

PyCAMA report generated by tropl2-proc

tropl2-proc

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1 Short Introduction

1.1 The list of parameters

You may want to keep the list given in table 1 at hand when viewing the results.

2 Definitions

The averages shown here are *unweighed* averages:

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N x_i \quad (1)$$

with N the number of observations in the dataset.

The spread of the measurements is indicated with the variance $V(x)$, or rather the standard deviation $\sigma(x) = \sqrt{V(x)}$.

$$V(x) = \frac{1}{N-1} \sum_{i=1}^N (x_i - \bar{x})^2 \quad (2)$$

We also report the more robust statistics median, minimum, maximum, various percentiles and inter quartile range.

The median m is the value of parameter x for which half of the observations of x is smaller than m :

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^m f(x) dx = \frac{1}{2} \quad (3)$$

with $f(x)$ the probability density function.

The median is a special case of a percentile. Instead of 1/2 in equation 3, other threshold values can be used. We report results for 1 %, 5 %, 10 %, 15.9 %, 25 %, 75 %, 84.1 %, 90 %, 95 % and 99 %. The inter quartile range is the difference between the 75 % and 25 % percentiles. Similarly the minimum and maximum values correspond to the 0 % and 100 % percentiles respectively.

For normally distributed parameters the mean and median are the same, while the $\mu \pm \sigma$ values and the 15.9 % and 84.1 % percentiles coincide.

To get a measure for the relation of one variable $x_{(k)}$ with another $x_{(l)}$, we calculate the covariance matrix C_{kl} .

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1} \sum_{i=1}^N (x_{(k),i} - \bar{x}_{(k)})(x_{(l),i} - \bar{x}_{(l)}) \quad (4)$$

Rather than a dimensionally dependent covariance, it is often easier to interpret a correlation matrix R_{kl} , a matrix of Pearson's r coefficients:

$$R_{kl} = R(x_{(k)}, x_{(l)}) = \frac{C_{kl}}{\sqrt{C_{kk}C_{ll}}} = \frac{C_{kl}}{\sqrt{V(x_{(k)})V(x_{(l)})}} \quad (5)$$

The diagonal elements of the covariance matrix are the variances of the elements, $V(x_{(k)}) = C_{kk}$ and obviously $R_{kk} = 1$.

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm \sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.651 ± 0.409	16942387	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.522 \pm 121.758) \times 10^{-2}$	16942387	0.294	0.461	9.856×10^{-3}	-115	382
sulfurdioxide total vertical column precision [DU]	0.580 ± 0.913	16942387	0.222	0.357	0.330	2.928×10^{-2}	176
sulfurdioxide slant column density corrected [DU]	$(1.821 \pm 36.848) \times 10^{-2}$	16942387	0.258	0.372	8.861×10^{-3}	-9.74	204
sulfurdioxide slant column density cobra [DU]	$(1.812 \pm 35.920) \times 10^{-2}$	16942387	0.258	0.372	8.861×10^{-3}	-9.74	33.3
sulfurdioxide slant column density cobra precision [DU]	0.294 ± 0.118	16942387	0.213	0.131	0.263	8.021×10^{-2}	14.3
sulfurdioxide slant column density window1 [DU]	0.171 ± 0.666	16942387	0.175	0.746	0.171	-67.4	50.7
sulfurdioxide slant column density window1 precision [DU]	0.294 ± 0.118	16942387	0.213	0.131	0.263	8.021×10^{-2}	14.3
sulfurdioxide slant column density corrected win1 [DU]	$(3.917 \pm 66.178) \times 10^{-2}$	16942387	-2.500×10^{-2}	0.737	1.913×10^{-2}	-67.4	50.6
background so2 slant column offset window1 [DU]	-0.131 ± 0.129	16942387	-0.140	0.141	-0.147	-0.553	2.68
sulfurdioxide slant column density window2 [DU]	2.31 ± 9.18	16942387	1.75	11.7	2.14	-1.861×10^3	771
sulfurdioxide slant column density window2 precision [DU]	8.25 ± 2.25	16942387	7.43	2.59	7.92	2.32	676
sulfurdioxide slant column density corrected win2 [DU]	-0.812 ± 8.865	16942387	-0.750	11.3	-0.834	-1.864×10^3	770
background so2 slant column offset window2 [DU]	-3.12 ± 2.44	16942387	-0.750	3.91	-2.48	-13.1	5.41
sulfurdioxide slant column density window3 [DU]	-7.34 ± 24.19	16942387	-8.40	30.4	-7.41	-1.768×10^3	745
sulfurdioxide slant column density window3 precision [DU]	28.4 ± 13.5	16942387	22.5	9.99	25.0	8.79	1.903×10^3
sulfurdioxide slant column density corrected win3 [DU]	6.49 ± 23.55	16942387	7.28	29.5	6.49	-1.768×10^3	757
background so2 slant column offset window3 [DU]	13.8 ± 6.1	16942387	8.40	10.0	13.3	-9.57	34.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	16942387	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.445 \pm 7.350) \times 10^{-2}$	16942387	1.539×10^{-2}	2.015×10^{-2}	1.453×10^{-2}	3.895×10^{-4}	1.78
fitted radiance shift [nm]	$(-5.575 \pm 26.615) \times 10^{-4}$	16942387	-5.000×10^{-4}	1.916×10^{-3}	-5.815×10^{-4}	-5.801×10^{-2}	4.568×10^{-2}
fitted radiance squeeze [1]	$(-7.013 \pm 174.544) \times 10^{-6}$	16942387	1.000×10^{-5}	2.055×10^{-4}	-3.359×10^{-6}	-1.561×10^{-2}	1.810×10^{-2}
fitted root mean square [1]	$(1.287 \pm 0.484) \times 10^{-3}$	16942387	1.025×10^{-3}	5.178×10^{-4}	1.167×10^{-3}	3.412×10^{-4}	7.093×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.879 ± 0.507	16942387	0.660	0.569	0.789	5.000×10^{-2}	3.54
sulfurdioxide total air mass factor polluted precision [1]	0.110 ± 0.105	16942387	3.500×10^{-2}	0.116	7.473×10^{-2}	2.506×10^{-3}	1.75
sulfurdioxide clear air mass factor polluted [1]	0.752 ± 0.415	16942387	0.660	0.370	0.690	4.260×10^{-2}	3.56
number of spectral points in retrieval [1]	73.4 ± 0.5	16942387	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.1000	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.80	-0.945	-0.559	-0.372	-0.217	0.244	0.413	0.624	1.07	3.25
sulfurdioxide total vertical column precision [DU]	8.132×10^{-2}	0.126	0.158	0.185	0.220	0.577	0.800	1.09	1.74	4.95
sulfurdioxide slant column density corrected [DU]	-0.834	-0.496	-0.362	-0.271	-0.175	0.196	0.297	0.396	0.547	0.985
sulfurdioxide slant column density cobra [DU]	-0.834	-0.496	-0.362	-0.271	-0.175	0.196	0.297	0.396	0.547	0.985
sulfurdioxide slant column density cobra precision [DU]	0.145	0.172	0.186	0.198	0.213	0.344	0.391	0.436	0.514	0.721
sulfurdioxide slant column density window1 [DU]	-1.55	-0.864	-0.588	-0.401	-0.204	0.542	0.736	0.921	1.19	1.92
sulfurdioxide slant column density window1 precision [DU]	0.145	0.172	0.186	0.198	0.213	0.344	0.391	0.436	0.514	0.721
sulfurdioxide slant column density corrected win1 [DU]	-1.56	-0.951	-0.702	-0.529	-0.343	0.393	0.596	0.791	1.09	1.89
background so2 slant column offset window1 [DU]	-0.365	-0.305	-0.271	-0.246	-0.215	-7.376×10^{-2}	-2.797×10^{-2}	2.544×10^{-2}	0.107	0.279
sulfurdioxide slant column density window2 [DU]	-19.0	-12.3	-8.95	-6.46	-3.64	8.09	11.1	13.8	17.5	25.1
sulfurdioxide slant column density window2 precision [DU]	4.40	5.32	5.85	6.27	6.77	9.36	10.2	11.1	12.3	14.9
sulfurdioxide slant column density corrected win2 [DU]	-22.0	-15.1	-11.8	-9.26	-6.46	4.81	7.63	10.2	13.6	20.7
background so2 slant column offset window2 [DU]	-8.79	-7.46	-6.73	-6.03	-5.05	-1.15	-0.816	-0.581	-0.237	1.44
sulfurdioxide slant column density window3 [DU]	-67.7	-46.8	-37.1	-30.1	-22.5	7.94	15.8	22.8	32.3	51.3
sulfurdioxide slant column density window3 precision [DU]	13.5	16.3	18.0	19.4	21.0	31.0	35.7	41.4	53.4	86.0
sulfurdioxide slant column density corrected win3 [DU]	-52.7	-32.0	-22.5	-15.6	-8.19	21.4	28.9	35.7	44.9	63.7
background so2 slant column offset window3 [DU]	1.79	5.71	6.78	7.60	8.66	18.7	20.6	22.2	23.9	27.0
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	1.831×10^{-3}	3.696×10^{-3}	4.955×10^{-3}	6.131×10^{-3}	7.839×10^{-3}	2.799×10^{-2}	4.460×10^{-2}	7.294×10^{-2}	0.135	0.355
fitted radiance shift [nm]	-8.396×10^{-3}	-4.378×10^{-3}	-3.016×10^{-3}	-2.239×10^{-3}	-1.563×10^{-3}	3.527×10^{-4}	1.042×10^{-3}	1.927×10^{-3}	3.490×10^{-3}	7.853×10^{-3}
fitted radiance squeeze [1]	-4.715×10^{-4}	-2.909×10^{-4}	-2.148×10^{-4}	-1.625×10^{-4}	-1.074×10^{-4}	9.815×10^{-5}	1.498×10^{-4}	1.973×10^{-4}	2.644×10^{-4}	4.181×10^{-4}
fitted root mean square [1]	6.064×10^{-4}	7.537×10^{-4}	8.316×10^{-4}	8.921×10^{-4}	9.674×10^{-4}	1.485×10^{-3}	1.694×10^{-3}	1.901×10^{-3}	2.204×10^{-3}	2.993×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.441×10^{-2}	0.206	0.324	0.423	0.542	1.11	1.32	1.54	1.86	2.62
sulfurdioxide total air mass factor polluted precision [1]	9.159×10^{-3}	1.760×10^{-2}	2.412×10^{-2}	2.988×10^{-2}	3.757×10^{-2}	0.153	0.195	0.235	0.301	0.504
sulfurdioxide clear air mass factor polluted [1]	0.188	0.283	0.359	0.428	0.516	0.886	0.989	1.10	1.34	2.74
number of spectral points in retrieval [1]	73.0	73.0	73.0	73.0	73.0	74.0	74.0	74.0	74.0	74.0

Table 3: Parameterlist and basic statistics for the analysis for observations in the northern hemisphere

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.699 $\pm$ 0.401	7577848	0.720	1.000	0.0	1.000	0.280	1.000
sulfurdioxide total vertical column [DU]	(5.290 $\pm$ 155.696) $\times 10^{-2}$	7577848	0.537	1.432 $\times 10^{-2}$	-115	167	-0.248	0.289
sulfurdioxide total vertical column precision [DU]	0.730 $\pm$ 1.162	7577848	0.481	0.377	4.954 $\times 10^{-2}$	43.8	0.240	0.722
sulfurdioxide slant column density corrected [DU]	(2.558 $\pm$ 38.793) $\times 10^{-2}$	7577848	0.378	1.113 $\times 10^{-2}$	-7.10	48.7	-0.175	0.202
sulfurdioxide slant column density cobra [DU]	(2.550 $\pm$ 38.380) $\times 10^{-2}$	7577848	0.378	1.113 $\times 10^{-2}$	-7.10	24.7	-0.175	0.202
sulfurdioxide slant column density cobra precision [DU]	0.299 $\pm$ 0.121	7577848	0.133	0.266	8.488 $\times 10^{-2}$	7.87	0.217	0.350
sulfurdioxide slant column density window1 [DU]	0.212 $\pm$ 0.683	7577848	0.757	0.206	-13.0	26.8	-0.172	0.585
sulfurdioxide slant column density window1 precision [DU]	0.299 $\pm$ 0.121	7577848	0.133	0.266	8.488 $\times 10^{-2}$	7.87	0.217	0.350
sulfurdioxide slant column density corrected win1 [DU]	(5.314 $\pm$ 68.084) $\times 10^{-2}$	7577848	0.751	2.963 $\times 10^{-2}$	-13.0	26.7	-0.339	0.412
background so2 slant column offset window1 [DU]	-0.159 $\pm$ 0.111	7577848	0.123	-0.166	-0.549	1.02	-0.228	-0.105
sulfurdioxide slant column density window2 [DU]	1.90 $\pm$ 9.48	7577848	12.1	1.65	-339	771	-4.28	7.82
sulfurdioxide slant column density window2 precision [DU]	8.67 $\pm$ 2.33	7577848	2.84	8.36	2.40	304	7.09	9.93
sulfurdioxide slant column density corrected win2 [DU]	-0.734 $\pm$ 9.220	7577848	11.8	-0.764	-341	770	-6.64	5.13
background so2 slant column offset window2 [DU]	-2.63 $\pm$ 2.20	7577848	2.73	-2.00	-11.7	5.41	-3.84	-1.11
sulfurdioxide slant column density window3 [DU]	-7.32 $\pm$ 25.86	7577848	32.5	-6.96	-201	210	-23.3	9.24
sulfurdioxide slant column density window3 precision [DU]	30.4 $\pm$ 14.3	7577848	10.9	26.9	9.62	273	22.5	33.4
sulfurdioxide slant column density corrected win3 [DU]	6.29 $\pm$ 25.27	7577848	32.0	6.41	-193	228	-9.52	22.4
background so2 slant column offset window3 [DU]	13.6 $\pm$ 5.9	7577848	9.48	12.6	-9.05	34.9	8.73	18.2
sulfurdioxide slant column cobra flag [1]	1.98 $\pm$ 0.22	7577848	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	(5.668 $\pm$ 10.056) $\times 10^{-2}$	7577848	4.190 $\times 10^{-2}$	2.256 $\times 10^{-2}$	3.895 $\times 10^{-4}$	1.78	1.353 $\times 10^{-2}$	5.542 $\times 10^{-2}$
fitted radiance shift [nm]	(-2.091 $\pm$ 28.798) $\times 10^{-4}$	7577848	1.847 $\times 10^{-3}$	-2.606 $\times 10^{-4}$	-5.801 $\times 10^{-2}$	4.568 $\times 10^{-2}$	-1.153 $\times 10^{-3}$	6.944 $\times 10^{-4}$
fitted radiance squeeze [1]	(1.093 $\pm$ 17.370) $\times 10^{-5}$	7577848	2.071 $\times 10^{-4}$	9.606 $\times 10^{-6}$	-1.034 $\times 10^{-2}$	1.372 $\times 10^{-2}$	-9.318 $\times 10^{-5}$	1.139 $\times 10^{-4}$
fitted root mean square [1]	(1.317 $\pm$ 0.496) $\times 10^{-3}$	7577848	5.585 $\times 10^{-4}$	1.192 $\times 10^{-3}$	3.541 $\times 10^{-4}$	4.095 $\times 10^{-2}$	9.810 $\times 10^{-4}$	1.540 $\times 10^{-3}$
sulfurdioxide total air mass factor polluted [1]	0.747 $\pm$ 0.390	7577848	0.524	0.727	5.000 $\times 10^{-2}$	2.94	0.459	0.982
sulfurdioxide total air mass factor polluted precision [1]	(9.880 $\pm$ 11.588) $\times 10^{-2}$	7577848	9.092 $\times 10^{-2}$	5.639 $\times 10^{-2}$	2.506 $\times 10^{-3}$	1.75	3.232 $\times 10^{-2}$	0.123
sulfurdioxide clear air mass factor polluted [1]	0.674 $\pm$ 0.286	7577848	0.450	0.671	4.260 $\times 10^{-2}$	2.32	0.440	0.891
number of spectral points in retrieval [1]	73.5 $\pm$ 0.5	7577848	1.000	73.0	53.0	74.0	73.0	74.0

Table 4: Parameterlist and basic statistics for the analysis for observations in the southern hemisphere

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.613 ± 0.411	9364539	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(2.091 \pm 84.858) \times 10^{-2}$	9364539	0.410	7.105×10^{-3}	-42.5	382	-0.195	0.215
sulfurdioxide total vertical column precision [DU]	0.459 ± 0.619	9364539	0.294	0.303	2.928×10^{-2}	176	0.203	0.496
sulfurdioxide slant column density corrected [DU]	$(1.225 \pm 35.184) \times 10^{-2}$	9364539	0.367	7.073×10^{-3}	-9.74	204	-0.175	0.192
sulfurdioxide slant column density cobra [DU]	$(1.216 \pm 33.787) \times 10^{-2}$	9364539	0.367	7.073×10^{-3}	-9.74	33.3	-0.175	0.192
sulfurdioxide slant column density cobra precision [DU]	0.291 ± 0.116	9364539	0.129	0.260	8.021×10^{-2}	14.3	0.211	0.340
sulfurdioxide slant column density window1 [DU]	0.137 ± 0.650	9364539	0.736	0.143	-67.4	50.7	-0.228	0.508
sulfurdioxide slant column density window1 precision [DU]	0.291 ± 0.116	9364539	0.129	0.260	8.021×10^{-2}	14.3	0.211	0.340
sulfurdioxide slant column density corrected win1 [DU]	$(2.787 \pm 64.572) \times 10^{-2}$	9364539	0.726	1.084×10^{-2}	-67.4	50.6	-0.347	0.379
background so2 slant column offset window1 [DU]	-0.109 ± 0.138	9364539	0.153	-0.126	-0.553	2.68	-0.201	-4.785×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.65 ± 8.91	9364539	11.4	2.51	-1.861×10^3	608	-3.12	8.28
sulfurdioxide slant column density window2 precision [DU]	7.90 ± 2.12	9364539	2.30	7.61	2.32	676	6.57	8.88
sulfurdioxide slant column density corrected win2 [DU]	-0.875 ± 8.566	9364539	10.9	-0.888	-1.864×10^3	604	-6.33	4.56
background so2 slant column offset window2 [DU]	-3.52 ± 2.56	9364539	4.48	-3.27	-13.1	5.27	-5.67	-1.20
sulfurdioxide slant column density window3 [DU]	-7.36 ± 22.74	9364539	28.9	-7.74	-1.768×10^3	745	-21.9	6.94
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 12.5	9364539	8.45	23.6	8.79	1.903×10^3	20.2	28.7
sulfurdioxide slant column density corrected win3 [DU]	6.66 ± 22.06	9364539	27.8	6.55	-1.768×10^3	757	-7.22	20.6
background so2 slant column offset window3 [DU]	14.0 ± 6.2	9364539	10.4	14.0	-9.57	31.9	8.59	19.0
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	9364539	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.647 \pm 2.945) \times 10^{-2}$	9364539	1.161×10^{-2}	9.934×10^{-3}	6.448×10^{-4}	1.40	6.359×10^{-3}	1.797×10^{-2}
fitted radiance shift [nm]	$(-8.394 \pm 24.346) \times 10^{-4}$	9364539	1.840×10^{-3}	-8.460×10^{-4}	-5.150×10^{-2}	4.393×10^{-2}	-1.808×10^{-3}	3.220×10^{-5}
fitted radiance squeeze [1]	$(-2.153 \pm 17.387) \times 10^{-5}$	9364539	2.042×10^{-4}	-1.370×10^{-5}	-1.561×10^{-2}	1.810×10^{-2}	-1.187×10^{-4}	8.555×10^{-5}
fitted root mean square [1]	$(1.263 \pm 0.473) \times 10^{-3}$	9364539	4.871×10^{-4}	1.148×10^{-3}	3.412×10^{-4}	7.093×10^{-2}	9.575×10^{-4}	1.445×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.986 ± 0.562	9364539	0.660	0.844	5.000×10^{-2}	3.54	0.605	1.27
sulfurdioxide total air mass factor polluted precision [1]	0.120 ± 0.095	9364539	0.129	9.624×10^{-2}	4.088×10^{-3}	1.48	4.219×10^{-2}	0.172
sulfurdioxide clear air mass factor polluted [1]	0.815 ± 0.487	9364539	0.321	0.699	0.107	3.56	0.559	0.880
number of spectral points in retrieval [1]	73.4 ± 0.5	9364539	1.000	73.0	52.0	74.0	73.0	74.0

Table 5: Parameterlist and basic statistics for the analysis for observations over water

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.663 ± 0.403	12306296	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(2.850 \pm 95.918) \times 10^{-2}$	12306296	0.435	9.645×10^{-3}	-115	357	-0.205	0.230
sulfurdioxide total vertical column precision [DU]	0.496 ± 0.714	12306296	0.300	0.308	3.339×10^{-2}	176	0.216	0.516
sulfurdioxide slant column density corrected [DU]	$(1.764 \pm 35.111) \times 10^{-2}$	12306296	0.366	8.768×10^{-3}	-9.74	153	-0.172	0.193
sulfurdioxide slant column density cobra [DU]	$(1.759 \pm 34.637) \times 10^{-2}$	12306296	0.366	8.768×10^{-3}	-9.74	17.5	-0.172	0.193
sulfurdioxide slant column density cobra precision [DU]	0.289 ± 0.116	12306296	0.127	0.258	8.146×10^{-2}	11.7	0.211	0.338
sulfurdioxide slant column density window1 [DU]	0.165 ± 0.653	12306296	0.733	0.168	-67.4	38.6	-0.201	0.532
sulfurdioxide slant column density window1 precision [DU]	0.289 ± 0.116	12306296	0.127	0.258	8.146×10^{-2}	11.7	0.211	0.338
sulfurdioxide slant column density corrected win1 [DU]	$(4.009 \pm 64.913) \times 10^{-2}$	12306296	0.724	2.057×10^{-2}	-67.4	38.6	-0.336	0.388
background so2 slant column offset window1 [DU]	-0.125 ± 0.134	12306296	0.145	-0.144	-0.553	2.68	-0.212	-6.682×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.39 ± 8.92	12306296	11.5	2.22	-642	573	-3.45	8.07
sulfurdioxide slant column density window2 precision [DU]	8.04 ± 2.06	12306296	2.40	7.75	2.37	350	6.67	9.07
sulfurdioxide slant column density corrected win2 [DU]	-0.823 ± 8.601	12306296	11.1	-0.843	-645	569	-6.36	4.69
background so2 slant column offset window2 [DU]	-3.21 ± 2.49	12306296	4.14	-2.59	-13.1	5.41	-5.28	-1.14
sulfurdioxide slant column density window3 [DU]	-5.03 ± 23.45	12306296	29.9	-5.44	-1.768×10^3	651	-20.1	9.80
sulfurdioxide slant column density window3 precision [DU]	27.5 ± 12.3	12306296	9.00	24.3	8.79	1.291×10^3	20.8	29.8
sulfurdioxide slant column density corrected win3 [DU]	8.61 ± 22.60	12306296	28.7	8.26	-1.768×10^3	657	-5.84	22.9
background so2 slant column offset window3 [DU]	13.6 ± 5.9	12306296	9.73	13.2	-9.57	34.9	8.60	18.3
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.16	12306296	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.932 \pm 3.279) \times 10^{-2}$	12306296	1.345×10^{-2}	1.256×10^{-2}	6.218×10^{-4}	1.78	7.446×10^{-3}	2.090×10^{-2}
fitted radiance shift [nm]	$(-5.848 \pm 24.952) \times 10^{-4}$	12306296	1.967×10^{-3}	-5.850×10^{-4}	-5.801×10^{-2}	4.568×10^{-2}	-1.621×10^{-3}	3.461×10^{-4}
fitted radiance squeeze [1]	$(-1.203 \pm 17.231) \times 10^{-5}$	12306296	2.024×10^{-4}	-6.156×10^{-6}	-1.561×10^{-2}	1.810×10^{-2}	-1.094×10^{-4}	9.297×10^{-5}
fitted root mean square [1]	$(1.265 \pm 0.479) \times 10^{-3}$	12306296	4.930×10^{-4}	1.143×10^{-3}	3.520×10^{-4}	4.841×10^{-2}	9.542×10^{-4}	1.447×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.896 ± 0.449	12306296	0.531	0.831	5.000×10^{-2}	2.97	0.595	1.13
sulfurdioxide total air mass factor polluted precision [1]	0.106 ± 0.088	12306296	0.106	7.603×10^{-2}	3.787×10^{-3}	1.32	4.117×10^{-2}	0.147
sulfurdioxide clear air mass factor polluted [1]	0.753 ± 0.312	12306296	0.341	0.717	7.322×10^{-2}	2.93	0.556	0.897
number of spectral points in retrieval [1]	73.4 ± 0.5	12306296	1.000	73.0	70.0	74.0	73.0	74.0

Table 6: Parameterlist and basic statistics for the analysis for observations over land

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.645 ± 0.416	3703401	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(4.664 \pm 150.296) \times 10^{-2}$	3703401	0.520	9.089×10^{-3}	-89.9	167	-0.243	0.277
sulfurdioxide total vertical column precision [DU]	0.704 ± 1.102	3703401	0.495	0.396	2.928×10^{-2}	43.8	0.232	0.727
sulfurdioxide slant column density corrected [DU]	$(1.846 \pm 39.577) \times 10^{-2}$	3703401	0.384	8.239×10^{-3}	-7.63	53.2	-0.182	0.202
sulfurdioxide slant column density cobra [DU]	$(1.832 \pm 38.797) \times 10^{-2}$	3703401	0.384	8.239×10^{-3}	-7.63	33.3	-0.182	0.202
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.121	3703401	0.132	0.271	8.021×10^{-2}	13.0	0.220	0.352
sulfurdioxide slant column density window1 [DU]	0.185 ± 0.687	3703401	0.771	0.179	-46.7	44.6	-0.206	0.566
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.121	3703401	0.132	0.271	8.021×10^{-2}	13.0	0.220	0.352
sulfurdioxide slant column density corrected win1 [DU]	$(3.119 \pm 68.163) \times 10^{-2}$	3703401	0.760	1.069×10^{-2}	-46.7	44.5	-0.363	0.398
background so2 slant column offset window1 [DU]	-0.153 ± 0.111	3703401	0.130	-0.159	-0.500	0.950	-0.226	-9.563×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.90 ± 9.79	3703401	12.2	1.72	-1.861×10^3	771	-4.31	7.92
sulfurdioxide slant column density window2 precision [DU]	8.77 ± 2.63	3703401	2.96	8.42	2.32	676	7.10	10.1
sulfurdioxide slant column density corrected win2 [DU]	-0.768 ± 9.525	3703401	11.9	-0.794	-1.864×10^3	770	-6.71	5.14
background so2 slant column offset window2 [DU]	-2.66 ± 2.17	3703401	2.78	-2.11	-11.7	5.41	-3.89	-1.11
sulfurdioxide slant column density window3 [DU]	-13.7 ± 25.0	3703401	31.2	-13.2	-1.040×10^3	745	-29.1	2.19
sulfurdioxide slant column density window3 precision [DU]	31.1 ± 16.1	3703401	11.6	27.1	9.52	1.903×10^3	22.2	33.7
sulfurdioxide slant column density corrected win3 [DU]	0.254 ± 25.024	3703401	31.2	0.744	-1.033×10^3	757	-15.1	16.1
background so2 slant column offset window3 [DU]	14.0 ± 6.4	3703401	10.6	12.9	-9.56	34.8	8.62	19.2
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.30	3703401	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.260 \pm 11.934) \times 10^{-2}$	3703401	7.395×10^{-2}	3.095×10^{-2}	3.895×10^{-4}	1.76	1.083×10^{-2}	8.478×10^{-2}
fitted radiance shift [nm]	$(-5.157 \pm 30.921) \times 10^{-4}$	3703401	1.714×10^{-3}	-6.078×10^{-4}	-5.150×10^{-2}	4.199×10^{-2}	-1.422×10^{-3}	2.922×10^{-4}
fitted radiance squeeze [1]	$(2.916 \pm 176.963) \times 10^{-6}$	3703401	2.127×10^{-4}	1.773×10^{-6}	-1.384×10^{-2}	1.157×10^{-2}	-1.040×10^{-4}	1.087×10^{-4}
fitted root mean square [1]	$(1.322 \pm 0.475) \times 10^{-3}$	3703401	5.225×10^{-4}	1.217×10^{-3}	3.412×10^{-4}	7.093×10^{-2}	1.009×10^{-3}	1.531×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.873 ± 0.658	3703401	0.612	0.673	5.000×10^{-2}	3.54	0.454	1.07
sulfurdioxide total air mass factor polluted precision [1]	0.123 ± 0.140	3703401	0.146	6.908×10^{-2}	2.506×10^{-3}	1.75	2.971×10^{-2}	0.175
sulfurdioxide clear air mass factor polluted [1]	0.790 ± 0.652	3703401	0.421	0.617	4.358×10^{-2}	3.56	0.423	0.844
number of spectral points in retrieval [1]	73.4 ± 0.5	3703401	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

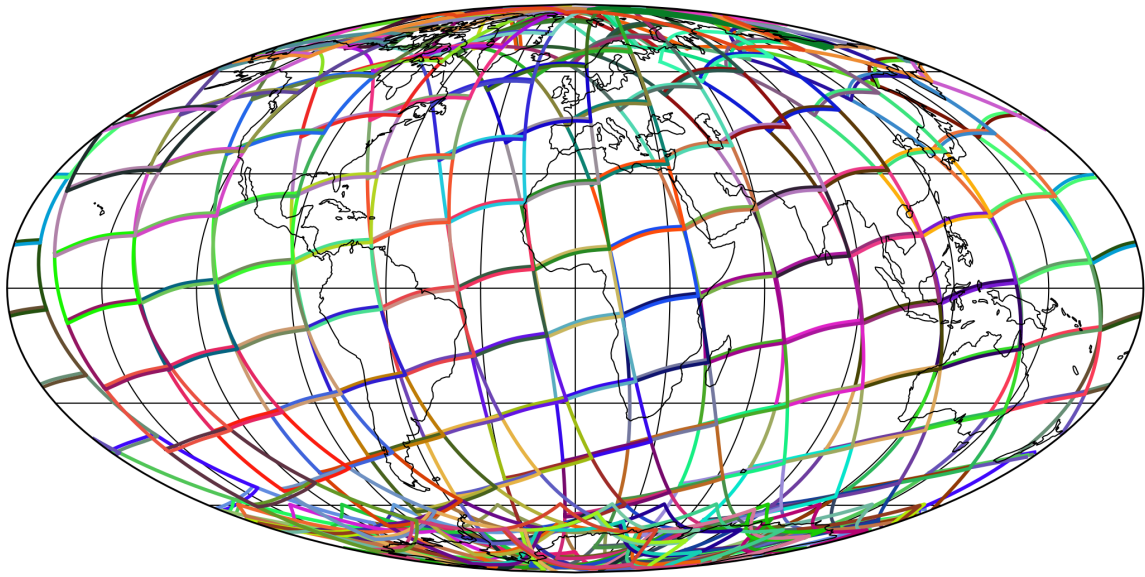


Figure 1: Outline of the granules.

