

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]	0.624 ± 0.415	18536455	0.995	0.810	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.927 \pm 161.669) \times 10^{-2}$	18536455	0.223	0.397	8.575×10^{-3}	-108	740
sulfurdioxide total vertical column precision [DU]	0.571 ± 1.120	18536455	0.197	0.332	0.293	3.577×10^{-2}	171
sulfurdioxide slant column density corrected [DU]	$(1.722 \pm 40.498) \times 10^{-2}$	18536455	0.242	0.338	8.247×10^{-3}	-43.6	333
sulfurdioxide slant column density cobra [DU]	$(1.686 \pm 34.167) \times 10^{-2}$	18536455	0.242	0.338	8.247×10^{-3}	-43.6	48.3
sulfurdioxide slant column density cobra precision [DU]	0.272 ± 0.125	18536455	0.213	0.110	0.232	7.522×10^{-2}	20.4
sulfurdioxide slant column density window1 [DU]	0.107 ± 0.646	18536455	0.125	0.709	0.116	-103	109
sulfurdioxide slant column density window1 precision [DU]	0.272 ± 0.125	18536455	0.213	0.110	0.232	7.522×10^{-2}	20.4
sulfurdioxide slant column density corrected win1 [DU]	$(5.784 \pm 62.623) \times 10^{-2}$	18536455	2.500×10^{-2}	0.675	4.354×10^{-2}	-103	109
background so2 slant column offset window1 [DU]	$(-4.965 \pm 18.638) \times 10^{-2}$	18536455	-0.140	0.223	-0.105	-1.41	5.19
sulfurdioxide slant column density window2 [DU]	2.49 ± 8.62	18536455	2.25	10.8	2.33	-819	1.330×10^3
sulfurdioxide slant column density window2 precision [DU]	7.79 ± 2.18	18536455	6.97	2.49	7.43	1.92	572
sulfurdioxide slant column density corrected win2 [DU]	2.56 ± 8.39	18536455	2.75	10.6	2.56	-817	1.331×10^3
background so2 slant column offset window2 [DU]	$(7.535 \pm 225.818) \times 10^{-2}$	18536455	1.75	2.52	0.727	-15.4	10.2
sulfurdioxide slant column density window3 [DU]	-11.2 ± 23.6	18536455	-12.9	29.4	-11.5	-2.646×10^3	521
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 12.8	18536455	22.5	9.96	23.6	9.04	2.041×10^3
sulfurdioxide slant column density corrected win3 [DU]	-10.9 ± 22.6	18536455	-11.8	28.1	-11.0	-2.653×10^3	518
background so2 slant column offset window3 [DU]	0.215 ± 6.633	18536455	0.560	10.0	0.230	-20.7	24.9
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	18536455	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.282 \pm 9.708) \times 10^{-2}$	18536455	2.878×10^{-2}	2.684×10^{-2}	2.356×10^{-2}	2.665×10^{-4}	2.95
fitted radiance shift [nm]	$(-3.143 \pm 24.656) \times 10^{-4}$	18536455	-5.000×10^{-4}	1.709×10^{-3}	-3.639×10^{-4}	-9.741×10^{-2}	5.079×10^{-2}
fitted radiance squeeze [1]	$(-6.312 \pm 18.352) \times 10^{-5}$	18536455	-3.000×10^{-5}	2.162×10^{-4}	-5.306×10^{-5}	-1.645×10^{-2}	1.570×10^{-2}
fitted root mean square [1]	$(1.213 \pm 0.508) \times 10^{-3}$	18536455	9.250×10^{-4}	4.815×10^{-4}	1.068×10^{-3}	3.247×10^{-4}	4.874×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.944 ± 0.618	18536455	0.580	0.660	0.785	5.000×10^{-2}	3.12
sulfurdioxide total air mass factor polluted precision [1]	0.139 ± 0.145	18536455	3.500×10^{-2}	0.162	8.400×10^{-2}	2.500×10^{-3}	1.87
sulfurdioxide clear air mass factor polluted [1]	0.828 ± 0.611	18536455	0.580	0.376	0.663	2.033×10^{-2}	3.13
number of spectral points in retrieval [1]	73.5 ± 0.5	18536455	73.0	1.000	73.0	52.0	156

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}	0.190	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.94	-0.885	-0.506	-0.329	-0.187	0.211	0.364	0.561	1.00	3.66
sulfurdioxide total vertical column precision [DU]	7.802×10^{-2}	9.945×10^{-2}	0.121	0.146	0.185	0.517	0.739	1.07	1.84	5.22
sulfurdioxide slant column density corrected [DU]	-0.798	-0.454	-0.329	-0.246	-0.159	0.179	0.270	0.360	0.502	0.953
sulfurdioxide slant column density cobra [DU]	-0.798	-0.454	-0.329	-0.246	-0.159	0.179	0.270	0.360	0.502	0.953
sulfurdioxide slant column density cobra precision [DU]	0.135	0.160	0.173	0.183	0.196	0.306	0.371	0.426	0.505	0.752
sulfurdioxide slant column density window1 [DU]	-1.60	-0.891	-0.620	-0.437	-0.244	0.465	0.645	0.815	1.07	1.79
sulfurdioxide slant column density window1 precision [DU]	0.135	0.160	0.173	0.183	0.196	0.306	0.371	0.426	0.505	0.752
sulfurdioxide slant column density corrected win1 [DU]	-1.50	-0.861	-0.623	-0.462	-0.290	0.384	0.567	0.745	1.02	1.81
background so2 slant column offset window1 [DU]	-0.371	-0.275	-0.236	-0.203	-0.170	5.321×10^{-2}	0.153	0.230	0.315	0.461
sulfurdioxide slant column density window2 [DU]	-17.7	-11.2	-8.04	-5.69	-3.04	7.80	10.6	13.1	16.7	24.6
sulfurdioxide slant column density window2 precision [DU]	4.19	4.99	5.47	5.86	6.34	8.83	9.72	10.6	11.8	14.4
sulfurdioxide slant column density corrected win2 [DU]	-17.9	-11.0	-7.78	-5.39	-2.74	7.86	10.5	12.9	16.1	23.0
background so2 slant column offset window2 [DU]	-7.09	-4.70	-3.02	-1.92	-0.932	1.59	1.85	2.07	2.40	3.99
sulfurdioxide slant column density window3 [DU]	-70.0	-49.2	-39.8	-33.2	-25.9	3.52	11.4	18.5	28.1	46.8
sulfurdioxide slant column density window3 precision [DU]	13.0	14.9	16.3	17.7	19.5	29.5	34.2	39.6	50.5	80.7
sulfurdioxide slant column density corrected win3 [DU]	-67.9	-47.7	-38.6	-32.0	-25.0	3.17	10.5	17.1	26.2	44.6
background so2 slant column offset window3 [DU]	-13.4	-10.5	-8.73	-7.08	-4.75	5.28	7.39	9.00	10.9	14.1
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]	2.022×10^{-3}	4.897×10^{-3}	7.747×10^{-3}	1.032×10^{-2}	1.349×10^{-2}	4.034×10^{-2}	5.313×10^{-2}	7.076×10^{-2}	0.116	0.411
fitted radiance shift [nm]	-7.696×10^{-3}	-3.928×10^{-3}	-2.567×10^{-3}	-1.811×10^{-3}	-1.215×10^{-3}	4.947×10^{-4}	1.186×10^{-3}	2.056×10^{-3}	3.540×10^{-3}	7.510×10^{-3}
fitted radiance squeeze [1]	-5.632×10^{-4}	-3.707×10^{-4}	-2.873×10^{-4}	-2.287×10^{-4}	-1.664×10^{-4}	4.980×10^{-5}	1.003×10^{-4}	1.462×10^{-4}	2.111×10^{-4}	3.666×10^{-4}
fitted root mean square [1]	5.782×10^{-4}	7.036×10^{-4}	7.758×10^{-4}	8.309×10^{-4}	8.969×10^{-4}	1.378×10^{-3}	1.609×10^{-3}	1.837×10^{-3}	2.188×10^{-3}	3.111×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.829×10^{-2}	0.202	0.315	0.410	0.526	1.19	1.51	1.90	2.39	2.72
sulfurdioxide total air mass factor polluted precision [1]	8.489×10^{-3}	1.671×10^{-2}	2.319×10^{-2}	2.871×10^{-2}	3.656×10^{-2}	0.199	0.265	0.328	0.419	0.651
sulfurdioxide clear air mass factor polluted [1]	0.138	0.265	0.353	0.422	0.505	0.881	1.02	1.33	2.59	2.94
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 ± 0.395	6681896	0.710	1.000	0.0	1.000	0.290	1.000
sulfurdioxide total vertical column [DU]	0.114 ± 2.591	6681896	0.631	1.671×10^{-2}	-108	740	-0.289	0.342
sulfurdioxide total vertical column precision [DU]	0.986 ± 1.717	6681896	0.690	0.453	4.431×10^{-2}	171	0.270	0.960
sulfurdioxide slant column density corrected [DU]	$(2.891 \pm 55.410) \times 10^{-2}$	6681896	0.396	1.216×10^{-2}	-7.50	333	-0.183	0.213
sulfurdioxide slant column density cobra [DU]	$(2.807 \pm 43.073) \times 10^{-2}$	6681896	0.396	1.216×10^{-2}	-7.50	48.3	-0.183	0.213
sulfurdioxide slant column density cobra precision [DU]	0.325 ± 0.157	6681896	0.177	0.273	7.522×10^{-2}	15.9	0.217	0.394
sulfurdioxide slant column density window1 [DU]	0.177 ± 0.765	6681896	0.795	0.185	-73.7	109	-0.216	0.579
sulfurdioxide slant column density window1 precision [DU]	0.325 ± 0.157	6681896	0.177	0.273	7.522×10^{-2}	15.9	0.217	0.394
sulfurdioxide slant column density corrected win1 [DU]	$(8.267 \pm 76.218) \times 10^{-2}$	6681896	0.785	5.741×10^{-2}	-73.7	109	-0.328	0.457
background so2 slant column offset window1 [DU]	$(-9.429 \pm 16.640) \times 10^{-2}$	6681896	0.146	-0.114	-1.21	4.12	-0.191	-4.515×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.25 ± 9.73	6681896	12.4	2.89	-141	331	-3.13	9.22
sulfurdioxide slant column density window2 precision [DU]	8.68 ± 2.26	6681896	2.83	8.35	2.30	45.5	7.11	9.94
sulfurdioxide slant column density corrected win2 [DU]	2.59 ± 9.35	6681896	11.9	2.58	-144	333	-3.38	8.54
background so2 slant column offset window2 [DU]	-0.657 ± 2.868	6681896	3.86	0.469	-15.4	10.2	-2.41	1.44
sulfurdioxide slant column density window3 [DU]	-14.1 ± 25.8	6681896	32.6	-13.7	-212	521	-30.2	2.45
sulfurdioxide slant column density window3 precision [DU]	29.8 ± 12.7	6681896	10.2	26.6	9.73	234	22.6	32.8
sulfurdioxide slant column density corrected win3 [DU]	-11.3 ± 25.2	6681896	31.8	-11.1	-200	518	-27.1	4.79
background so2 slant column offset window3 [DU]	2.84 ± 5.50	6681896	8.89	2.30	-13.4	24.9	-1.72	7.17
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.28	6681896	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.059 \pm 15.326) \times 10^{-2}$	6681896	4.833×10^{-2}	2.678×10^{-2}	8.495×10^{-4}	2.95	1.485×10^{-2}	6.319×10^{-2}
fitted radiance shift [nm]	$(-1.341 \pm 25.138) \times 10^{-4}$	6681896	1.765×10^{-3}	-1.594×10^{-4}	-3.456×10^{-2}	4.117×10^{-2}	-1.039×10^{-3}	7.257×10^{-4}
fitted radiance squeeze [1]	$(-1.497 \pm 19.395) \times 10^{-5}$	6681896	2.163×10^{-4}	-9.624×10^{-6}	-9.961×10^{-3}	1.383×10^{-2}	-1.190×10^{-4}	9.724×10^{-5}
fitted root mean square [1]	$(1.406 \pm 0.635) \times 10^{-3}$	6681896	7.101×10^{-4}	1.199×10^{-3}	3.564×10^{-4}	4.874×10^{-2}	9.780×10^{-4}	1.688×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.671 ± 0.393	6681896	0.519	0.629	5.000×10^{-2}	2.85	0.371	0.890
sulfurdioxide total air mass factor polluted precision [1]	0.102 ± 0.145	6681896	9.193×10^{-2}	4.758×10^{-2}	2.500×10^{-3}	1.87	2.748×10^{-2}	0.119
sulfurdioxide clear air mass factor polluted [1]	0.581 ± 0.267	6681896	0.422	0.574	2.033×10^{-2}	2.10	0.364	0.786
number of spectral points in retrieval [1]	73.5 ± 0.5	6681896	1.000	73.0	52.0	156	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]	0.582 ± 0.419	11854559	0.840	0.490	0.0	1.000	0.160	1.000
sulfurdioxide total vertical column [DU]	$(1.275 \pm 54.826) \times 10^{-2}$	11854559	0.318	6.086×10^{-3}	-45.5	68.1	-0.152	0.167
sulfurdioxide total vertical column precision [DU]	0.336 ± 0.385	11854559	0.231	0.241	3.577×10^{-2}	20.5	0.155	0.387
sulfurdioxide slant column density corrected [DU]	$(1.063 \pm 28.858) \times 10^{-2}$	11854559	0.311	6.484×10^{-3}	-43.6	63.5	-0.148	0.163
sulfurdioxide slant column density cobra [DU]	$(1.053 \pm 27.903) \times 10^{-2}$	11854559	0.311	6.484×10^{-3}	-43.6	21.3	-0.148	0.163
sulfurdioxide slant column density cobra precision [DU]	0.242 ± 0.090	11854559	7.878×10^{-2}	0.217	8.283×10^{-2}	20.4	0.188	0.267
sulfurdioxide slant column density window1 [DU]	$(6.833 \pm 56.421) \times 10^{-2}$	11854559	0.665	8.376×10^{-2}	-103	56.6	-0.257	0.408
sulfurdioxide slant column density window1 precision [DU]	0.242 ± 0.090	11854559	7.878×10^{-2}	0.217	8.283×10^{-2}	20.4	0.188	0.267
sulfurdioxide slant column density corrected win1 [DU]	$(4.384 \pm 53.407) \times 10^{-2}$	11854559	0.624	3.726×10^{-2}	-103	56.7	-0.273	0.351
background so2 slant column offset window1 [DU]	$(-2.449 \pm 19.223) \times 10^{-2}$	11854559	0.277	-9.571×10^{-2}	-1.41	5.19	-0.163	0.113
sulfurdioxide slant column density window2 [DU]	2.06 ± 7.90	11854559	10.1	2.07	-819	1.330×10^3	-2.99	7.12
sulfurdioxide slant column density window2 precision [DU]	7.28 ± 1.97	11854559	2.09	7.01	1.92	572	6.06	8.14
sulfurdioxide slant column density corrected win2 [DU]	2.55 ± 7.80	11854559	9.94	2.56	-817	1.331×10^3	-2.42	7.52
background so2 slant column offset window2 [DU]	0.488 ± 1.692	11854559	2.20	0.847	-11.3	9.90	-0.529	1.67
sulfurdioxide slant column density window3 [DU]	-9.49 ± 22.14	11854559	27.9	-10.4	-2.646×10^3	499	-23.8	4.07
sulfurdioxide slant column density window3 precision [DU]	25.1 ± 12.5	11854559	8.59	22.0	9.04	2.041×10^3	18.3	26.8
sulfurdioxide slant column density corrected win3 [DU]	-10.7 ± 21.1	11854559	26.3	-11.0	-2.653×10^3	491	-24.0	2.36
background so2 slant column offset window3 [DU]	-1.26 ± 6.76	11854559	10.9	-1.33	-20.7	23.6	-6.92	3.96
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	11854559	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.716 \pm 2.857) \times 10^{-2}$	11854559	2.275×10^{-2}	2.211×10^{-2}	2.665×10^{-4}	1.35	1.271×10^{-2}	3.546×10^{-2}
fitted radiance shift [nm]	$(-4.159 \pm 24.322) \times 10^{-4}$	11854559	1.635×10^{-3}	-4.733×10^{-4}	-9.741×10^{-2}	5.079×10^{-2}	-1.288×10^{-3}	3.472×10^{-4}
fitted radiance squeeze [1]	$(-9.026 \pm 17.152) \times 10^{-5}$	11854559	2.119×10^{-4}	-7.655×10^{-5}	-1.645×10^{-2}	1.570×10^{-2}	-1.896×10^{-4}	2.232×10^{-5}
fitted root mean square [1]	$(1.105 \pm 0.378) \times 10^{-3}$	11854559	3.853×10^{-4}	1.013×10^{-3}	3.247×10^{-4}	4.641×10^{-2}	8.651×10^{-4}	1.250×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.10 ± 0.67	11854559	0.815	0.896	5.000×10^{-2}	3.12	0.611	1.43
sulfurdioxide total air mass factor polluted precision [1]	0.159 ± 0.140	11854559	0.190	0.121	5.833×10^{-3}	1.40	4.410×10^{-2}	0.234
sulfurdioxide clear air mass factor polluted [1]	0.966 ± 0.700	11854559	0.395	0.703	0.147	3.13	0.565	0.960
number of spectral points in retrieval [1]	73.4 ± 0.5	11854559	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]	0.670 ± 0.403	13394186	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.464 \pm 135.454) \times 10^{-2}$	13394186	0.407	8.091×10^{-3}	-108	740	-0.193	0.214
sulfurdioxide total vertical column precision [DU]	0.502 ± 0.906	13394186	0.283	0.294	4.655×10^{-2}	171	0.201	0.484
sulfurdioxide slant column density corrected [DU]	$(1.359 \pm 31.948) \times 10^{-2}$	13394186	0.324	6.987×10^{-3}	-9.43	49.3	-0.154	0.170
sulfurdioxide slant column density cobra [DU]	$(1.347 \pm 31.140) \times 10^{-2}$	13394186	0.324	6.987×10^{-3}	-9.43	30.0	-0.154	0.170
sulfurdioxide slant column density cobra precision [DU]	0.259 ± 0.115	13394186	9.531×10^{-2}	0.223	7.522×10^{-2}	15.9	0.191	0.286
sulfurdioxide slant column density window1 [DU]	0.131 ± 0.598	13394186	0.667	0.136	-46.6	109	-0.200	0.467
sulfurdioxide slant column density window1 precision [DU]	0.259 ± 0.115	13394186	9.531×10^{-2}	0.223	7.522×10^{-2}	15.9	0.191	0.286
sulfurdioxide slant column density corrected win1 [DU]	$(5.170 \pm 58.585) \times 10^{-2}$	13394186	0.646	4.032×10^{-2}	-46.6	109	-0.280	0.366
background so2 slant column offset window1 [DU]	$(-7.978 \pm 15.569) \times 10^{-2}$	13394186	0.176	-0.116	-1.31	4.12	-0.176	2.698×10^{-4}
sulfurdioxide slant column density window2 [DU]	2.11 ± 8.38	13394186	10.6	1.98	-819	1.330×10^3	-3.27	7.31
sulfurdioxide slant column density window2 precision [DU]	7.64 ± 2.08	13394186	2.37	7.32	1.92	572	6.27	8.65
sulfurdioxide slant column density corrected win2 [DU]	2.49 ± 8.22	13394186	10.4	2.50	-817	1.331×10^3	-2.73	7.71
background so2 slant column offset window2 [DU]	0.375 ± 2.047	13394186	2.05	0.919	-15.4	10.2	-0.410	1.64
sulfurdioxide slant column density window3 [DU]	-8.33 ± 23.33	13394186	29.4	-8.80	-2.646×10^3	390	-23.1	6.31
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 12.4	13394186	9.39	23.6	9.04	2.041×10^3	19.9	29.3
sulfurdioxide slant column density corrected win3 [DU]	-9.11 ± 22.25	13394186	28.2	-9.54	-2.653×10^3	379	-23.3	4.84
background so2 slant column offset window3 [DU]	-0.781 ± 6.147	13394186	8.75	-0.752	-20.7	24.9	-5.25	3.50
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.15	13394186	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.291 \pm 4.710) \times 10^{-2}$	13394186	2.358×10^{-2}	2.446×10^{-2}	8.495×10^{-4}	1.81	1.501×10^{-2}	3.860×10^{-2}
fitted radiance shift [nm]	$(-2.470 \pm 24.379) \times 10^{-4}$	13394186	1.792×10^{-3}	-2.572×10^{-4}	-3.913×10^{-2}	5.079×10^{-2}	-1.171×10^{-3}	6.210×10^{-4}
fitted radiance squeeze [1]	$(-5.313 \pm 17.111) \times 10^{-5}$	13394186	1.992×10^{-4}	-4.442×10^{-5}	-1.461×10^{-2}	1.383×10^{-2}	-1.476×10^{-4}	5.161×10^{-5}
fitted root mean square [1]	$(1.152 \pm 0.472) \times 10^{-3}$	13394186	4.011×10^{-4}	1.021×10^{-3}	3.247×10^{-4}	4.874×10^{-2}	8.716×10^{-4}	1.273×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.841 ± 0.424	13394186	0.510	0.773	5.000×10^{-2}	2.71	0.553	1.06
sulfurdioxide total air mass factor polluted precision [1]	0.124 ± 0.119	13394186	0.140	7.509×10^{-2}	2.983×10^{-3}	1.29	3.807×10^{-2}	0.179
sulfurdioxide clear air mass factor polluted [1]	0.682 ± 0.241	13394186	0.291	0.654	4.558×10^{-2}	2.71	0.526	0.817
number of spectral points in retrieval [1]	73.5 ± 0.5	13394186	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]	0.497 ± 0.419	4527908	0.910	0.410	0.0	1.000	9.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(6.444 \pm 181.903) \times 10^{-2}$	4527908	0.340	8.529×10^{-3}	-91.3	207	-0.155	0.185
sulfurdioxide total vertical column precision [DU]	0.665 ± 1.332	4527908	0.491	0.260	3.577×10^{-2}	44.9	0.119	0.610
sulfurdioxide slant column density corrected [DU]	$(2.410 \pm 57.758) \times 10^{-2}$	4527908	0.379	1.132×10^{-2}	-43.6	333	-0.176	0.203
sulfurdioxide slant column density cobra [DU]	$(2.302 \pm 39.997) \times 10^{-2}$	4527908	0.379	1.132×10^{-2}	-43.6	48.3	-0.176	0.203
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.135	4527908	0.138	0.259	8.933×10^{-2}	20.4	0.215	0.353
sulfurdioxide slant column density window1 [DU]	$(2.999 \pm 74.301) \times 10^{-2}$	4527908	0.837	3.607×10^{-2}	-103	56.6	-0.392	0.445
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.135	4527908	0.138	0.259	8.933×10^{-2}	20.4	0.215	0.353
sulfurdioxide slant column density corrected win1 [DU]	$(6.872 \pm 70.722) \times 10^{-2}$	4527908	0.757	5.081×10^{-2}	-103	56.7	-0.323	0.435
background so2 slant column offset window1 [DU]	$(3.872 \pm 23.318) \times 10^{-2}$	4527908	0.398	-3.982×10^{-2}	-1.41	5.19	-0.151	0.246
sulfurdioxide slant column density window2 [DU]	3.41 ± 9.03	4527908	11.3	3.32	-758	709	-2.31	9.00
sulfurdioxide slant column density window2 precision [DU]	8.09 ± 2.37	4527908	2.73	7.67	2.40	402	6.50	9.23
sulfurdioxide slant column density corrected win2 [DU]	2.72 ± 8.74	4527908	10.9	2.73	-759	712	-2.73	8.18
background so2 slant column offset window2 [DU]	-0.690 ± 2.490	4527908	3.61	-0.337	-13.5	10.2	-2.25	1.36
sulfurdioxide slant column density window3 [DU]	-18.6 ± 22.5	4527908	27.2	-18.3	-281	521	-32.0	-4.77
sulfurdioxide slant column density window3 precision [DU]	26.3 ± 13.4	4527908	11.3	23.0	9.73	234	18.1	29.4
sulfurdioxide slant column density corrected win3 [DU]	-15.7 ± 22.7	4527908	27.6	-14.8	-274	518	-29.0	-1.42
background so2 slant column offset window3 [DU]	2.98 ± 7.11	4527908	11.0	4.78	-20.7	23.6	-2.62	8.41
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.34	4527908	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.043 \pm 14.653) \times 10^{-2}$	4527908	4.106×10^{-2}	1.812×10^{-2}	2.665×10^{-4}	2.87	6.758×10^{-3}	4.782×10^{-2}
fitted radiance shift [nm]	$(-5.226 \pm 24.647) \times 10^{-4}$	4527908	1.346×10^{-3}	-6.360×10^{-4}	-9.741×10^{-2}	4.144×10^{-2}	-1.282×10^{-3}	6.467×10^{-5}
fitted radiance squeeze [1]	$(-9.703 \pm 20.981) \times 10^{-5}$	4527908	2.665×10^{-4}	-9.251×10^{-5}	-1.645×10^{-2}	1.458×10^{-2}	-2.297×10^{-4}	3.684×10^{-5}
fitted root mean square [1]	$(1.365 \pm 0.536) \times 10^{-3}$	4527908	5.705×10^{-4}	1.239×10^{-3}	3.515×10^{-4}	4.641×10^{-2}	1.011×10^{-3}	1.582×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.29 ± 0.92	4527908	1.82	0.948	5.000×10^{-2}	3.12	0.461	2.28
sulfurdioxide total air mass factor polluted precision [1]	0.183 ± 0.194	4527908	0.237	0.131	2.500×10^{-3}	1.87	3.001×10^{-2}	0.267
sulfurdioxide clear air mass factor polluted [1]	1.30 ± 1.02	4527908	2.04	0.801	2.033×10^{-2}	3.13	0.433	2.47
number of spectral points in retrieval [1]	73.4 ± 0.5	4527908	1.000	73.0	52.0	156	73.0	74.0

3 Granule outlines

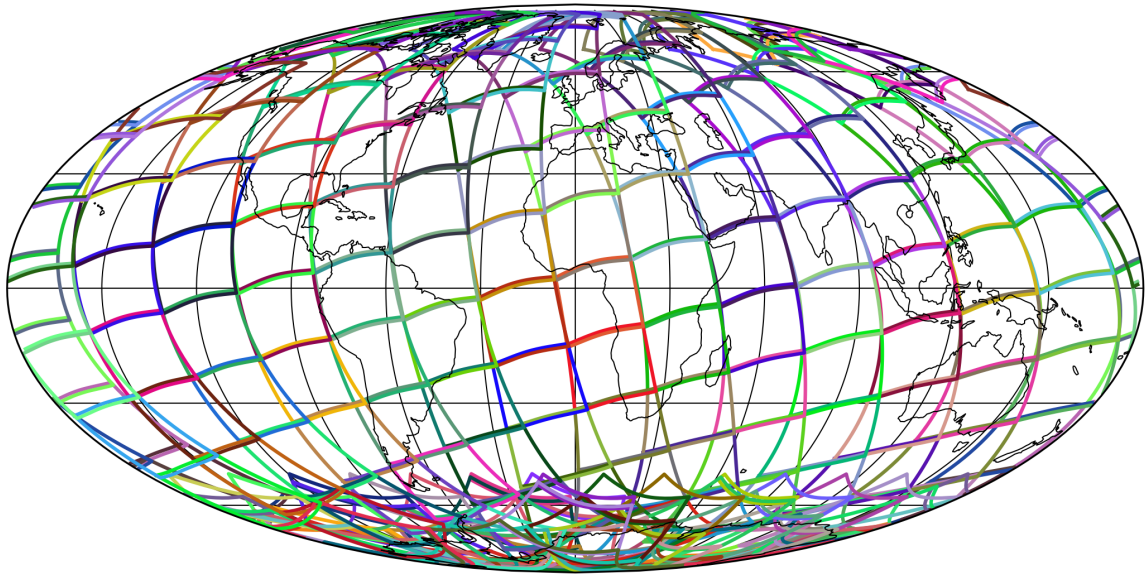


Figure 1: Outline of the granules.

