

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 $\frac{1}{2}$ 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]	0.630 ± 0.415	16878423	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.413 \pm 134.381) \times 10^{-2}$	16878423	0.263	0.440	8.382×10^{-3}	-121	547
sulfurdioxide total vertical column precision [DU]	0.596 ± 0.990	16878423	0.222	0.382	0.319	2.305×10^{-2}	41.2
sulfurdioxide slant column density corrected [DU]	$(1.425 \pm 36.858) \times 10^{-2}$	16878423	0.250	0.362	7.832×10^{-3}	-12.0	557
sulfurdioxide slant column density cobra [DU]	$(1.417 \pm 33.943) \times 10^{-2}$	16878423	0.250	0.362	7.832×10^{-3}	-12.0	48.1
sulfurdioxide slant column density cobra precision [DU]	0.287 ± 0.116	16878423	0.213	0.118	0.254	7.323×10^{-2}	16.8
sulfurdioxide slant column density window1 [DU]	0.116 ± 0.652	16878423	0.125	0.739	0.119	-72.8	96.7
sulfurdioxide slant column density window1 precision [DU]	0.287 ± 0.116	16878423	0.213	0.118	0.254	7.323×10^{-2}	16.8
sulfurdioxide slant column density corrected win1 [DU]	$(1.983 \pm 64.440) \times 10^{-2}$	16878423	2.500×10^{-2}	0.725	6.875×10^{-3}	-72.8	96.6
background so2 slant column offset window1 [DU]	$(-9.572 \pm 12.997) \times 10^{-2}$	16878423	-0.140	0.157	-0.112	-1.25	4.00
sulfurdioxide slant column density window2 [DU]	1.58 ± 8.99	16878423	1.25	11.4	1.46	-1.383×10^3	1.226×10^3
sulfurdioxide slant column density window2 precision [DU]	8.07 ± 2.25	16878423	7.43	2.56	7.70	2.29	479
sulfurdioxide slant column density corrected win2 [DU]	0.760 ± 8.768	16878423	0.750	11.1	0.731	-1.383×10^3	1.228×10^3
background so2 slant column offset window2 [DU]	-0.825 ± 2.162	16878423	1.25	3.32	-0.343	-13.4	7.12
sulfurdioxide slant column density window3 [DU]	-5.90 ± 23.98	16878423	-6.16	30.0	-5.97	-911	363
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 12.8	16878423	21.5	9.97	24.4	9.68	251
sulfurdioxide slant column density corrected win3 [DU]	-2.56 ± 23.15	16878423	-2.80	28.7	-2.46	-911	356
background so2 slant column offset window3 [DU]	3.33 ± 6.35	16878423	-2.80	10.3	2.80	-17.6	36.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	16878423	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.612 \pm 9.869) \times 10^{-2}$	16878423	1.539×10^{-2}	1.908×10^{-2}	1.514×10^{-2}	7.248×10^{-4}	3.20
fitted radiance shift [nm]	$(-5.614 \pm 25.191) \times 10^{-4}$	16878423	-5.000×10^{-4}	1.823×10^{-3}	-5.990×10^{-4}	-4.856×10^{-2}	4.375×10^{-2}
fitted radiance squeeze [1]	$(-9.149 \pm 179.918) \times 10^{-6}$	16878423	1.000×10^{-5}	2.093×10^{-4}	-3.009×10^{-6}	-1.553×10^{-2}	1.743×10^{-2}
fitted root mean square [1]	$(1.258 \pm 0.479) \times 10^{-3}$	16878423	9.750×10^{-4}	4.825×10^{-4}	1.131×10^{-3}	3.485×10^{-4}	6.867×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.906 ± 0.563	16878423	0.620	0.648	0.794	5.000×10^{-2}	3.51
sulfurdioxide total air mass factor polluted precision [1]	0.124 ± 0.121	16878423	3.500×10^{-2}	0.141	7.876×10^{-2}	2.500×10^{-3}	1.69
sulfurdioxide clear air mass factor polluted [1]	0.759 ± 0.448	16878423	0.580	0.430	0.669	4.098×10^{-2}	3.53
number of spectral points in retrieval [1]	73.4 ± 0.5	16878423	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	4.000×10^{-2}	9.000×10^{-2}	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-3.05	-0.982	-0.562	-0.365	-0.208	0.232	0.400	0.617	1.09	3.52
sulfurdioxide total vertical column precision [DU]	7.877×10^{-2}	0.112	0.140	0.168	0.205	0.587	0.835	1.16	1.88	5.11
sulfurdioxide slant column density corrected [DU]	-0.818	-0.482	-0.353	-0.265	-0.172	0.190	0.287	0.381	0.523	0.929
sulfurdioxide slant column density cobra [DU]	-0.818	-0.482	-0.353	-0.265	-0.172	0.190	0.287	0.381	0.523	0.929
sulfurdioxide slant column density cobra precision [DU]	0.144	0.171	0.185	0.197	0.211	0.330	0.379	0.428	0.505	0.709
sulfurdioxide slant column density window1 [DU]	-1.59	-0.904	-0.633	-0.449	-0.253	0.485	0.675	0.855	1.12	1.82
sulfurdioxide slant column density window1 precision [DU]	0.144	0.171	0.185	0.197	0.211	0.330	0.379	0.428	0.505	0.709
sulfurdioxide slant column density corrected win1 [DU]	-1.58	-0.956	-0.709	-0.537	-0.352	0.373	0.567	0.753	1.03	1.79
background so2 slant column offset window1 [DU]	-0.349	-0.277	-0.242	-0.213	-0.179	-2.289×10^{-2}	1.805×10^{-2}	5.816×10^{-2}	0.127	0.309
sulfurdioxide slant column density window2 [DU]	-19.5	-12.7	-9.42	-6.96	-4.18	7.21	10.1	12.7	16.3	23.9
sulfurdioxide slant column density window2 precision [DU]	4.41	5.23	5.71	6.10	6.58	9.14	10.0	10.9	12.2	14.7
sulfurdioxide slant column density corrected win2 [DU]	-20.3	-13.3	-10.0	-7.54	-4.79	6.27	9.06	11.6	15.0	22.1
background so2 slant column offset window2 [DU]	-6.16	-4.73	-3.93	-3.28	-2.40	0.920	1.24	1.47	1.78	3.20
sulfurdioxide slant column density window3 [DU]	-66.6	-44.8	-35.1	-28.3	-20.8	9.16	16.9	24.0	33.5	52.3
sulfurdioxide slant column density window3 precision [DU]	14.2	16.4	17.9	19.0	20.5	30.5	35.1	40.4	51.4	82.2
sulfurdioxide slant column density corrected win3 [DU]	-61.8	-40.5	-30.9	-24.1	-16.8	11.9	19.3	25.9	35.0	53.7
background so2 slant column offset window3 [DU]	-7.62	-5.51	-4.37	-3.41	-2.06	8.19	10.5	12.3	14.2	17.3
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]	2.730×10^{-3}	4.015×10^{-3}	5.274×10^{-3}	6.525×10^{-3}	8.463×10^{-3}	2.754×10^{-2}	4.204×10^{-2}	6.564×10^{-2}	0.122	0.402
fitted radiance shift [nm]	-8.019×10^{-3}	-4.166×10^{-3}	-2.861×10^{-3}	-2.152×10^{-3}	-1.531×10^{-3}	2.912×10^{-4}	9.642×10^{-4}	1.826×10^{-3}	3.338×10^{-3}	7.474×10^{-3}
fitted radiance squeeze [1]	-5.005×10^{-4}	-3.062×10^{-4}	-2.237×10^{-4}	-1.681×10^{-4}	-1.101×10^{-4}	9.920×10^{-5}	1.508×10^{-4}	1.983×10^{-4}	2.658×10^{-4}	4.236×10^{-4}
fitted root mean square [1]	6.181×10^{-4}	7.508×10^{-4}	8.226×10^{-4}	8.792×10^{-4}	9.491×10^{-4}	1.432×10^{-3}	1.647×10^{-3}	1.869×10^{-3}	2.190×10^{-3}	2.974×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.203×10^{-2}	0.197	0.302	0.392	0.515	1.16	1.43	1.70	2.04	2.71
sulfurdioxide total air mass factor polluted precision [1]	8.825×10^{-3}	1.577×10^{-2}	2.184×10^{-2}	2.798×10^{-2}	3.627×10^{-2}	0.177	0.234	0.284	0.360	0.545
sulfurdioxide clear air mass factor polluted [1]	0.181	0.275	0.344	0.404	0.486	0.916	1.03	1.17	1.54	2.79
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]	0.708 ± 0.397	6790770	0.690	1.000	0.0	1.000	0.310	1.000
sulfurdioxide total vertical column [DU]	$(5.442 \pm 185.484) \times 10^{-2}$	6790770	0.578	1.280×10^{-2}	-121	222	-0.270	0.308
sulfurdioxide total vertical column precision [DU]	0.846 ± 1.336	6790770	0.627	0.418	4.836×10^{-2}	41.2	0.250	0.877
sulfurdioxide slant column density corrected [DU]	$(1.823 \pm 36.614) \times 10^{-2}$	6790770	0.382	9.657×10^{-3}	-9.69	50.5	-0.180	0.202
sulfurdioxide slant column density cobra [DU]	$(1.819 \pm 36.372) \times 10^{-2}$	6790770	0.382	9.657×10^{-3}	-9.69	11.0	-0.180	0.202
sulfurdioxide slant column density cobra precision [DU]	0.305 ± 0.128	6790770	0.144	0.269	8.553×10^{-2}	4.08	0.218	0.362
sulfurdioxide slant column density window1 [DU]	0.174 ± 0.682	6790770	0.765	0.172	-14.4	12.2	-0.210	0.555
sulfurdioxide slant column density window1 precision [DU]	0.305 ± 0.128	6790770	0.144	0.269	8.553×10^{-2}	4.08	0.218	0.362
sulfurdioxide slant column density corrected win1 [DU]	$(3.619 \pm 68.123) \times 10^{-2}$	6790770	0.760	1.720×10^{-2}	-14.4	12.0	-0.356	0.404
background so2 slant column offset window1 [DU]	-0.138 ± 0.113	6790770	0.114	-0.140	-0.637	1.18	-0.204	-9.054×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.34 ± 9.66	6790770	12.2	1.06	-1.383×10^3	401	-4.93	7.30
sulfurdioxide slant column density window2 precision [DU]	8.76 ± 2.35	6790770	2.95	8.43	2.45	311	7.13	10.1
sulfurdioxide slant column density corrected win2 [DU]	0.863 ± 9.430	6790770	12.0	0.814	-1.383×10^3	398	-5.15	6.82
background so2 slant column offset window2 [DU]	-0.473 ± 2.075	6790770	2.45	0.117	-11.1	5.70	-1.48	0.969
sulfurdioxide slant column density window3 [DU]	-6.72 ± 26.32	6790770	33.0	-5.93	-204	217	-22.7	10.2
sulfurdioxide slant column density window3 precision [DU]	30.3 ± 13.3	6790770	10.9	27.1	10.4	246	22.7	33.7
sulfurdioxide slant column density corrected win3 [DU]	-3.09 ± 25.67	6790770	32.2	-2.70	-197	219	-18.9	13.3
background so2 slant column offset window3 [DU]	3.63 ± 5.70	6790770	9.09	2.42	-12.5	24.4	-0.967	8.13
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	6790770	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.520 \pm 14.523) \times 10^{-2}$	6790770	4.582×10^{-2}	2.421×10^{-2}	7.248×10^{-4}	3.16	1.355×10^{-2}	5.937×10^{-2}
fitted radiance shift [nm]	$(-2.073 \pm 26.526) \times 10^{-4}$	6790770	1.712×10^{-3}	-2.538×10^{-4}	-3.624×10^{-2}	4.314×10^{-2}	-1.090×10^{-3}	6.218×10^{-4}
fitted radiance squeeze [1]	$(2.722 \pm 17.810) \times 10^{-5}$	6790770	2.106×10^{-4}	2.484×10^{-5}	-1.360×10^{-2}	1.681×10^{-3}	-7.924×10^{-5}	1.313×10^{-4}
fitted root mean square [1]	$(1.343 \pm 0.524) \times 10^{-3}$	6790770	5.935×10^{-4}	1.202×10^{-3}	3.539×10^{-4}	3.621×10^{-2}	9.838×10^{-4}	1.577×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.706 ± 0.399	6790770	0.559	0.669	5.000×10^{-2}	2.92	0.392	0.952
sulfurdioxide total air mass factor polluted precision [1]	$(8.778 \pm 10.901) \times 10^{-2}$	6790770	7.933×10^{-2}	4.974×10^{-2}	2.500×10^{-3}	1.69	2.845×10^{-2}	0.108
sulfurdioxide clear air mass factor polluted [1]	0.652 ± 0.282	6790770	0.468	0.637	4.098×10^{-2}	2.03	0.410	0.878
number of spectral points in retrieval [1]	73.5 ± 0.5	6790770	1.000	73.0	71.0	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]	0.577 ± 0.418	10087653	0.850	0.490	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	$(2.048 \pm 83.963) \times 10^{-2}$	10087653	0.373	6.401×10^{-3}	-83.7	547	-0.178	0.195
sulfurdioxide total vertical column precision [DU]	0.428 ± 0.608	10087653	0.285	0.277	2.305×10^{-2}	40.9	0.180	0.464
sulfurdioxide slant column density corrected [DU]	$(1.157 \pm 37.019) \times 10^{-2}$	10087653	0.350	6.711×10^{-3}	-12.0	557	-0.167	0.183
sulfurdioxide slant column density cobra [DU]	$(1.147 \pm 32.202) \times 10^{-2}$	10087653	0.350	6.711×10^{-3}	-12.0	48.1	-0.167	0.183
sulfurdioxide slant column density cobra precision [DU]	0.274 ± 0.106	10087653	0.102	0.245	7.323×10^{-2}	16.8	0.208	0.310
sulfurdioxide slant column density window1 [DU]	$(7.616 \pm 62.823) \times 10^{-2}$	10087653	0.719	8.514×10^{-2}	-72.8	96.7	-0.280	0.439
sulfurdioxide slant column density window1 precision [DU]	0.274 ± 0.106	10087653	0.102	0.245	7.323×10^{-2}	16.8	0.208	0.310
sulfurdioxide slant column density corrected win1 [DU]	$(8.821 \pm 618.119) \times 10^{-3}$	10087653	0.703	2.993×10^{-4}	-72.8	96.6	-0.350	0.353
background so2 slant column offset window1 [DU]	$(-6.734 \pm 13.309) \times 10^{-2}$	10087653	0.167	-7.487×10^{-2}	-1.25	4.00	-0.160	6.931×10^{-3}
sulfurdioxide slant column density window2 [DU]	1.75 ± 8.51	10087653	10.9	1.71	-1.136×10^3	1.226×10^3	-3.70	7.16
sulfurdioxide slant column density window2 precision [DU]	7.60 ± 2.05	10087653	2.15	7.31	2.29	479	6.34	8.49
sulfurdioxide slant column density corrected win2 [DU]	0.690 ± 8.292	10087653	10.5	0.682	-1.135×10^3	1.228×10^3	-4.58	5.94
background so2 slant column offset window2 [DU]	-1.06 ± 2.19	10087653	3.64	-0.904	-13.4	7.12	-2.77	0.868
sulfurdioxide slant column density window3 [DU]	-5.34 ± 22.26	10087653	28.2	-6.00	-911	363	-19.7	8.45
sulfurdioxide slant column density window3 precision [DU]	26.1 ± 12.1	10087653	8.03	22.8	9.68	251	19.7	27.7
sulfurdioxide slant column density corrected win3 [DU]	-2.21 ± 21.28	10087653	26.6	-2.33	-911	356	-15.5	11.1
background so2 slant column offset window3 [DU]	3.13 ± 6.75	10087653	11.2	3.11	-17.6	36.5	-2.98	8.25
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	10087653	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.654 \pm 3.382) \times 10^{-2}$	10087653	1.241×10^{-2}	1.127×10^{-2}	7.657×10^{-4}	3.20	6.643×10^{-3}	1.905×10^{-2}
fitted radiance shift [nm]	$(-7.997 \pm 23.958) \times 10^{-4}$	10087653	1.752×10^{-3}	-8.402×10^{-4}	-4.856×10^{-2}	4.375×10^{-2}	-1.742×10^{-3}	9.966×10^{-6}
fitted radiance squeeze [1]	$(-3.363 \pm 17.697) \times 10^{-5}$	10087653	2.075×10^{-4}	-2.134×10^{-5}	-1.553×10^{-2}	1.743×10^{-2}	-1.300×10^{-4}	7.753×10^{-5}
fitted root mean square [1]	$(1.202 \pm 0.438) \times 10^{-3}$	10087653	4.146×10^{-4}	1.093×10^{-3}	3.485×10^{-4}	6.867×10^{-2}	9.314×10^{-4}	1.346×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.04 ± 0.61	10087653	0.783	0.889	5.000×10^{-2}	3.51	0.594	1.38
sulfurdioxide total air mass factor polluted precision [1]	0.148 ± 0.123	10087653	0.172	0.117	3.671×10^{-3}	1.32	4.510×10^{-2}	0.217
sulfurdioxide clear air mass factor polluted [1]	0.831 ± 0.518	10087653	0.427	0.687	7.108×10^{-2}	3.53	0.519	0.946
number of spectral points in retrieval [1]	73.4 ± 0.5	10087653	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]	0.643 ± 0.412	12237709	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(2.592 \pm 113.256) \times 10^{-2}$	12237709	0.419	8.124×10^{-3}	-83.7	547	-0.199	0.220
sulfurdioxide total vertical column precision [DU]	0.524 ± 0.847	12237709	0.315	0.302	4.628×10^{-2}	40.9	0.205	0.520
sulfurdioxide slant column density corrected [DU]	$(1.248 \pm 35.464) \times 10^{-2}$	12237709	0.351	7.472×10^{-3}	-8.77	557	-0.167	0.184
sulfurdioxide slant column density cobra [DU]	$(1.239 \pm 31.355) \times 10^{-2}$	12237709	0.351	7.472×10^{-3}	-8.77	30.2	-0.167	0.184
sulfurdioxide slant column density cobra precision [DU]	0.276 ± 0.107	12237709	0.102	0.246	8.553×10^{-2}	11.4	0.209	0.310
sulfurdioxide slant column density window1 [DU]	0.121 ± 0.614	12237709	0.710	0.125	-72.8	56.1	-0.233	0.477
sulfurdioxide slant column density window1 precision [DU]	0.276 ± 0.107	12237709	0.102	0.246	8.553×10^{-2}	11.4	0.209	0.310
sulfurdioxide slant column density corrected win1 [DU]	$(2.553 \pm 60.779) \times 10^{-2}$	12237709	0.698	1.436×10^{-2}	-72.8	56.1	-0.332	0.366
background so2 slant column offset window1 [DU]	$(-9.555 \pm 12.510) \times 10^{-2}$	12237709	0.159	-0.109	-0.875	4.00	-0.178	-1.891×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.50 ± 8.64	12237709	11.1	1.42	-1.383×10^3	1.044×10^3	-4.08	6.98
sulfurdioxide slant column density window2 precision [DU]	7.81 ± 2.03	12237709	2.32	7.50	2.31	474	6.46	8.78
sulfurdioxide slant column density corrected win2 [DU]	0.704 ± 8.432	12237709	10.8	0.691	-1.383×10^3	1.042×10^3	-4.69	6.07
background so2 slant column offset window2 [DU]	-0.796 ± 2.119	12237709	3.34	-0.352	-11.1	5.95	-2.40	0.941
sulfurdioxide slant column density window3 [DU]	-3.25 ± 22.99	12237709	29.2	-3.74	-911	363	-18.0	11.2
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 12.1	12237709	8.75	23.7	9.68	243	20.3	29.0
sulfurdioxide slant column density corrected win3 [DU]	-0.462 ± 22.063	12237709	27.8	-0.760	-911	356	-14.5	13.4
background so2 slant column offset window3 [DU]	2.79 ± 5.93	12237709	9.46	2.39	-17.3	24.8	-2.20	7.26
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.14	12237709	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.264 \pm 5.270) \times 10^{-2}$	12237709	1.425×10^{-2}	1.414×10^{-2}	1.472×10^{-3}	3.20	8.503×10^{-3}	2.276×10^{-2}
fitted radiance shift [nm]	$(-5.658 \pm 24.226) \times 10^{-4}$	12237709	1.851×10^{-3}	-5.834×10^{-4}	-3.769×10^{-2}	4.375×10^{-2}	-1.542×10^{-3}	3.084×10^{-4}
fitted radiance squeeze [1]	$(-7.712 \pm 170.757) \times 10^{-6}$	12237709	2.009×10^{-4}	-1.068×10^{-6}	-1.553×10^{-2}	1.512×10^{-2}	-1.039×10^{-4}	9.694×10^{-5}
fitted root mean square [1]	$(1.207 \pm 0.440) \times 10^{-3}$	12237709	4.154×10^{-4}	1.095×10^{-3}	3.485×10^{-4}	4.659×10^{-2}	9.334×10^{-4}	1.349×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.897 ± 0.484	12237709	0.582	0.822	5.000×10^{-2}	3.06	0.562	1.14
sulfurdioxide total air mass factor polluted precision [1]	0.120 ± 0.108	12237709	0.134	7.992×10^{-2}	3.419×10^{-3}	1.03	4.007×10^{-2}	0.174
sulfurdioxide clear air mass factor polluted [1]	0.723 ± 0.297	12237709	0.385	0.678	7.108×10^{-2}	3.08	0.515	0.900
number of spectral points in retrieval [1]	73.4 ± 0.5	12237709	1.000	73.0	70.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.599 ± 0.420	3904344	0.840	1.000	0.0	1.000	0.160	1.000
sulfurdioxide total vertical column [DU]	$(4.620 \pm 155.933) \times 10^{-2}$	3904344	0.484	7.973×10^{-3}	-121	150	-0.227	0.258
sulfurdioxide total vertical column precision [DU]	0.711 ± 1.129	3904344	0.577	0.379	2.305×10^{-2}	36.4	0.193	0.770
sulfurdioxide slant column density corrected [DU]	$(1.724 \pm 39.649) \times 10^{-2}$	3904344	0.393	8.190×10^{-3}	-12.0	49.1	-0.187	0.206
sulfurdioxide slant column density cobra [DU]	$(1.720 \pm 39.385) \times 10^{-2}$	3904344	0.393	8.190×10^{-3}	-12.0	48.1	-0.187	0.206
sulfurdioxide slant column density cobra precision [DU]	0.312 ± 0.130	3904344	0.147	0.282	7.323×10^{-2}	16.8	0.222	0.369
sulfurdioxide slant column density window1 [DU]	$(9.046 \pm 73.639) \times 10^{-2}$	3904344	0.823	9.198×10^{-2}	-62.9	96.7	-0.323	0.500
sulfurdioxide slant column density window1 precision [DU]	0.312 ± 0.130	3904344	0.147	0.282	7.323×10^{-2}	16.8	0.222	0.369
sulfurdioxide slant column density corrected win1 [DU]	$(-4.770 \pm 723.449) \times 10^{-3}$	3904344	0.800	-2.389×10^{-2}	-62.9	96.6	-0.418	0.382
background so2 slant column offset window1 [DU]	$(-9.523 \pm 14.423) \times 10^{-2}$	3904344	0.148	-0.118	-1.25	2.98	-0.183	-3.469×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.74 ± 9.77	3904344	12.3	1.57	-1.136×10^3	756	-4.48	7.80
sulfurdioxide slant column density window2 precision [DU]	8.70 ± 2.58	3904344	3.05	8.31	2.29	479	6.98	10.0
sulfurdioxide slant column density corrected win2 [DU]	0.920 ± 9.517	3904344	11.9	0.863	-1.135×10^3	756	-5.05	6.85
background so2 slant column offset window2 [DU]	-0.824 ± 2.213	3904344	3.12	-0.266	-13.4	7.12	-2.25	0.871
sulfurdioxide slant column density window3 [DU]	-13.1 ± 24.9	3904344	30.7	-12.6	-423	217	-28.1	2.62
sulfurdioxide slant column density window3 precision [DU]	29.8 ± 14.1	3904344	11.9	26.6	10.4	246	21.2	33.1
sulfurdioxide slant column density corrected win3 [DU]	-8.32 ± 24.81	3904344	30.4	-7.55	-428	219	-23.1	7.28
background so2 slant column offset window3 [DU]	4.74 ± 7.20	3904344	12.8	4.14	-17.6	36.5	-1.66	11.2
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.33	3904344	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.645 \pm 15.366) \times 10^{-2}$	3904344	5.340×10^{-2}	1.963×10^{-2}	7.248×10^{-4}	3.16	7.466×10^{-3}	6.087×10^{-2}
fitted radiance shift [nm]	$(-5.914 \pm 27.279) \times 10^{-4}$	3904344	1.683×10^{-3}	-6.816×10^{-4}	-4.856×10^{-2}	3.702×10^{-2}	-1.521×10^{-3}	1.614×10^{-4}
fitted radiance squeeze [1]	$(-1.970 \pm 20.164) \times 10^{-5}$	3904344	2.349×10^{-4}	-1.457×10^{-5}	-7.480×10^{-3}	1.743×10^{-2}	-1.345×10^{-4}	1.004×10^{-4}
fitted root mean square [1]	$(1.381 \pm 0.528) \times 10^{-3}$	3904344	6.091×10^{-4}	1.260×10^{-3}	3.539×10^{-4}	6.867×10^{-2}	1.018×10^{-3}	1.627×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.985 ± 0.758	3904344	0.944	0.722	5.000×10^{-2}	3.51	0.418	1.36
sulfurdioxide total air mass factor polluted precision [1]	0.139 ± 0.154	3904344	0.168	8.110×10^{-2}	2.500×10^{-3}	1.69	2.858×10^{-2}	0.196
sulfurdioxide clear air mass factor polluted [1]	0.907 ± 0.732	3904344	0.674	0.658	4.402×10^{-2}	3.53	0.406	1.08
number of spectral points in retrieval [1]	73.4 ± 0.5	3904344	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

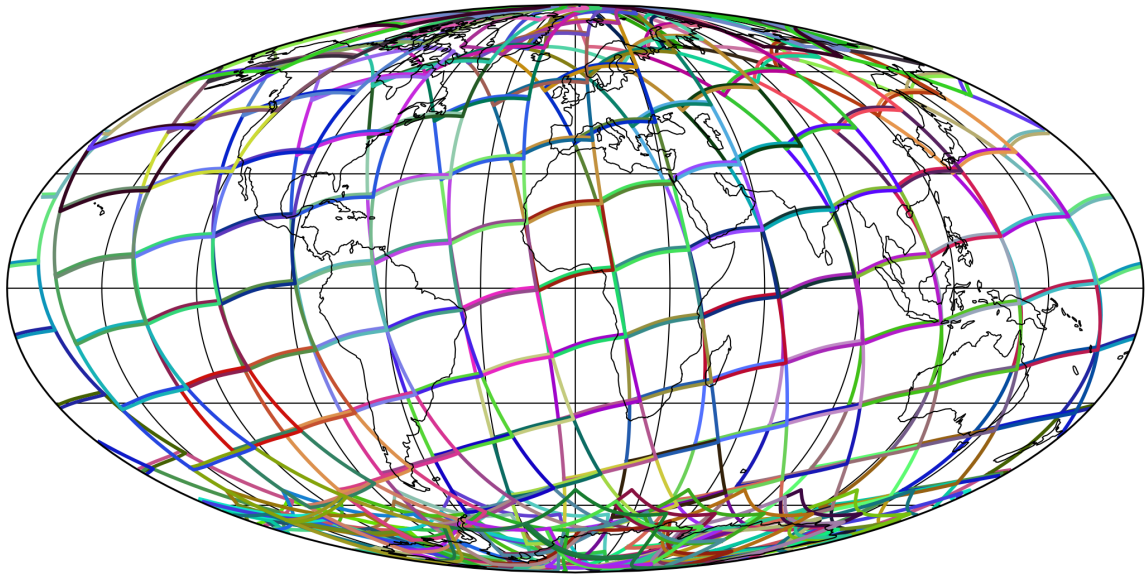


Figure 1: Outline of the granules.

