

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]	0.671 ± 0.406	16783117	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.357 \pm 113.030) \times 10^{-2}$	16783117	0.278	0.469	1.059×10^{-2}	-59.2	563
sulfurdioxide total vertical column precision [DU]	0.562 ± 0.849	16783117	0.222	0.349	0.340	3.049×10^{-2}	198
sulfurdioxide slant column density corrected [DU]	$(1.914 \pm 37.601) \times 10^{-2}$	16783117	0.267	0.375	9.204×10^{-3}	-15.7	49.9
sulfurdioxide slant column density cobra [DU]	$(1.906 \pm 37.133) \times 10^{-2}$	16783117	0.267	0.375	9.204×10^{-3}	-15.7	33.8
sulfurdioxide slant column density cobra precision [DU]	0.299 ± 0.126	16783117	0.213	0.135	0.263	7.513×10^{-2}	22.5
sulfurdioxide slant column density window1 [DU]	0.151 ± 0.692	16783117	0.175	0.755	0.157	-77.1	87.1
sulfurdioxide slant column density window1 precision [DU]	0.299 ± 0.126	16783117	0.213	0.135	0.263	7.513×10^{-2}	22.5
sulfurdioxide slant column density corrected win1 [DU]	$(1.455 \pm 68.708) \times 10^{-2}$	16783117	-2.500×10^{-2}	0.744	-5.315×10^{-3}	-77.1	86.9
background so2 slant column offset window1 [DU]	-0.137 ± 0.149	16783117	-0.180	0.156	-0.158	-0.677	2.54
sulfurdioxide slant column density window2 [DU]	1.00 ± 9.24	16783117	0.250	11.8	0.797	-1.016×10^3	1.106×10^3
sulfurdioxide slant column density window2 precision [DU]	8.34 ± 2.25	16783117	7.43	2.60	8.02	2.27	718
sulfurdioxide slant column density corrected win2 [DU]	-1.20 ± 8.99	16783117	-1.25	11.4	-1.21	-1.015×10^3	1.104×10^3
background so2 slant column offset window2 [DU]	-2.21 ± 2.41	16783117	-0.250	3.76	-1.47	-16.3	4.04
sulfurdioxide slant column density window3 [DU]	-7.49 ± 24.57	16783117	-7.28	31.0	-7.38	-937	341
sulfurdioxide slant column density window3 precision [DU]	29.4 ± 13.3	16783117	23.7	9.89	25.8	10.7	459
sulfurdioxide slant column density corrected win3 [DU]	2.79 ± 24.00	16783117	2.80	30.3	2.83	-926	356
background so2 slant column offset window3 [DU]	10.3 ± 6.3	16783117	5.04	10.2	9.66	-13.7	31.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	16783117	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.220 \pm 6.657) \times 10^{-2}$	16783117	1.316×10^{-2}	2.027×10^{-2}	1.385×10^{-2}	3.330×10^{-4}	1.98
fitted radiance shift [nm]	$(-5.360 \pm 26.748) \times 10^{-4}$	16783117	-5.000×10^{-4}	1.903×10^{-3}	-5.311×10^{-4}	-4.891×10^{-2}	4.391×10^{-2}
fitted radiance squeeze [1]	$(-1.752 \pm 183.993) \times 10^{-6}$	16783117	1.000×10^{-5}	2.089×10^{-4}	5.929×10^{-6}	-1.887×10^{-2}	1.607×10^{-2}
fitted root mean square [1]	$(1.309 \pm 0.525) \times 10^{-3}$	16783117	1.025×10^{-3}	5.443×10^{-4}	1.170×10^{-3}	3.148×10^{-4}	6.213×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.856 ± 0.439	16783117	0.620	0.552	0.794	5.000×10^{-2}	3.18
sulfurdioxide total air mass factor polluted precision [1]	0.106 ± 0.103	16783117	3.500×10^{-2}	0.107	7.029×10^{-2}	2.727×10^{-3}	1.74
sulfurdioxide clear air mass factor polluted [1]	0.731 ± 0.310	16783117	0.620	0.374	0.688	6.299×10^{-2}	3.21
number of spectral points in retrieval [1]	73.4 ± 0.5	16783117	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}	0.120	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.58	-0.916	-0.557	-0.375	-0.220	0.249	0.415	0.617	1.03	3.03
sulfurdioxide total vertical column precision [DU]	9.923×10^{-2}	0.136	0.165	0.191	0.225	0.575	0.763	1.01	1.55	4.60
sulfurdioxide slant column density corrected [DU]	-0.859	-0.503	-0.366	-0.274	-0.177	0.199	0.301	0.401	0.558	1.02
sulfurdioxide slant column density cobra [DU]	-0.859	-0.503	-0.366	-0.274	-0.177	0.199	0.301	0.401	0.558	1.02
sulfurdioxide slant column density cobra precision [DU]	0.143	0.172	0.187	0.198	0.214	0.349	0.403	0.455	0.531	0.761
sulfurdioxide slant column density window1 [DU]	-1.69	-0.918	-0.623	-0.427	-0.224	0.531	0.726	0.912	1.19	1.94
sulfurdioxide slant column density window1 precision [DU]	0.143	0.172	0.187	0.198	0.214	0.349	0.403	0.455	0.531	0.761
sulfurdioxide slant column density corrected win1 [DU]	-1.66	-1.00	-0.739	-0.561	-0.372	0.372	0.576	0.776	1.09	1.94
background so2 slant column offset window1 [DU]	-0.385	-0.318	-0.288	-0.261	-0.230	-7.421×10^{-2}	-2.801×10^{-2}	2.870×10^{-2}	0.126	0.355
sulfurdioxide slant column density window2 [DU]	-20.4	-13.6	-10.3	-7.82	-4.99	6.78	9.83	12.6	16.3	24.2
sulfurdioxide slant column density window2 precision [DU]	4.48	5.41	5.94	6.36	6.87	9.47	10.3	11.1	12.3	14.8
sulfurdioxide slant column density corrected win2 [DU]	-22.8	-15.8	-12.3	-9.79	-6.93	4.51	7.36	9.92	13.4	20.6
background so2 slant column offset window2 [DU]	-8.07	-6.57	-5.74	-5.01	-4.04	-0.278	3.362×10^{-2}	0.252	0.577	1.70
sulfurdioxide slant column density window3 [DU]	-69.0	-47.9	-38.0	-30.8	-22.9	8.16	16.0	23.1	32.6	51.5
sulfurdioxide slant column density window3 precision [DU]	15.0	17.6	19.2	20.5	22.0	31.9	36.5	42.4	54.6	86.4
sulfurdioxide slant column density corrected win3 [DU]	-57.0	-36.6	-26.9	-19.9	-12.3	18.0	25.7	32.6	41.9	60.8
background so2 slant column offset window3 [DU]	-1.45	1.58	2.82	3.80	5.05	15.3	17.2	18.9	20.9	24.2
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]	1.497×10^{-3}	2.927×10^{-3}	4.132×10^{-3}	5.446×10^{-3}	7.590×10^{-3}	2.786×10^{-2}	4.324×10^{-2}	6.644×10^{-2}	0.124	0.328
fitted radiance shift [nm]	-8.399×10^{-3}	-4.451×10^{-3}	-3.081×10^{-3}	-2.273×10^{-3}	-1.538×10^{-3}	3.644×10^{-4}	1.078×10^{-3}	1.983×10^{-3}	3.556×10^{-3}	7.891×10^{-3}
fitted radiance squeeze [1]	-5.355×10^{-4}	-3.036×10^{-4}	-2.153×10^{-4}	-1.584×10^{-4}	-1.005×10^{-4}	1.084×10^{-4}	1.603×10^{-4}	2.078×10^{-4}	2.744×10^{-4}	4.252×10^{-4}
fitted root mean square [1]	6.098×10^{-4}	7.541×10^{-4}	8.311×10^{-4}	8.911×10^{-4}	9.663×10^{-4}	1.511×10^{-3}	1.740×10^{-3}	1.971×10^{-3}	2.305×10^{-3}	3.162×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.912×10^{-2}	0.236	0.346	0.440	0.550	1.10	1.29	1.47	1.68	2.11
sulfurdioxide total air mass factor polluted precision [1]	9.223×10^{-3}	1.803×10^{-2}	2.458×10^{-2}	2.976×10^{-2}	3.729×10^{-2}	0.144	0.184	0.222	0.289	0.505
sulfurdioxide clear air mass factor polluted [1]	0.199	0.306	0.381	0.448	0.526	0.900	1.00	1.09	1.24	1.74
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]	0.681 $\pm$ 0.409	8210088	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(3.860 \pm 134.417) \times 10^{-2}$	8210088	0.493	1.112×10^{-2}	-55.2	563	-0.231	0.261
sulfurdioxide total vertical column precision [DU]	0.646 $\pm$ 1.024	8210088	0.401	0.349	4.323×10^{-2}	198	0.229	0.630
sulfurdioxide slant column density corrected [DU]	$(2.013 \pm 37.684) \times 10^{-2}$	8210088	0.362	8.961×10^{-3}	-7.90	46.8	-0.170	0.192
sulfurdioxide slant column density cobra [DU]	$(2.004 \pm 37.154) \times 10^{-2}$	8210088	0.362	8.961×10^{-3}	-7.90	28.2	-0.170	0.192
sulfurdioxide slant column density cobra precision [DU]	0.287 $\pm$ 0.117	8210088	0.125	0.253	8.370×10^{-2}	9.89	0.210	0.335
sulfurdioxide slant column density window1 [DU]	0.178 $\pm$ 0.663	8210088	0.729	0.176	-77.1	37.0	-0.190	0.539
sulfurdioxide slant column density window1 precision [DU]	0.287 $\pm$ 0.117	8210088	0.125	0.253	8.370×10^{-2}	9.89	0.210	0.335
sulfurdioxide slant column density corrected win1 [DU]	$(1.357 \pm 65.774) \times 10^{-2}$	8210088	0.720	-5.466×10^{-3}	-77.1	37.1	-0.360	0.360
background so2 slant column offset window1 [DU]	-0.164 $\pm$ 0.117	8210088	0.141	-0.175	-0.672	1.06	-0.242	-0.101
sulfurdioxide slant column density window2 [DU]	0.537 $\pm$ 9.184	8210088	11.7	0.332	-224	498	-5.41	6.26
sulfurdioxide slant column density window2 precision [DU]	8.42 $\pm$ 2.29	8210088	2.77	8.09	2.27	309	6.87	9.63
sulfurdioxide slant column density corrected win2 [DU]	-1.15 $\pm$ 8.99	8210088	11.5	-1.16	-225	497	-6.89	4.57
background so2 slant column offset window2 [DU]	-1.69 $\pm$ 2.10	8210088	2.65	-1.02	-14.4	3.96	-2.86	-0.209
sulfurdioxide slant column density window3 [DU]	-7.38 $\pm$ 25.45	8210088	31.9	-7.04	-551	244	-23.0	8.82
sulfurdioxide slant column density window3 precision [DU]	30.1 $\pm$ 14.0	8210088	10.9	26.4	10.7	459	22.2	33.1
sulfurdioxide slant column density corrected win3 [DU]	2.36 $\pm$ 24.81	8210088	31.2	2.45	-547	250	-13.1	18.1
background so2 slant column offset window3 [DU]	9.74 $\pm$ 6.52	8210088	10.4	8.61	-13.7	31.3	4.39	14.8
sulfurdioxide slant column cobra flag [1]	1.98 $\pm$ 0.21	8210088	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.861 \pm 8.504) \times 10^{-2}$	8210088	3.607×10^{-2}	2.072×10^{-2}	3.330×10^{-4}	1.28	1.118×10^{-2}	4.725×10^{-2}
fitted radiance shift [nm]	$(-1.839 \pm 28.194) \times 10^{-4}$	8210088	1.764×10^{-3}	-2.413×10^{-4}	-4.891×10^{-2}	4.391×10^{-2}	-1.089×10^{-3}	6.751×10^{-4}
fitted radiance squeeze [1]	$(8.329 \pm 167.275) \times 10^{-6}$	8210088	1.993×10^{-4}	9.352×10^{-6}	-1.161×10^{-2}	1.475×10^{-2}	-9.065×10^{-5}	1.086×10^{-4}
fitted root mean square [1]	$(1.265 \pm 0.478) \times 10^{-3}$	8210088	5.200×10^{-4}	1.141×10^{-3}	3.187×10^{-4}	3.438×10^{-2}	9.467×10^{-4}	1.467×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.785 $\pm$ 0.416	8210088	0.536	0.745	5.000×10^{-2}	2.85	0.487	1.02
sulfurdioxide total air mass factor polluted precision [1]	0.103 $\pm$ 0.117	8210088	9.910×10^{-2}	5.888×10^{-2}	2.727×10^{-3}	1.74	3.382×10^{-2}	0.133
sulfurdioxide clear air mass factor polluted [1]	0.708 $\pm$ 0.290	8210088	0.427	0.696	6.299×10^{-2}	2.60	0.486	0.912
number of spectral points in retrieval [1]	73.5 $\pm$ 0.5	8210088	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]	0.661 ± 0.403	8573029	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.875 \pm 87.790) \times 10^{-2}$	8573029	0.448	1.012×10^{-2}	-59.2	142	-0.211	0.238
sulfurdioxide total vertical column precision [DU]	0.481 ± 0.626	8573029	0.315	0.333	3.049×10^{-2}	26.5	0.221	0.537
sulfurdioxide slant column density corrected [DU]	$(1.820 \pm 37.521) \times 10^{-2}$	8573029	0.388	9.466×10^{-3}	-15.7	49.9	-0.183	0.205
sulfurdioxide slant column density cobra [DU]	$(1.813 \pm 37.112) \times 10^{-2}$	8573029	0.388	9.466×10^{-3}	-15.7	33.8	-0.183	0.205
sulfurdioxide slant column density cobra precision [DU]	0.310 ± 0.134	8573029	0.144	0.276	7.513×10^{-2}	22.5	0.219	0.363
sulfurdioxide slant column density window1 [DU]	0.126 ± 0.718	8573029	0.779	0.138	-76.4	87.1	-0.256	0.523
sulfurdioxide slant column density window1 precision [DU]	0.310 ± 0.134	8573029	0.144	0.276	7.513×10^{-2}	22.5	0.219	0.363
sulfurdioxide slant column density corrected win1 [DU]	$(1.549 \pm 71.404) \times 10^{-2}$	8573029	0.768	-5.159×10^{-3}	-76.4	86.9	-0.384	0.384
background so2 slant column offset window1 [DU]	-0.111 ± 0.171	8573029	0.168	-0.139	-0.677	2.54	-0.217	-4.930×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.45 ± 9.27	8573029	11.8	1.25	-1.016×10^3	1.106×10^3	-4.57	7.25
sulfurdioxide slant column density window2 precision [DU]	8.26 ± 2.21	8573029	2.46	7.96	2.46	718	6.87	9.32
sulfurdioxide slant column density corrected win2 [DU]	-1.25 ± 8.99	8573029	11.4	-1.26	-1.015×10^3	1.104×10^3	-6.97	4.45
background so2 slant column offset window2 [DU]	-2.70 ± 2.57	8573029	4.41	-2.41	-16.3	4.04	-4.79	-0.378
sulfurdioxide slant column density window3 [DU]	-7.59 ± 23.70	8573029	30.3	-7.70	-937	341	-22.7	7.54
sulfurdioxide slant column density window3 precision [DU]	28.7 ± 12.6	8573029	8.87	25.3	10.9	323	21.9	30.7
sulfurdioxide slant column density corrected win3 [DU]	3.21 ± 23.19	8573029	29.5	3.17	-926	356	-11.5	18.0
background so2 slant column offset window3 [DU]	10.8 ± 6.1	8573029	9.81	10.5	-12.2	31.6	5.77	15.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	8573029	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.649 \pm 3.527) \times 10^{-2}$	8573029	1.149×10^{-2}	1.013×10^{-2}	3.463×10^{-4}	1.98	5.695×10^{-3}	1.718×10^{-2}
fitted radiance shift [nm]	$(-8.731 \pm 24.822) \times 10^{-4}$	8573029	1.895×10^{-3}	-8.337×10^{-4}	-4.387×10^{-2}	3.911×10^{-2}	-1.878×10^{-3}	1.691×10^{-5}
fitted radiance squeeze [1]	$(-1.141 \pm 19.821) \times 10^{-5}$	8573029	2.191×10^{-4}	2.363×10^{-6}	-1.887×10^{-2}	1.607×10^{-2}	-1.110×10^{-4}	1.082×10^{-4}
fitted root mean square [1]	$(1.351 \pm 0.563) \times 10^{-3}$	8573029	5.651×10^{-4}	1.200×10^{-3}	3.148×10^{-4}	6.213×10^{-2}	9.863×10^{-4}	1.551×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.924 ± 0.450	8573029	0.598	0.837	5.000×10^{-2}	3.18	0.594	1.19
sulfurdioxide total air mass factor polluted precision [1]	0.108 ± 0.088	8573029	0.111	8.453×10^{-2}	3.639×10^{-3}	1.59	4.071×10^{-2}	0.151
sulfurdioxide clear air mass factor polluted [1]	0.752 ± 0.326	8573029	0.335	0.683	9.201×10^{-2}	3.21	0.550	0.885
number of spectral points in retrieval [1]	73.4 ± 0.5	8573029	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]	0.673 ± 0.403	12077545	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.209 \pm 97.566) \times 10^{-2}$	12077545	0.439	1.011×10^{-2}	-59.2	85.5	-0.207	0.233
sulfurdioxide total vertical column precision [DU]	0.493 ± 0.723	12077545	0.298	0.314	3.245×10^{-2}	28.6	0.219	0.516
sulfurdioxide slant column density corrected [DU]	$(1.918 \pm 37.068) \times 10^{-2}$	12077545	0.370	9.078×10^{-3}	-15.7	38.5	-0.174	0.196
sulfurdioxide slant column density cobra [DU]	$(1.910 \pm 36.685) \times 10^{-2}$	12077545	0.370	9.078×10^{-3}	-15.7	33.8	-0.174	0.196
sulfurdioxide slant column density cobra precision [DU]	0.295 ± 0.126	12077545	0.135	0.259	7.513×10^{-2}	22.5	0.211	0.346
sulfurdioxide slant column density window1 [DU]	0.148 ± 0.689	12077545	0.744	0.156	-77.1	87.1	-0.221	0.523
sulfurdioxide slant column density window1 precision [DU]	0.295 ± 0.126	12077545	0.135	0.259	7.513×10^{-2}	22.5	0.211	0.346
sulfurdioxide slant column density corrected win1 [DU]	$(1.660 \pm 68.378) \times 10^{-2}$	12077545	0.733	-3.839×10^{-3}	-77.1	86.9	-0.365	0.368
background so2 slant column offset window1 [DU]	-0.131 ± 0.155	12077545	0.158	-0.155	-0.677	2.33	-0.227	-6.927×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.08 ± 9.03	12077545	11.6	0.875	-1.016×10^3	1.106×10^3	-4.81	6.75
sulfurdioxide slant column density window2 precision [DU]	8.13 ± 2.08	12077545	2.45	7.84	2.27	490	6.75	9.20
sulfurdioxide slant column density corrected win2 [DU]	-1.22 ± 8.76	12077545	11.2	-1.23	-1.015×10^3	1.104×10^3	-6.84	4.38
background so2 slant column offset window2 [DU]	-2.30 ± 2.47	12077545	4.01	-1.56	-16.3	4.04	-4.28	-0.273
sulfurdioxide slant column density window3 [DU]	-5.17 ± 23.79	12077545	30.4	-5.40	-937	256	-20.4	9.98
sulfurdioxide slant column density window3 precision [DU]	28.2 ± 12.2	12077545	8.97	24.9	10.7	288	21.5	30.5
sulfurdioxide slant column density corrected win3 [DU]	5.04 ± 22.98	12077545	29.3	4.75	-926	269	-9.71	19.6
background so2 slant column offset window3 [DU]	10.2 ± 6.2	12077545	10.2	9.62	-13.7	31.6	5.03	15.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	12077545	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.878 \pm 3.047) \times 10^{-2}$	12077545	1.340×10^{-2}	1.215×10^{-2}	3.463×10^{-4}	1.25	7.051×10^{-3}	2.045×10^{-2}
fitted radiance shift [nm]	$(-6.093 \pm 24.847) \times 10^{-4}$	12077545	1.947×10^{-3}	-5.788×10^{-4}	-4.387×10^{-2}	4.125×10^{-2}	-1.636×10^{-3}	3.109×10^{-4}
fitted radiance squeeze [1]	$(-2.626 \pm 184.564) \times 10^{-6}$	12077545	2.064×10^{-4}	7.282×10^{-6}	-1.887×10^{-2}	1.607×10^{-2}	-9.837×10^{-5}	1.080×10^{-4}
fitted root mean square [1]	$(1.292 \pm 0.527) \times 10^{-3}$	12077545	5.343×10^{-4}	1.146×10^{-3}	3.187×10^{-4}	6.213×10^{-2}	9.519×10^{-4}	1.486×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.889 ± 0.416	12077545	0.522	0.838	5.000×10^{-2}	2.85	0.600	1.12
sulfurdioxide total air mass factor polluted precision [1]	0.102 ± 0.086	12077545	9.942×10^{-2}	7.415×10^{-2}	3.584×10^{-3}	1.41	4.140×10^{-2}	0.141
sulfurdioxide clear air mass factor polluted [1]	0.757 ± 0.283	12077545	0.350	0.722	7.325×10^{-2}	2.89	0.567	0.917
number of spectral points in retrieval [1]	73.4 ± 0.5	12077545	1.000	73.0	53.0	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]	0.700 ± 0.407	3544487	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.175 \pm 128.893) \times 10^{-2}$	3544487	0.539	1.081×10^{-2}	-55.2	87.9	-0.253	0.286
sulfurdioxide total vertical column precision [DU]	0.675 ± 0.986	3544487	0.452	0.404	3.049×10^{-2}	26.3	0.251	0.703
sulfurdioxide slant column density corrected [DU]	$(1.729 \pm 36.357) \times 10^{-2}$	3544487	0.377	8.773×10^{-3}	-15.0	38.3	-0.178	0.199
sulfurdioxide slant column density cobra [DU]	$(1.719 \pm 35.746) \times 10^{-2}$	3544487	0.377	8.773×10^{-3}	-15.0	22.4	-0.178	0.199
sulfurdioxide slant column density cobra precision [DU]	0.296 ± 0.116	3544487	0.120	0.264	8.582×10^{-2}	13.0	0.221	0.341
sulfurdioxide slant column density window1 [DU]	0.165 ± 0.674	3544487	0.762	0.167	-22.1	29.4	-0.216	0.546
sulfurdioxide slant column density window1 precision [DU]	0.296 ± 0.116	3544487	0.120	0.264	8.582×10^{-2}	13.0	0.221	0.341
sulfurdioxide slant column density corrected win1 [DU]	$(3.758 \pm 668.933) \times 10^{-3}$	3544487	0.752	-1.281×10^{-2}	-22.1	29.2	-0.383	0.368
background so2 slant column offset window1 [DU]	-0.161 ± 0.131	3544487	0.146	-0.175	-0.672	2.54	-0.244	-9.865×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.513 ± 9.630	3544487	12.2	0.328	-756	605	-5.66	6.49
sulfurdioxide slant column density window2 precision [DU]	8.79 ± 2.55	3544487	2.75	8.46	2.48	718	7.22	9.97
sulfurdioxide slant column density corrected win2 [DU]	-1.10 ± 9.45	3544487	11.9	-1.12	-756	602	-7.07	4.85
background so2 slant column offset window2 [DU]	-1.61 ± 2.03	3544487	2.45	-1.02	-16.2	4.04	-2.64	-0.195
sulfurdioxide slant column density window3 [DU]	-13.4 ± 25.3	3544487	31.9	-12.8	-559	316	-29.0	2.86
sulfurdioxide slant column density window3 precision [DU]	32.2 ± 15.7	3544487	10.6	28.0	11.1	459	23.9	34.4
sulfurdioxide slant column density corrected win3 [DU]	-3.80 ± 25.36	3544487	32.0	-3.41	-550	332	-19.6	12.4
background so2 slant column offset window3 [DU]	9.59 ± 6.26	3544487	9.46	8.41	-13.7	31.6	4.70	14.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	3544487	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.629 \pm 10.735) \times 10^{-2}$	3544487	6.272×10^{-2}	2.982×10^{-2}	3.342×10^{-4}	1.98	1.020×10^{-2}	7.291×10^{-2}
fitted radiance shift [nm]	$(-3.672 \pm 31.634) \times 10^{-4}$	3544487	1.687×10^{-3}	-4.470×10^{-4}	-4.891×10^{-2}	4.391×10^{-2}	-1.251×10^{-3}	4.367×10^{-4}
fitted radiance squeeze [1]	$(-3.581 \pm 177.680) \times 10^{-6}$	3544487	2.104×10^{-4}	-9.216×10^{-7}	-1.288×10^{-2}	1.390×10^{-2}	-1.068×10^{-4}	1.036×10^{-4}
fitted root mean square [1]	$(1.311 \pm 0.488) \times 10^{-3}$	3544487	4.942×10^{-4}	1.198×10^{-3}	3.464×10^{-4}	3.273×10^{-2}	9.999×10^{-4}	1.494×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.781 ± 0.476	3544487	0.569	0.666	5.000×10^{-2}	3.18	0.450	1.02
sulfurdioxide total air mass factor polluted precision [1]	0.113 ± 0.137	3544487	0.124	5.413×10^{-2}	2.727×10^{-3}	1.74	2.851×10^{-2}	0.152
sulfurdioxide clear air mass factor polluted [1]	0.674 ± 0.363	3544487	0.398	0.604	6.299×10^{-2}	3.21	0.432	0.830
number of spectral points in retrieval [1]	73.4 ± 0.5	3544487	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

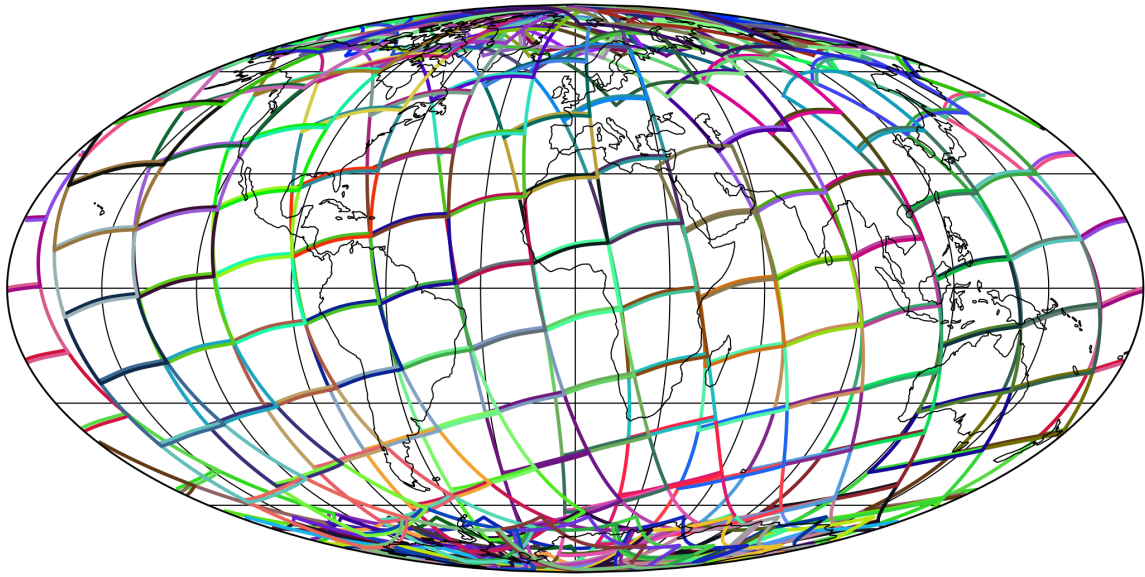


Figure 1: Outline of the granules.

