

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]	0.669 ± 0.409	9791422	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.140 \pm 119.492) \times 10^{-2}$	9791422	0.310	0.489	1.066×10^{-2}	-91.8	176
sulfurdioxide total vertical column precision [DU]	0.596 ± 0.877	9791422	0.222	0.381	0.358	3.845×10^{-2}	39.4
sulfurdioxide slant column density corrected [DU]	$(1.737 \pm 37.320) \times 10^{-2}$	9791422	0.258	0.373	9.031×10^{-3}	-17.7	247
sulfurdioxide slant column density cobra [DU]	$(1.728 \pm 35.893) \times 10^{-2}$	9791422	0.258	0.373	9.031×10^{-3}	-17.7	32.7
sulfurdioxide slant column density cobra precision [DU]	0.299 ± 0.129	9791422	0.213	0.137	0.258	8.385×10^{-2}	11.0
sulfurdioxide slant column density window1 [DU]	0.128 ± 0.689	9791422	0.175	0.757	0.137	-68.9	23.7
sulfurdioxide slant column density window1 precision [DU]	0.299 ± 0.129	9791422	0.213	0.137	0.258	8.385×10^{-2}	11.0
sulfurdioxide slant column density corrected win1 [DU]	$(1.327 \pm 68.118) \times 10^{-2}$	9791422	-2.500×10^{-2}	0.744	-4.385×10^{-3}	-68.9	23.5
background so2 slant column offset window1 [DU]	-0.115 ± 0.152	9791422	-0.140	0.154	-0.137	-1.46	3.48
sulfurdioxide slant column density window2 [DU]	0.918 ± 9.169	9791422	0.250	11.7	0.715	-577	469
sulfurdioxide slant column density window2 precision [DU]	8.25 ± 2.13	9791422	7.43	2.56	7.96	2.16	360
sulfurdioxide slant column density corrected win2 [DU]	-0.270 ± 8.934	9791422	-0.250	11.5	-0.303	-576	465
background so2 slant column offset window2 [DU]	-1.19 ± 2.39	9791422	0.750	3.64	-0.564	-11.0	8.56
sulfurdioxide slant column density window3 [DU]	-3.60 ± 24.36	9791422	-3.92	30.8	-3.53	-957	1.165×10^3
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 12.5	9791422	23.7	9.14	25.2	10.6	1.438×10^3
sulfurdioxide slant column density corrected win3 [DU]	3.53 ± 23.80	9791422	2.80	30.0	3.72	-950	1.165×10^3
background so2 slant column offset window3 [DU]	7.14 ± 6.01	9791422	1.68	9.86	6.59	-17.7	26.0
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	9791422	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.973 \pm 8.434) \times 10^{-2}$	9791422	1.316×10^{-2}	2.449×10^{-2}	1.528×10^{-2}	2.962×10^{-4}	2.11
fitted radiance shift [nm]	$(-4.873 \pm 24.844) \times 10^{-4}$	9791422	-5.000×10^{-4}	1.762×10^{-3}	-4.604×10^{-4}	-4.183×10^{-2}	4.336×10^{-2}
fitted radiance squeeze [1]	$(-1.687 \pm 18.721) \times 10^{-5}$	9791422	1.000×10^{-5}	2.111×10^{-4}	-5.402×10^{-6}	-1.161×10^{-2}	1.041×10^{-2}
fitted root mean square [1]	$(1.311 \pm 0.533) \times 10^{-3}$	9791422	1.025×10^{-3}	5.446×10^{-4}	1.156×10^{-3}	3.310×10^{-4}	3.966×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.833 ± 0.460	9791422	0.620	0.548	0.765	5.000×10^{-2}	3.34
sulfurdioxide total air mass factor polluted precision [1]	0.101 ± 0.106	9791422	3.500×10^{-2}	0.102	6.358×10^{-2}	3.269×10^{-3}	1.74
sulfurdioxide clear air mass factor polluted [1]	0.715 ± 0.323	9791422	0.620	0.379	0.674	5.335×10^{-2}	3.38
number of spectral points in retrieval [1]	73.4 ± 0.5	9791422	73.0	1.000	73.0	52.0	155

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}	0.110	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.86	-0.991	-0.594	-0.395	-0.229	0.259	0.437	0.657	1.11	3.20
sulfurdioxide total vertical column precision [DU]	8.932×10^{-2}	0.133	0.165	0.194	0.231	0.612	0.828	1.13	1.75	4.46
sulfurdioxide slant column density corrected [DU]	-0.871	-0.504	-0.365	-0.273	-0.176	0.197	0.299	0.399	0.556	1.02
sulfurdioxide slant column density cobra [DU]	-0.871	-0.504	-0.365	-0.273	-0.176	0.197	0.299	0.399	0.556	1.02
sulfurdioxide slant column density cobra precision [DU]	0.143	0.172	0.187	0.198	0.213	0.351	0.414	0.465	0.539	0.776
sulfurdioxide slant column density window1 [DU]	-1.75	-0.949	-0.648	-0.450	-0.245	0.512	0.707	0.894	1.17	1.93
sulfurdioxide slant column density window1 precision [DU]	0.143	0.172	0.187	0.198	0.213	0.351	0.414	0.465	0.539	0.776
sulfurdioxide slant column density corrected win1 [DU]	-1.69	-1.01	-0.741	-0.562	-0.372	0.372	0.576	0.776	1.09	1.96
background so2 slant column offset window1 [DU]	-0.365	-0.295	-0.264	-0.240	-0.210	-5.566×10^{-2}	-6.227×10^{-3}	5.559×10^{-2}	0.165	0.403
sulfurdioxide slant column density window2 [DU]	-20.4	-13.7	-10.4	-7.88	-5.06	6.68	9.72	12.5	16.2	24.0
sulfurdioxide slant column density window2 precision [DU]	4.47	5.36	5.88	6.30	6.81	9.37	10.2	11.0	12.1	14.6
sulfurdioxide slant column density corrected win2 [DU]	-21.8	-14.8	-11.4	-8.85	-6.01	5.44	8.31	10.9	14.4	21.5
background so2 slant column offset window2 [DU]	-6.99	-5.54	-4.73	-3.97	-2.94	0.709	1.03	1.24	1.57	2.79
sulfurdioxide slant column density window3 [DU]	-64.6	-43.6	-33.8	-26.7	-18.8	11.9	19.7	26.7	36.1	54.9
sulfurdioxide slant column density window3 precision [DU]	14.6	17.0	18.6	20.0	21.5	30.7	35.0	40.2	51.2	82.3
sulfurdioxide slant column density corrected win3 [DU]	-56.5	-35.8	-26.0	-19.0	-11.3	18.7	26.2	33.0	42.1	60.5
background so2 slant column offset window3 [DU]	-3.84	-0.858	9.229×10^{-2}	0.900	2.01	11.9	13.8	15.3	17.3	20.3
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]	2.329×10^{-3}	3.994×10^{-3}	5.209×10^{-3}	6.410×10^{-3}	8.630×10^{-3}	3.312×10^{-2}	5.423×10^{-2}	8.827×10^{-2}	0.155	0.430
fitted radiance shift [nm]	-7.892×10^{-3}	-4.135×10^{-3}	-2.854×10^{-3}	-2.104×10^{-3}	-1.407×10^{-3}	3.549×10^{-4}	9.875×10^{-4}	1.808×10^{-3}	3.255×10^{-3}	7.353×10^{-3}
fitted radiance squeeze [1]	-5.812×10^{-4}	-3.336×10^{-4}	-2.363×10^{-4}	-1.752×10^{-4}	-1.143×10^{-4}	9.674×10^{-5}	1.477×10^{-4}	1.938×10^{-4}	2.582×10^{-4}	4.046×10^{-4}
fitted root mean square [1]	6.205×10^{-4}	7.590×10^{-4}	8.328×10^{-4}	8.908×10^{-4}	9.635×10^{-4}	1.508×10^{-3}	1.775×10^{-3}	2.018×10^{-3}	2.344×10^{-3}	3.212×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.630×10^{-2}	0.195	0.314	0.412	0.515	1.06	1.26	1.46	1.71	2.30
sulfurdioxide total air mass factor polluted precision [1]	8.788×10^{-3}	1.685×10^{-2}	2.316×10^{-2}	2.798×10^{-2}	3.516×10^{-2}	0.137	0.174×10^{-2}	0.211	0.279	0.497
sulfurdioxide clear air mass factor polluted [1]	0.184	0.283	0.360	0.427	0.502	0.881	0.978	1.06	1.19	1.93
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]	0.711 ± 0.399	4783778	0.710	1.000	0.0	1.000	0.290	1.000
sulfurdioxide total vertical column [DU]	$(3.310 \pm 126.991) \times 10^{-2}$	4783778	0.520	1.144×10^{-2}	-55.5	80.6	-0.244	0.276
sulfurdioxide total vertical column precision [DU]	0.652 ± 0.953	4783778	0.408	0.379	4.756×10^{-2}	29.7	0.240	0.648
sulfurdioxide slant column density corrected [DU]	$(1.693 \pm 35.515) \times 10^{-2}$	4783778	0.368	8.866×10^{-3}	-17.7	109	-0.173	0.194
sulfurdioxide slant column density cobra [DU]	$(1.682 \pm 34.456) \times 10^{-2}$	4783778	0.368	8.866×10^{-3}	-17.7	17.6	-0.173	0.194
sulfurdioxide slant column density cobra precision [DU]	0.291 ± 0.114	4783778	0.119	0.259	8.385×10^{-2}	6.07	0.214	0.333
sulfurdioxide slant column density window1 [DU]	0.160 ± 0.658	4783778	0.746	0.161	-26.7	22.5	-0.213	0.534
sulfurdioxide slant column density window1 precision [DU]	0.291 ± 0.114	4783778	0.119	0.259	8.385×10^{-2}	6.07	0.214	0.333
sulfurdioxide slant column density corrected win1 [DU]	$(1.885 \pm 65.329) \times 10^{-2}$	4783778	0.736	3.783×10^{-3}	-26.7	22.3	-0.360	0.376
background so2 slant column offset window1 [DU]	-0.141 ± 0.122	4783778	0.141	-0.154	-1.46	2.71	-0.220	-7.891×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.481 ± 9.279	4783778	11.8	0.281	-61.6	469	-5.55	6.29
sulfurdioxide slant column density window2 precision [DU]	8.46 ± 2.19	4783778	2.66	8.17	2.39	212	6.97	9.64
sulfurdioxide slant column density corrected win2 [DU]	-0.167 ± 9.109	4783778	11.6	-0.175	-62.9	465	-6.00	5.65
background so2 slant column offset window2 [DU]	-0.648 ± 2.032	4783778	2.51	-0.105	-11.0	8.52	-1.74	0.775
sulfurdioxide slant column density window3 [DU]	-3.56 ± 25.77	4783778	32.5	-3.17	-894	1.014×10^3	-19.5	13.0
sulfurdioxide slant column density window3 precision [DU]	29.4 ± 12.9	4783778	9.98	26.1	10.6	1.438×10^3	22.2	32.2
sulfurdioxide slant column density corrected win3 [DU]	3.30 ± 25.15	4783778	31.9	3.59	-876	1.011×10^3	-12.4	19.5
background so2 slant column offset window3 [DU]	6.86 ± 6.12	4783778	9.89	6.07	-17.7	26.0	1.68	11.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	4783778	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.974 \pm 11.274) \times 10^{-2}$	4783778	4.799×10^{-2}	1.889×10^{-2}	2.962×10^{-4}	2.11	1.176×10^{-2}	5.976×10^{-2}
fitted radiance shift [nm]	$(-1.411 \pm 25.358) \times 10^{-4}$	4783778	1.565×10^{-3}	-1.882×10^{-4}	-4.183×10^{-2}	4.336×10^{-2}	-9.419×10^{-4}	6.230×10^{-4}
fitted radiance squeeze [1]	$(3.148 \pm 171.229) \times 10^{-6}$	4783778	2.029×10^{-4}	5.202×10^{-6}	-3.351×10^{-3}	1.804×10^{-3}	-9.682×10^{-5}	1.061×10^{-4}
fitted root mean square [1]	$(1.288 \pm 0.482) \times 10^{-3}$	4783778	5.069×10^{-4}	1.163×10^{-3}	3.445×10^{-4}	1.079×10^{-2}	9.690×10^{-4}	1.476×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.752 ± 0.388	4783778	0.502	0.715	5.000×10^{-2}	2.80	0.480	0.981
sulfurdioxide total air mass factor polluted precision [1]	$(9.958 \pm 12.529) \times 10^{-2}$	4783778	9.362×10^{-2}	5.348×10^{-2}	3.269×10^{-3}	1.74	3.146×10^{-2}	0.125
sulfurdioxide clear air mass factor polluted [1]	0.662 ± 0.268	4783778	0.404	0.649	5.335×10^{-2}	2.49	0.462	0.866
number of spectral points in retrieval [1]	73.4 ± 0.5	4783778	1.000	73.0	52.0	155	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]	0.629 ± 0.414	5007644	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(2.977 \pm 111.860) \times 10^{-2}$	5007644	0.460	1.001×10^{-2}	-91.8	176	-0.216	0.244
sulfurdioxide total vertical column precision [DU]	0.544 ± 0.795	5007644	0.360	0.340	3.845×10^{-2}	39.4	0.222	0.582
sulfurdioxide slant column density corrected [DU]	$(1.780 \pm 38.967) \times 10^{-2}$	5007644	0.379	9.191×10^{-3}	-7.81	247	-0.178	0.200
sulfurdioxide slant column density cobra [DU]	$(1.772 \pm 37.214) \times 10^{-2}$	5007644	0.379	9.191×10^{-3}	-7.81	32.7	-0.178	0.200
sulfurdioxide slant column density cobra precision [DU]	0.307 ± 0.141	5007644	0.161	0.258	8.409×10^{-2}	11.0	0.213	0.374
sulfurdioxide slant column density window1 [DU]	$(9.835 \pm 71.484) \times 10^{-2}$	5007644	0.766	0.112	-68.9	23.7	-0.276	0.490
sulfurdioxide slant column density window1 precision [DU]	0.307 ± 0.141	5007644	0.161	0.258	8.409×10^{-2}	11.0	0.213	0.374
sulfurdioxide slant column density corrected win1 [DU]	$(7.936 \pm 706.761) \times 10^{-3}$	5007644	0.751	-1.228×10^{-2}	-68.9	23.5	-0.383	0.368
background so2 slant column offset window1 [DU]	$(-9.041 \pm 17.176) \times 10^{-2}$	5007644	0.167	-0.119	-0.894	3.48	-0.198	-3.099×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.34 ± 9.04	5007644	11.6	1.12	-577	456	-4.59	7.03
sulfurdioxide slant column density window2 precision [DU]	8.05 ± 2.05	5007644	2.44	7.77	2.16	360	6.67	9.11
sulfurdioxide slant column density corrected win2 [DU]	-0.369 ± 8.762	5007644	11.3	-0.421	-576	456	-6.03	5.24
background so2 slant column offset window2 [DU]	-1.70 ± 2.58	5007644	4.44	-1.45	-10.3	8.56	-3.83	0.614
sulfurdioxide slant column density window3 [DU]	-3.65 ± 22.94	5007644	29.2	-3.84	-957	1.165×10^3	-18.3	10.9
sulfurdioxide slant column density window3 precision [DU]	27.3 ± 12.0	5007644	8.18	24.3	10.7	540	21.0	29.2
sulfurdioxide slant column density corrected win3 [DU]	3.75 ± 22.43	5007644	28.3	3.83	-950	1.165×10^3	-10.3	18.0
background so2 slant column offset window3 [DU]	7.40 ± 5.89	5007644	9.77	6.98	-17.6	24.2	2.37	12.1
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	5007644	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.061 \pm 3.192) \times 10^{-2}$	5007644	1.685×10^{-2}	1.201×10^{-2}	1.190×10^{-3}	1.14	6.945×10^{-3}	2.379×10^{-2}
fitted radiance shift [nm]	$(-8.180 \pm 23.878) \times 10^{-4}$	5007644	1.819×10^{-3}	-7.595×10^{-4}	-3.841×10^{-2}	3.547×10^{-2}	-1.776×10^{-3}	4.369×10^{-5}
fitted radiance squeeze [1]	$(-3.600 \pm 19.942) \times 10^{-5}$	5007644	2.204×10^{-4}	-1.621×10^{-5}	-1.161×10^{-2}	1.041×10^{-2}	-1.329×10^{-4}	8.753×10^{-5}
fitted root mean square [1]	$(1.333 \pm 0.577) \times 10^{-3}$	5007644	5.891×10^{-4}	1.149×10^{-3}	3.310×10^{-4}	3.966×10^{-2}	9.585×10^{-4}	1.548×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.910 ± 0.508	5007644	0.628	0.813	5.000×10^{-2}	3.34	0.552	1.18
sulfurdioxide total air mass factor polluted precision [1]	0.102 ± 0.083	5007644	0.105	7.897×10^{-2}	3.628×10^{-3}	0.936	3.906×10^{-2}	0.144
sulfurdioxide clear air mass factor polluted [1]	0.765 ± 0.361	5007644	0.361	0.698	8.518×10^{-2}	3.38	0.534	0.895
number of spectral points in retrieval [1]	73.4 ± 0.5	5007644	1.000	73.0	71.0	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 ± 0.407	6899473	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.573 \pm 108.175) \times 10^{-2}$	6899473	0.456	9.710×10^{-3}	-91.8	176	-0.215	0.240
sulfurdioxide total vertical column precision [DU]	0.533 ± 0.775	6899473	0.347	0.330	3.845×10^{-2}	39.4	0.220	0.567
sulfurdioxide slant column density corrected [DU]	$(1.563 \pm 36.582) \times 10^{-2}$	6899473	0.369	8.585×10^{-3}	-7.81	247	-0.174	0.194
sulfurdioxide slant column density cobra [DU]	$(1.558 \pm 35.265) \times 10^{-2}$	6899473	0.369	8.585×10^{-3}	-7.81	32.7	-0.174	0.194
sulfurdioxide slant column density cobra precision [DU]	0.298 ± 0.132	6899473	0.143	0.254	8.409×10^{-2}	11.0	0.210	0.352
sulfurdioxide slant column density window1 [DU]	0.122 ± 0.679	6899473	0.743	0.133	-68.9	23.7	-0.243	0.500
sulfurdioxide slant column density window1 precision [DU]	0.298 ± 0.132	6899473	0.143	0.254	8.409×10^{-2}	11.0	0.210	0.352
sulfurdioxide slant column density corrected win1 [DU]	$(9.774 \pm 672.511) \times 10^{-3}$	6899473	0.730	-7.401×10^{-3}	-68.9	23.5	-0.368	0.362
background so2 slant column offset window1 [DU]	-0.112 ± 0.154	6899473	0.155	-0.136	-0.894	3.48	-0.208	-5.279×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.988 ± 8.986	6899473	11.5	0.784	-577	456	-4.88	6.64
sulfurdioxide slant column density window2 precision [DU]	8.06 ± 2.06	6899473	2.45	7.76	2.16	360	6.67	9.12
sulfurdioxide slant column density corrected win2 [DU]	-0.361 ± 8.748	6899473	11.2	-0.396	-576	456	-5.99	5.24
background so2 slant column offset window2 [DU]	-1.35 ± 2.47	6899473	3.97	-0.768	-10.9	8.56	-3.27	0.692
sulfurdioxide slant column density window3 [DU]	-1.19 ± 23.60	6899473	30.1	-1.50	-957	1.165×10^3	-16.3	13.8
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 11.8	6899473	8.48	24.3	10.6	540	21.0	29.5
sulfurdioxide slant column density corrected win3 [DU]	5.98 ± 22.77	6899473	28.9	5.79	-950	1.165×10^3	-8.47	20.4
background so2 slant column offset window3 [DU]	7.17 ± 5.93	6899473	9.84	6.80	-17.7	25.9	2.07	11.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	6899473	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.312 \pm 3.731) \times 10^{-2}$	6899473	1.502×10^{-2}	1.321×10^{-2}	1.124×10^{-3}	1.17	8.098×10^{-3}	2.312×10^{-2}
fitted radiance shift [nm]	$(-5.607 \pm 24.032) \times 10^{-4}$	6899473	1.853×10^{-3}	-5.173×10^{-4}	-3.978×10^{-2}	3.917×10^{-2}	-1.526×10^{-3}	3.261×10^{-4}
fitted radiance squeeze [1]	$(-1.932 \pm 18.754) \times 10^{-5}$	6899473	2.091×10^{-4}	-5.411×10^{-6}	-1.161×10^{-2}	1.041×10^{-2}	-1.141×10^{-4}	9.495×10^{-5}
fitted root mean square [1]	$(1.293 \pm 0.538) \times 10^{-3}$	6899473	5.382×10^{-4}	1.127×10^{-3}	3.310×10^{-4}	3.966×10^{-2}	9.448×10^{-4}	1.483×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.874 ± 0.455	6899473	0.538	0.818	5.000×10^{-2}	3.00	0.559	1.10
sulfurdioxide total air mass factor polluted precision [1]	$(9.802 \pm 8.461) \times 10^{-2}$	6899473	9.442×10^{-2}	6.873×10^{-2}	3.628×10^{-3}	1.24	3.976×10^{-2}	0.134
sulfurdioxide clear air mass factor polluted [1]	0.749 ± 0.295	6899473	0.361	0.716	8.518×10^{-2}	3.02	0.547	0.909
number of spectral points in retrieval [1]	73.4 ± 0.5	6899473	1.000	73.0	71.0	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]	0.706 ± 0.404	2409997	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.967 \pm 130.486) \times 10^{-2}$	2409997	0.559	1.172×10^{-2}	-45.2	80.6	-0.260	0.298
sulfurdioxide total vertical column precision [DU]	0.681 ± 0.967	2409997	0.415	0.408	4.756×10^{-2}	29.7	0.273	0.688
sulfurdioxide slant column density corrected [DU]	$(2.030 \pm 38.966) \times 10^{-2}$	2409997	0.380	9.065×10^{-3}	-6.25	109	-0.179	0.201
sulfurdioxide slant column density cobra [DU]	$(2.009 \pm 37.104) \times 10^{-2}$	2409997	0.380	9.065×10^{-3}	-6.25	17.6	-0.179	0.201
sulfurdioxide slant column density cobra precision [DU]	0.300 ± 0.121	2409997	0.118	0.263	8.538×10^{-2}	9.68	0.222	0.340
sulfurdioxide slant column density window1 [DU]	0.144 ± 0.707	2409997	0.787	0.148	-8.29	22.5	-0.247	0.540
sulfurdioxide slant column density window1 precision [DU]	0.300 ± 0.121	2409997	0.118	0.263	8.538×10^{-2}	9.68	0.222	0.340
sulfurdioxide slant column density corrected win1 [DU]	$(2.026 \pm 69.738) \times 10^{-2}$	2409997	0.773	2.340×10^{-3}	-7.72	22.3	-0.379	0.394
background so2 slant column offset window1 [DU]	-0.124 ± 0.148	2409997	0.149	-0.145	-1.18	3.02	-0.216	-6.716×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.653 ± 9.569	2409997	12.3	0.450	-124	383	-5.61	6.69
sulfurdioxide slant column density window2 precision [DU]	8.71 ± 2.20	2409997	2.61	8.44	2.39	212	7.25	9.86
sulfurdioxide slant column density corrected win2 [DU]	$(-1.061 \pm 933.248) \times 10^{-2}$	2409997	12.0	-2.552×10^{-2}	-124	386	-6.02	5.97
background so2 slant column offset window2 [DU]	-0.664 ± 2.059	2409997	2.55	-0.125	-11.0	8.56	-1.77	0.782
sulfurdioxide slant column density window3 [DU]	-9.56 ± 25.21	2409997	31.9	-8.87	-233	782	-25.2	6.74
sulfurdioxide slant column density window3 precision [DU]	30.6 ± 13.9	2409997	9.52	27.2	10.6	1.086×10^3	23.3	32.8
sulfurdioxide slant column density corrected win3 [DU]	-2.86 ± 25.18	2409997	32.0	-2.30	-233	782	-18.6	13.4
background so2 slant column offset window3 [DU]	6.70 ± 6.11	2409997	9.62	5.43	-17.7	26.0	1.71	11.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	2409997	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.360 \pm 12.577) \times 10^{-2}$	2409997	6.980×10^{-2}	2.822×10^{-2}	2.966×10^{-4}	2.11	1.212×10^{-2}	8.192×10^{-2}
fitted radiance shift [nm]	$(-3.300 \pm 26.714) \times 10^{-4}$	2409997	1.468×10^{-3}	-3.658×10^{-4}	-3.915×10^{-2}	3.911×10^{-2}	-1.100×10^{-3}	3.675×10^{-4}
fitted radiance squeeze [1]	$(-1.411 \pm 18.559) \times 10^{-5}$	2409997	2.151×10^{-4}	-7.612×10^{-6}	-4.256×10^{-3}	2.070×10^{-3}	-1.169×10^{-4}	9.819×10^{-5}
fitted root mean square [1]	$(1.346 \pm 0.516) \times 10^{-3}$	2409997	5.176×10^{-4}	1.207×10^{-3}	3.619×10^{-4}	9.831×10^{-3}	1.017×10^{-3}	1.535×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.758 ± 0.460	2409997	0.508	0.660	5.000×10^{-2}	3.34	0.454	0.963
sulfurdioxide total air mass factor polluted precision [1]	0.106 ± 0.140	2409997	0.115	4.744×10^{-2}	3.286×10^{-3}	1.74	2.855×10^{-2}	0.144
sulfurdioxide clear air mass factor polluted [1]	0.656 ± 0.381	2409997	0.393	0.591	5.335×10^{-2}	3.38	0.413	0.806
number of spectral points in retrieval [1]	73.5 ± 0.5	2409997	1.000	73.0	52.0	155	73.0	74.0

3 Granule outlines

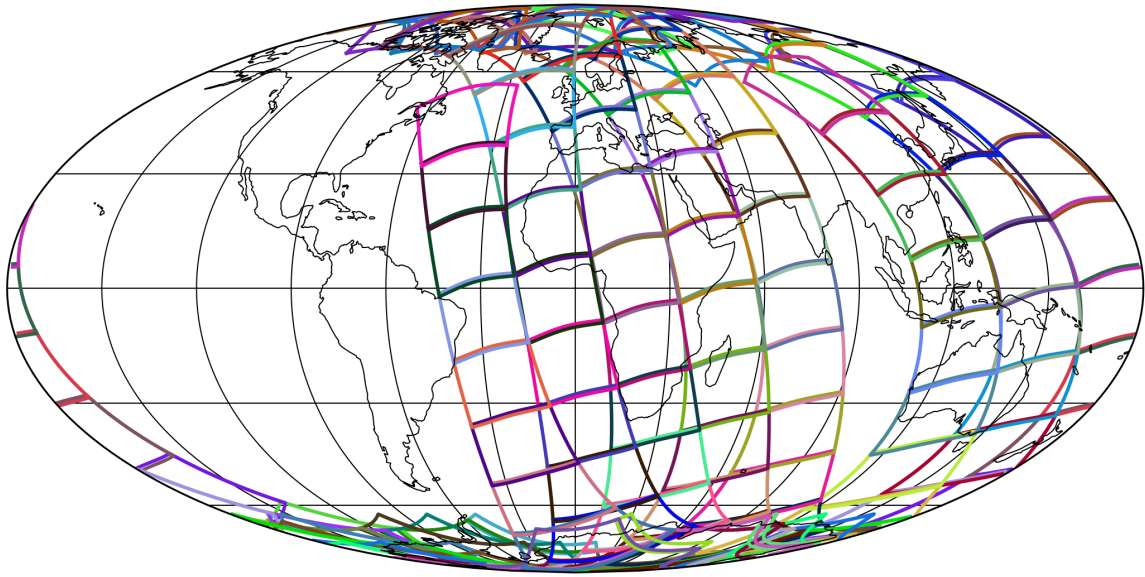


Figure 1: Outline of the granules.