4 Input data monitoring

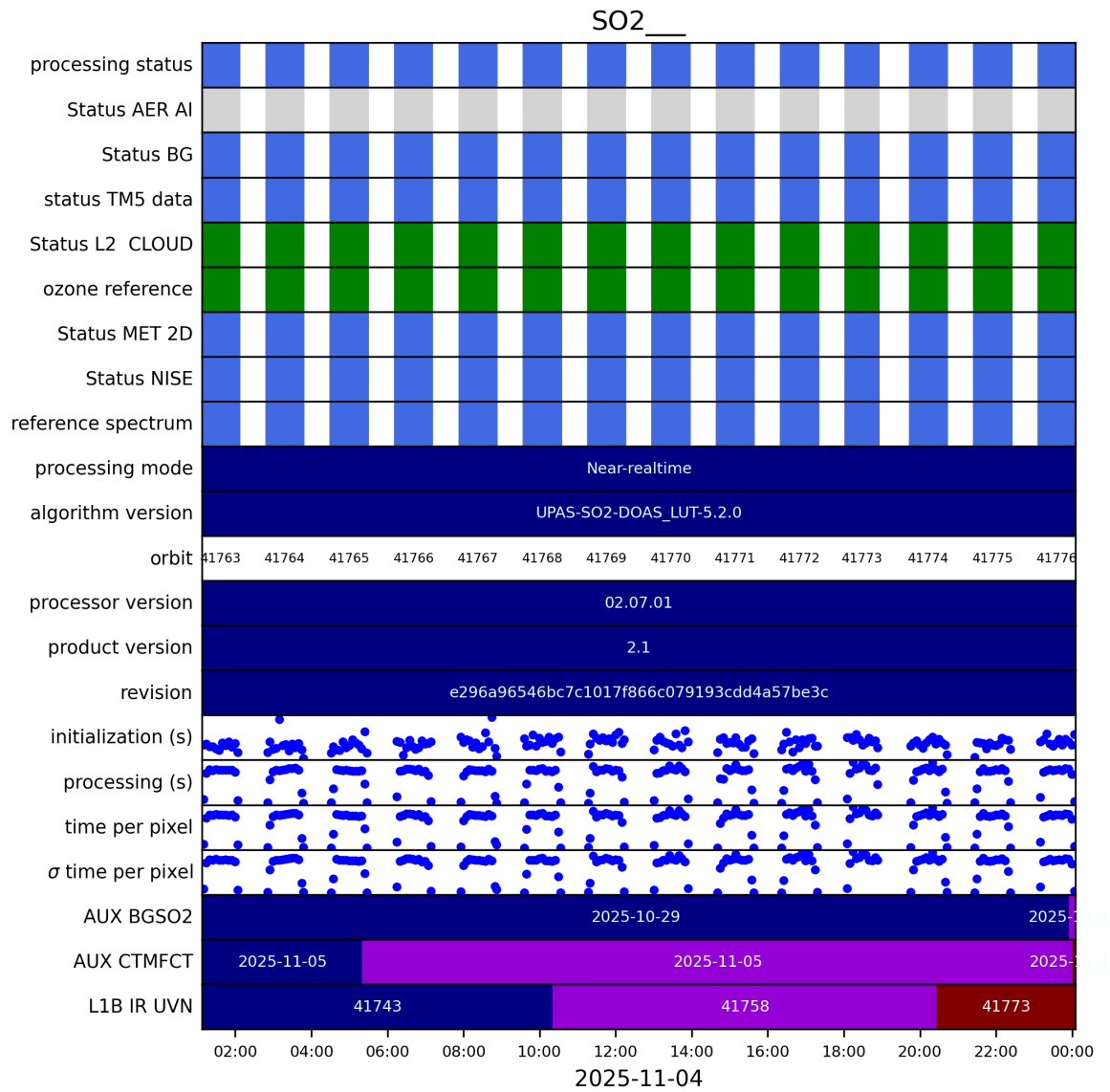


Figure 2: Input data per granule

5 Warnings and errors

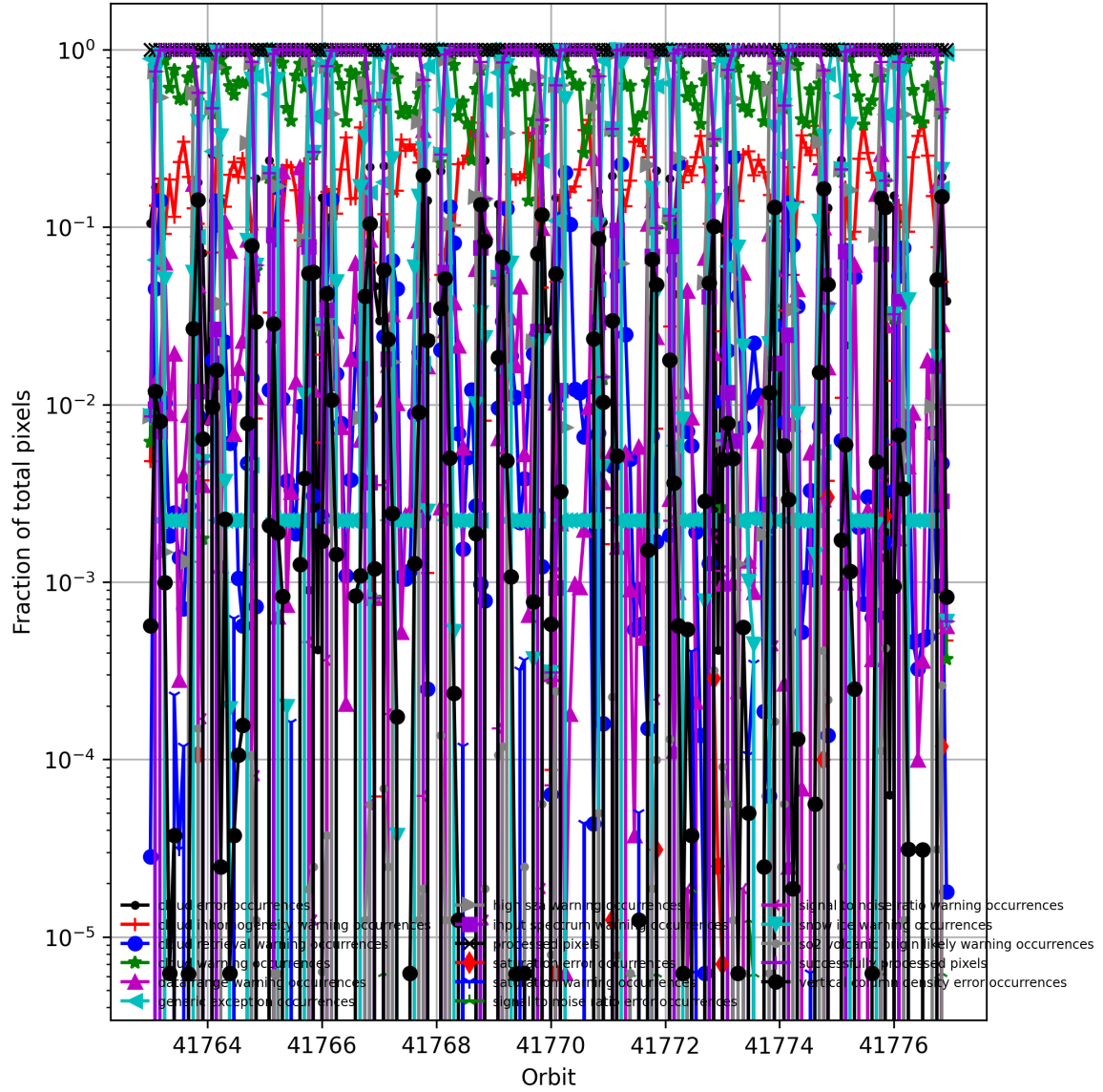


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

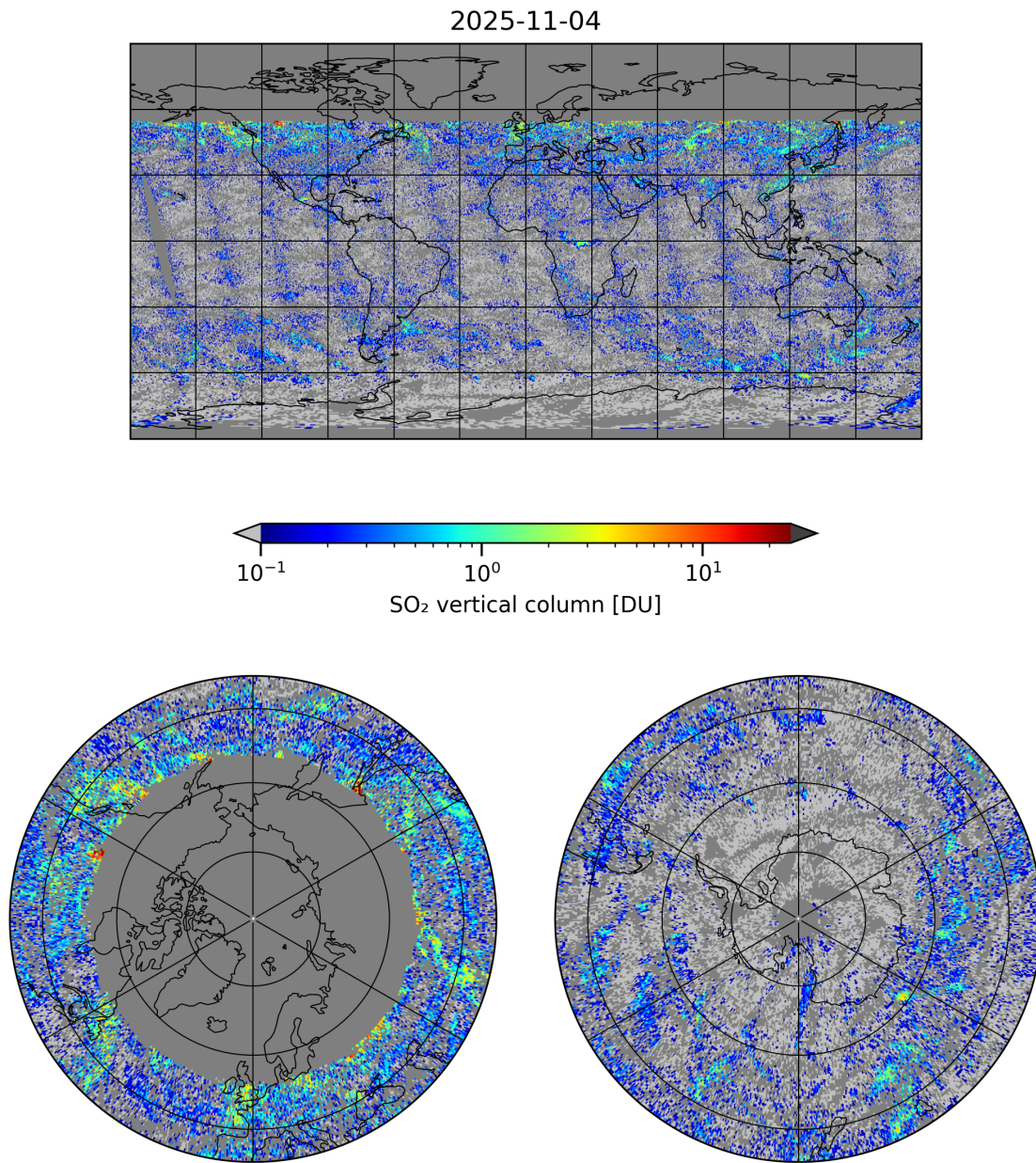


Figure 4: Map of “SO₂ vertical column” for 2025-11-04 to 2025-11-05

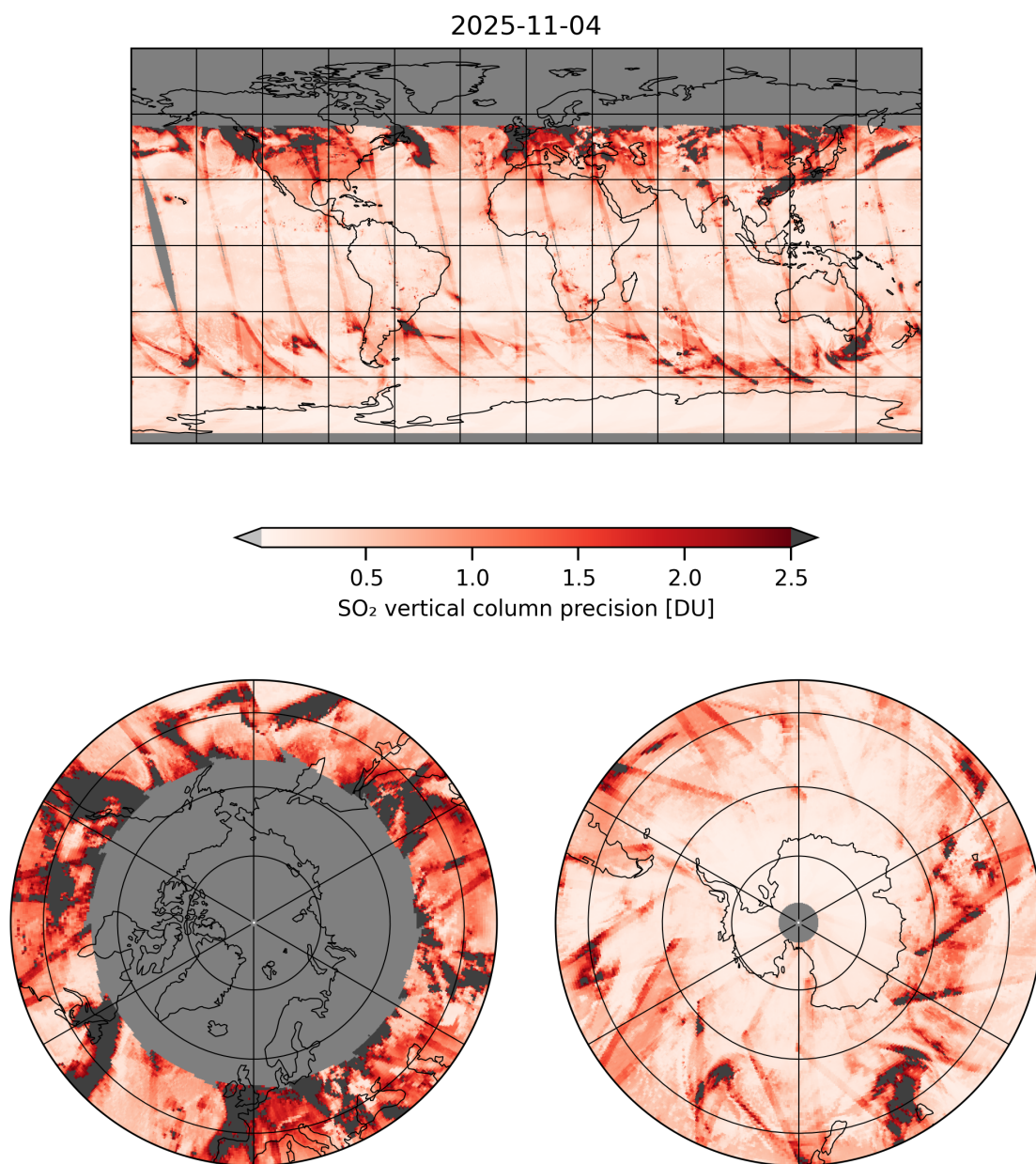


Figure 5: Map of “SO₂ vertical column precision” for 2025-11-04 to 2025-11-05

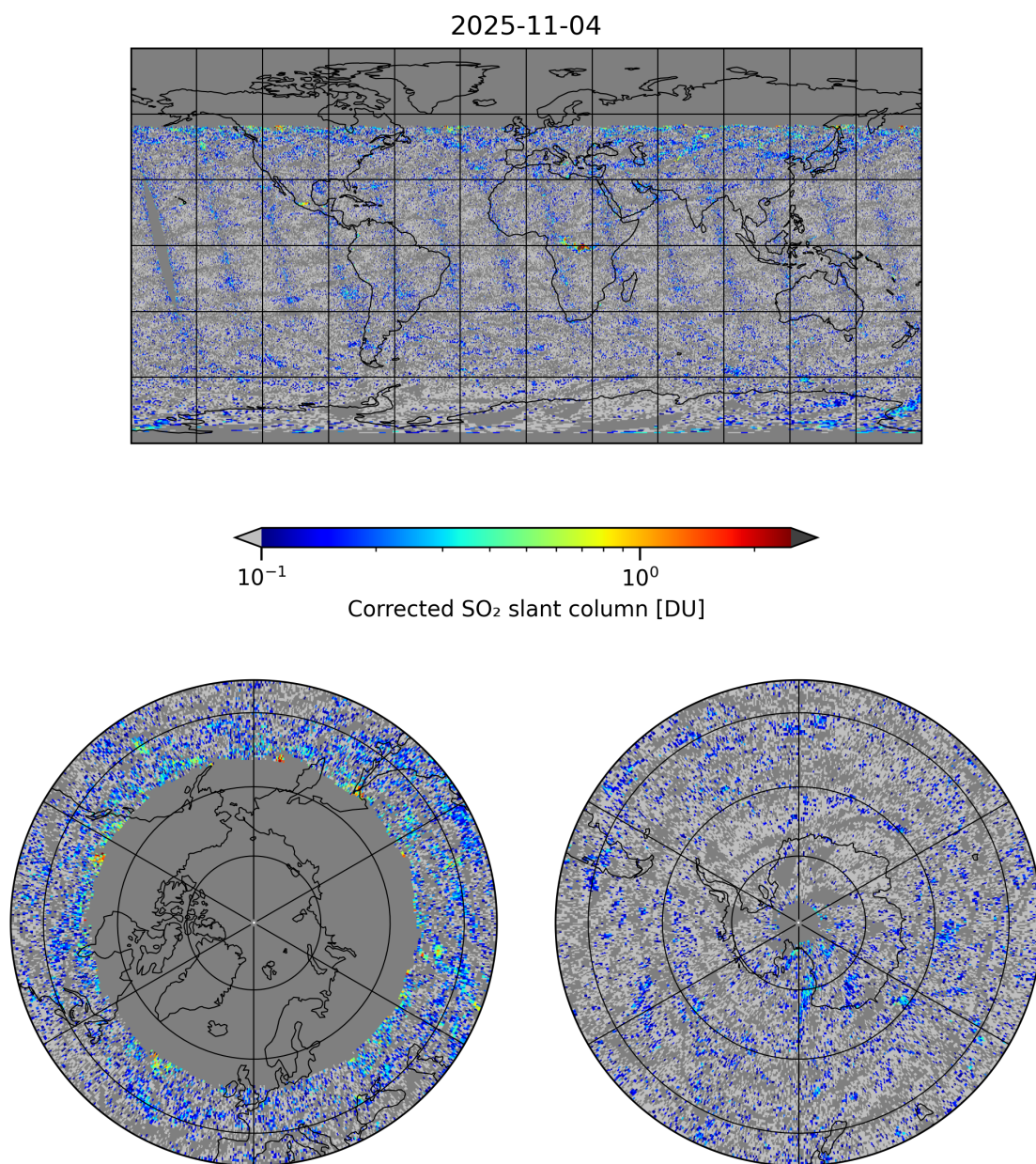


Figure 6: Map of “Corrected SO₂ slant column” for 2025-11-04 to 2025-11-05

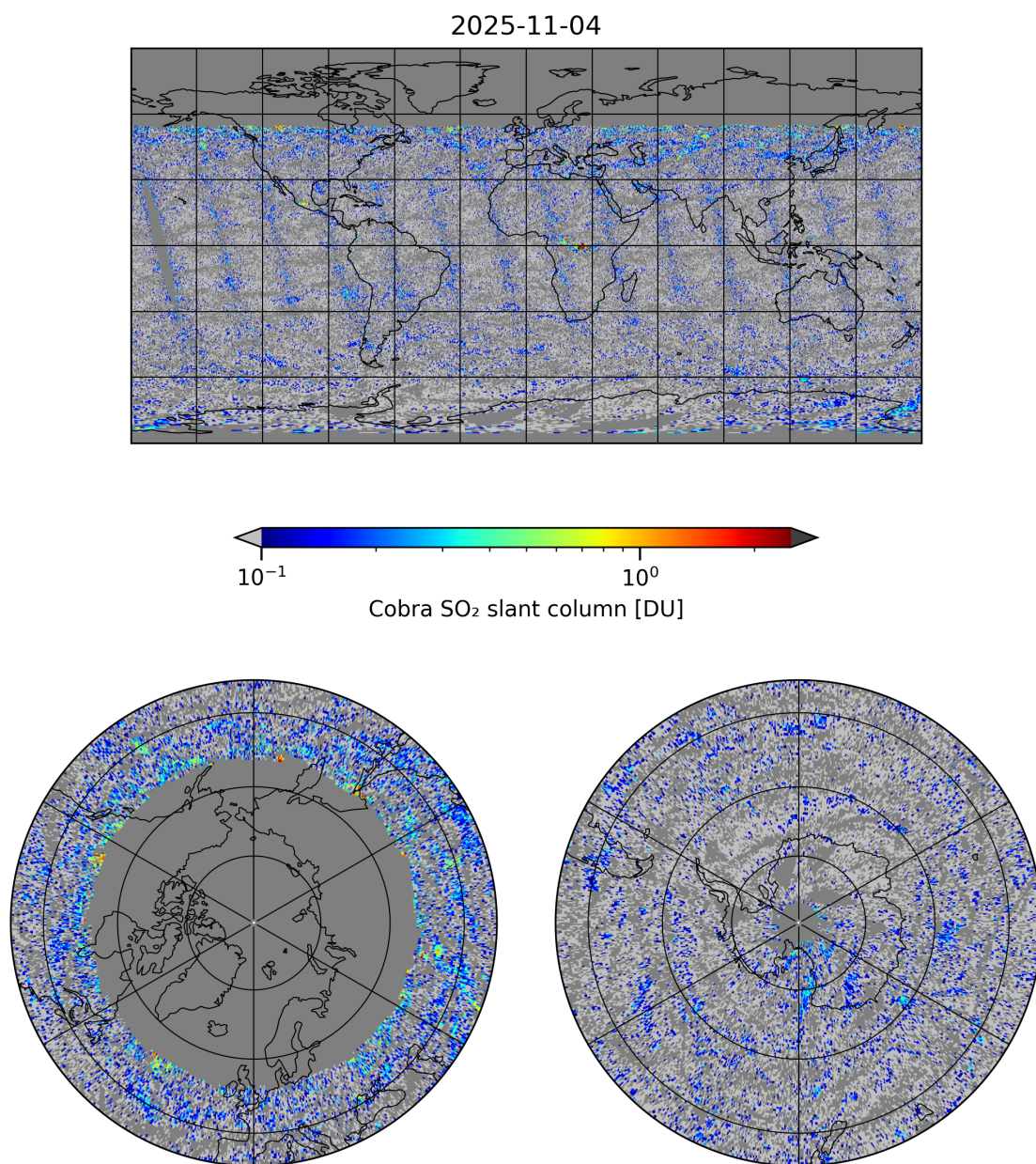


Figure 7: Map of “Cobra SO₂ slant column” for 2025-11-04 to 2025-11-05

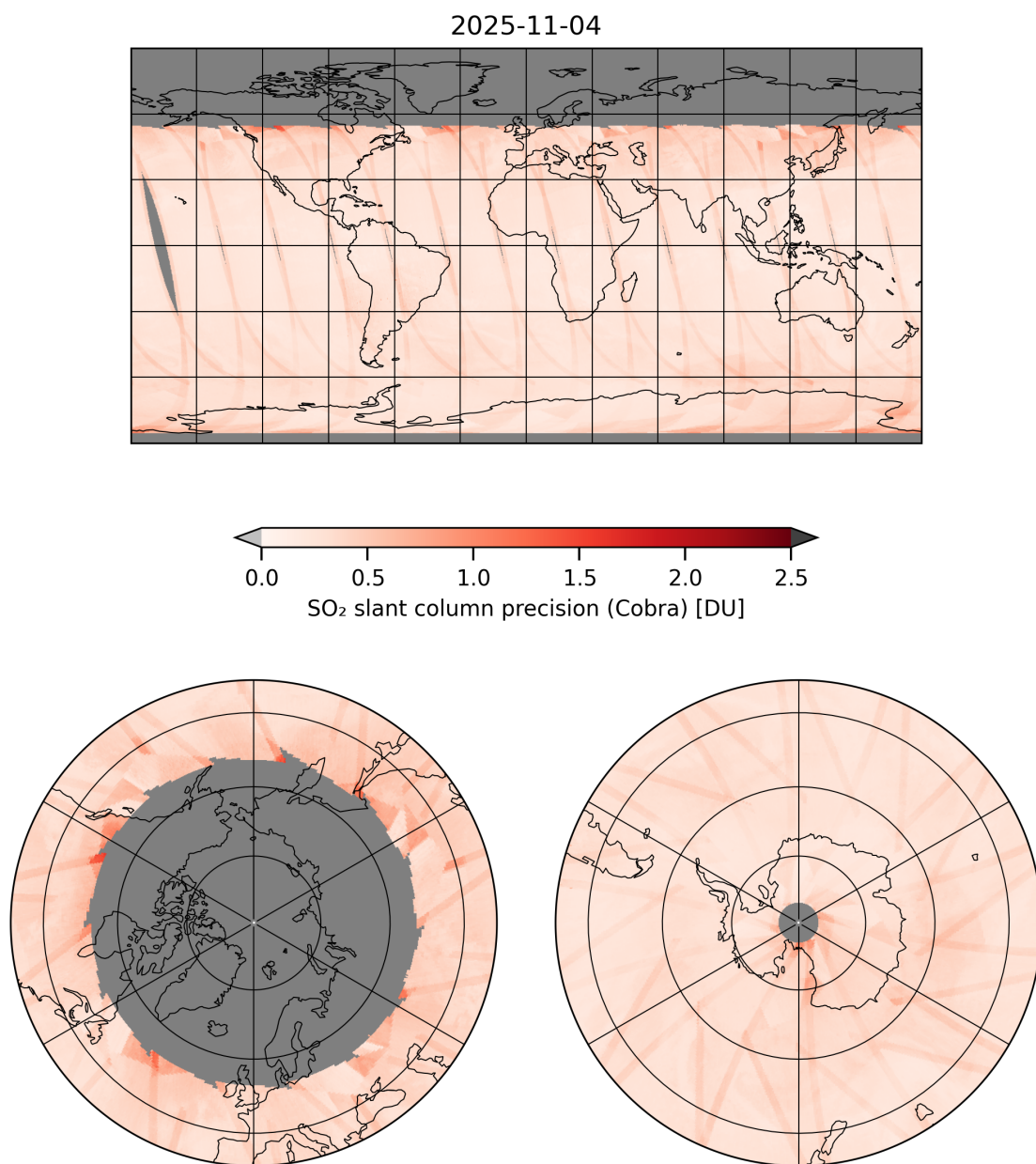


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-11-04 to 2025-11-05

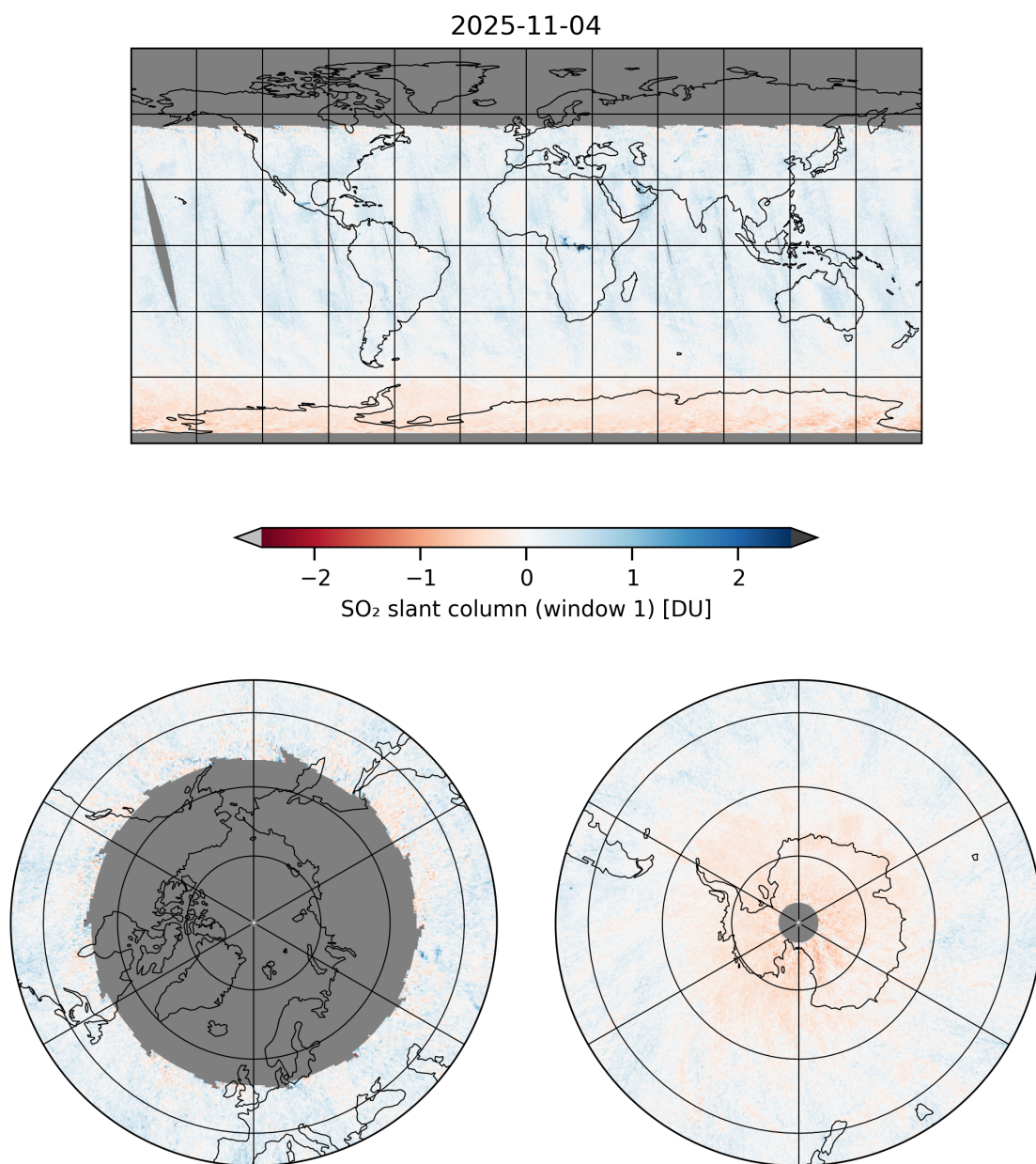


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-11-04 to 2025-11-05

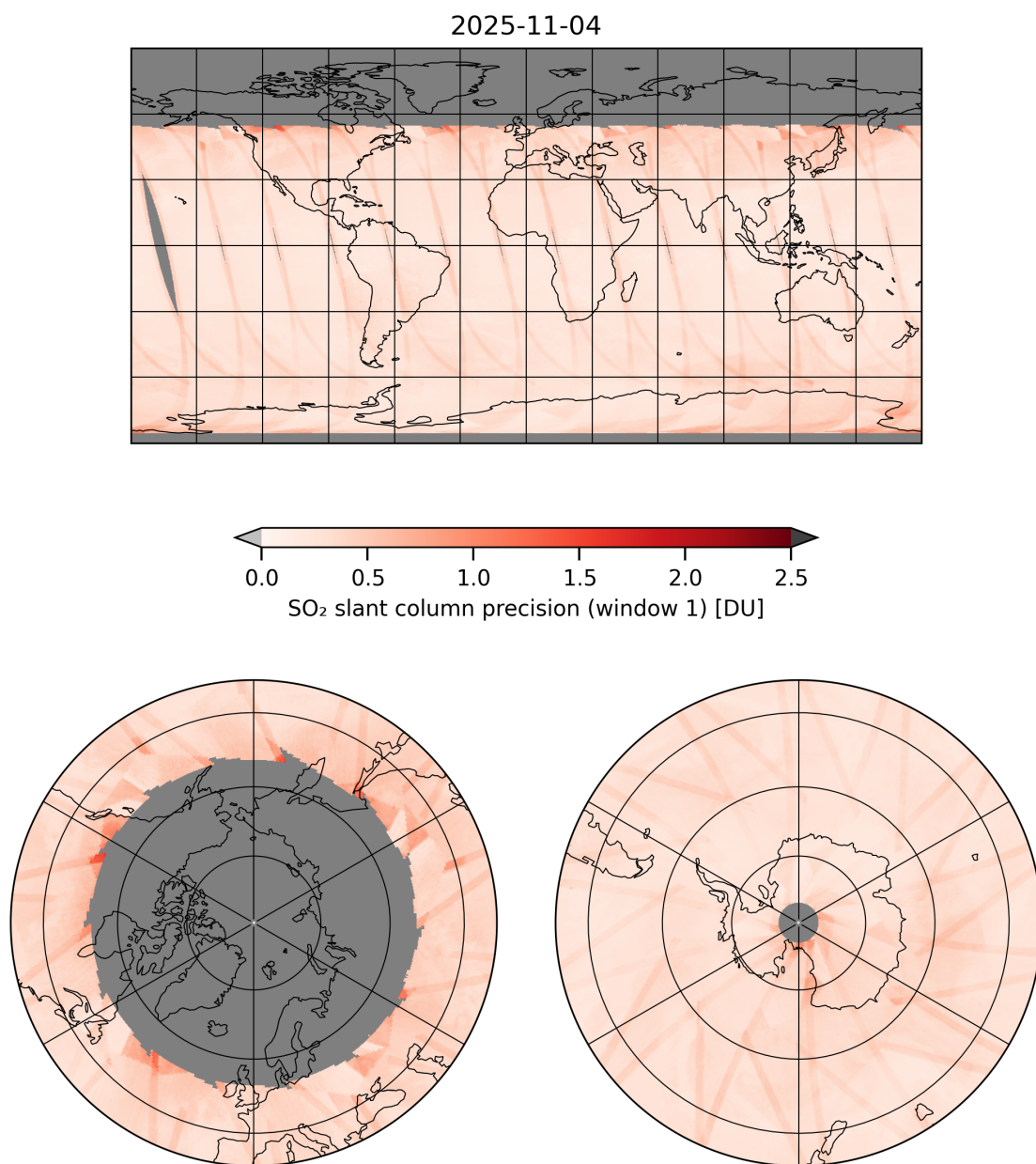


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-11-04 to 2025-11-05

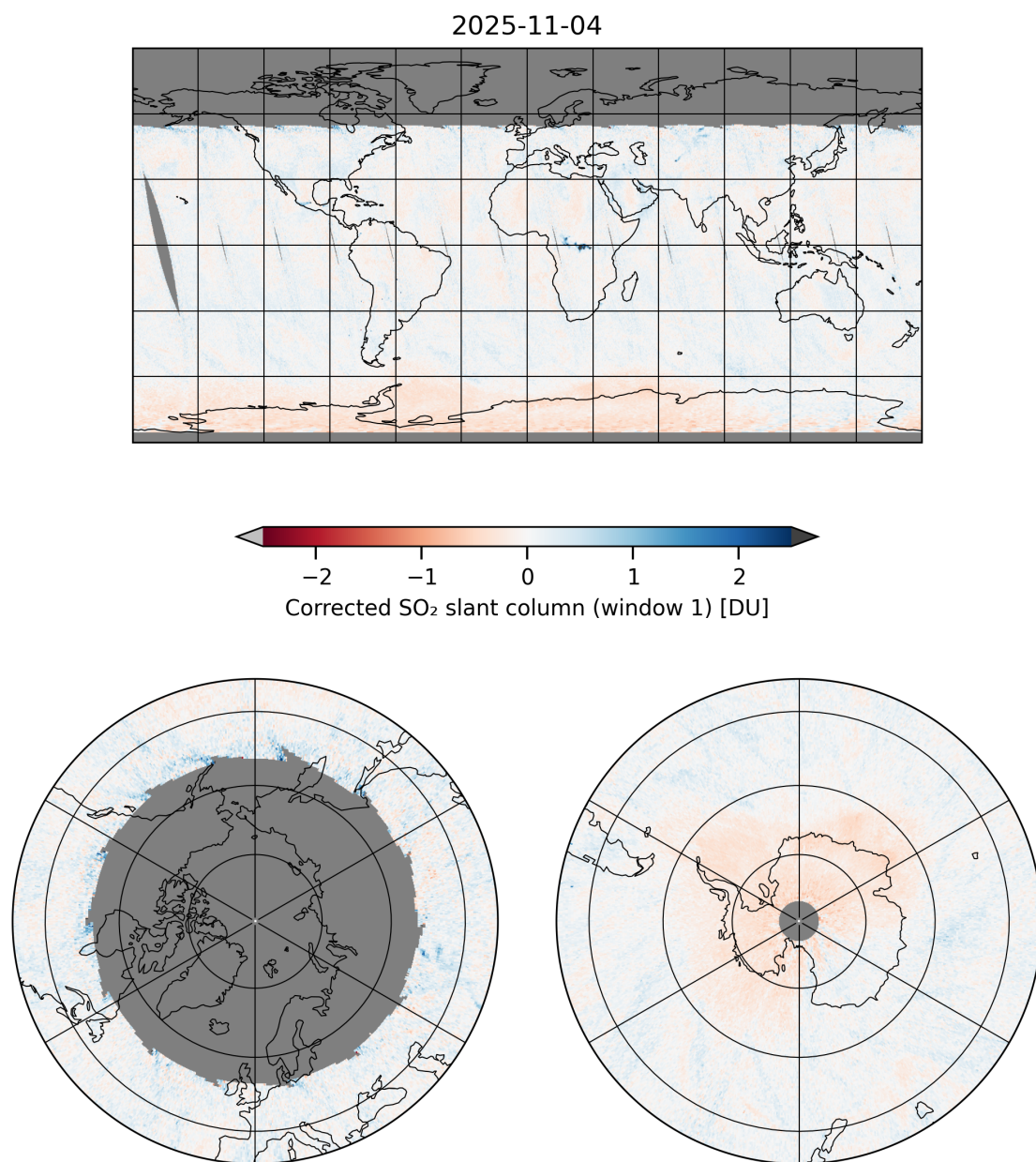


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-11-04 to 2025-11-05

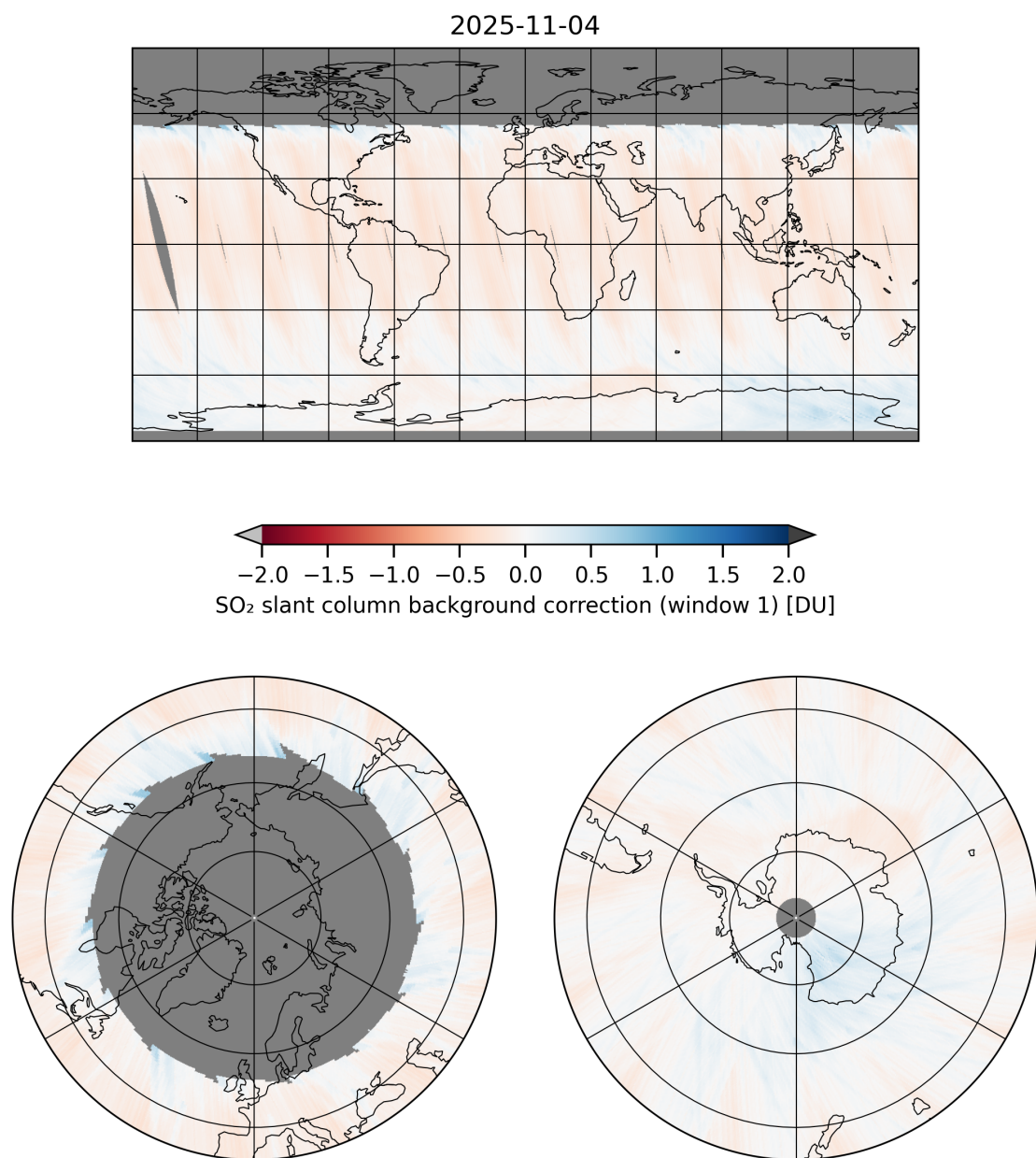


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-11-04 to 2025-11-05

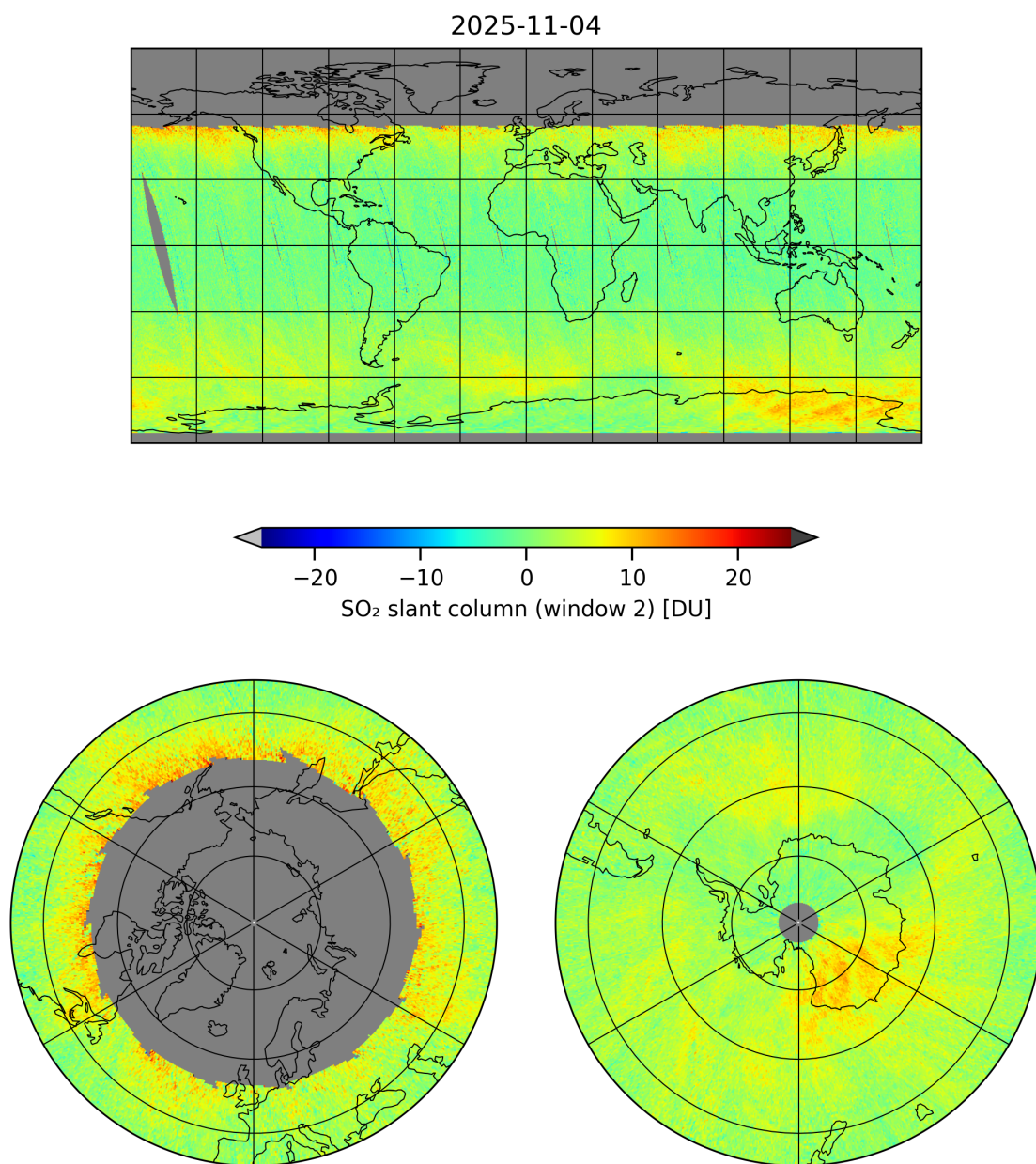


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-11-04 to 2025-11-05

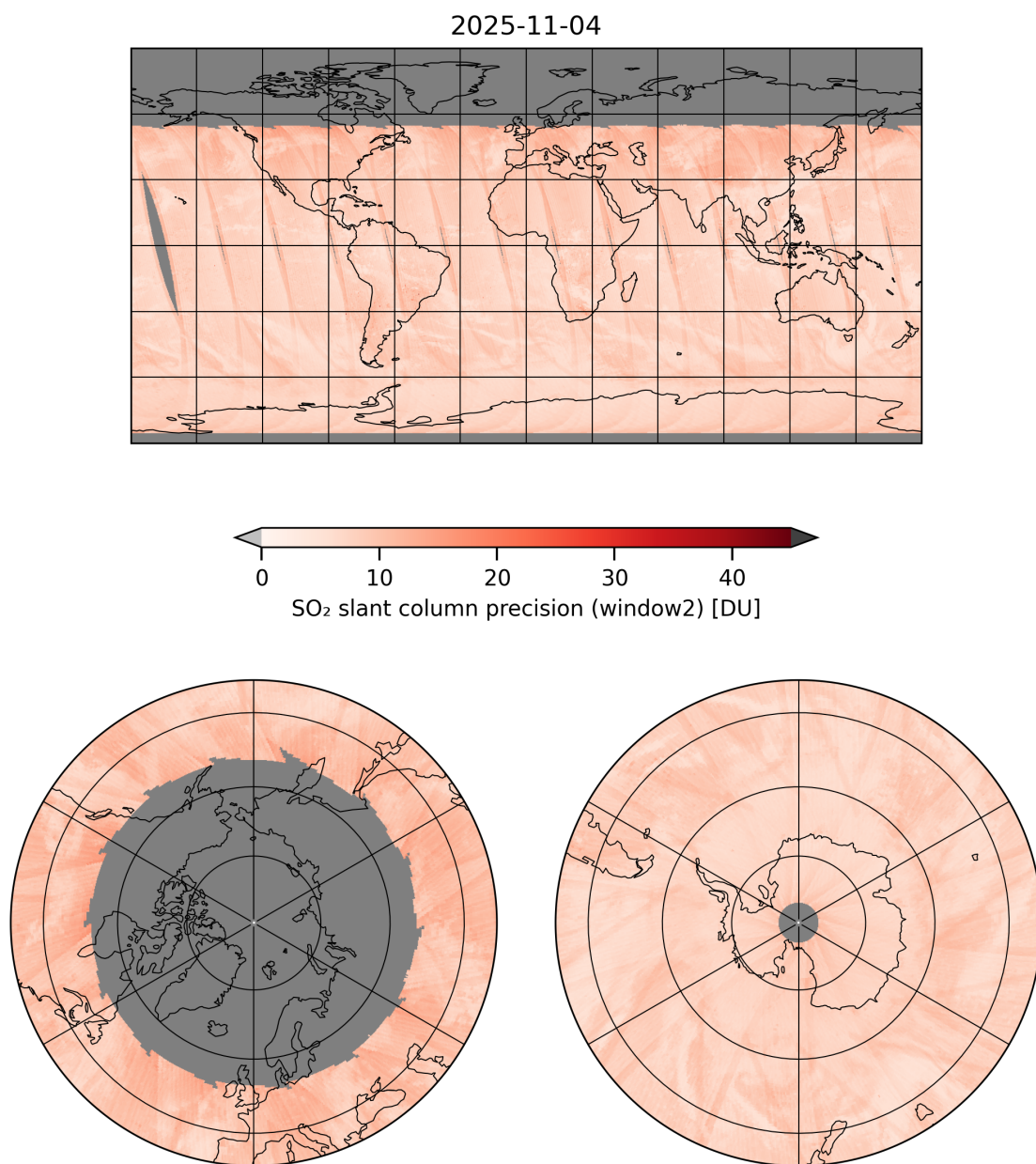


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-11-04 to 2025-11-05

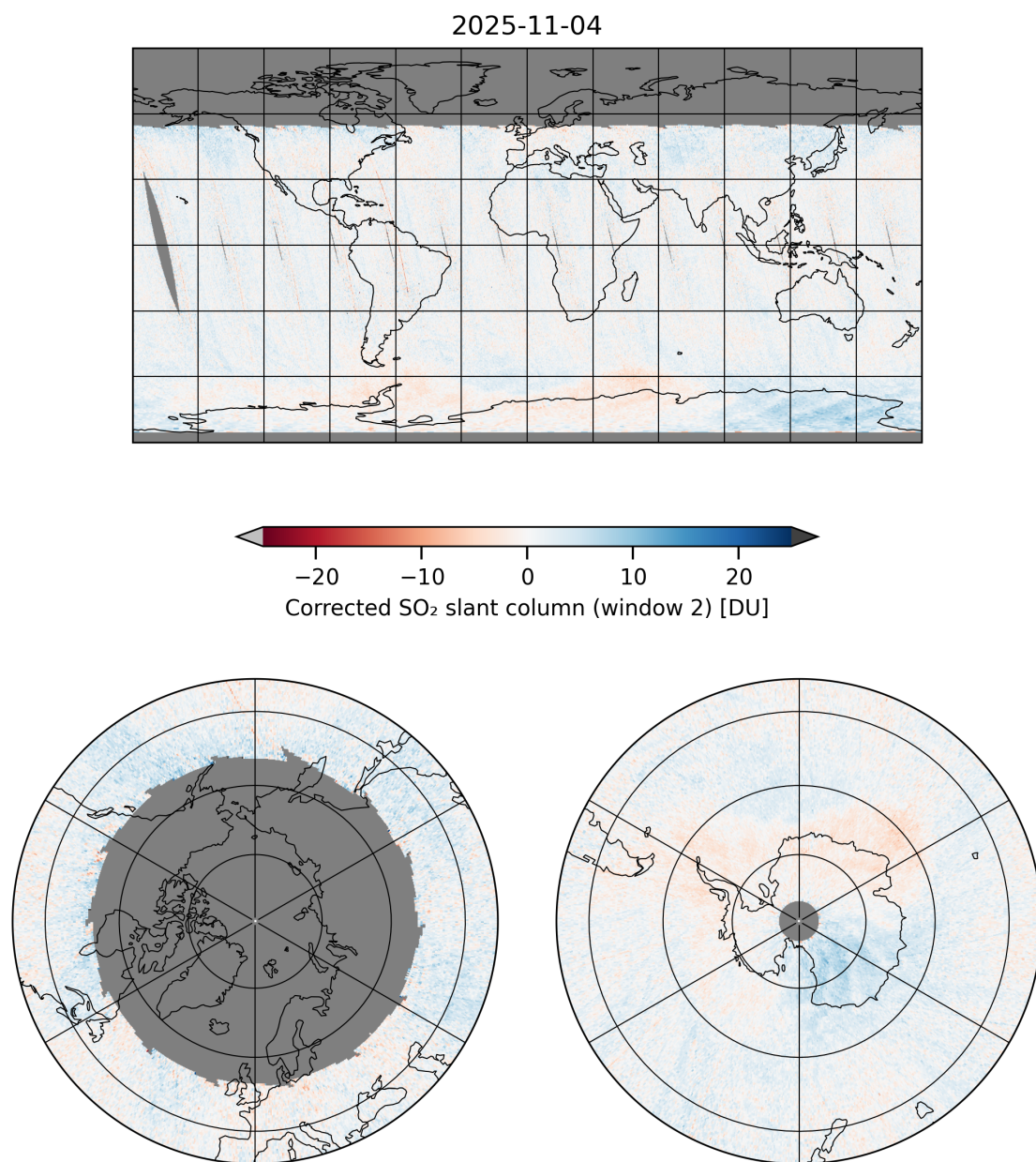


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-11-04 to 2025-11-05

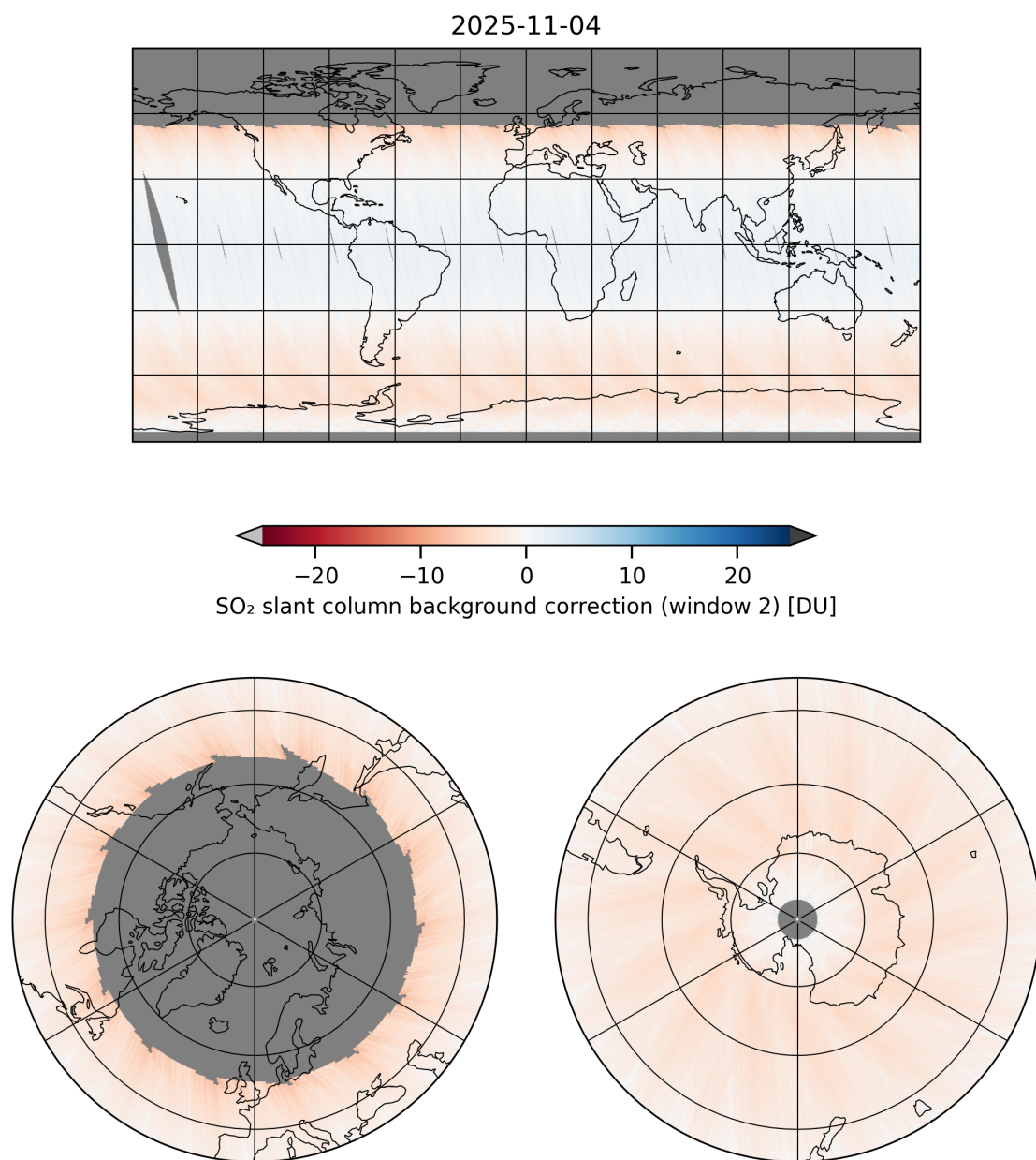


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-11-04 to 2025-11-05

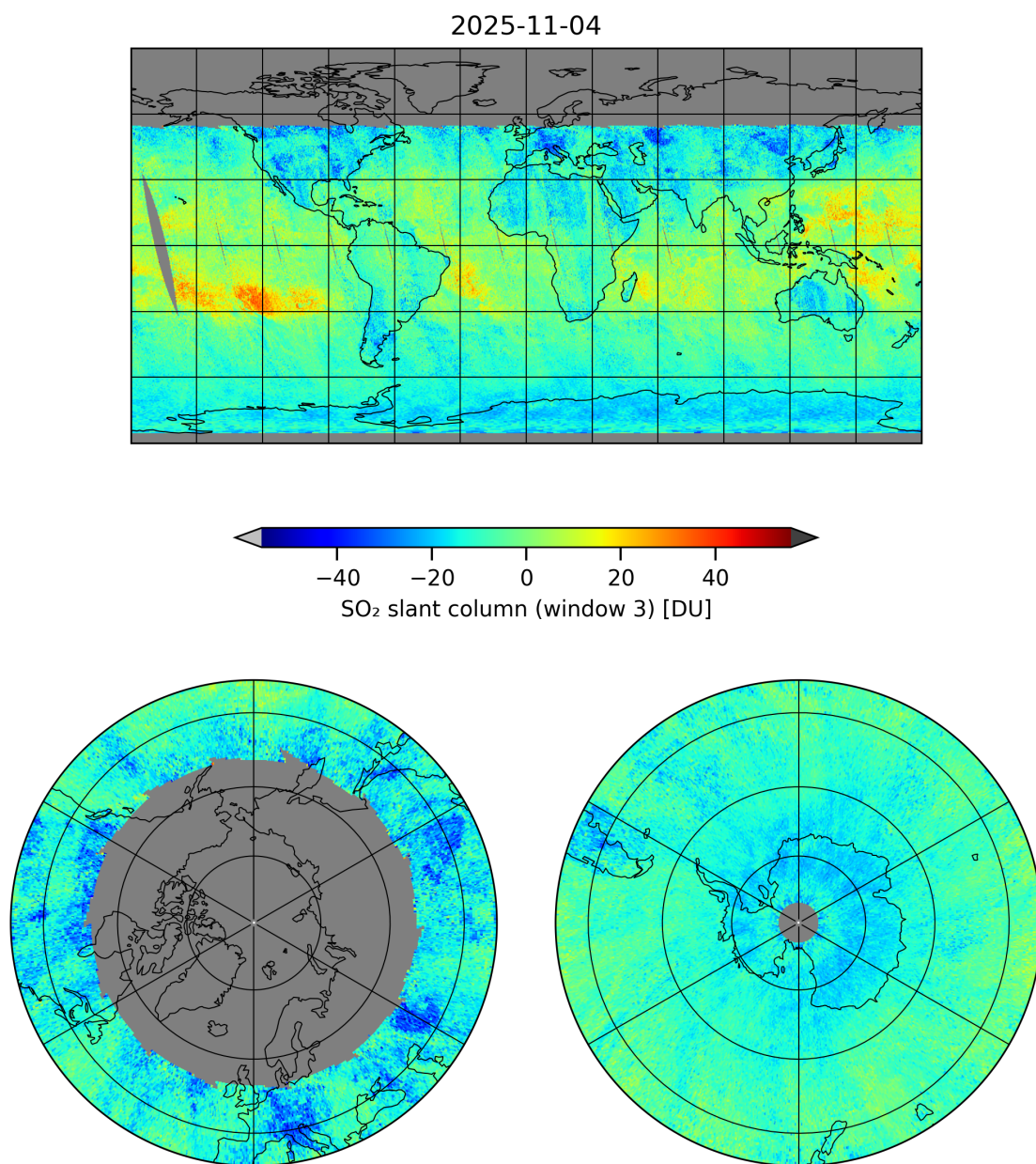


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-11-04 to 2025-11-05

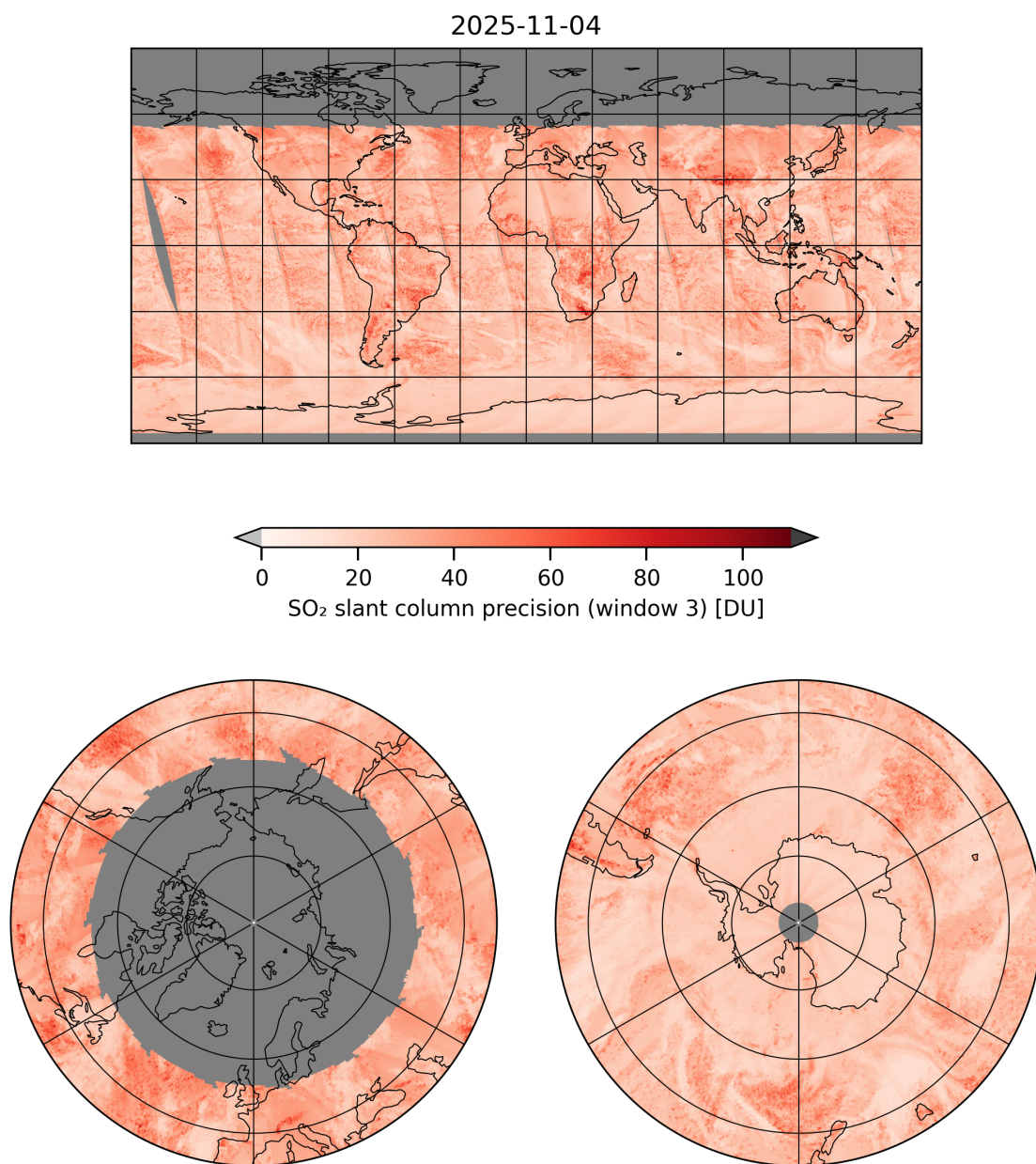


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-11-04 to 2025-11-05

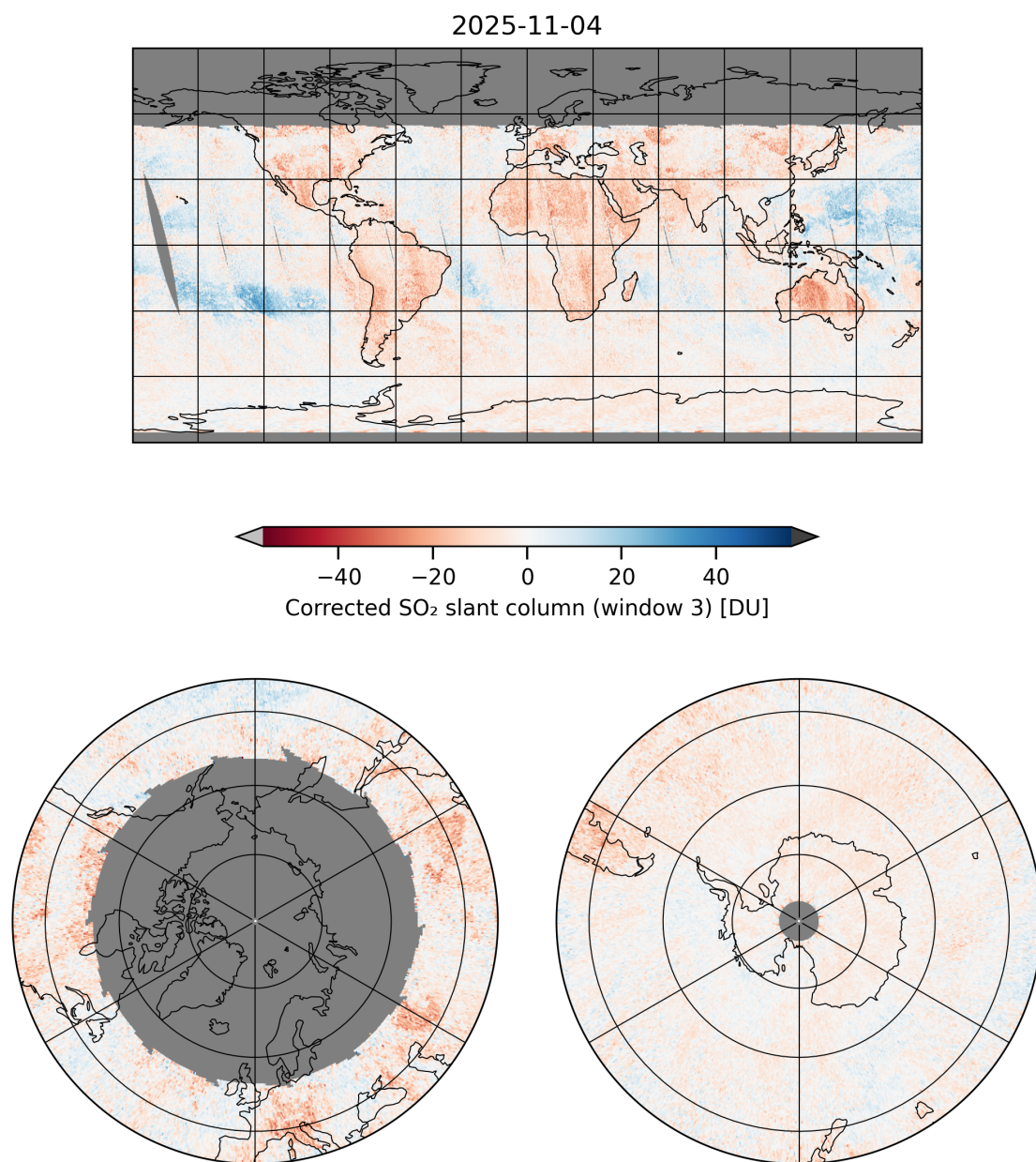