4 Input data monitoring

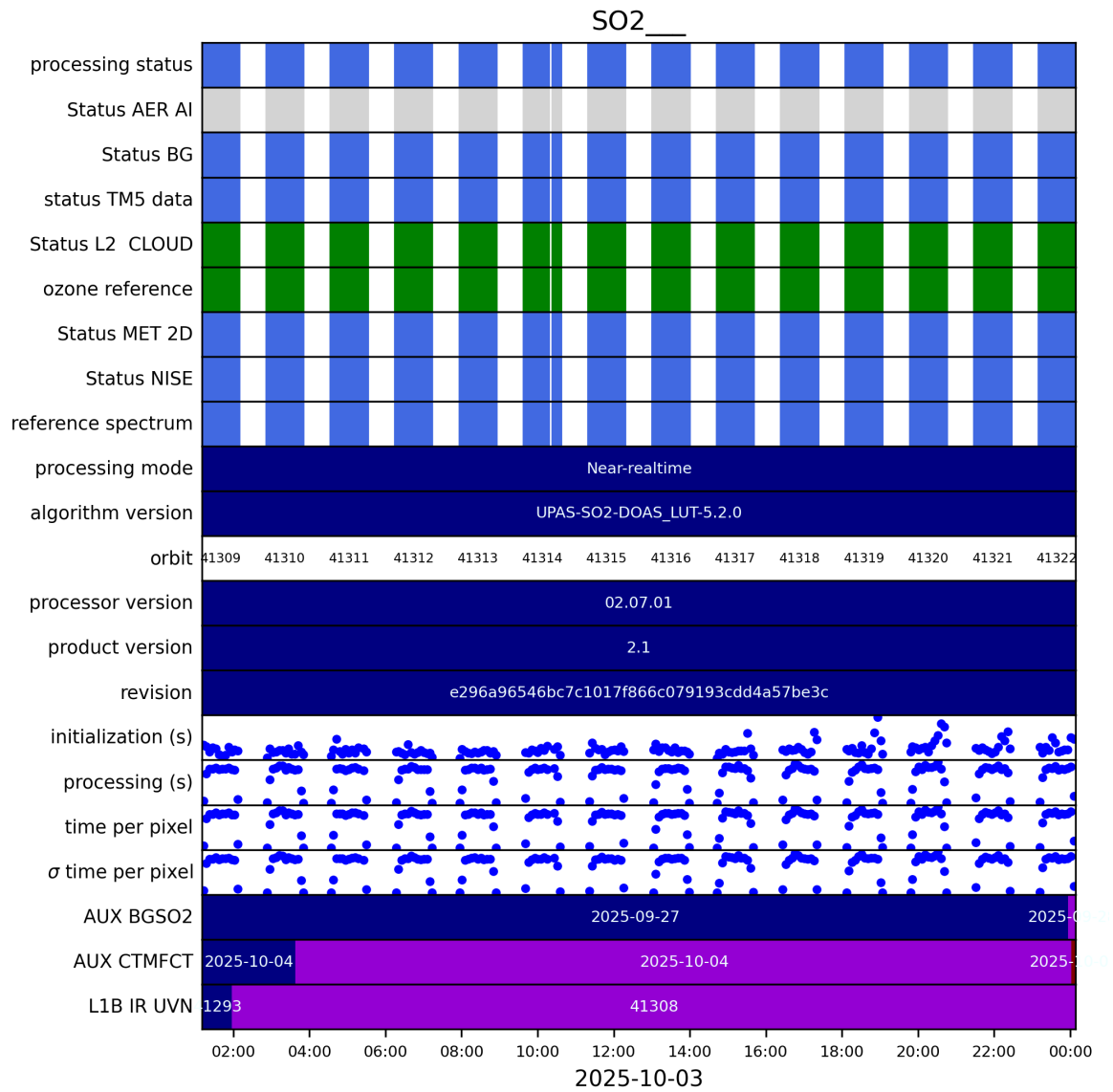


Figure 2: Input data per granule

5 Warnings and errors

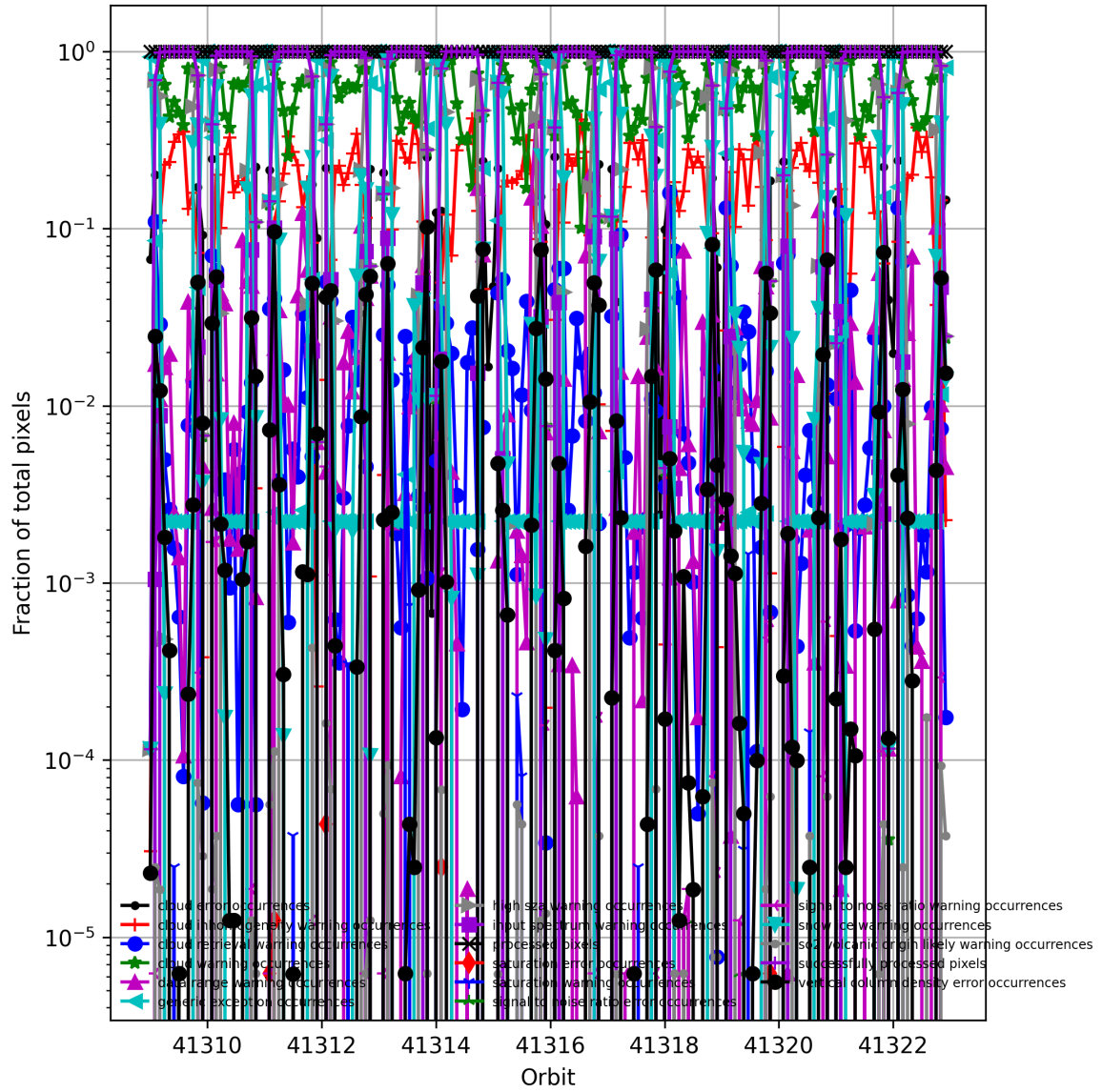


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

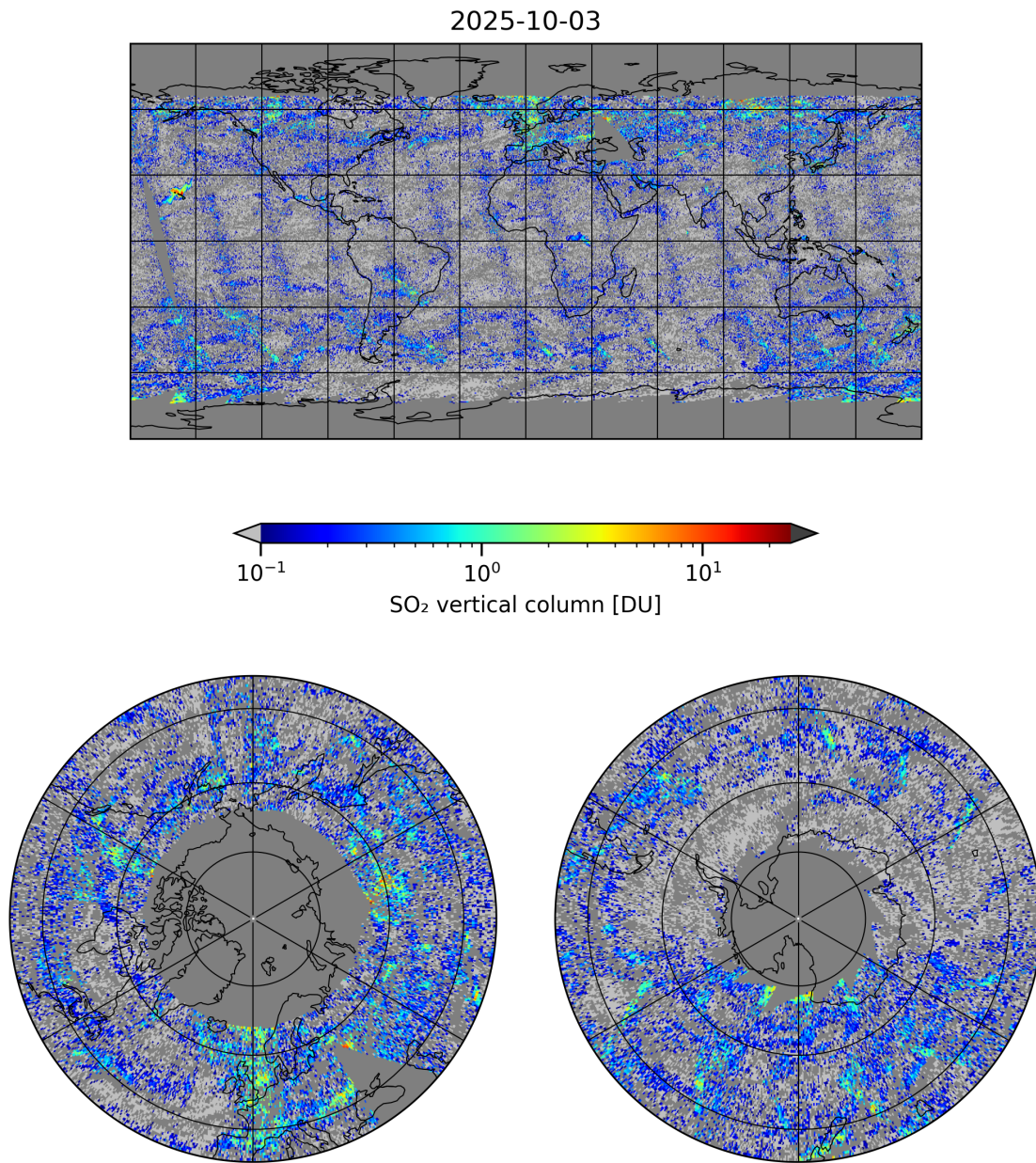


Figure 4: Map of “SO₂ vertical column” for 2025-10-03 to 2025-10-04

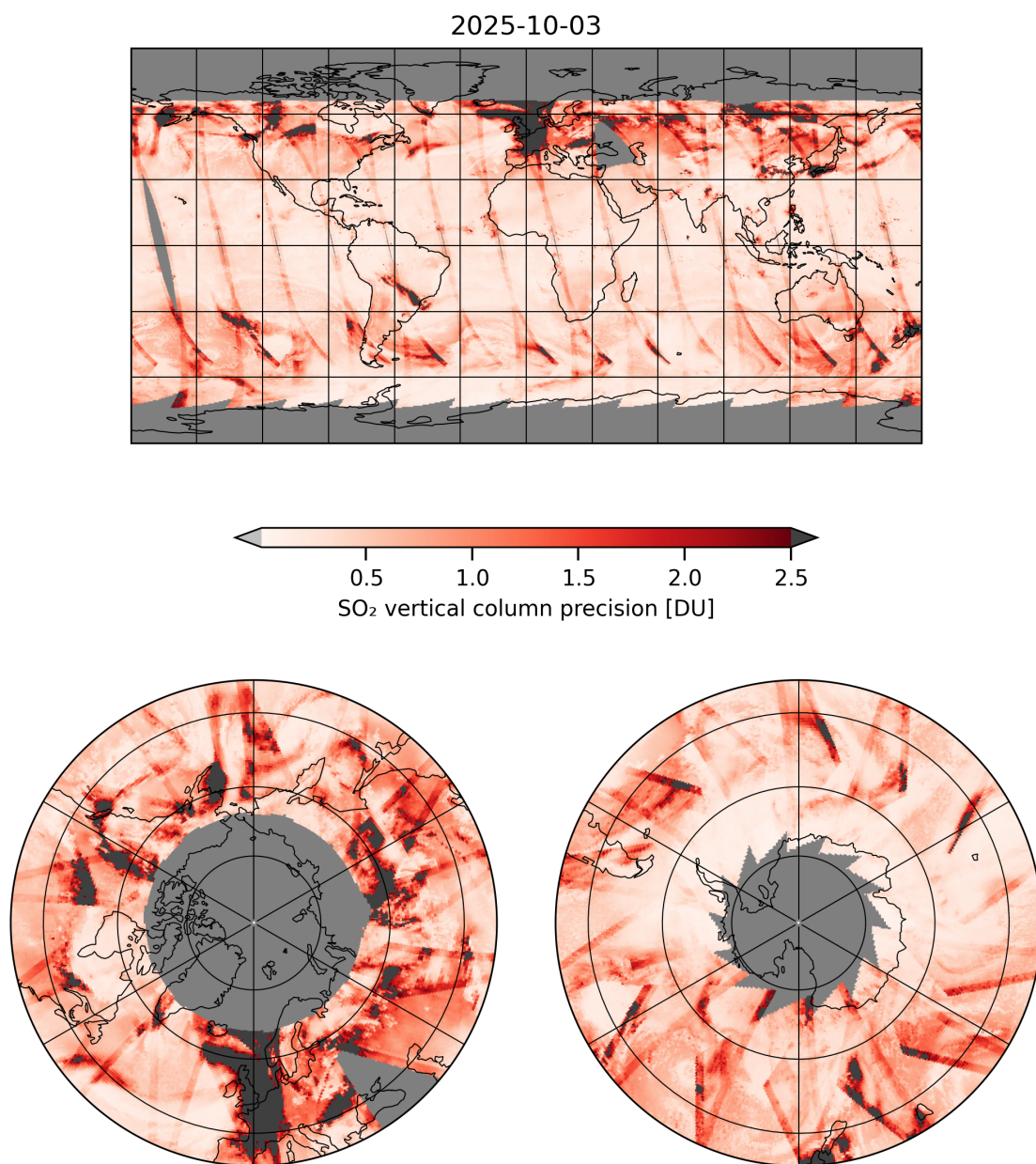


Figure 5: Map of “SO₂ vertical column precision” for 2025-10-03 to 2025-10-04

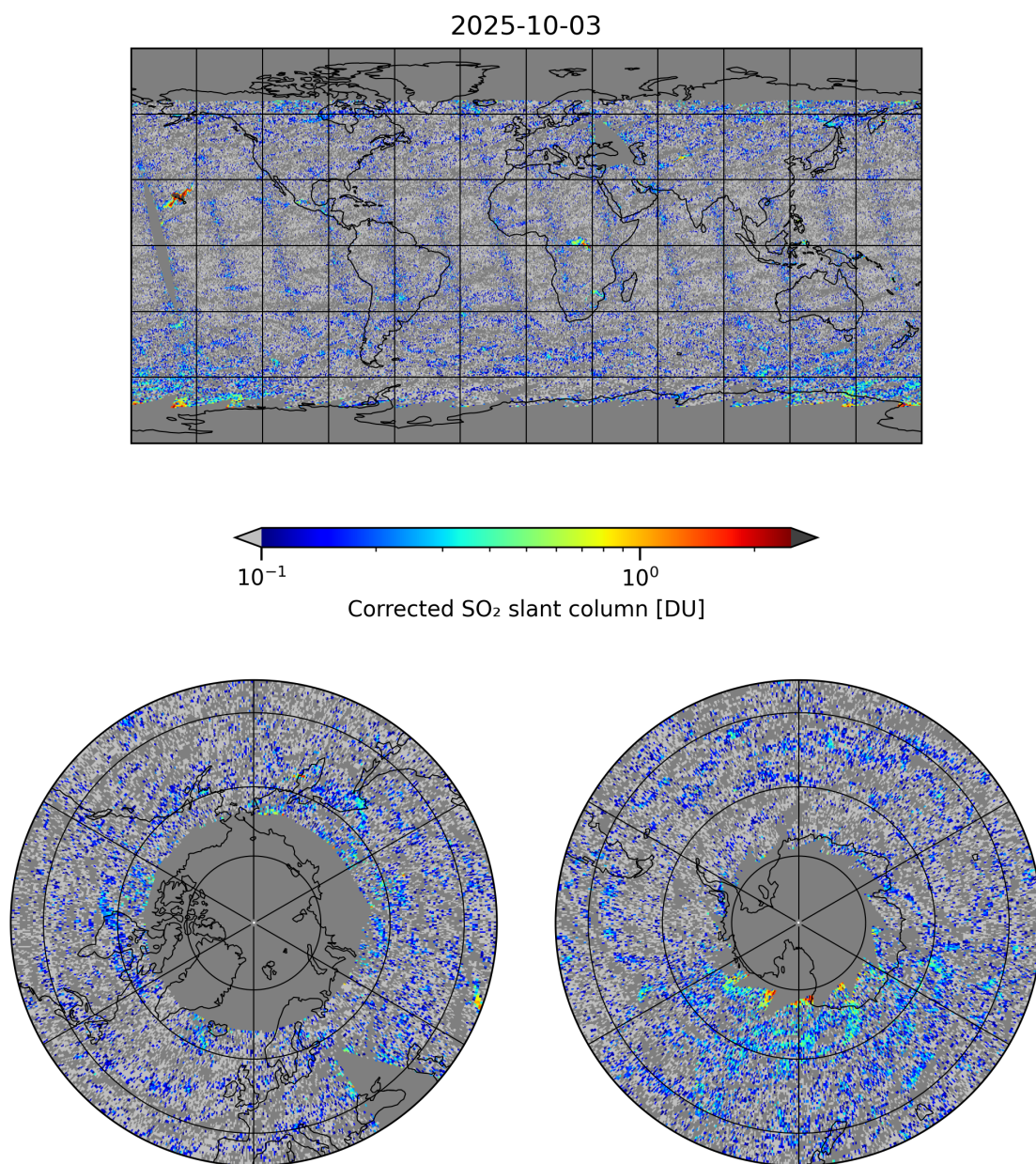


Figure 6: Map of “Corrected SO₂ slant column” for 2025-10-03 to 2025-10-04

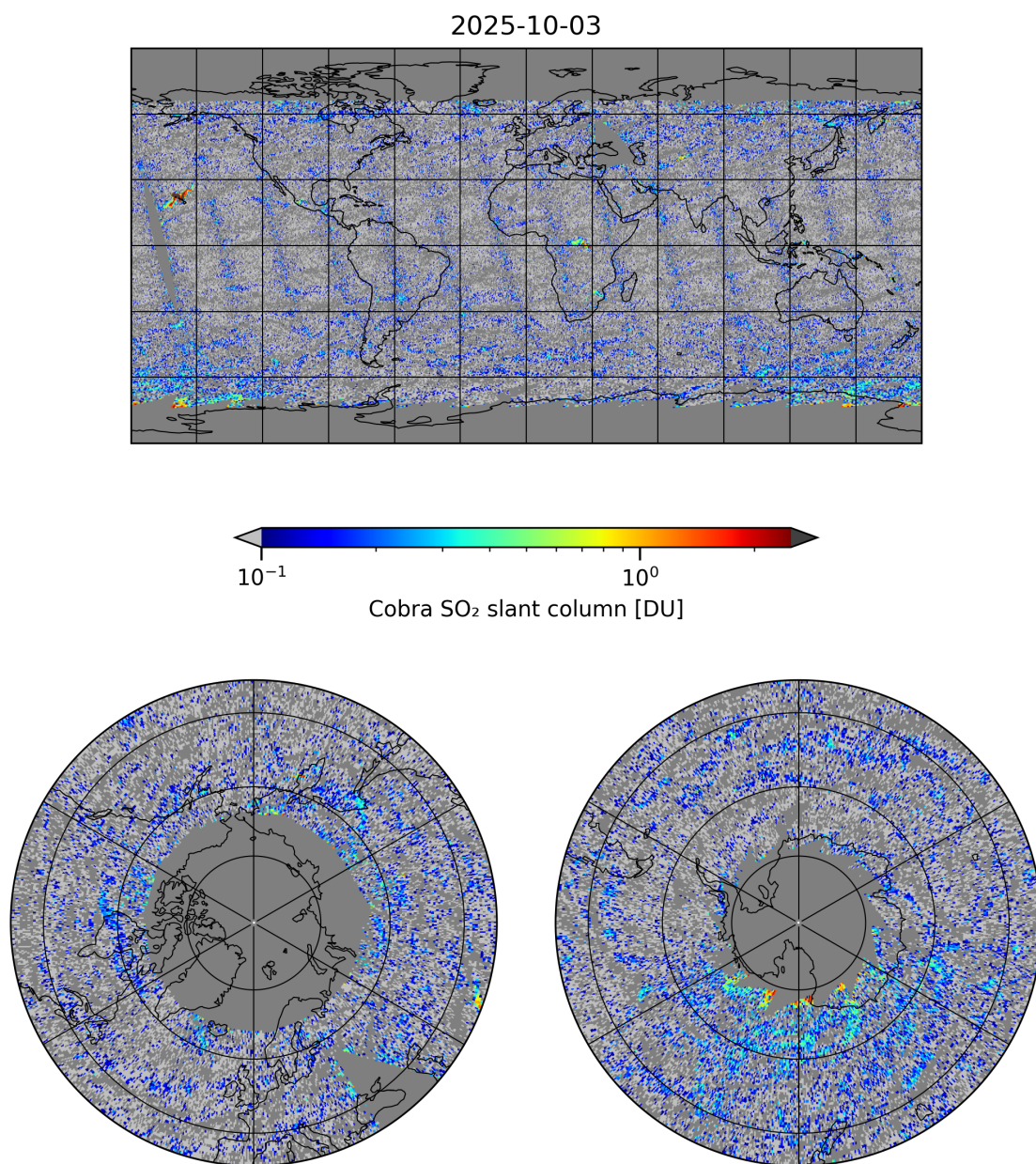


Figure 7: Map of “Cobra SO₂ slant column” for 2025-10-03 to 2025-10-04

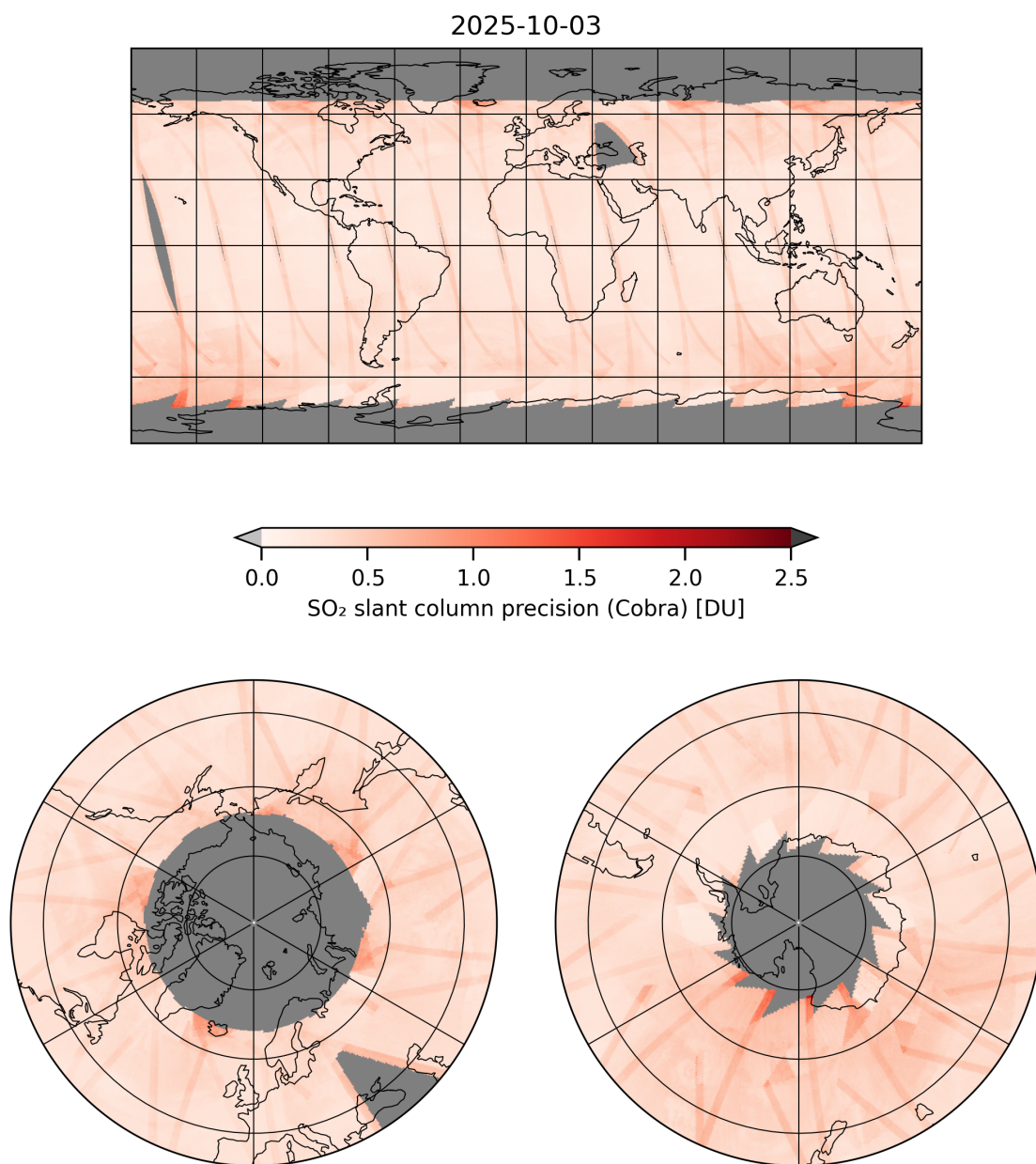


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-10-03 to 2025-10-04

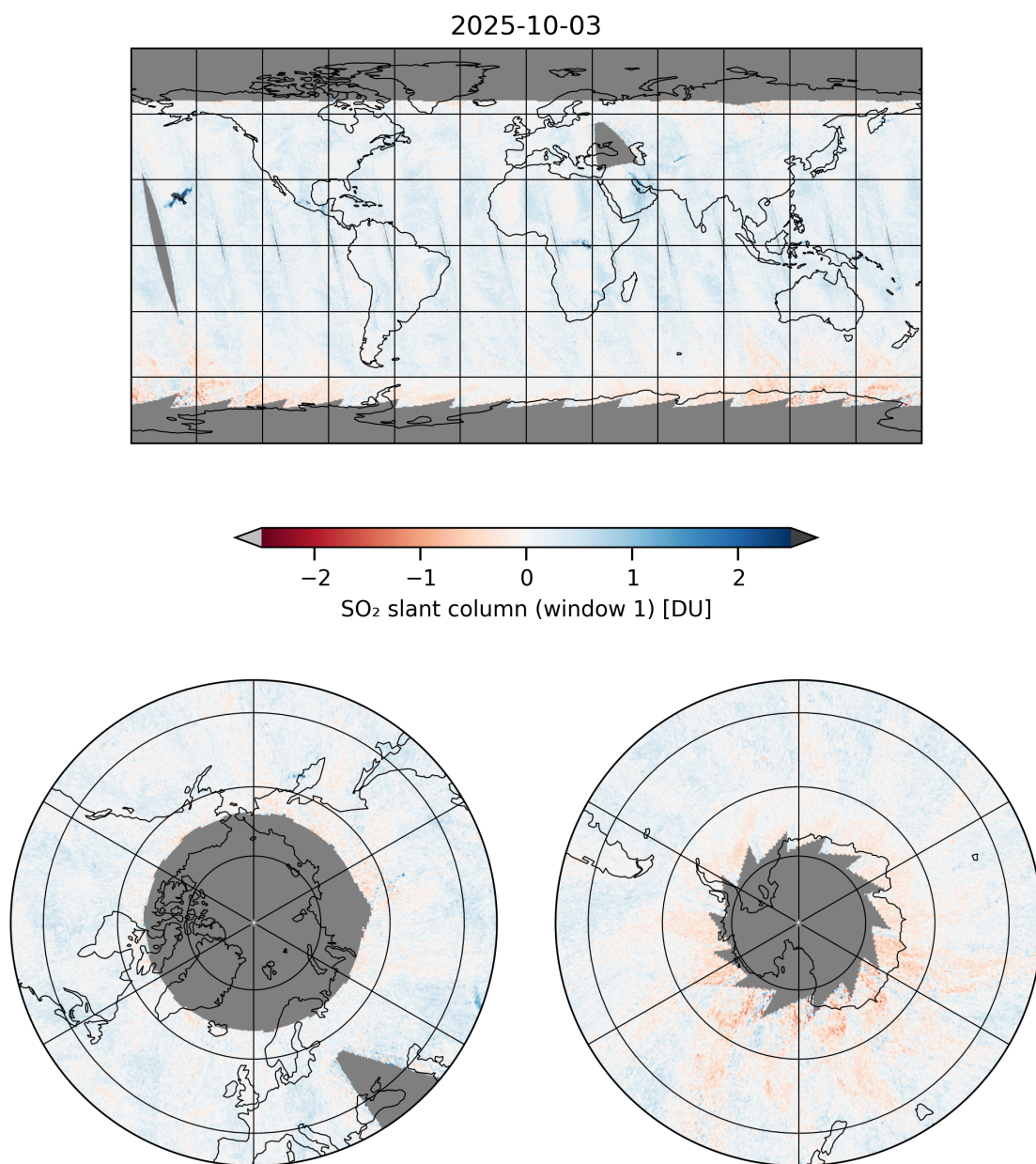


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-10-03 to 2025-10-04

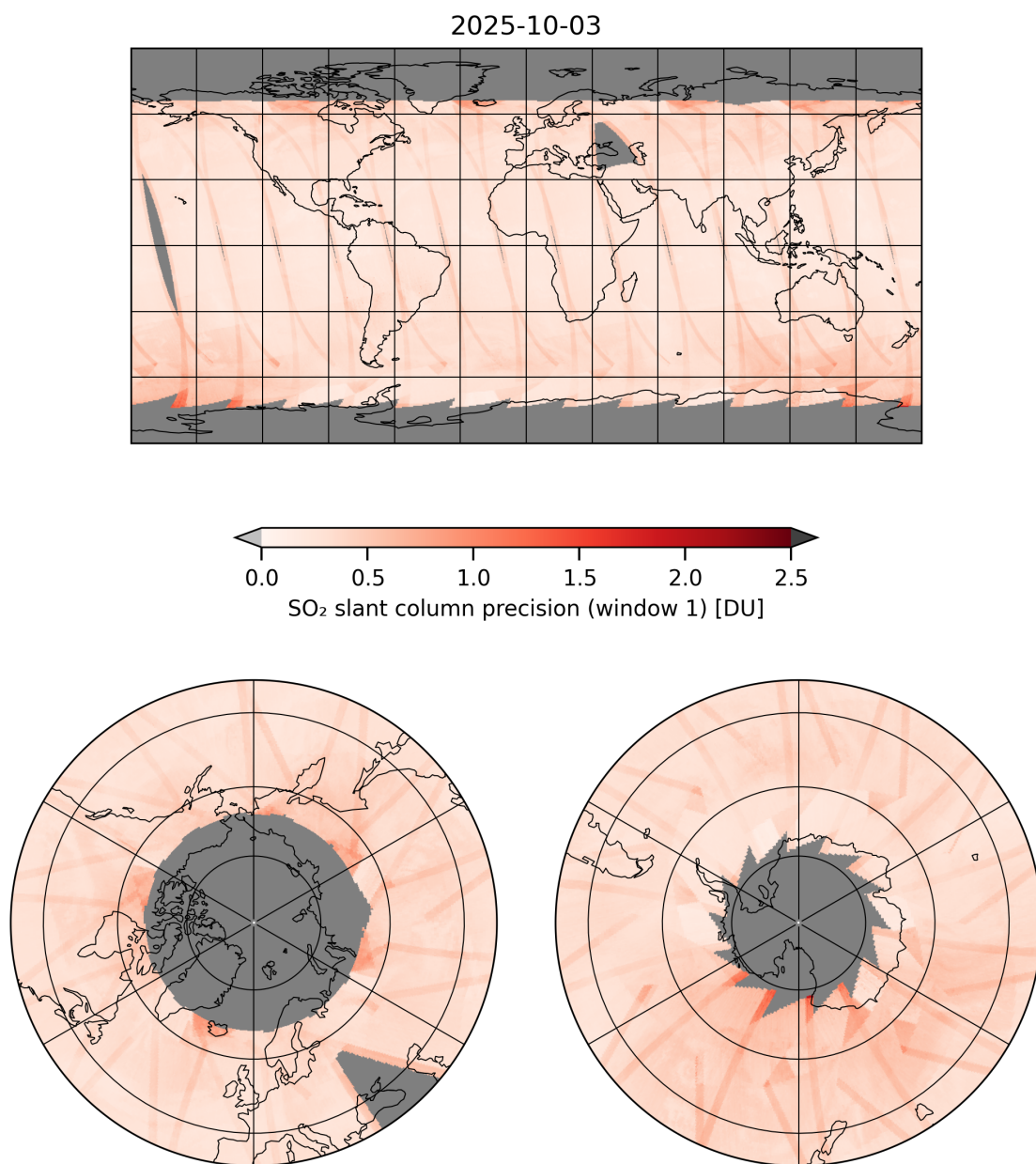


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-10-03 to 2025-10-04

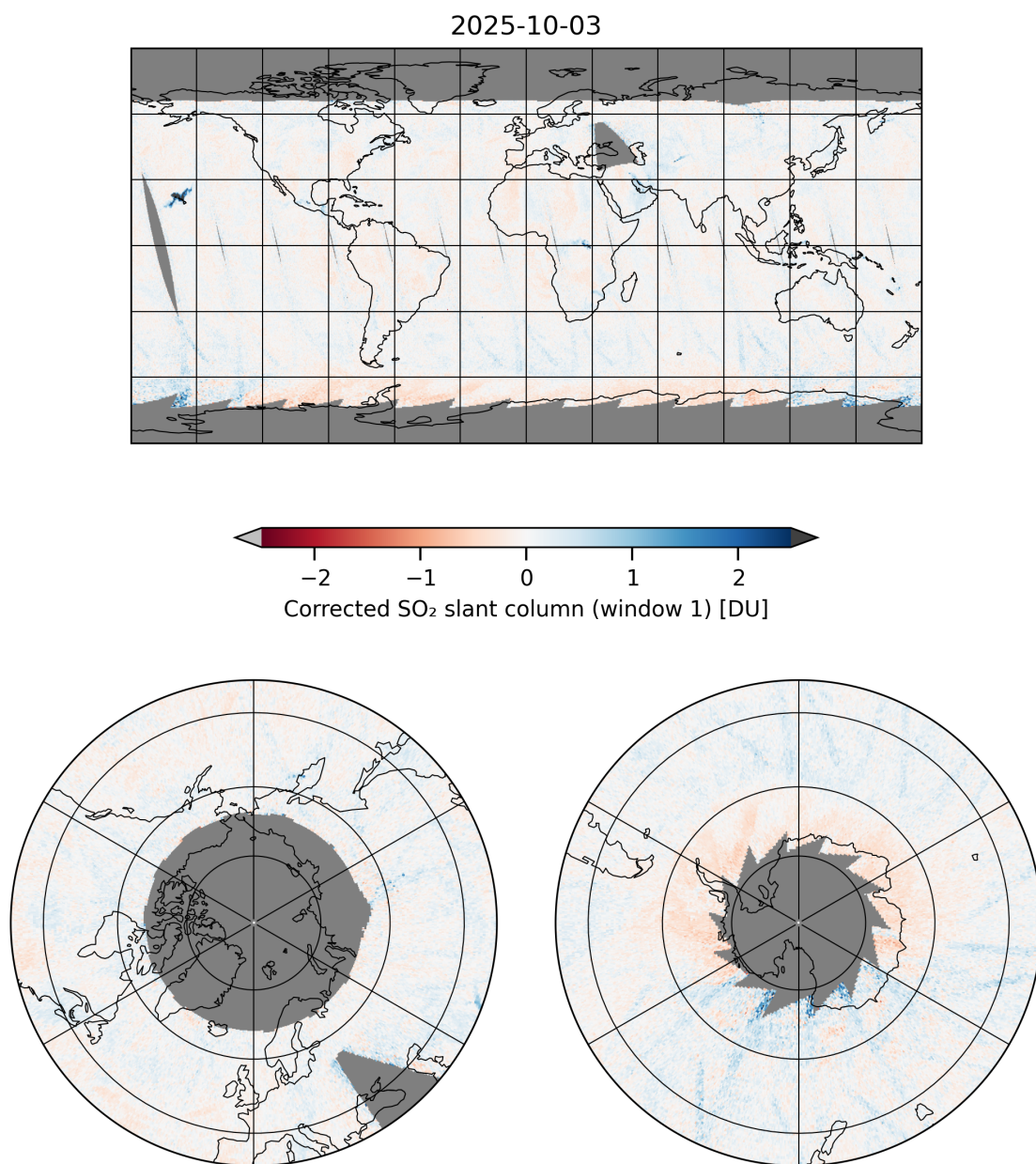


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-10-03 to 2025-10-04

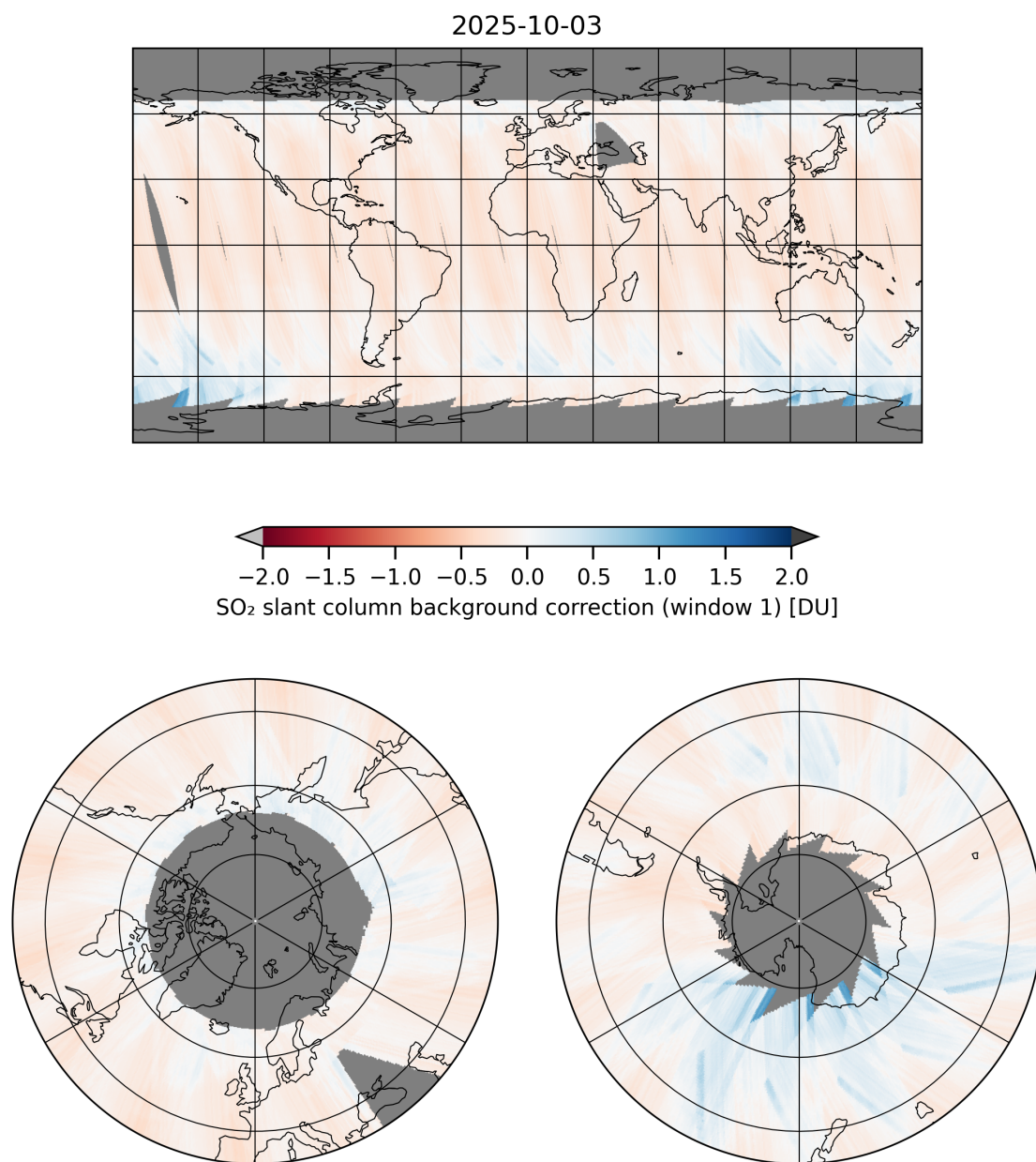


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-10-03 to 2025-10-04

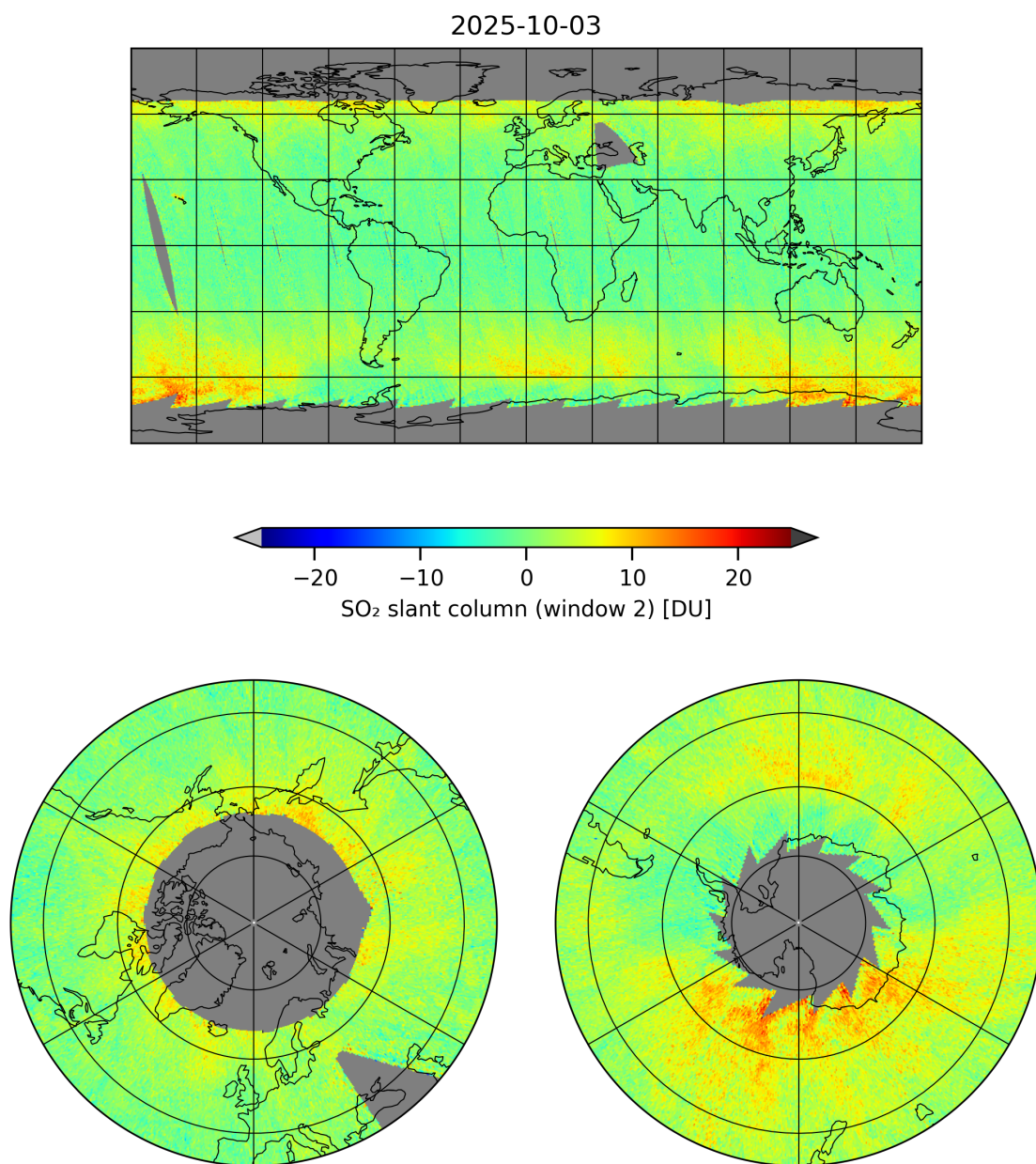


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-10-03 to 2025-10-04

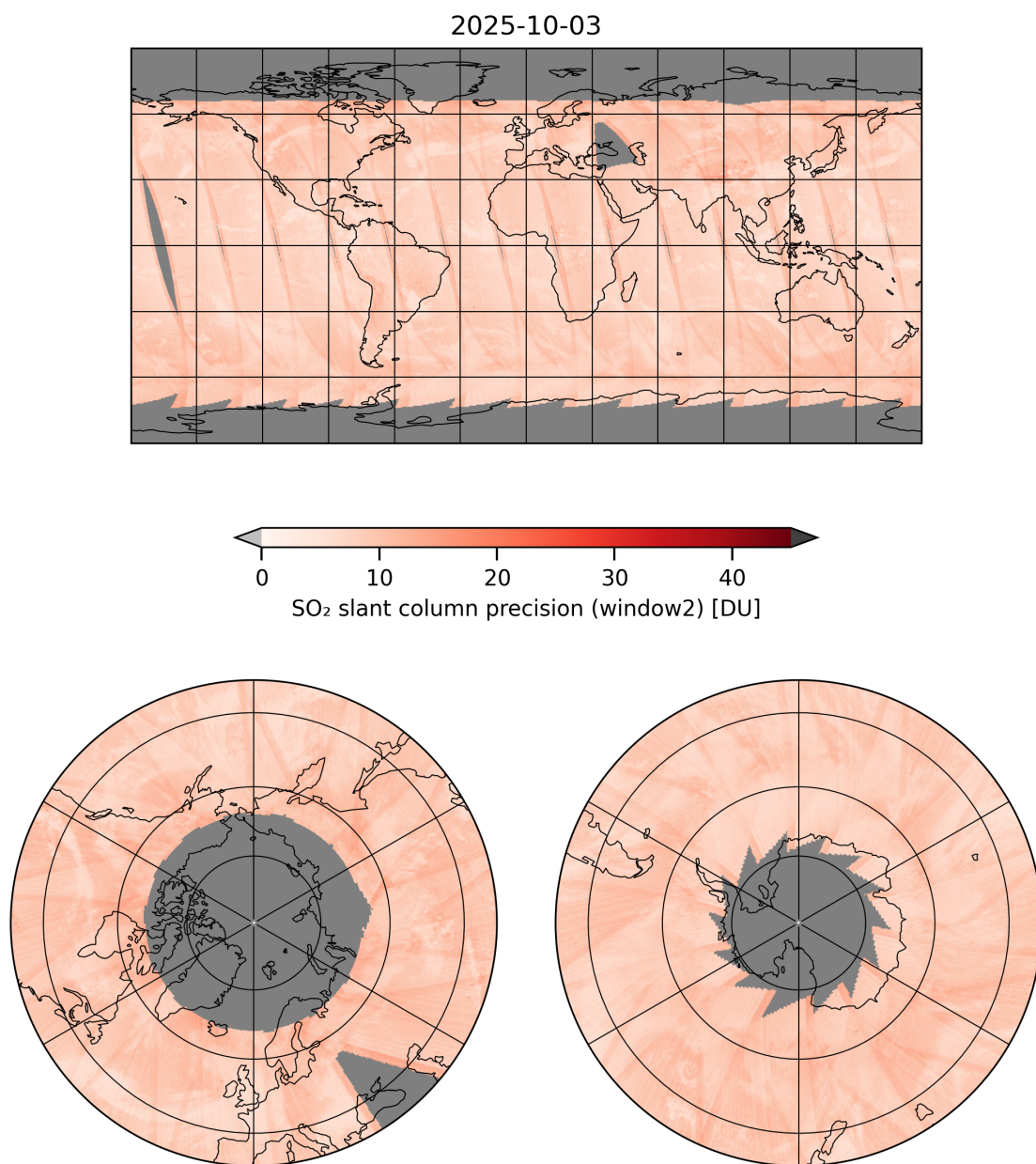


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-10-03 to 2025-10-04

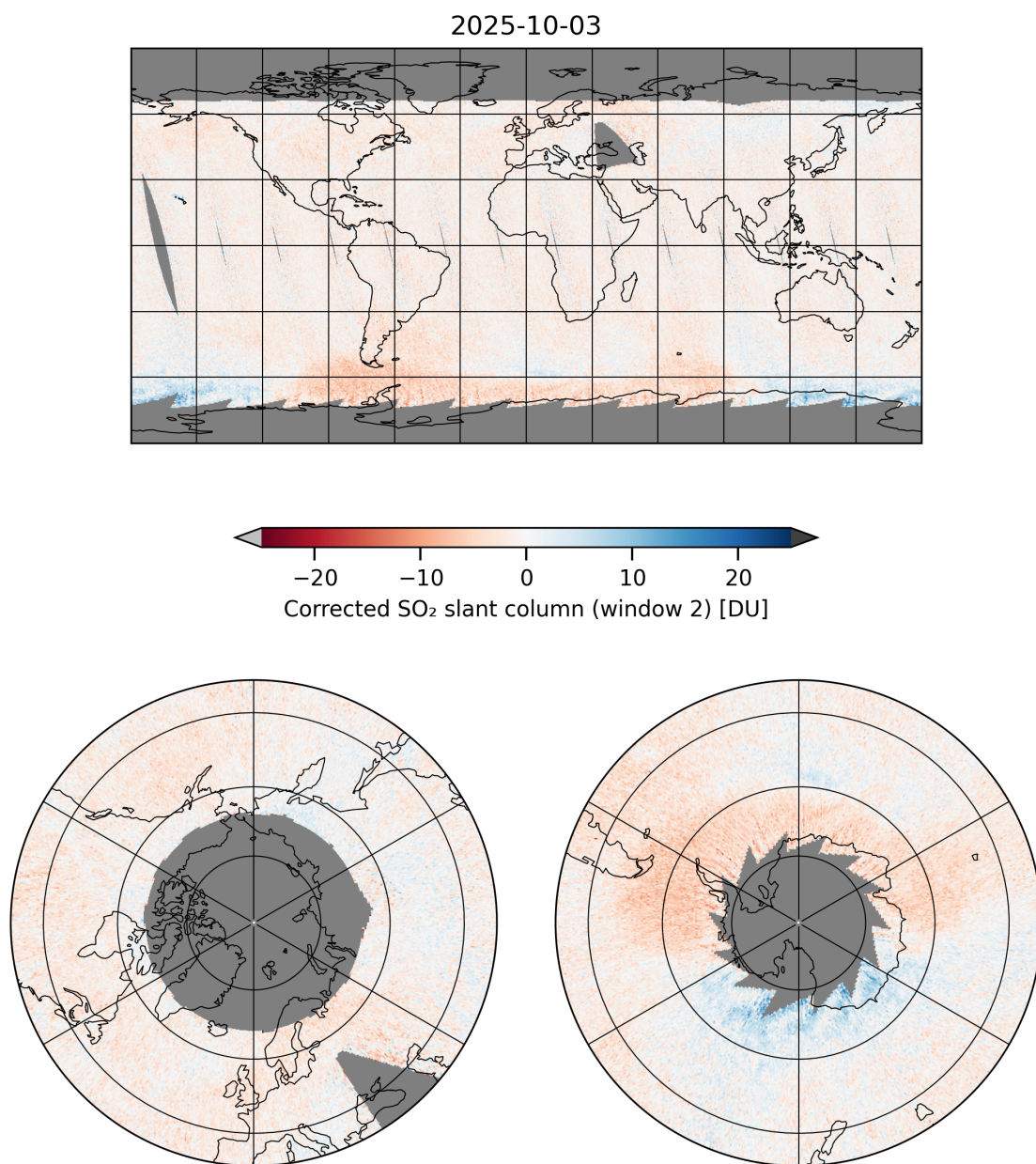


Figure 15: Map of "Corrected SO₂ slant column (window 2)" for 2025-10-03 to 2025-10-04

