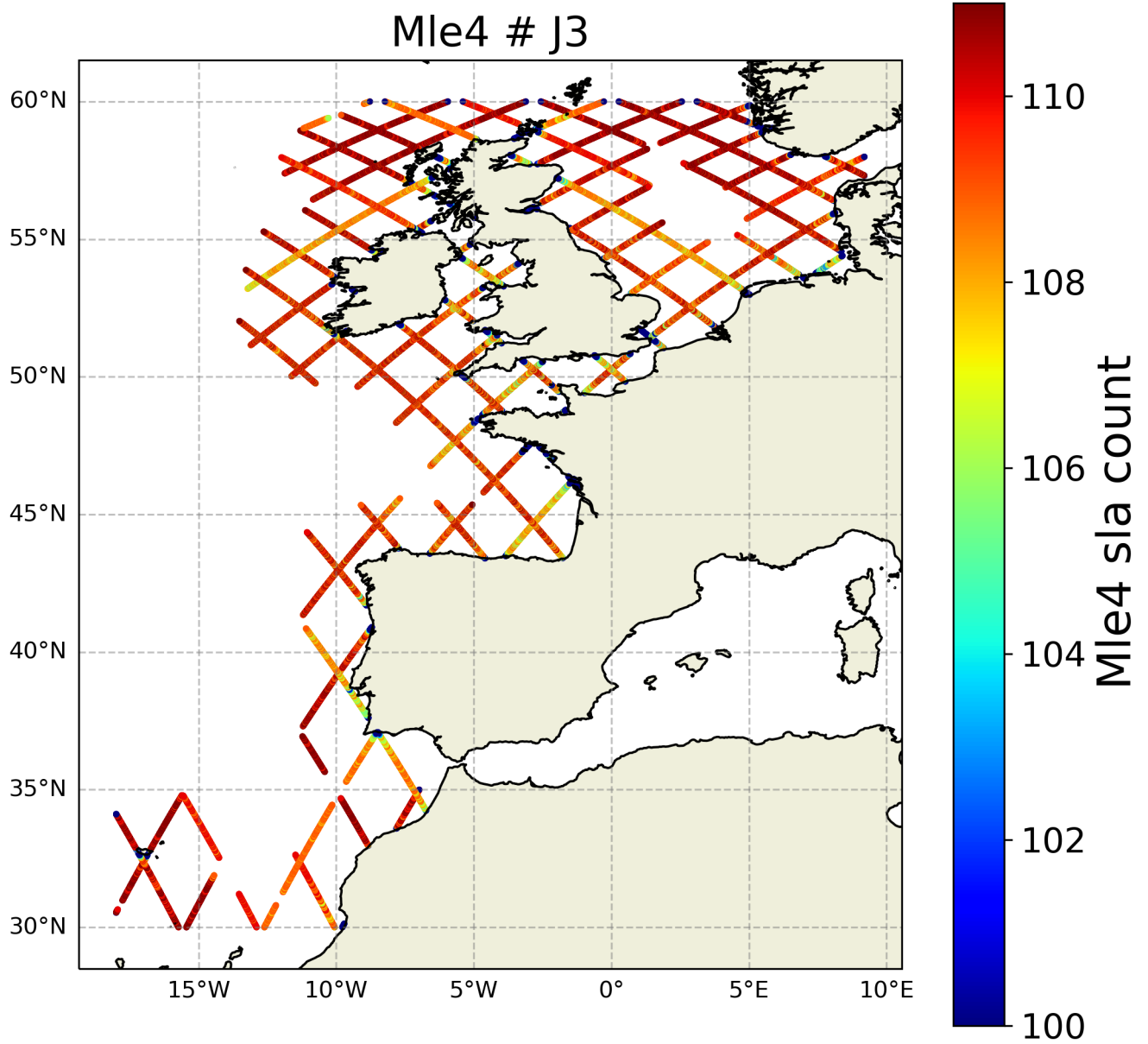


FIGURE 1 – Spatial coherence analysis of the count of the Mle4 version of sla variable

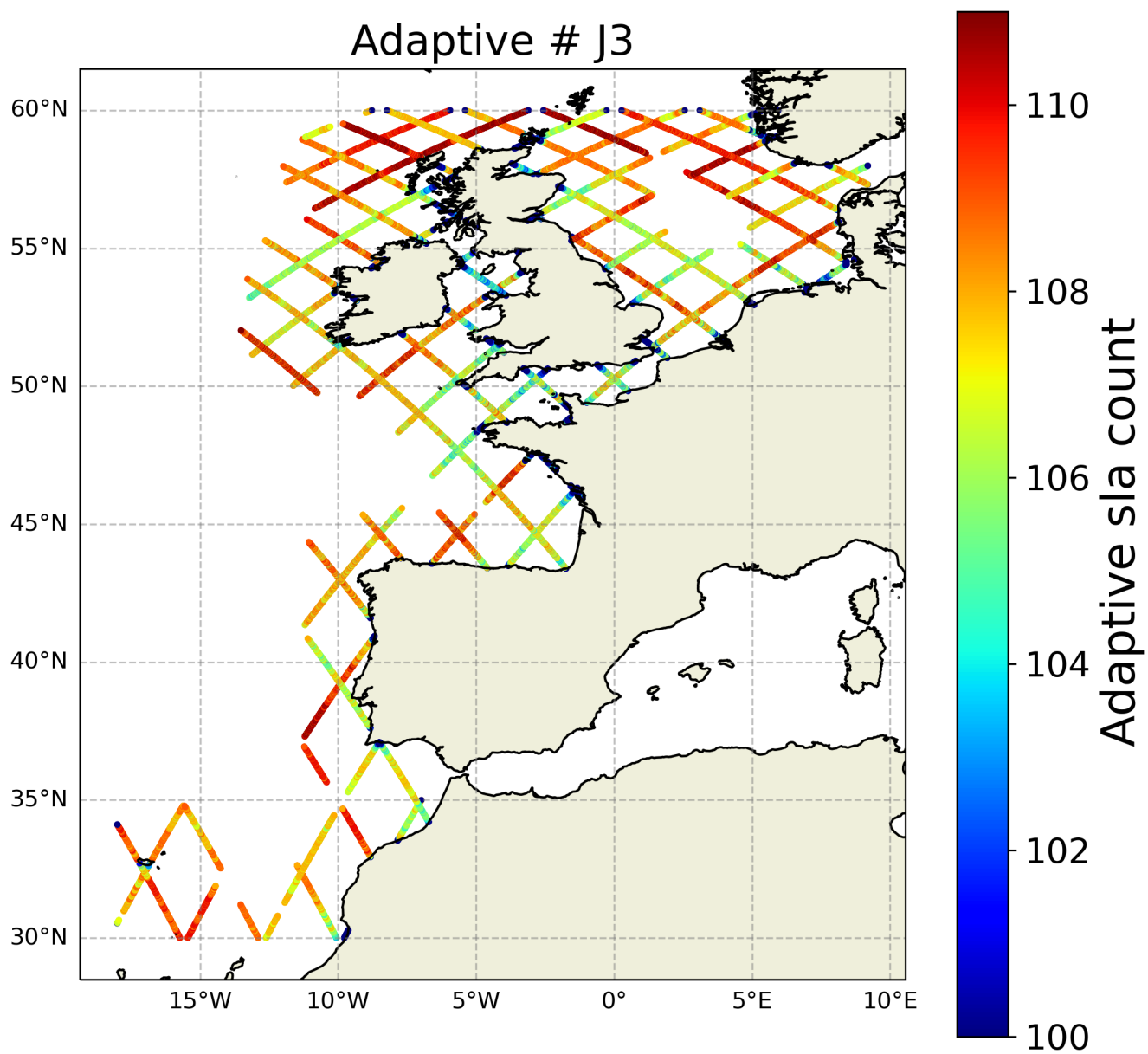


FIGURE 2 – Spatial coherence analysis of the count of the Adaptive version of sla variable

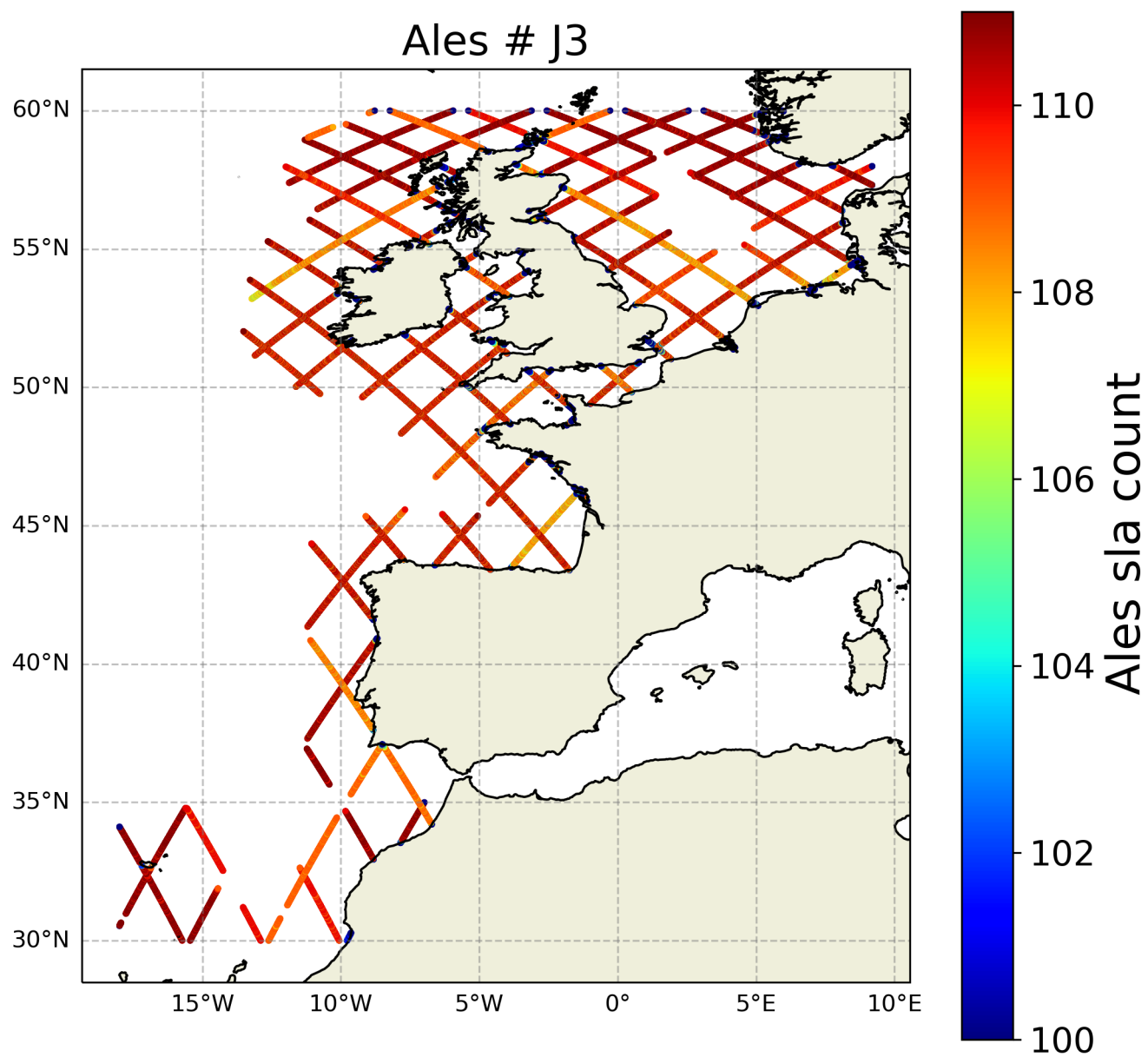


FIGURE 3 – Spatial coherence analysis of the count of the Ales version of sla variable

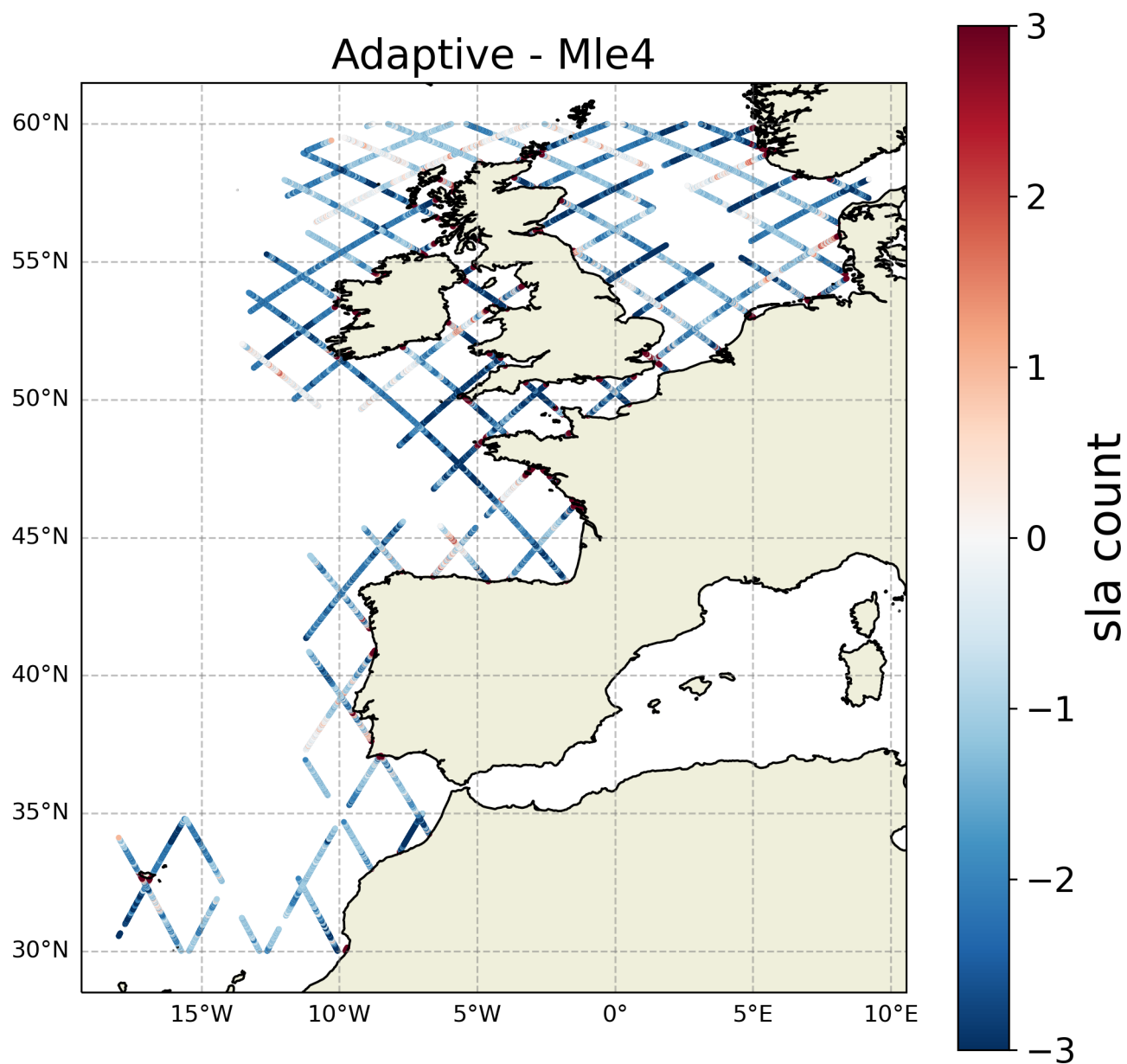


FIGURE 4 – Spatial coherence analysis of the Difference in sla 's count between Adaptive and Mle4

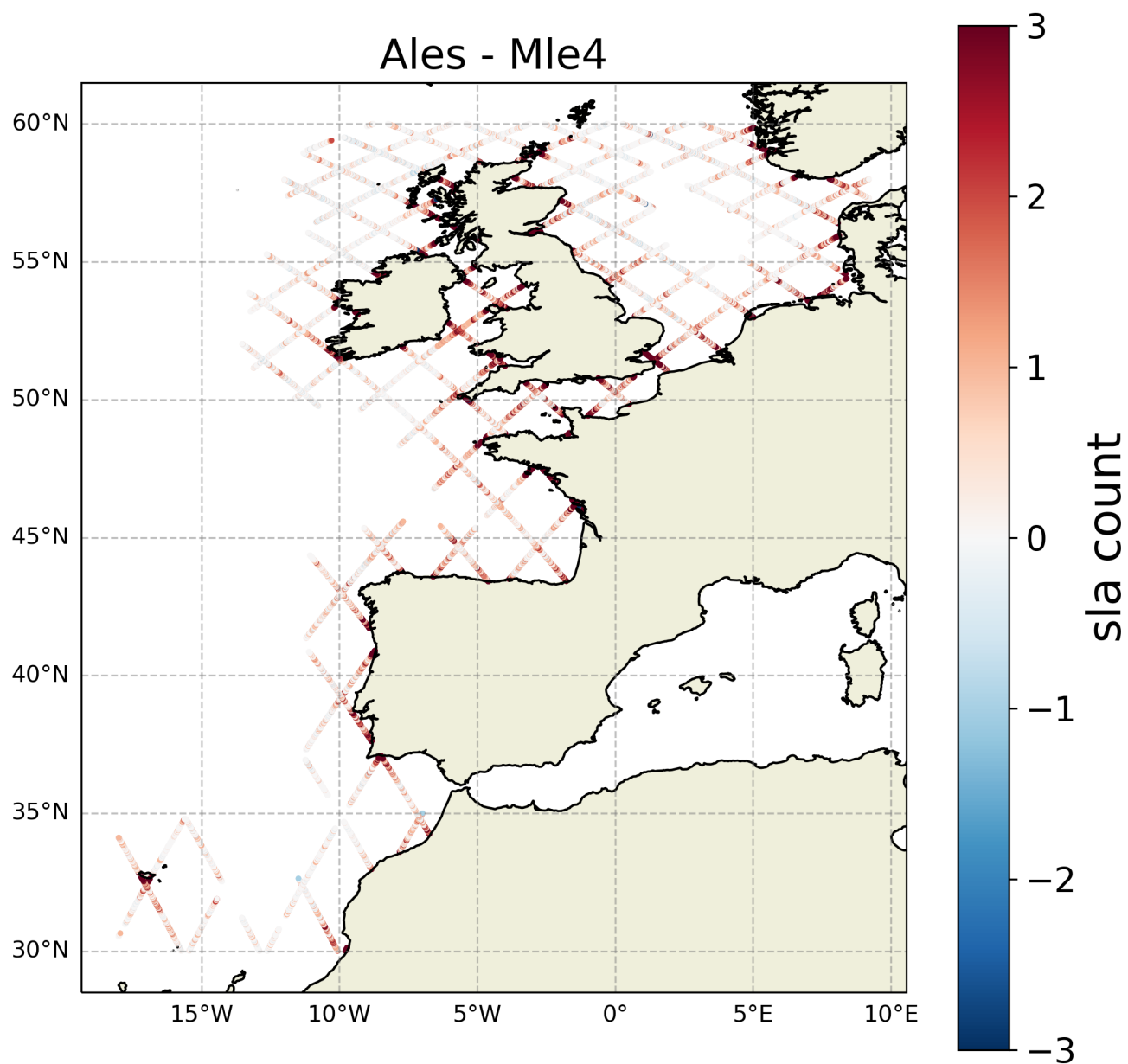


FIGURE 5 – Spatial coherence analysis of the Difference in sla 's count between Ales and Mle4

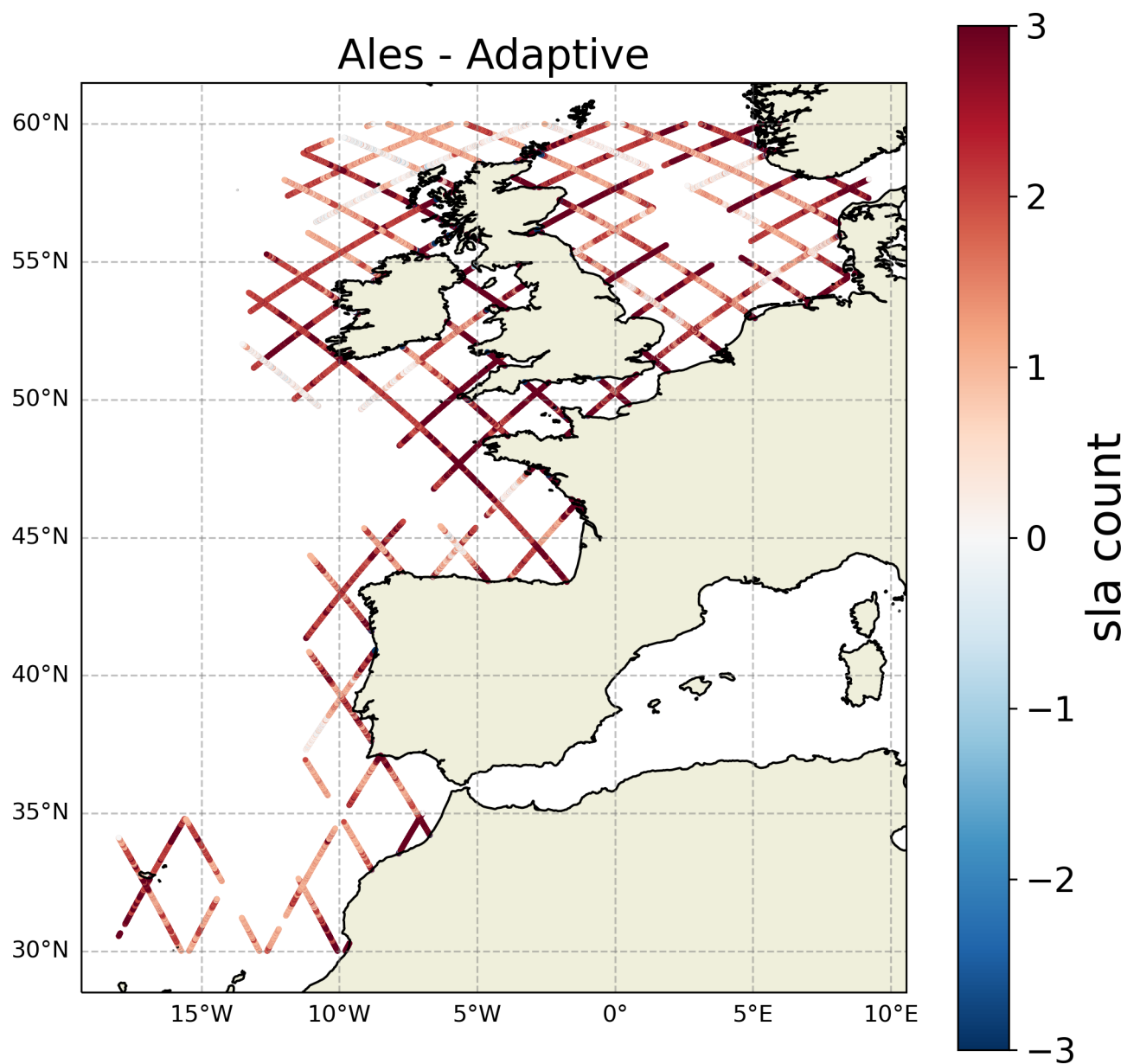


FIGURE 6 – Spatial coherence analysis of the Difference in sla 's count between Ales and Adaptive

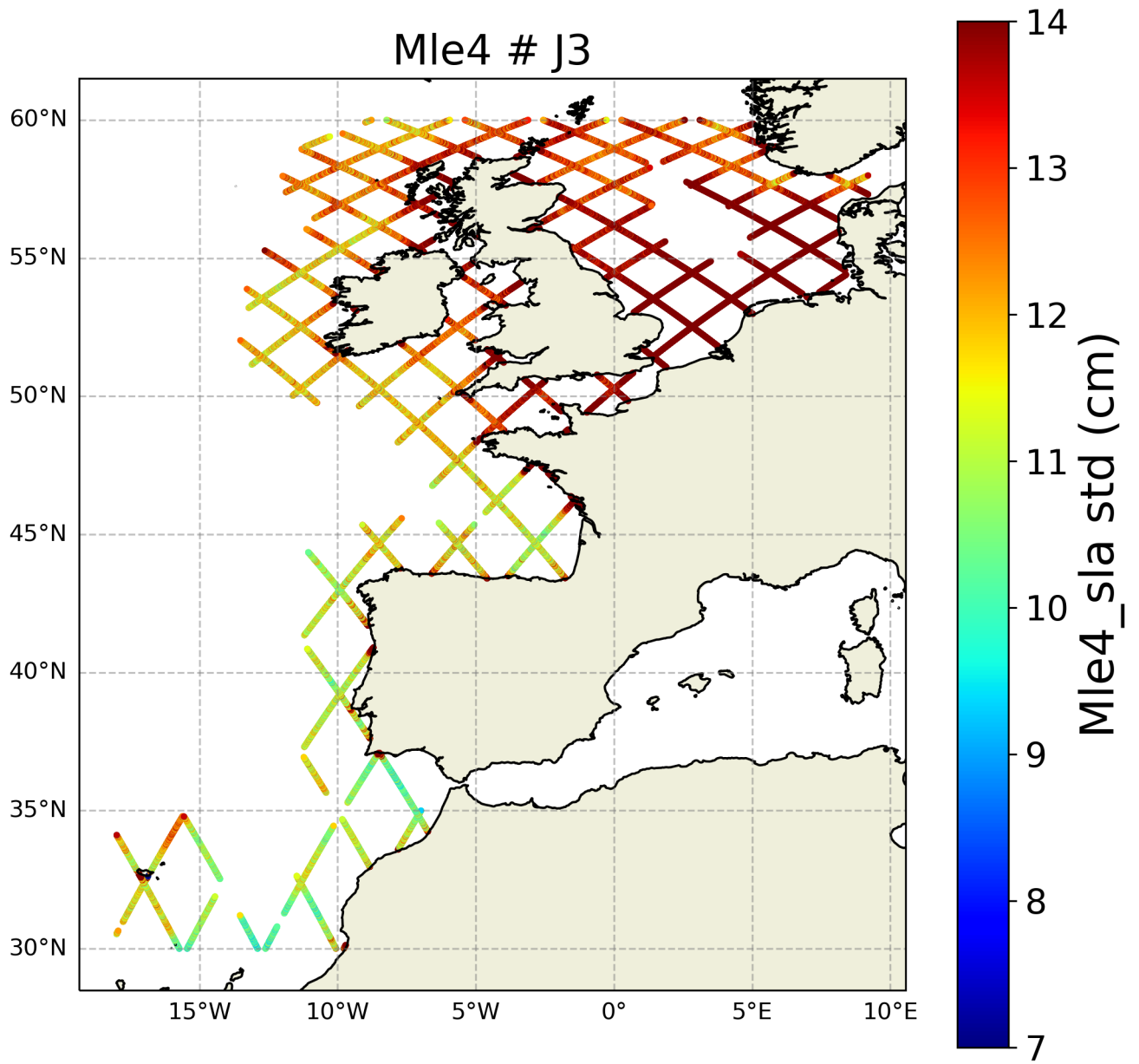


FIGURE 7 – Spatial coherence analysis of the std of the Mle4 version of sla variable

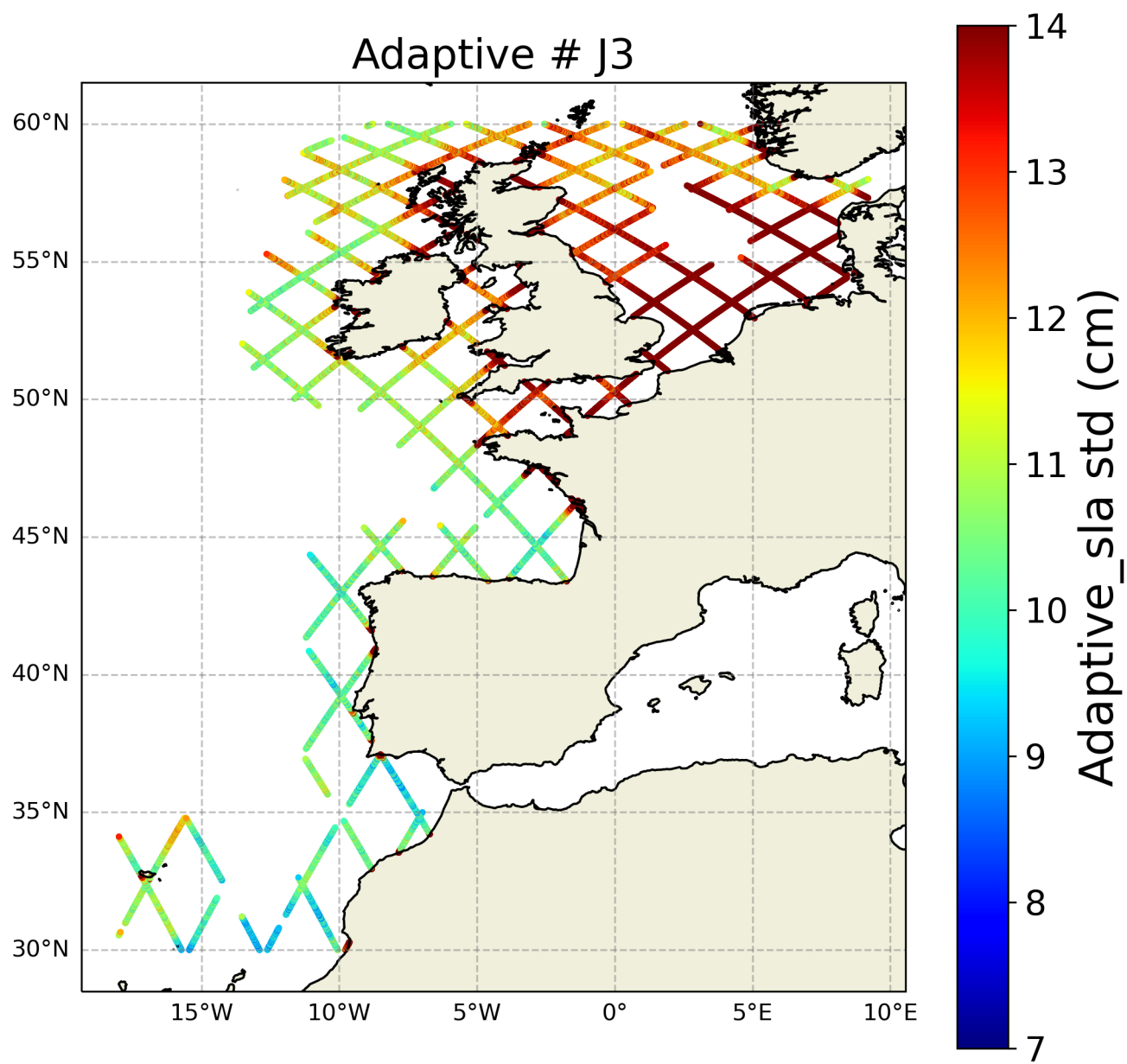


FIGURE 8 – Spatial coherence analysis of the std of the Adaptive version of sla variable

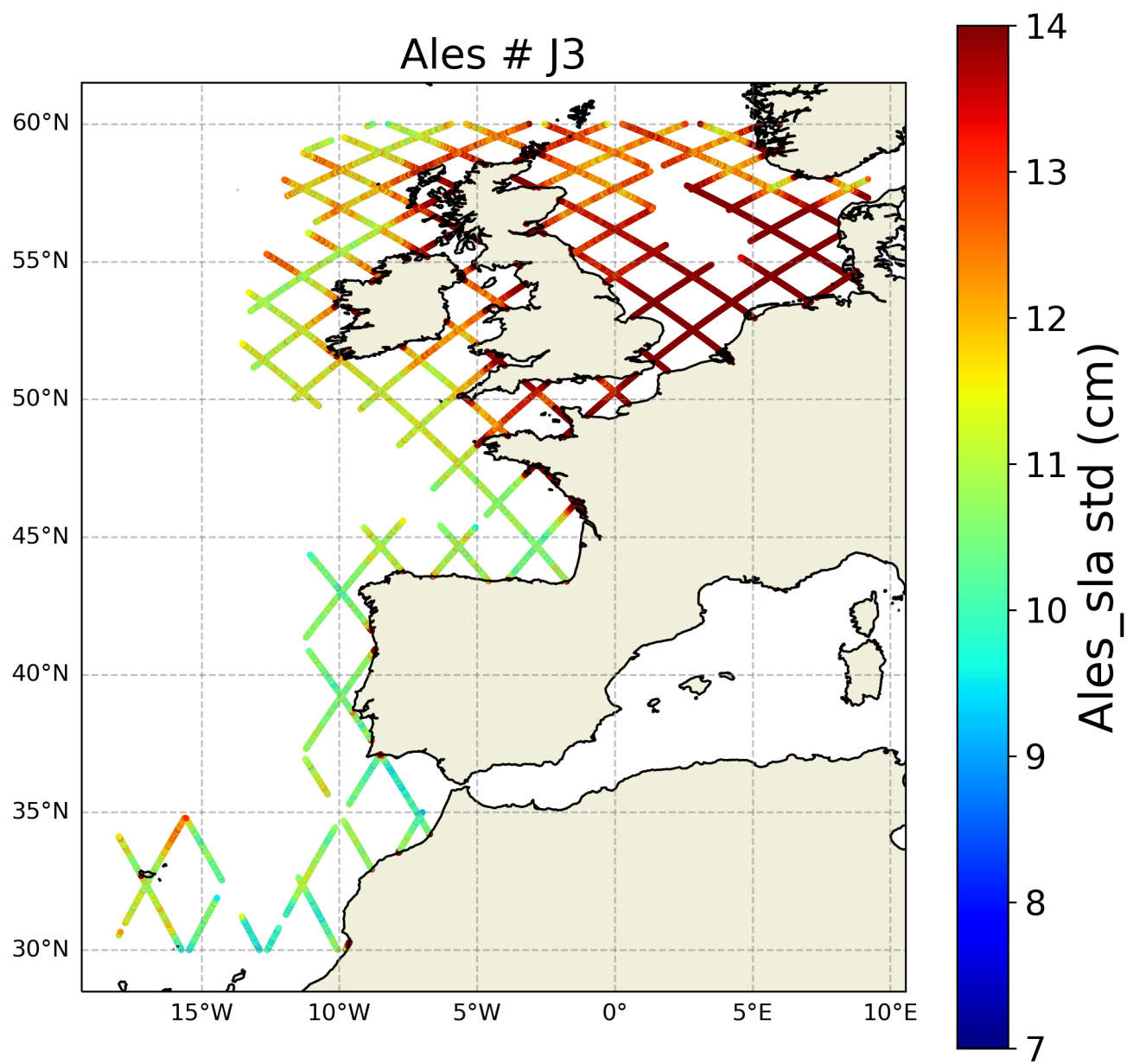


FIGURE 9 – Spatial coherence analysis of the std of the Ales version of sla variable

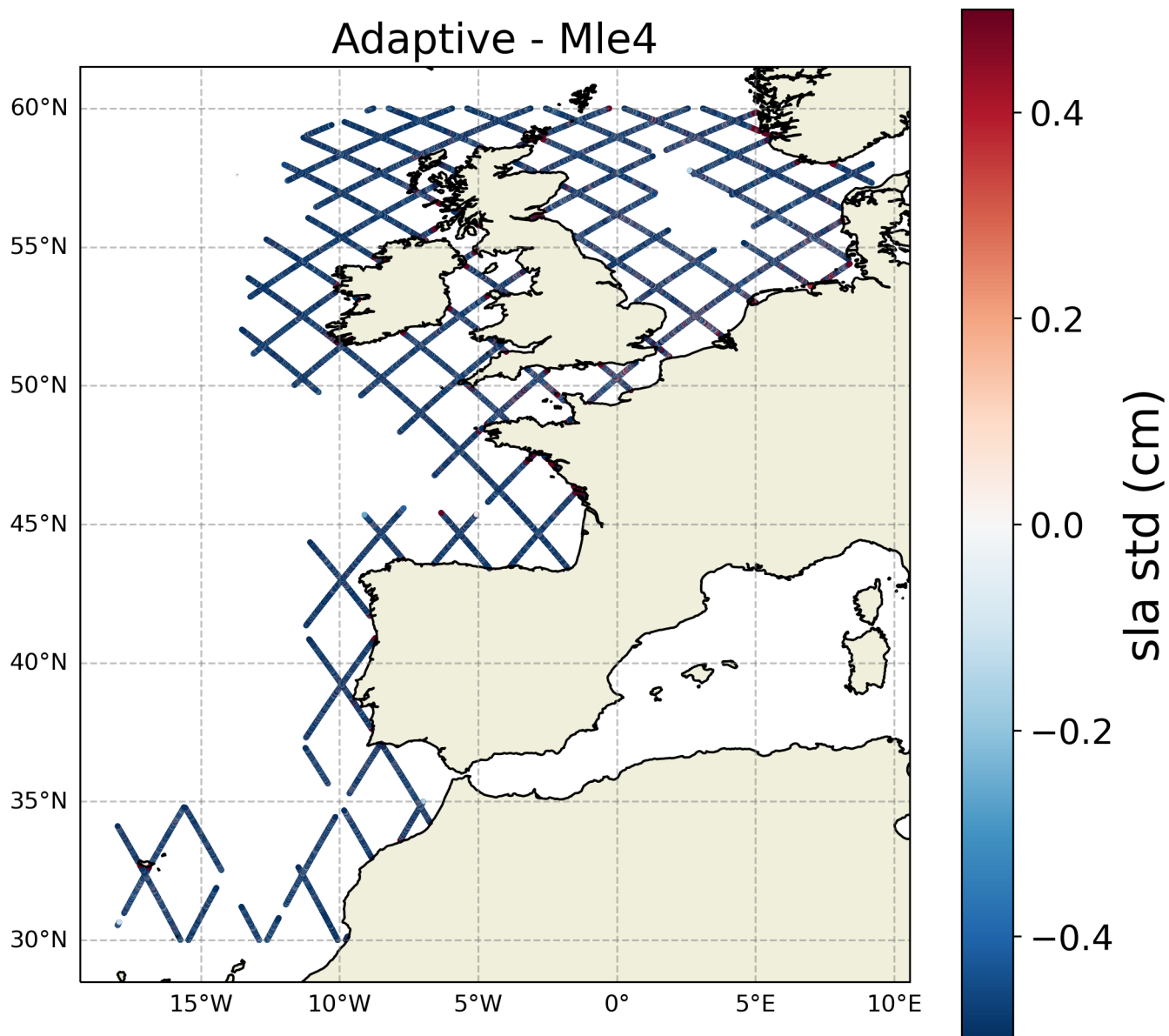


FIGURE 10 – Spatial coherence analysis of the Difference in sla 's std between Adaptive and Mle4

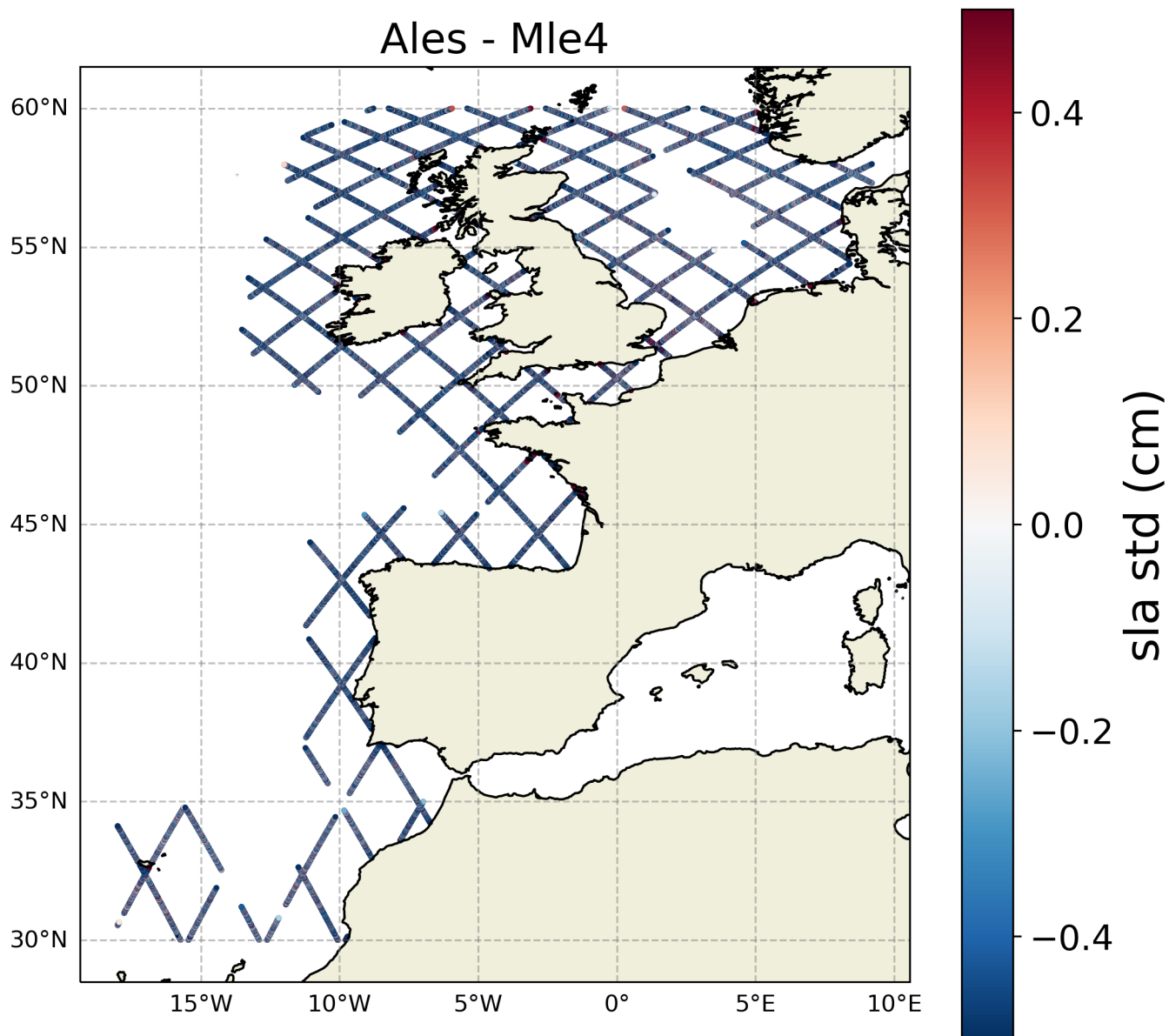


FIGURE 11 – Spatial coherence analysis of the Difference in sla 's std between Ales and Mle4

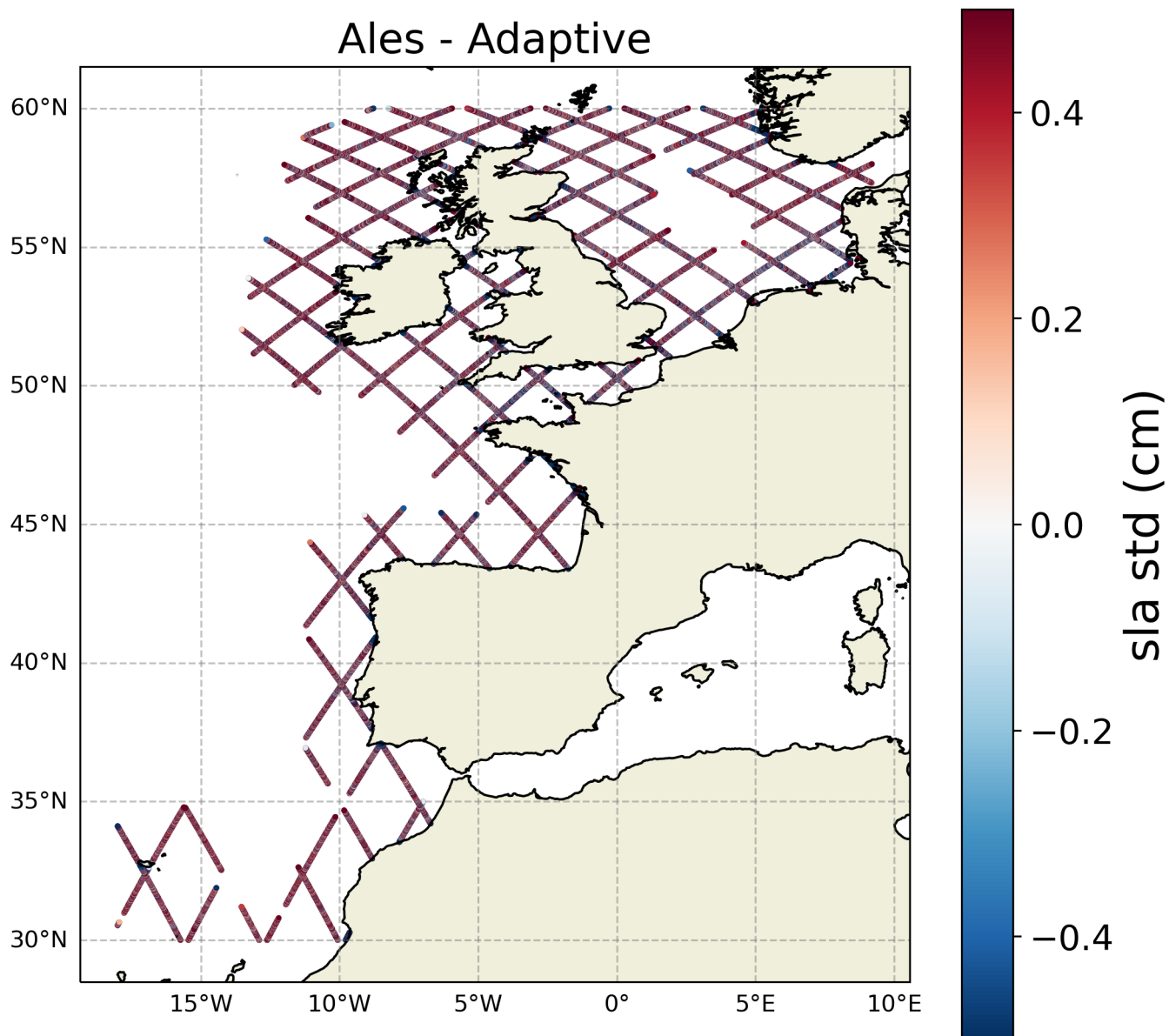


FIGURE 12 – Spatial coherence analysis of the Difference in sla 's std between Ales and Adaptive

3.1.3 sla's mean

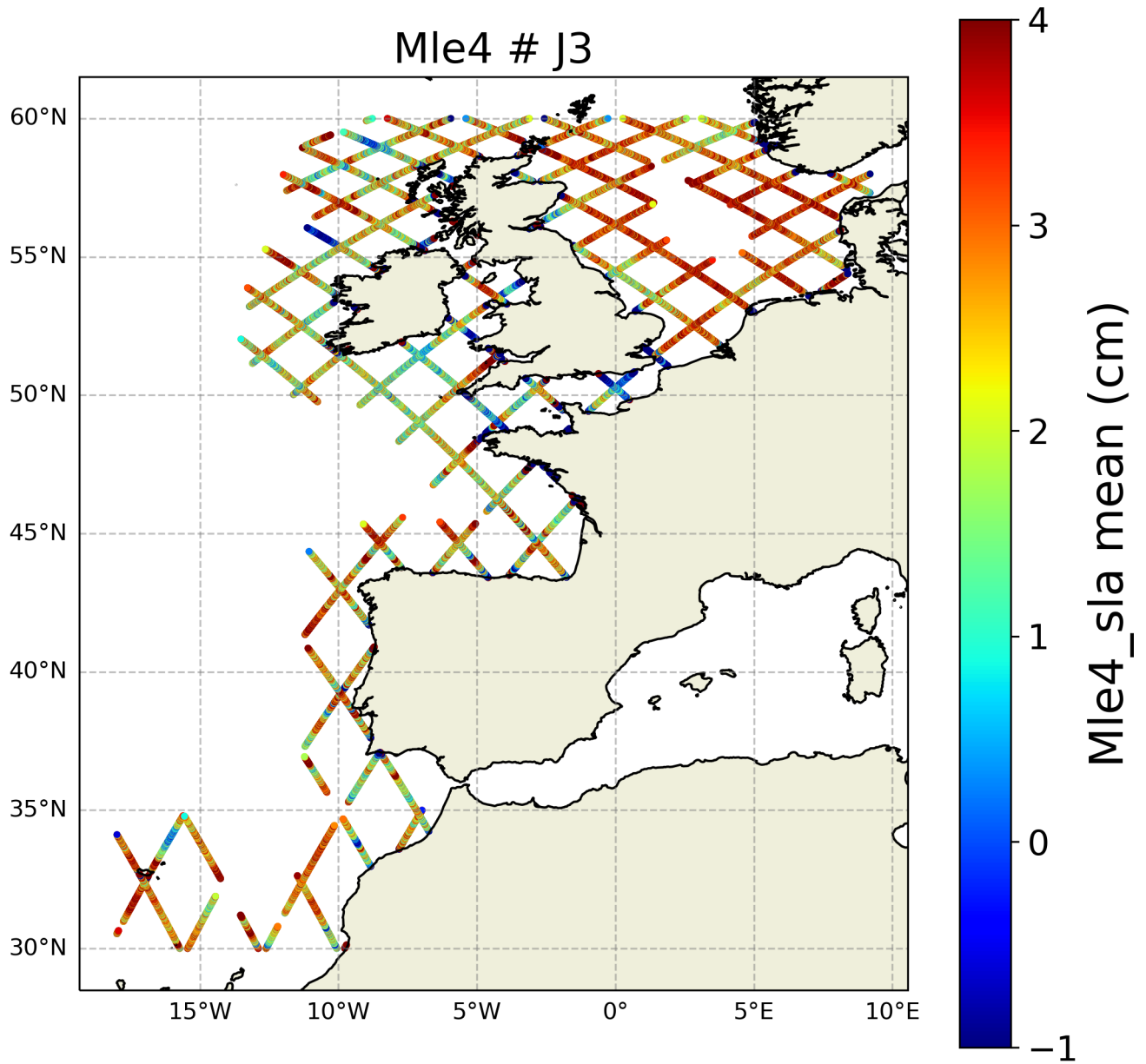


FIGURE 13 – Spatial coherence analysis of the mean of the Mle4 version of sla variable

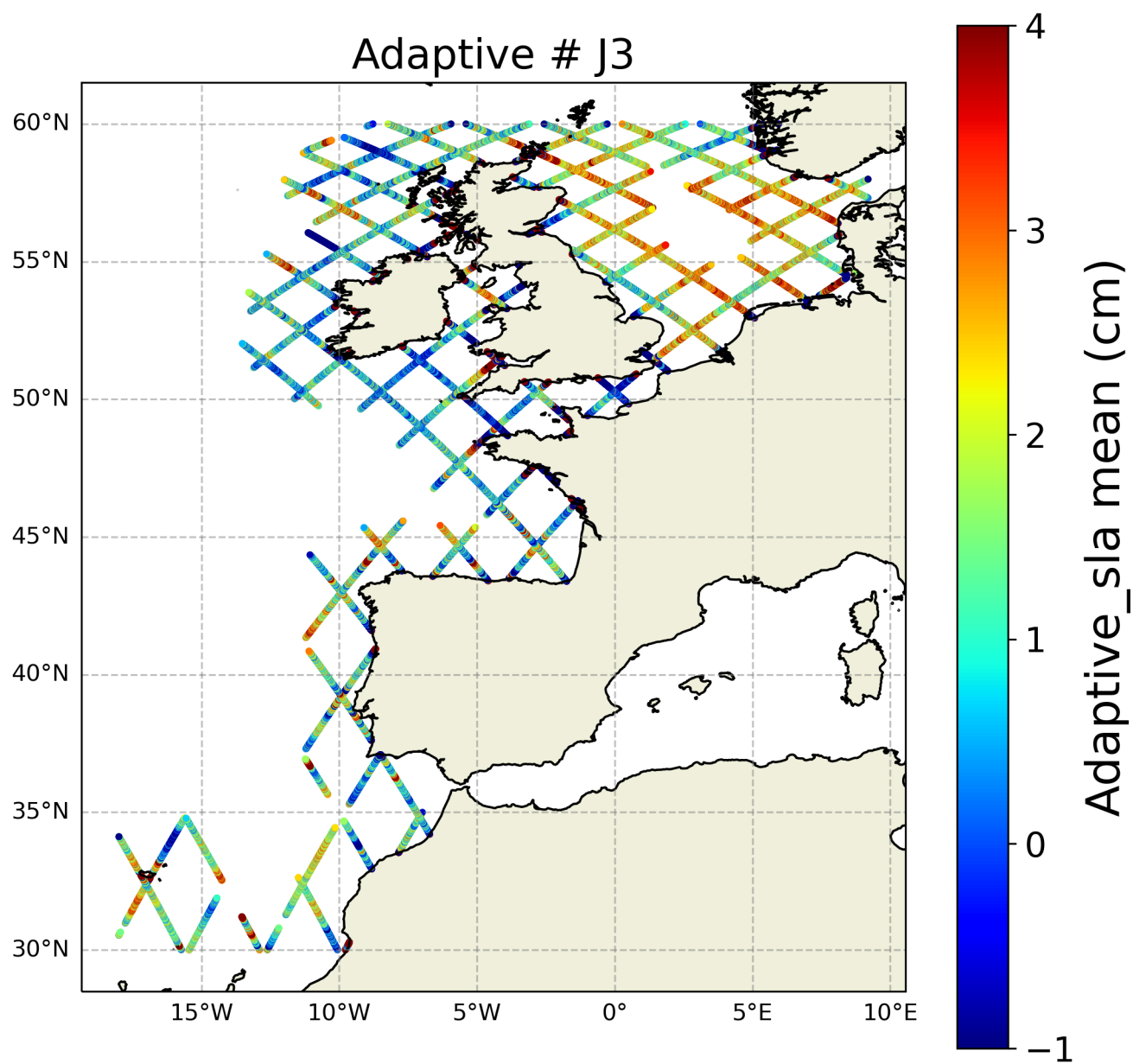


FIGURE 14 – Spatial coherence analysis of the mean of the Adaptive version of sla variable

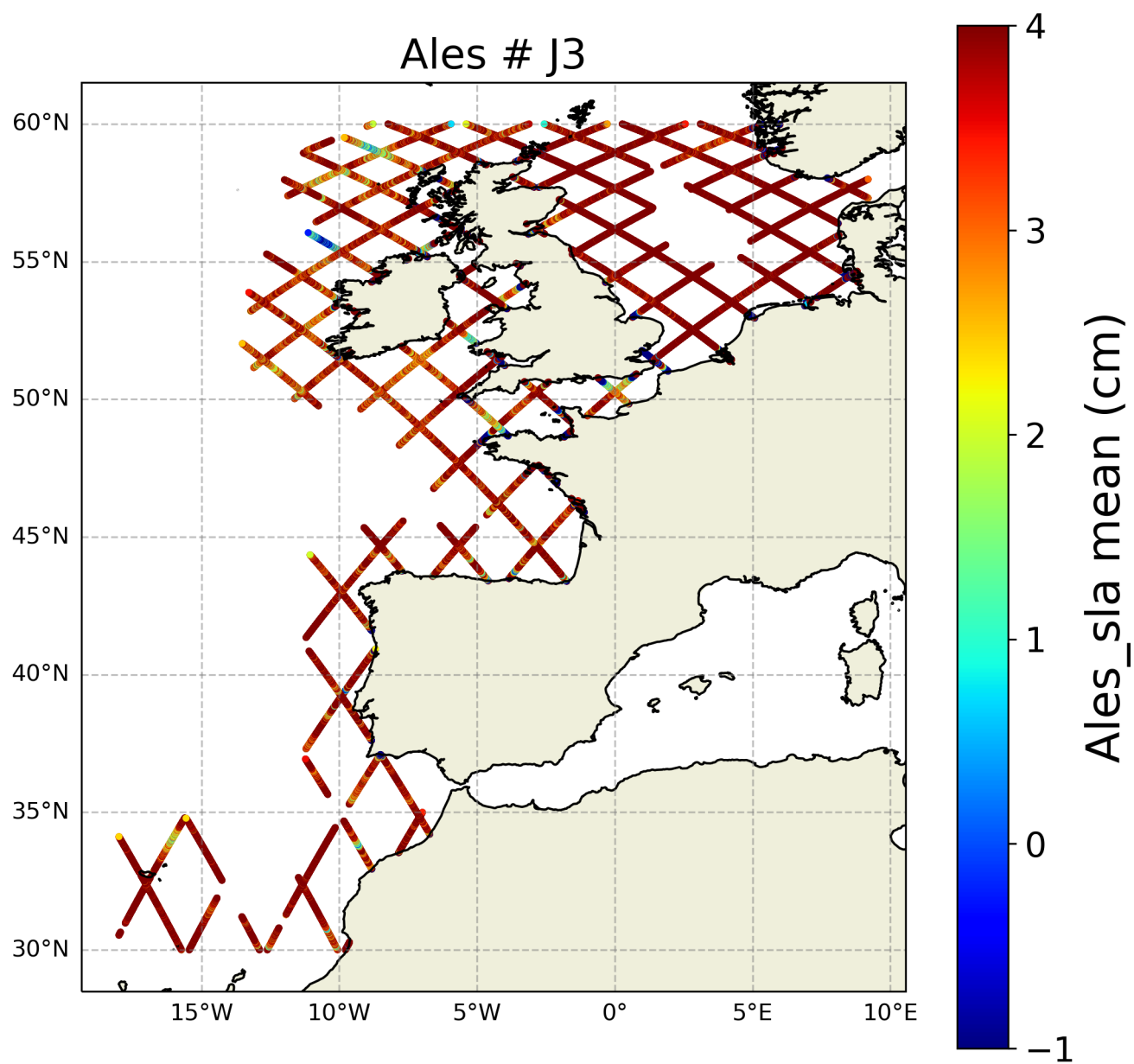


FIGURE 15 – Spatial coherence analysis of the mean of the Ales version of sla variable

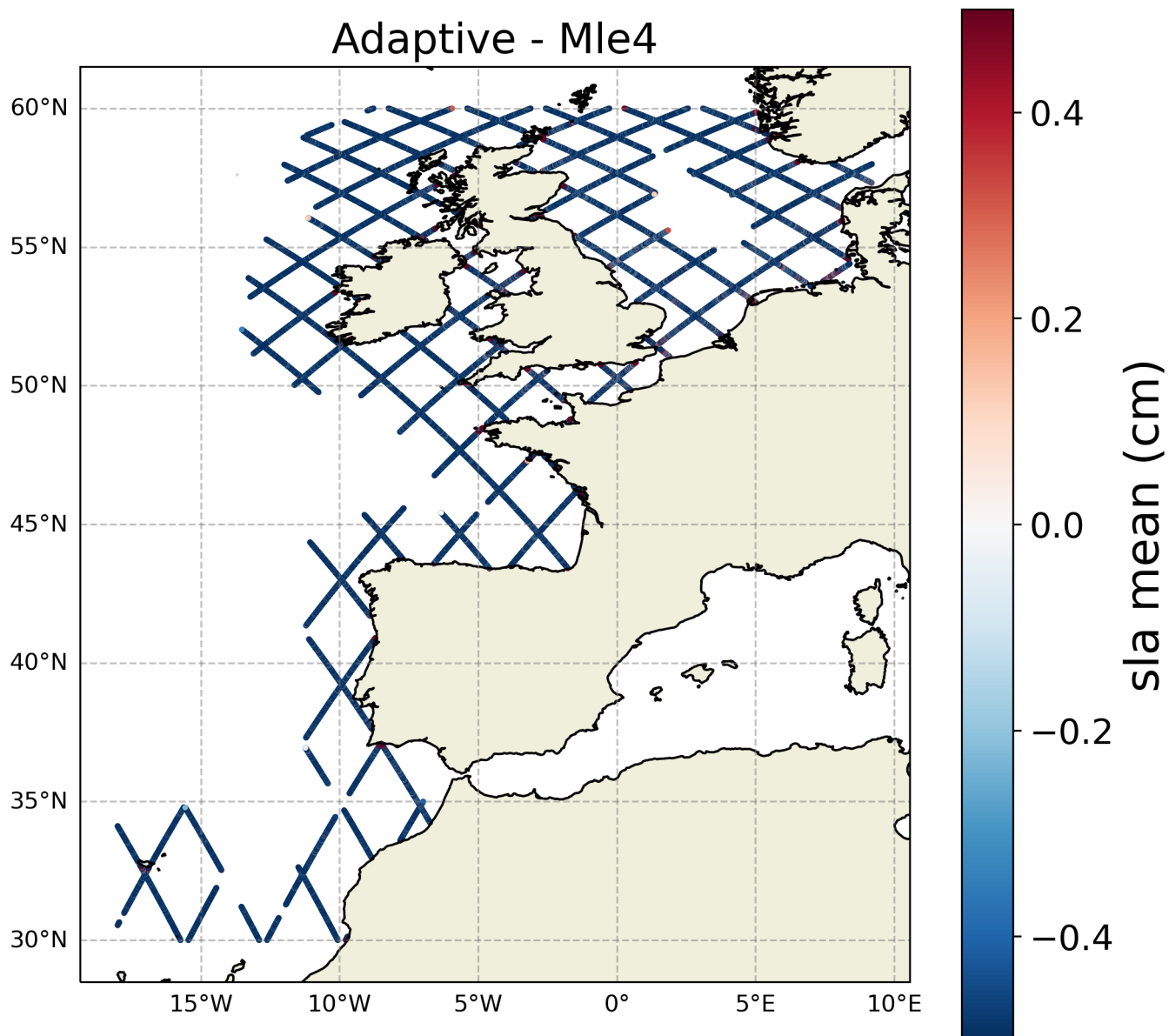


FIGURE 16 – Spatial coherence analysis of the Difference in sla 's mean between Adaptive and Mle4