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-11-04 to 2025-11-05

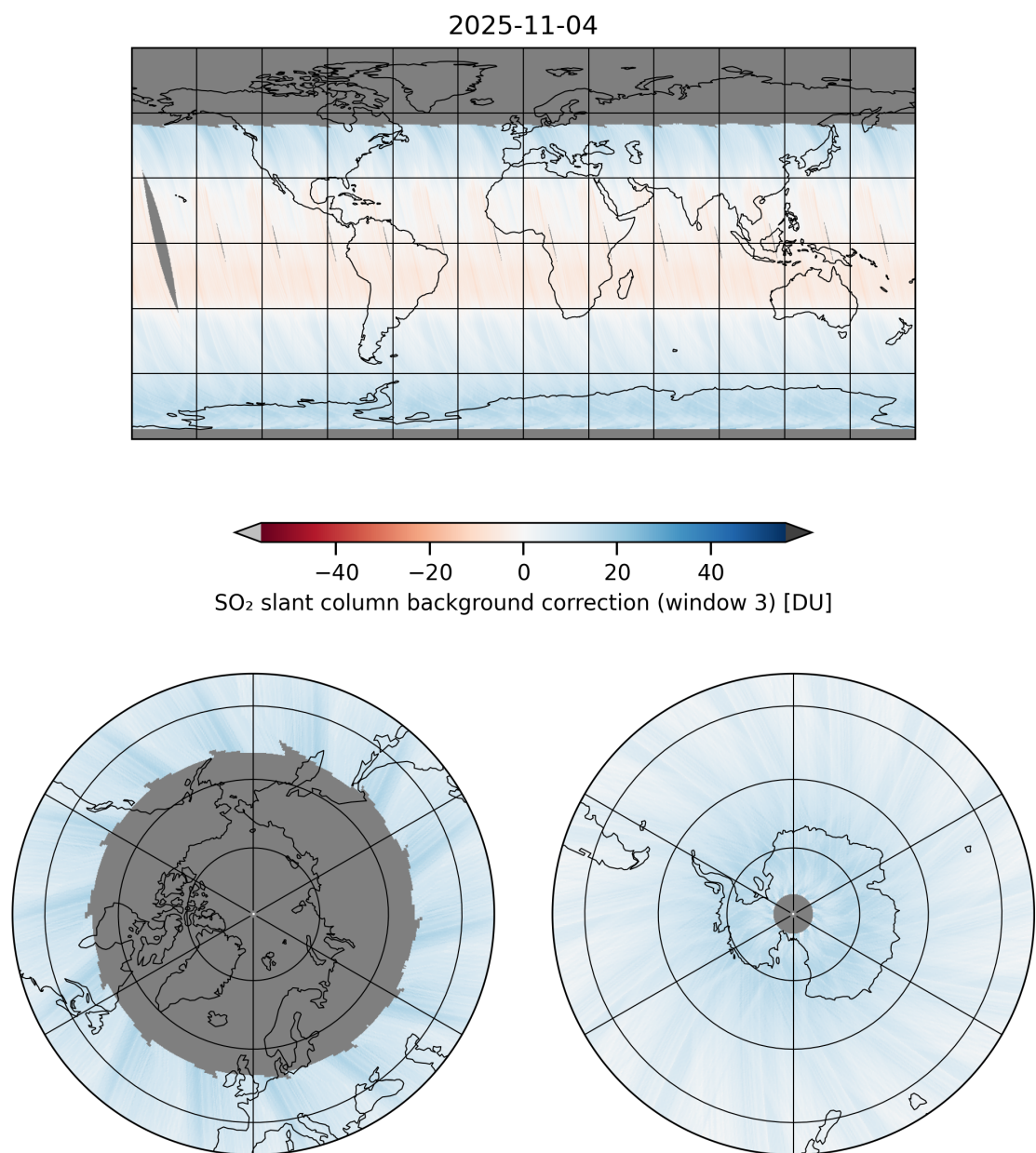


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-11-04 to 2025-11-05

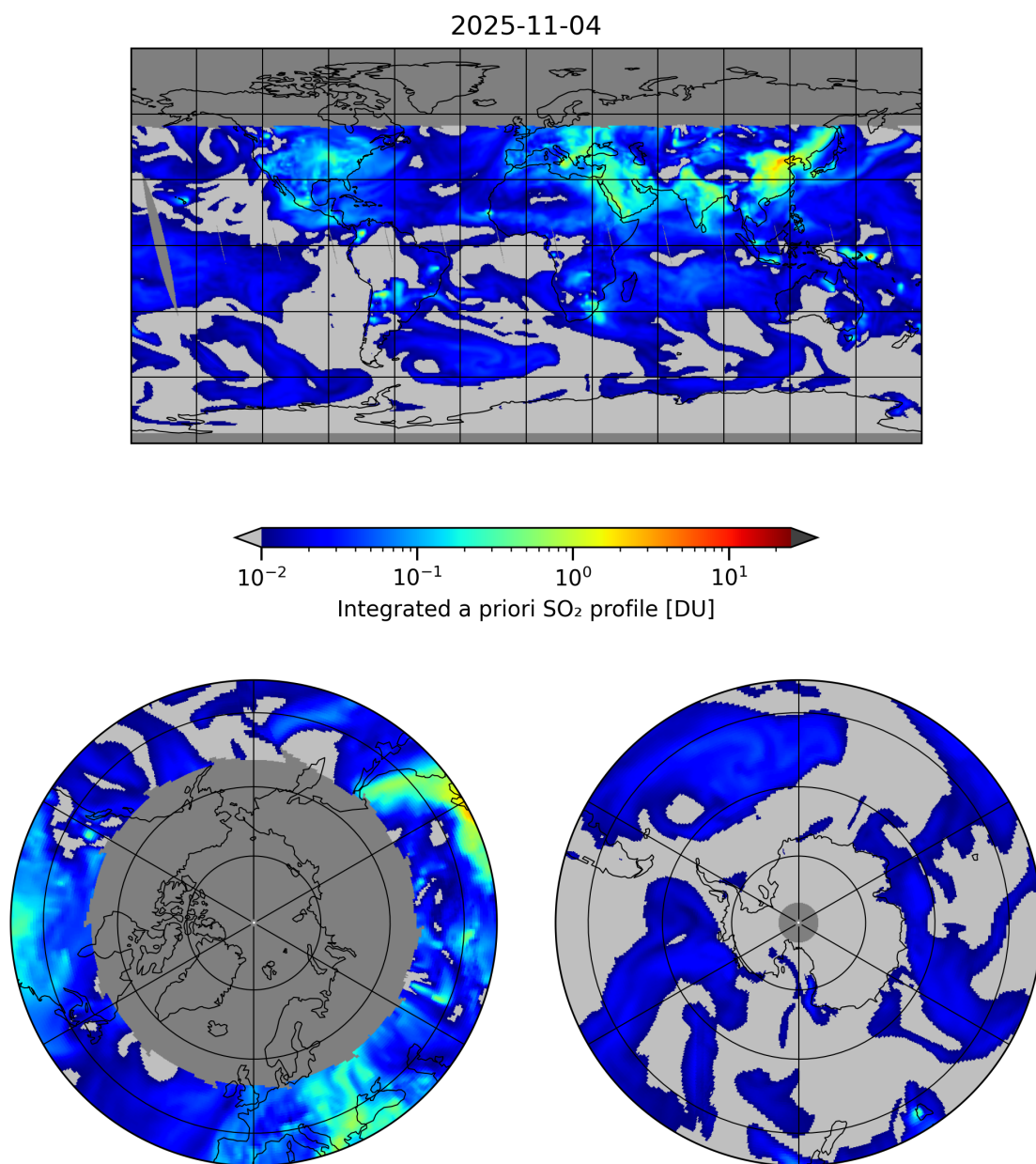


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-11-04 to 2025-11-05

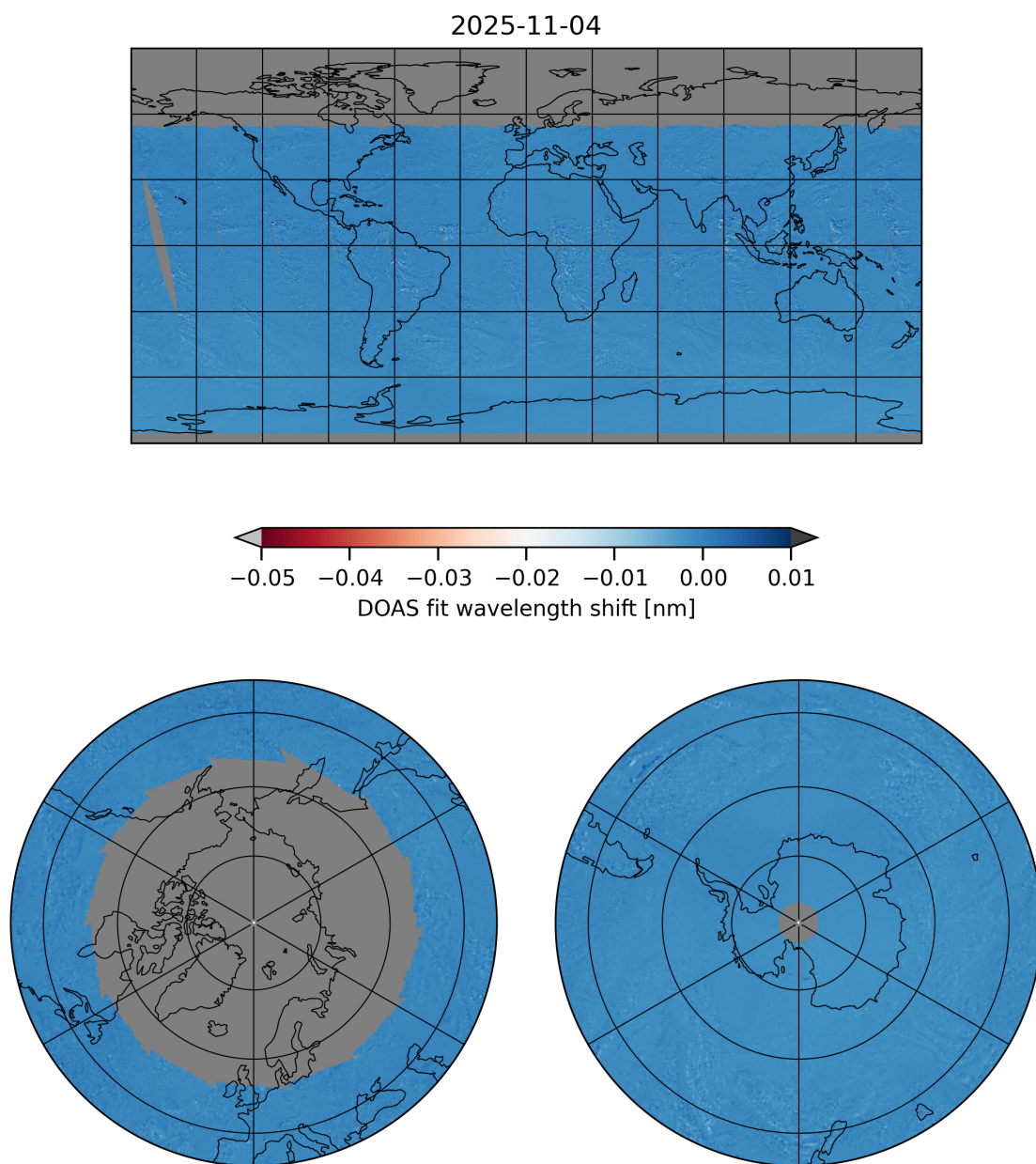


Figure 22: Map of “DOAS fit wavelength shift” for 2025-11-04 to 2025-11-05

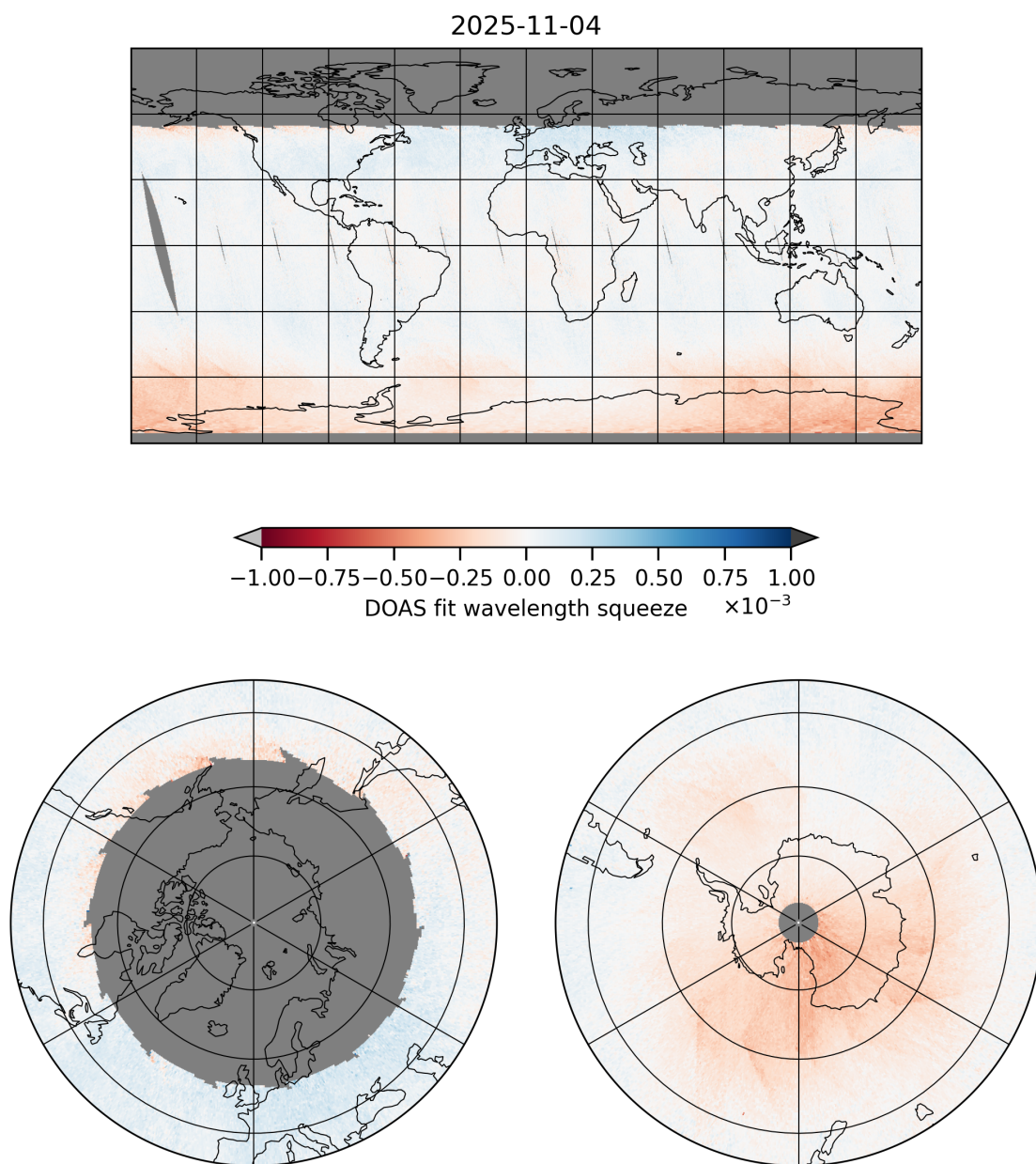


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-11-04 to 2025-11-05

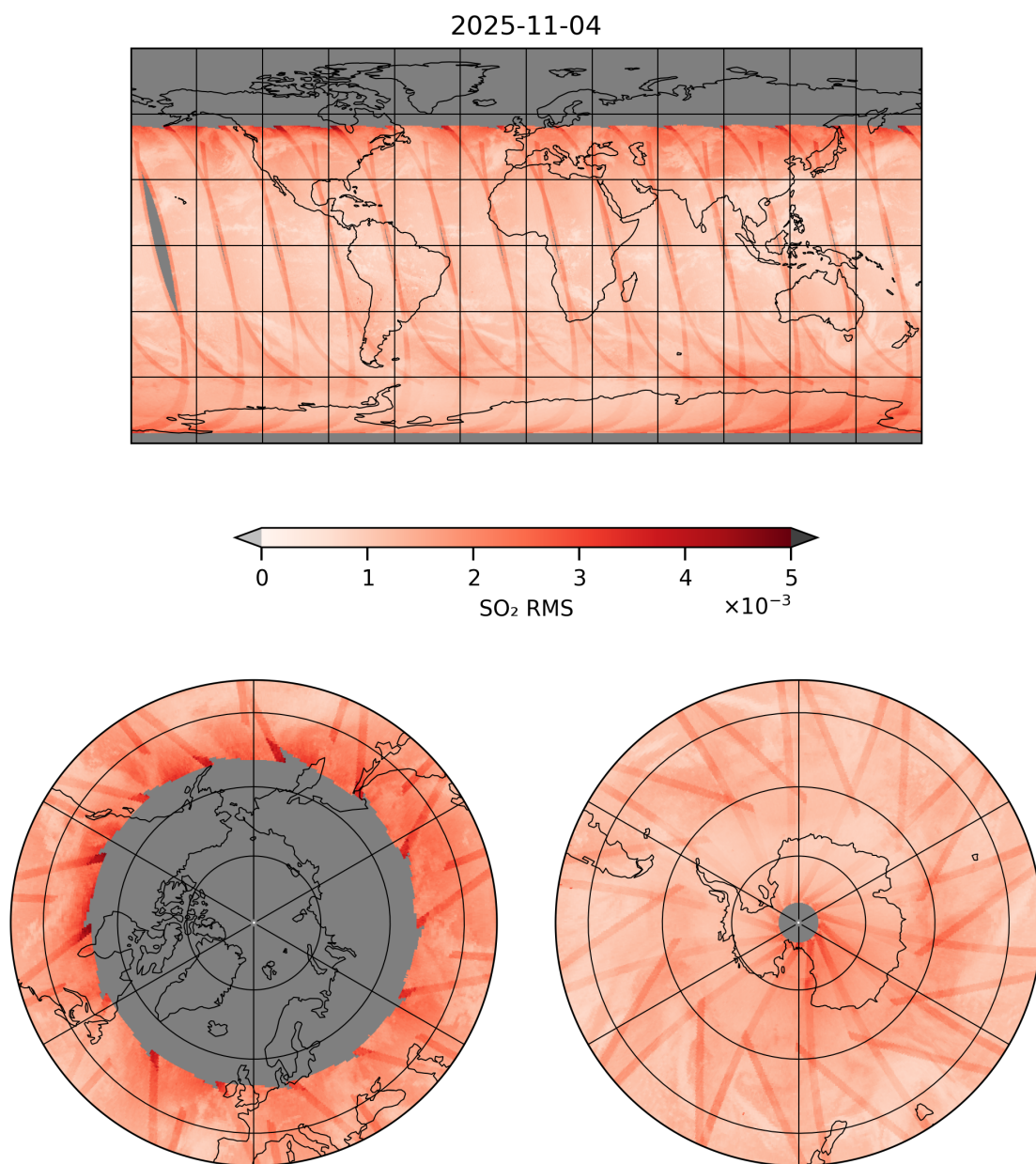


Figure 24: Map of “SO₂ RMS” for 2025-11-04 to 2025-11-05

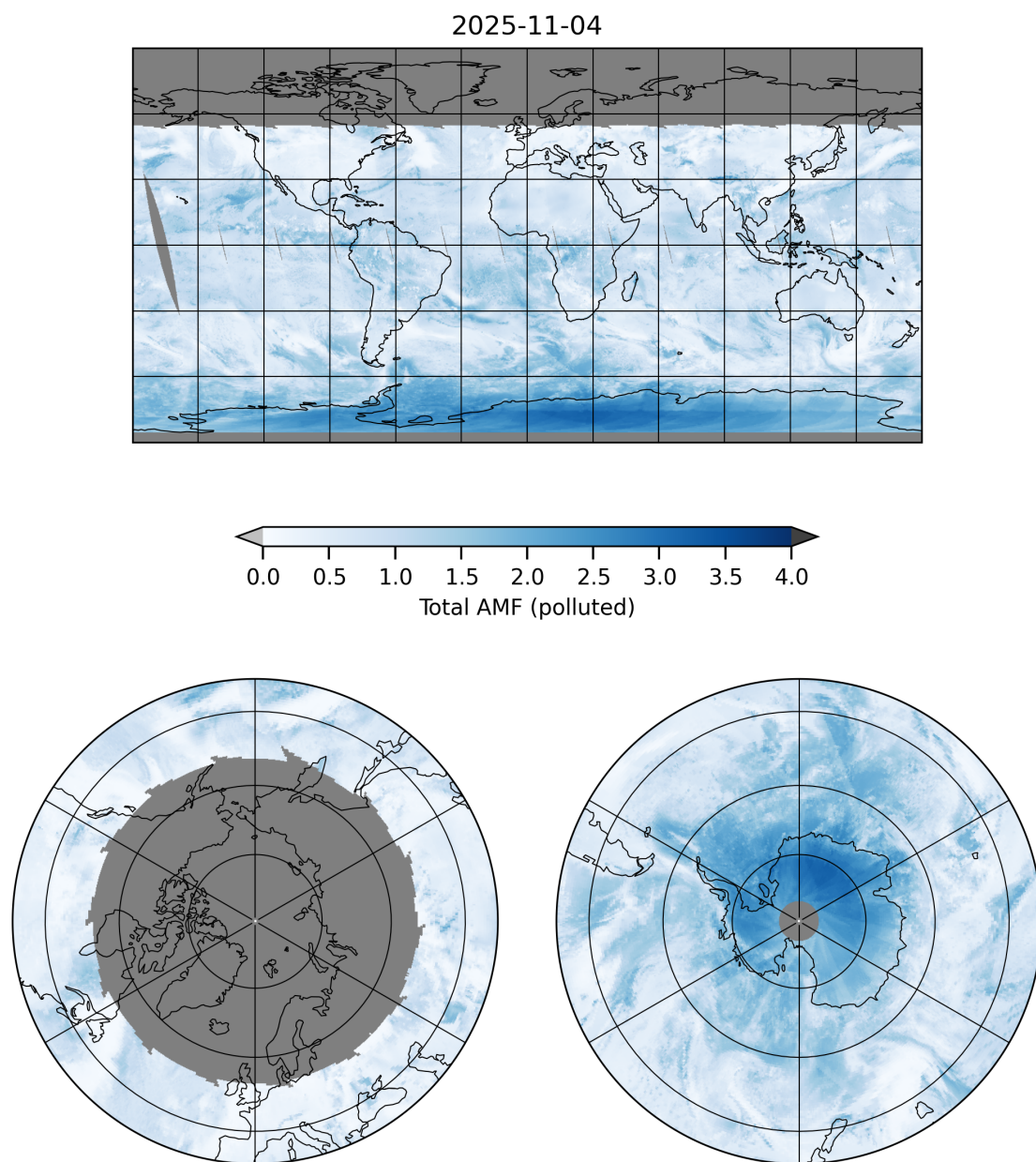


Figure 25: Map of “Total AMF (polluted)” for 2025-11-04 to 2025-11-05

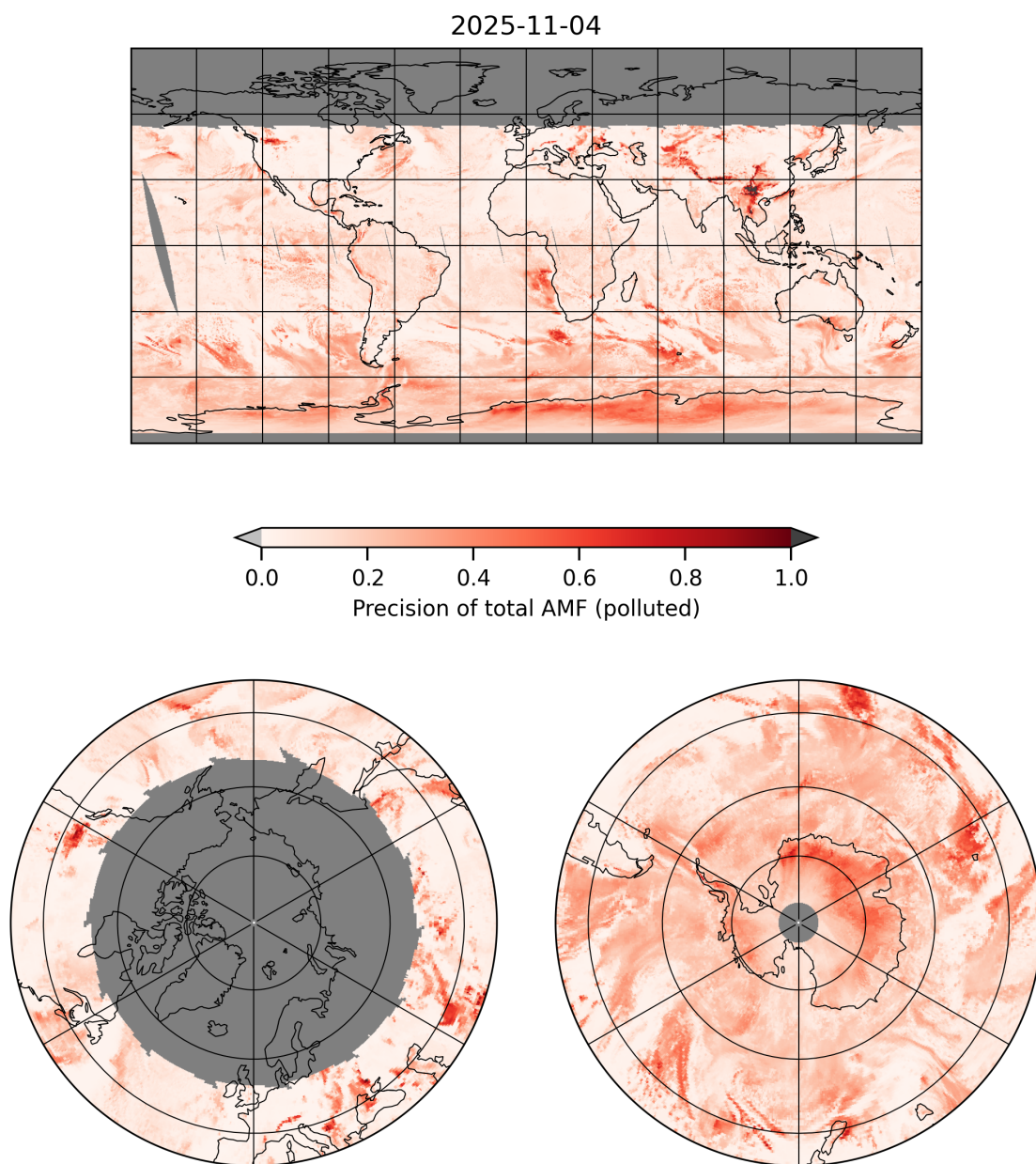


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-11-04 to 2025-11-05

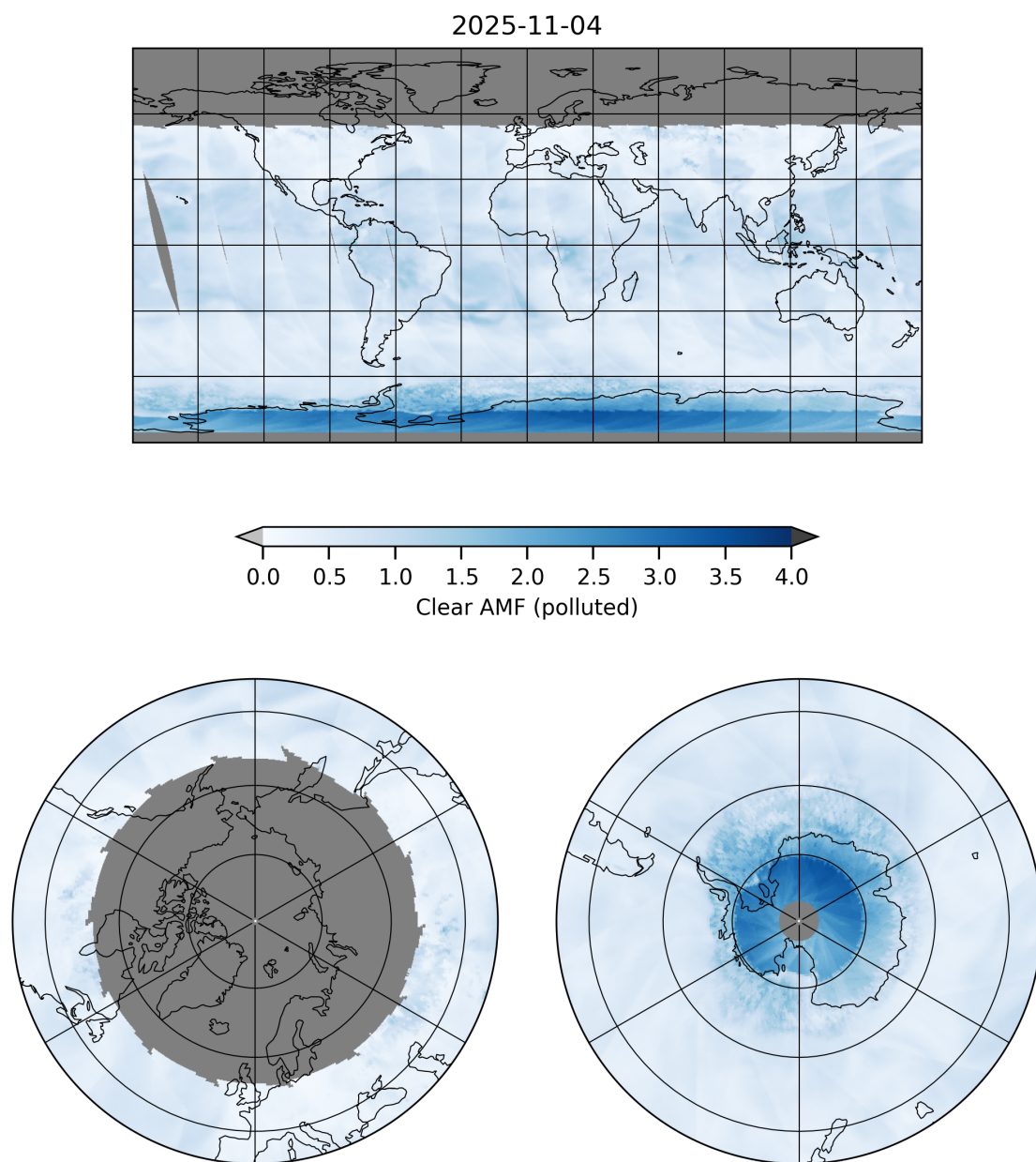


Figure 27: Map of “Clear AMF (polluted)” for 2025-11-04 to 2025-11-05

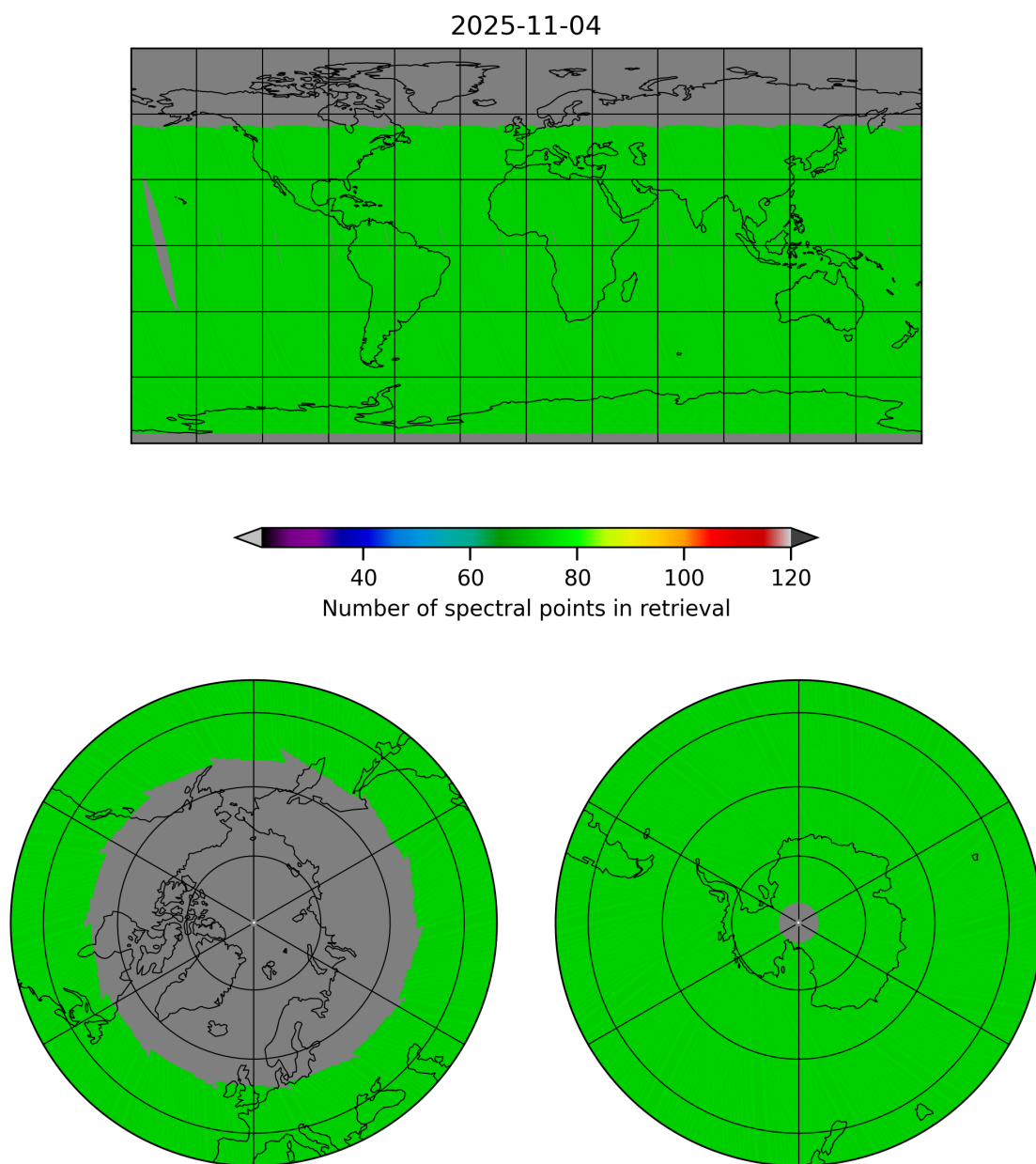


Figure 28: Map of “Number of spectral points in retrieval” for 2025-11-04 to 2025-11-05

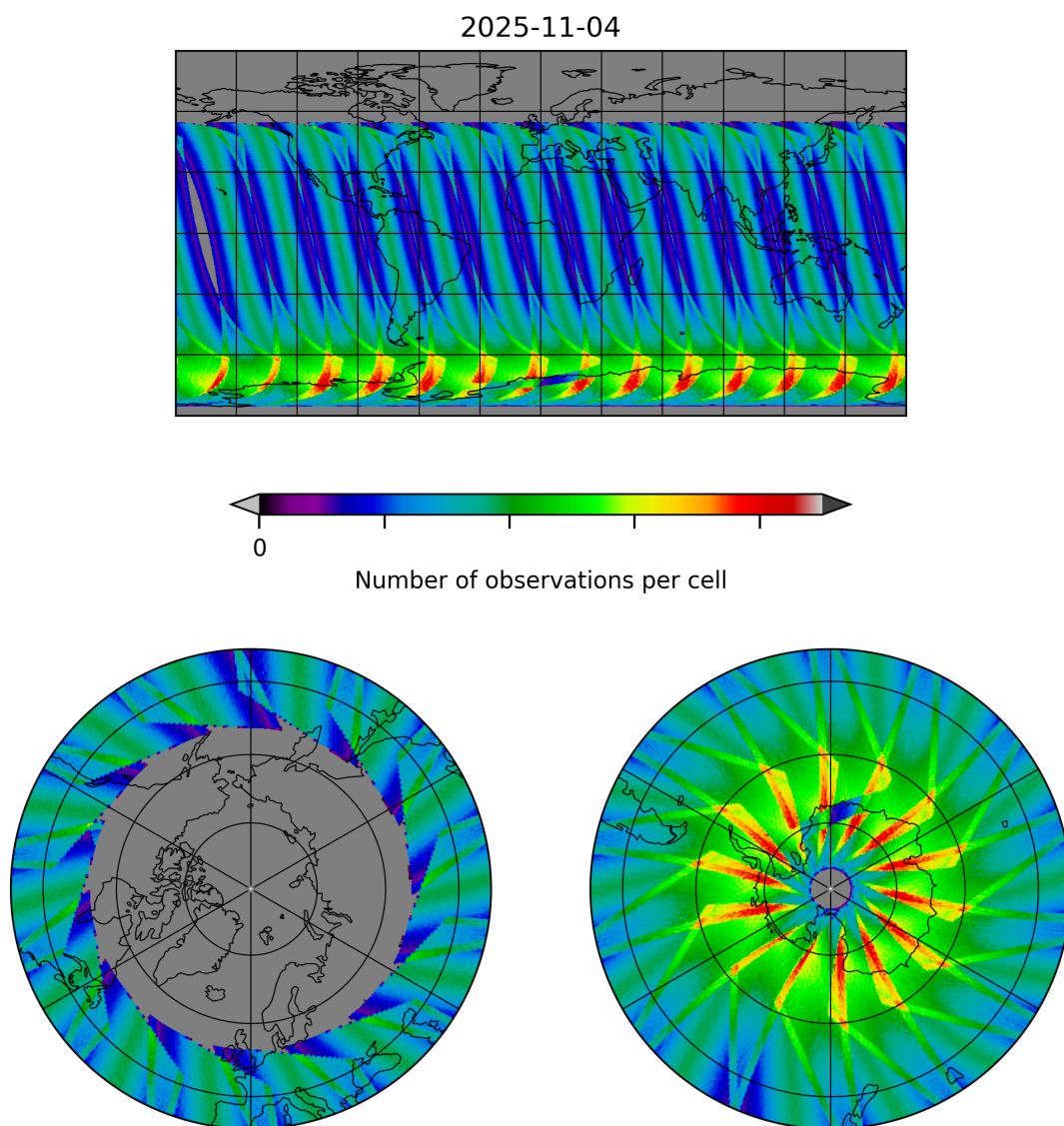


Figure 29: Map of the number of observations for 2025-11-04 to 2025-11-05

7 Zonal average

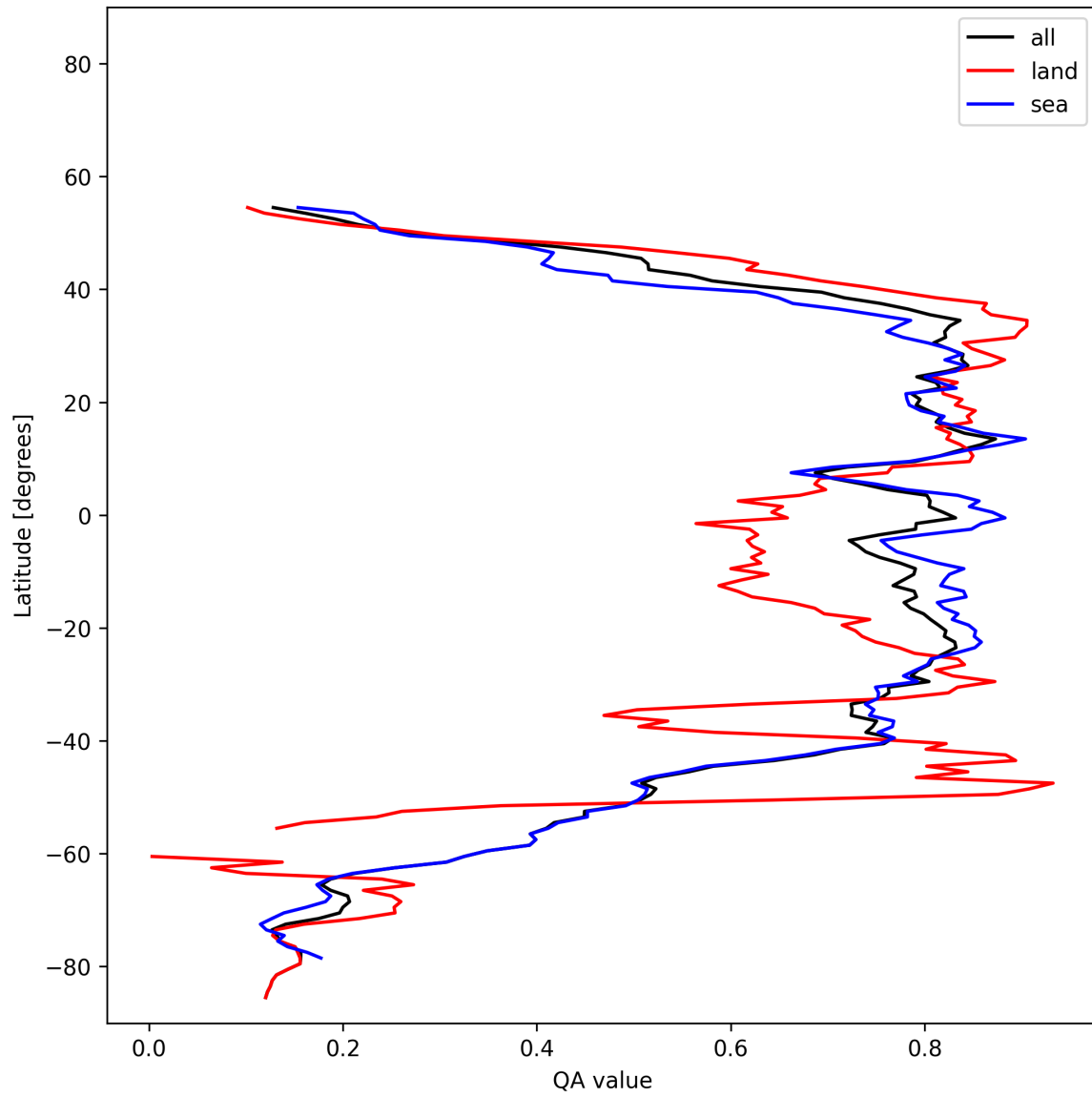


Figure 30: Zonal average of “QA value” for 2025-11-04 to 2025-11-05.

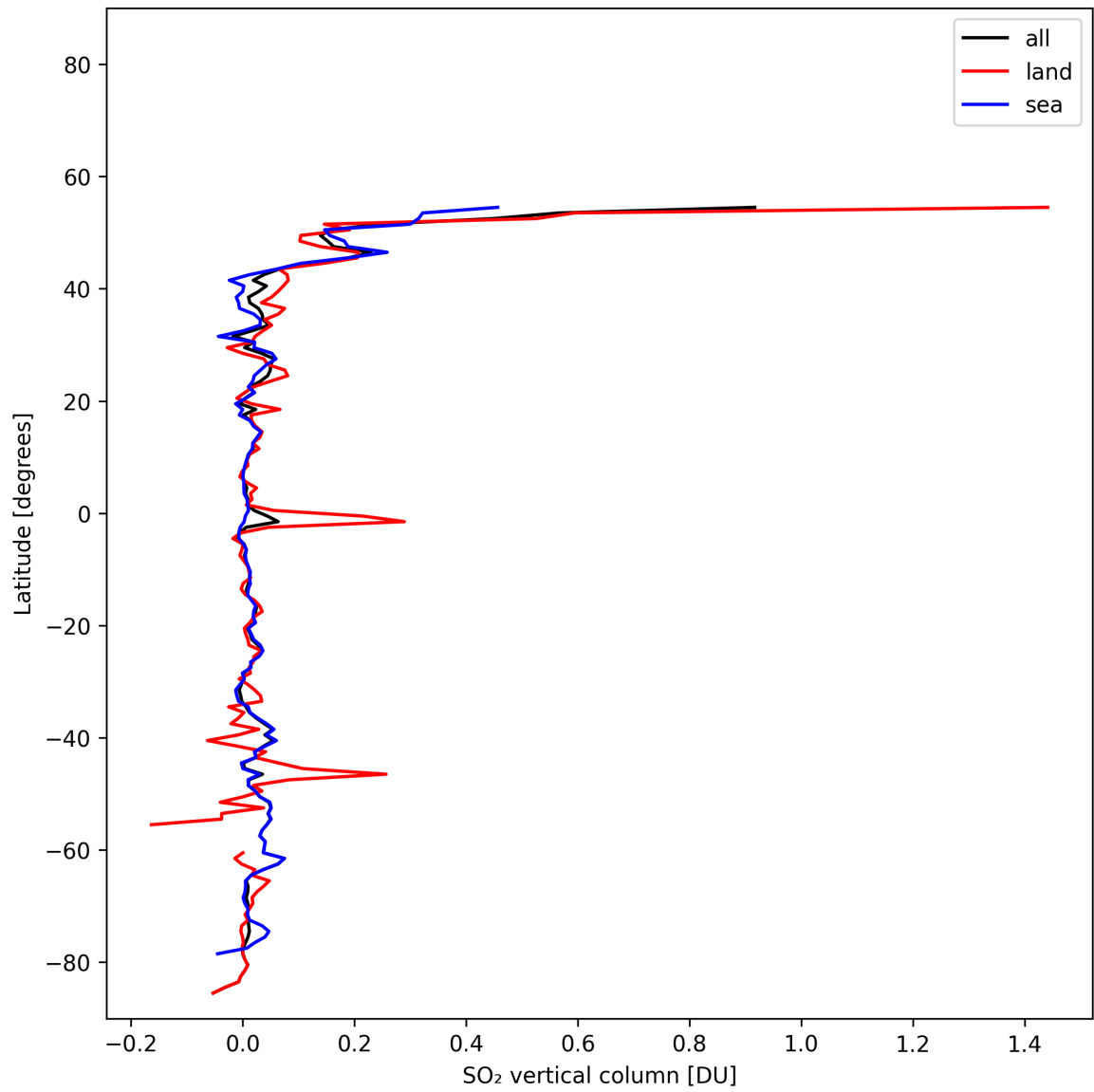


Figure 31: Zonal average of “SO₂ vertical column” for 2025-11-04 to 2025-11-05.

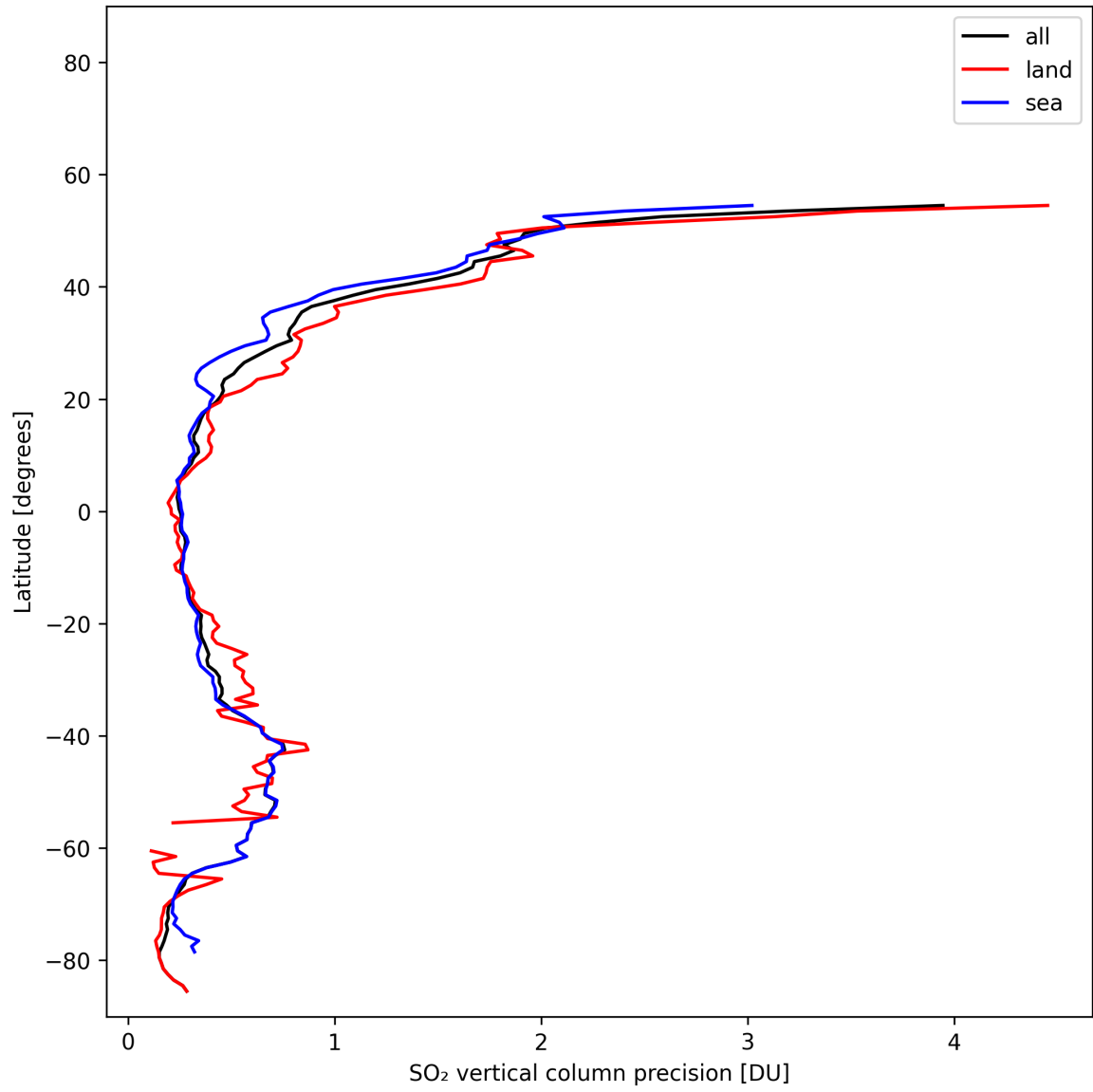


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-11-04 to 2025-11-05.

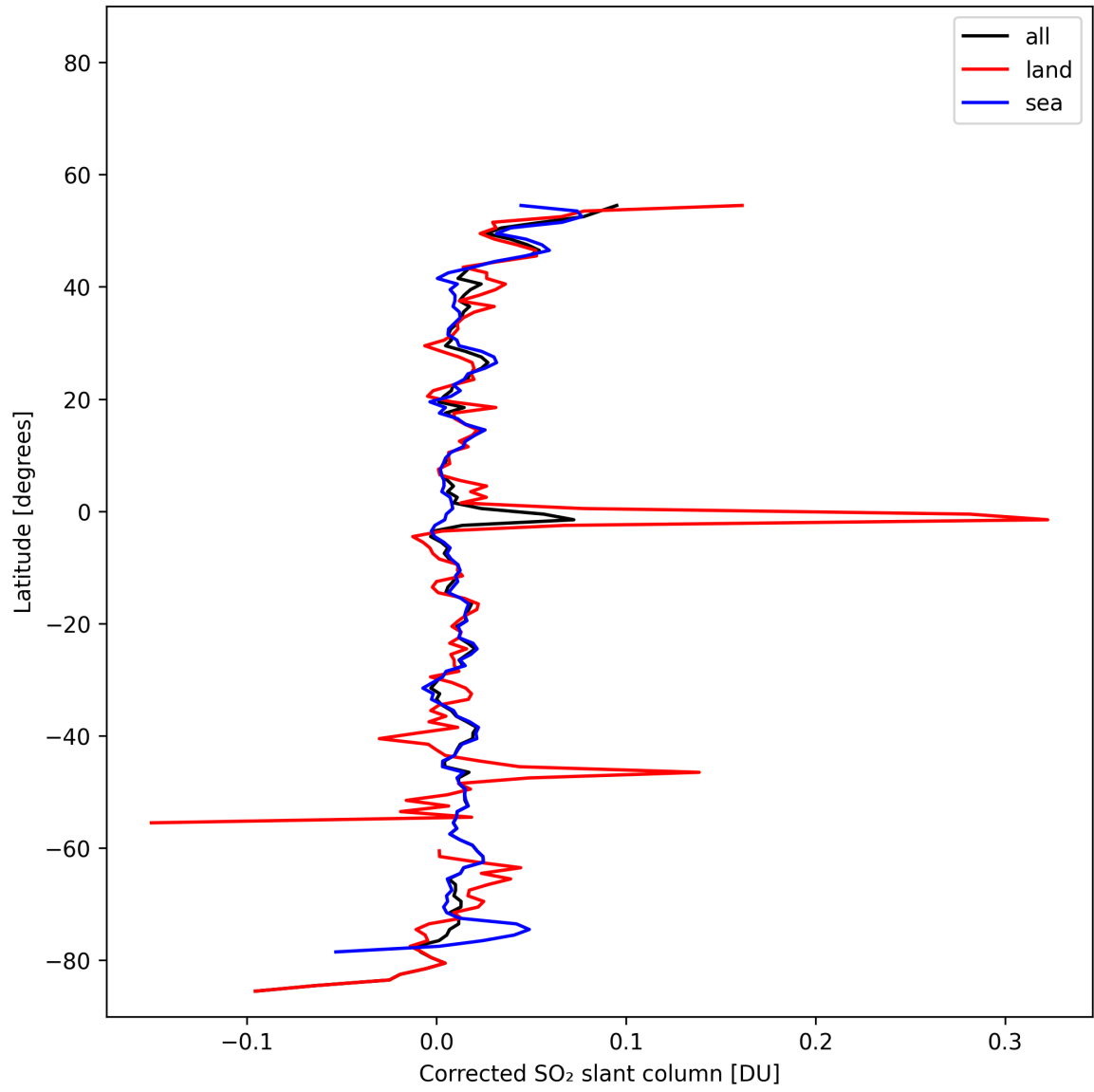


Figure 33: Zonal average of "Corrected SO₂ slant column" for 2025-11-04 to 2025-11-05.

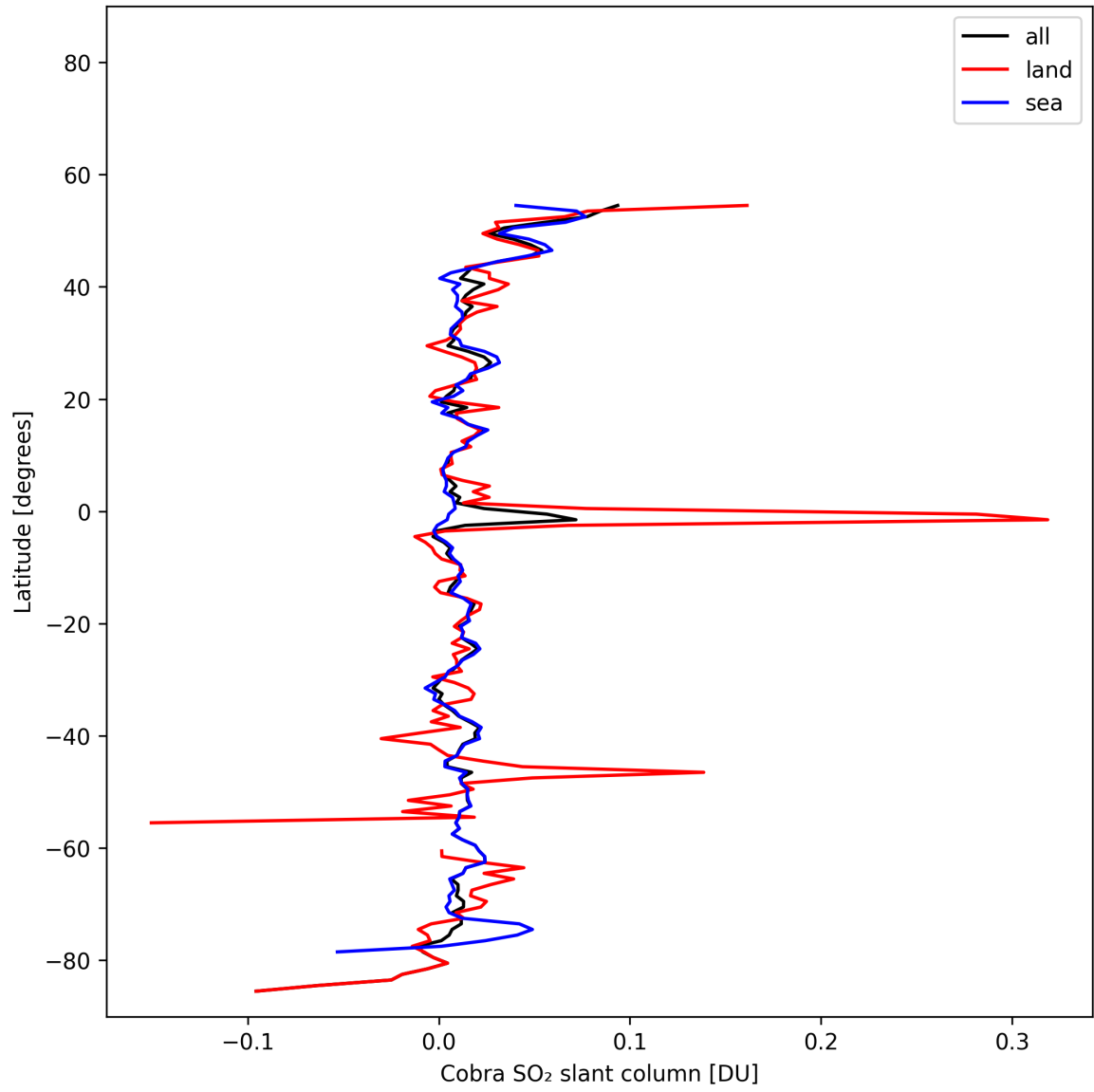


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-11-04 to 2025-11-05.

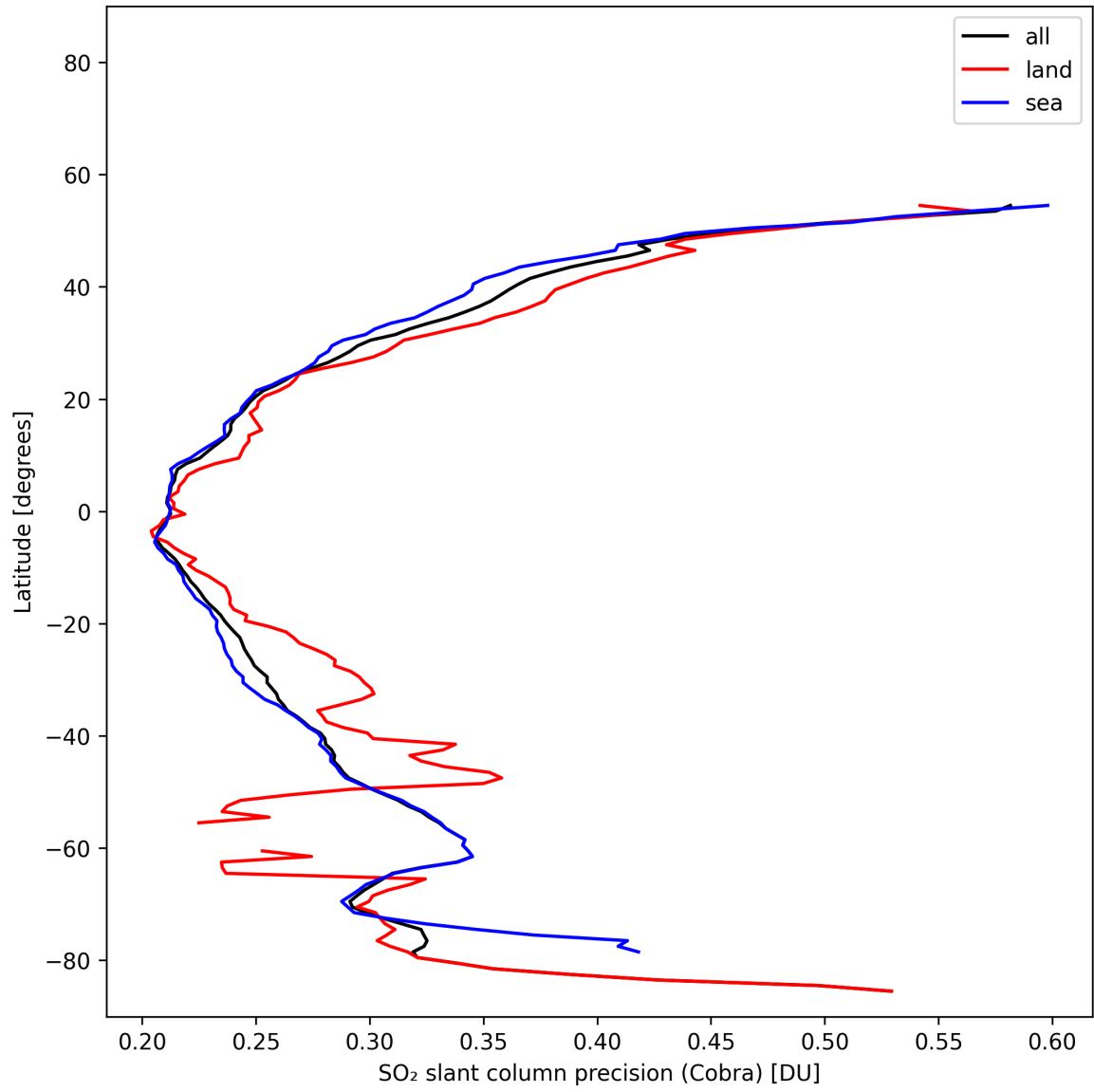


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-11-04 to 2025-11-05.

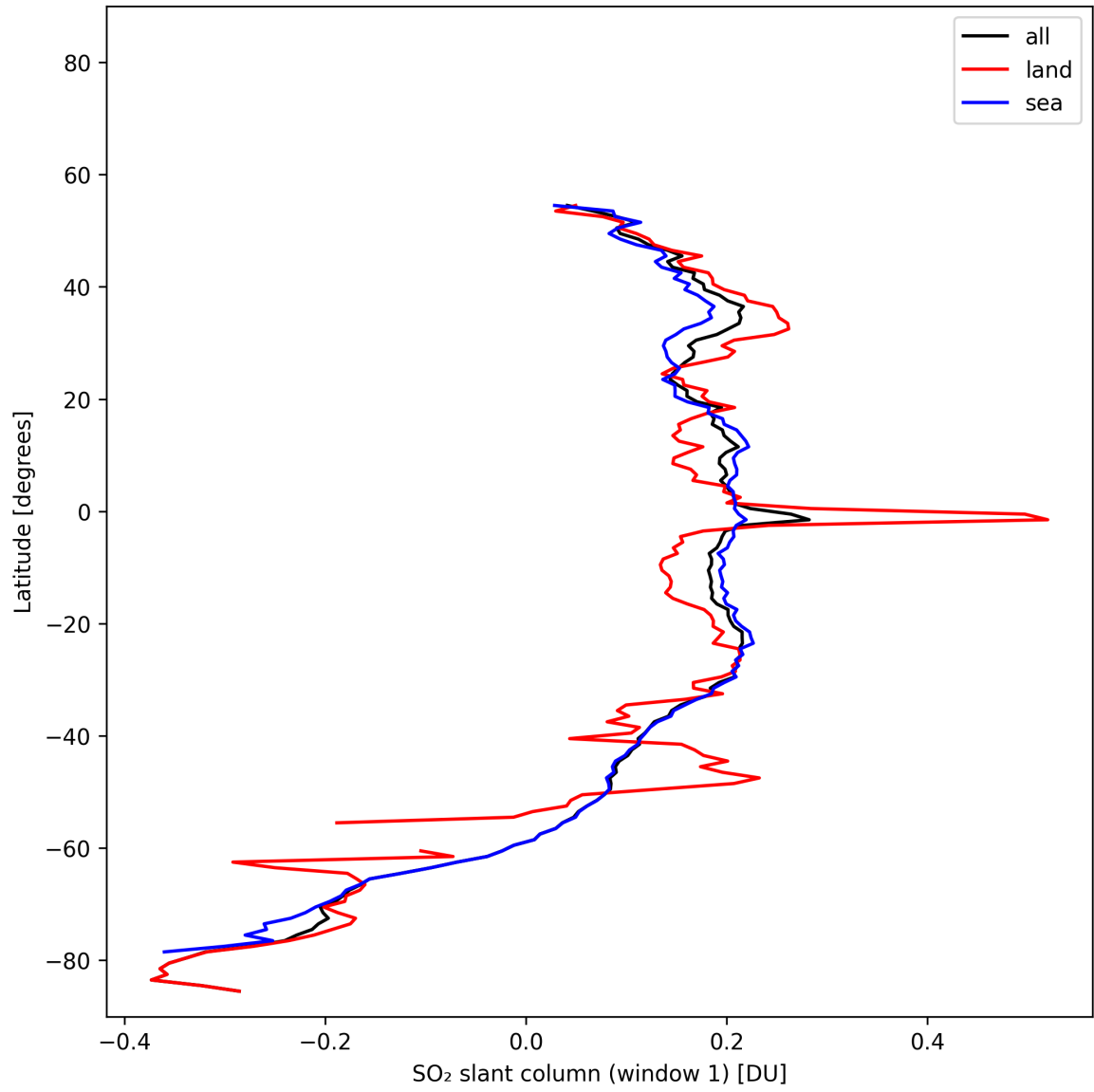


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-11-04 to 2025-11-05.