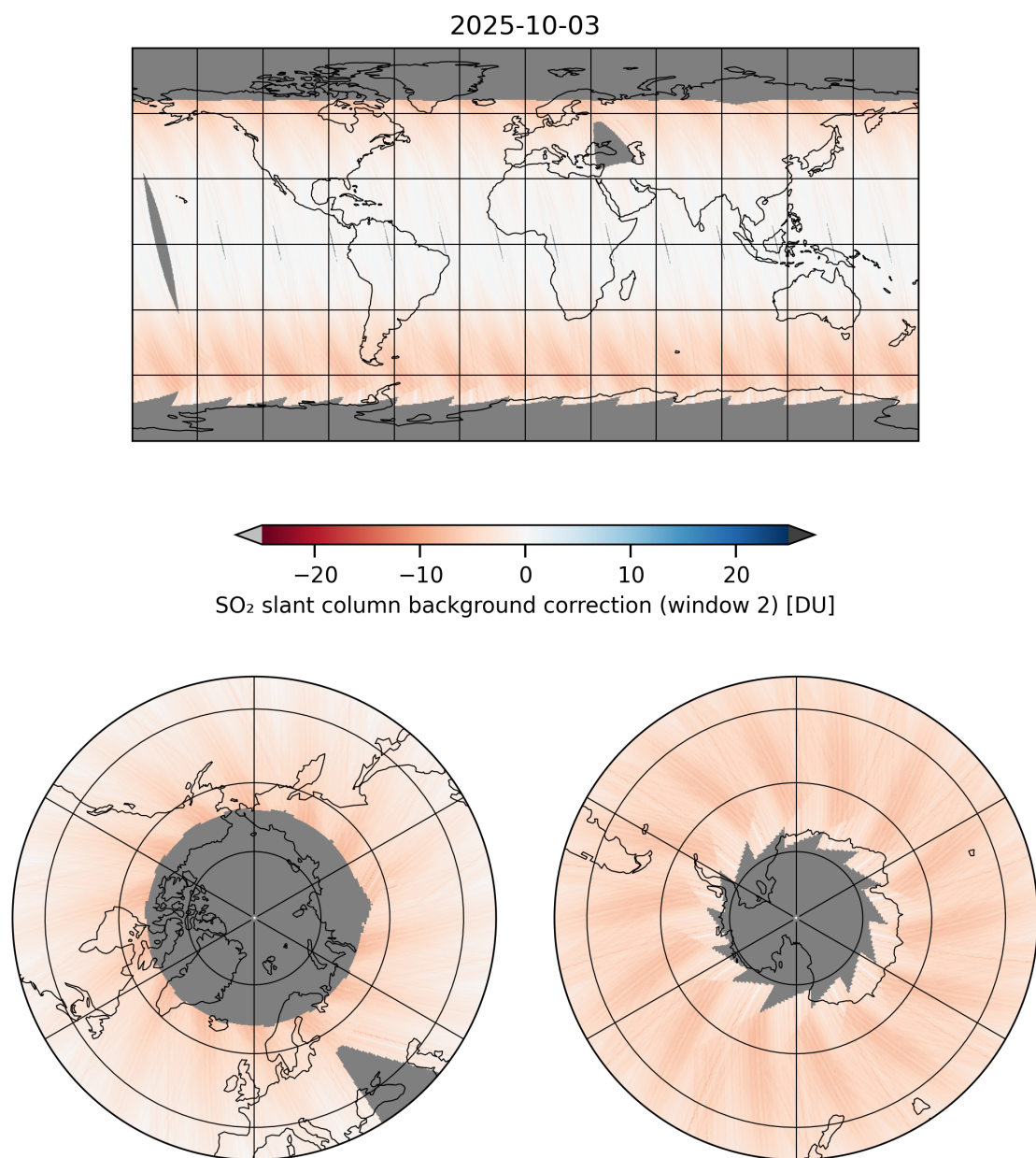


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-10-03 to 2025-10-04

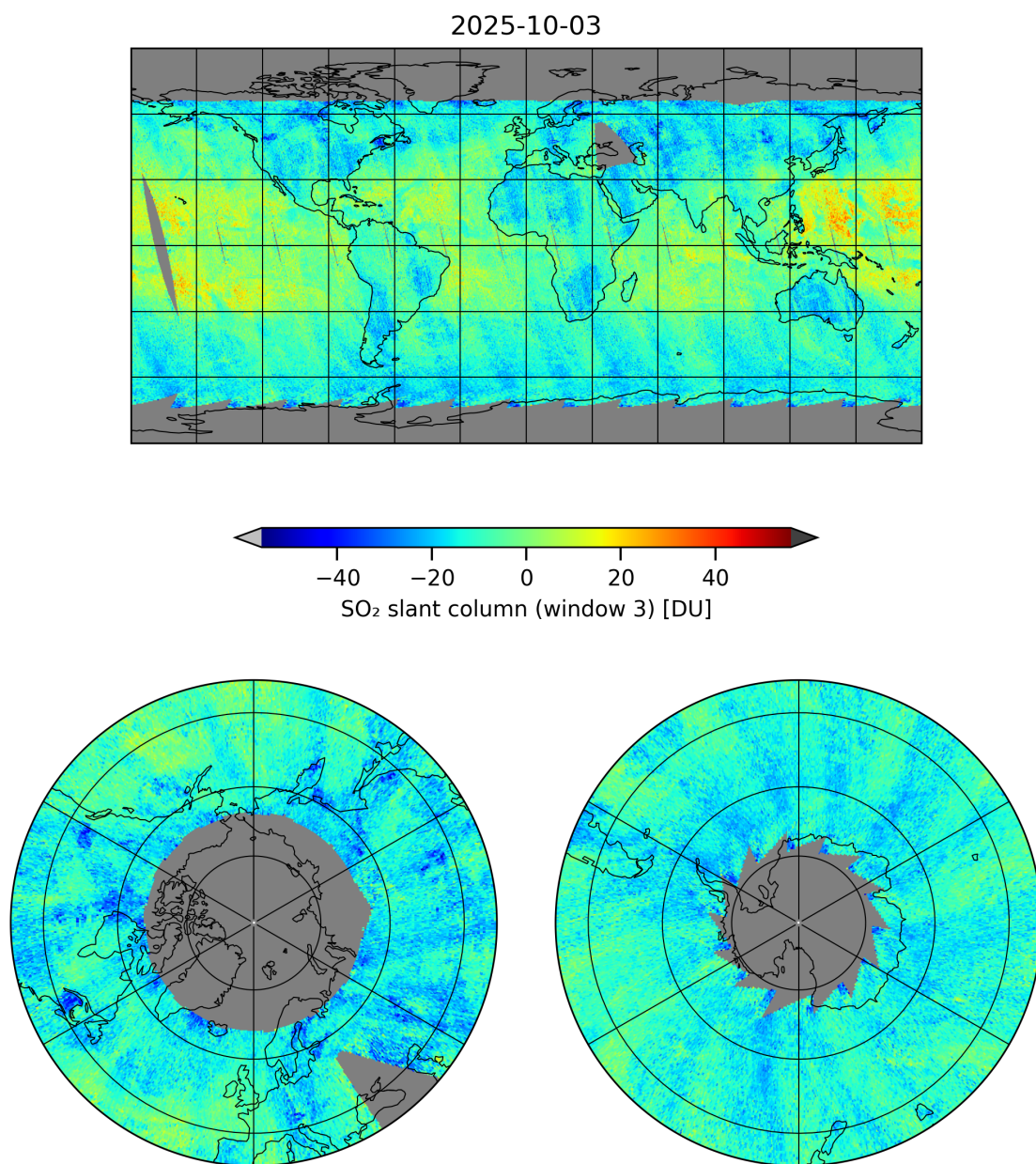


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-10-03 to 2025-10-04

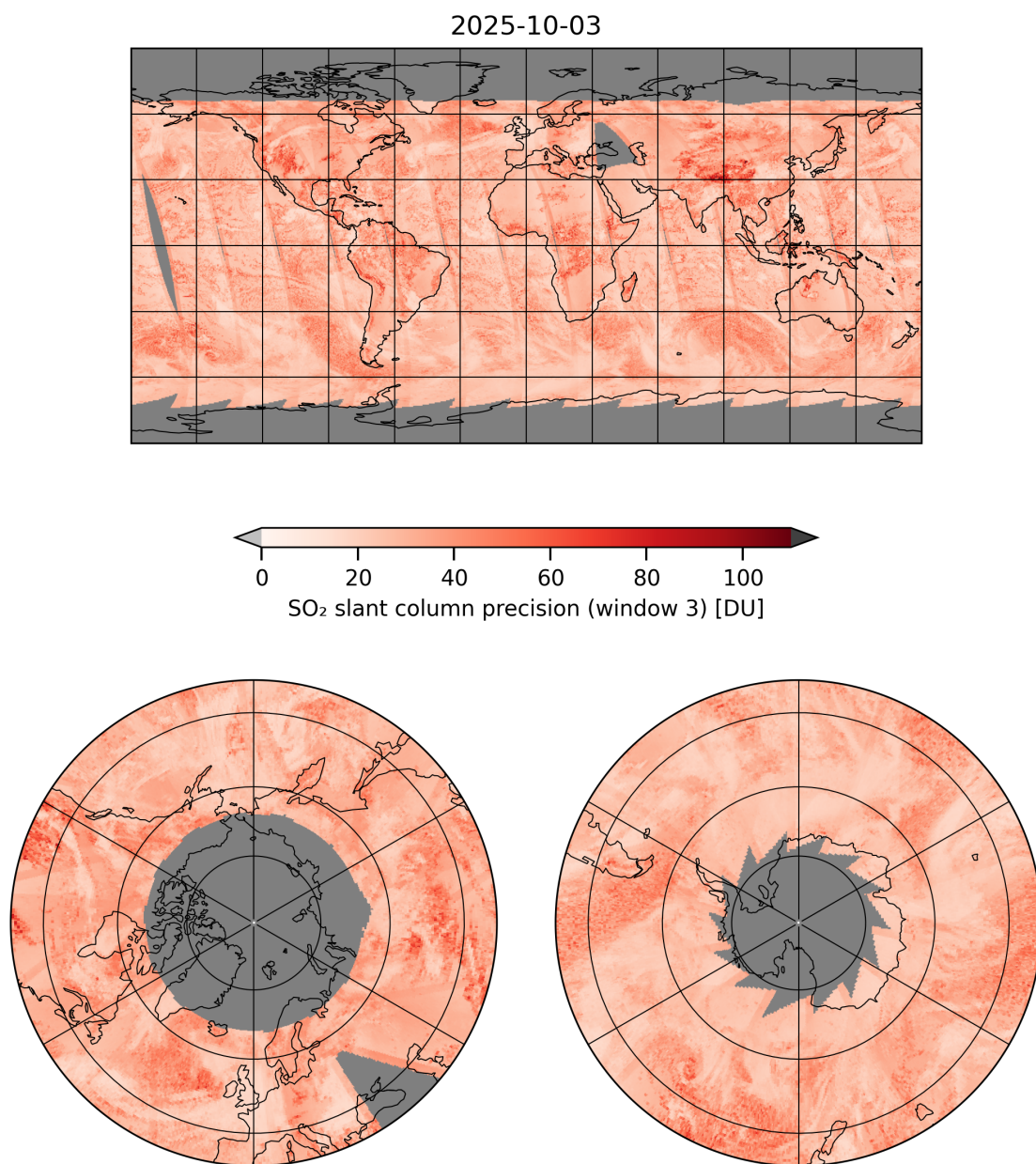


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-10-03 to 2025-10-04

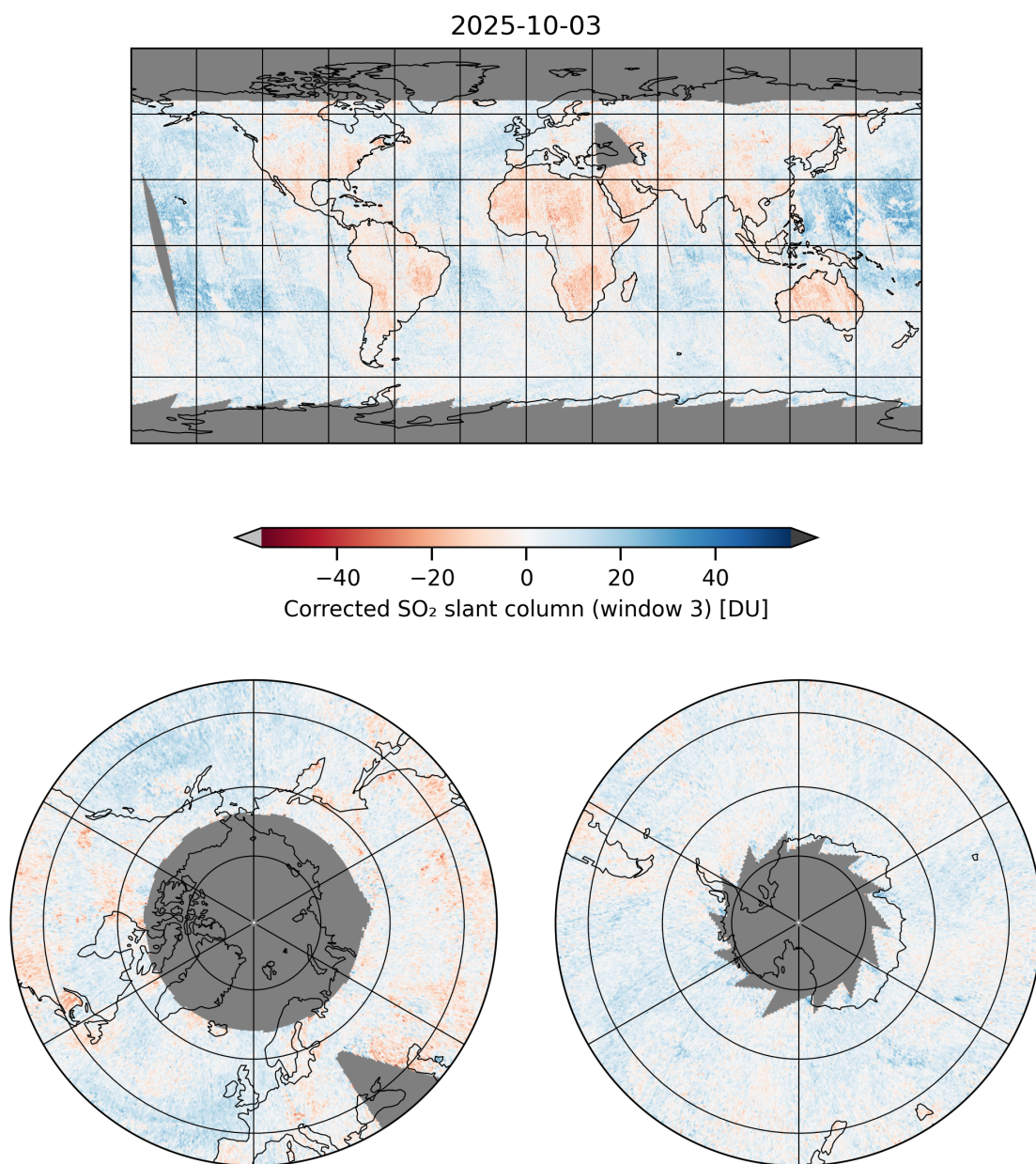


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-10-03 to 2025-10-04

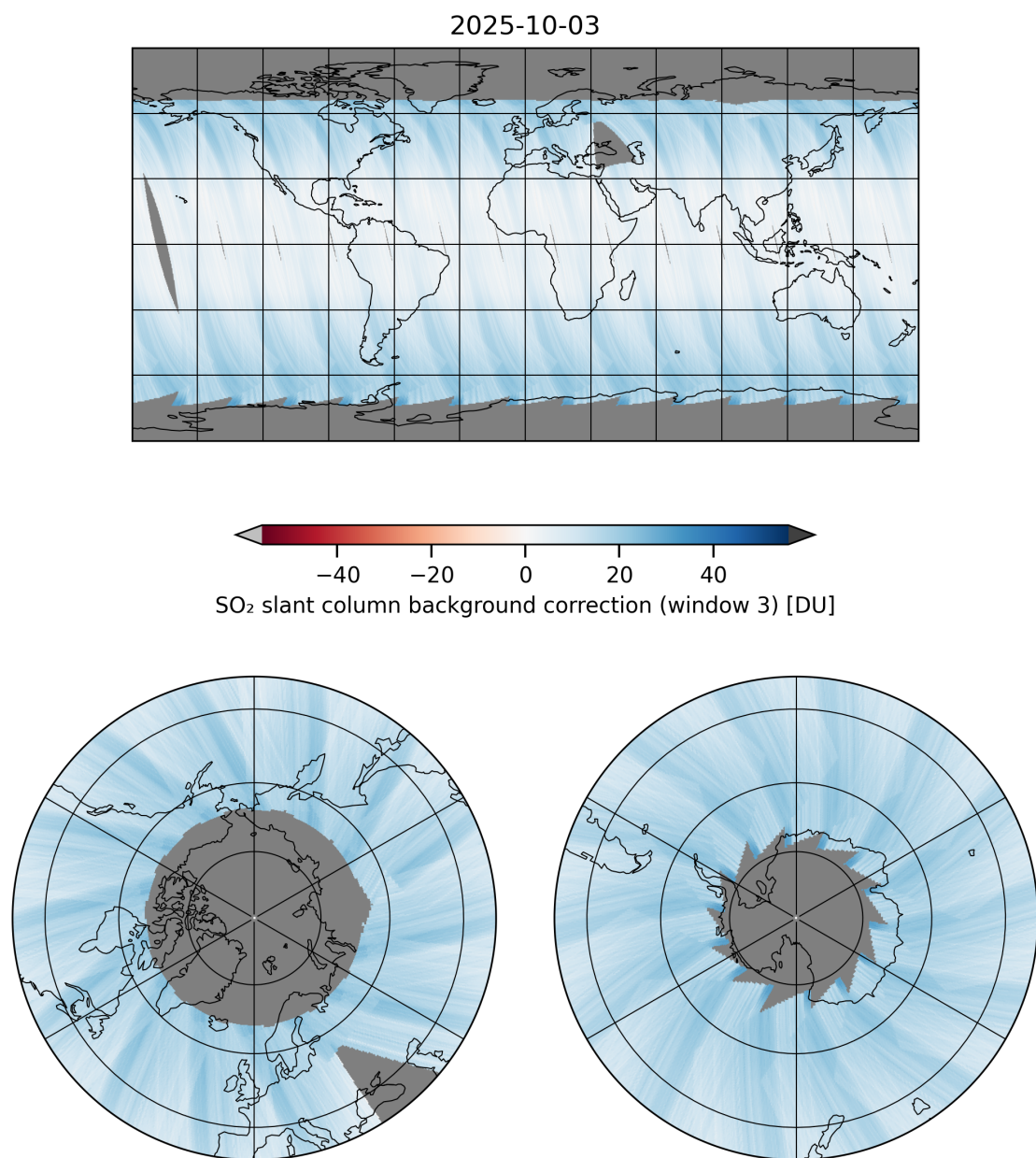


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-10-03 to 2025-10-04

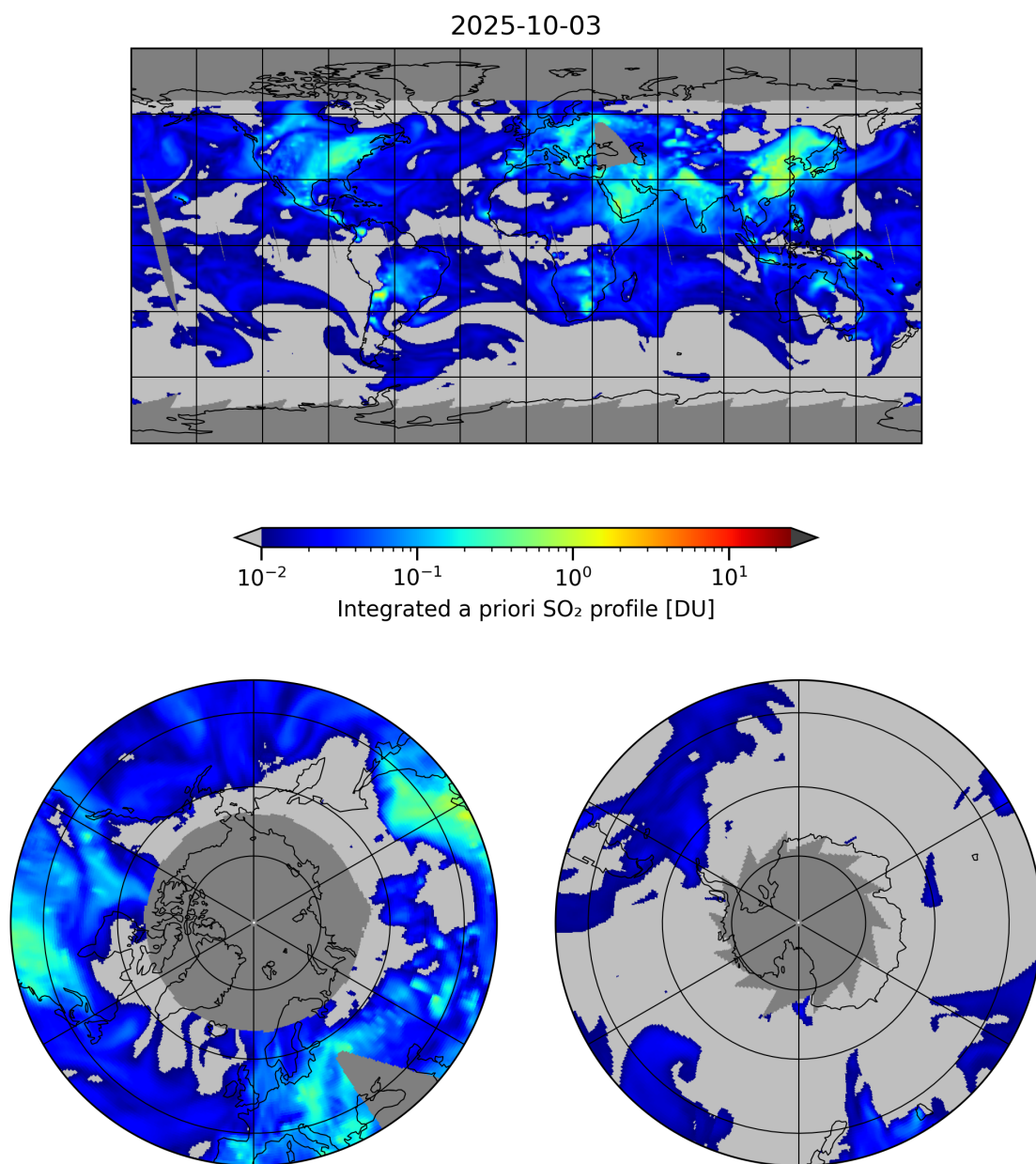


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-10-03 to 2025-10-04

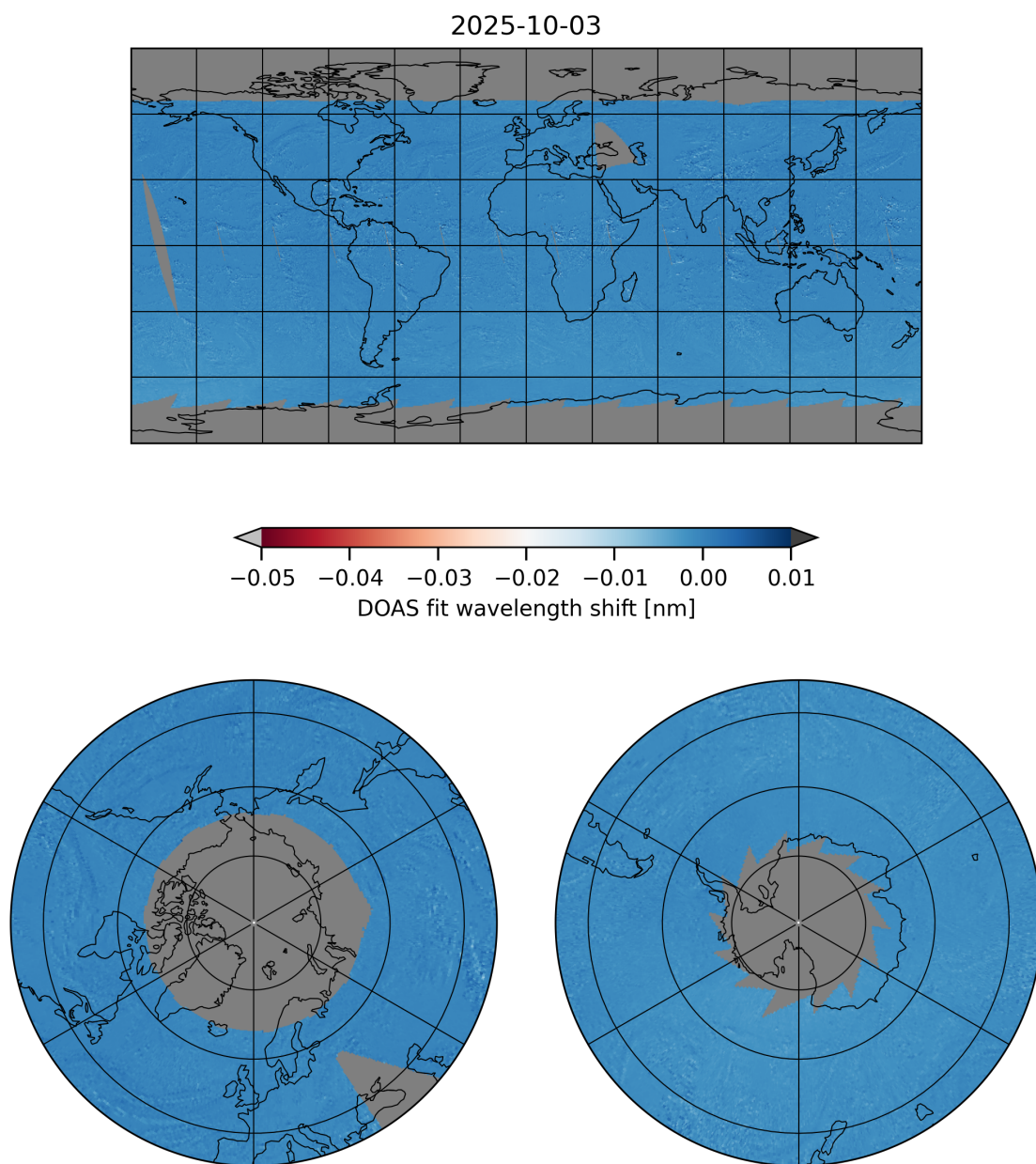


Figure 22: Map of “DOAS fit wavelength shift” for 2025-10-03 to 2025-10-04

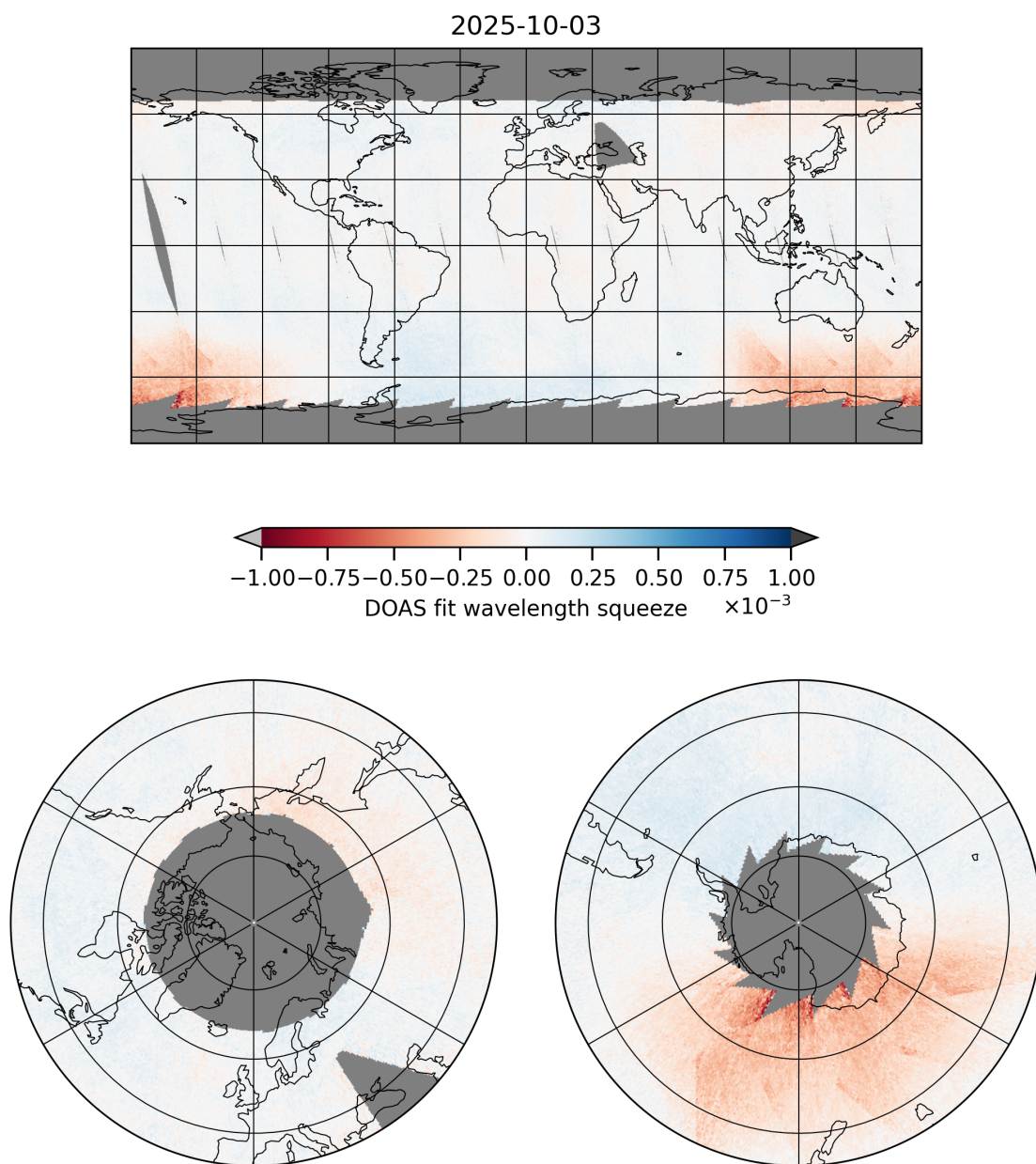


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-10-03 to 2025-10-04

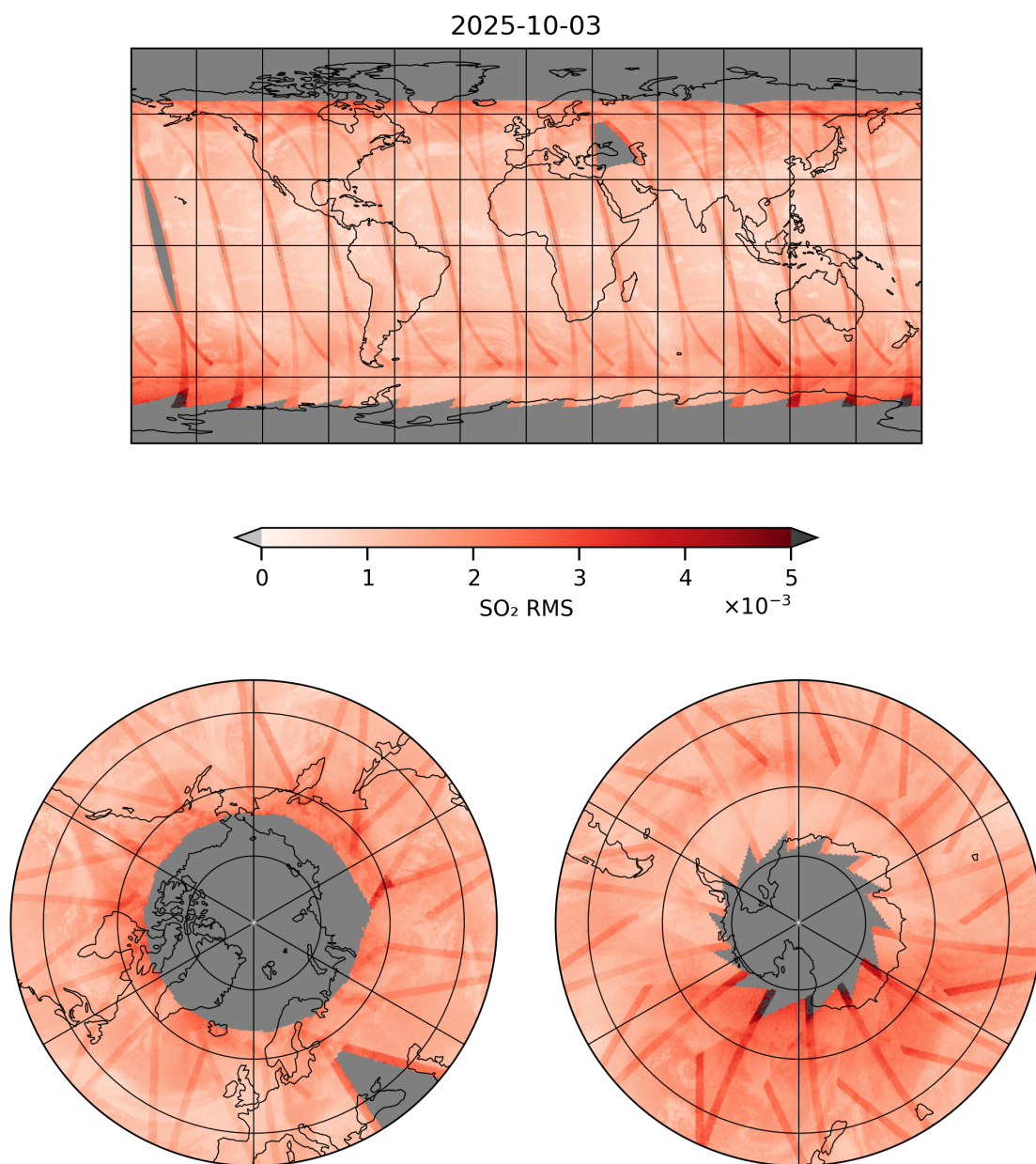


Figure 24: Map of “SO₂ RMS” for 2025-10-03 to 2025-10-04

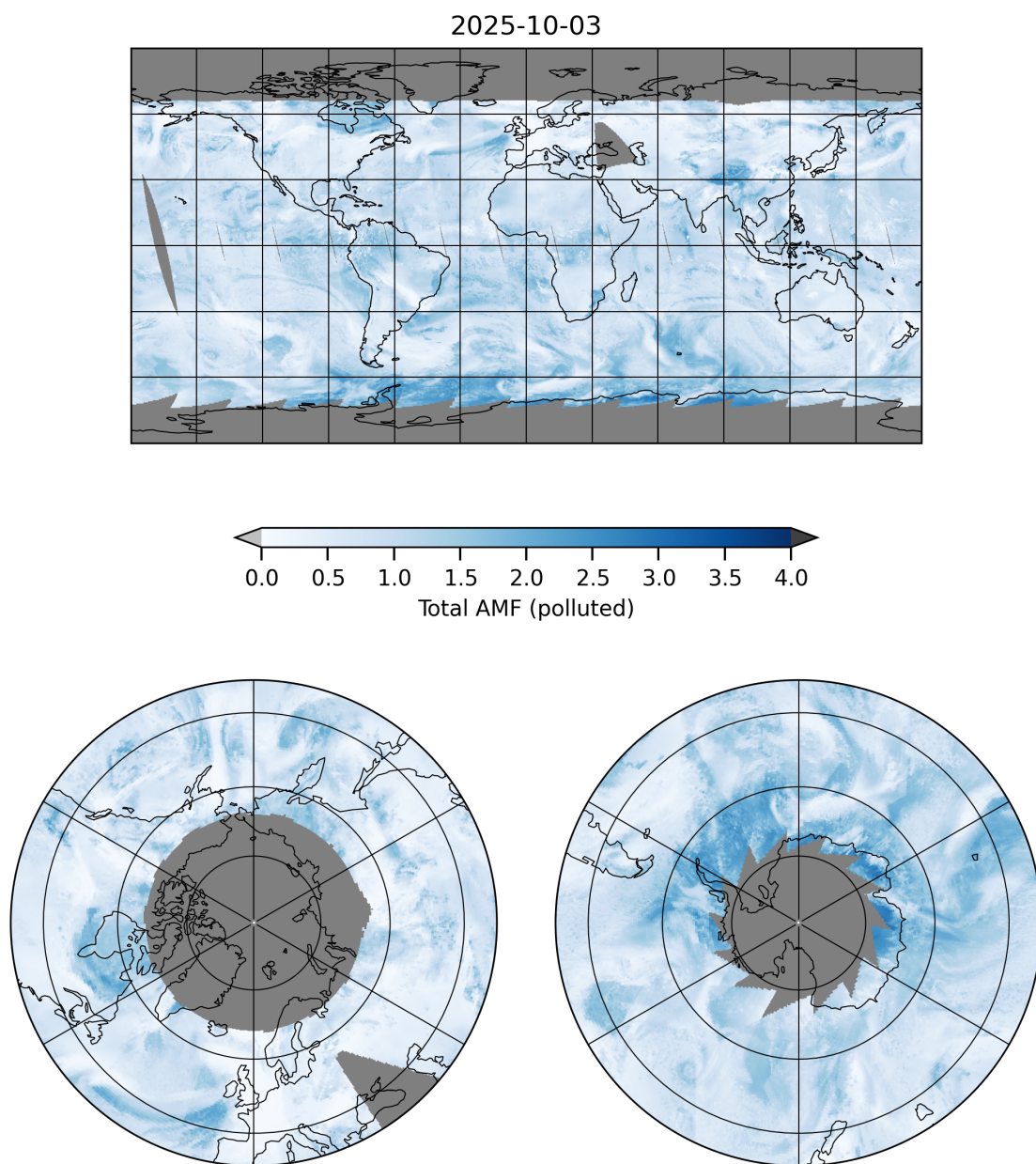


Figure 25: Map of “Total AMF (polluted)” for 2025-10-03 to 2025-10-04

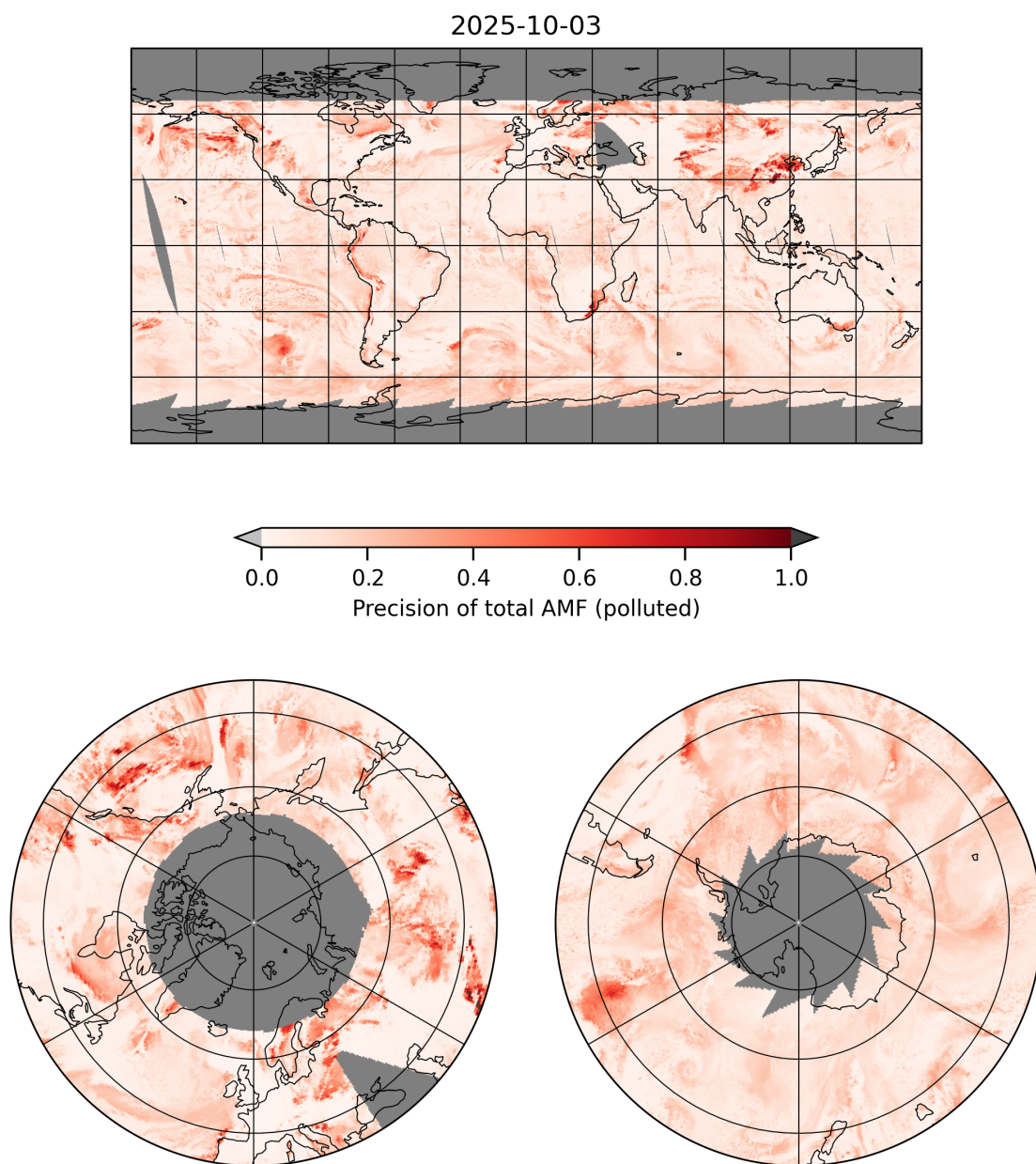


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-10-03 to 2025-10-04

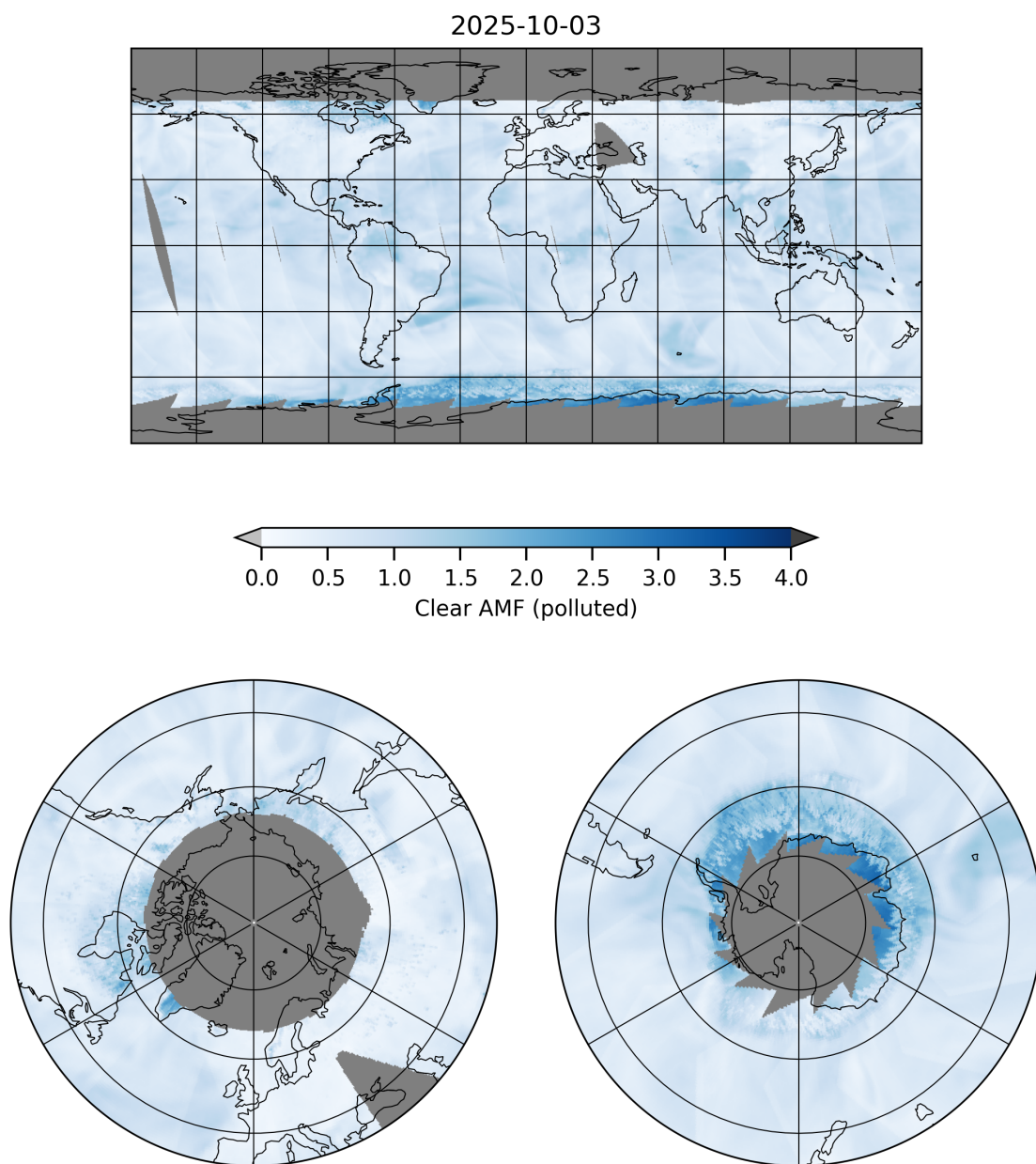


Figure 27: Map of “Clear AMF (polluted)” for 2025-10-03 to 2025-10-04

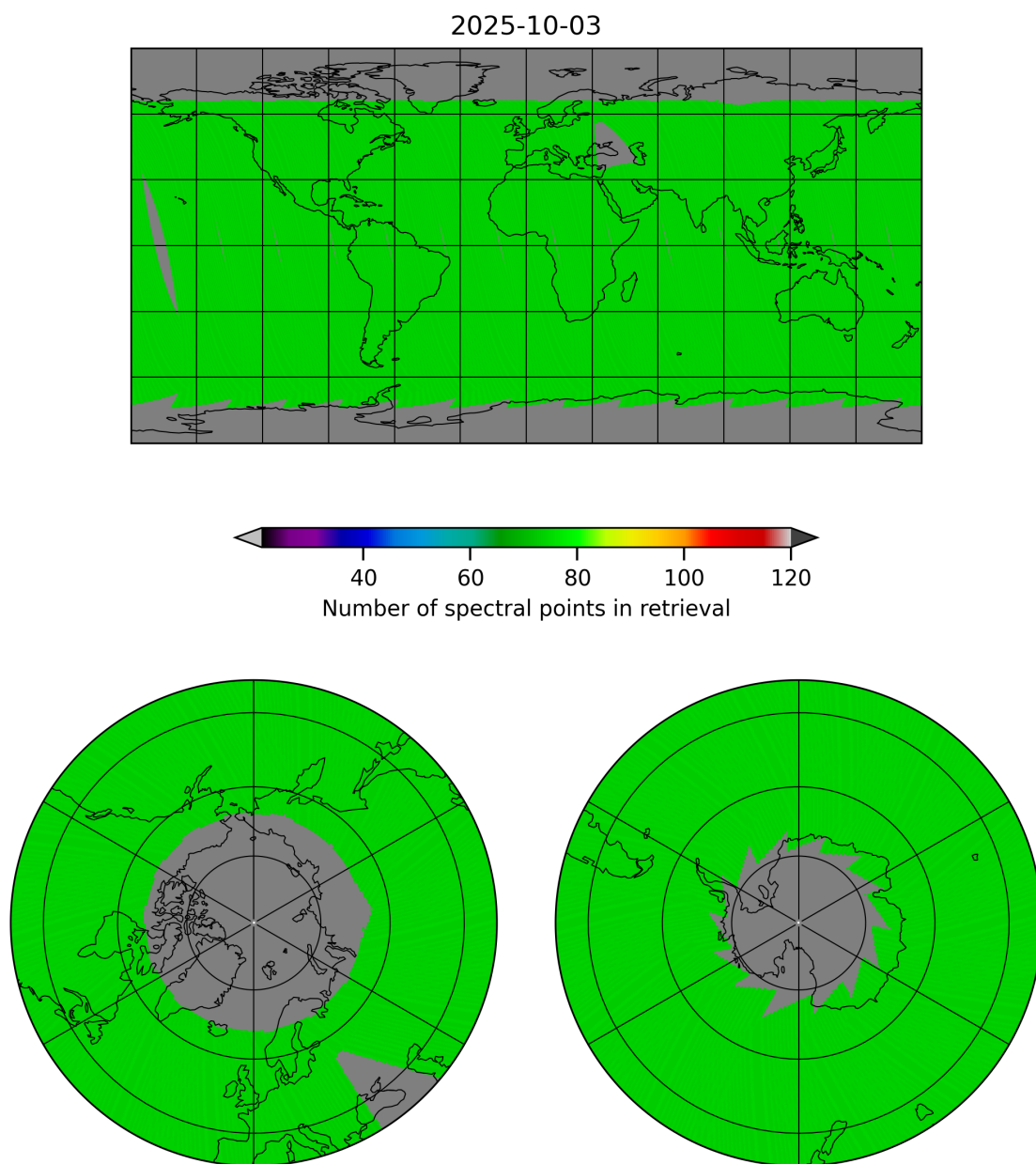


Figure 28: Map of “Number of spectral points in retrieval” for 2025-10-03 to 2025-10-04

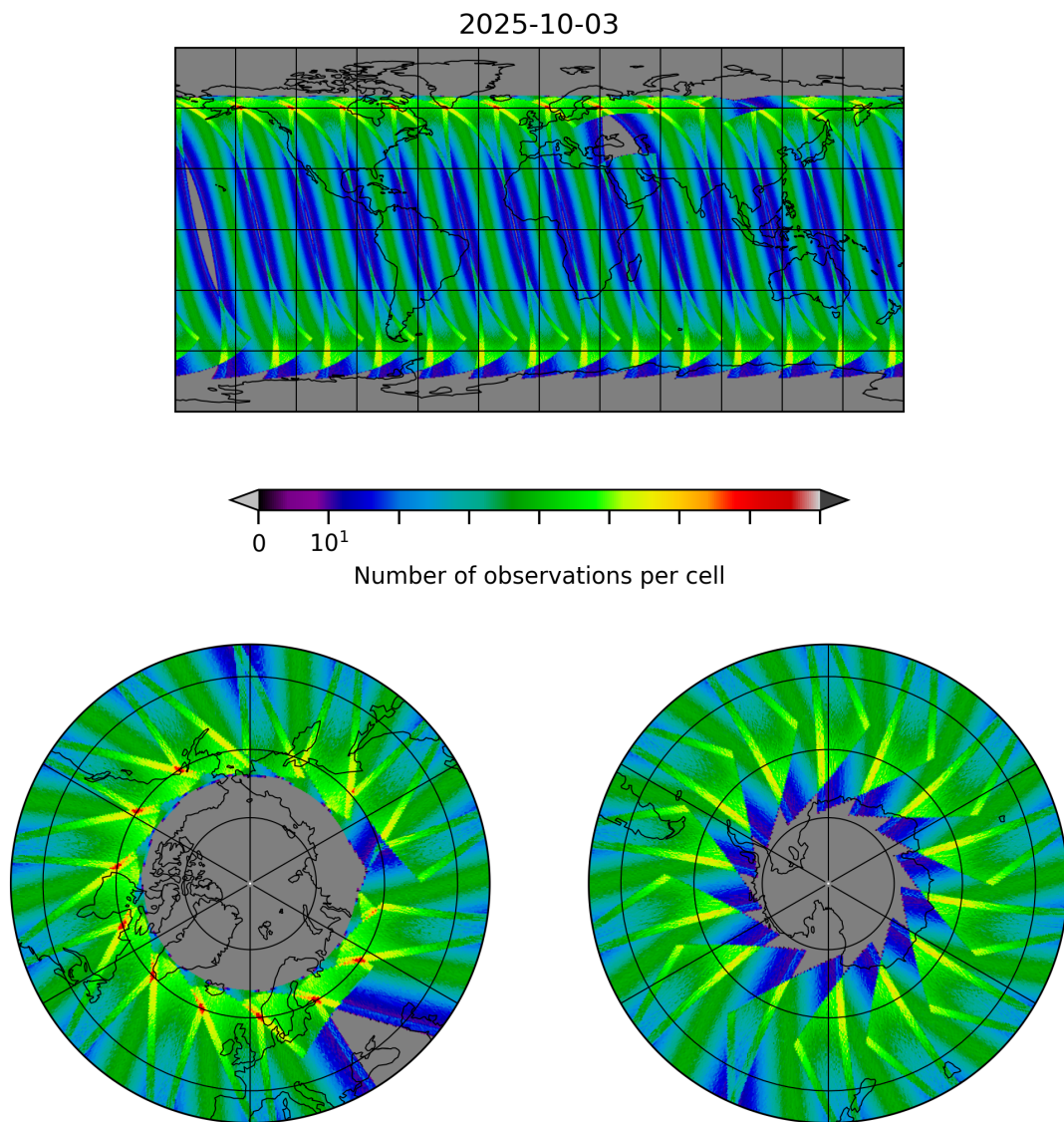


Figure 29: Map of the number of observations for 2025-10-03 to 2025-10-04

7 Zonal average

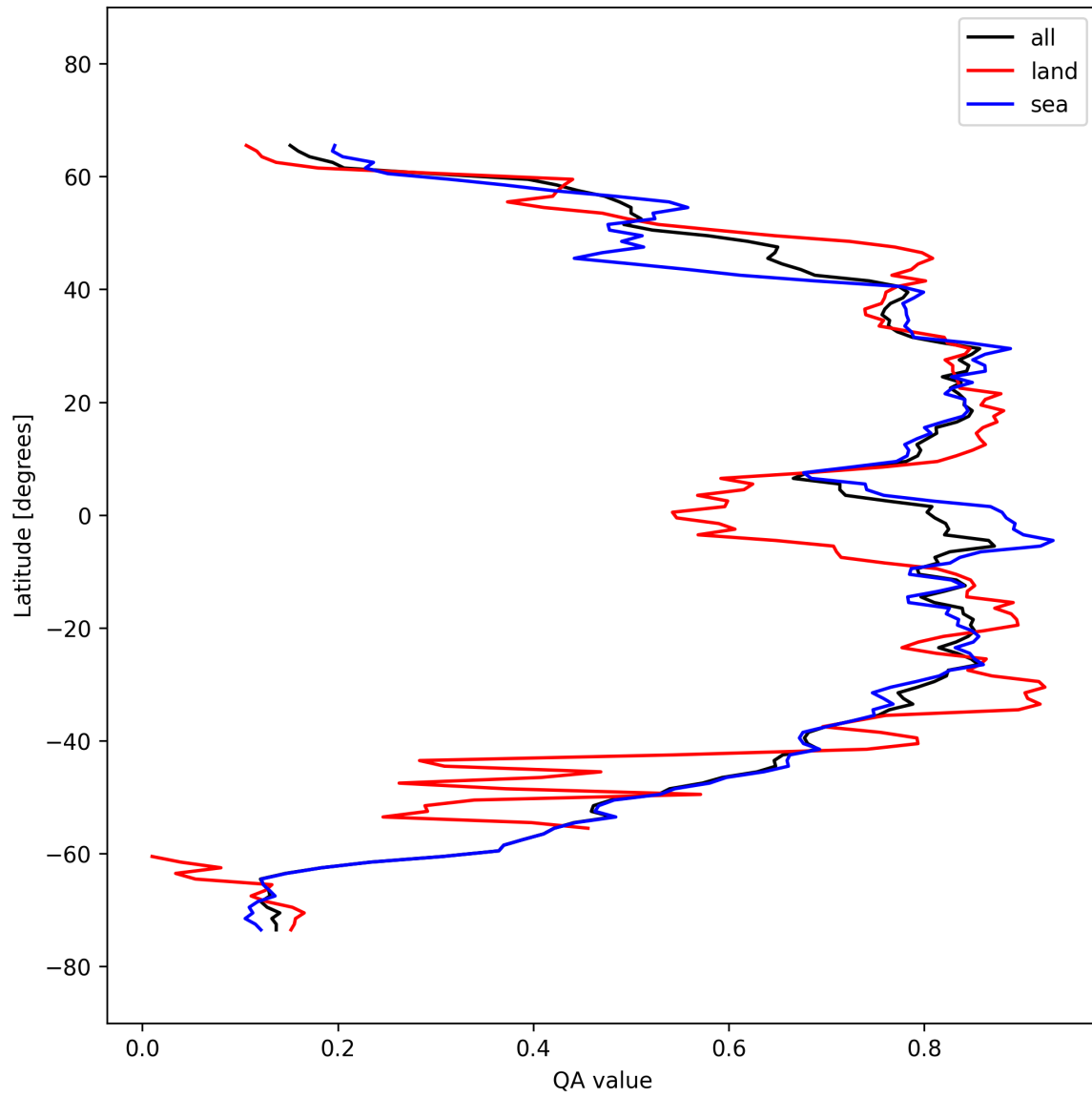


Figure 30: Zonal average of “QA value” for 2025-10-03 to 2025-10-04.

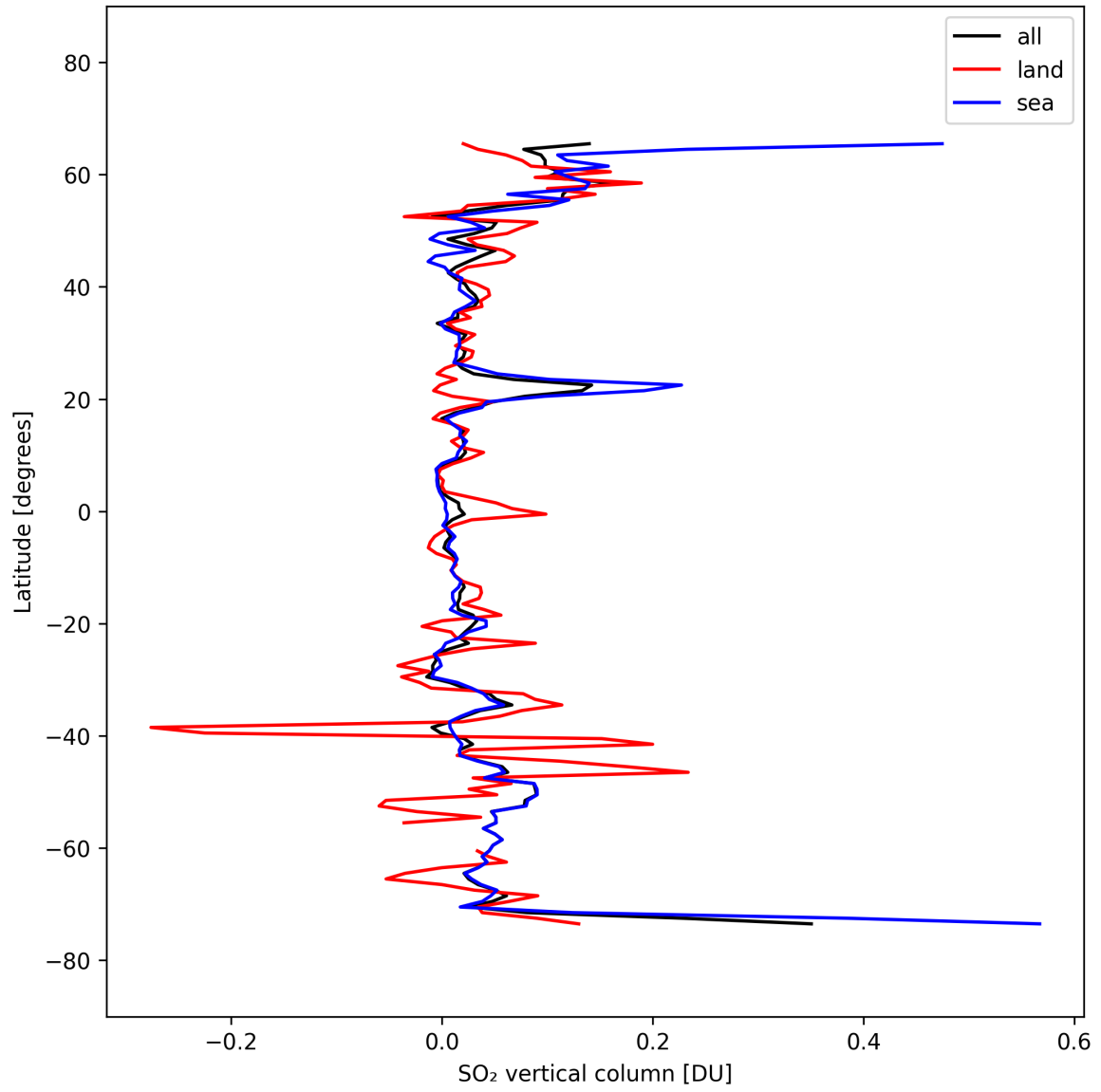


Figure 31: Zonal average of “SO₂ vertical column” for 2025-10-03 to 2025-10-04.

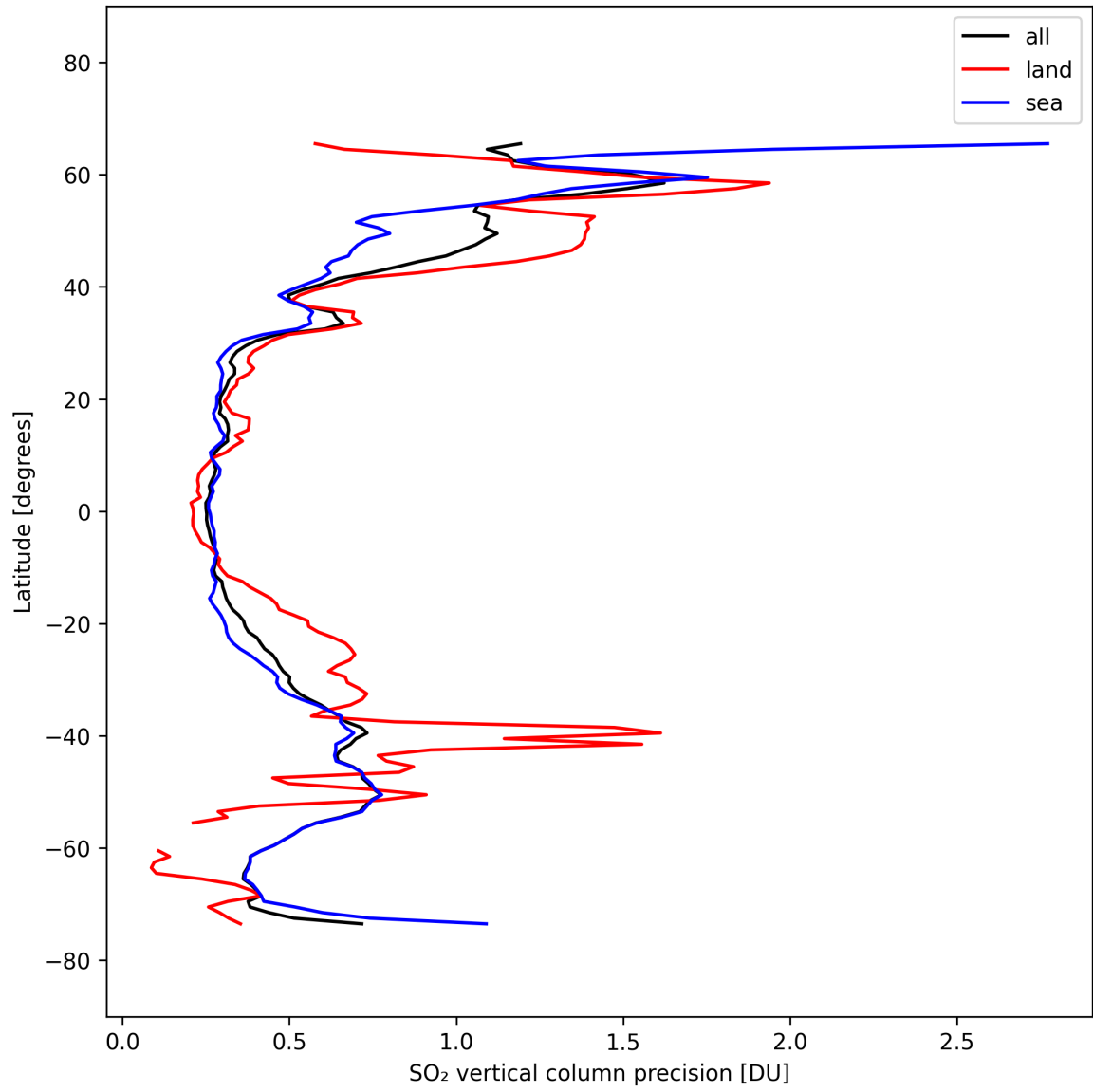


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-10-03 to 2025-10-04.

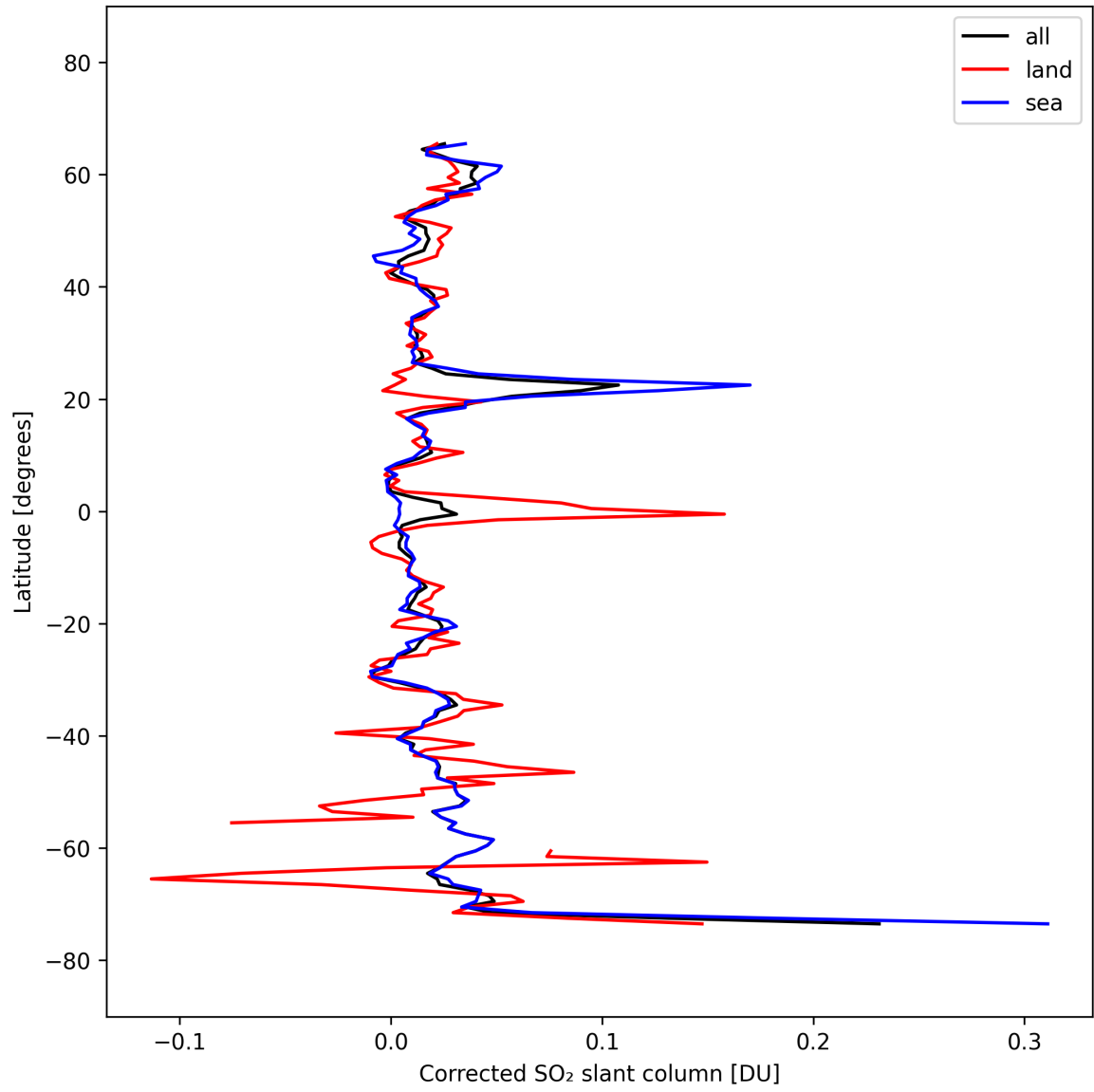


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-10-03 to 2025-10-04.

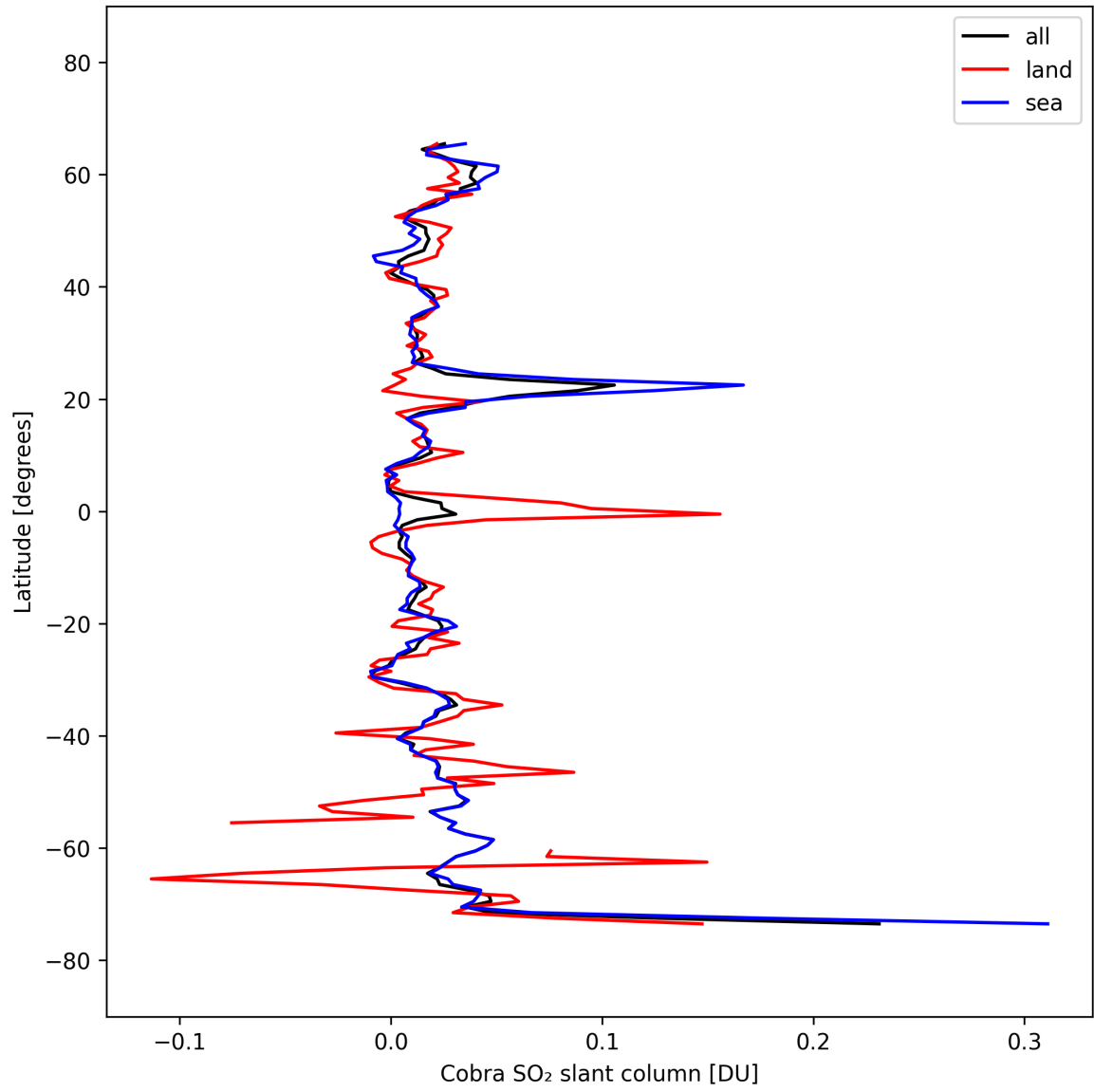


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-10-03 to 2025-10-04.

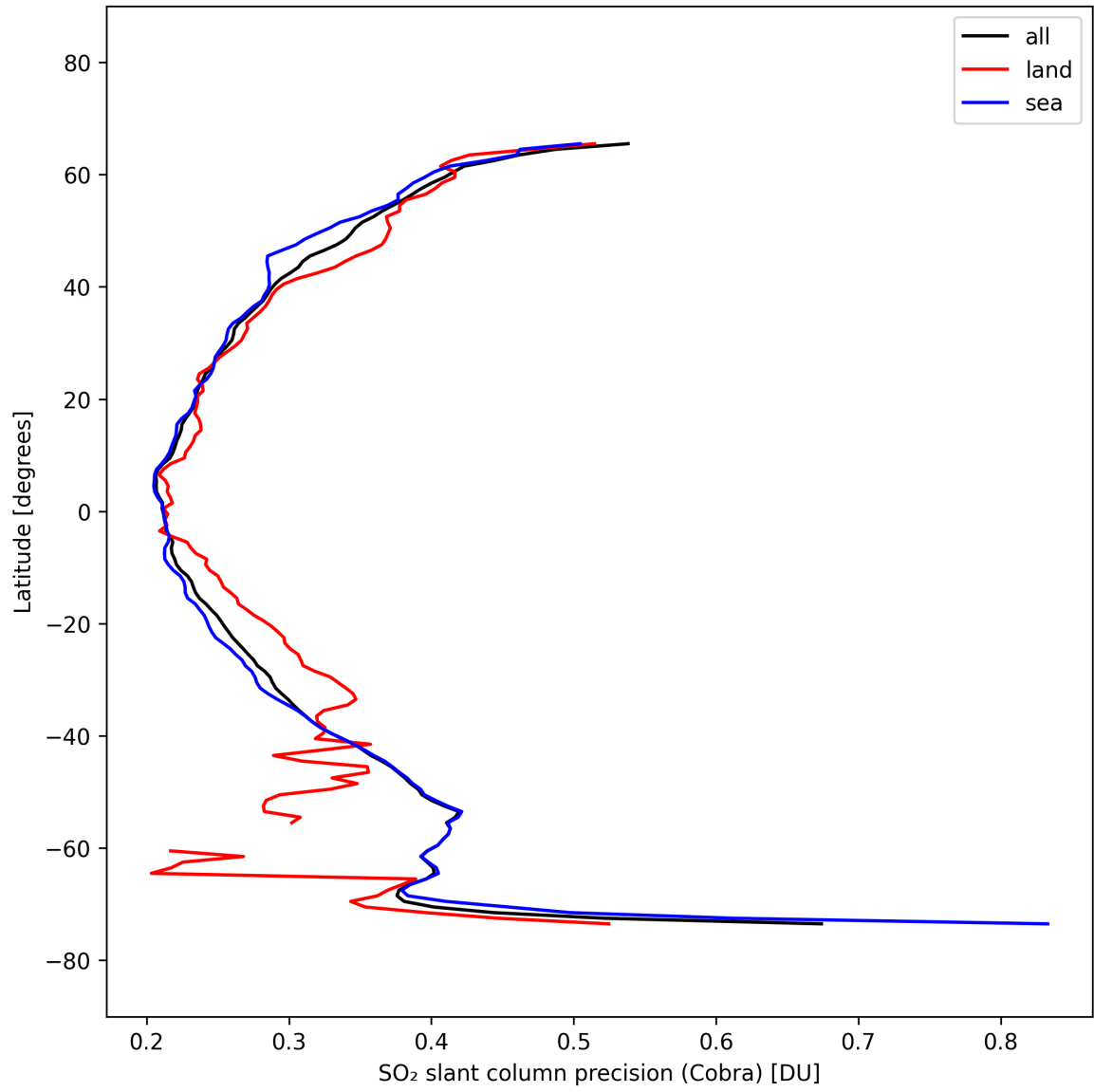


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-10-03 to 2025-10-04.

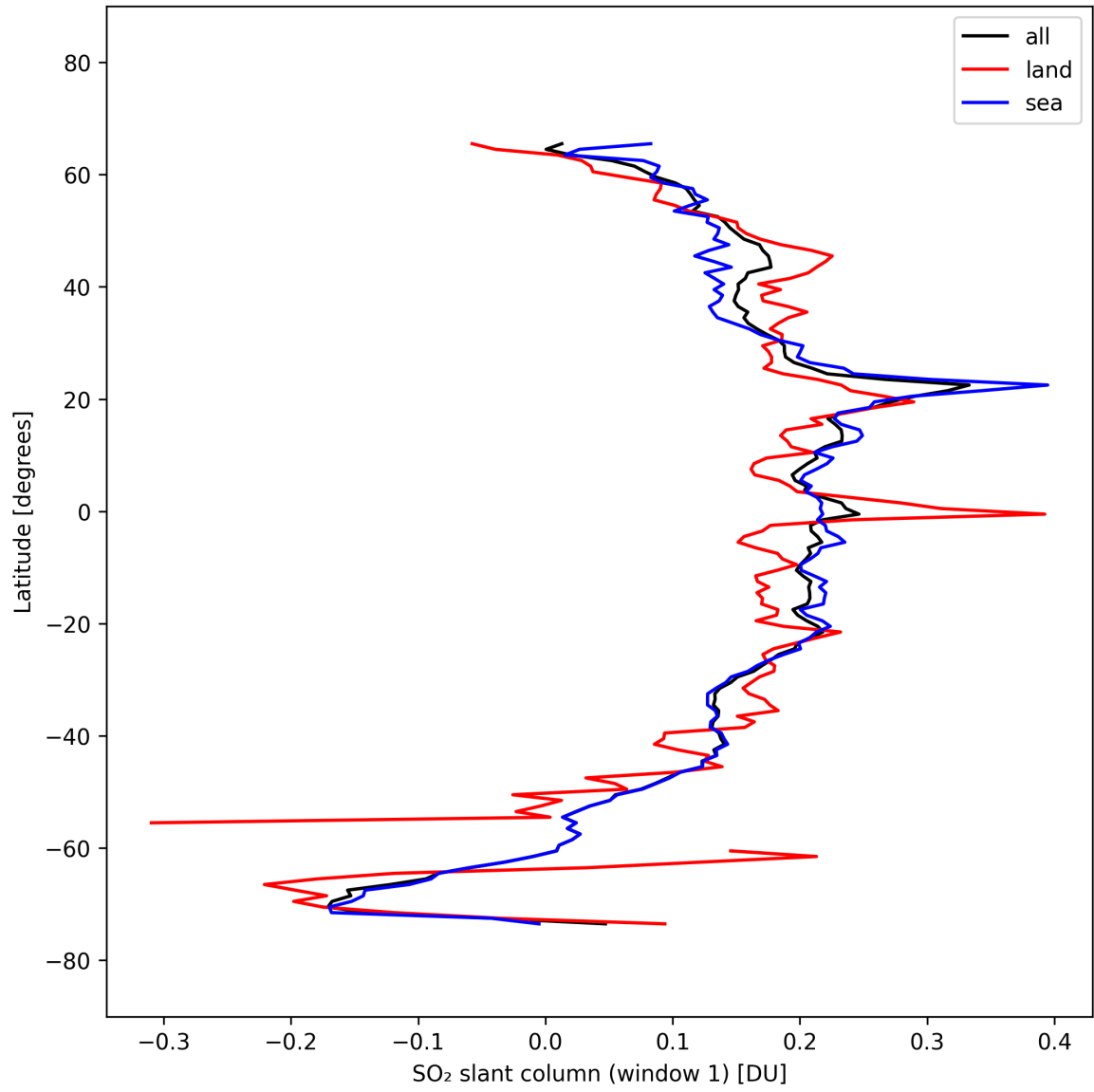


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-10-03 to 2025-10-04.

