

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]	0.621 ± 0.417	17322029	0.995	0.820	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(5.479 \pm 204.858) \times 10^{-2}$	17322029	0.235	0.427	9.626×10^{-3}	-214	364
sulfurdioxide total vertical column precision [DU]	0.657 ± 1.396	17322029	0.222	0.360	0.314	3.295×10^{-2}	68.5
sulfurdioxide slant column density corrected [DU]	$(1.848 \pm 36.466) \times 10^{-2}$	17322029	0.235	0.340	8.733×10^{-3}	-25.0	60.1
sulfurdioxide slant column density cobra [DU]	$(1.824 \pm 35.021) \times 10^{-2}$	17322029	0.235	0.340	8.733×10^{-3}	-25.0	40.5
sulfurdioxide slant column density cobra precision [DU]	0.274 ± 0.131	17322029	0.213	0.113	0.234	7.887×10^{-2}	21.7
sulfurdioxide slant column density window1 [DU]	0.162 ± 0.653	17322029	0.175	0.711	0.171	-74.4	96.6
sulfurdioxide slant column density window1 precision [DU]	0.274 ± 0.131	17322029	0.213	0.113	0.234	7.887×10^{-2}	21.7
sulfurdioxide slant column density corrected win1 [DU]	$(5.794 \pm 63.414) \times 10^{-2}$	17322029	2.500×10^{-2}	0.678	4.135×10^{-2}	-74.4	96.5
background so2 slant column offset window1 [DU]	-0.104 ± 0.179	17322029	-0.220	0.219	-0.160	-1.40	4.78
sulfurdioxide slant column density window2 [DU]	3.43 ± 8.68	17322029	3.25	10.8	3.27	-916	2.053×10^3
sulfurdioxide slant column density window2 precision [DU]	7.82 ± 2.22	17322029	6.97	2.50	7.46	2.12	657
sulfurdioxide slant column density corrected win2 [DU]	$(-5.676 \pm 841.517) \times 10^{-2}$	17322029	-0.250	10.6	-2.977×10^{-2}	-916	2.052×10^3
background so2 slant column offset window2 [DU]	-3.48 ± 2.36	17322029	-1.75	2.63	-2.79	-16.4	3.12
sulfurdioxide slant column density window3 [DU]	-21.1 ± 23.7	17322029	-23.0	29.6	-21.5	-613	717
sulfurdioxide slant column density window3 precision [DU]	27.6 ± 12.5	17322029	23.7	9.56	24.6	9.96	281
sulfurdioxide slant column density corrected win3 [DU]	-3.06 ± 22.75	17322029	-3.92	28.4	-3.11	-606	725
background so2 slant column offset window3 [DU]	18.1 ± 6.9	17322029	15.1	9.84	18.3	-13.4	41.3
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17322029	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.920 \pm 14.849) \times 10^{-2}$	17322029	2.104×10^{-2}	2.677×10^{-2}	2.325×10^{-2}	5.756×10^{-4}	5.85
fitted radiance shift [nm]	$(-5.216 \pm 24.671) \times 10^{-4}$	17322029	-5.000×10^{-4}	1.702×10^{-3}	-5.581×10^{-4}	-5.852×10^{-2}	4.424×10^{-2}
fitted radiance squeeze [1]	$(-5.700 \pm 18.167) \times 10^{-5}$	17322029	-3.000×10^{-5}	2.133×10^{-4}	-4.885×10^{-5}	-1.722×10^{-2}	1.738×10^{-2}
fitted root mean square [1]	$(1.224 \pm 0.518) \times 10^{-3}$	17322029	9.750×10^{-4}	4.775×10^{-4}	1.080×10^{-3}	3.296×10^{-4}	7.127×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.896 ± 0.617	17322029	0.580	0.639	0.734	5.000×10^{-2}	3.12
sulfurdioxide total air mass factor polluted precision [1]	0.133 ± 0.142	17322029	2.500×10^{-2}	0.159	7.624×10^{-2}	2.500×10^{-3}	1.79
sulfurdioxide clear air mass factor polluted [1]	0.799 ± 0.603	17322029	0.540	0.392	0.636	8.947×10^{-3}	3.14
number of spectral points in retrieval [1]	73.4 ± 0.5	17322029	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}	0.180	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-3.60	-1.00	-0.553	-0.355	-0.200	0.228	0.397	0.622	1.15	4.44
sulfurdioxide total vertical column precision [DU]	7.893×10^{-2}	0.103	0.128	0.156	0.197	0.557	0.846	1.26	2.24	6.37
sulfurdioxide slant column density corrected [DU]	-0.803	-0.456	-0.331	-0.247	-0.160	0.180	0.273	0.364	0.509	0.979
sulfurdioxide slant column density cobra [DU]	-0.803	-0.456	-0.331	-0.247	-0.160	0.180	0.273	0.364	0.509	0.979
sulfurdioxide slant column density cobra precision [DU]	0.133	0.159	0.172	0.183	0.196	0.309	0.371	0.428	0.511	0.759
sulfurdioxide slant column density window1 [DU]	-1.57	-0.841	-0.568	-0.384	-0.190	0.520	0.701	0.873	1.13	1.87
sulfurdioxide slant column density window1 precision [DU]	0.133	0.159	0.172	0.183	0.196	0.309	0.371	0.428	0.511	0.759
sulfurdioxide slant column density corrected win1 [DU]	-1.51	-0.864	-0.627	-0.465	-0.293	0.384	0.569	0.750	1.03	1.85
background so2 slant column offset window1 [DU]	-0.385	-0.315	-0.282	-0.255	-0.226	-7.229×10^{-3}	9.151×10^{-2}	0.165	0.247	0.392
sulfurdioxide slant column density window2 [DU]	-16.8	-10.3	-7.12	-4.76	-2.11	8.74	11.5	14.1	17.7	25.6
sulfurdioxide slant column density window2 precision [DU]	4.20	5.00	5.49	5.88	6.36	8.86	9.74	10.6	11.9	14.5
sulfurdioxide slant column density corrected win2 [DU]	-20.6	-13.7	-10.4	-8.01	-5.34	5.24	7.88	10.2	13.5	20.3
background so2 slant column offset window2 [DU]	-11.1	-8.69	-6.77	-5.57	-4.49	-1.85	-1.59	-1.36	-1.04	9.386×10^{-3}
sulfurdioxide slant column density window3 [DU]	-80.3	-59.5	-50.0	-43.3	-36.0	-6.37	1.52	8.68	18.3	37.1
sulfurdioxide slant column density window3 precision [DU]	14.1	15.8	17.2	18.6	20.5	30.1	34.5	39.8	50.6	80.8
sulfurdioxide slant column density corrected win3 [DU]	-60.6	-40.2	-30.9	-24.3	-17.2	11.2	18.5	25.2	34.2	52.4
background so2 slant column offset window3 [DU]	2.70	6.46	8.50	10.7	13.4	23.3	25.3	27.0	28.8	32.1
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]	3.223×10^{-3}	6.560×10^{-3}	8.748×10^{-3}	1.078×10^{-2}	1.386×10^{-2}	4.063×10^{-2}	5.386×10^{-2}	7.203×10^{-2}	0.139	0.491
fitted radiance shift [nm]	-7.937×10^{-3}	-4.104×10^{-3}	-2.762×10^{-3}	-2.019×10^{-3}	-1.415×10^{-3}	2.868×10^{-4}	9.620×10^{-4}	1.811×10^{-3}	3.273×10^{-3}	7.300×10^{-3}
fitted radiance squeeze [1]	-5.460×10^{-4}	-3.574×10^{-4}	-2.767×10^{-4}	-2.201×10^{-4}	-1.599×10^{-4}	5.346×10^{-5}	1.040×10^{-4}	1.504×10^{-4}	2.165×10^{-4}	3.767×10^{-4}
fitted root mean square [1]	5.763×10^{-4}	7.057×10^{-4}	7.809×10^{-4}	8.381×10^{-4}	9.063×10^{-4}	1.384×10^{-3}	1.614×10^{-3}	1.849×10^{-3}	2.219×10^{-3}	3.163×10^{-3}
sulfurdioxide total air mass factor polluted [1]	5.357×10^{-2}	0.163	0.270	0.367	0.483	1.12	1.45	1.83	2.33	2.74
sulfurdioxide total air mass factor polluted precision [1]	7.080×10^{-3}	1.383×10^{-2}	2.033×10^{-2}	2.608×10^{-2}	3.306×10^{-2}	0.192	0.259	0.321	0.407	0.639
sulfurdioxide clear air mass factor polluted [1]	0.131	0.247	0.330	0.402	0.475	0.867	1.00	1.26	2.53	2.95
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]	0.700 ± 0.399	6392354	0.720	1.000	0.0	1.000	0.280	1.000
sulfurdioxide total vertical column [DU]	0.122 ± 3.247	6392354	0.664	1.739×10^{-2}	-214	364	-0.303	0.361
sulfurdioxide total vertical column precision [DU]	1.12 ± 2.12	6392354	0.791	0.473	5.233×10^{-2}	68.5	0.276	1.07
sulfurdioxide slant column density corrected [DU]	$(2.928 \pm 45.066) \times 10^{-2}$	6392354	0.399	1.220×10^{-2}	-10.7	58.1	-0.184	0.215
sulfurdioxide slant column density cobra [DU]	$(2.893 \pm 43.553) \times 10^{-2}$	6392354	0.399	1.220×10^{-2}	-10.7	33.1	-0.184	0.215
sulfurdioxide slant column density cobra precision [DU]	0.328 ± 0.165	6392354	0.175	0.276	8.903×10^{-2}	13.5	0.218	0.393
sulfurdioxide slant column density window1 [DU]	0.238 ± 0.768	6392354	0.800	0.247	-12.5	85.6	-0.156	0.644
sulfurdioxide slant column density window1 precision [DU]	0.328 ± 0.165	6392354	0.175	0.276	8.903×10^{-2}	13.5	0.218	0.393
sulfurdioxide slant column density corrected win1 [DU]	$(9.043 \pm 76.469) \times 10^{-2}$	6392354	0.790	6.323×10^{-2}	-11.7	85.6	-0.323	0.467
background so2 slant column offset window1 [DU]	-0.148 ± 0.161	6392354	0.156	-0.173	-1.24	4.78	-0.247	-9.071×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.20 ± 9.76	6392354	12.4	3.84	-484	911	-2.18	10.2
sulfurdioxide slant column density window2 precision [DU]	8.69 ± 2.31	6392354	2.84	8.36	2.50	408	7.10	9.94
sulfurdioxide slant column density corrected win2 [DU]	-0.125 ± 9.333	6392354	11.9	-0.120	-484	909	-6.06	5.80
background so2 slant column offset window2 [DU]	-4.33 ± 3.02	6392354	4.29	-3.12	-16.4	2.56	-6.31	-2.02
sulfurdioxide slant column density window3 [DU]	-24.2 ± 25.8	6392354	32.7	-23.6	-209	149	-40.2	-7.51
sulfurdioxide slant column density window3 precision [DU]	30.1 ± 12.4	6392354	9.49	27.3	10.9	230	23.3	32.8
sulfurdioxide slant column density corrected win3 [DU]	-3.19 ± 25.14	6392354	31.8	-2.84	-183	175	-18.9	13.0
background so2 slant column offset window3 [DU]	21.0 ± 6.0	6392354	9.42	20.5	-6.32	41.3	16.2	25.7
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.29	6392354	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(8.642 \pm 23.667) \times 10^{-2}$	6392354	5.288×10^{-2}	2.781×10^{-2}	8.726×10^{-4}	5.85	1.432×10^{-2}	6.720×10^{-2}
fitted radiance shift [nm]	$(-3.609 \pm 24.914) \times 10^{-4}$	6392354	1.665×10^{-3}	-3.933×10^{-4}	-3.784×10^{-2}	3.427×10^{-2}	-1.214×10^{-3}	4.519×10^{-4}
fitted radiance squeeze [1]	$(-7.311 \pm 191.822) \times 10^{-6}$	6392354	2.151×10^{-4}	-3.937×10^{-6}	-4.824×10^{-3}	1.289×10^{-2}	-1.122×10^{-4}	1.029×10^{-4}
fitted root mean square [1]	$(1.420 \pm 0.649) \times 10^{-3}$	6392354	7.032×10^{-4}	1.211×10^{-3}	3.476×10^{-4}	4.814×10^{-2}	9.859×10^{-4}	1.689×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.645 ± 0.393	6392354	0.534	0.597	5.000×10^{-2}	2.72	0.345	0.878
sulfurdioxide total air mass factor polluted precision [1]	$(9.070 \pm 13.103) \times 10^{-2}$	6392354	8.607×10^{-2}	4.424×10^{-2}	2.500×10^{-3}	1.79	2.351×10^{-2}	0.110
sulfurdioxide clear air mass factor polluted [1]	0.576 ± 0.279	6392354	0.442	0.564	8.947×10^{-3}	2.12	0.343	0.785
number of spectral points in retrieval [1]	73.4 ± 0.5	6392354	1.000	73.0	52.0	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]	0.576 ± 0.420	10929675	0.850	0.490	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	$(1.519 \pm 69.205) \times 10^{-2}$	10929675	0.342	7.089×10^{-3}	-52.7	129	-0.162	0.180
sulfurdioxide total vertical column precision [DU]	0.385 ± 0.511	10929675	0.253	0.261	3.295×10^{-2}	33.6	0.165	0.419
sulfurdioxide slant column density corrected [DU]	$(1.216 \pm 30.308) \times 10^{-2}$	10929675	0.312	7.117×10^{-3}	-25.0	60.1	-0.148	0.164
sulfurdioxide slant column density cobra [DU]	$(1.200 \pm 28.868) \times 10^{-2}$	10929675	0.312	7.117×10^{-3}	-25.0	40.5	-0.148	0.164
sulfurdioxide slant column density cobra precision [DU]	0.243 ± 0.091	10929675	8.037×10^{-2}	0.219	7.887×10^{-2}	21.7	0.188	0.268
sulfurdioxide slant column density window1 [DU]	0.118 ± 0.571	10929675	0.663	0.134	-74.4	96.6	-0.207	0.456
sulfurdioxide slant column density window1 precision [DU]	0.243 ± 0.091	10929675	8.037×10^{-2}	0.219	7.887×10^{-2}	21.7	0.188	0.268
sulfurdioxide slant column density corrected win1 [DU]	$(3.895 \pm 54.253) \times 10^{-2}$	10929675	0.623	3.117×10^{-2}	-74.4	96.5	-0.279	0.345
background so2 slant column offset window1 [DU]	$(-7.903 \pm 18.393) \times 10^{-2}$	10929675	0.273	-0.147	-1.40	2.90	-0.218	5.489×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.97 ± 7.94	10929675	10.1	2.99	-916	2.053×10^3	-2.07	8.04
sulfurdioxide slant column density window2 precision [DU]	7.30 ± 2.00	10929675	2.09	7.04	2.12	657	6.08	8.17
sulfurdioxide slant column density corrected win2 [DU]	$(-1.666 \pm 782.862) \times 10^{-2}$	10929675	9.93	1.411×10^{-2}	-916	2.052×10^3	-4.97	4.96
background so2 slant column offset window2 [DU]	-2.99 ± 1.69	10929675	2.27	-2.61	-12.9	3.12	-4.03	-1.76
sulfurdioxide slant column density window3 [DU]	-19.4 ± 22.3	10929675	28.1	-20.4	-613	717	-33.8	-5.75
sulfurdioxide slant column density window3 precision [DU]	26.1 ± 12.3	10929675	8.59	23.1	9.96	281	19.2	27.8
sulfurdioxide slant column density corrected win3 [DU]	-2.99 ± 21.23	10929675	26.6	-3.24	-606	725	-16.3	10.3
background so2 slant column offset window3 [DU]	16.4 ± 6.9	10929675	10.9	16.8	-13.4	35.4	10.9	21.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	10929675	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.743 \pm 3.002) \times 10^{-2}$	10929675	2.066×10^{-2}	2.205×10^{-2}	5.756×10^{-4}	1.84	1.361×10^{-2}	3.427×10^{-2}
fitted radiance shift [nm]	$(-6.156 \pm 24.479) \times 10^{-4}$	10929675	1.690×10^{-3}	-6.584×10^{-4}	-5.852×10^{-2}	4.424×10^{-2}	-1.512×10^{-3}	1.779×10^{-4}
fitted radiance squeeze [1]	$(-8.606 \pm 16.881) \times 10^{-5}$	10929675	2.072×10^{-4}	-7.372×10^{-5}	-1.722×10^{-2}	1.738×10^{-2}	-1.835×10^{-4}	2.376×10^{-5}
fitted root mean square [1]	$(1.110 \pm 0.379) \times 10^{-3}$	10929675	3.795×10^{-4}	1.025×10^{-3}	3.296×10^{-4}	7.127×10^{-2}	8.727×10^{-4}	1.252×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.04 ± 0.67	10929675	0.798	0.836	5.000×10^{-2}	3.12	0.562	1.36
sulfurdioxide total air mass factor polluted precision [1]	0.158 ± 0.143	10929675	0.195	0.118	5.414×10^{-3}	1.44	4.092×10^{-2}	0.235
sulfurdioxide clear air mass factor polluted [1]	0.929 ± 0.696	10929675	0.408	0.668	0.125	3.14	0.524	0.932
number of spectral points in retrieval [1]	73.4 ± 0.5	10929675	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]	0.664 ± 0.407	12246920	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.752 \pm 109.595) \times 10^{-2}$	12246920	0.433	9.174×10^{-3}	-63.8	129	-0.205	0.228
sulfurdioxide total vertical column precision [DU]	0.537 ± 0.835	12246920	0.297	0.312	4.443×10^{-2}	31.7	0.213	0.509
sulfurdioxide slant column density corrected [DU]	$(1.350 \pm 30.436) \times 10^{-2}$	12246920	0.322	7.403×10^{-3}	-8.90	45.4	-0.152	0.170
sulfurdioxide slant column density cobra [DU]	$(1.347 \pm 30.233) \times 10^{-2}$	12246920	0.322	7.403×10^{-3}	-8.90	33.1	-0.152	0.170
sulfurdioxide slant column density cobra precision [DU]	0.256 ± 0.110	12246920	9.129×10^{-2}	0.222	7.887×10^{-2}	17.1	0.191	0.282
sulfurdioxide slant column density window1 [DU]	0.182 ± 0.590	12246920	0.665	0.187	-37.1	85.6	-0.149	0.517
sulfurdioxide slant column density window1 precision [DU]	0.256 ± 0.110	12246920	9.129×10^{-2}	0.222	7.887×10^{-2}	17.1	0.191	0.282
sulfurdioxide slant column density corrected win1 [DU]	$(5.060 \pm 57.653) \times 10^{-2}$	12246920	0.643	3.844×10^{-2}	-37.1	85.6	-0.280	0.363
background so2 slant column offset window1 [DU]	-0.132 ± 0.149	12246920	0.177	-0.170	-1.40	2.51	-0.230	-5.305×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.98 ± 8.30	12246920	10.5	2.87	-916	911	-2.35	8.16
sulfurdioxide slant column density window2 precision [DU]	7.61 ± 2.03	12246920	2.32	7.31	2.12	420	6.27	8.59
sulfurdioxide slant column density corrected win2 [DU]	-0.125 ± 8.143	12246920	10.4	-8.589×10^{-2}	-916	909	-5.29	5.07
background so2 slant column offset window2 [DU]	-3.10 ± 2.05	12246920	2.09	-2.54	-16.4	3.12	-3.88	-1.79
sulfurdioxide slant column density window3 [DU]	-18.0 ± 23.2	12246920	29.4	-18.6	-366	166	-32.9	-3.44
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 11.9	12246920	8.80	24.5	9.96	272	20.9	29.7
sulfurdioxide slant column density corrected win3 [DU]	-0.951 ± 22.119	12246920	28.1	-1.36	-358	177	-15.1	13.0
background so2 slant column offset window3 [DU]	17.1 ± 6.5	12246920	8.73	17.3	-13.4	41.3	12.9	21.6
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.11	12246920	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.423 \pm 6.838) \times 10^{-2}$	12246920	2.195×10^{-2}	2.337×10^{-2}	9.137×10^{-4}	4.41	1.499×10^{-2}	3.695×10^{-2}
fitted radiance shift [nm]	$(-4.505 \pm 24.120) \times 10^{-4}$	12246920	1.775×10^{-3}	-4.555×10^{-4}	-5.852×10^{-2}	4.424×10^{-2}	-1.365×10^{-3}	4.096×10^{-4}
fitted radiance squeeze [1]	$(-4.877 \pm 16.741) \times 10^{-5}$	12246920	1.970×10^{-4}	-4.163×10^{-5}	-1.722×10^{-2}	1.738×10^{-2}	-1.431×10^{-4}	5.383×10^{-5}
fitted root mean square [1]	$(1.147 \pm 0.450) \times 10^{-3}$	12246920	3.843×10^{-4}	1.026×10^{-3}	3.453×10^{-4}	4.814×10^{-2}	8.787×10^{-4}	1.263×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.797 ± 0.425	12246920	0.507	0.725	5.000×10^{-2}	2.55	0.508	1.01
sulfurdioxide total air mass factor polluted precision [1]	0.123 ± 0.124	12246920	0.140	6.902×10^{-2}	2.500×10^{-3}	1.38	3.499×10^{-2}	0.175
sulfurdioxide clear air mass factor polluted [1]	0.660 ± 0.246	12246920	0.307	0.626	3.056×10^{-2}	2.74	0.493	0.800
number of spectral points in retrieval [1]	73.4 ± 0.5	12246920	1.000	73.0	52.0	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]	0.512 ± 0.420	4430023	0.900	0.460	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	$(9.362 \pm 255.974) \times 10^{-2}$	4430023	0.375	9.077×10^{-3}	-181	307	-0.170	0.205
sulfurdioxide total vertical column precision [DU]	0.804 ± 1.745	4430023	0.559	0.294	3.295×10^{-2}	60.3	0.128	0.687
sulfurdioxide slant column density corrected [DU]	$(2.690 \pm 44.092) \times 10^{-2}$	4430023	0.387	1.141×10^{-2}	-25.0	58.1	-0.180	0.208
sulfurdioxide slant column density cobra [DU]	$(2.646 \pm 41.660) \times 10^{-2}$	4430023	0.387	1.141×10^{-2}	-25.0	40.5	-0.180	0.208
sulfurdioxide slant column density cobra precision [DU]	0.310 ± 0.145	4430023	0.137	0.269	8.395×10^{-2}	21.7	0.220	0.357
sulfurdioxide slant column density window1 [DU]	0.101 ± 0.762	4430023	0.839	0.107	-74.4	96.6	-0.323	0.517
sulfurdioxide slant column density window1 precision [DU]	0.310 ± 0.145	4430023	0.137	0.269	8.395×10^{-2}	21.7	0.220	0.357
sulfurdioxide slant column density corrected win1 [DU]	$(6.989 \pm 73.108) \times 10^{-2}$	4430023	0.771	4.645×10^{-2}	-74.4	96.5	-0.332	0.439
background so2 slant column offset window1 [DU]	$(-3.062 \pm 22.188) \times 10^{-2}$	4430023	0.372	-0.106	-1.18	4.44	-0.211	0.161
sulfurdioxide slant column density window2 [DU]	4.44 ± 9.29	4430023	11.5	4.30	-583	2.053×10^3	-1.41	10.1
sulfurdioxide slant column density window2 precision [DU]	8.23 ± 2.50	4430023	2.84	7.83	2.12	489	6.59	9.42
sulfurdioxide slant column density corrected win2 [DU]	$(6.606 \pm 894.729) \times 10^{-2}$	4430023	11.0	9.265×10^{-2}	-584	2.052×10^3	-5.45	5.59
background so2 slant column offset window2 [DU]	-4.37 ± 2.68	4430023	3.88	-4.03	-16.4	3.12	-5.97	-2.09
sulfurdioxide slant column density window3 [DU]	-28.8 ± 23.0	4430023	28.0	-28.3	-613	717	-42.5	-14.5
sulfurdioxide slant column density window3 precision [DU]	27.6 ± 13.7	4430023	11.4	24.5	10.5	281	19.1	30.5
sulfurdioxide slant column density corrected win3 [DU]	-8.15 ± 23.27	4430023	28.3	-7.32	-606	725	-21.8	6.45
background so2 slant column offset window3 [DU]	20.6 ± 7.3	4430023	11.1	22.4	-13.4	41.2	15.2	26.3
sulfurdioxide slant column cobra flag [1]	1.93 ± 0.35	4430023	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.487 \pm 22.385) \times 10^{-2}$	4430023	4.515×10^{-2}	2.057×10^{-2}	5.943×10^{-4}	5.85	1.009×10^{-2}	5.524×10^{-2}
fitted radiance shift [nm]	$(-7.185 \pm 25.315) \times 10^{-4}$	4430023	1.397×10^{-3}	-8.067×10^{-4}	-5.487×10^{-2}	4.097×10^{-2}	-1.489×10^{-3}	-9.204×10^{-5}
fitted radiance squeeze [1]	$(-8.264 \pm 20.880) \times 10^{-5}$	4430023	2.590×10^{-4}	-7.896×10^{-5}	-1.504×10^{-2}	1.558×10^{-2}	-2.122×10^{-4}	4.674×10^{-5}
fitted root mean square [1]	$(1.394 \pm 0.570) \times 10^{-3}$	4430023	5.635×10^{-4}	1.262×10^{-3}	3.296×10^{-4}	7.127×10^{-2}	1.034×10^{-3}	1.597×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.21 ± 0.90	4430023	1.73	0.853	5.000×10^{-2}	3.12	0.434	2.16
sulfurdioxide total air mass factor polluted precision [1]	0.165 ± 0.179	4430023	0.211	0.123	2.500×10^{-3}	1.79	2.875×10^{-2}	0.240
sulfurdioxide clear air mass factor polluted [1]	1.22 ± 1.00	4430023	1.96	0.744	8.947×10^{-3}	3.14	0.411	2.37
number of spectral points in retrieval [1]	73.4 ± 0.5	4430023	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

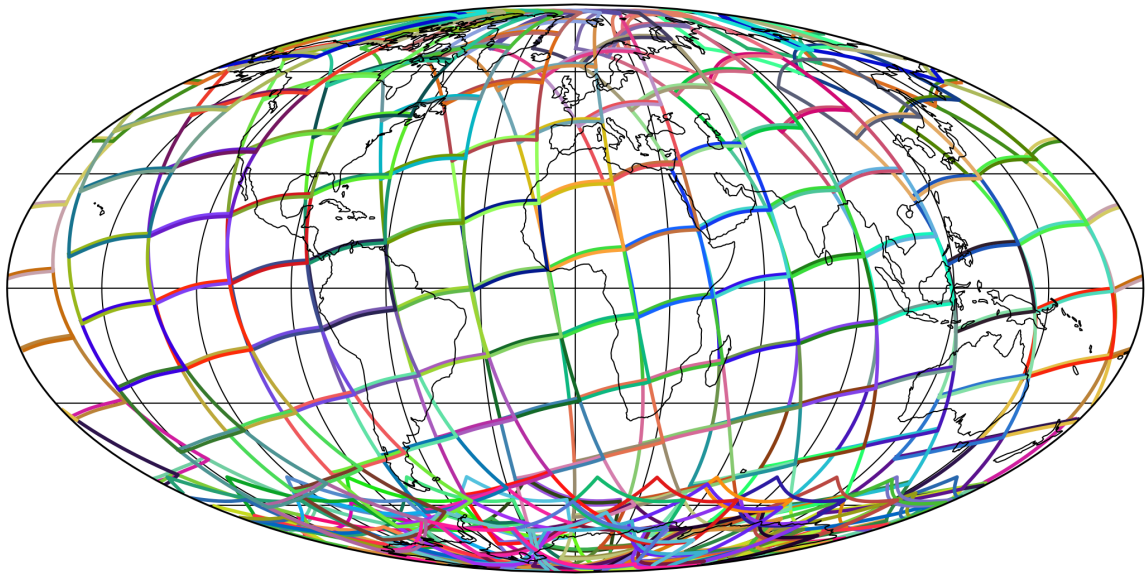


Figure 1: Outline of the granules.