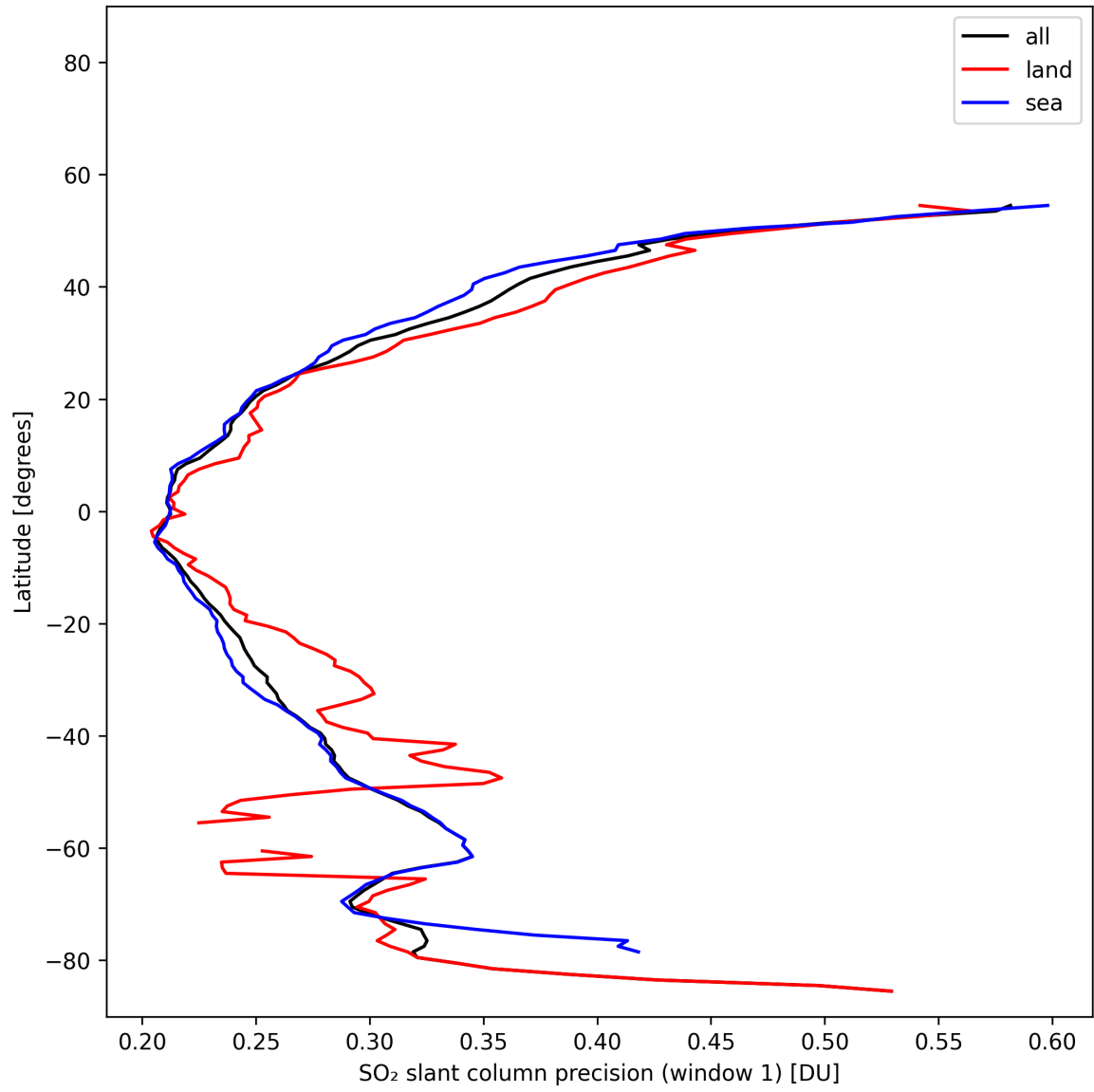


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-11-04 to 2025-11-05.

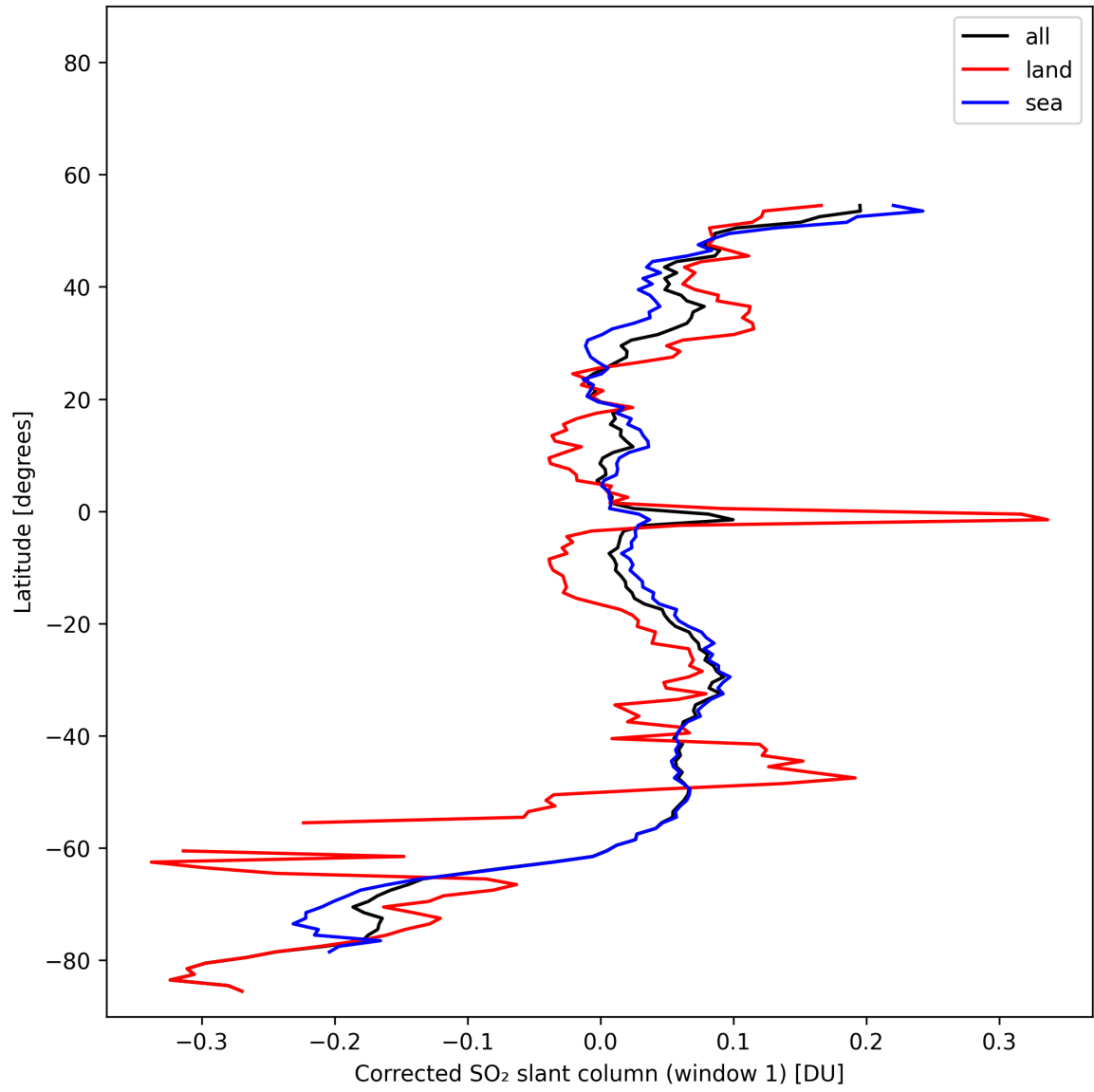


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-11-04 to 2025-11-05.

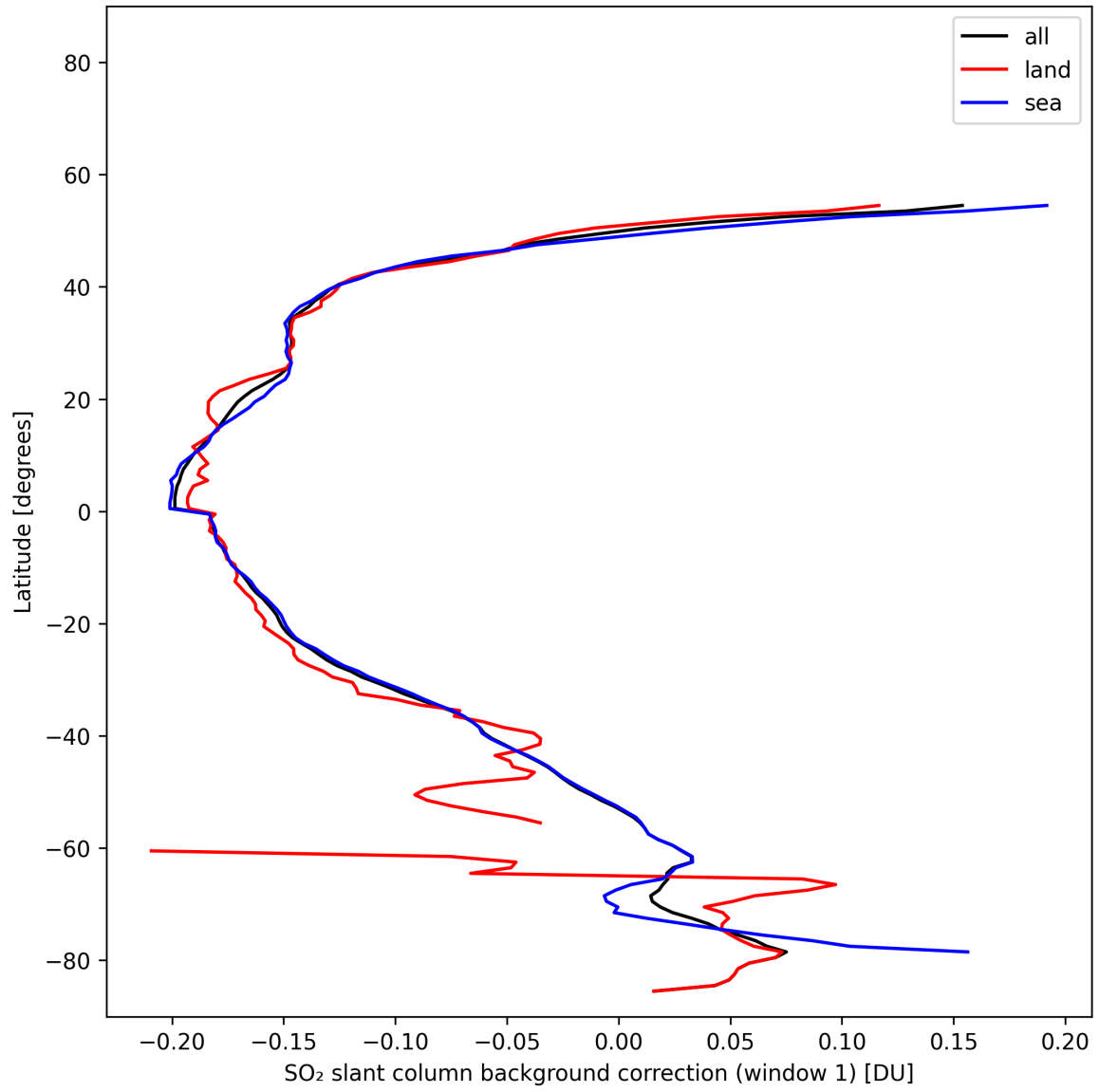


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-11-04 to 2025-11-05.

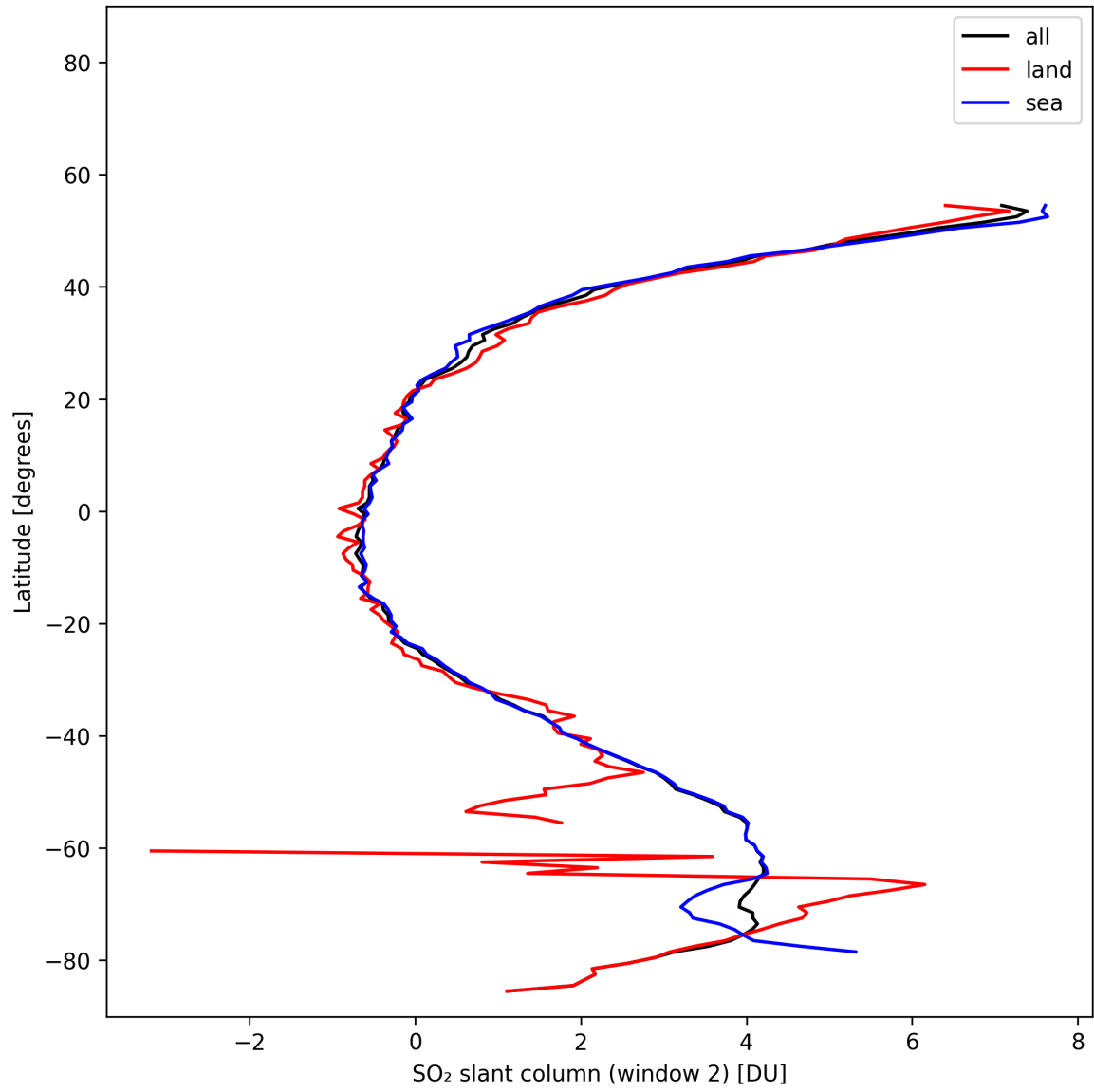


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-11-04 to 2025-11-05.

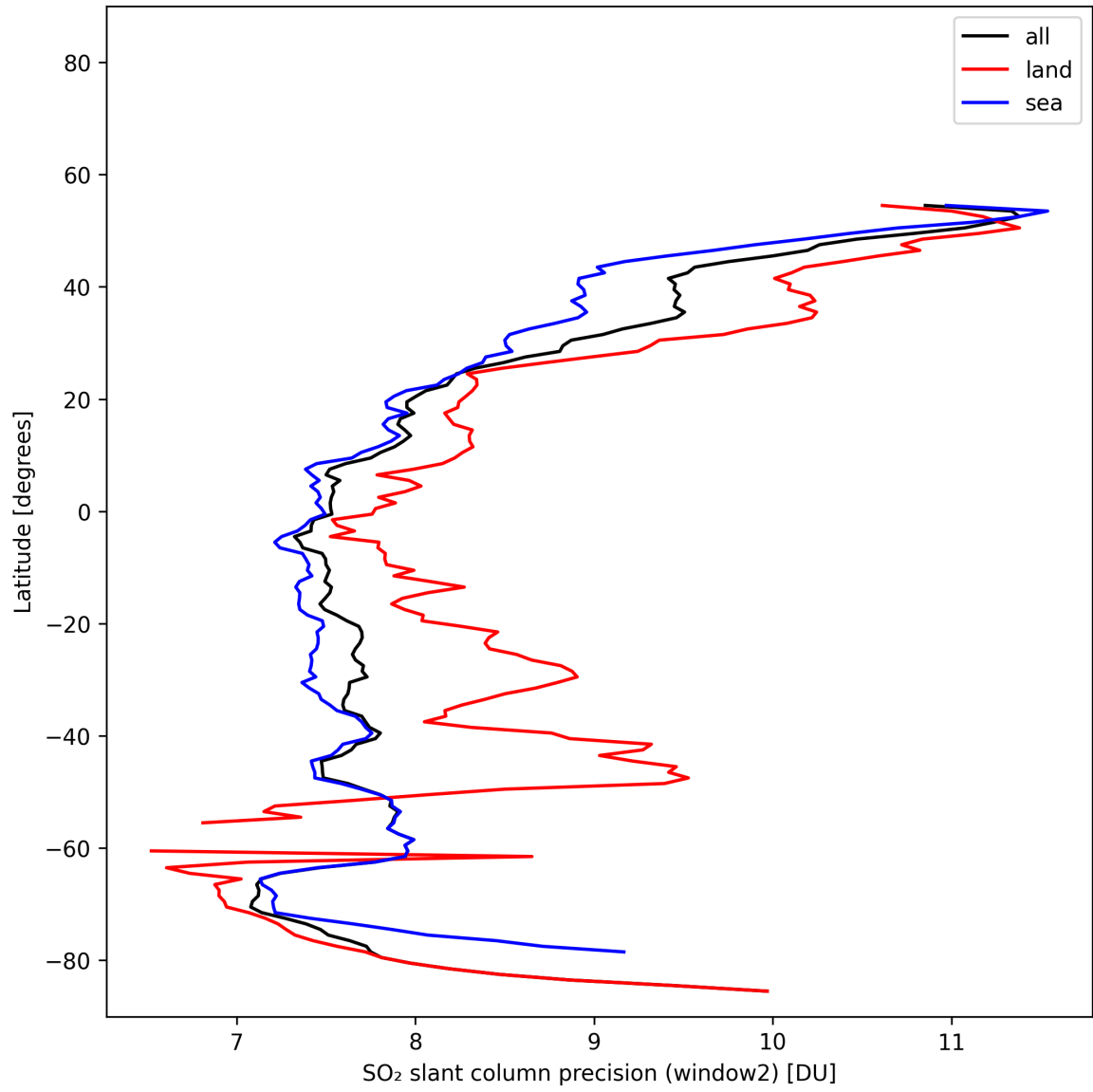


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-11-04 to 2025-11-05.

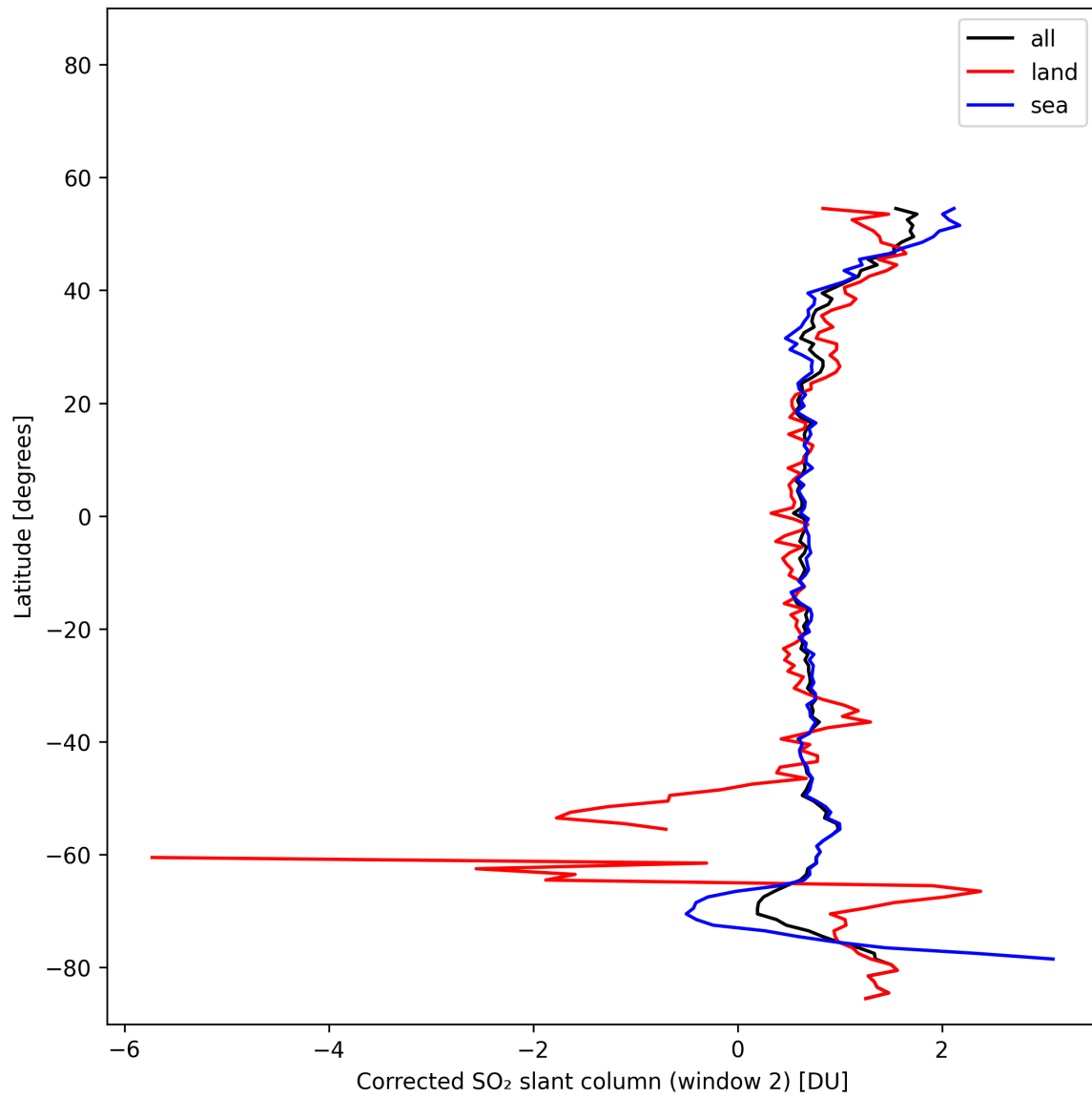


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-11-04 to 2025-11-05.

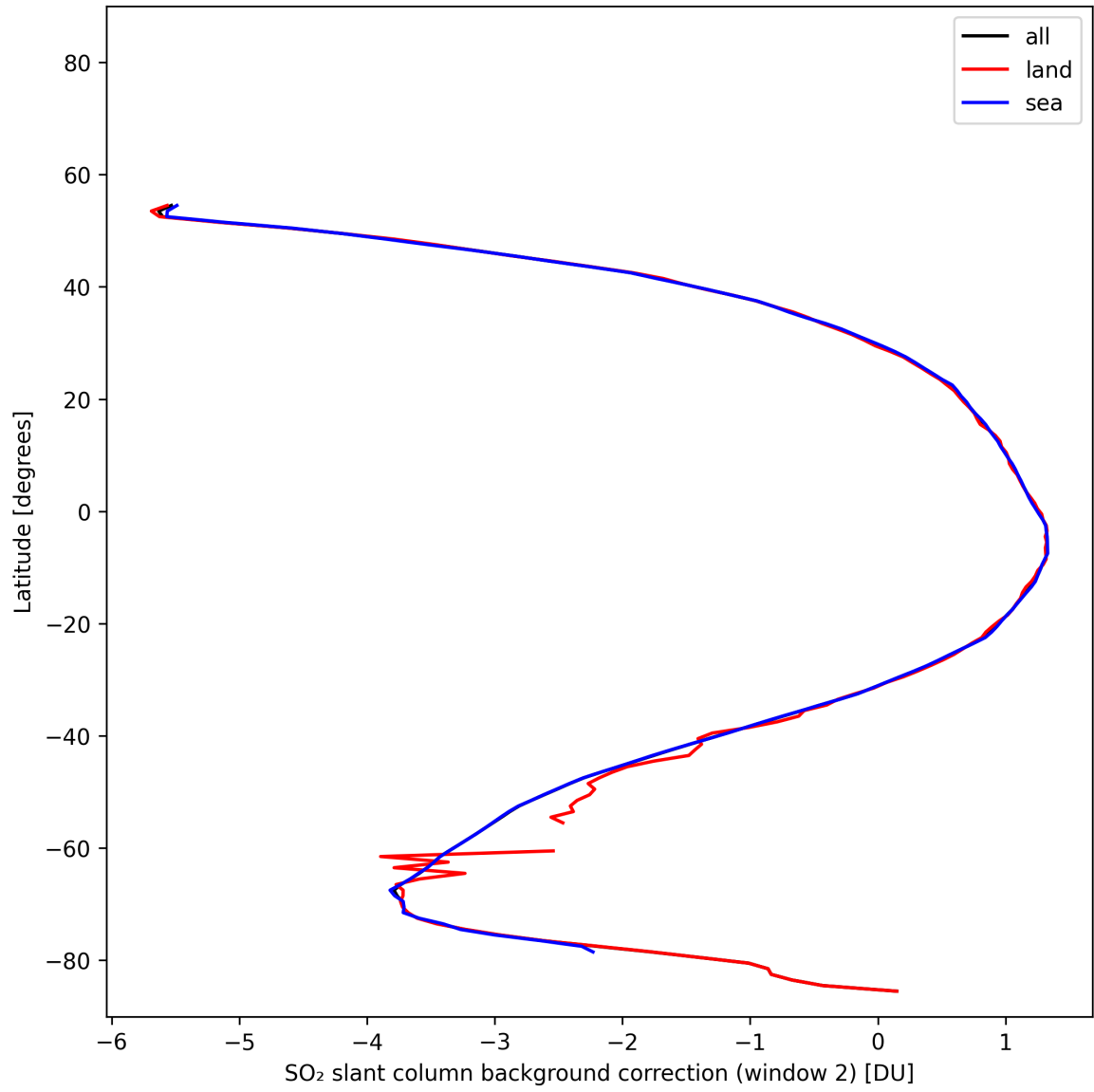


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-11-04 to 2025-11-05.

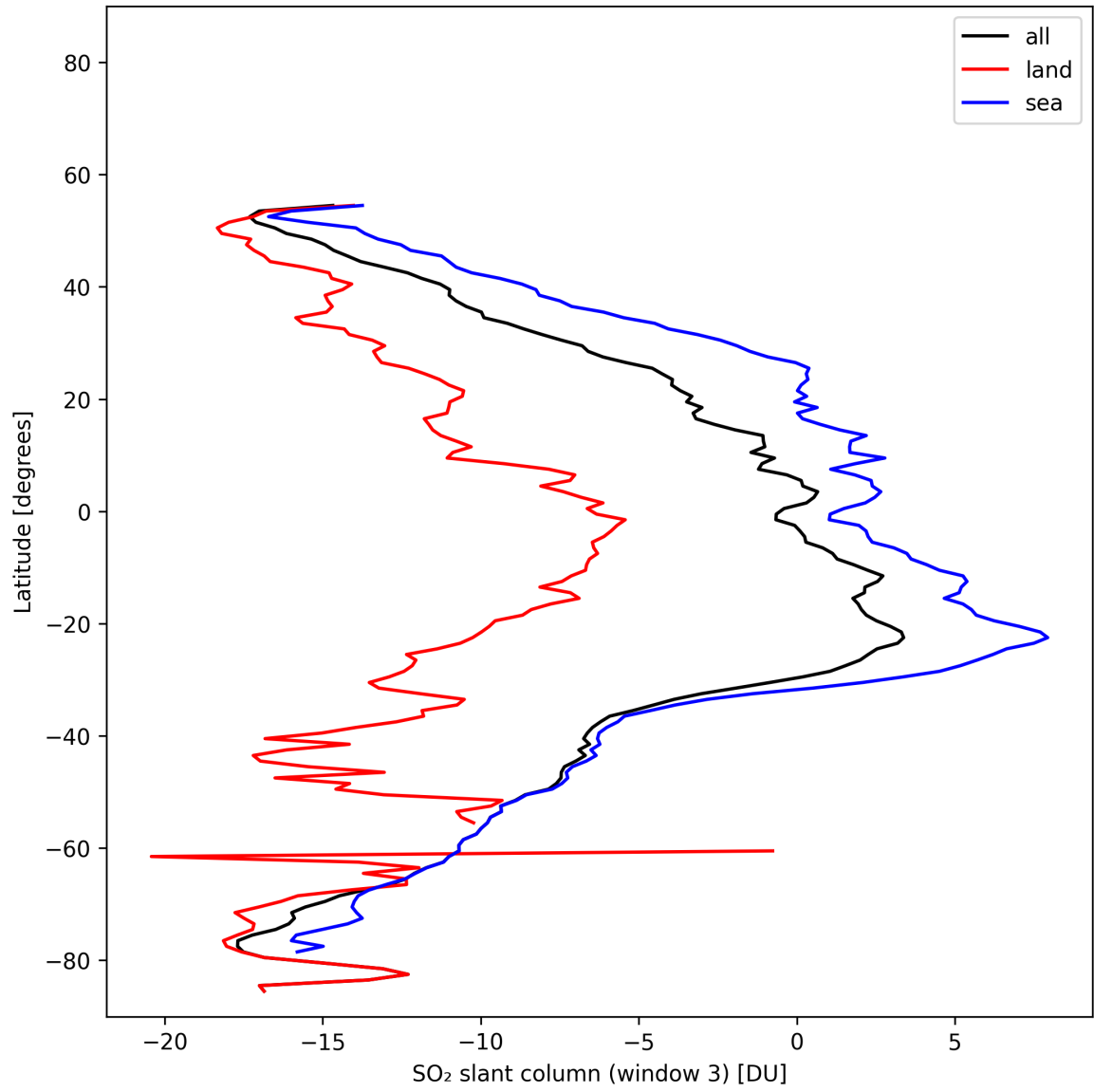


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-11-04 to 2025-11-05.

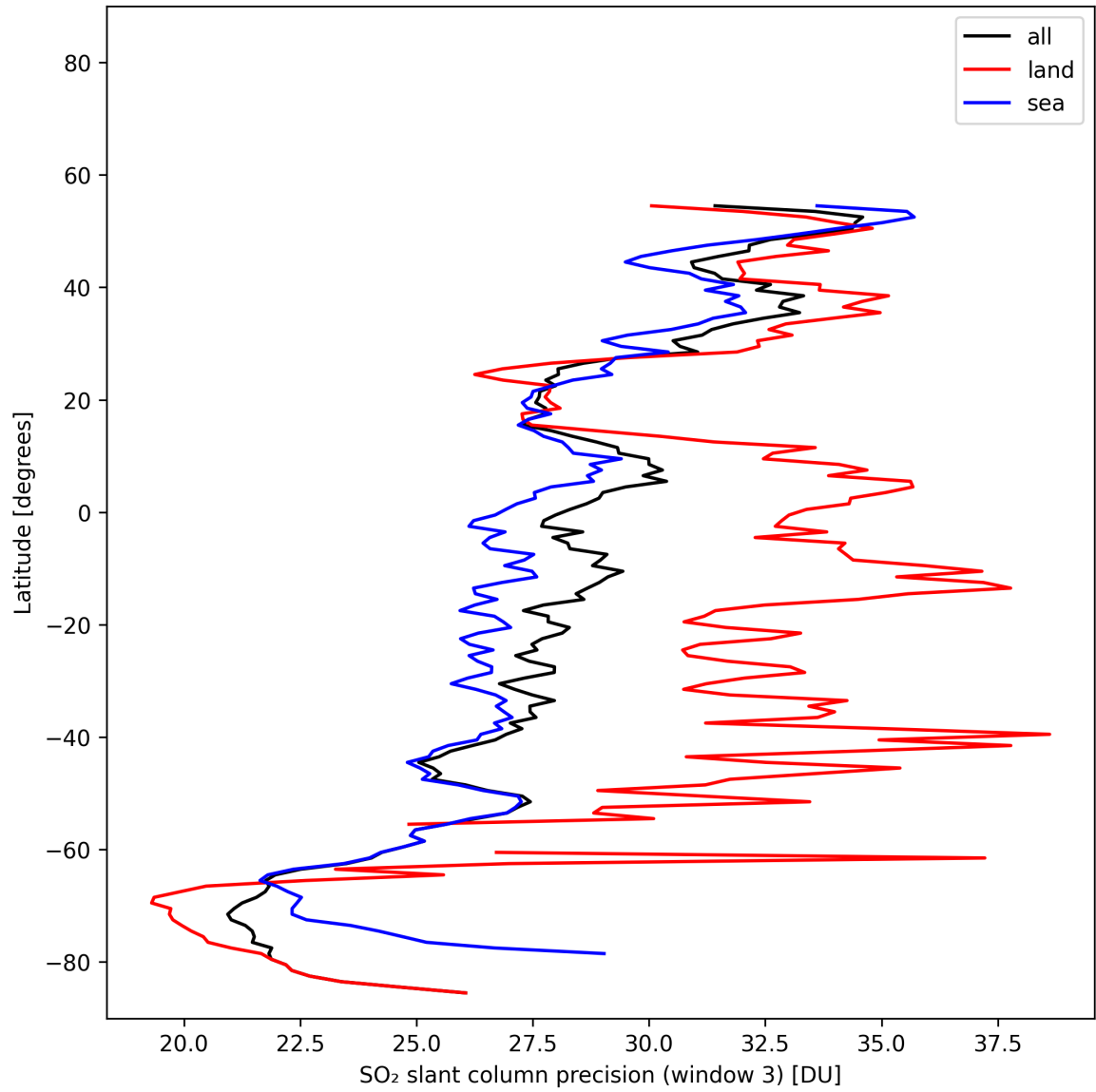


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-11-04 to 2025-11-05.

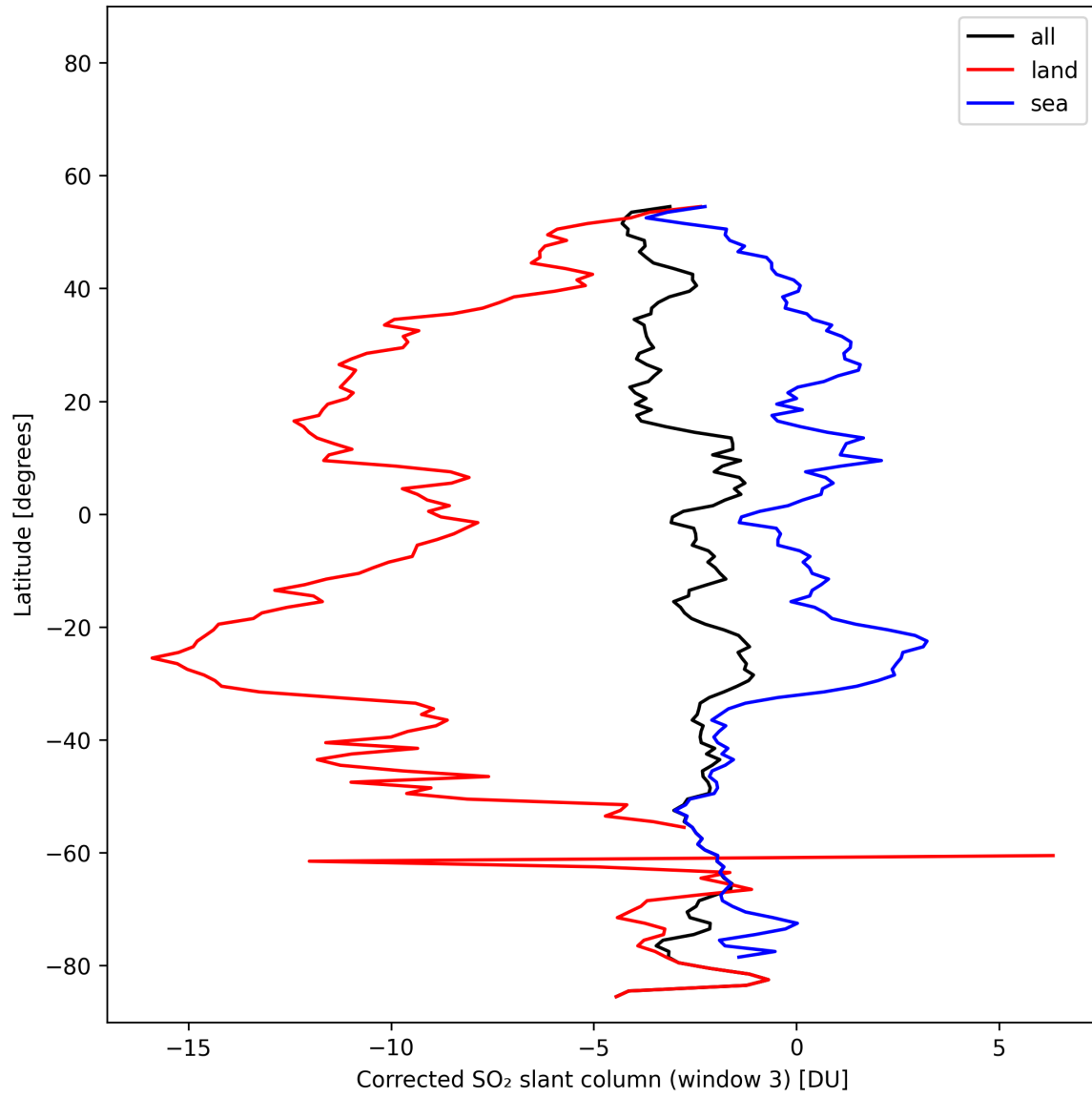


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-11-04 to 2025-11-05.

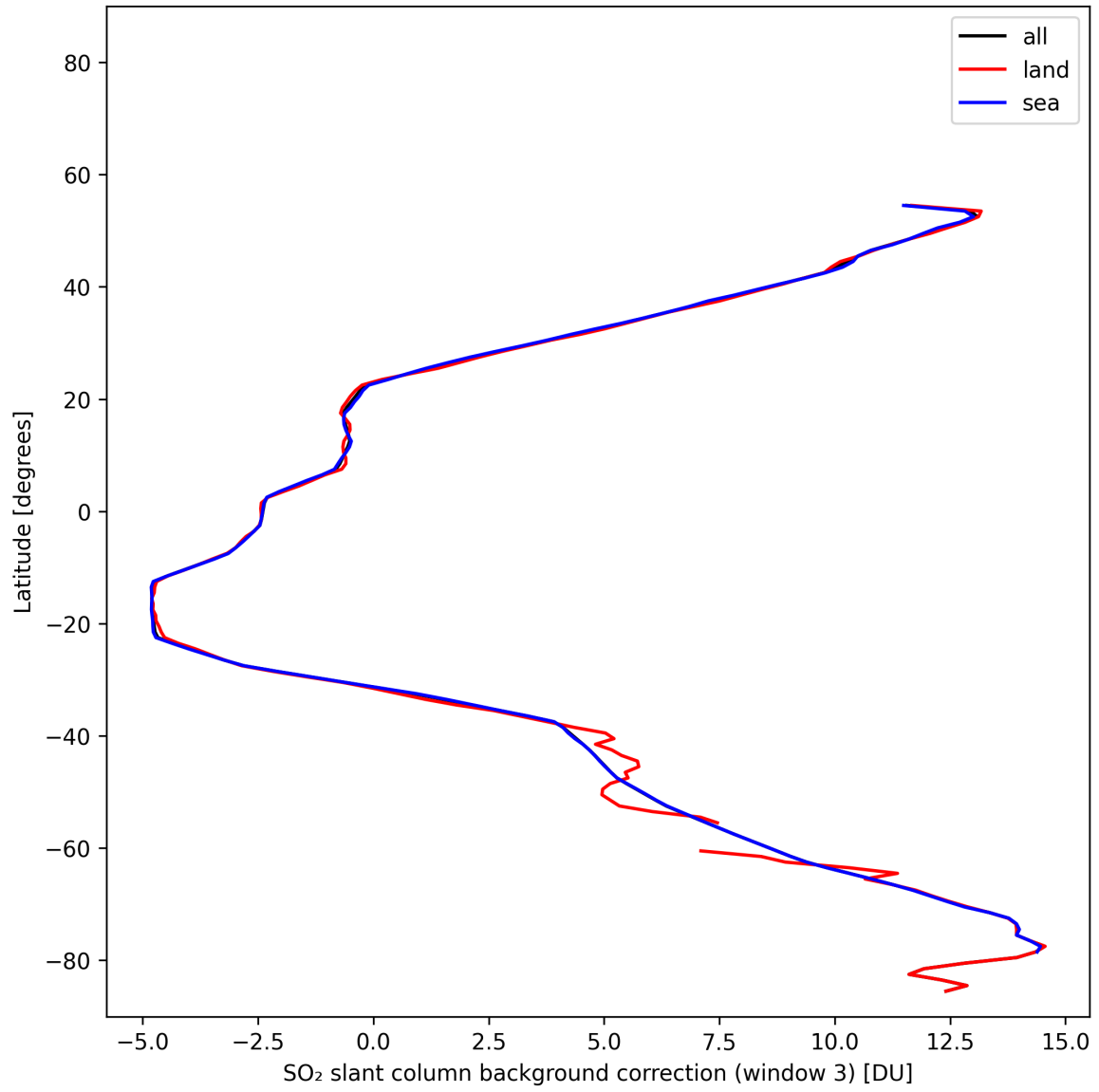


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-11-04 to 2025-11-05.

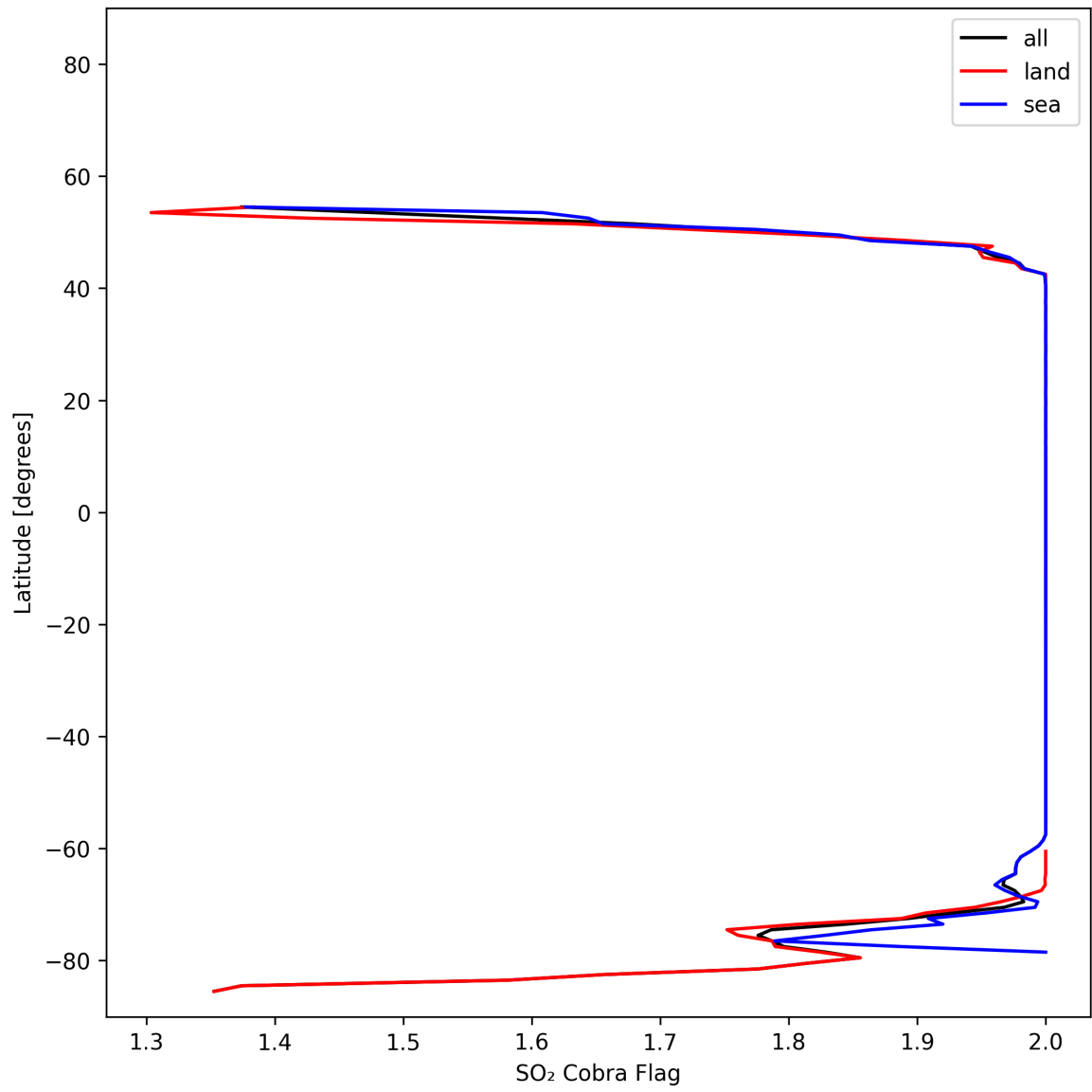


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-11-04 to 2025-11-05.

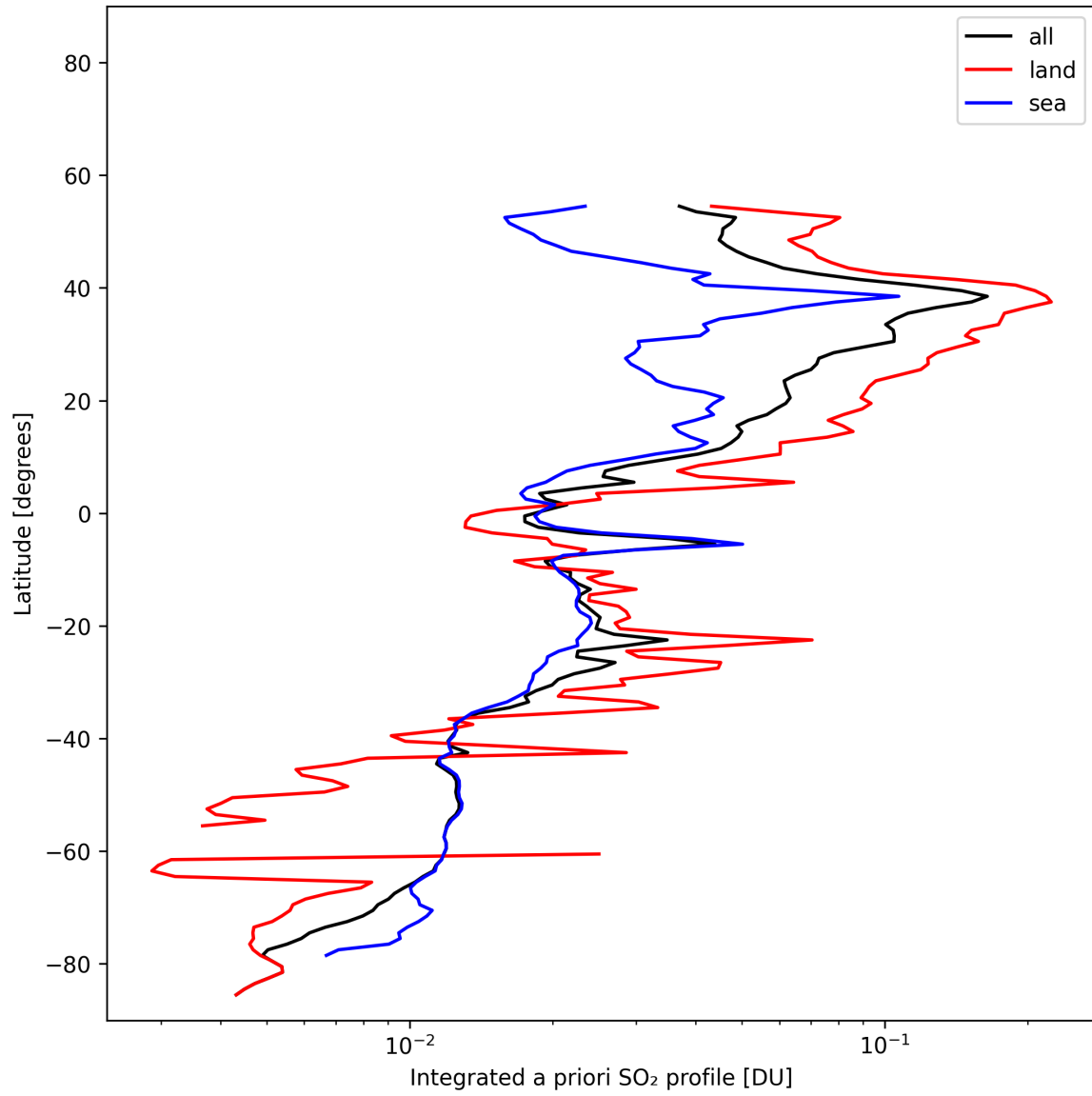


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-11-04 to 2025-11-05.

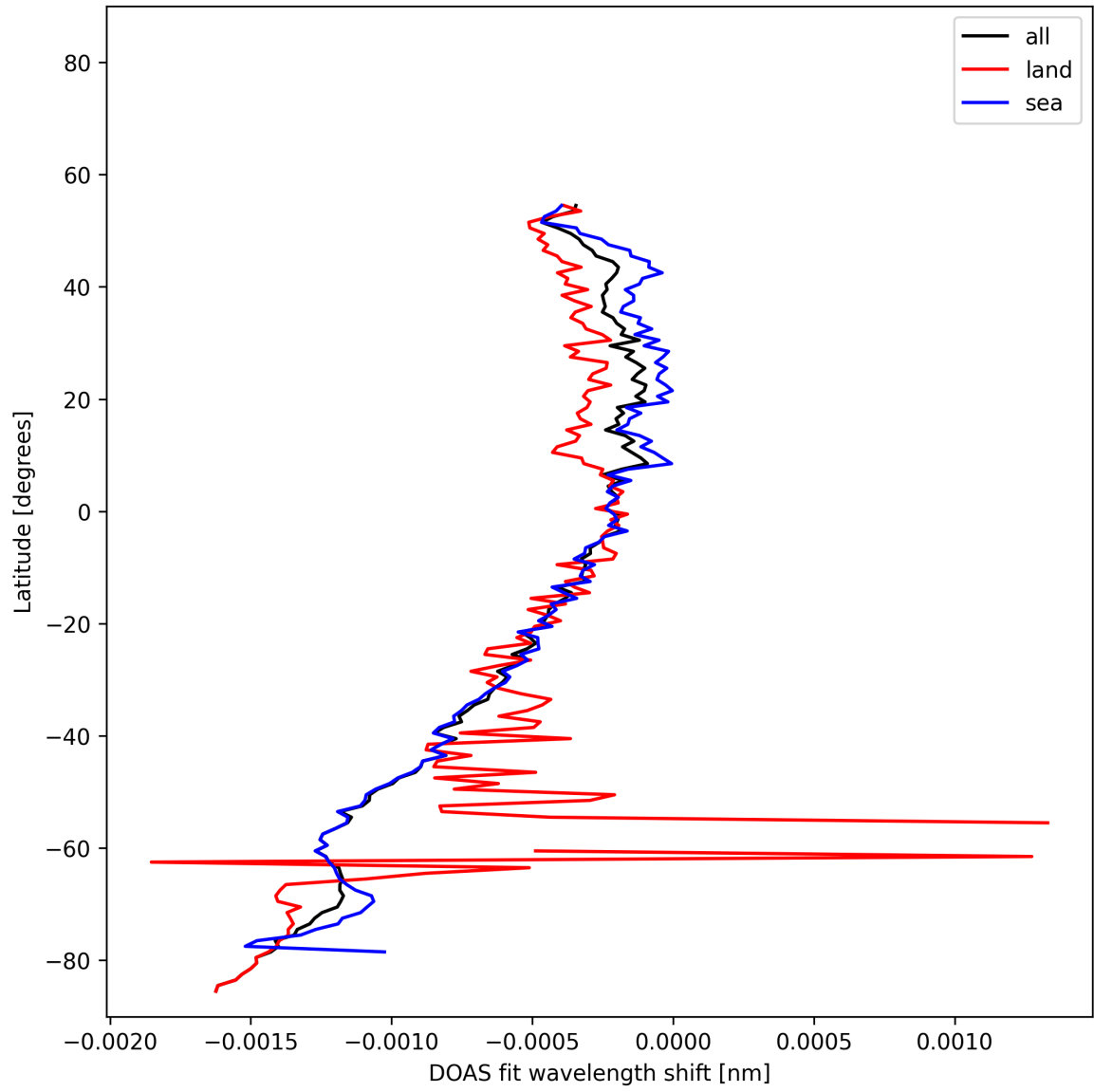


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2025-11-04 to 2025-11-05.

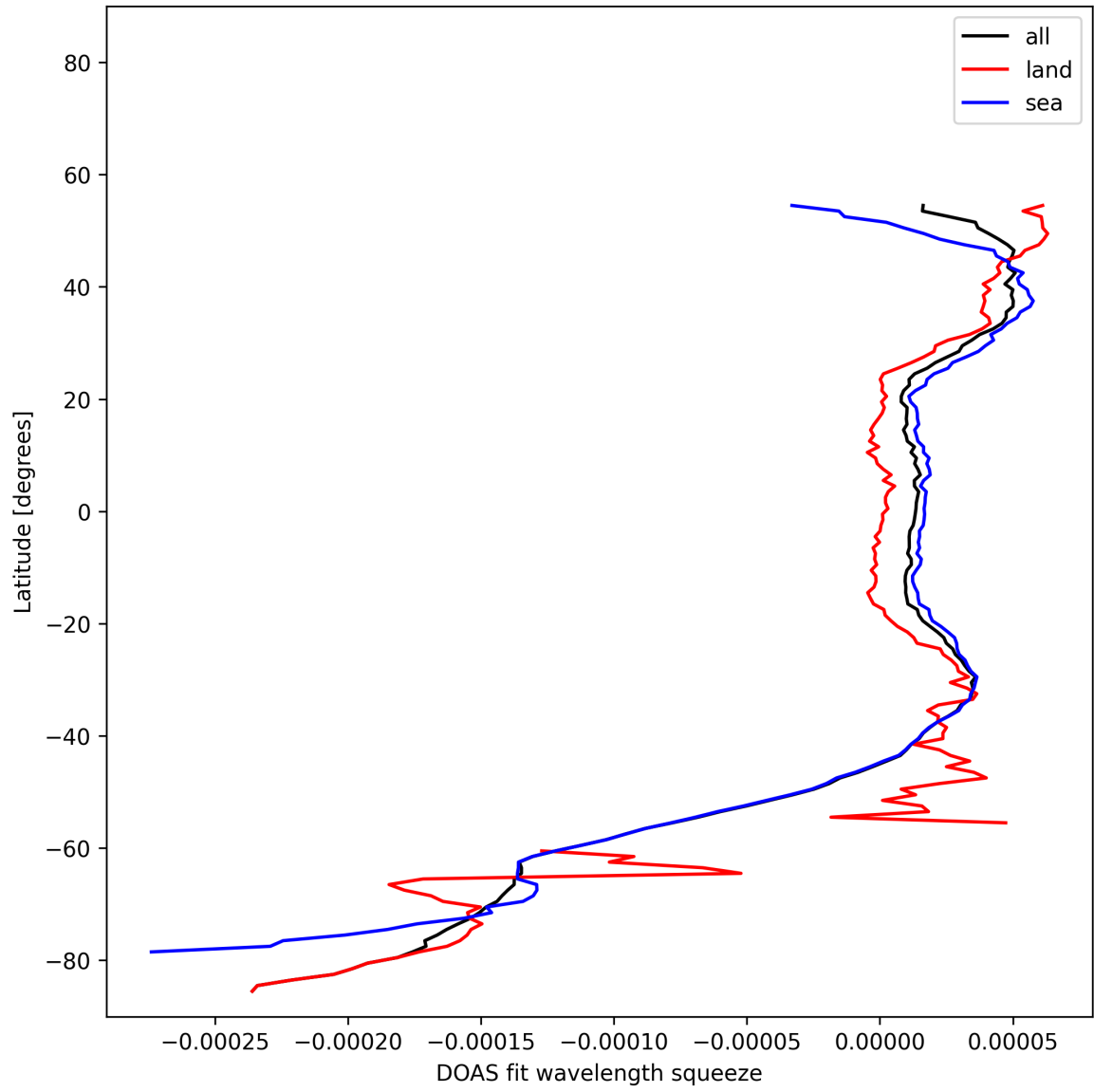


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-11-04 to 2025-11-05.