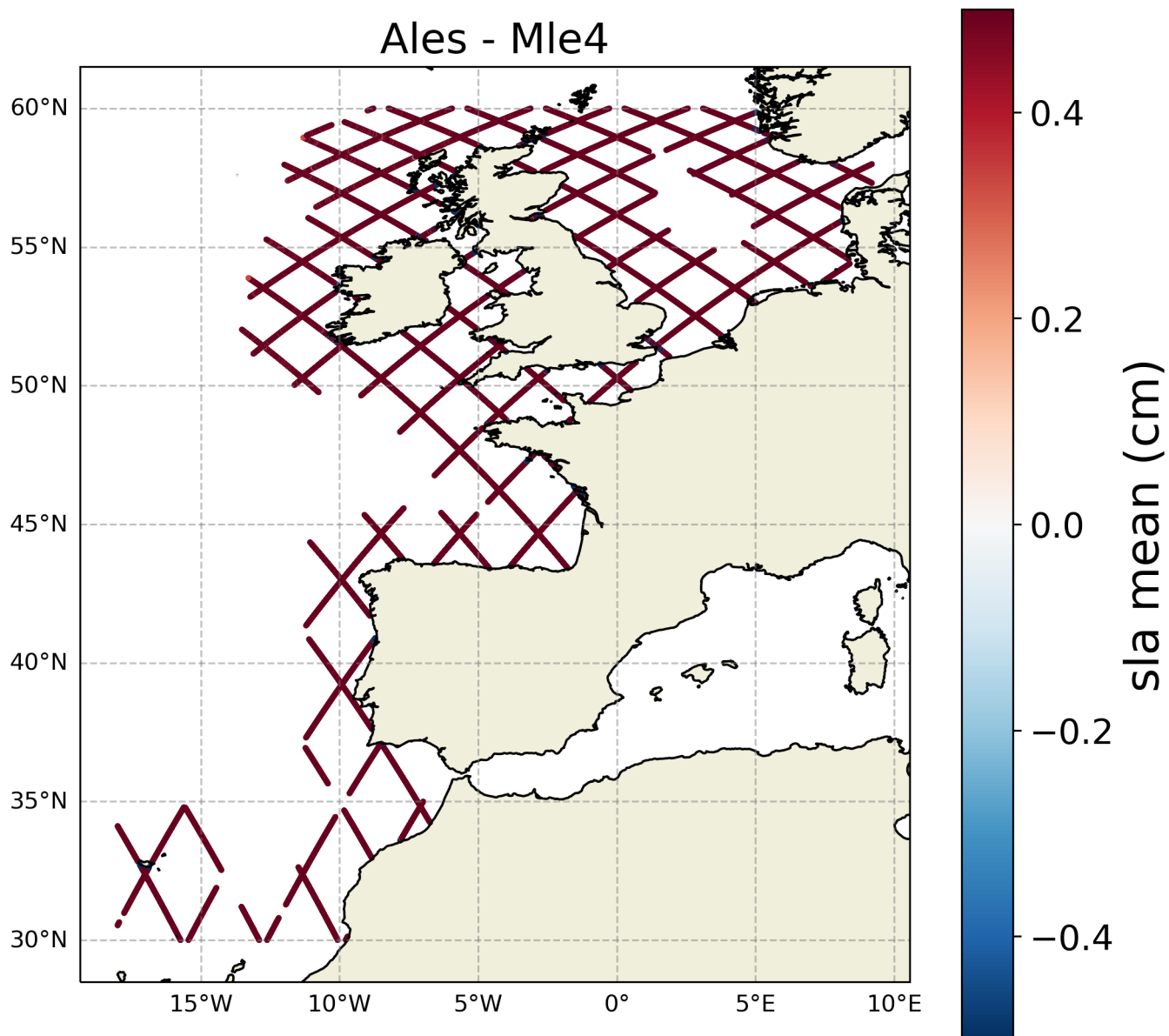


FIGURE 17 – Spatial coherence analysis of the Difference in sla 's mean between Ales and Mle4

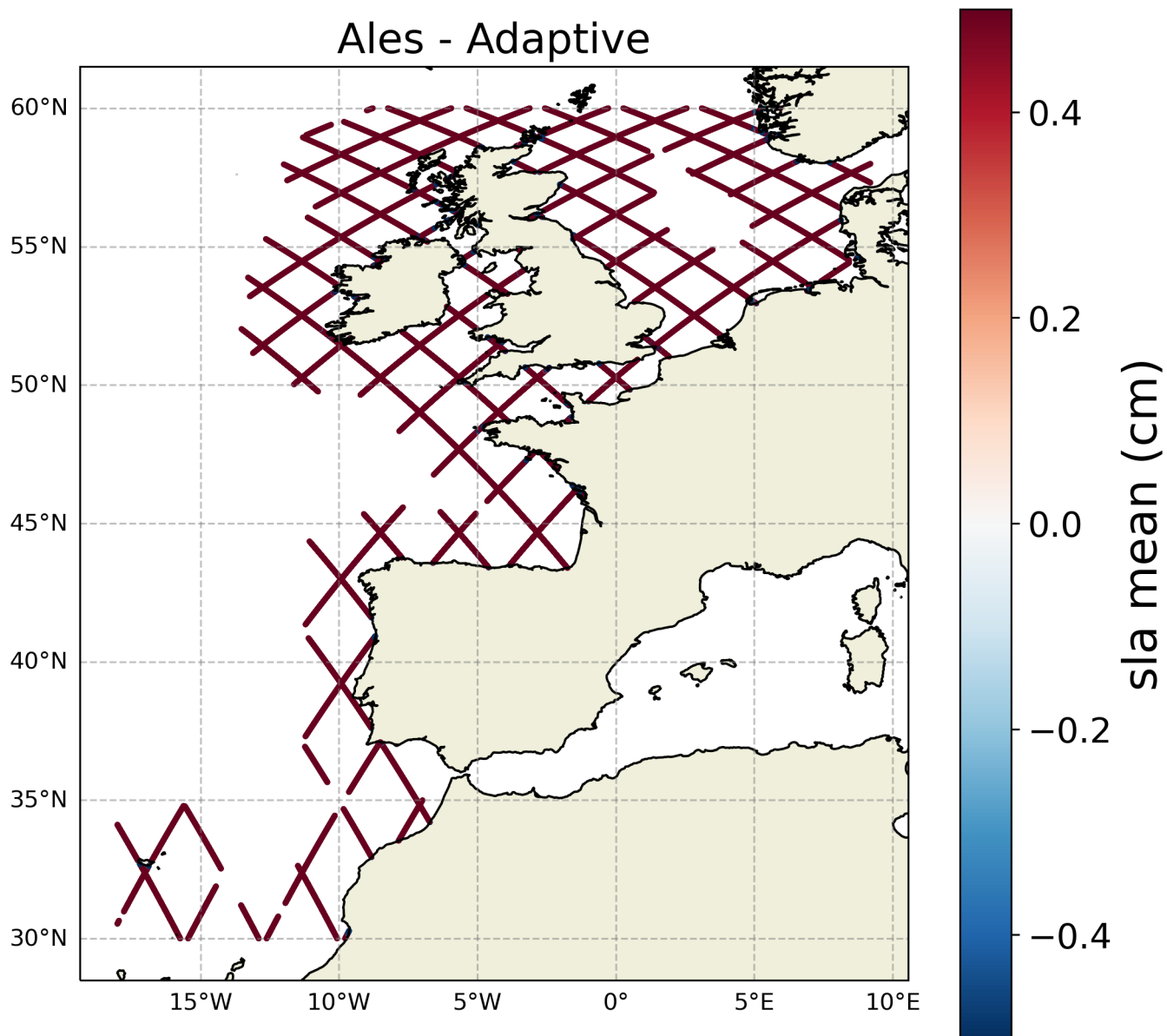


FIGURE 18 – Spatial coherence analysis of the Difference in sla 's mean between Ales and Adaptive

3.2 Range

3.2.1 Range's count

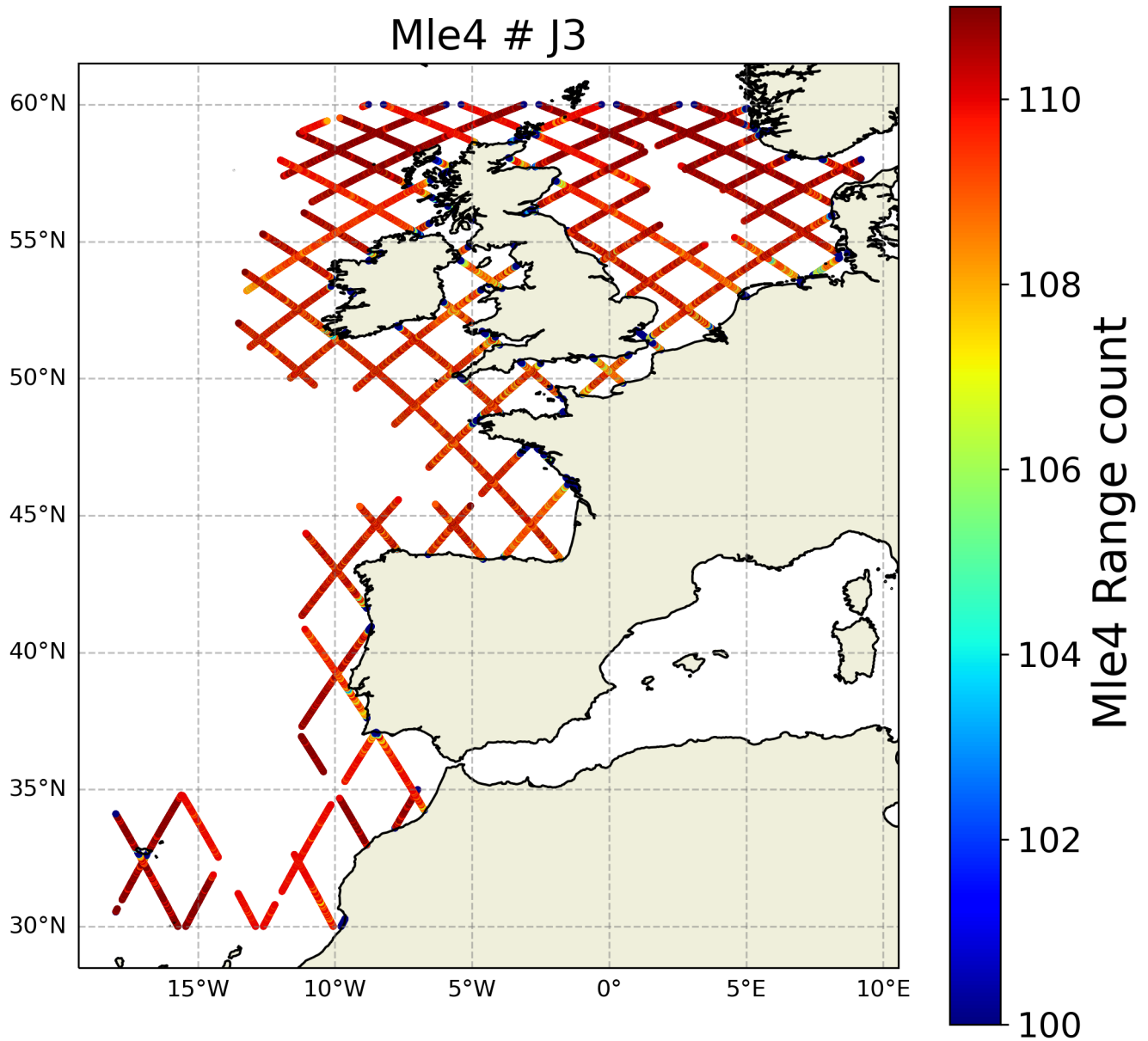


FIGURE 19 – Spatial coherence analysis of the count of the Mle4 version of Range variable

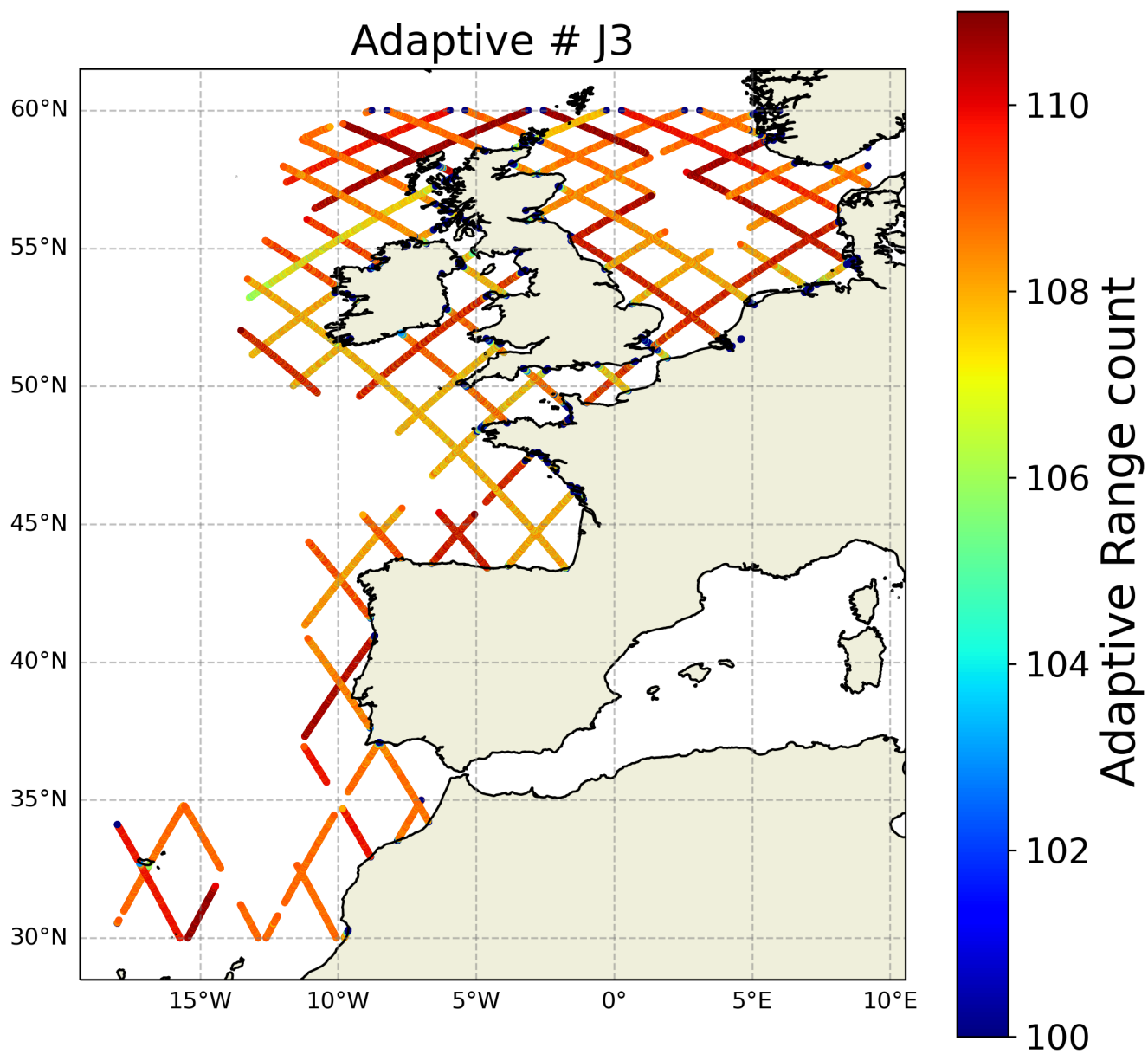


FIGURE 20 – Spatial coherence analysis of the count of the Adaptive version of Range variable

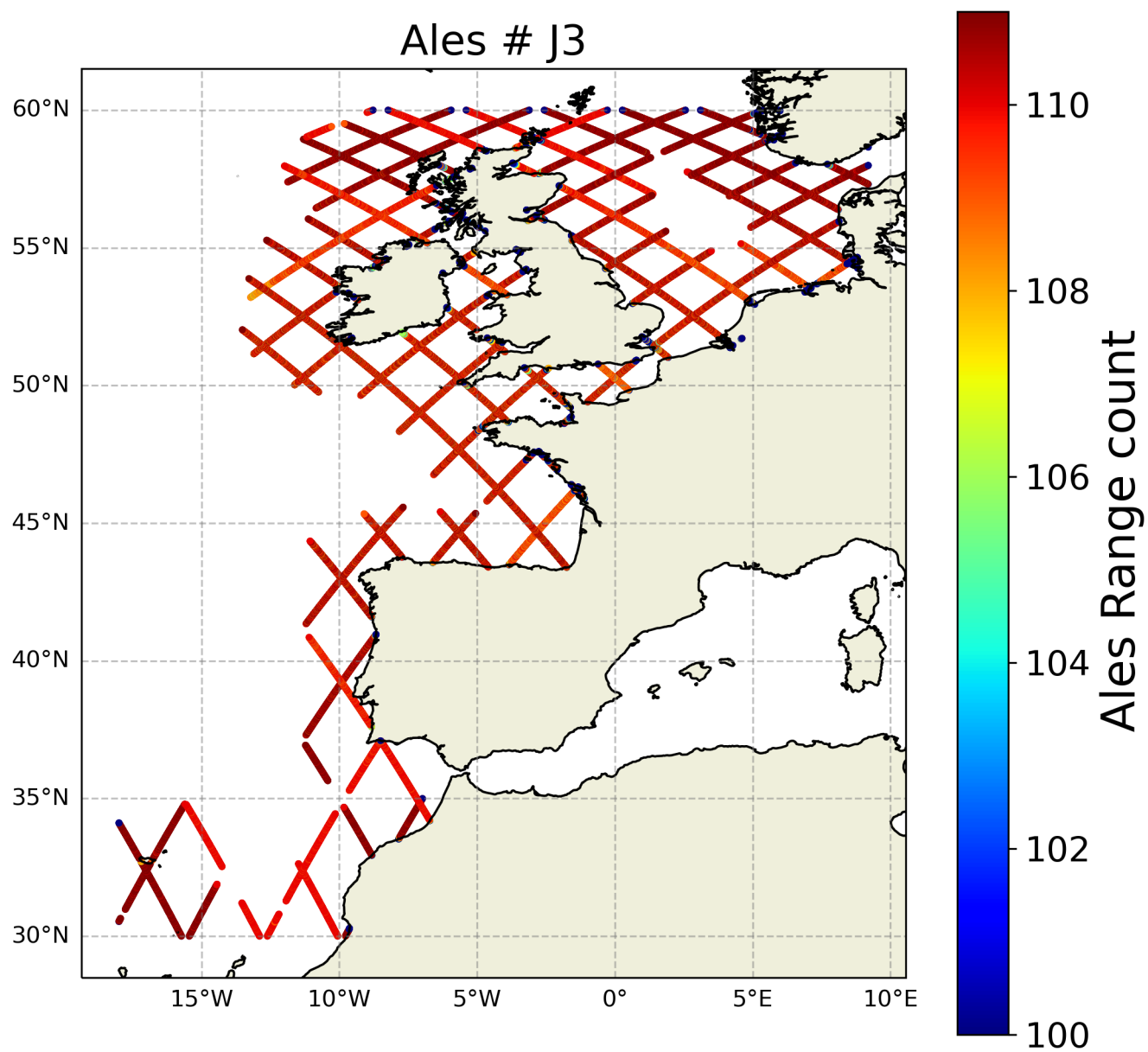


FIGURE 21 – Spatial coherence analysis of the count of the Ales version of Range variable

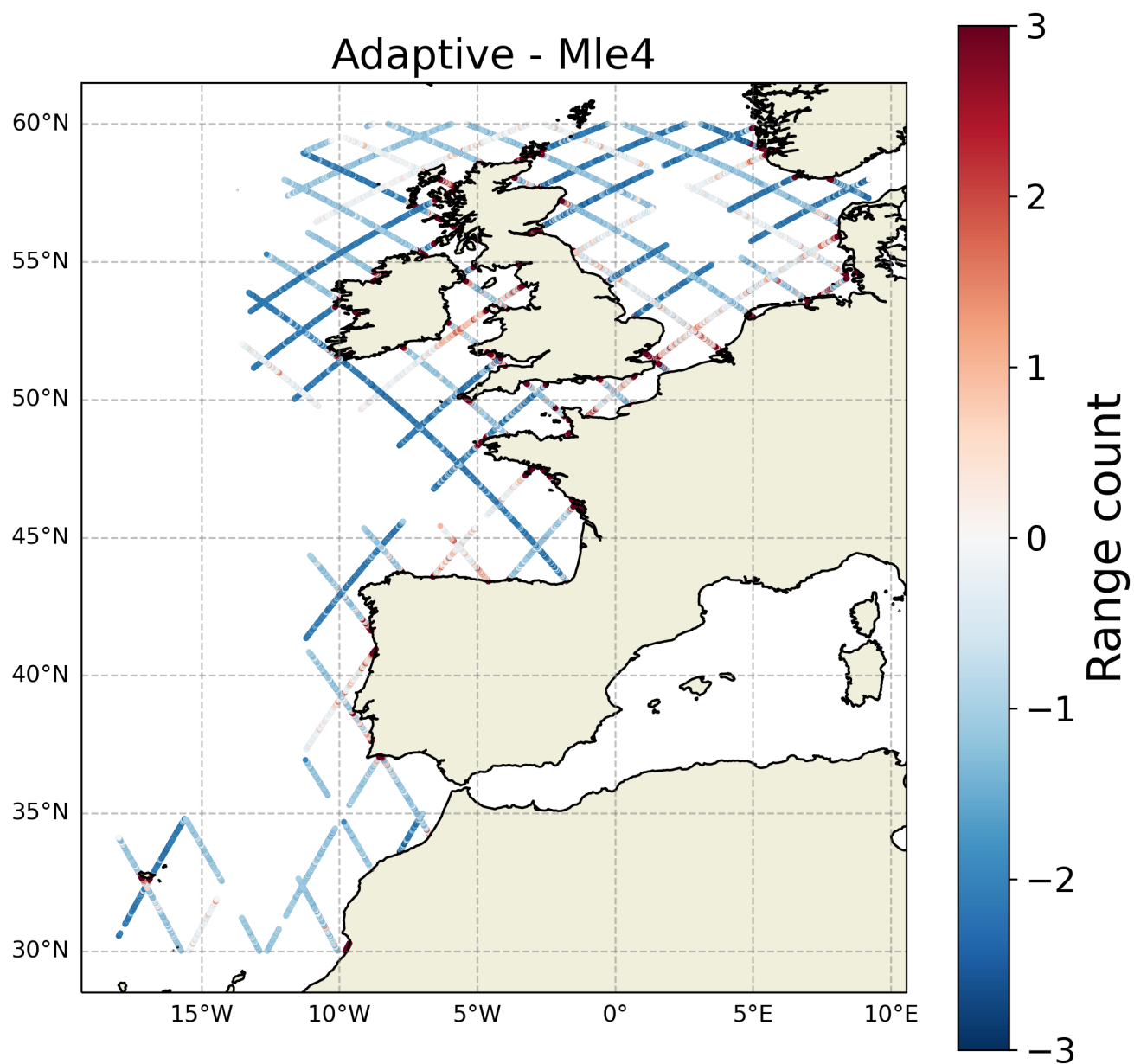


FIGURE 22 – Spatial coherence analysis of the Difference in Range 's count between Adaptive and Mle4

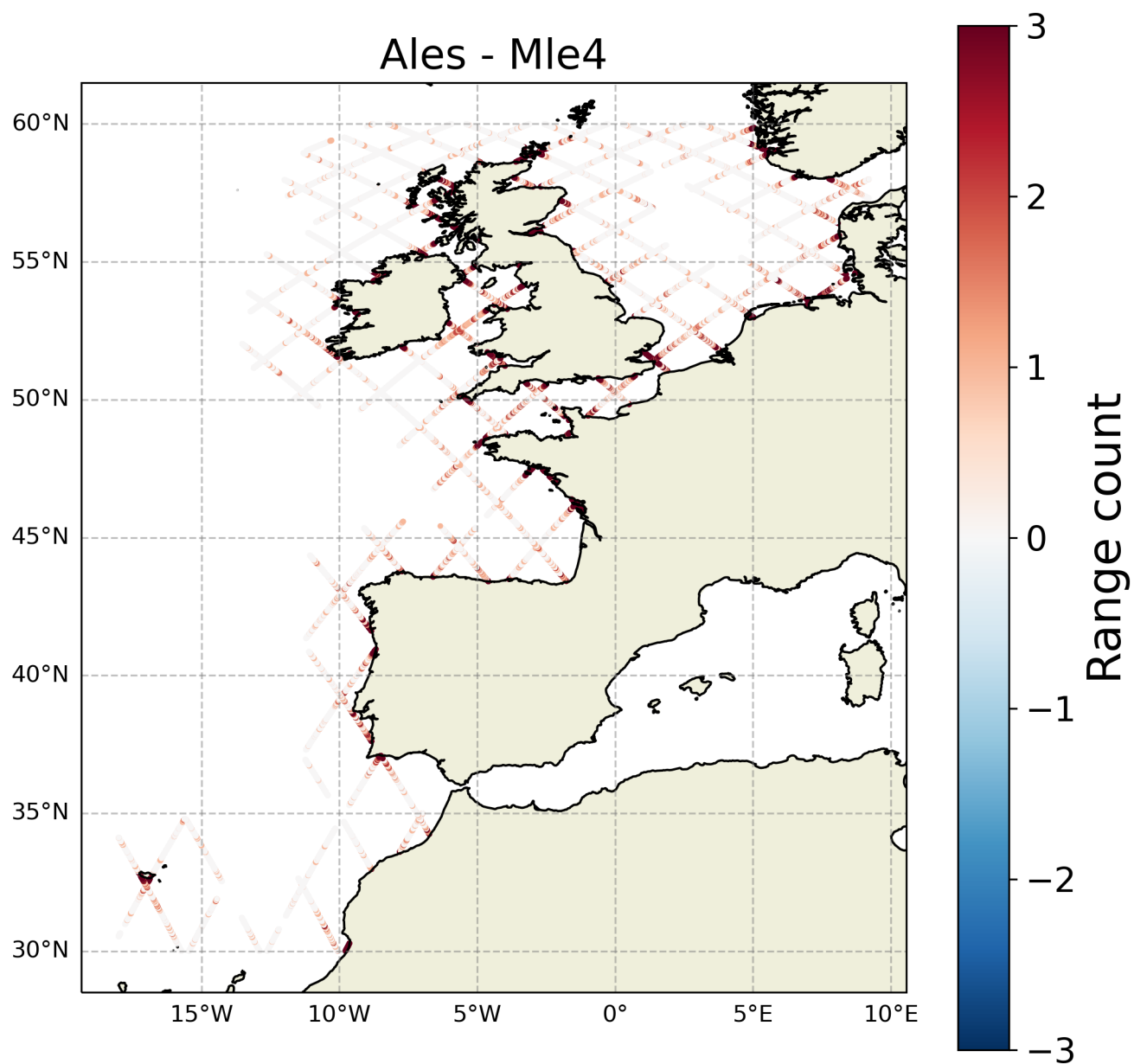


FIGURE 23 – Spatial coherence analysis of the Difference in Range 's count between Ales and Mle4

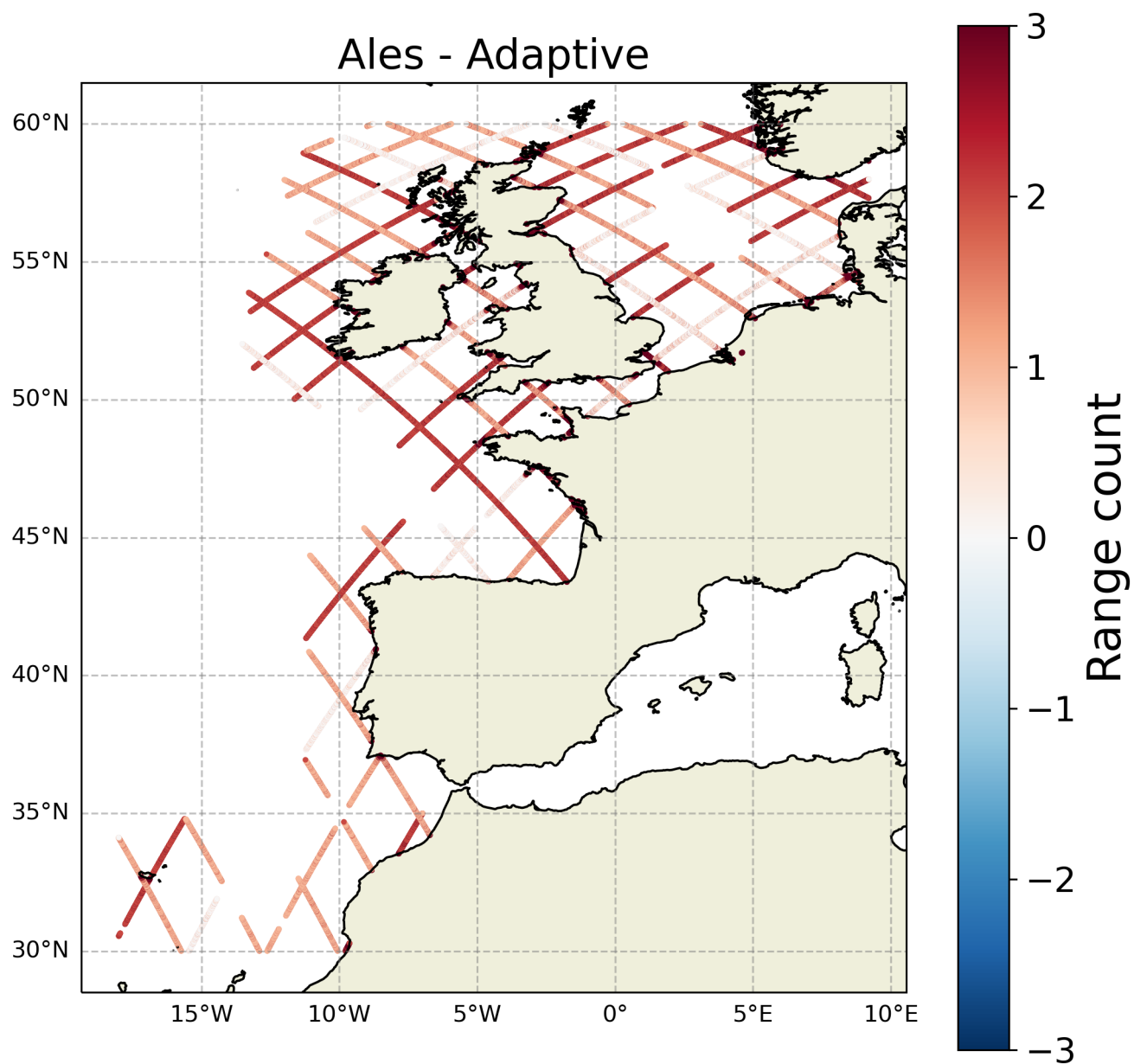


FIGURE 24 – Spatial coherence analysis of the Difference in Range 's count between Ales and Adaptive

4 Histograms

4.1 sla

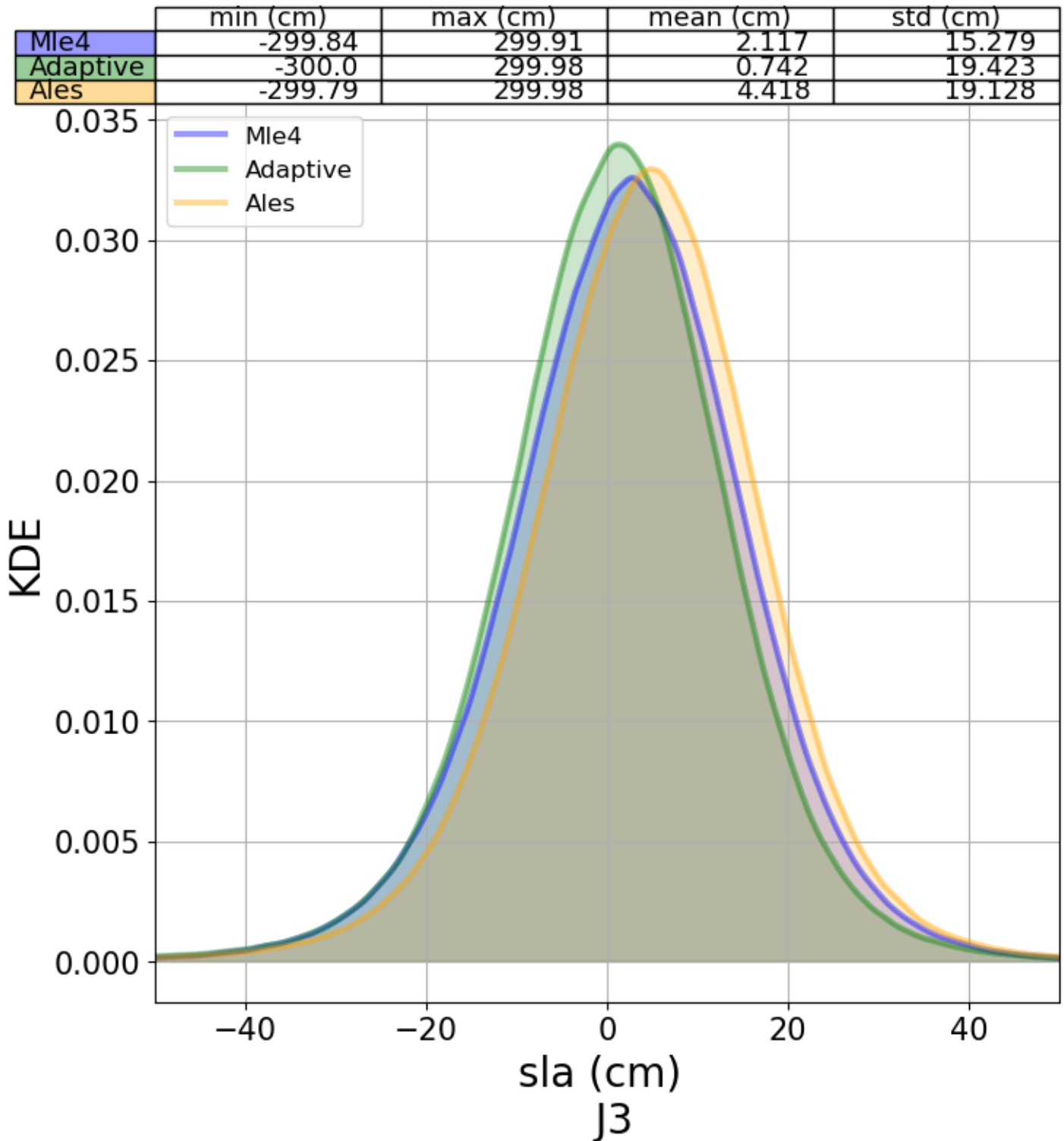


FIGURE 25 – Histogram of each of sla version

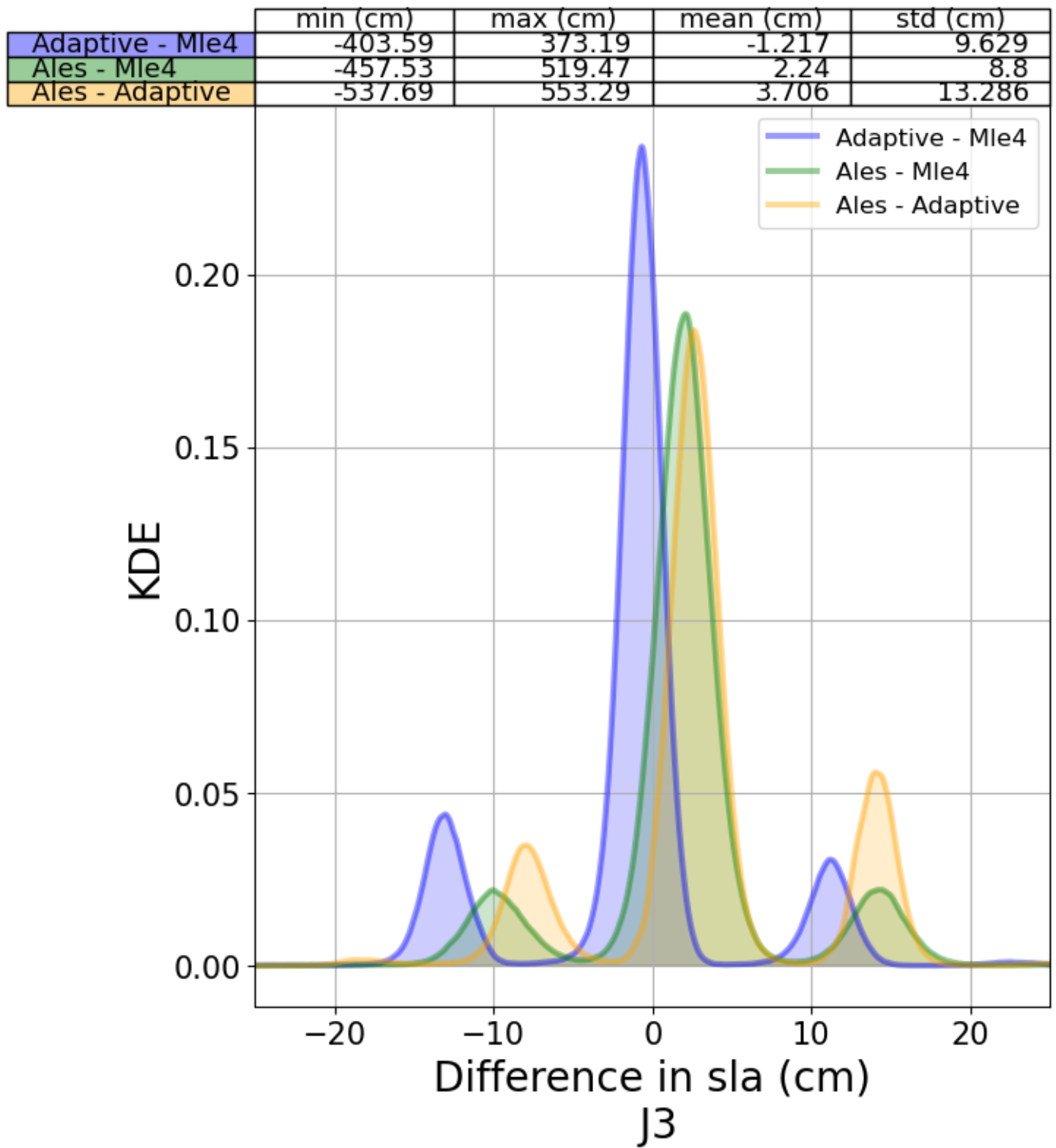


FIGURE 26 – Histograms of difference of each sla version and reference one

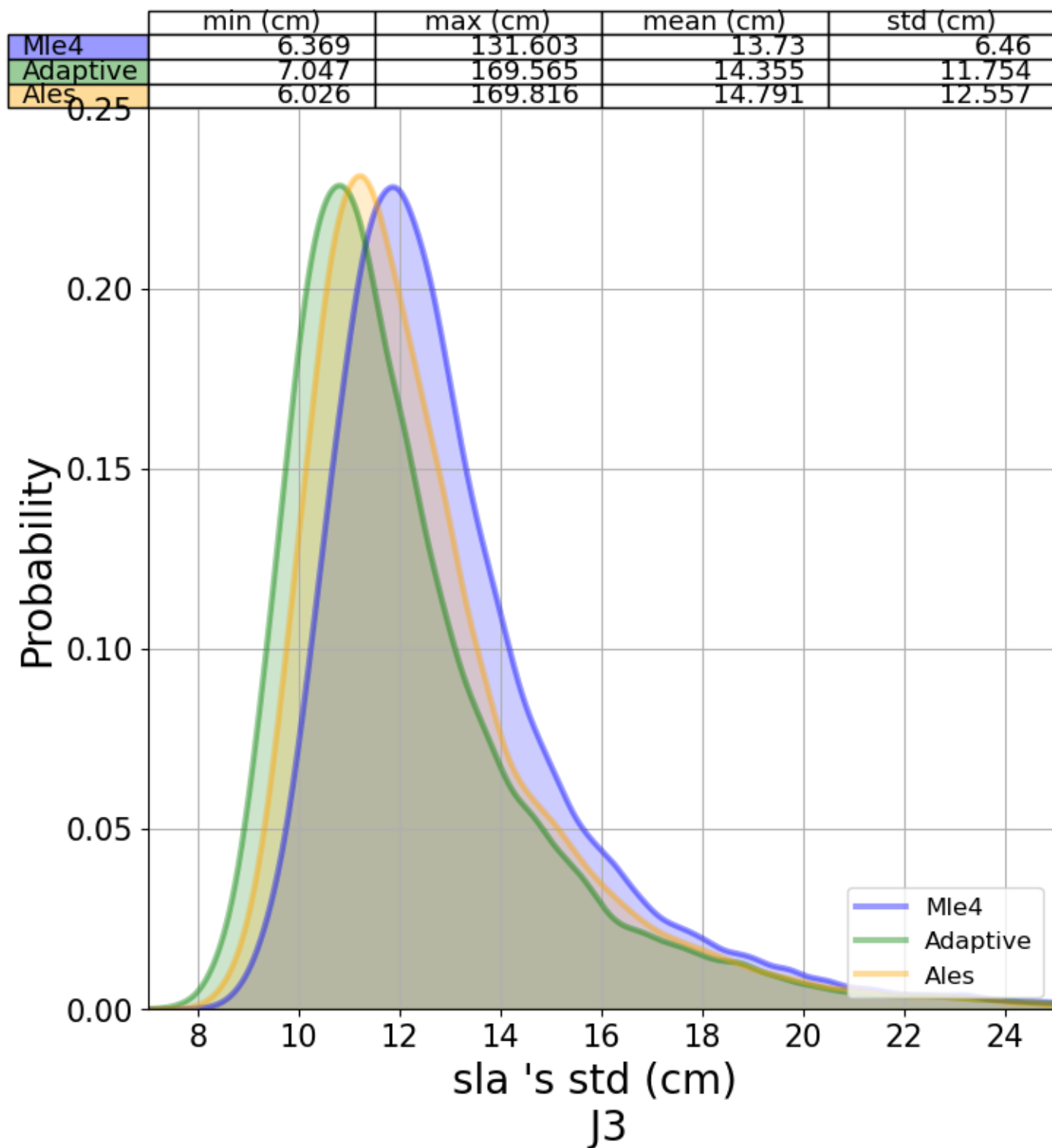


FIGURE 27 – Histograms of the standard deviation of each sla version

5 Along-track analysis

5.1 Range

5.1.1 Range 's count

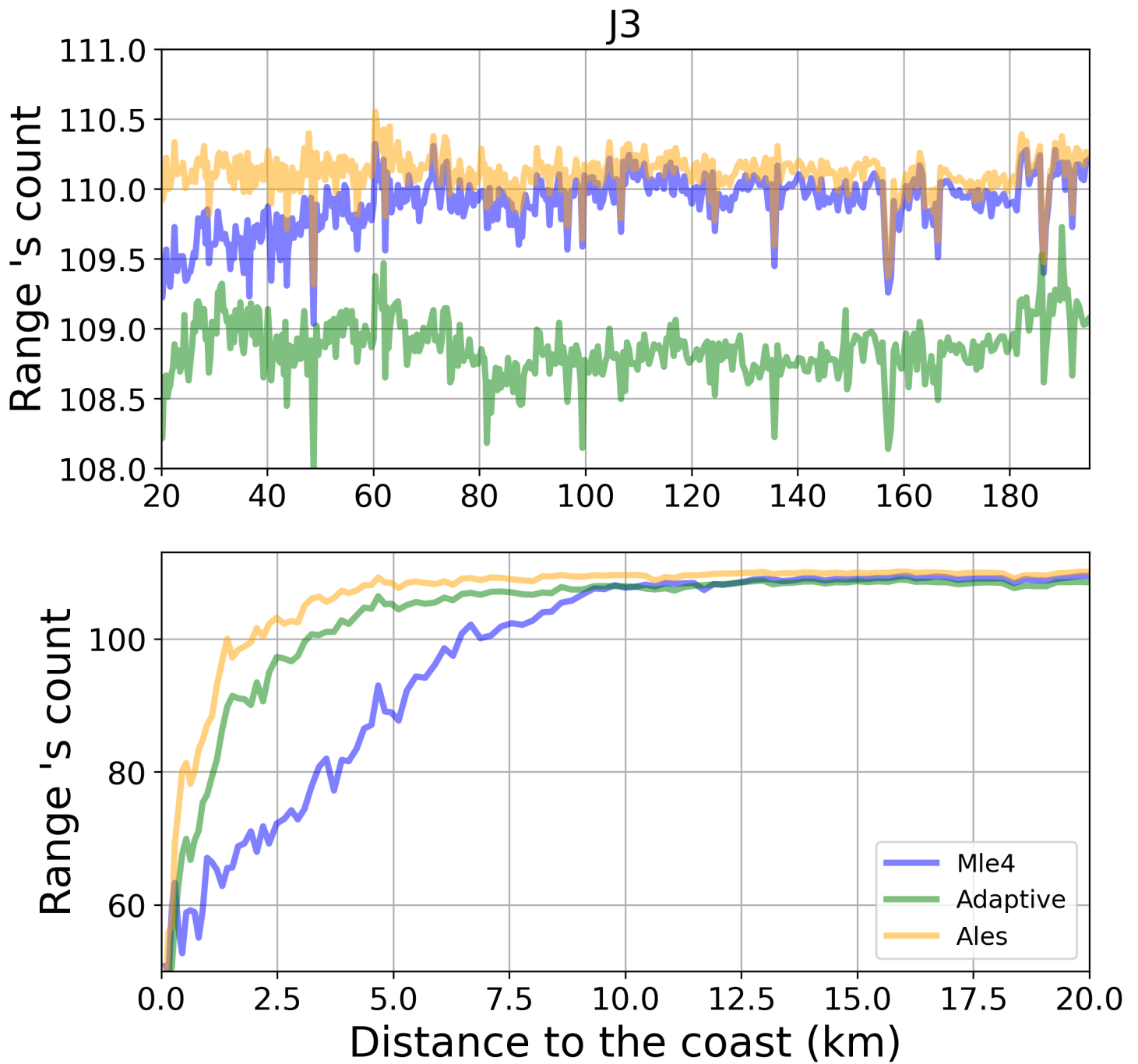


FIGURE 28 – Along-track analysis of Range 's count

5.2 sla

5.2.1 sla's count

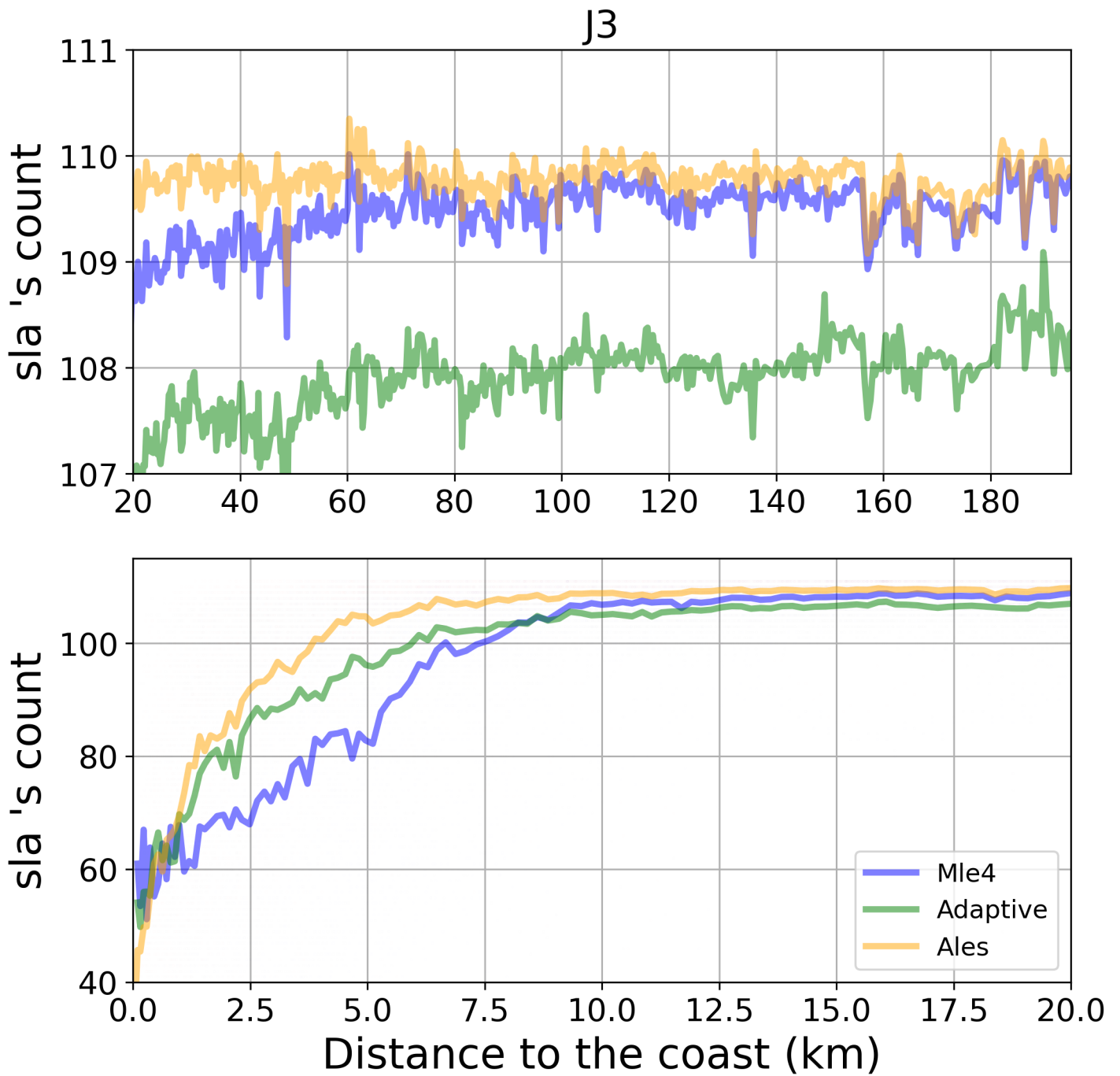


FIGURE 29 – Along-track analysis of sla's count

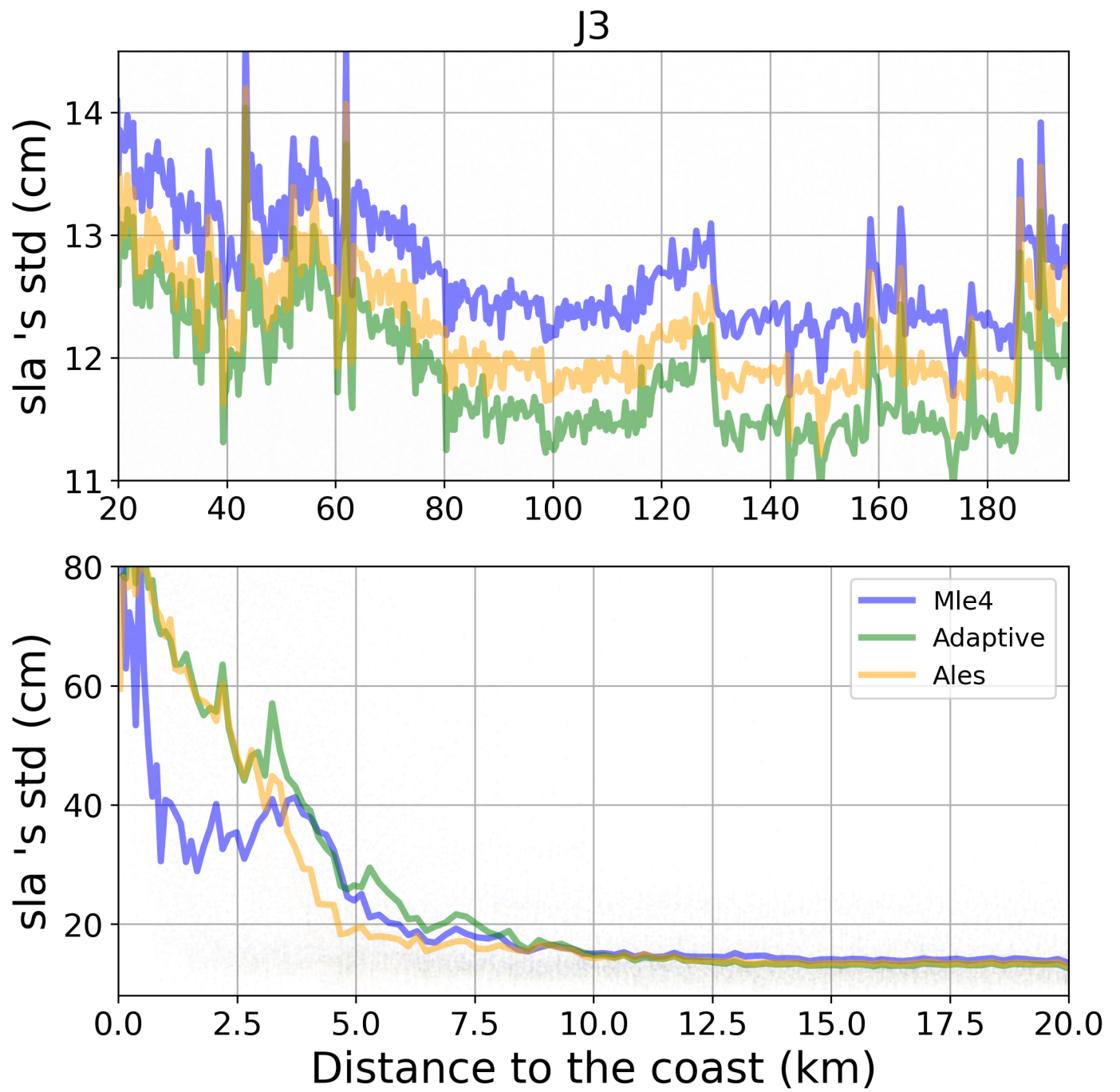


FIGURE 30 – Along-track analysis of sla 's std

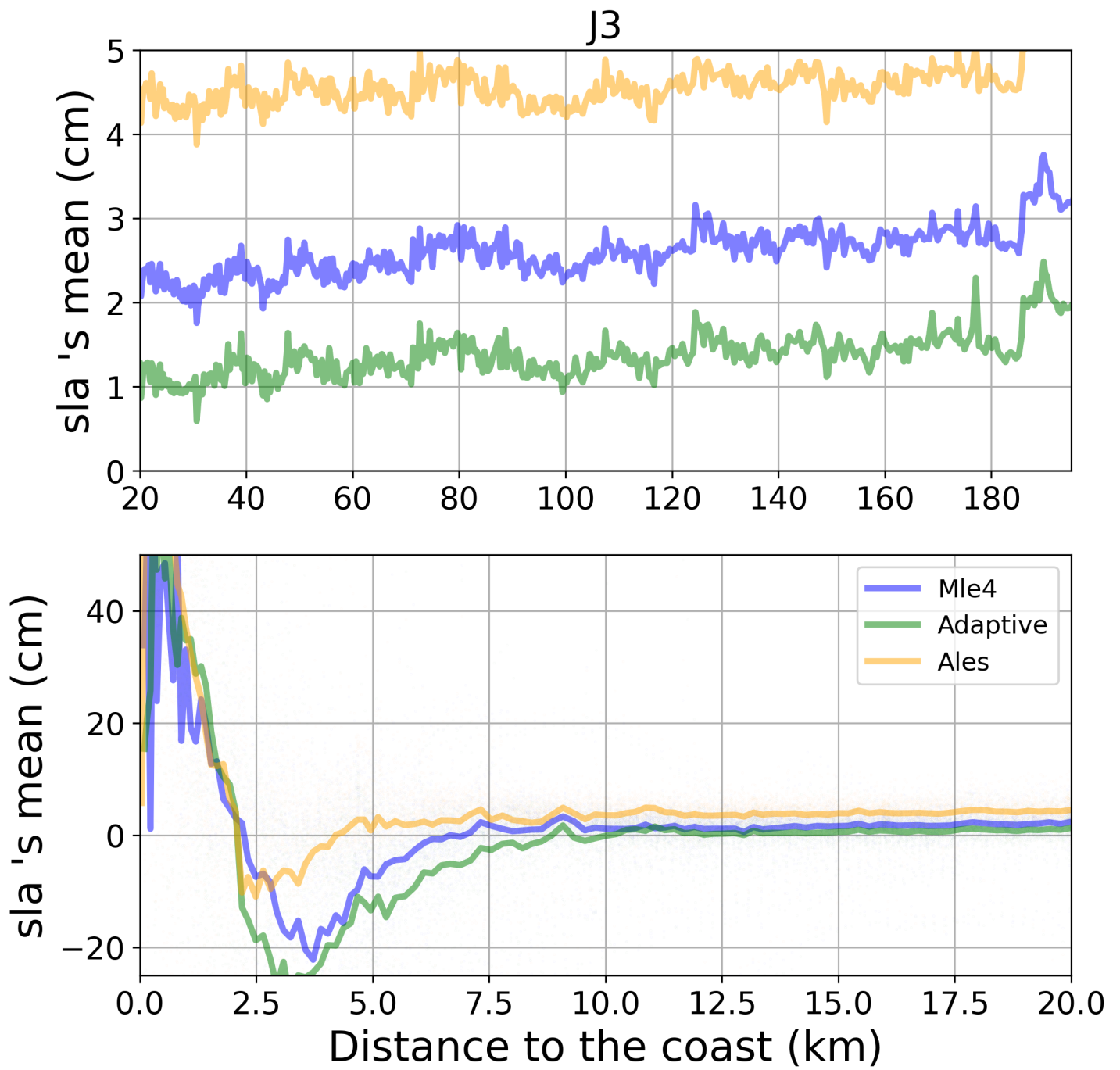


FIGURE 31 – Along-track analysis of sla 's mean

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 Radius 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

Correlation Altimetry data with respect to HERBAUDIERE Tide gauge data

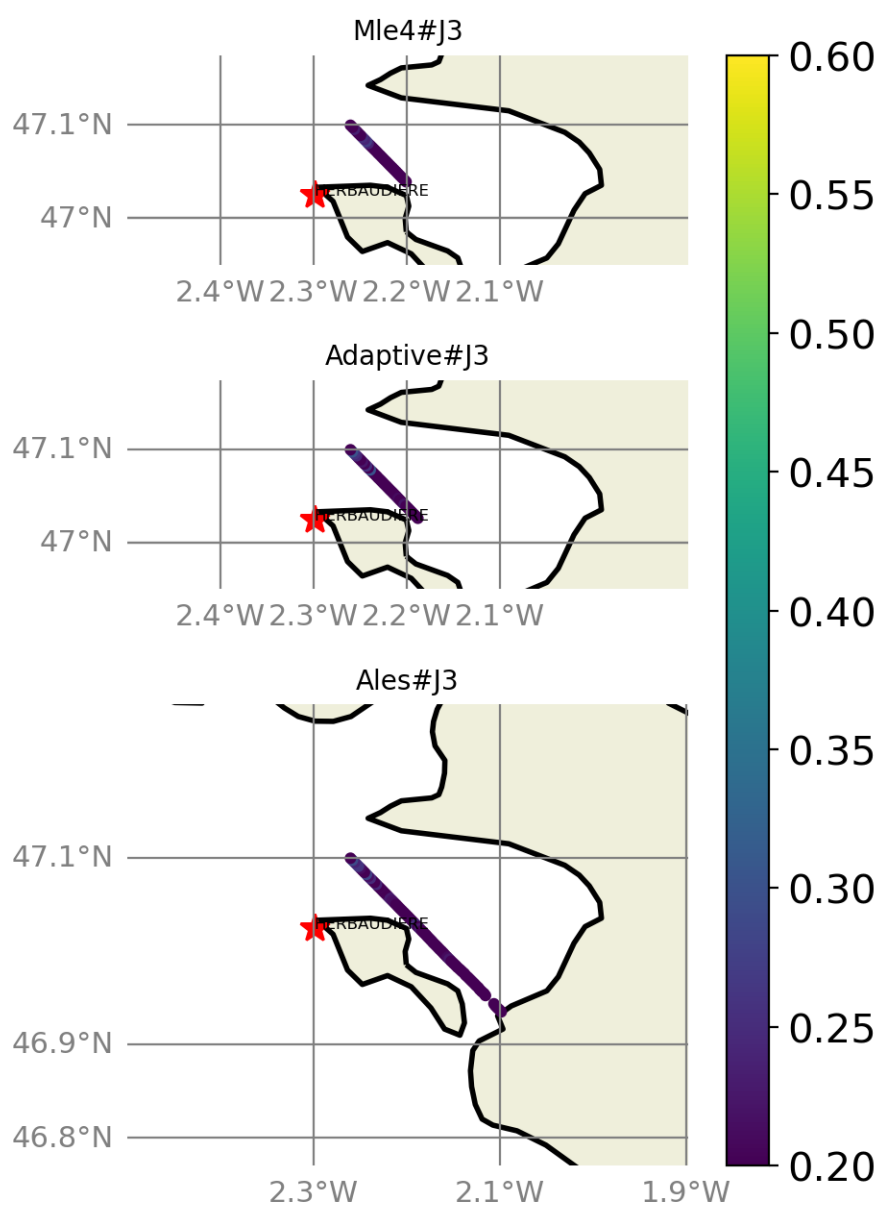


FIGURE 32 – correlation visualization in maps view % HERBAUDIERE tide gauge

6.1.2 rmsd visualization in maps view % HERBAUDIERE tide gauge

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

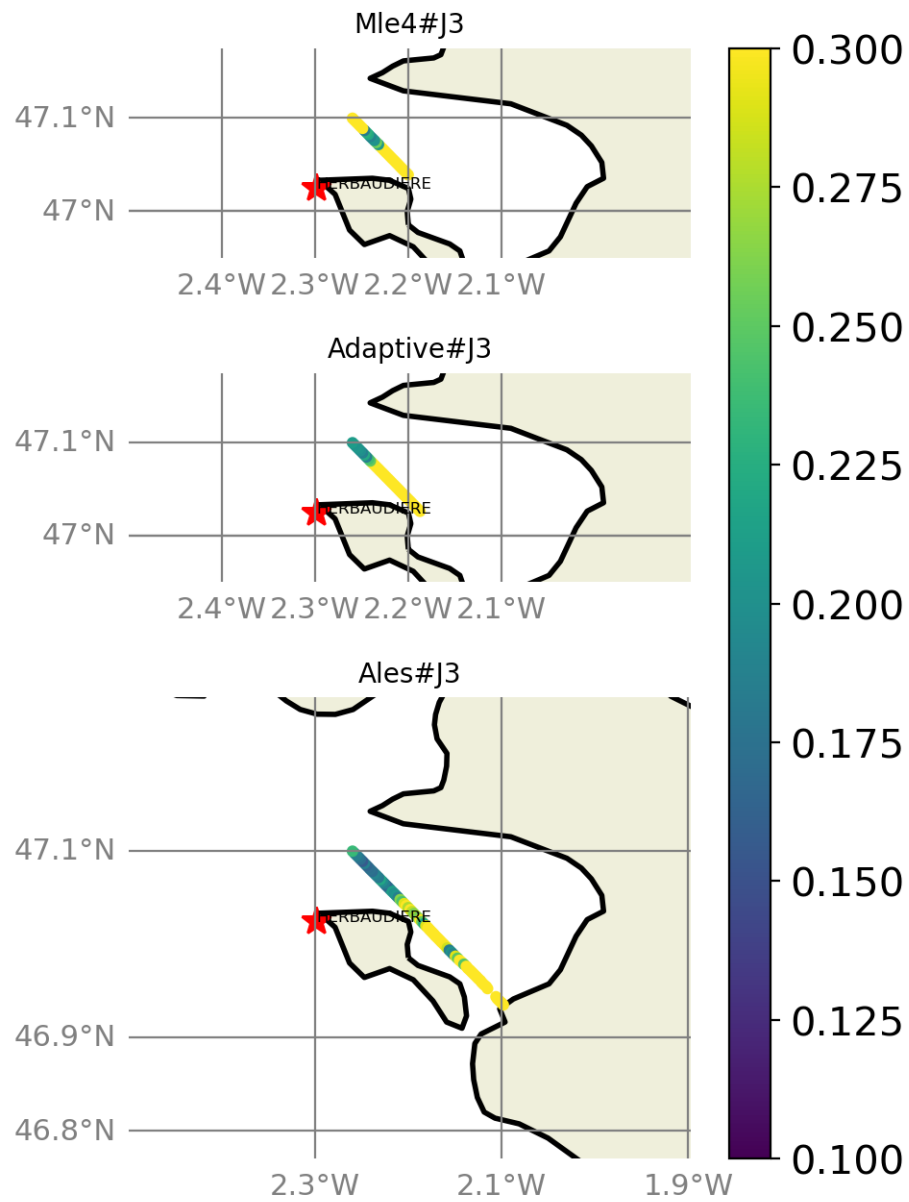


FIGURE 33 – rmsd visualization in maps view % HERBAUDIERE tide gauge

6.1.3 std visualization in maps view % HERBAUDIÈRE tide gauge

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

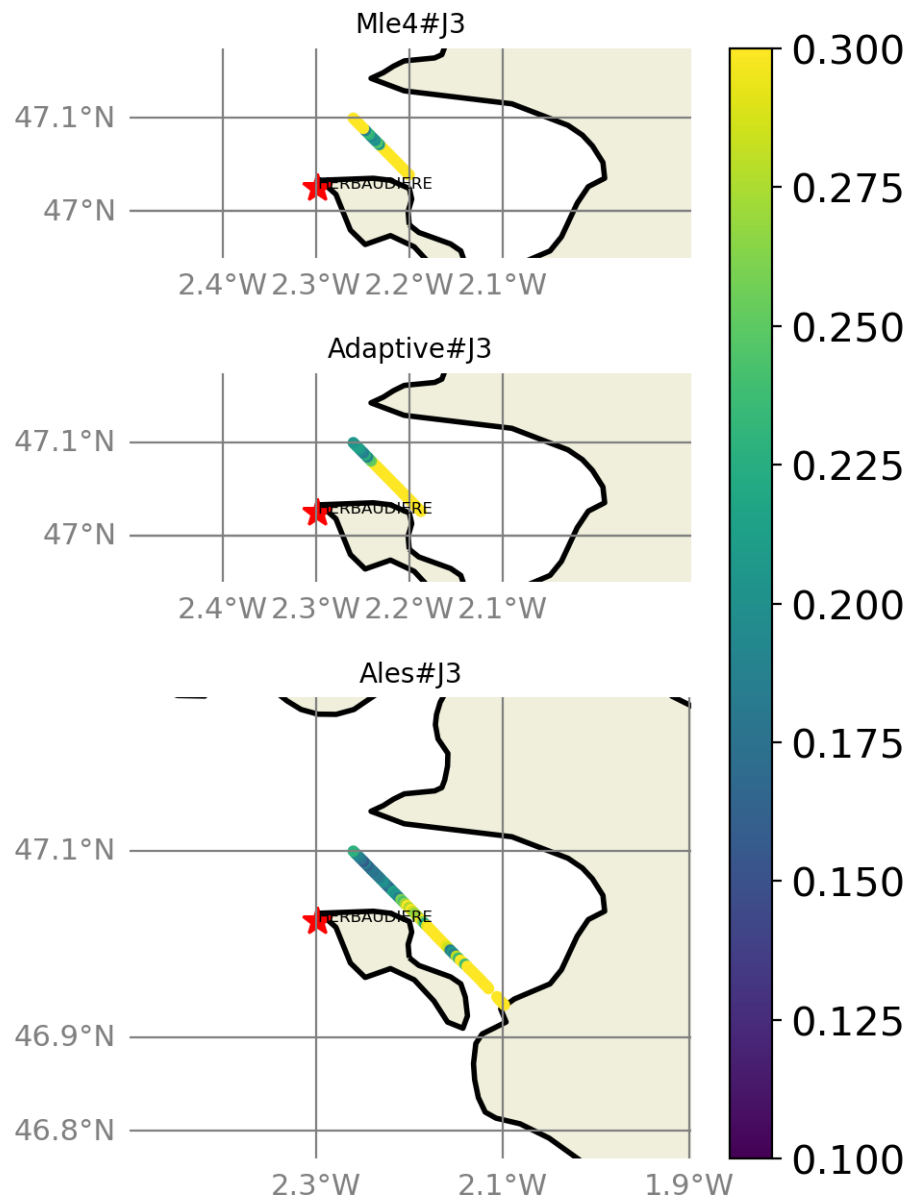


FIGURE 34 – std visualization in maps view % HERBAUDIÈRE tide gauge

6.1.4 valid_data_percent visualization in maps view % HERBAUDIERE tide gauge

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

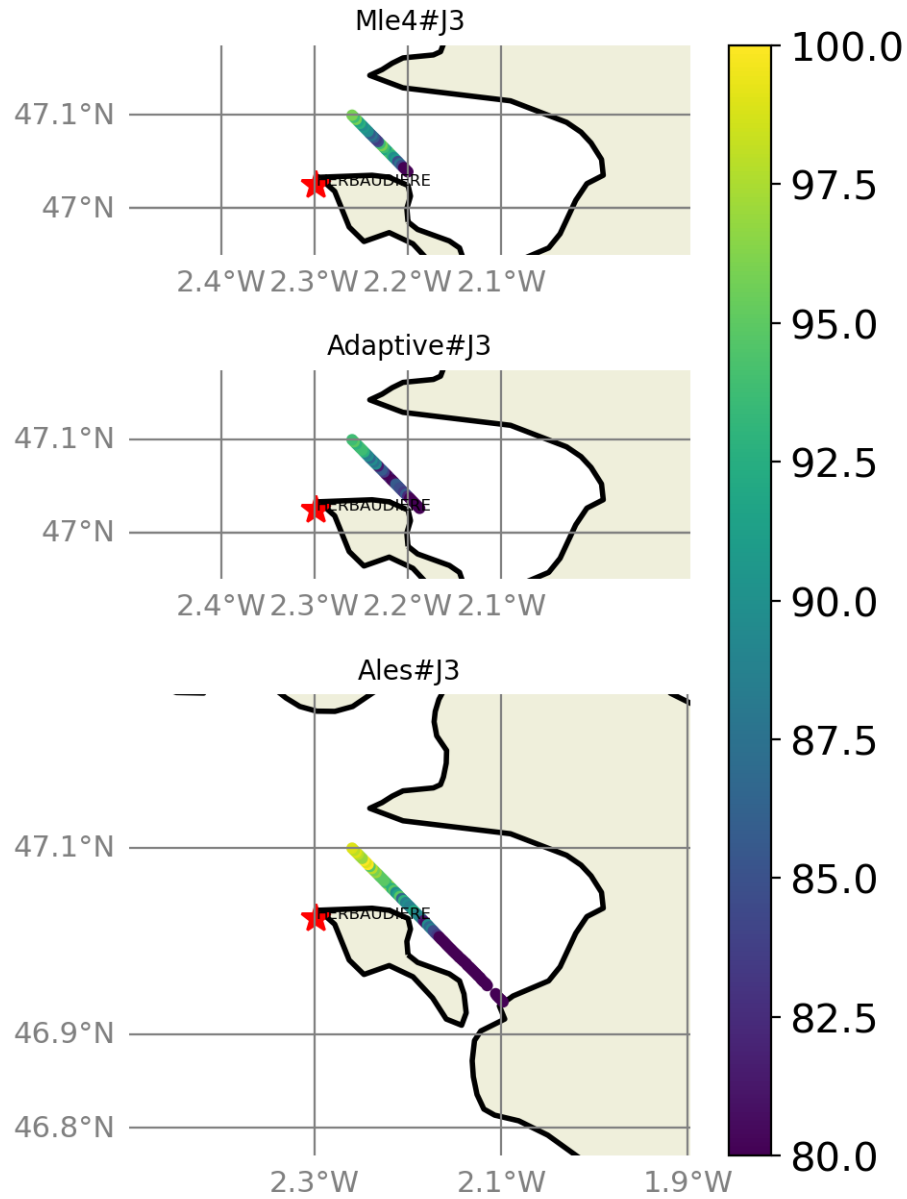


FIGURE 35 – valid_data_percent visualization in maps view % HERBAUDIERE tide gauge

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. $maxNB = 97$ 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.