4 Input data monitoring

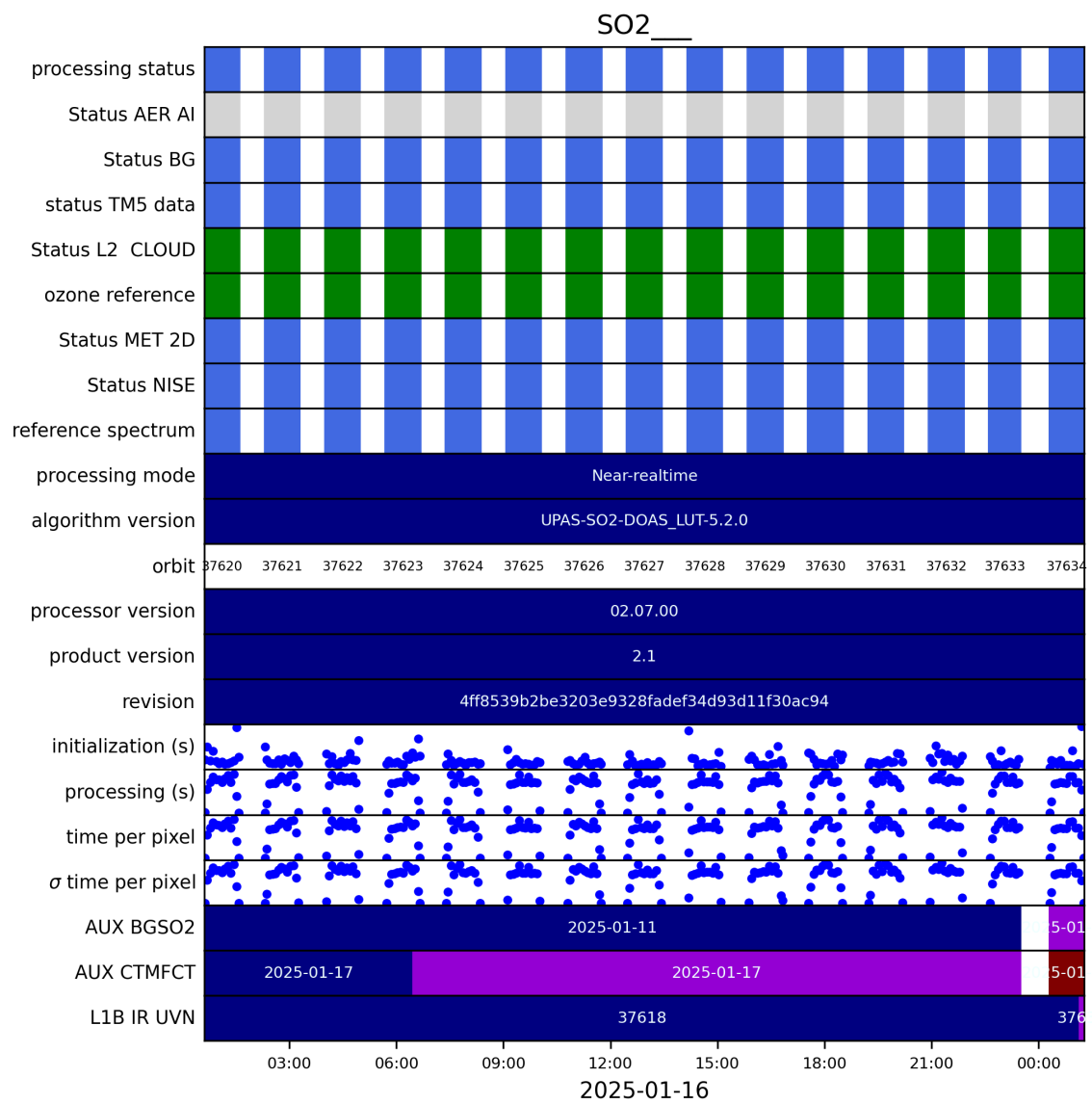


Figure 2: Input data per granule

5 Warnings and errors

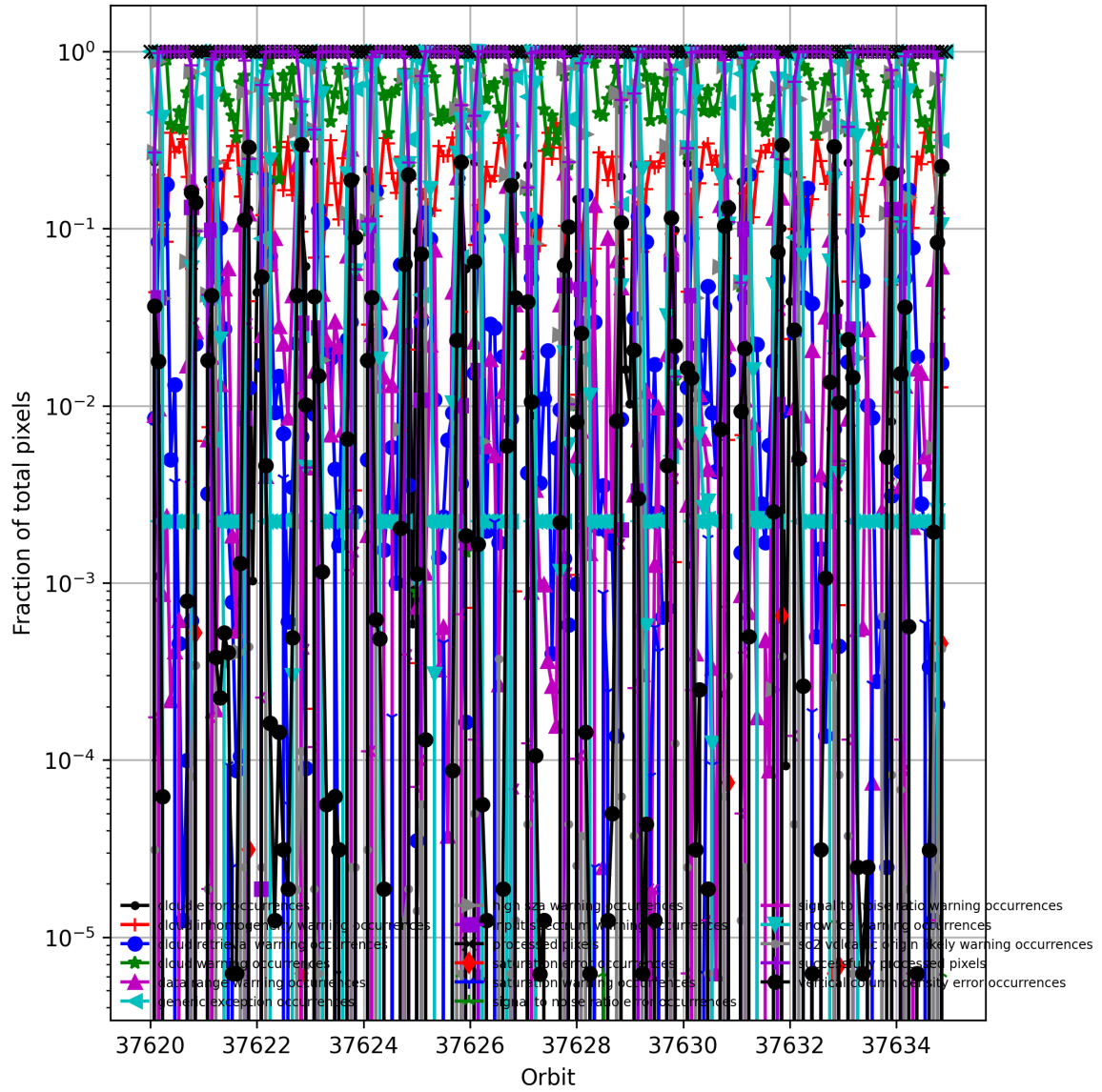


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

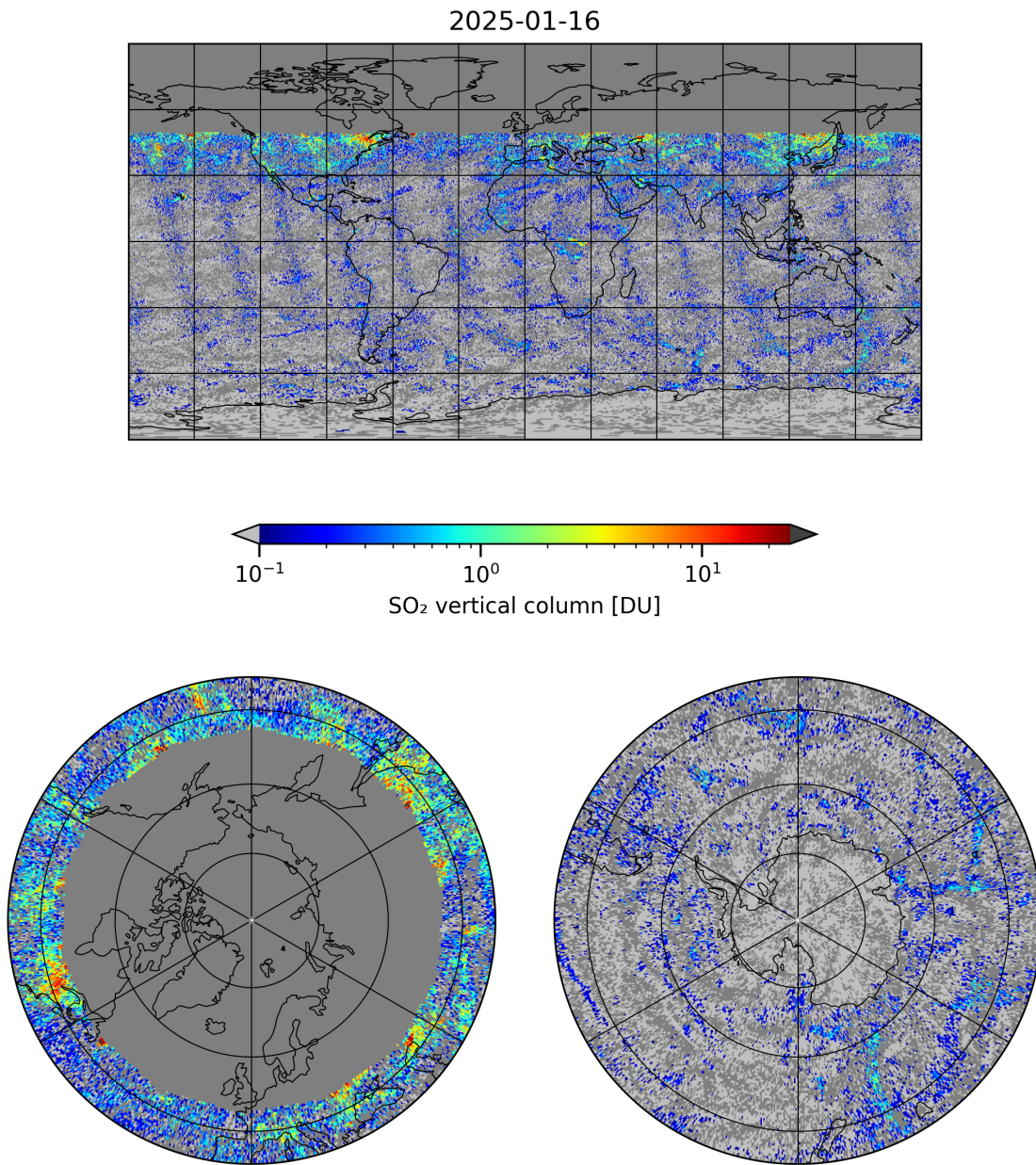


Figure 4: Map of “SO₂ vertical column” for 2025-01-16 to 2025-01-17

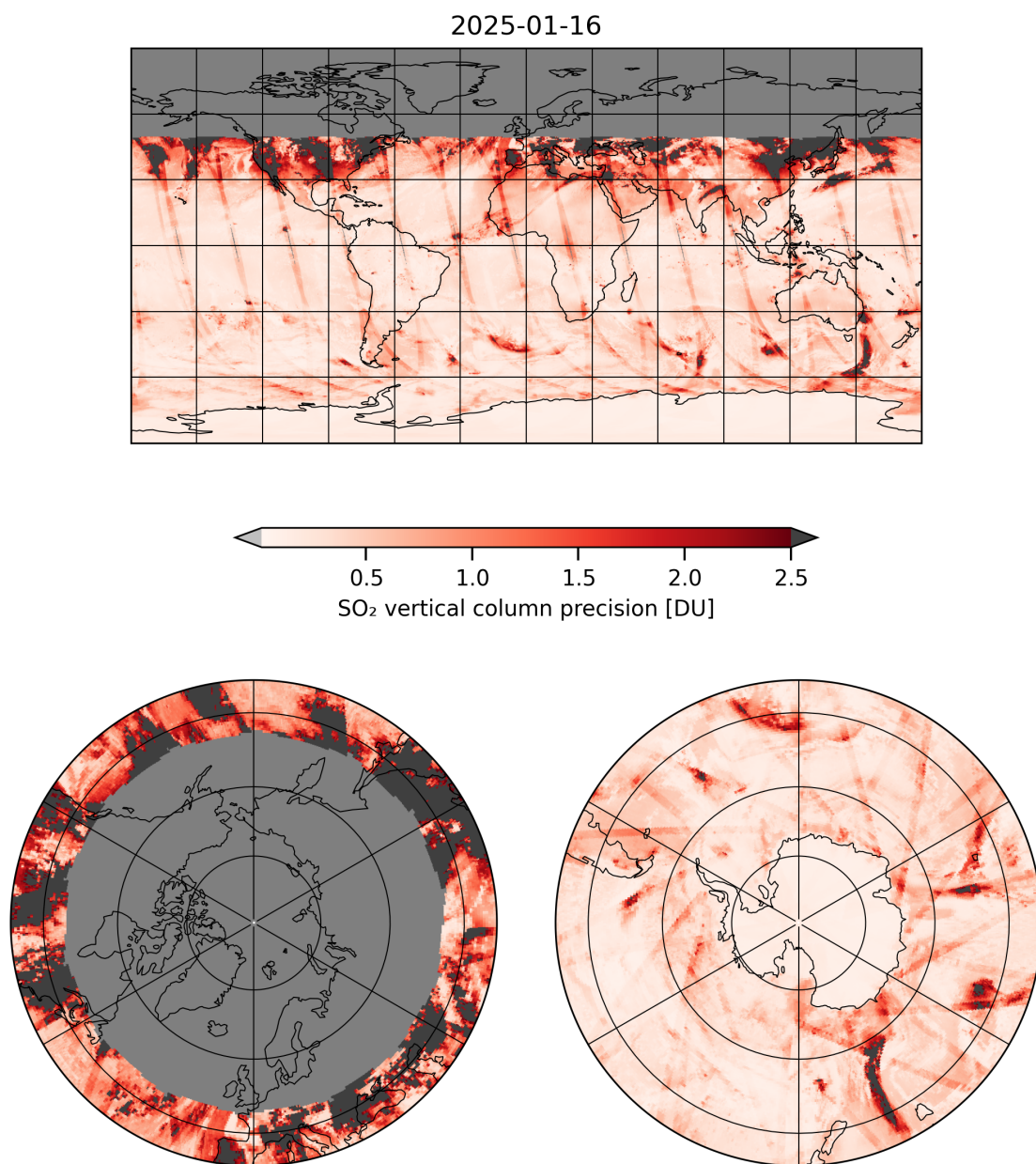


Figure 5: Map of “SO₂ vertical column precision” for 2025-01-16 to 2025-01-17

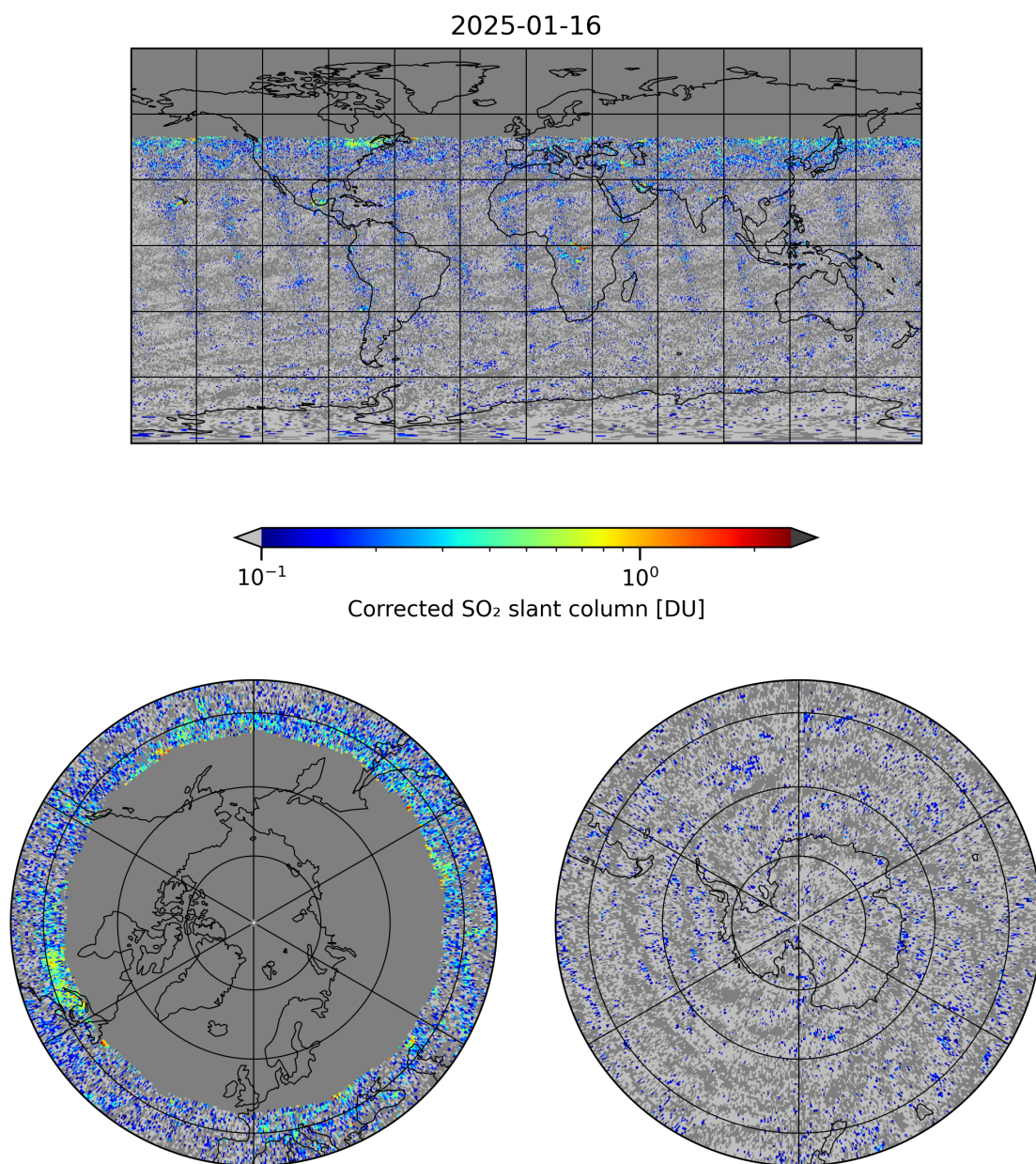


Figure 6: Map of “Corrected SO₂ slant column” for 2025-01-16 to 2025-01-17

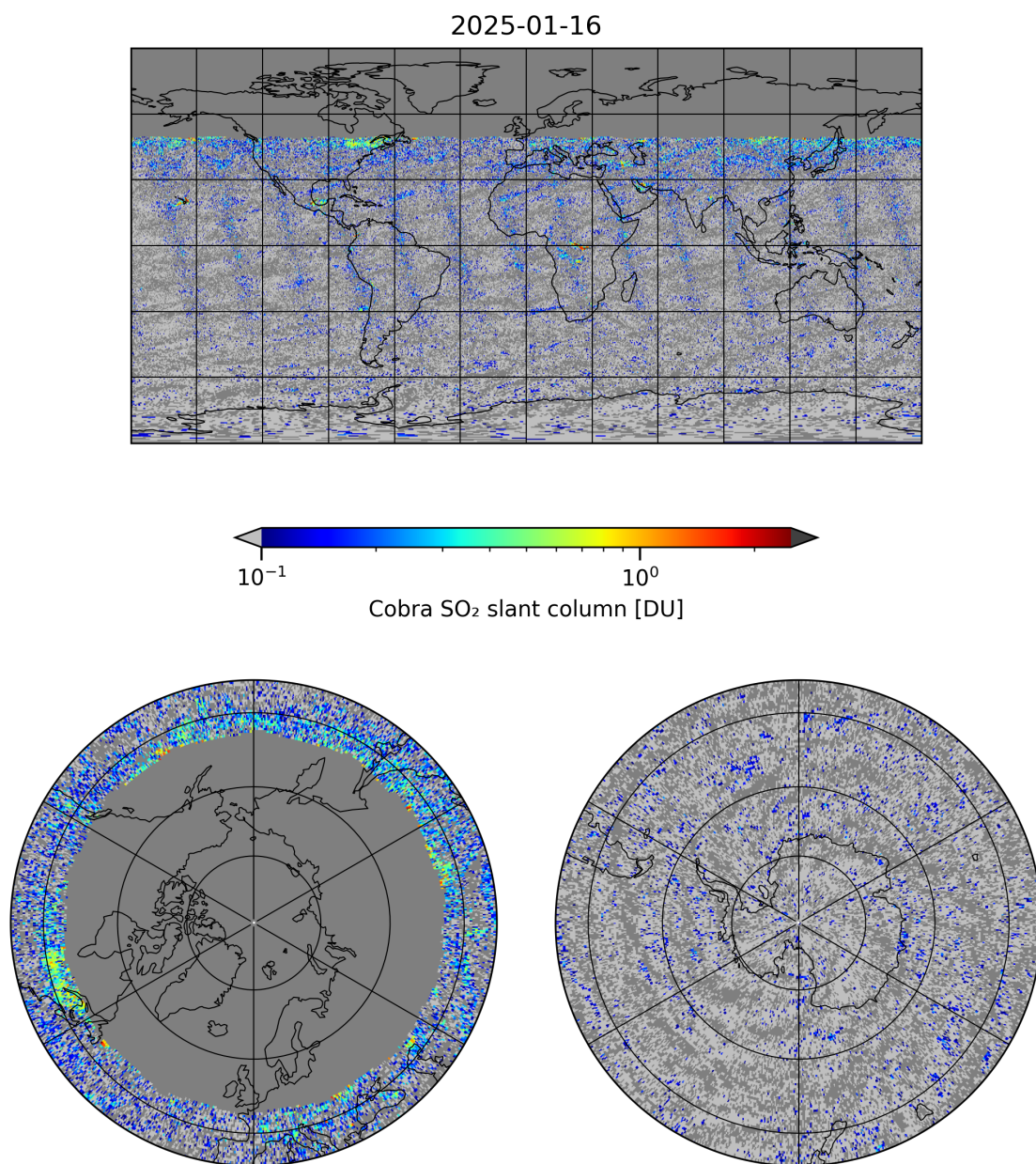


Figure 7: Map of “Cobra SO₂ slant column” for 2025-01-16 to 2025-01-17

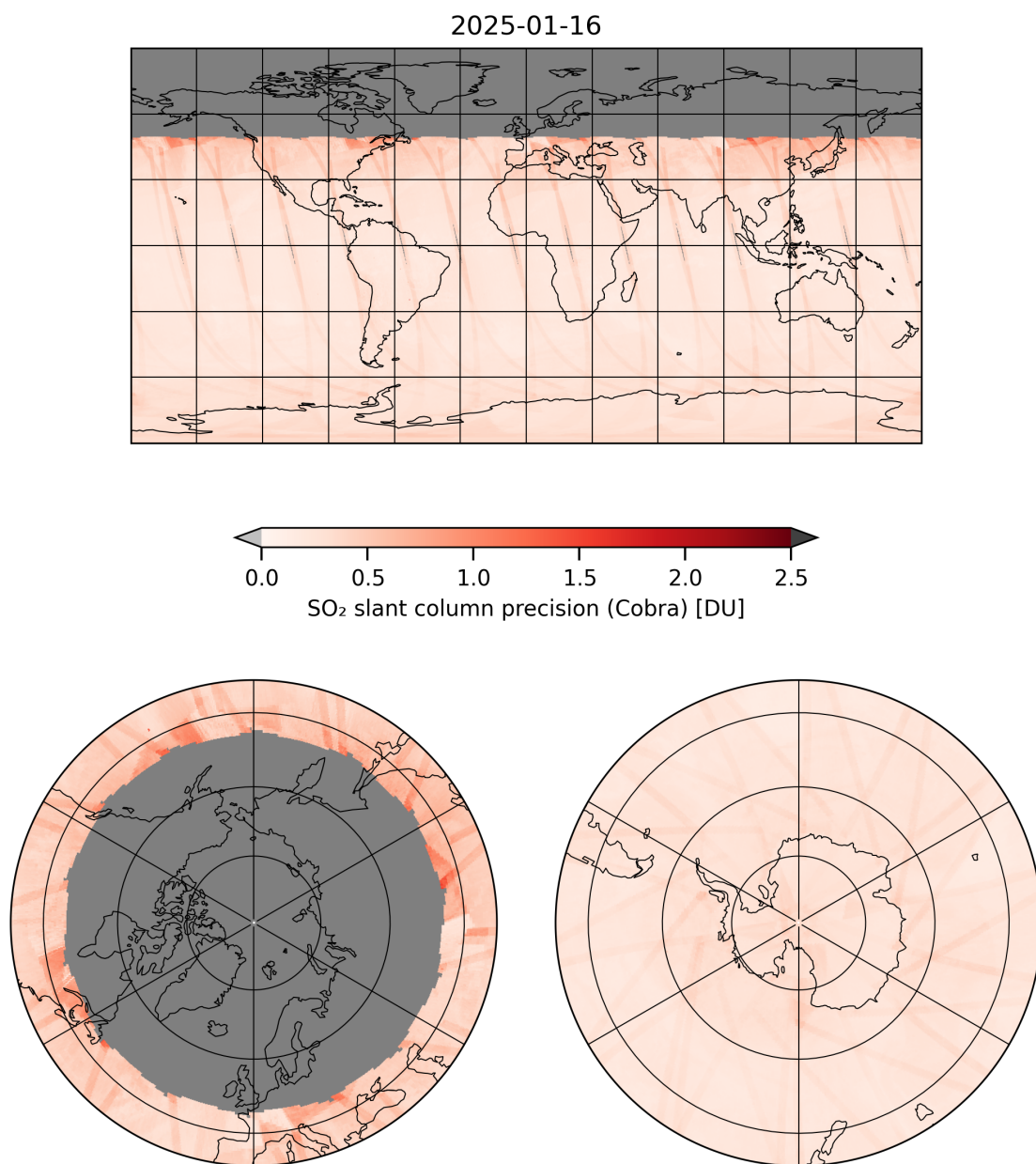


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-01-16 to 2025-01-17

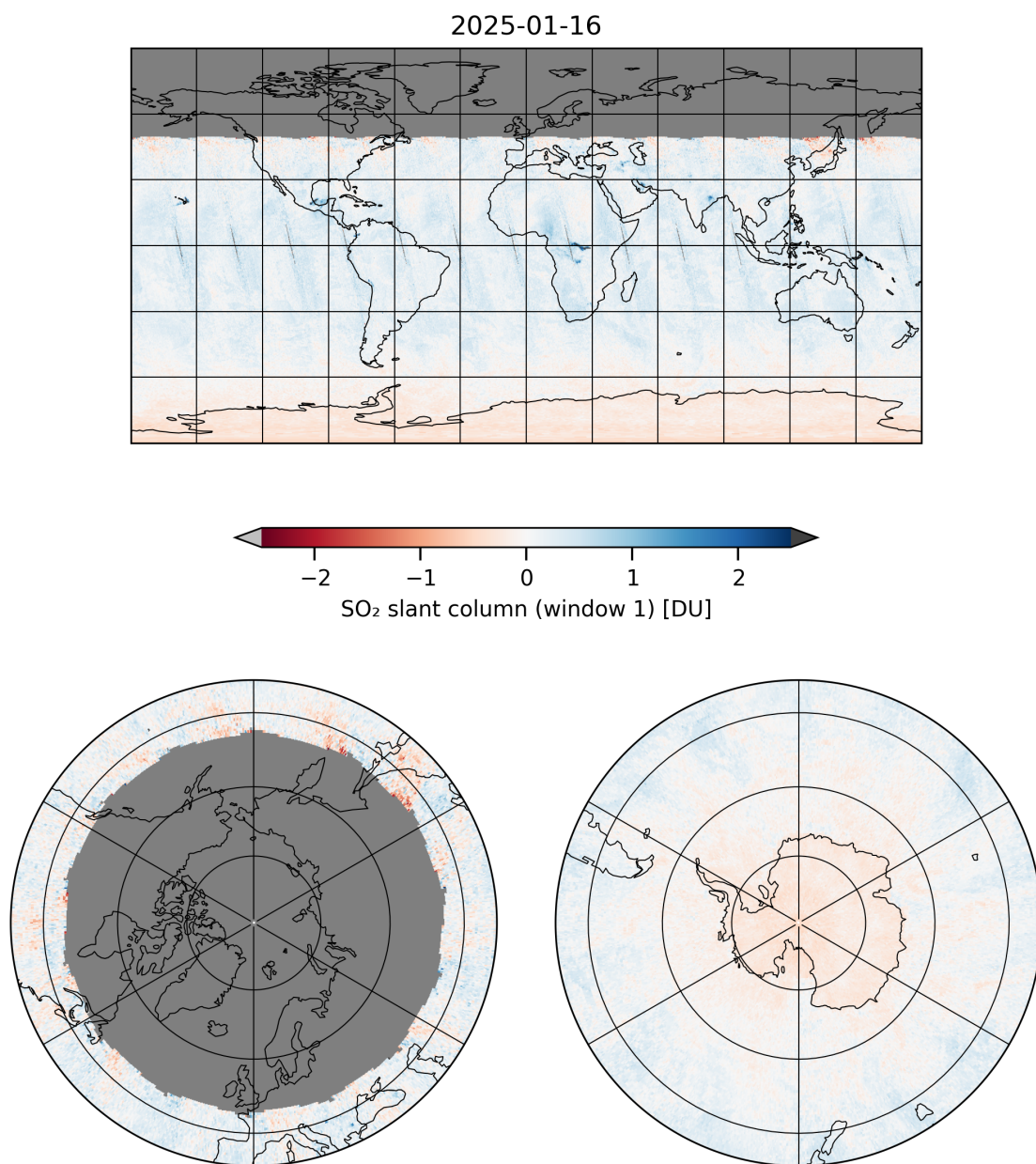


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-01-16 to 2025-01-17

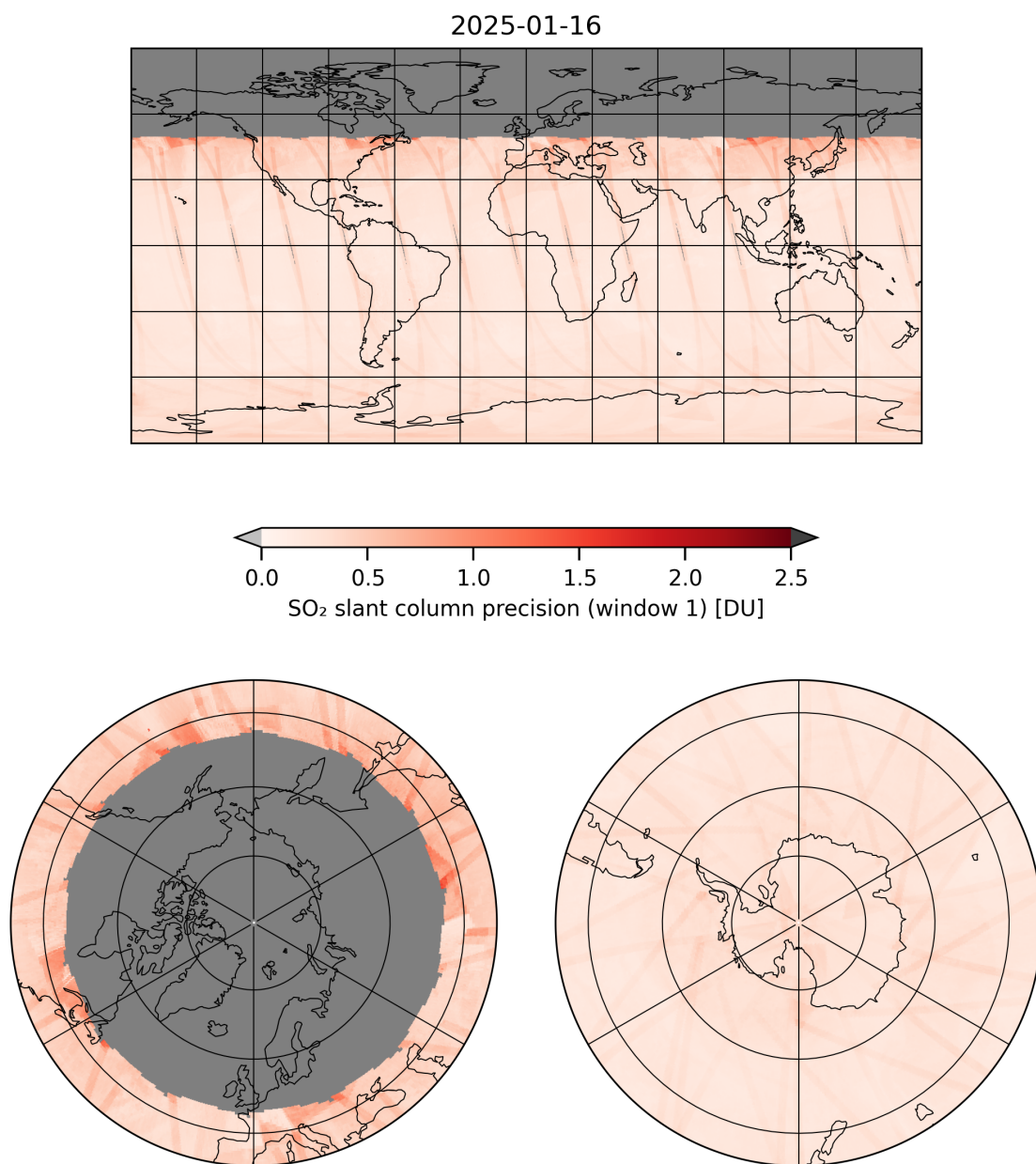


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-01-16 to 2025-01-17

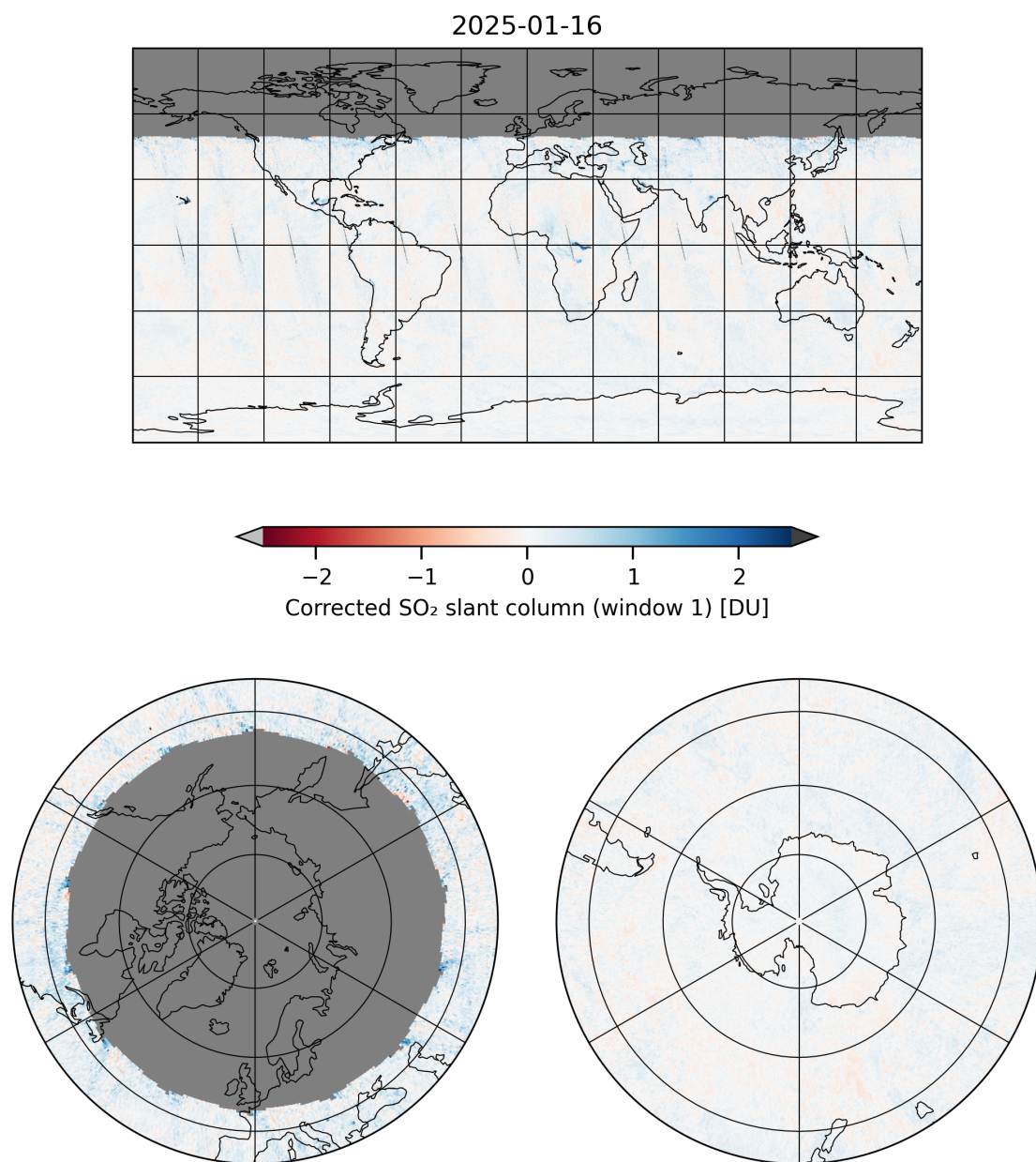


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-01-16 to 2025-01-17

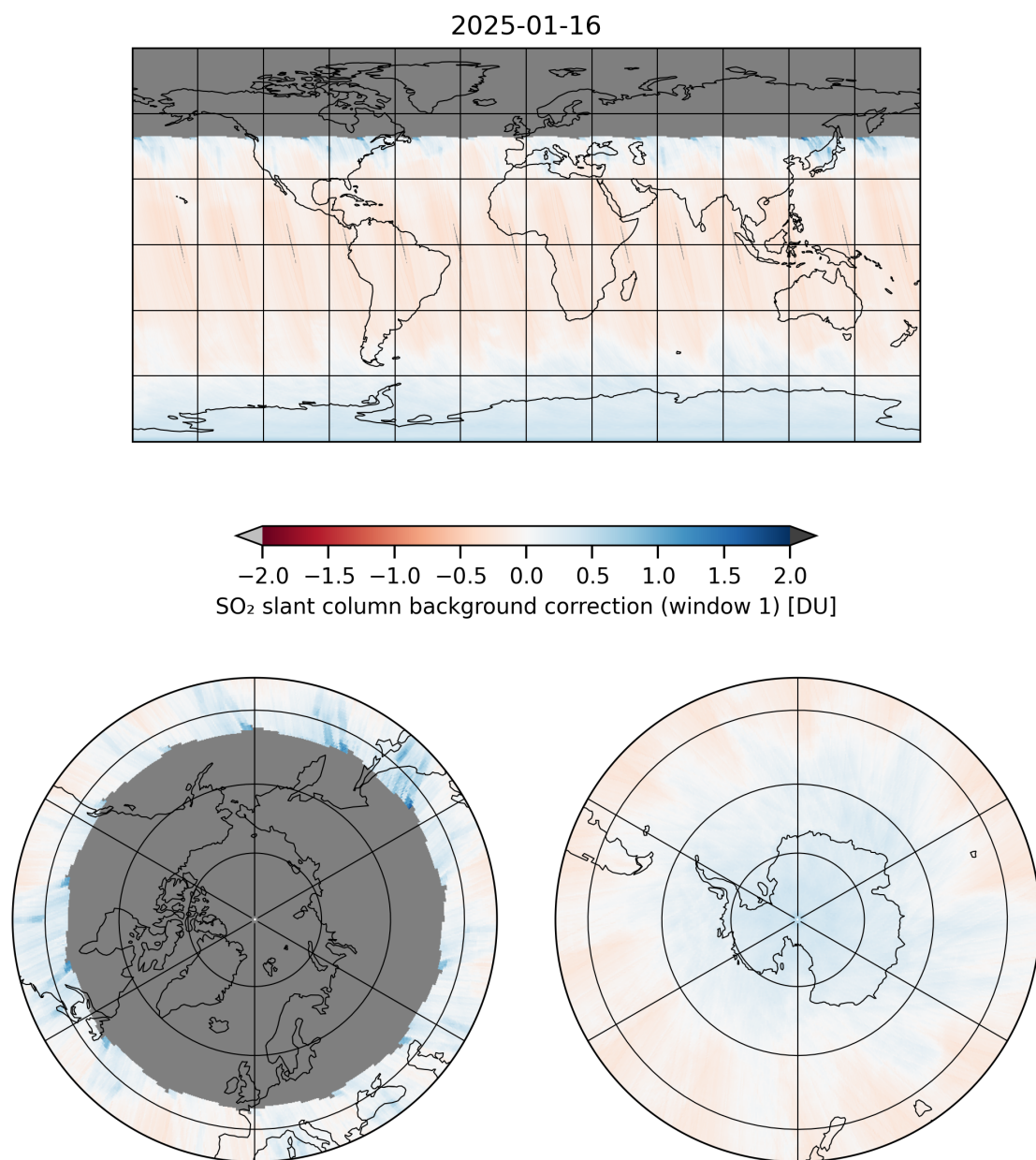


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-01-16 to 2025-01-17

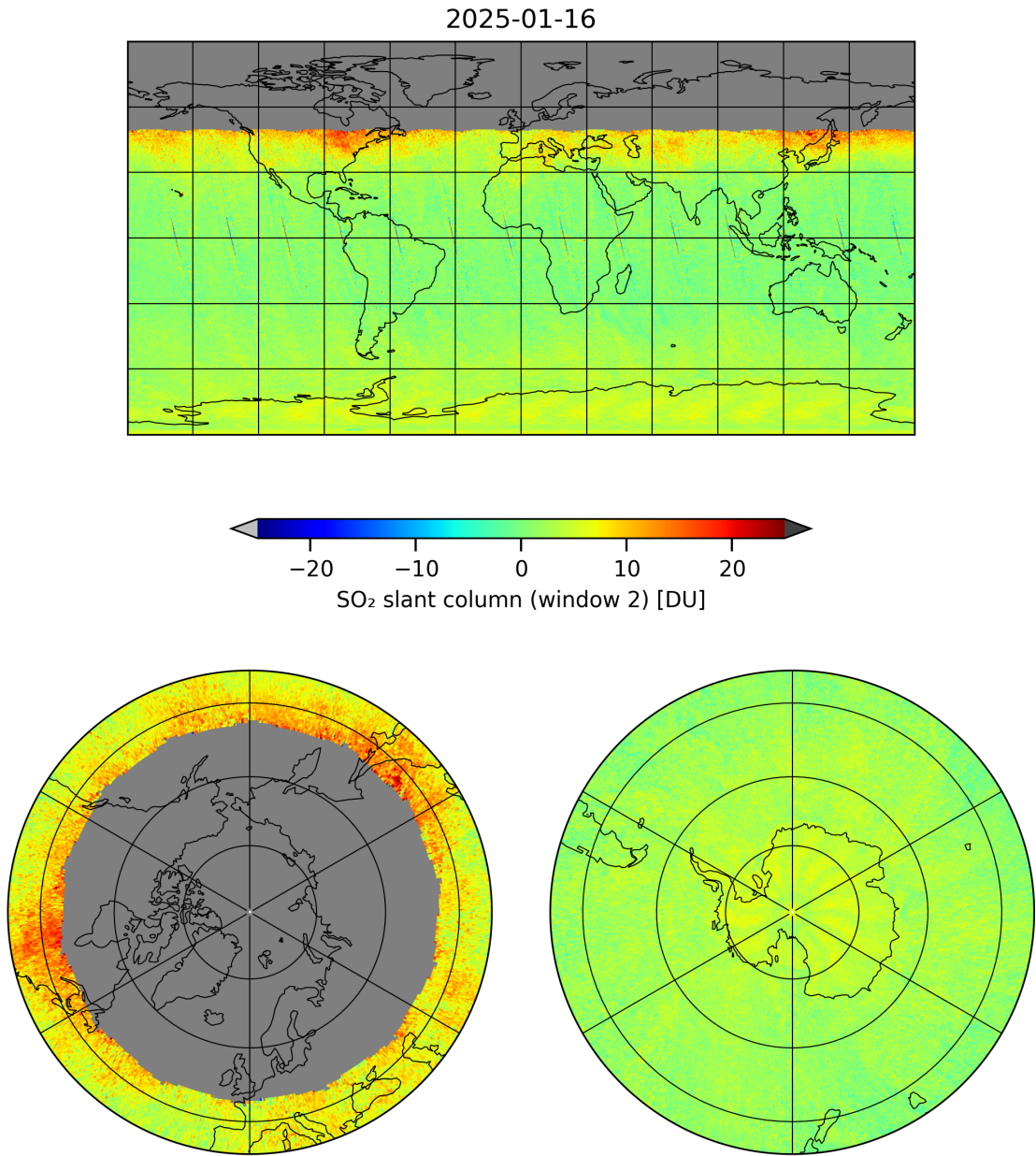


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-01-16 to 2025-01-17

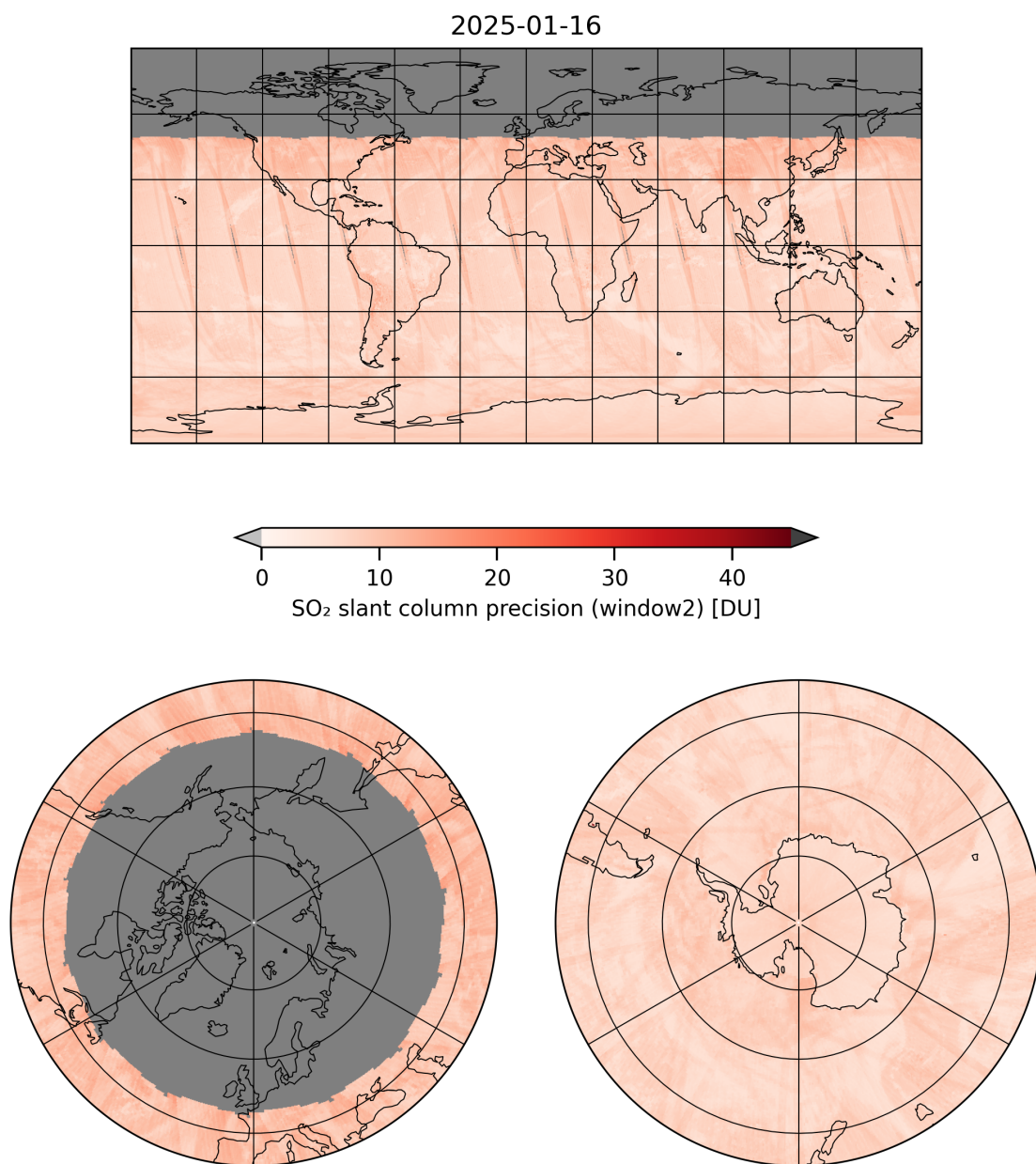


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-01-16 to 2025-01-17

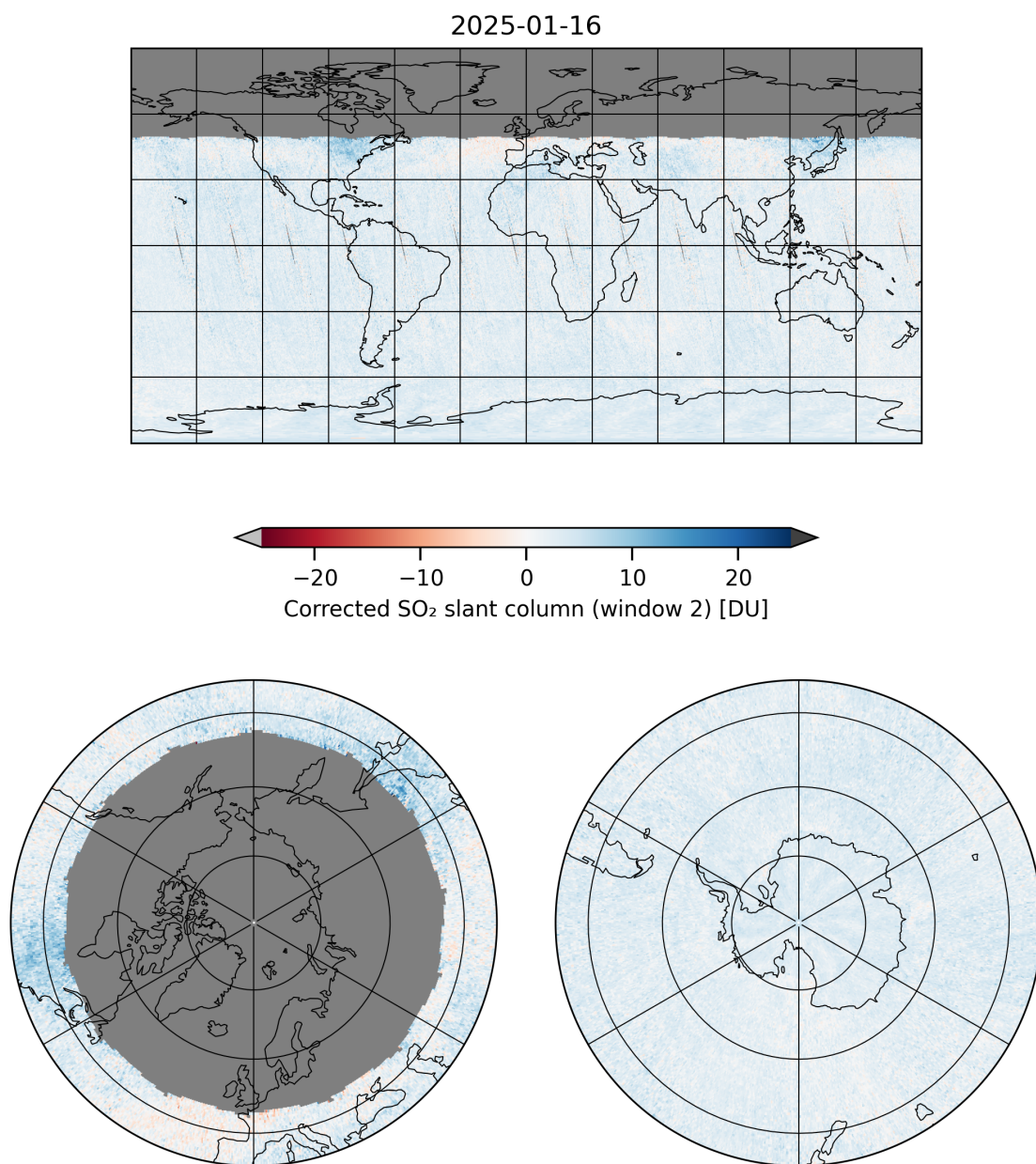


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-01-16 to 2025-01-17

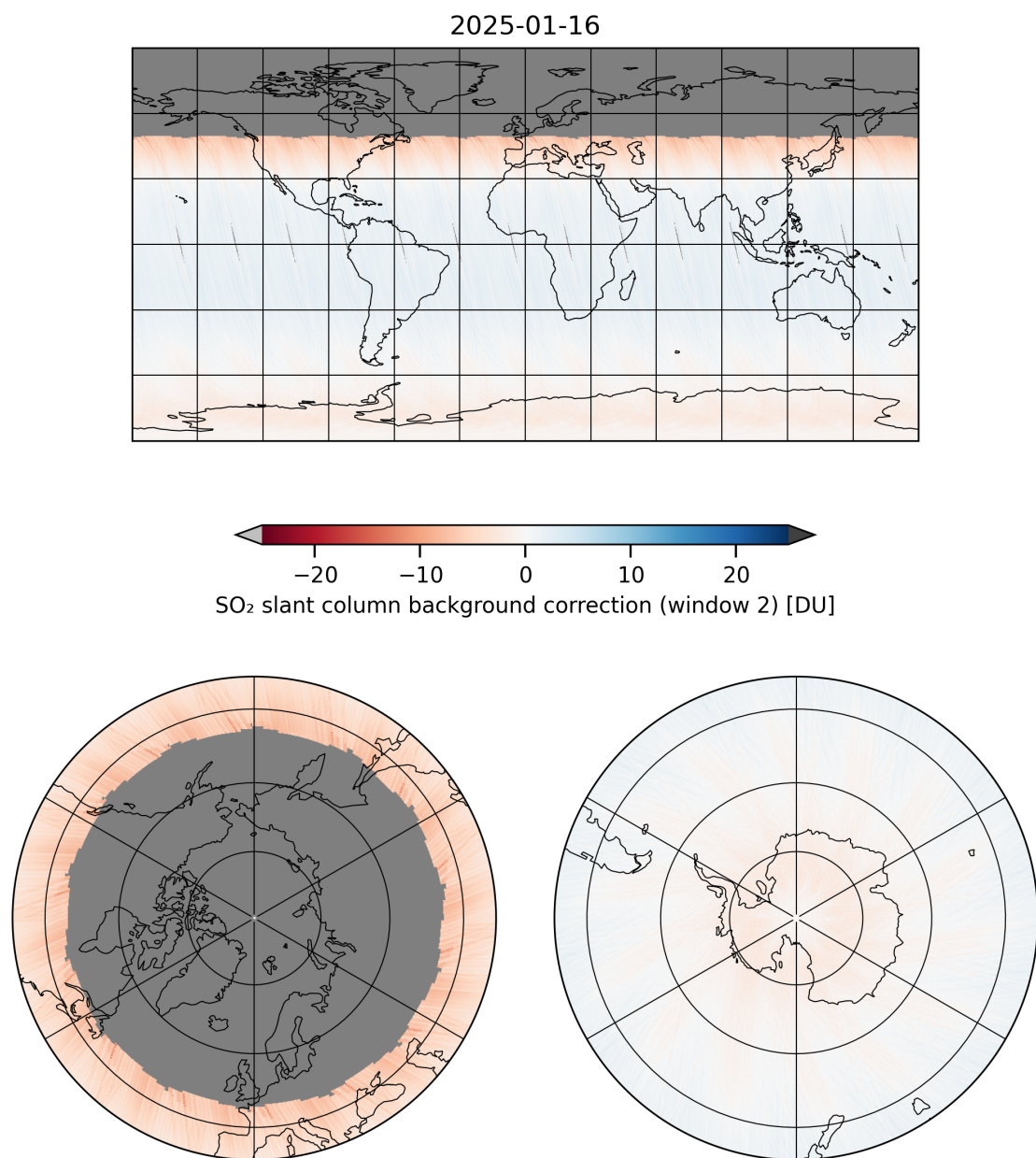


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-01-16 to 2025-01-17

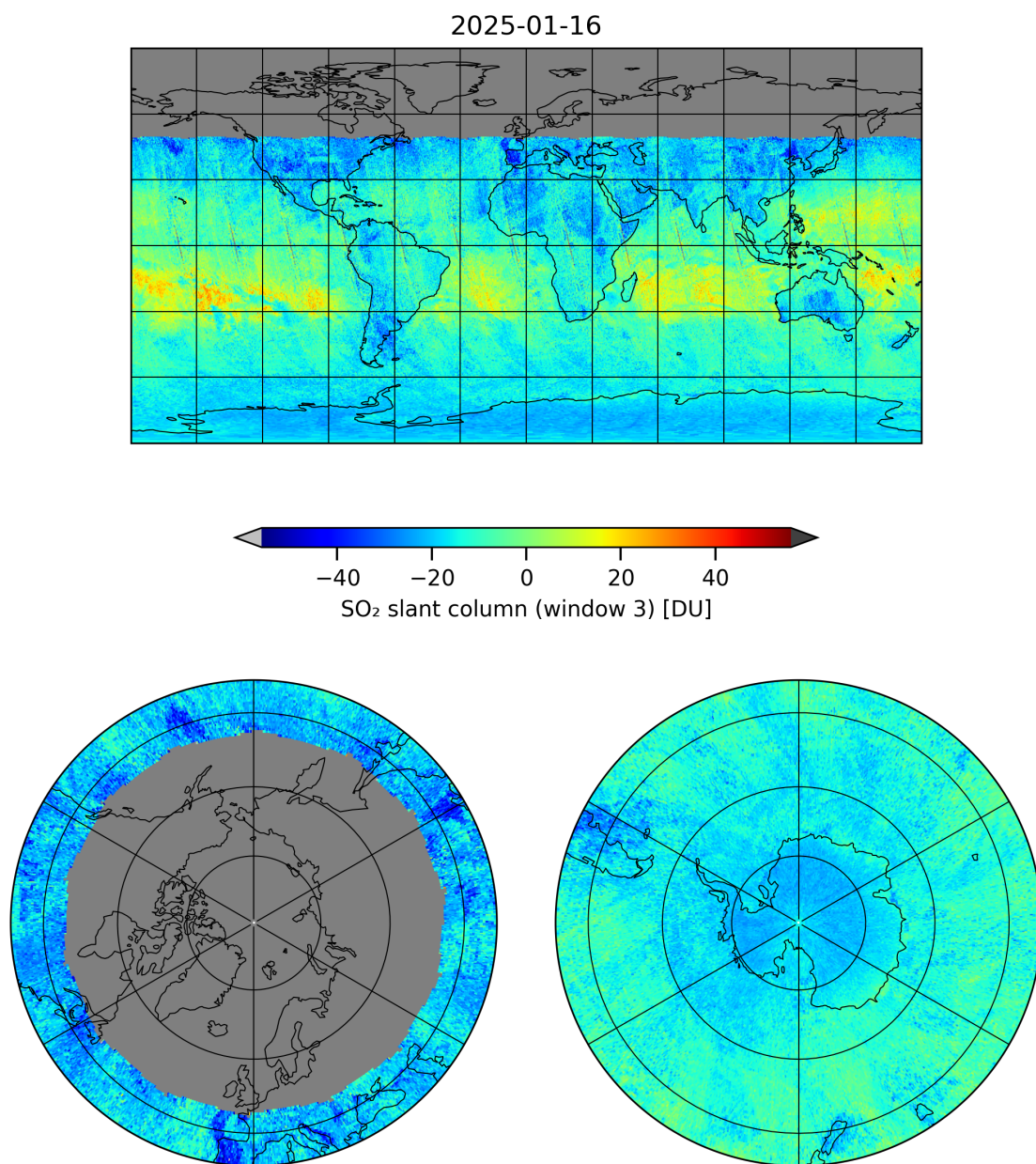


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-01-16 to 2025-01-17

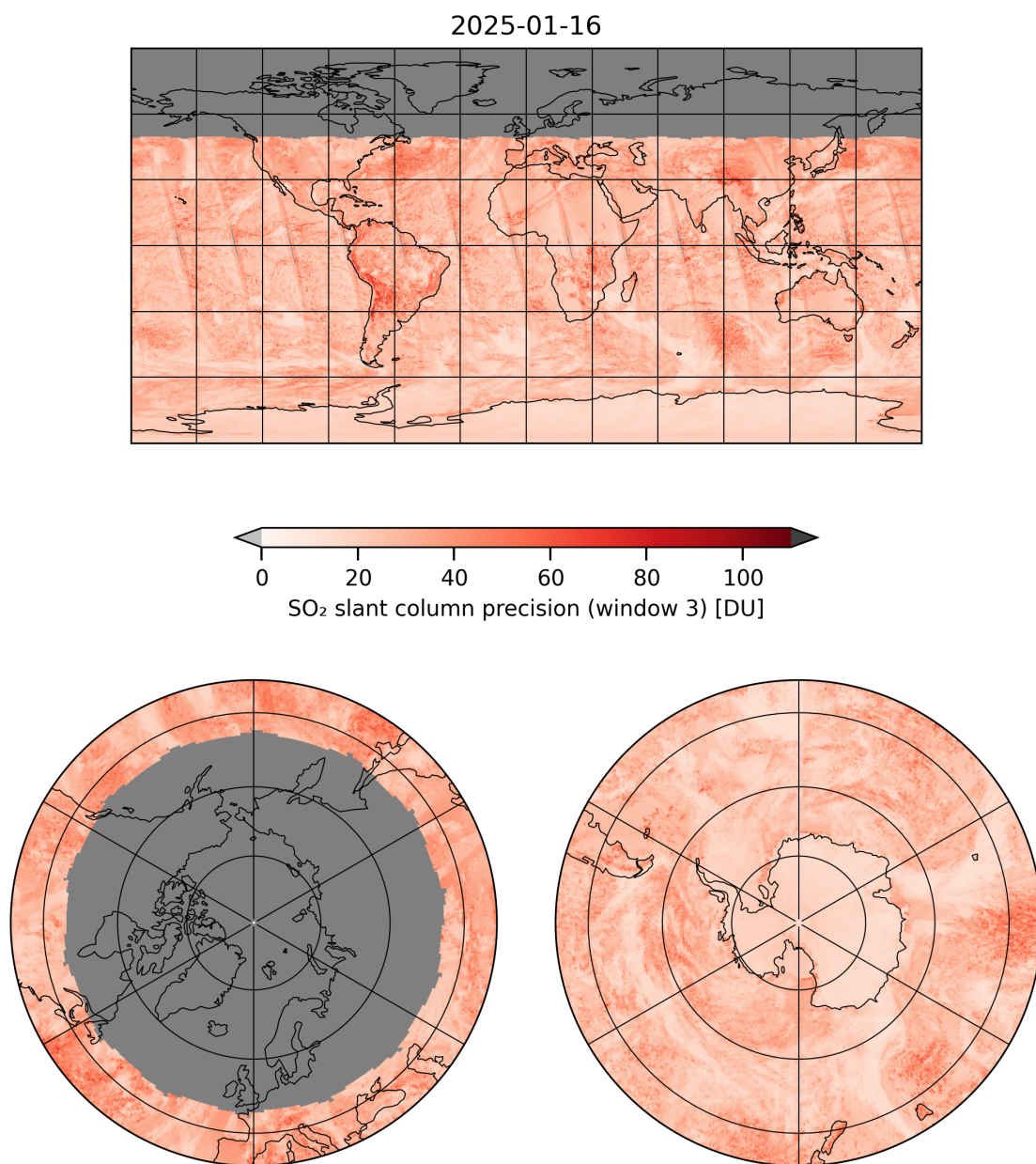


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-01-16 to 2025-01-17

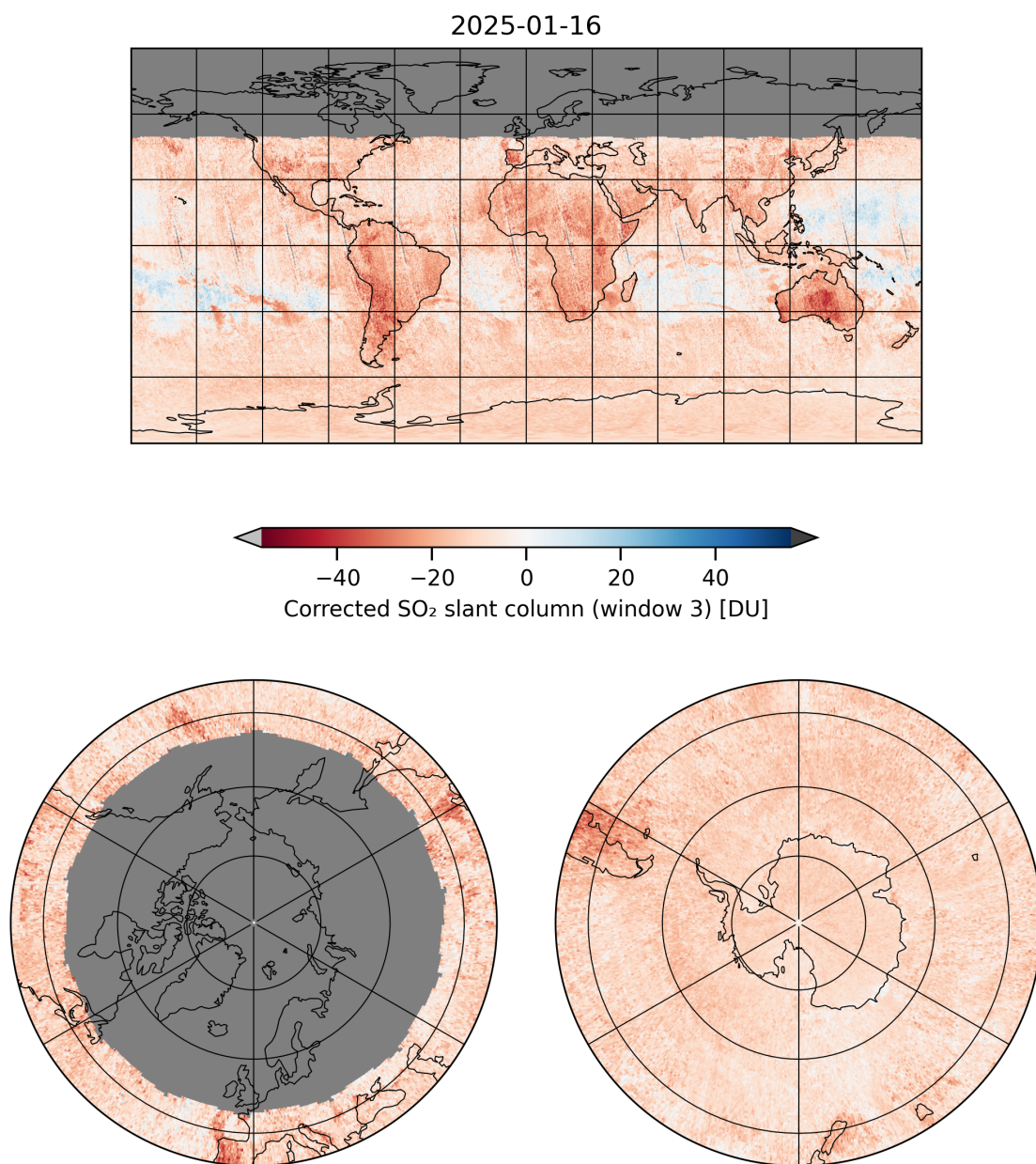