4 Input data monitoring

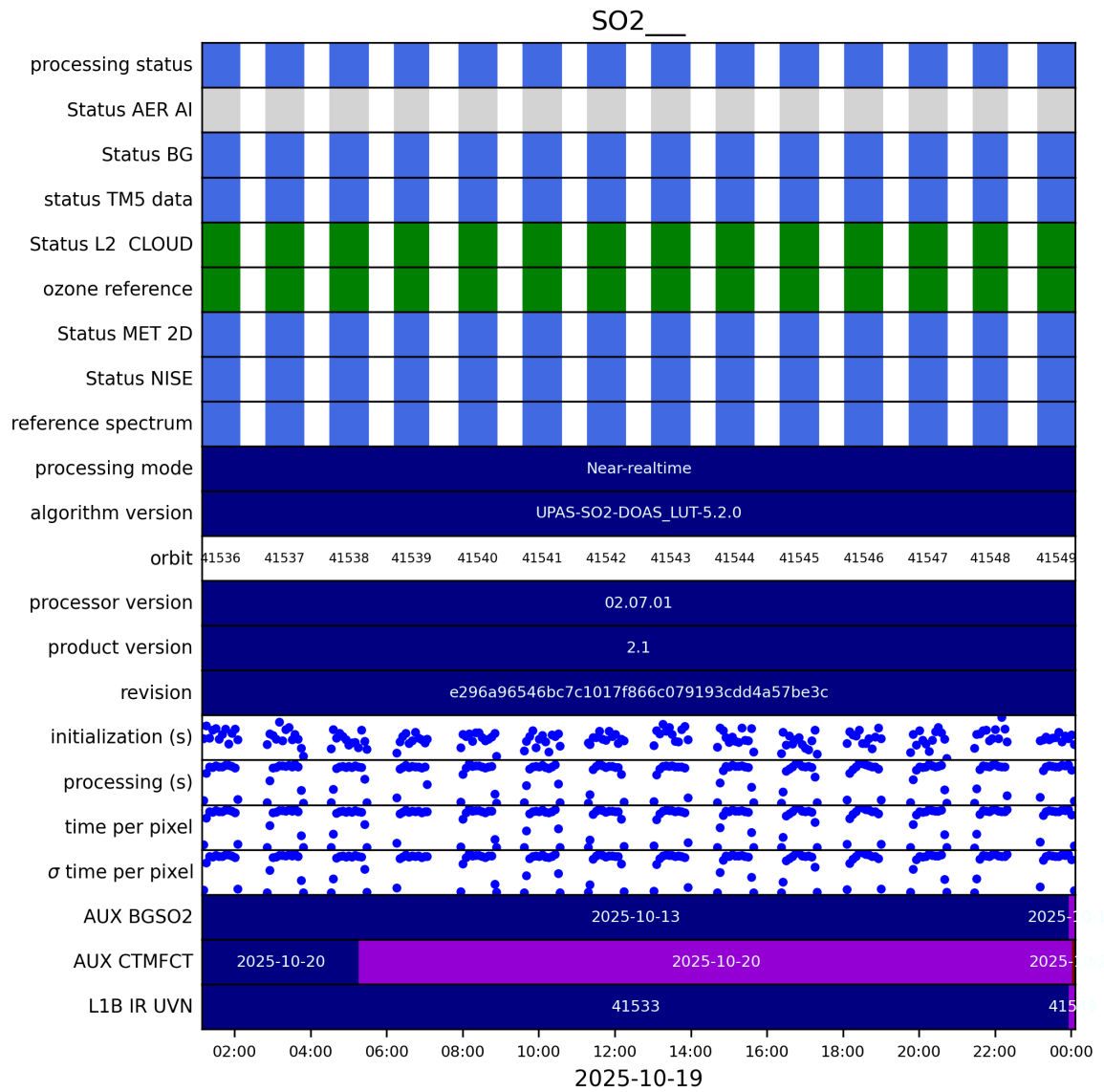


Figure 2: Input data per granule

5 Warnings and errors

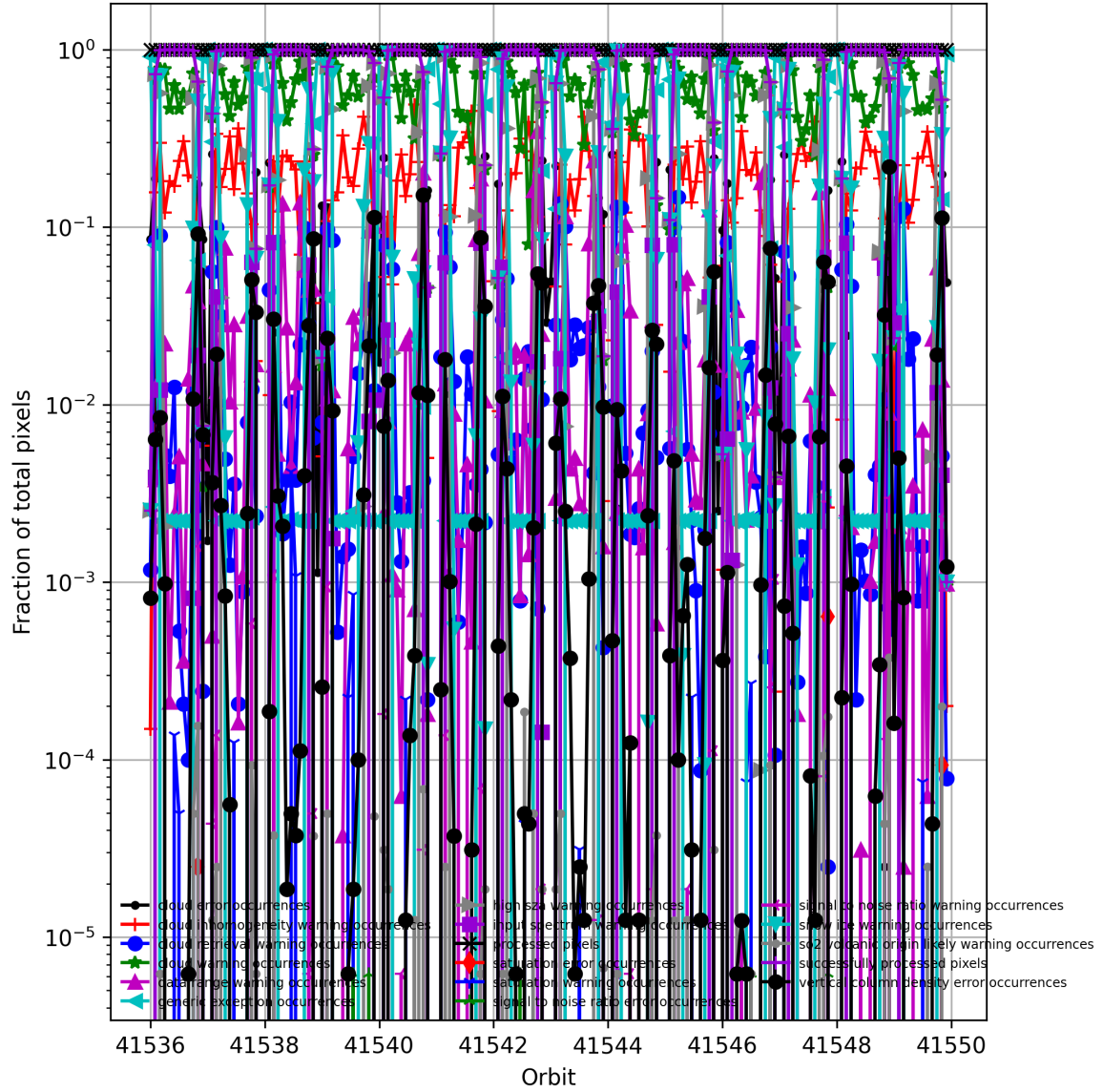


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

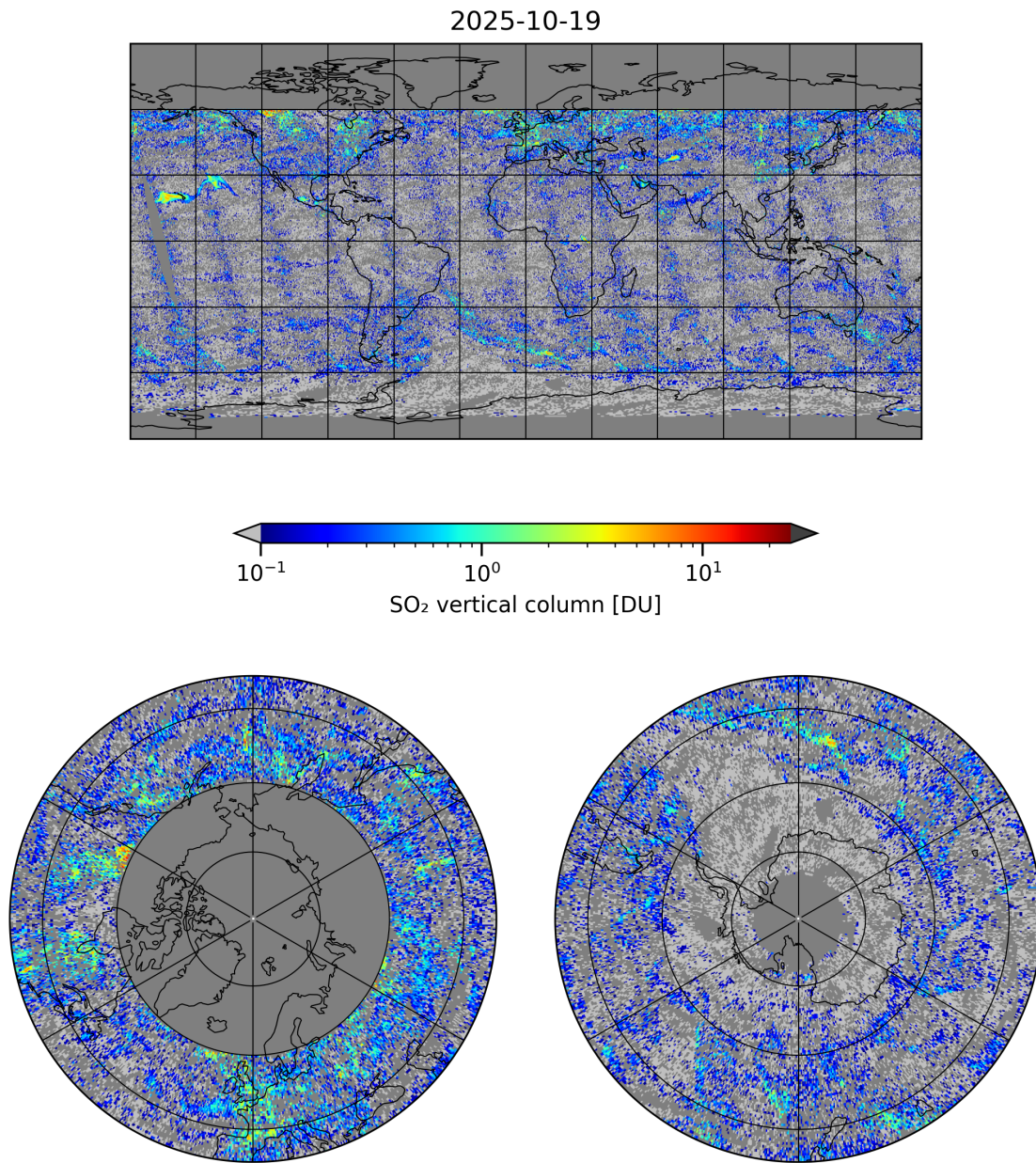


Figure 4: Map of “SO₂ vertical column” for 2025-10-19 to 2025-10-20

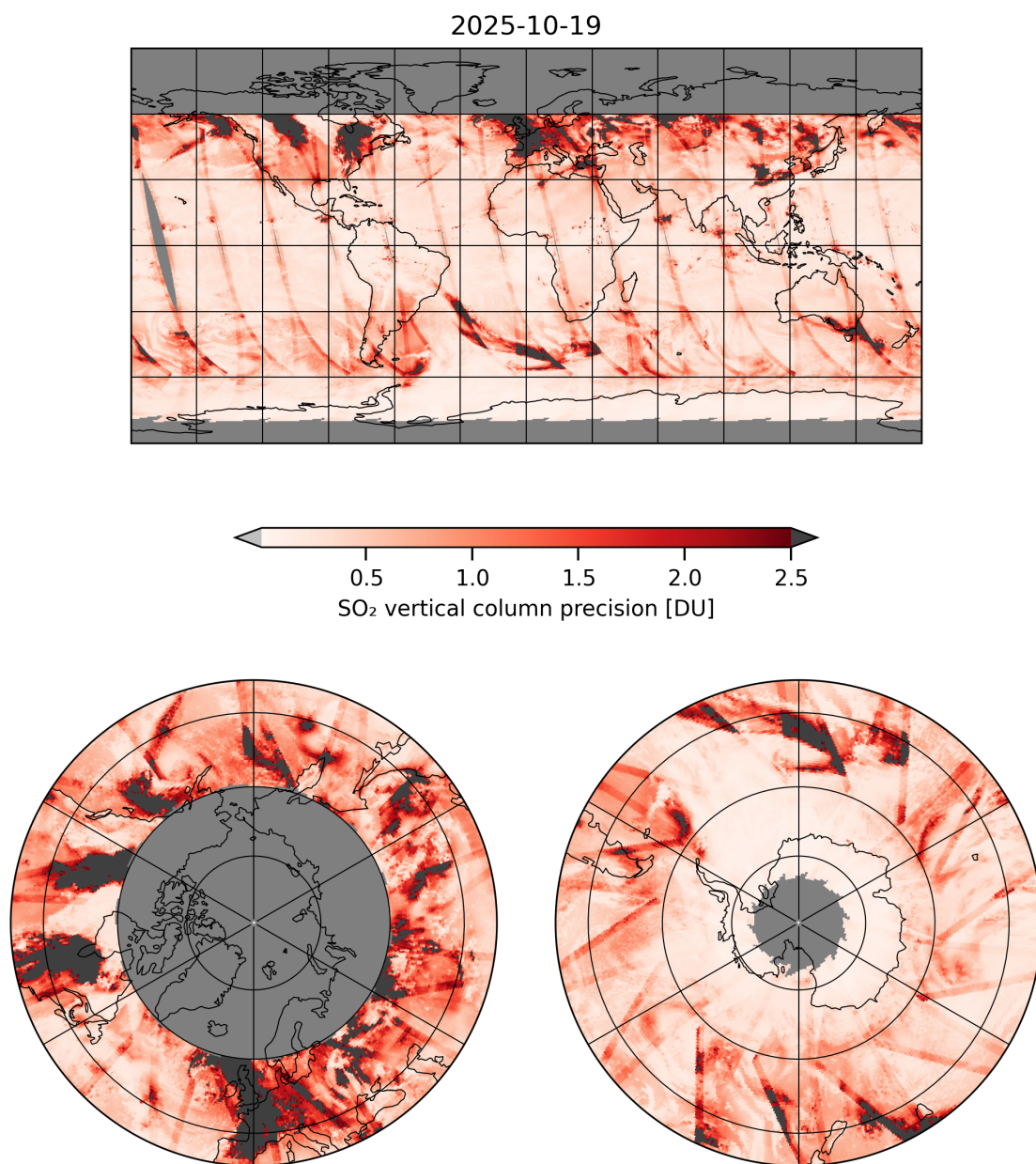


Figure 5: Map of “SO₂ vertical column precision” for 2025-10-19 to 2025-10-20

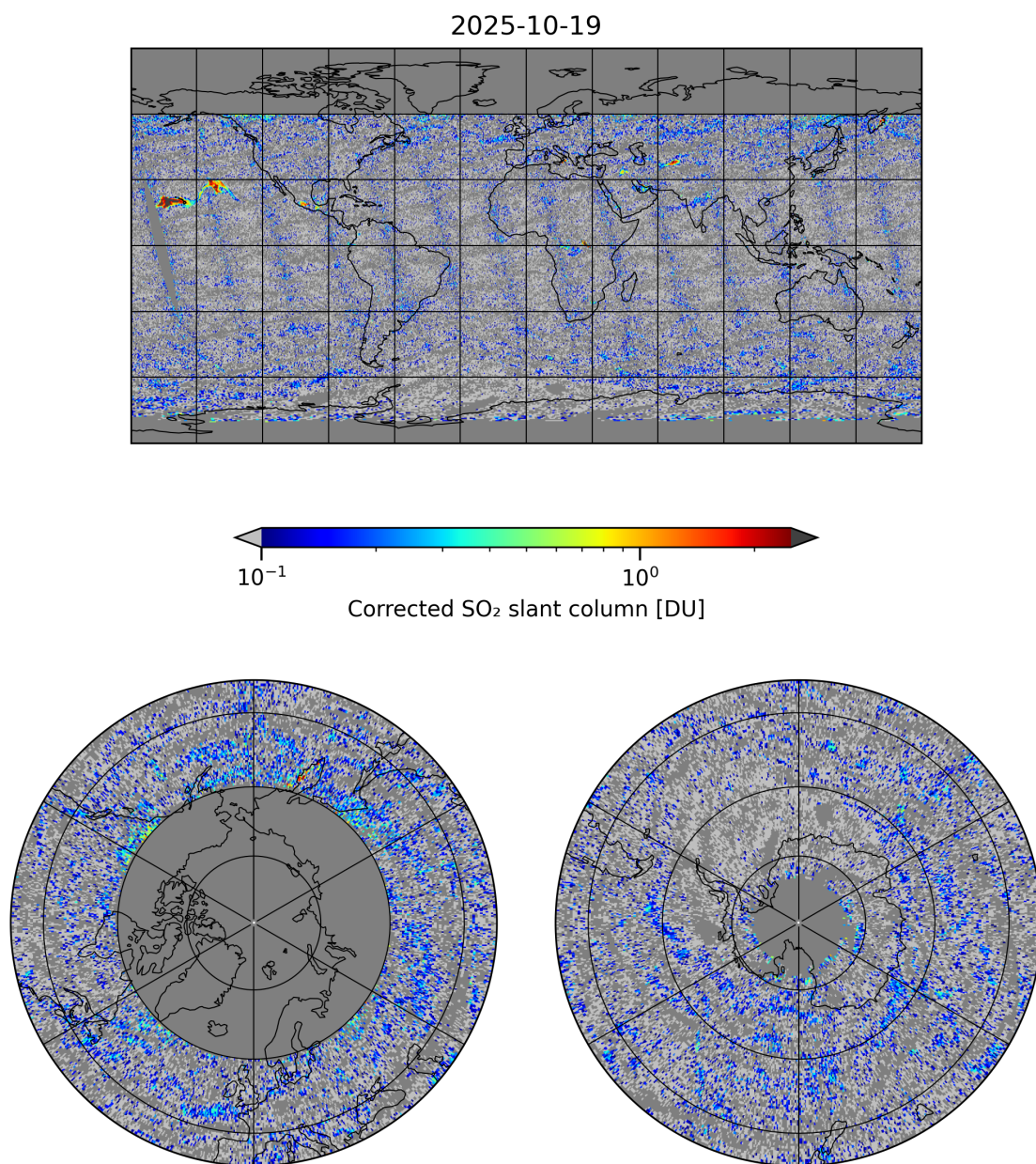


Figure 6: Map of “Corrected SO₂ slant column” for 2025-10-19 to 2025-10-20

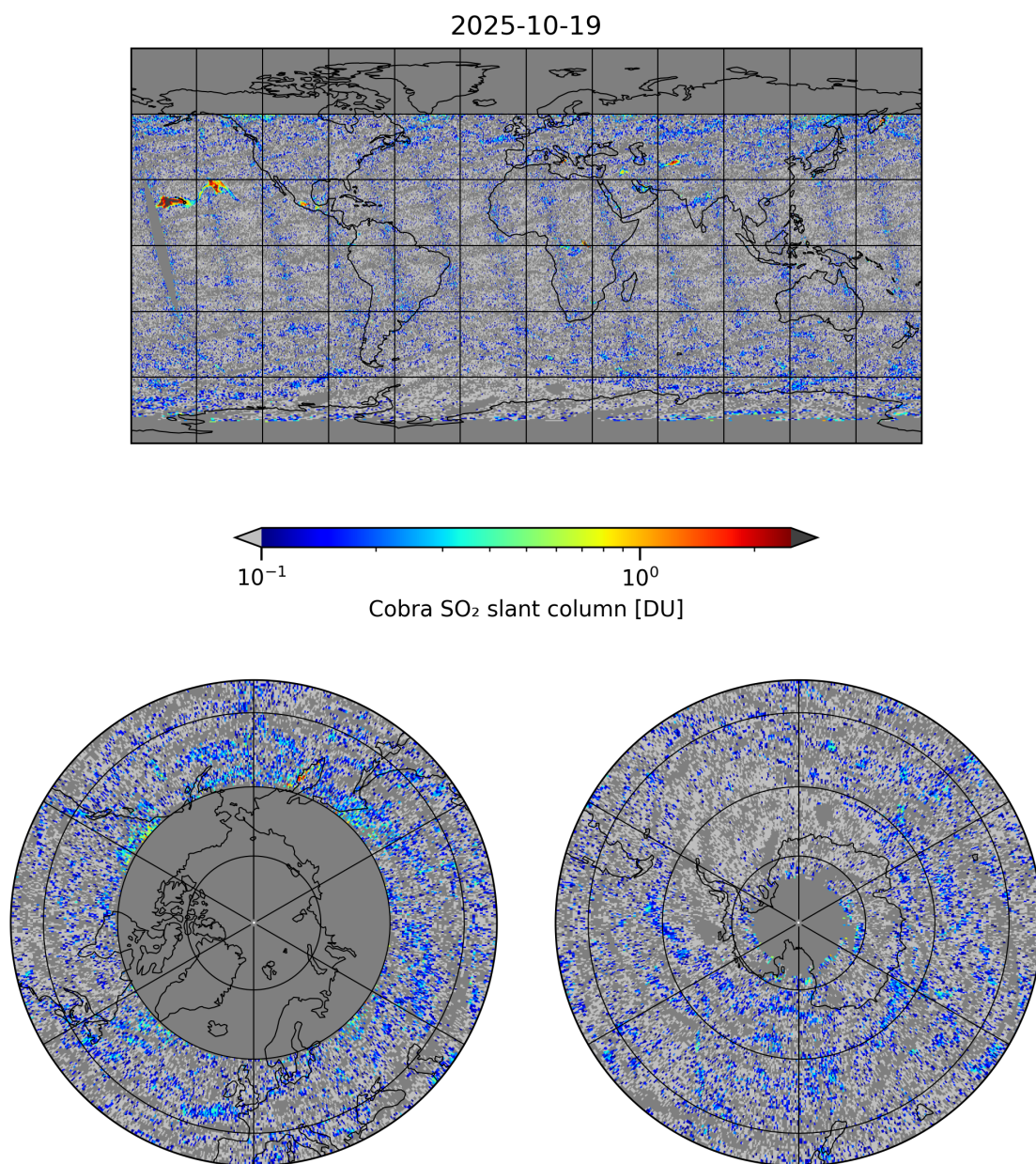


Figure 7: Map of “Cobra SO₂ slant column” for 2025-10-19 to 2025-10-20

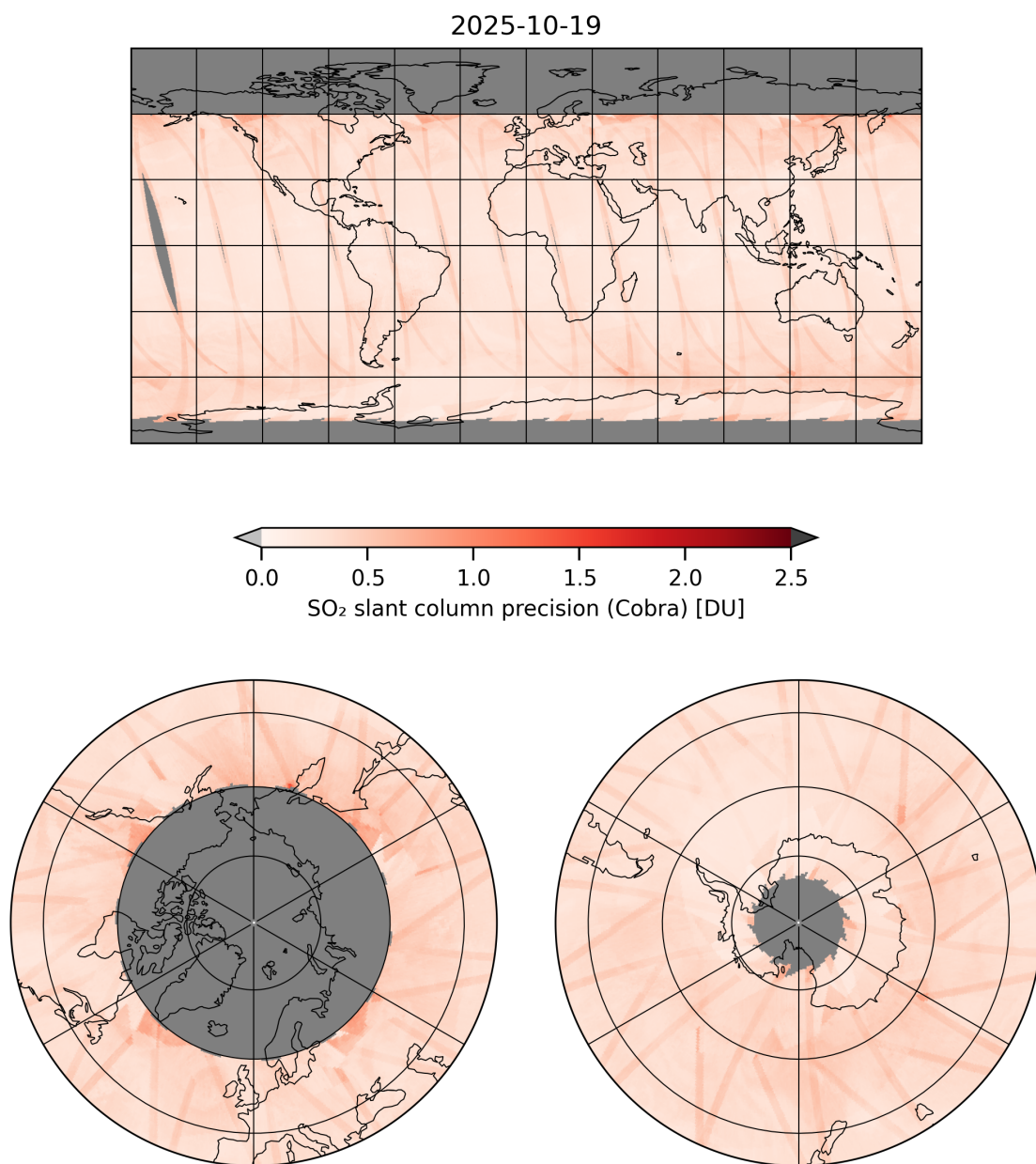


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-10-19 to 2025-10-20

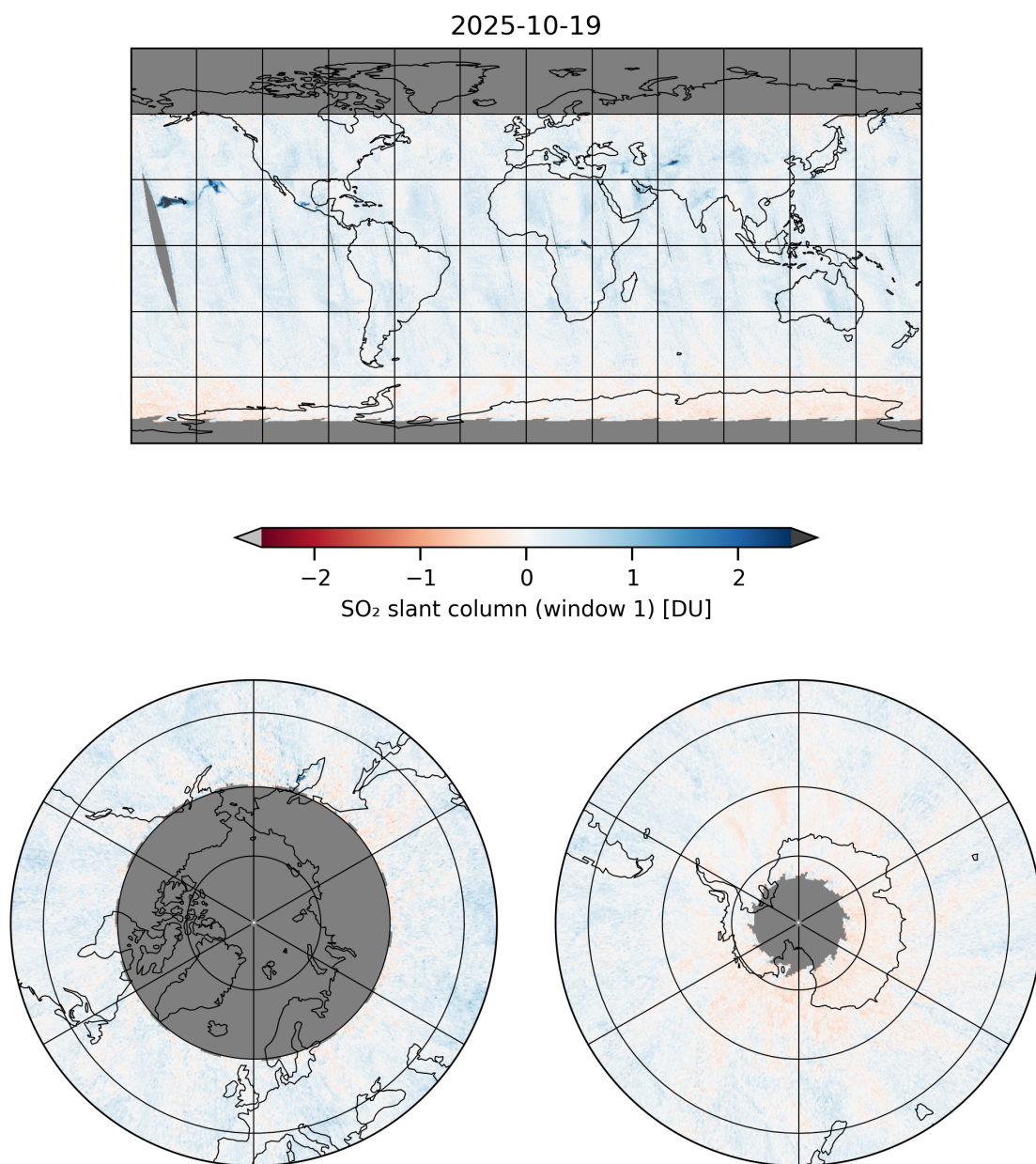


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-10-19 to 2025-10-20

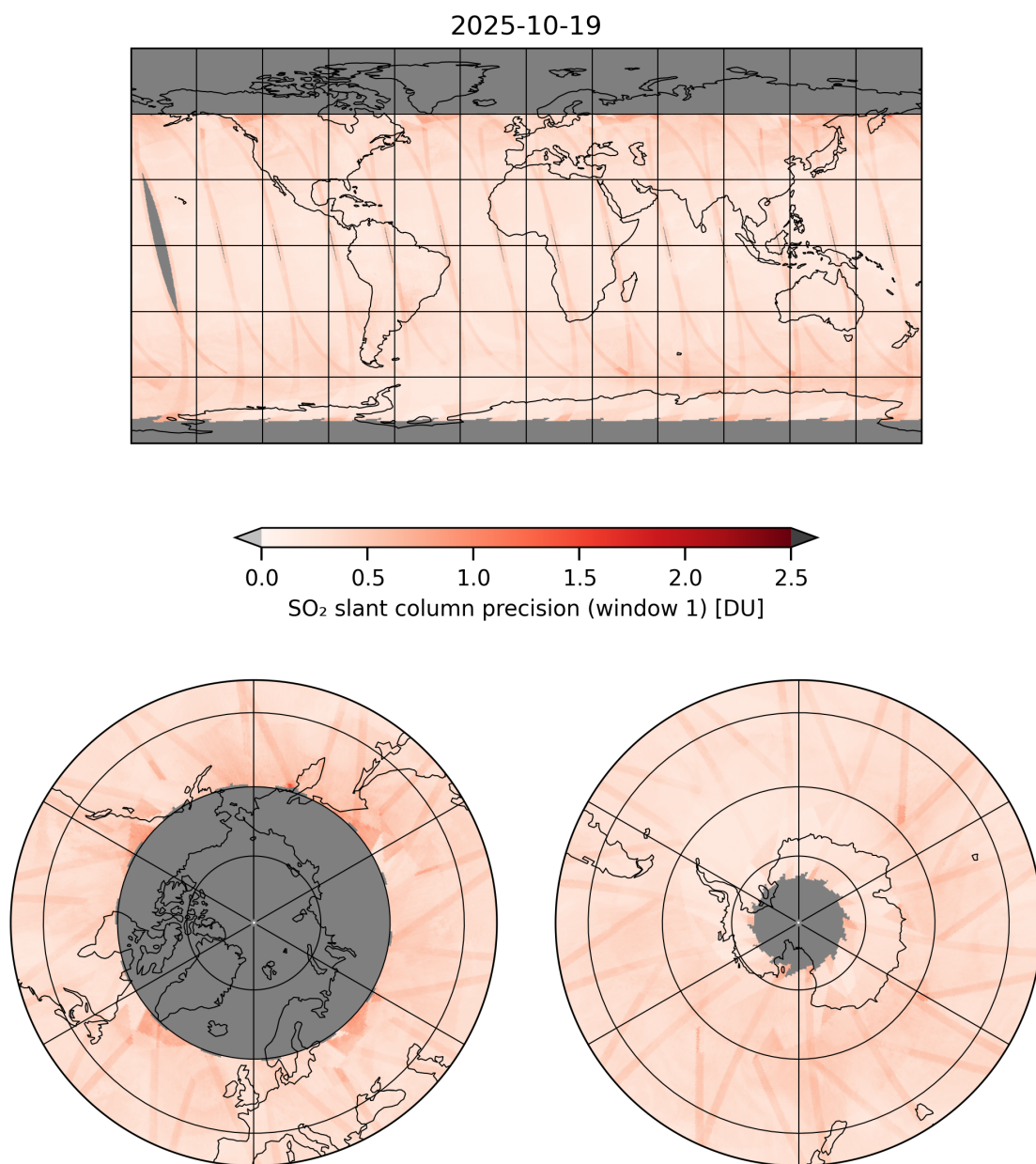


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-10-19 to 2025-10-20

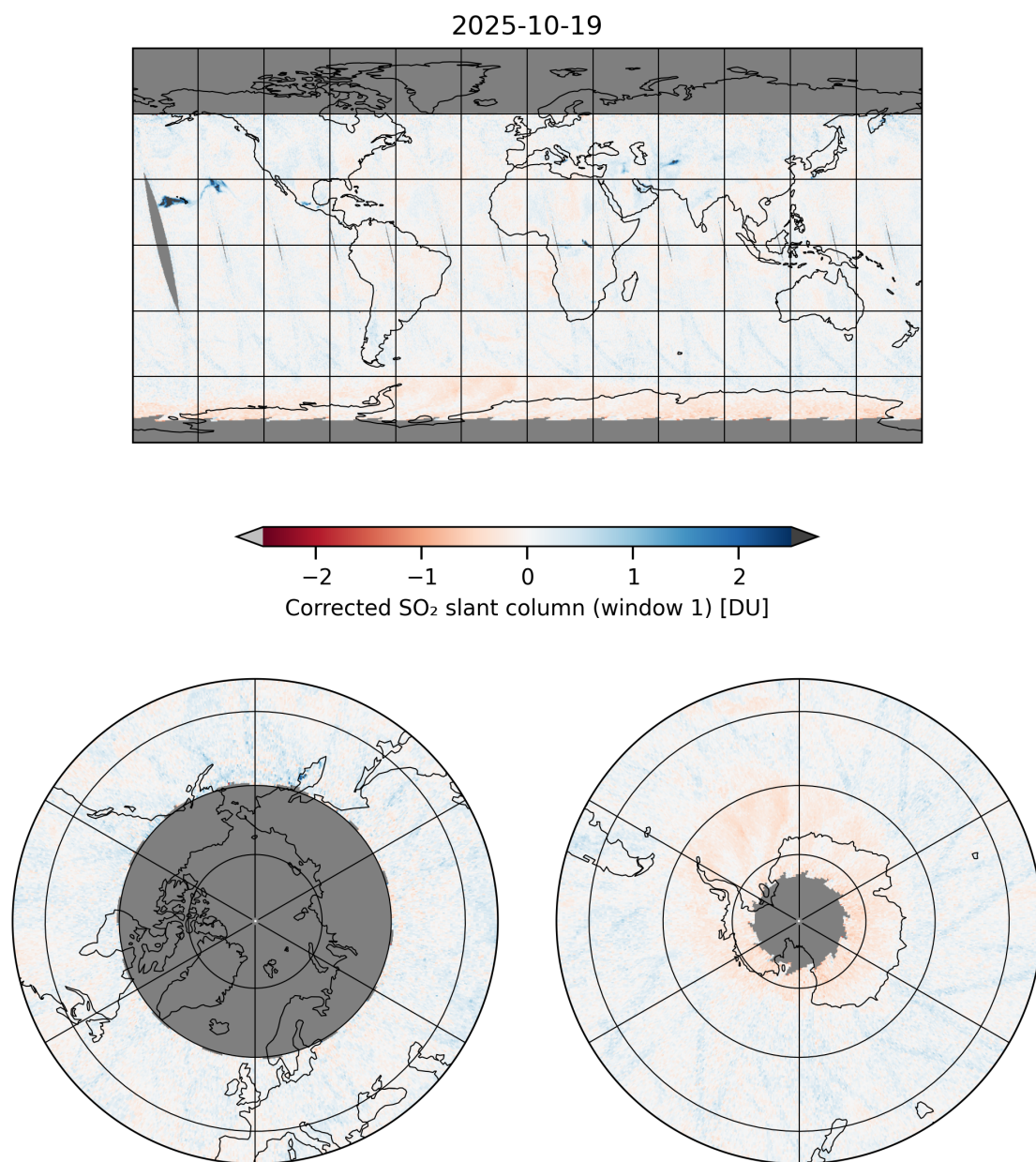


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-10-19 to 2025-10-20

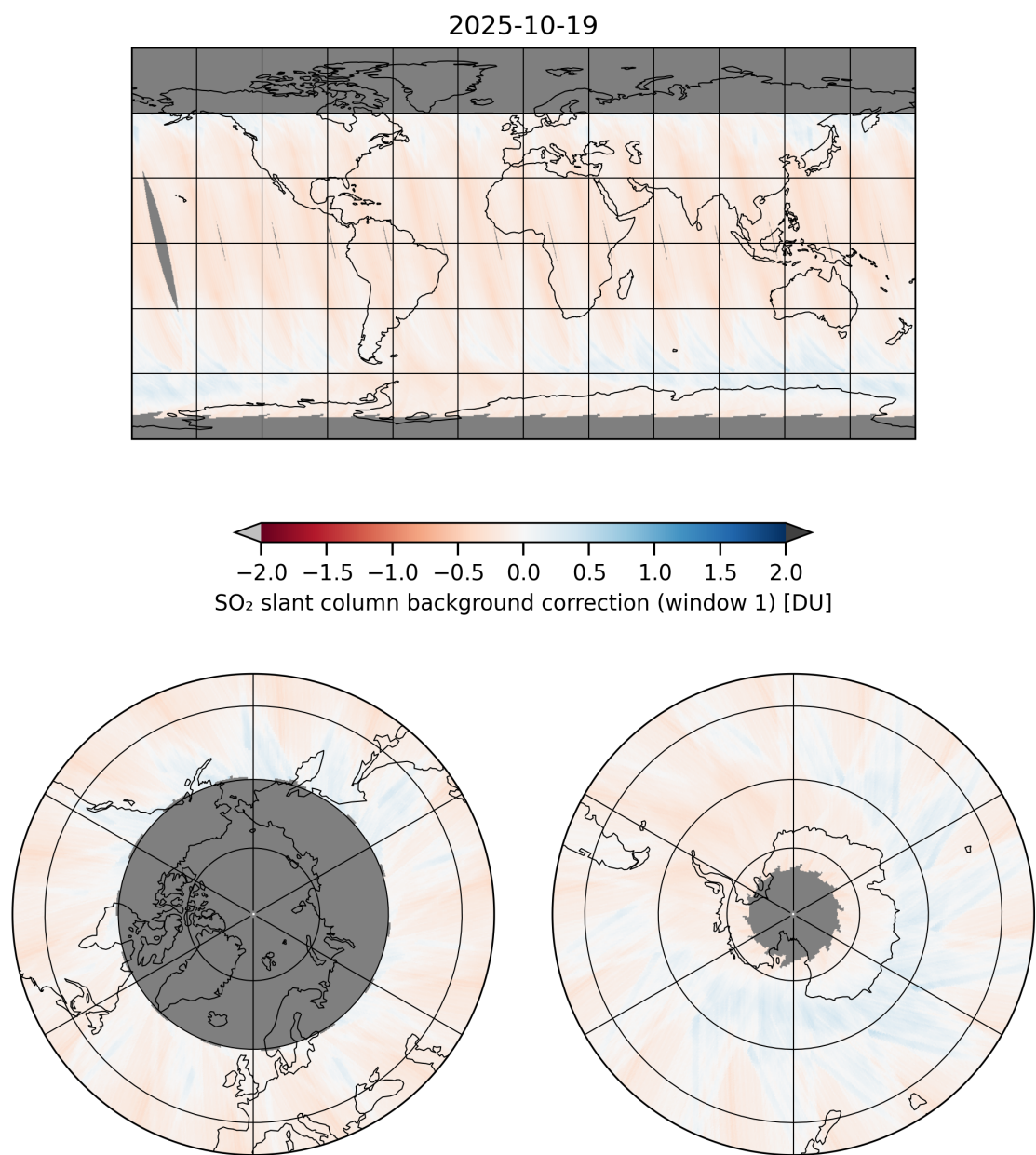


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-10-19 to 2025-10-20

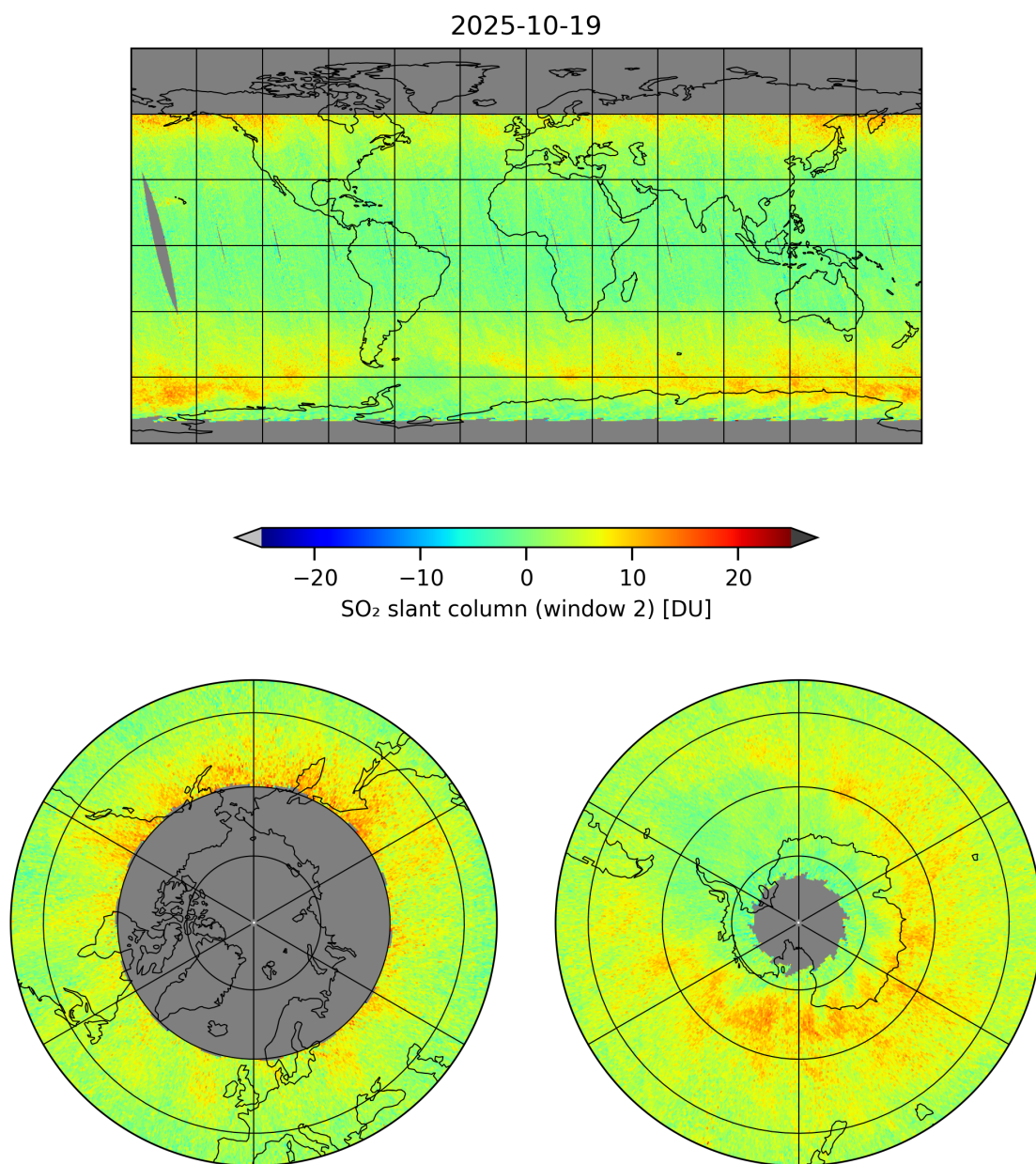


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-10-19 to 2025-10-20

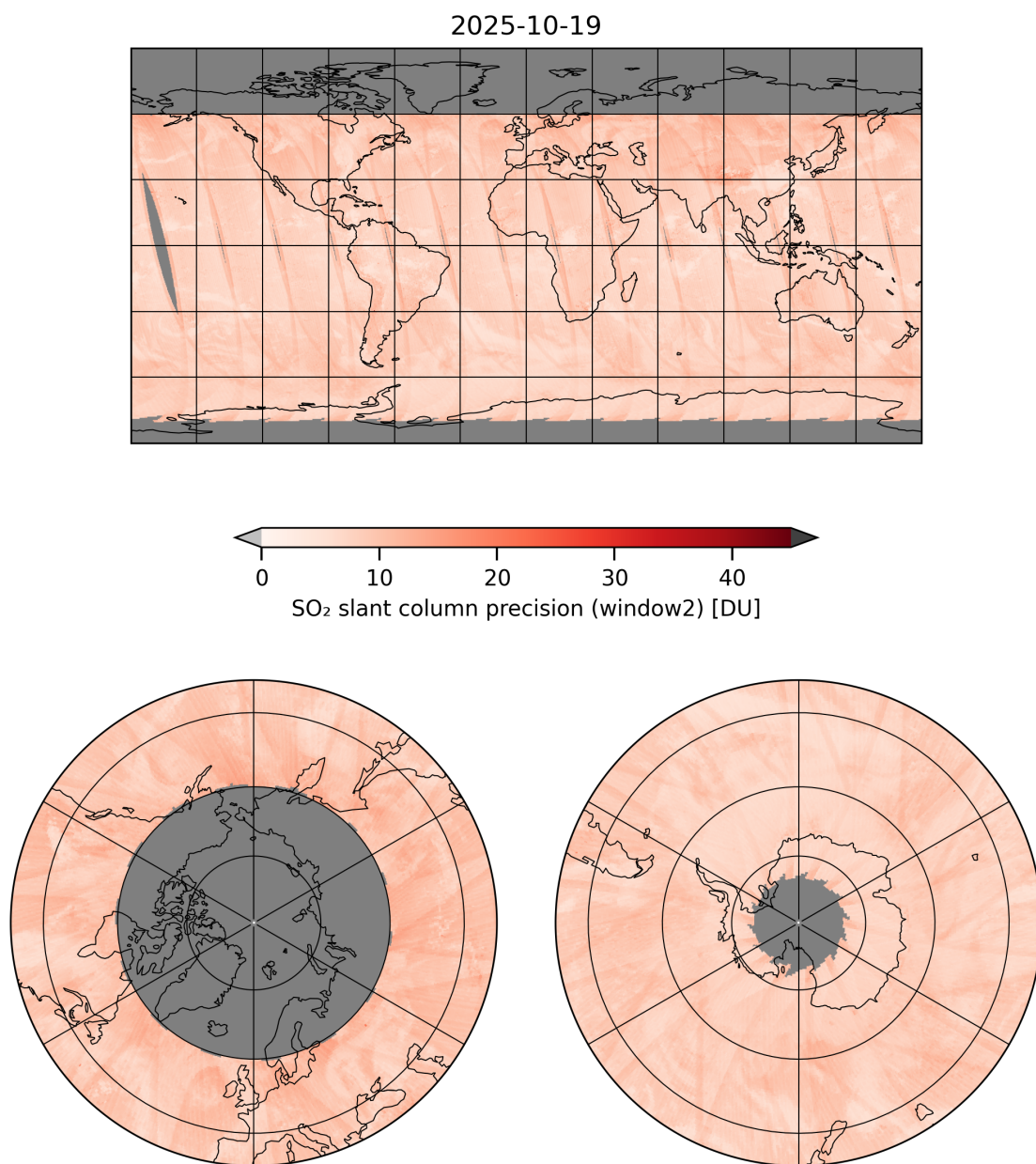


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-10-19 to 2025-10-20

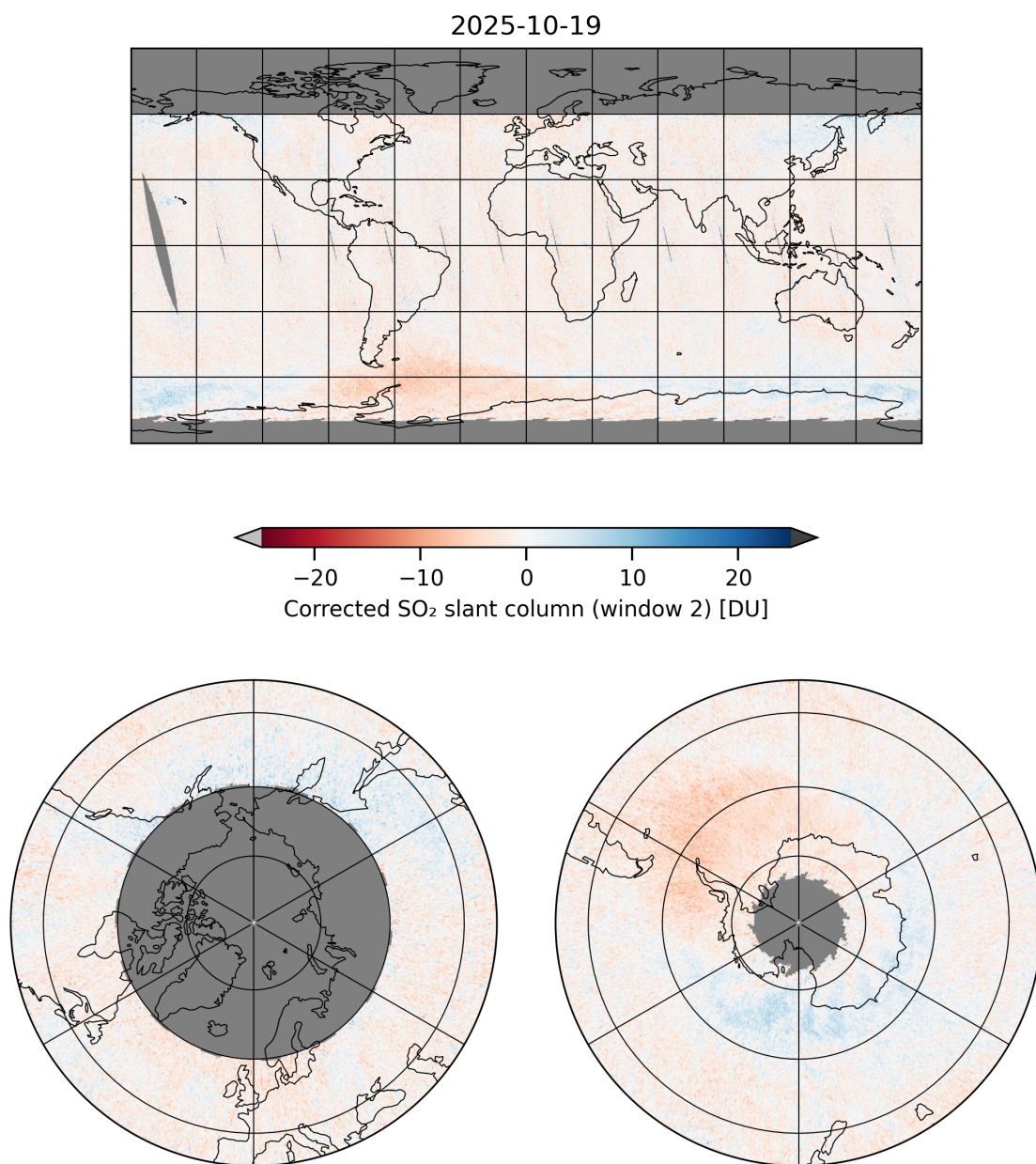


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-10-19 to 2025-10-20

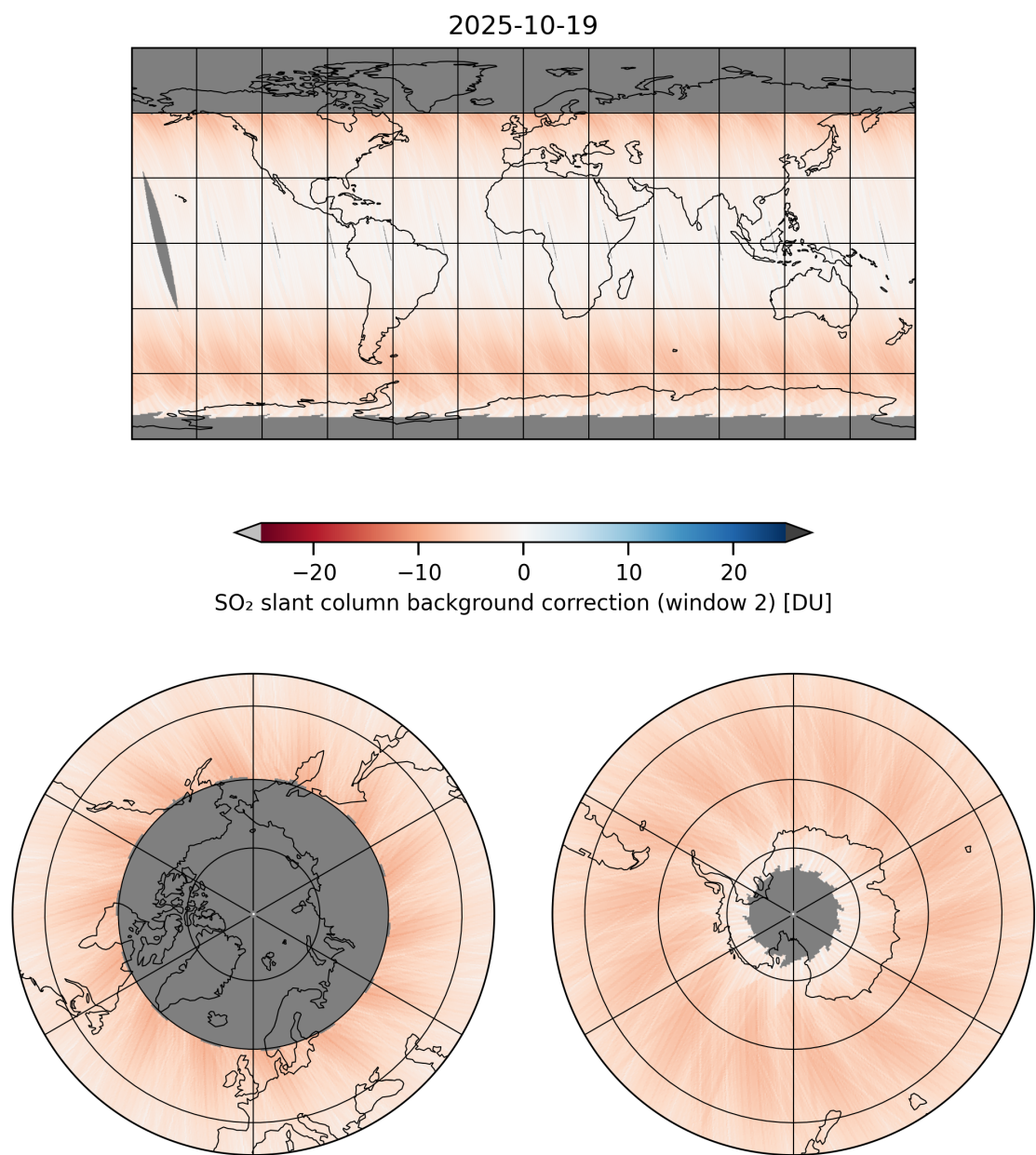


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-10-19 to 2025-10-20

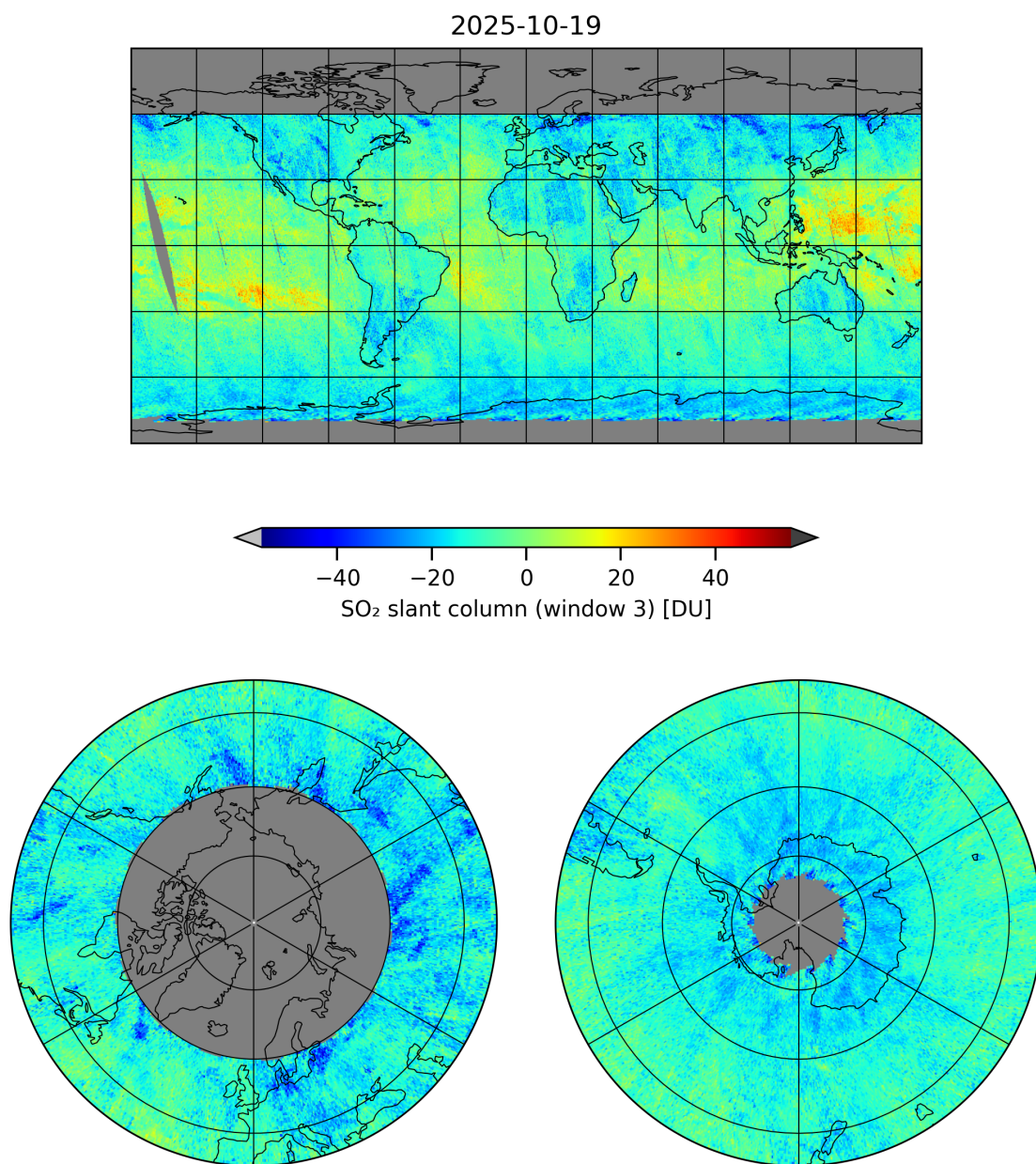


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-10-19 to 2025-10-20

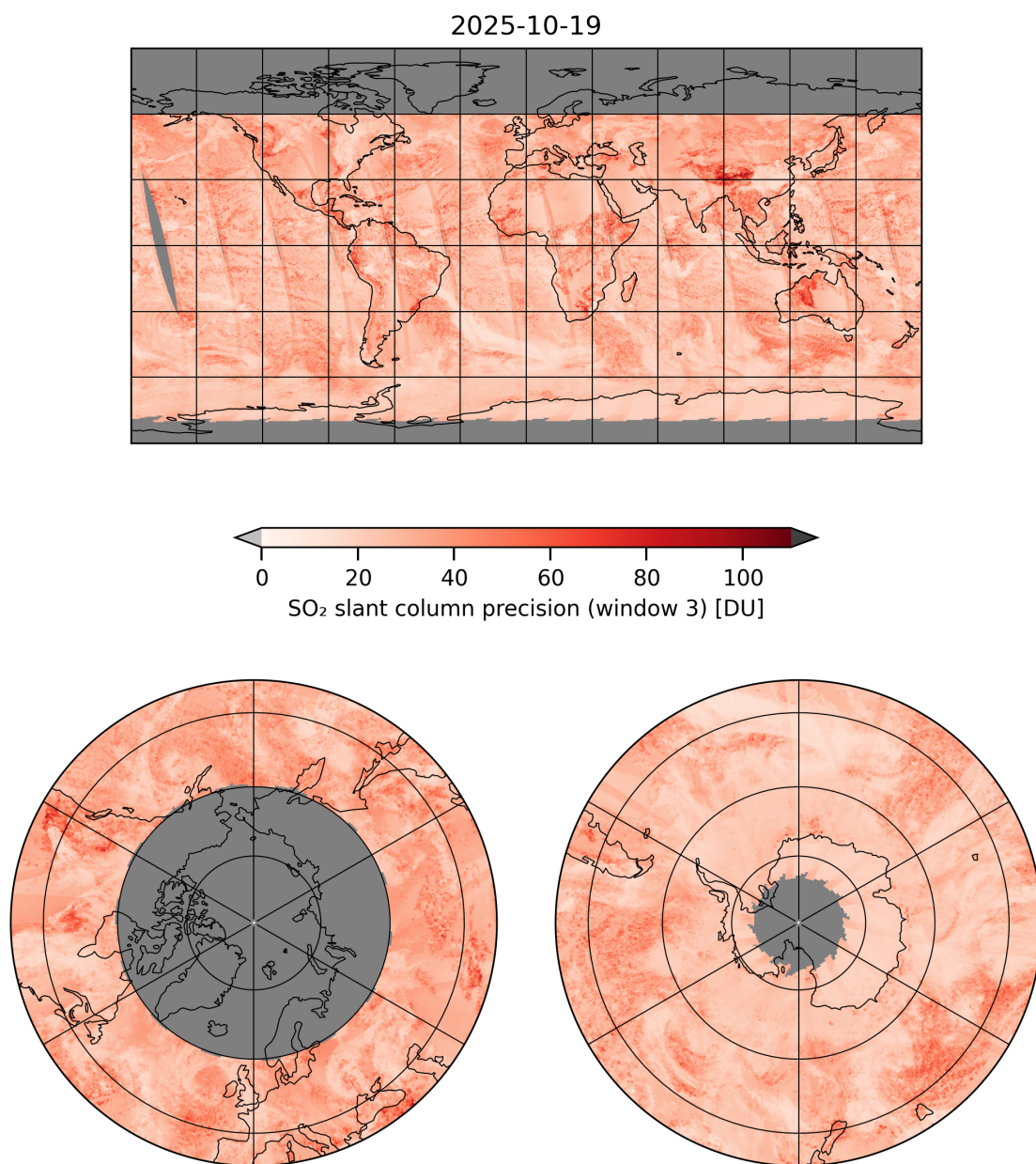


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-10-19 to 2025-10-20

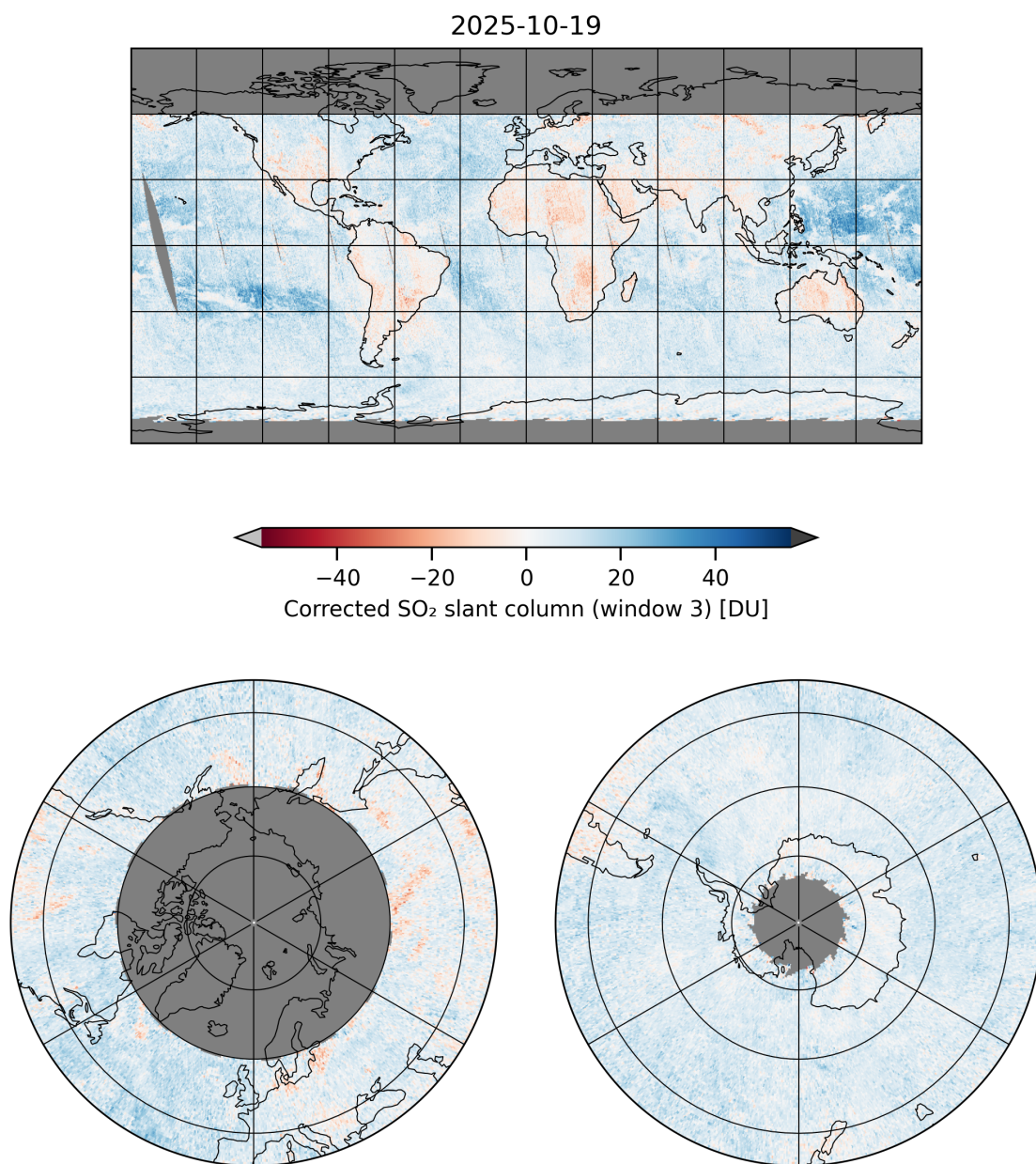