4 Input data monitoring

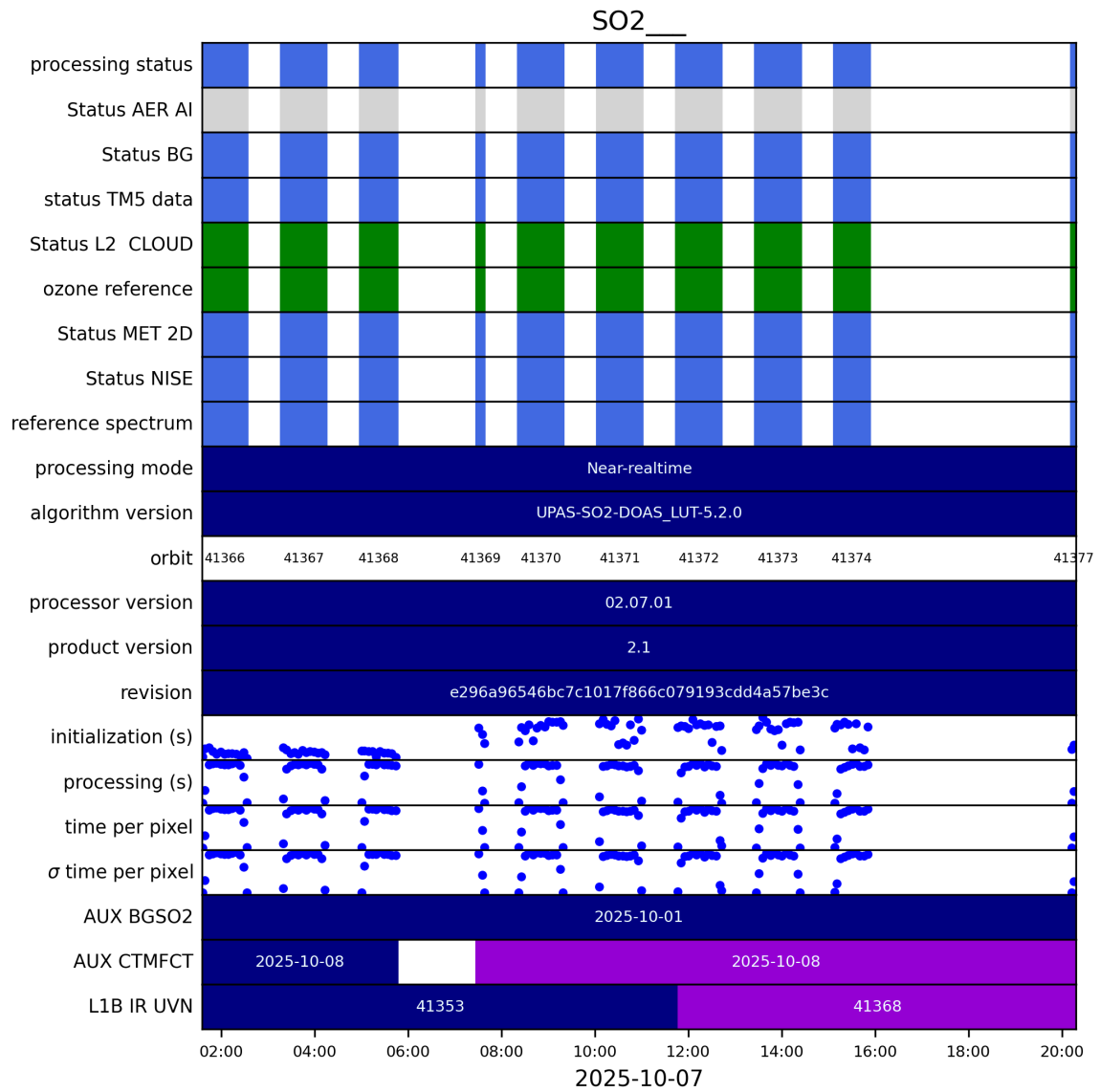


Figure 2: Input data per granule

5 Warnings and errors

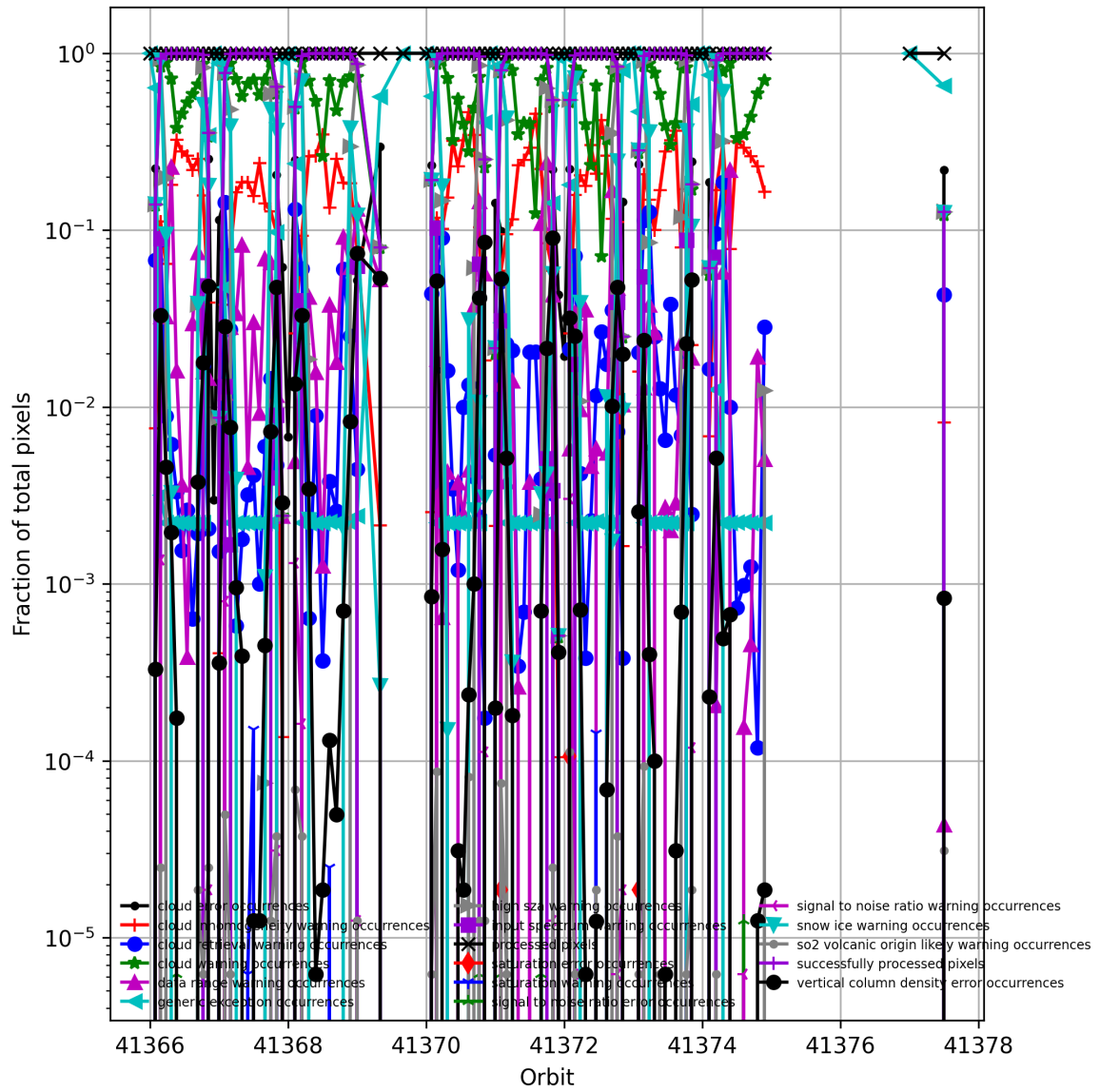


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

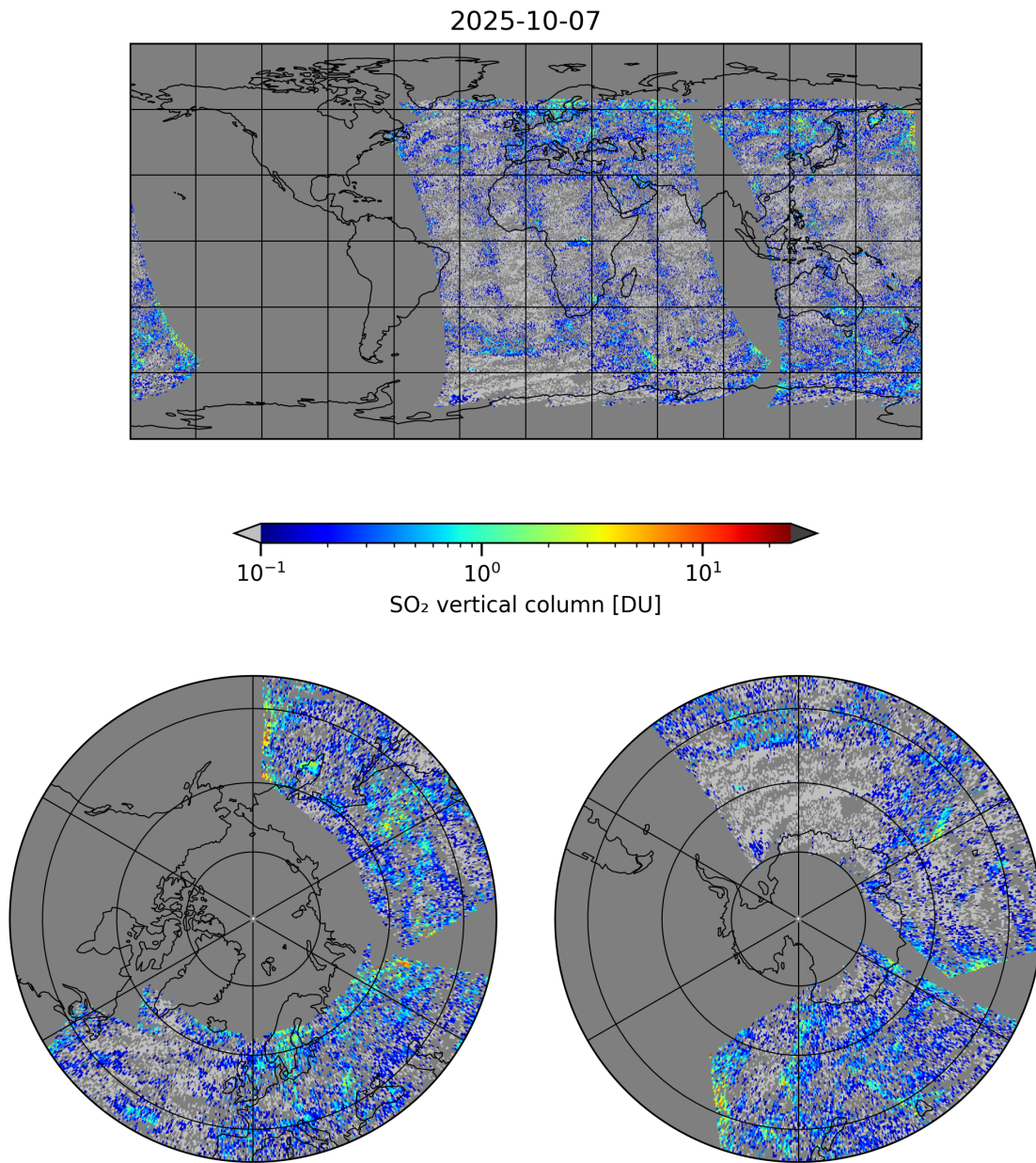


Figure 4: Map of “SO₂ vertical column” for 2025-10-07 to 2025-10-07

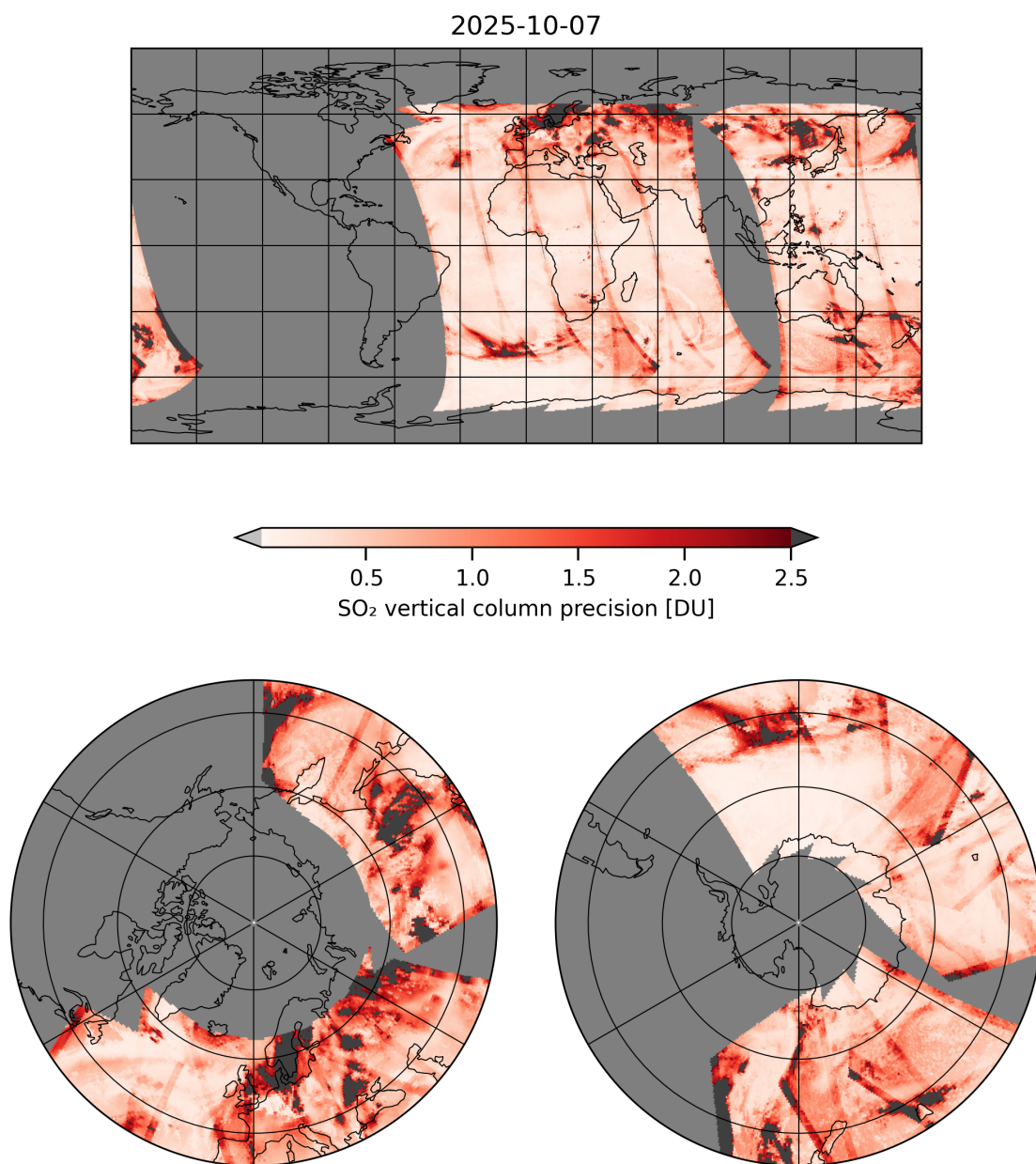


Figure 5: Map of “SO₂ vertical column precision” for 2025-10-07 to 2025-10-07

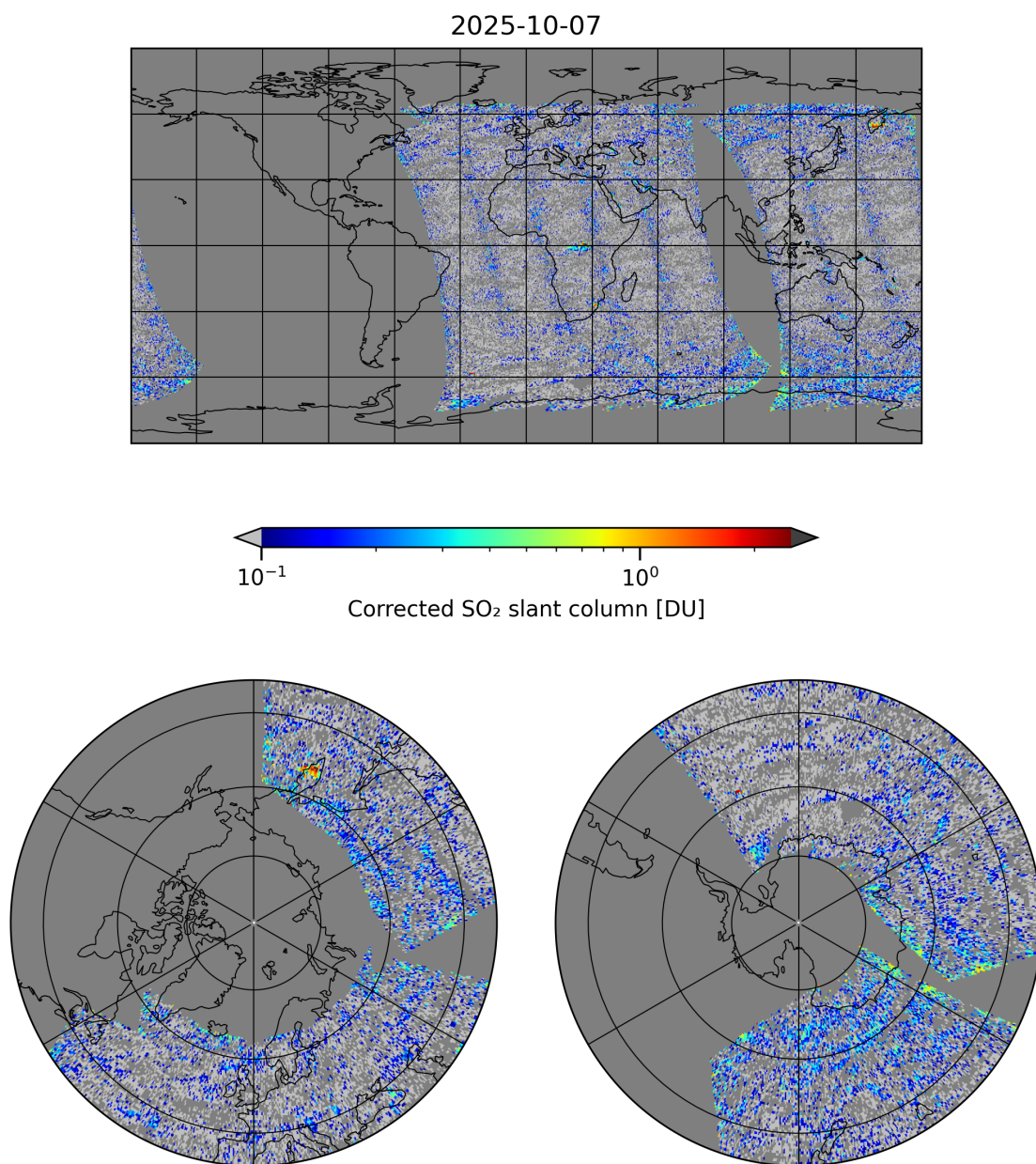


Figure 6: Map of “Corrected SO₂ slant column” for 2025-10-07 to 2025-10-07

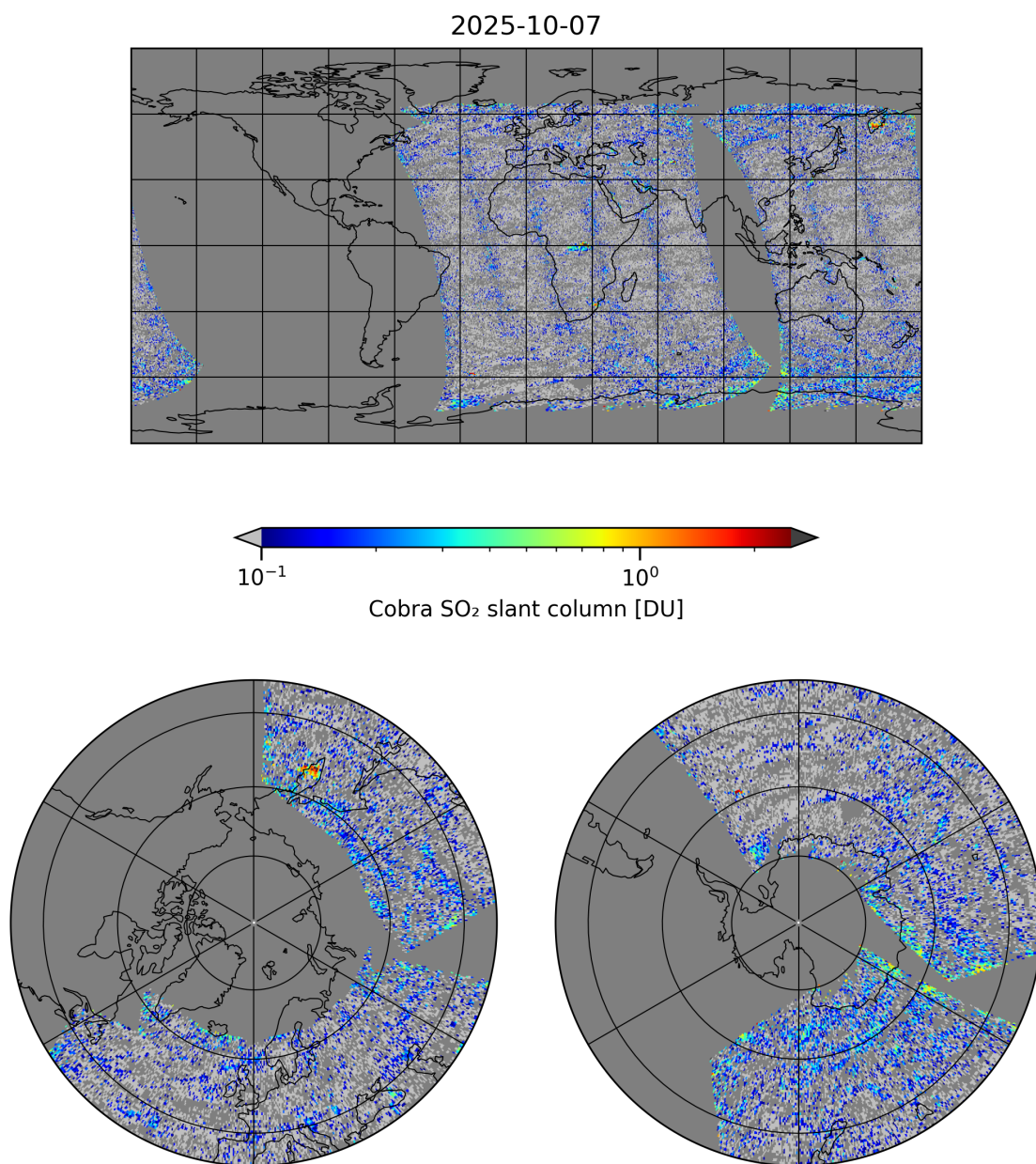


Figure 7: Map of “Cobra SO₂ slant column” for 2025-10-07 to 2025-10-07

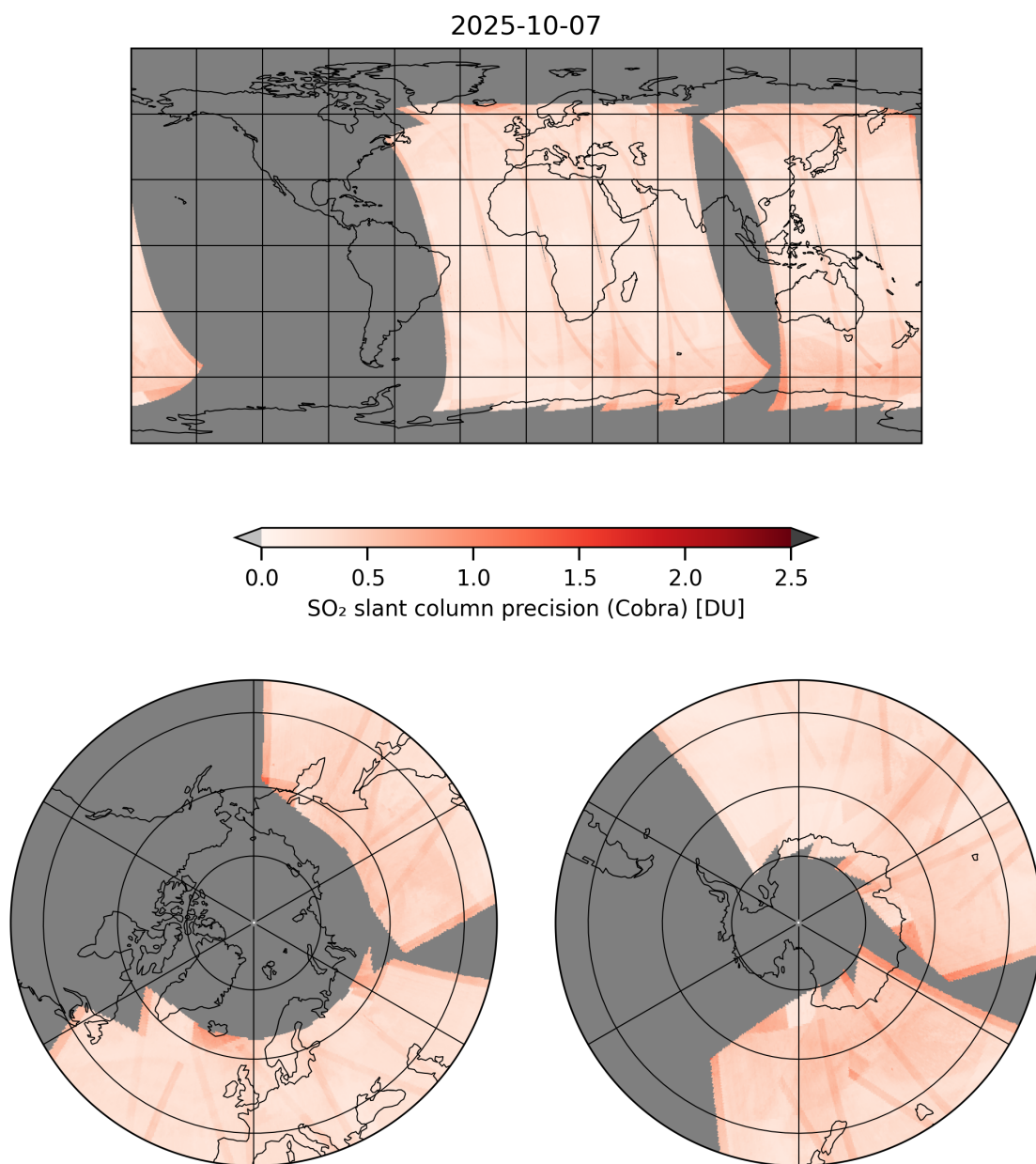


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-10-07 to 2025-10-07

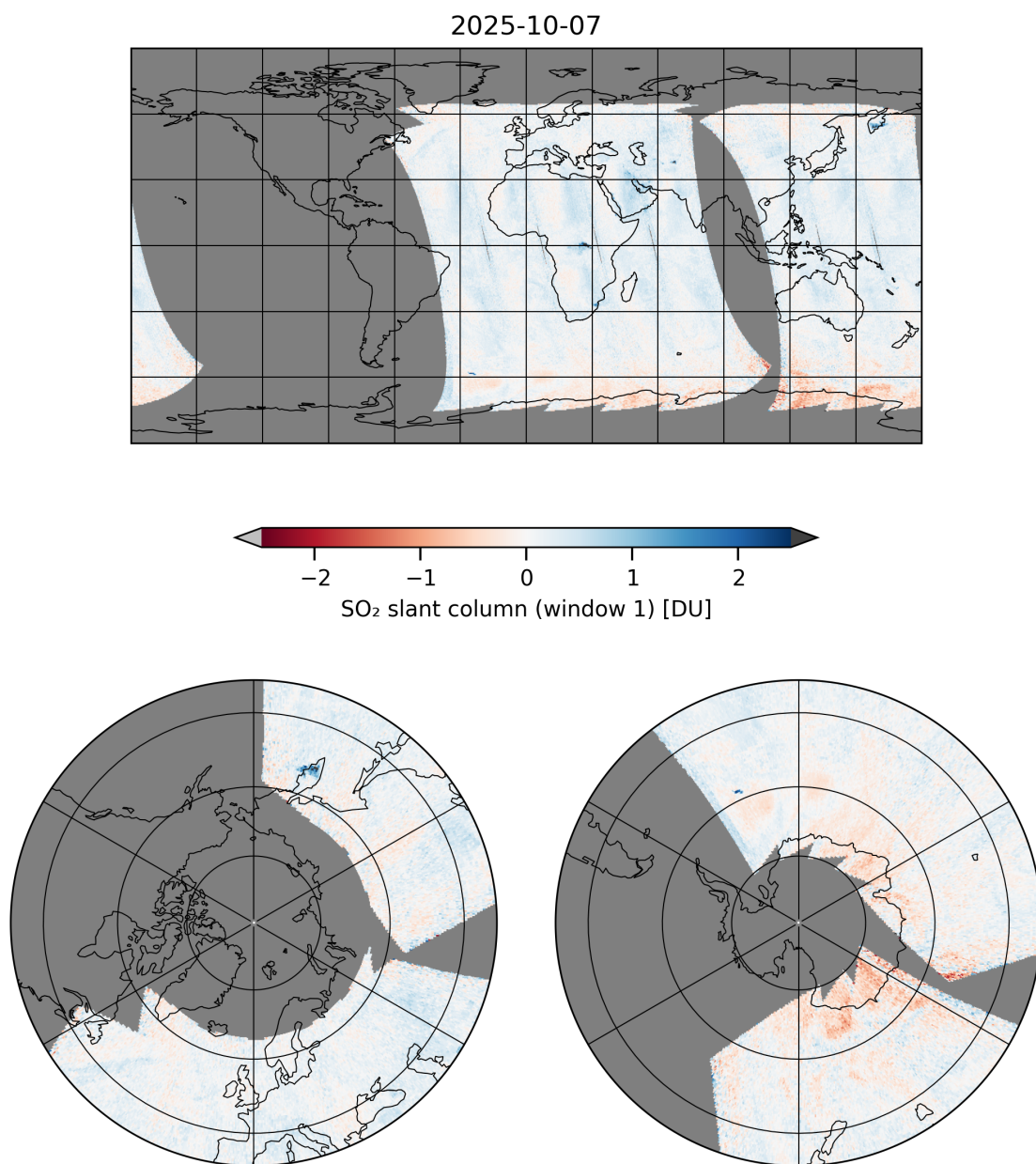


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-10-07 to 2025-10-07

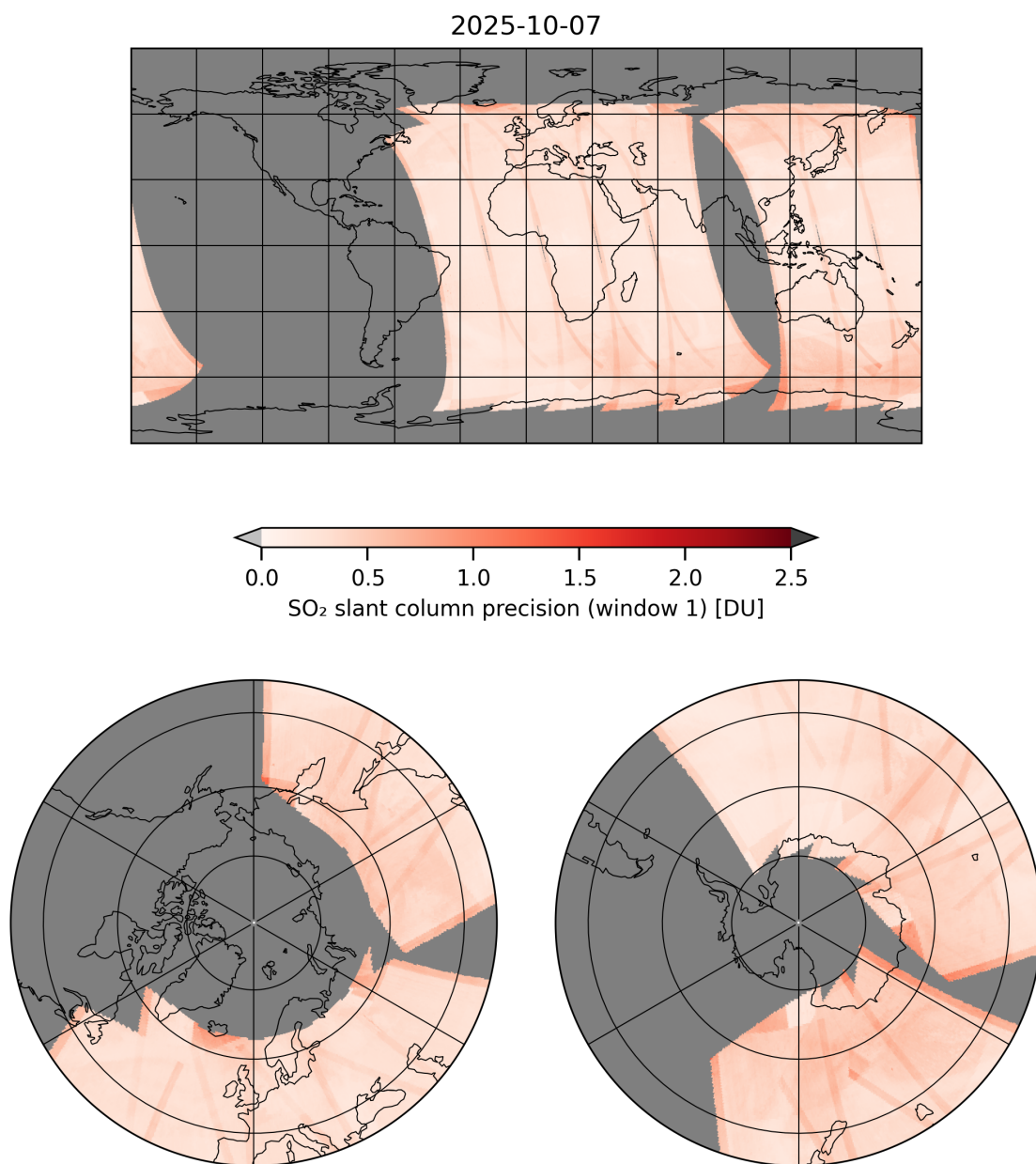


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-10-07 to 2025-10-07

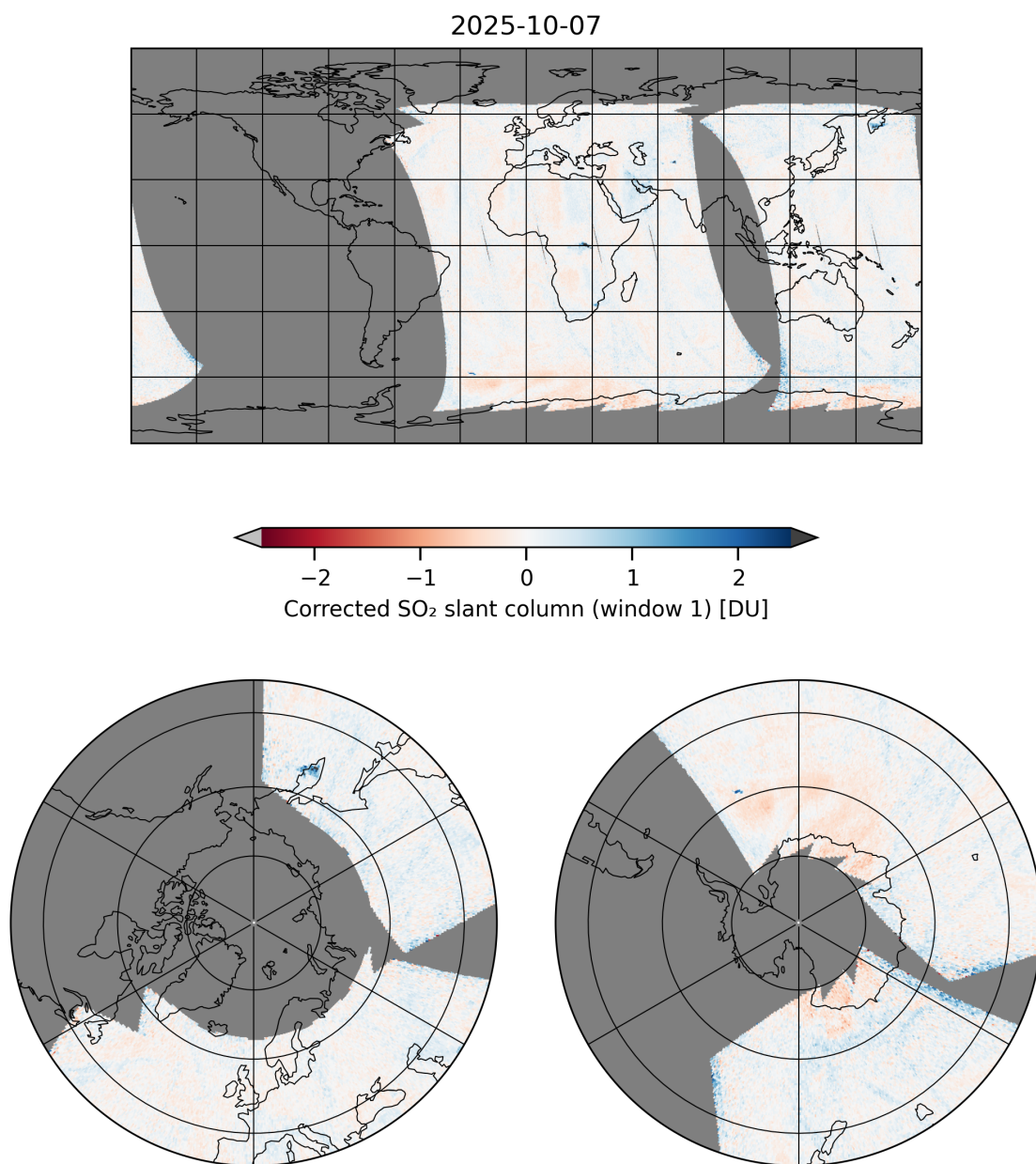


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-10-07 to 2025-10-07

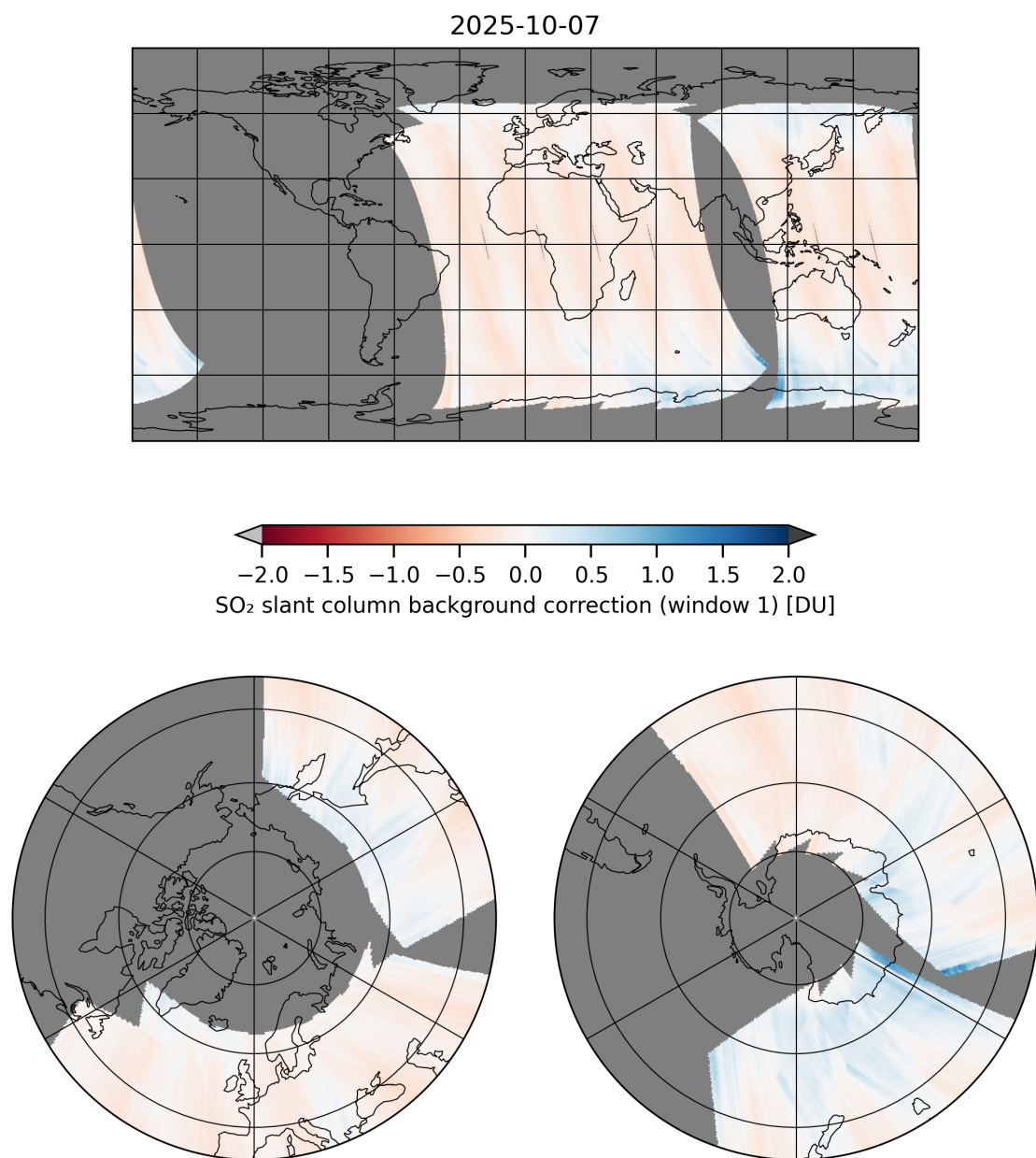


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-10-07 to 2025-10-07

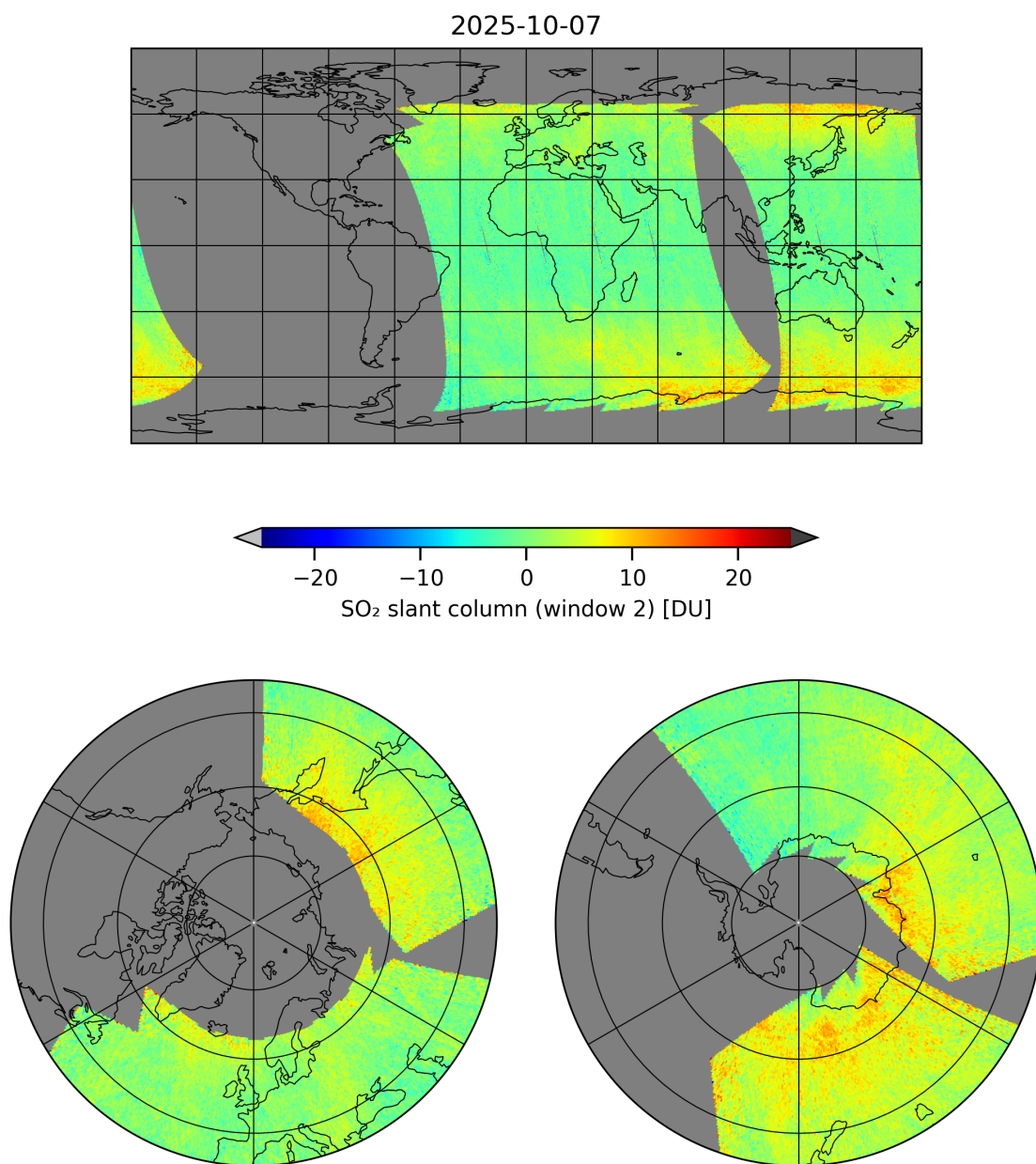


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-10-07 to 2025-10-07

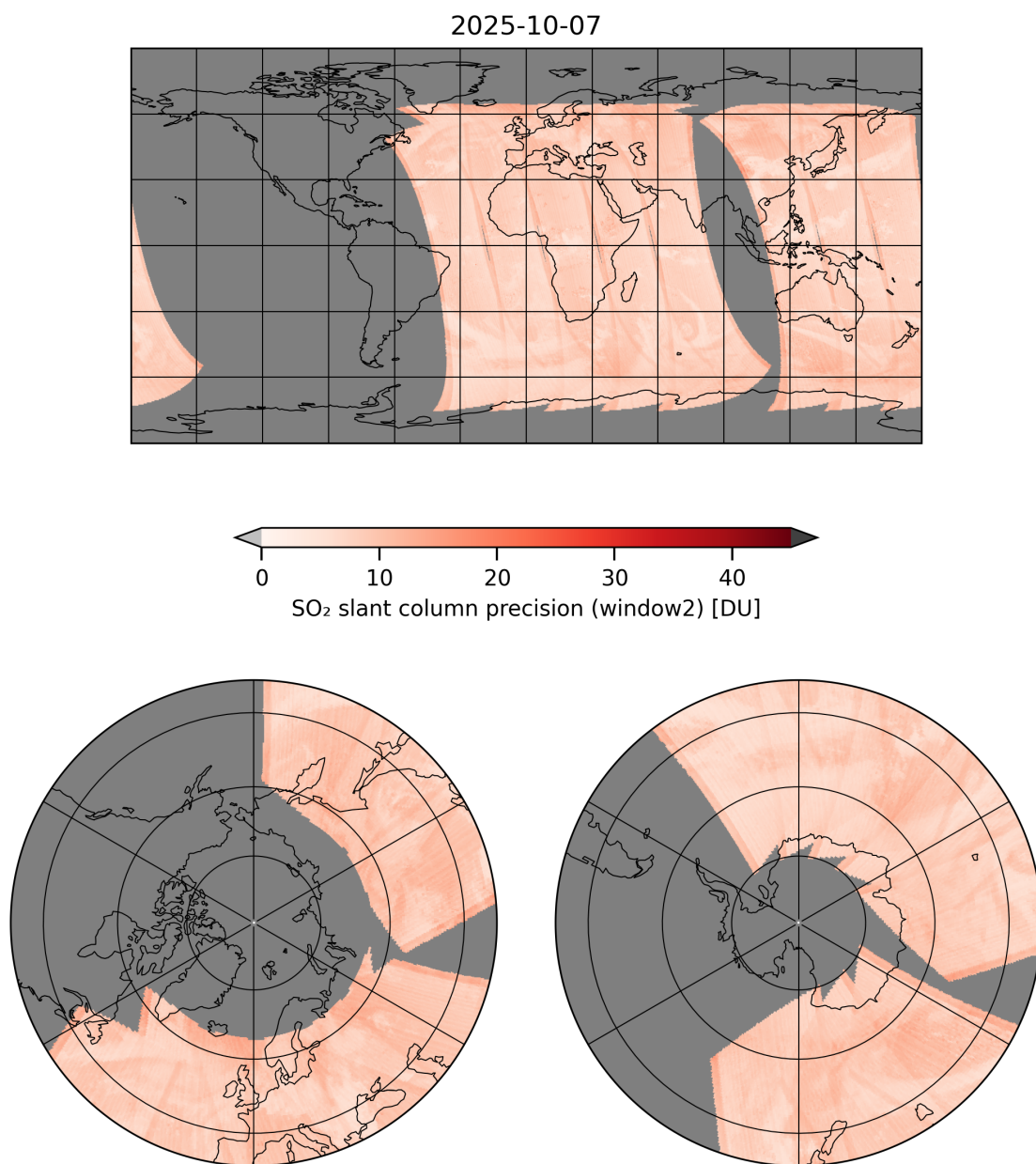


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-10-07 to 2025-10-07

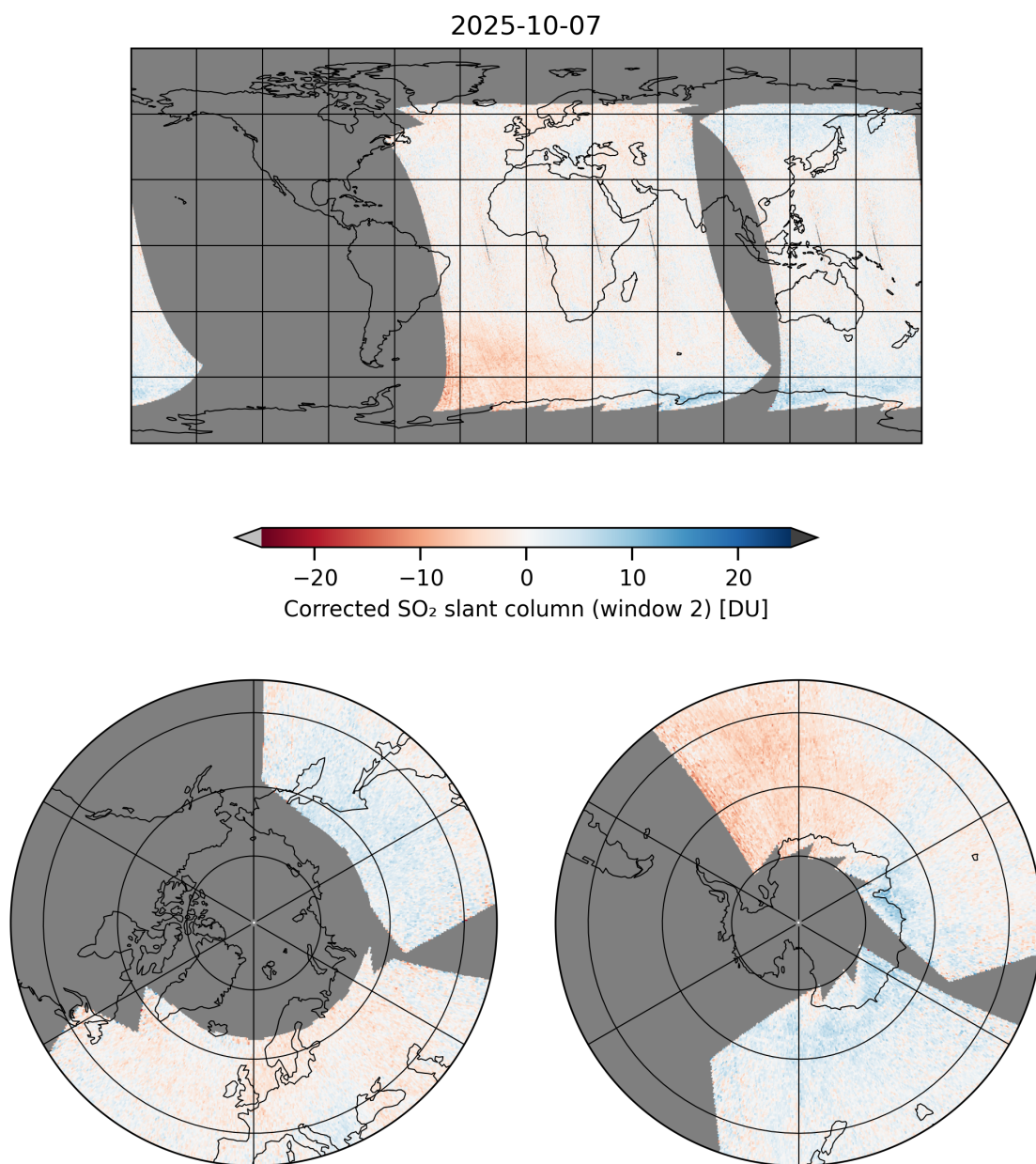


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-10-07 to 2025-10-07

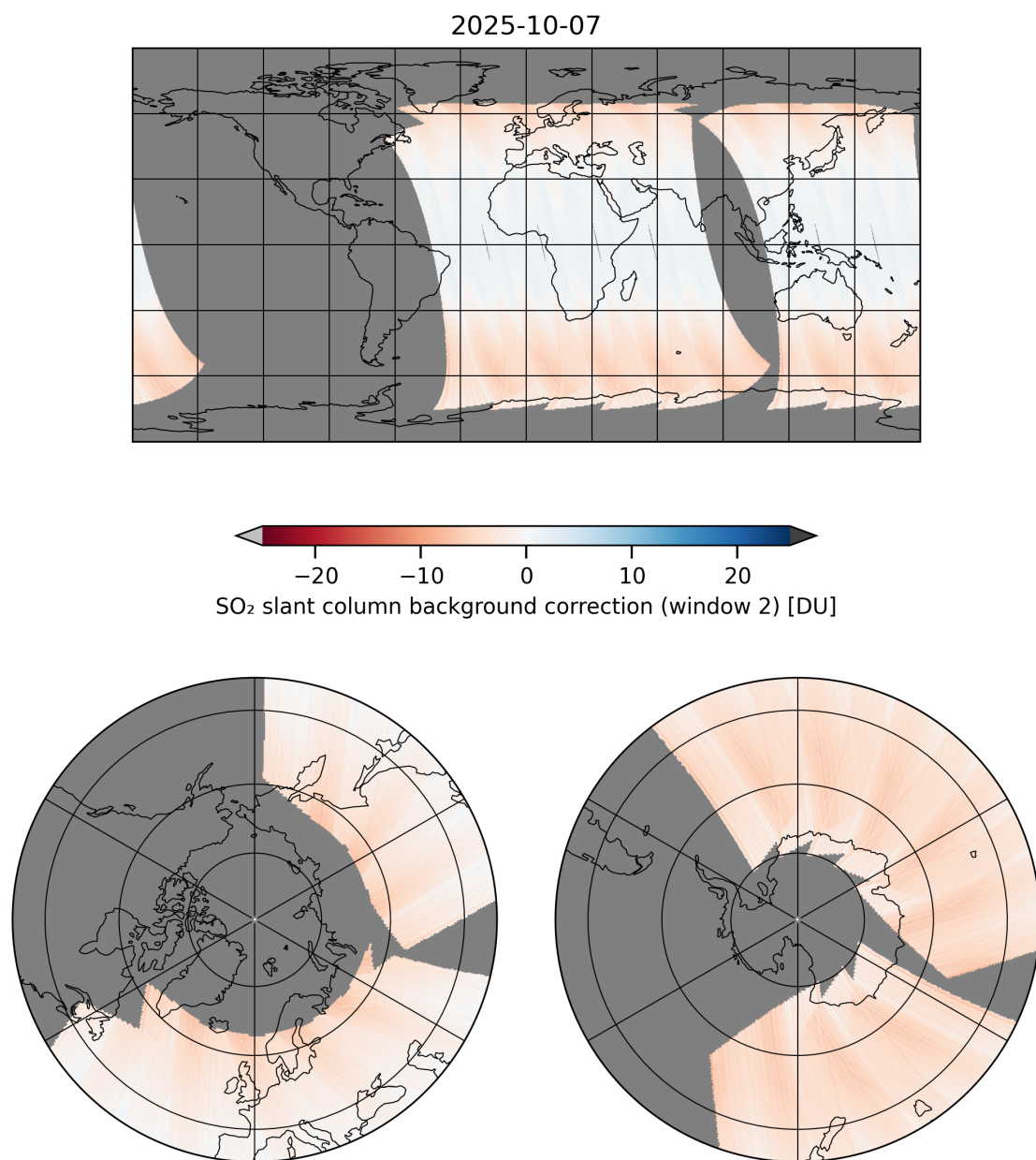


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-10-07 to 2025-10-07

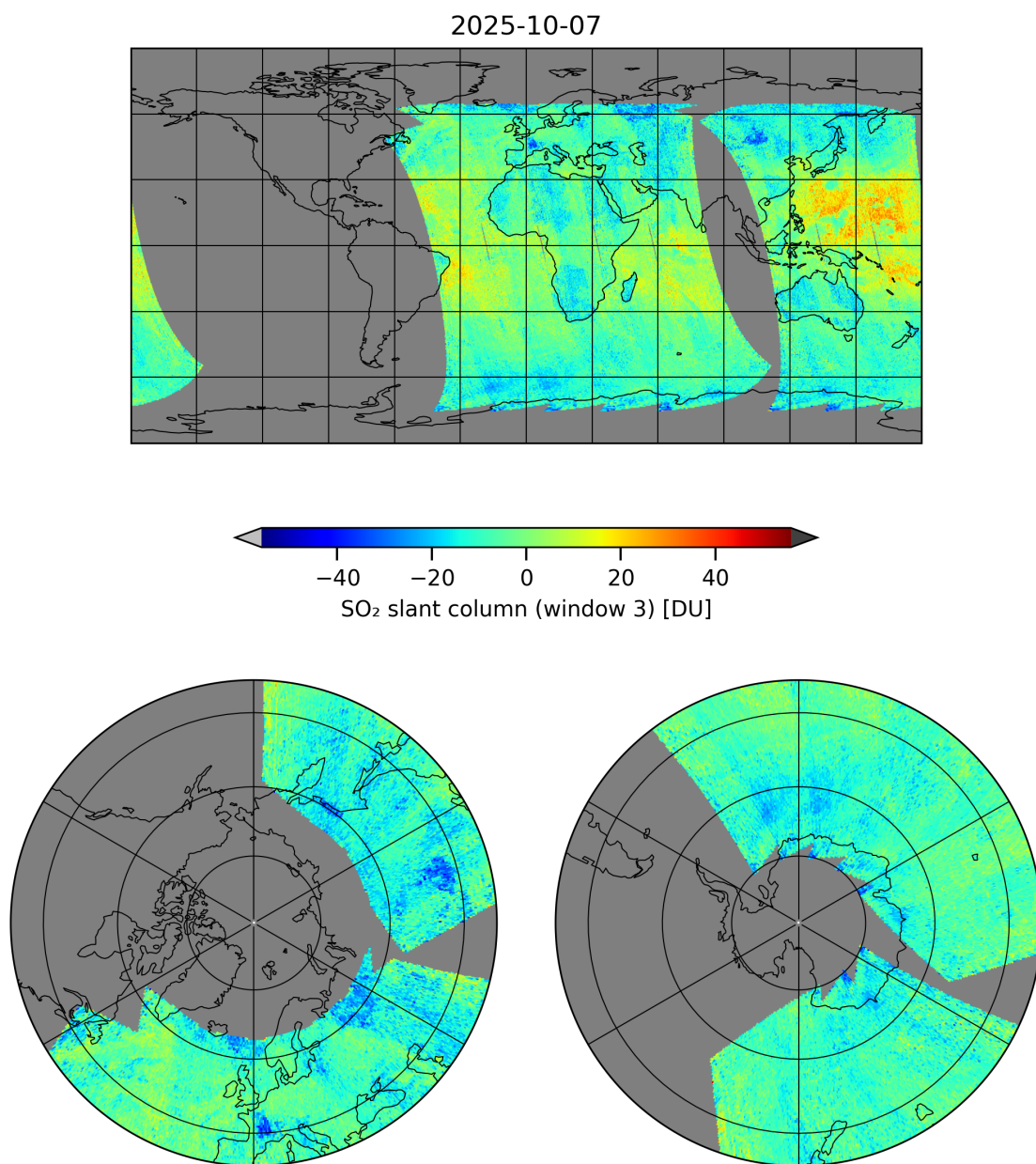


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-10-07 to 2025-10-07

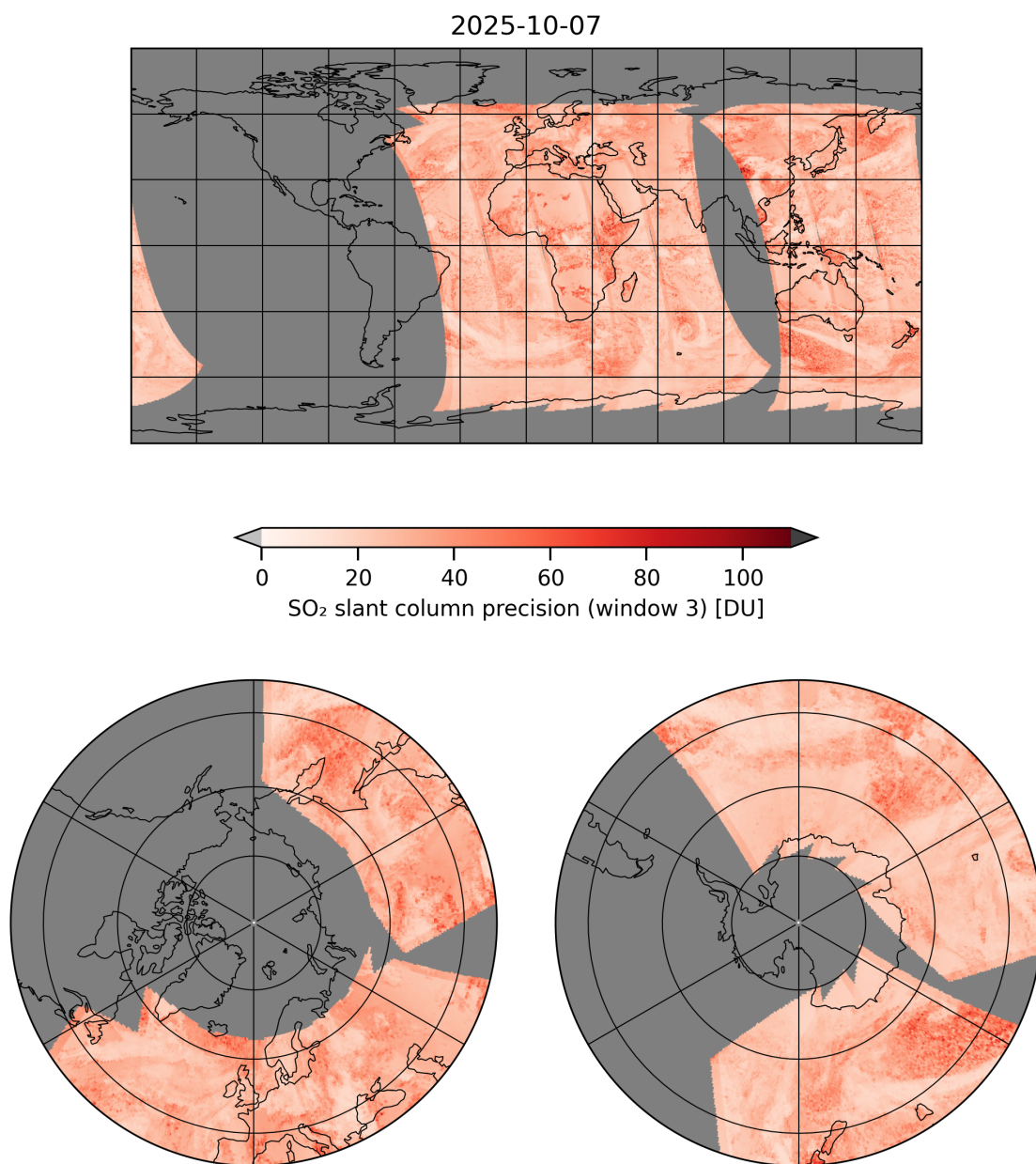


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-10-07 to 2025-10-07

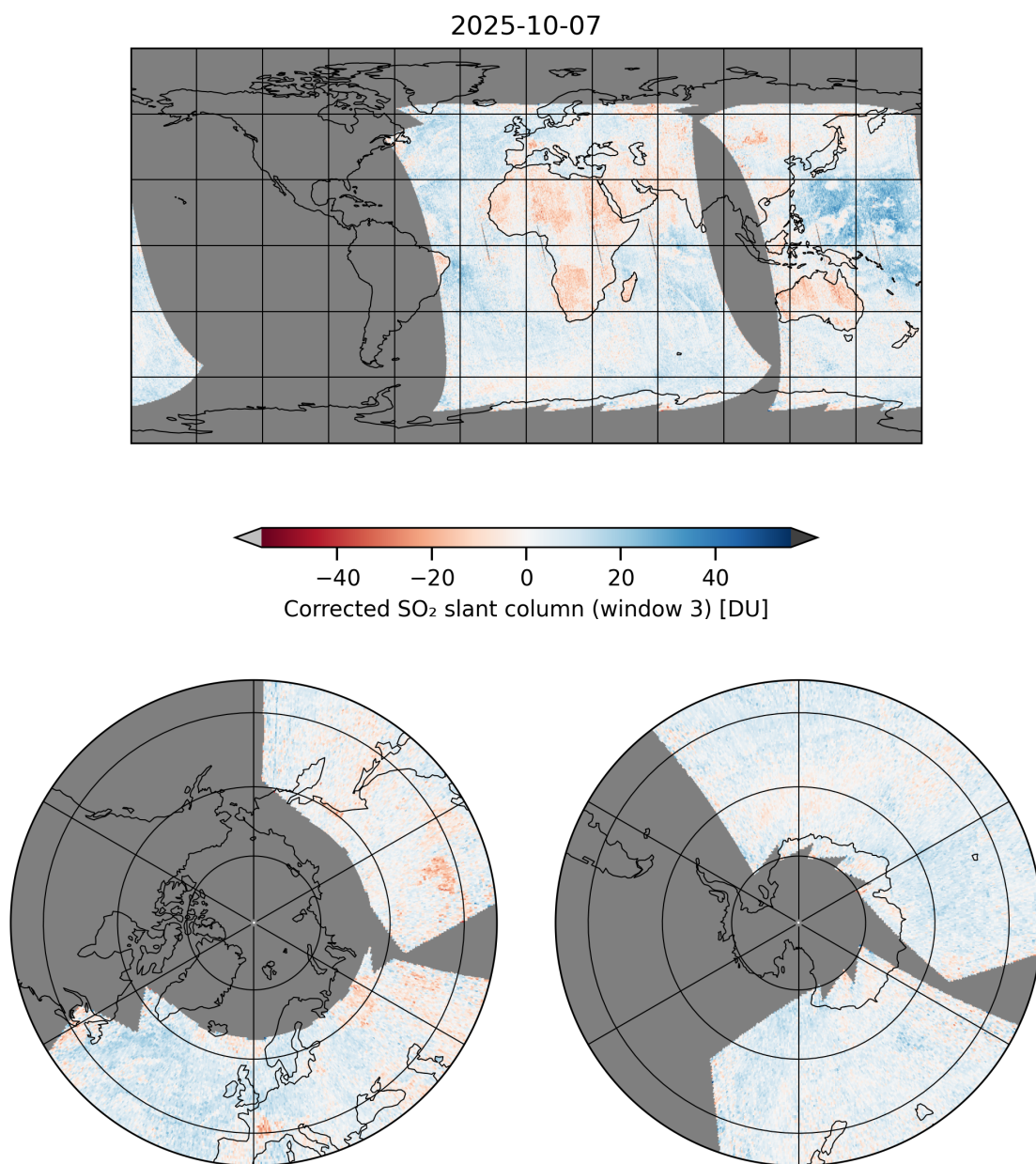