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-01-16 to 2025-01-17

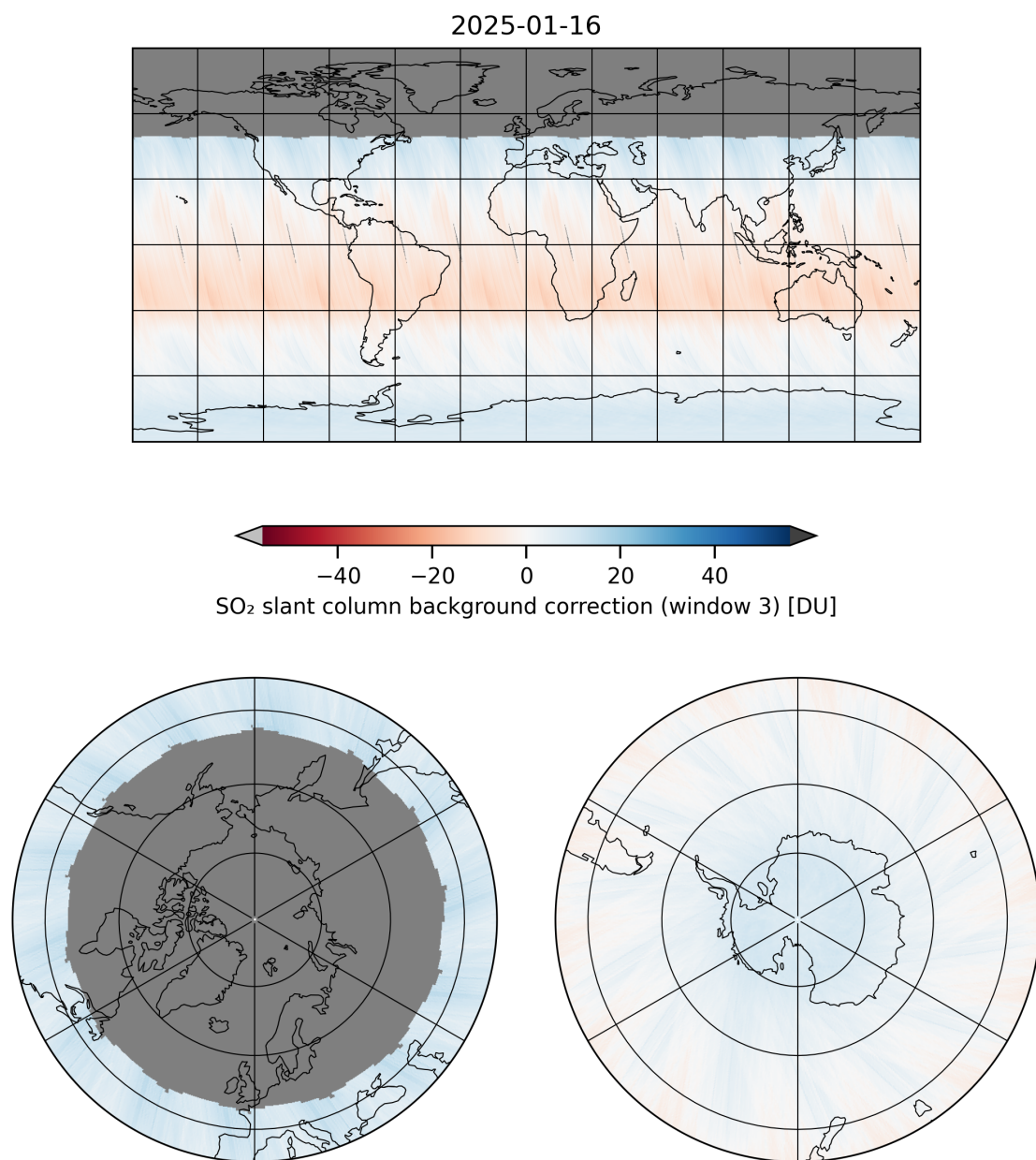


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-01-16 to 2025-01-17

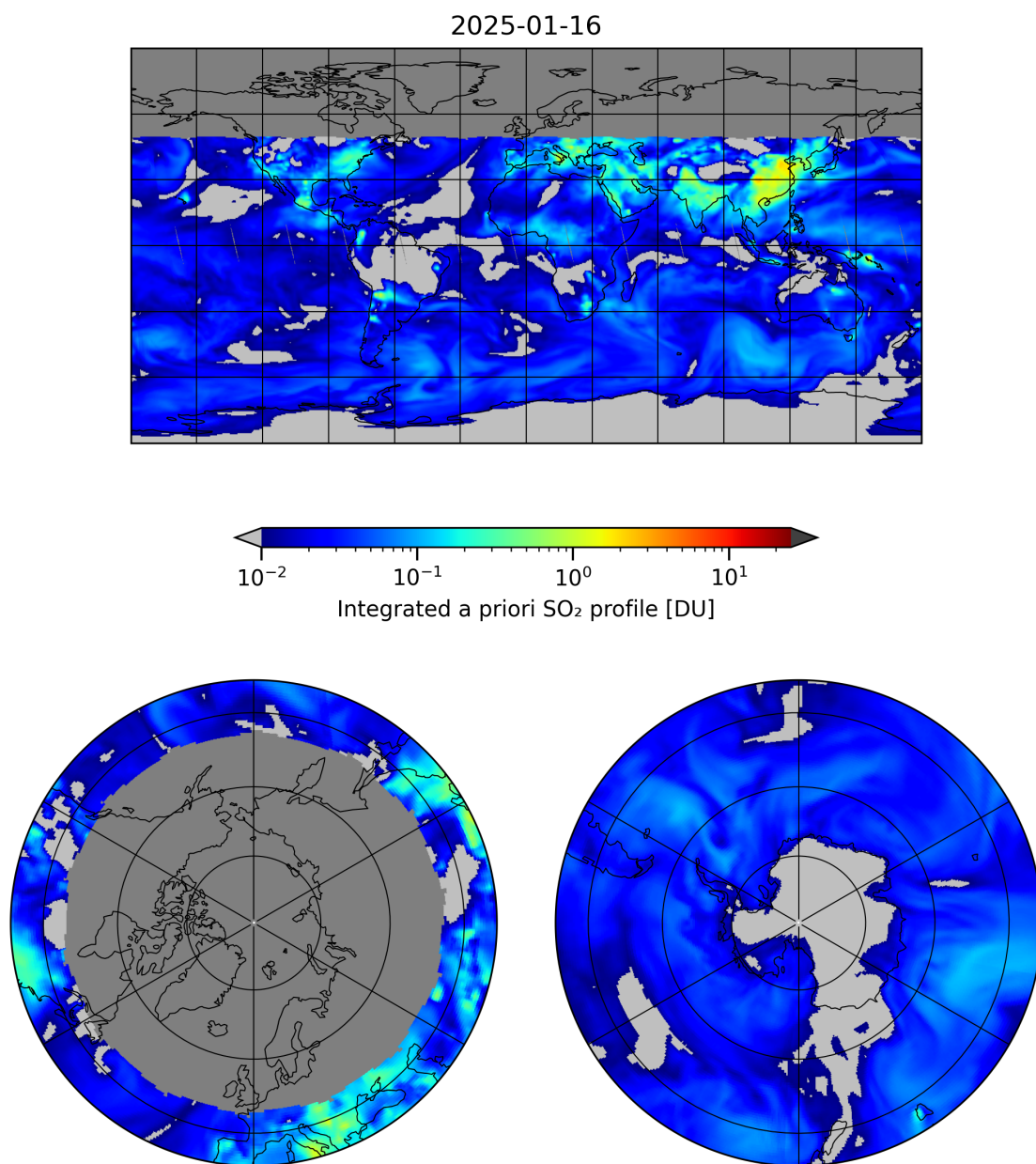


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-01-16 to 2025-01-17

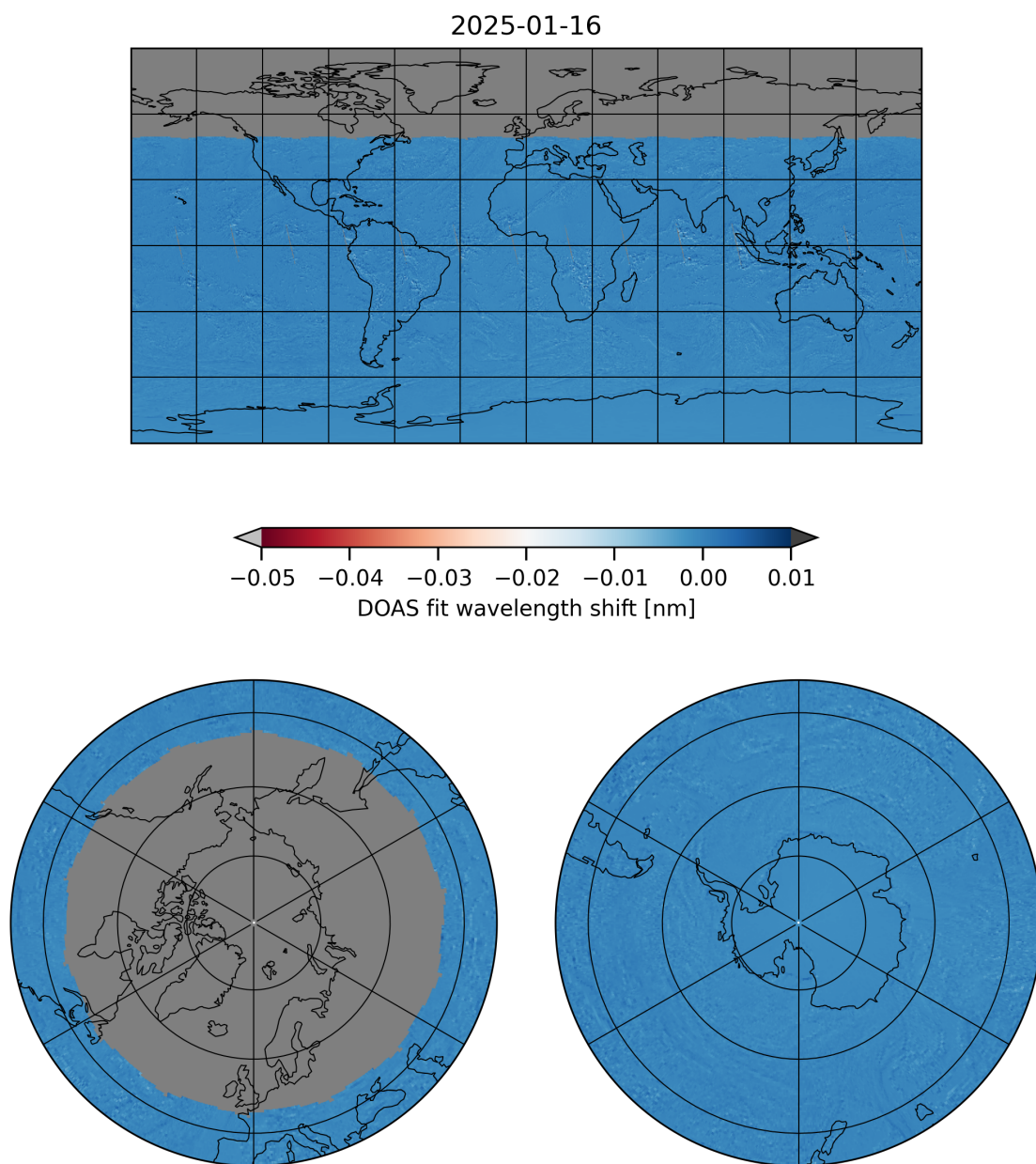


Figure 22: Map of “DOAS fit wavelength shift” for 2025-01-16 to 2025-01-17

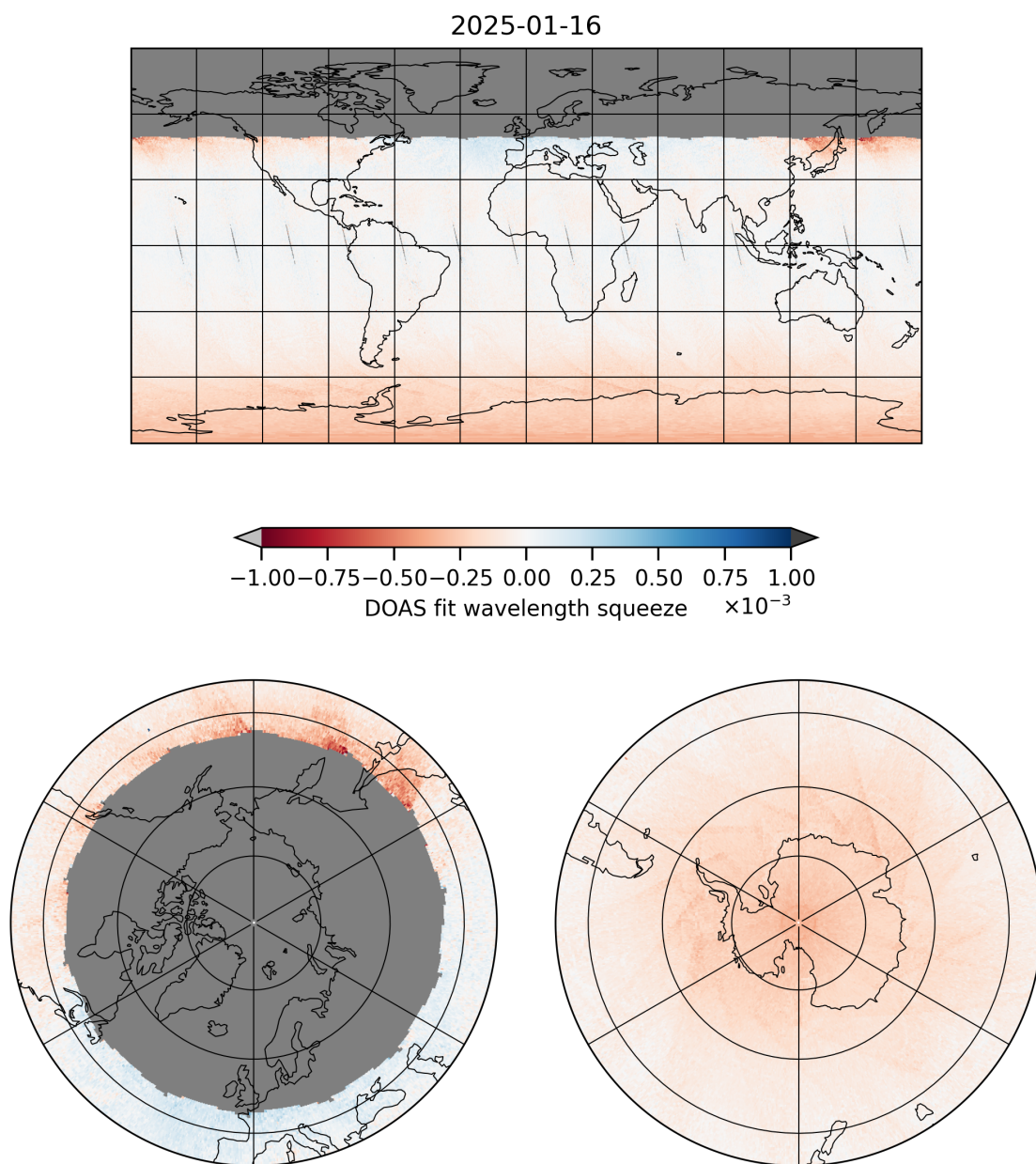


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-01-16 to 2025-01-17

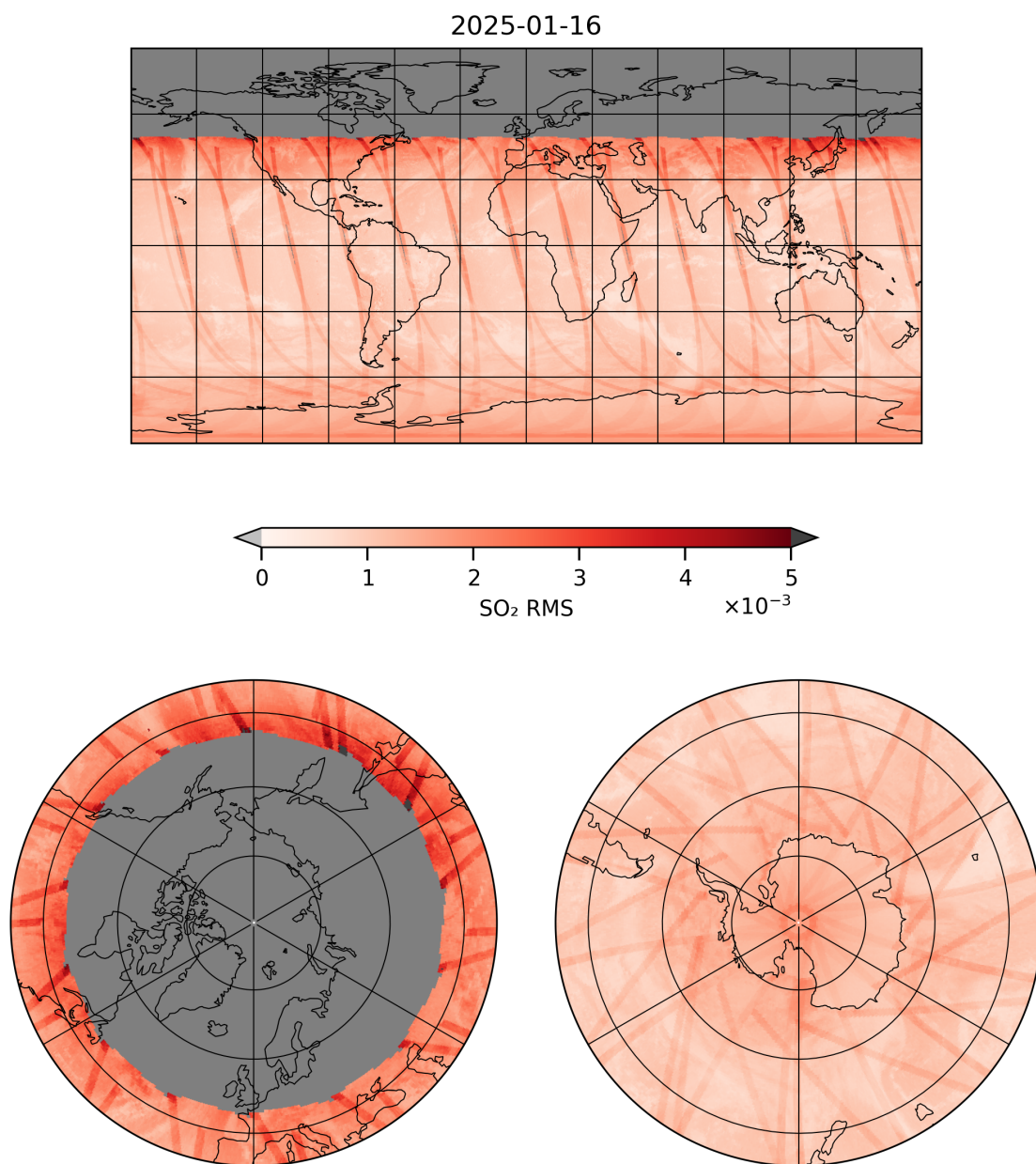


Figure 24: Map of “SO₂ RMS” for 2025-01-16 to 2025-01-17

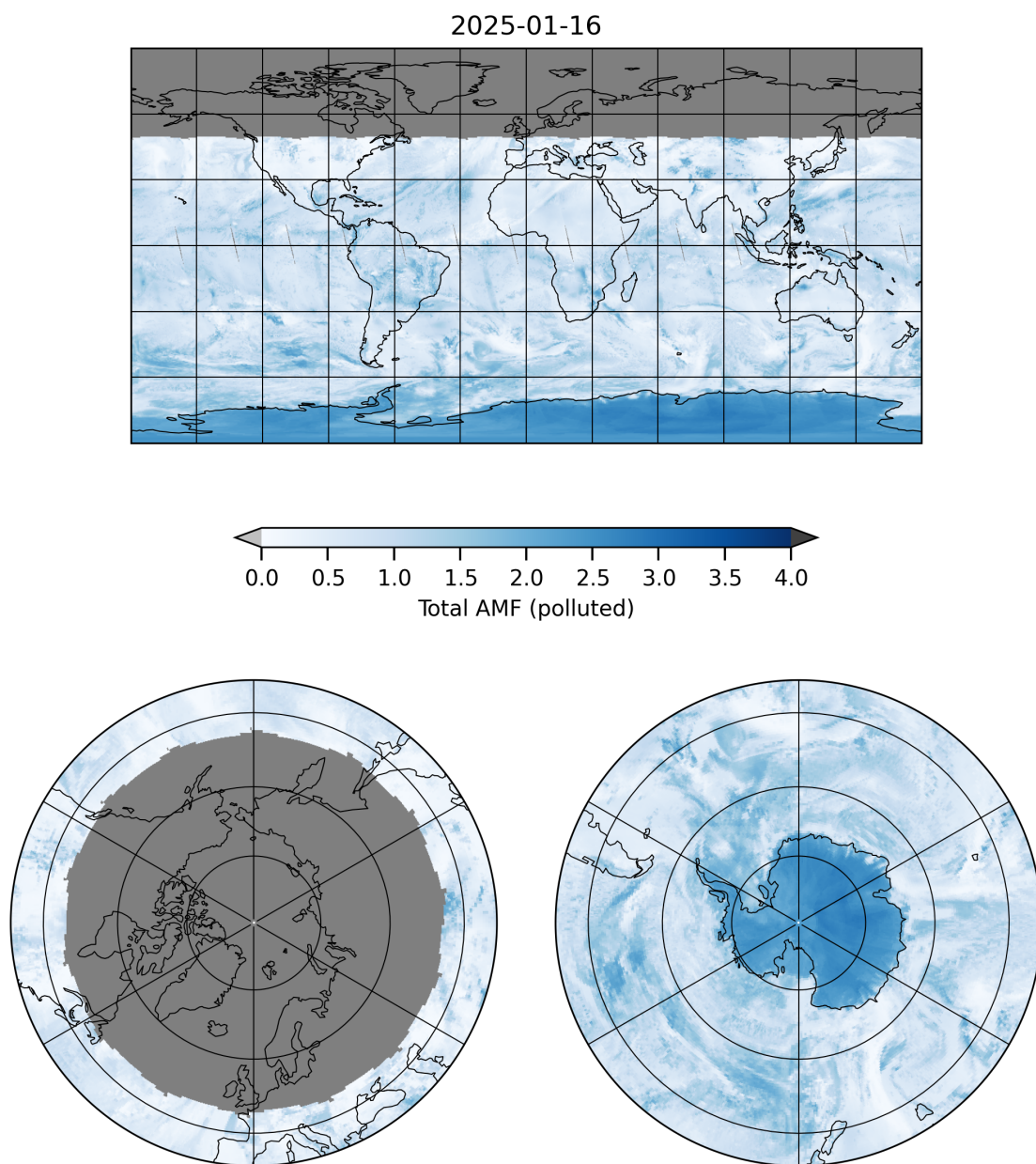


Figure 25: Map of “Total AMF (polluted)” for 2025-01-16 to 2025-01-17

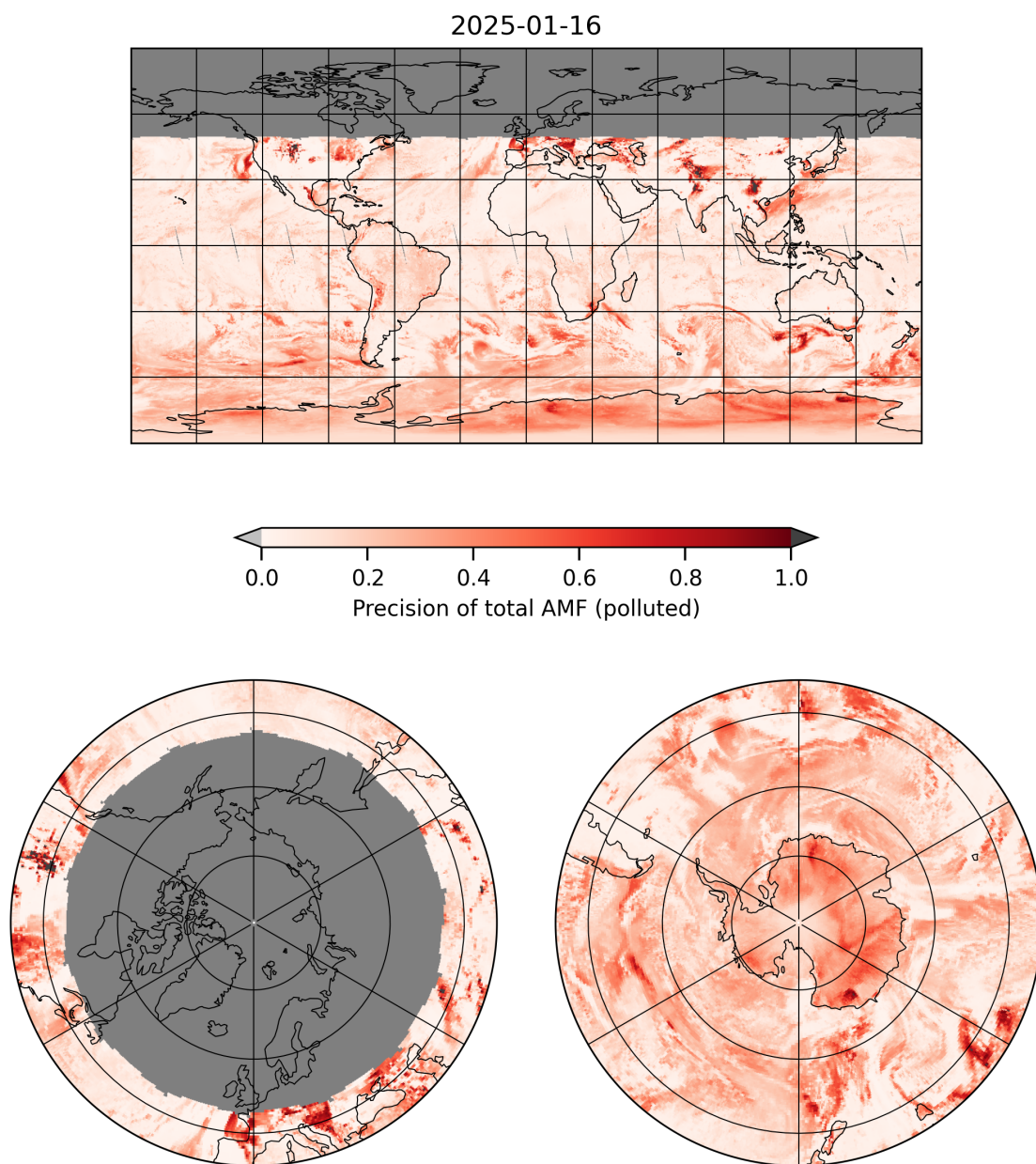


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-01-16 to 2025-01-17

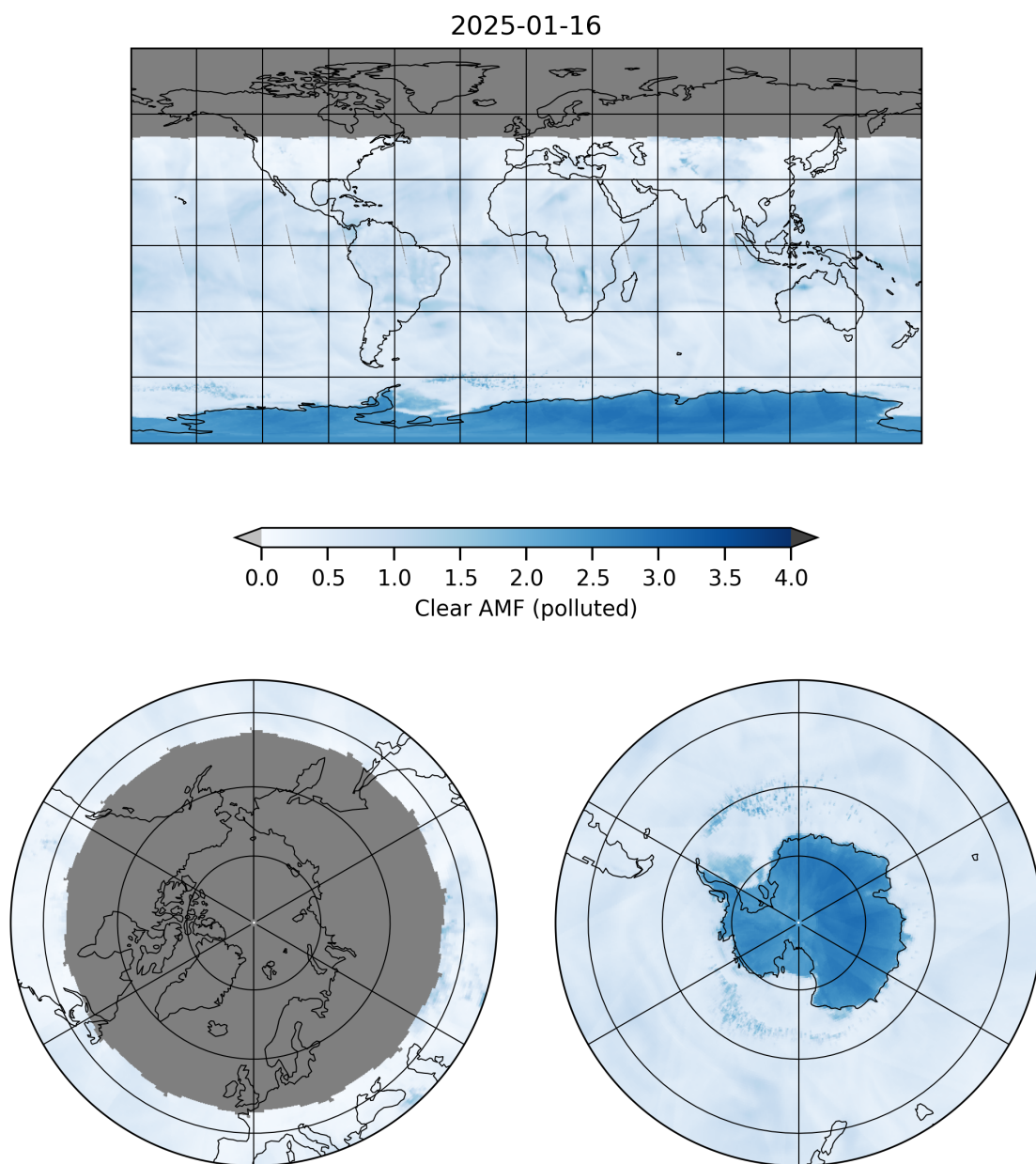


Figure 27: Map of “Clear AMF (polluted)” for 2025-01-16 to 2025-01-17

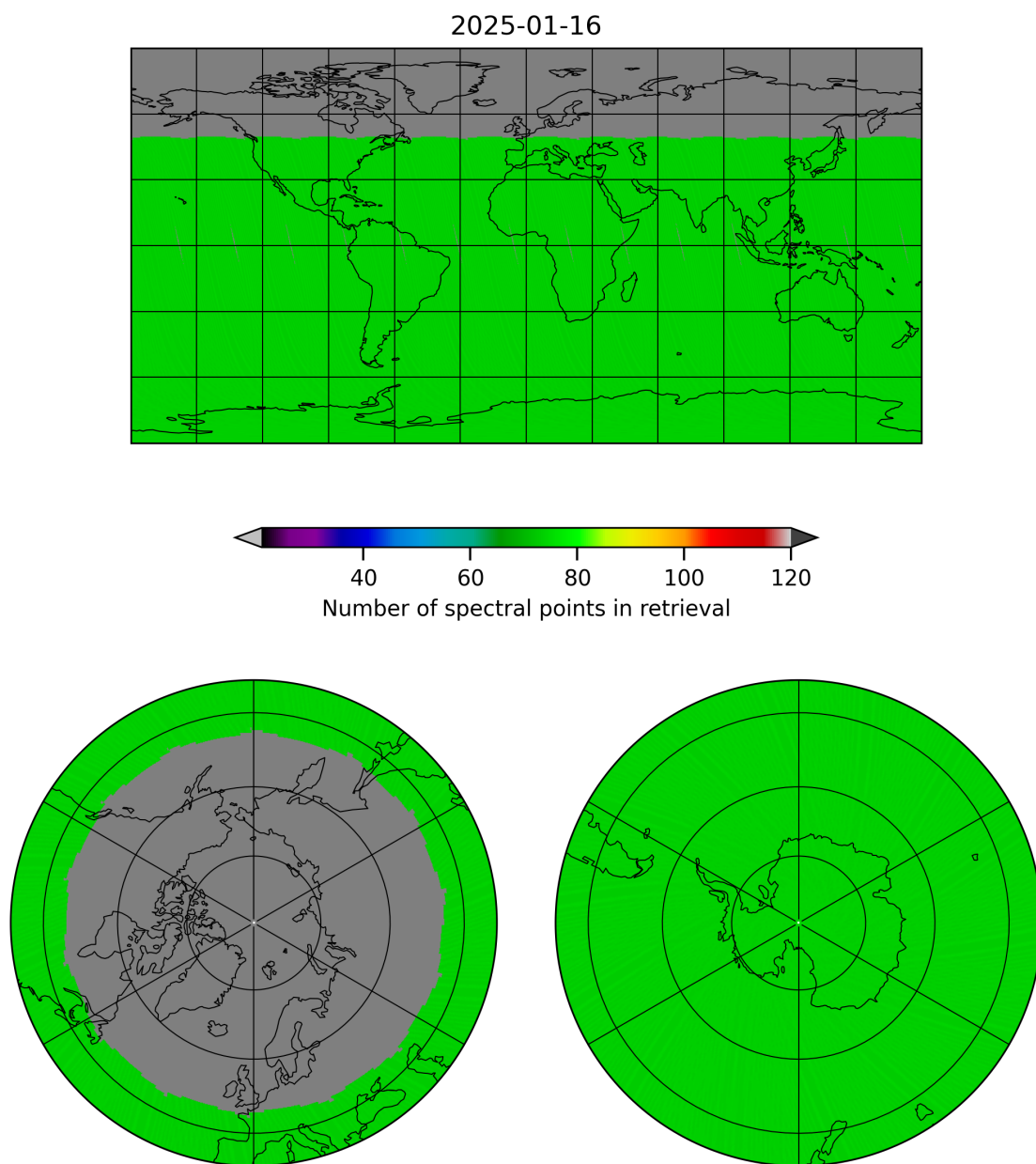


Figure 28: Map of “Number of spectral points in retrieval” for 2025-01-16 to 2025-01-17

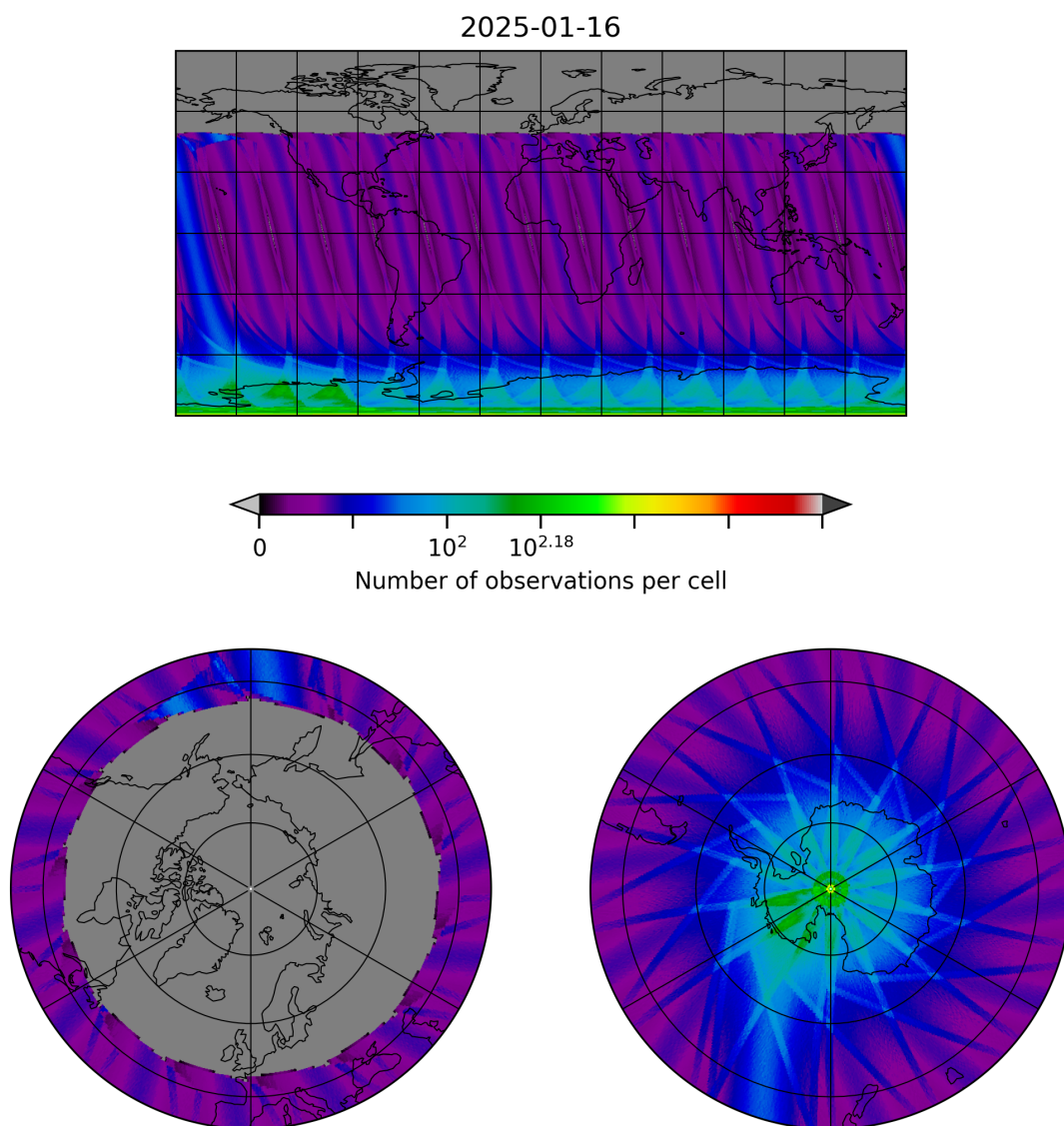


Figure 29: Map of the number of observations for 2025-01-16 to 2025-01-17

7 Zonal average

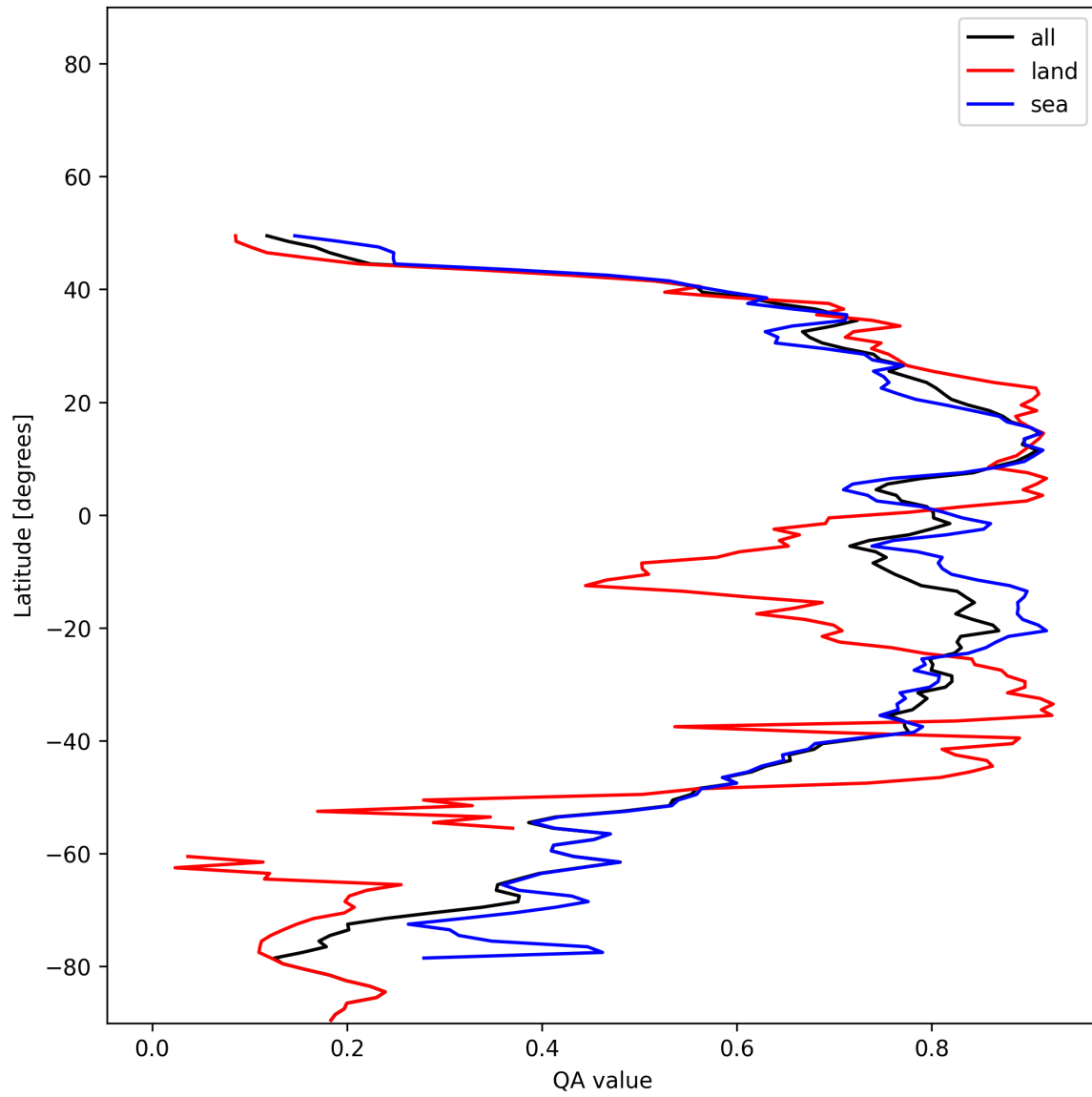


Figure 30: Zonal average of “QA value” for 2025-01-16 to 2025-01-17.

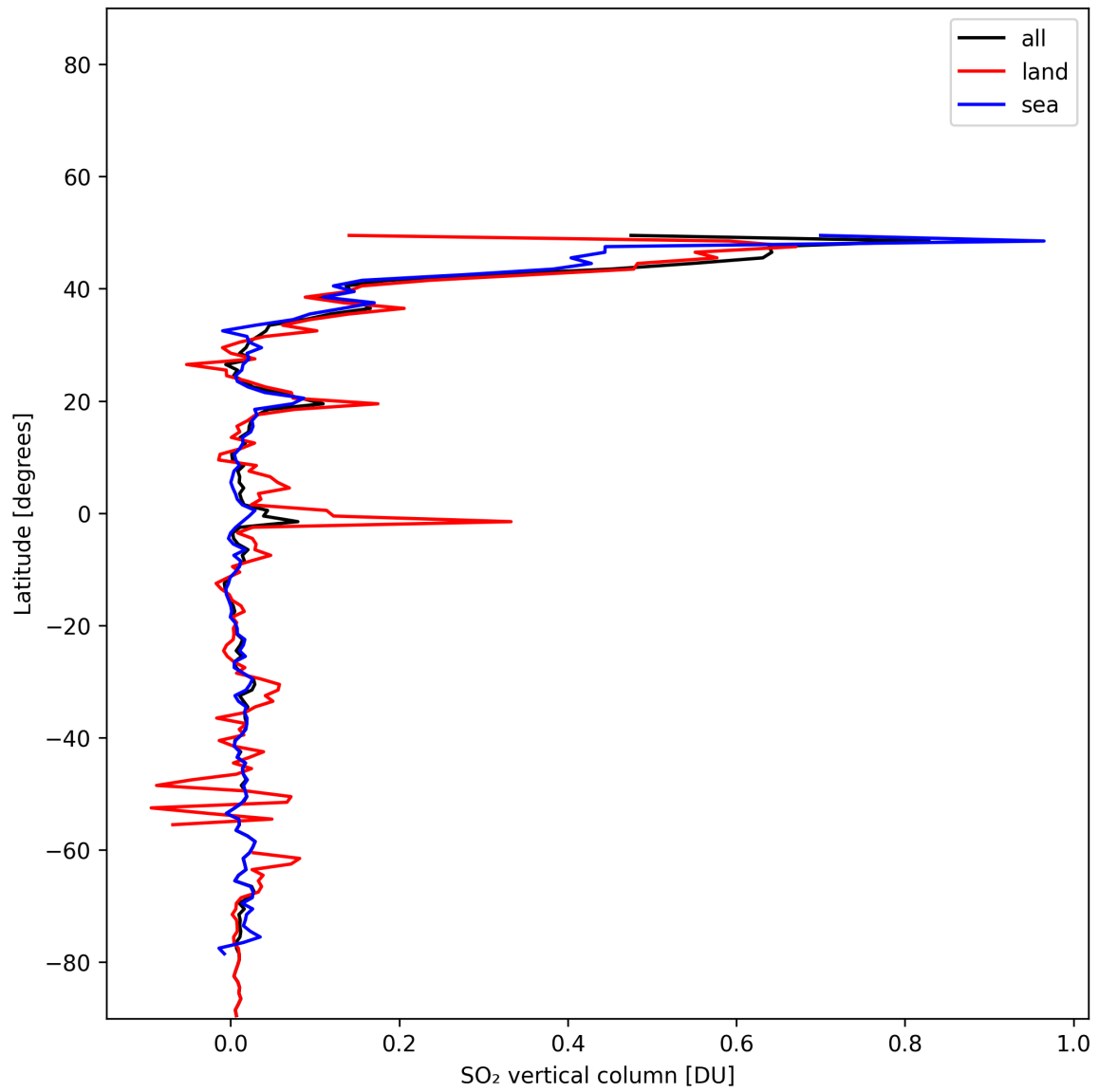


Figure 31: Zonal average of “SO₂ vertical column” for 2025-01-16 to 2025-01-17.

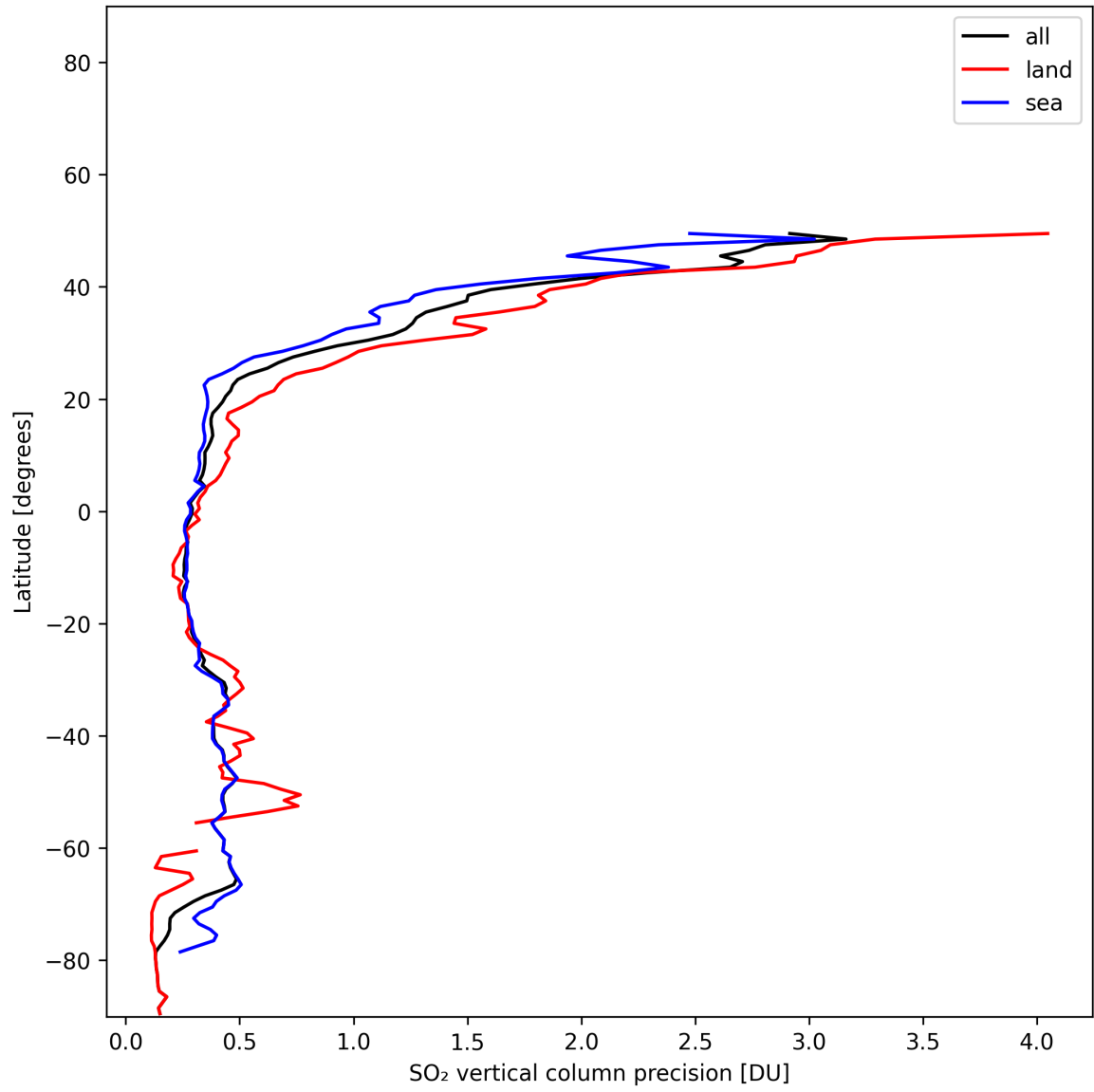


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-01-16 to 2025-01-17.

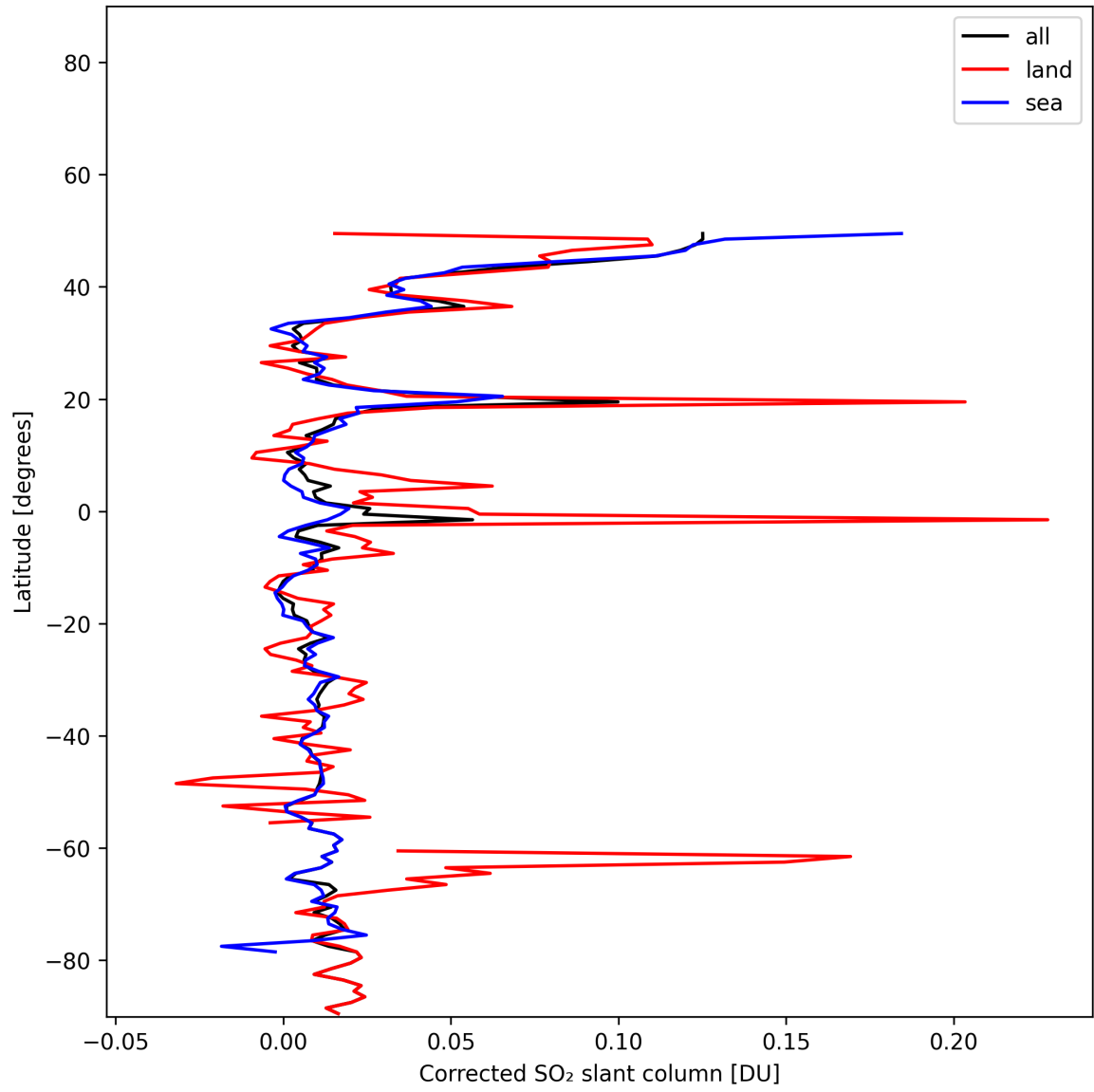


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-01-16 to 2025-01-17.

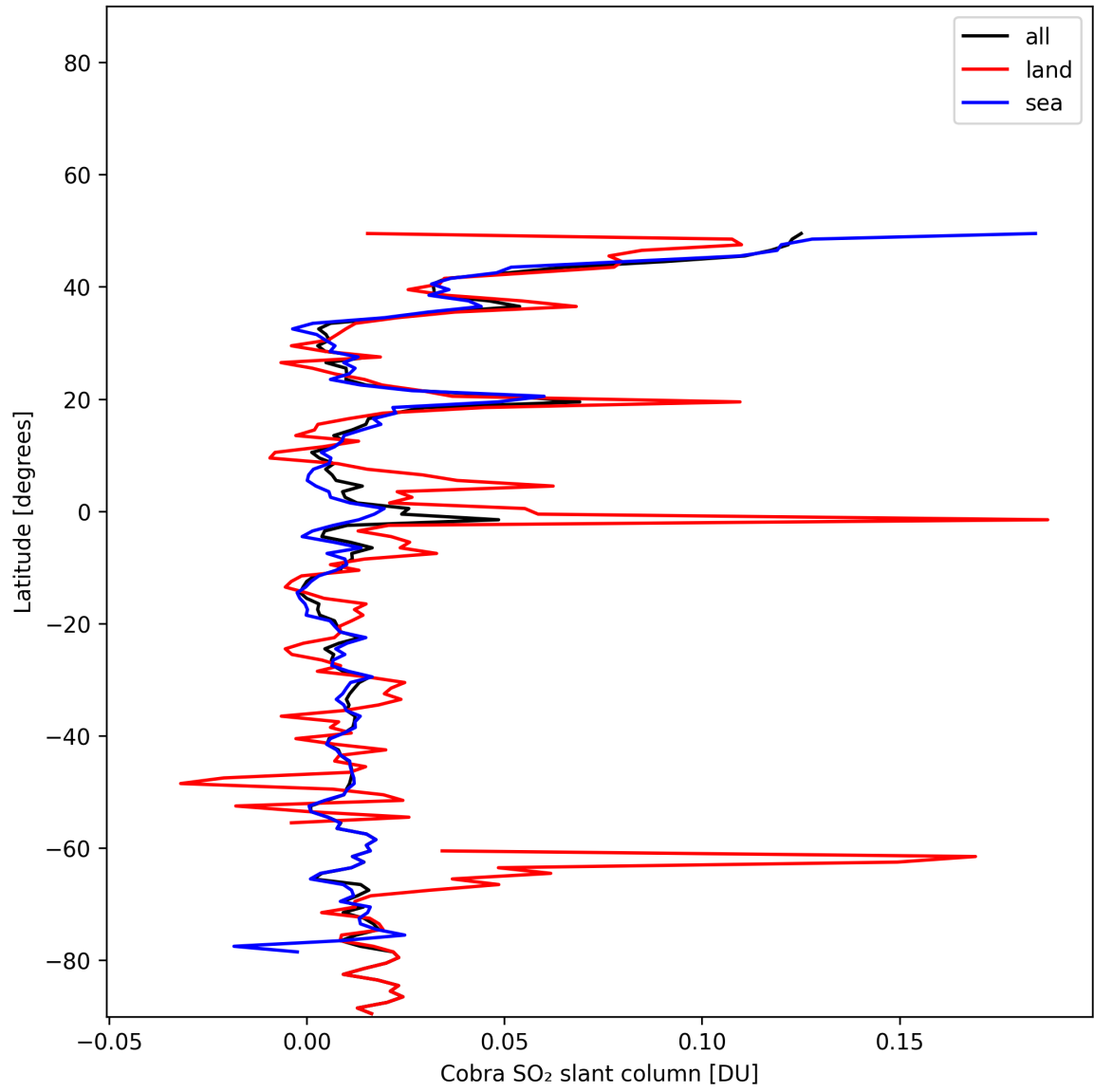


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-01-16 to 2025-01-17.

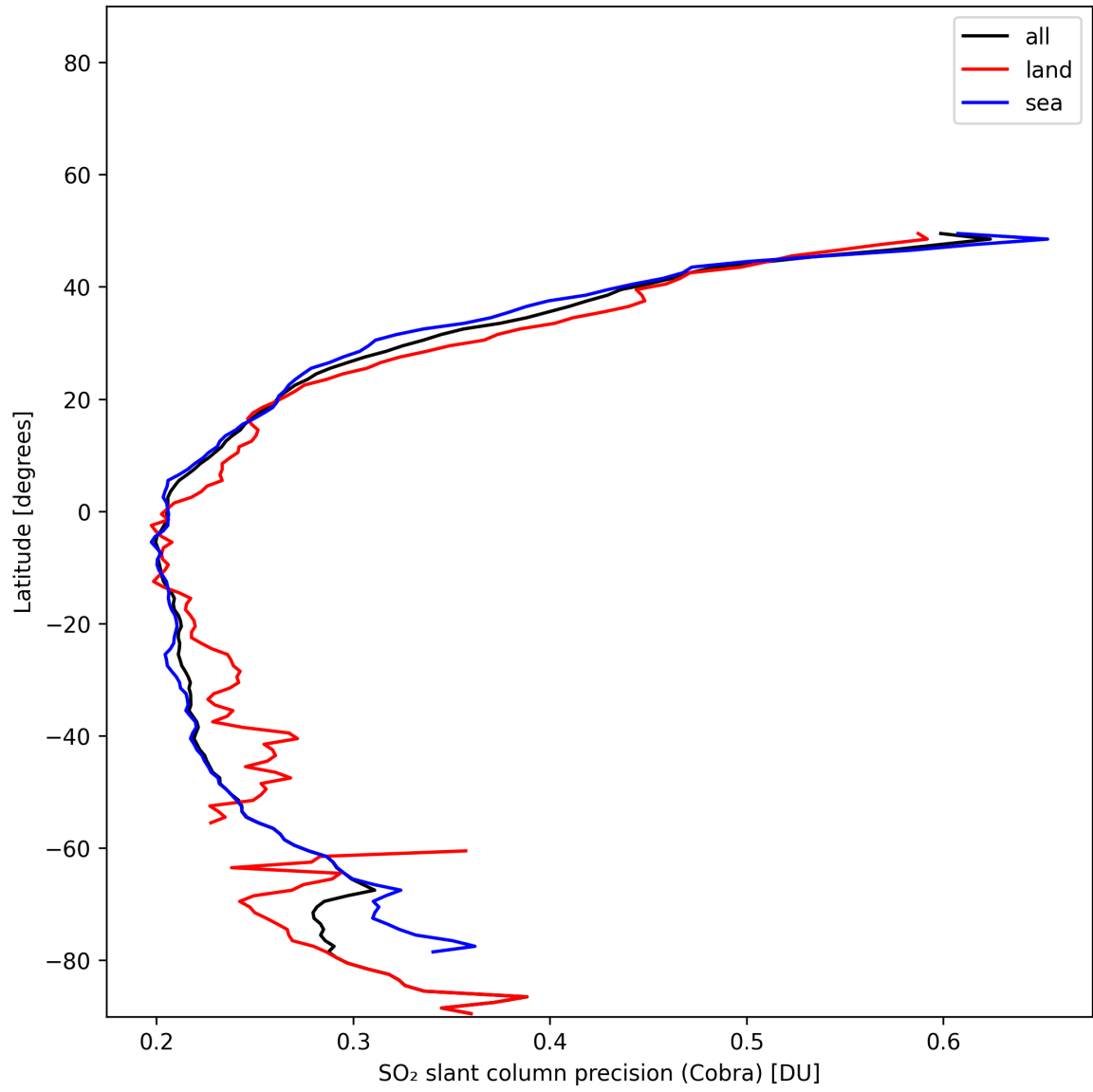


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-01-16 to 2025-01-17.

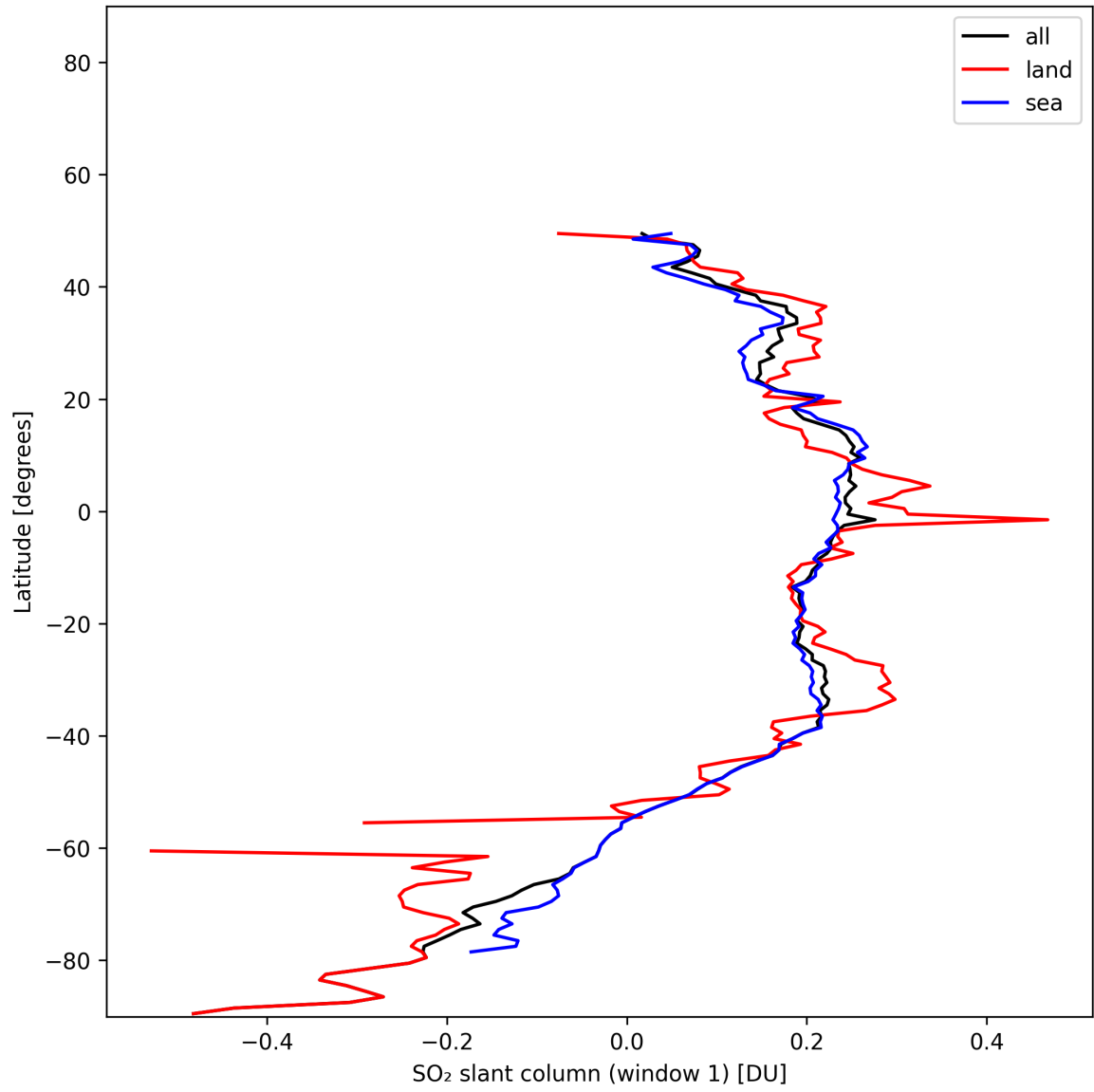


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-01-16 to 2025-01-17.