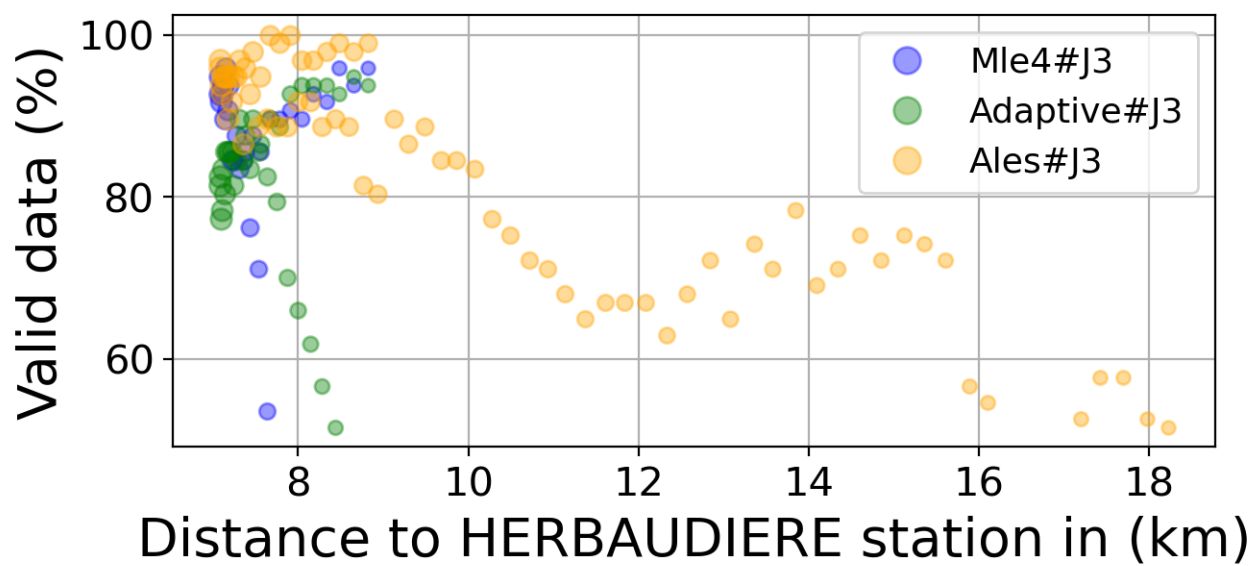
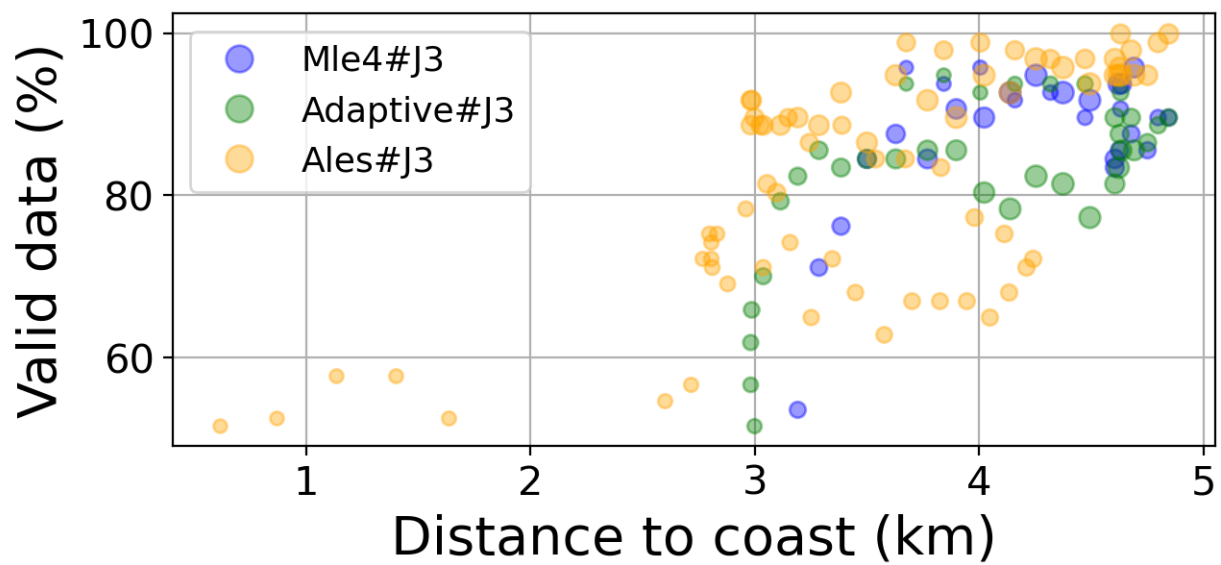


FIGURE 36 – Valid data (%) in function of distance to coast/HERBAUDIÈRE station

6.1.6 Std in function of distance to coast/HERBAUDIÈRE station

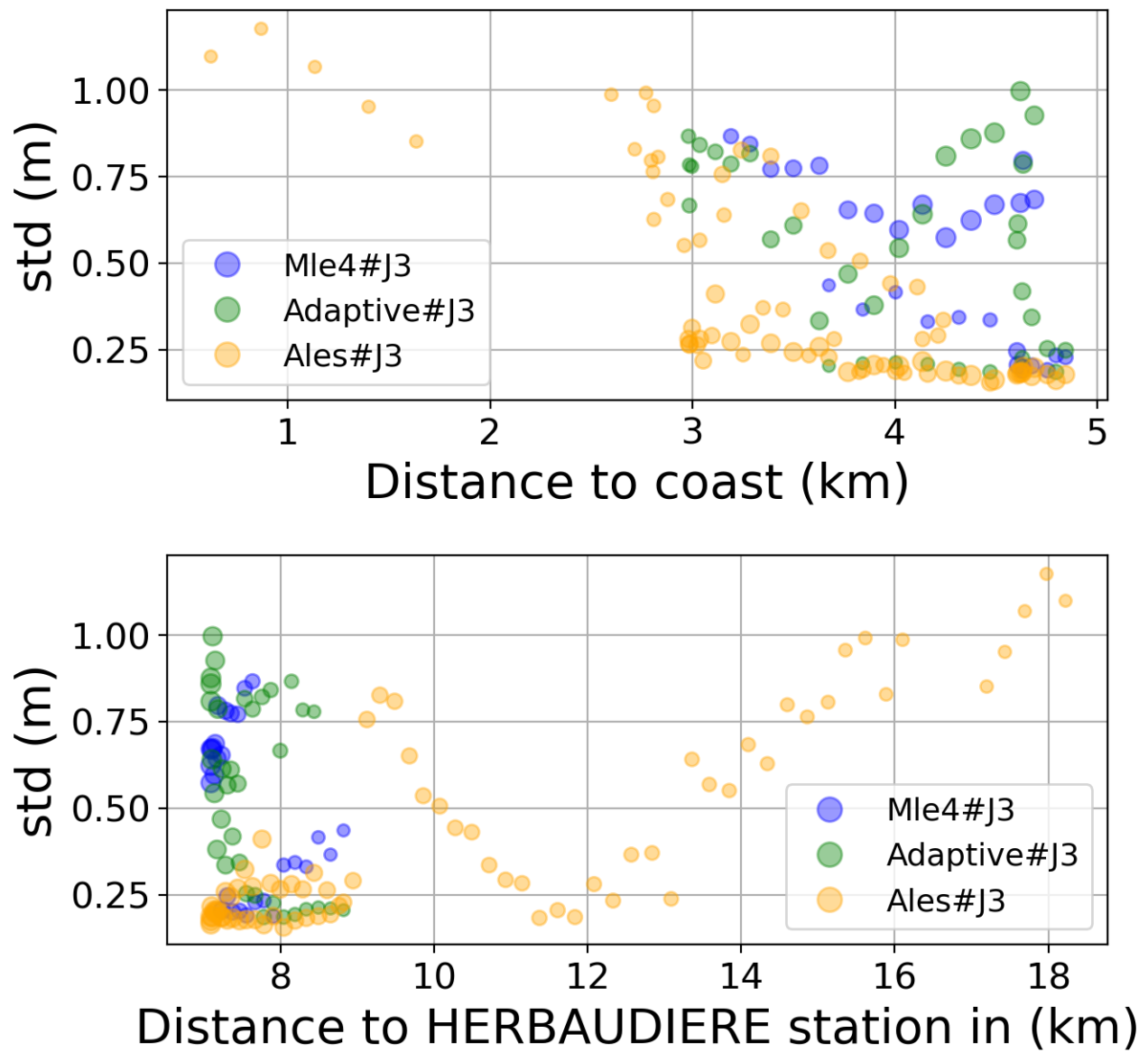


FIGURE 37 – Std in function of the distance to the coast/HERBAUDIÈRE station

6.1.7 Correlation in function of distance to coast/HERBAUDIÈRE station

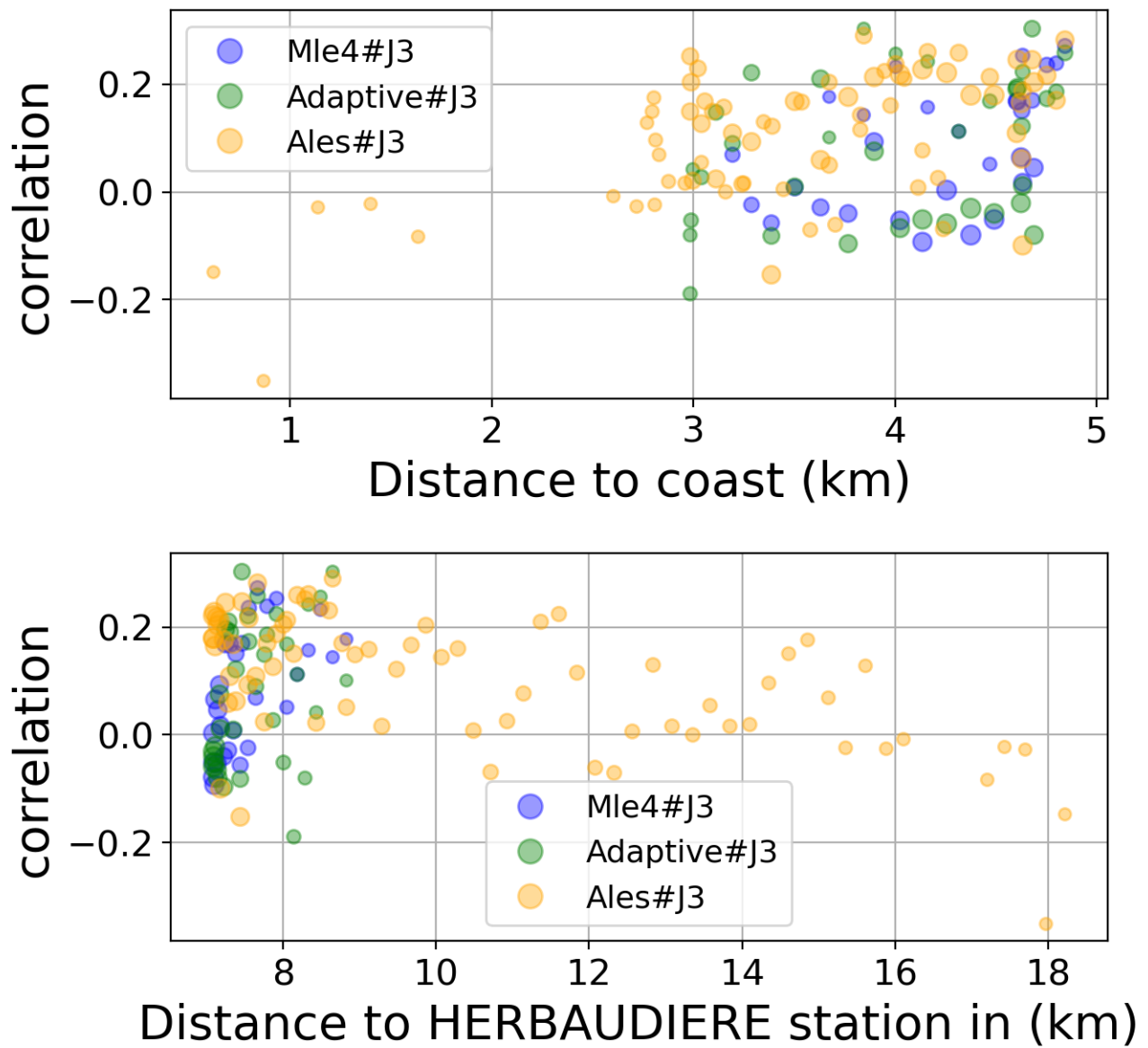


FIGURE 38 – Correlation in function of the distance to the coast/HERBAUDIÈRE station

6.1.8 Taylor Diagram

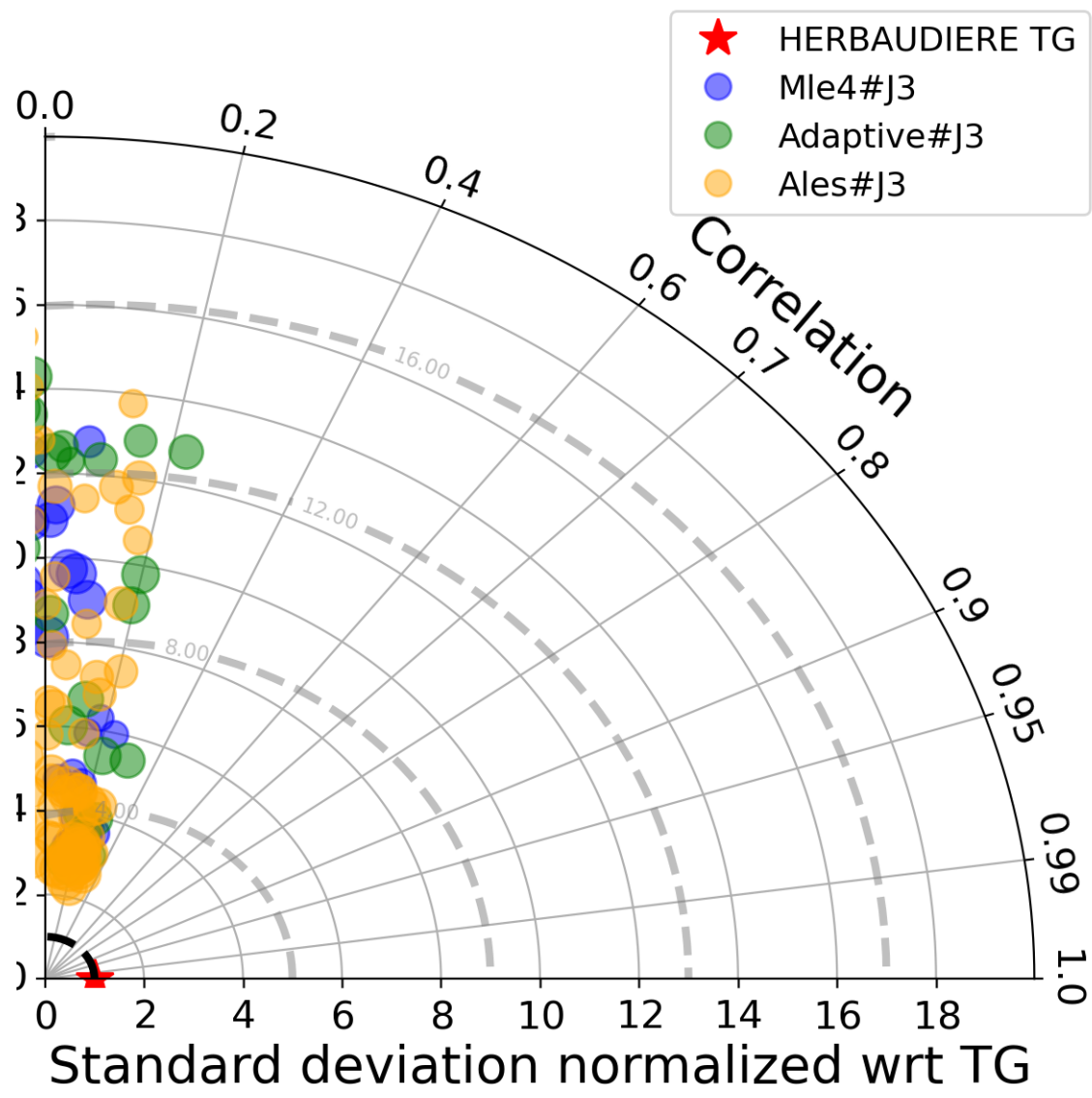


FIGURE 39 – Taylor diagram

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)
Mle4#J3	87.949	0.084	0.503	0.503
Adaptive#J3	86.74	0.102	0.5	0.5
Ales#J3	95.165	0.166	0.202	0.203

FIGURE 40 – 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 97 point.

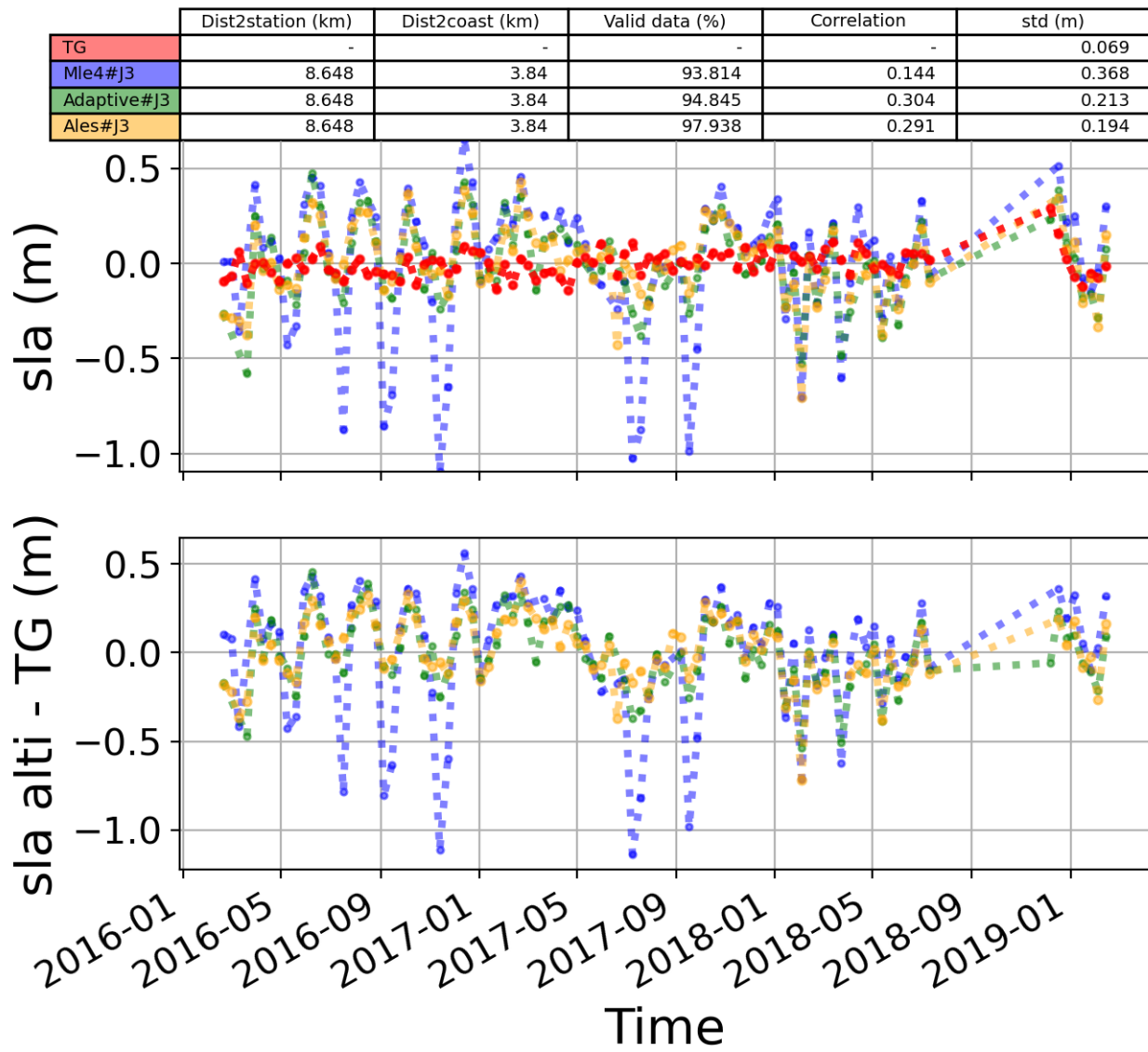


FIGURE 41 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

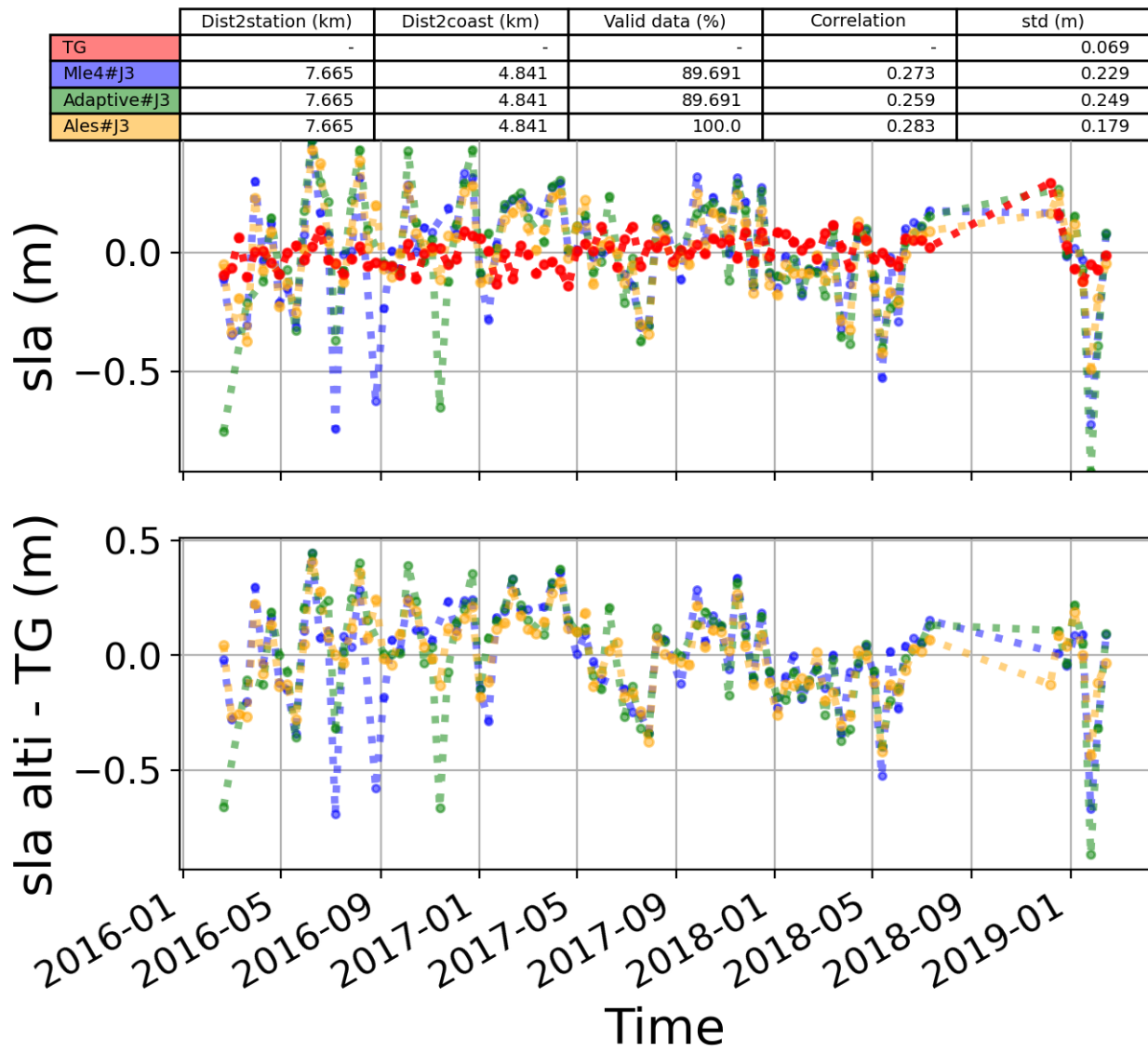


FIGURE 42 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

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

Correlation Altimetry data with respect to Llandudno Tide gauge data

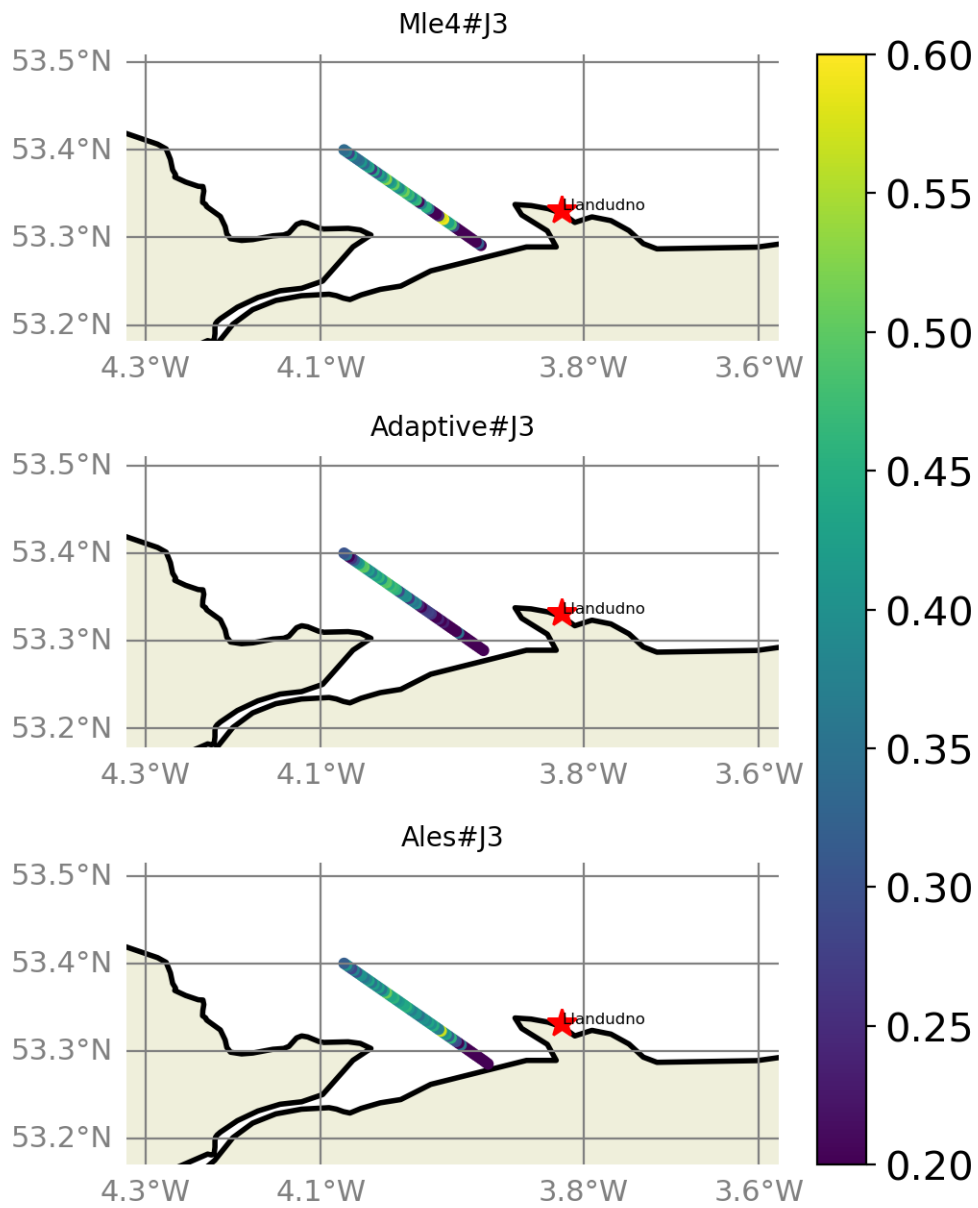


FIGURE 43 – correlation visualization in maps view % Llandudno tide gauge

6.2.2 rmsd visualization in maps view % Llandudno tide gauge

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

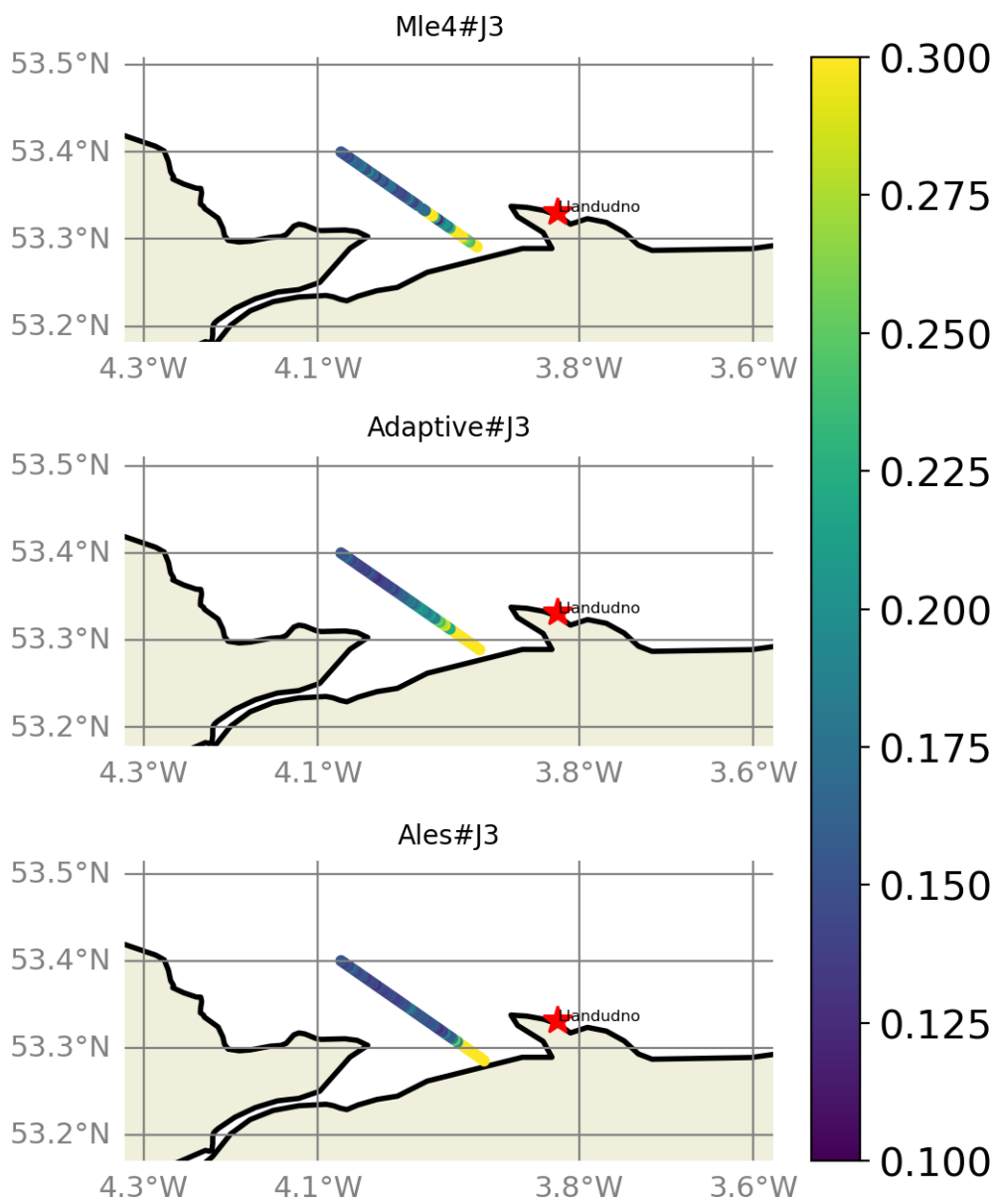


FIGURE 44 – rmsd visualization in maps view % Llandudno tide gauge

6.2.3 std visualization in maps view % Llandudno tide gauge

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

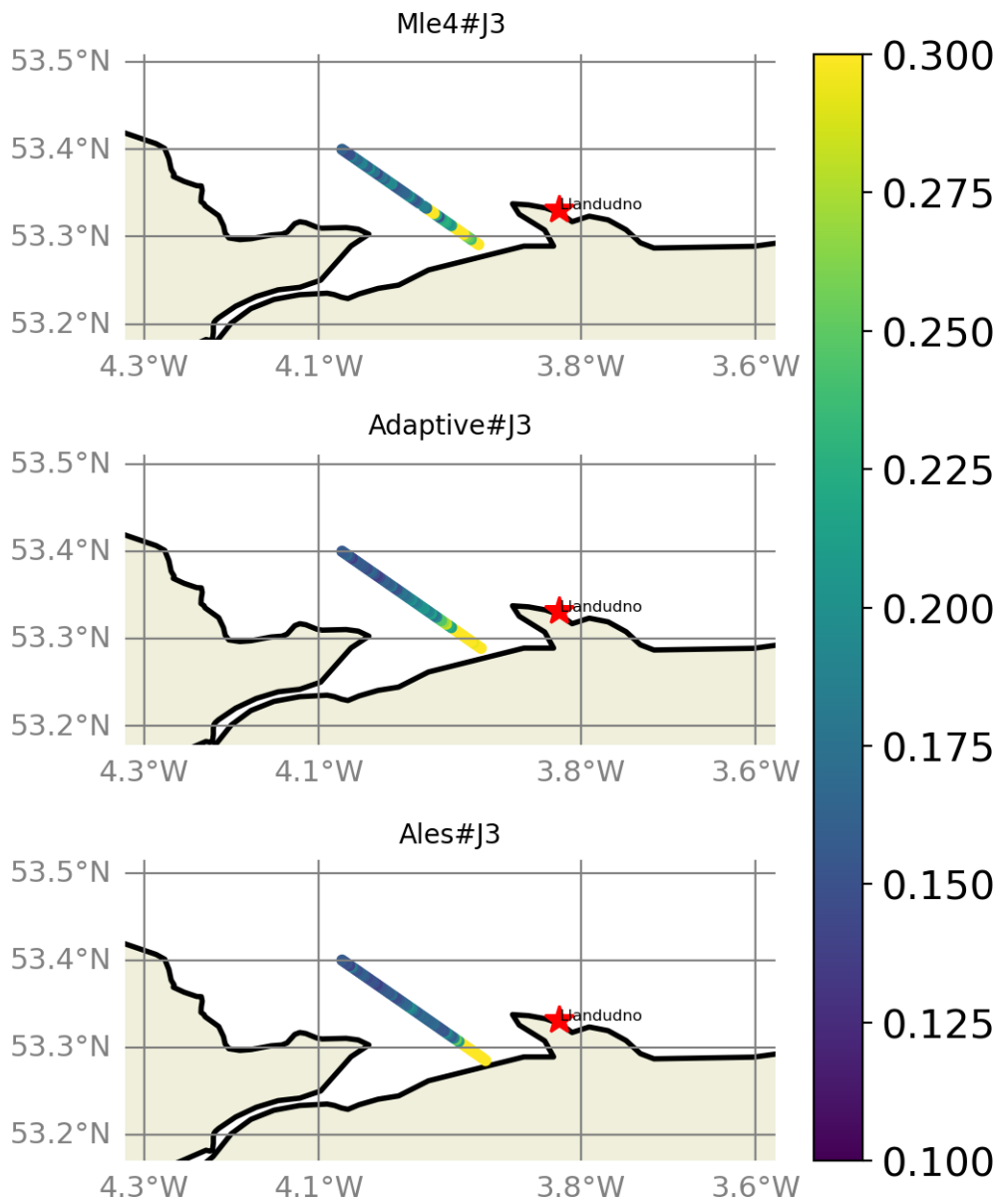


FIGURE 45 – std visualization in maps view % Llandudno tide gauge

6.2.4 valid_data_percent visualization in maps view % Llandudno tide gauge

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

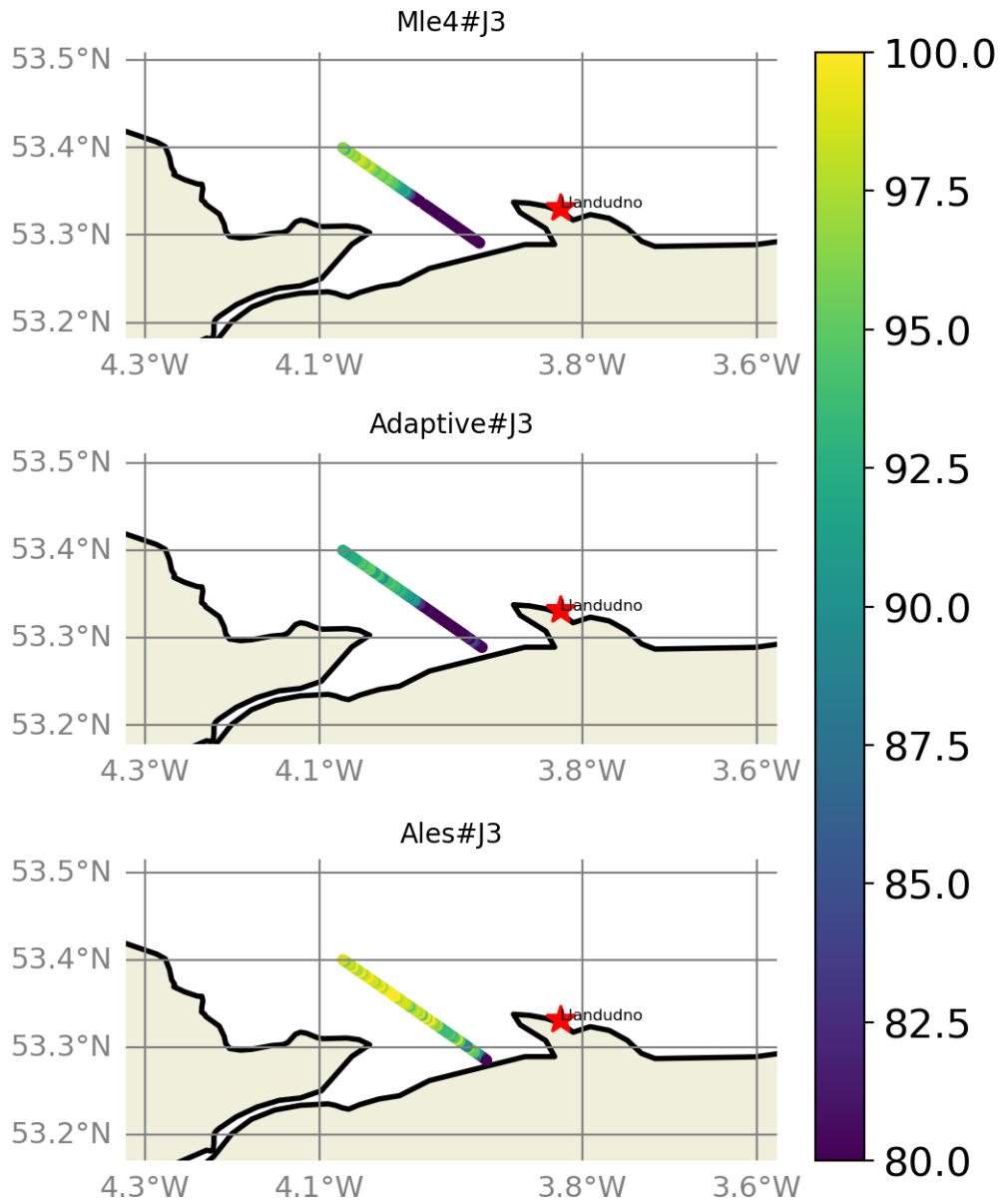


FIGURE 46 – valid_data_percent visualization in maps view % Llandudno tide gauge

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. $maxNB = 79$ 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.

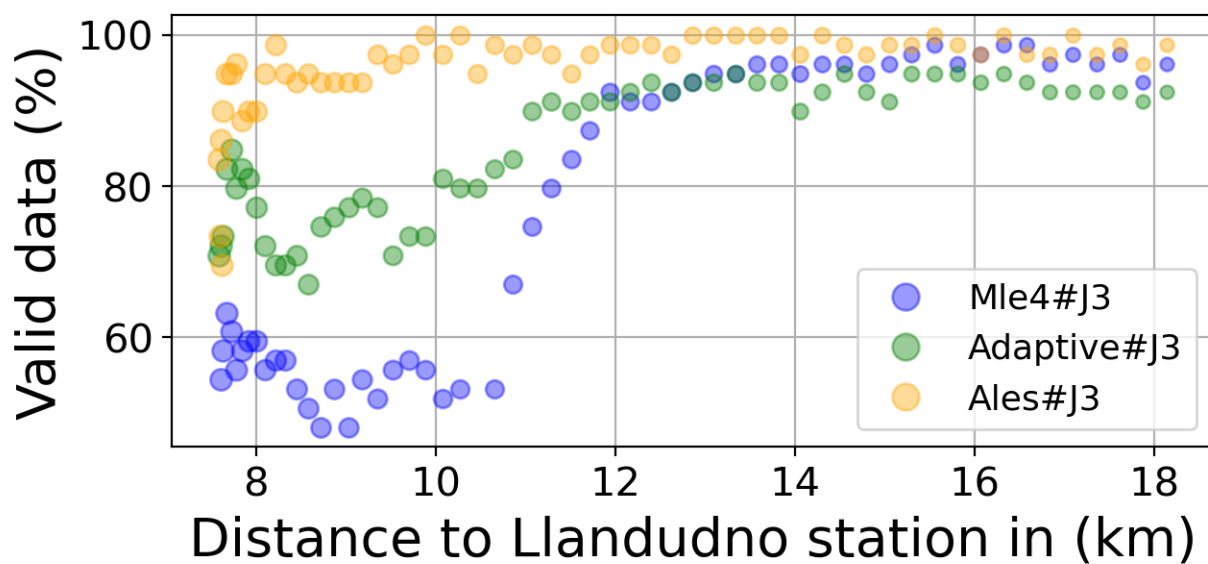
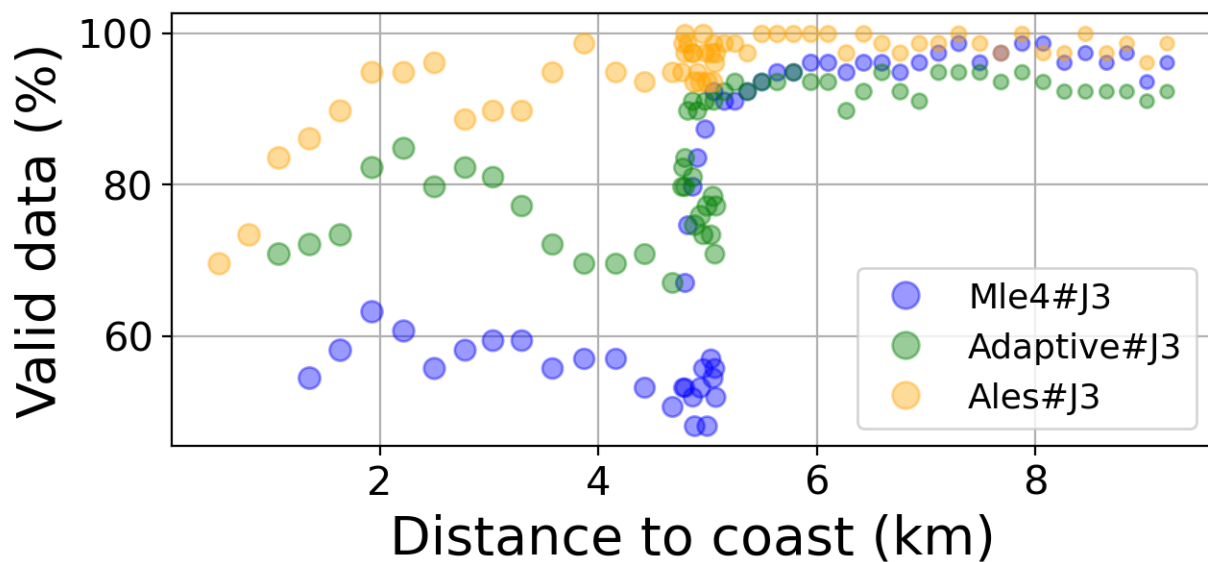


FIGURE 47 – Valid data (%) in function of distance to coast/Llandudno station

6.2.6 Std in function of distance to coast/Llandudno station

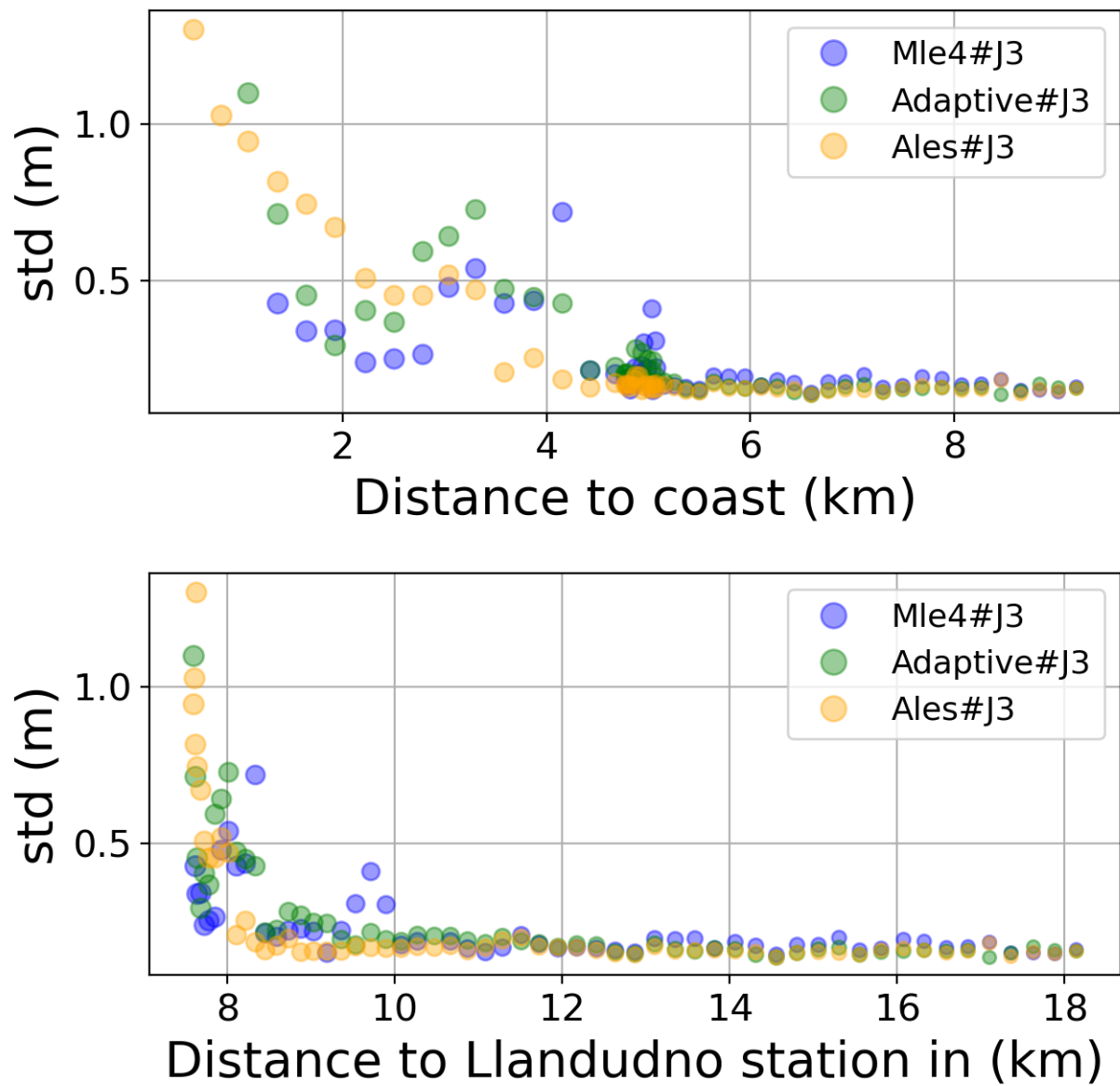


FIGURE 48 – Std in function of the distance to the coast/Llandudno station

6.2.7 Correlation in function of distance to coast/Llandudno station

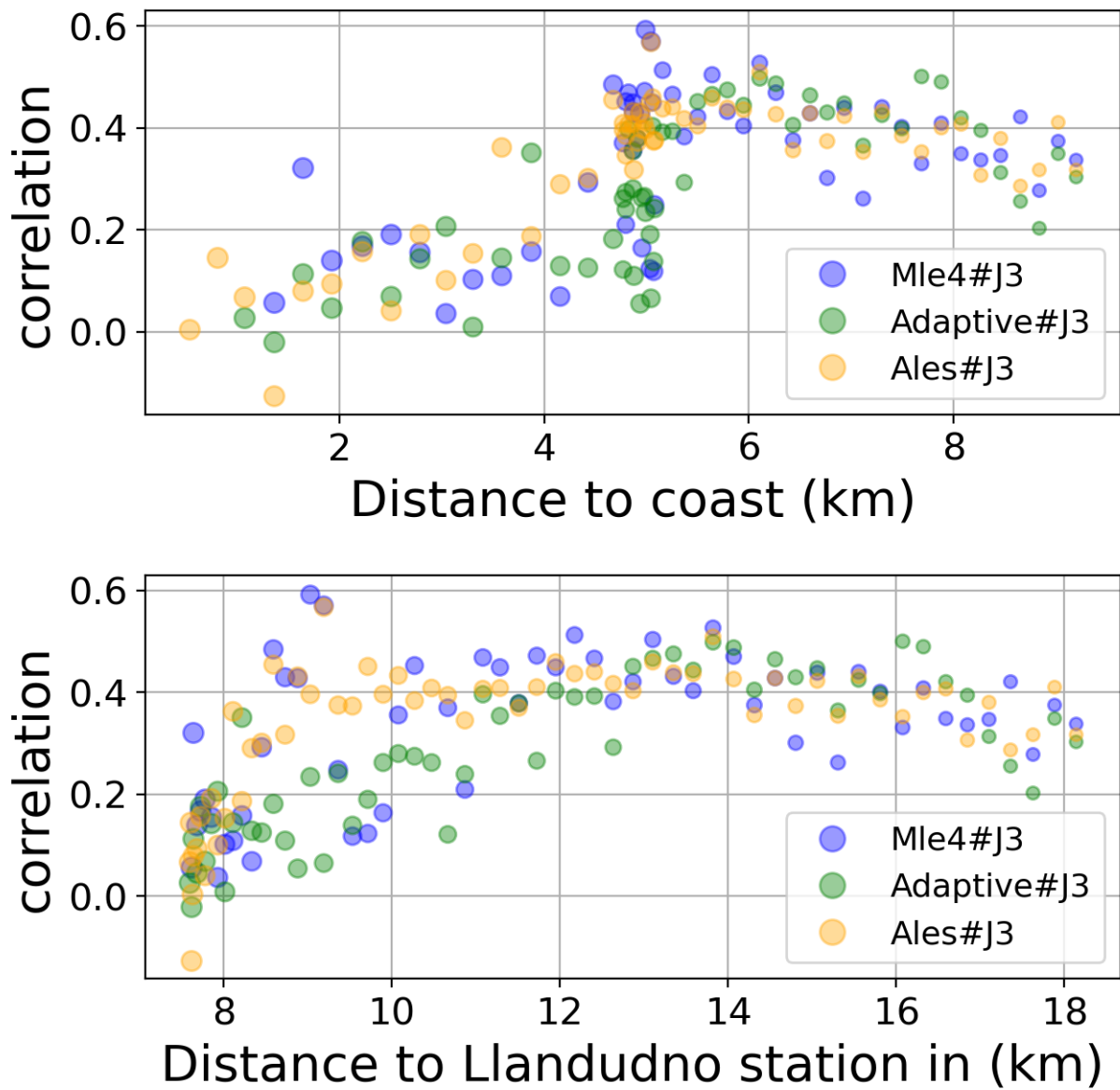


FIGURE 49 – Correlation in function of the distance to the coast/Llandudno station

6.2.8 Taylor Diagram

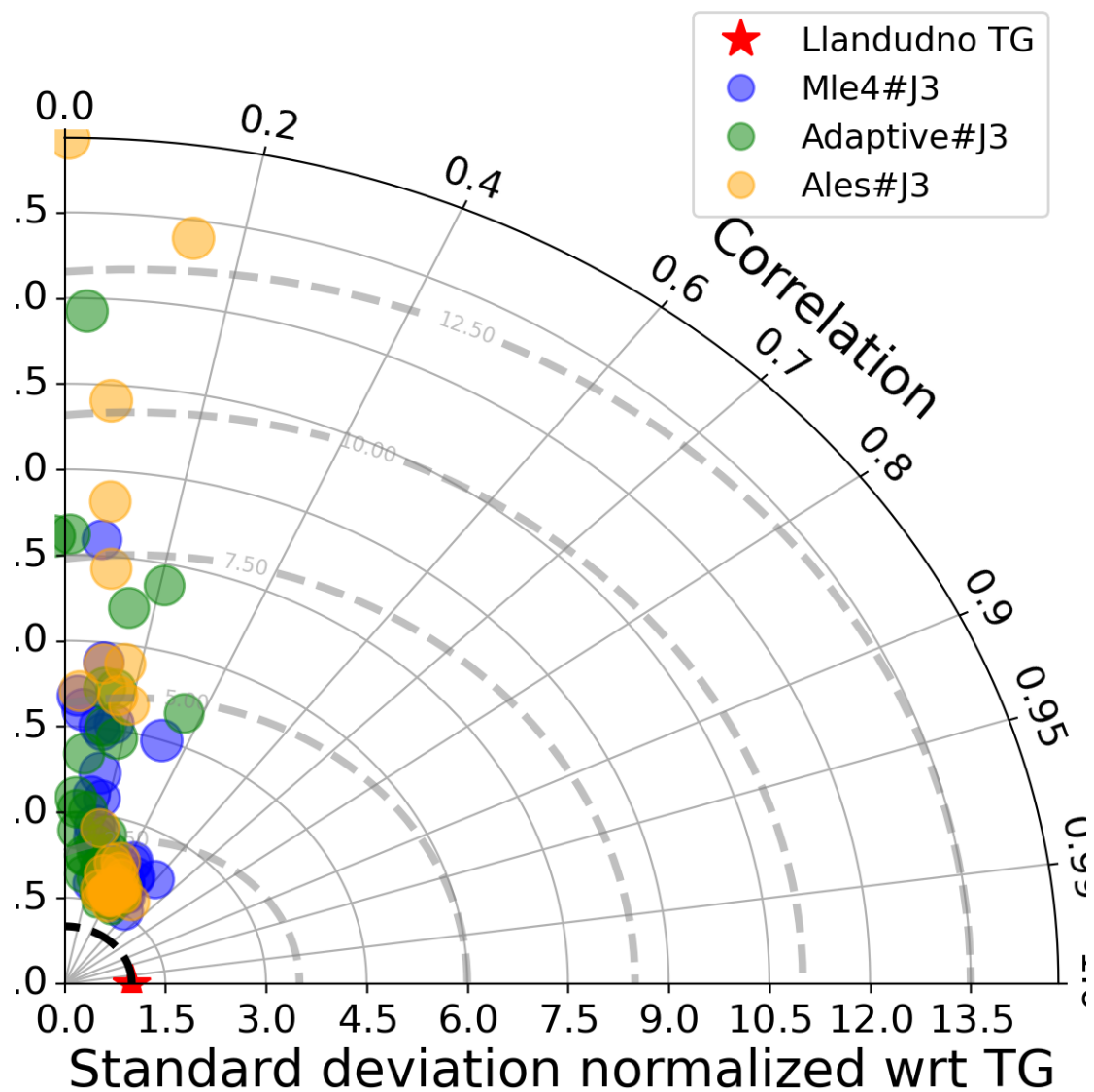


FIGURE 50 – Taylor diagram

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)
Mle4#J3	76.433	0.337	0.233	0.223
Adaptive#J3	85.316	0.287	0.245	0.239
Ales#J3	96.778	0.348	0.225	0.215

FIGURE 51 – 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 79 point.