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-10-07 to 2025-10-07

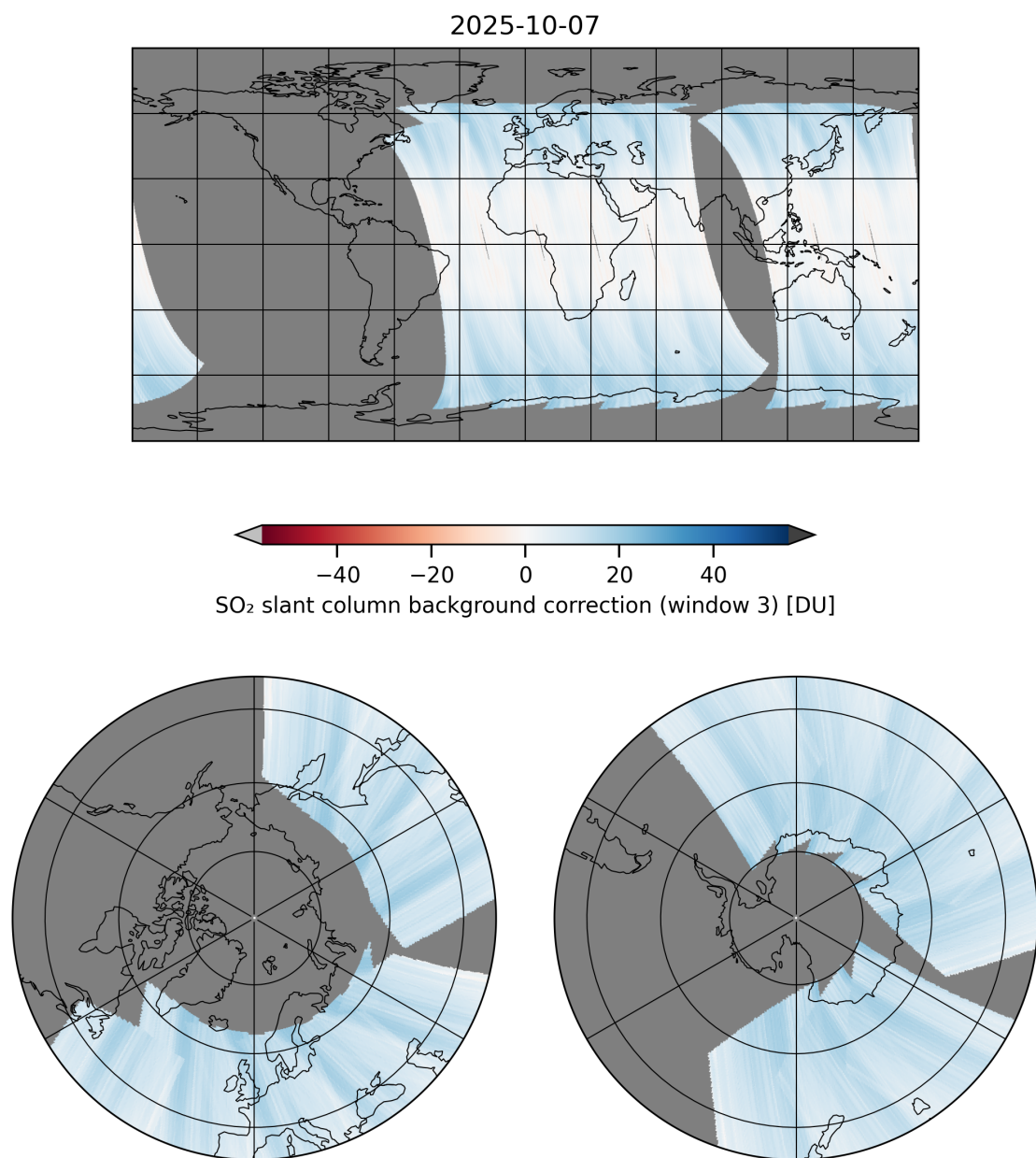


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-10-07 to 2025-10-07

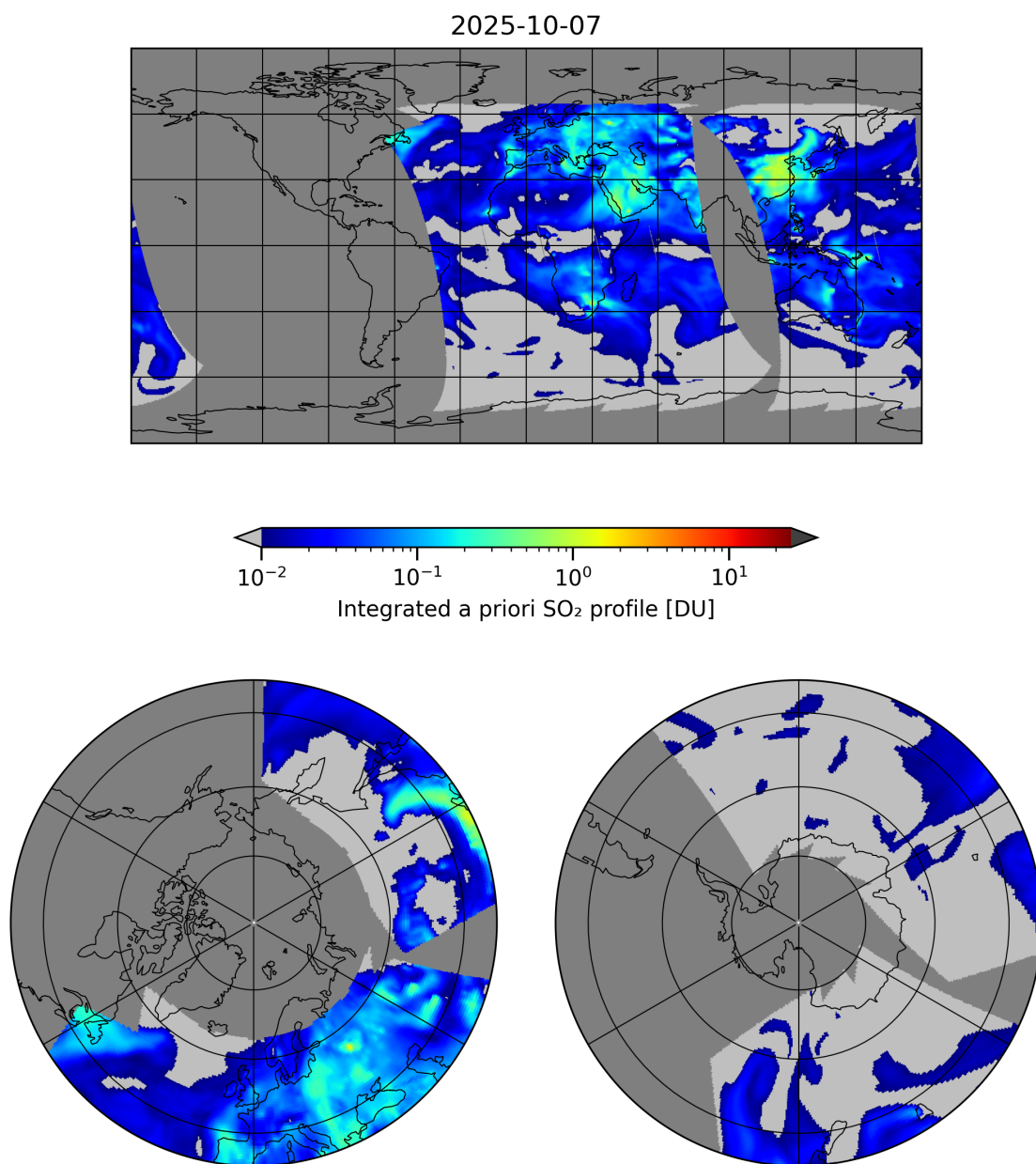


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-10-07 to 2025-10-07

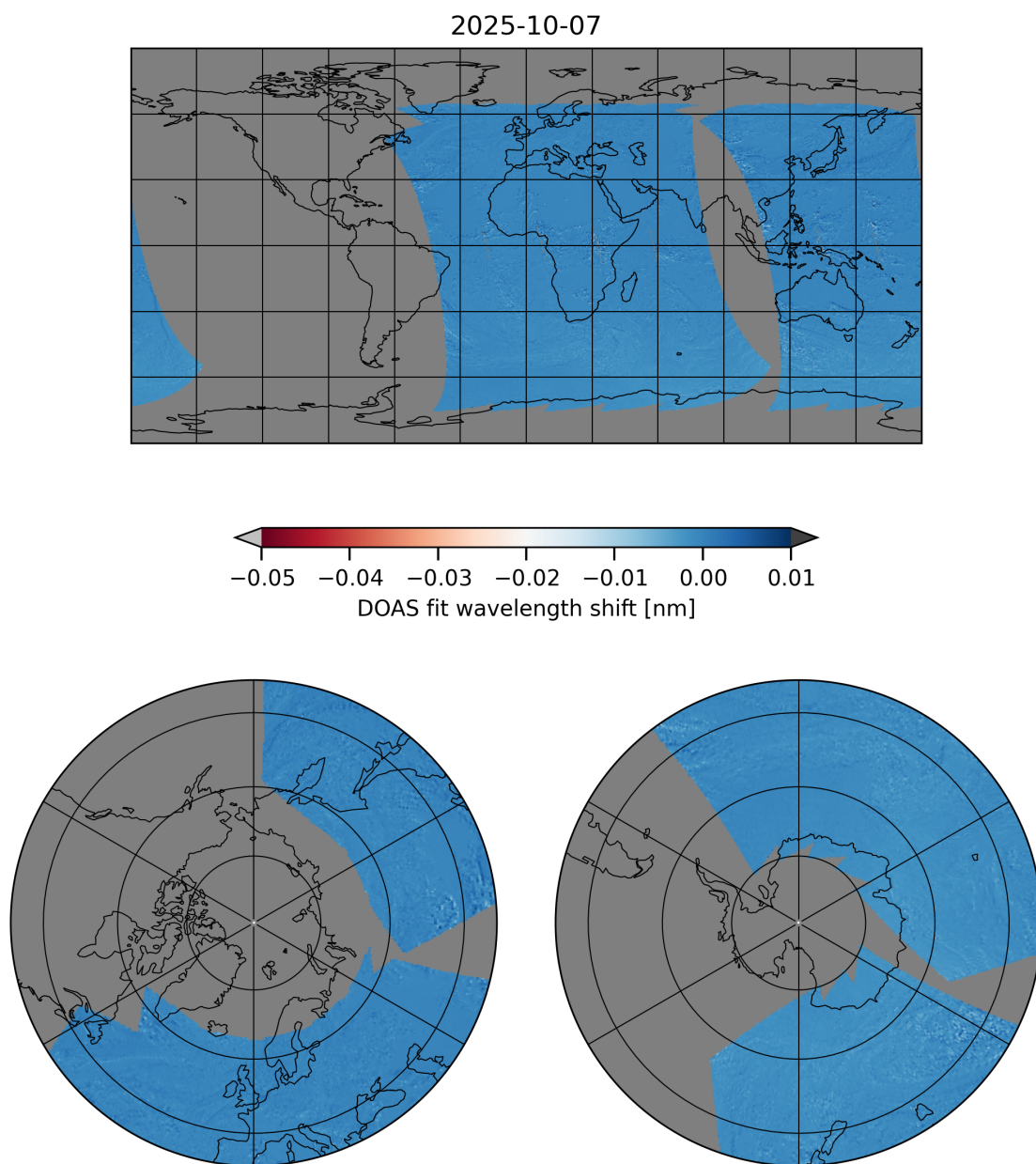


Figure 22: Map of “DOAS fit wavelength shift” for 2025-10-07 to 2025-10-07

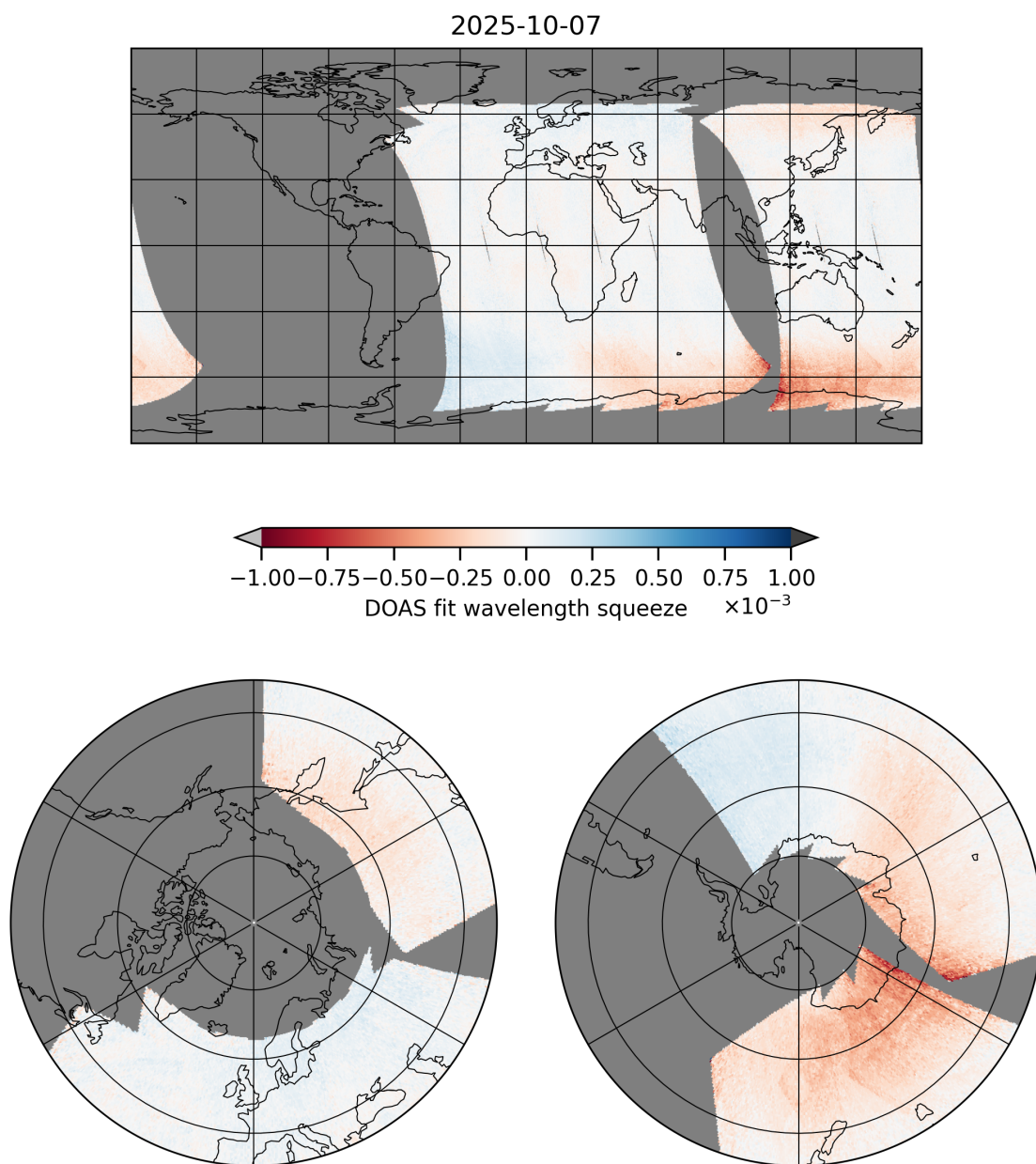


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-10-07 to 2025-10-07

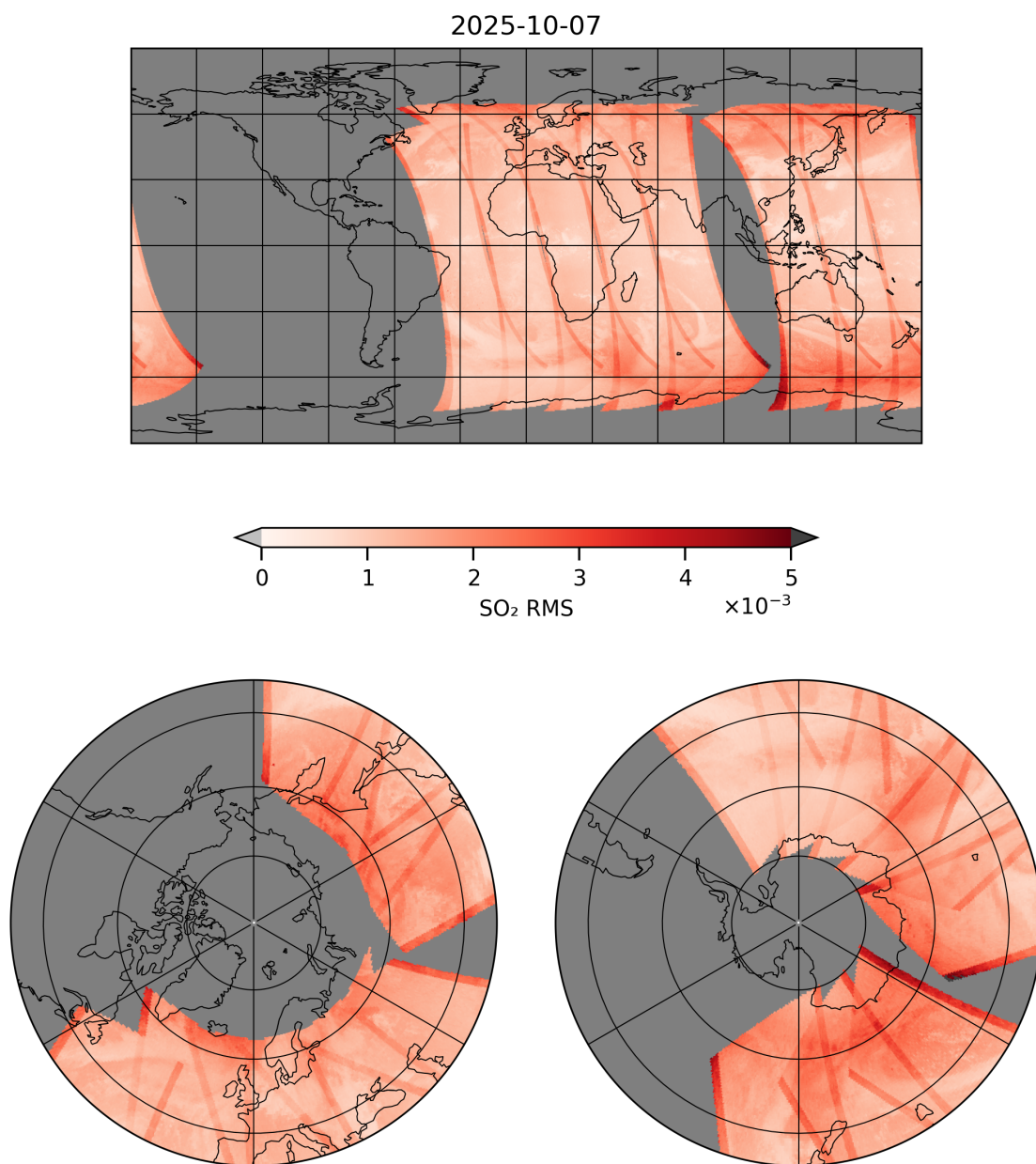


Figure 24: Map of “SO₂ RMS” for 2025-10-07 to 2025-10-07

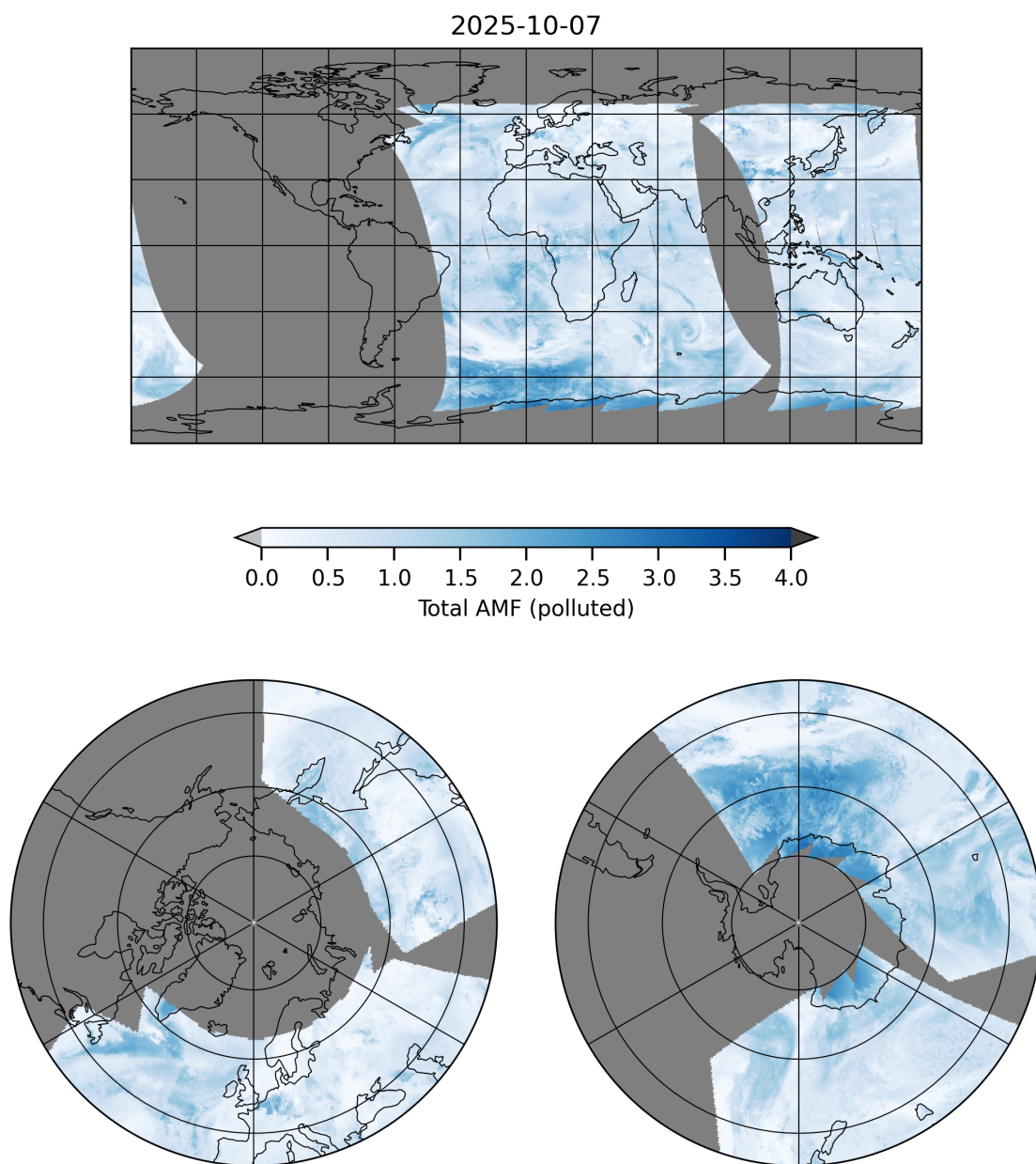


Figure 25: Map of “Total AMF (polluted)” for 2025-10-07 to 2025-10-07

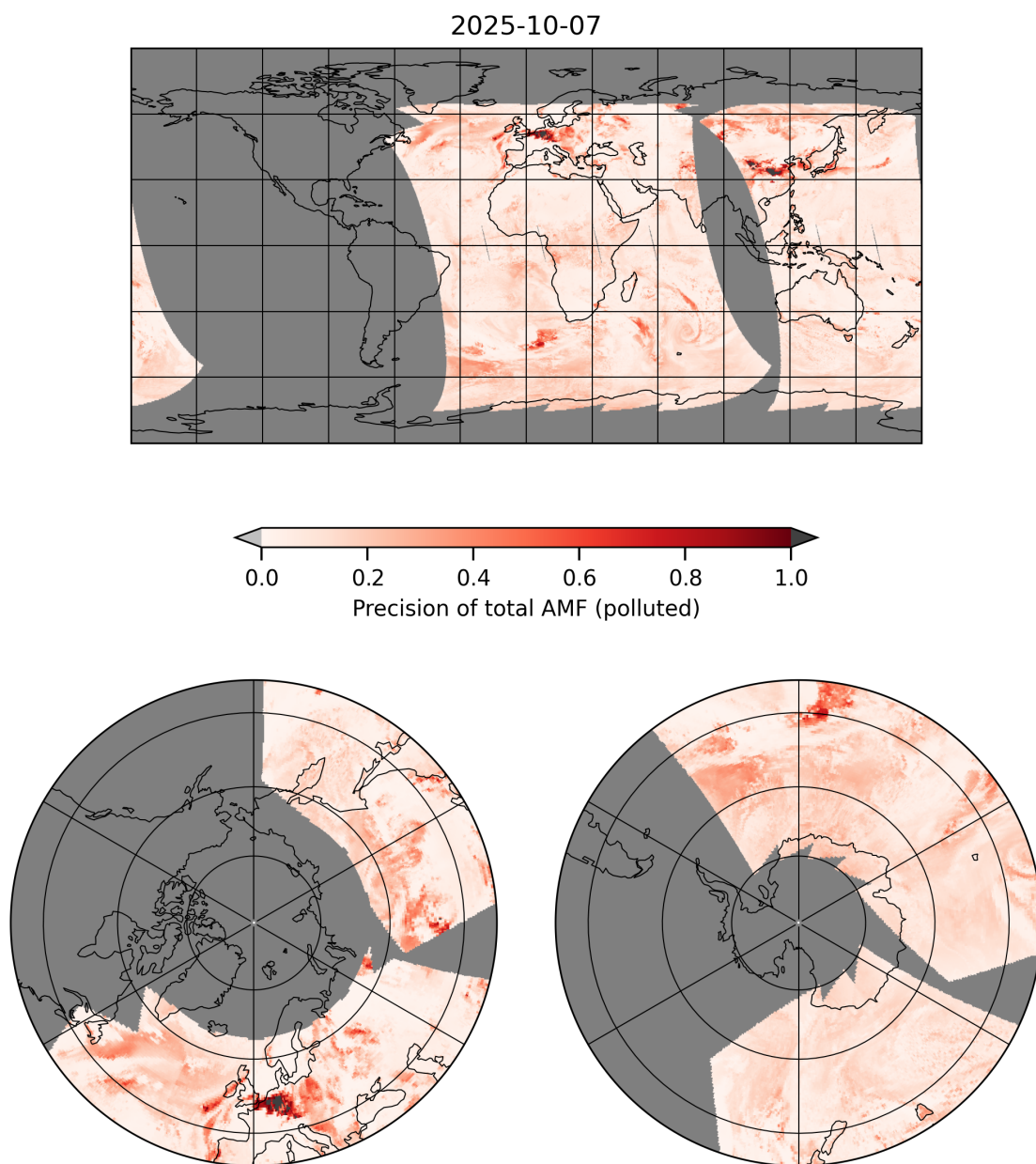


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-10-07 to 2025-10-07

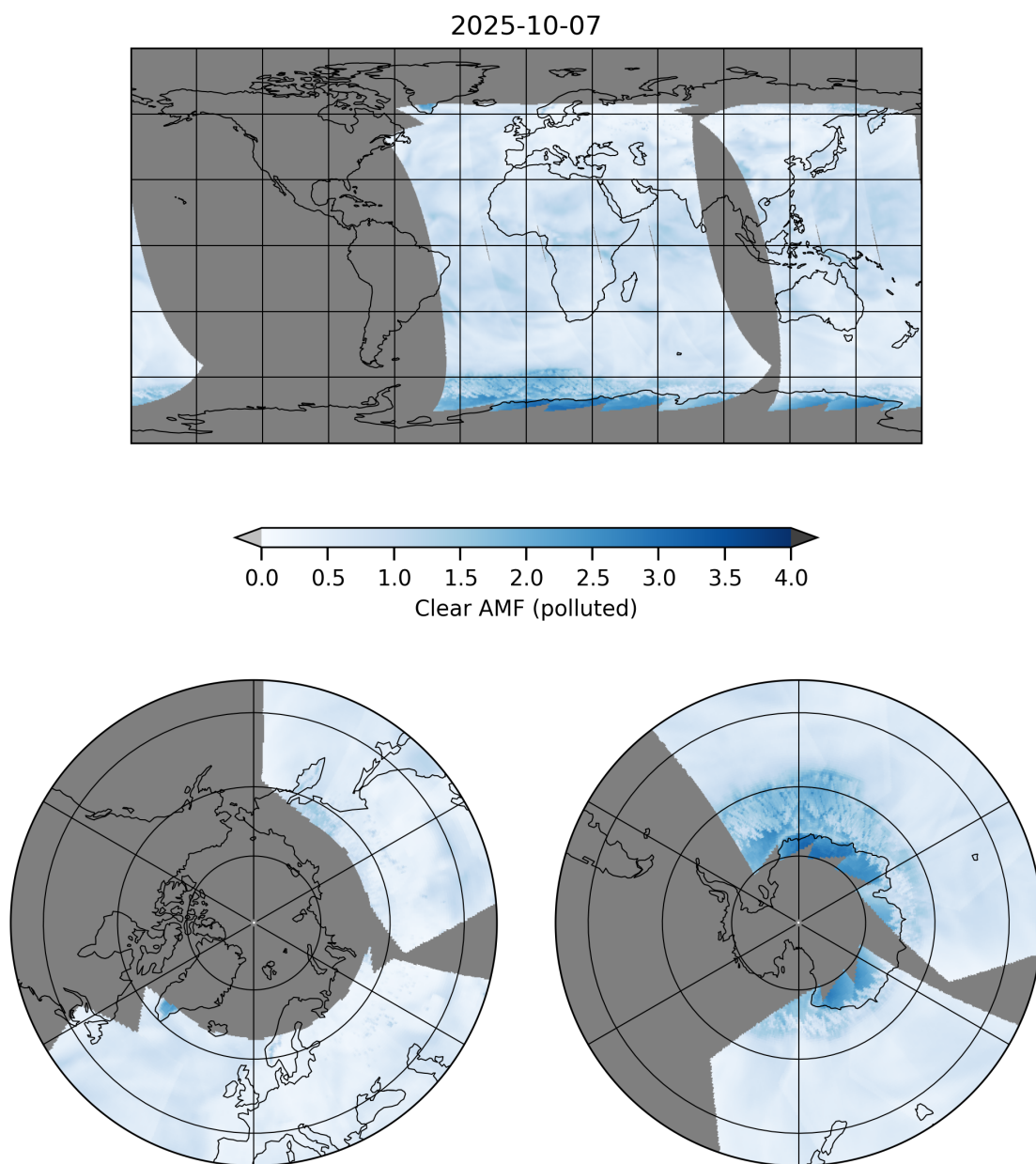


Figure 27: Map of “Clear AMF (polluted)” for 2025-10-07 to 2025-10-07

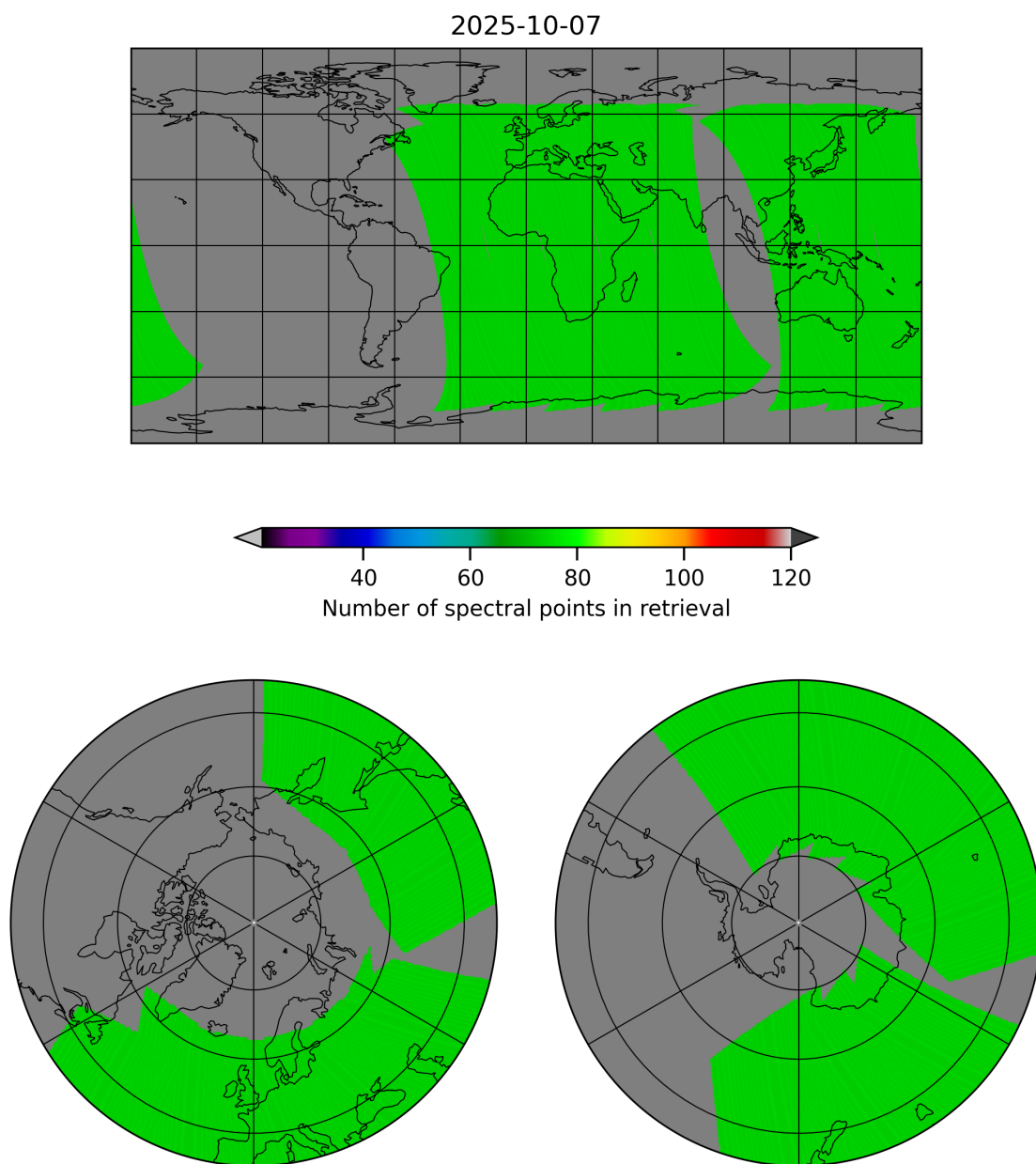


Figure 28: Map of “Number of spectral points in retrieval” for 2025-10-07 to 2025-10-07

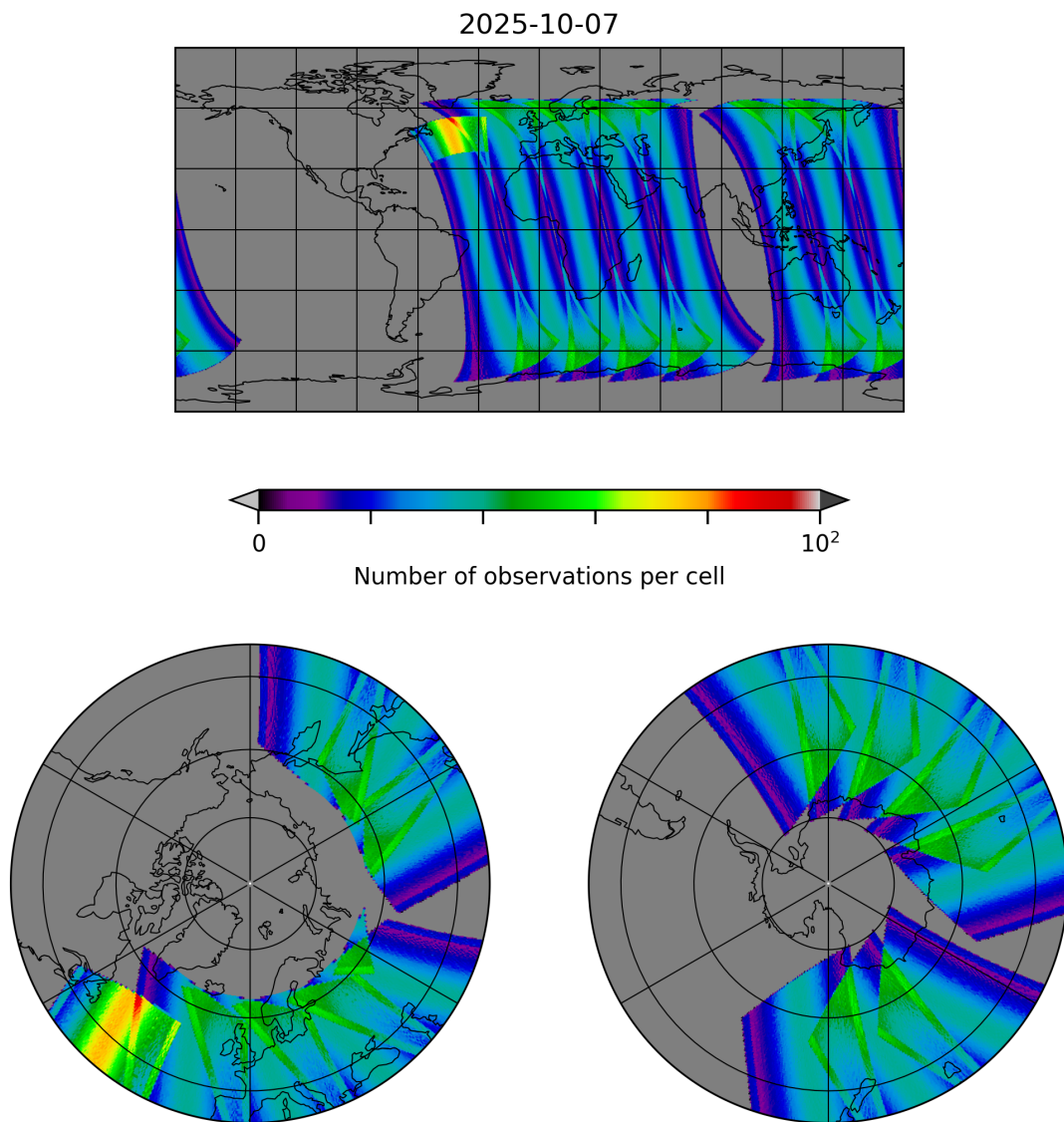


Figure 29: Map of the number of observations for 2025-10-07 to 2025-10-07

7 Zonal average

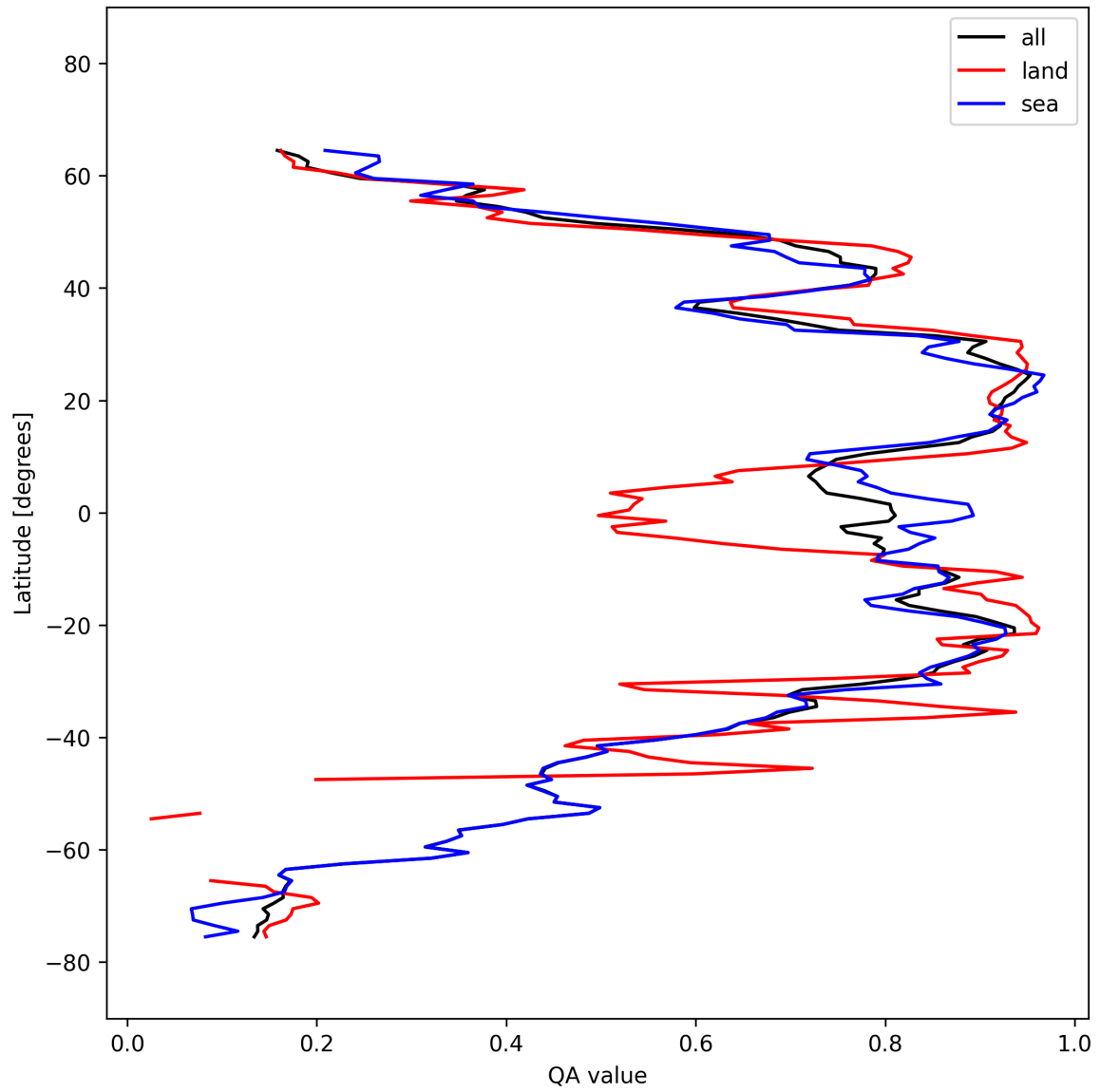


Figure 30: Zonal average of “QA value” for 2025-10-07 to 2025-10-07.

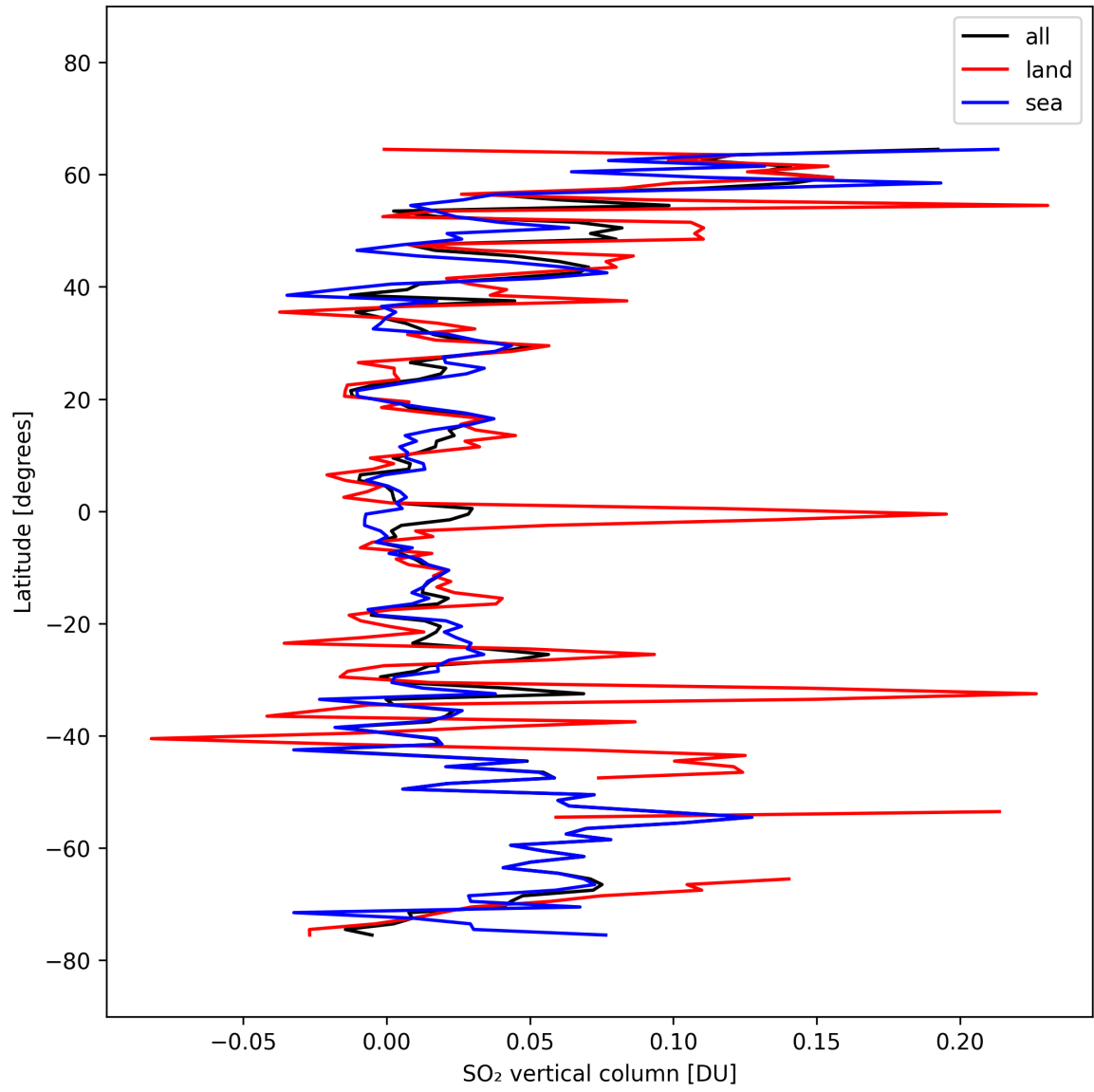


Figure 31: Zonal average of “SO₂ vertical column” for 2025-10-07 to 2025-10-07.

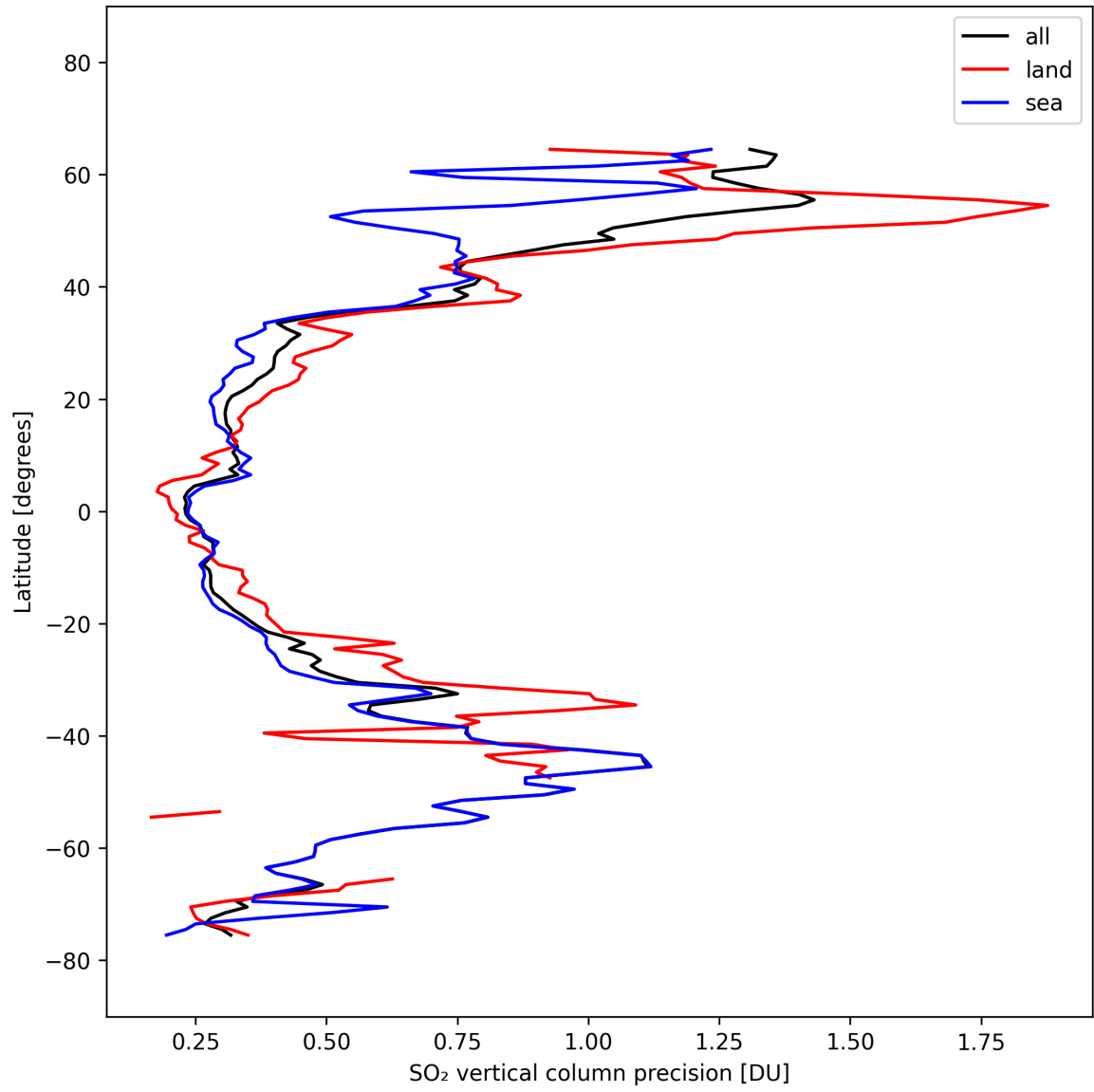


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-10-07 to 2025-10-07.

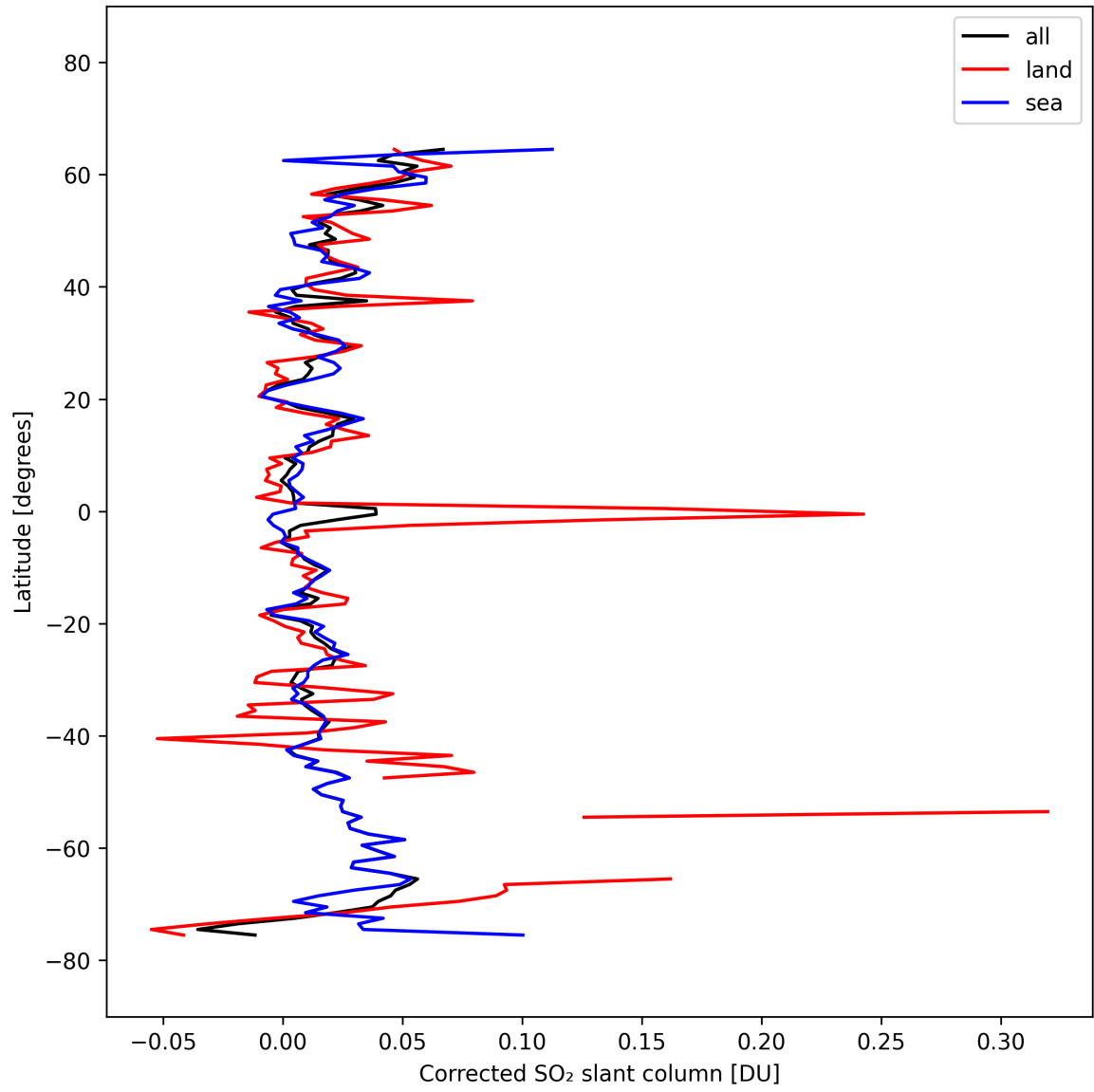


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-10-07 to 2025-10-07.

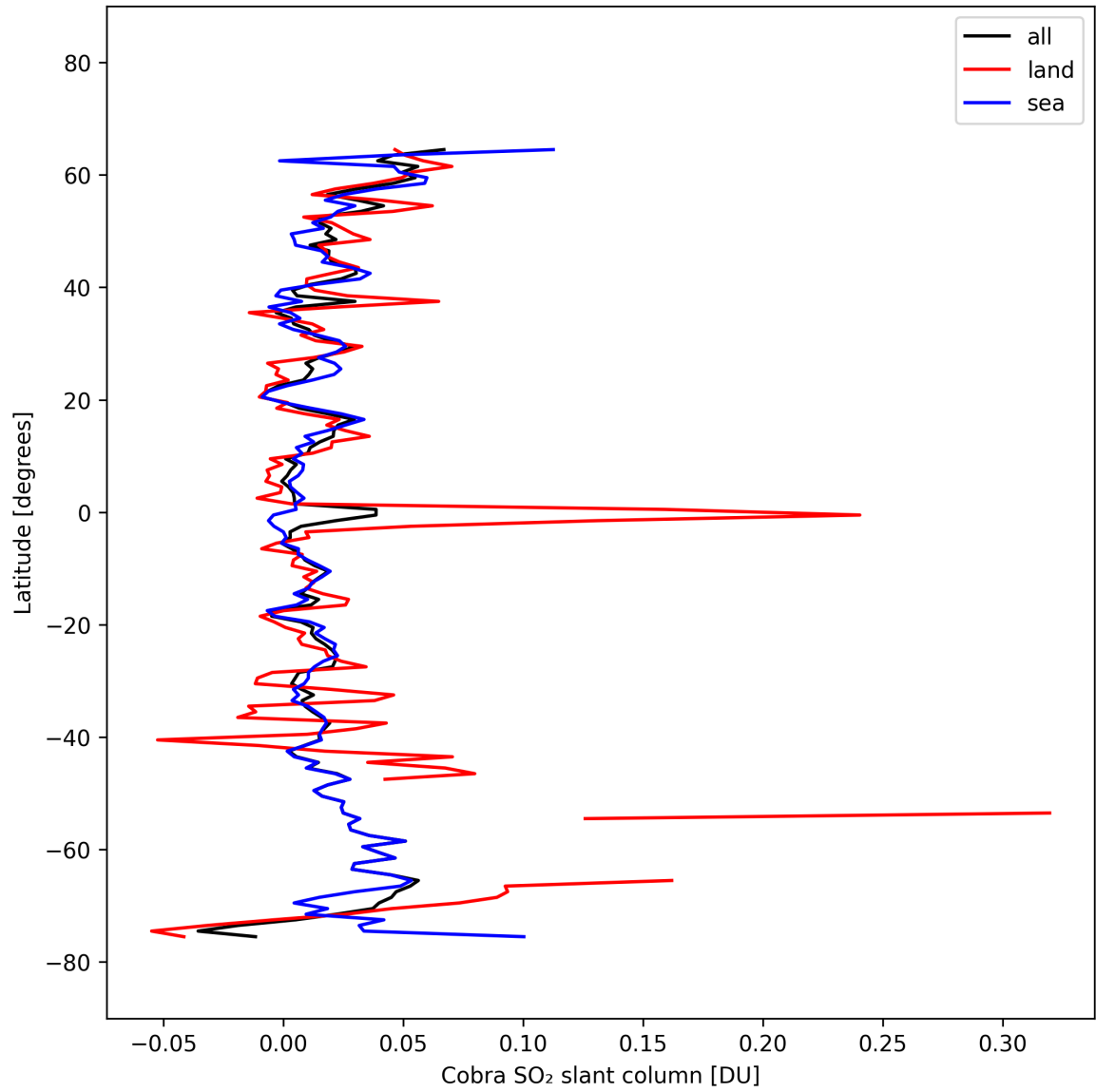


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-10-07 to 2025-10-07.

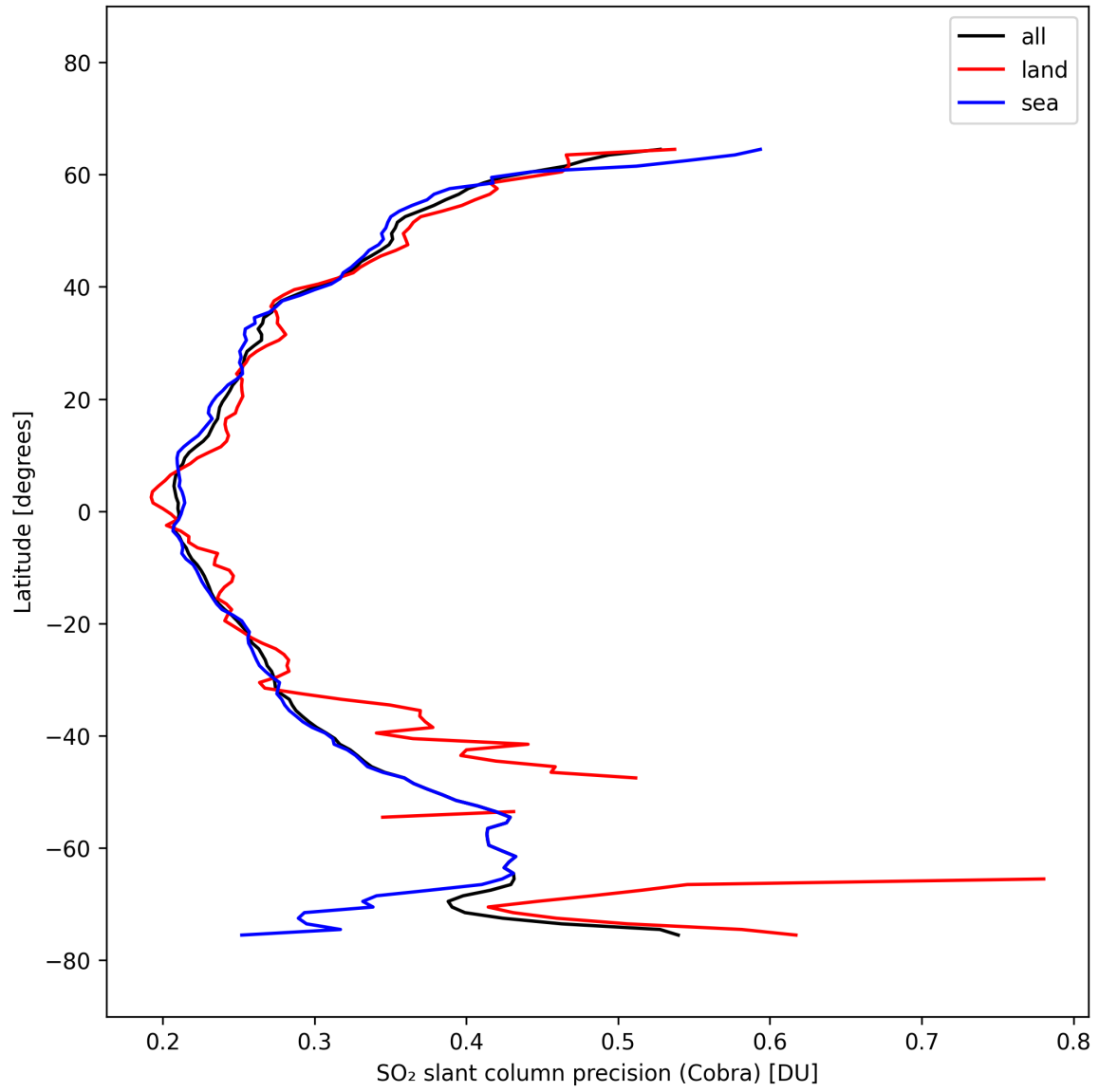


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-10-07 to 2025-10-07.

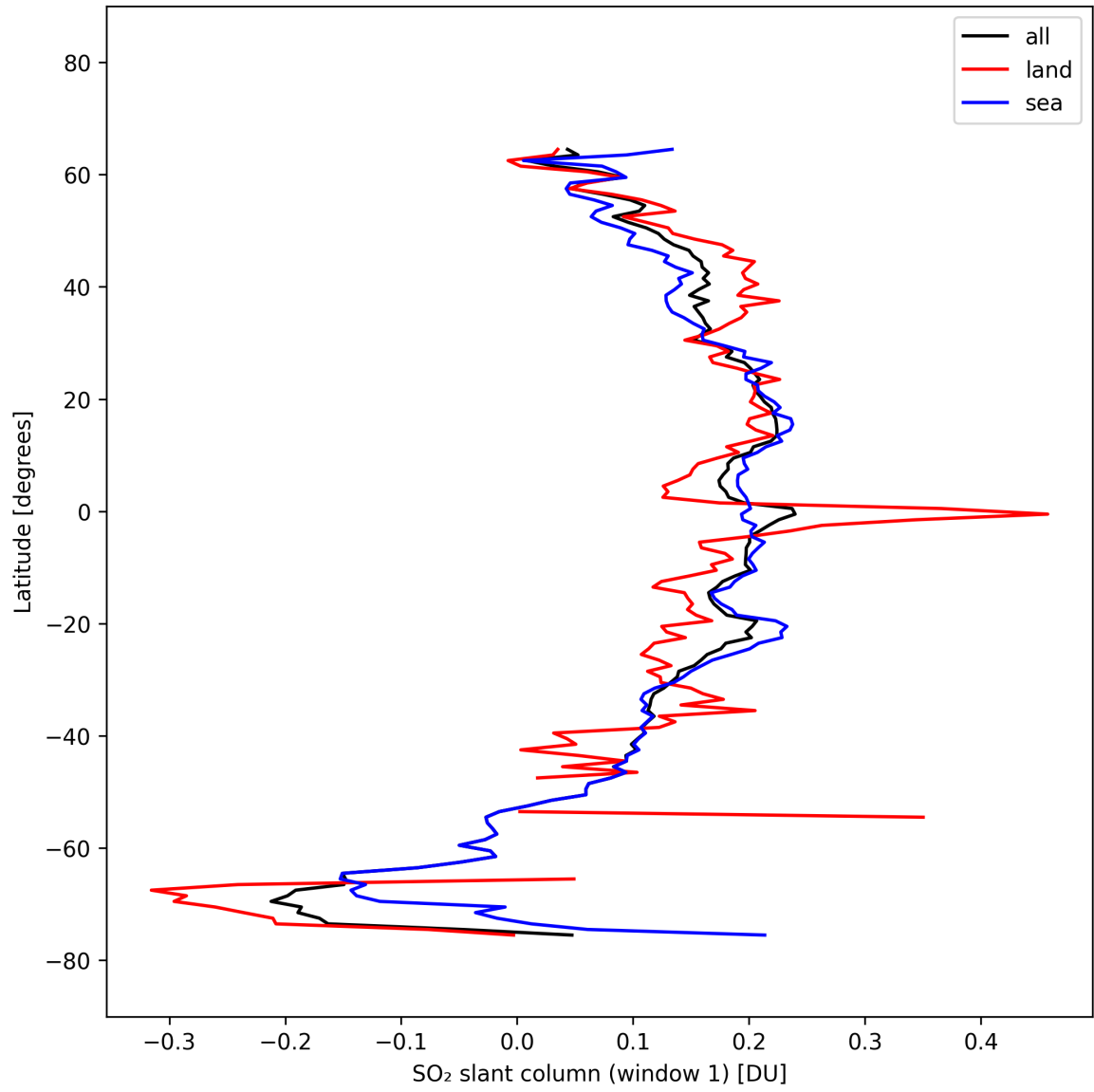


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-10-07 to 2025-10-07.