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-10-19 to 2025-10-20

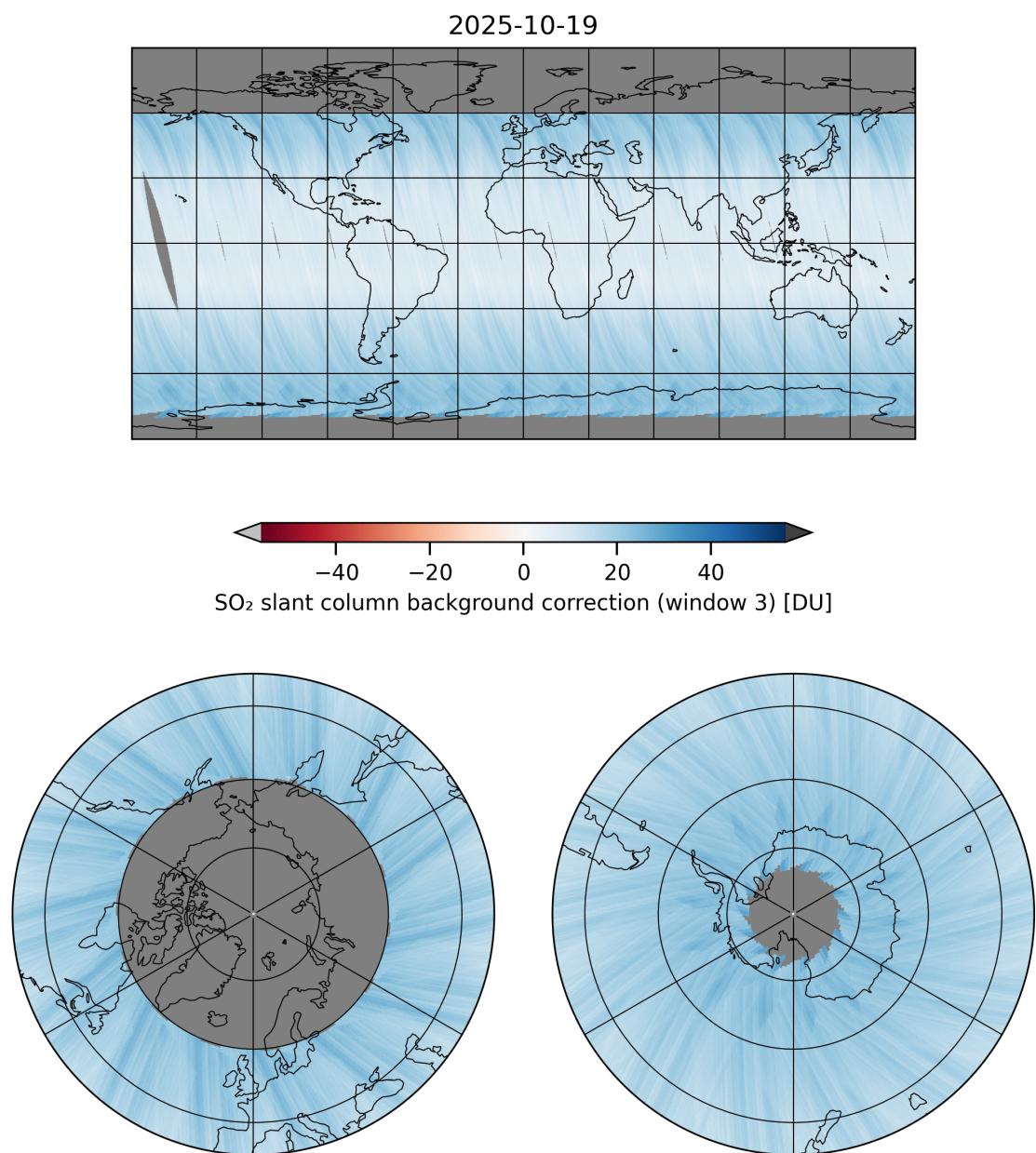


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-10-19 to 2025-10-20

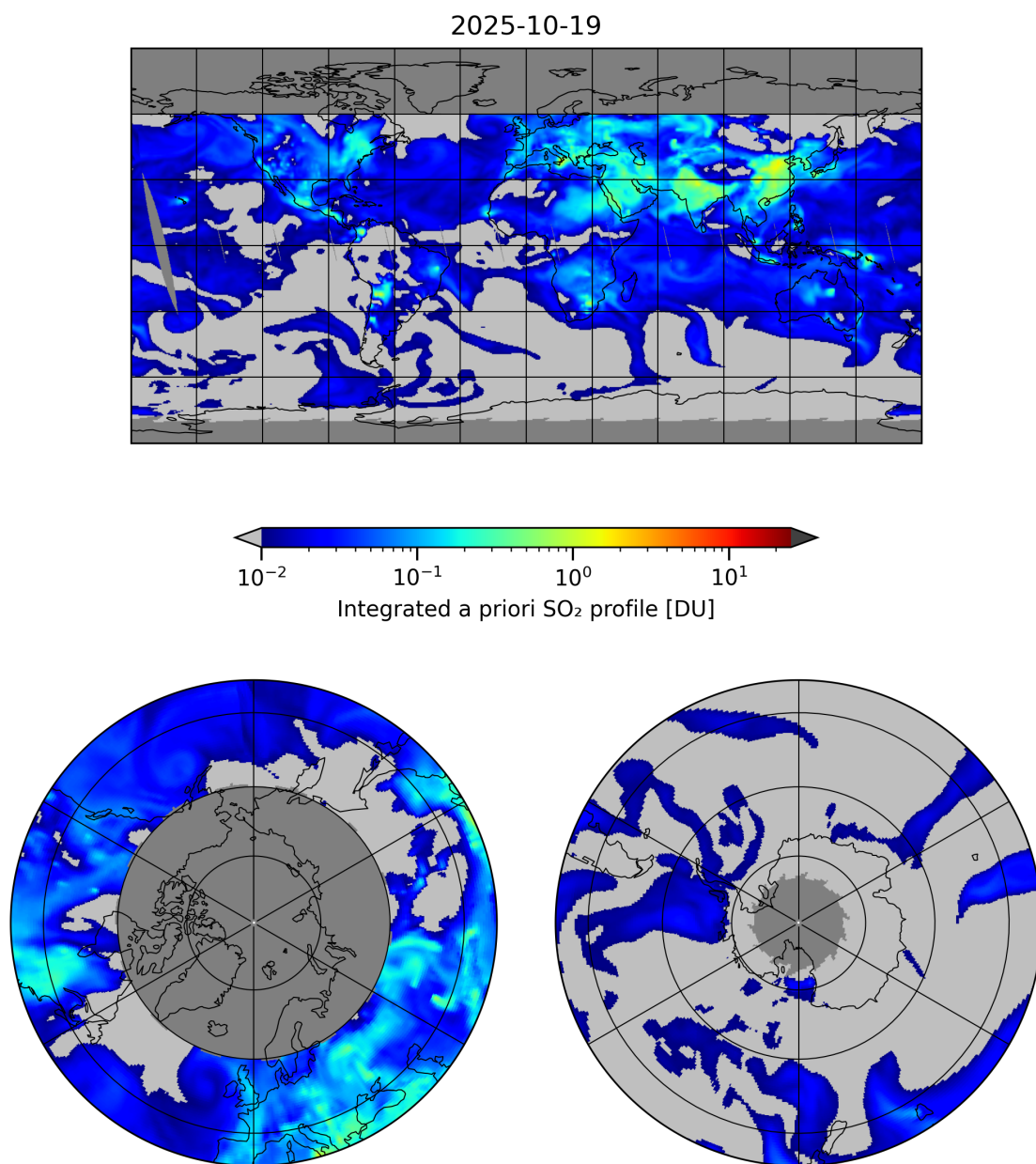


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-10-19 to 2025-10-20

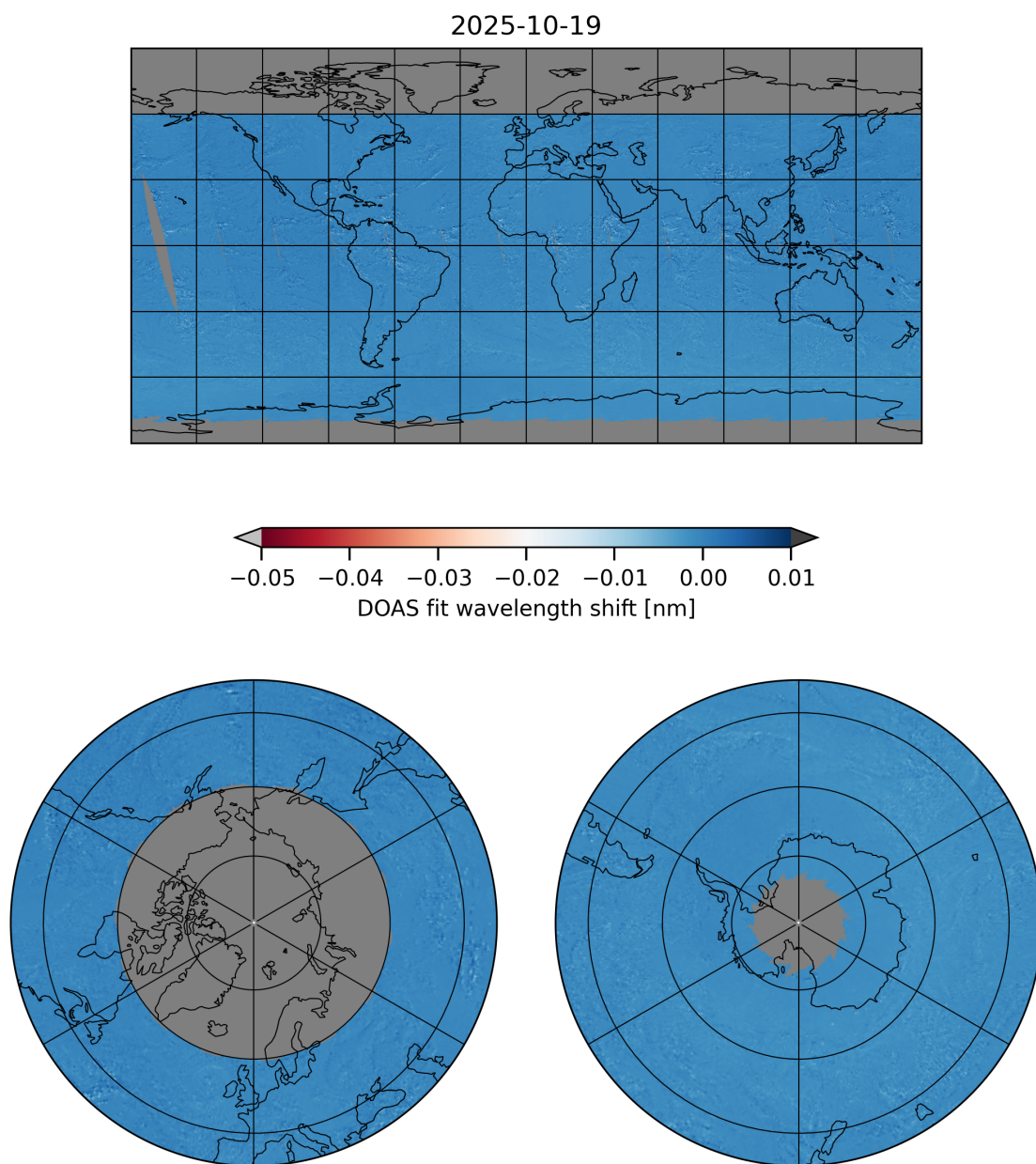


Figure 22: Map of “DOAS fit wavelength shift” for 2025-10-19 to 2025-10-20

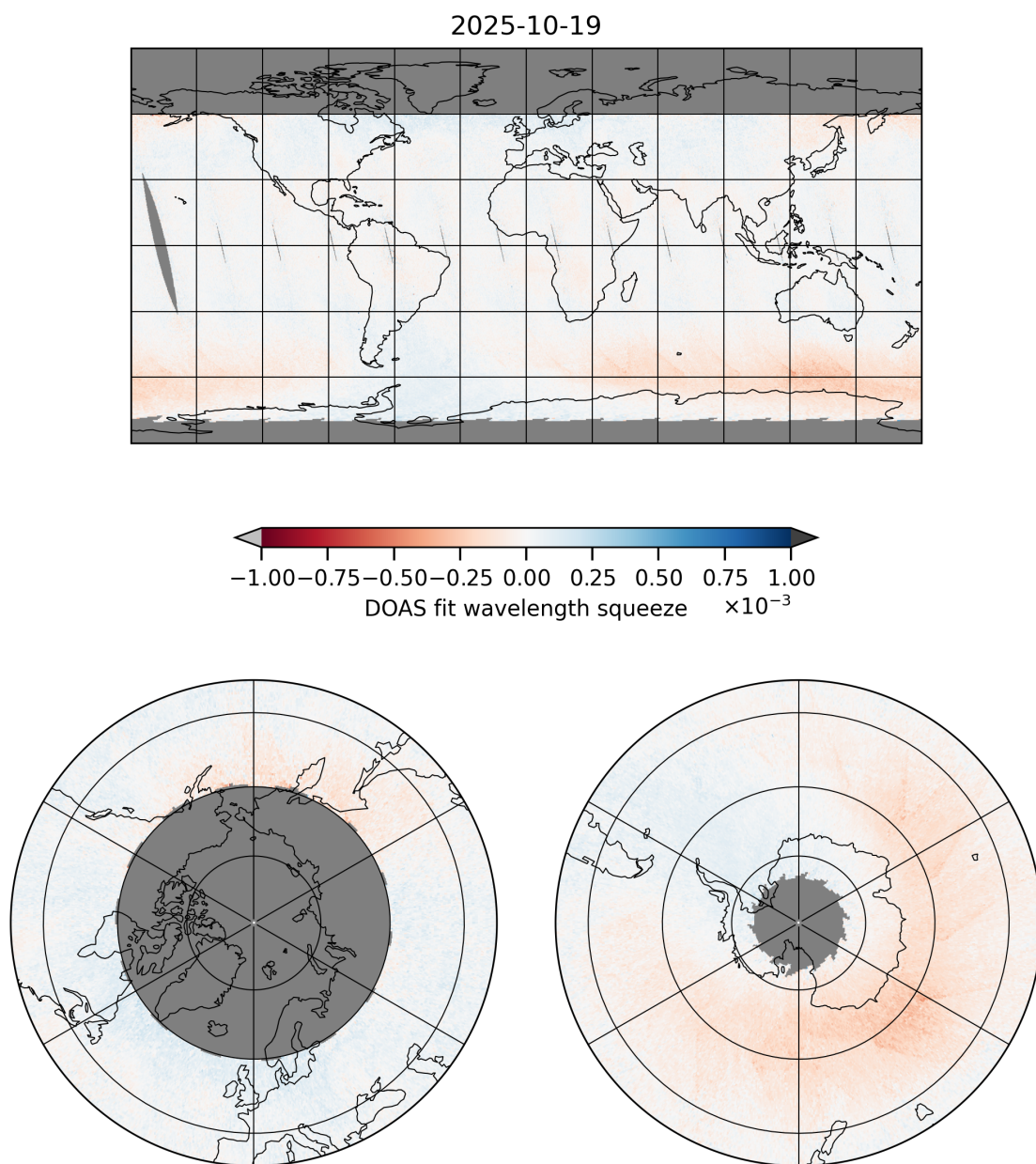


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-10-19 to 2025-10-20

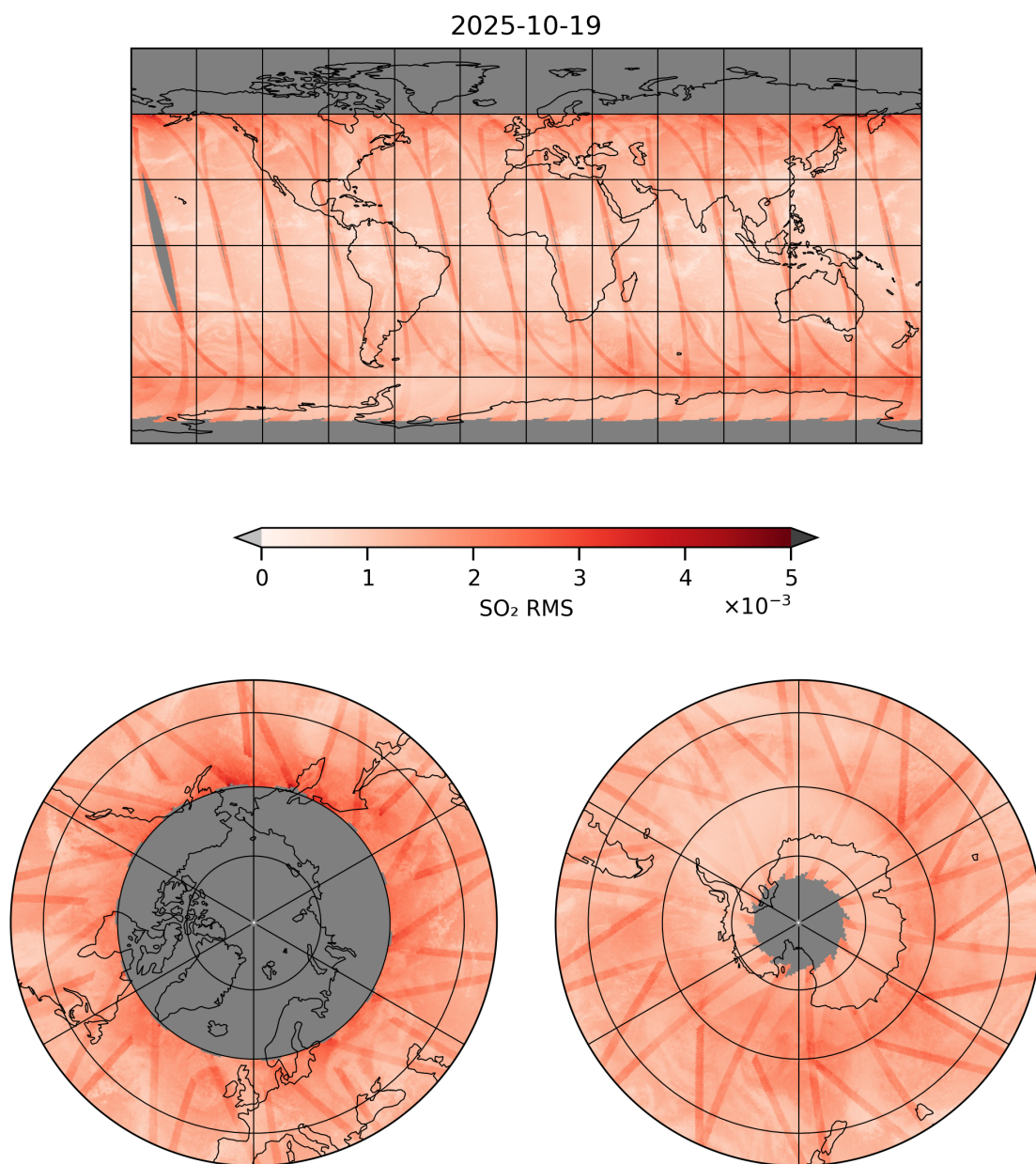


Figure 24: Map of “SO₂ RMS” for 2025-10-19 to 2025-10-20

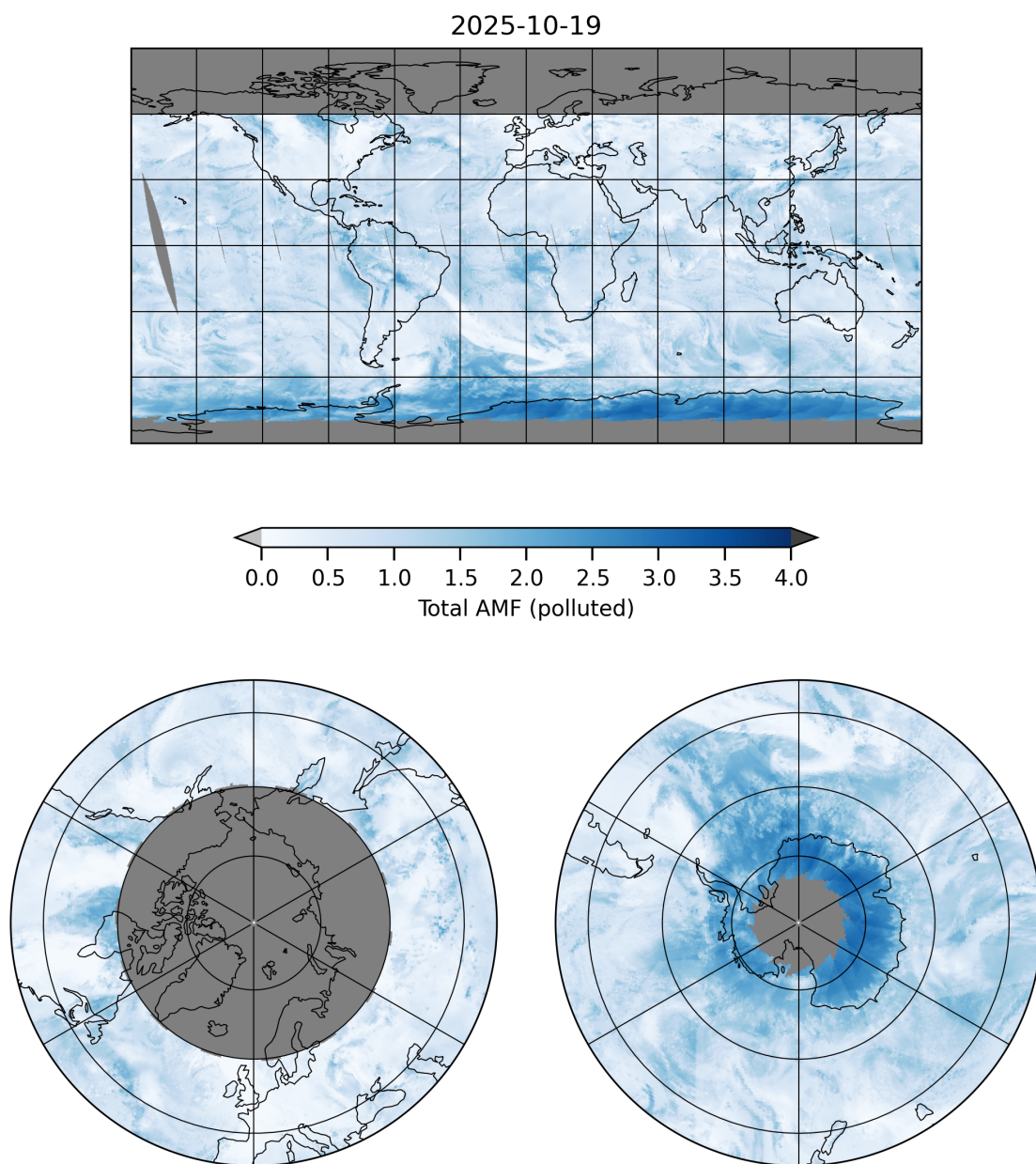


Figure 25: Map of “Total AMF (polluted)” for 2025-10-19 to 2025-10-20

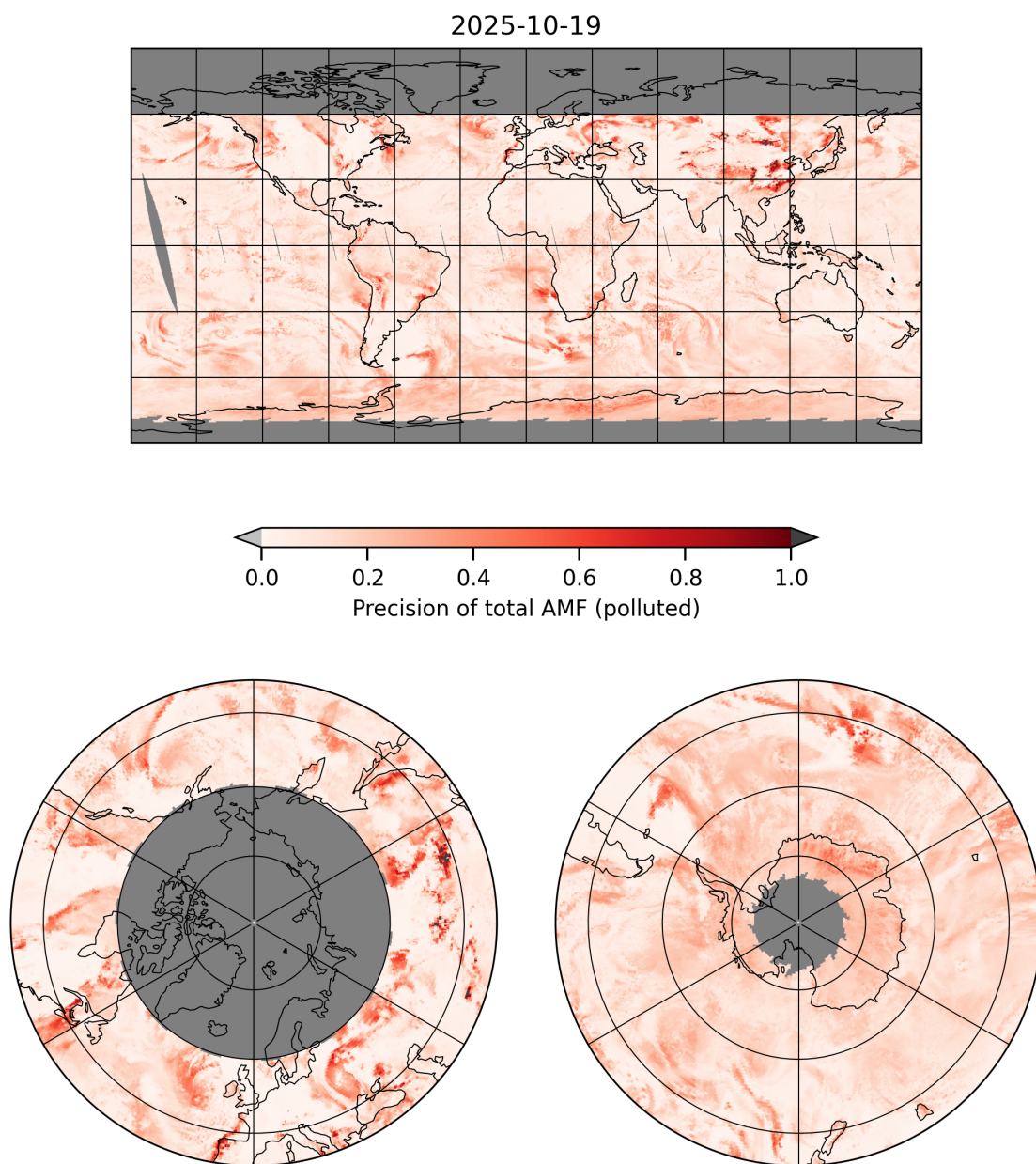


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-10-19 to 2025-10-20

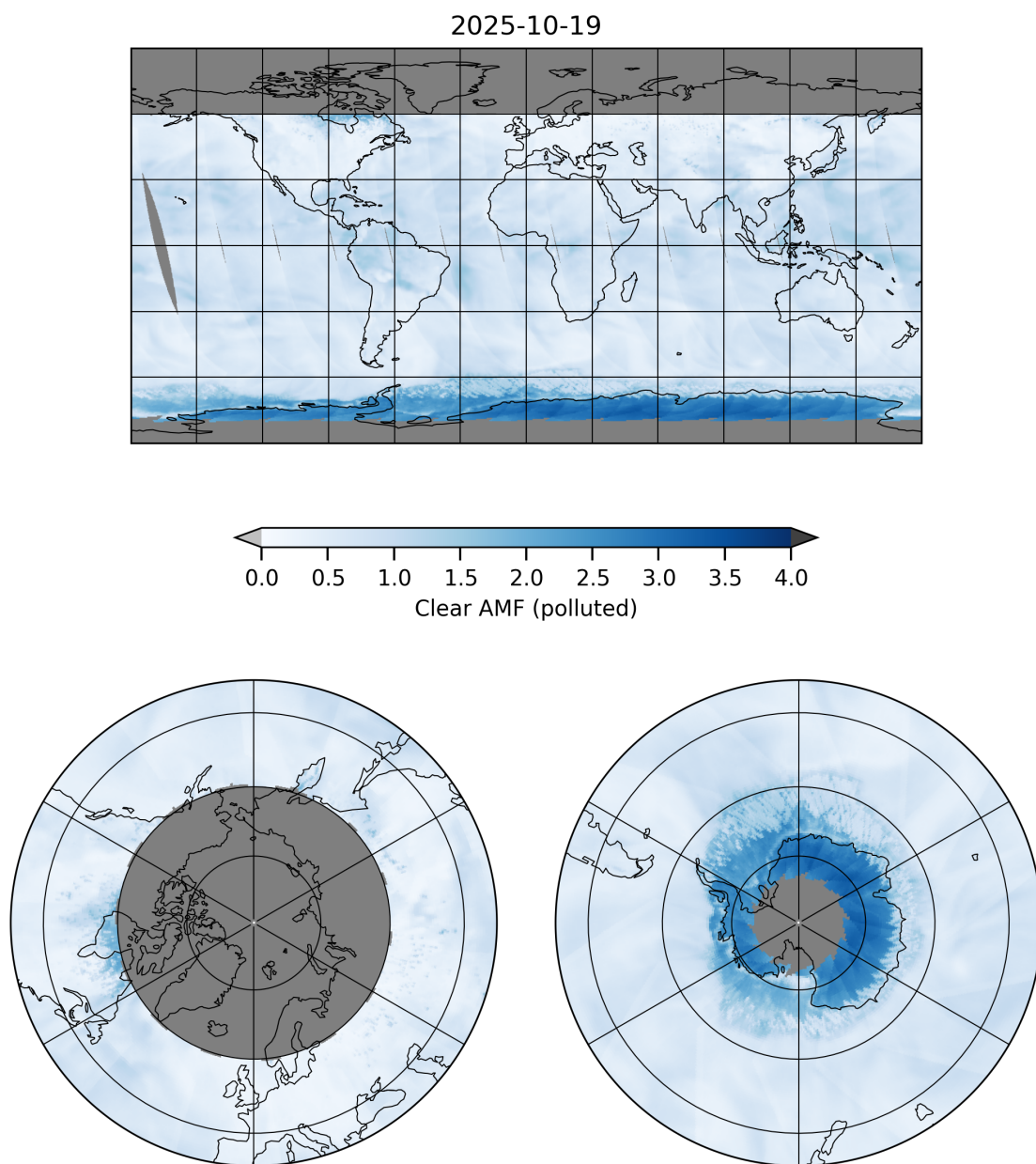


Figure 27: Map of “Clear AMF (polluted)” for 2025-10-19 to 2025-10-20

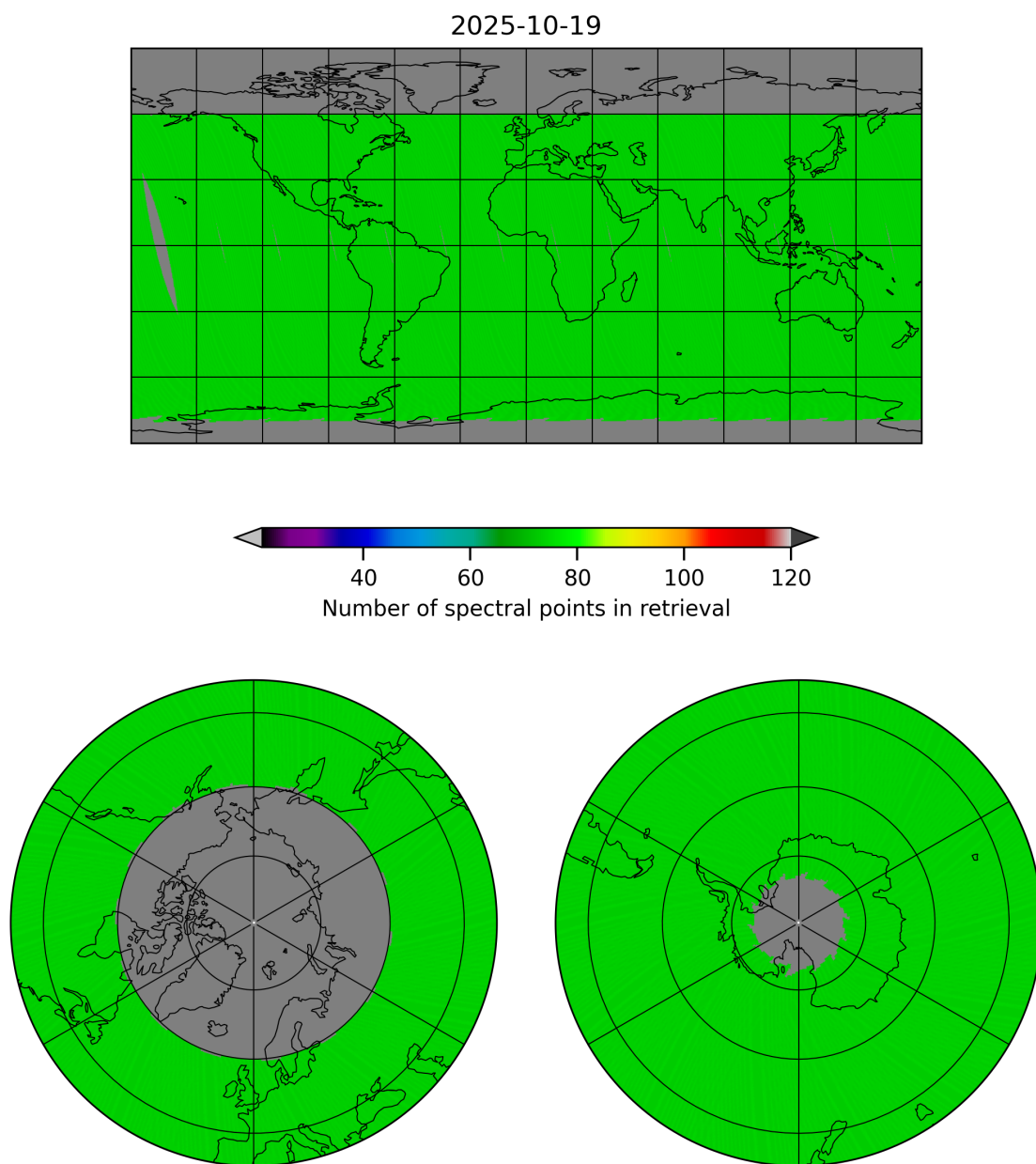


Figure 28: Map of “Number of spectral points in retrieval” for 2025-10-19 to 2025-10-20

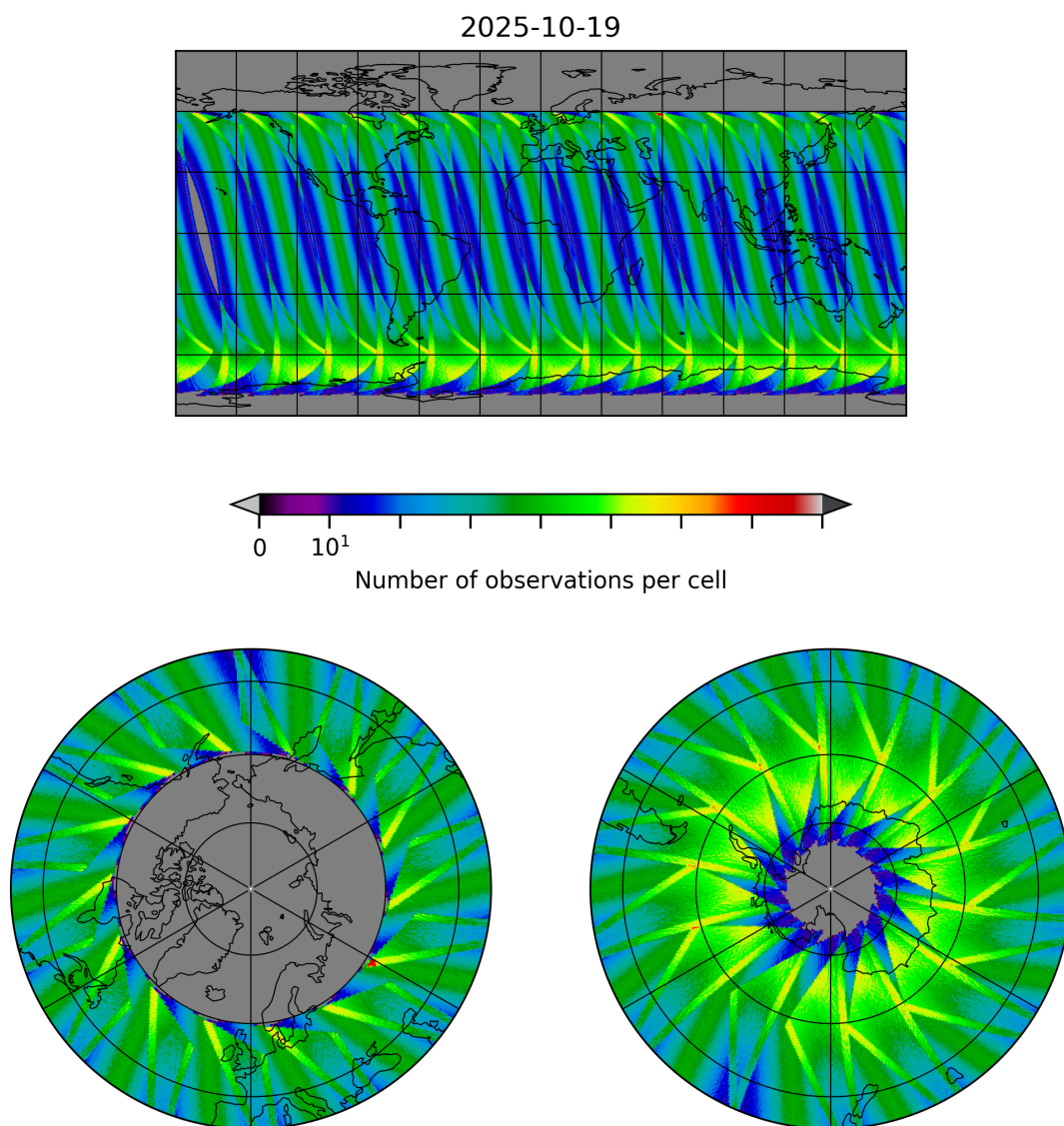


Figure 29: Map of the number of observations for 2025-10-19 to 2025-10-20

7 Zonal average

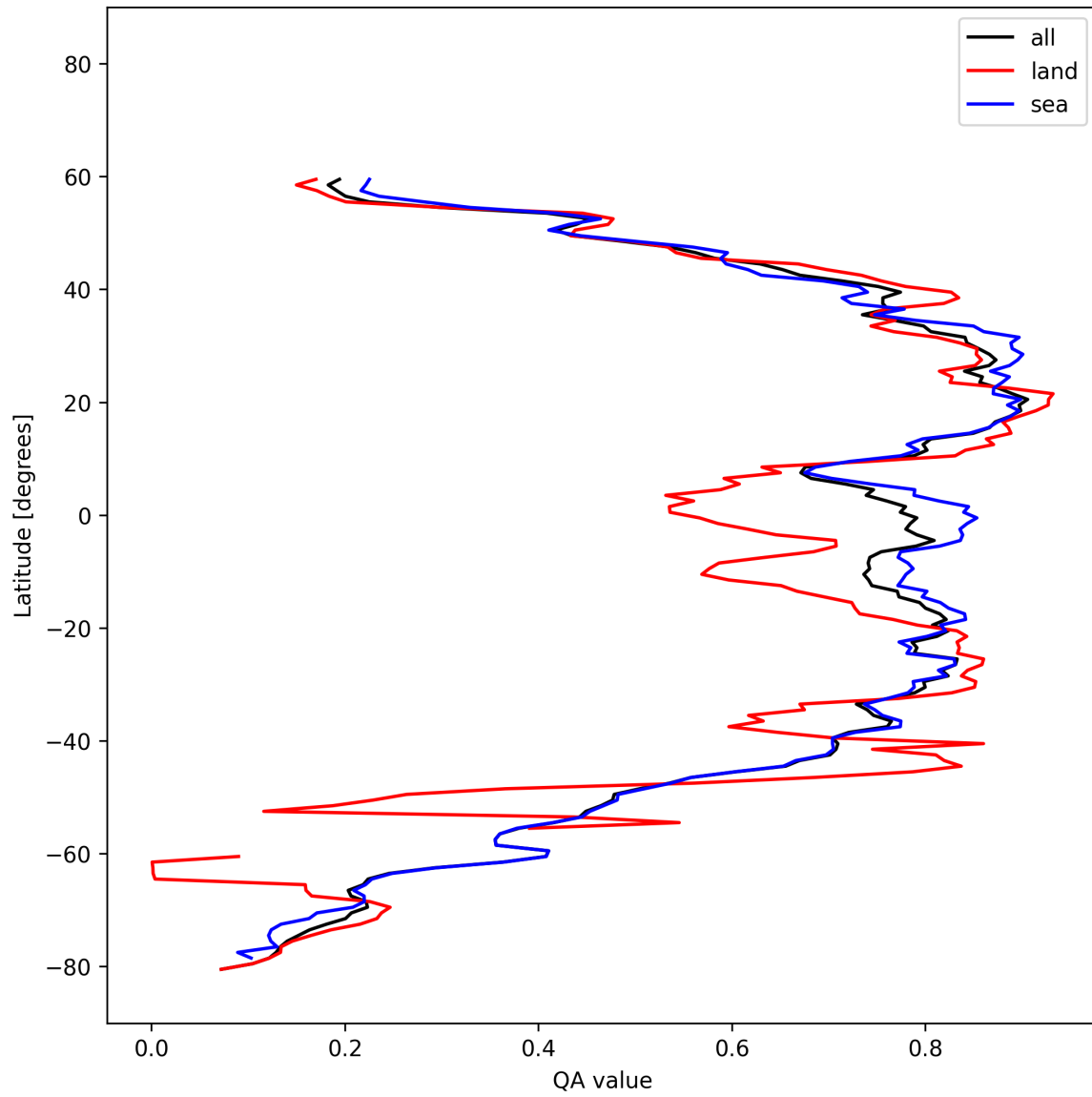


Figure 30: Zonal average of “QA value” for 2025-10-19 to 2025-10-20.

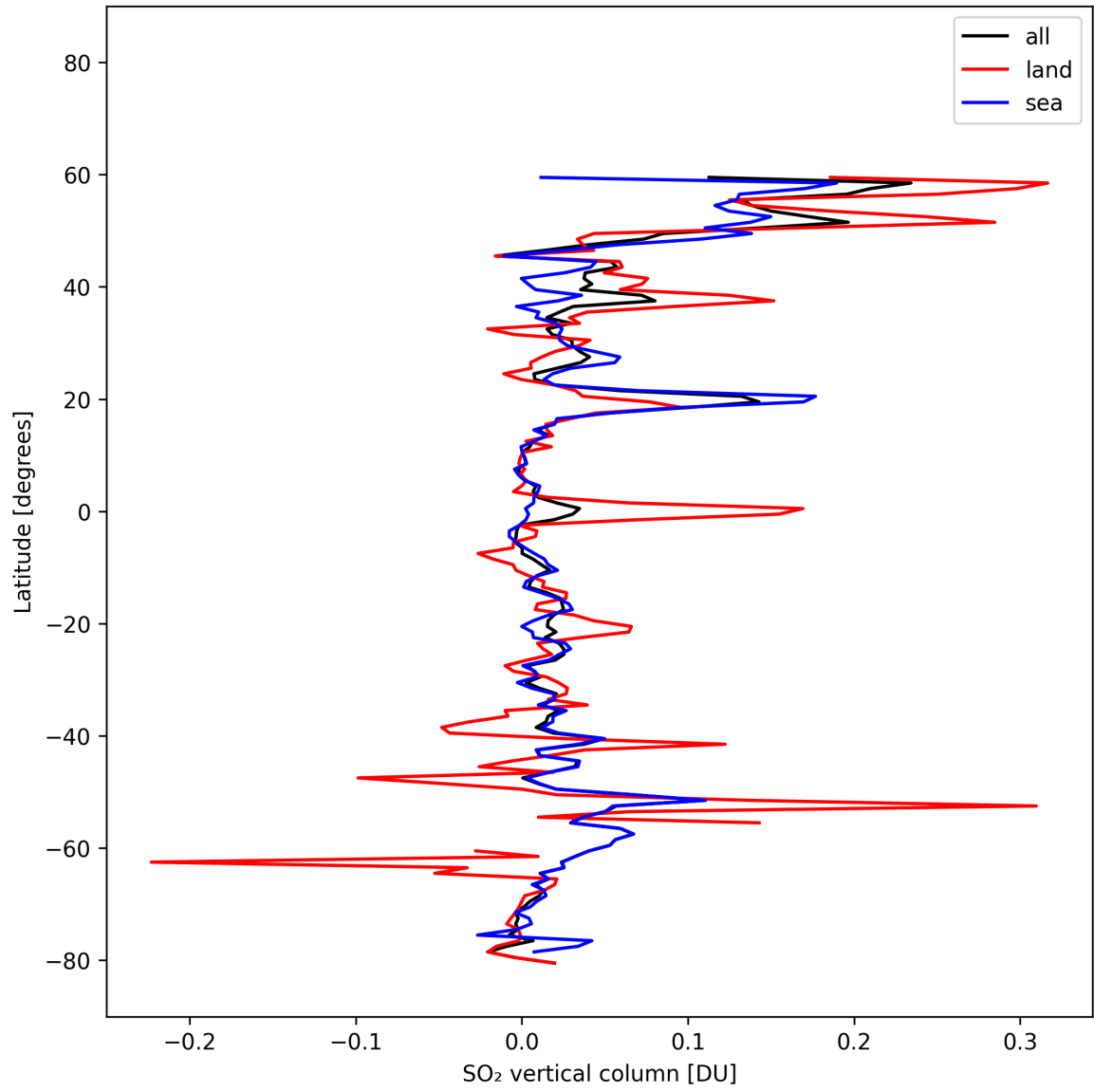


Figure 31: Zonal average of “SO₂ vertical column” for 2025-10-19 to 2025-10-20.

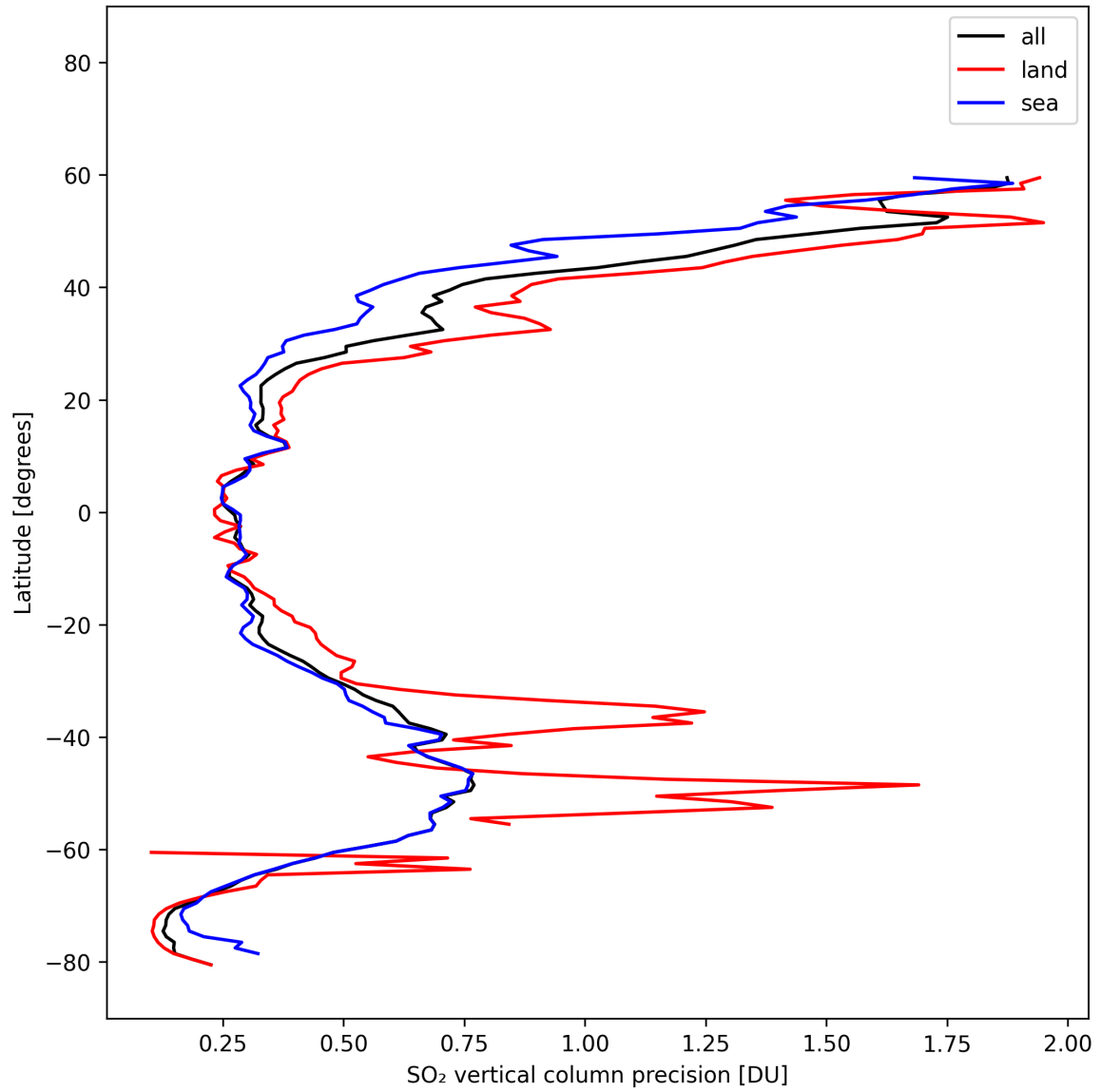


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-10-19 to 2025-10-20.

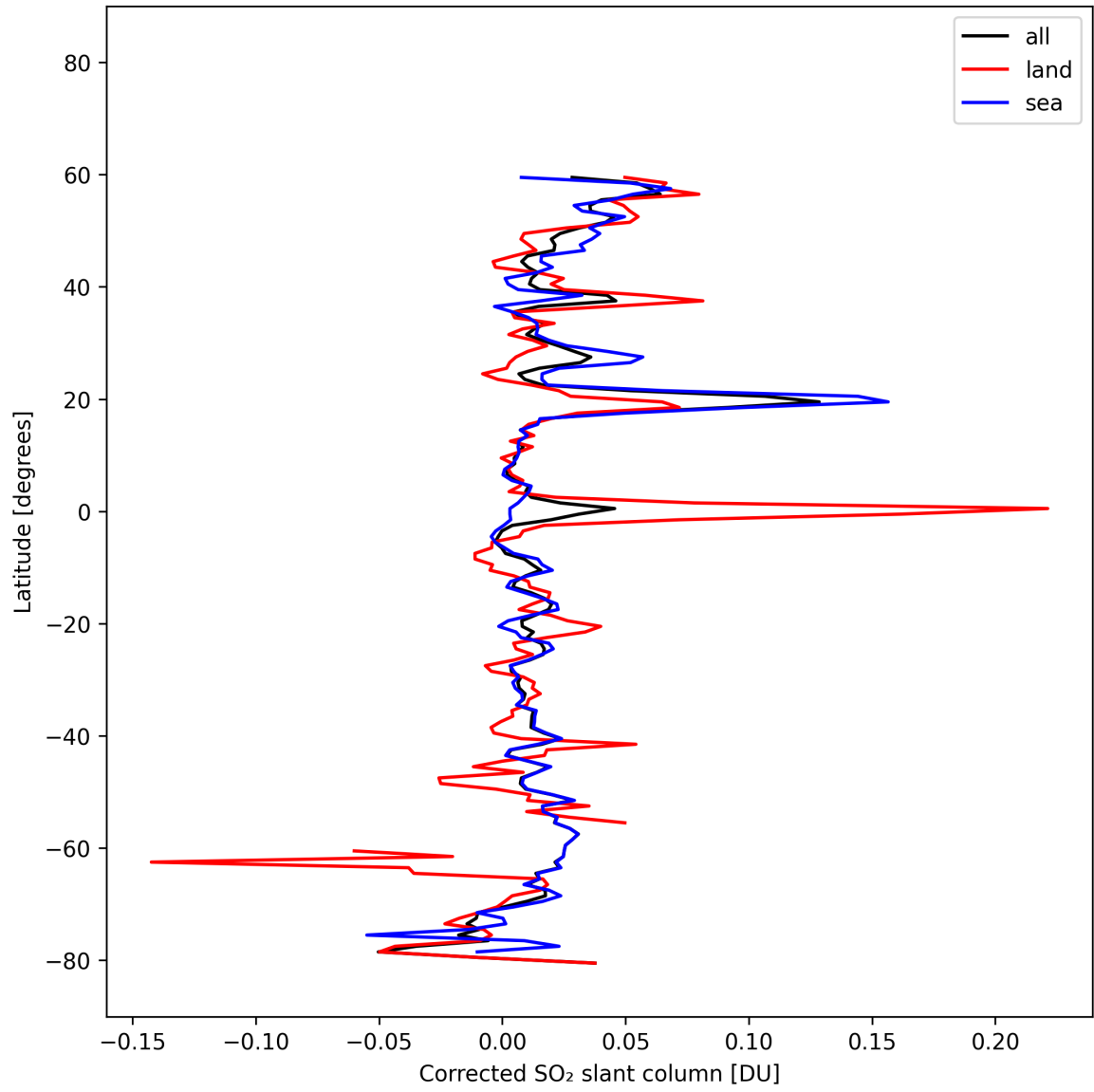


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-10-19 to 2025-10-20.

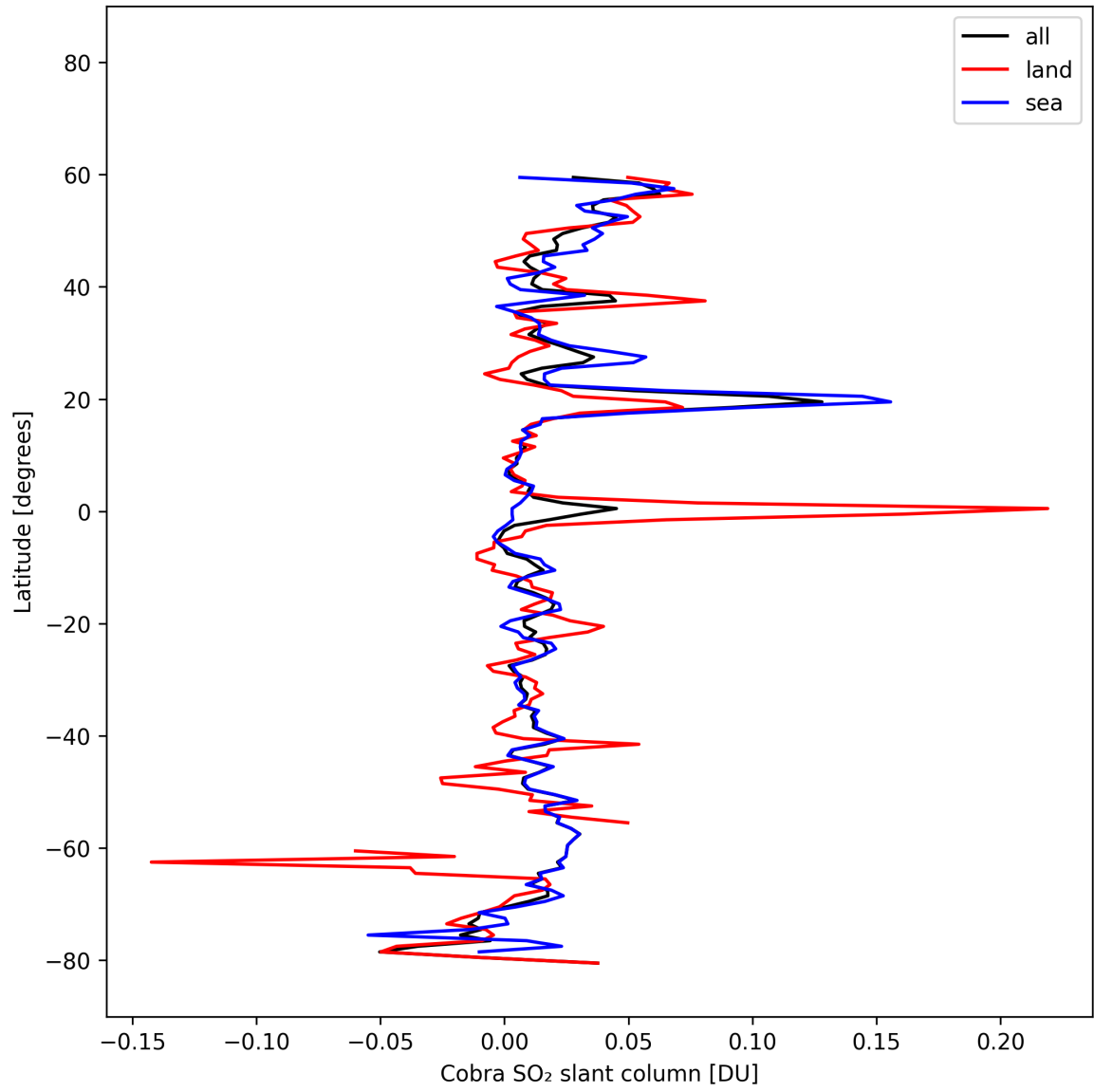


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-10-19 to 2025-10-20.

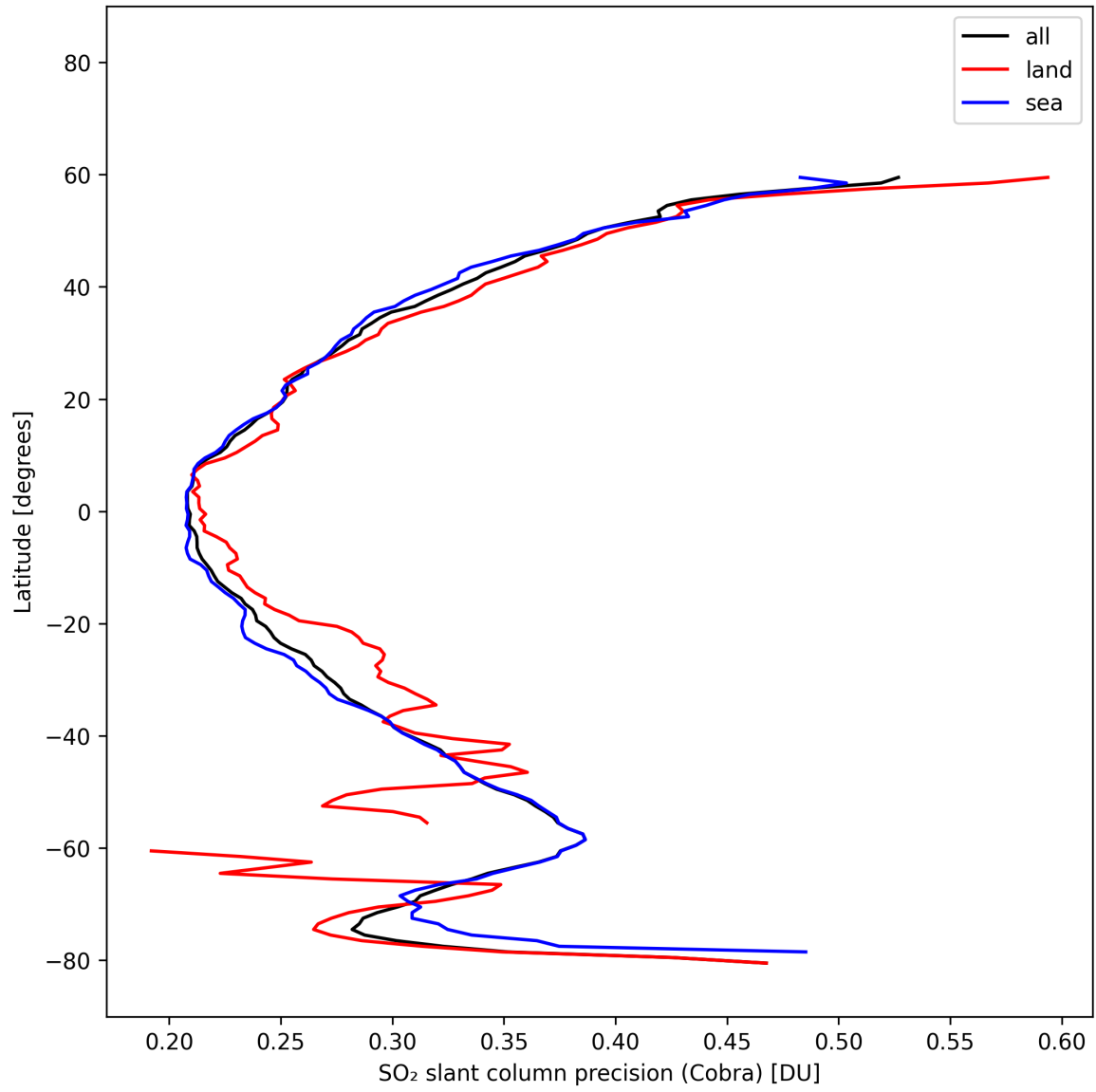


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-10-19 to 2025-10-20.

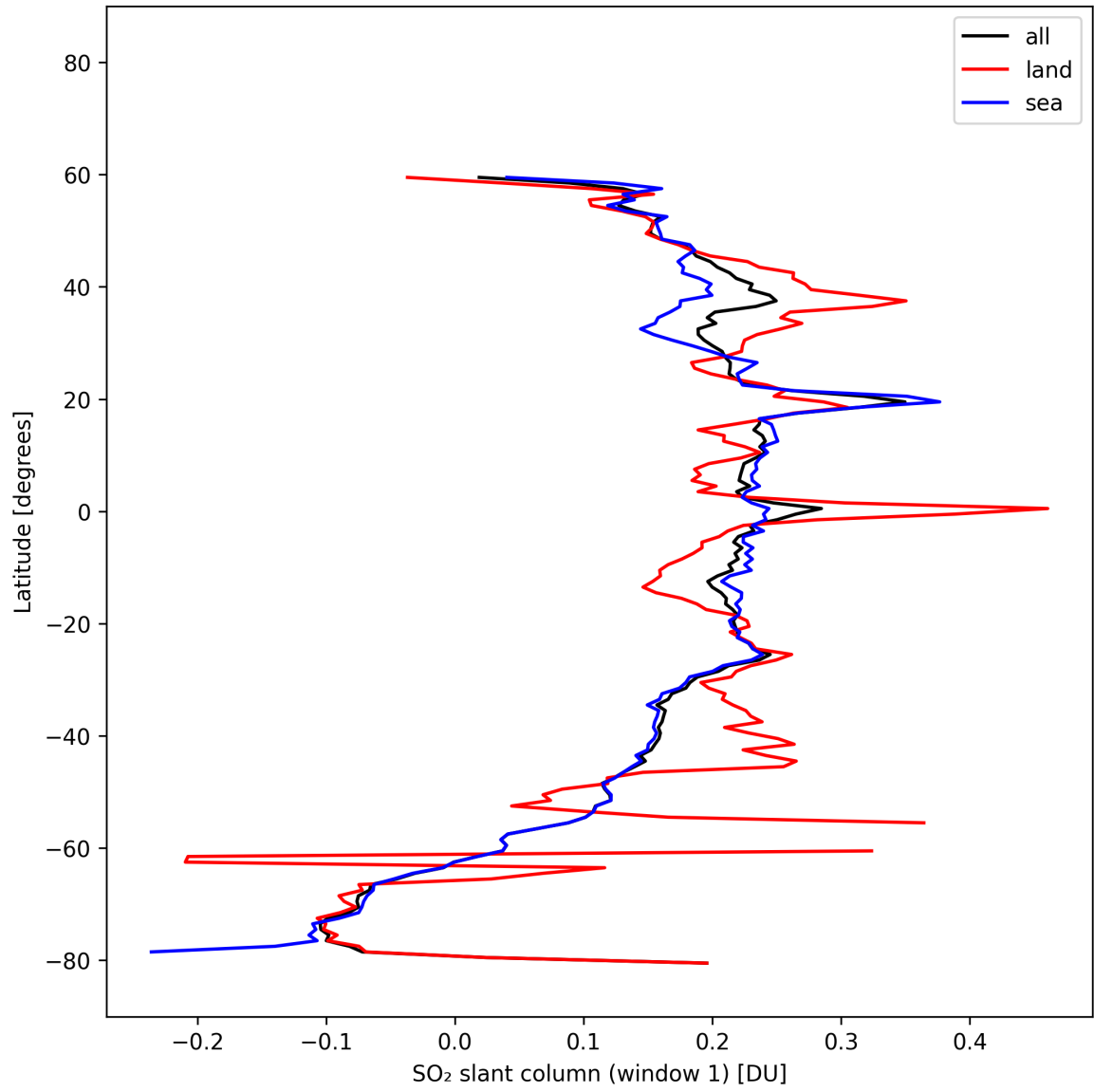


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-10-19 to 2025-10-20.

