

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]	0.600 ± 0.421	16099048	0.995	0.840	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.314 \pm 122.033) \times 10^{-2}$	16099048	0.235	0.419	7.894×10^{-3}	-109	134
sulfurdioxide total vertical column precision [DU]	0.561 ± 0.878	16099048	0.147	0.391	0.320	2.047×10^{-2}	37.9
sulfurdioxide slant column density corrected [DU]	$(1.433 \pm 32.981) \times 10^{-2}$	16099048	0.242	0.342	7.715×10^{-3}	-23.9	74.4
sulfurdioxide slant column density cobra [DU]	$(1.430 \pm 32.727) \times 10^{-2}$	16099048	0.242	0.342	7.715×10^{-3}	-23.9	58.8
sulfurdioxide slant column density cobra precision [DU]	0.272 ± 0.117	16099048	0.213	0.109	0.235	6.093×10^{-2}	18.9
sulfurdioxide slant column density window1 [DU]	$(7.898 \pm 62.455) \times 10^{-2}$	16099048	7.500×10^{-2}	0.707	8.027×10^{-2}	-83.2	67.4
sulfurdioxide slant column density window1 precision [DU]	0.272 ± 0.117	16099048	0.213	0.109	0.235	6.093×10^{-2}	18.9
sulfurdioxide slant column density corrected win1 [DU]	$(2.261 \pm 61.382) \times 10^{-2}$	16099048	2.500×10^{-2}	0.688	1.155×10^{-2}	-83.2	67.3
background so2 slant column offset window1 [DU]	$(-5.637 \pm 13.174) \times 10^{-2}$	16099048	-0.140	0.159	-8.764×10^{-2}	-1.32	1.98
sulfurdioxide slant column density window2 [DU]	0.233 ± 8.588	16099048	0.750	10.8	0.132	-1.135×10^3	1.653×10^3
sulfurdioxide slant column density window2 precision [DU]	7.76 ± 2.23	16099048	6.97	2.61	7.38	2.21	473
sulfurdioxide slant column density corrected win2 [DU]	-1.06 ± 8.44	16099048	-1.25	10.6	-1.06	-1.134×10^3	1.654×10^3
background so2 slant column offset window2 [DU]	-1.29 ± 1.97	16099048	0.250	2.61	-0.925	-13.9	6.48
sulfurdioxide slant column density window3 [DU]	-1.54 ± 23.39	16099048	-2.80	28.9	-1.94	-511	245
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 12.5	16099048	21.5	9.91	23.7	9.84	264
sulfurdioxide slant column density corrected win3 [DU]	6.45 ± 22.49	16099048	5.04	27.6	6.38	-515	252
background so2 slant column offset window3 [DU]	7.99 ± 6.48	16099048	3.92	9.69	7.68	-13.0	28.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	16099048	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.000 \pm 10.909) \times 10^{-2}$	16099048	1.664×10^{-2}	2.138×10^{-2}	1.630×10^{-2}	2.415×10^{-4}	2.53
fitted radiance shift [nm]	$(-4.161 \pm 24.338) \times 10^{-4}$	16099048	-5.000×10^{-4}	1.627×10^{-3}	-4.604×10^{-4}	-4.157×10^{-2}	4.668×10^{-2}
fitted radiance squeeze [1]	$(-3.592 \pm 17.137) \times 10^{-5}$	16099048	-3.000×10^{-5}	2.019×10^{-4}	-3.162×10^{-5}	-1.416×10^{-2}	1.417×10^{-2}
fitted root mean square [1]	$(1.193 \pm 0.471) \times 10^{-3}$	16099048	9.250×10^{-4}	4.497×10^{-4}	1.063×10^{-3}	3.304×10^{-4}	6.320×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.939 ± 0.666	16099048	0.540	0.687	0.750	5.000×10^{-2}	3.49
sulfurdioxide total air mass factor polluted precision [1]	0.159 ± 0.196	16099048	2.500×10^{-2}	0.177	8.171×10^{-2}	2.731×10^{-3}	1.94
sulfurdioxide clear air mass factor polluted [1]	0.781 ± 0.570	16099048	0.500	0.413	0.636	4.905×10^{-2}	3.53
number of spectral points in retrieval [1]	73.4 ± 0.5	16099048	73.0	1.000	73.0	53.0	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	2.000×10^{-2}	7.000×10^{-2}	0.160	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.77	-0.959	-0.552	-0.356	-0.197	0.221	0.391	0.608	1.07	3.21
sulfurdioxide total vertical column precision [DU]	6.103×10^{-2}	8.819×10^{-2}	0.119	0.147	0.190	0.580	0.822	1.14	1.78	4.24
sulfurdioxide slant column density corrected [DU]	-0.789	-0.456	-0.333	-0.250	-0.162	0.180	0.272	0.360	0.498	0.905
sulfurdioxide slant column density cobra [DU]	-0.789	-0.456	-0.333	-0.250	-0.162	0.180	0.272	0.360	0.498	0.905
sulfurdioxide slant column density cobra precision [DU]	0.142	0.164	0.176	0.186	0.199	0.308	0.370	0.423	0.494	0.697
sulfurdioxide slant column density window1 [DU]	-1.54	-0.887	-0.634	-0.461	-0.276	0.431	0.612	0.784	1.04	1.73
sulfurdioxide slant column density window1 precision [DU]	0.142	0.164	0.176	0.186	0.199	0.308	0.370	0.423	0.494	0.697
sulfurdioxide slant column density corrected win1 [DU]	-1.51	-0.903	-0.667	-0.505	-0.330	0.358	0.540	0.715	0.982	1.72
background so2 slant column offset window1 [DU]	-0.305	-0.231	-0.195	-0.165	-0.142	1.724×10^{-2}	7.698×10^{-2}	0.128	0.197	0.318
sulfurdioxide slant column density window2 [DU]	-20.1	-13.5	-10.3	-7.88	-5.22	5.54	8.29	10.8	14.3	21.9
sulfurdioxide slant column density window2 precision [DU]	4.22	4.94	5.39	5.77	6.24	8.86	9.77	10.7	11.9	14.5
sulfurdioxide slant column density corrected win2 [DU]	-21.7	-14.7	-11.4	-9.03	-6.37	4.24	6.90	9.30	12.6	19.6
background so2 slant column offset window2 [DU]	-7.46	-5.00	-3.84	-3.12	-2.43	0.174	0.465	0.704	1.04	2.09
sulfurdioxide slant column density window3 [DU]	-60.0	-39.0	-29.7	-23.1	-16.0	12.8	20.6	27.7	37.4	56.7
sulfurdioxide slant column density window3 precision [DU]	13.7	15.6	17.0	18.2	19.8	29.7	34.0	39.0	49.6	80.3
sulfurdioxide slant column density corrected win3 [DU]	-50.8	-30.1	-20.8	-14.3	-7.30	20.3	27.5	34.1	43.3	62.3
background so2 slant column offset window3 [DU]	-5.39	-2.29	-0.286	1.30	3.16	12.8	15.1	16.9	18.8	21.5
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]	9.049×10^{-4}	3.069×10^{-3}	4.437×10^{-3}	6.064×10^{-3}	8.614×10^{-3}	2.999×10^{-2}	4.589×10^{-2}	7.047×10^{-2}	0.150	0.427
fitted radiance shift [nm]	-7.797×10^{-3}	-3.924×10^{-3}	-2.582×10^{-3}	-1.851×10^{-3}	-1.269×10^{-3}	3.588×10^{-4}	1.005×10^{-3}	1.842×10^{-3}	3.318×10^{-3}	7.374×10^{-3}
fitted radiance squeeze [1]	-4.905×10^{-4}	-3.145×10^{-4}	-2.404×10^{-4}	-1.890×10^{-4}	-1.346×10^{-4}	6.736×10^{-5}	1.173×10^{-4}	1.631×10^{-4}	2.283×10^{-4}	3.830×10^{-4}
fitted root mean square [1]	5.971×10^{-4}	7.108×10^{-4}	7.759×10^{-4}	8.288×10^{-4}	8.945×10^{-4}	1.344×10^{-3}	1.567×10^{-3}	1.800×10^{-3}	2.121×10^{-3}	2.896×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.828×10^{-2}	0.200	0.290	0.380	0.488	1.18	1.52	1.96	2.46	3.01
sulfurdioxide total air mass factor polluted precision [1]	9.024×10^{-3}	1.536×10^{-2}	2.147×10^{-2}	2.656×10^{-2}	3.422×10^{-2}	0.211	0.295	0.389	0.543	0.961
sulfurdioxide clear air mass factor polluted [1]	0.168	0.263	0.340	0.398	0.463	0.875	1.03	1.22	2.27	3.16
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]	0.727 ± 0.383	5745048	0.640	1.000	0.0	1.000	0.360	1.000
sulfurdioxide total vertical column [DU]	$(6.828 \pm 177.064) \times 10^{-2}$	5745048	0.654	1.732×10^{-2}	-109	134	-0.302	0.352
sulfurdioxide total vertical column precision [DU]	0.844 ± 1.185	5745048	0.638	0.476	4.918×10^{-2}	37.9	0.287	0.925
sulfurdioxide slant column density corrected [DU]	$(2.419 \pm 40.685) \times 10^{-2}$	5745048	0.404	1.211×10^{-2}	-7.72	49.0	-0.188	0.216
sulfurdioxide slant column density cobra [DU]	$(2.412 \pm 40.349) \times 10^{-2}$	5745048	0.404	1.211×10^{-2}	-7.72	27.8	-0.188	0.216
sulfurdioxide slant column density cobra precision [DU]	0.325 ± 0.142	5745048	0.166	0.285	9.584×10^{-2}	10.1	0.226	0.393
sulfurdioxide slant column density window1 [DU]	0.145 ± 0.730	5745048	0.798	0.145	-10.0	31.1	-0.255	0.544
sulfurdioxide slant column density window1 precision [DU]	0.325 ± 0.142	5745048	0.166	0.285	9.584×10^{-2}	10.1	0.226	0.393
sulfurdioxide slant column density corrected win1 [DU]	$(4.953 \pm 72.925) \times 10^{-2}$	5745048	0.794	2.773×10^{-2}	-9.40	31.1	-0.363	0.432
background so2 slant column offset window1 [DU]	$(-9.523 \pm 11.718) \times 10^{-2}$	5745048	0.104	-0.109	-1.32	1.98	-0.158	-5.447×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.606 ± 9.759	5745048	12.4	0.321	-272	384	-5.75	6.65
sulfurdioxide slant column density window2 precision [DU]	8.85 ± 2.30	5745048	2.92	8.56	2.25	293	7.25	10.2
sulfurdioxide slant column density corrected win2 [DU]	-1.04 ± 9.54	5745048	12.2	-1.05	-268	380	-7.13	5.03
background so2 slant column offset window2 [DU]	-1.64 ± 2.38	5745048	3.05	-0.838	-13.9	5.84	-2.96	9.222×10^{-2}
sulfurdioxide slant column density window3 [DU]	-3.34 ± 26.32	5745048	33.2	-2.77	-203	186	-19.6	13.6
sulfurdioxide slant column density window3 precision [DU]	30.4 ± 12.7	5745048	9.97	27.5	10.0	235	23.4	33.4
sulfurdioxide slant column density corrected win3 [DU]	5.75 ± 25.84	5745048	32.6	5.94	-190	203	-10.4	22.2
background so2 slant column offset window3 [DU]	9.09 ± 5.16	5745048	8.07	8.28	-9.76	28.1	4.99	13.1
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	5745048	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(8.224 \pm 17.038) \times 10^{-2}$	5745048	5.776×10^{-2}	3.095×10^{-2}	7.997×10^{-4}	2.53	1.702×10^{-2}	7.478×10^{-2}
fitted radiance shift [nm]	$(-2.036 \pm 25.403) \times 10^{-4}$	5745048	1.668×10^{-3}	-2.331×10^{-4}	-3.521×10^{-2}	4.095×10^{-2}	-1.063×10^{-3}	6.048×10^{-4}
fitted radiance squeeze [1]	$(-1.912 \pm 187.055) \times 10^{-6}$	5745048	2.166×10^{-4}	-2.160×10^{-7}	-3.912×10^{-3}	1.292×10^{-2}	-1.088×10^{-4}	1.078×10^{-4}
fitted root mean square [1]	$(1.397 \pm 0.569) \times 10^{-3}$	5745048	6.502×10^{-4}	1.241×10^{-3}	3.385×10^{-4}	4.522×10^{-2}	1.008×10^{-3}	1.659×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.657 ± 0.358	5745048	0.483	0.617	5.000×10^{-2}	2.82	0.384	0.868
sulfurdioxide total air mass factor polluted precision [1]	$(8.828 \pm 12.260) \times 10^{-2}$	5745048	7.413×10^{-2}	4.551×10^{-2}	2.731×10^{-3}	1.75	2.667×10^{-2}	0.101
sulfurdioxide clear air mass factor polluted [1]	0.610 ± 0.266	5745048	0.410	0.605	4.905×10^{-2}	1.69	0.399	0.809
number of spectral points in retrieval [1]	73.5 ± 0.5	5745048	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]	0.529 ± 0.424	10354000	0.900	0.430	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	$(1.364 \pm 75.818) \times 10^{-2}$	10354000	0.332	5.276×10^{-3}	-44.2	68.1	-0.159	0.173
sulfurdioxide total vertical column precision [DU]	0.404 ± 0.593	10354000	0.281	0.259	2.047×10^{-2}	34.4	0.153	0.434
sulfurdioxide slant column density corrected [DU]	$(8.864 \pm 277.847) \times 10^{-3}$	10354000	0.314	5.810×10^{-3}	-23.9	74.4	-0.150	0.163
sulfurdioxide slant column density cobra [DU]	$(8.846 \pm 275.899) \times 10^{-3}$	10354000	0.314	5.810×10^{-3}	-23.9	58.8	-0.150	0.163
sulfurdioxide slant column density cobra precision [DU]	0.243 ± 0.087	10354000	7.402×10^{-2}	0.218	6.093×10^{-2}	18.9	0.191	0.265
sulfurdioxide slant column density window1 [DU]	$(4.248 \pm 55.403) \times 10^{-2}$	10354000	0.661	5.034×10^{-2}	-83.2	67.4	-0.285	0.376
sulfurdioxide slant column density window1 precision [DU]	0.243 ± 0.087	10354000	7.402×10^{-2}	0.218	6.093×10^{-2}	18.9	0.191	0.265
sulfurdioxide slant column density corrected win1 [DU]	$(7.667 \pm 538.630) \times 10^{-3}$	10354000	0.639	4.261×10^{-3}	-83.2	67.3	-0.315	0.324
background so2 slant column offset window1 [DU]	$(-3.481 \pm 13.440) \times 10^{-2}$	10354000	0.185	-6.263×10^{-2}	-1.27	1.89	-0.134	5.141×10^{-2}
sulfurdioxide slant column density window2 [DU]	$(2.599 \pm 785.607) \times 10^{-2}$	10354000	10.0	4.720×10^{-2}	-1.135×10^3	1.653×10^3	-4.97	5.04
sulfurdioxide slant column density window2 precision [DU]	7.16 ± 1.94	10354000	2.08	6.88	2.21	473	5.93	8.01
sulfurdioxide slant column density corrected win2 [DU]	-1.07 ± 7.77	10354000	9.88	-1.07	-1.134×10^3	1.654×10^3	-6.01	3.86
background so2 slant column offset window2 [DU]	-1.10 ± 1.68	10354000	2.52	-0.964	-9.03	6.48	-2.29	0.228
sulfurdioxide slant column density window3 [DU]	-0.538 ± 21.523	10354000	26.9	-1.56	-511	245	-14.5	12.4
sulfurdioxide slant column density window3 precision [DU]	25.0 ± 12.0	10354000	7.62	21.8	9.84	264	18.7	26.3
sulfurdioxide slant column density corrected win3 [DU]	6.84 ± 20.38	10354000	25.3	6.57	-515	252	-5.91	19.4
background so2 slant column offset window3 [DU]	7.38 ± 7.03	10354000	11.0	7.27	-13.0	28.4	1.64	12.7
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	10354000	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.656 \pm 2.928) \times 10^{-2}$	10354000	1.323×10^{-2}	1.216×10^{-2}	2.415×10^{-4}	1.53	6.323×10^{-3}	1.955×10^{-2}
fitted radiance shift [nm]	$(-5.341 \pm 23.644) \times 10^{-4}$	10354000	1.554×10^{-3}	-5.773×10^{-4}	-4.157×10^{-2}	4.668×10^{-2}	-1.357×10^{-3}	1.979×10^{-4}
fitted radiance squeeze [1]	$(-5.479 \pm 15.891) \times 10^{-5}$	10354000	1.923×10^{-4}	-4.705×10^{-5}	-1.416×10^{-2}	1.417×10^{-2}	-1.465×10^{-4}	4.588×10^{-5}
fitted root mean square [1]	$(1.080 \pm 0.359) \times 10^{-3}$	10354000	3.374×10^{-4}	9.961×10^{-4}	3.304×10^{-4}	6.320×10^{-2}	8.582×10^{-4}	1.196×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.10 ± 0.74	10354000	0.900	0.866	5.000×10^{-2}	3.49	0.556	1.46
sulfurdioxide total air mass factor polluted precision [1]	0.198 ± 0.217	10354000	0.228	0.132	2.997×10^{-3}	1.94	4.162×10^{-2}	0.270
sulfurdioxide clear air mass factor polluted [1]	0.876 ± 0.664	10354000	0.457	0.653	6.314×10^{-2}	3.53	0.489	0.946
number of spectral points in retrieval [1]	73.4 ± 0.5	10354000	1.000	73.0	53.0	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]	0.636 ± 0.414	11612276	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(2.416 \pm 100.949) \times 10^{-2}$	11612276	0.437	8.675×10^{-3}	-75.9	110	-0.208	0.229
sulfurdioxide total vertical column precision [DU]	0.520 ± 0.744	11612276	0.321	0.324	4.351×10^{-2}	37.9	0.212	0.533
sulfurdioxide slant column density corrected [DU]	$(1.265 \pm 30.630) \times 10^{-2}$	11612276	0.330	7.221×10^{-3}	-23.9	49.0	-0.157	0.173
sulfurdioxide slant column density cobra [DU]	$(1.263 \pm 30.446) \times 10^{-2}$	11612276	0.330	7.221×10^{-3}	-23.9	24.8	-0.157	0.173
sulfurdioxide slant column density cobra precision [DU]	0.260 ± 0.108	11612276	8.669×10^{-2}	0.228	8.302×10^{-2}	11.9	0.197	0.283
sulfurdioxide slant column density window1 [DU]	0.101 ± 0.584	11612276	0.671	0.103	-83.2	57.3	-0.235	0.436
sulfurdioxide slant column density window1 precision [DU]	0.260 ± 0.108	11612276	8.669×10^{-2}	0.228	8.302×10^{-2}	11.9	0.197	0.283
sulfurdioxide slant column density corrected win1 [DU]	$(3.910 \pm 57.517) \times 10^{-2}$	11612276	0.656	3.079×10^{-2}	-83.2	57.5	-0.295	0.361
background so2 slant column offset window1 [DU]	$(-6.163 \pm 12.627) \times 10^{-2}$	11612276	0.157	-9.060×10^{-2}	-1.32	1.98	-0.143	1.381×10^{-2}
sulfurdioxide slant column density window2 [DU]	$(1.581 \pm 8299.423) \times 10^{-3}$	11612276	10.5	-5.418×10^{-2}	-611	754	-5.31	5.22
sulfurdioxide slant column density window2 precision [DU]	7.58 ± 2.06	11612276	2.39	7.26	2.21	423	6.19	8.58
sulfurdioxide slant column density corrected win2 [DU]	-1.10 ± 8.19	11612276	10.4	-1.08	-616	753	-6.29	4.11
background so2 slant column offset window2 [DU]	-1.10 ± 1.86	11612276	2.39	-0.740	-13.9	6.16	-2.15	0.237
sulfurdioxide slant column density window3 [DU]	1.43 ± 22.68	11612276	28.4	0.738	-194	166	-13.0	15.4
sulfurdioxide slant column density window3 precision [DU]	26.6 ± 12.3	11612276	9.14	23.4	9.84	235	19.8	29.0
sulfurdioxide slant column density corrected win3 [DU]	8.19 ± 21.82	11612276	27.3	7.72	-192	173	-5.64	21.6
background so2 slant column offset window3 [DU]	6.76 ± 5.79	11612276	8.31	6.62	-13.0	28.1	2.63	10.9
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.14	11612276	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.568 \pm 4.127) \times 10^{-2}$	11612276	1.664×10^{-2}	1.670×10^{-2}	1.416×10^{-3}	1.81	1.026×10^{-2}	2.690×10^{-2}
fitted radiance shift [nm]	$(-3.808 \pm 24.504) \times 10^{-4}$	11612276	1.776×10^{-3}	-4.081×10^{-4}	-4.157×10^{-2}	4.668×10^{-2}	-1.306×10^{-3}	4.707×10^{-4}
fitted radiance squeeze [1]	$(-2.850 \pm 16.316) \times 10^{-5}$	11612276	1.925×10^{-4}	-2.359×10^{-5}	-1.409×10^{-2}	1.327×10^{-2}	-1.218×10^{-4}	7.079×10^{-5}
fitted root mean square [1]	$(1.140 \pm 0.431) \times 10^{-3}$	11612276	3.745×10^{-4}	1.028×10^{-3}	3.304×10^{-4}	6.320×10^{-2}	8.799×10^{-4}	1.254×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.817 ± 0.451	11612276	0.539	0.734	5.000×10^{-2}	2.73	0.507	1.05
sulfurdioxide total air mass factor polluted precision [1]	0.137 ± 0.149	11612276	0.157	7.096×10^{-2}	3.123×10^{-3}	1.76	3.544×10^{-2}	0.192
sulfurdioxide clear air mass factor polluted [1]	0.651 ± 0.239	11612276	0.329	0.620	5.723×10^{-2}	2.96	0.475	0.804
number of spectral points in retrieval [1]	73.4 ± 0.5	11612276	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]	0.491 ± 0.422	3966398	0.910	0.380	0.0	1.000	9.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(4.653 \pm 141.370) \times 10^{-2}$	3966398	0.332	5.539×10^{-3}	-94.9	134	-0.154	0.178
sulfurdioxide total vertical column precision [DU]	0.613 ± 1.011	3966398	0.609	0.269	2.047×10^{-2}	30.2	0.114	0.724
sulfurdioxide slant column density corrected [DU]	$(1.633 \pm 37.270) \times 10^{-2}$	3966398	0.375	8.240×10^{-3}	-7.64	74.4	-0.178	0.197
sulfurdioxide slant column density cobra [DU]	$(1.629 \pm 36.980) \times 10^{-2}$	3966398	0.375	8.240×10^{-3}	-7.64	58.8	-0.178	0.197
sulfurdioxide slant column density cobra precision [DU]	0.301 ± 0.130	3966398	0.163	0.265	6.093×10^{-2}	18.9	0.206	0.369
sulfurdioxide slant column density window1 [DU]	$(8.689 \pm 708.232) \times 10^{-3}$	3966398	0.801	-3.004×10^{-3}	-17.4	67.4	-0.402	0.399
sulfurdioxide slant column density window1 precision [DU]	0.301 ± 0.130	3966398	0.163	0.265	6.093×10^{-2}	18.9	0.206	0.369
sulfurdioxide slant column density corrected win1 [DU]	$(-3.052 \pm 69.442) \times 10^{-2}$	3966398	0.774	-5.723×10^{-2}	-17.5	67.3	-0.436	0.338
background so2 slant column offset window1 [DU]	$(-3.921 \pm 14.540) \times 10^{-2}$	3966398	0.167	-7.675×10^{-2}	-1.27	1.35	-0.135	3.162×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.838 ± 9.196	3966398	11.3	0.675	-626	1.653×10^3	-4.93	6.41
sulfurdioxide slant column density window2 precision [DU]	8.19 ± 2.53	3966398	3.20	7.75	2.45	473	6.39	9.59
sulfurdioxide slant column density corrected win2 [DU]	-0.957 ± 9.006	3966398	11.1	-1.01	-626	1.654×10^3	-6.54	4.58
background so2 slant column offset window2 [DU]	-1.80 ± 2.12	3966398	2.96	-1.53	-13.9	6.48	-3.09	-0.129
sulfurdioxide slant column density window3 [DU]	-9.49 ± 23.20	3966398	27.8	-9.24	-254	245	-23.2	4.57
sulfurdioxide slant column density window3 precision [DU]	27.2 ± 12.6	3966398	11.4	24.2	10.0	219	19.4	30.8
sulfurdioxide slant column density corrected win3 [DU]	2.05 ± 23.37	3966398	27.9	2.94	-255	252	-11.4	16.5
background so2 slant column offset window3 [DU]	11.5 ± 7.1	3966398	11.5	13.1	-13.0	28.4	5.80	17.3
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.31	3966398	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.938 \pm 17.252) \times 10^{-2}$	3966398	5.489×10^{-2}	1.206×10^{-2}	2.415×10^{-4}	2.53	4.089×10^{-3}	5.898×10^{-2}
fitted radiance shift [nm]	$(-5.285 \pm 23.026) \times 10^{-4}$	3966398	1.248×10^{-3}	-5.843×10^{-4}	-3.988×10^{-2}	3.943×10^{-2}	-1.197×10^{-3}	5.094×10^{-5}
fitted radiance squeeze [1]	$(-6.056 \pm 18.857) \times 10^{-5}$	3966398	2.236×10^{-4}	-6.133×10^{-5}	-1.416×10^{-2}	1.264×10^{-2}	-1.730×10^{-4}	5.054×10^{-5}
fitted root mean square [1]	$(1.326 \pm 0.526) \times 10^{-3}$	3966398	6.053×10^{-4}	1.204×10^{-3}	3.432×10^{-4}	2.934×10^{-2}	9.560×10^{-4}	1.561×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.33 ± 0.98	3966398	1.84	0.967	5.000×10^{-2}	3.49	0.458	2.30
sulfurdioxide total air mass factor polluted precision [1]	0.229 ± 0.285	3966398	0.256	0.135	2.731×10^{-3}	1.90	3.068×10^{-2}	0.287
sulfurdioxide clear air mass factor polluted [1]	1.19 ± 0.96	3966398	1.34	0.802	4.905×10^{-2}	3.53	0.434	1.78
number of spectral points in retrieval [1]	73.4 ± 0.5	3966398	1.000	73.0	71.0	74.0	73.0	74.0

3 Granule outlines

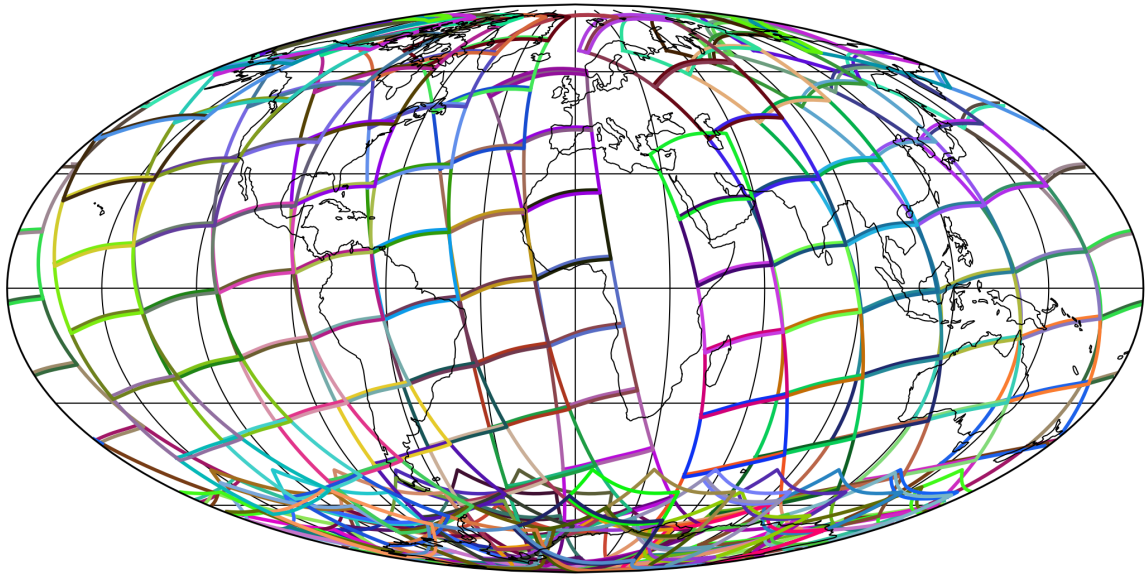


Figure 1: Outline of the granules.