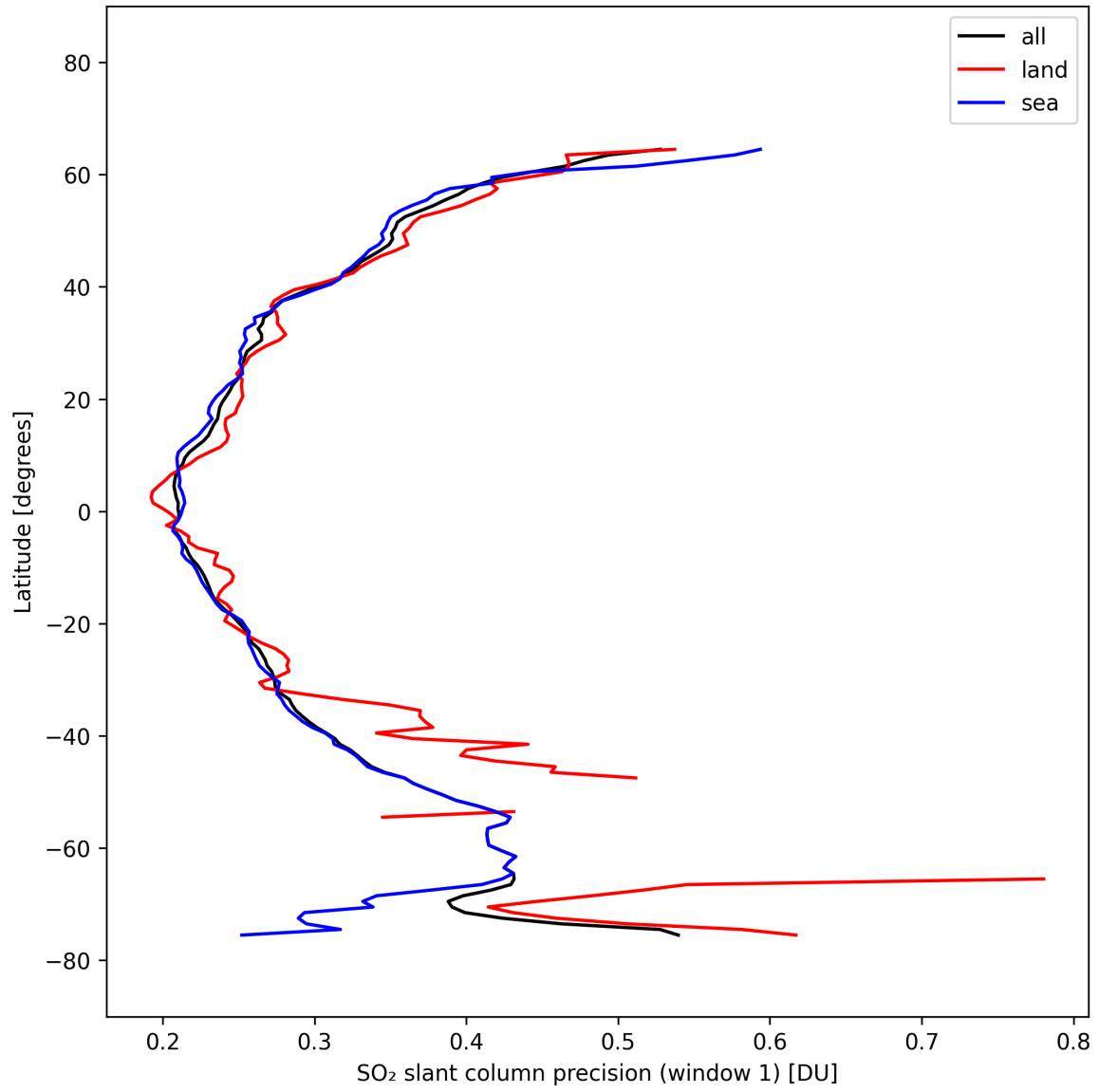


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-10-07 to 2025-10-07.

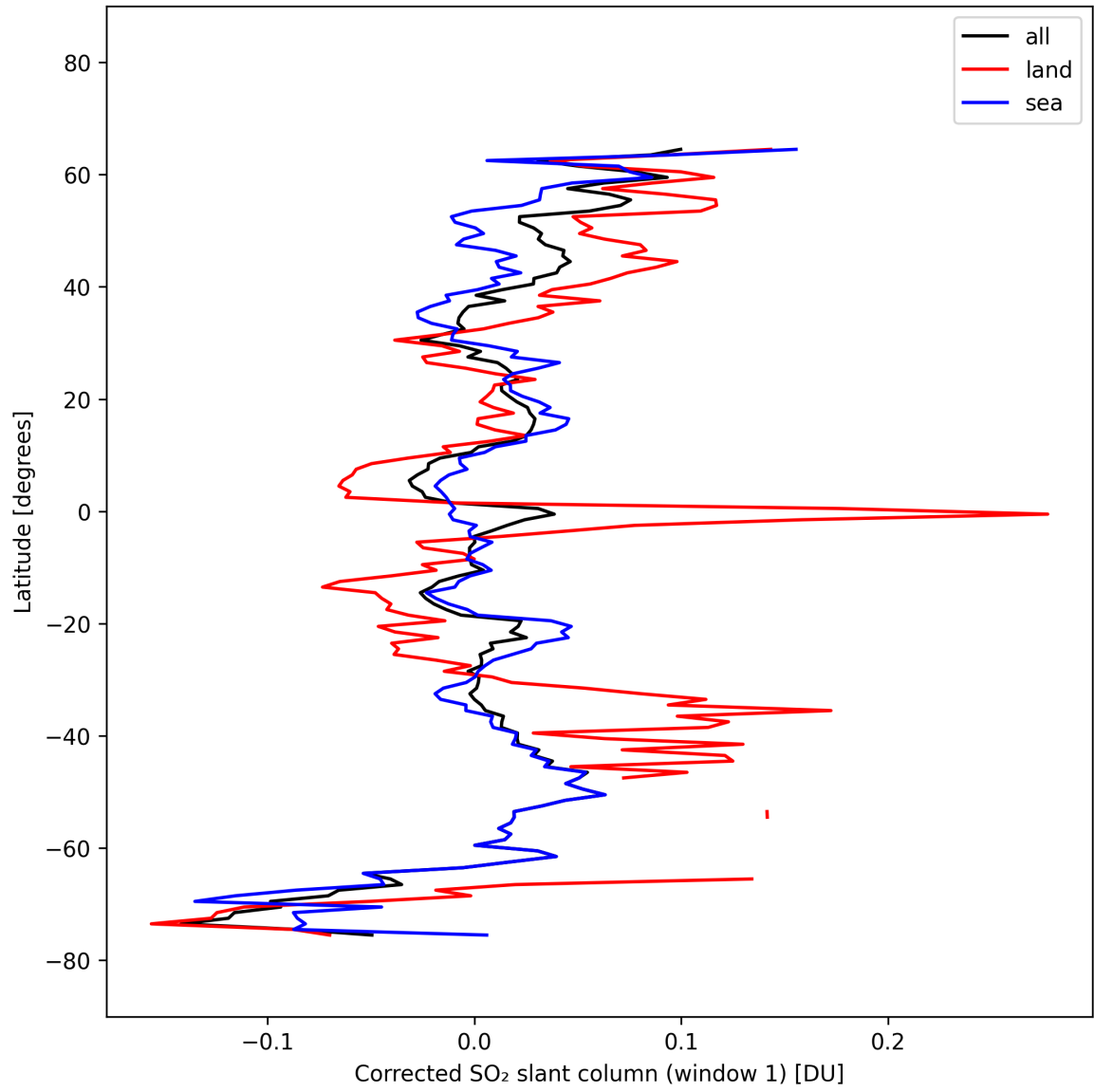


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-10-07 to 2025-10-07.

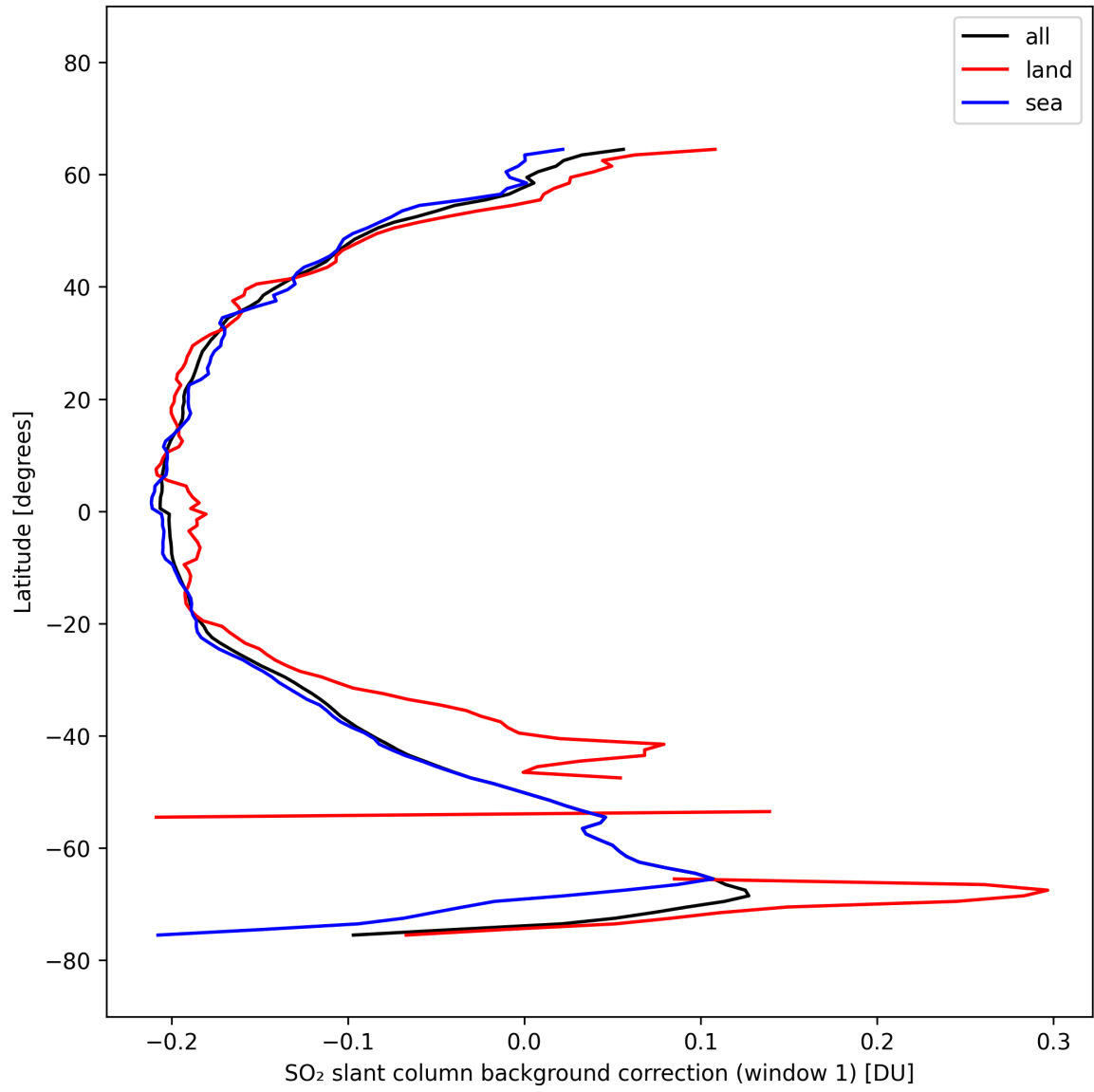


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-10-07 to 2025-10-07.

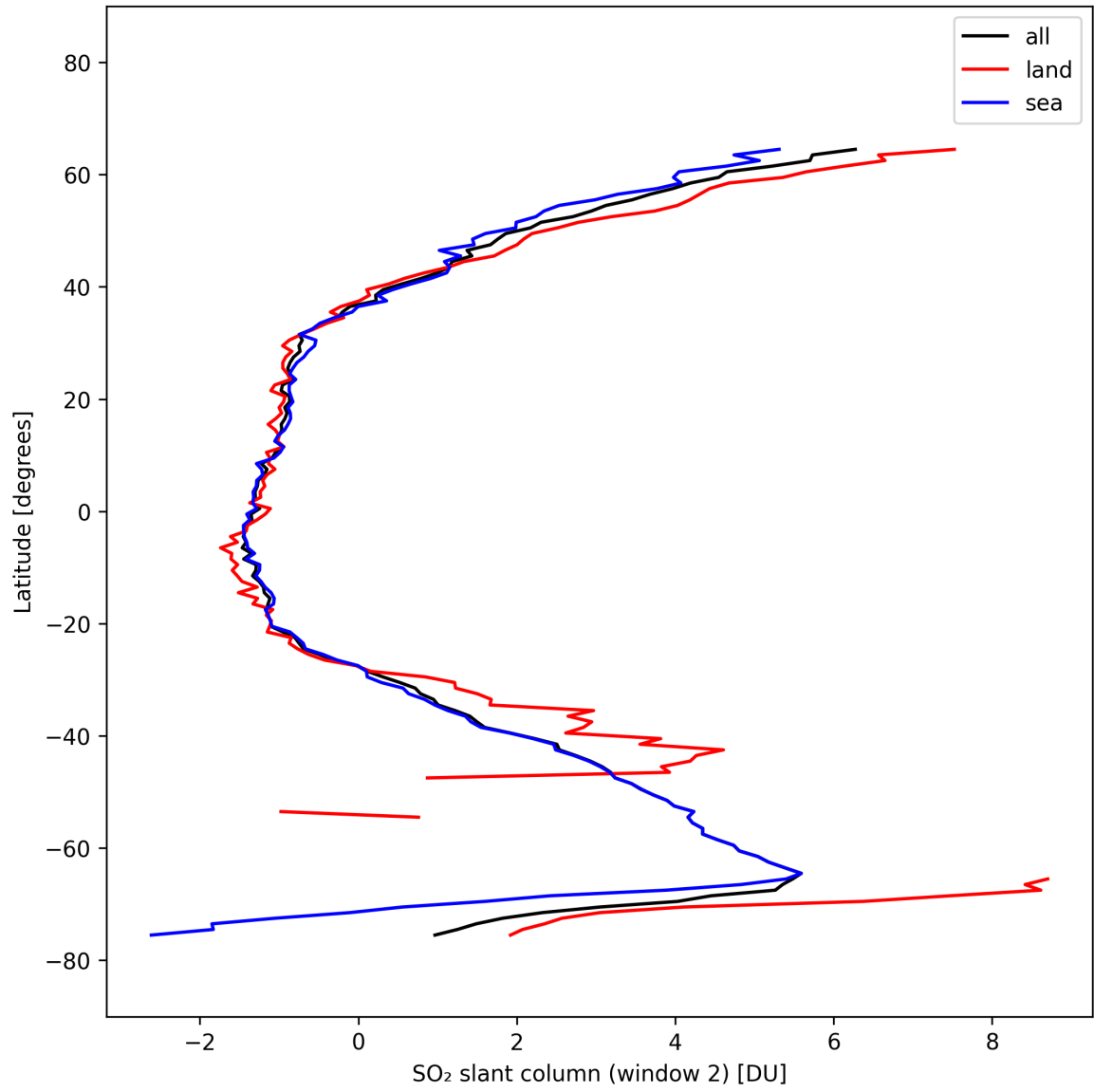


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-10-07 to 2025-10-07.

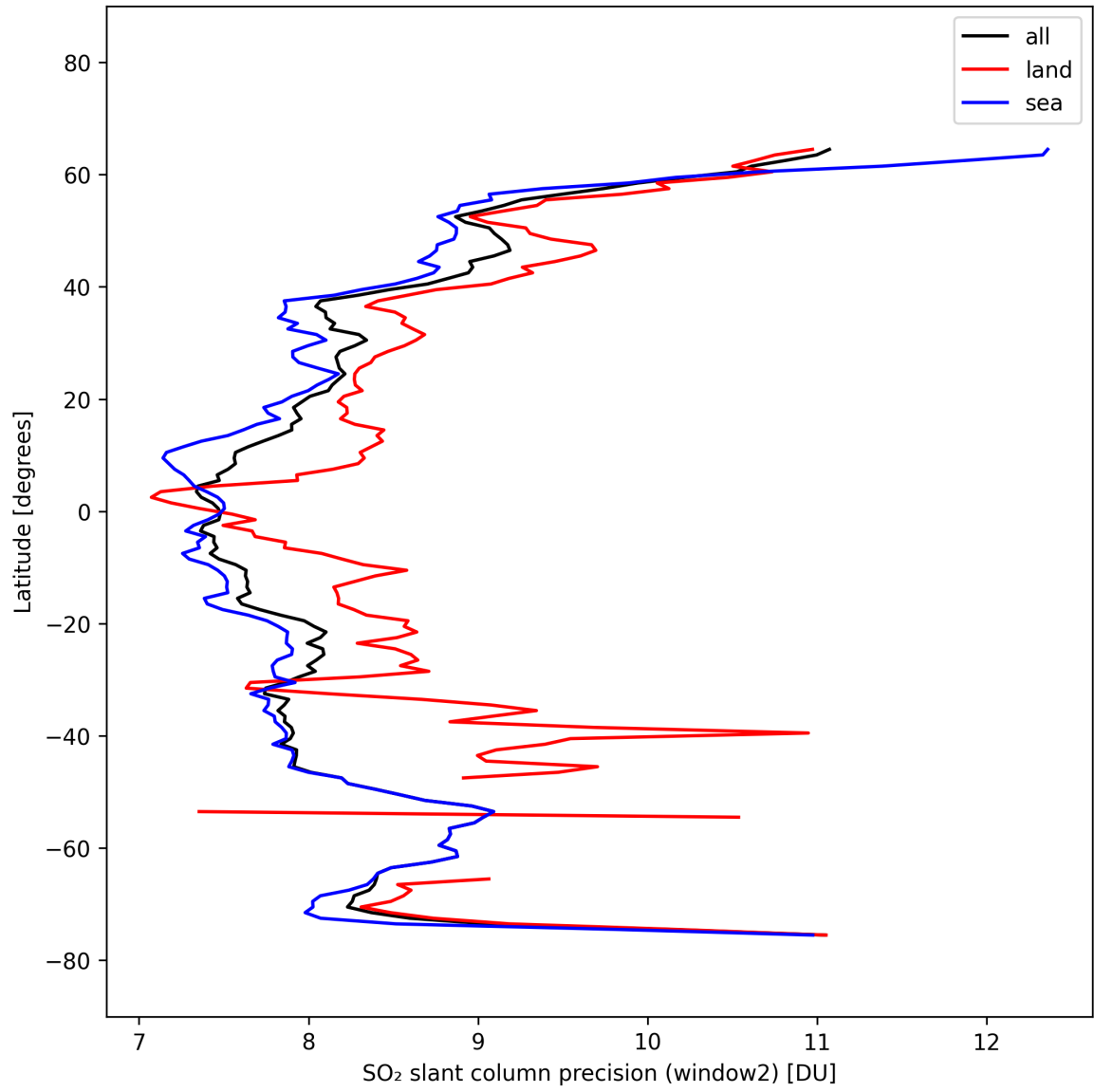


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-10-07 to 2025-10-07.

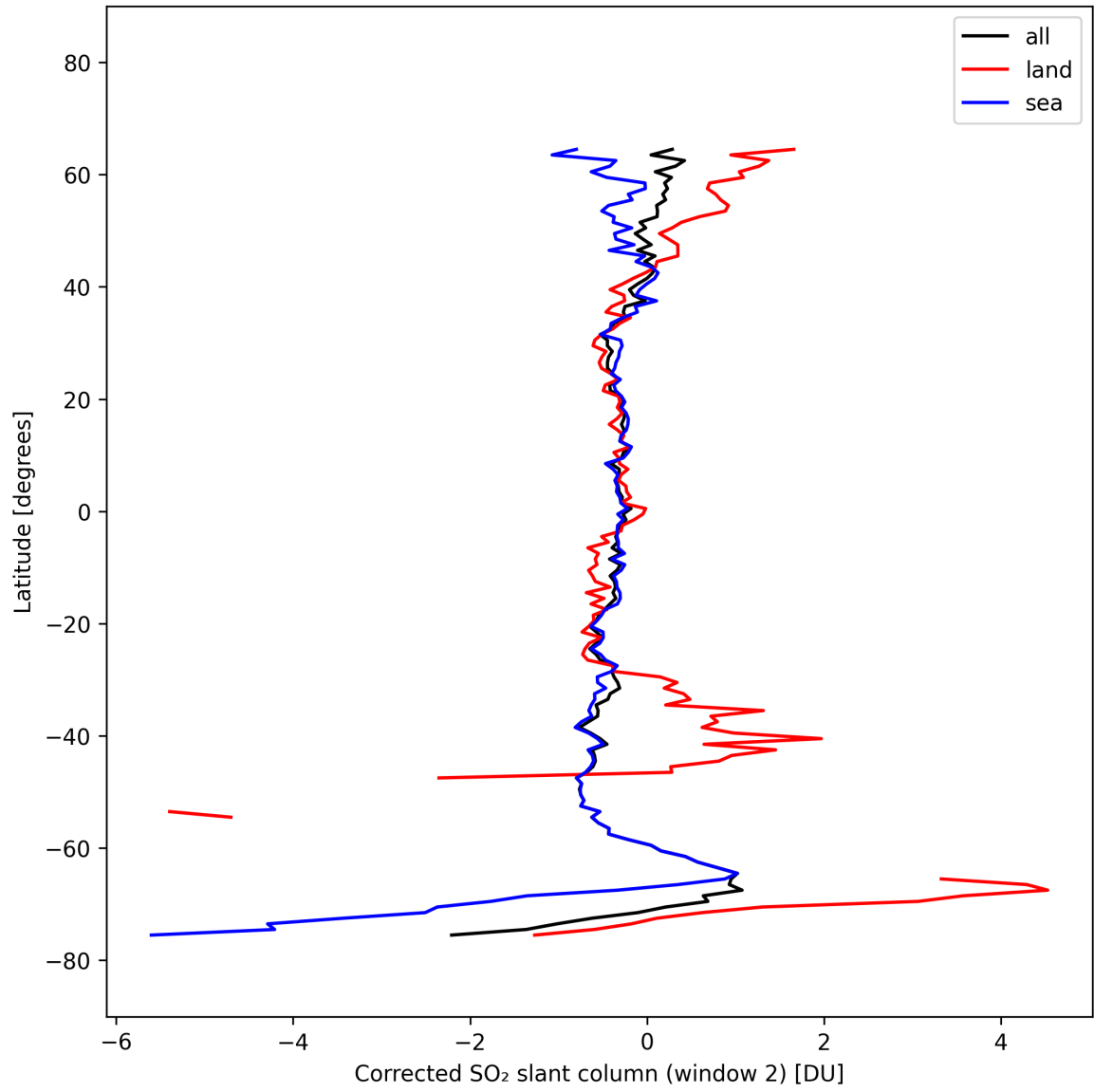


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-10-07 to 2025-10-07.

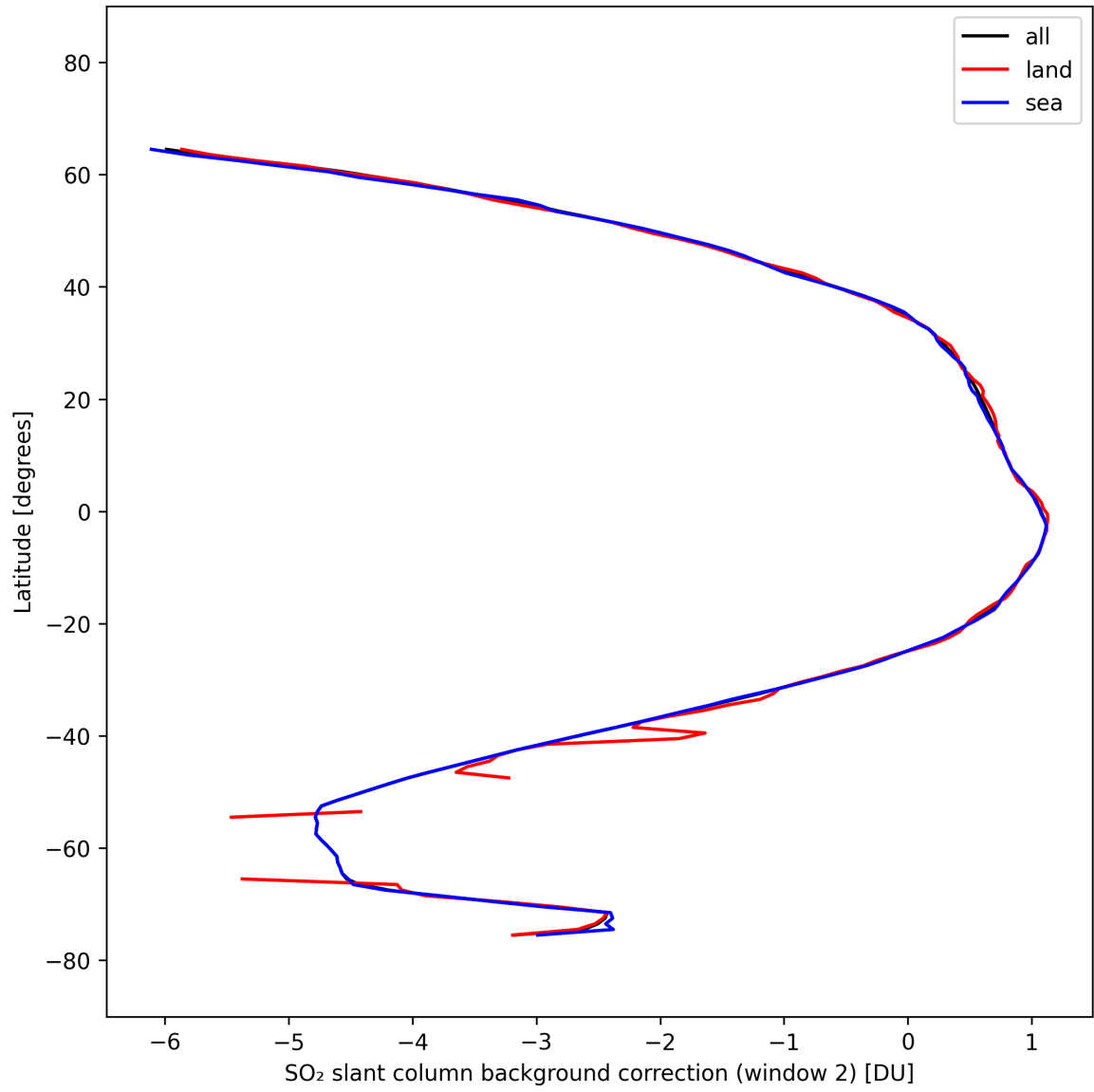


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-10-07 to 2025-10-07.

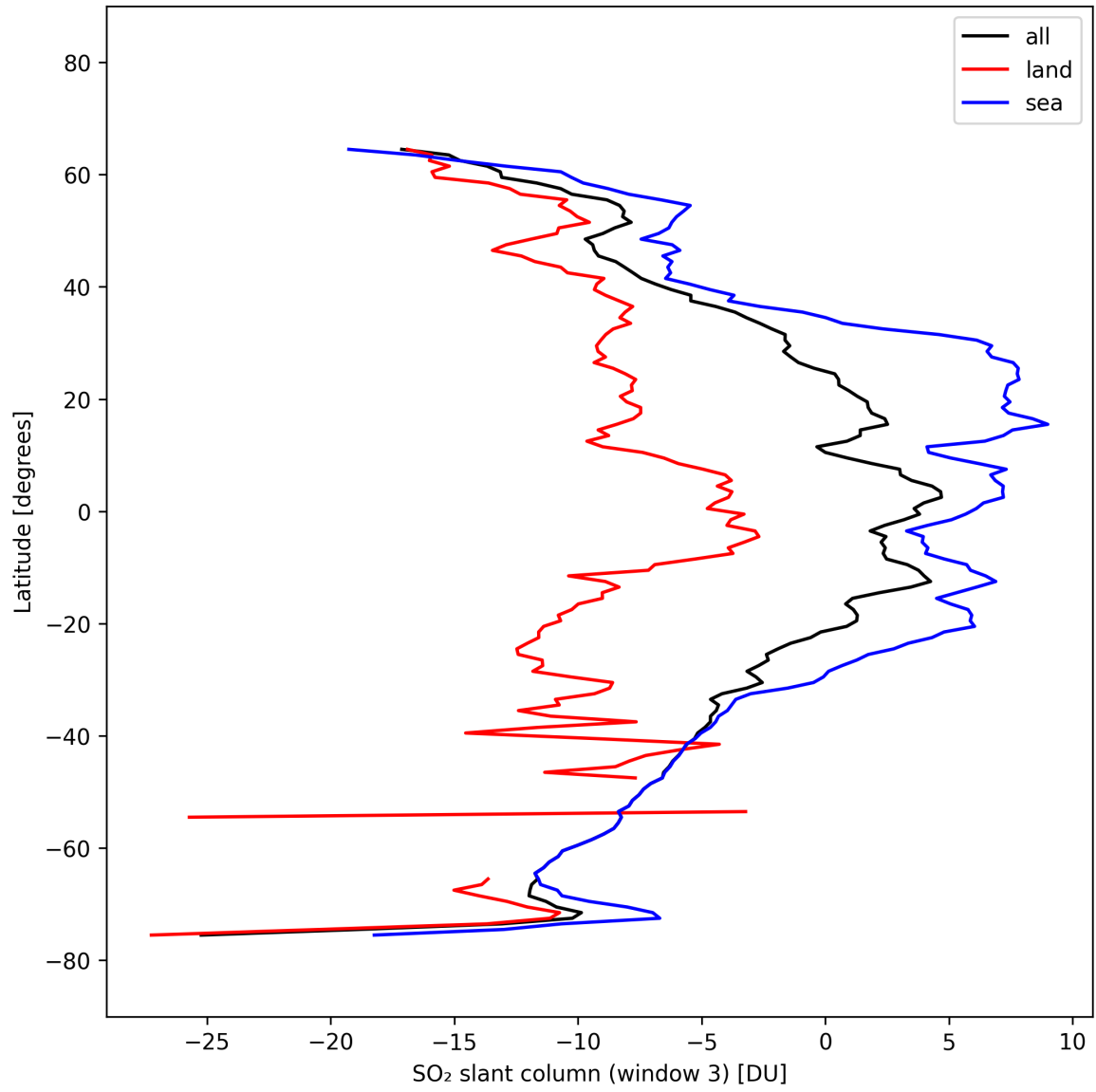


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-10-07 to 2025-10-07.

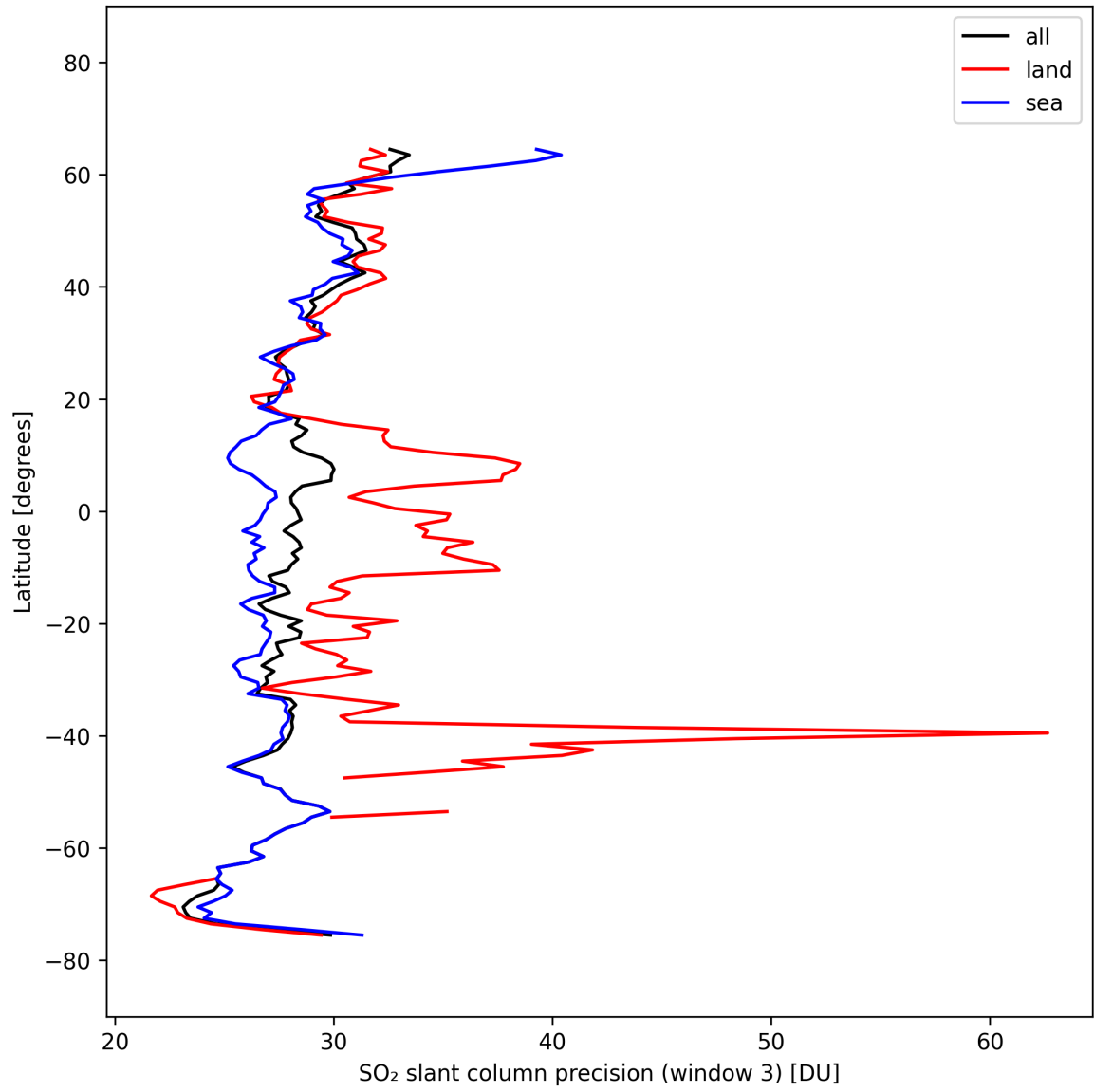


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-10-07 to 2025-10-07.

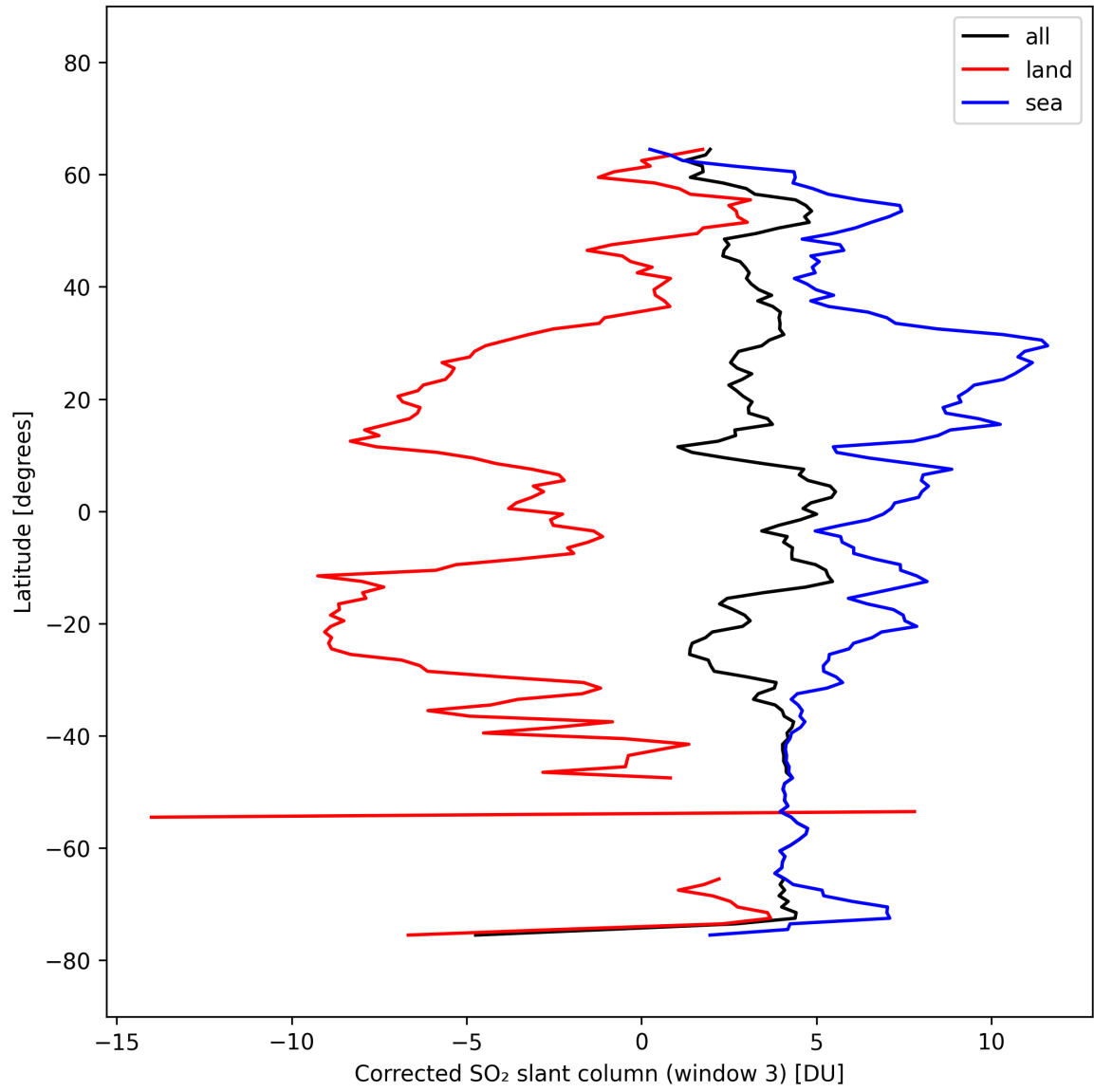


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-10-07 to 2025-10-07.

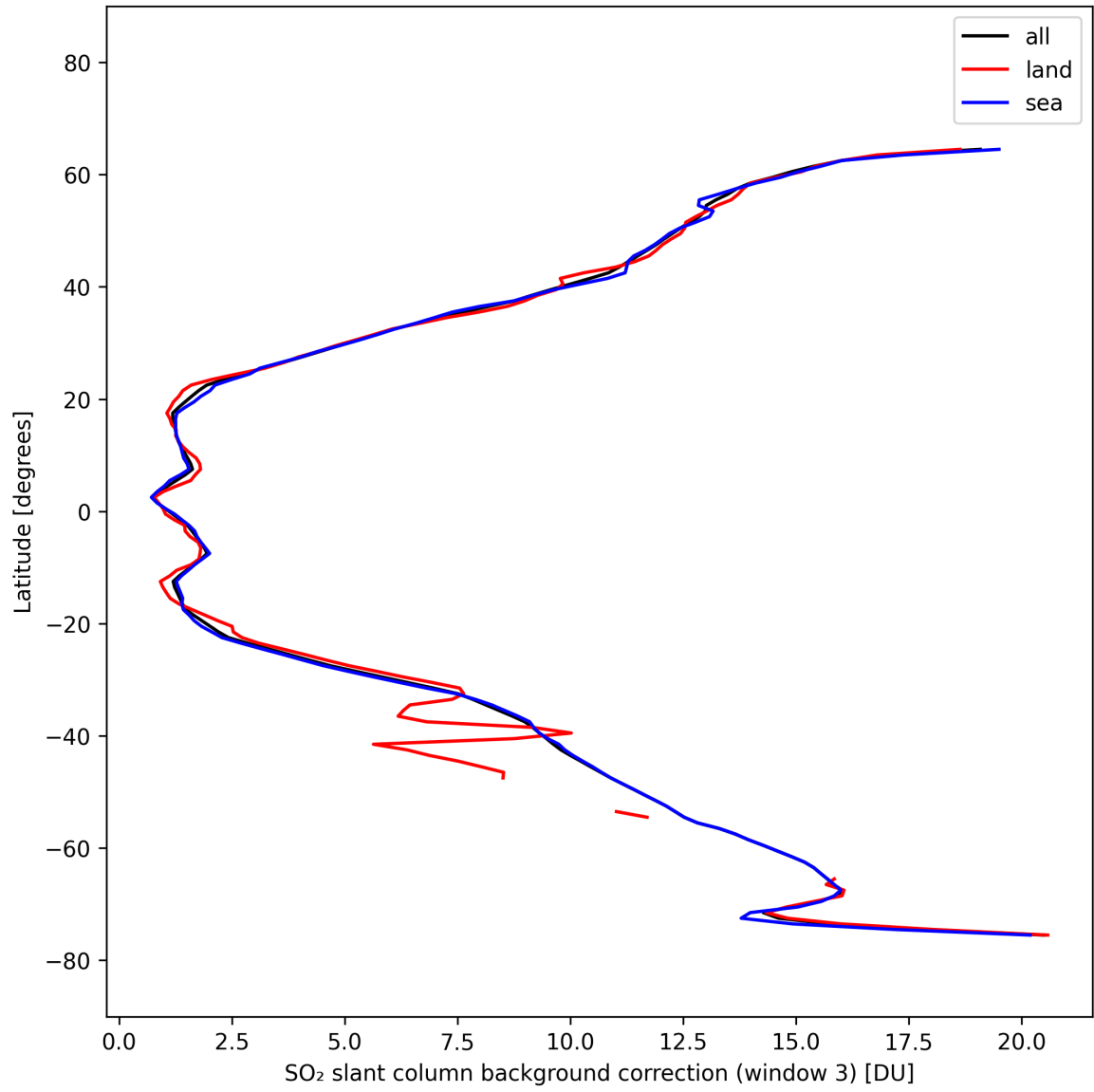


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-10-07 to 2025-10-07.

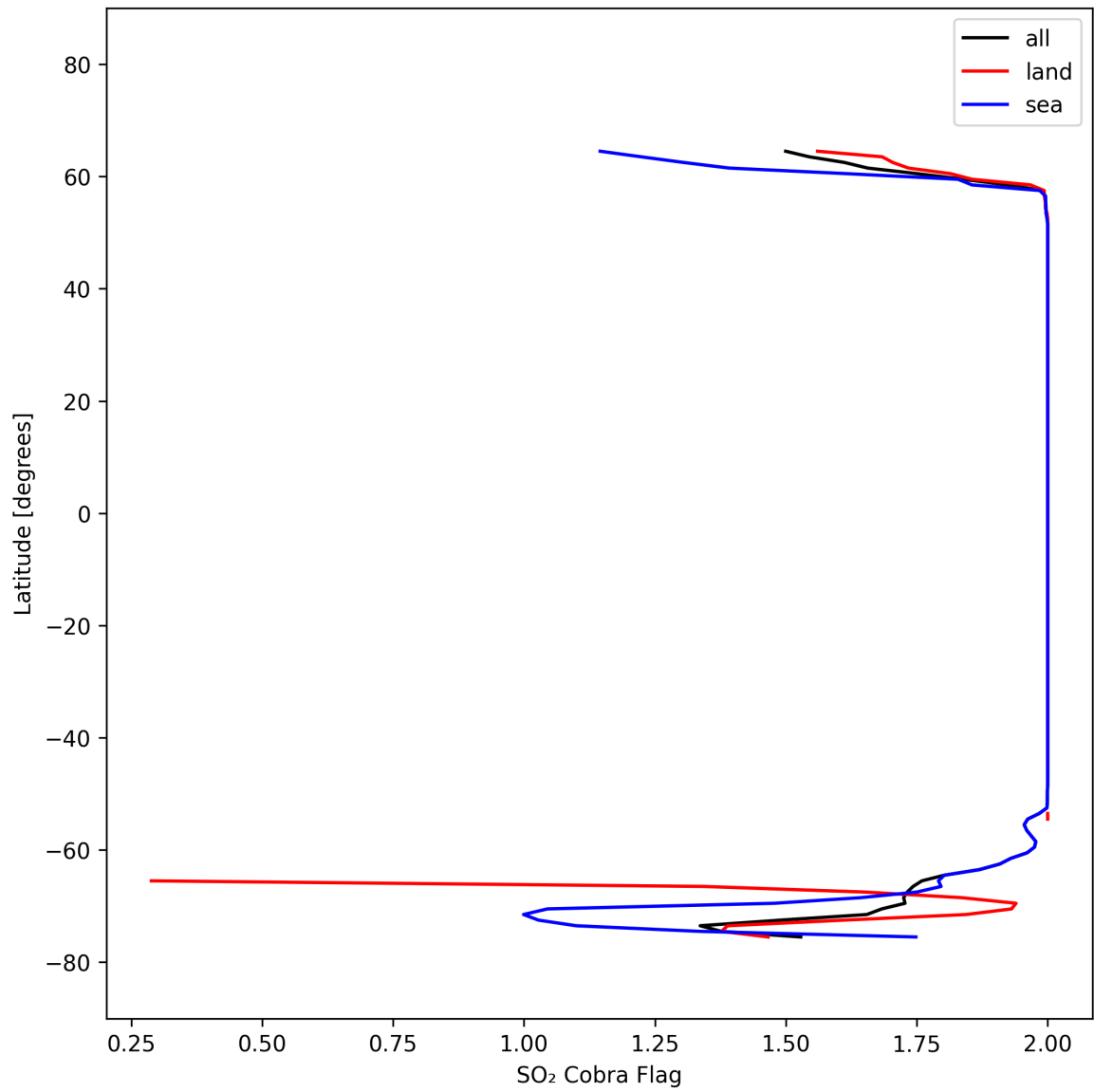


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-10-07 to 2025-10-07.

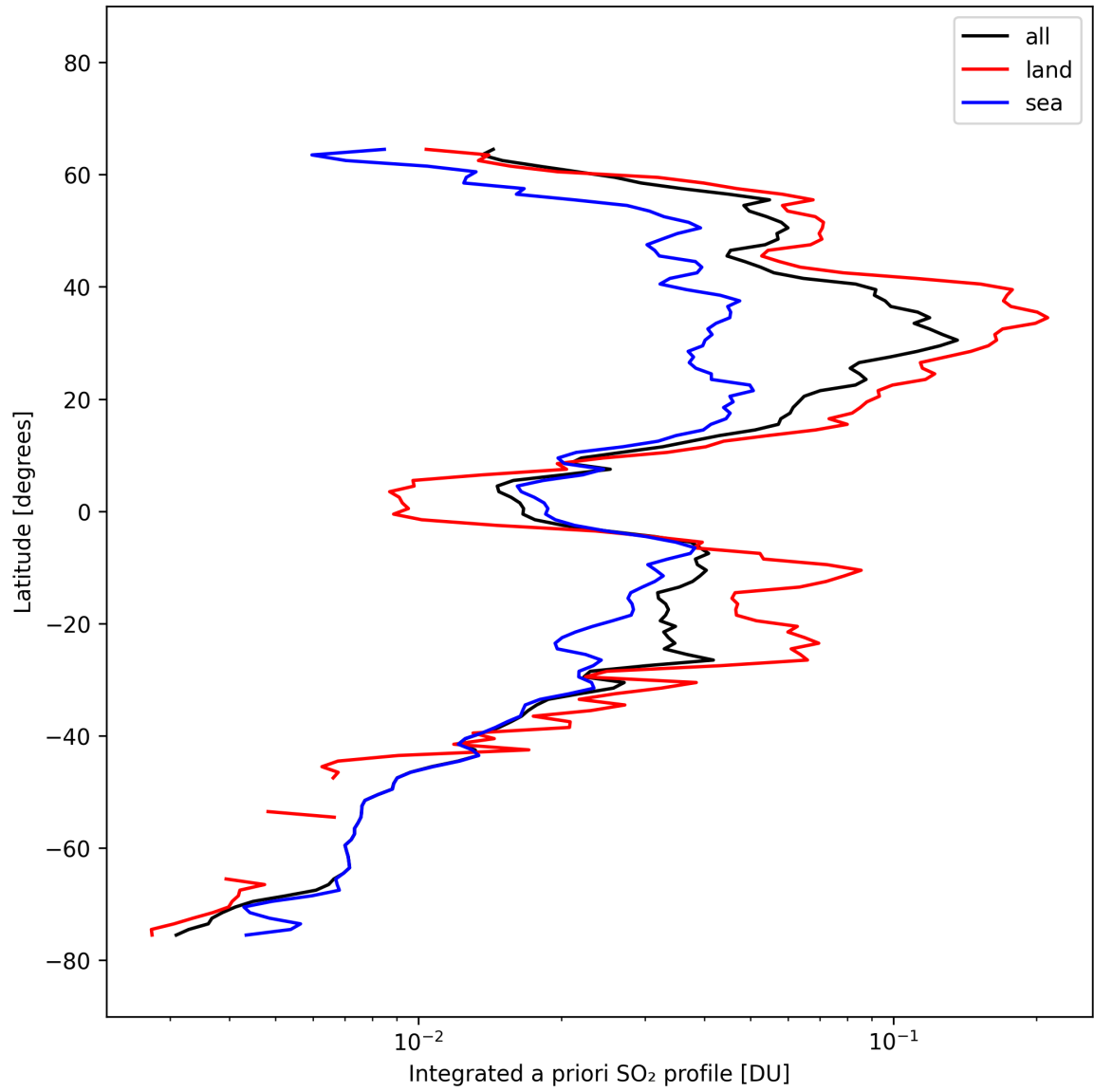


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-10-07 to 2025-10-07.

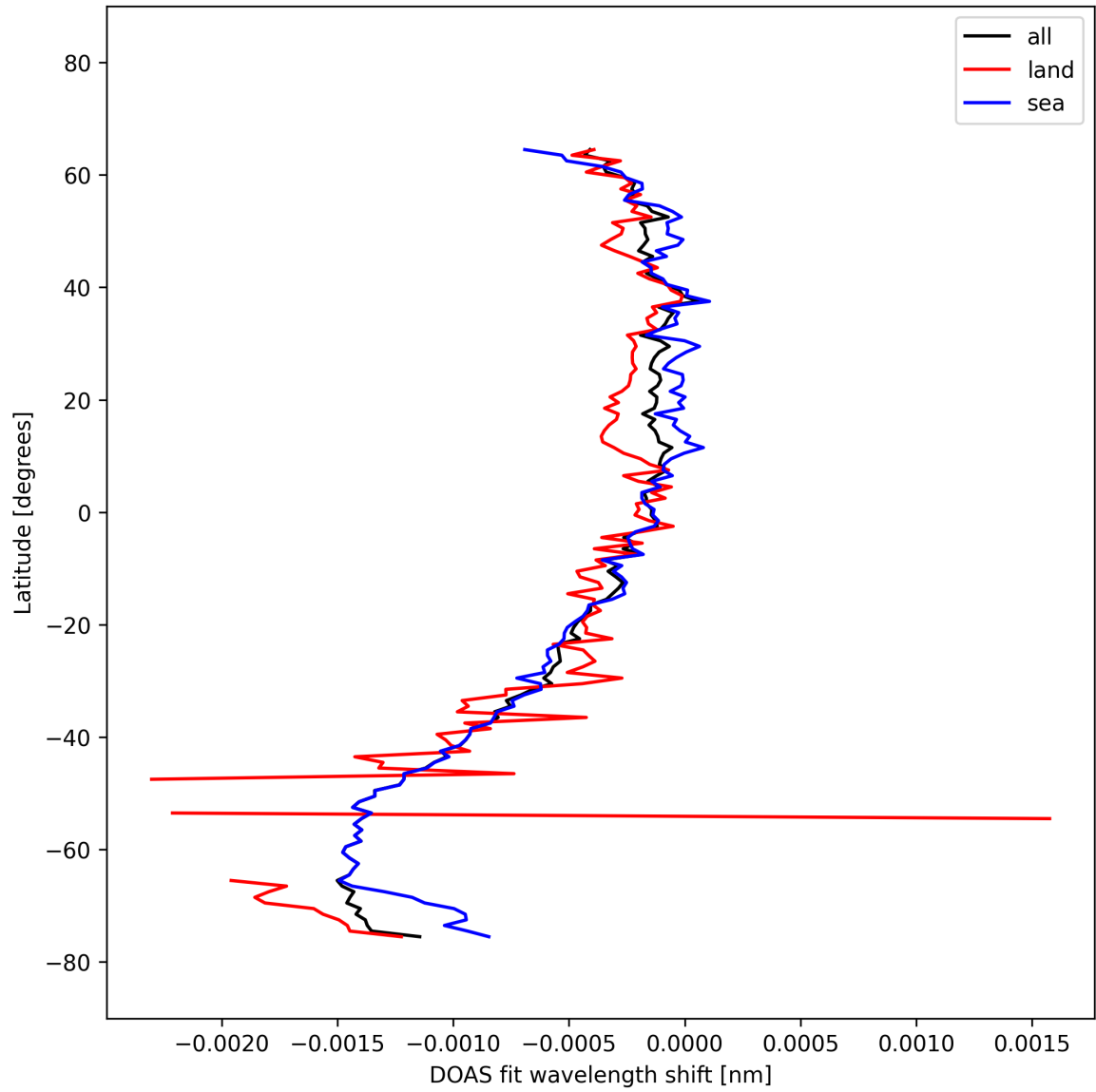


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2025-10-07 to 2025-10-07.

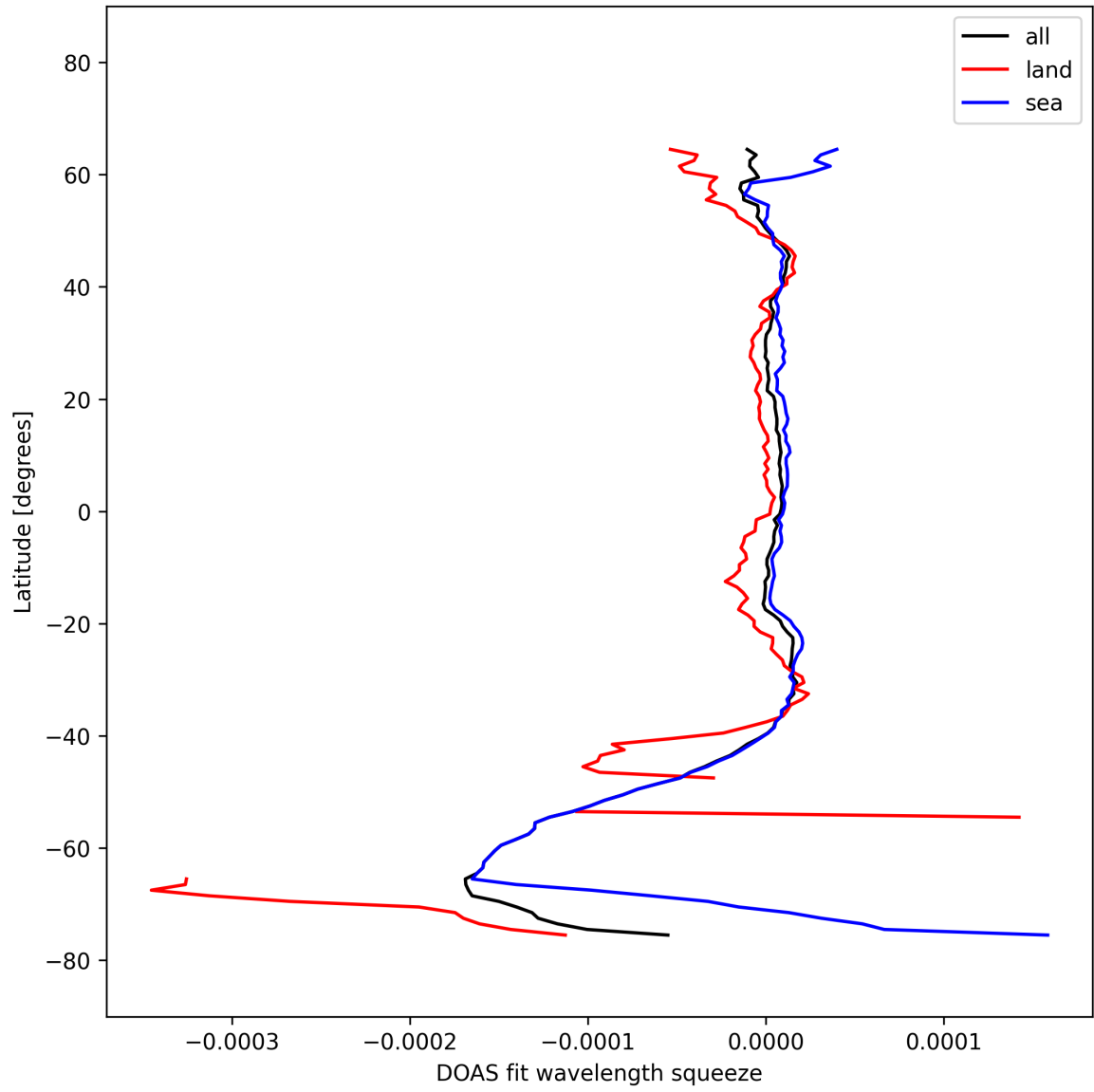


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-10-07 to 2025-10-07.