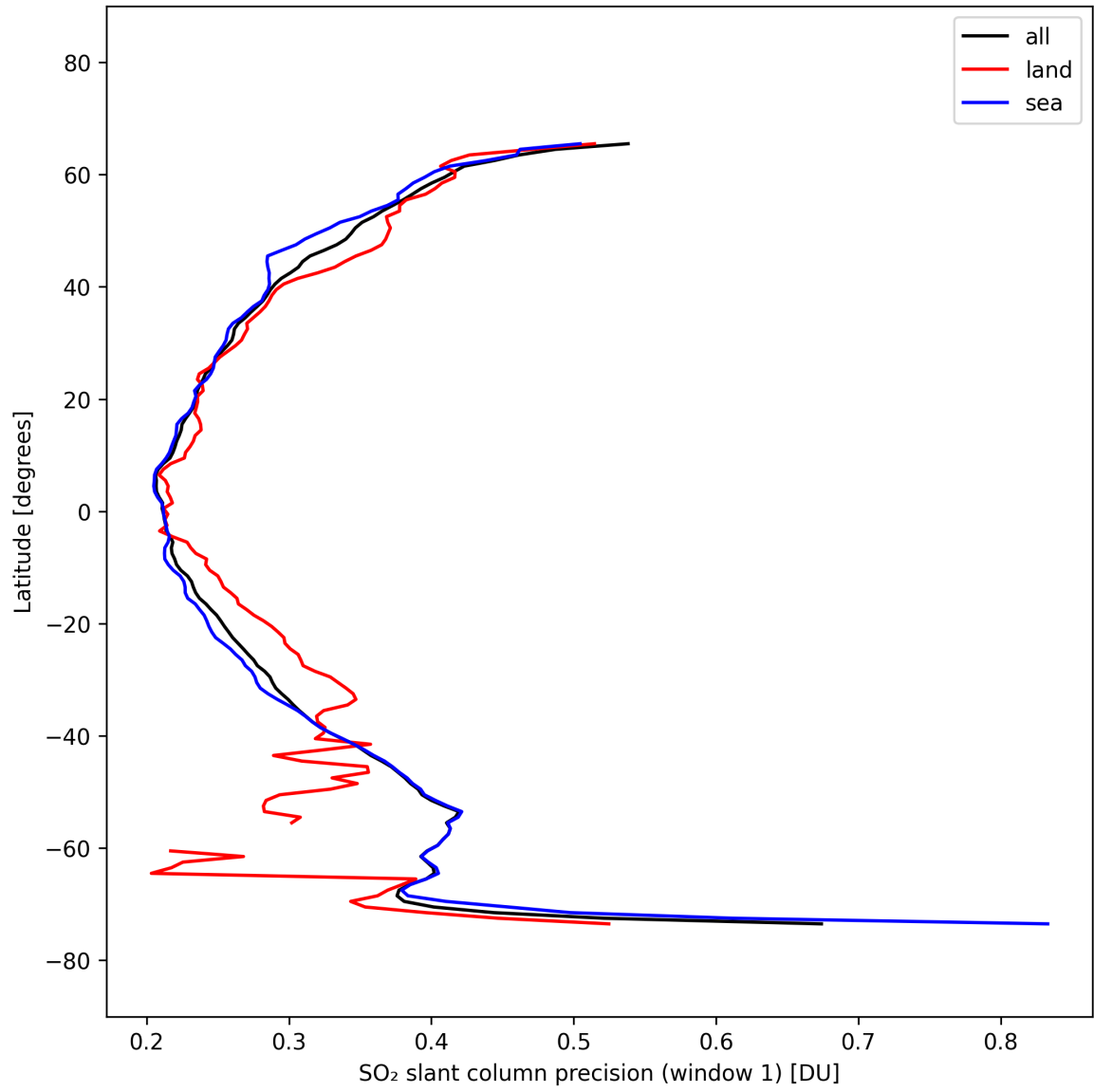


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-10-03 to 2025-10-04.

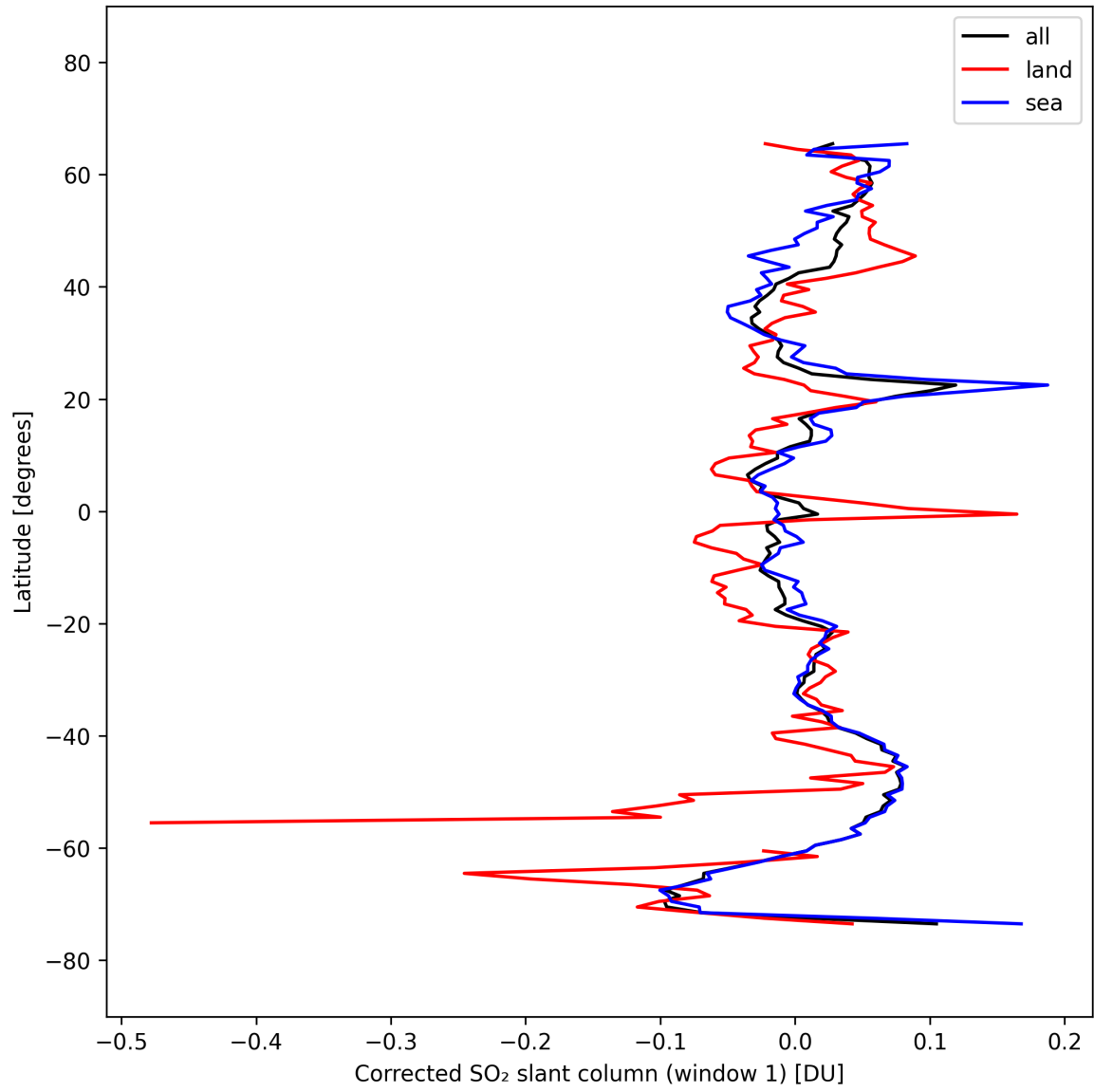


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-10-03 to 2025-10-04.

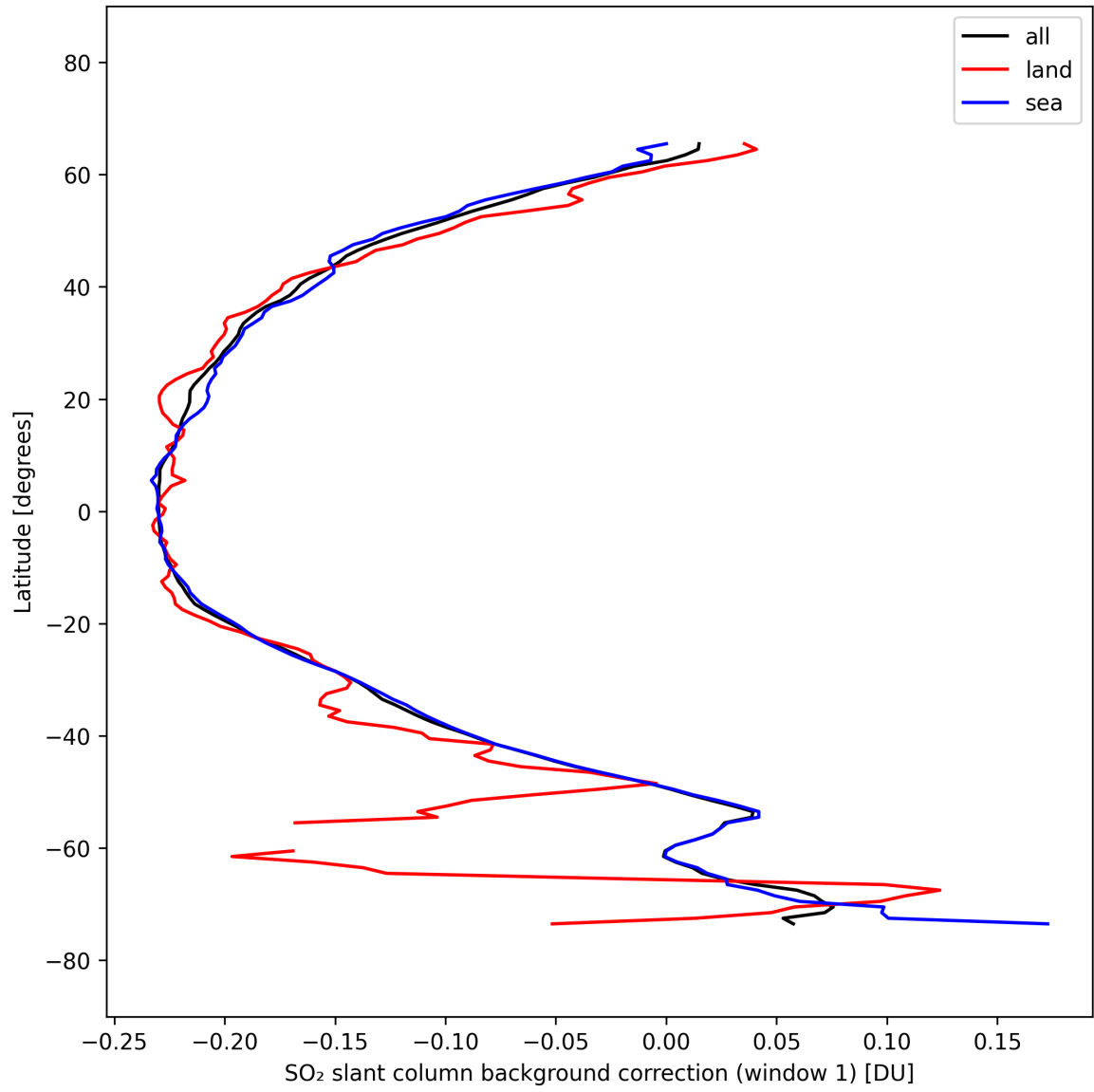


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-10-03 to 2025-10-04.

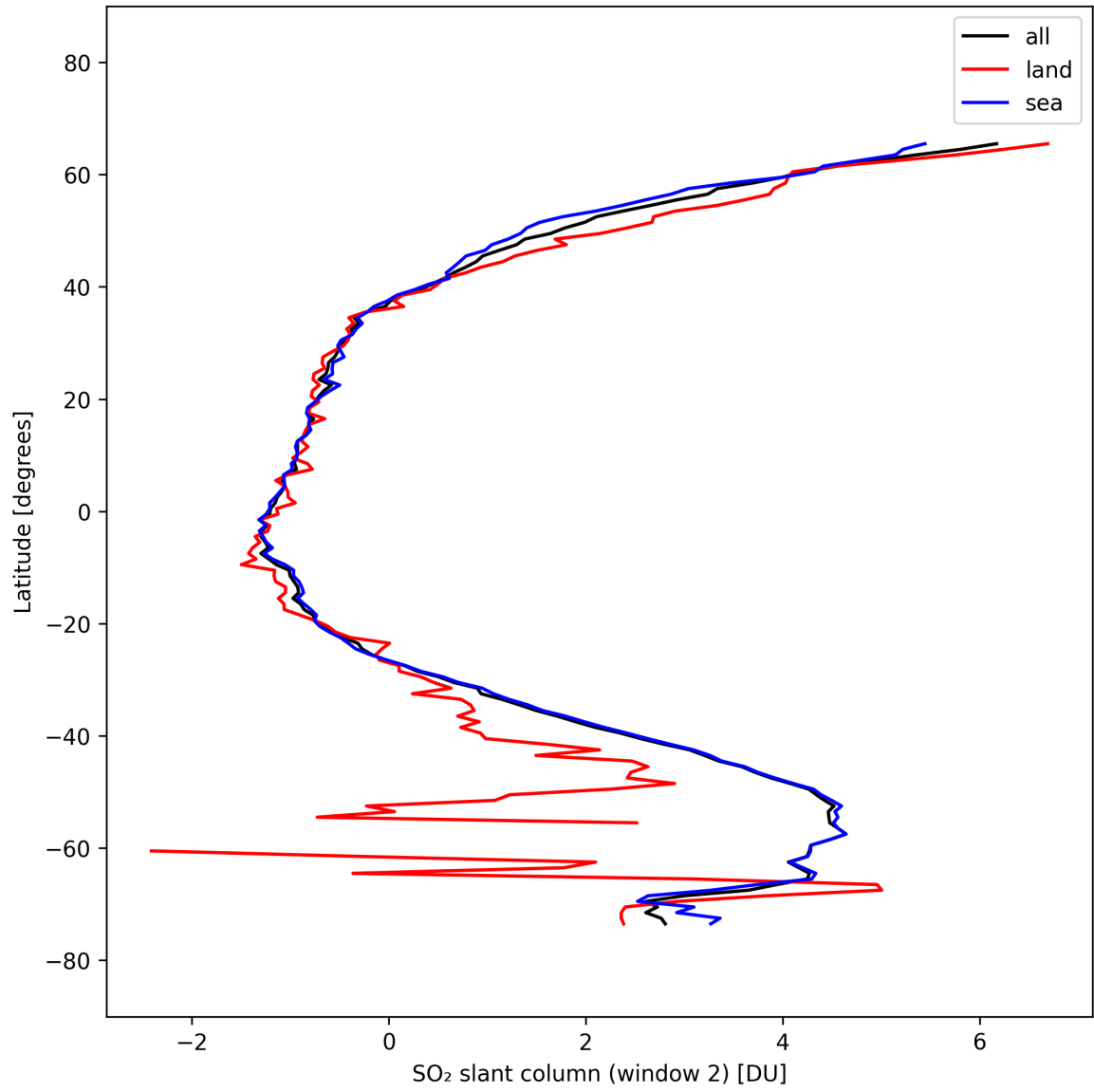


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-10-03 to 2025-10-04.

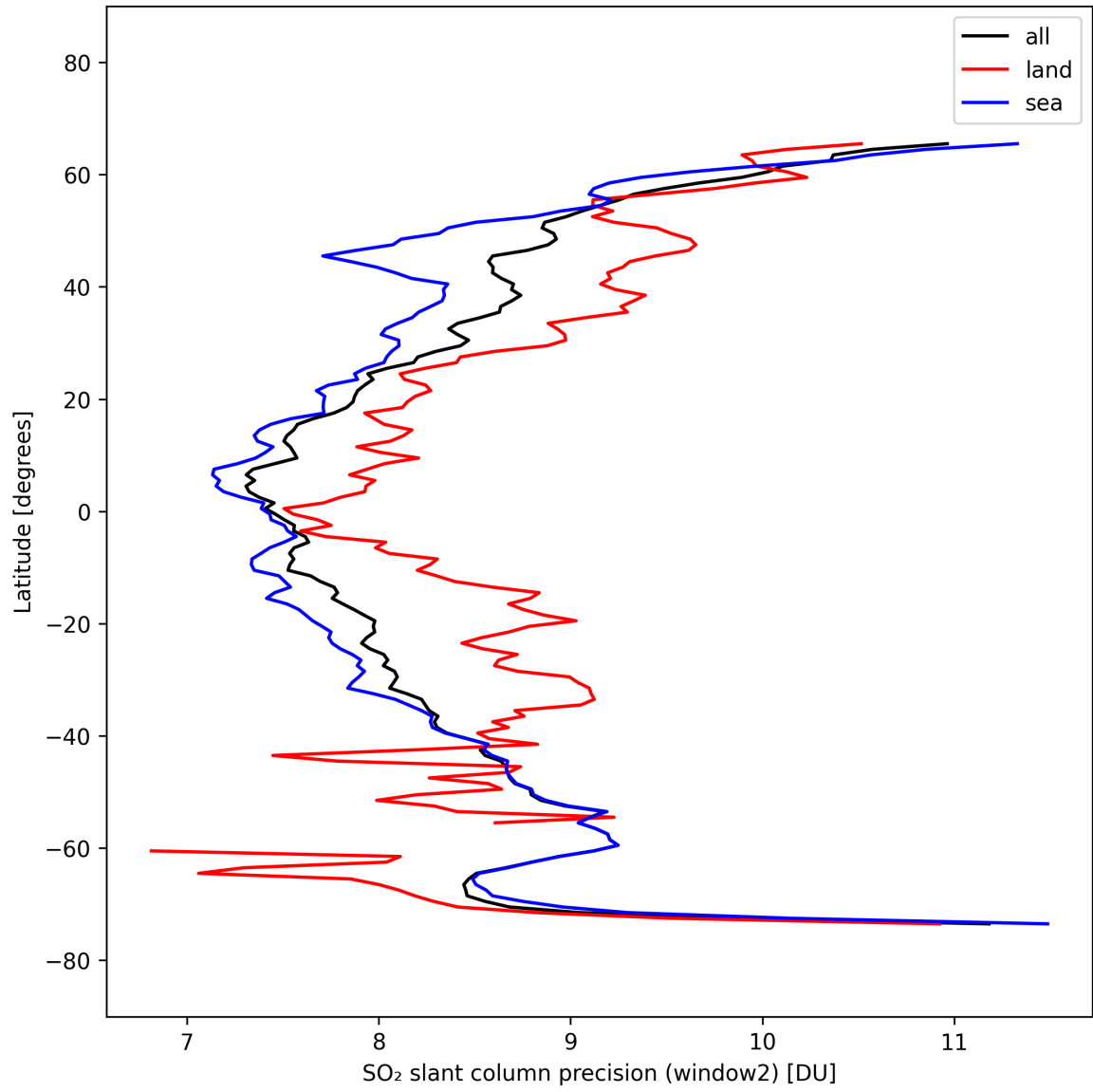


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-10-03 to 2025-10-04.

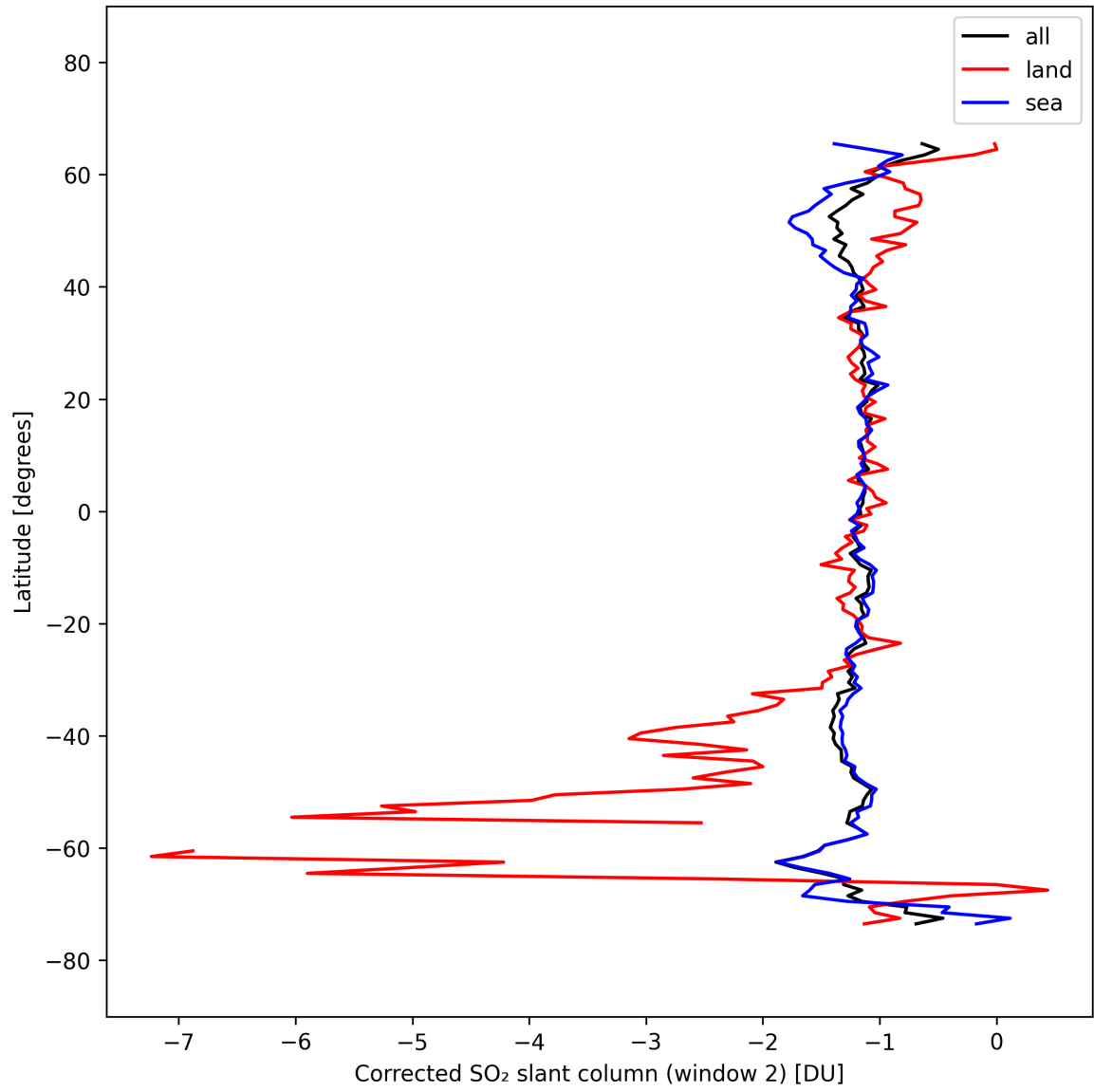


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-10-03 to 2025-10-04.

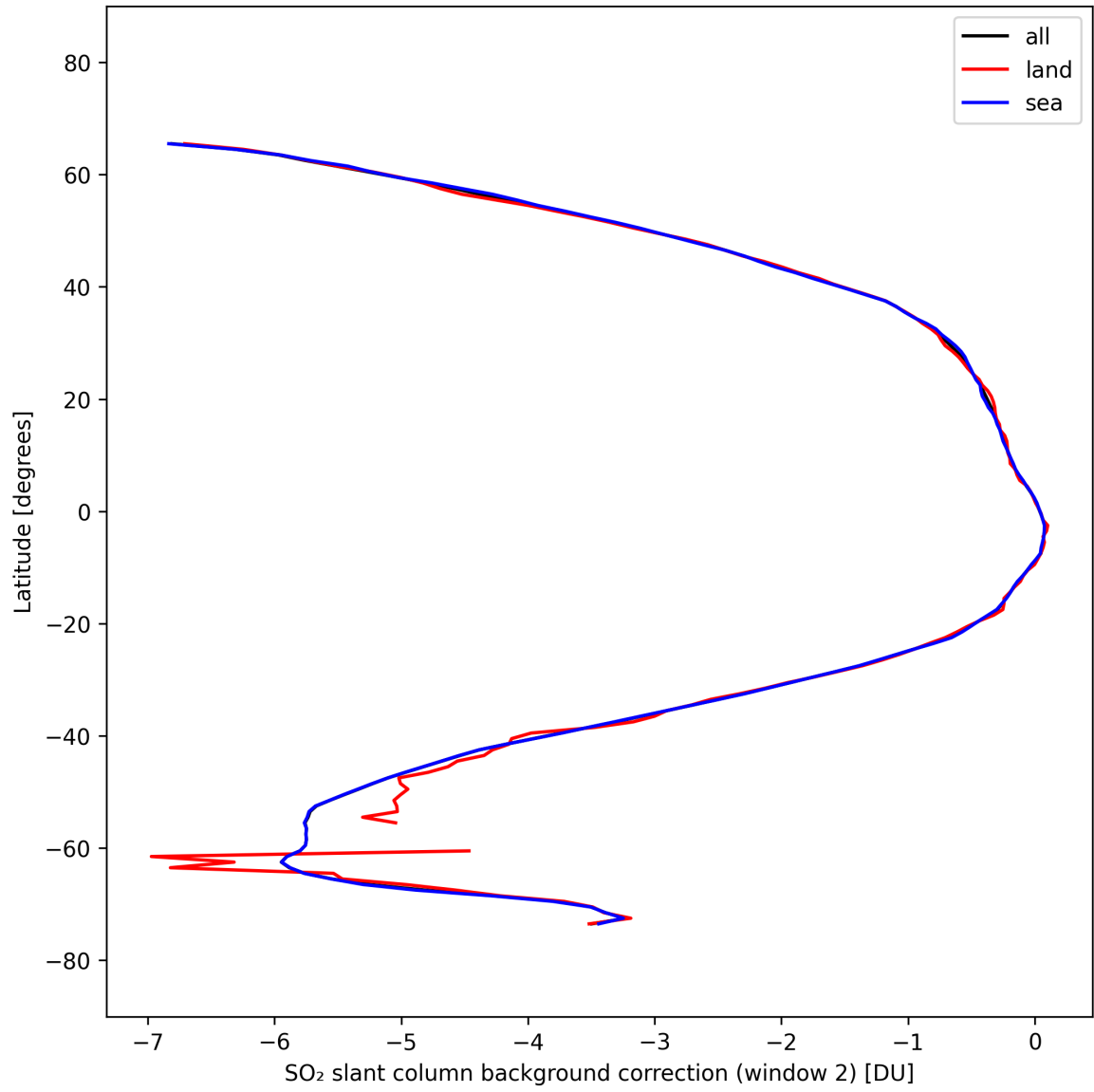


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-10-03 to 2025-10-04.

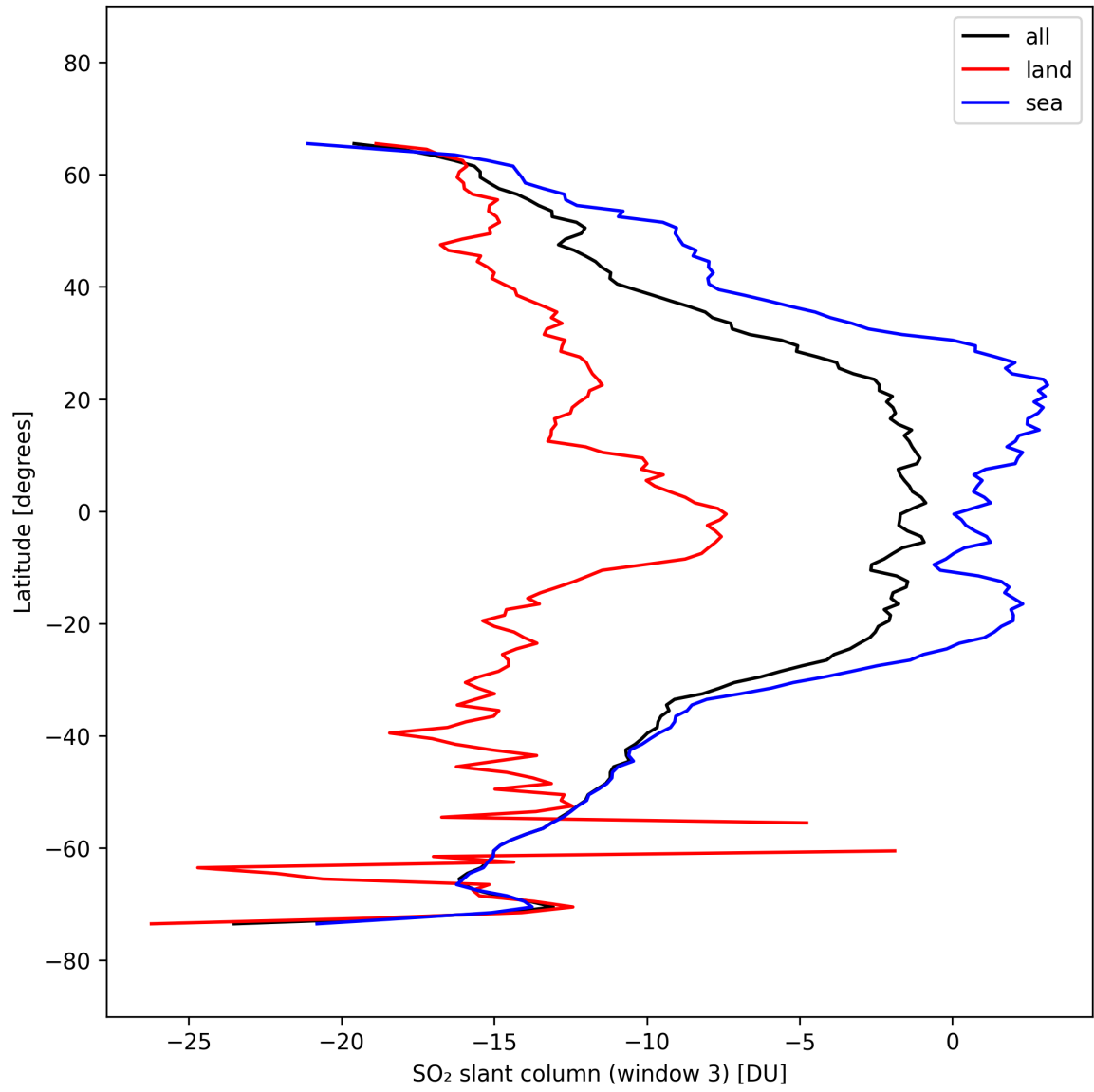


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-10-03 to 2025-10-04.

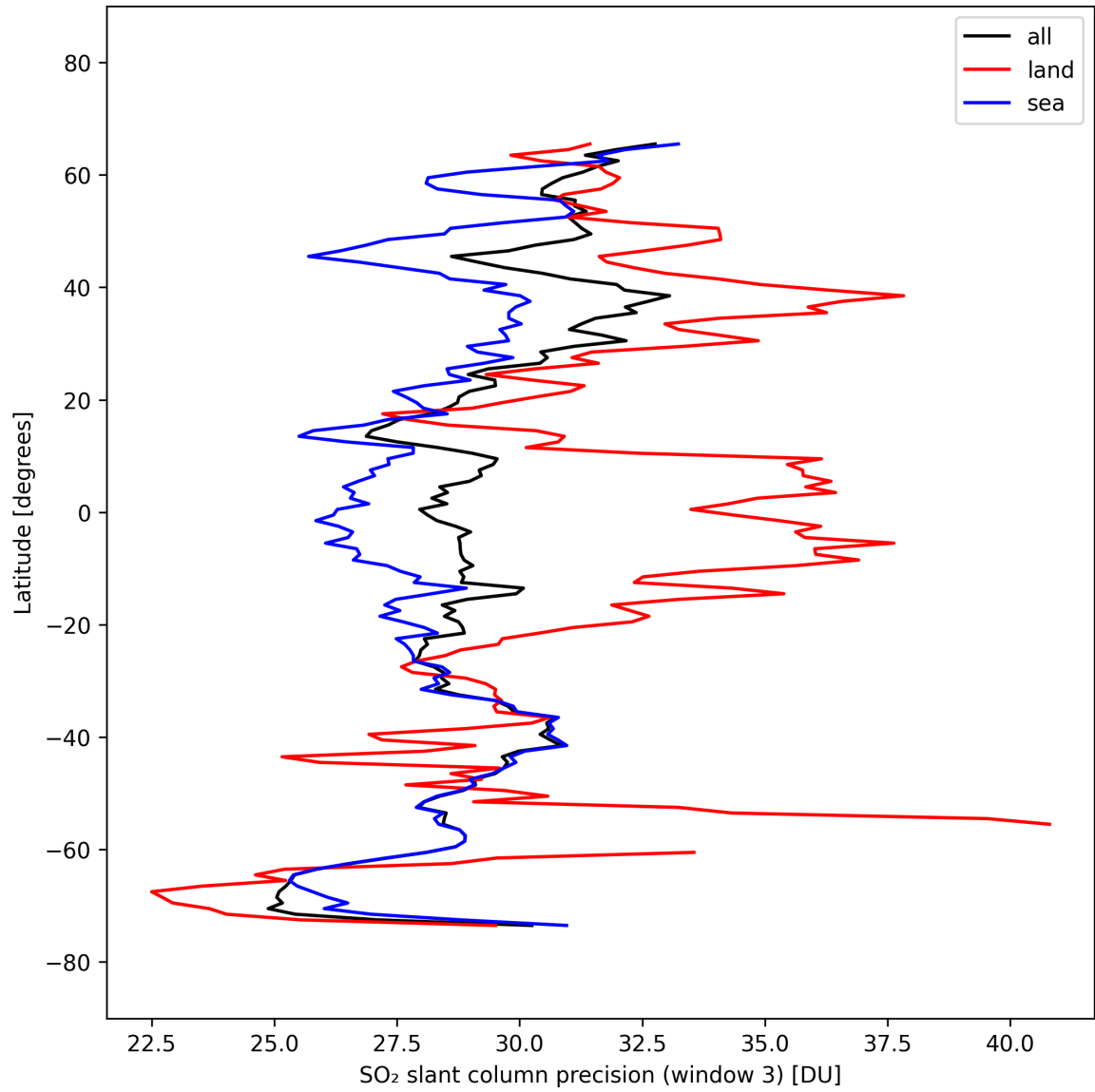


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-10-03 to 2025-10-04.

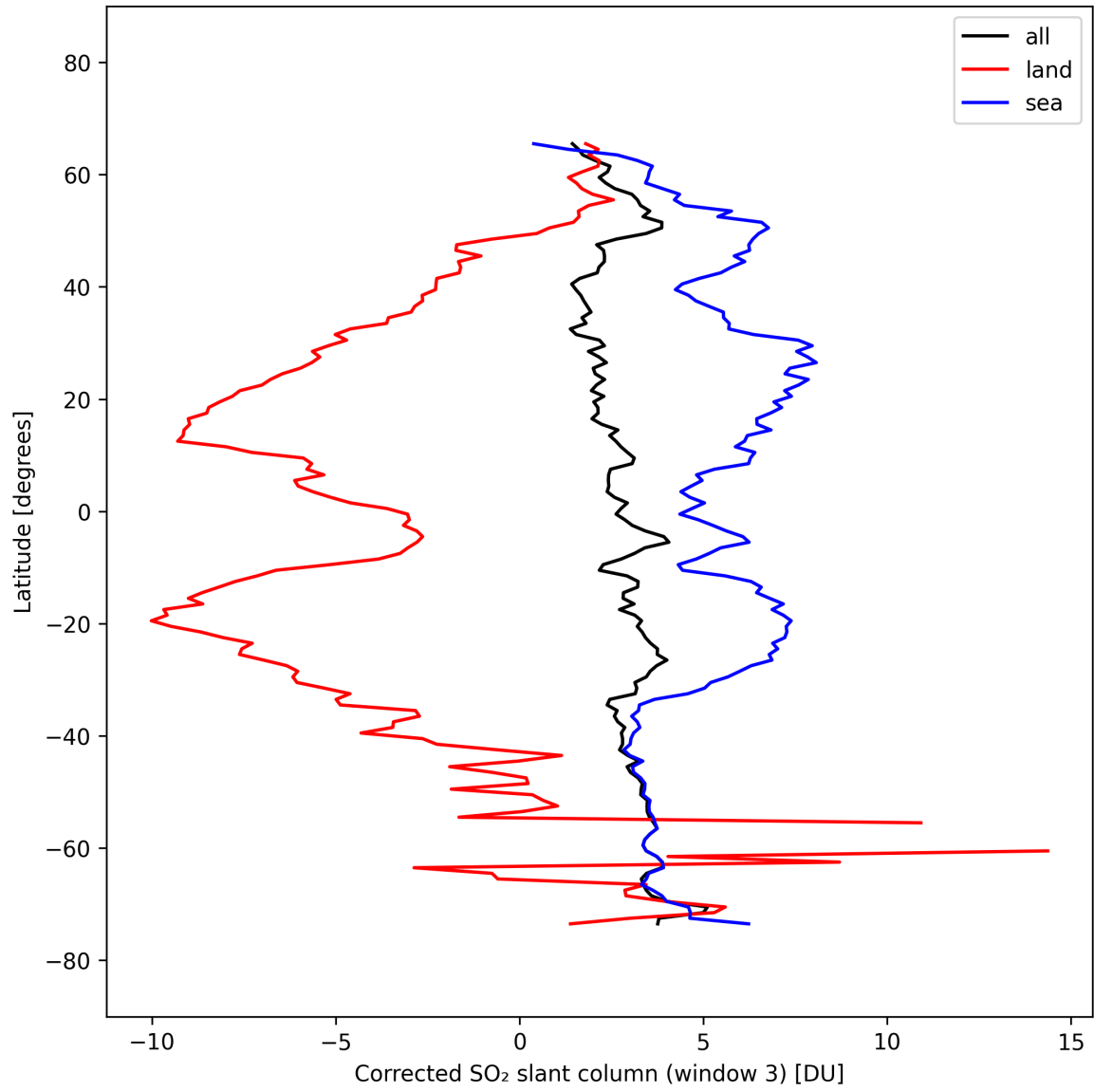


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-10-03 to 2025-10-04.

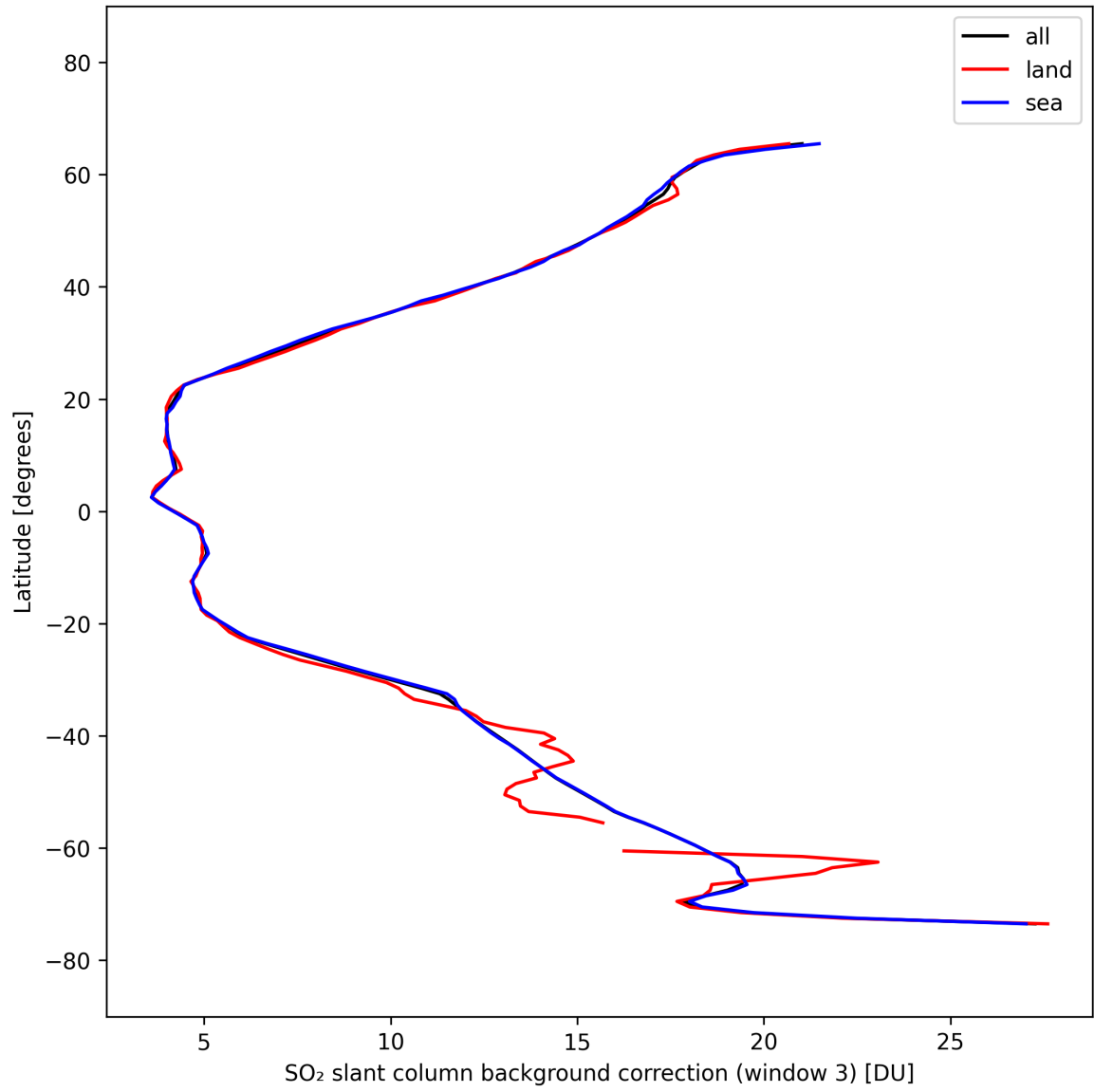


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-10-03 to 2025-10-04.

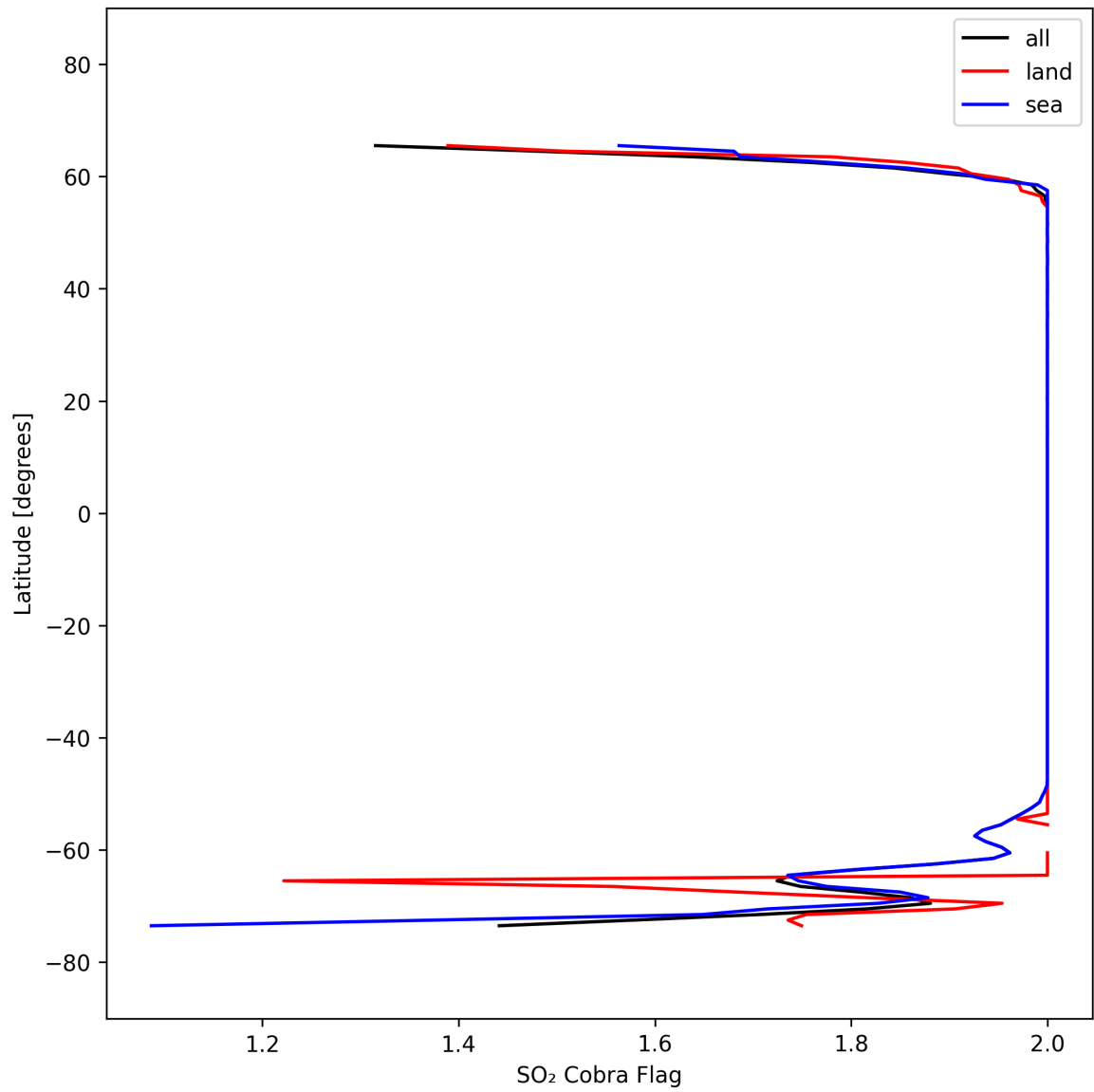


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-10-03 to 2025-10-04.

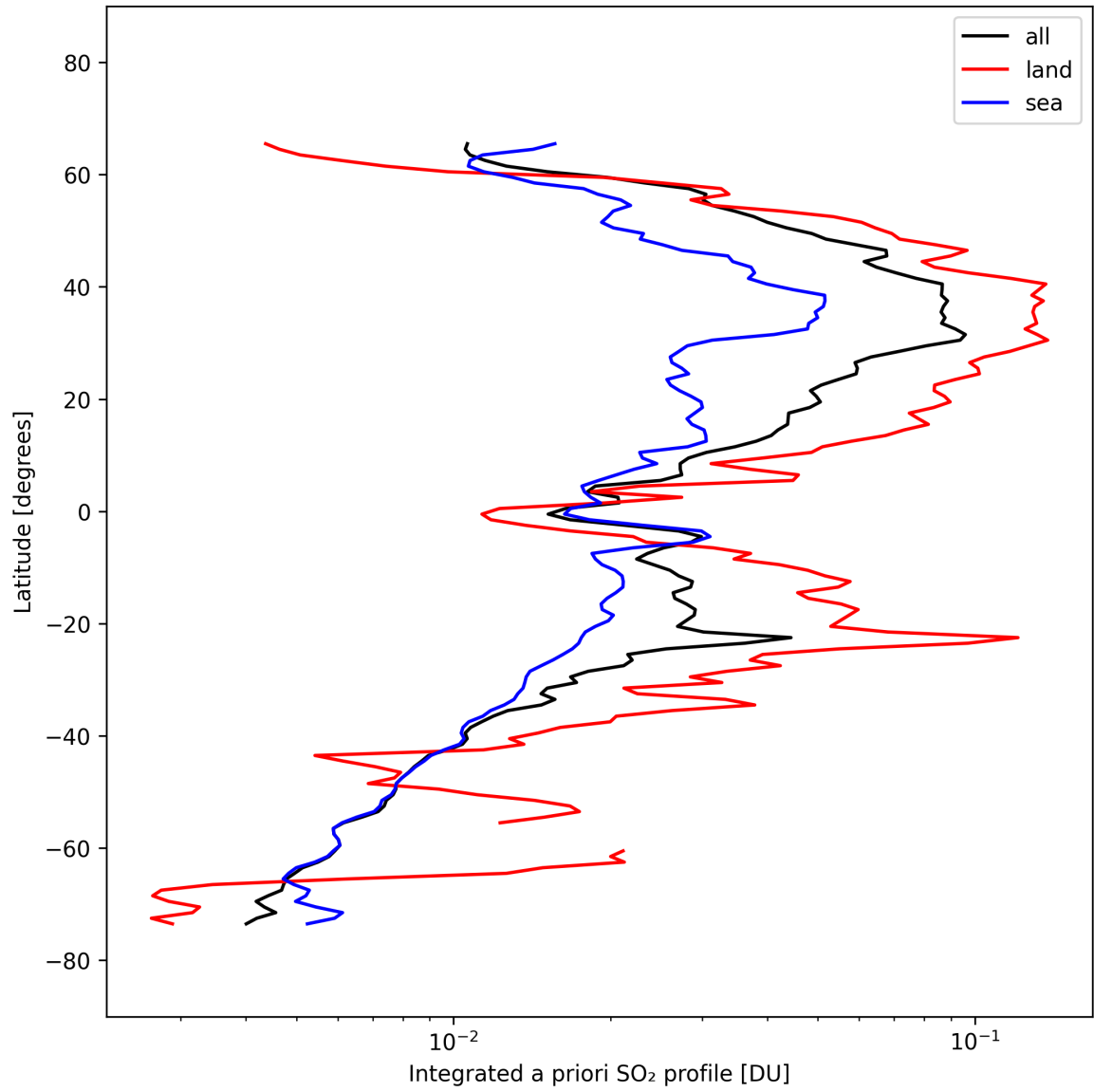


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-10-03 to 2025-10-04.

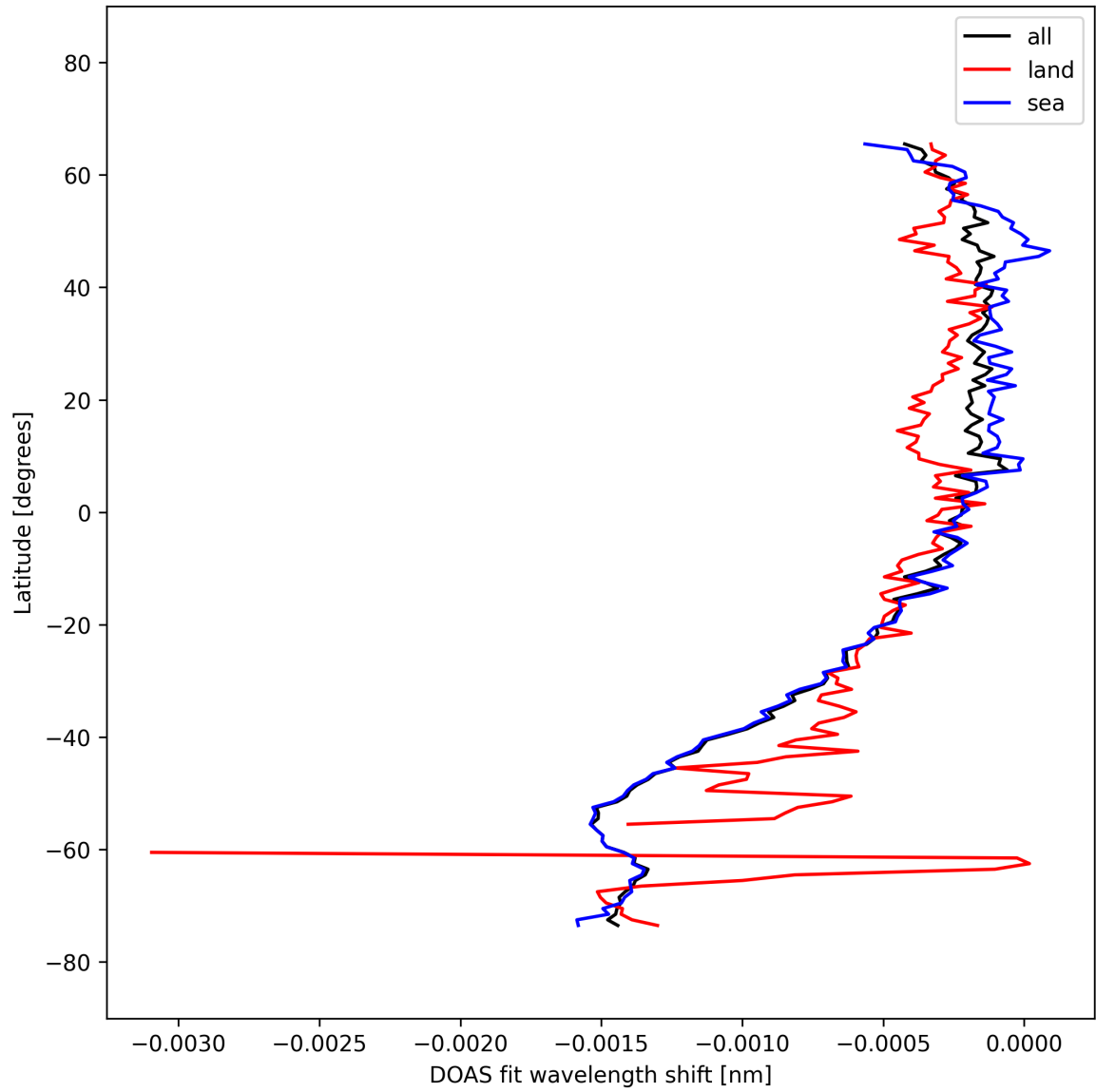


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2025-10-03 to 2025-10-04.

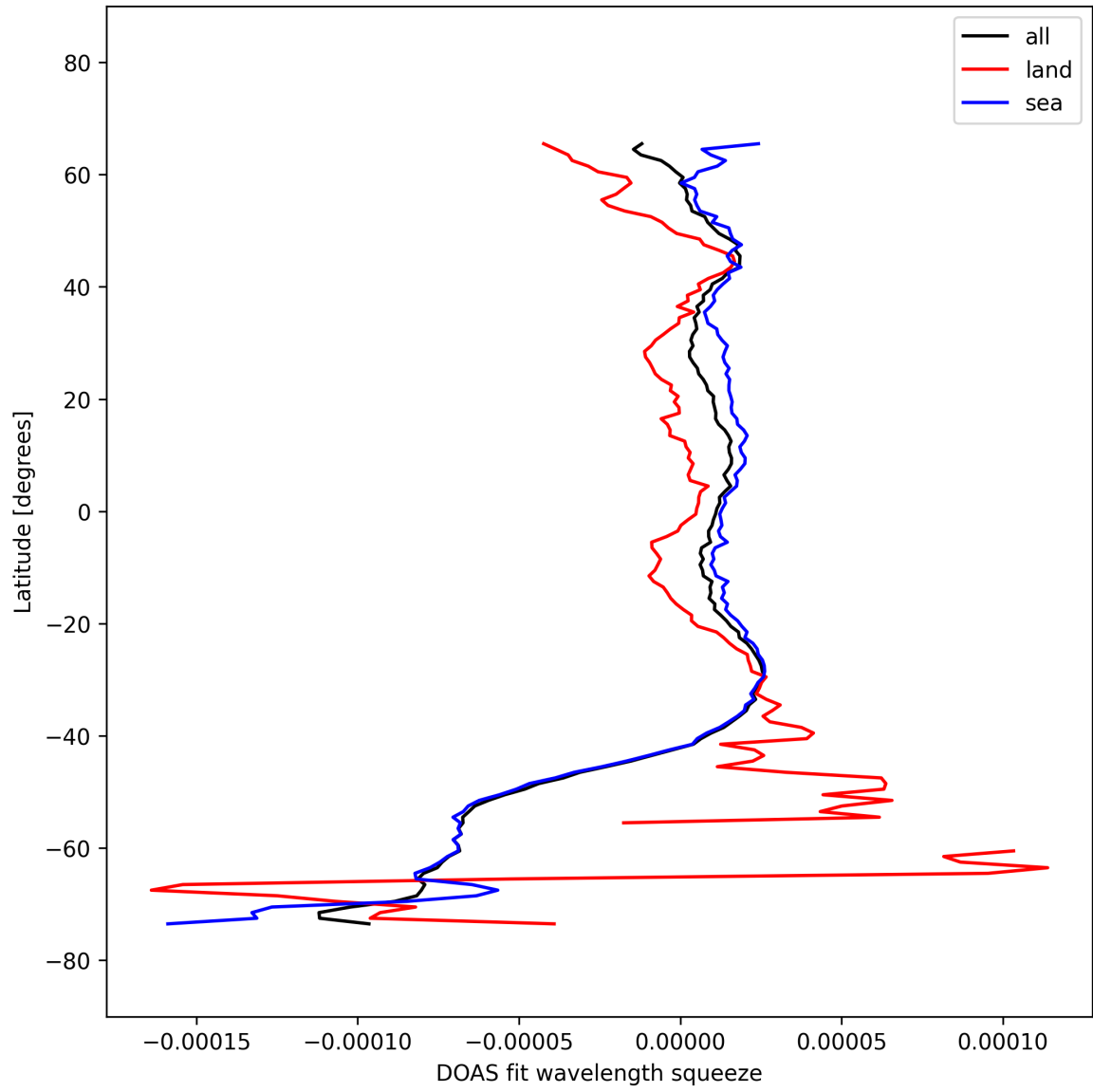


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-10-03 to 2025-10-04.