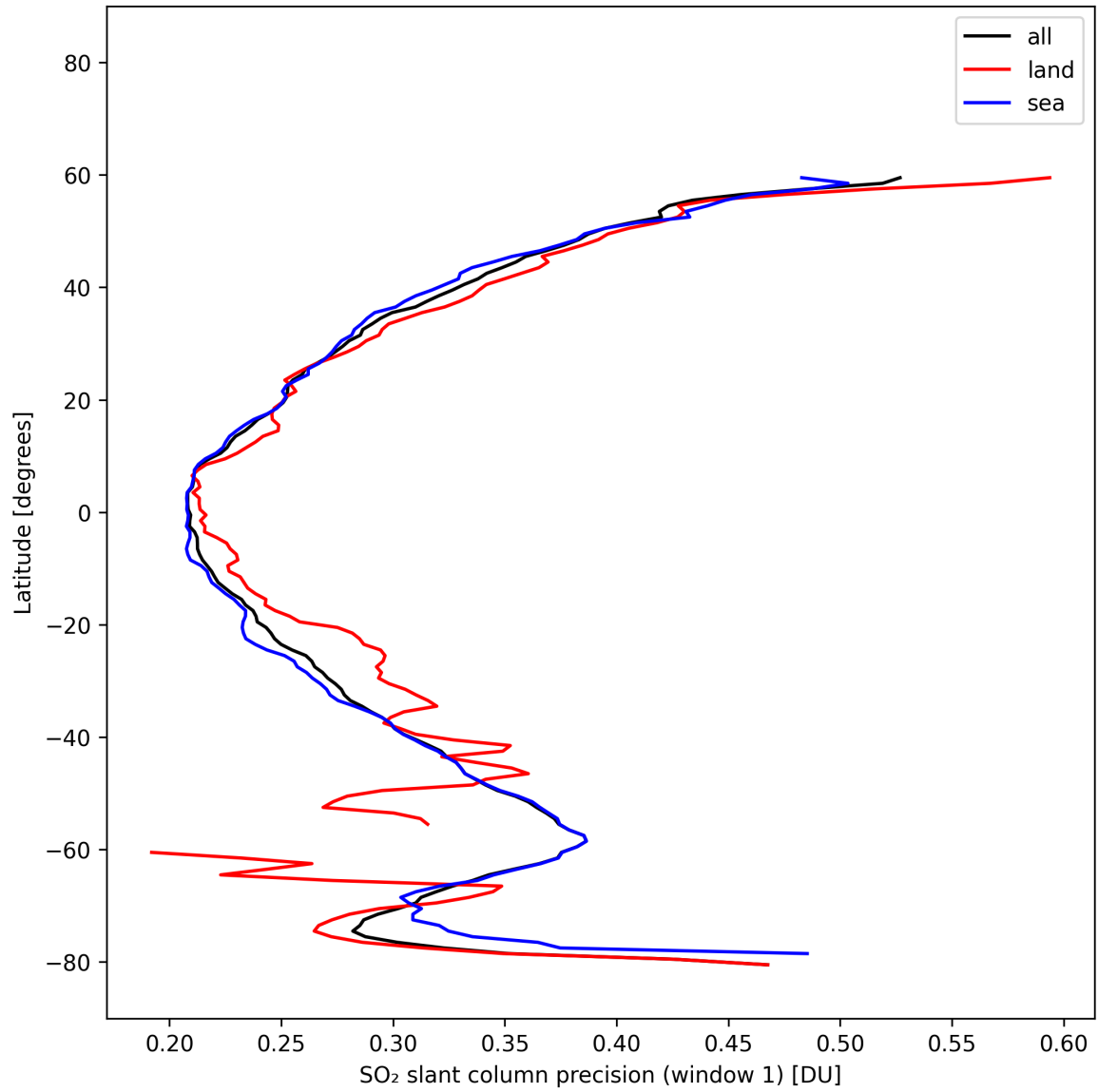


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-10-19 to 2025-10-20.

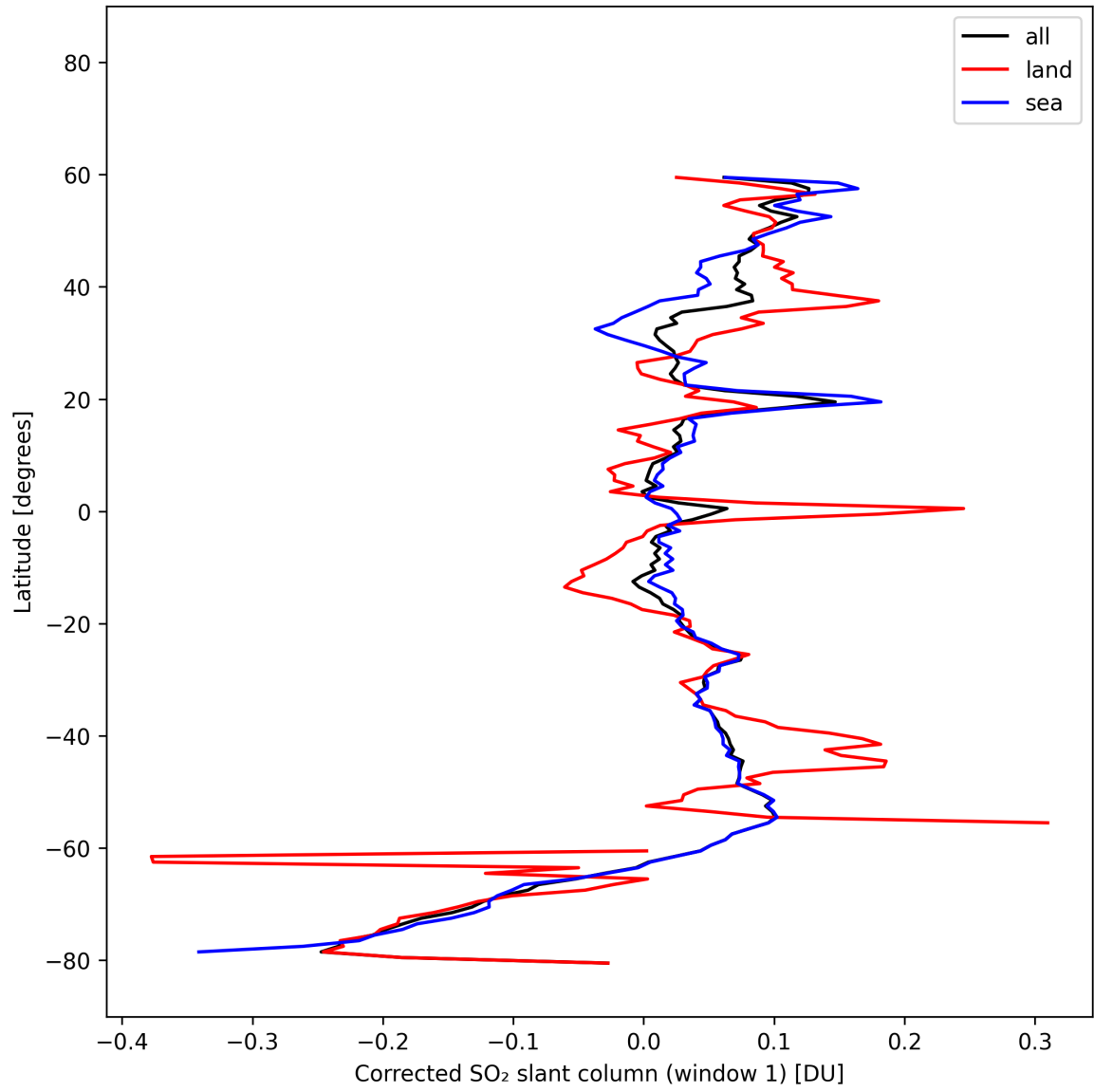


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-10-19 to 2025-10-20.

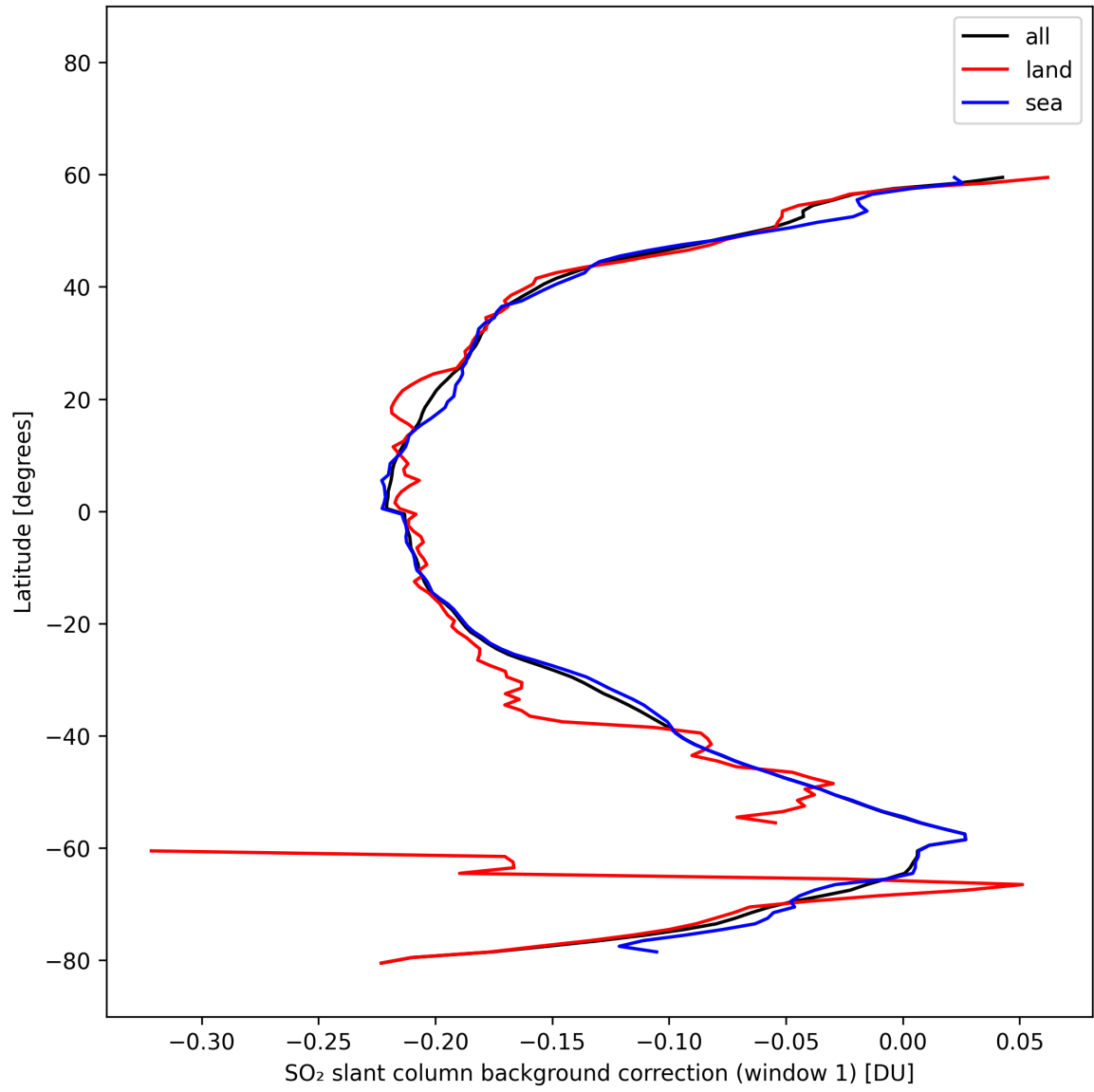


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-10-19 to 2025-10-20.

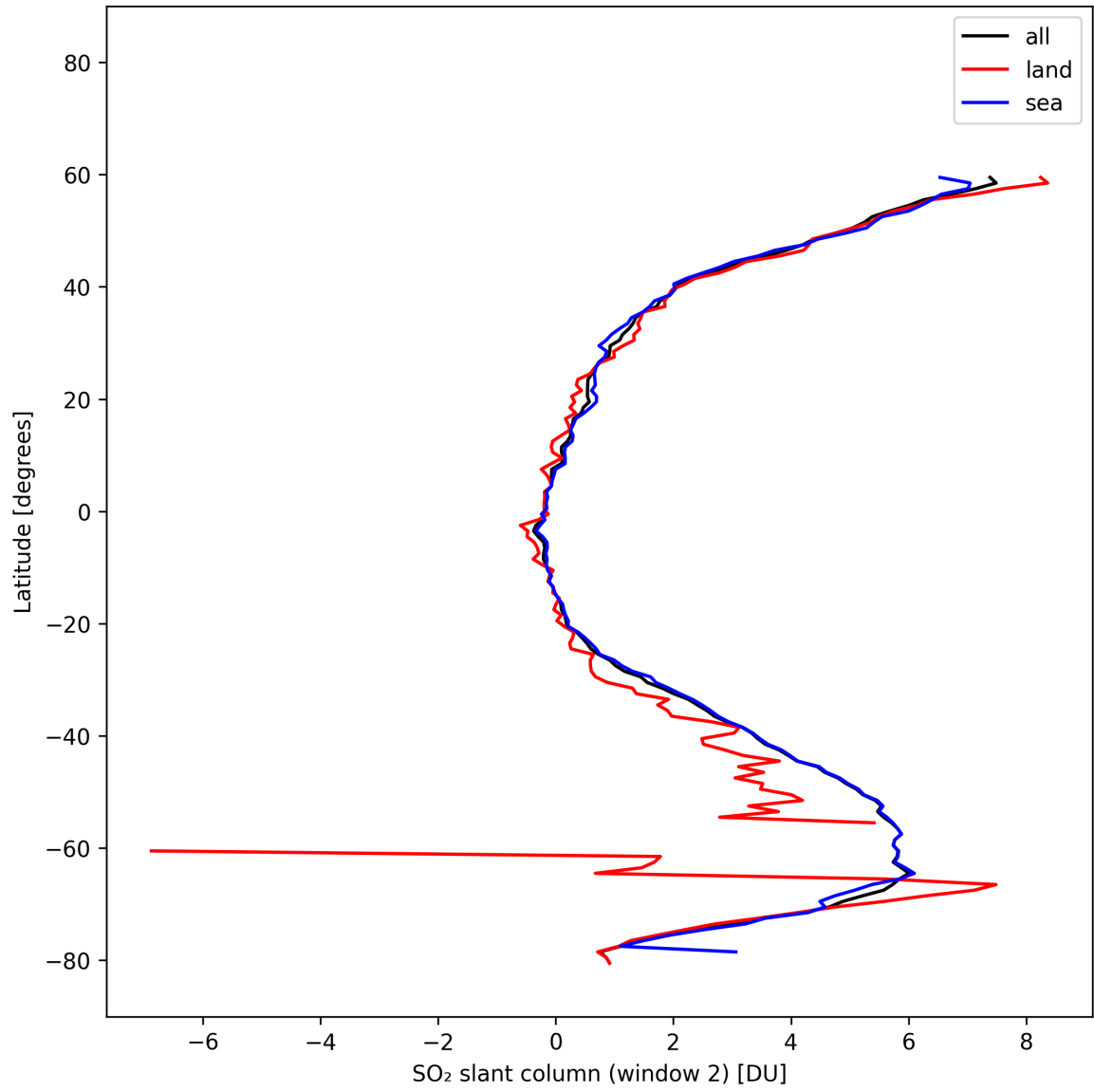


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-10-19 to 2025-10-20.

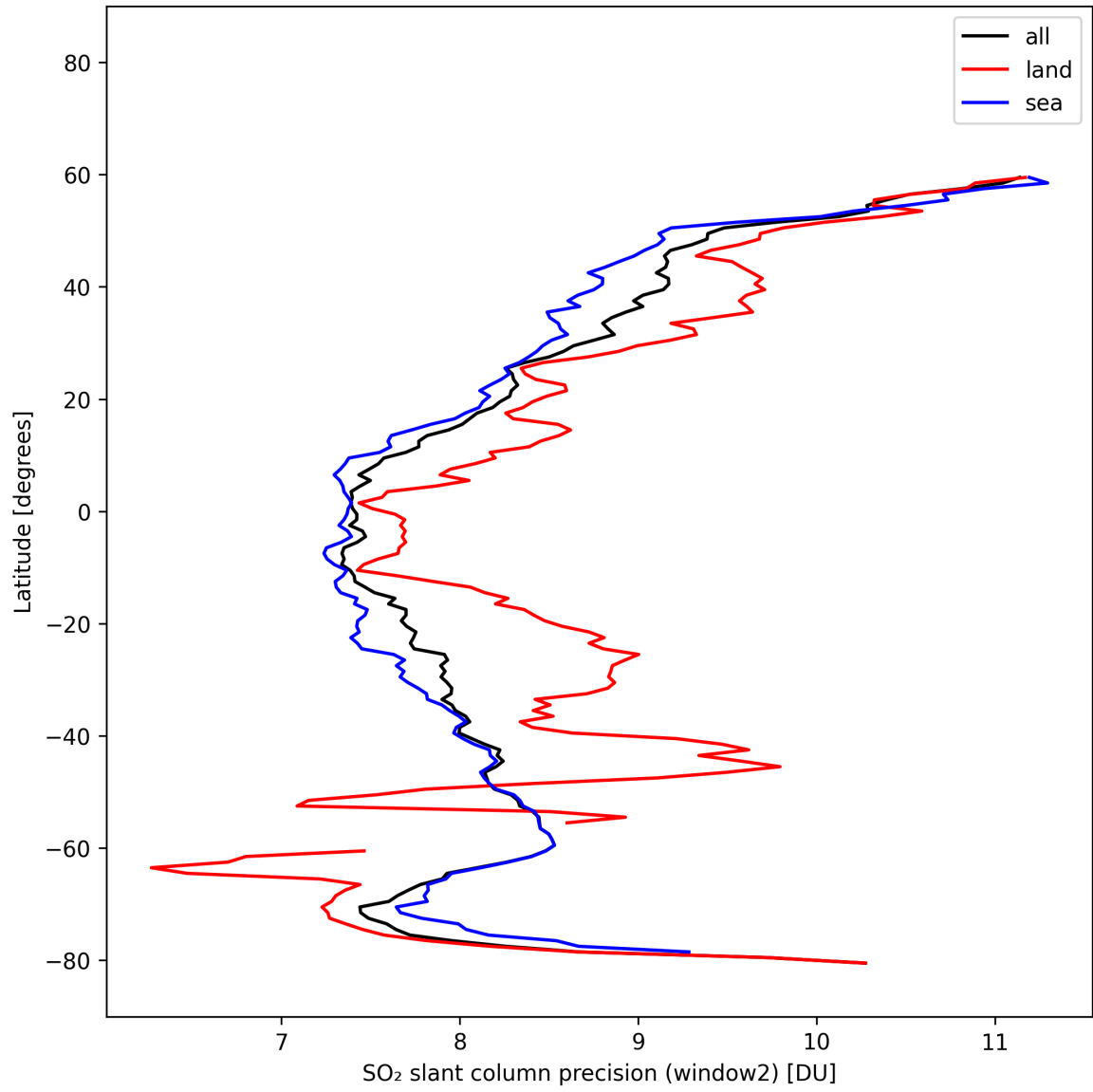


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-10-19 to 2025-10-20.

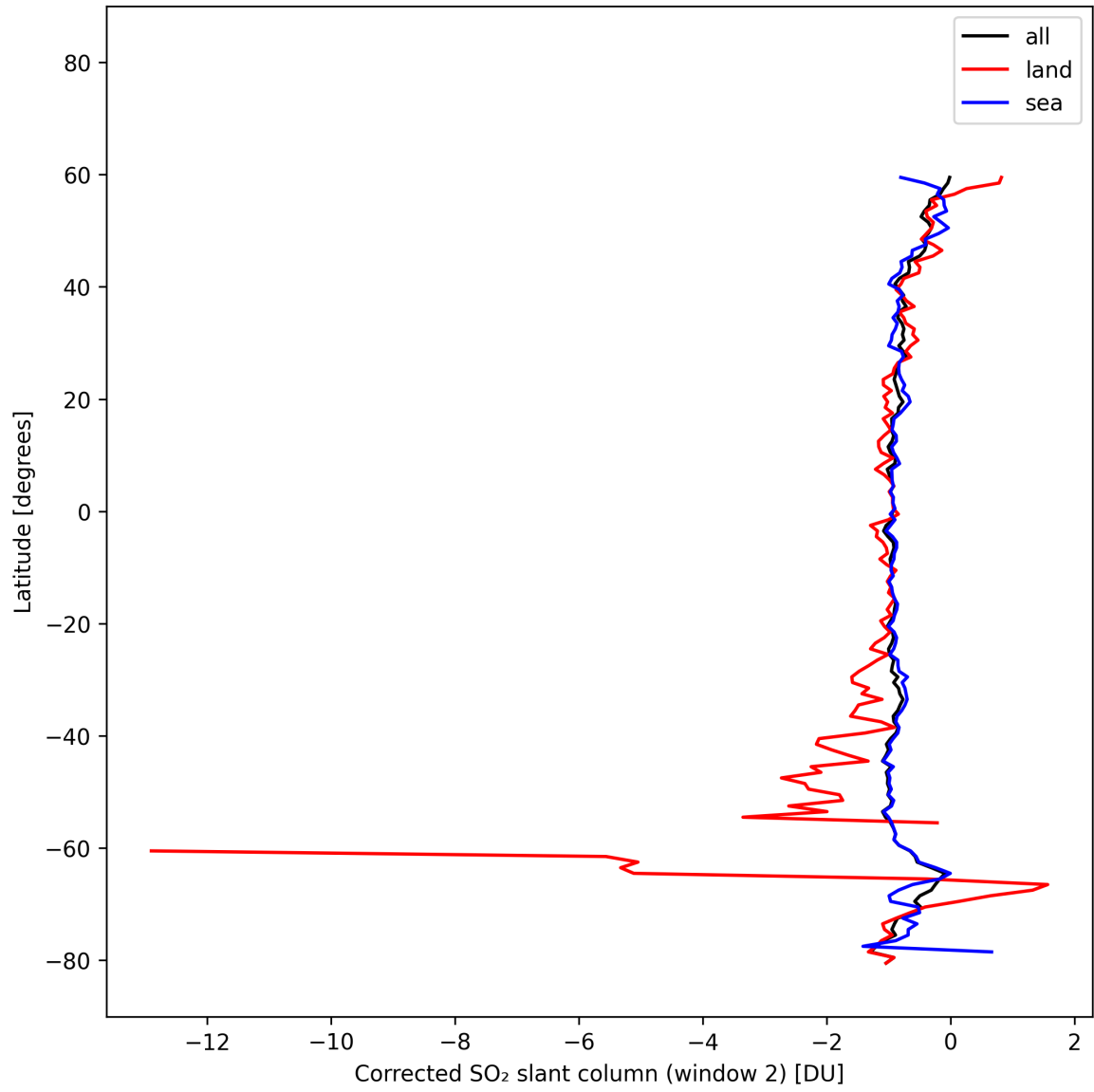


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-10-19 to 2025-10-20.

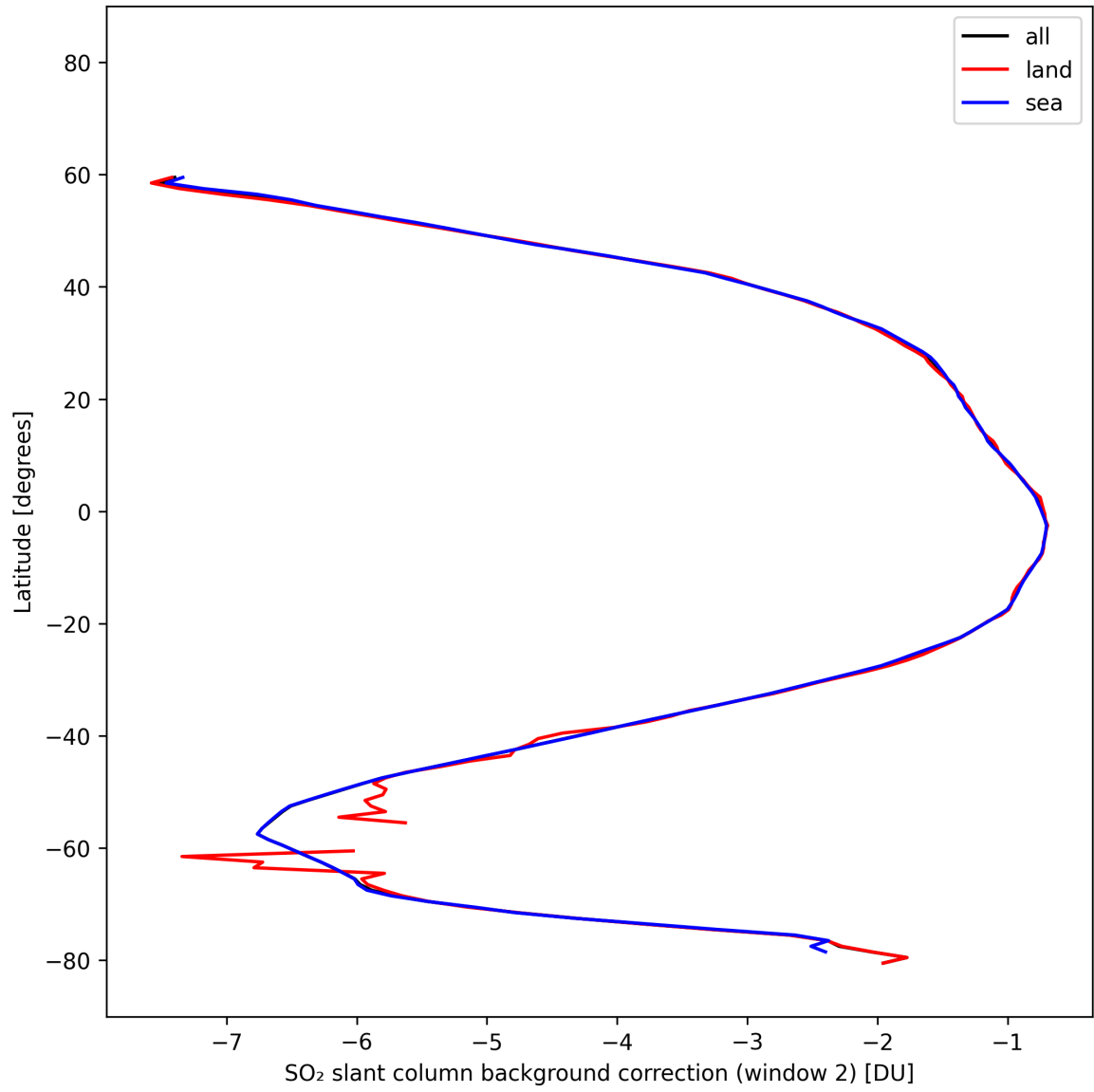


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-10-19 to 2025-10-20.

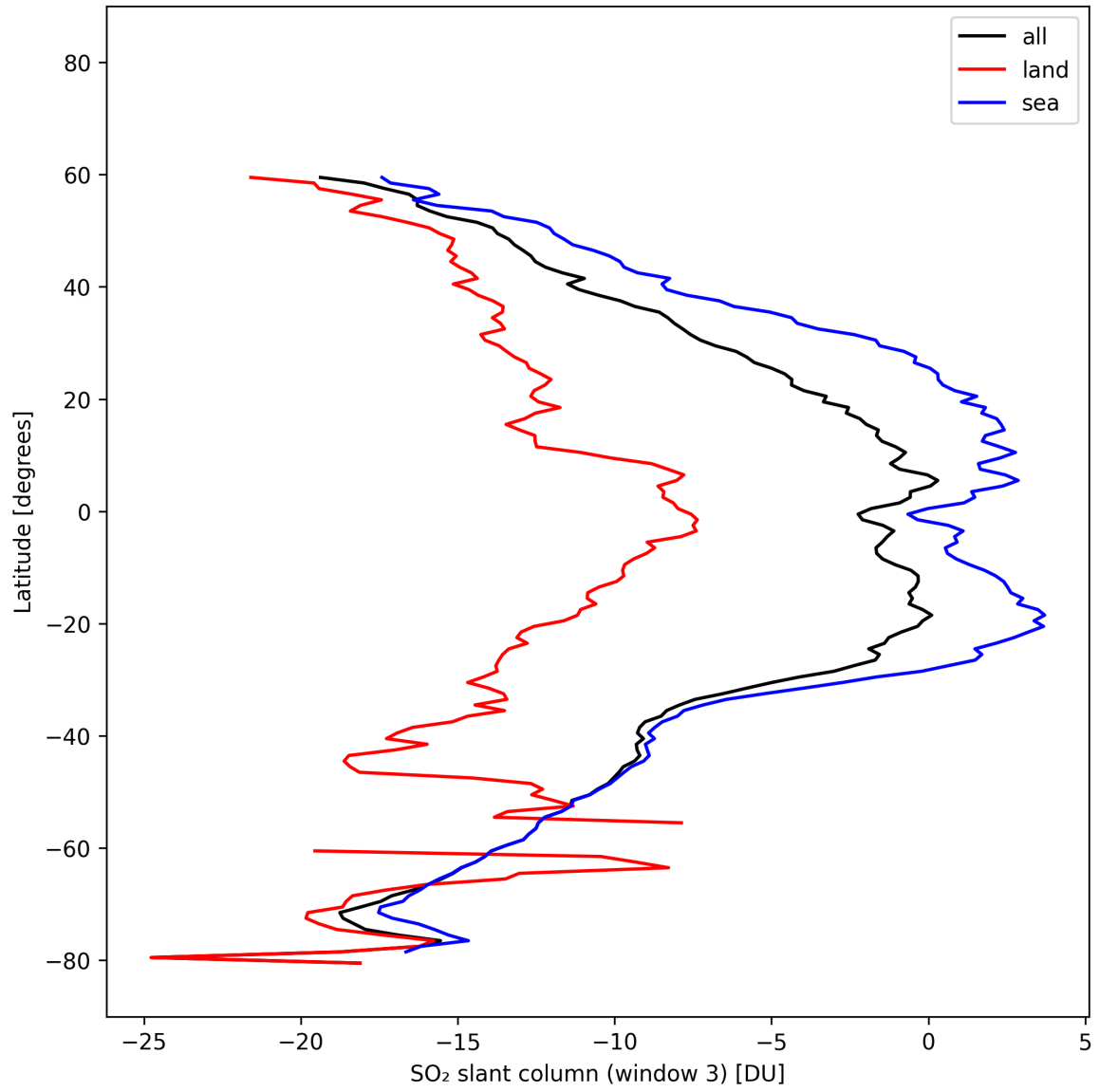


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-10-19 to 2025-10-20.

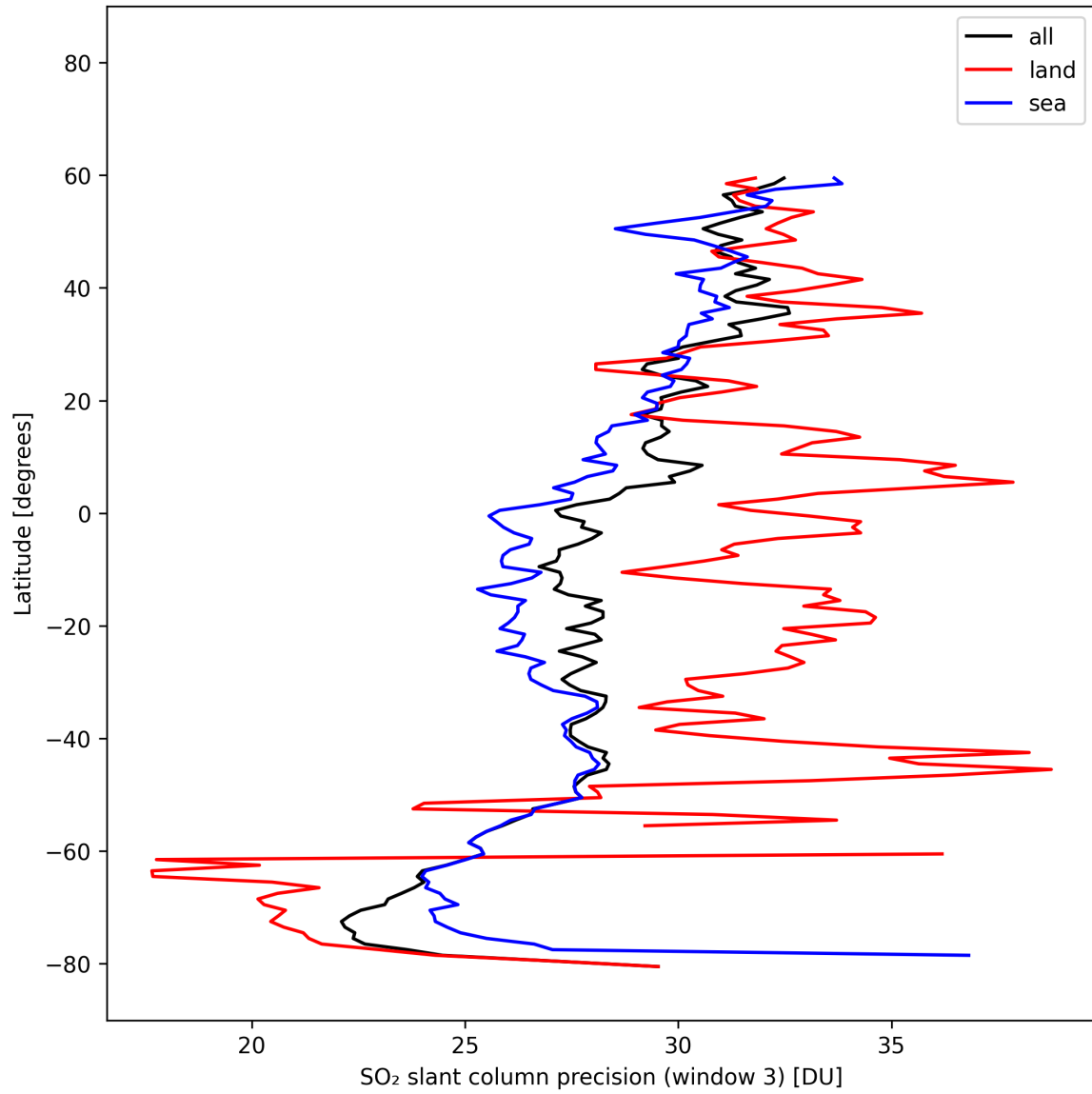


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-10-19 to 2025-10-20.

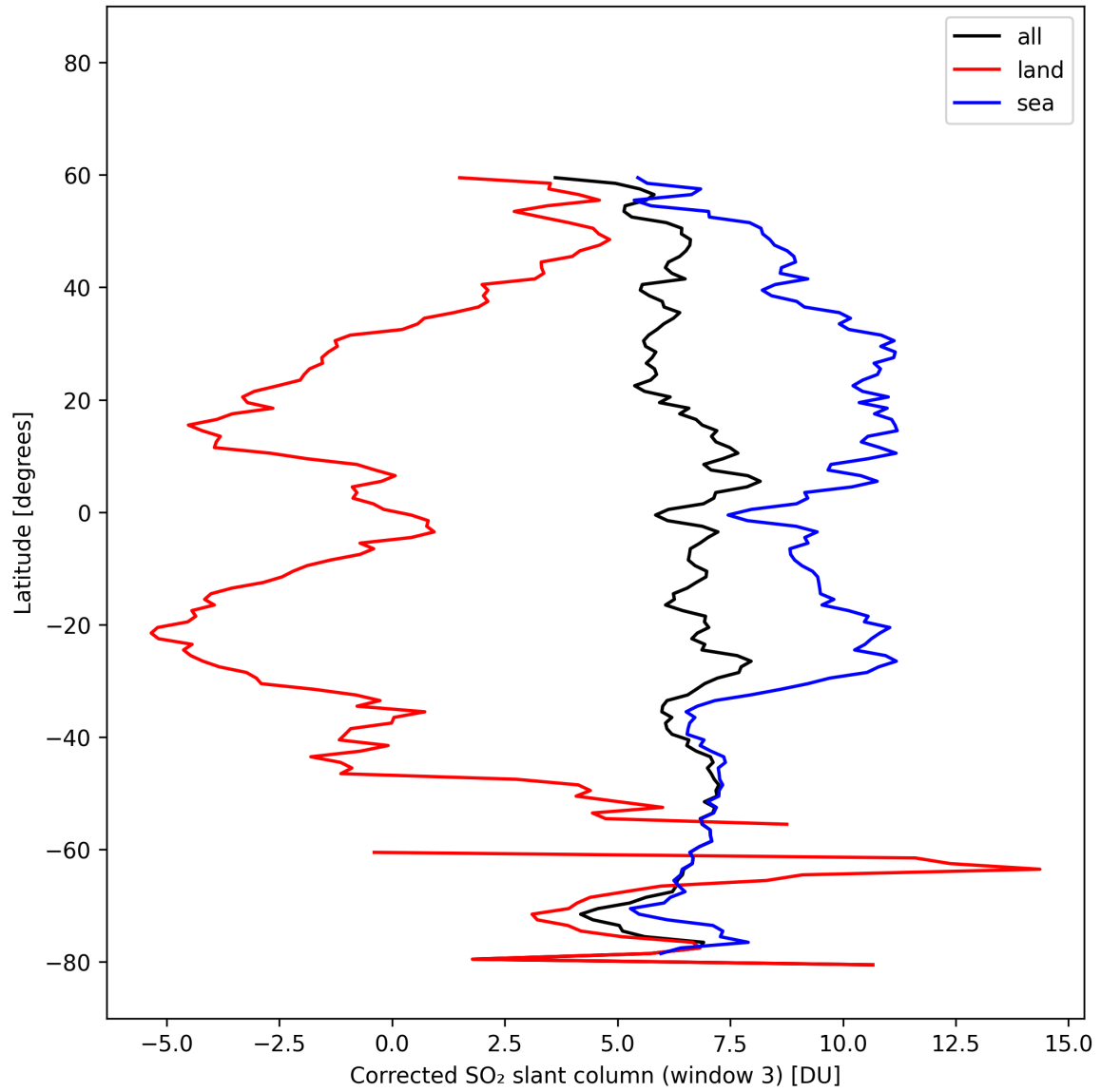


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-10-19 to 2025-10-20.

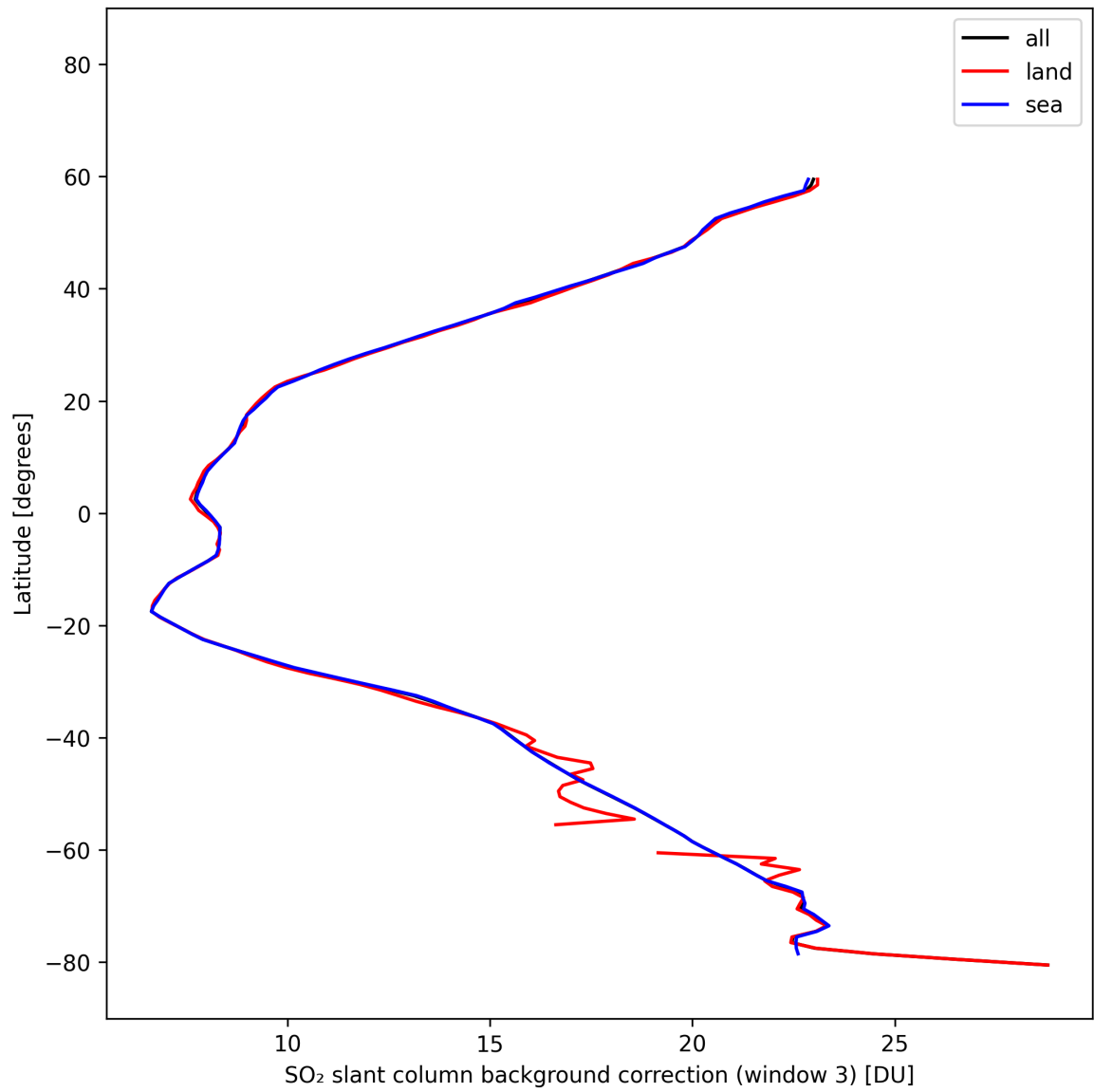


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-10-19 to 2025-10-20.

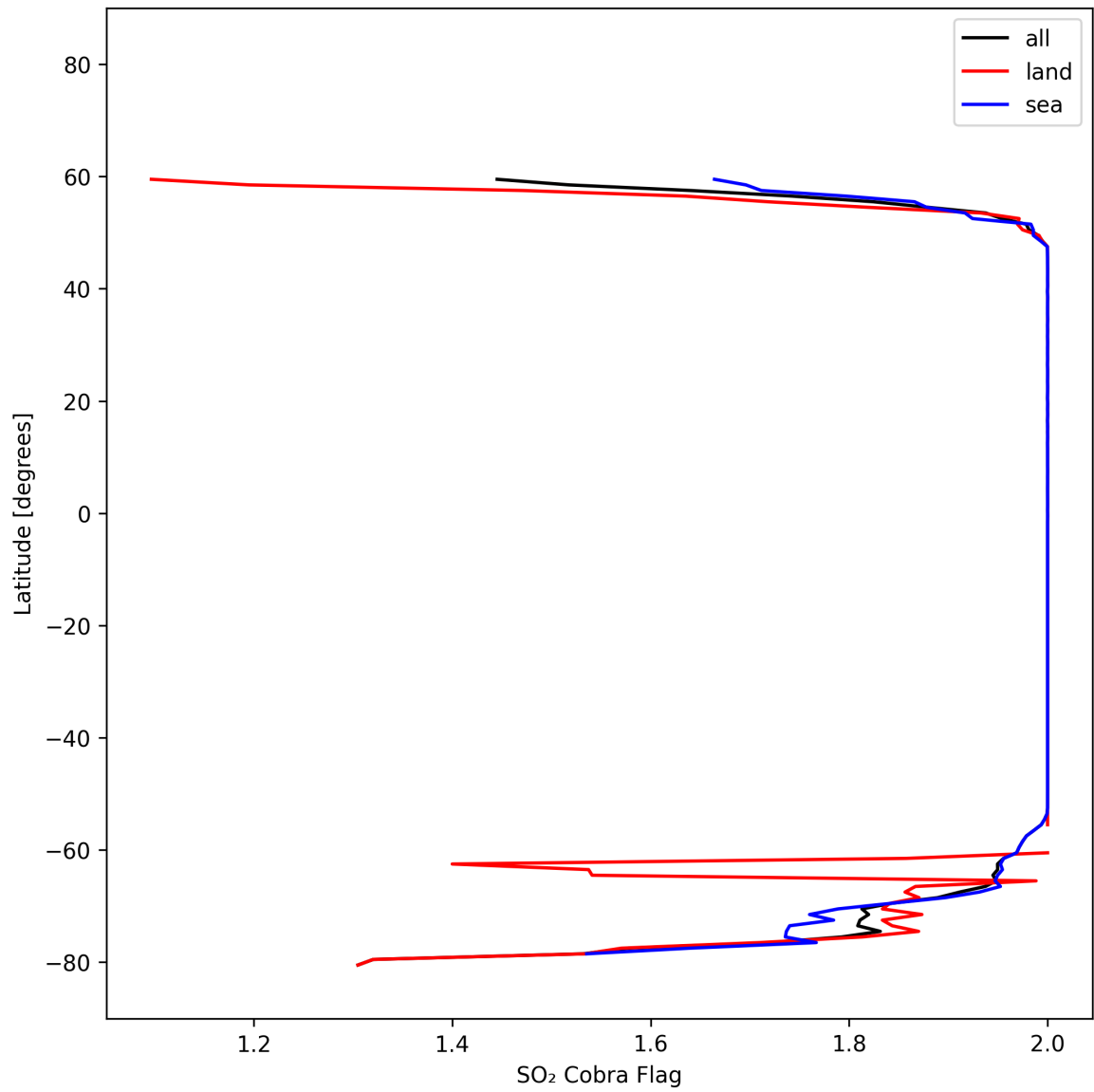


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-10-19 to 2025-10-20.

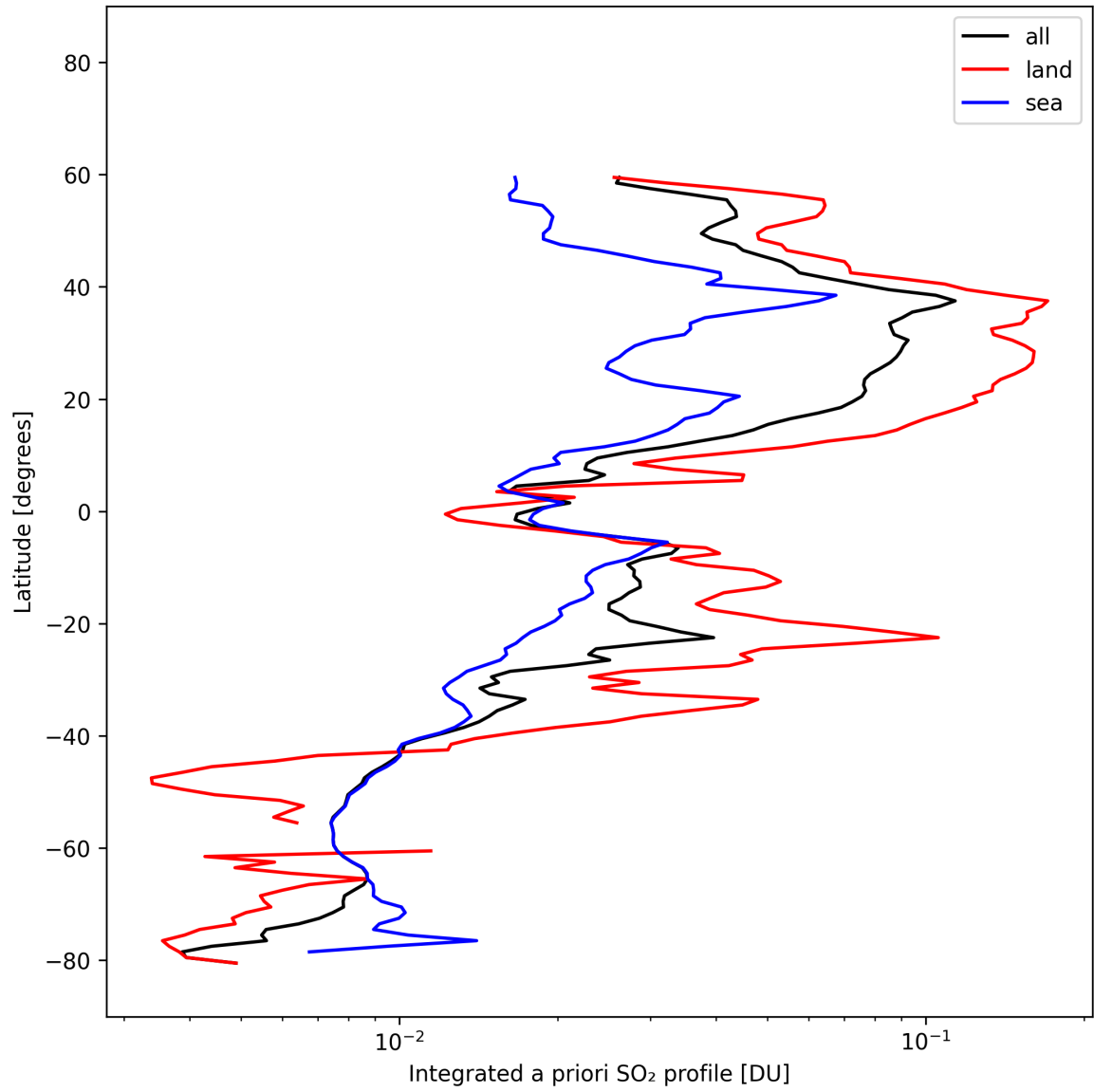


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-10-19 to 2025-10-20.

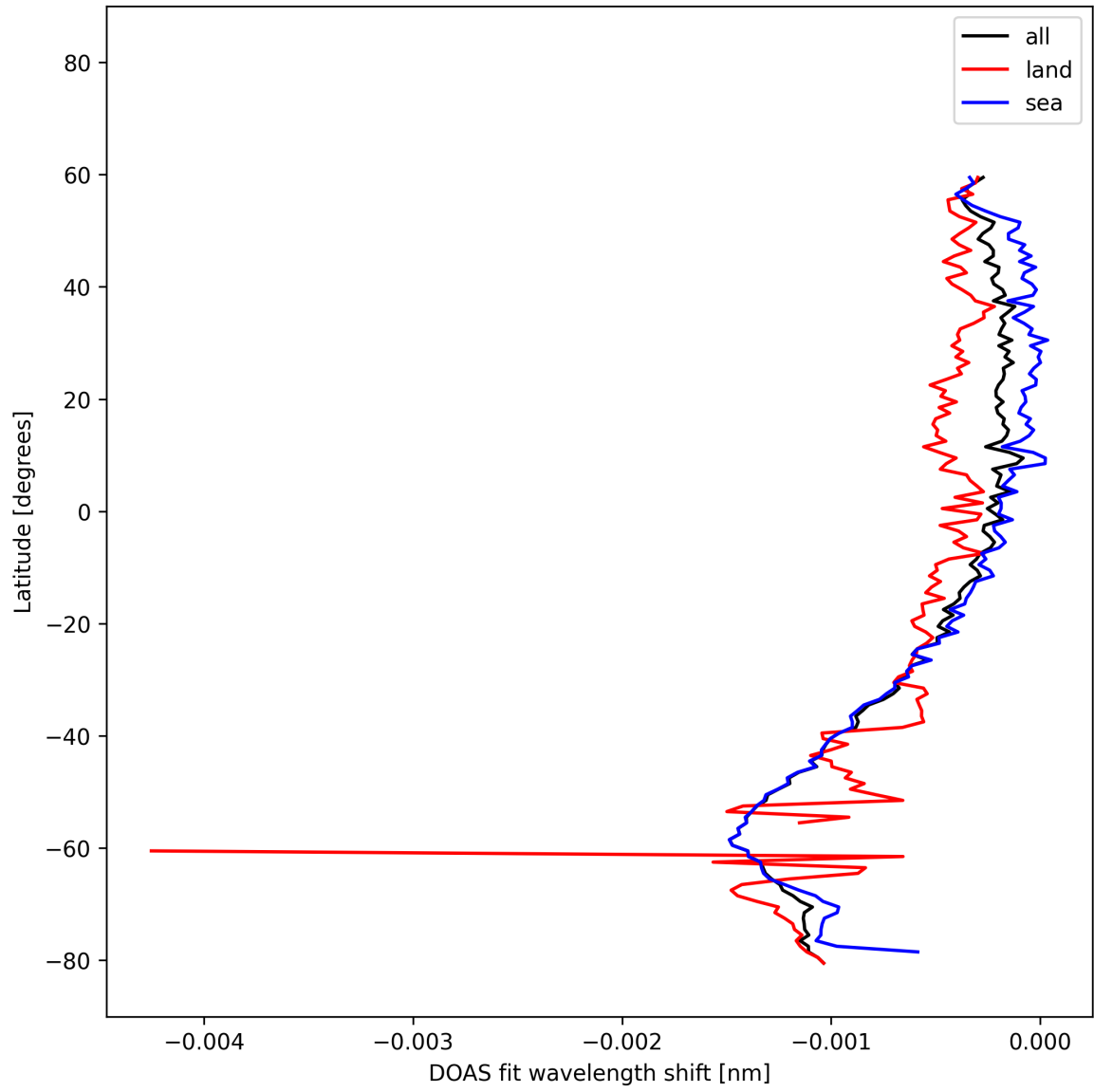


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-10-19 to 2025-10-20.