4 Input data monitoring

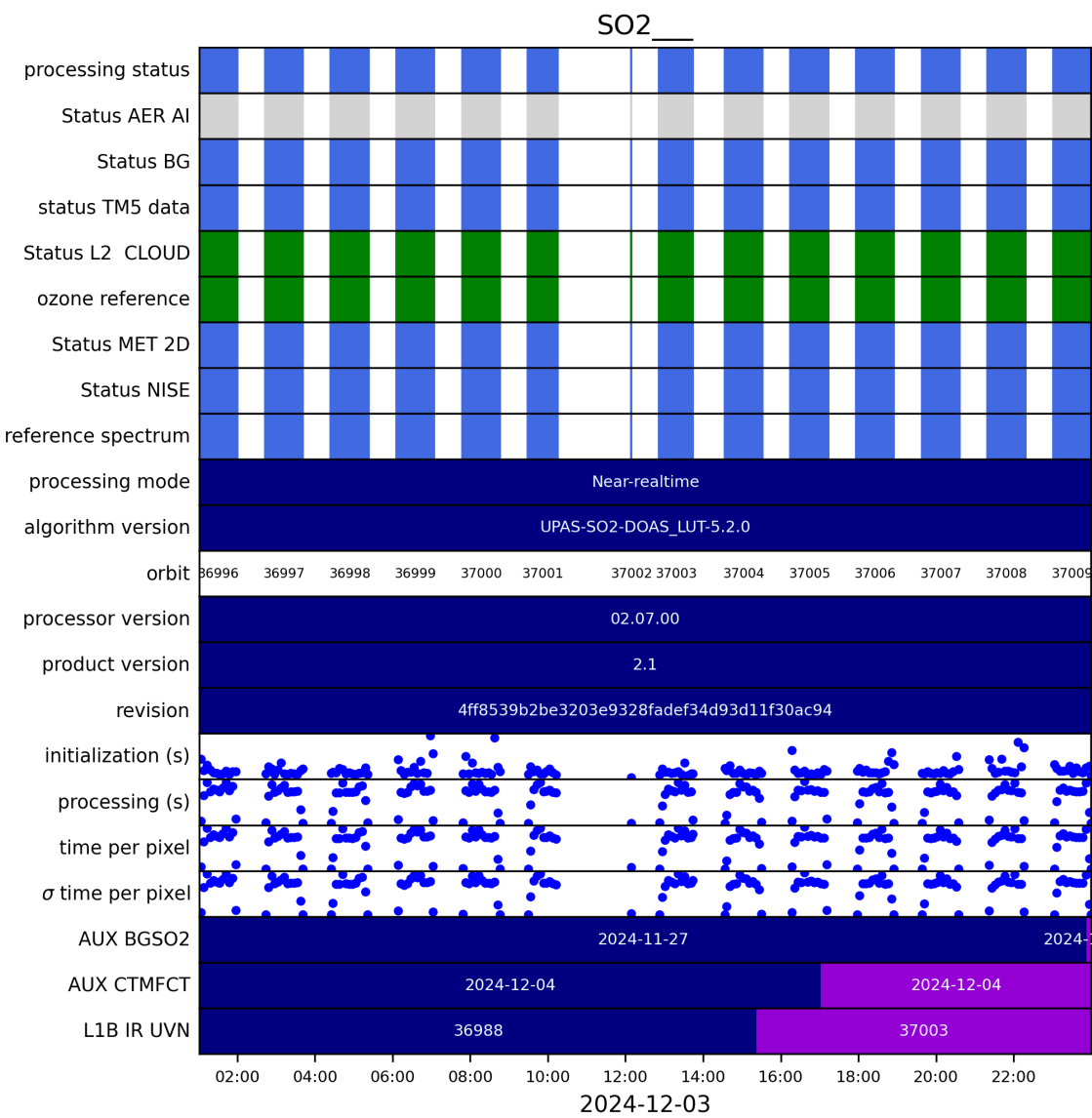


Figure 2: Input data per granule

5 Warnings and errors

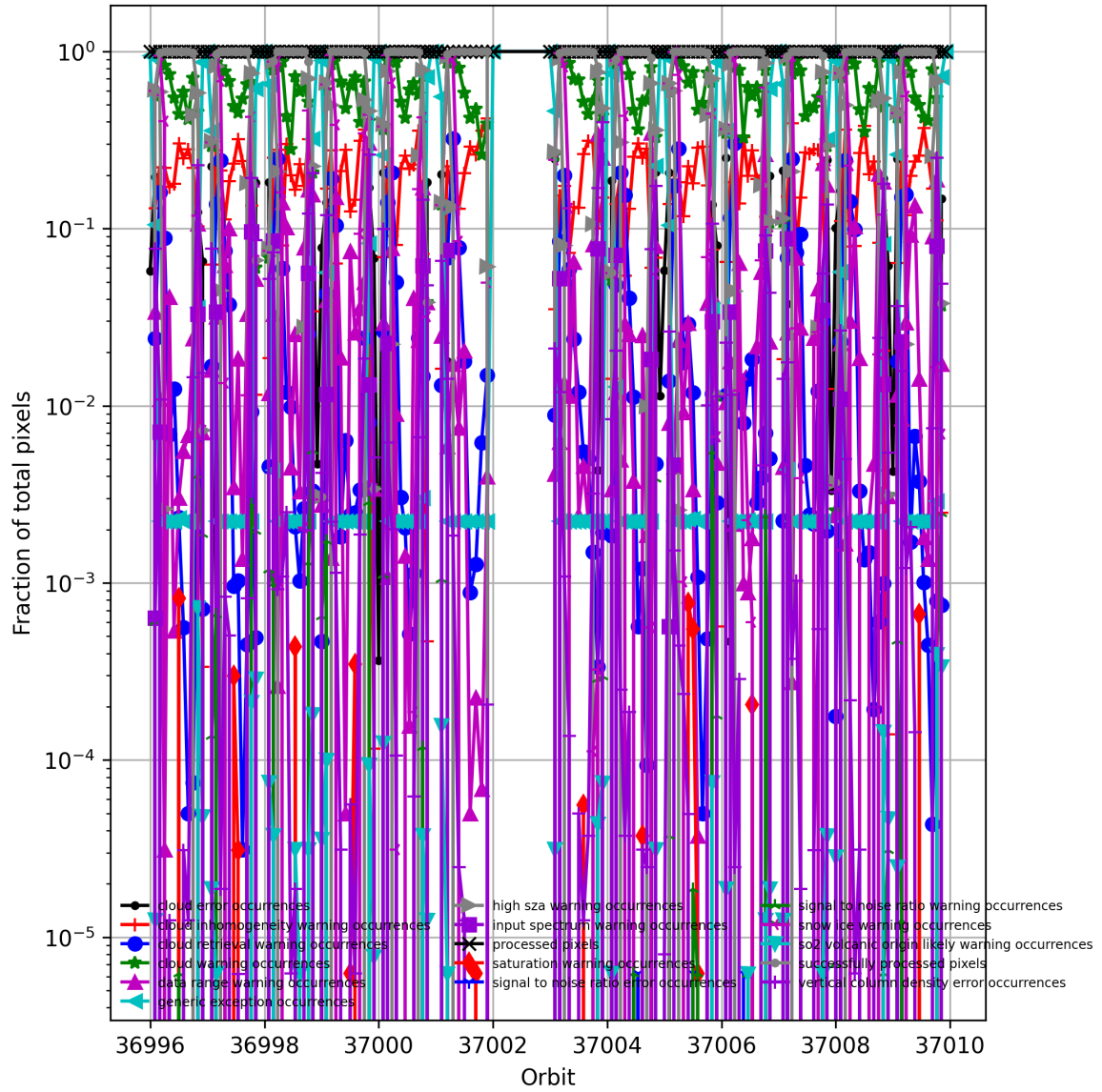


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

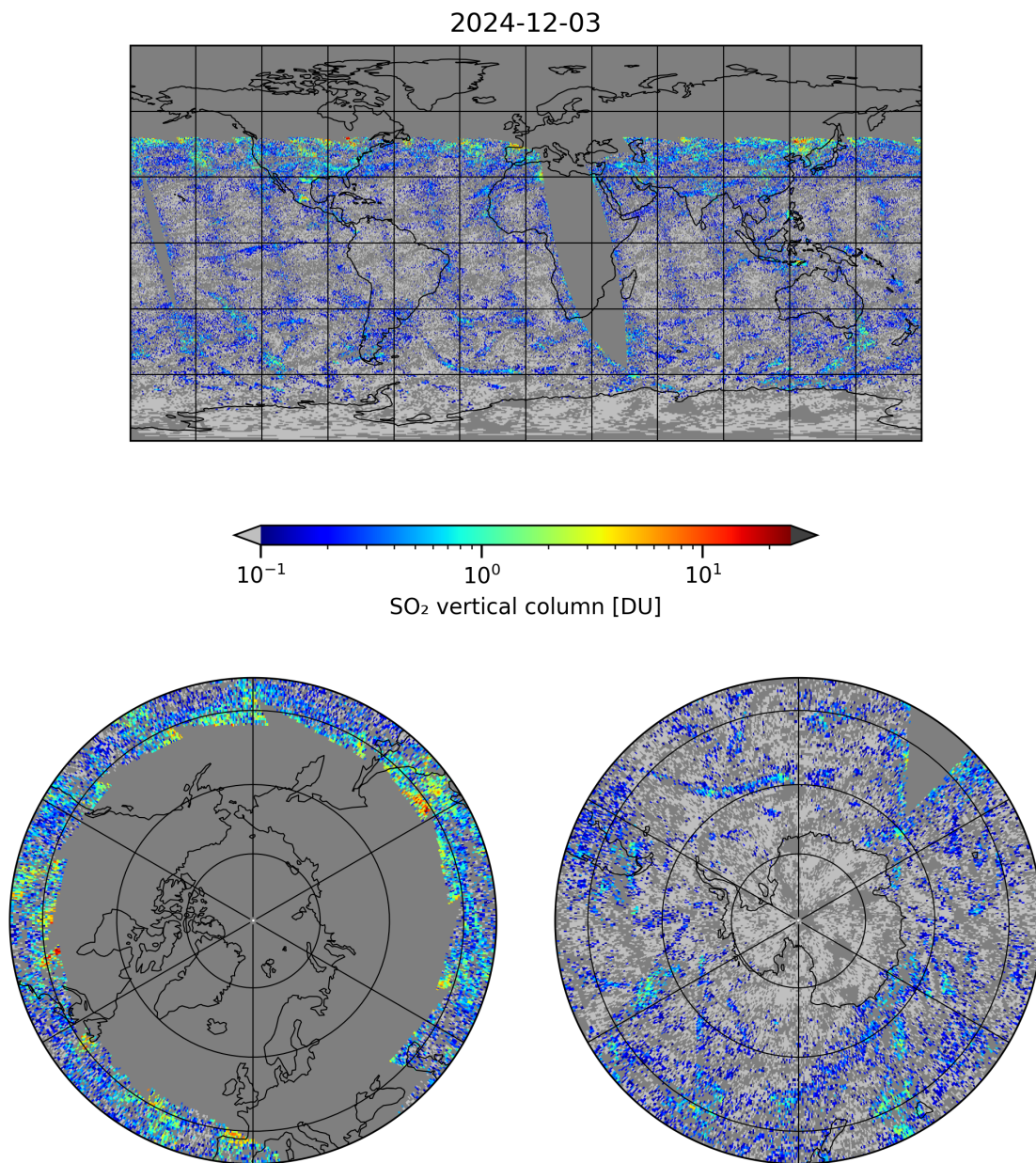


Figure 4: Map of “SO₂ vertical column” for 2024-12-03 to 2024-12-03

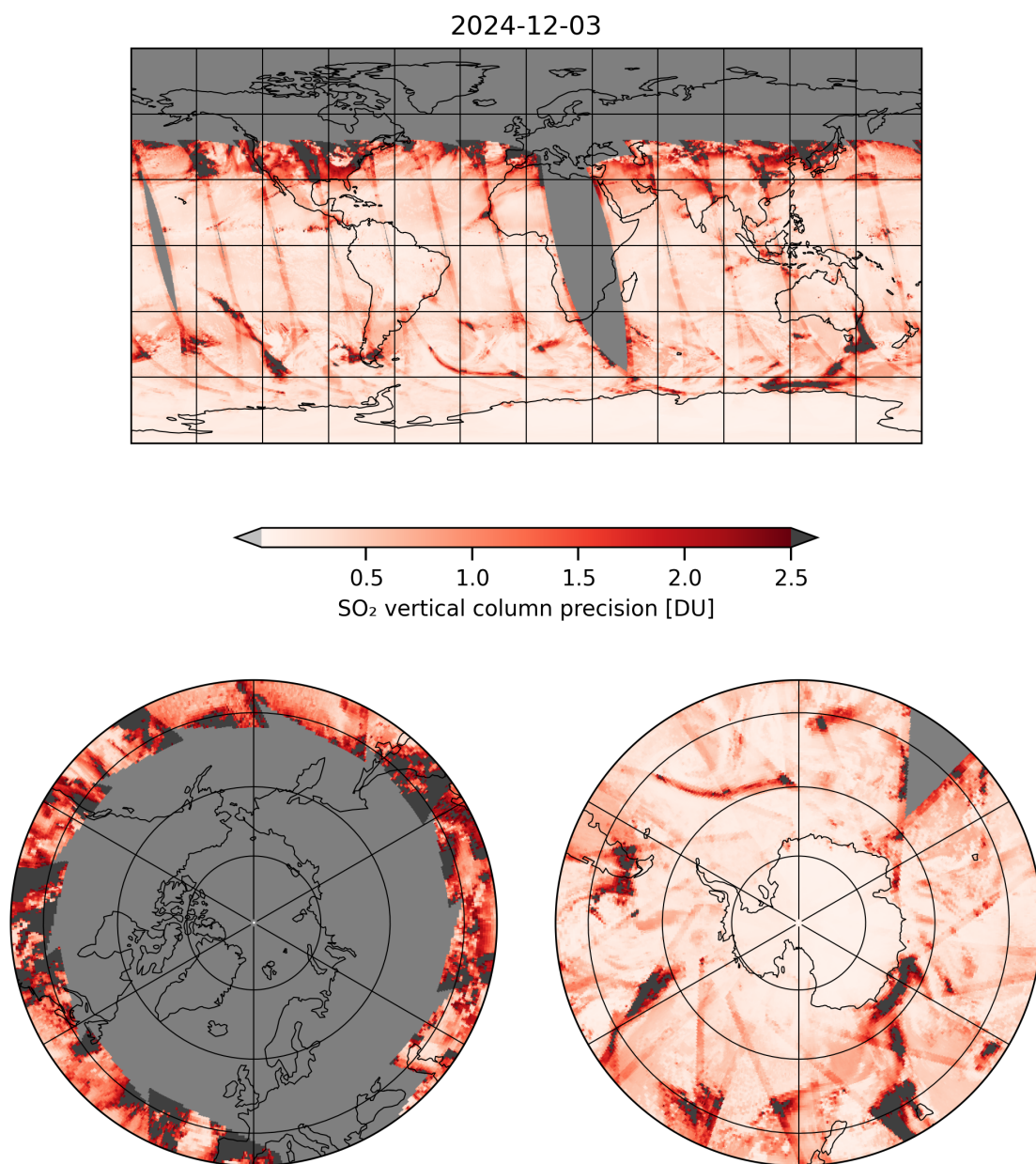


Figure 5: Map of “SO₂ vertical column precision” for 2024-12-03 to 2024-12-03

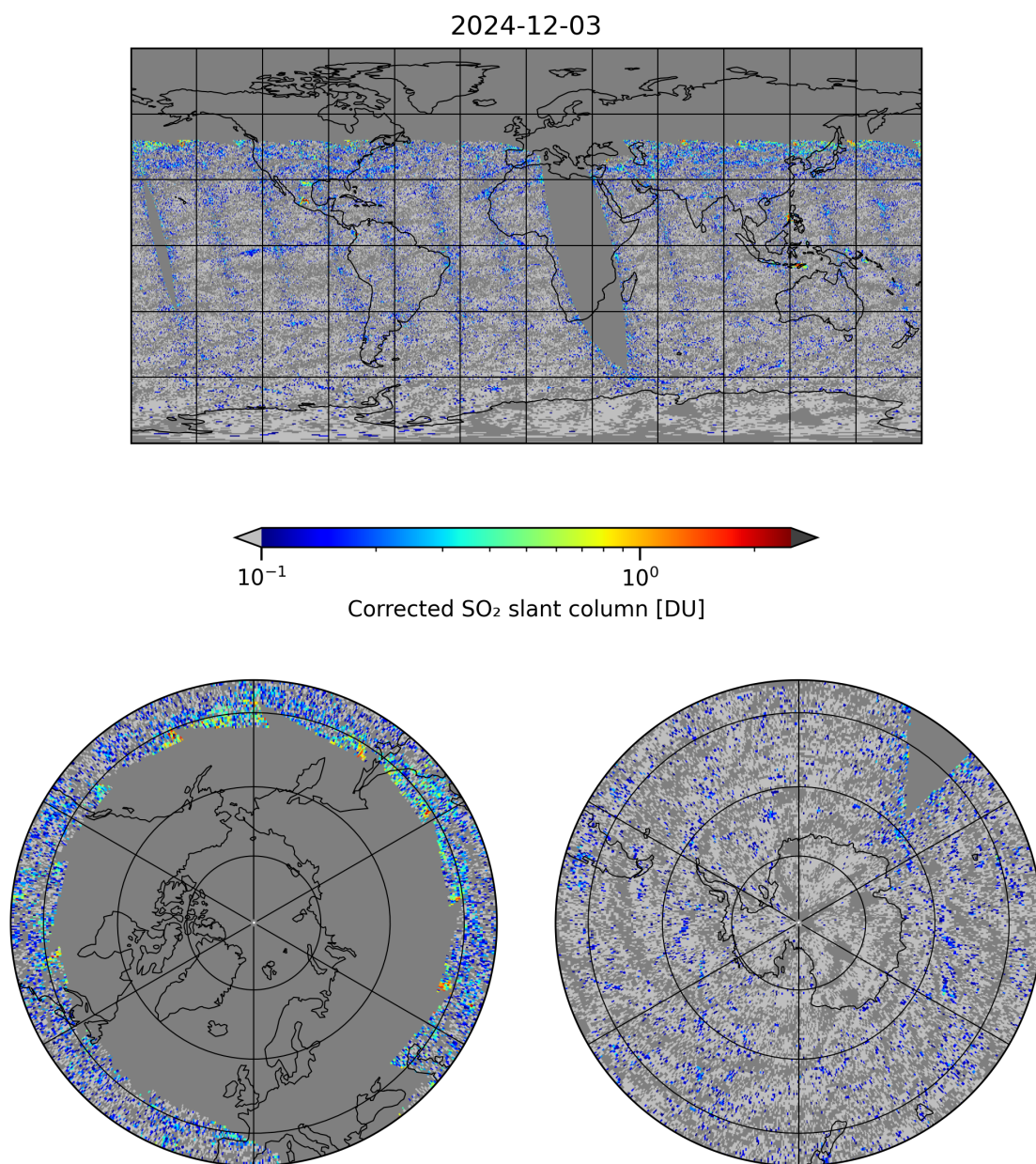


Figure 6: Map of “Corrected SO₂ slant column” for 2024-12-03 to 2024-12-03

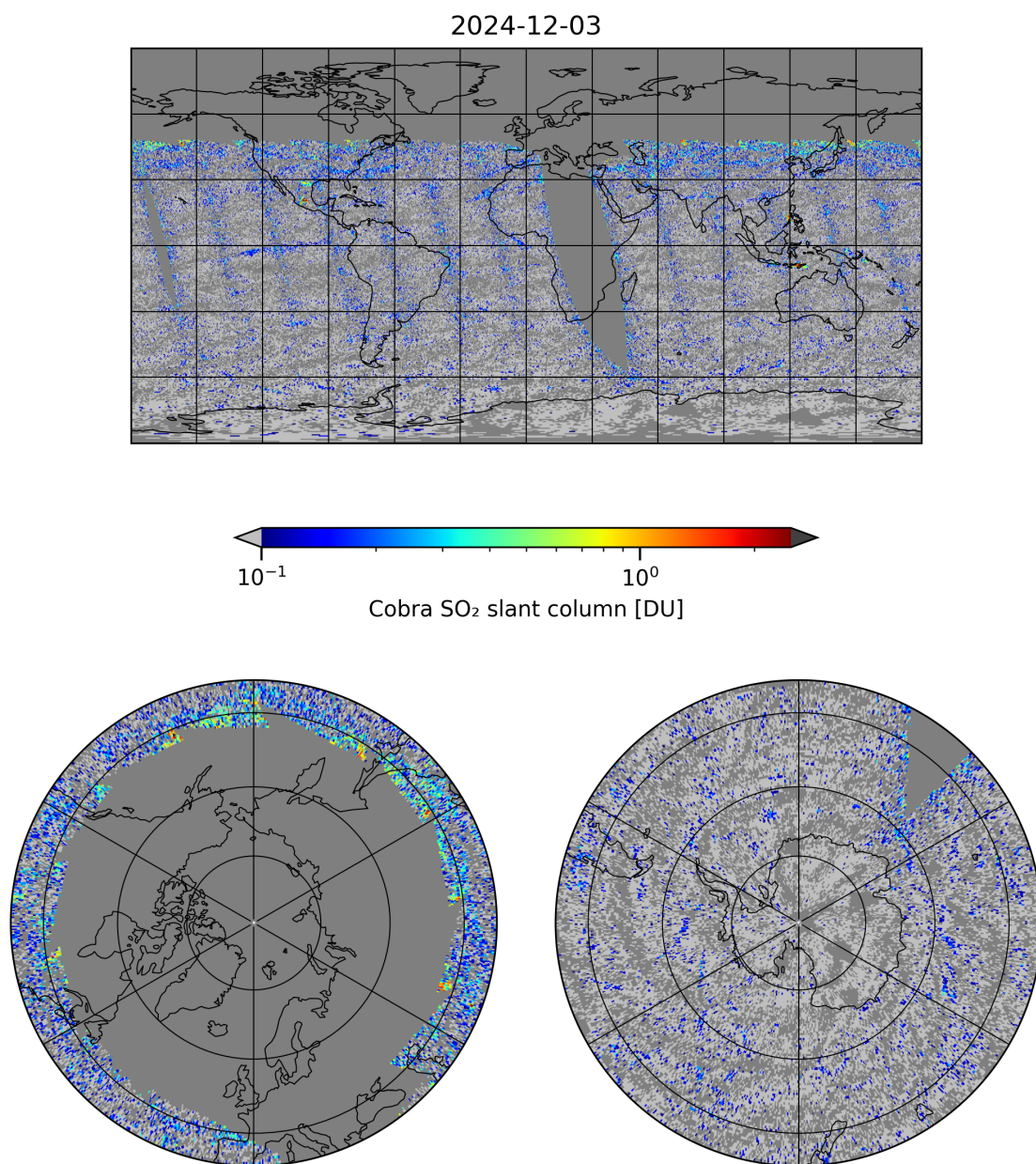


Figure 7: Map of “Cobra SO₂ slant column” for 2024-12-03 to 2024-12-03

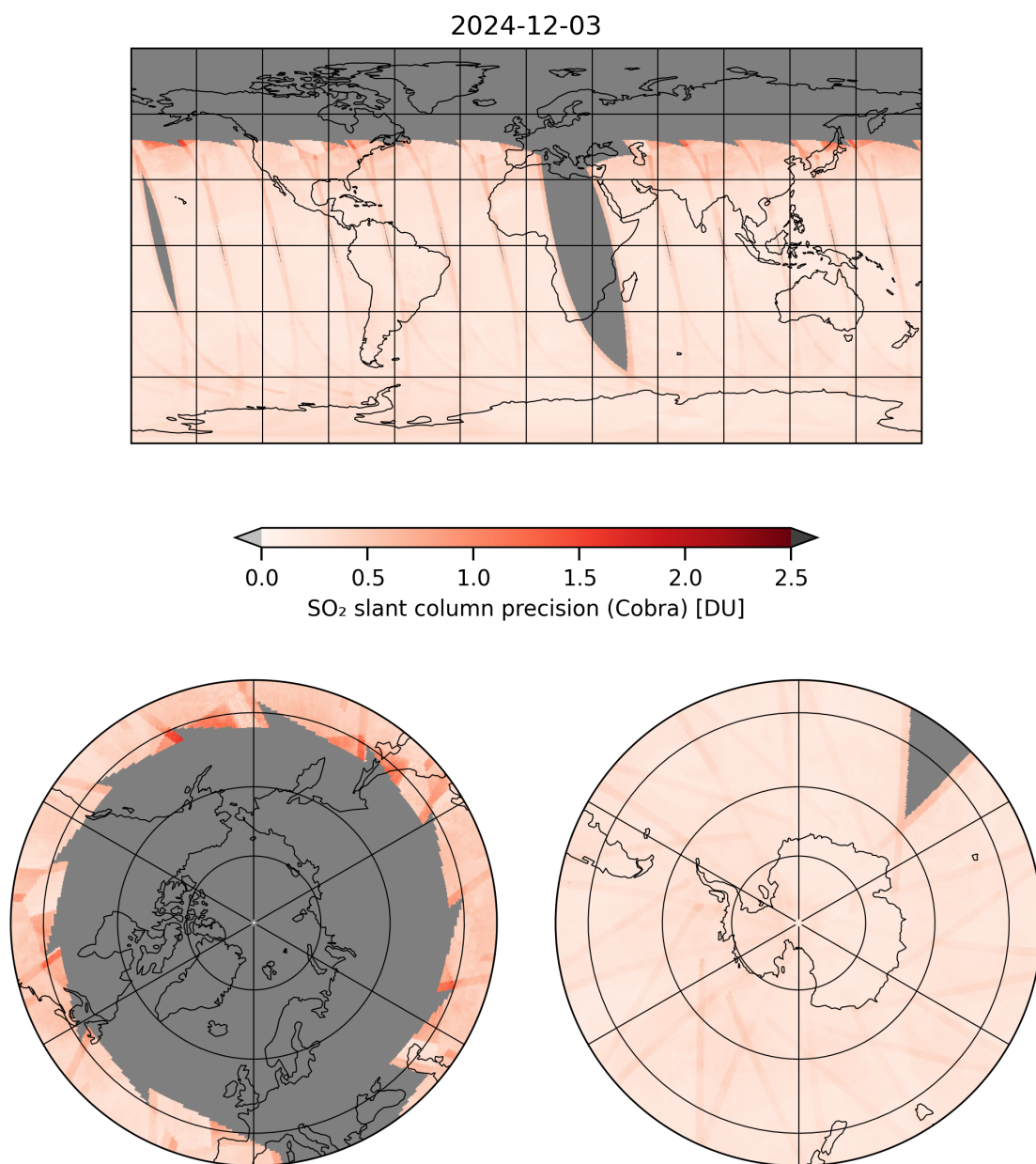


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2024-12-03 to 2024-12-03

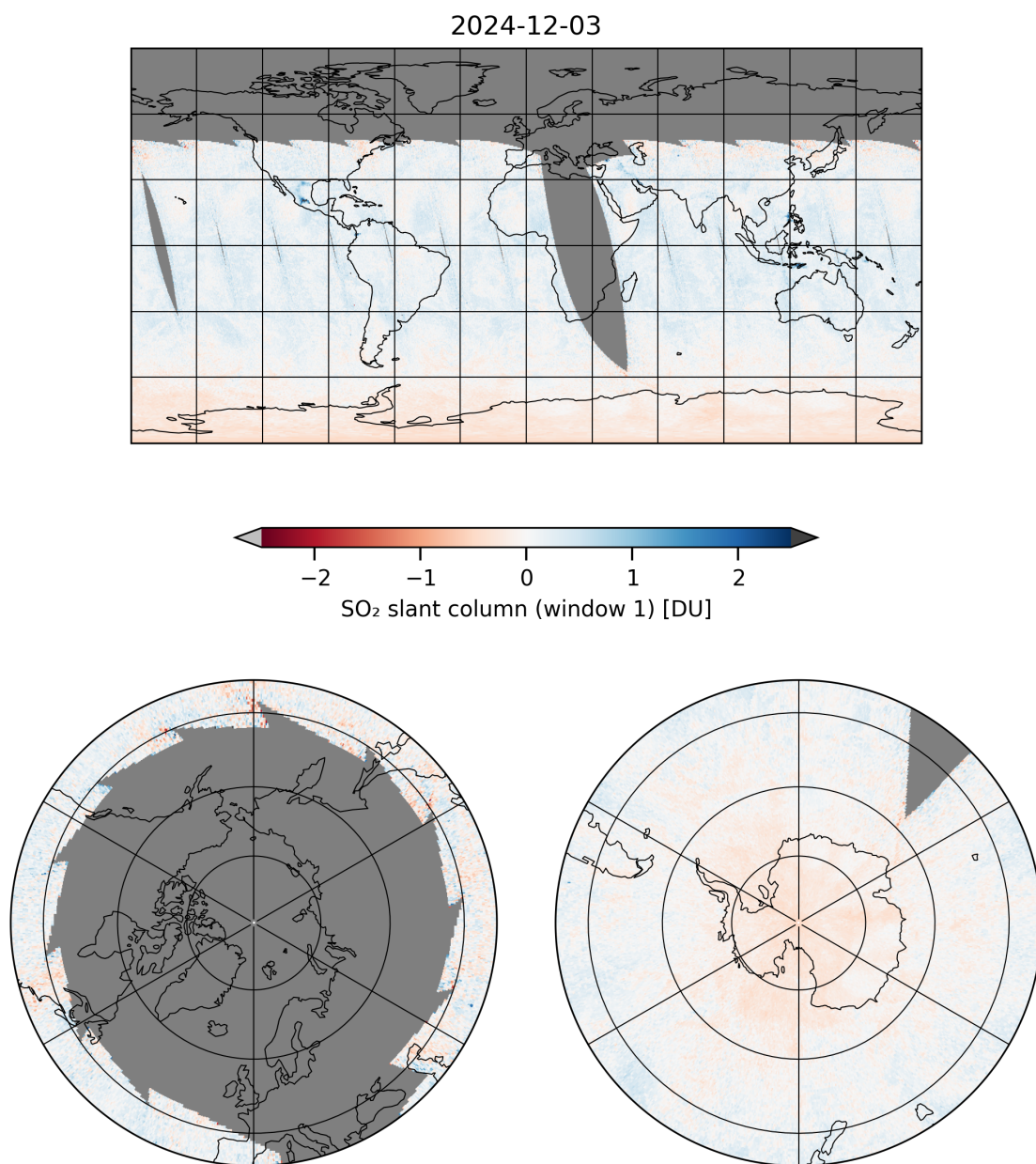


Figure 9: Map of “SO₂ slant column (window 1)” for 2024-12-03 to 2024-12-03

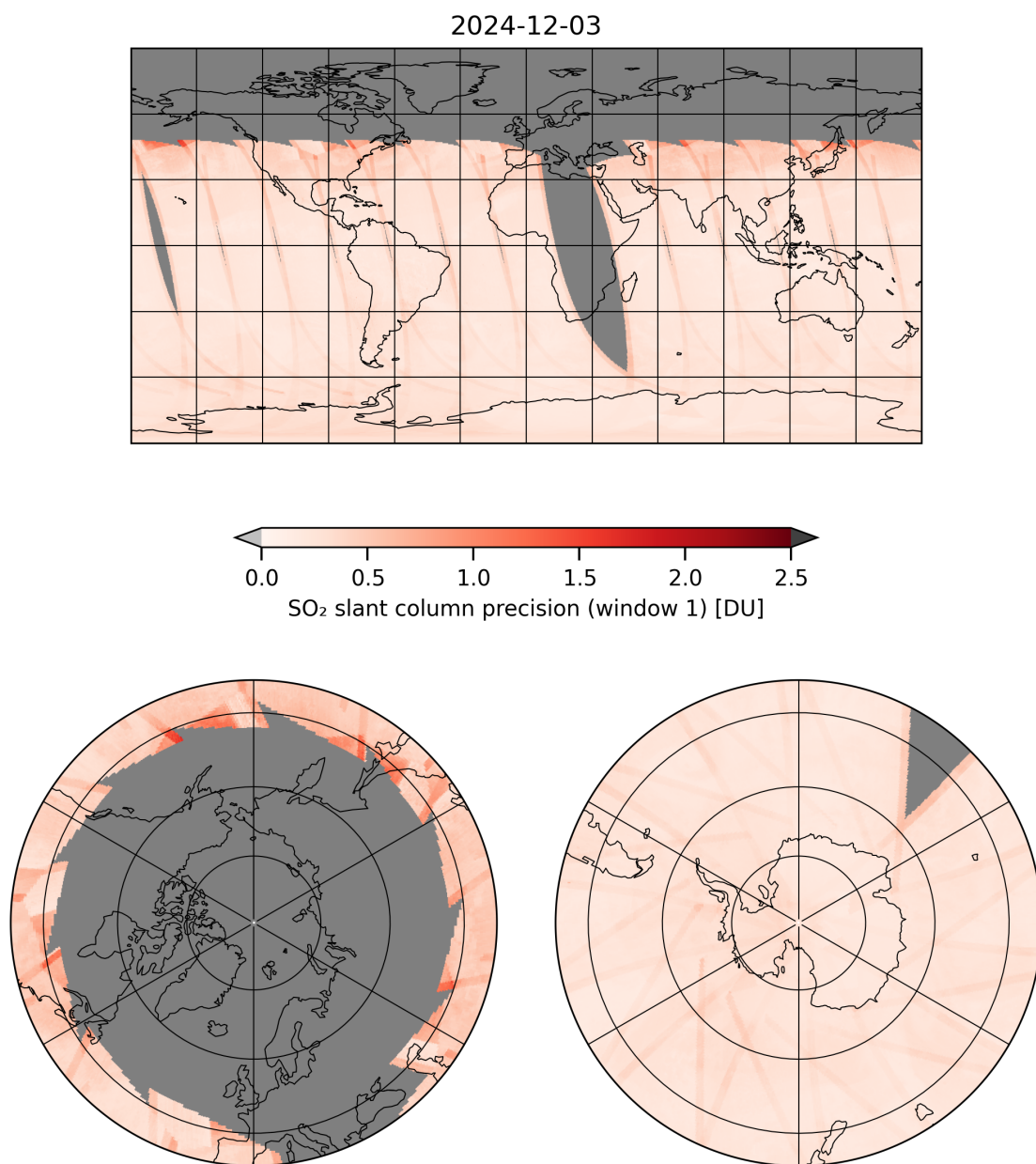


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2024-12-03 to 2024-12-03

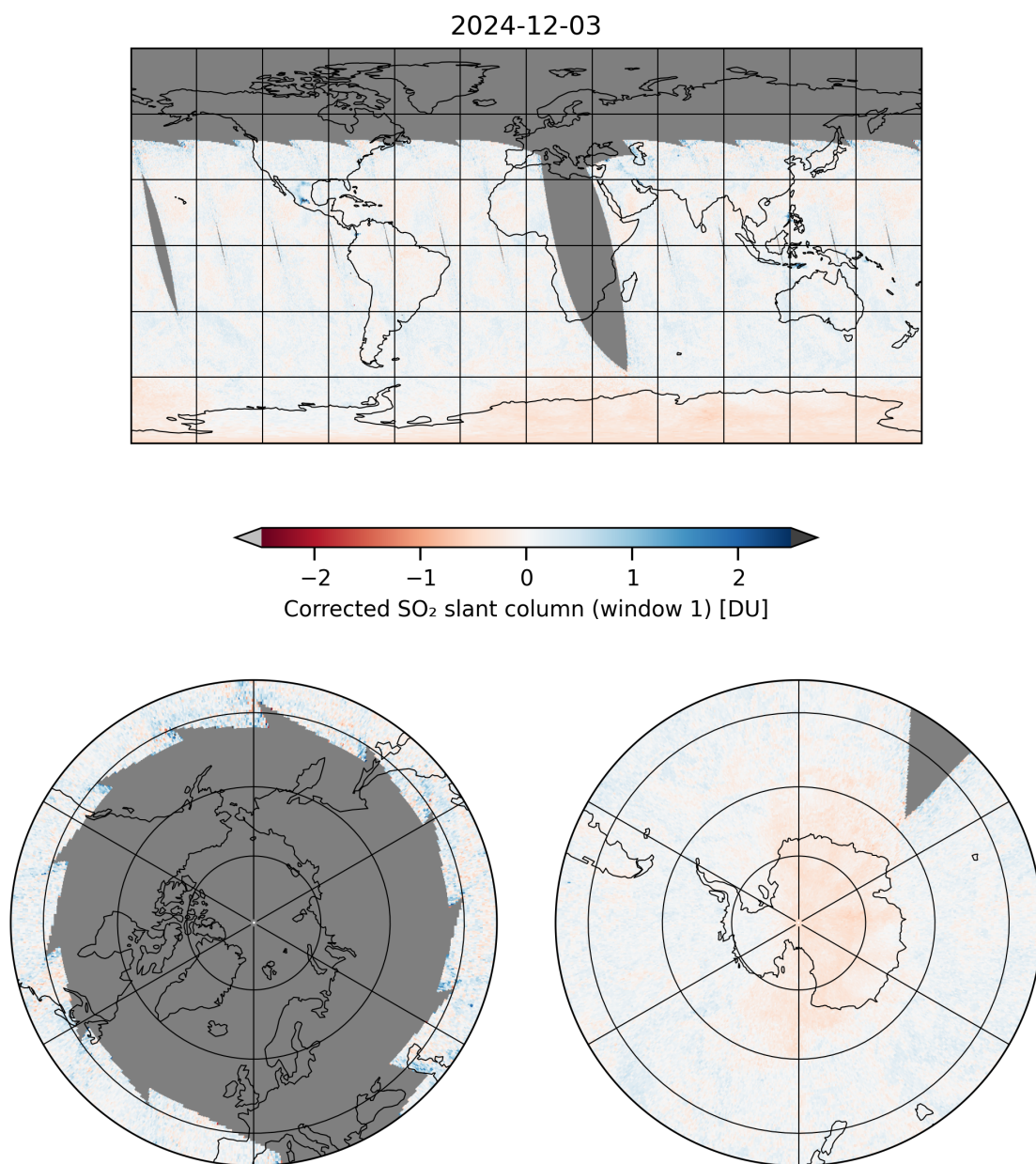


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2024-12-03 to 2024-12-03

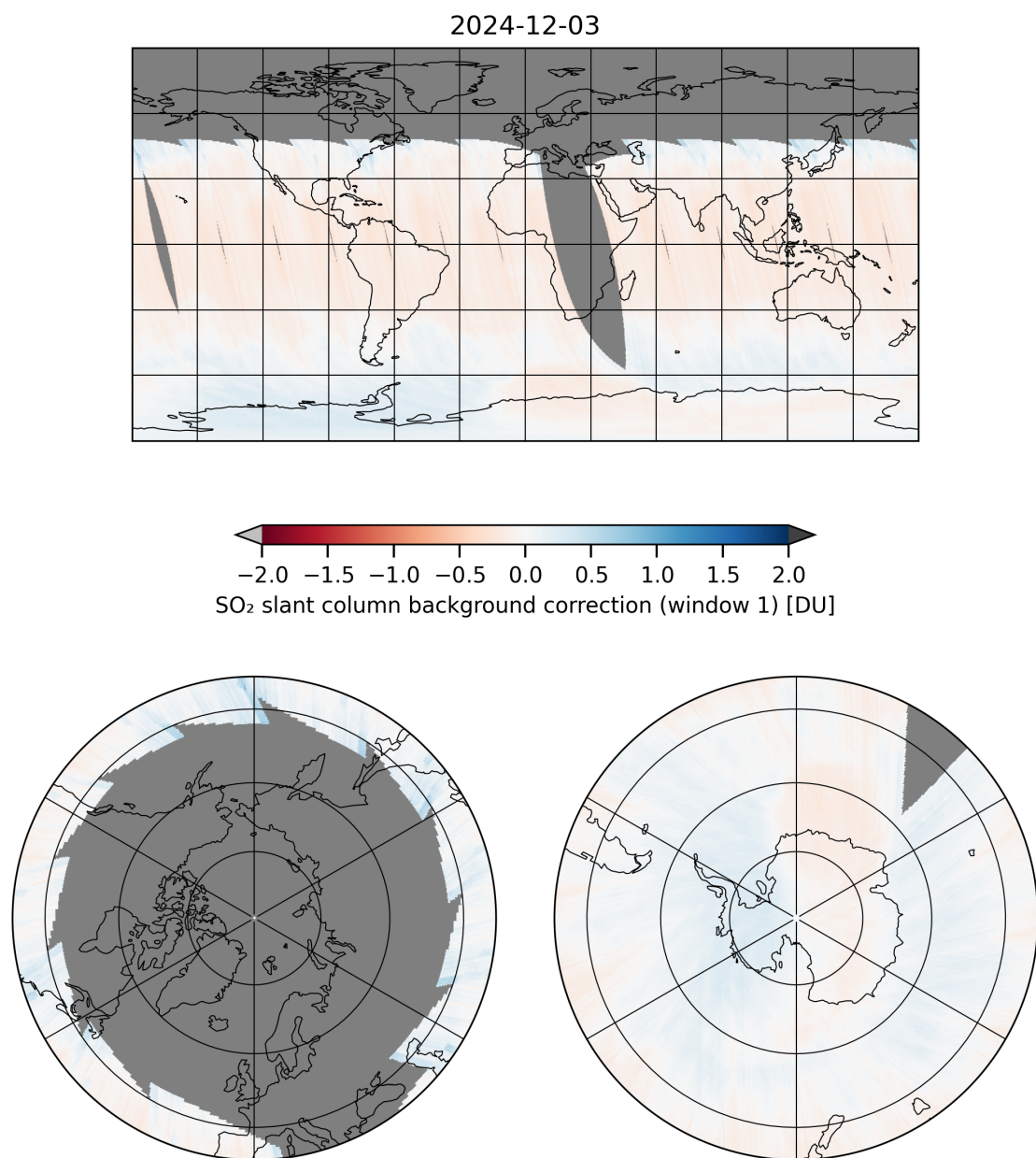


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2024-12-03 to 2024-12-03

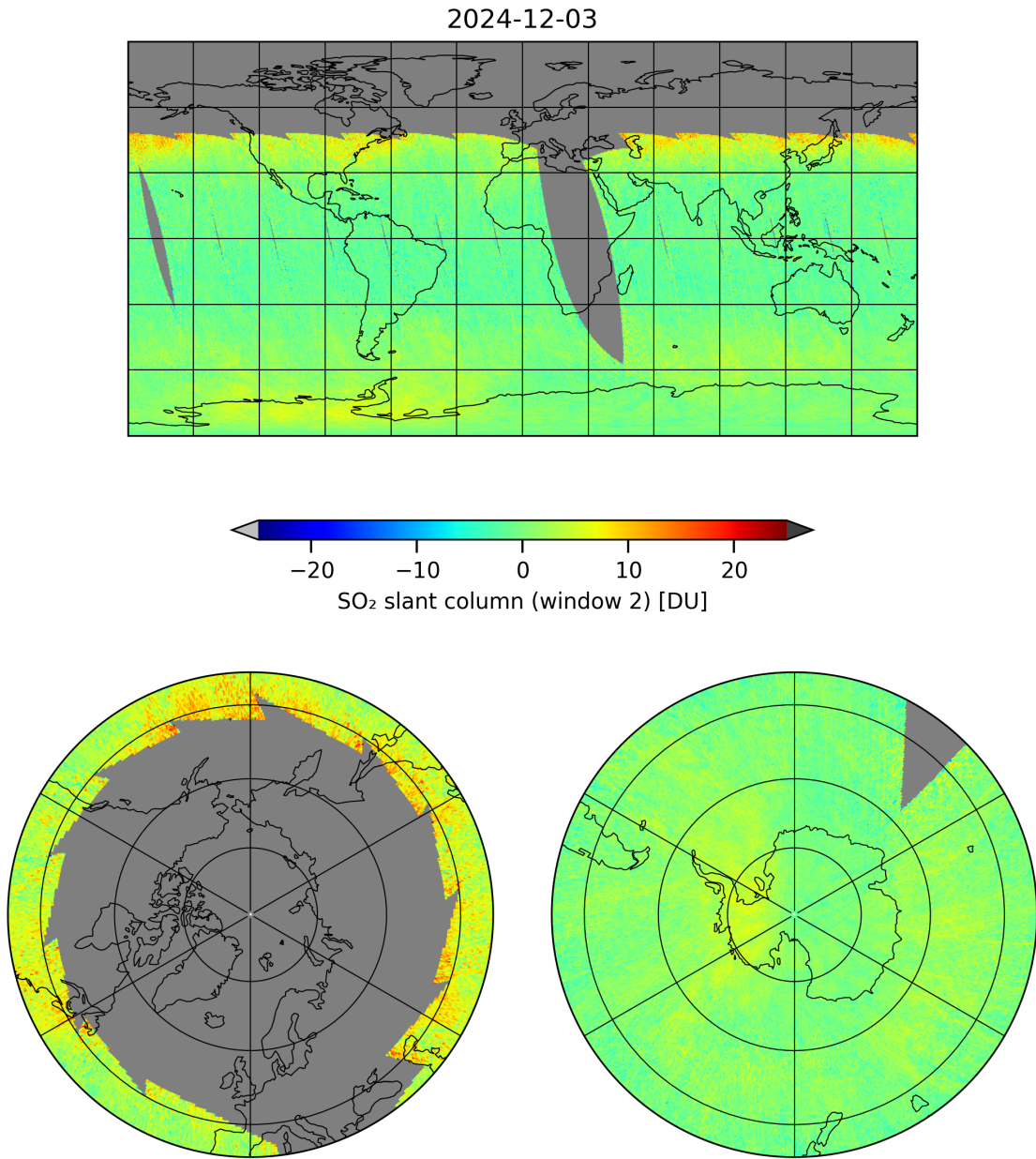


Figure 13: Map of “SO₂ slant column (window 2)” for 2024-12-03 to 2024-12-03

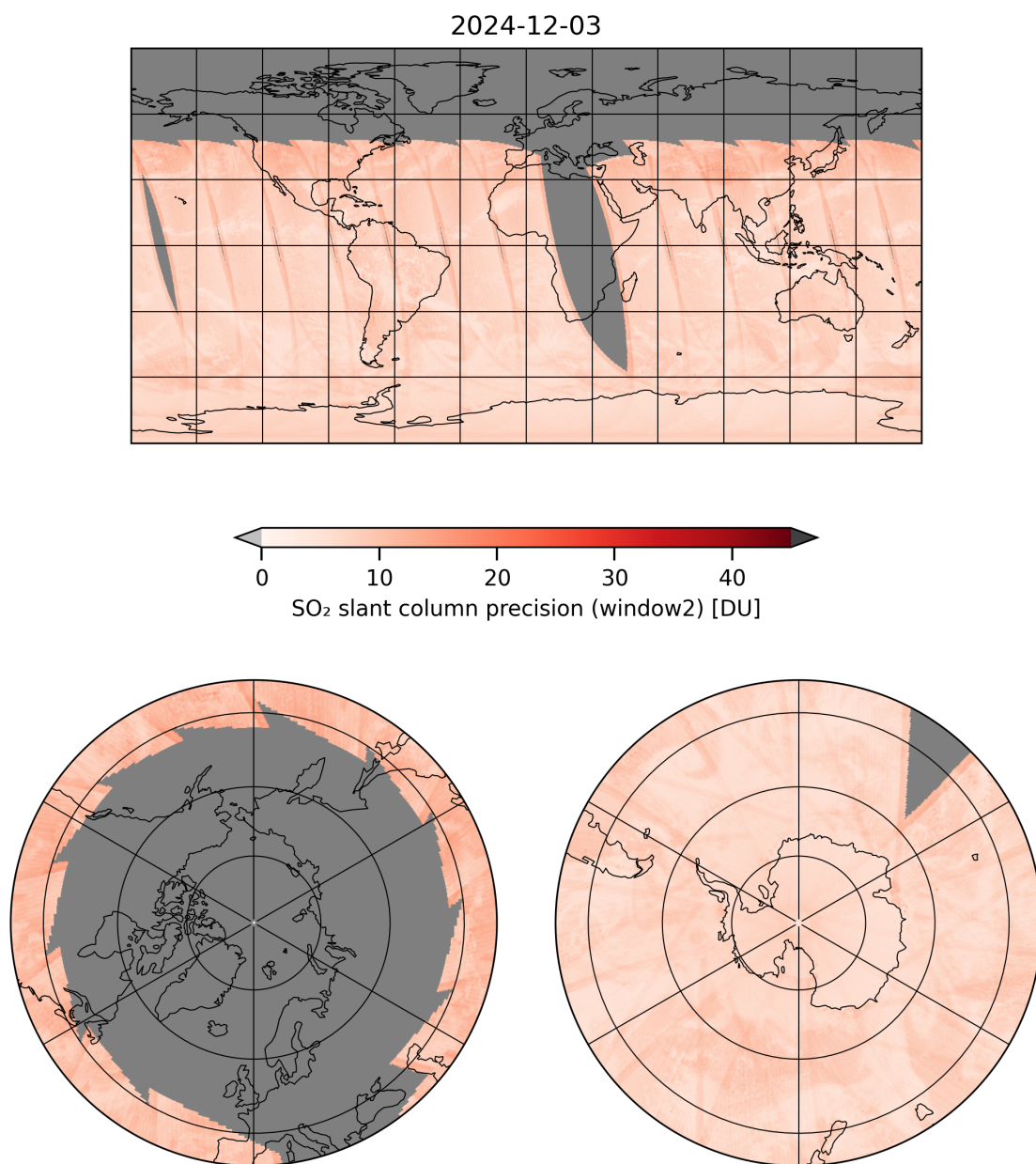


Figure 14: Map of “SO₂ slant column precision (window2)” for 2024-12-03 to 2024-12-03