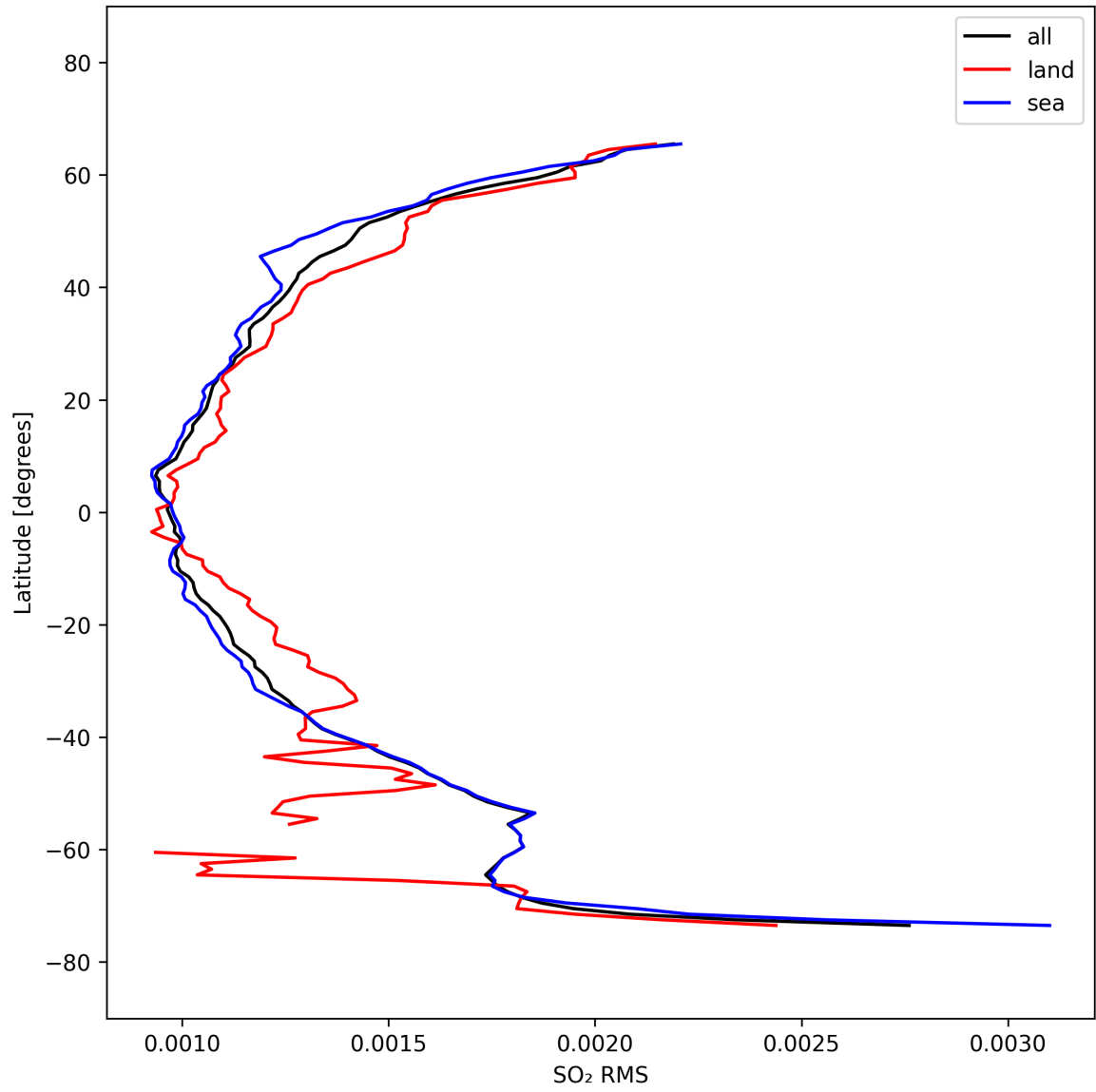


Figure 52: Zonal average of “SO₂ RMS” for 2025-10-03 to 2025-10-04.

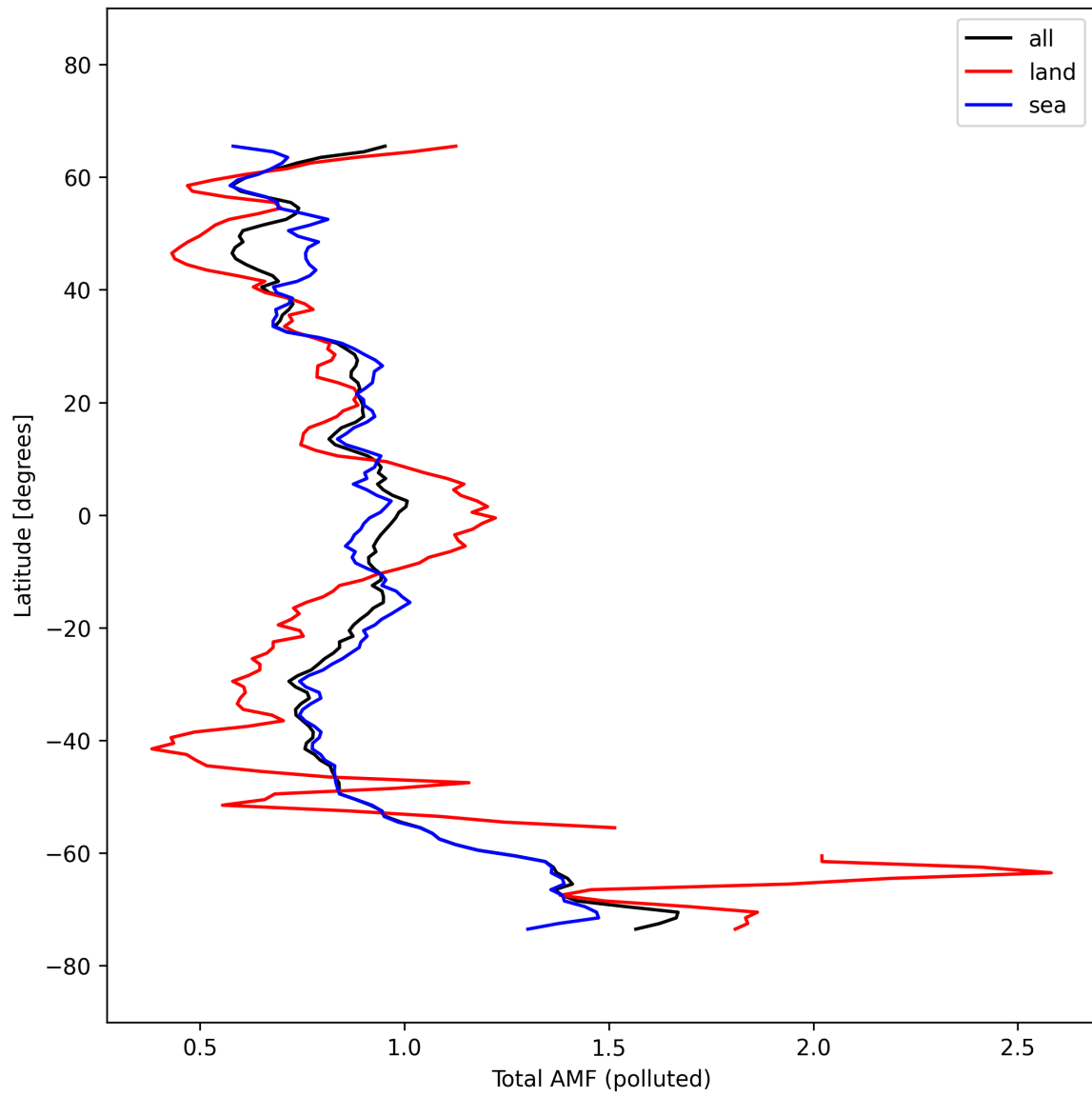


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-10-03 to 2025-10-04.

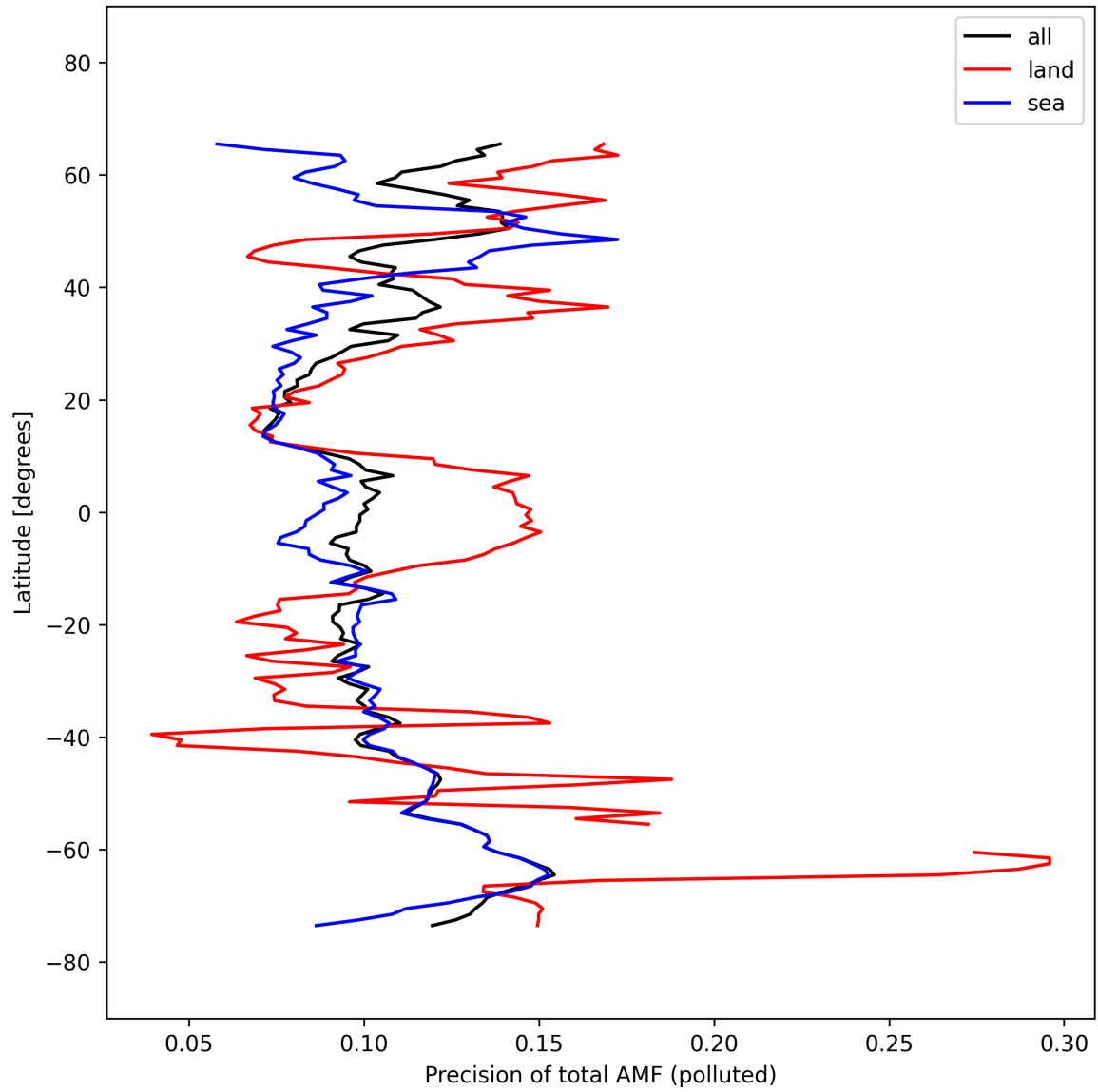


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-10-03 to 2025-10-04.

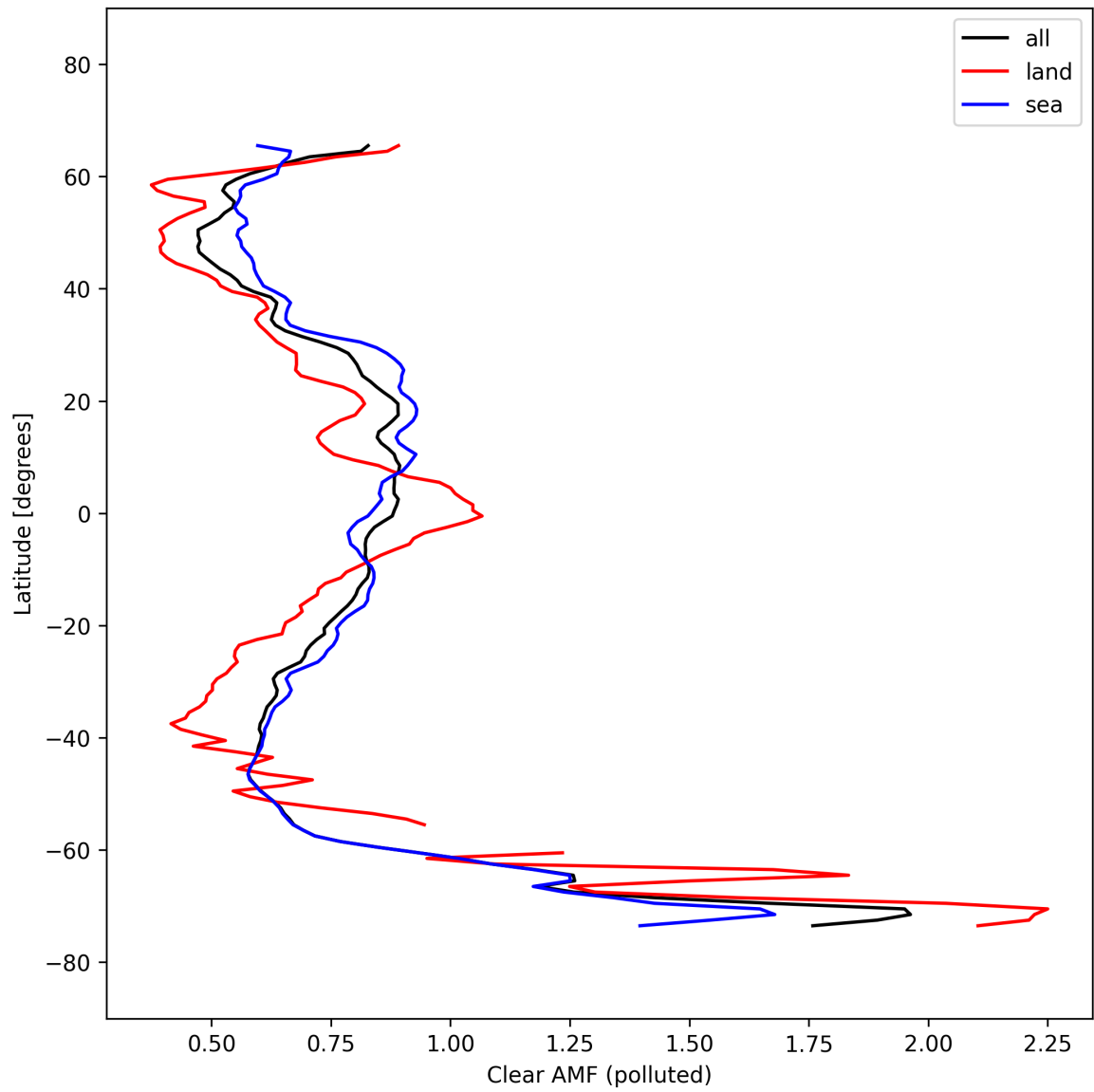


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-10-03 to 2025-10-04.

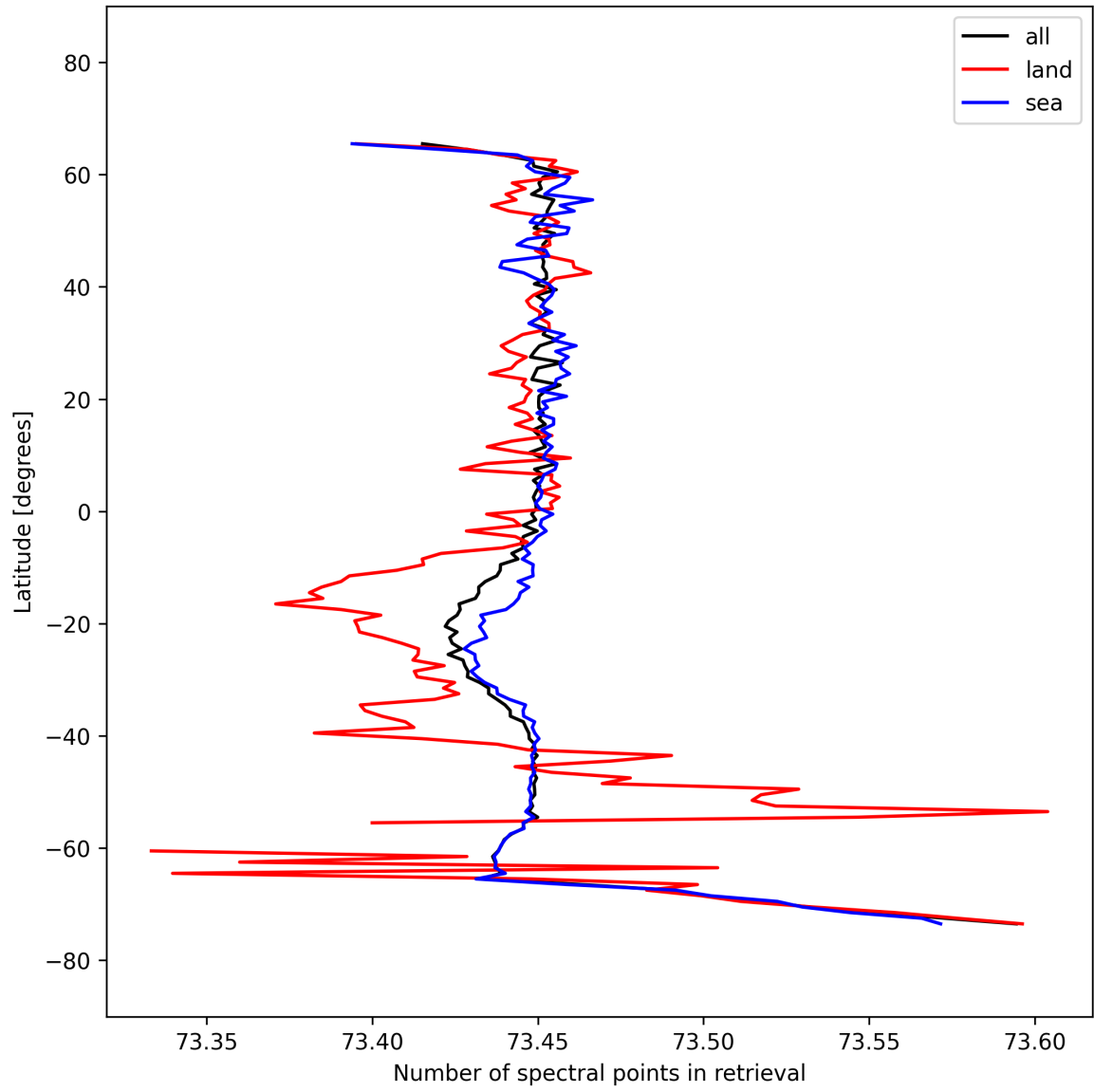


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-10-03 to 2025-10-04.