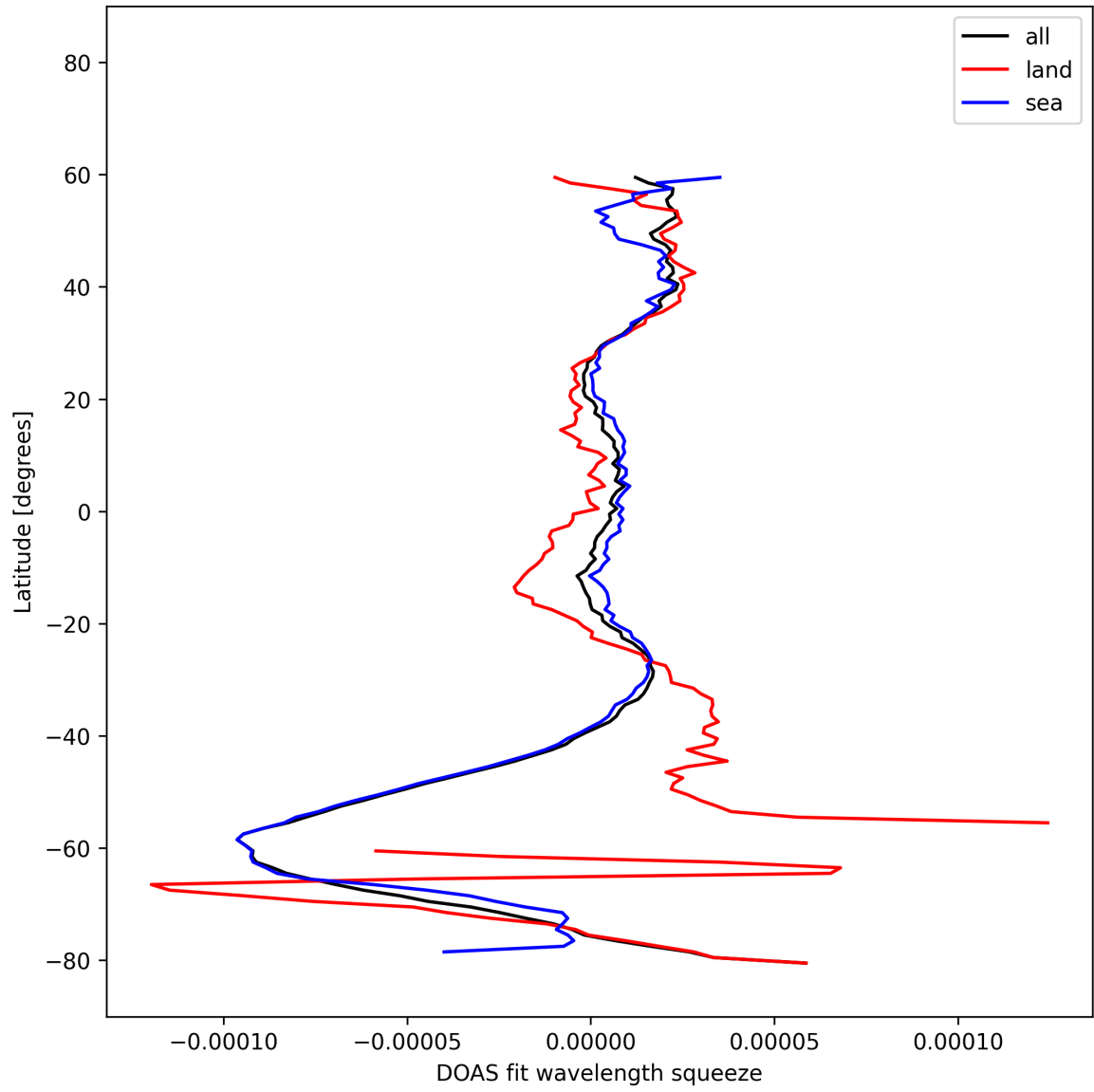


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-10-19 to 2025-10-20.

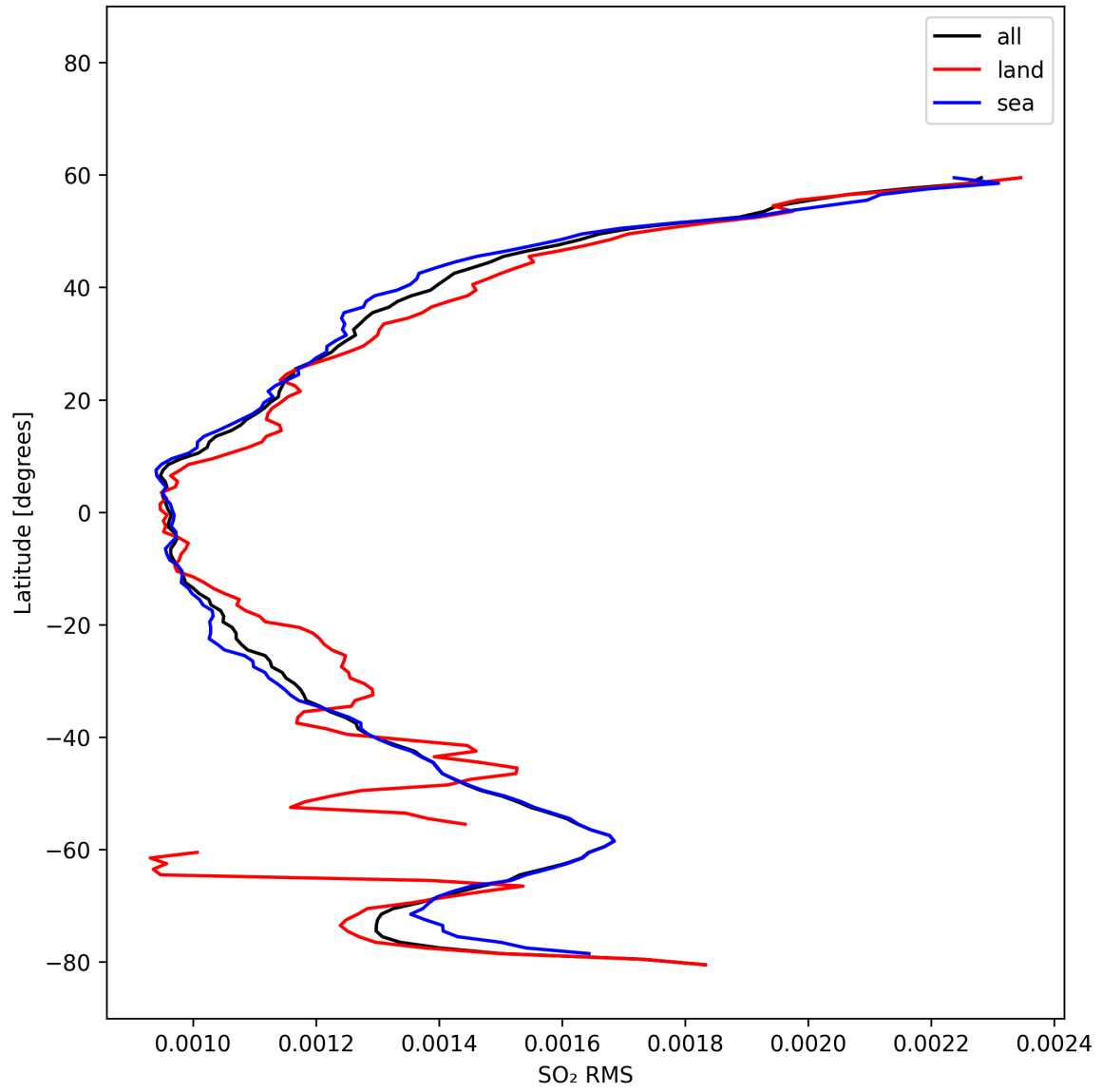


Figure 52: Zonal average of “SO₂ RMS” for 2025-10-19 to 2025-10-20.

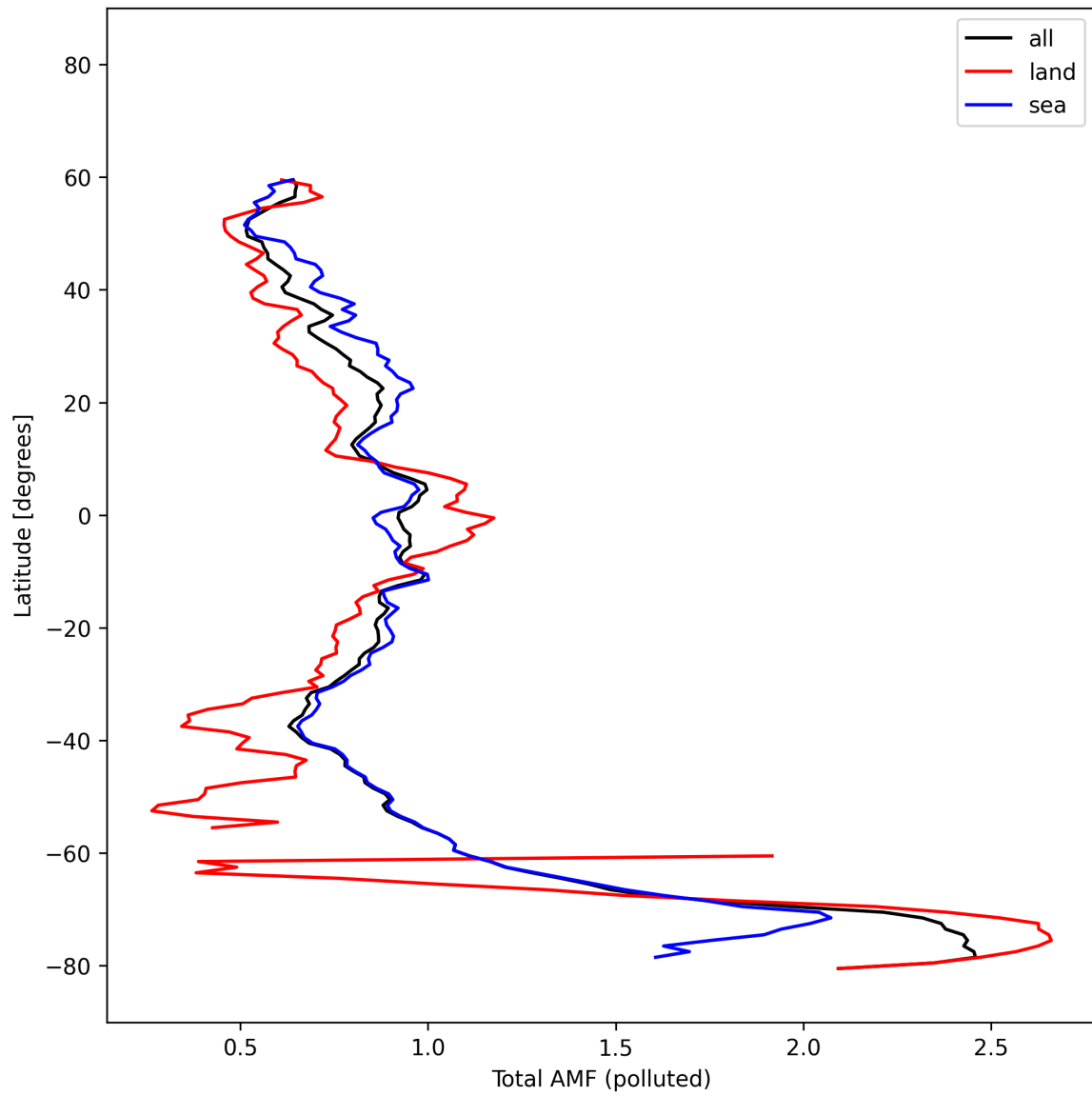


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-10-19 to 2025-10-20.

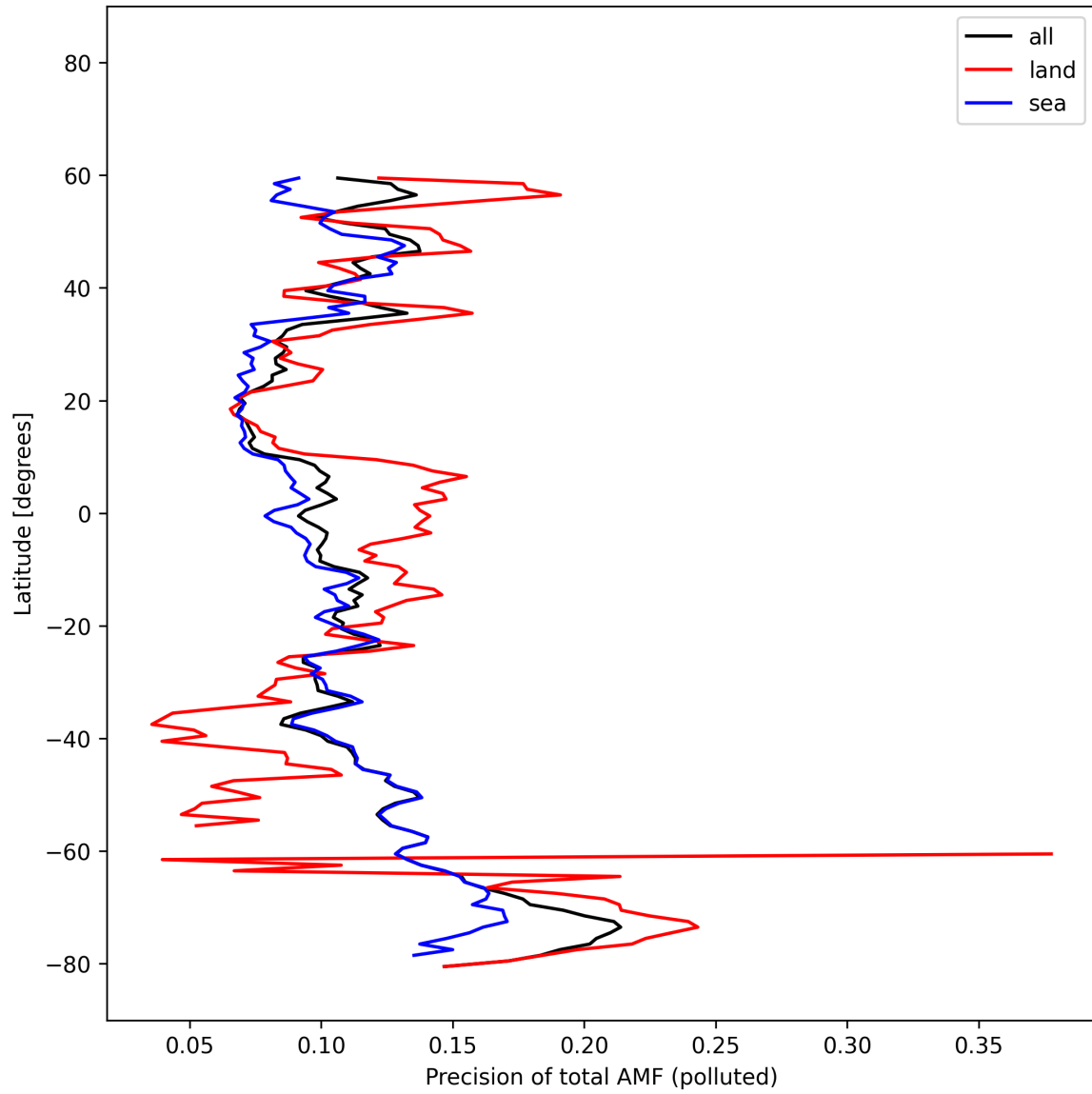


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-10-19 to 2025-10-20.

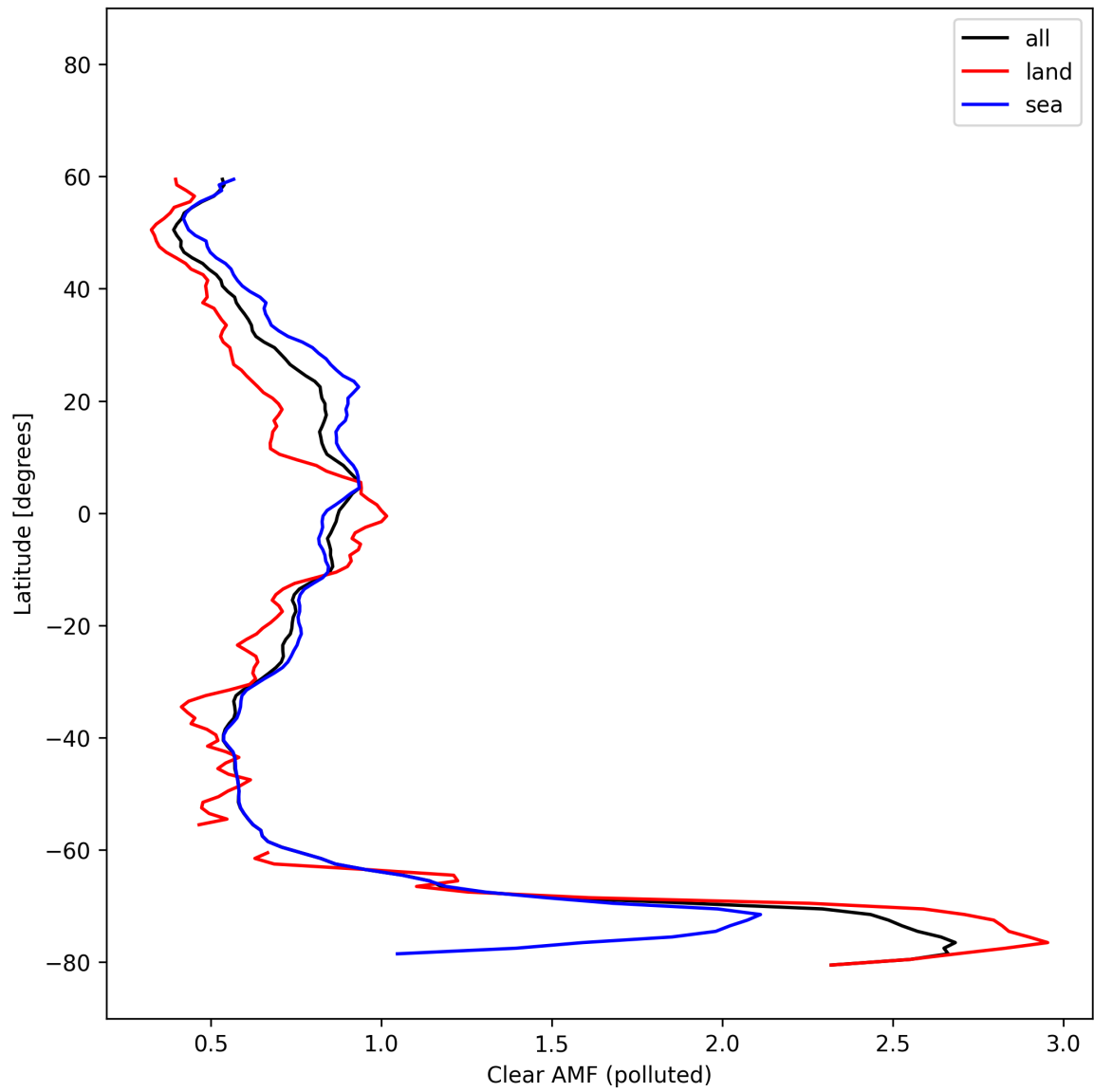


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-10-19 to 2025-10-20.

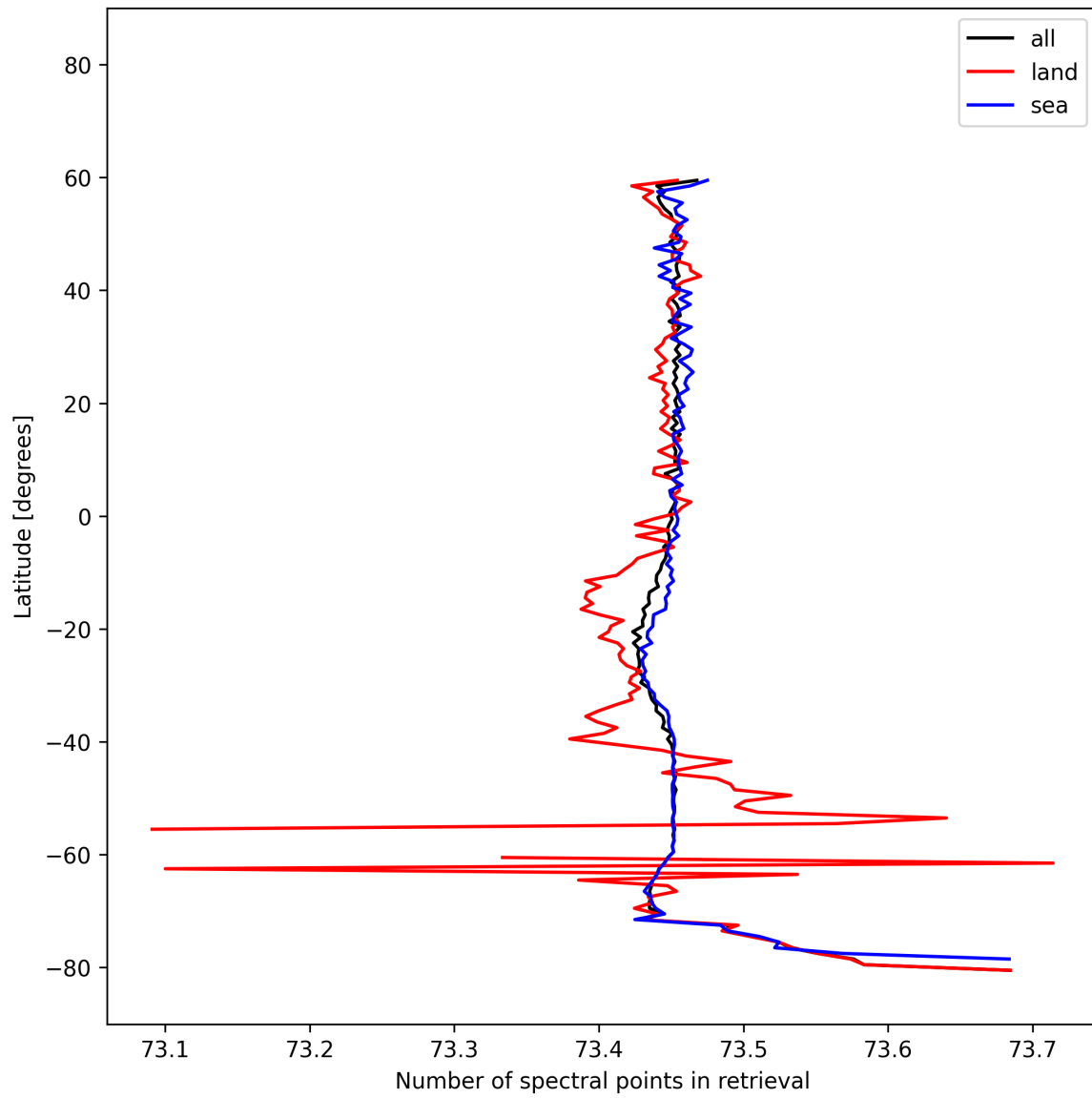


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-10-19 to 2025-10-20.

8 Histograms

The definitions of the parameters given in this section can be found in section 2.