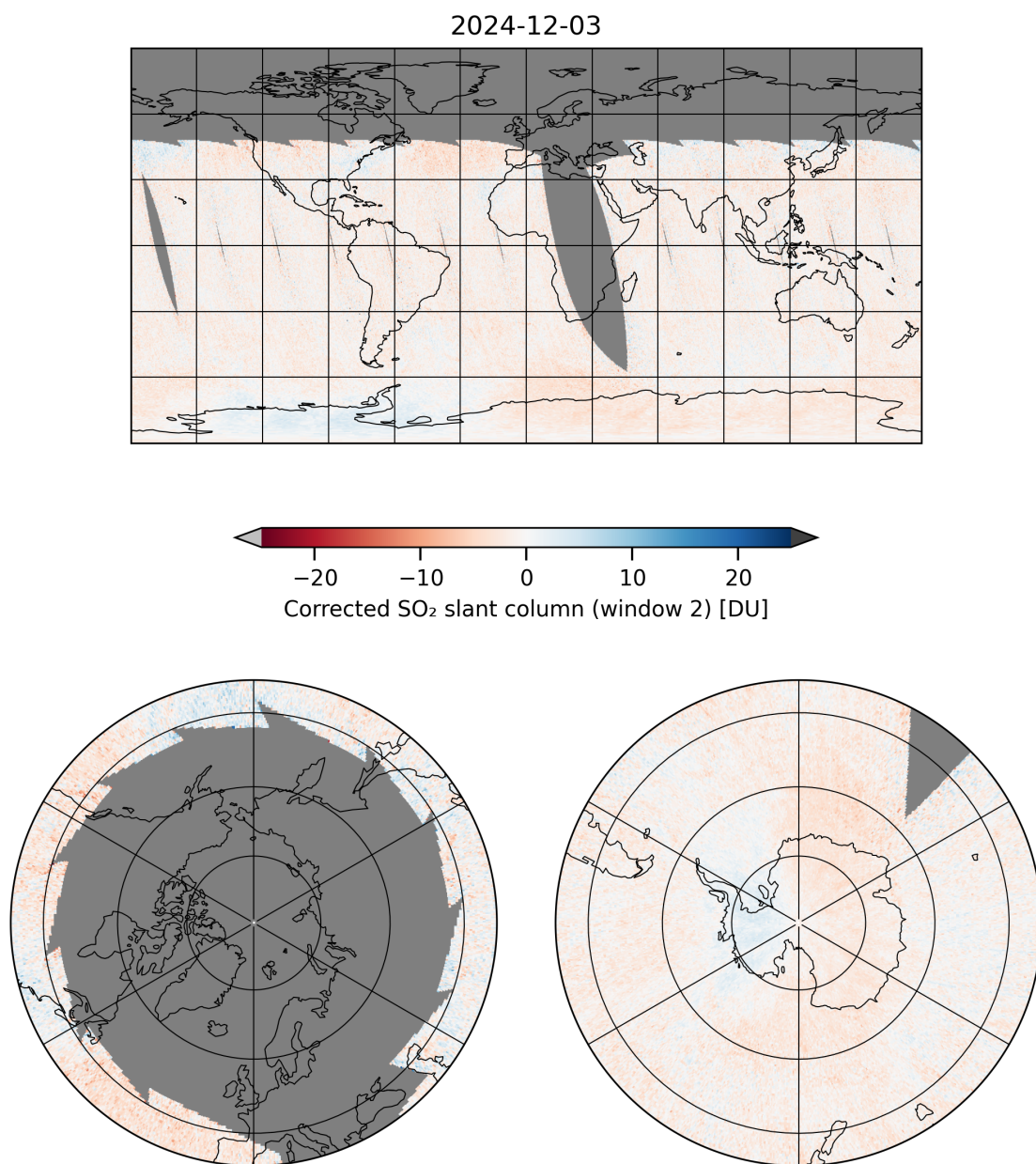


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2024-12-03 to 2024-12-03

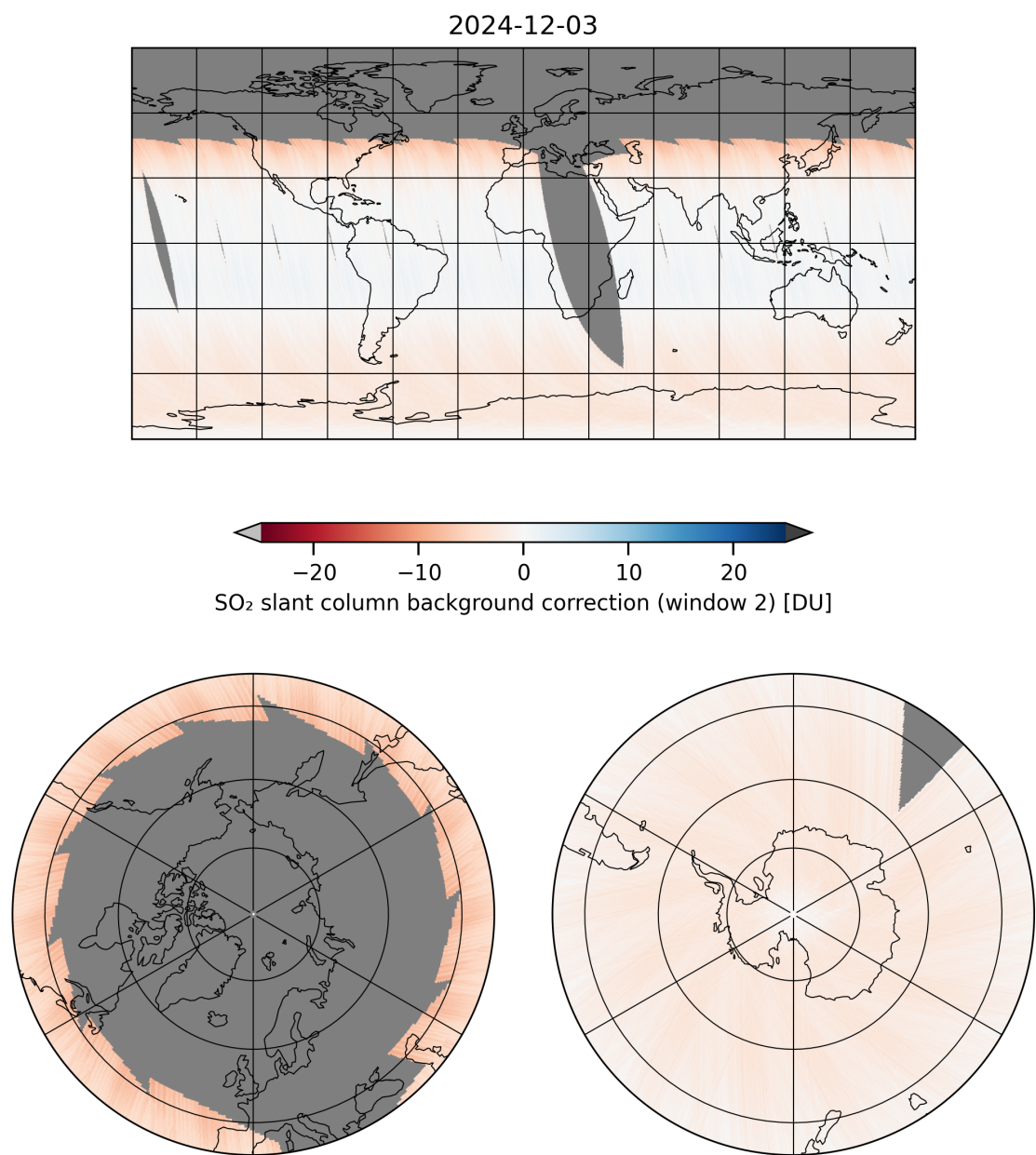


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2024-12-03 to 2024-12-03

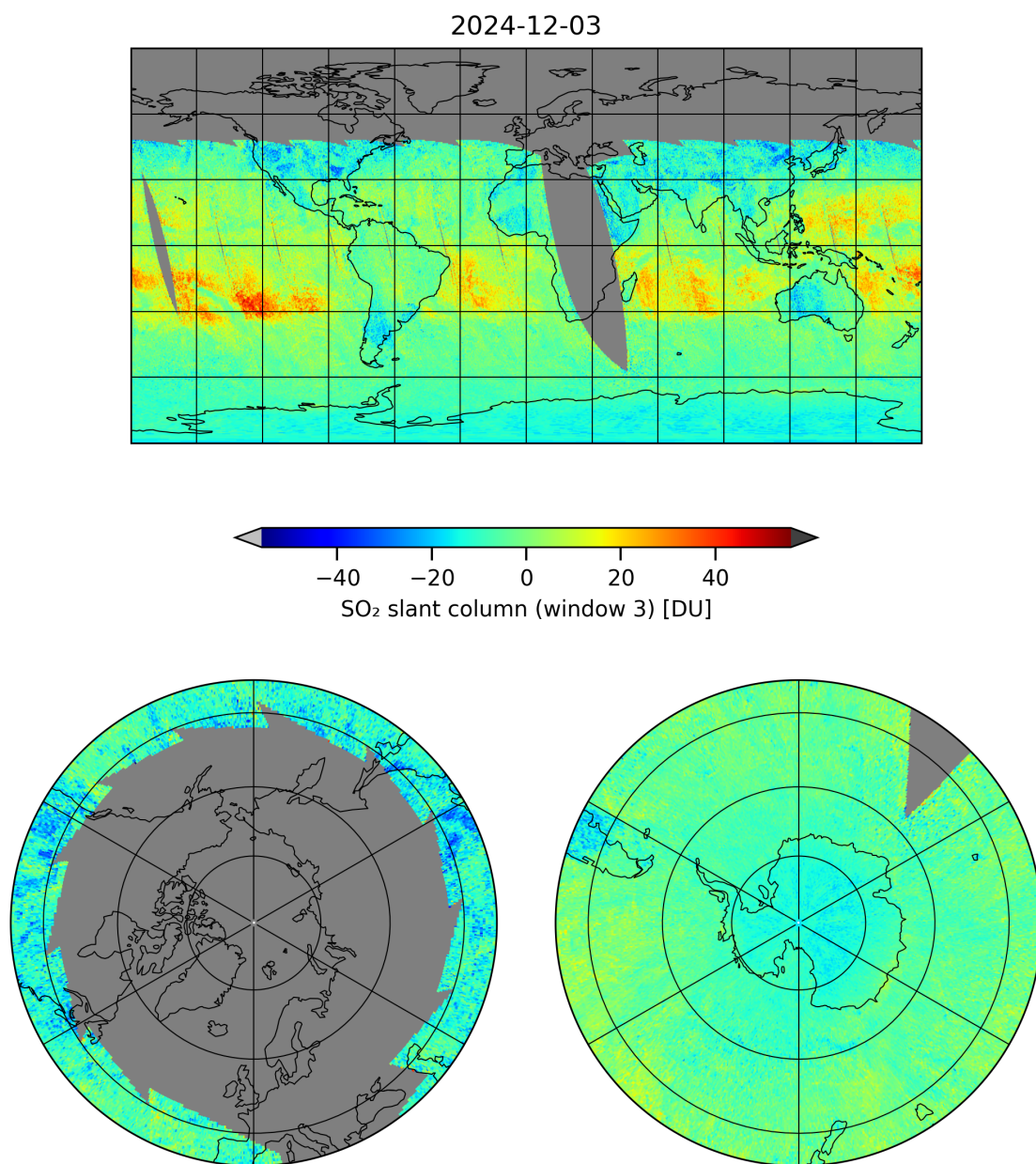


Figure 17: Map of “SO₂ slant column (window 3)” for 2024-12-03 to 2024-12-03

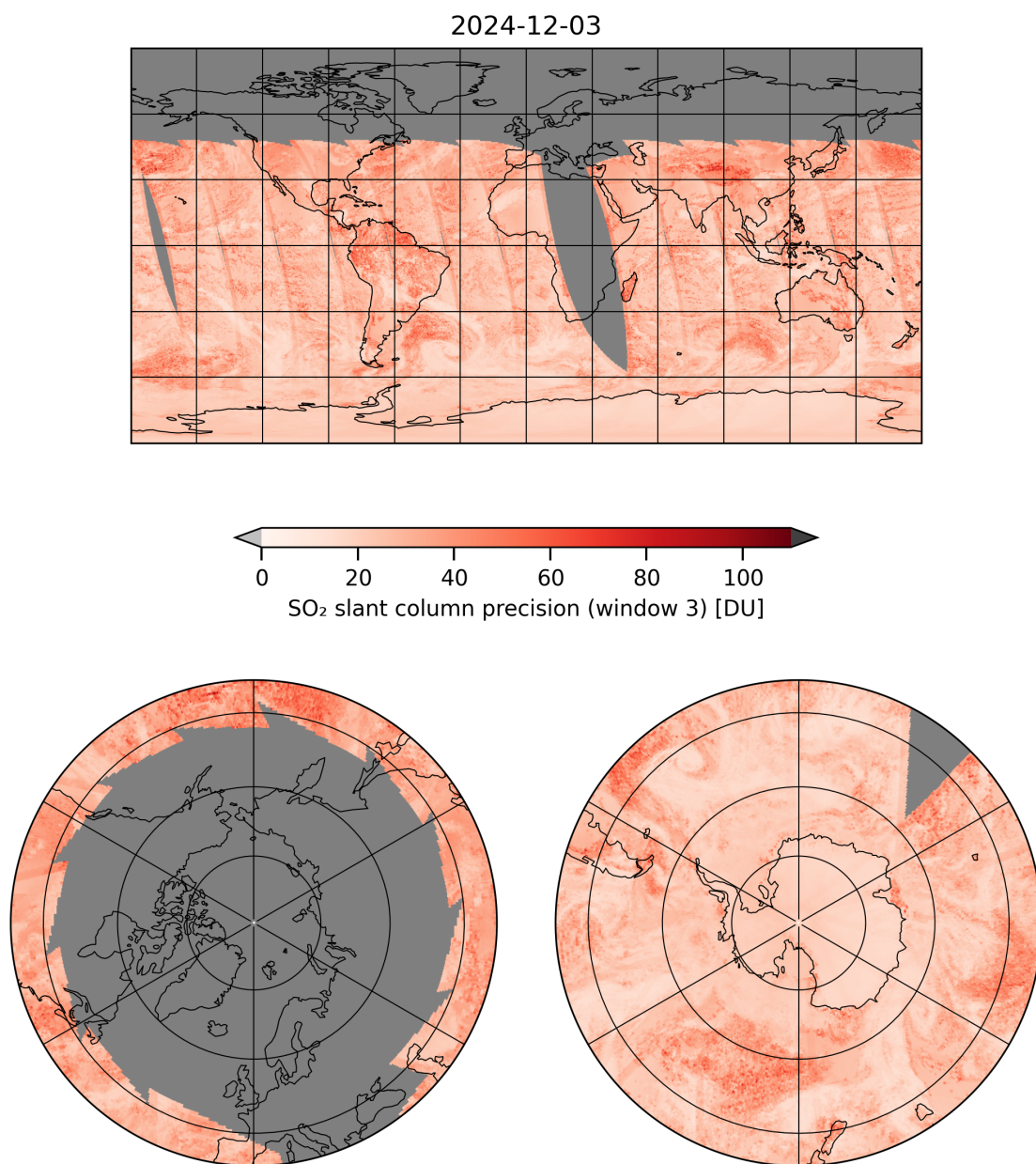


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2024-12-03 to 2024-12-03

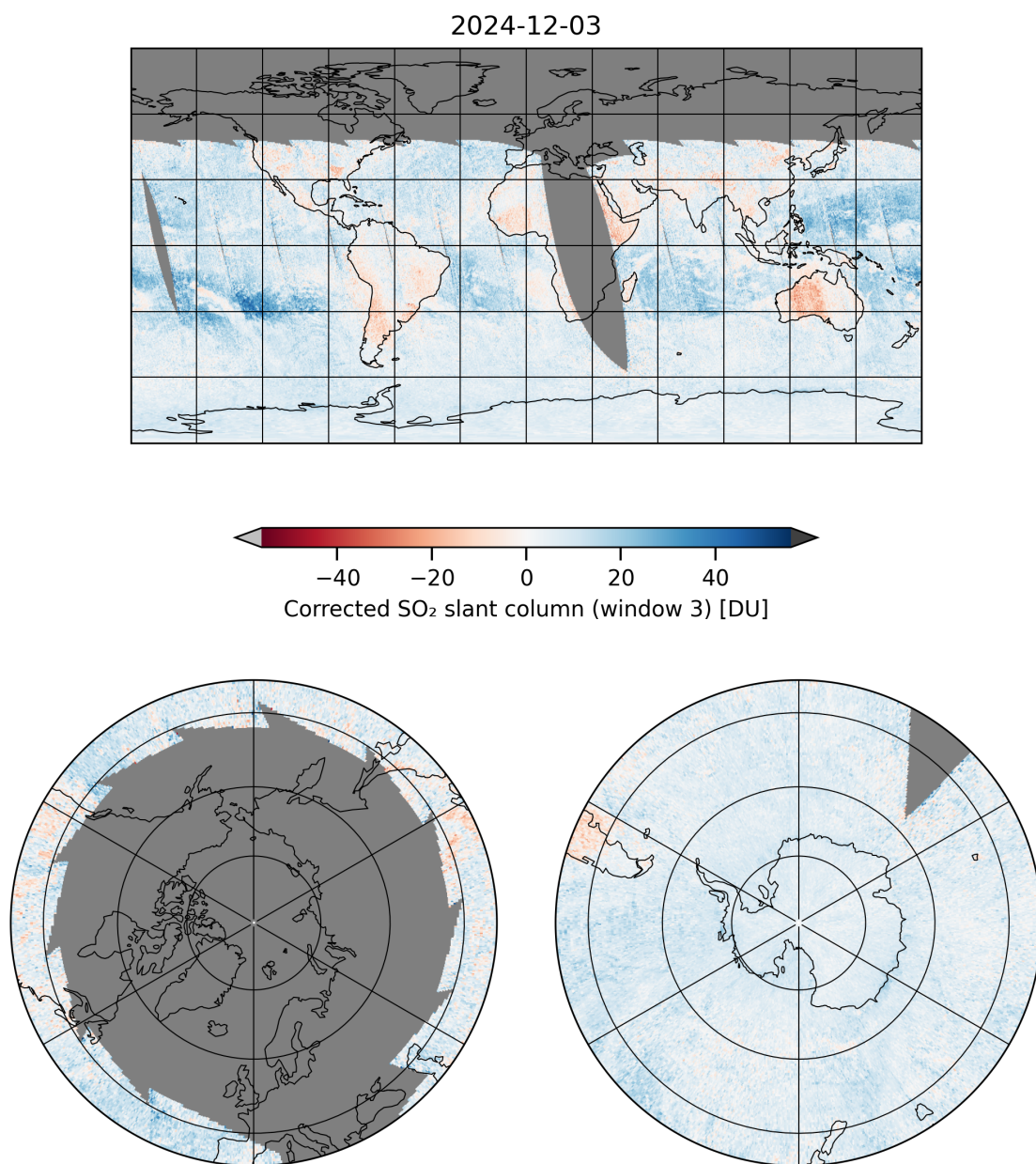


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2024-12-03 to 2024-12-03

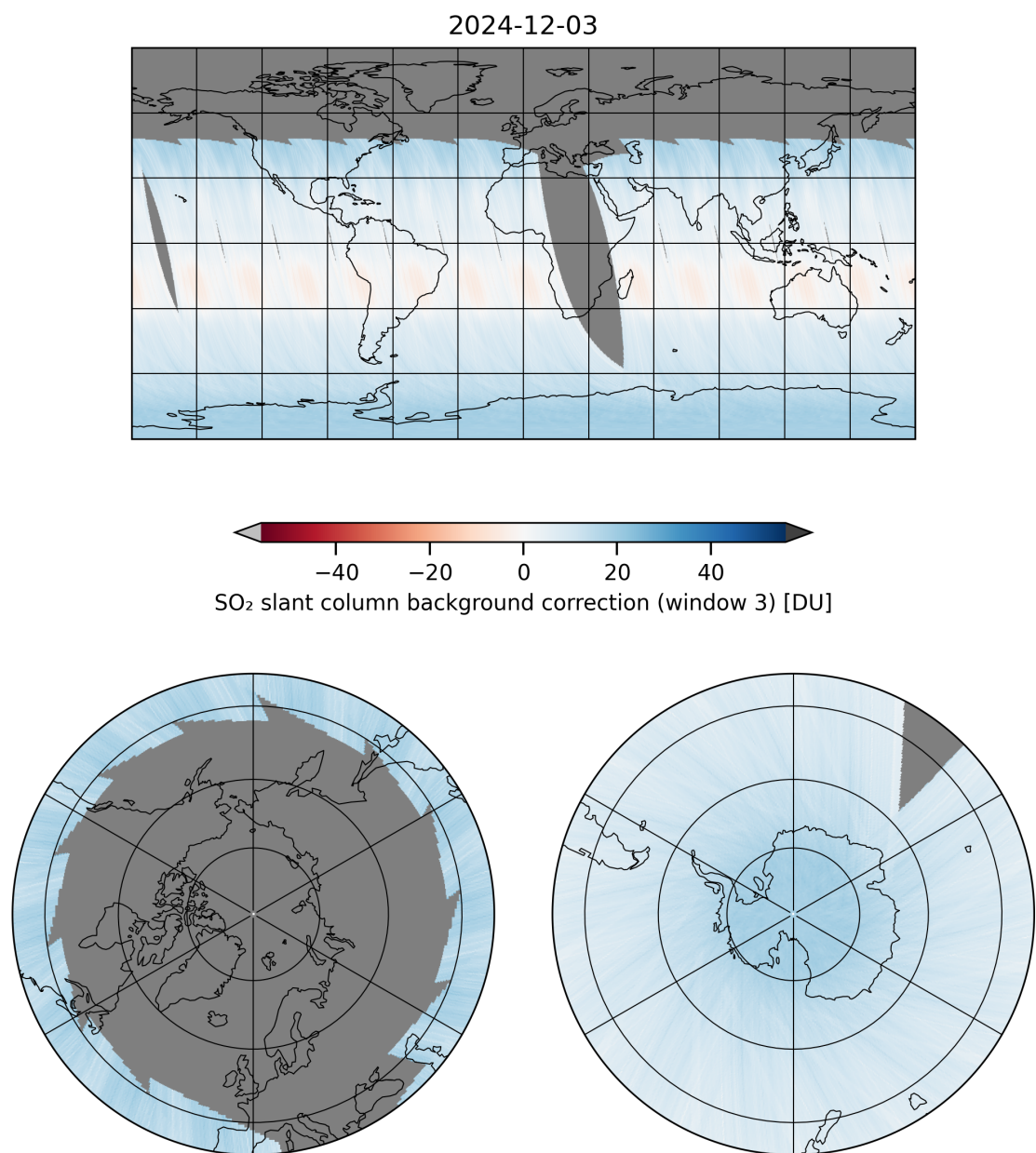


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2024-12-03 to 2024-12-03

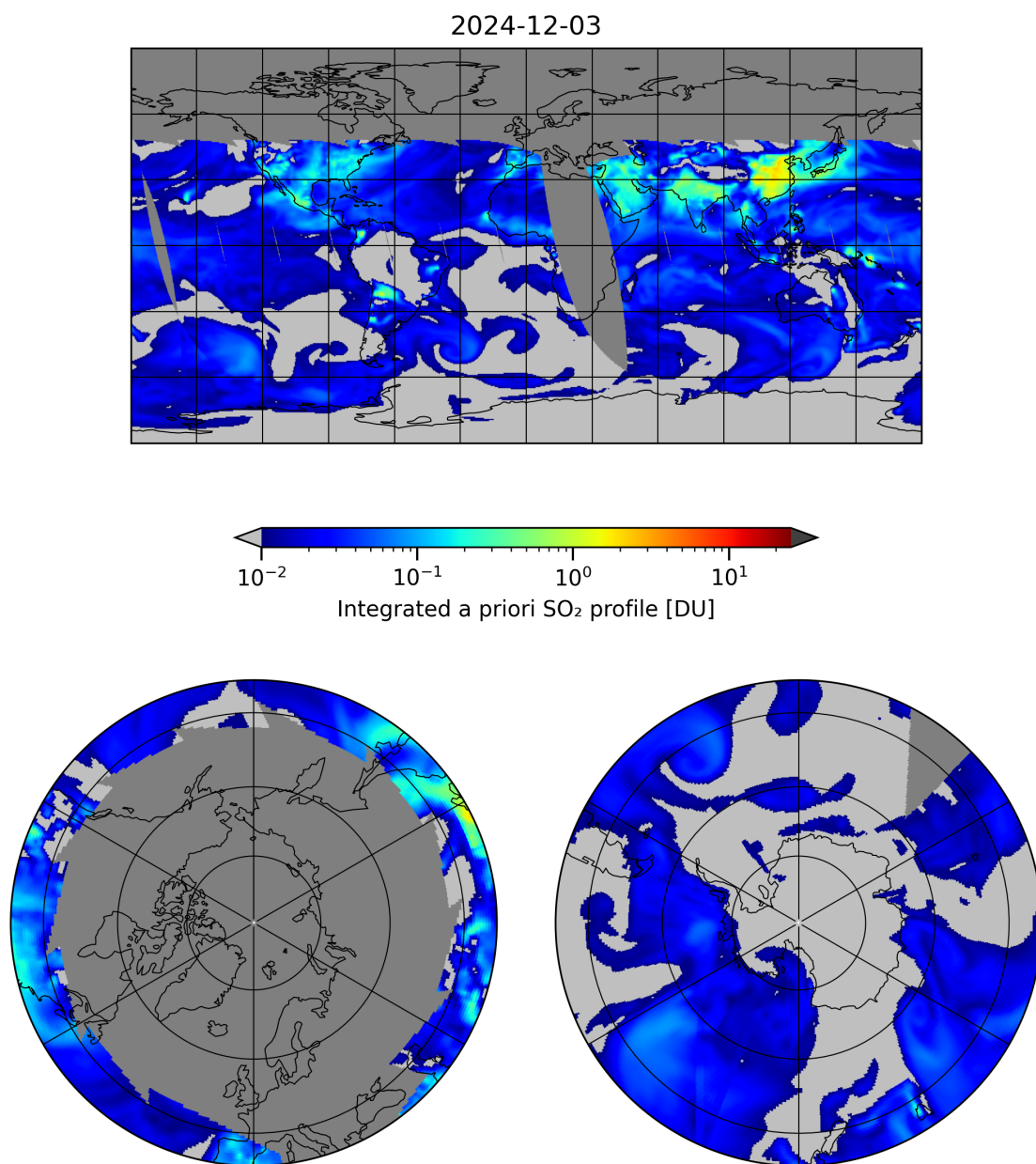


Figure 21: Map of “Integrated a priori SO₂ profile” for 2024-12-03 to 2024-12-03

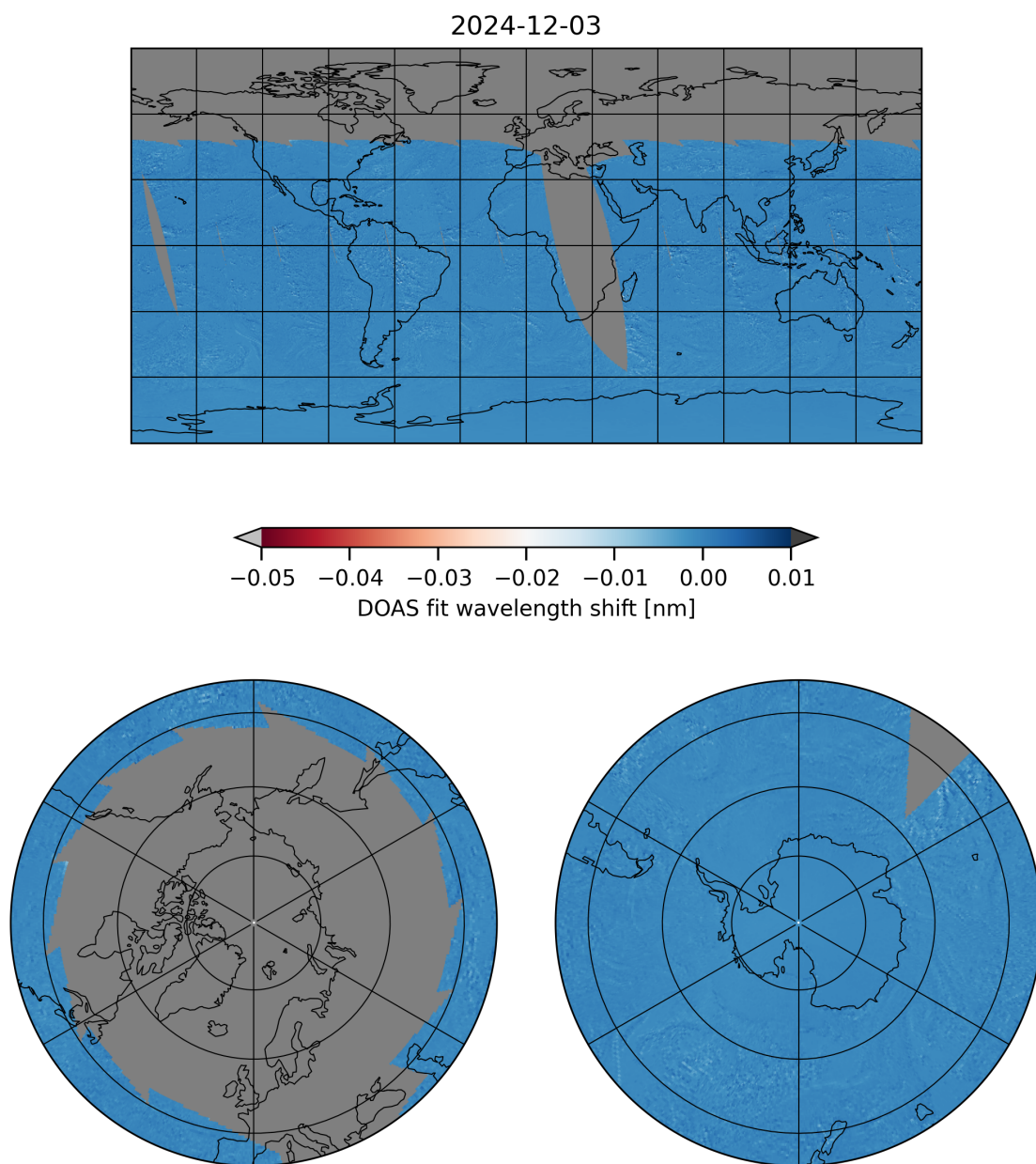


Figure 22: Map of “DOAS fit wavelength shift” for 2024-12-03 to 2024-12-03

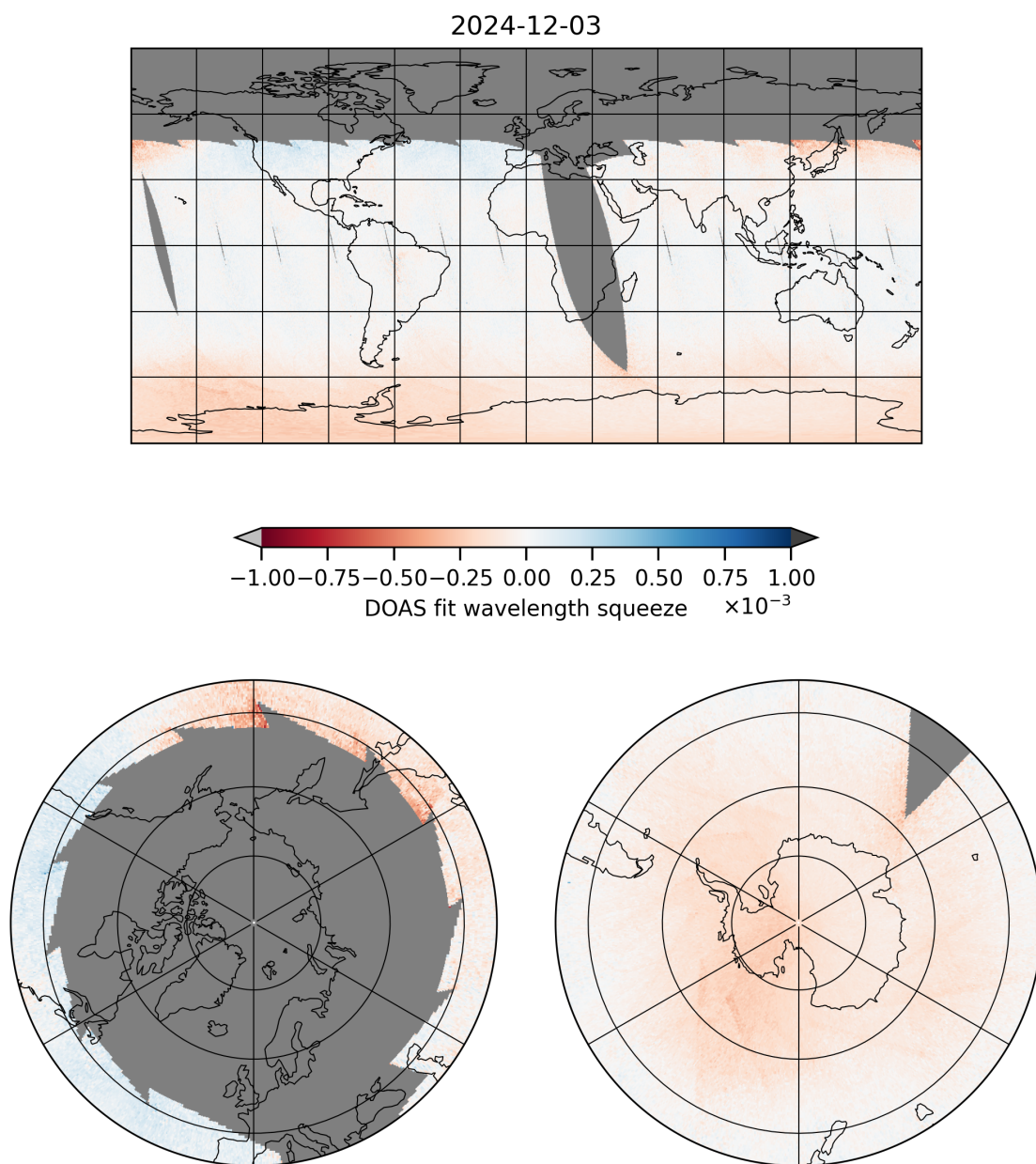


Figure 23: Map of “DOAS fit wavelength squeeze” for 2024-12-03 to 2024-12-03

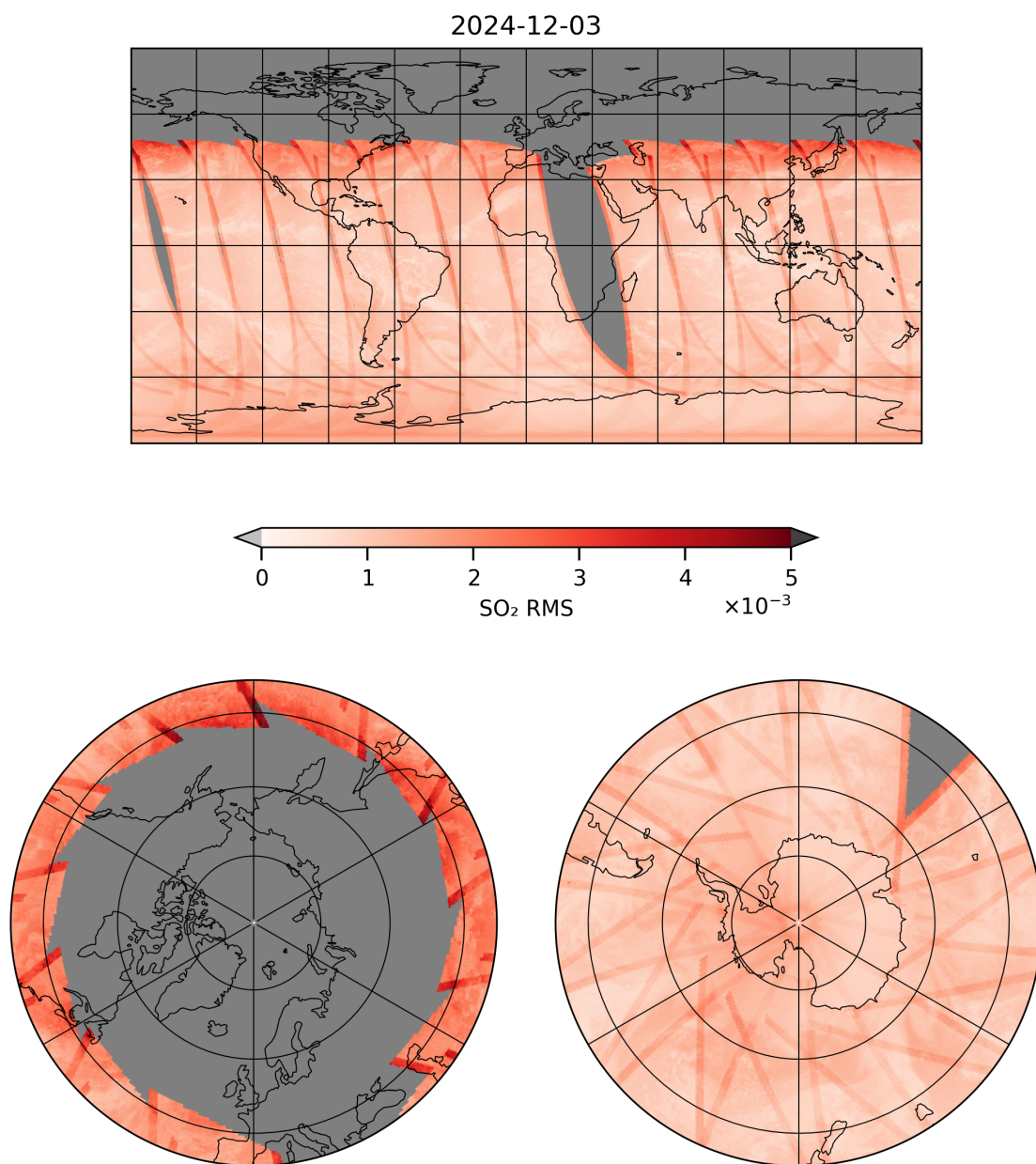


Figure 24: Map of “SO₂ RMS” for 2024-12-03 to 2024-12-03

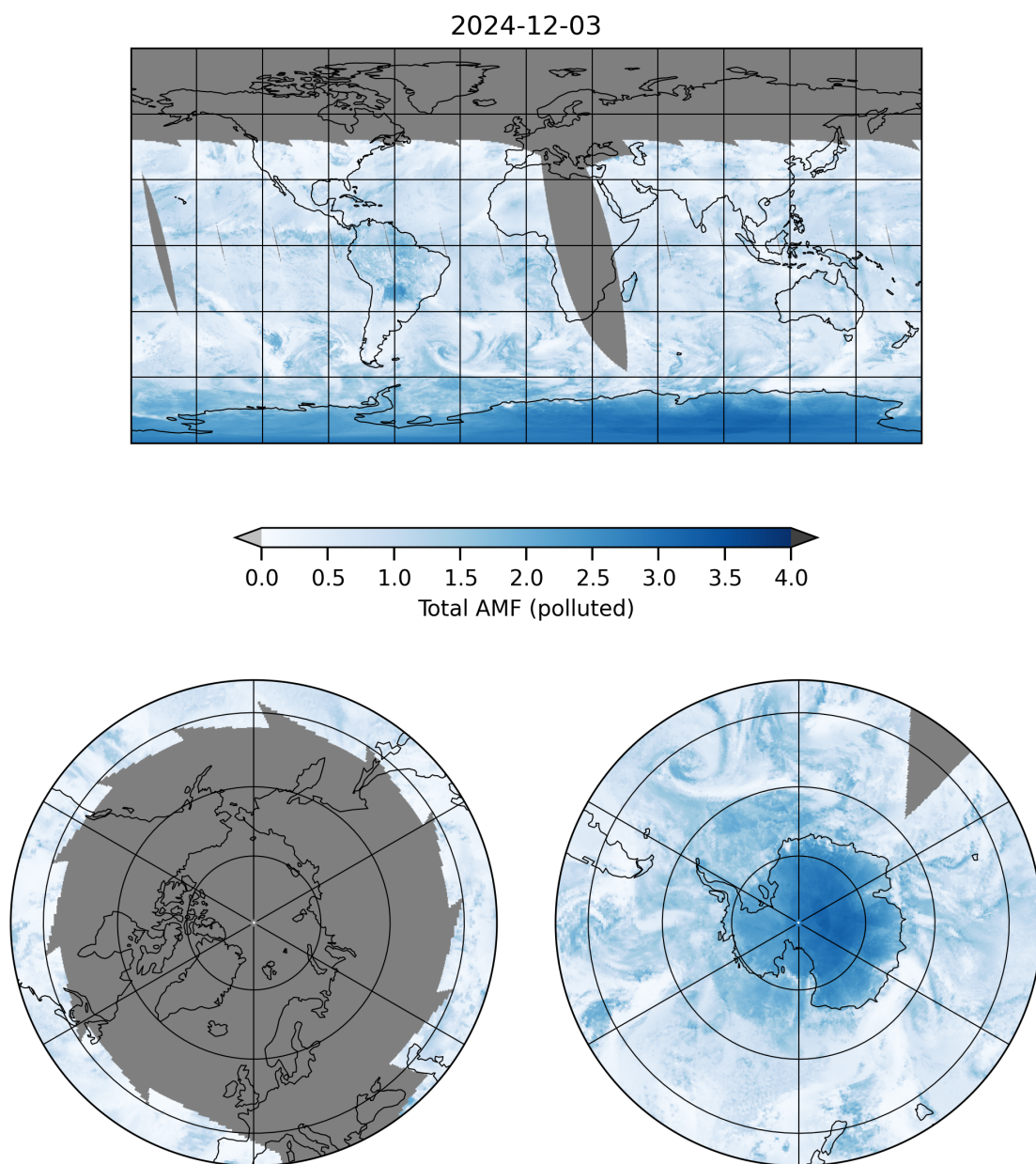


Figure 25: Map of “Total AMF (polluted)” for 2024-12-03 to 2024-12-03

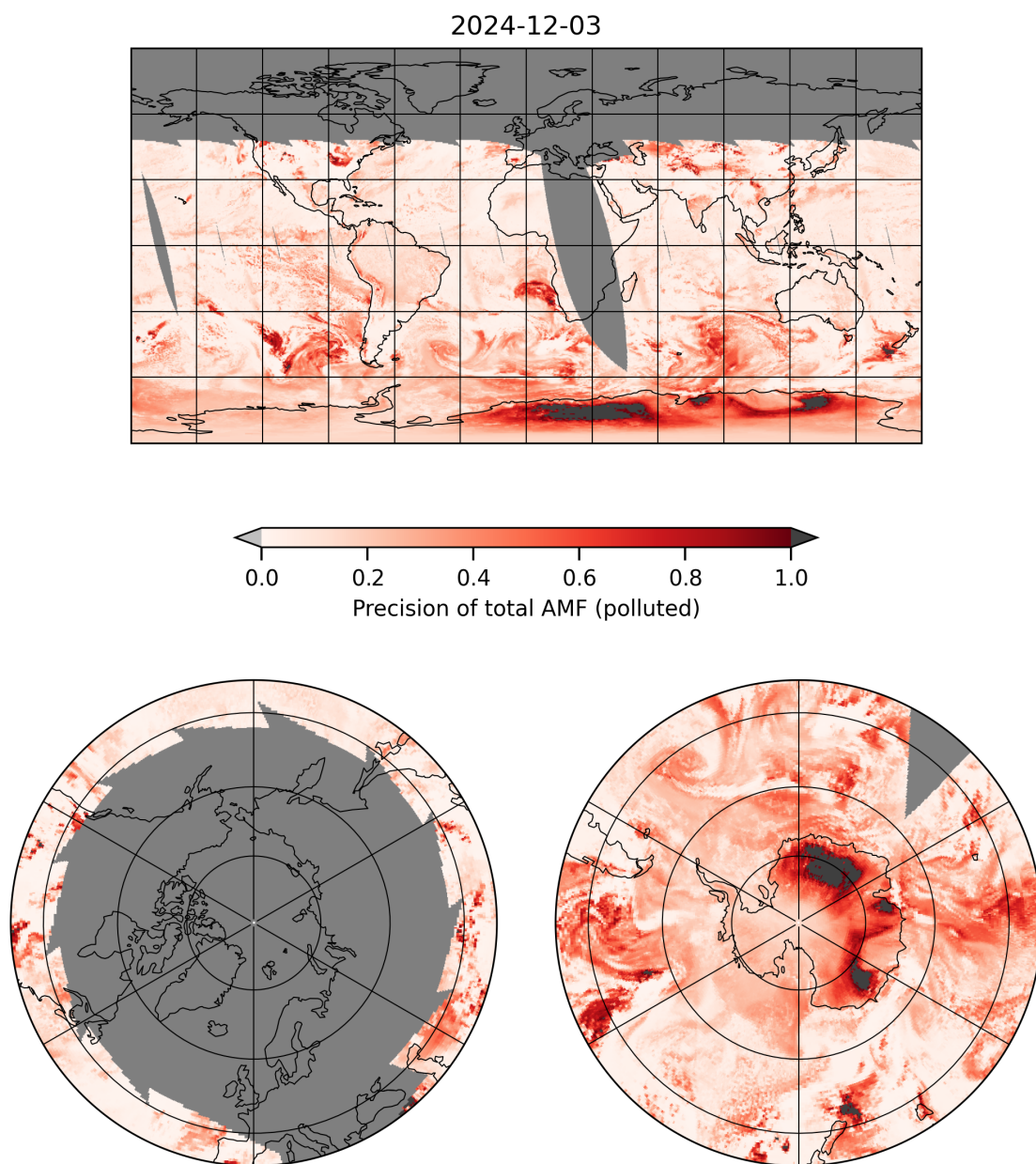


Figure 26: Map of “Precision of total AMF (polluted)” for 2024-12-03 to 2024-12-03

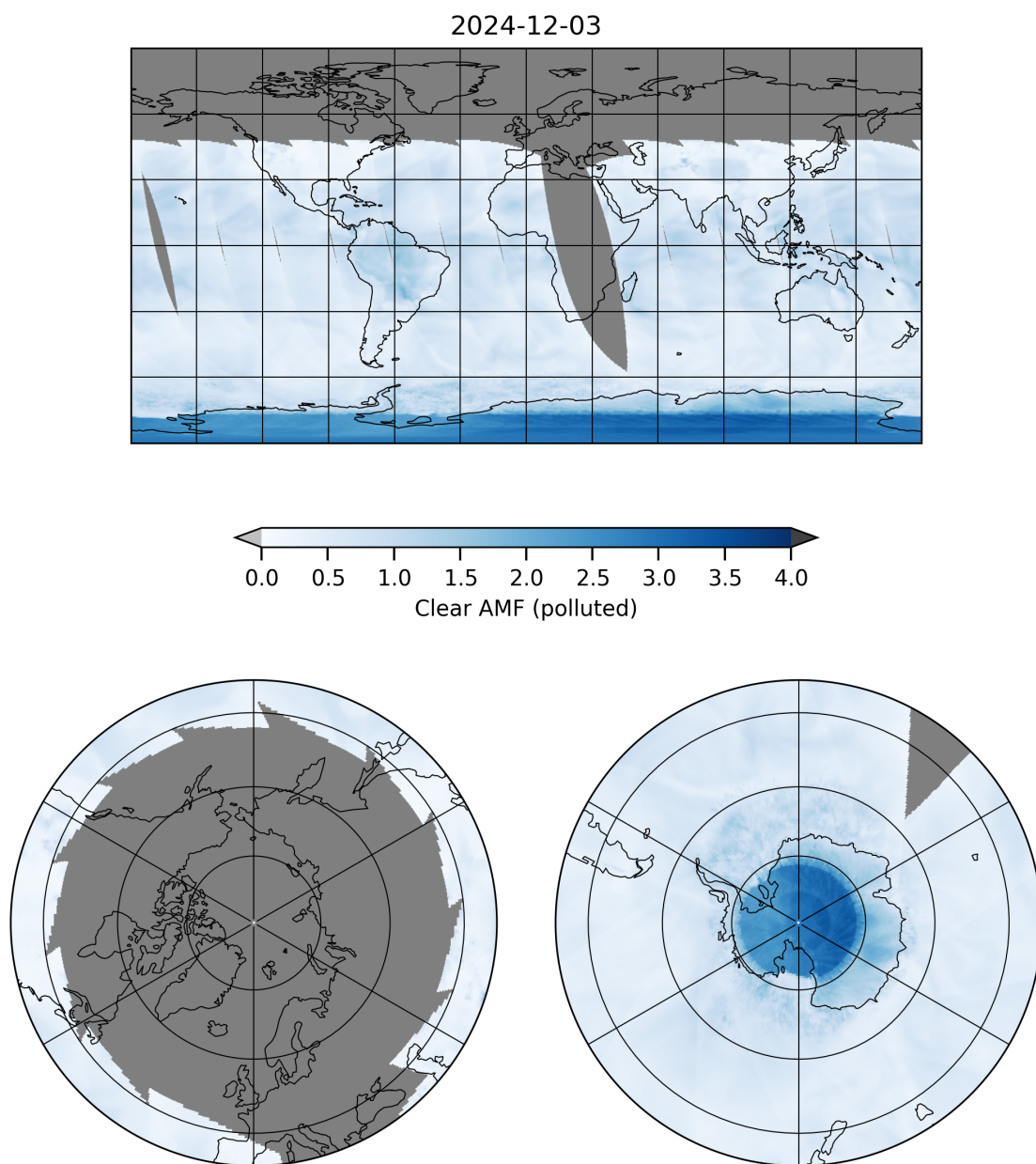


Figure 27: Map of “Clear AMF (polluted)” for 2024-12-03 to 2024-12-03

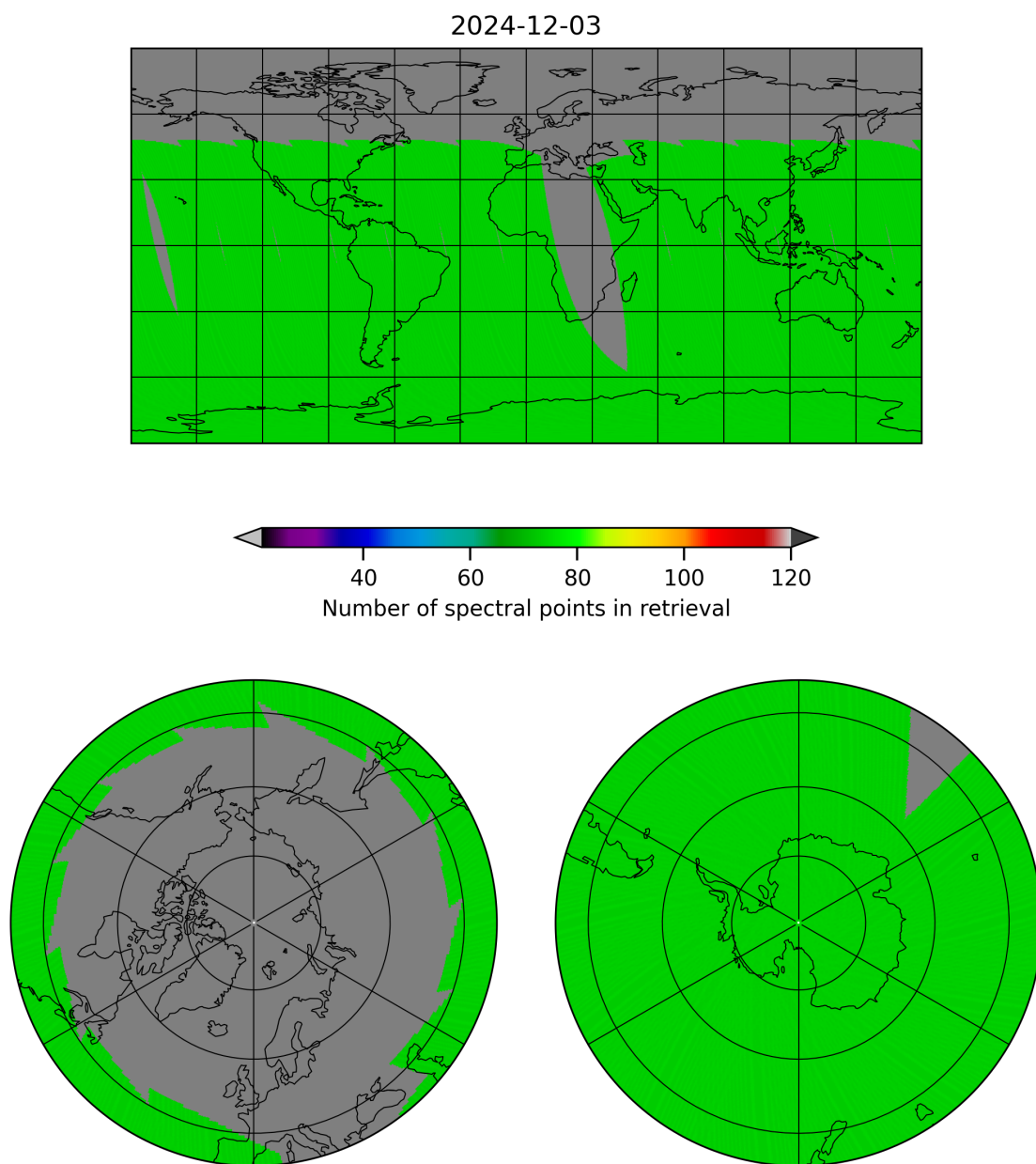


Figure 28: Map of “Number of spectral points in retrieval” for 2024-12-03 to 2024-12-03

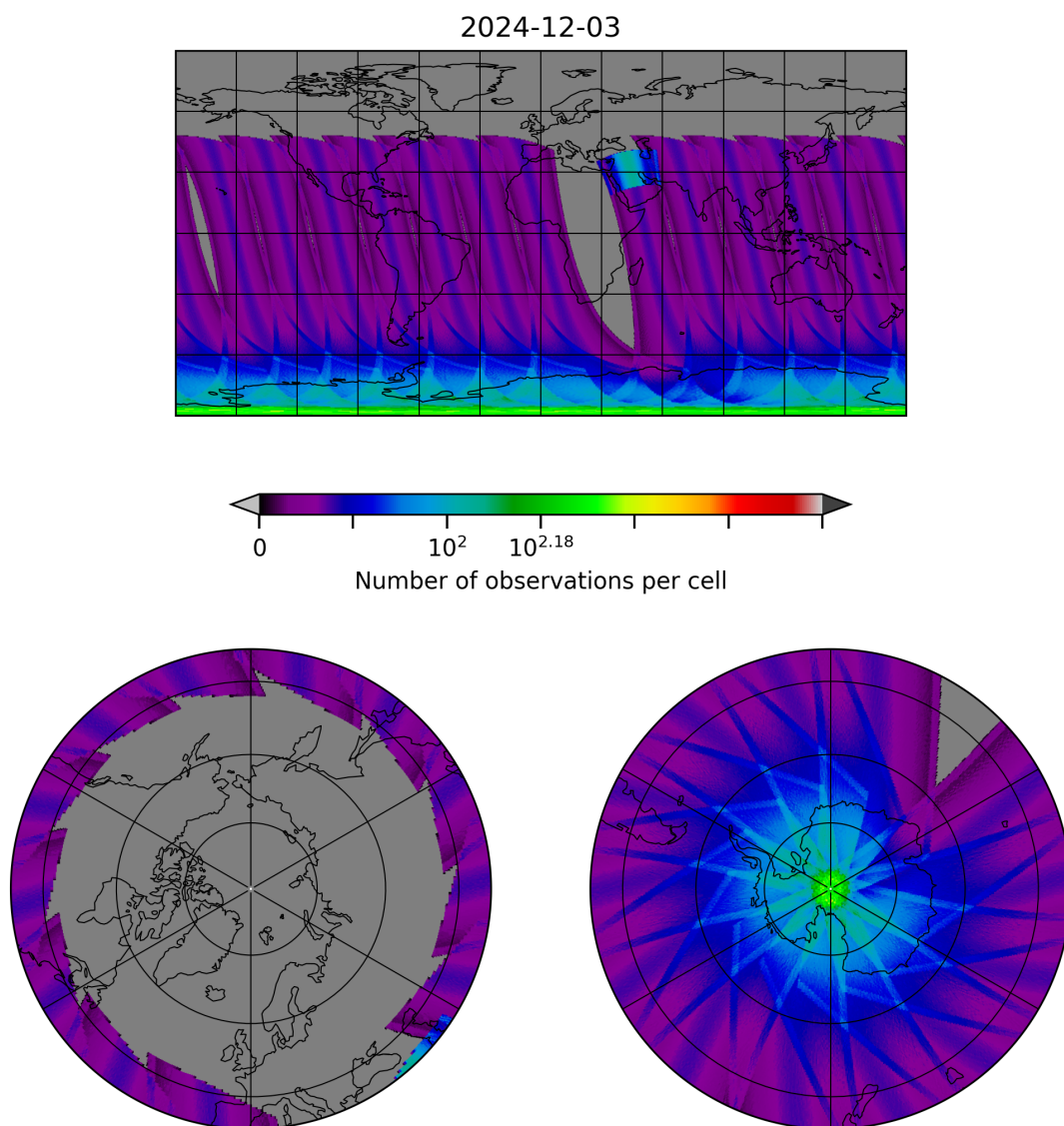


Figure 29: Map of the number of observations for 2024-12-03 to 2024-12-03

7 Zonal average

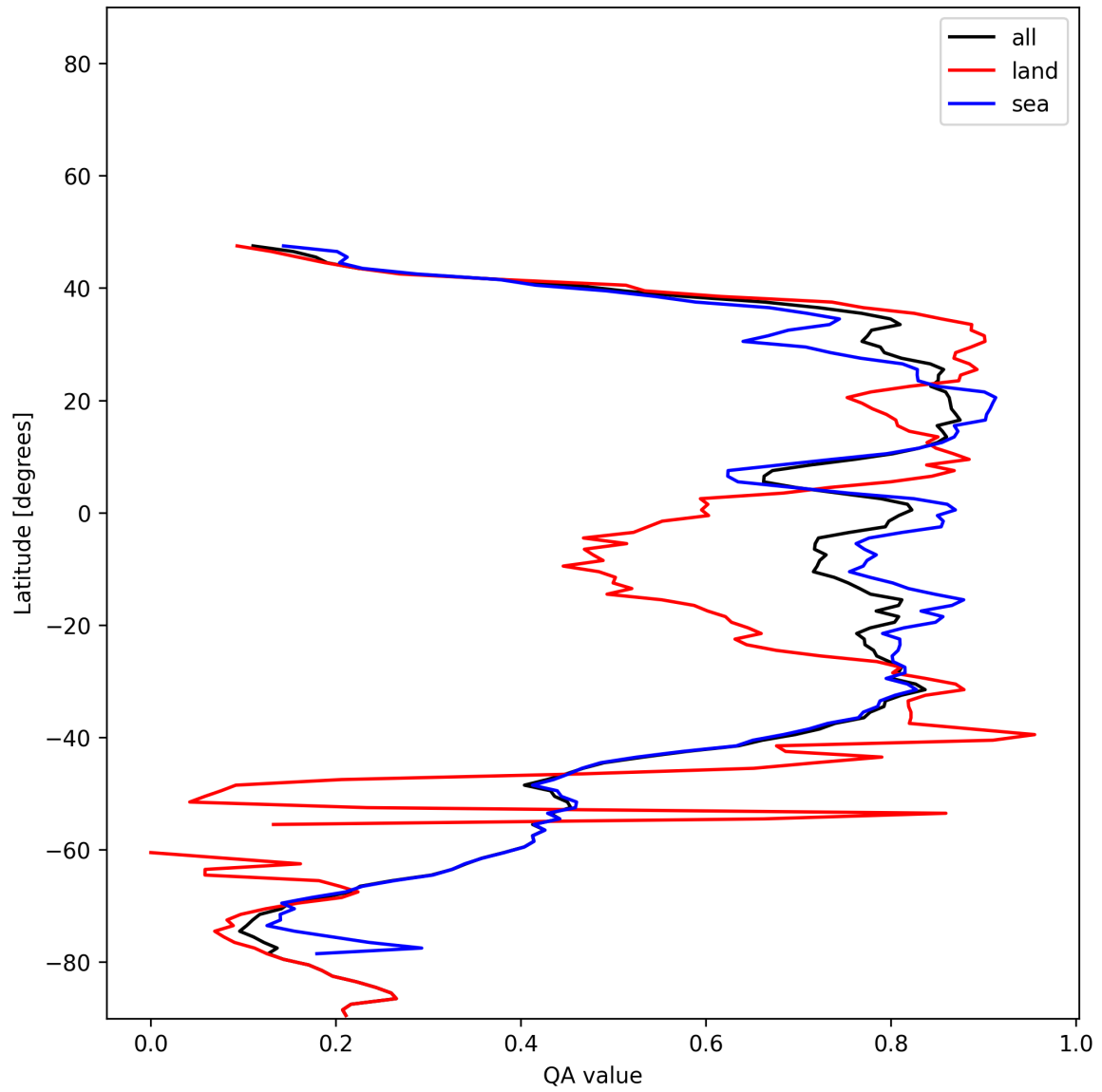


Figure 30: Zonal average of “QA value” for 2024-12-03 to 2024-12-03.

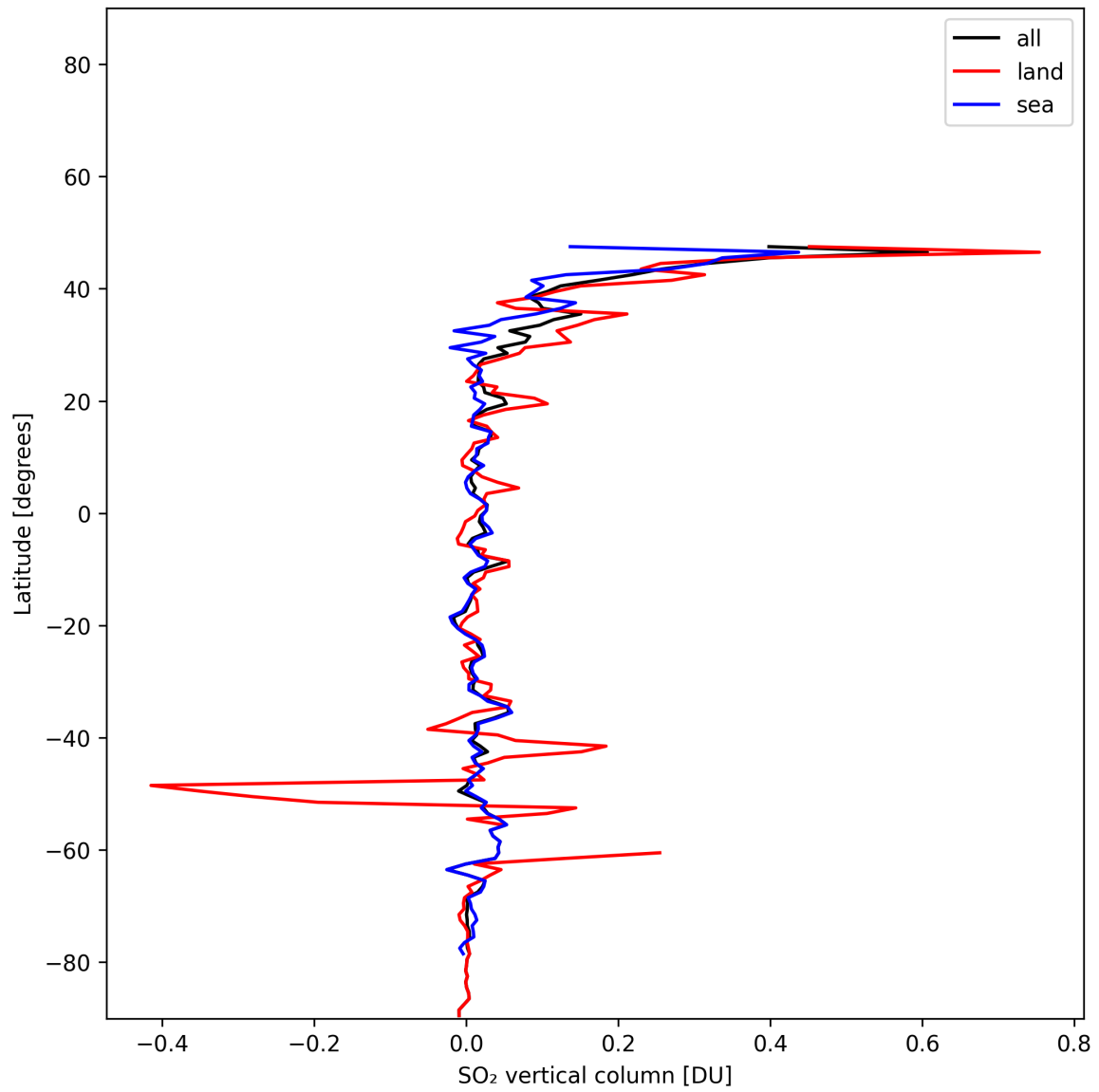


Figure 31: Zonal average of “SO₂ vertical column” for 2024-12-03 to 2024-12-03.

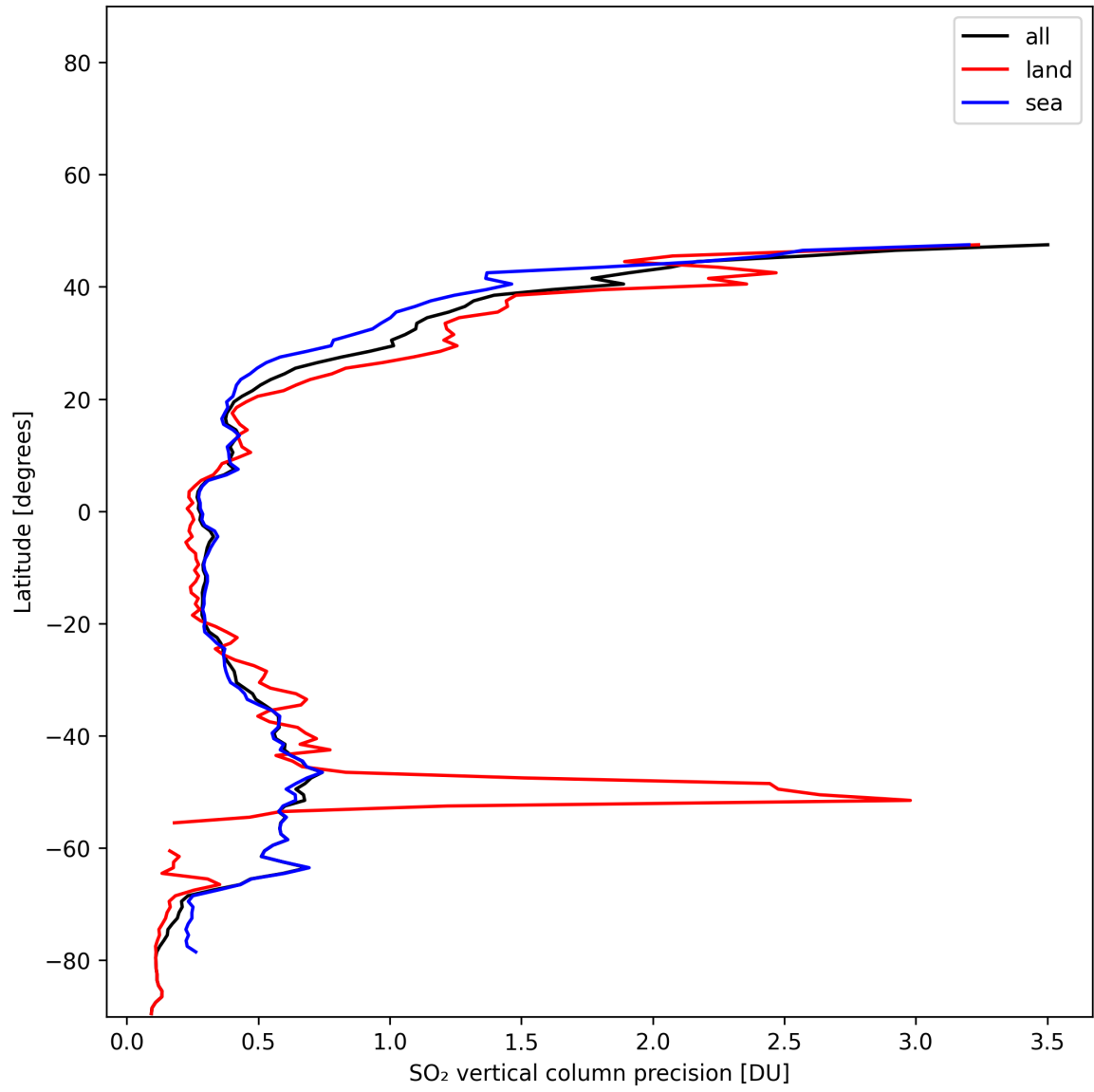


Figure 32: Zonal average of “SO₂ vertical column precision” for 2024-12-03 to 2024-12-03.

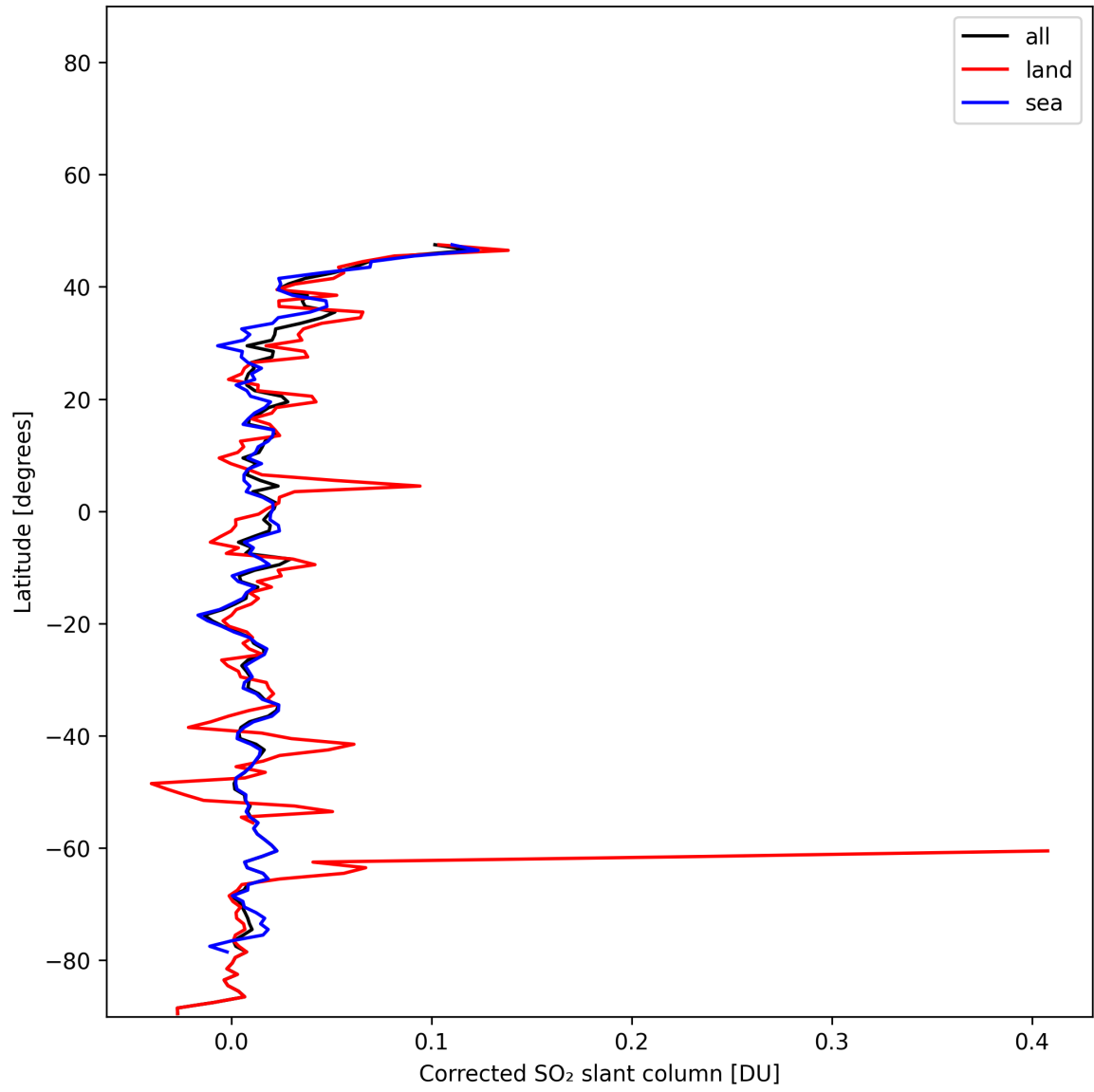


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2024-12-03 to 2024-12-03.

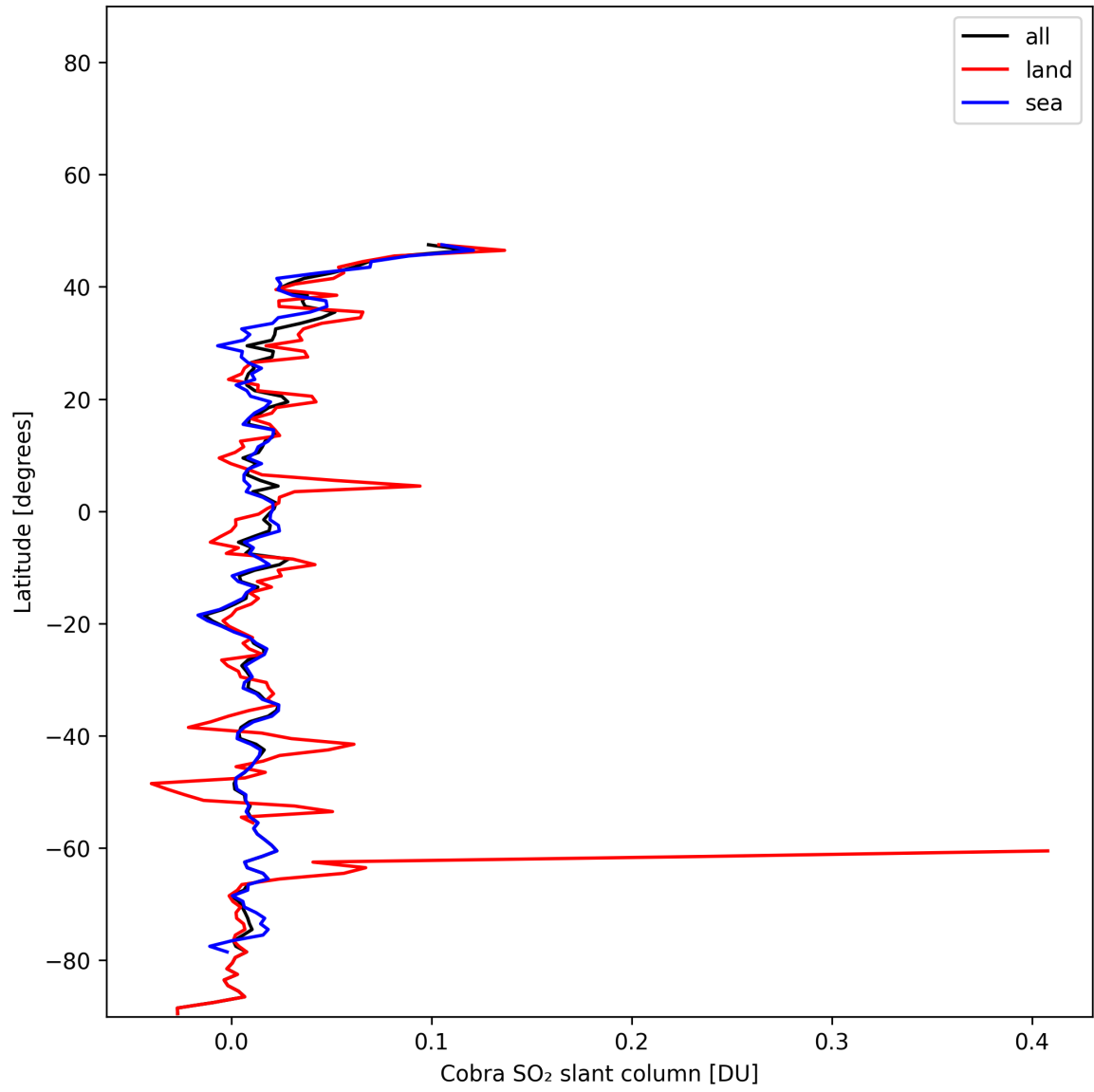


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2024-12-03 to 2024-12-03.

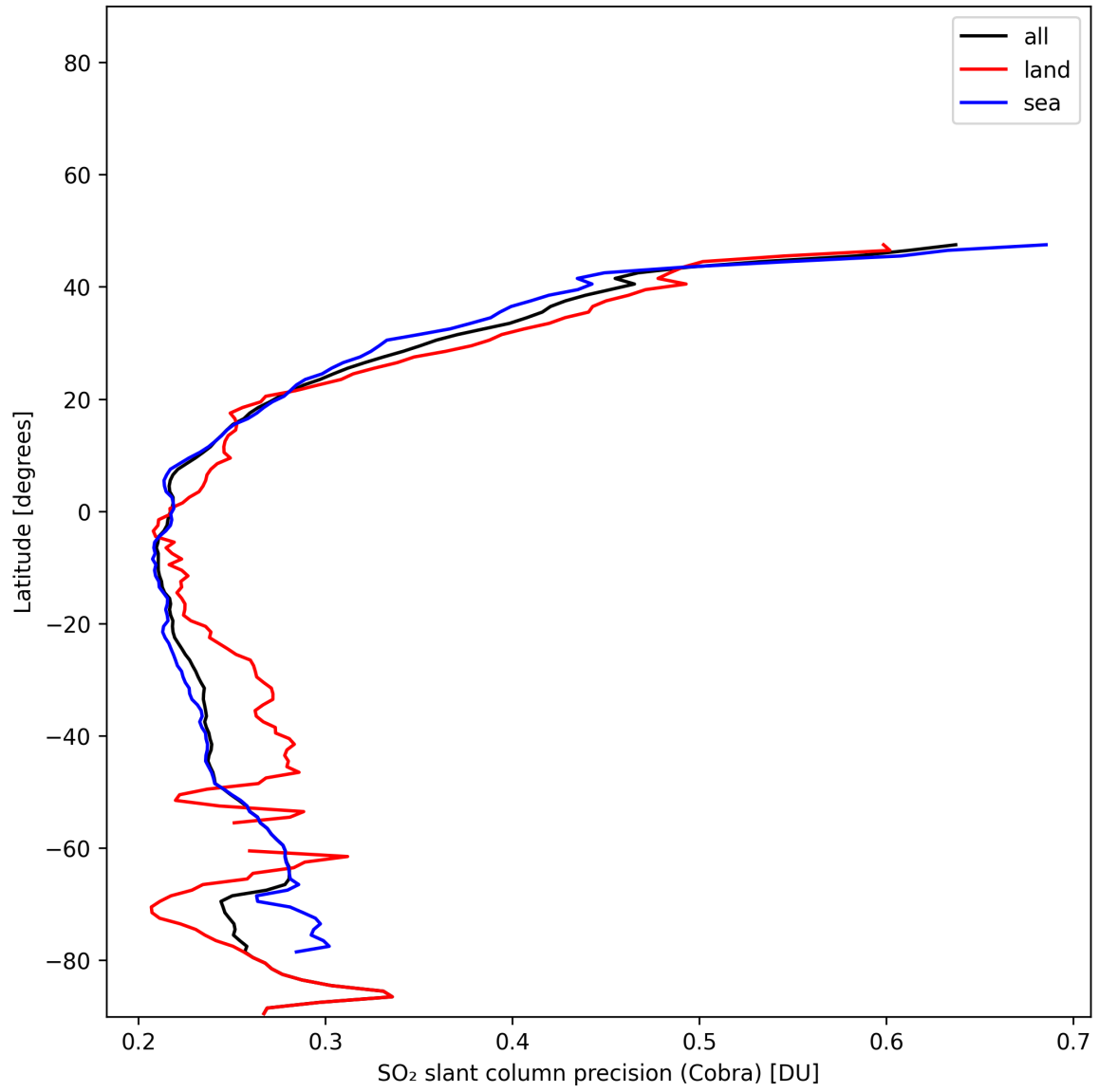


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2024-12-03 to 2024-12-03.

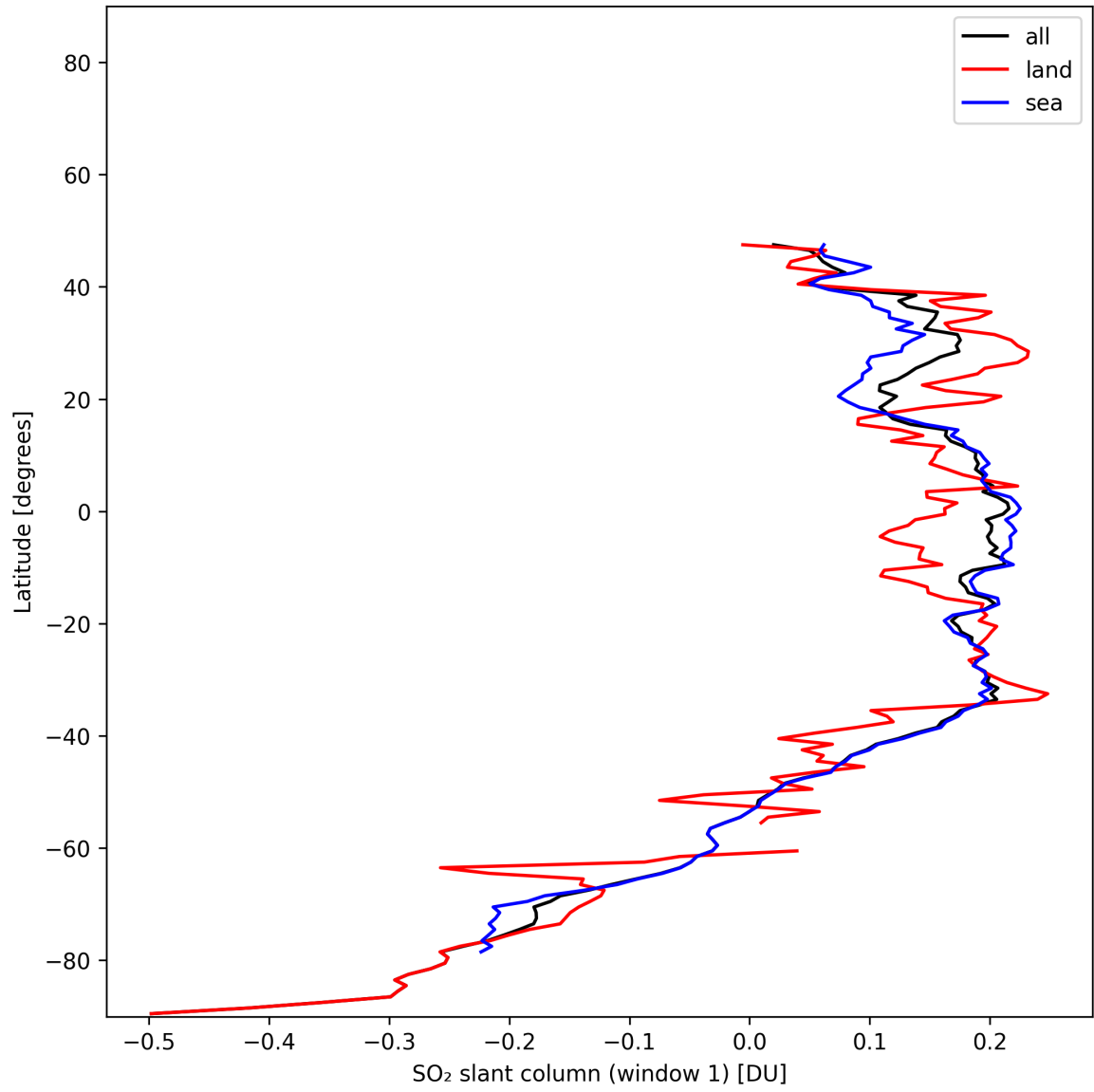


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2024-12-03 to 2024-12-03.