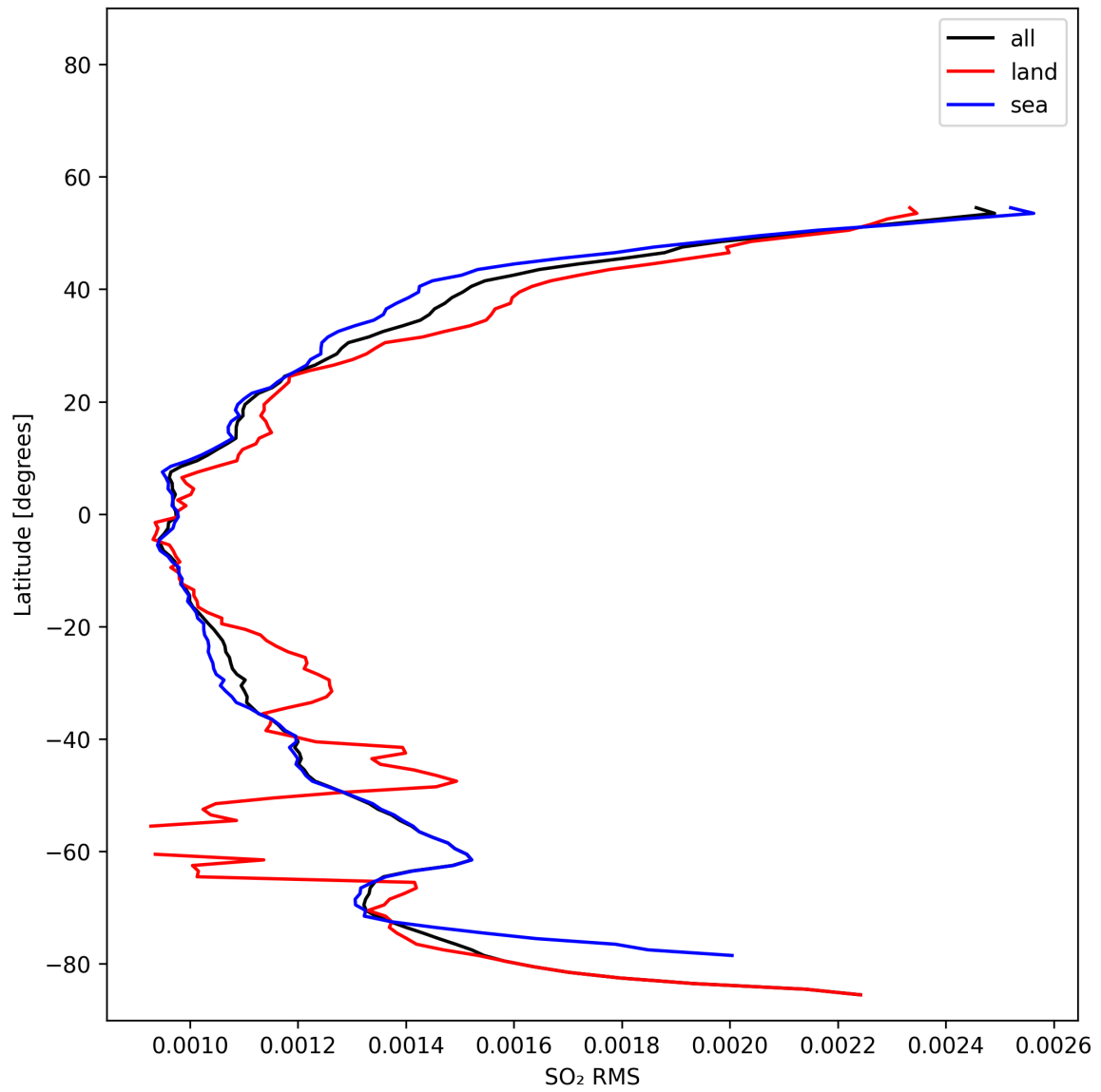


Figure 52: Zonal average of “SO₂ RMS” for 2025-11-04 to 2025-11-05.

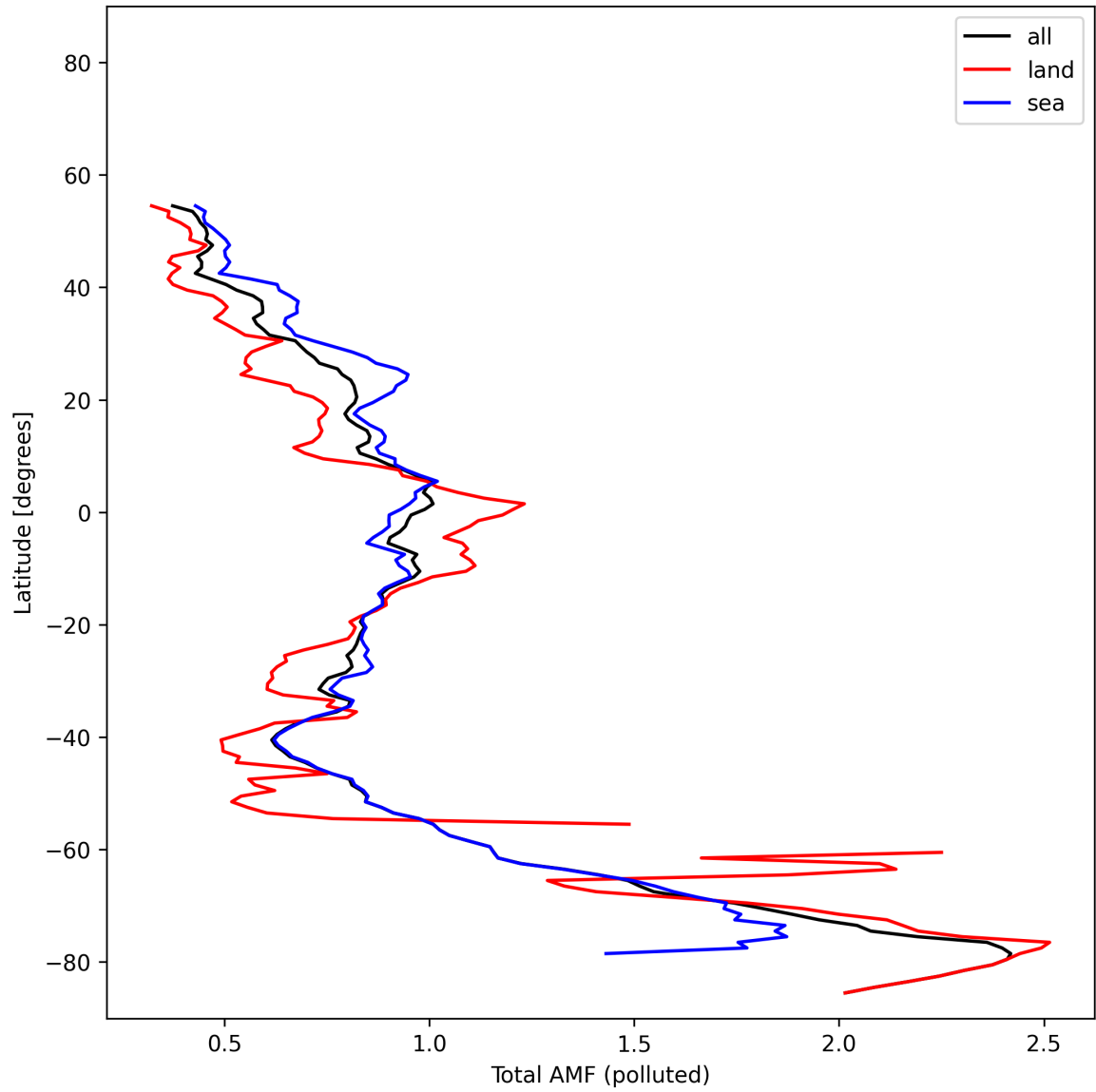


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-11-04 to 2025-11-05.

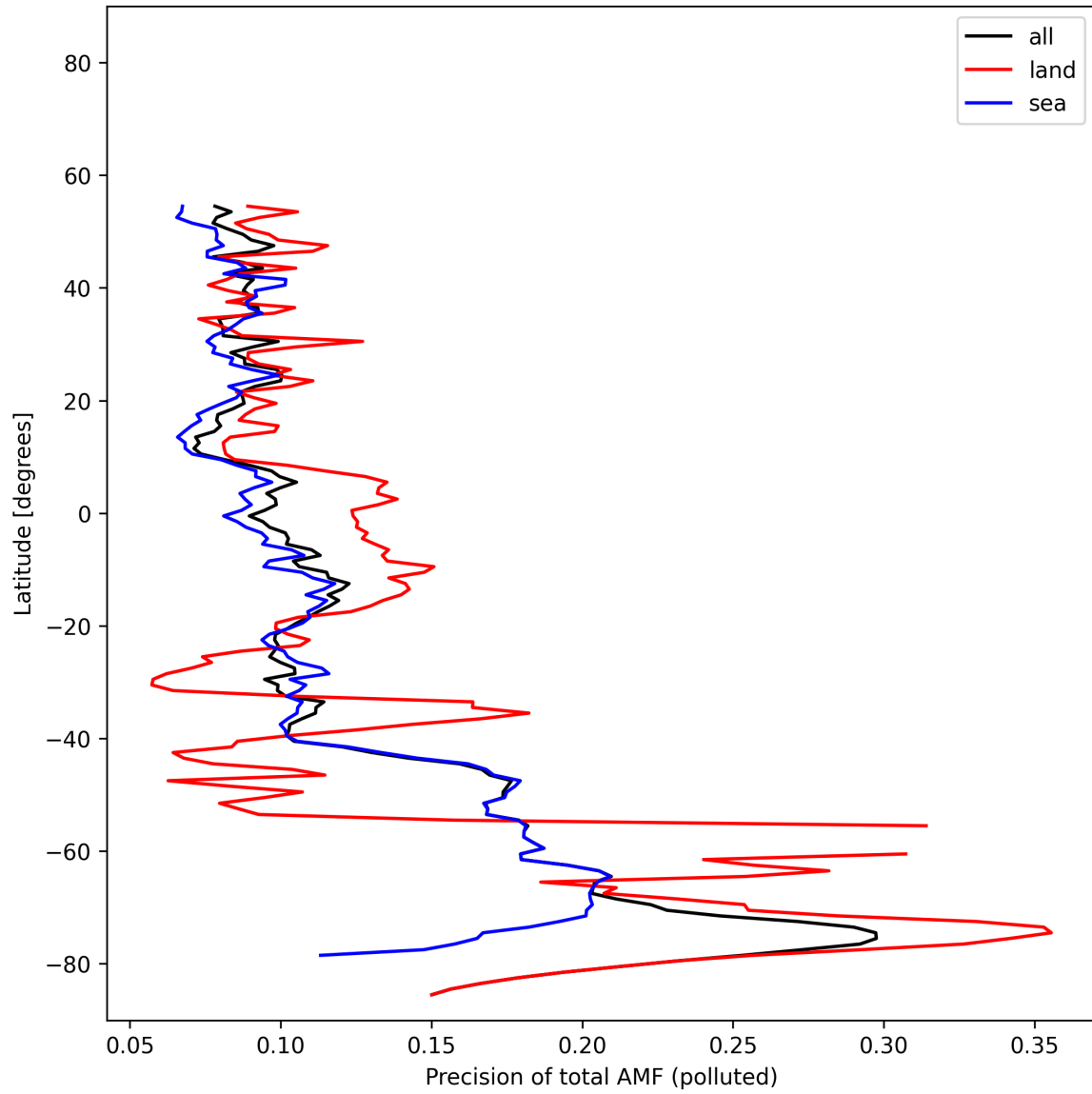


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-11-04 to 2025-11-05.

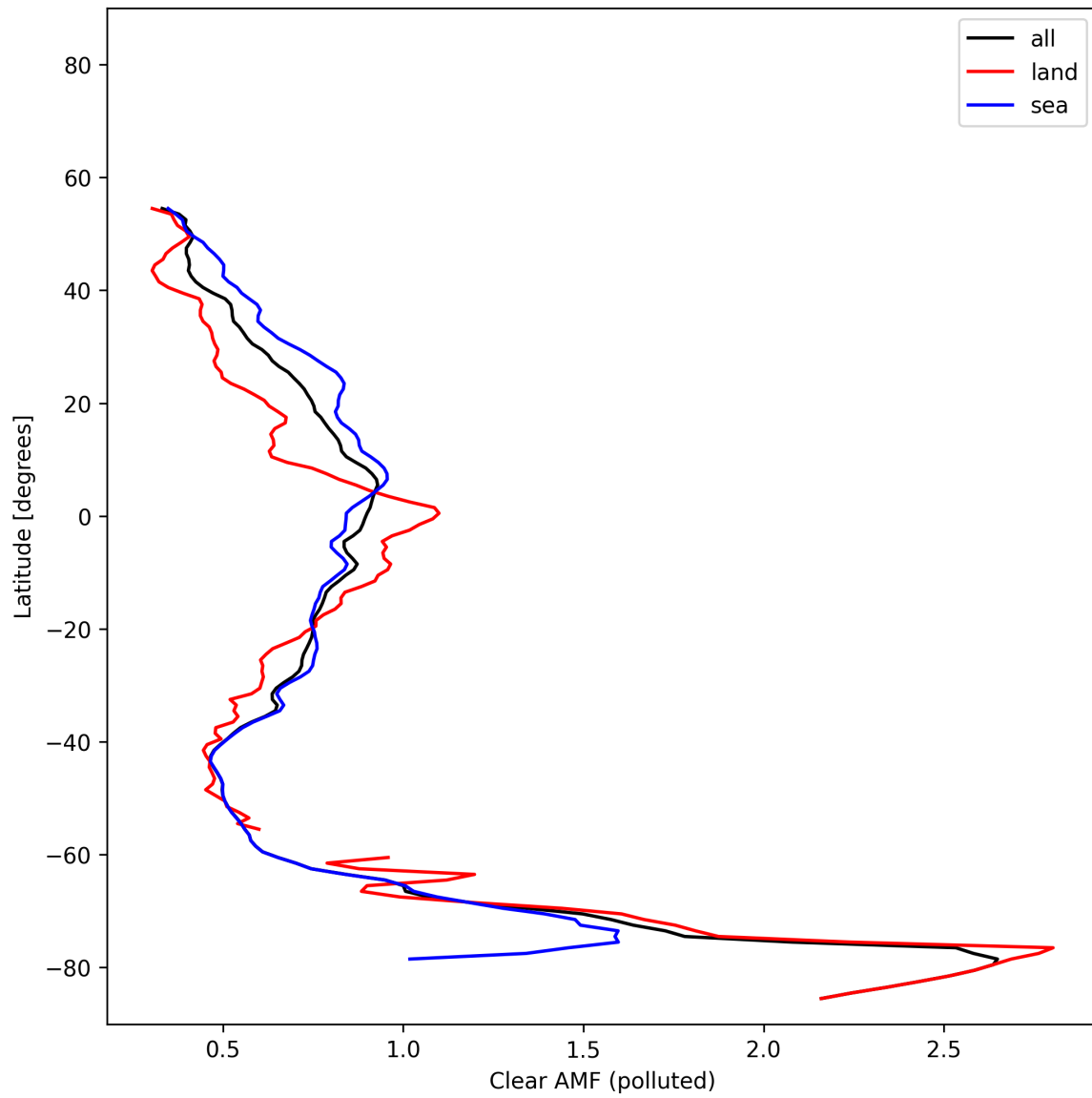


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-11-04 to 2025-11-05.

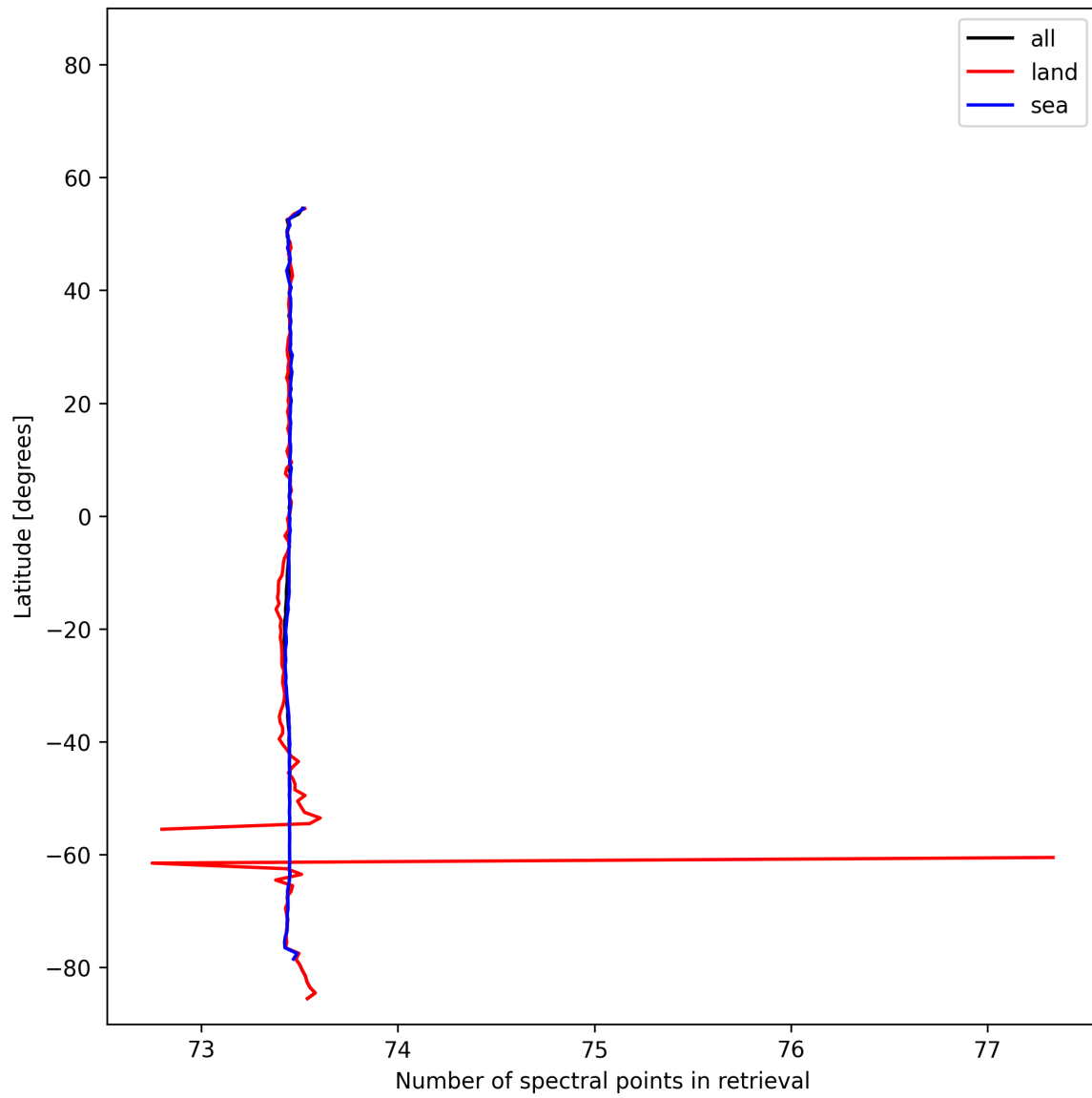


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-11-04 to 2025-11-05.

8 Histograms

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

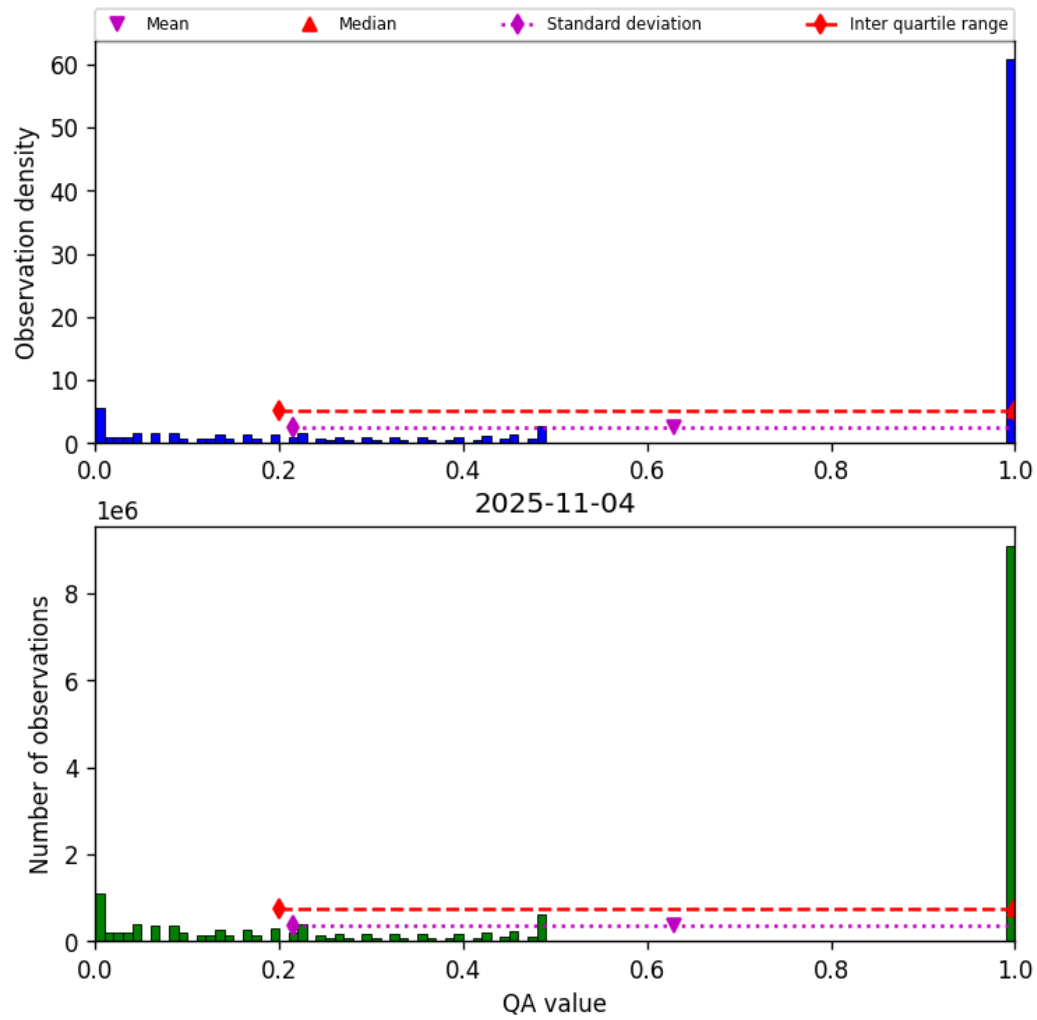


Figure 57: Histogram of “QA value” for 2025-11-04 to 2025-11-05

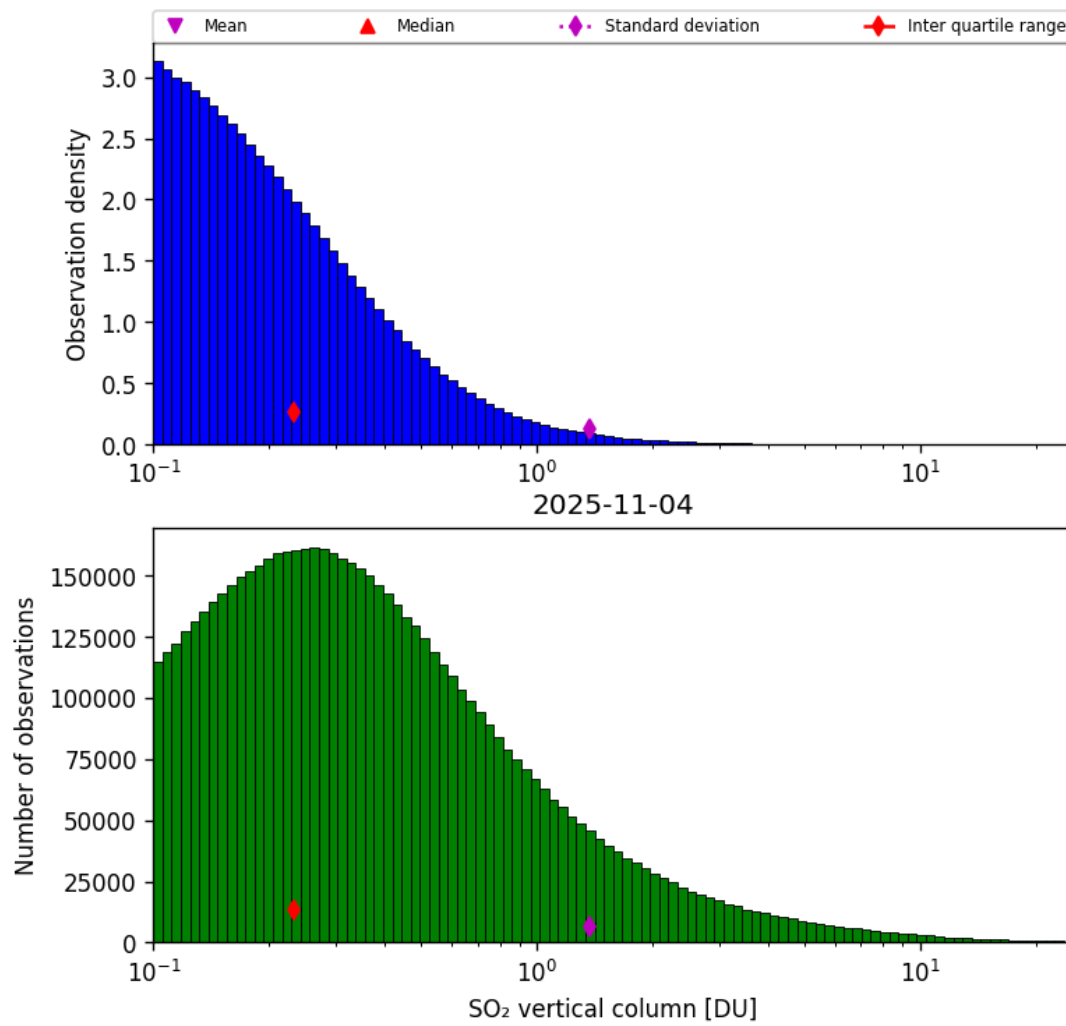


Figure 58: Histogram of “SO₂ vertical column” for 2025-11-04 to 2025-11-05

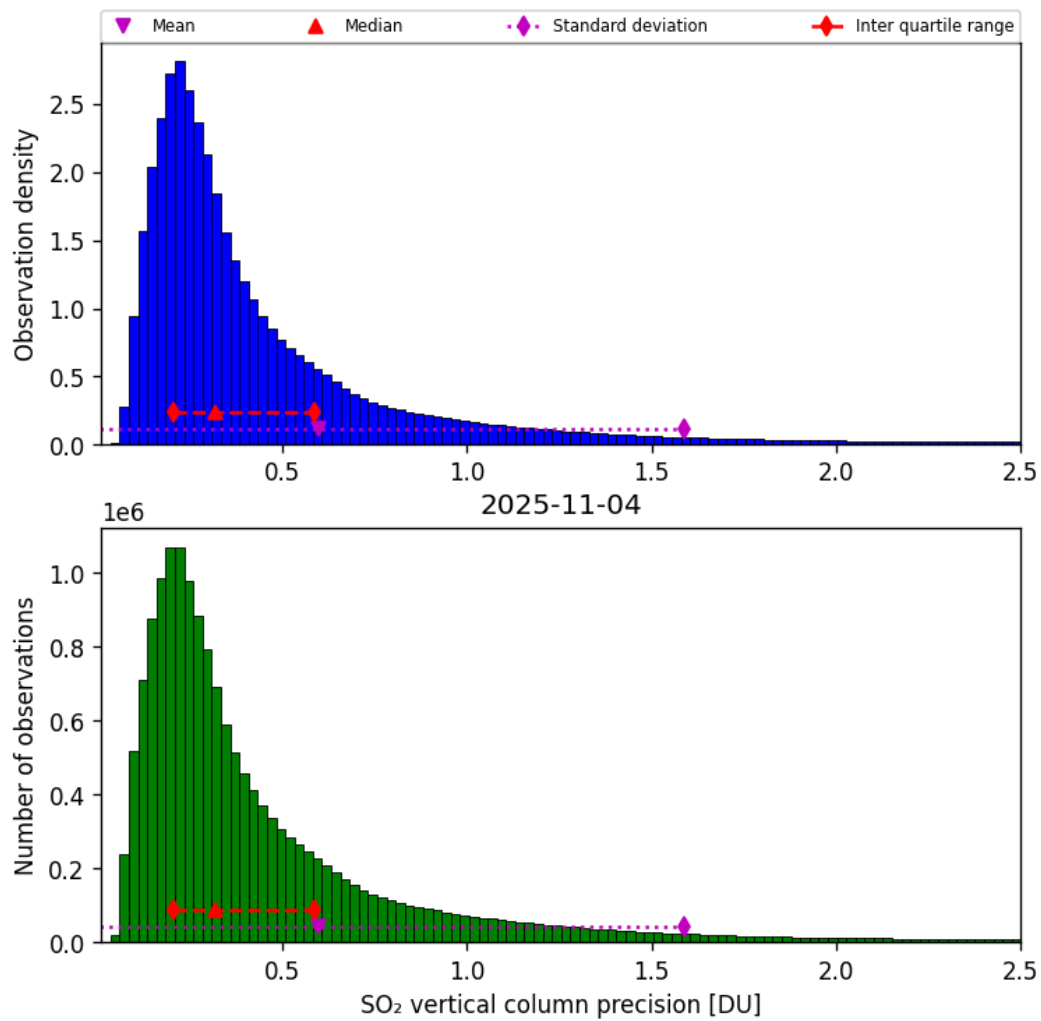


Figure 59: Histogram of "SO₂ vertical column precision" for 2025-11-04 to 2025-11-05