4 Input data monitoring

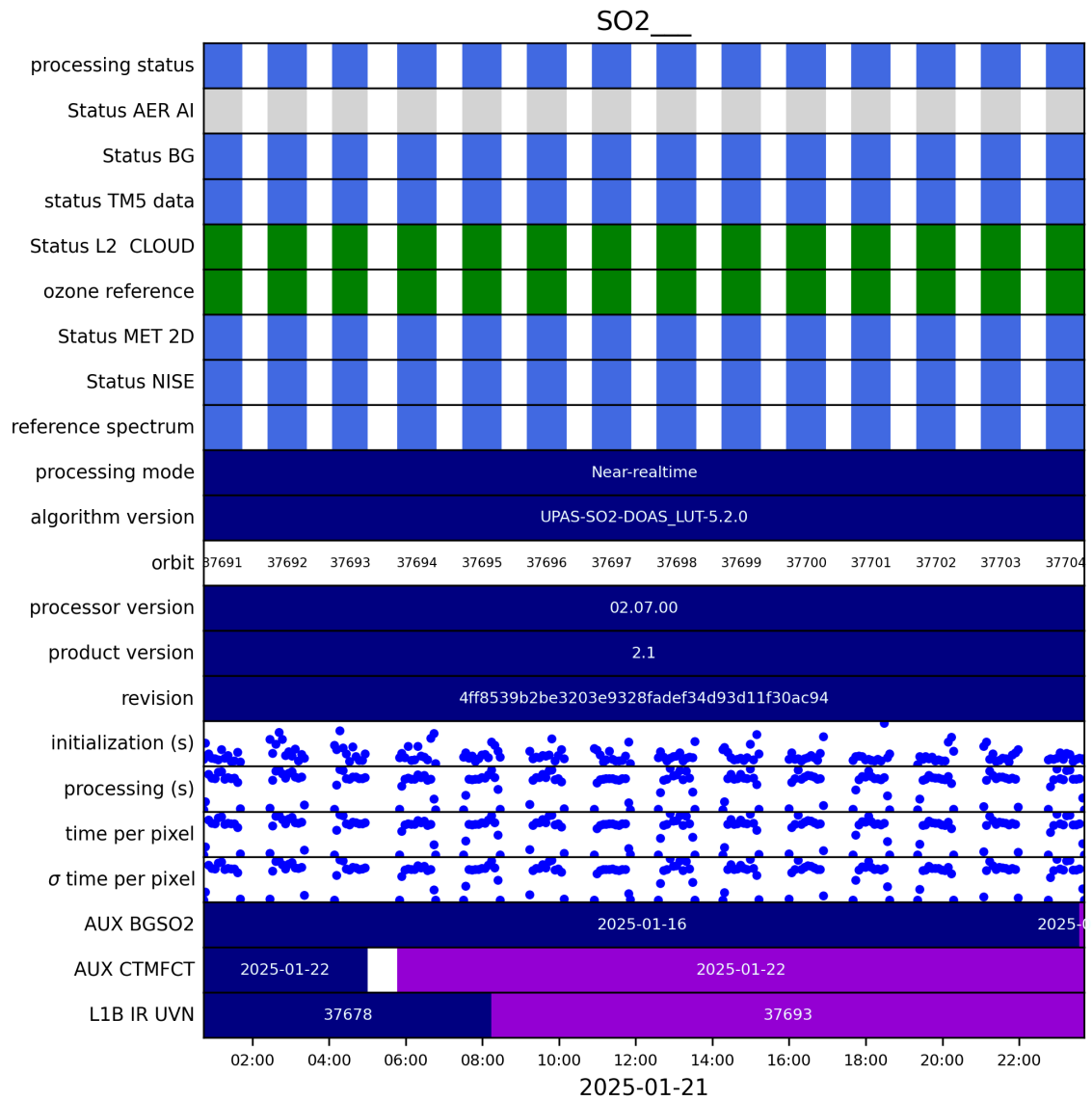


Figure 2: Input data per granule

5 Warnings and errors

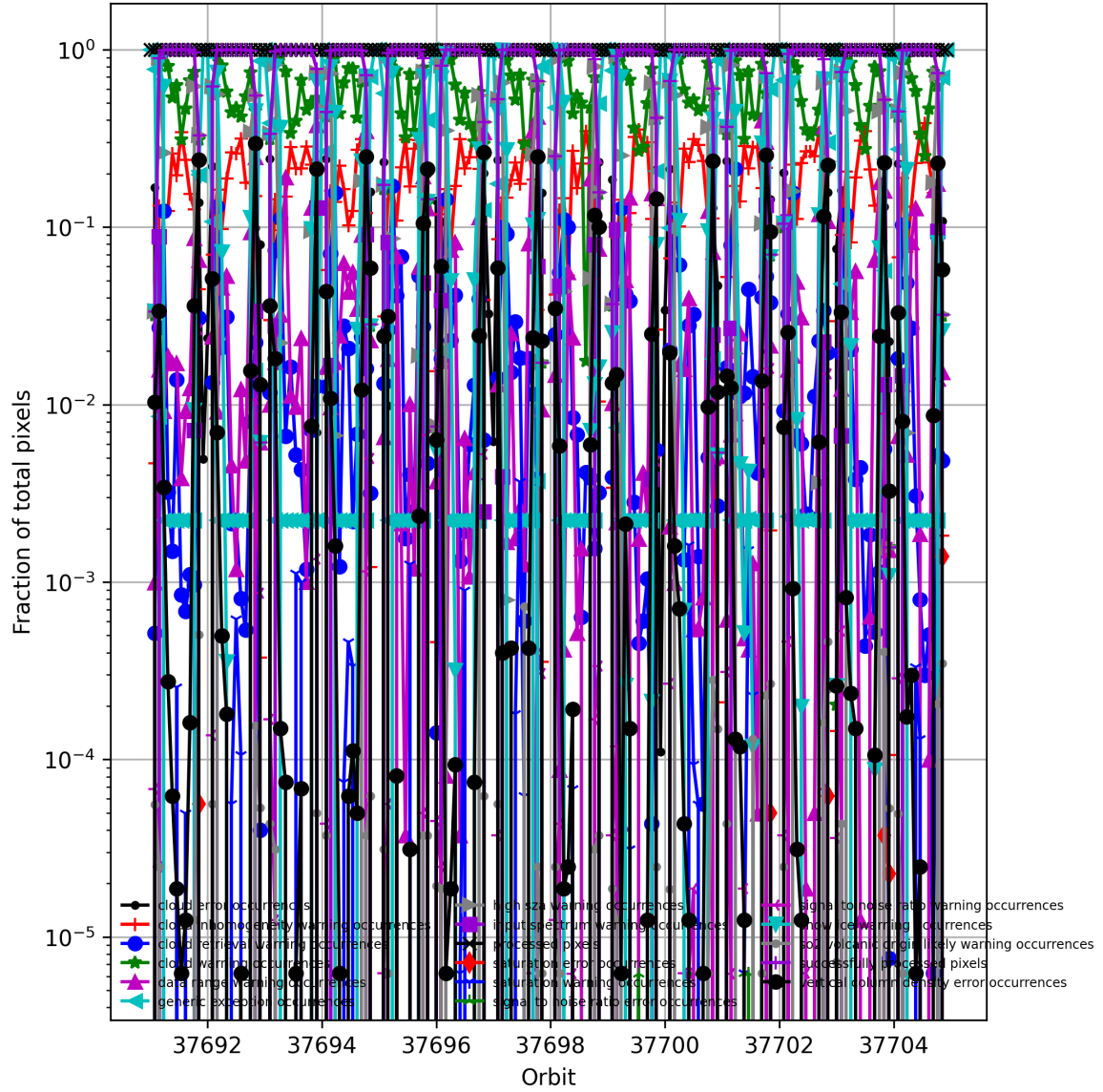


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

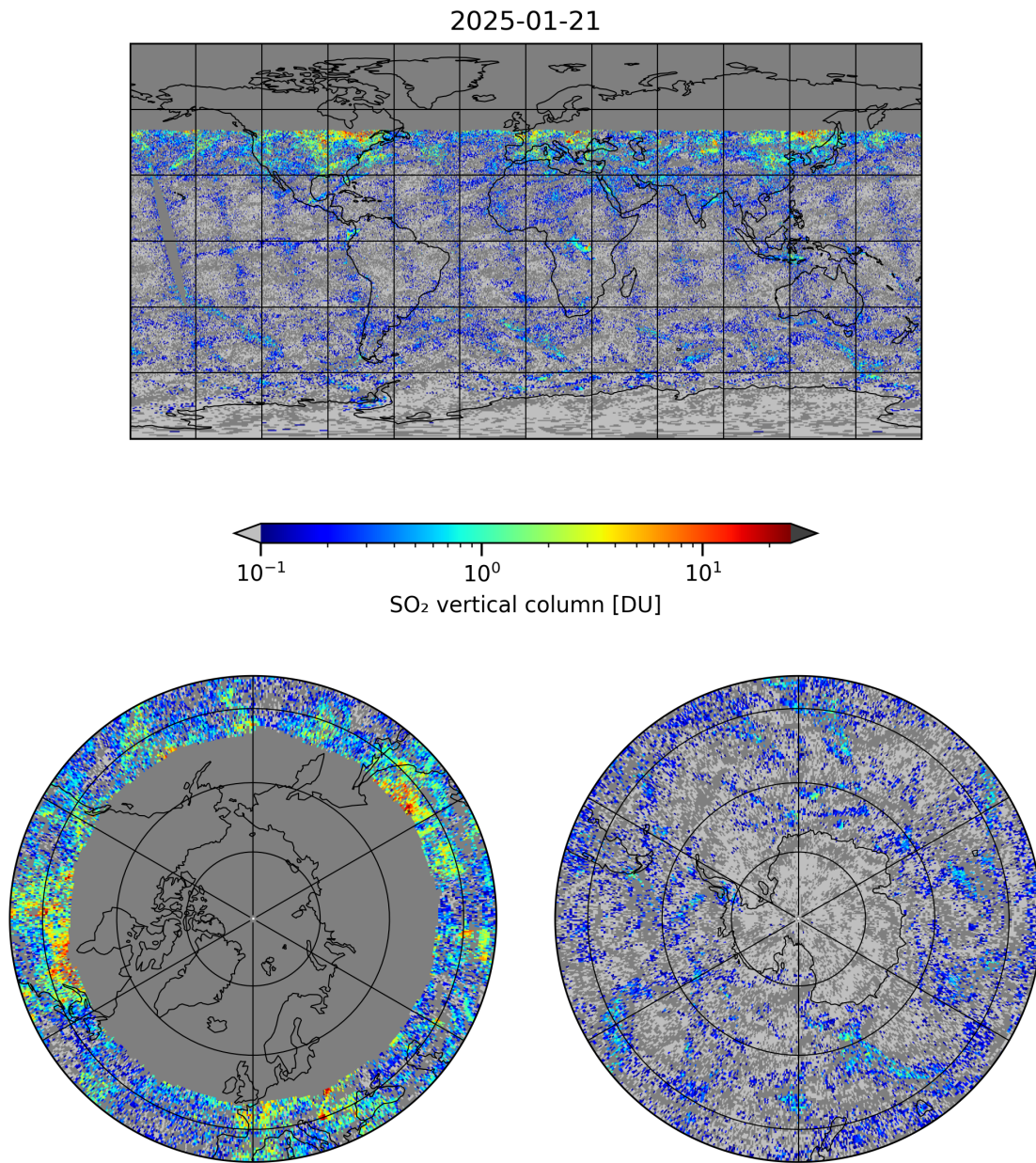


Figure 4: Map of “SO₂ vertical column” for 2025-01-21 to 2025-01-21

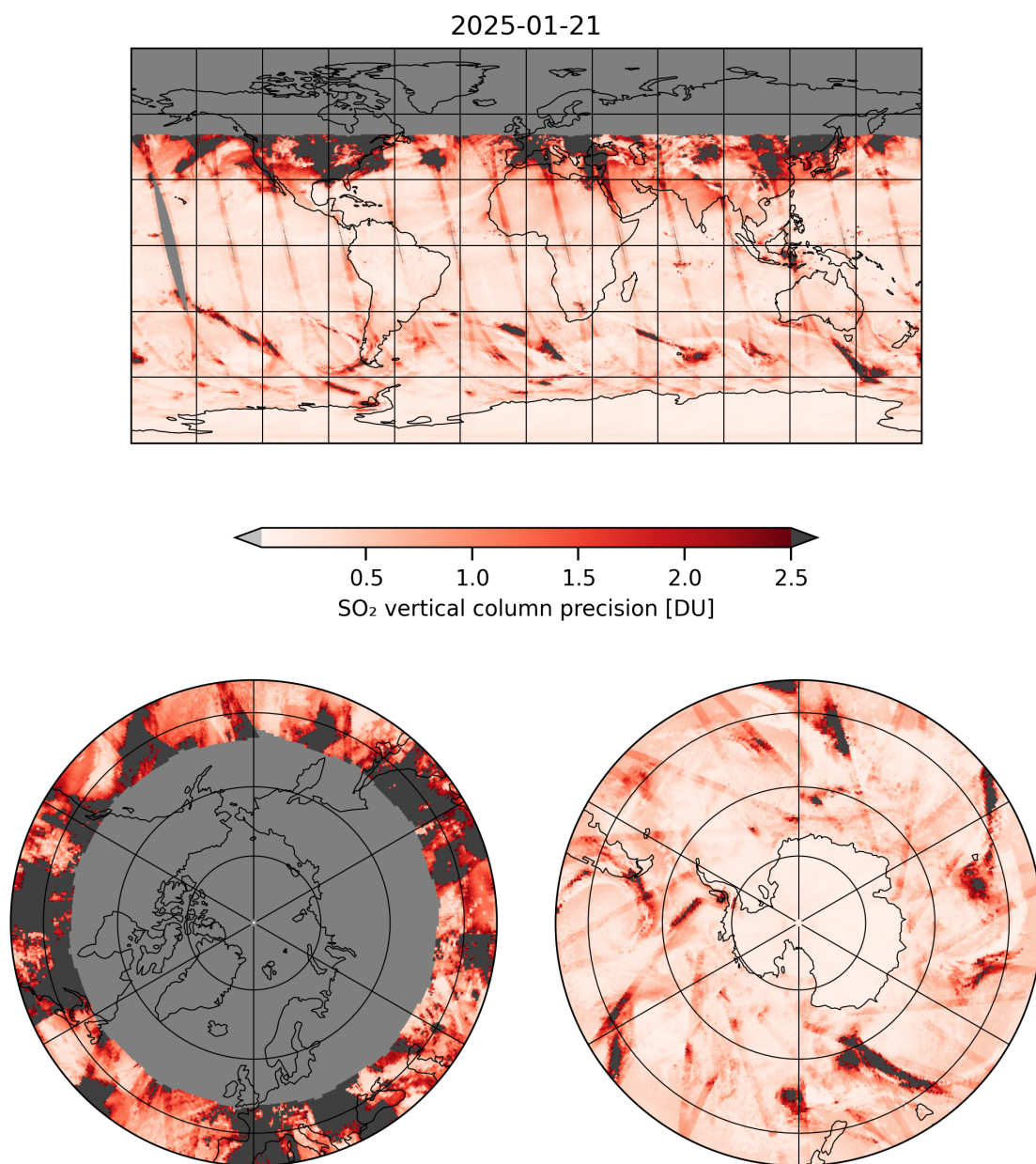


Figure 5: Map of “SO₂ vertical column precision” for 2025-01-21 to 2025-01-21

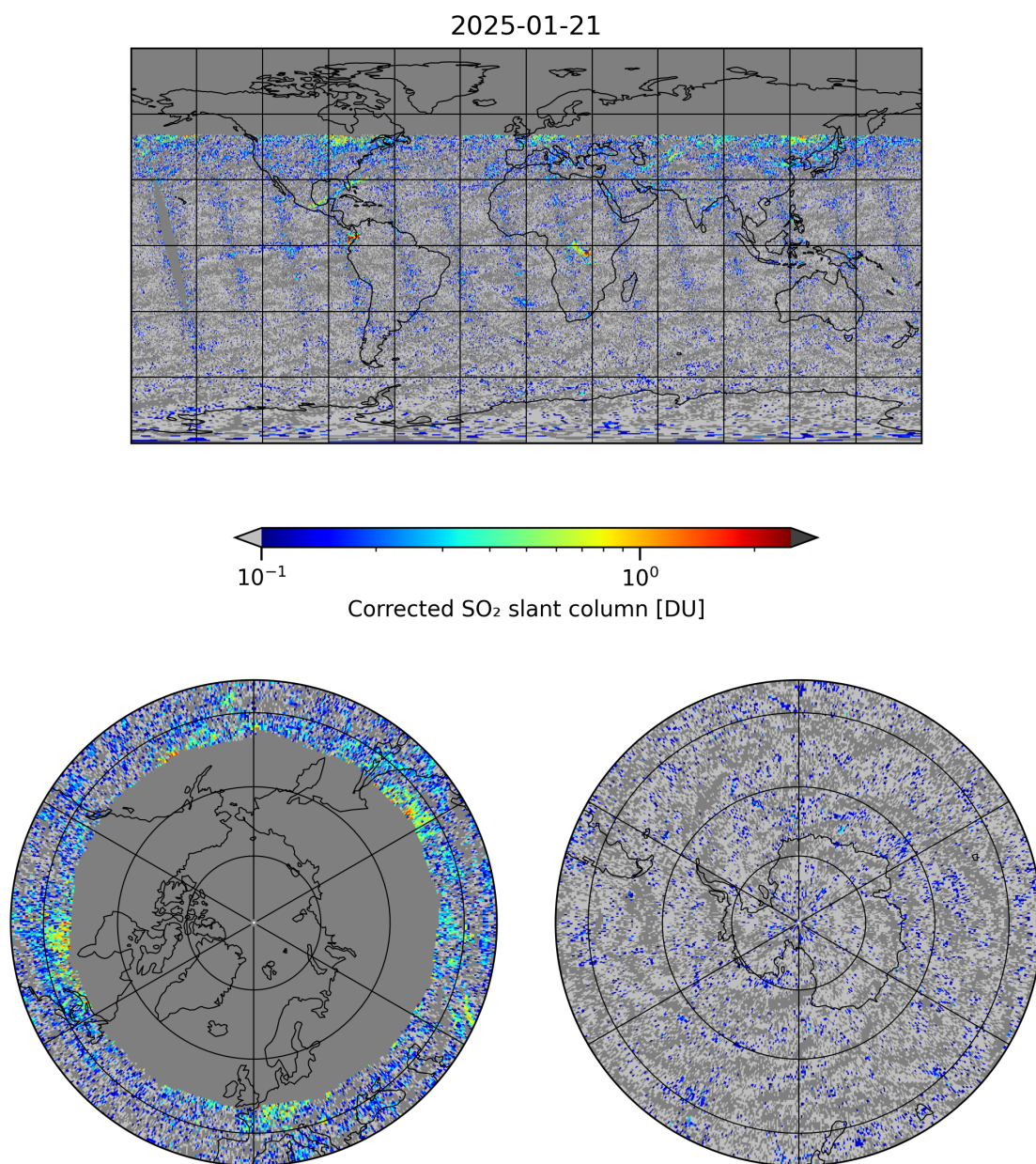


Figure 6: Map of “Corrected SO₂ slant column” for 2025-01-21 to 2025-01-21

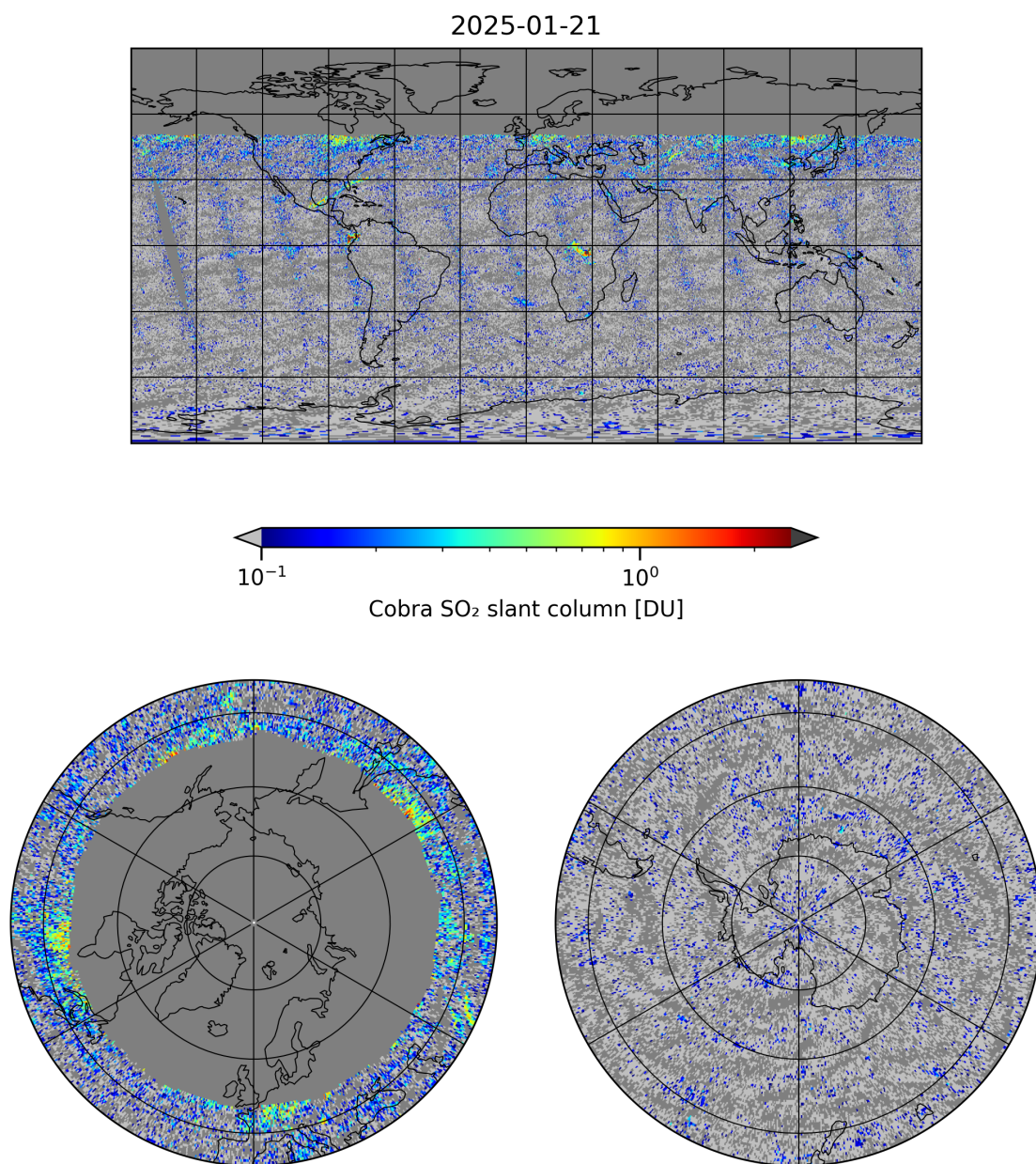


Figure 7: Map of “Cobra SO₂ slant column” for 2025-01-21 to 2025-01-21

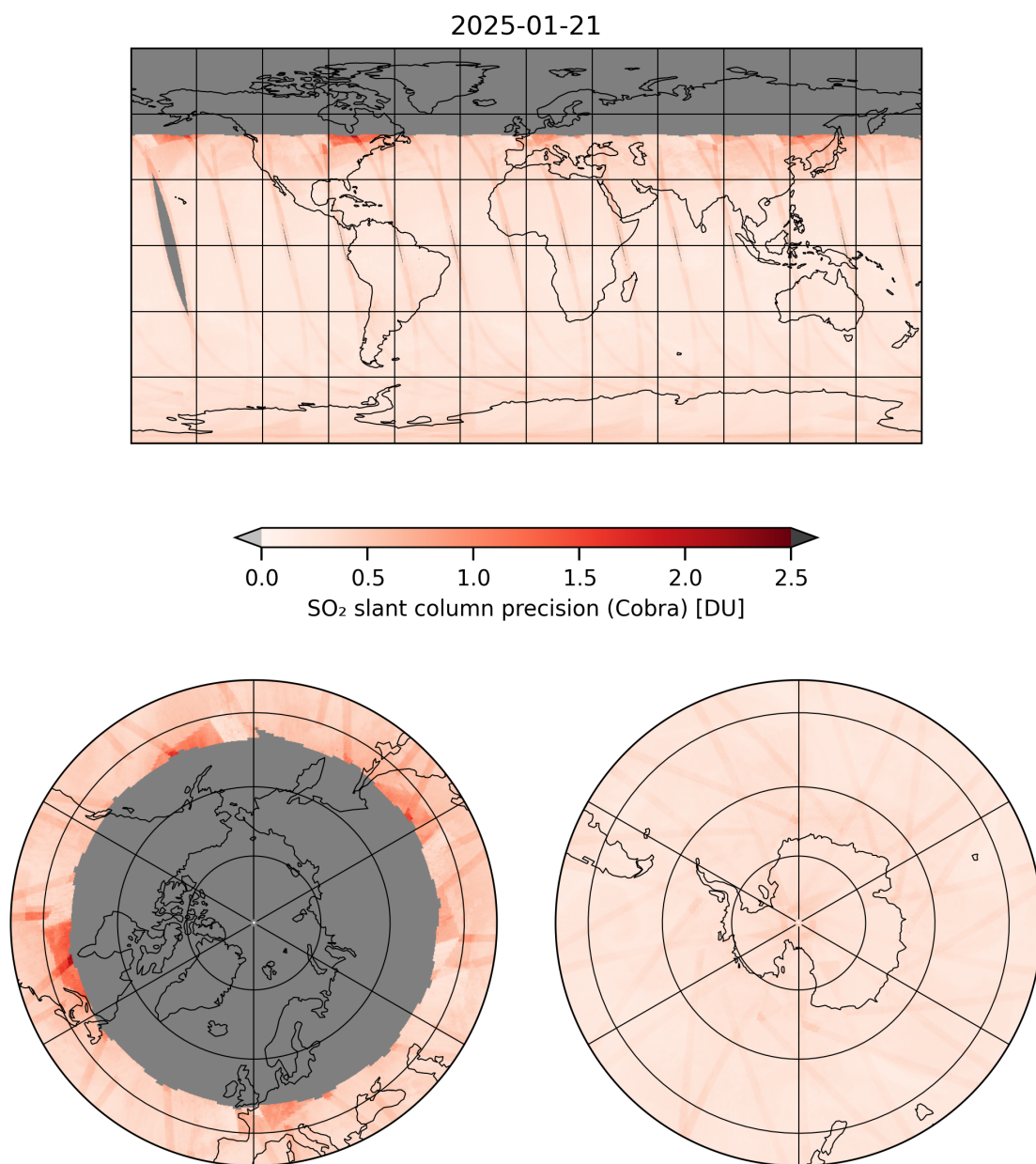


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-01-21 to 2025-01-21

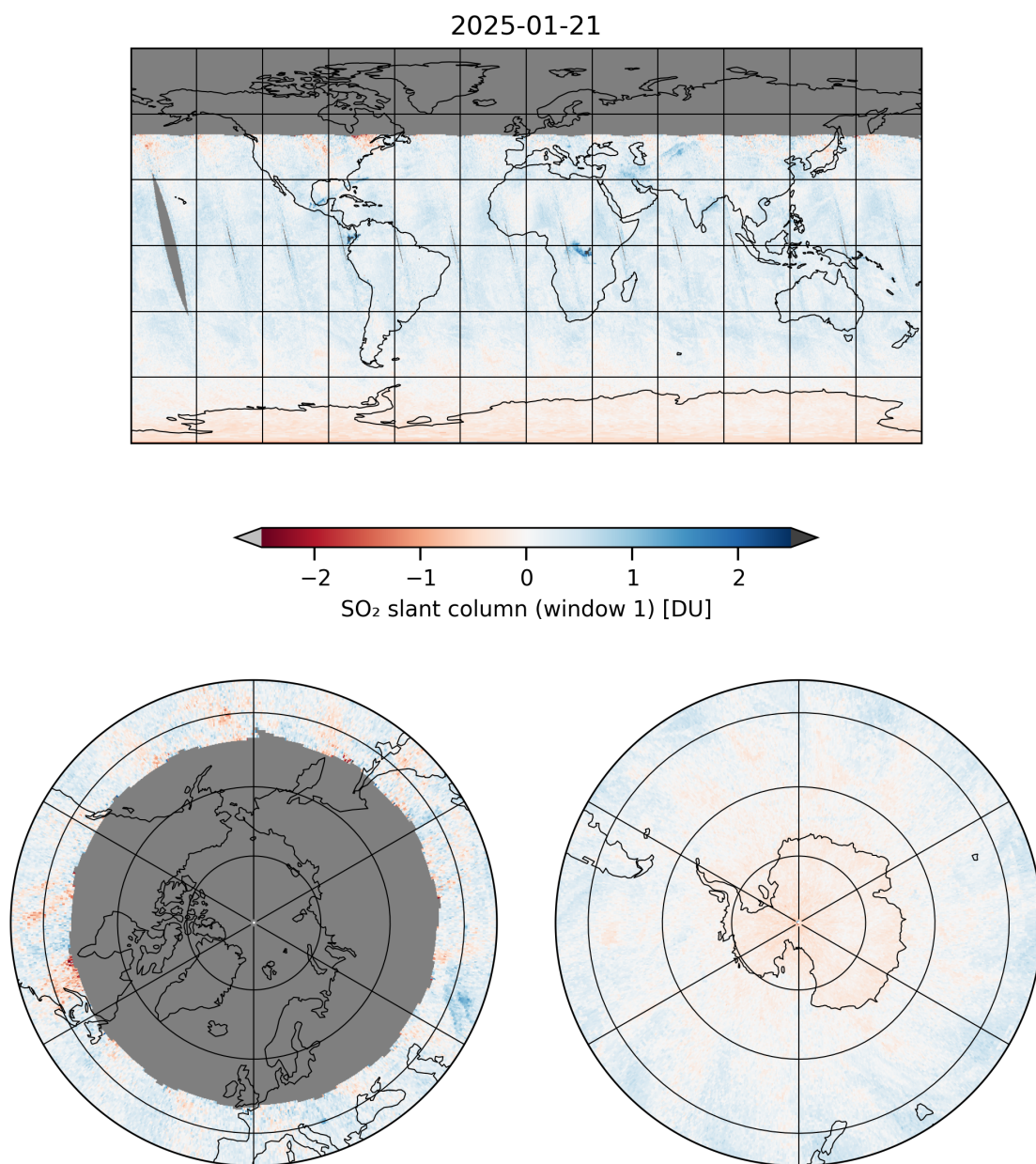


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-01-21 to 2025-01-21

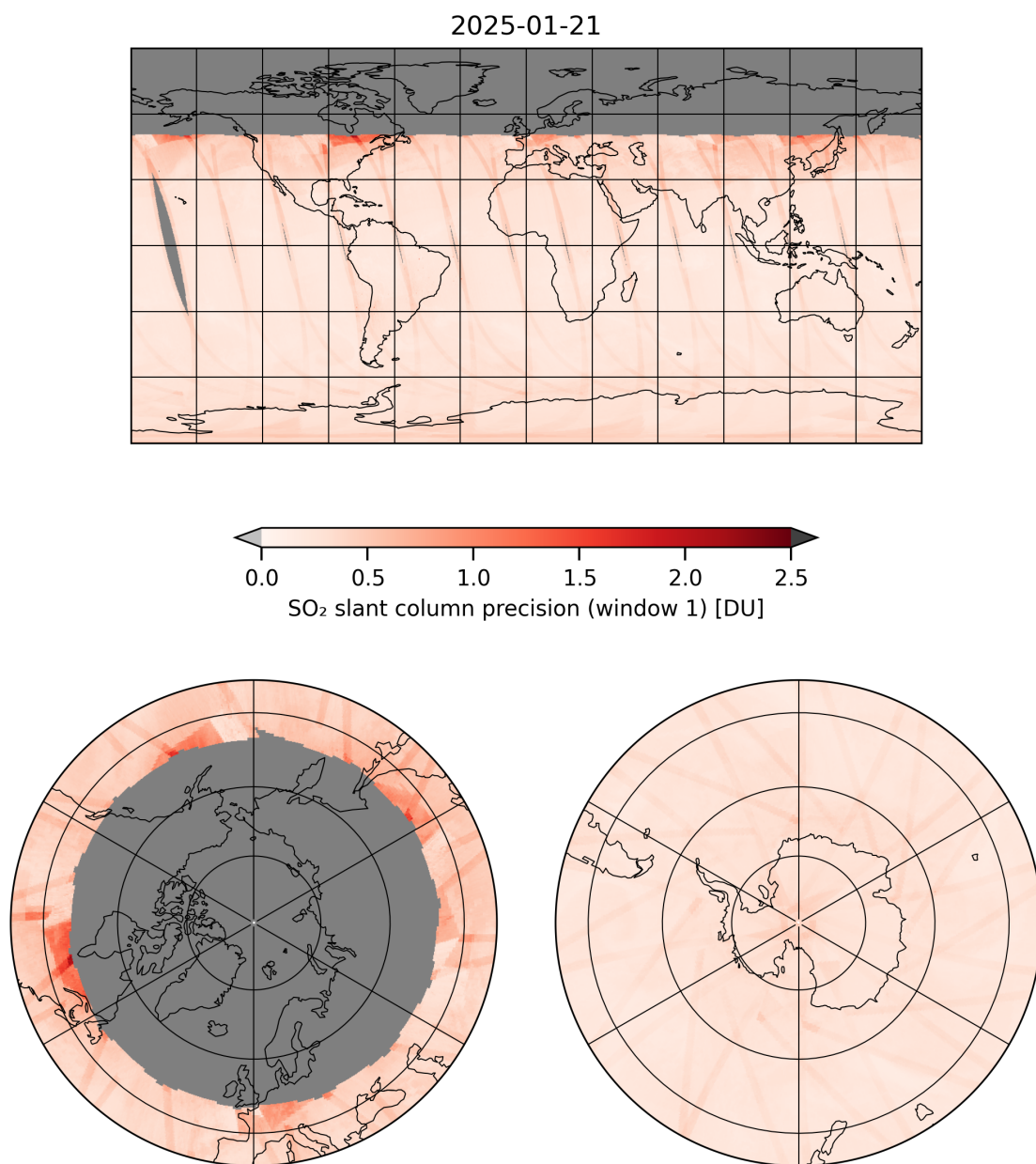


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-01-21 to 2025-01-21

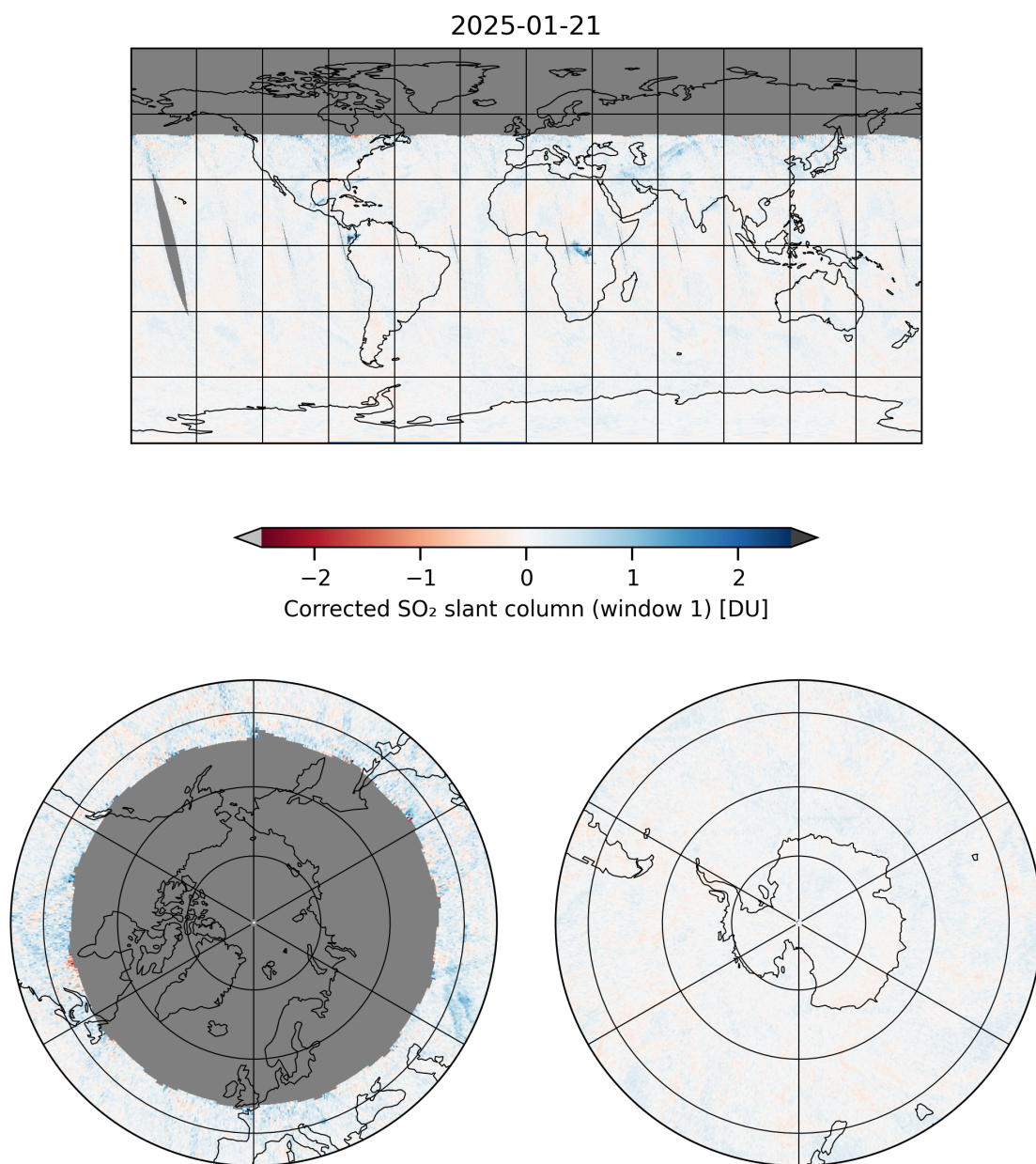


Figure 11: Map of "Corrected SO₂ slant column (window 1)" for 2025-01-21 to 2025-01-21