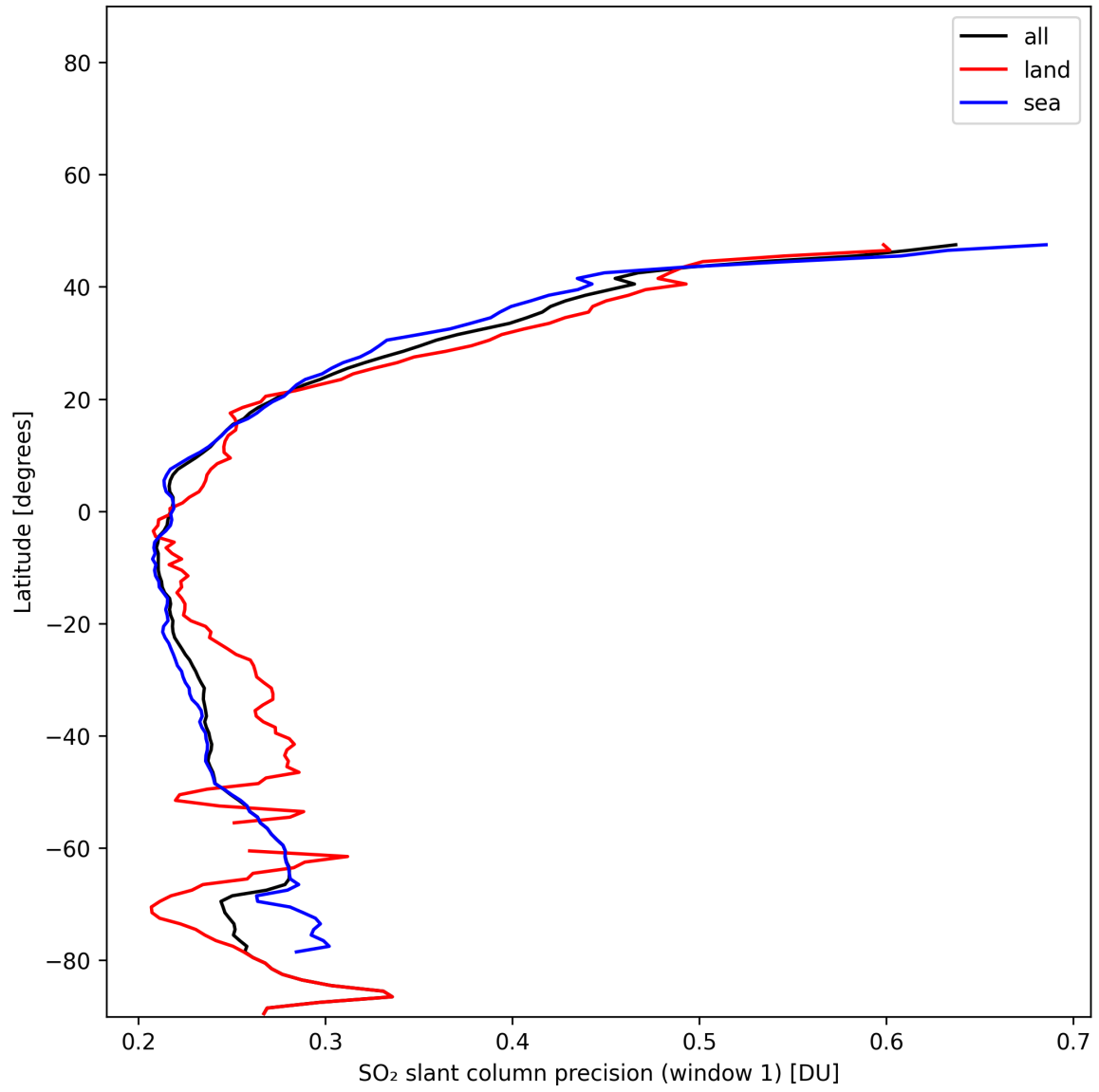


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2024-12-03 to 2024-12-03.

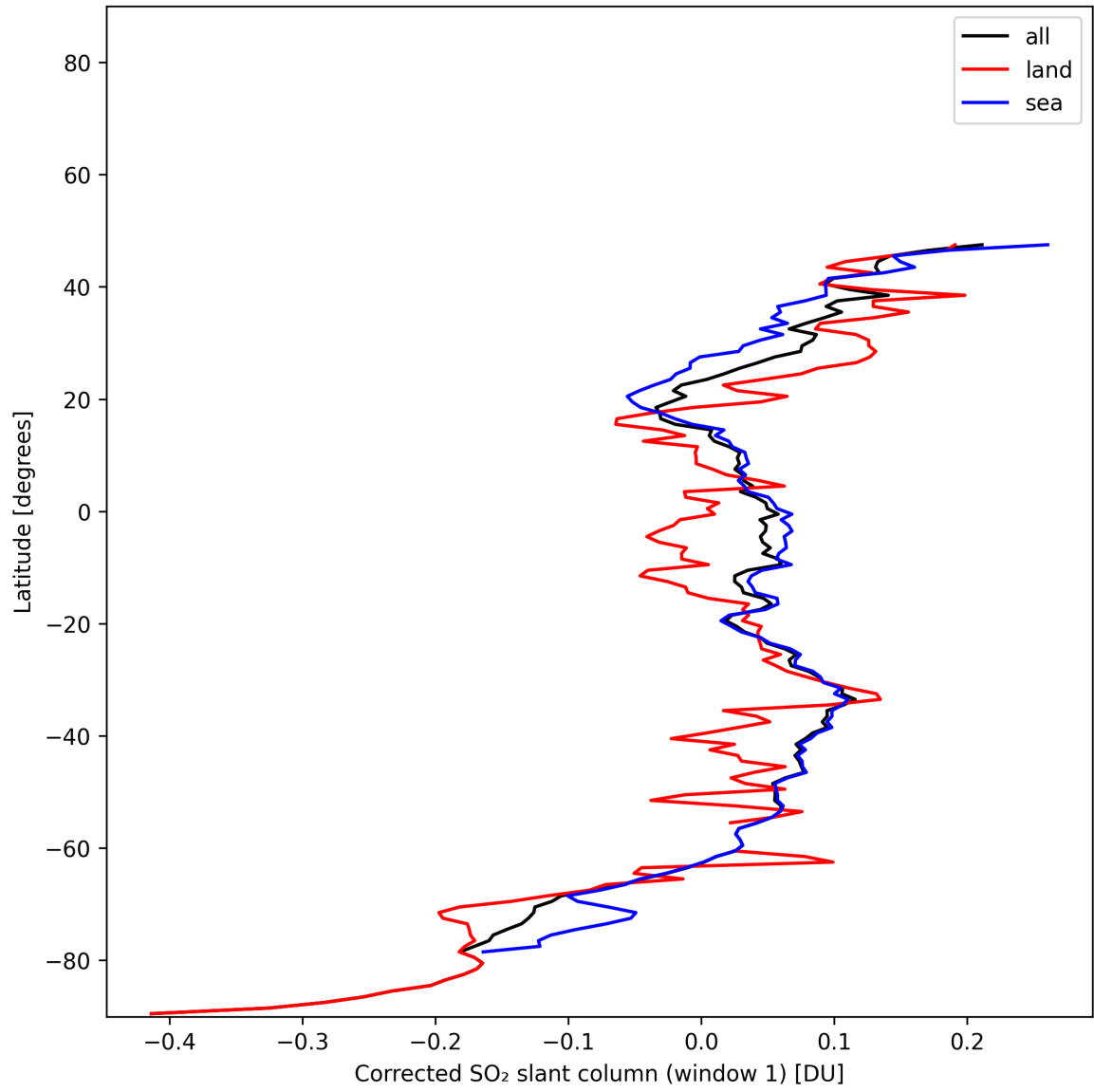


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2024-12-03 to 2024-12-03.

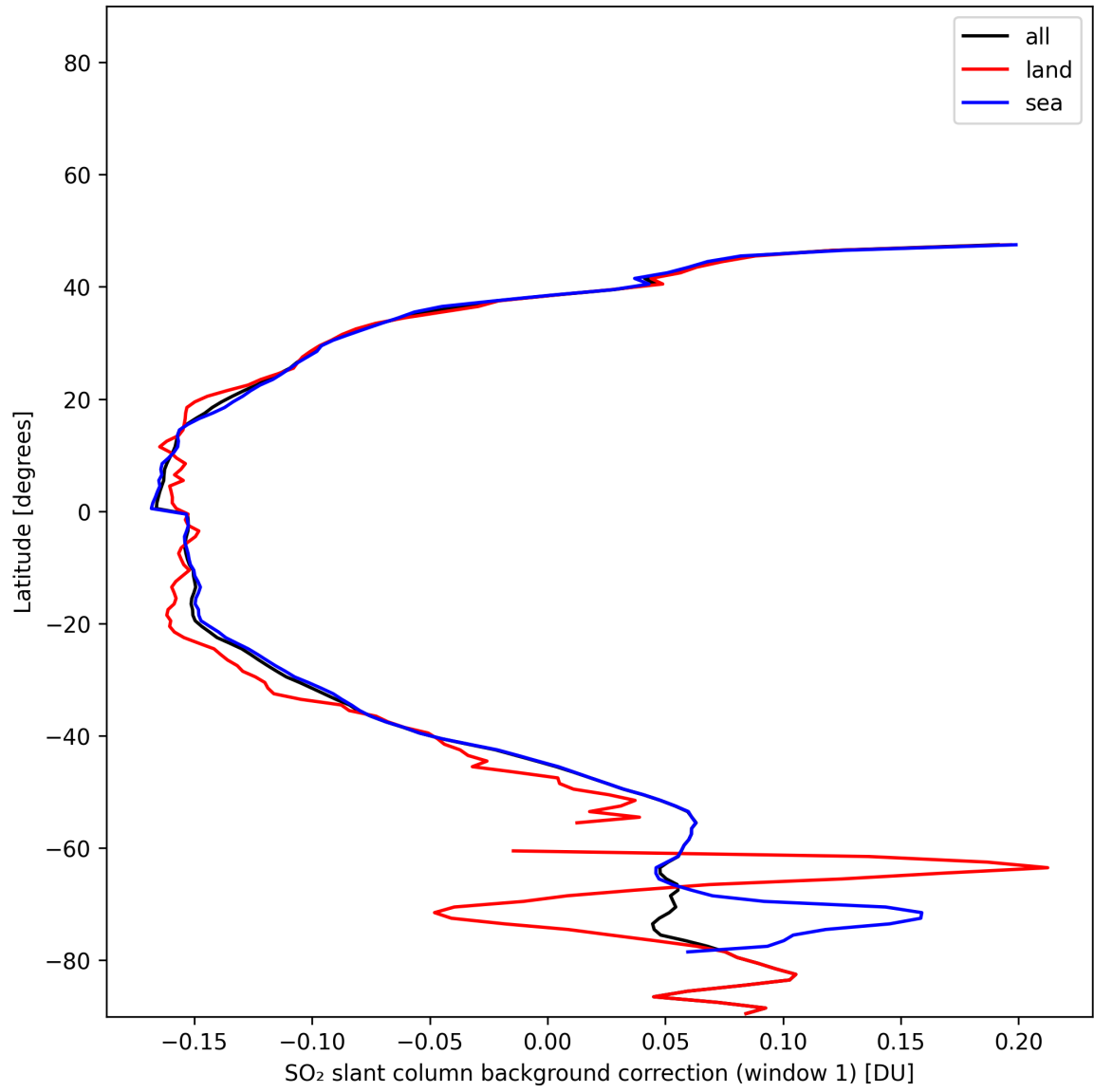


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2024-12-03 to 2024-12-03.

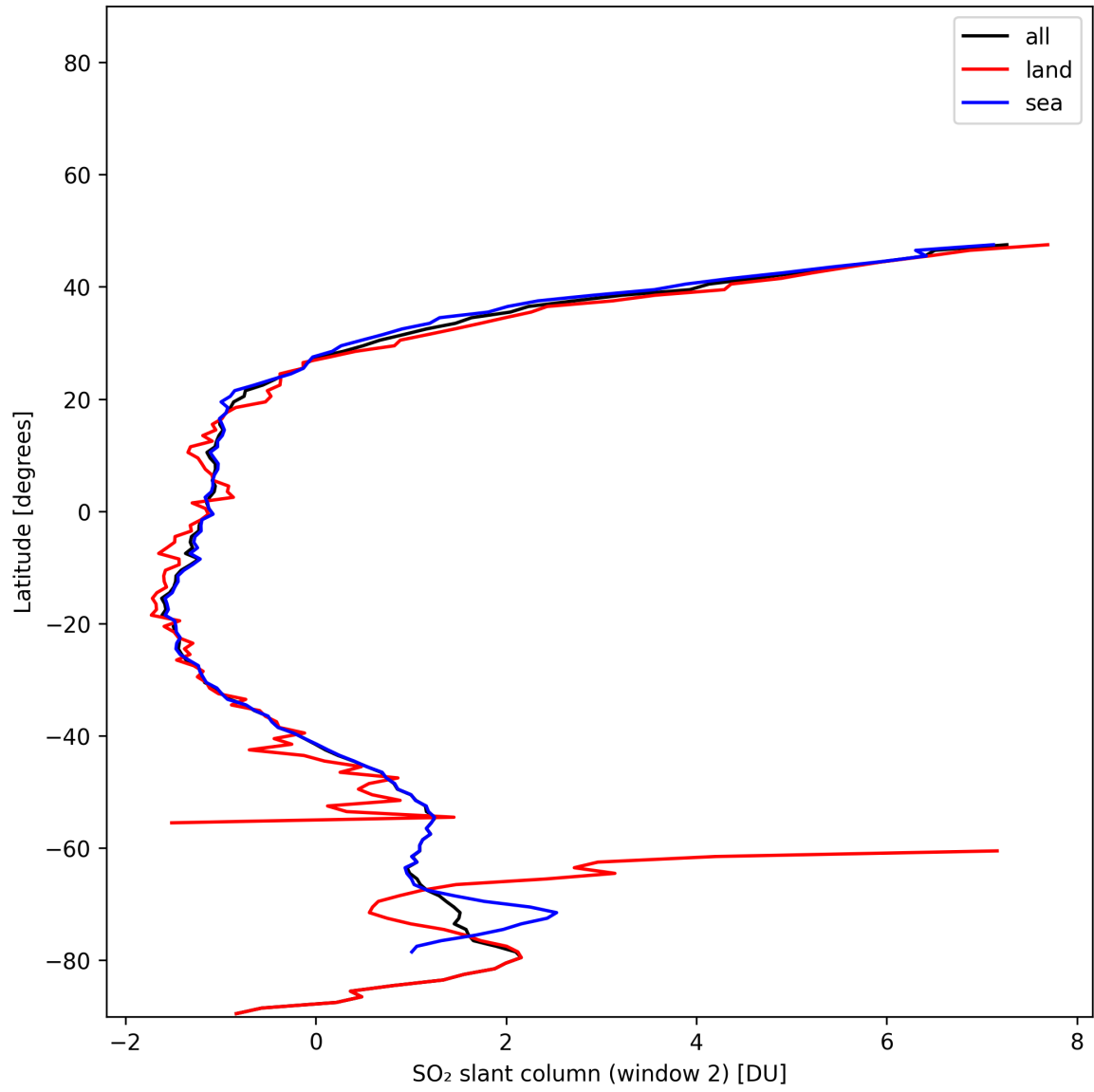


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2024-12-03 to 2024-12-03.

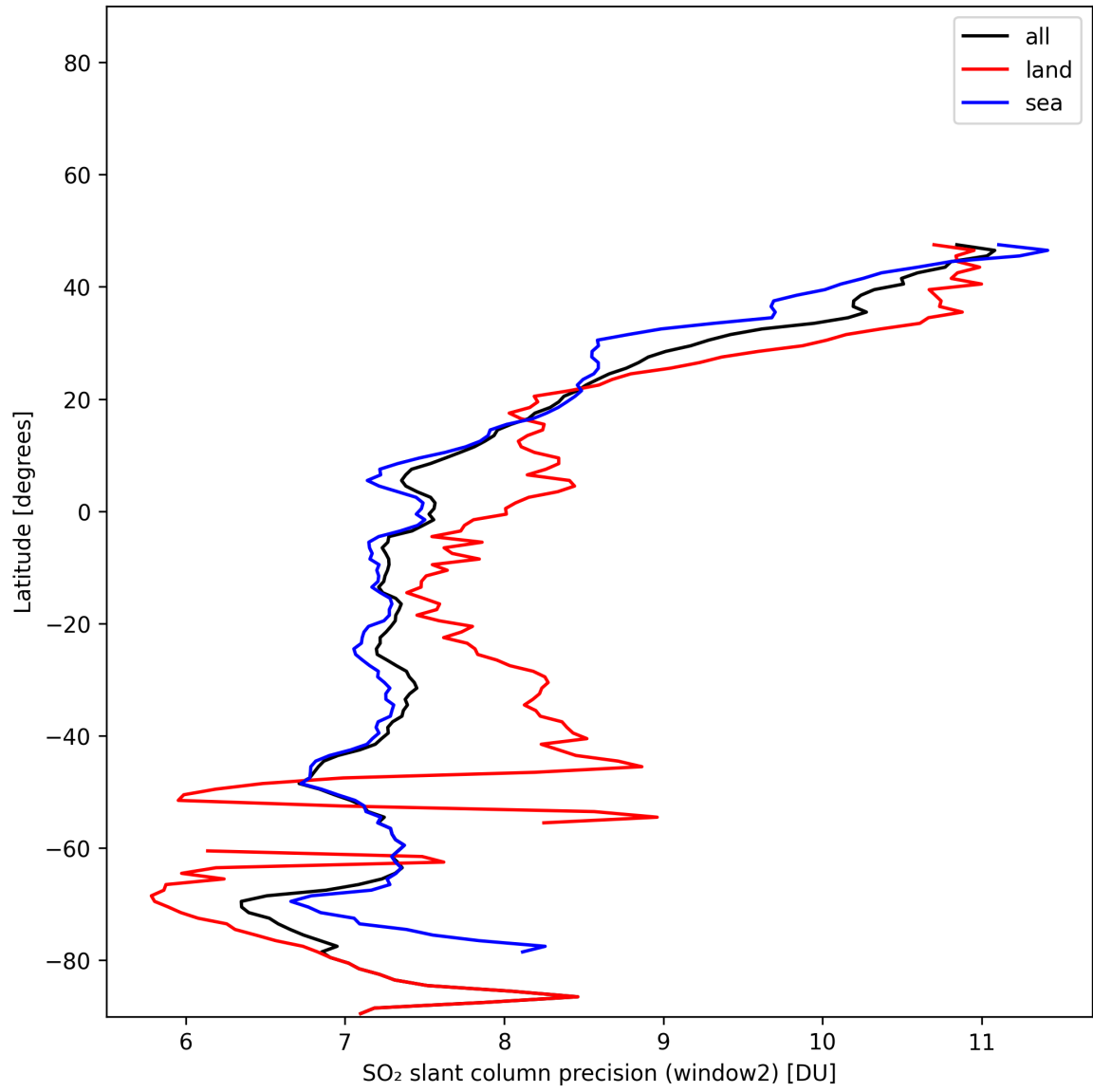


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2024-12-03 to 2024-12-03.

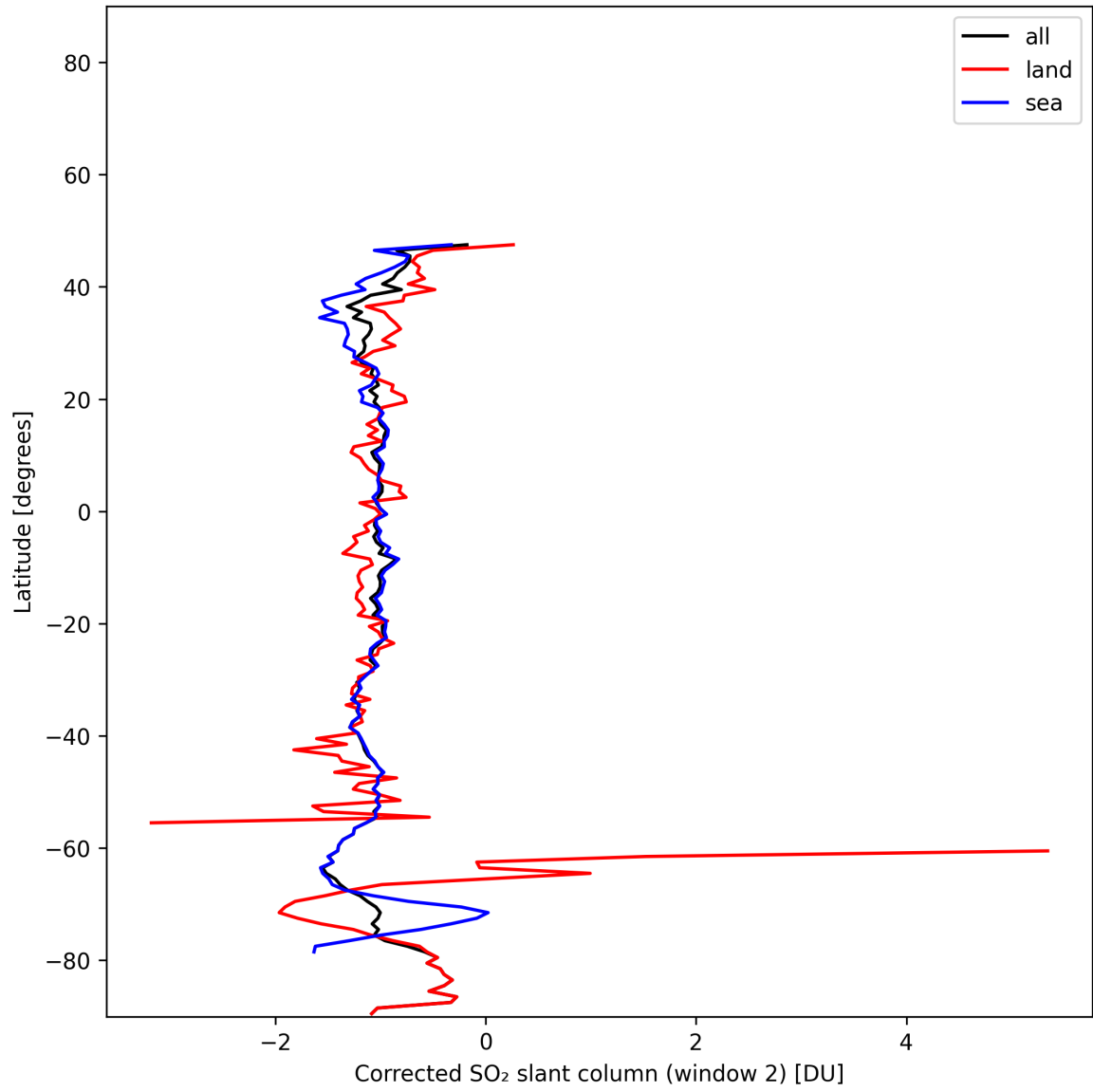


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2024-12-03 to 2024-12-03.

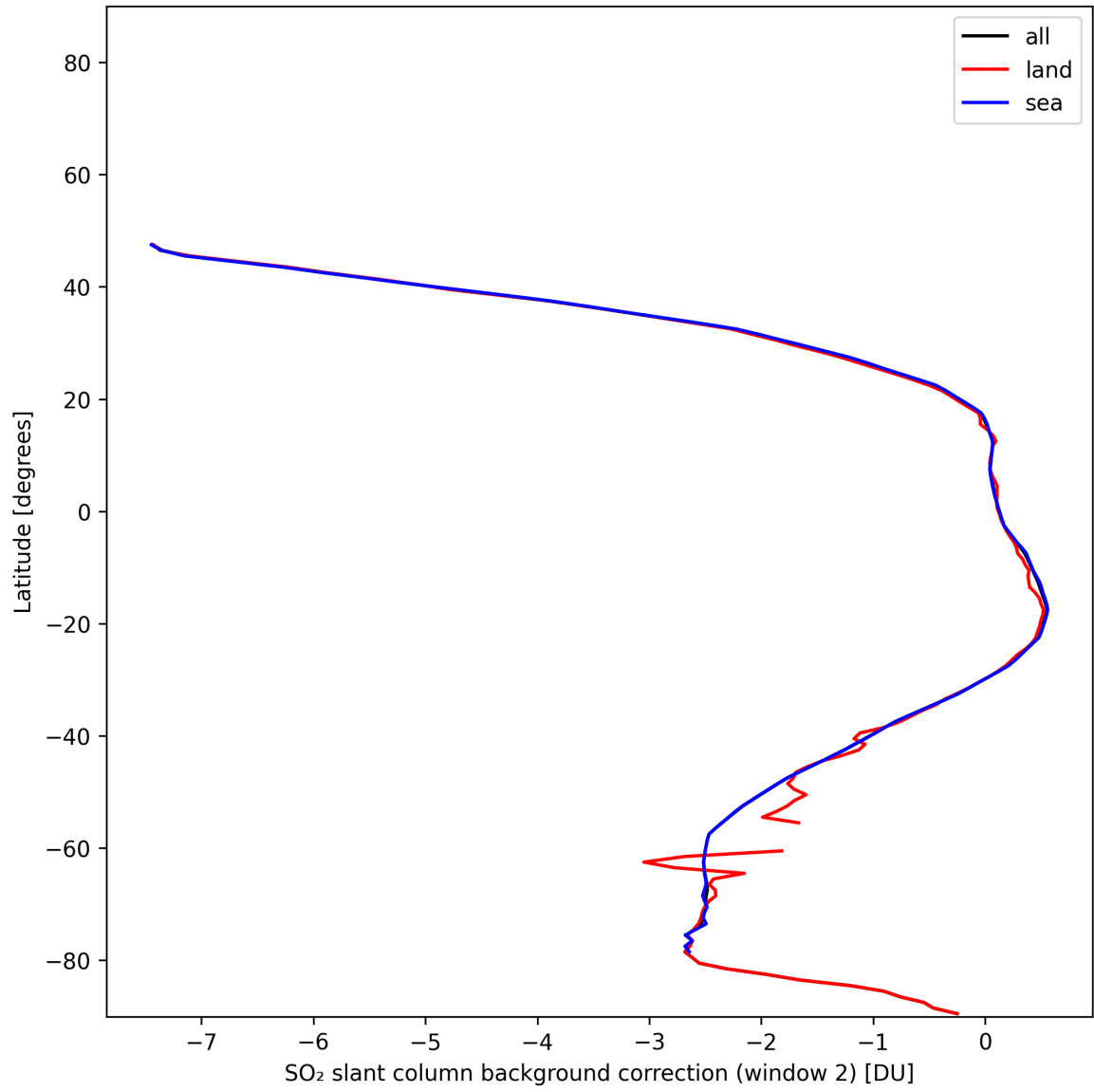


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2024-12-03 to 2024-12-03.

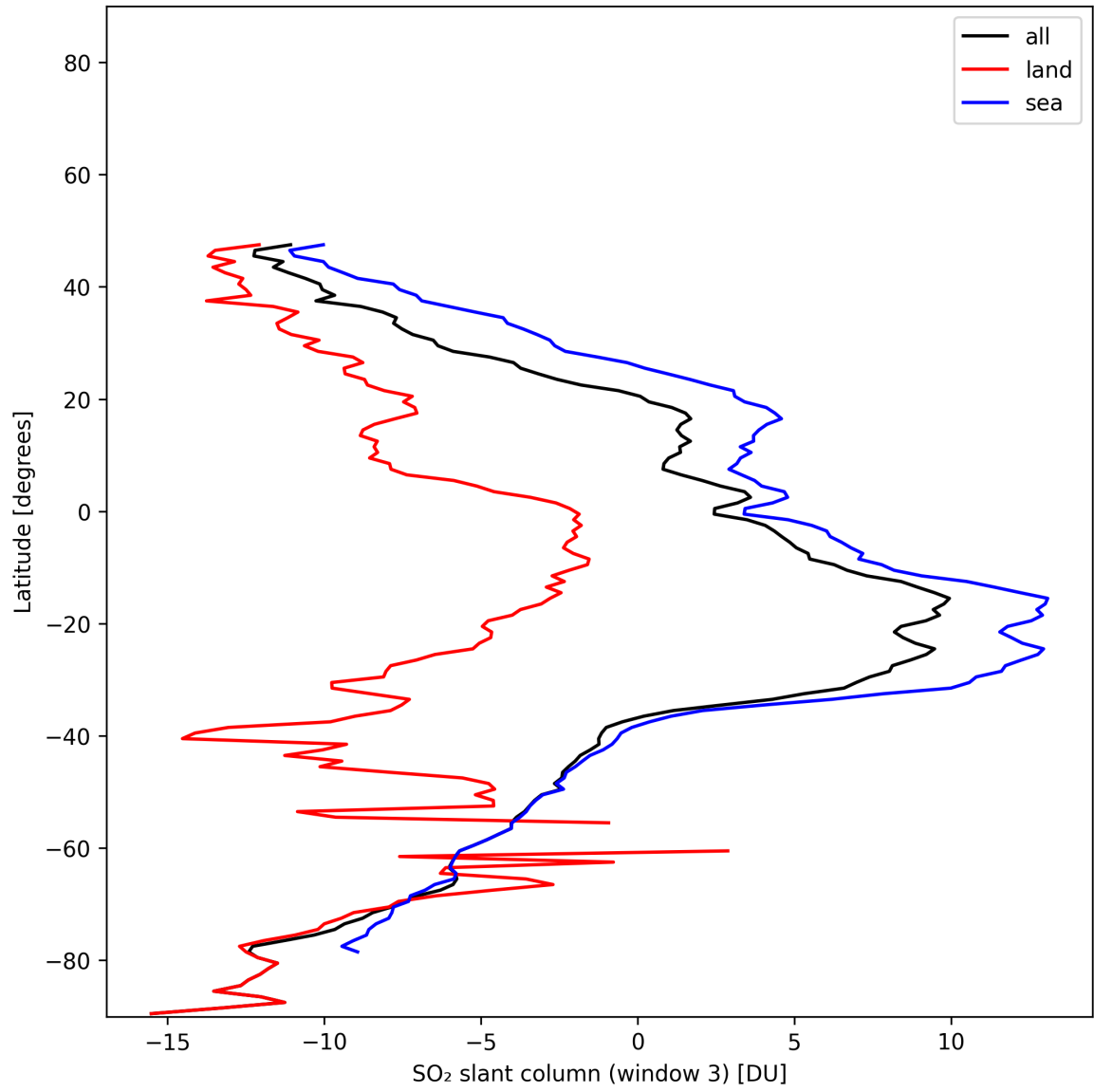


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2024-12-03 to 2024-12-03.

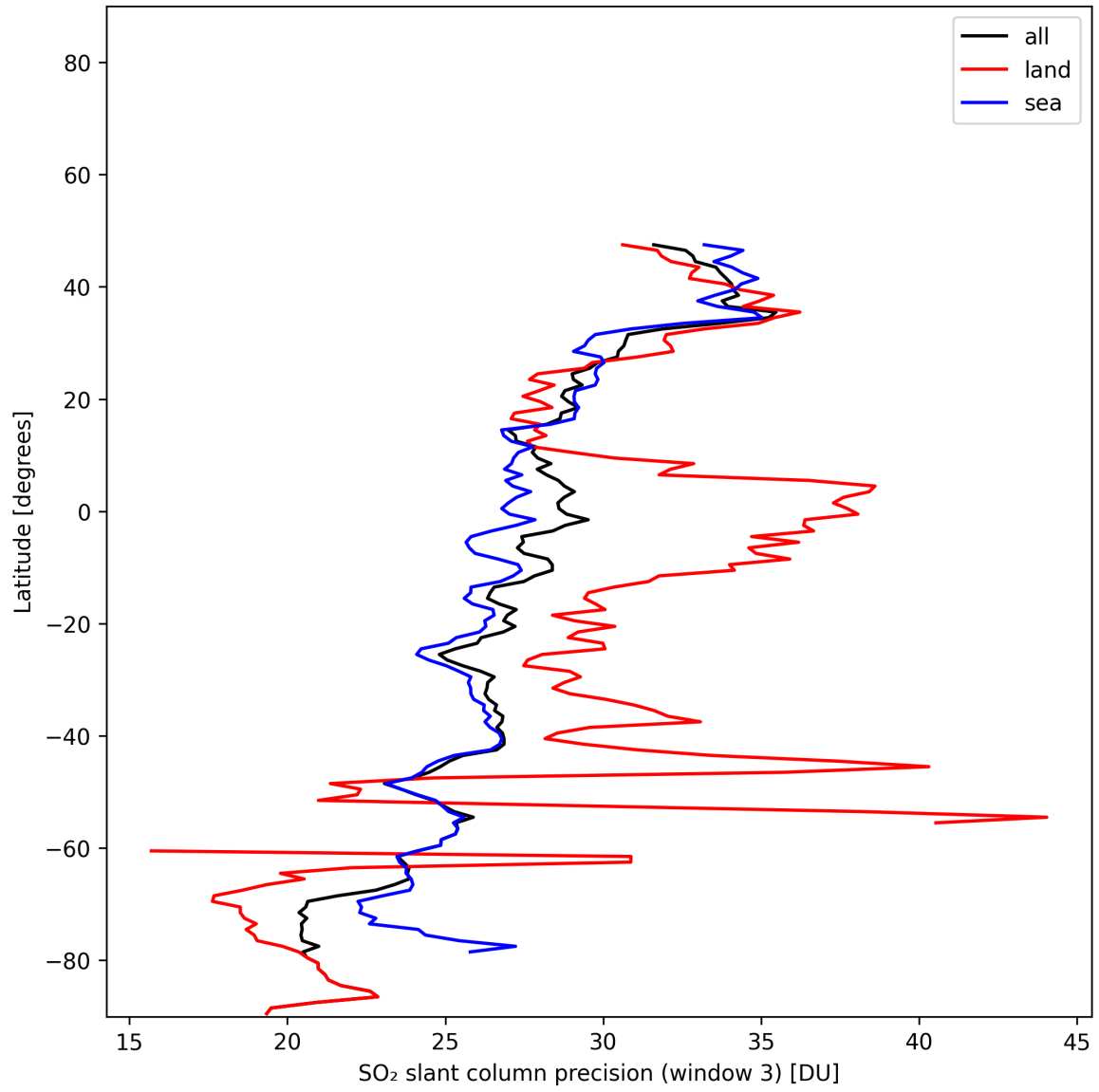


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2024-12-03 to 2024-12-03.

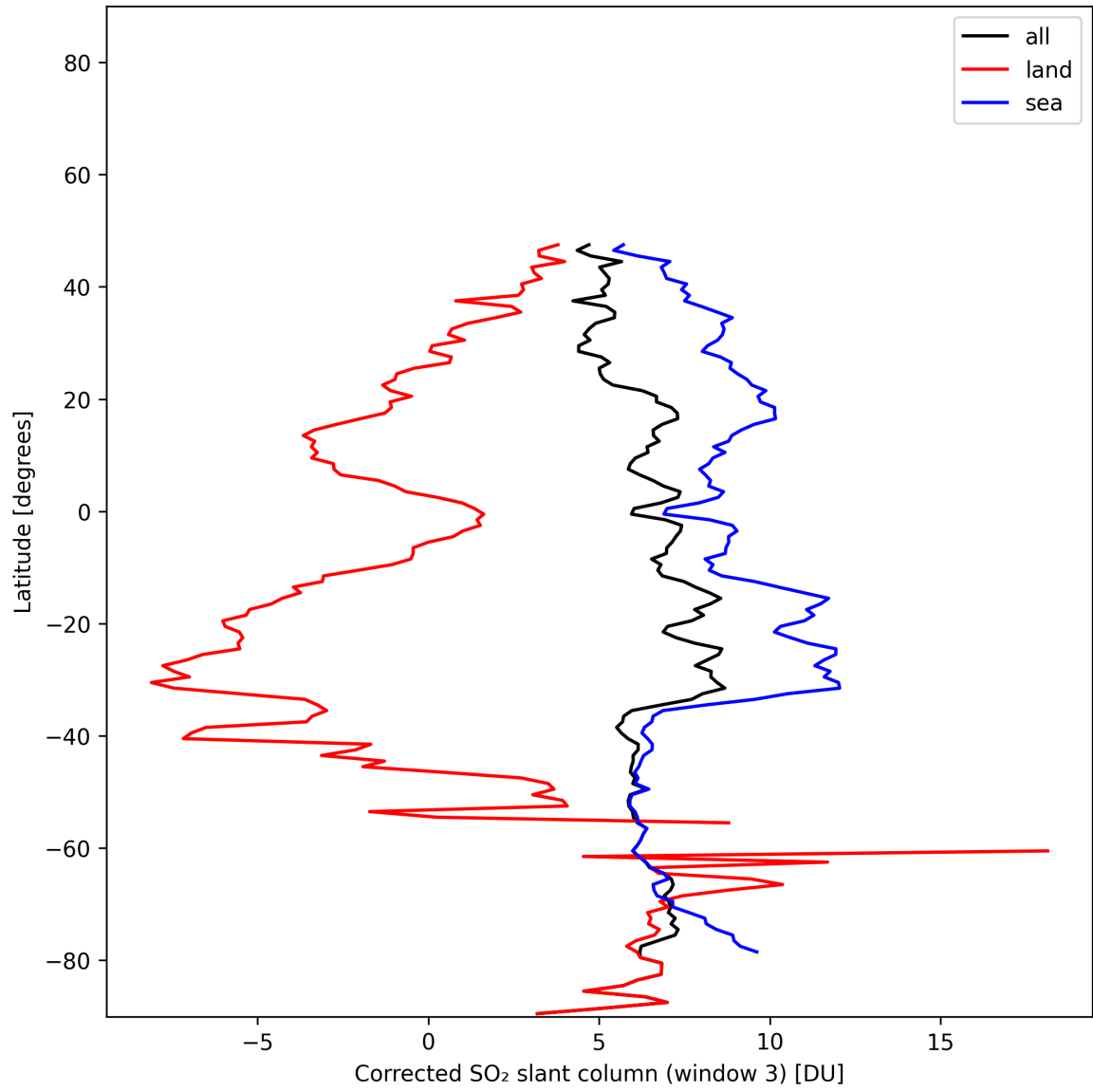


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2024-12-03 to 2024-12-03.

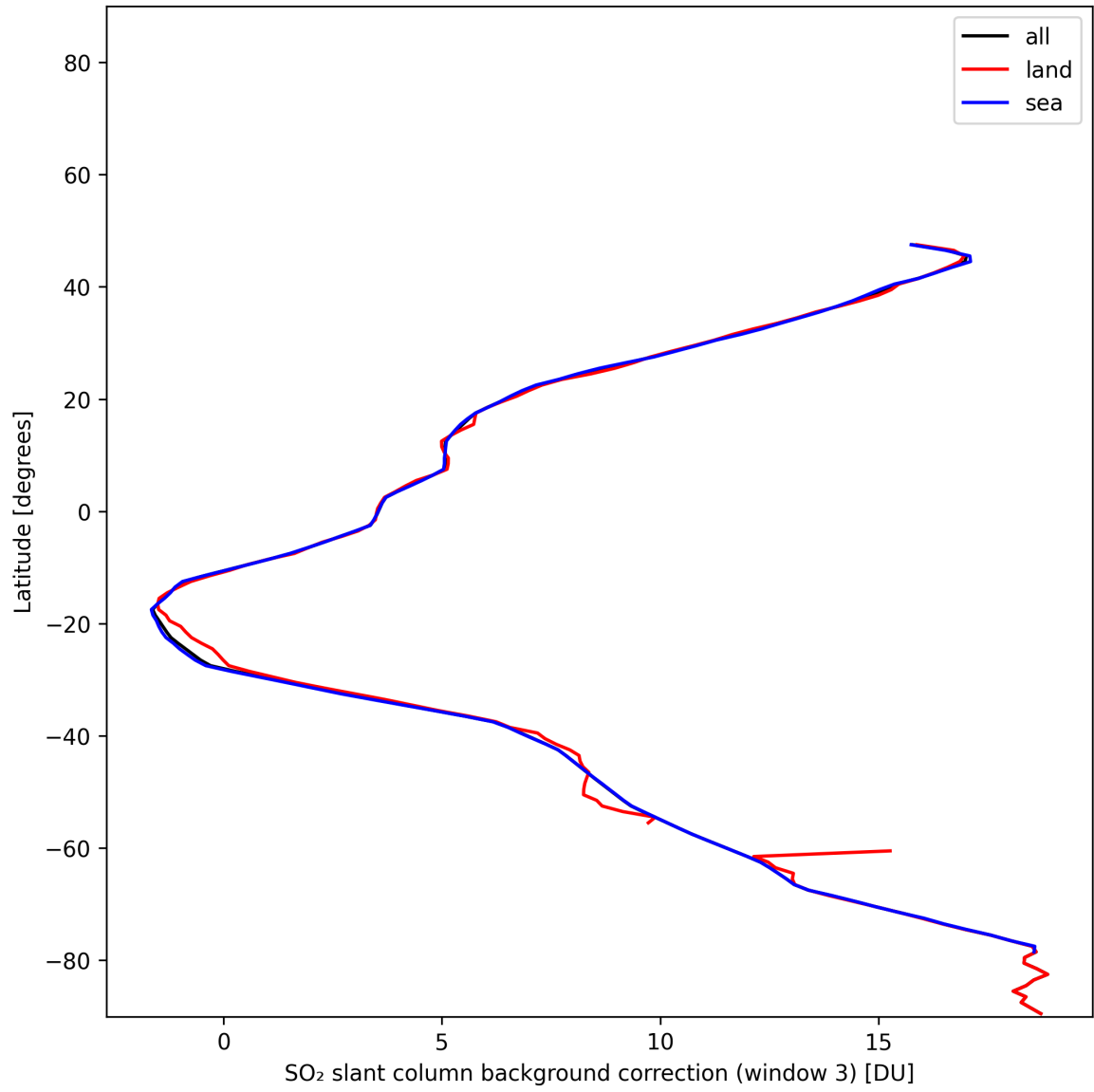


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2024-12-03 to 2024-12-03.

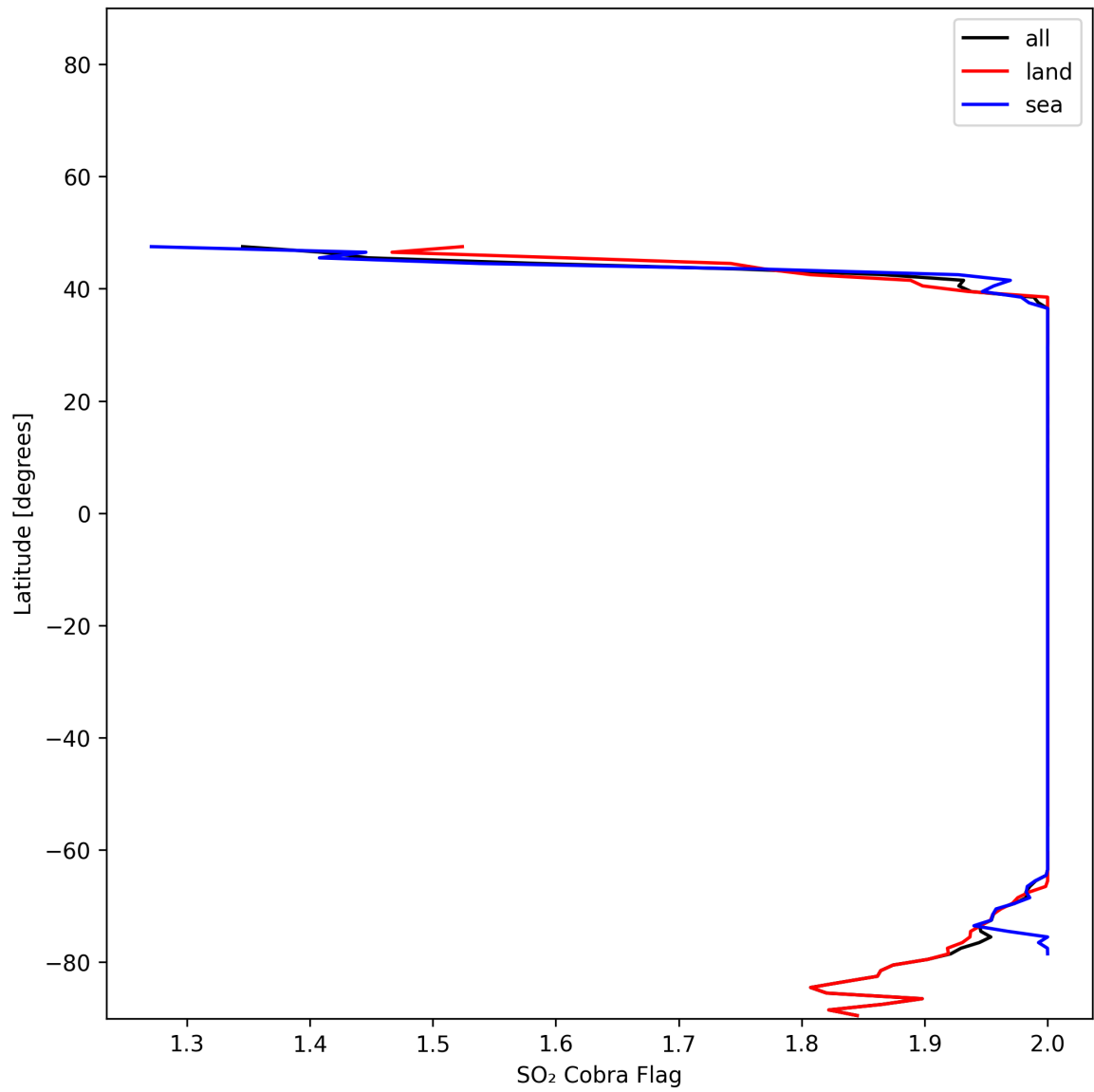


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2024-12-03 to 2024-12-03.

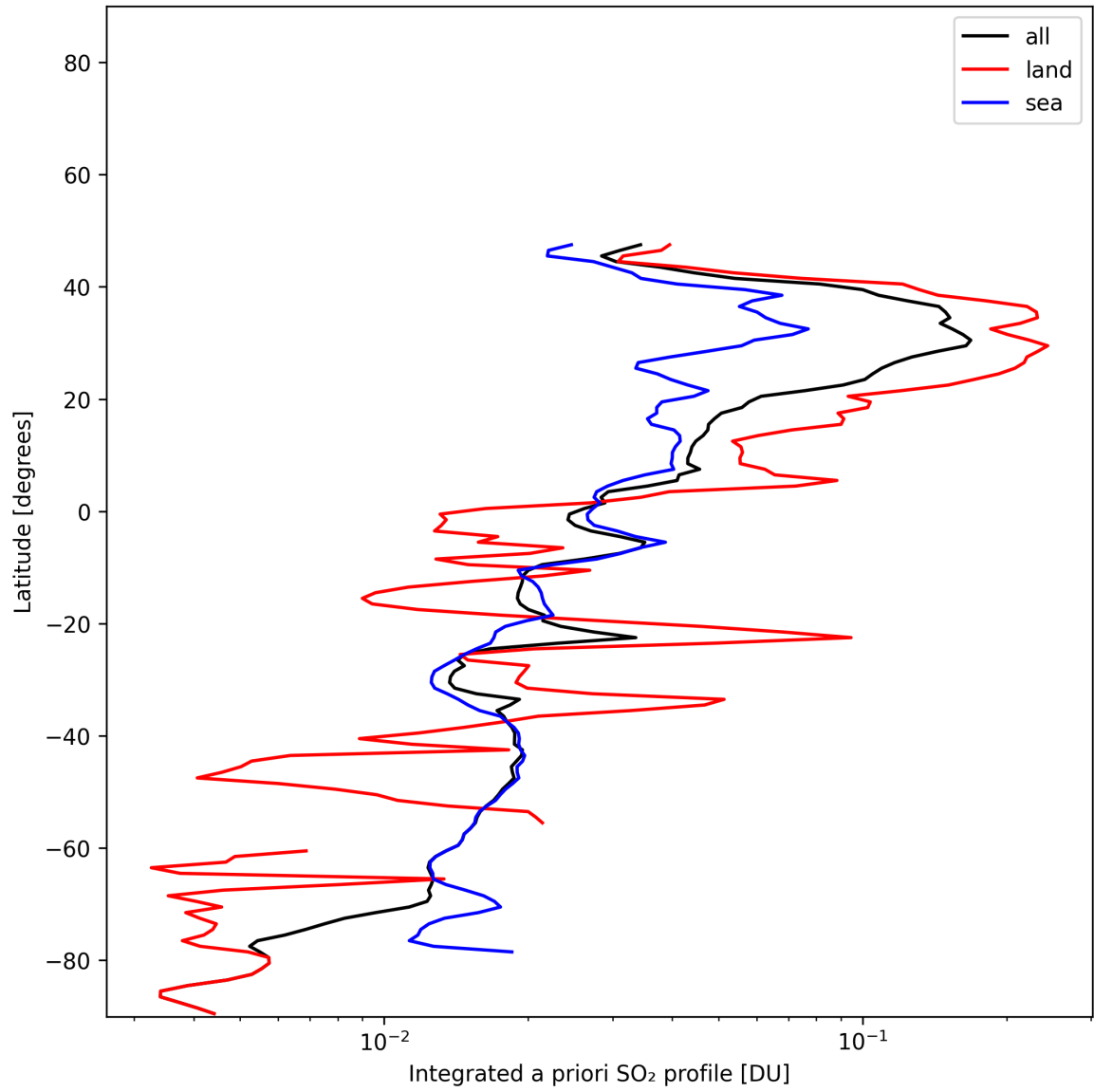


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2024-12-03 to 2024-12-03.

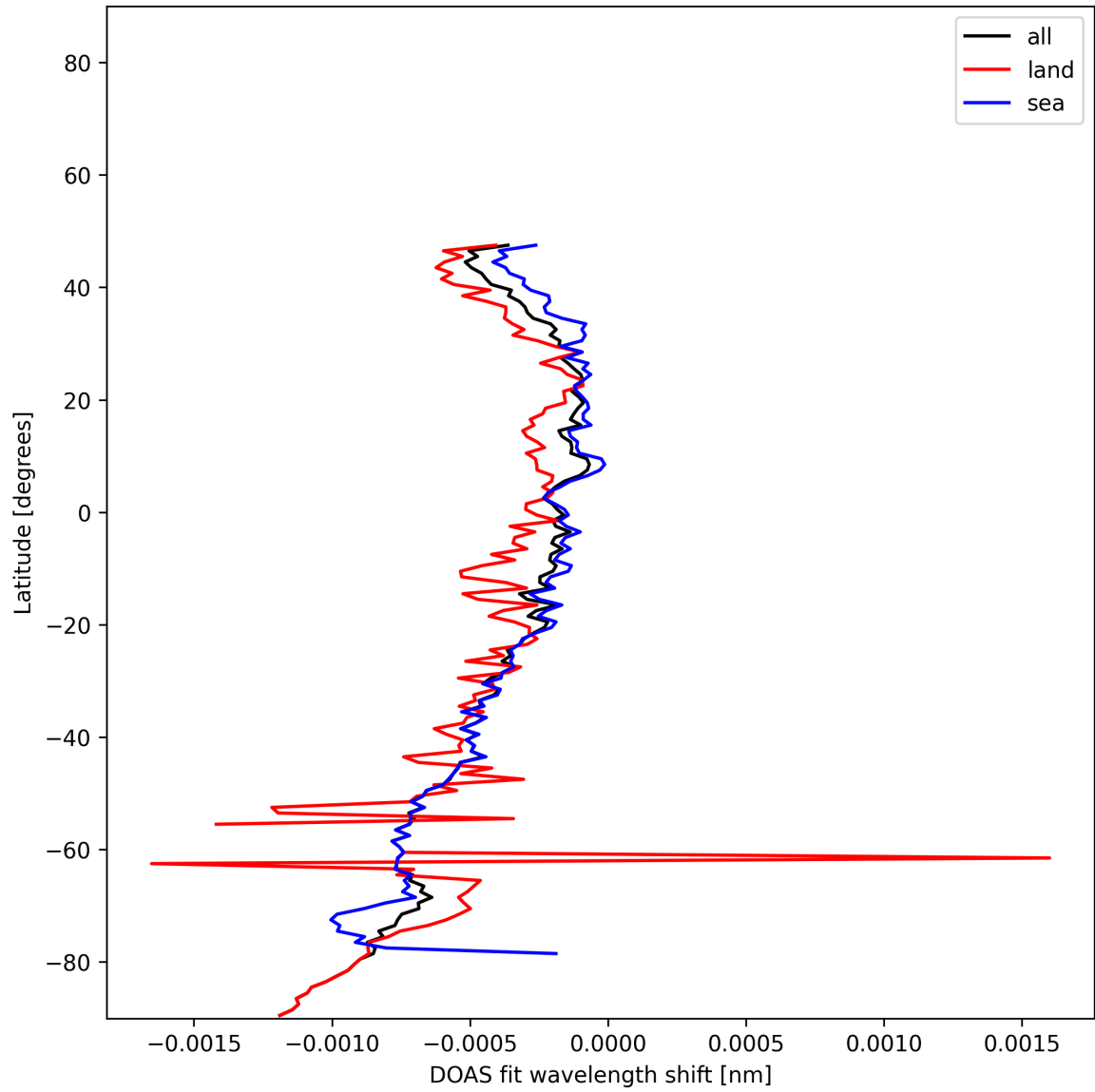


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2024-12-03 to 2024-12-03.

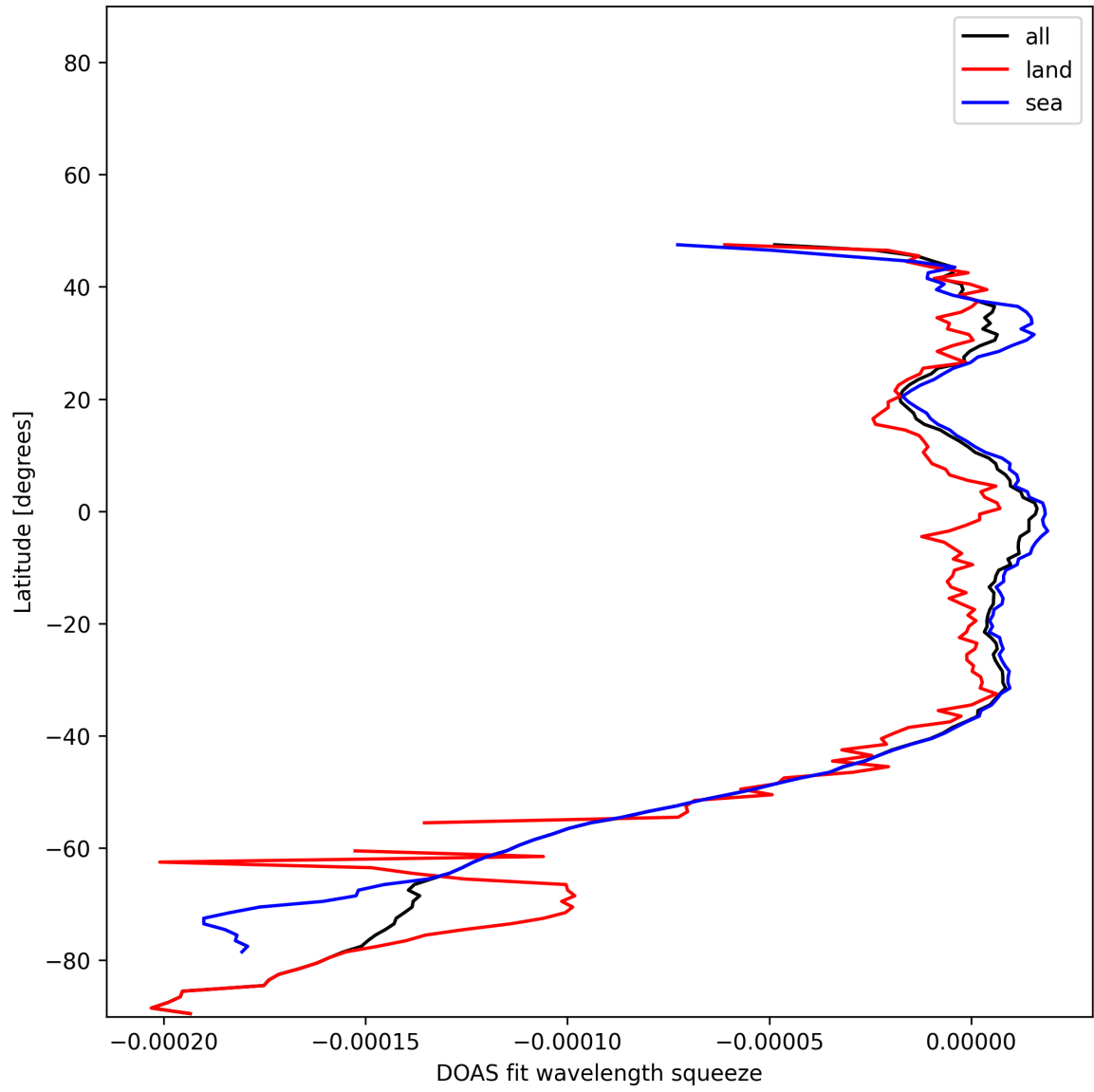


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2024-12-03 to 2024-12-03.