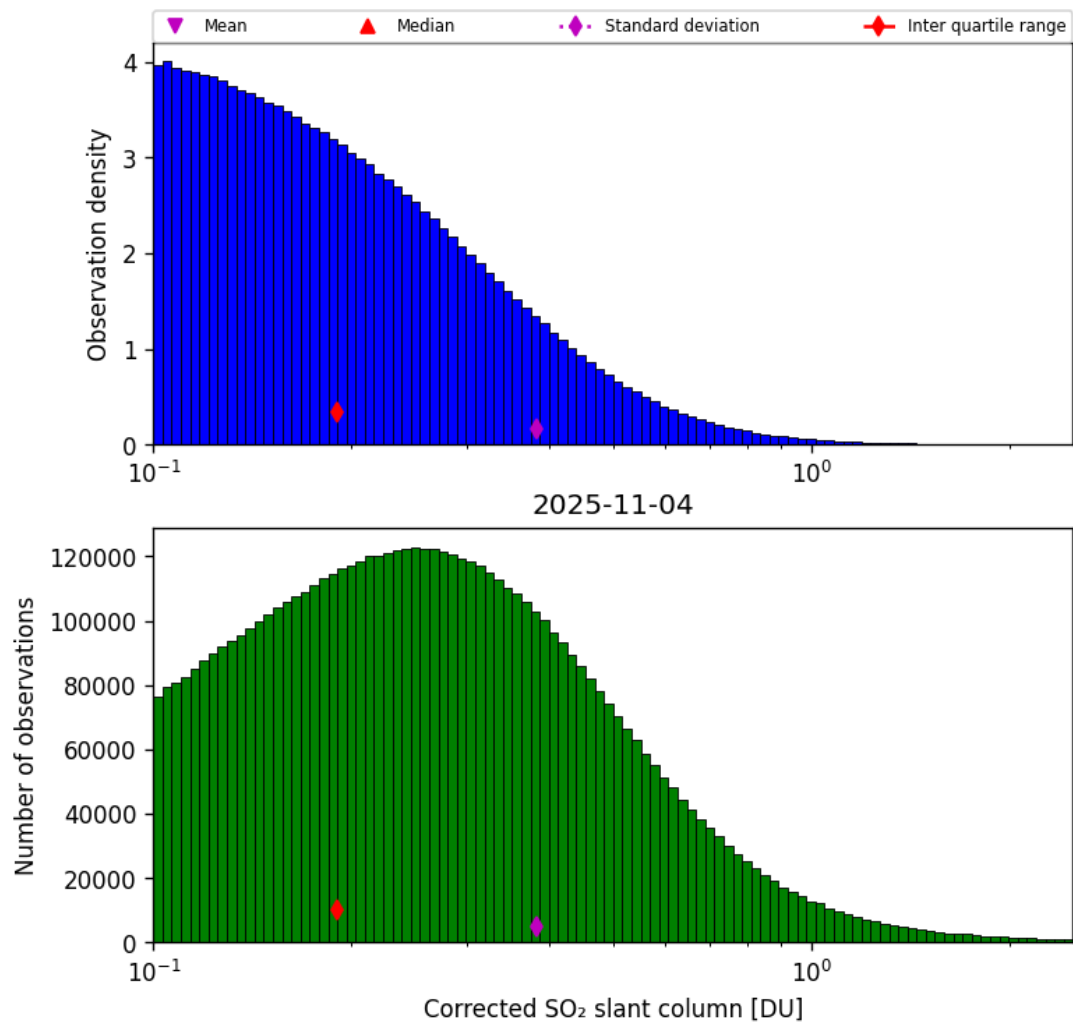


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-11-04 to 2025-11-05

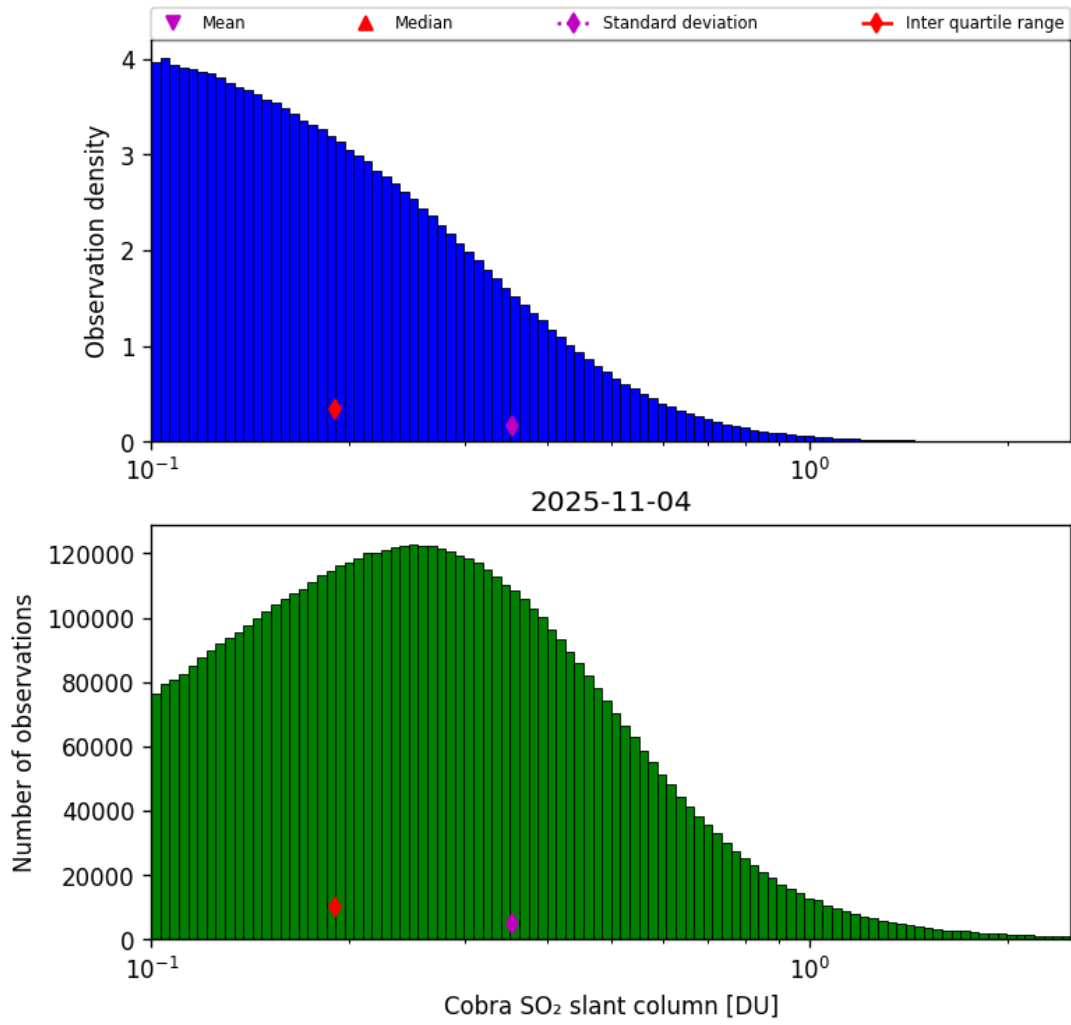


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-11-04 to 2025-11-05

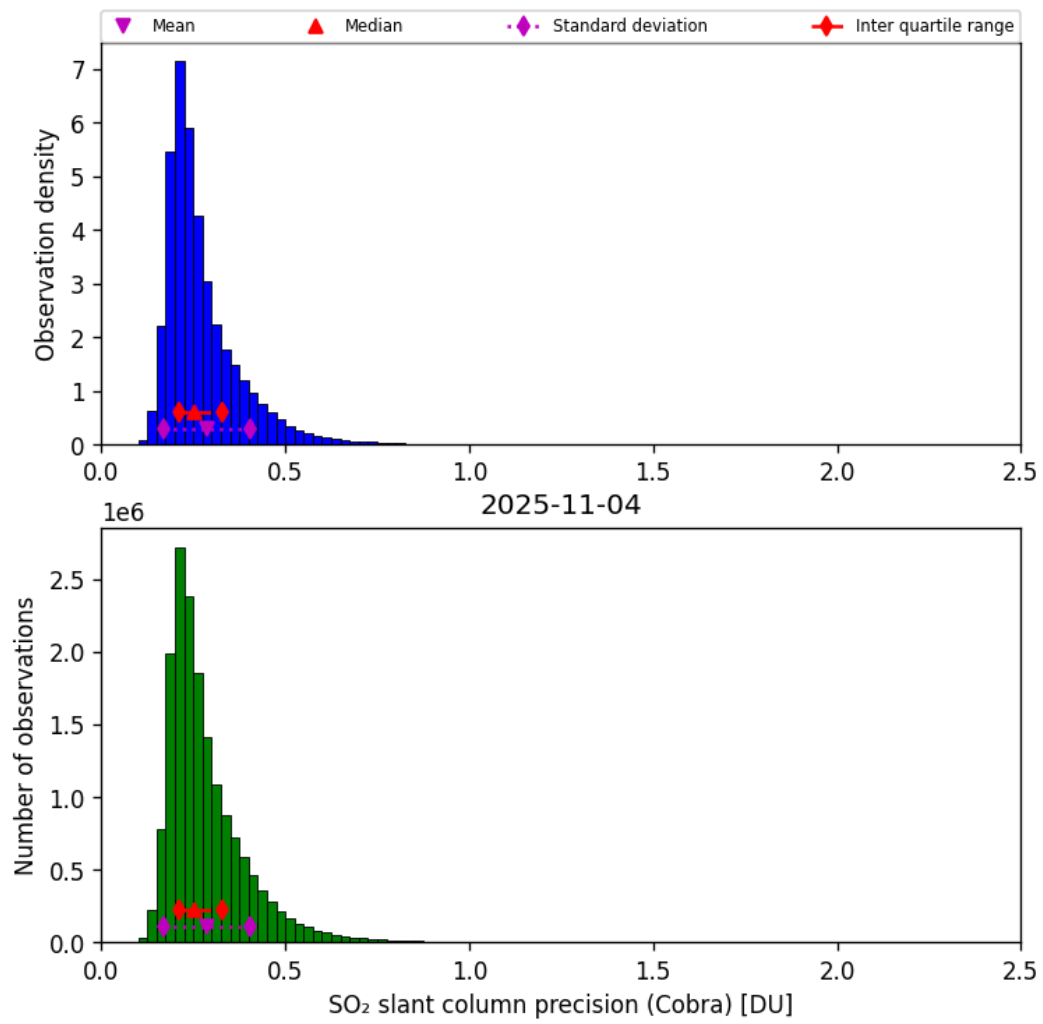


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-11-04 to 2025-11-05

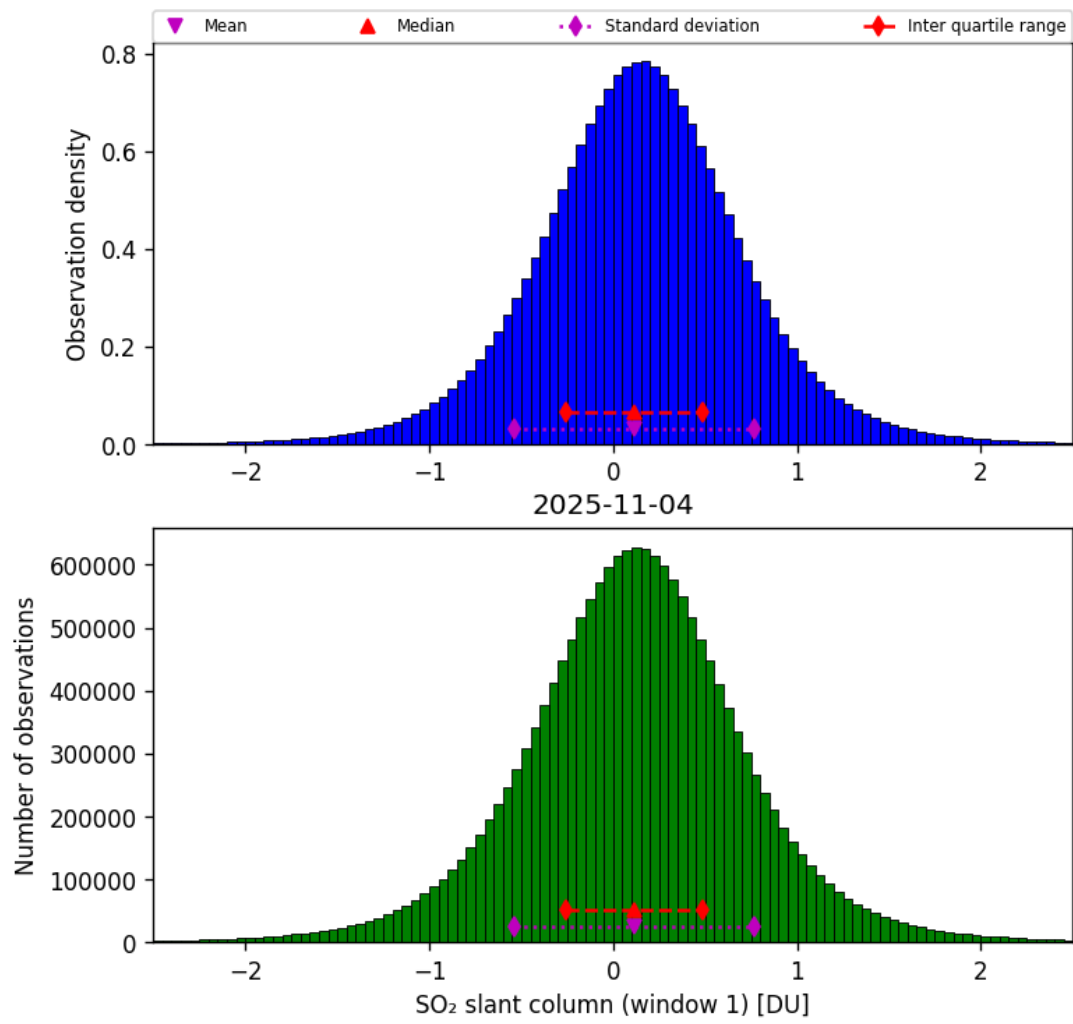


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-11-04 to 2025-11-05

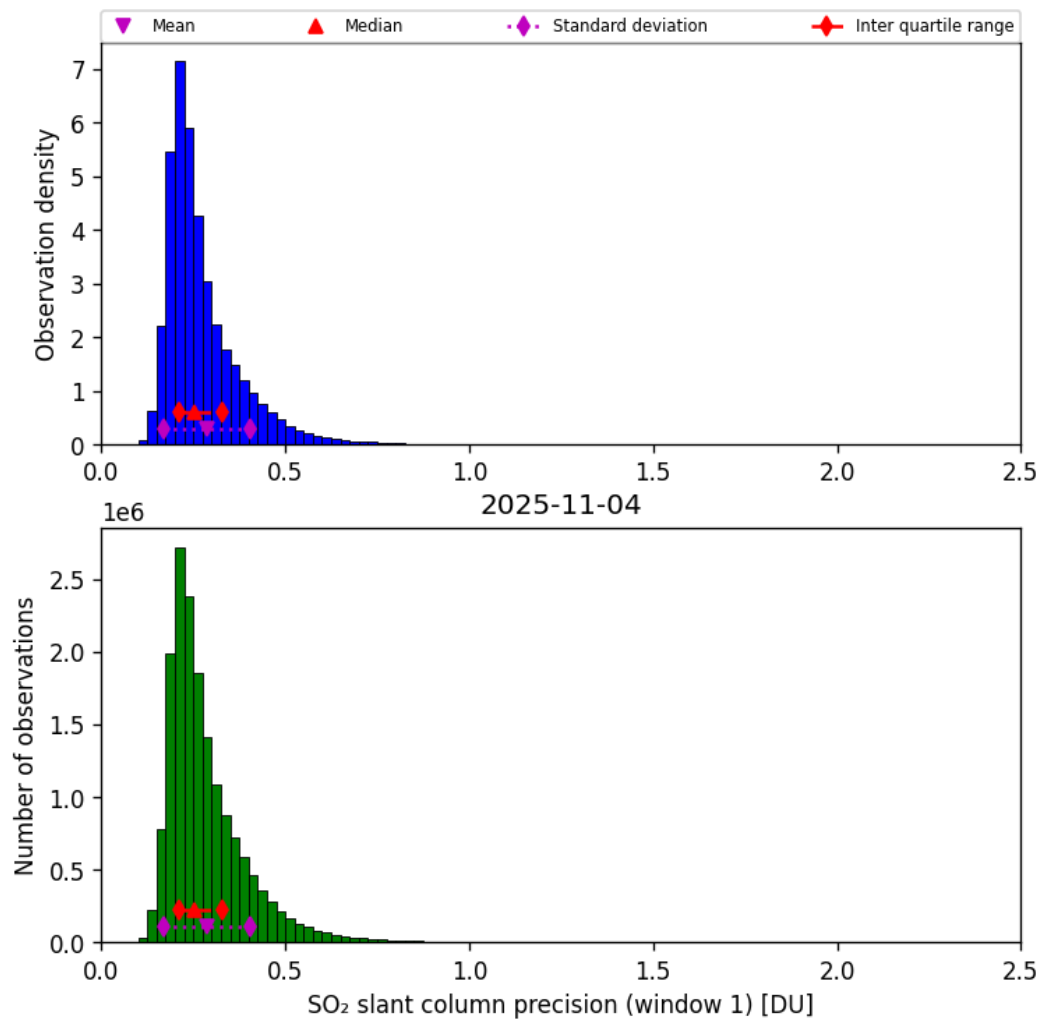


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-11-04 to 2025-11-05

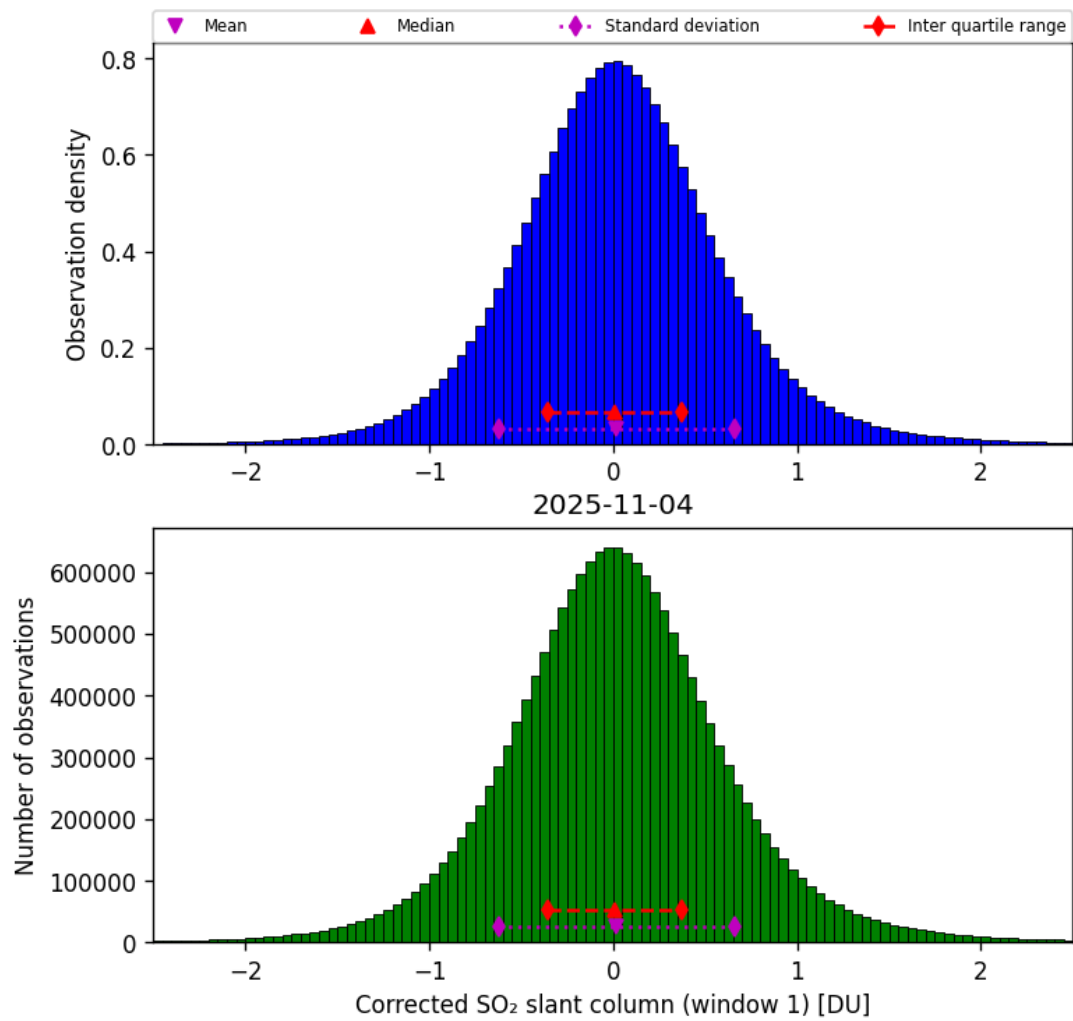


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-11-04 to 2025-11-05

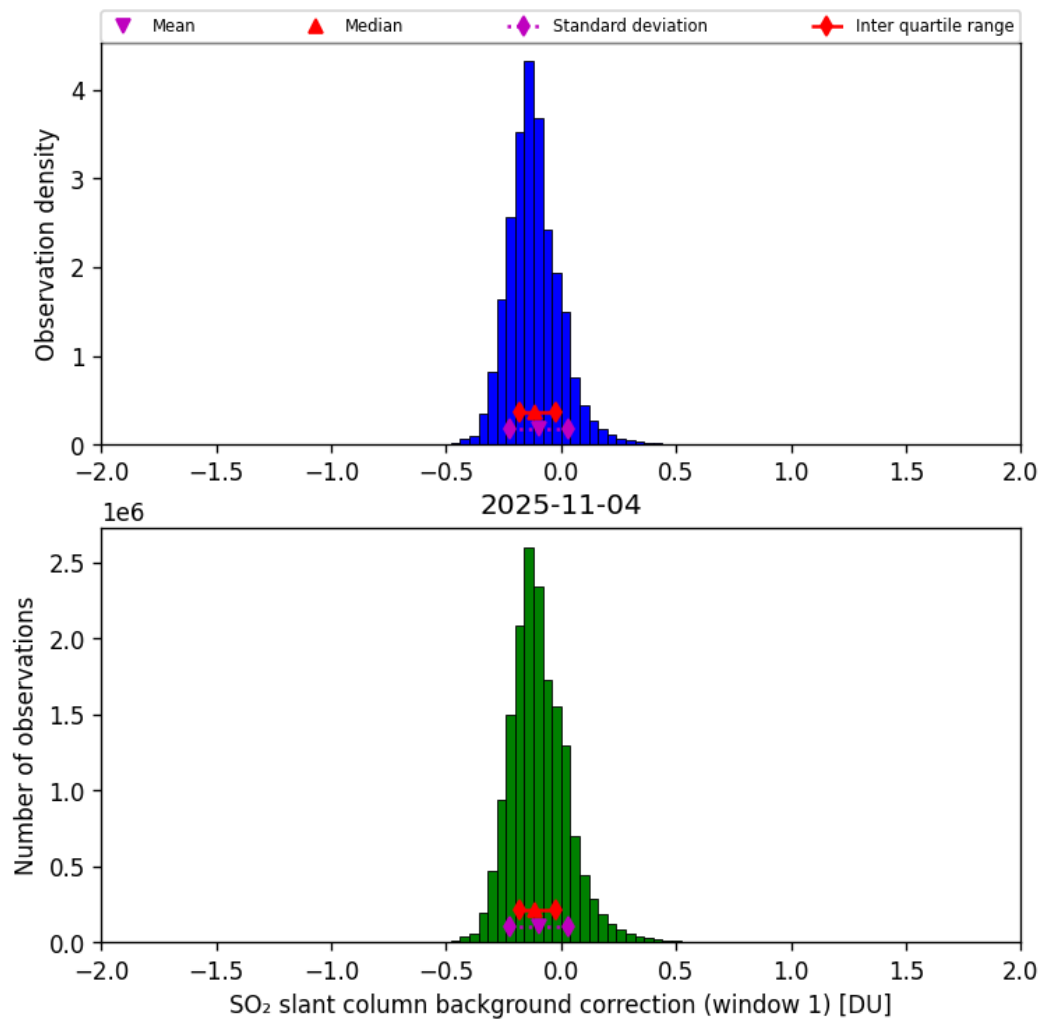


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-11-04 to 2025-11-05

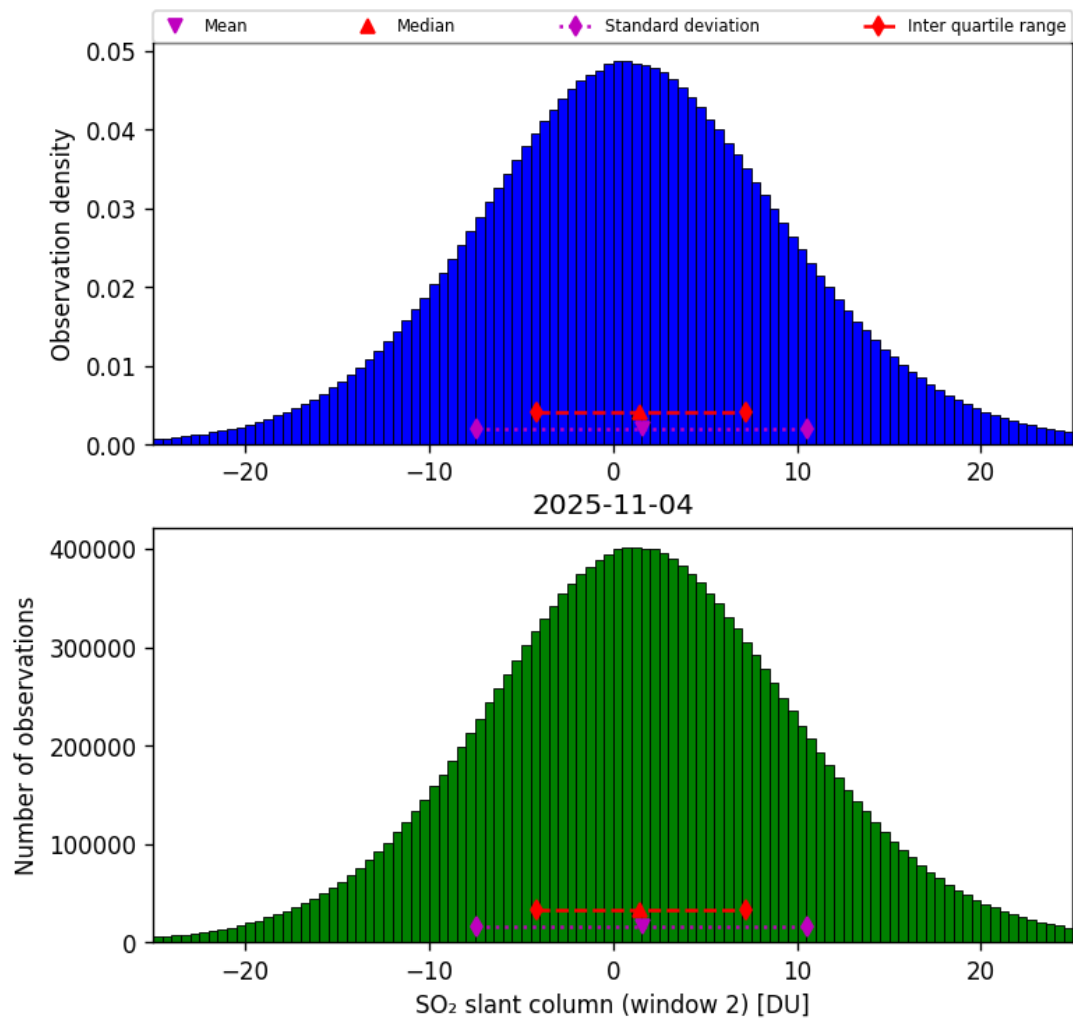


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-11-04 to 2025-11-05

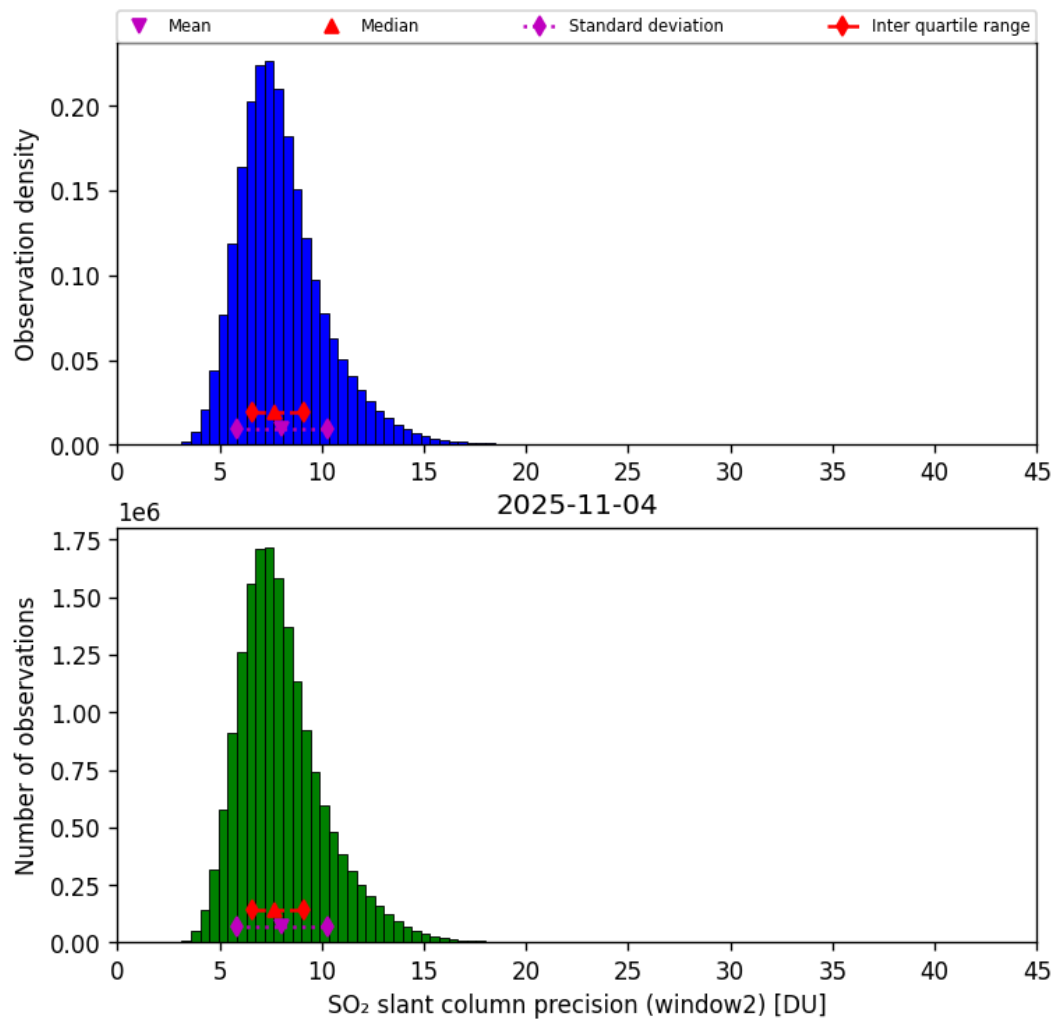


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-11-04 to 2025-11-05

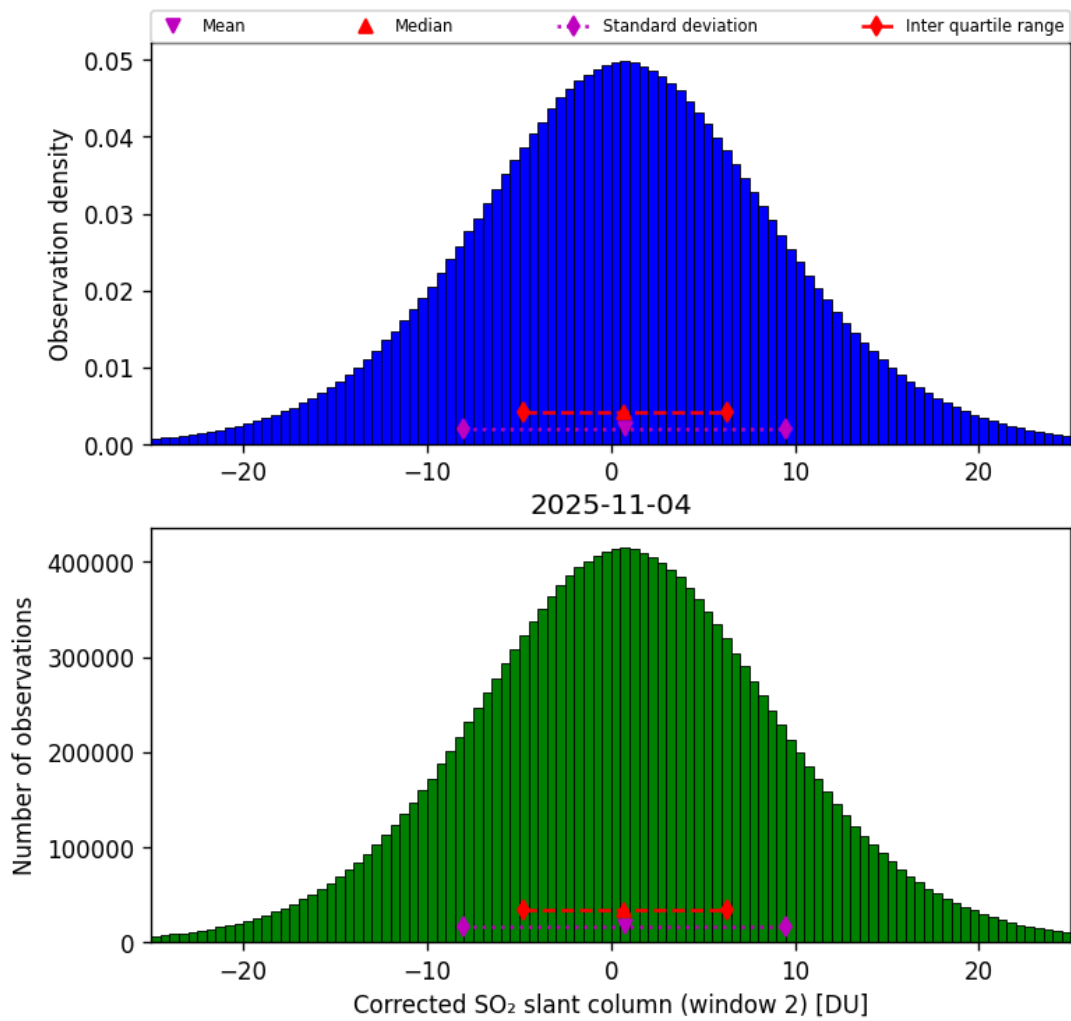


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-11-04 to 2025-11-05

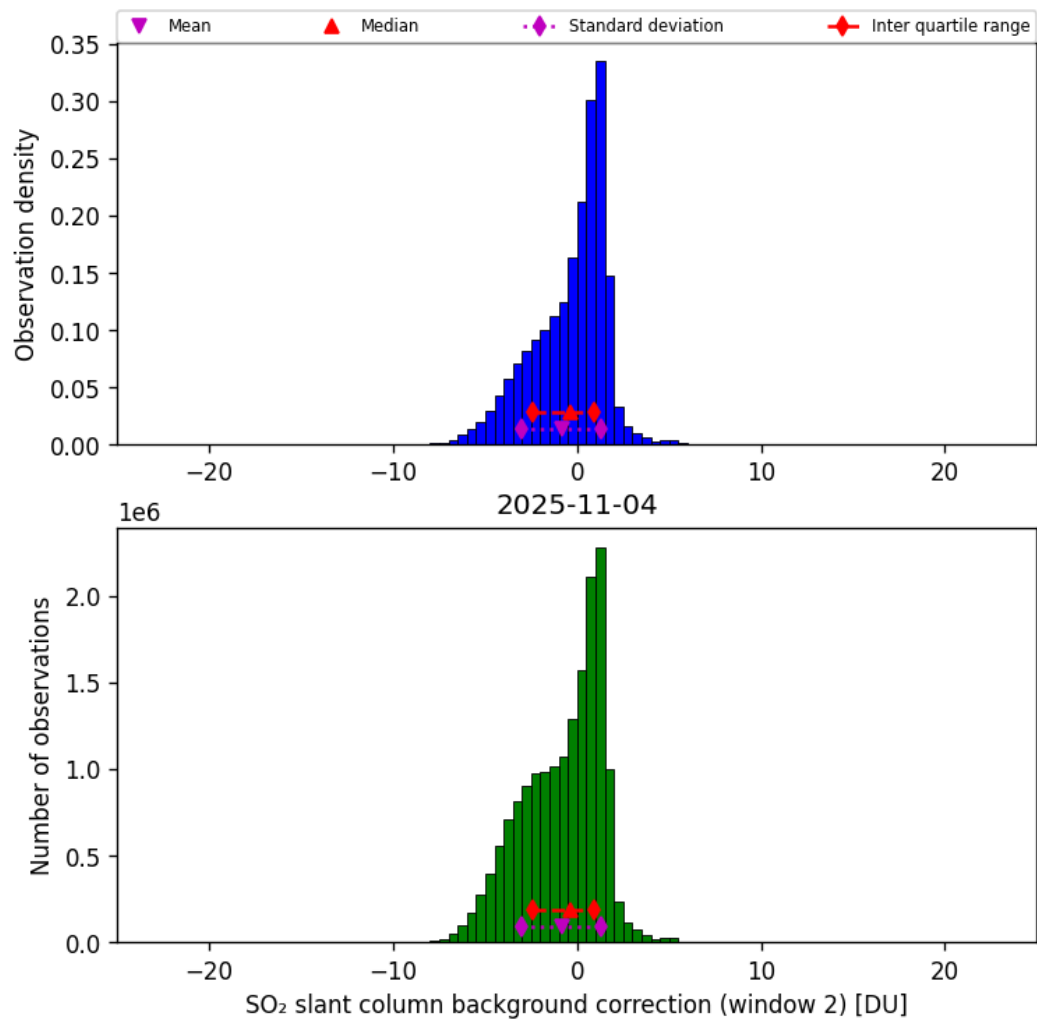


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-11-04 to 2025-11-05

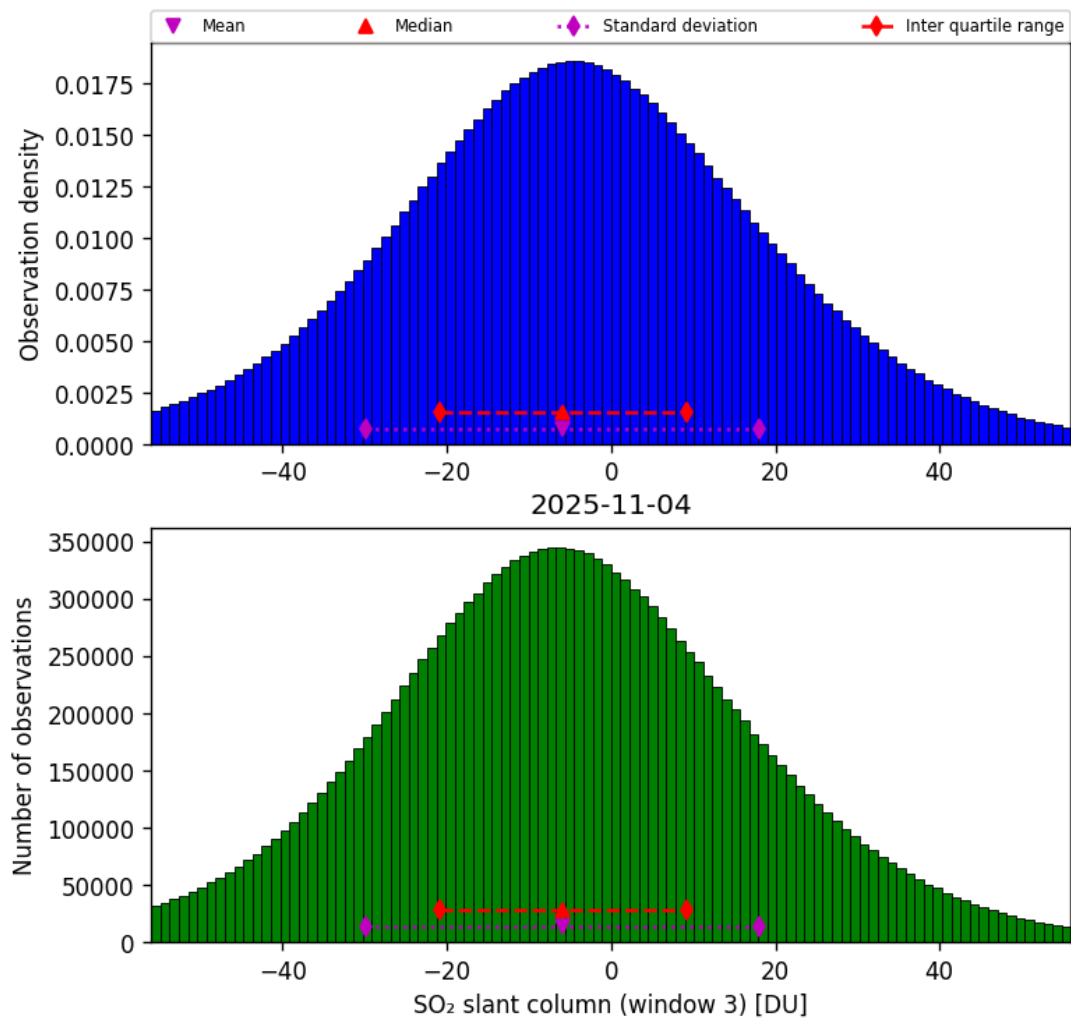


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-11-04 to 2025-11-05

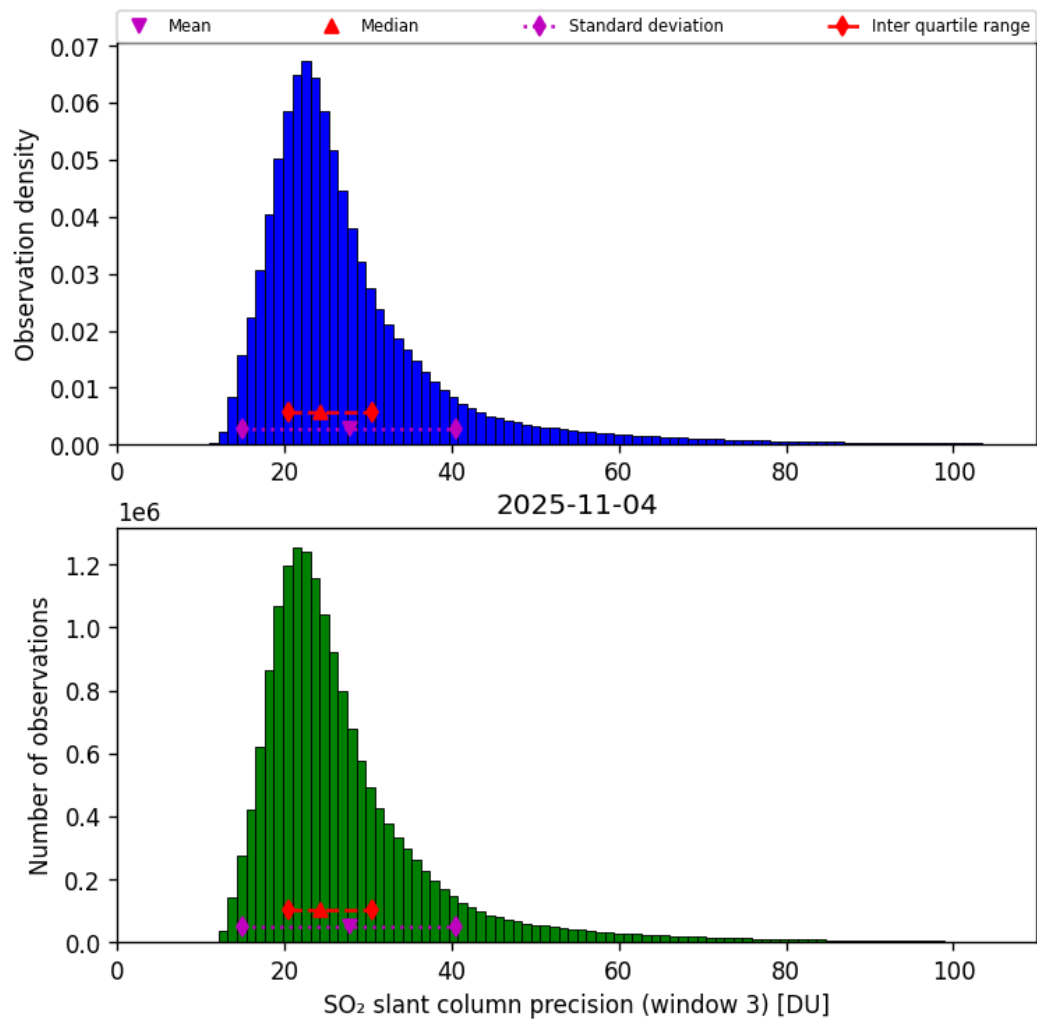


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-11-04 to 2025-11-05

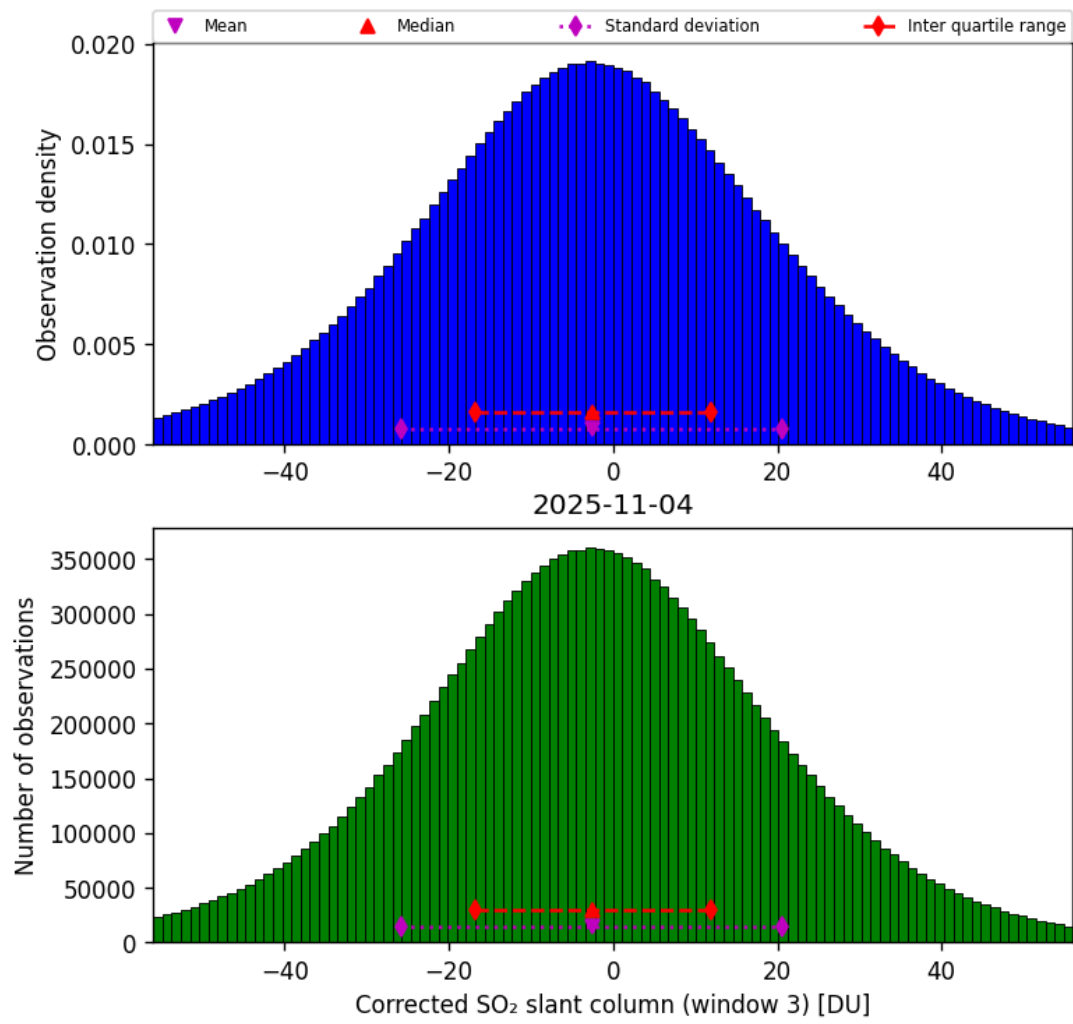


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-11-04 to 2025-11-05

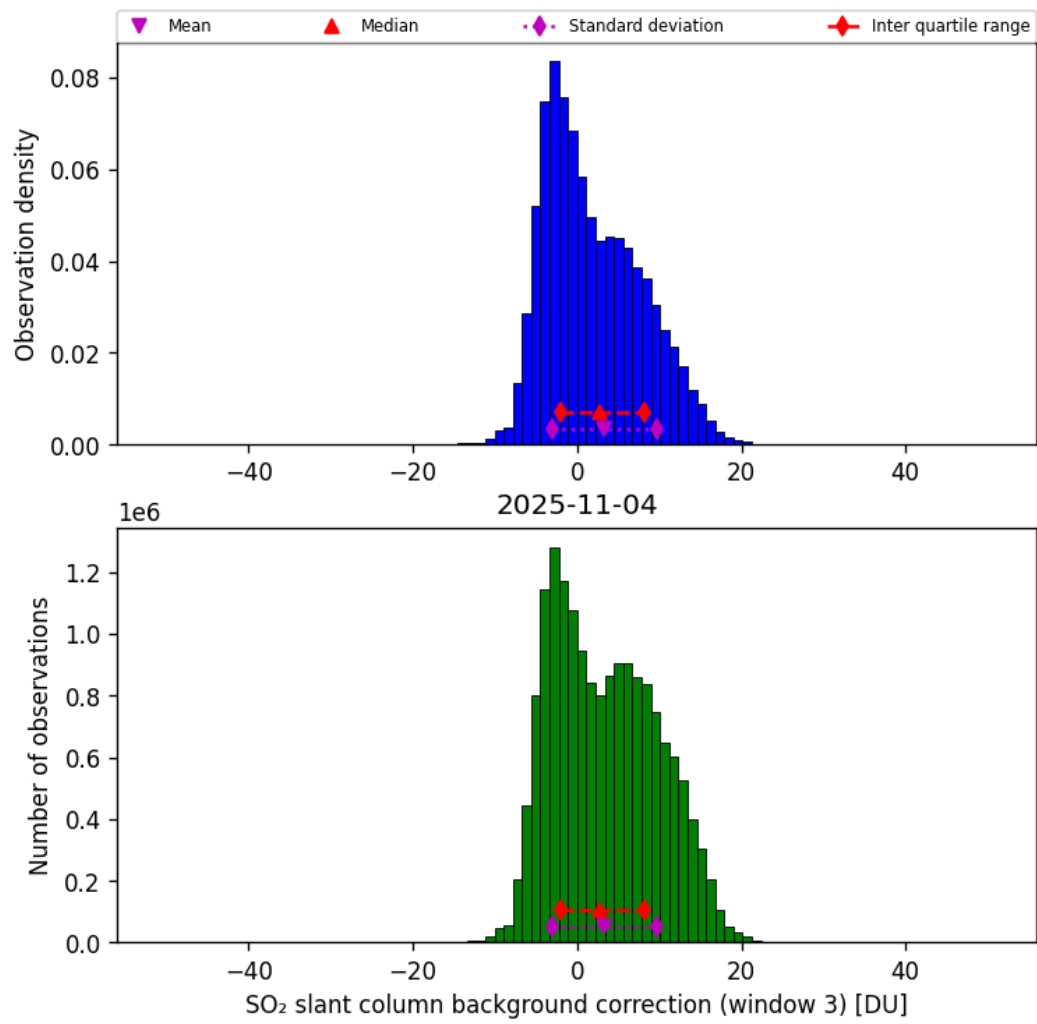


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-11-04 to 2025-11-05

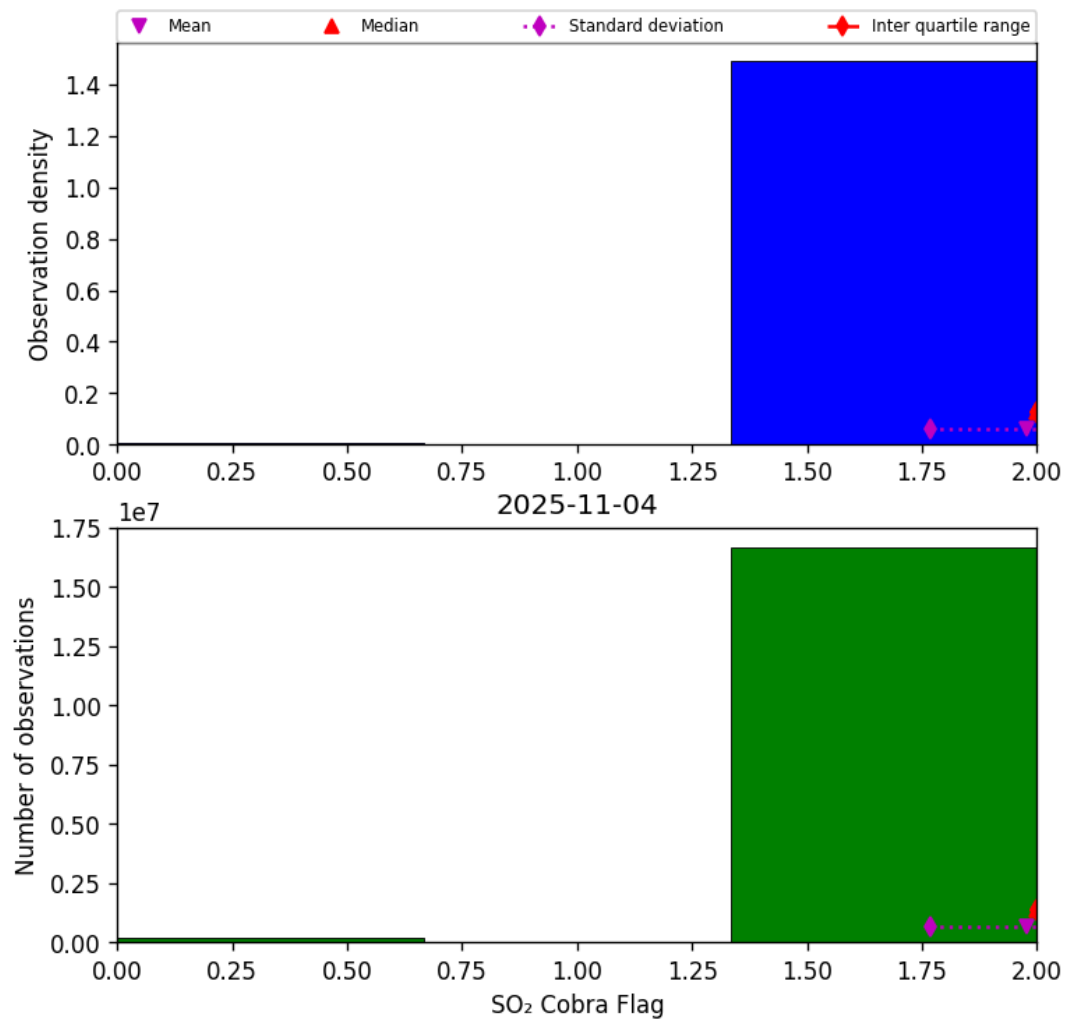


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-11-04 to 2025-11-05

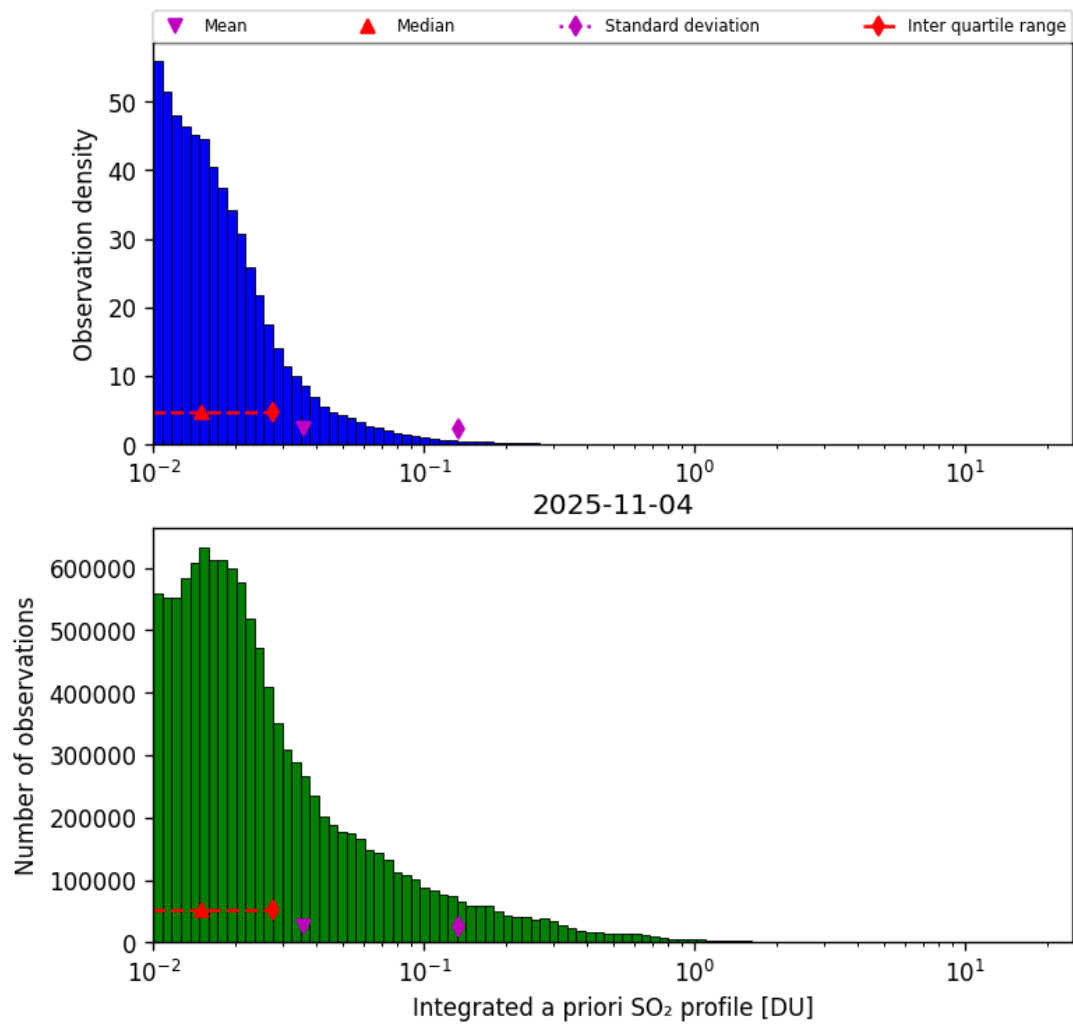


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-11-04 to 2025-11-05

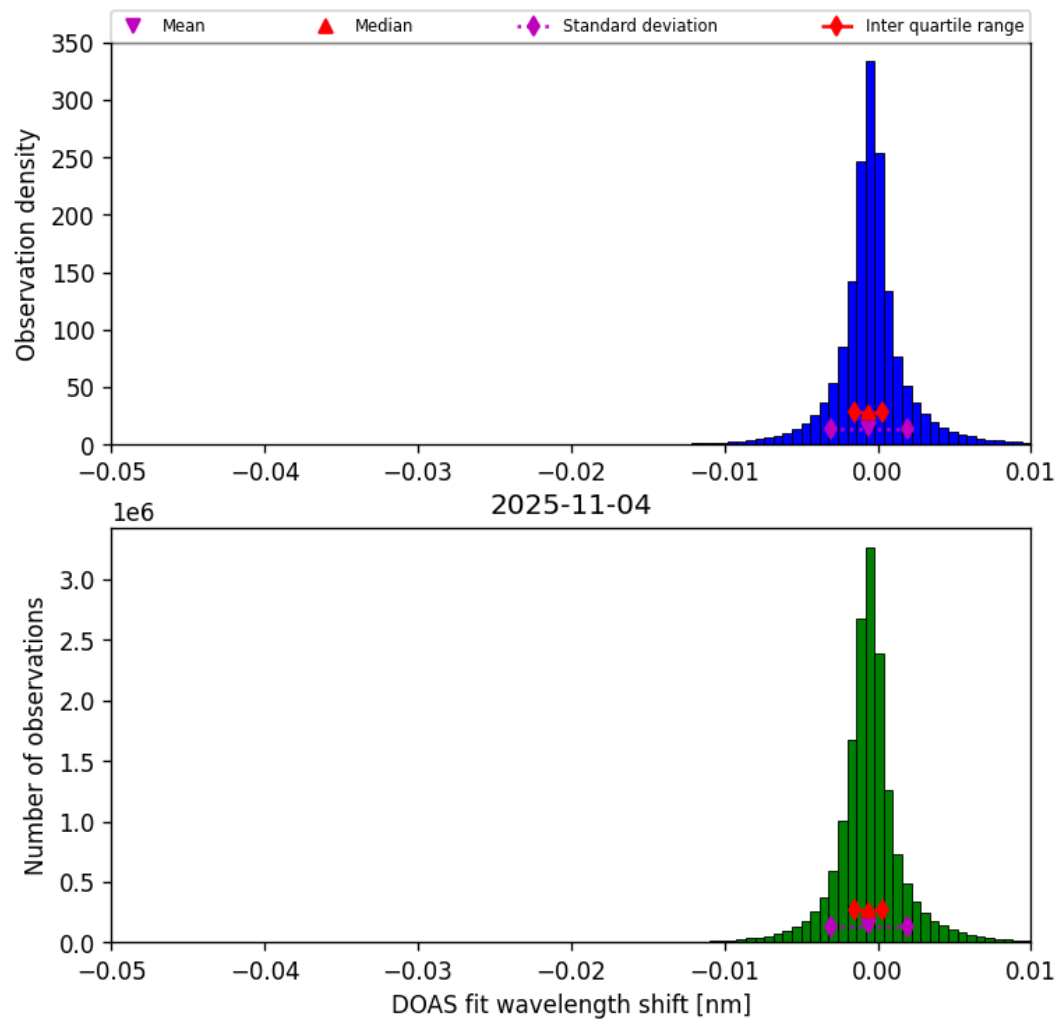


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-11-04 to 2025-11-05

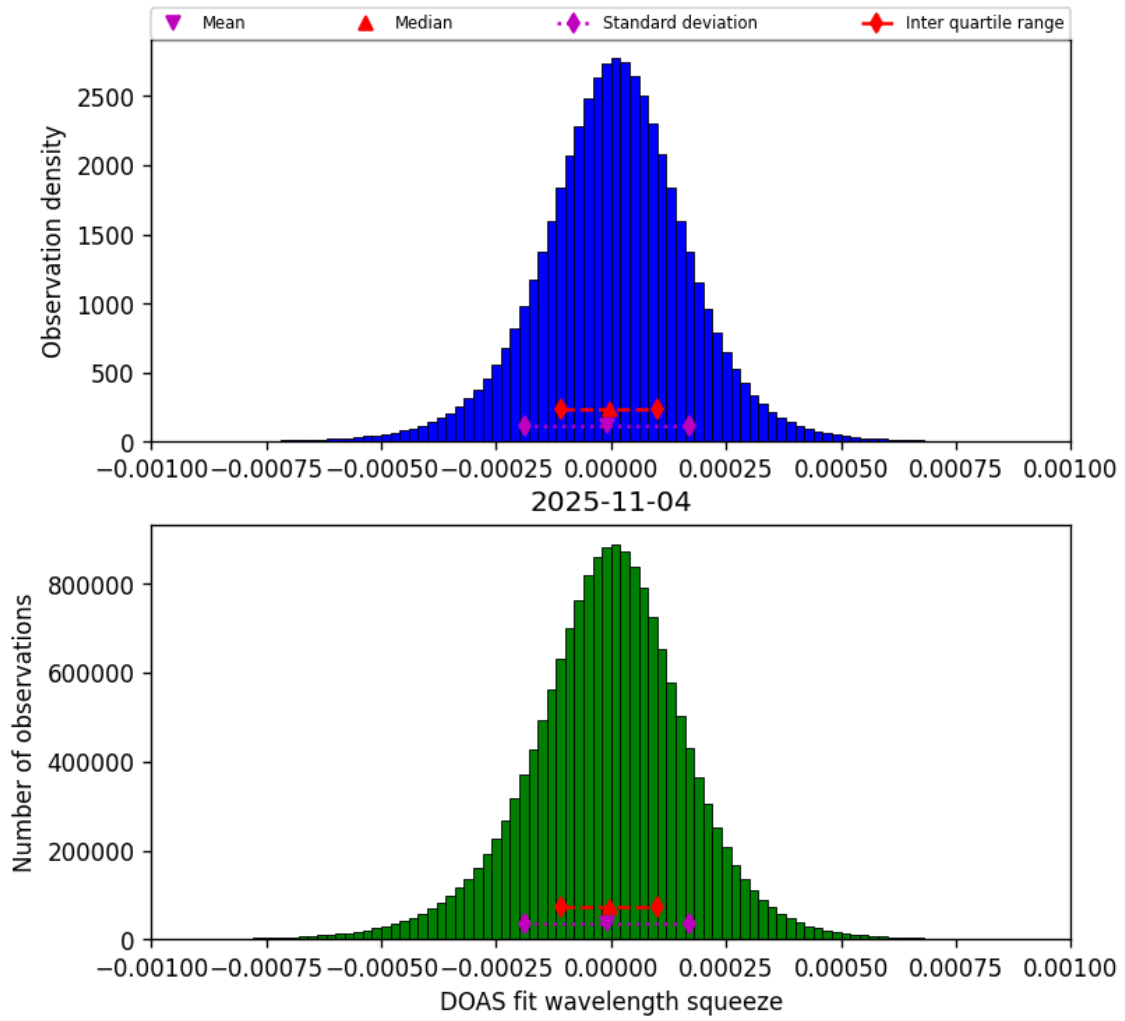


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-11-04 to 2025-11-05

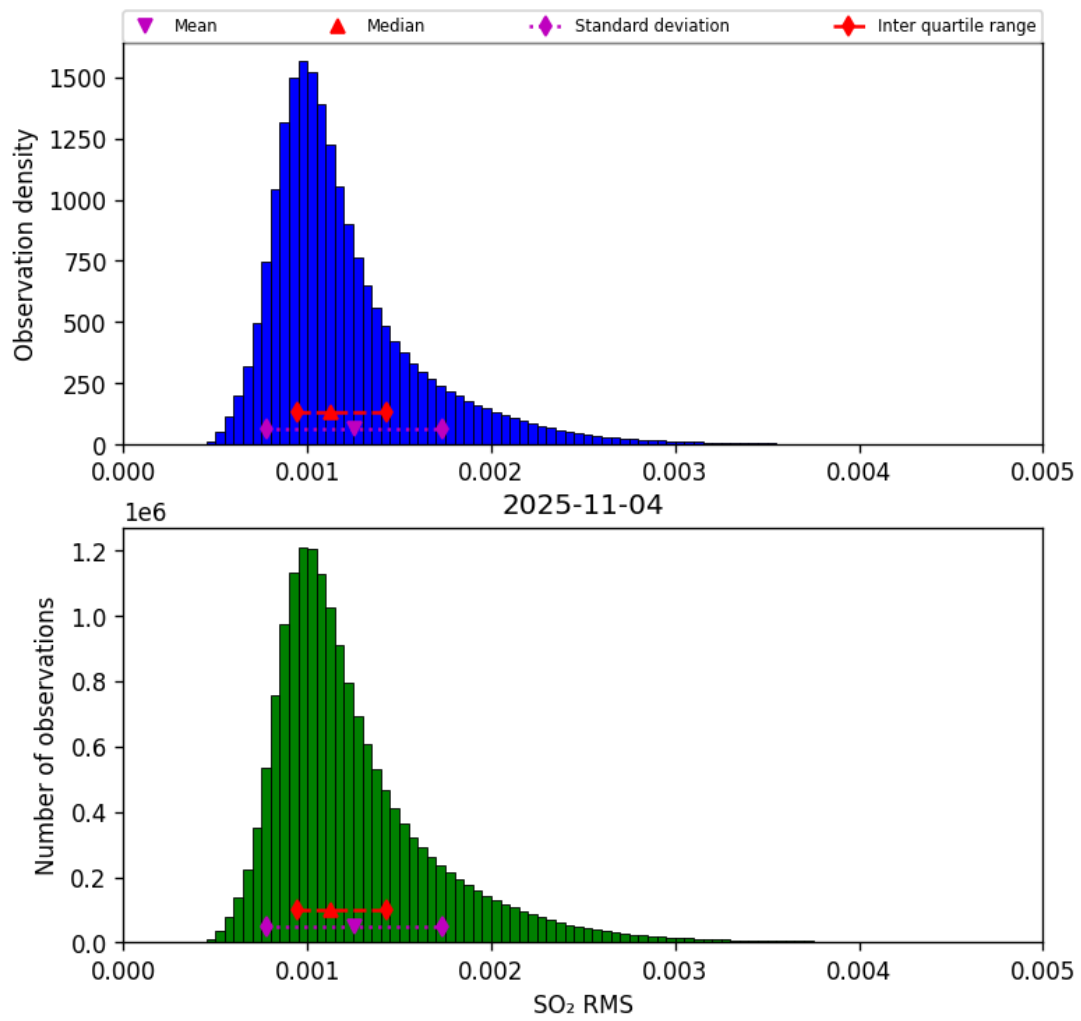


Figure 79: Histogram of “SO₂ RMS” for 2025-11-04 to 2025-11-05

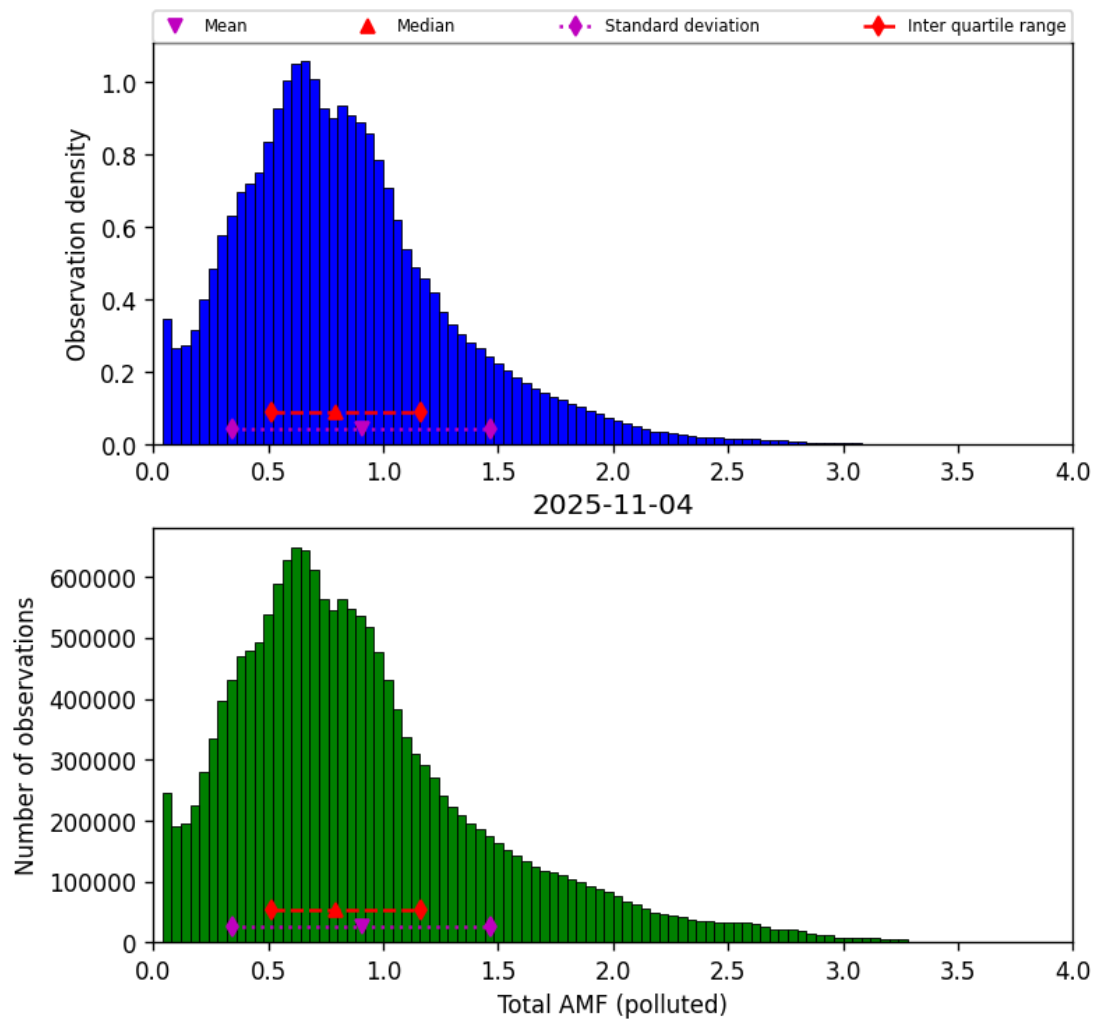


Figure 80: Histogram of “Total AMF (polluted)” for 2025-11-04 to 2025-11-05

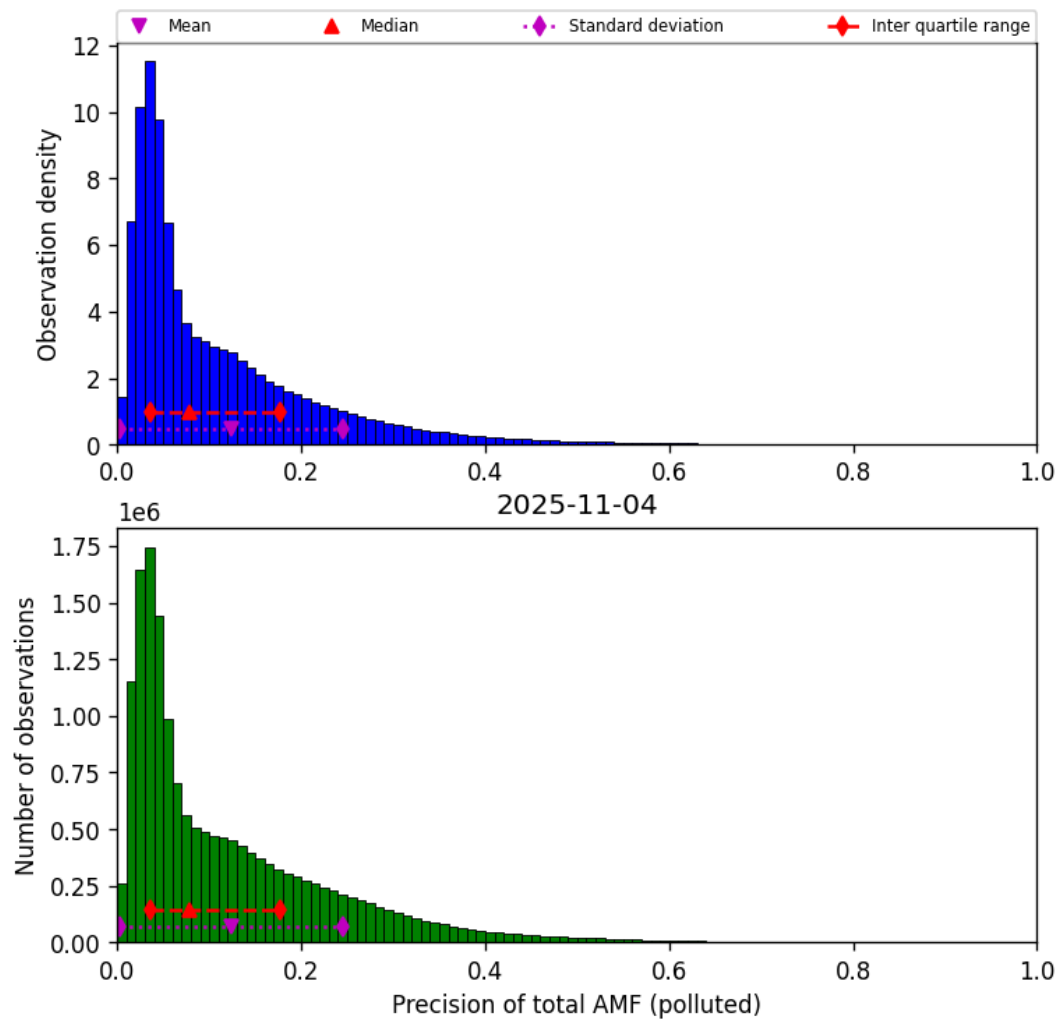


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-11-04 to 2025-11-05

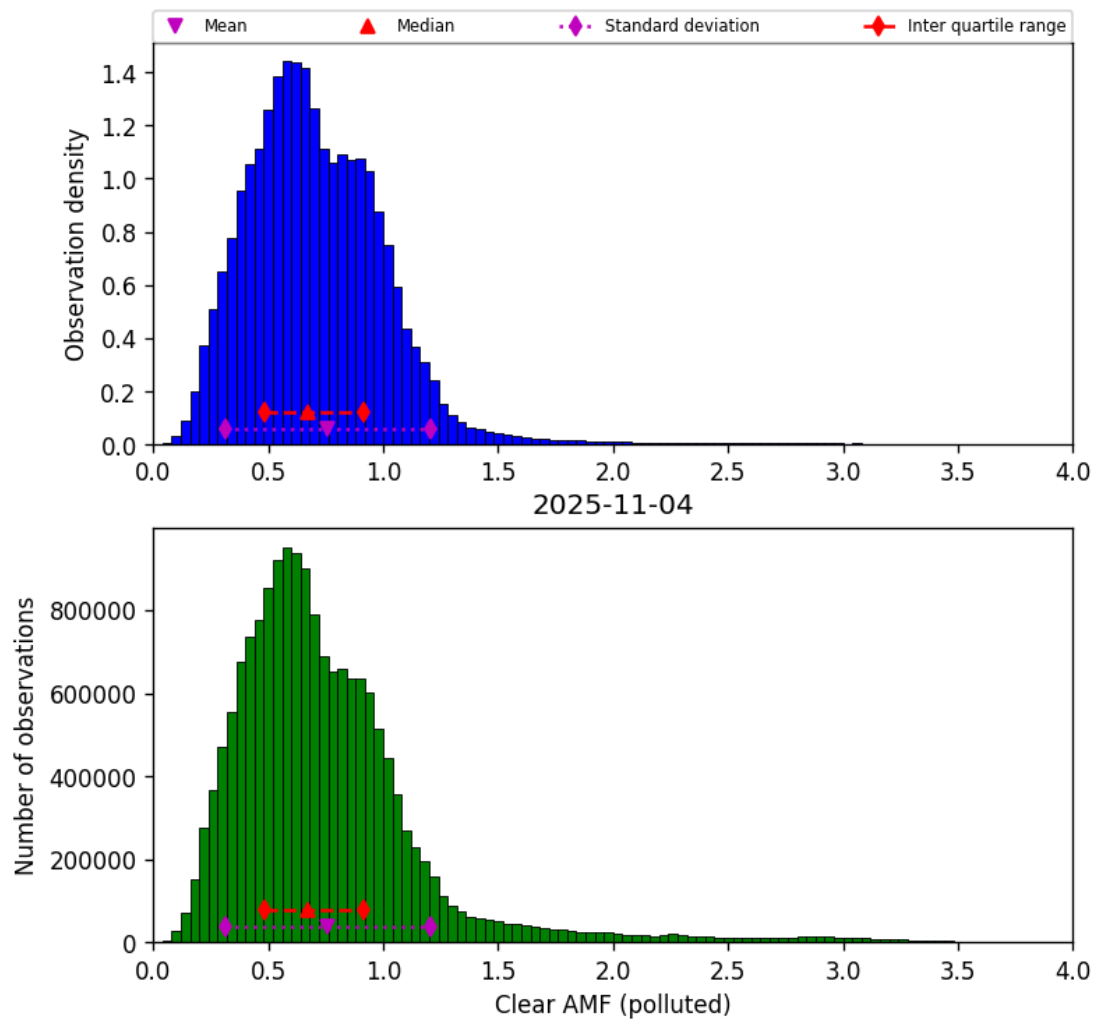


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-11-04 to 2025-11-05

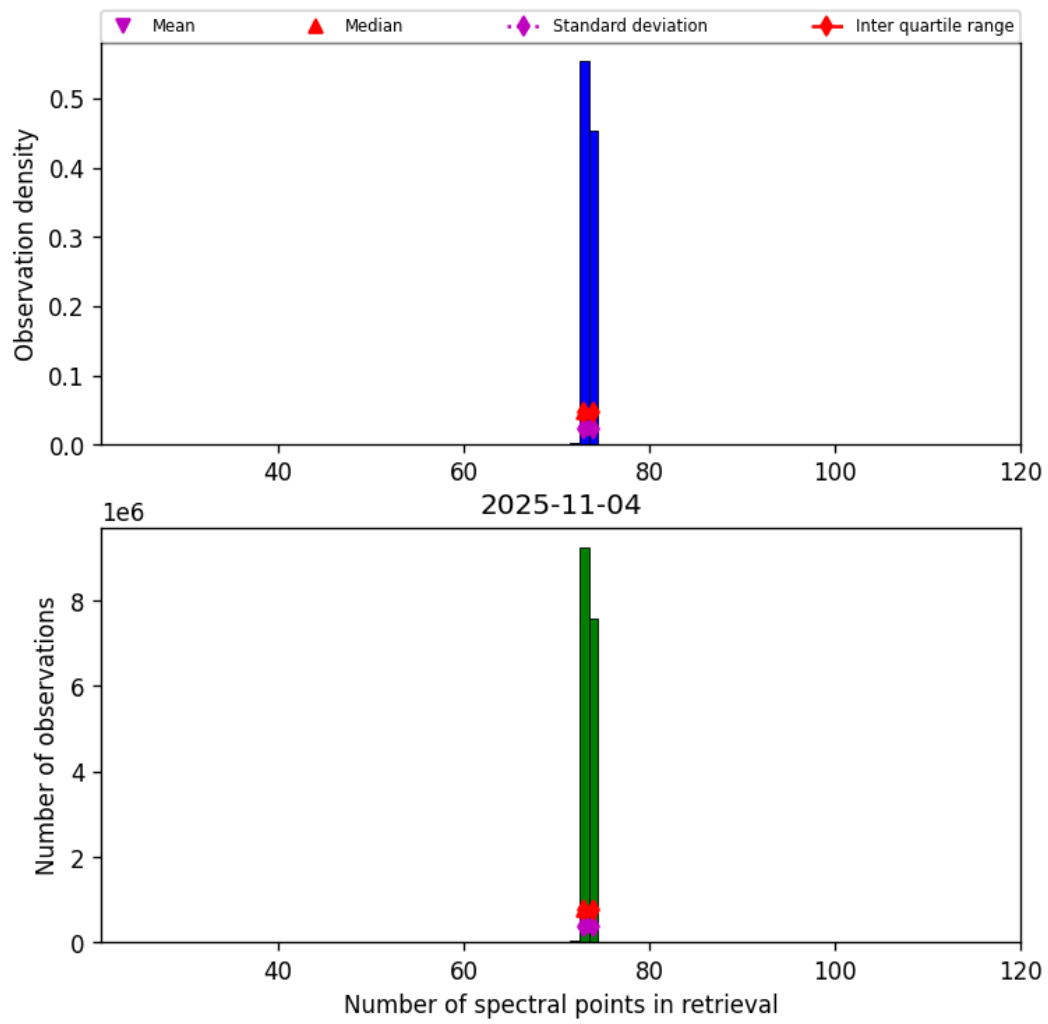


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-11-04 to 2025-11-05

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.