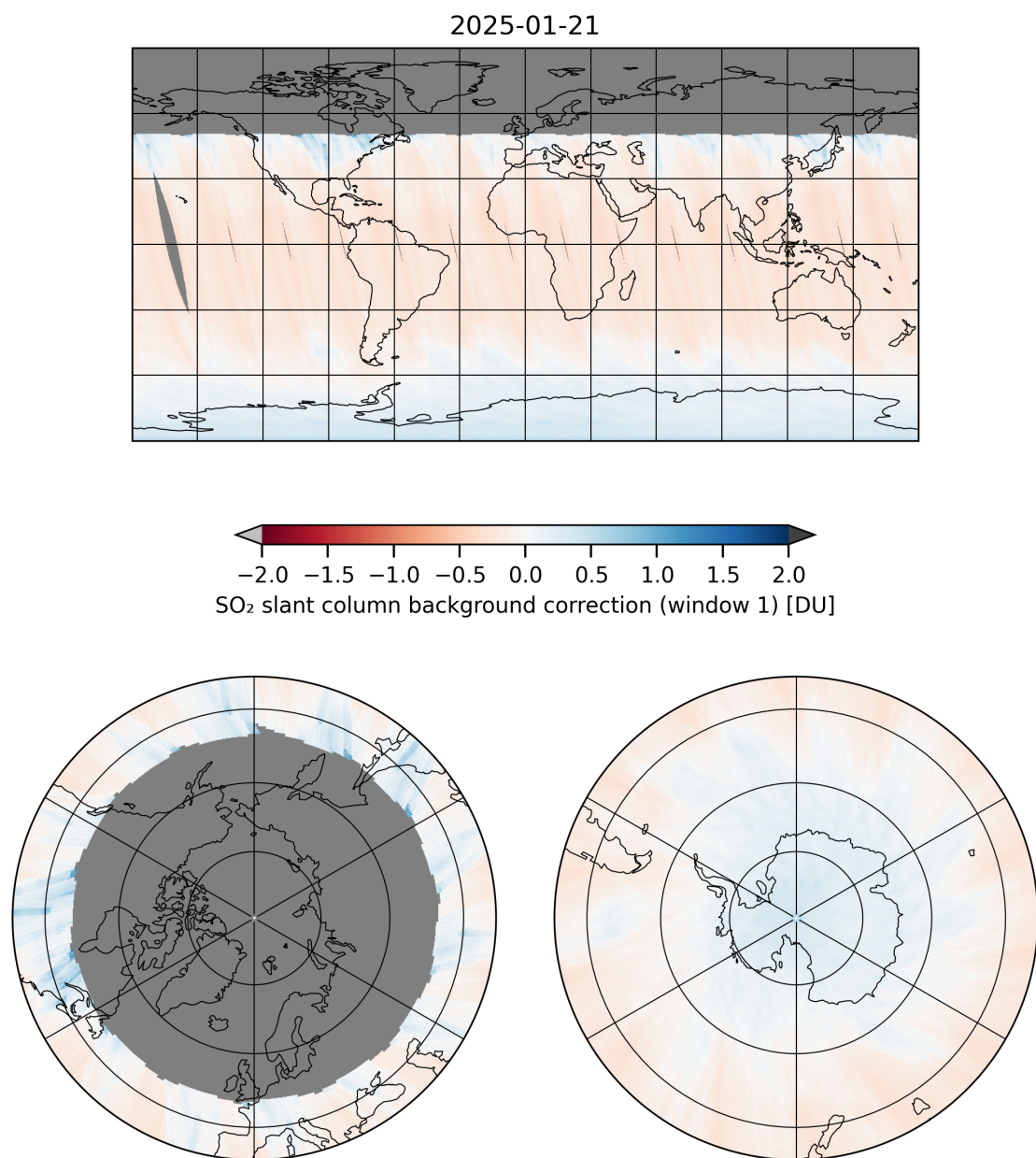


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-01-21 to 2025-01-21

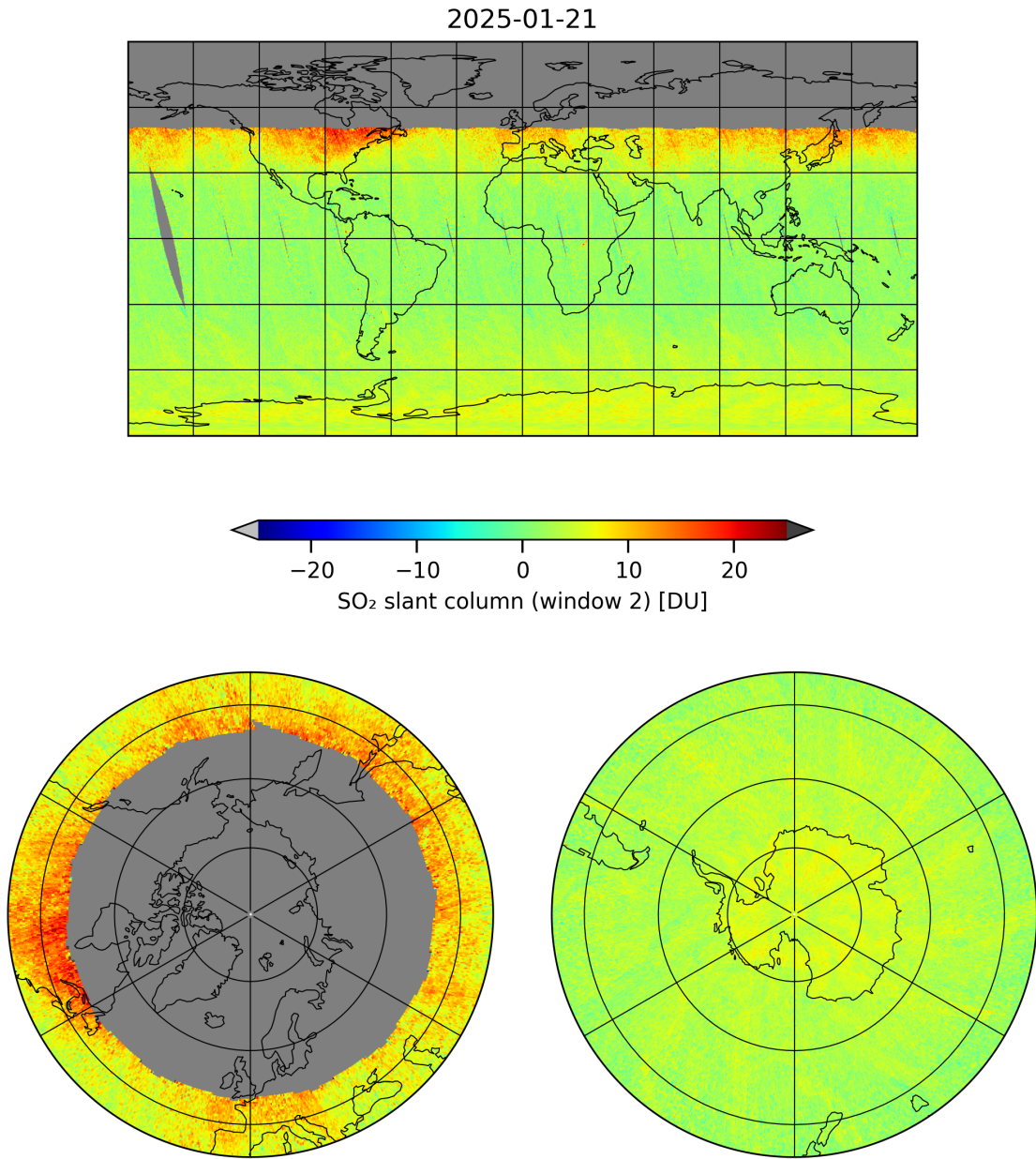


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-01-21 to 2025-01-21

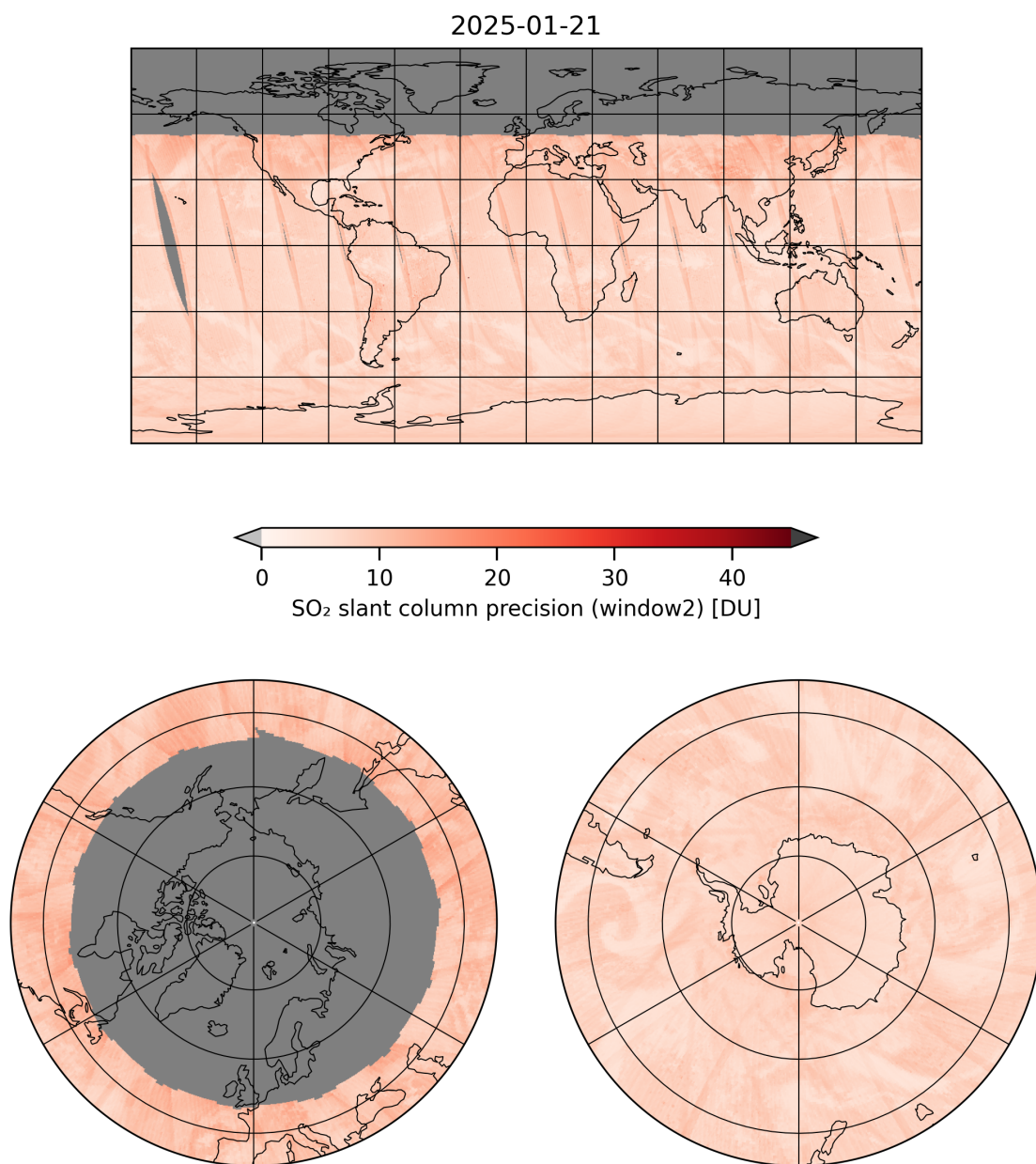


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-01-21 to 2025-01-21

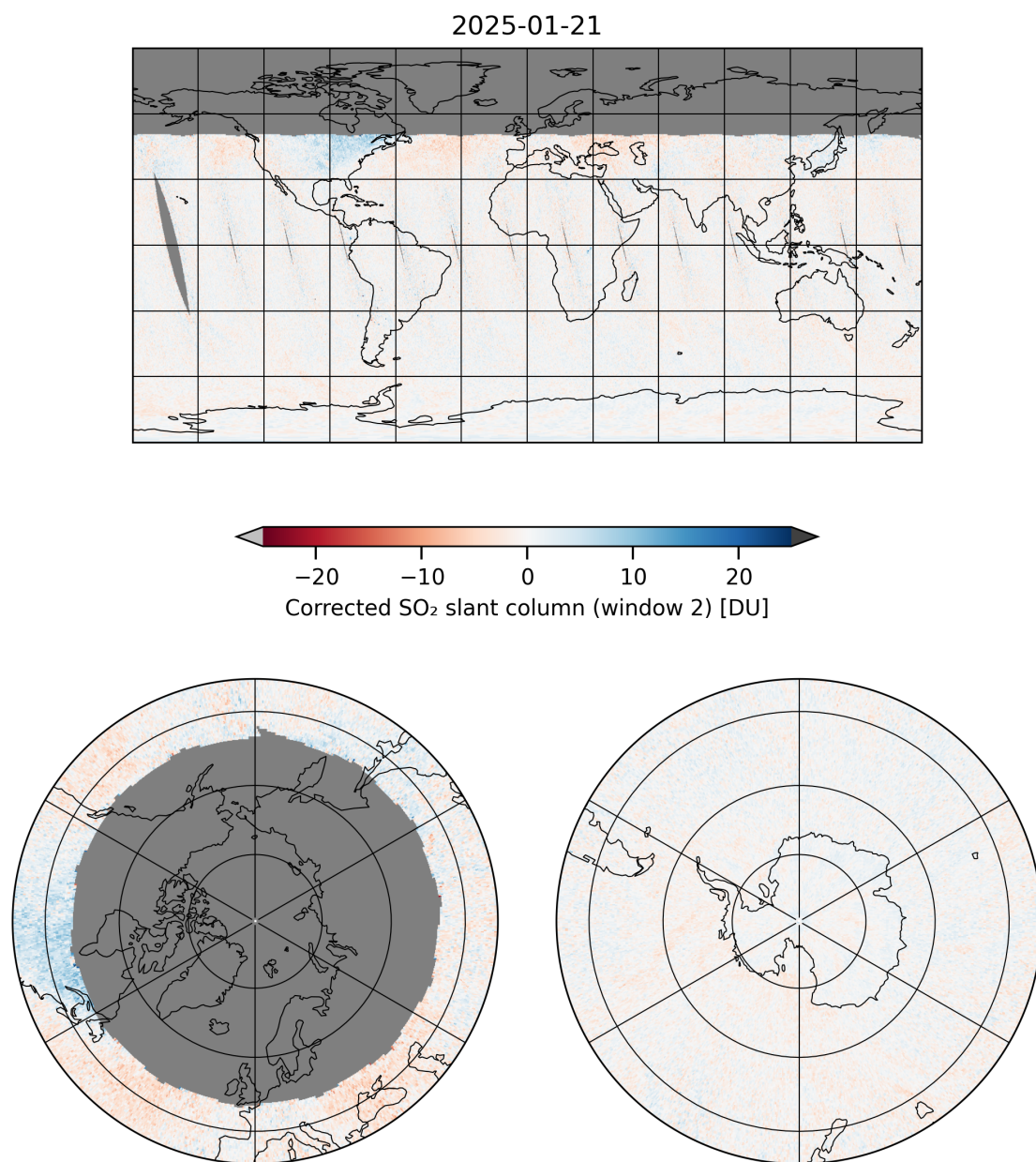


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-01-21 to 2025-01-21

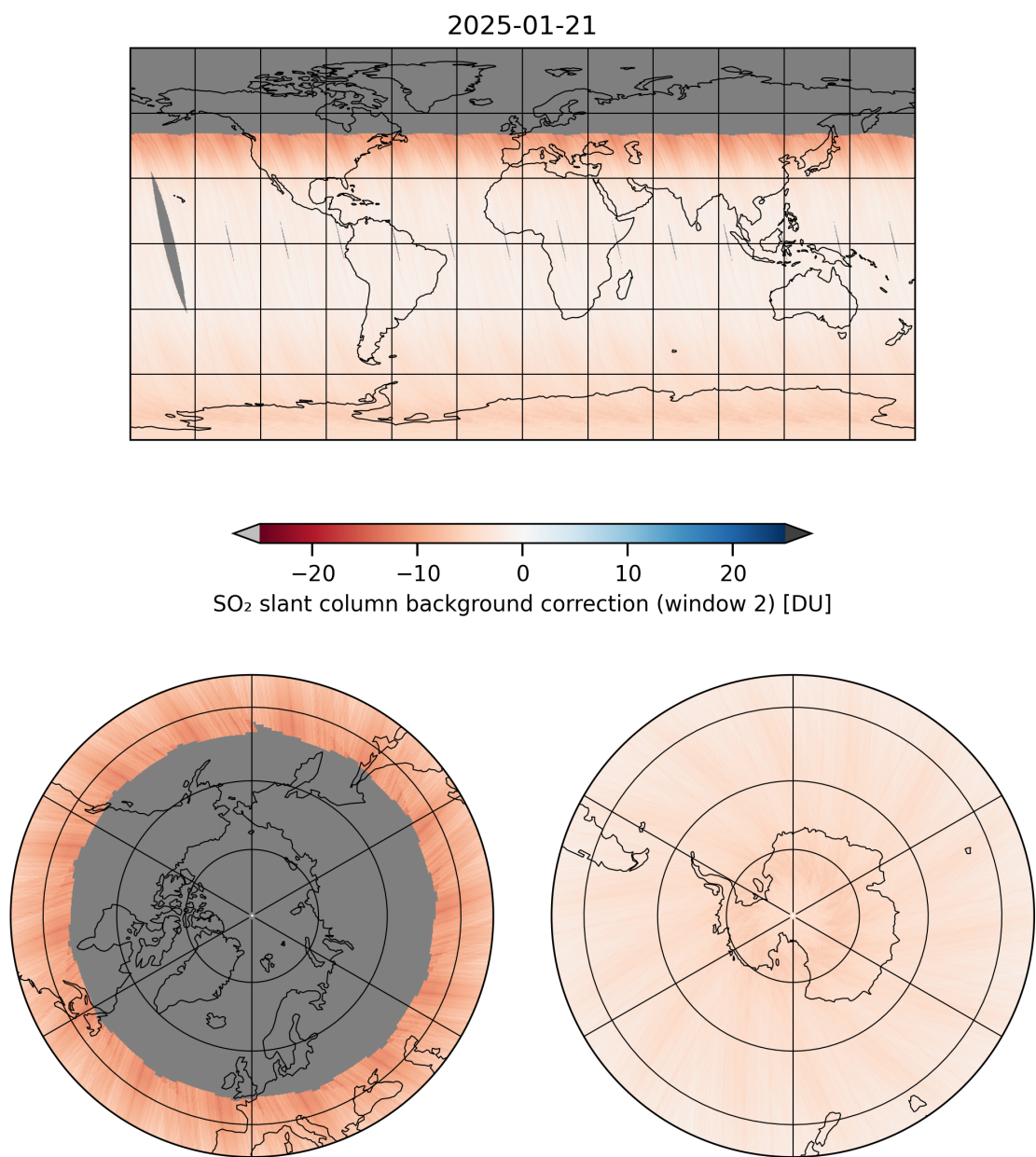


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-01-21 to 2025-01-21

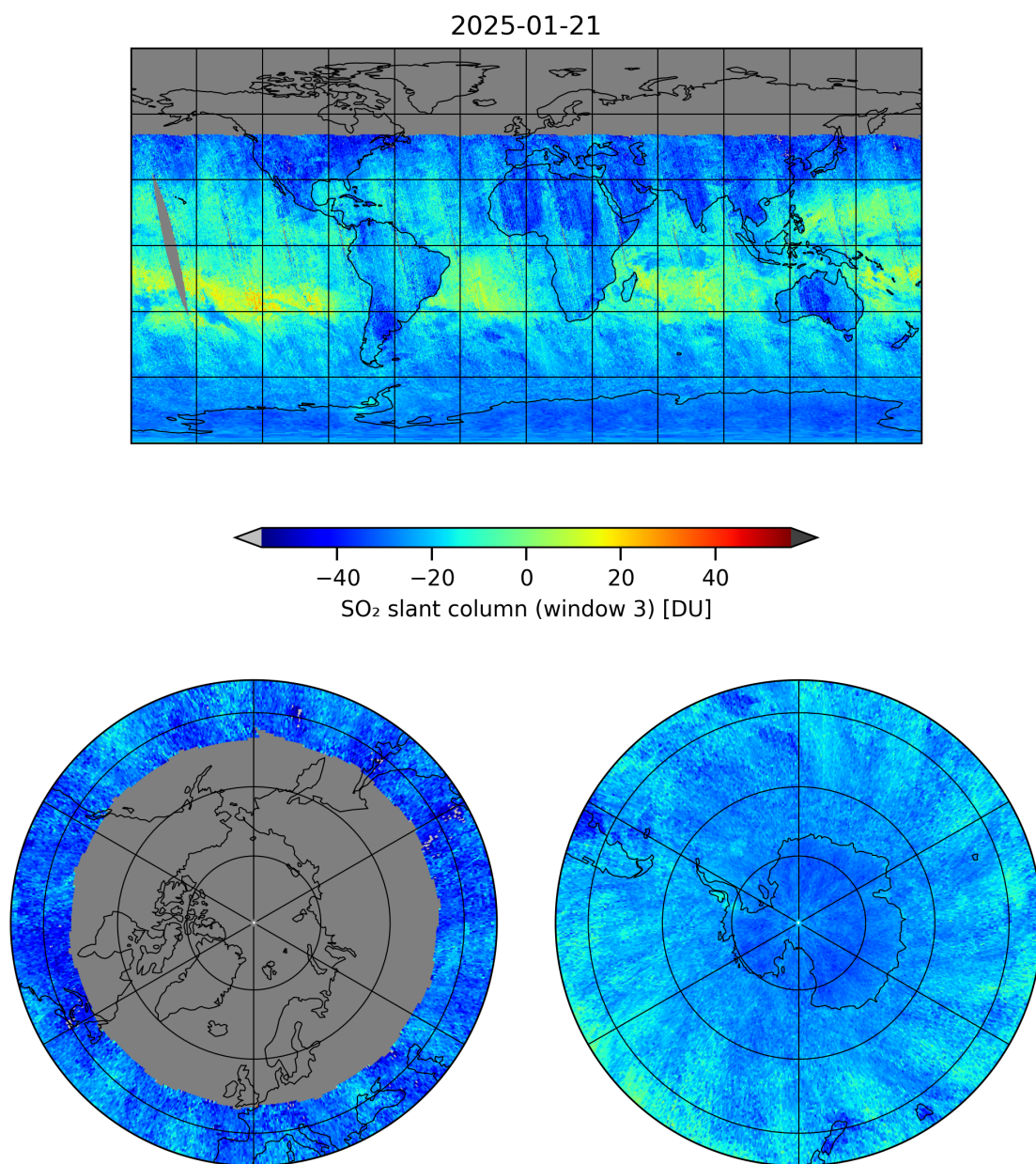


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-01-21 to 2025-01-21

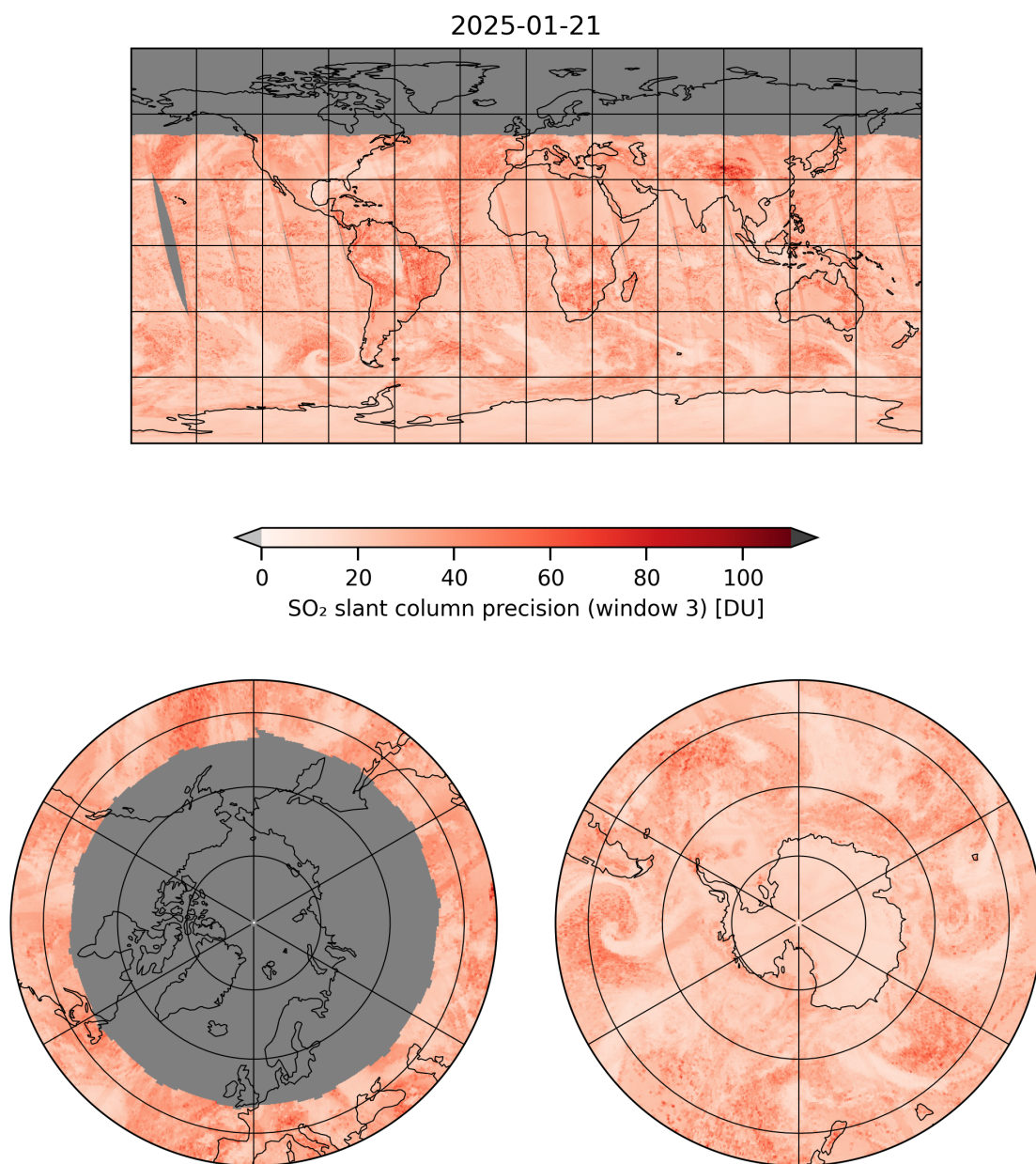


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-01-21 to 2025-01-21

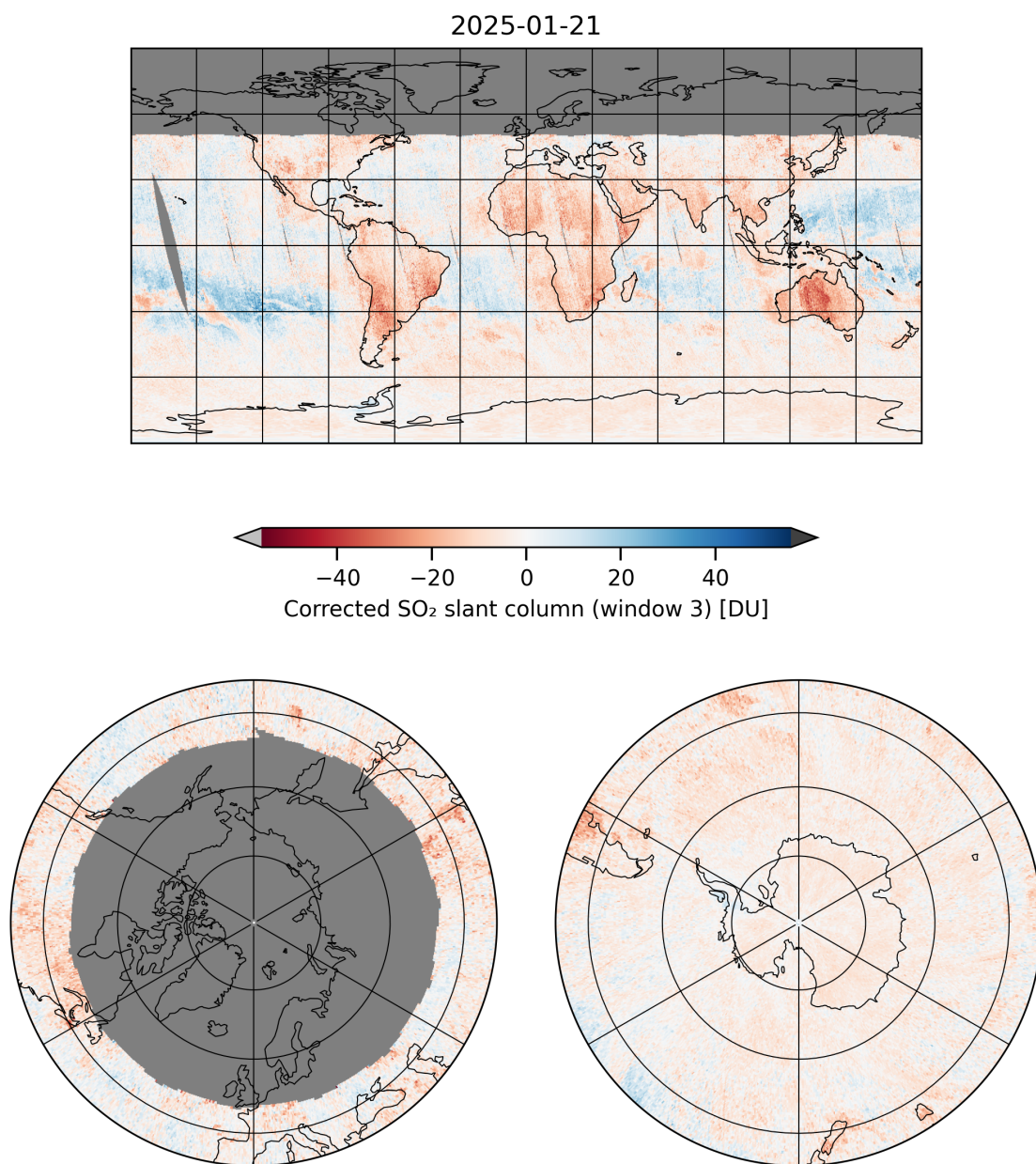


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-01-21 to 2025-01-21

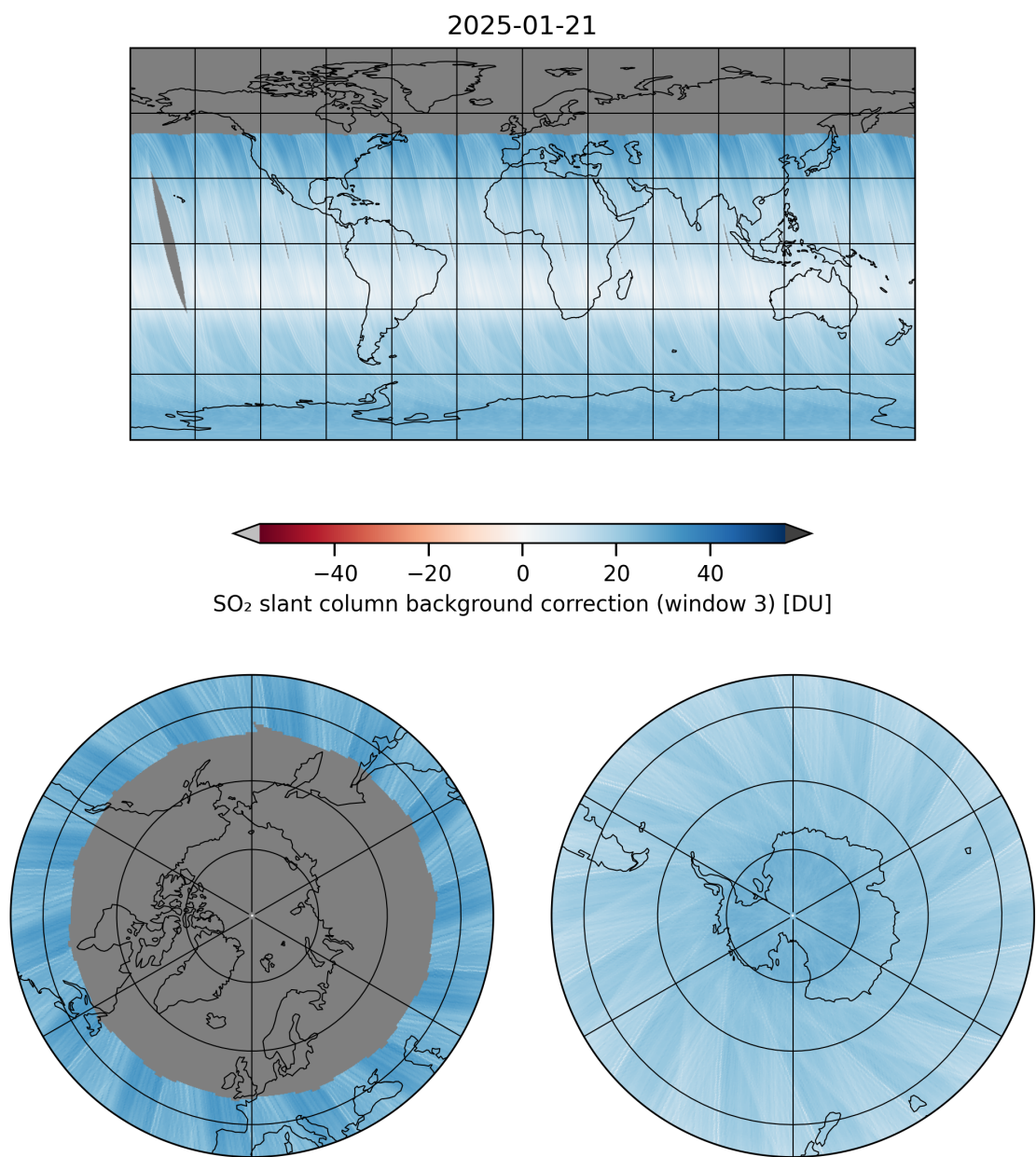


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-01-21 to 2025-01-21

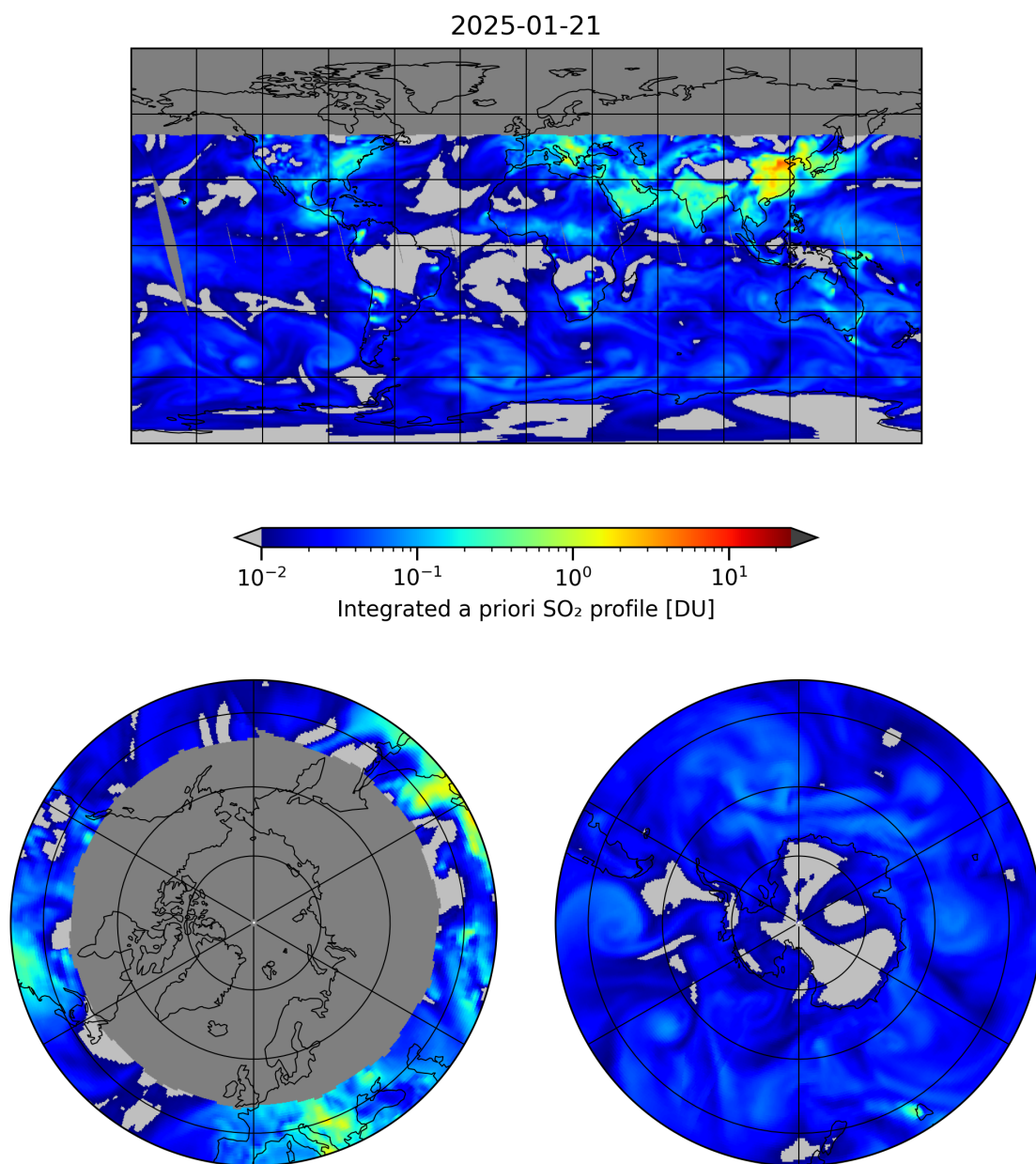


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-01-21 to 2025-01-21

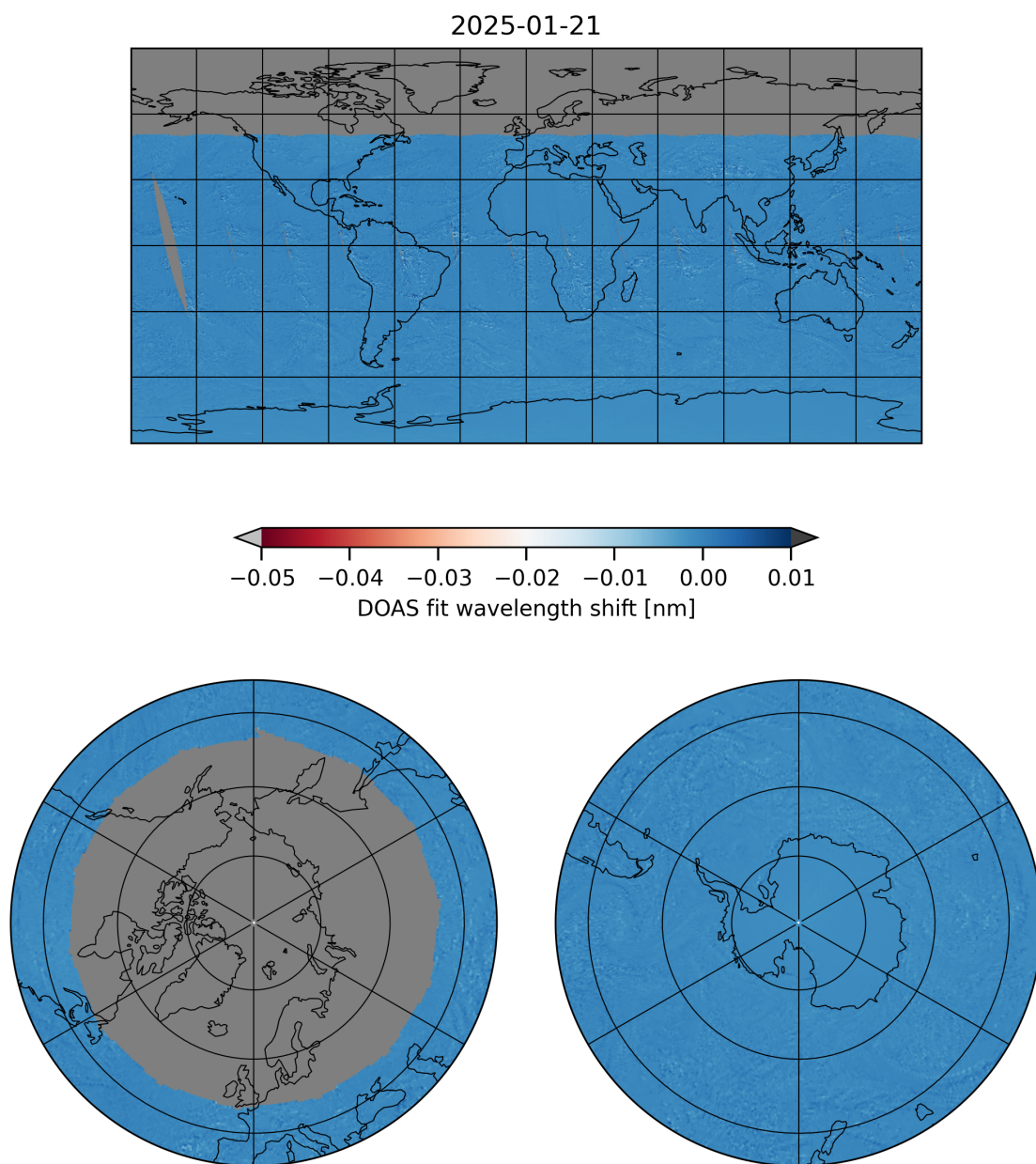


Figure 22: Map of “DOAS fit wavelength shift” for 2025-01-21 to 2025-01-21

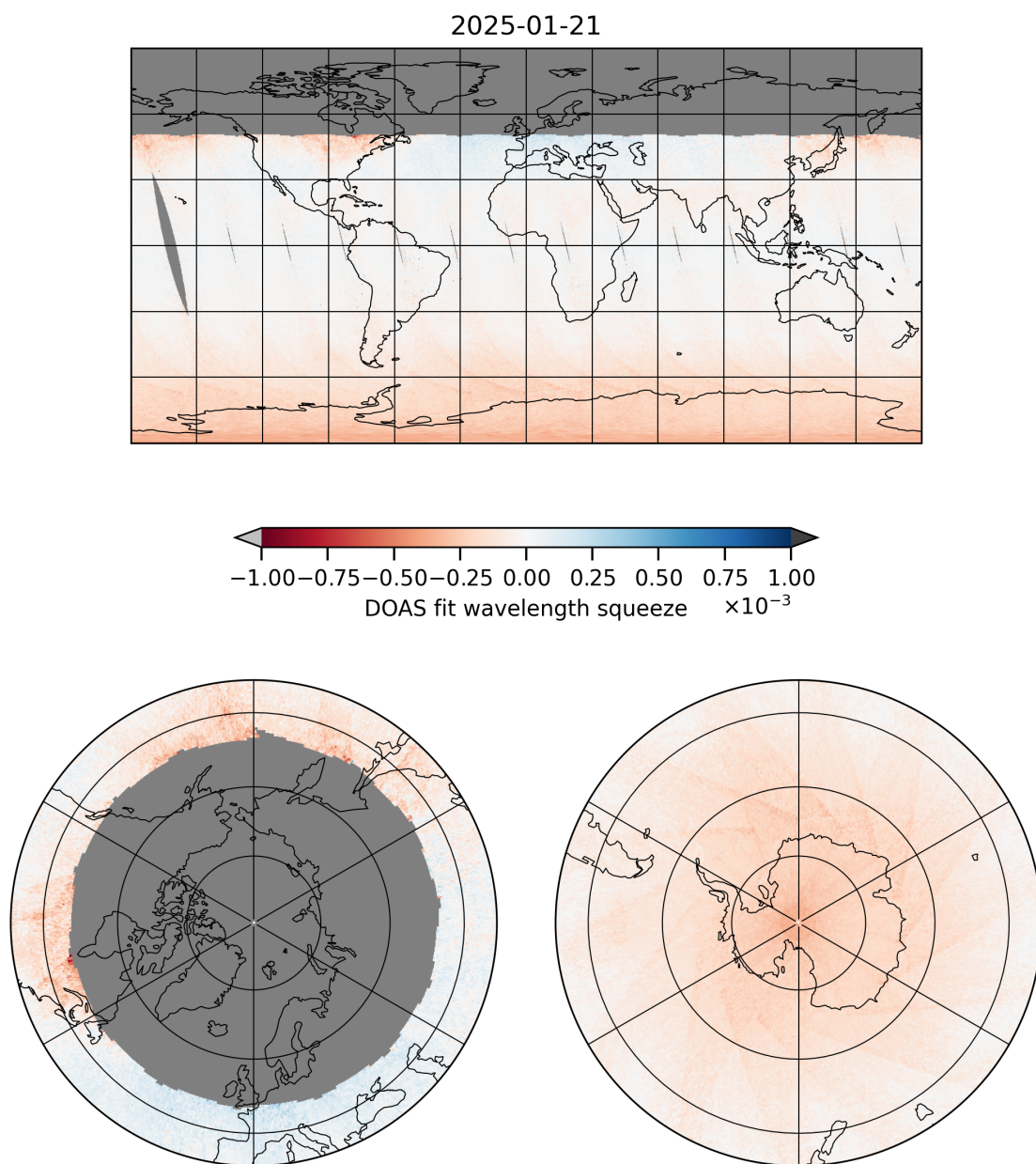


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-01-21 to 2025-01-21

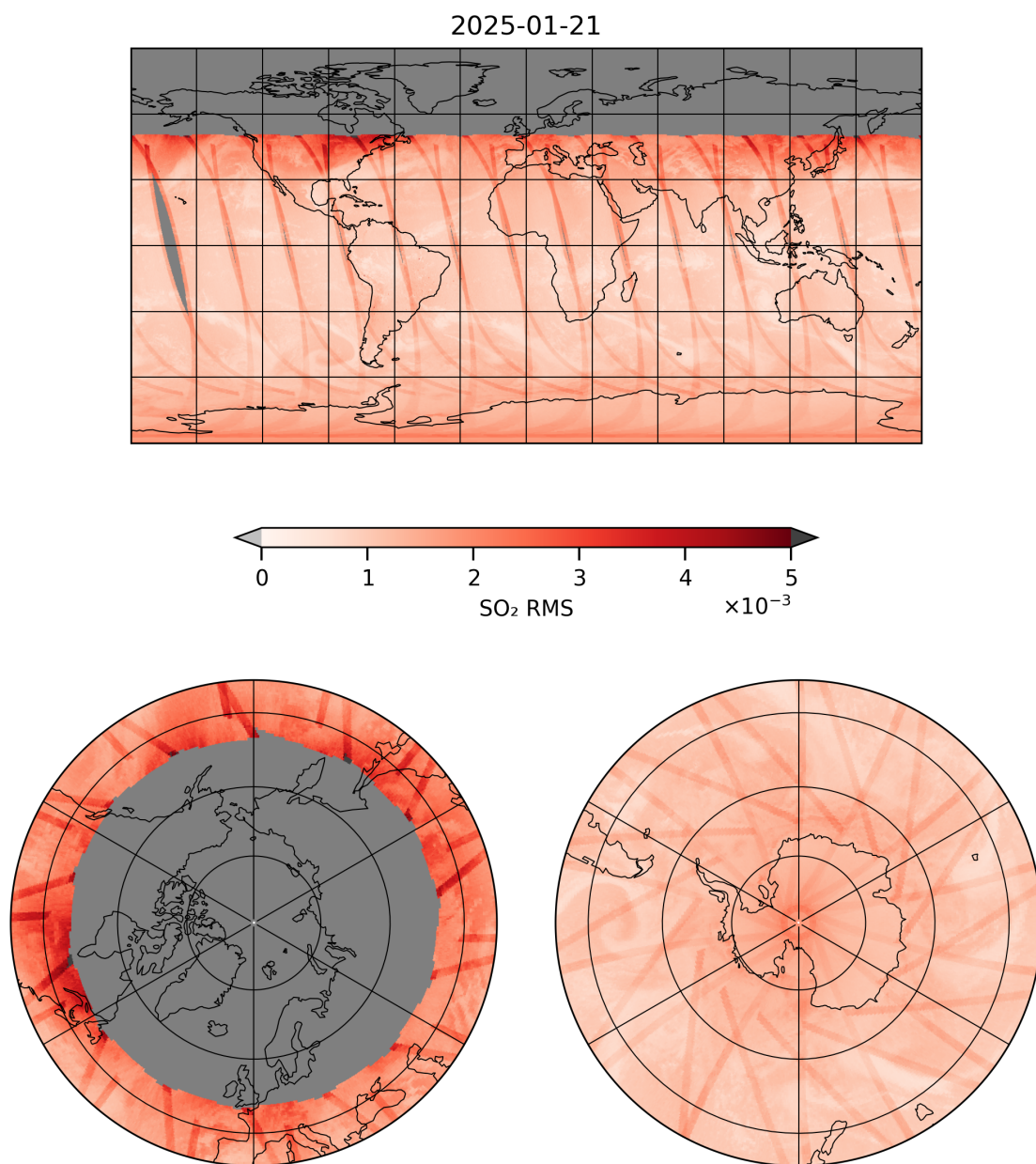


Figure 24: Map of “SO₂ RMS” for 2025-01-21 to 2025-01-21

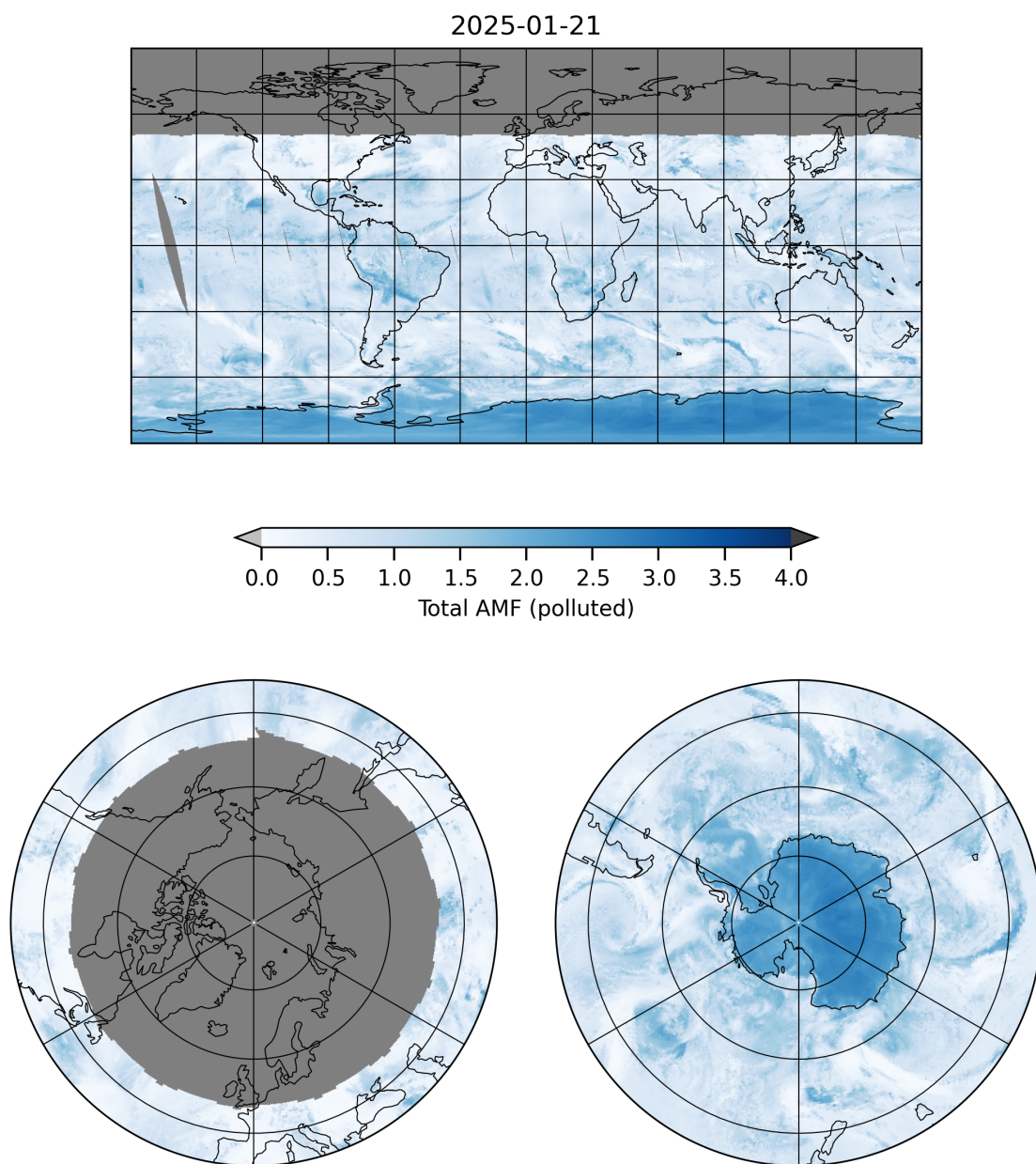


Figure 25: Map of “Total AMF (polluted)” for 2025-01-21 to 2025-01-21

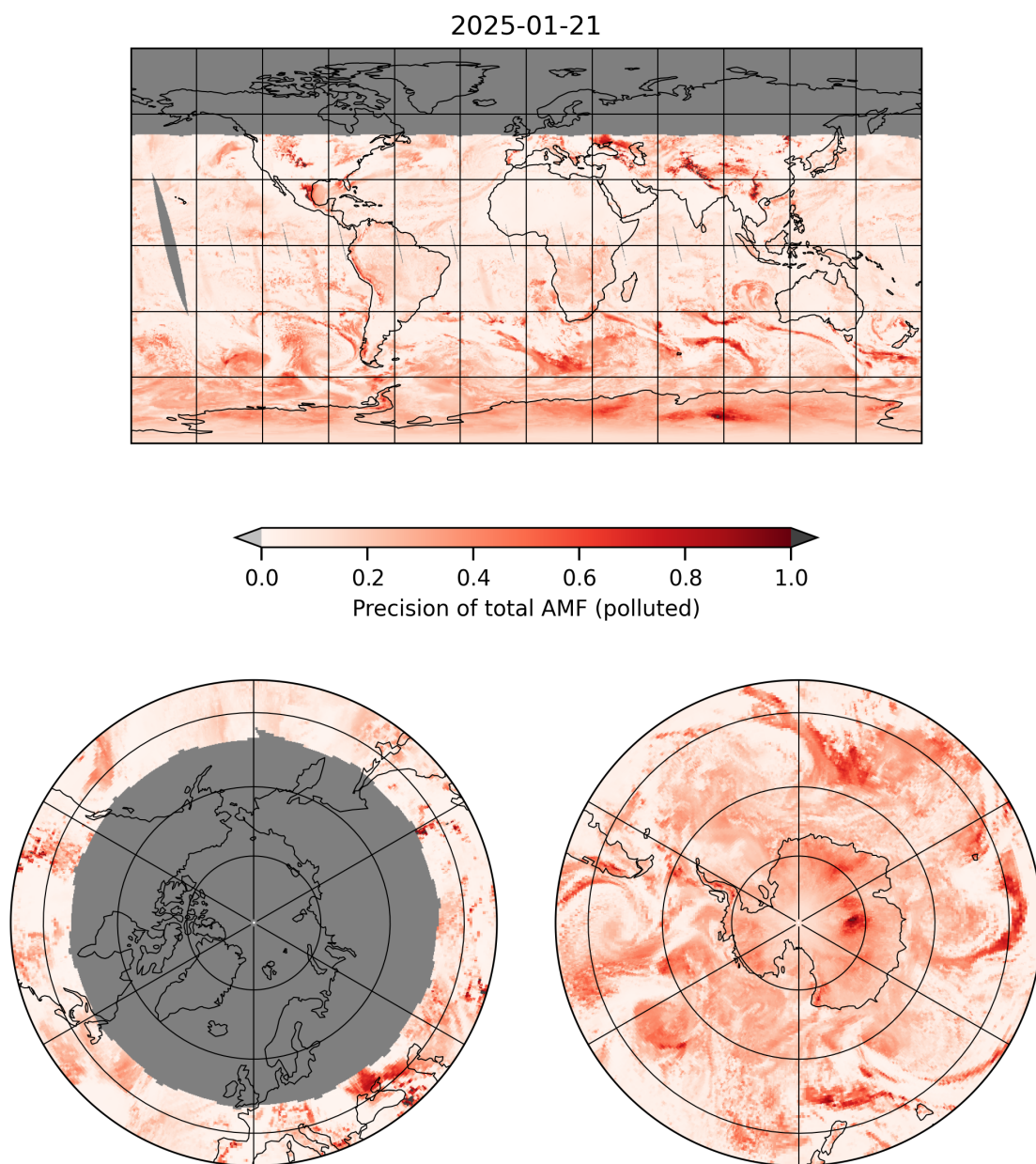


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-01-21 to 2025-01-21

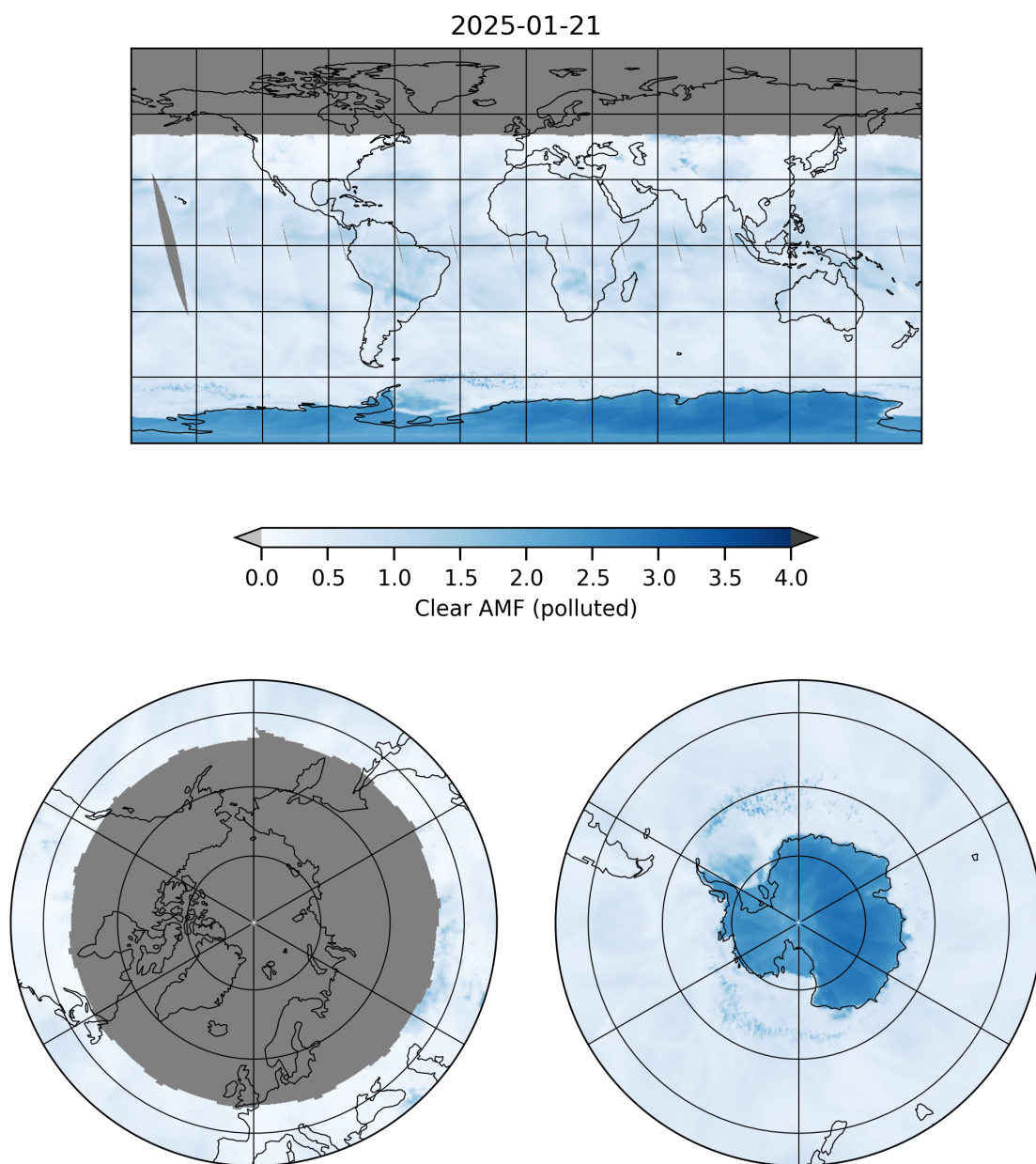


Figure 27: Map of “Clear AMF (polluted)” for 2025-01-21 to 2025-01-21

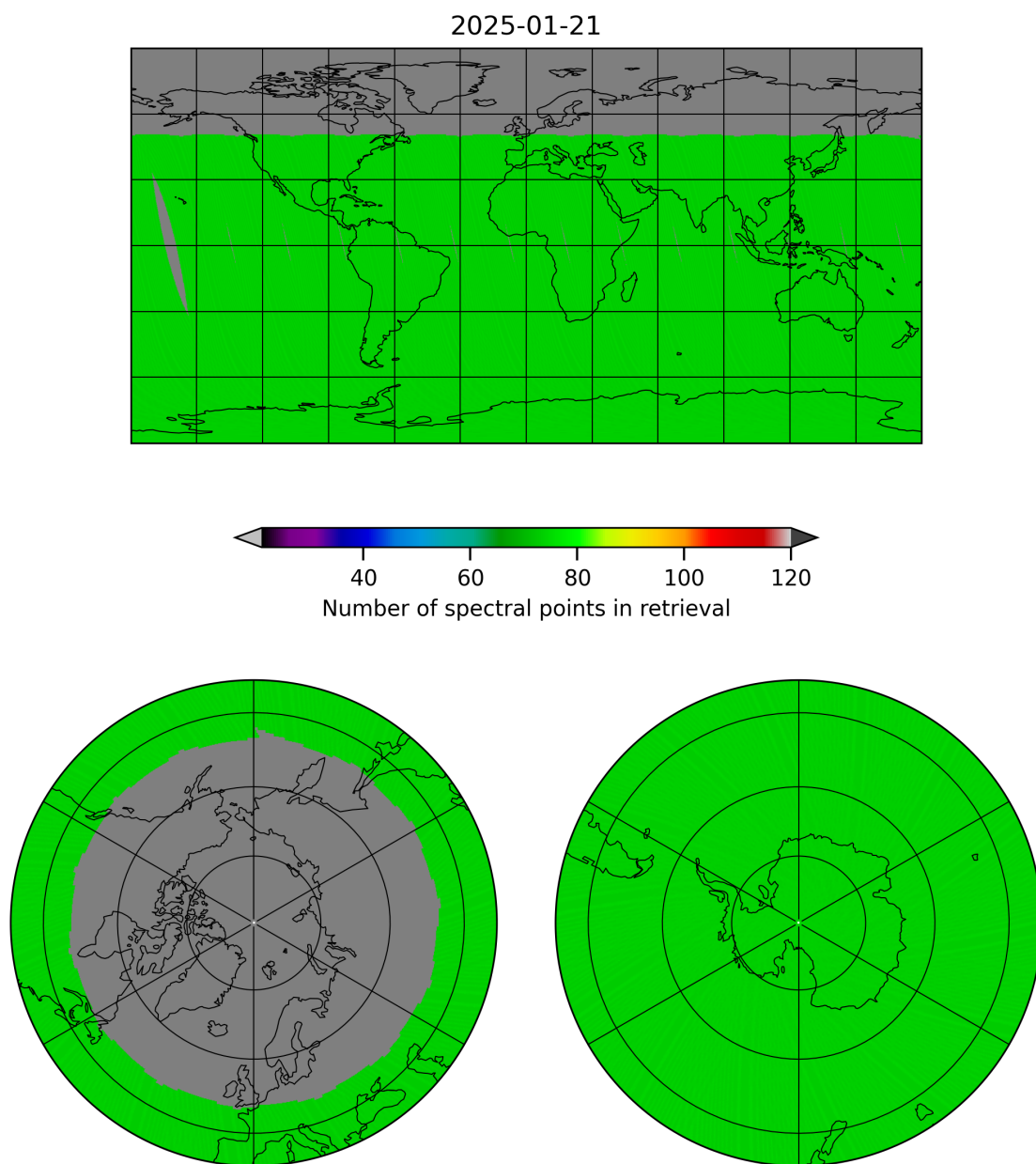


Figure 28: Map of “Number of spectral points in retrieval” for 2025-01-21 to 2025-01-21

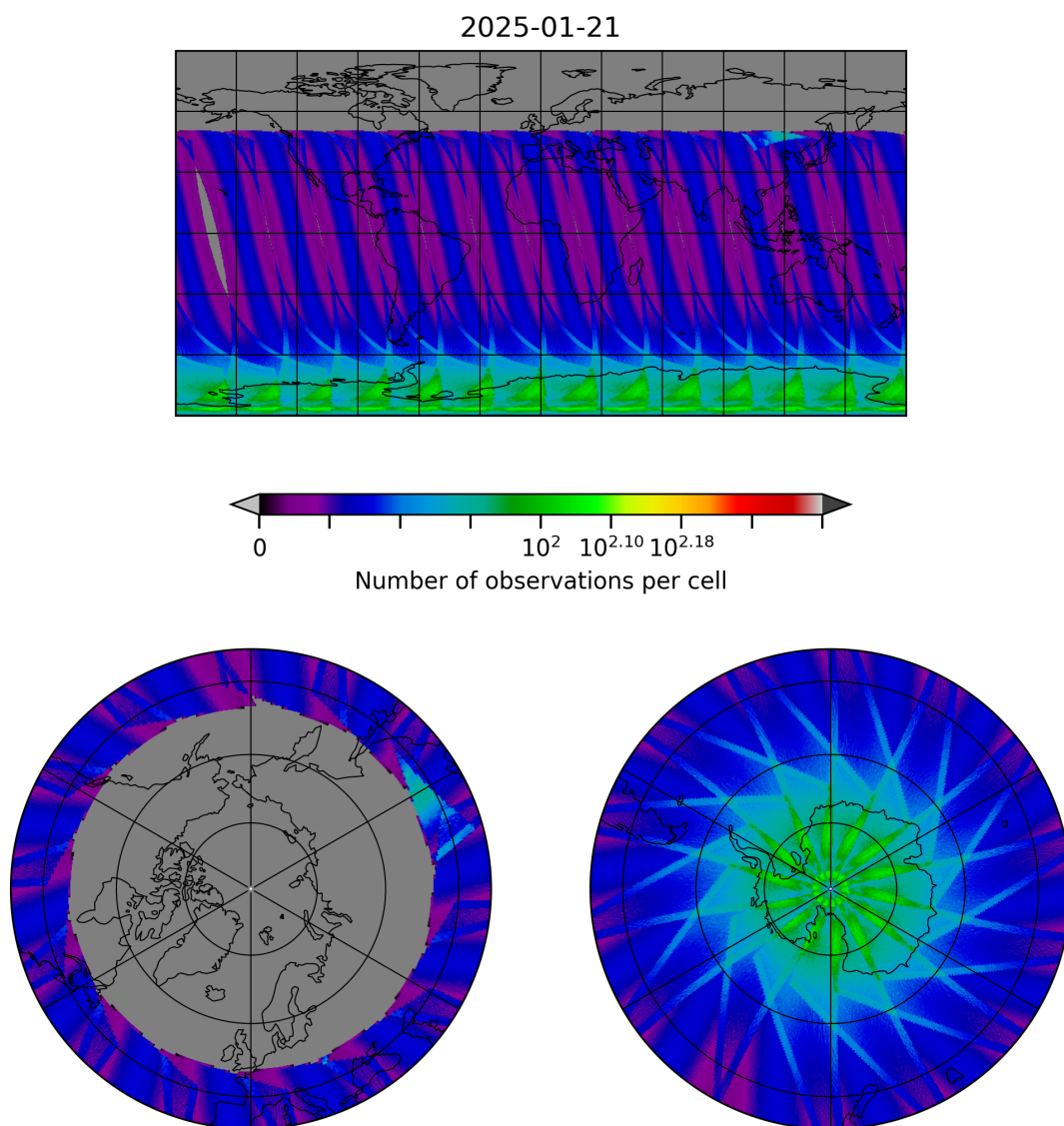


Figure 29: Map of the number of observations for 2025-01-21 to 2025-01-21

7 Zonal average

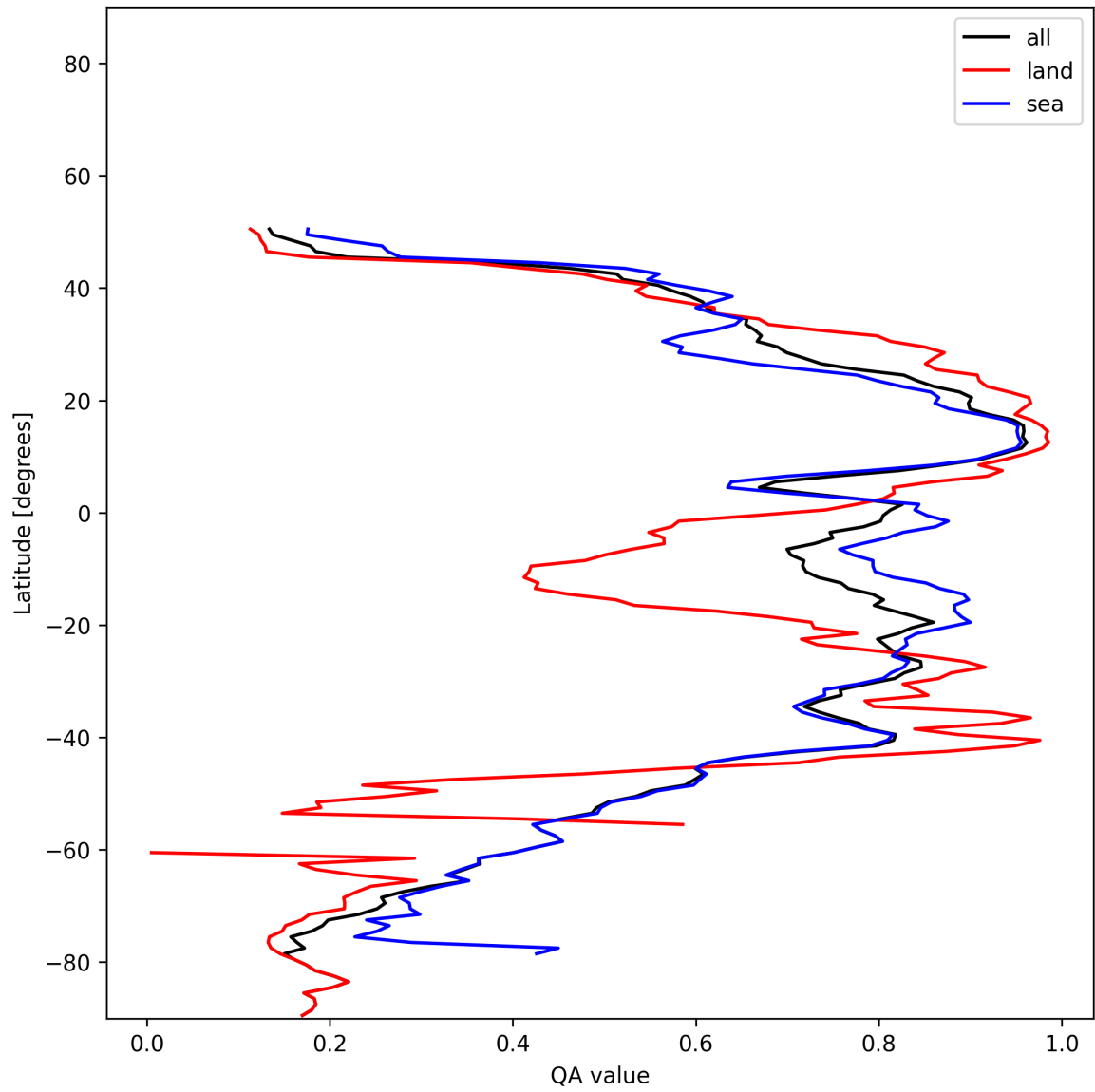


Figure 30: Zonal average of “QA value” for 2025-01-21 to 2025-01-21.

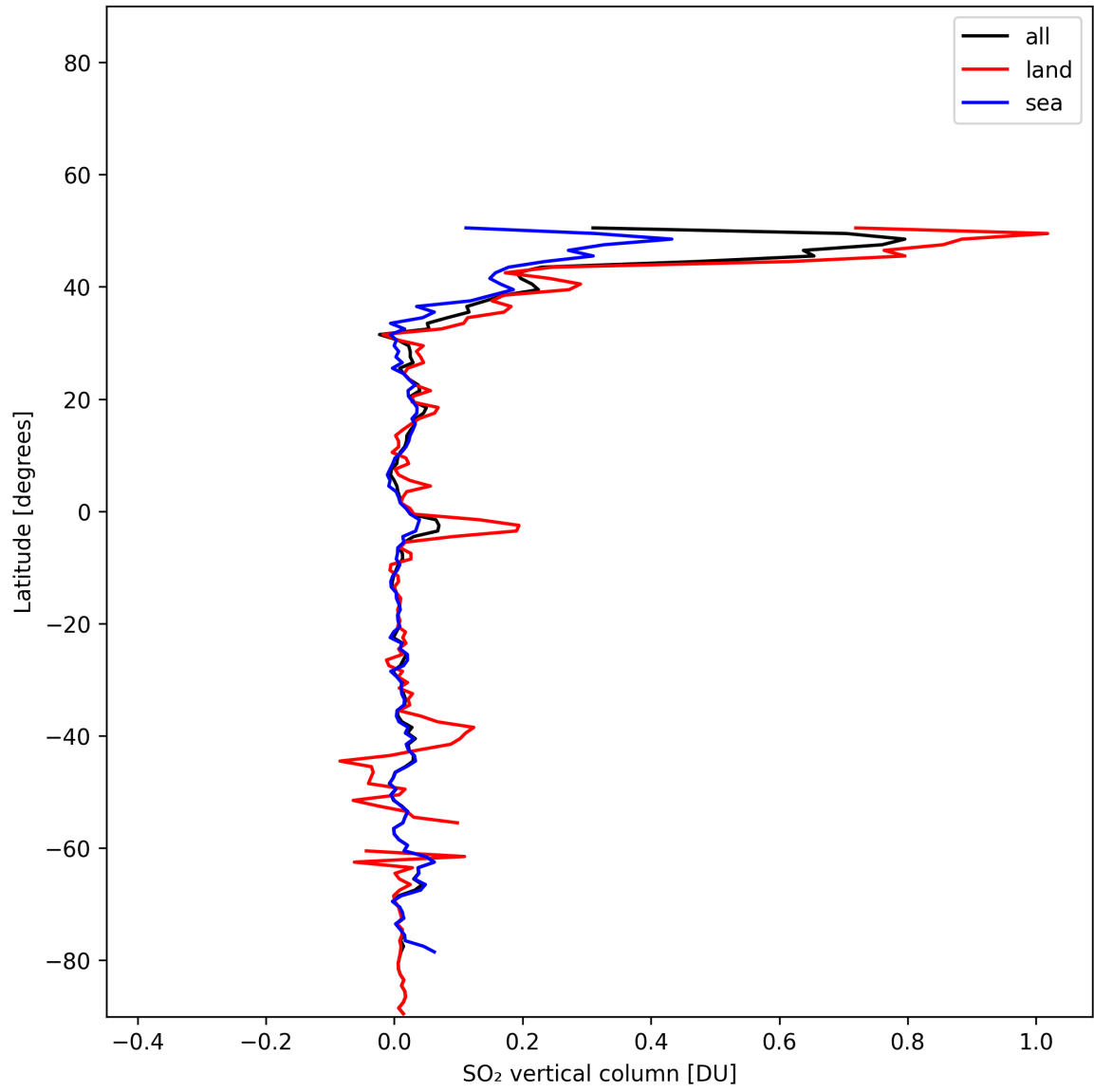


Figure 31: Zonal average of “SO₂ vertical column” for 2025-01-21 to 2025-01-21.

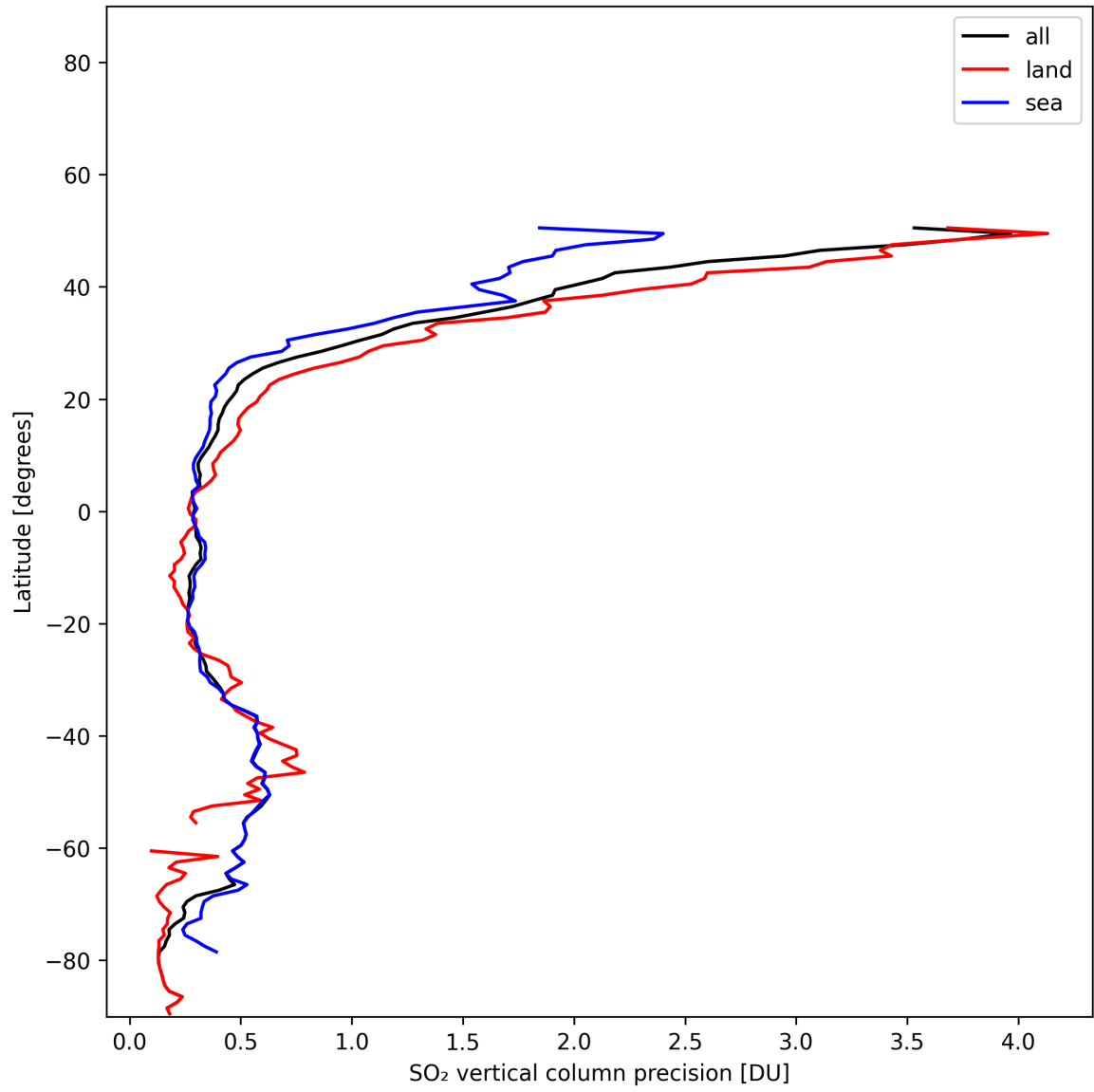


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-01-21 to 2025-01-21.

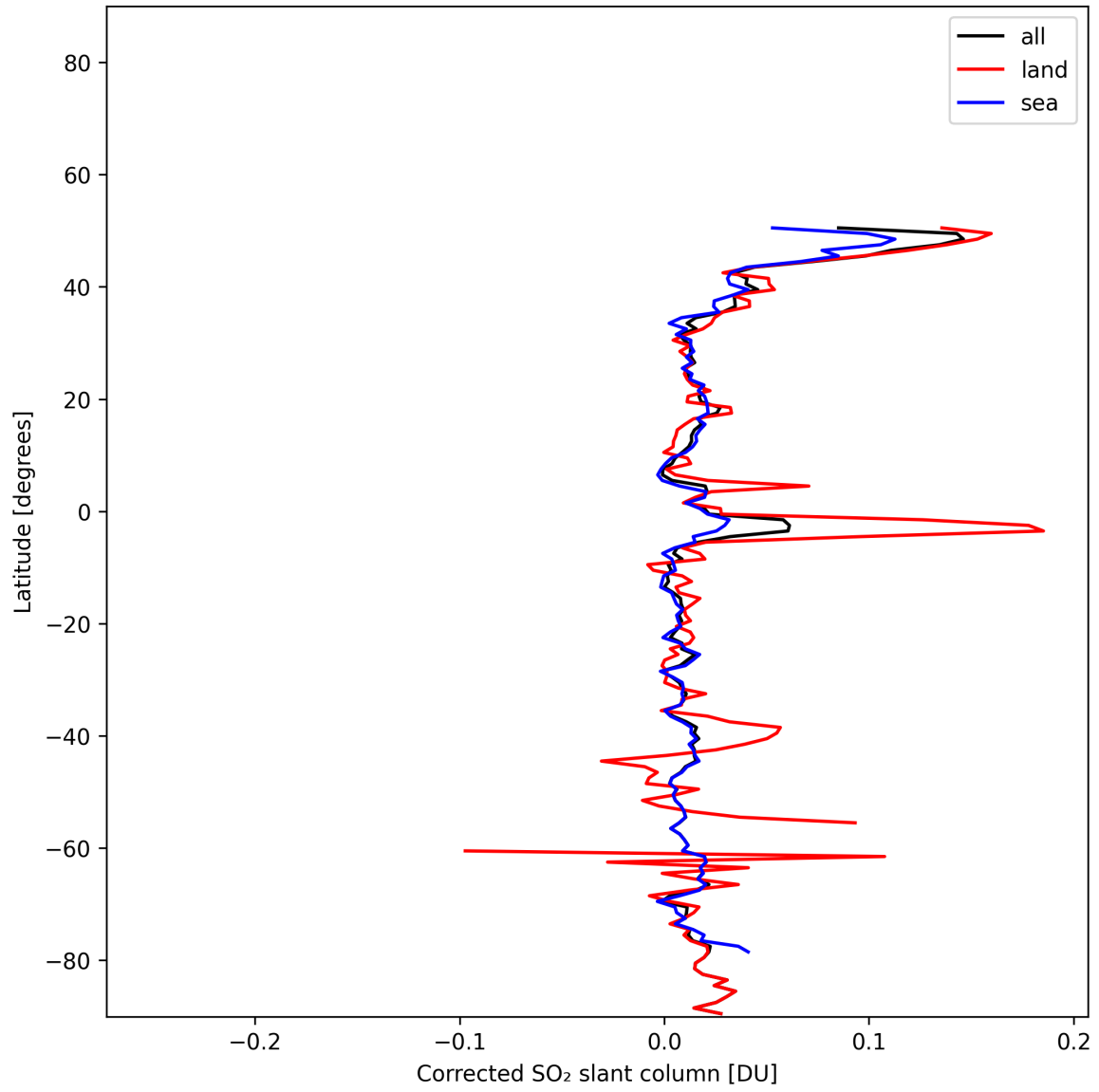


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-01-21 to 2025-01-21.

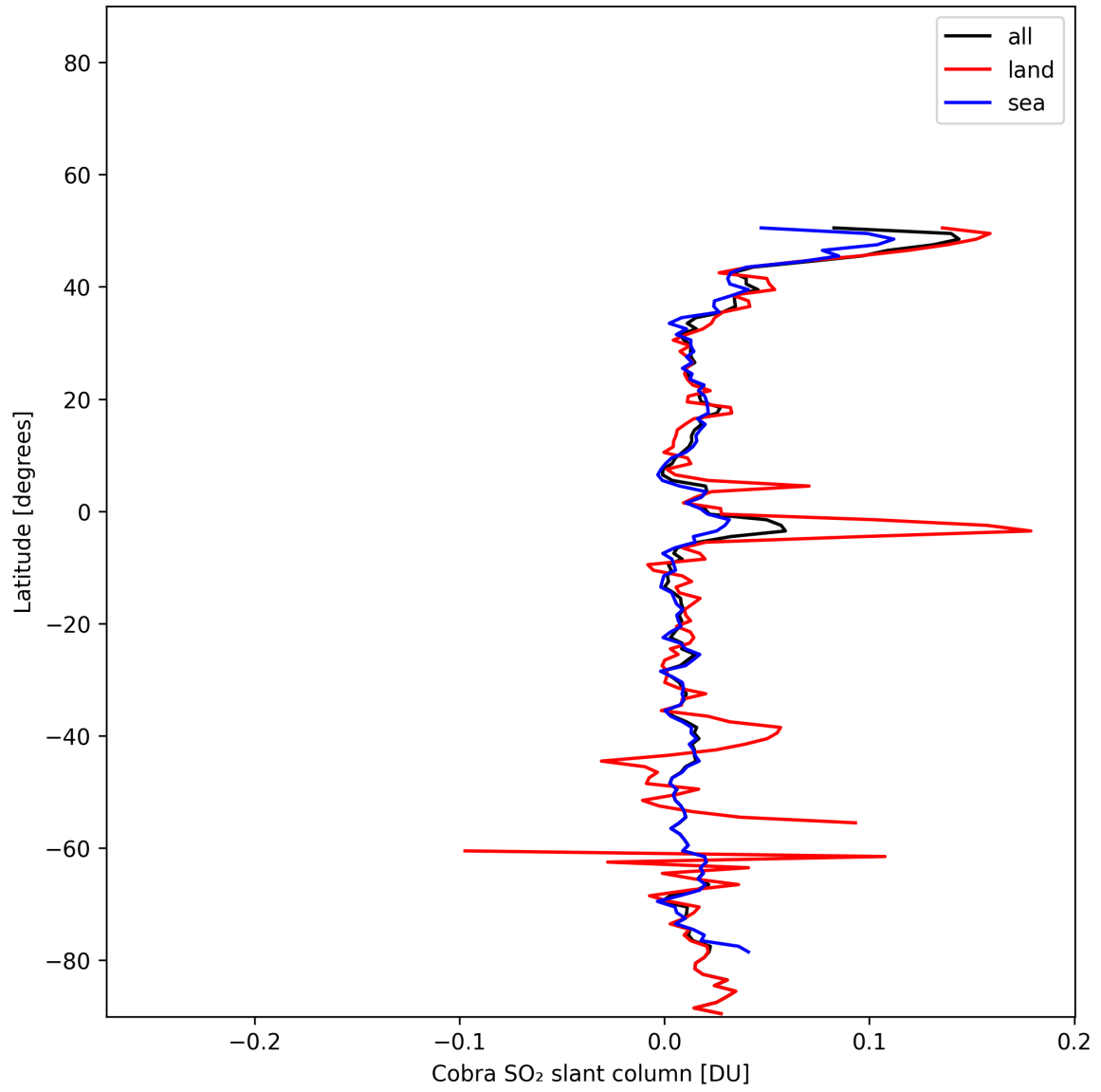


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-01-21 to 2025-01-21.

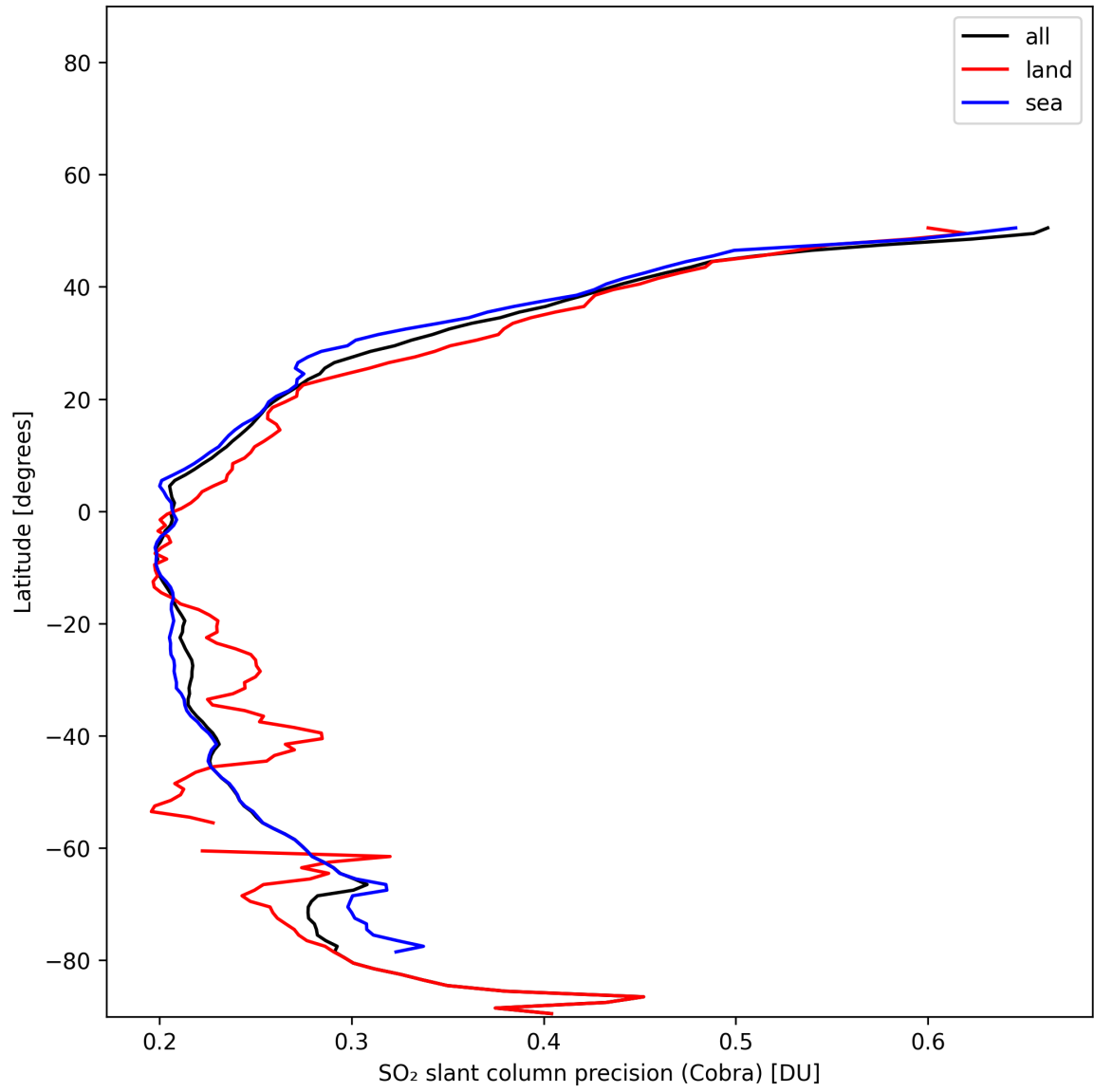


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-01-21 to 2025-01-21.

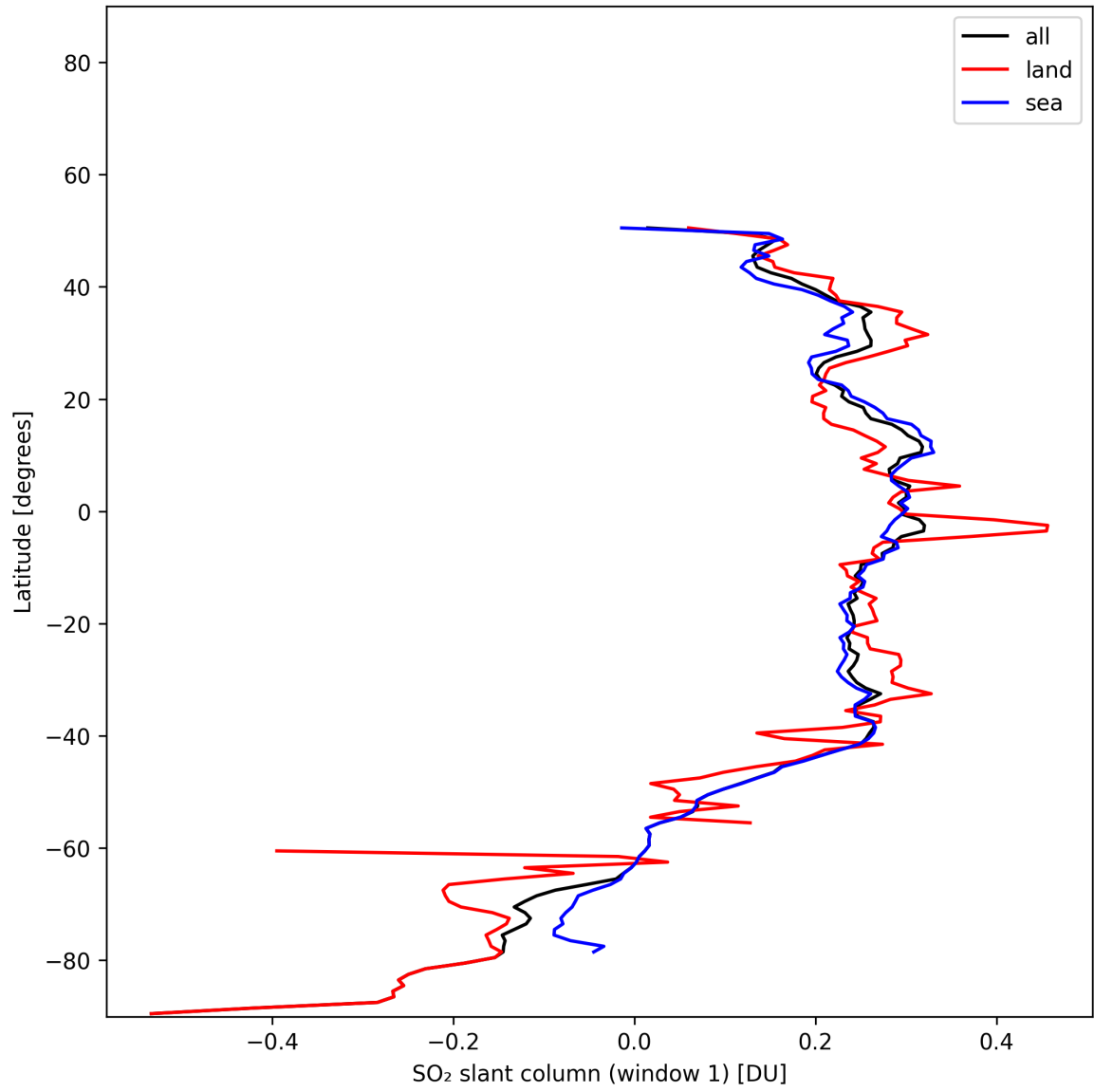


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-01-21 to 2025-01-21.