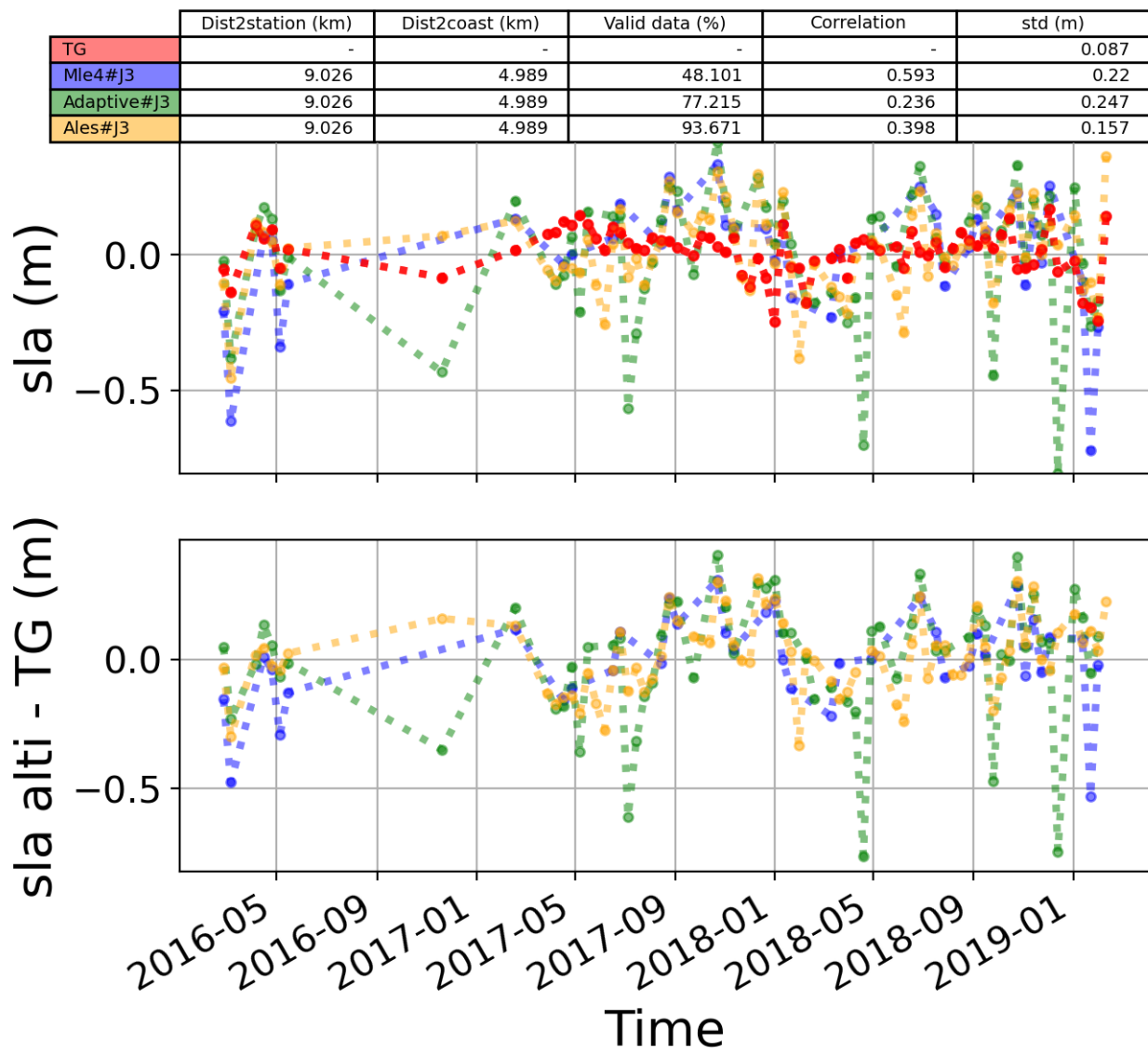


FIGURE 52 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

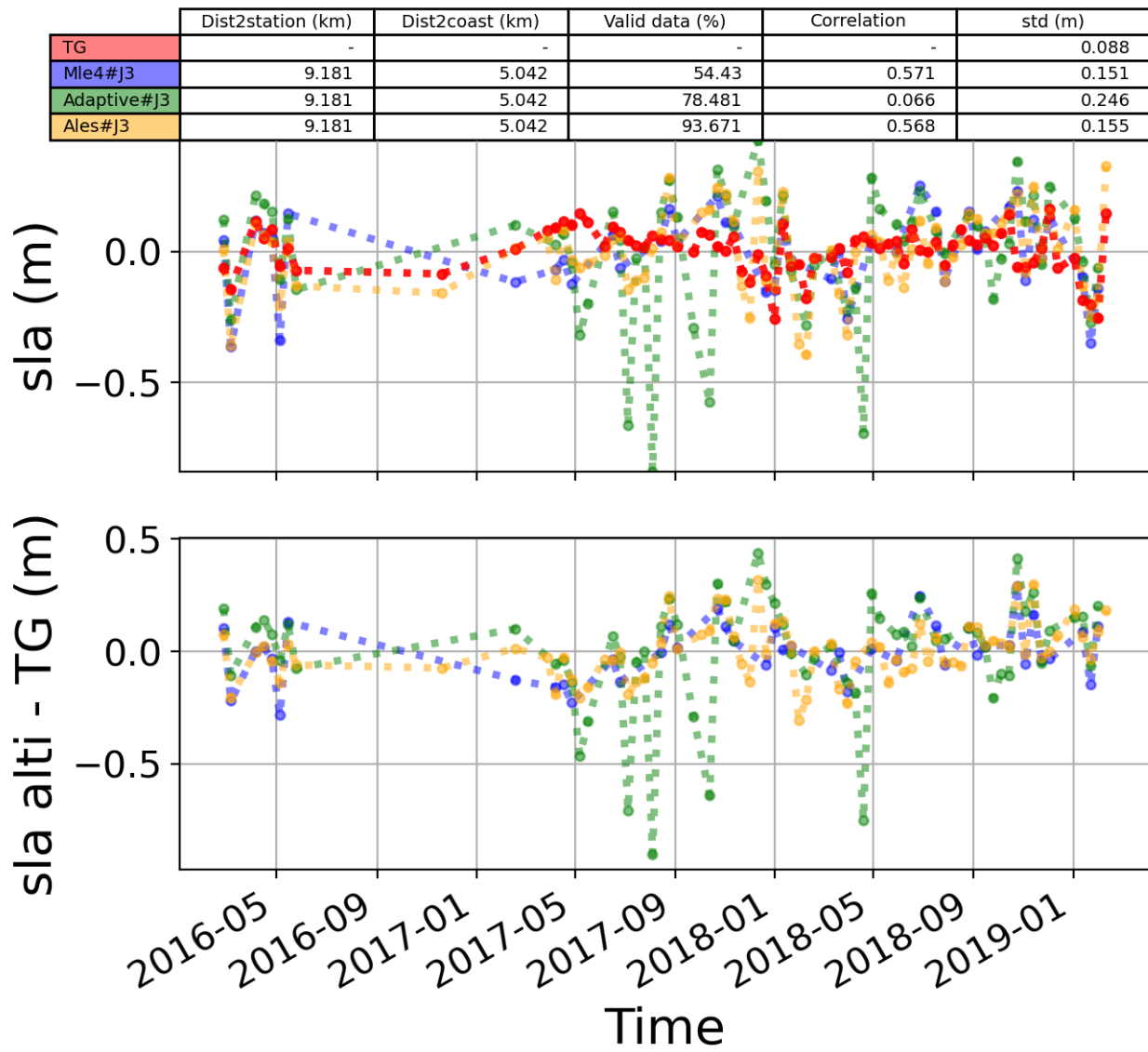


FIGURE 53 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

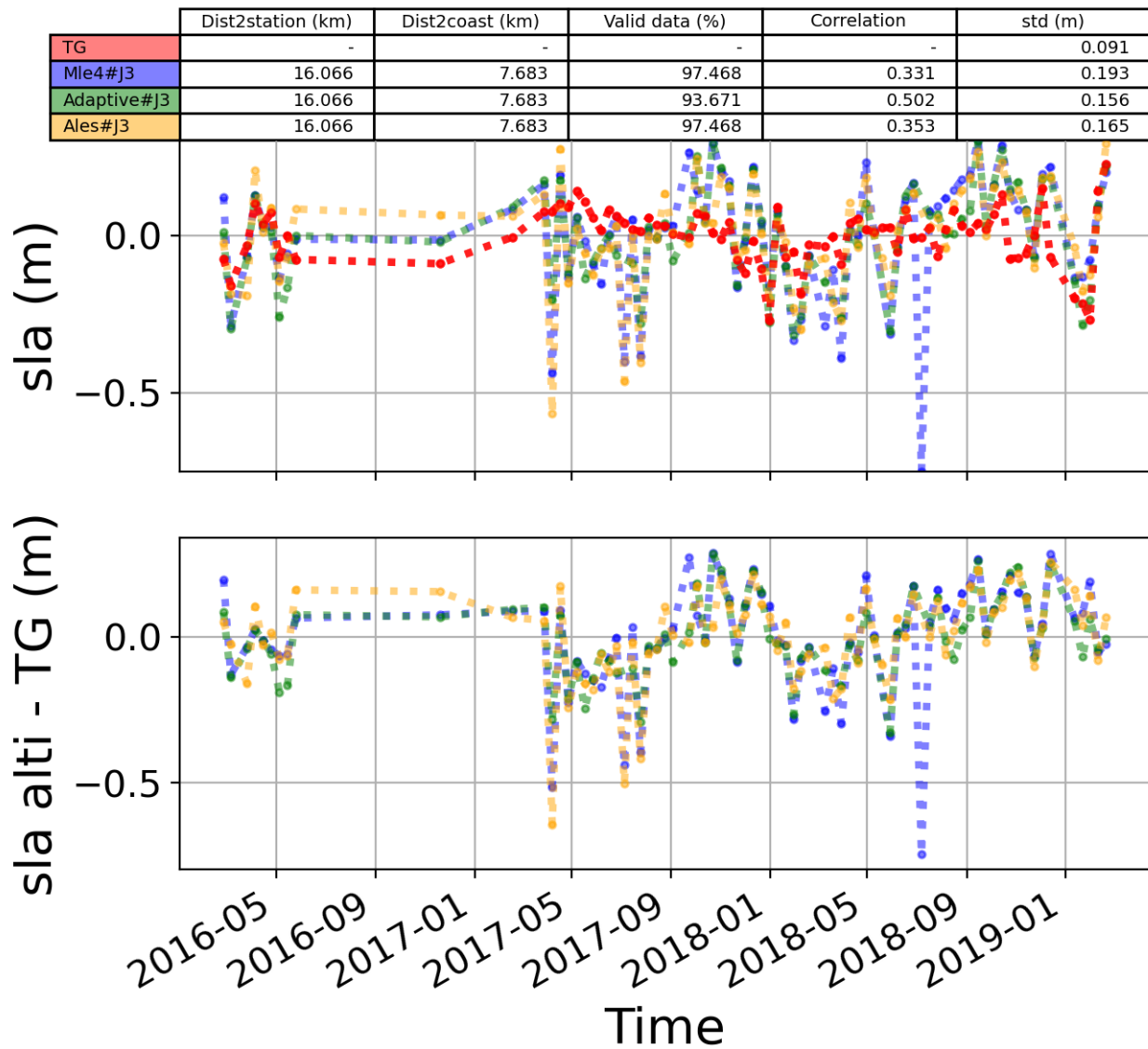


FIGURE 54 – The 3rd most correlated sla altimetry Time serie with tide gauge sla time serie

6.3 Station : Newhaven

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

6.3.1 correlation visualization in maps view % Newhaven tide gauge

Correlation Altimetry data with respect to Newhaven Tide gauge data

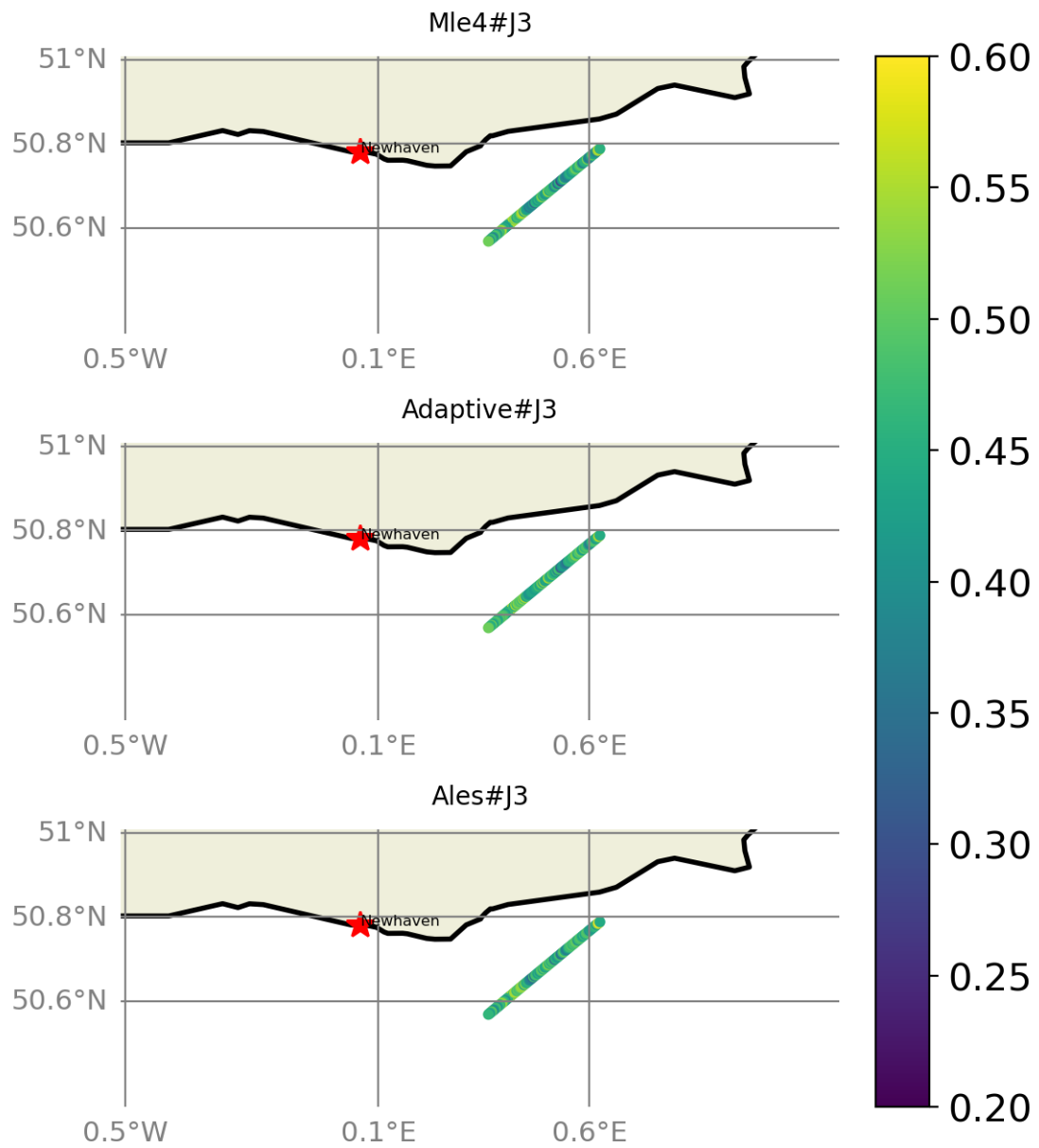


FIGURE 55 – correlation visualization in maps view % Newhaven tide gauge

6.3.2 rmsd visualization in maps view % Newhaven tide gauge

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

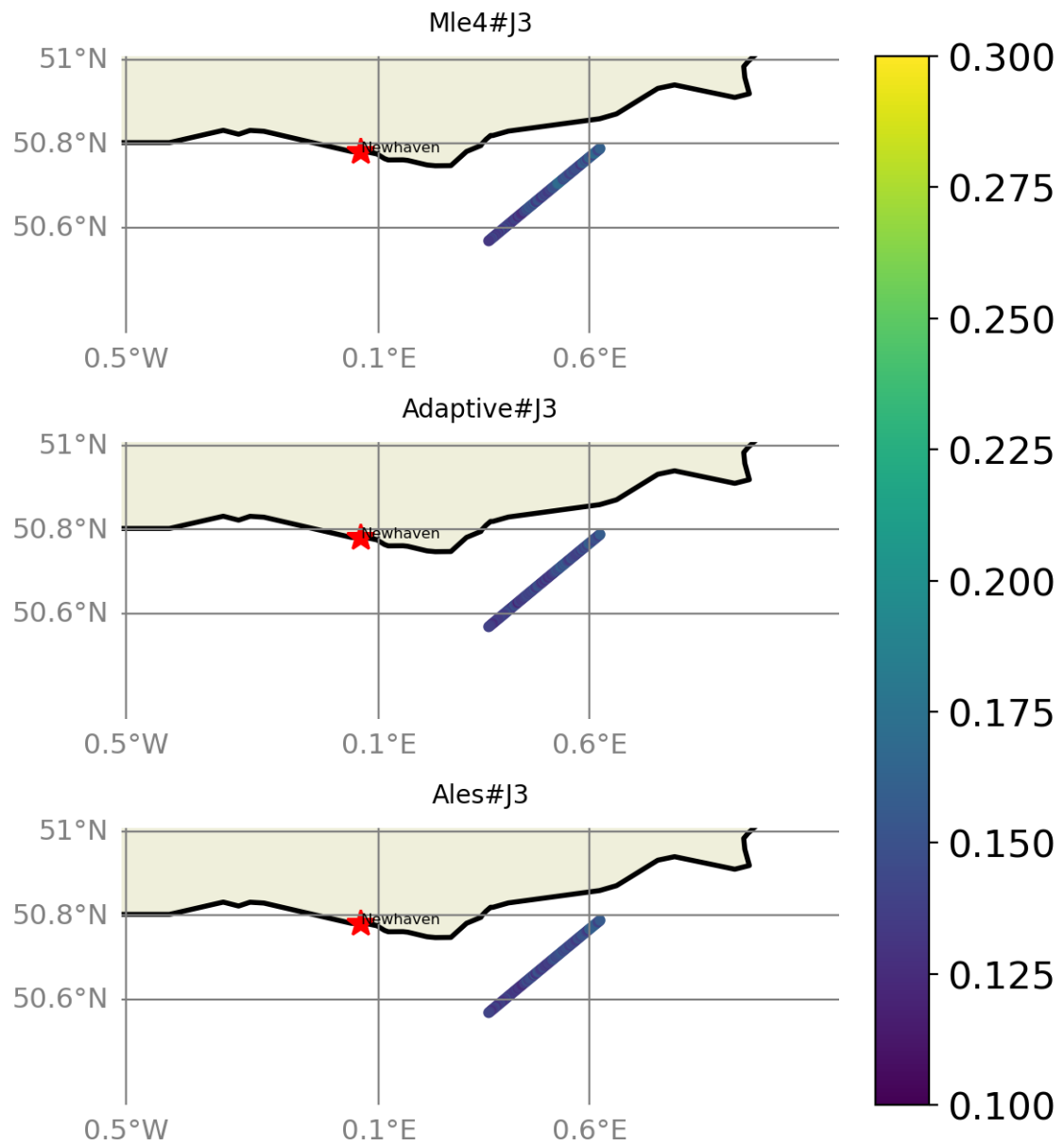


FIGURE 56 – rmsd visualization in maps view % Newhaven tide gauge

6.3.3 std visualization in maps view % Newhaven tide gauge

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

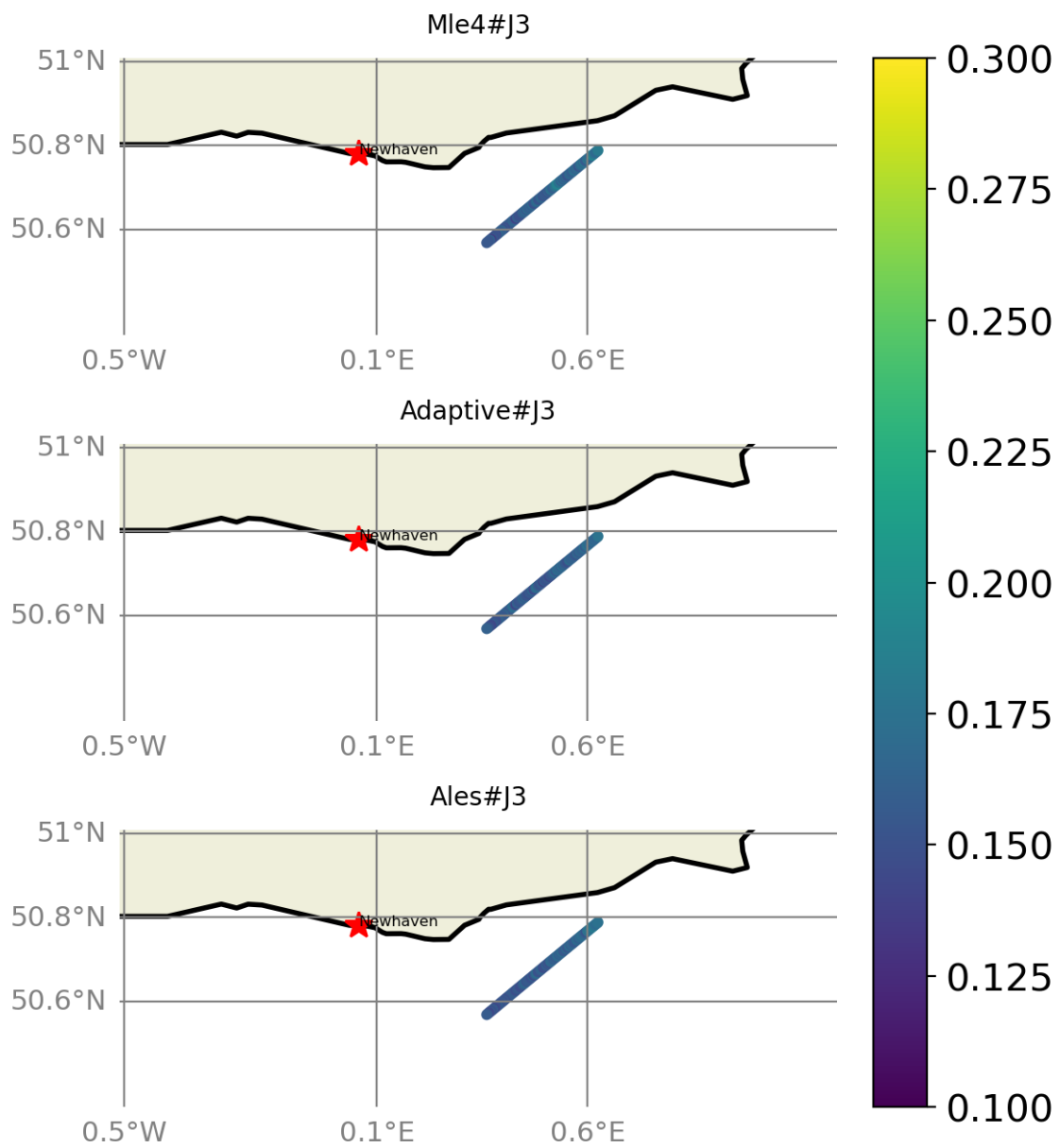


FIGURE 57 – std visualization in maps view % Newhaven tide gauge

6.3.4 valid_data_percent visualization in maps view % Newhaven tide gauge

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

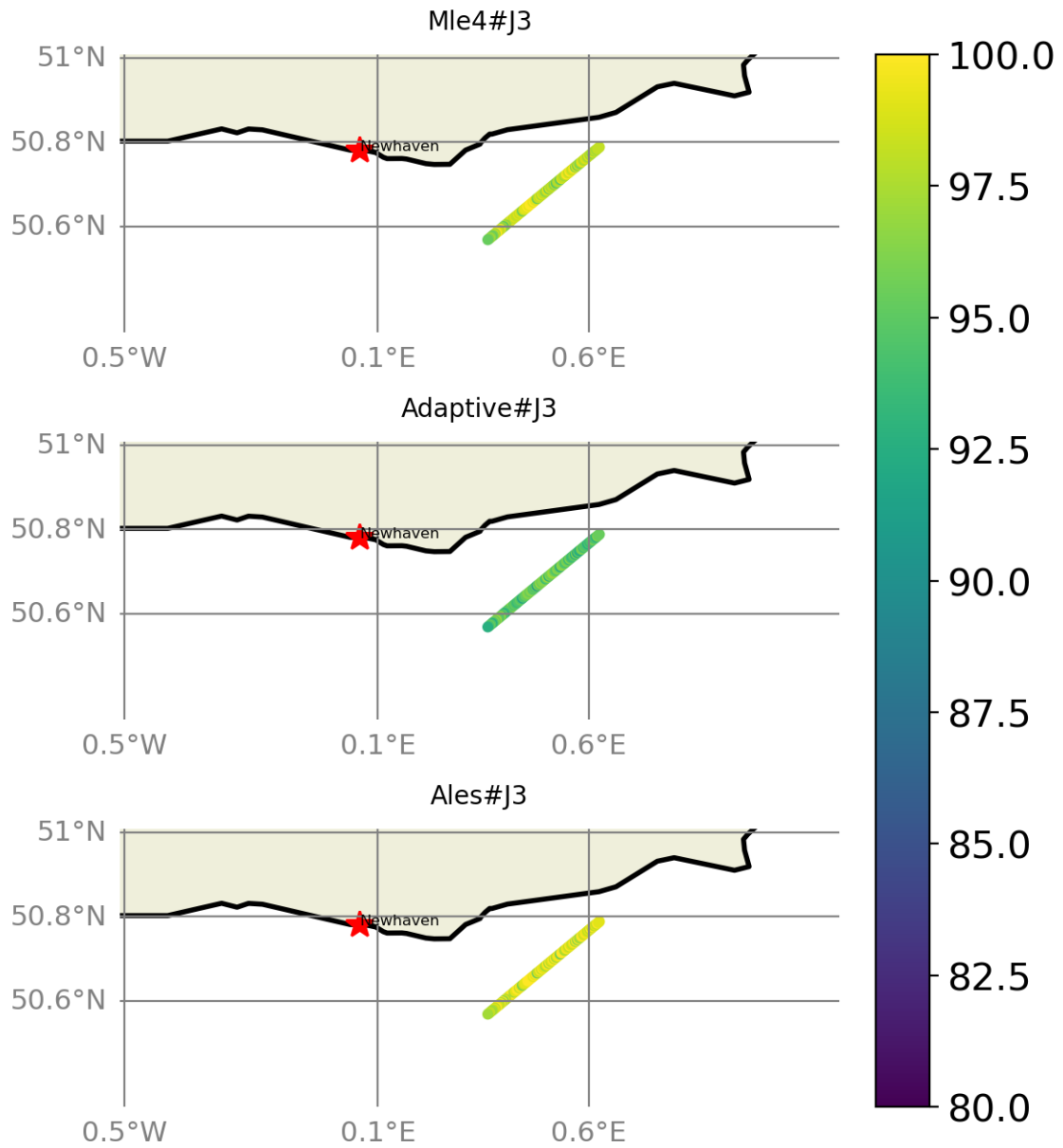


FIGURE 58 – valid_data_percent visualization in maps view % Newhaven tide gauge

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. $maxNB = 108$ 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.

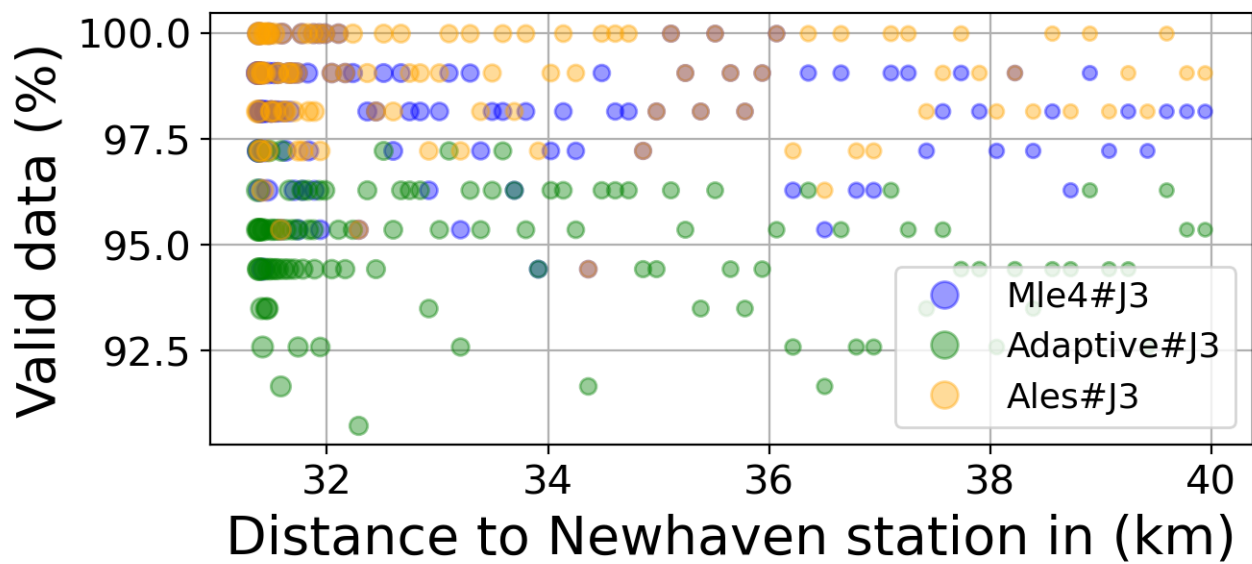
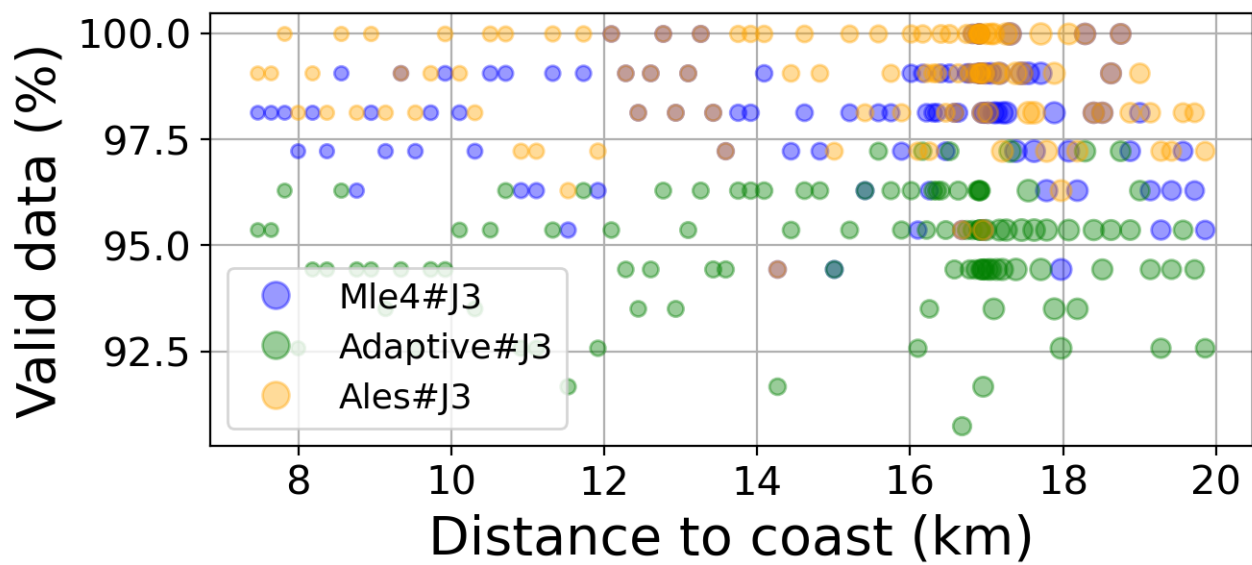


FIGURE 59 – Valid data (%) in function of distance to coast/Newhaven station

6.3.6 Std in function of distance to coast/Newhaven station

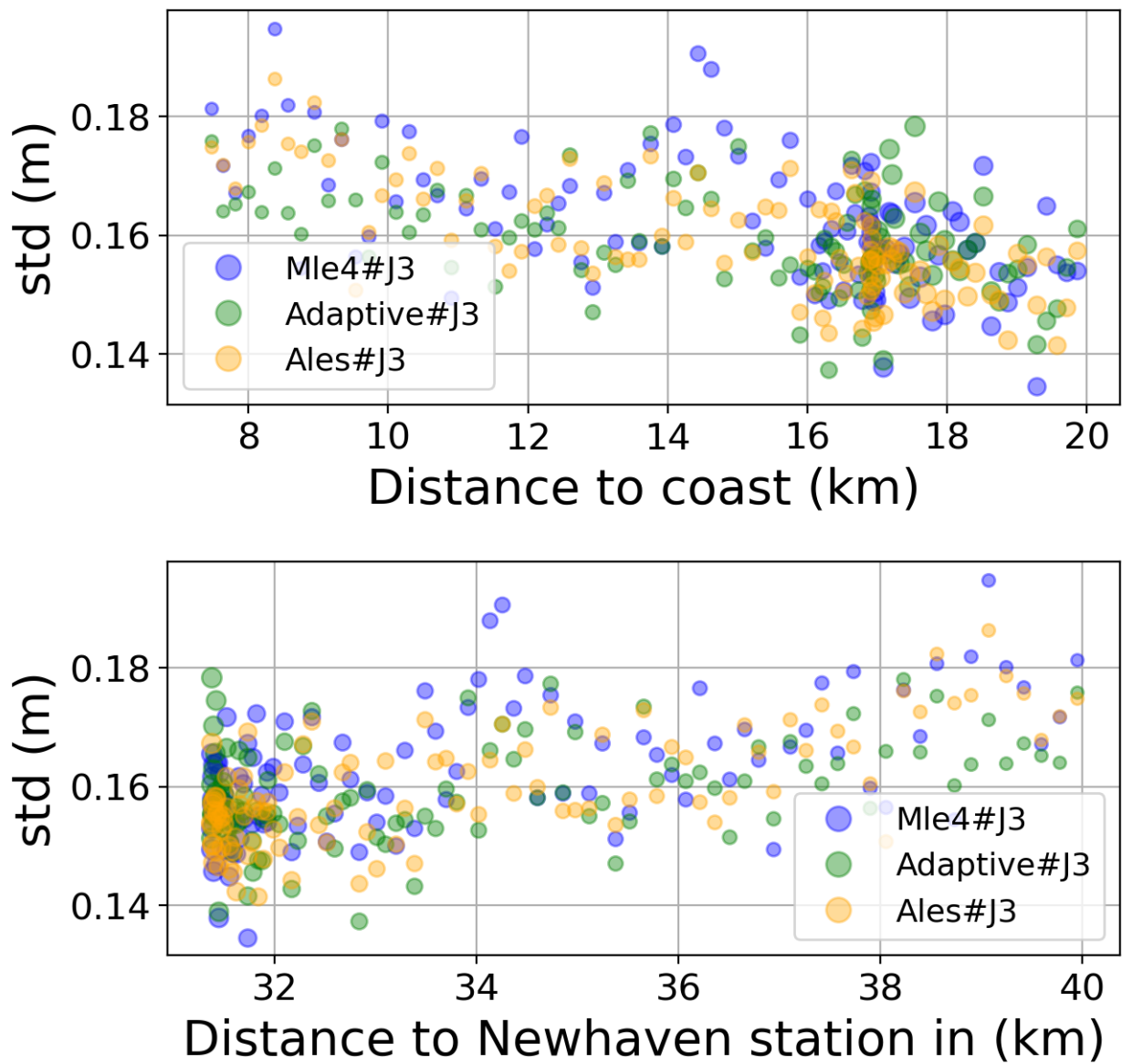


FIGURE 60 – Std in function of the distance to the coast/Newhaven station

6.3.7 Correlation in function of distance to coast/Newhaven station

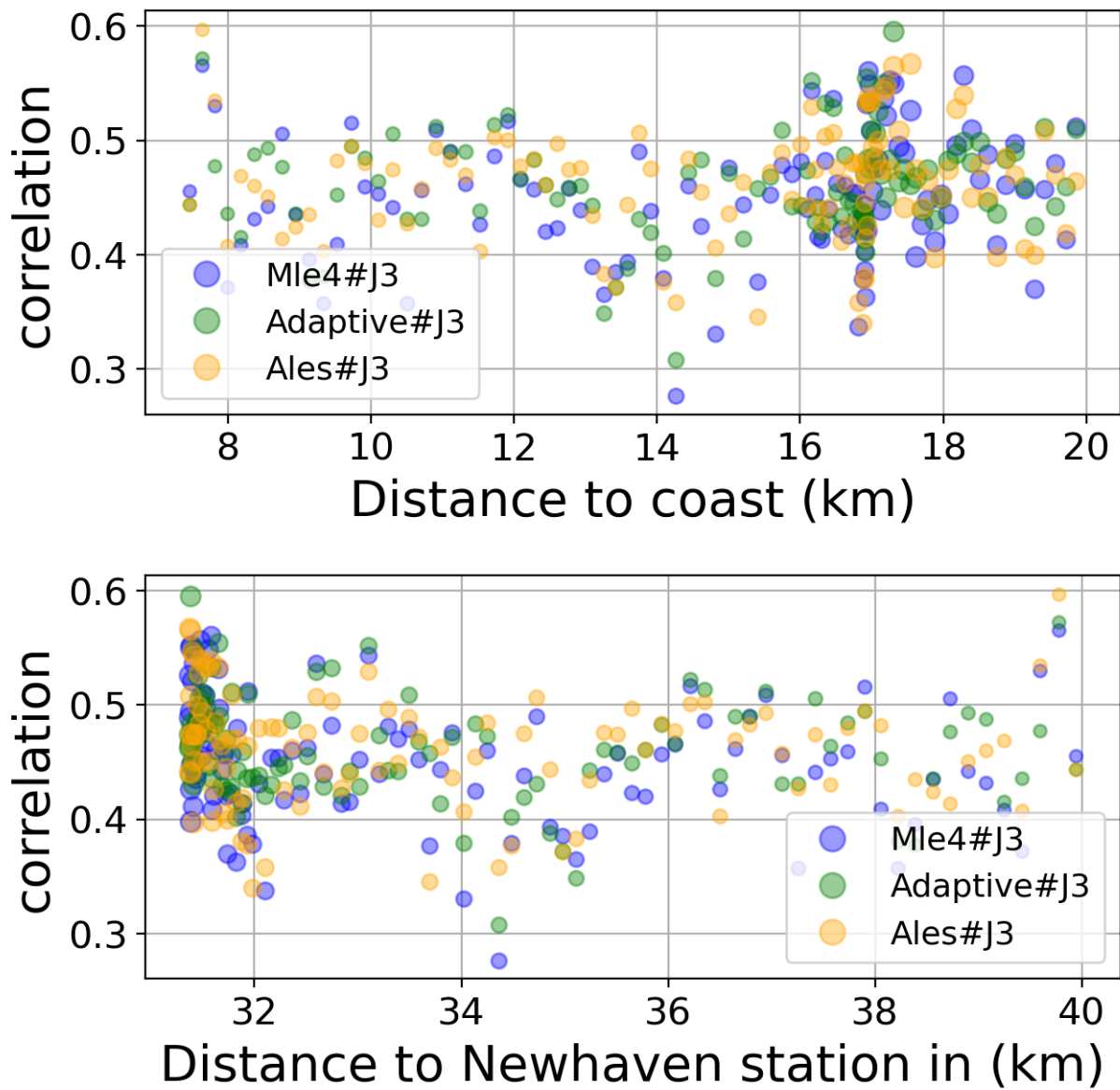


FIGURE 61 – Correlation in function of the distance to the coast/Newhaven station

6.3.8 Taylor Diagram

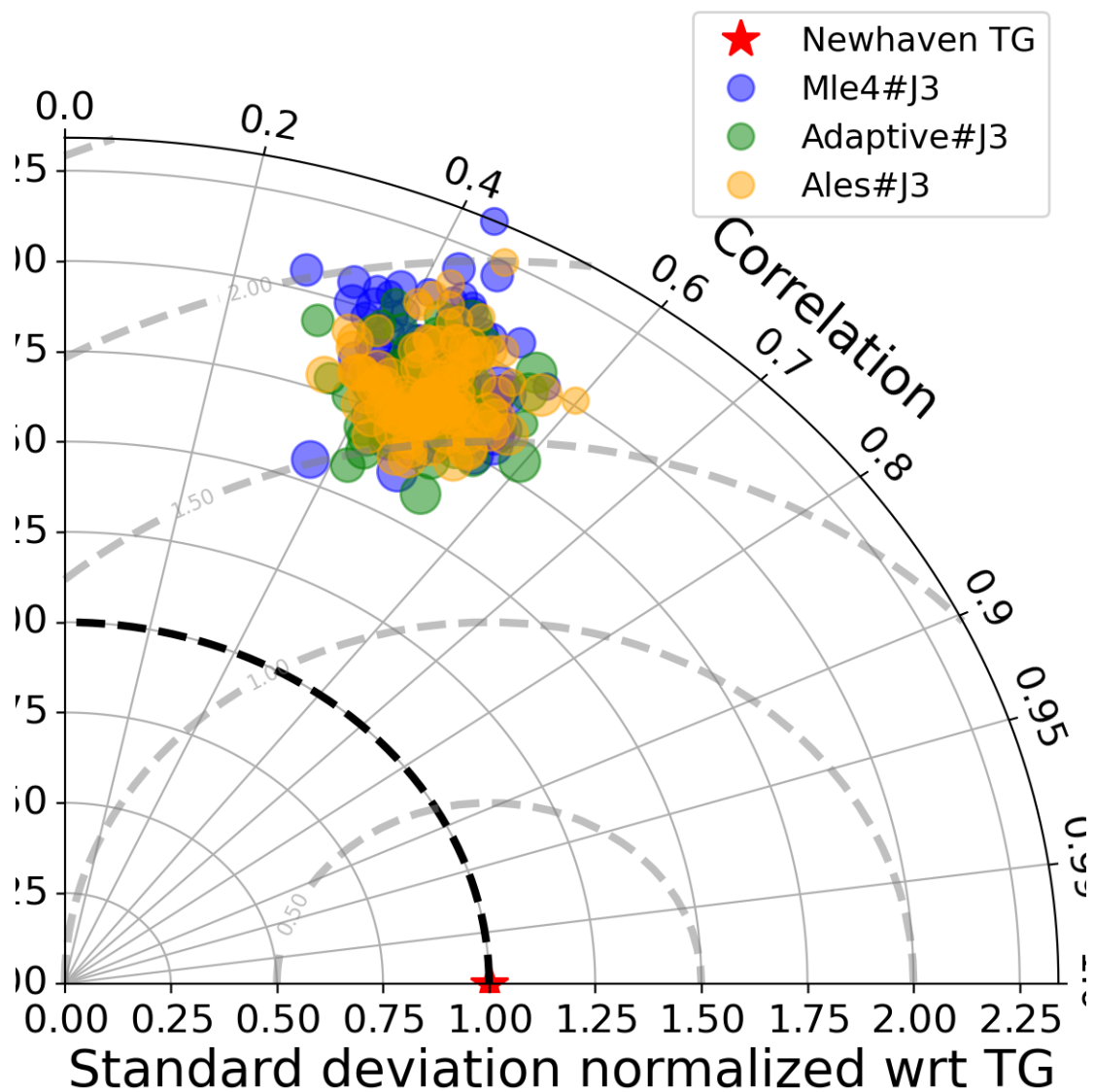


FIGURE 62 – Taylor diagram

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)
Mle4#J3	98.01	0.451	0.162	0.145
Adaptive#J3	94.92	0.462	0.159	0.142
Ales#J3	98.806	0.462	0.159	0.142

FIGURE 63 – 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 108 point.

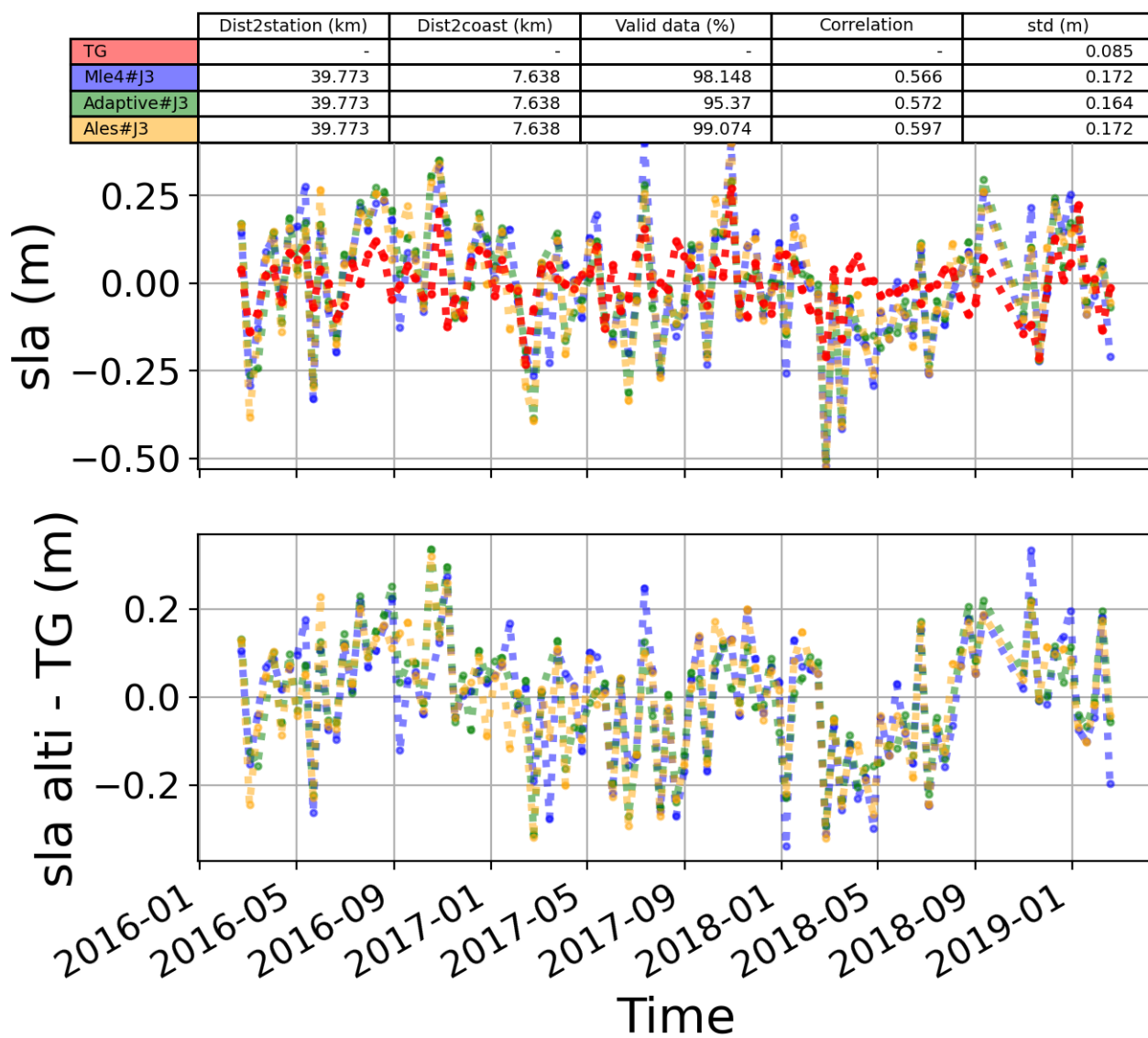


FIGURE 64 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

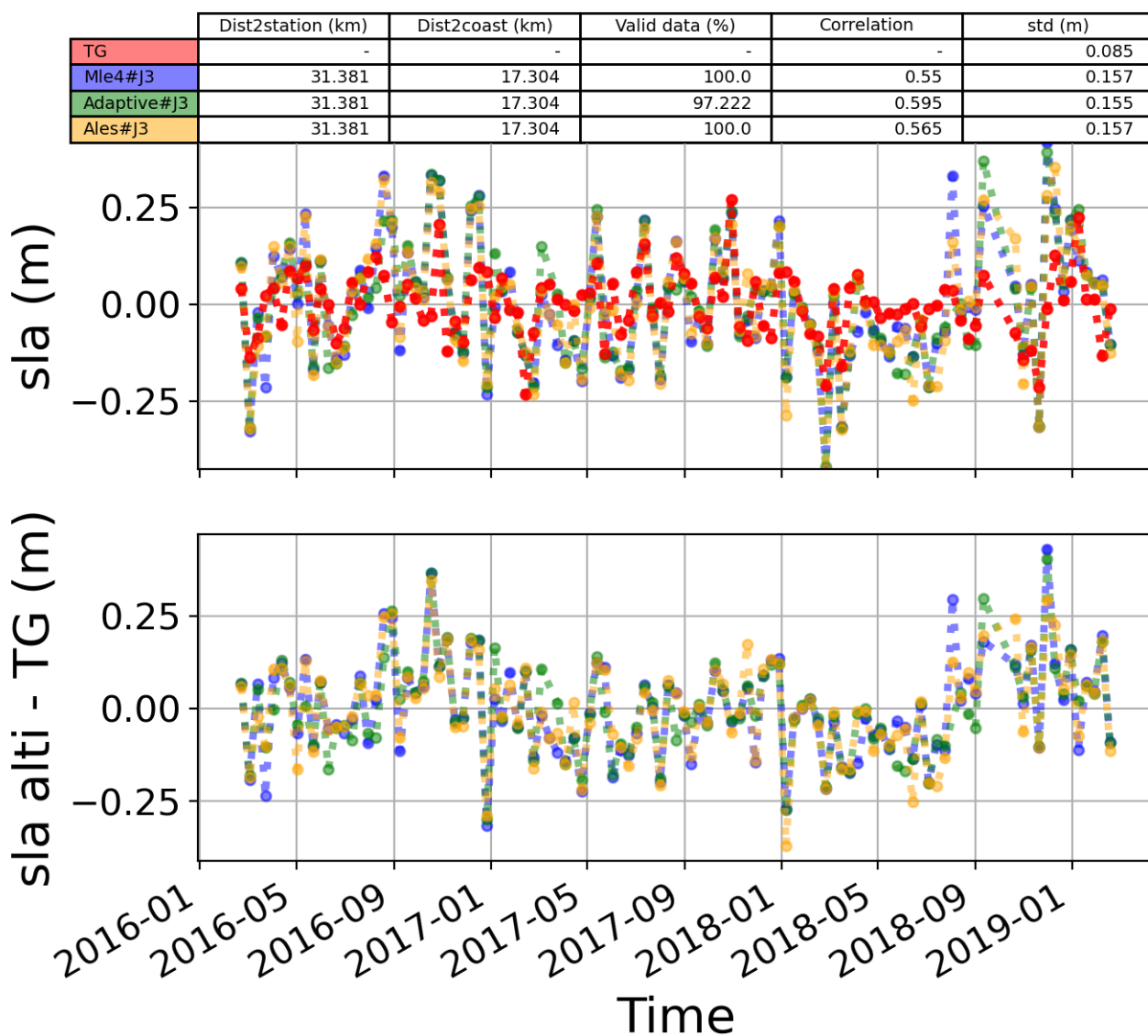


FIGURE 65 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

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 : $[50.8, 51.21]^\circ$

6.4.1 correlation visualization in maps view % CALAIS tide gauge

Correlation Altimetry data with respect to CALAIS Tide gauge data

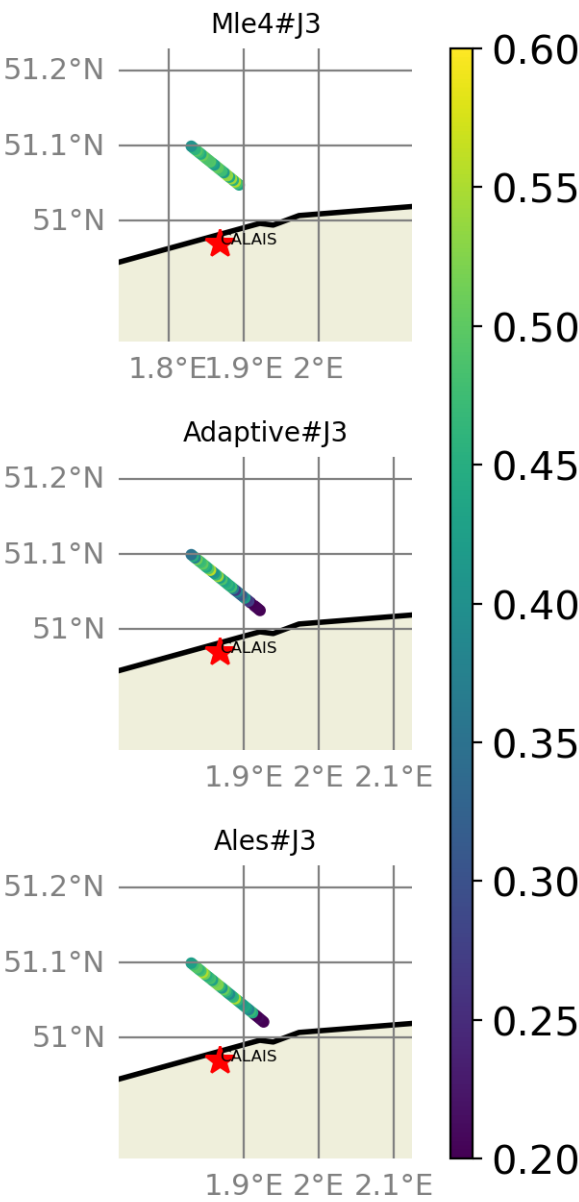


FIGURE 66 – correlation visualization in maps view % CALAIS tide gauge

6.4.2 rmsd visualization in maps view % CALAIS tide gauge

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

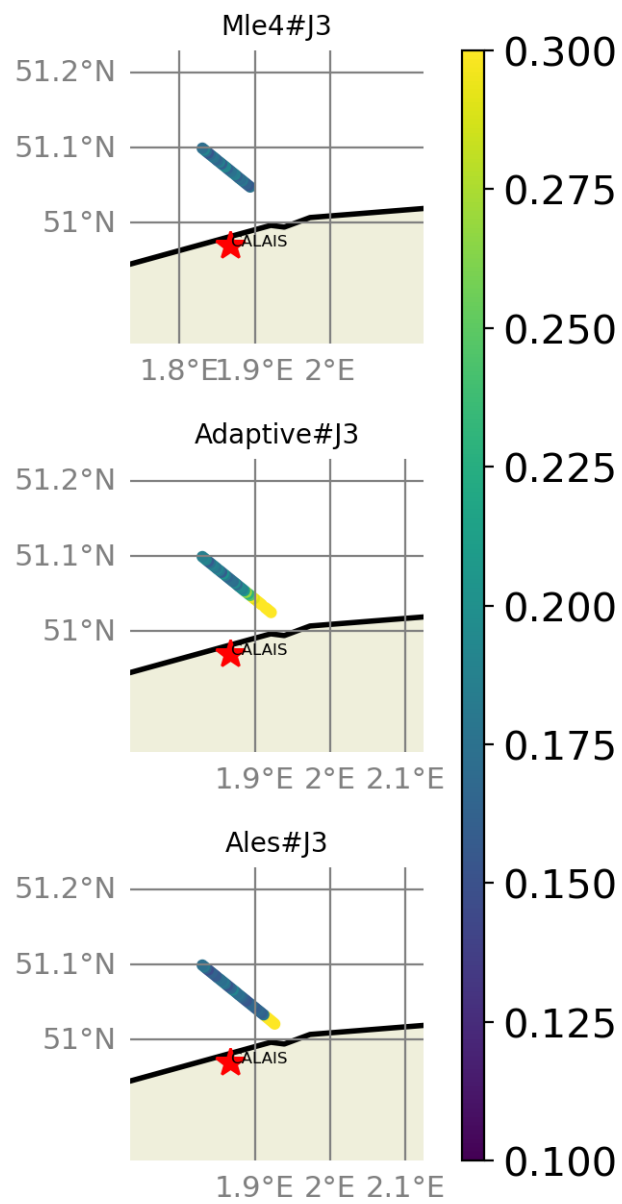


FIGURE 67 – rmsd visualization in maps view % CALAIS tide gauge

6.4.3 std visualization in maps view % CALAIS tide gauge

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

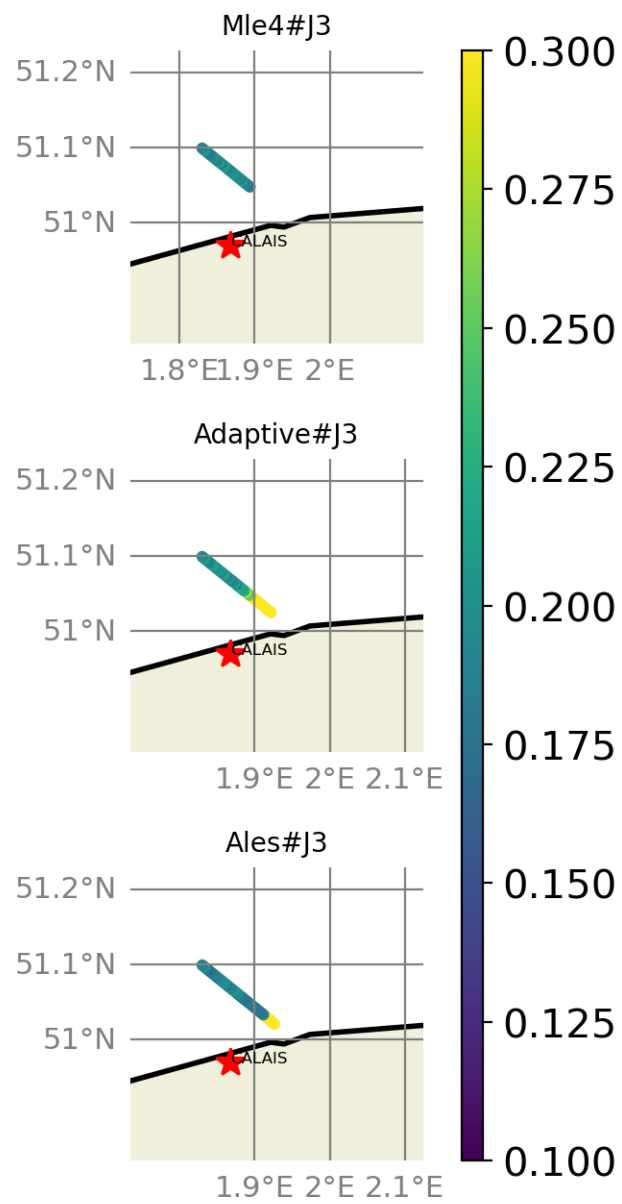


FIGURE 68 – std visualization in maps view % CALAIS tide gauge

6.4.4 valid_data_percent visualization in maps view % CALAIS tide gauge

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

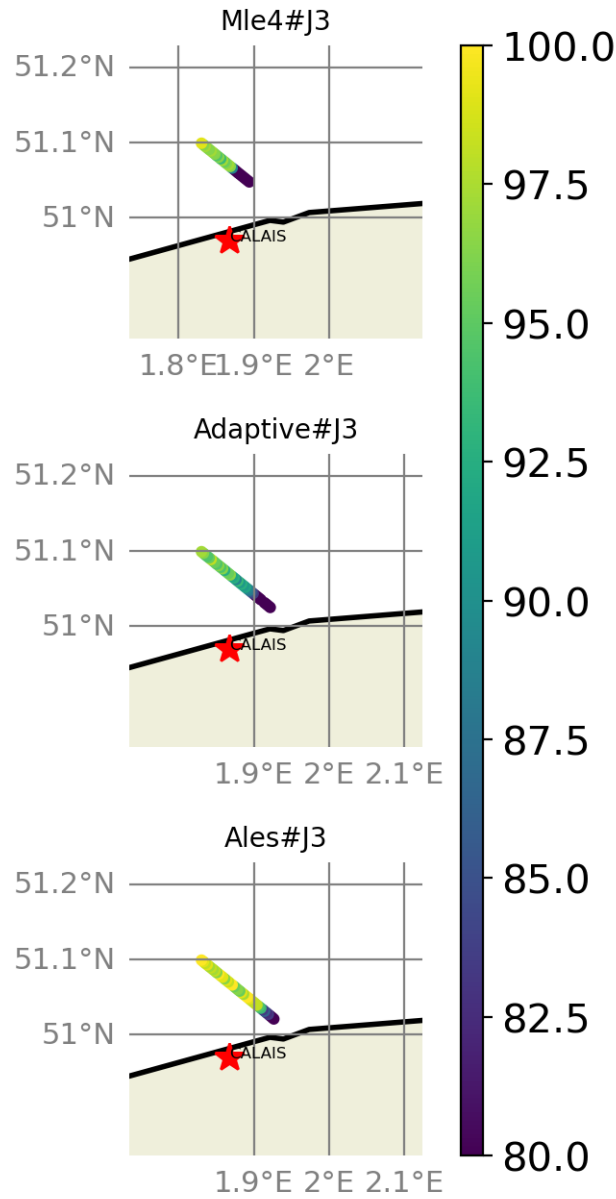


FIGURE 69 – valid_data_percent visualization in maps view % CALAIS tide gauge

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. $maxNB = 109$ point is the maximum number of valid altimetry points in the set of all the altimetry sla time series covered by the period of time of the Tide gauge sla time serie.