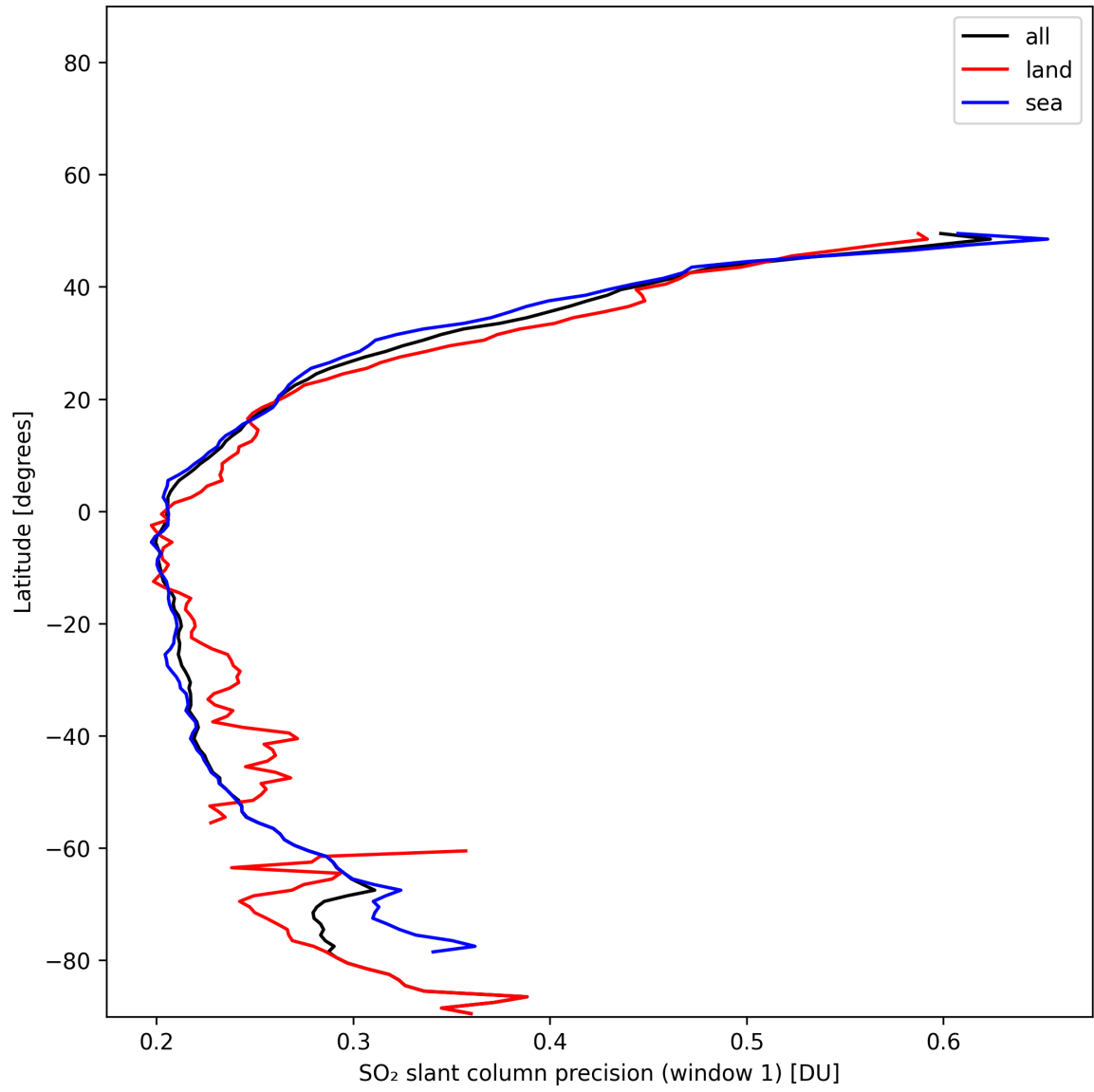


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-01-16 to 2025-01-17.

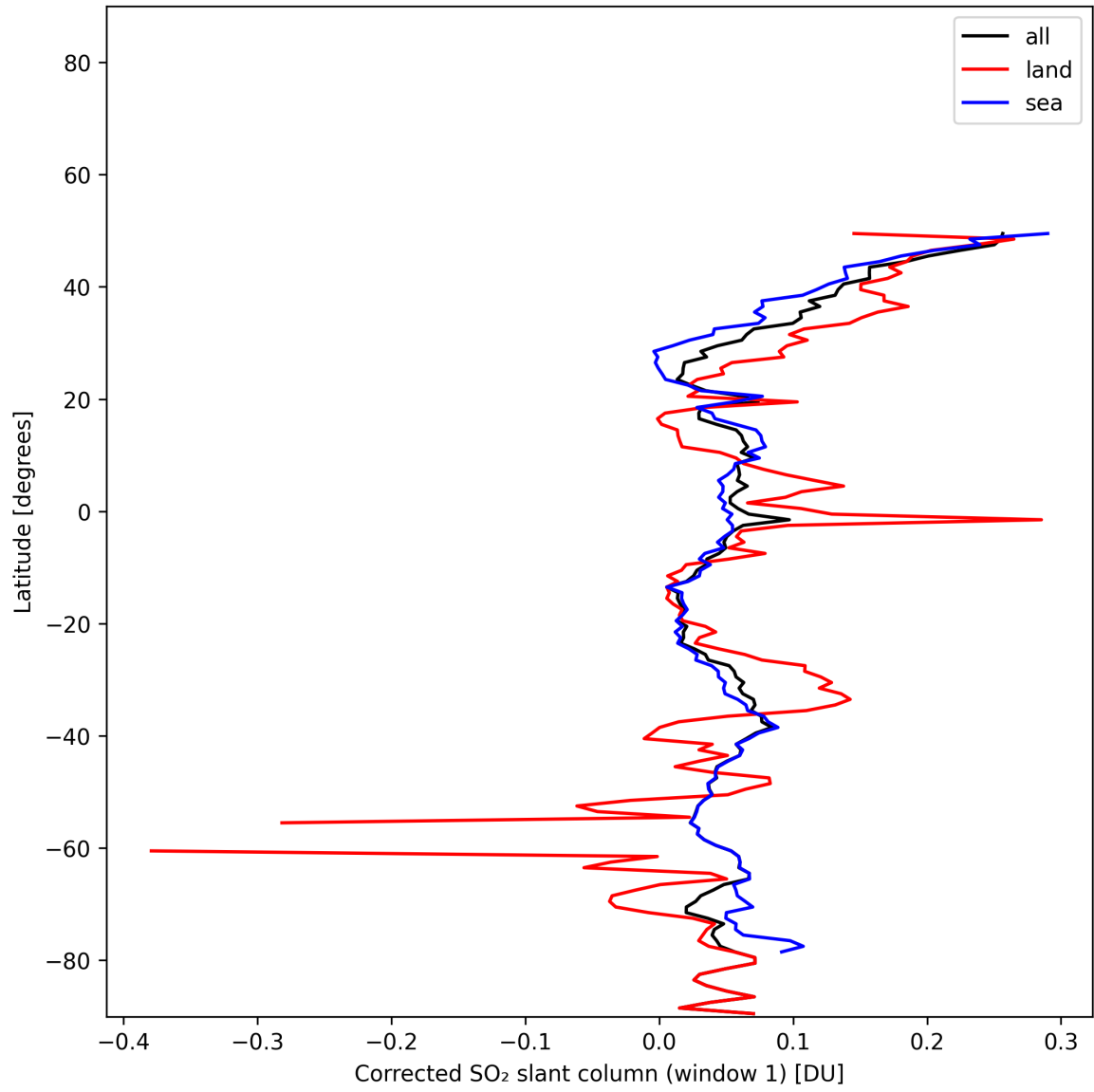


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-01-16 to 2025-01-17.

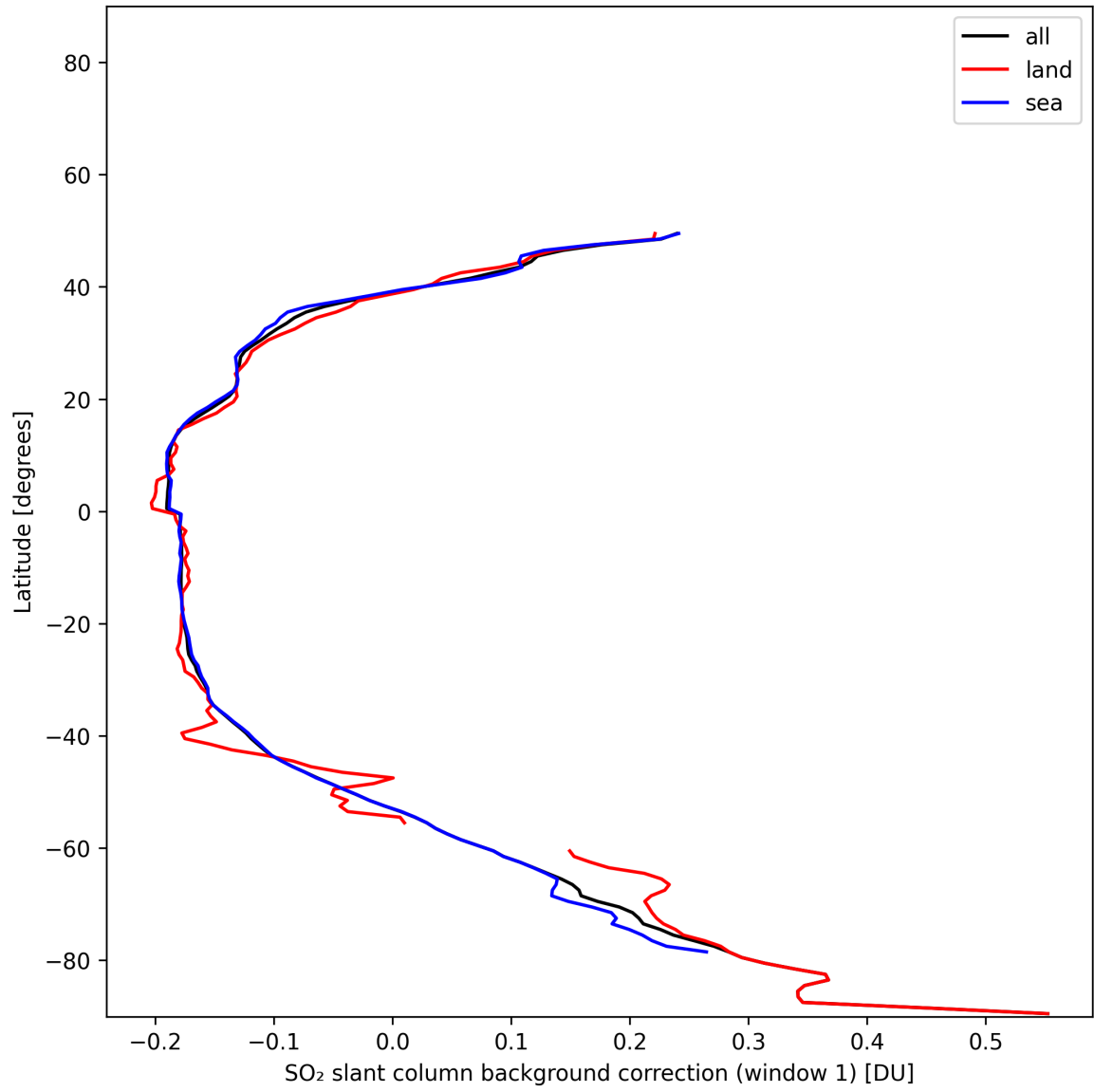


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-01-16 to 2025-01-17.

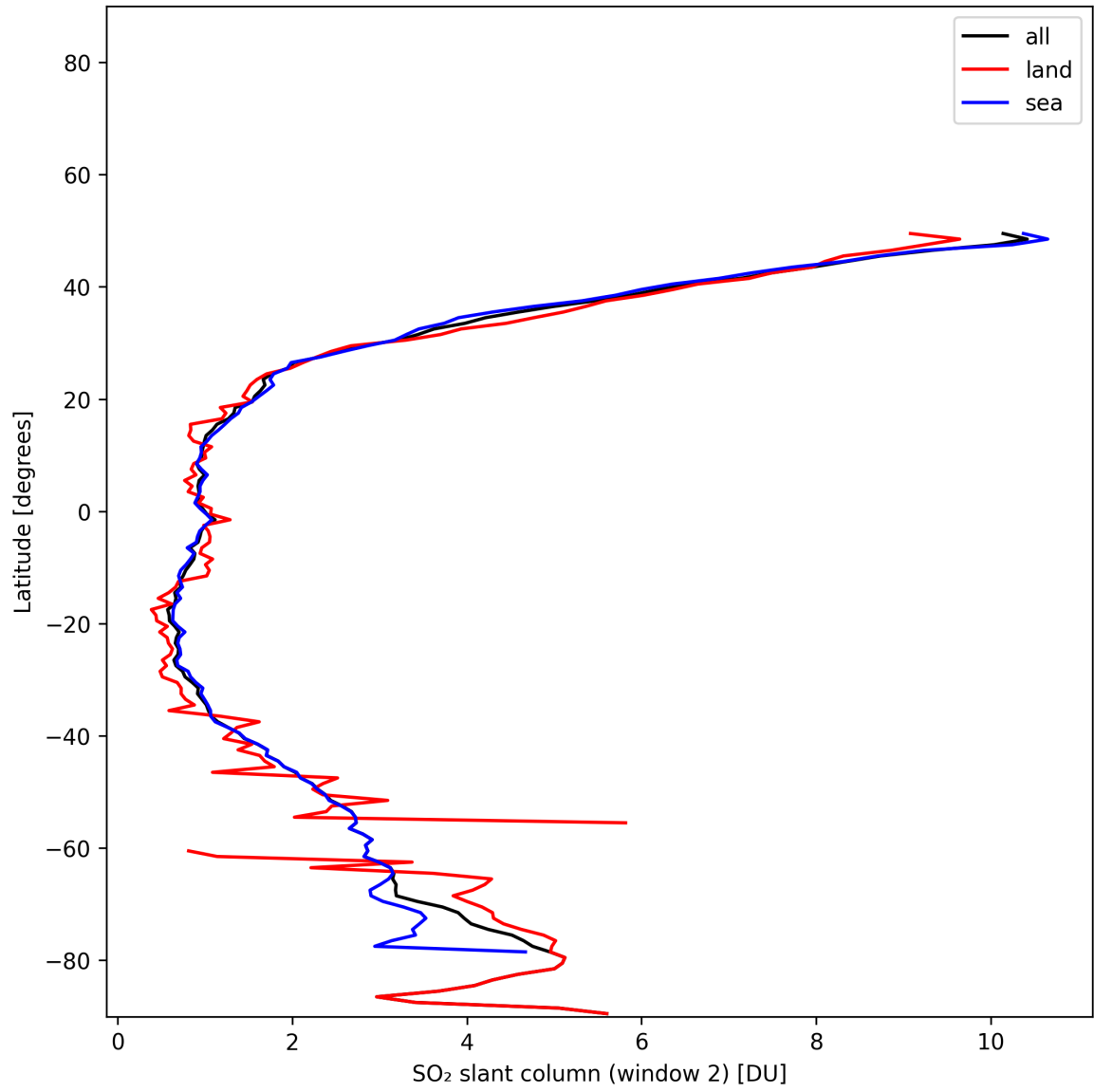


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-01-16 to 2025-01-17.

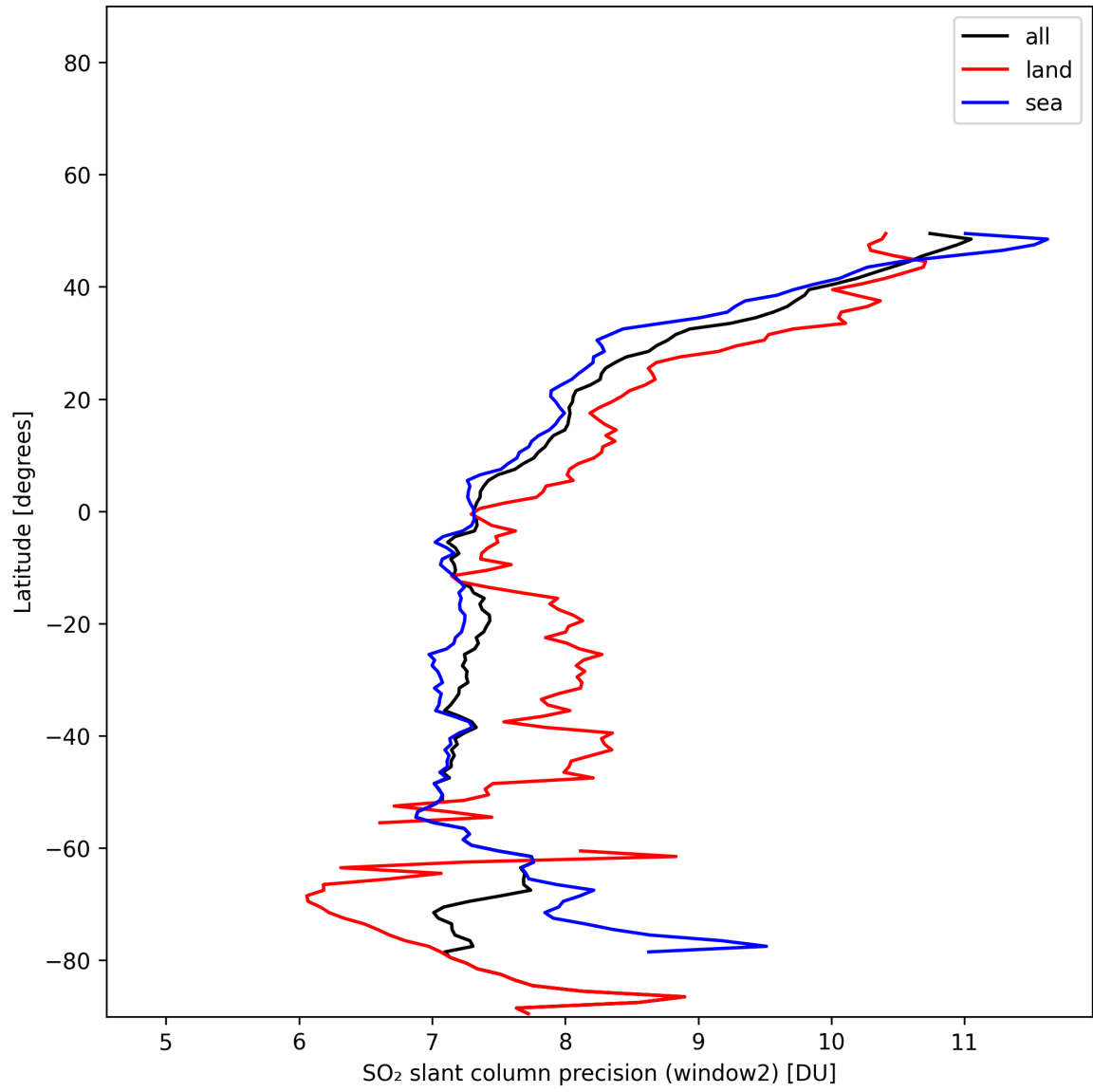


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-01-16 to 2025-01-17.

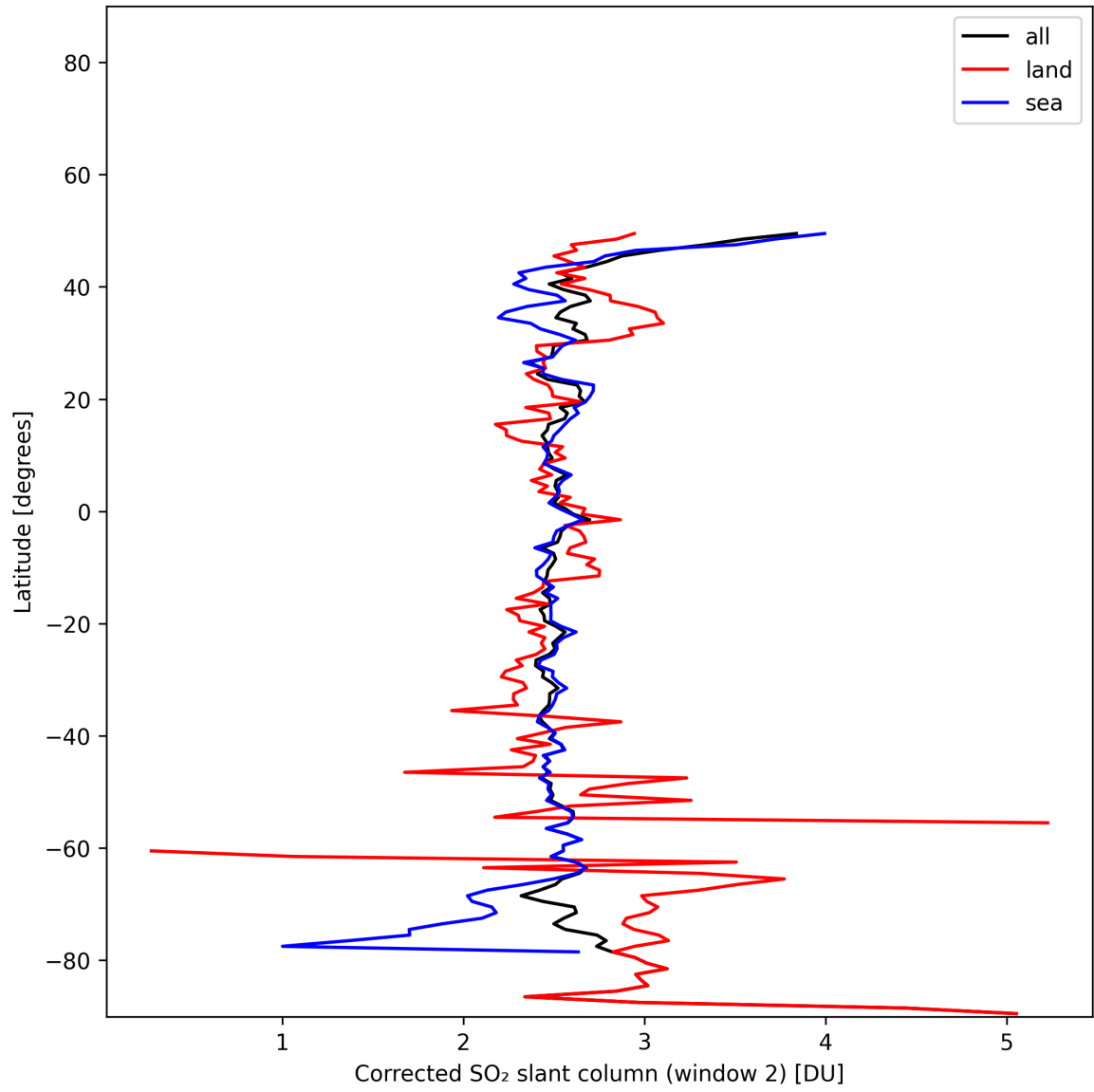


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-01-16 to 2025-01-17.

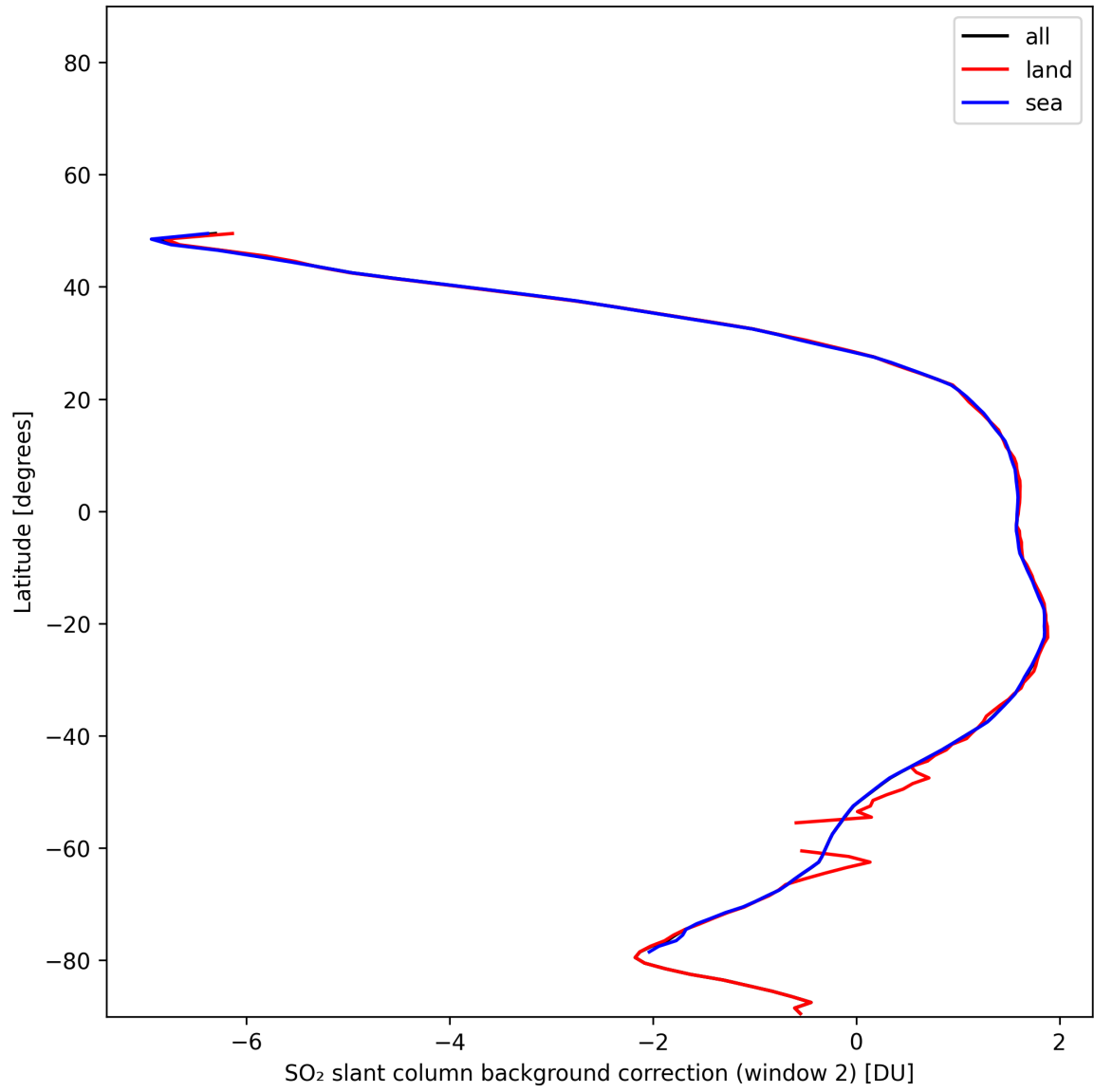


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-01-16 to 2025-01-17.

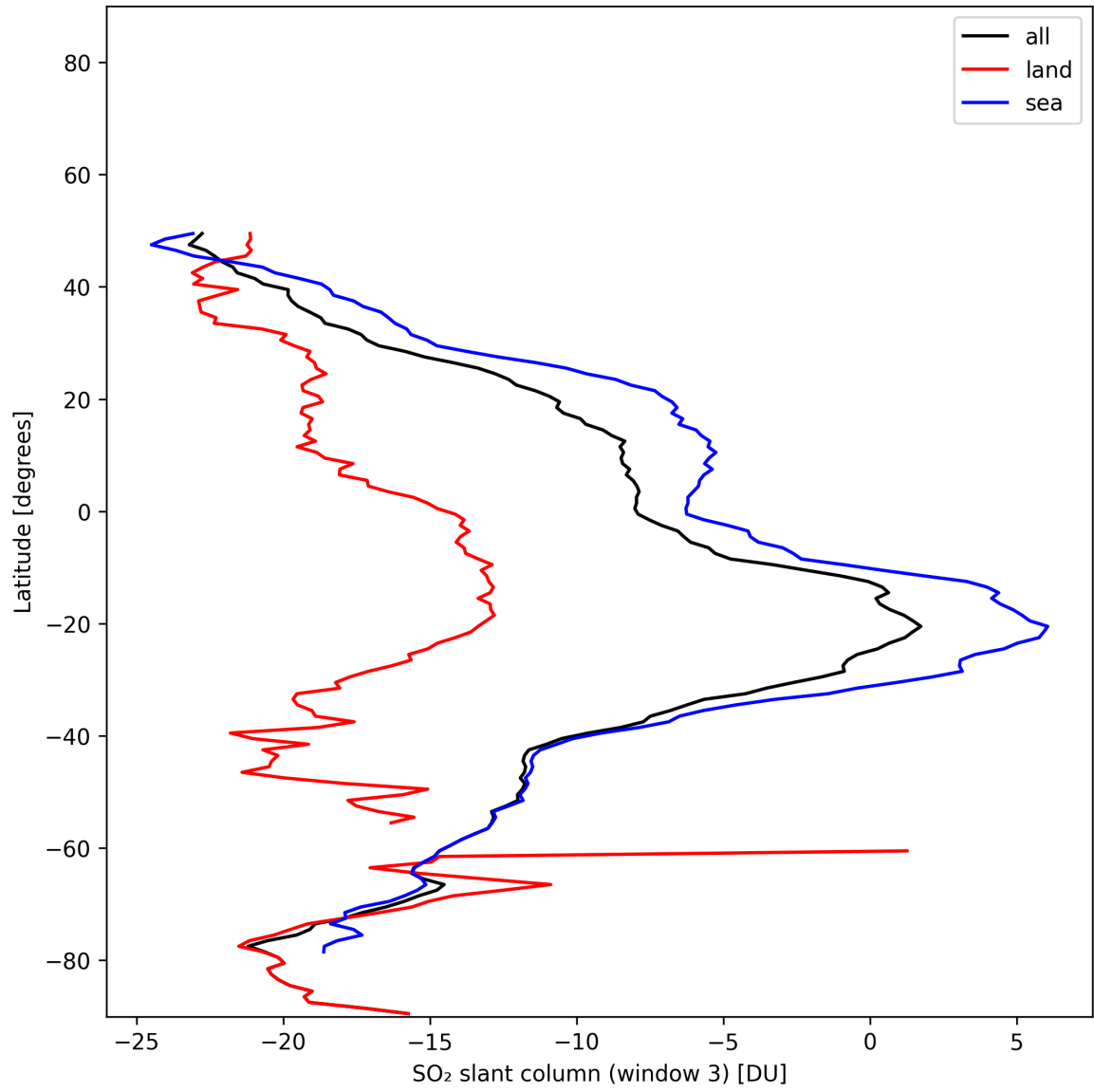


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-01-16 to 2025-01-17.

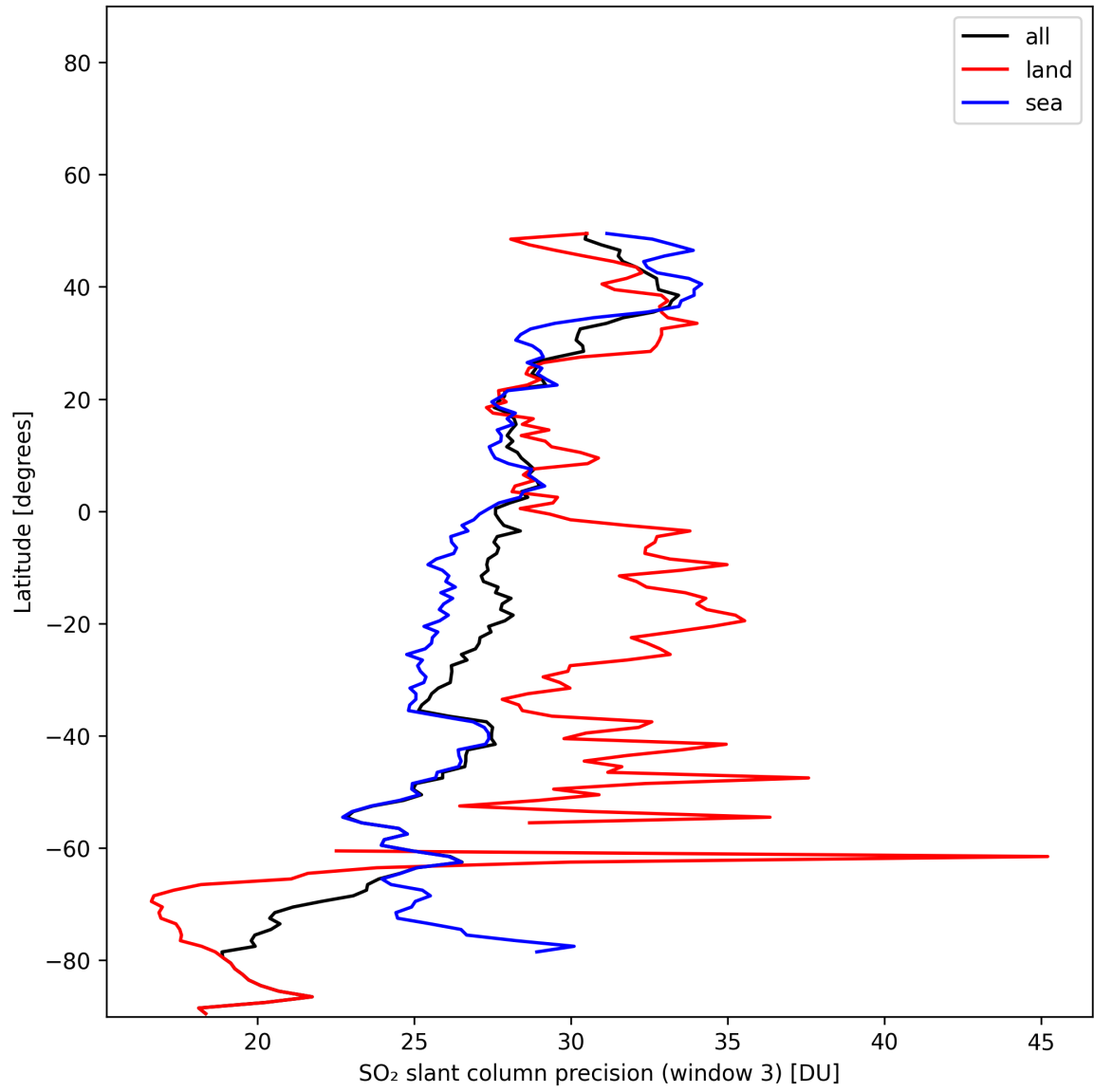


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-01-16 to 2025-01-17.

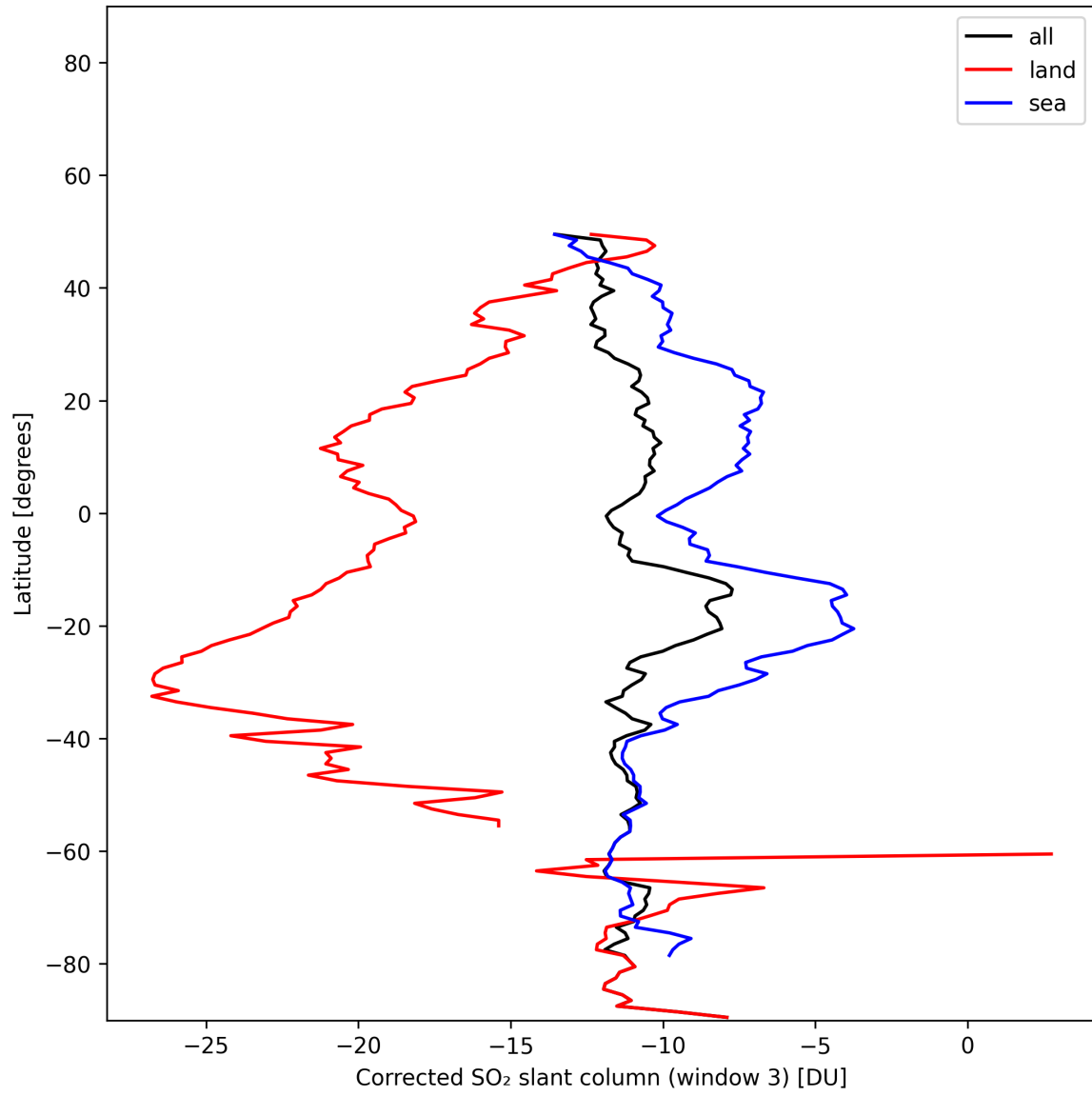


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-01-16 to 2025-01-17.

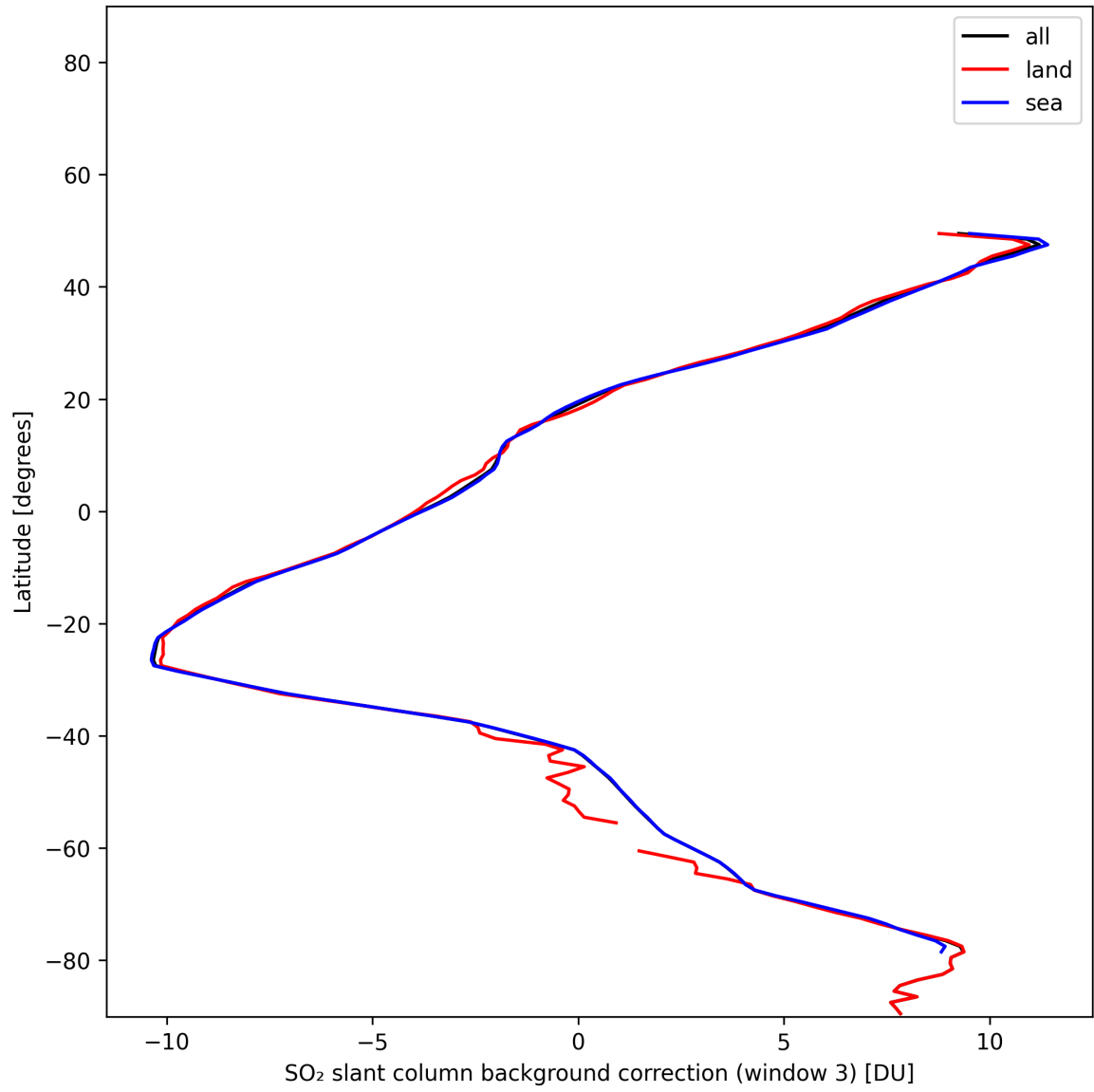


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-01-16 to 2025-01-17.

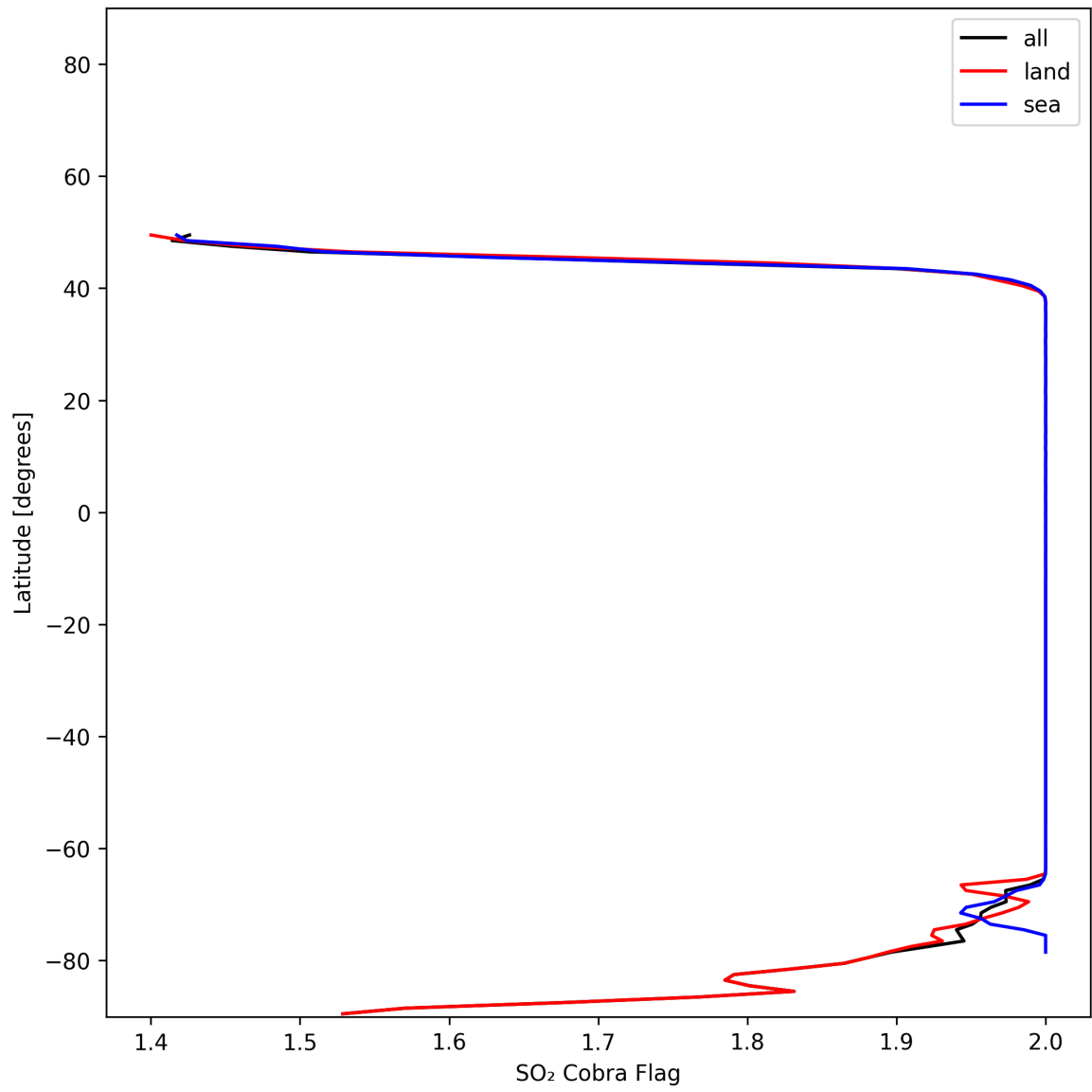


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-01-16 to 2025-01-17.

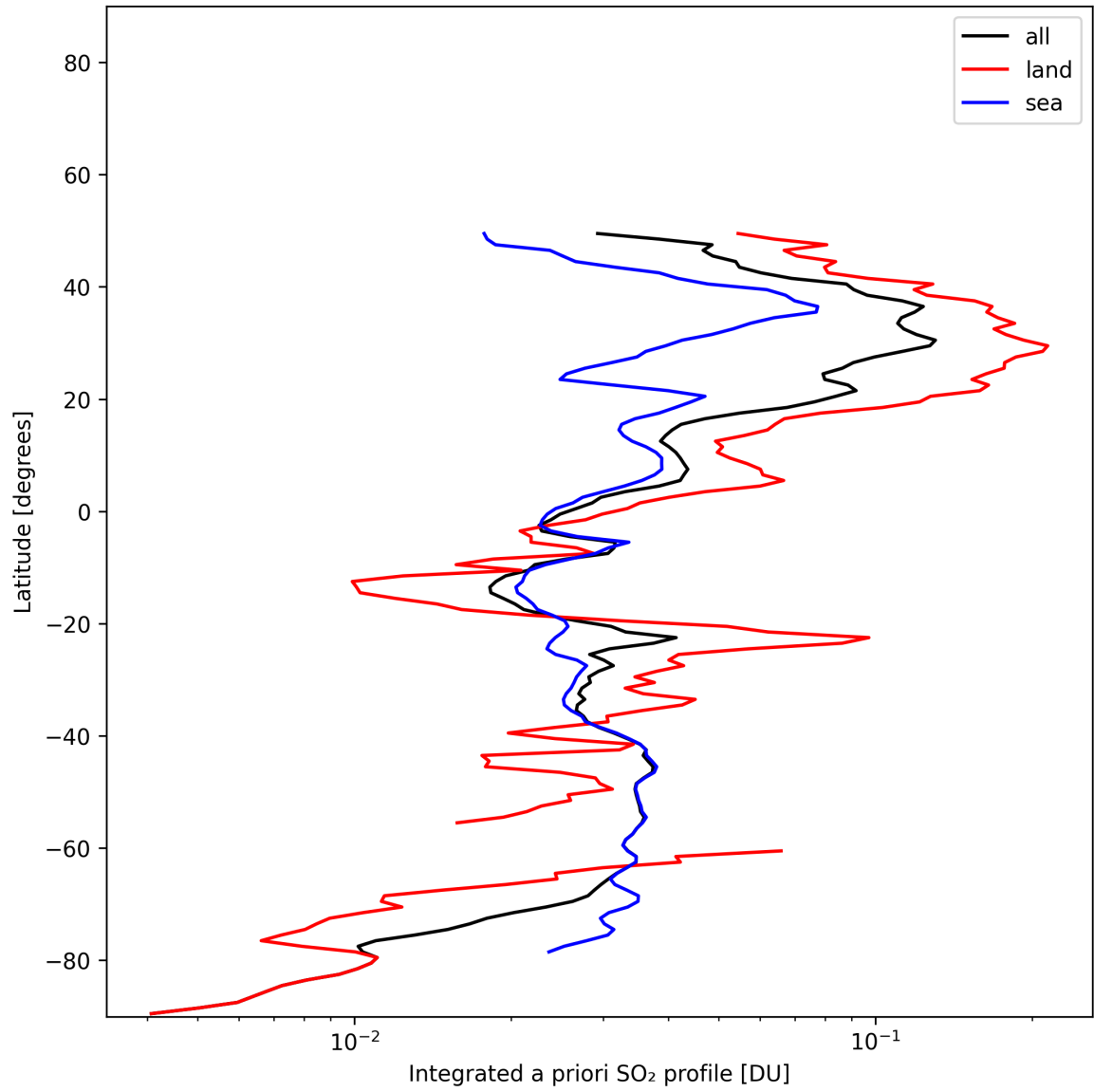


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-01-16 to 2025-01-17.

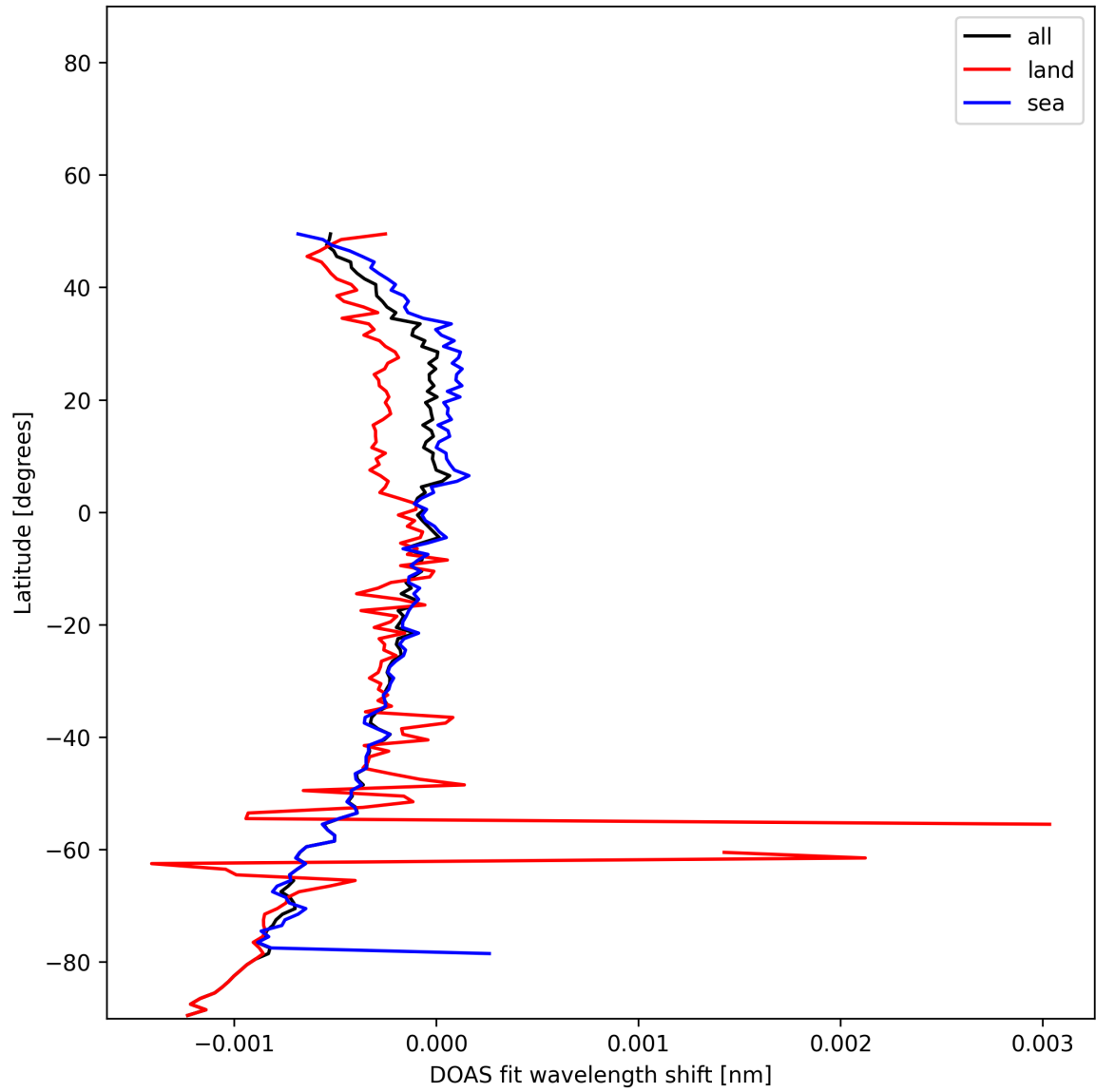


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-01-16 to 2025-01-17.