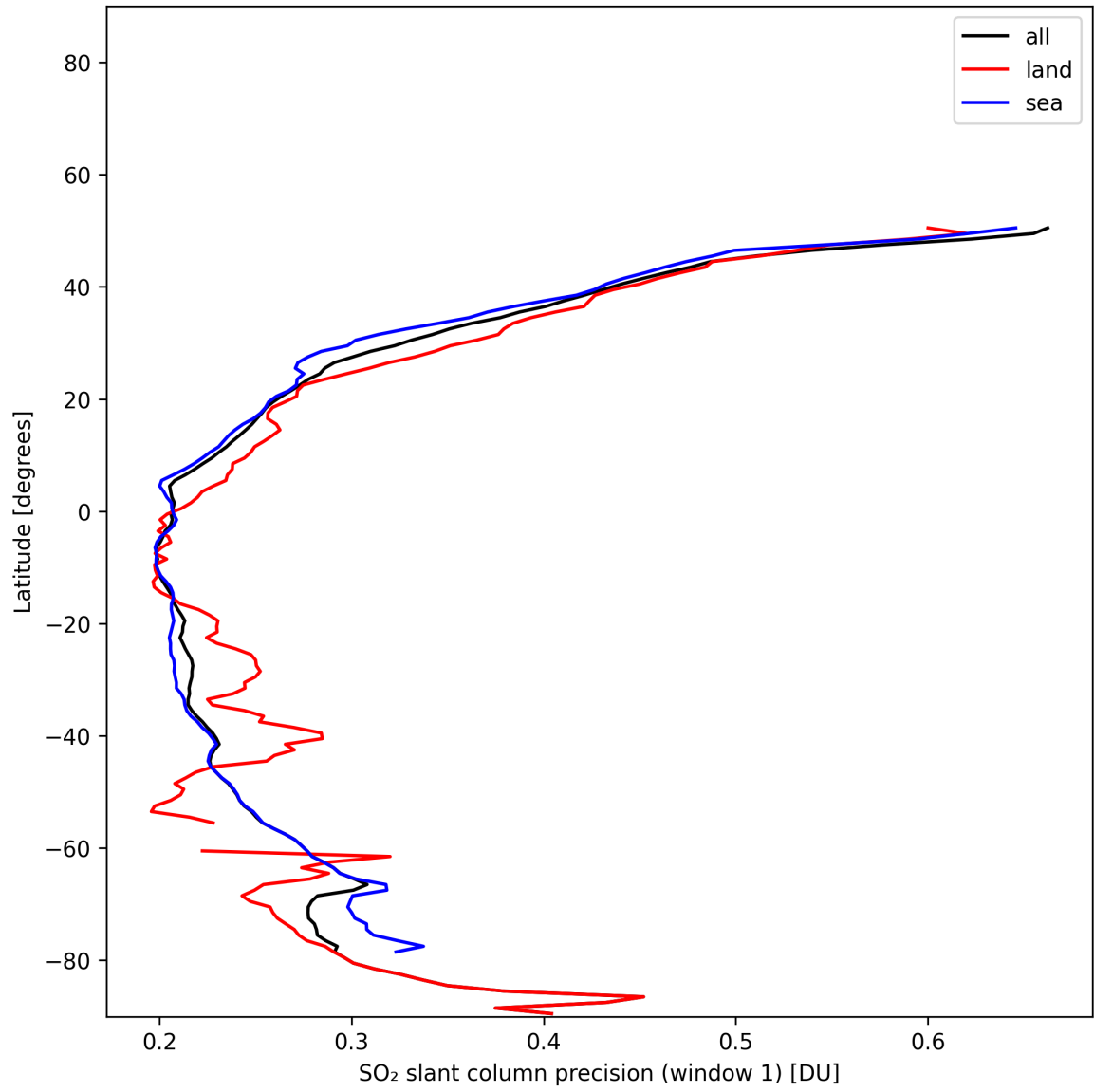


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-01-21 to 2025-01-21.

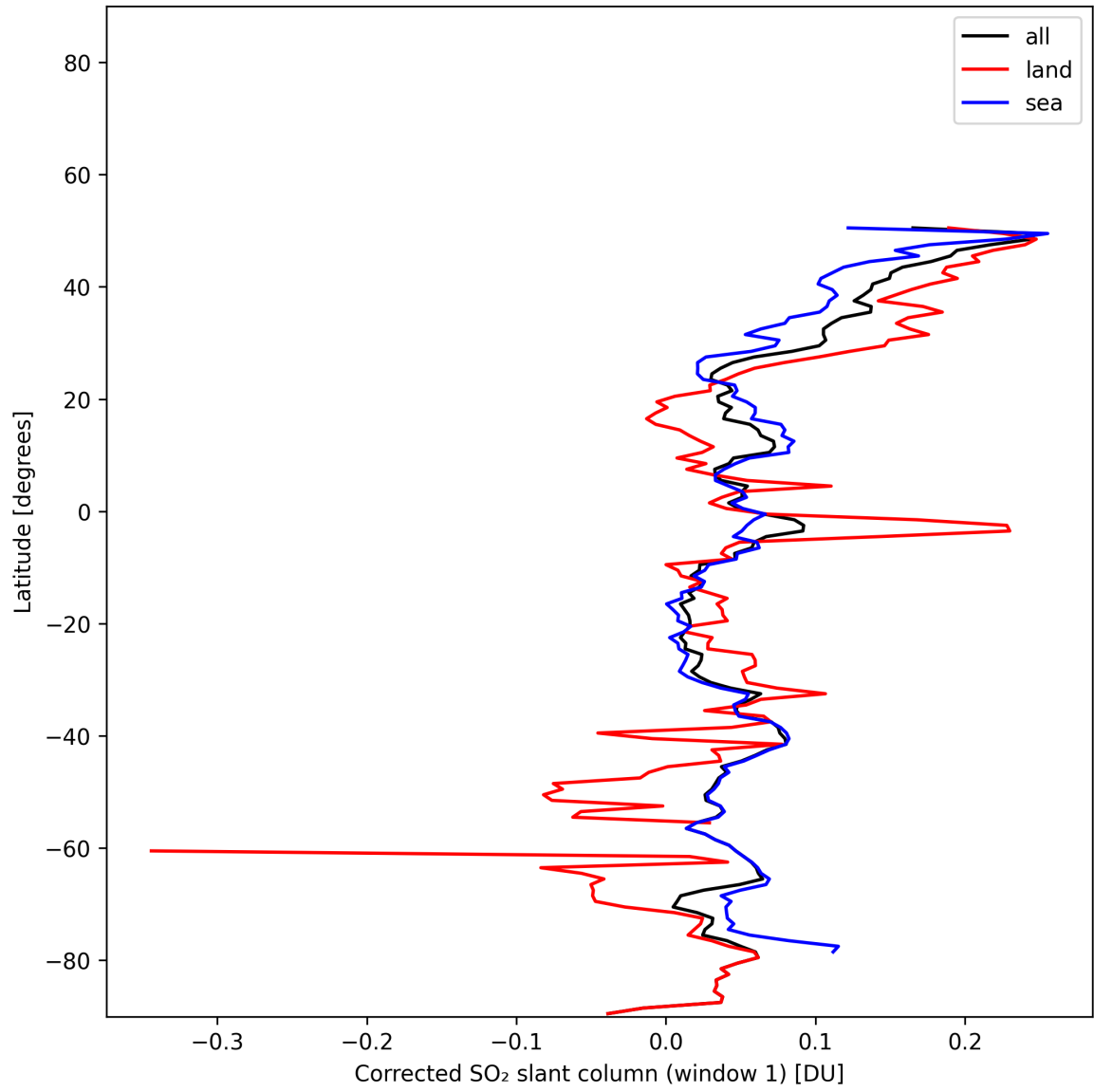


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-01-21 to 2025-01-21.

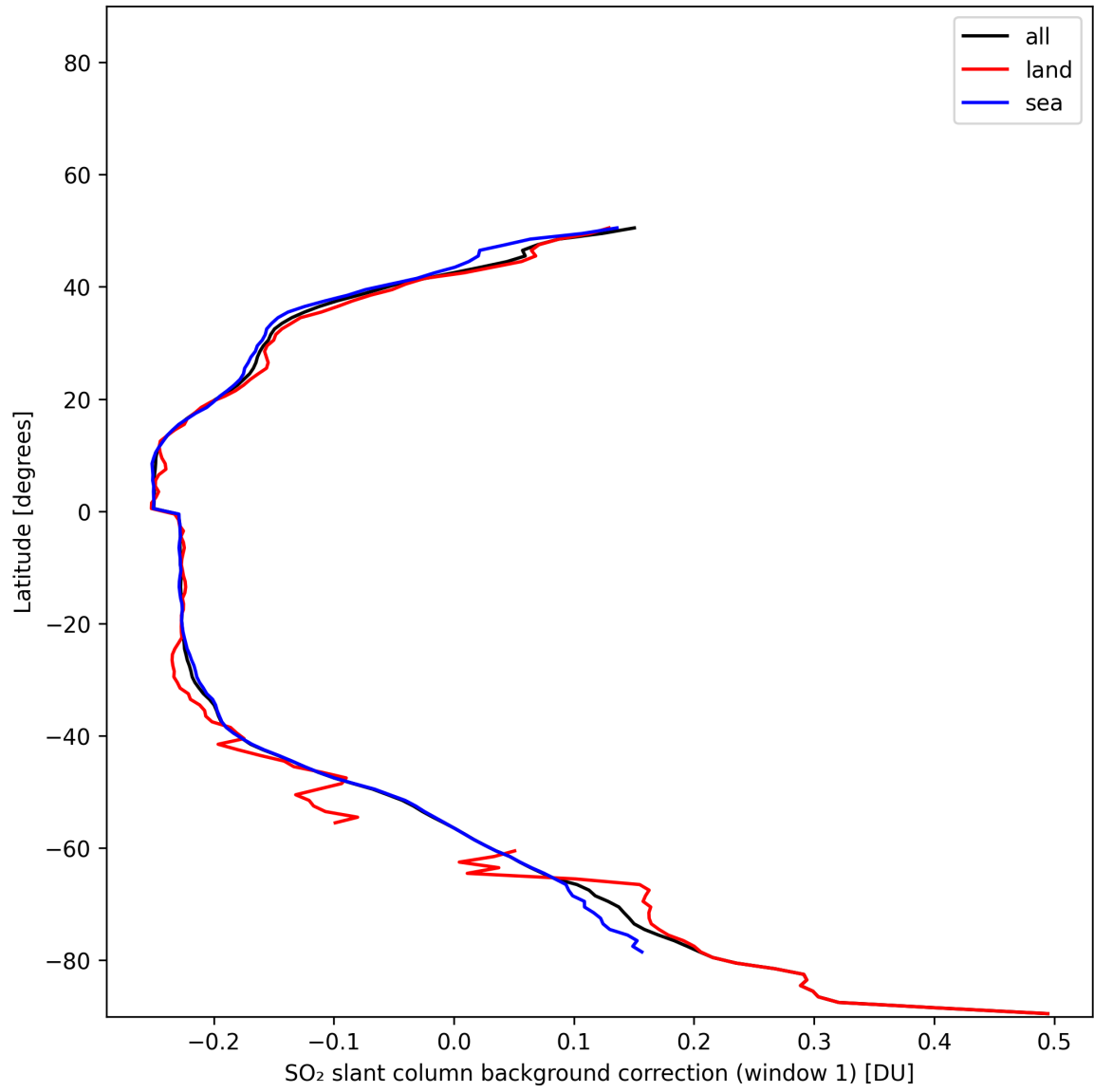


Figure 39: Zonal average of "SO₂ slant column background correction (window 1)" for 2025-01-21 to 2025-01-21.

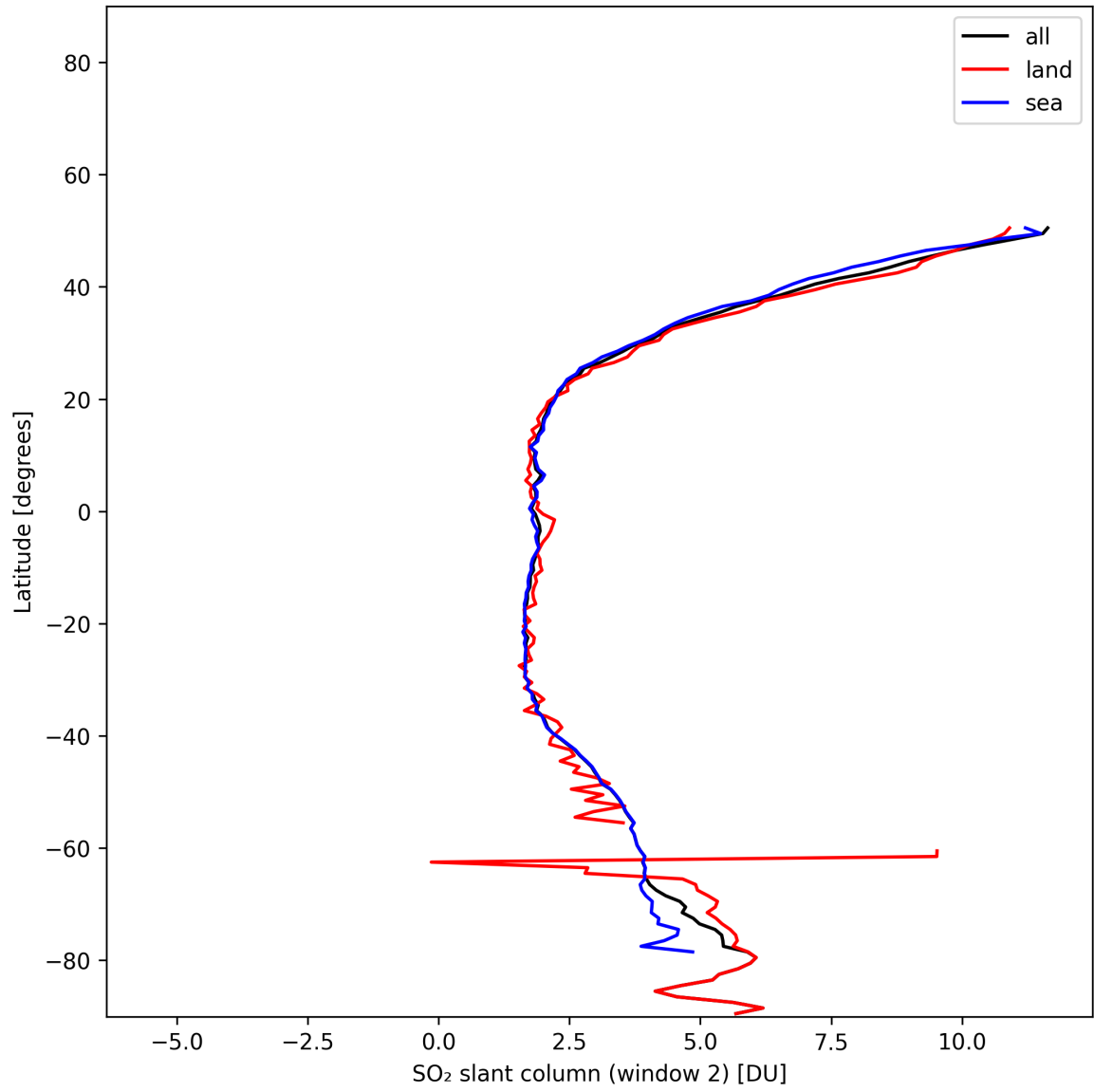


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-01-21 to 2025-01-21.

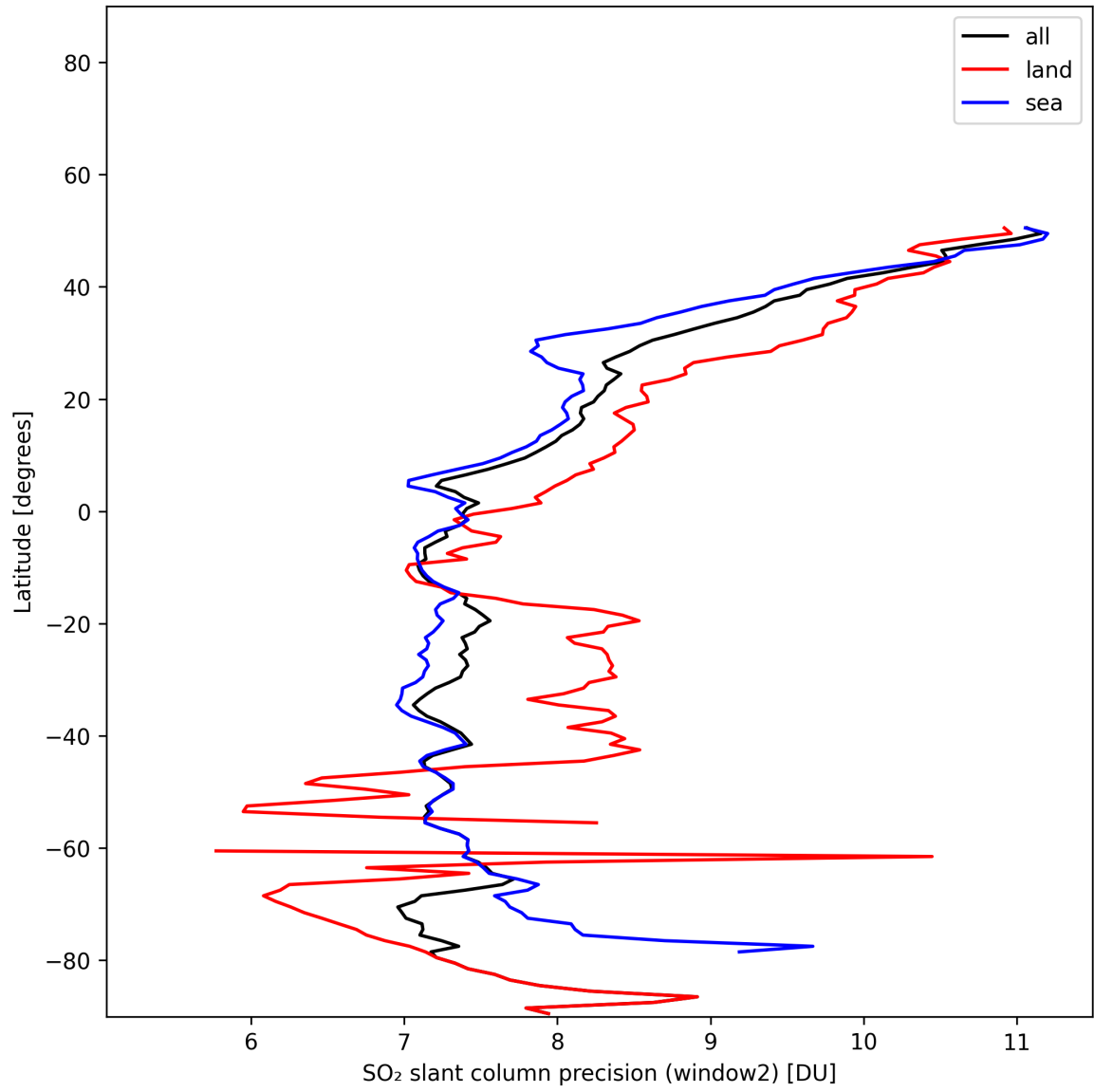


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-01-21 to 2025-01-21.

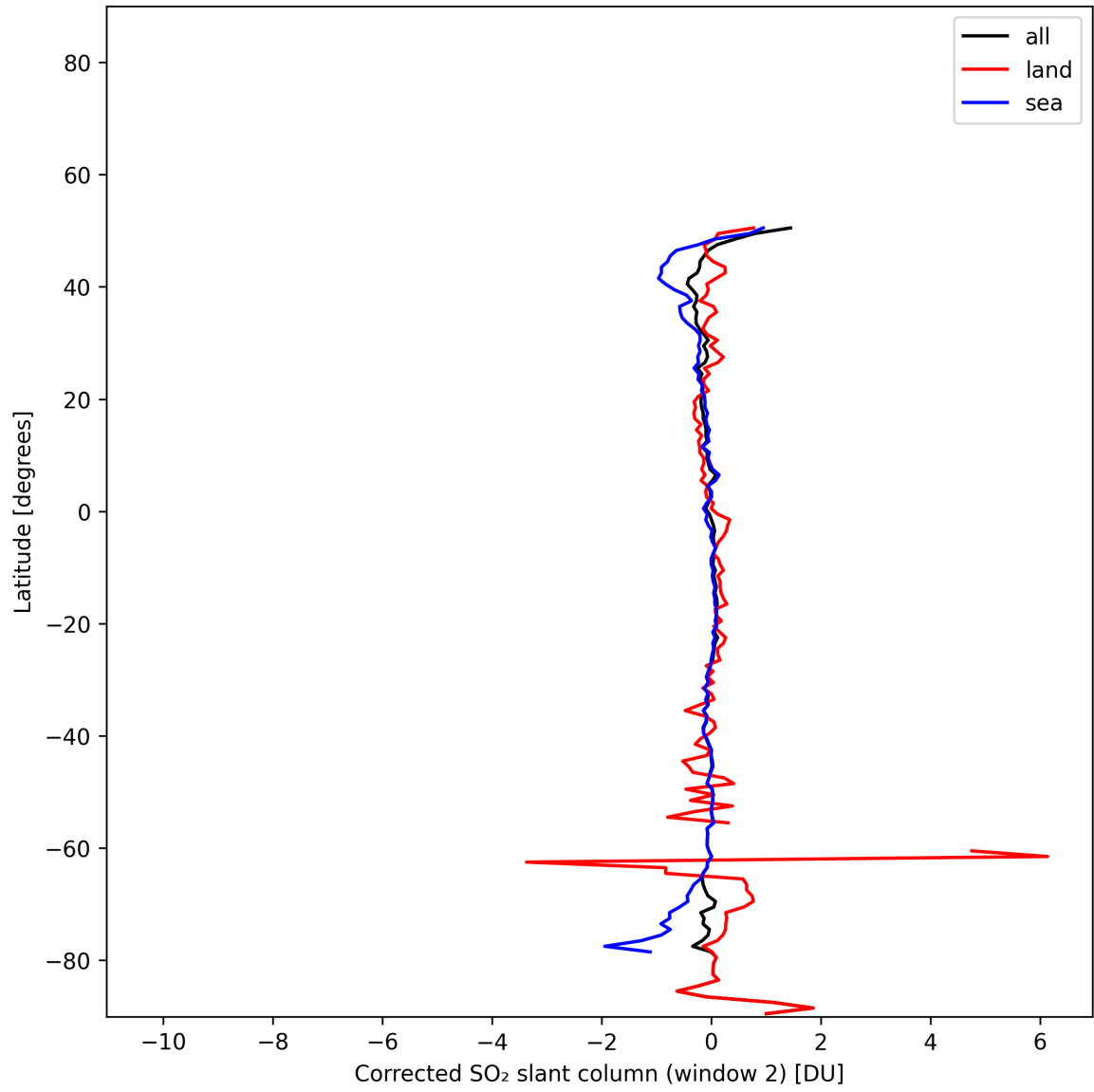


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-01-21 to 2025-01-21.

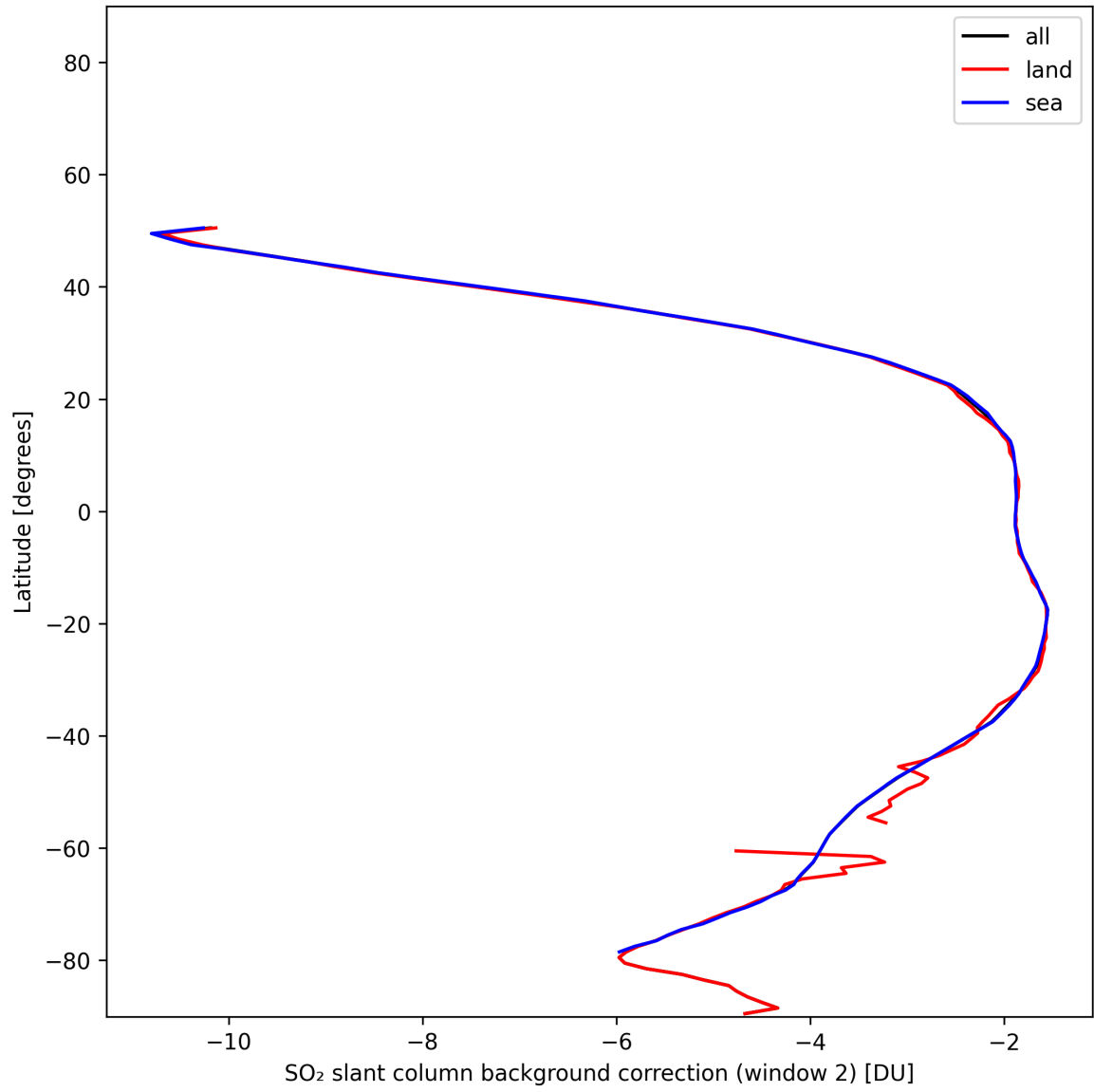


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-01-21 to 2025-01-21.

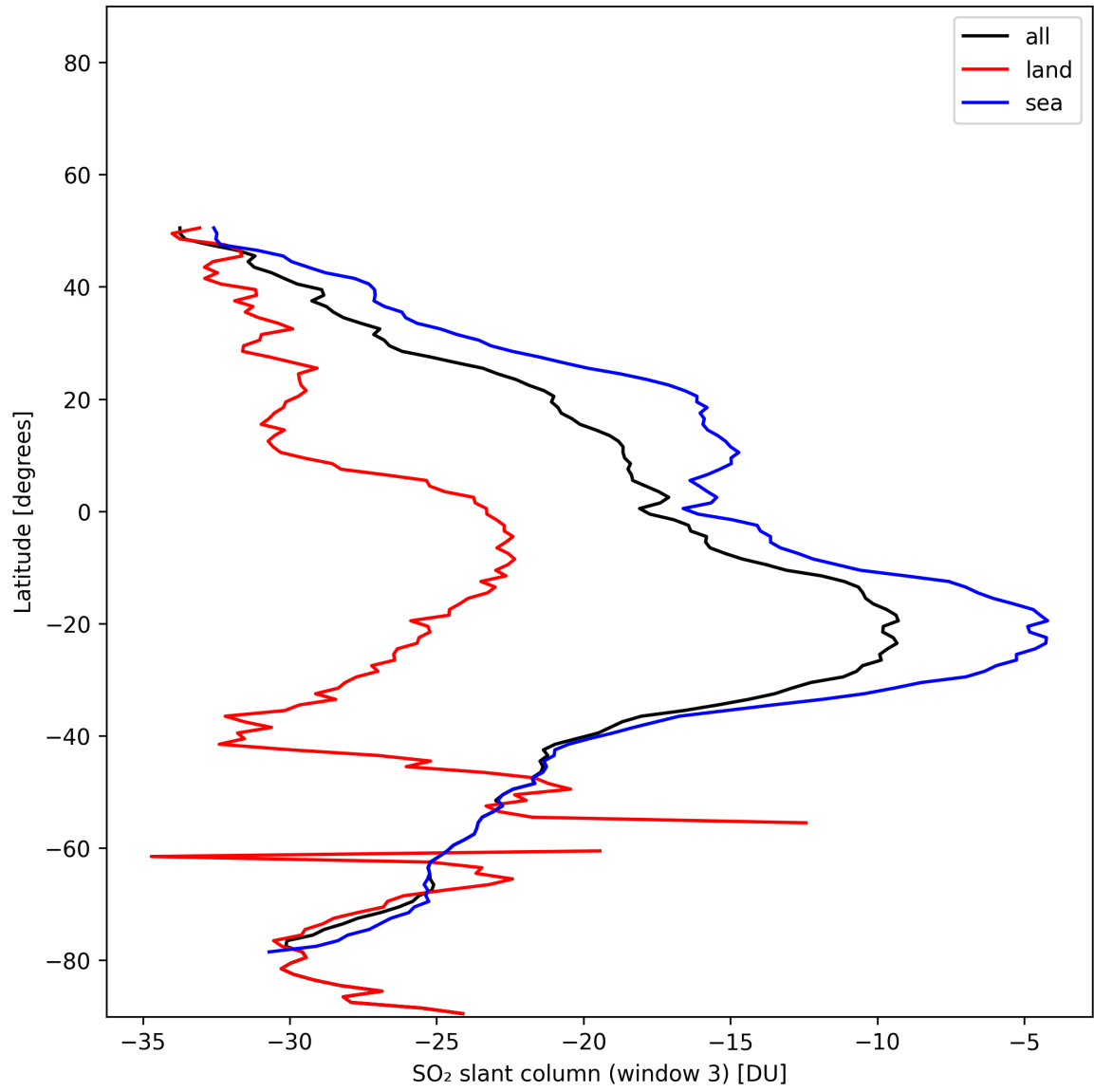


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-01-21 to 2025-01-21.

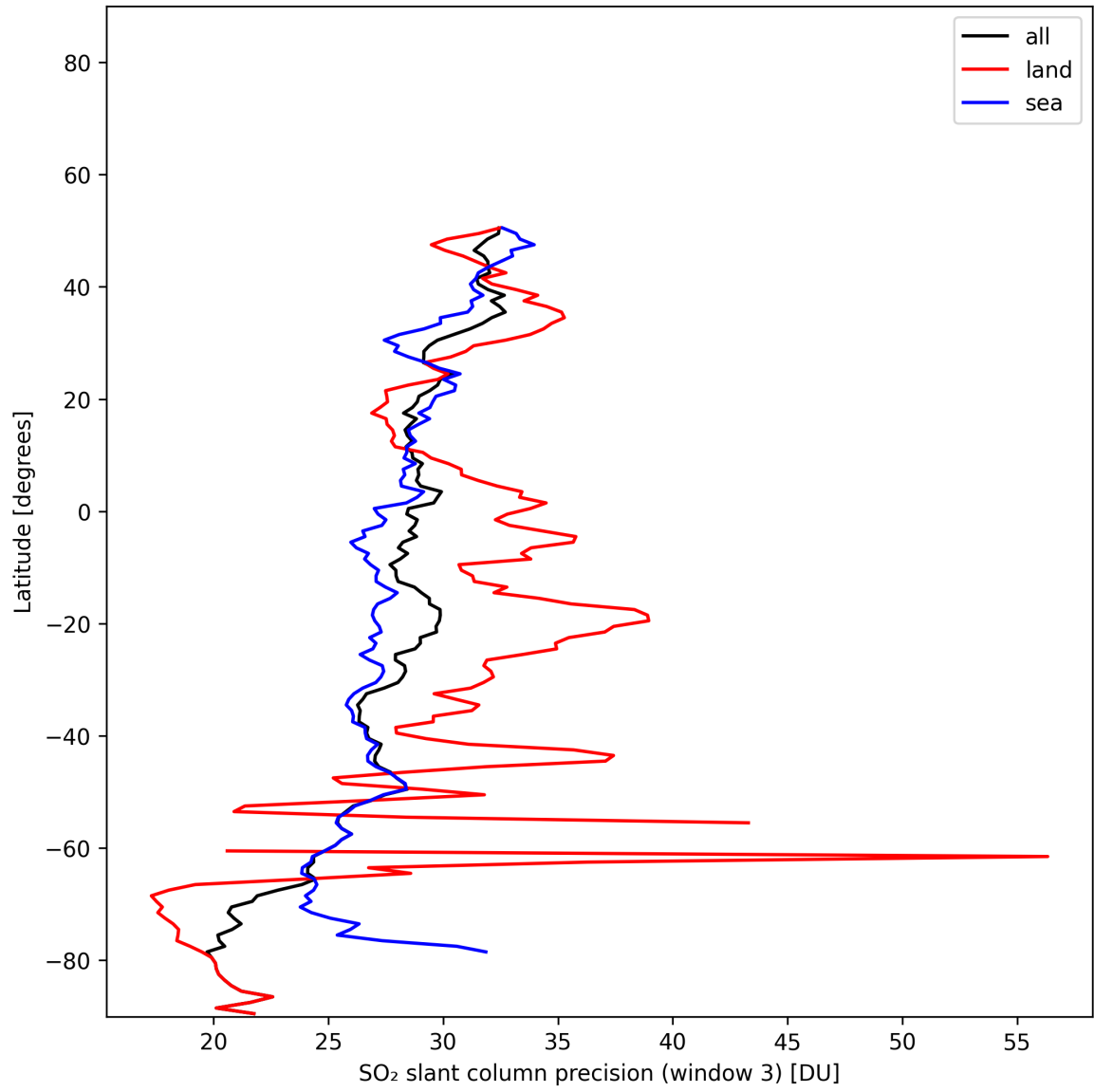


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-01-21 to 2025-01-21.

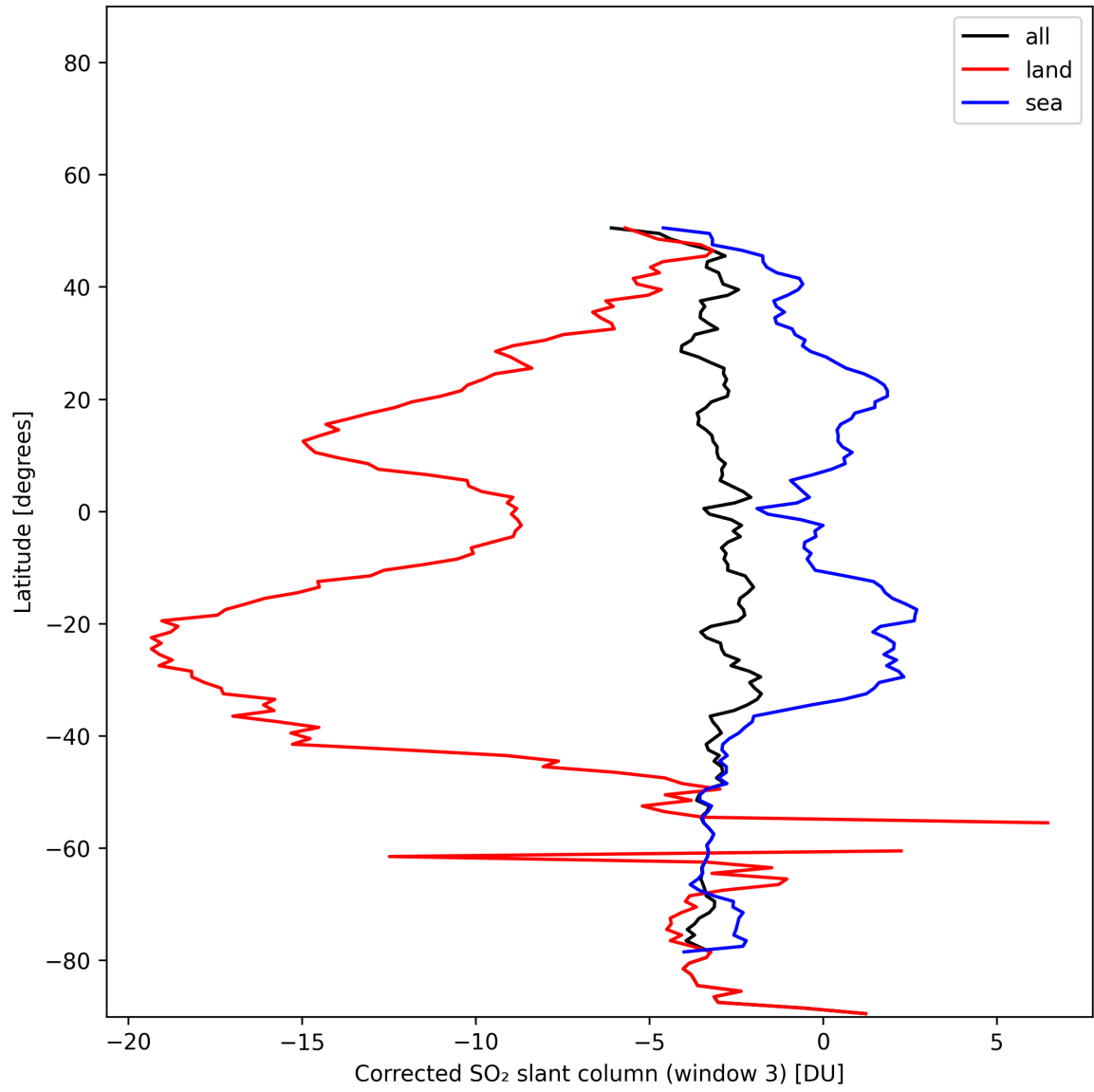


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-01-21 to 2025-01-21.

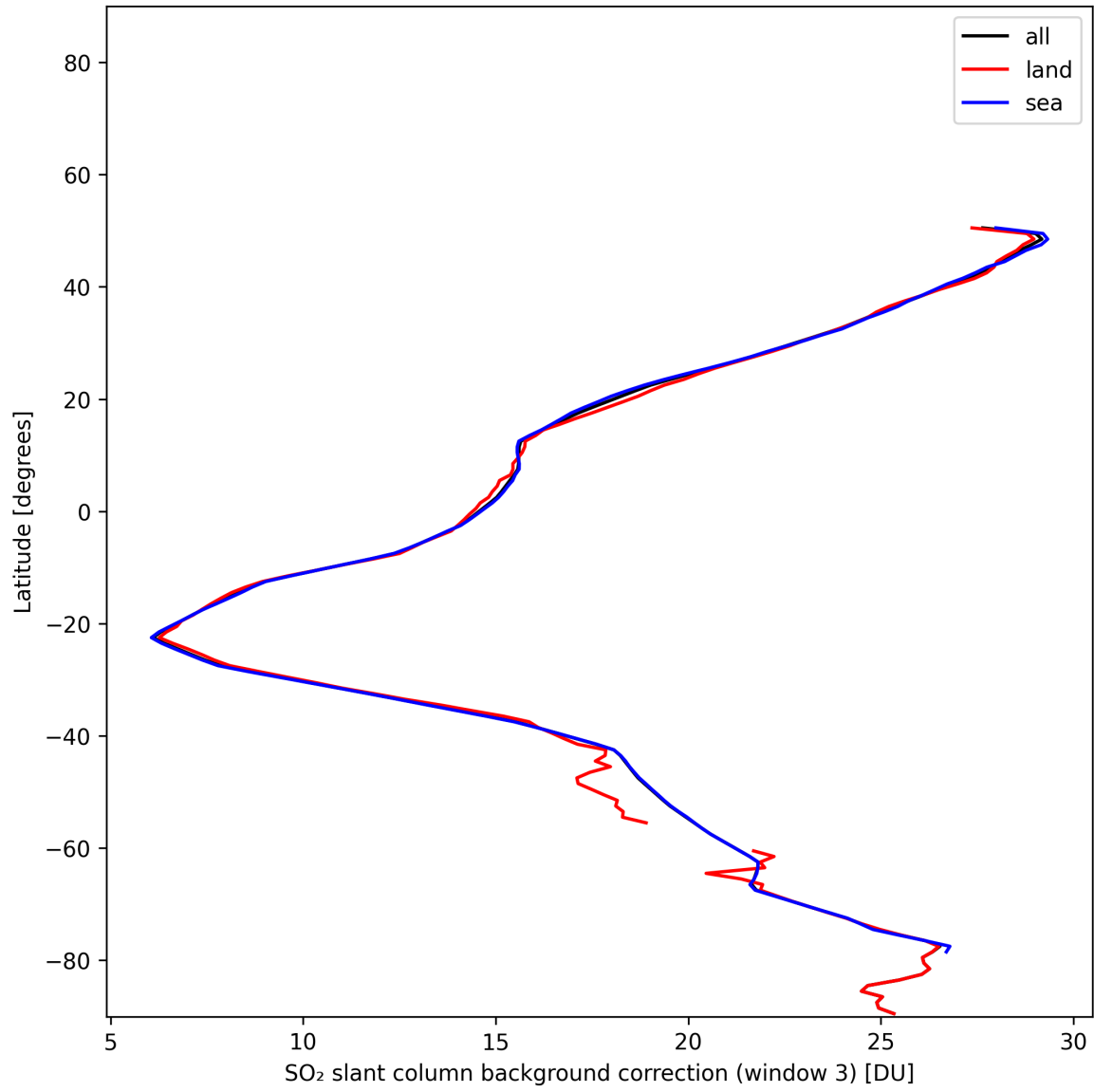


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-01-21 to 2025-01-21.

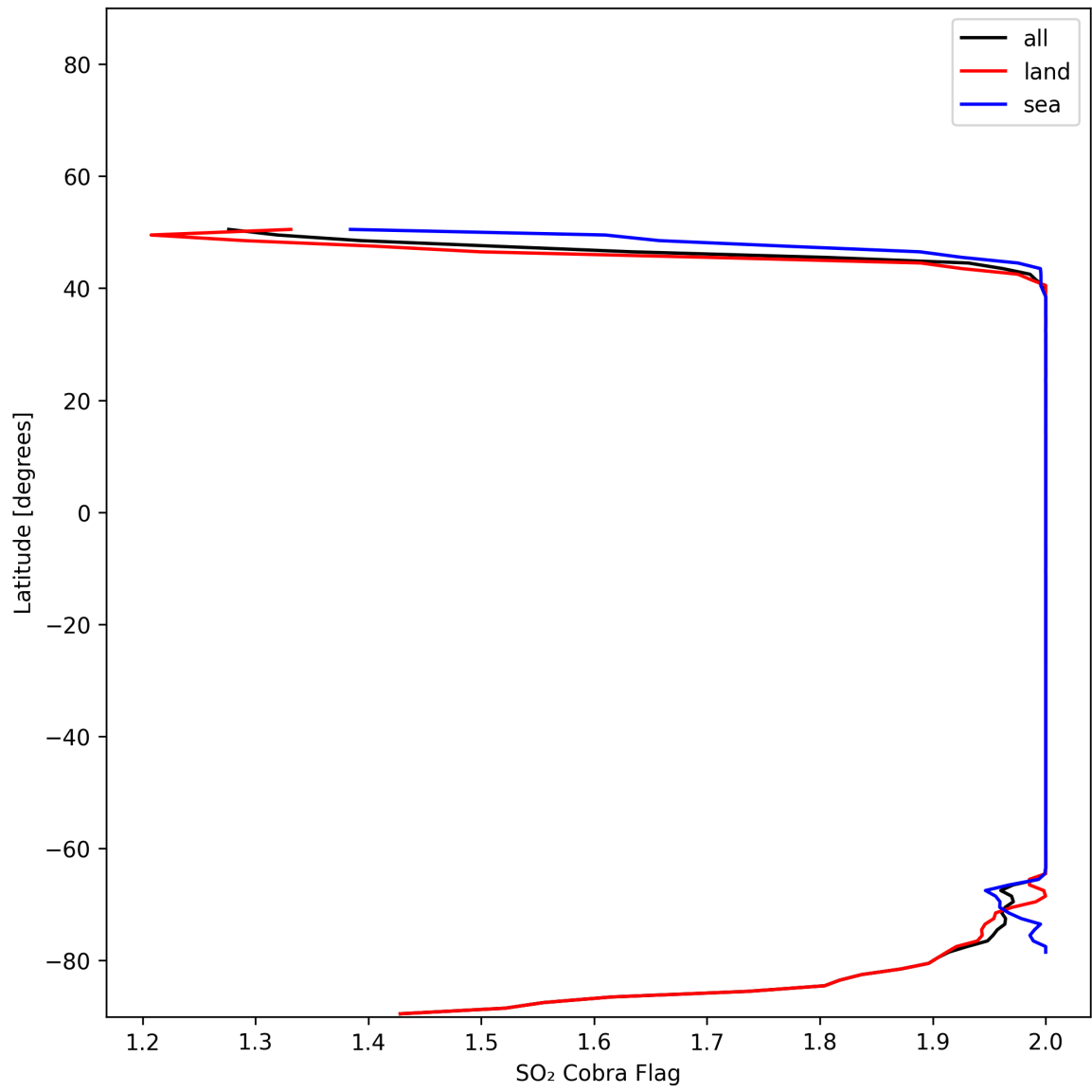


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-01-21 to 2025-01-21.

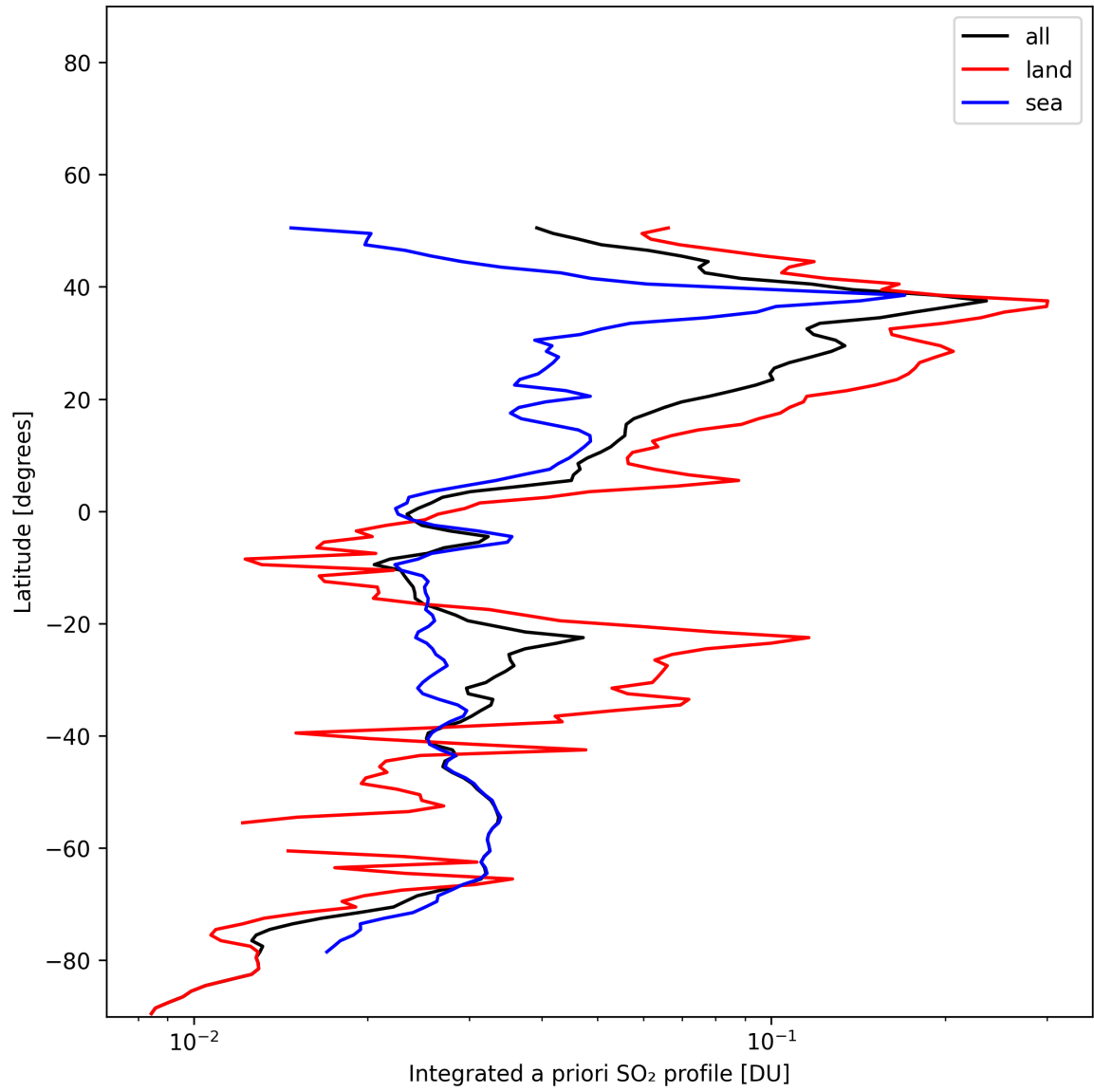


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-01-21 to 2025-01-21.

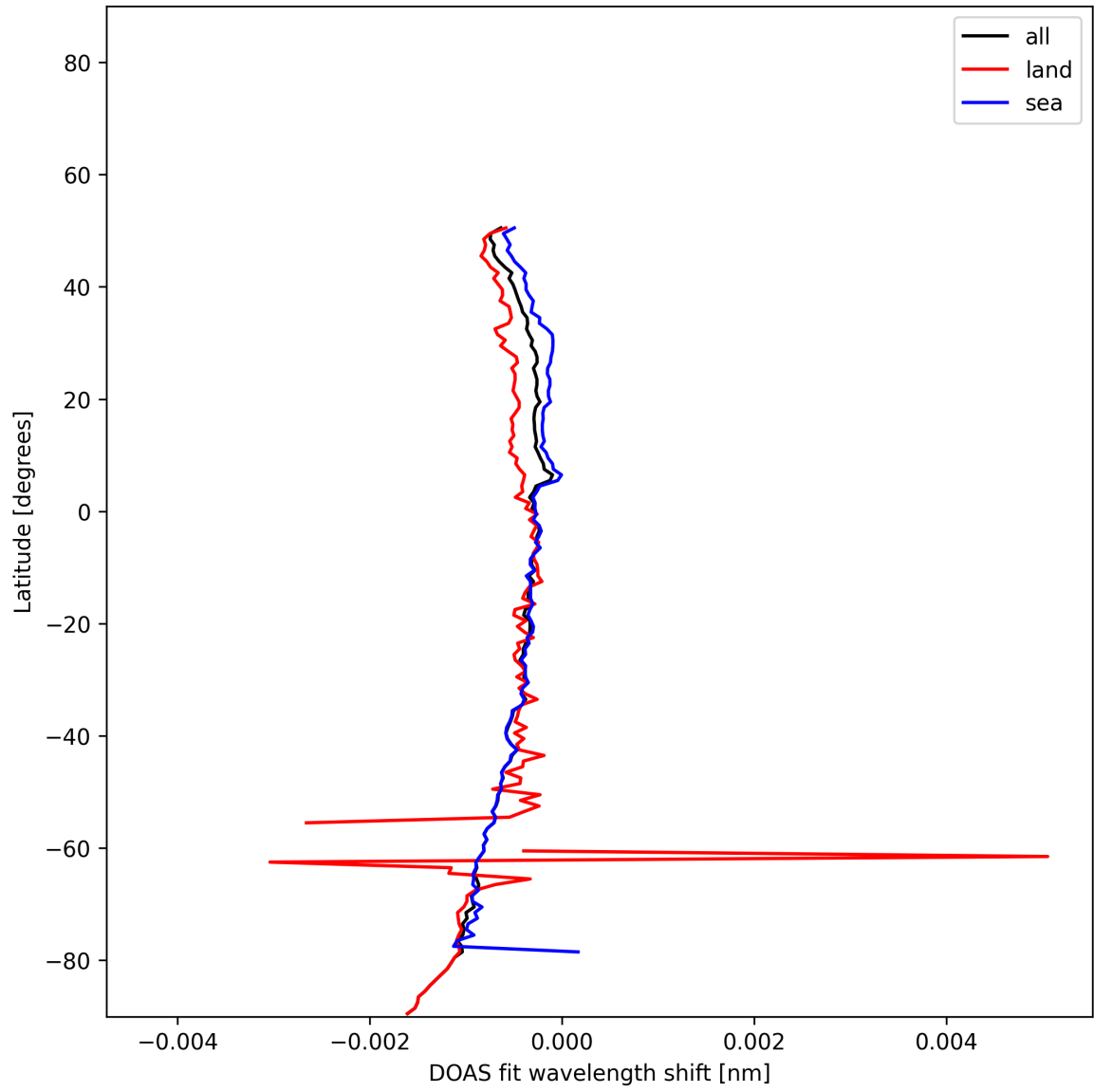


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2025-01-21 to 2025-01-21.

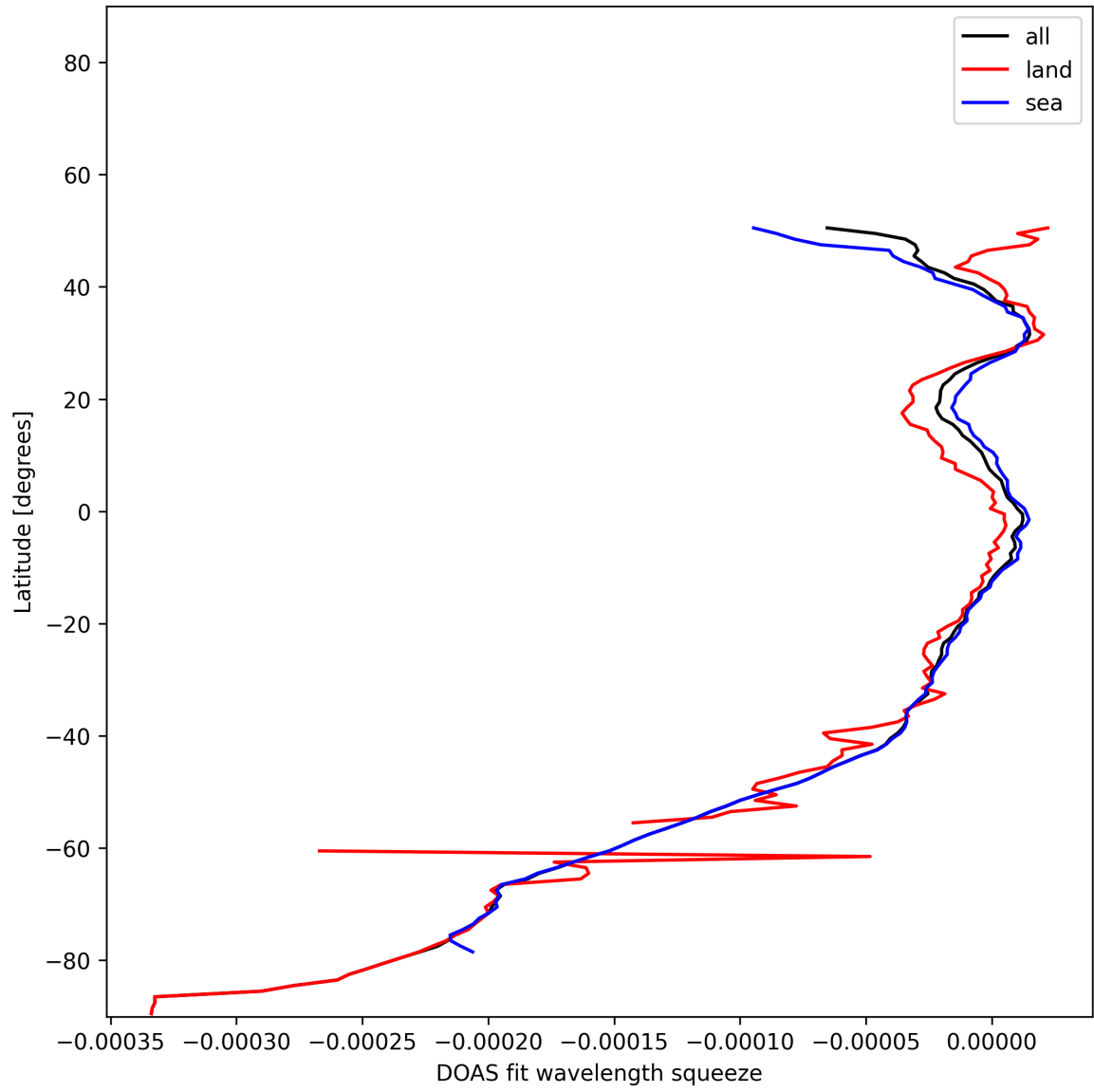


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-01-21 to 2025-01-21.