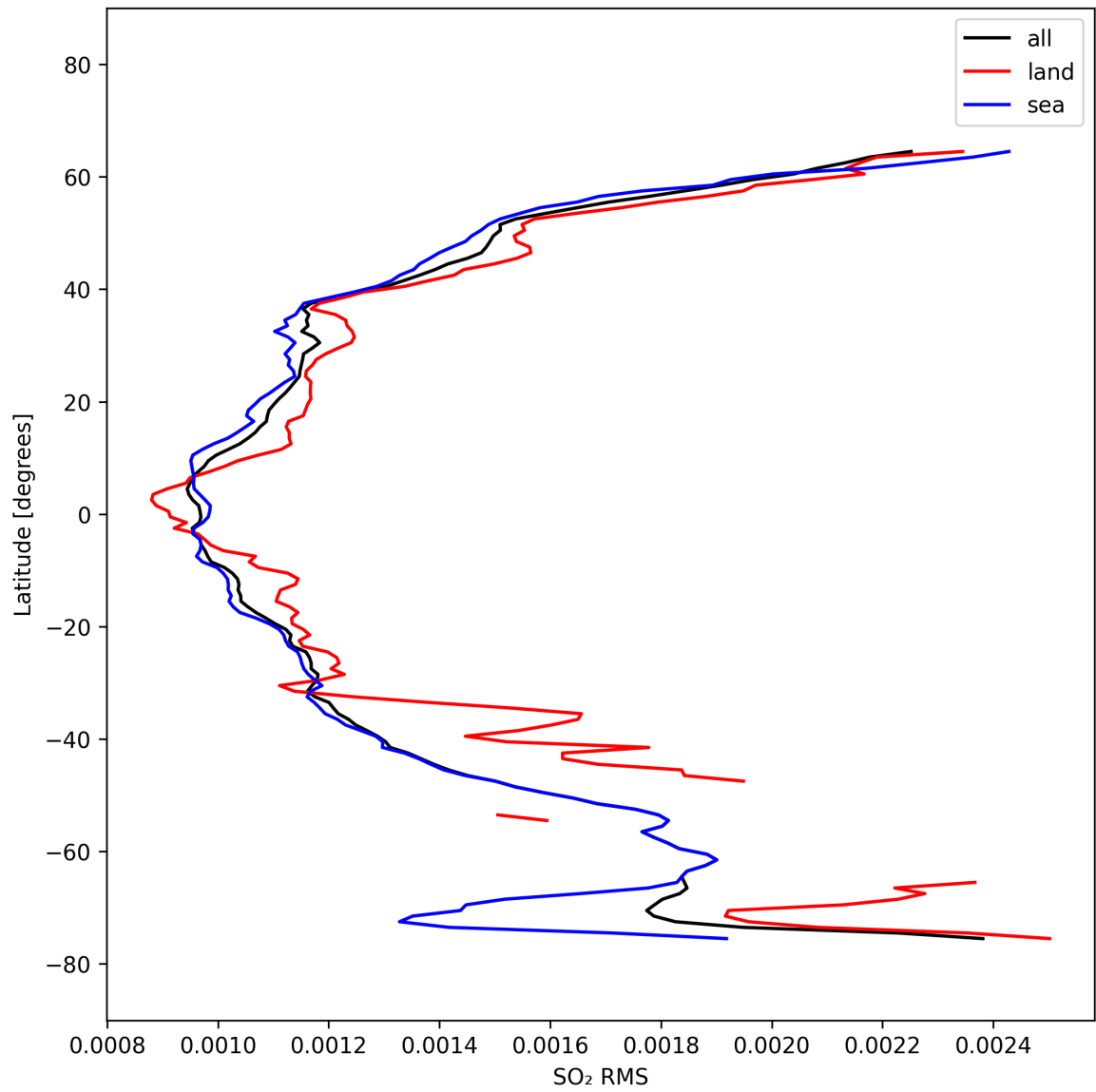


Figure 52: Zonal average of “SO₂ RMS” for 2025-10-07 to 2025-10-07.

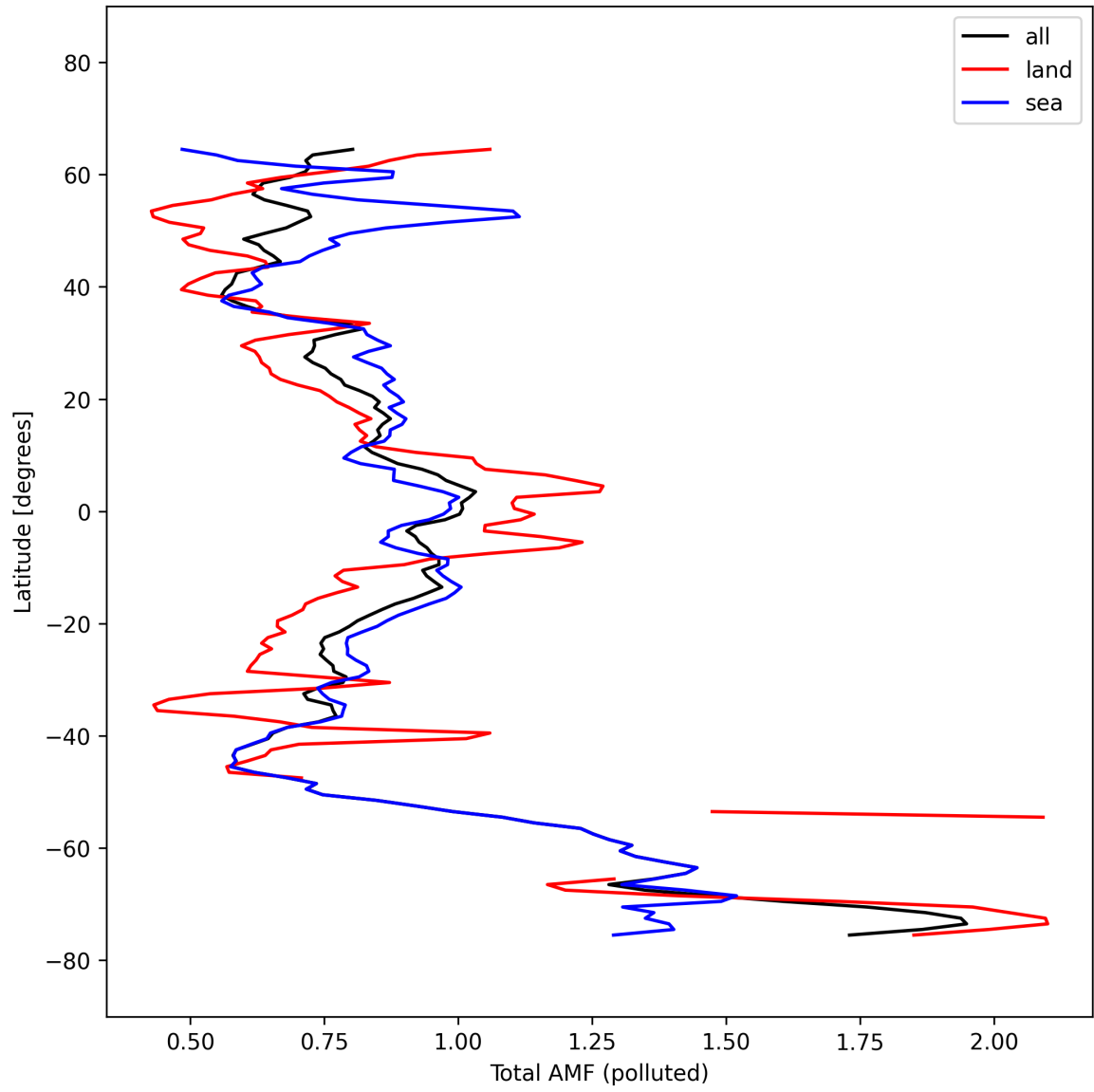


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-10-07 to 2025-10-07.

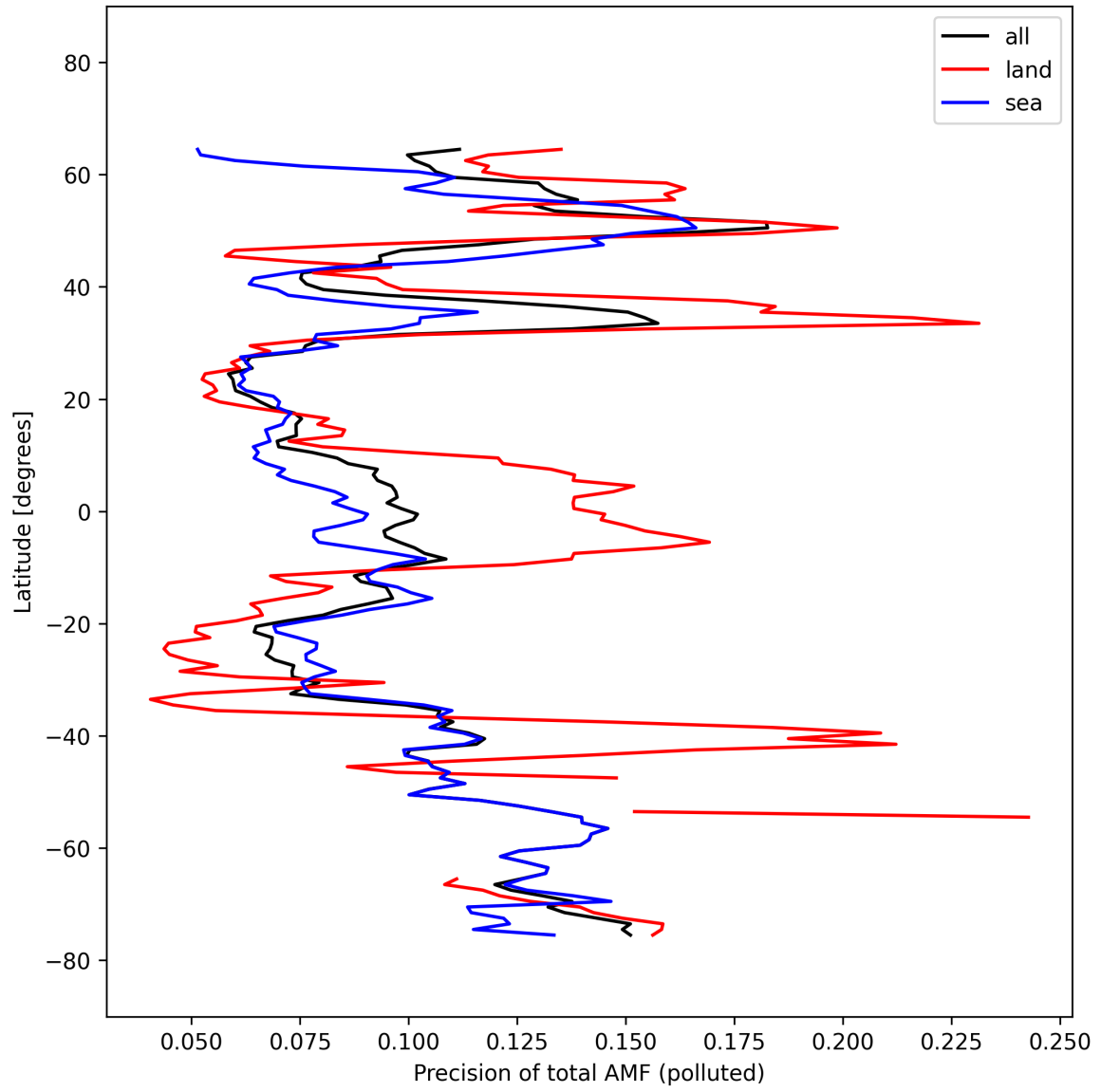


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-10-07 to 2025-10-07.

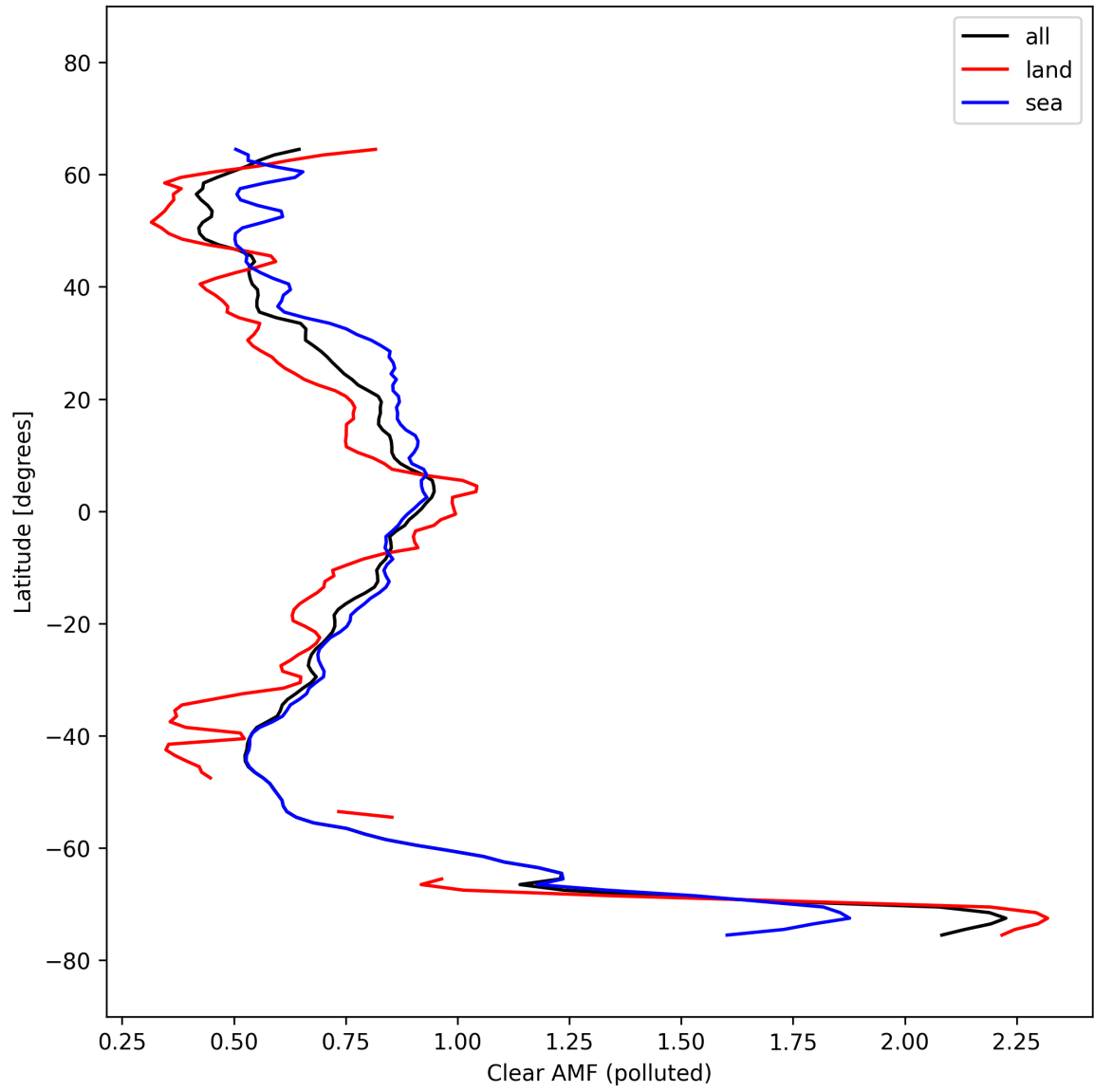


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-10-07 to 2025-10-07.

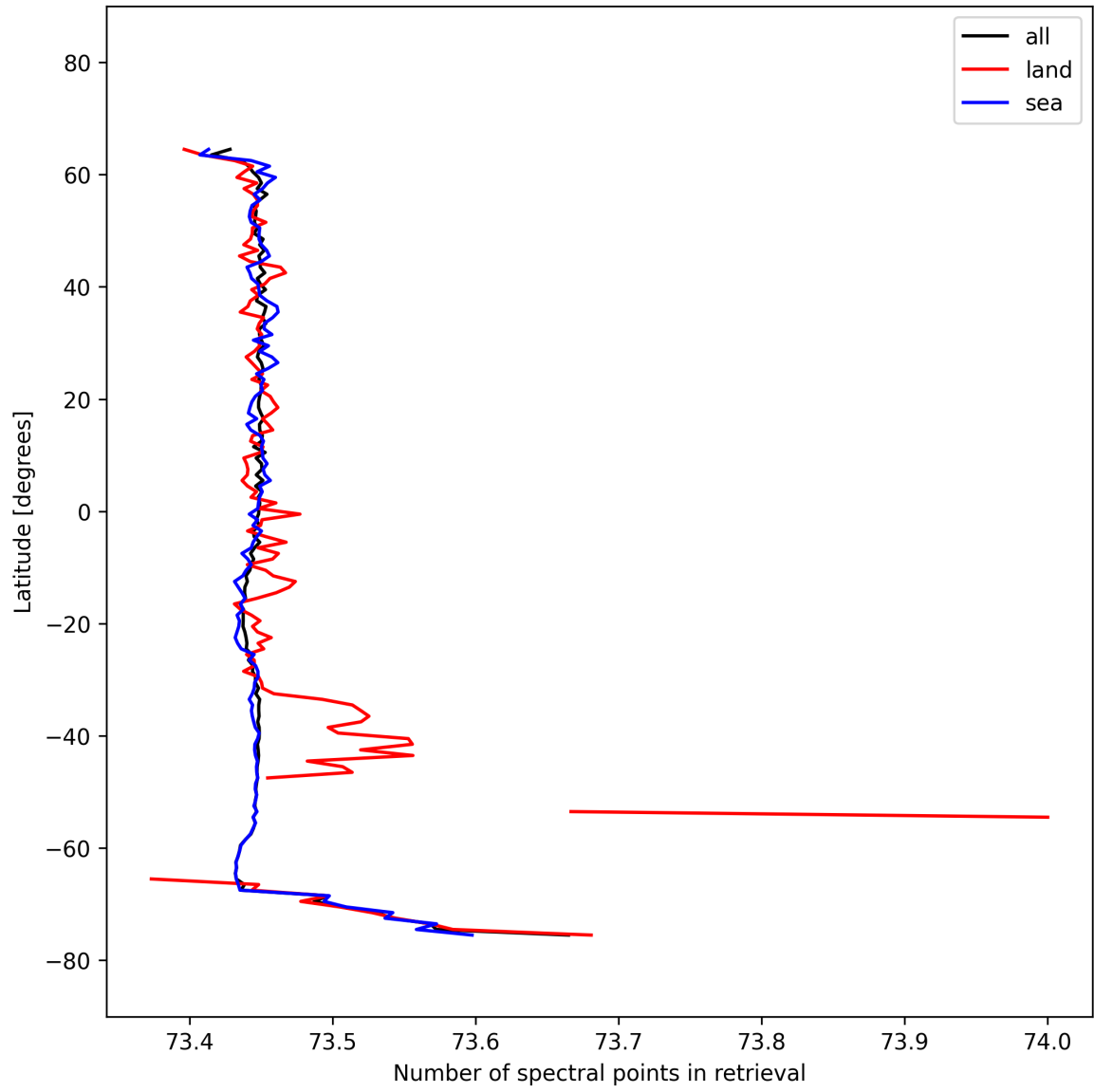


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-10-07 to 2025-10-07.