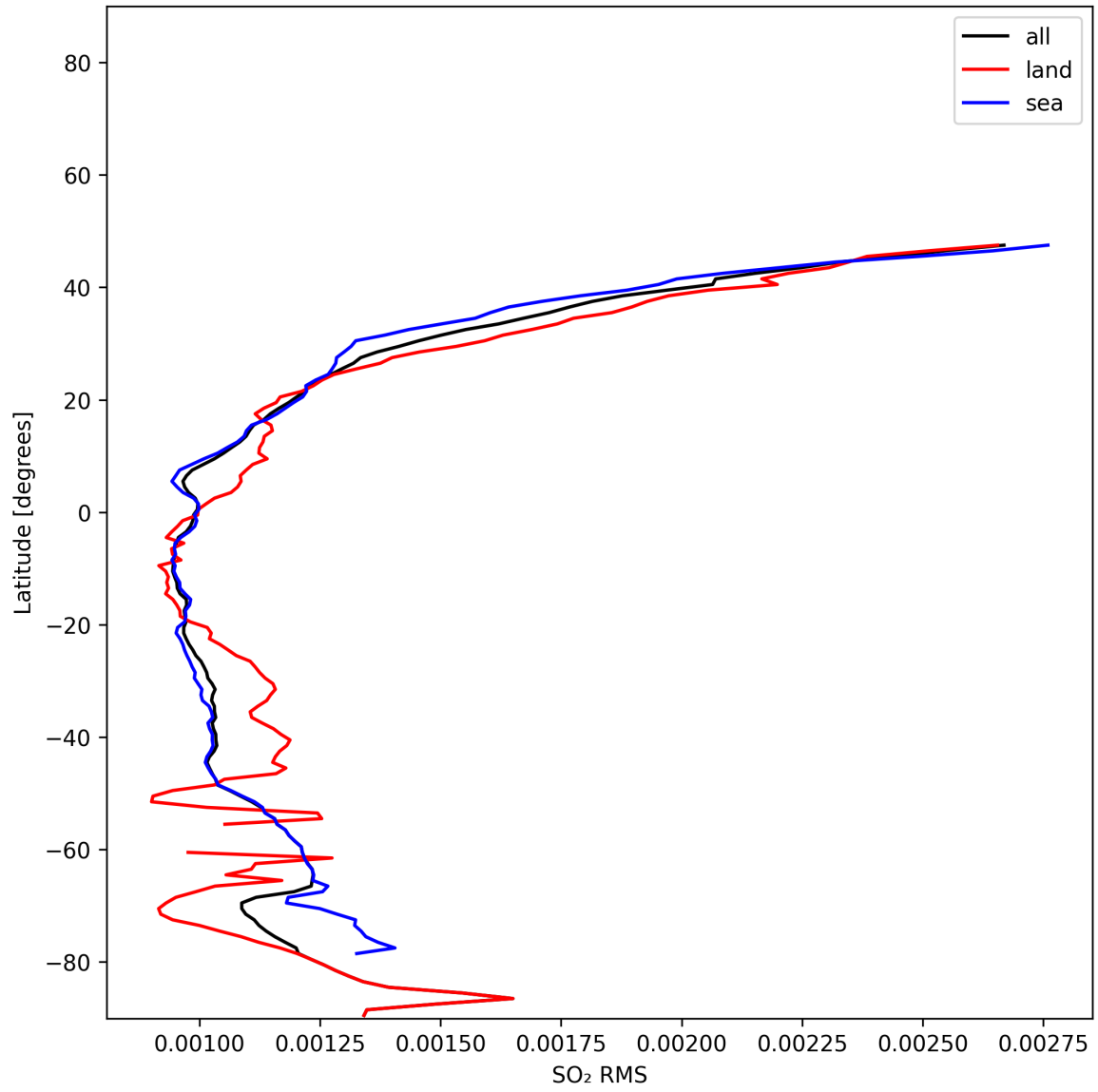


Figure 52: Zonal average of “SO₂ RMS” for 2024-12-03 to 2024-12-03.

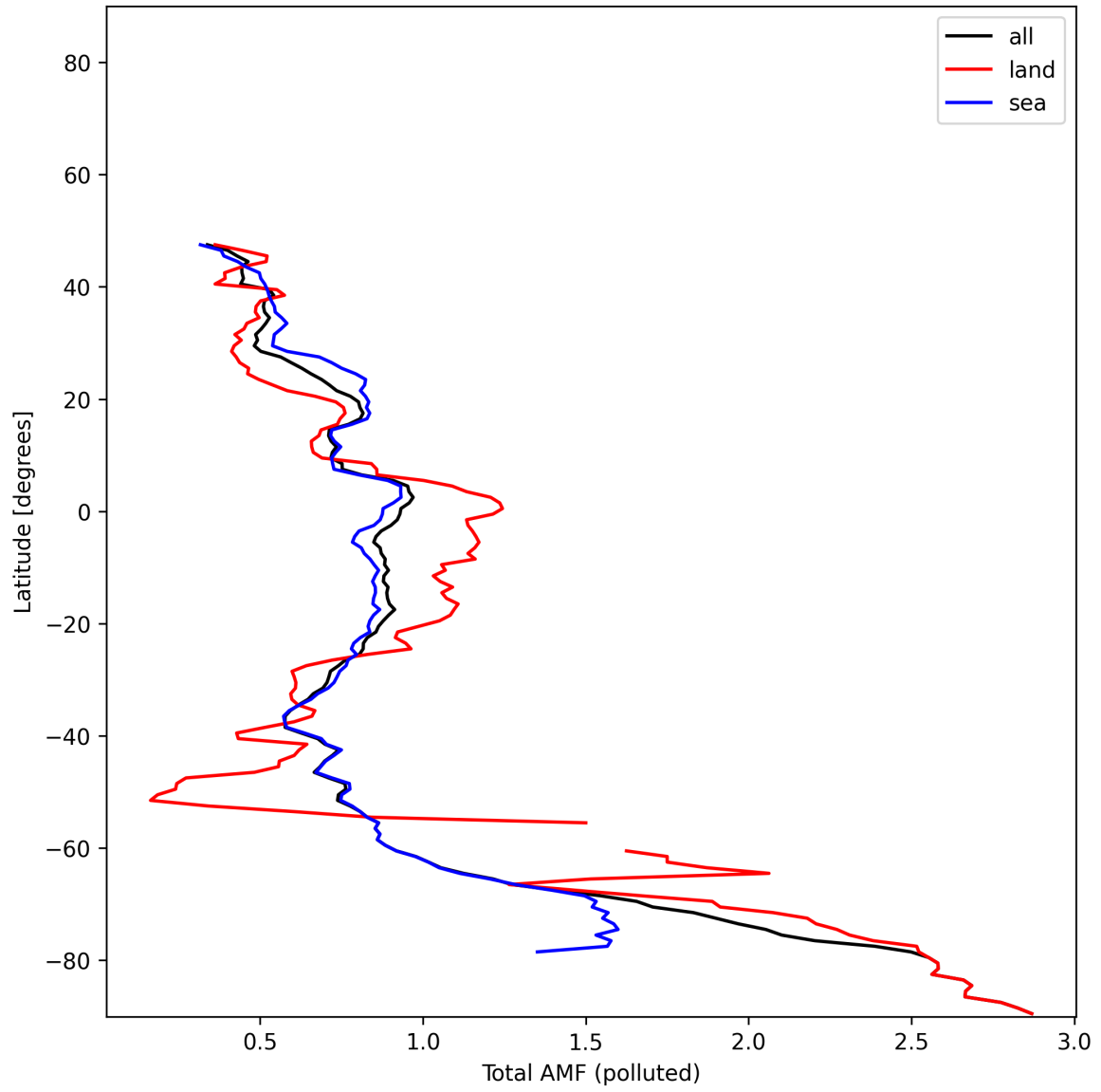


Figure 53: Zonal average of “Total AMF (polluted)” for 2024-12-03 to 2024-12-03.

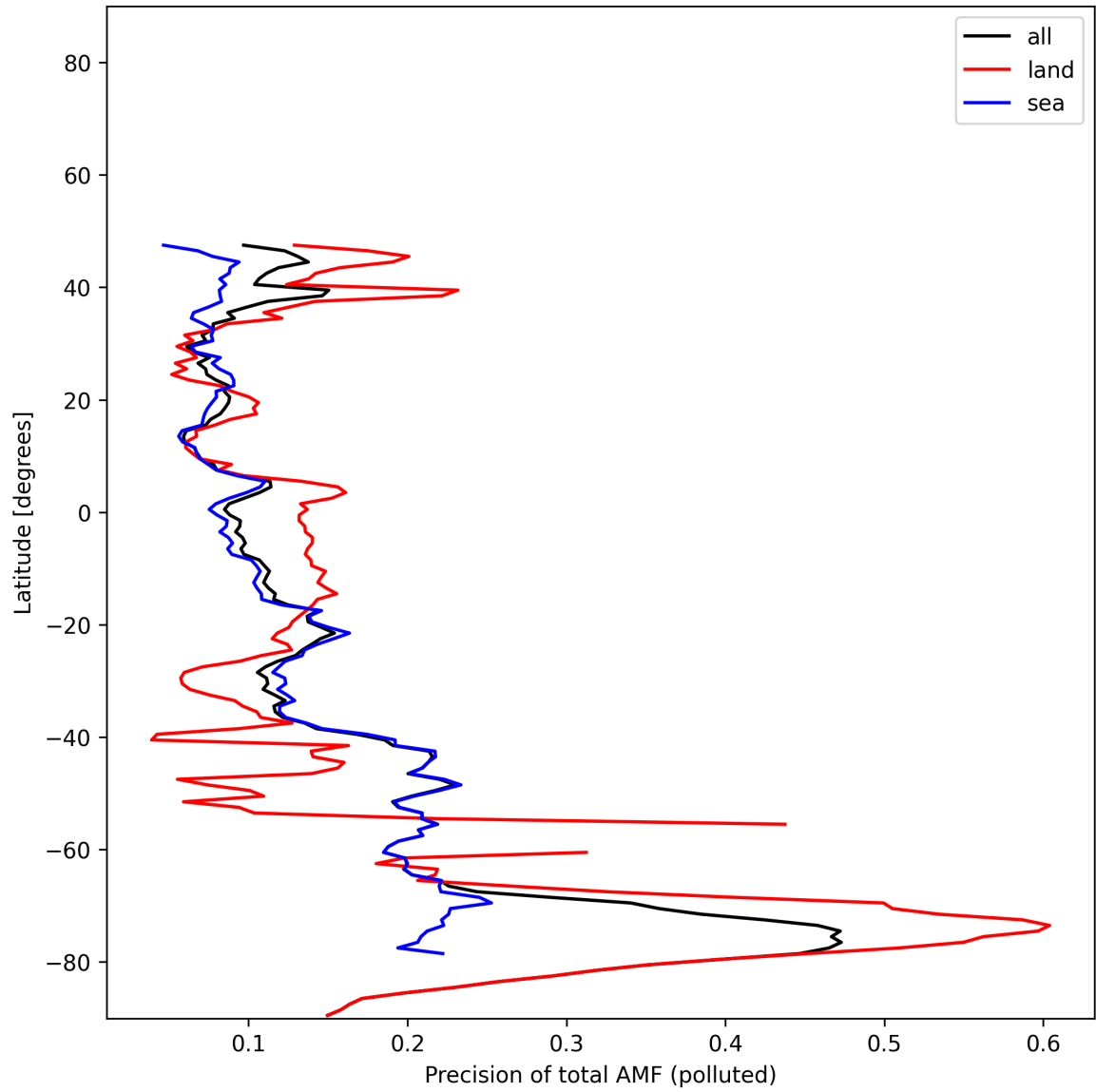


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2024-12-03 to 2024-12-03.

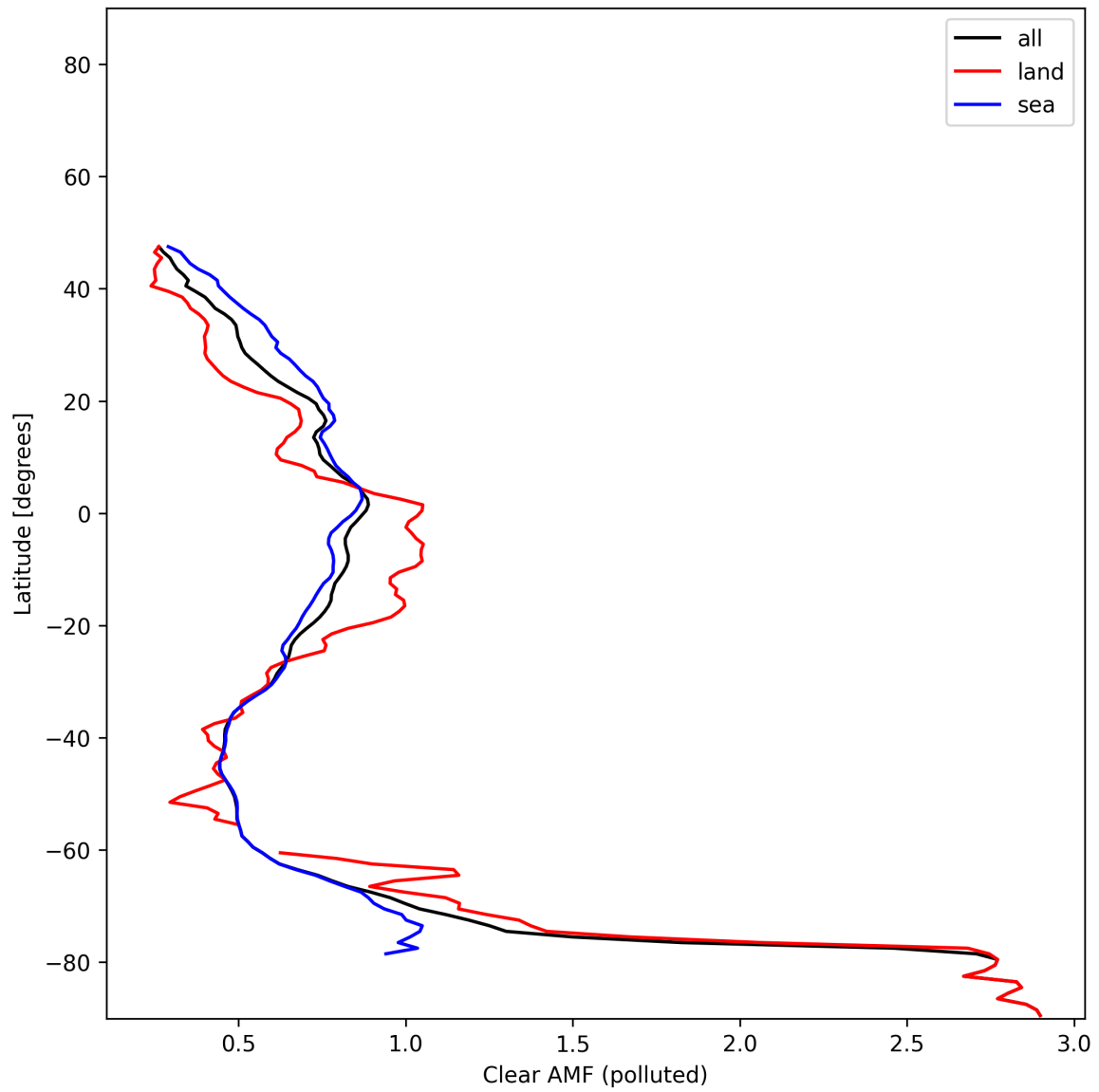


Figure 55: Zonal average of “Clear AMF (polluted)” for 2024-12-03 to 2024-12-03.

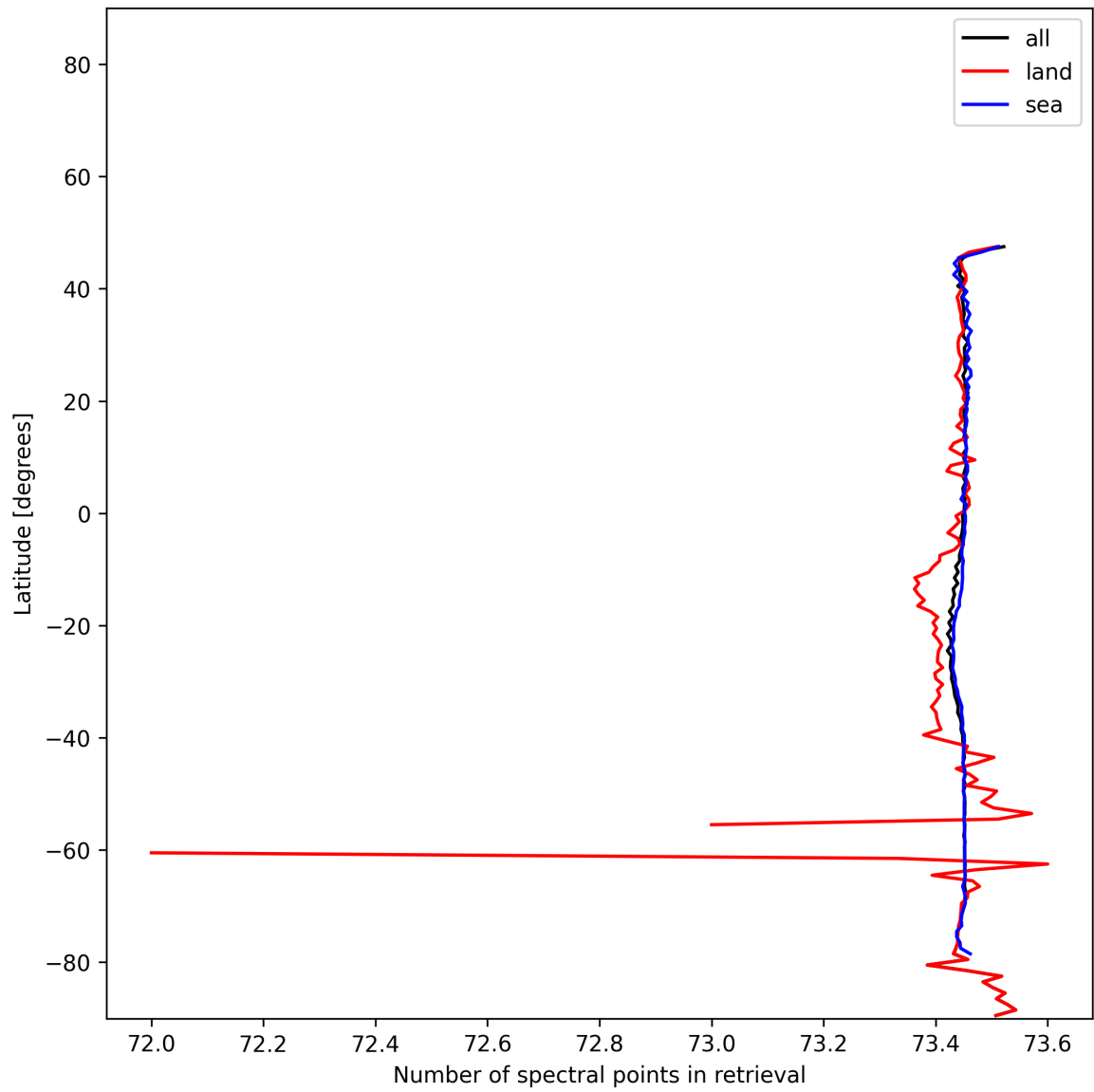


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2024-12-03 to 2024-12-03.

8 Histograms

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

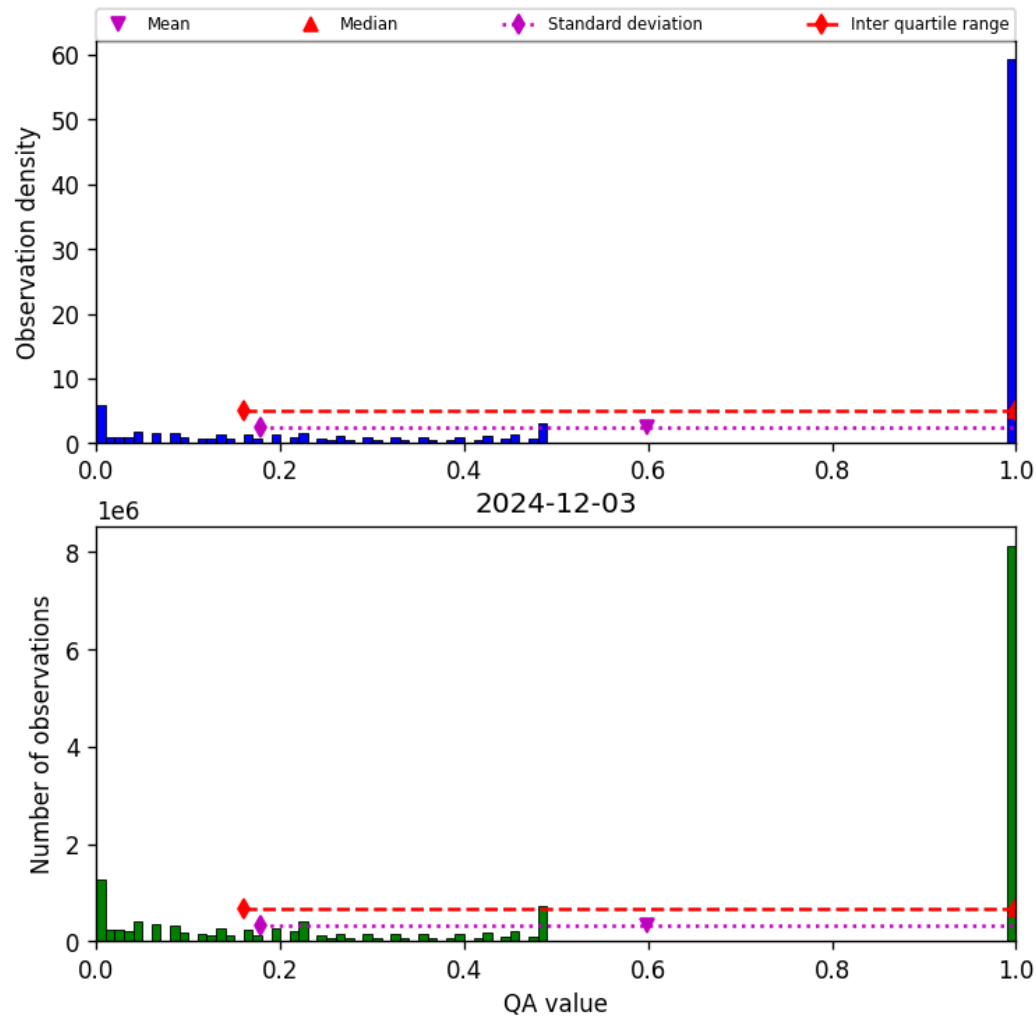


Figure 57: Histogram of “QA value” for 2024-12-03 to 2024-12-03

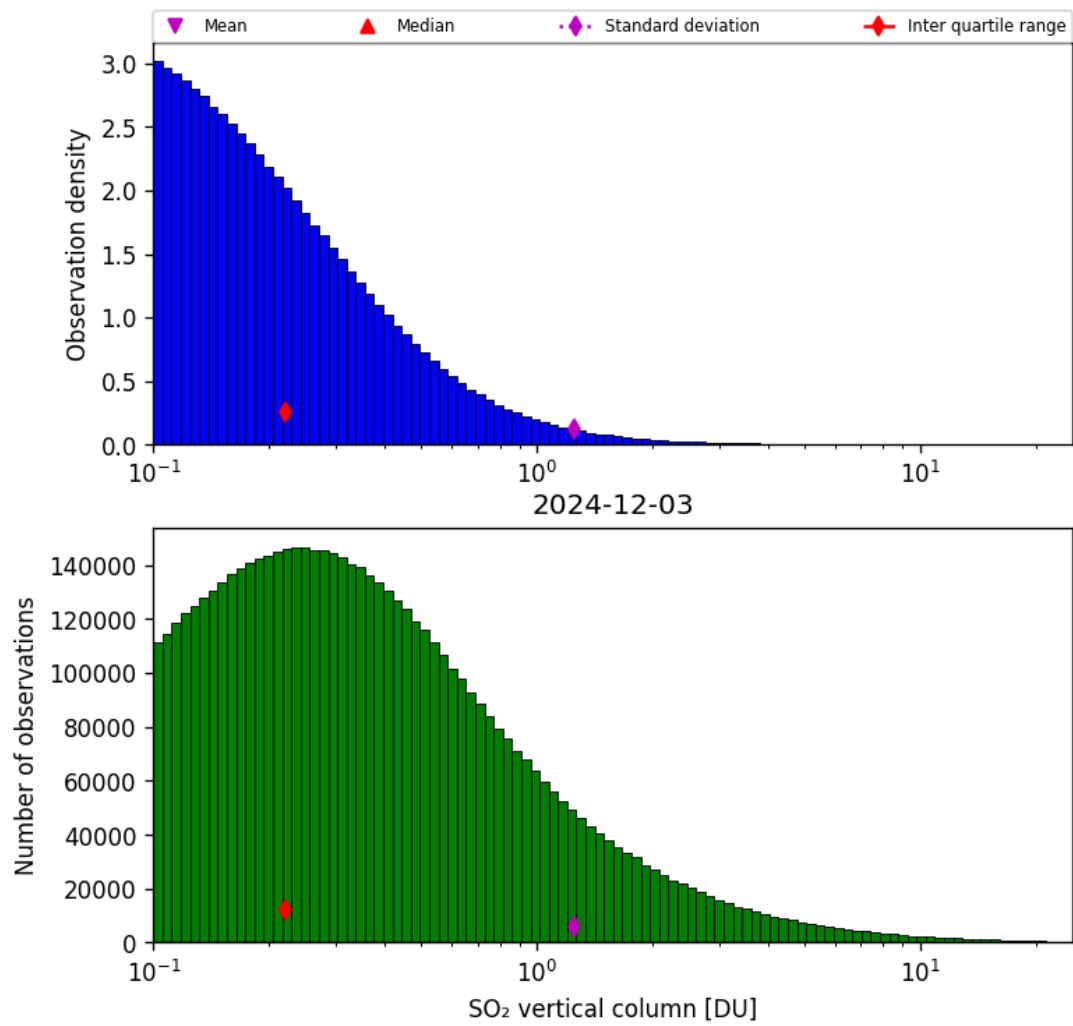


Figure 58: Histogram of “SO₂ vertical column” for 2024-12-03 to 2024-12-03

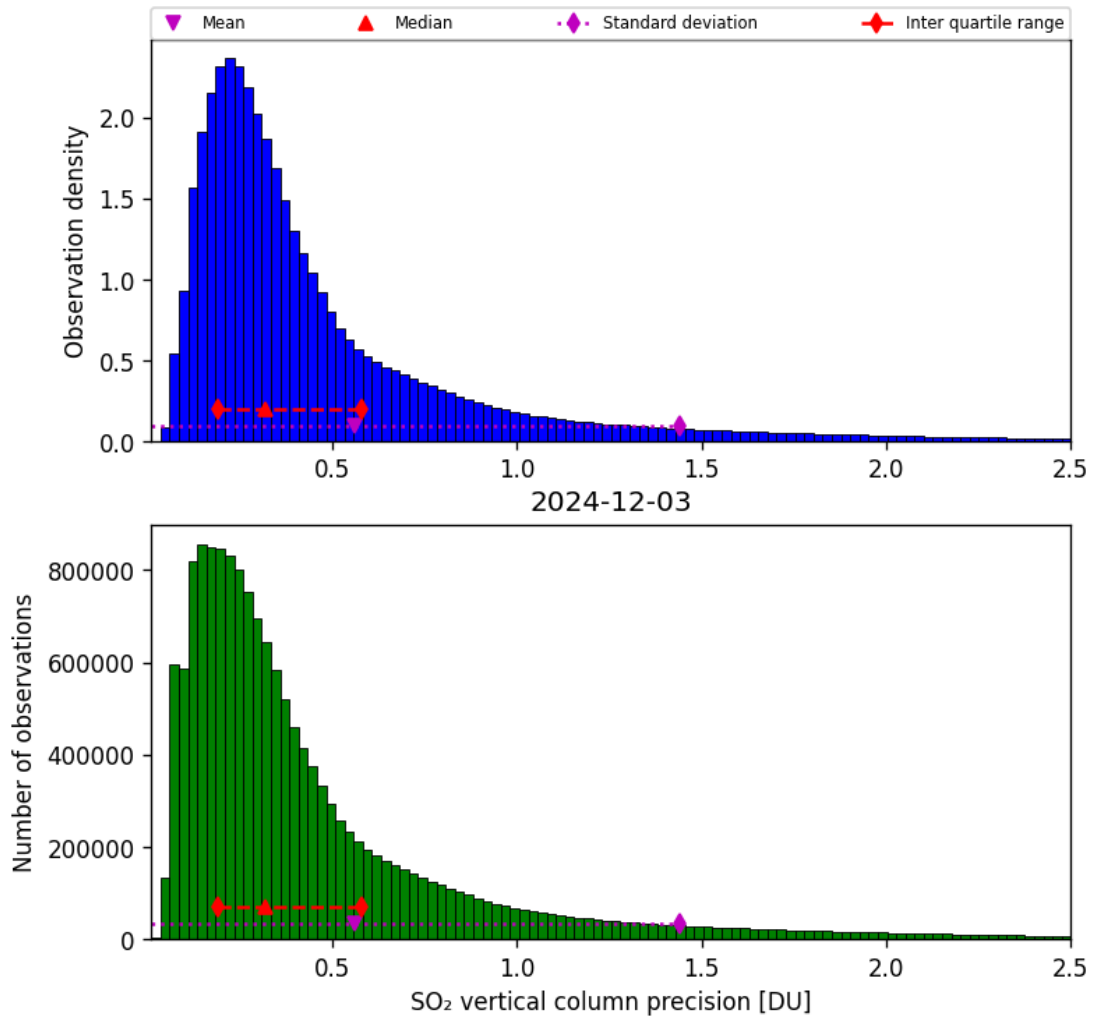


Figure 59: Histogram of “SO₂ vertical column precision” for 2024-12-03 to 2024-12-03

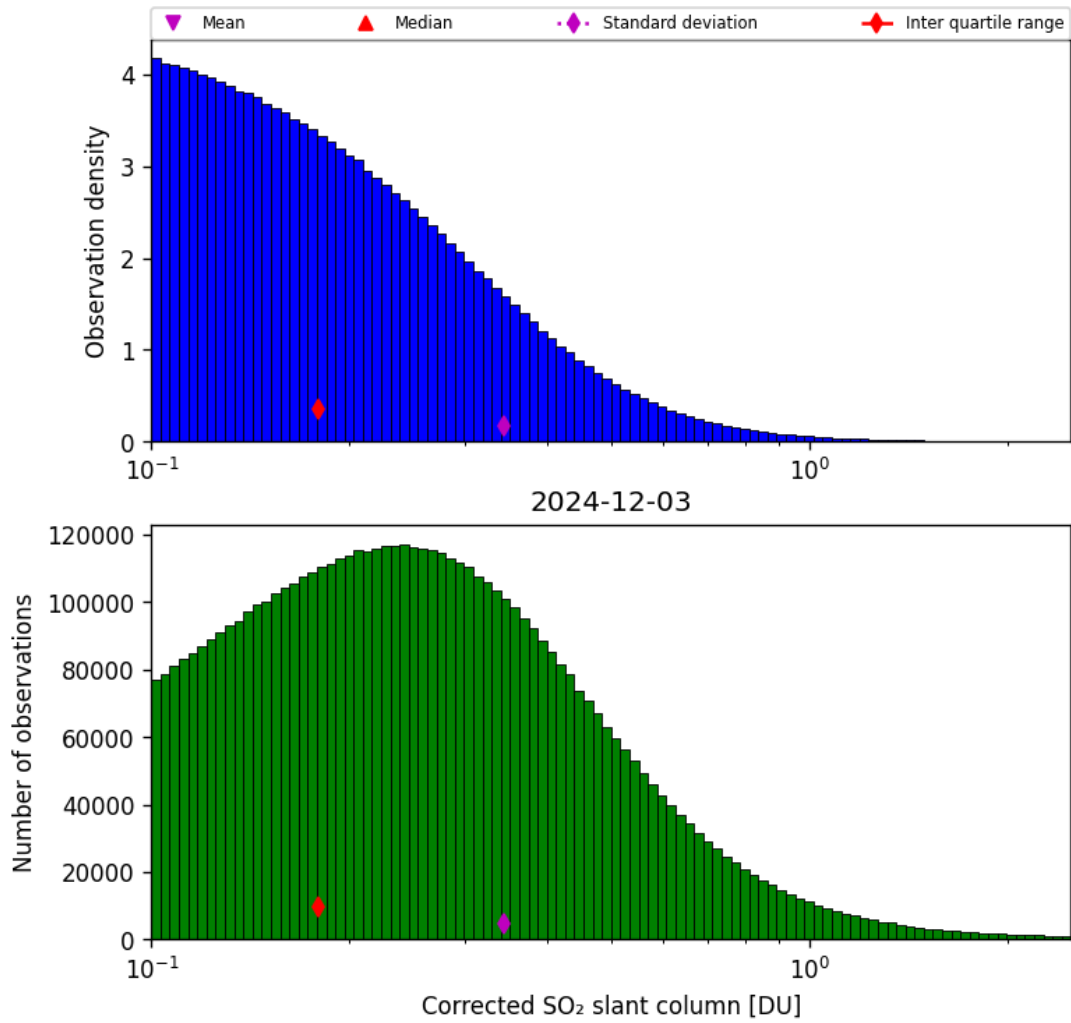


Figure 60: Histogram of “Corrected SO₂ slant column” for 2024-12-03 to 2024-12-03