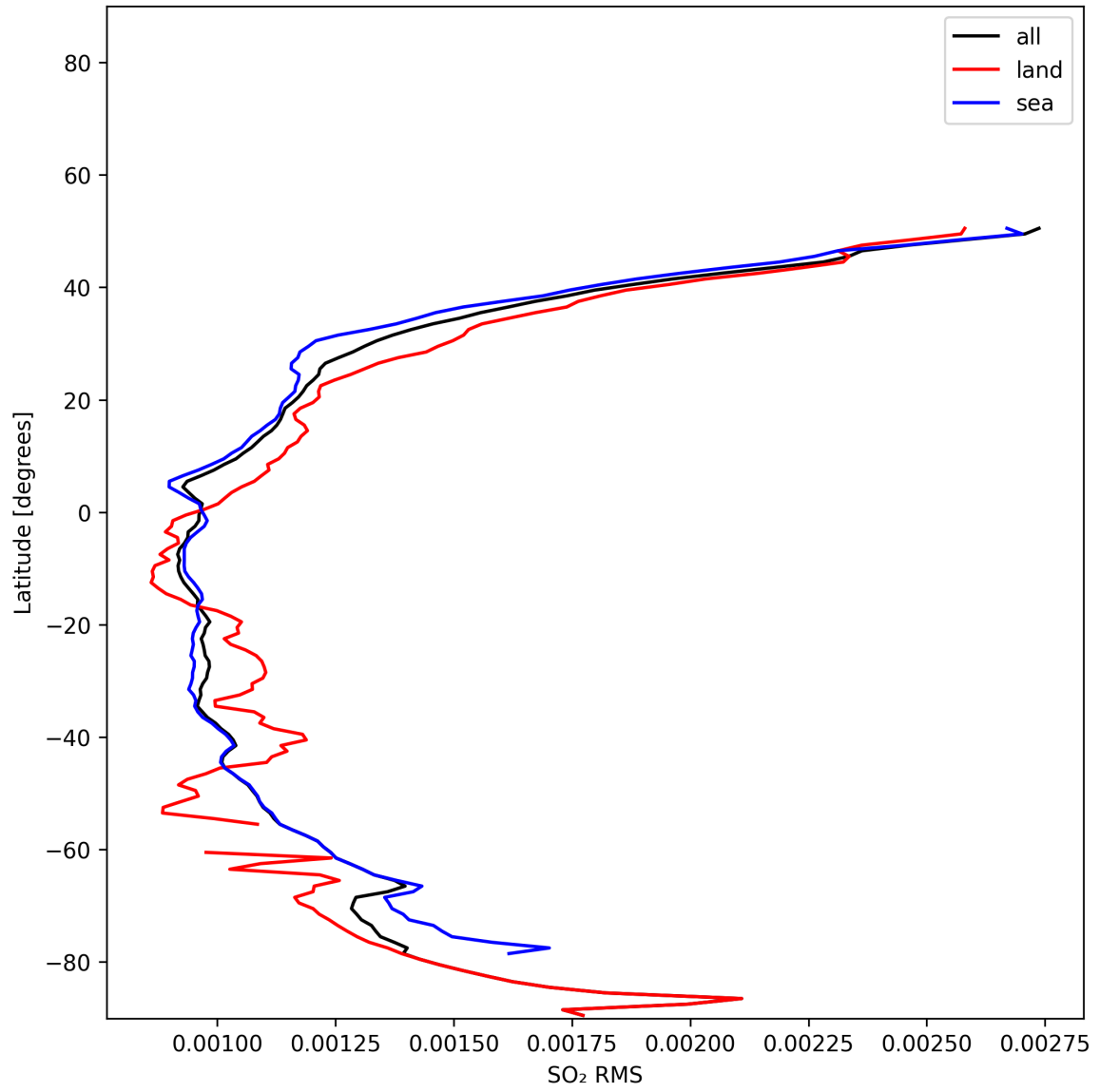


Figure 52: Zonal average of “SO₂ RMS” for 2025-01-21 to 2025-01-21.

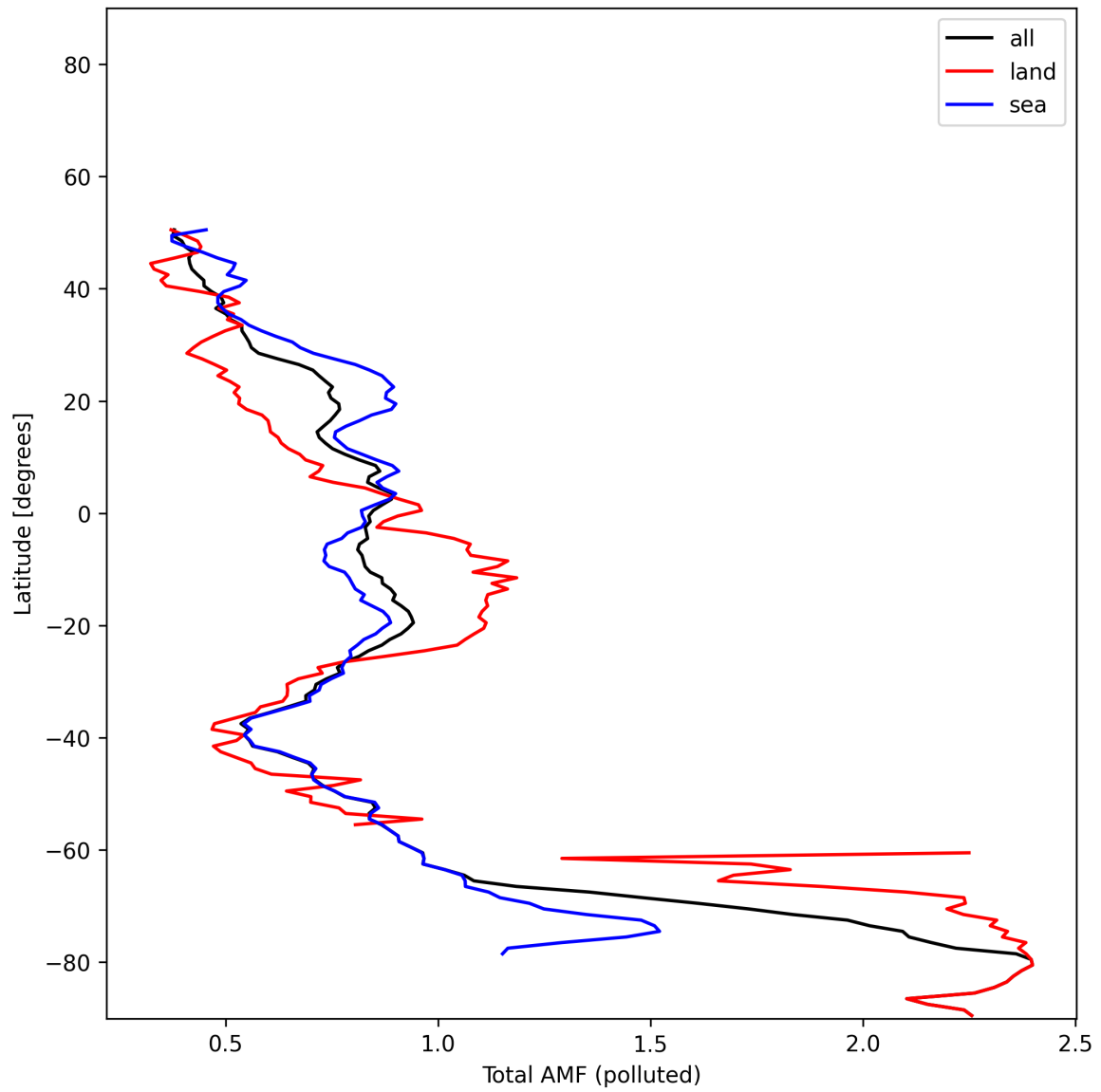


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-01-21 to 2025-01-21.

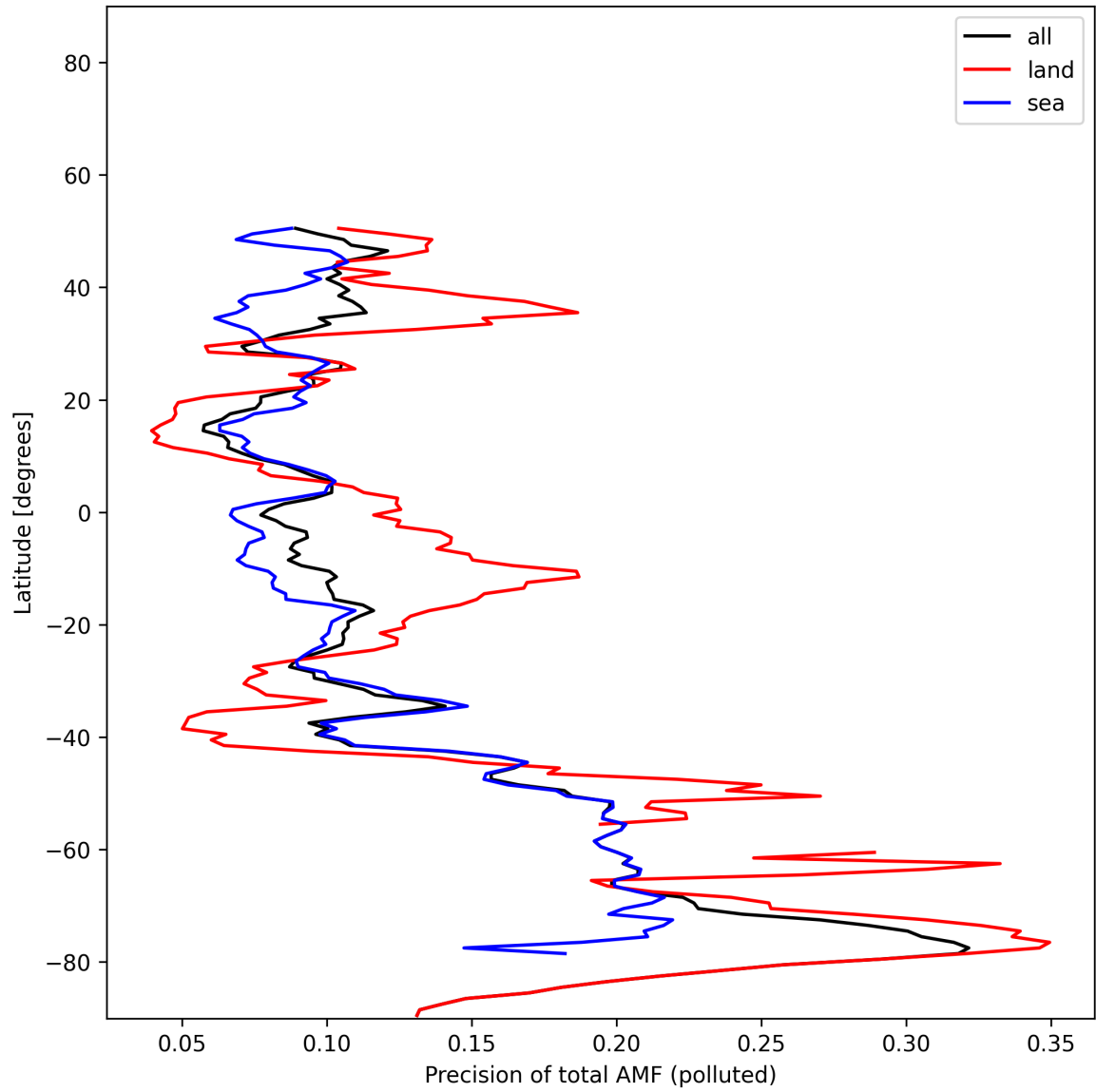


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-01-21 to 2025-01-21.

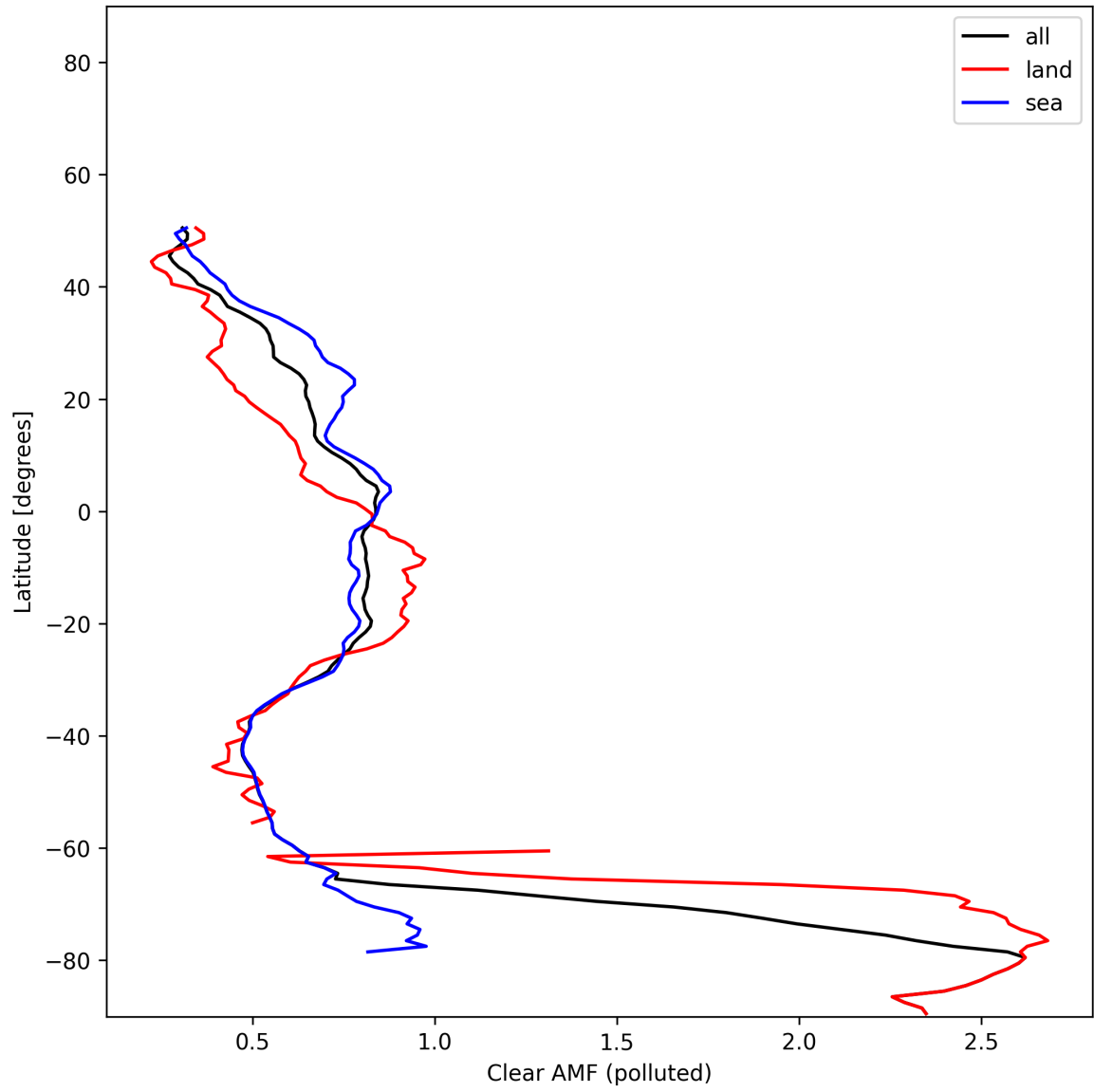


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-01-21 to 2025-01-21.

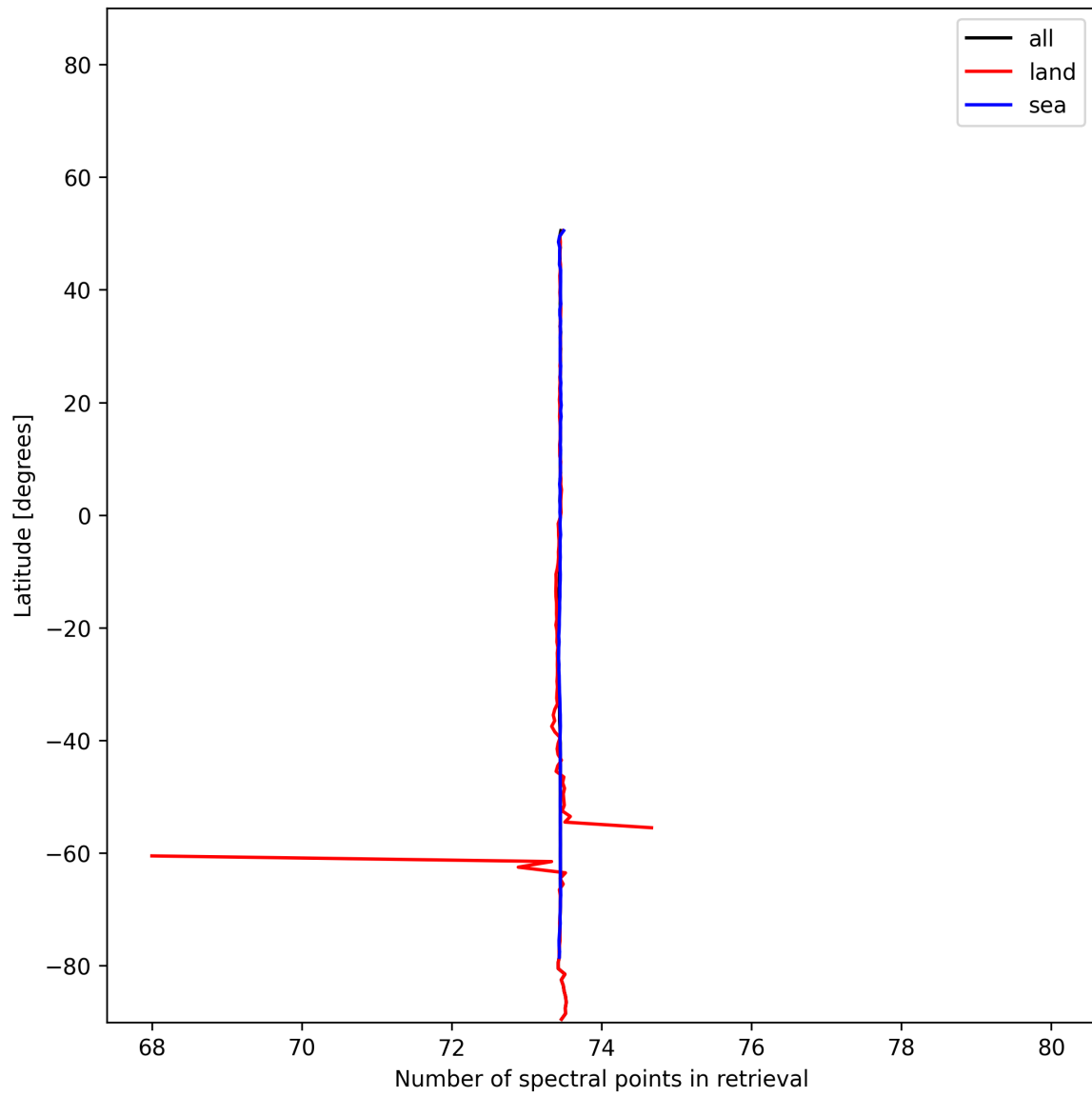


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-01-21 to 2025-01-21.