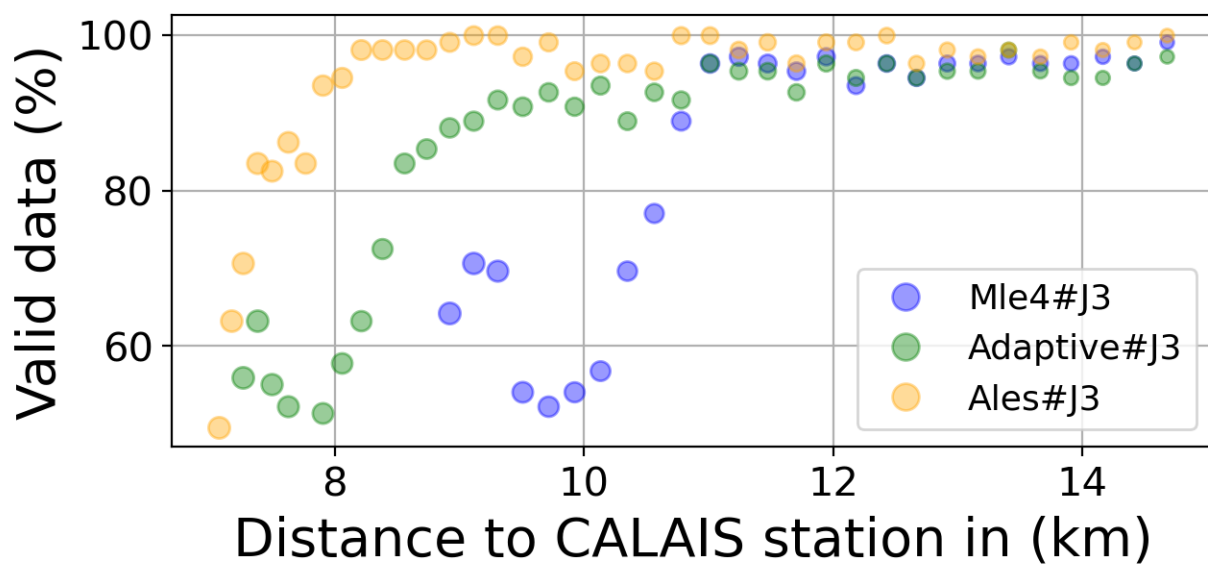
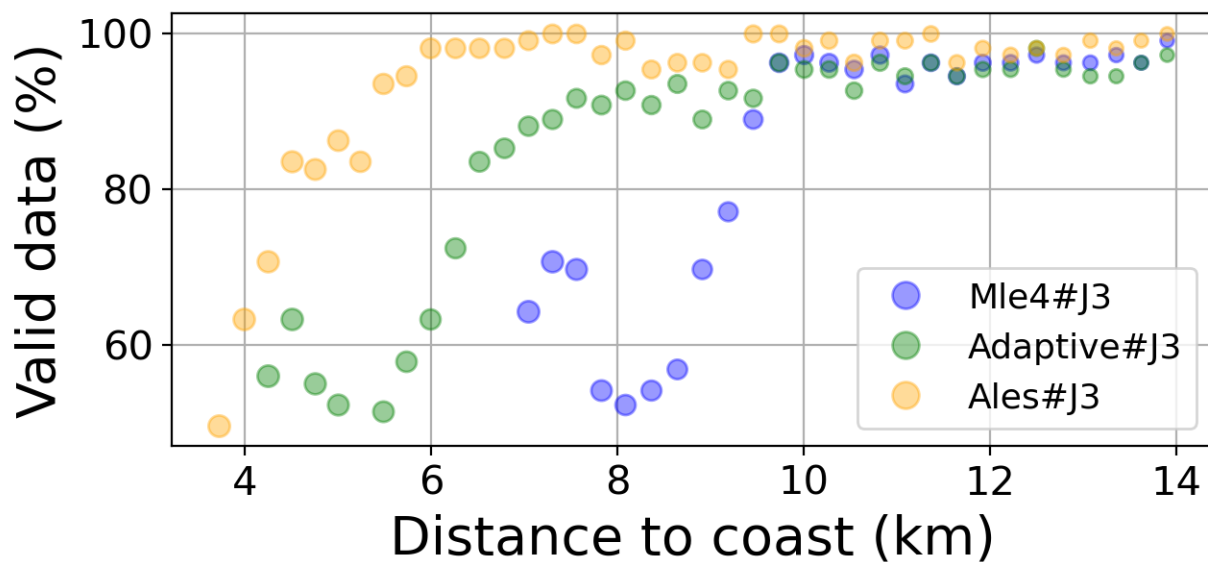


FIGURE 70 – Valid data (%) in function of distance to coast/CALAIS station

6.4.6 Std in function of distance to coast/CALAIS station

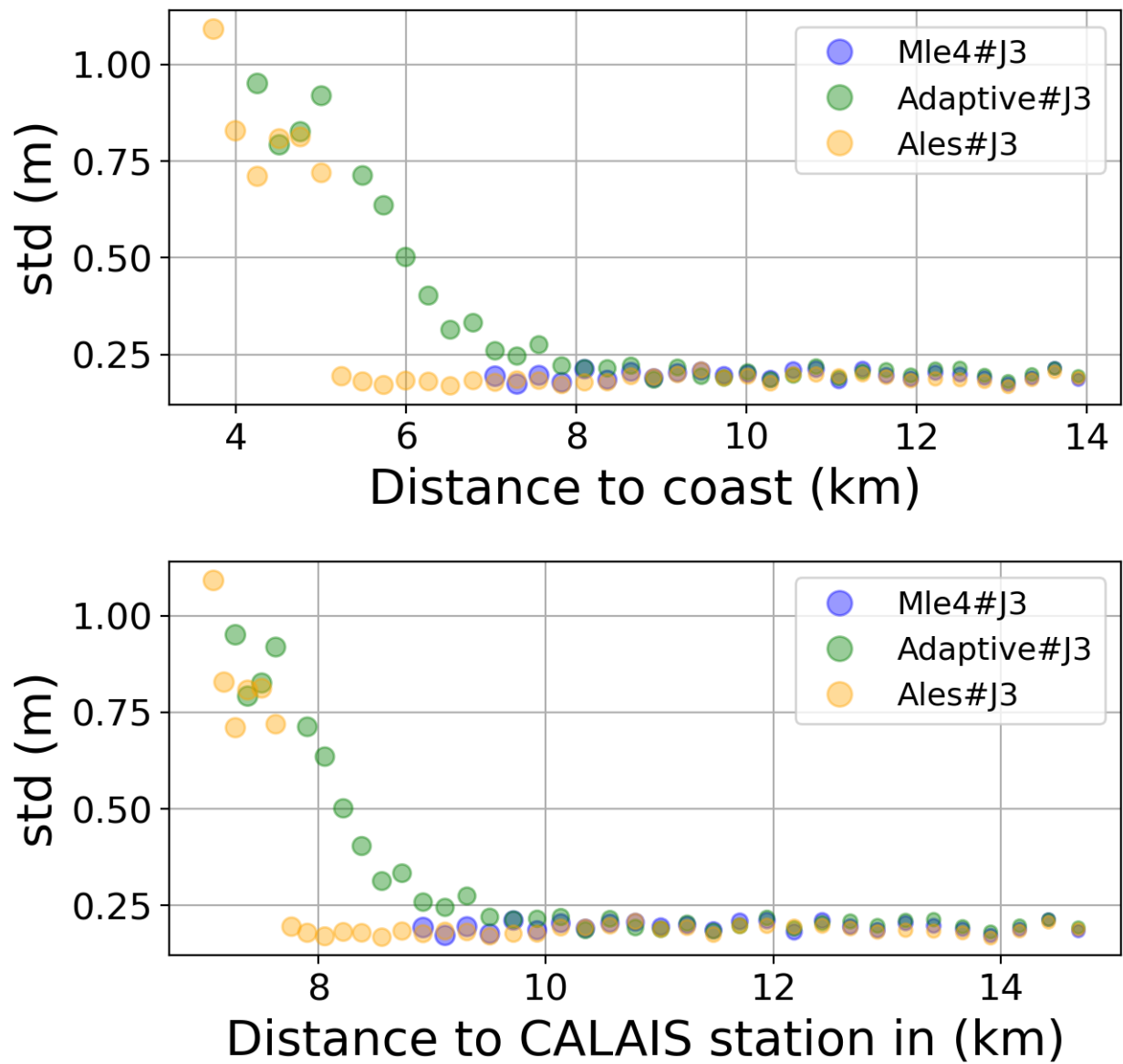


FIGURE 71 – Std in function of the distance to the coast/CALAIS station

6.4.7 Correlation in function of distance to coast/CALAIS station

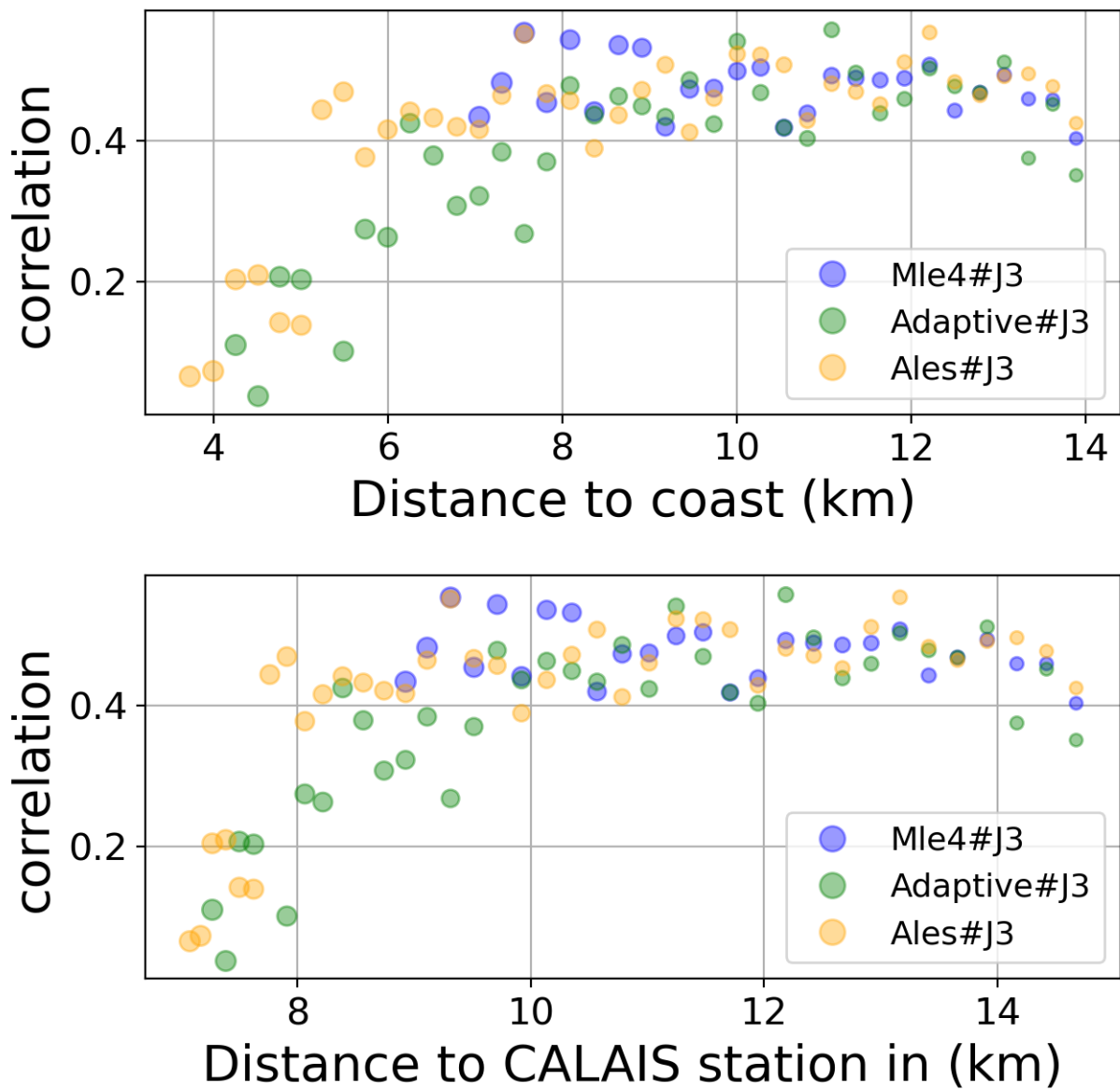


FIGURE 72 – Correlation in function of the distance to the coast/CALAIS station

6.4.8 Taylor Diagram

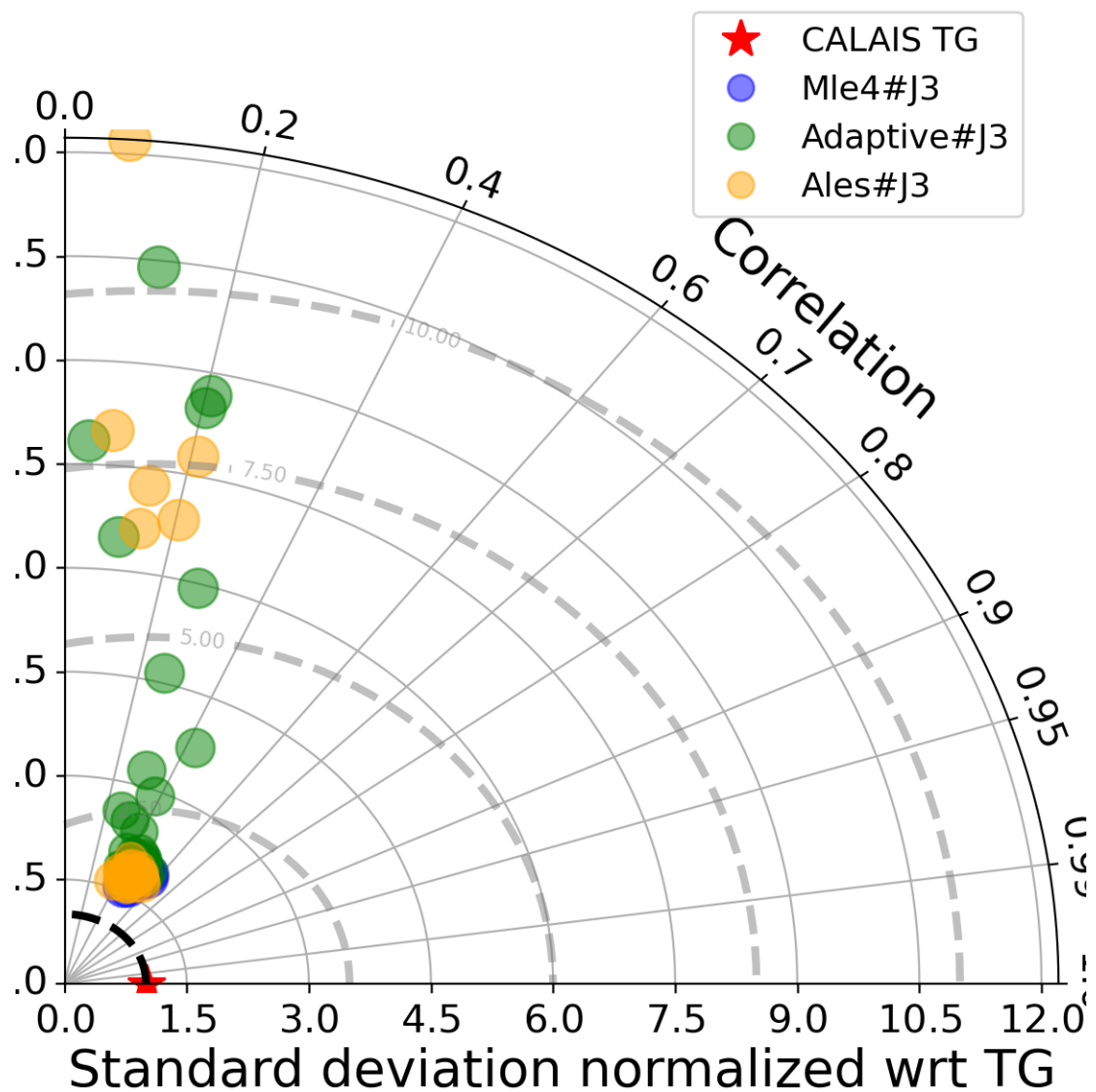


FIGURE 73 – Taylor diagram

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)
Mle4#J3	84.615	0.477	0.196	0.173
Adaptive#J3	93.79	0.44	0.21	0.19
Ales#J3	98.236	0.474	0.189	0.167

FIGURE 74 – 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 109 point.

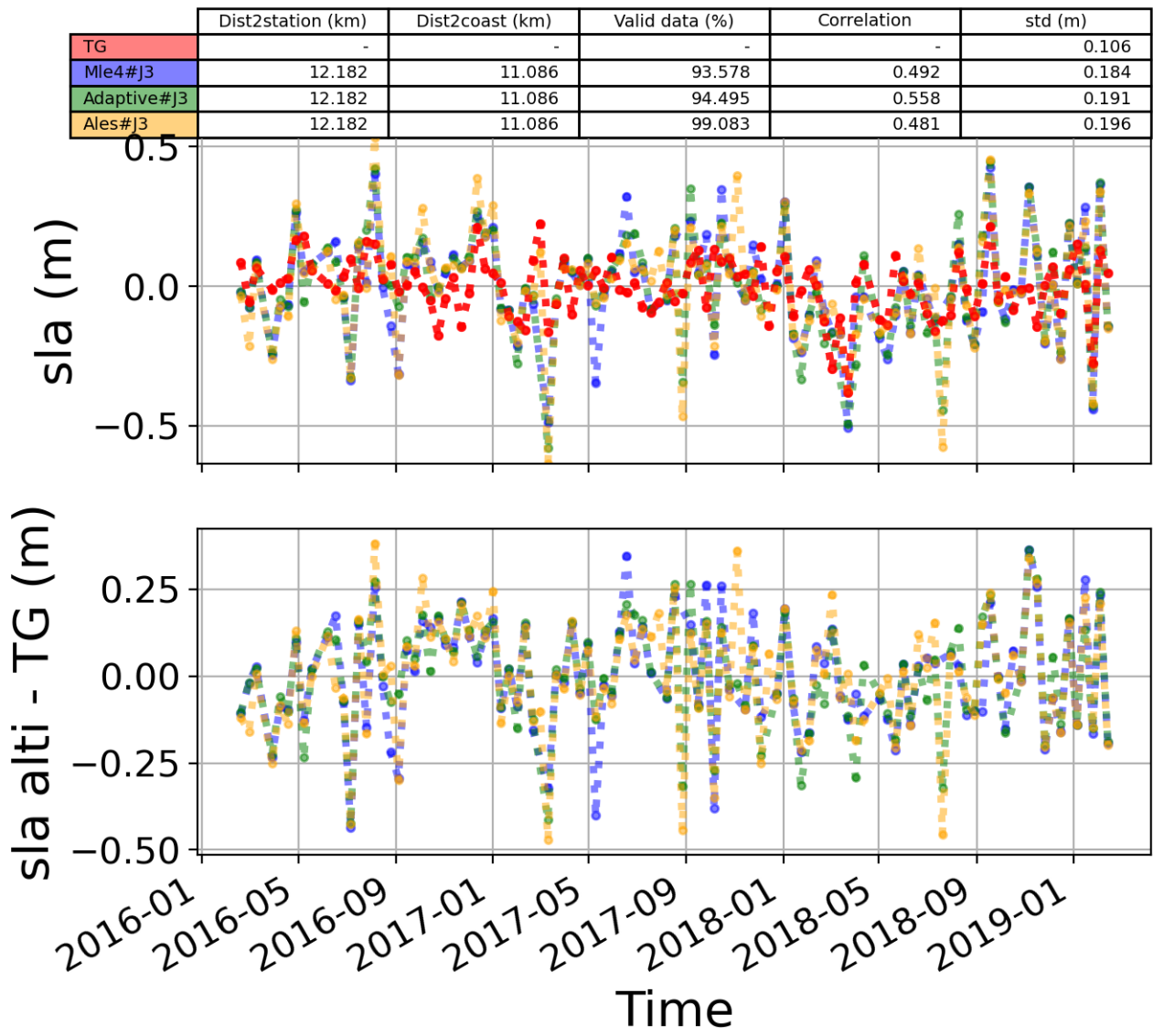


FIGURE 75 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

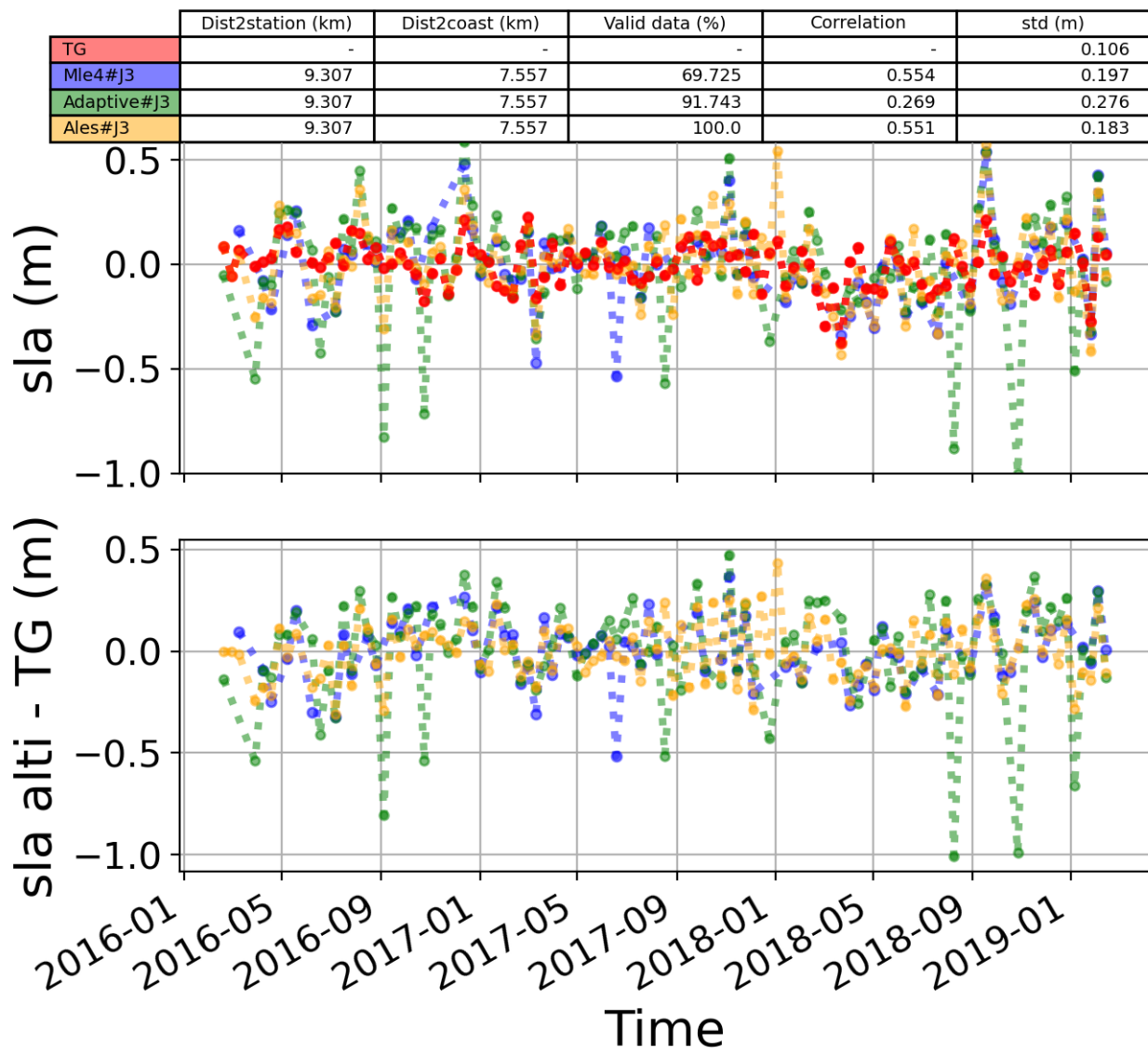


FIGURE 76 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

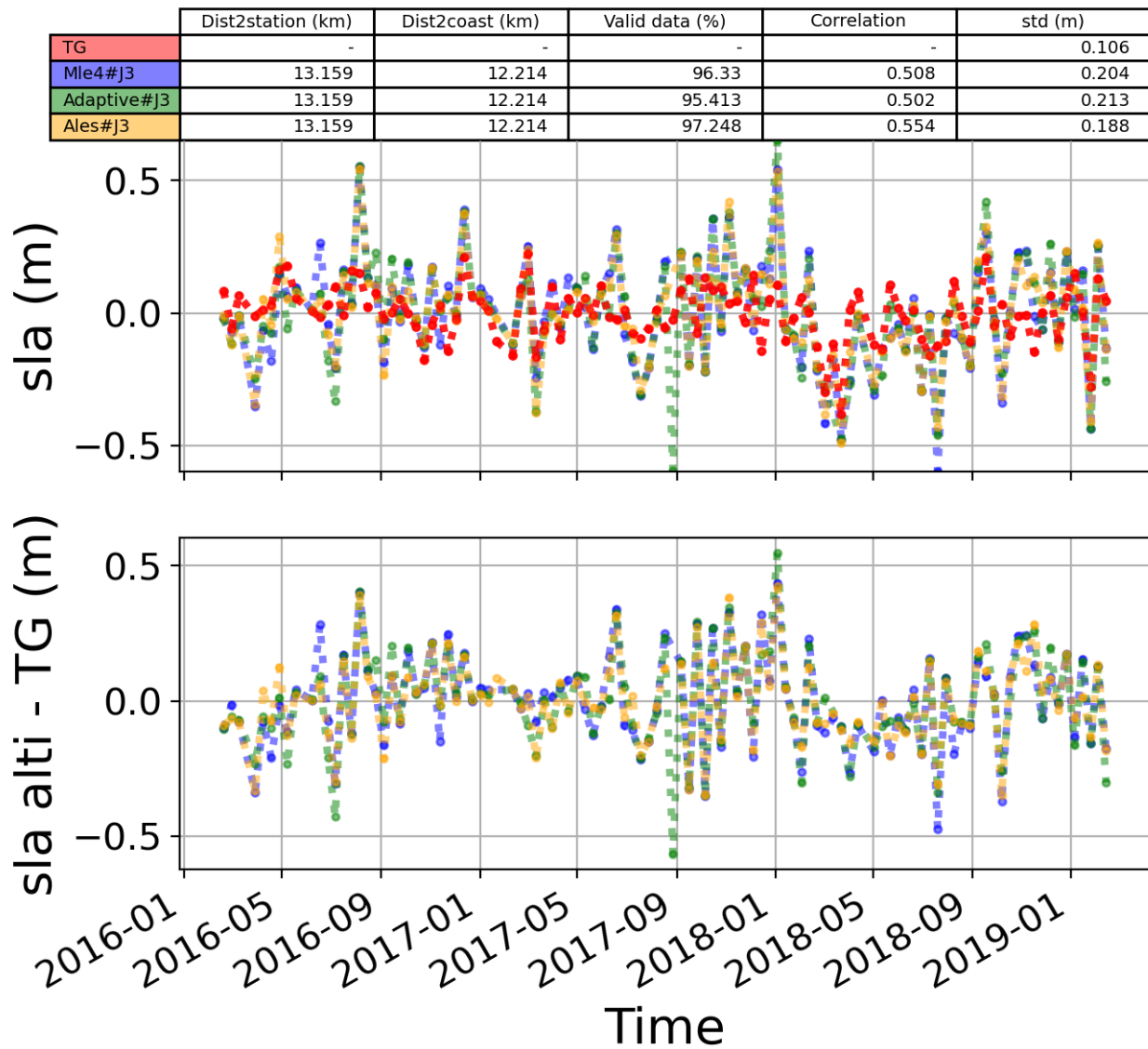


FIGURE 77 – The 3rd most correlated sla altimetry Time serie with tide gauge sla time serie

6.5 Station : Portpatrick

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

6.5.1 correlation visualization in maps view % Portpatrick tide gauge

Correlation Altimetry data with respect to Portpatrick Tide gauge data

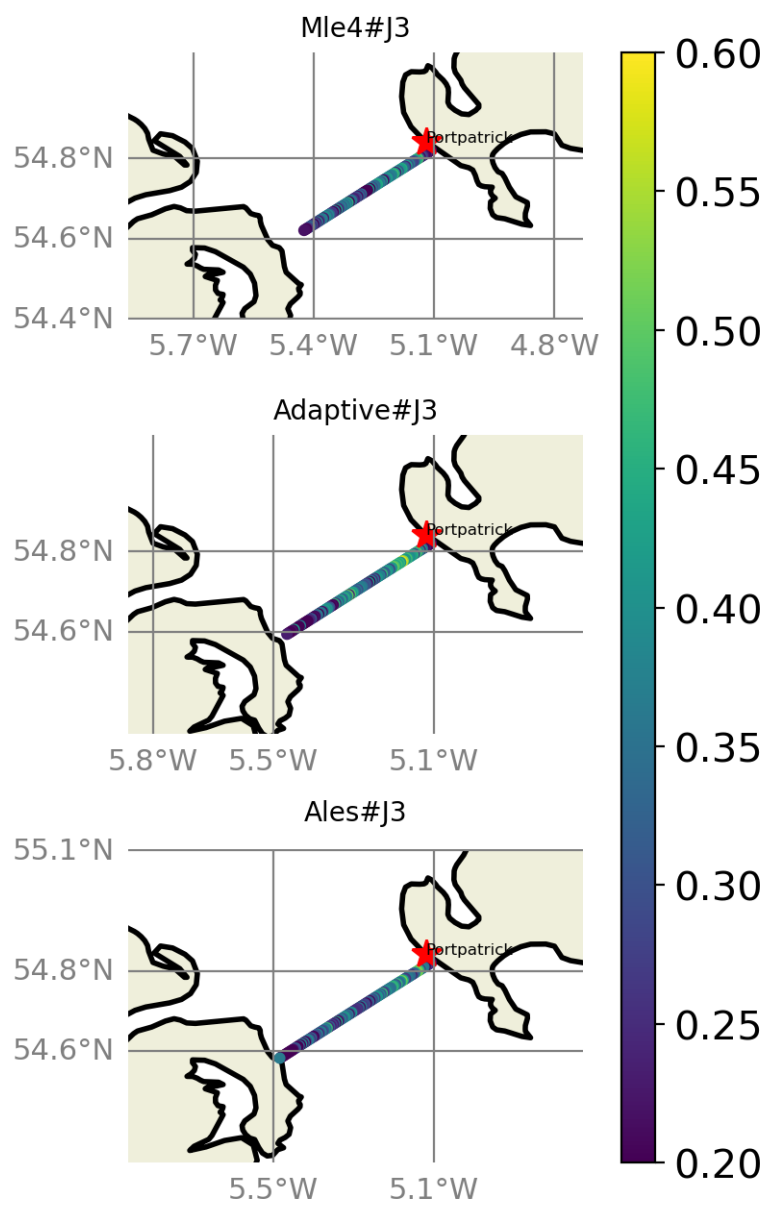


FIGURE 78 – correlation visualization in maps view % Portpatrick tide gauge

6.5.2 rmsd visualization in maps view % Portpatrick tide gauge

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

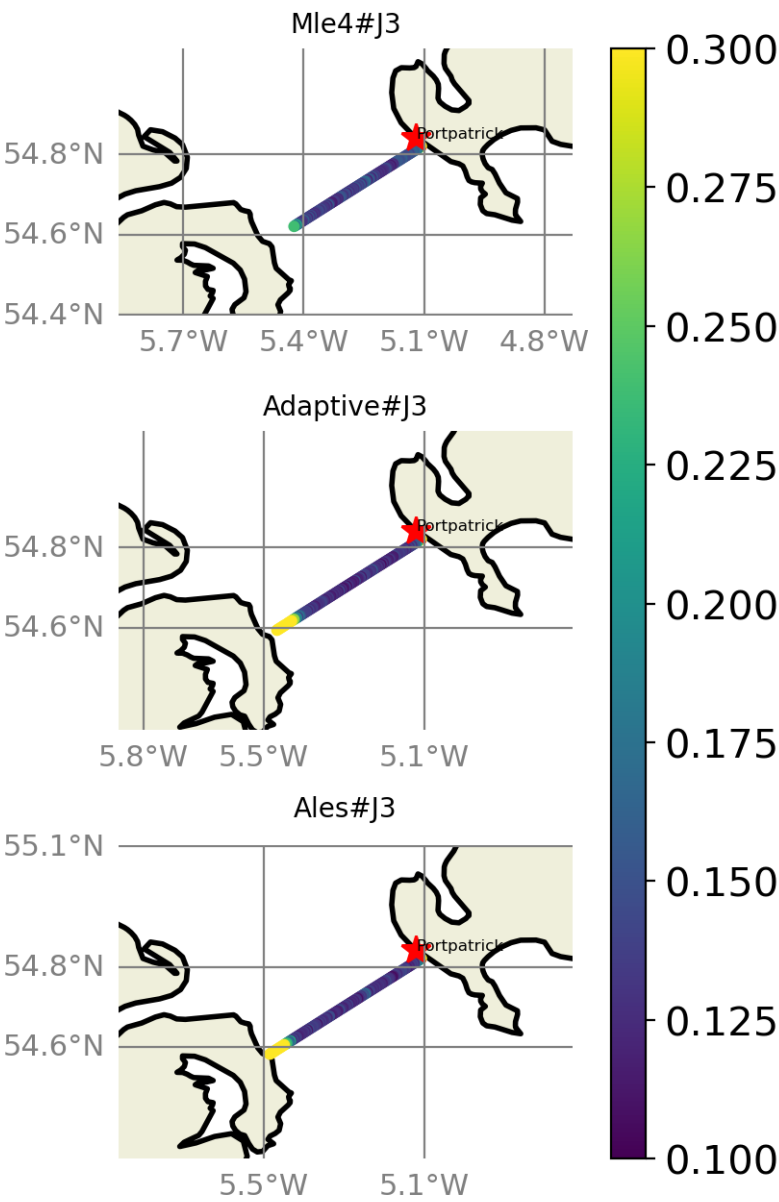


FIGURE 79 – rmsd visualization in maps view % Portpatrick tide gauge

6.5.3 std visualization in maps view % Portpatrick tide gauge

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

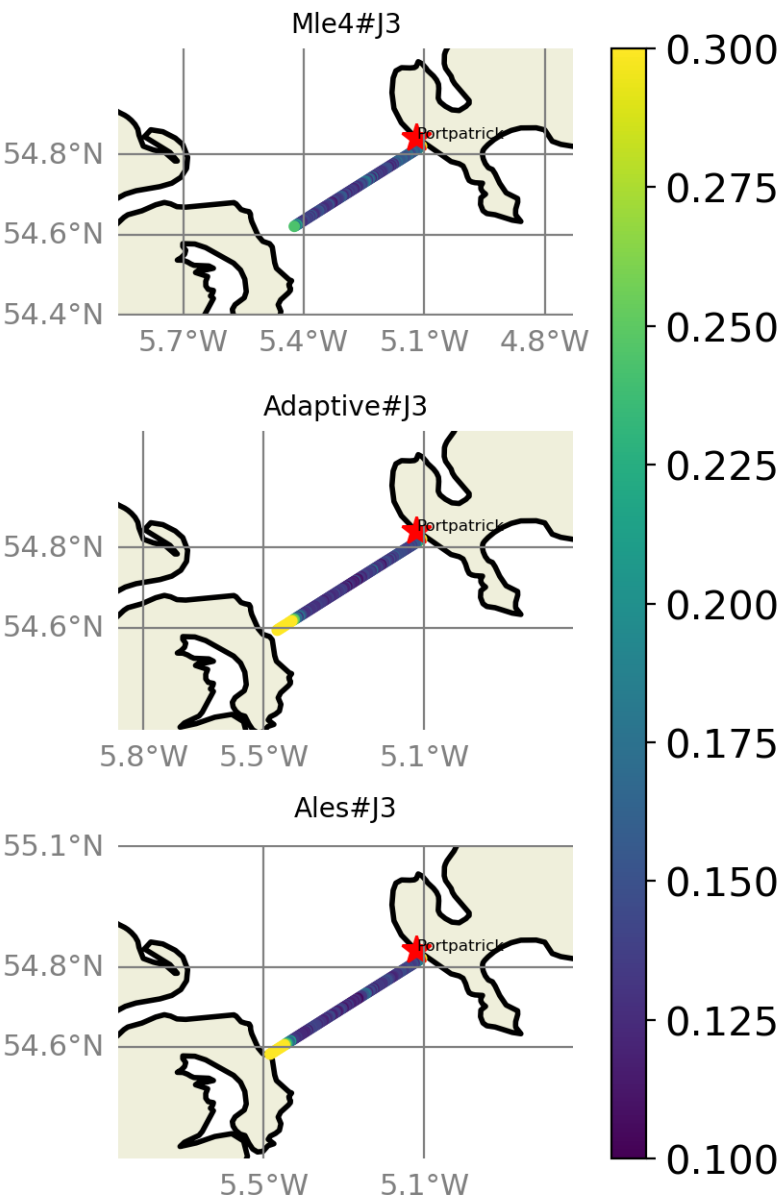


FIGURE 80 – std visualization in maps view % Portpatrick tide gauge

6.5.4 valid_data_percent visualization in maps view % Portpatrick tide gauge

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

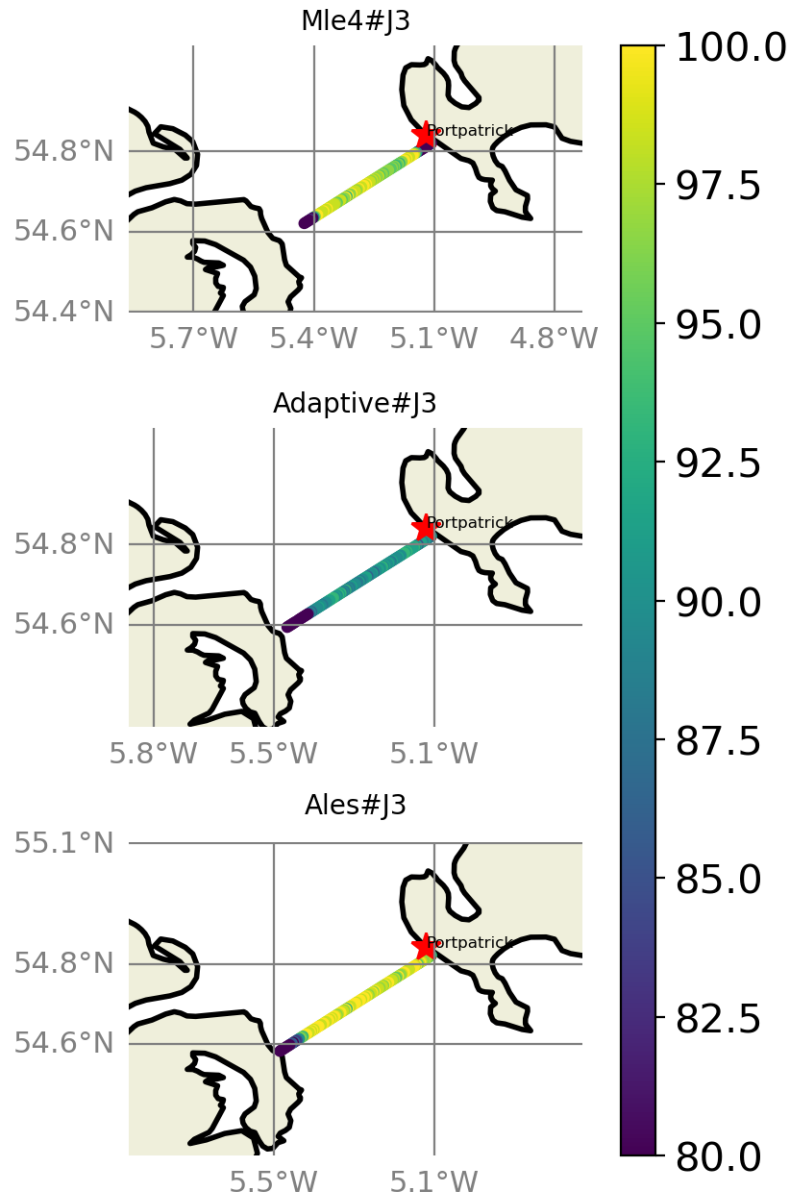


FIGURE 81 – valid_data_percent visualization in maps view % Portpatrick tide gauge

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

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

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

Where pvd and nvd are the percentage of data and the number of altimetry data in the period covered by the tide gauge sla time serie, respectively in the time series, i is the index of the time series, np is the number of the selected altimetry time series. $maxNB = 59$ 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.

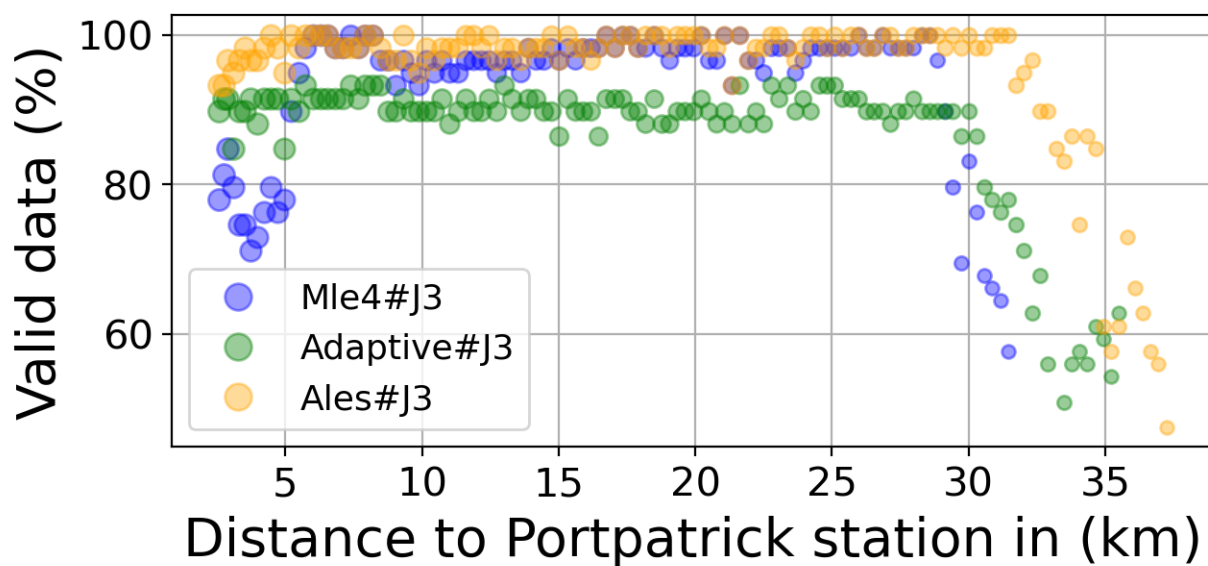
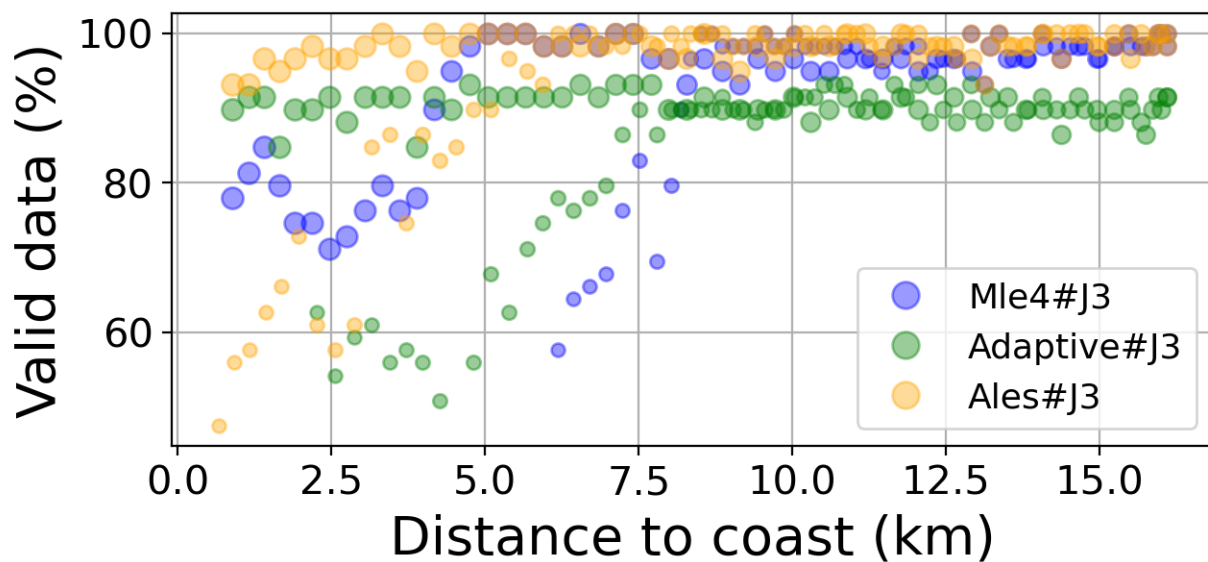


FIGURE 82 – Valid data (%) in function of distance to coast/Portpatrick station

6.5.6 Std in function of distance to coast/Portpatrick station

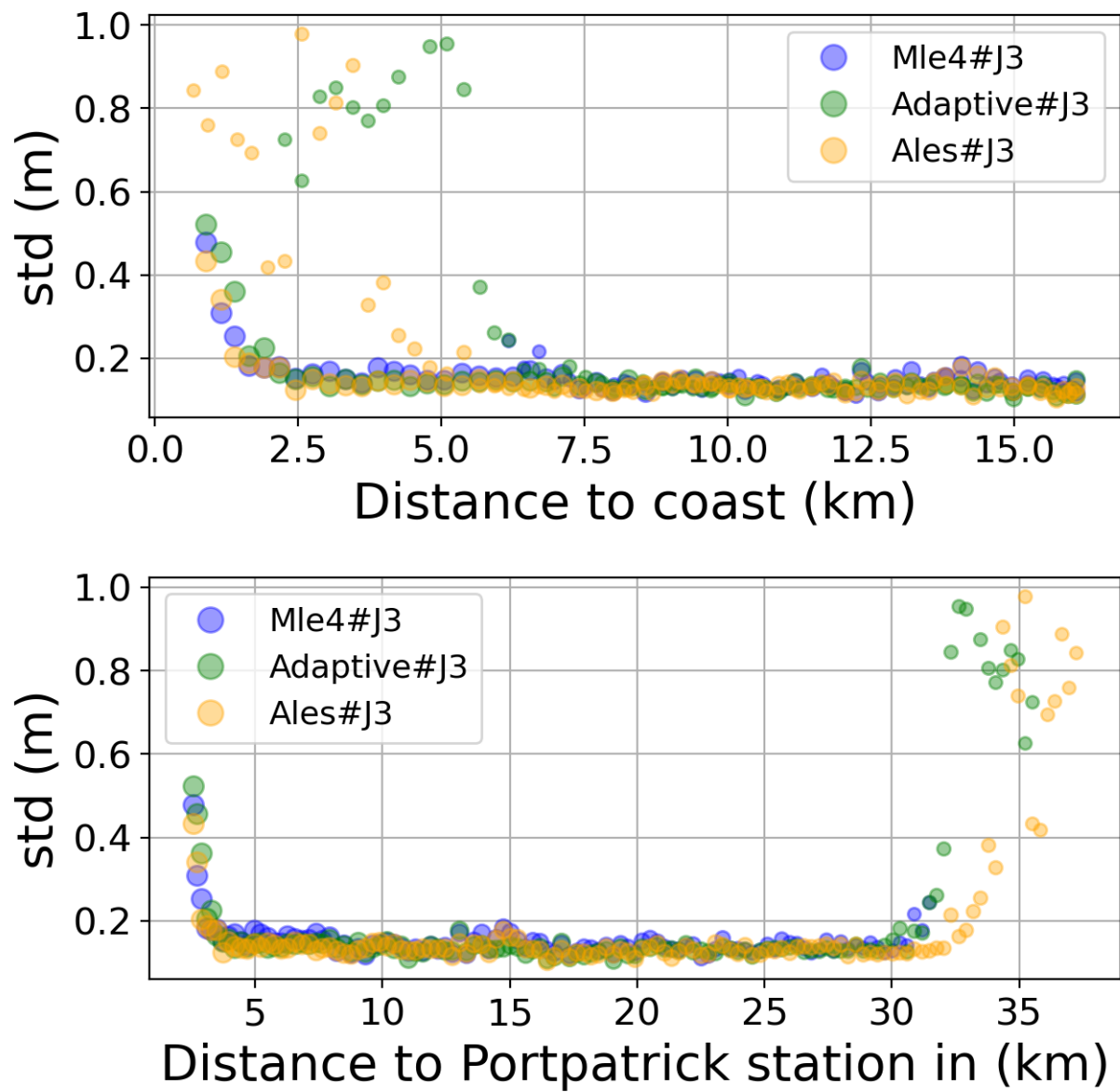


FIGURE 83 – Std in function of the distance to the coast/Portpatrick station

6.5.7 Correlation in function of distance to coast/Portpatrick station

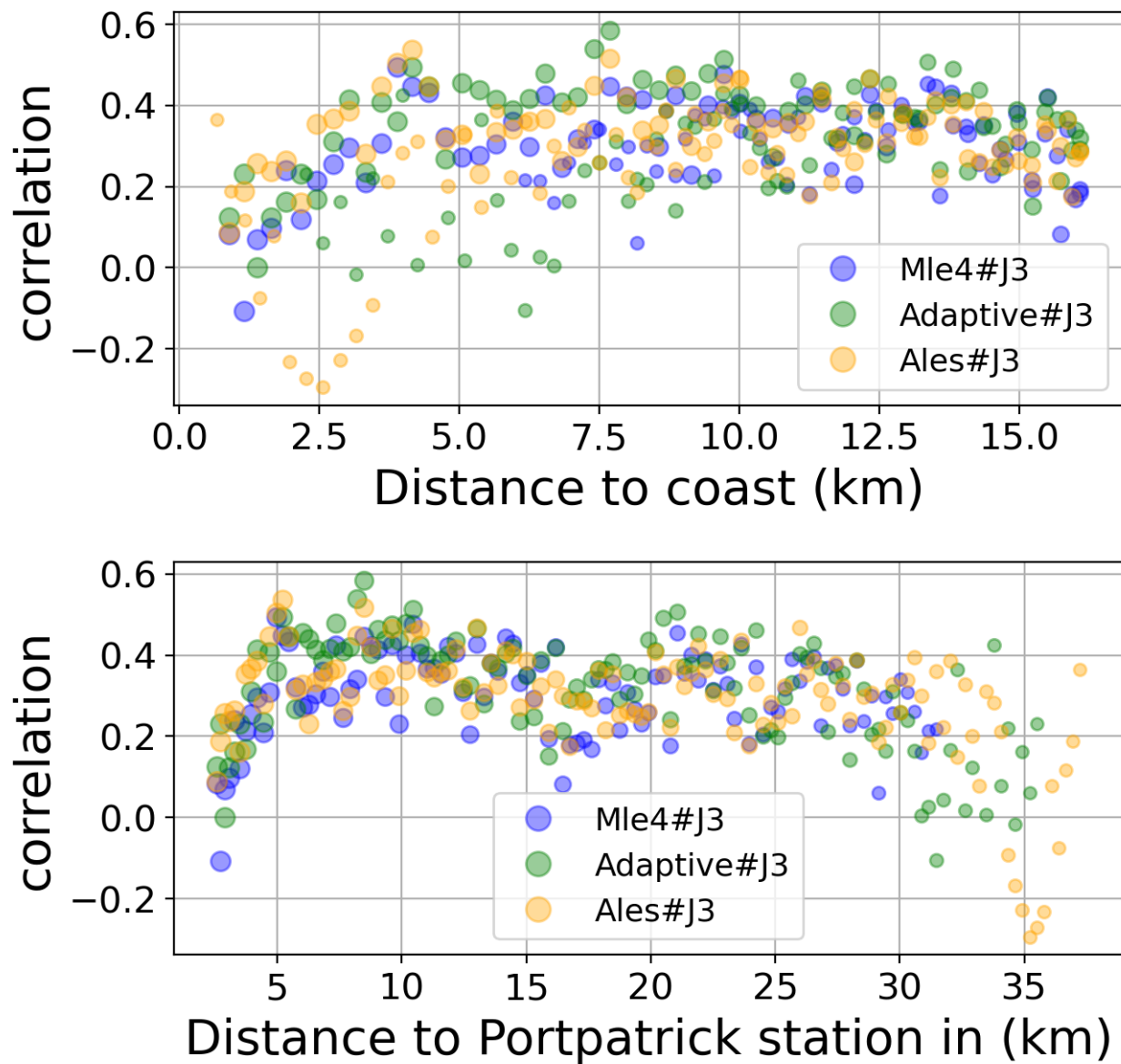


FIGURE 84 – Correlation in function of the distance to the coast/Portpatrick station

6.5.8 Taylor Diagram

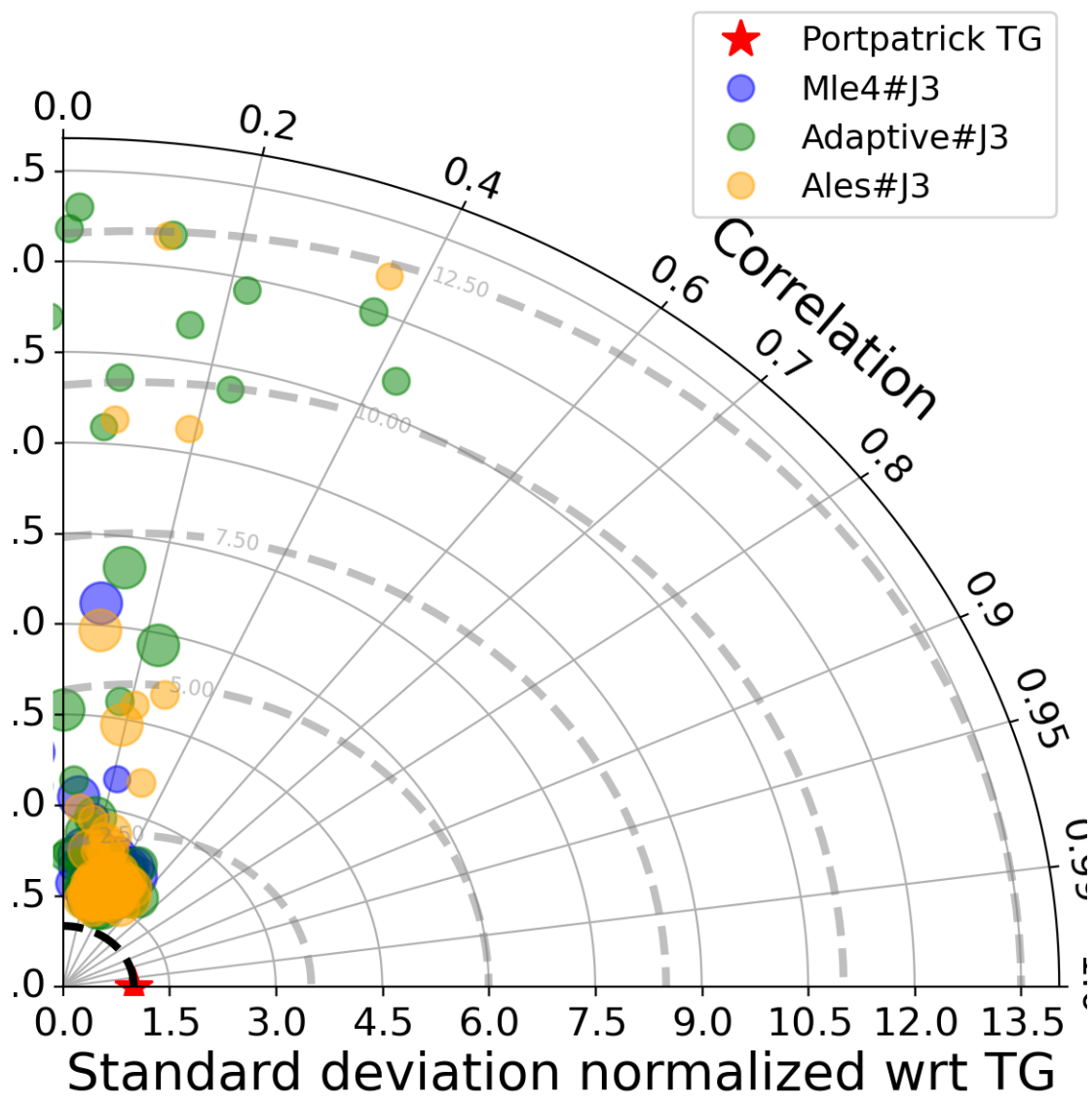


FIGURE 85 – Taylor diagram

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)
Mle4#J3	93.107	0.303	0.152	0.149
Adaptive#J3	89.895	0.334	0.147	0.143
Ales#J3	98.547	0.325	0.14	0.137

FIGURE 86 – 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 59 point.