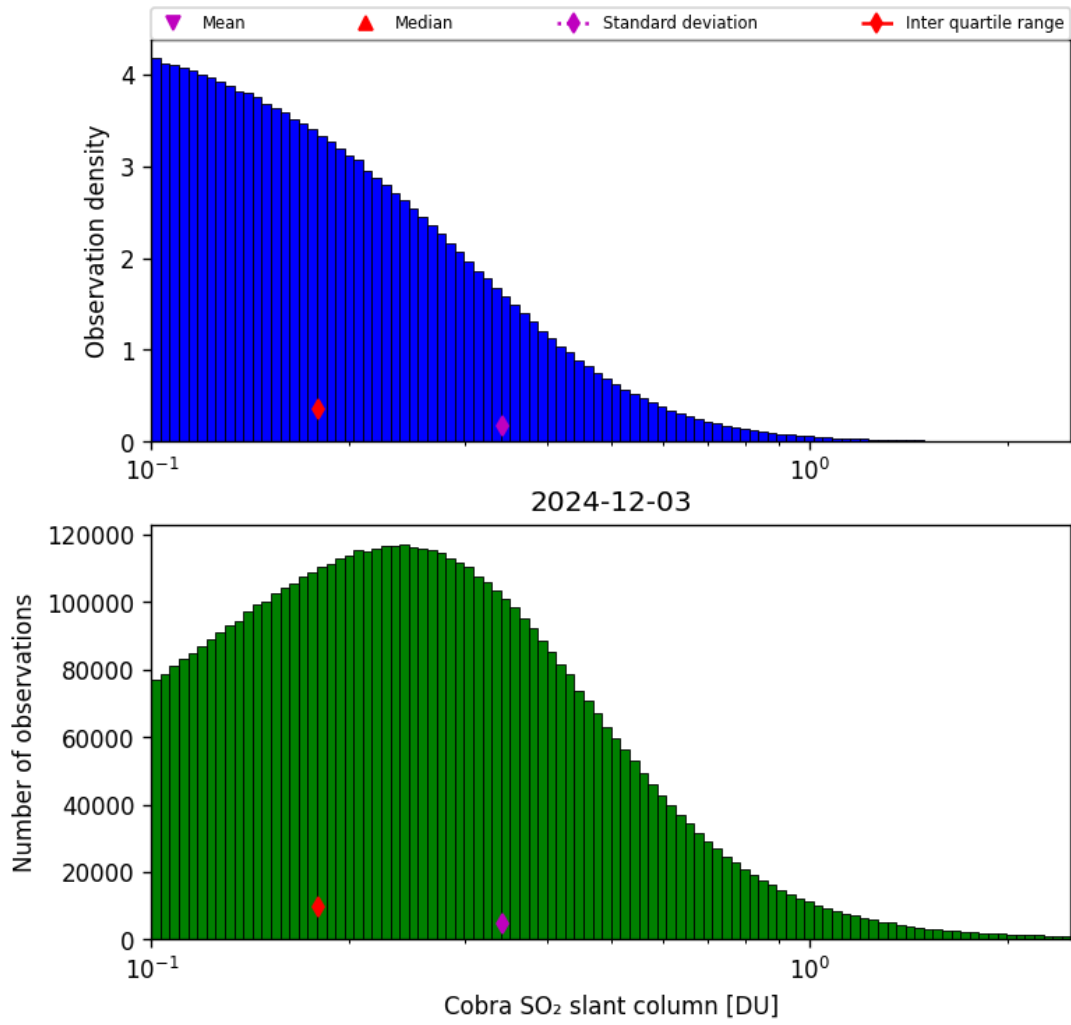


Figure 61: Histogram of “Cobra SO₂ slant column” for 2024-12-03 to 2024-12-03

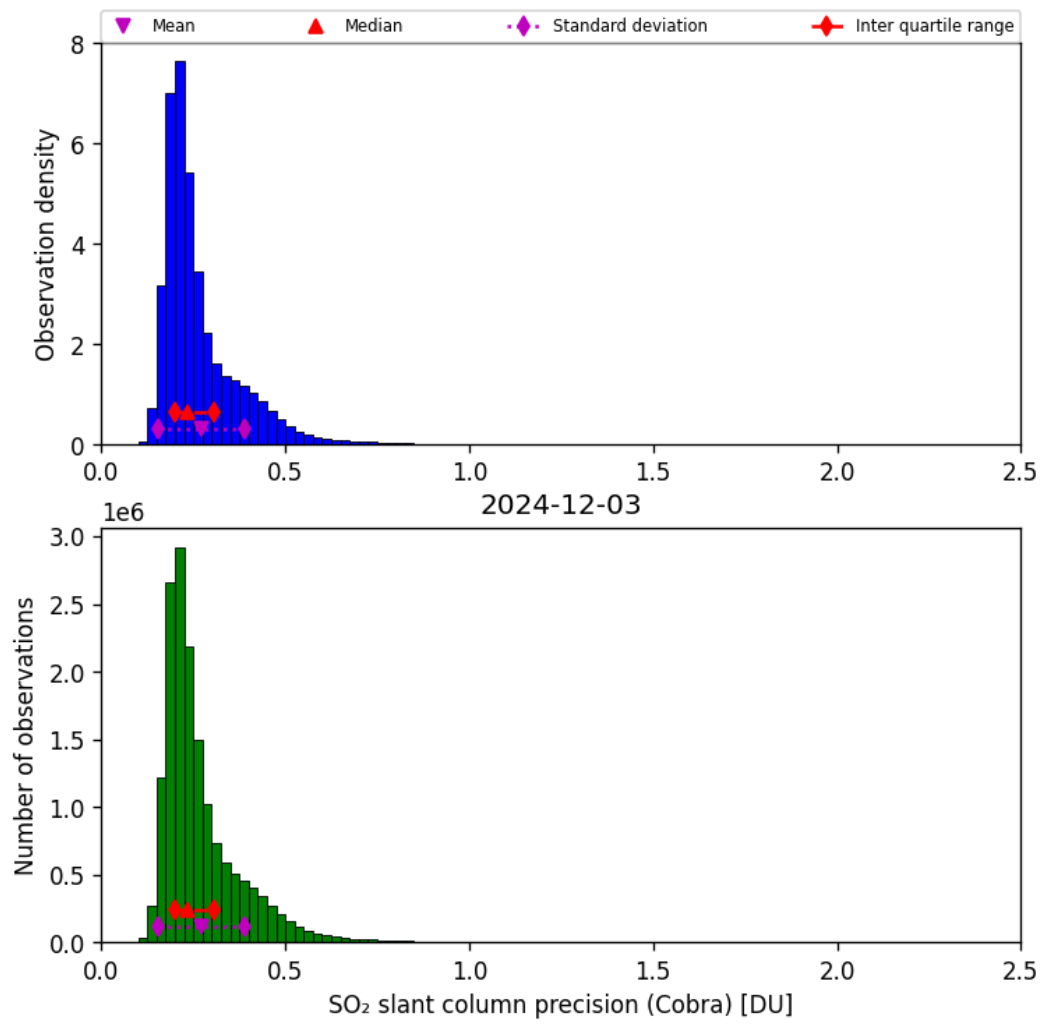


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2024-12-03 to 2024-12-03

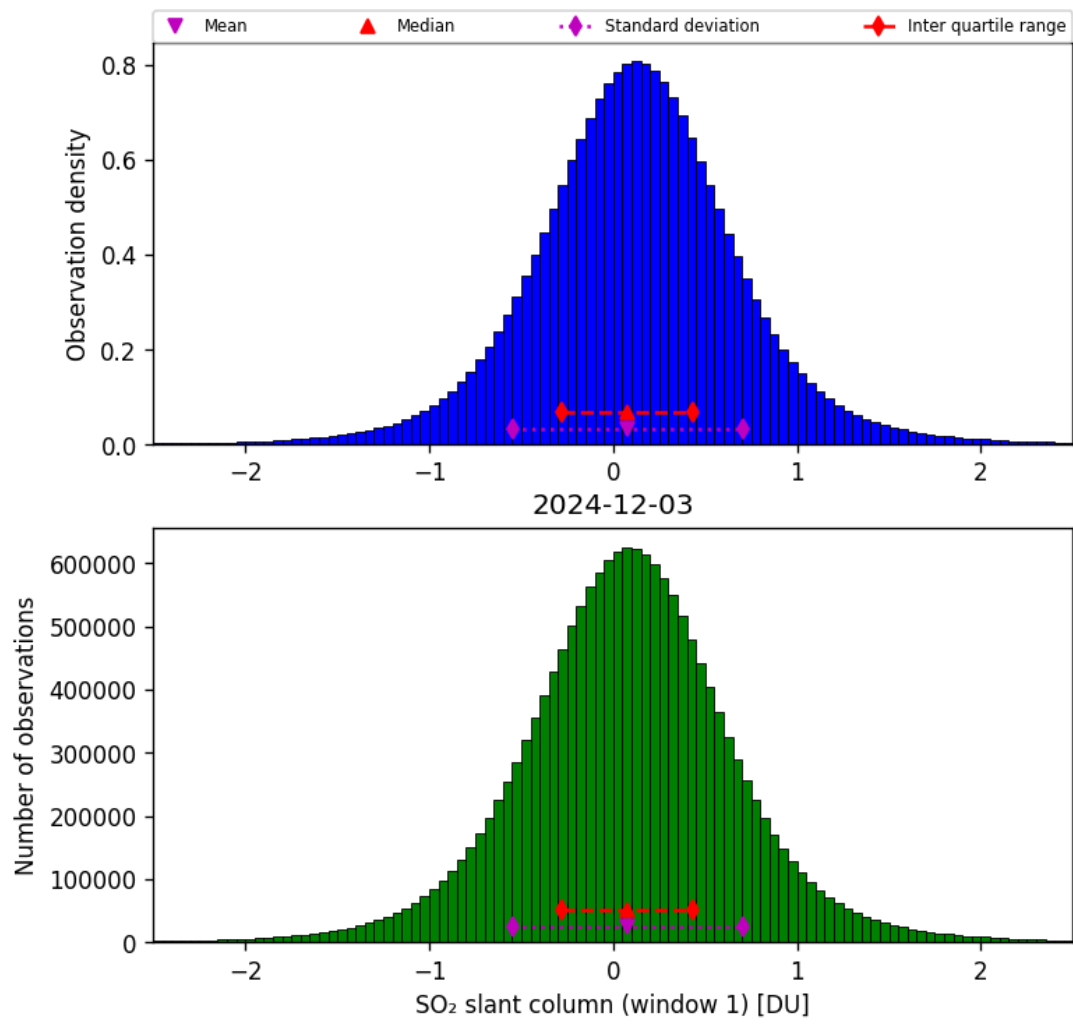


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2024-12-03 to 2024-12-03

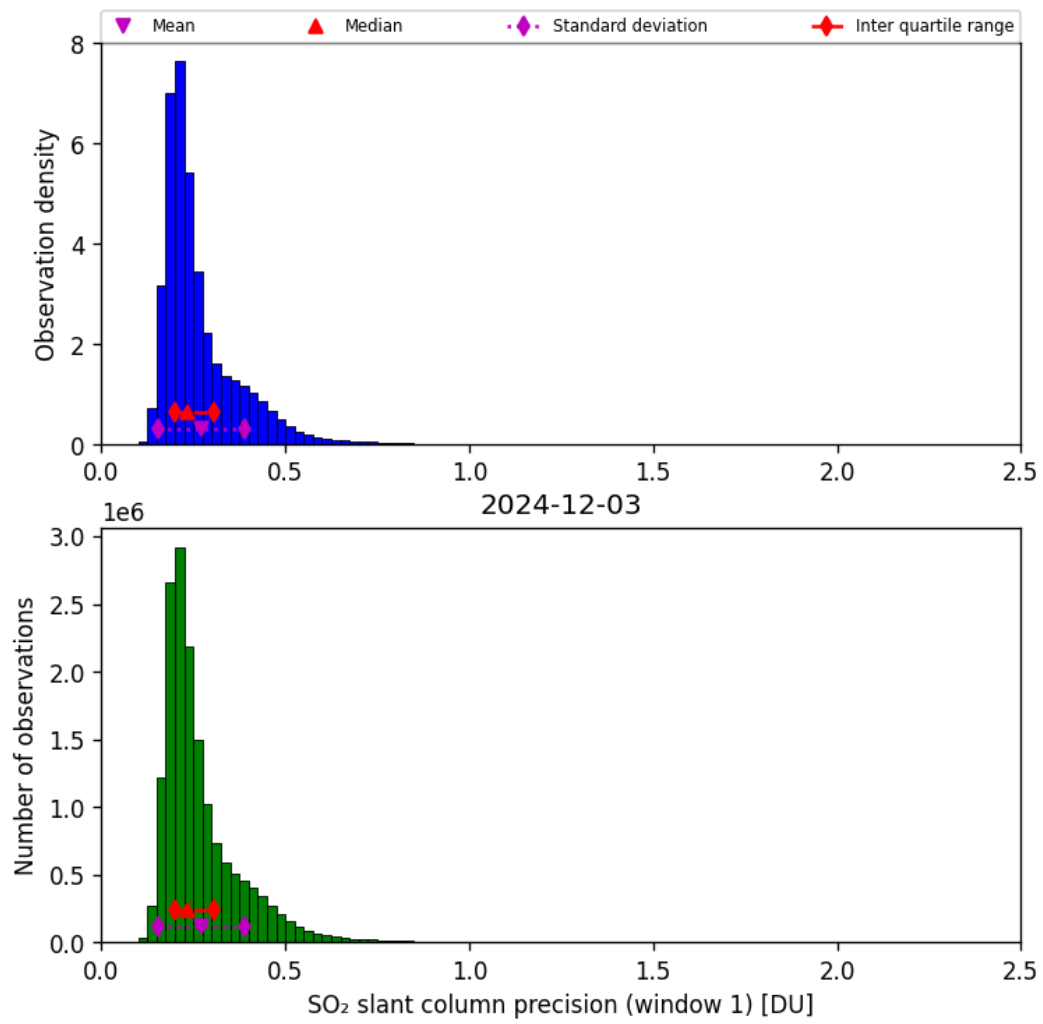


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2024-12-03 to 2024-12-03

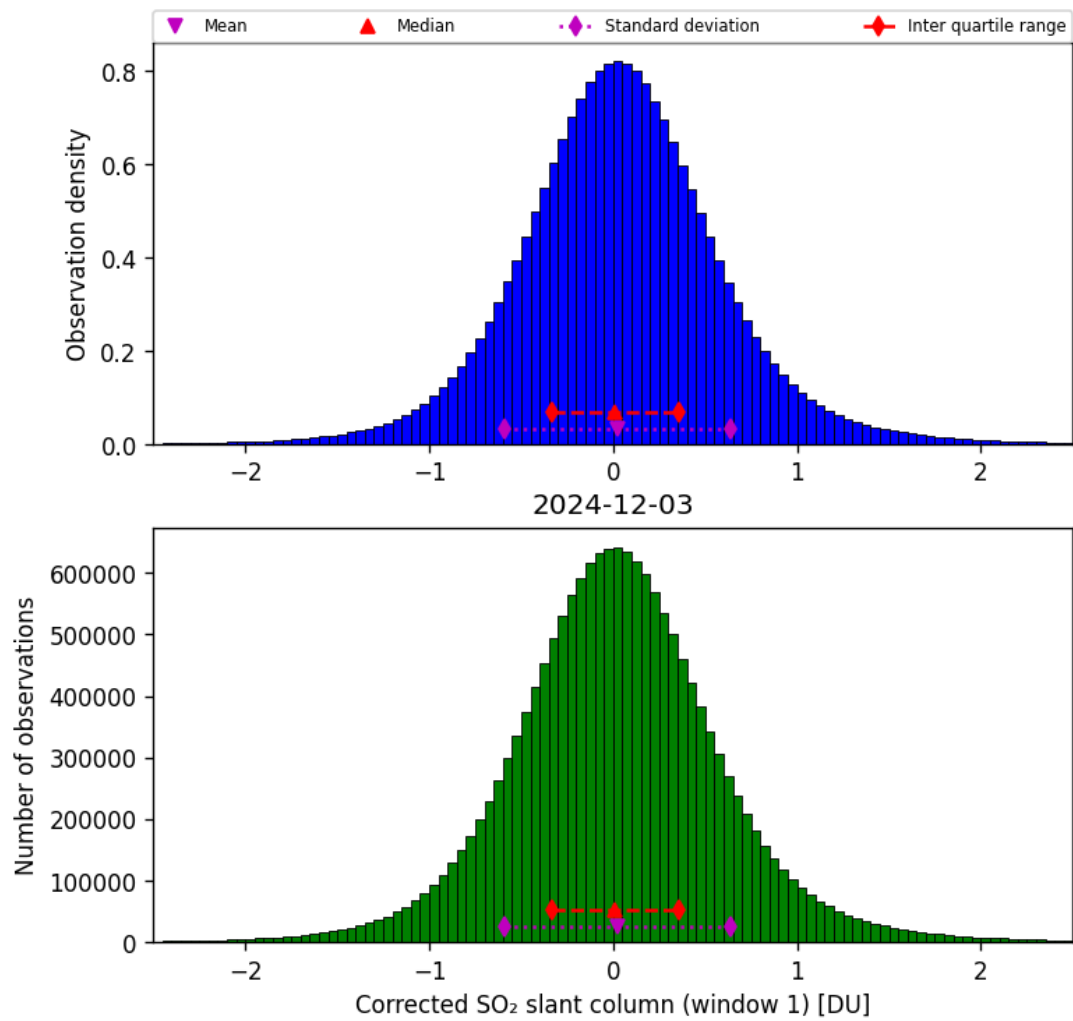


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2024-12-03 to 2024-12-03

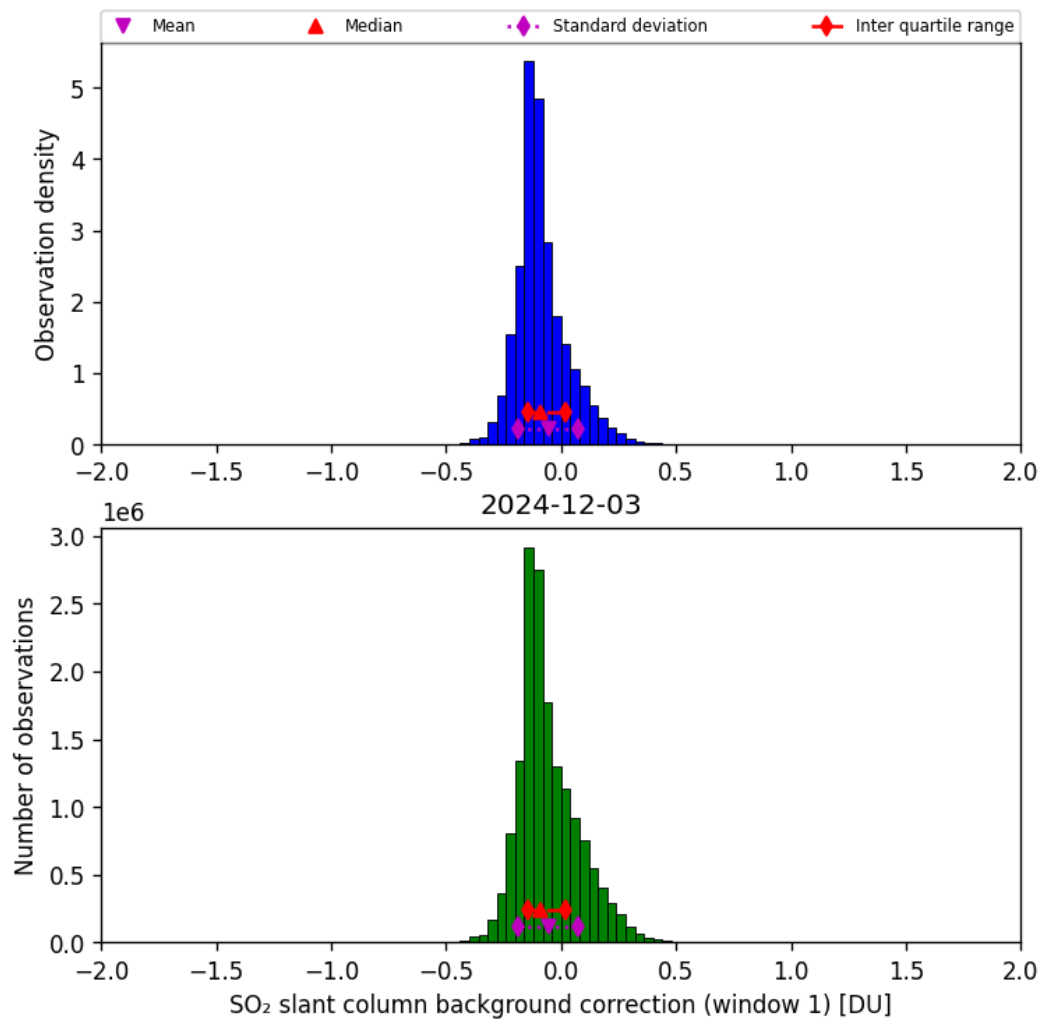


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2024-12-03 to 2024-12-03

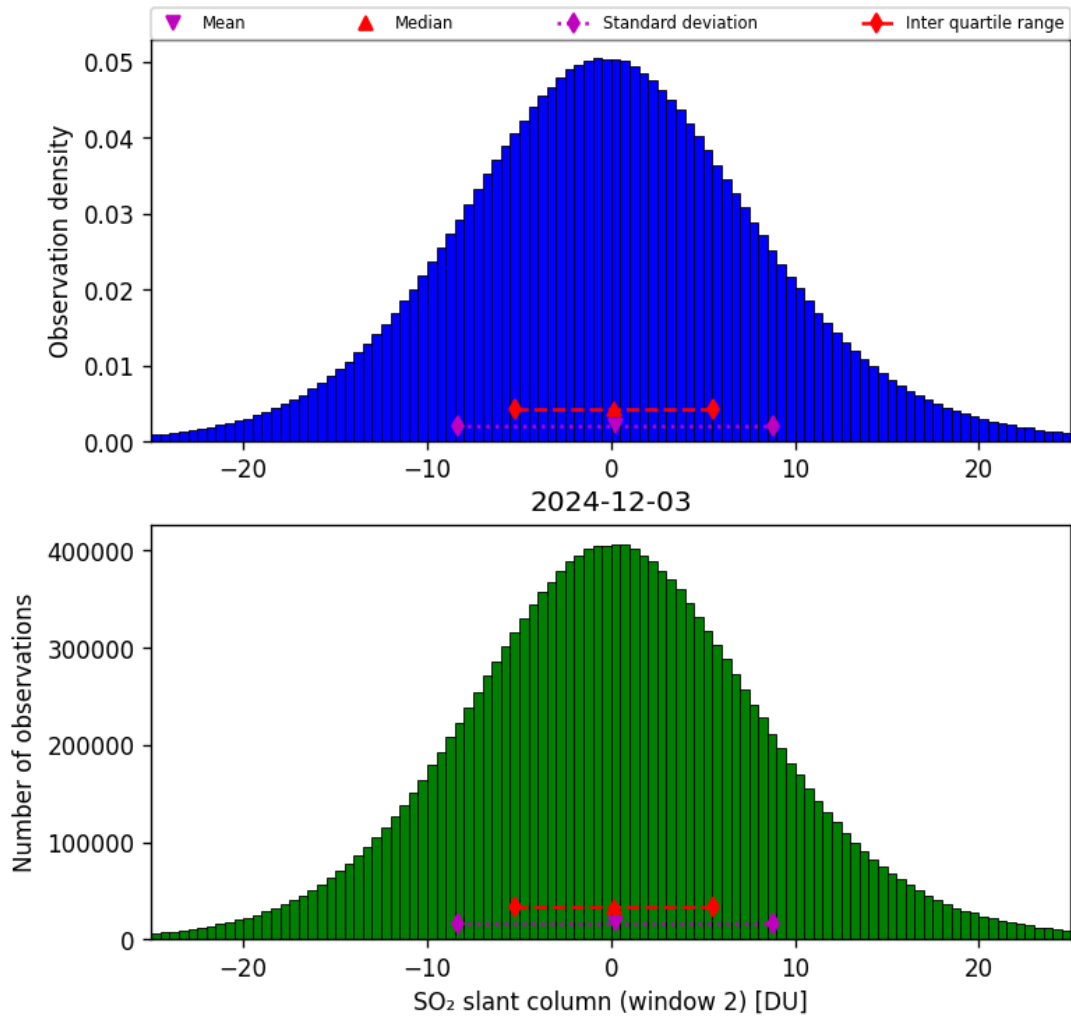


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2024-12-03 to 2024-12-03

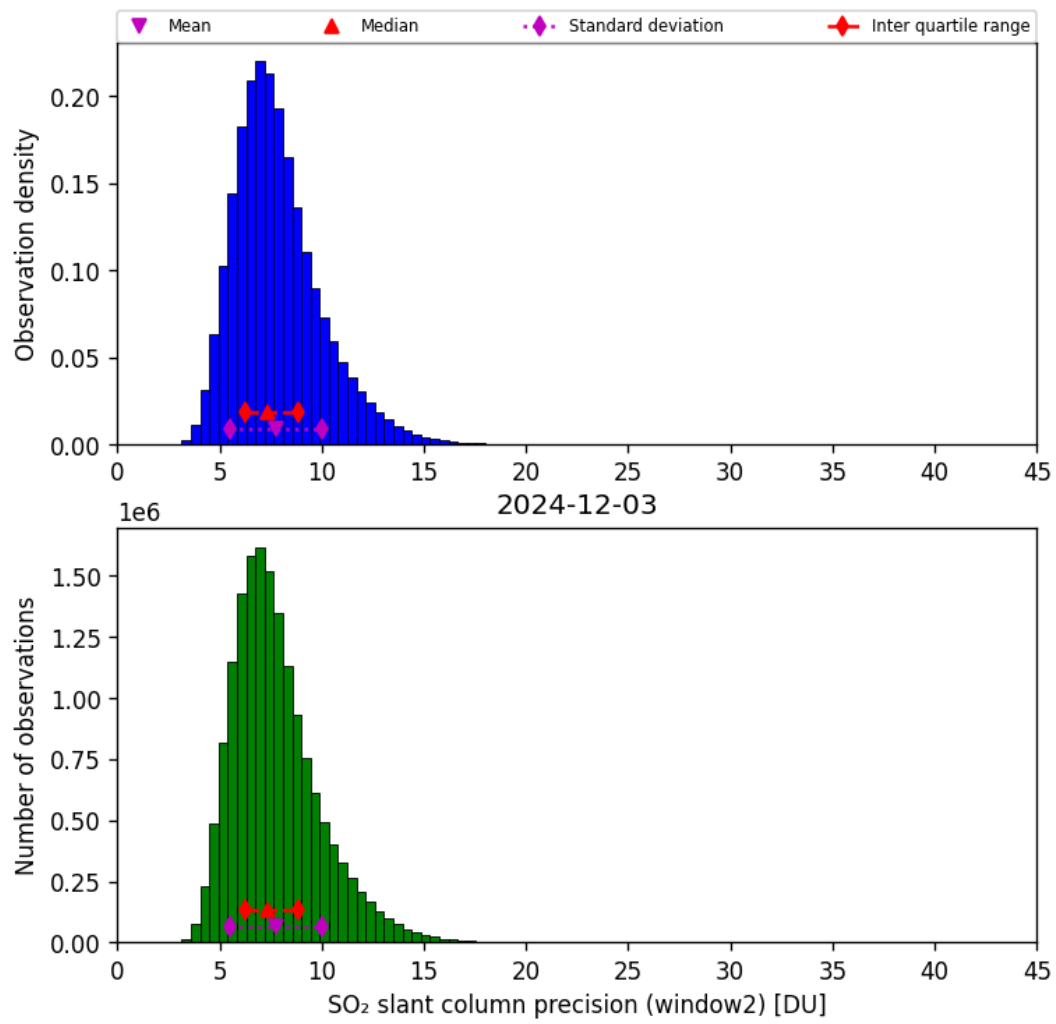


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2024-12-03 to 2024-12-03

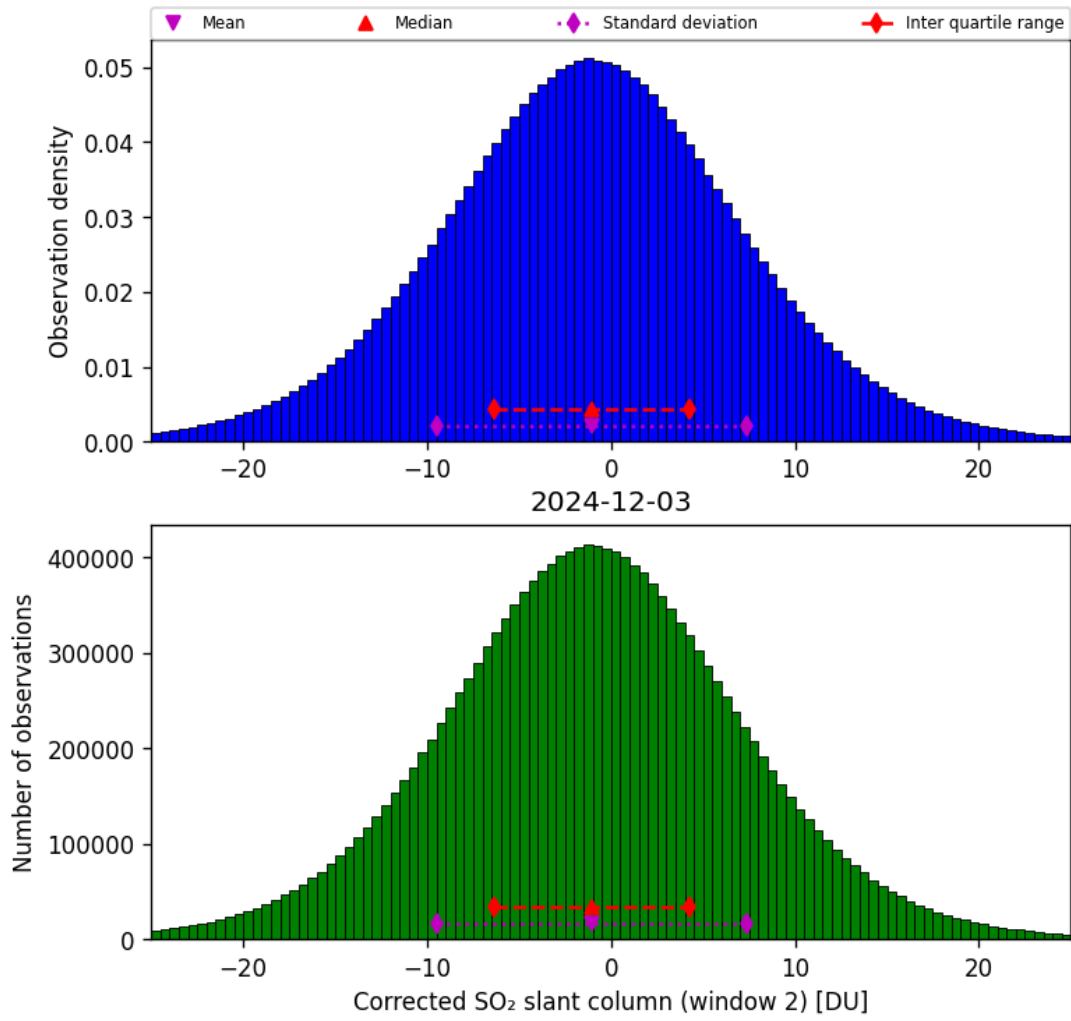


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2024-12-03 to 2024-12-03

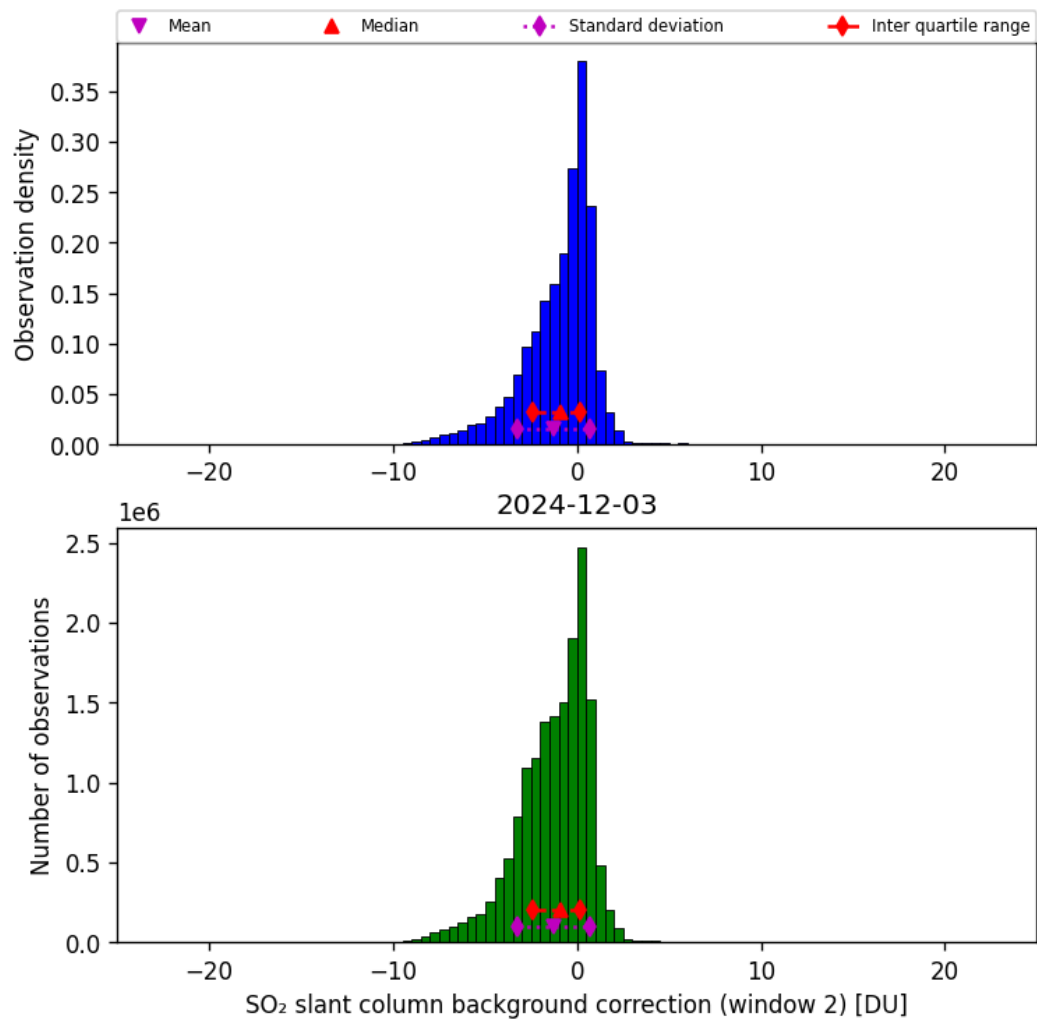


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2024-12-03 to 2024-12-03

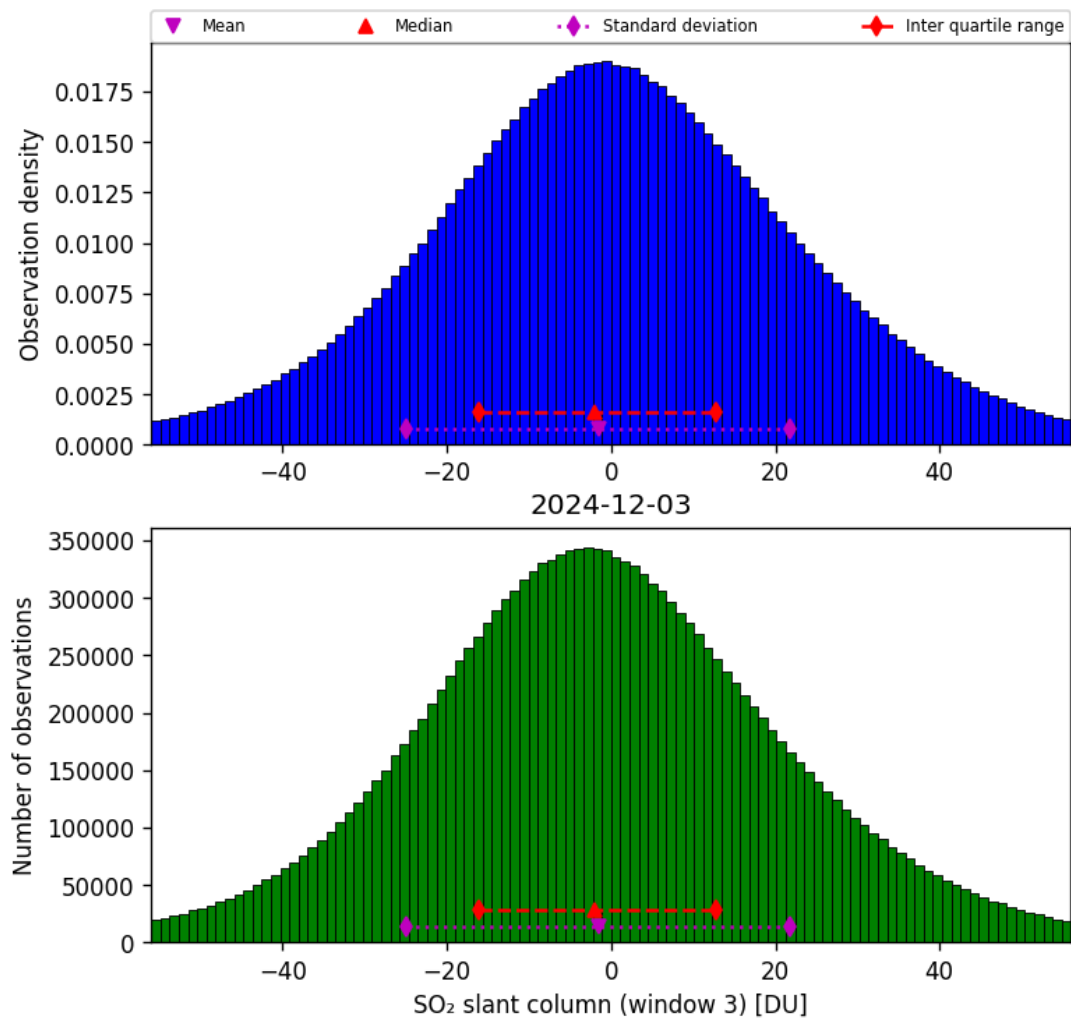


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2024-12-03 to 2024-12-03

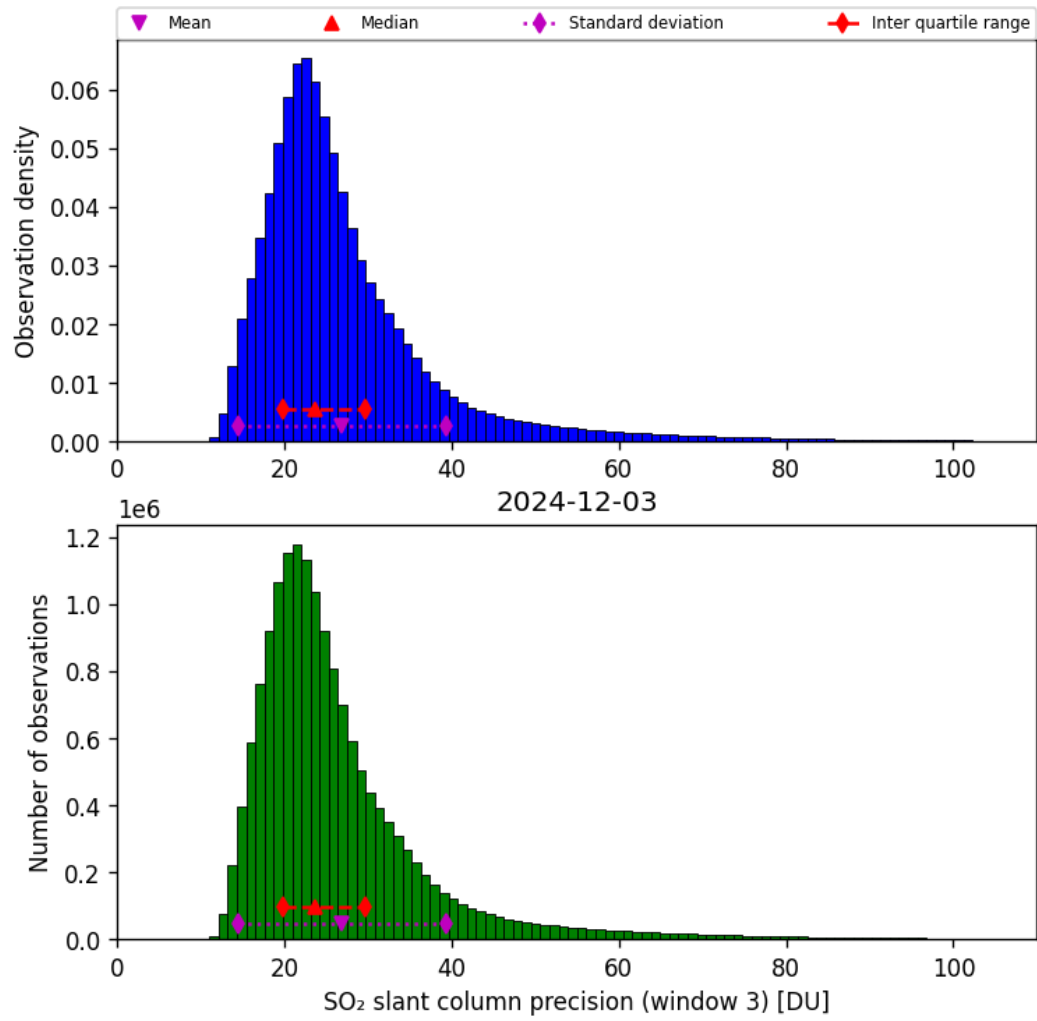


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2024-12-03 to 2024-12-03

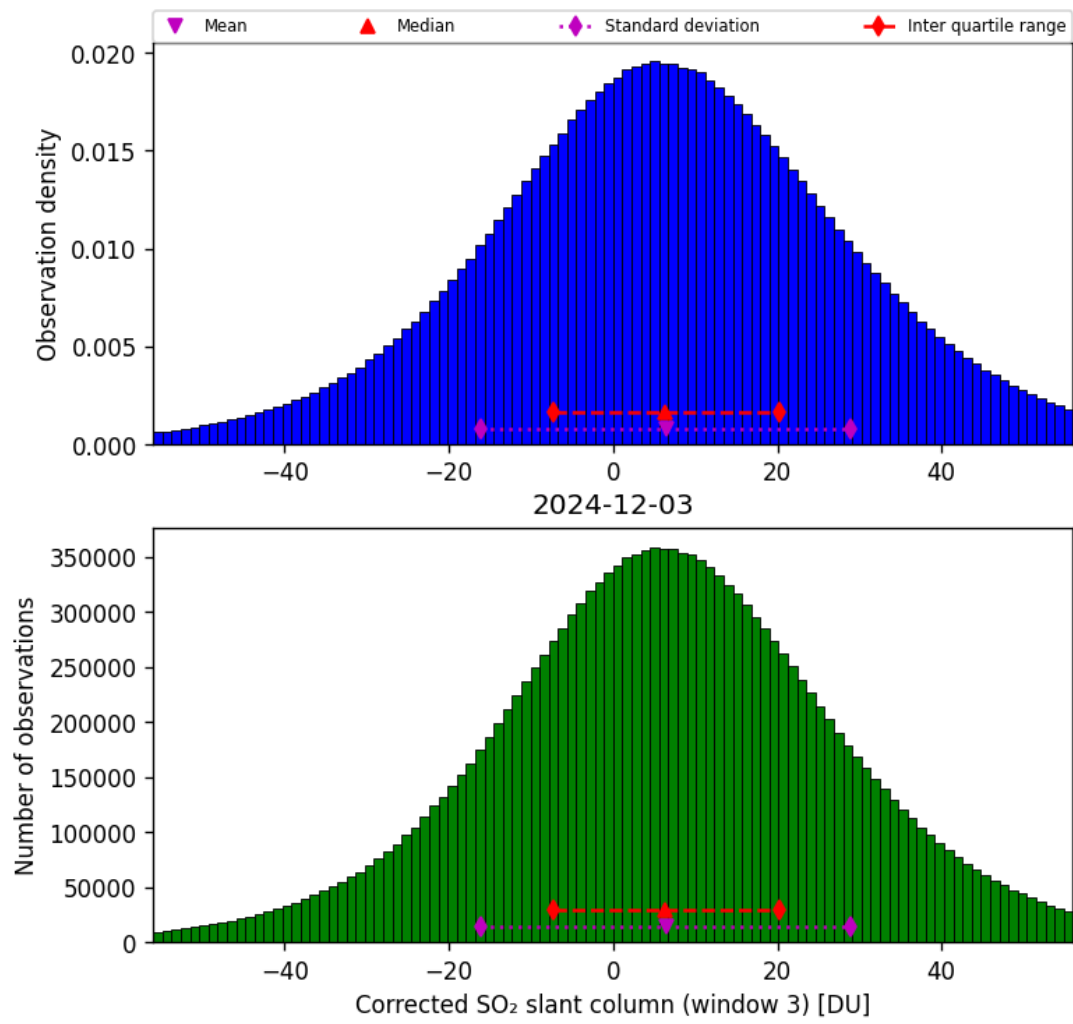


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2024-12-03 to 2024-12-03

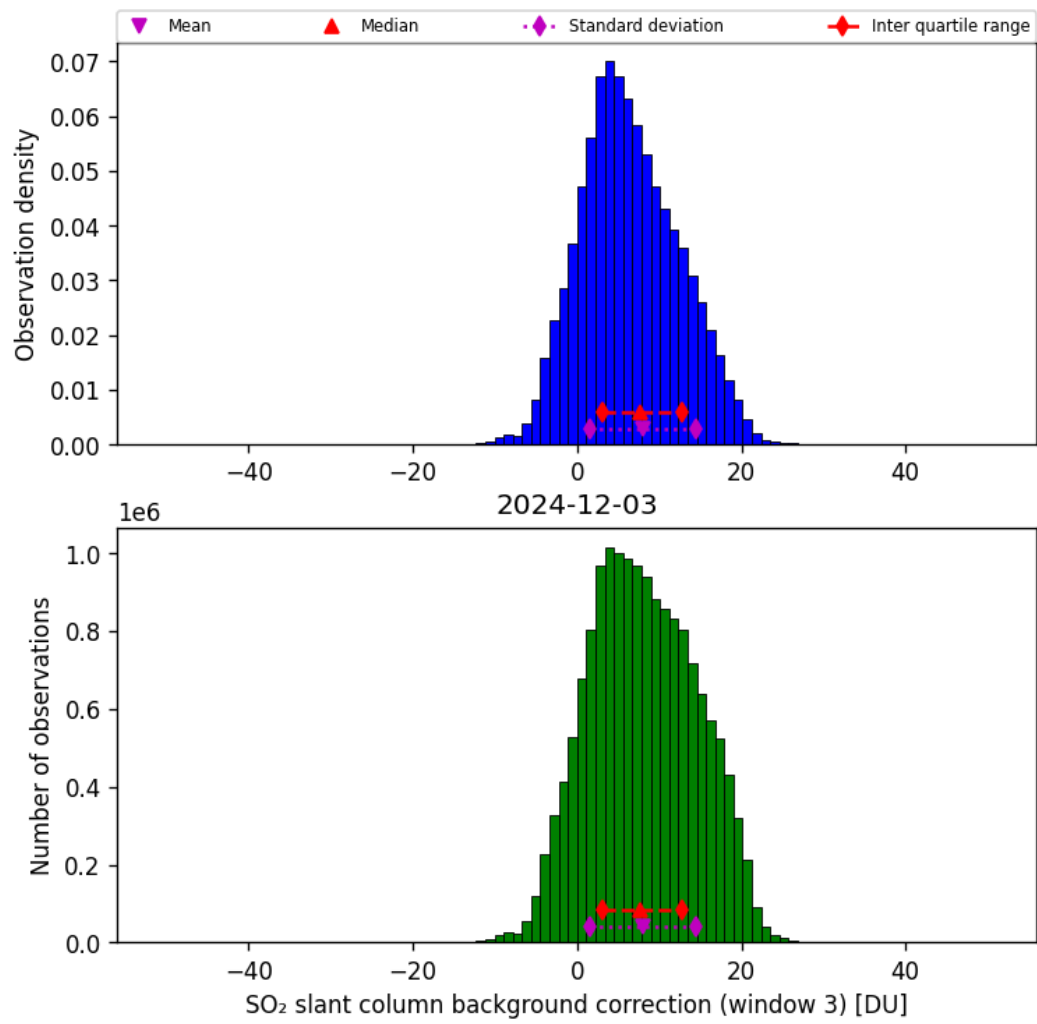


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2024-12-03 to 2024-12-03

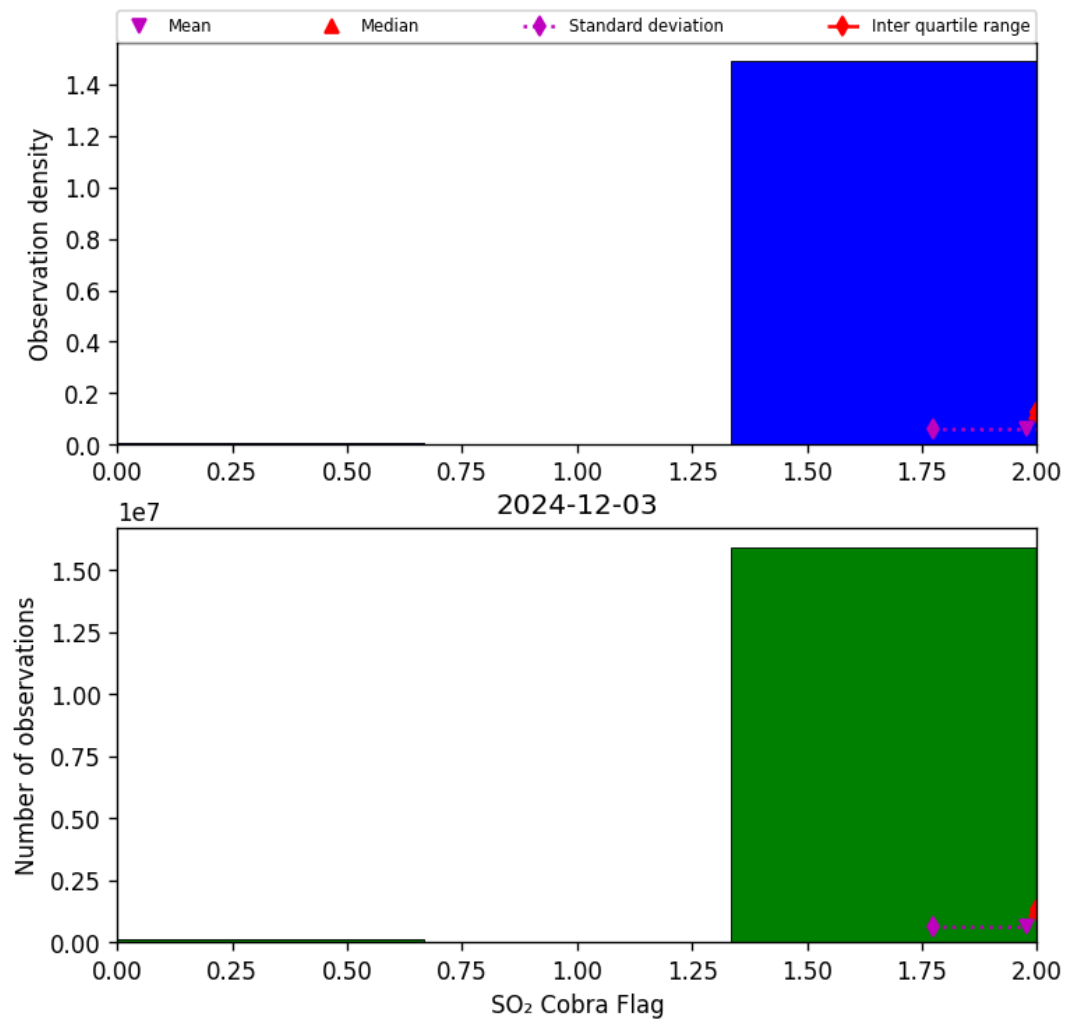


Figure 75: Histogram of “SO₂ Cobra Flag” for 2024-12-03 to 2024-12-03

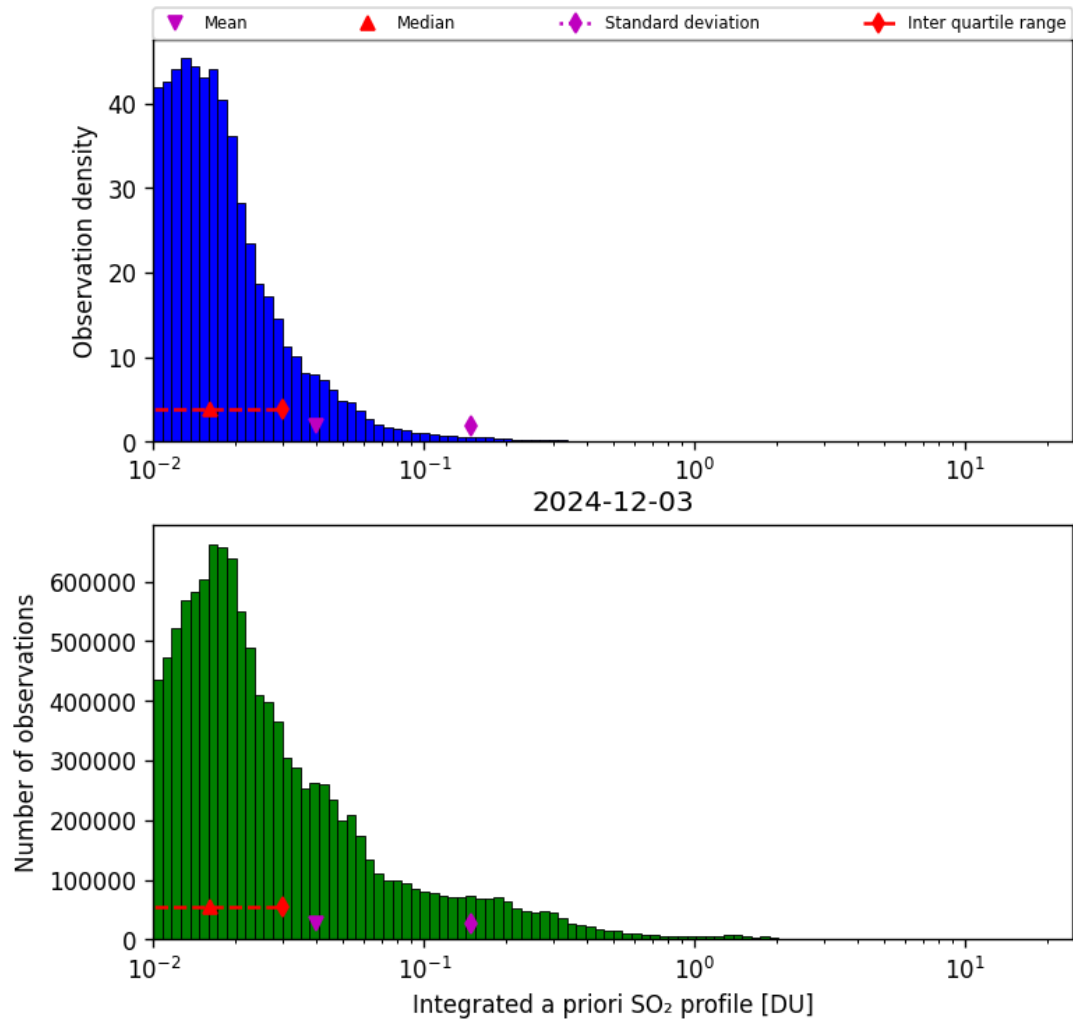


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2024-12-03 to 2024-12-03

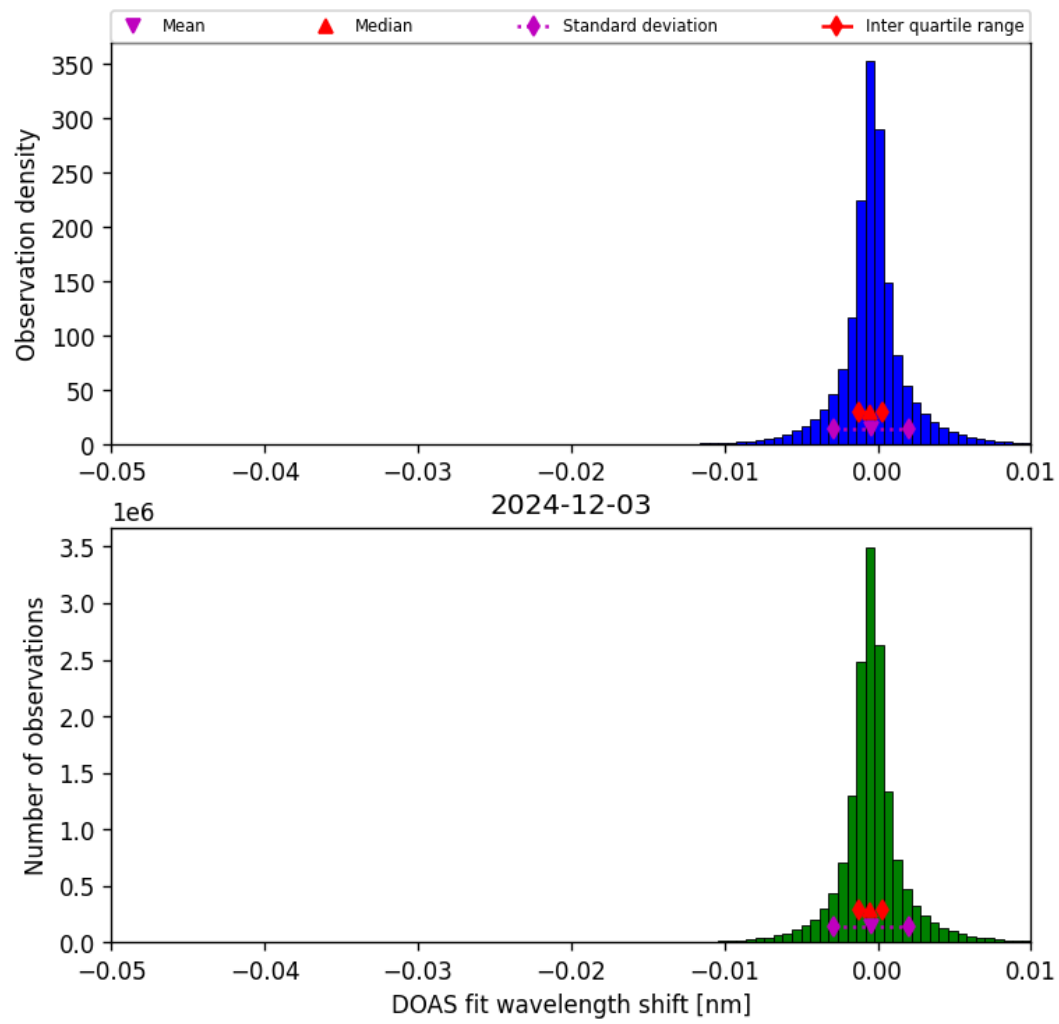


Figure 77: Histogram of “DOAS fit wavelength shift” for 2024-12-03 to 2024-12-03

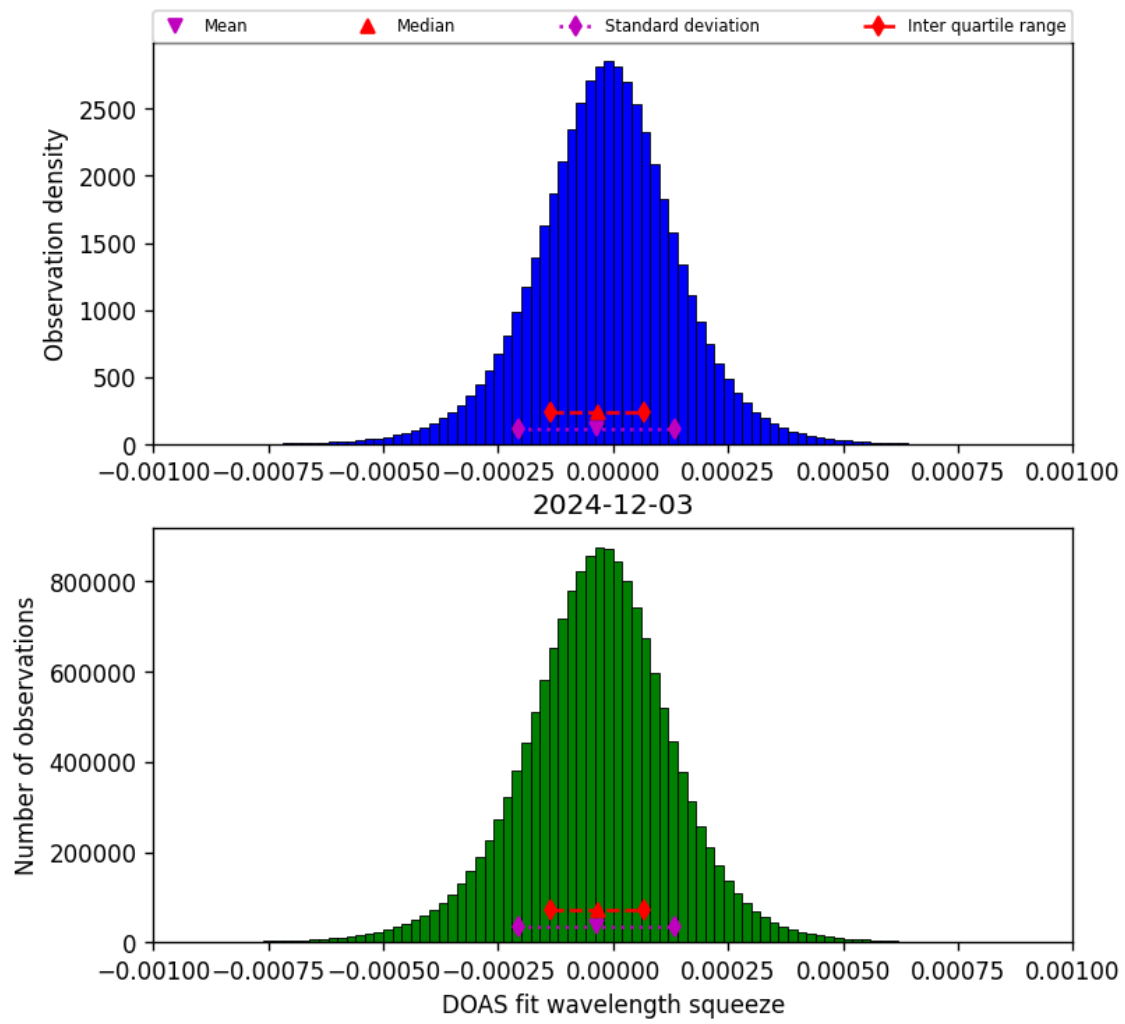


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2024-12-03 to 2024-12-03

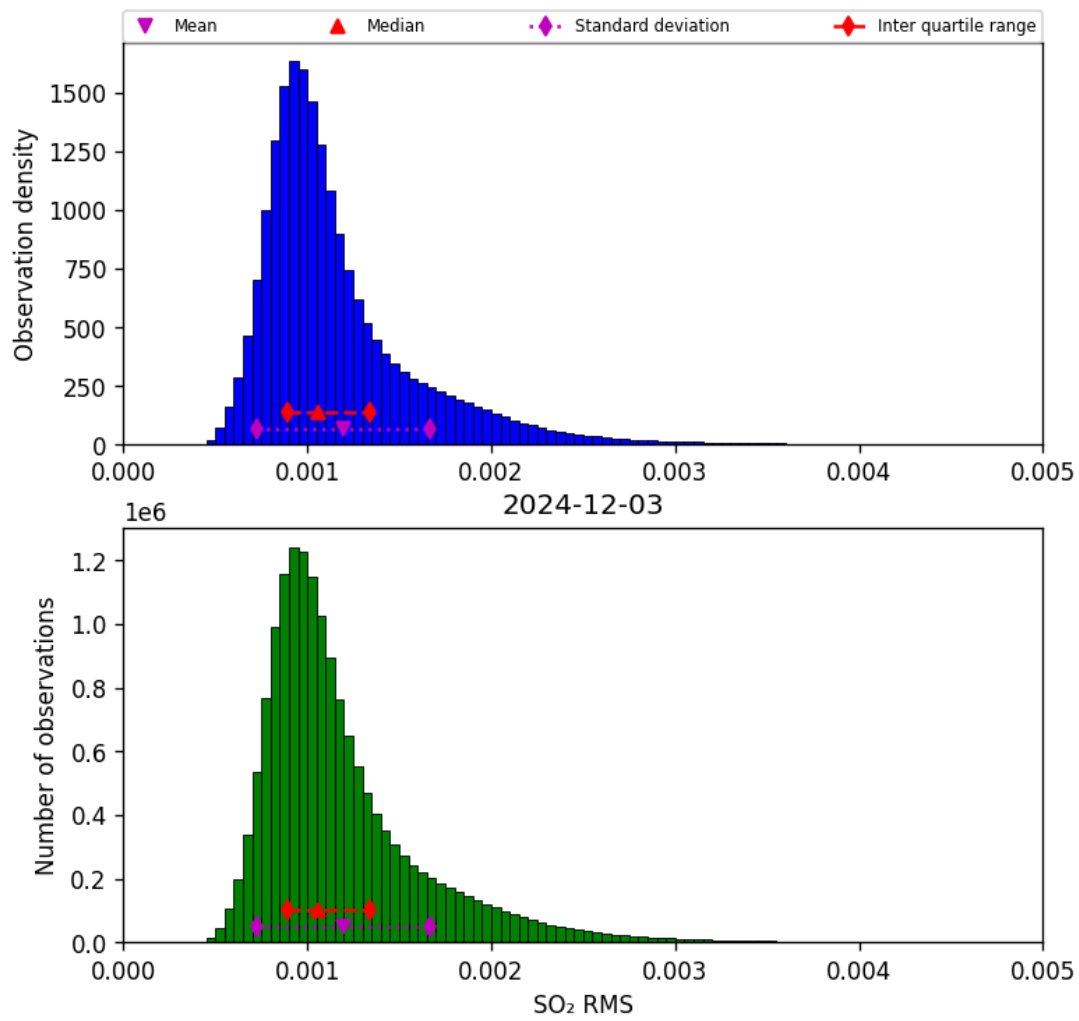


Figure 79: Histogram of “SO₂ RMS” for 2024-12-03 to 2024-12-03

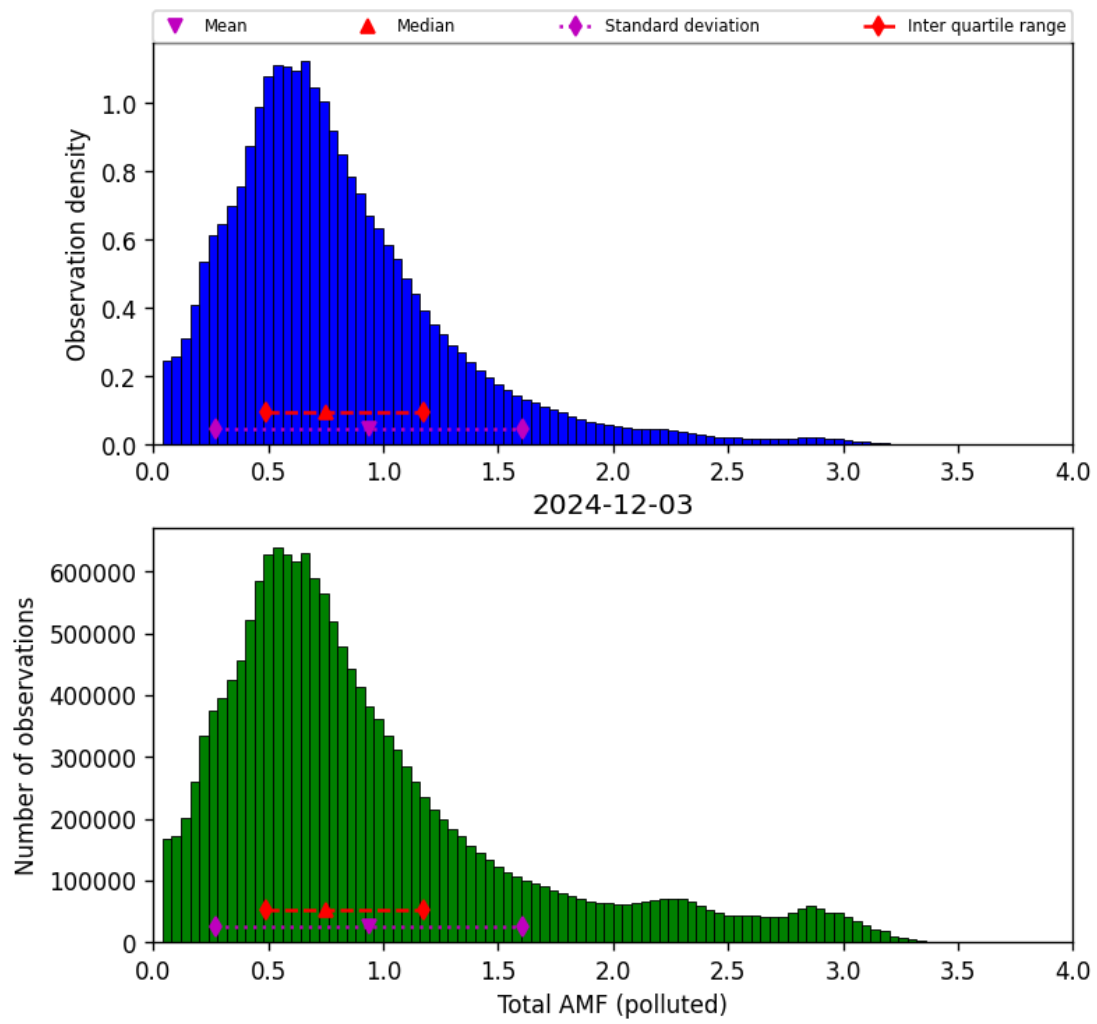


Figure 80: Histogram of “Total AMF (polluted)” for 2024-12-03 to 2024-12-03

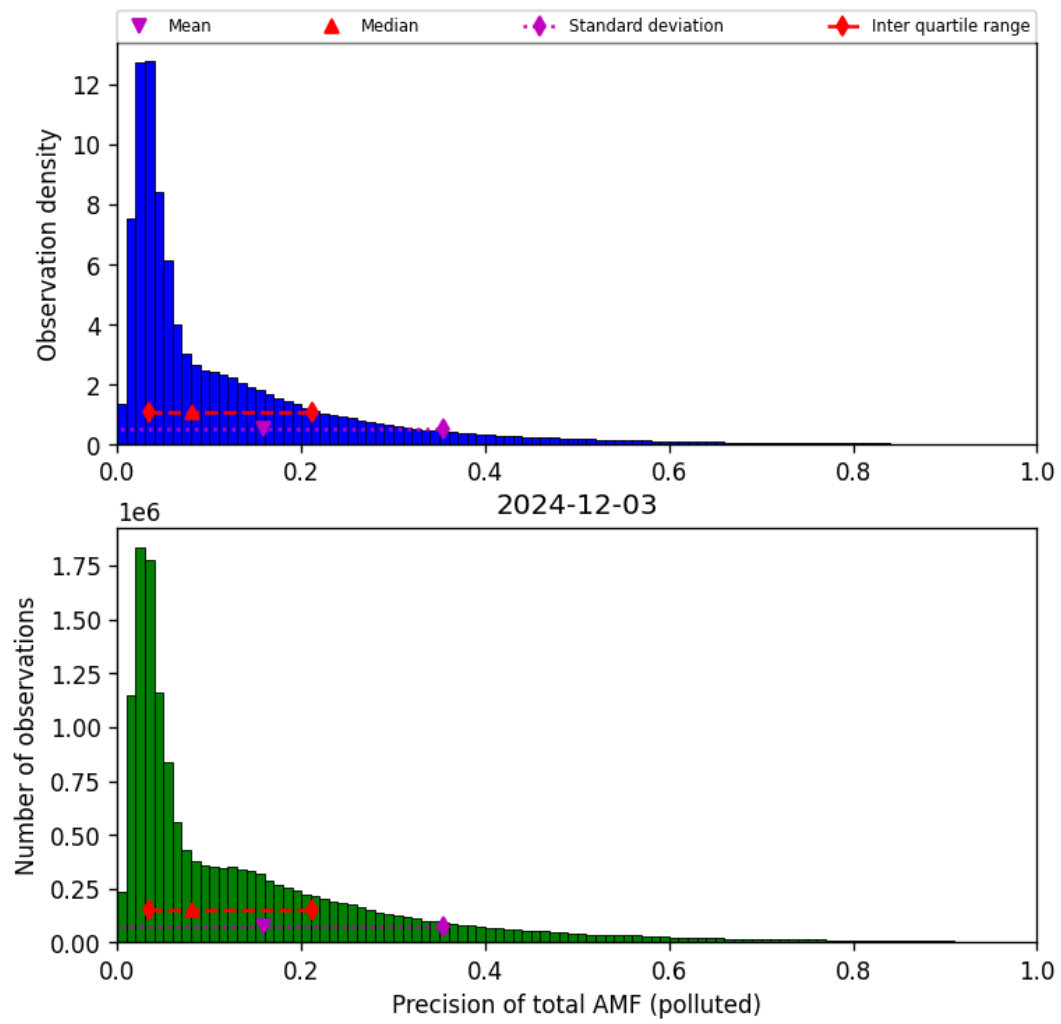


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2024-12-03 to 2024-12-03

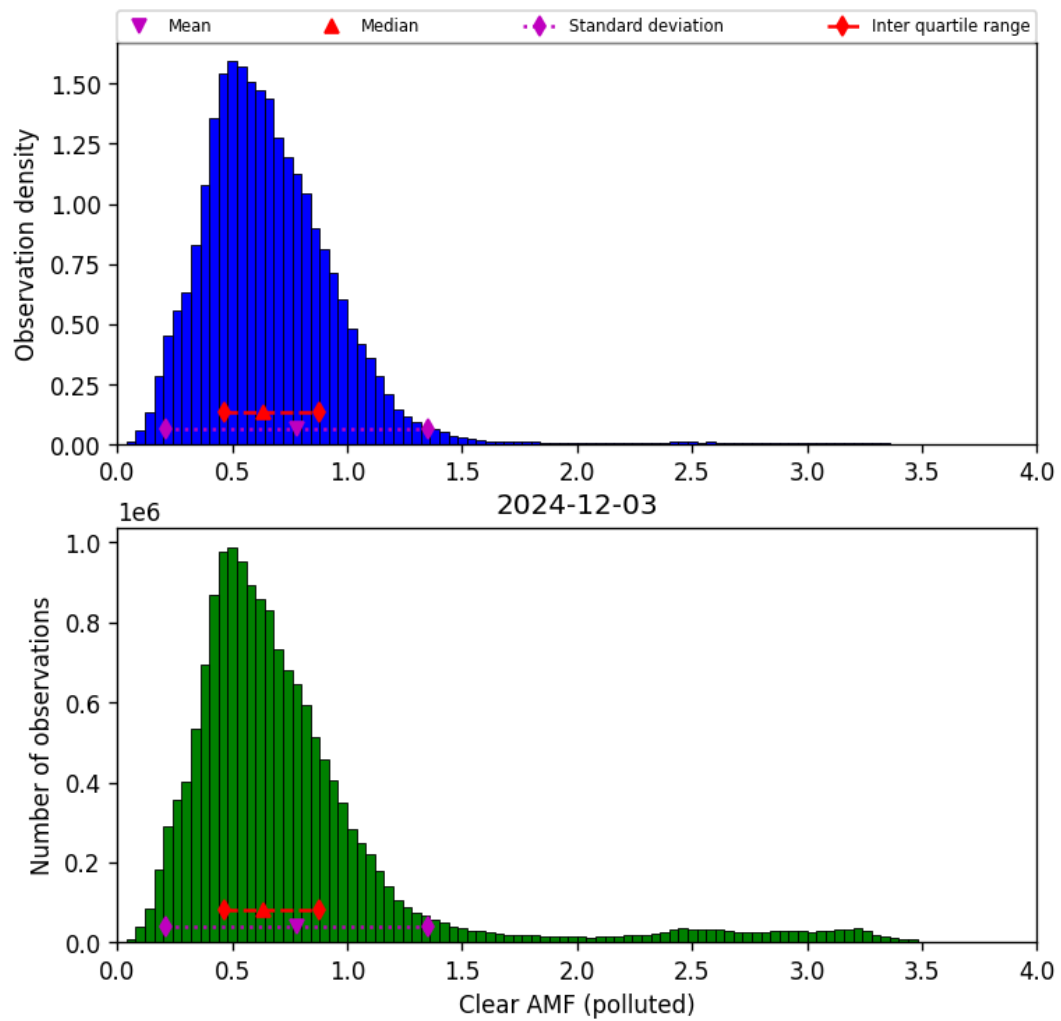


Figure 82: Histogram of “Clear AMF (polluted)” for 2024-12-03 to 2024-12-03

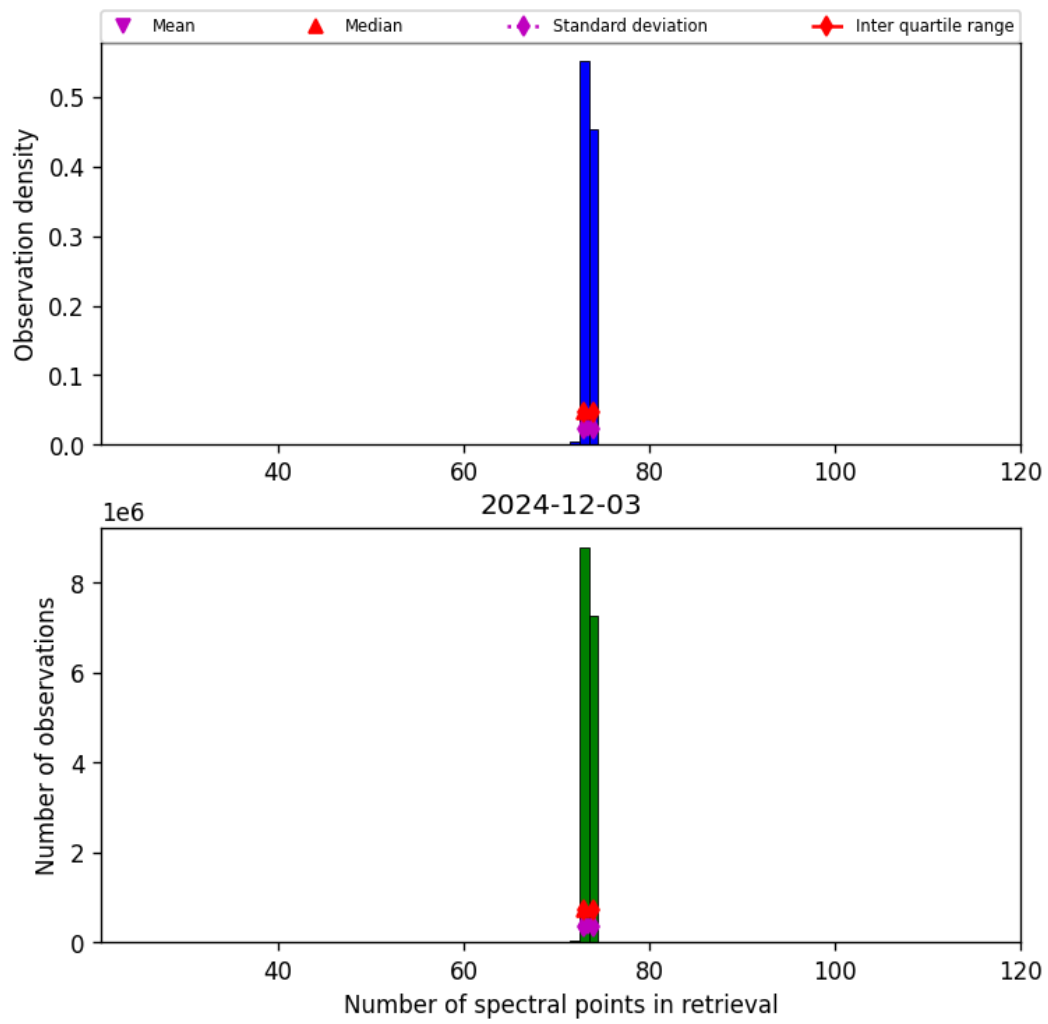


Figure 83: Histogram of “Number of spectral points in retrieval” for 2024-12-03 to 2024-12-03

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.