8 Histograms

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

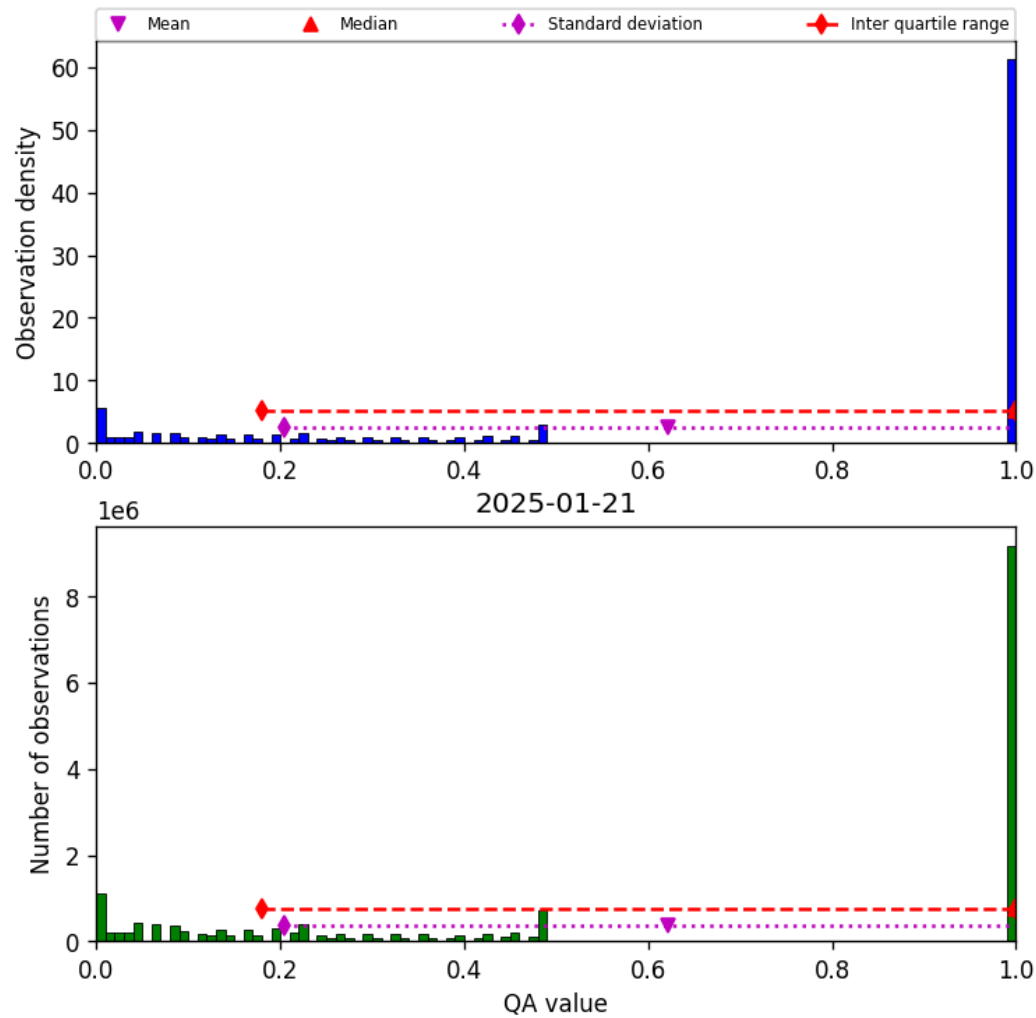


Figure 57: Histogram of “QA value” for 2025-01-21 to 2025-01-21

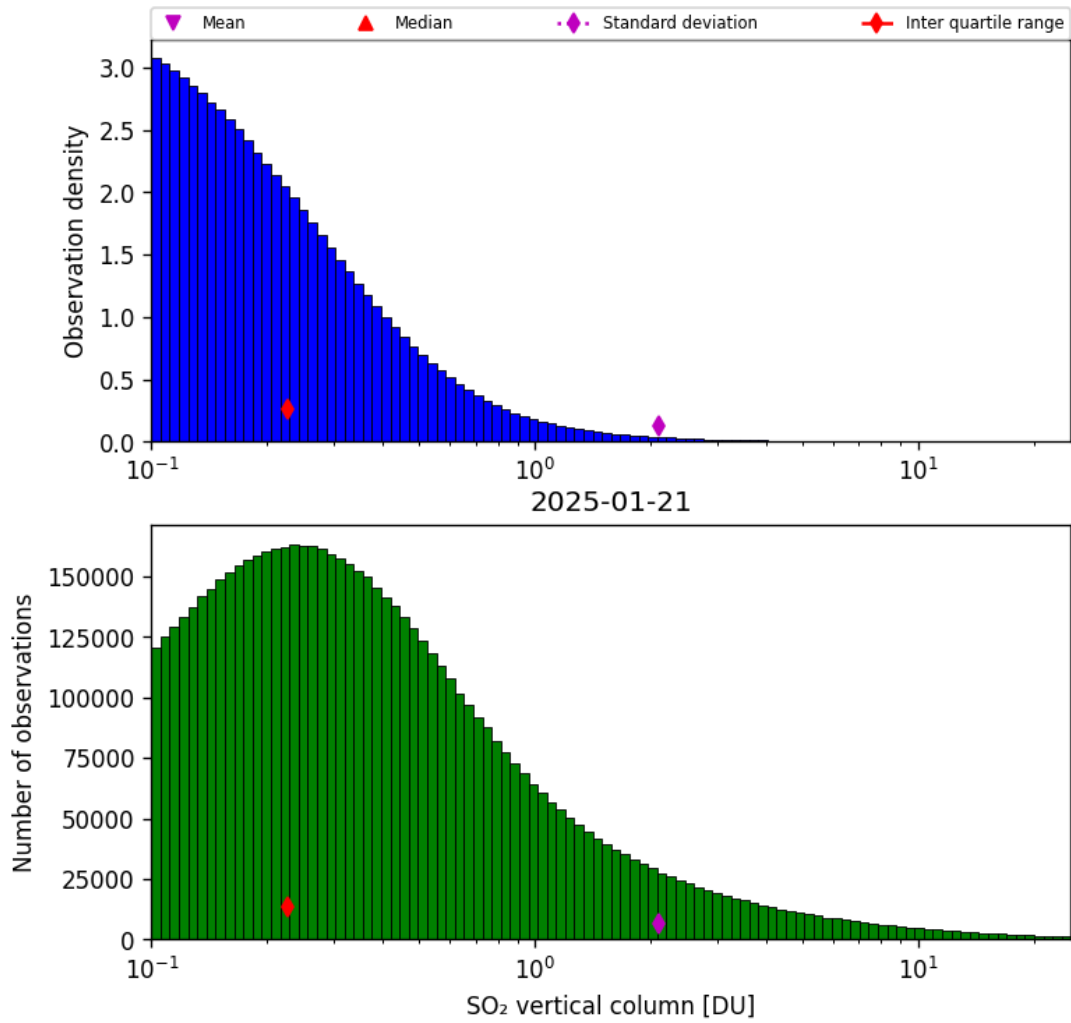


Figure 58: Histogram of “SO₂ vertical column” for 2025-01-21 to 2025-01-21

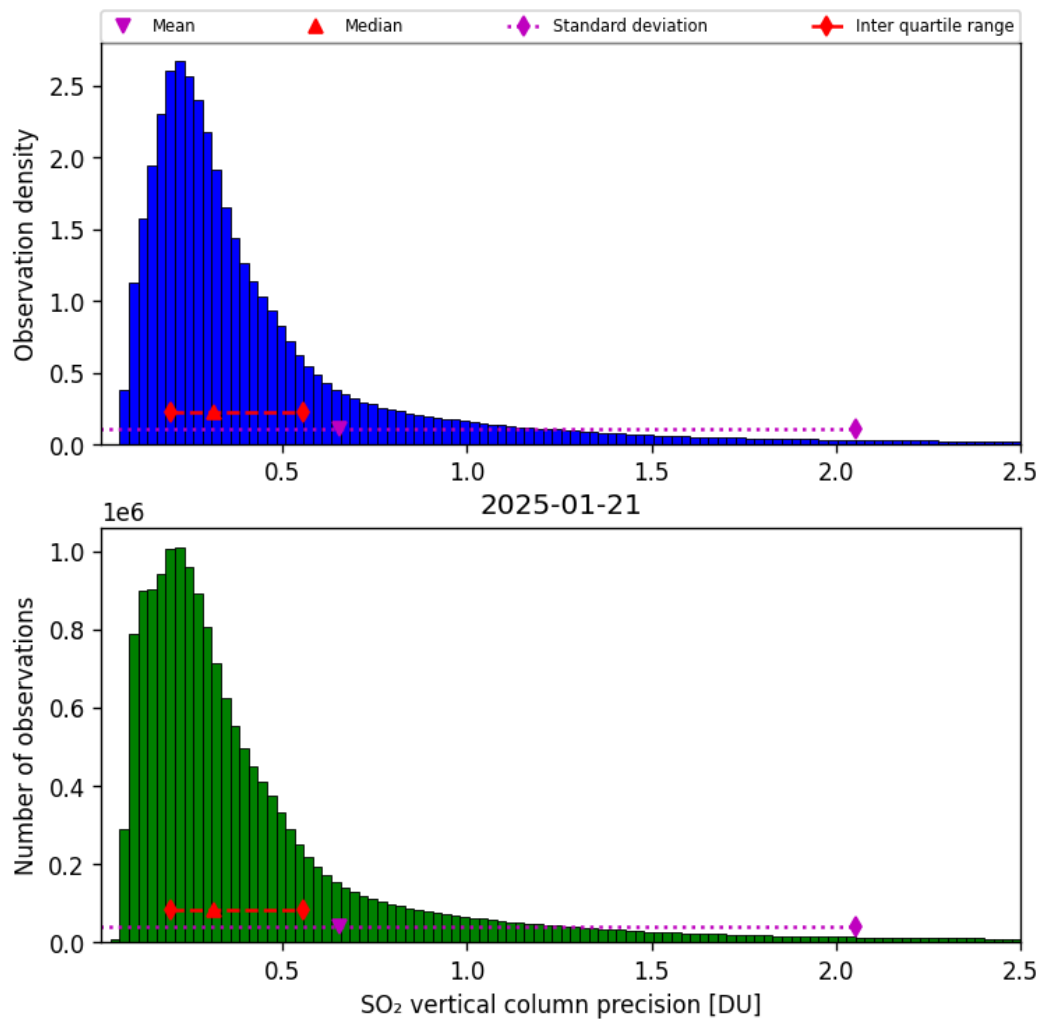


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-01-21 to 2025-01-21

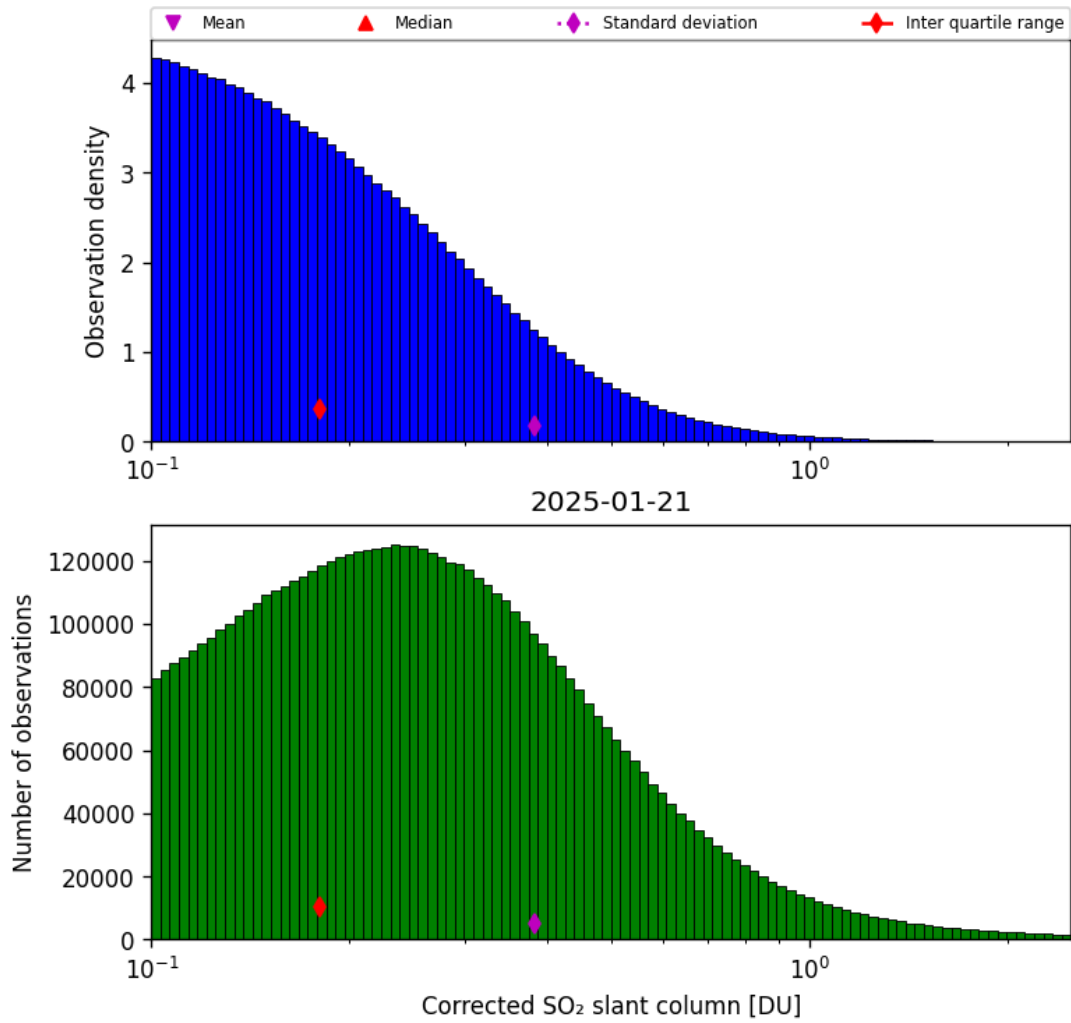


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-01-21 to 2025-01-21

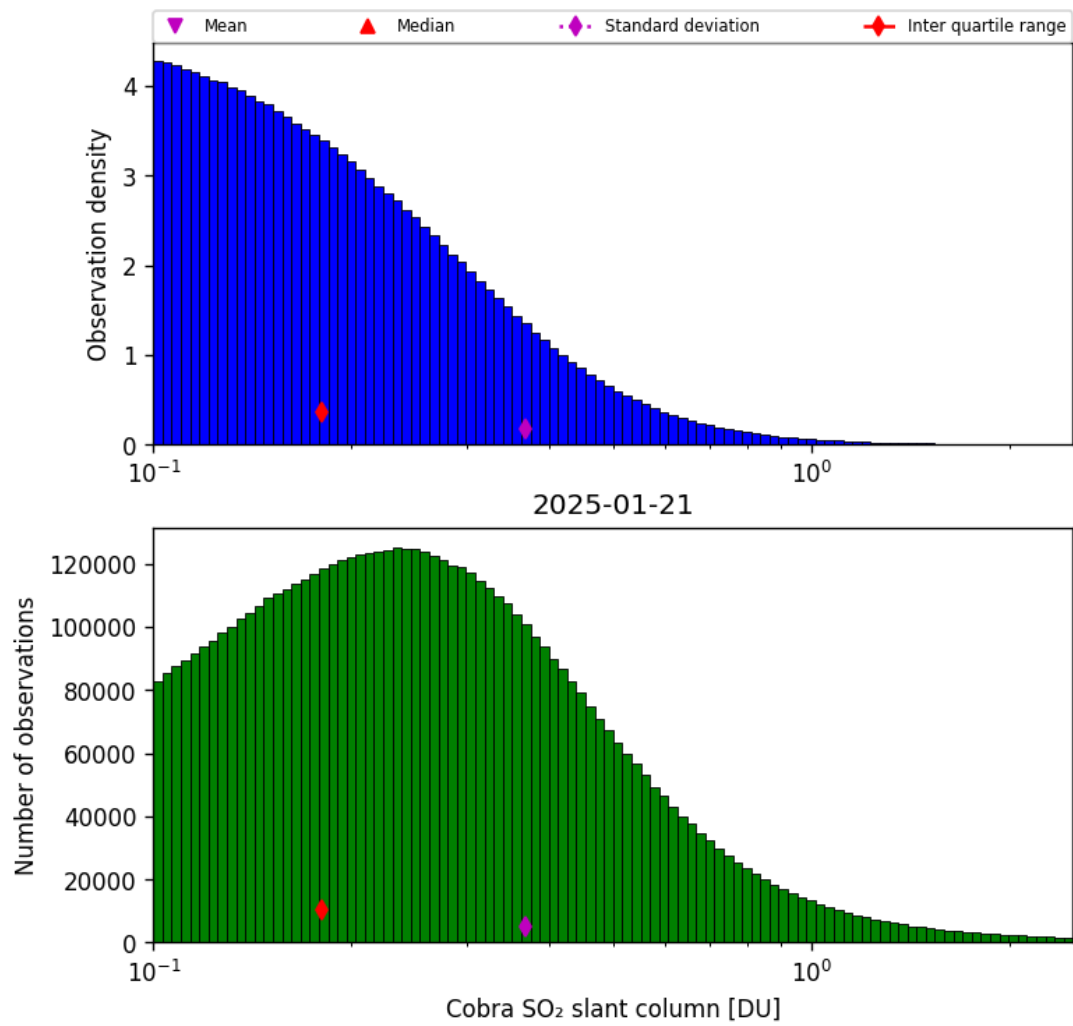


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-01-21 to 2025-01-21

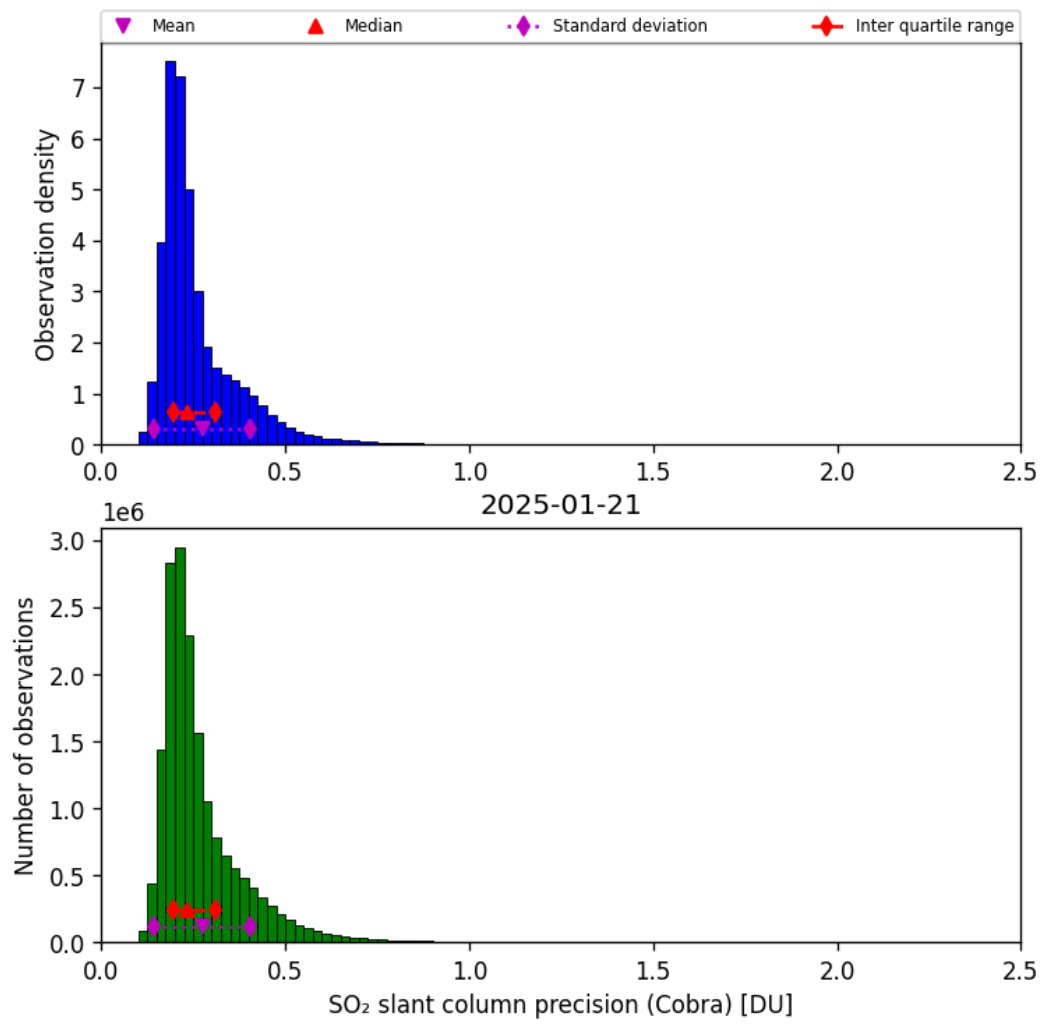


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-01-21 to 2025-01-21

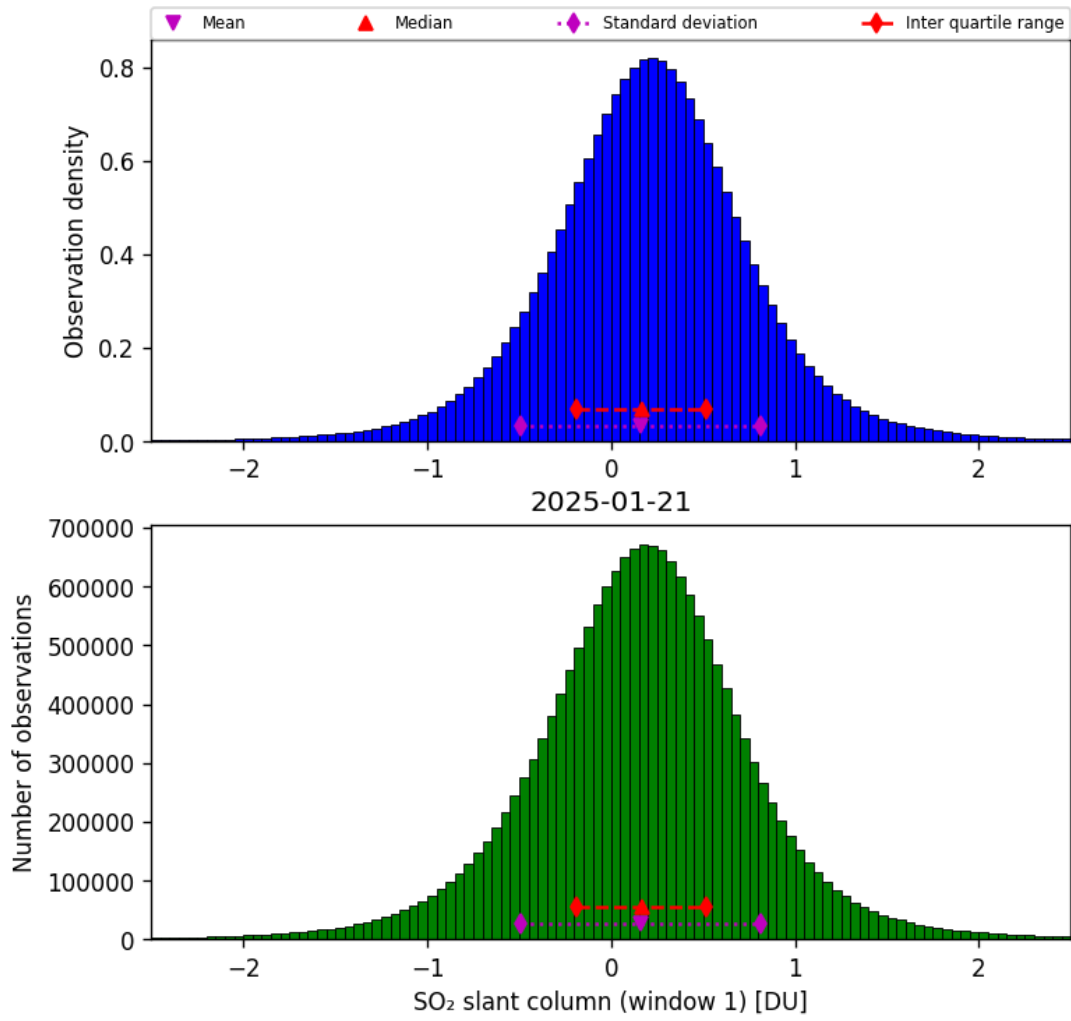


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-01-21 to 2025-01-21

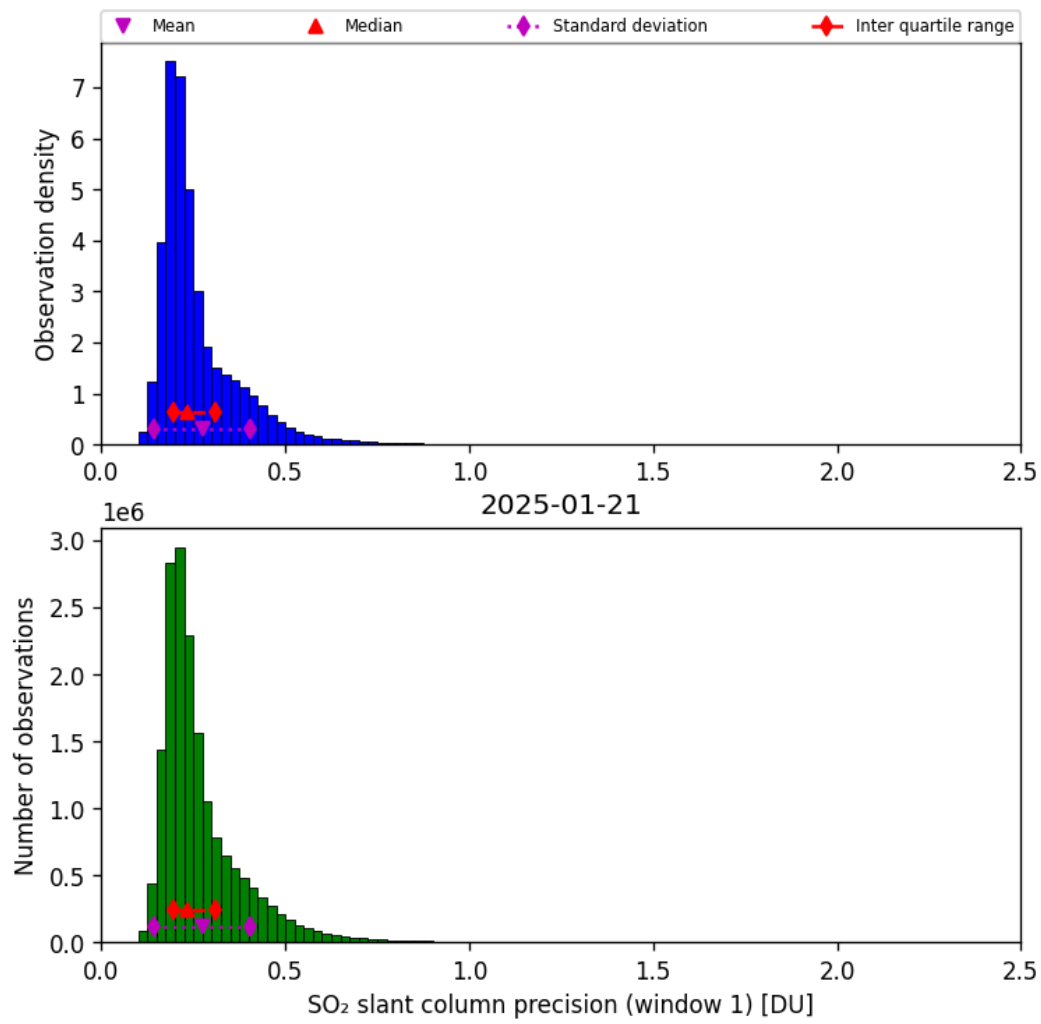


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-01-21 to 2025-01-21

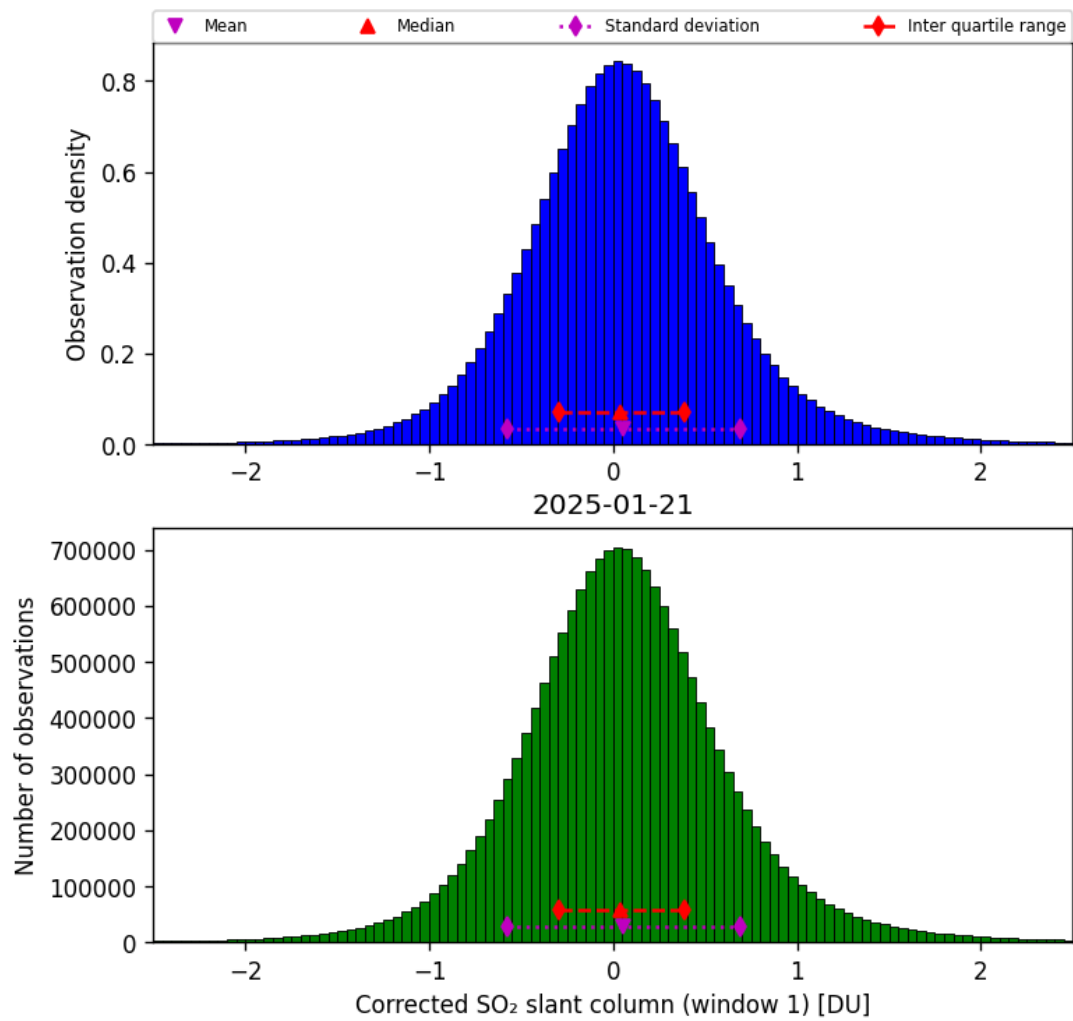


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-01-21 to 2025-01-21

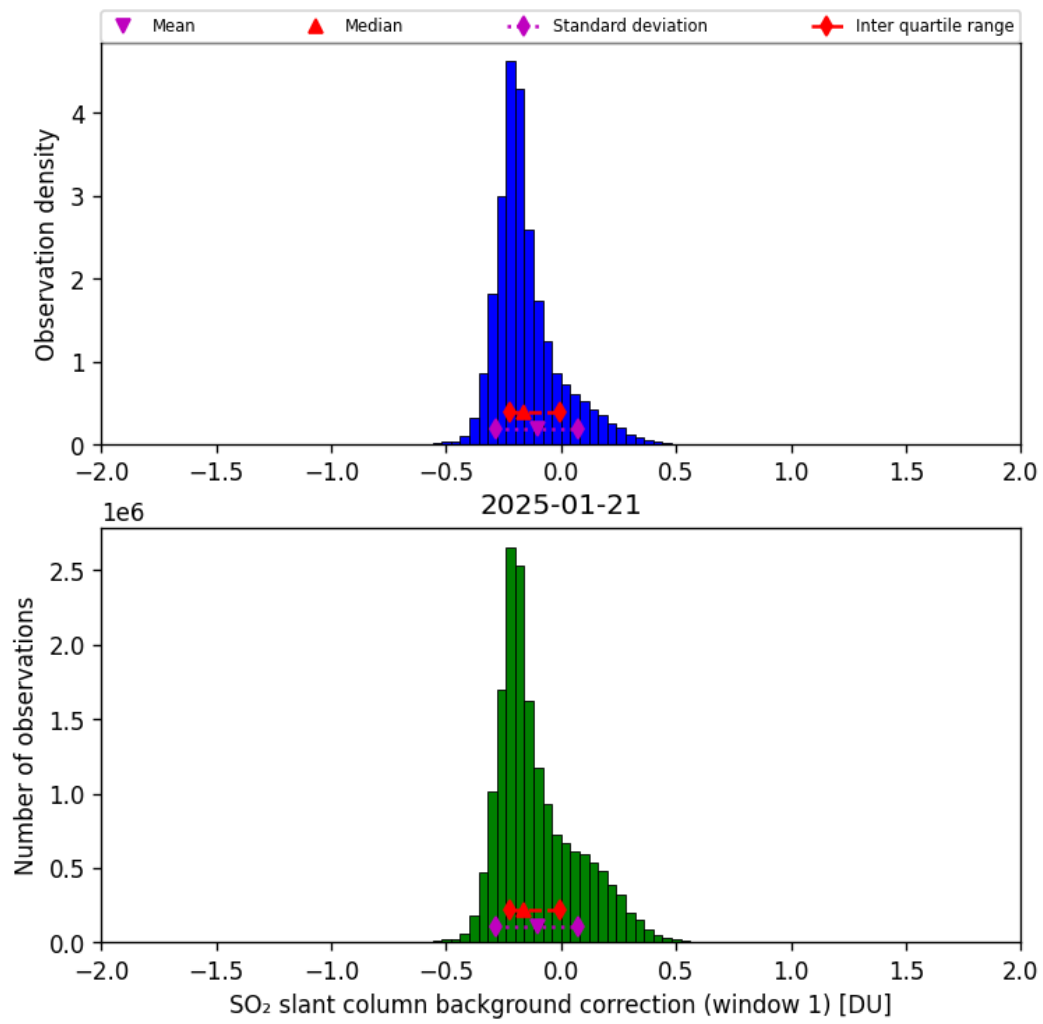


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-01-21 to 2025-01-21

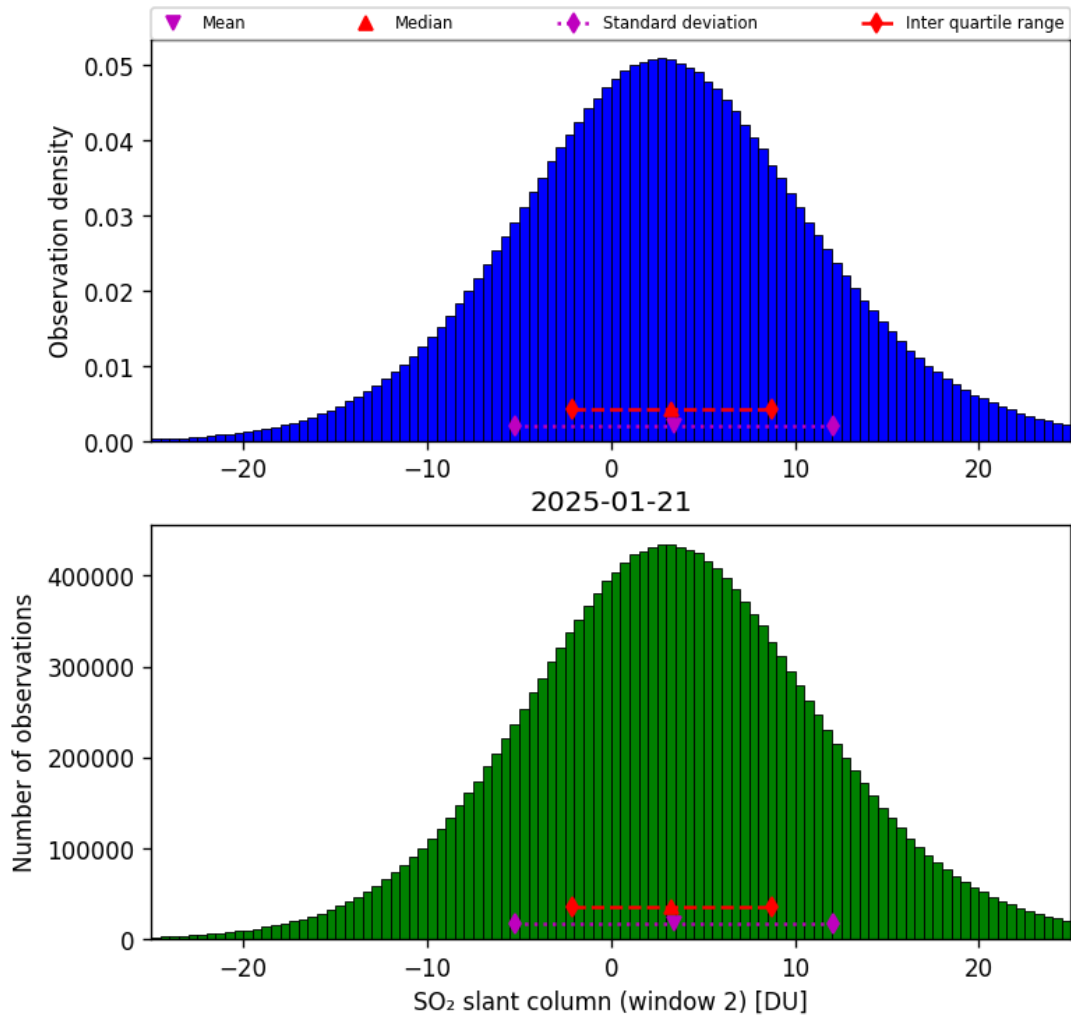


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-01-21 to 2025-01-21

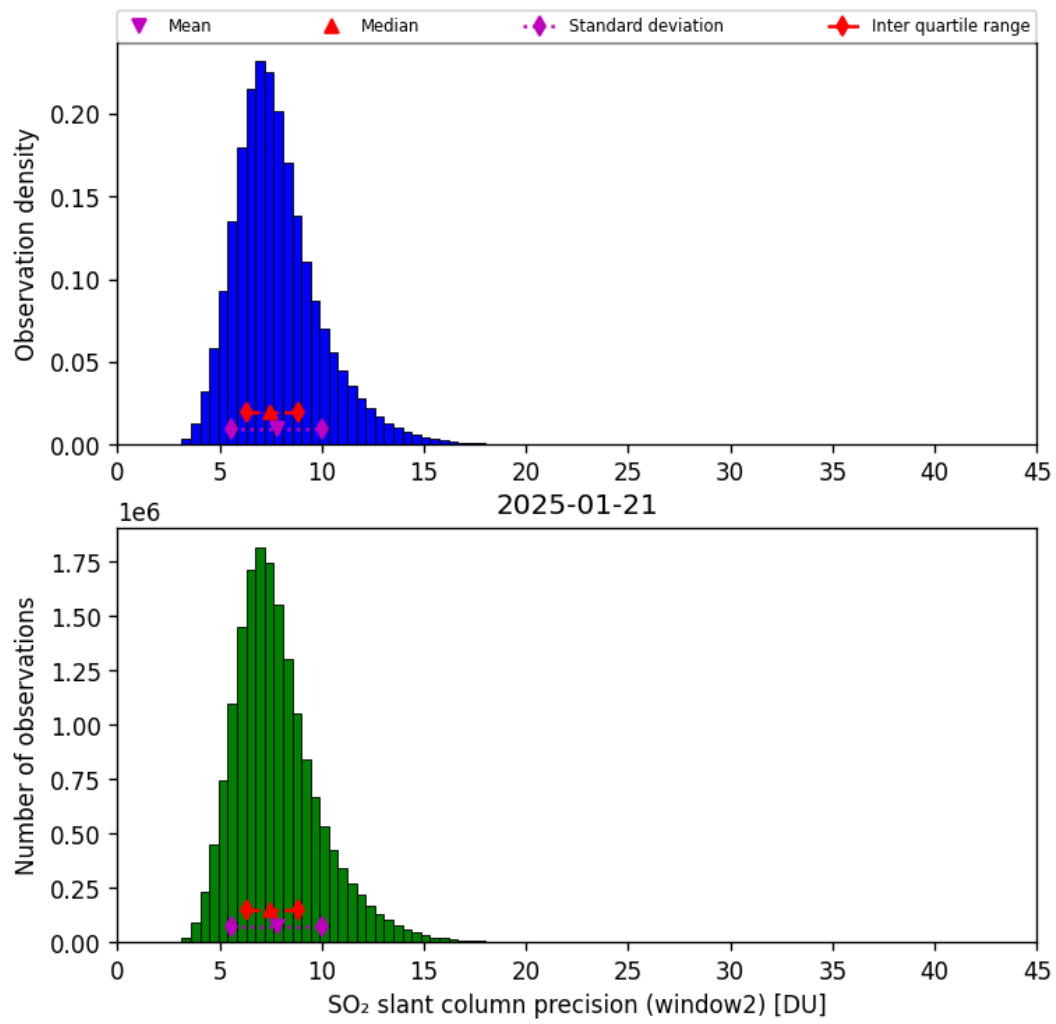


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-01-21 to 2025-01-21

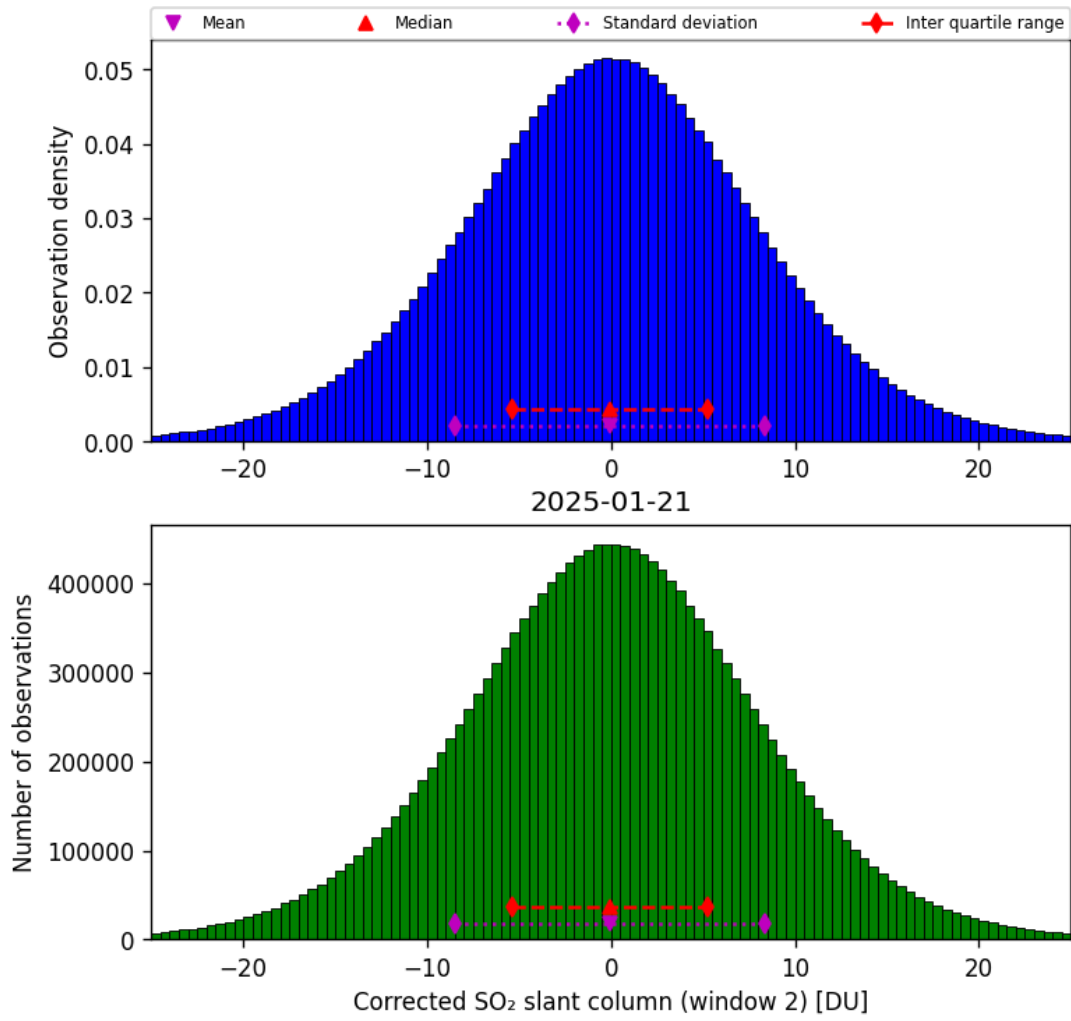


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-01-21 to 2025-01-21

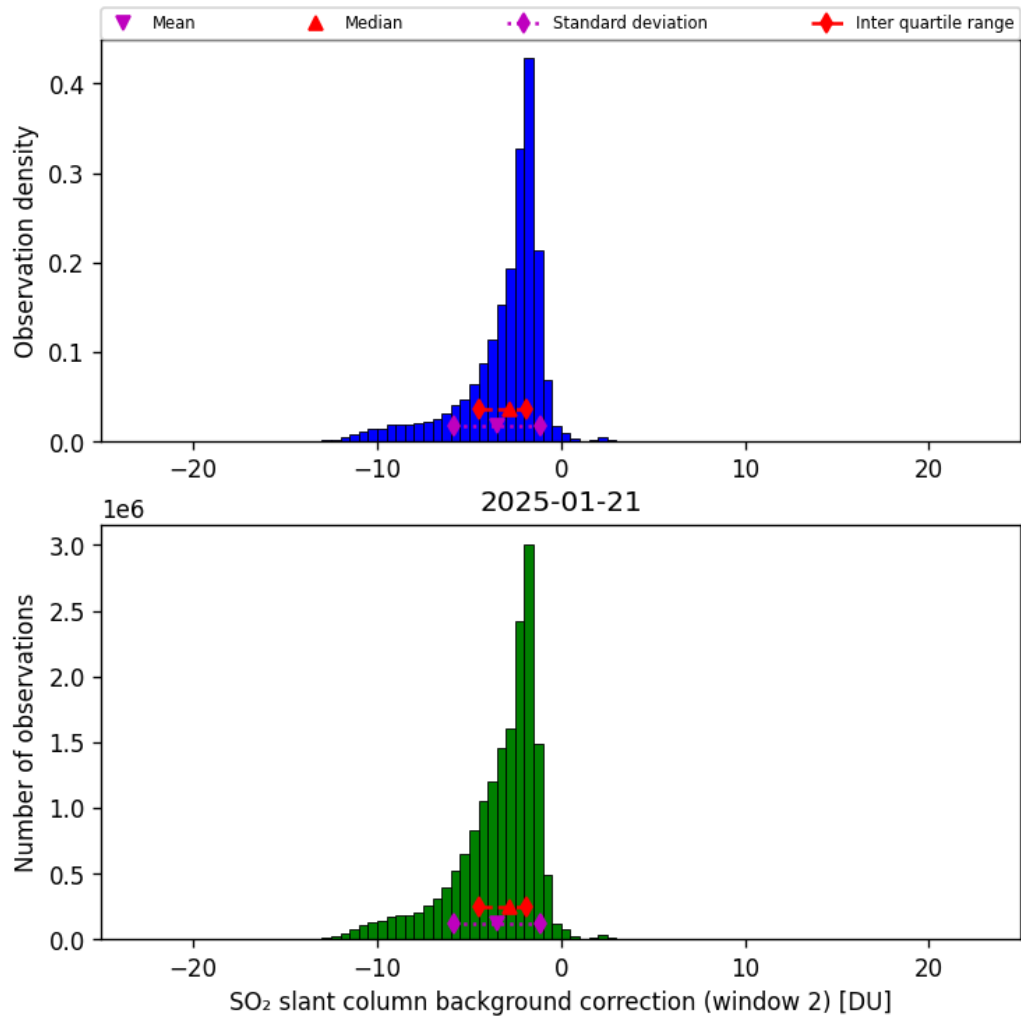


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-01-21 to 2025-01-21

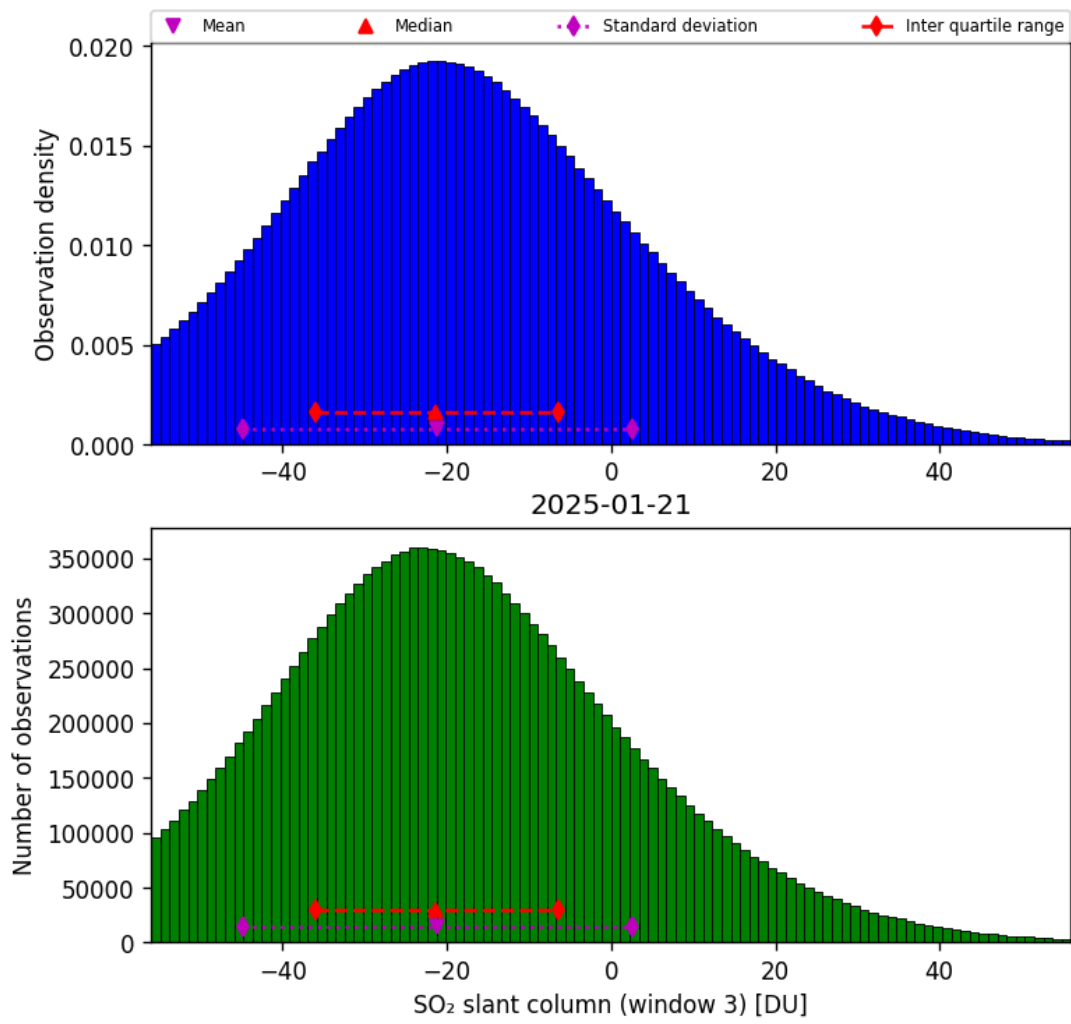


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-01-21 to 2025-01-21

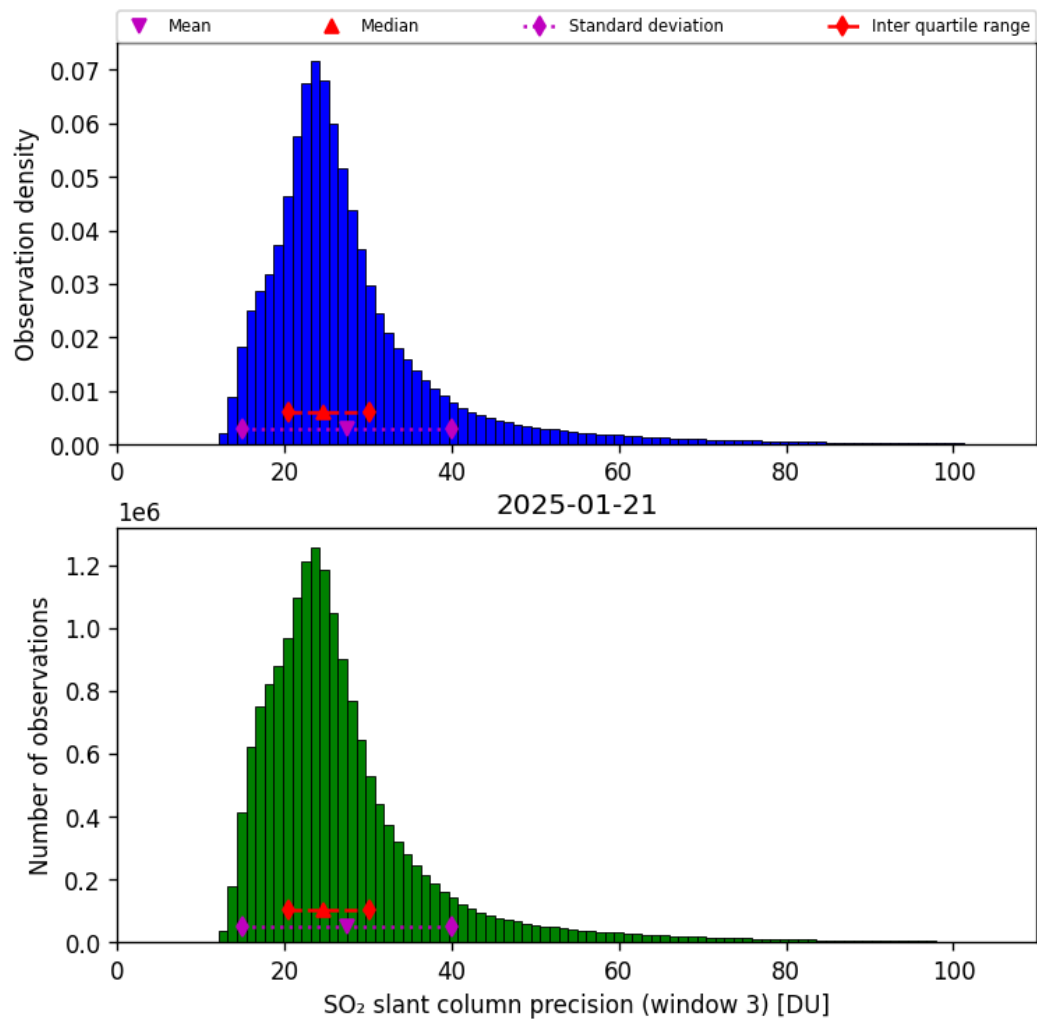


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-01-21 to 2025-01-21

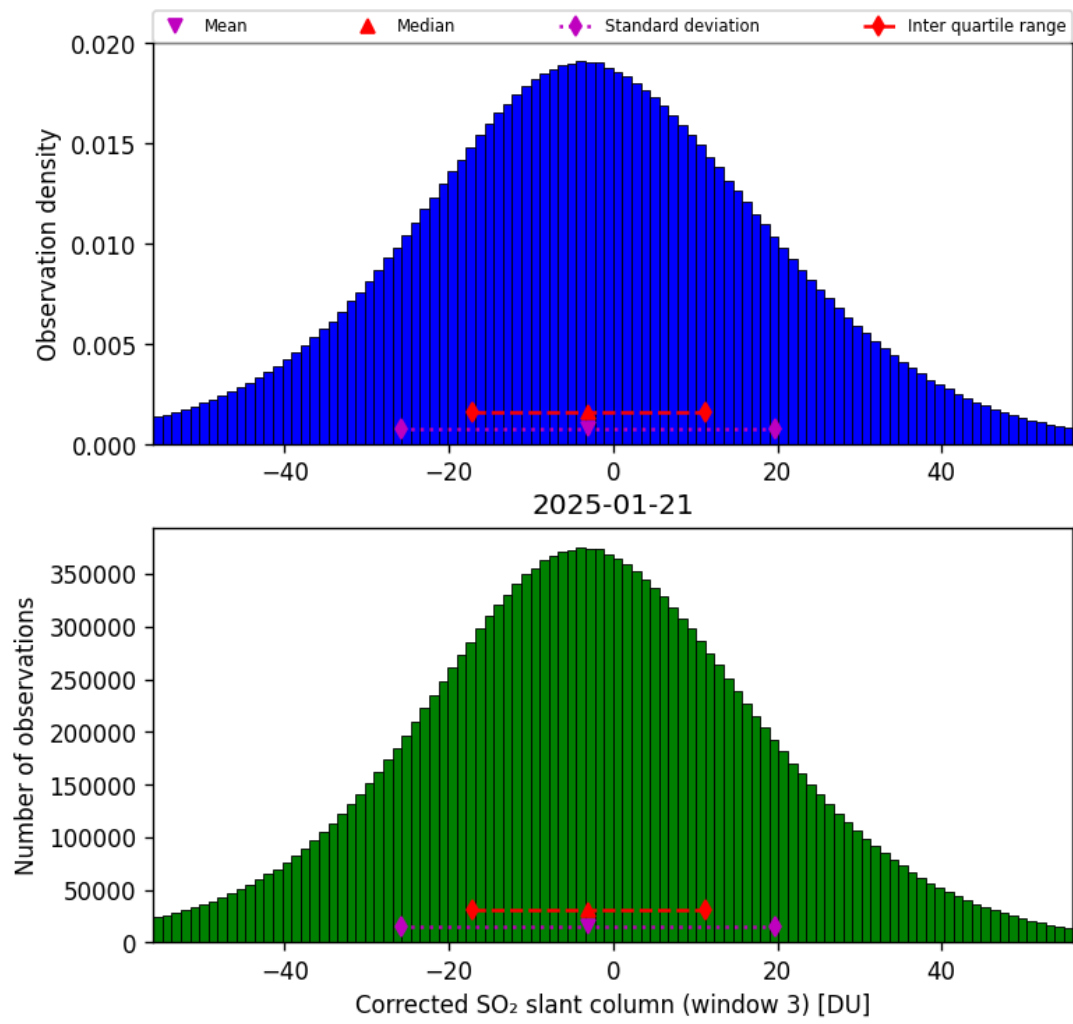


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-01-21 to 2025-01-21

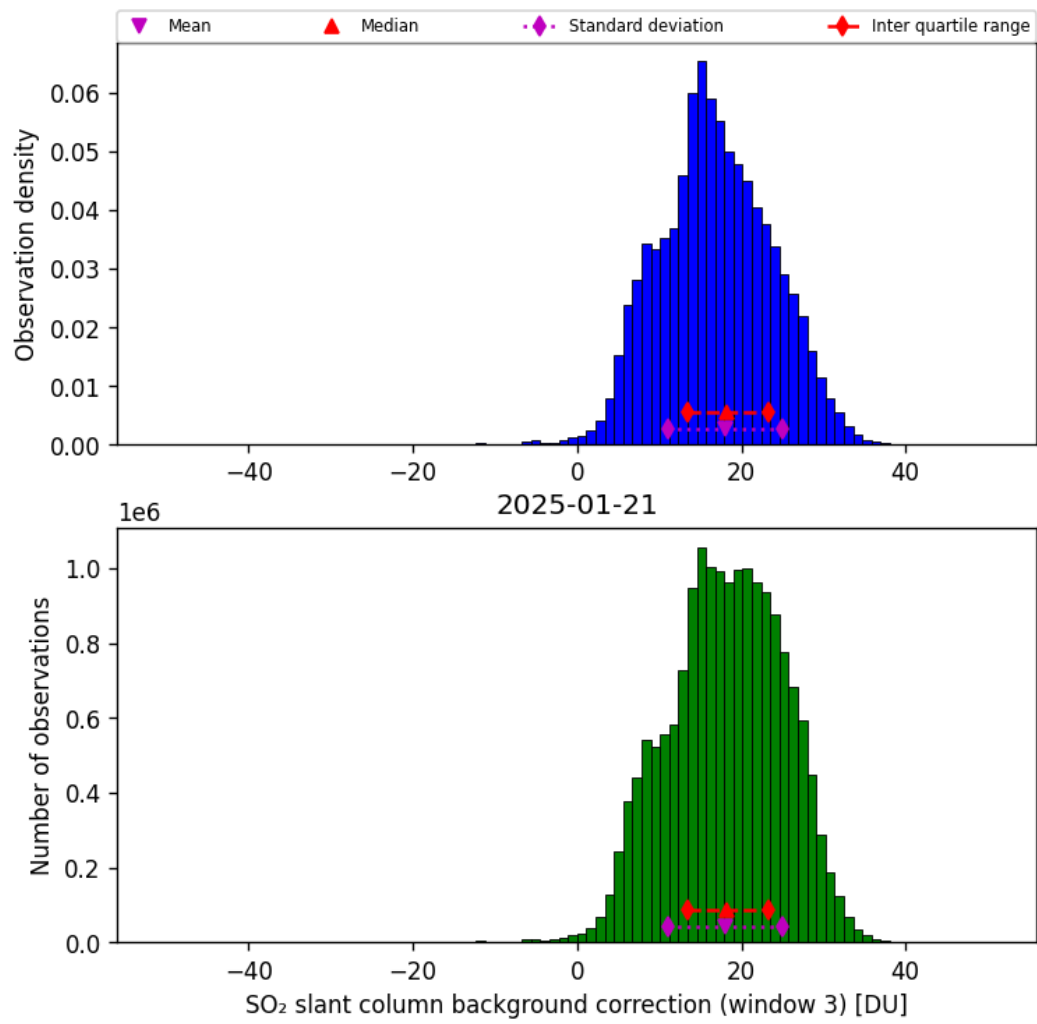


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-01-21 to 2025-01-21

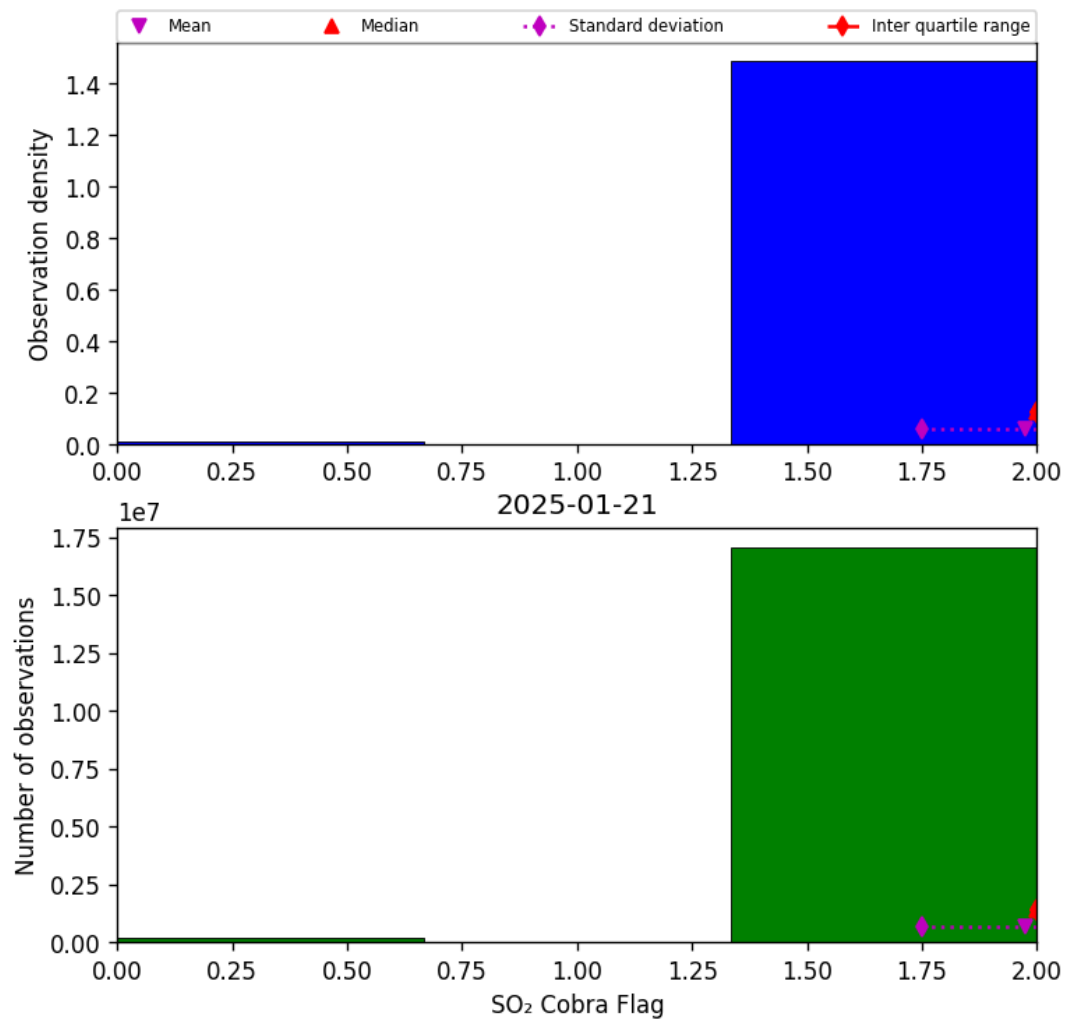


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-01-21 to 2025-01-21

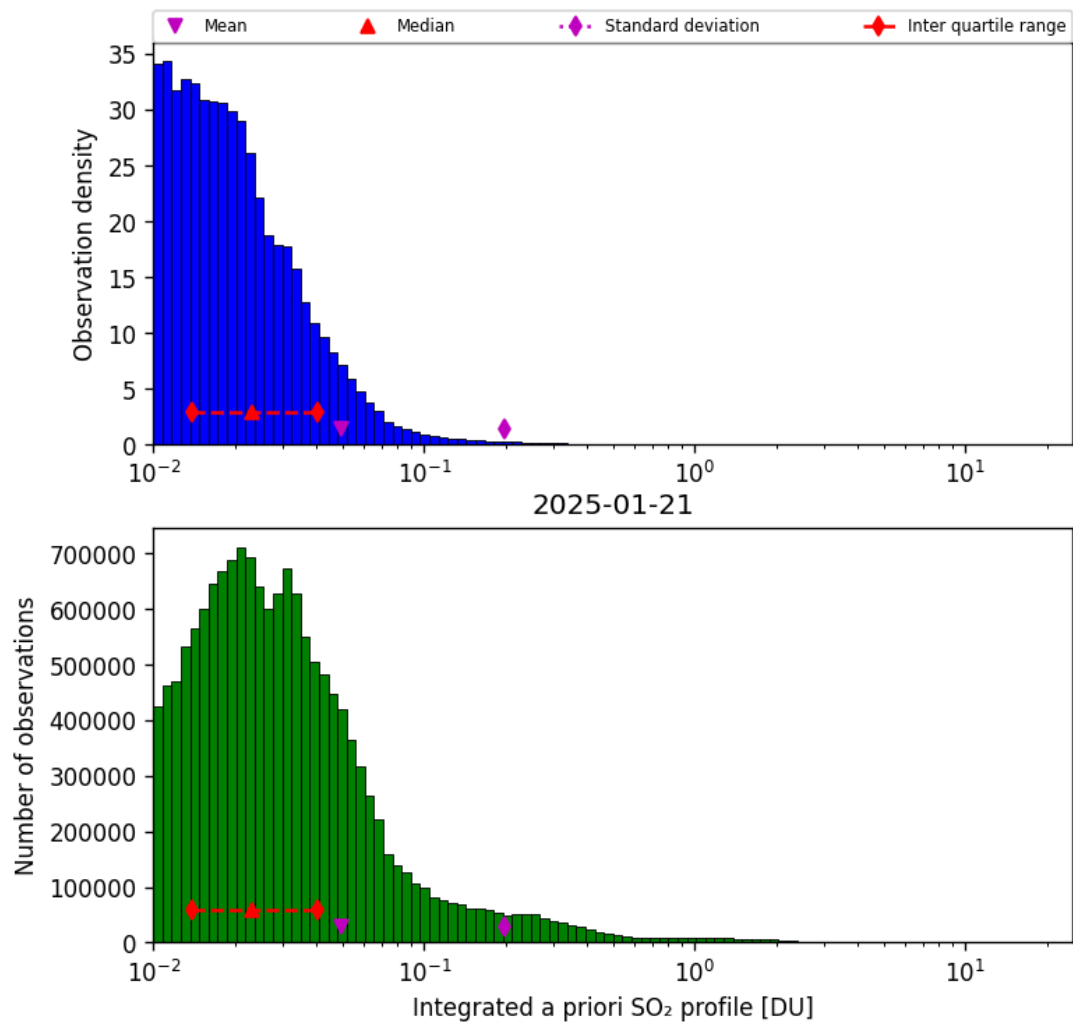


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-01-21 to 2025-01-21

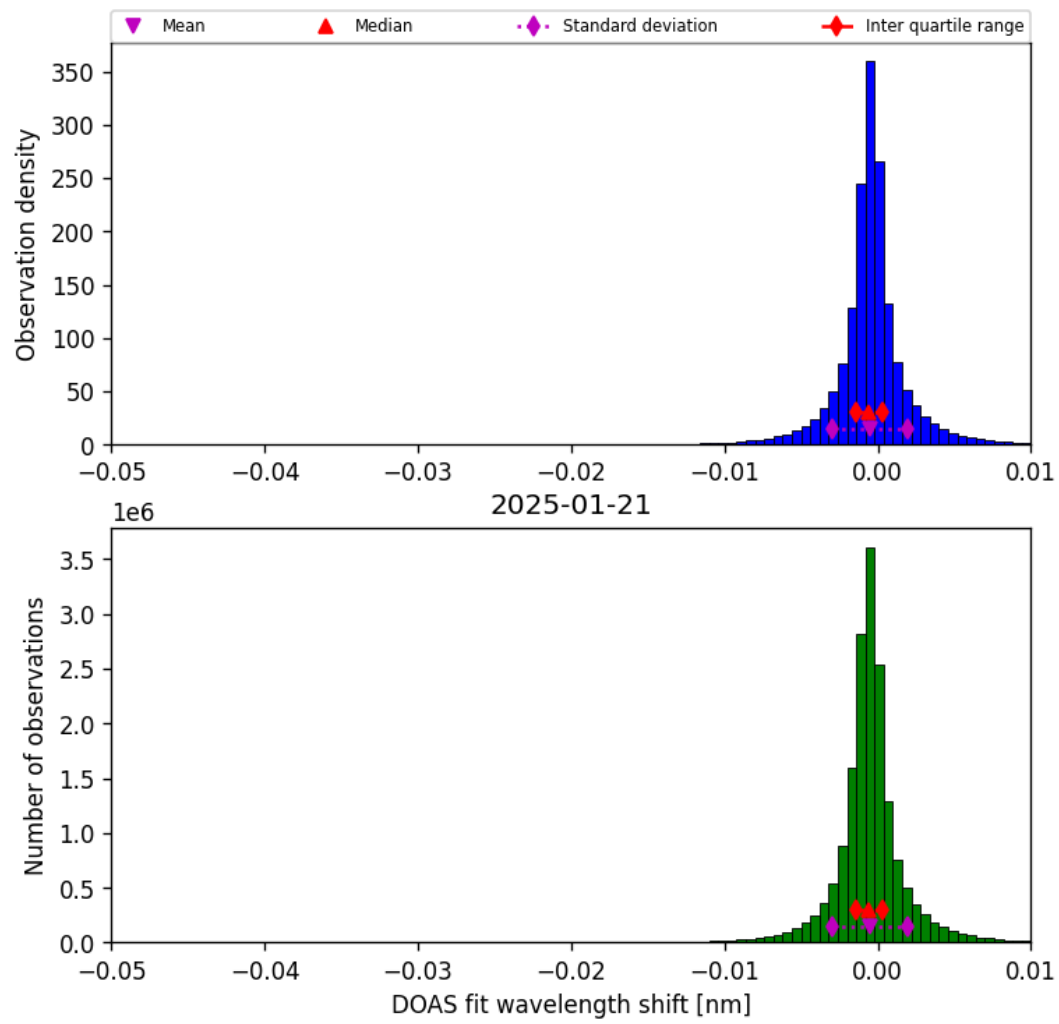


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-01-21 to 2025-01-21

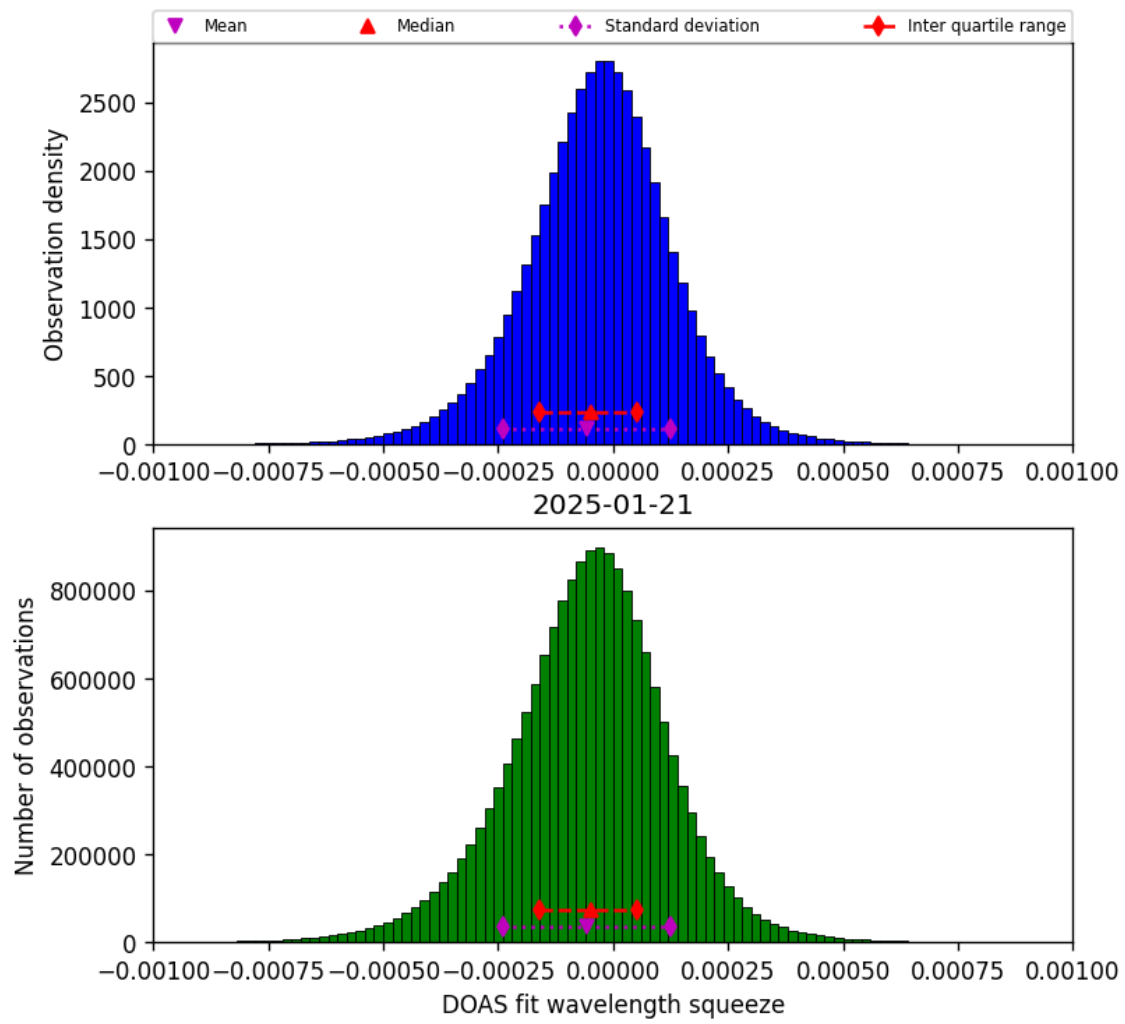


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-01-21 to 2025-01-21

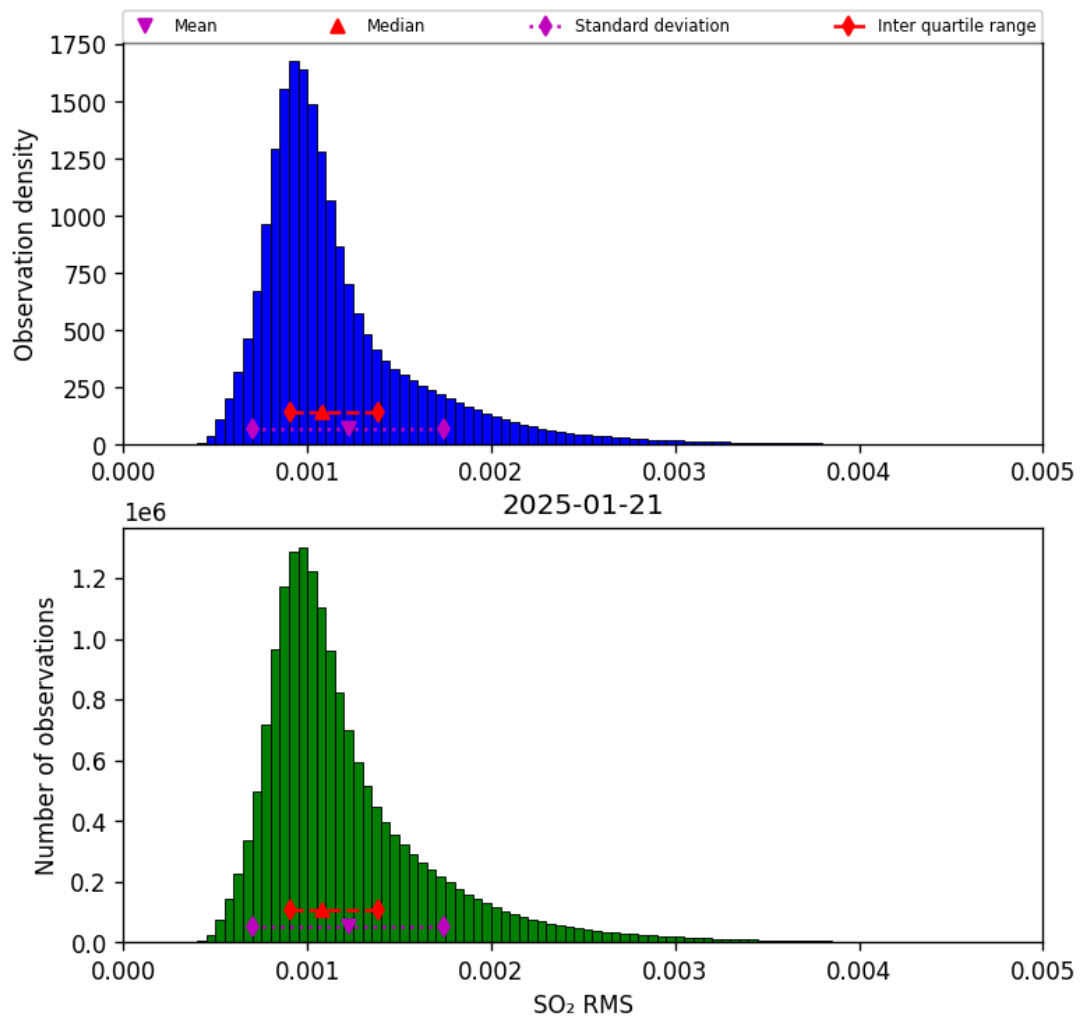


Figure 79: Histogram of “SO₂ RMS” for 2025-01-21 to 2025-01-21

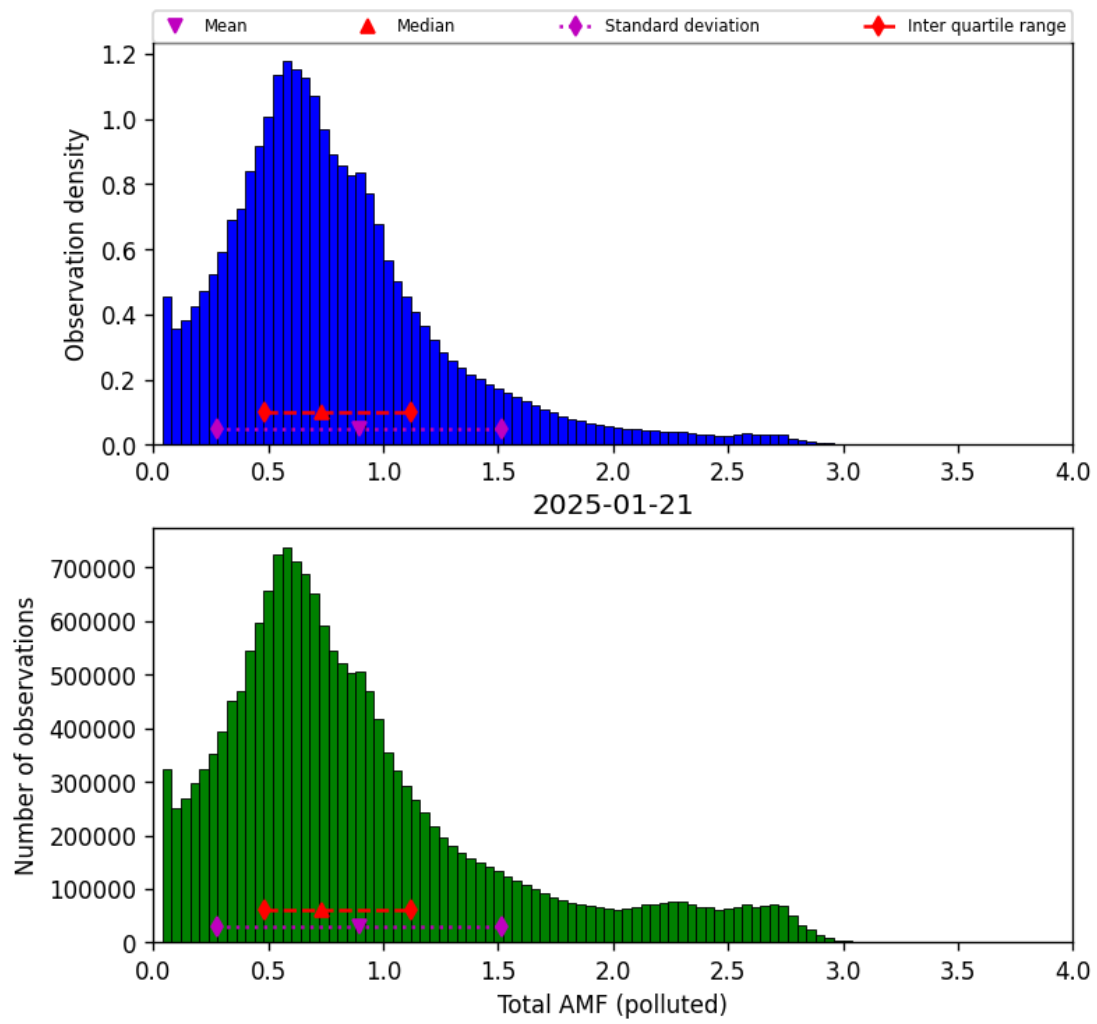


Figure 80: Histogram of “Total AMF (polluted)” for 2025-01-21 to 2025-01-21

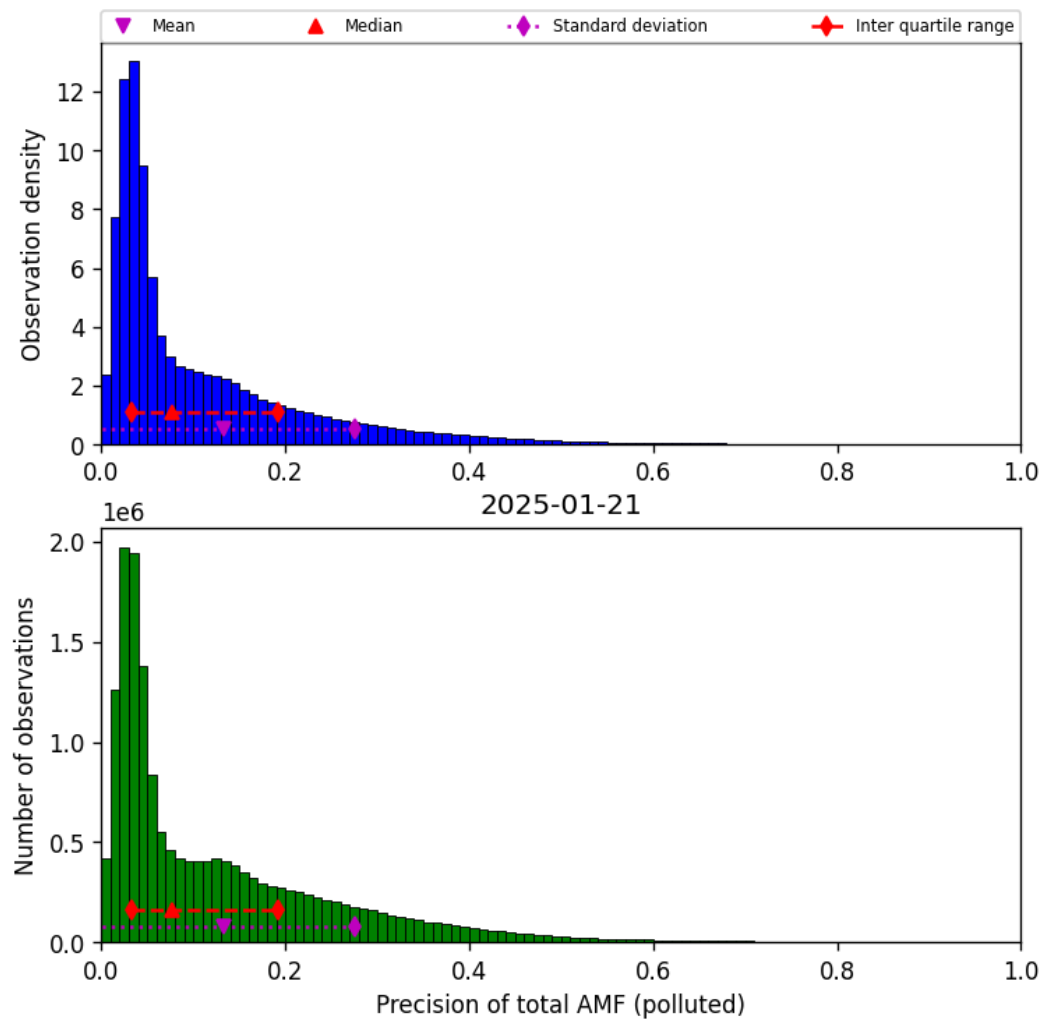


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-01-21 to 2025-01-21

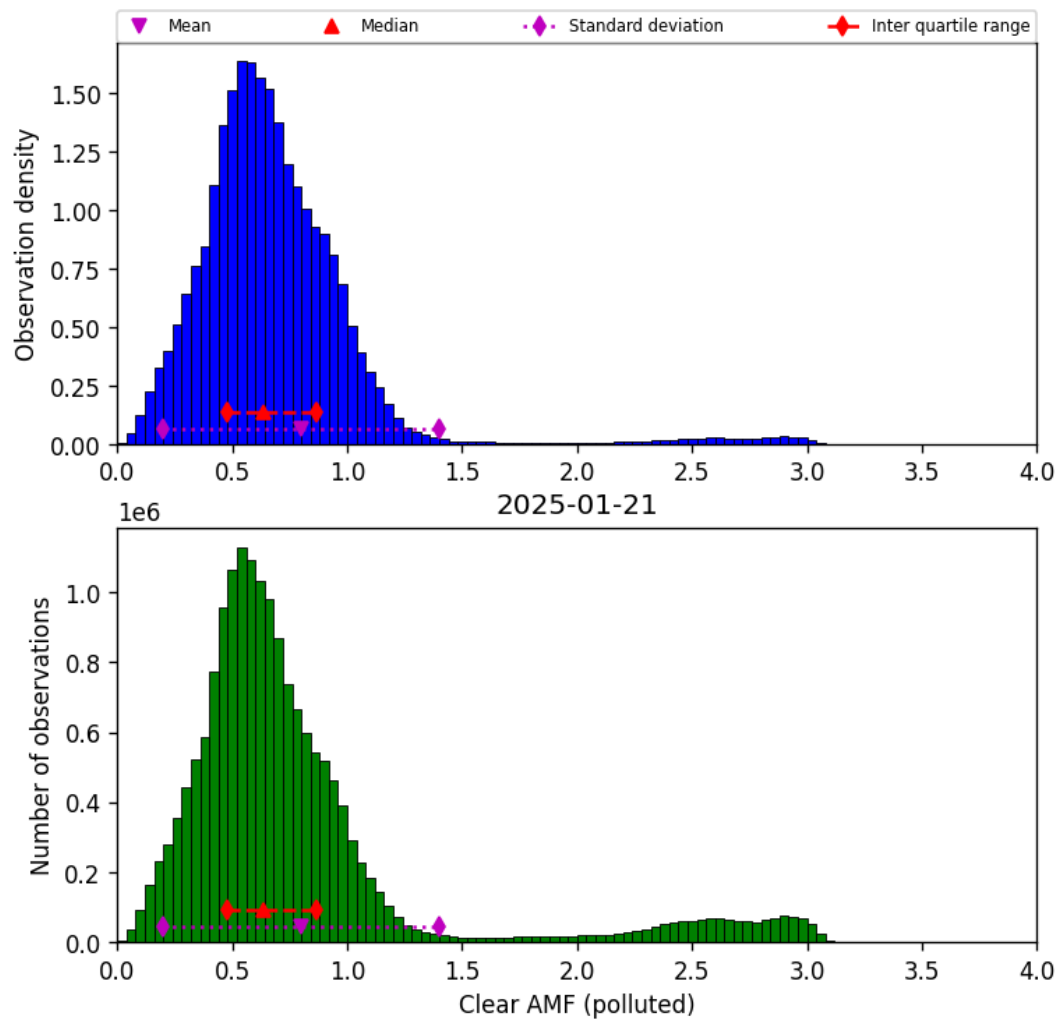


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-01-21 to 2025-01-21

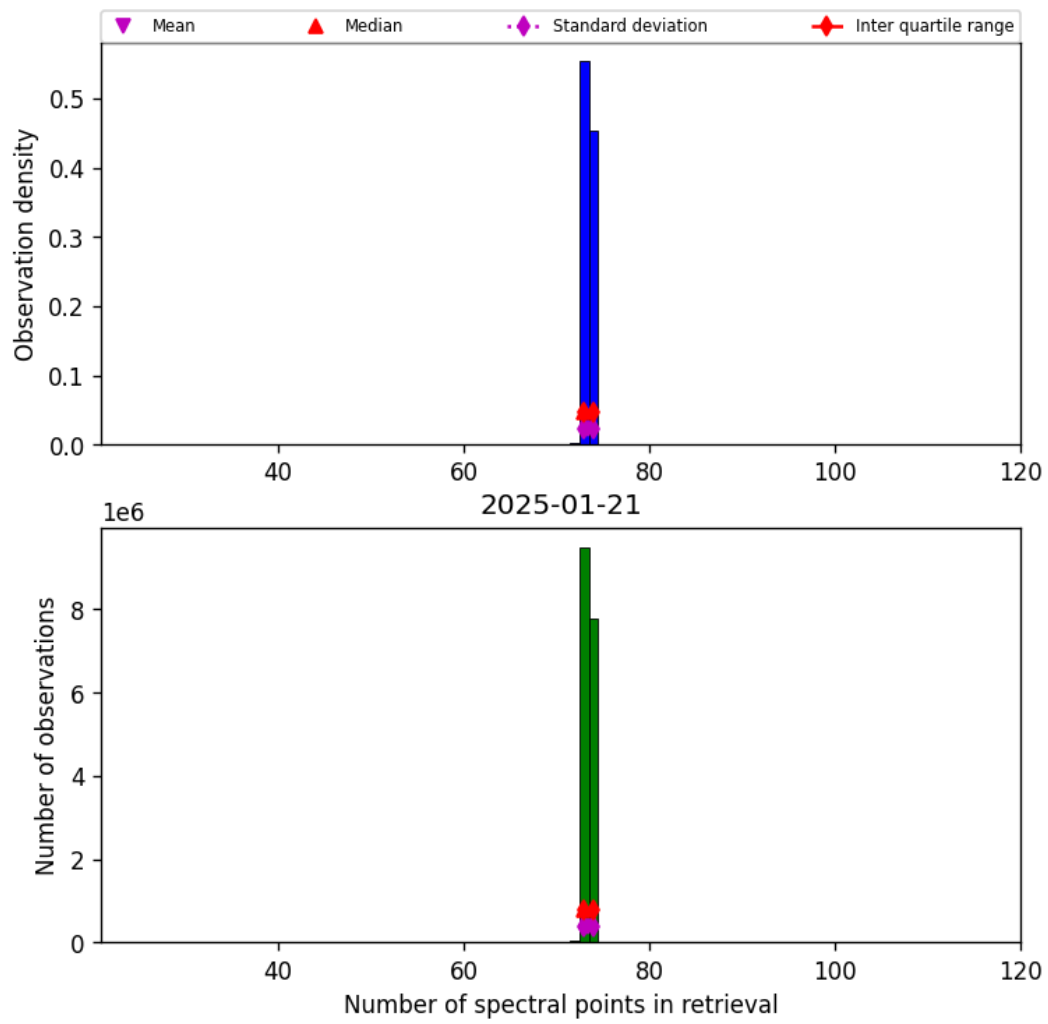


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-01-21 to 2025-01-21

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.