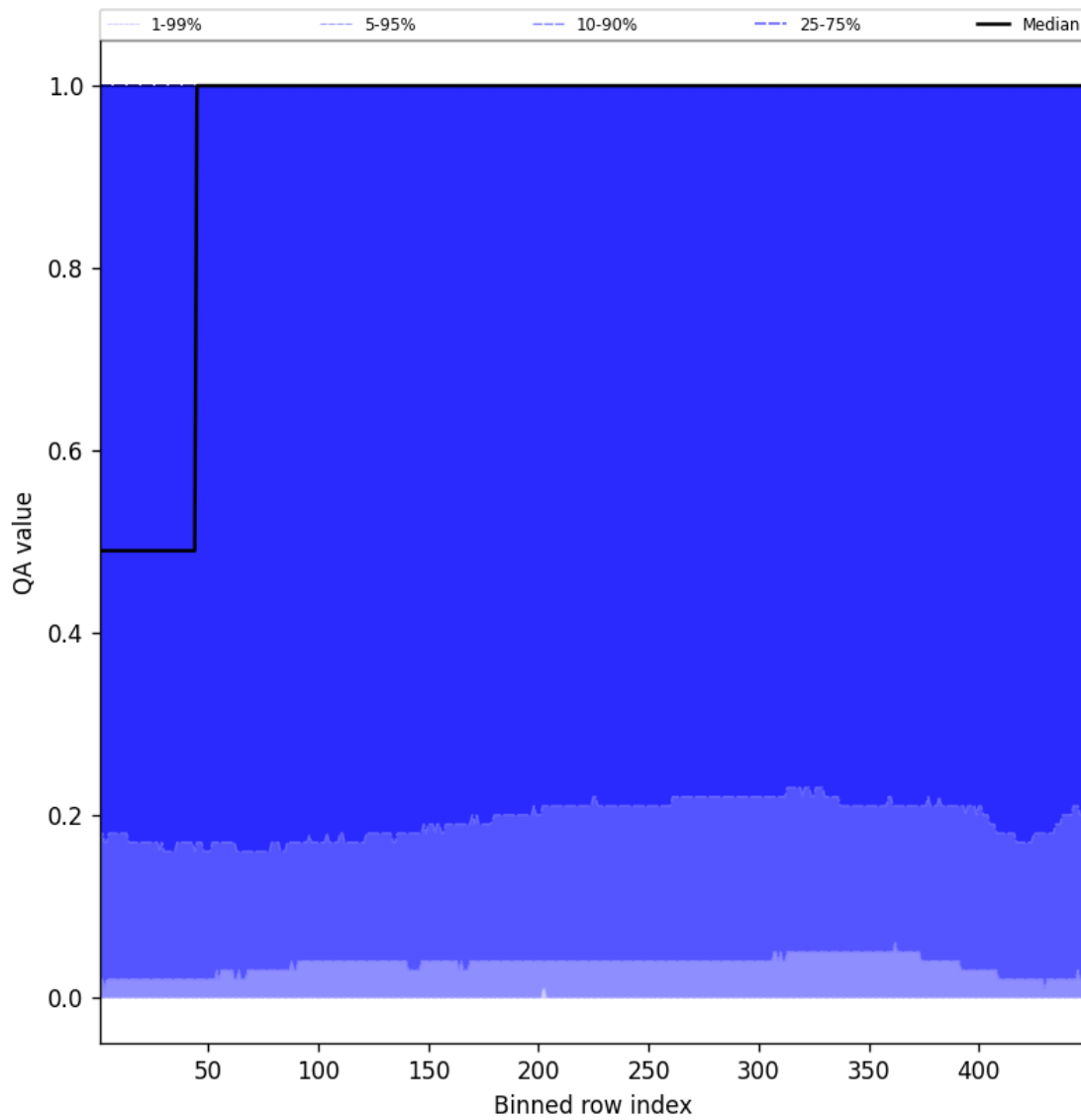


Figure 84: Along track statistics of “QA value” for 2025-11-04 to 2025-11-05

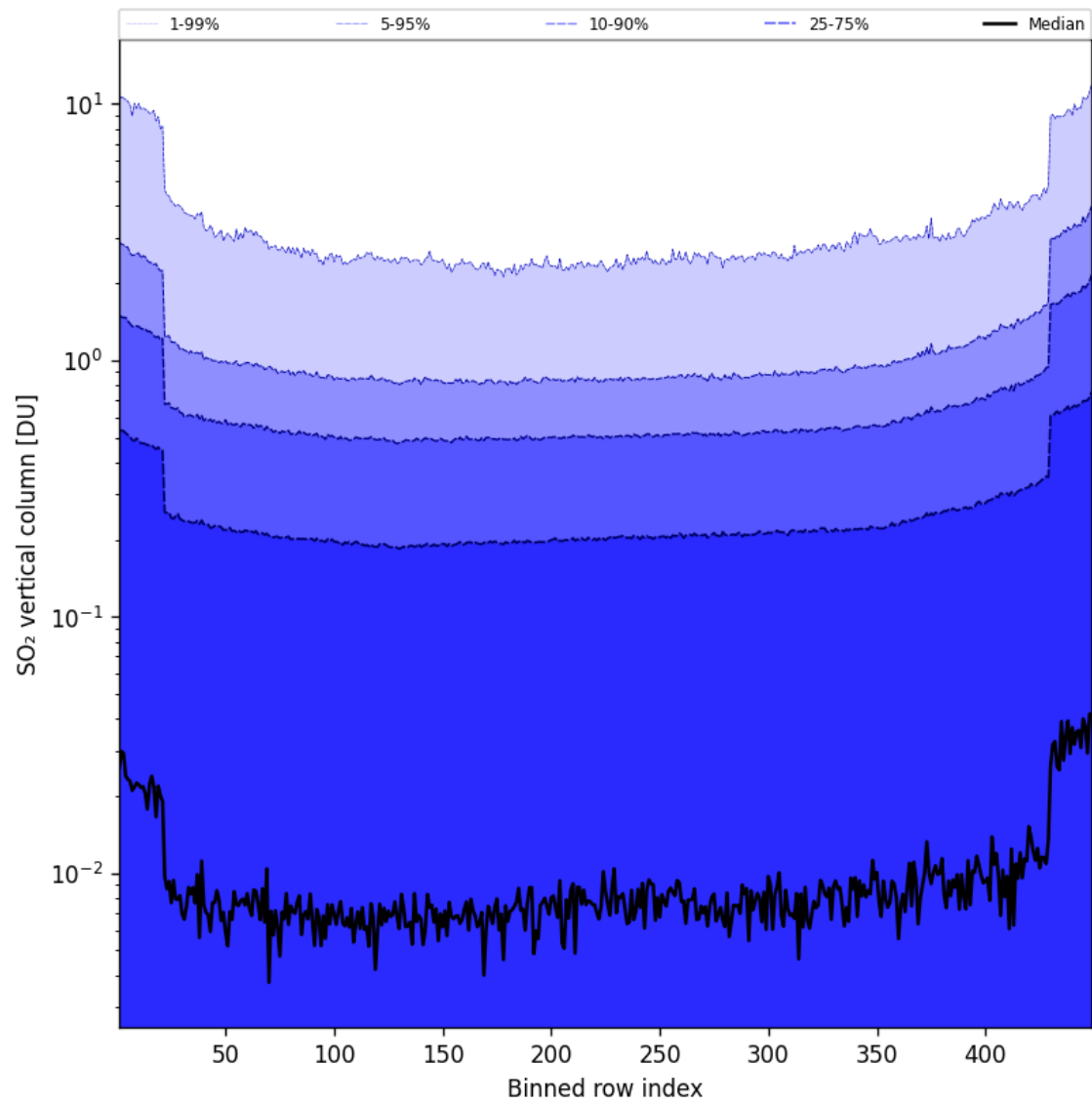


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-11-04 to 2025-11-05

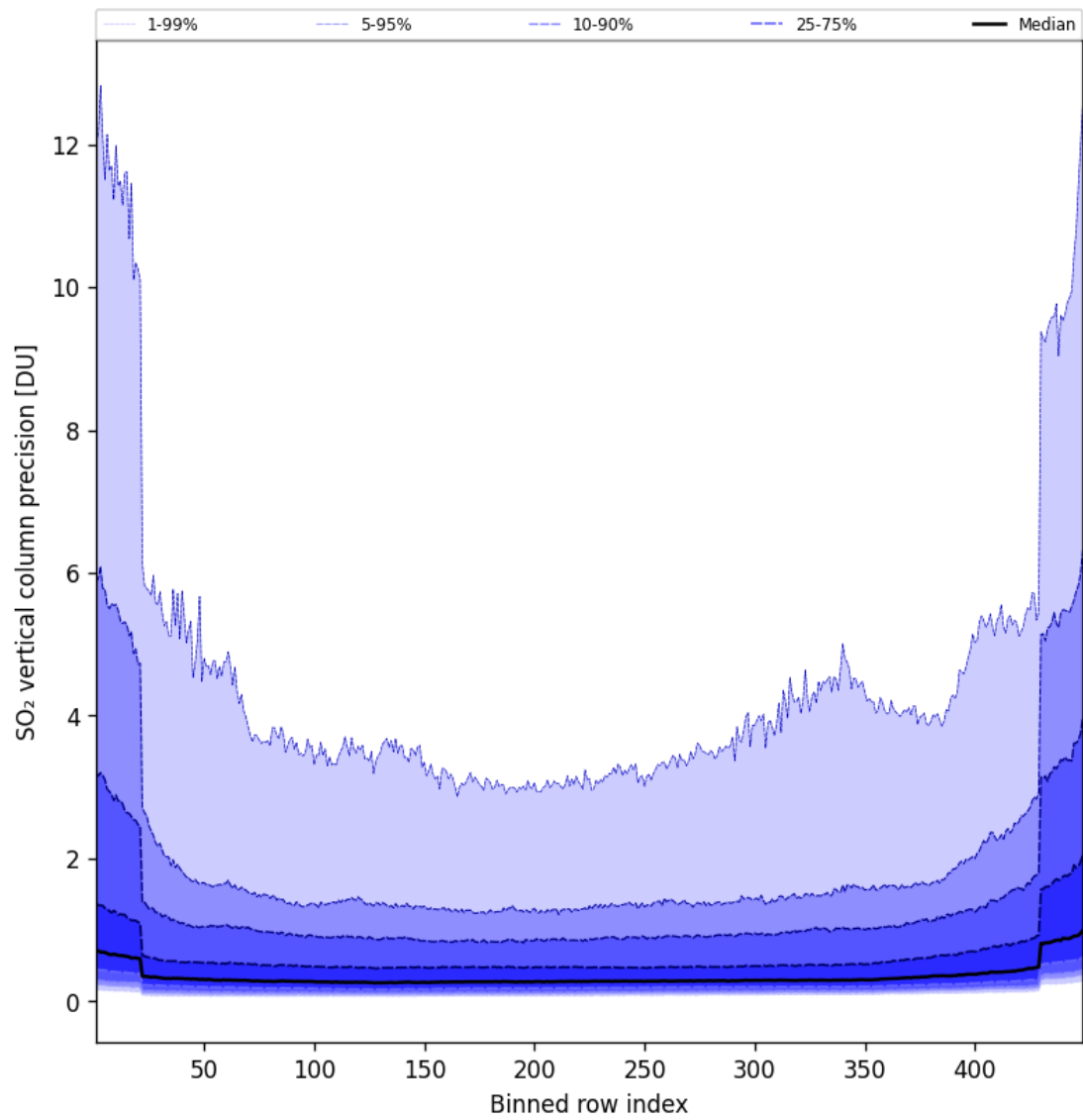


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-11-04 to 2025-11-05

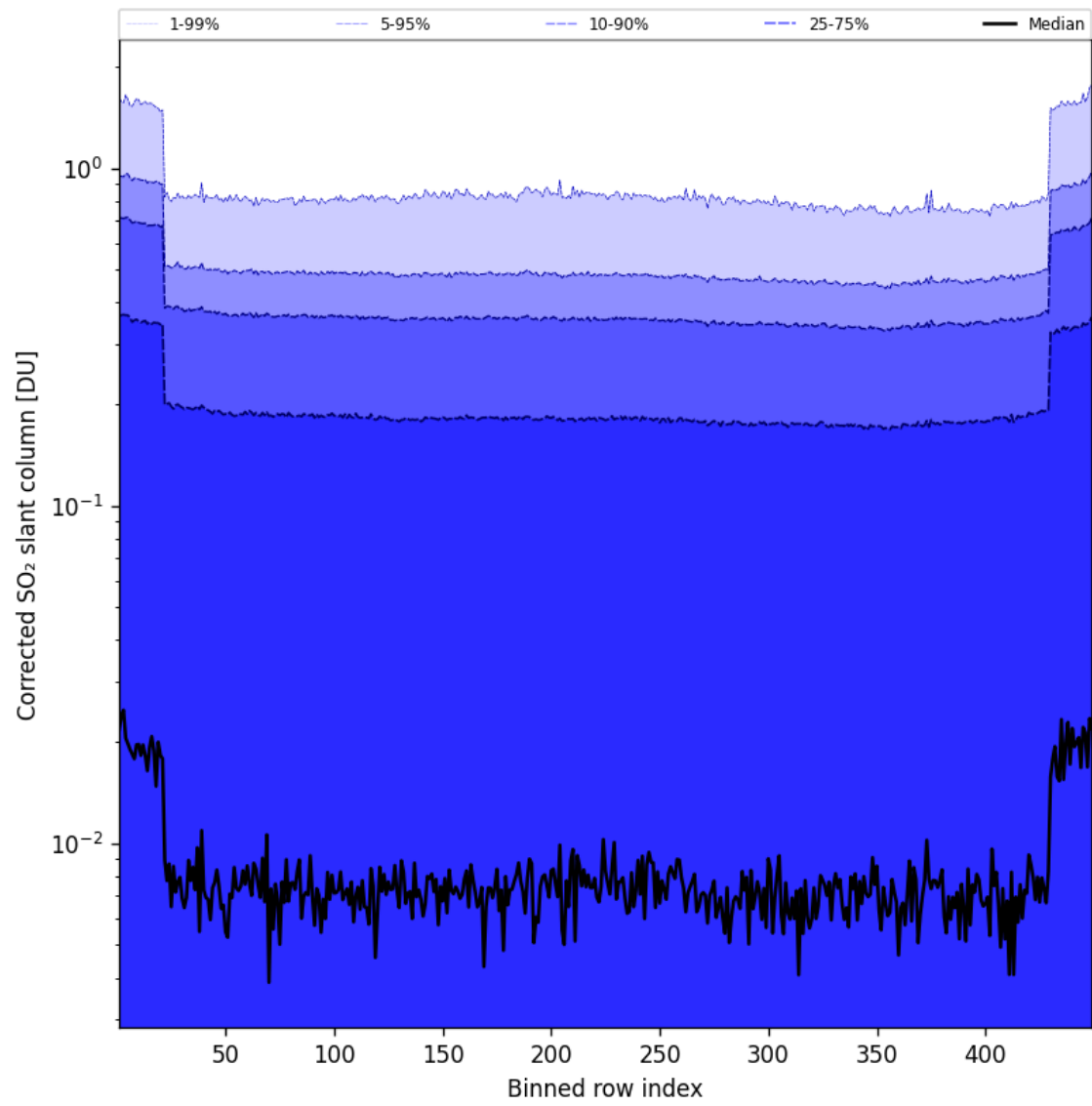


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-11-04 to 2025-11-05

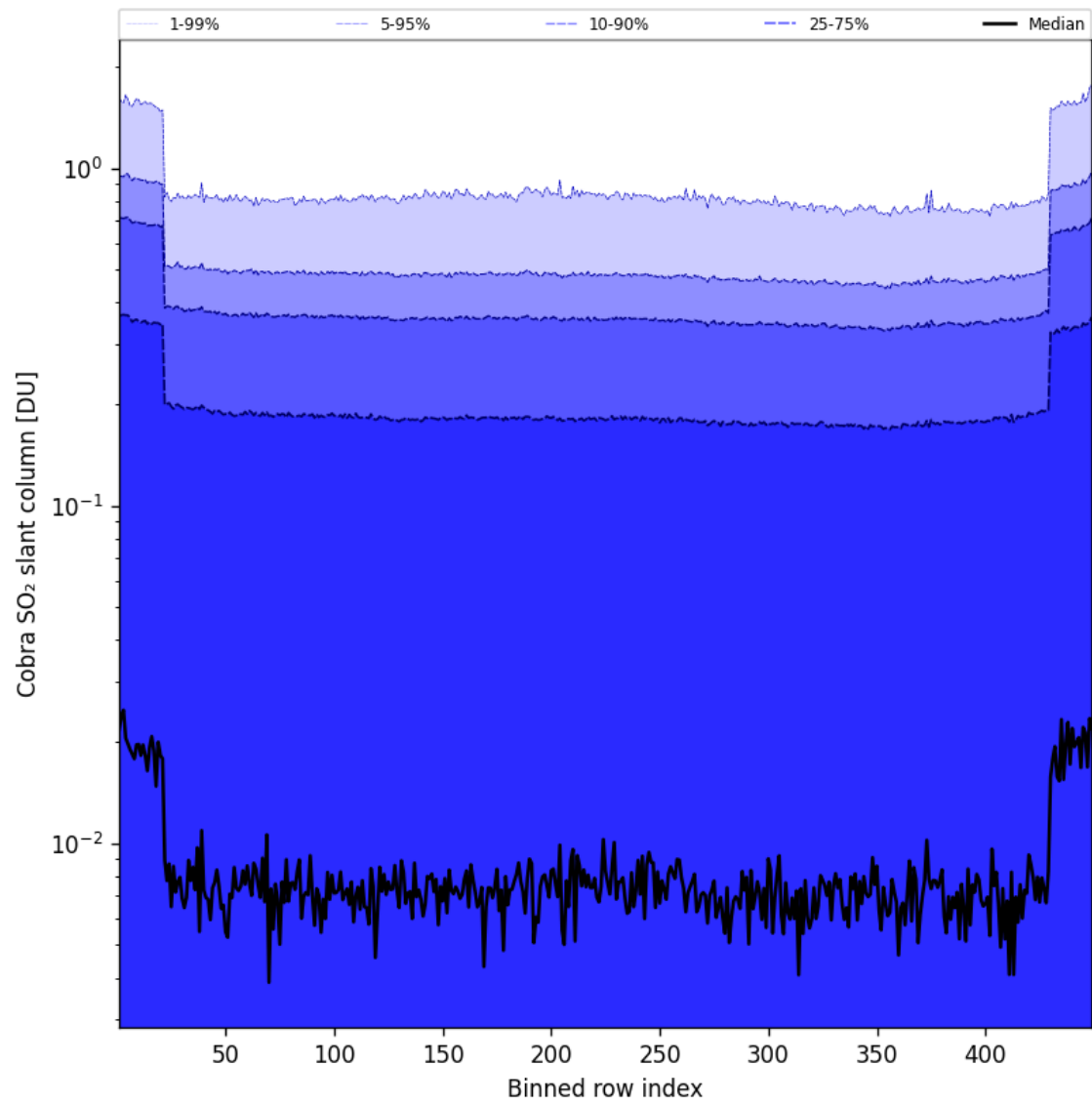


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-11-04 to 2025-11-05

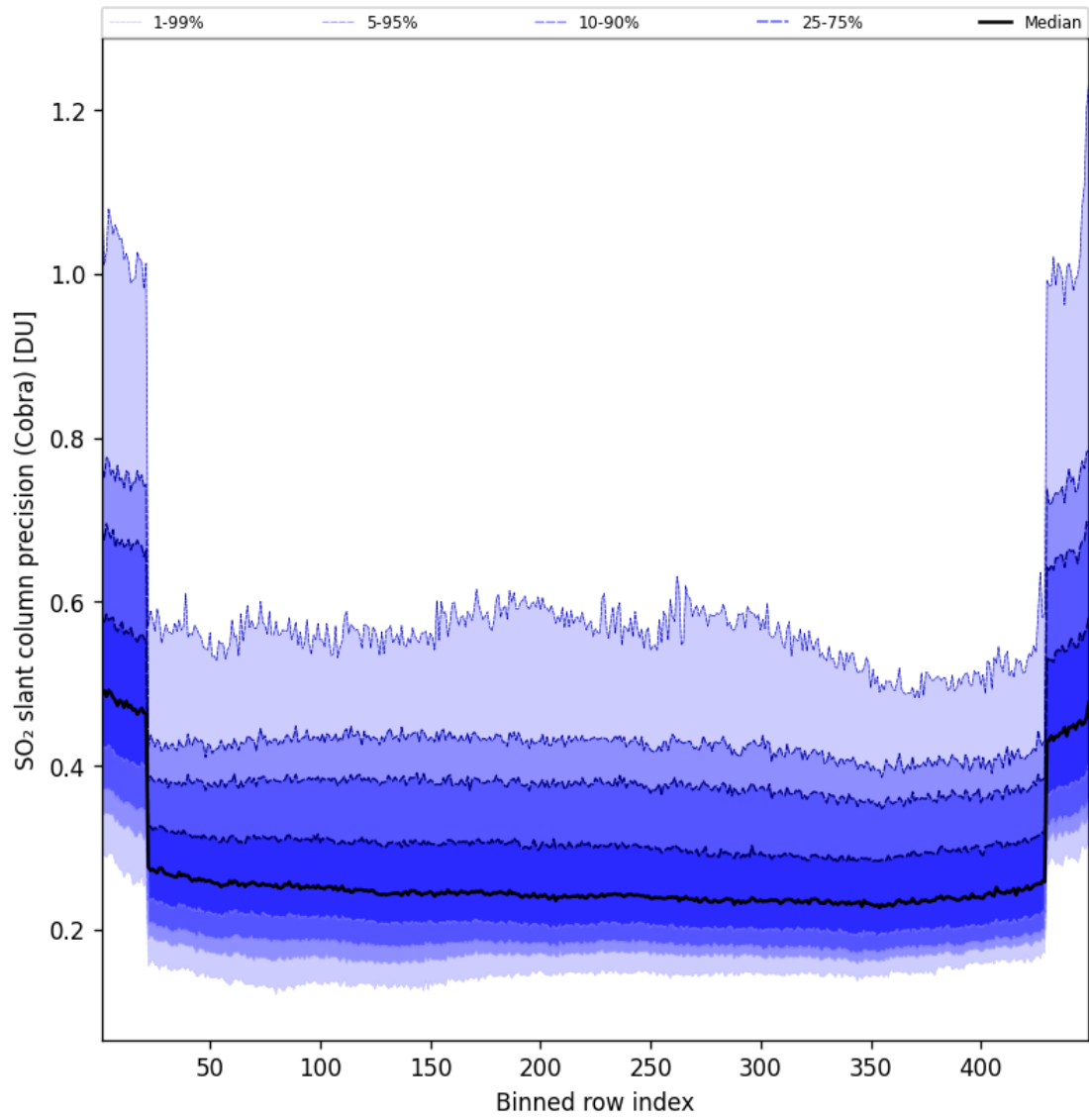


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-11-04 to 2025-11-05

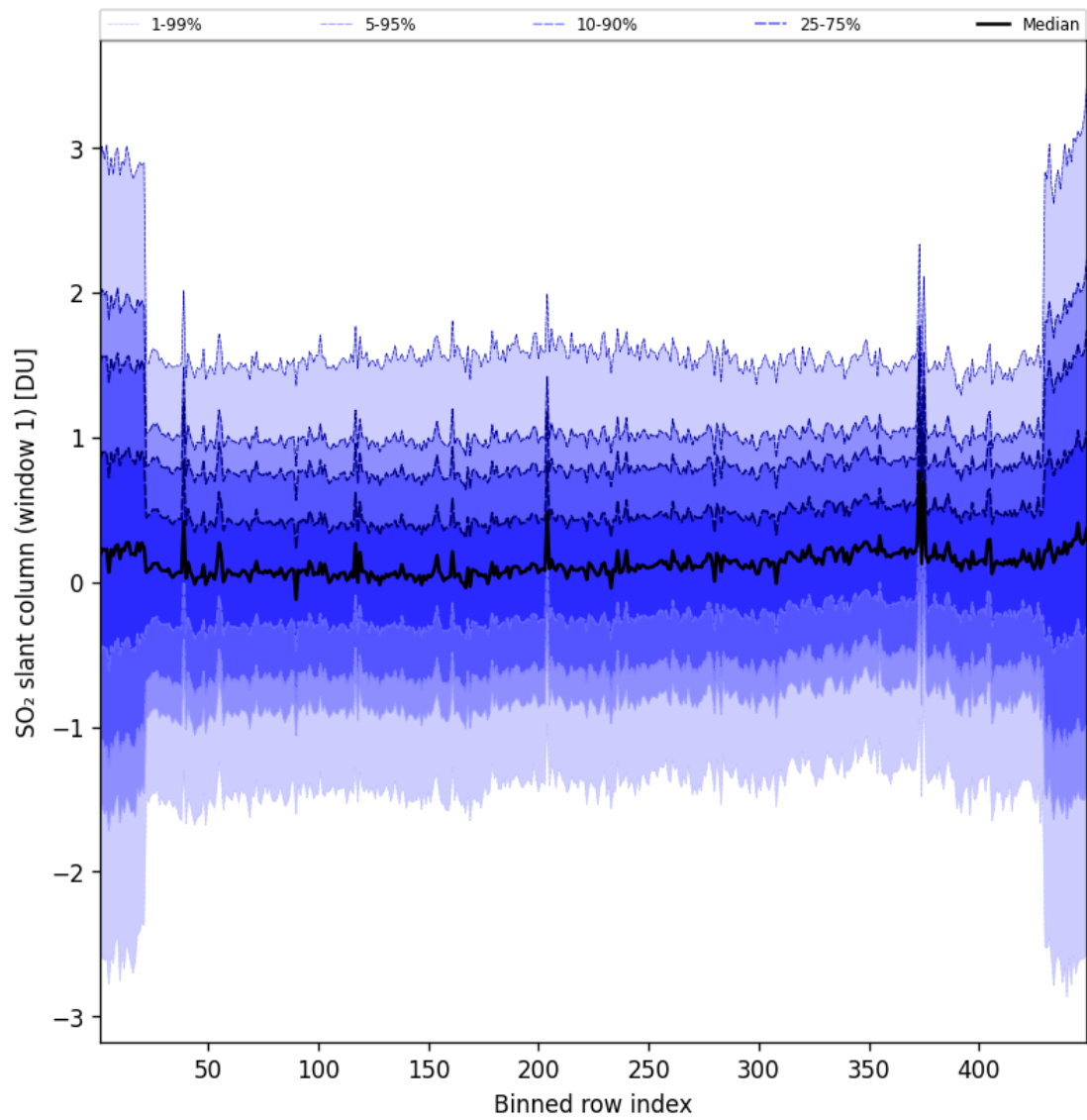


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-11-04 to 2025-11-05

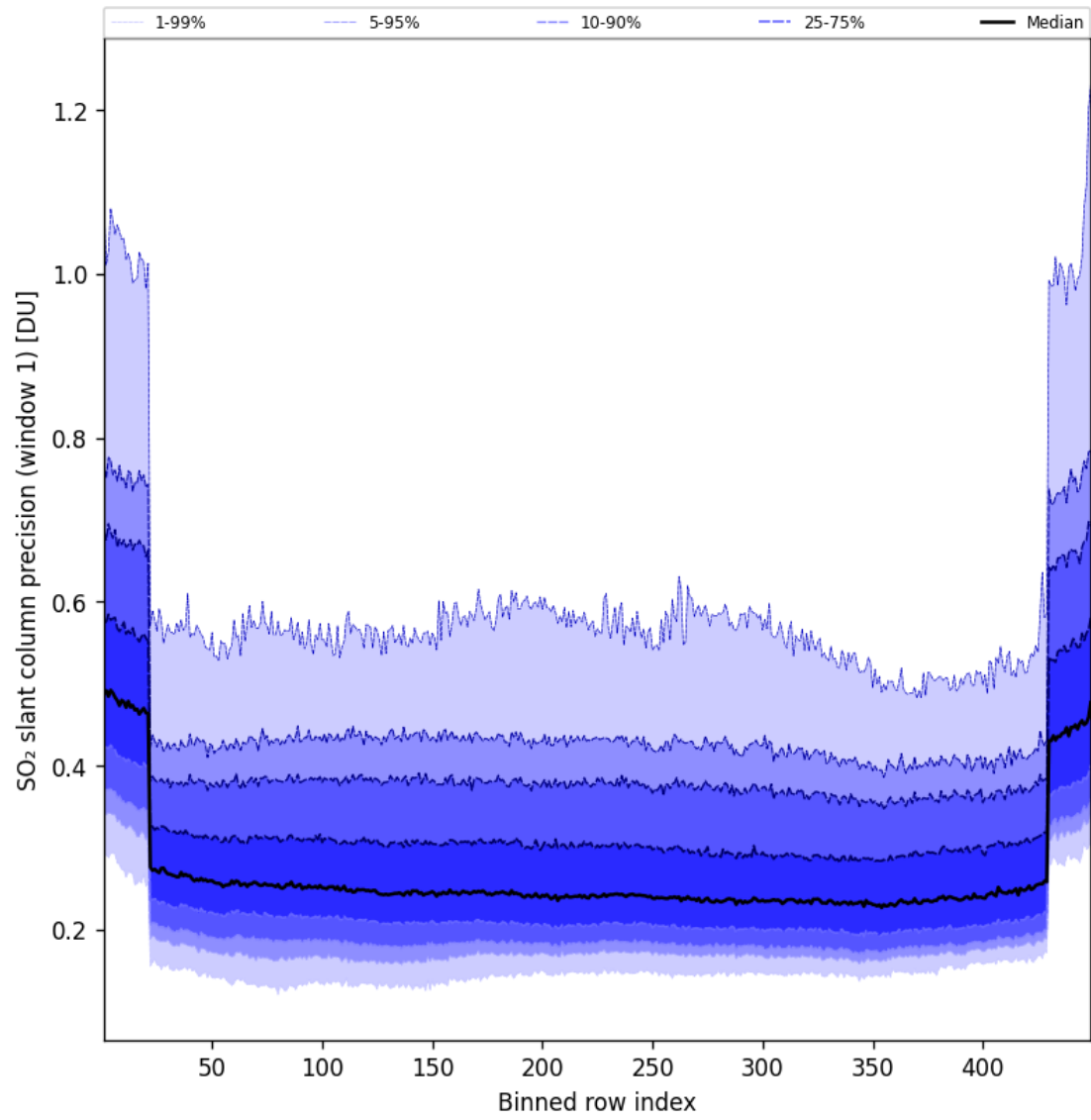


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-11-04 to 2025-11-05

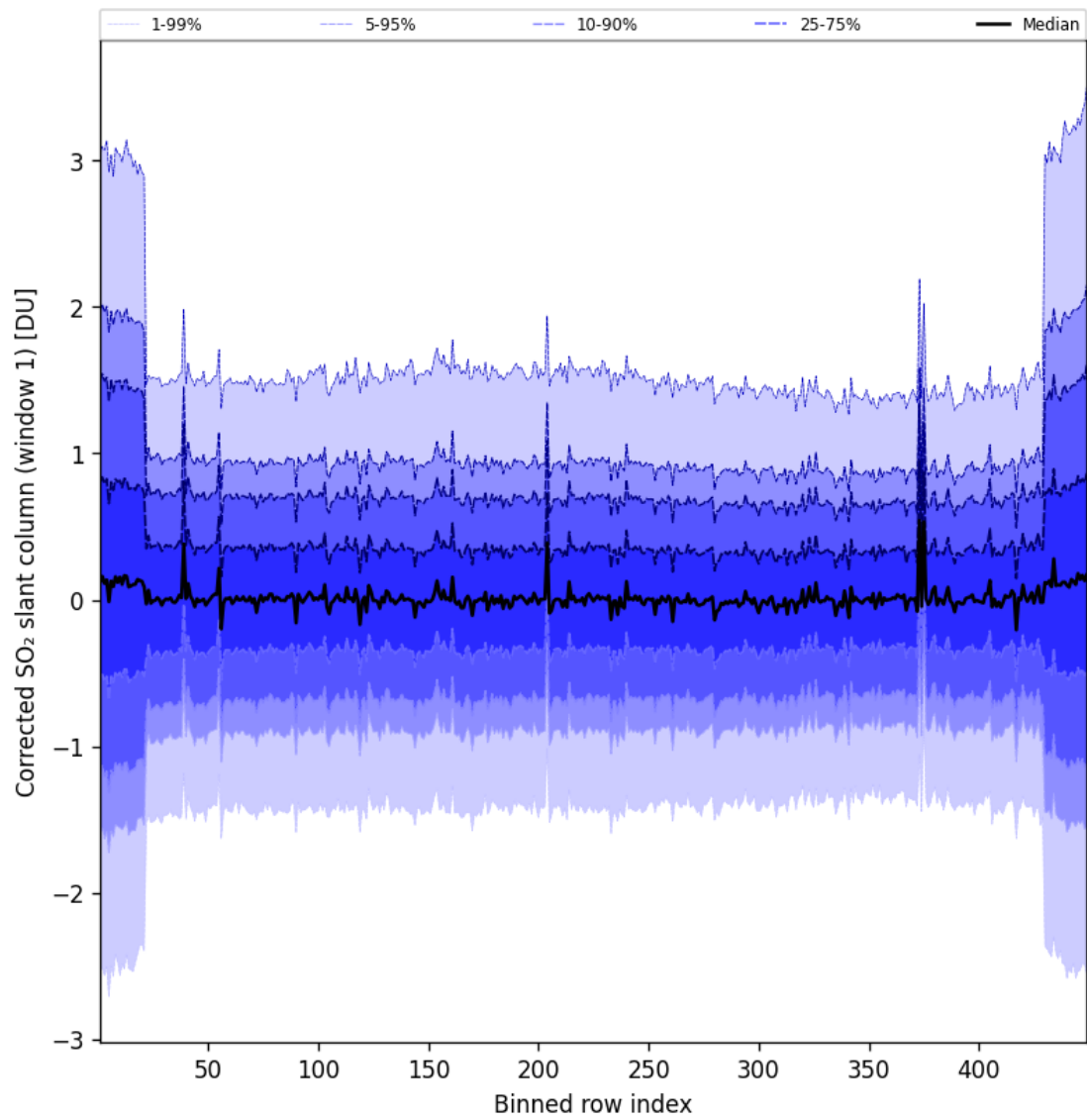


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-11-04 to 2025-11-05

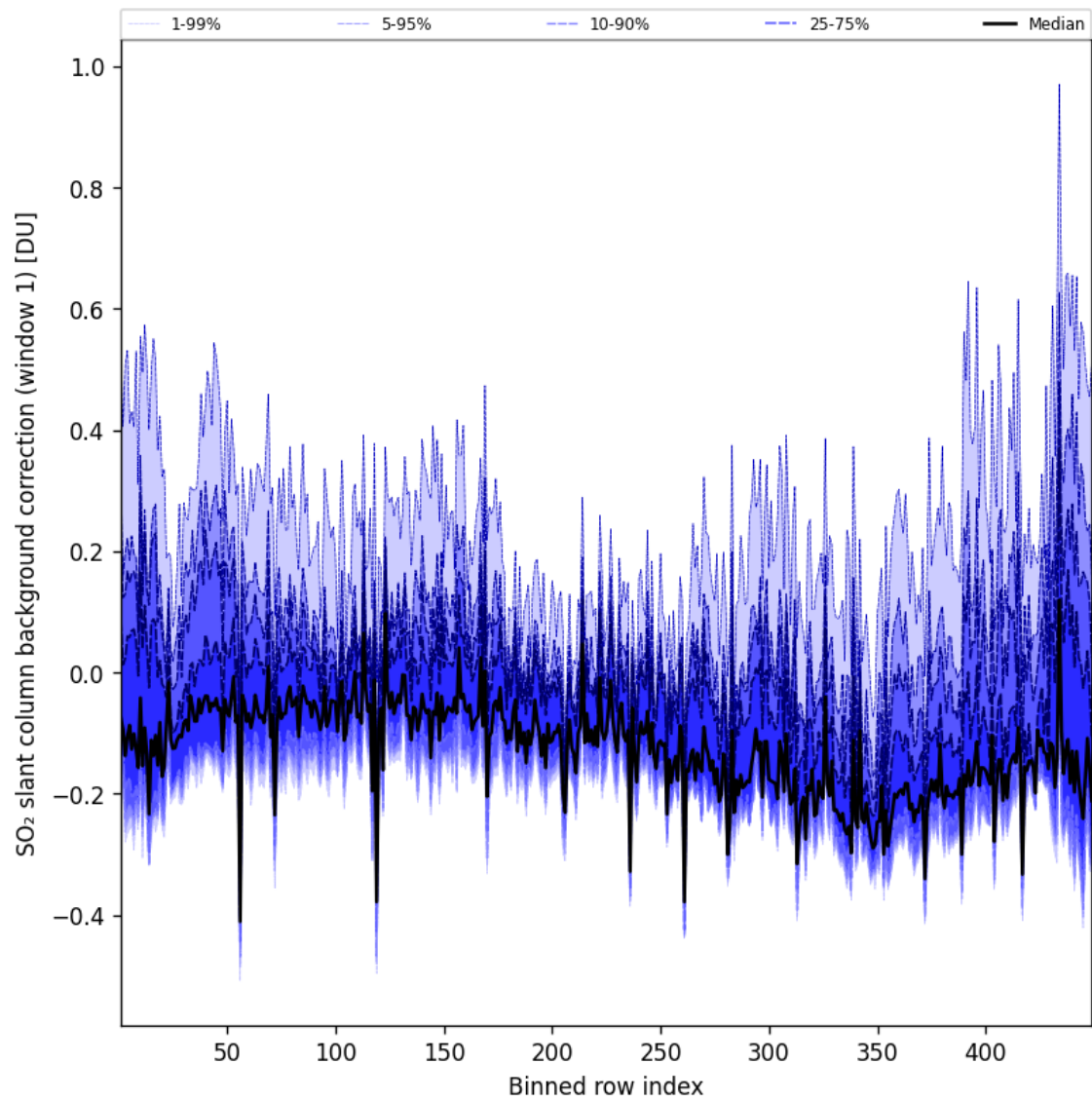


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-11-04 to 2025-11-05

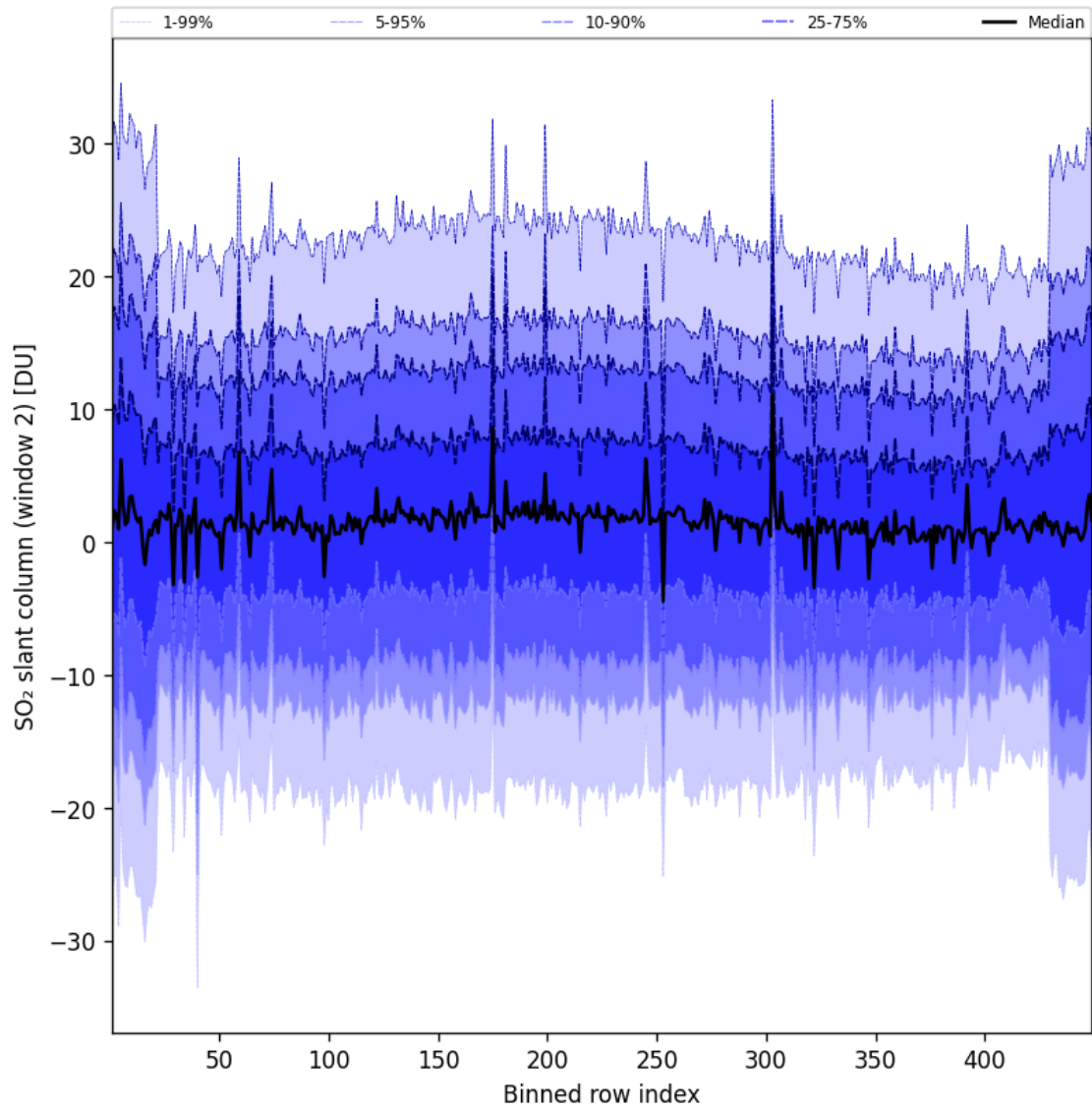


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-11-04 to 2025-11-05

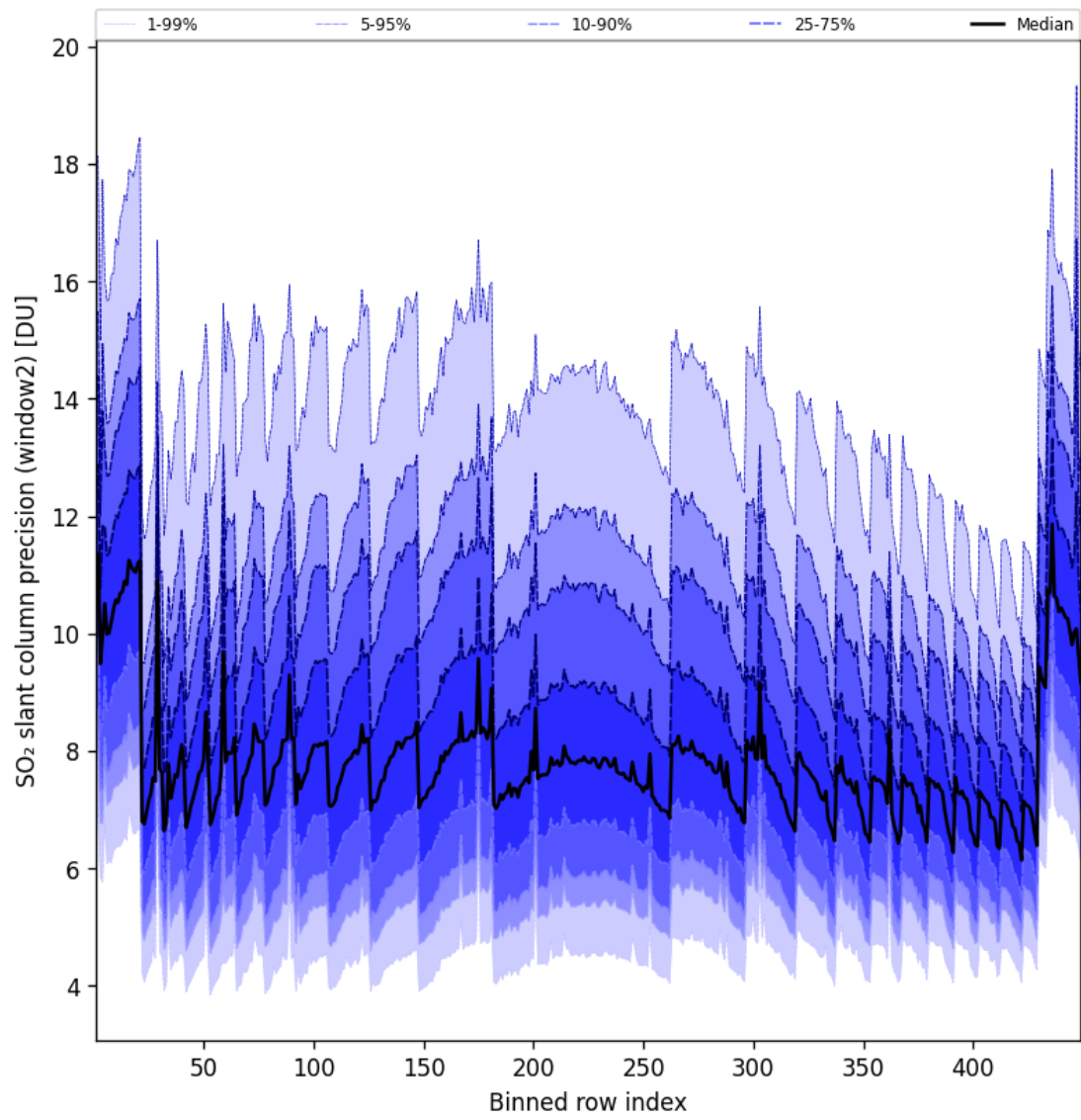


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-11-04 to 2025-11-05

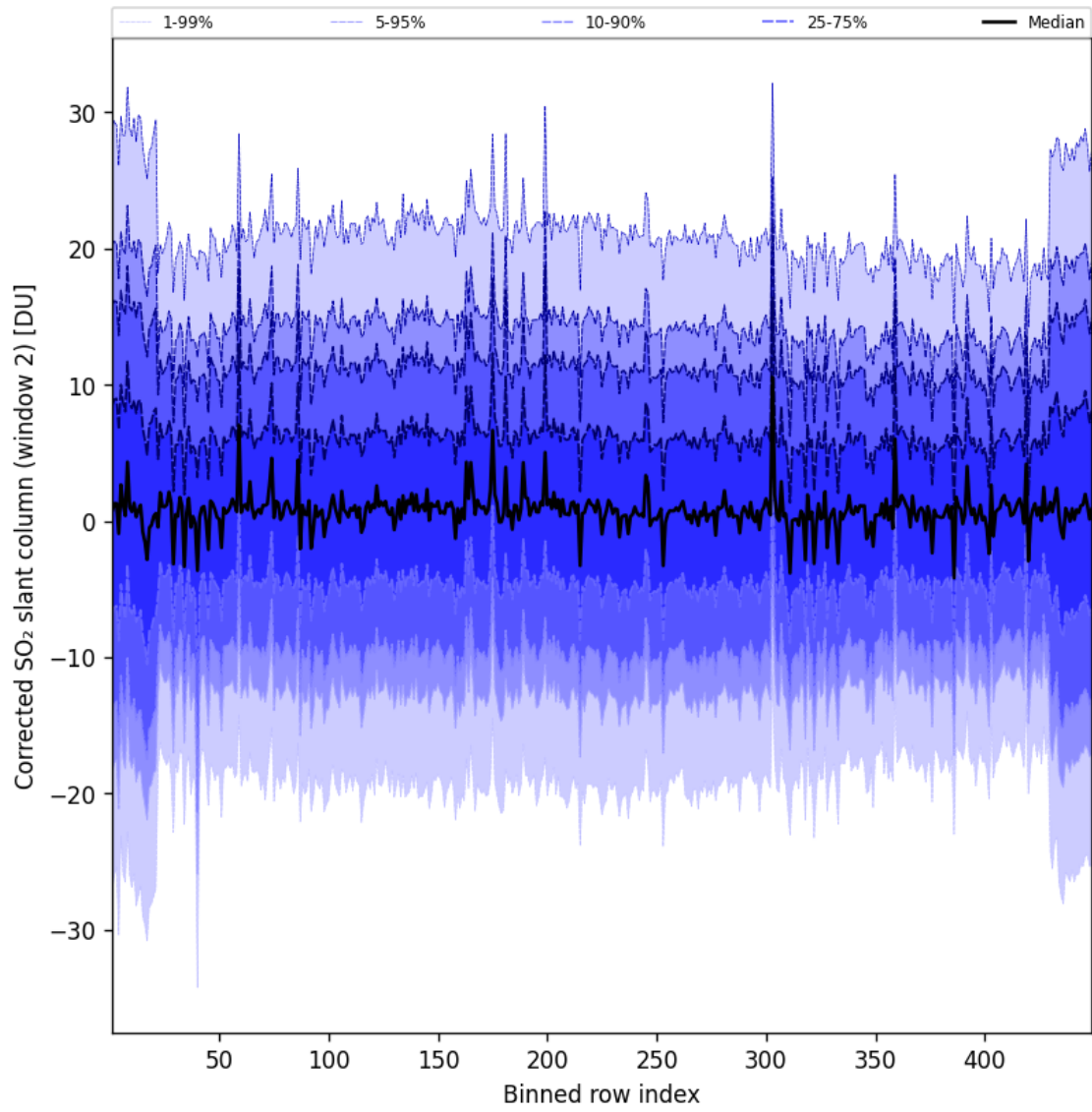


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-11-04 to 2025-11-05

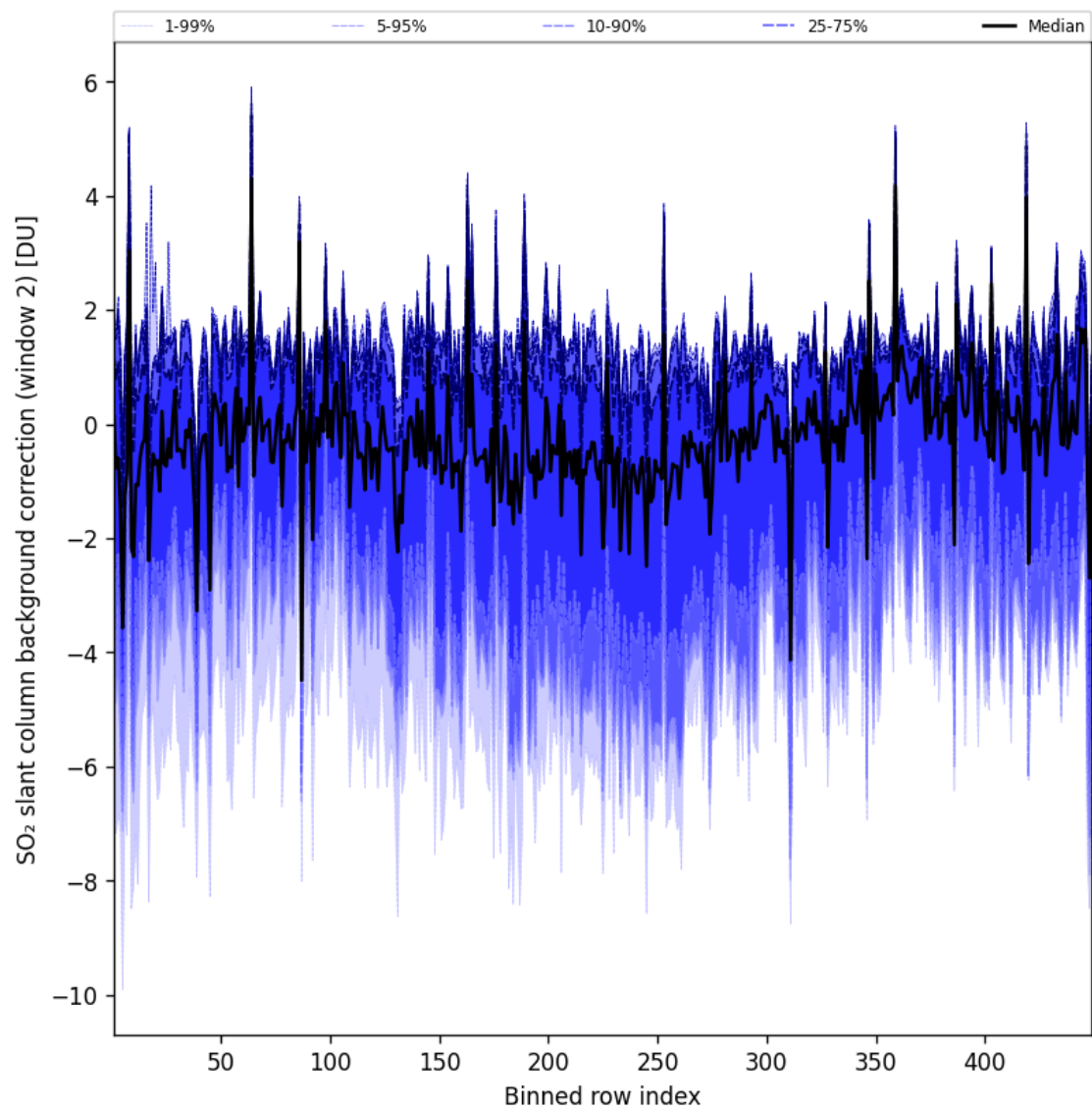


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-11-04 to 2025-11-05