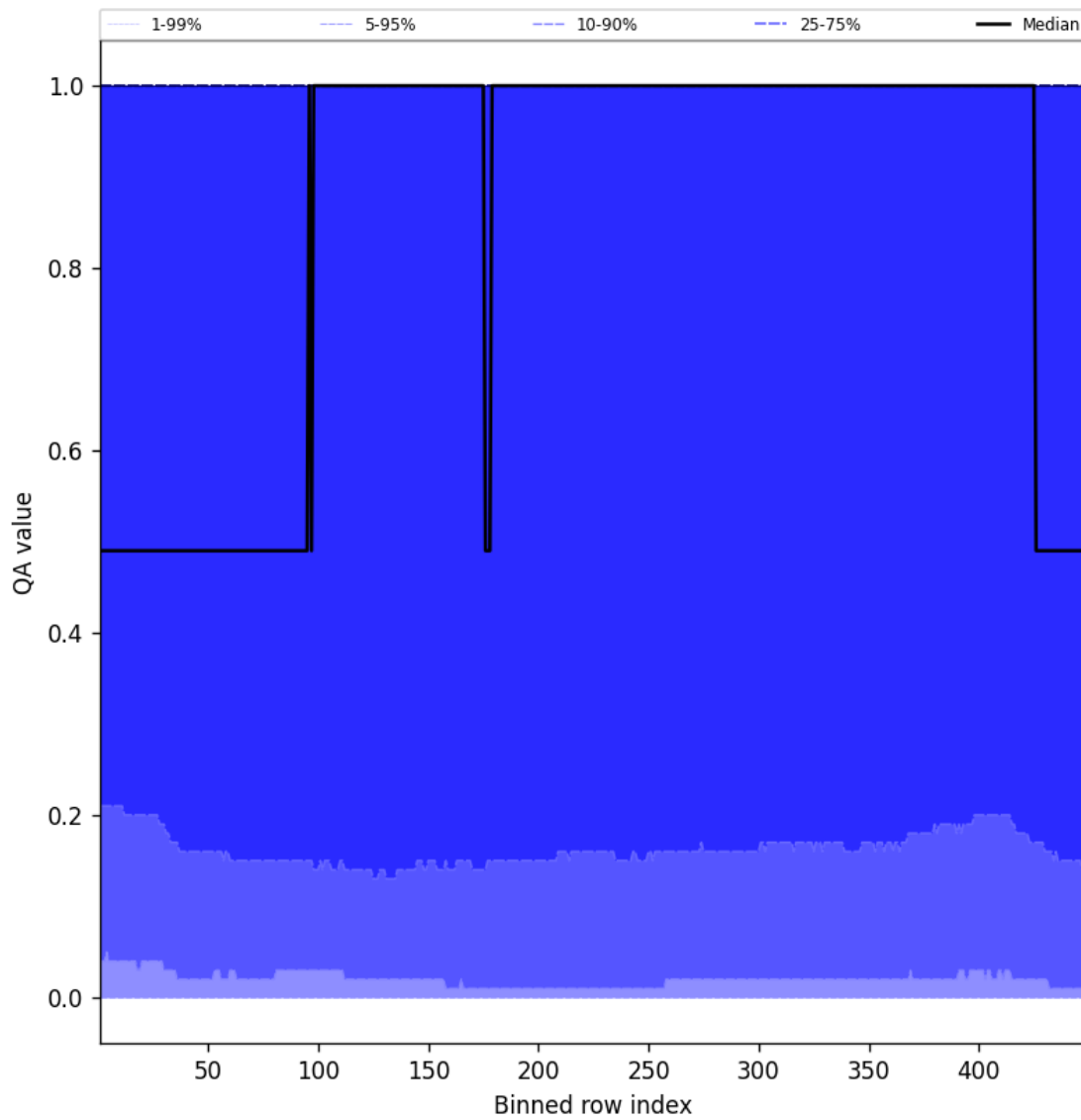


Figure 84: Along track statistics of “QA value” for 2024-12-03 to 2024-12-03

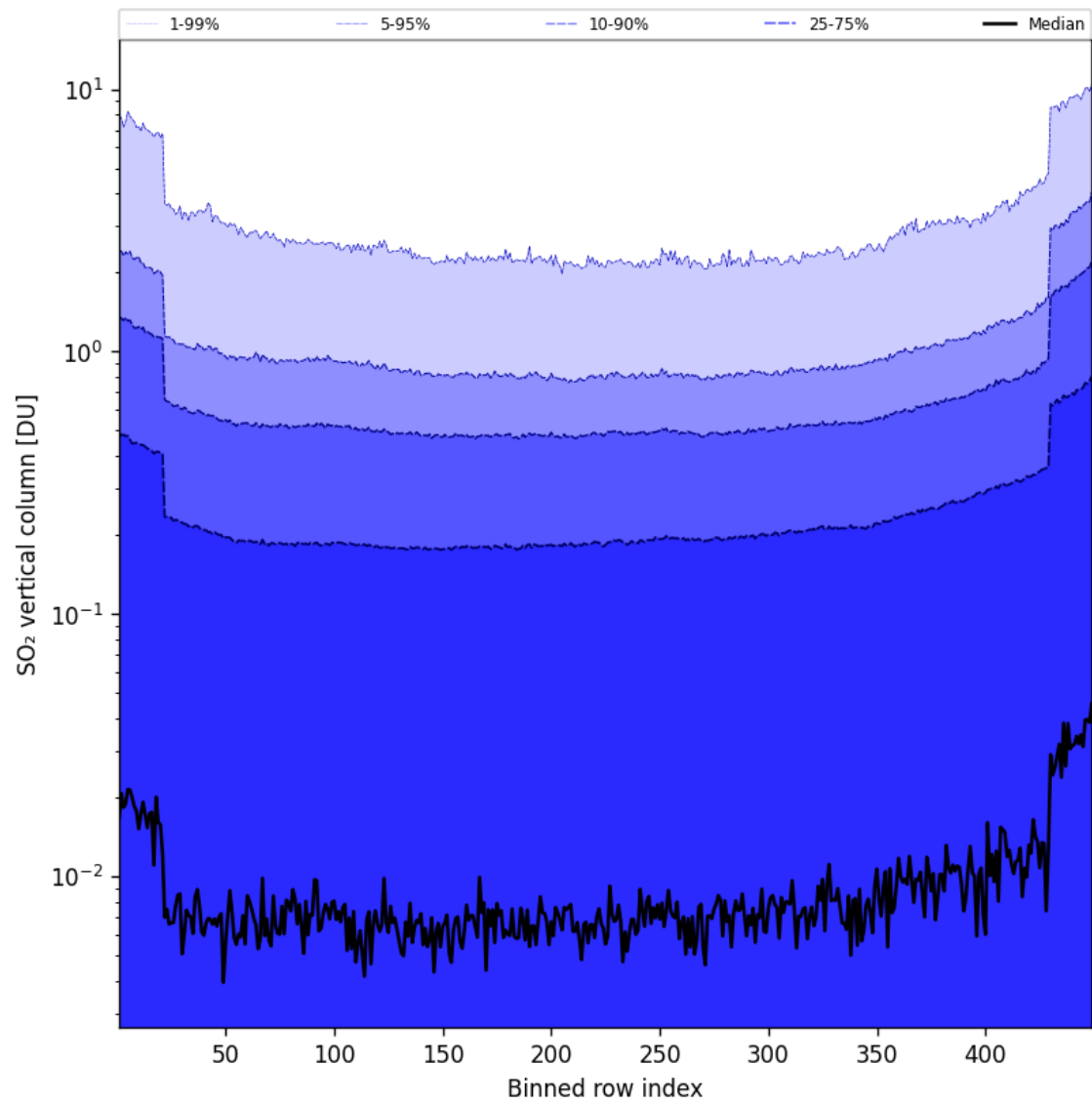


Figure 85: Along track statistics of “SO₂ vertical column” for 2024-12-03 to 2024-12-03

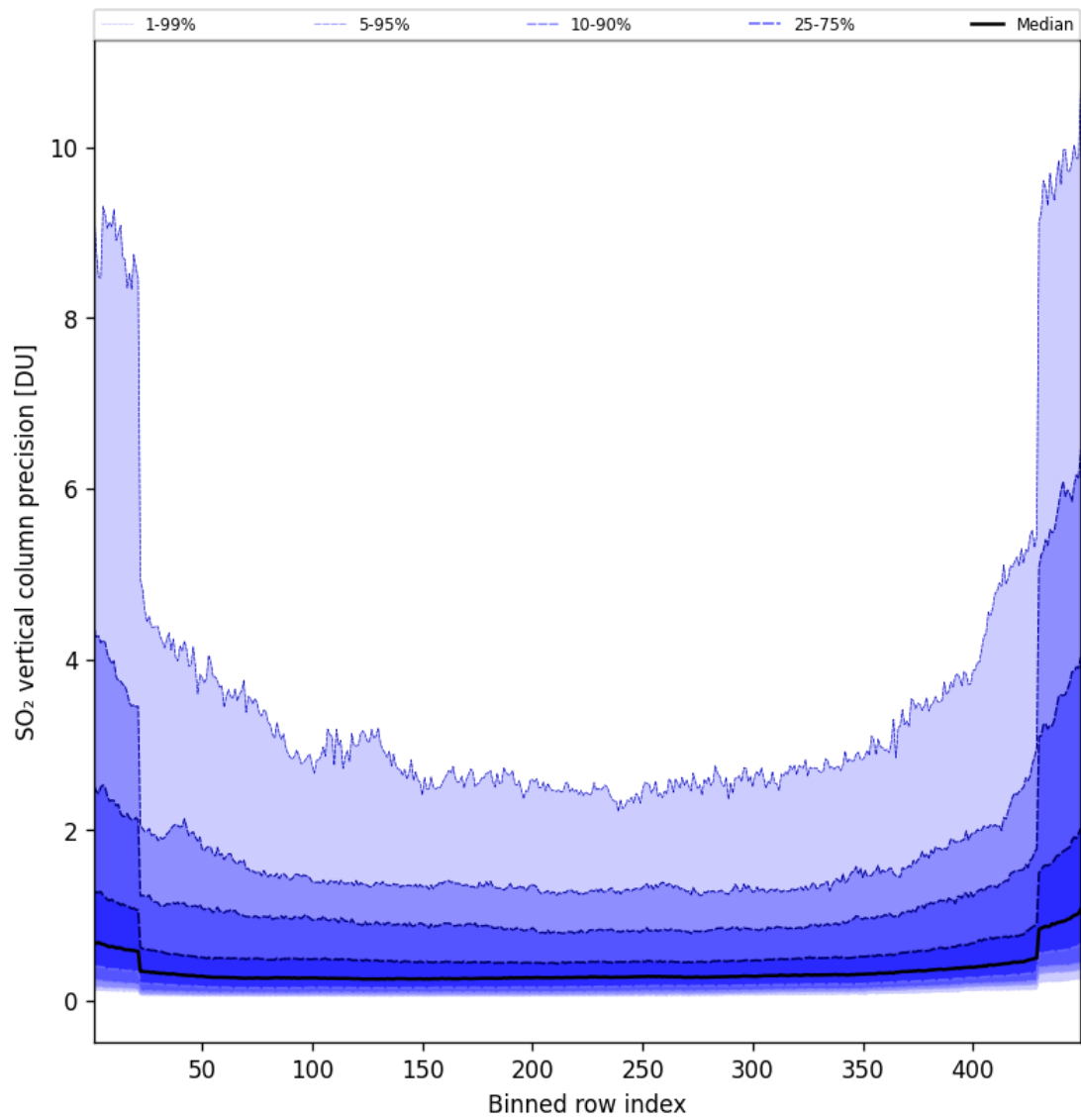


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2024-12-03 to 2024-12-03

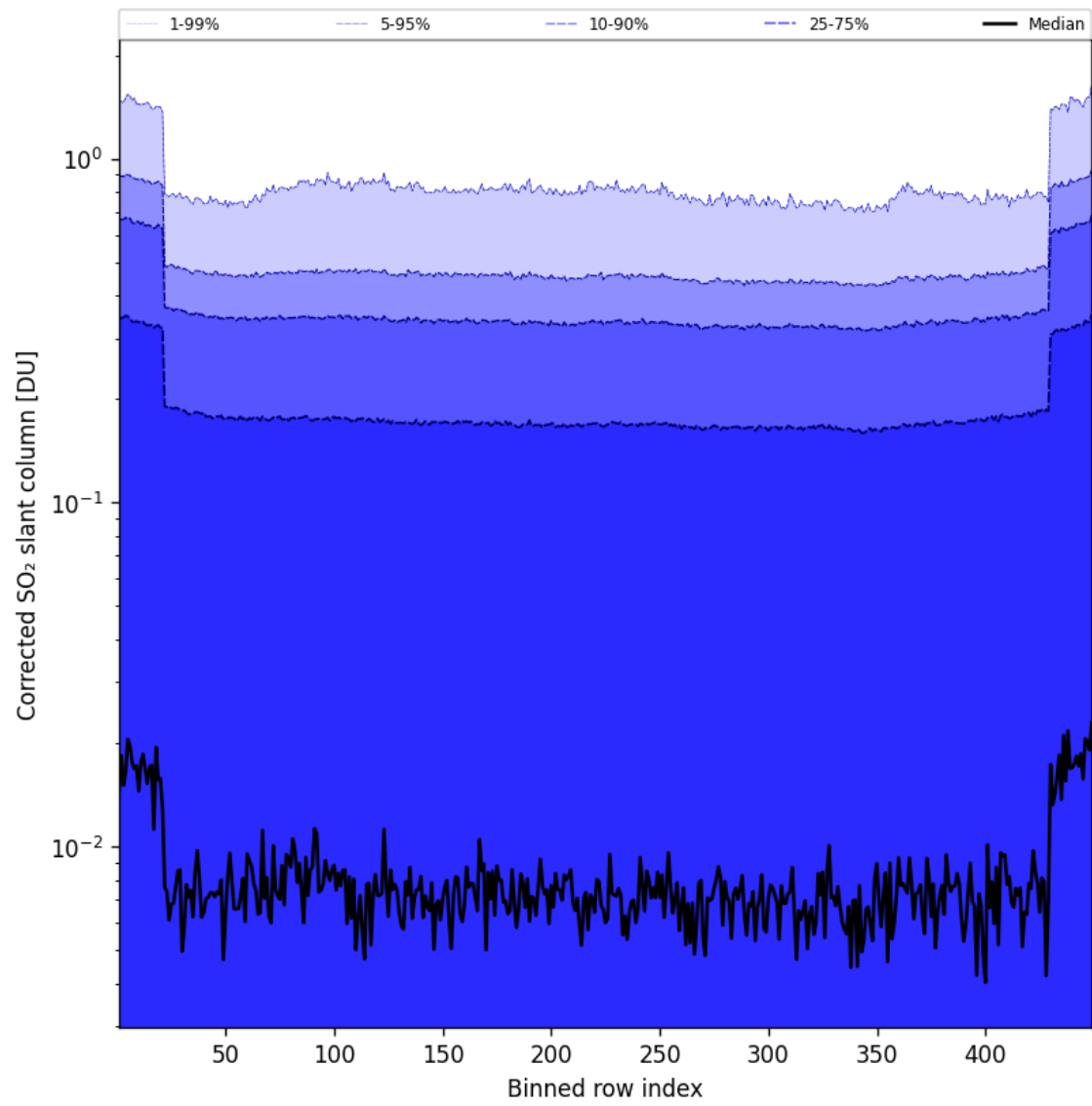


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2024-12-03 to 2024-12-03

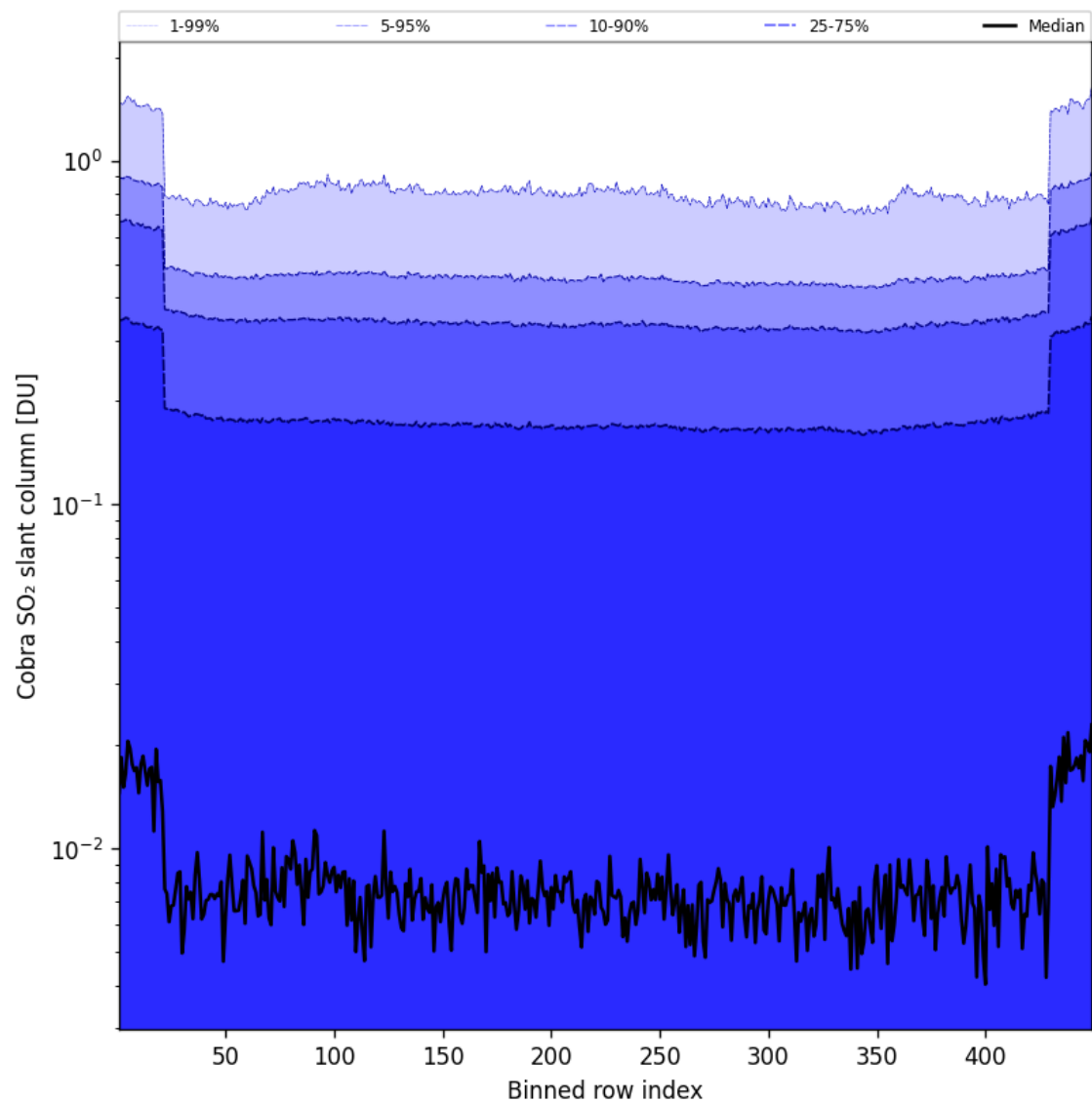


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2024-12-03 to 2024-12-03

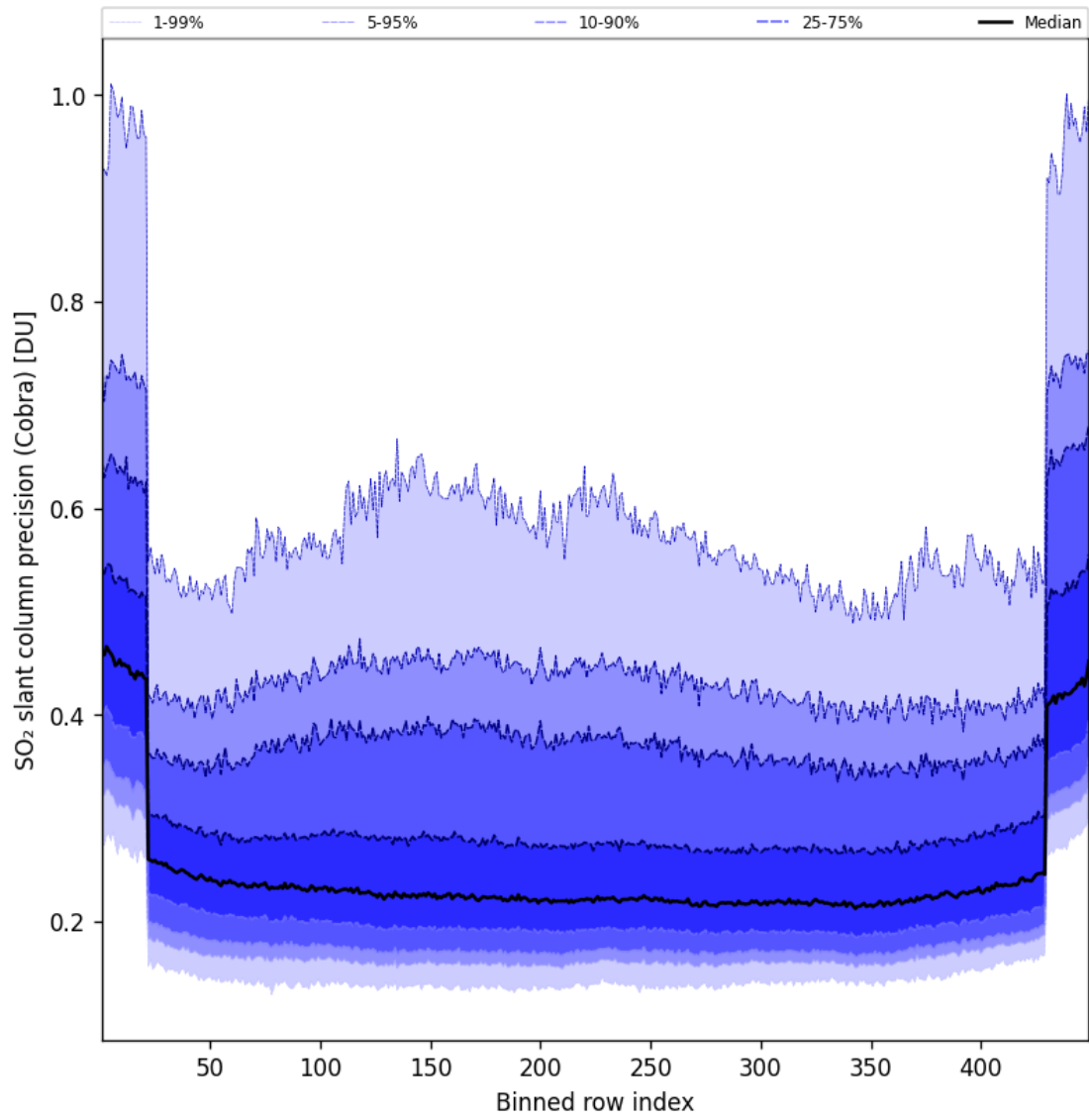


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2024-12-03 to 2024-12-03

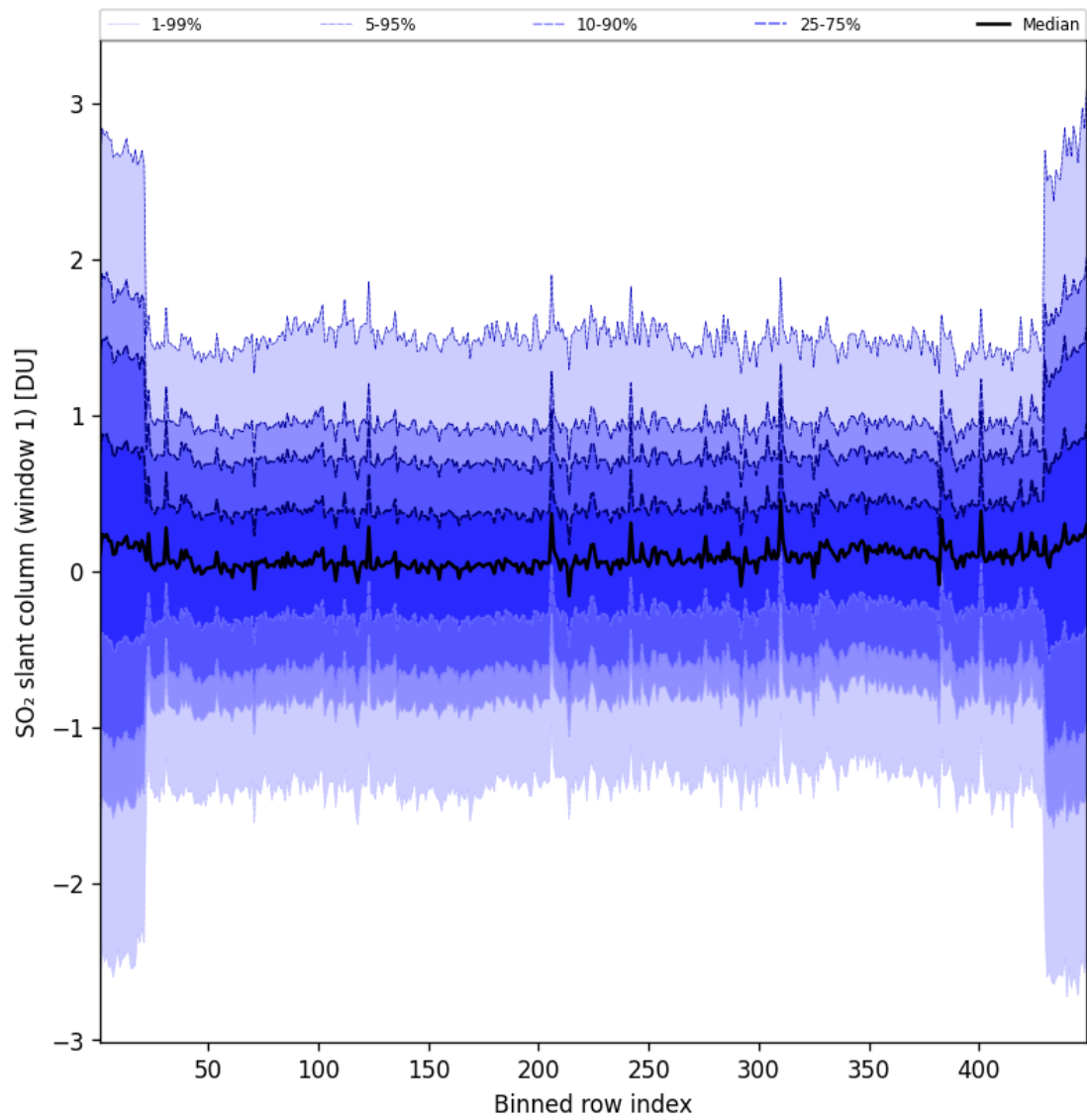


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2024-12-03 to 2024-12-03

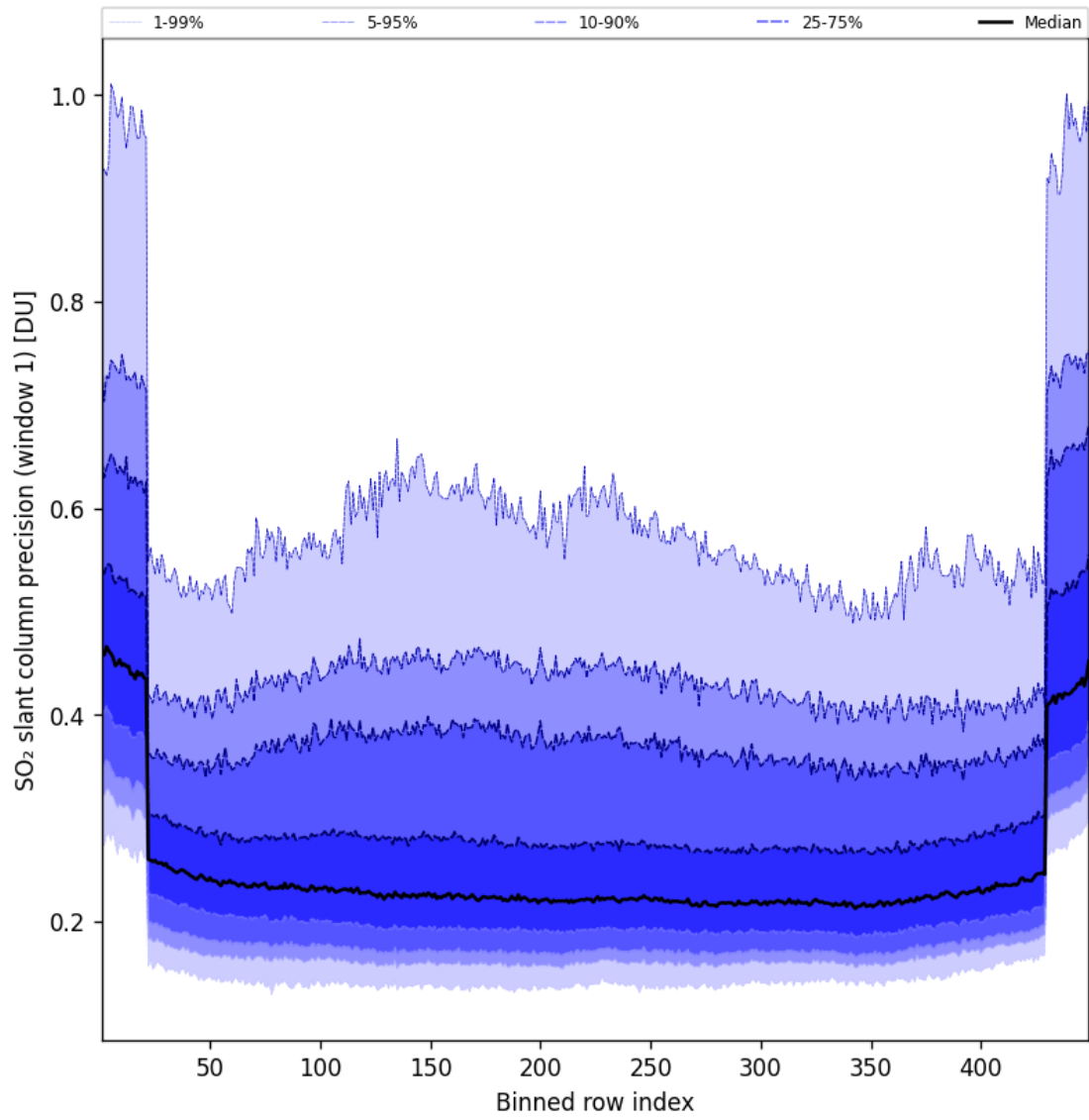


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2024-12-03 to 2024-12-03

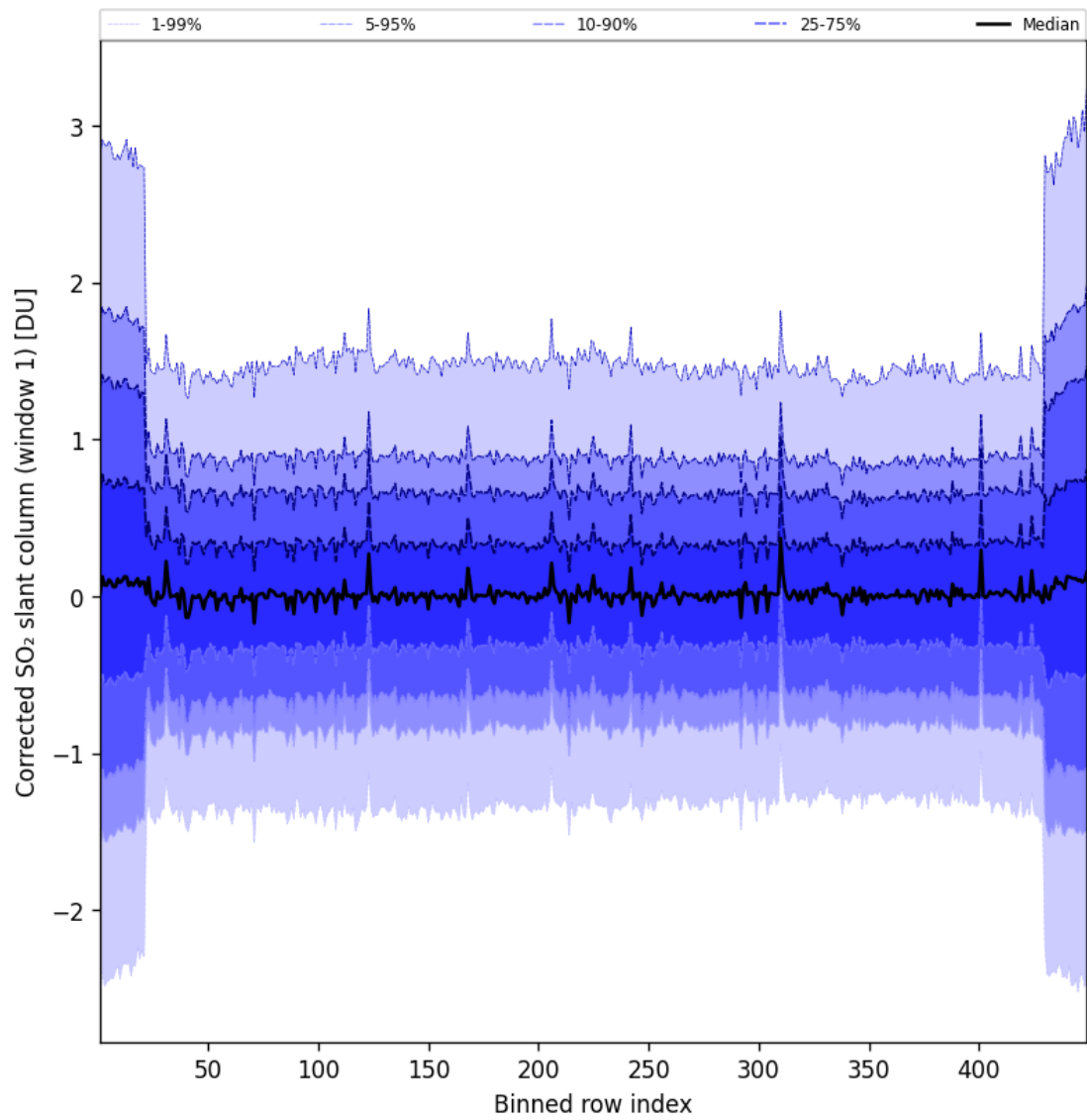


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2024-12-03 to 2024-12-03

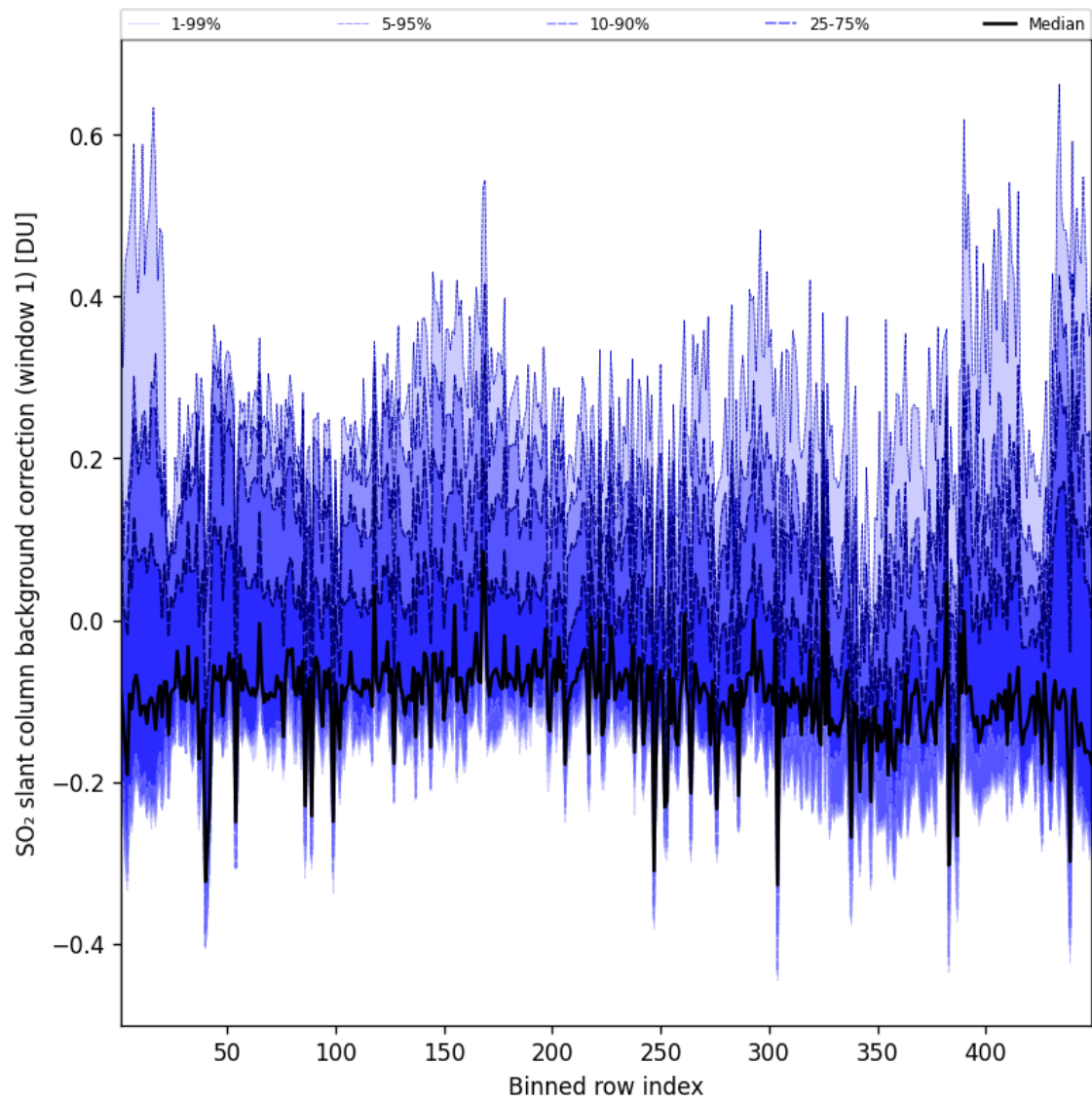


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2024-12-03 to 2024-12-03

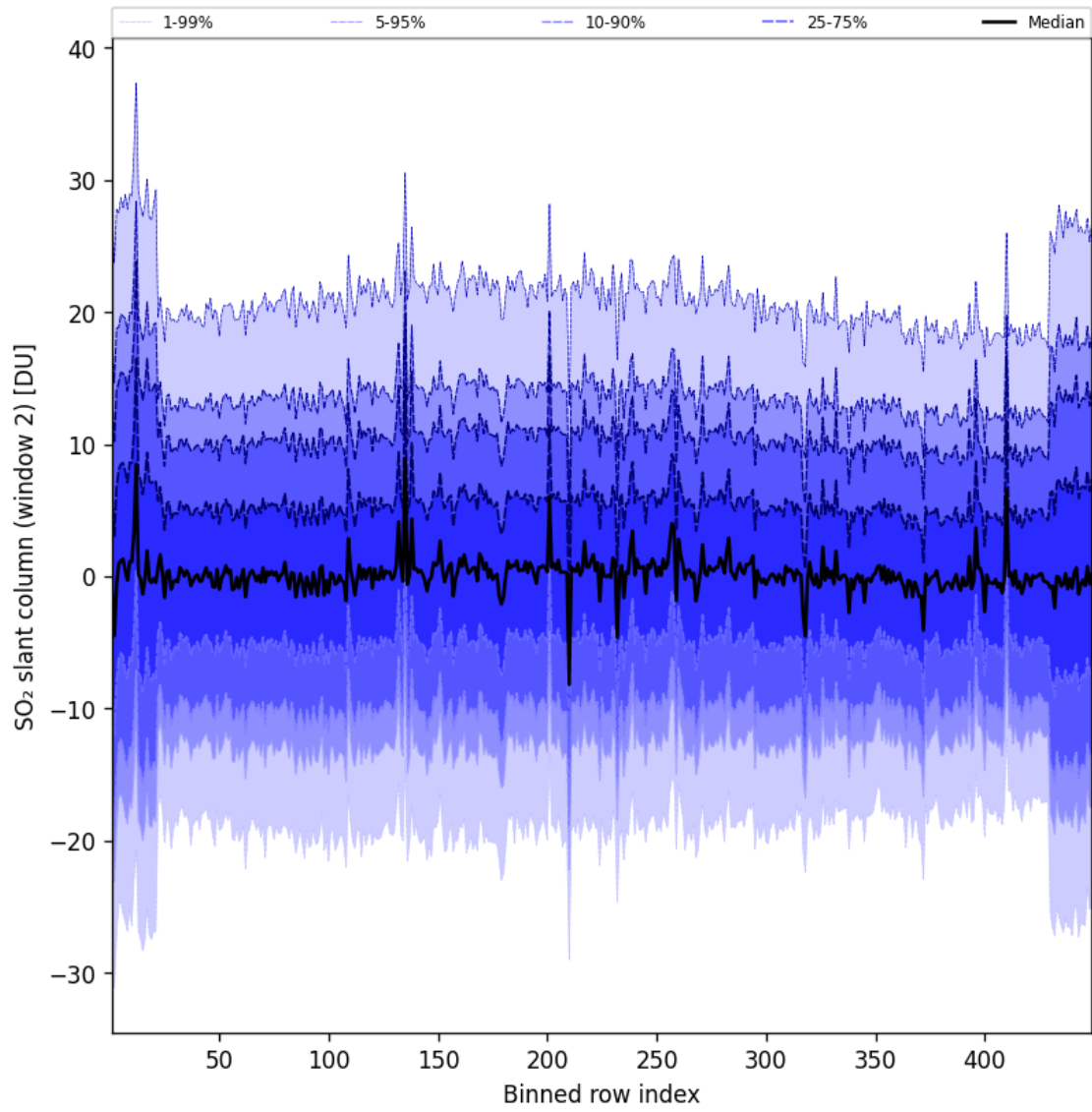


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2024-12-03 to 2024-12-03

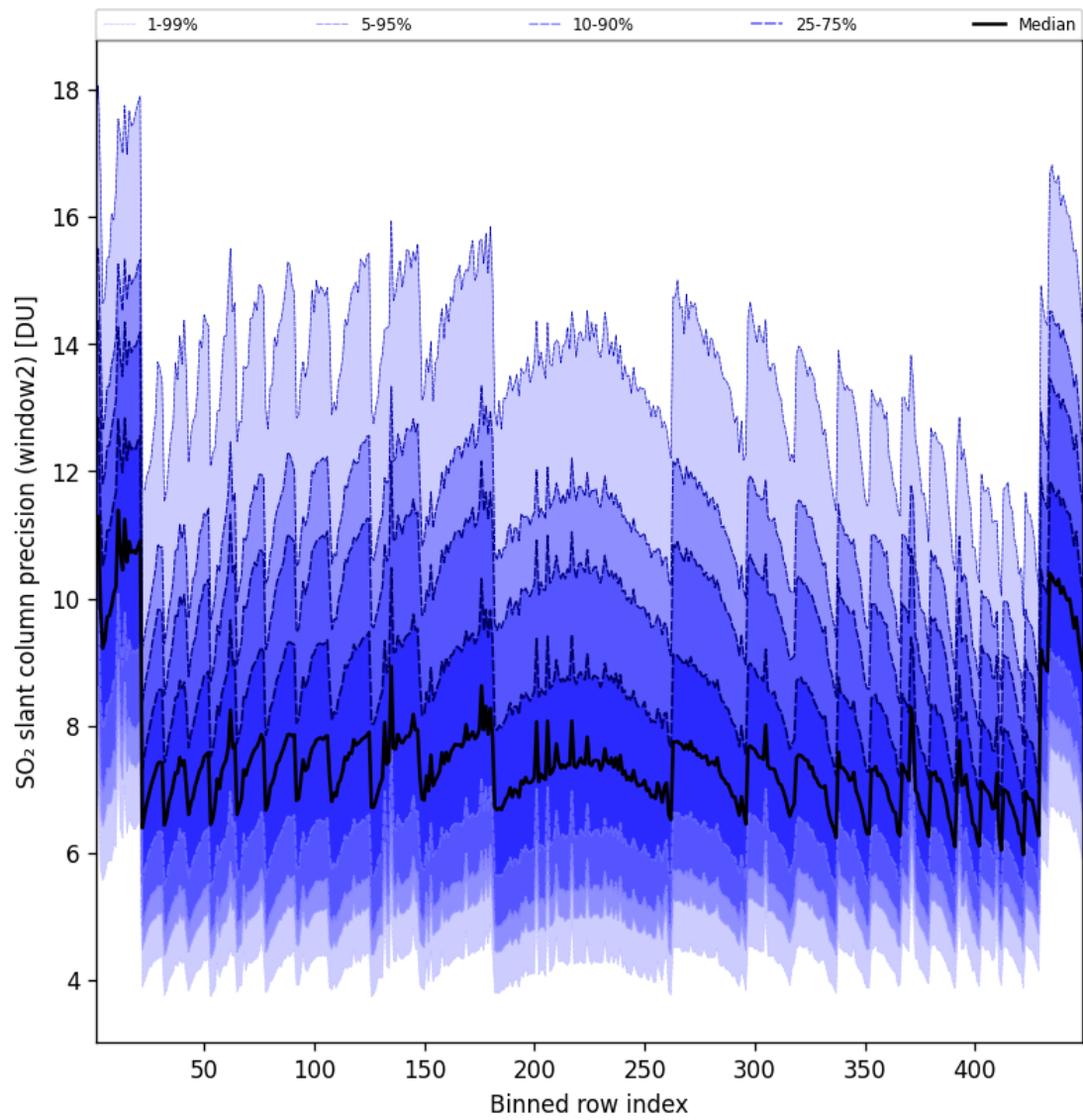


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2024-12-03 to 2024-12-03

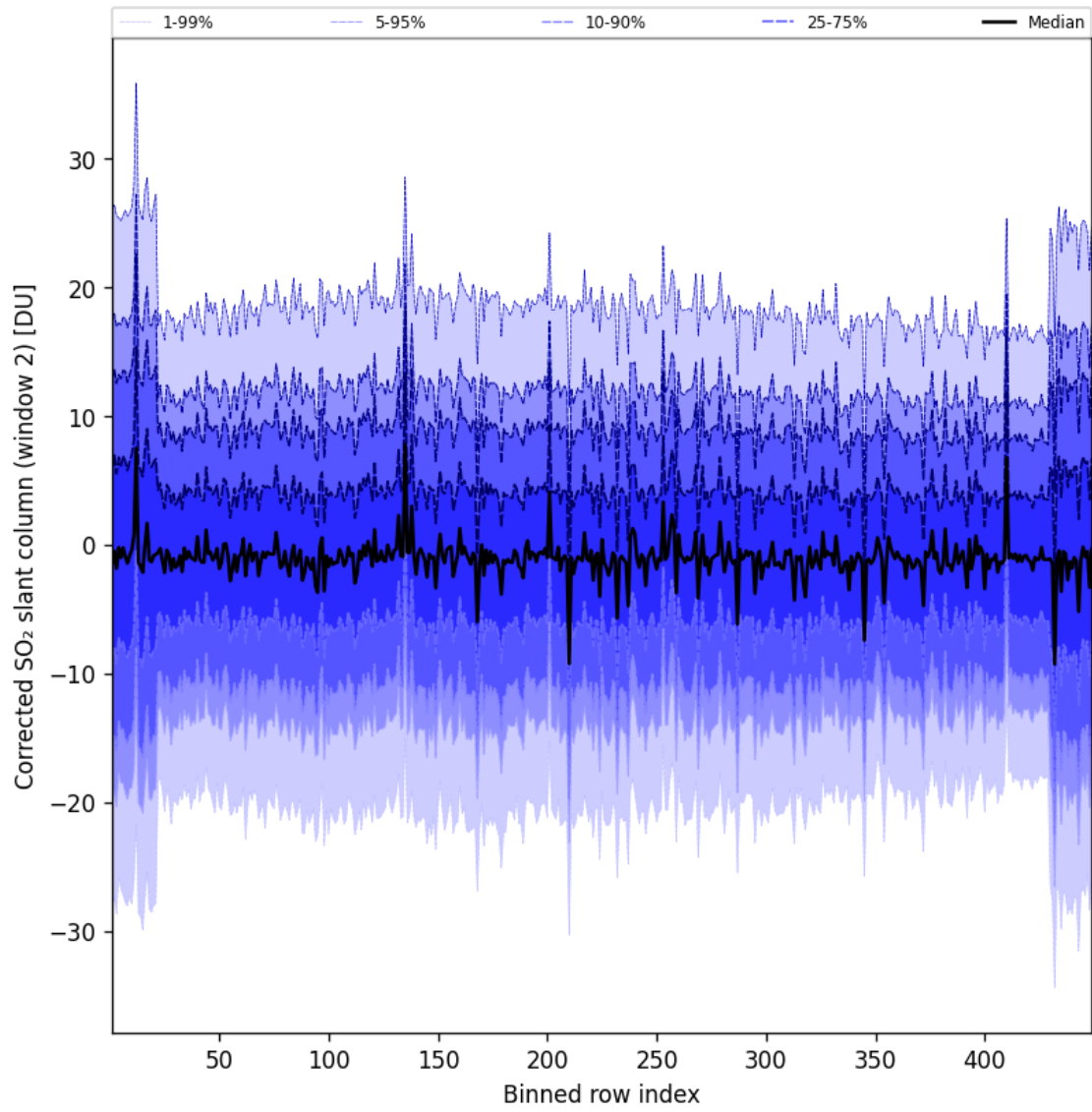


Figure 96: Along track statistics of "Corrected SO₂ slant column (window 2)" for 2024-12-03 to 2024-12-03