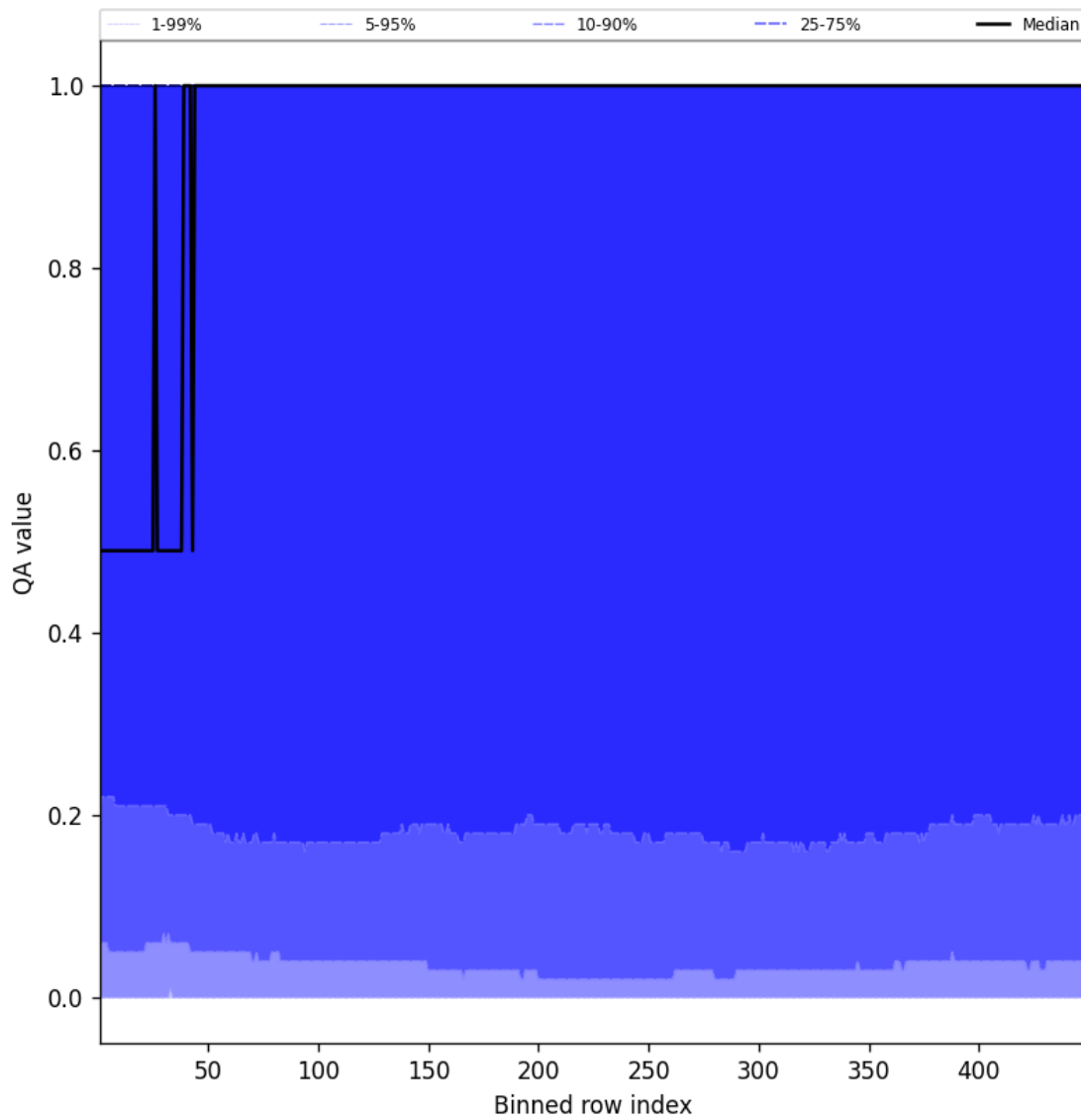


Figure 84: Along track statistics of “QA value” for 2025-01-21 to 2025-01-21

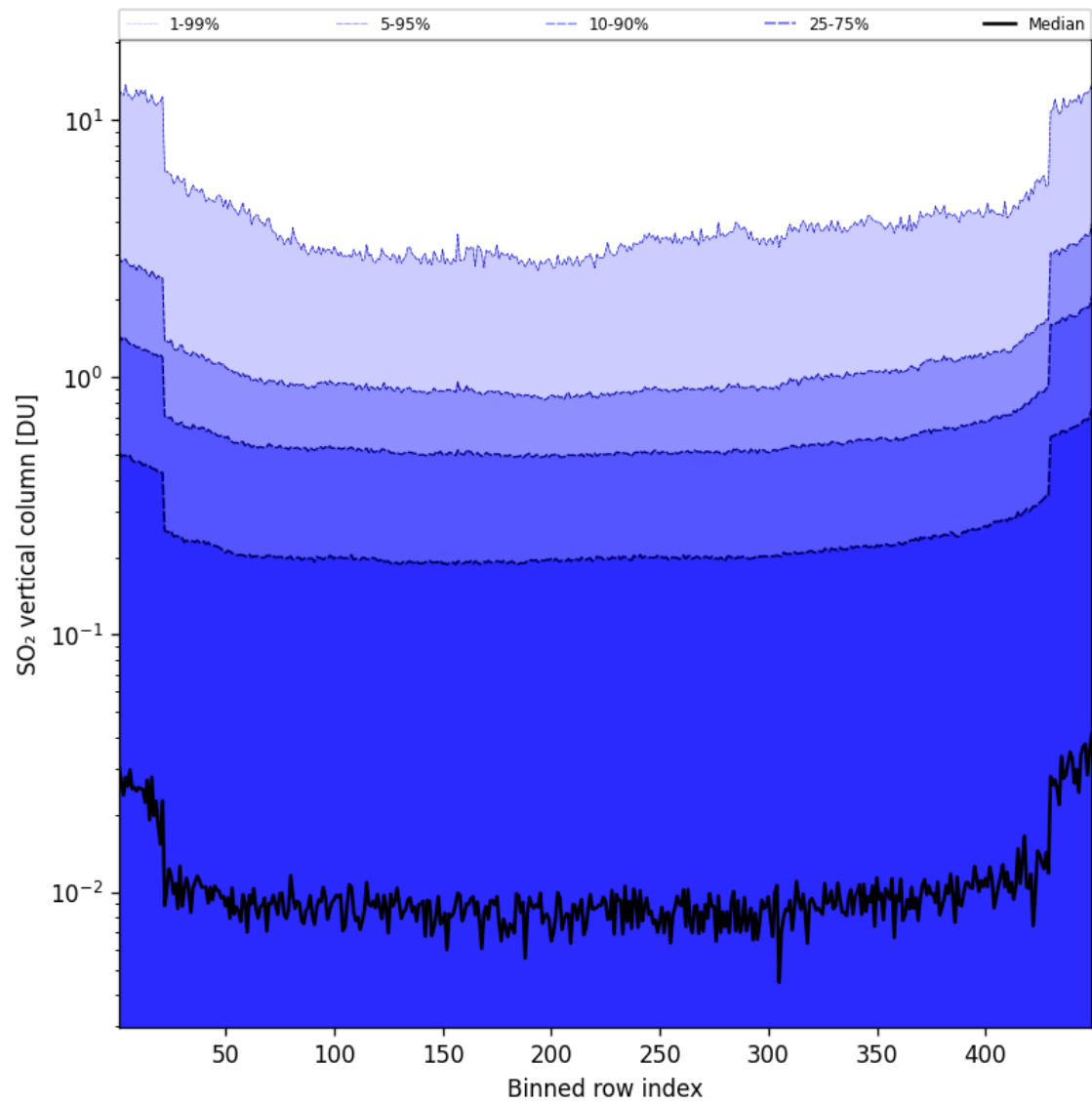


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-01-21 to 2025-01-21

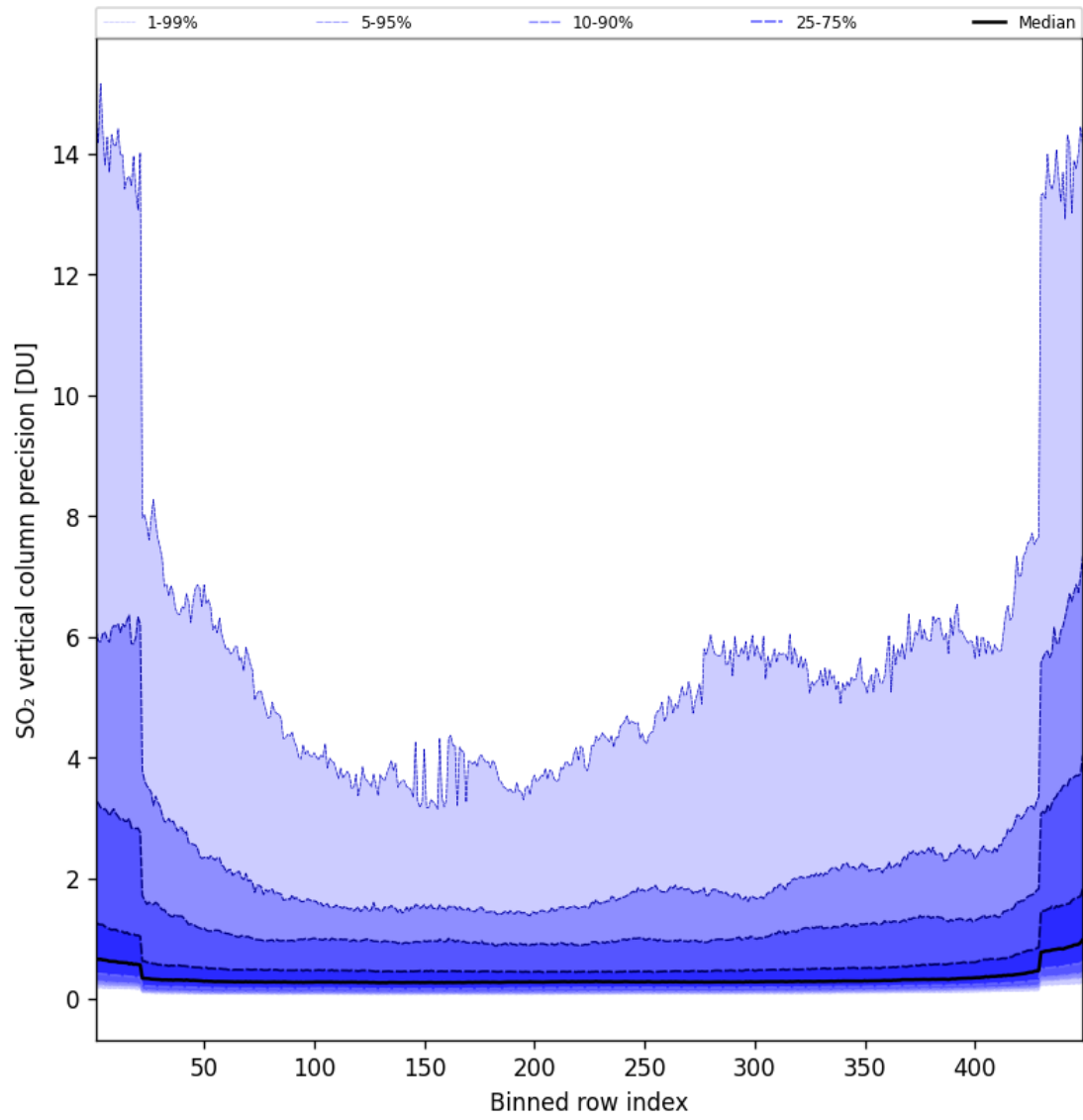


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-01-21 to 2025-01-21

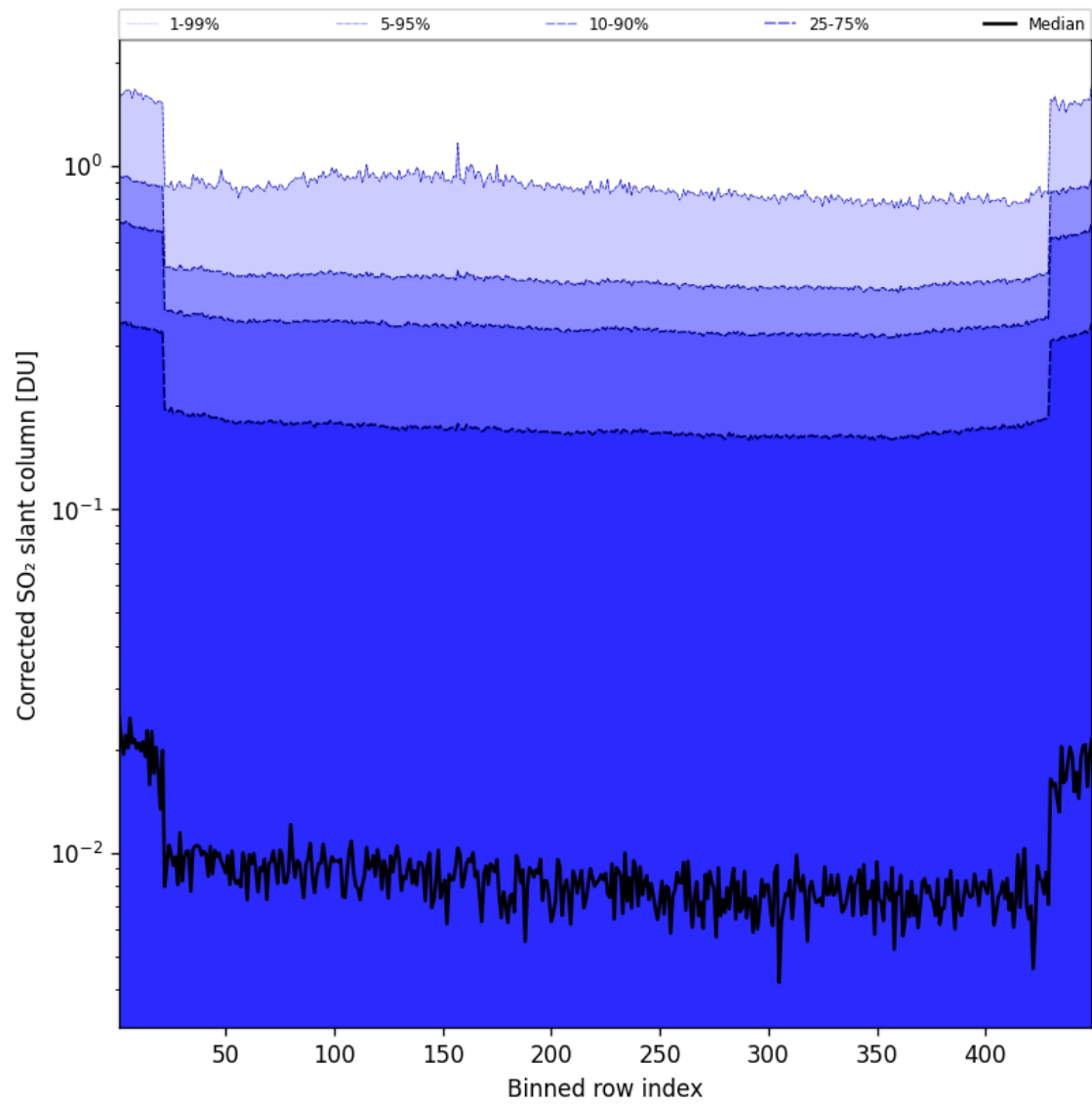


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-01-21 to 2025-01-21

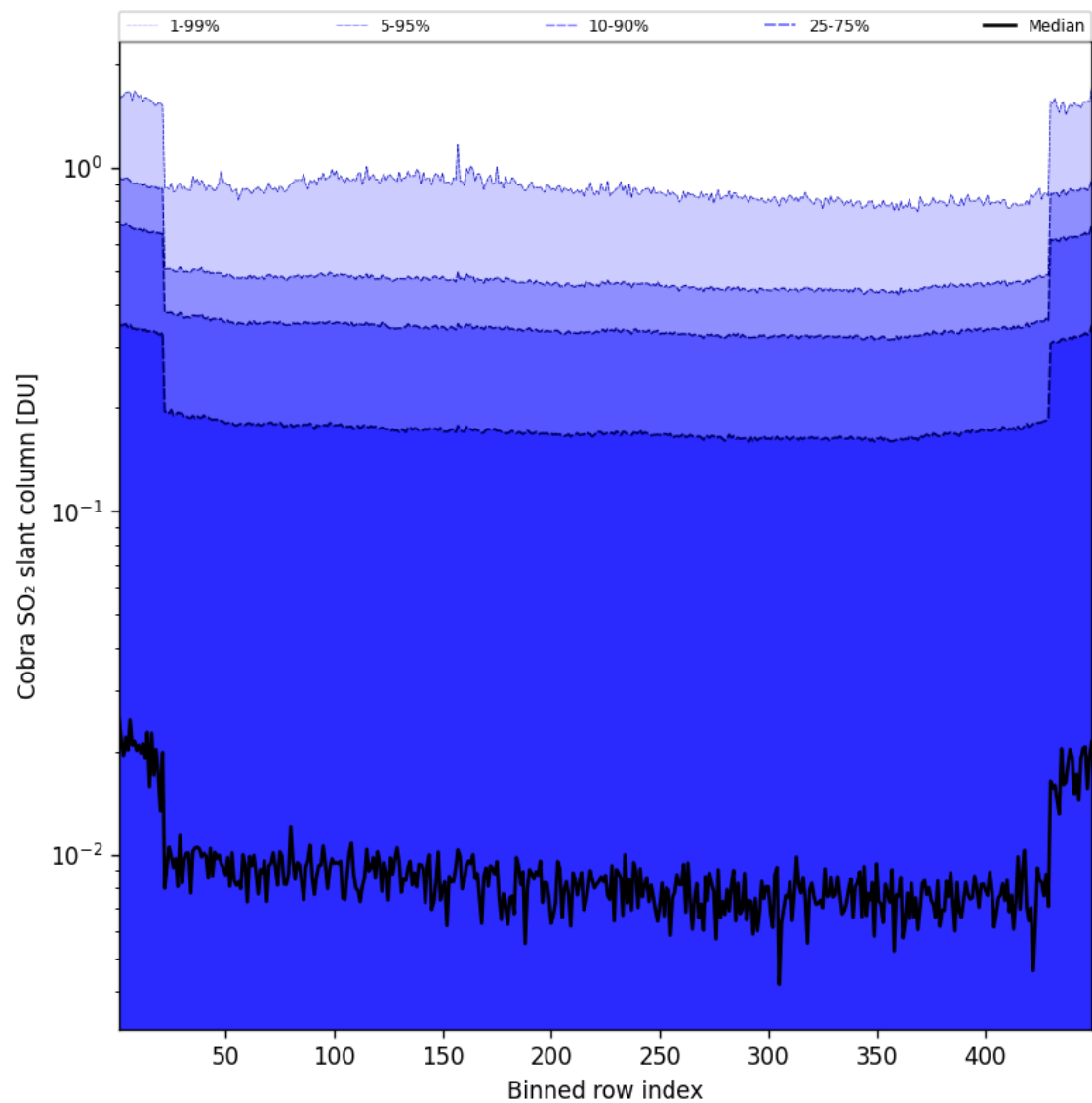


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-01-21 to 2025-01-21

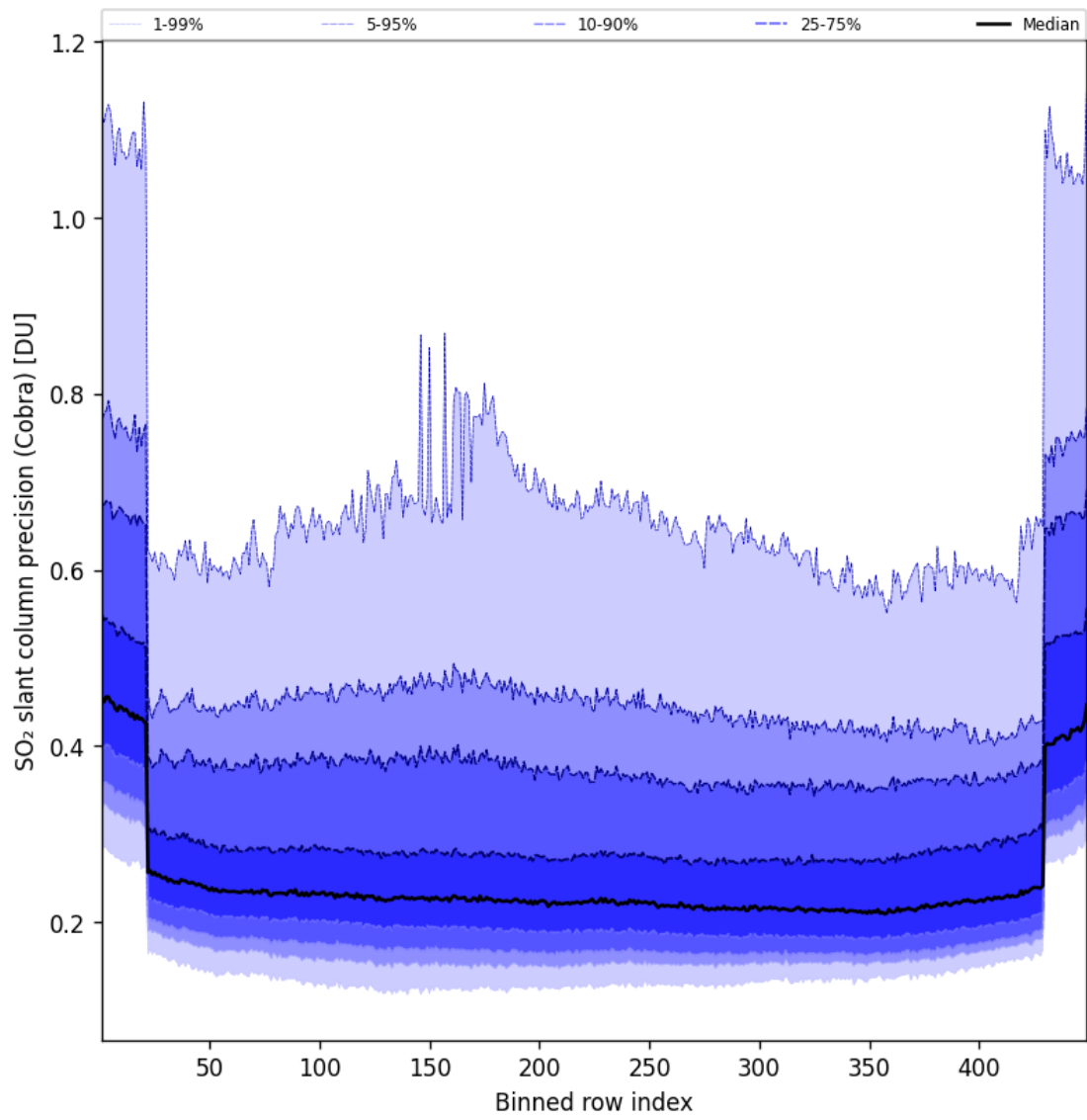


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-01-21 to 2025-01-21

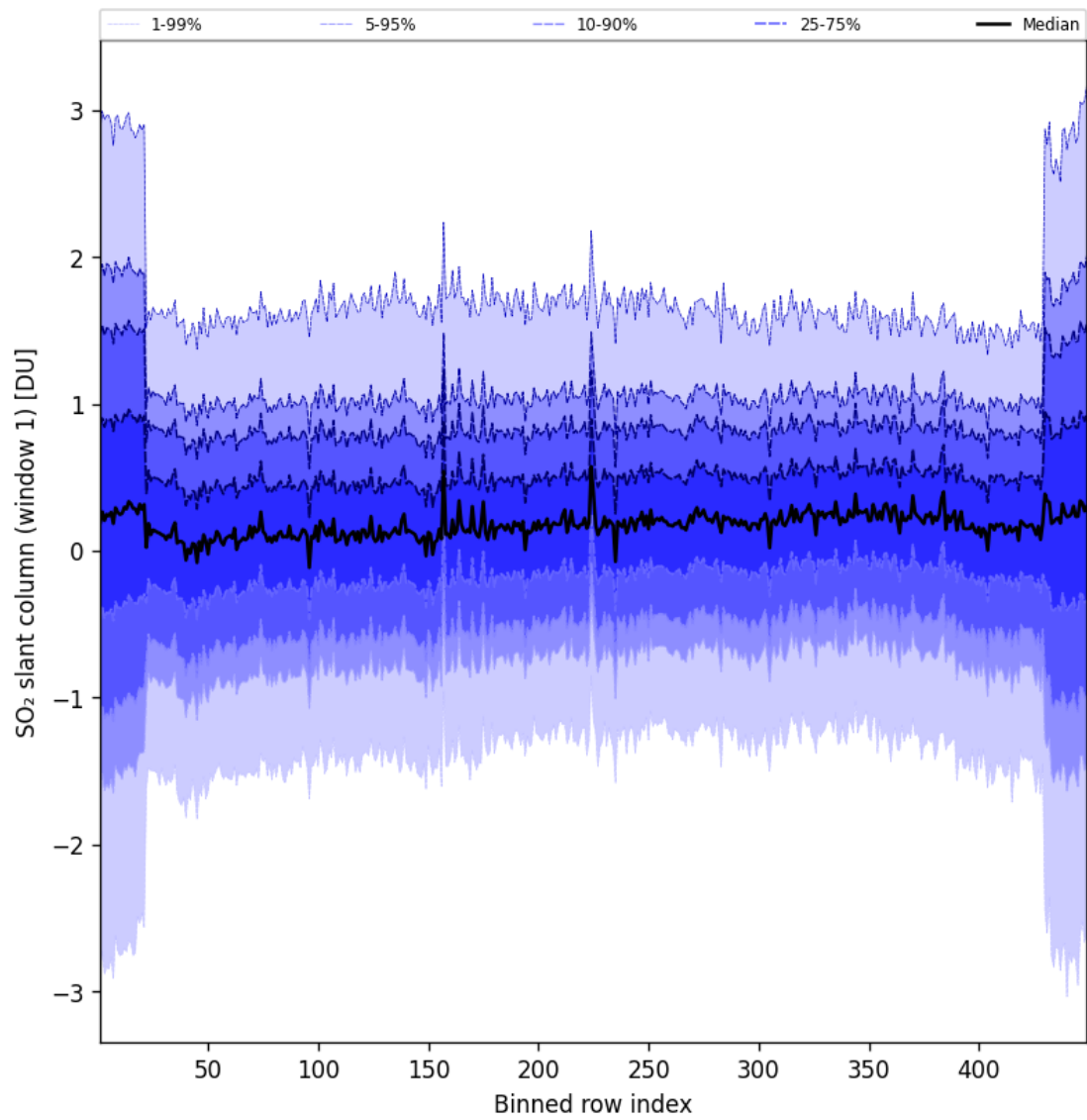


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-01-21 to 2025-01-21

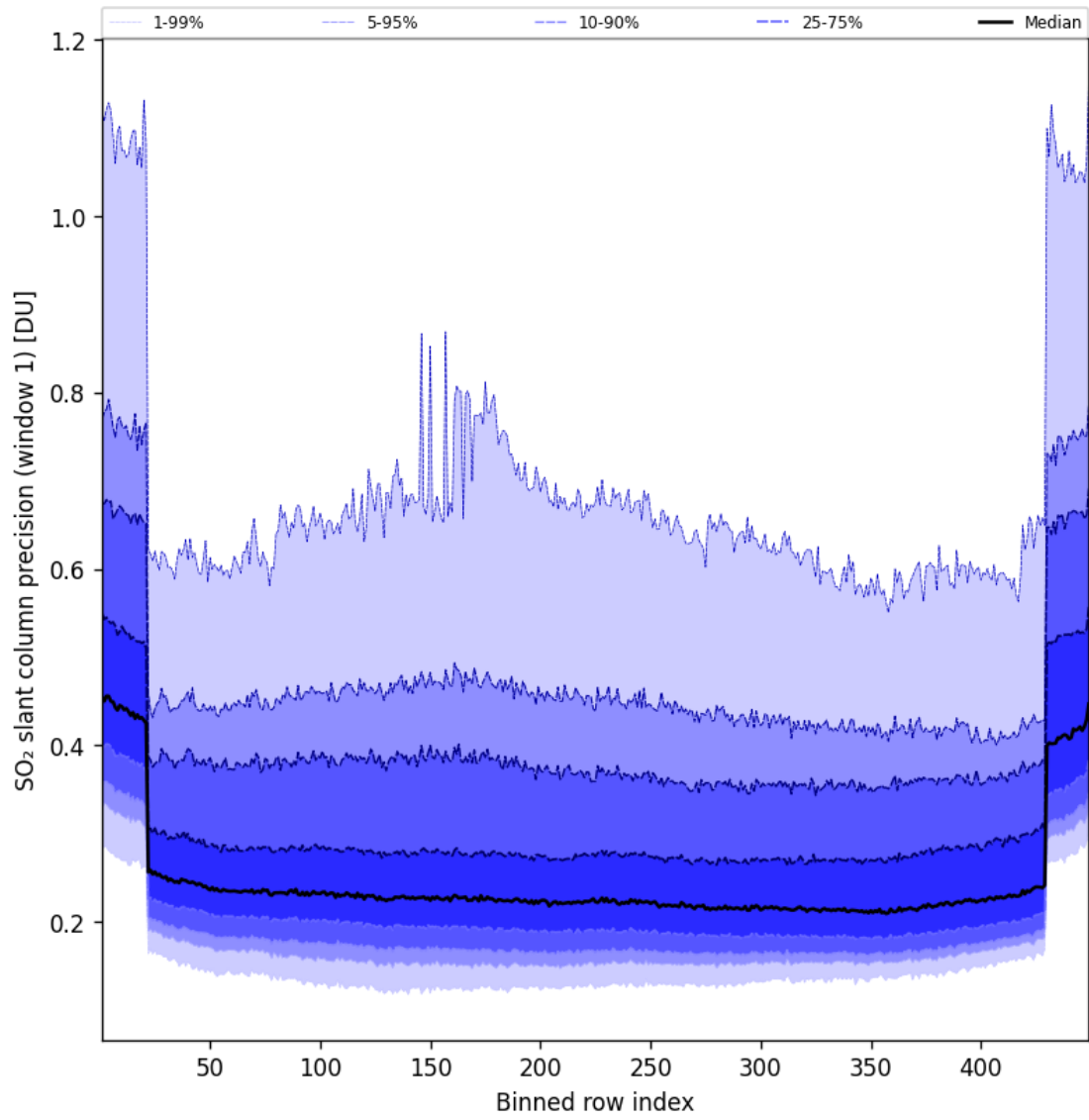


Figure 91: Along track statistics of "SO₂ slant column precision (window 1)" for 2025-01-21 to 2025-01-21