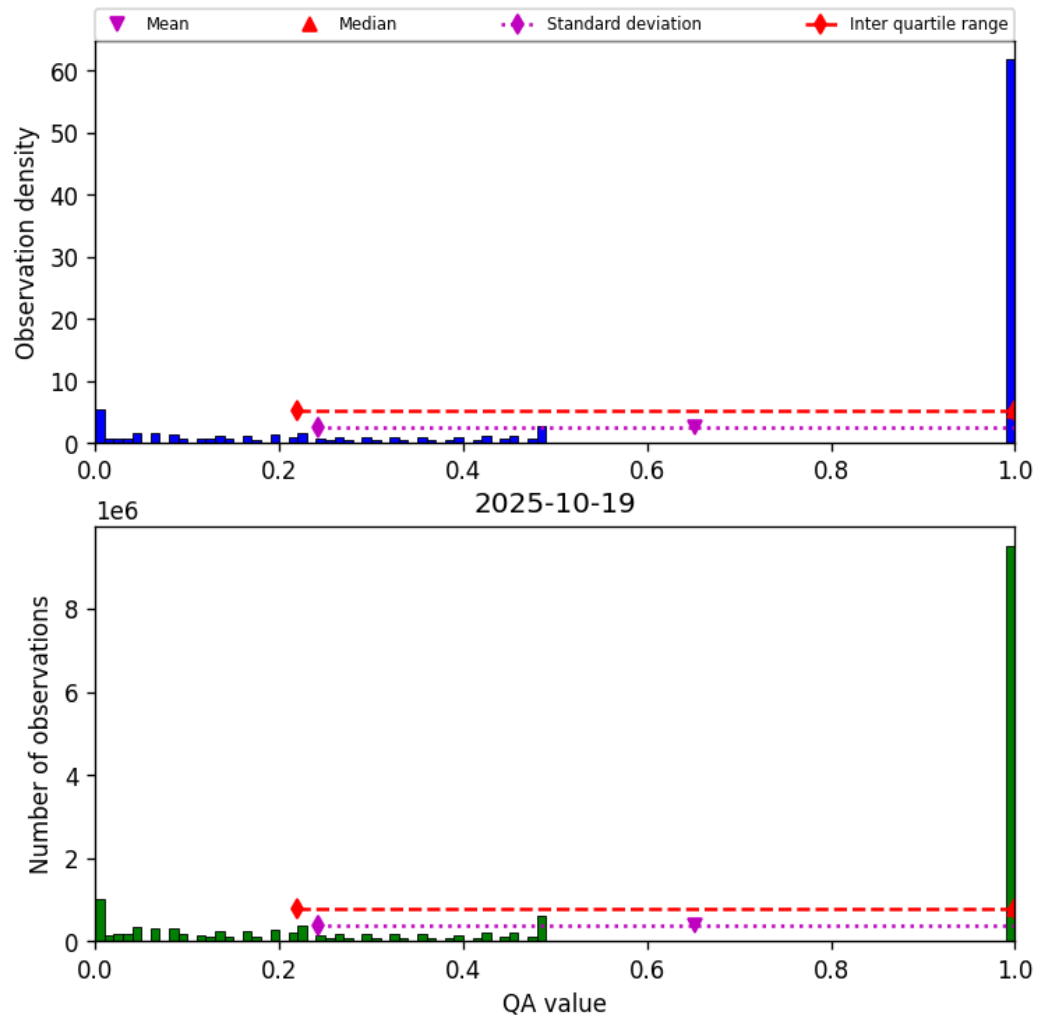


Figure 57: Histogram of “QA value” for 2025-10-19 to 2025-10-20

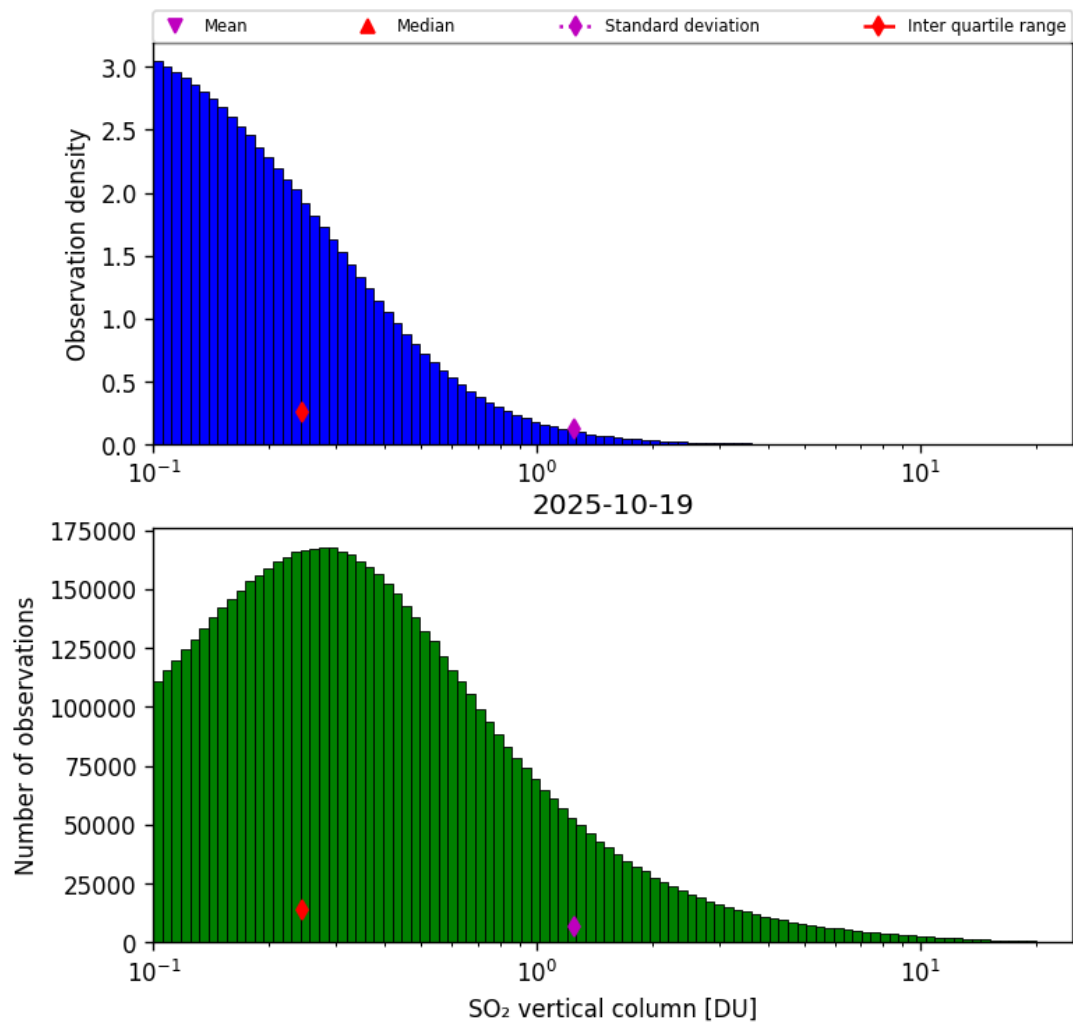


Figure 58: Histogram of “SO₂ vertical column” for 2025-10-19 to 2025-10-20

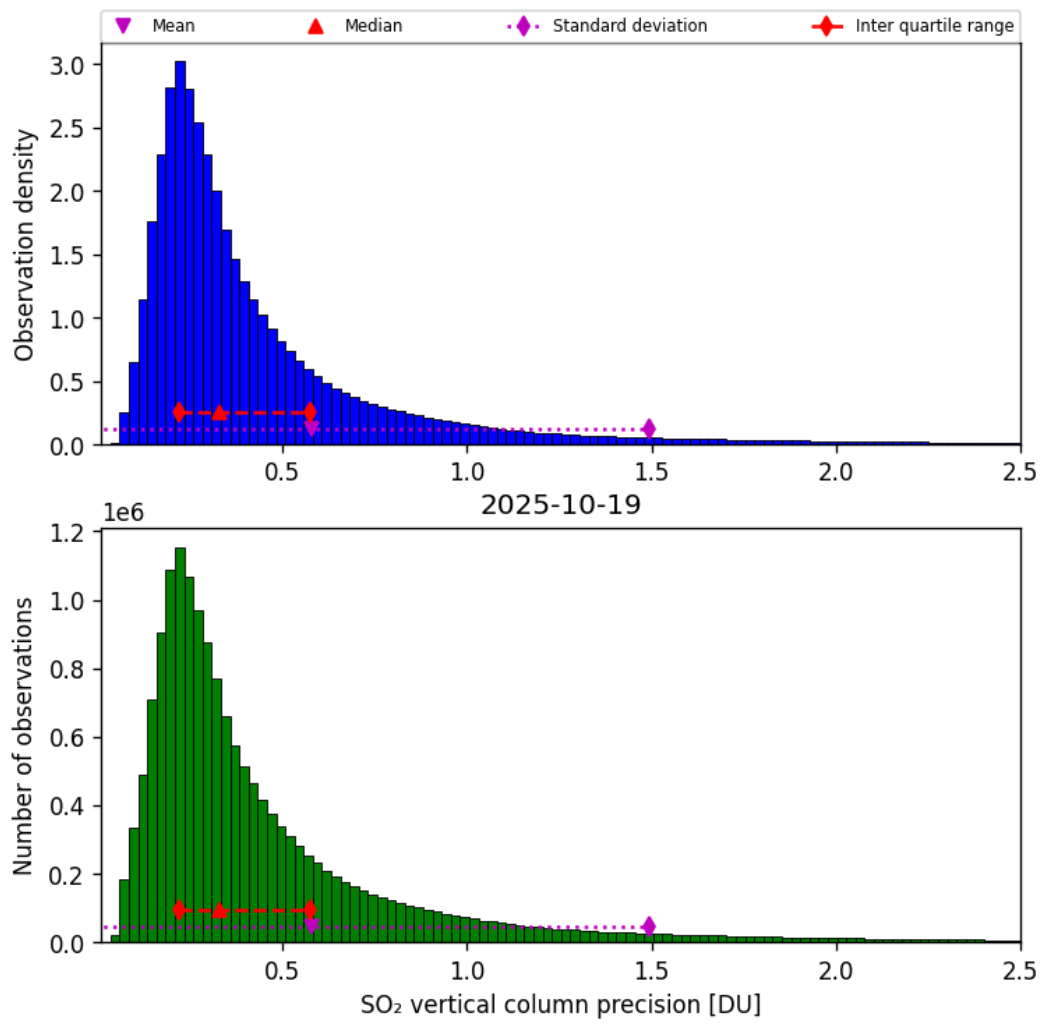


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-10-19 to 2025-10-20

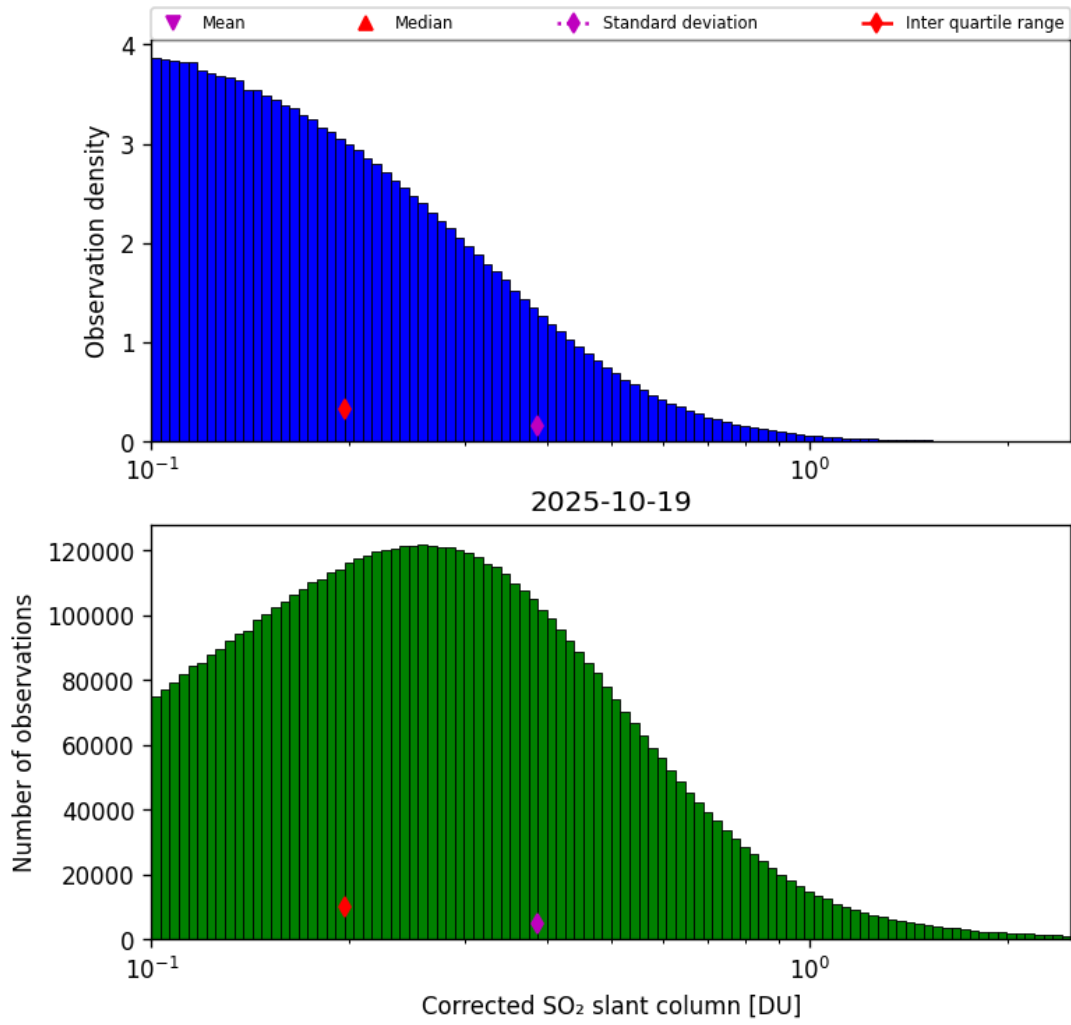


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-10-19 to 2025-10-20

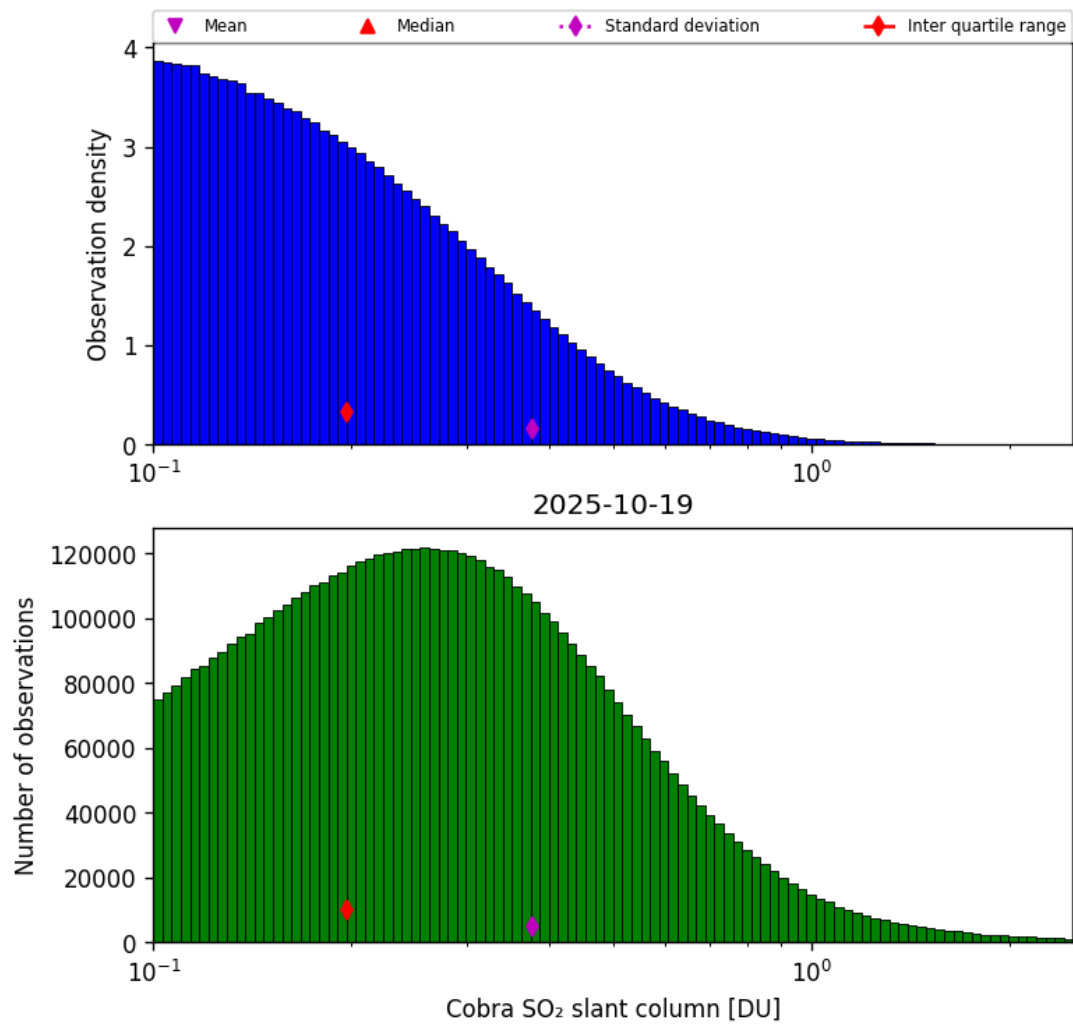


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-10-19 to 2025-10-20

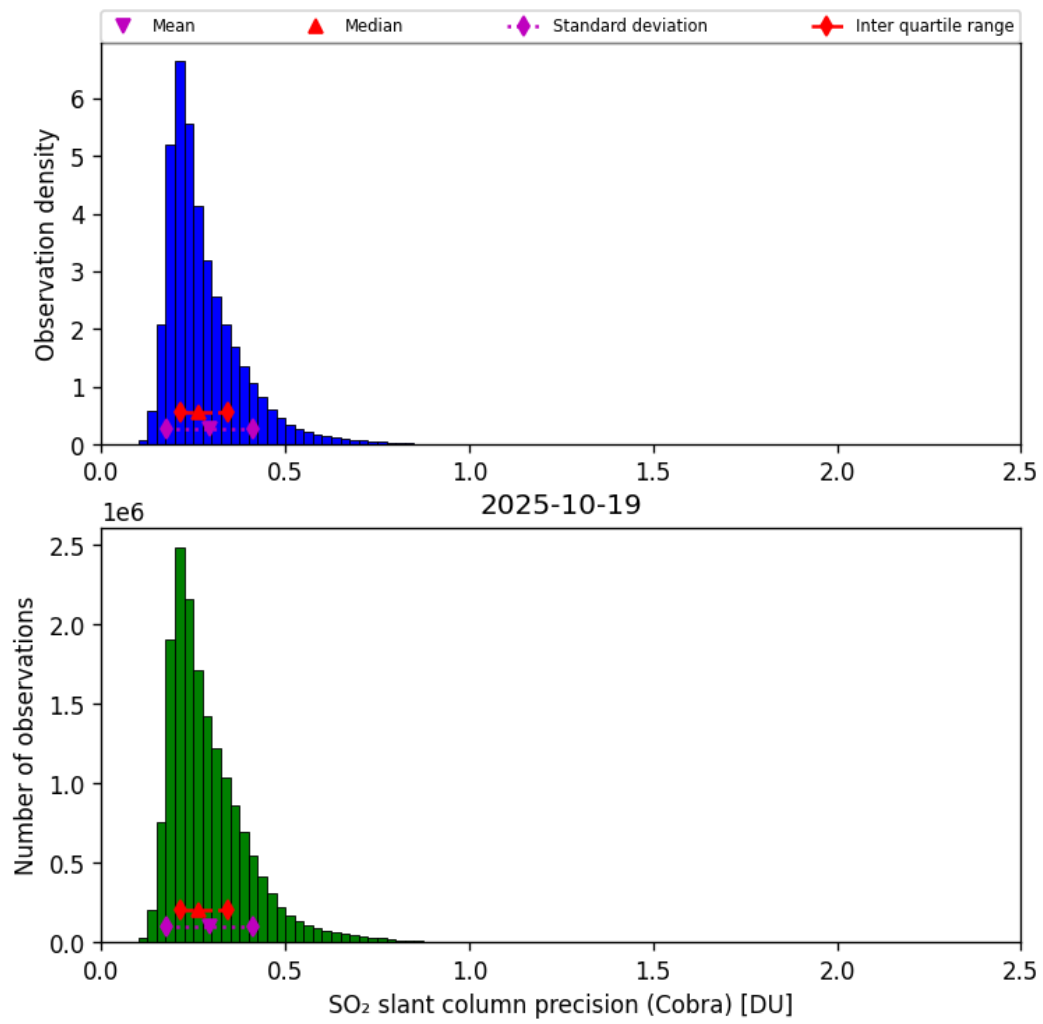


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-10-19 to 2025-10-20

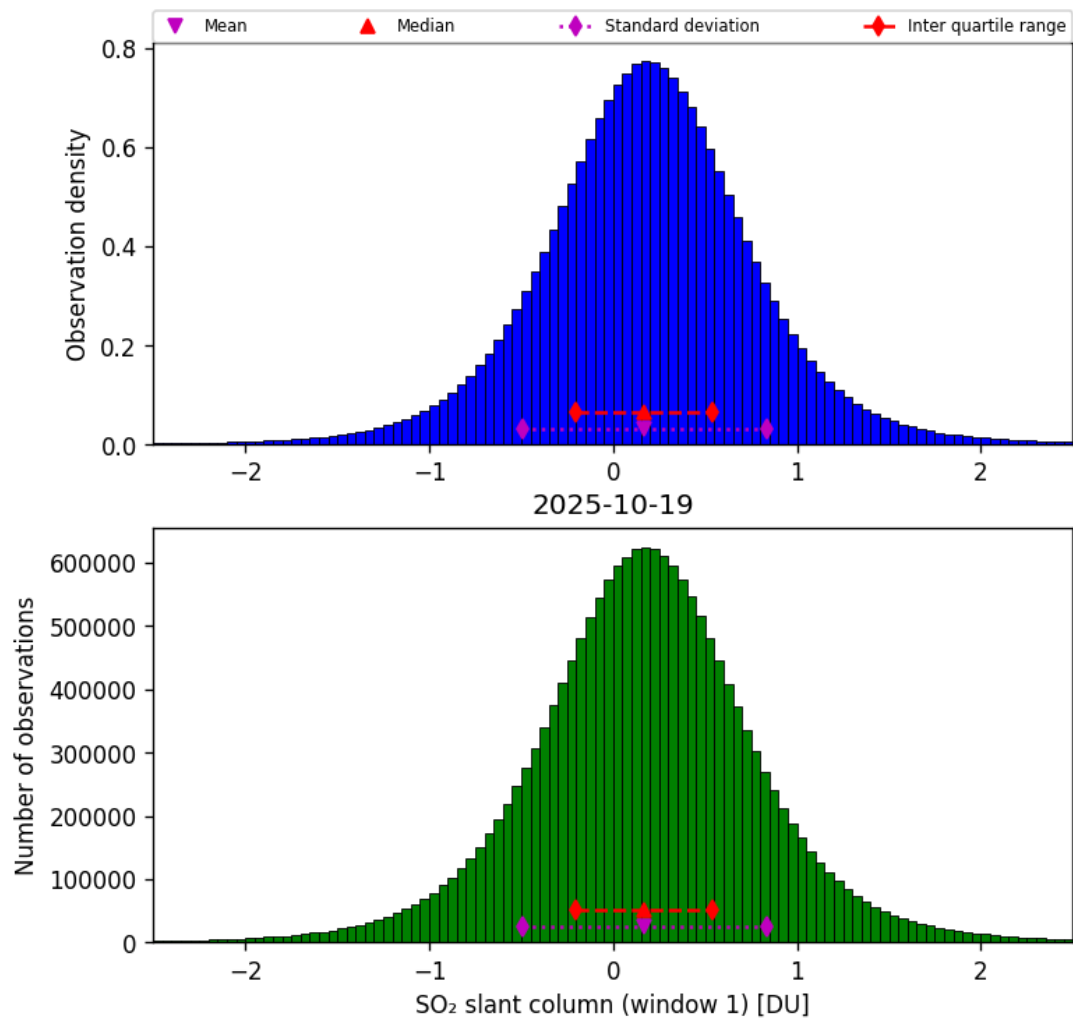


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-10-19 to 2025-10-20

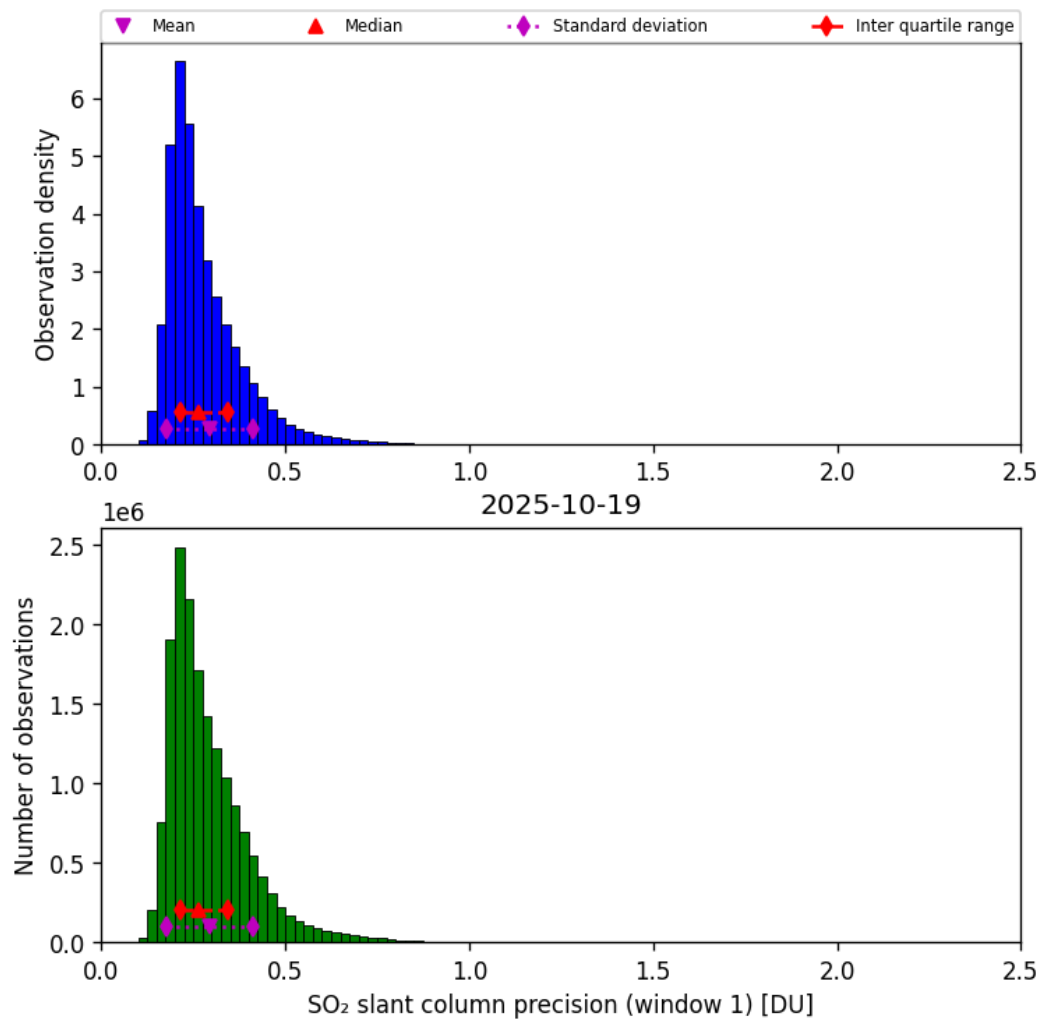


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-10-19 to 2025-10-20

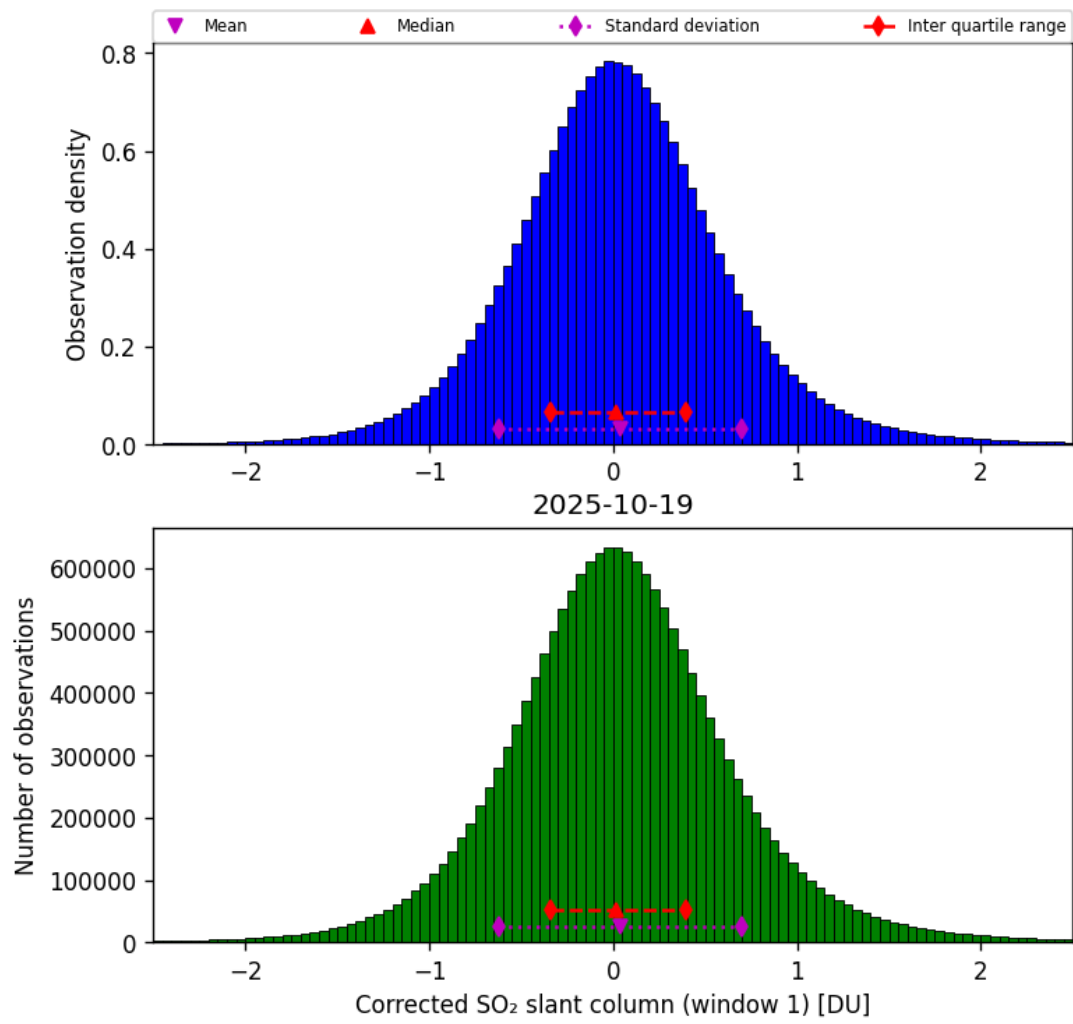


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-10-19 to 2025-10-20

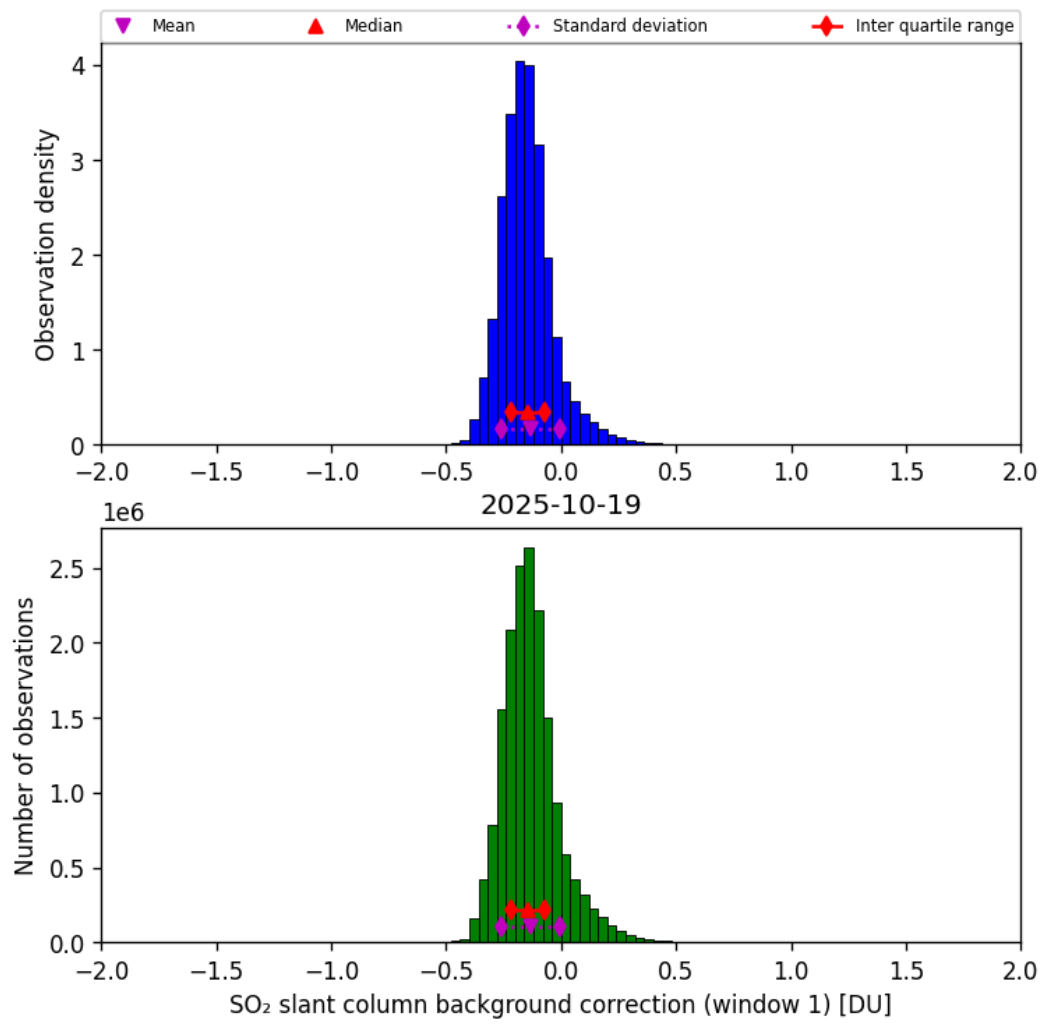


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-10-19 to 2025-10-20

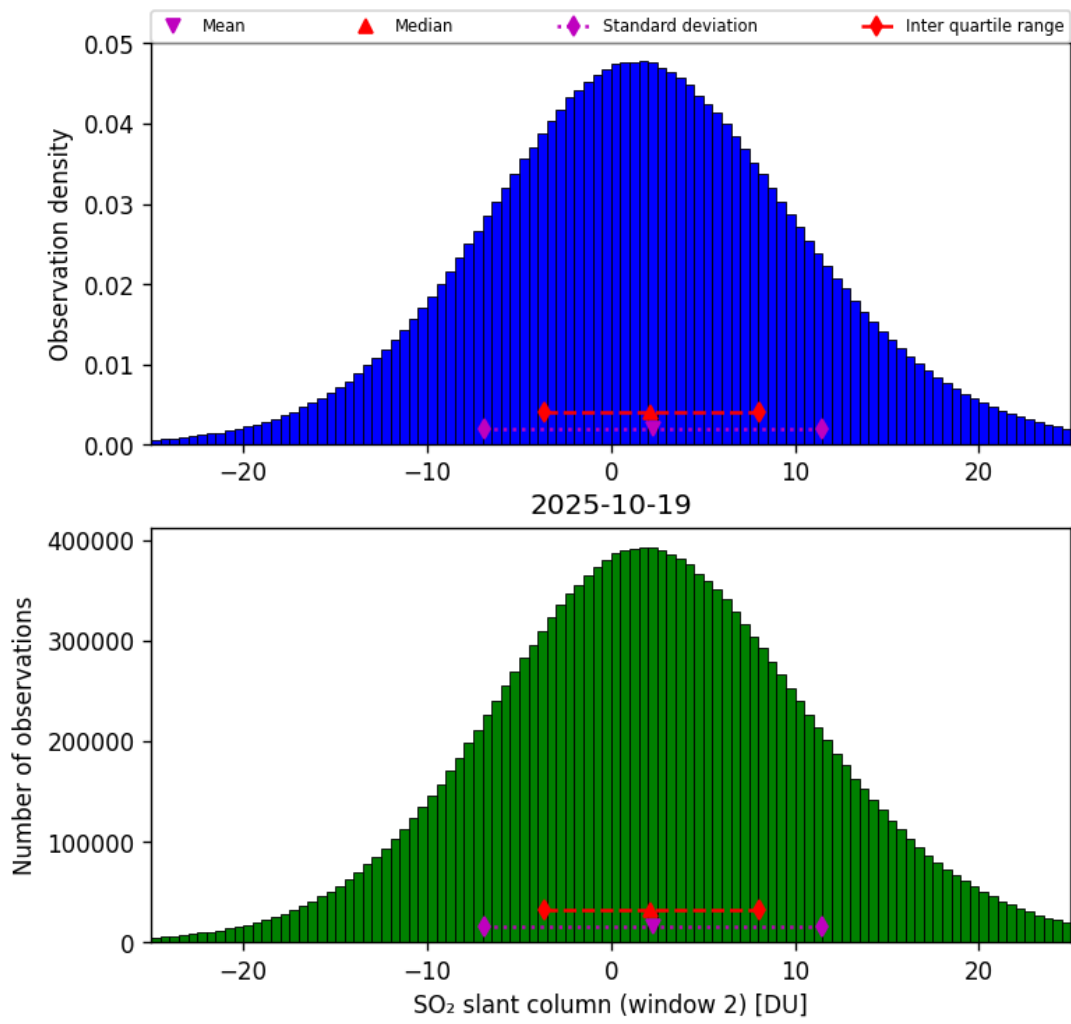


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-10-19 to 2025-10-20

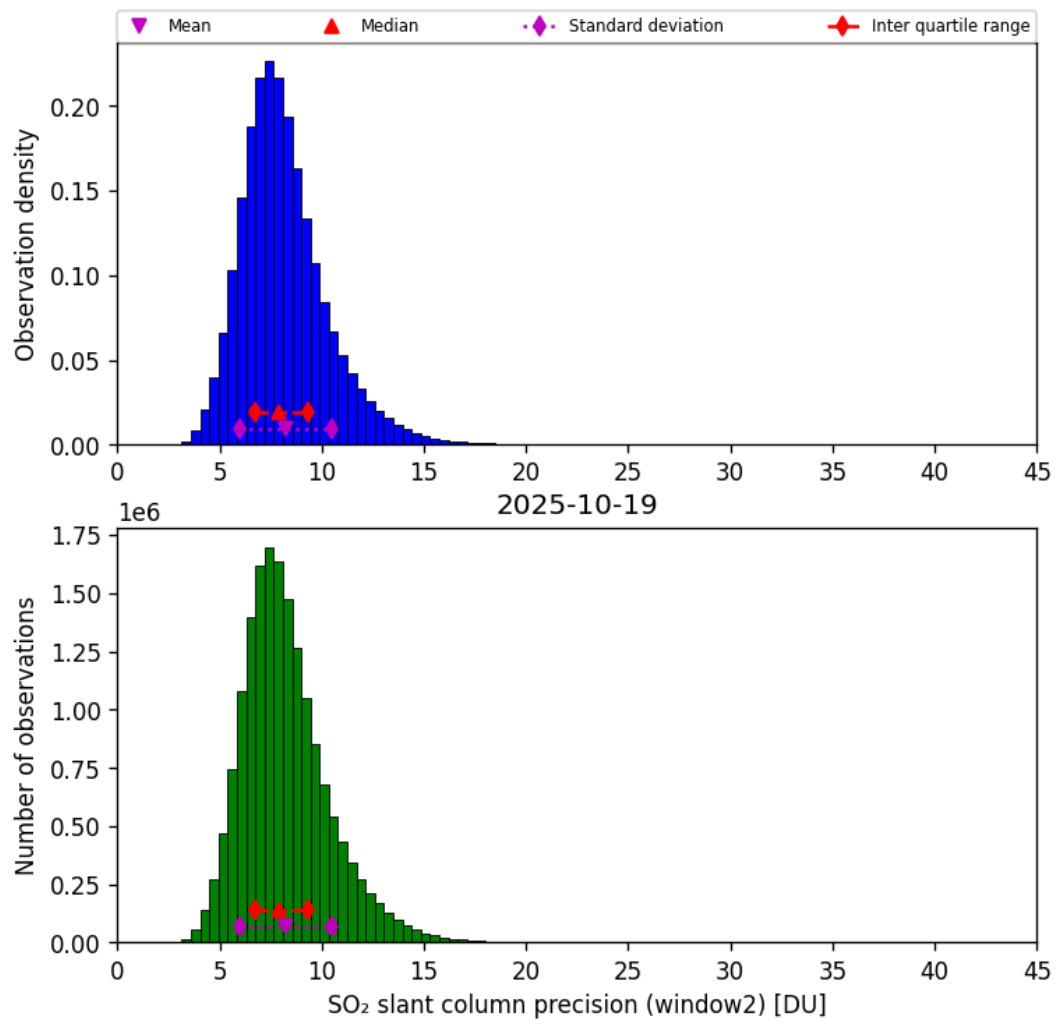


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-10-19 to 2025-10-20

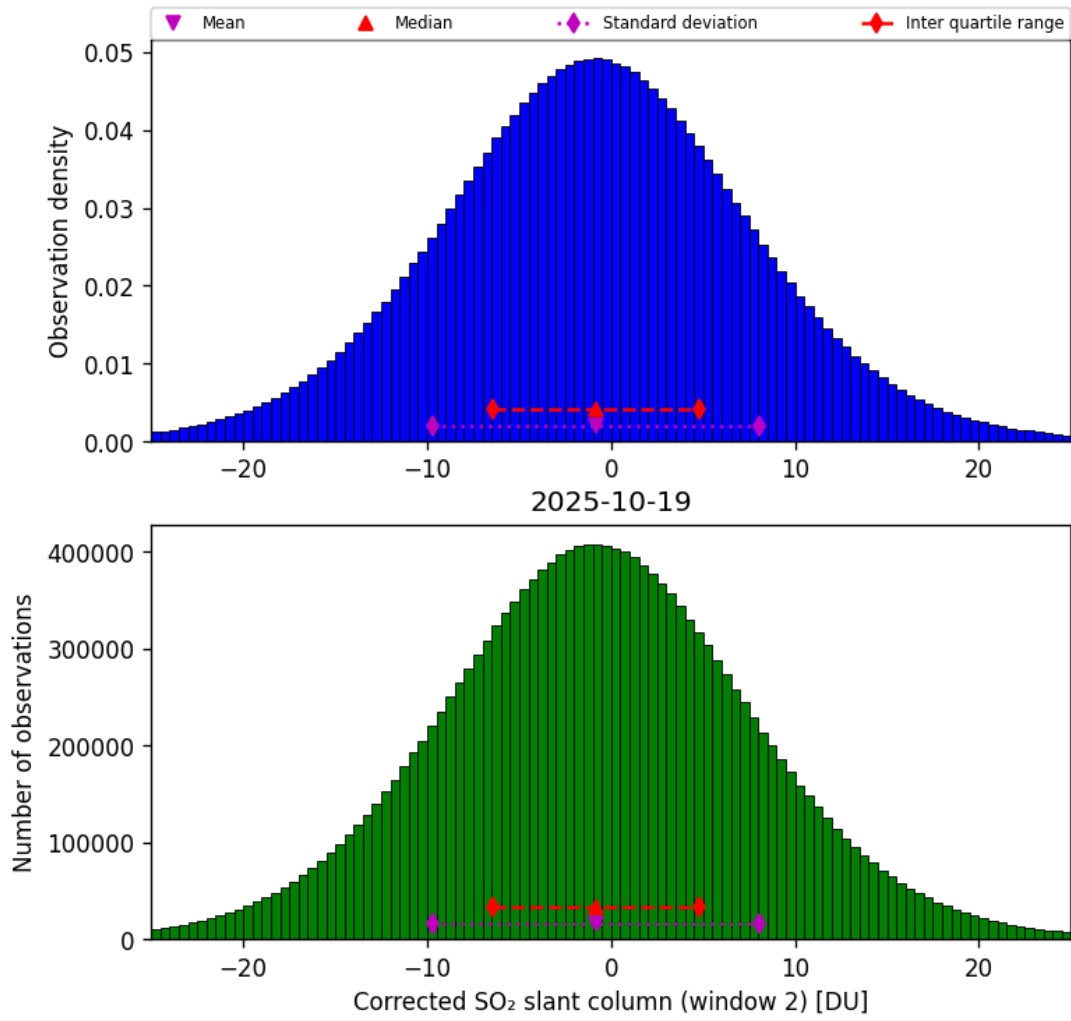


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-10-19 to 2025-10-20

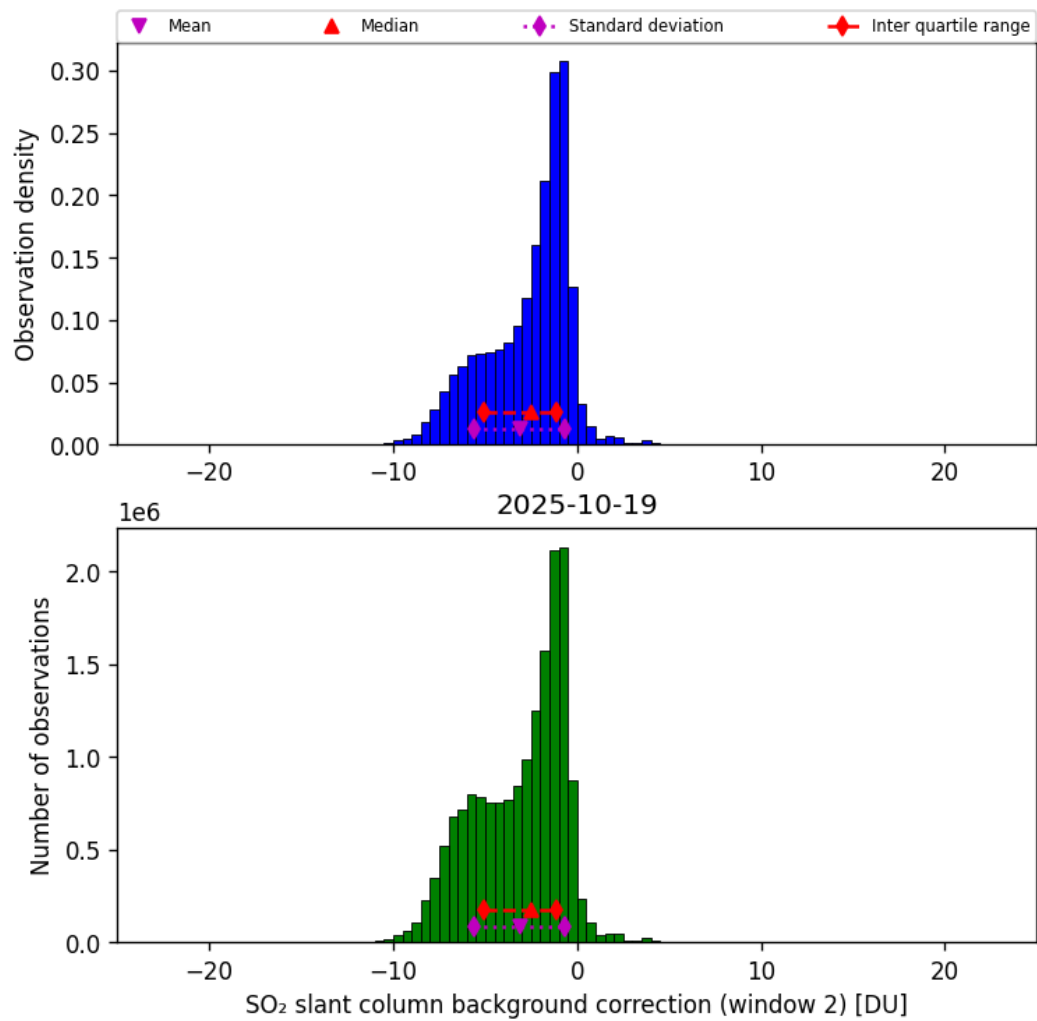


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-10-19 to 2025-10-20

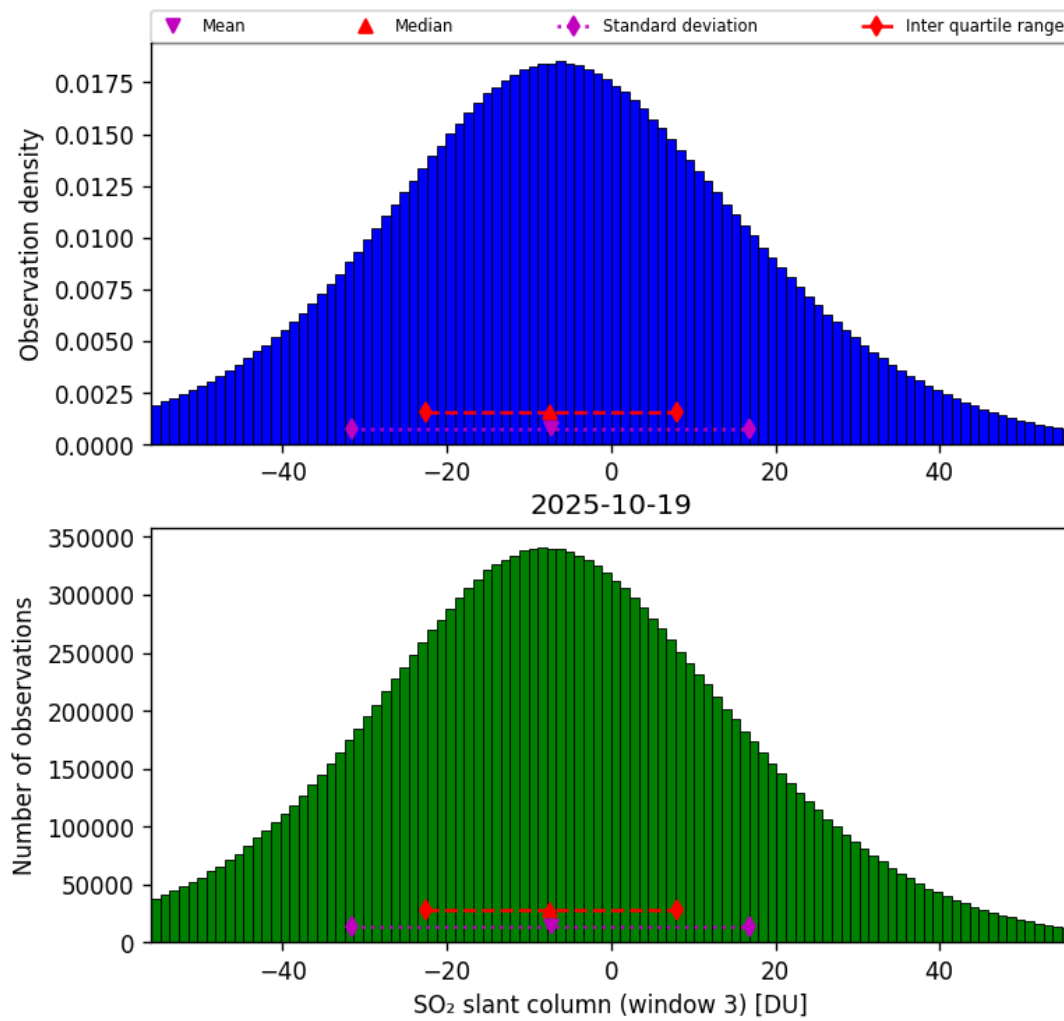


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-10-19 to 2025-10-20

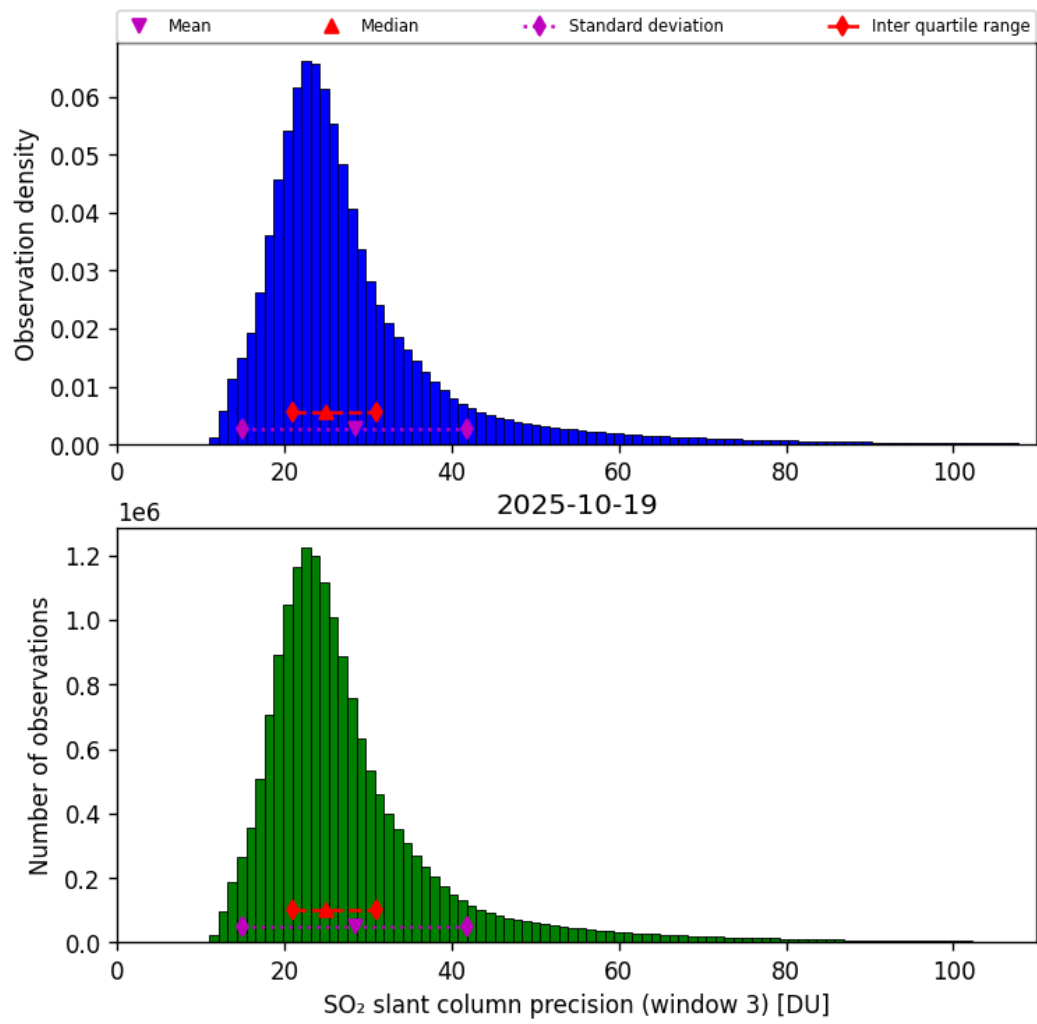


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-10-19 to 2025-10-20

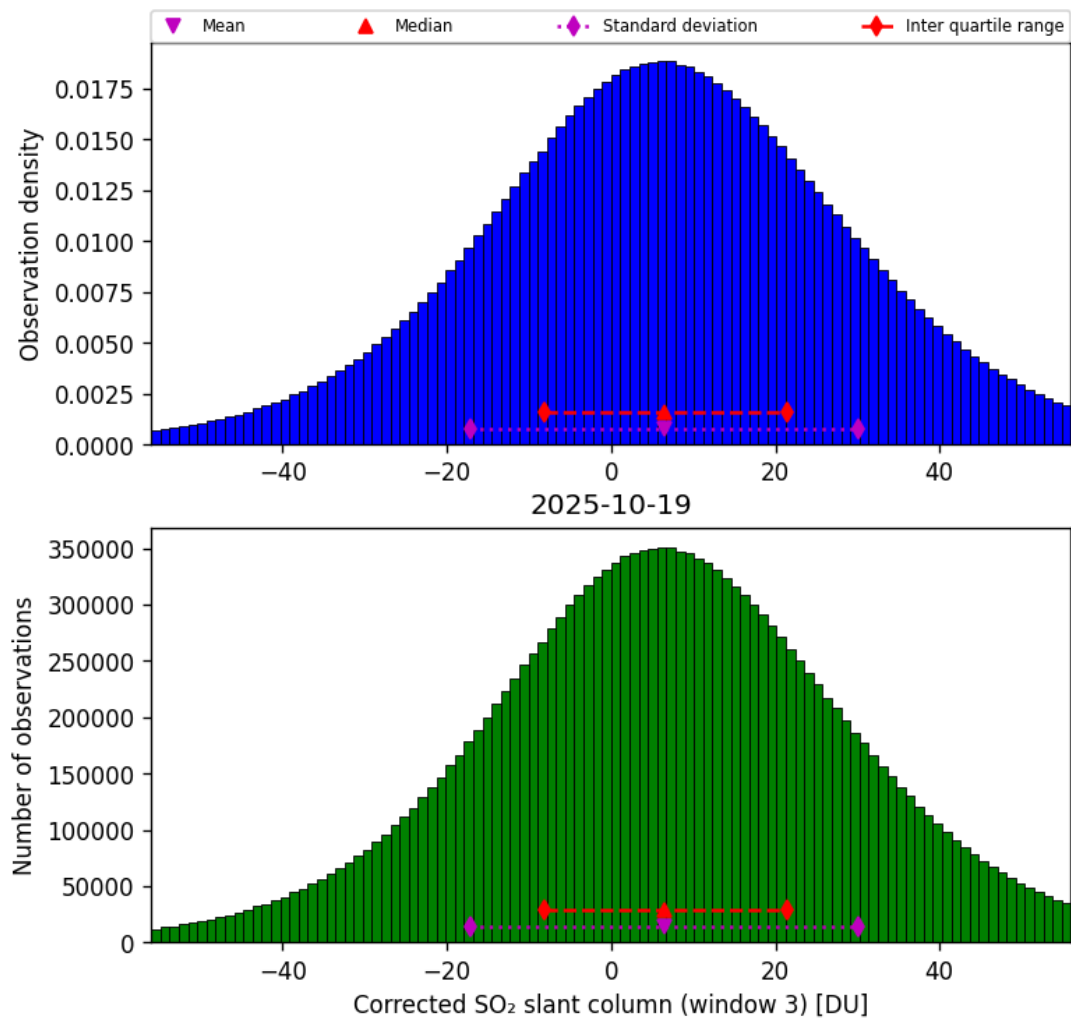


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-10-19 to 2025-10-20

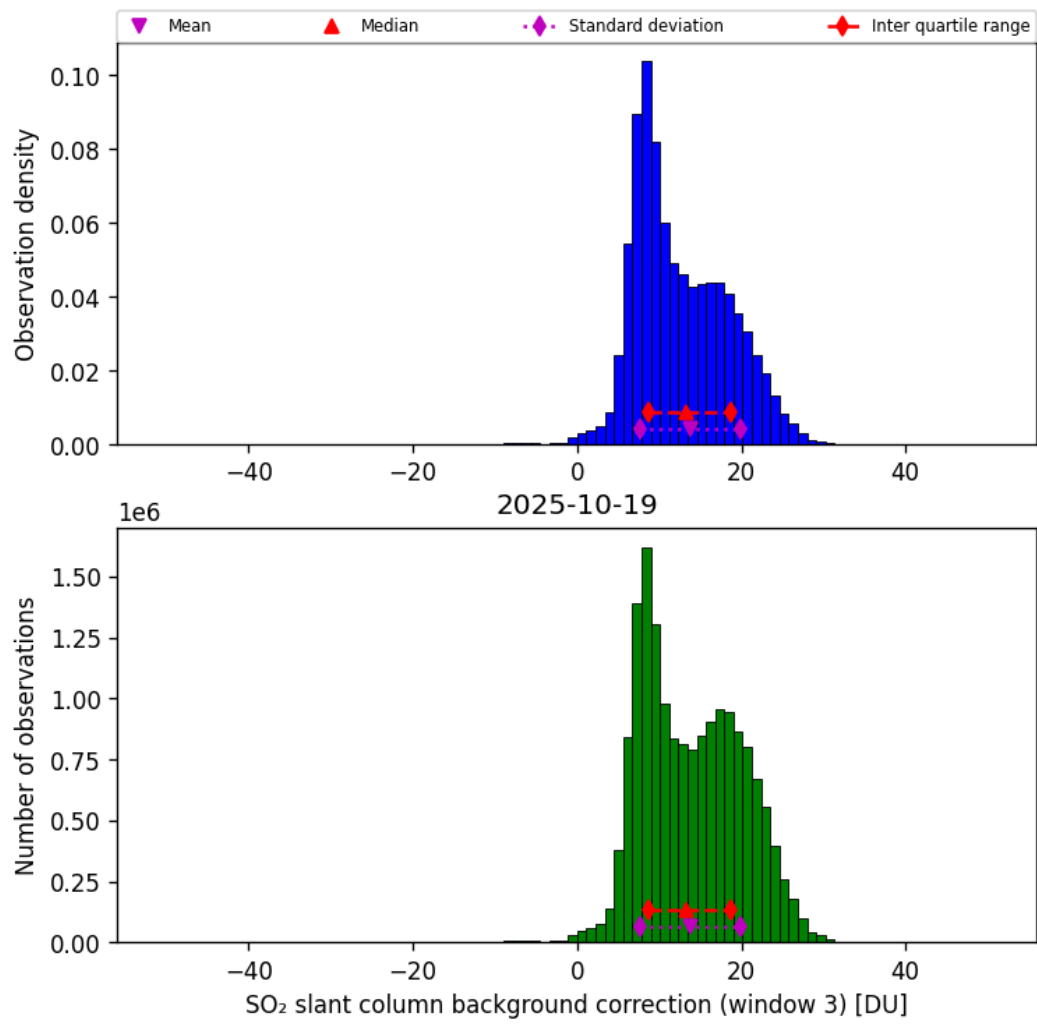


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-10-19 to 2025-10-20

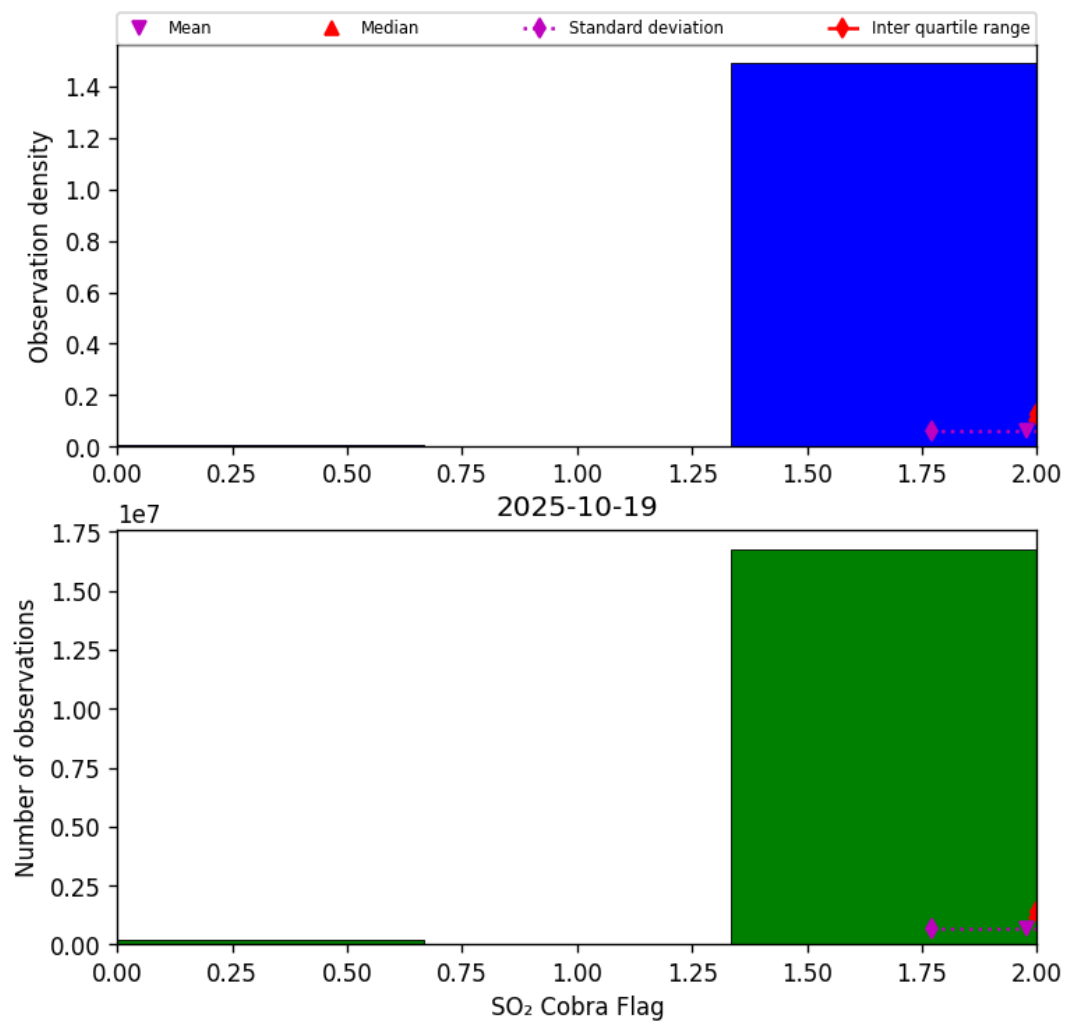


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-10-19 to 2025-10-20

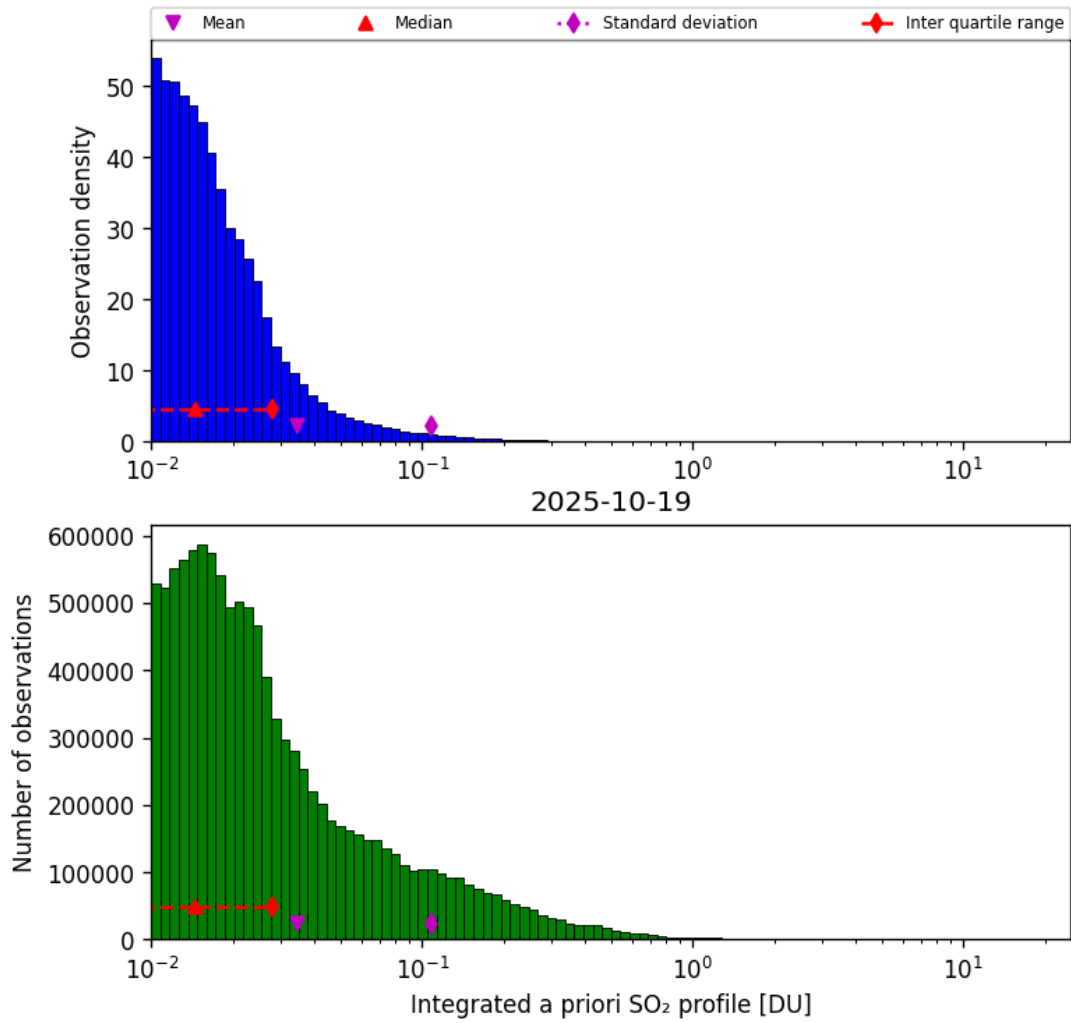


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-10-19 to 2025-10-20

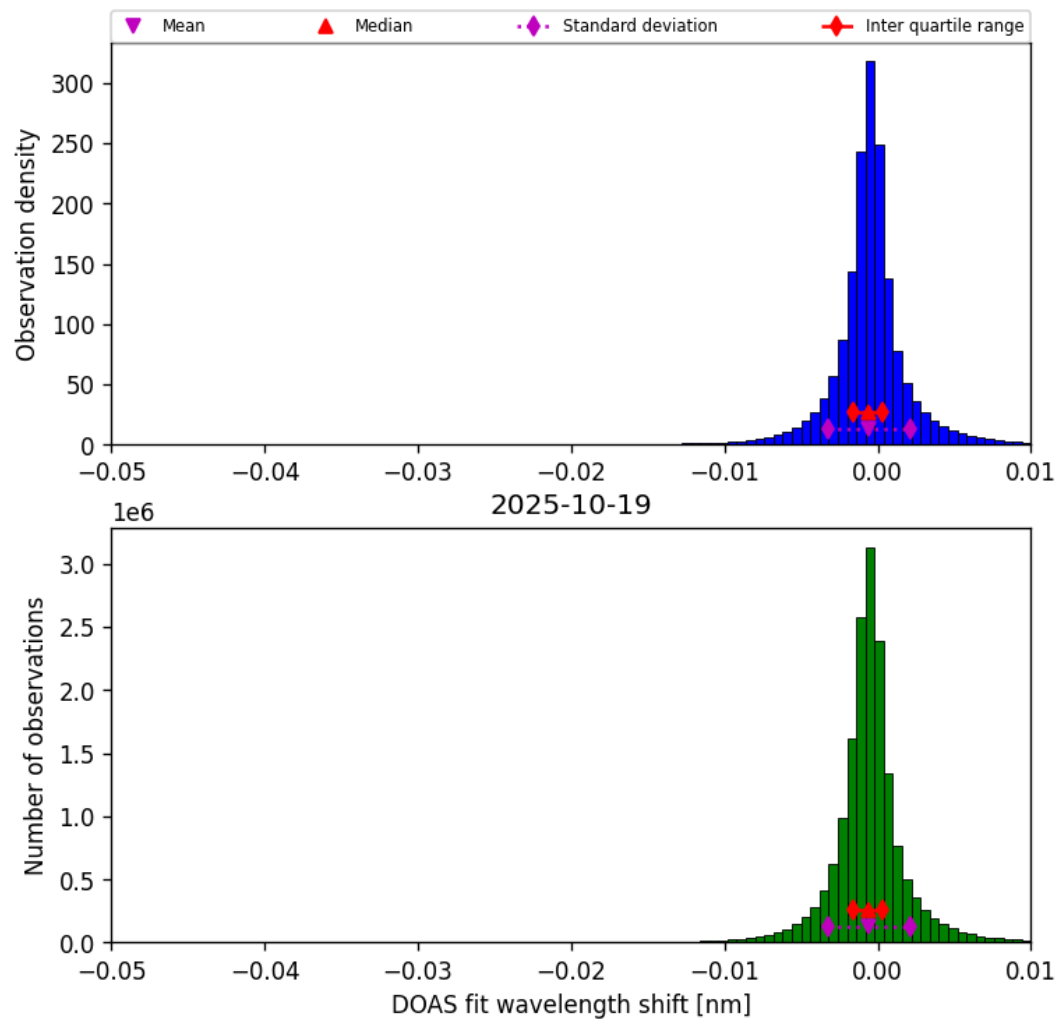


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-10-19 to 2025-10-20

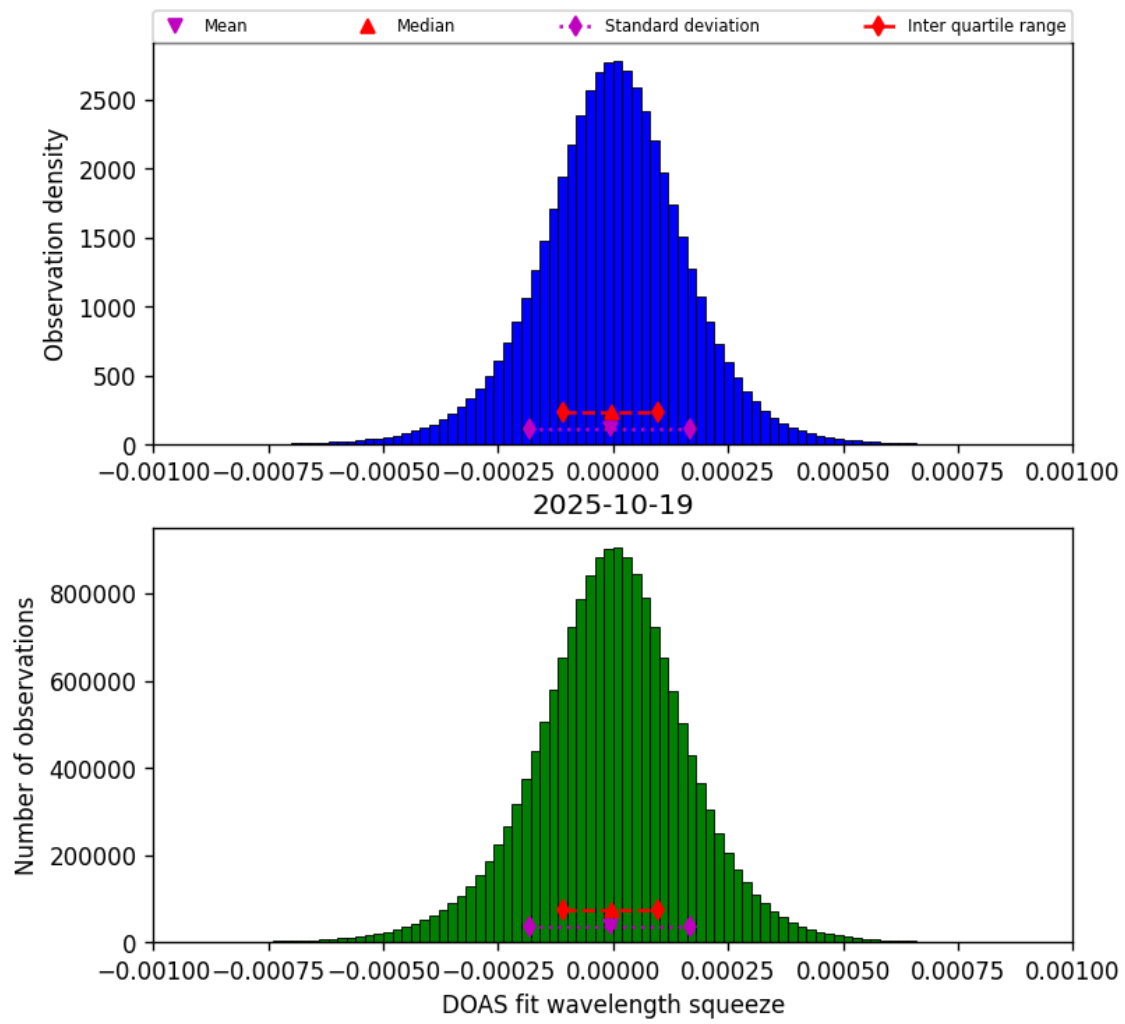


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-10-19 to 2025-10-20

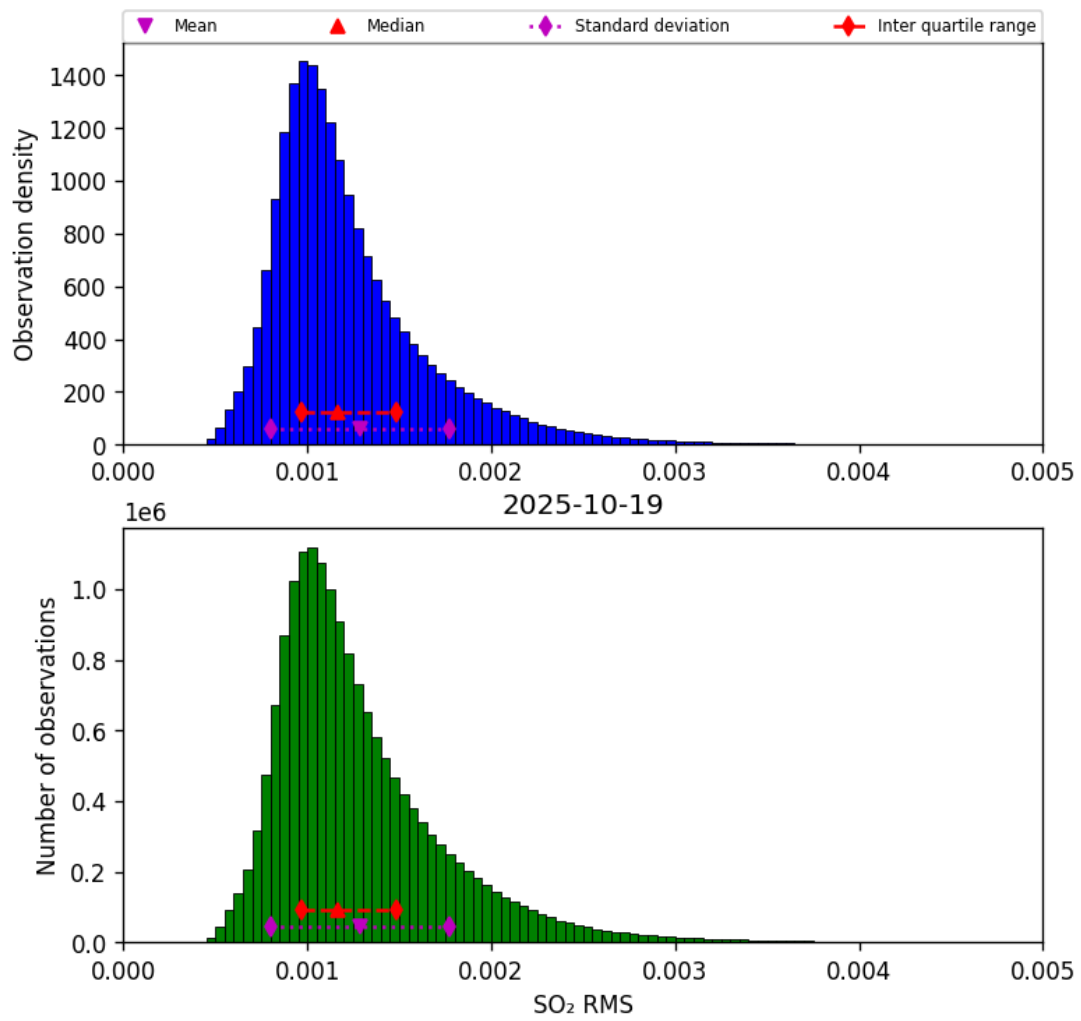


Figure 79: Histogram of “SO₂ RMS” for 2025-10-19 to 2025-10-20

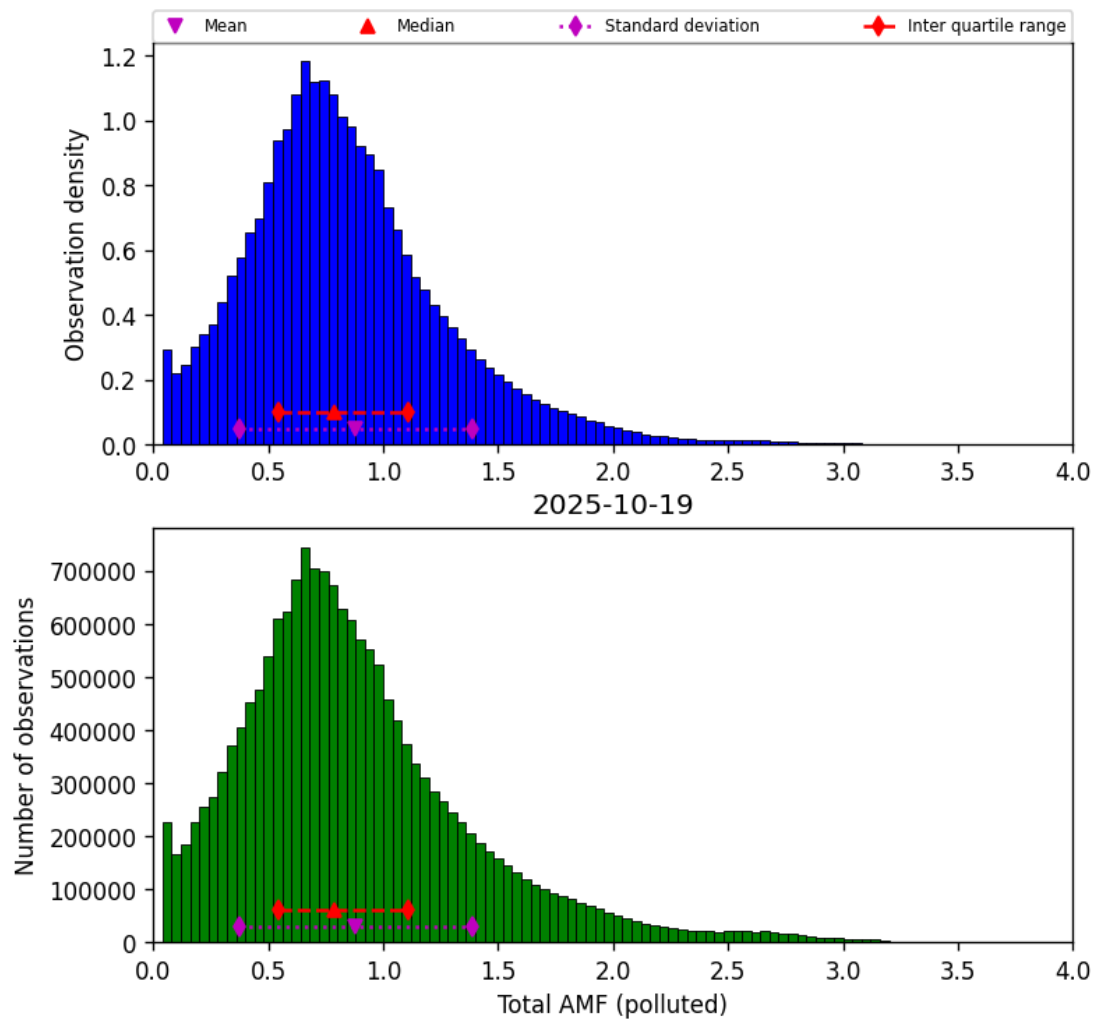


Figure 80: Histogram of “Total AMF (polluted)” for 2025-10-19 to 2025-10-20

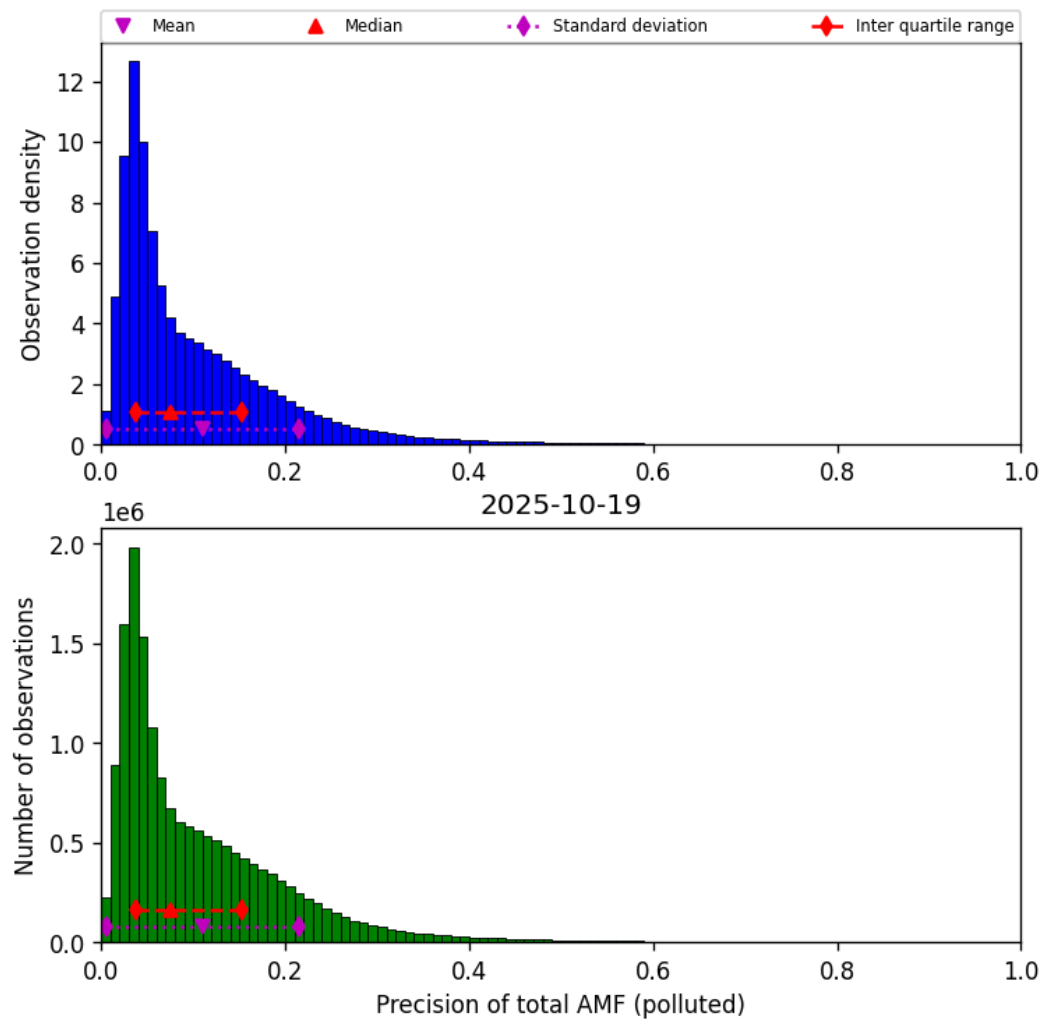


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-10-19 to 2025-10-20

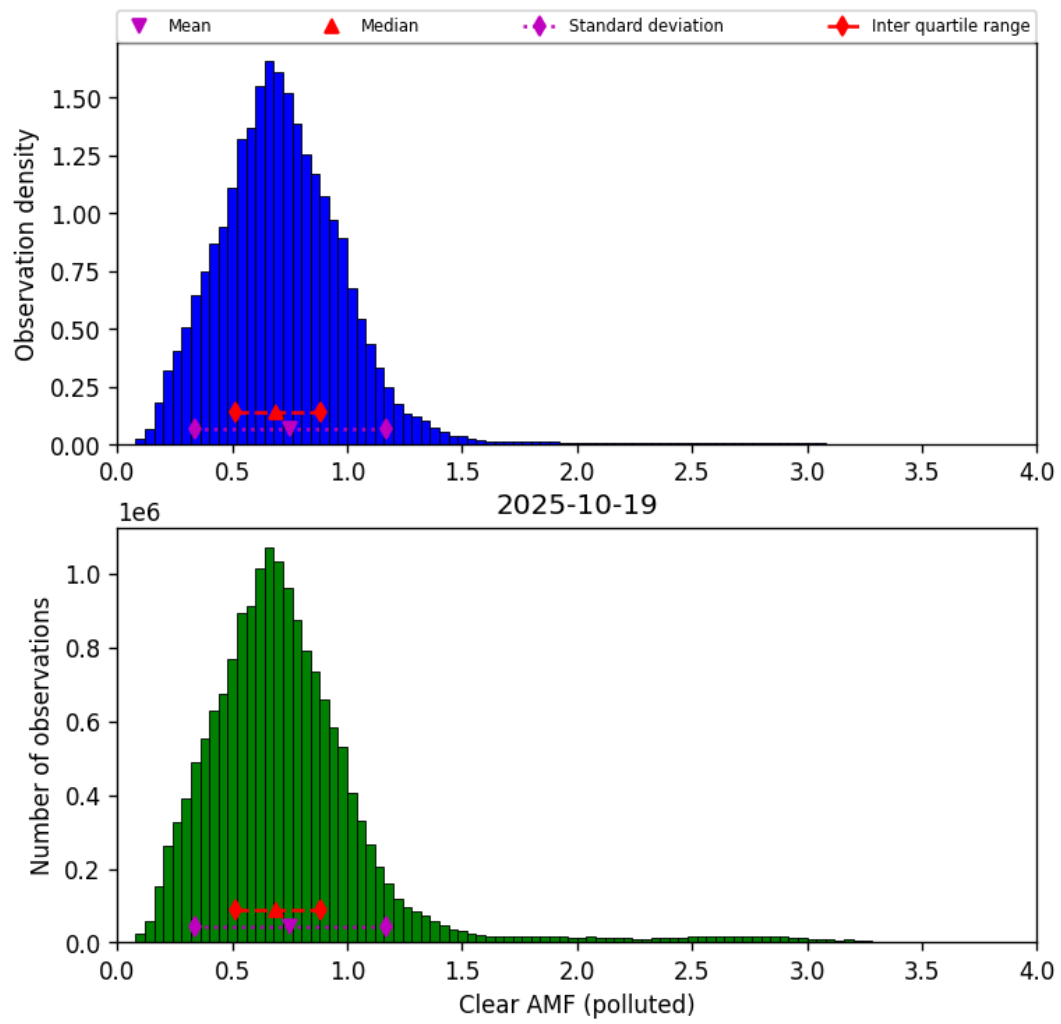


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-10-19 to 2025-10-20

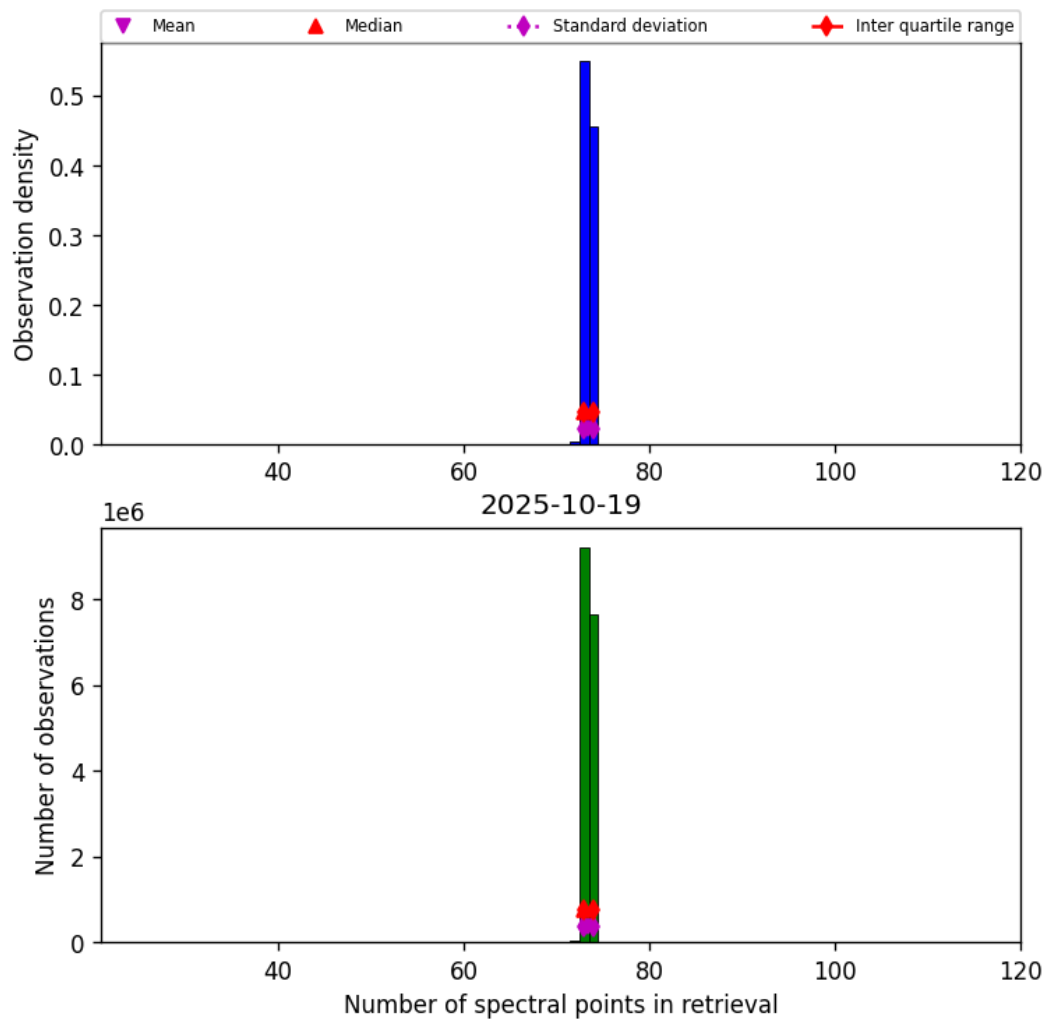


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-10-19 to 2025-10-20

9 Along track statistics

The TROPOMI instrument uses different binned detector rows for different viewing directions. In this section statistics are presented for each of the binned rows in the instrument.