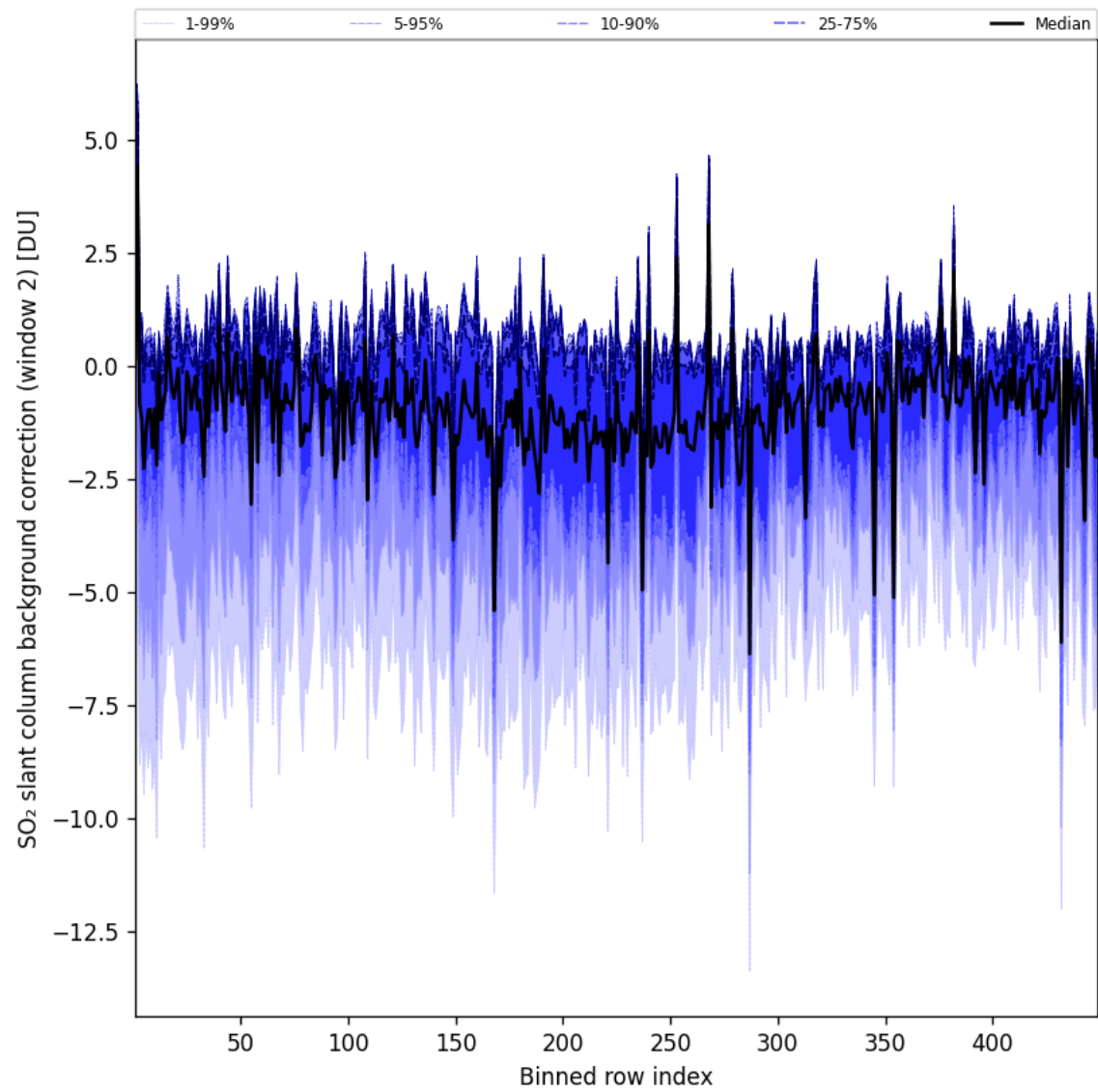


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2024-12-03 to 2024-12-03

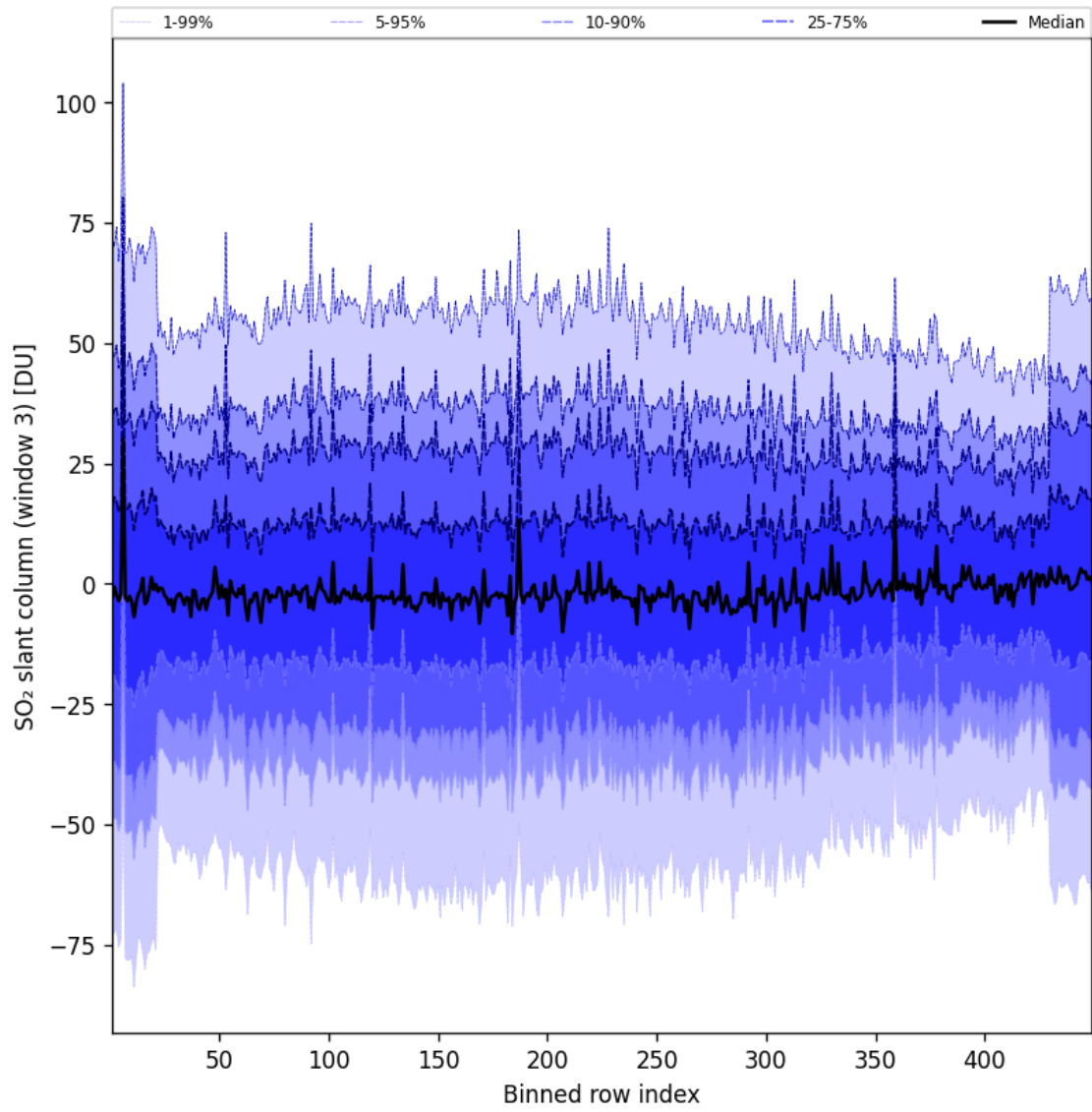


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2024-12-03 to 2024-12-03

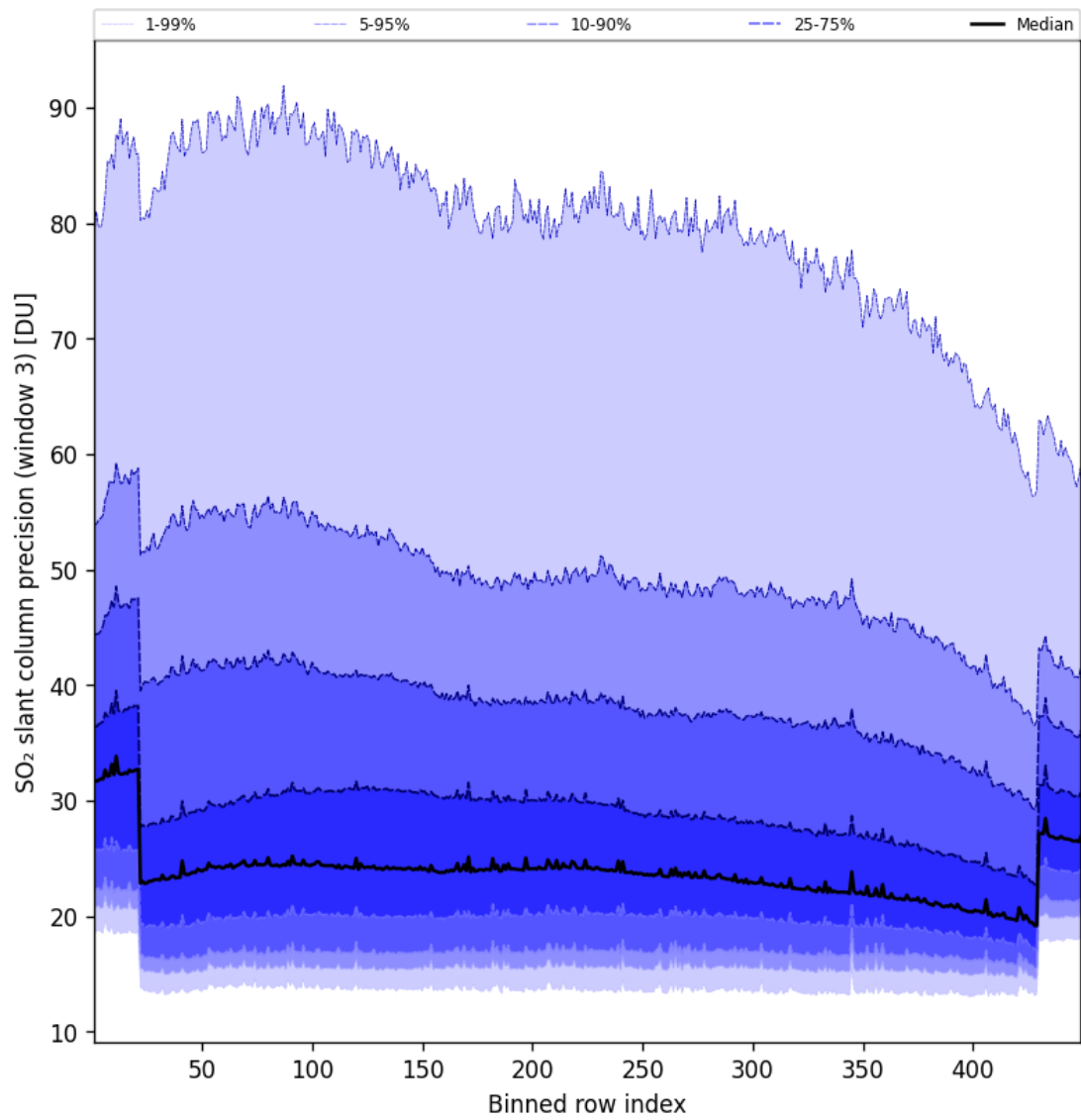


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2024-12-03 to 2024-12-03

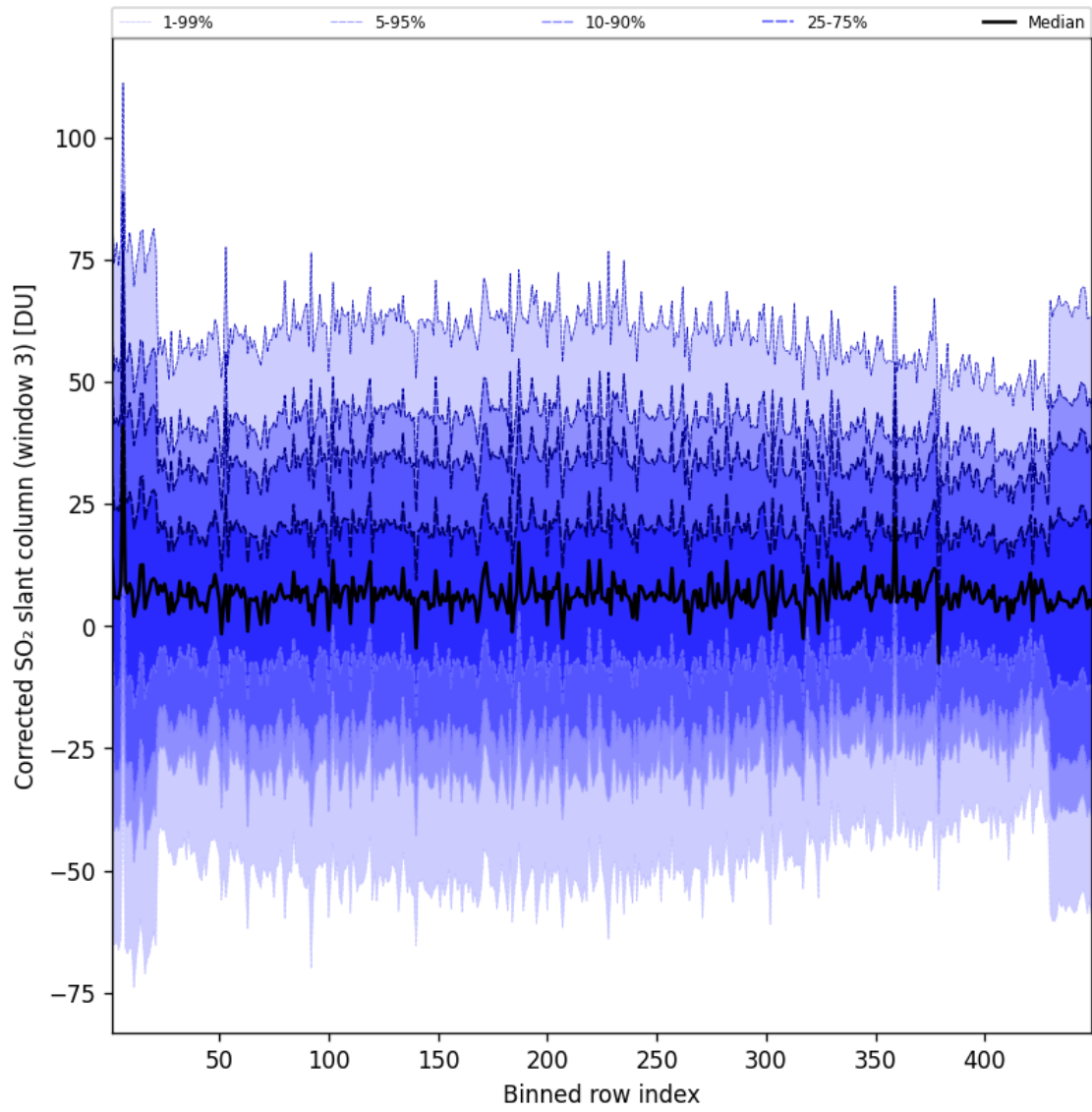


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2024-12-03 to 2024-12-03

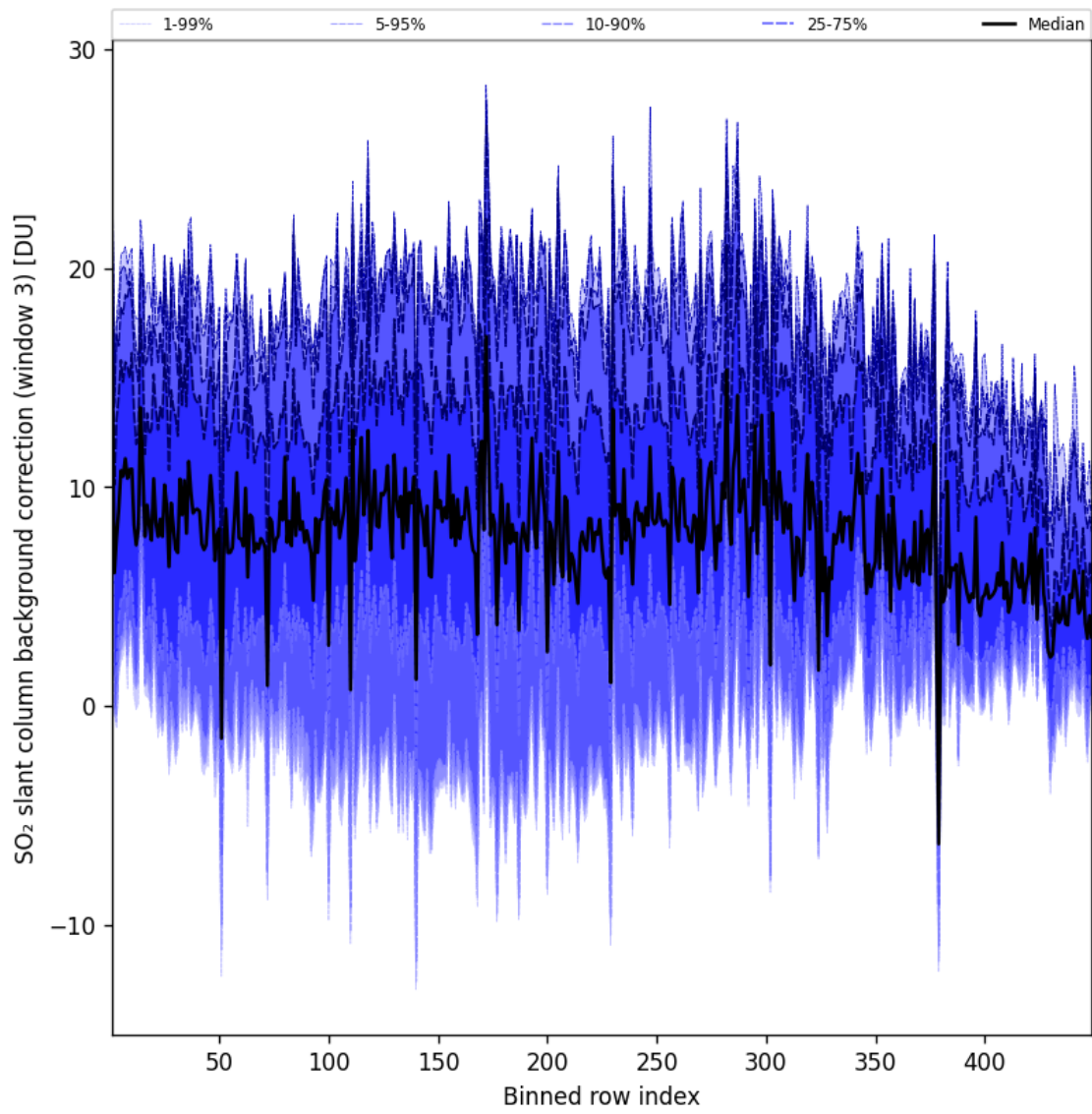


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2024-12-03 to 2024-12-03

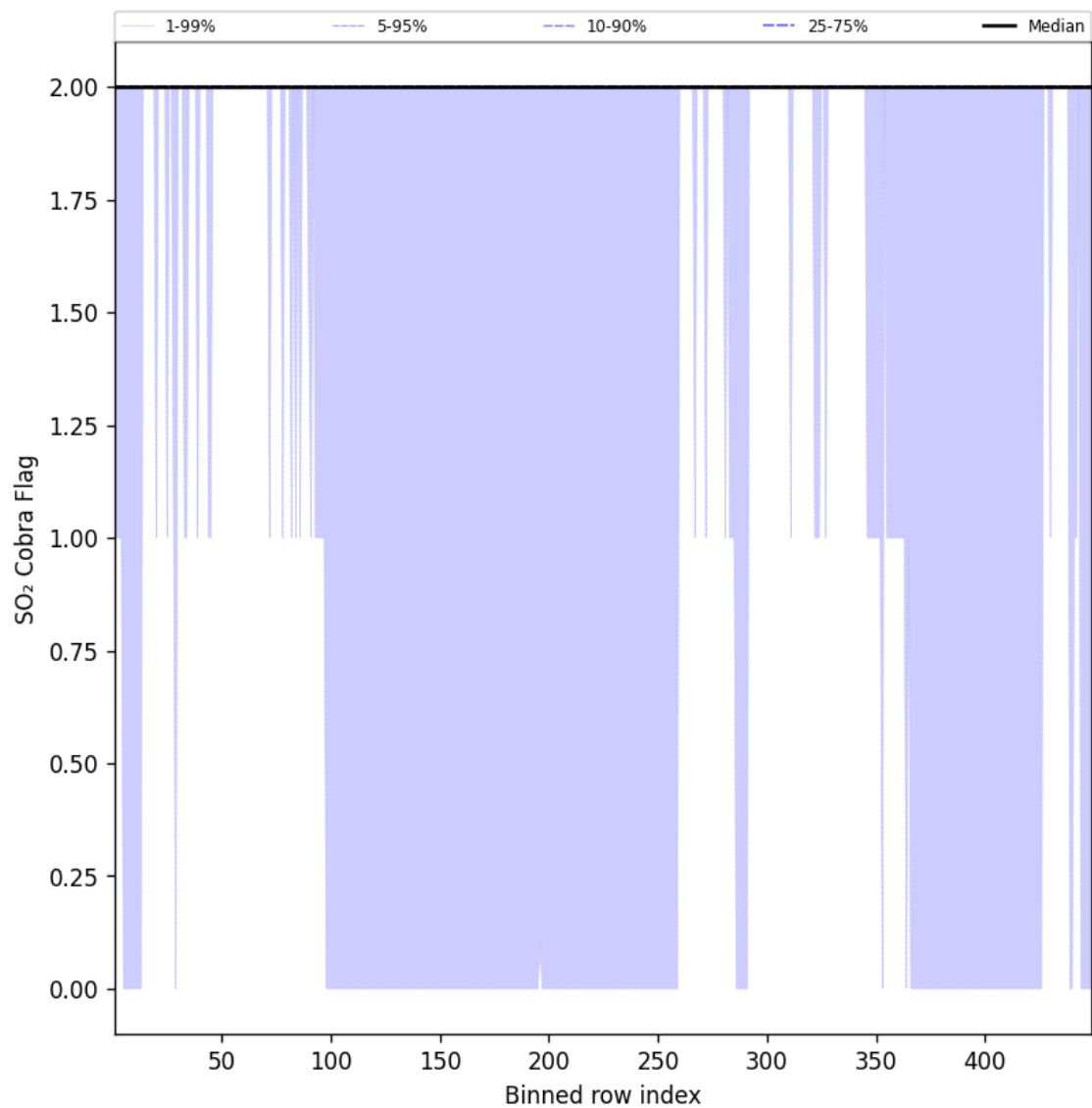


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2024-12-03 to 2024-12-03

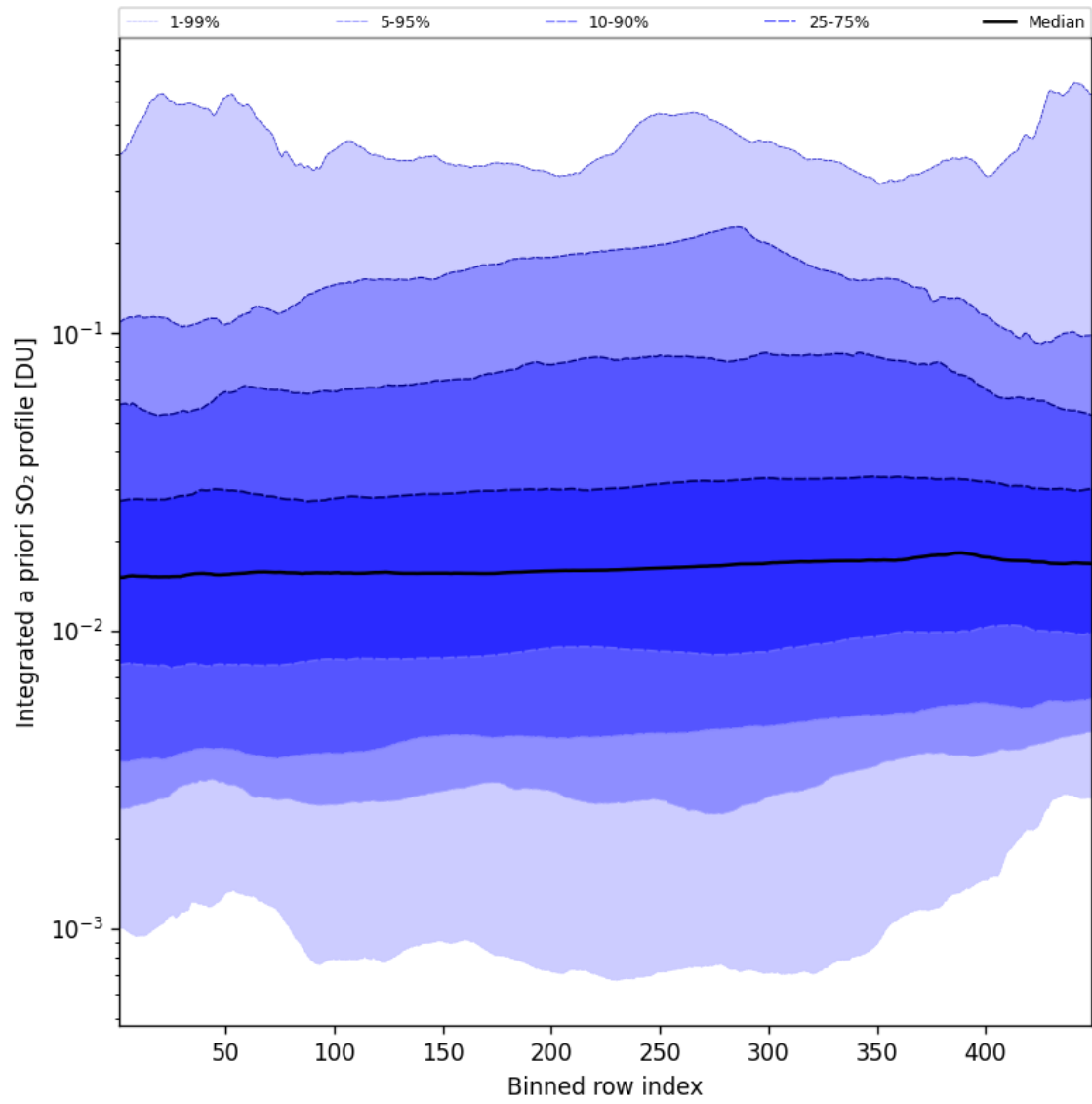


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2024-12-03 to 2024-12-03

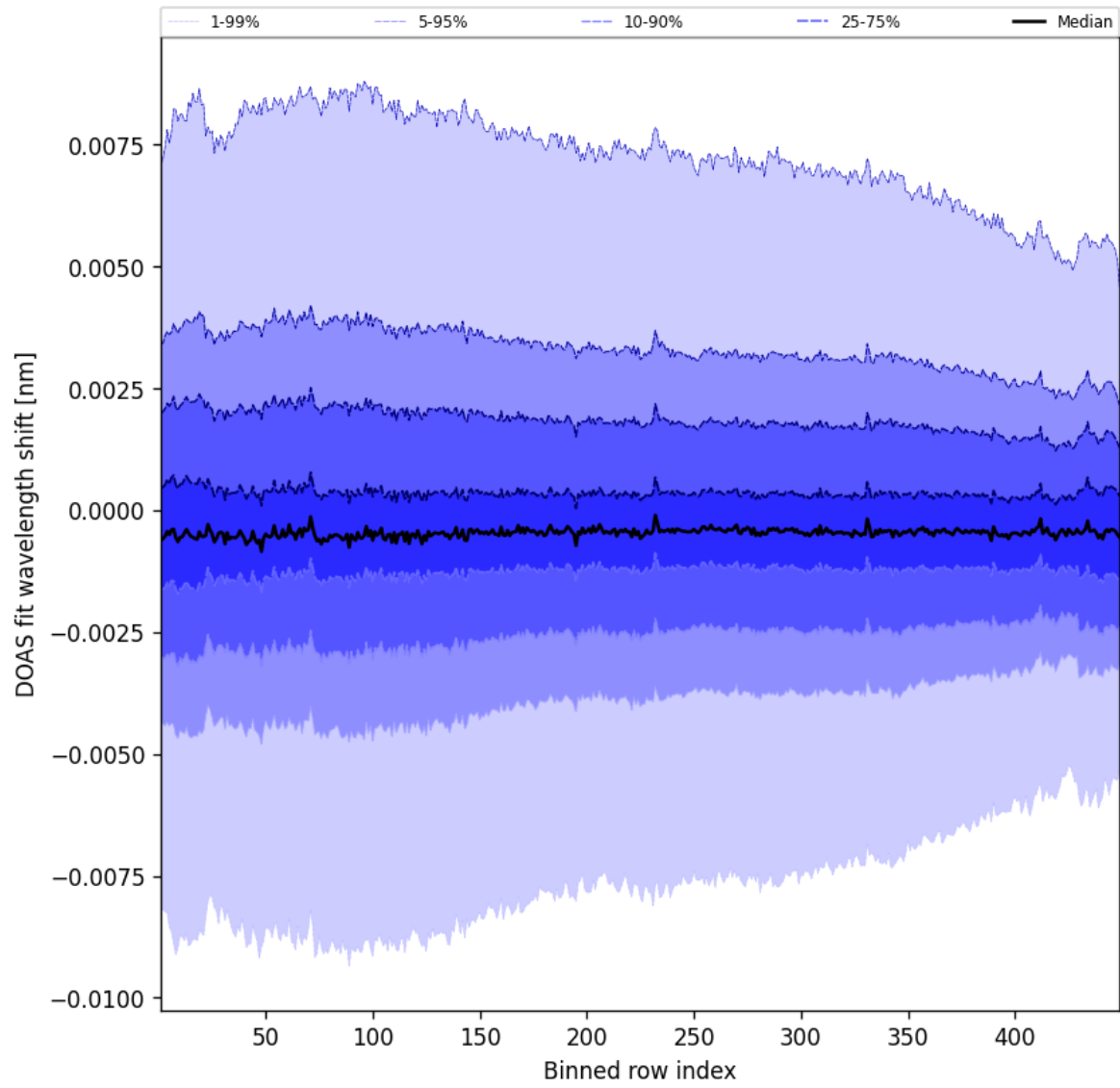


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2024-12-03 to 2024-12-03

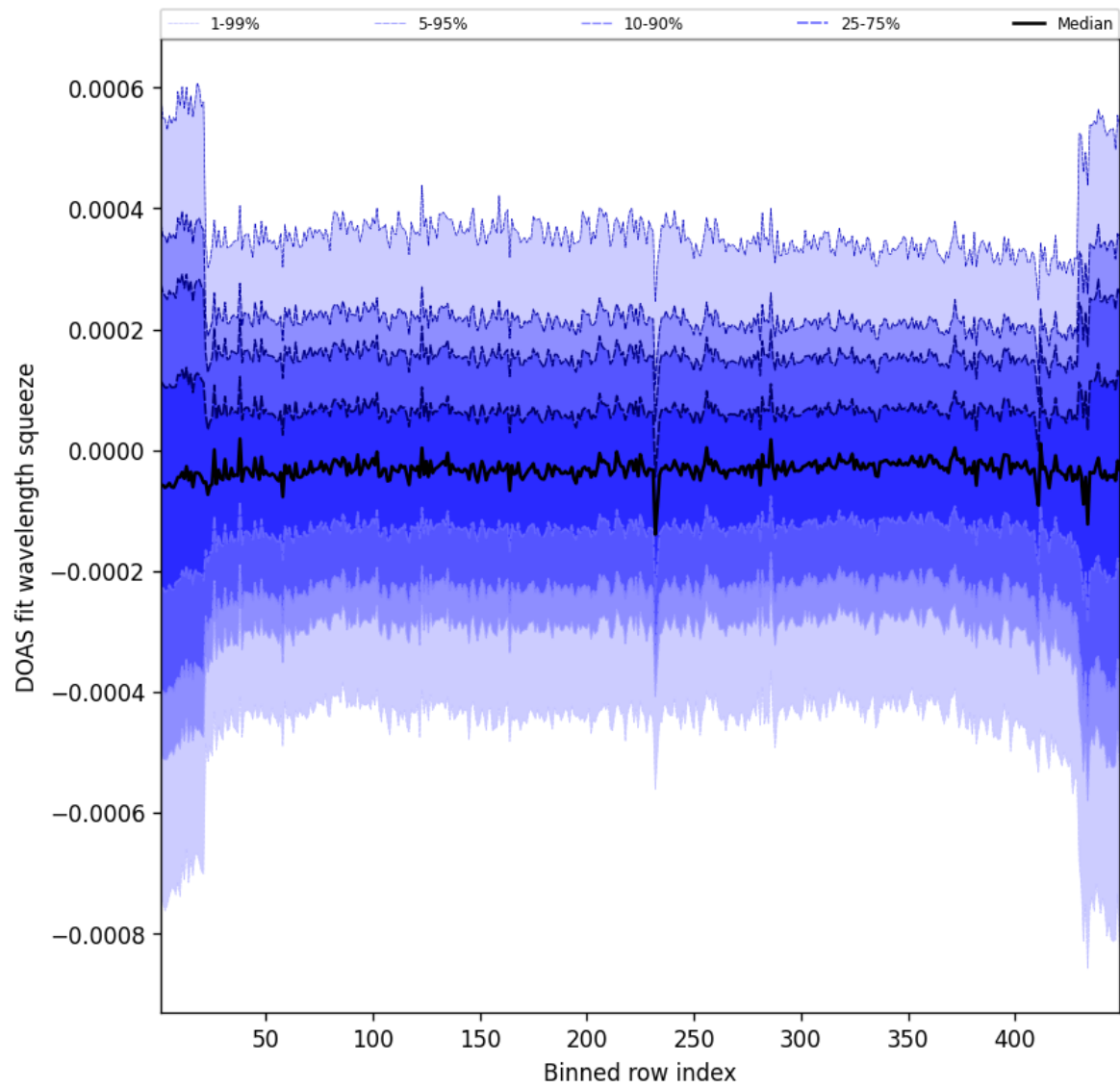


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2024-12-03 to 2024-12-03

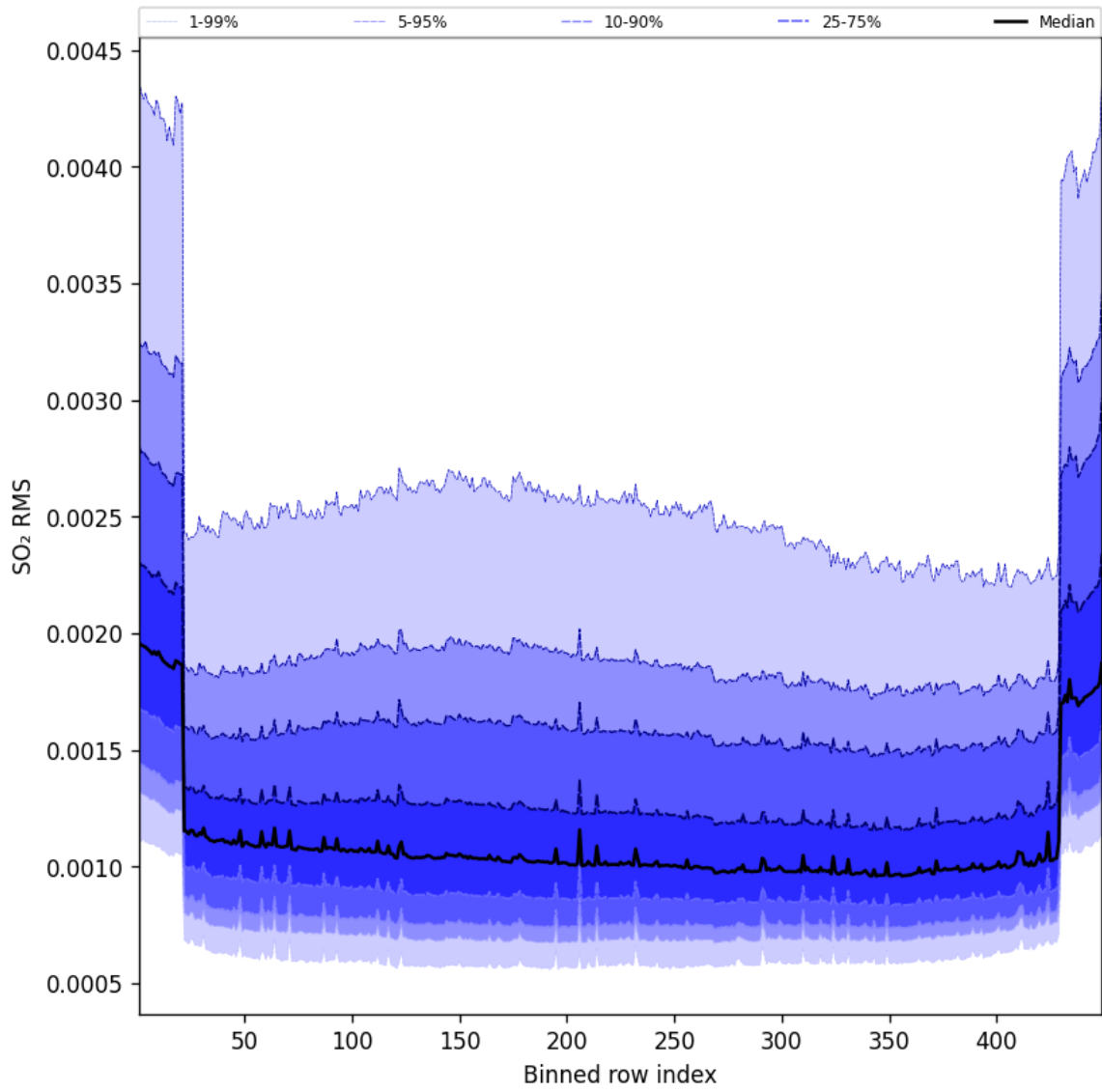


Figure 106: Along track statistics of “SO₂ RMS” for 2024-12-03 to 2024-12-03

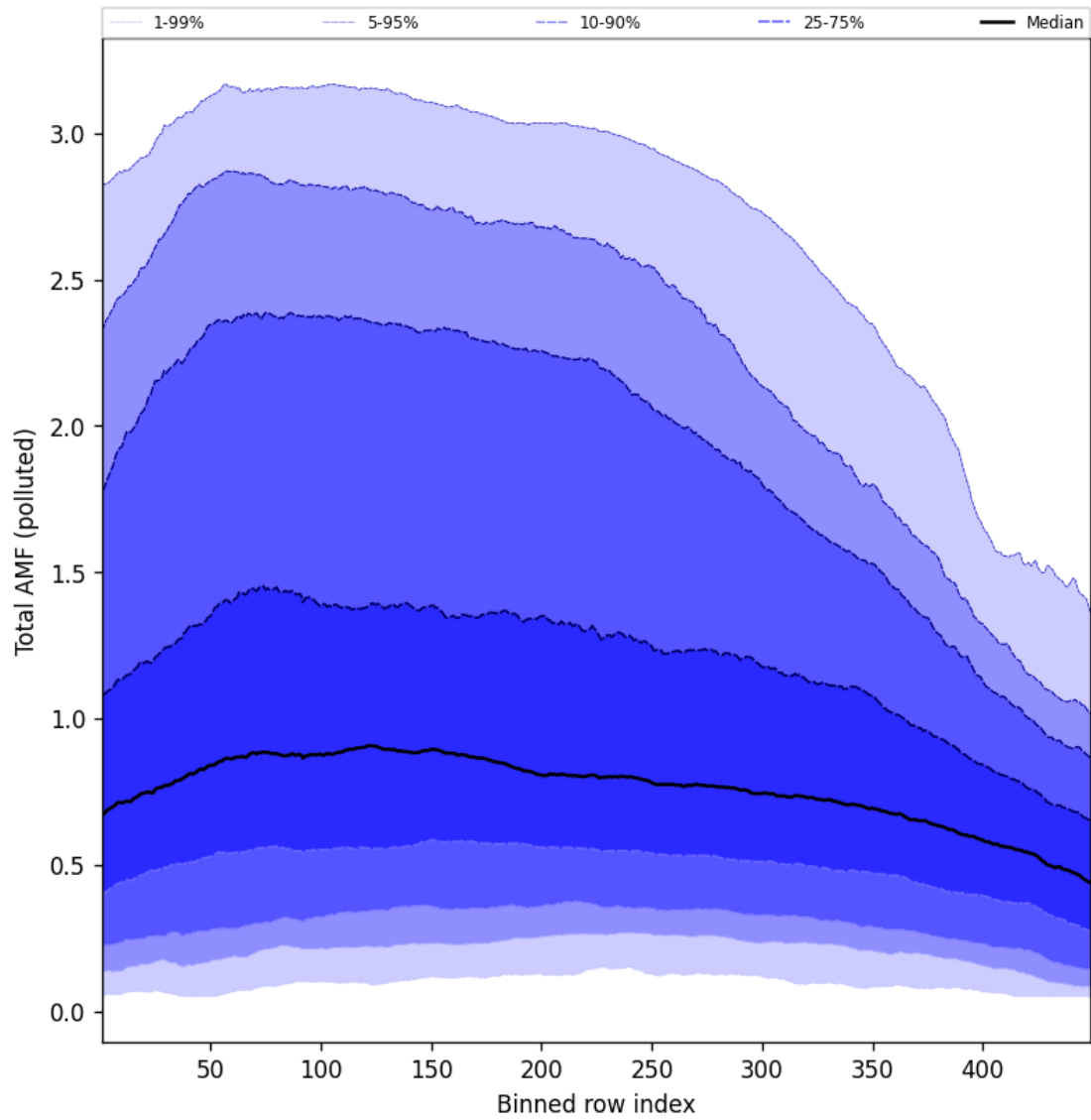


Figure 107: Along track statistics of “Total AMF (polluted)” for 2024-12-03 to 2024-12-03

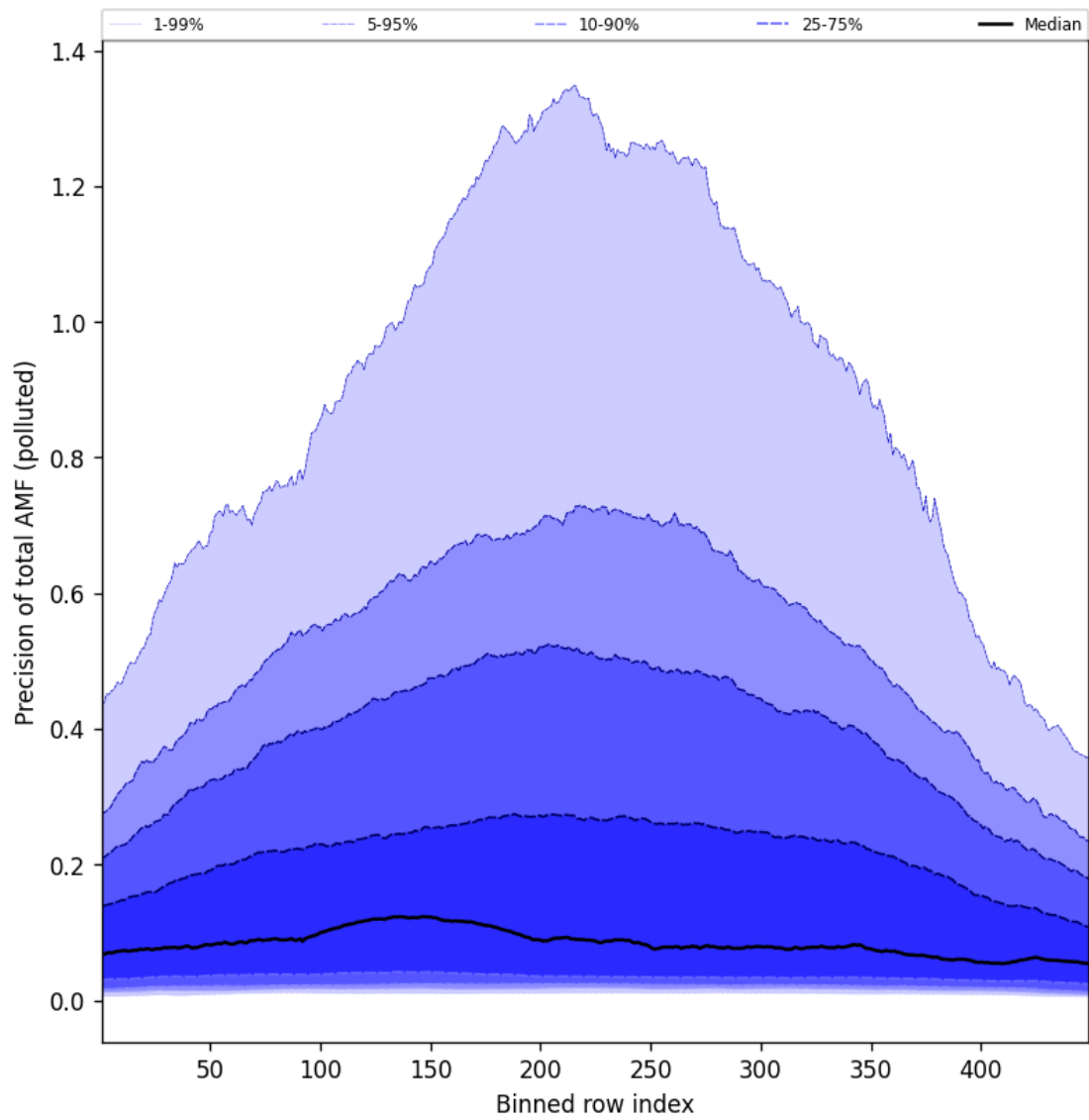


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2024-12-03 to 2024-12-03

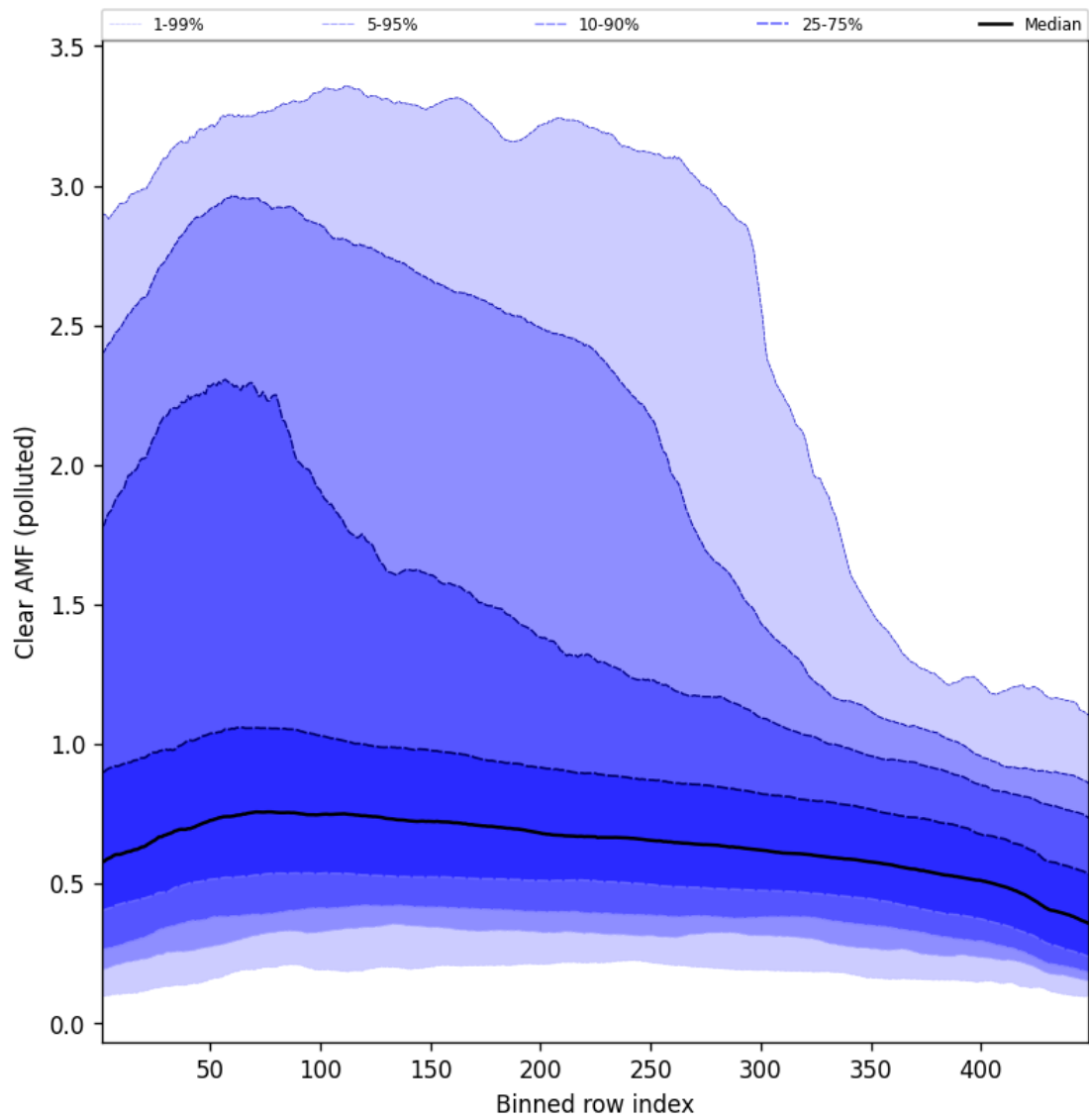


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2024-12-03 to 2024-12-03

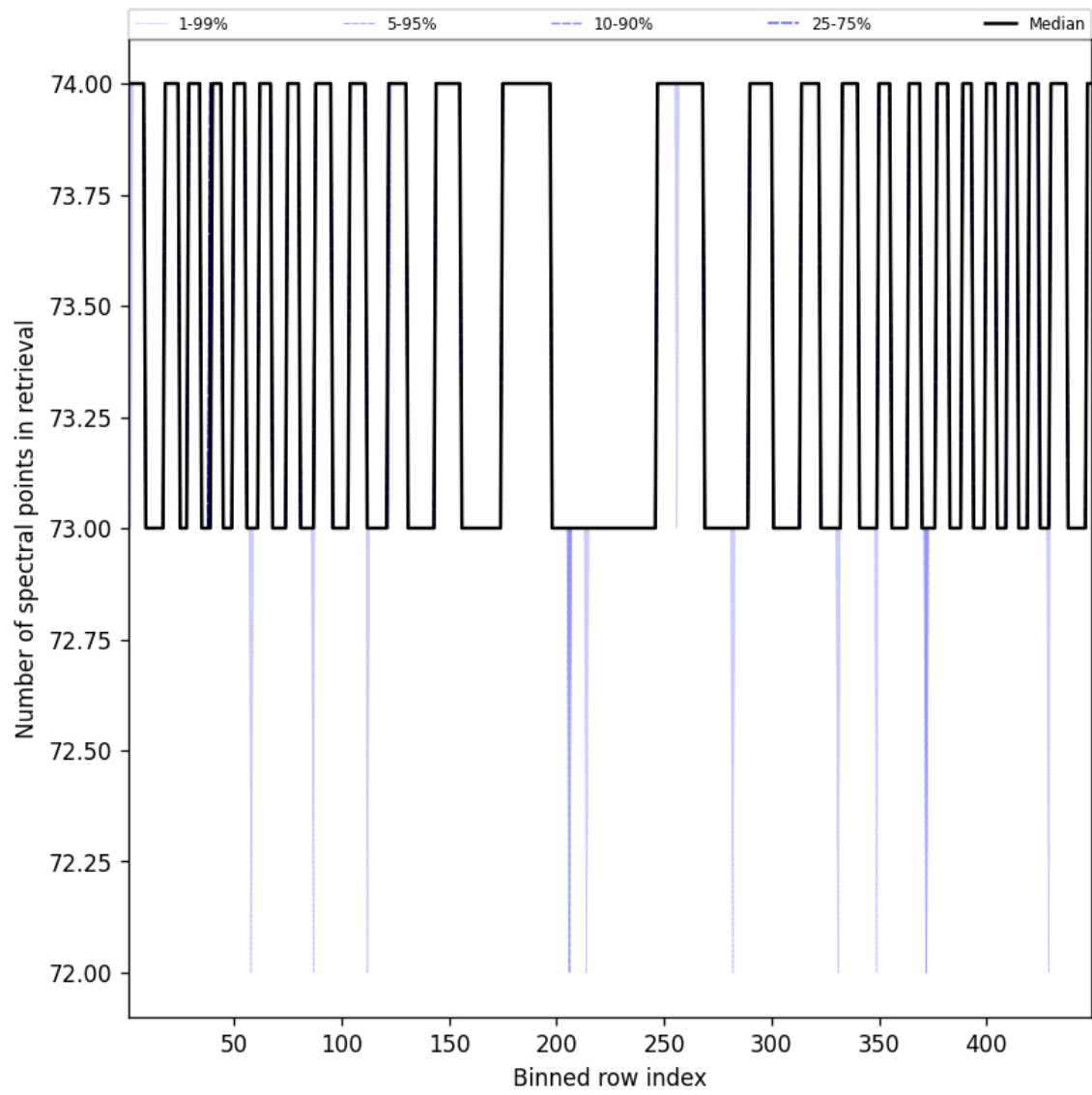


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2024-12-03 to 2024-12-03

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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