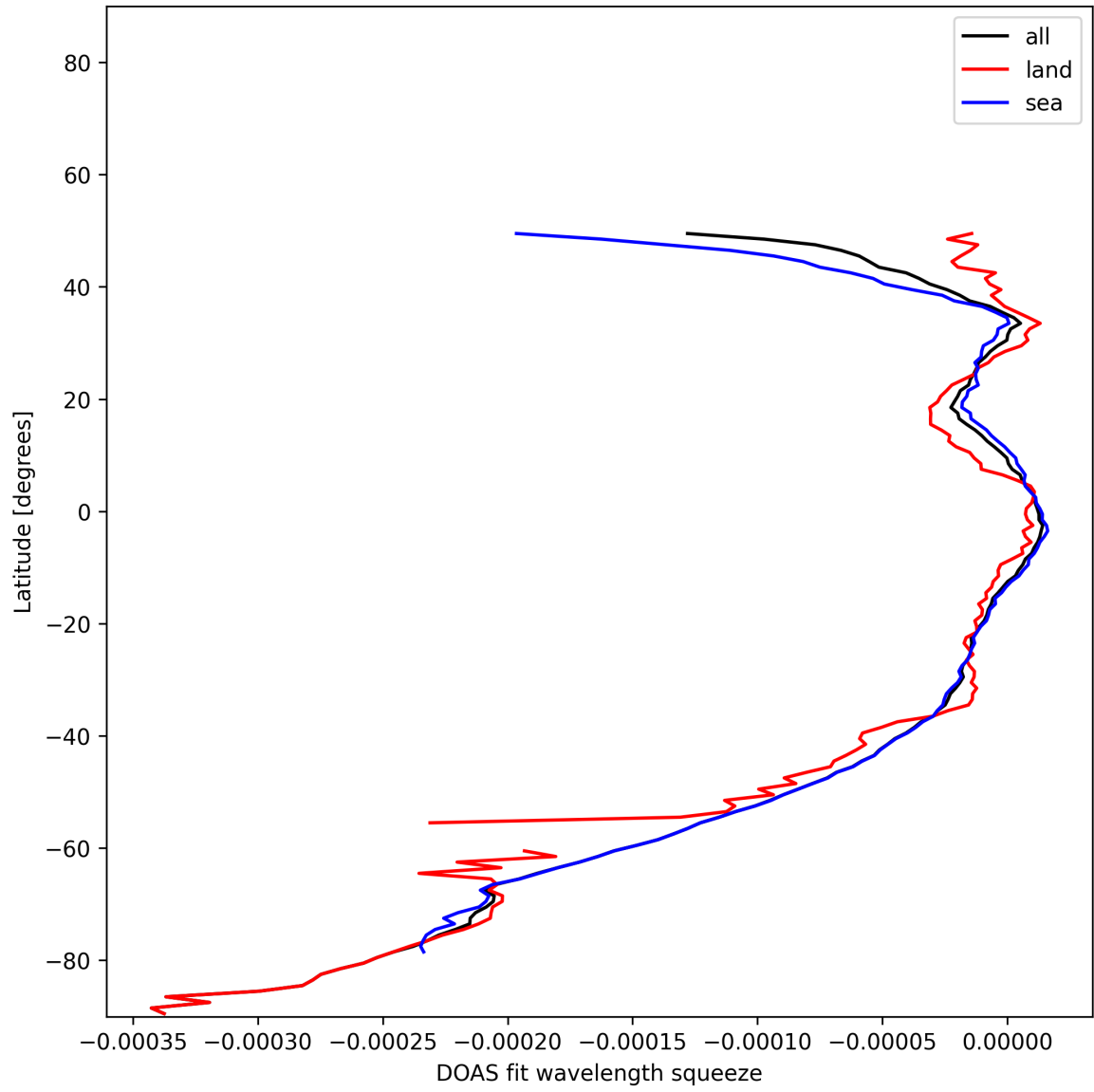


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-01-16 to 2025-01-17.

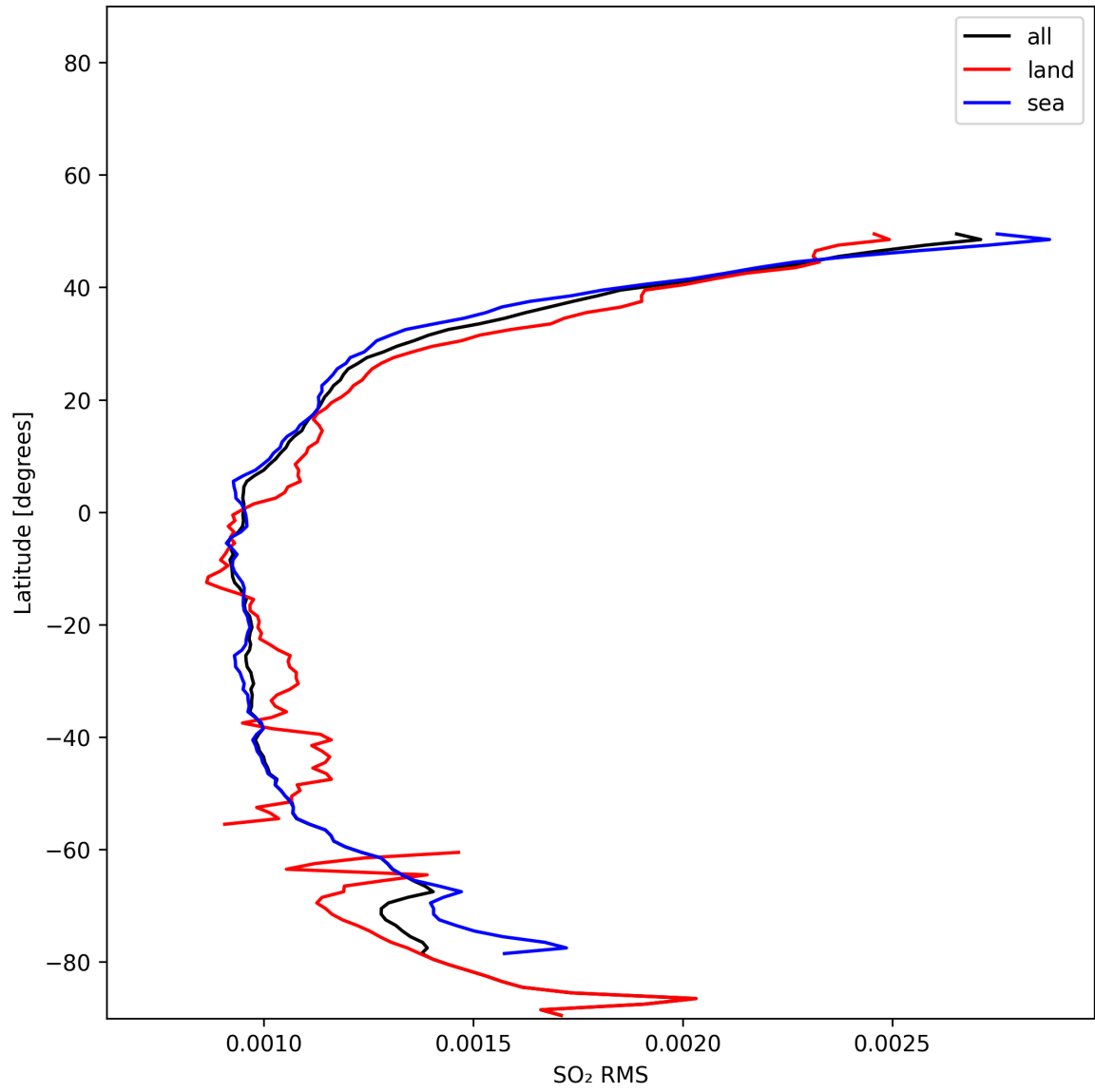


Figure 52: Zonal average of “SO₂ RMS” for 2025-01-16 to 2025-01-17.

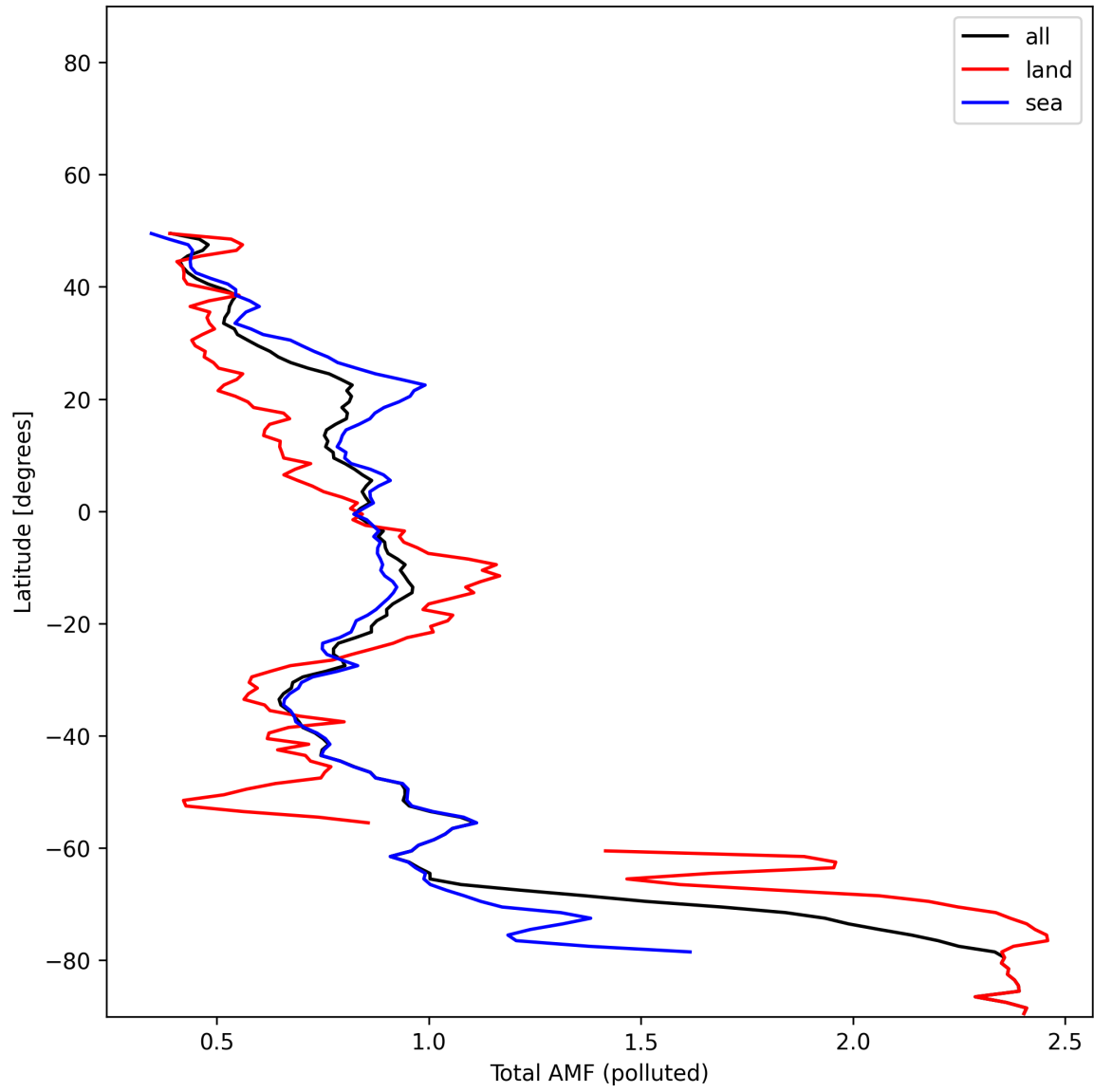


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-01-16 to 2025-01-17.

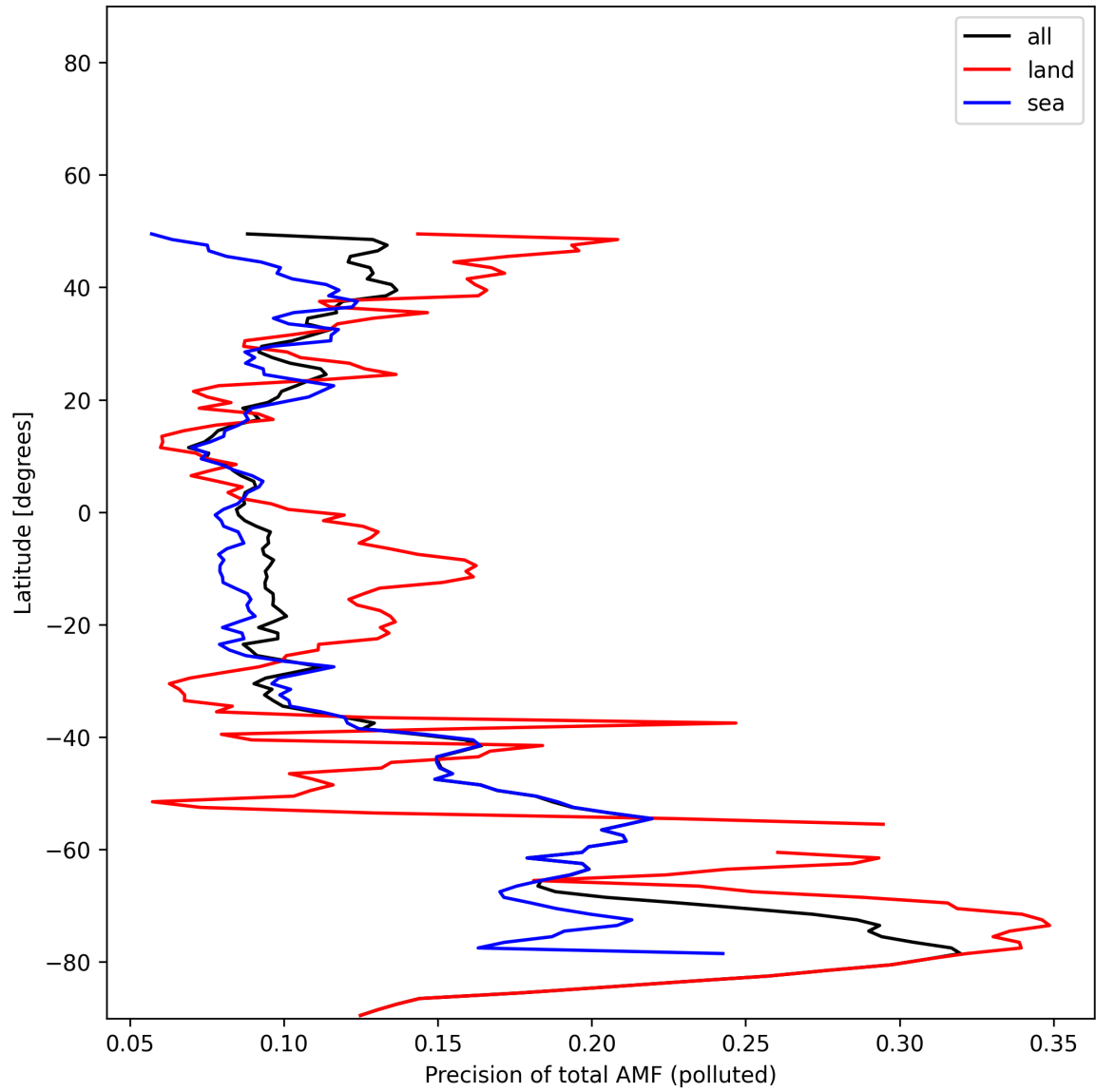


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-01-16 to 2025-01-17.

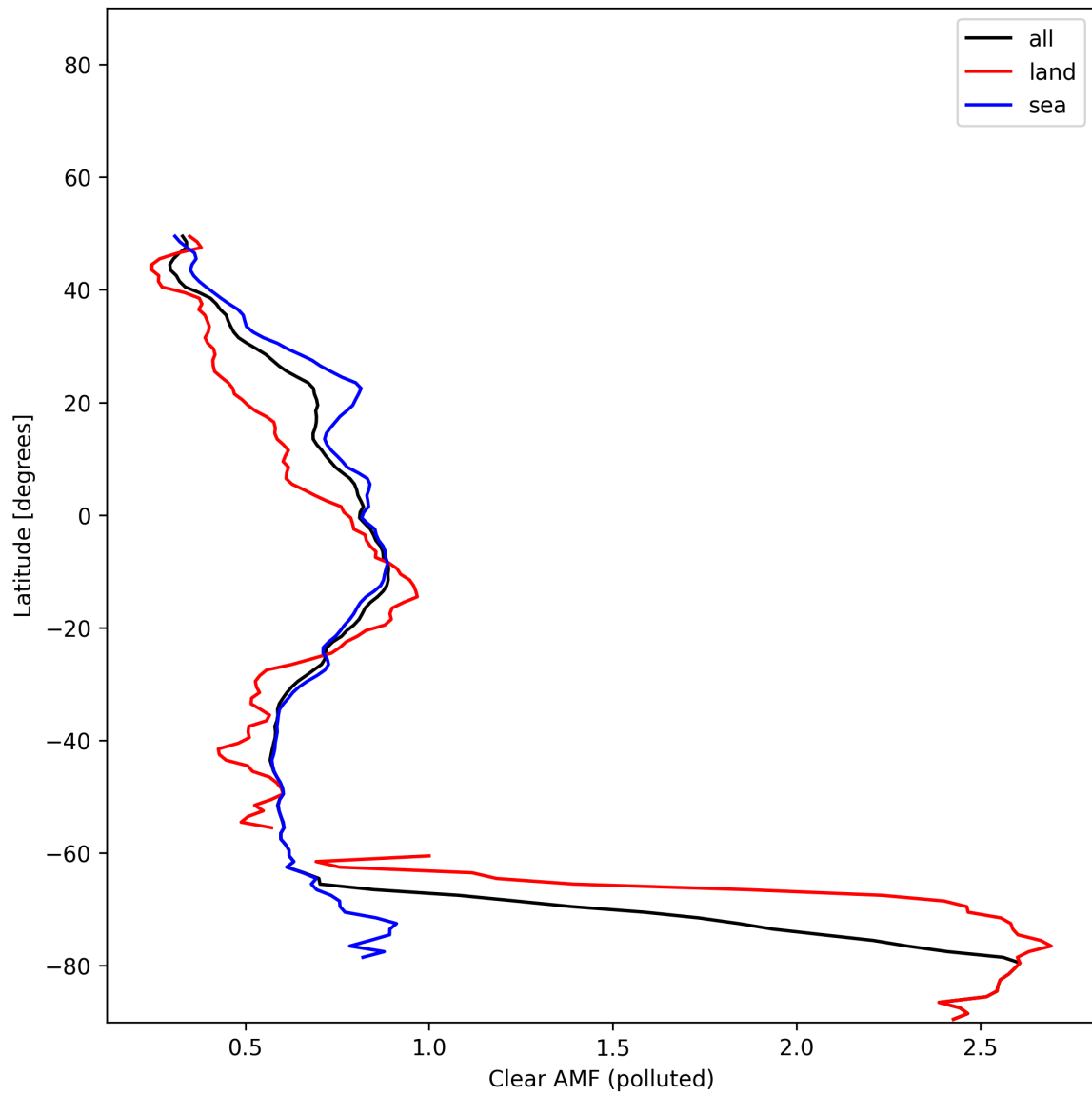


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-01-16 to 2025-01-17.

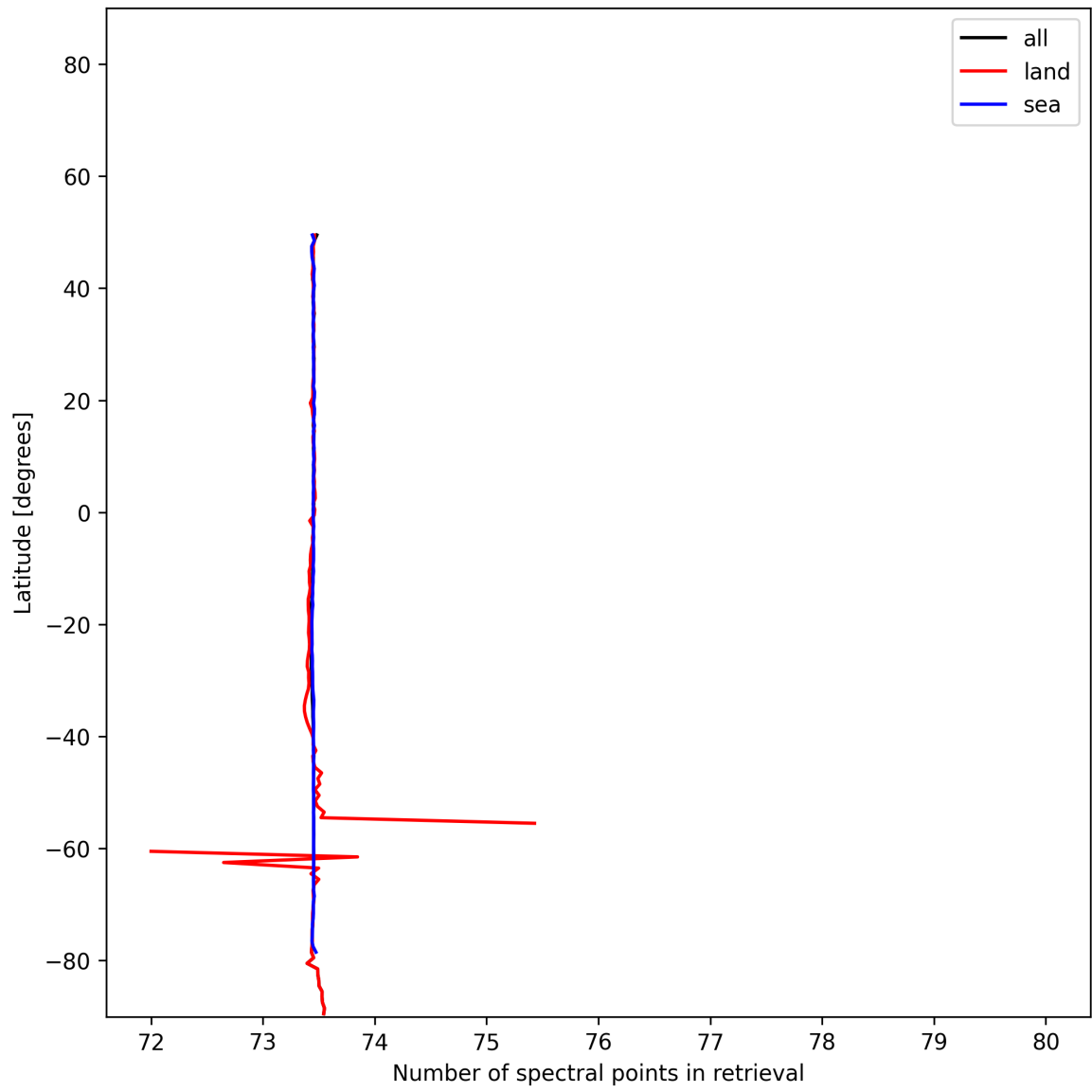


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-01-16 to 2025-01-17.