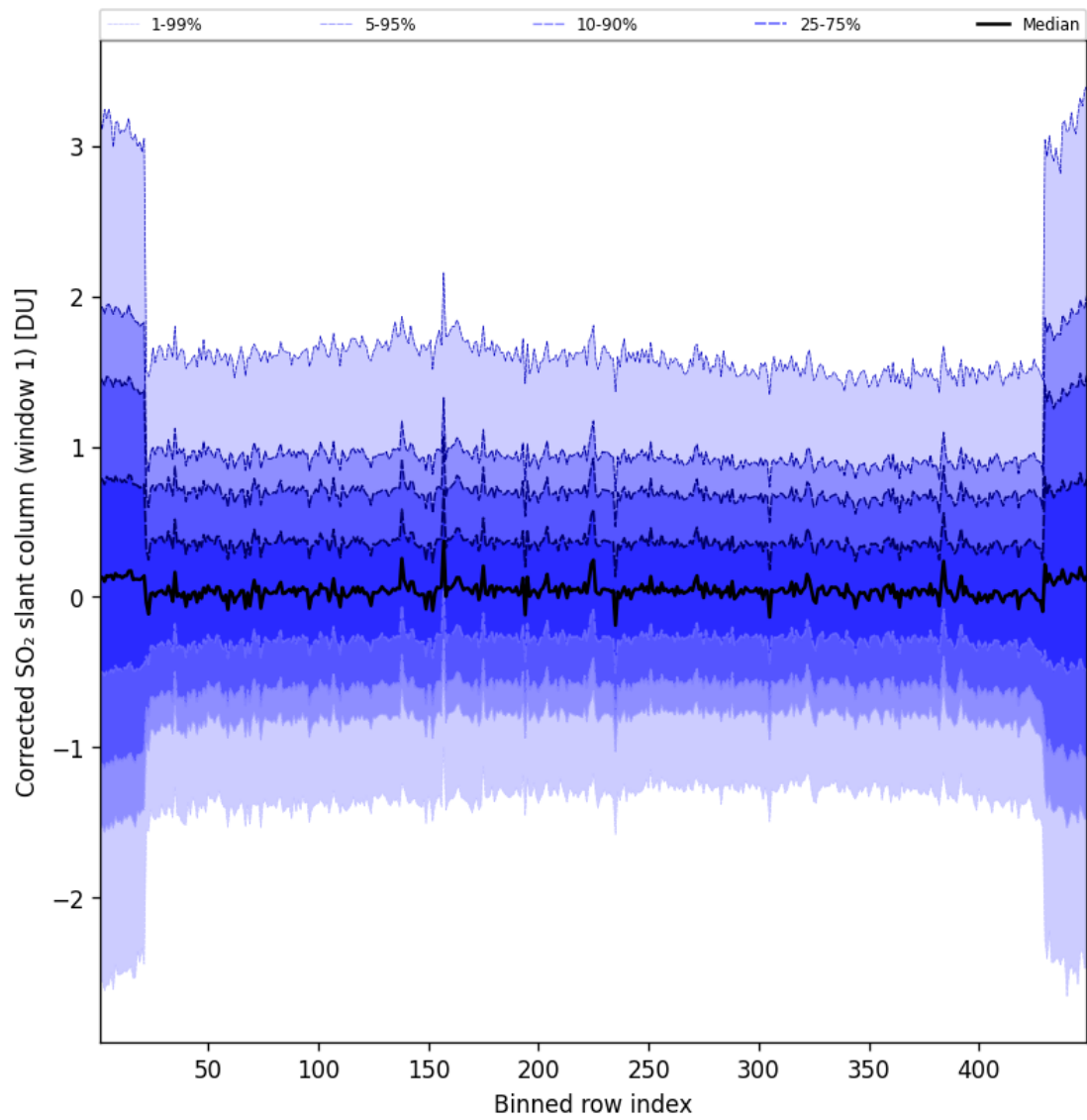


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-01-21 to 2025-01-21

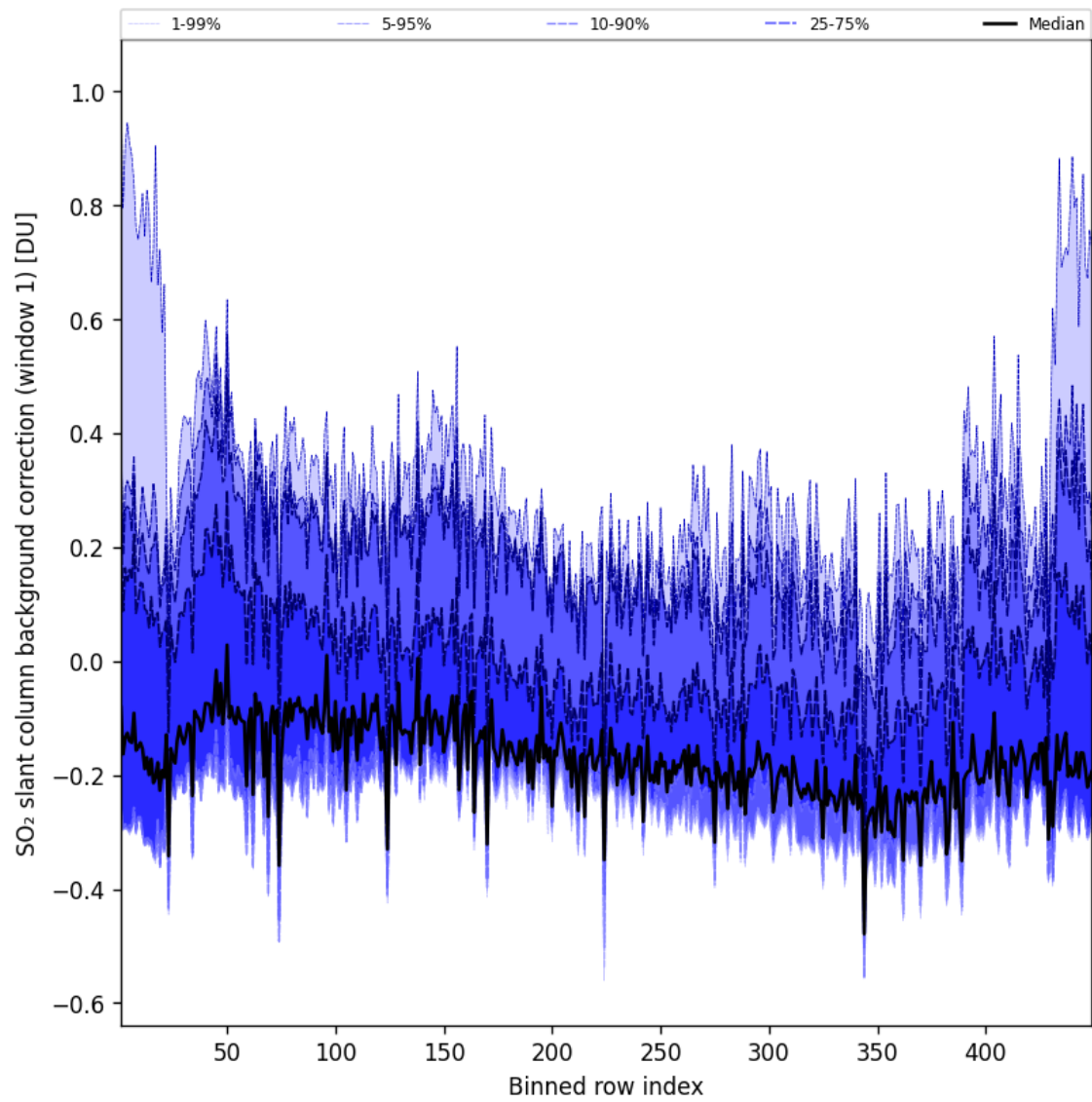


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-01-21 to 2025-01-21

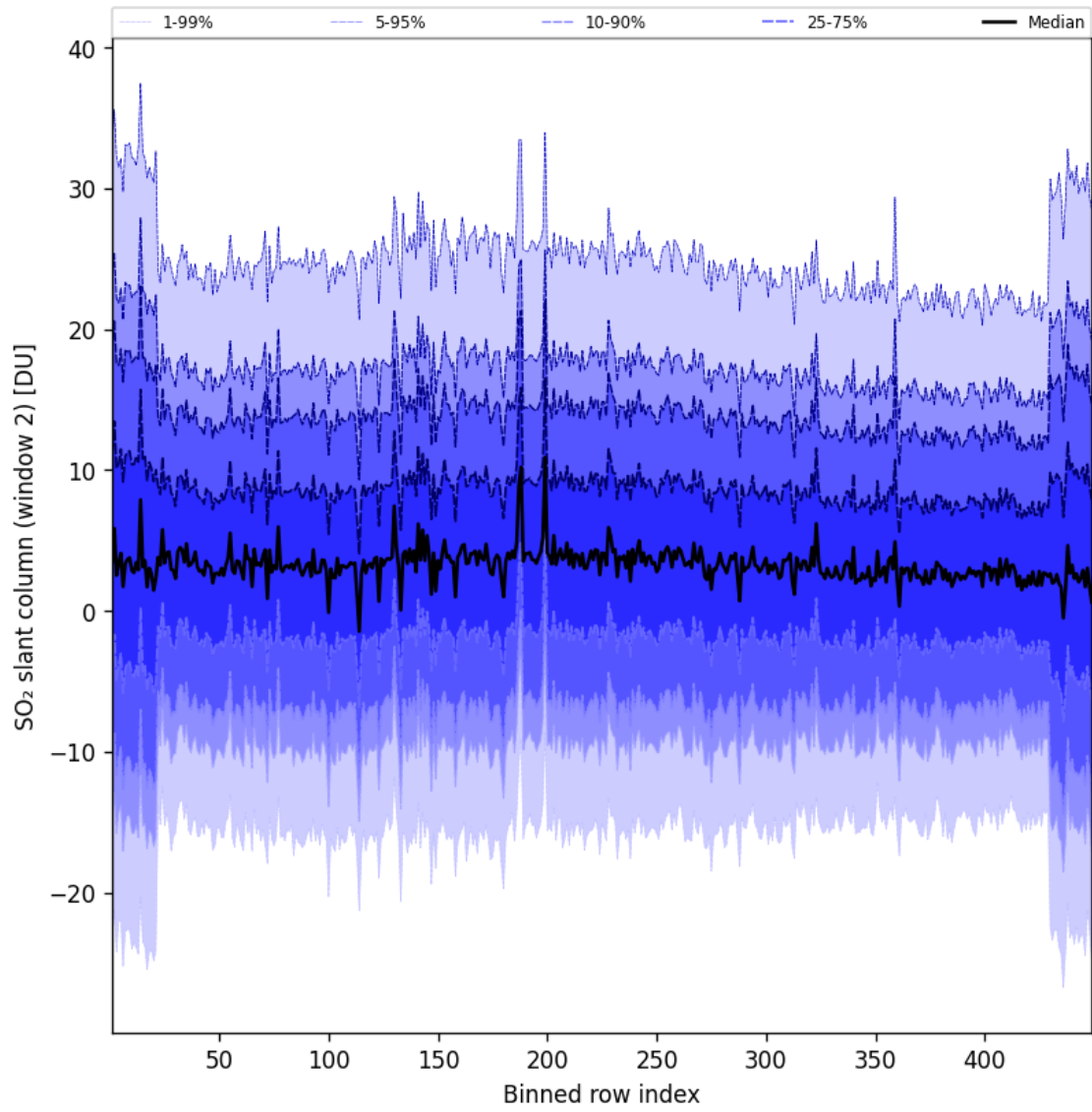


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-01-21 to 2025-01-21

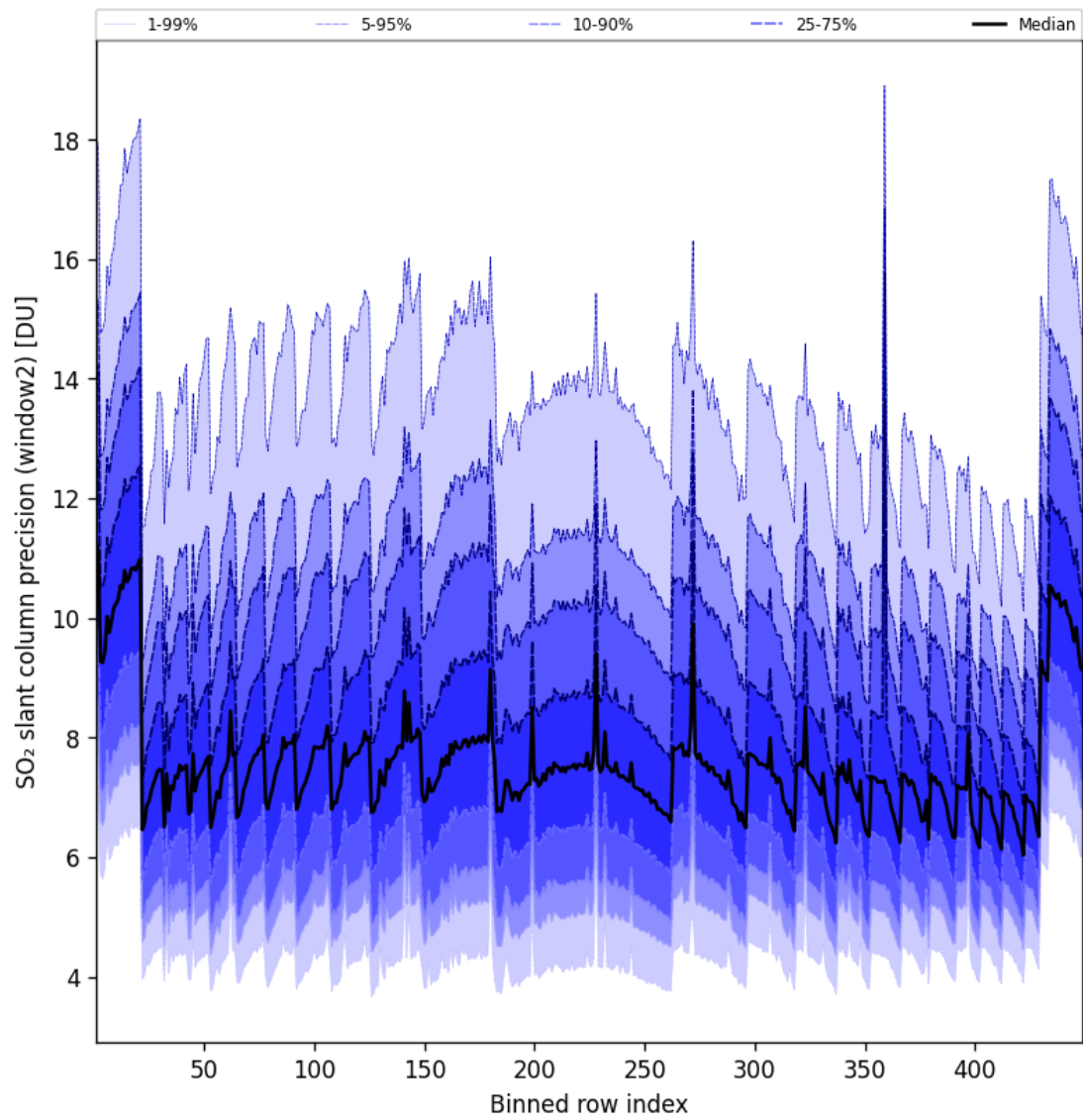


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-01-21 to 2025-01-21

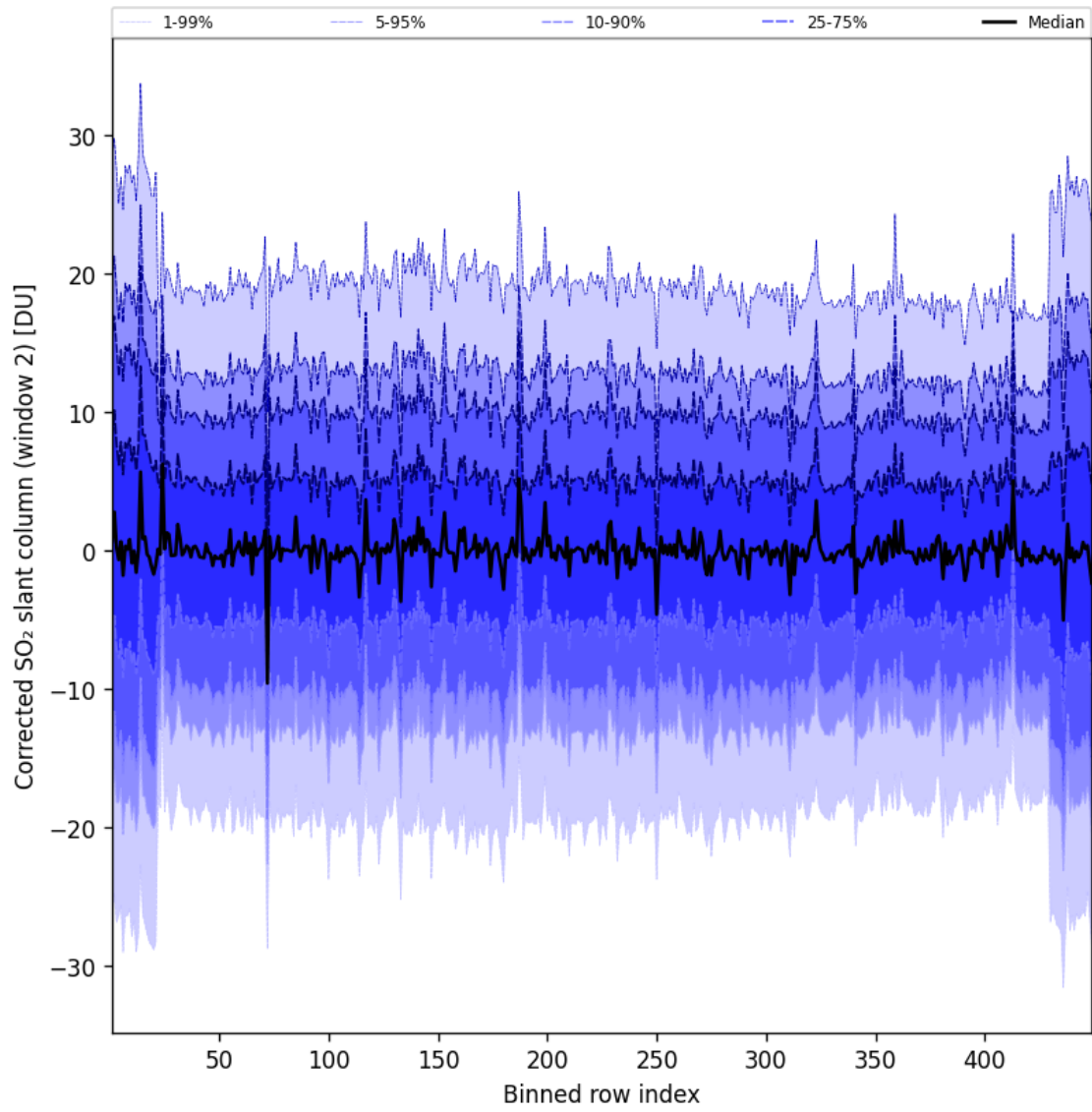


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-01-21 to 2025-01-21

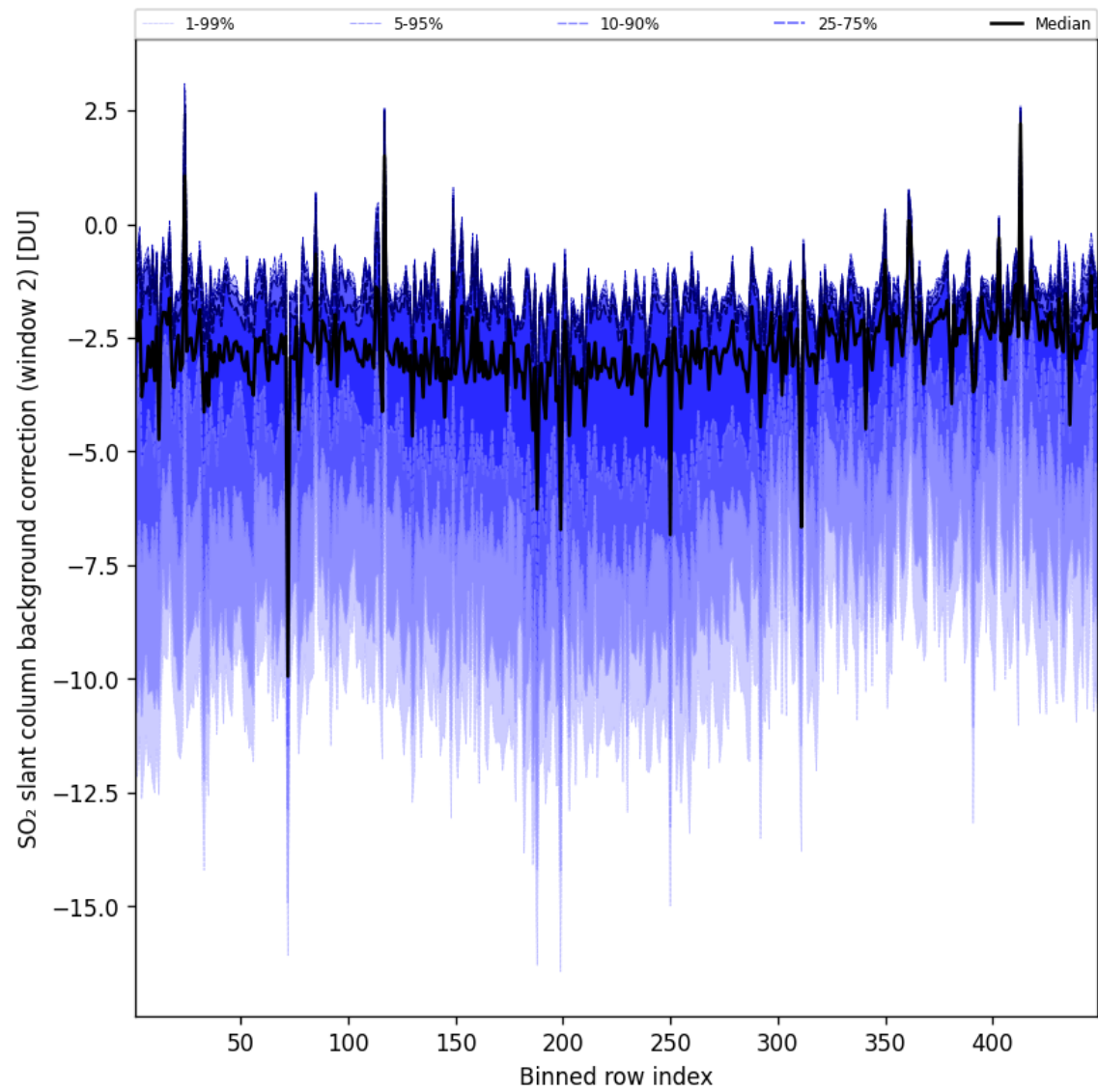


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-01-21 to 2025-01-21

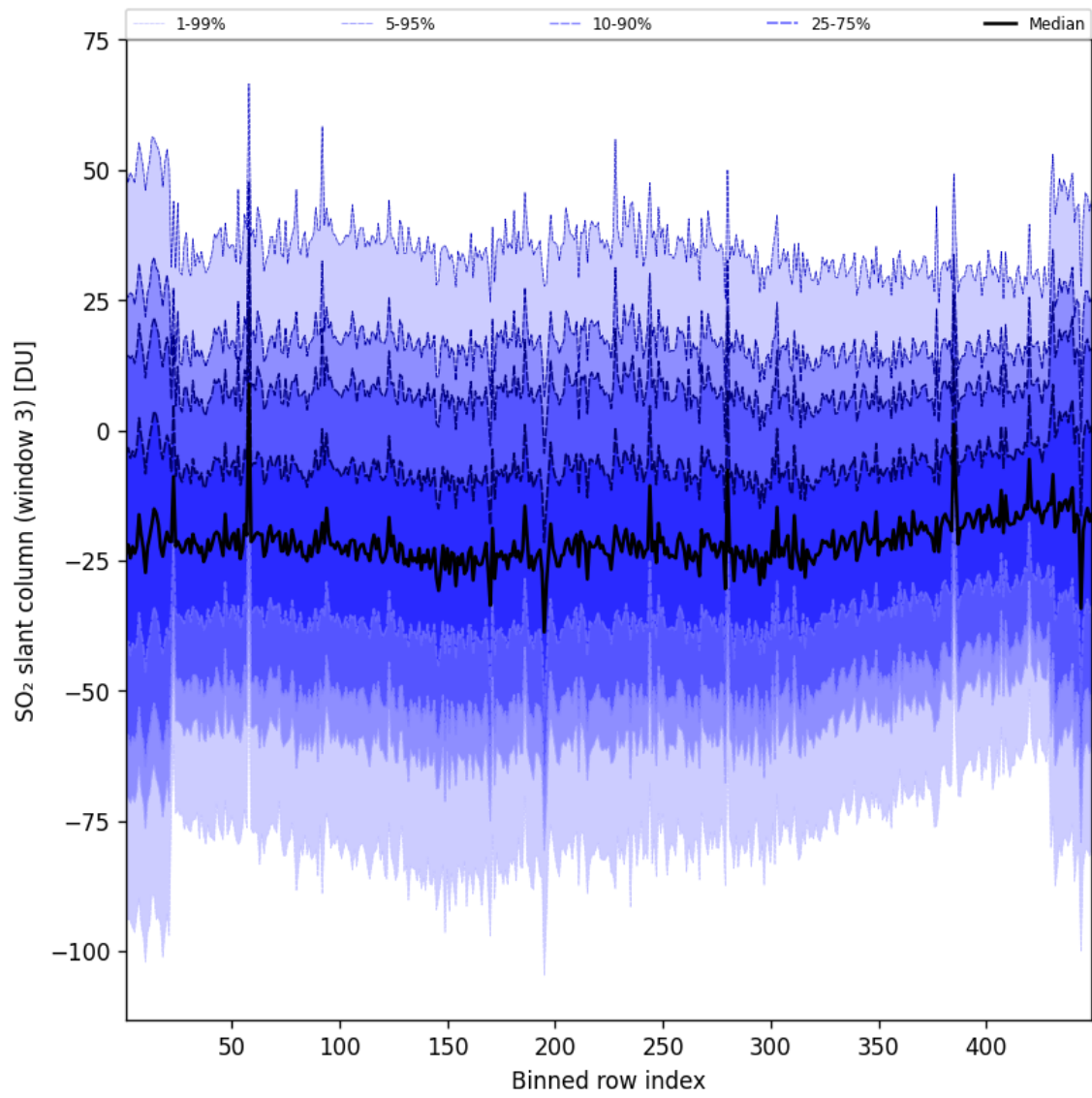


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-01-21 to 2025-01-21

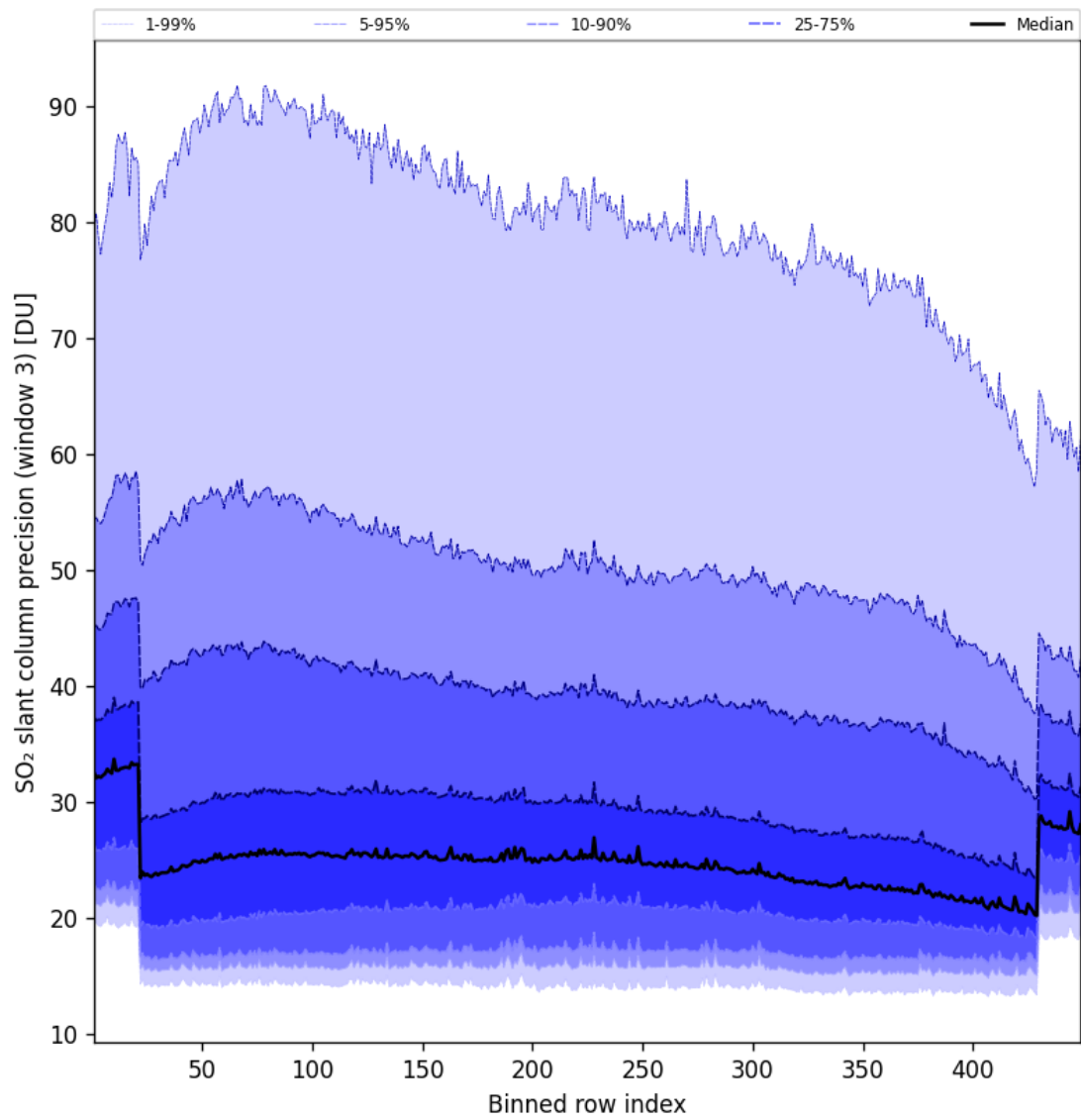


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-01-21 to 2025-01-21

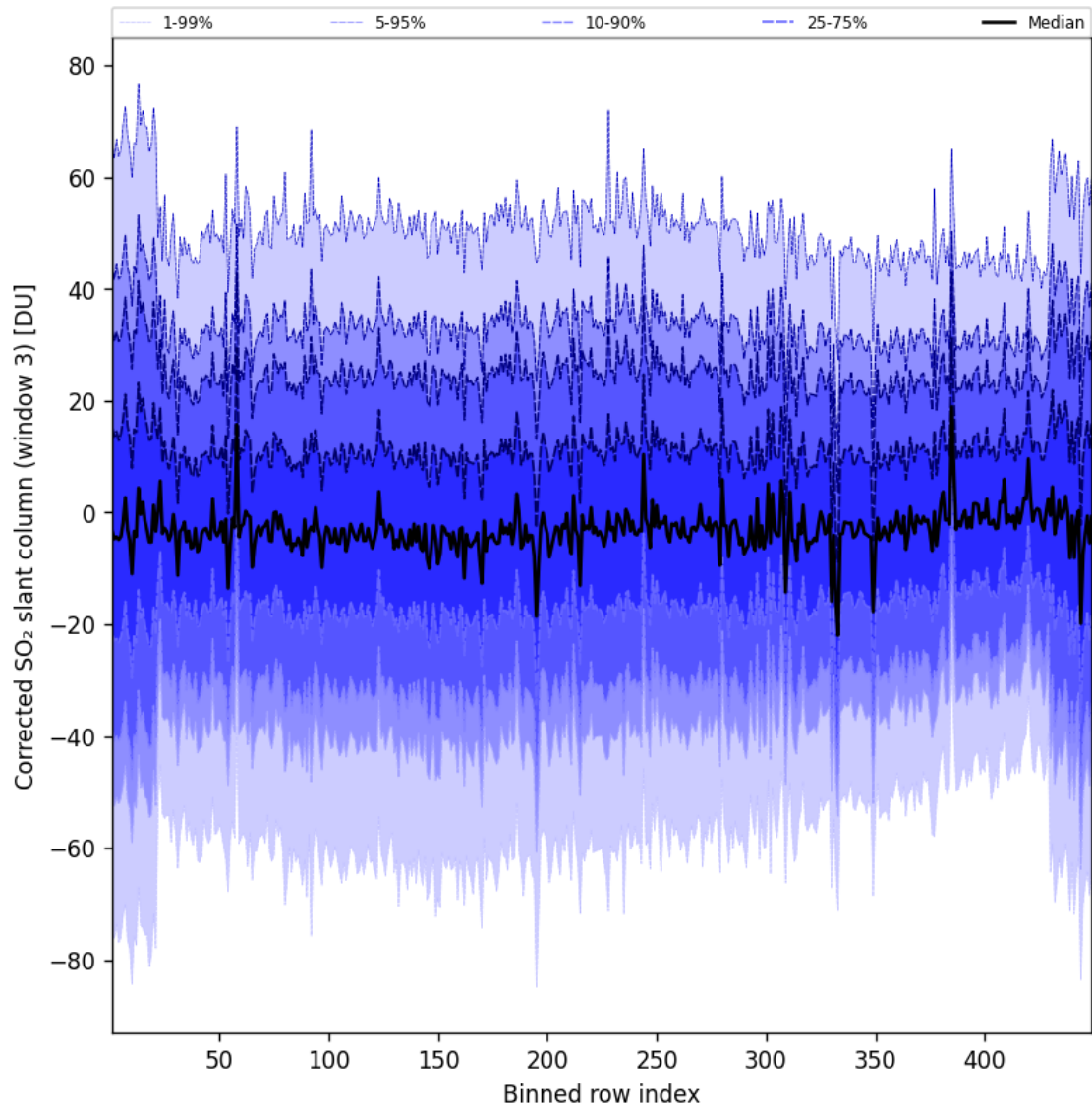


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-01-21 to 2025-01-21

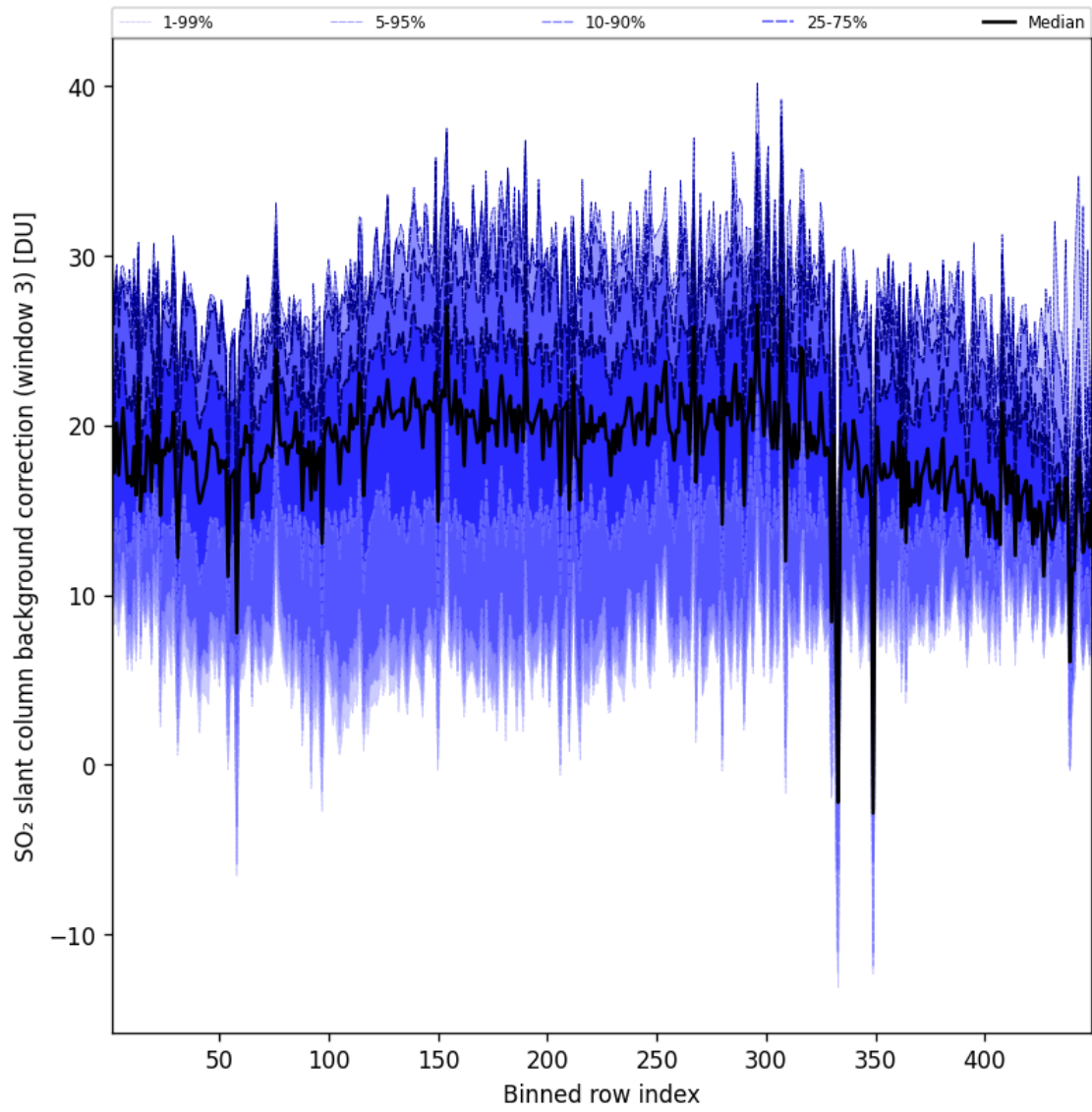


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-01-21 to 2025-01-21

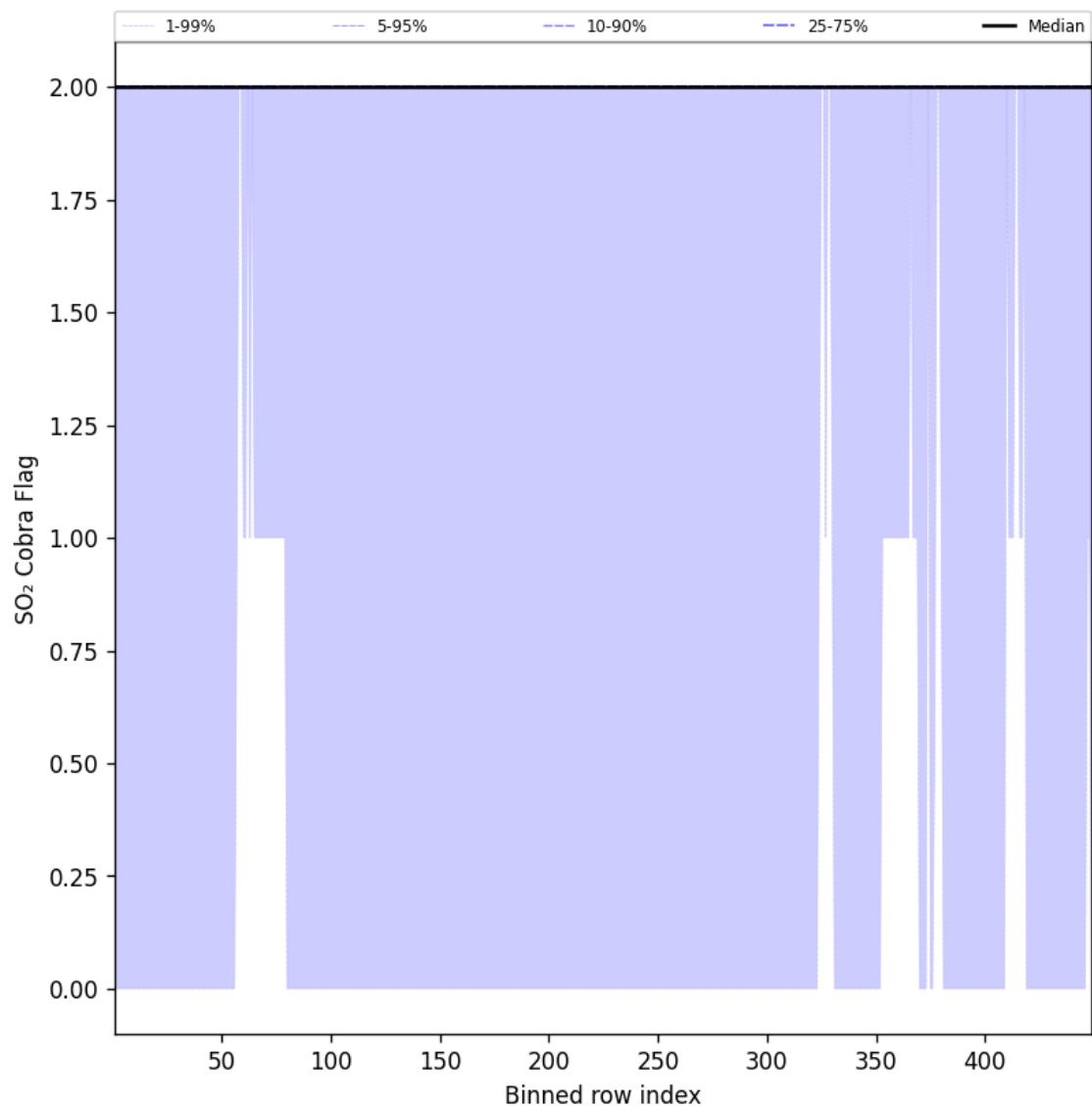


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-01-21 to 2025-01-21

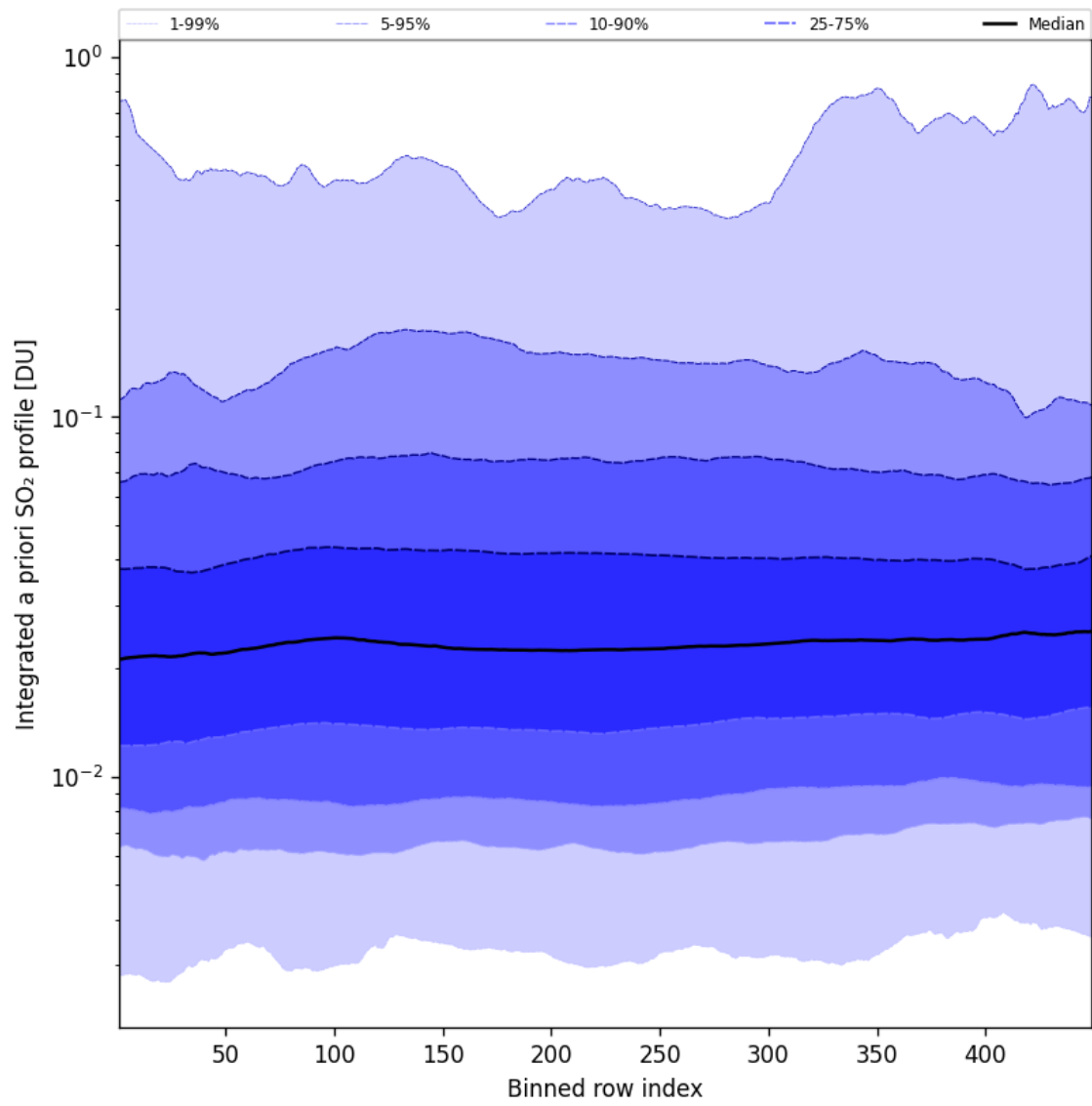


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-01-21 to 2025-01-21

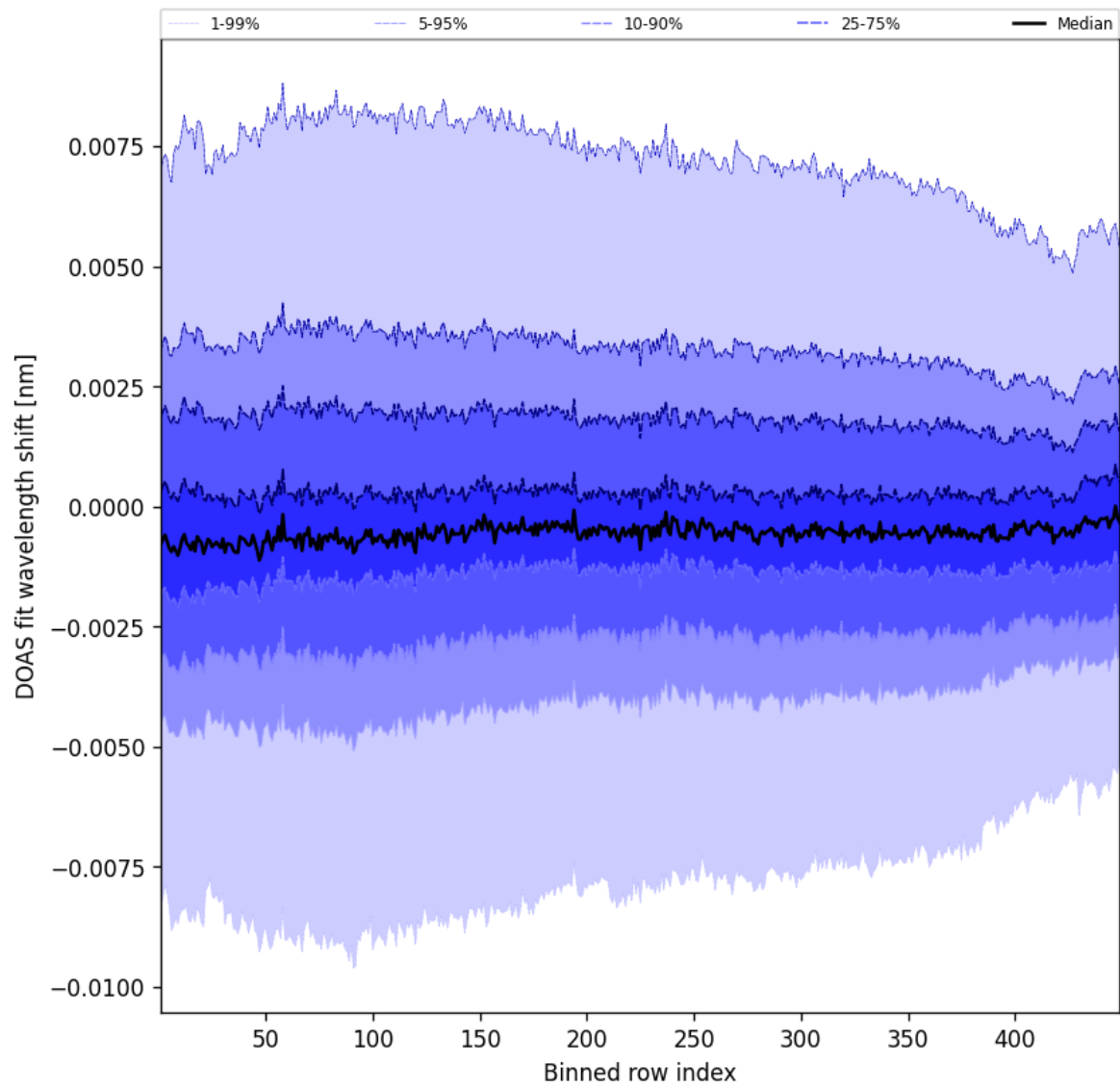


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-01-21 to 2025-01-21

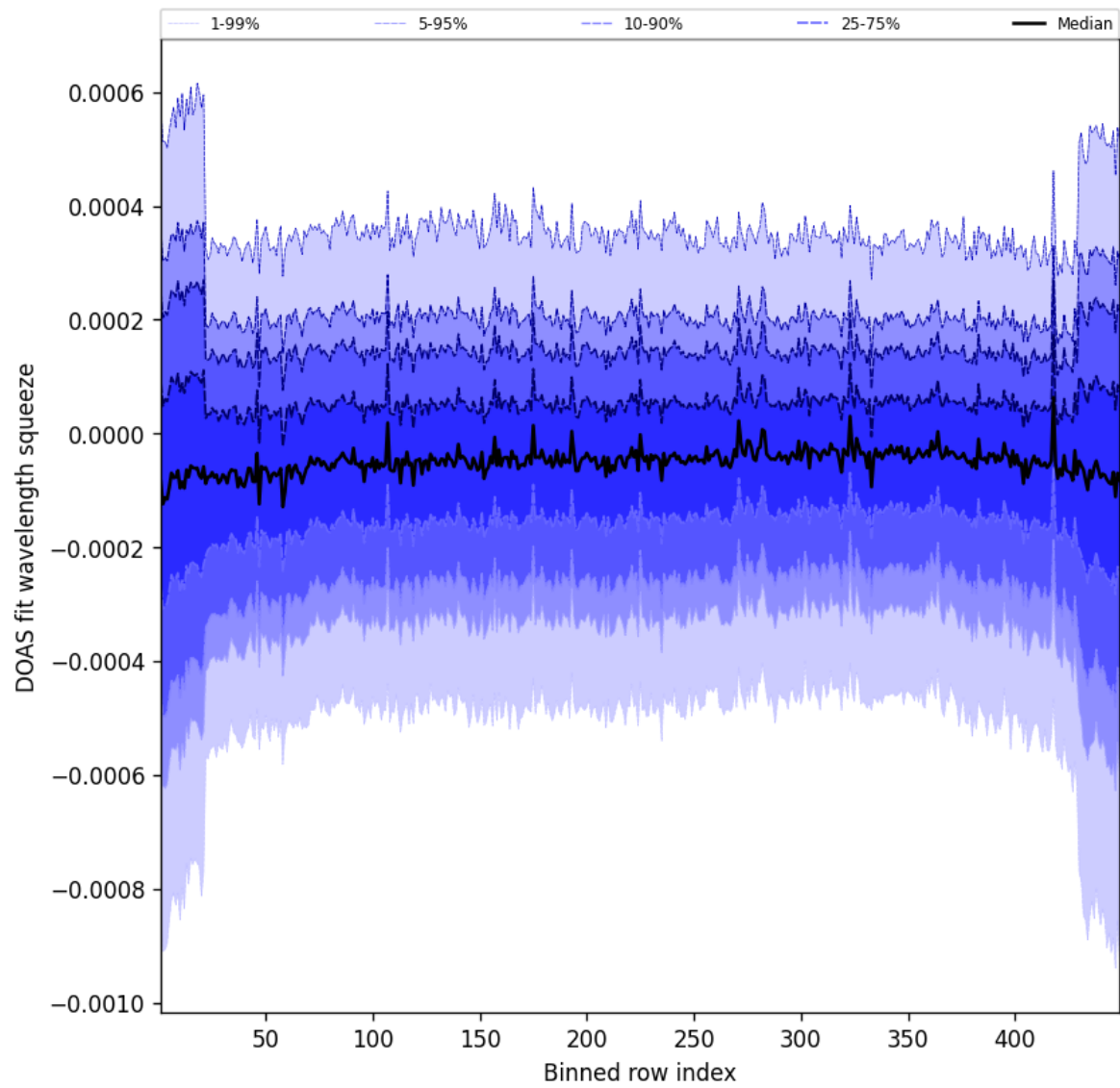


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-01-21 to 2025-01-21

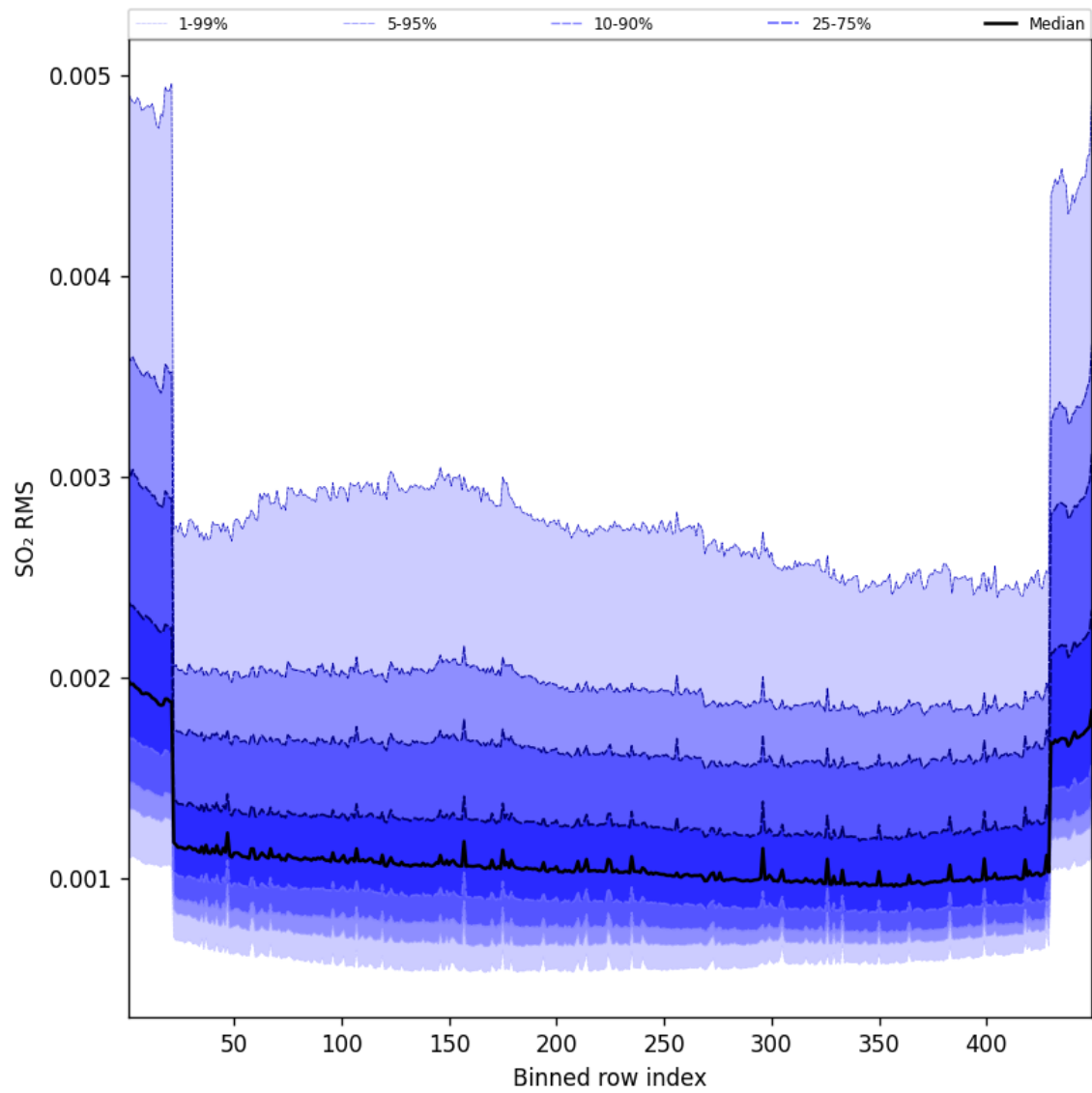


Figure 106: Along track statistics of “SO₂ RMS” for 2025-01-21 to 2025-01-21

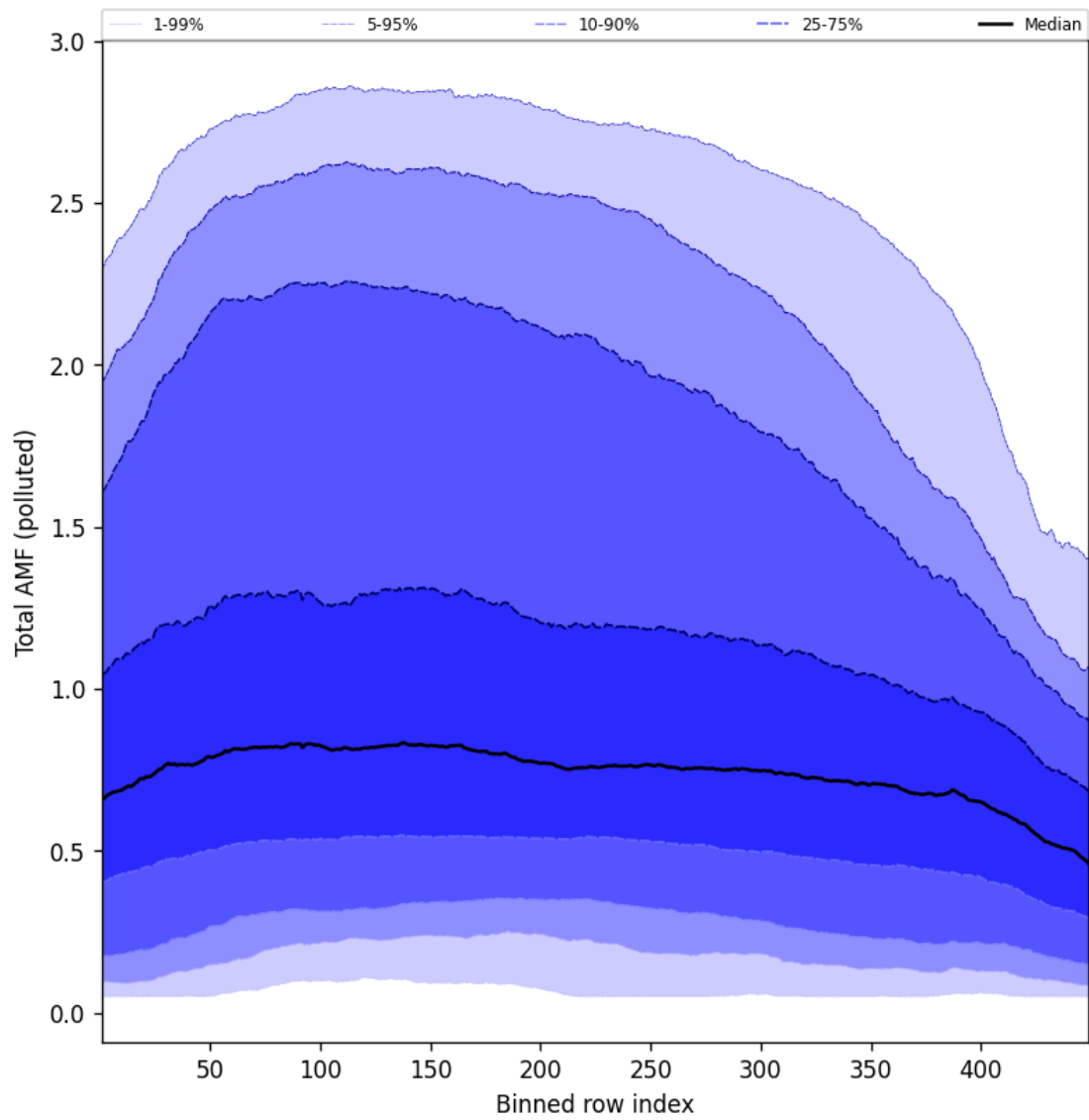


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-01-21 to 2025-01-21

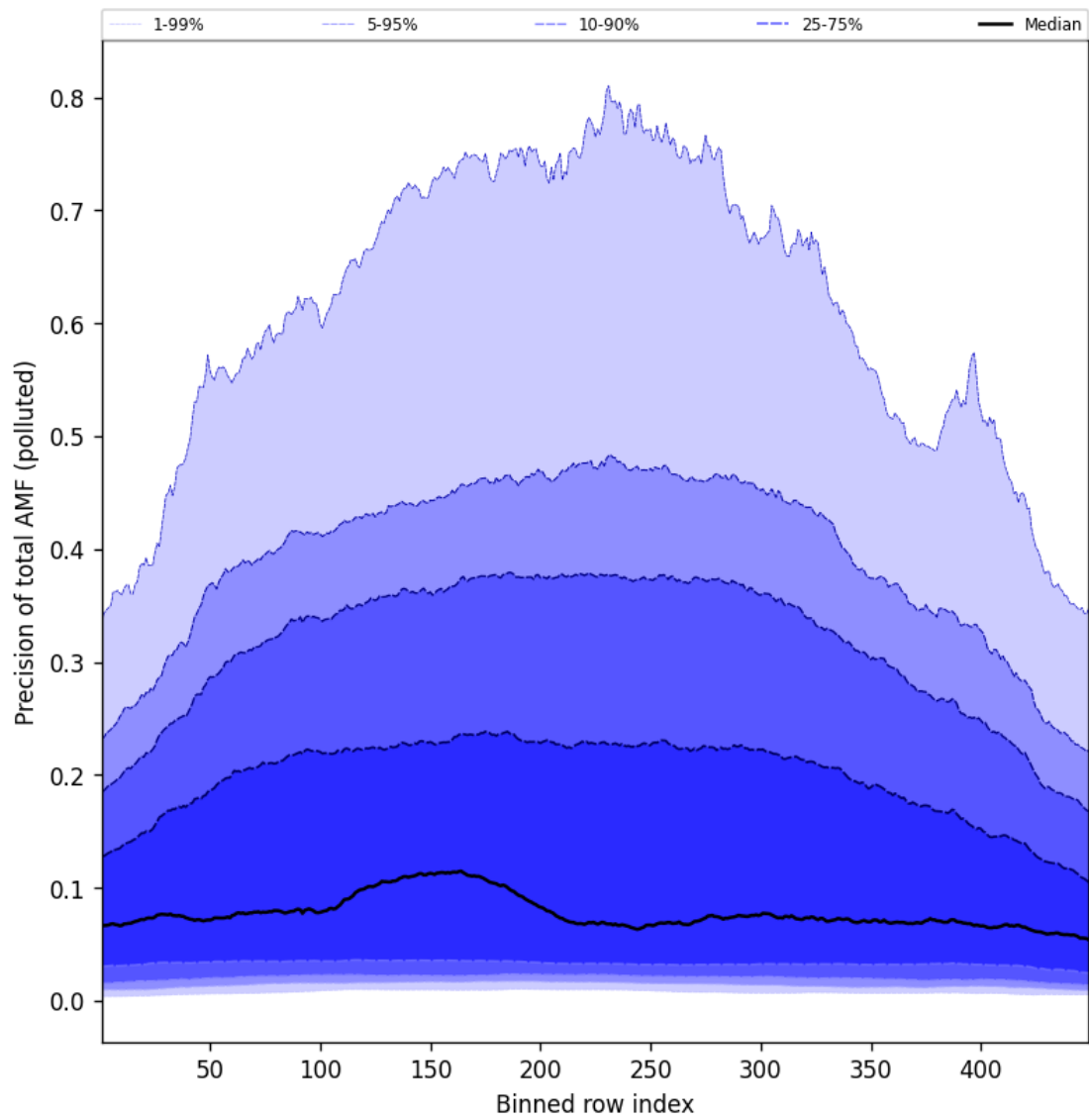


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-01-21 to 2025-01-21

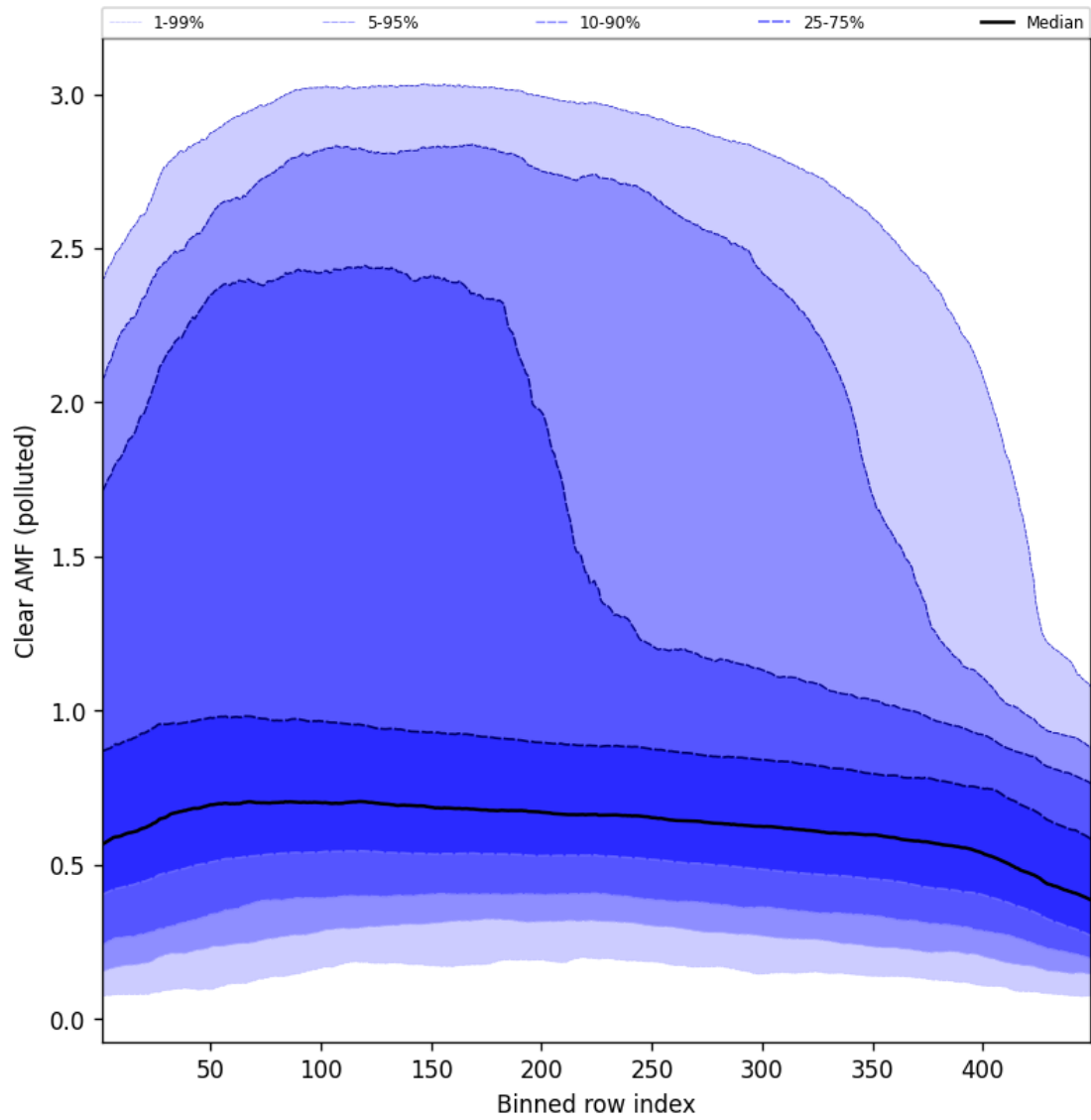


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-01-21 to 2025-01-21

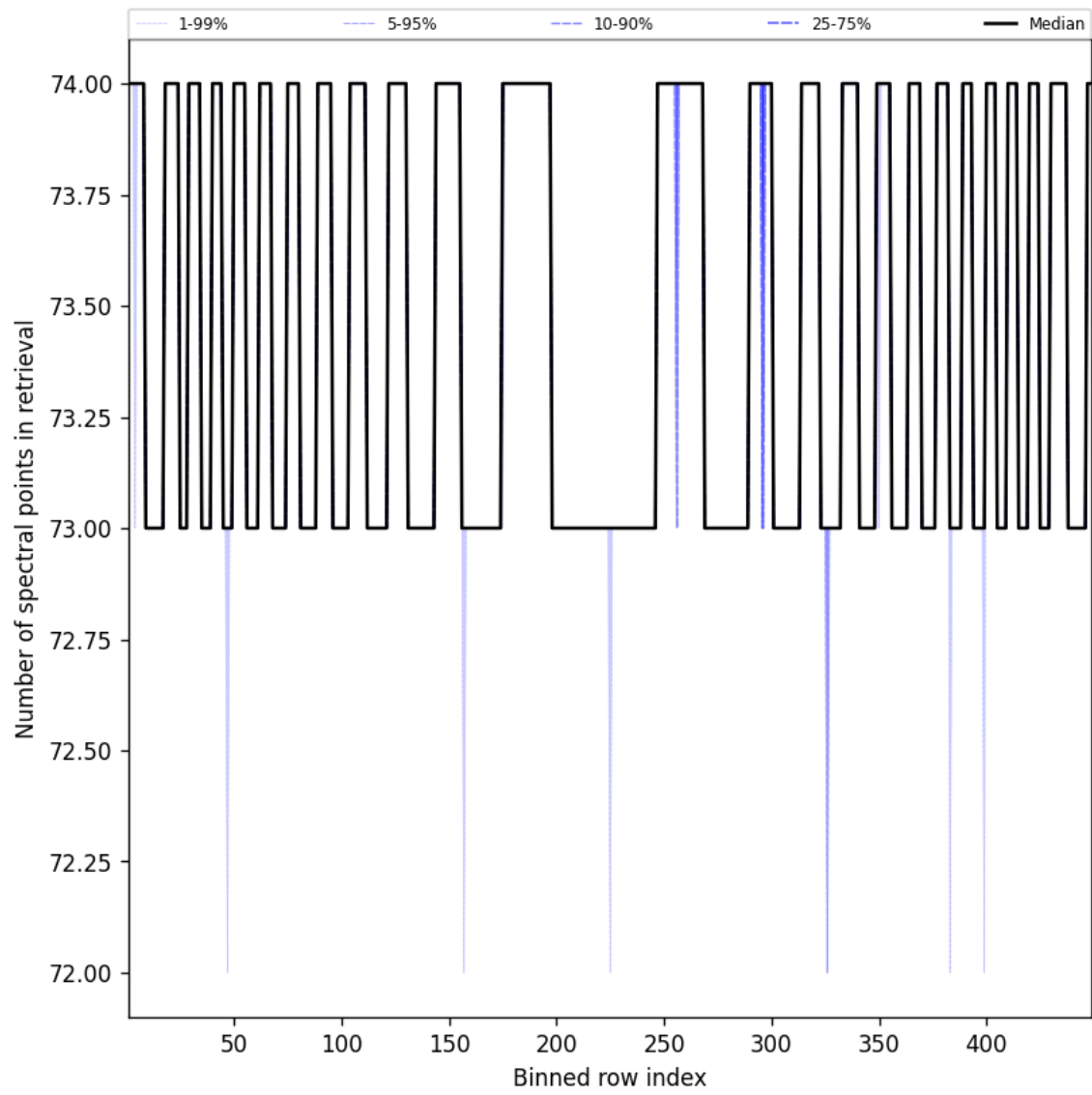


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-01-21 to 2025-01-21

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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