8 Histograms

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

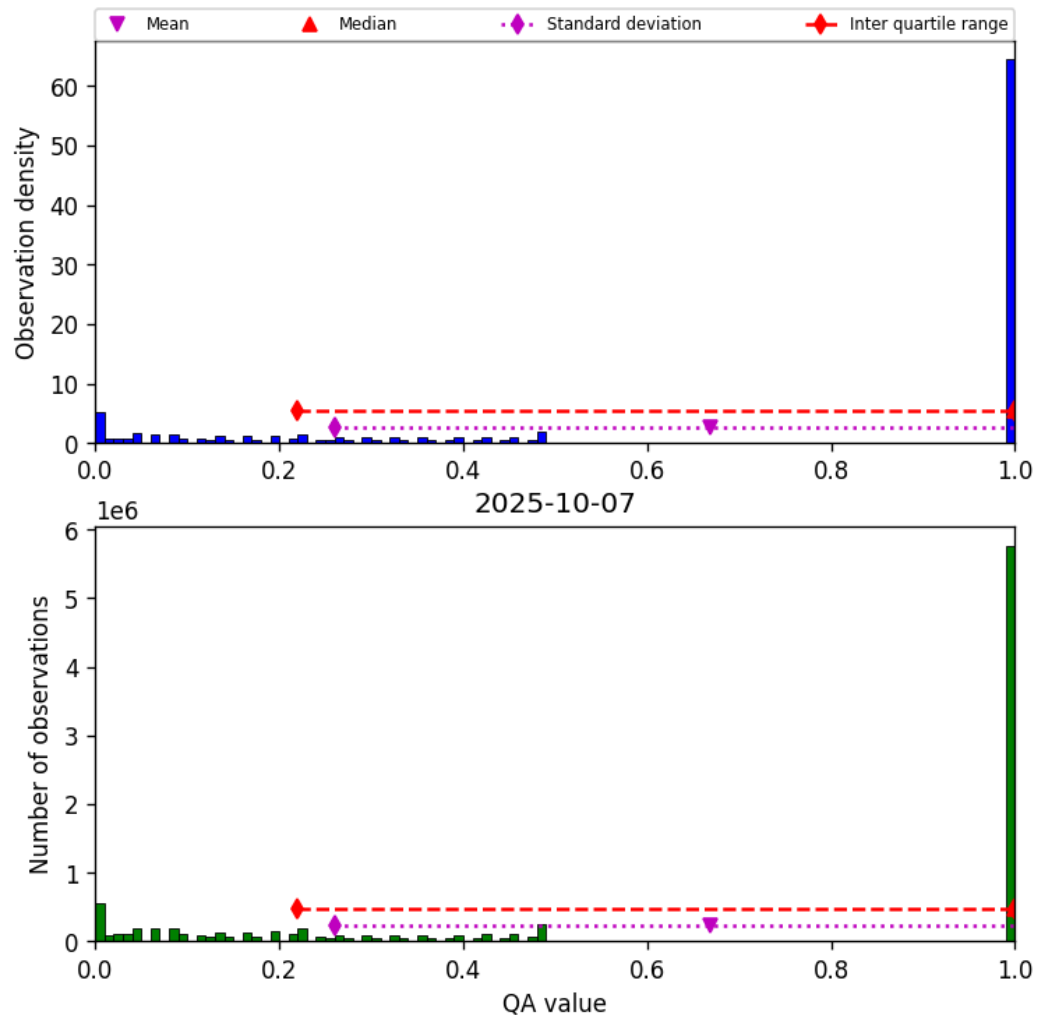


Figure 57: Histogram of “QA value” for 2025-10-07 to 2025-10-07

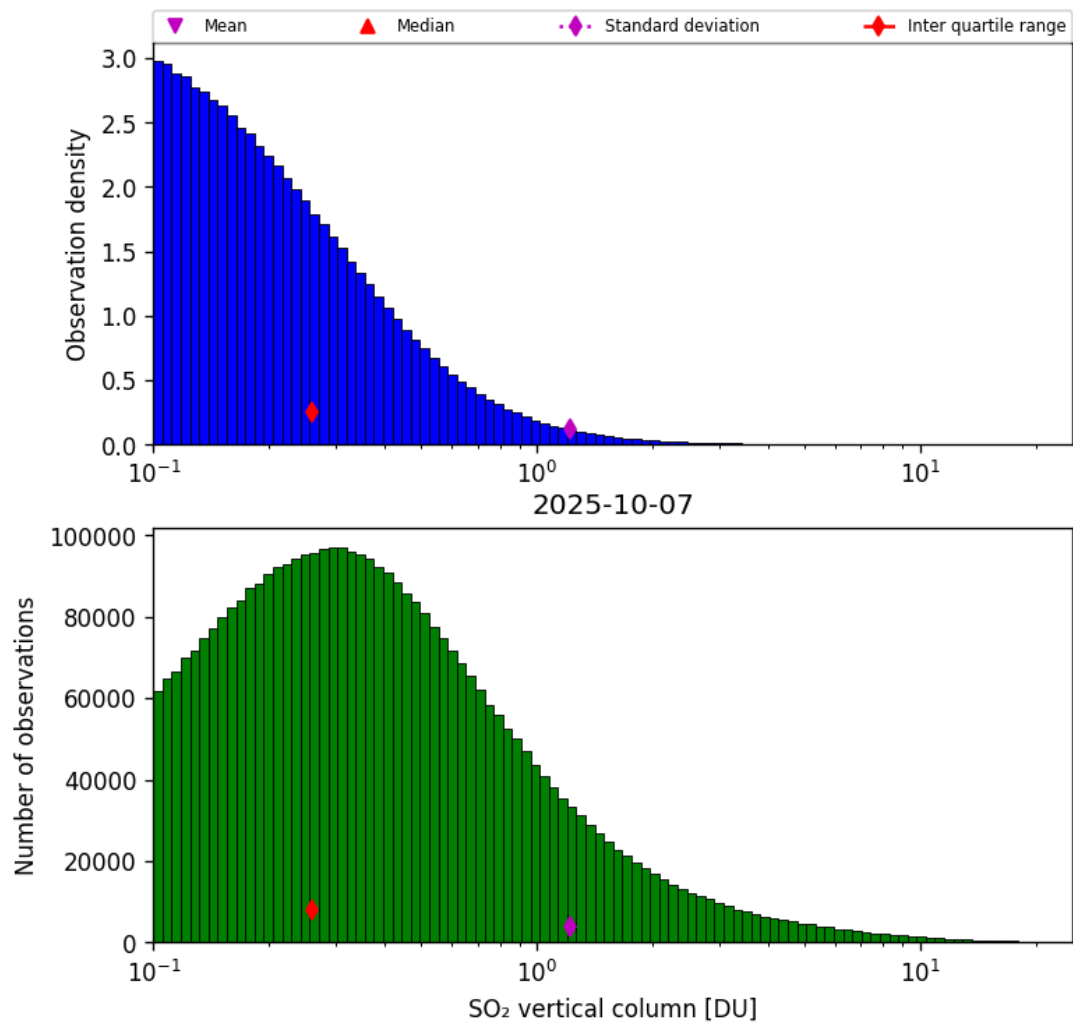


Figure 58: Histogram of “SO₂ vertical column” for 2025-10-07 to 2025-10-07

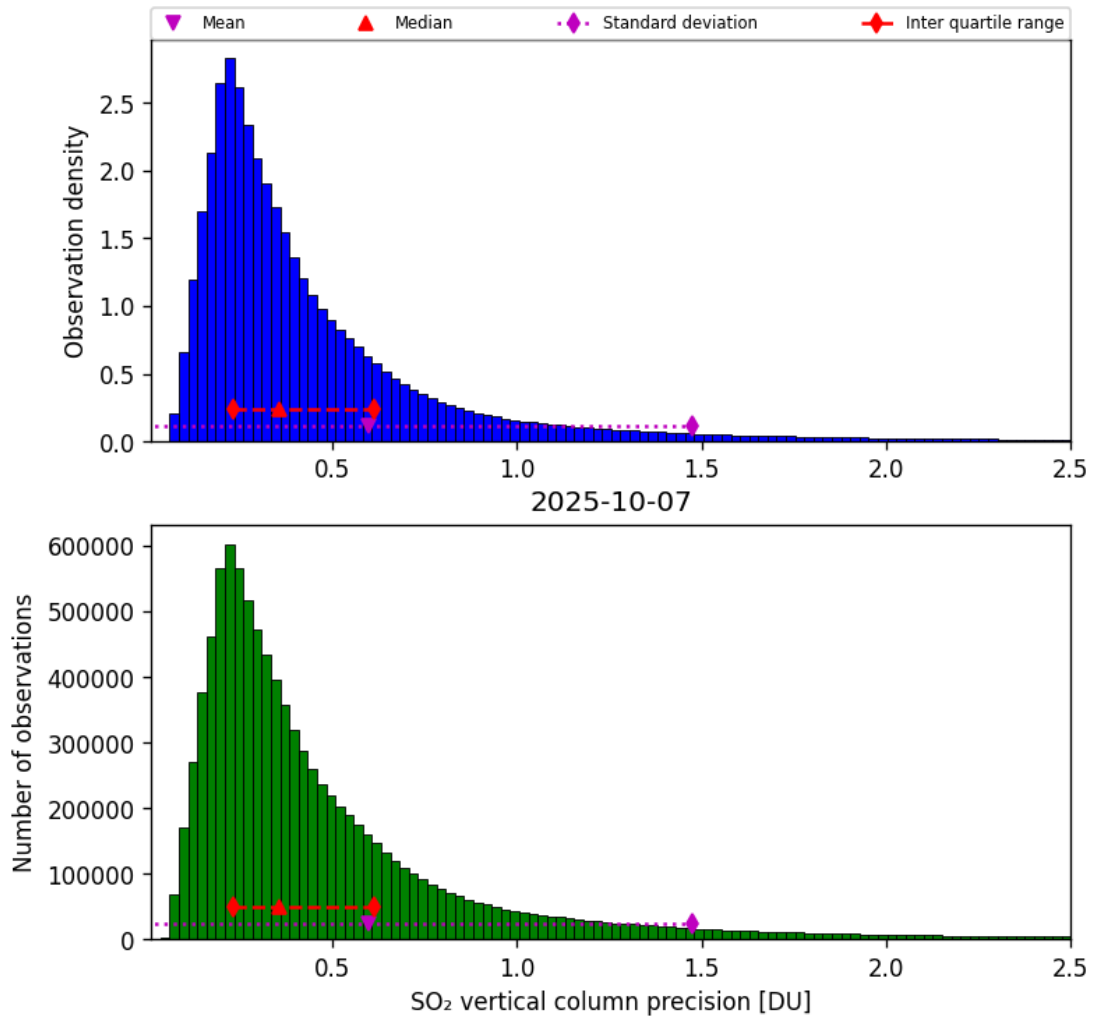


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-10-07 to 2025-10-07

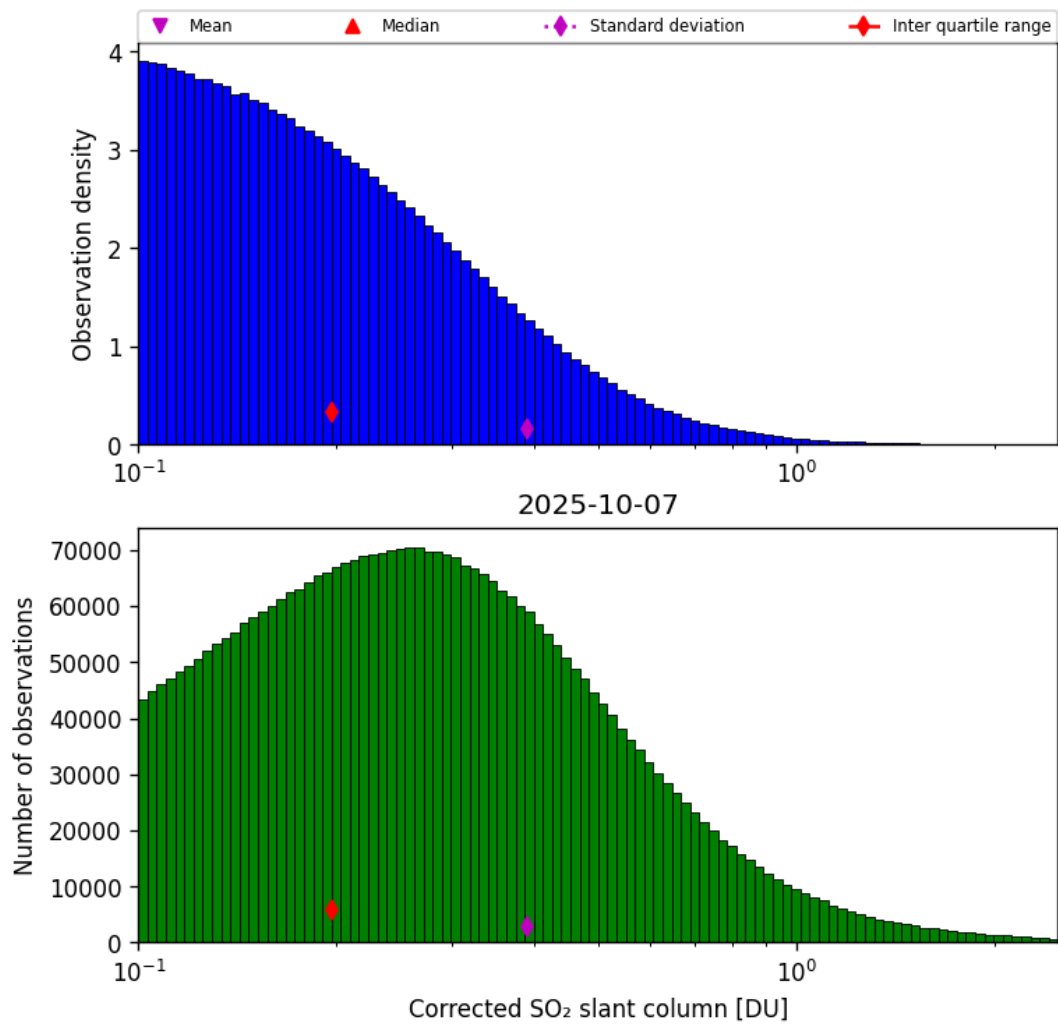


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-10-07 to 2025-10-07

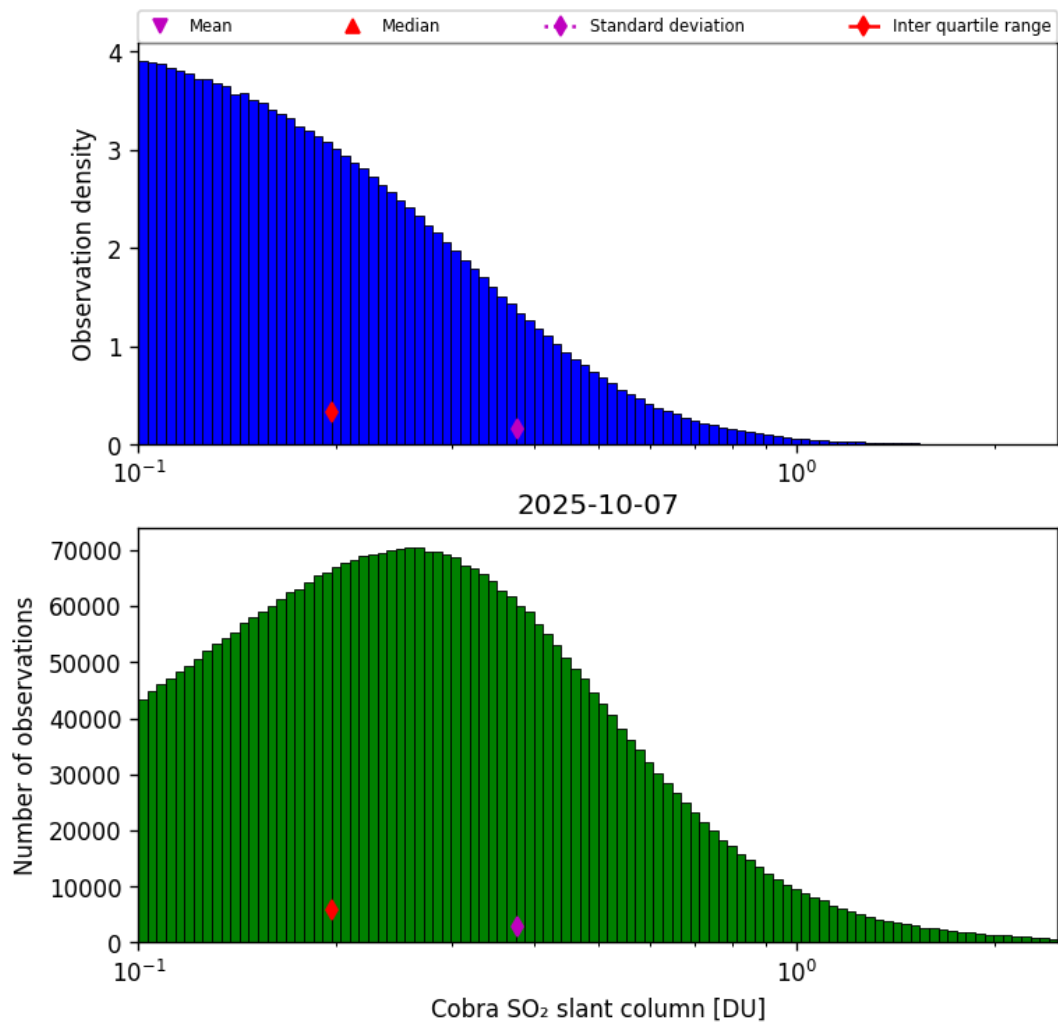


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-10-07 to 2025-10-07

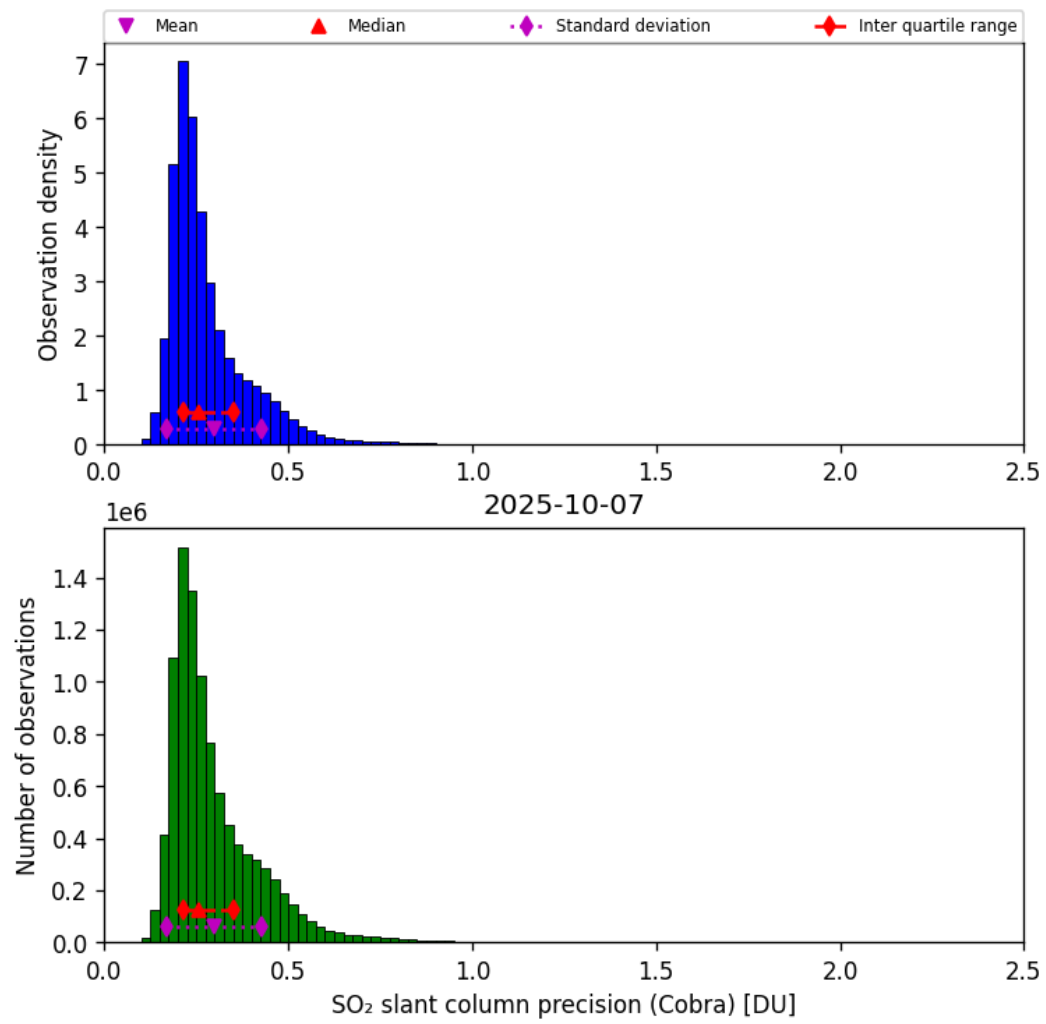


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-10-07 to 2025-10-07

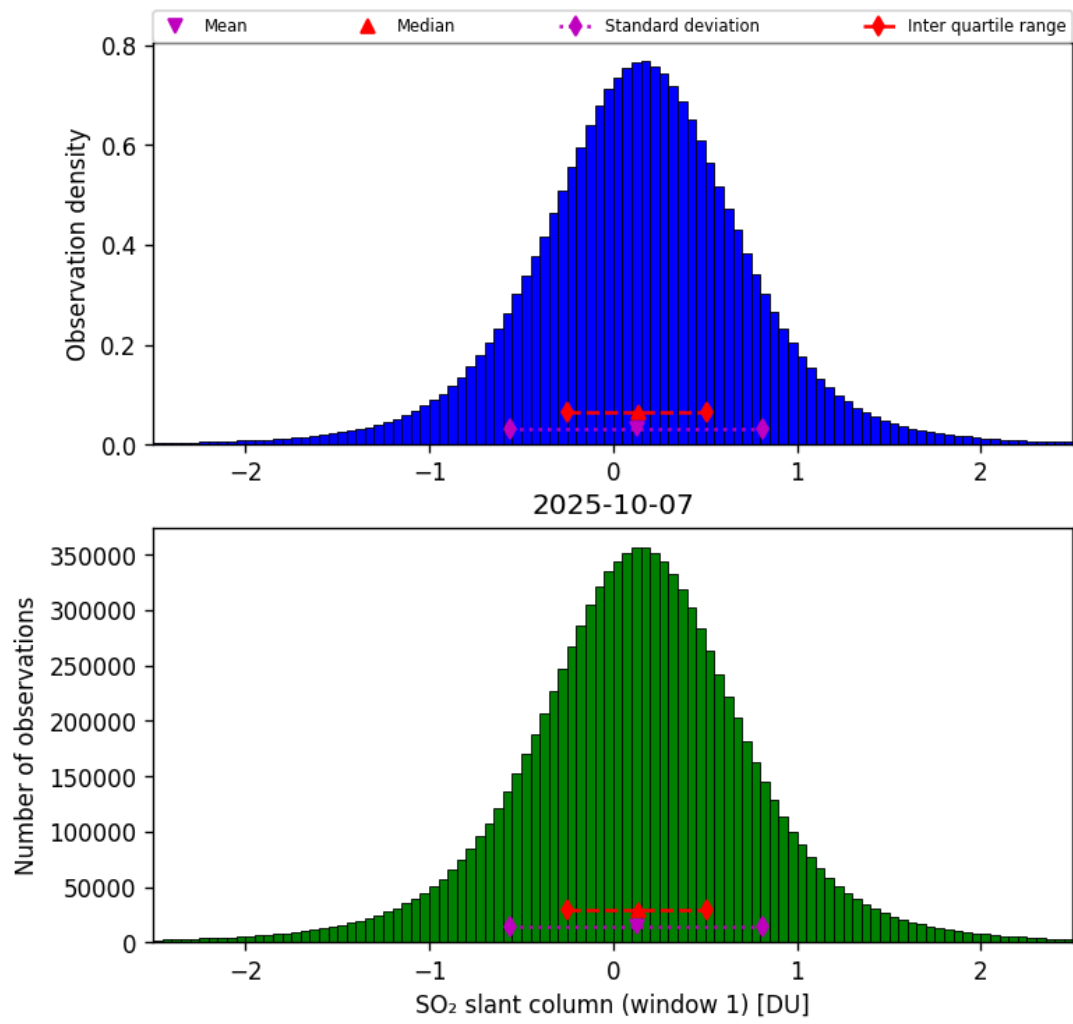


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-10-07 to 2025-10-07

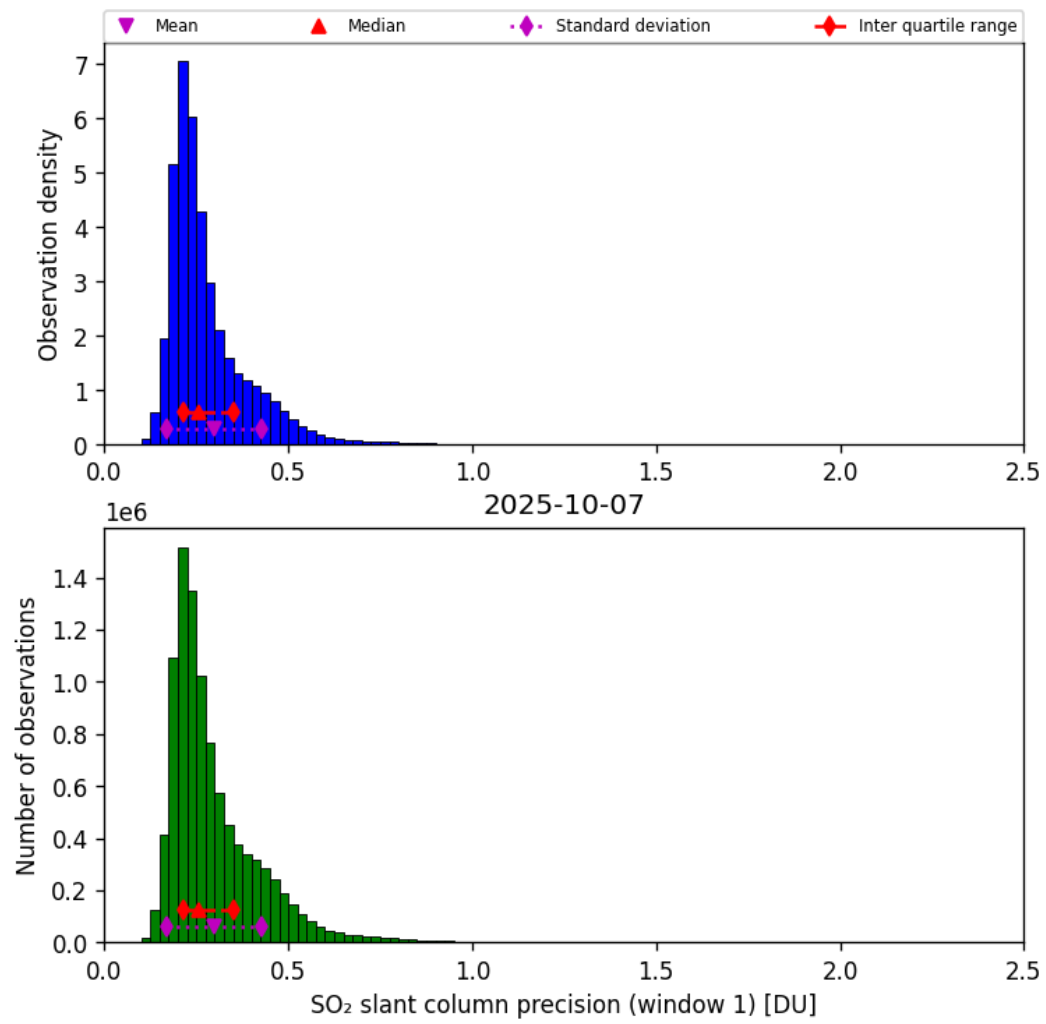


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-10-07 to 2025-10-07

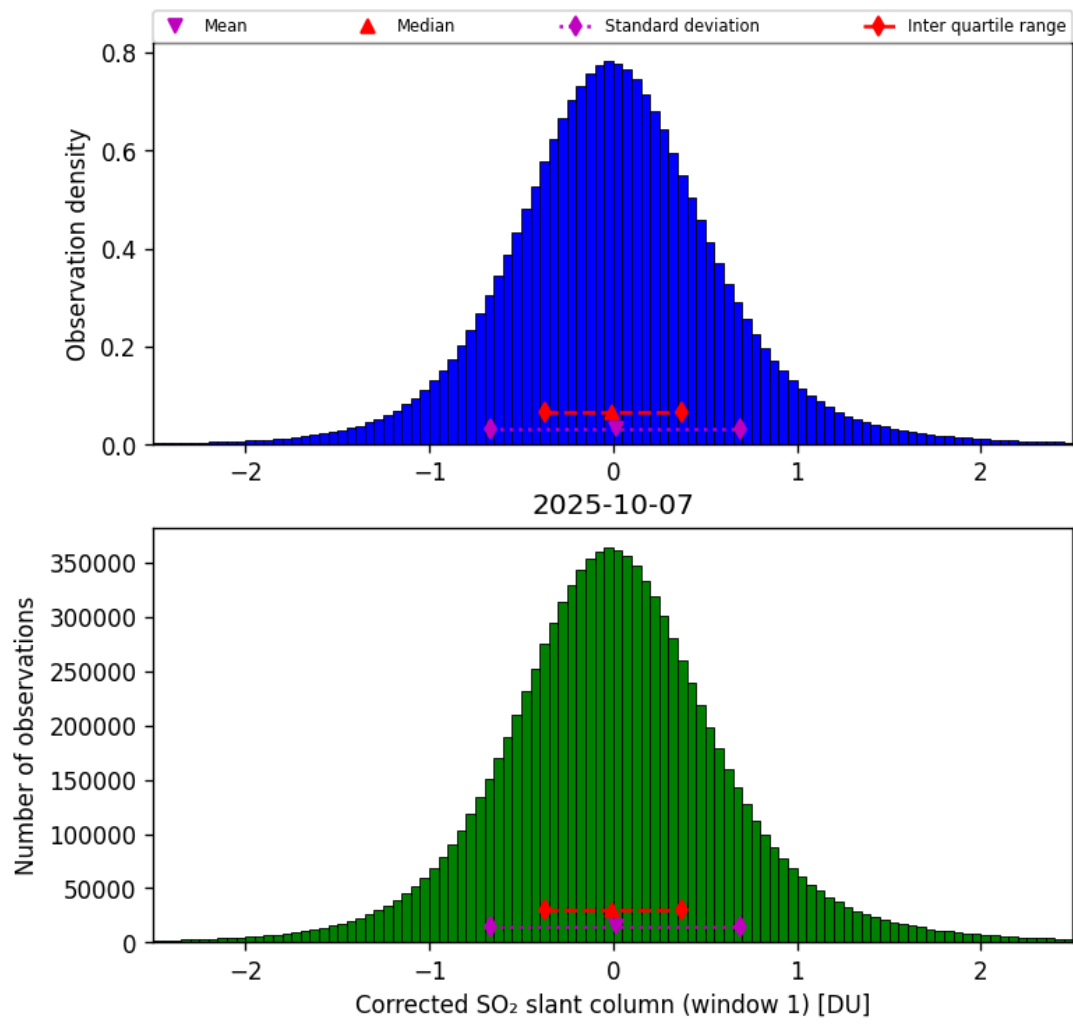


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-10-07 to 2025-10-07

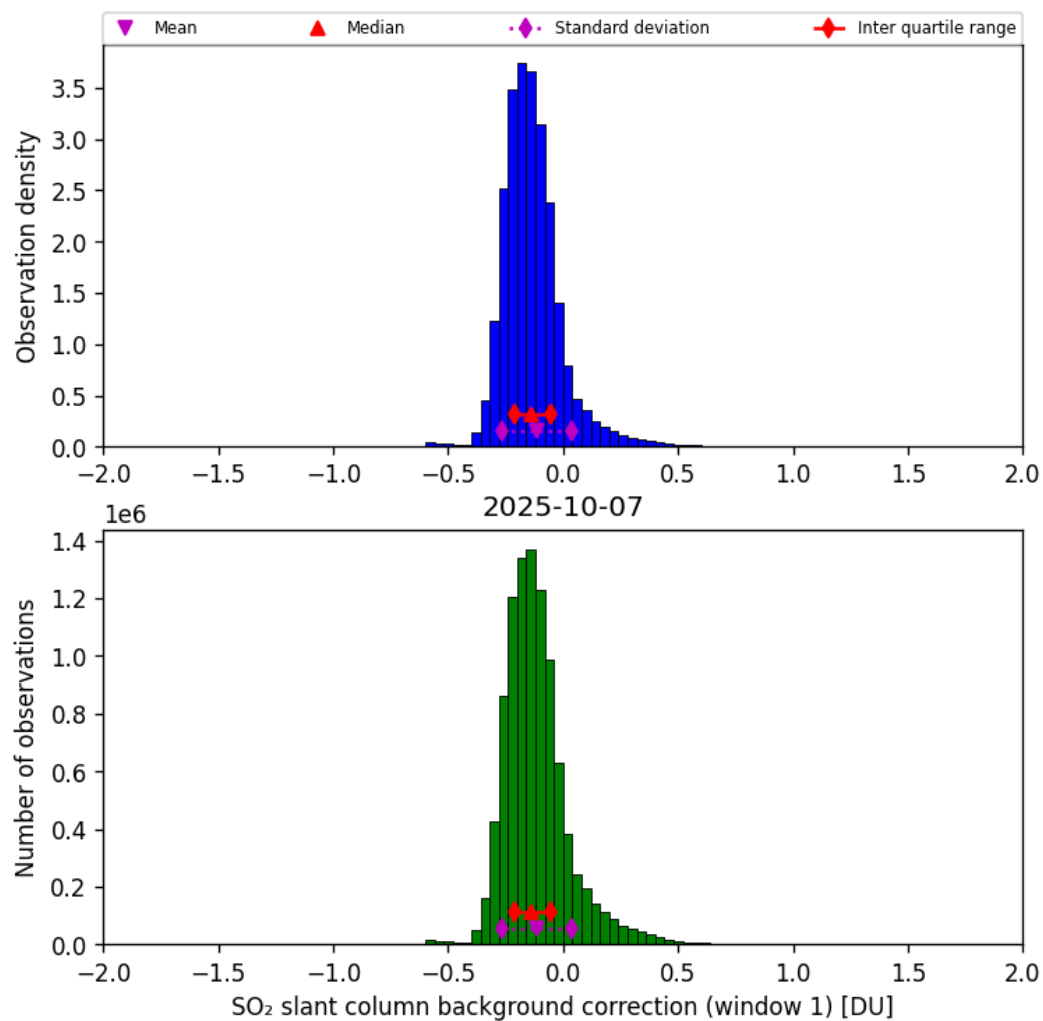


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-10-07 to 2025-10-07

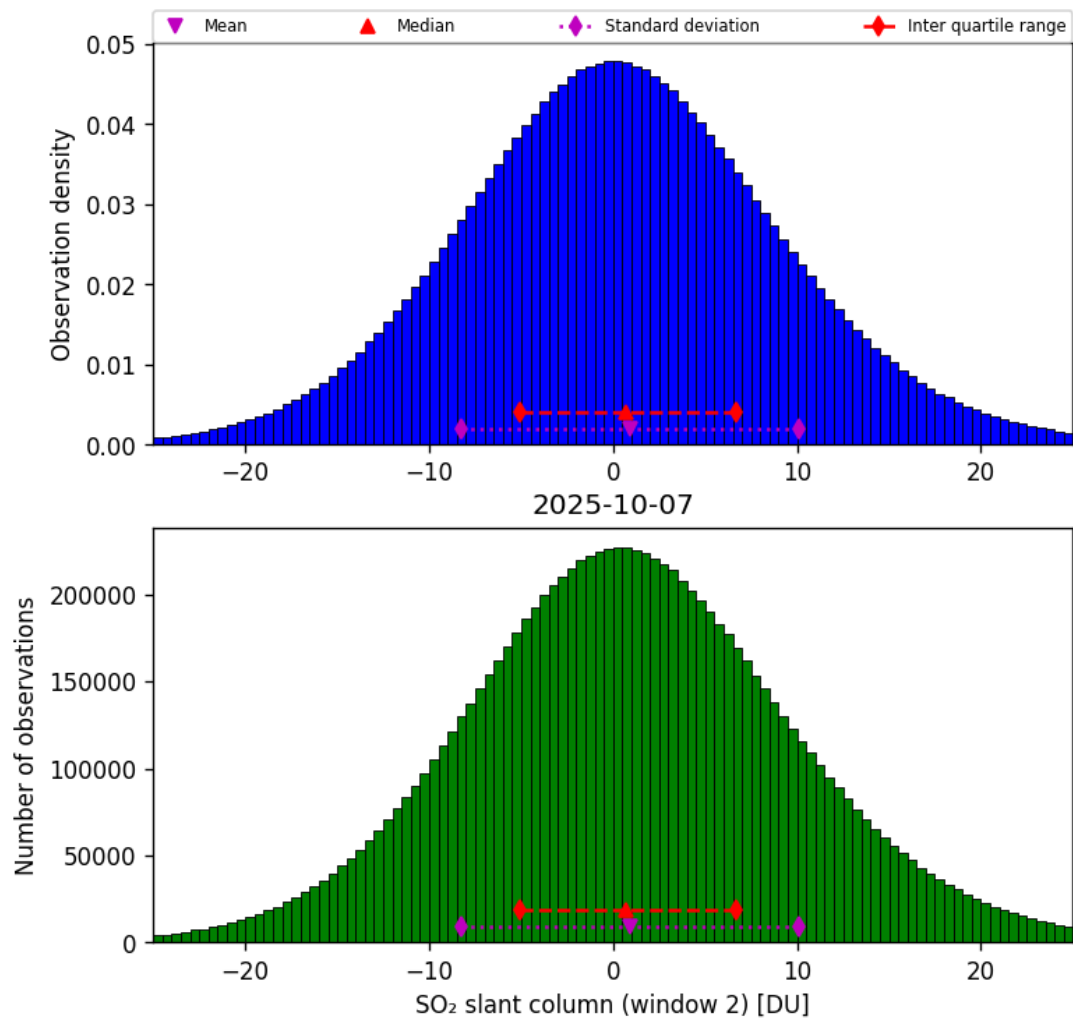


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-10-07 to 2025-10-07

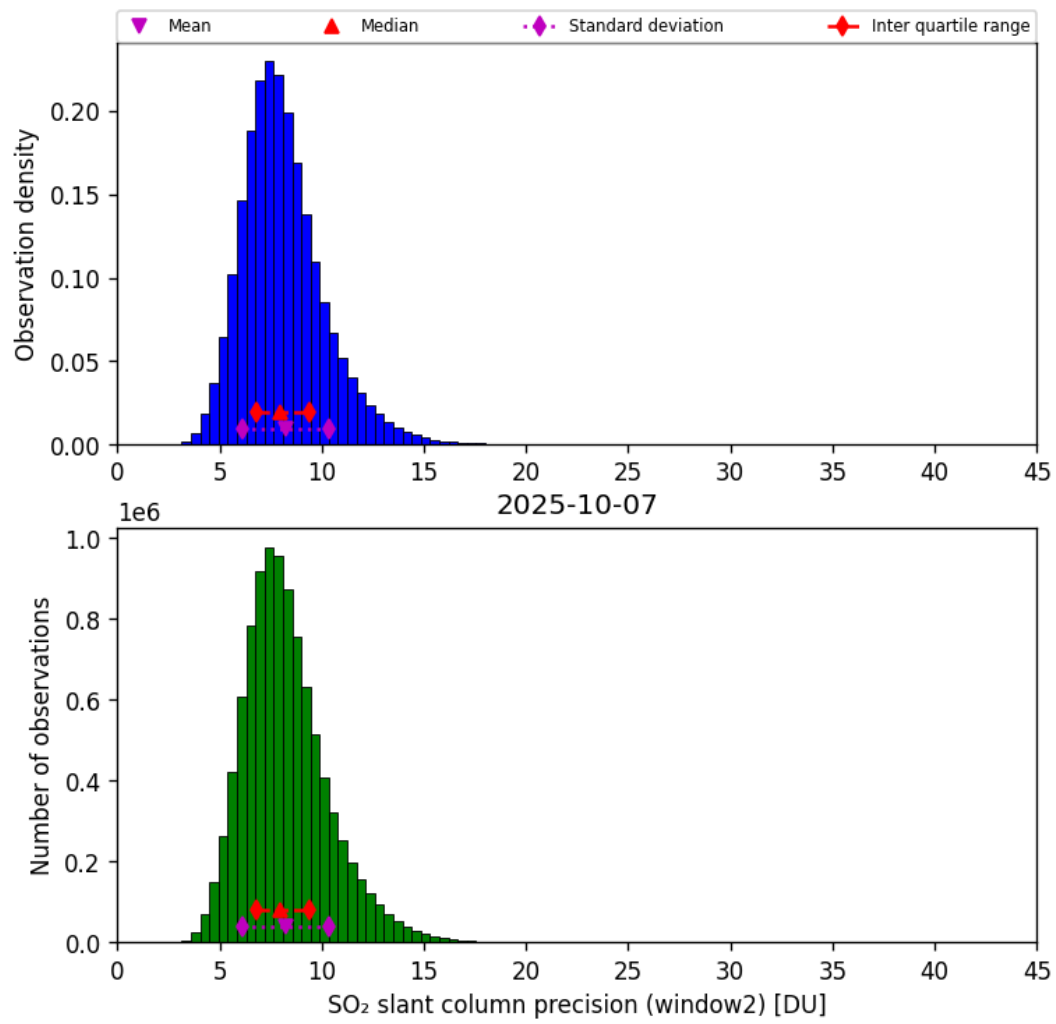


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-10-07 to 2025-10-07

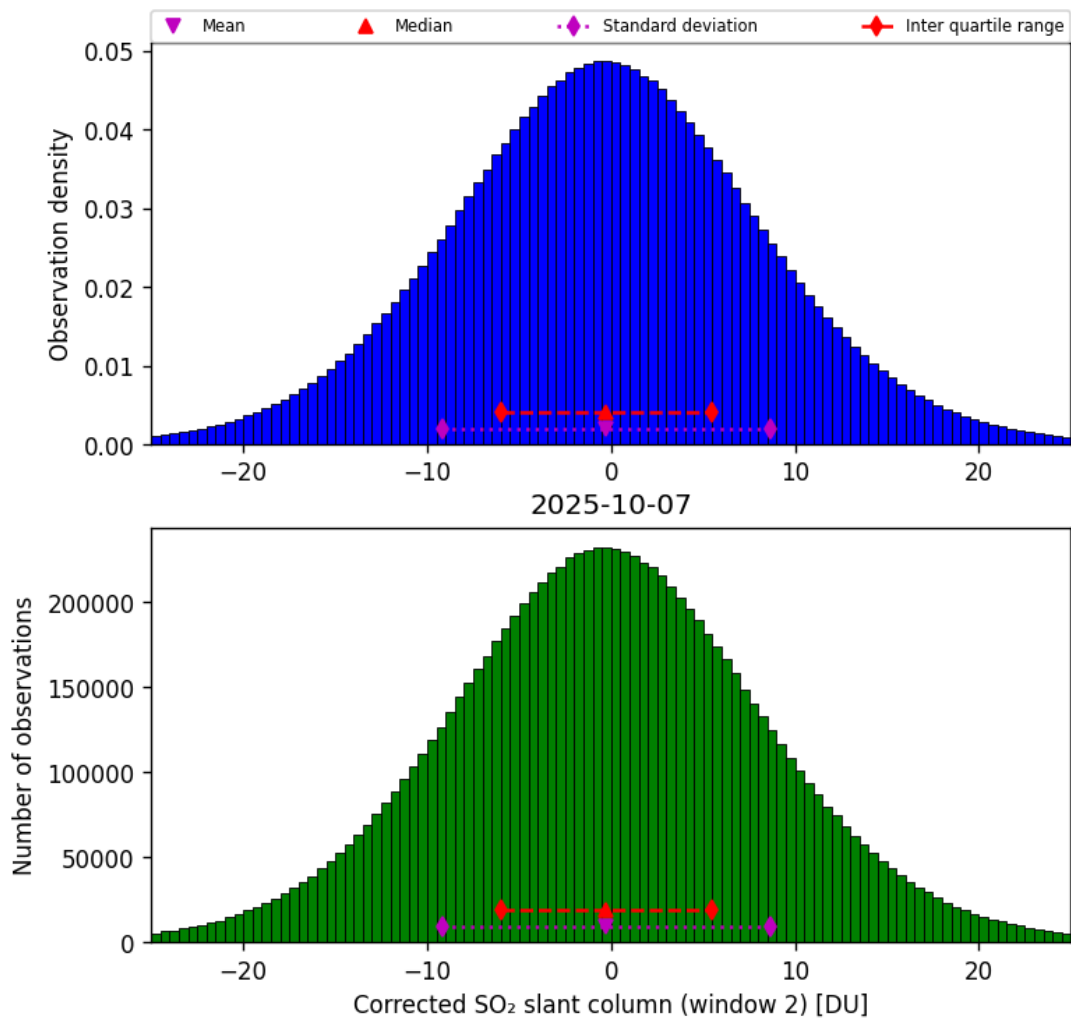


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-10-07 to 2025-10-07

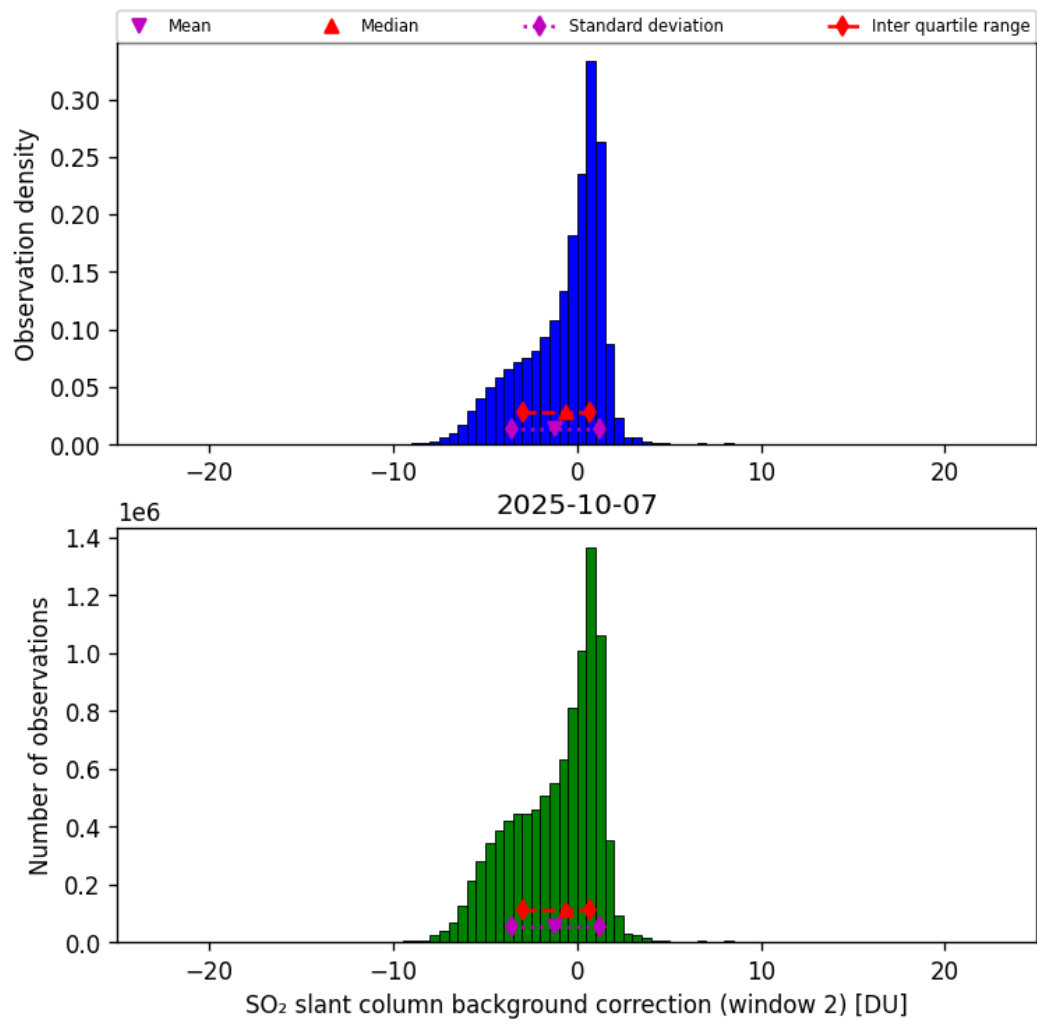


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-10-07 to 2025-10-07

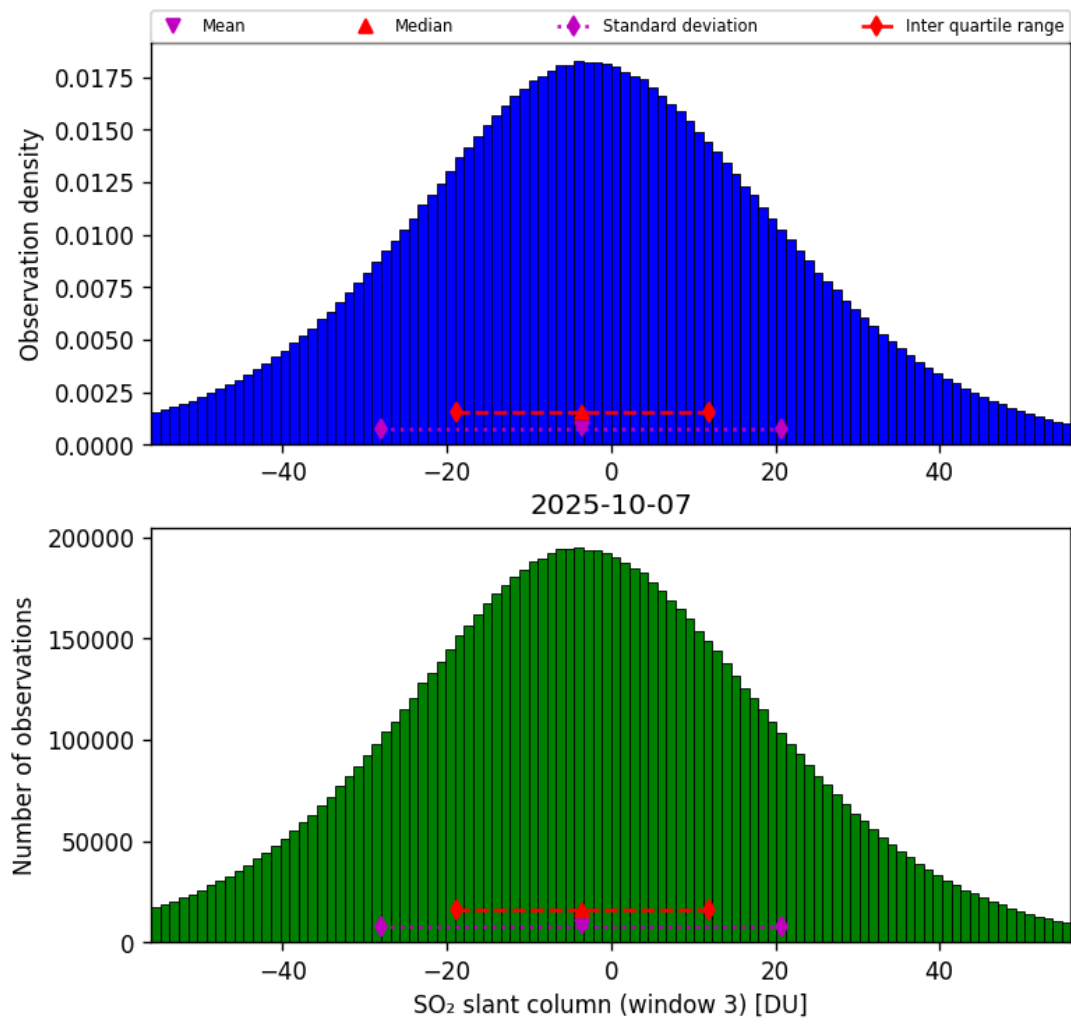


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-10-07 to 2025-10-07

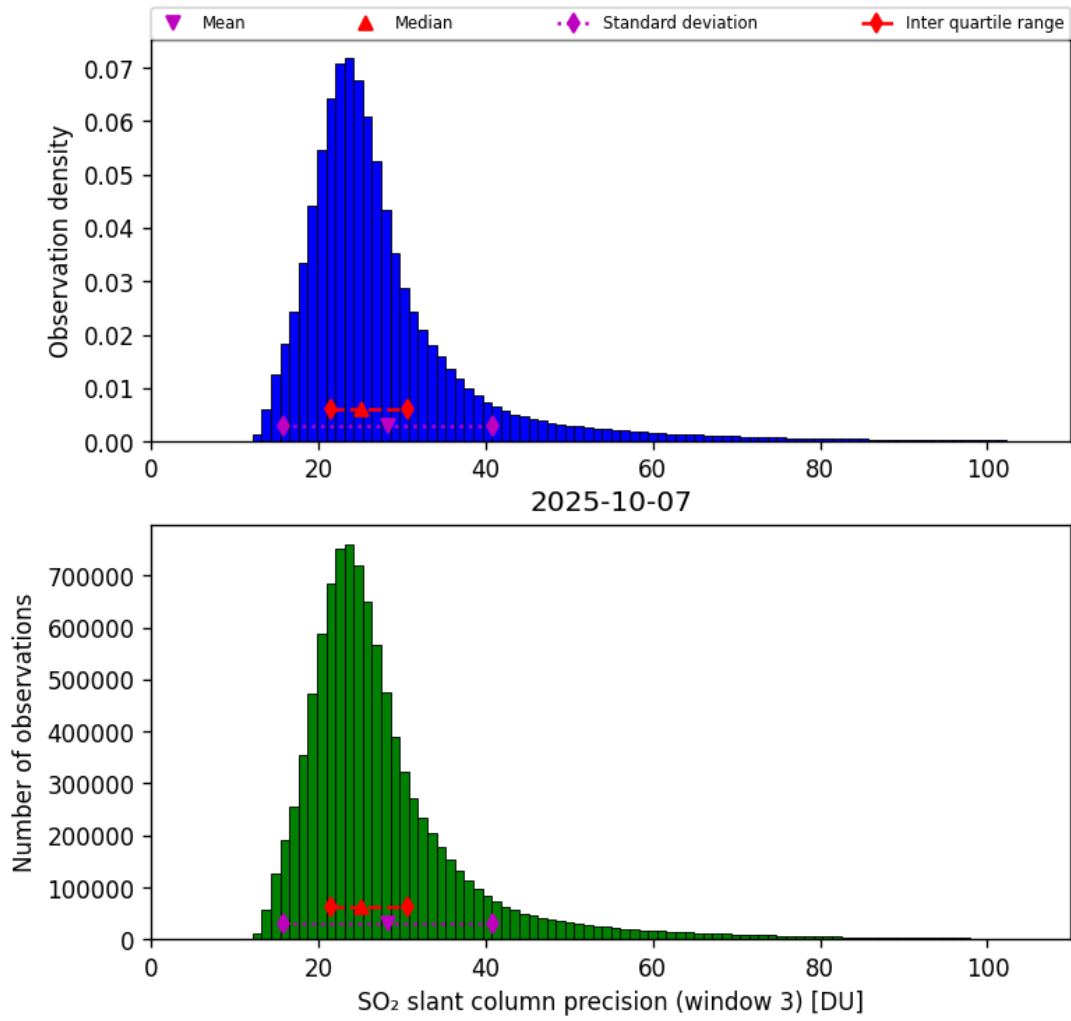


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-10-07 to 2025-10-07

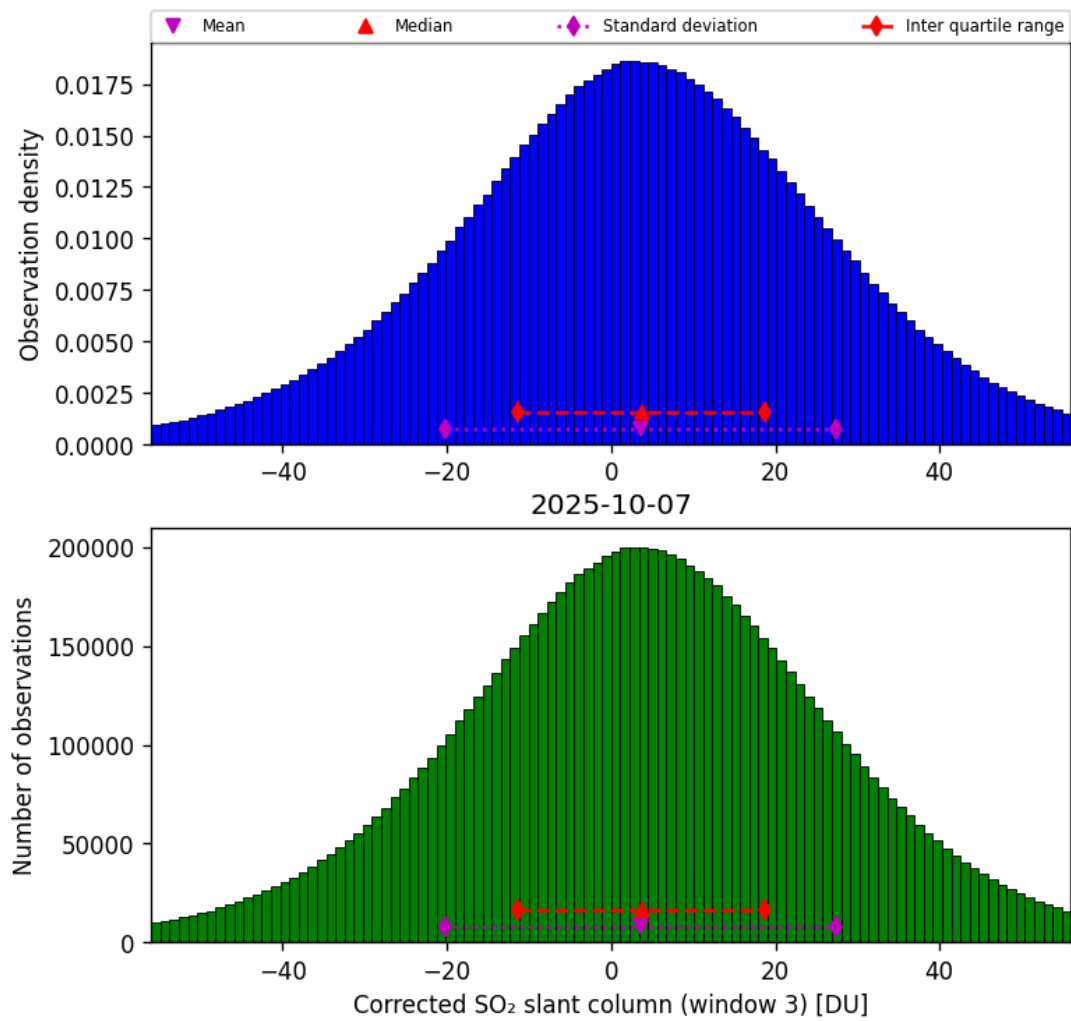


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-10-07 to 2025-10-07

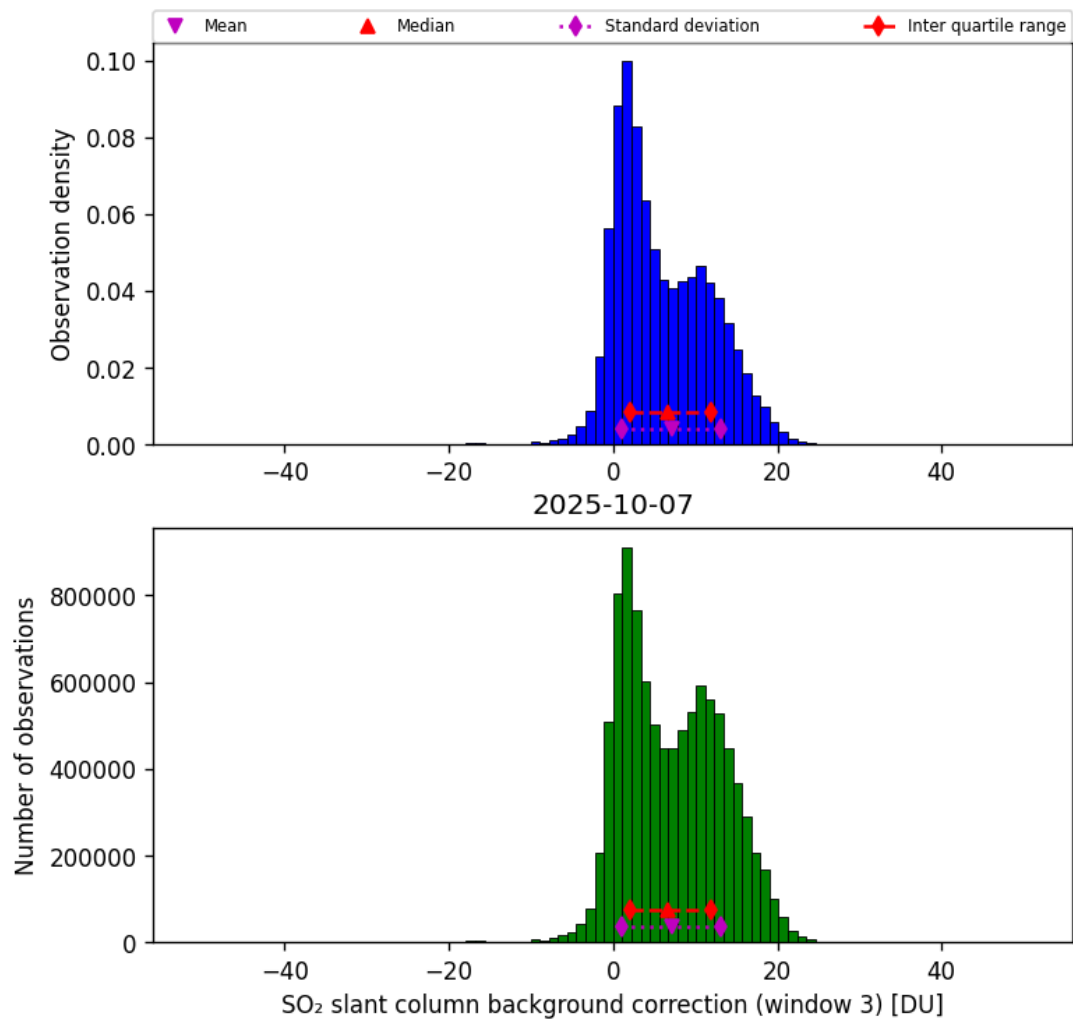


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-10-07 to 2025-10-07

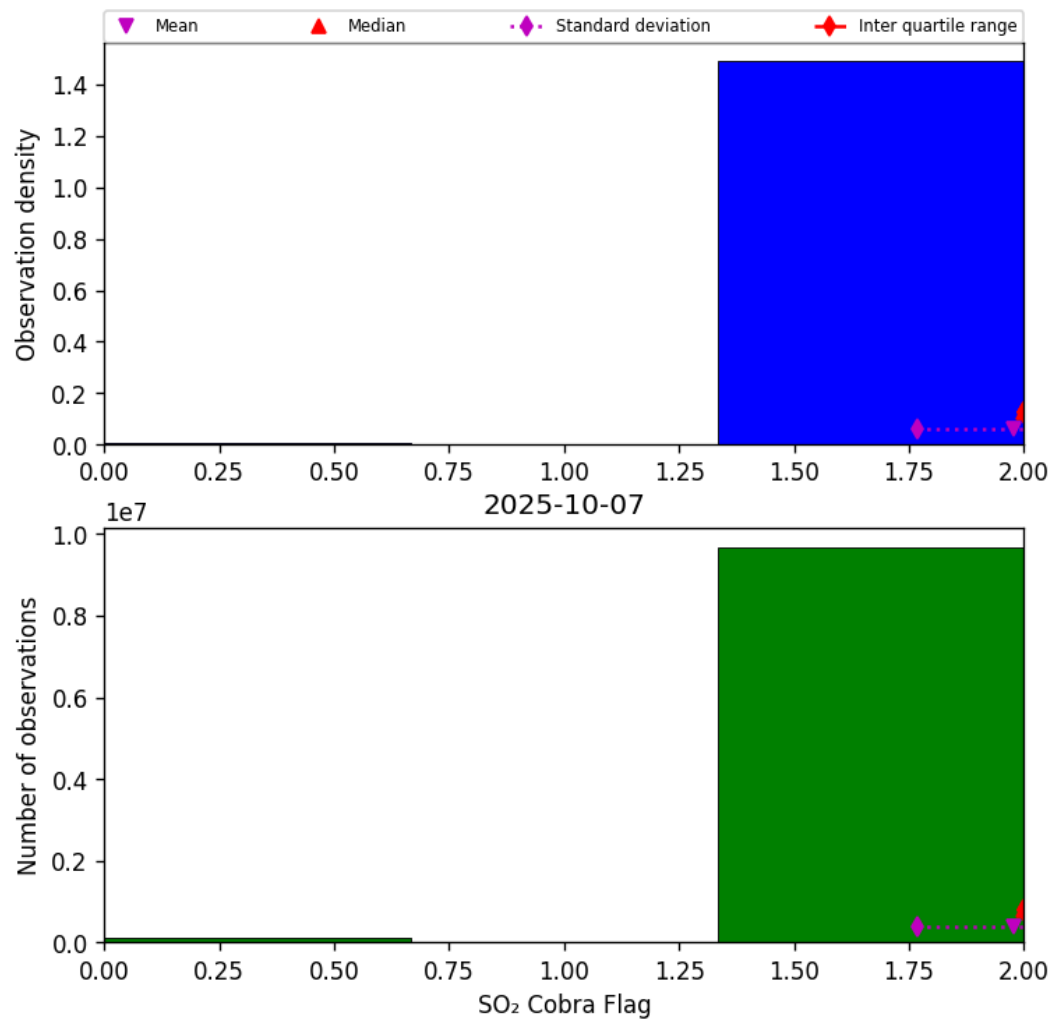


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-10-07 to 2025-10-07

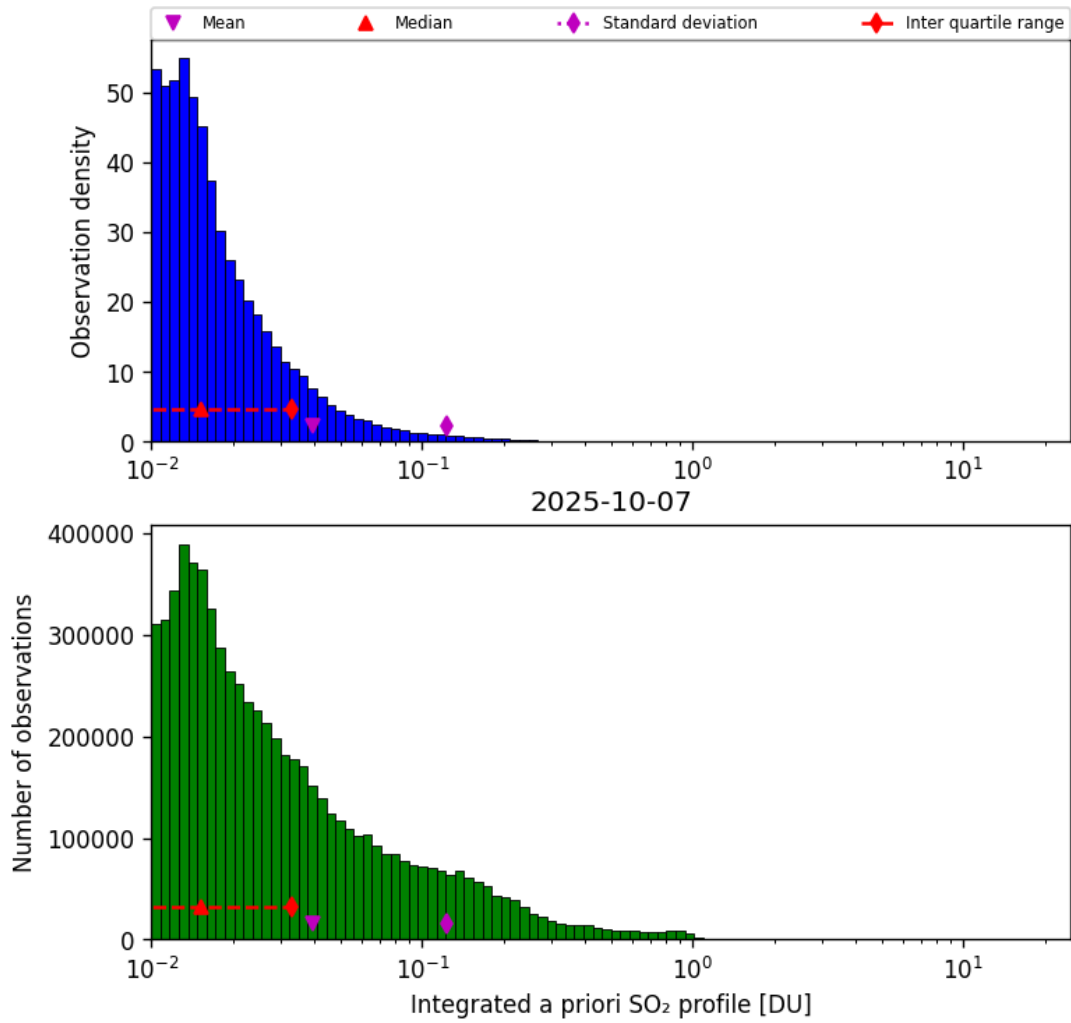


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-10-07 to 2025-10-07

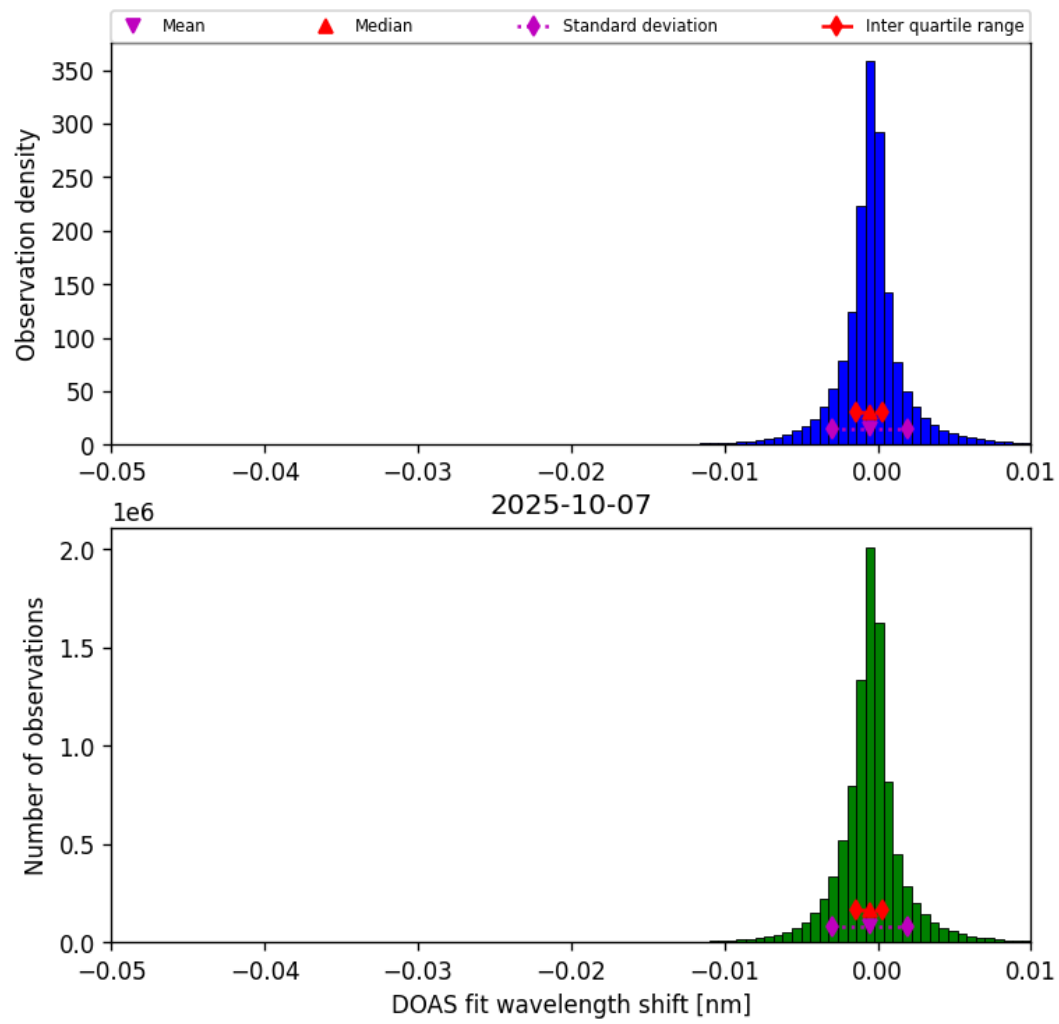


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-10-07 to 2025-10-07

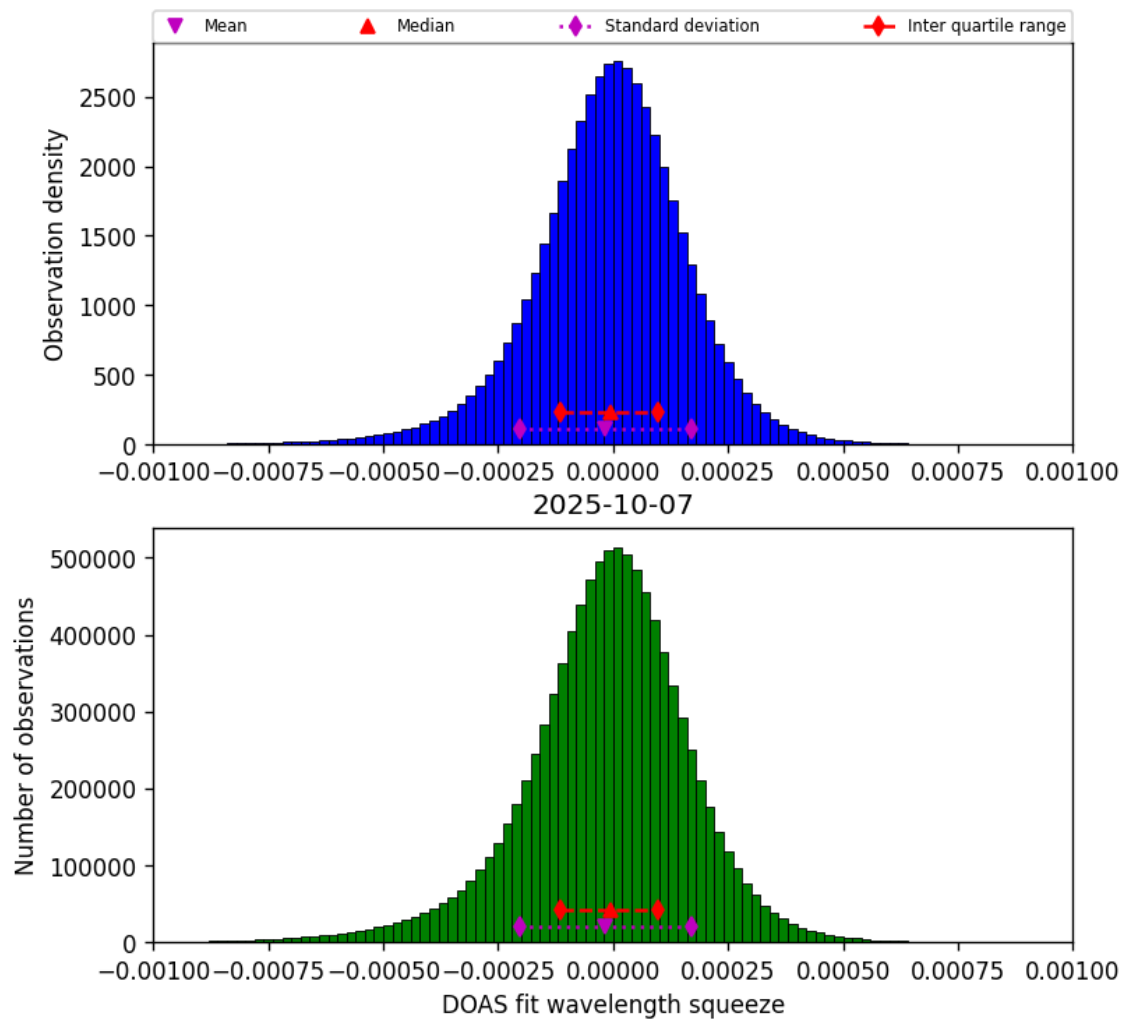


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-10-07 to 2025-10-07

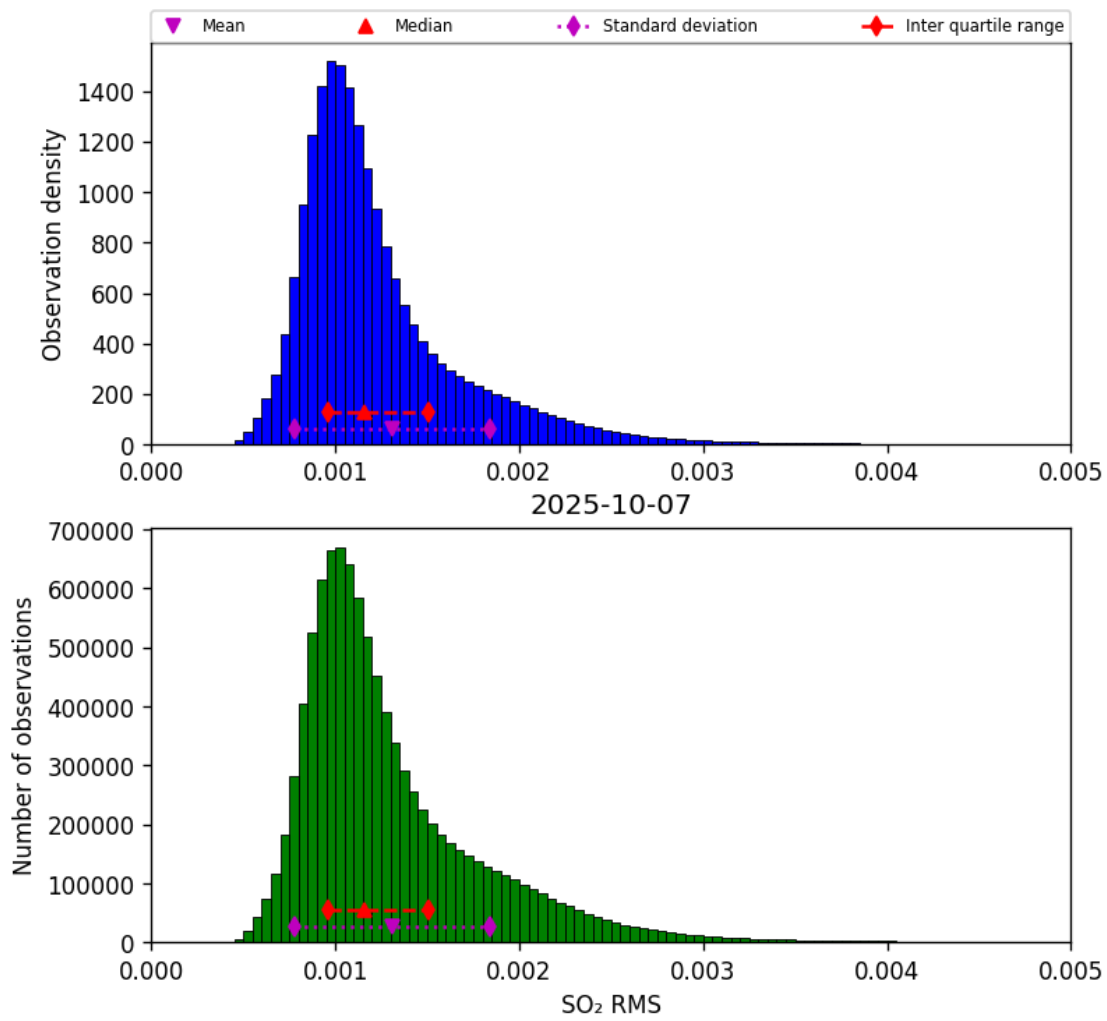


Figure 79: Histogram of “SO₂ RMS” for 2025-10-07 to 2025-10-07

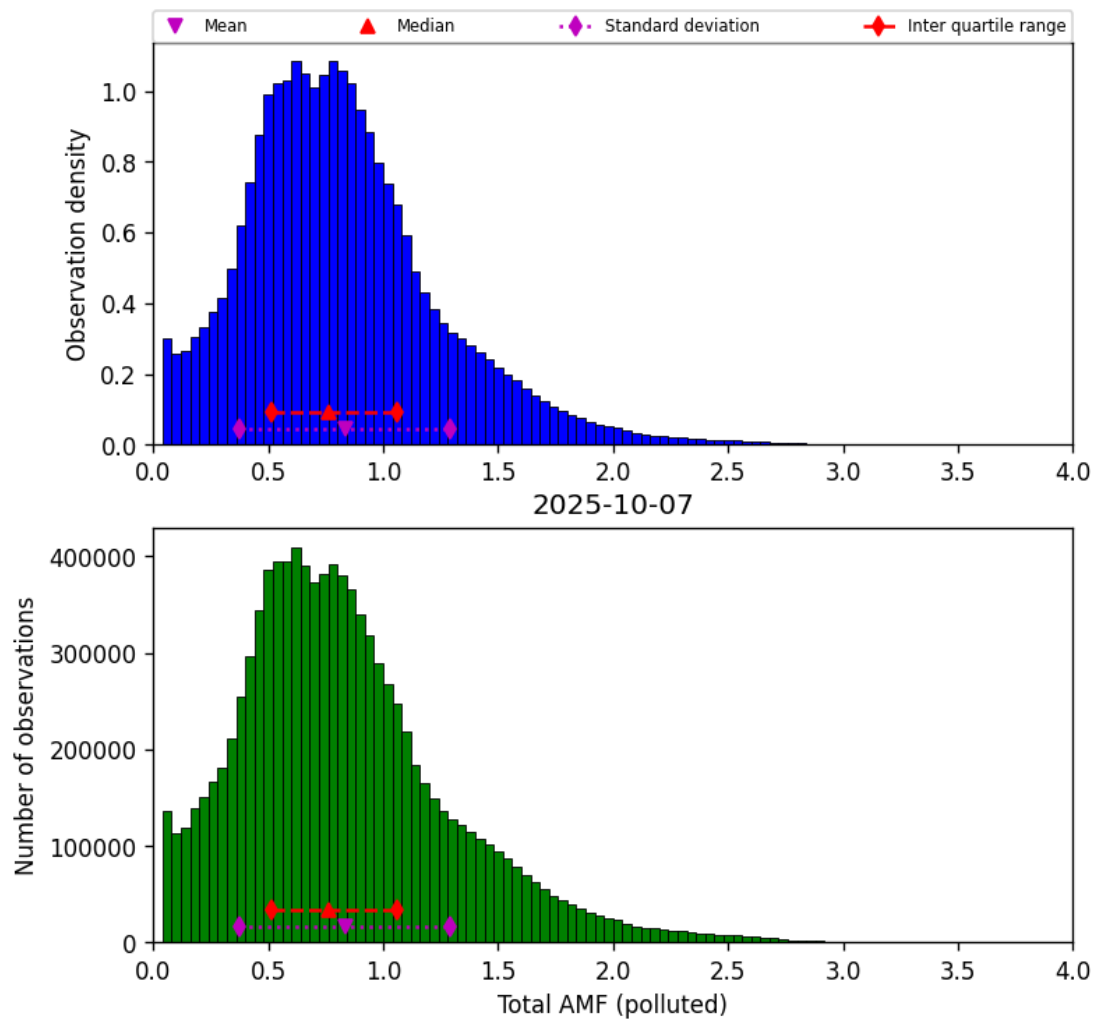


Figure 80: Histogram of “Total AMF (polluted)” for 2025-10-07 to 2025-10-07

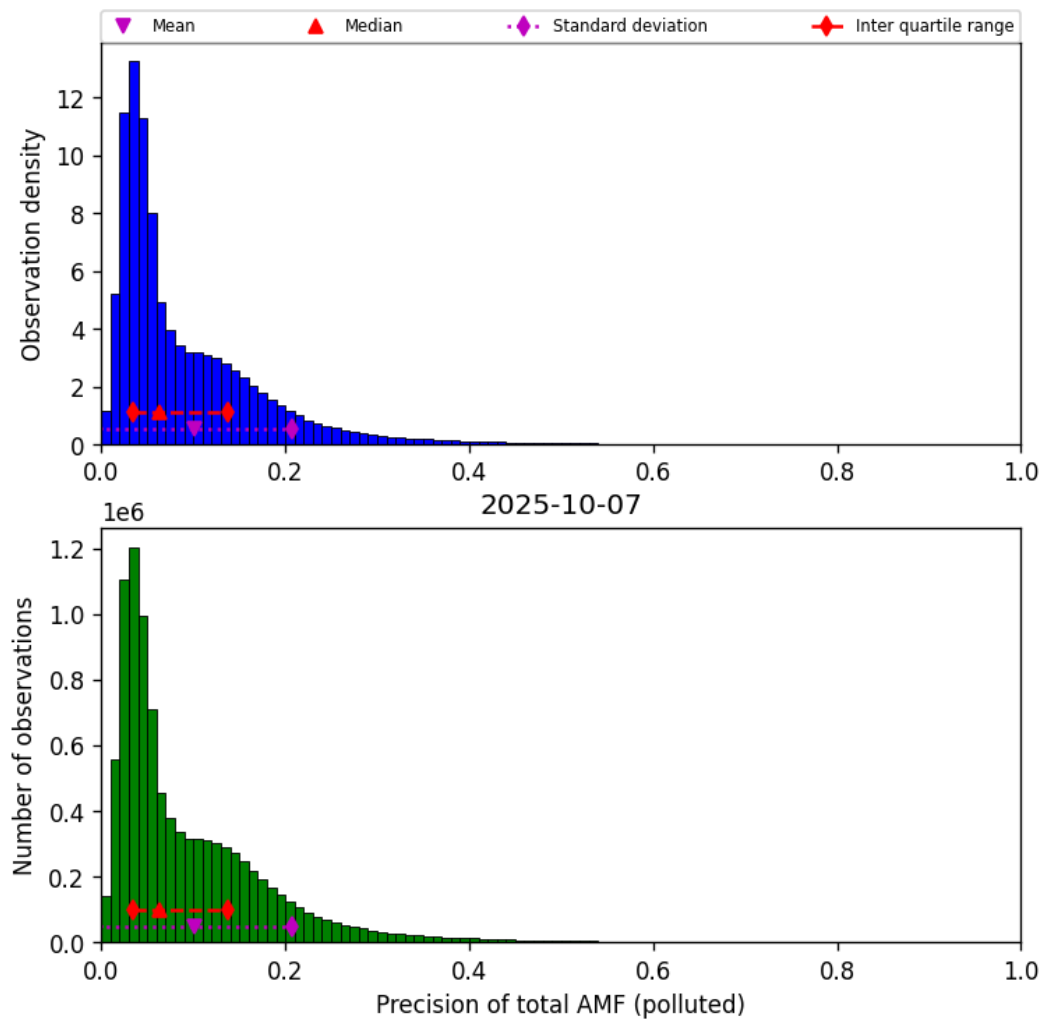


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-10-07 to 2025-10-07

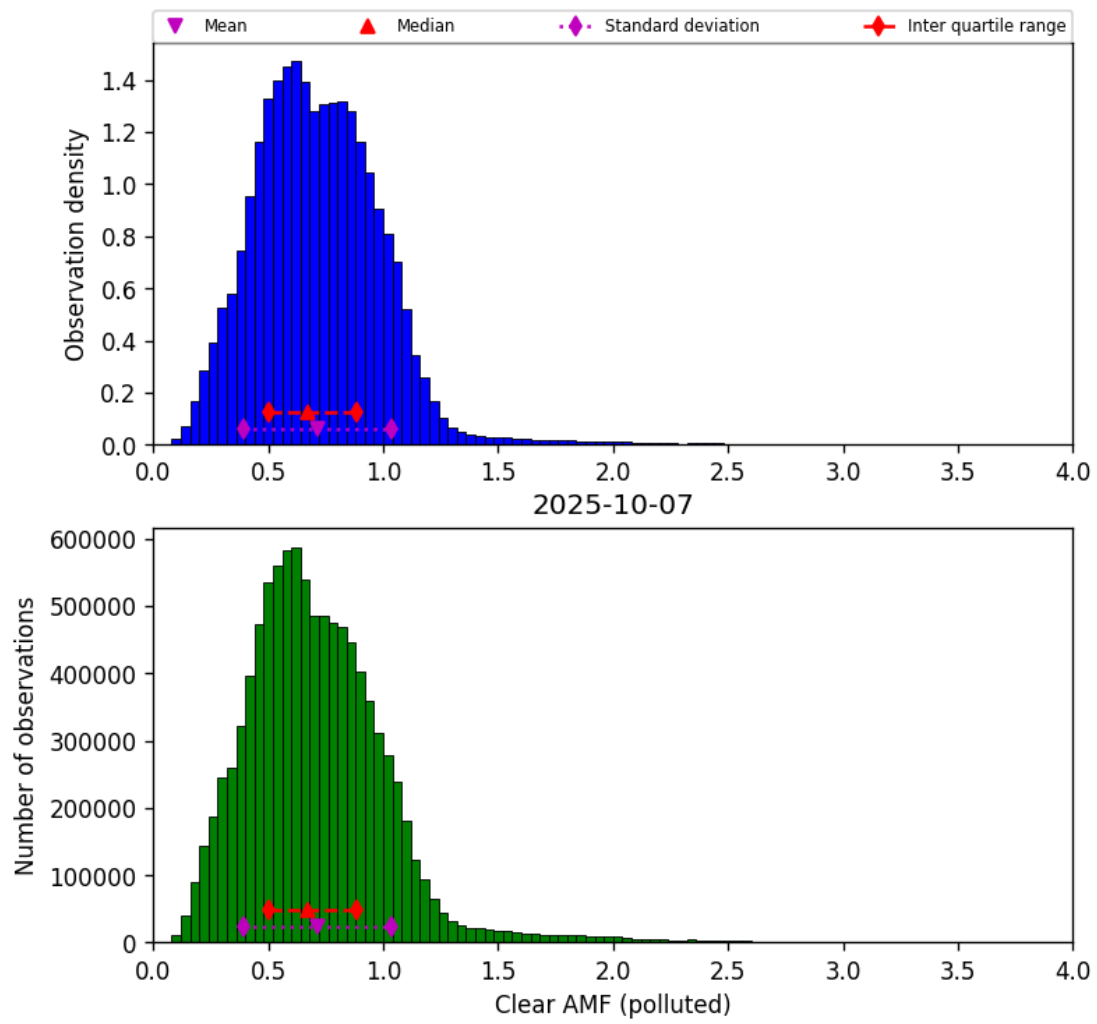


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-10-07 to 2025-10-07

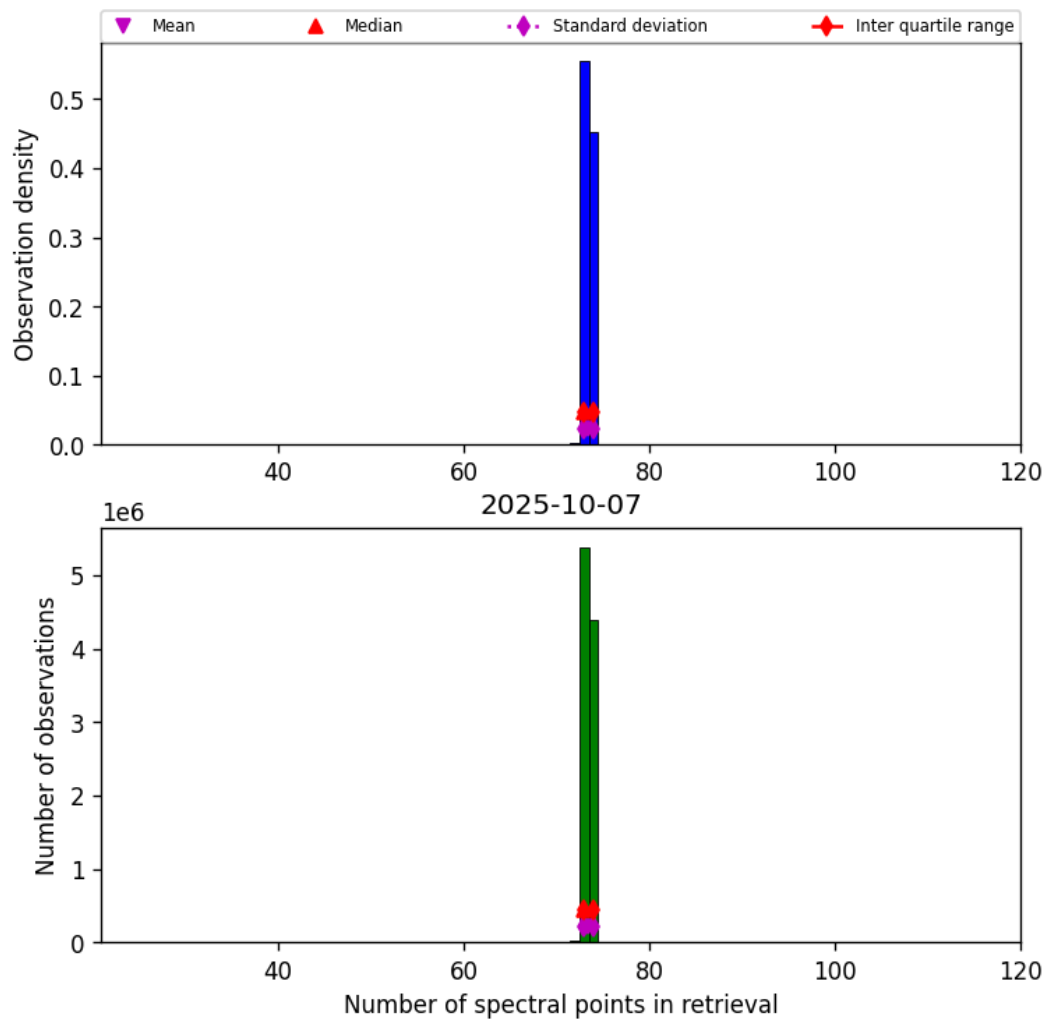


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-10-07 to 2025-10-07

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.