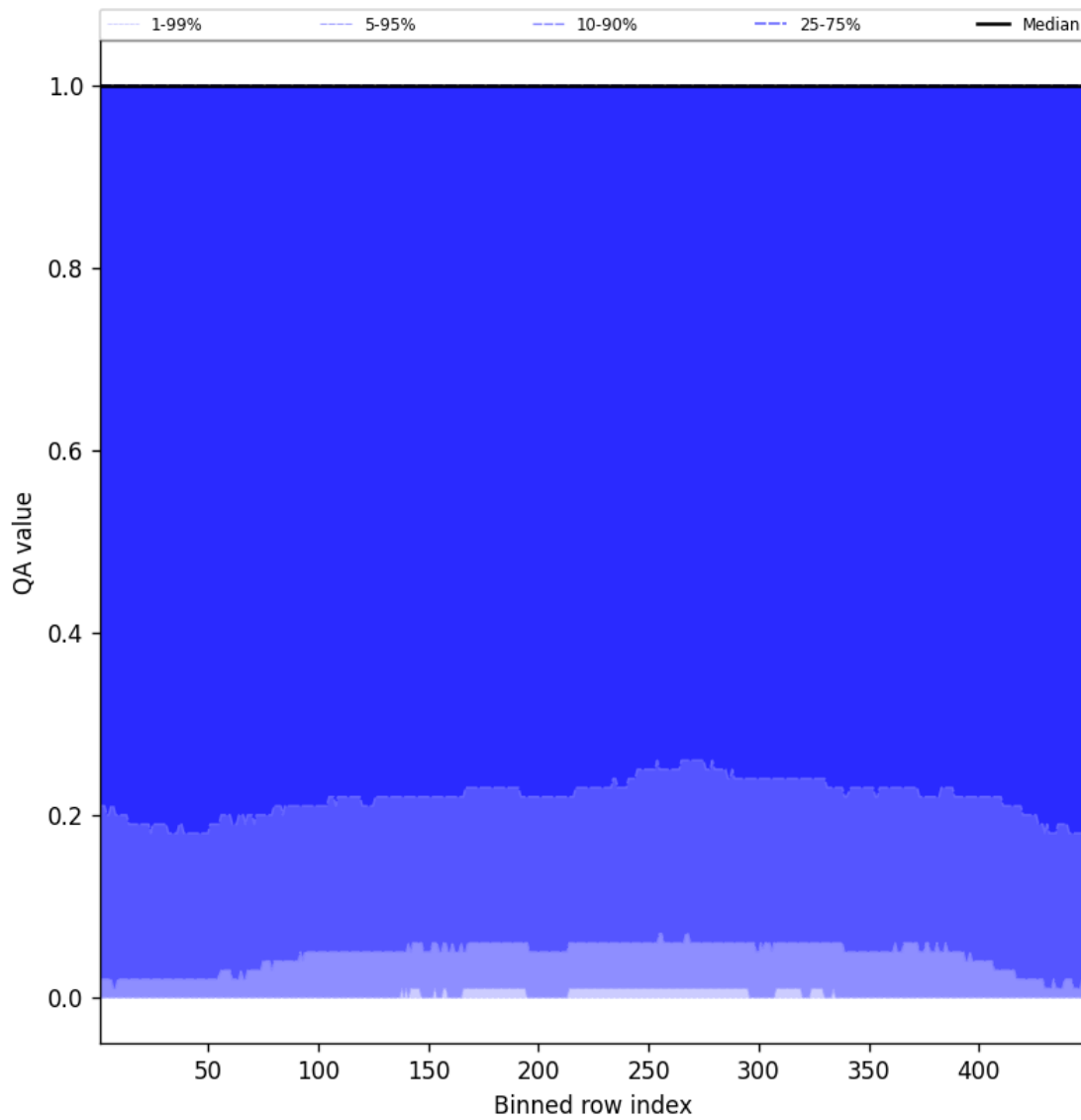


Figure 84: Along track statistics of “QA value” for 2025-10-19 to 2025-10-20

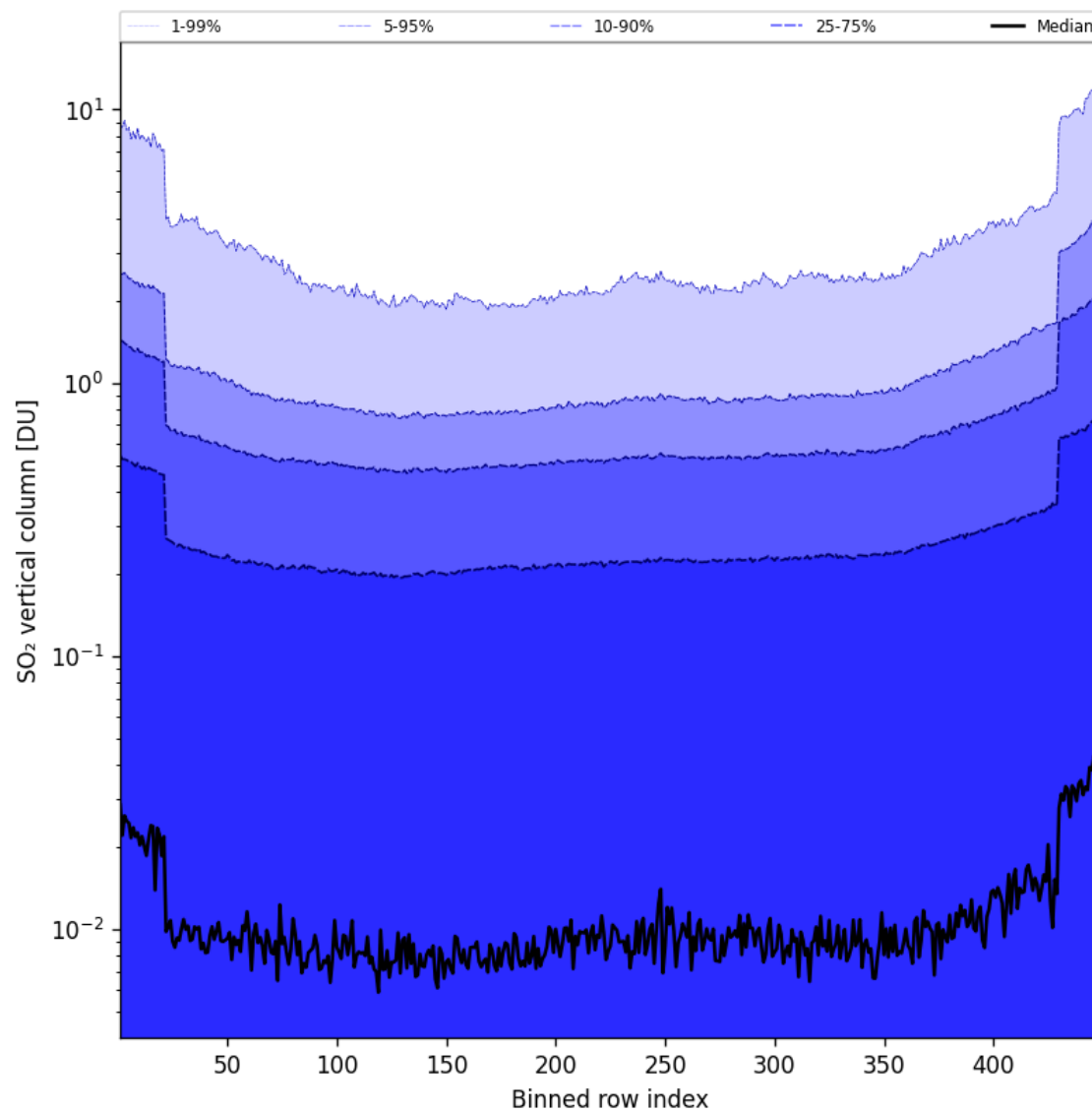


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-10-19 to 2025-10-20

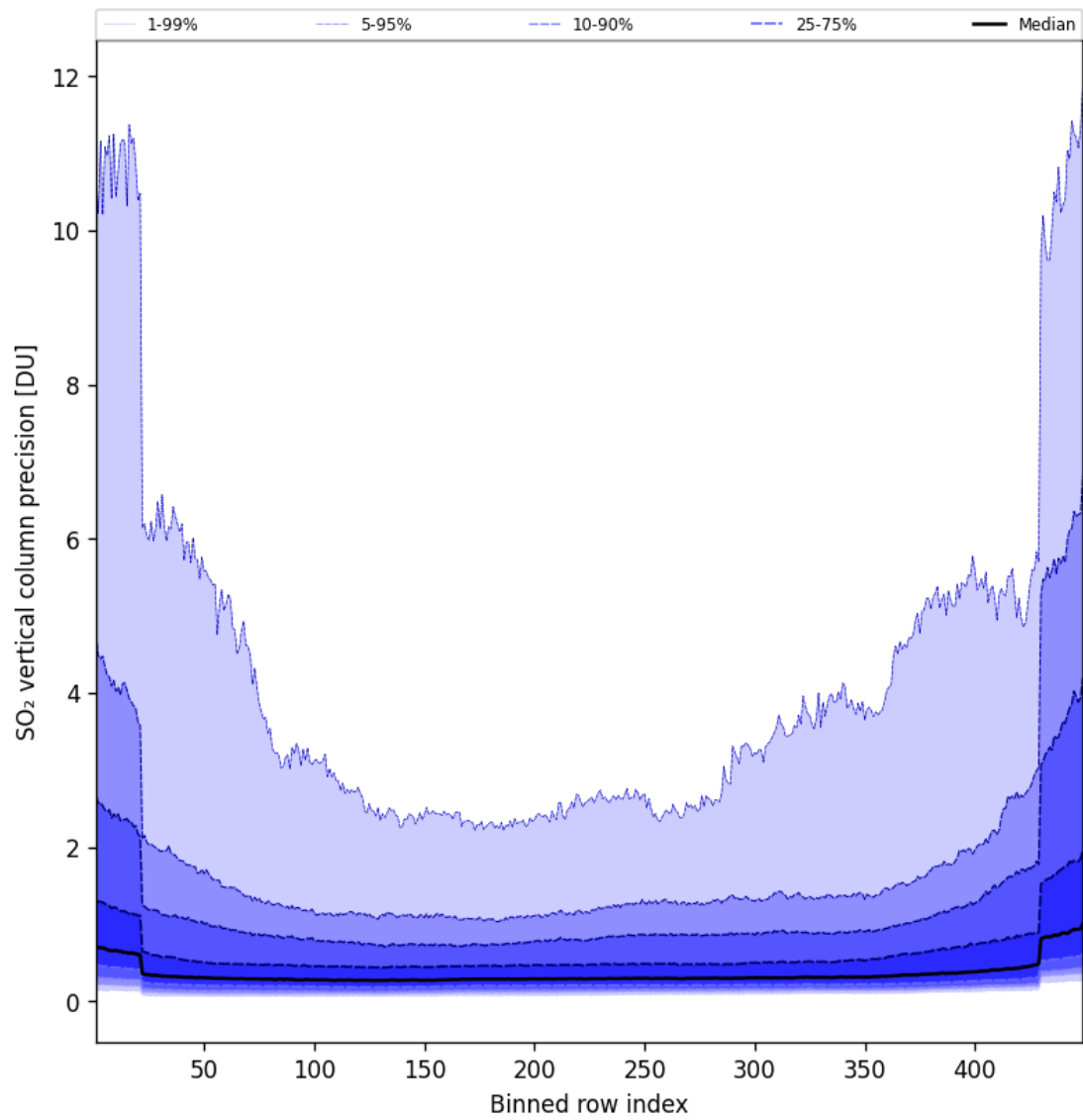


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-10-19 to 2025-10-20

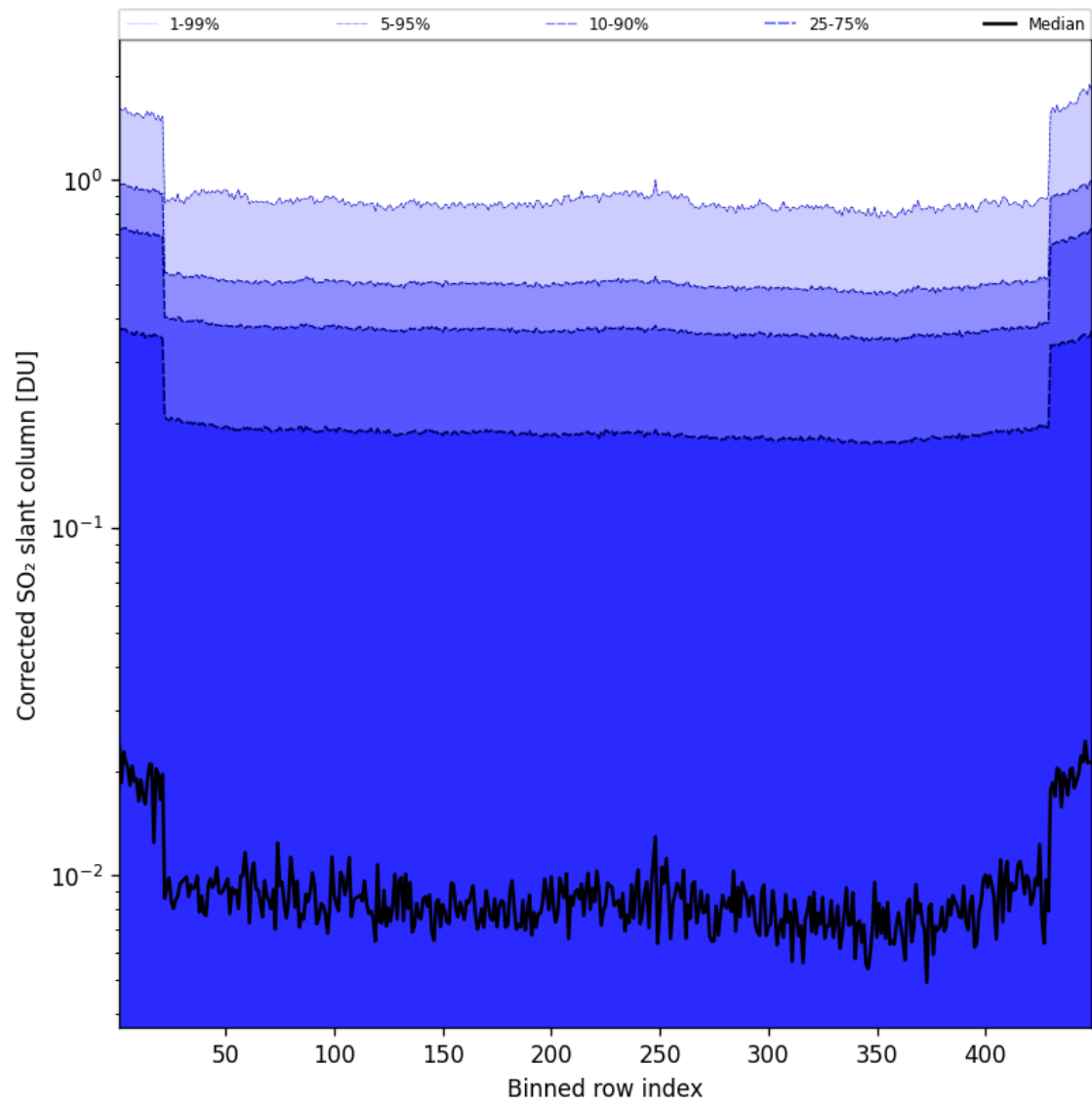


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-10-19 to 2025-10-20

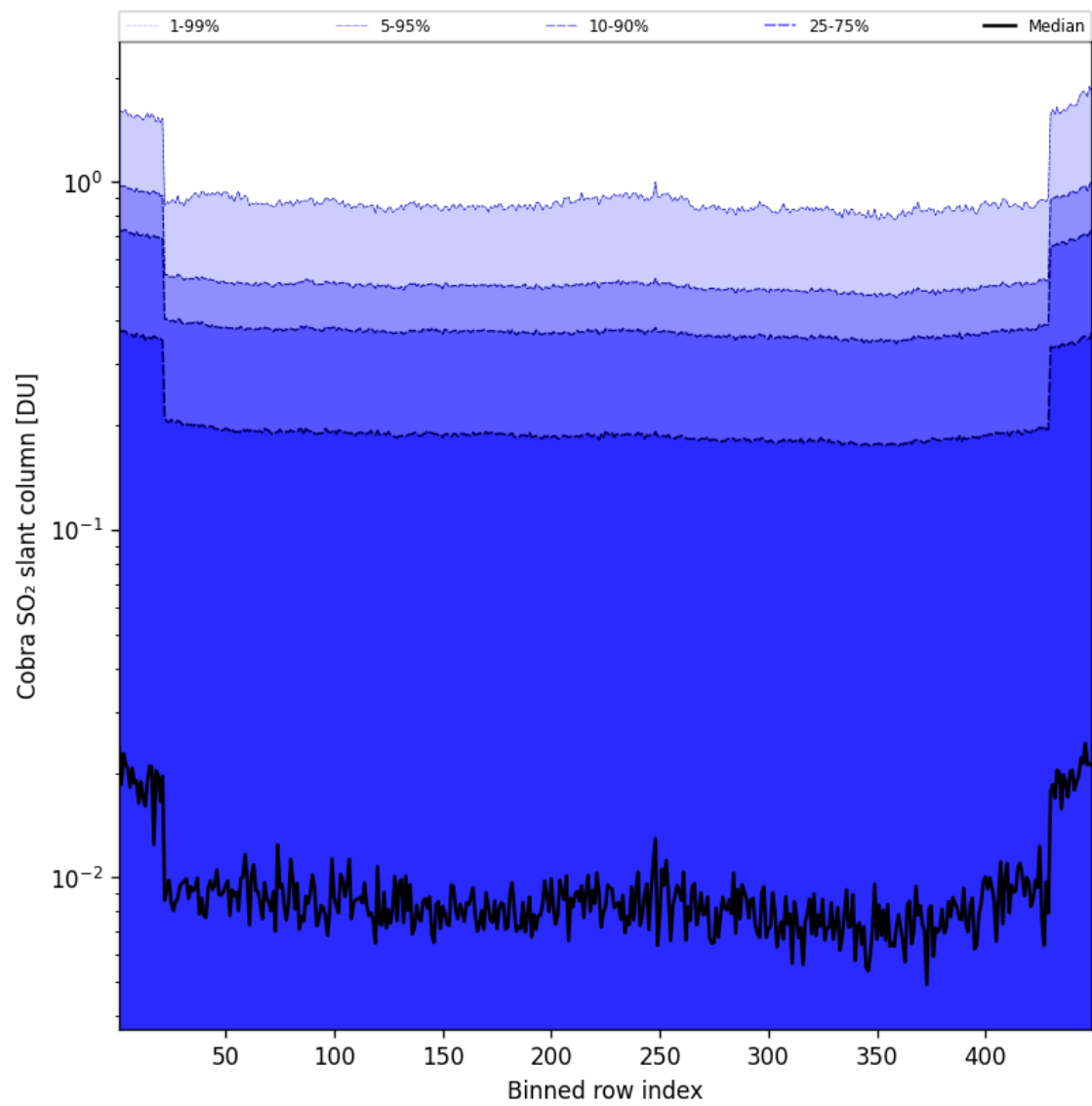


Figure 88: Along track statistics of "Cobra SO₂ slant column" for 2025-10-19 to 2025-10-20

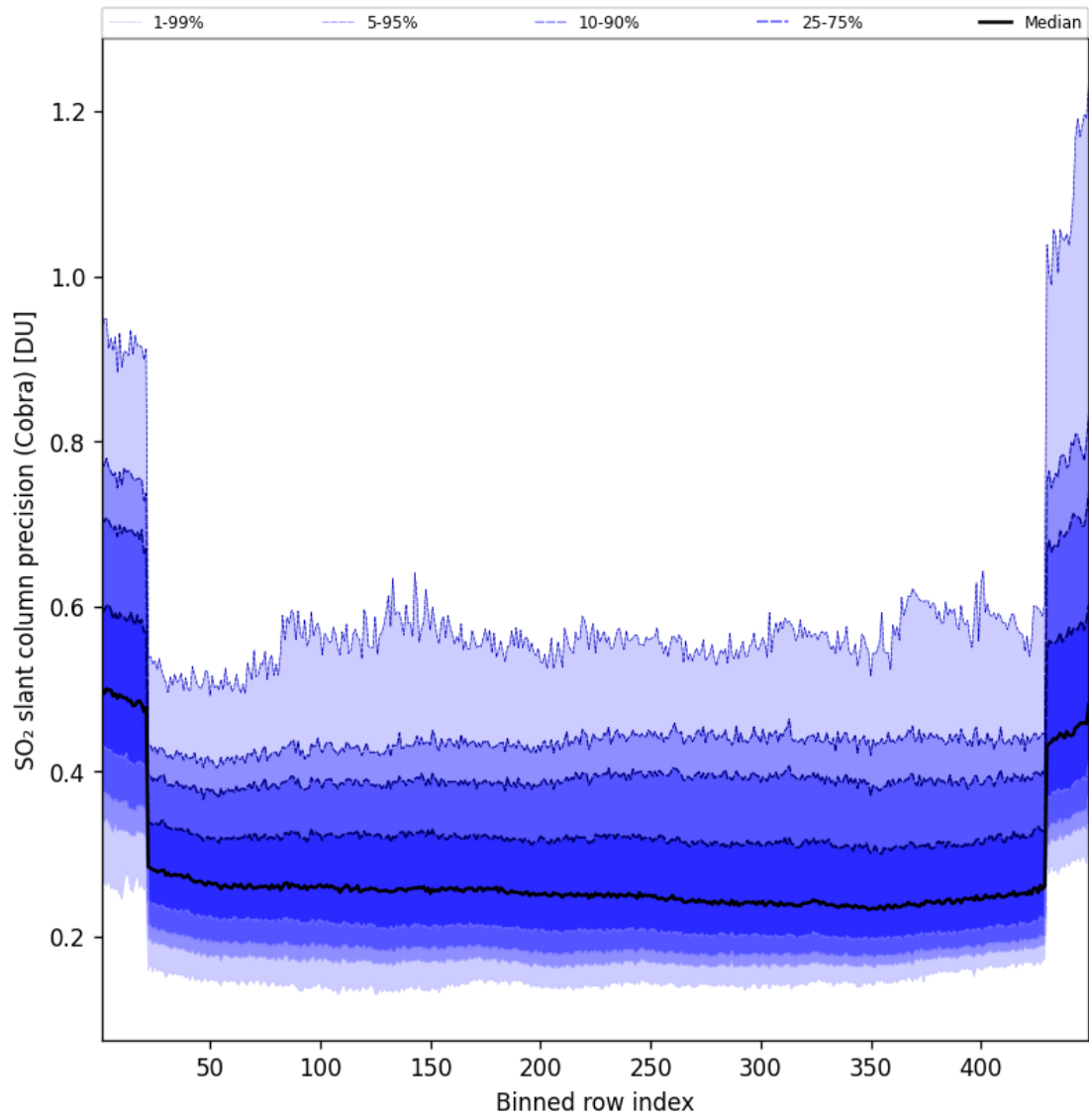


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-10-19 to 2025-10-20

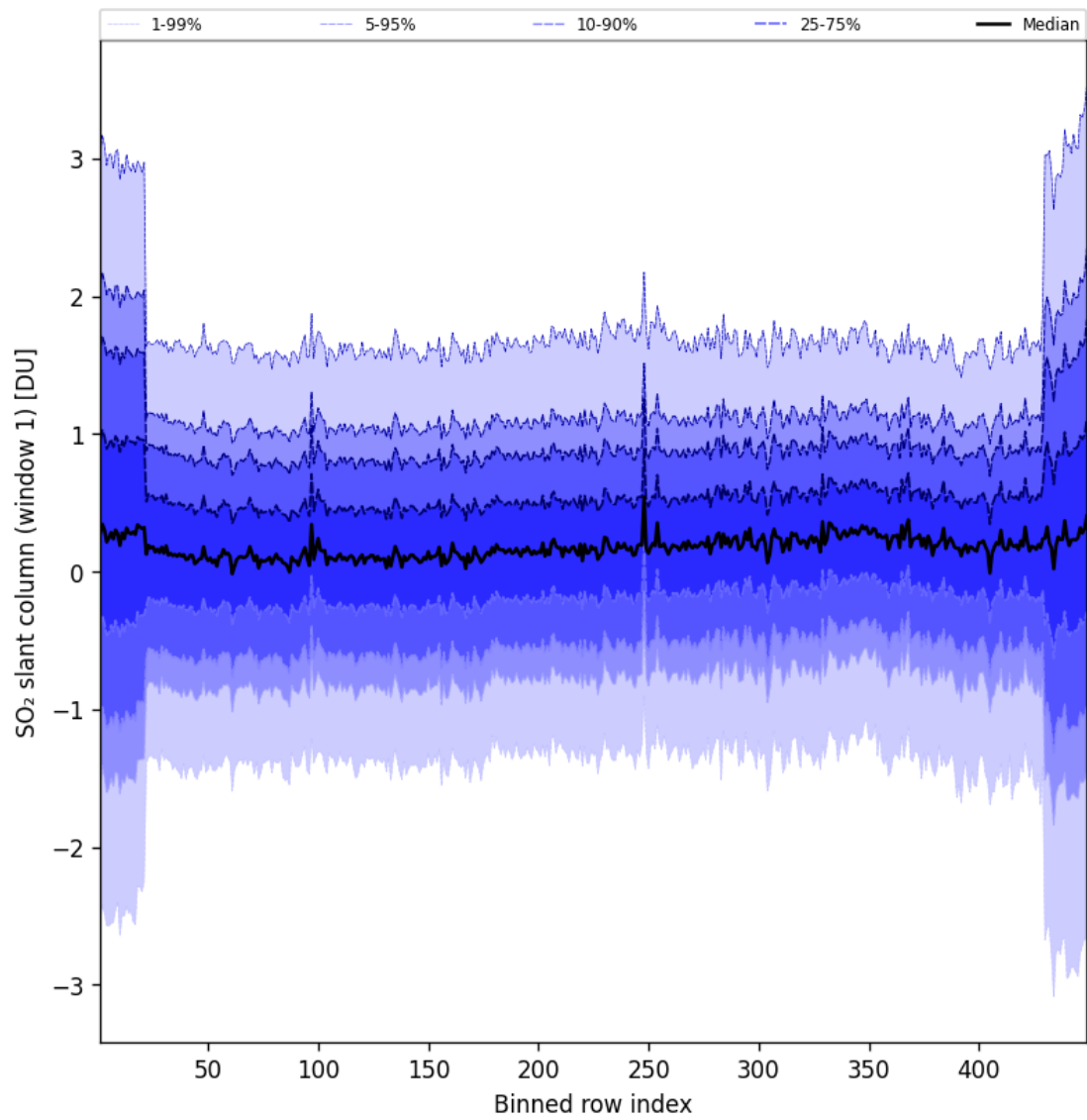


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-10-19 to 2025-10-20

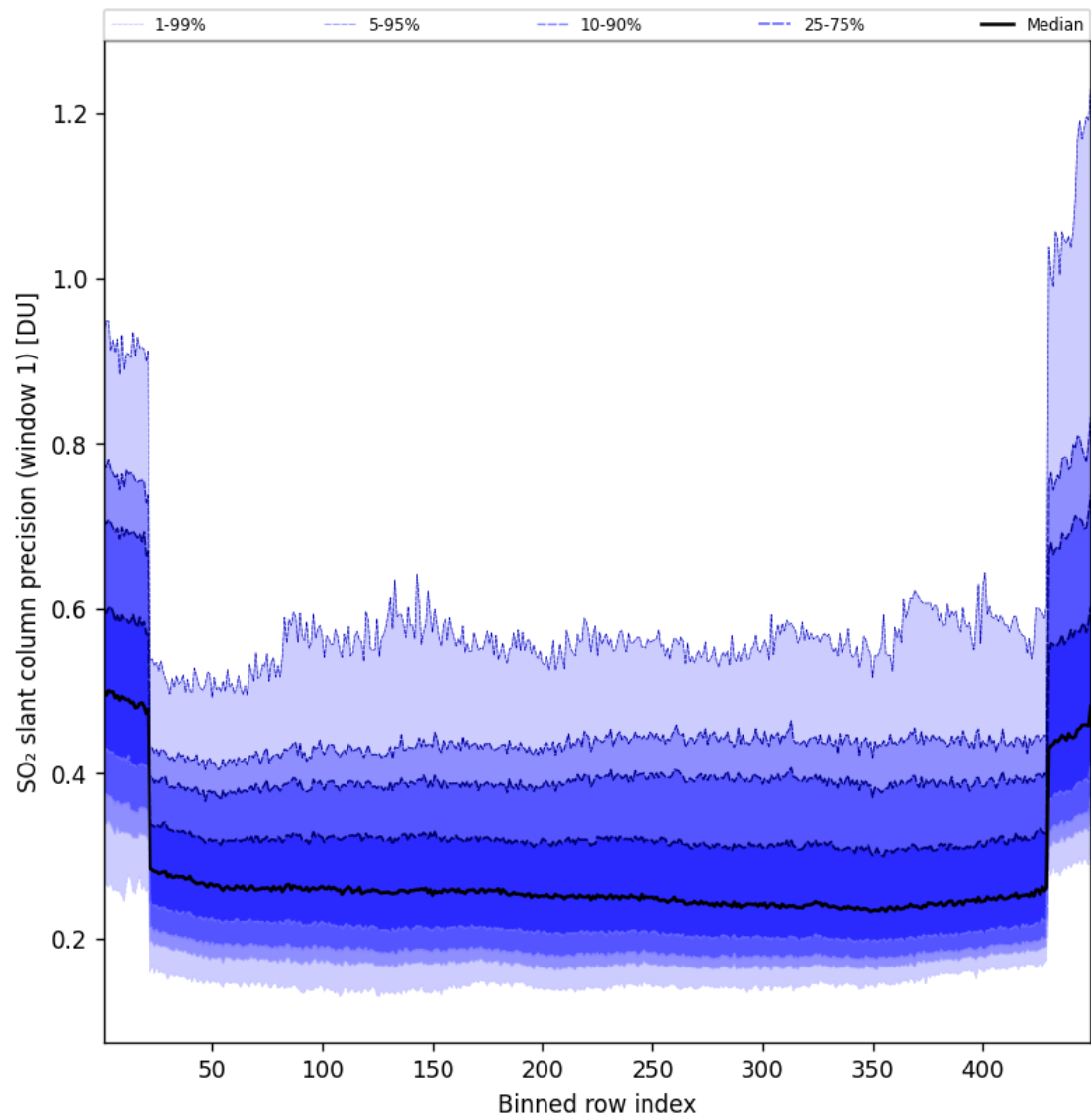


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-10-19 to 2025-10-20

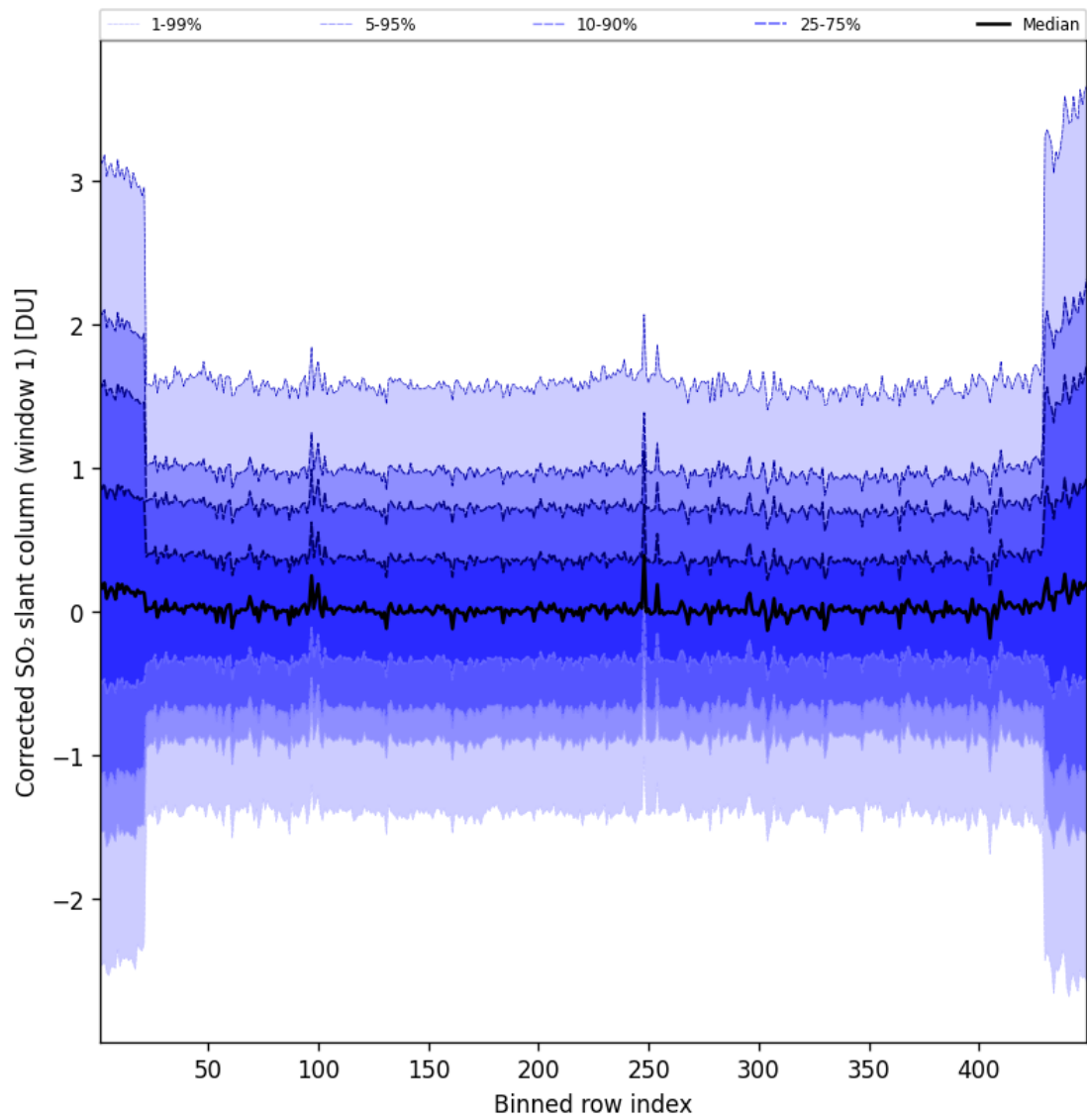


Figure 92: Along track statistics of "Corrected SO₂ slant column (window 1)" for 2025-10-19 to 2025-10-20