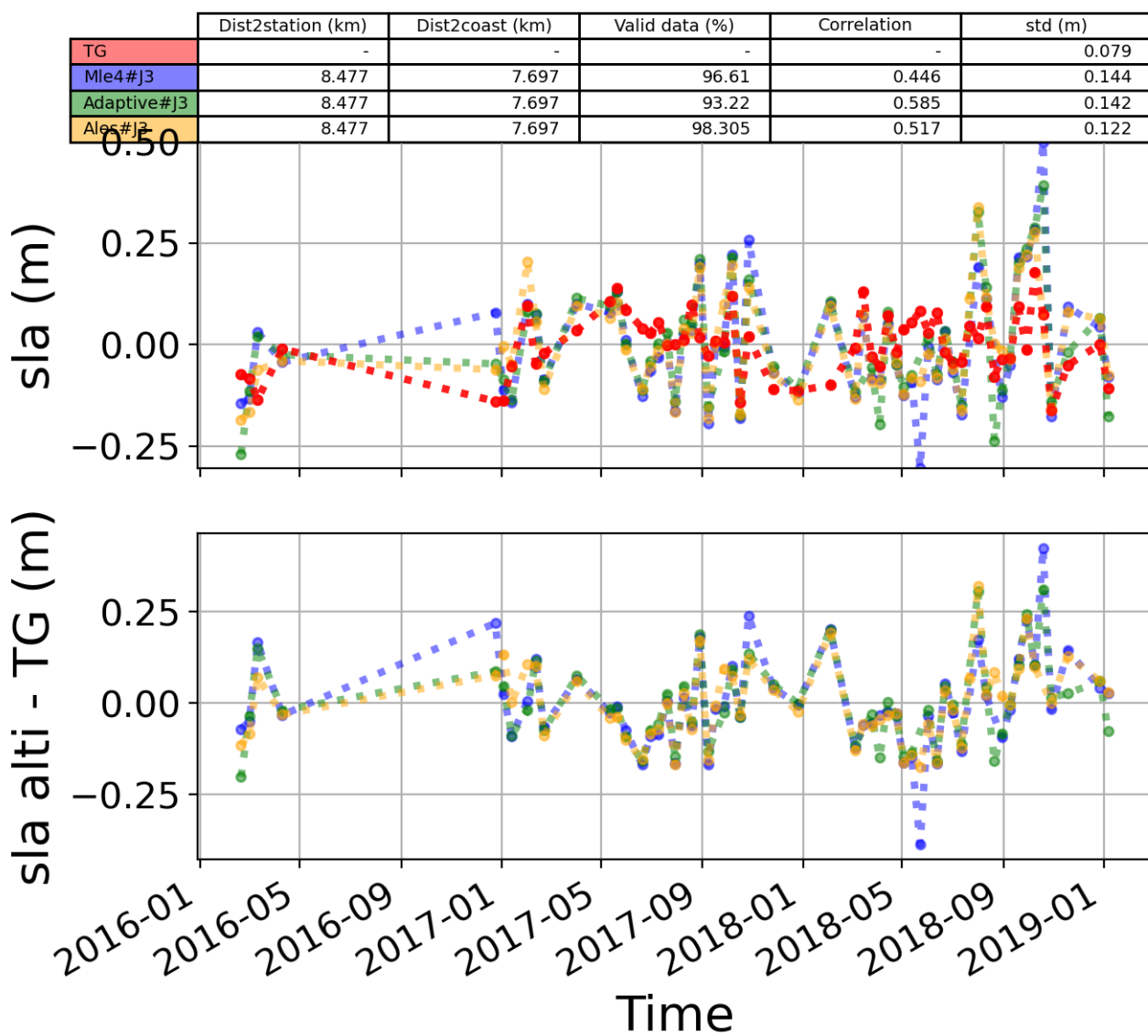


FIGURE 87 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

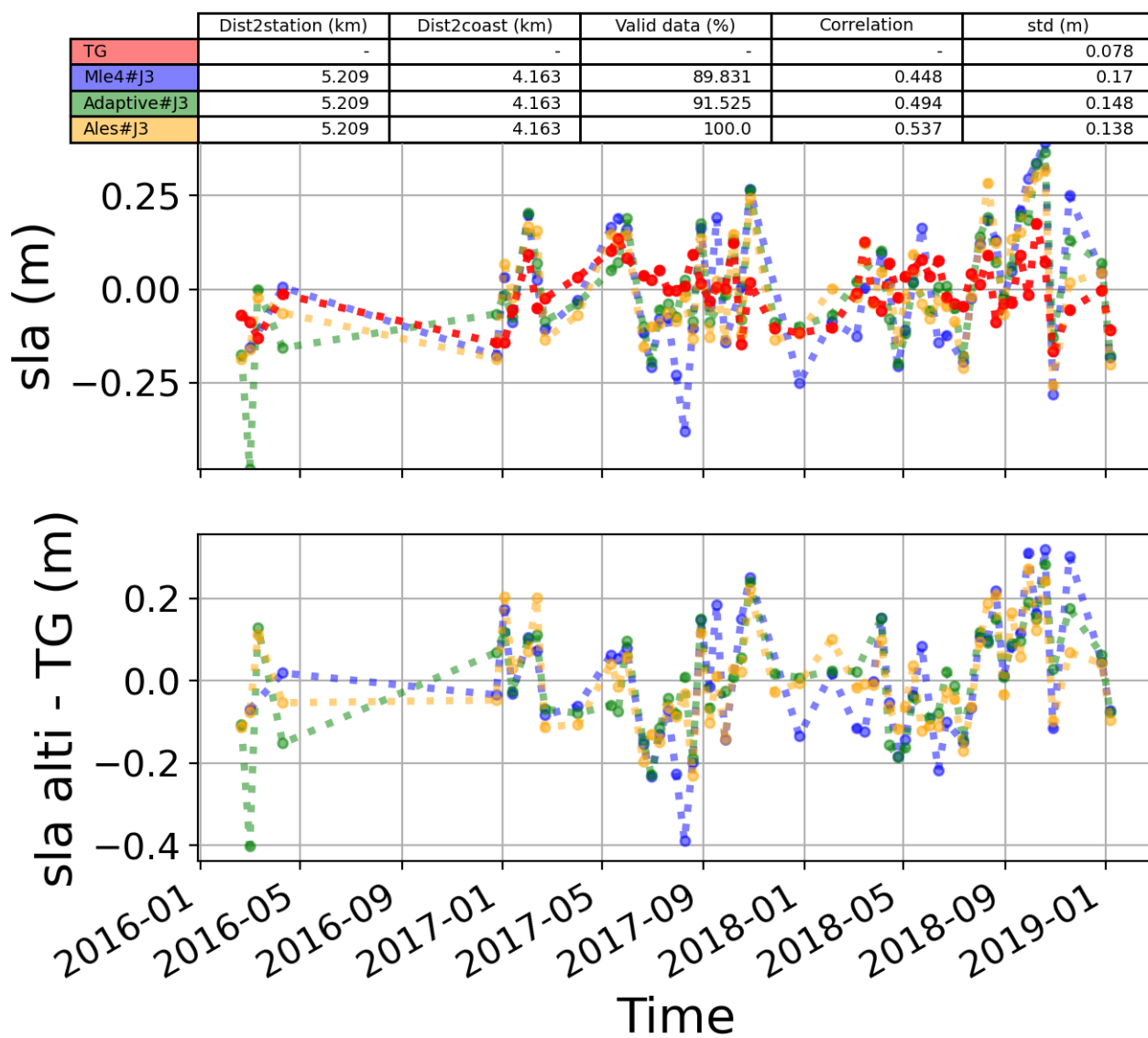


FIGURE 88 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

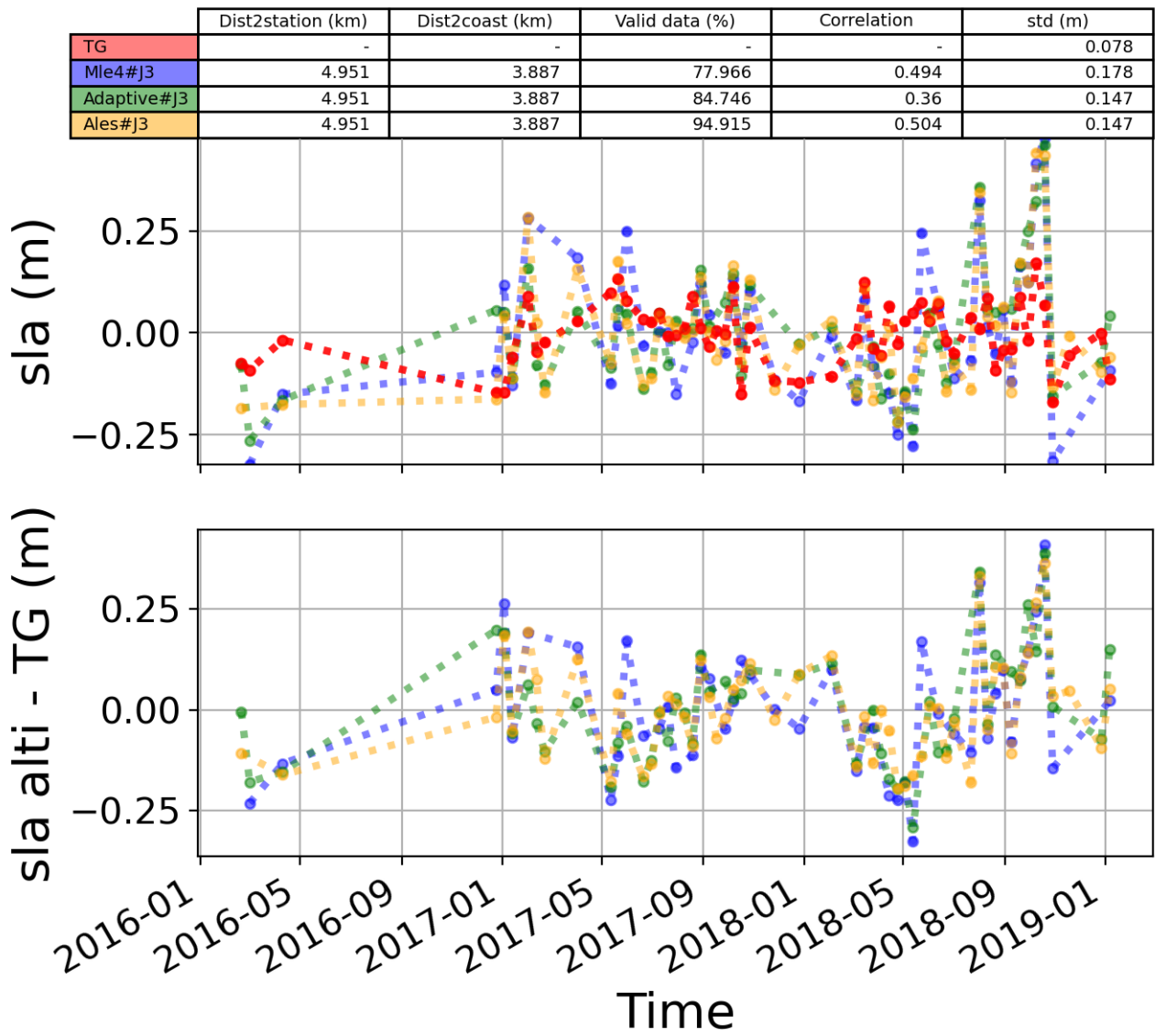


FIGURE 89 – The 3rd most correlated sla altimetry Time serie with tide gauge sla time serie

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 : $[49.8, 50.06]^\circ$

6.6.1 correlation visualization in maps view % Newlyn tide gauge

Correlation Altimetry data with respect to Newlyn Tide gauge data

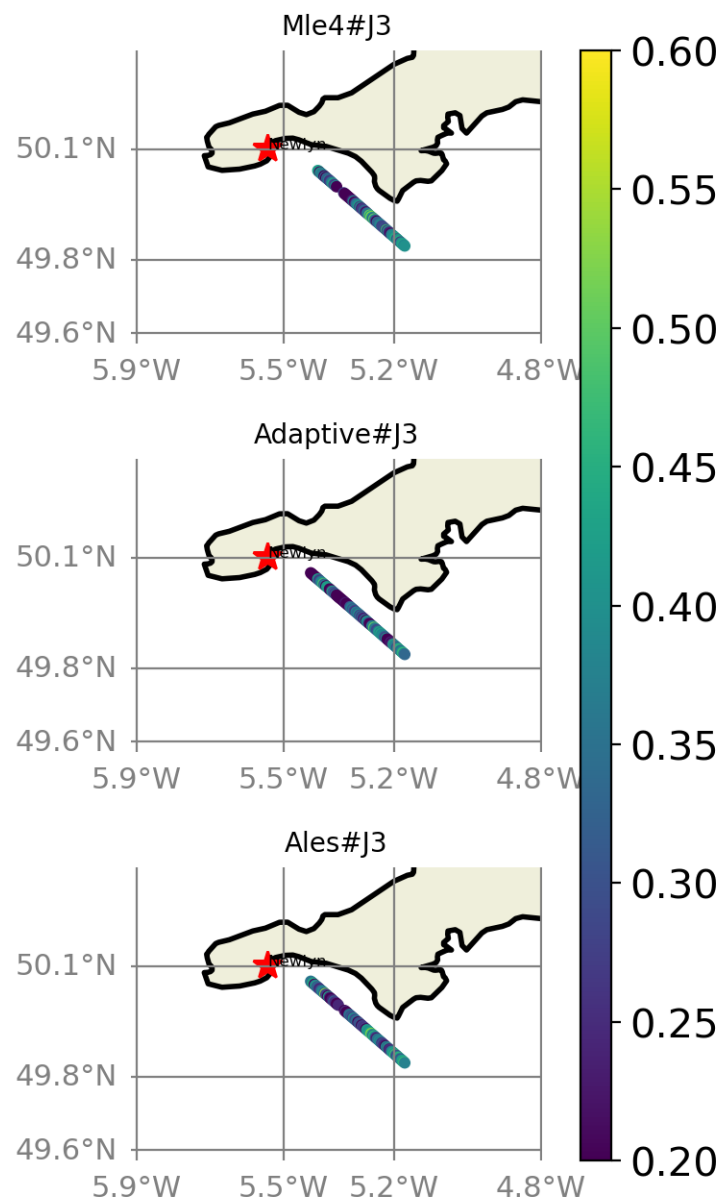


FIGURE 90 – correlation visualization in maps view % Newlyn tide gauge

6.6.2 rmsd visualization in maps view % Newlyn tide gauge

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

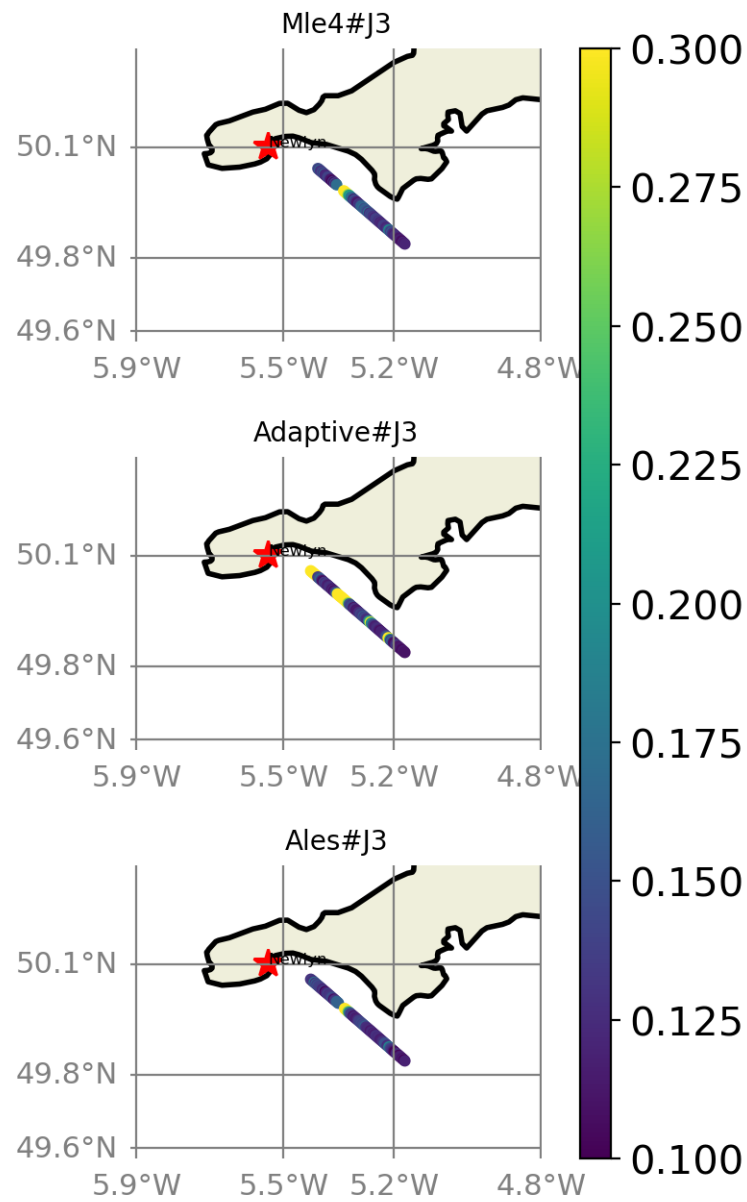


FIGURE 91 – rmsd visualization in maps view % Newlyn tide gauge

6.6.3 std visualization in maps view % Newlyn tide gauge

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

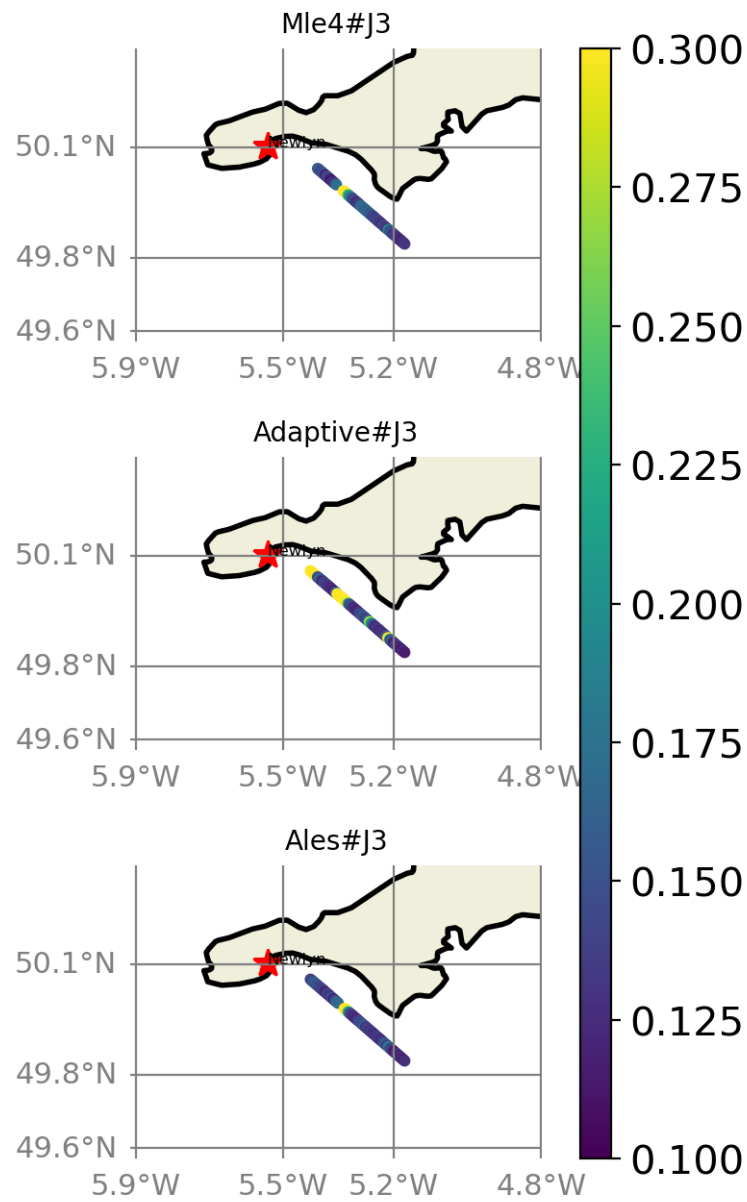


FIGURE 92 – std visualization in maps view % Newlyn tide gauge

6.6.4 valid_data_percent visualization in maps view % Newlyn tide gauge

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

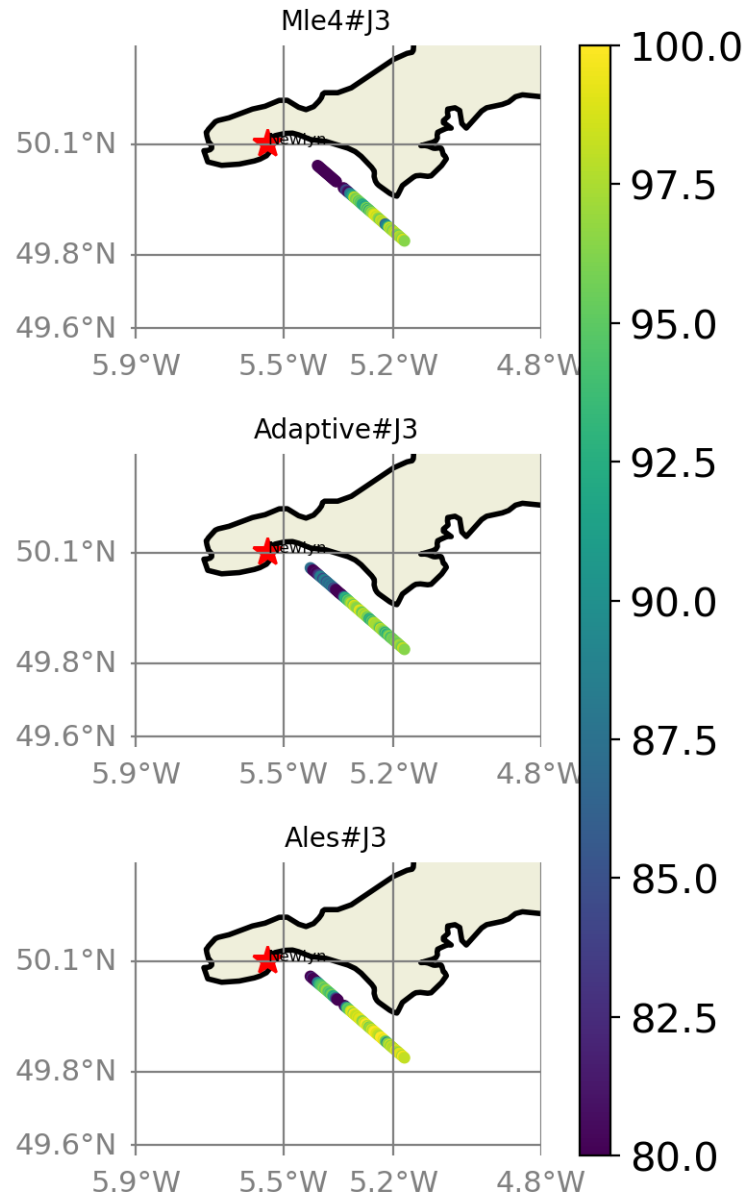


FIGURE 93 – valid_data_percent visualization in maps view % Newlyn tide gauge

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. $maxNB = 111$ 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.

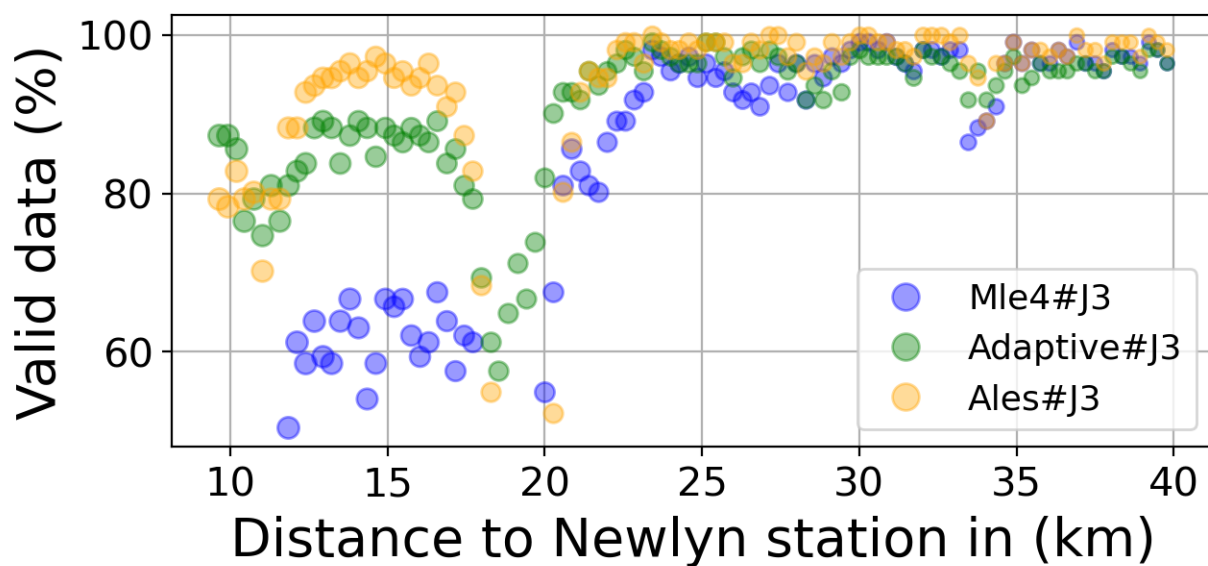
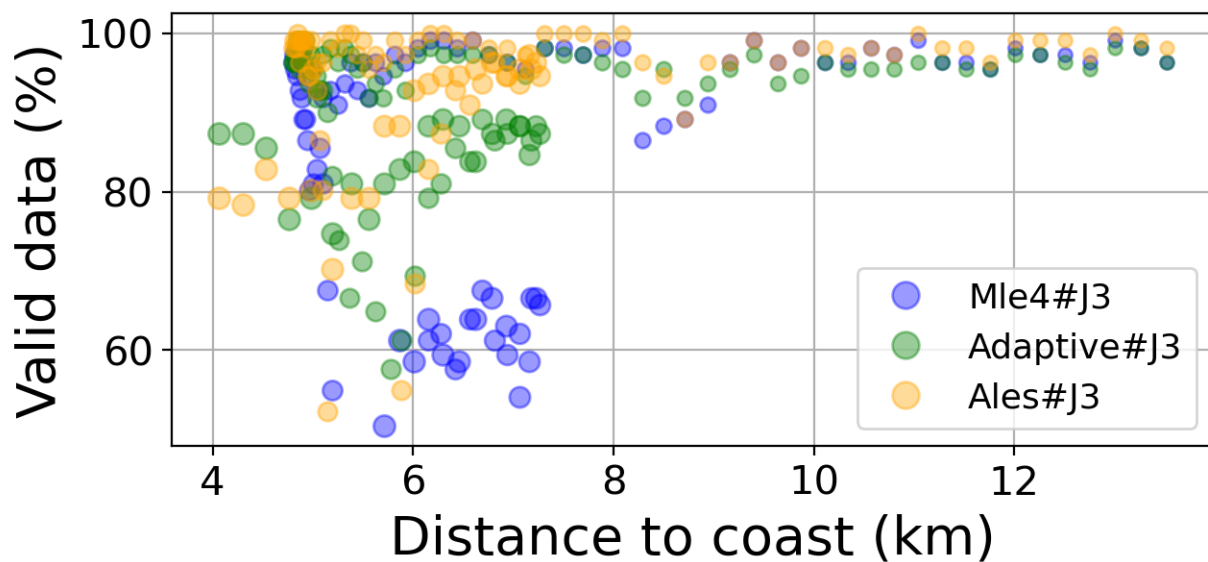


FIGURE 94 – Valid data (%) in function of distance to coast/Newlyn station

6.6.6 Std in function of distance to coast/Newlyn station

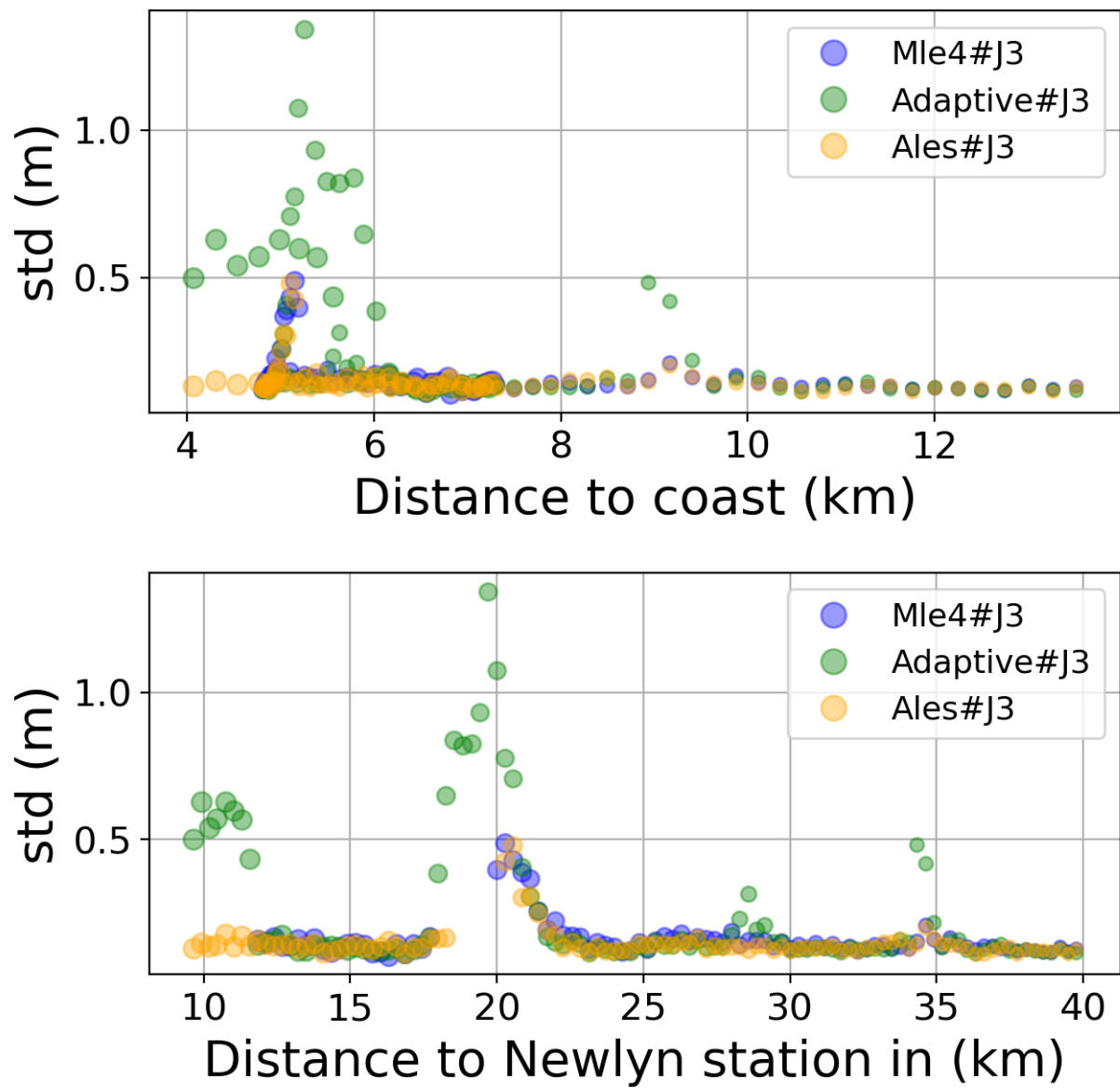


FIGURE 95 – Std in function of the distance to the coast/Newlyn station

6.6.7 Correlation in function of distance to coast/Newlyn station

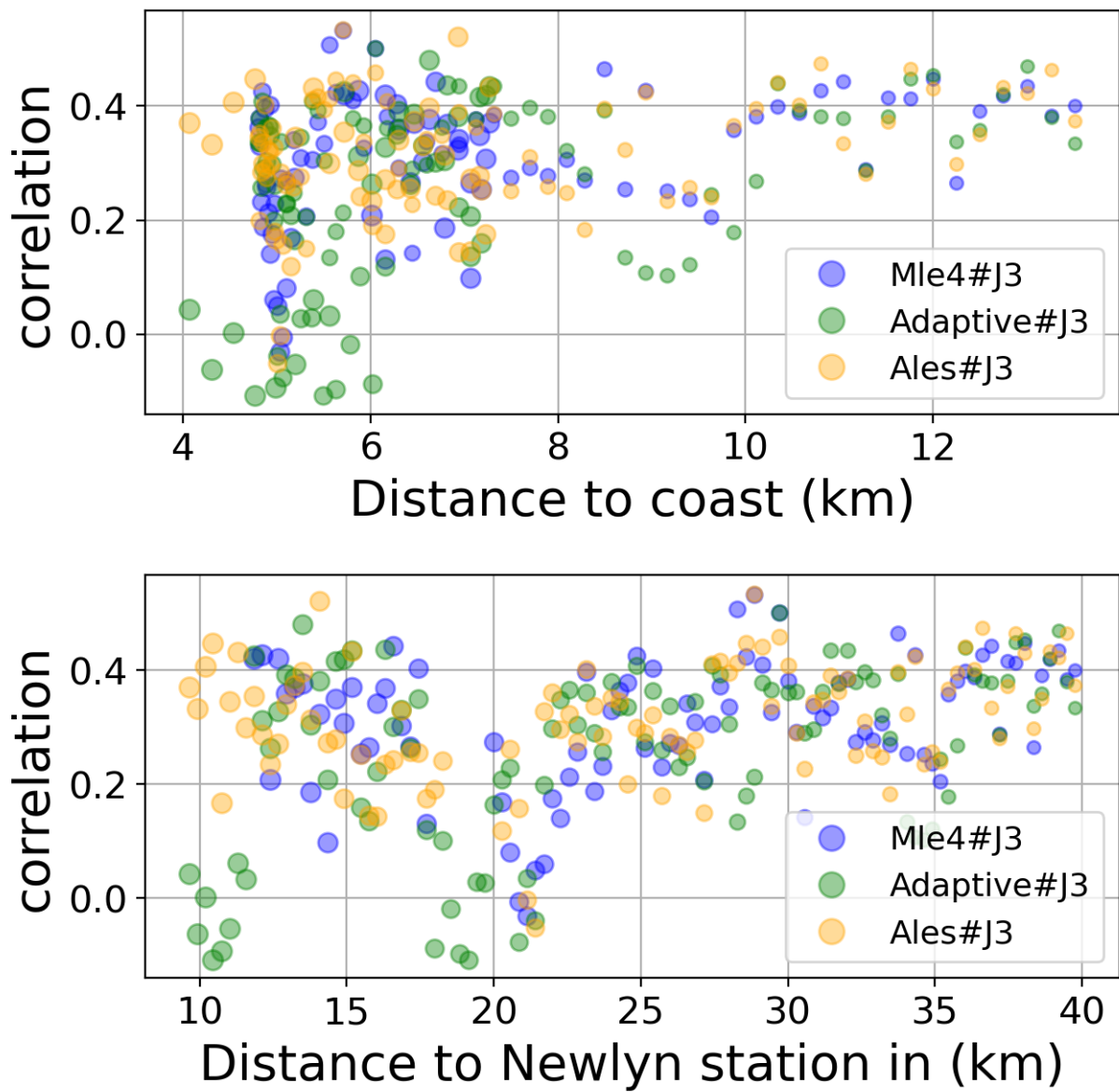


FIGURE 96 – Correlation in function of the distance to the coast/Newlyn station

6.6.8 Taylor Diagram

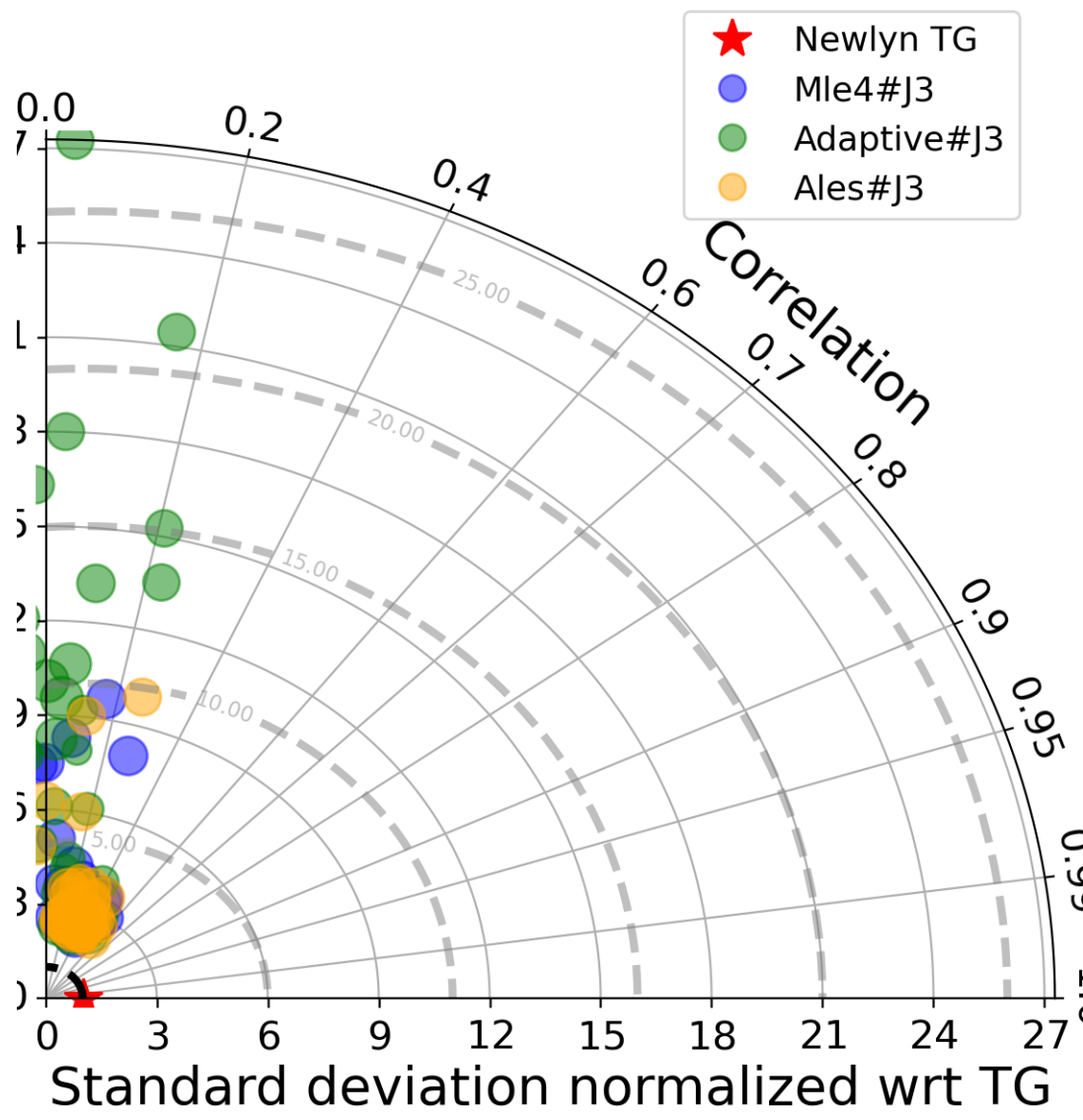


FIGURE 97 – Taylor diagram

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)
Mle4#J3	86.239	0.313	0.159	0.151
Adaptive#J3	93.506	0.31	0.168	0.161
Ales#J3	95.981	0.315	0.149	0.142

FIGURE 98 – 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 111 point.

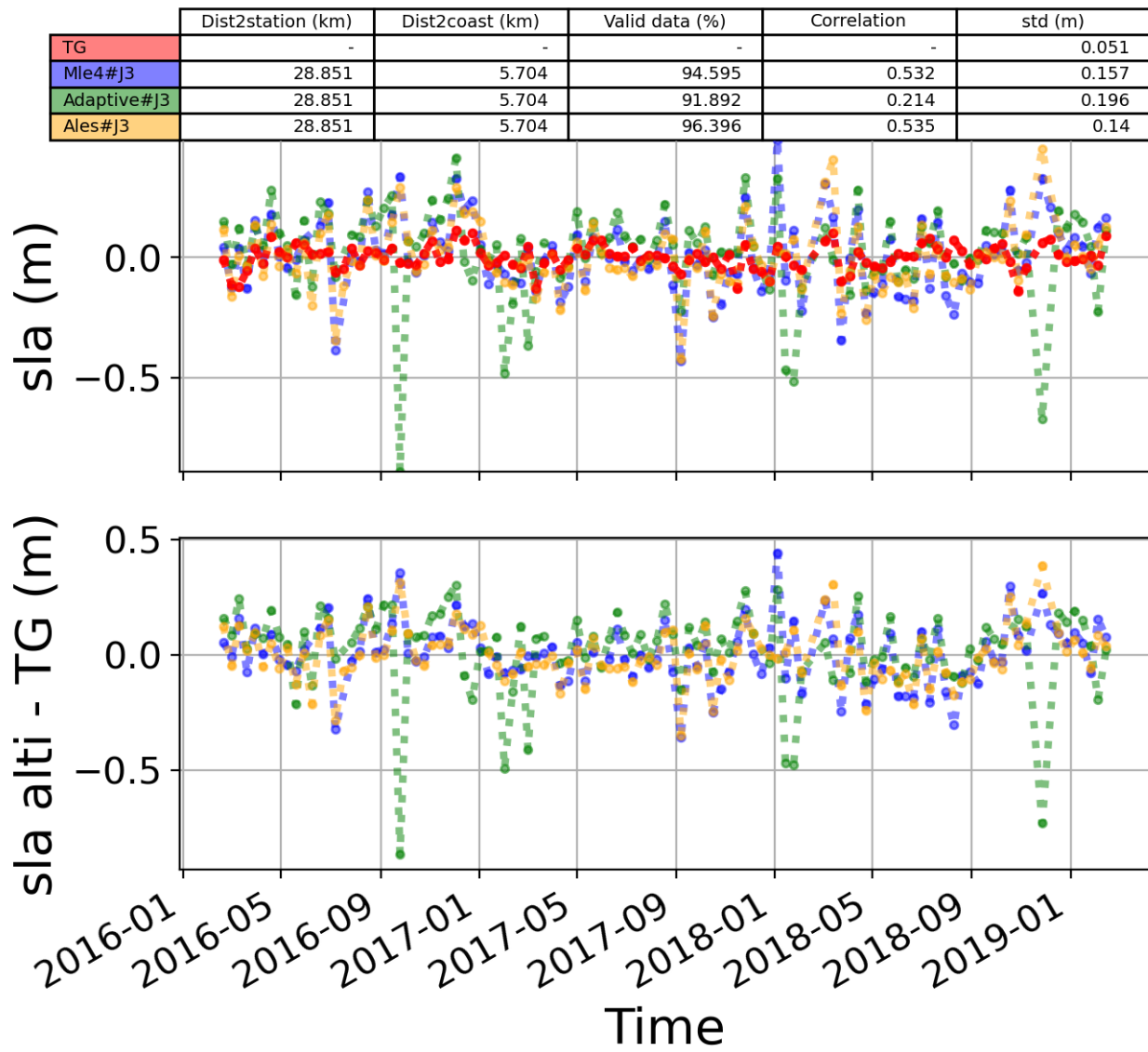


FIGURE 99 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

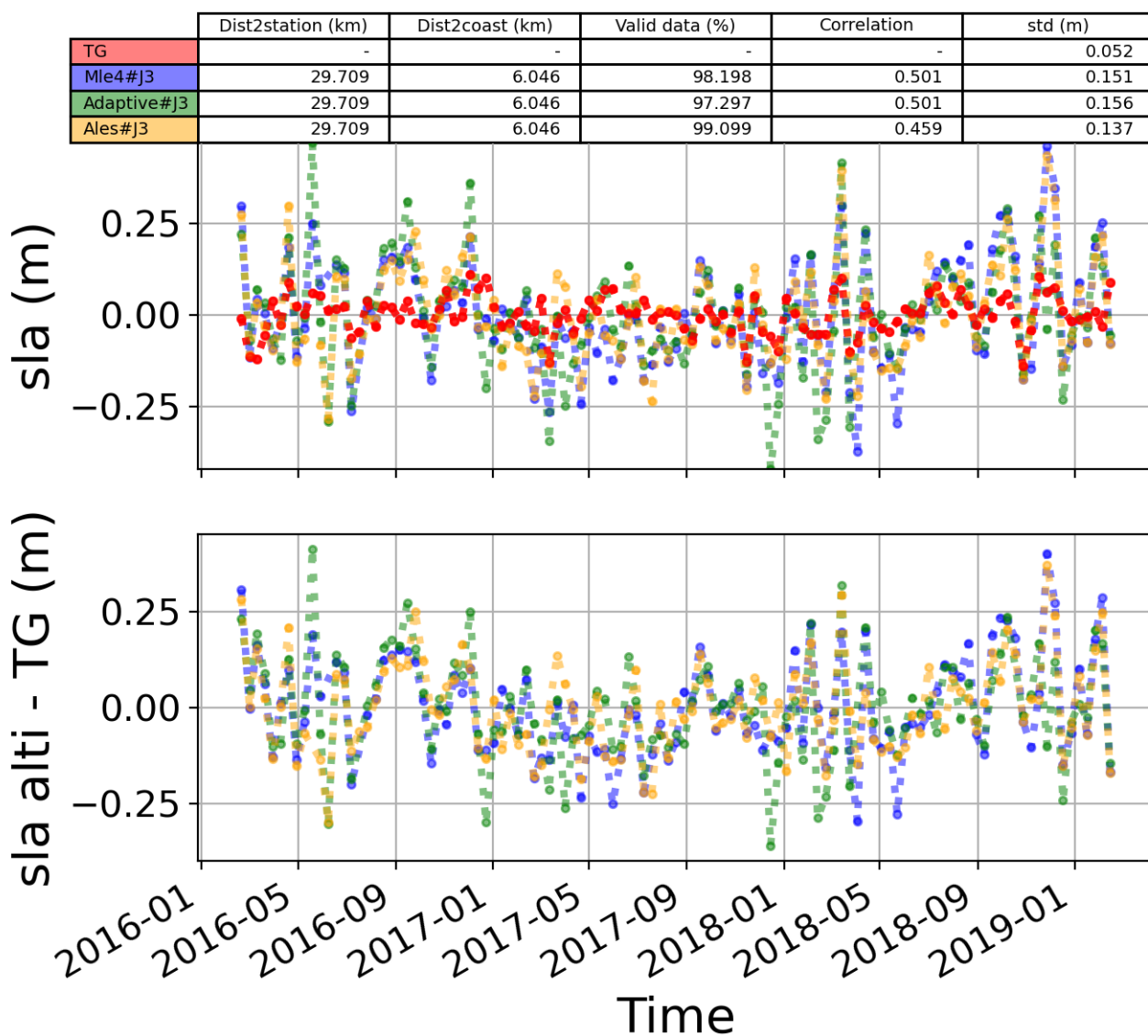


FIGURE 100 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.7 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

Correlation Altimetry data with respect to LE_CONQUET Tide gauge data

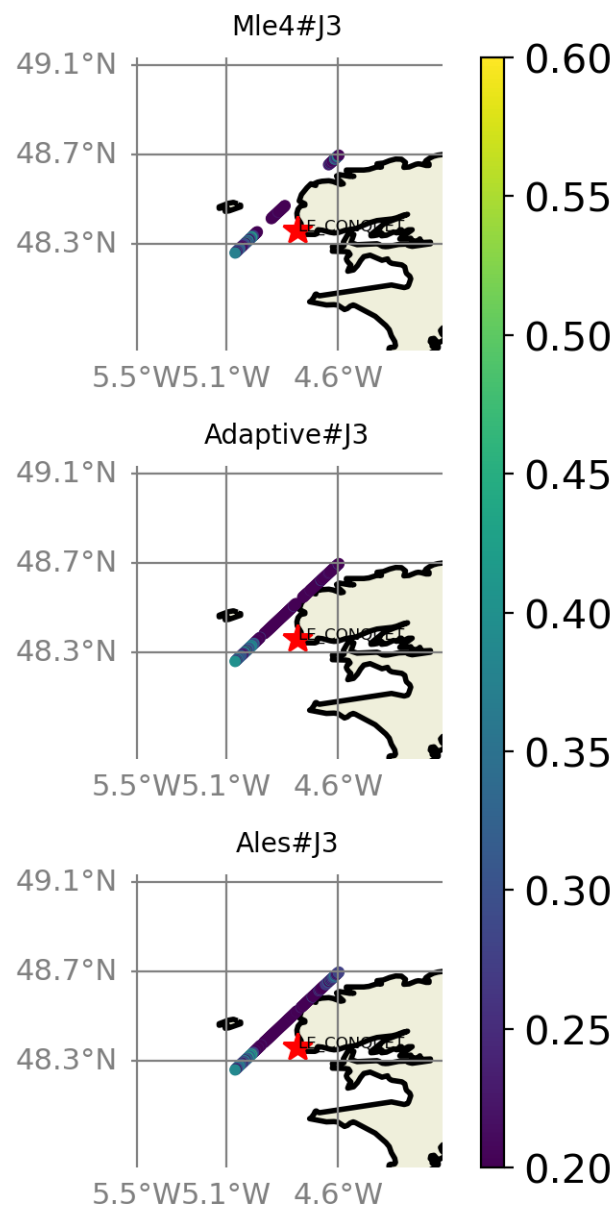


FIGURE 101 – correlation visualization in maps view % LE_CONQUET tide gauge

6.7.2 rmsd visualization in maps view % LE_CONQUET tide gauge

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

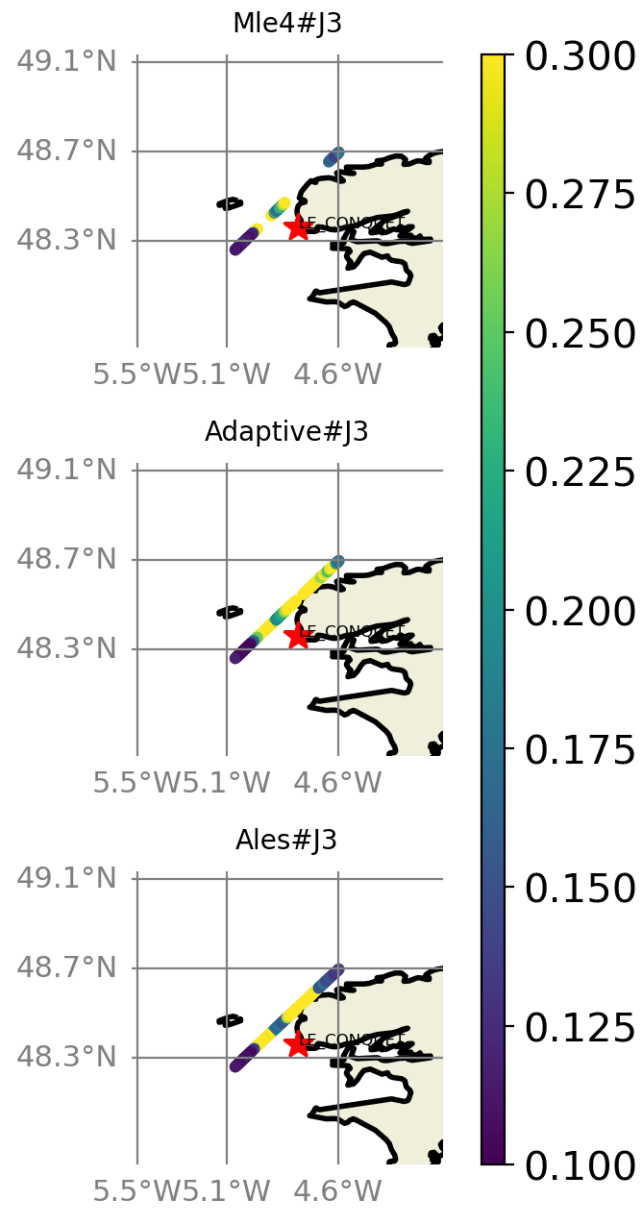


FIGURE 102 – rmsd visualization in maps view % LE_CONQUET tide gauge

6.7.3 std visualization in maps view % LE_CONQUET tide gauge

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

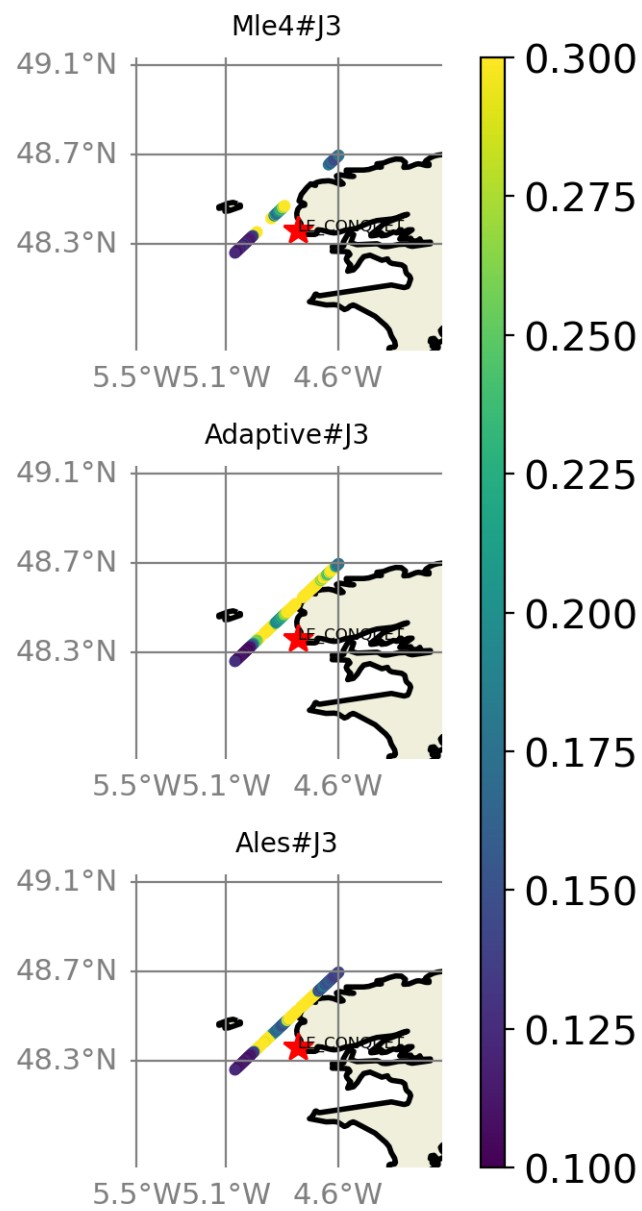


FIGURE 103 – std visualization in maps view % LE_CONQUET tide gauge

6.7.4 valid_data_percent visualization in maps view % LE_CONQUET tide gauge

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

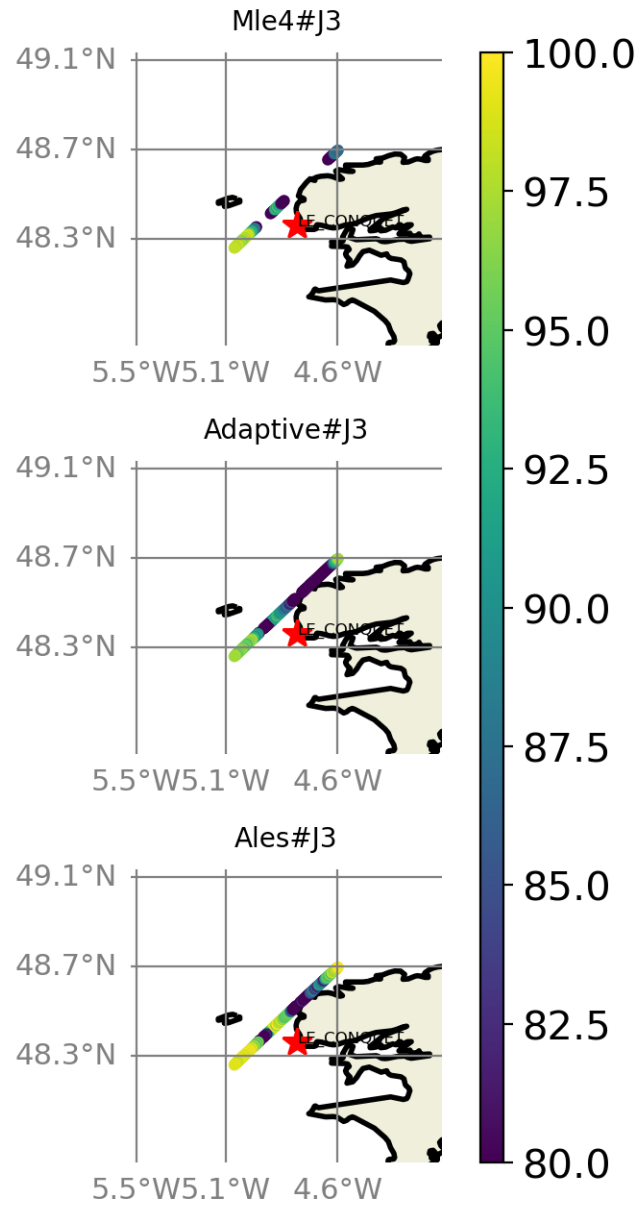


FIGURE 104 – valid_data_percent visualization in maps view % LE_CONQUET tide gauge

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 series is;

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

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

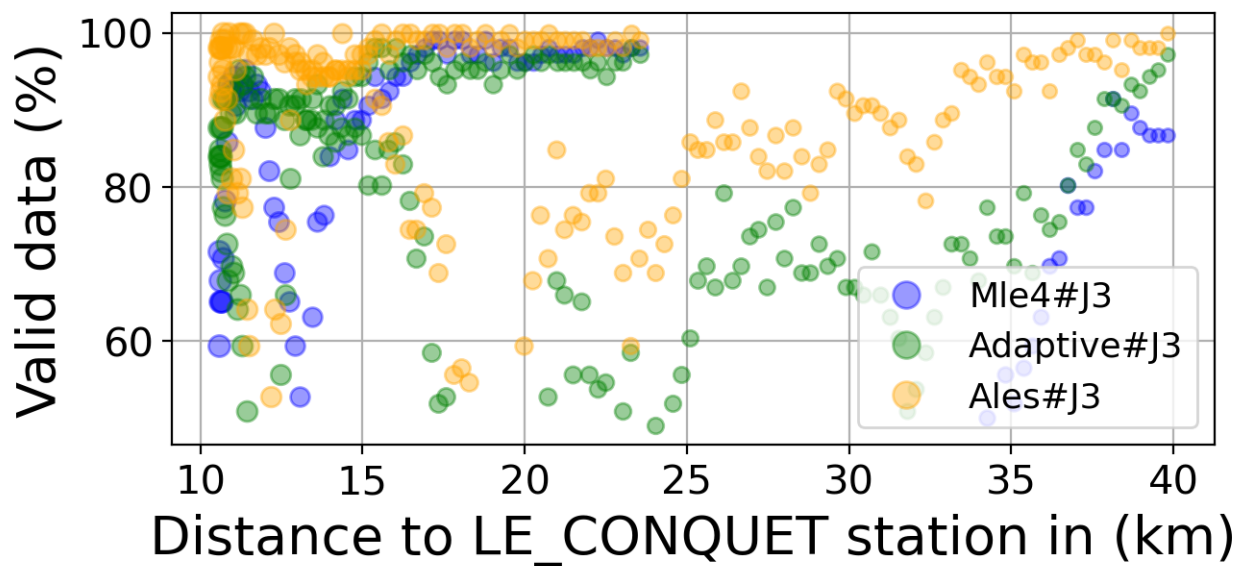
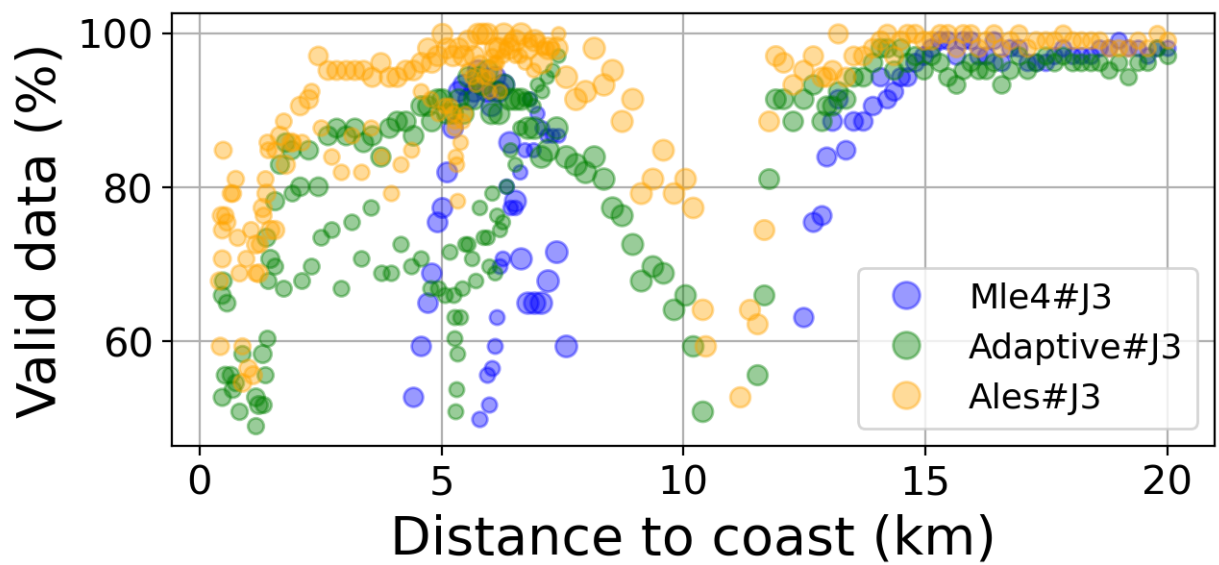


FIGURE 105 – Valid data (%) in function of distance to coast/LE_CONQUET station

6.7.6 Std in function of distance to coast/LE_CONQUET station

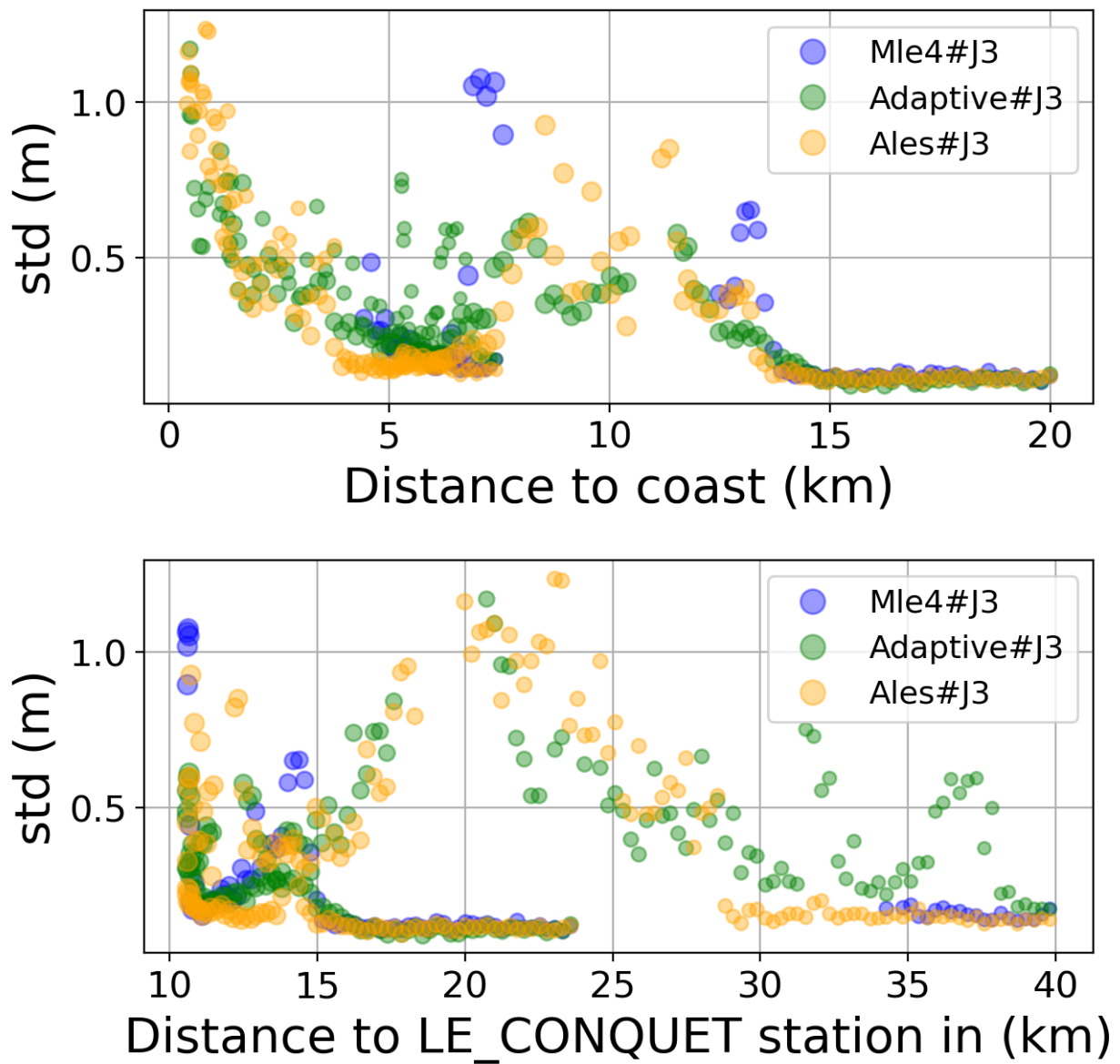


FIGURE 106 – Std in function of the distance to the coast/LE_CONQUET station

6.7.7 Correlation in function of distance to coast/LE_CONQUET station

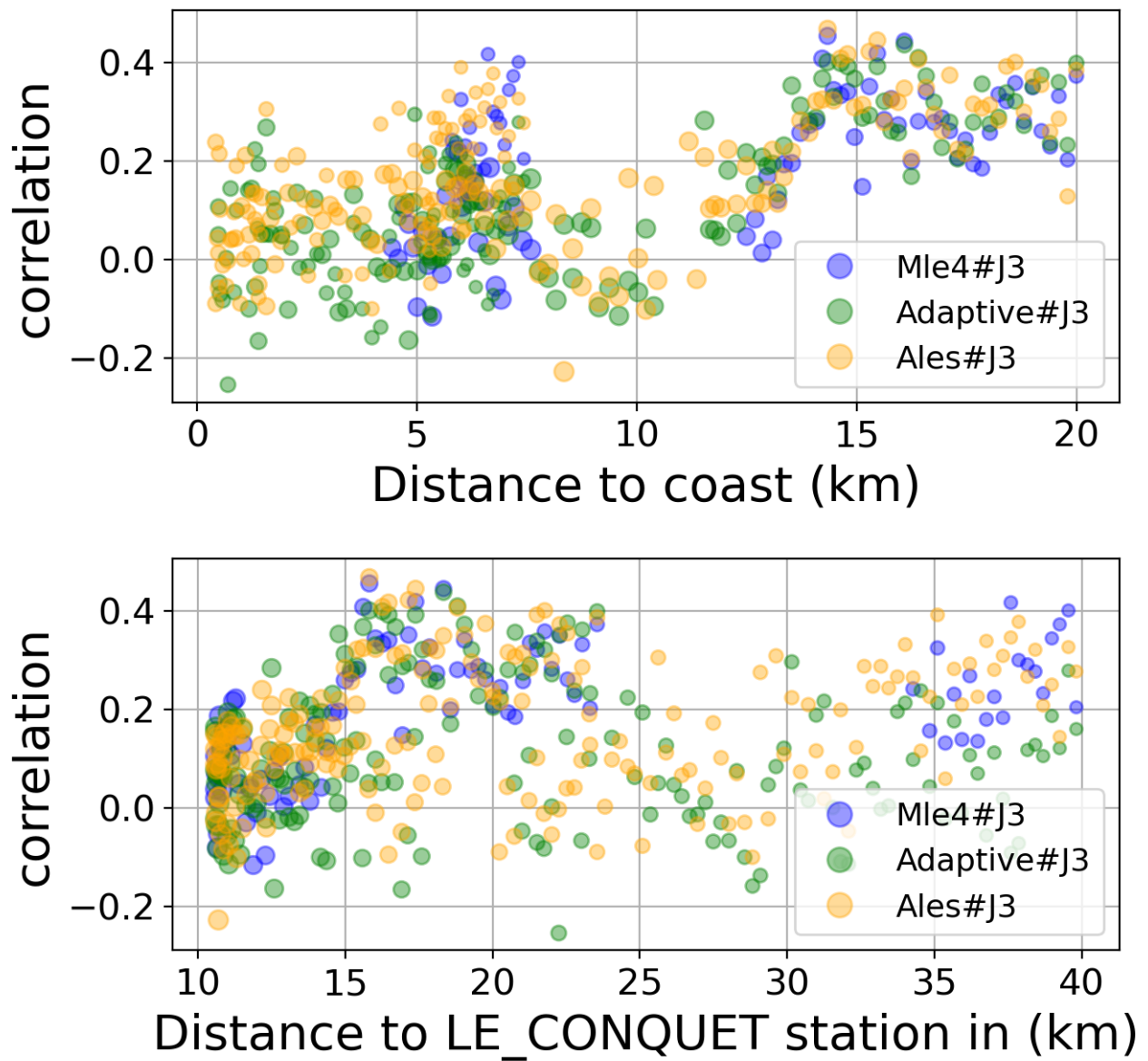


FIGURE 107 – Correlation in function of the distance to the coast/LE_CONQUET station

6.7.8 Taylor Diagram

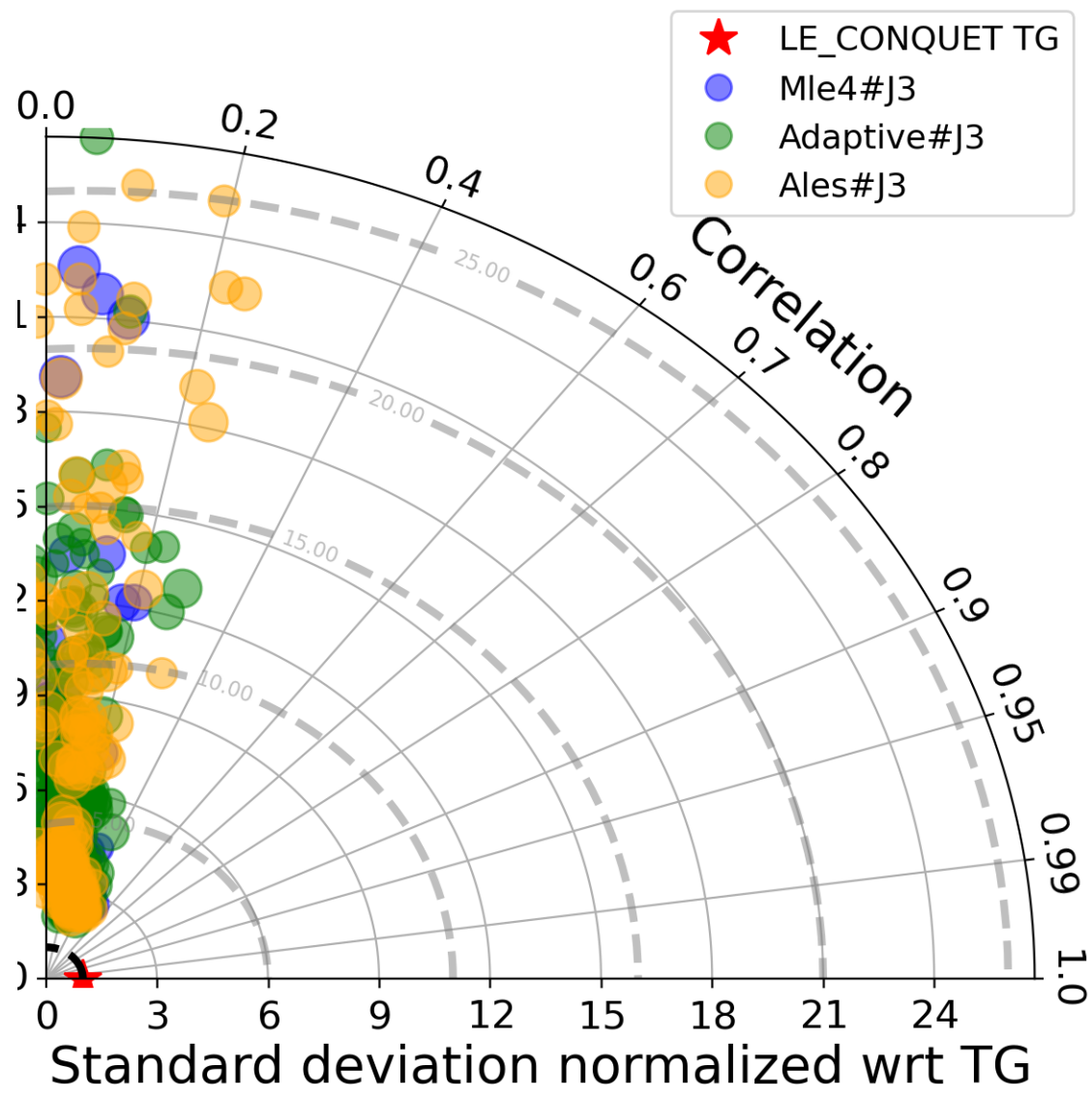


FIGURE 108 – Taylor diagram

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)
Mle4#J3	85.413	0.2	0.241	0.238
Adaptive#J3	91.286	0.184	0.22	0.218
Ales#J3	97.971	0.235	0.161	0.157

FIGURE 109 – 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 106 point.