8 Histograms

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

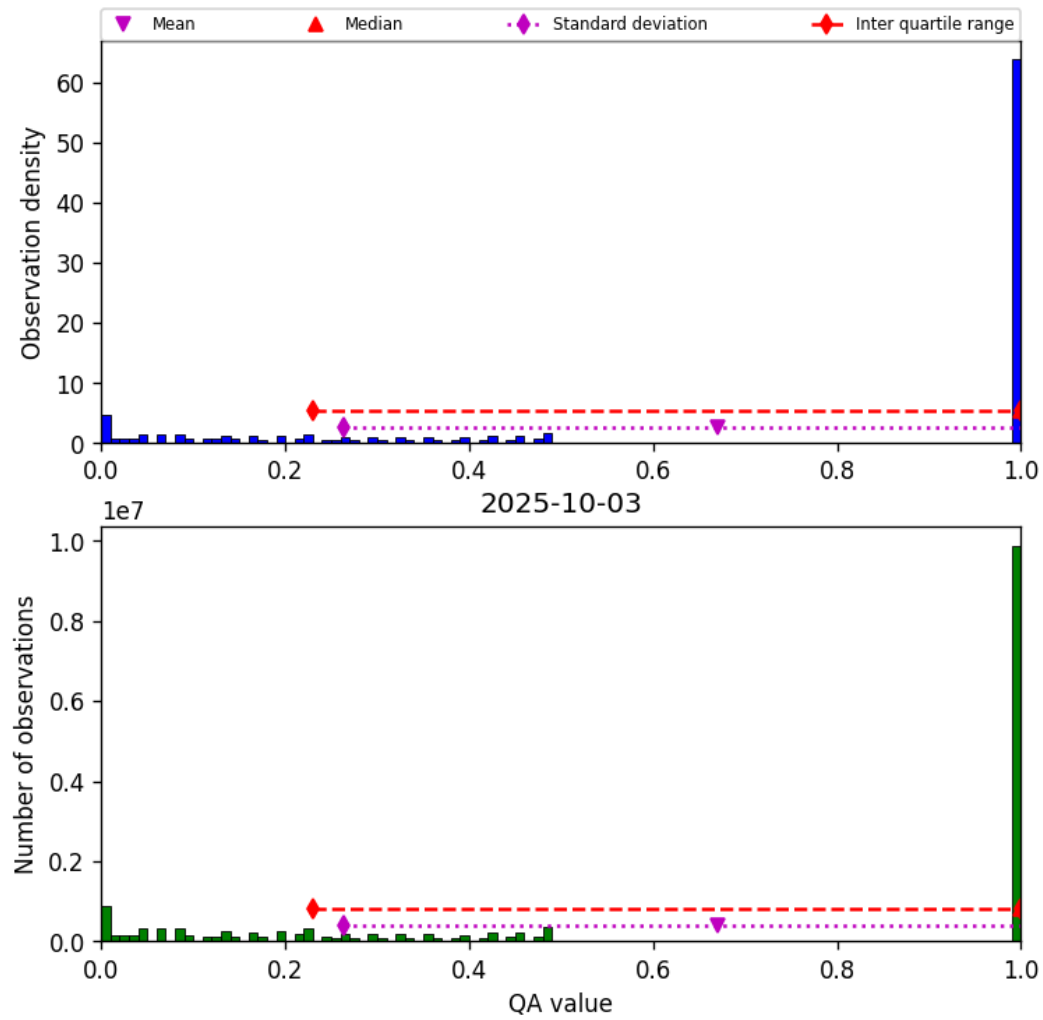


Figure 57: Histogram of “QA value” for 2025-10-03 to 2025-10-04

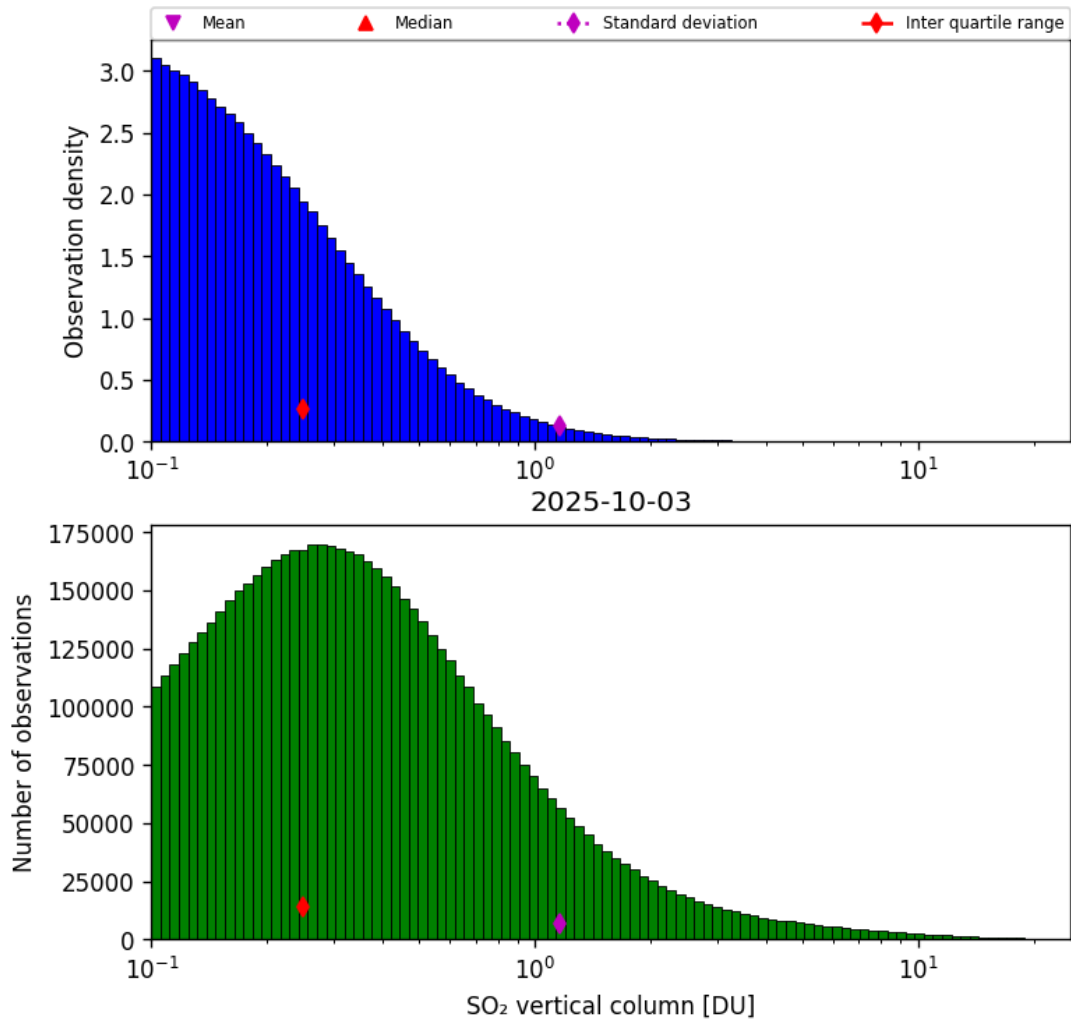


Figure 58: Histogram of “SO₂ vertical column” for 2025-10-03 to 2025-10-04

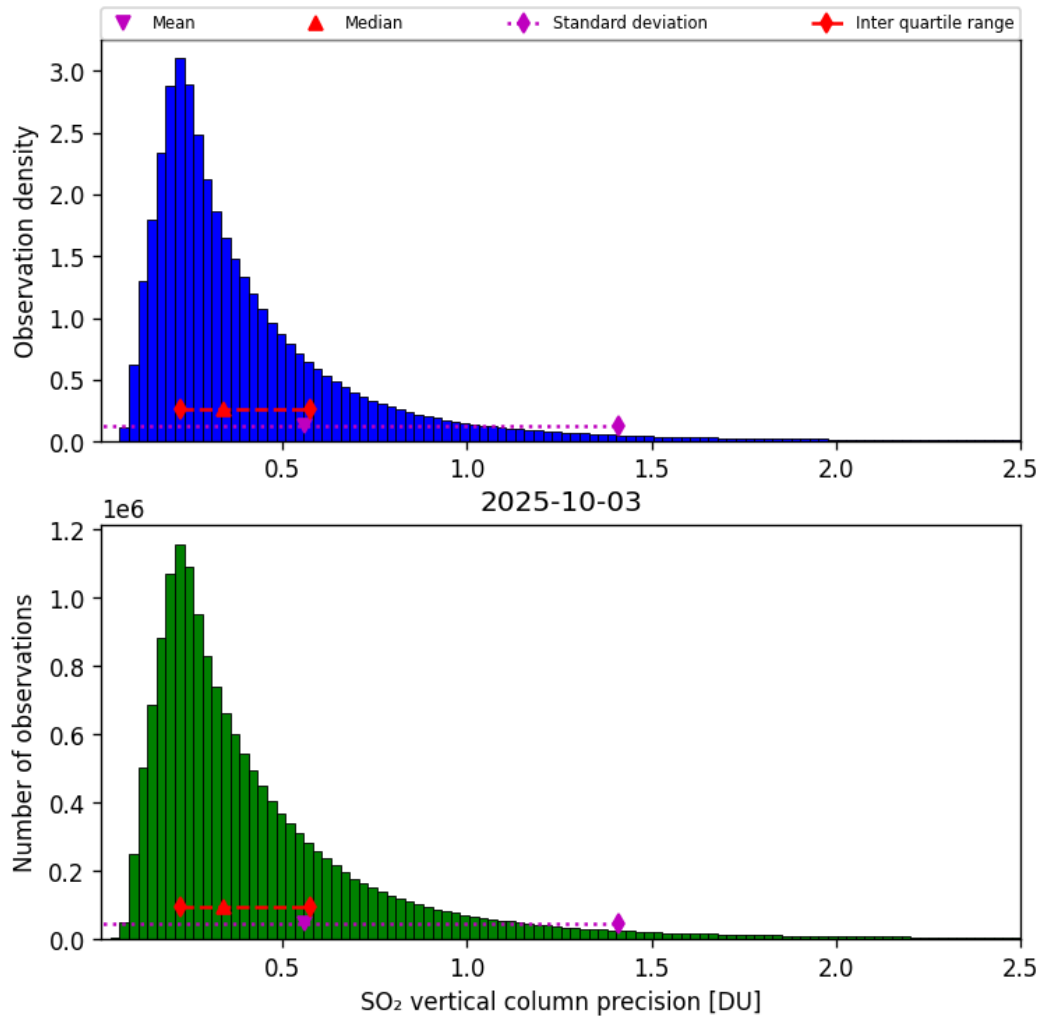


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-10-03 to 2025-10-04

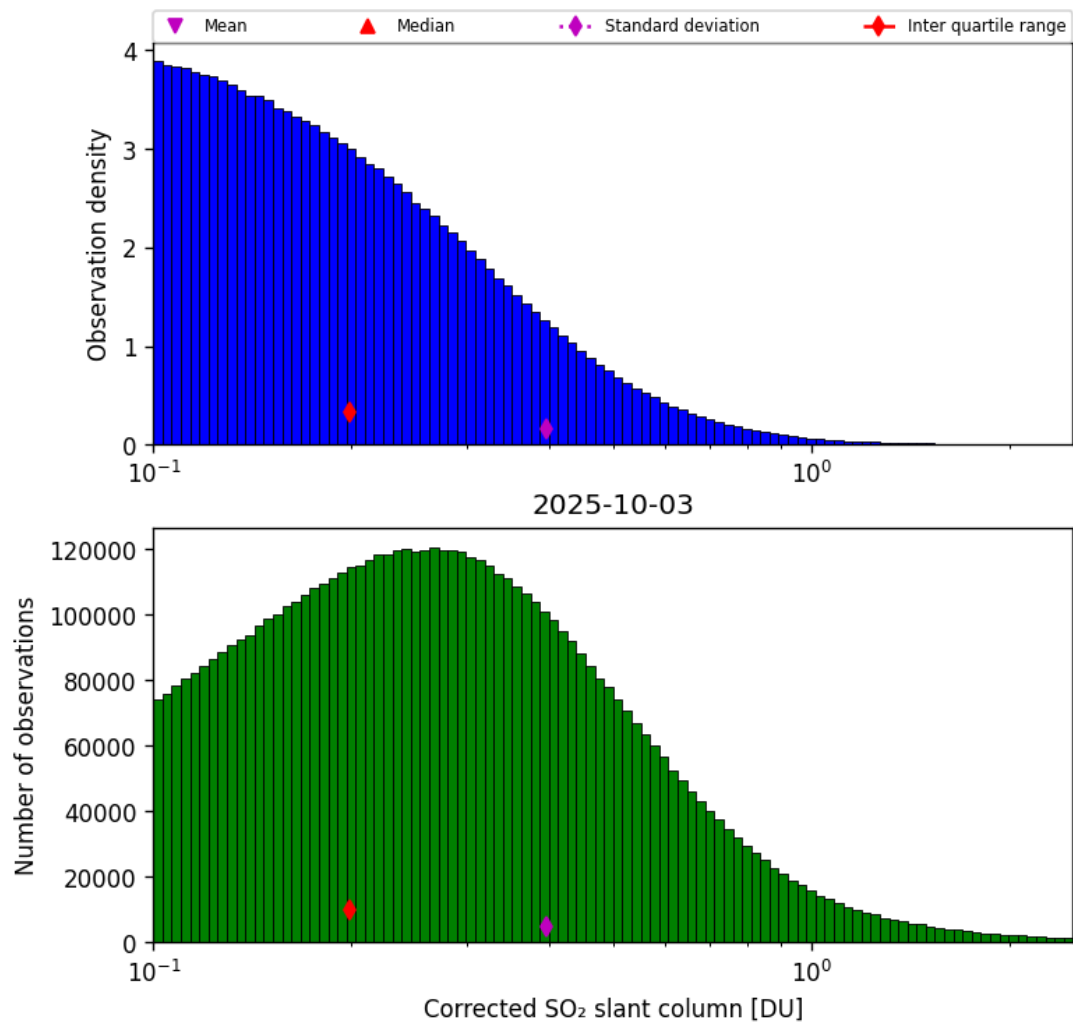


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-10-03 to 2025-10-04

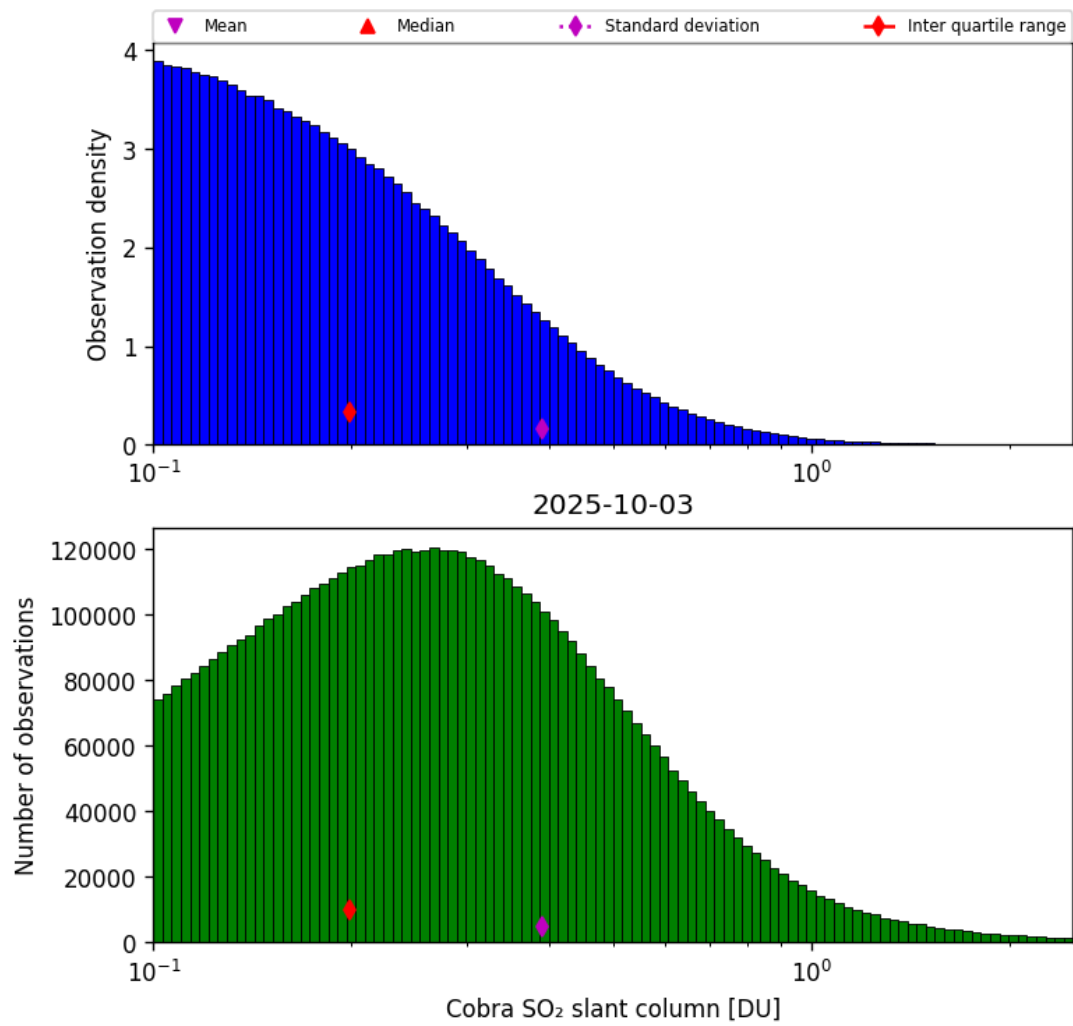


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-10-03 to 2025-10-04

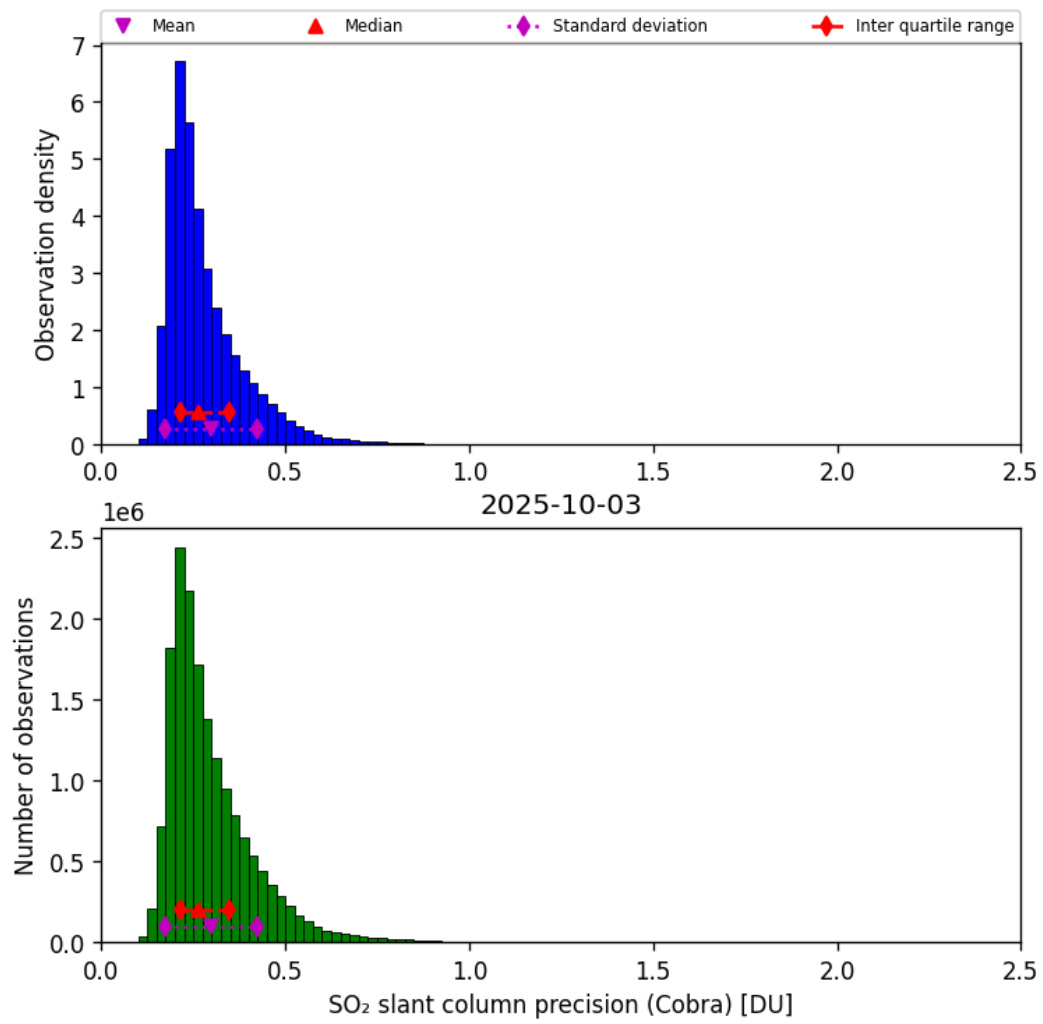


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-10-03 to 2025-10-04

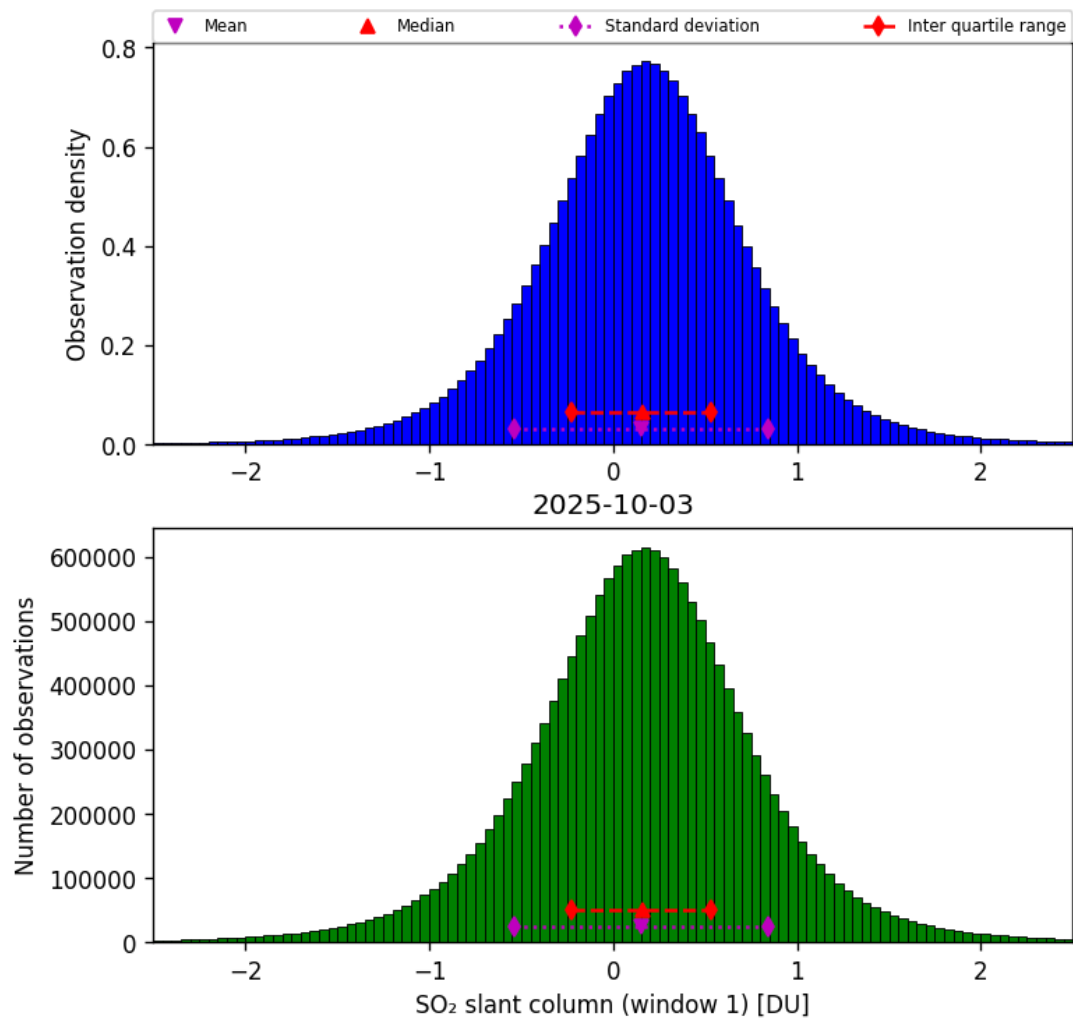


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-10-03 to 2025-10-04

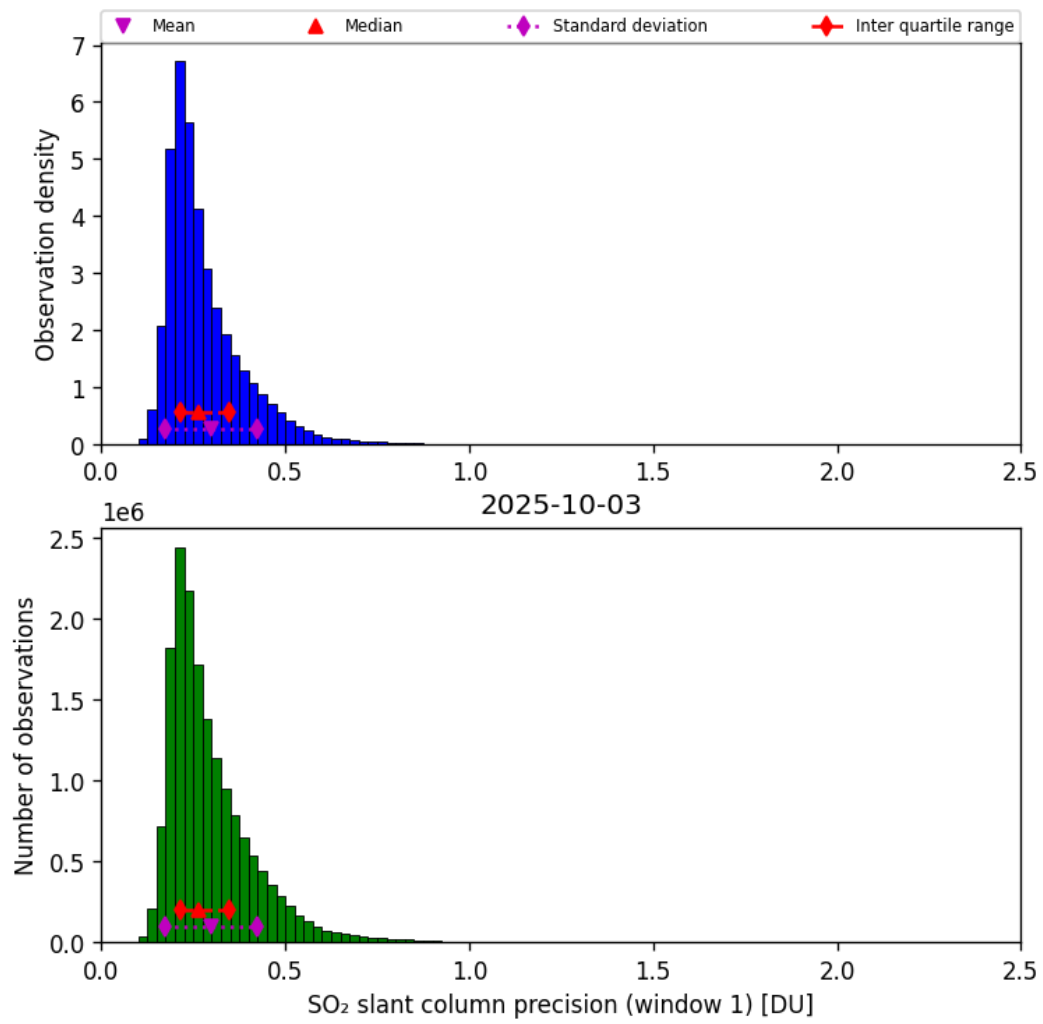


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-10-03 to 2025-10-04

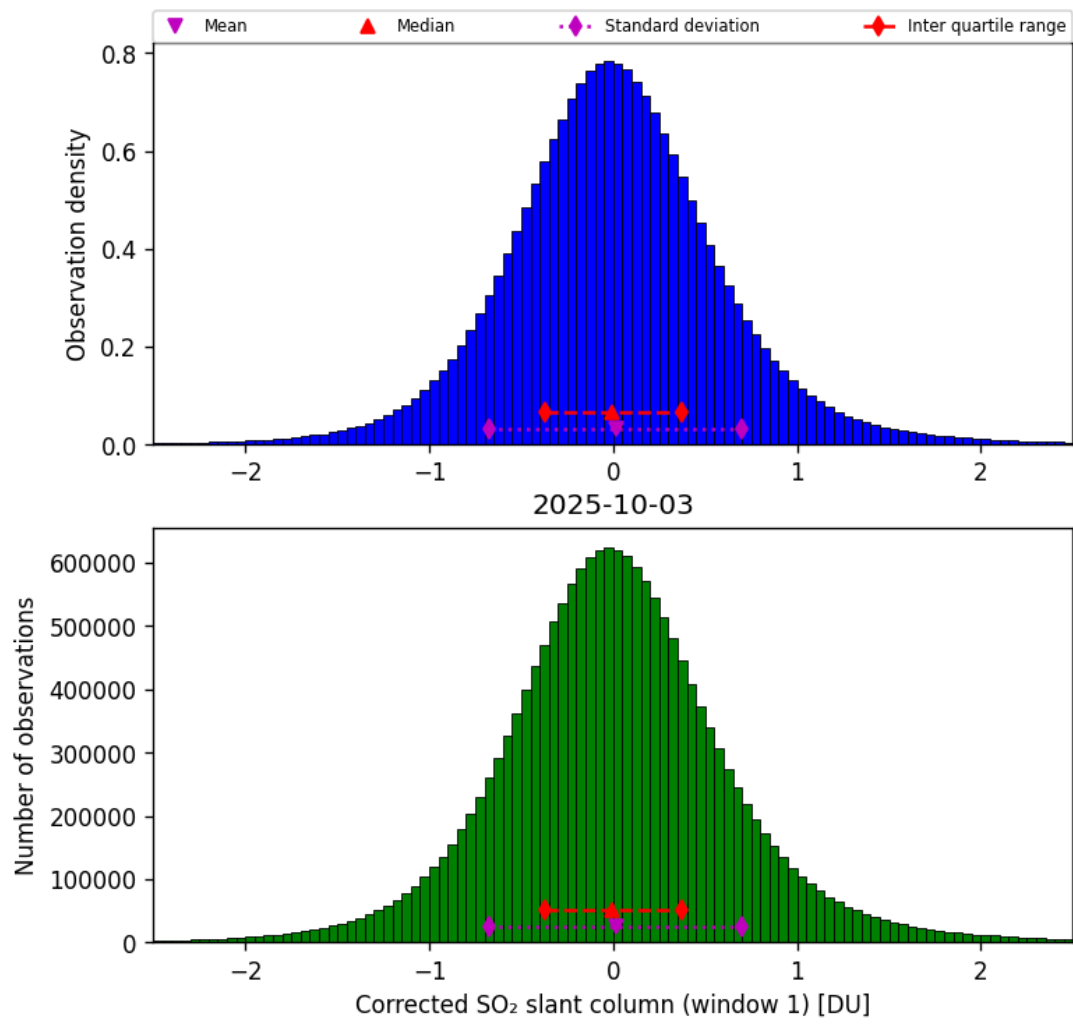


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-10-03 to 2025-10-04

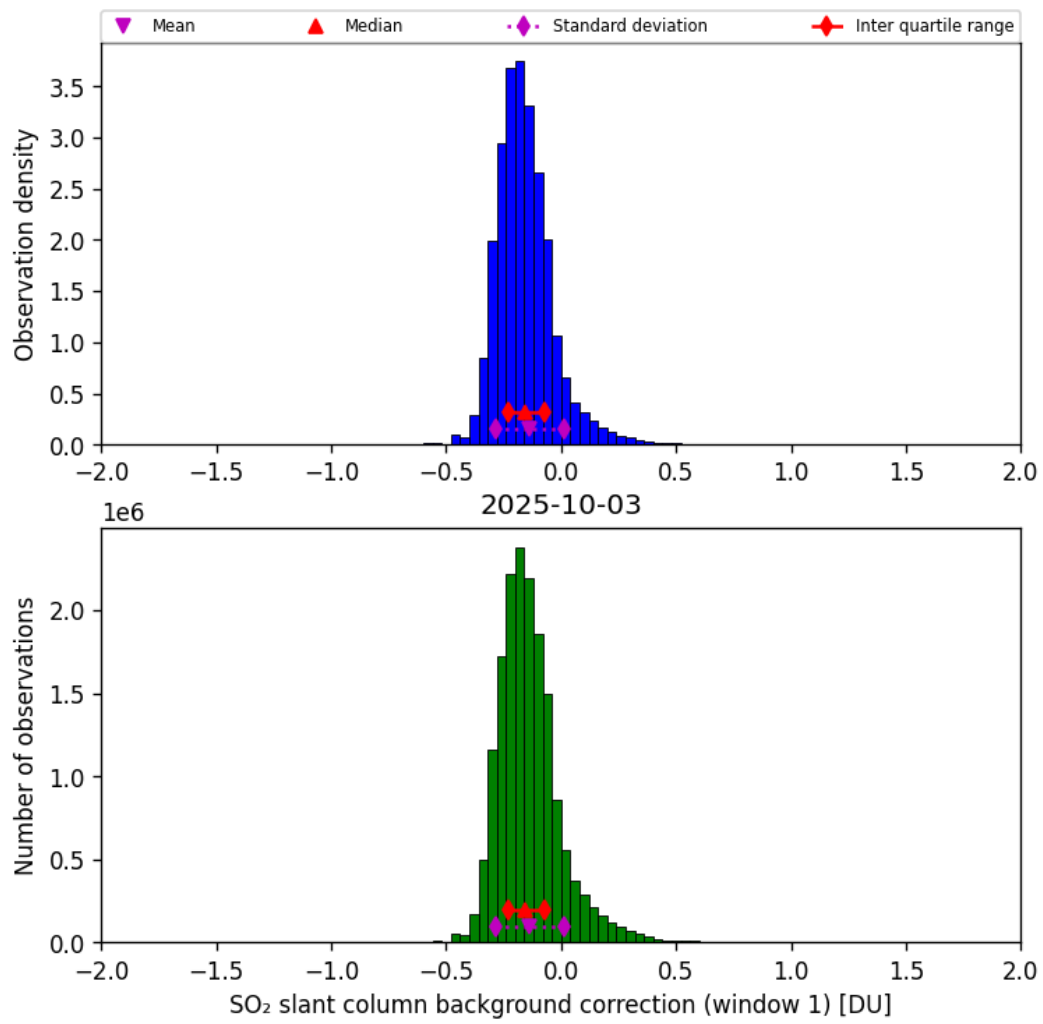


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-10-03 to 2025-10-04

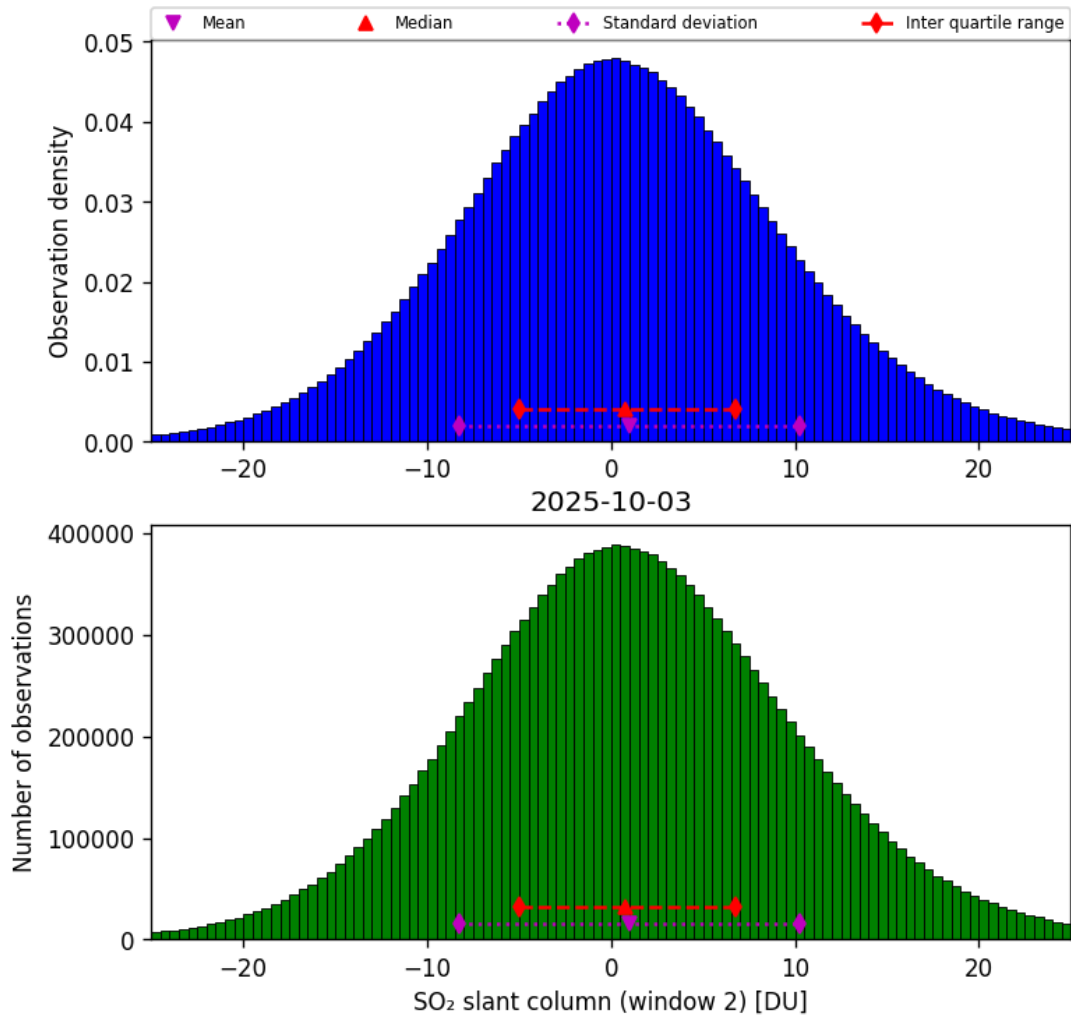


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-10-03 to 2025-10-04

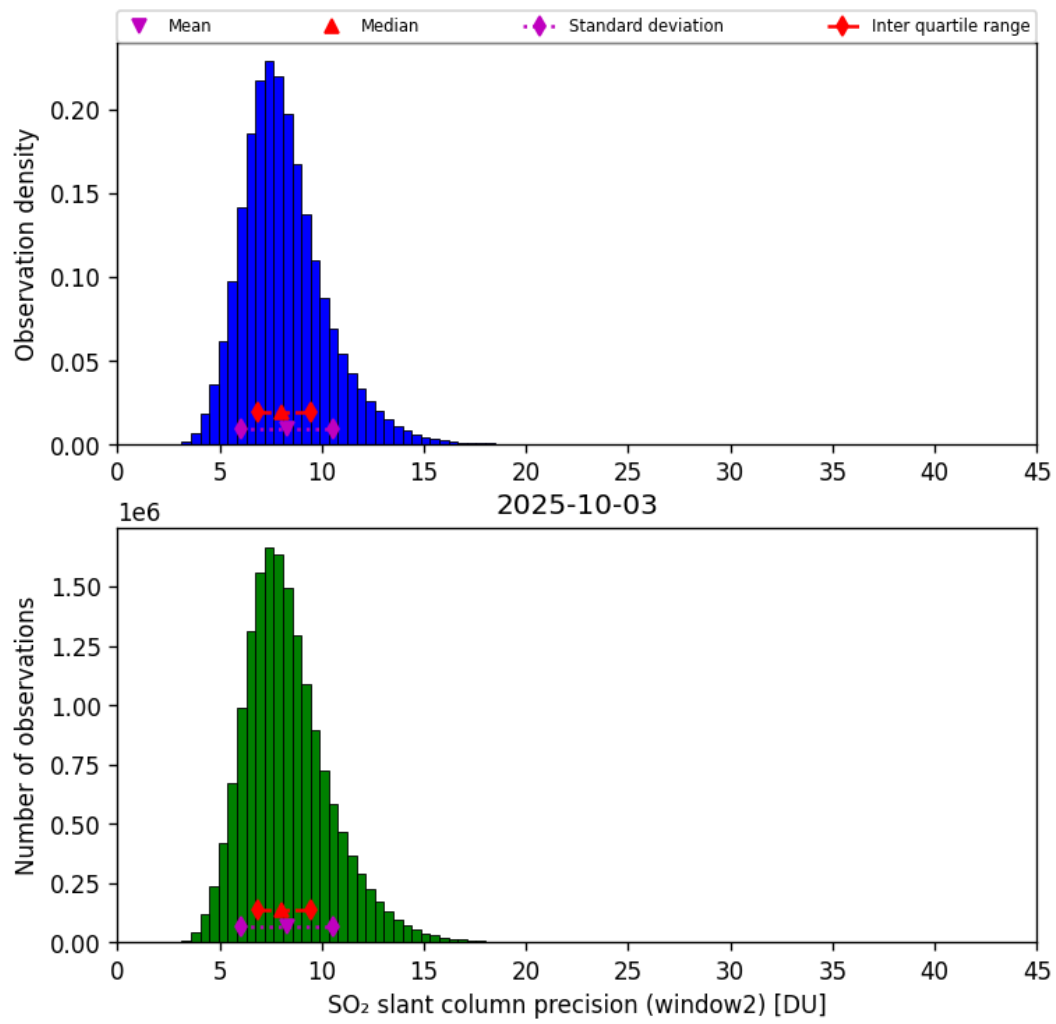


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-10-03 to 2025-10-04

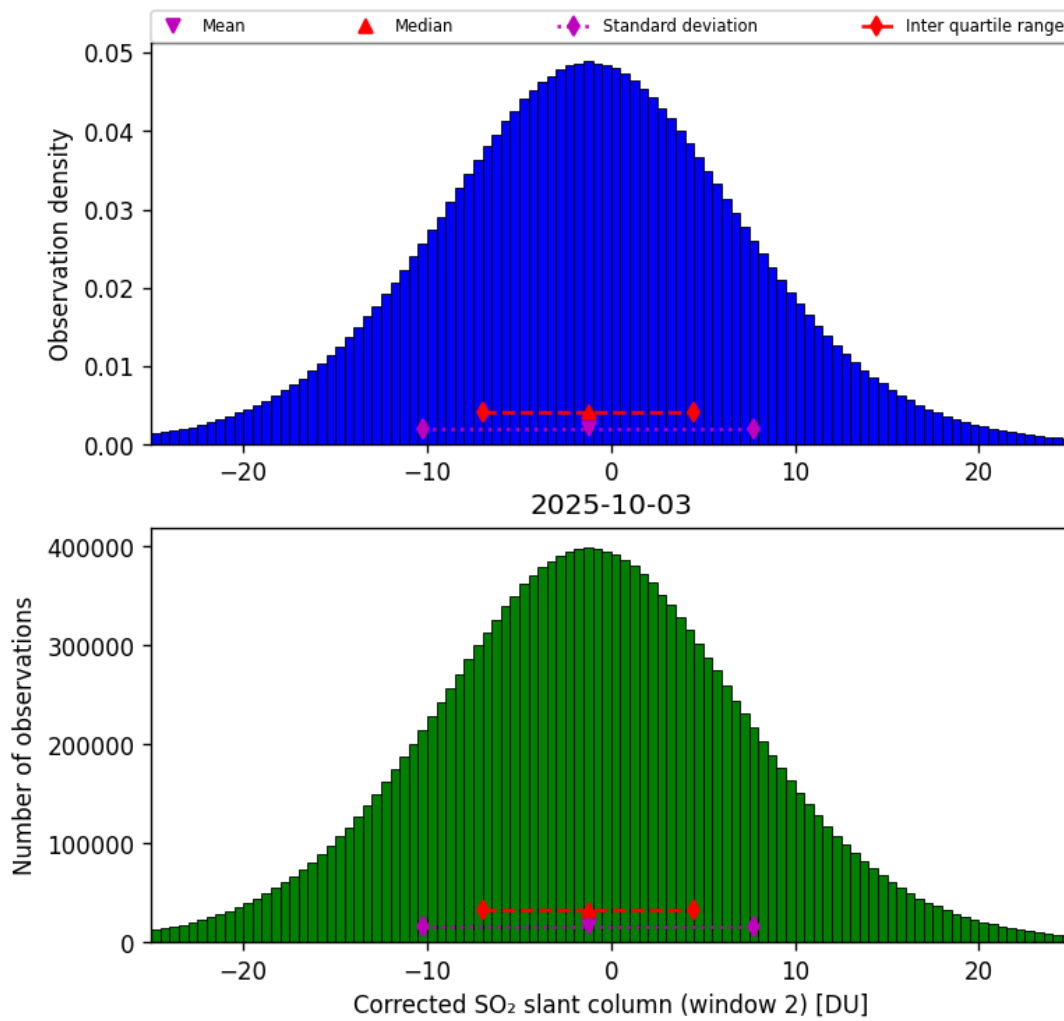


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-10-03 to 2025-10-04

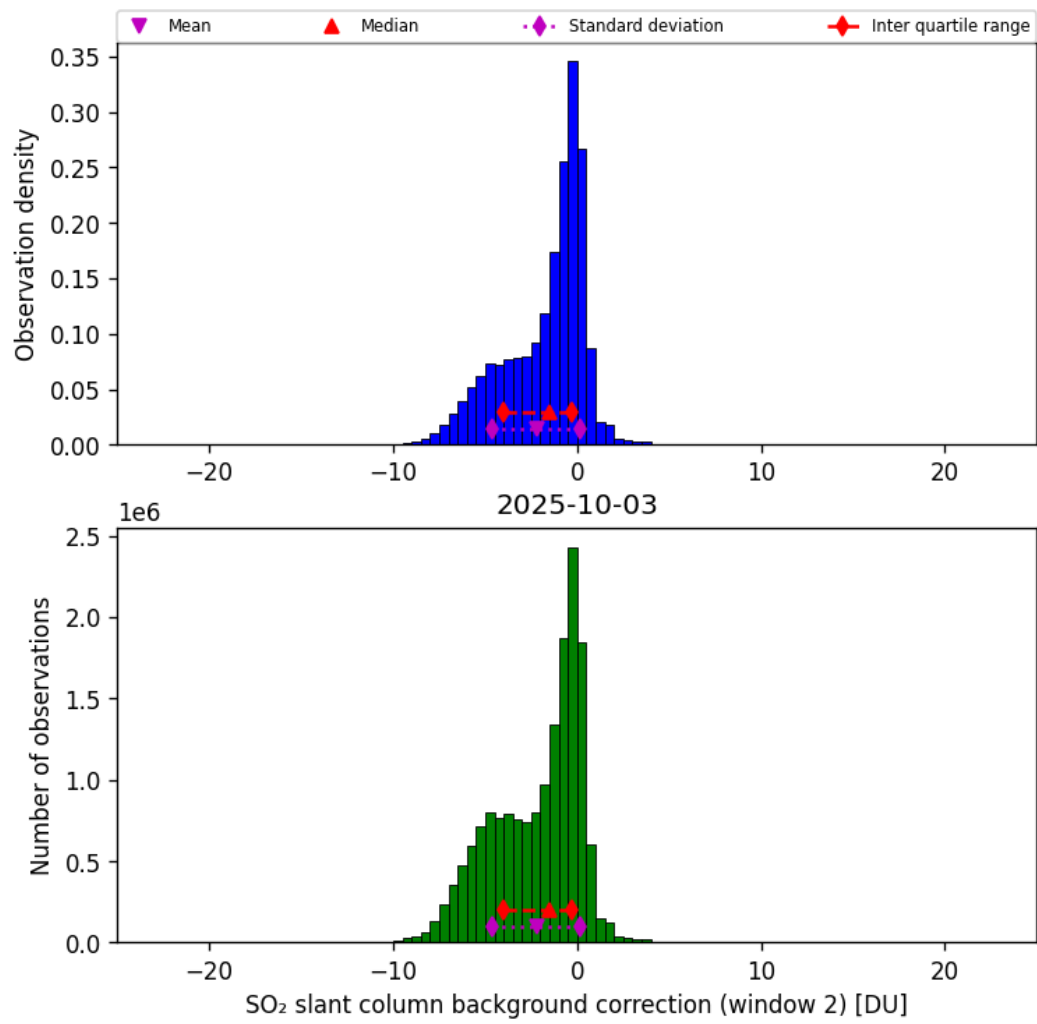


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-10-03 to 2025-10-04

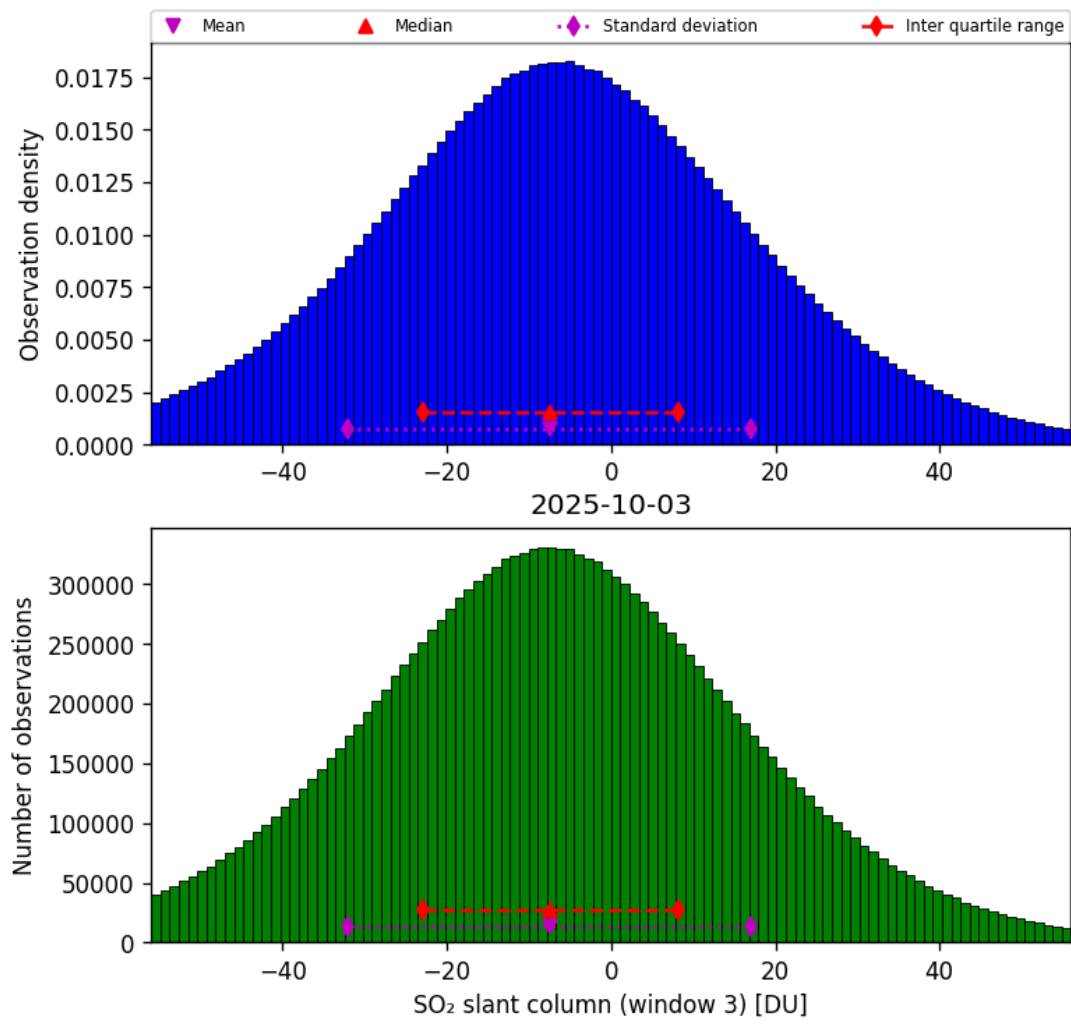


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-10-03 to 2025-10-04

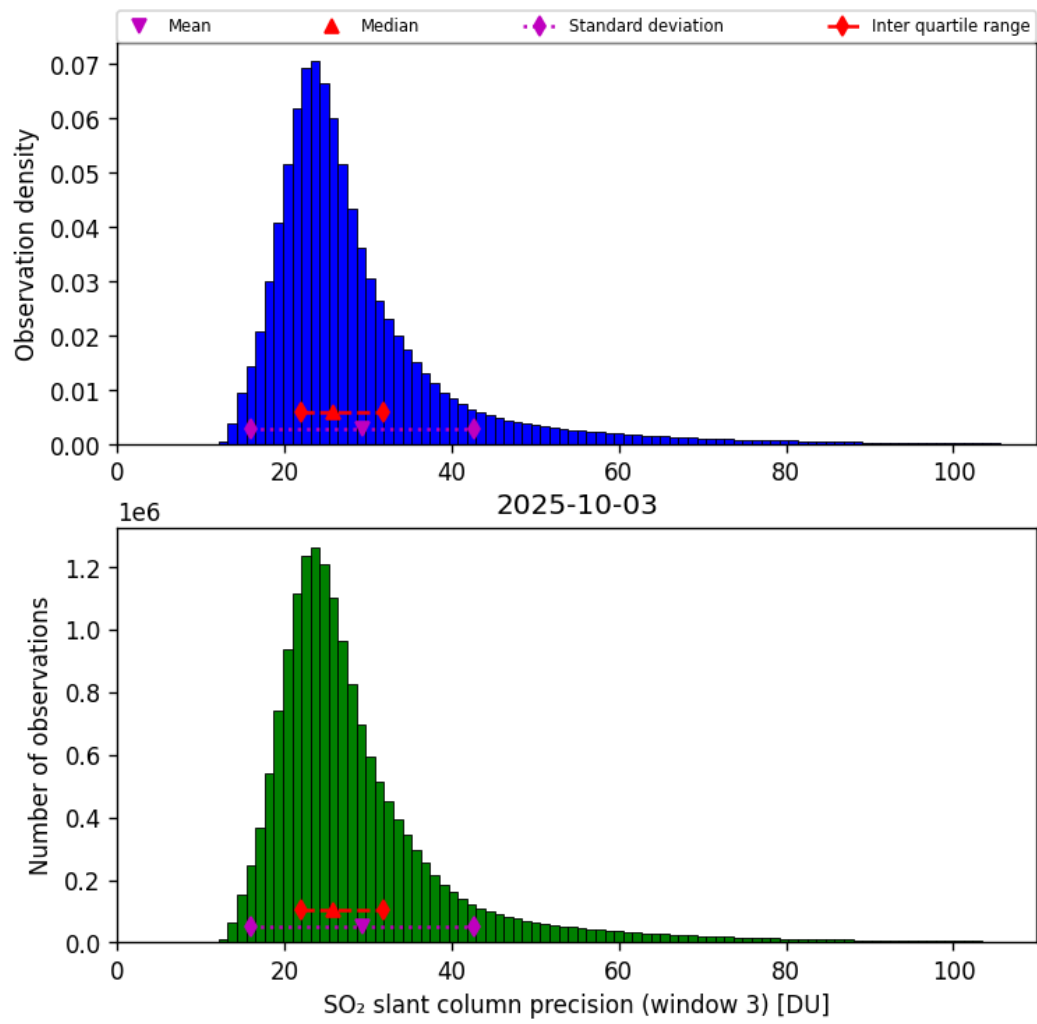


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-10-03 to 2025-10-04

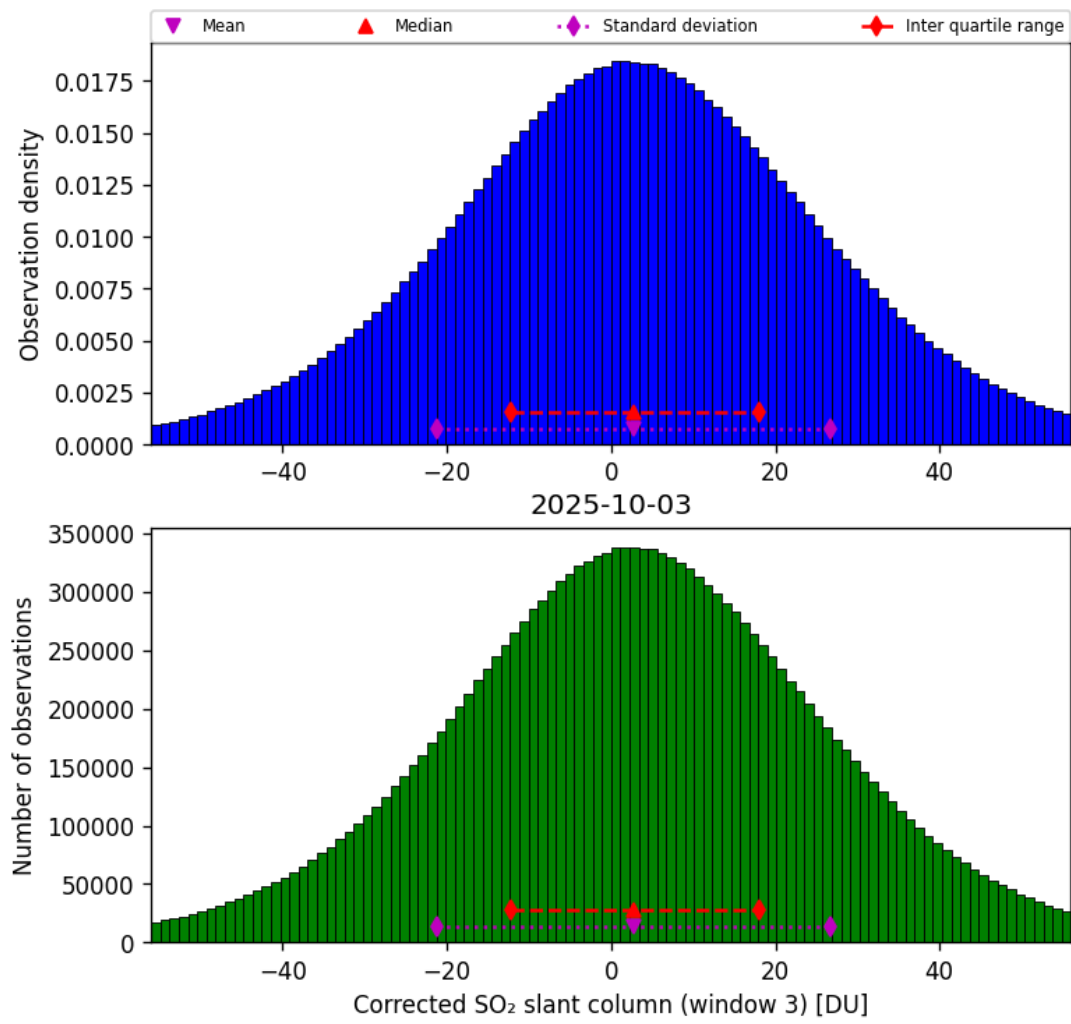


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-10-03 to 2025-10-04

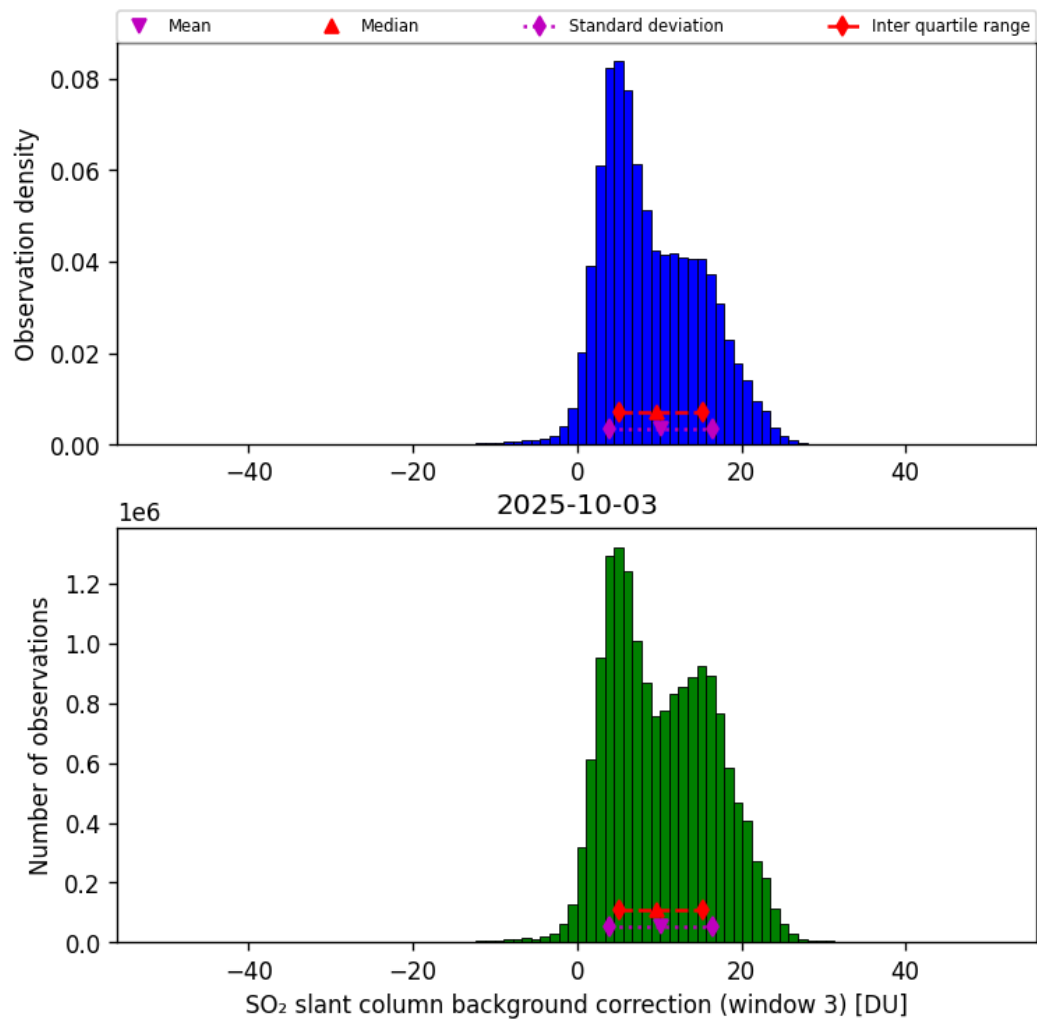


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-10-03 to 2025-10-04

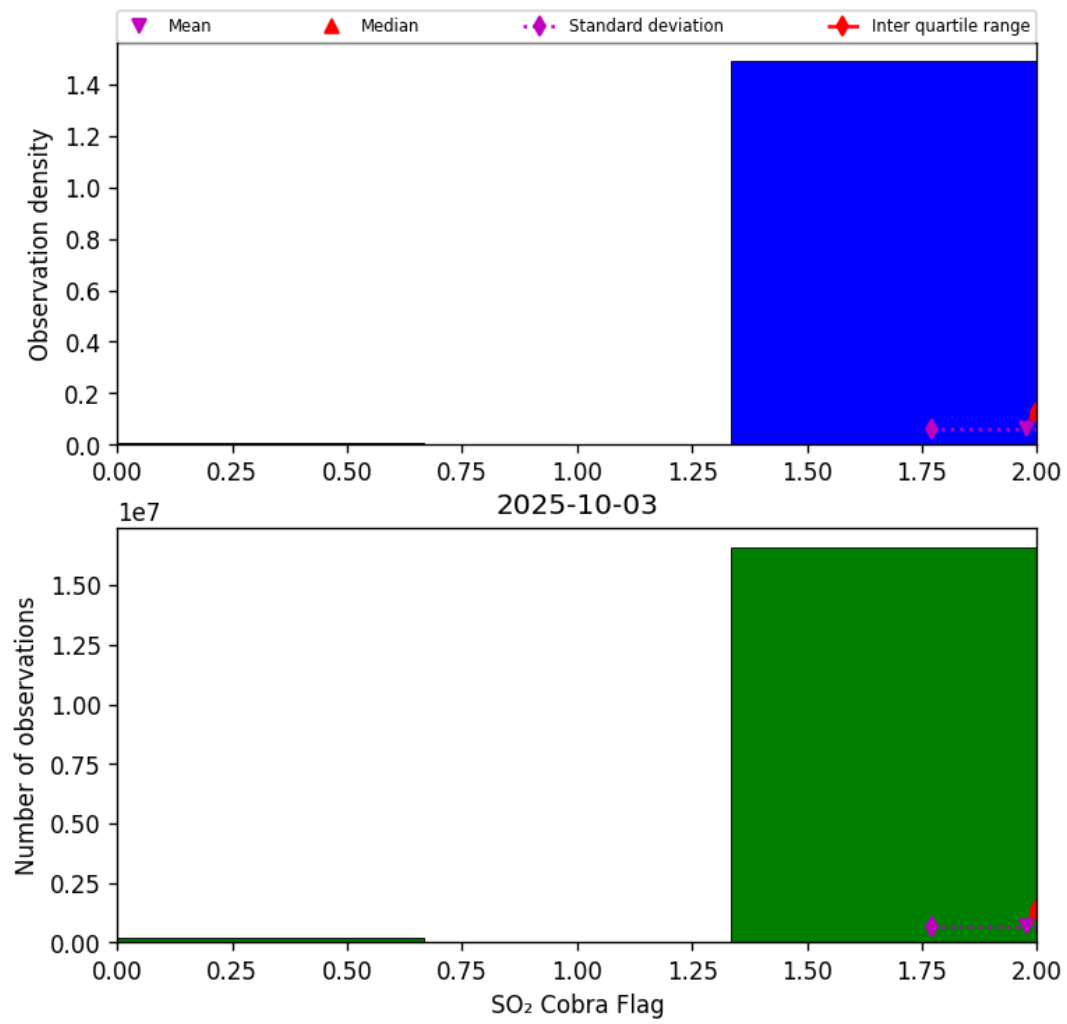


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-10-03 to 2025-10-04

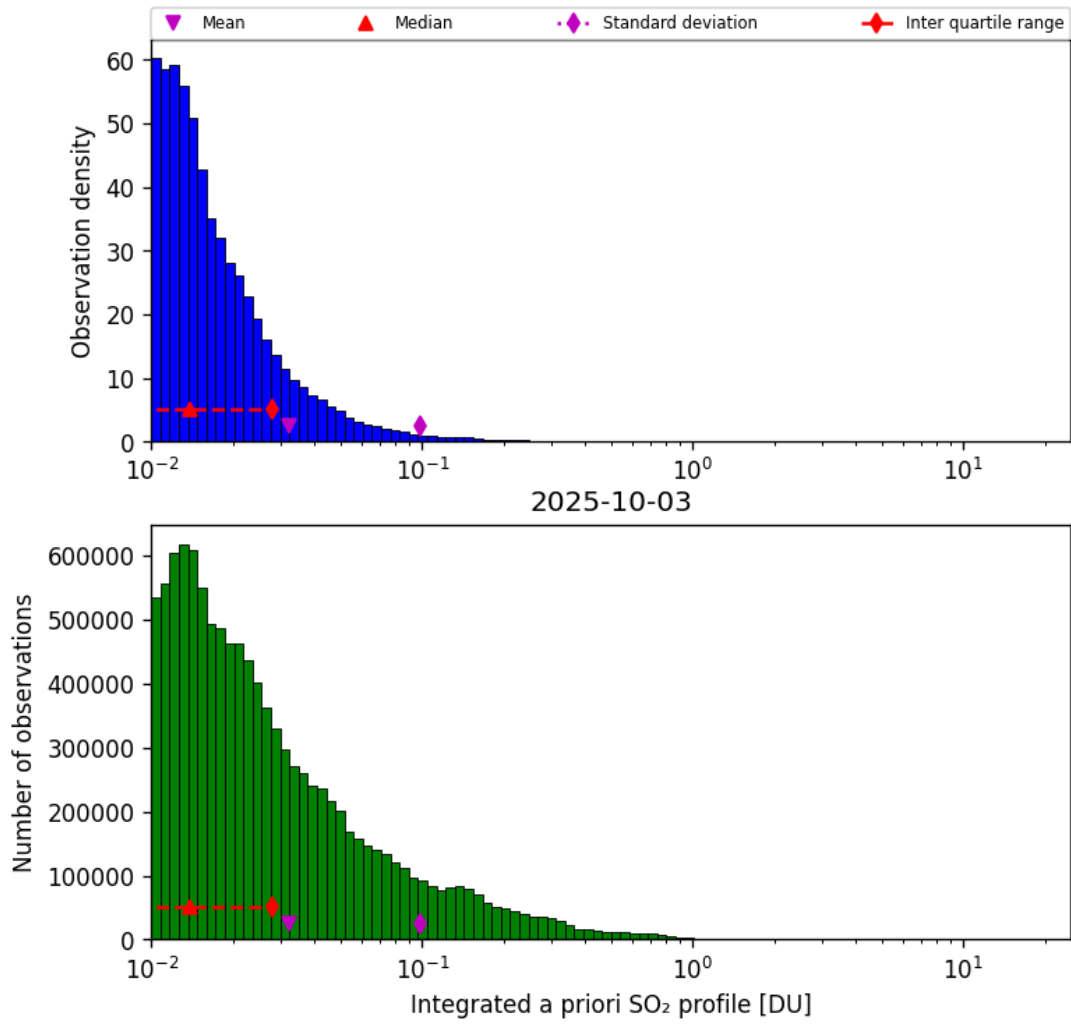


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-10-03 to 2025-10-04

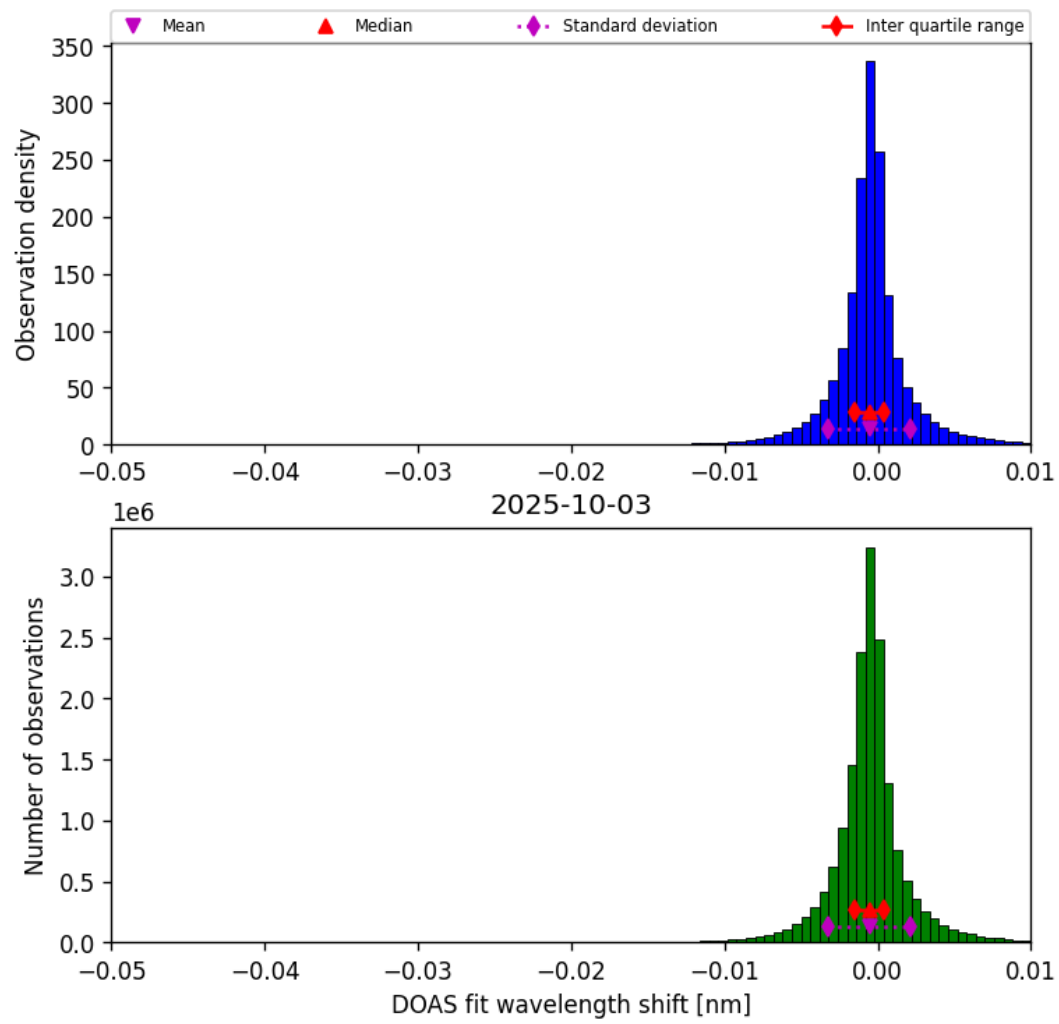


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-10-03 to 2025-10-04

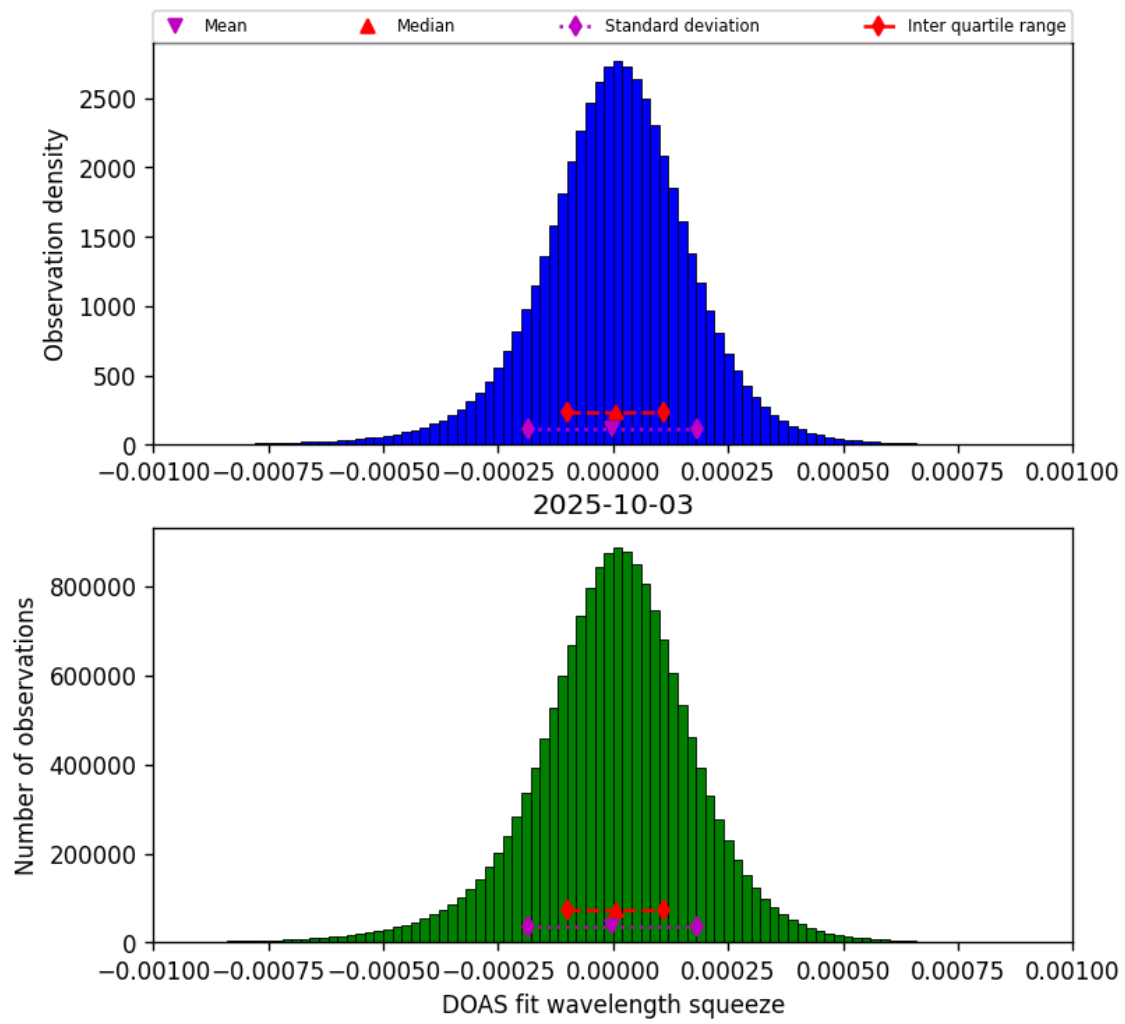


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-10-03 to 2025-10-04

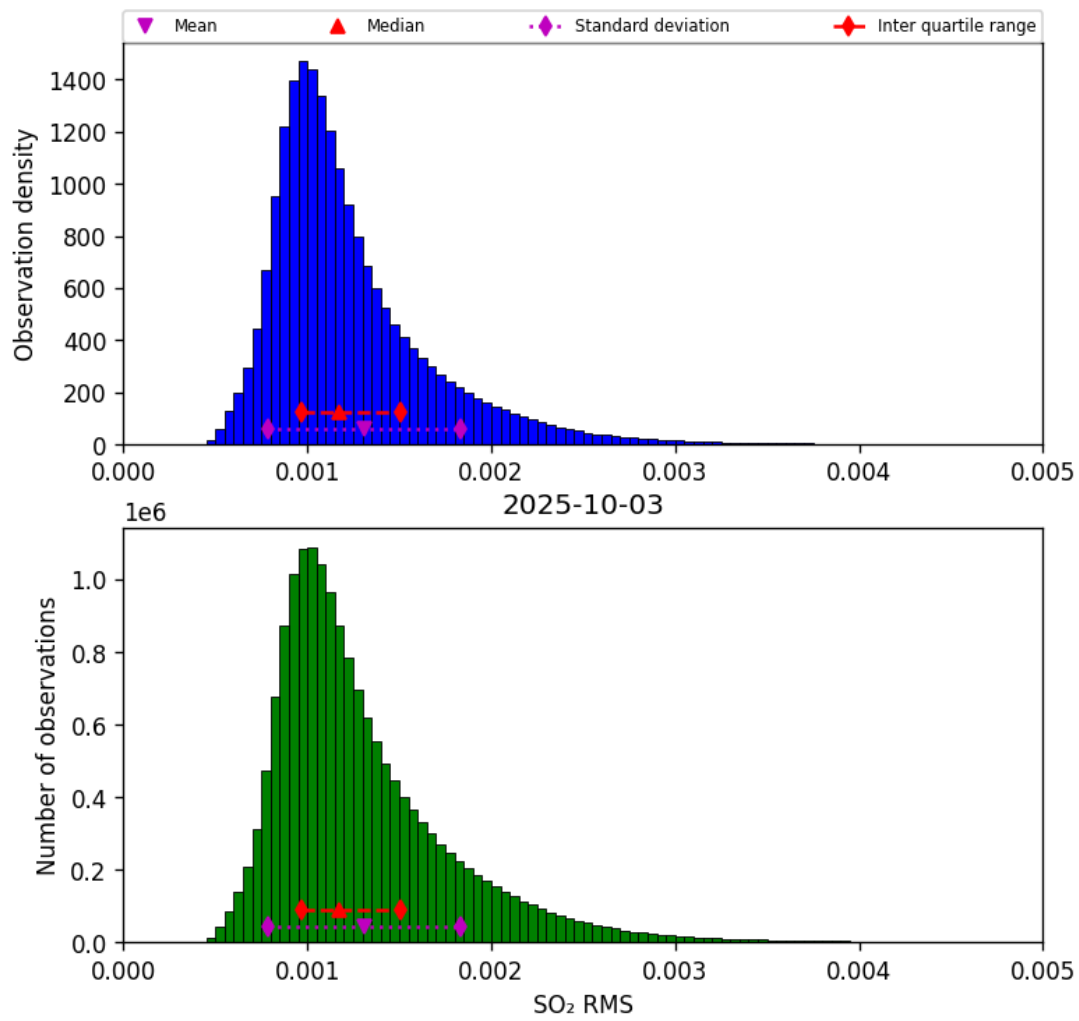


Figure 79: Histogram of “SO₂ RMS” for 2025-10-03 to 2025-10-04

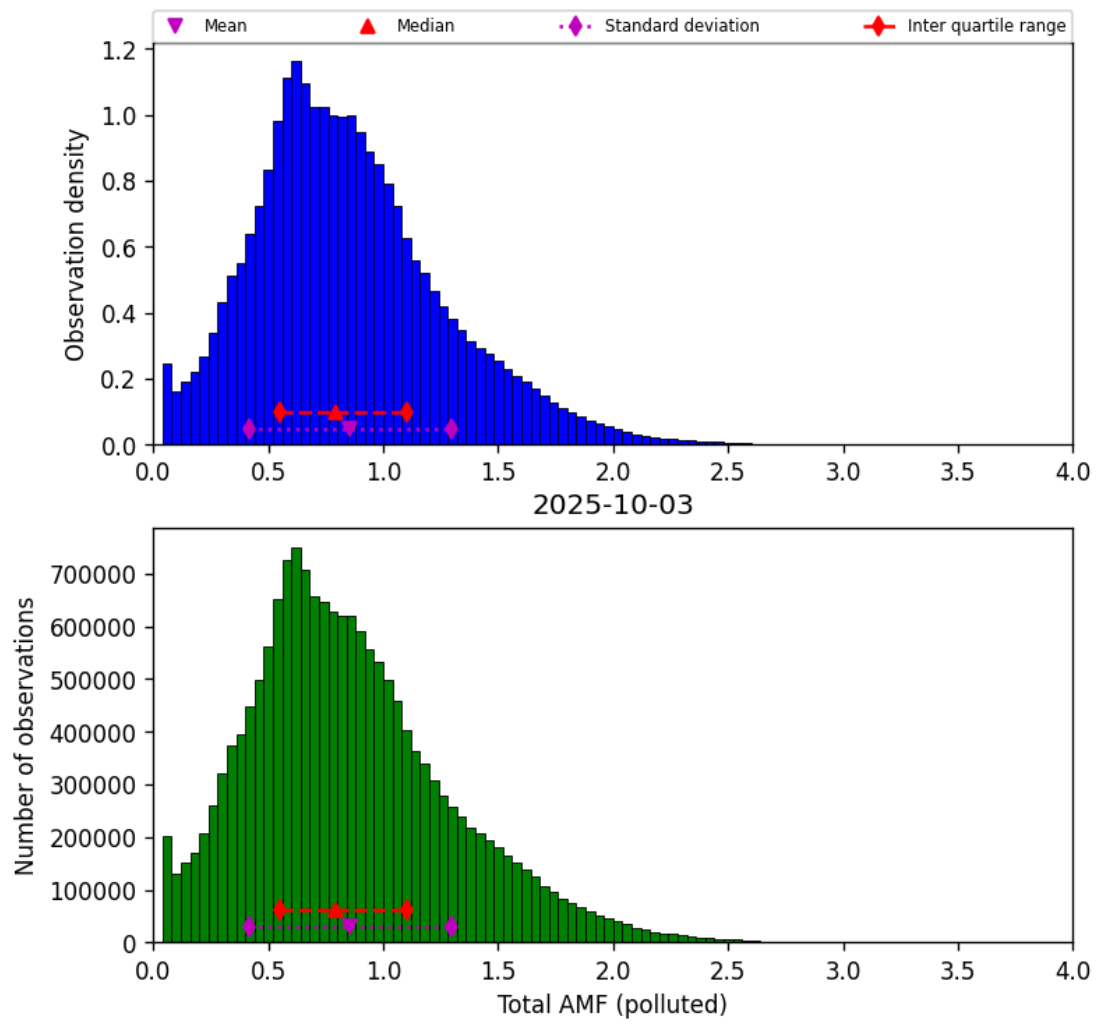


Figure 80: Histogram of “Total AMF (polluted)” for 2025-10-03 to 2025-10-04

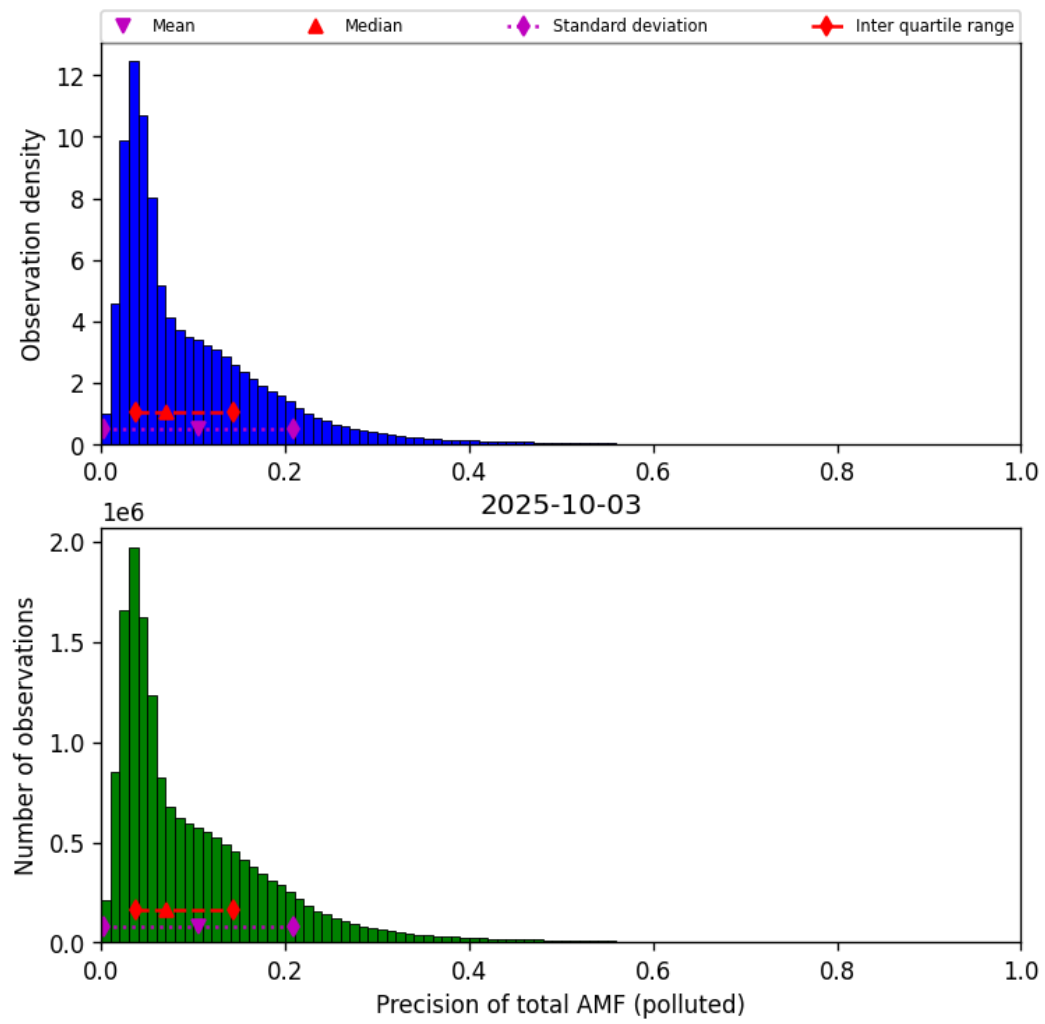


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-10-03 to 2025-10-04

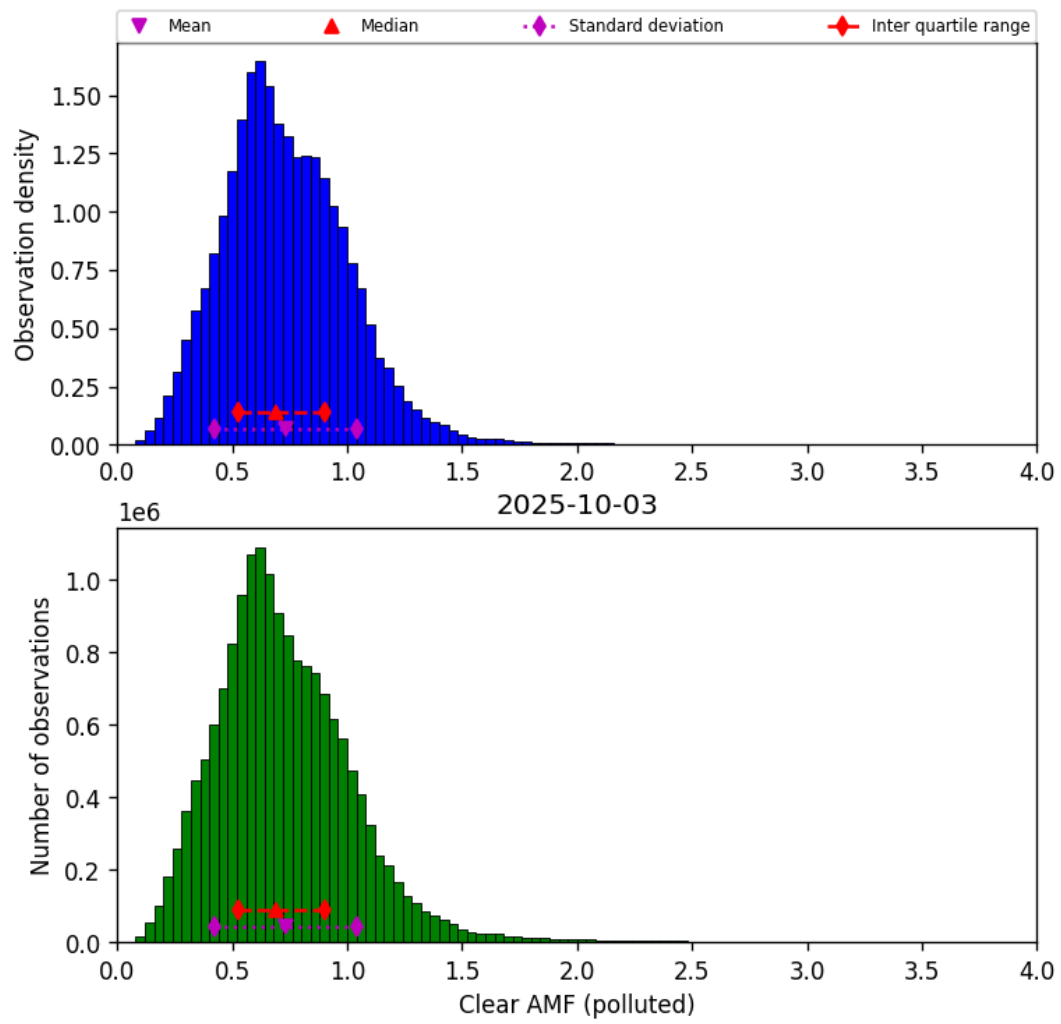


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-10-03 to 2025-10-04

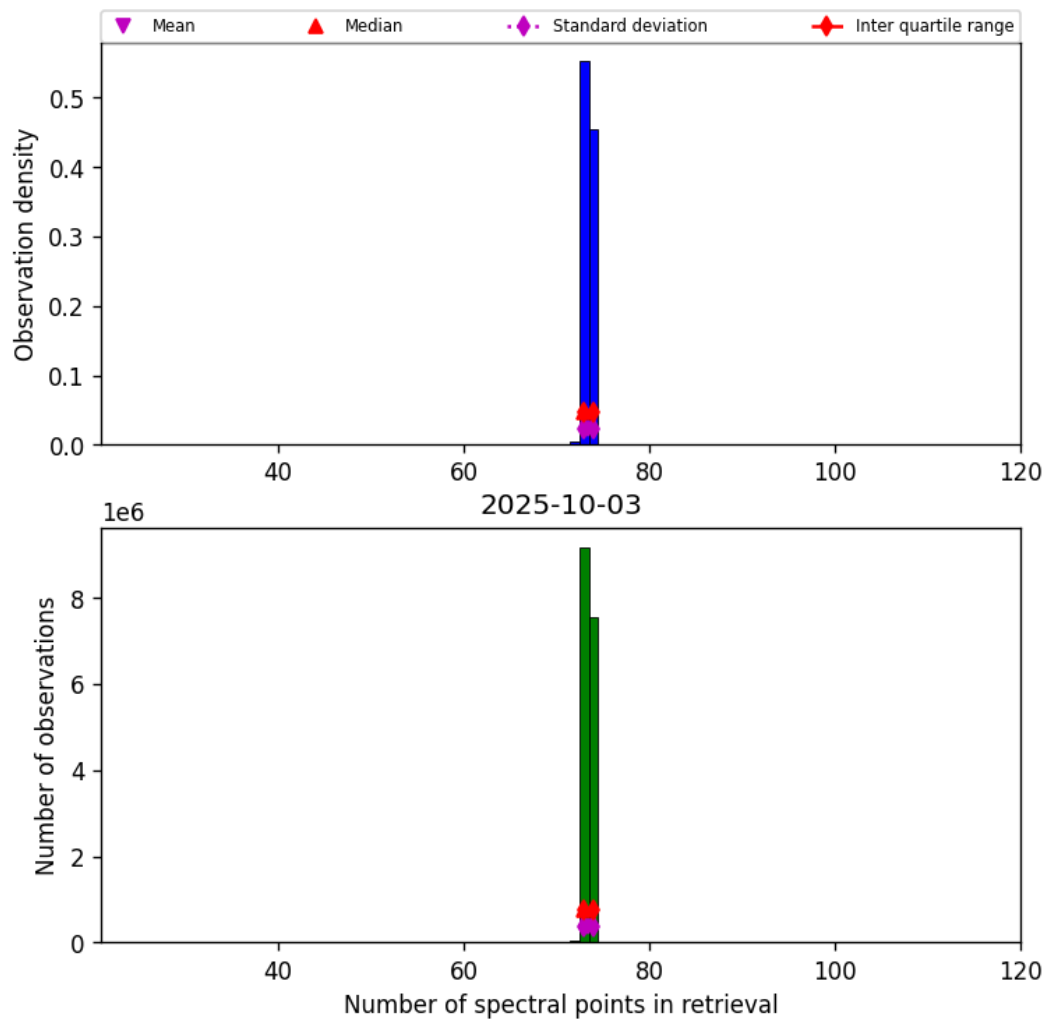


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-10-03 to 2025-10-04

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.