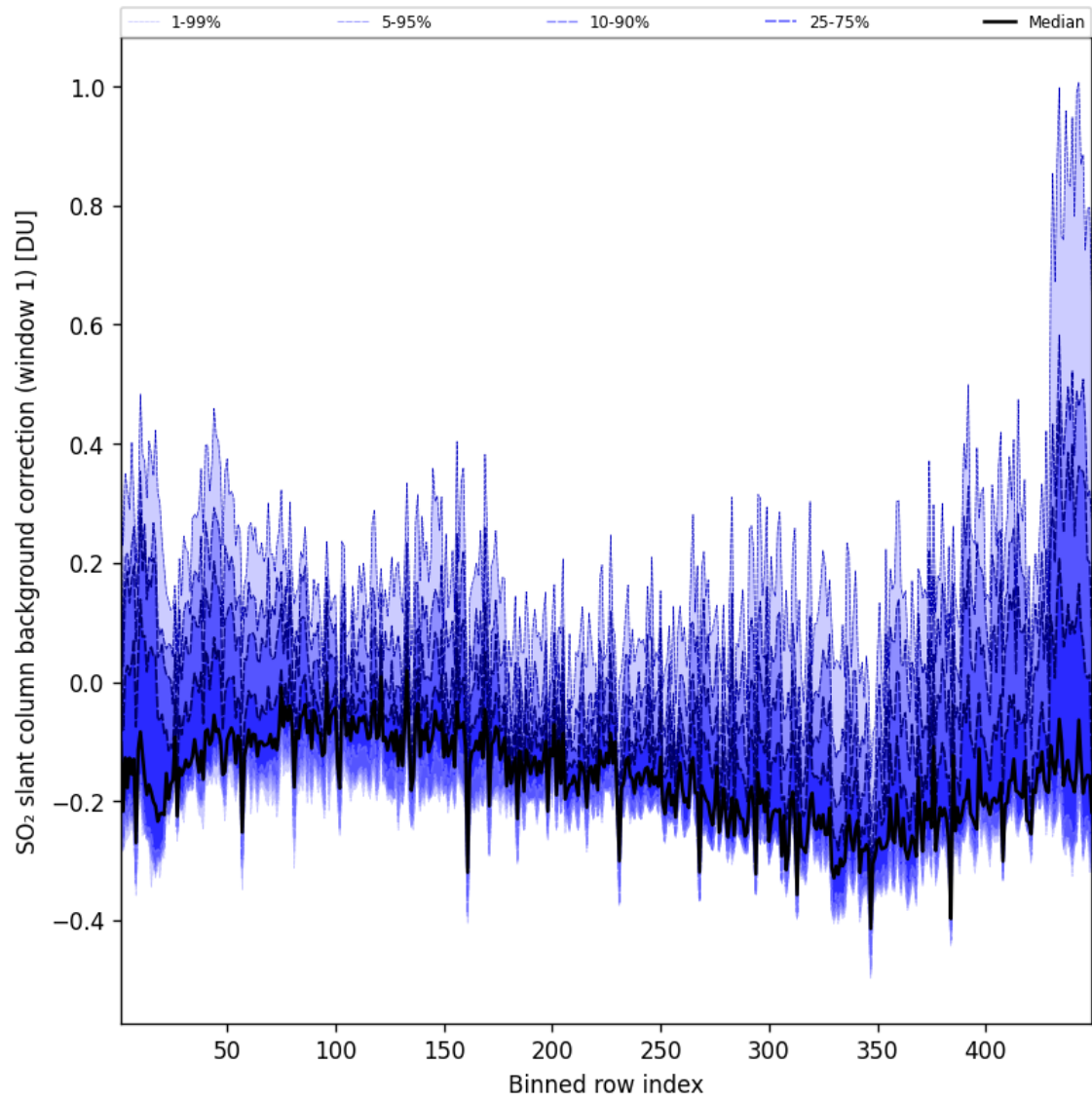


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-10-19 to 2025-10-20

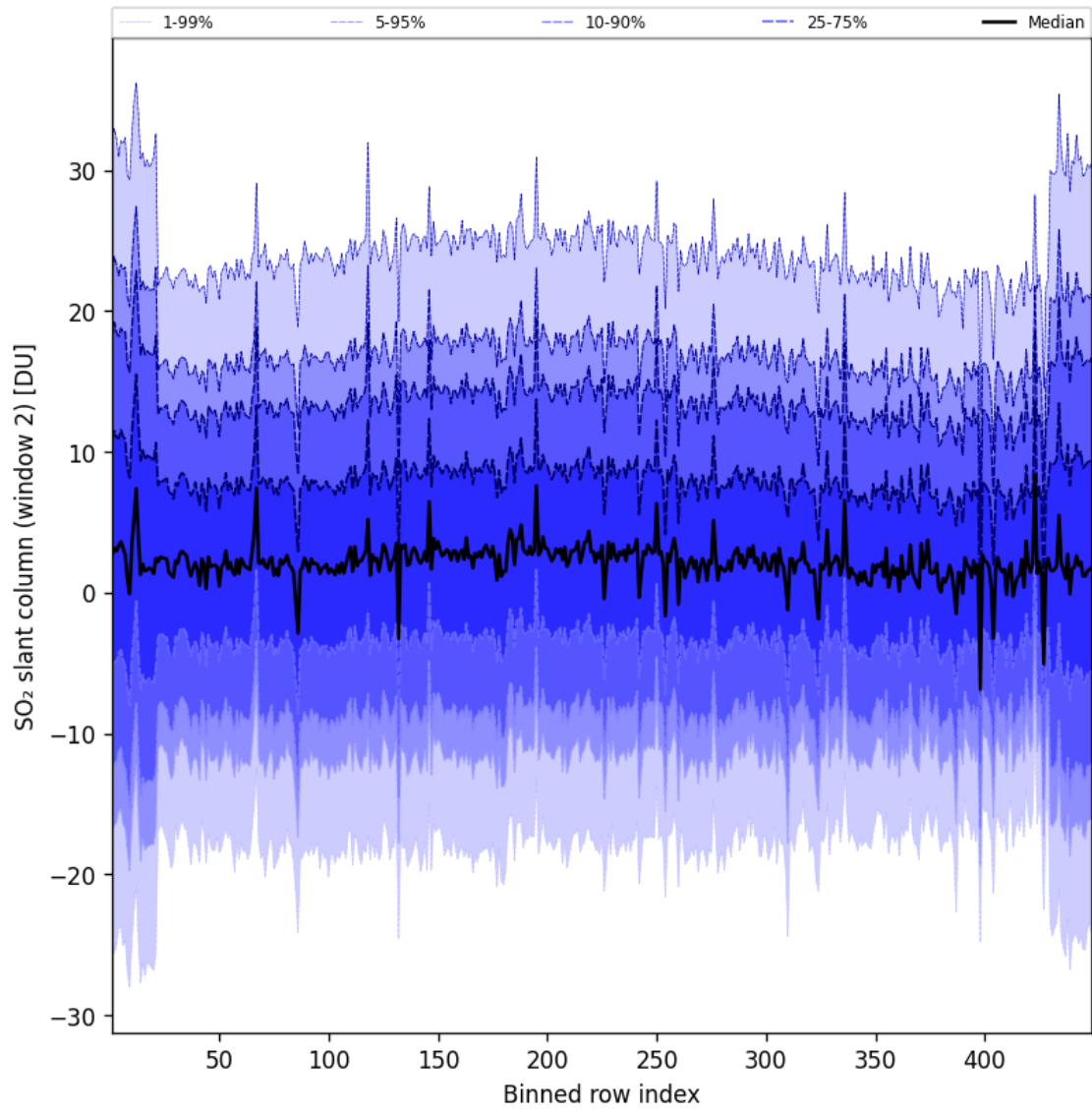


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-10-19 to 2025-10-20

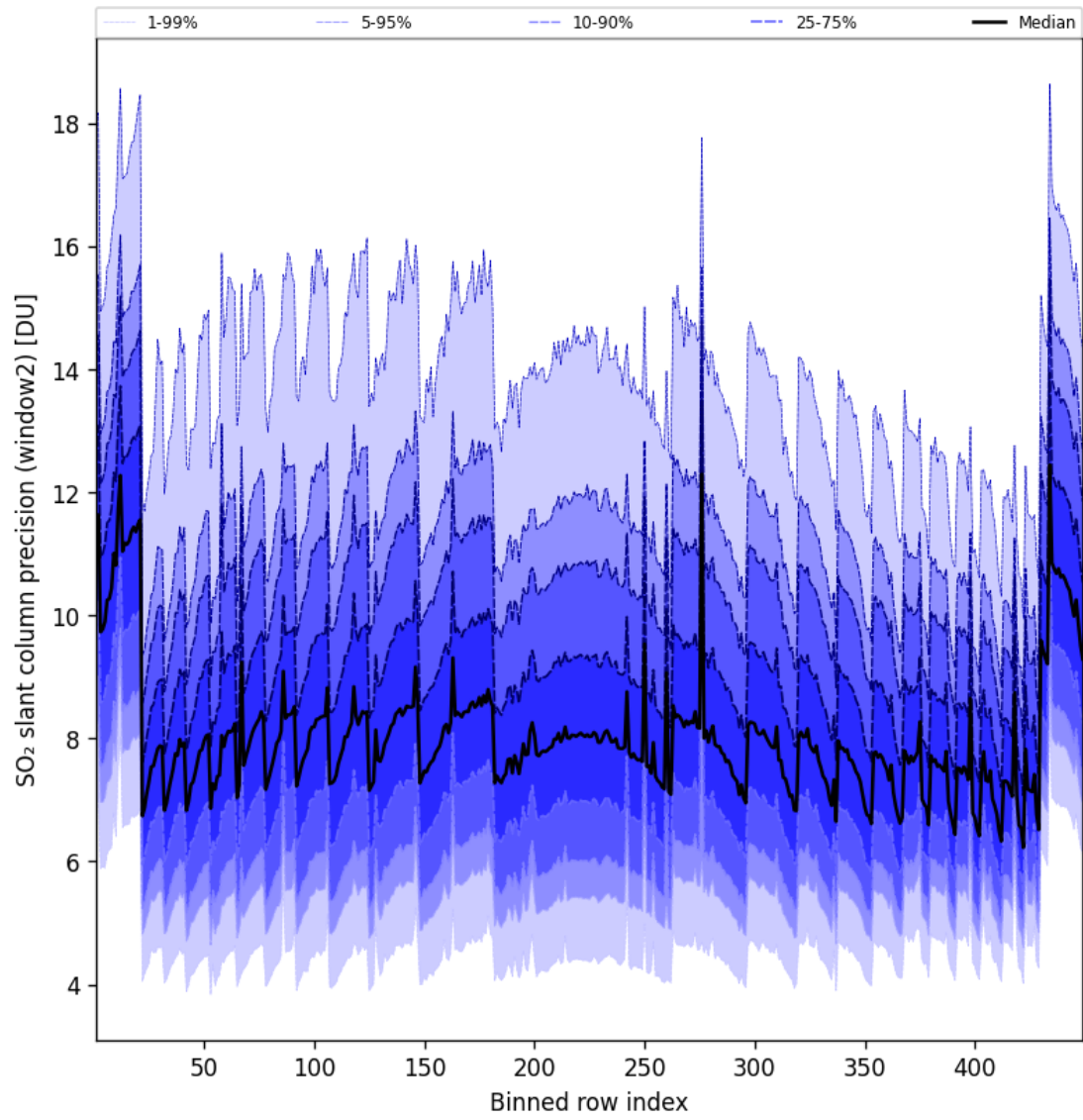


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-10-19 to 2025-10-20

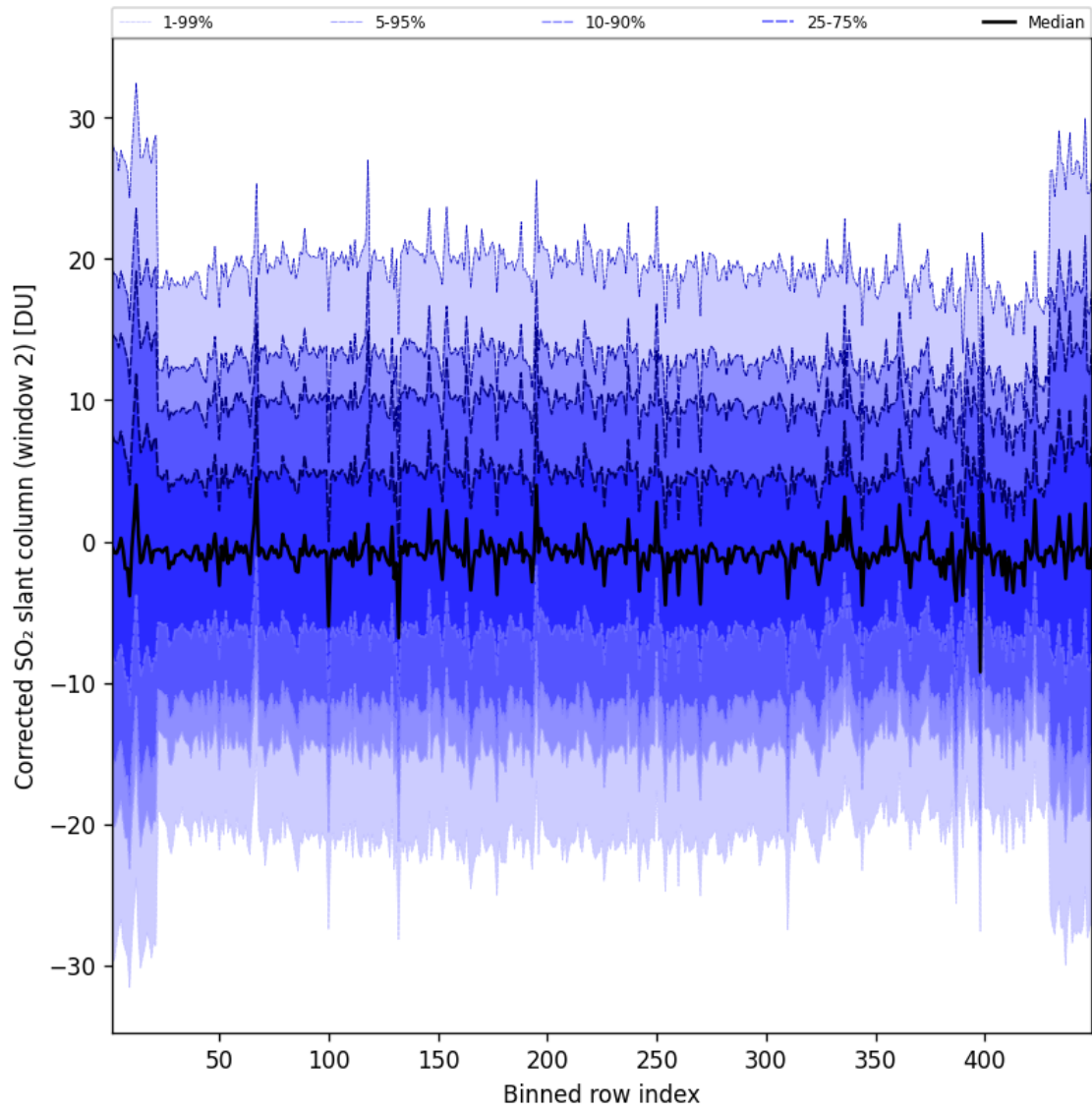


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-10-19 to 2025-10-20

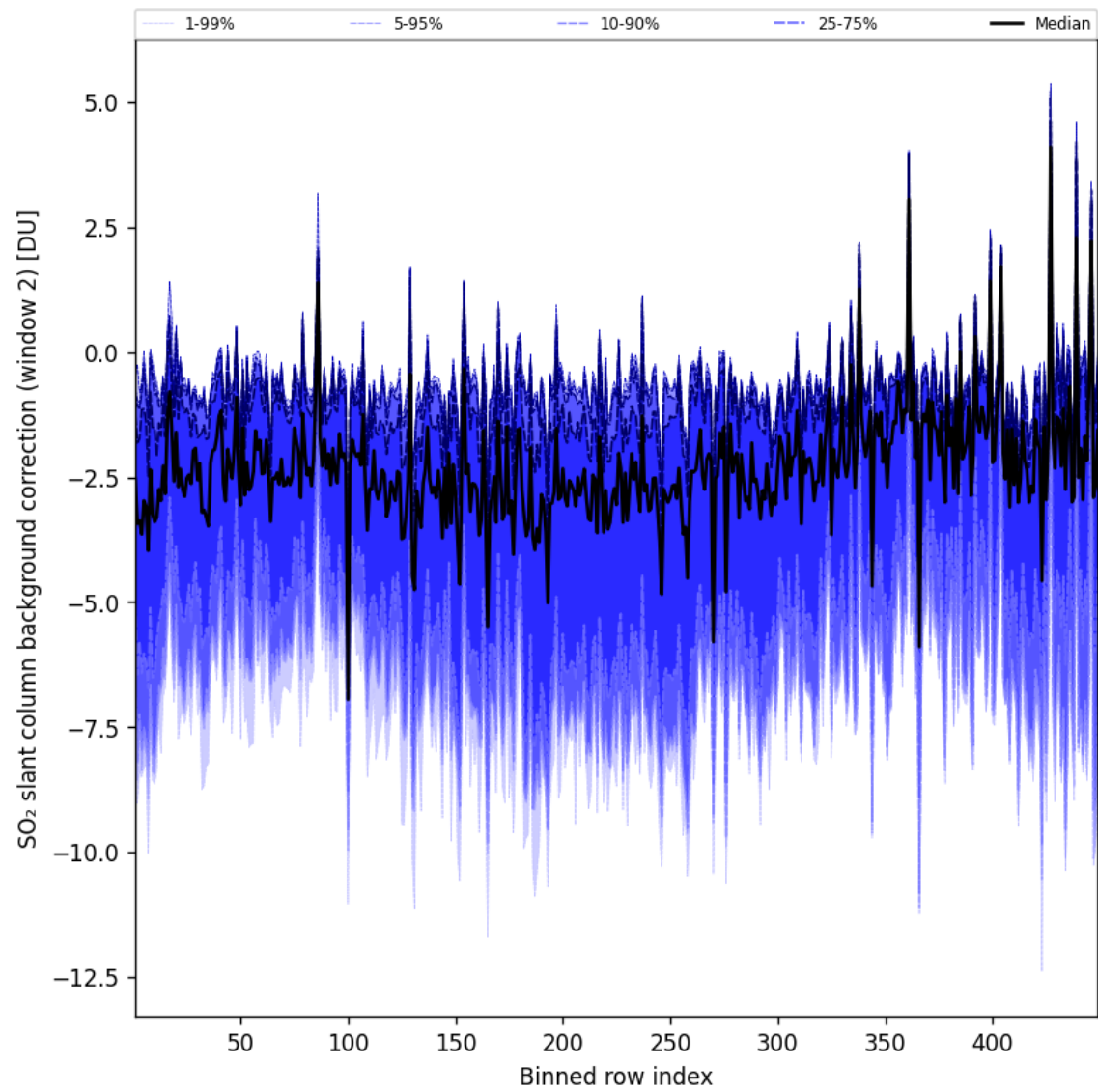


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-10-19 to 2025-10-20

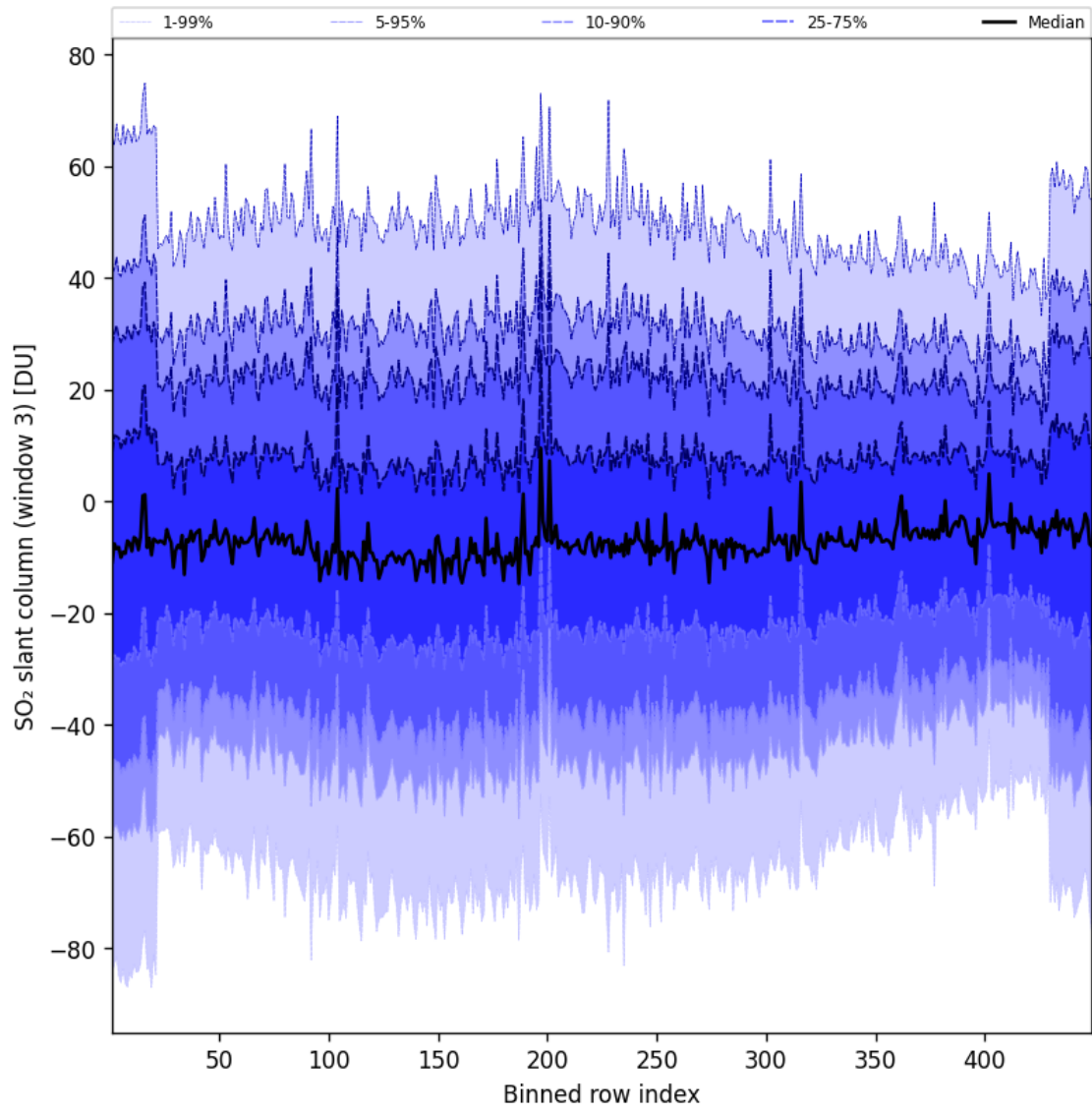


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-10-19 to 2025-10-20

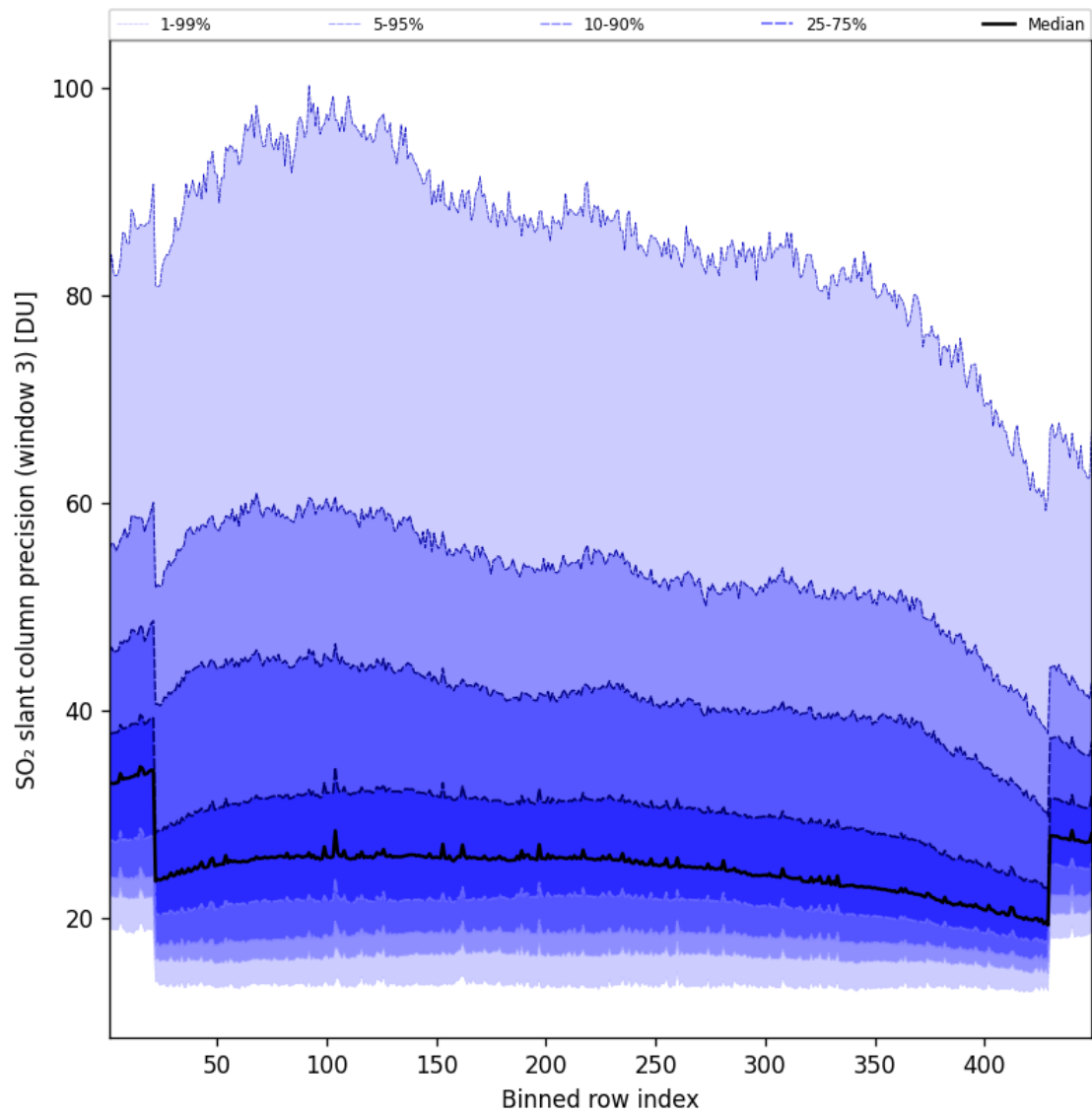


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-10-19 to 2025-10-20

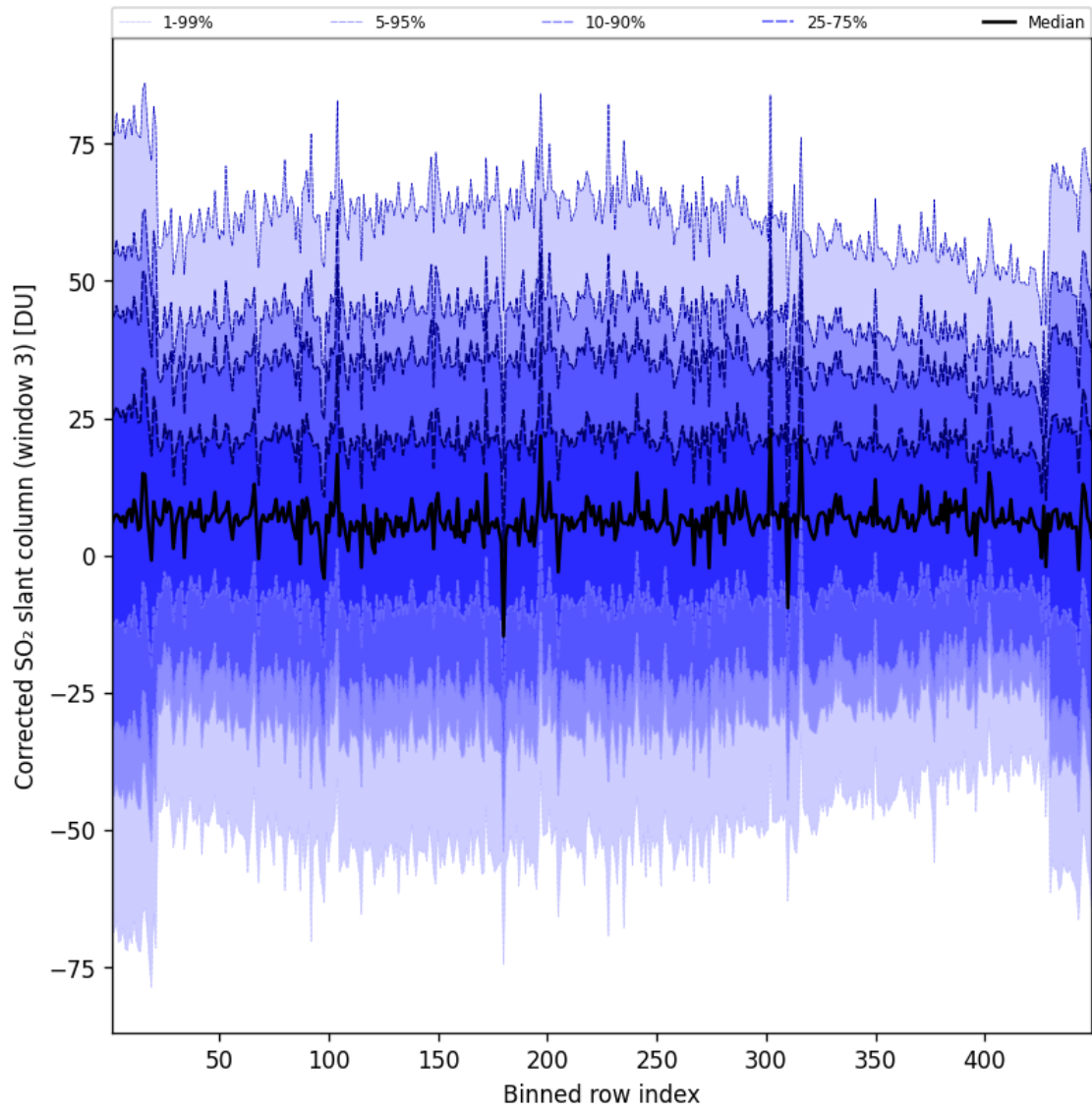


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-10-19 to 2025-10-20

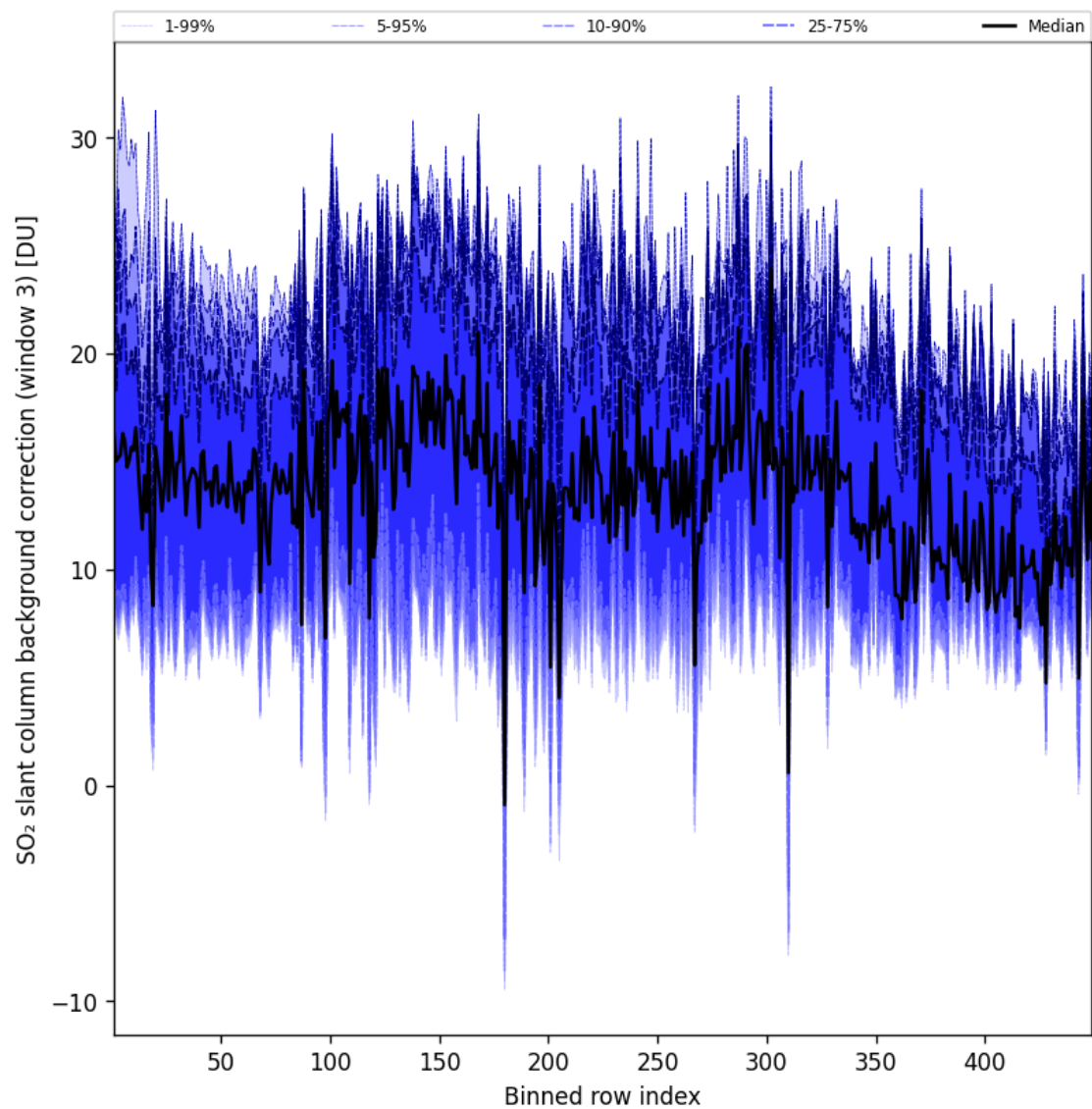


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-10-19 to 2025-10-20

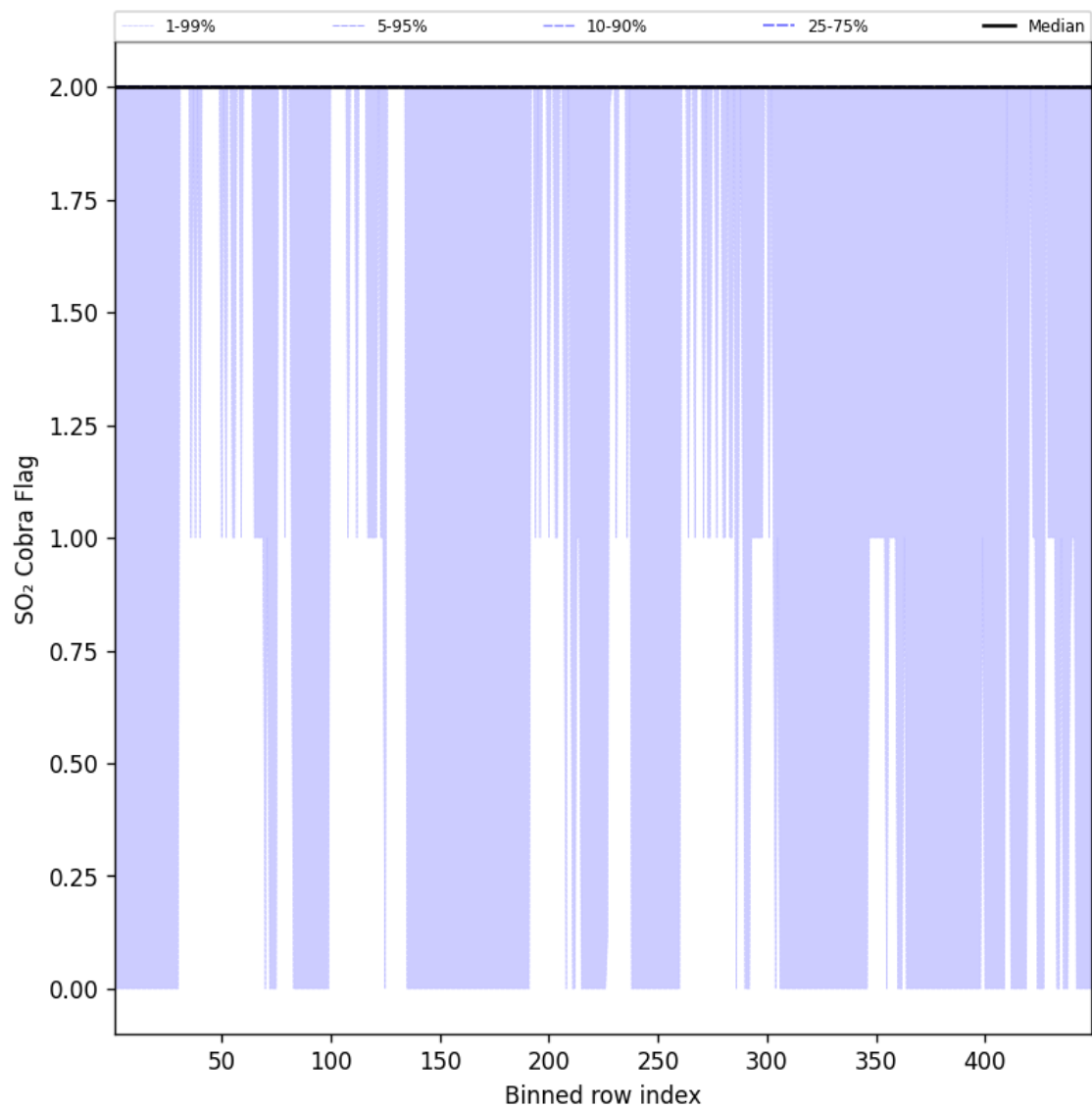


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-10-19 to 2025-10-20

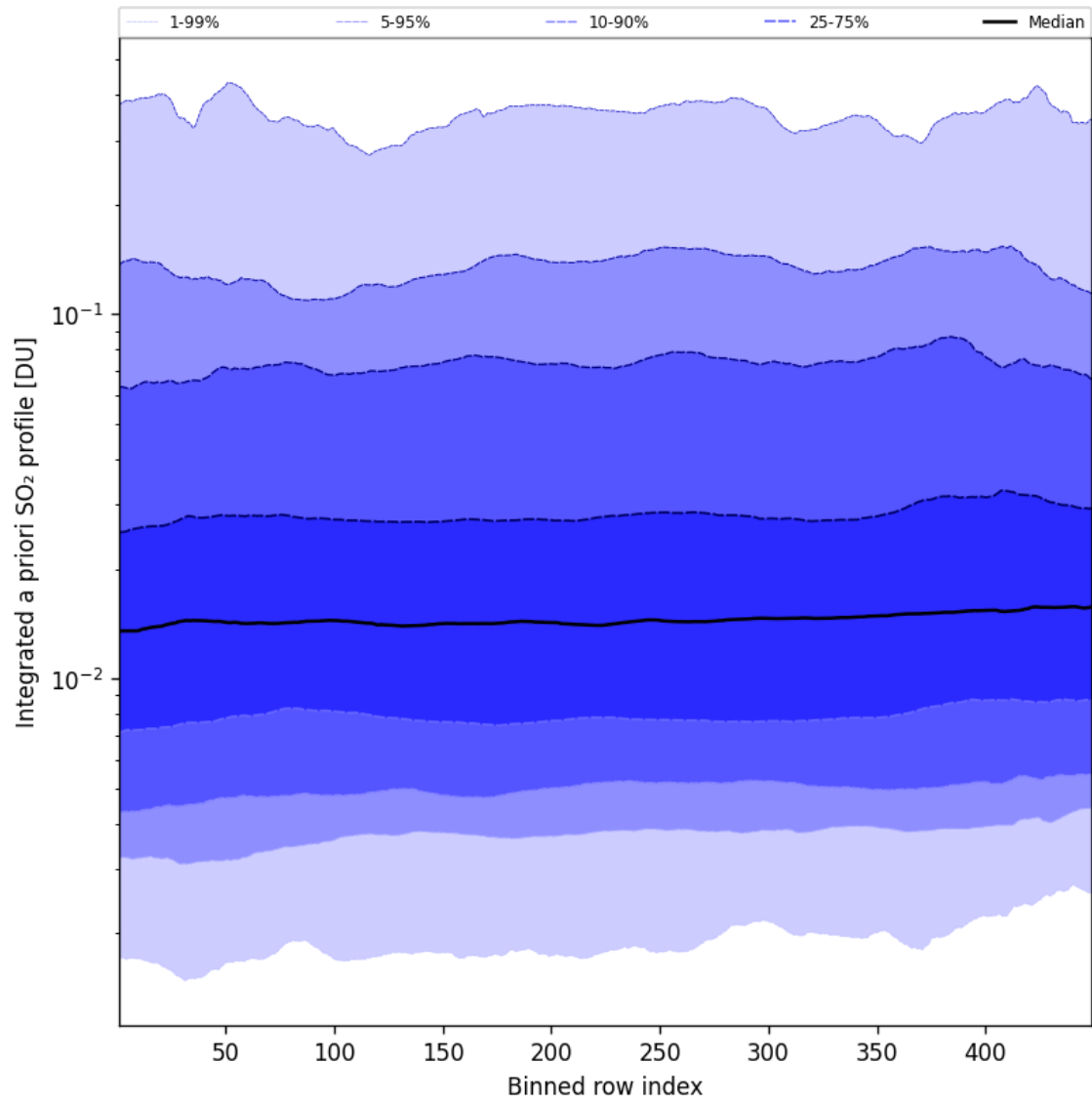


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-10-19 to 2025-10-20

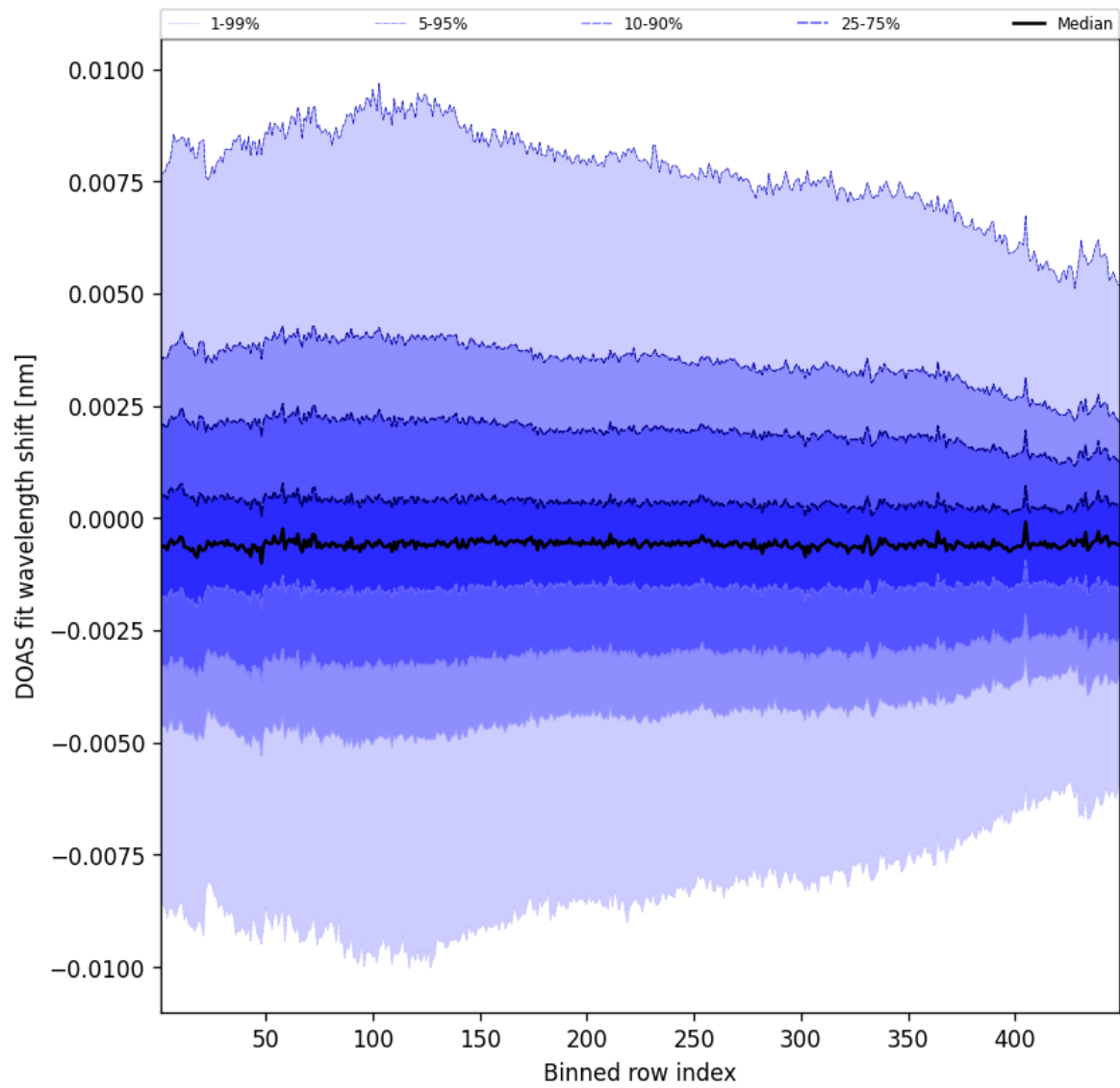


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-10-19 to 2025-10-20

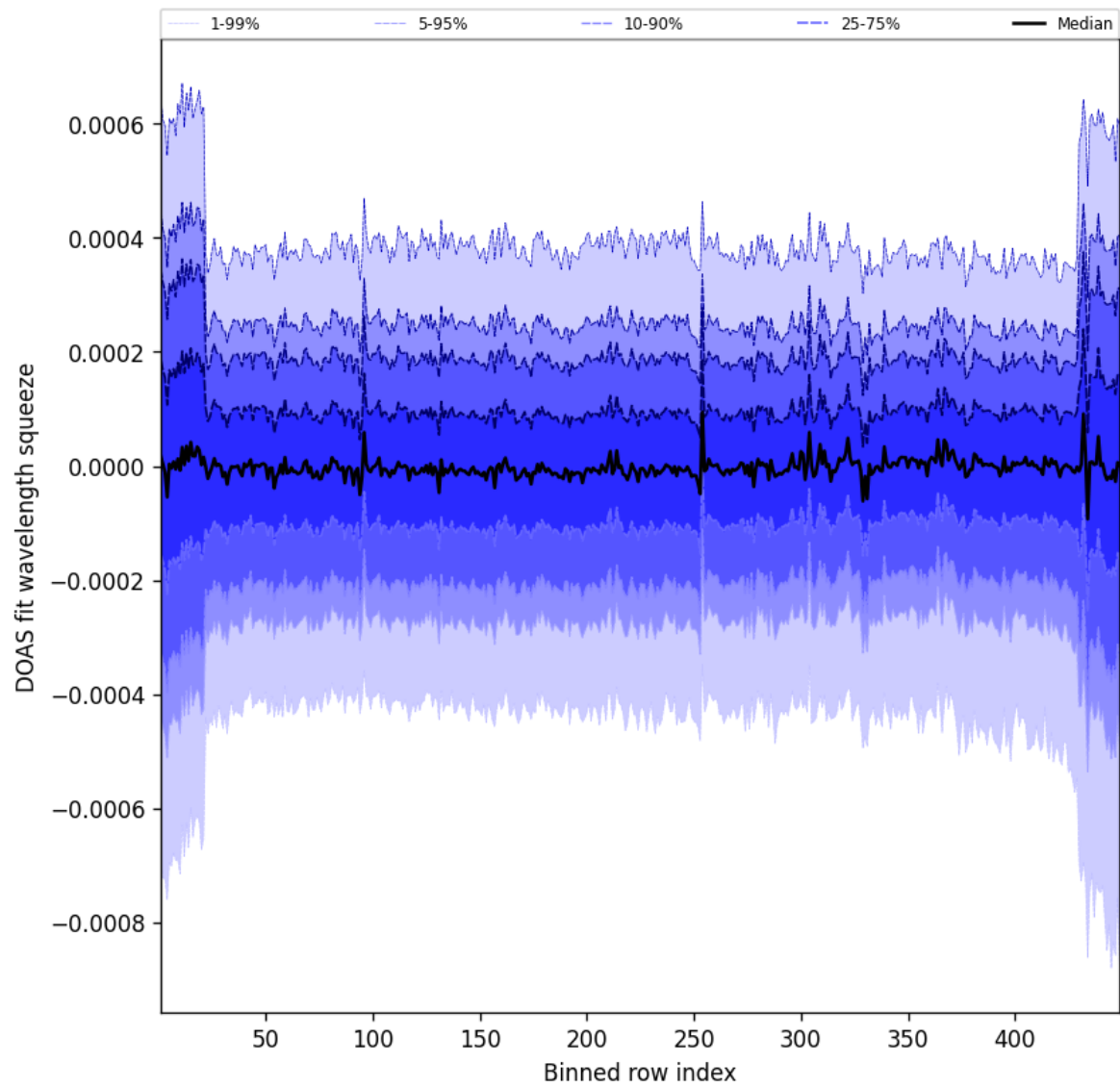


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-10-19 to 2025-10-20

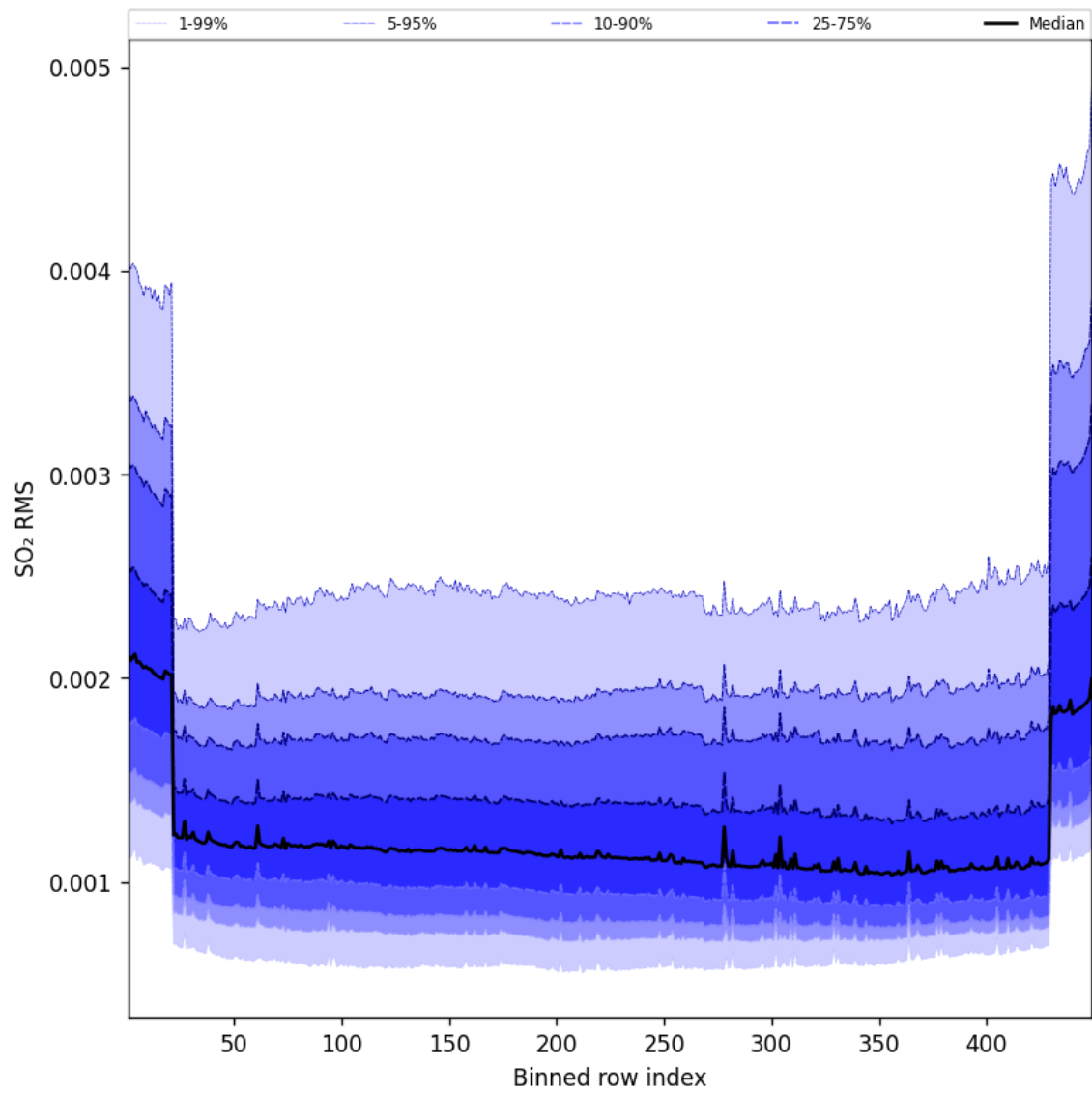


Figure 106: Along track statistics of “SO₂ RMS” for 2025-10-19 to 2025-10-20

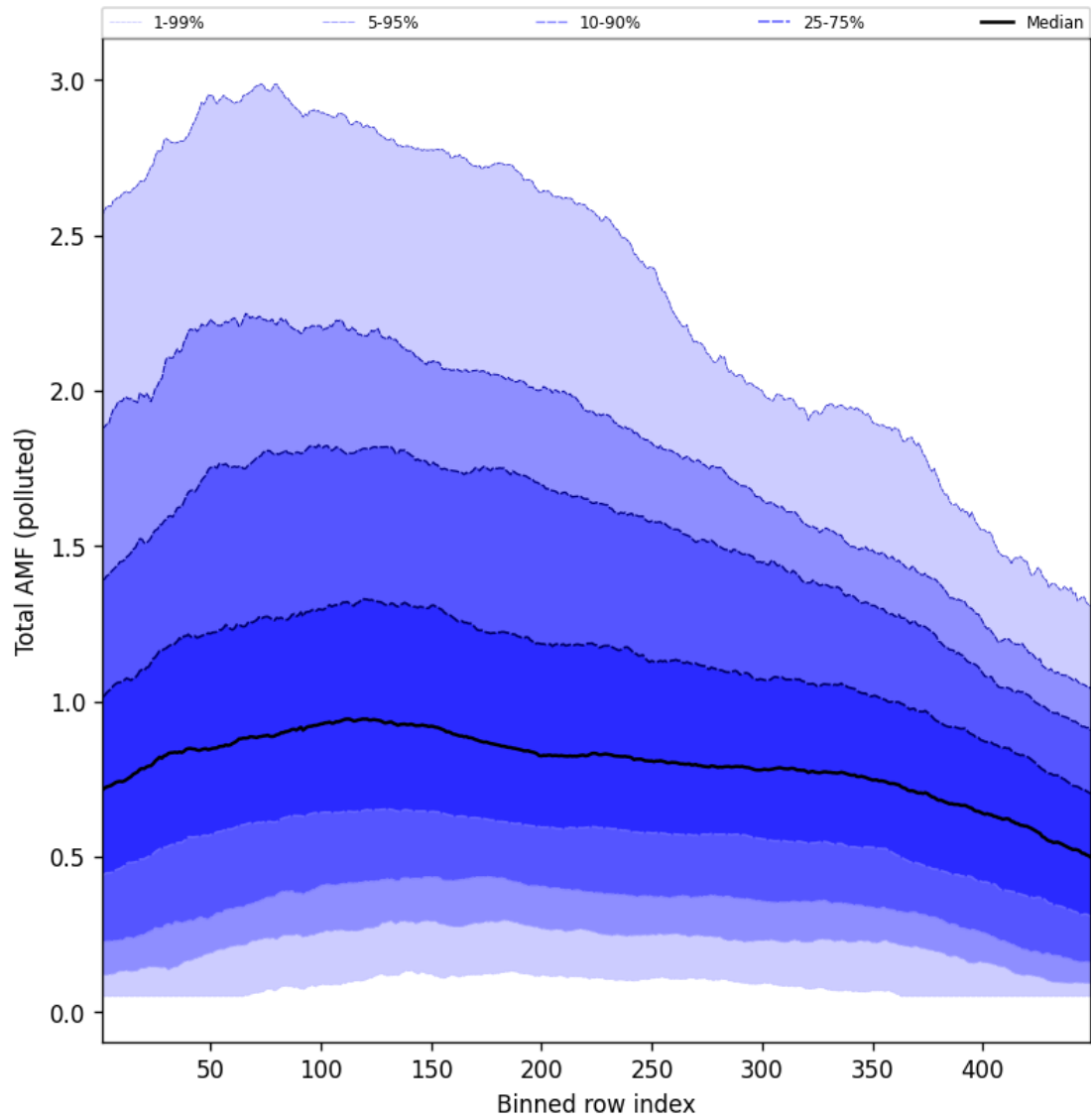


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-10-19 to 2025-10-20

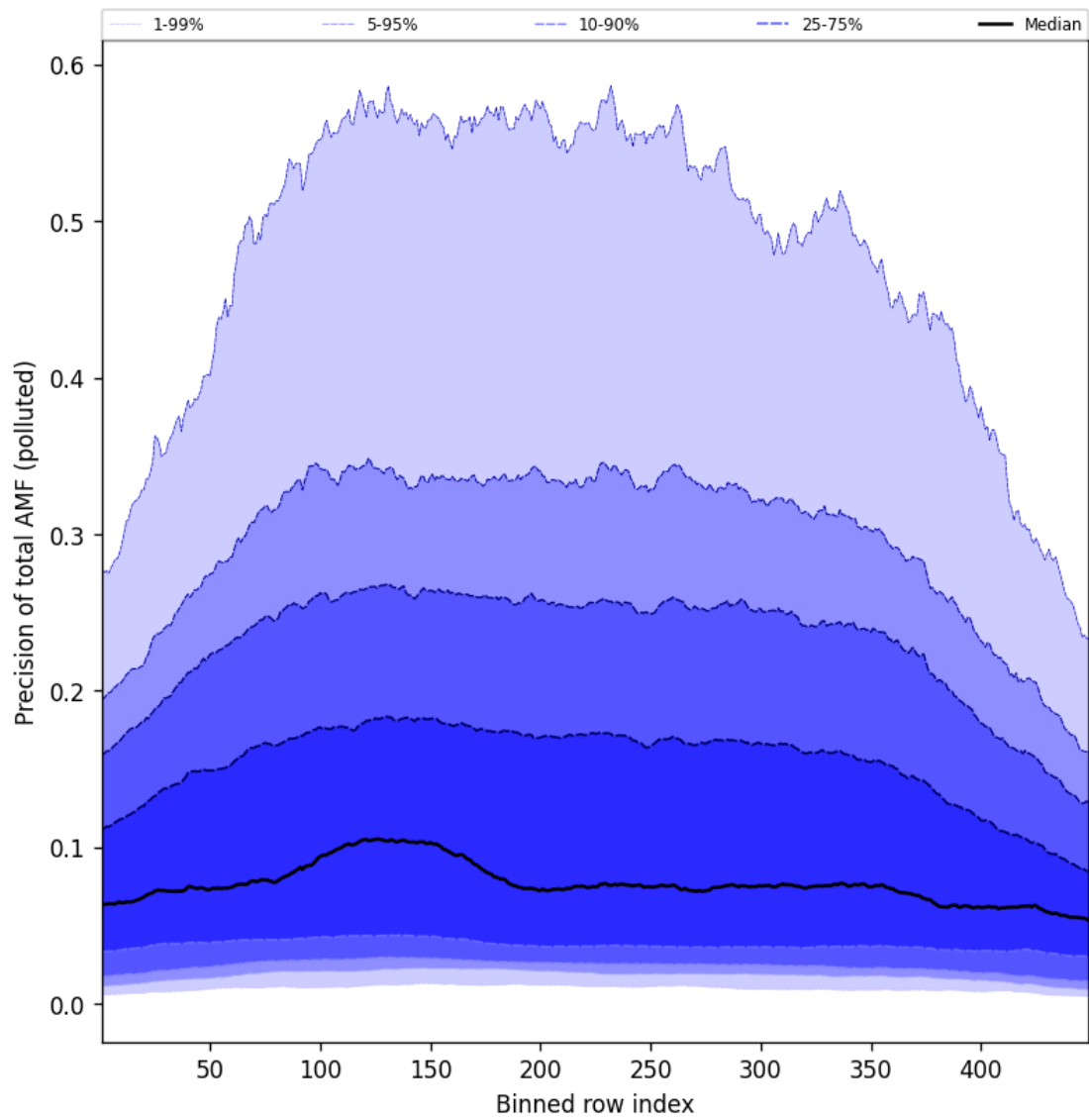


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-10-19 to 2025-10-20

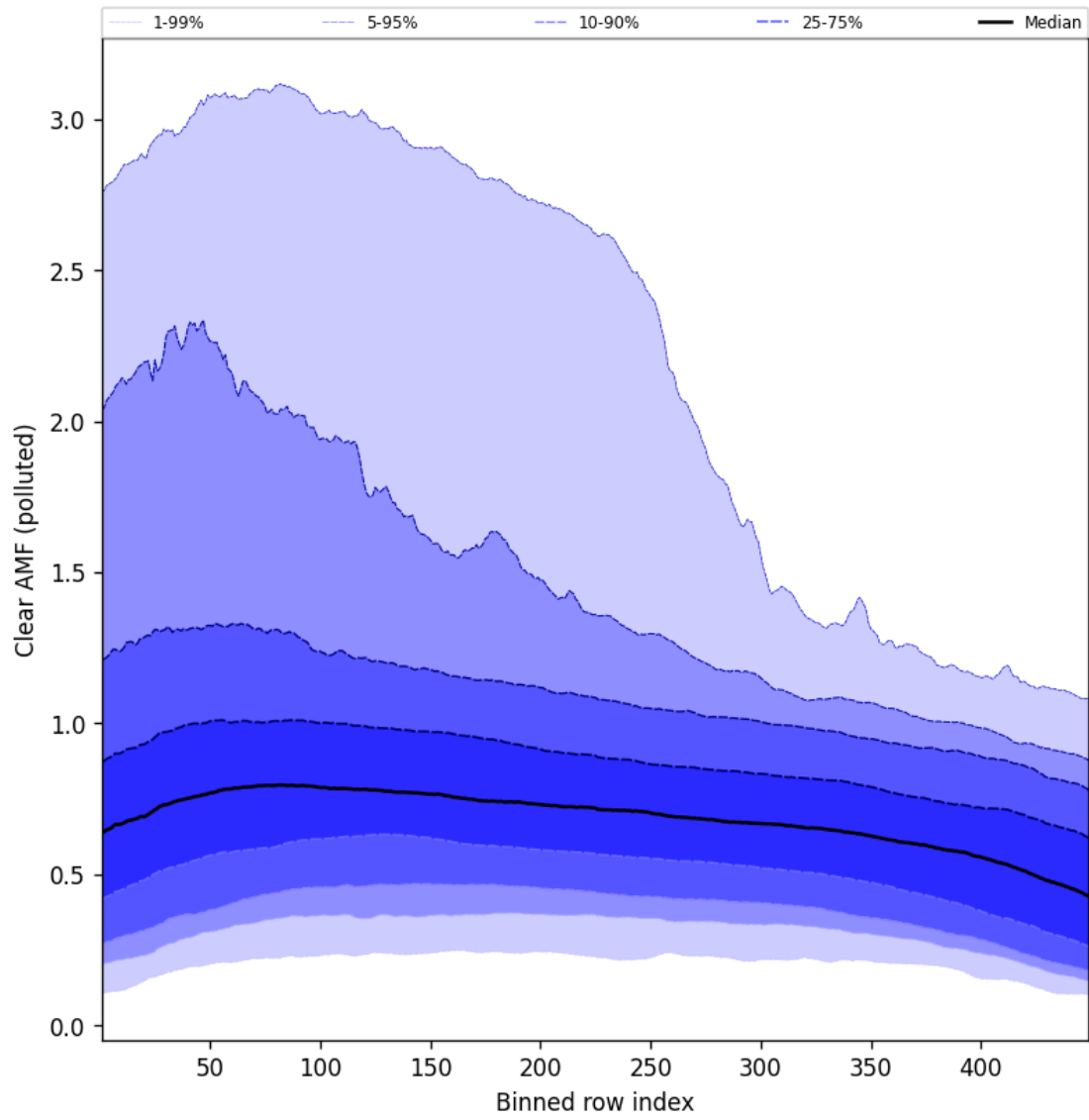


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-10-19 to 2025-10-20

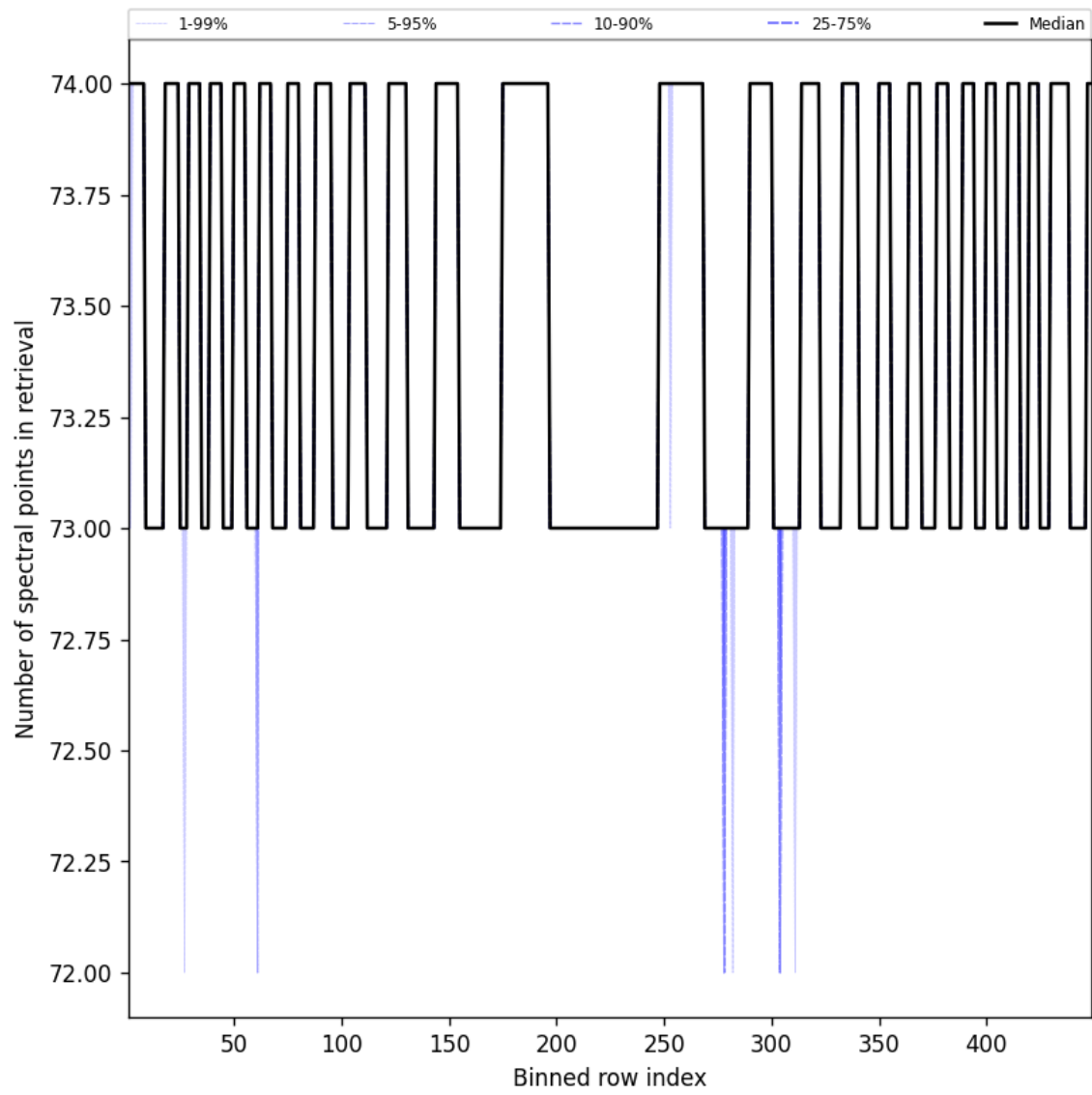


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-10-19 to 2025-10-20

10 Coincidence density

To investigate the relation between parameters scatter density plots are produced. These include some ‘hidden’ parameters, latitude and the solar- and viewing geometries, in addition to all configured parameters. All combinations of pairs of parameters are included *once*, in one direction alone.

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