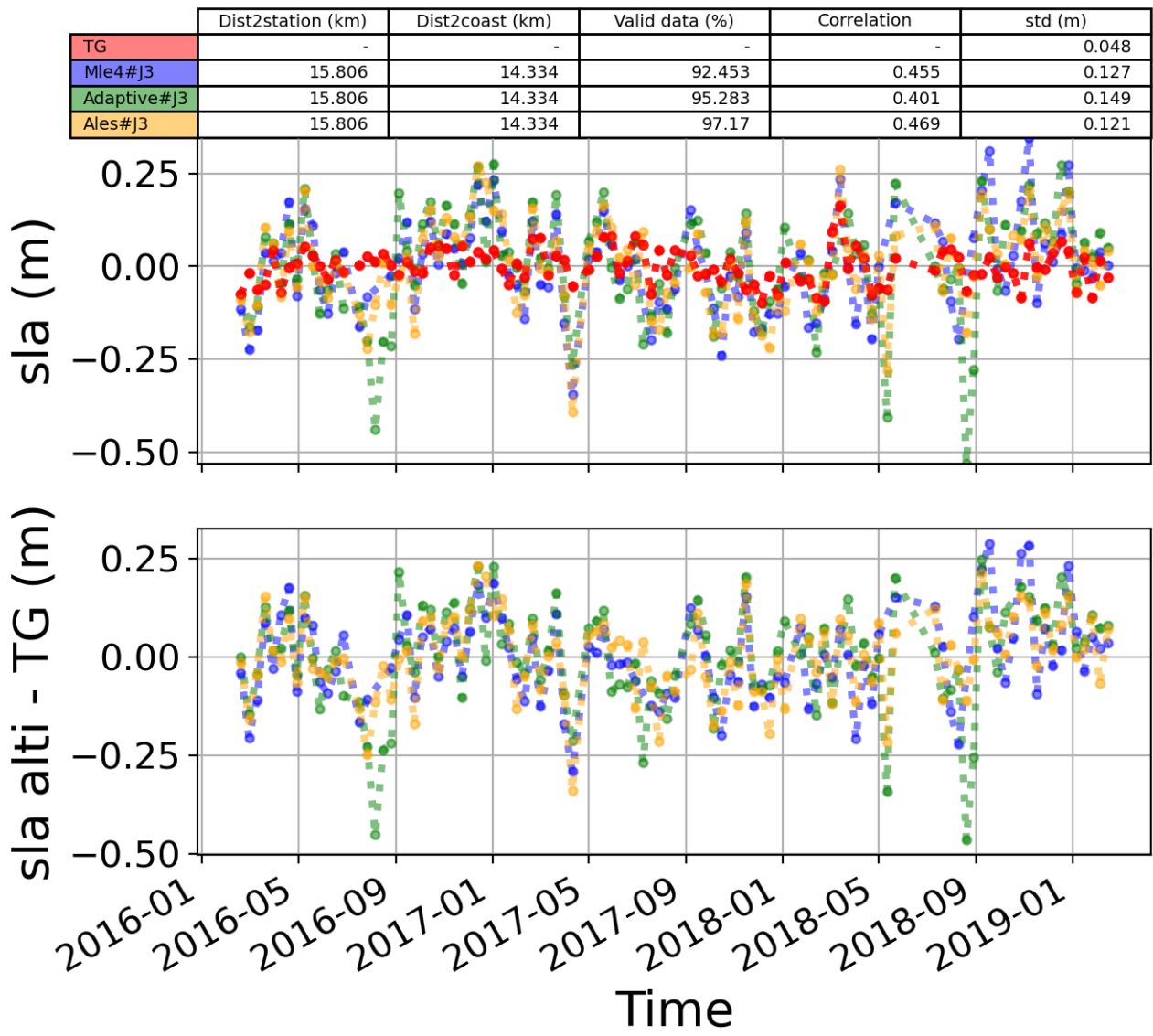


FIGURE 110 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

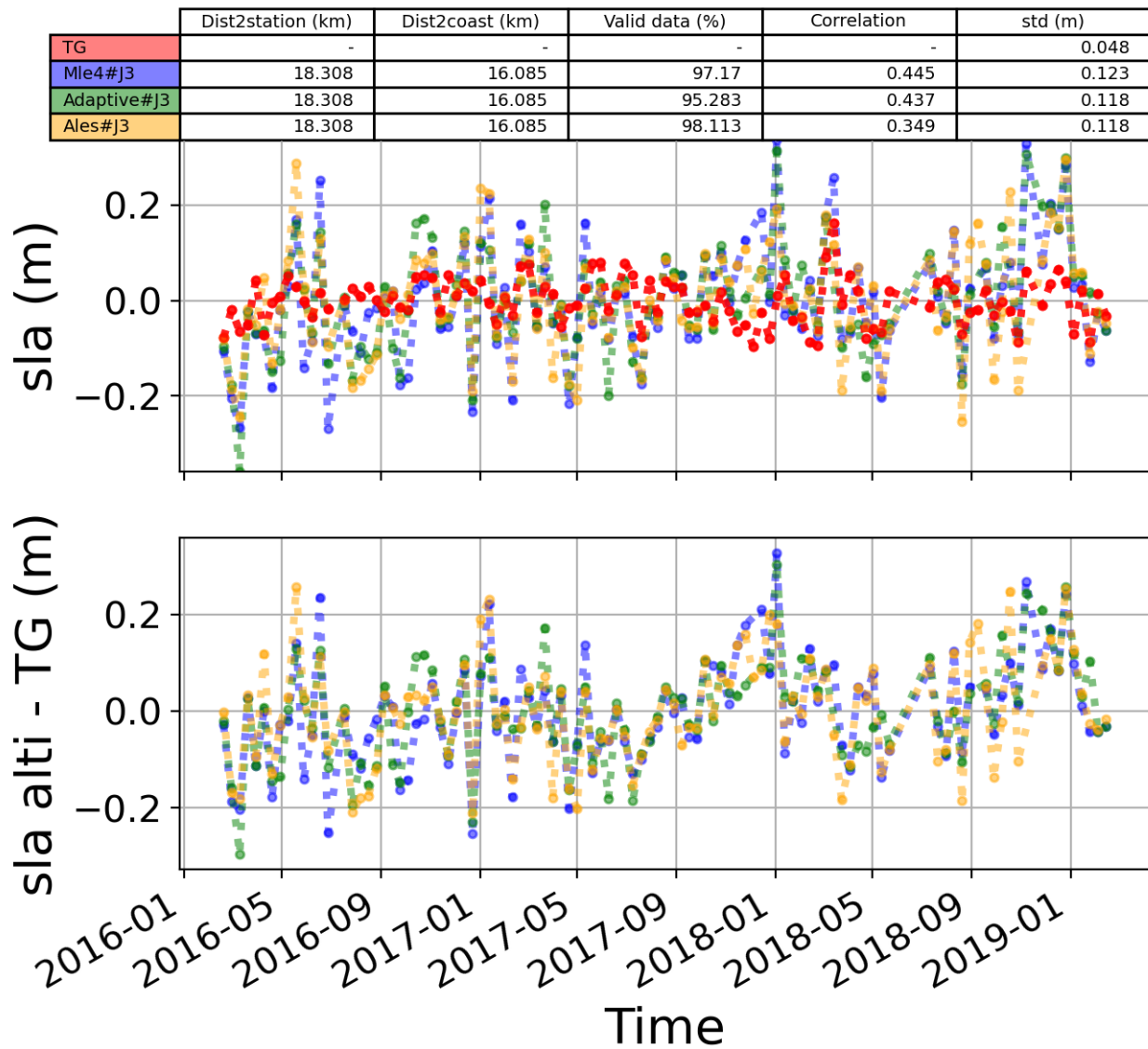


FIGURE 111 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

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

Correlation Altimetry data with respect to Holyhead Tide gauge data

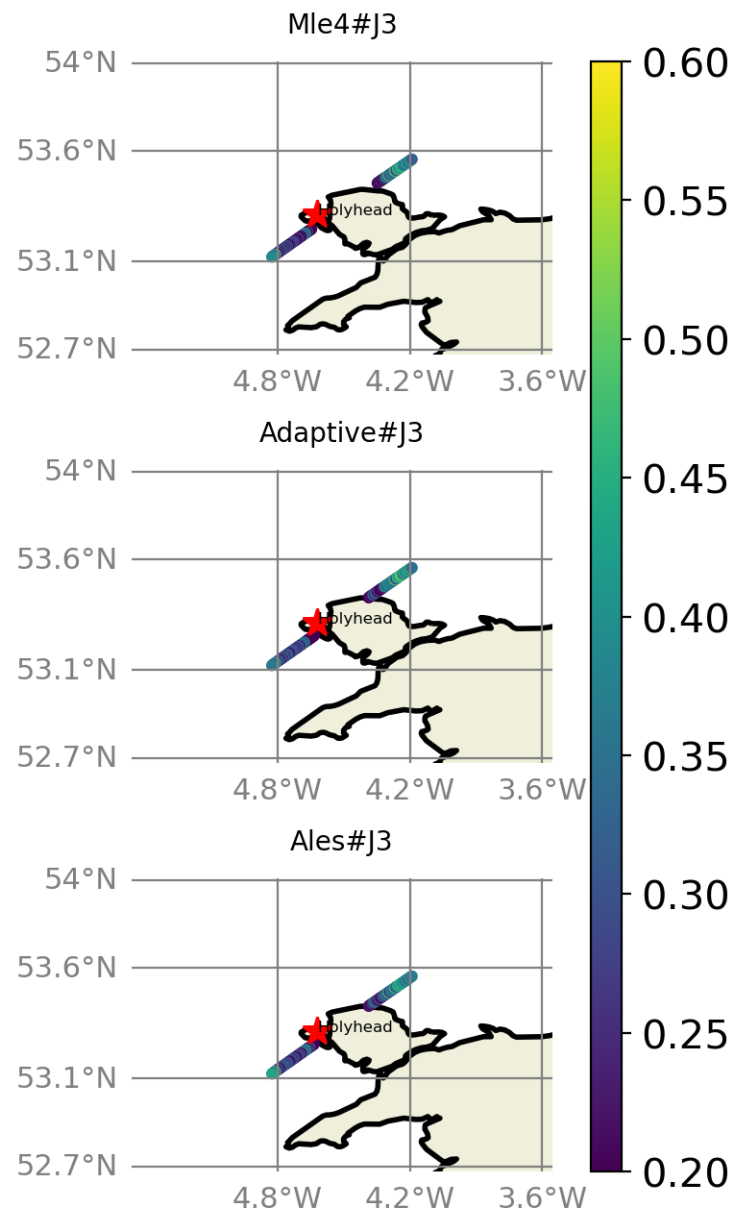


FIGURE 112 – correlation visualization in maps view % Holyhead tide gauge

6.8.2 rmsd visualization in maps view % Holyhead tide gauge

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

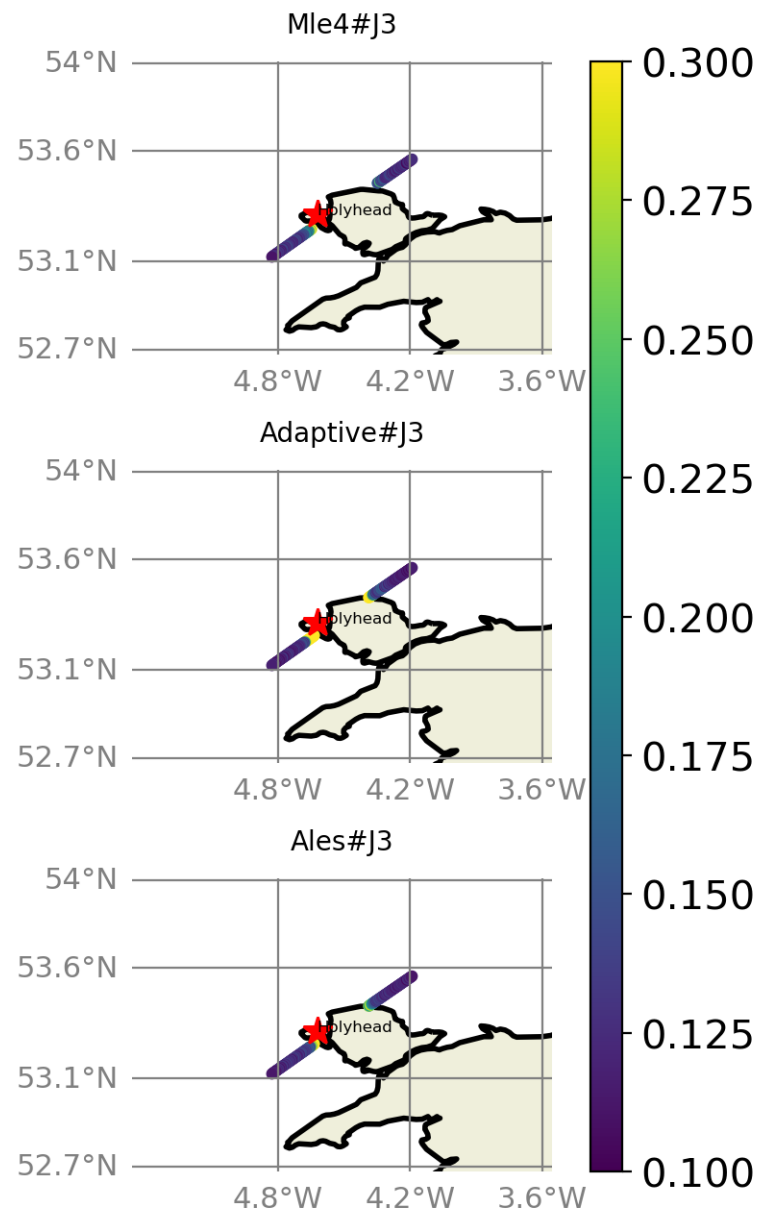


FIGURE 113 – rmsd visualization in maps view % Holyhead tide gauge

6.8.3 std visualization in maps view % Holyhead tide gauge

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

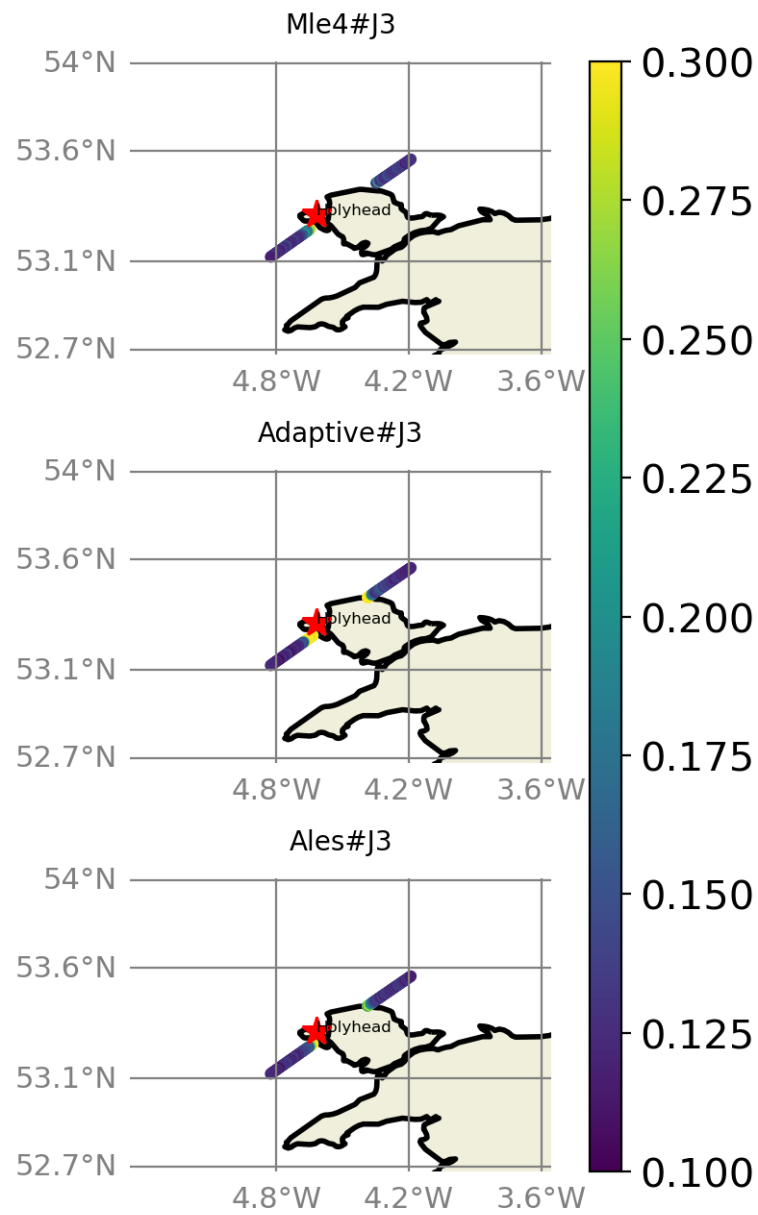


FIGURE 114 – std visualization in maps view % Holyhead tide gauge

6.8.4 valid_data_percent visualization in maps view % Holyhead tide gauge

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

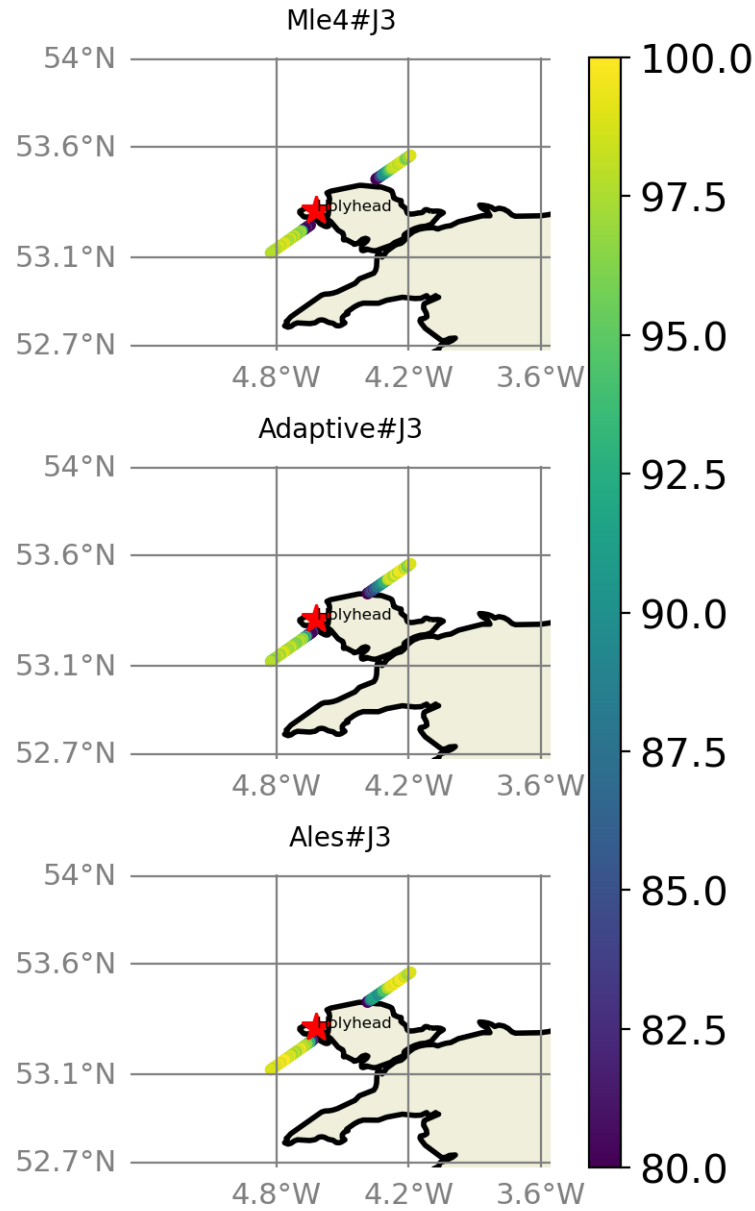


FIGURE 115 – valid_data_percent visualization in maps view % Holyhead tide gauge

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. $maxNB = 89$ 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.

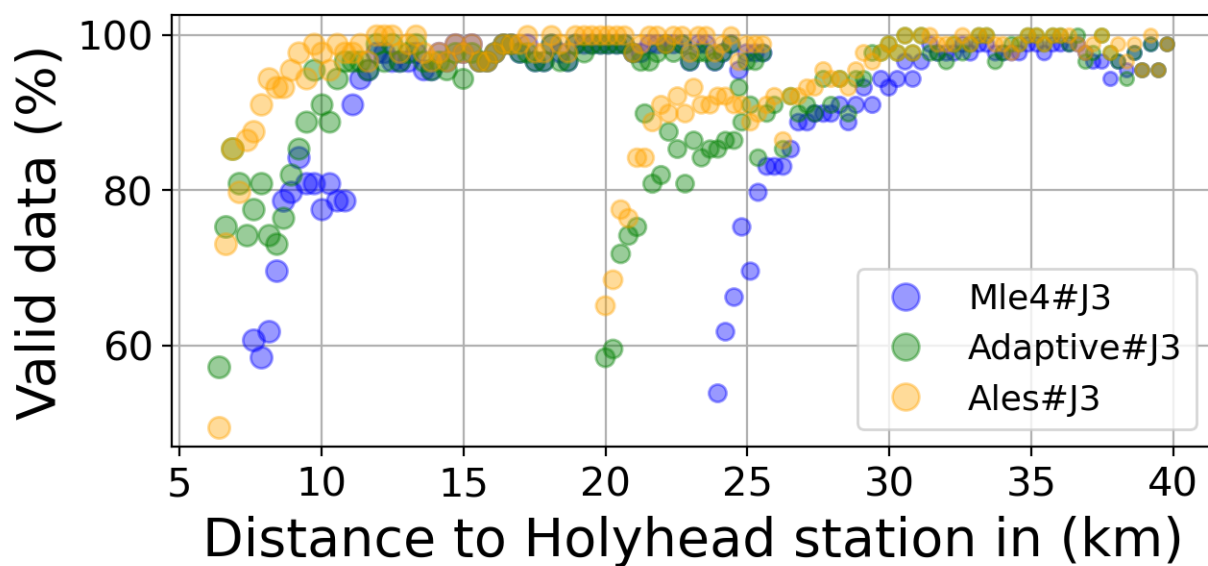
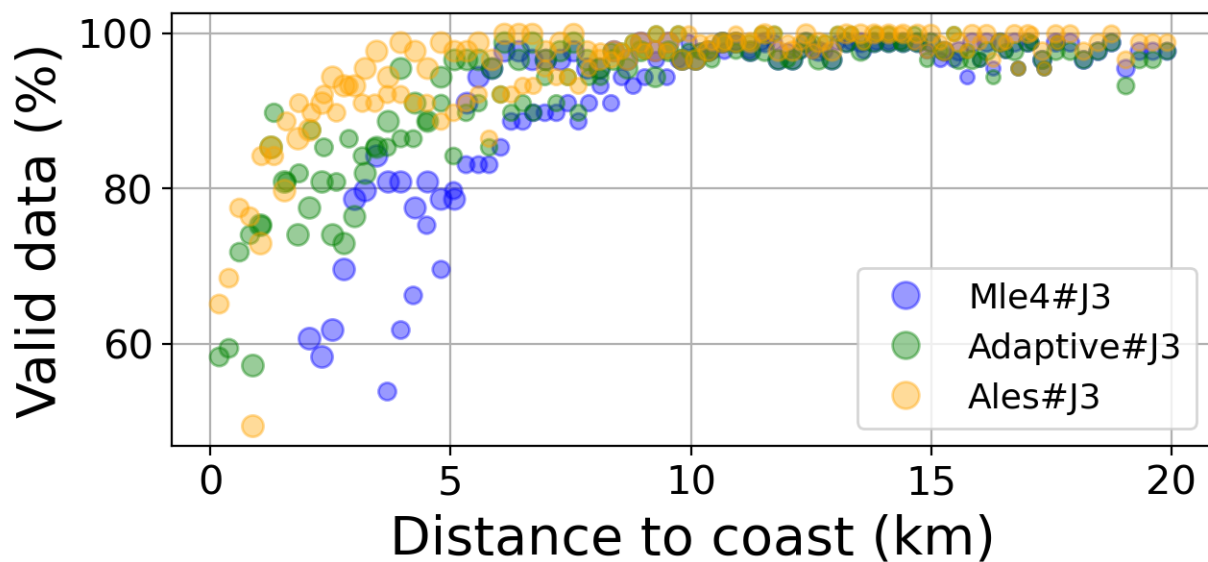


FIGURE 116 – Valid data (%) in function of distance to coast/Holyhead station

6.8.6 Std in function of distance to coast/Holyhead station

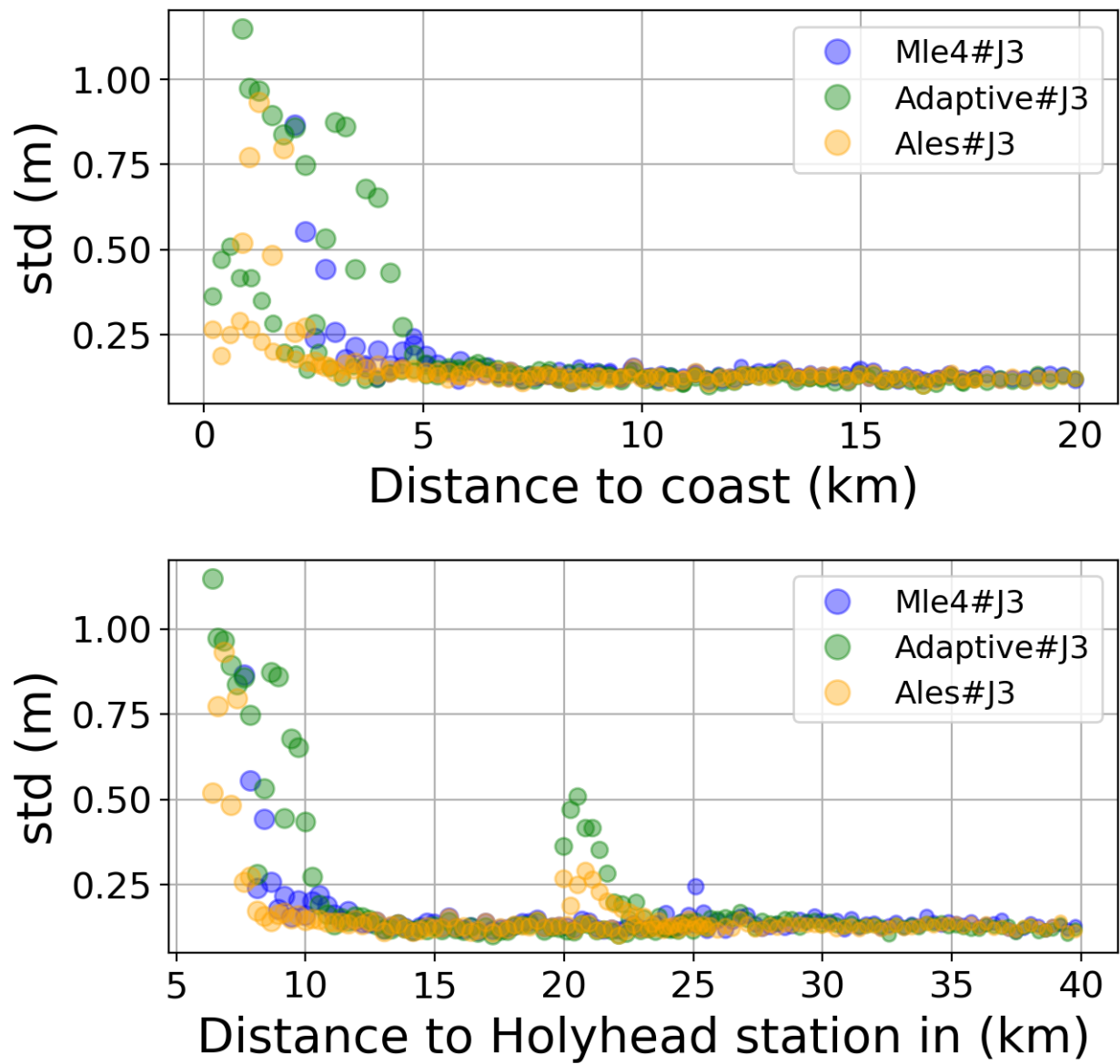


FIGURE 117 – Std in function of the distance to the coast/Holyhead station

6.8.7 Correlation in function of distance to coast/Holyhead station

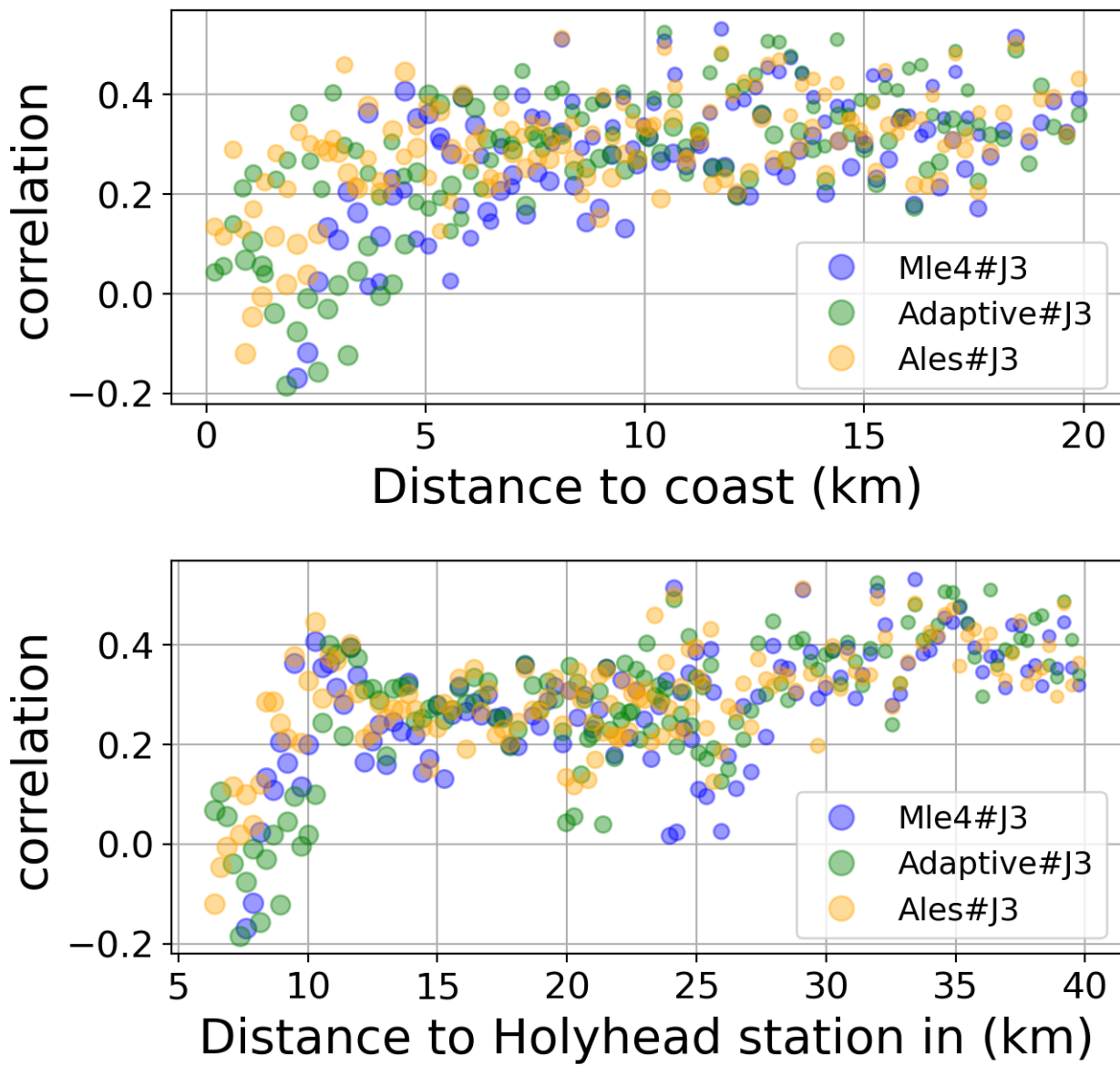


FIGURE 118 – Correlation in function of the distance to the coast/Holyhead station

6.8.8 Taylor Diagram

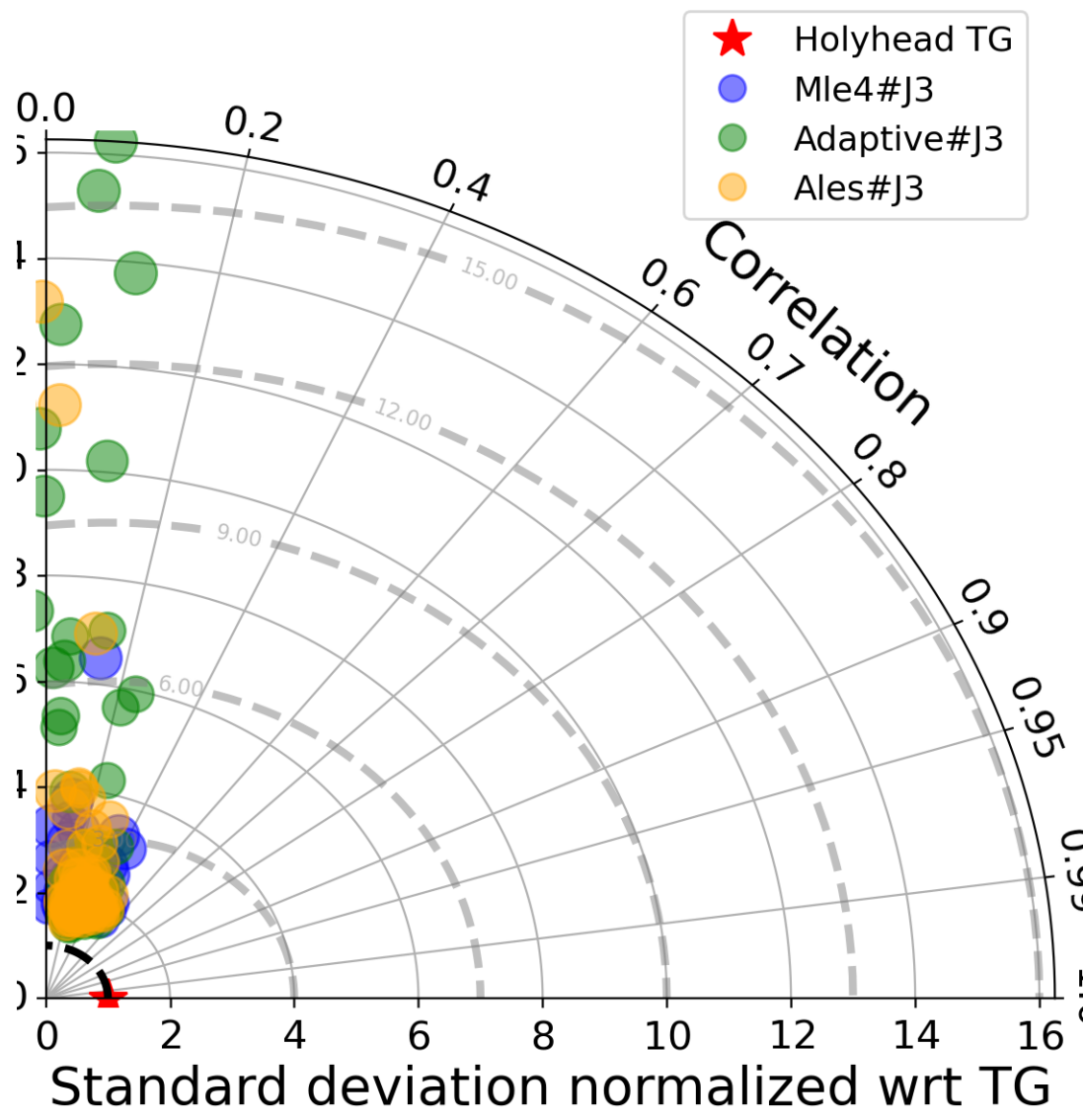


FIGURE 119 – Taylor diagram

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)
Mle4#J3	92.497	0.286	0.152	0.149
Adaptive#J3	95.181	0.298	0.172	0.169
Ales#J3	97.391	0.313	0.132	0.129

FIGURE 120 – 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 89 point.

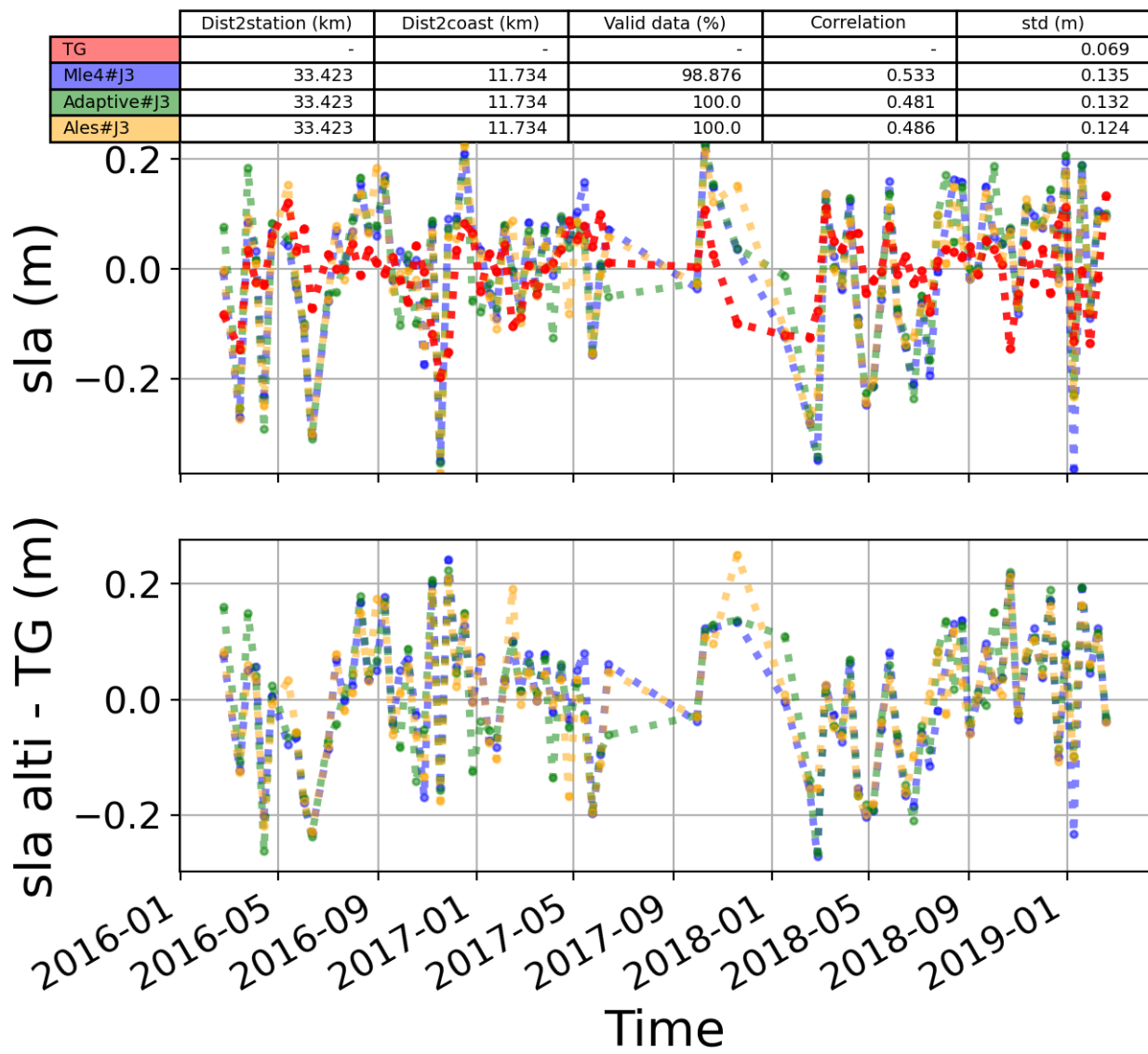


FIGURE 121 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

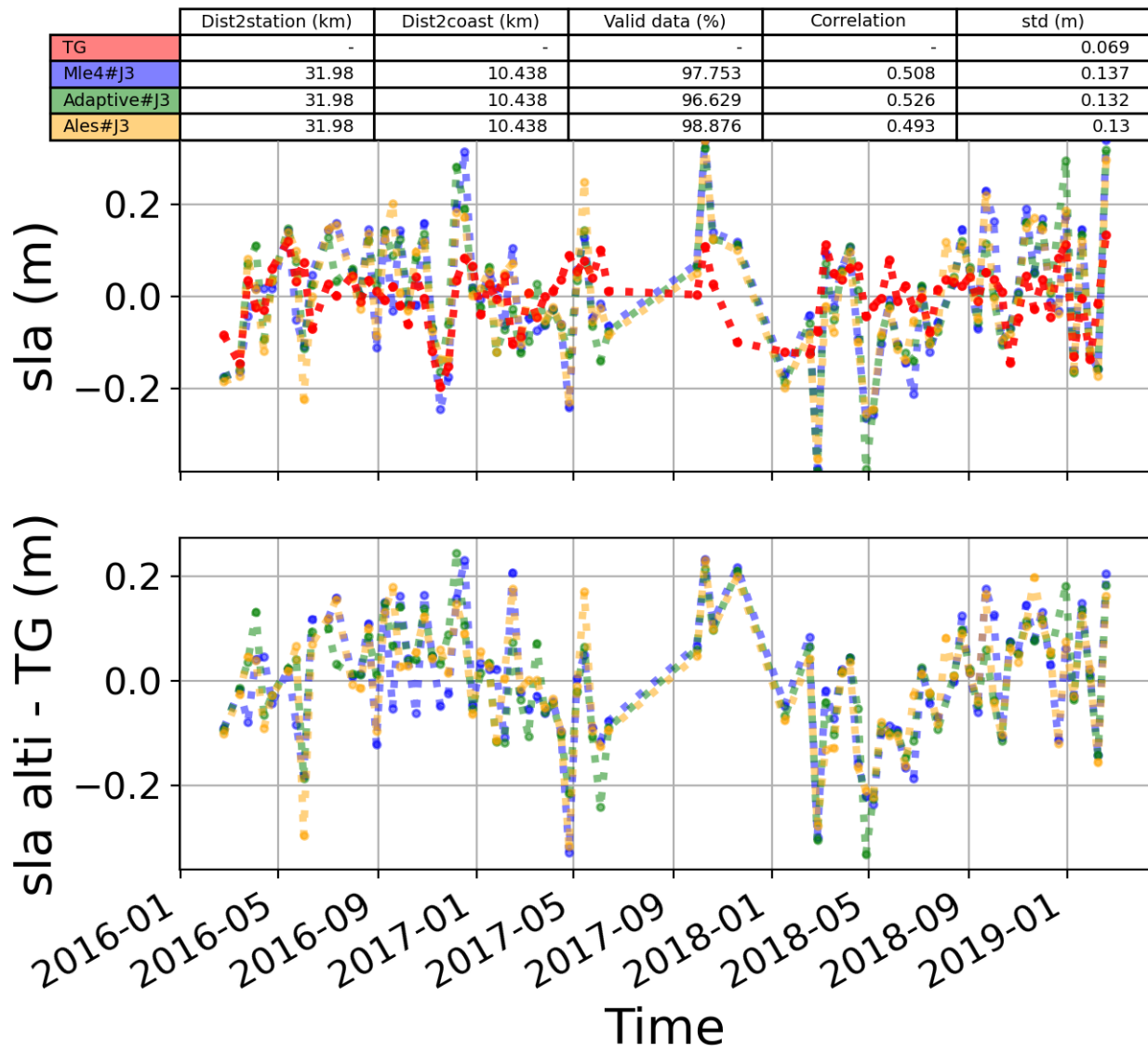


FIGURE 122 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

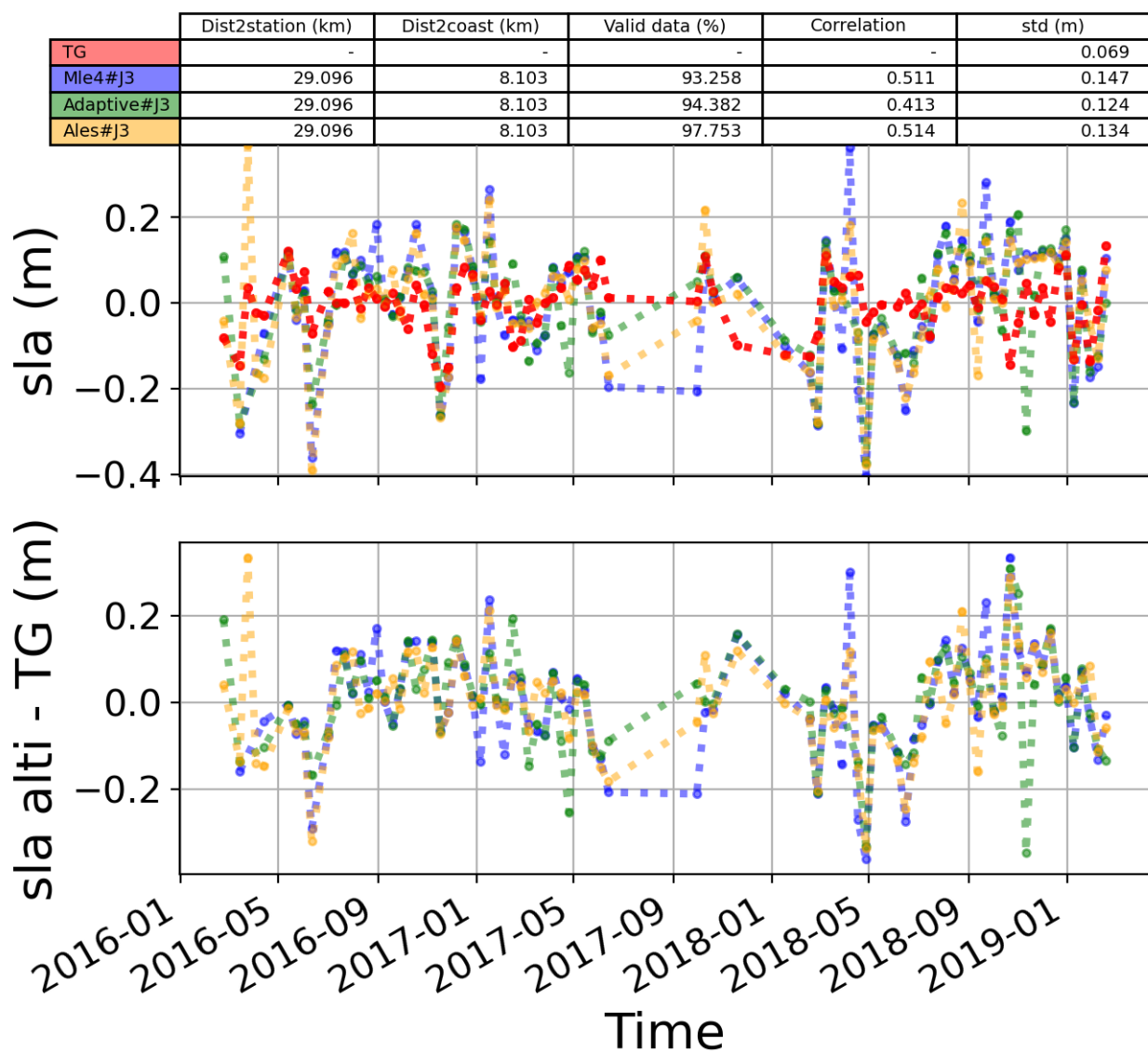


FIGURE 123 – The 3rd most correlated sla altimetry Time serie with tide gauge sla time serie

6.9 Station : LE_CROUESTY

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

6.9.1 correlation visualization in maps view % LE_CROUESTY tide gauge

Correlation Altimetry data with respect to LE_CROUESTY Tide gauge data

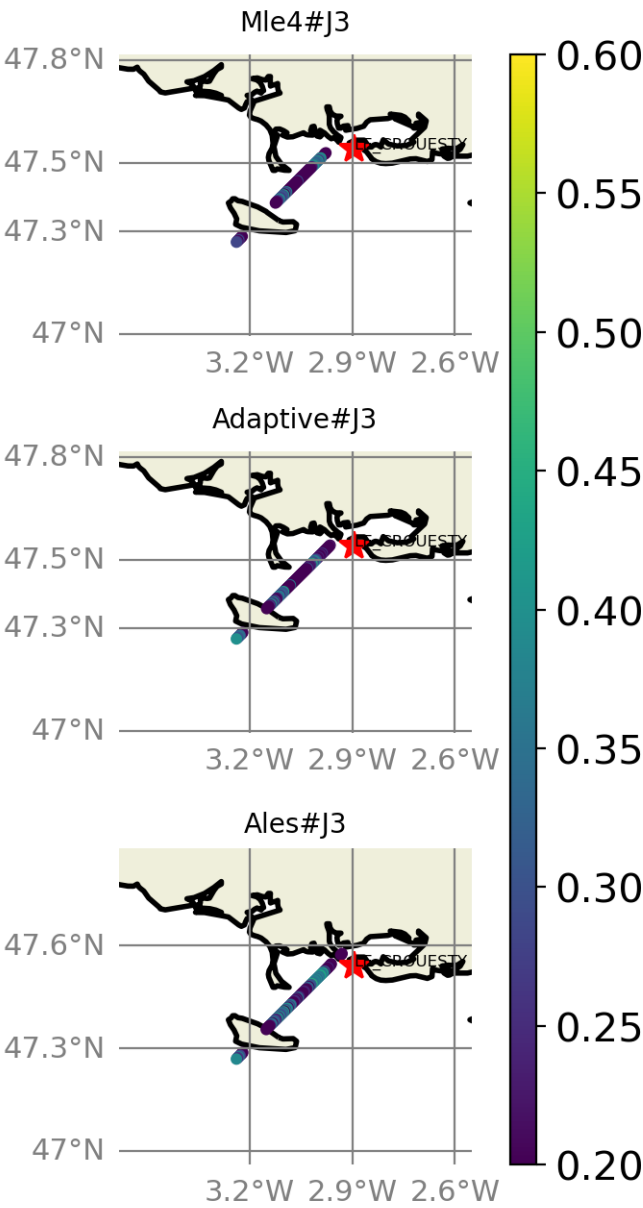


FIGURE 124 – correlation visualization in maps view % LE_CROUESTY tide gauge

6.9.2 rmsd visualization in maps view % LE_CROUESTY tide gauge

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

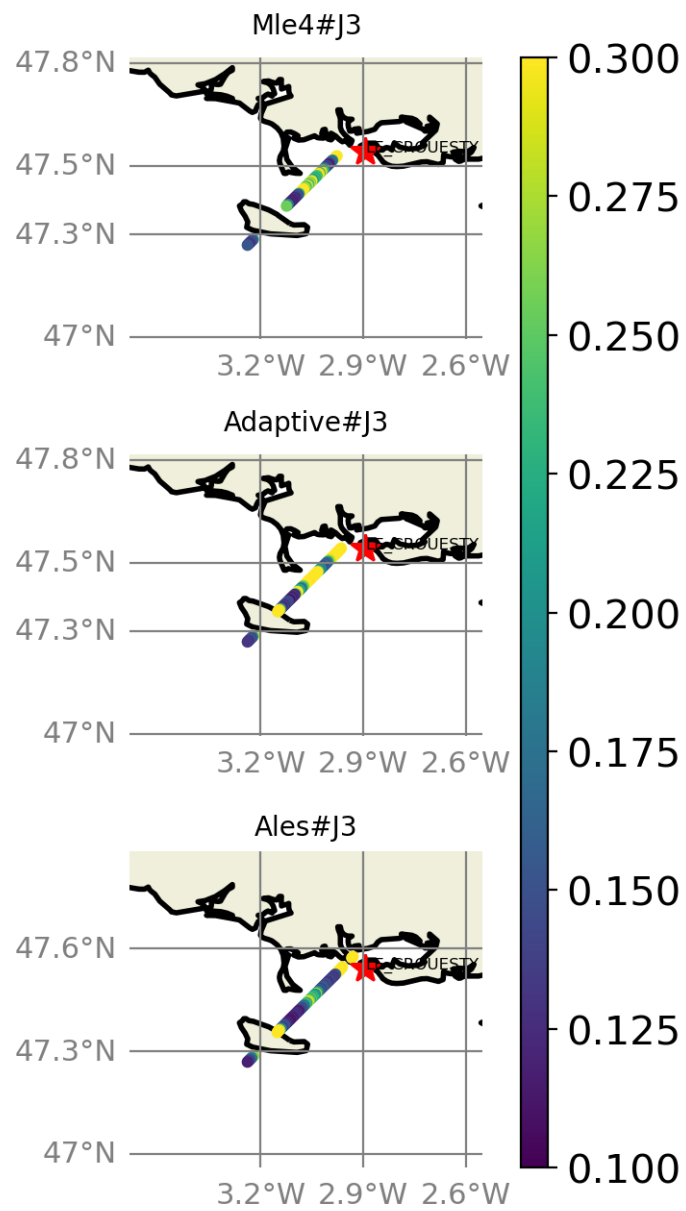


FIGURE 125 – rmsd visualization in maps view % LE_CROUESTY tide gauge

6.9.3 std visualization in maps view % LE_CROUESTY tide gauge

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

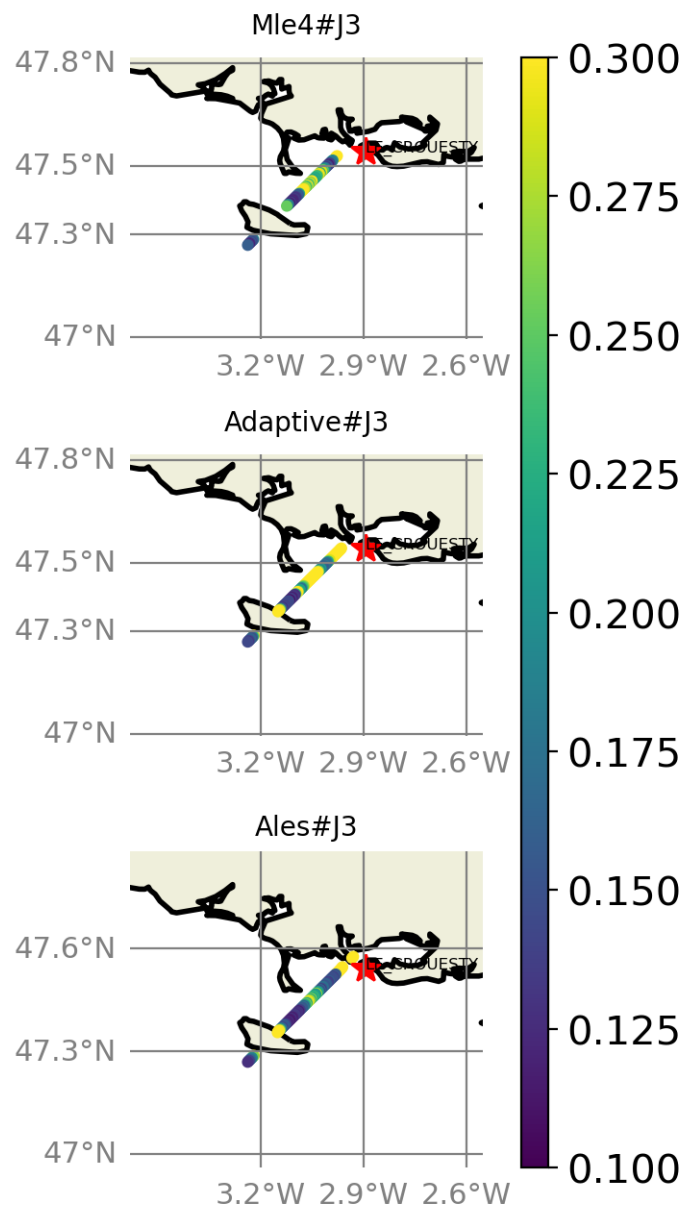


FIGURE 126 – std visualization in maps view % LE_CROUESTY tide gauge

6.9.4 valid_data_percent visualization in maps view % LE_CROUESTY tide gauge

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

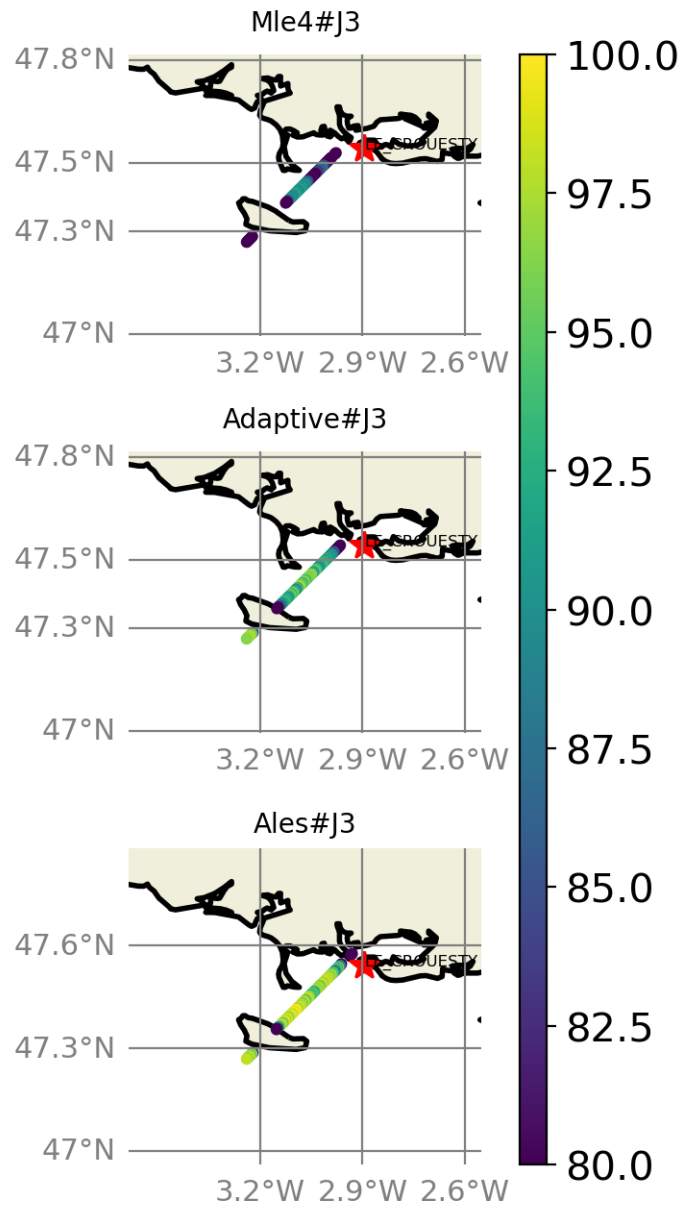


FIGURE 127 – valid_data_percent visualization in maps view % LE_CROUESTY tide gauge