8 Histograms

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

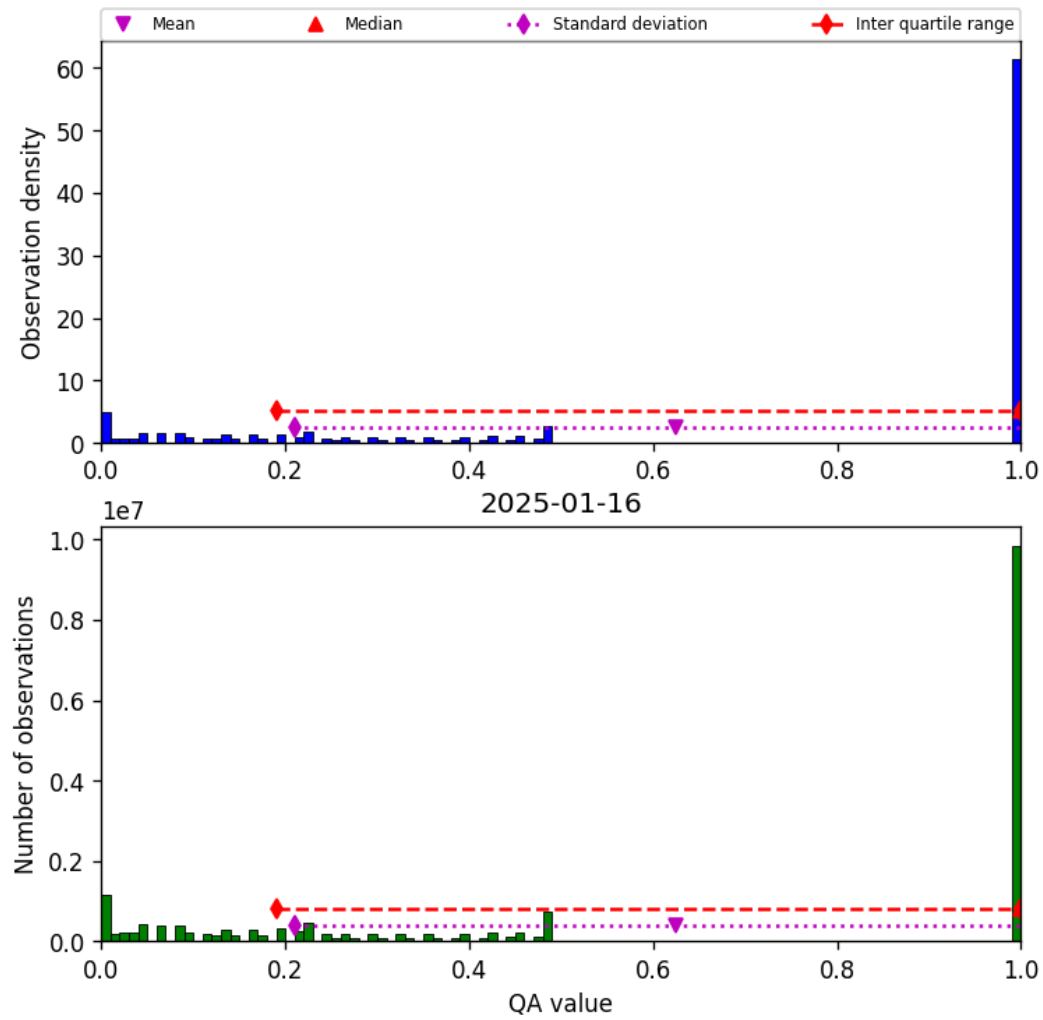


Figure 57: Histogram of “QA value” for 2025-01-16 to 2025-01-17

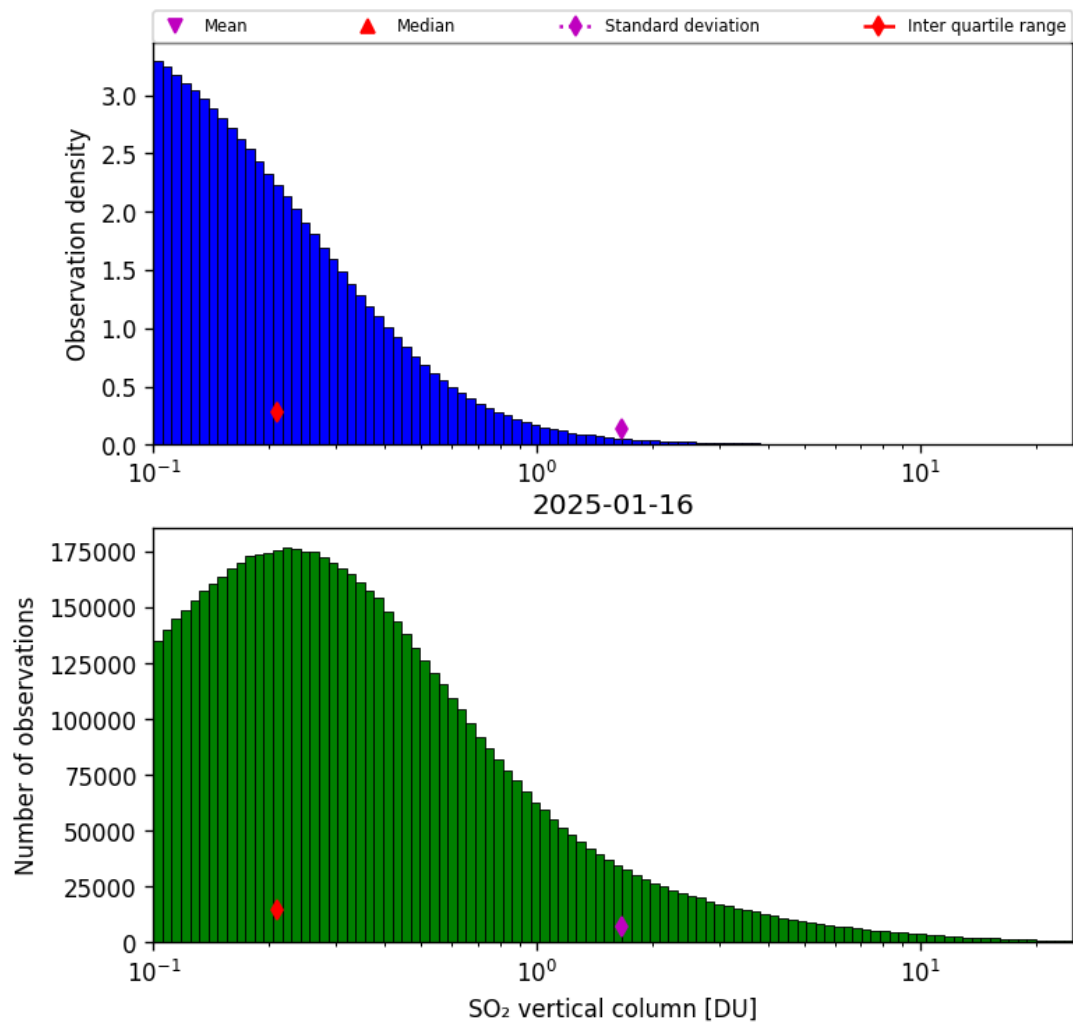


Figure 58: Histogram of “SO₂ vertical column” for 2025-01-16 to 2025-01-17

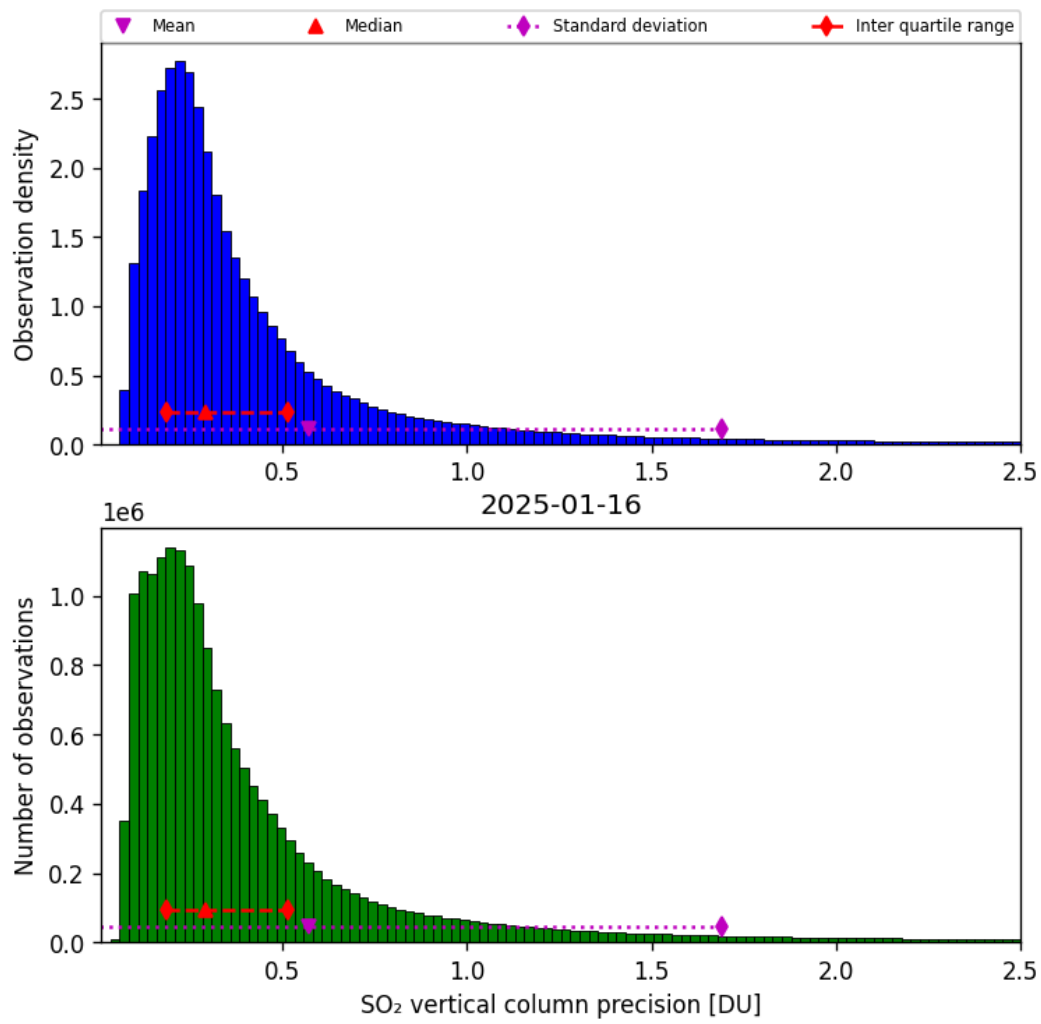


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-01-16 to 2025-01-17

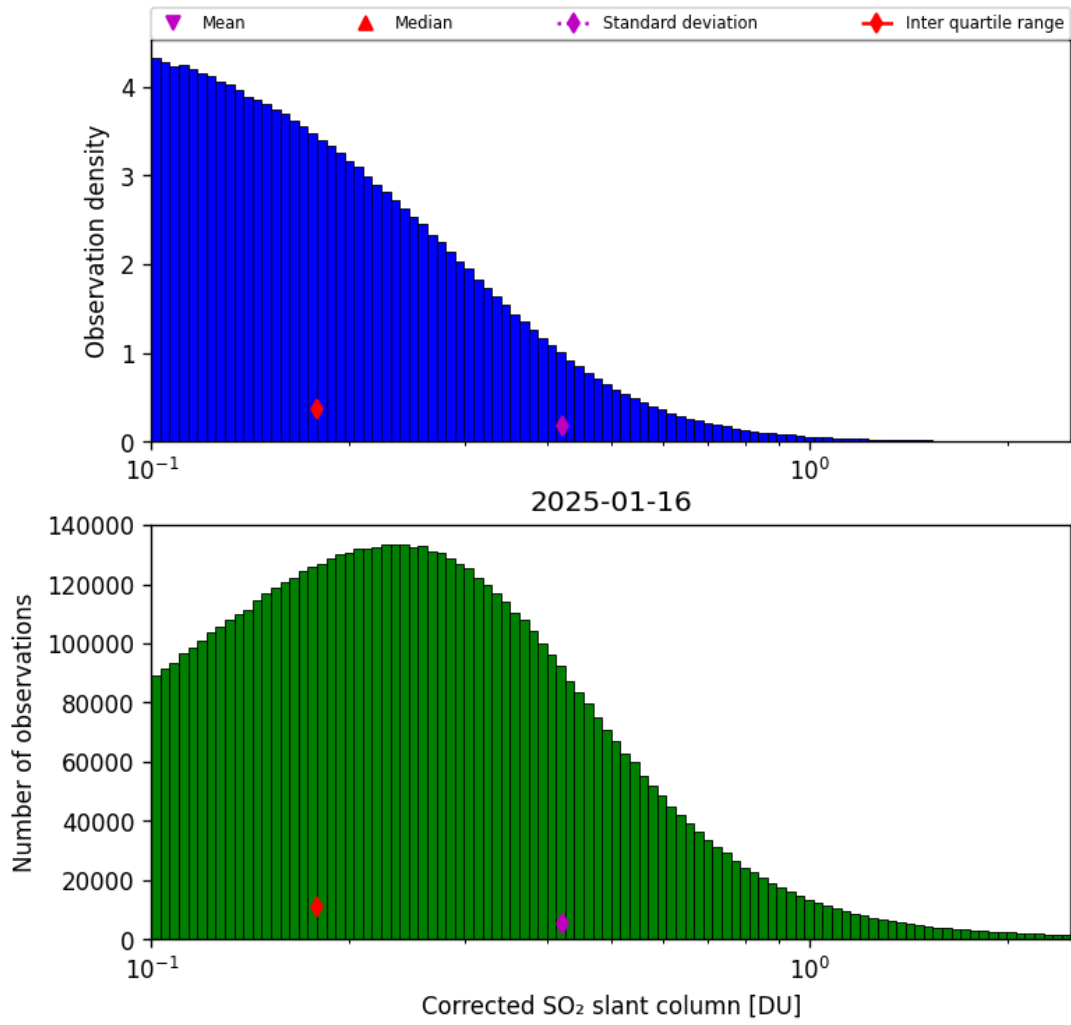


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-01-16 to 2025-01-17

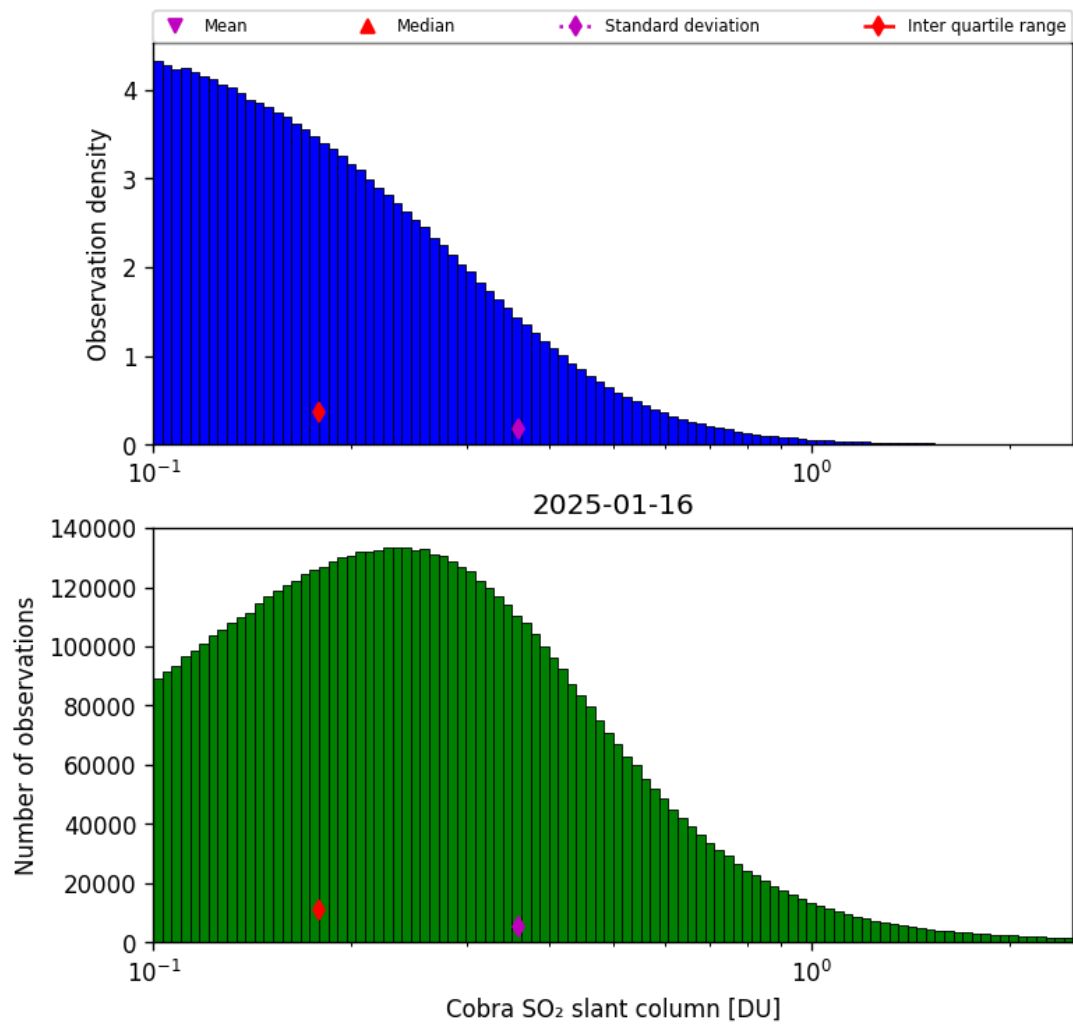


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-01-16 to 2025-01-17

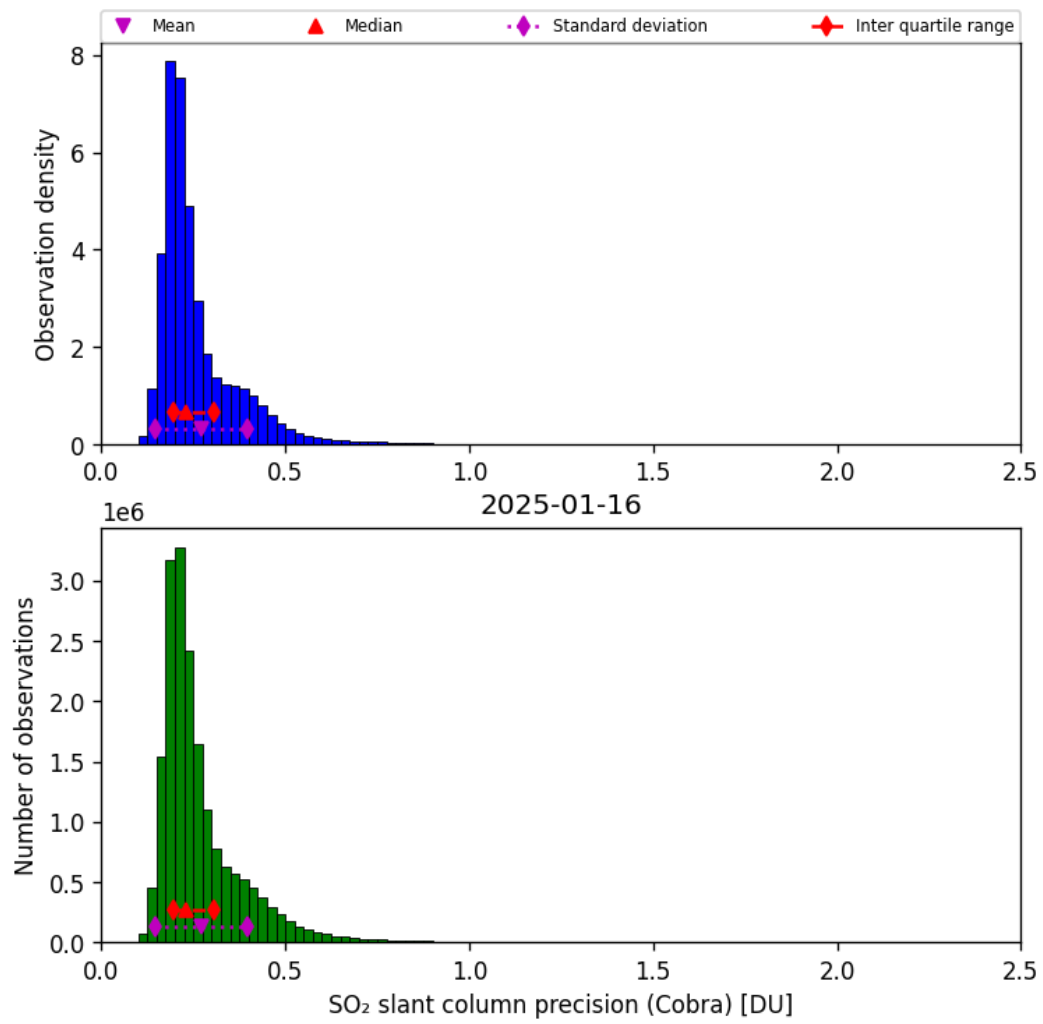


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-01-16 to 2025-01-17

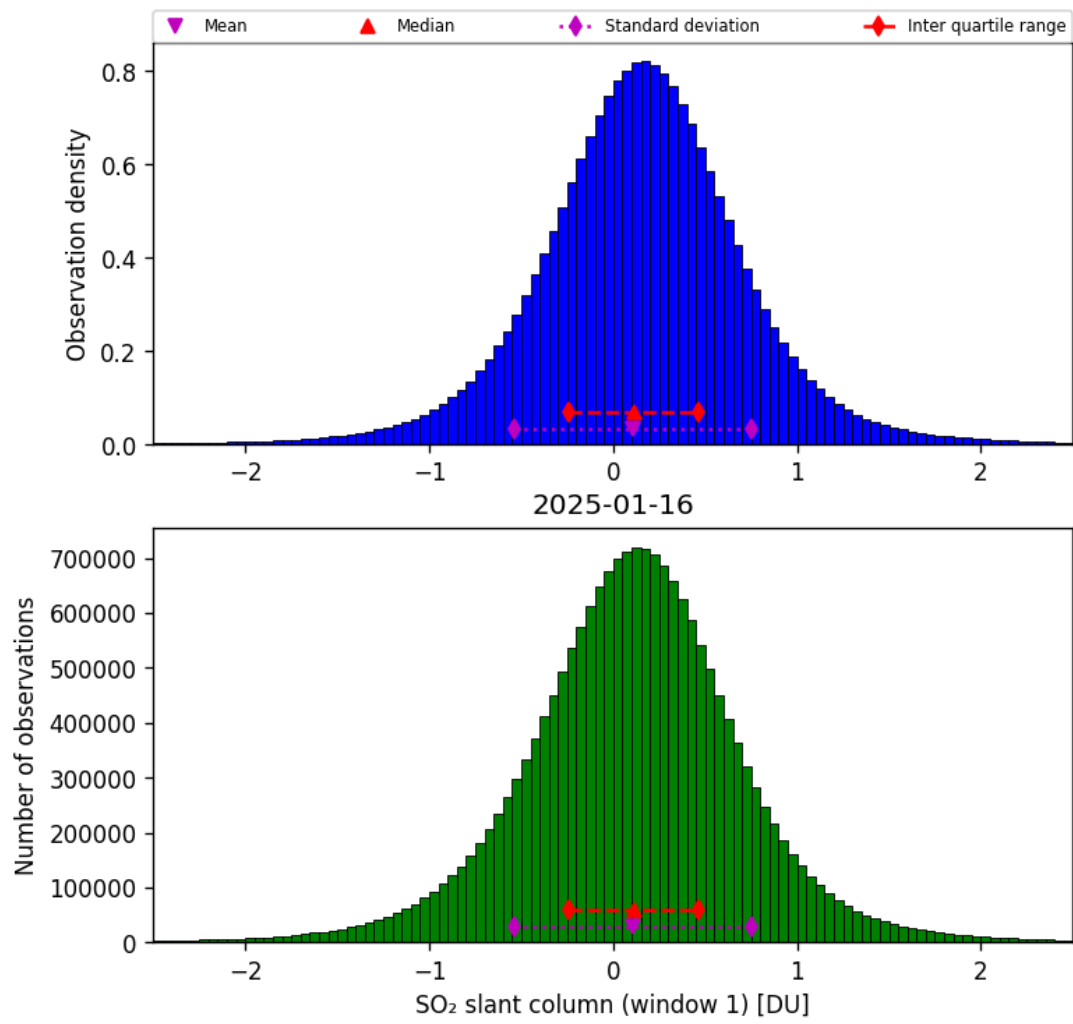


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-01-16 to 2025-01-17

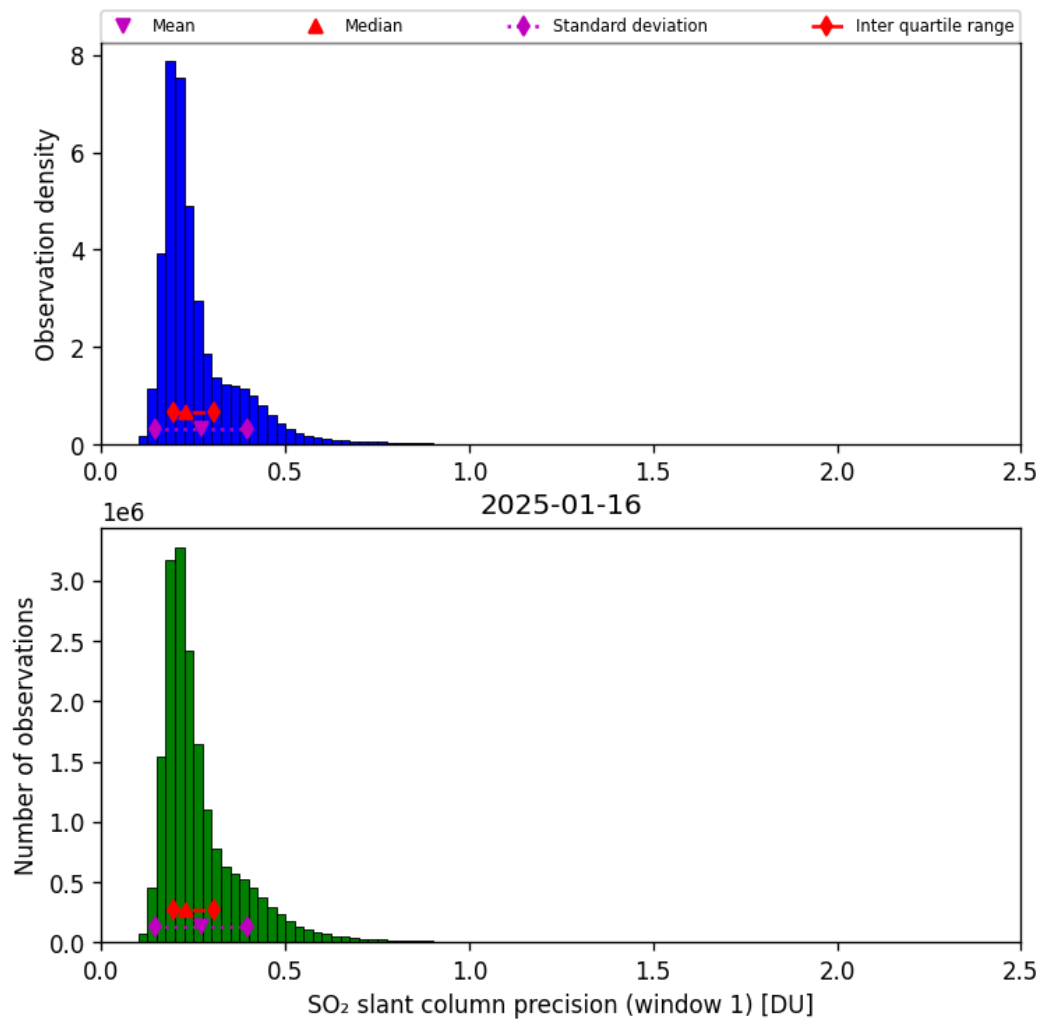


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-01-16 to 2025-01-17

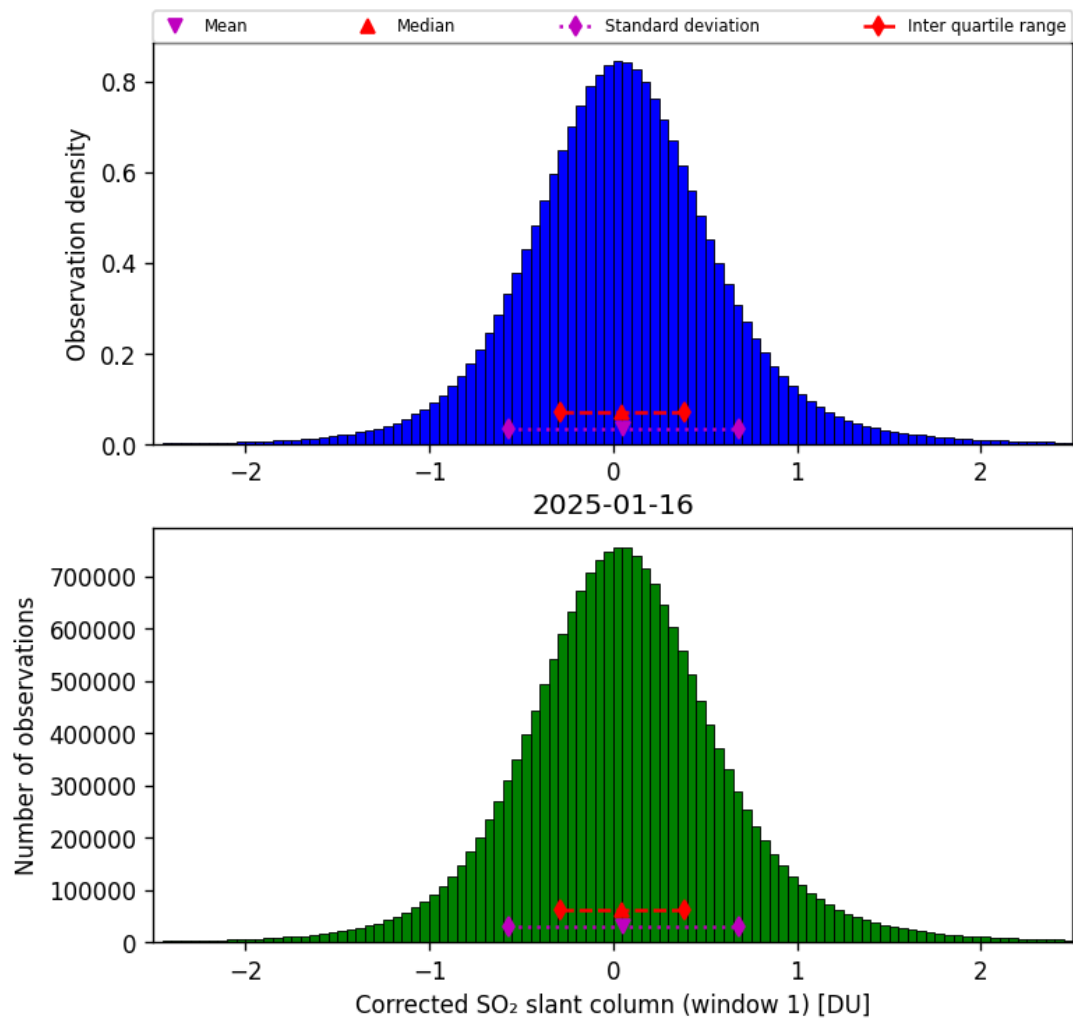


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-01-16 to 2025-01-17

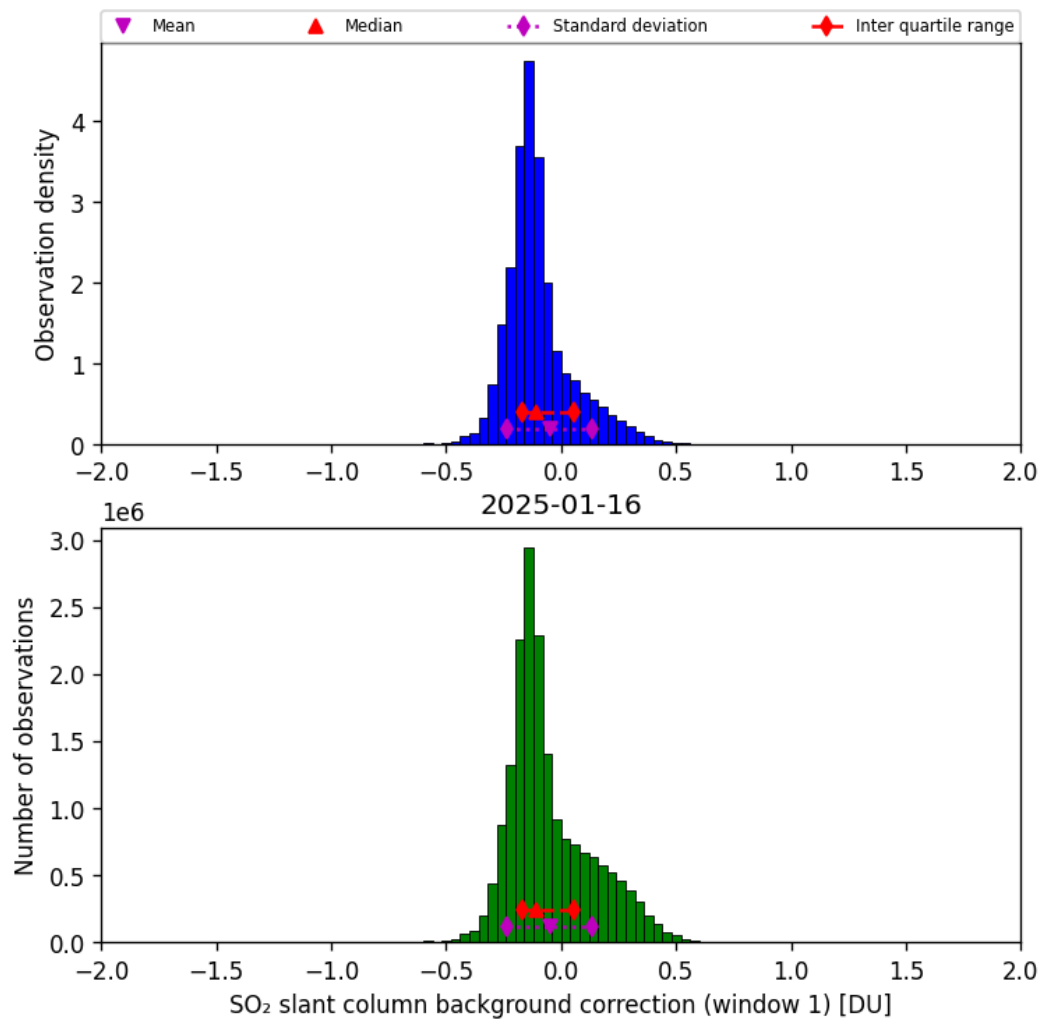


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-01-16 to 2025-01-17

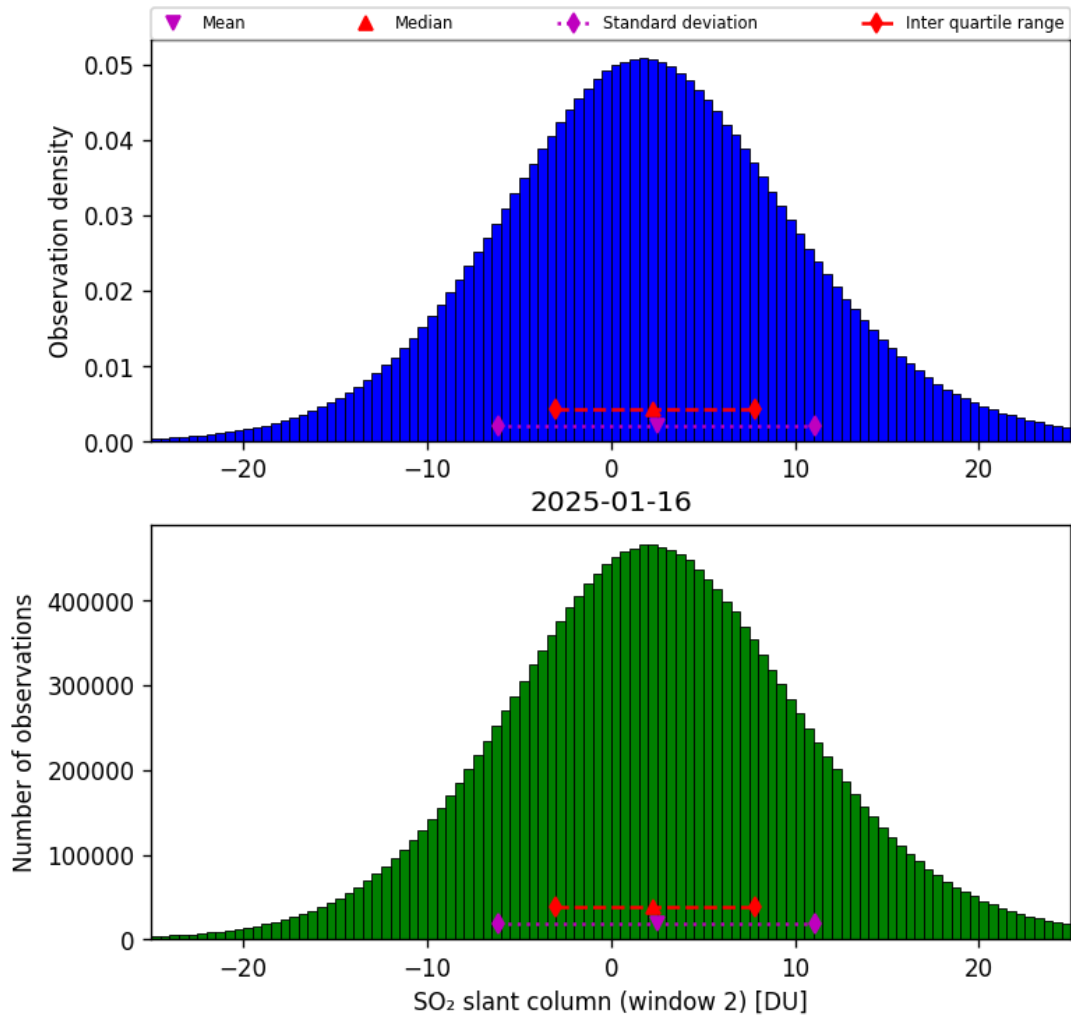


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-01-16 to 2025-01-17

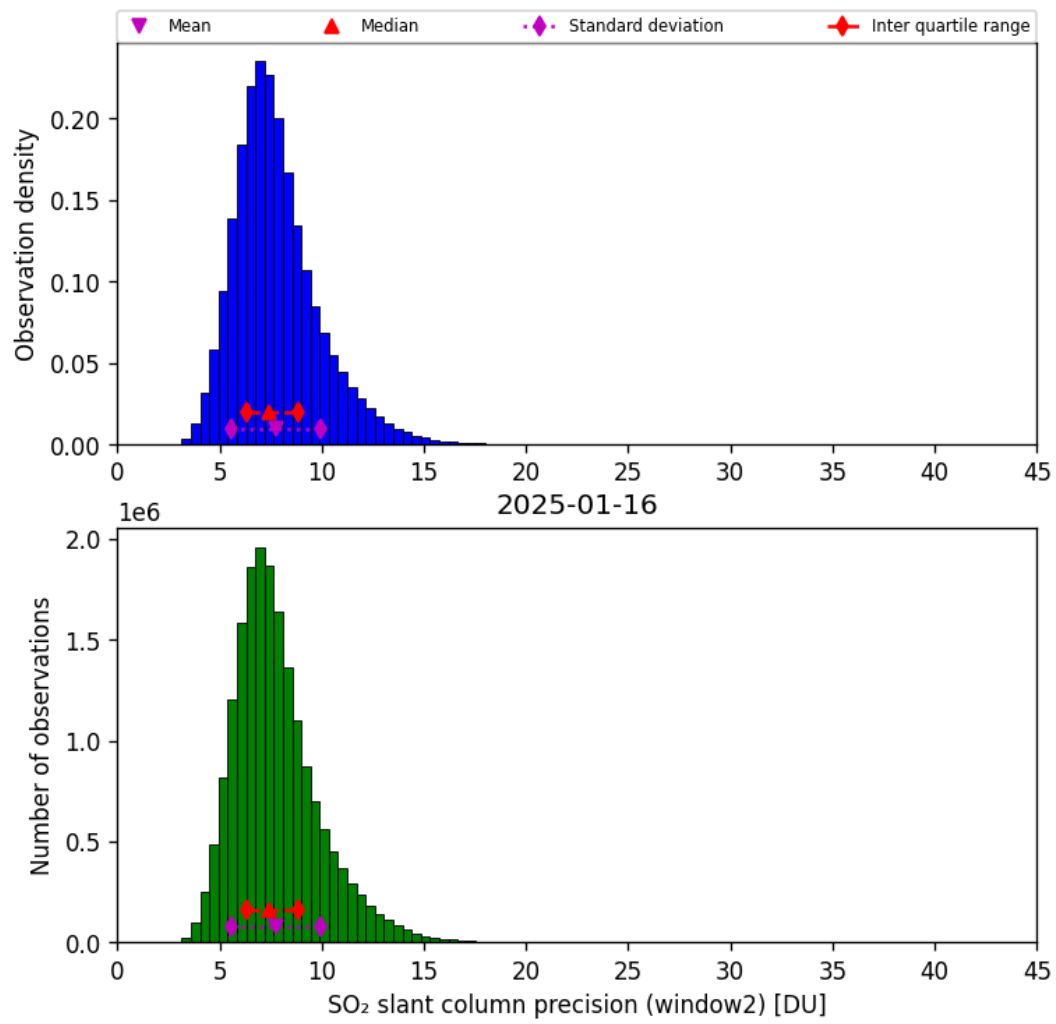


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-01-16 to 2025-01-17

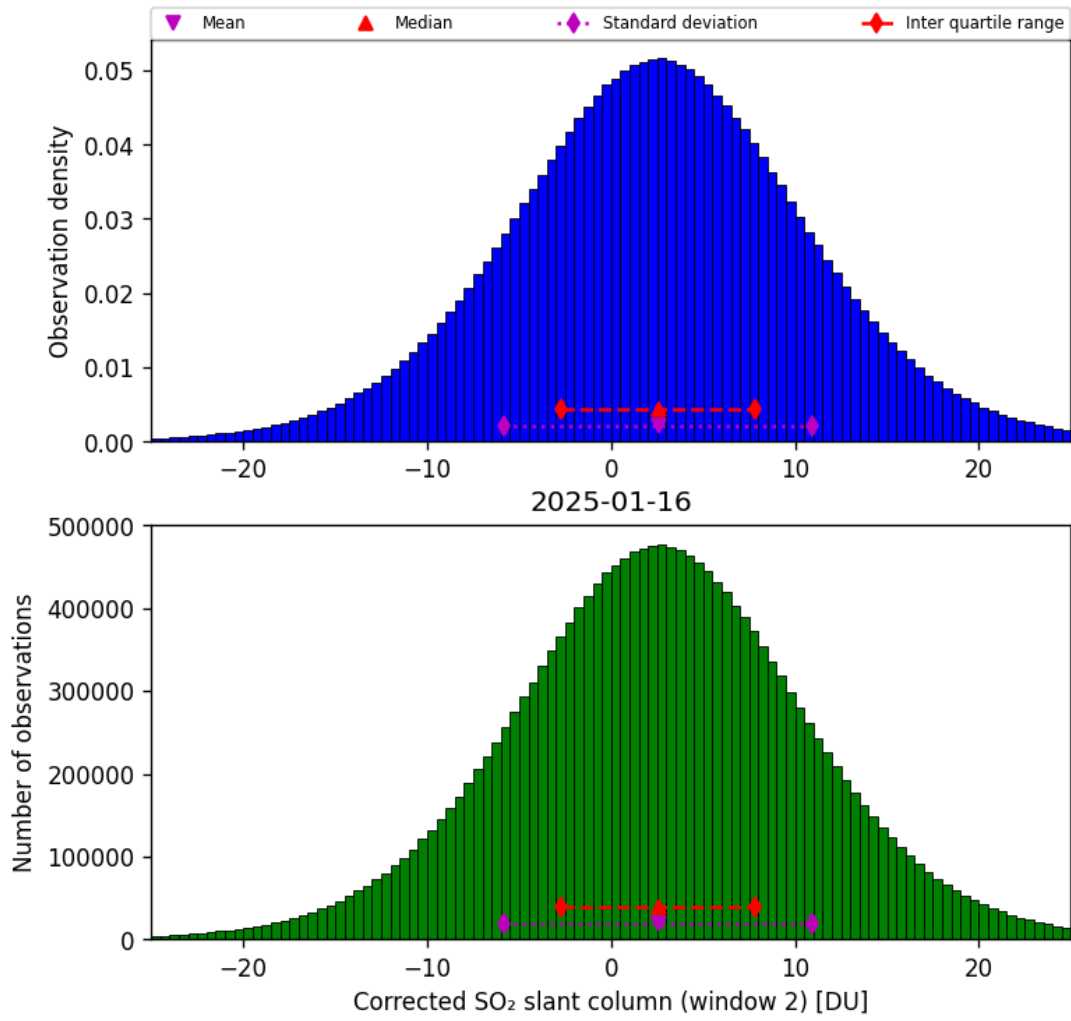


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-01-16 to 2025-01-17

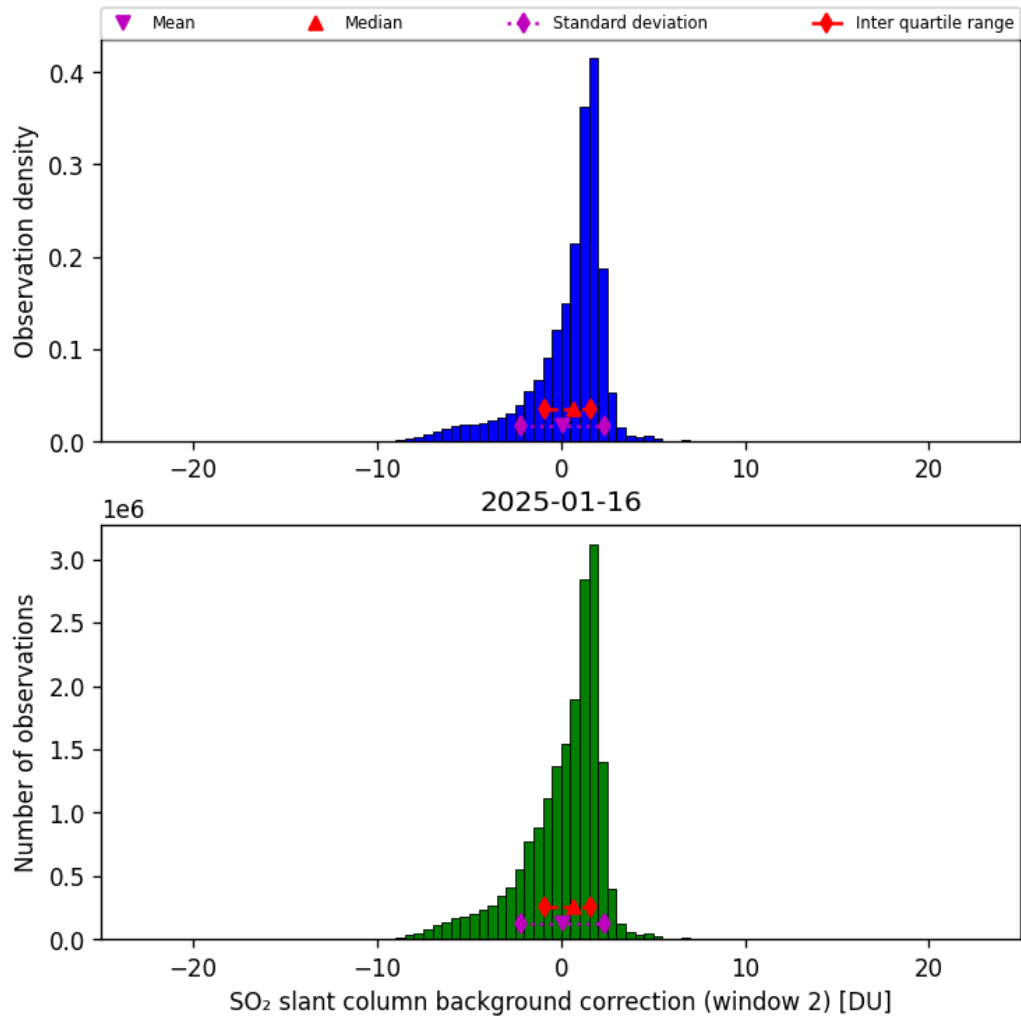


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-01-16 to 2025-01-17

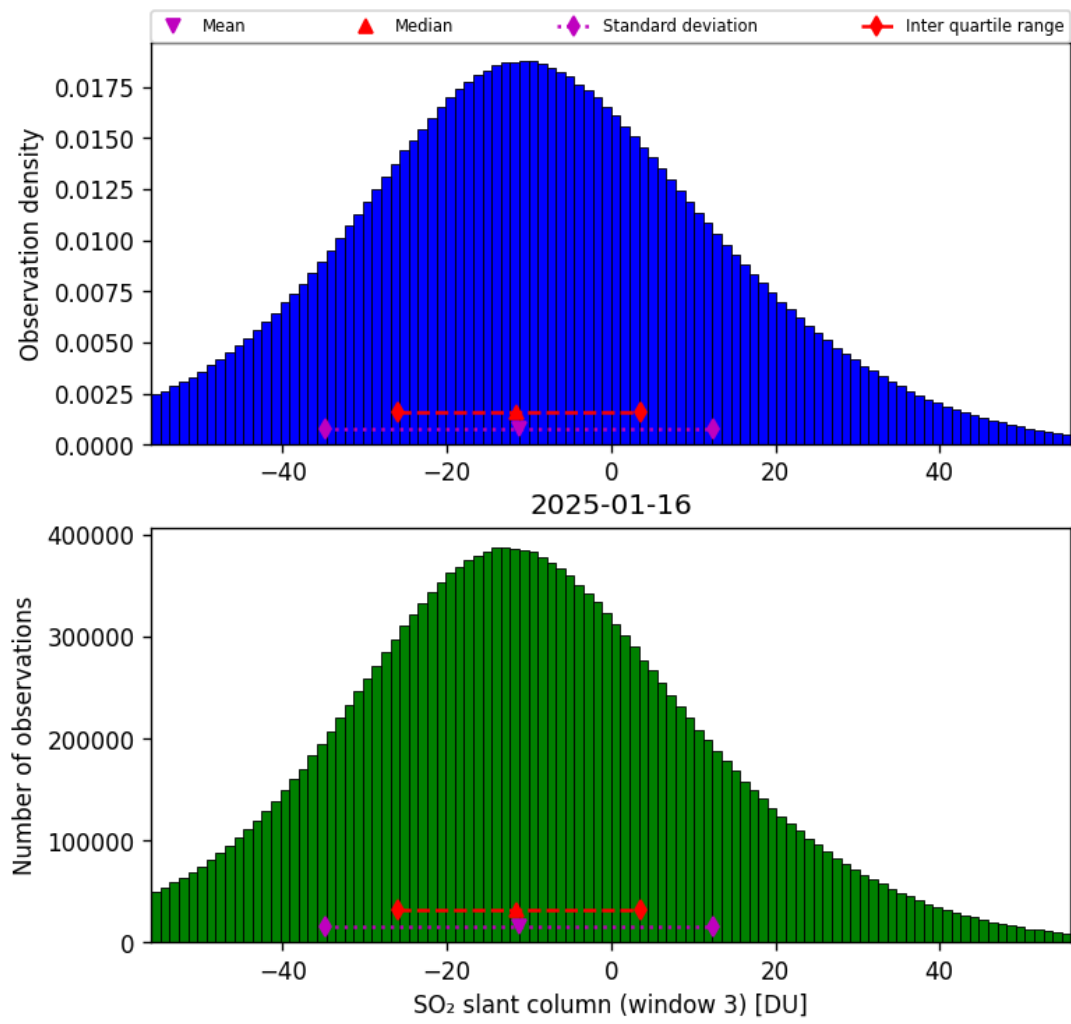


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-01-16 to 2025-01-17

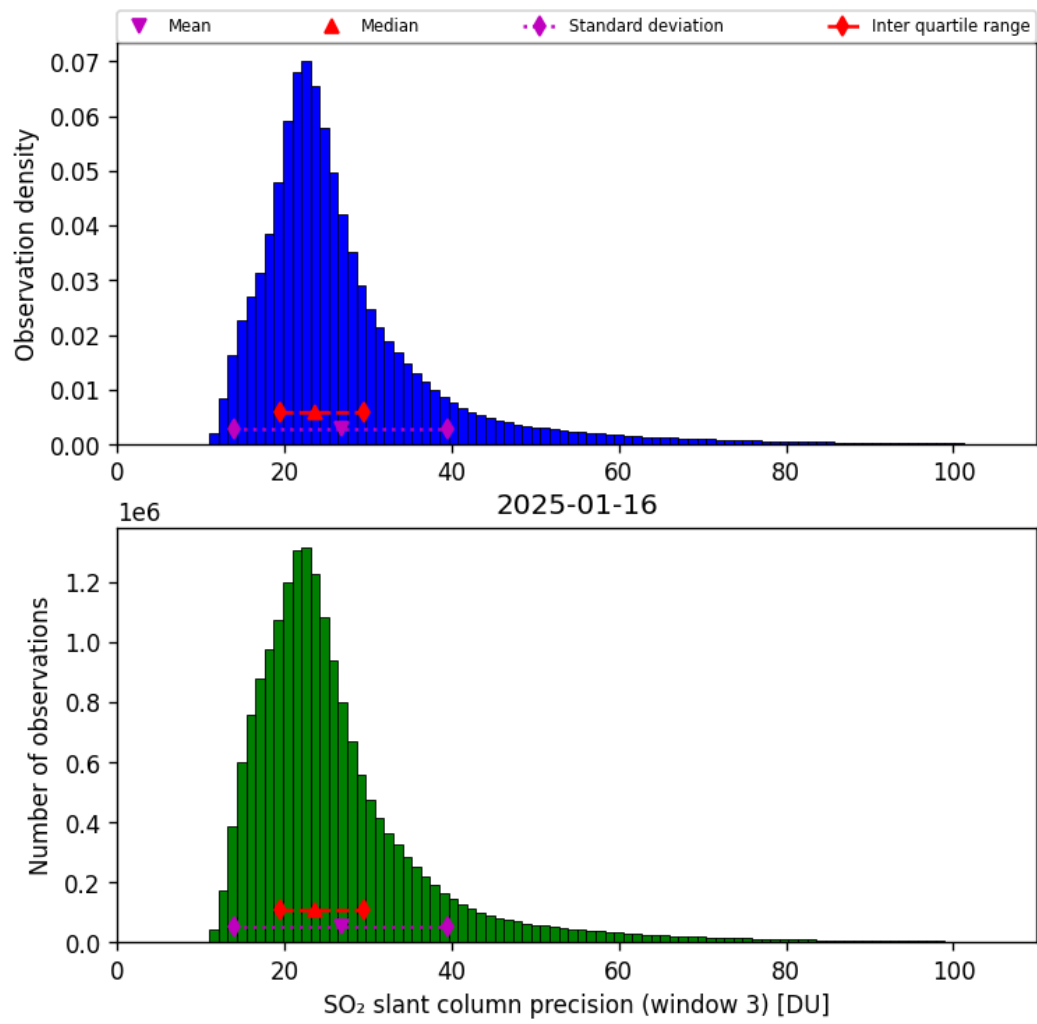


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-01-16 to 2025-01-17

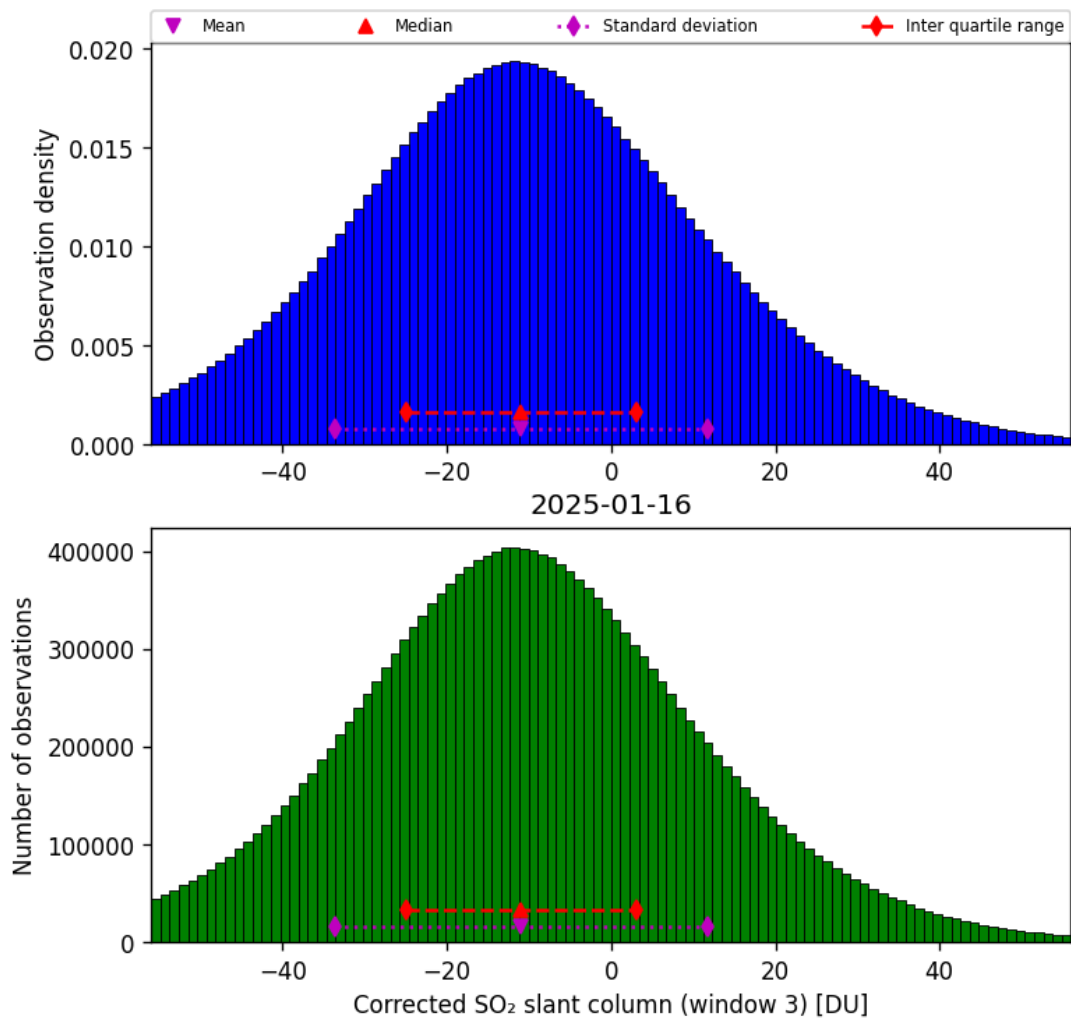


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-01-16 to 2025-01-17

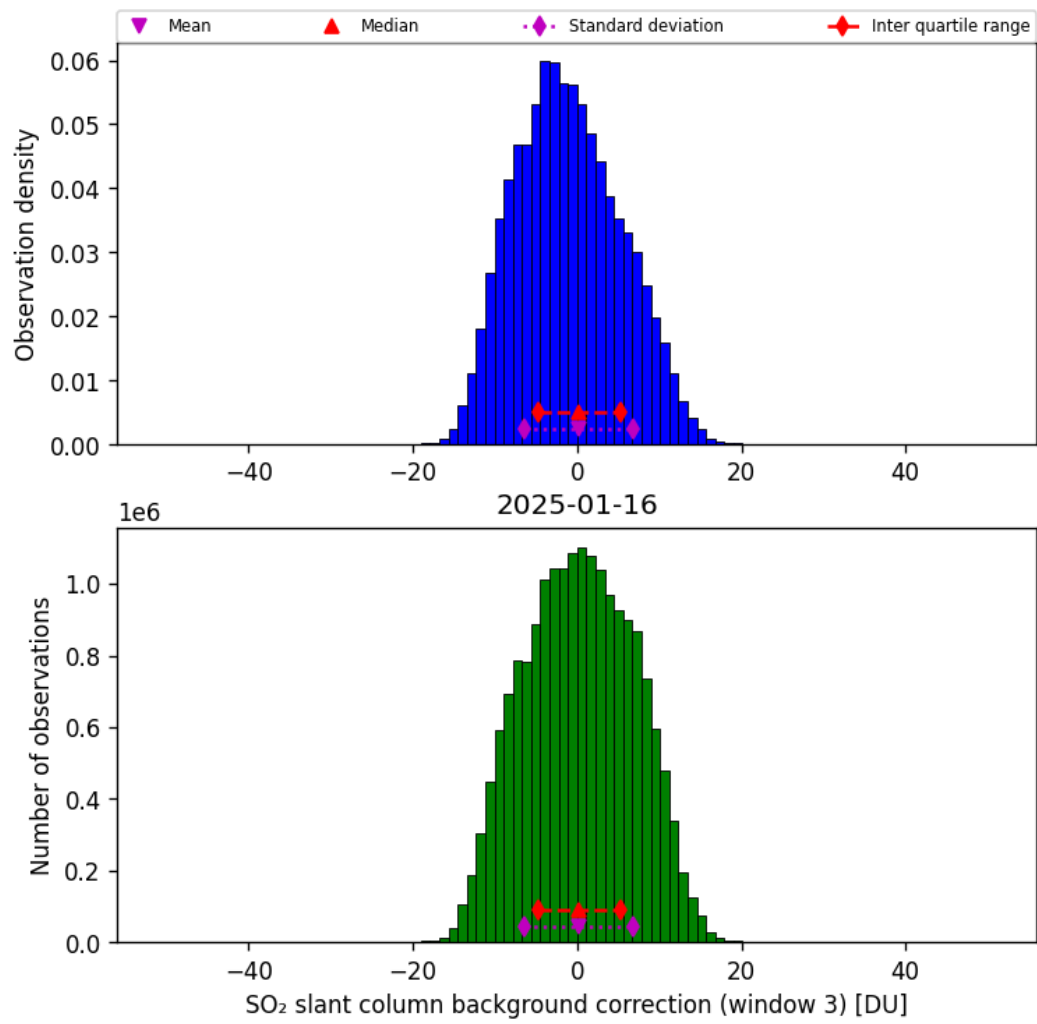


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-01-16 to 2025-01-17

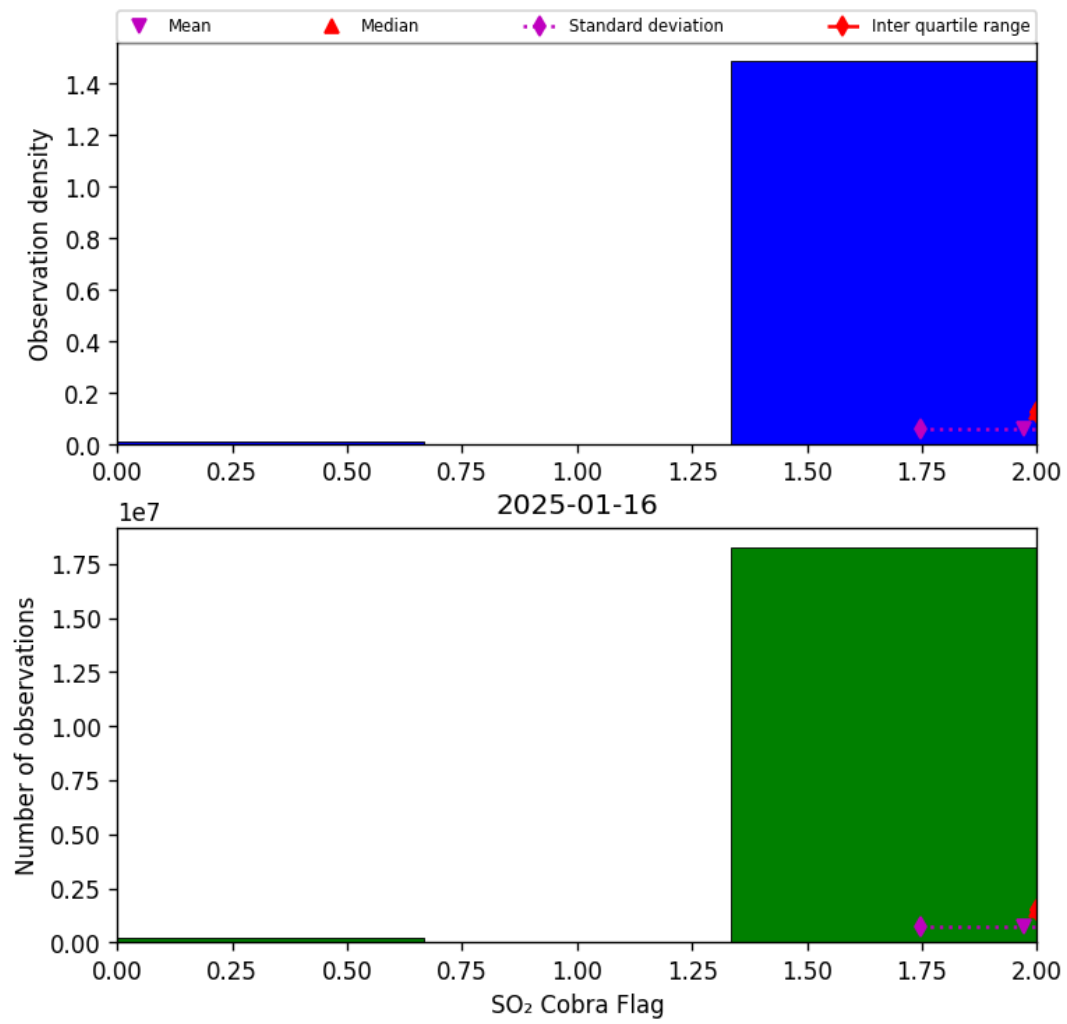


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-01-16 to 2025-01-17

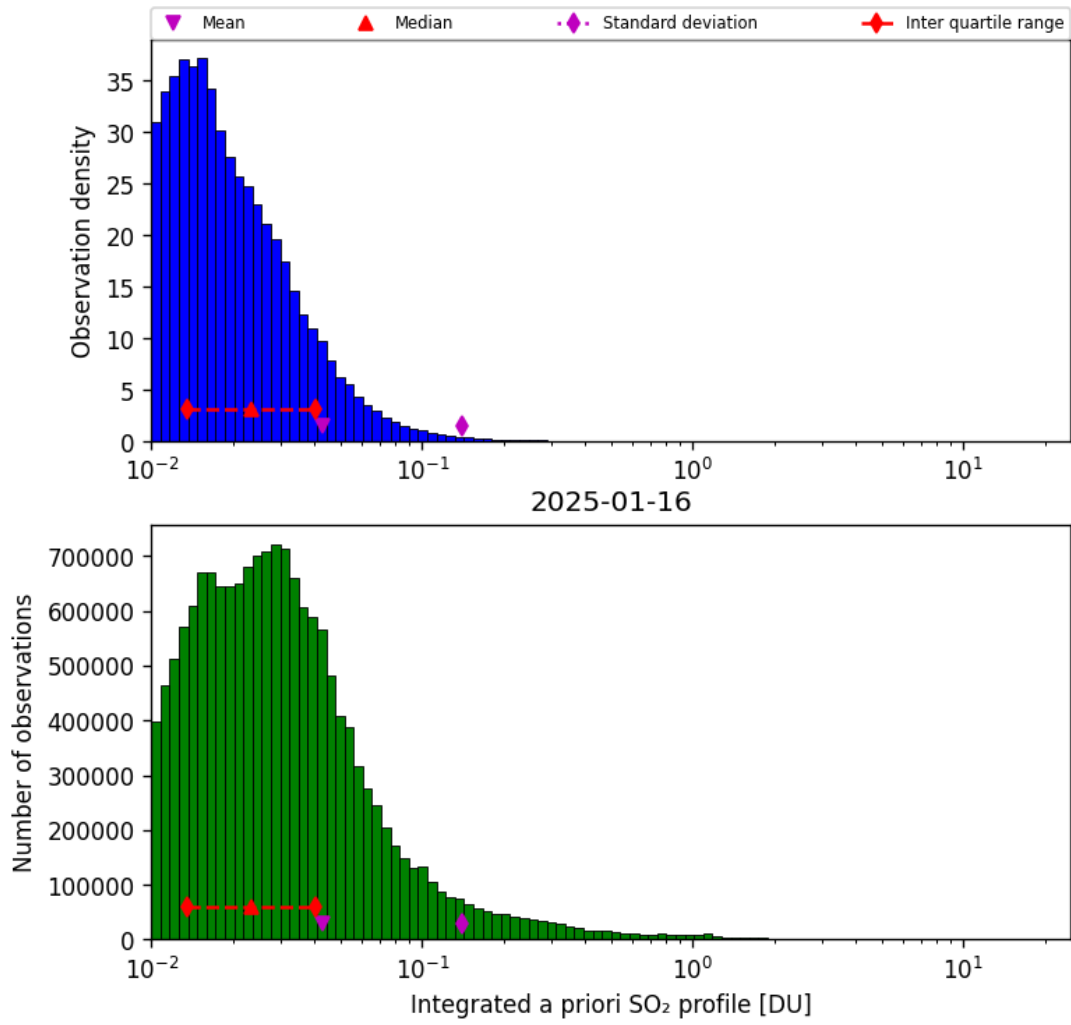


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-01-16 to 2025-01-17

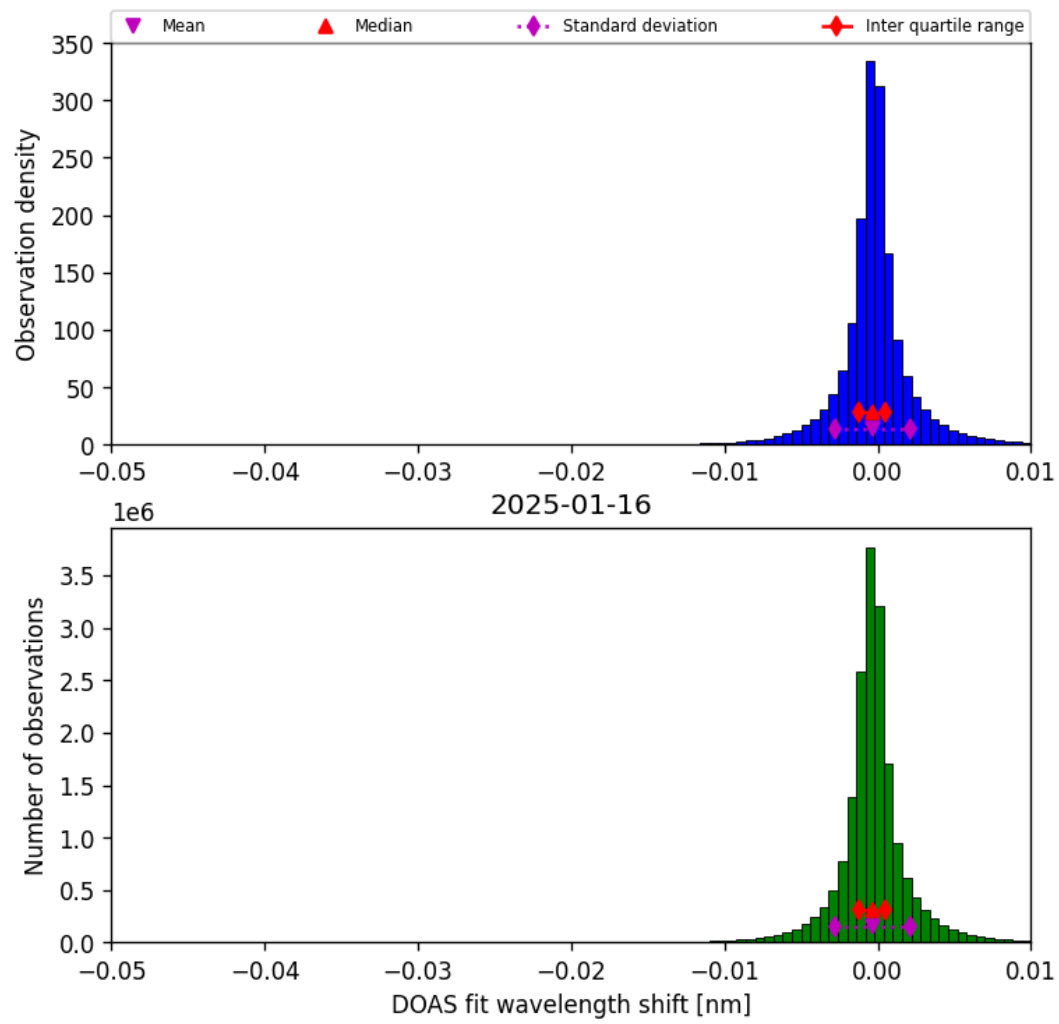


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-01-16 to 2025-01-17

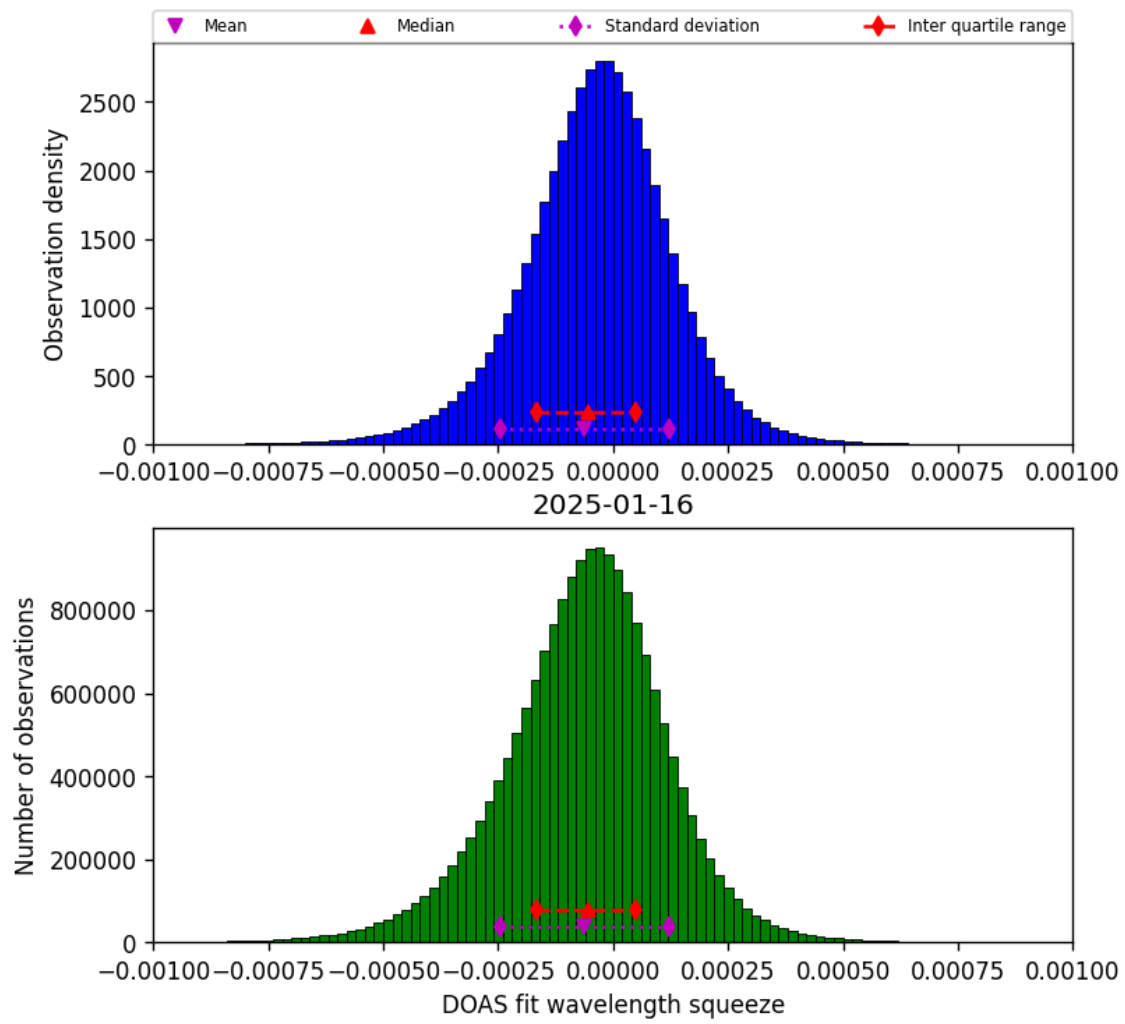


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-01-16 to 2025-01-17

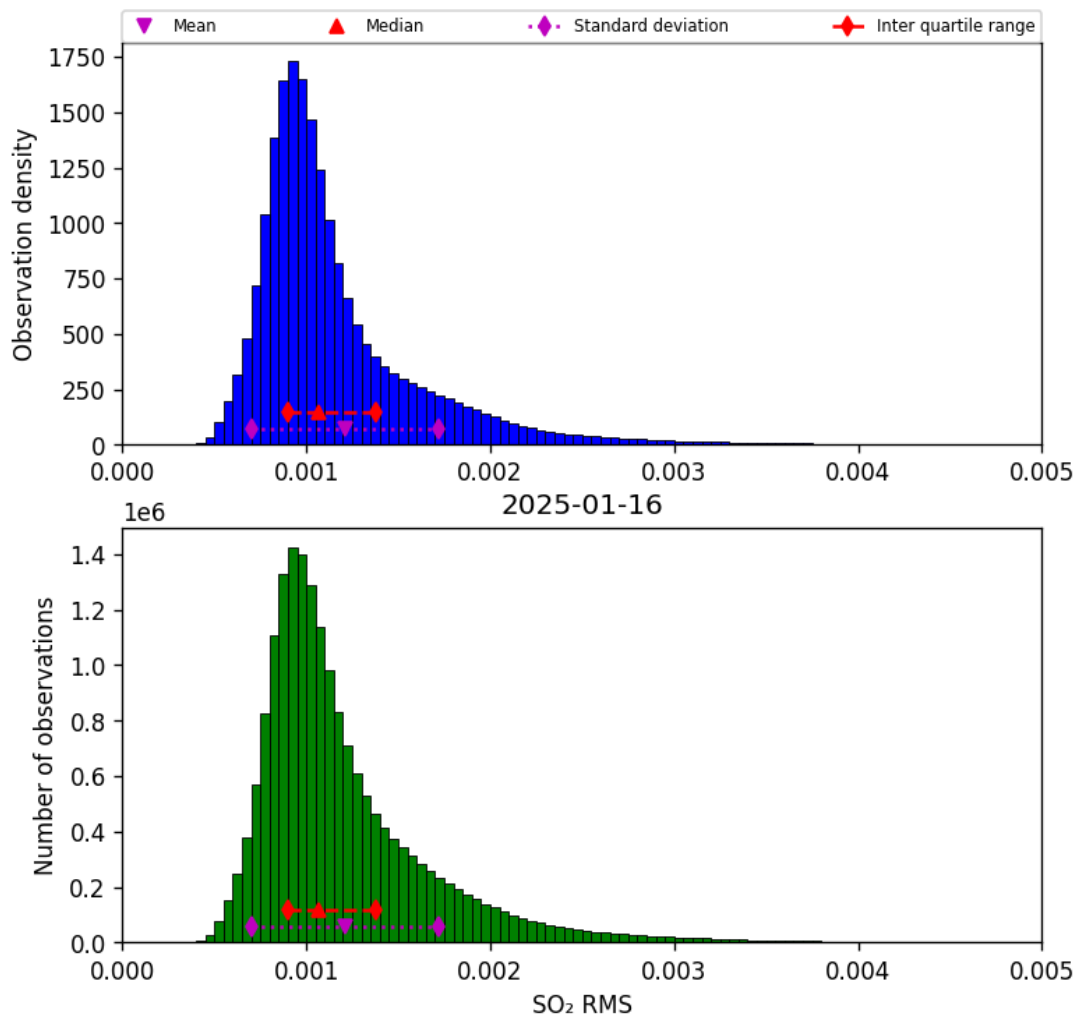


Figure 79: Histogram of "SO₂ RMS" for 2025-01-16 to 2025-01-17

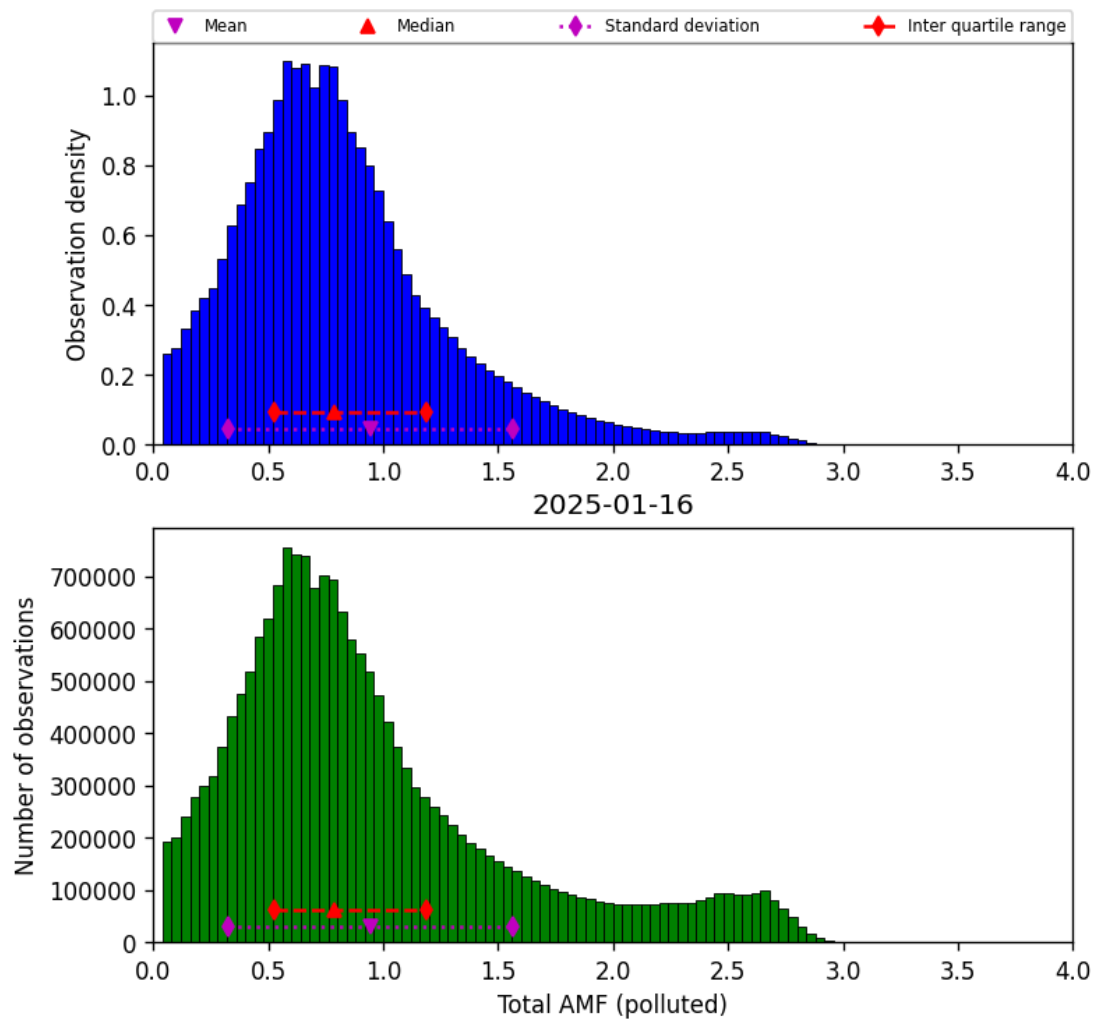


Figure 80: Histogram of “Total AMF (polluted)” for 2025-01-16 to 2025-01-17

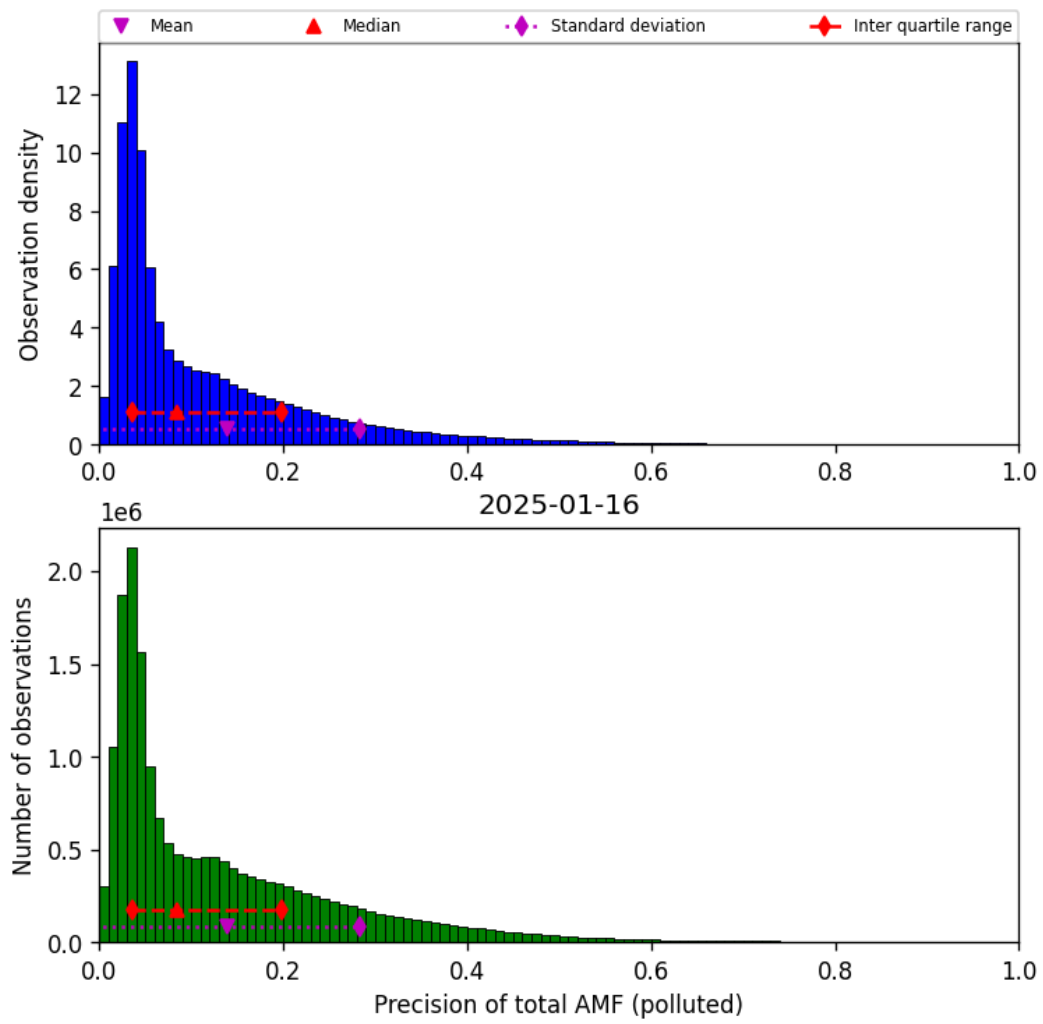


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-01-16 to 2025-01-17

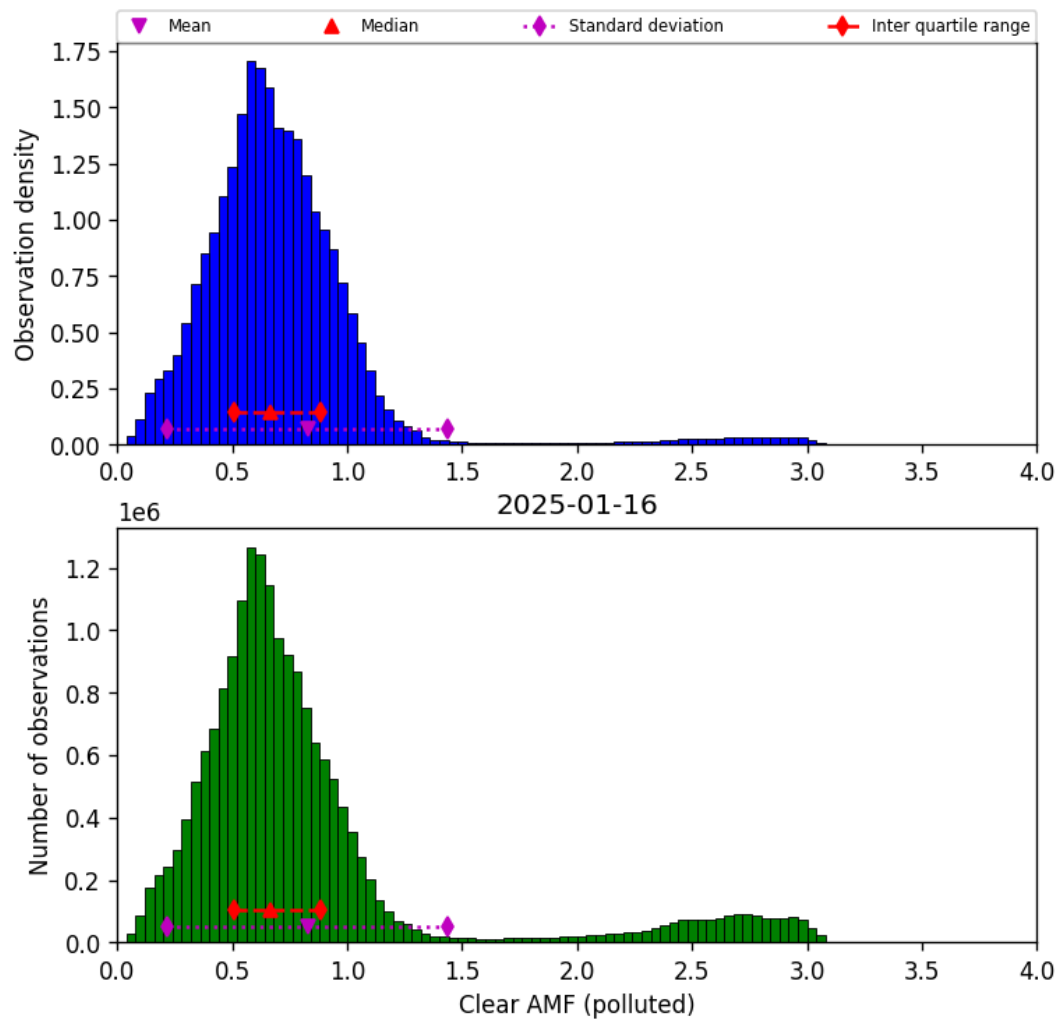


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-01-16 to 2025-01-17

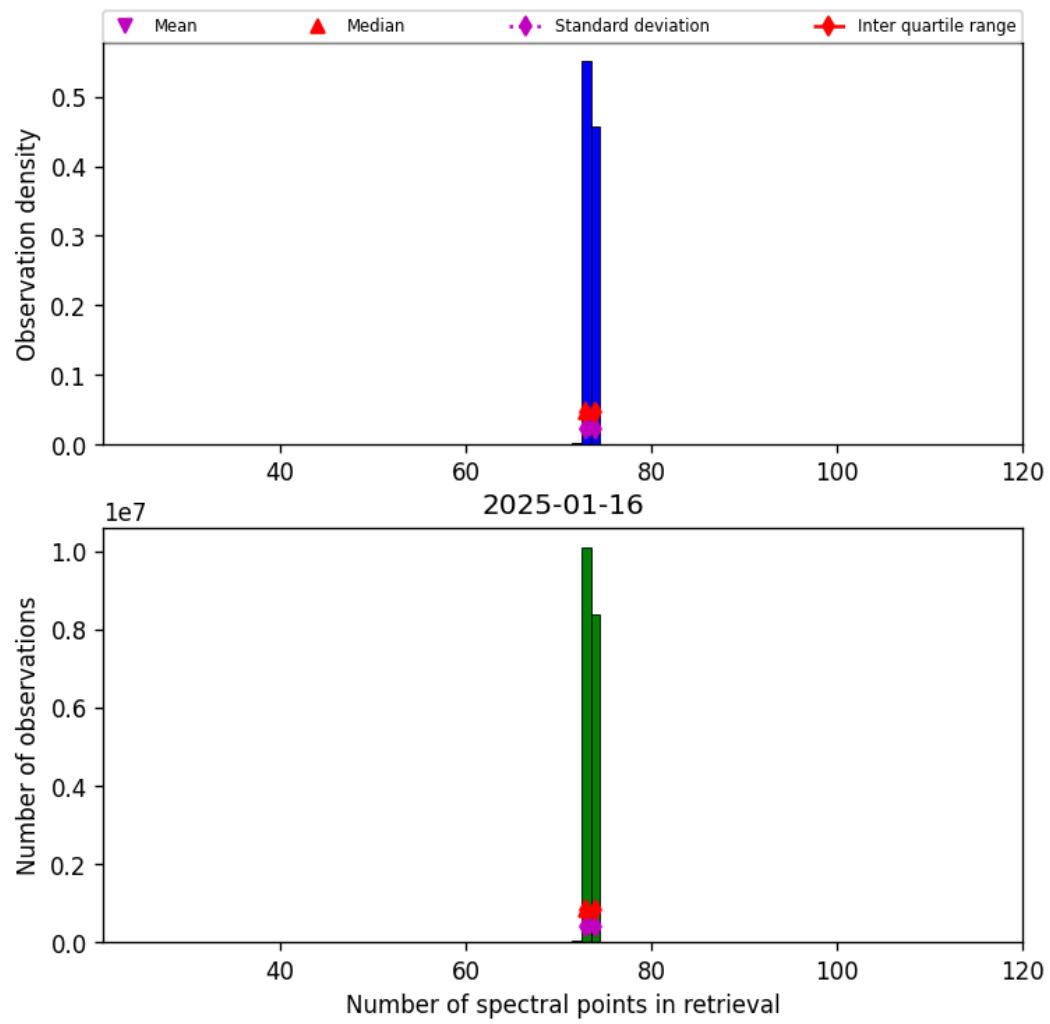


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-01-16 to 2025-01-17

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.