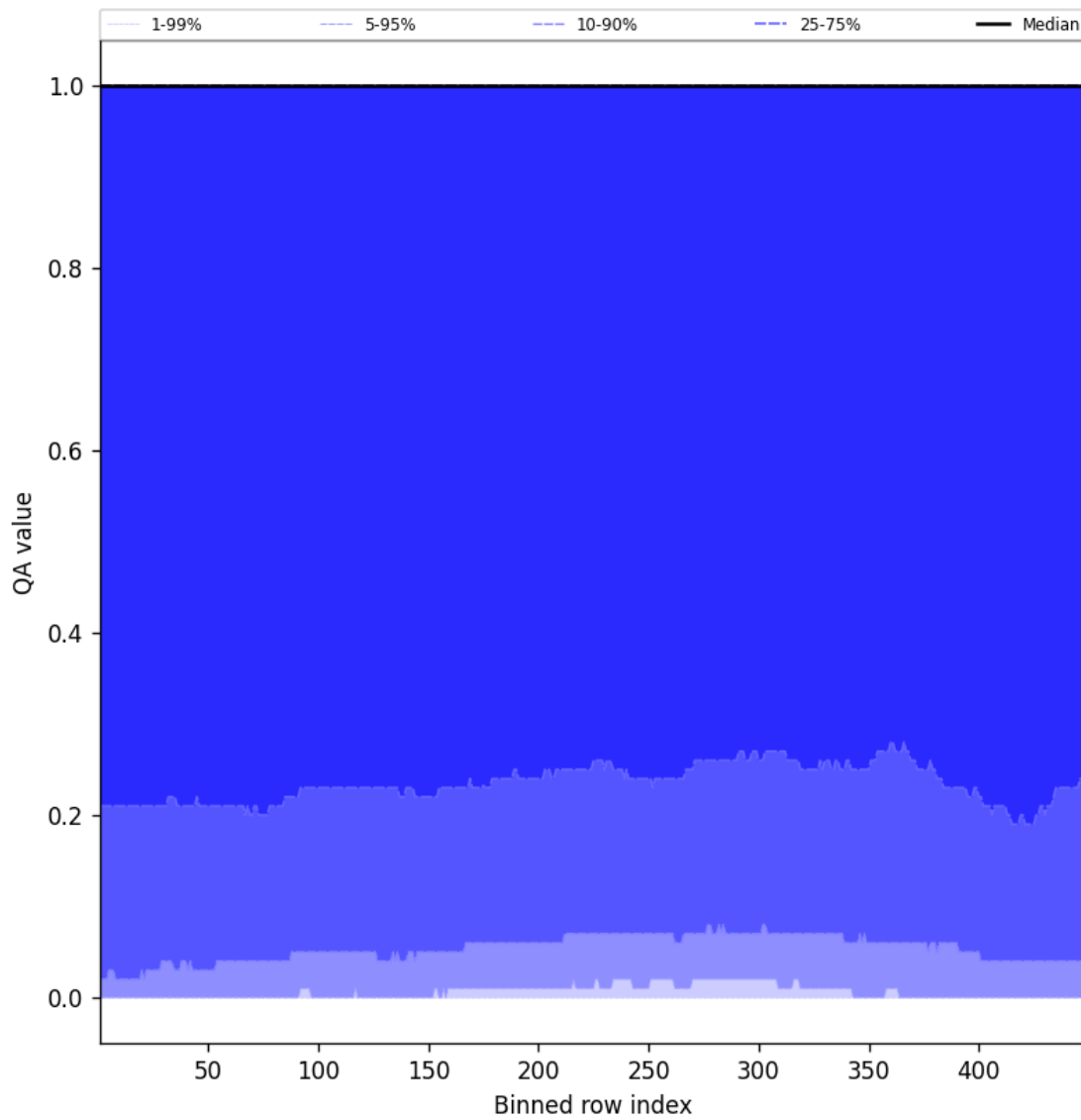


Figure 84: Along track statistics of “QA value” for 2025-10-03 to 2025-10-04

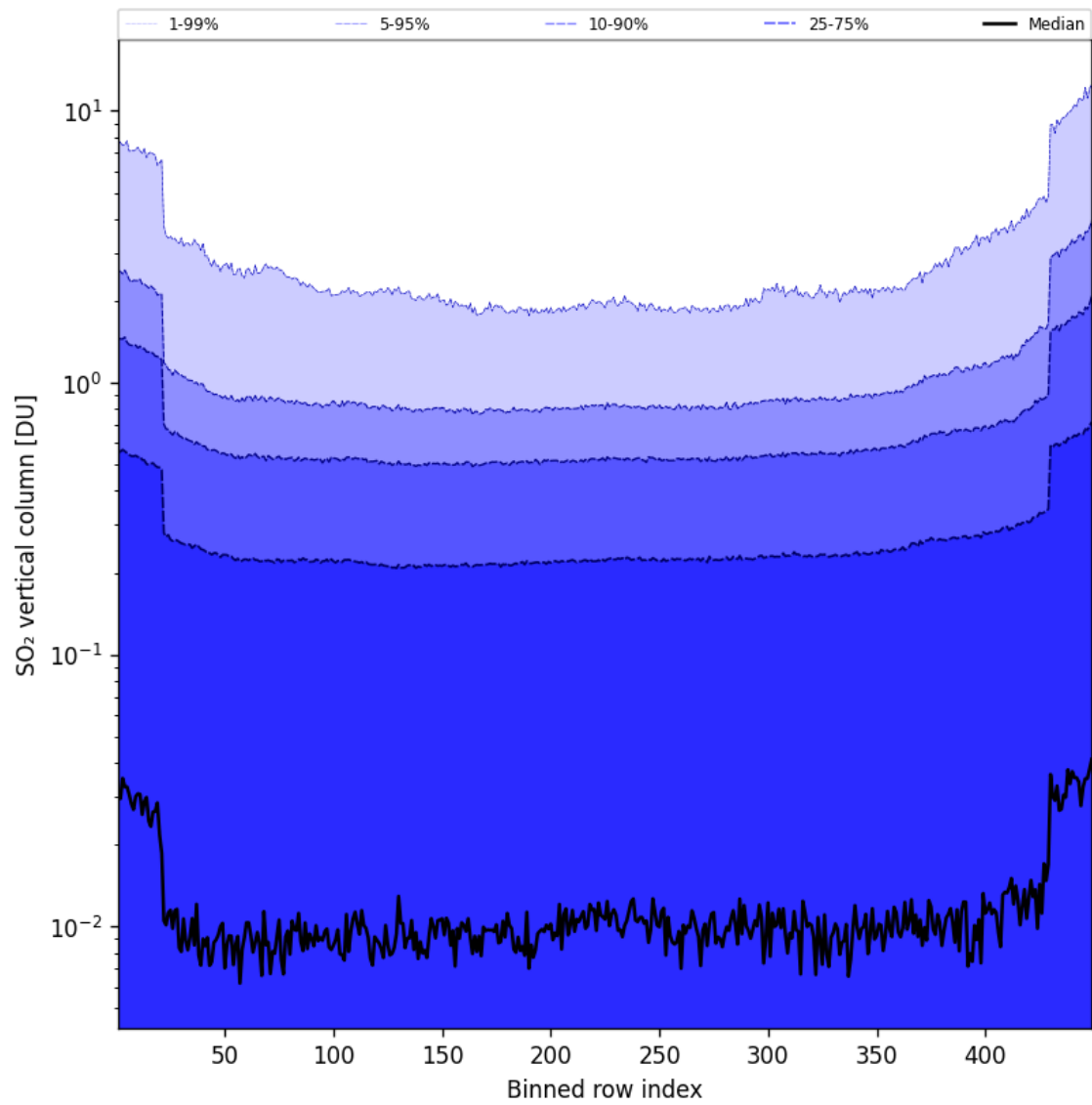


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-10-03 to 2025-10-04

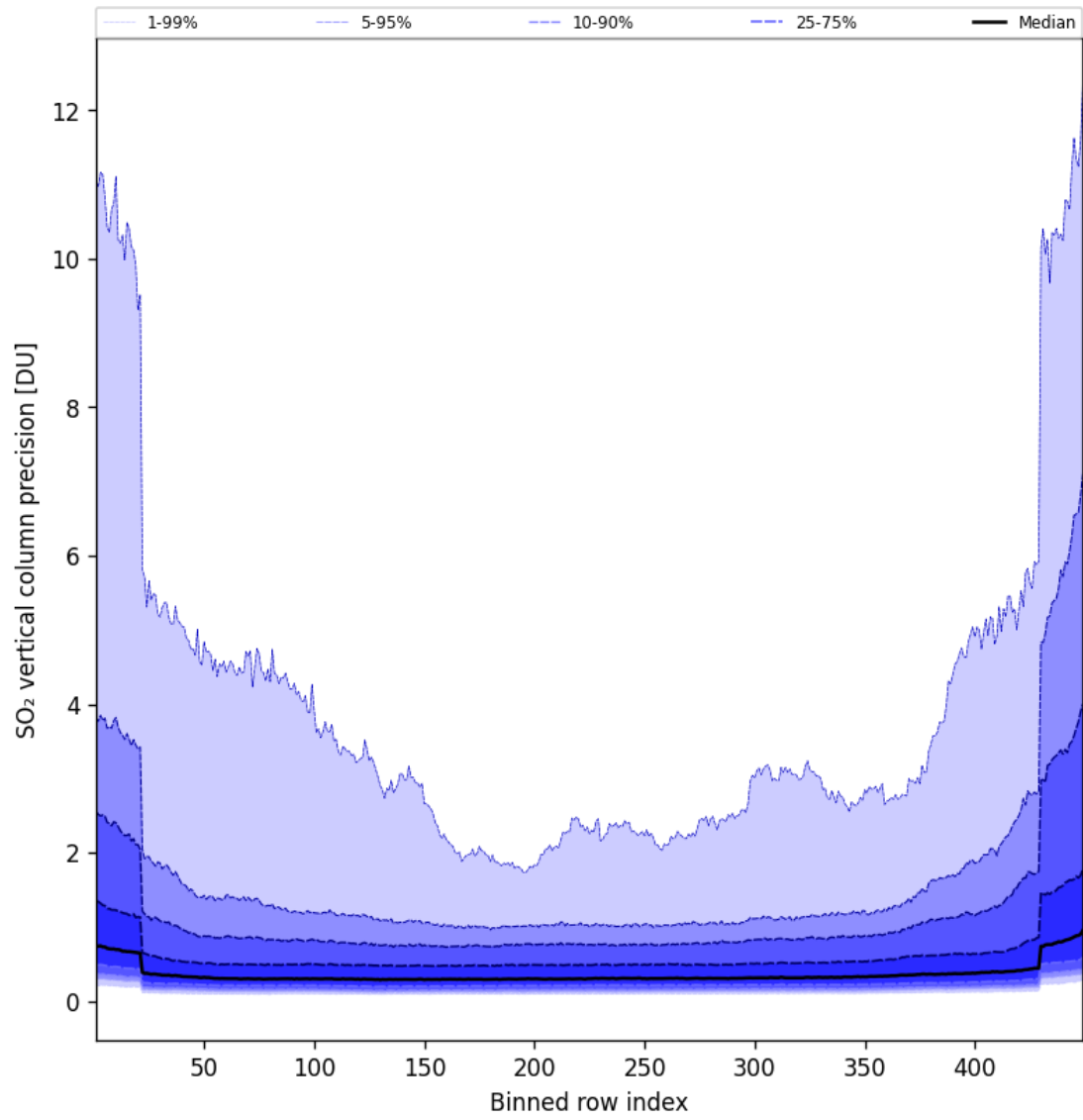


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-10-03 to 2025-10-04

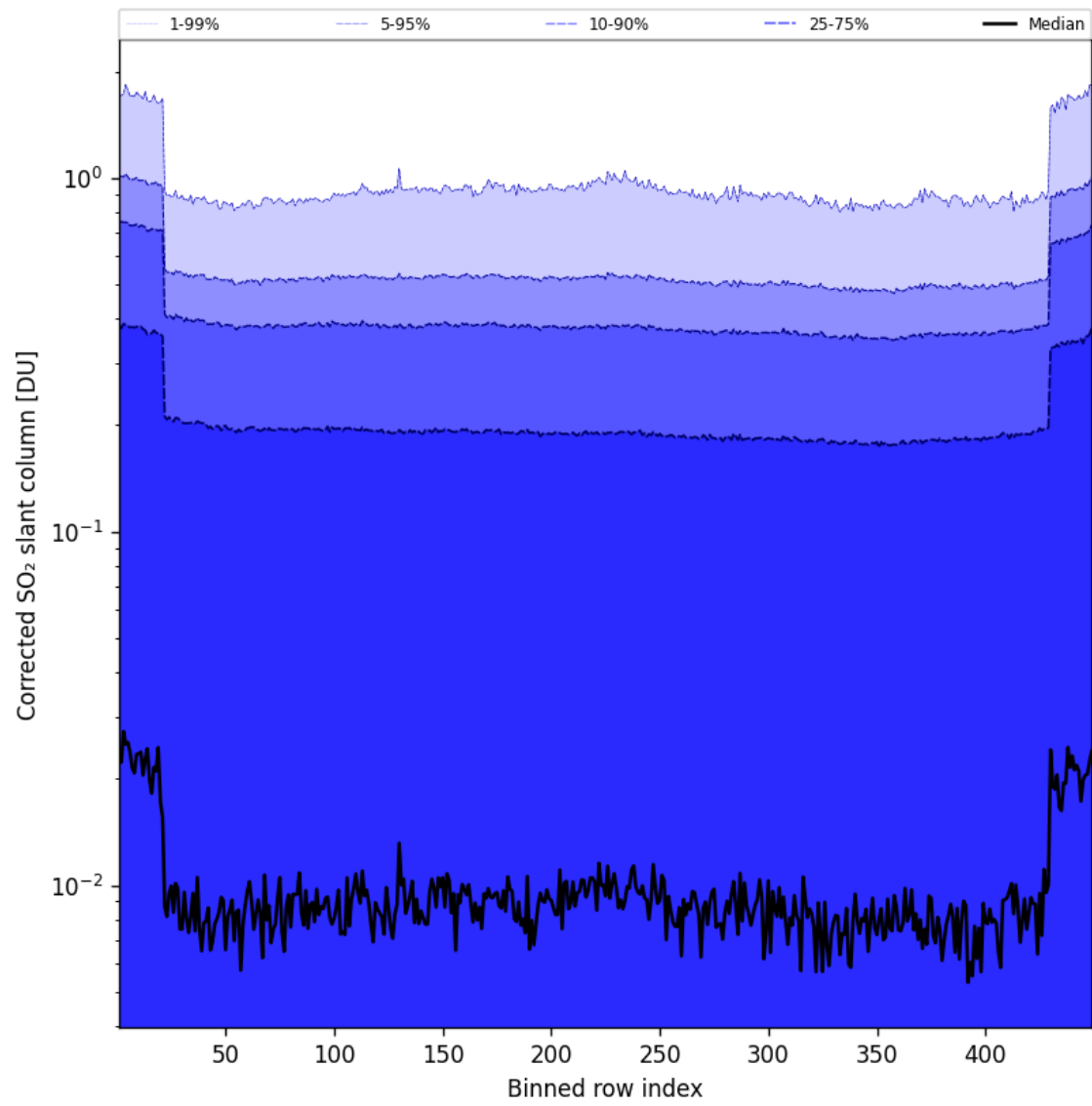


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-10-03 to 2025-10-04

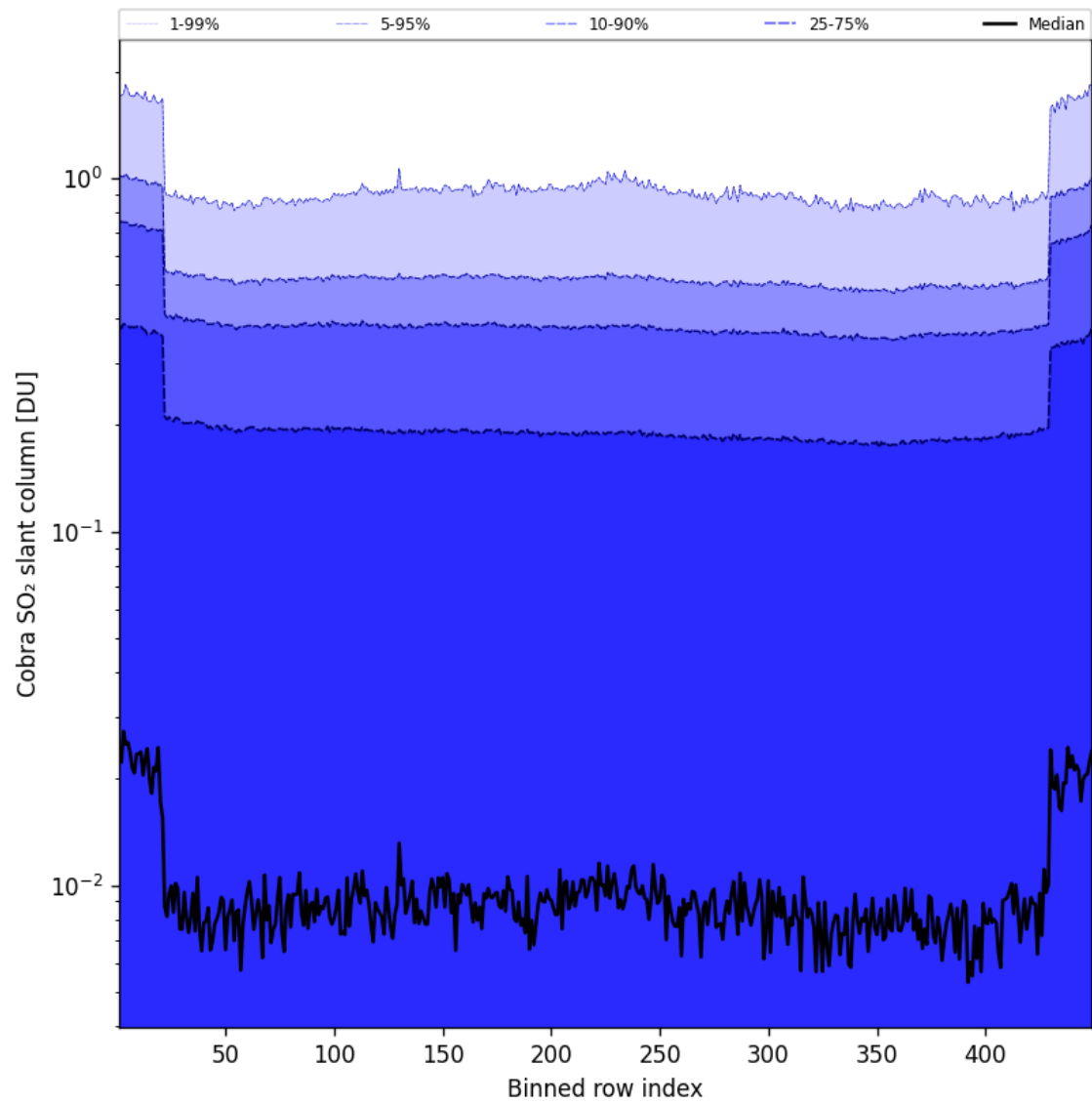


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-10-03 to 2025-10-04

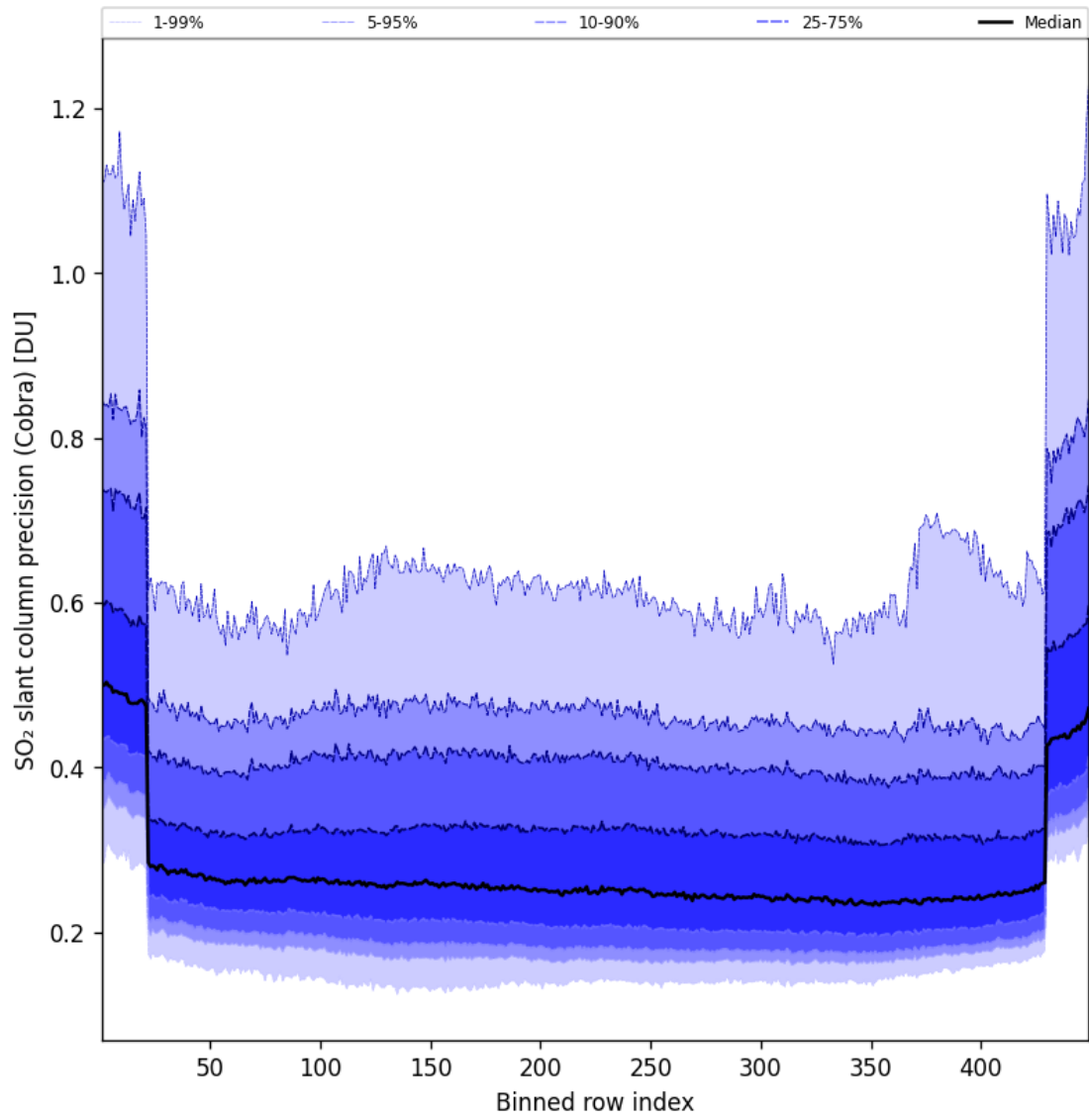


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-10-03 to 2025-10-04

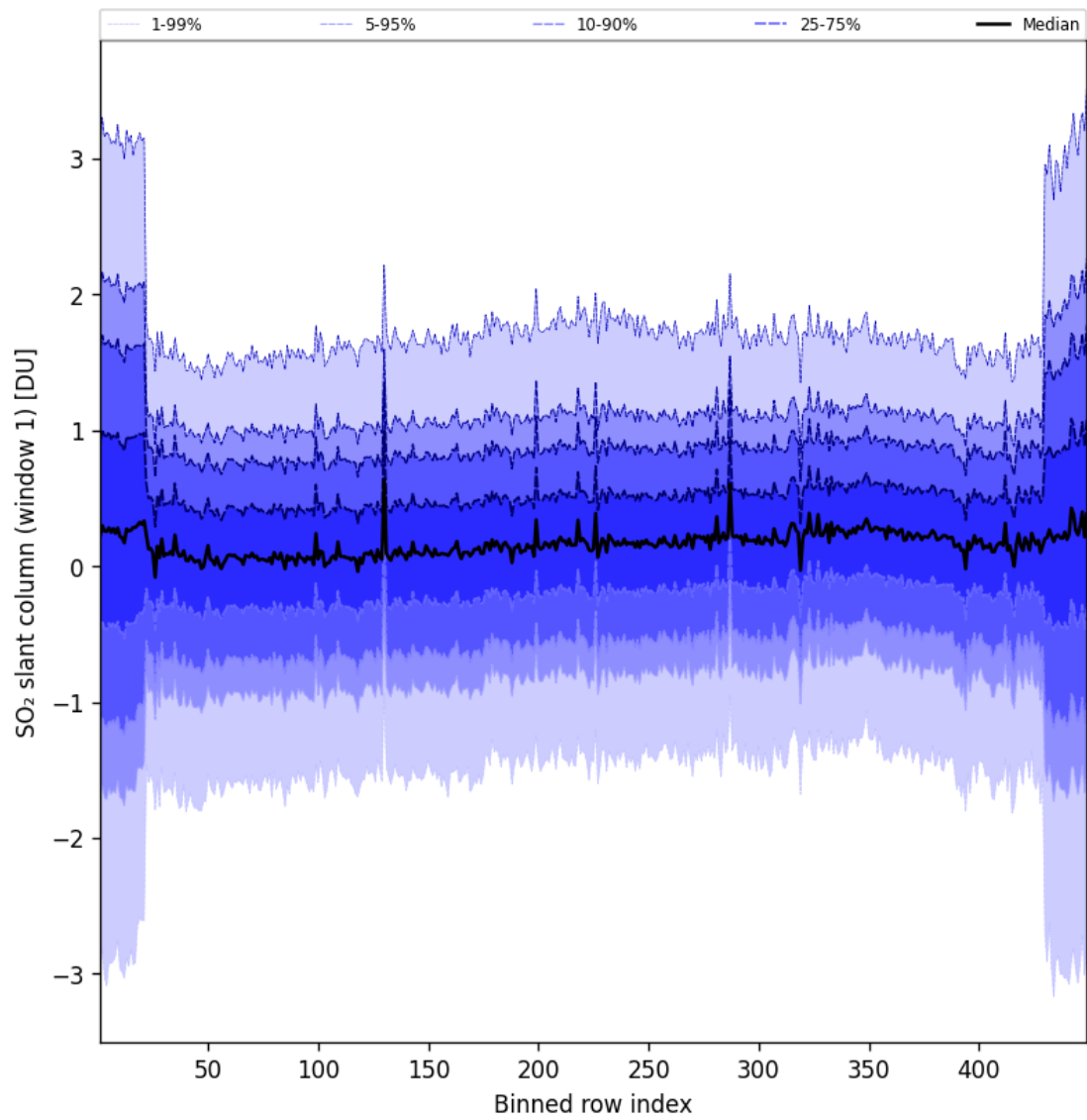


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-10-03 to 2025-10-04

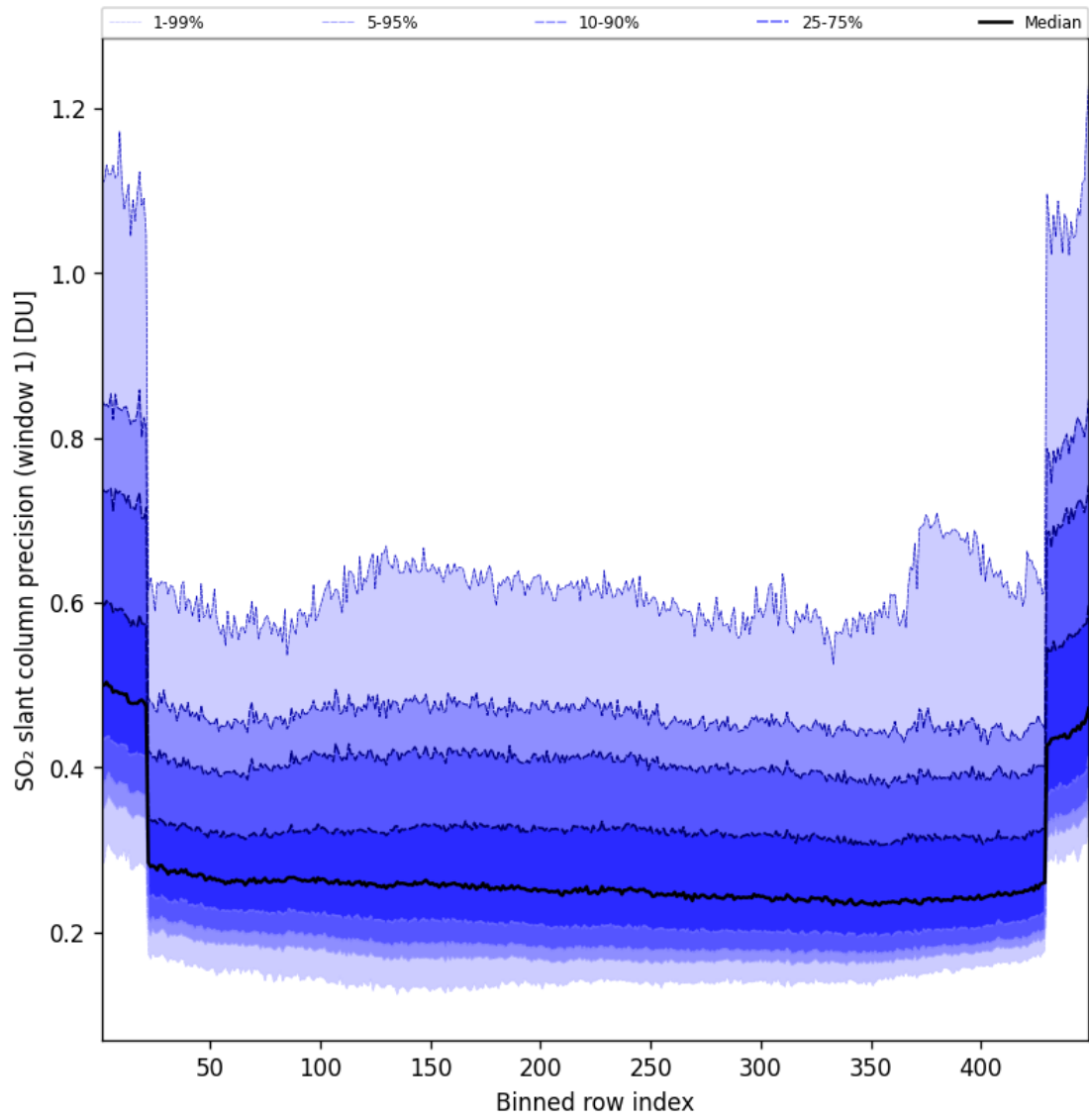


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-10-03 to 2025-10-04

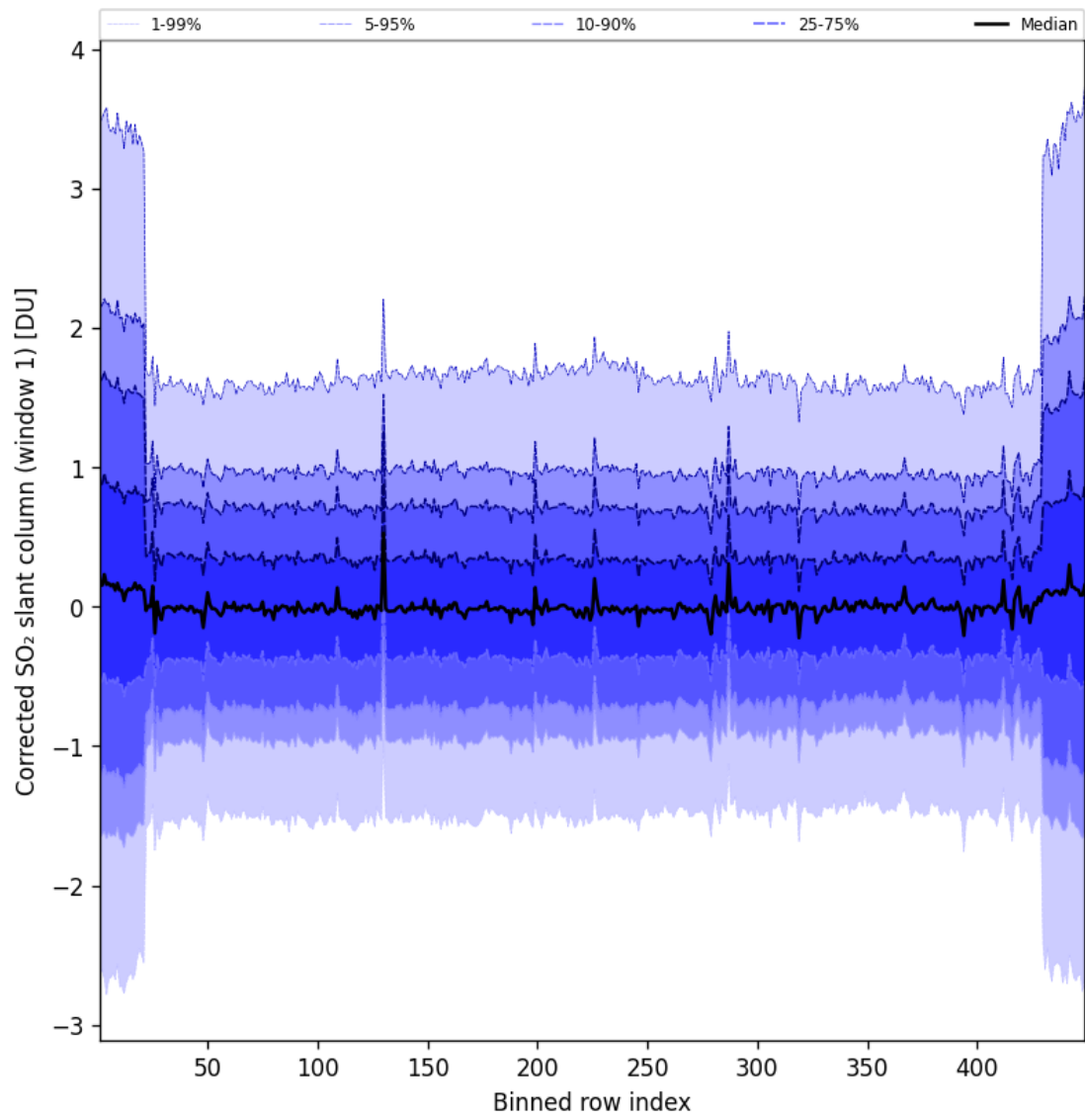


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-10-03 to 2025-10-04

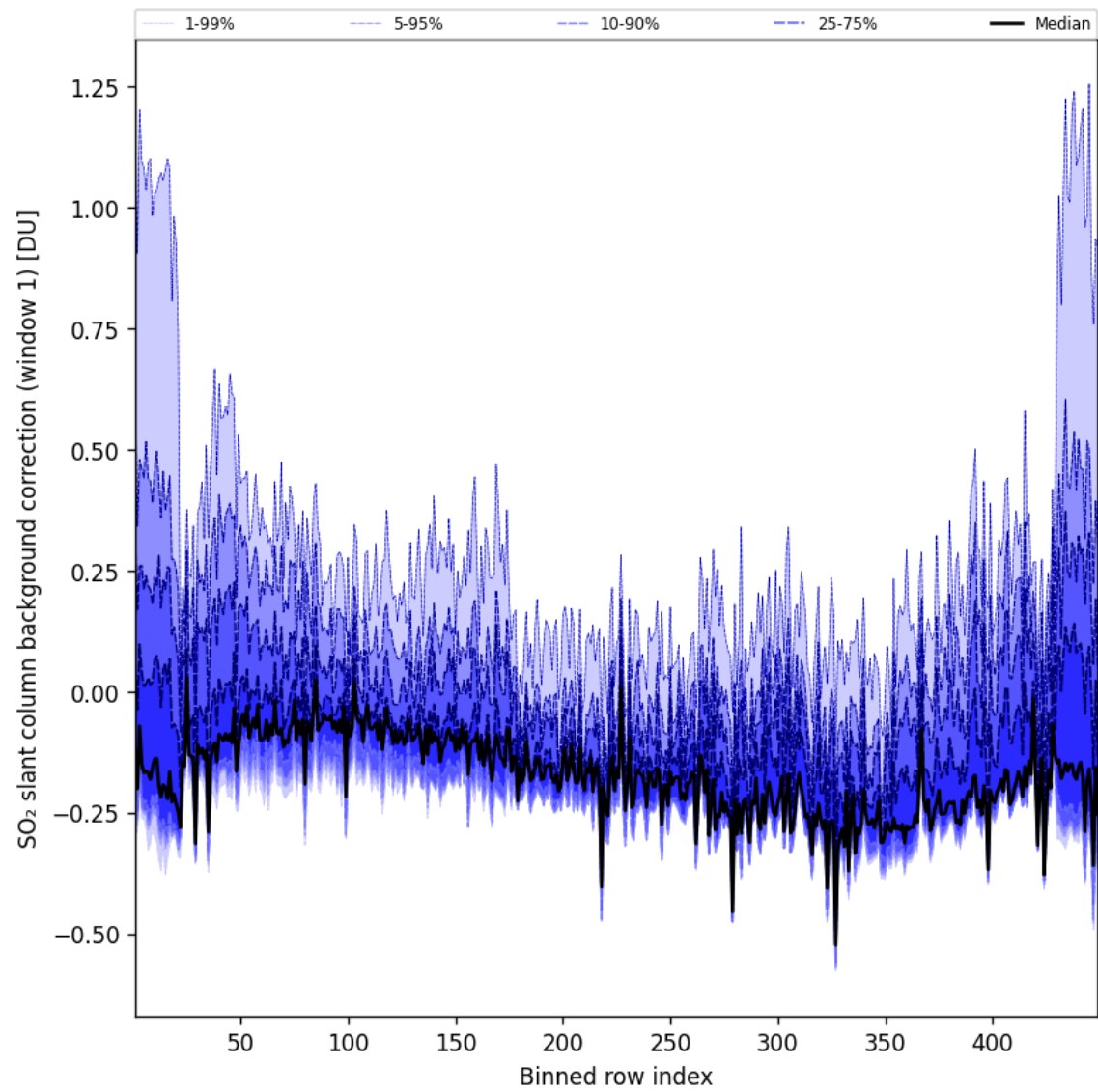


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-10-03 to 2025-10-04

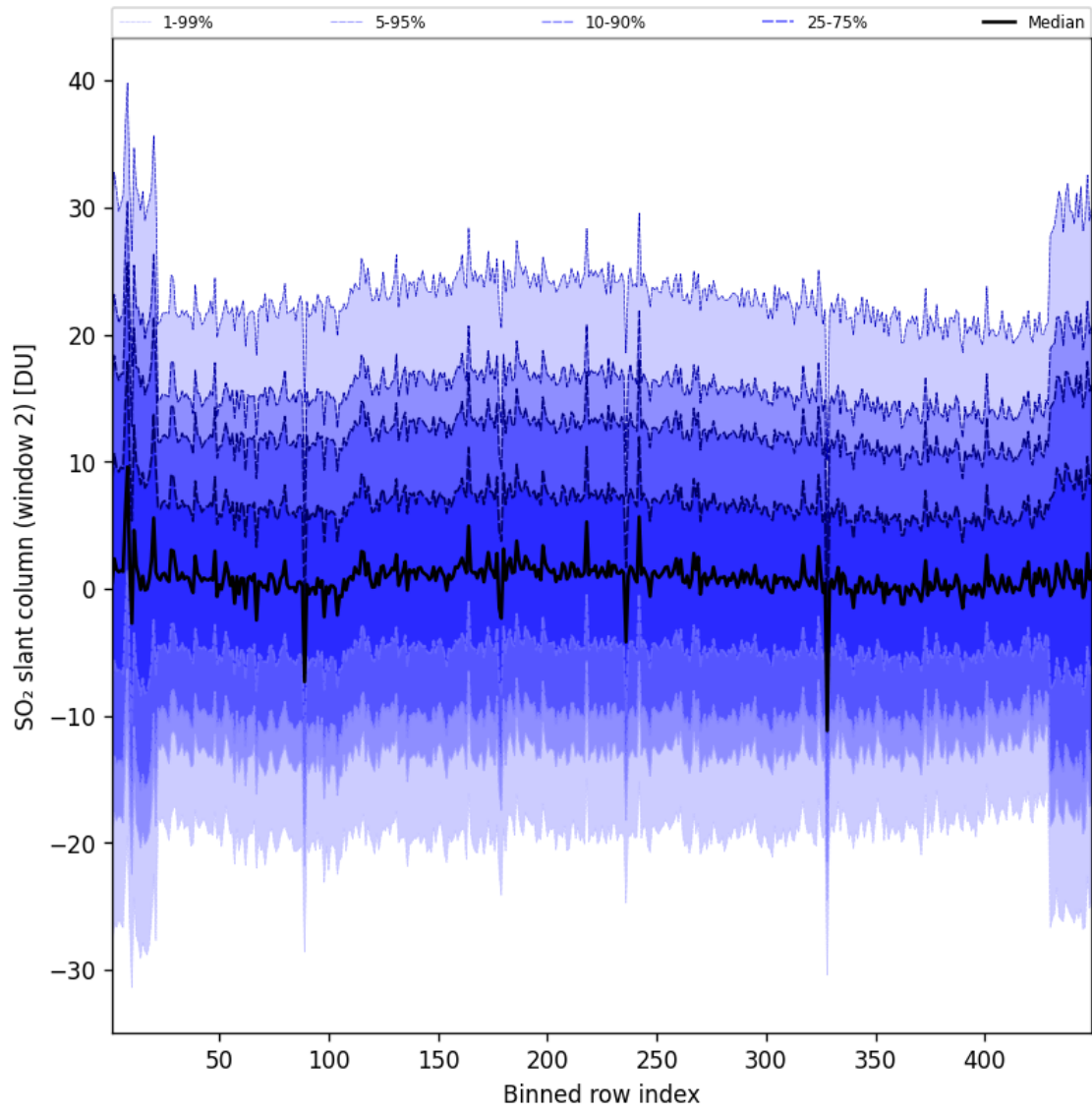


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-10-03 to 2025-10-04

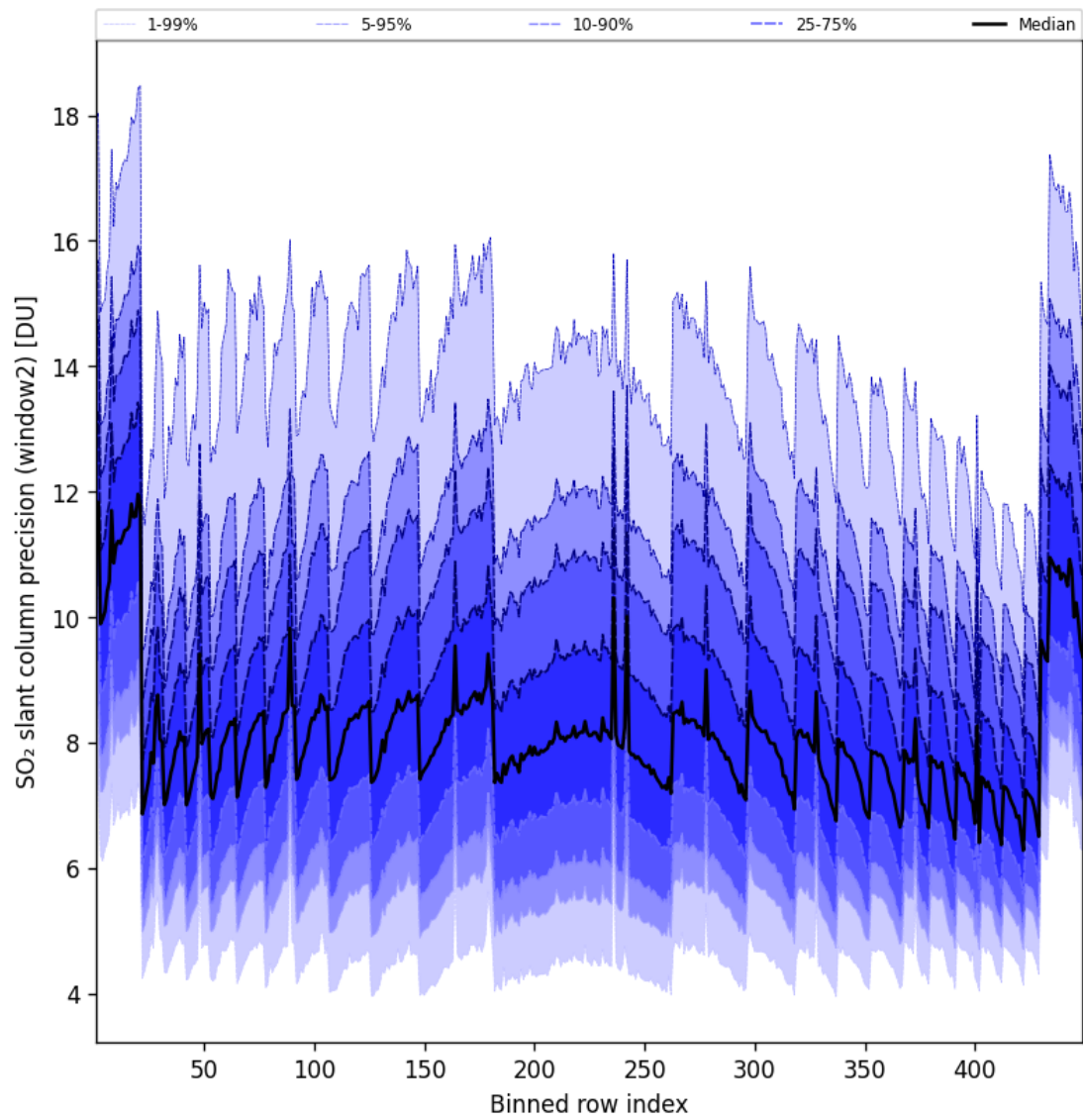


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-10-03 to 2025-10-04

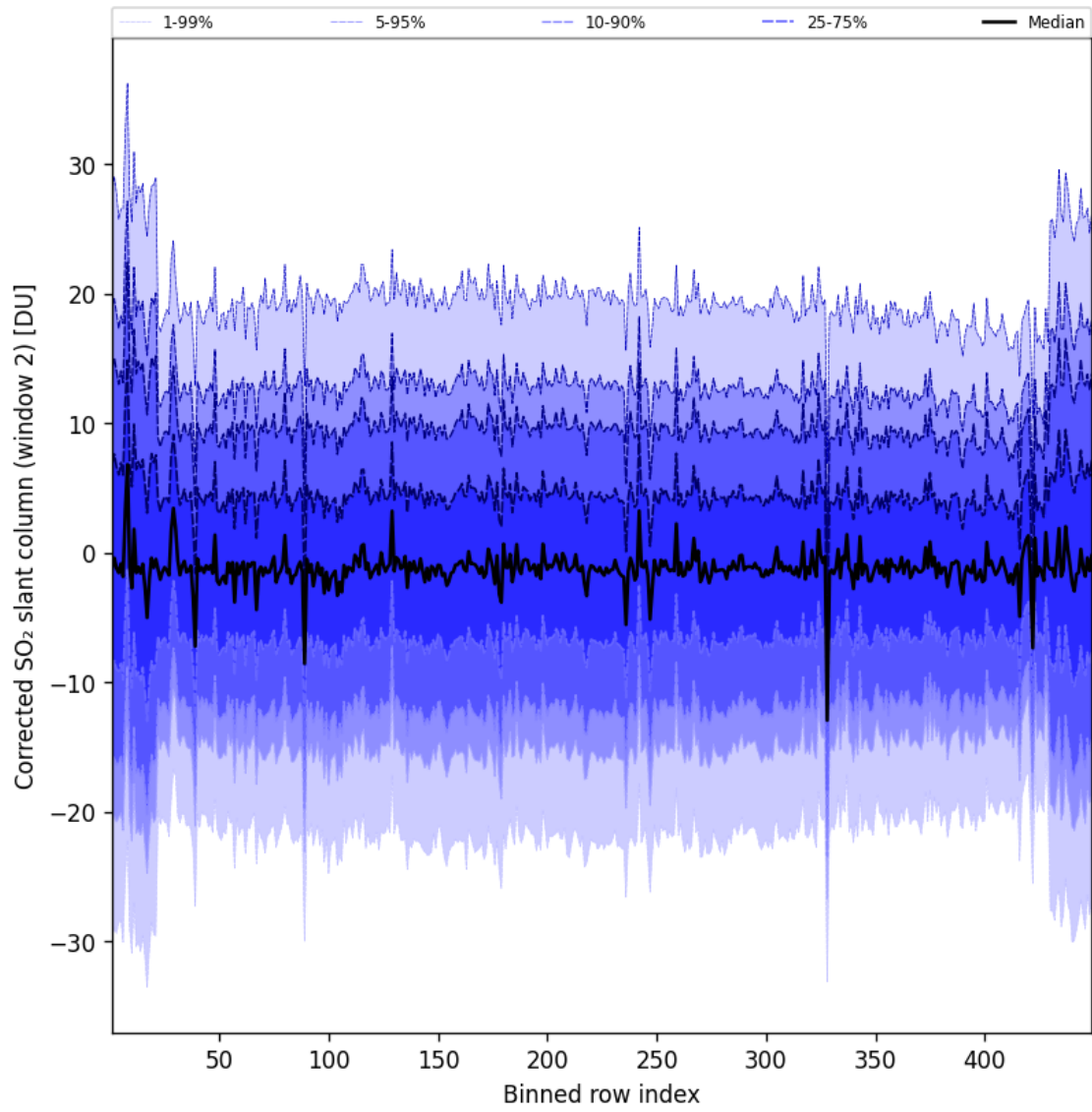


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-10-03 to 2025-10-04

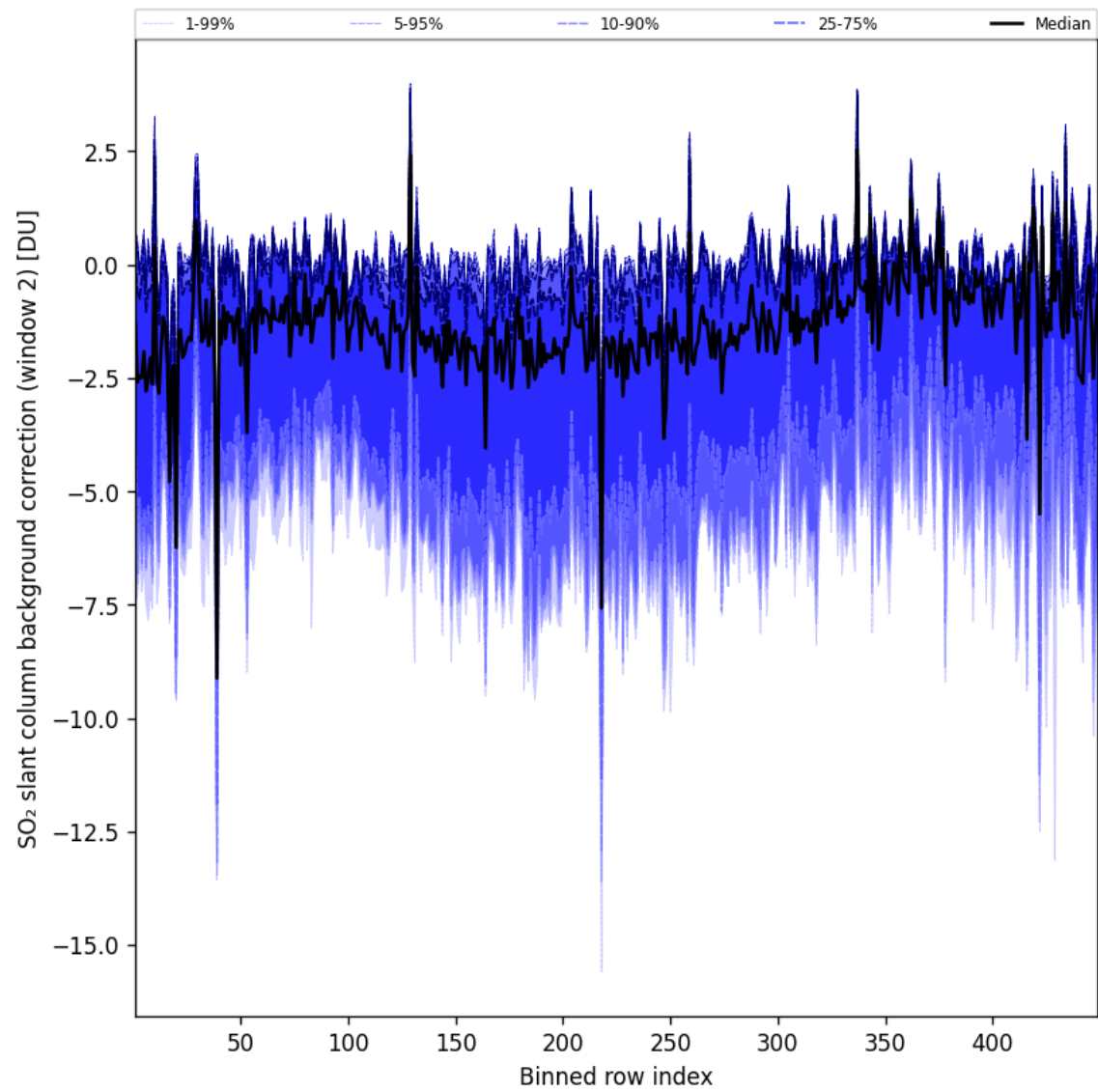


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-10-03 to 2025-10-04