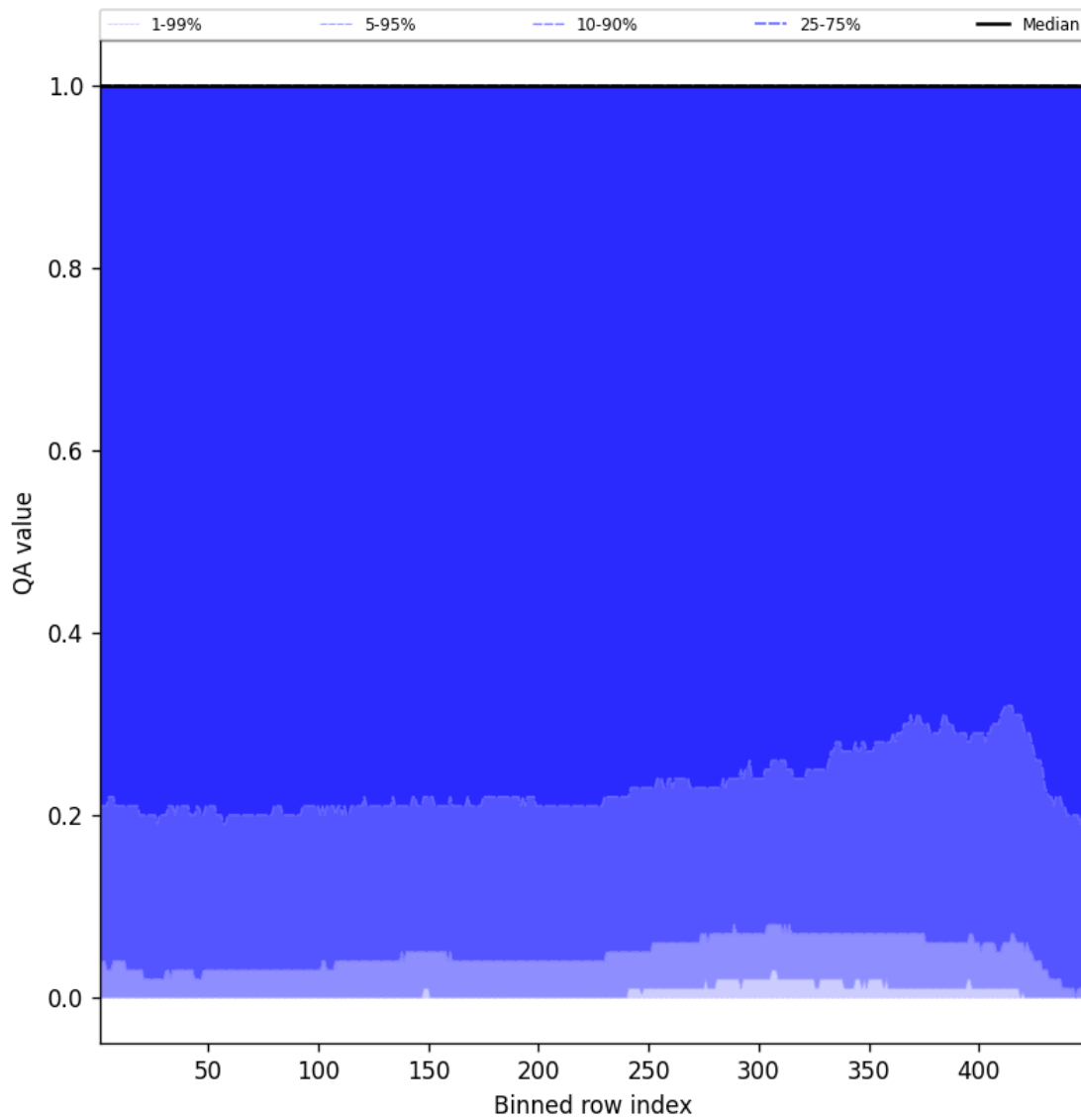


Figure 84: Along track statistics of “QA value” for 2025-10-07 to 2025-10-07

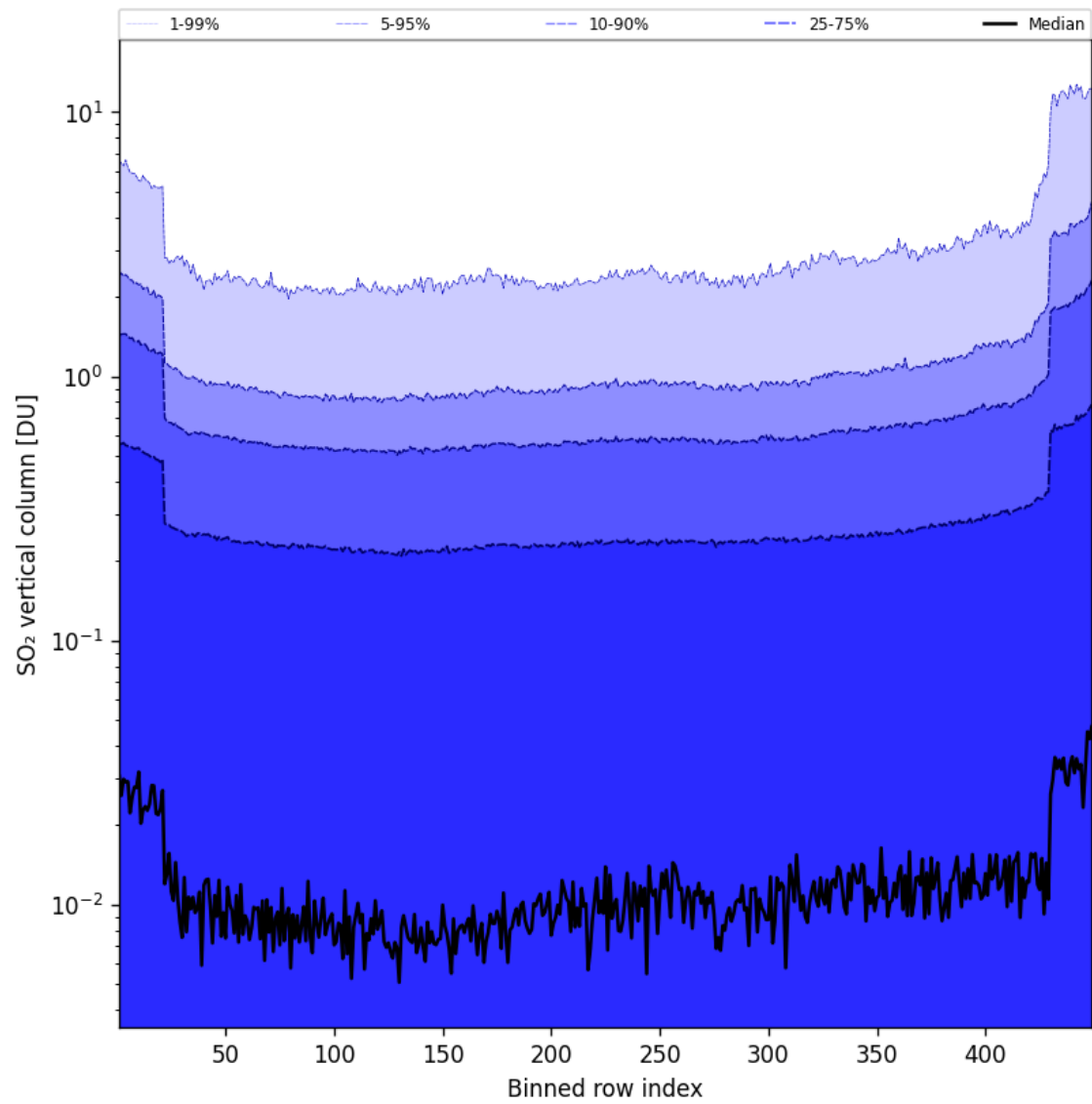


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-10-07 to 2025-10-07

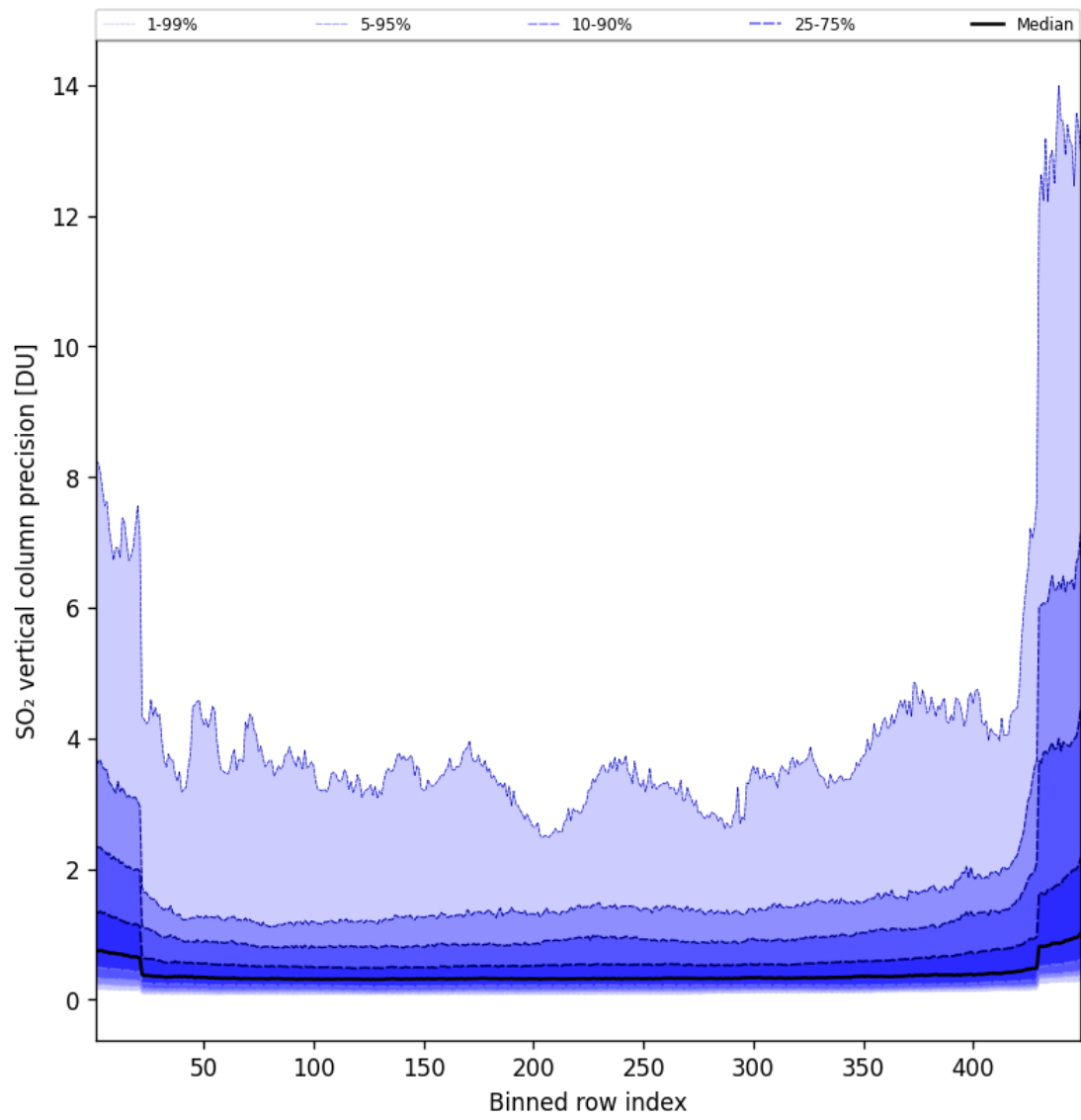


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-10-07 to 2025-10-07

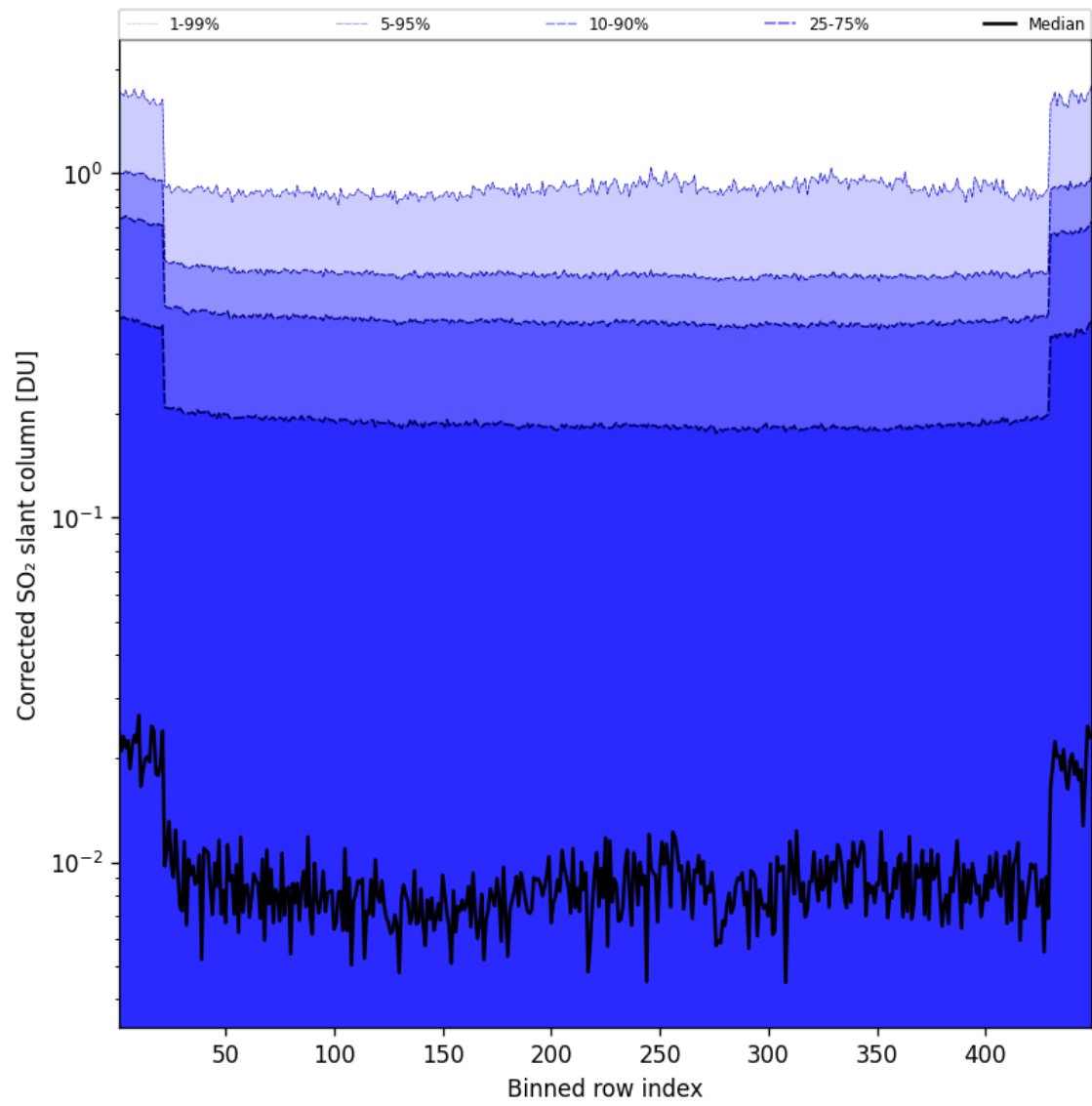


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-10-07 to 2025-10-07

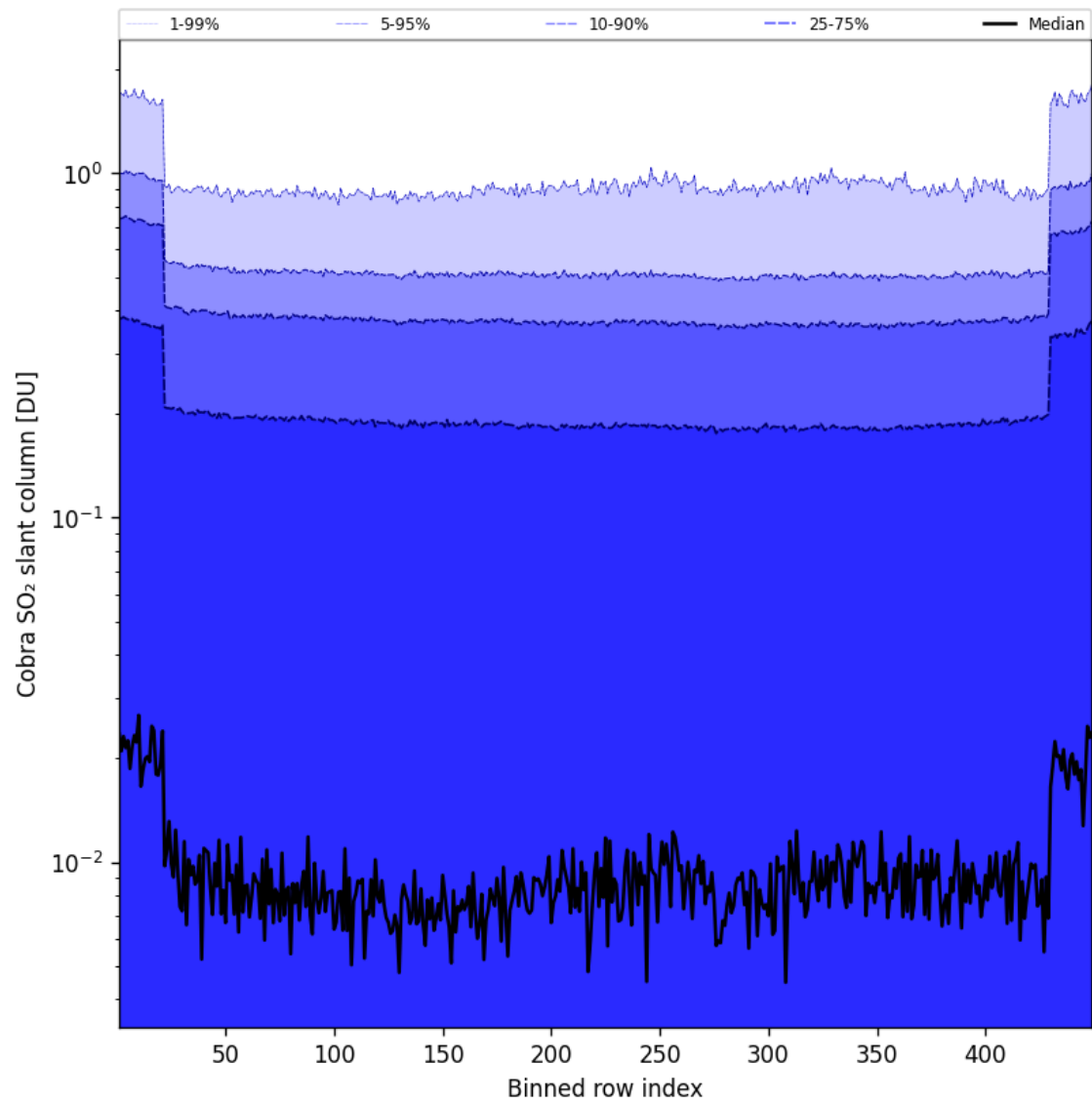


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-10-07 to 2025-10-07

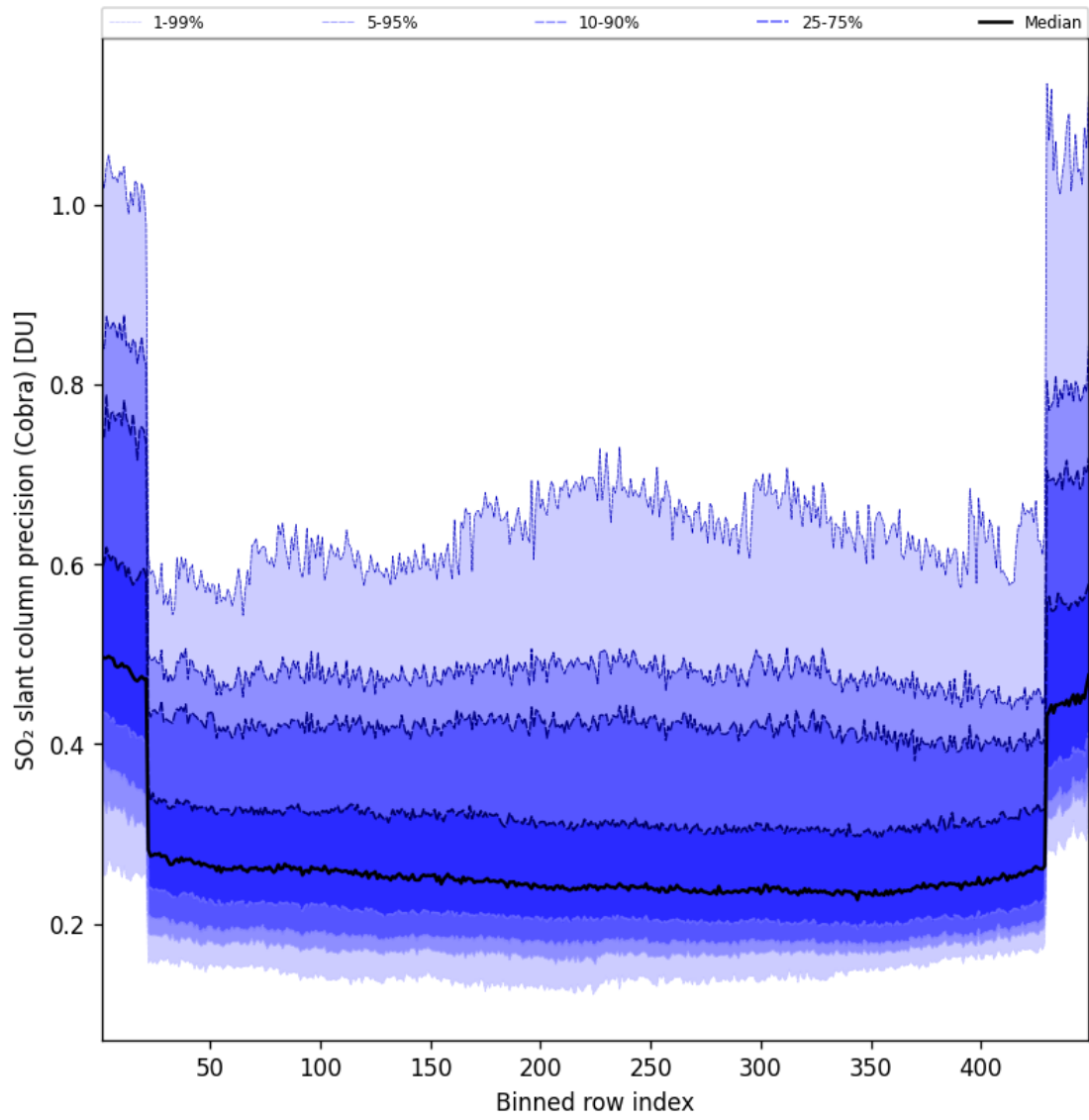


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-10-07 to 2025-10-07

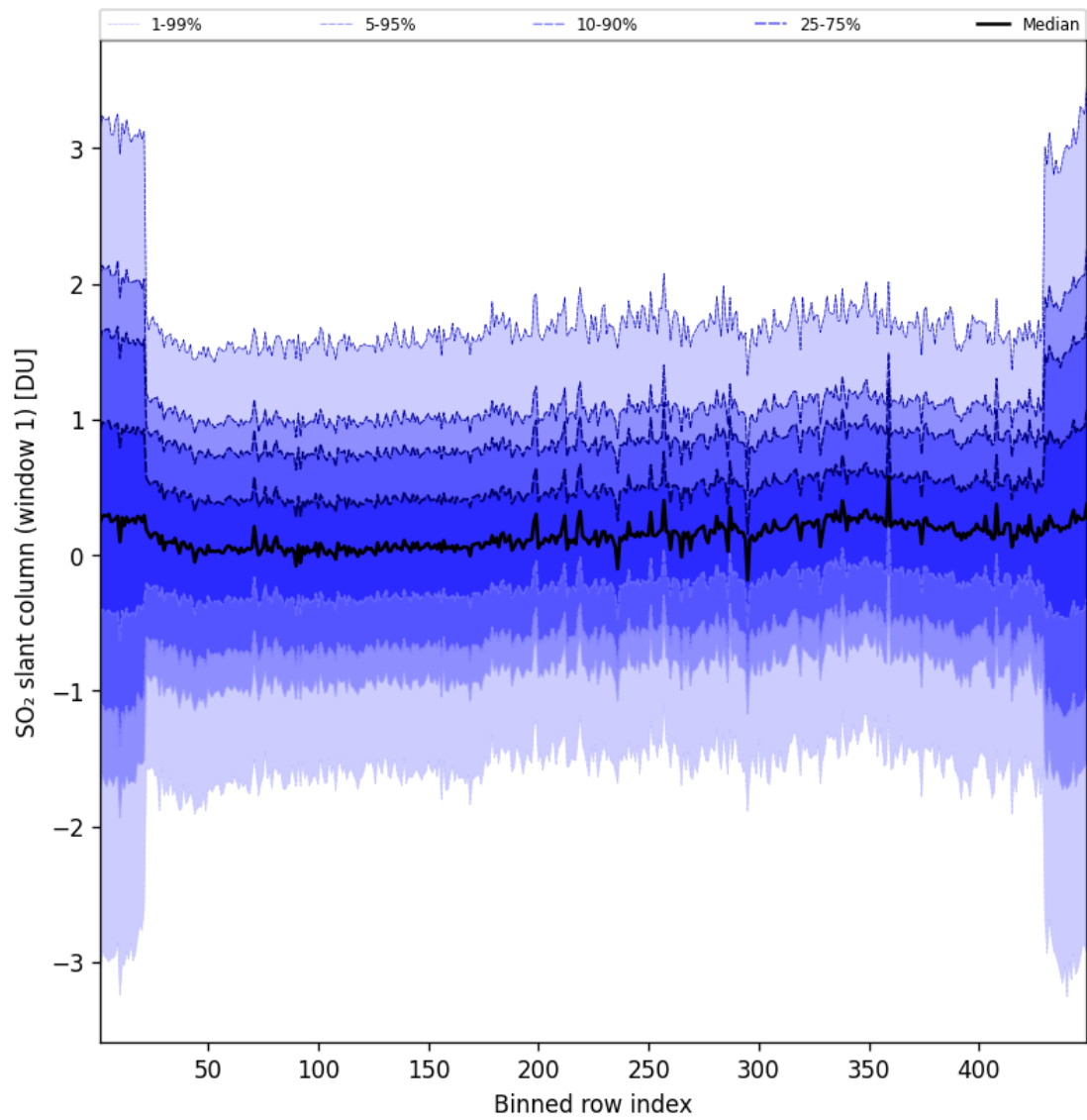


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-10-07 to 2025-10-07

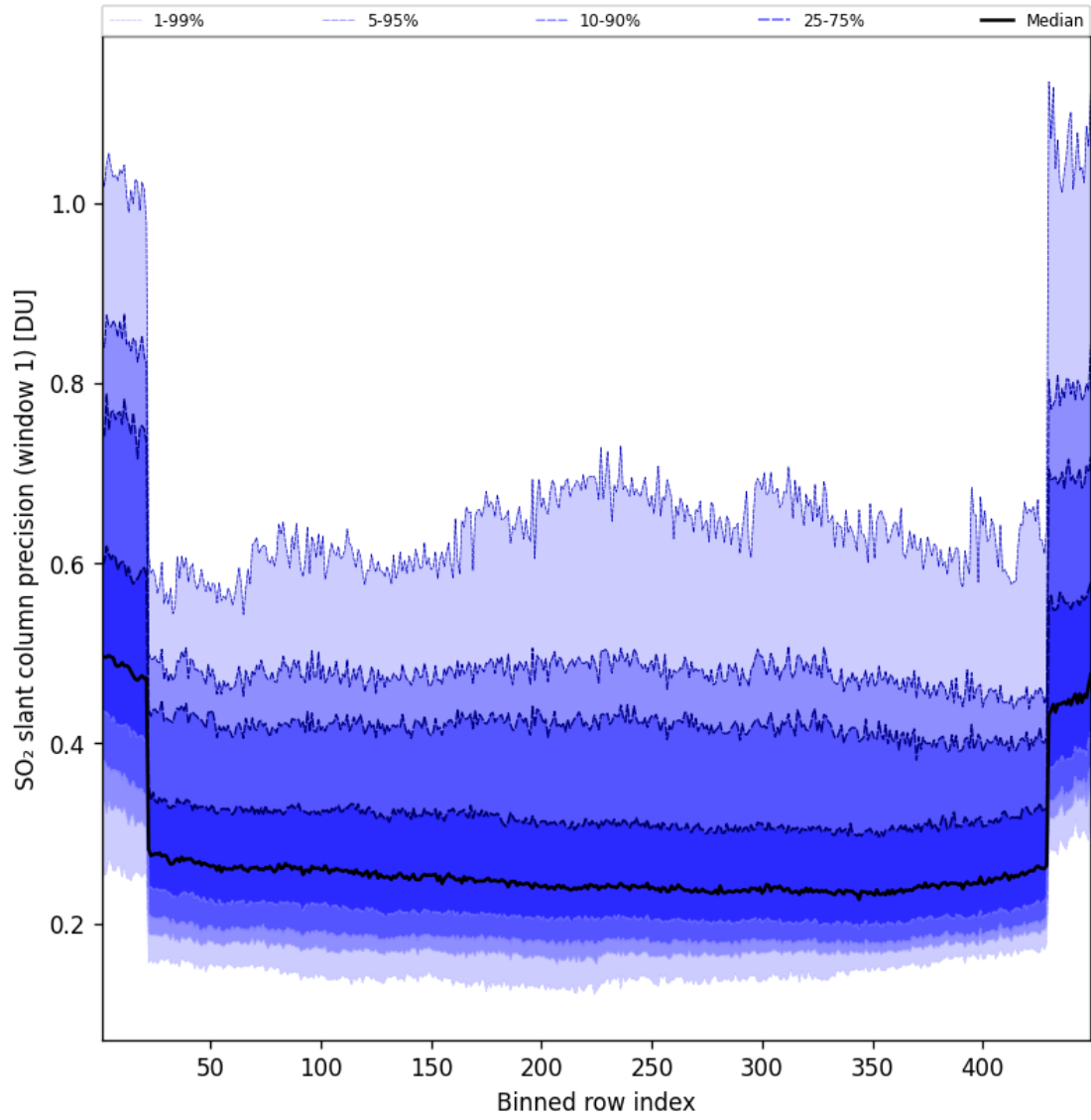


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-10-07 to 2025-10-07

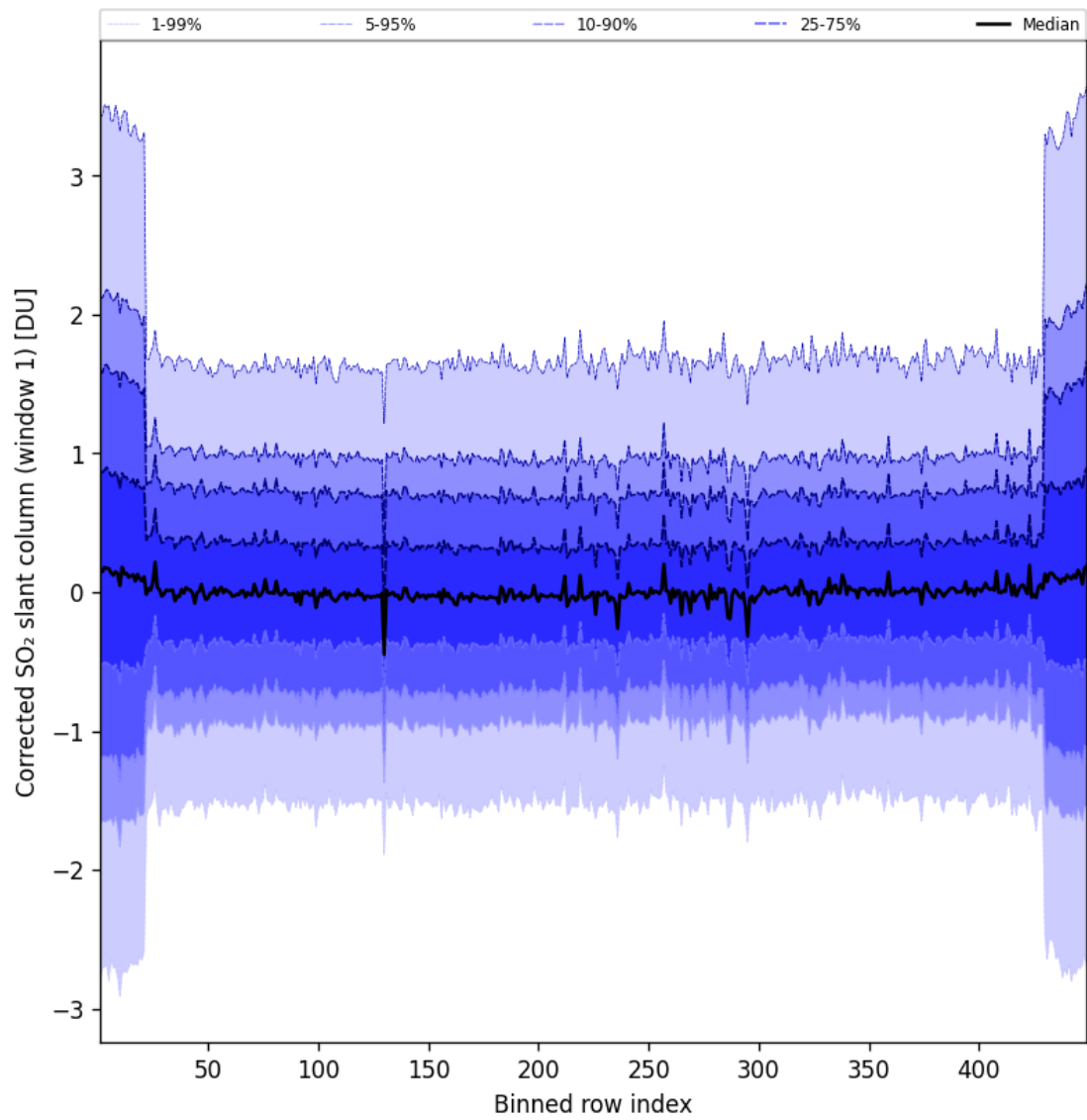


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-10-07 to 2025-10-07

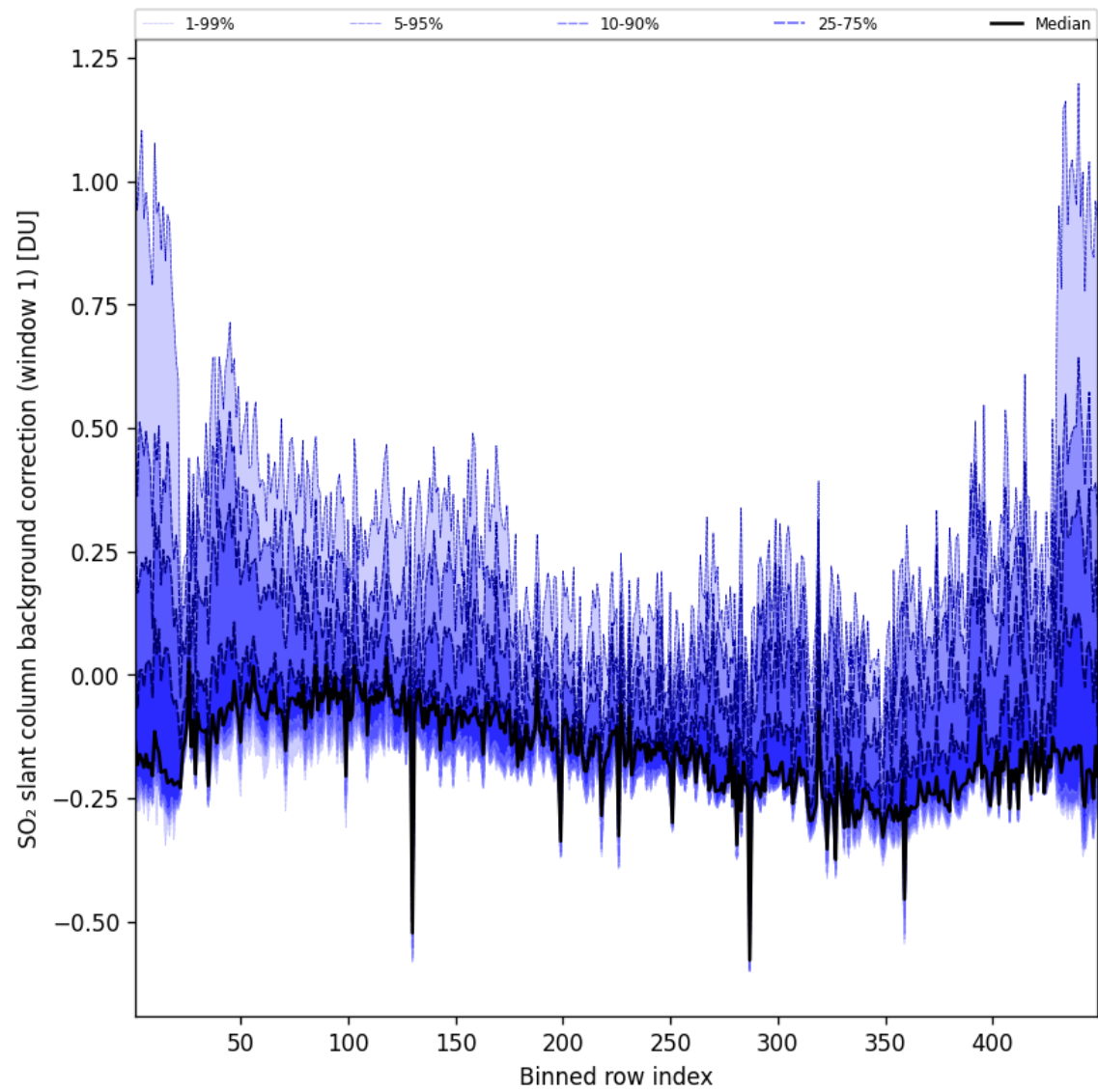


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-10-07 to 2025-10-07

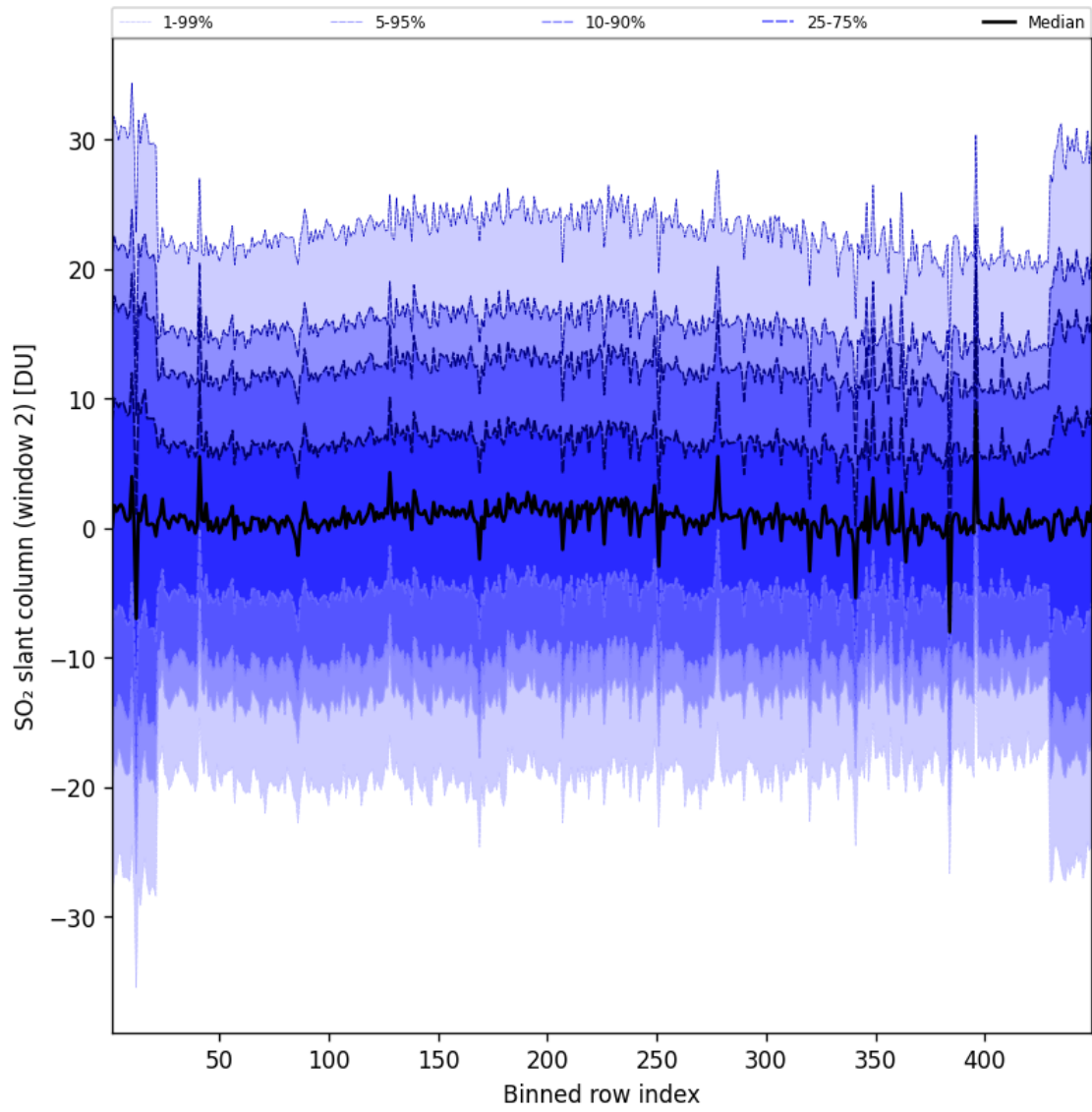


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-10-07 to 2025-10-07

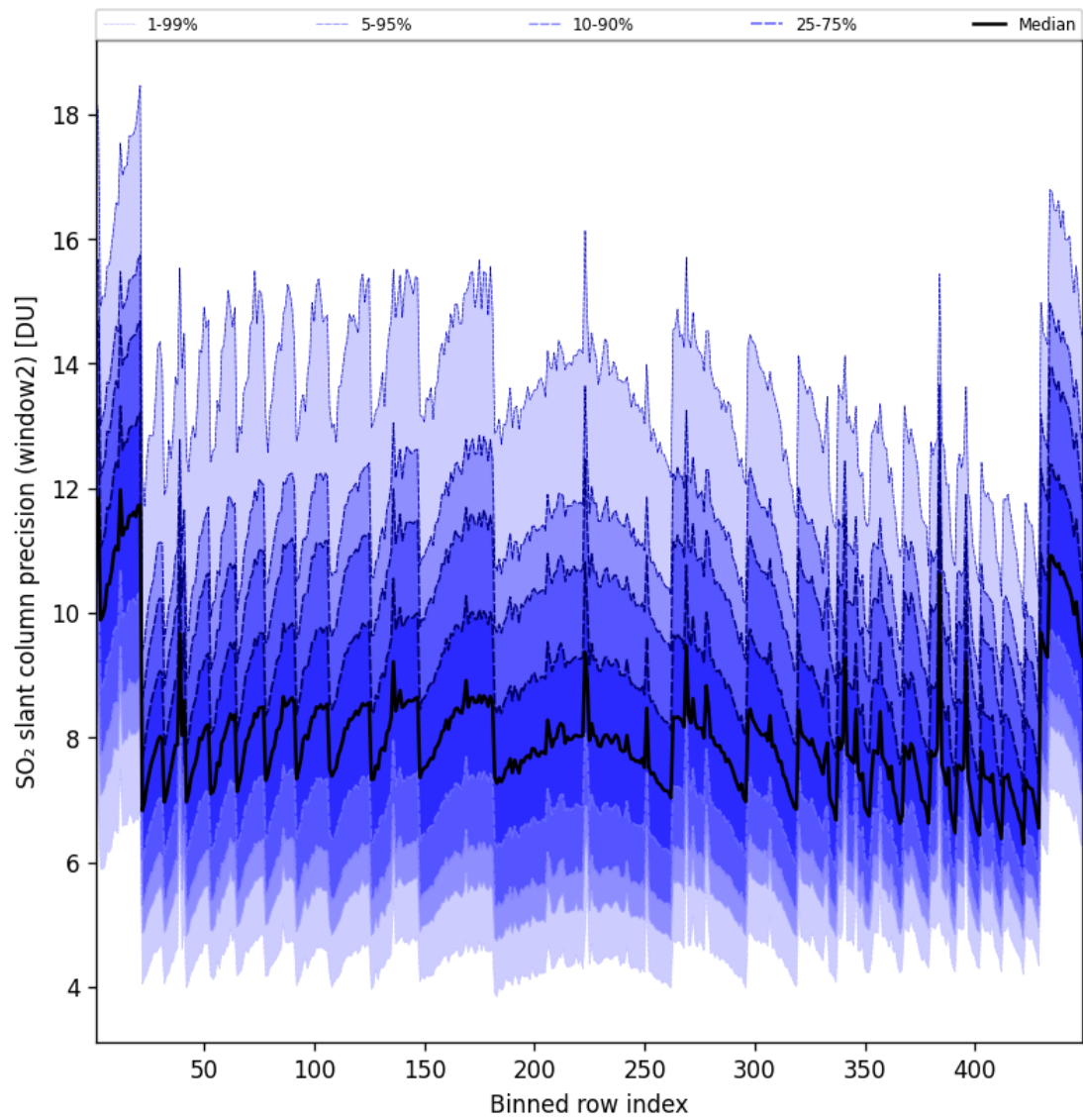


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-10-07 to 2025-10-07

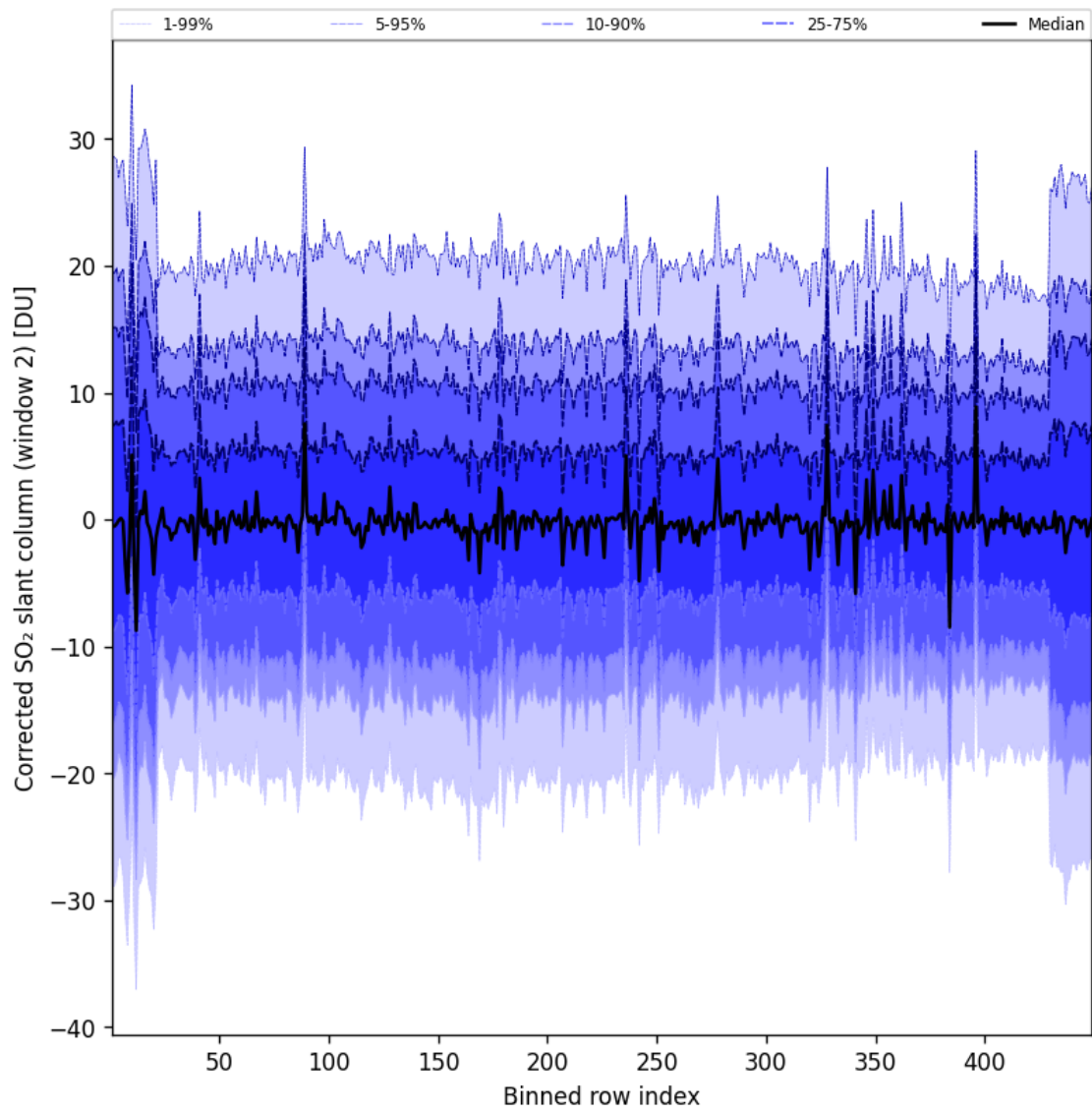


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-10-07 to 2025-10-07

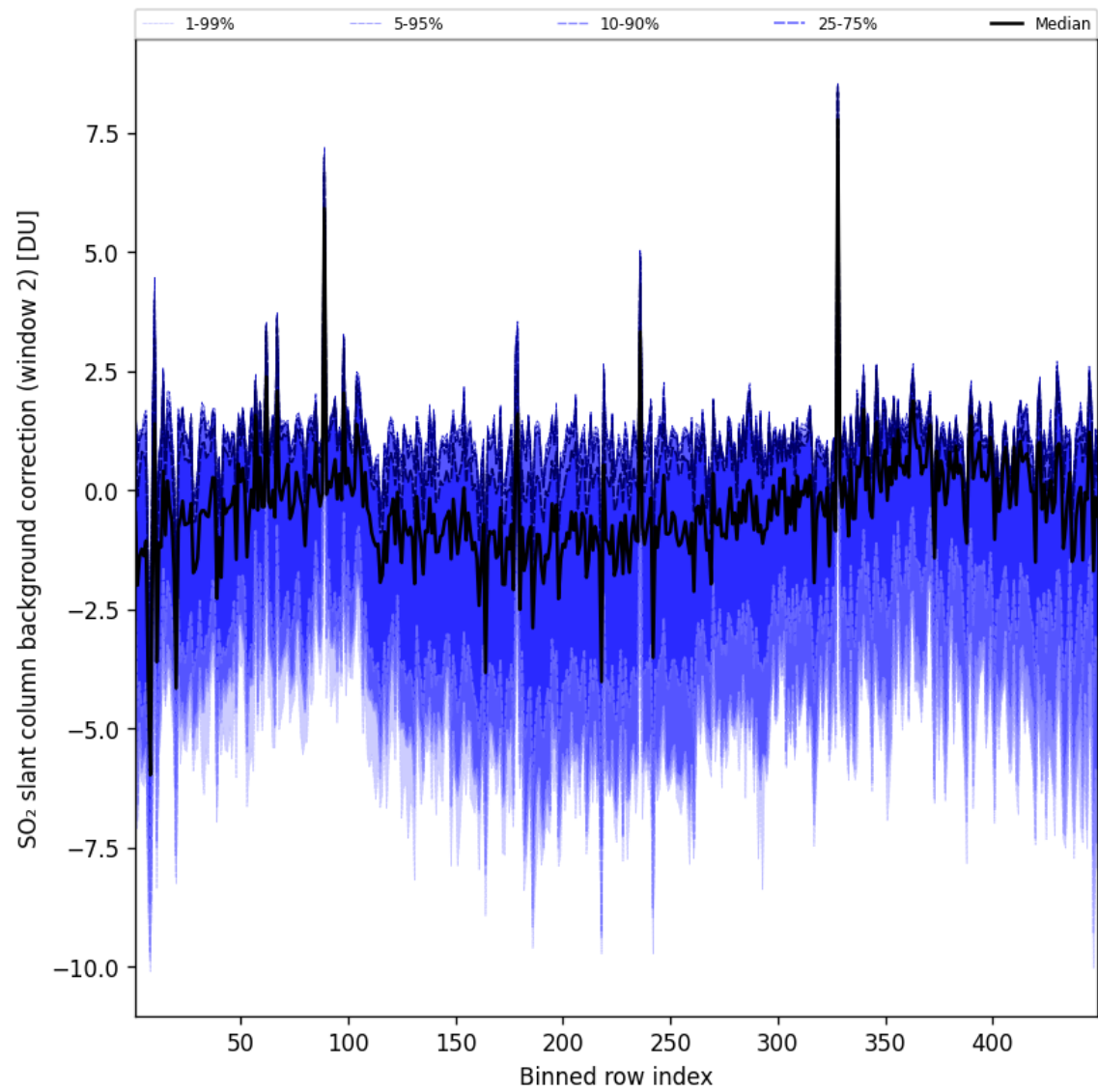


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-10-07 to 2025-10-07