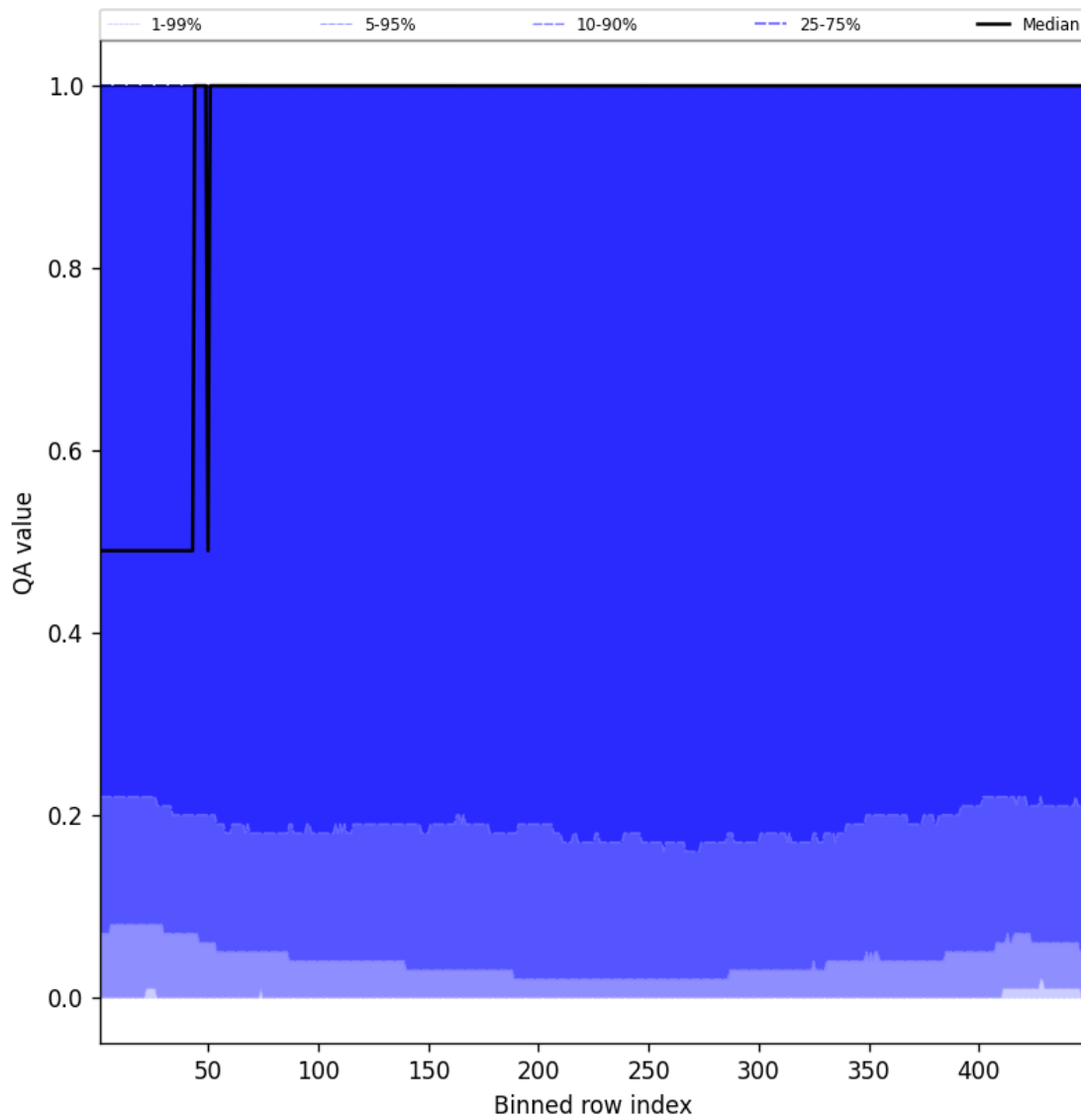


Figure 84: Along track statistics of “QA value” for 2025-01-16 to 2025-01-17

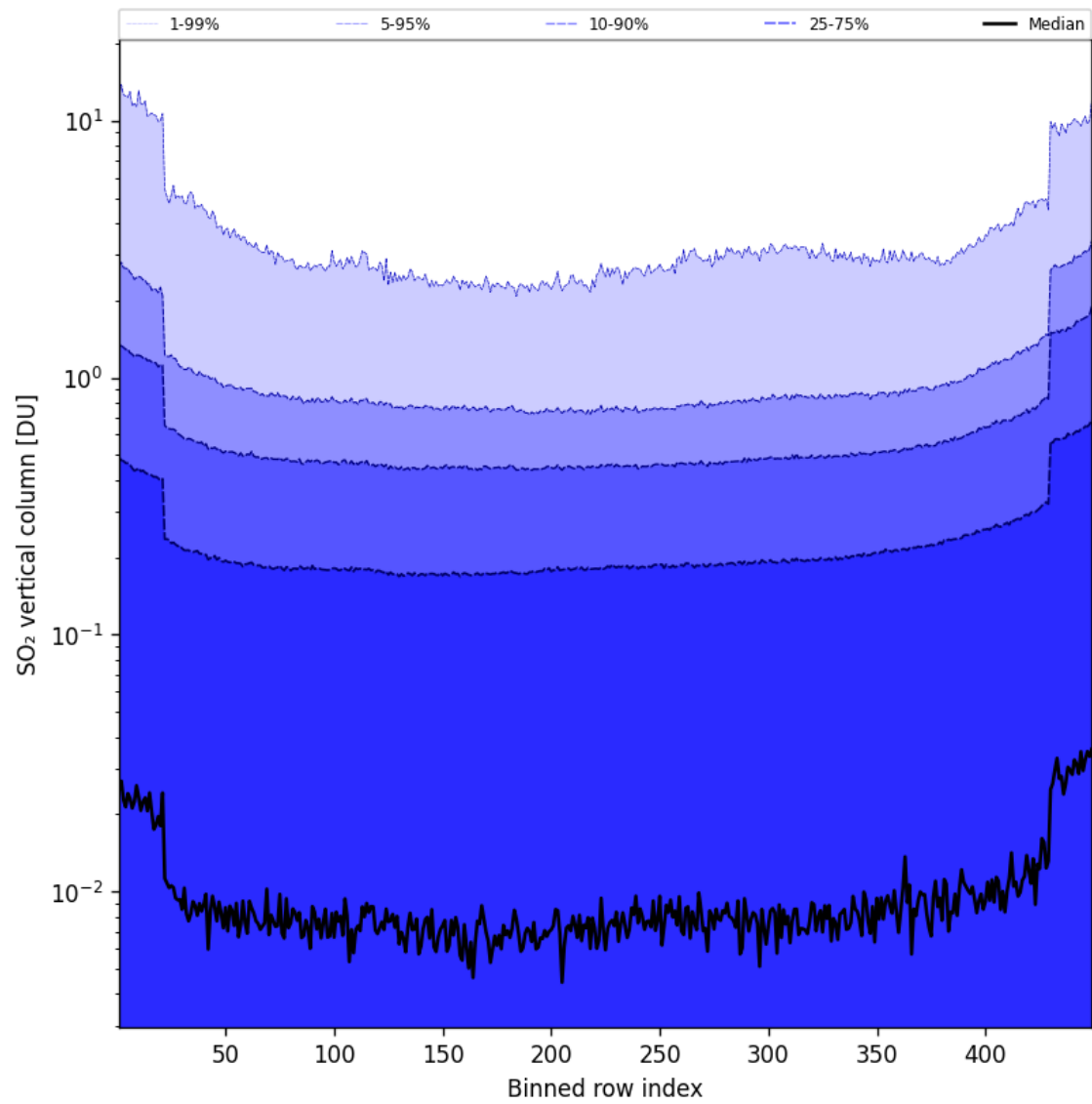


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-01-16 to 2025-01-17

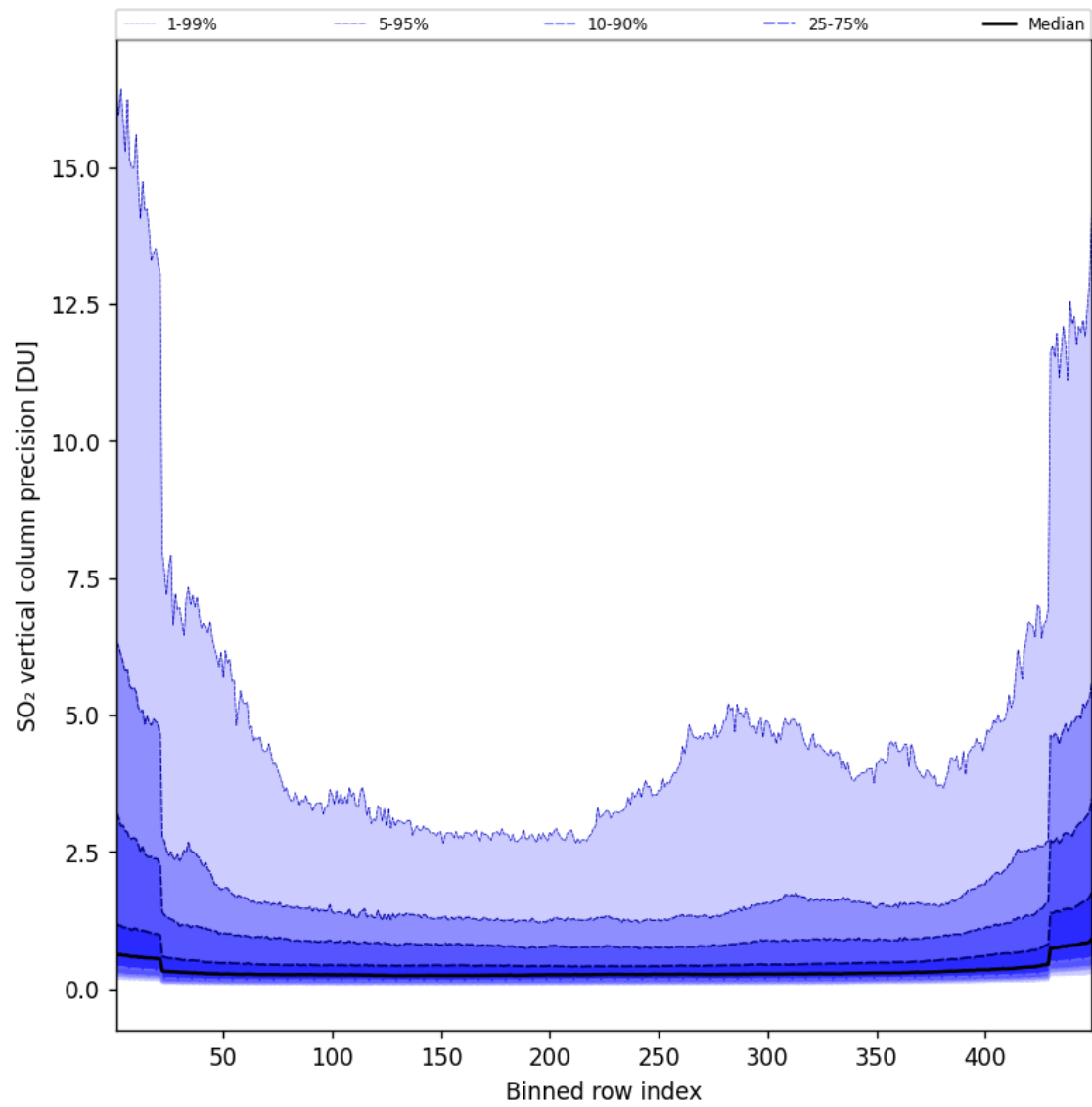


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-01-16 to 2025-01-17

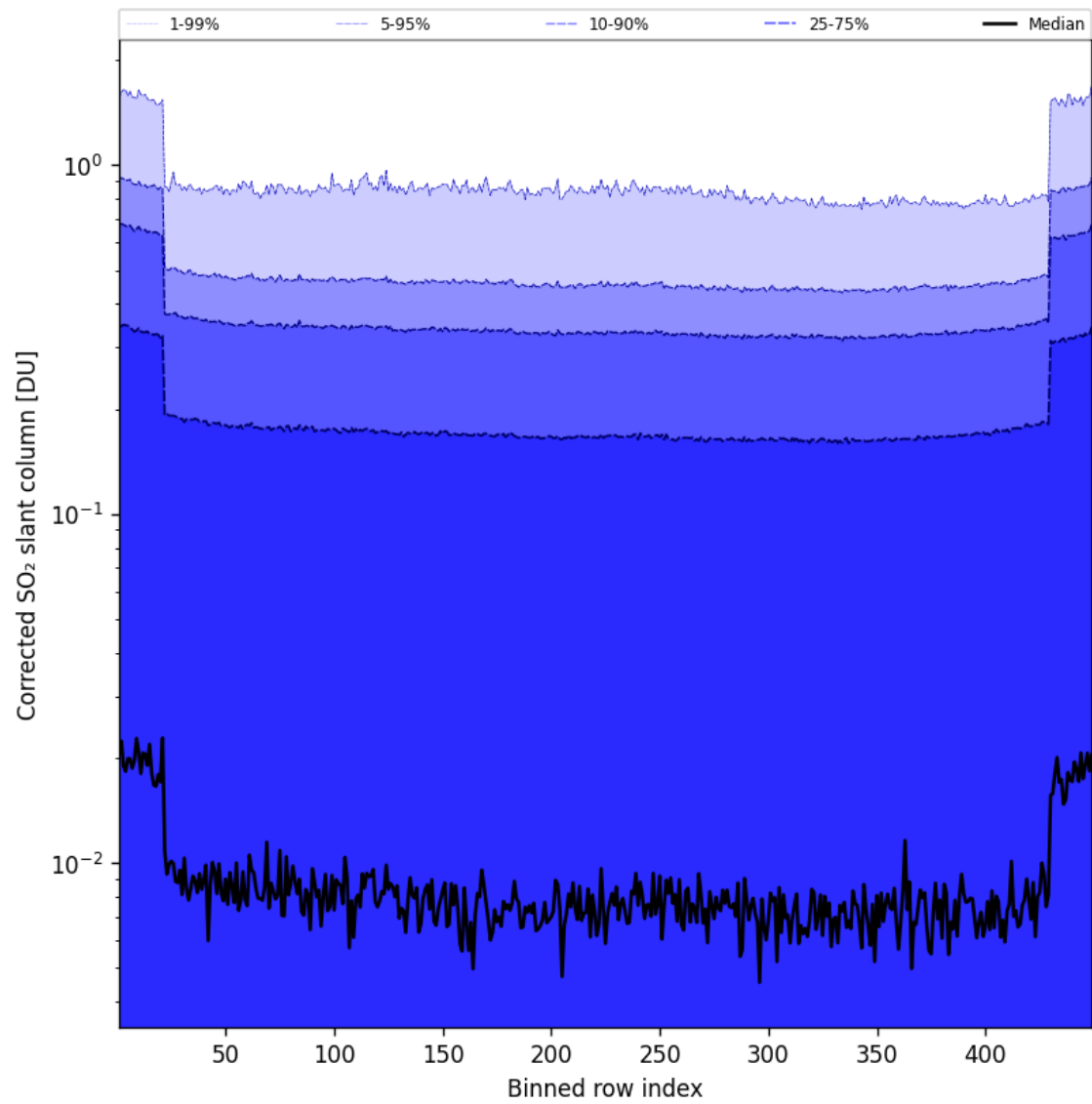


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-01-16 to 2025-01-17

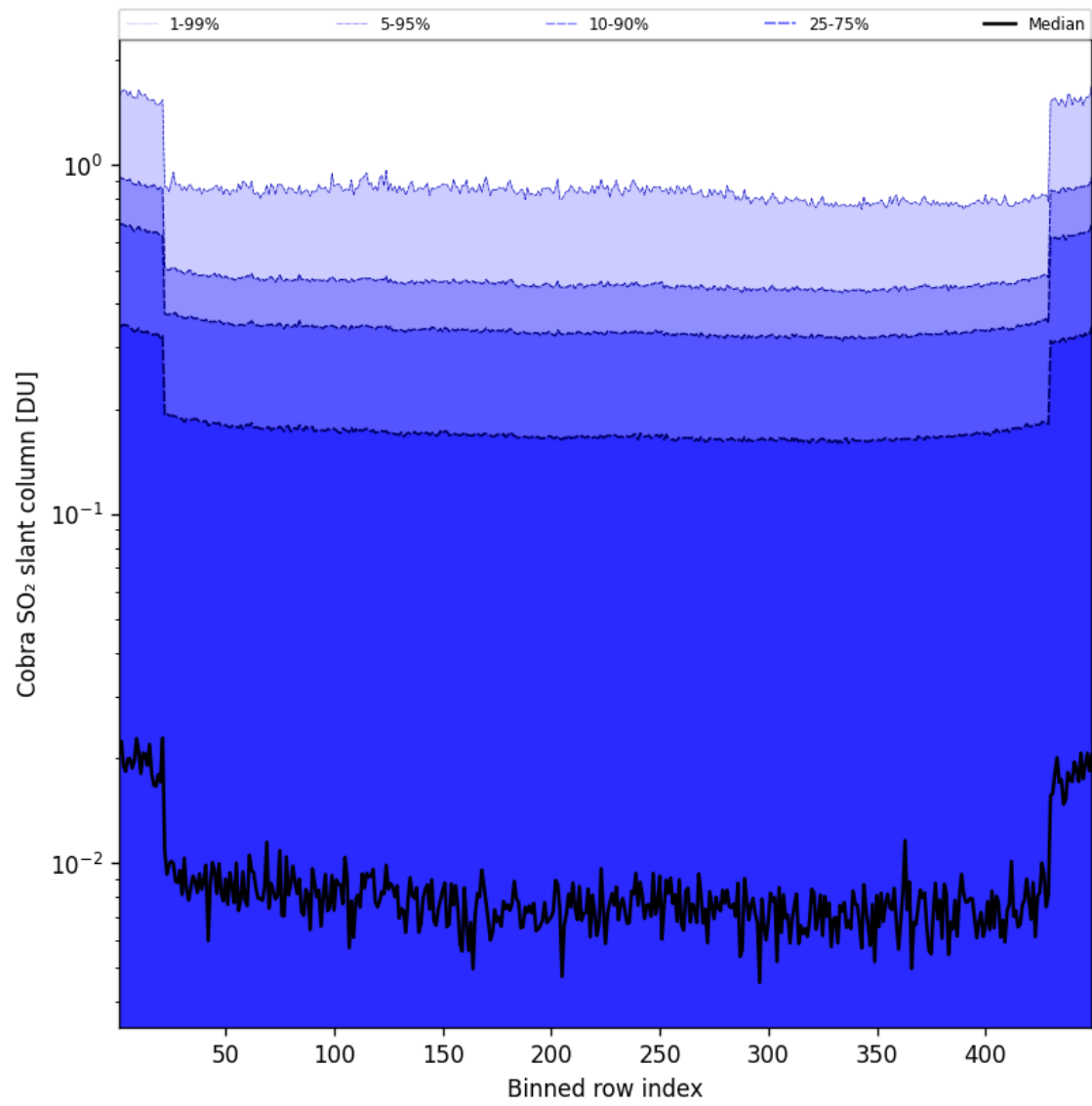


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-01-16 to 2025-01-17

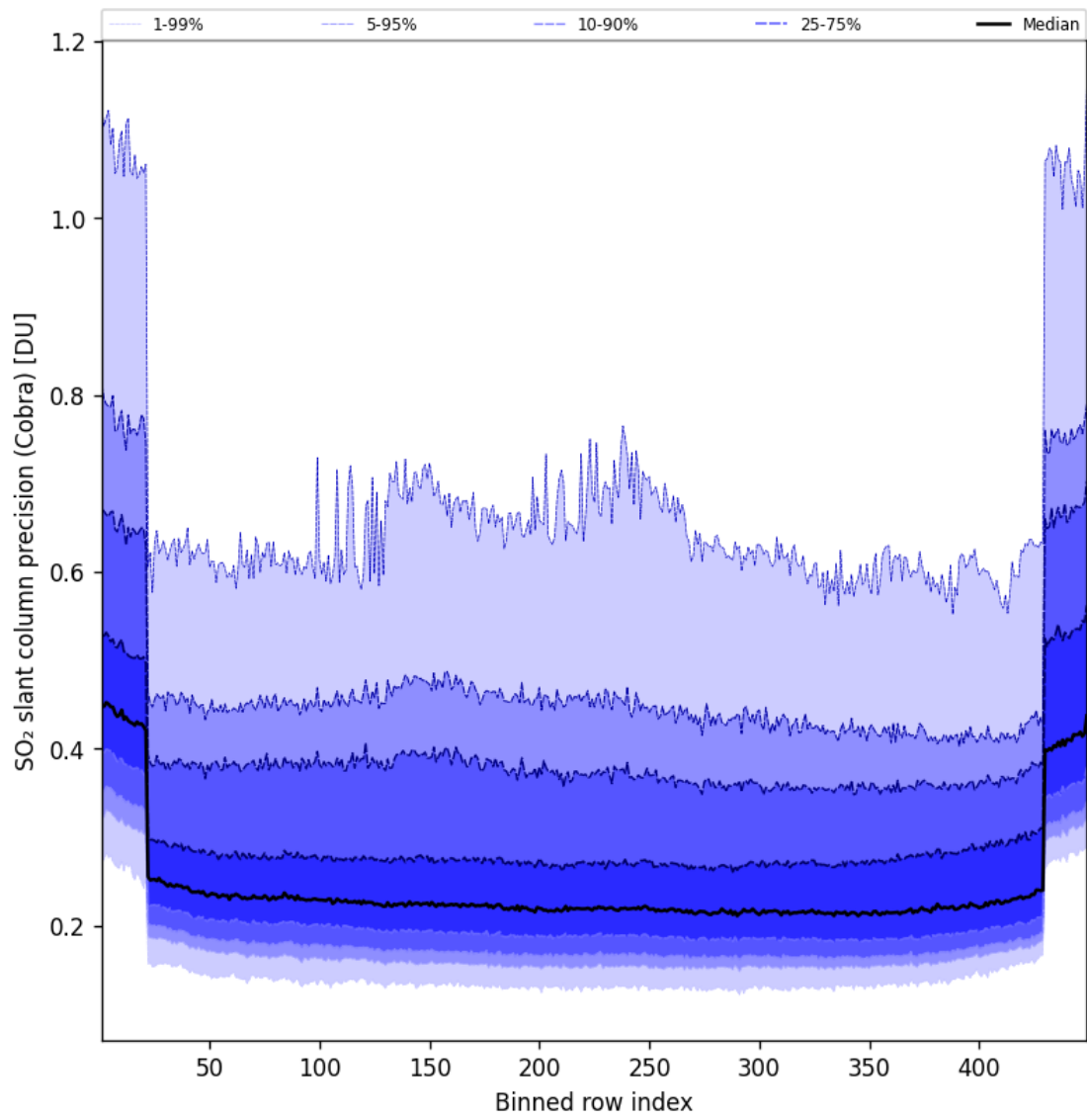


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-01-16 to 2025-01-17

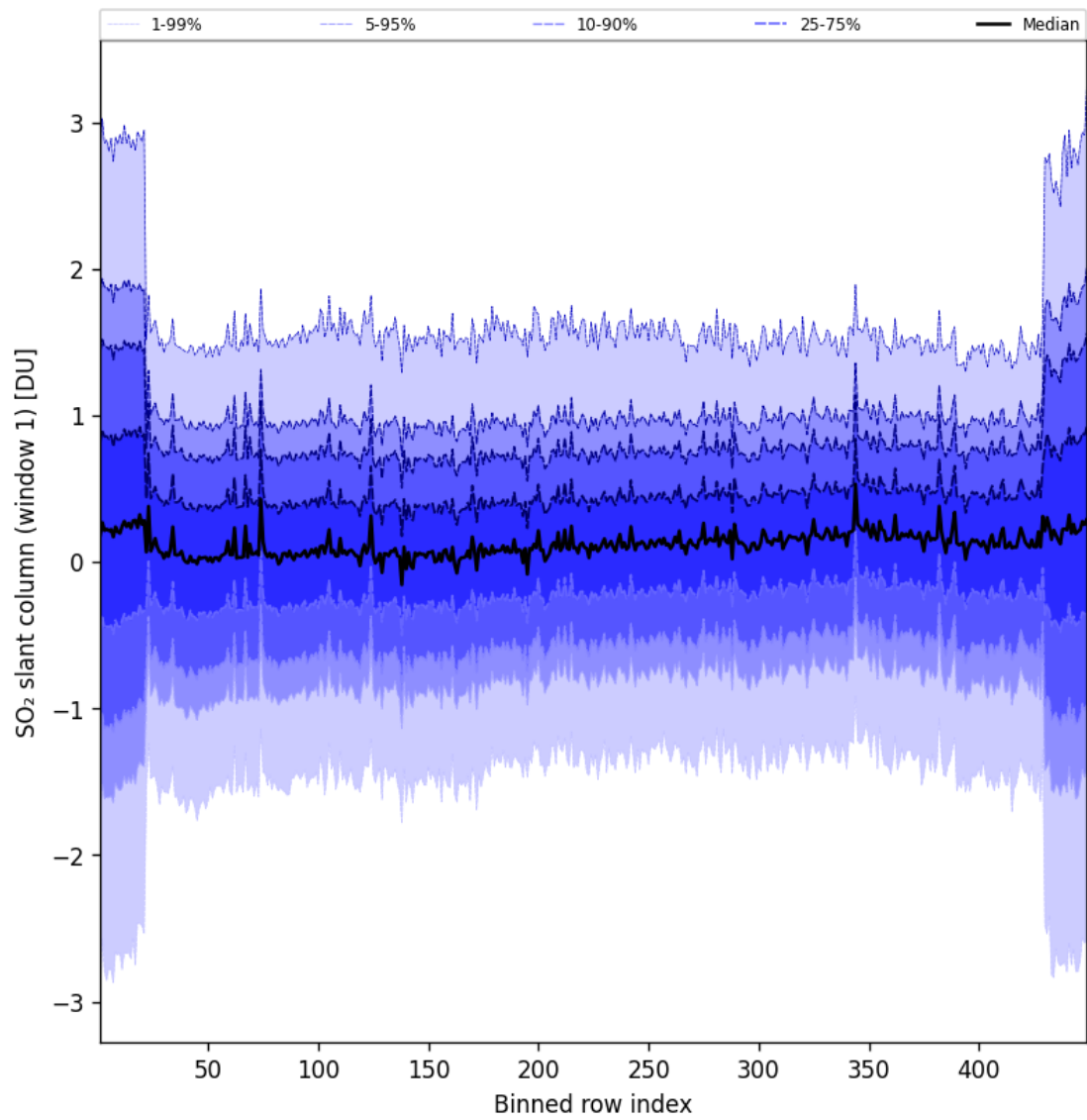


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-01-16 to 2025-01-17

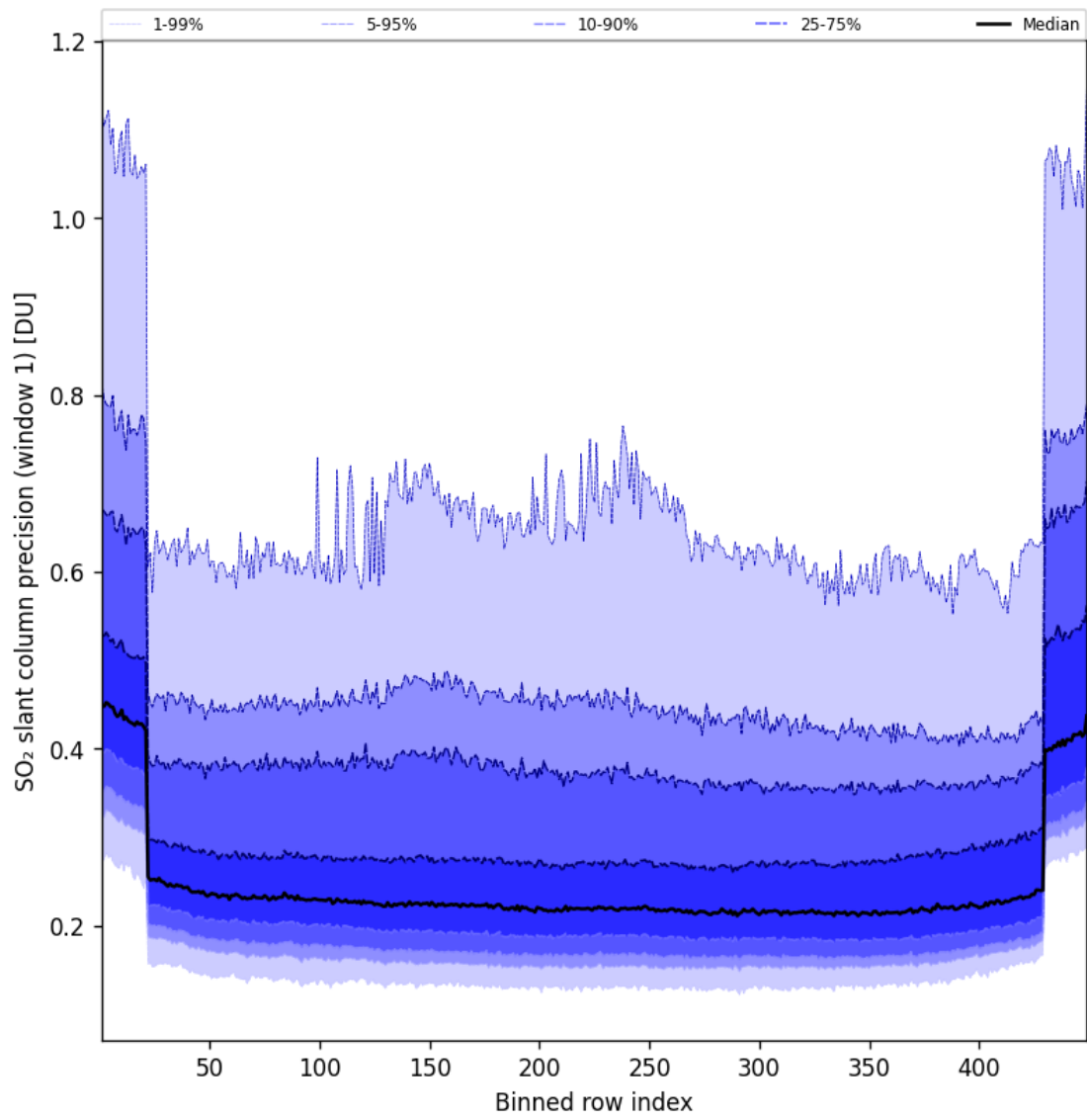


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-01-16 to 2025-01-17

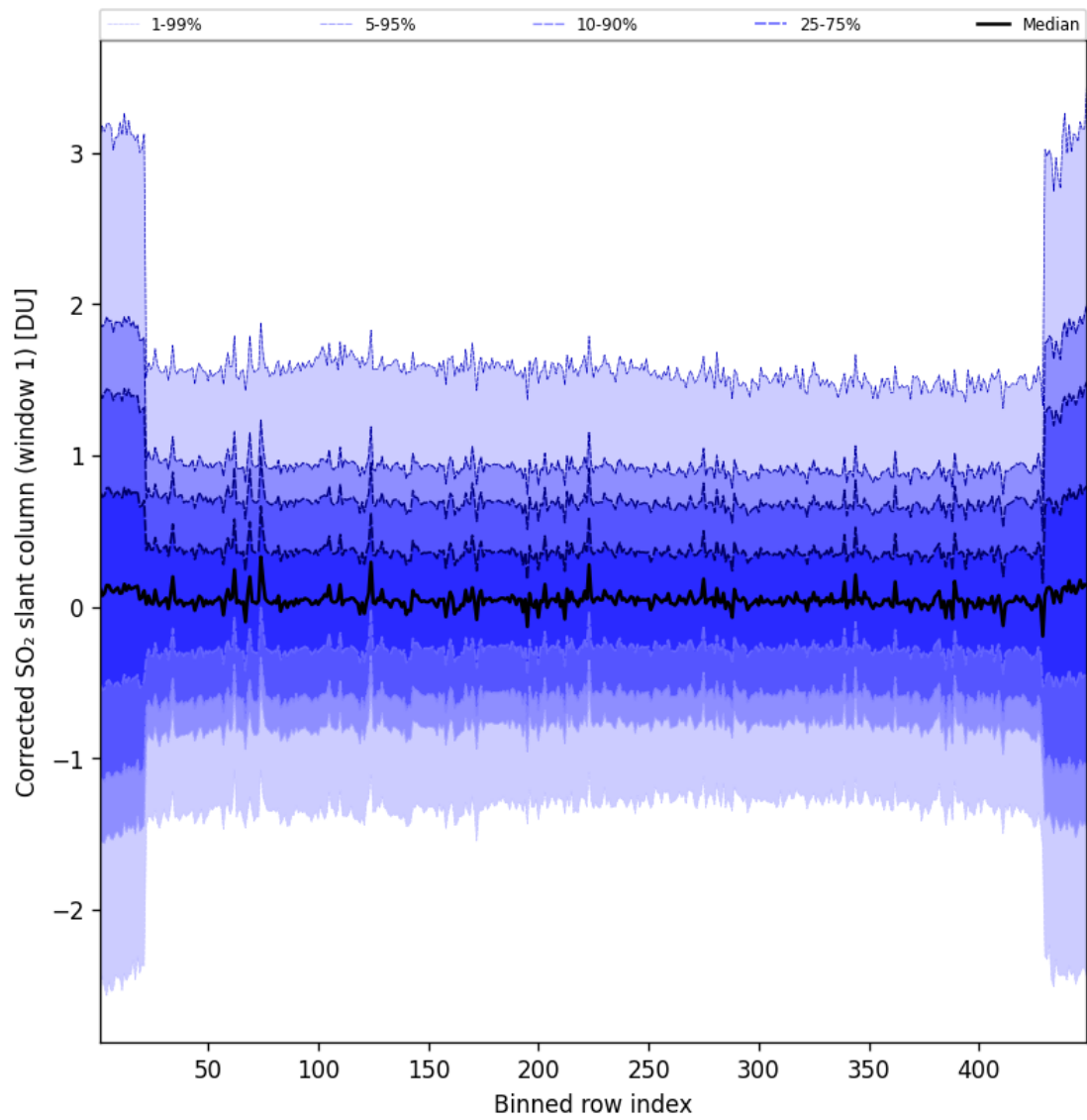


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-01-16 to 2025-01-17

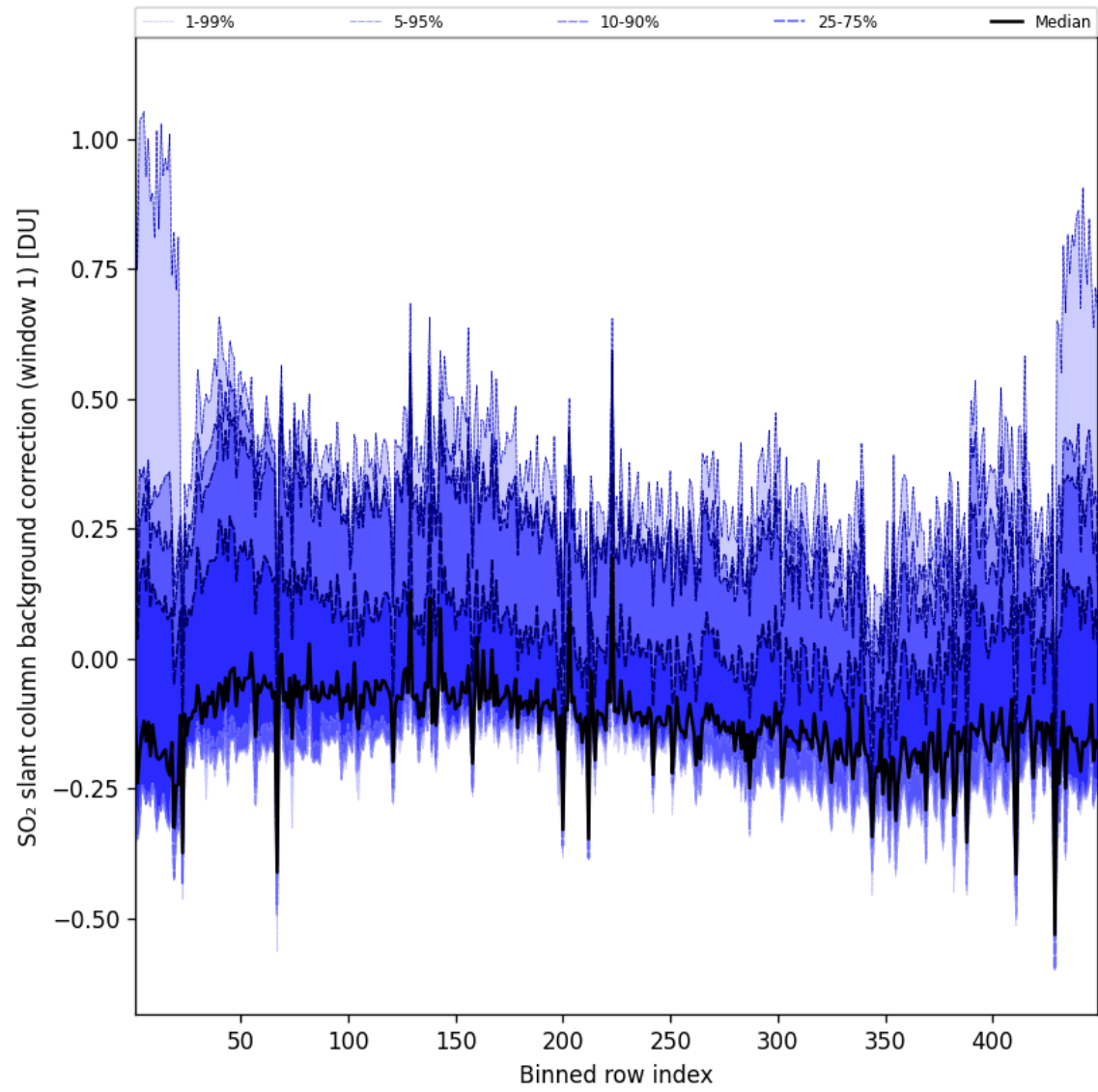


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-01-16 to 2025-01-17

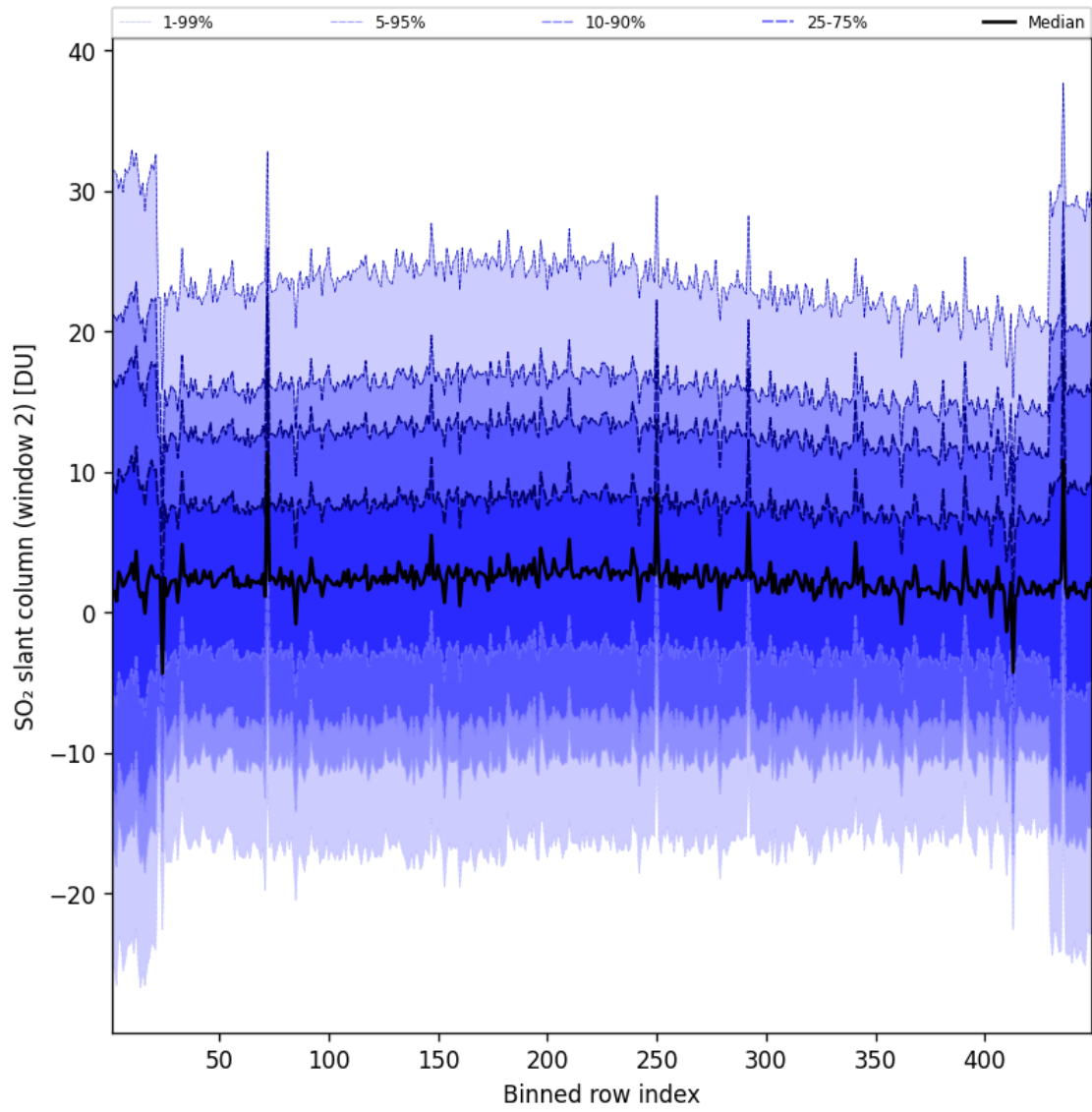


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-01-16 to 2025-01-17

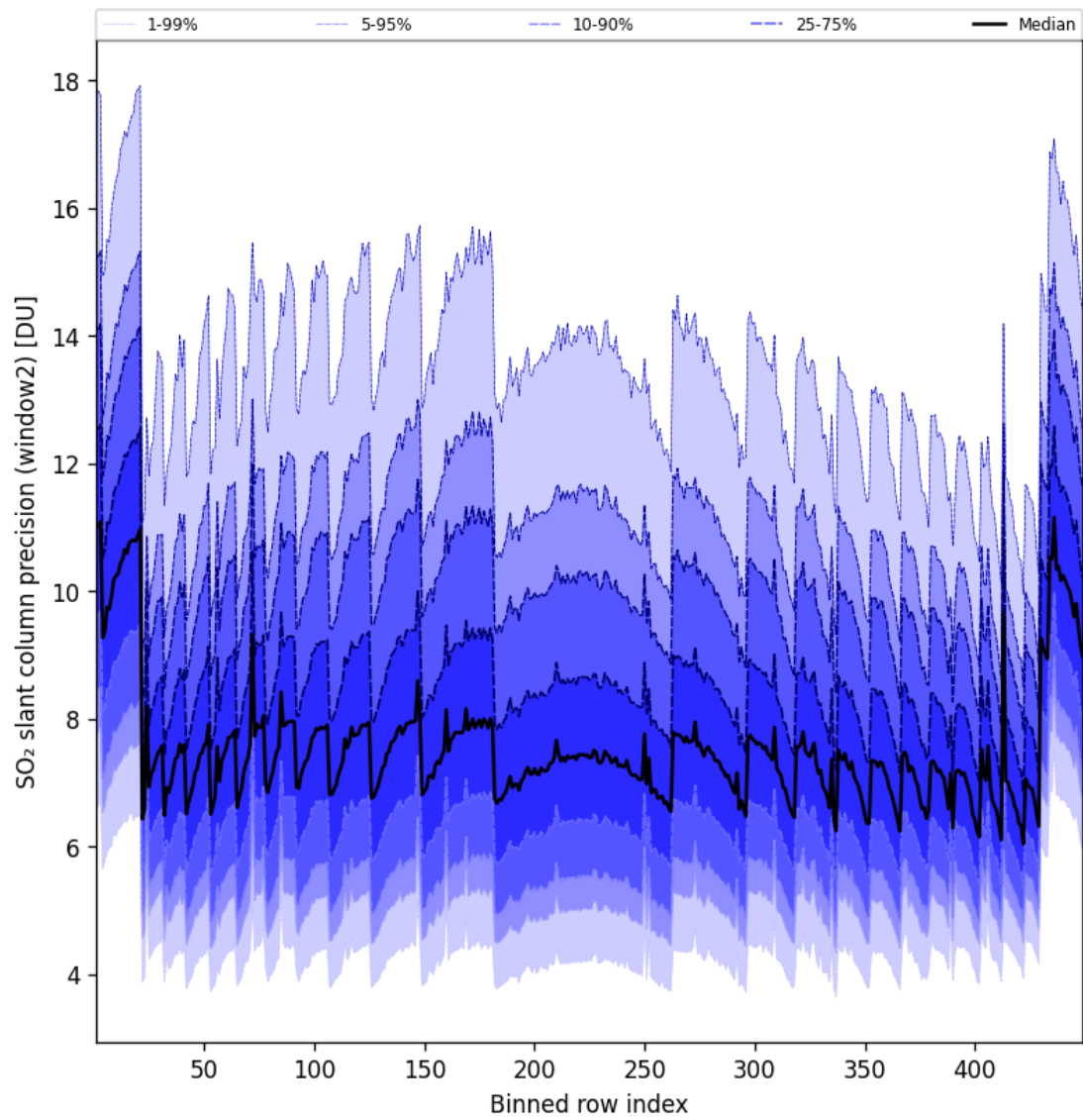


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-01-16 to 2025-01-17

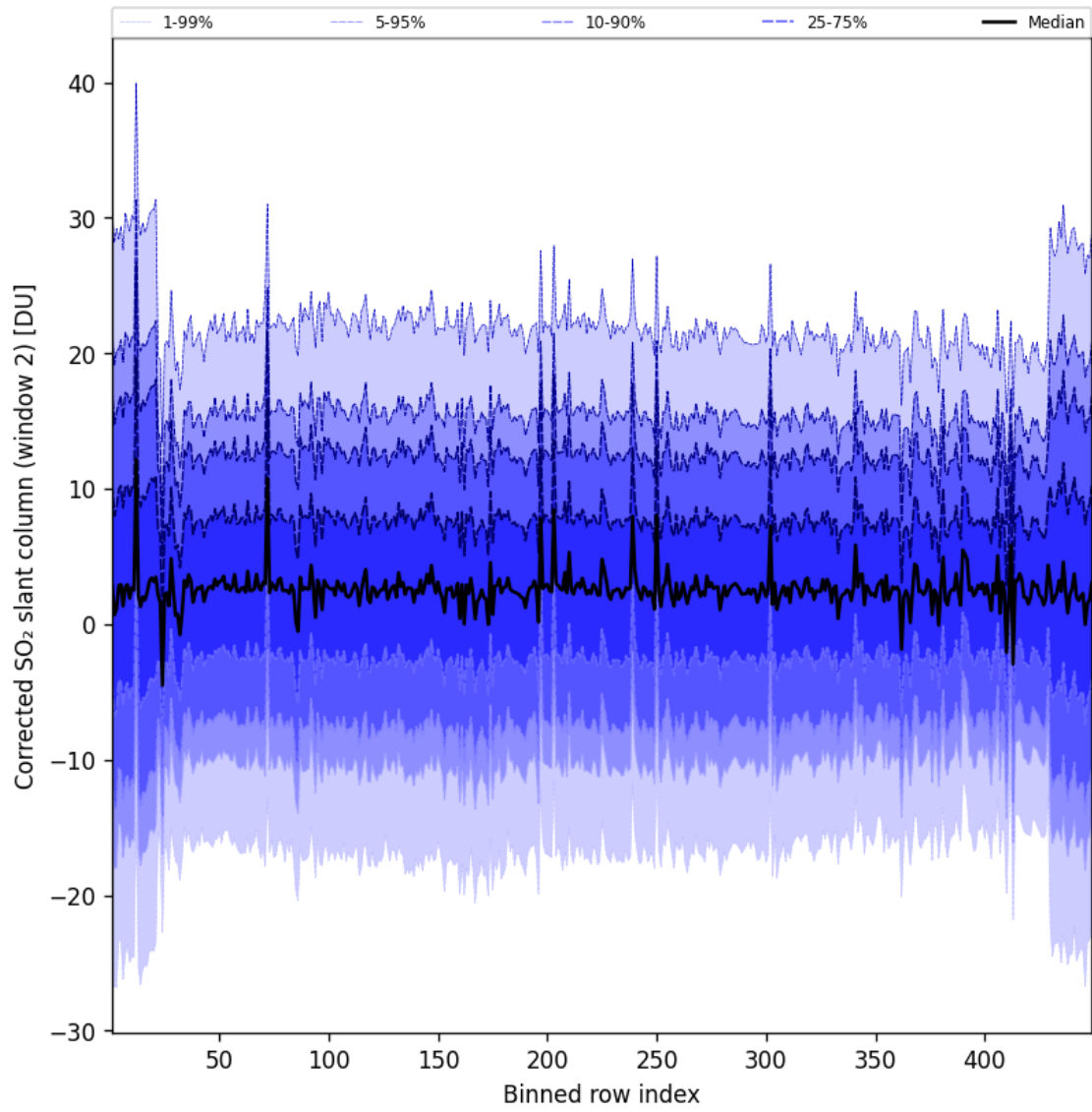