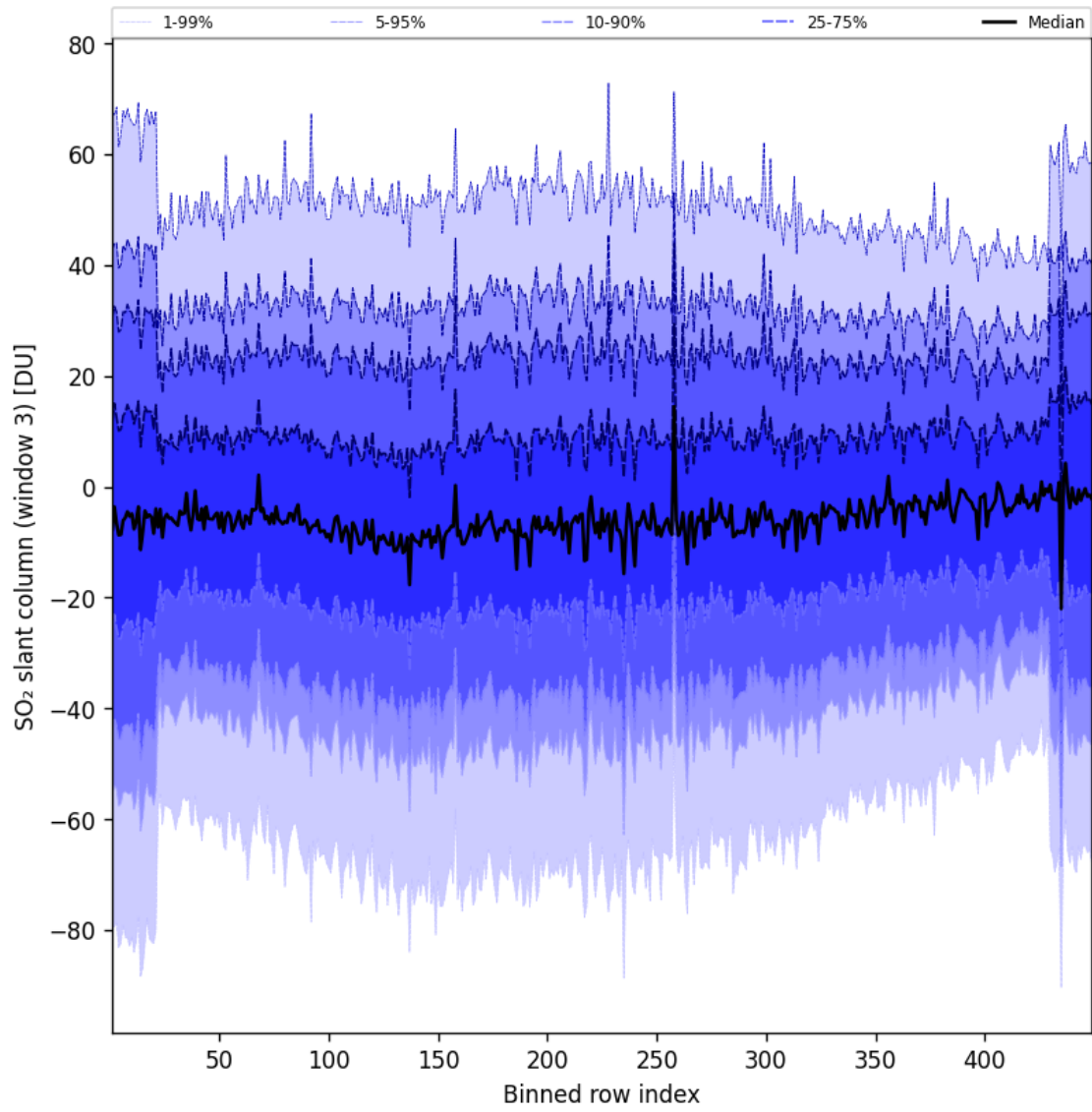


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-11-04 to 2025-11-05

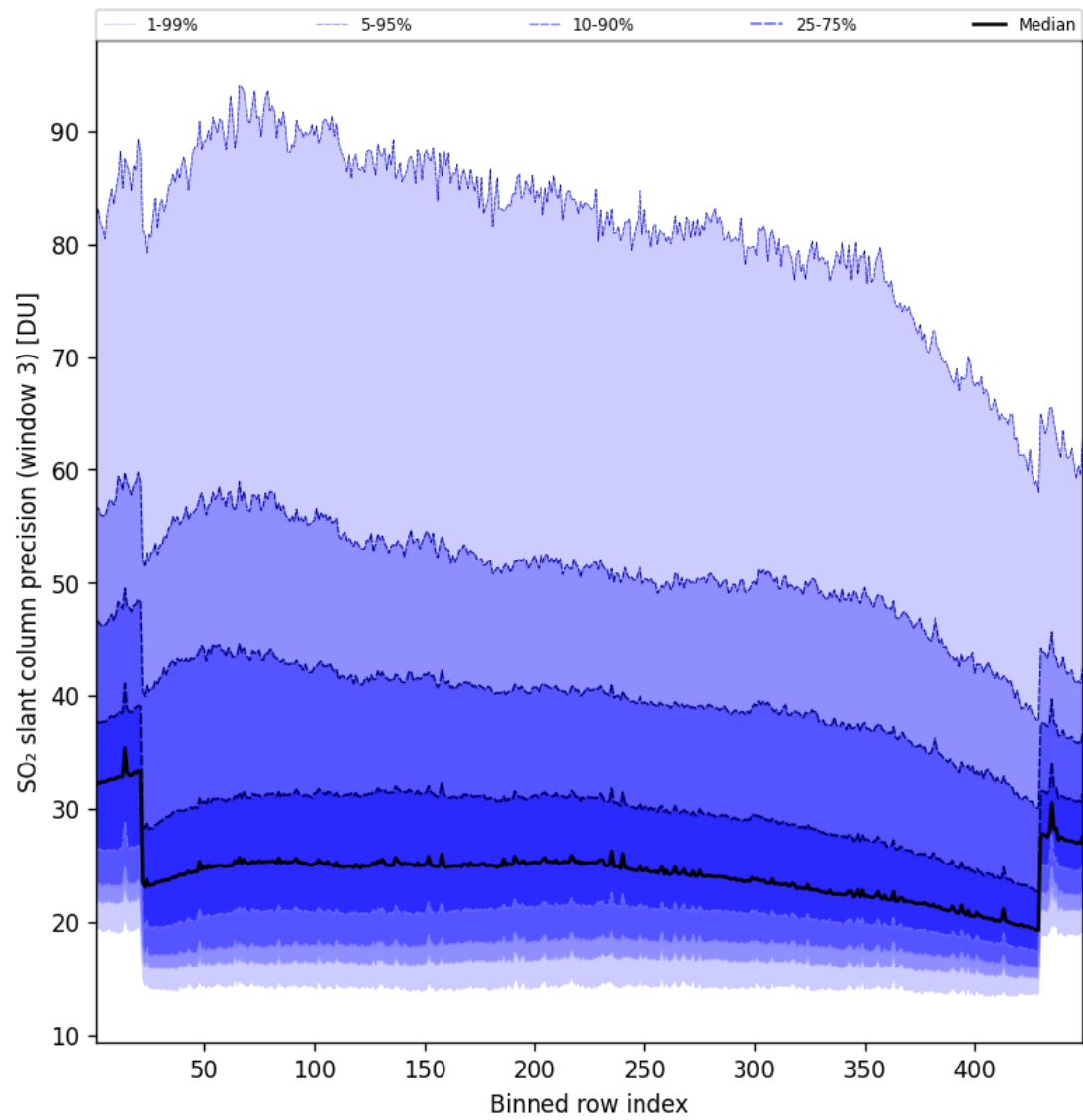


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-11-04 to 2025-11-05

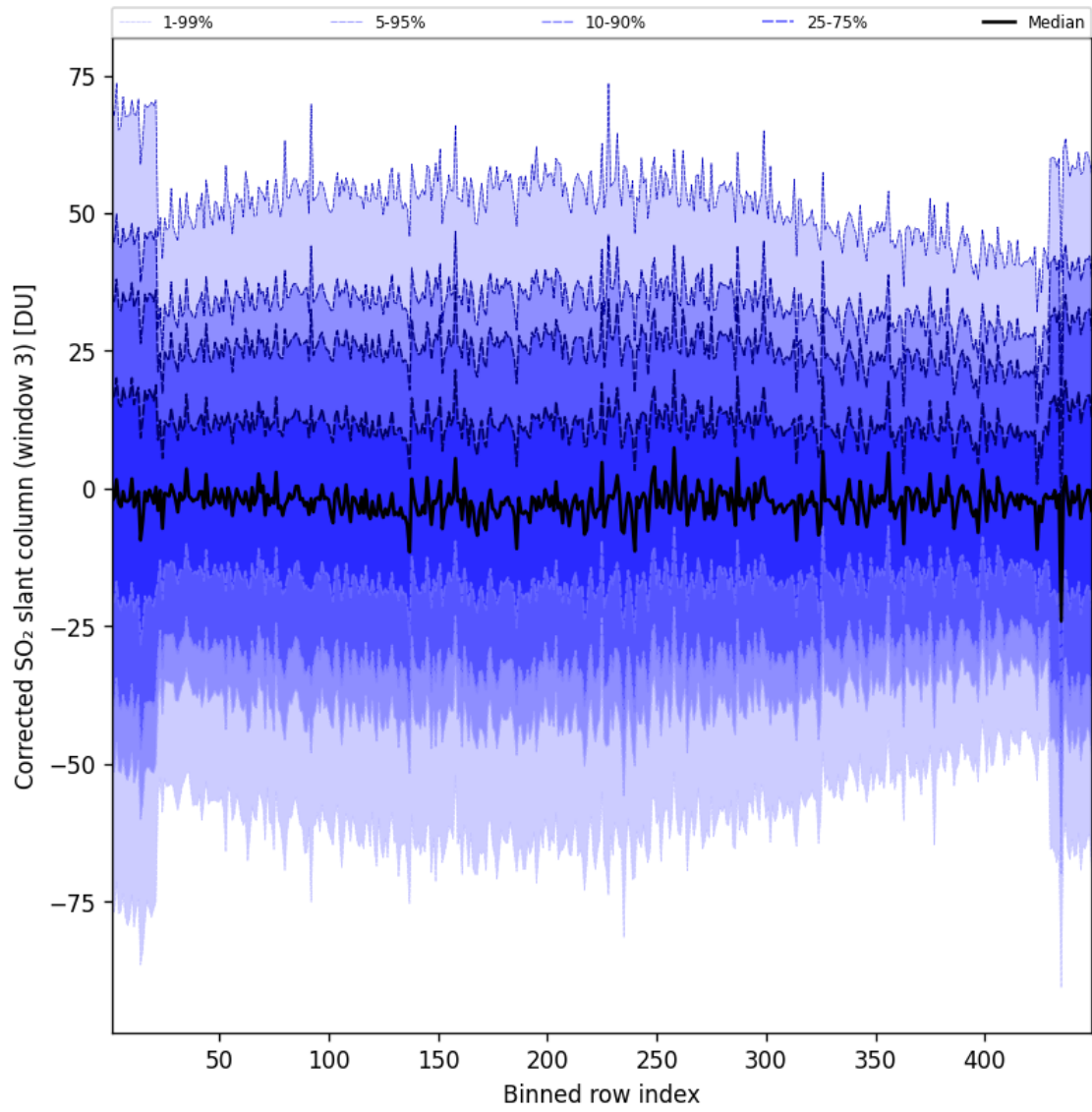


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-11-04 to 2025-11-05

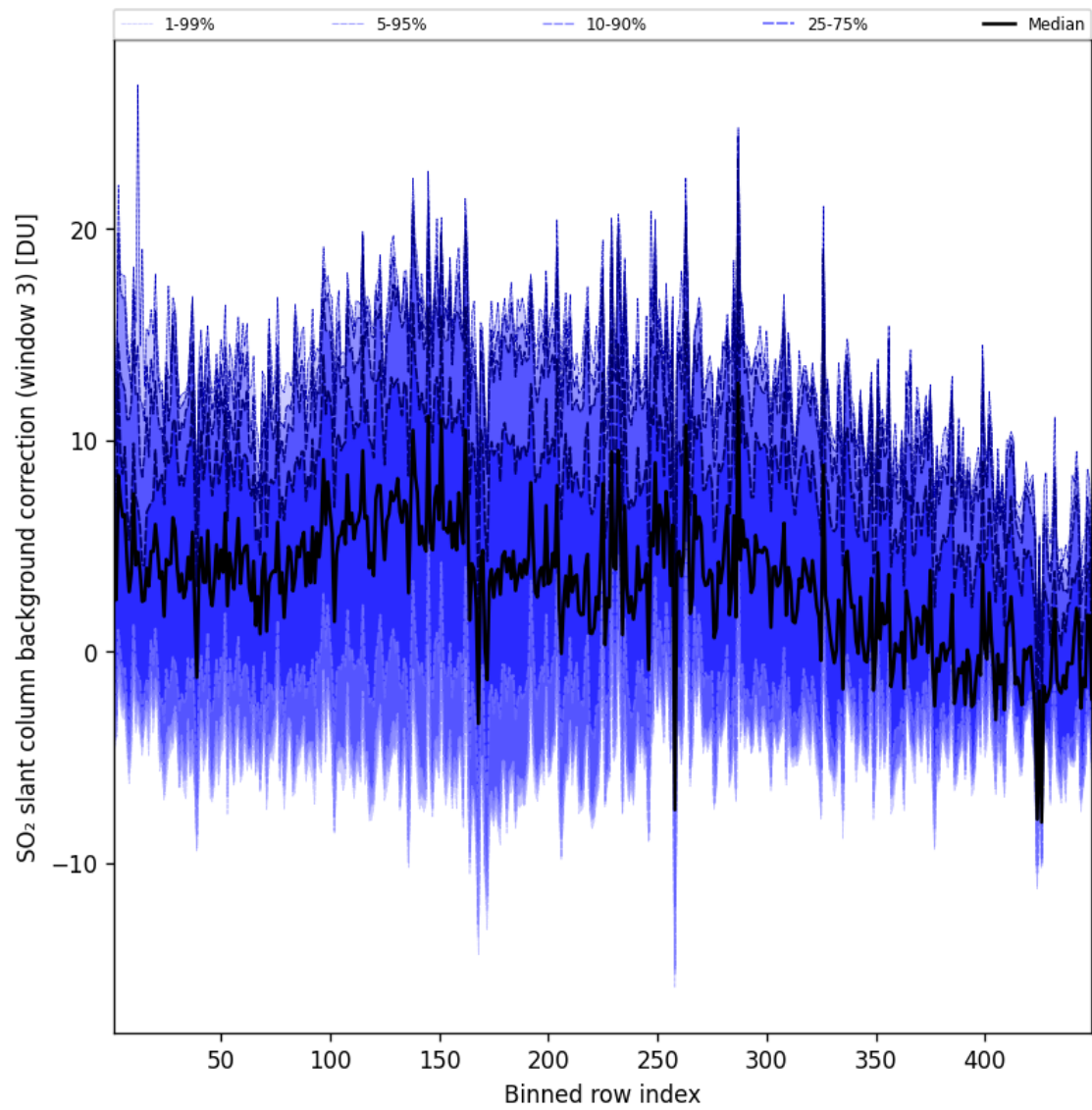


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-11-04 to 2025-11-05

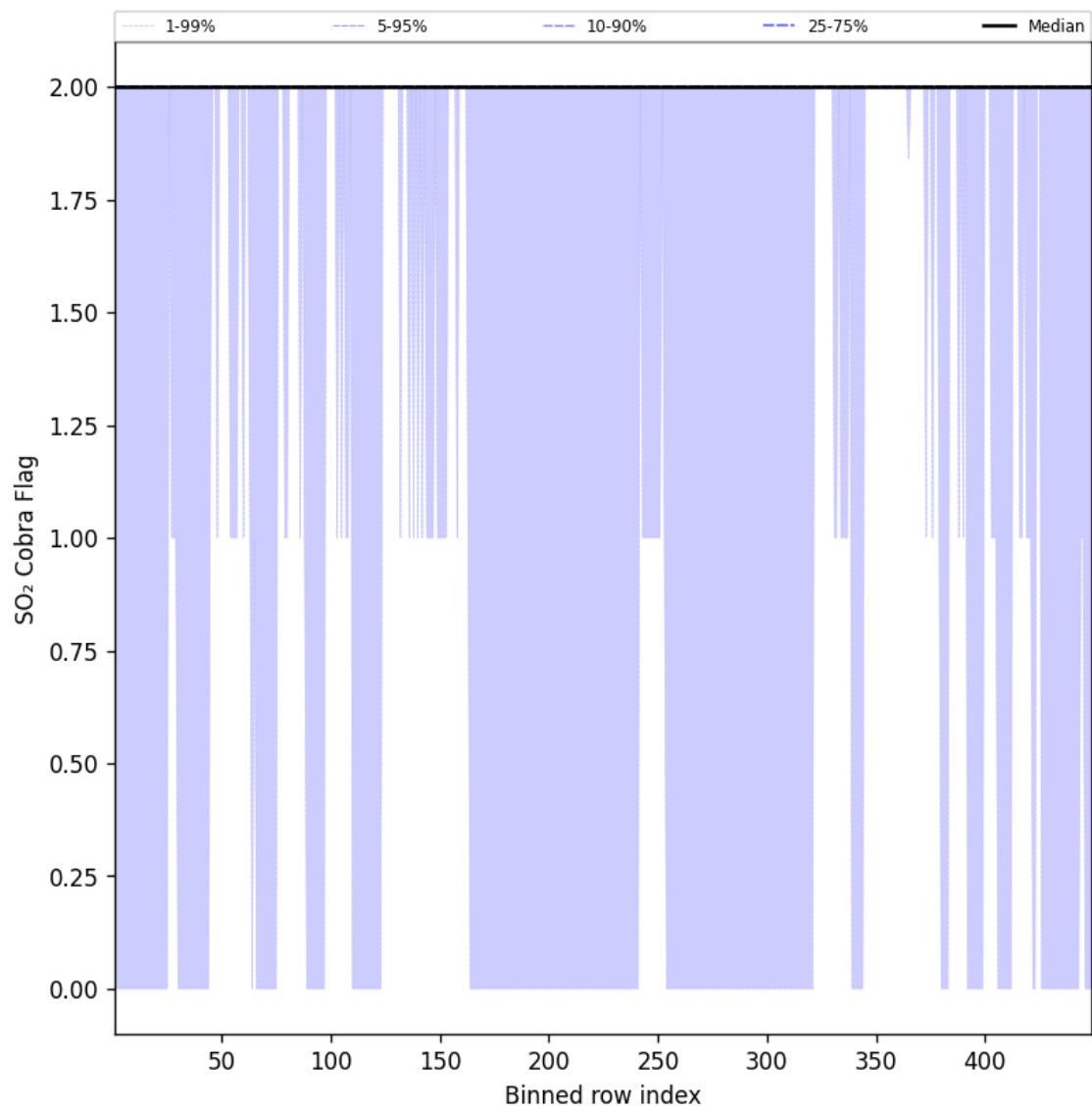


Figure 102: Along track statistics of "SO₂ Cobra Flag" for 2025-11-04 to 2025-11-05

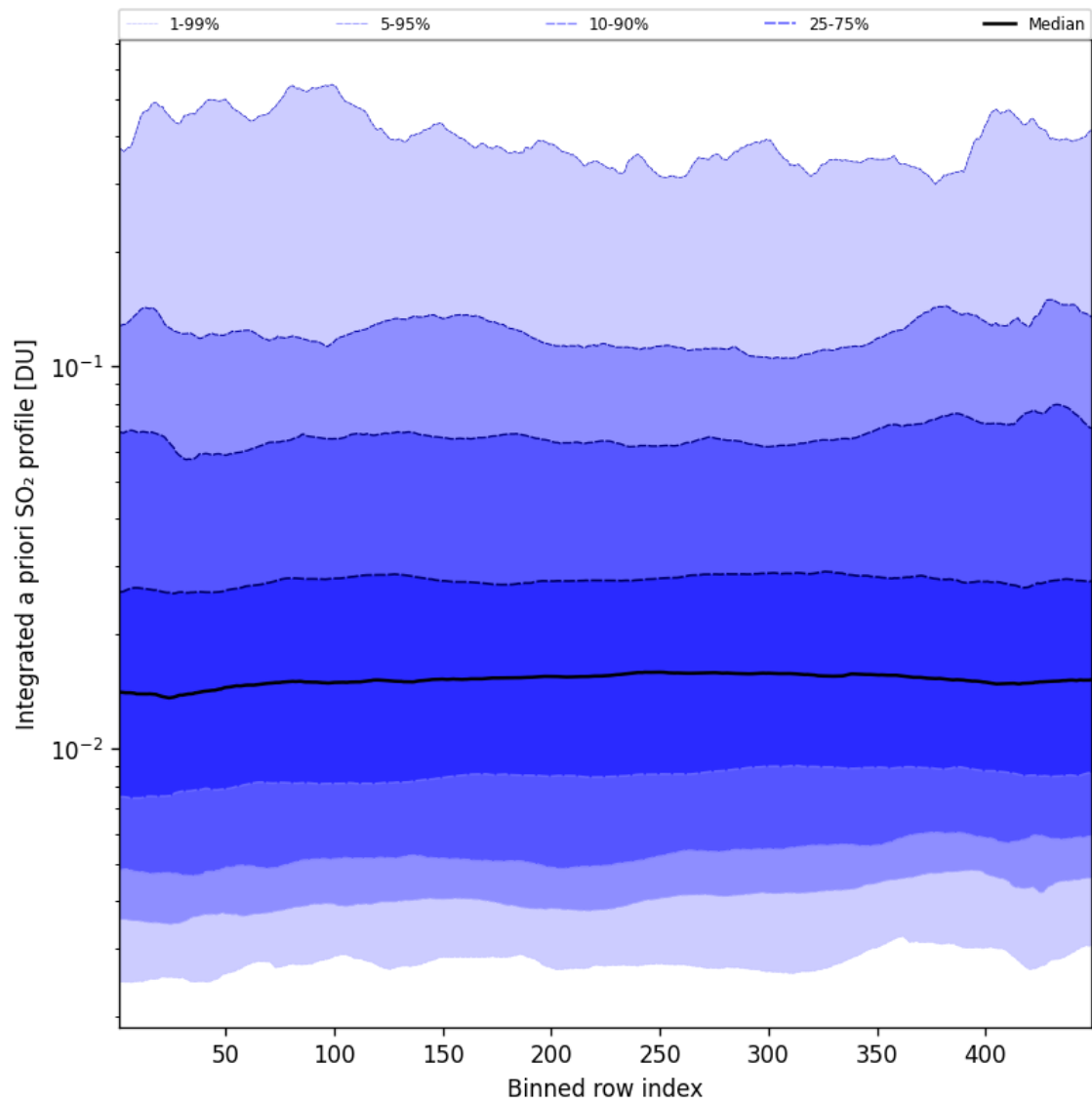


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-11-04 to 2025-11-05

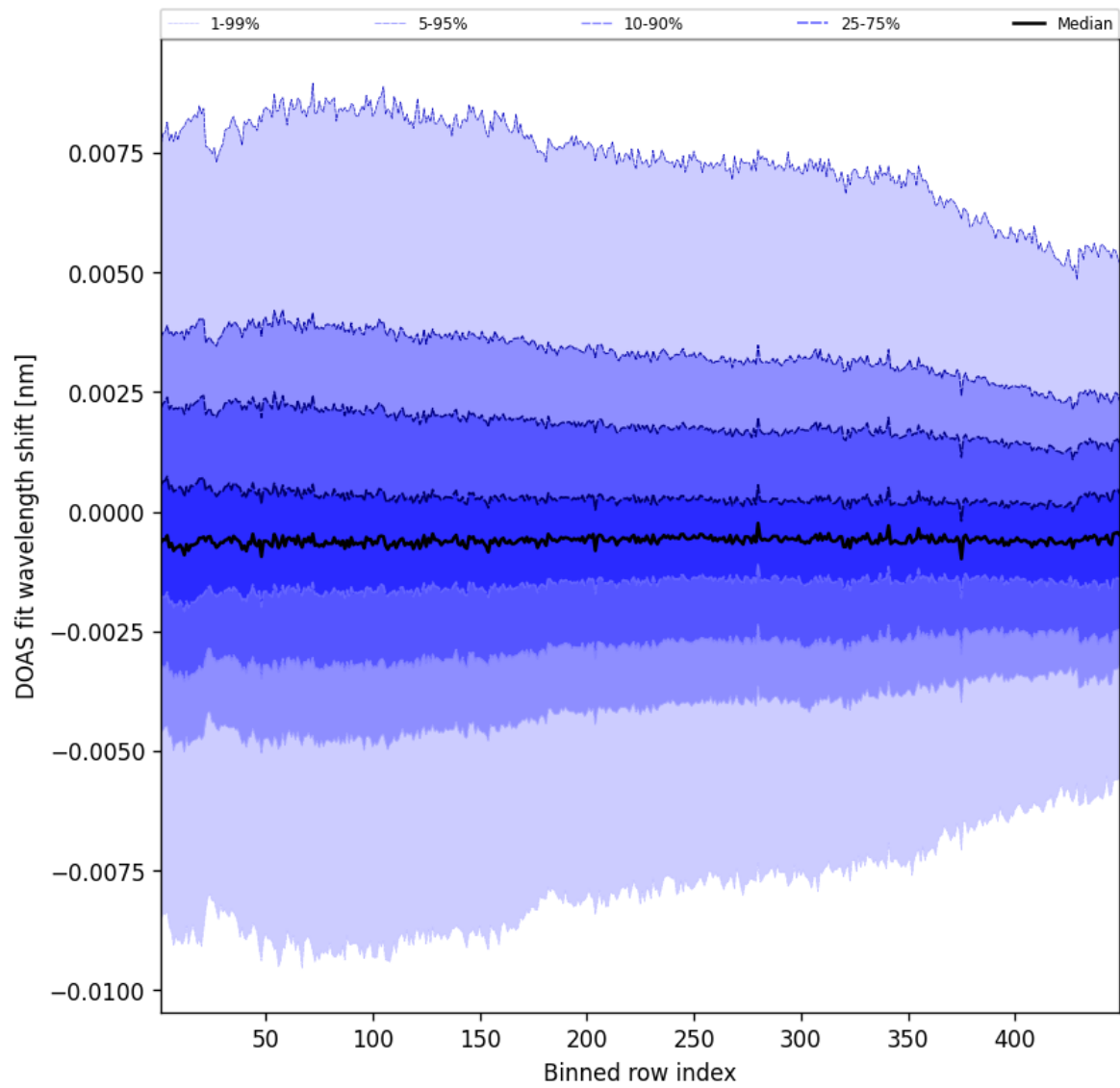


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-11-04 to 2025-11-05

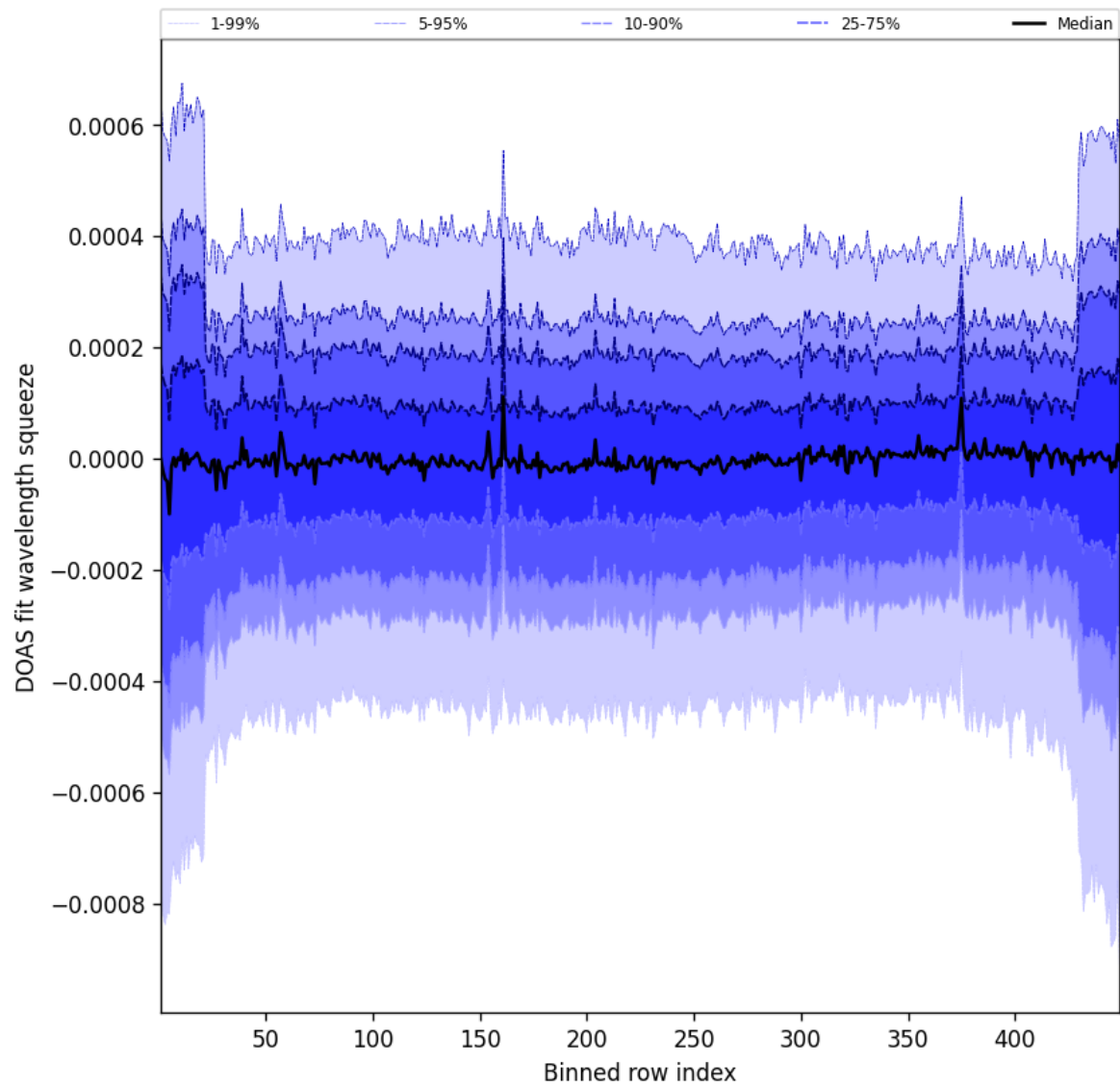


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-11-04 to 2025-11-05

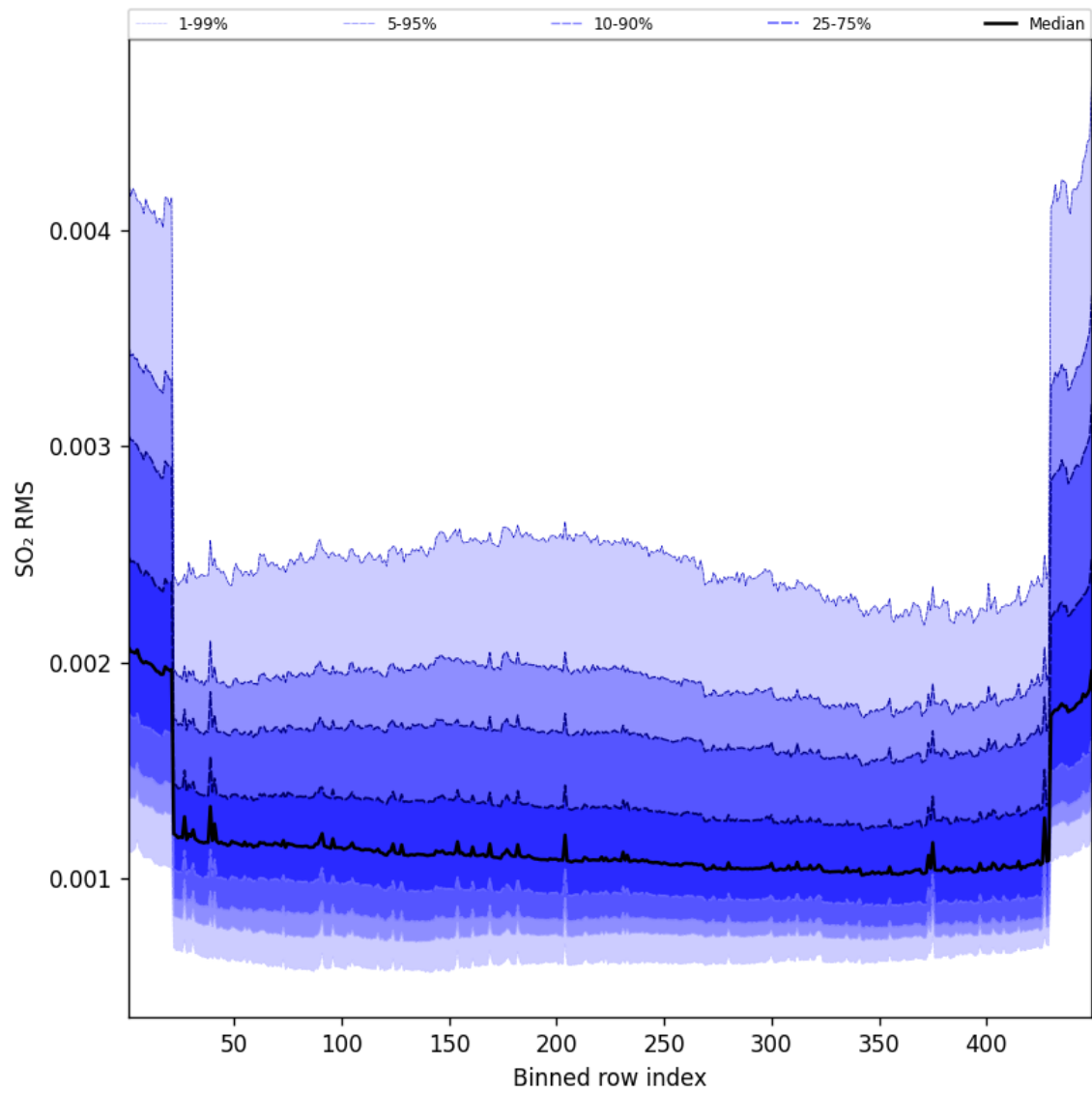


Figure 106: Along track statistics of “SO₂ RMS” for 2025-11-04 to 2025-11-05

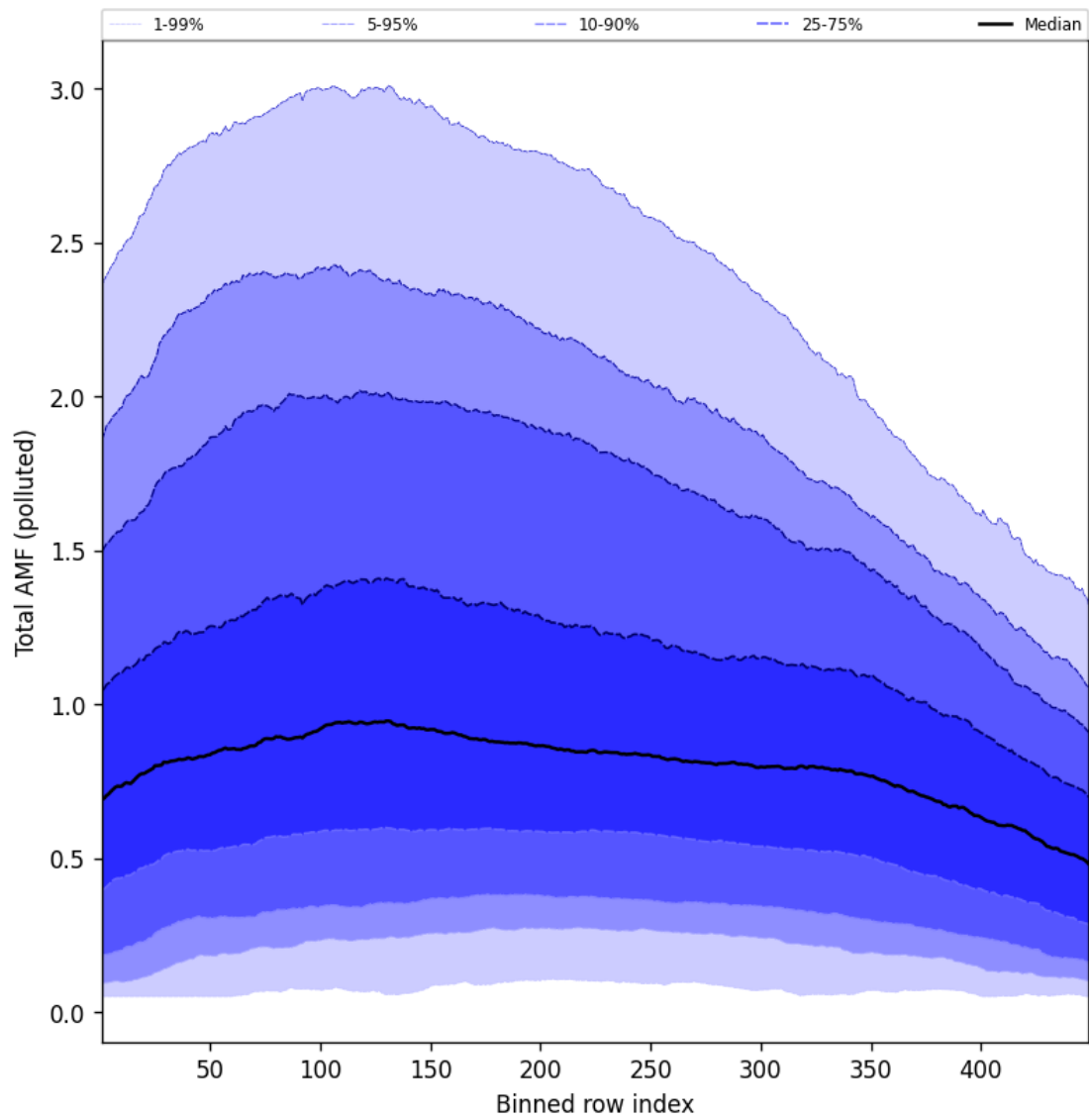


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-11-04 to 2025-11-05

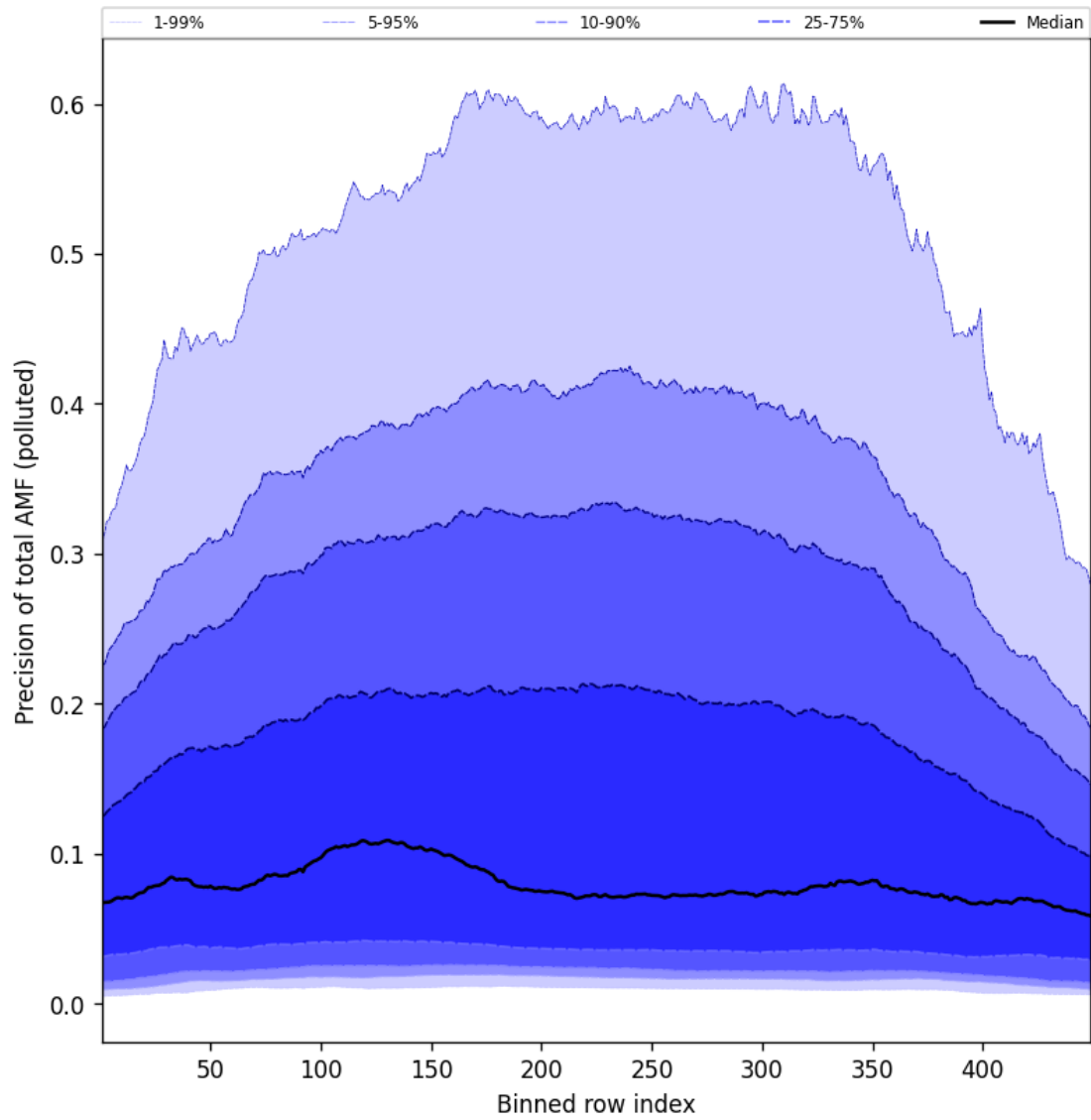


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-11-04 to 2025-11-05

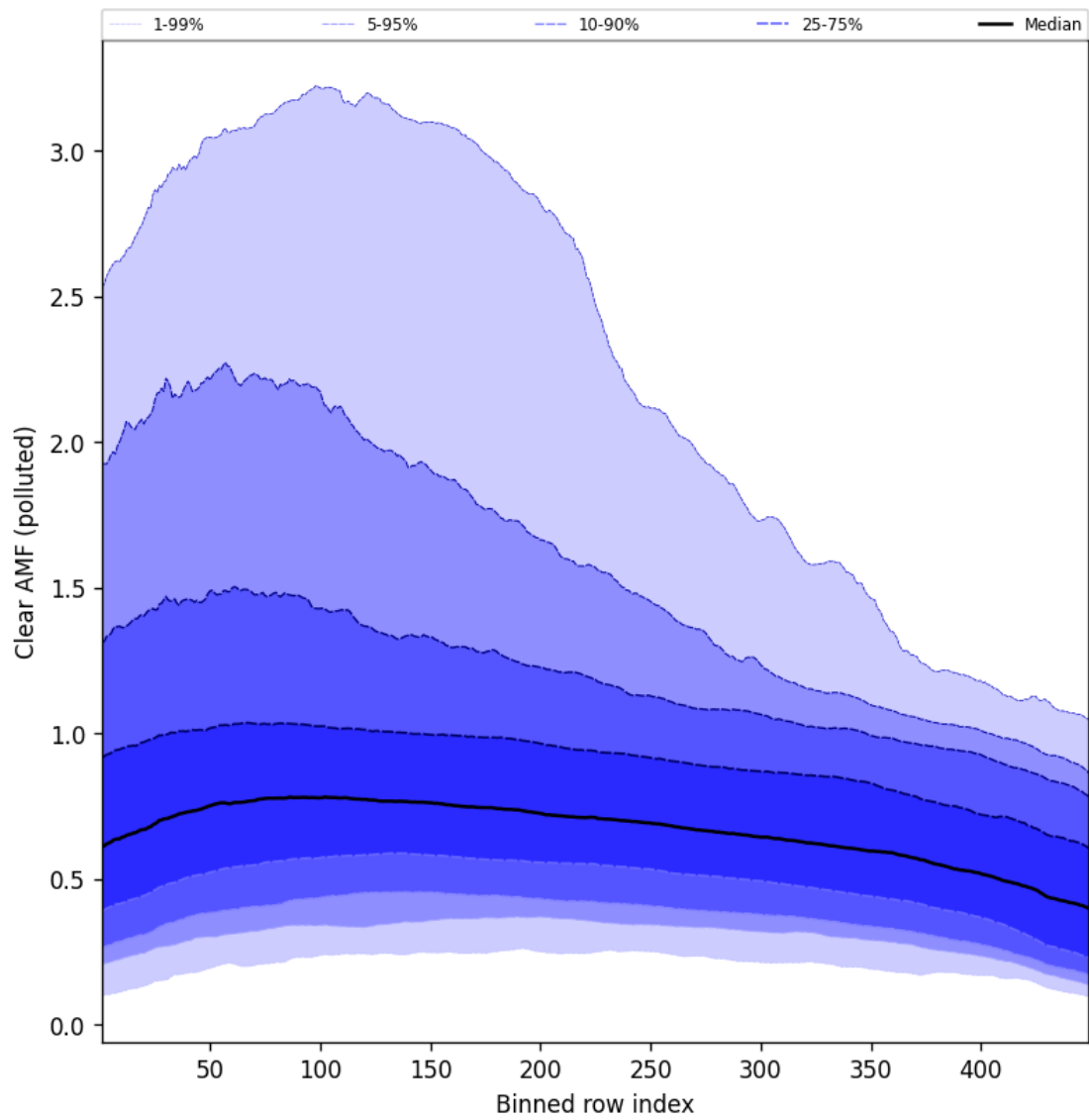


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-11-04 to 2025-11-05

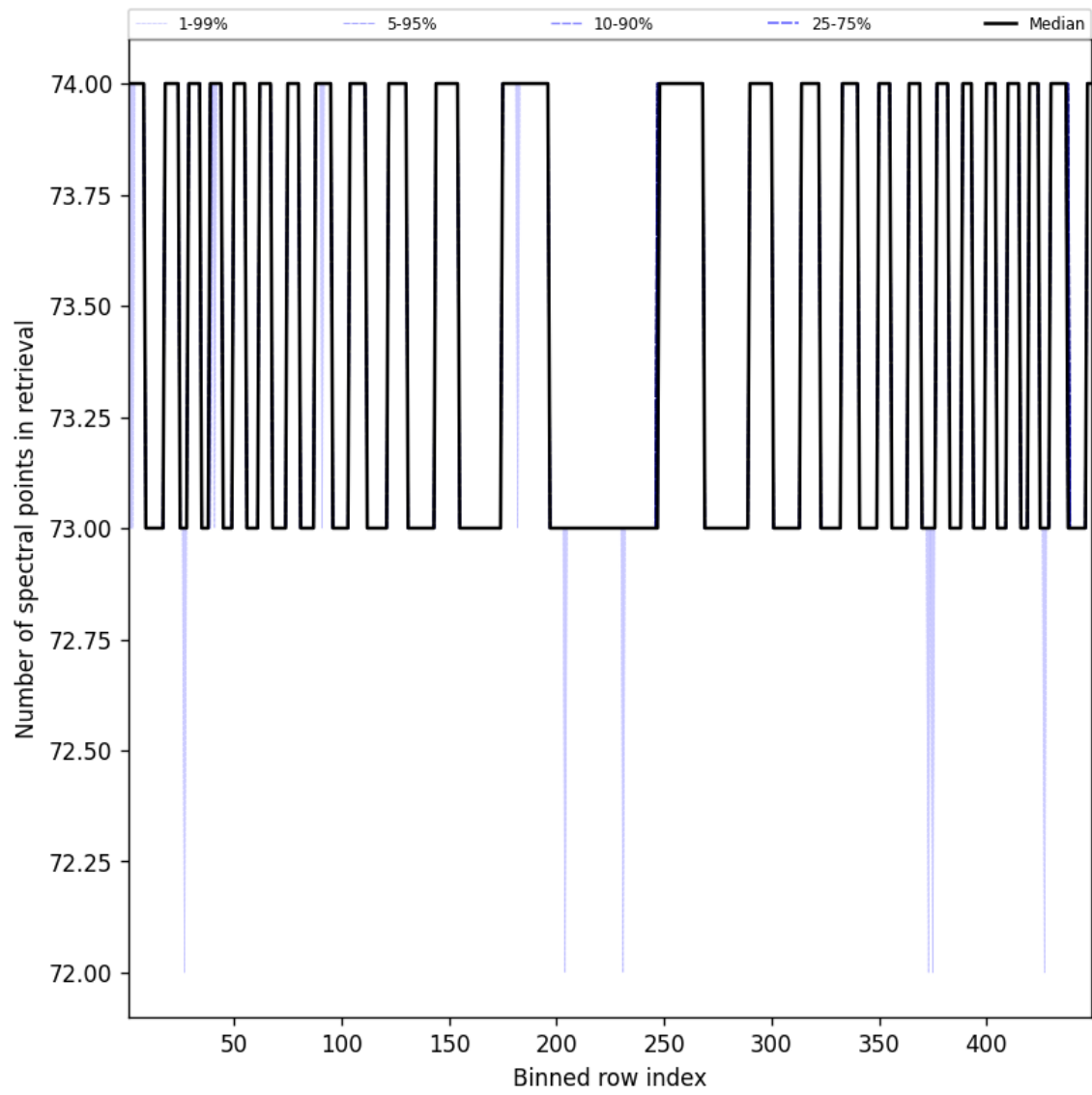


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-11-04 to 2025-11-05

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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