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 series is;

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

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

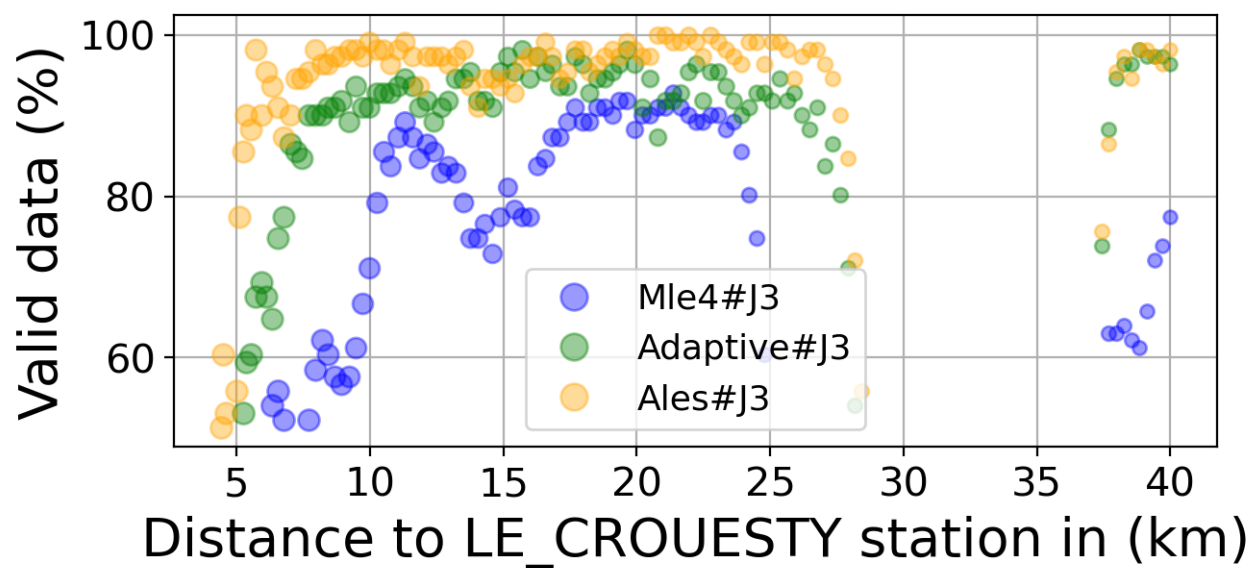
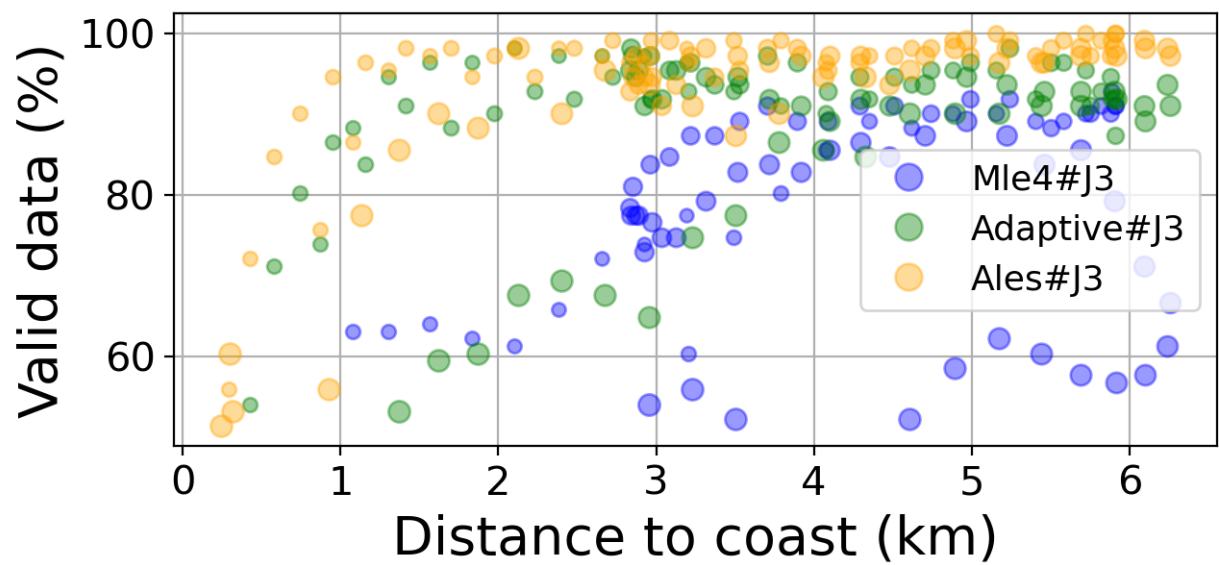


FIGURE 128 – Valid data (%) in function of distance to coast/LE_CROUESTY station

6.9.6 Std in function of distance to coast/LE_CROUESTY station

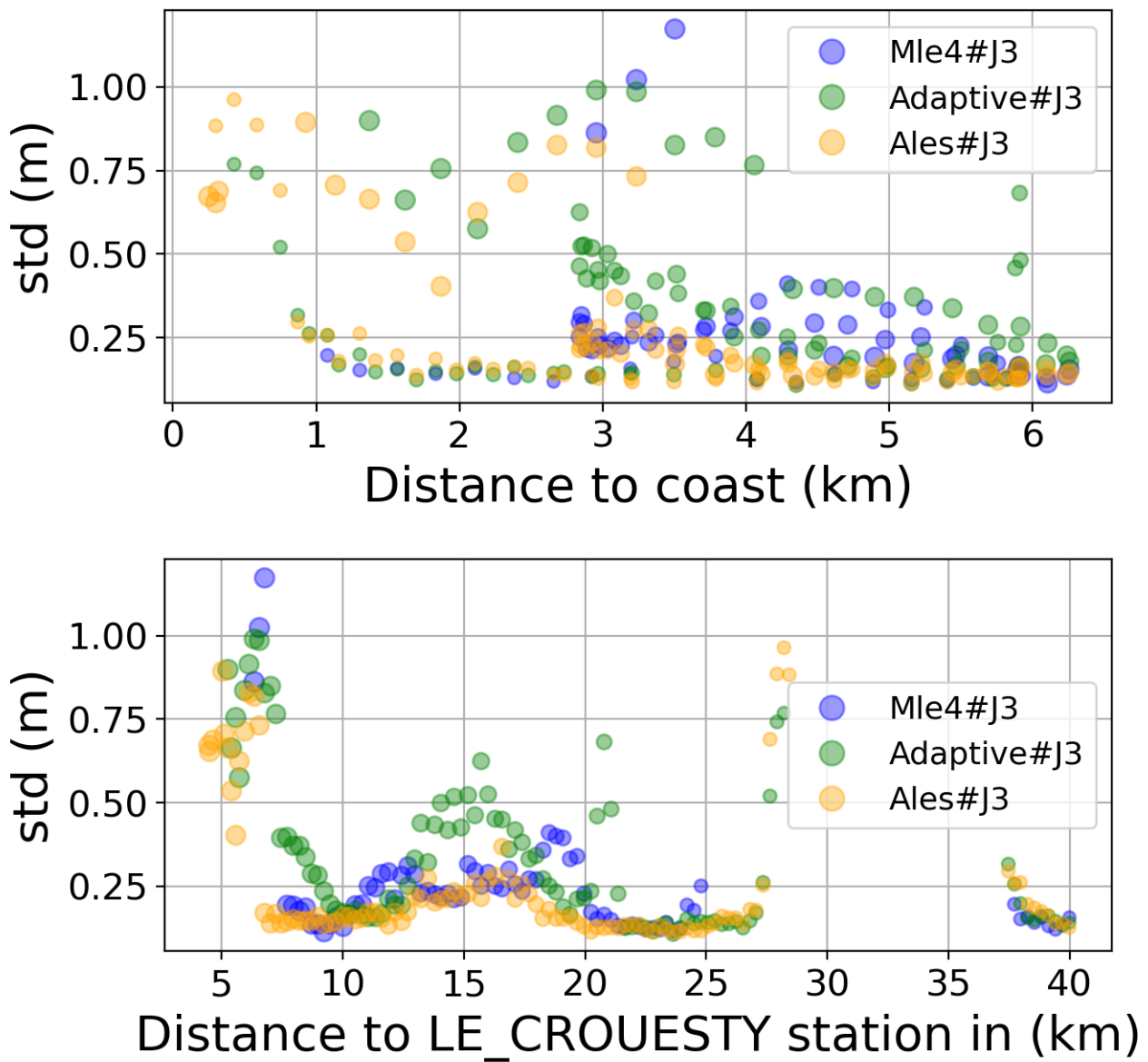


FIGURE 129 – Std in function of the distance to the coast/LE_CROUESTY station

6.9.7 Correlation in function of distance to coast/LE_CROUESTY station

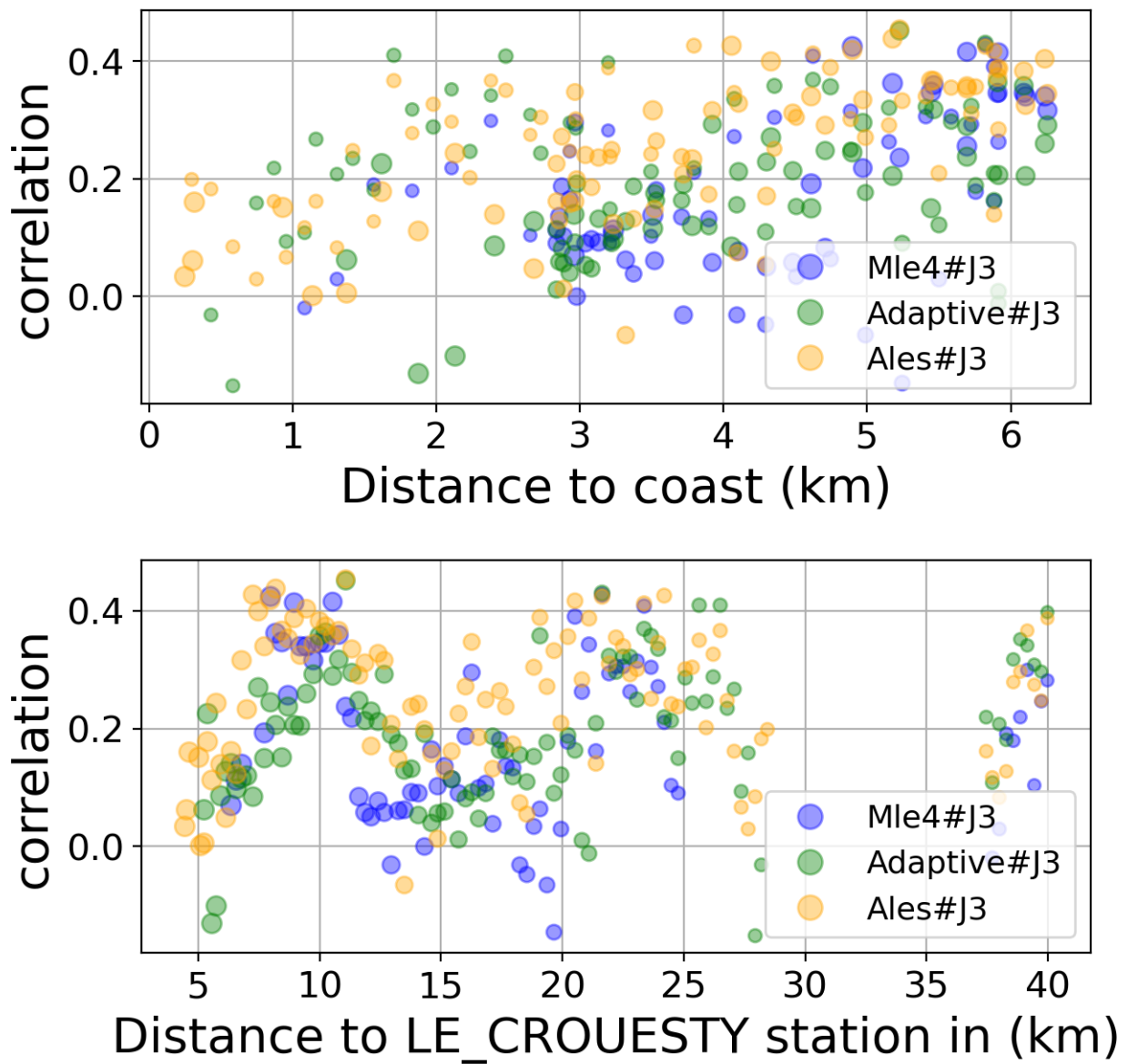


FIGURE 130 – Correlation in function of the distance to the coast/LE_CROUESTY station

6.9.8 Taylor Diagram

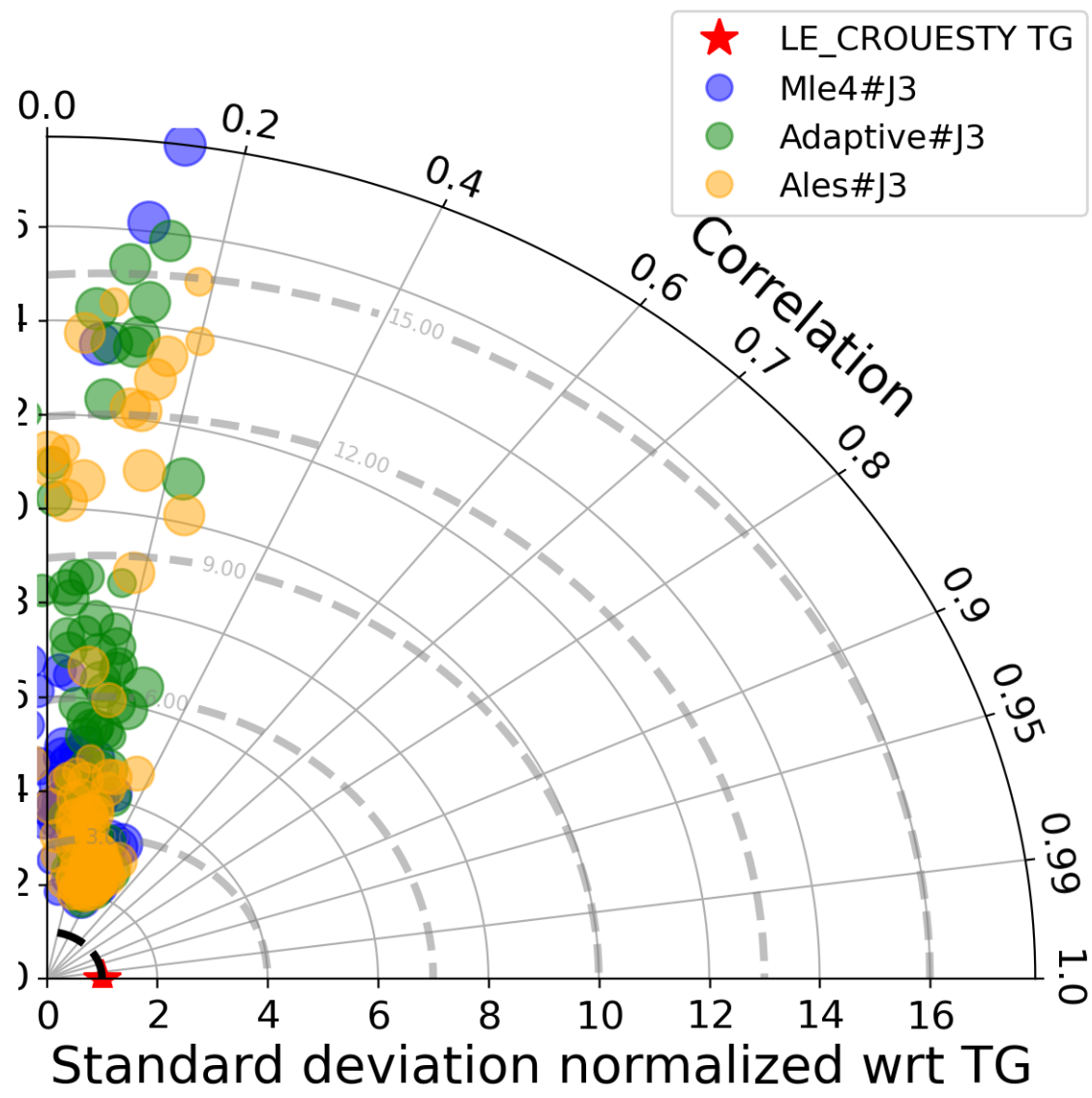


FIGURE 131 – Taylor diagram

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)
Mle4#J3	78.366	0.182	0.244	0.243
Adaptive#J3	92.793	0.207	0.3	0.296
Ales#J3	96.781	0.274	0.19	0.185

FIGURE 132 – 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 111 point.

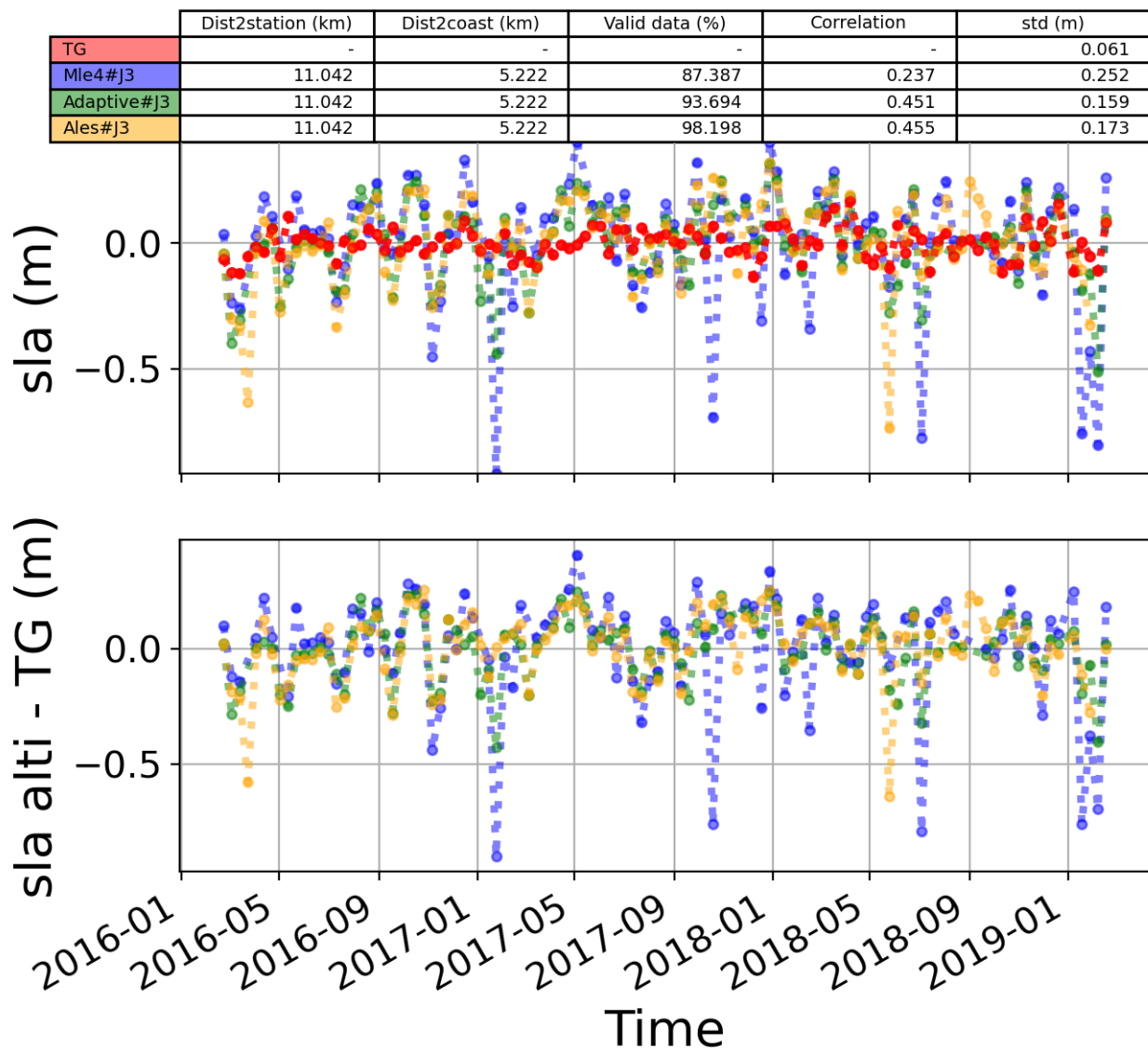


FIGURE 133 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

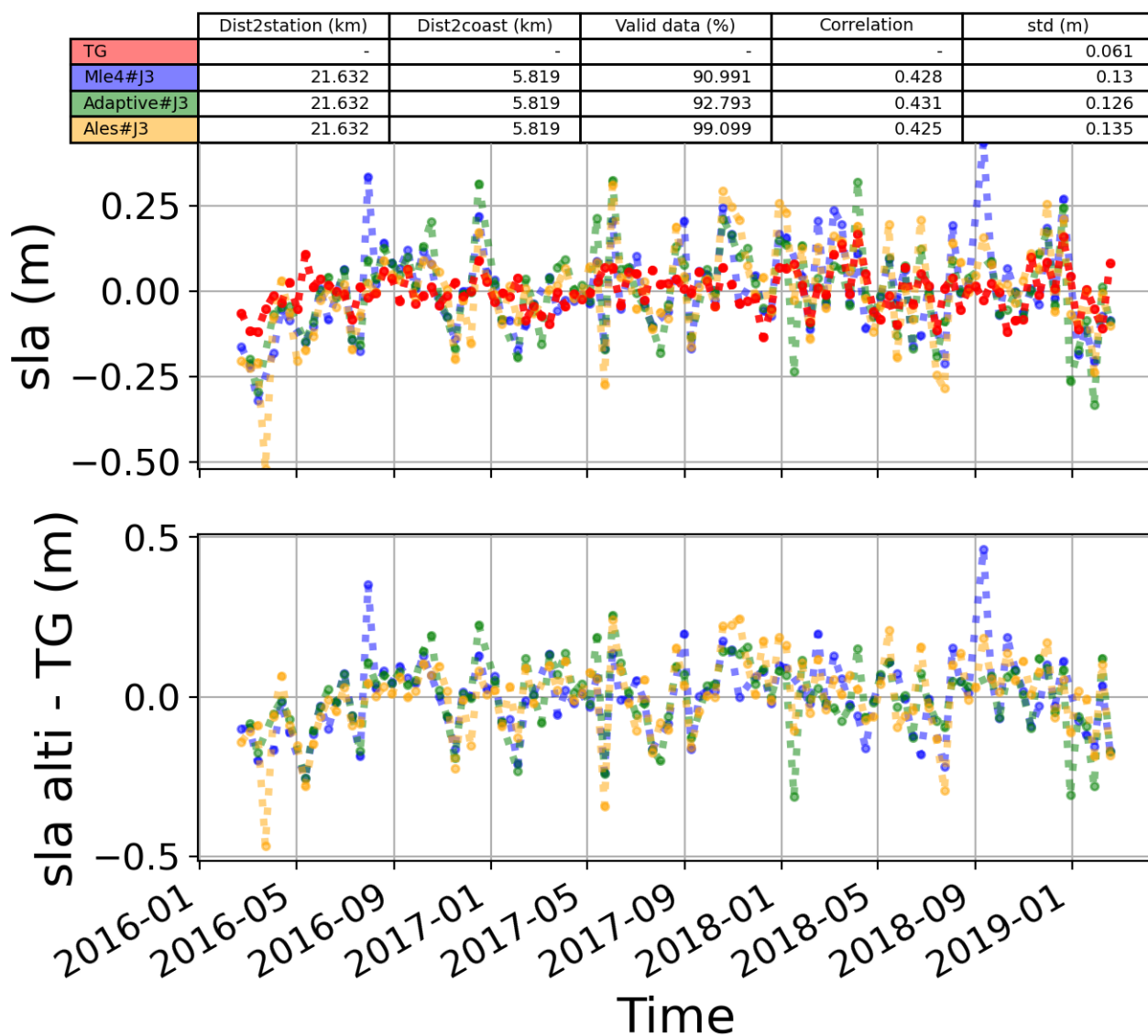


FIGURE 134 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

6.10 Station : North_Shields

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

6.10.1 correlation visualization in maps view % North_Shields tide gauge

Correlation Altimetry data with respect to North_Shields Tide gauge data

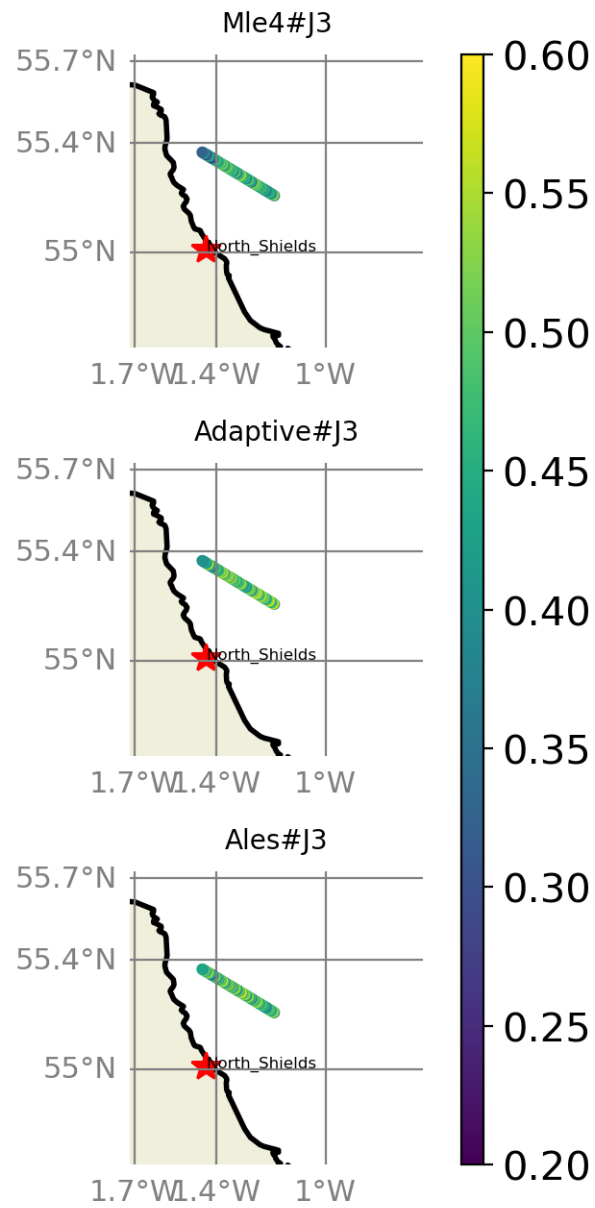


FIGURE 135 – correlation visualization in maps view % North_Shields tide gauge

6.10.2 rmsd visualization in maps view % North_Shields tide gauge

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

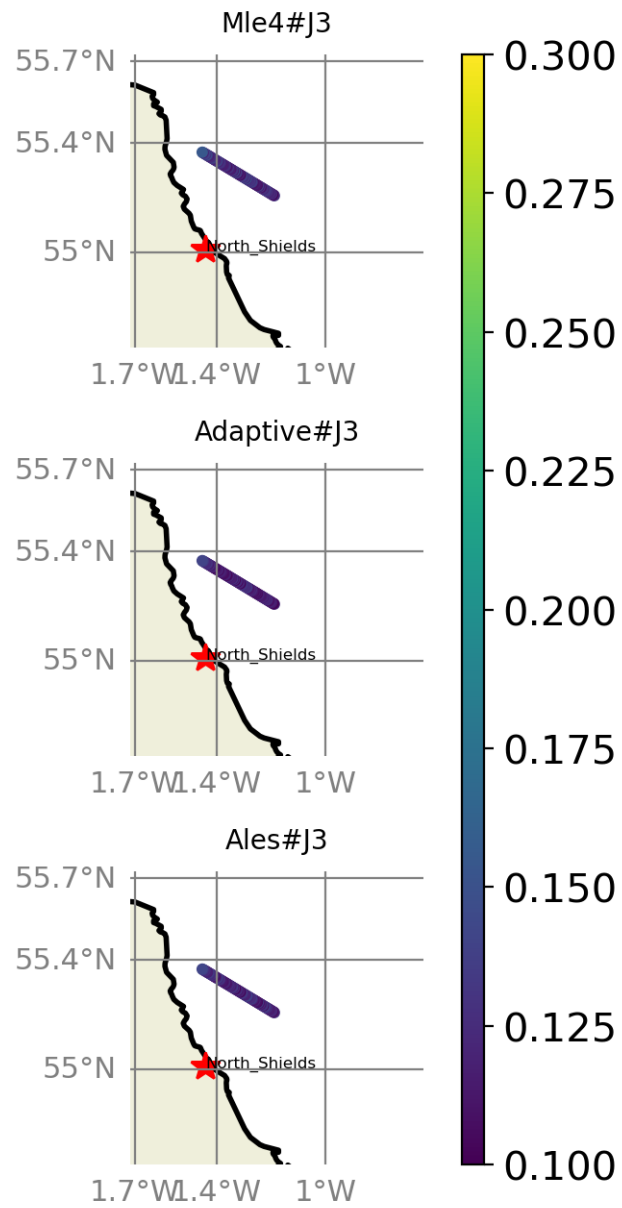


FIGURE 136 – rmsd visualization in maps view % North_Shields tide gauge

6.10.3 std visualization in maps view % North_Shields tide gauge

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

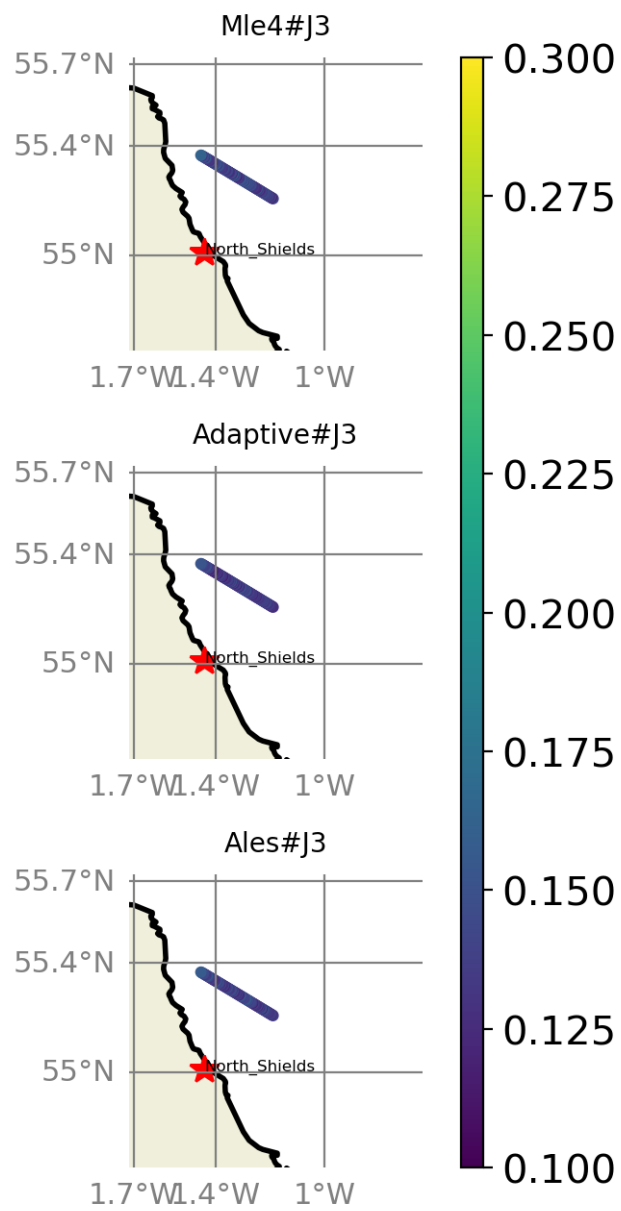


FIGURE 137 – std visualization in maps view % North_Shields tide gauge

6.10.4 valid_data_percent visualization in maps view % North_Shields tide gauge

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

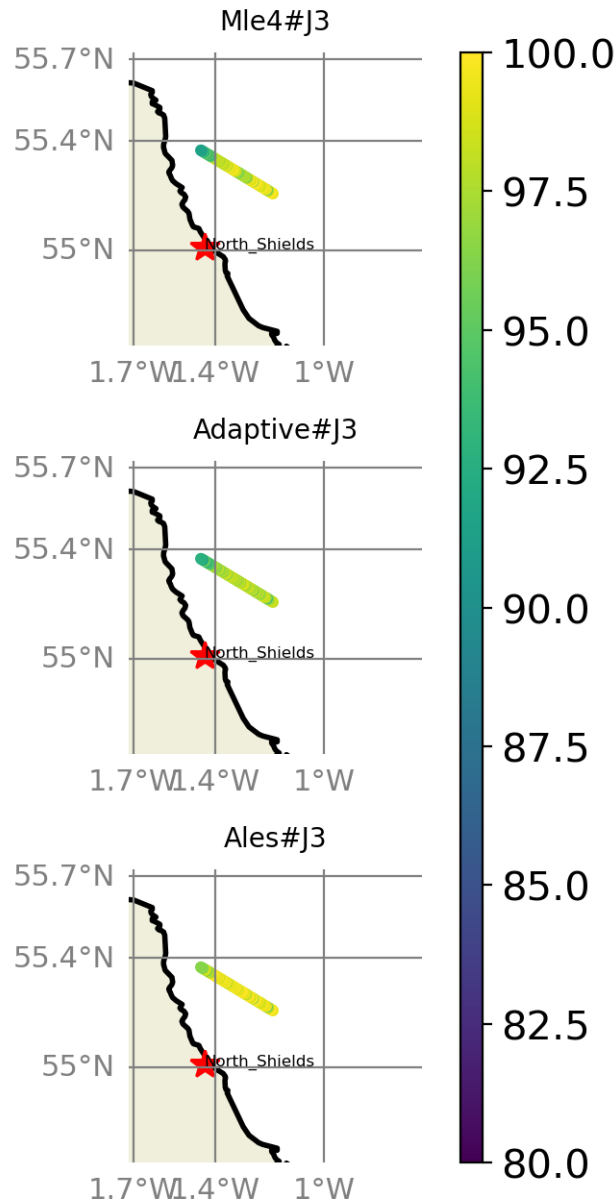


FIGURE 138 – valid_data_percent visualization in maps view % North_Shields tide gauge

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. $maxNB = 82$ 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.

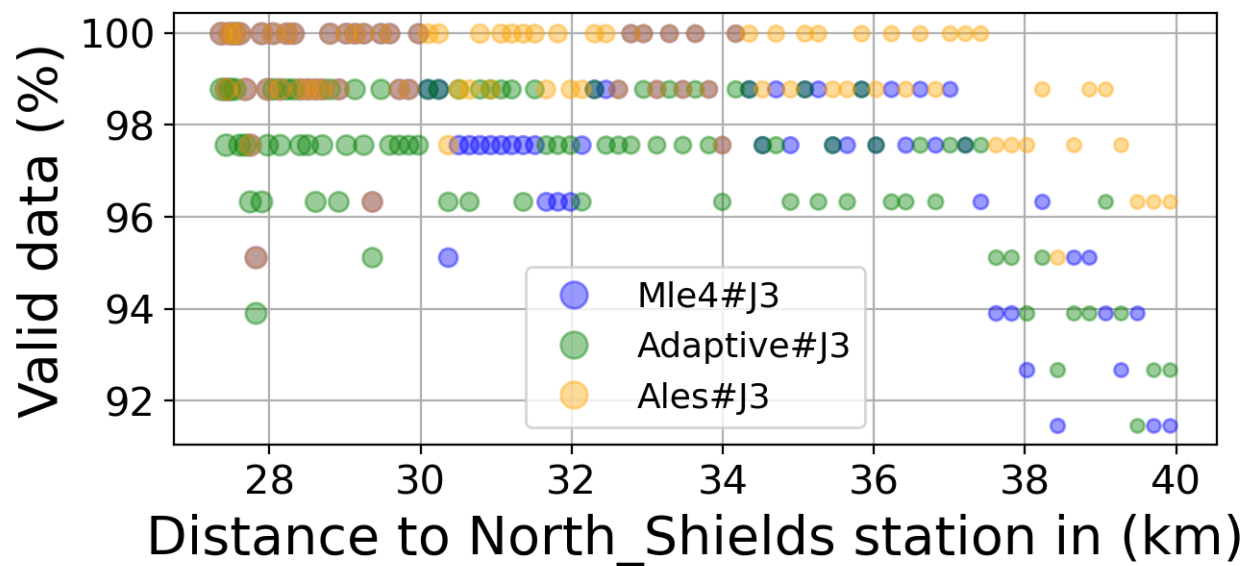
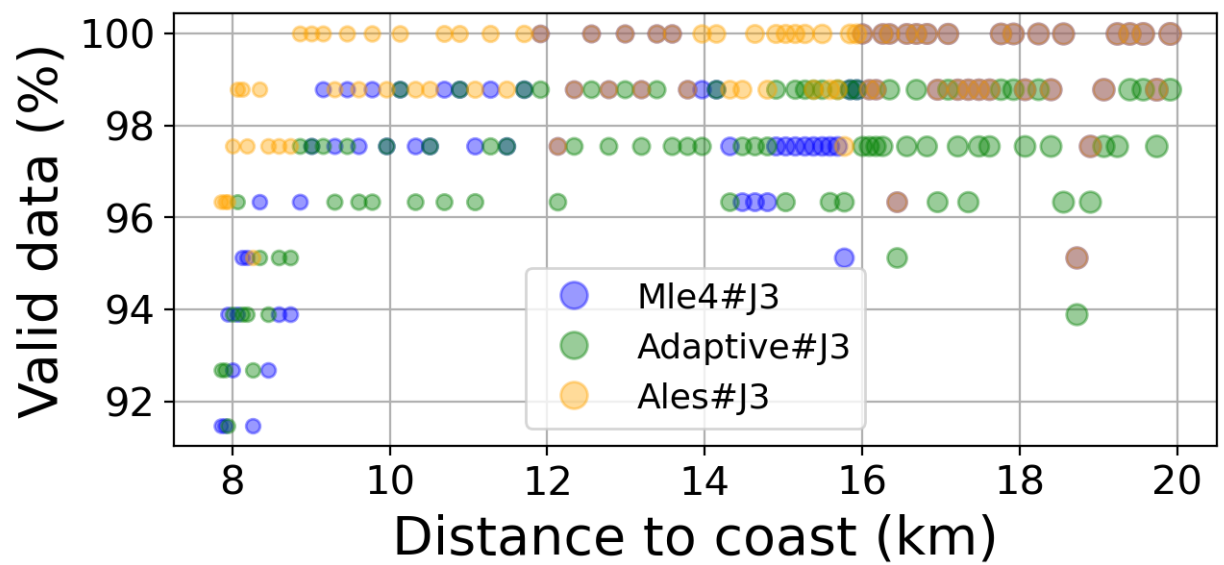


FIGURE 139 – Valid data (%) in function of distance to coast/North_Shields station

6.10.6 Std in function of distance to coast/North_Shields station

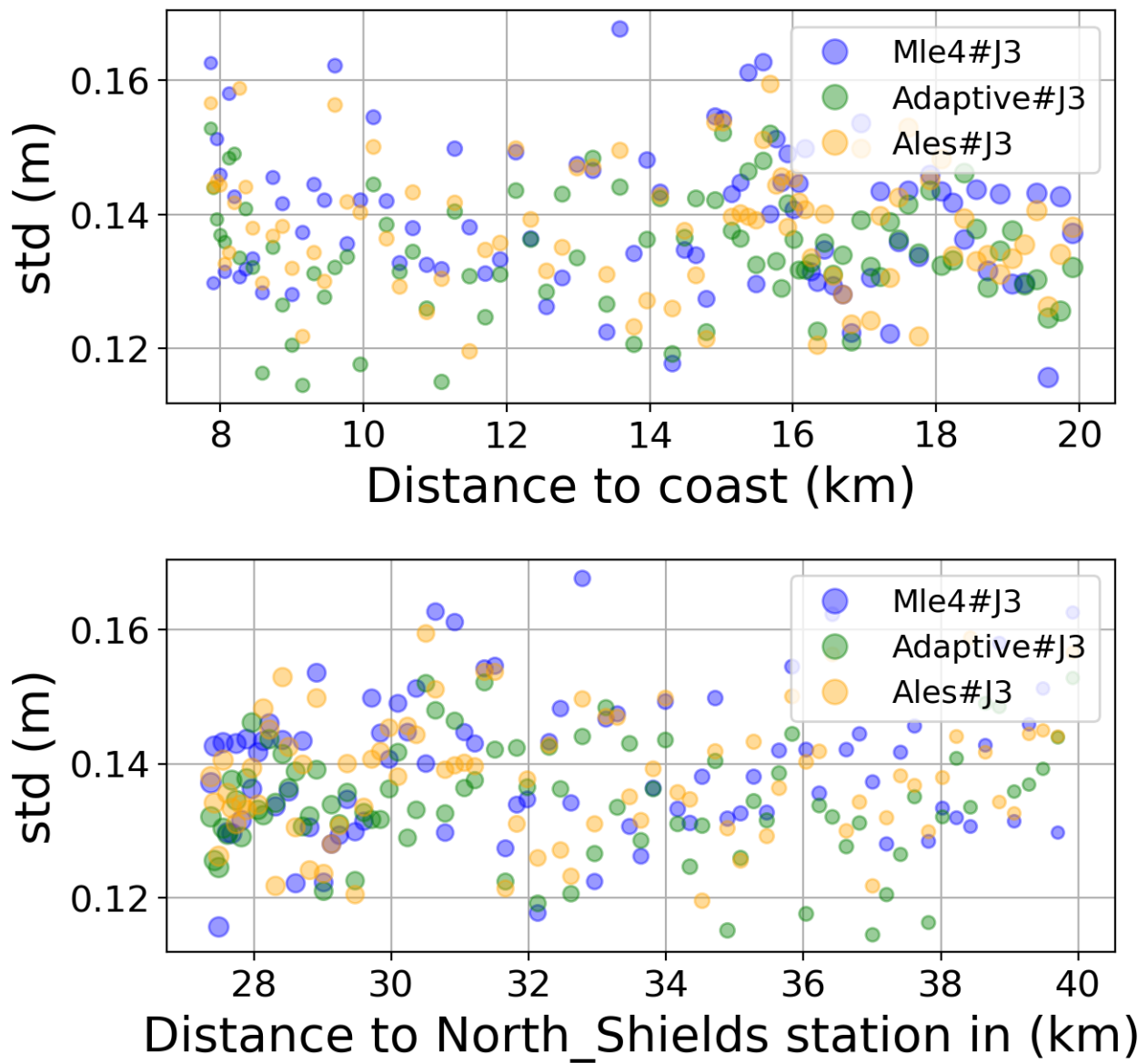


FIGURE 140 – Std in function of the distance to the coast/North_Shields station

6.10.7 Correlation in function of distance to coast/North_Shields station

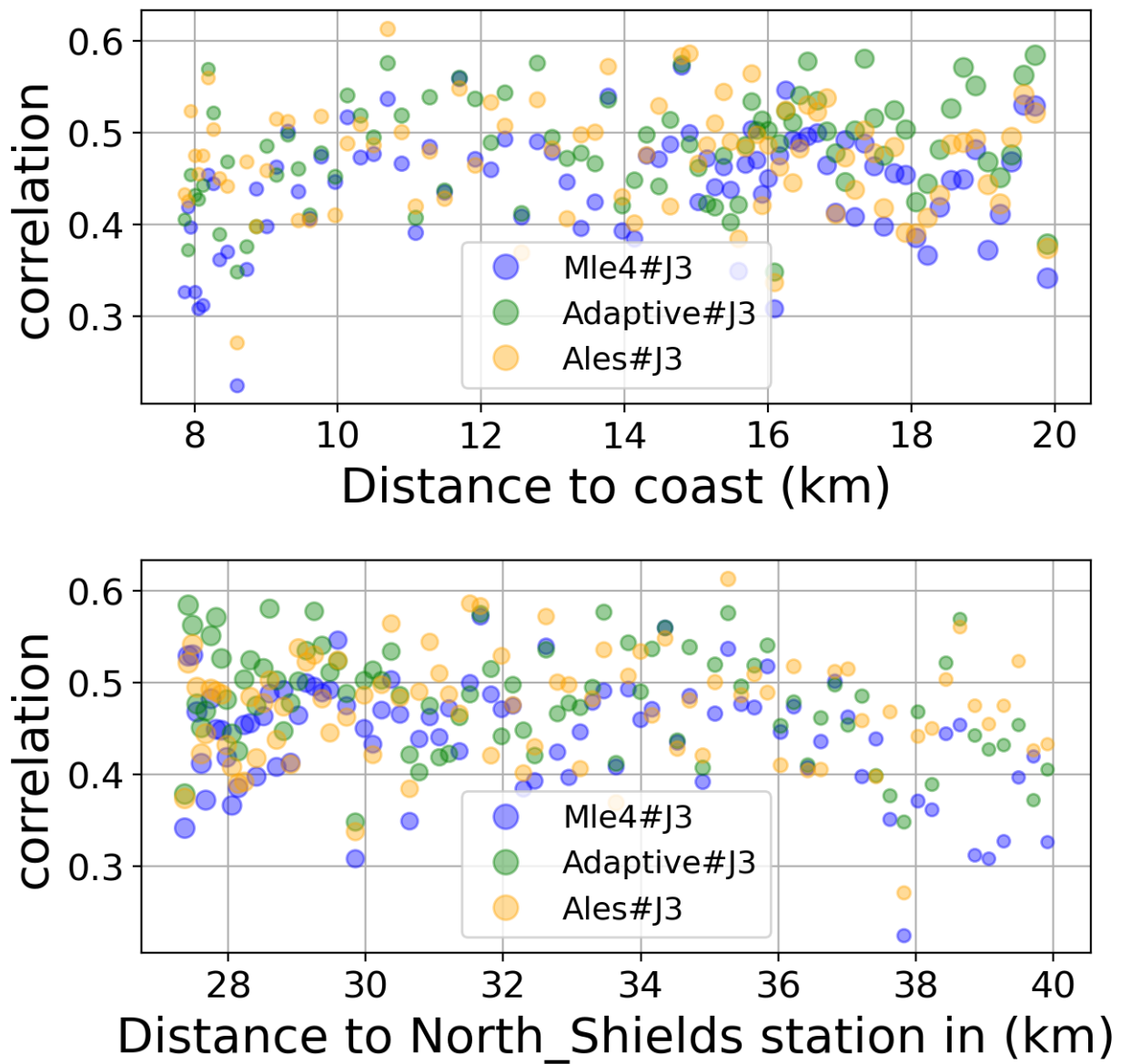


FIGURE 141 – Correlation in function of the distance to the coast/North_Shields station

6.10.8 Taylor Diagram

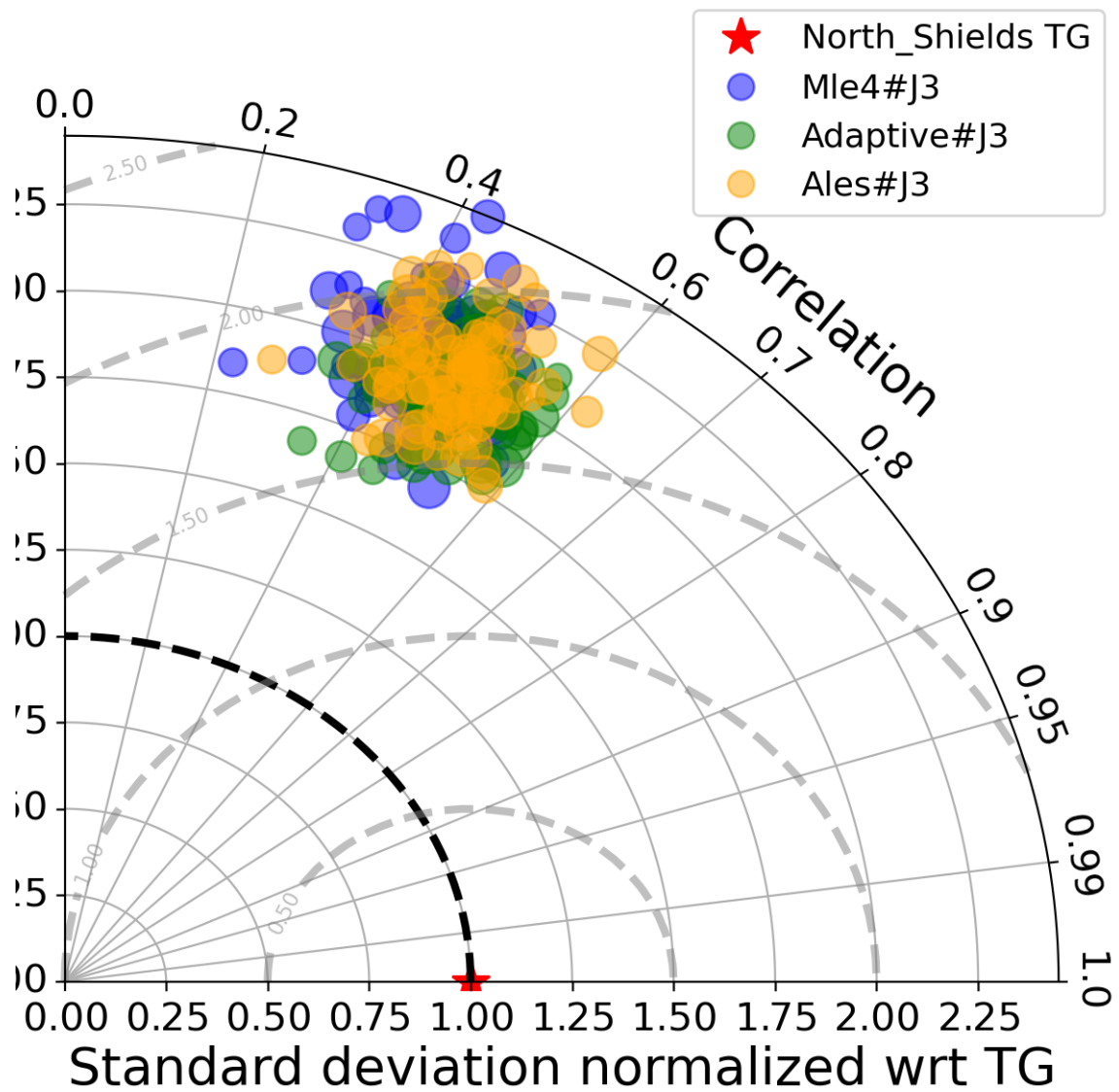


FIGURE 142 – Taylor diagram

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)
Mle4#J3	97.819	0.442	0.14	0.126
Adaptive#J3	97.116	0.482	0.134	0.118
Ales#J3	99.039	0.473	0.138	0.122

FIGURE 143 – 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 82 point.

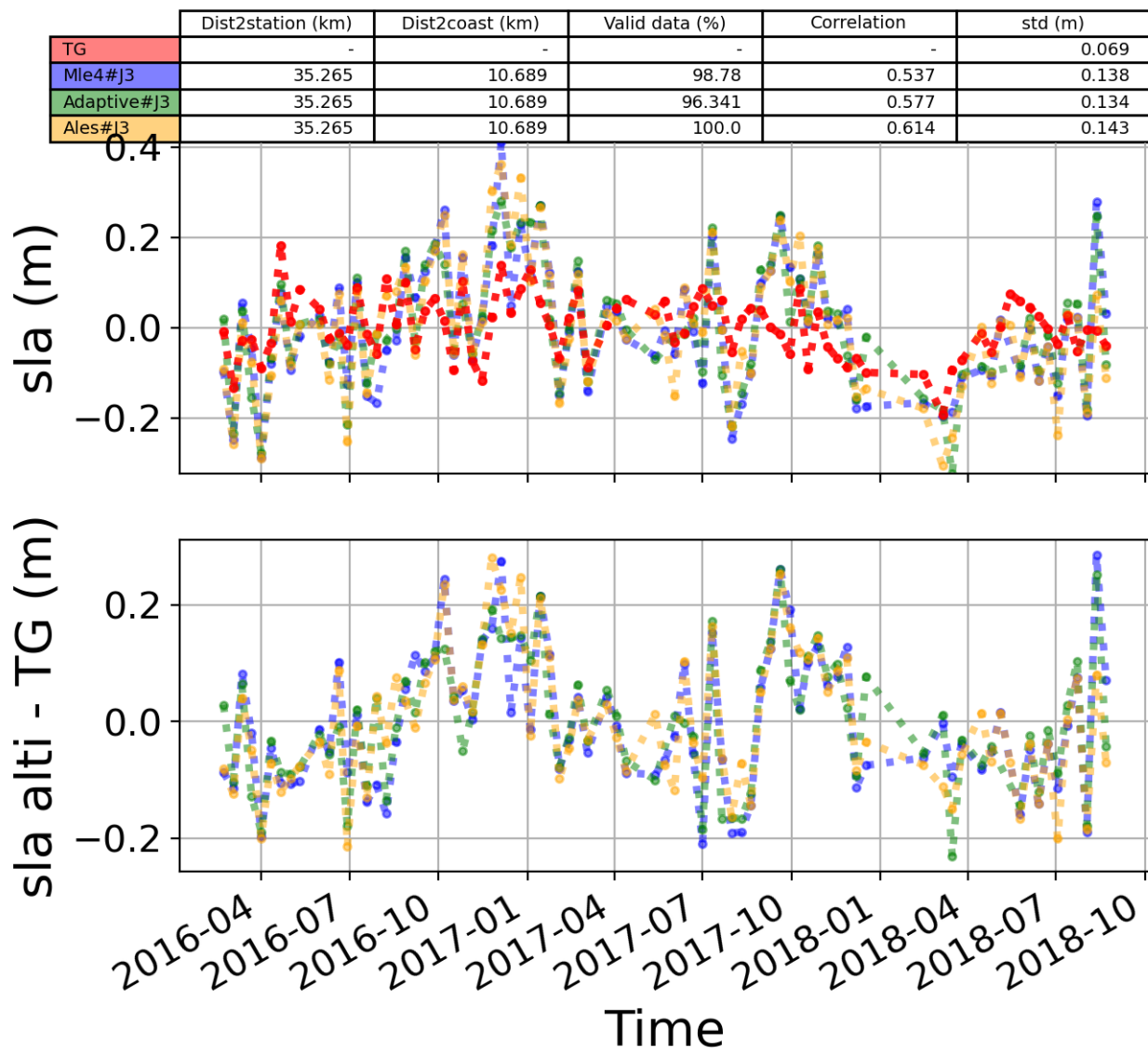


FIGURE 144 – The 1st most correlated sla altimetry Time serie with tide gauge sla time serie

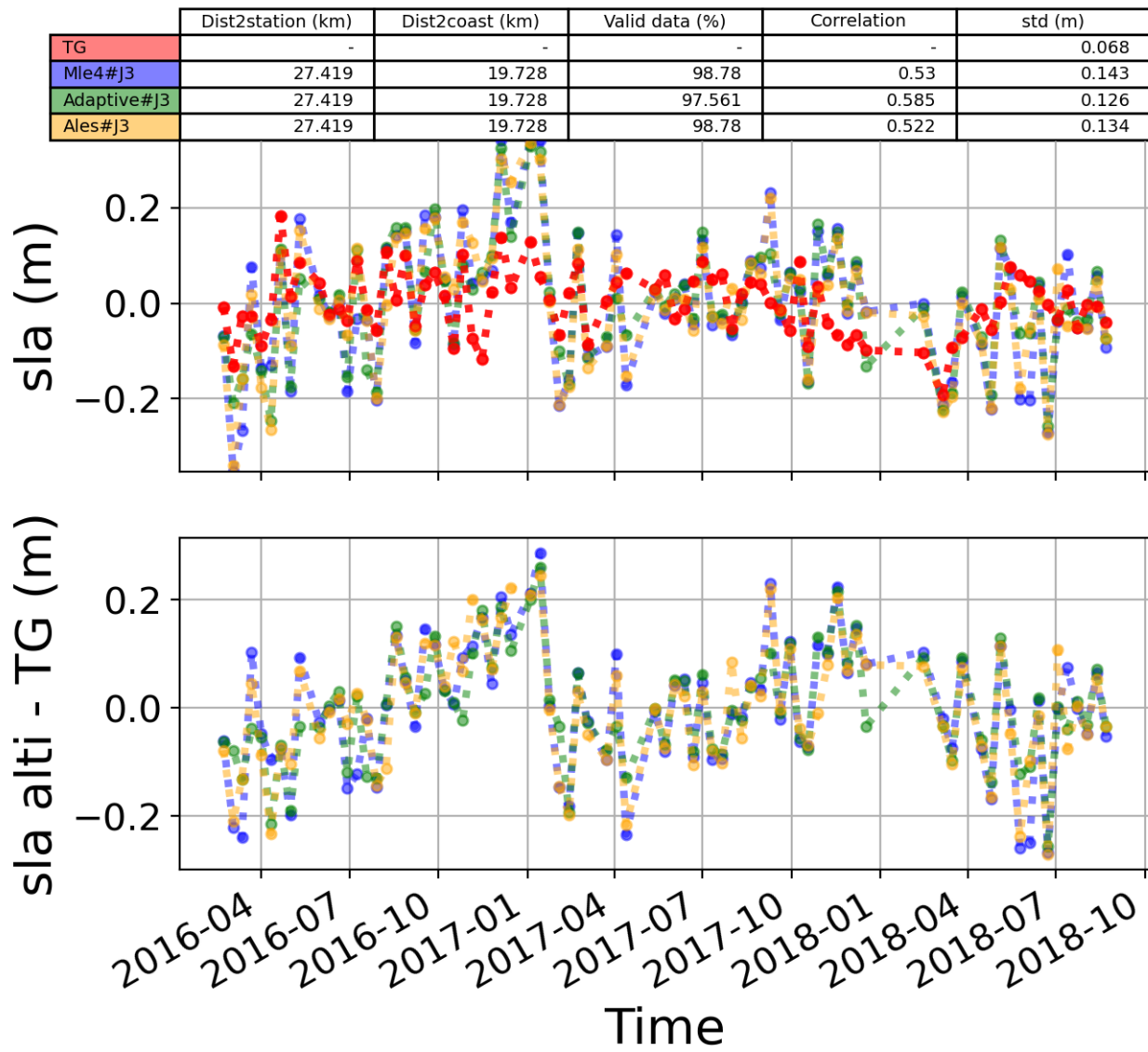


FIGURE 145 – The 2nd most correlated sla altimetry Time serie with tide gauge sla time serie

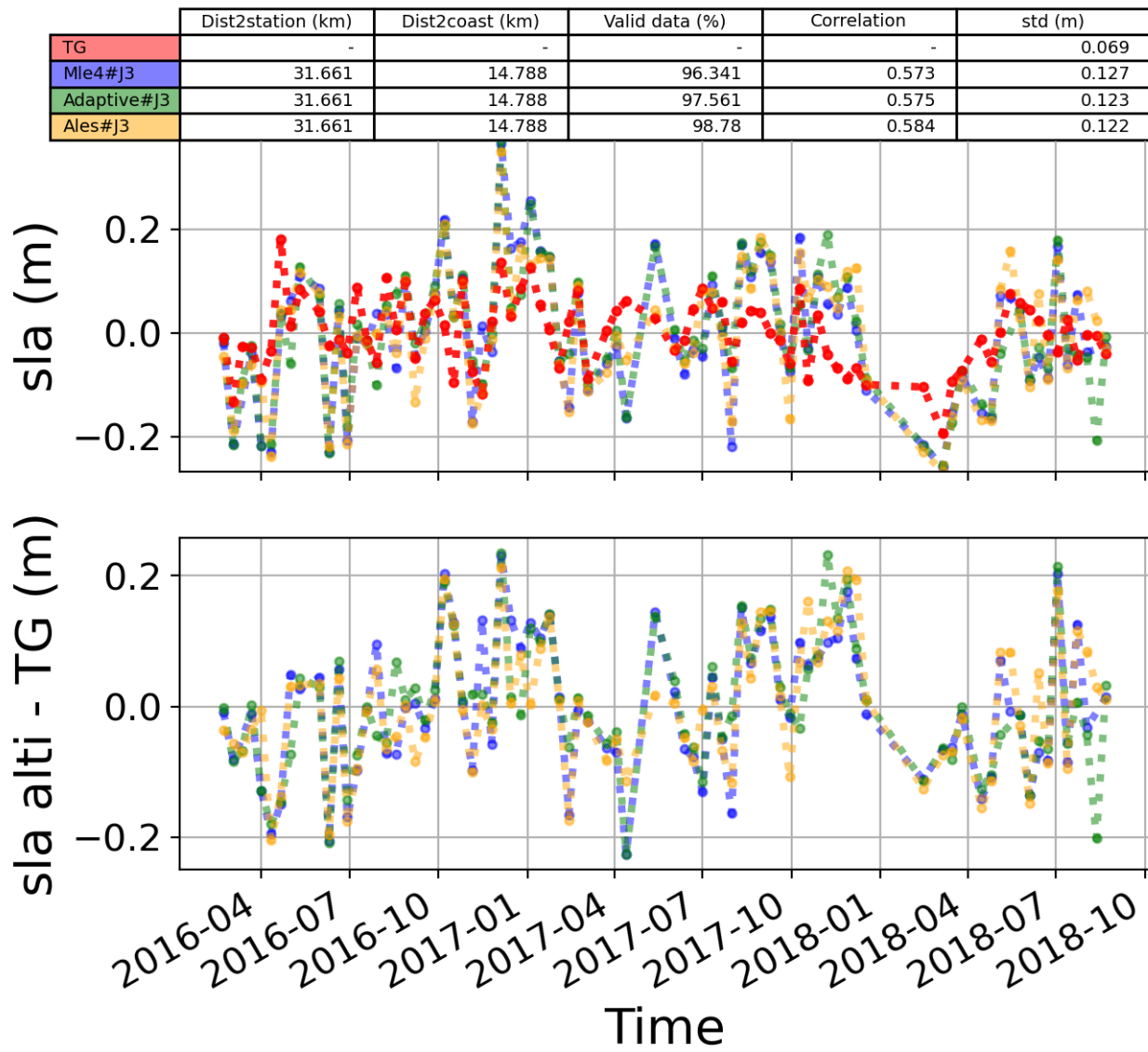


FIGURE 146 – The 3rd most correlated sla altimetry Time serie with tide gauge sla time serie