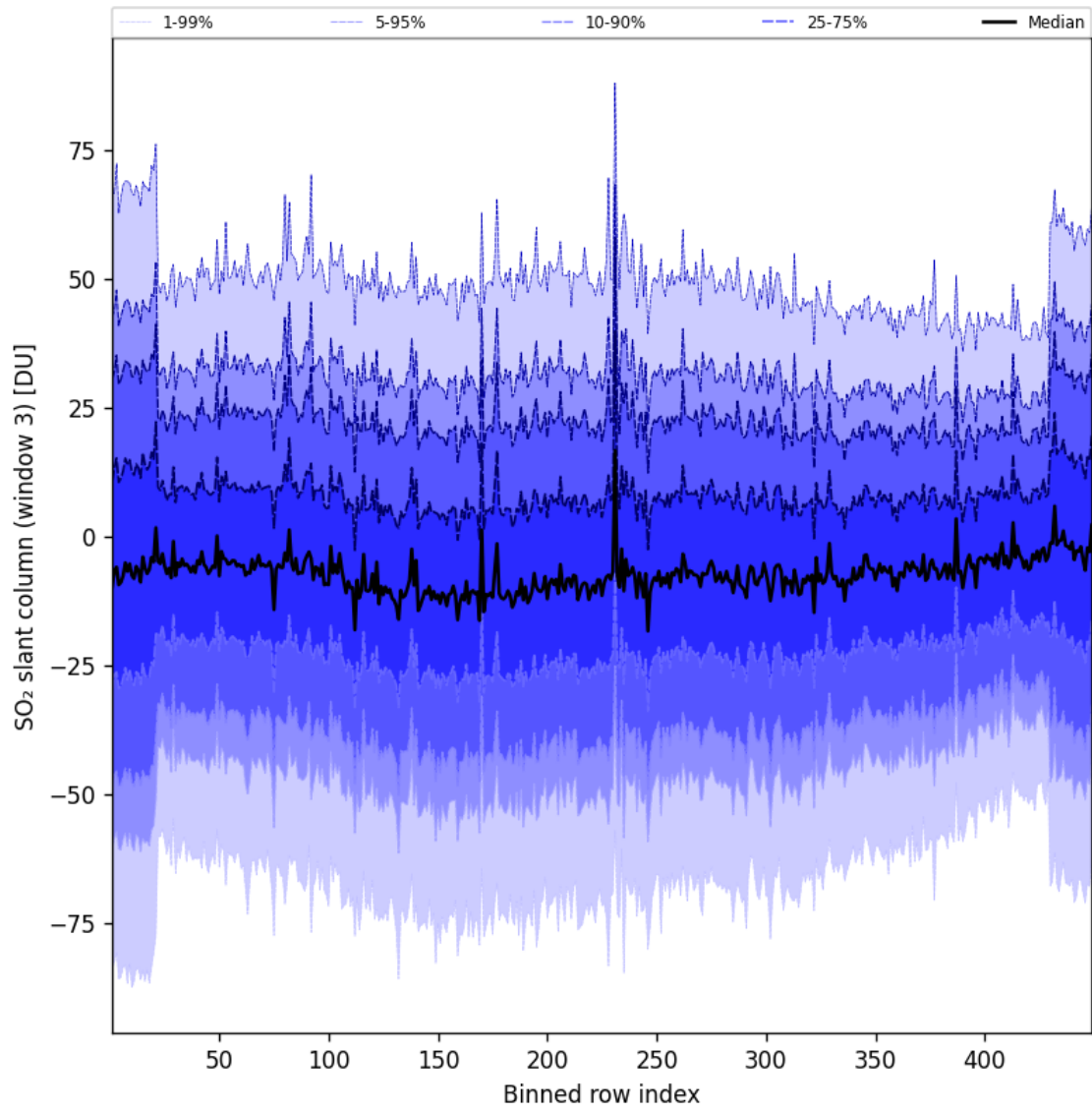


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-10-03 to 2025-10-04

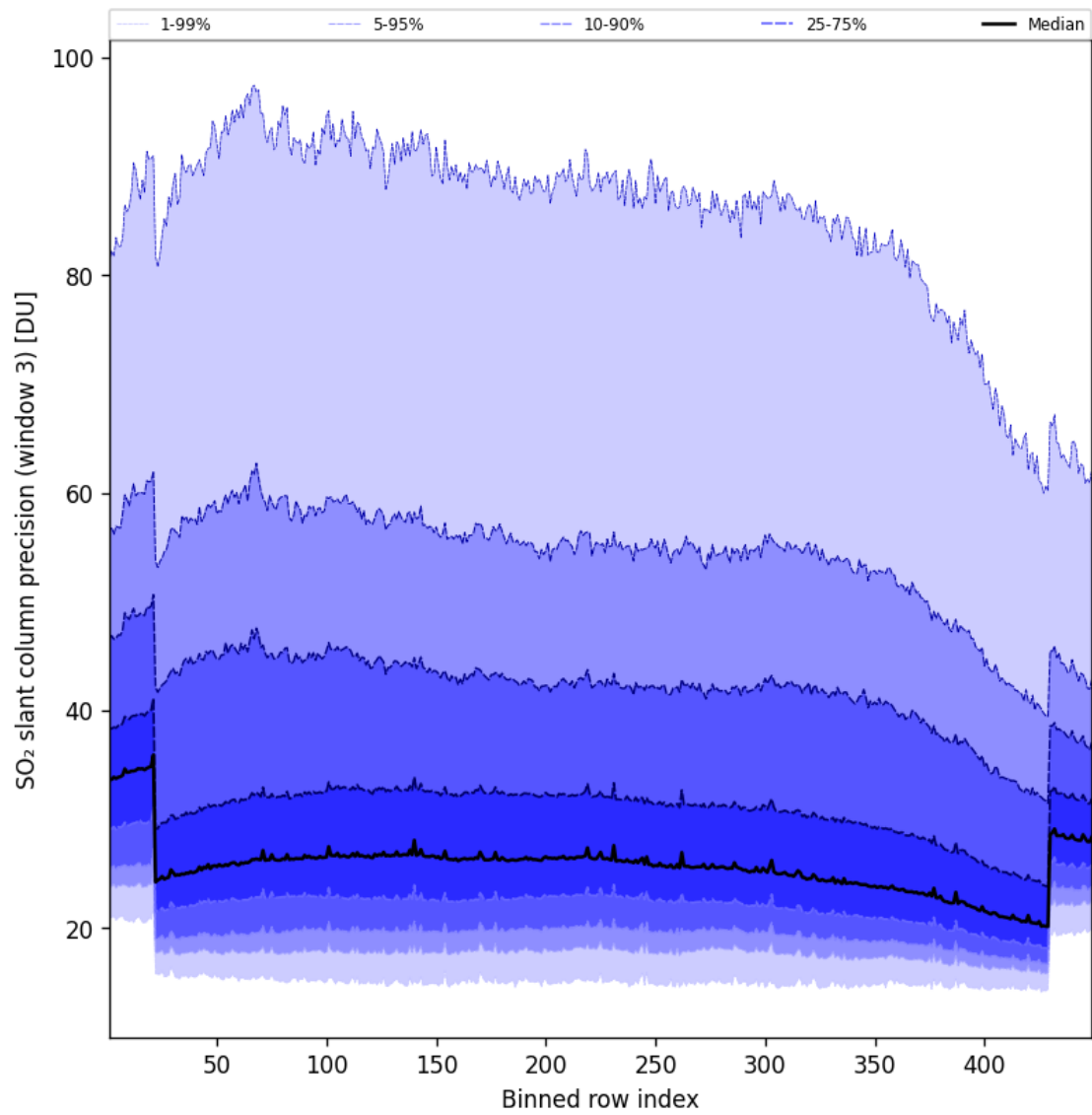


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-10-03 to 2025-10-04

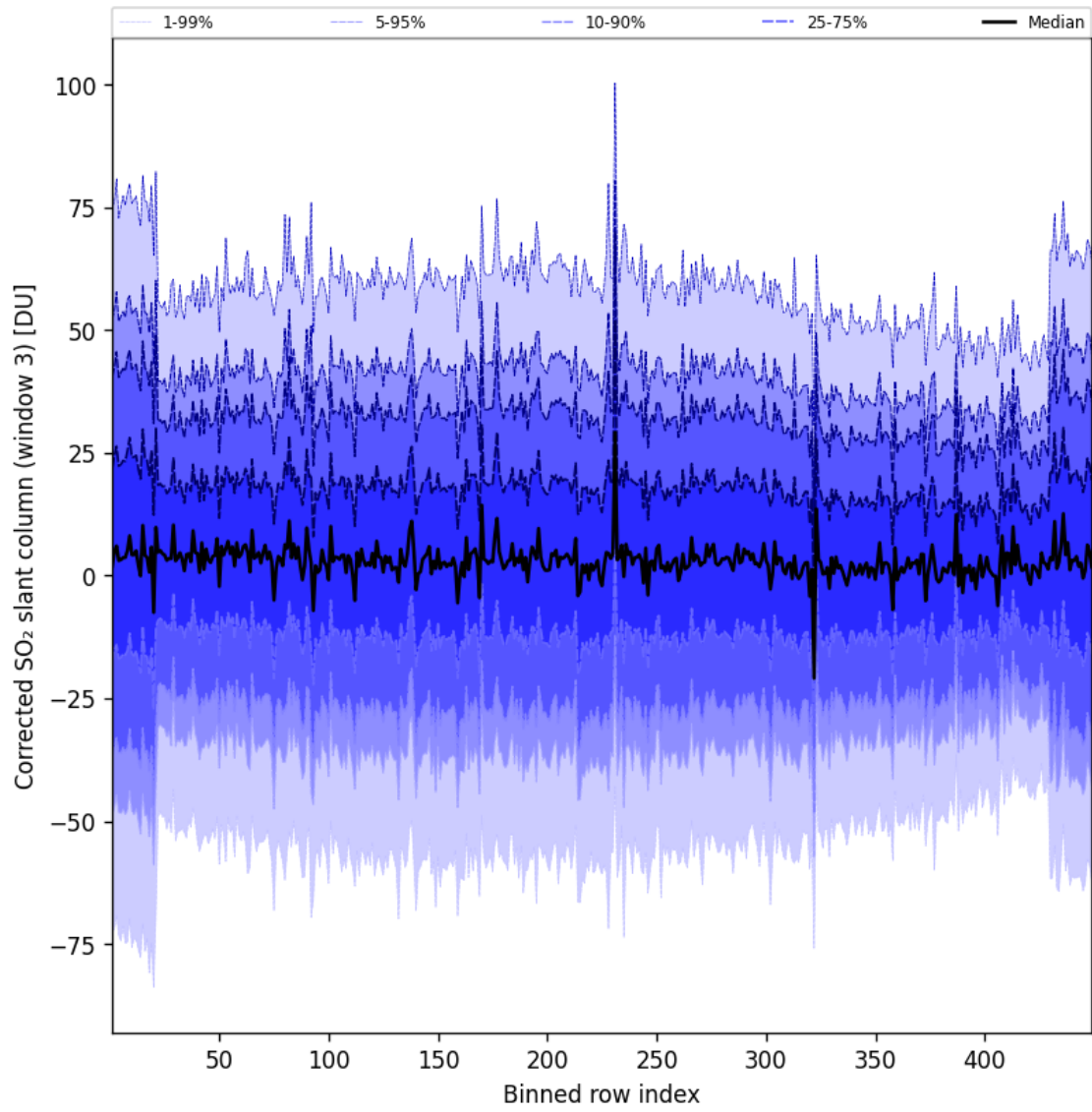


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-10-03 to 2025-10-04

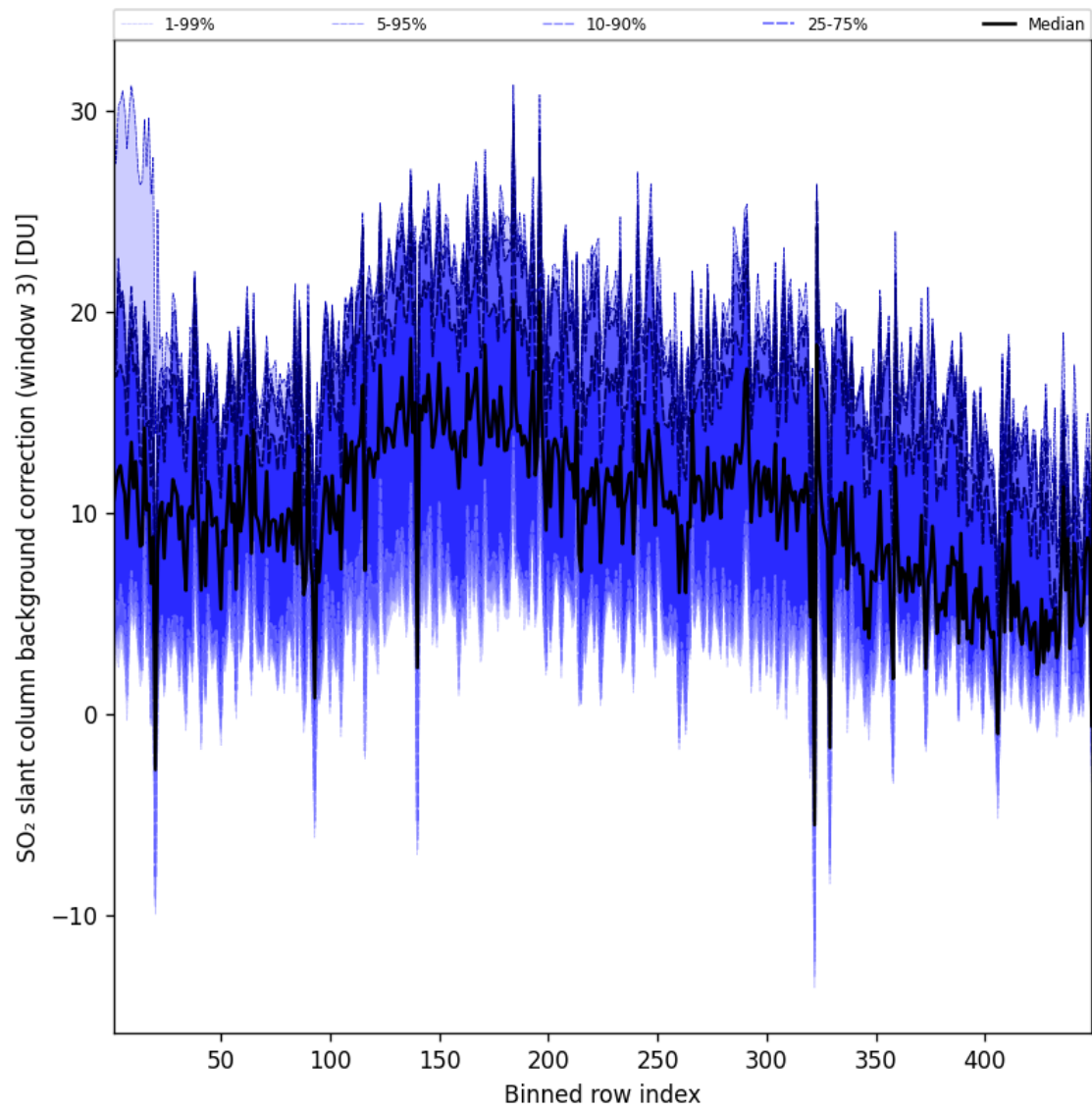


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-10-03 to 2025-10-04

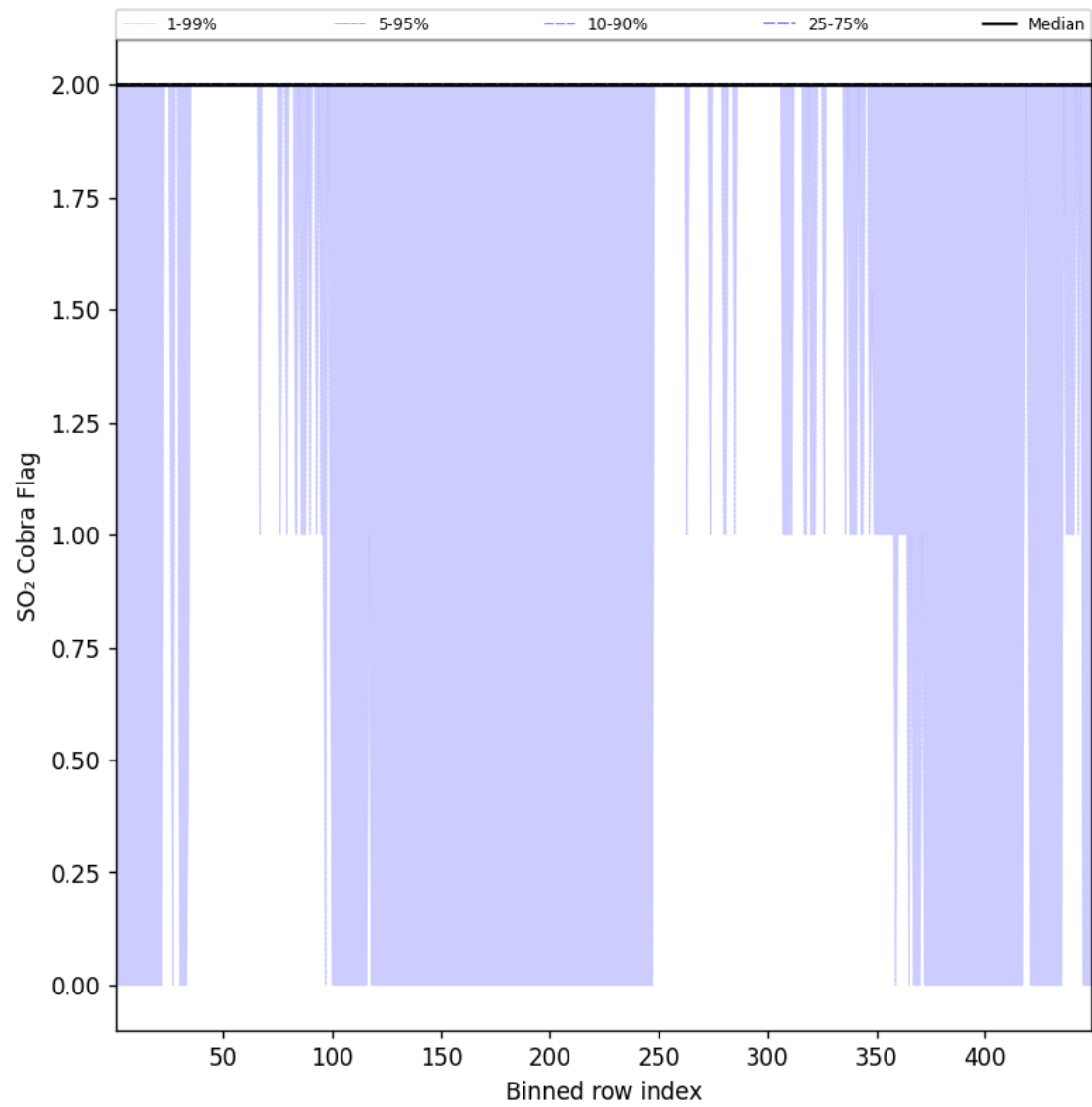


Figure 102: Along track statistics of "SO₂ Cobra Flag" for 2025-10-03 to 2025-10-04

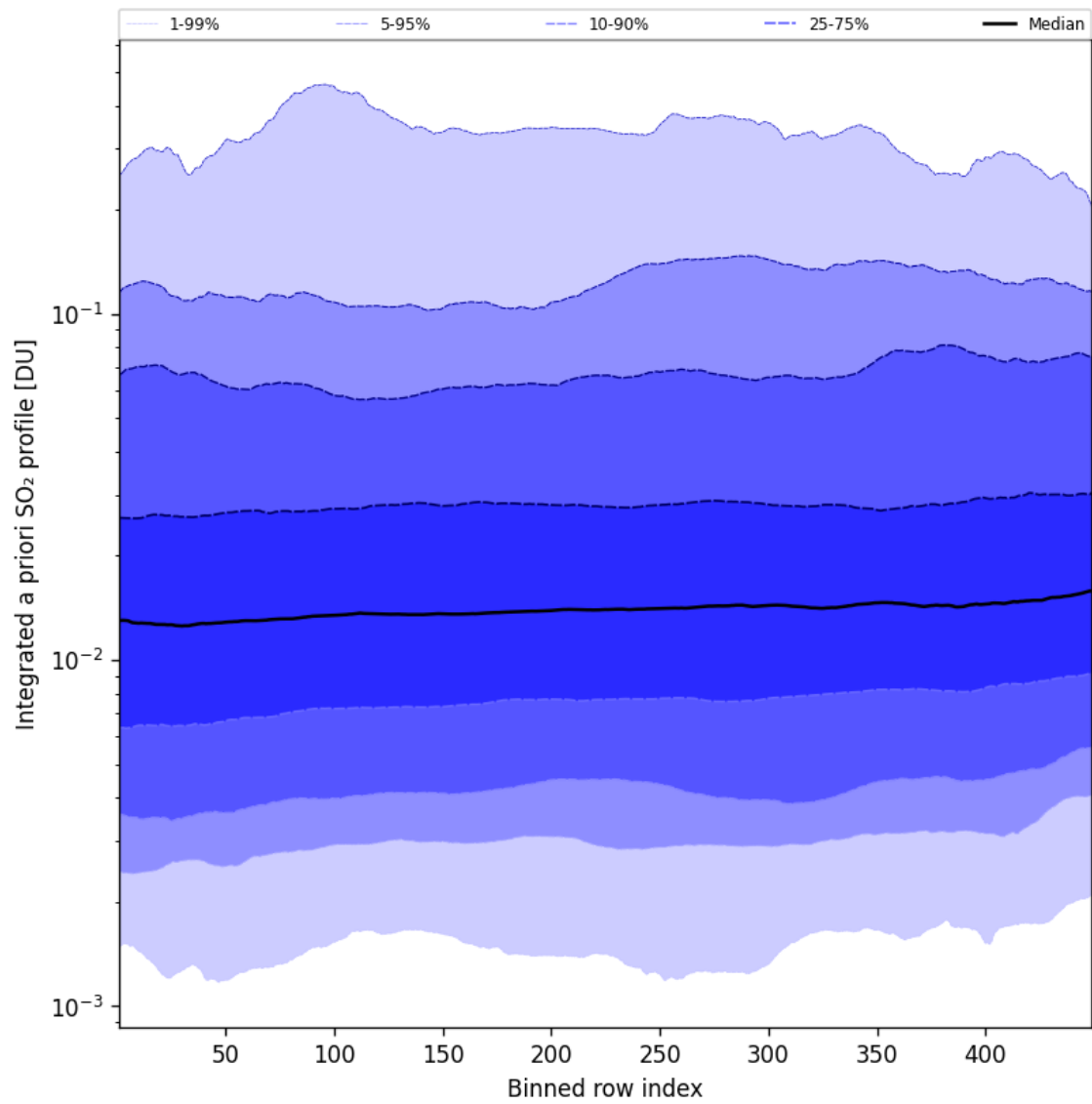


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-10-03 to 2025-10-04

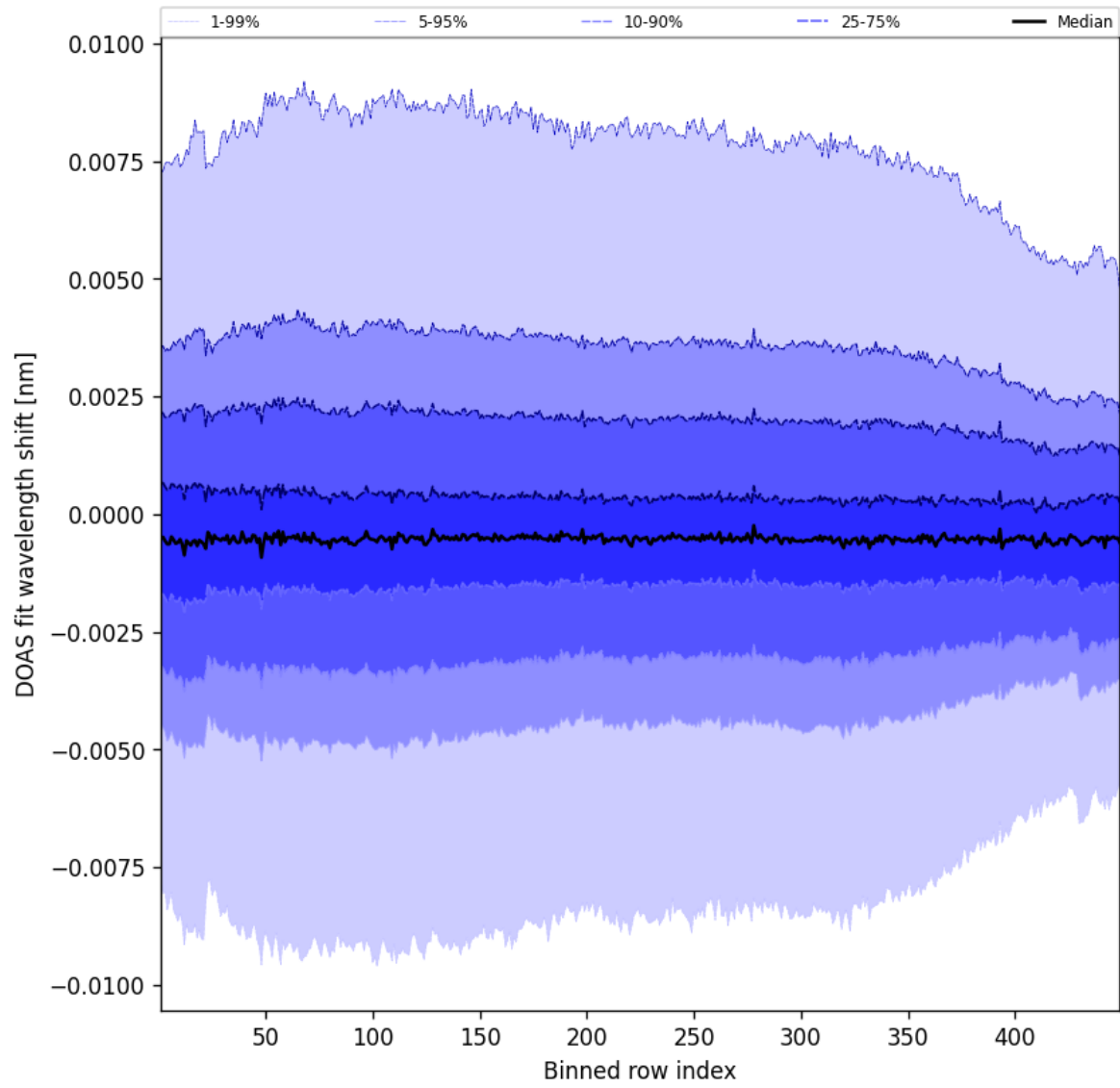


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-10-03 to 2025-10-04

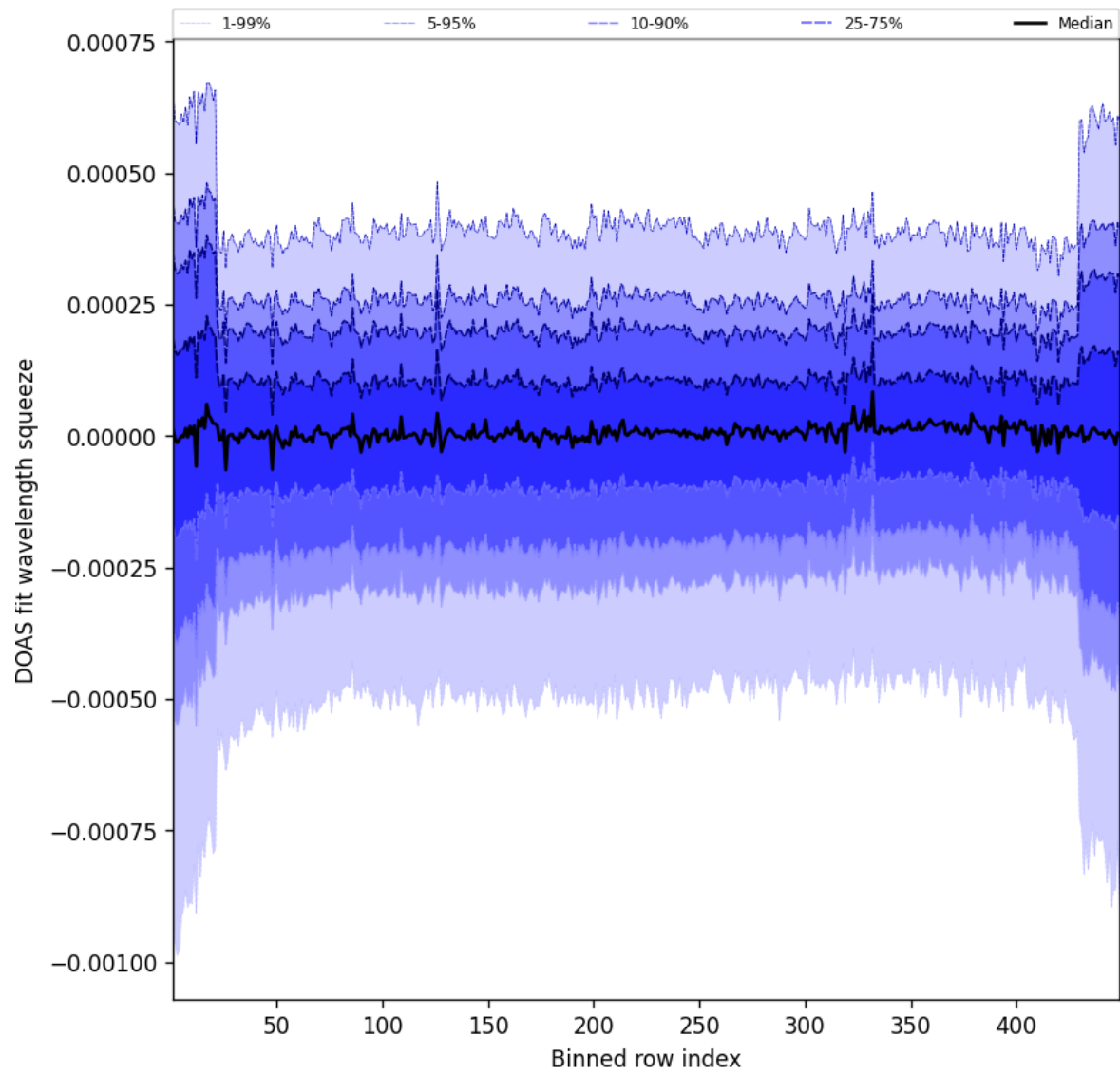


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-10-03 to 2025-10-04

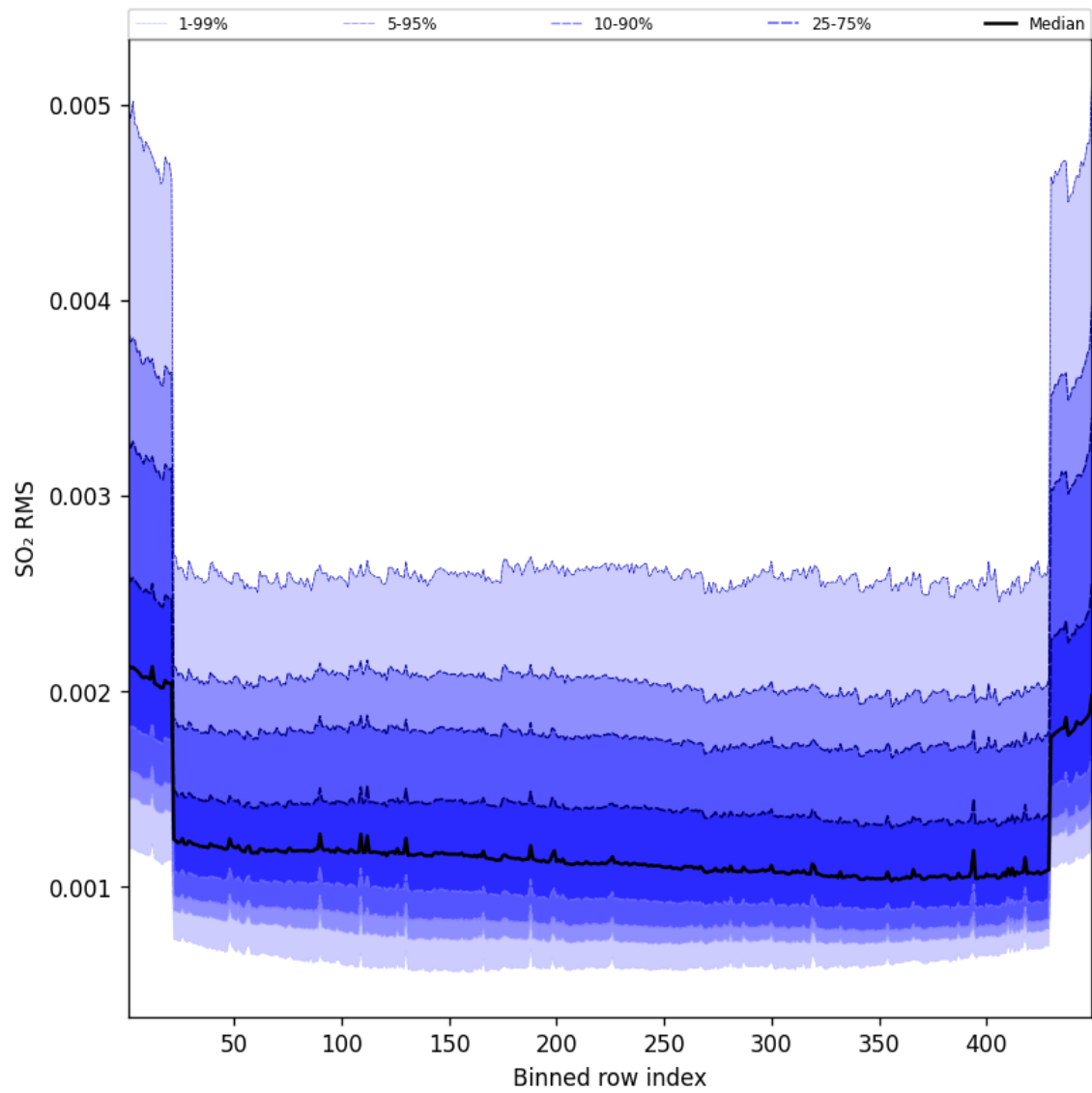


Figure 106: Along track statistics of “SO₂ RMS” for 2025-10-03 to 2025-10-04

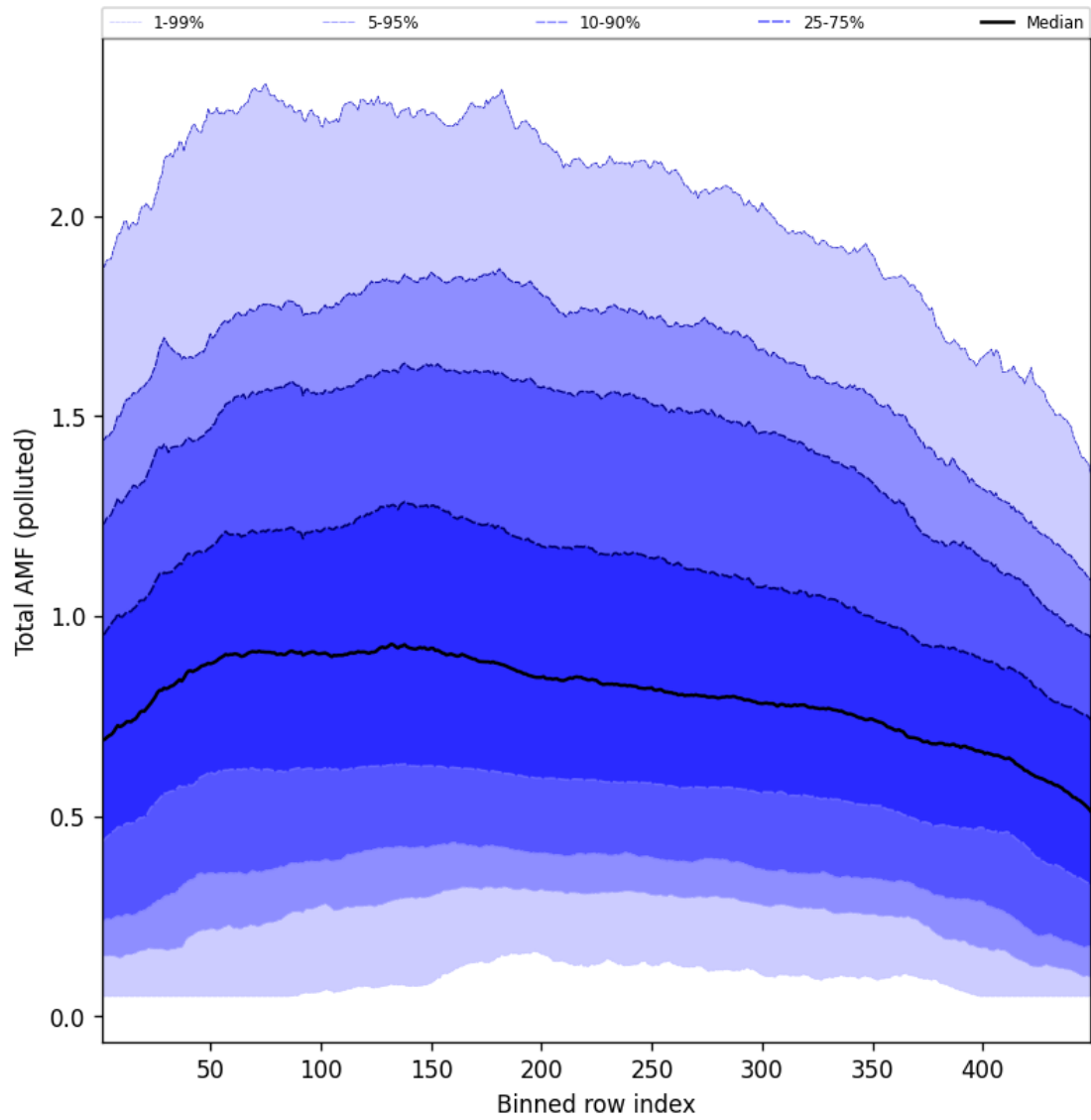


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-10-03 to 2025-10-04

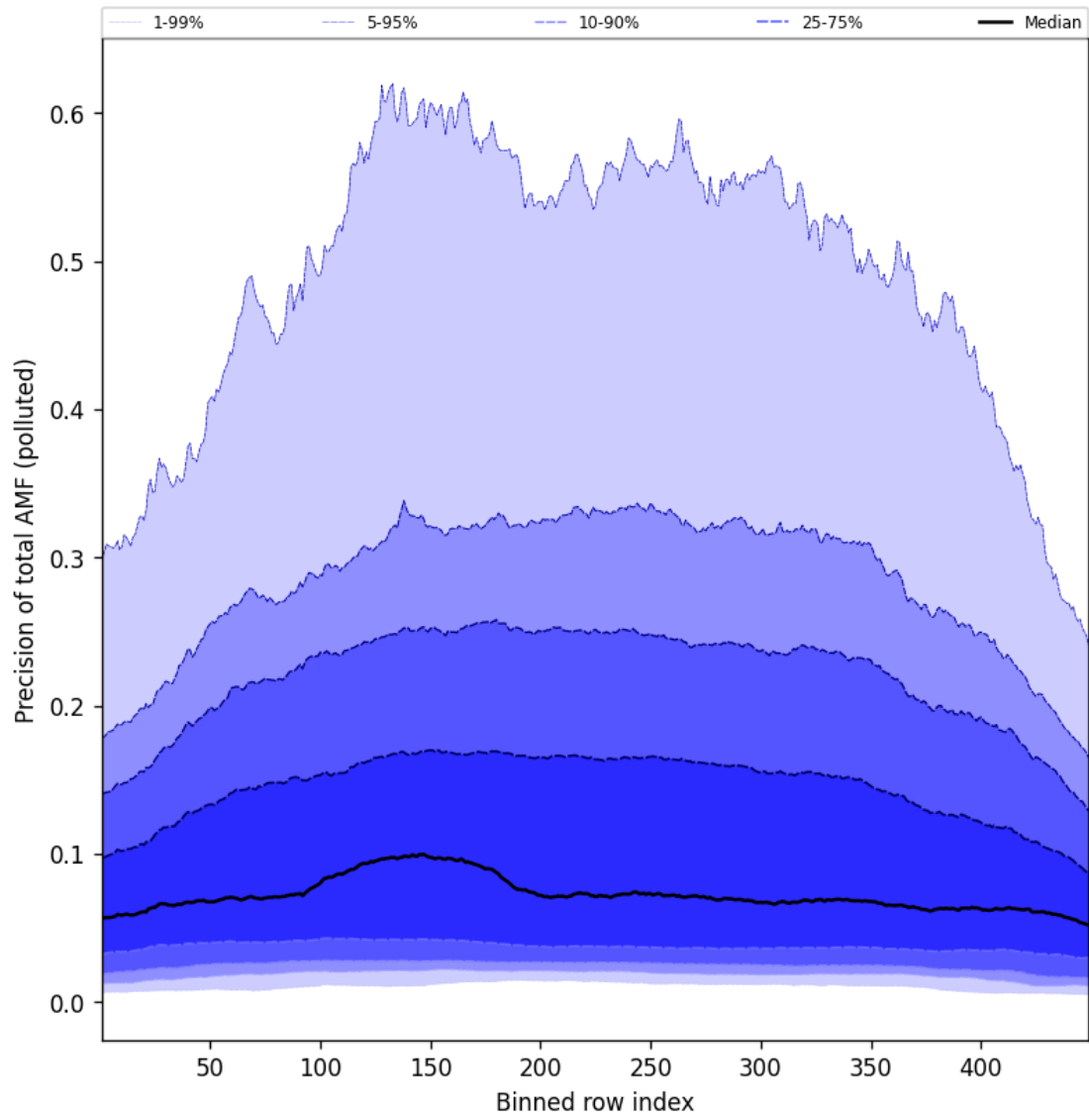


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-10-03 to 2025-10-04

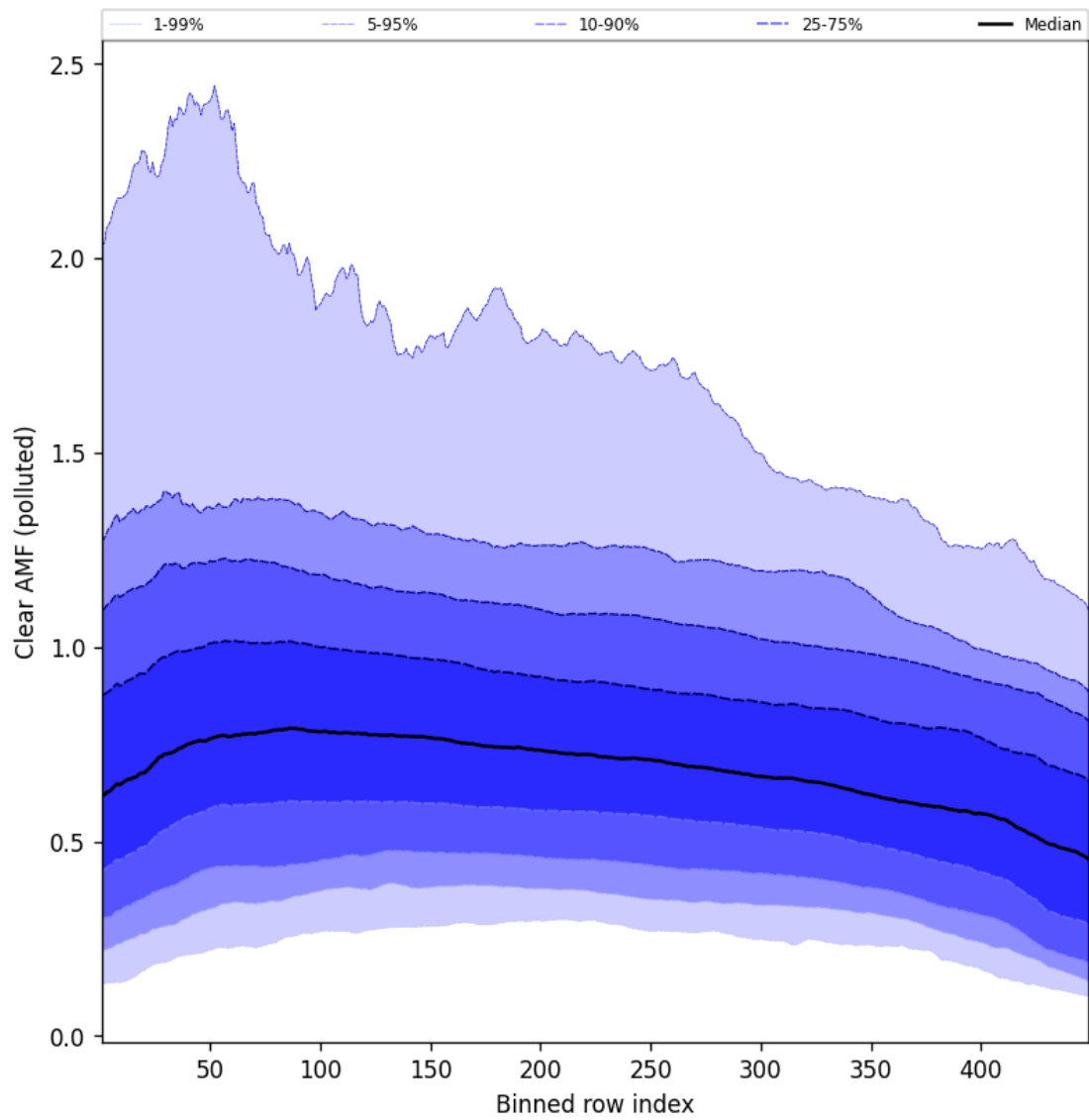


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-10-03 to 2025-10-04

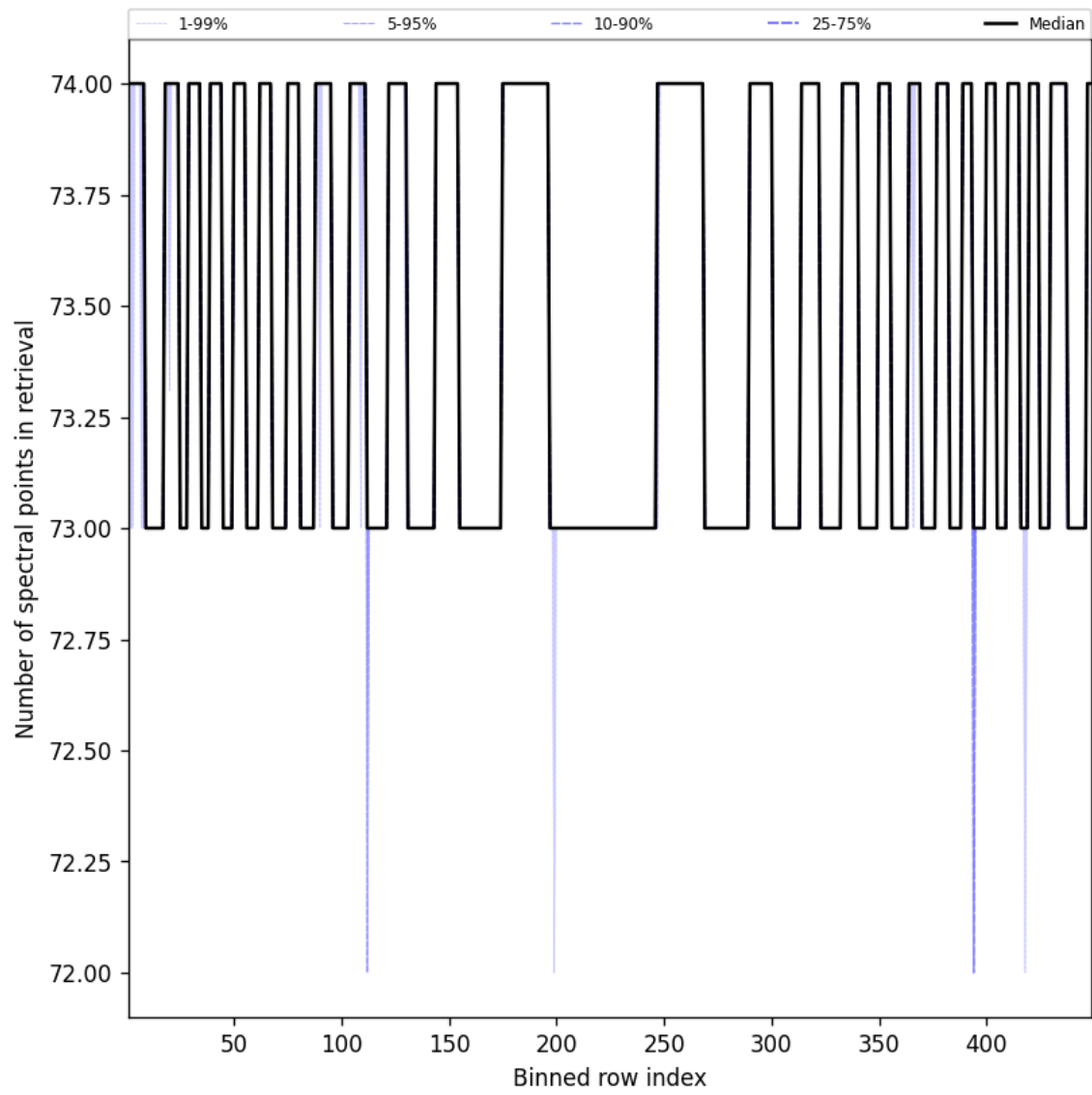


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-10-03 to 2025-10-04

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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