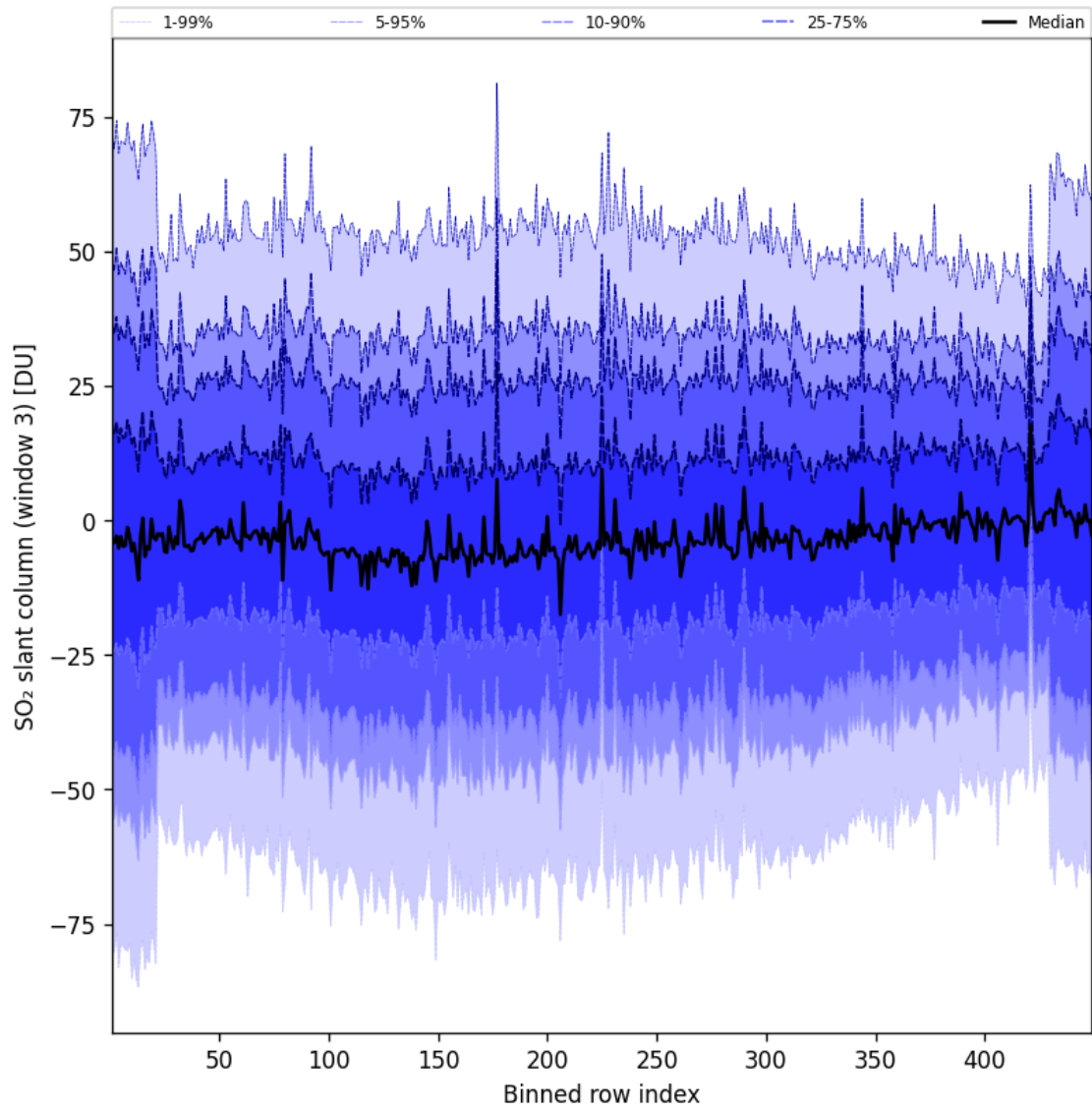


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-10-07 to 2025-10-07

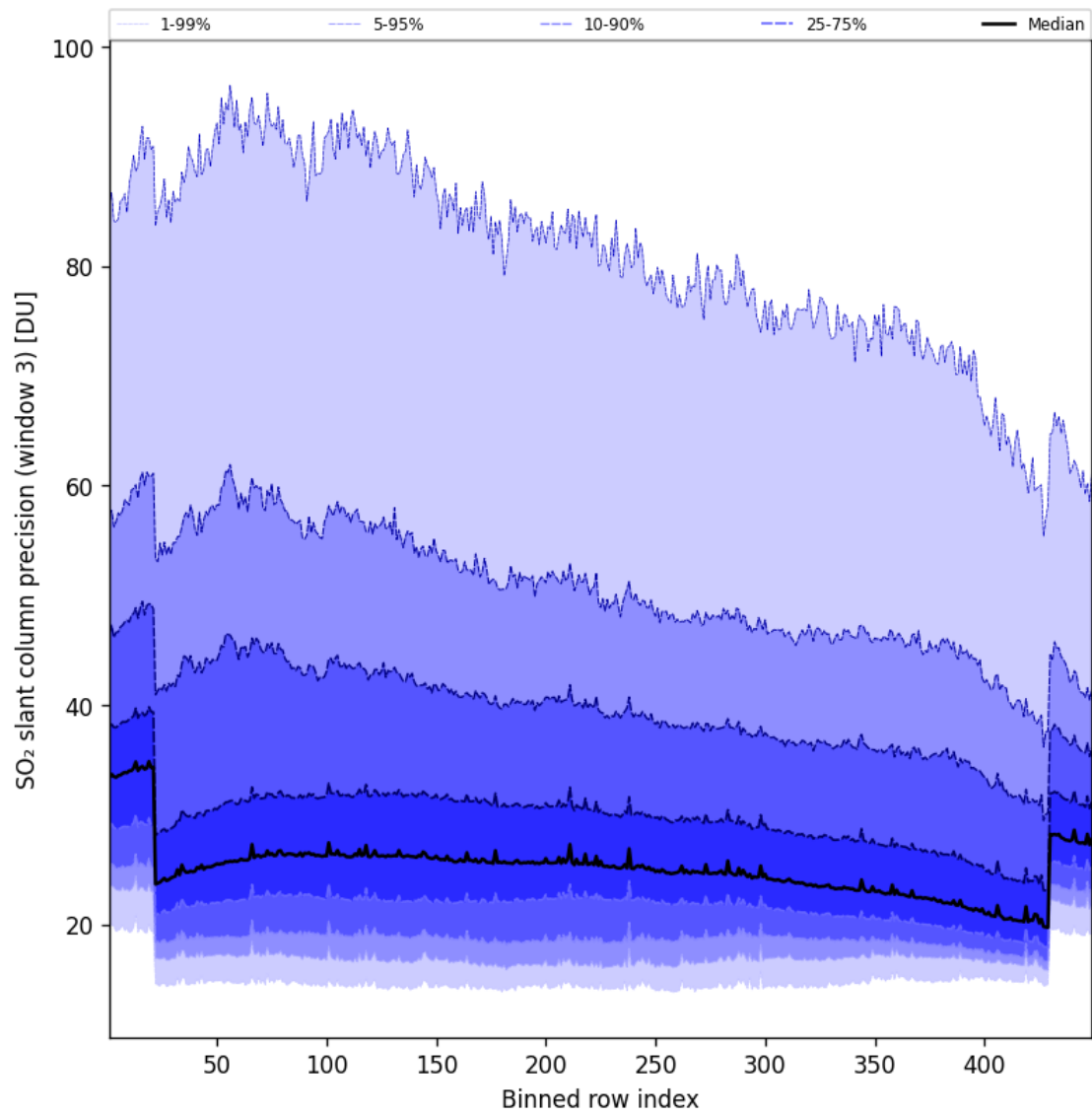


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-10-07 to 2025-10-07

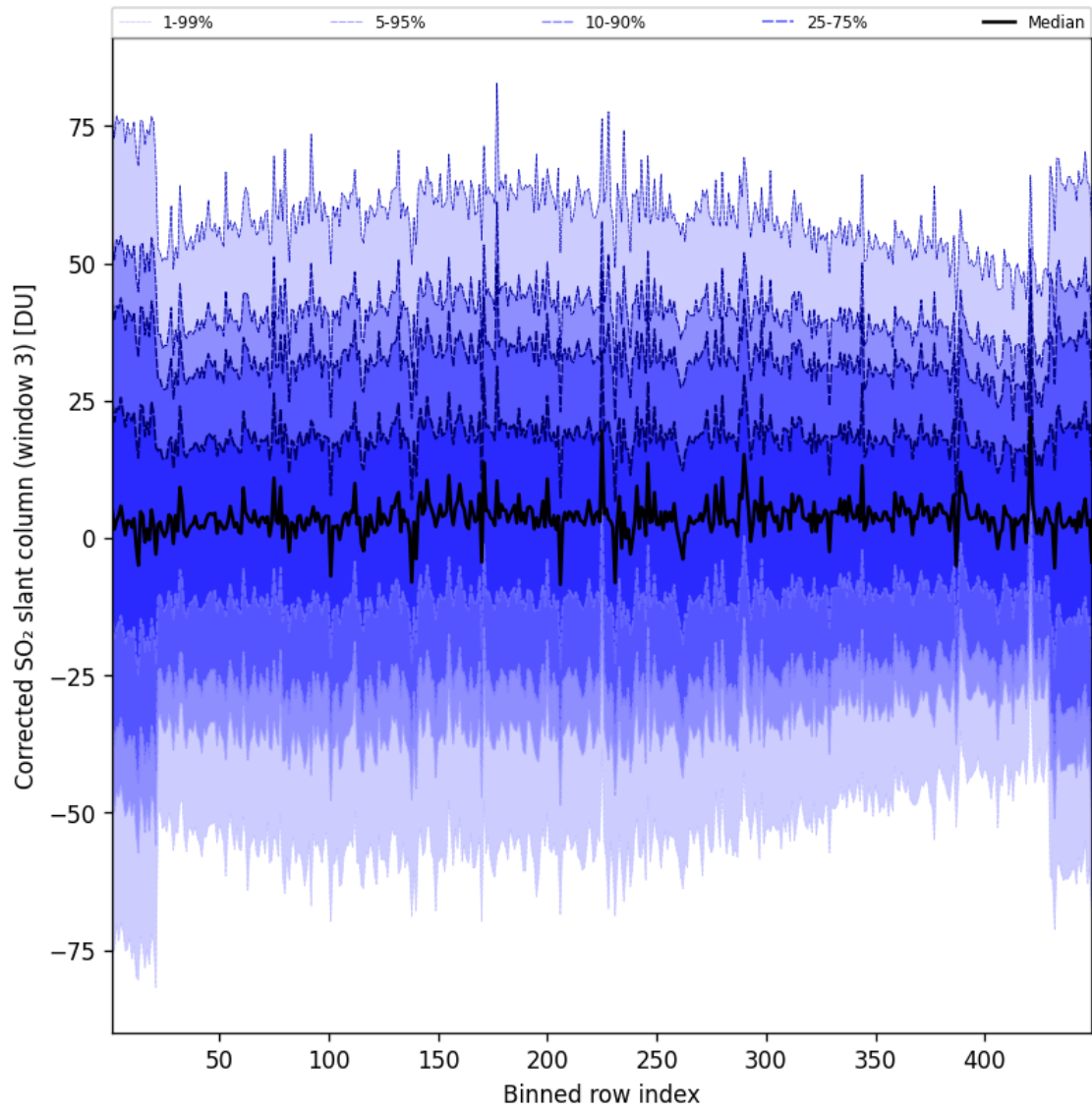


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-10-07 to 2025-10-07

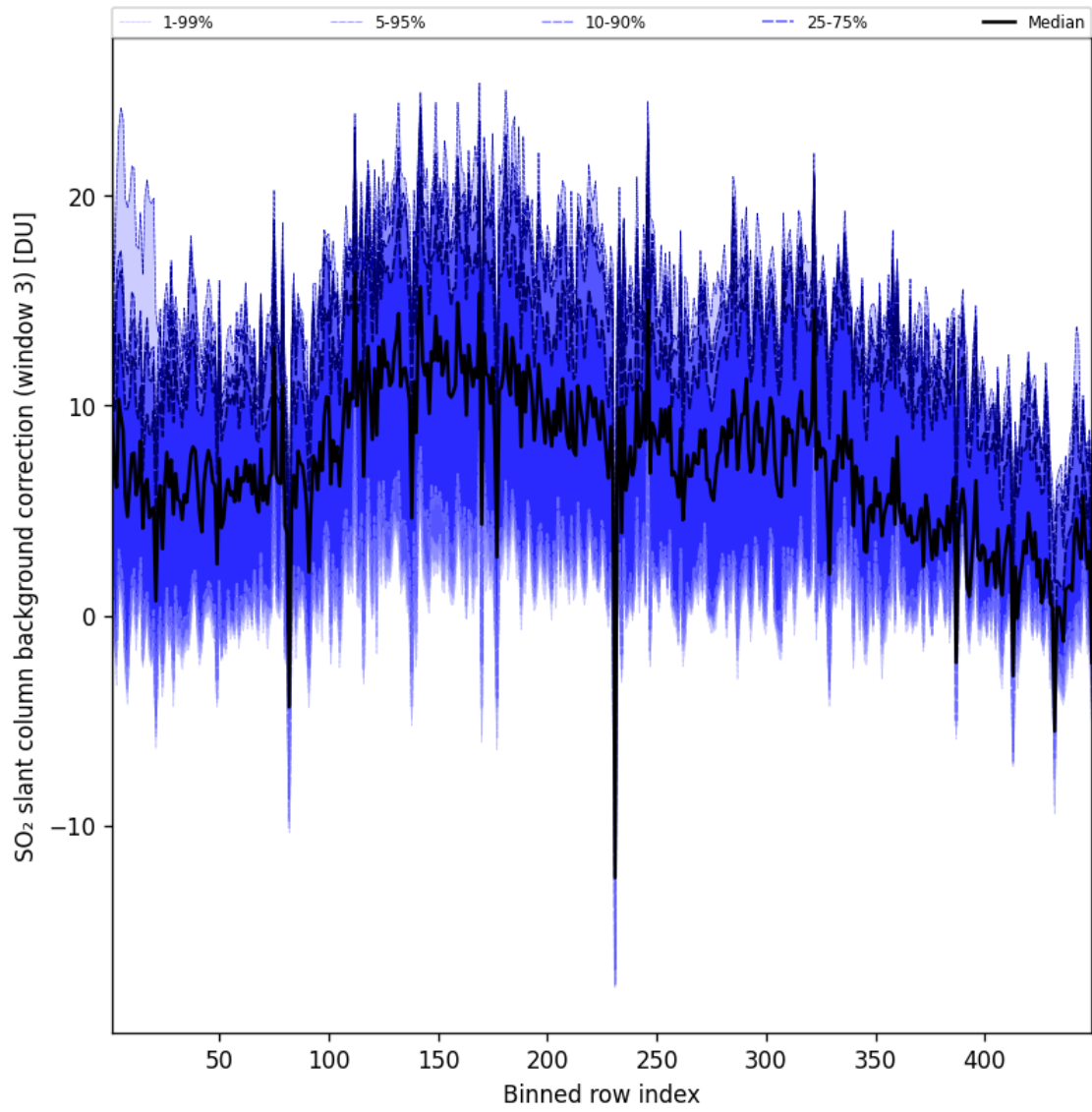


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-10-07 to 2025-10-07

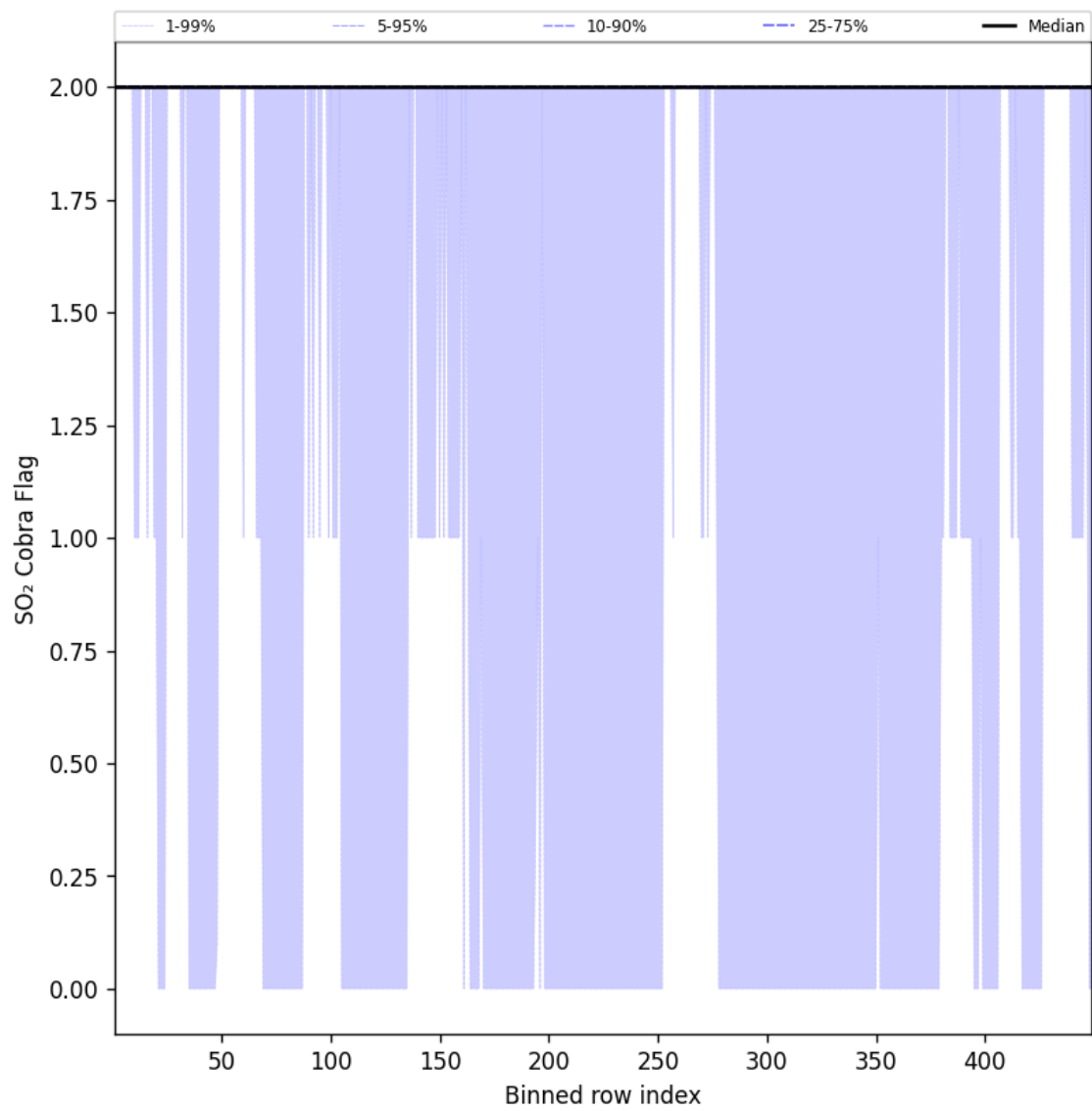


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-10-07 to 2025-10-07

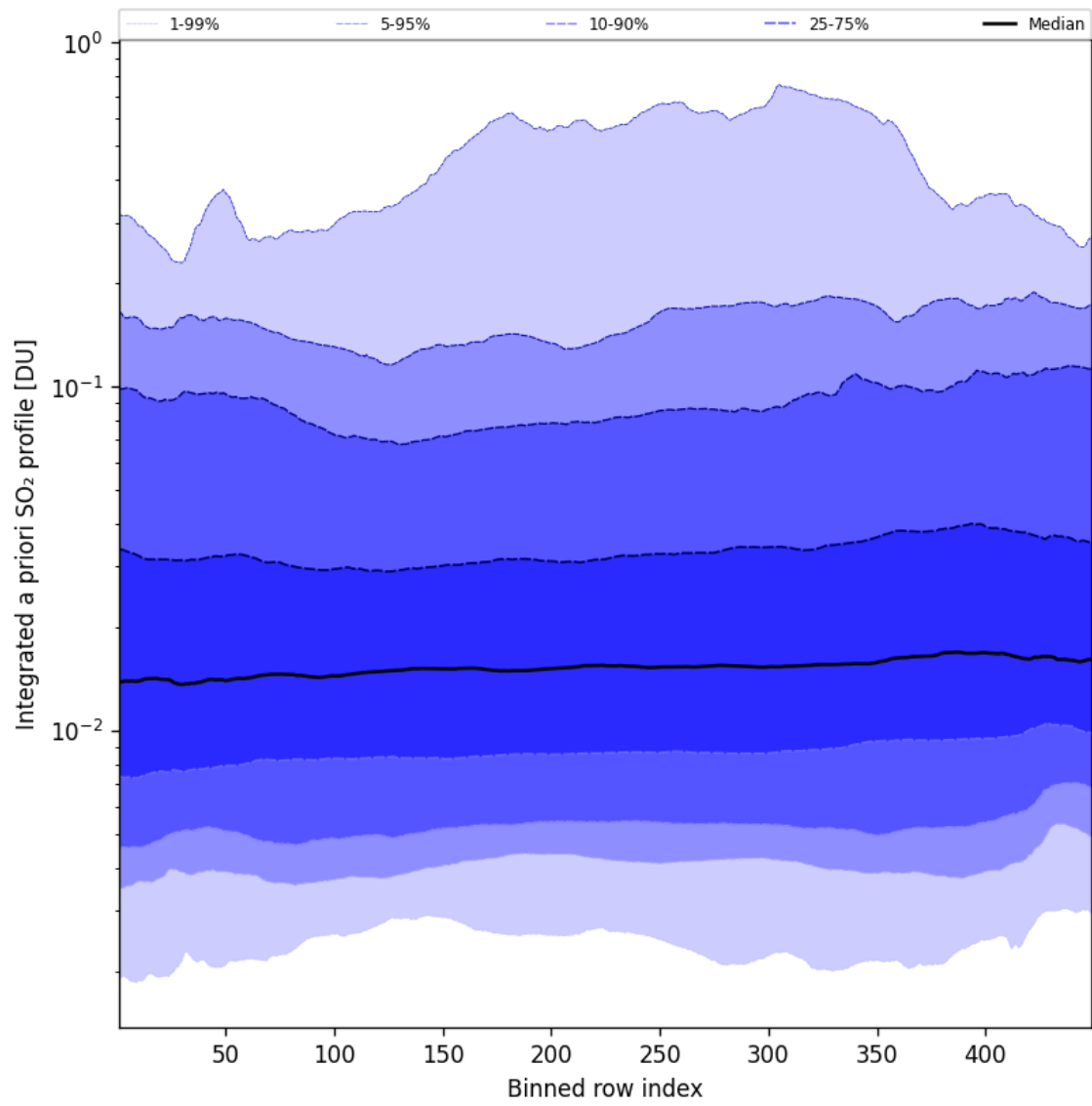


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-10-07 to 2025-10-07

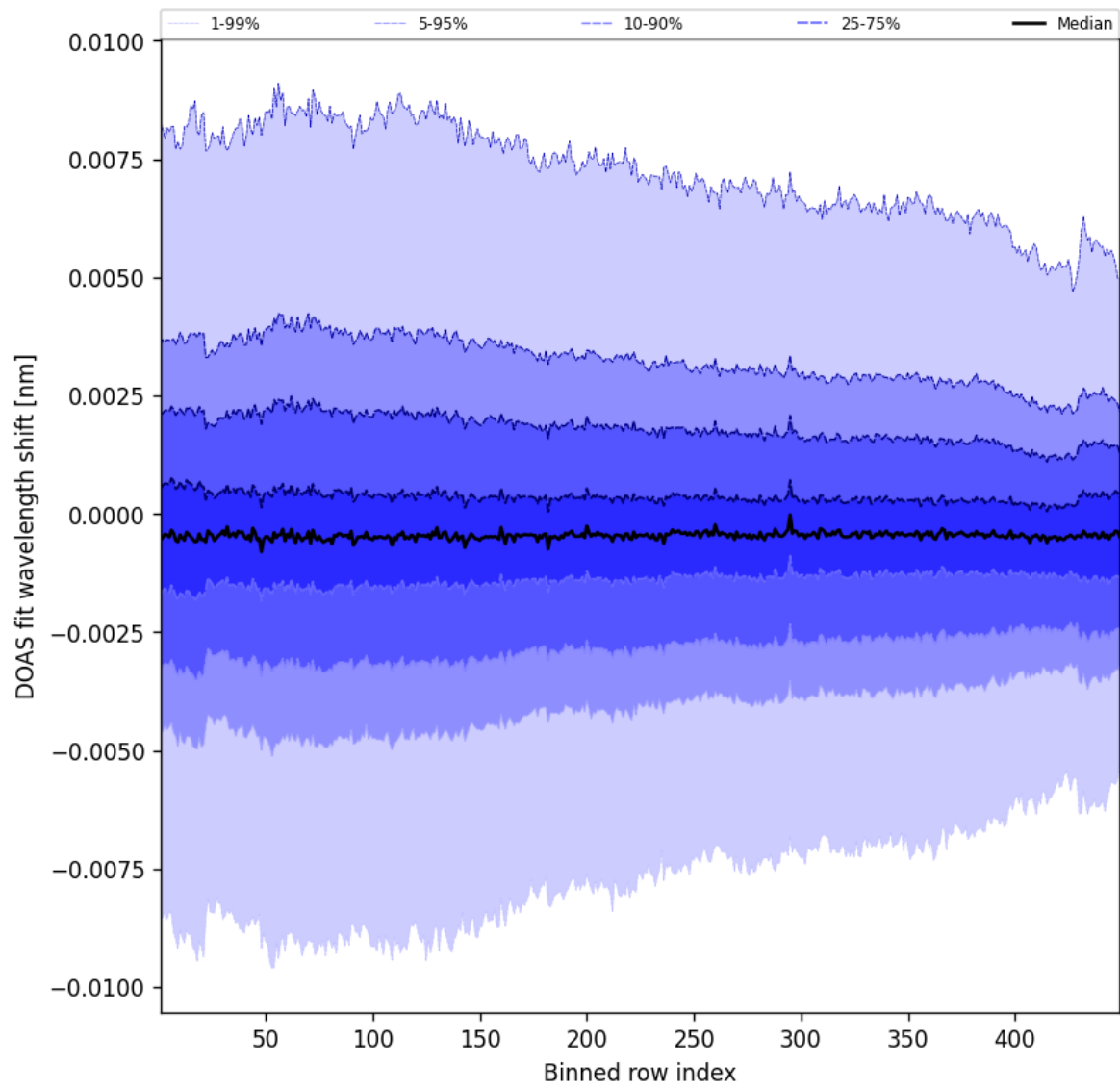


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-10-07 to 2025-10-07

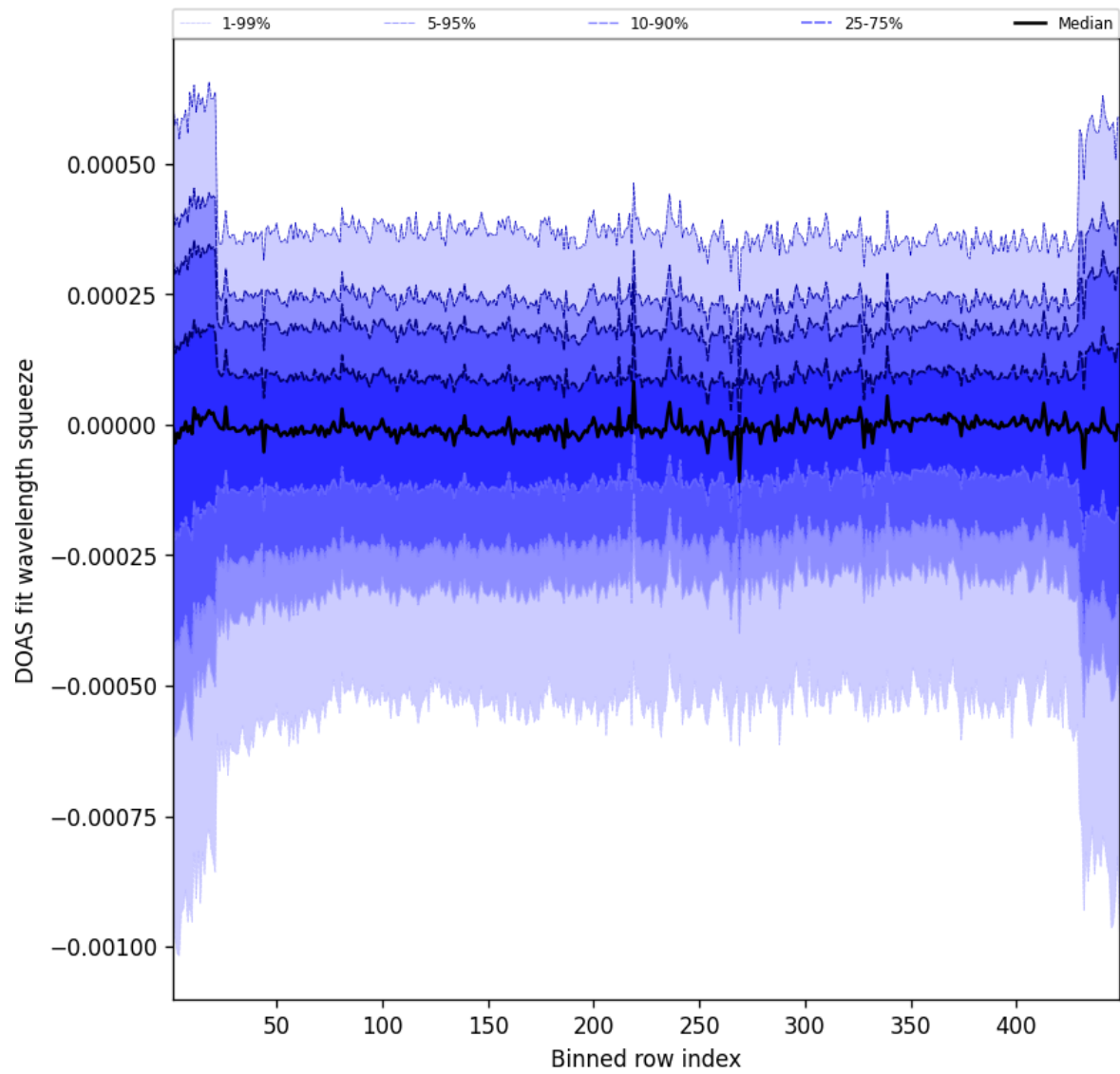


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-10-07 to 2025-10-07

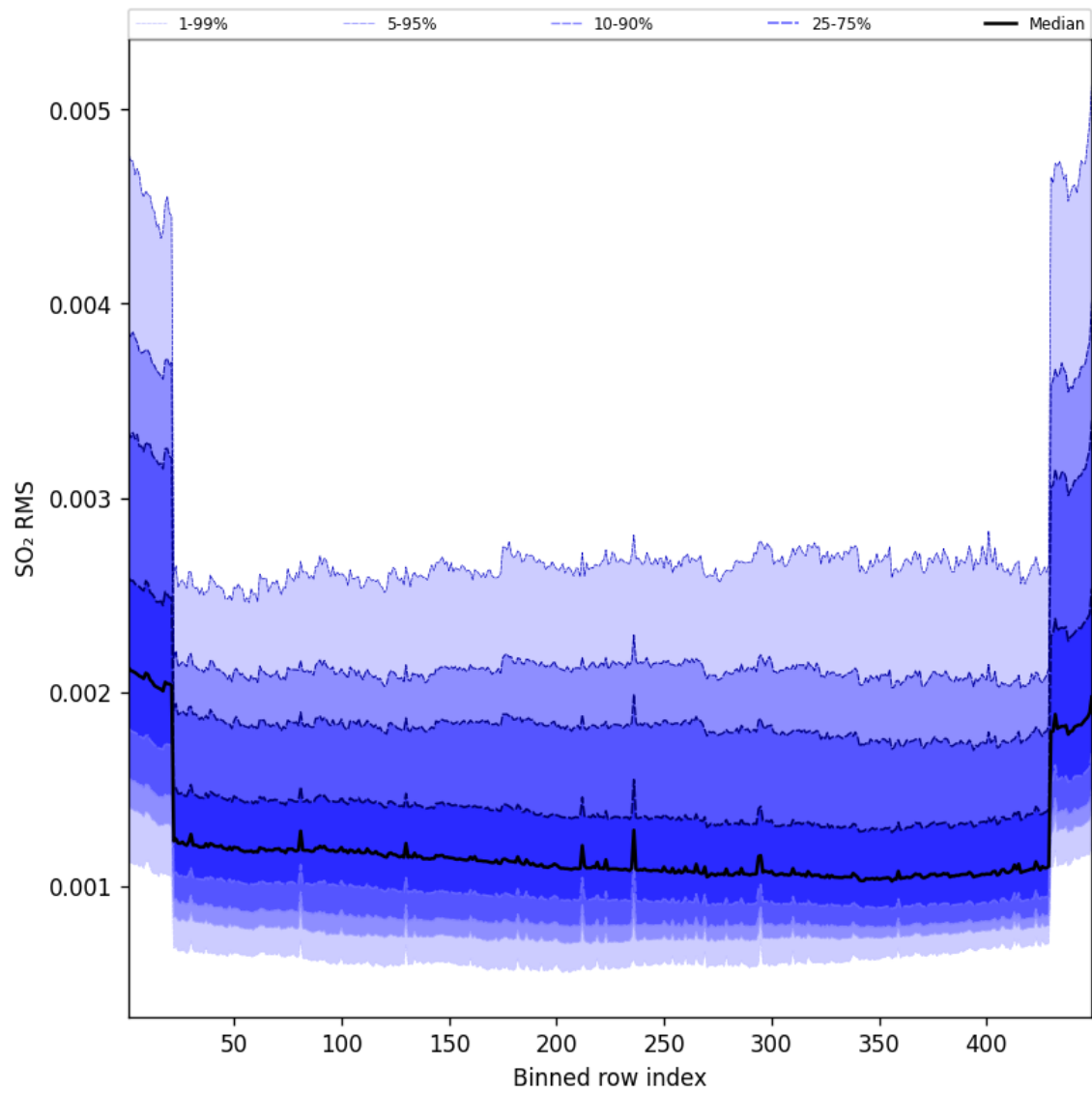


Figure 106: Along track statistics of “SO₂ RMS” for 2025-10-07 to 2025-10-07

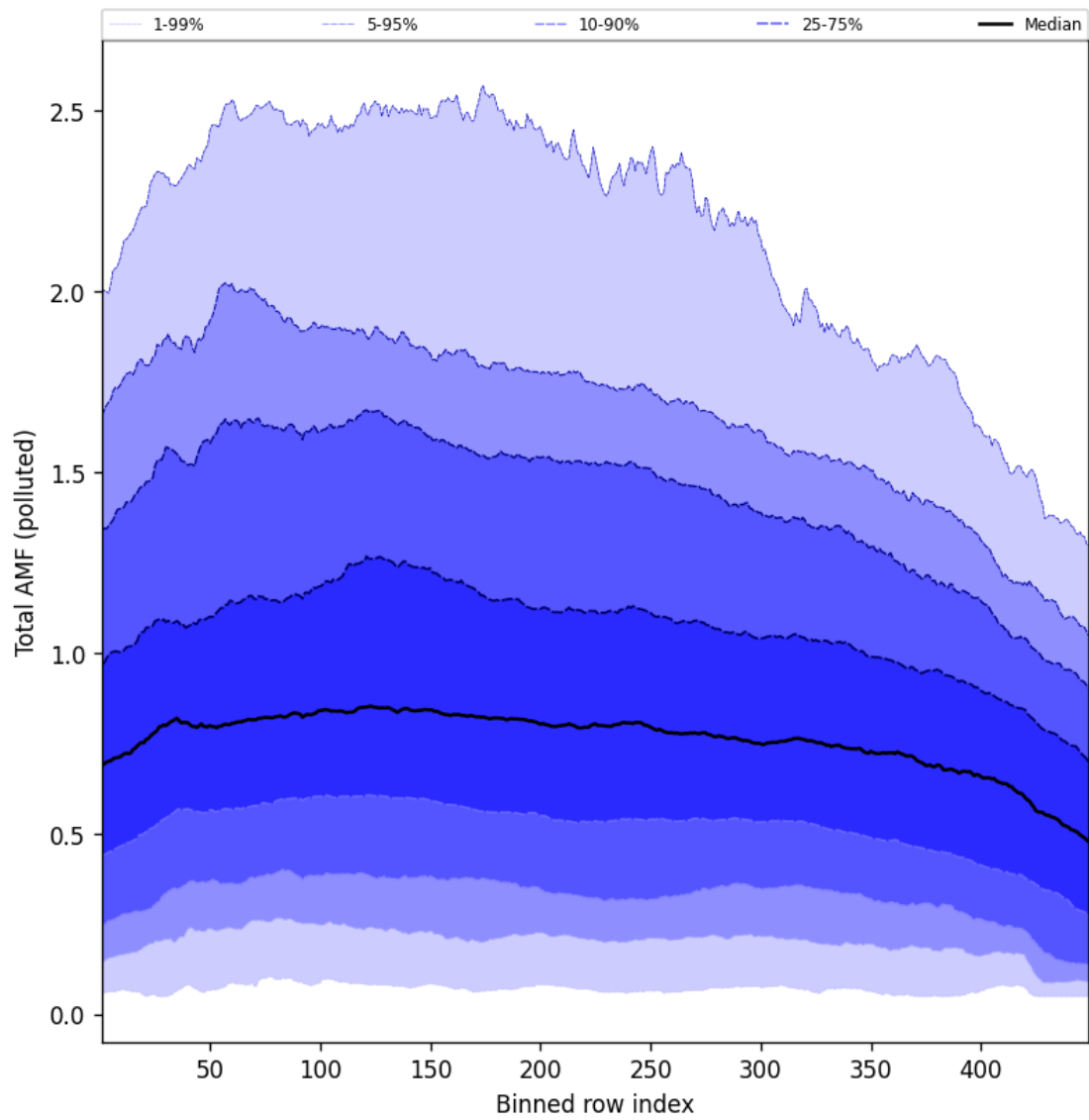


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-10-07 to 2025-10-07

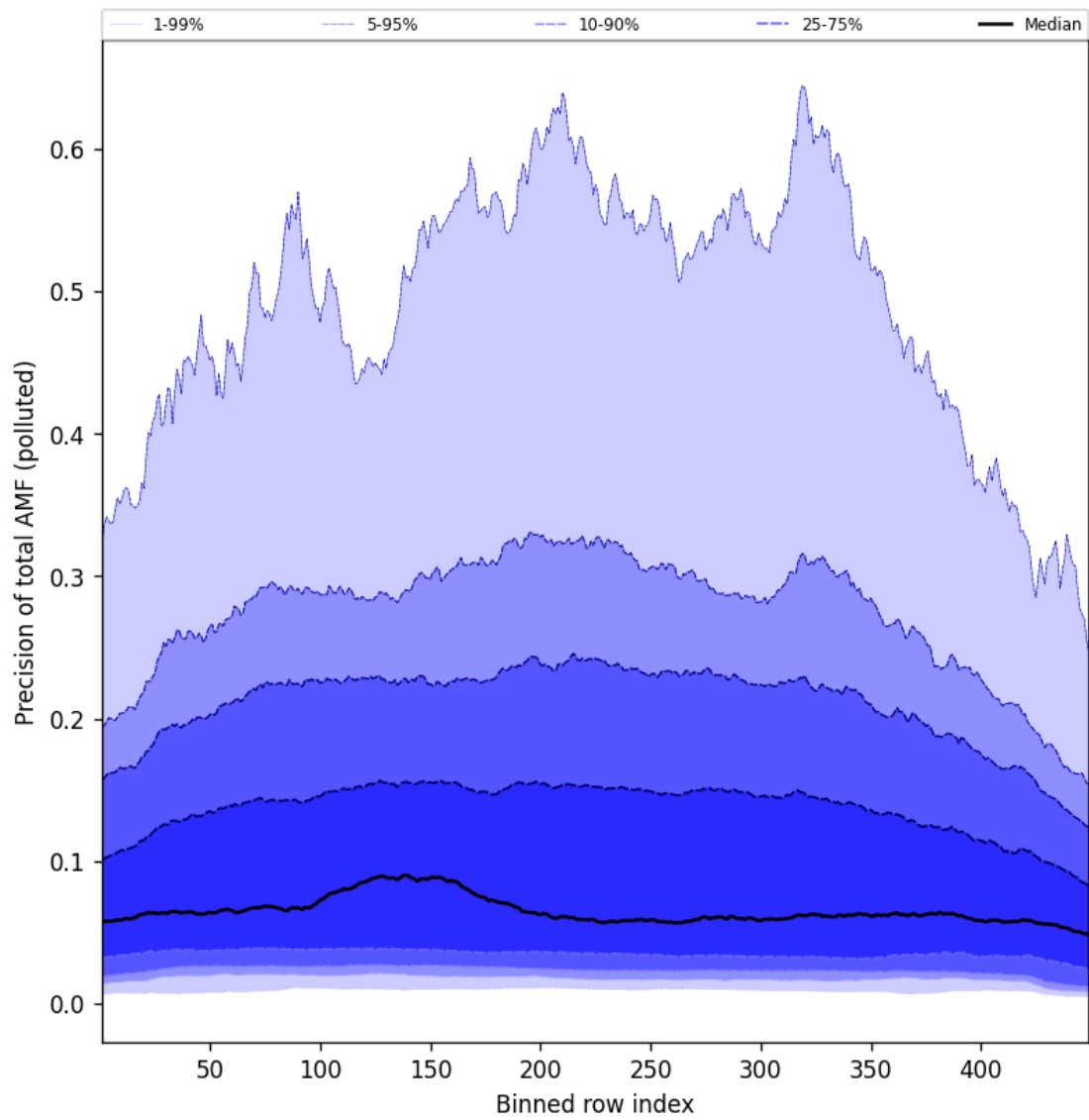


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-10-07 to 2025-10-07

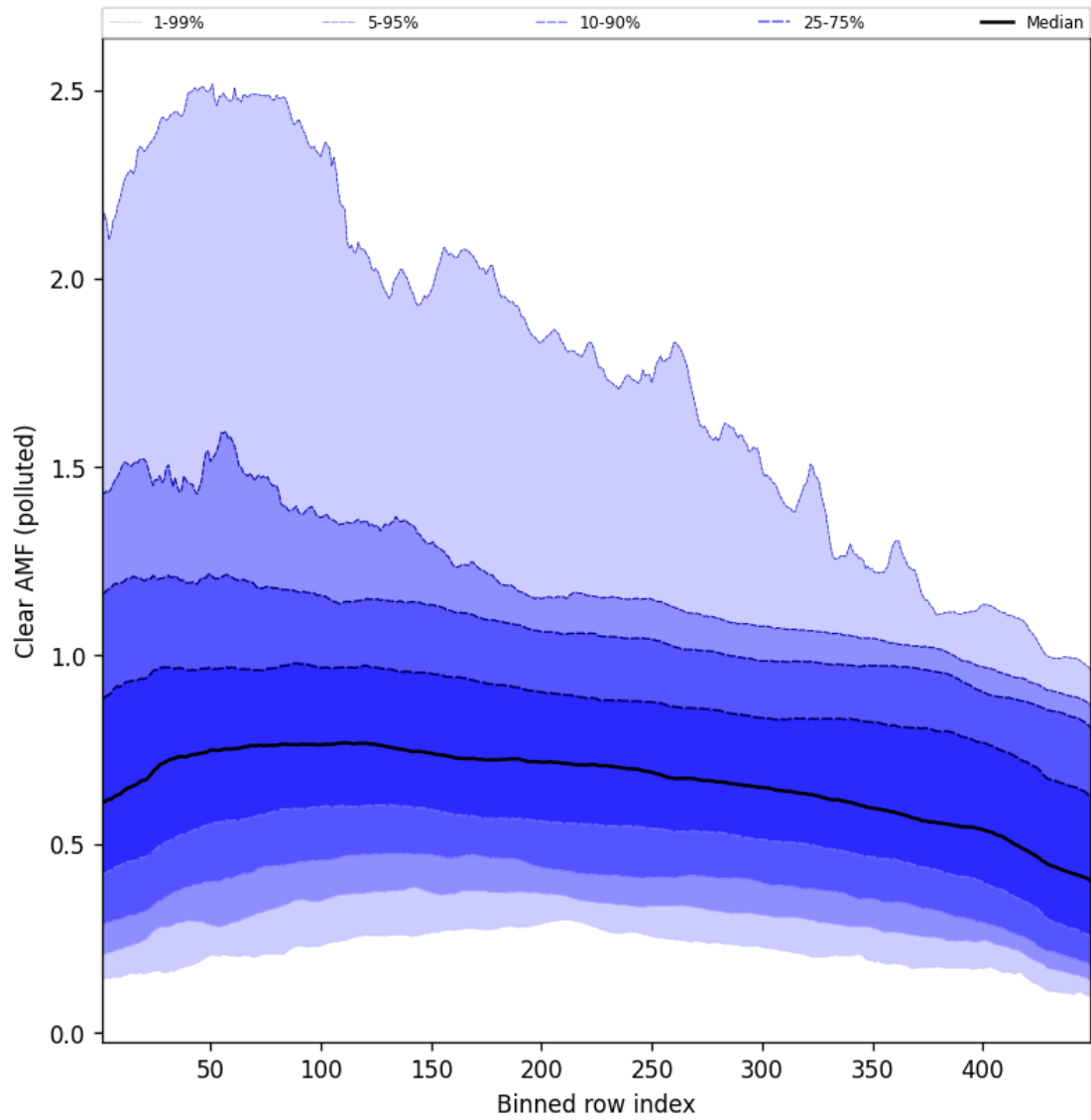


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-10-07 to 2025-10-07

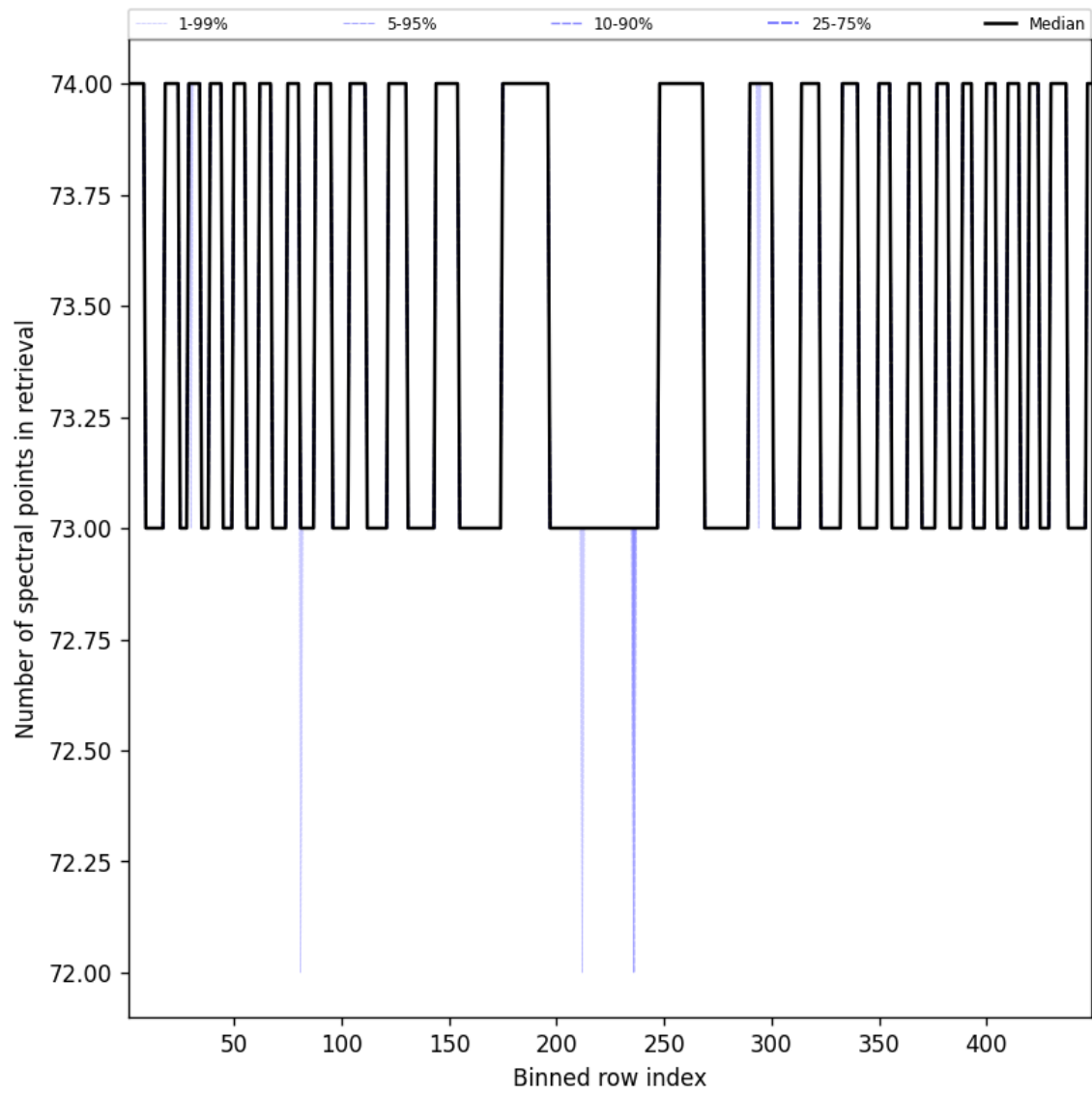


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-10-07 to 2025-10-07

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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