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-01-16 to 2025-01-17

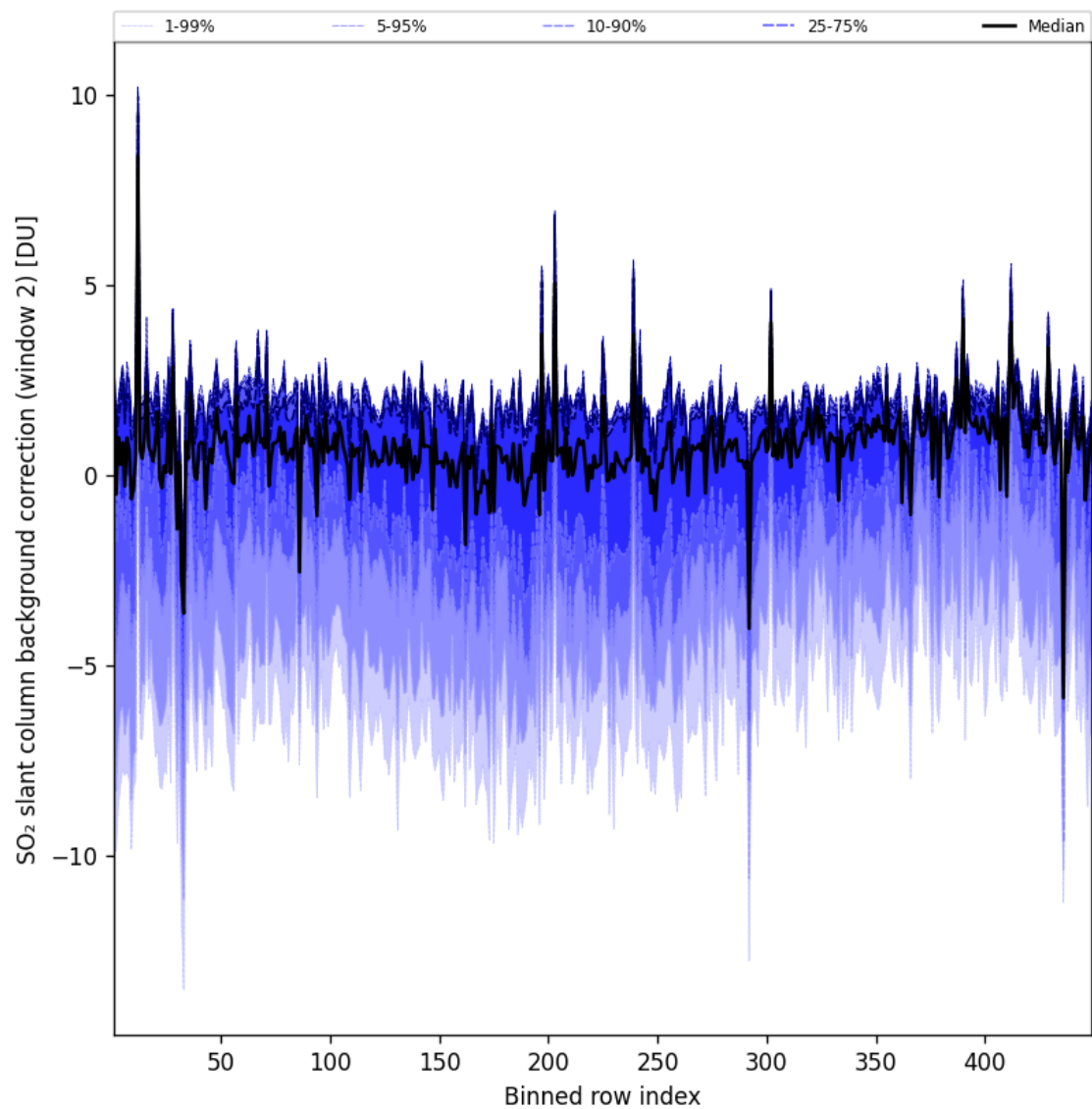


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-01-16 to 2025-01-17

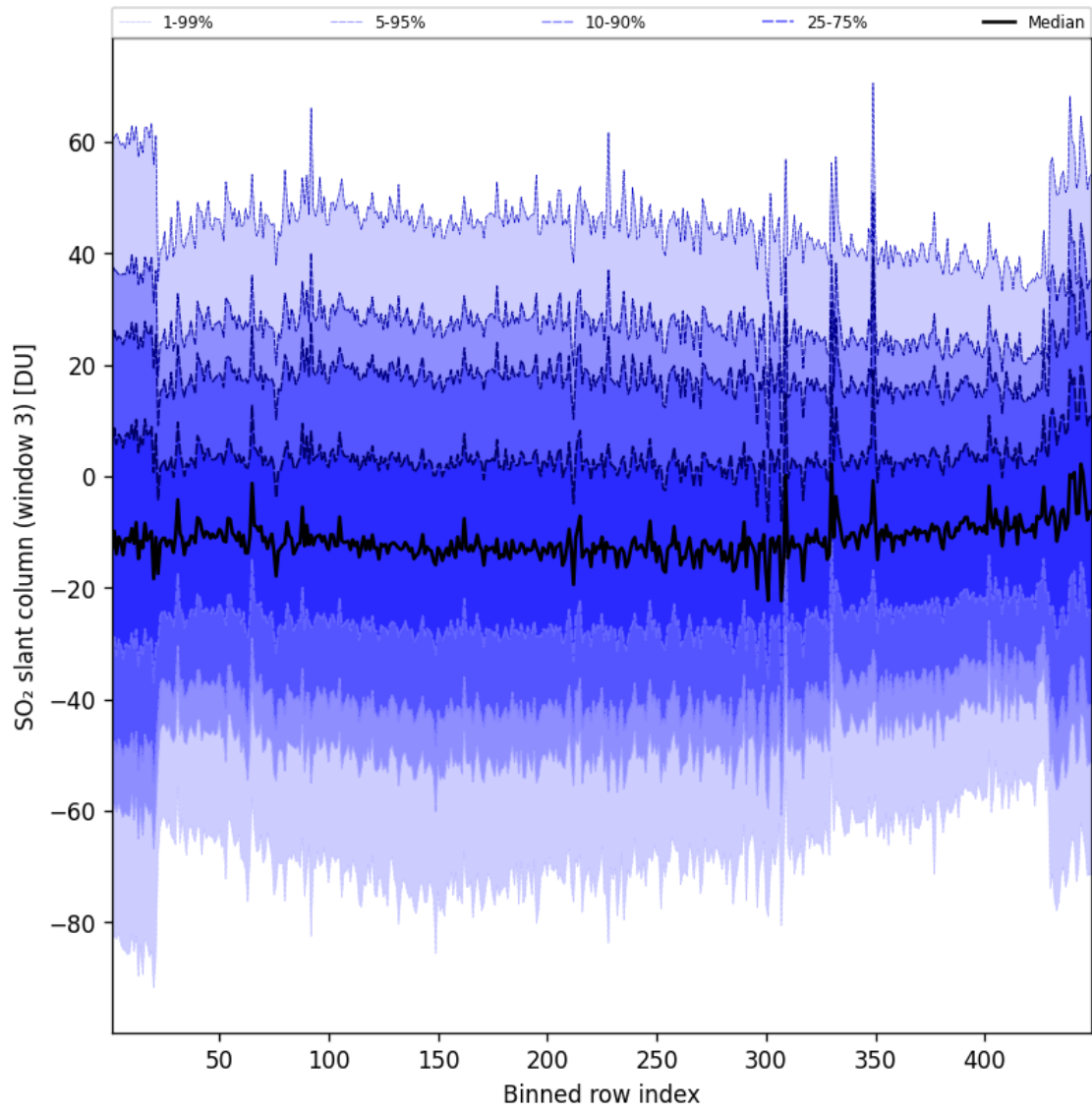


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-01-16 to 2025-01-17

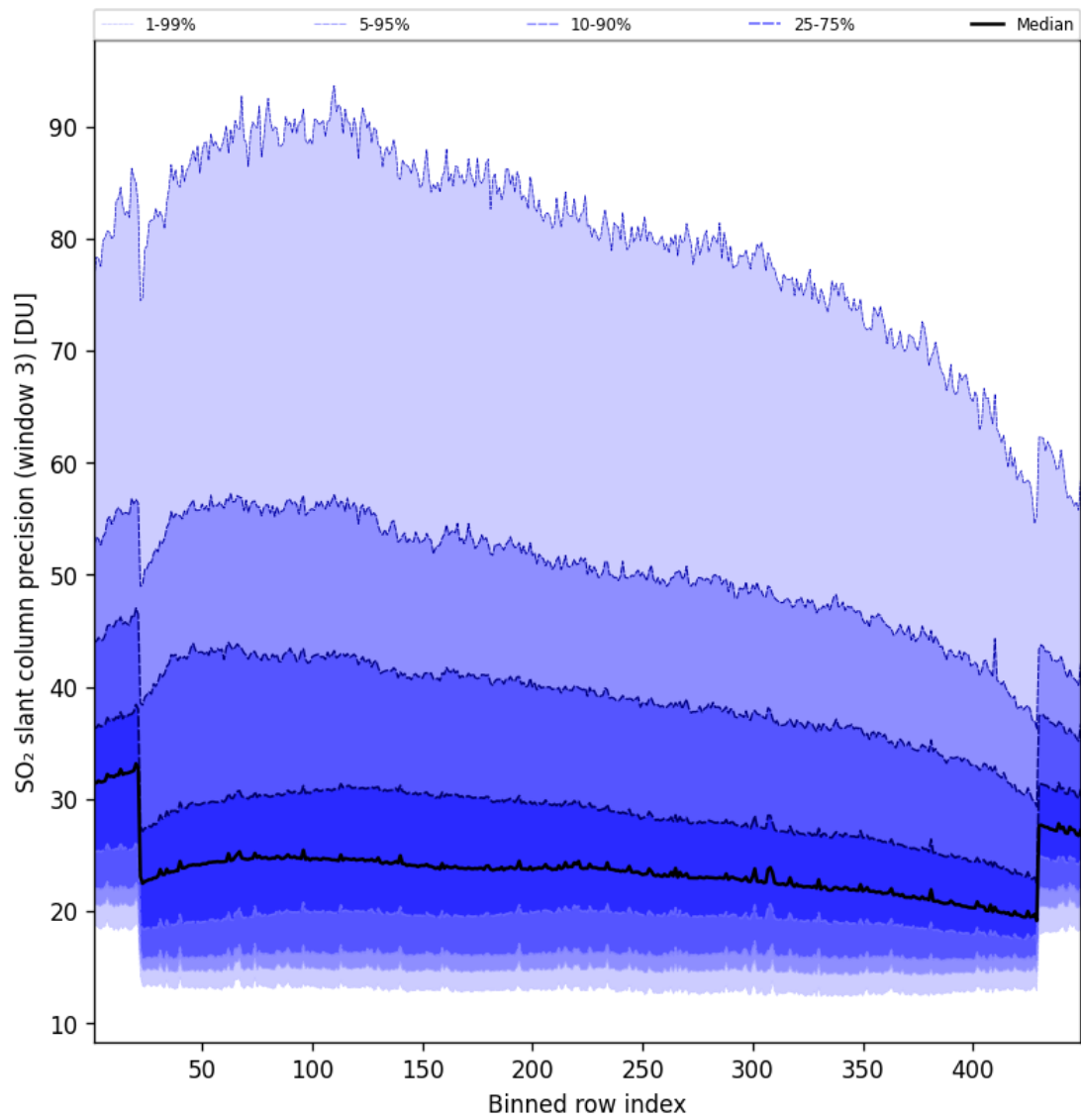


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-01-16 to 2025-01-17

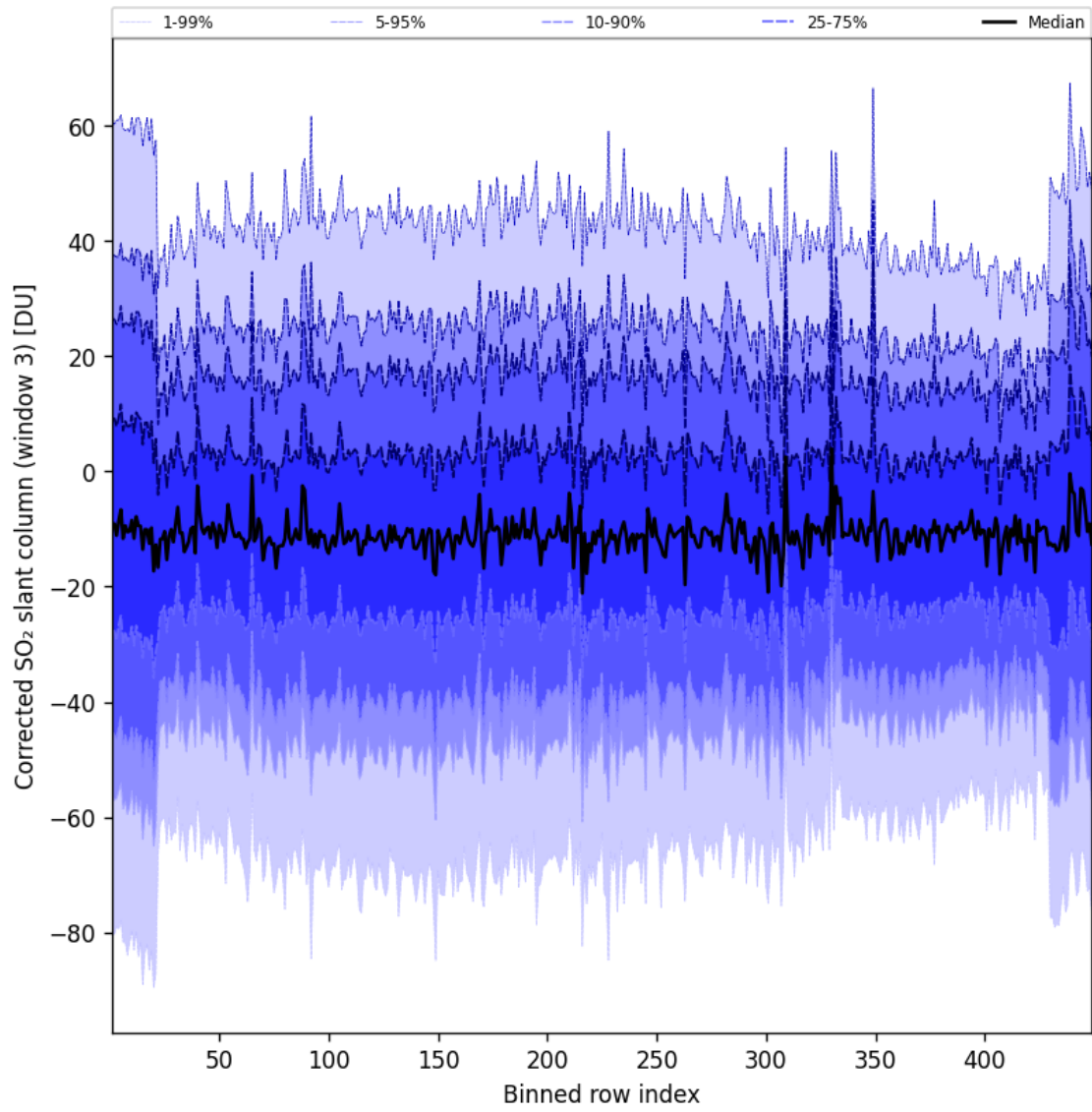


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-01-16 to 2025-01-17

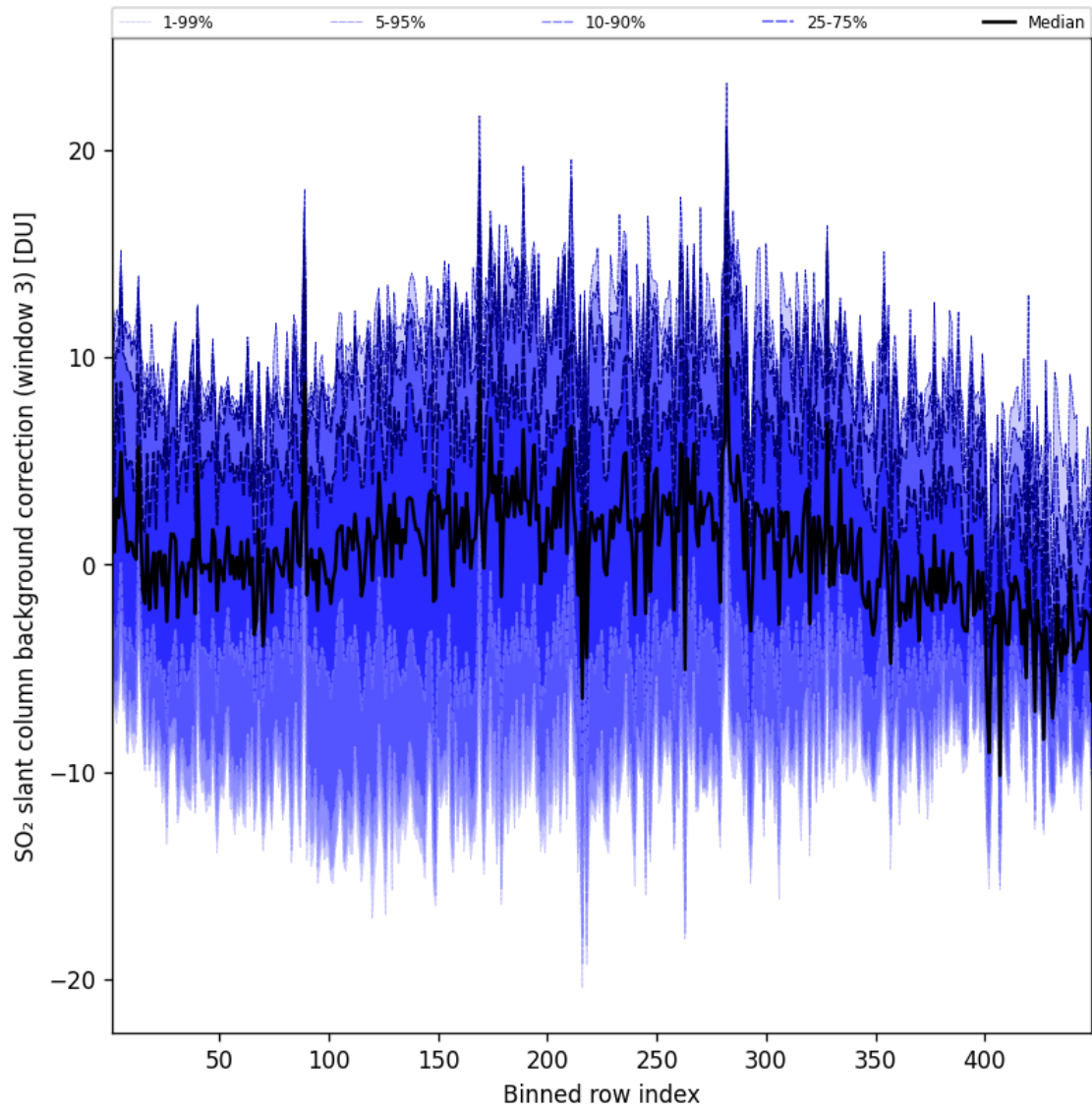


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-01-16 to 2025-01-17

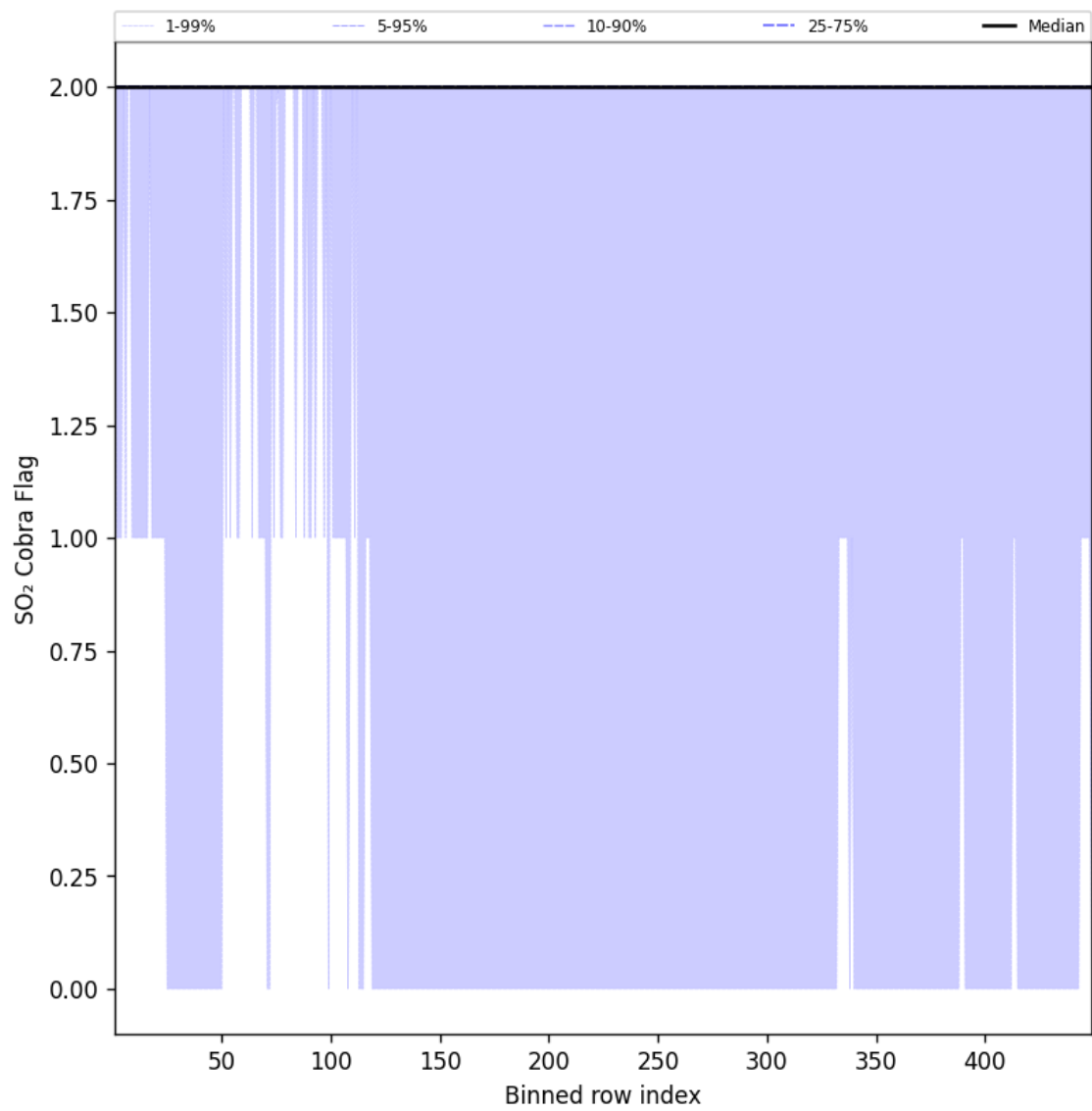


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-01-16 to 2025-01-17

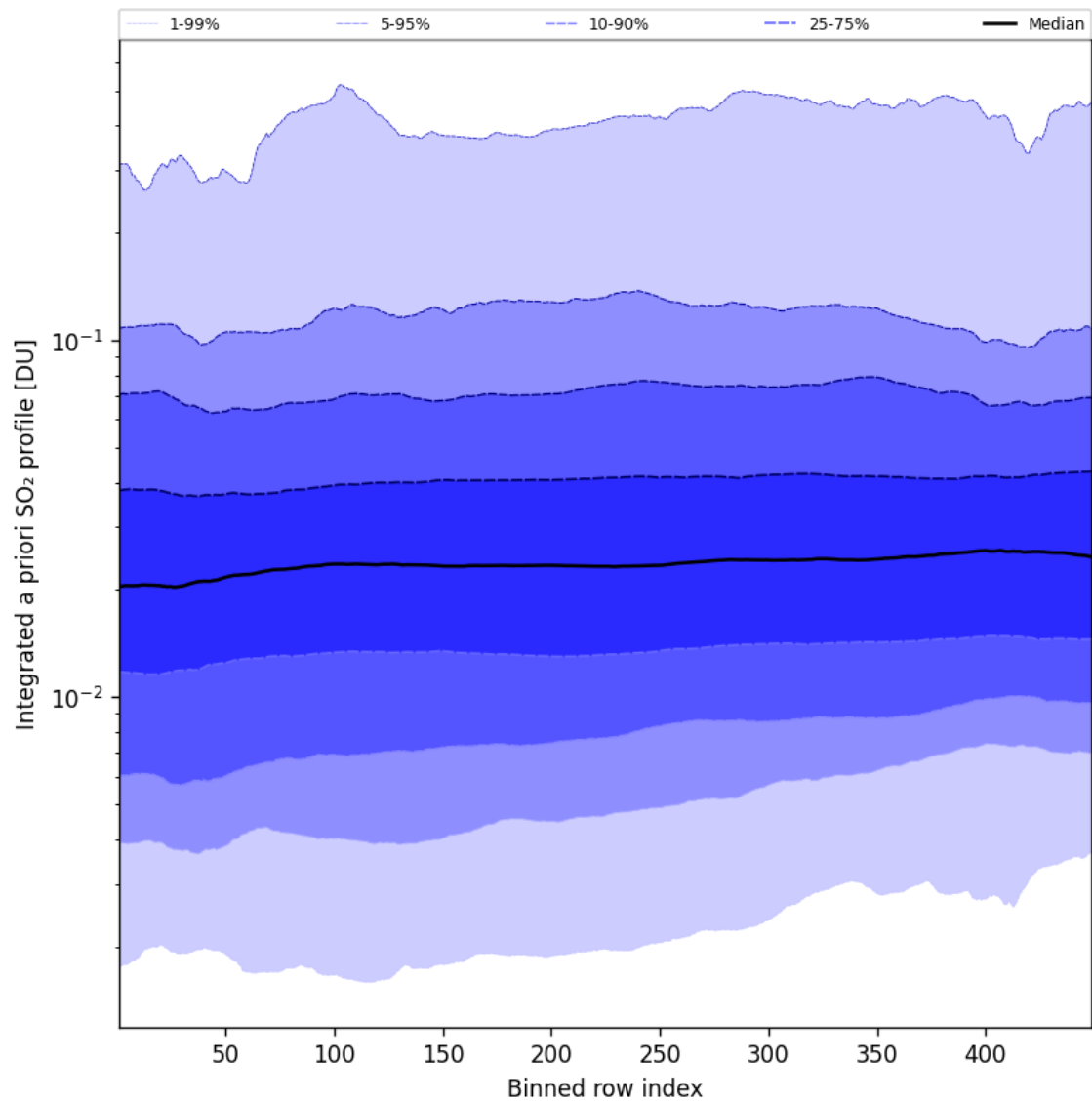


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-01-16 to 2025-01-17

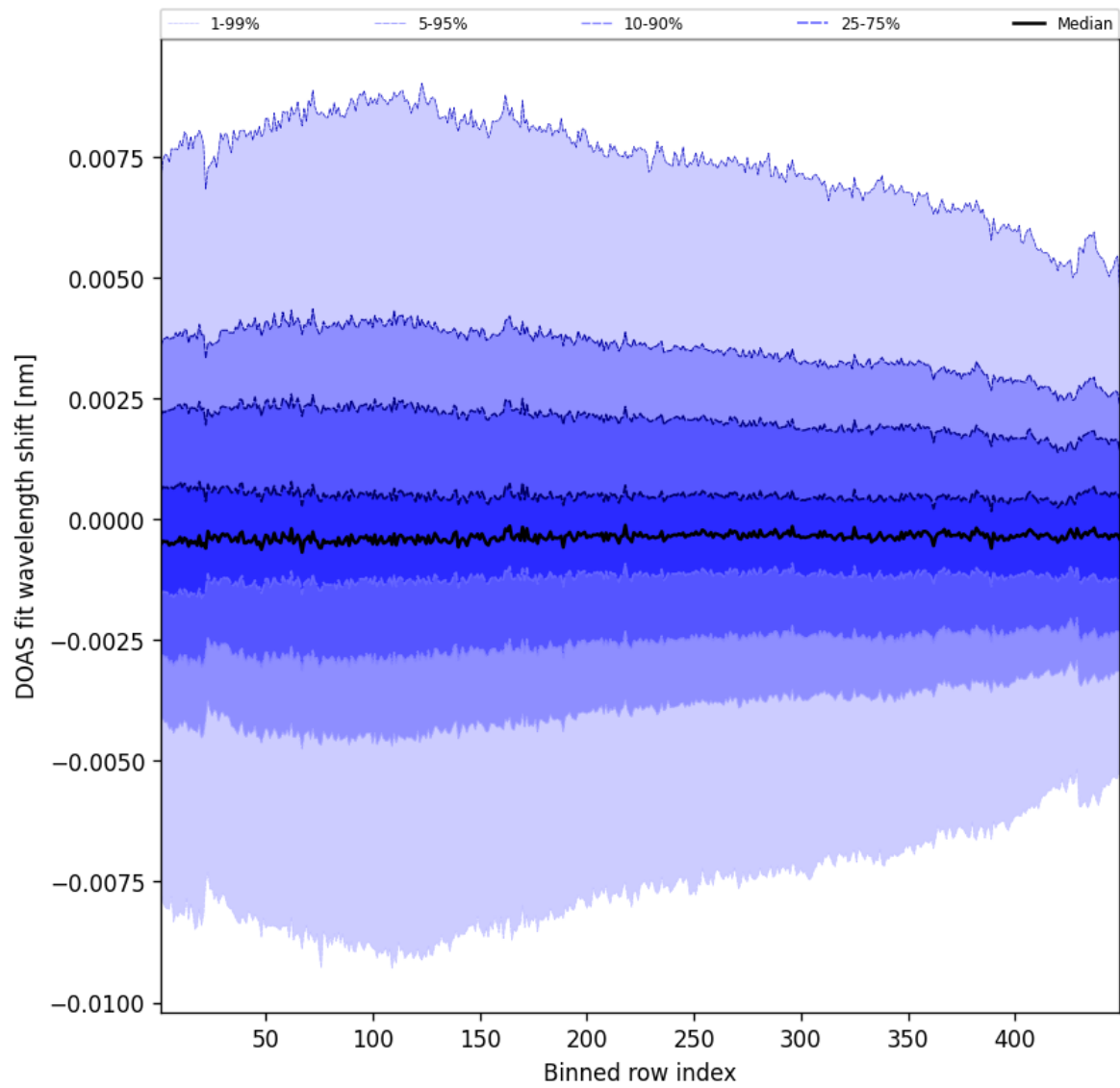


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-01-16 to 2025-01-17

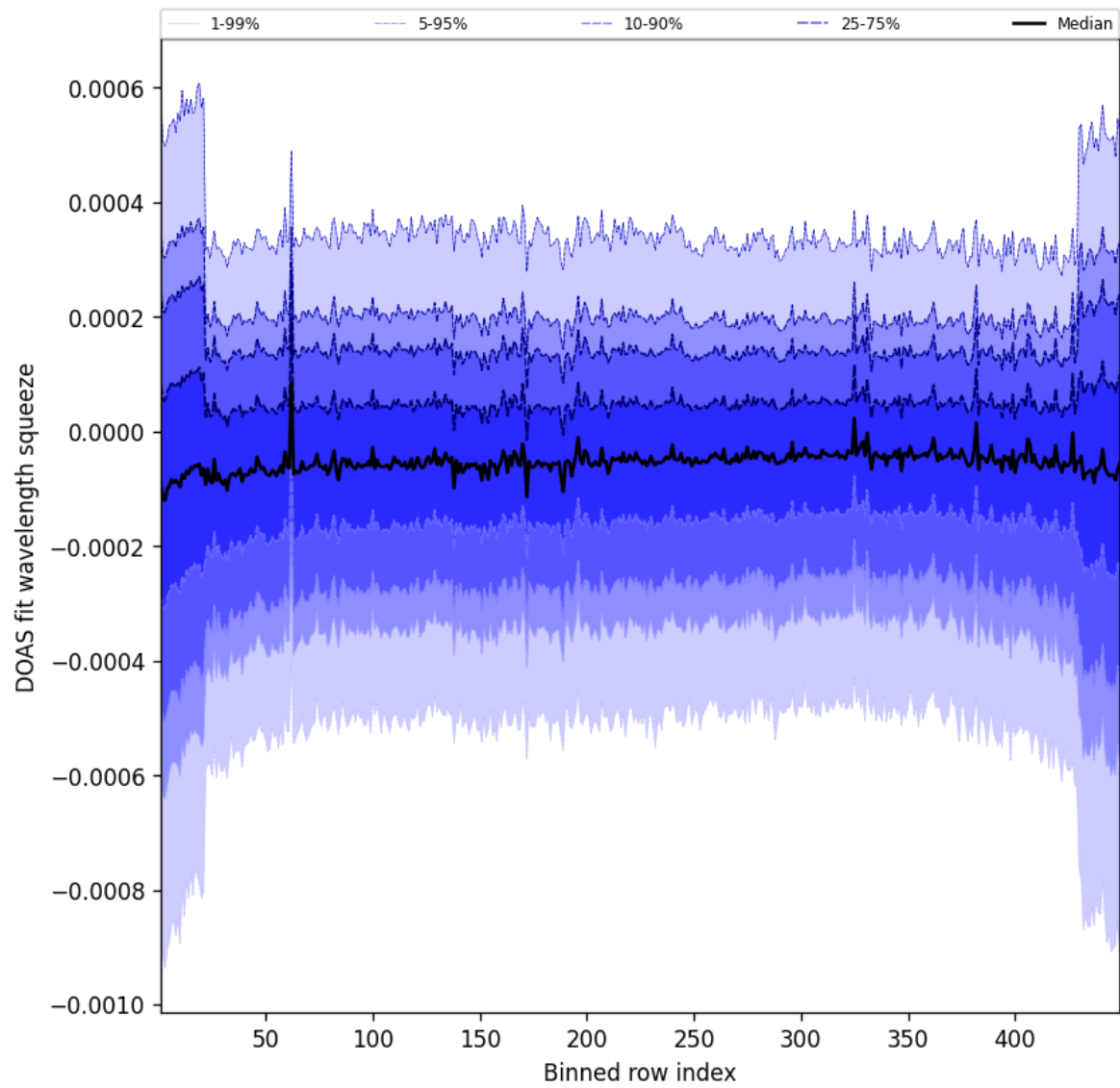


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-01-16 to 2025-01-17

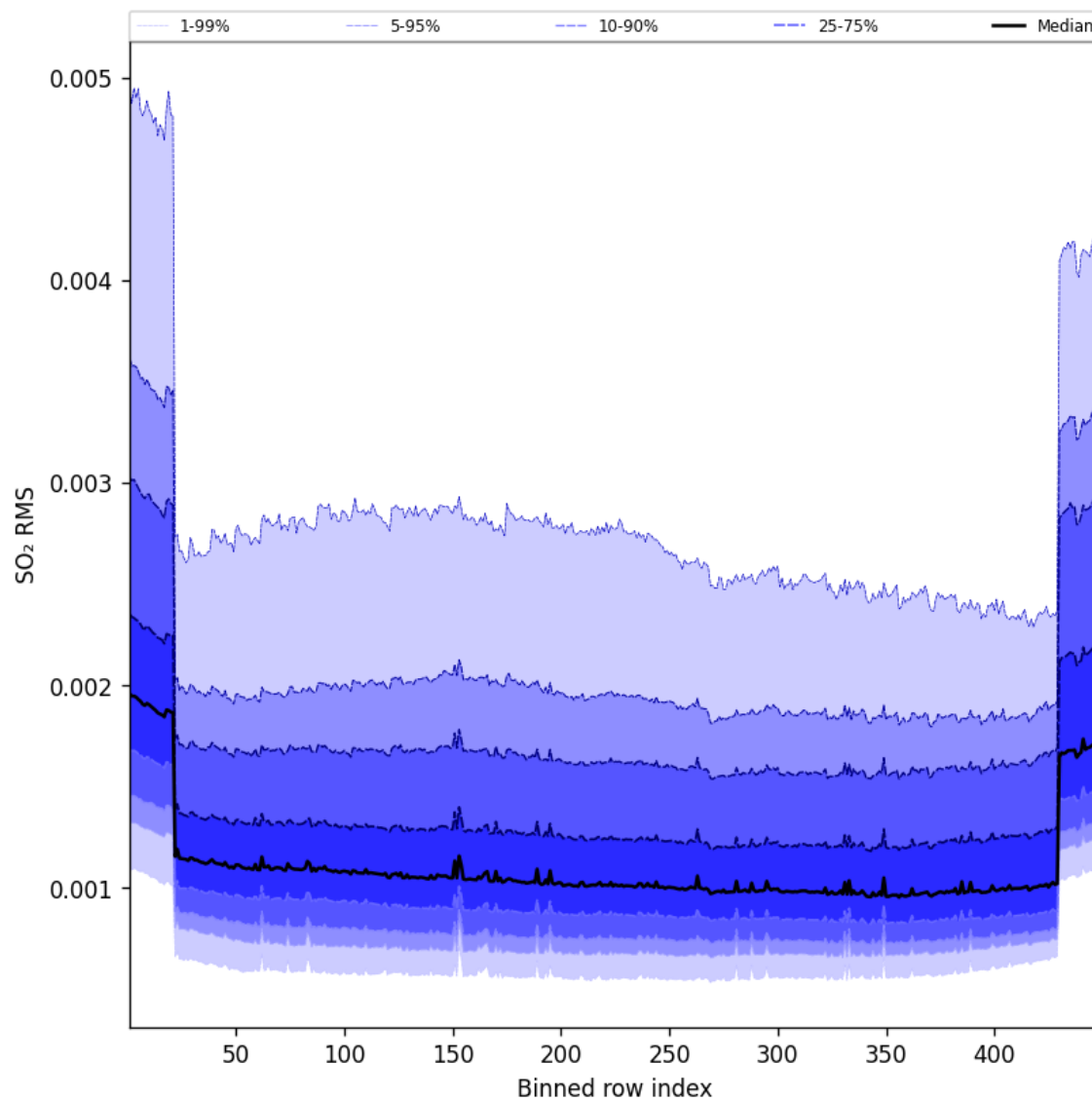


Figure 106: Along track statistics of “SO₂ RMS” for 2025-01-16 to 2025-01-17

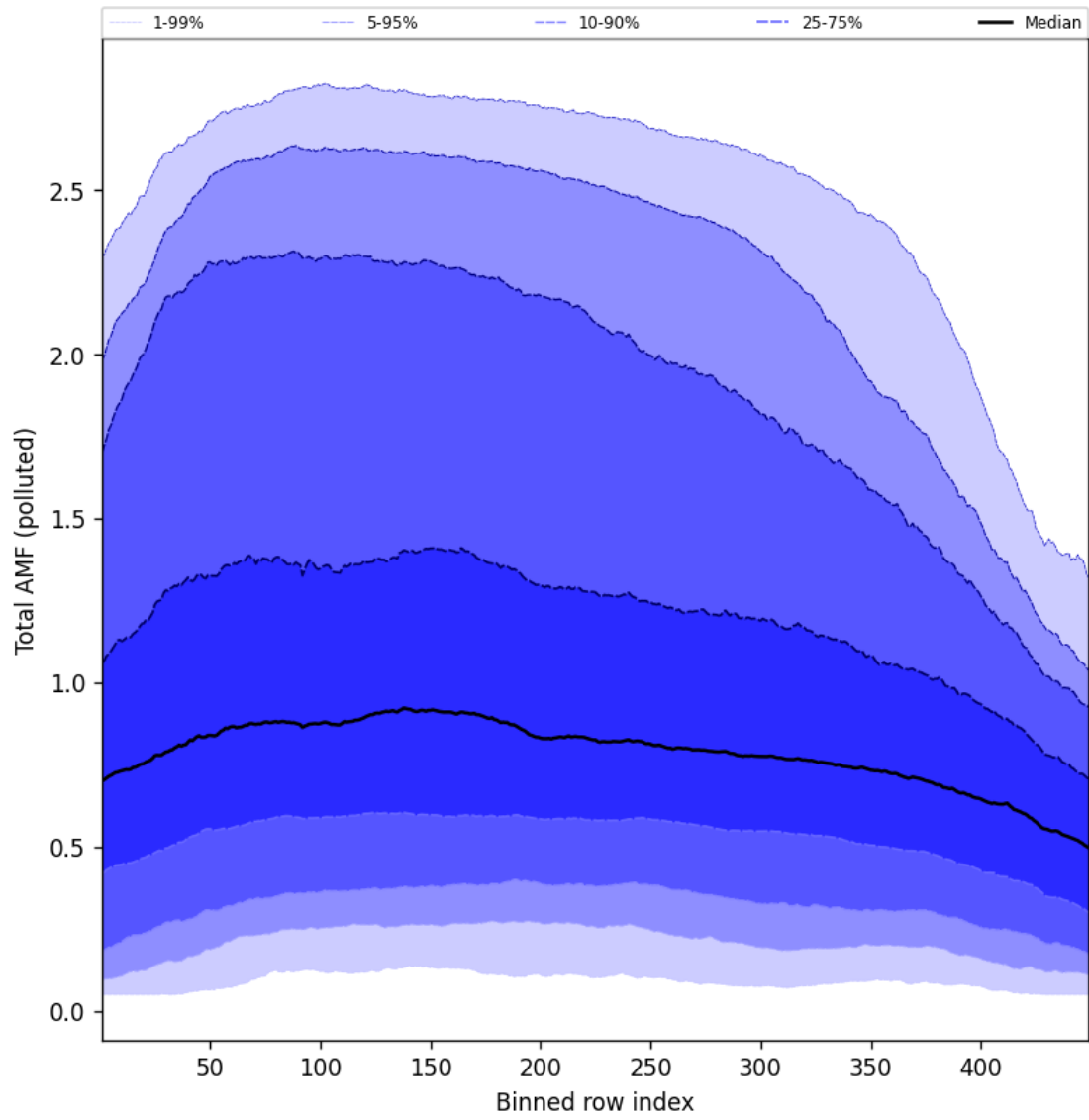


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-01-16 to 2025-01-17

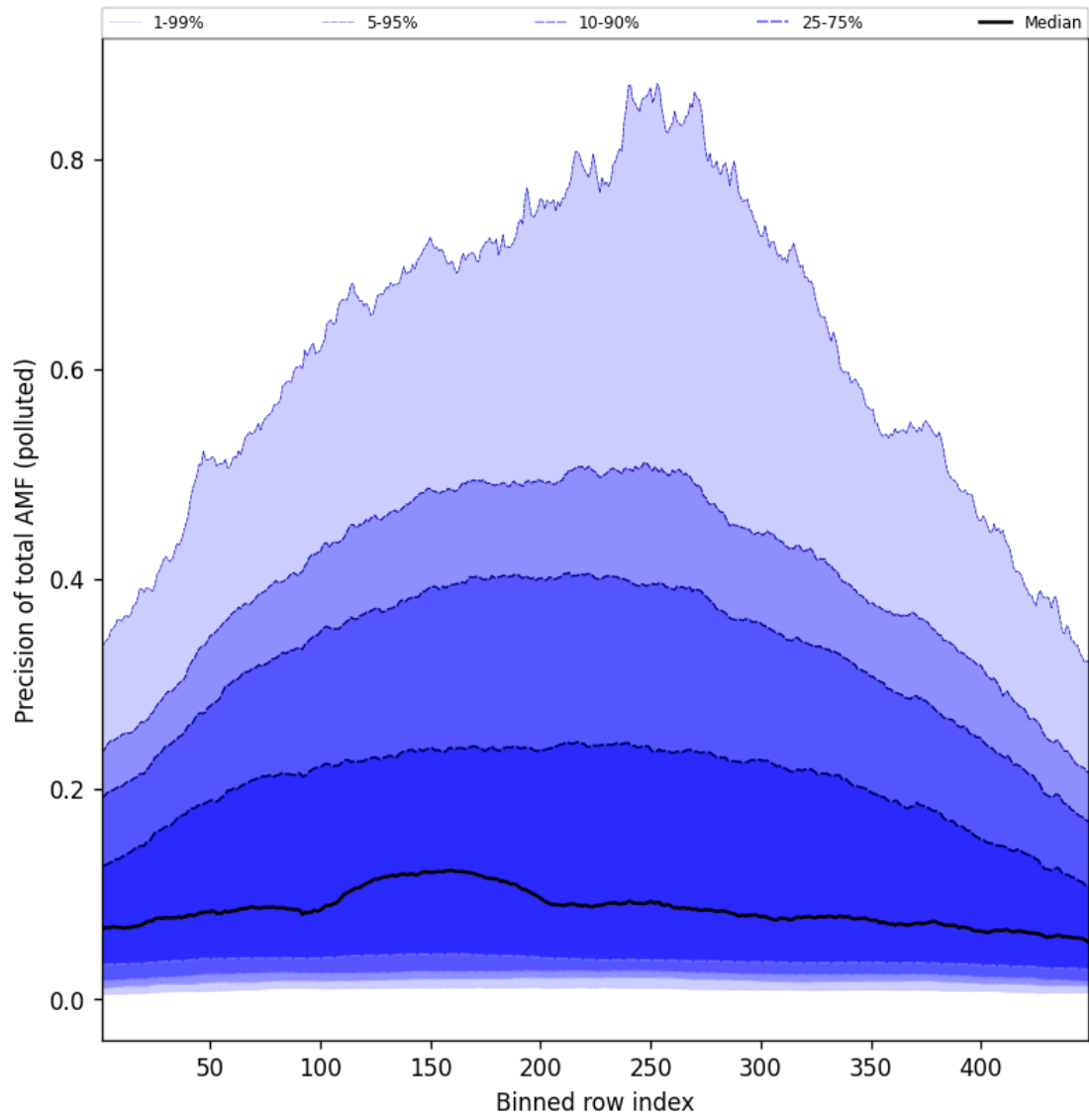


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-01-16 to 2025-01-17

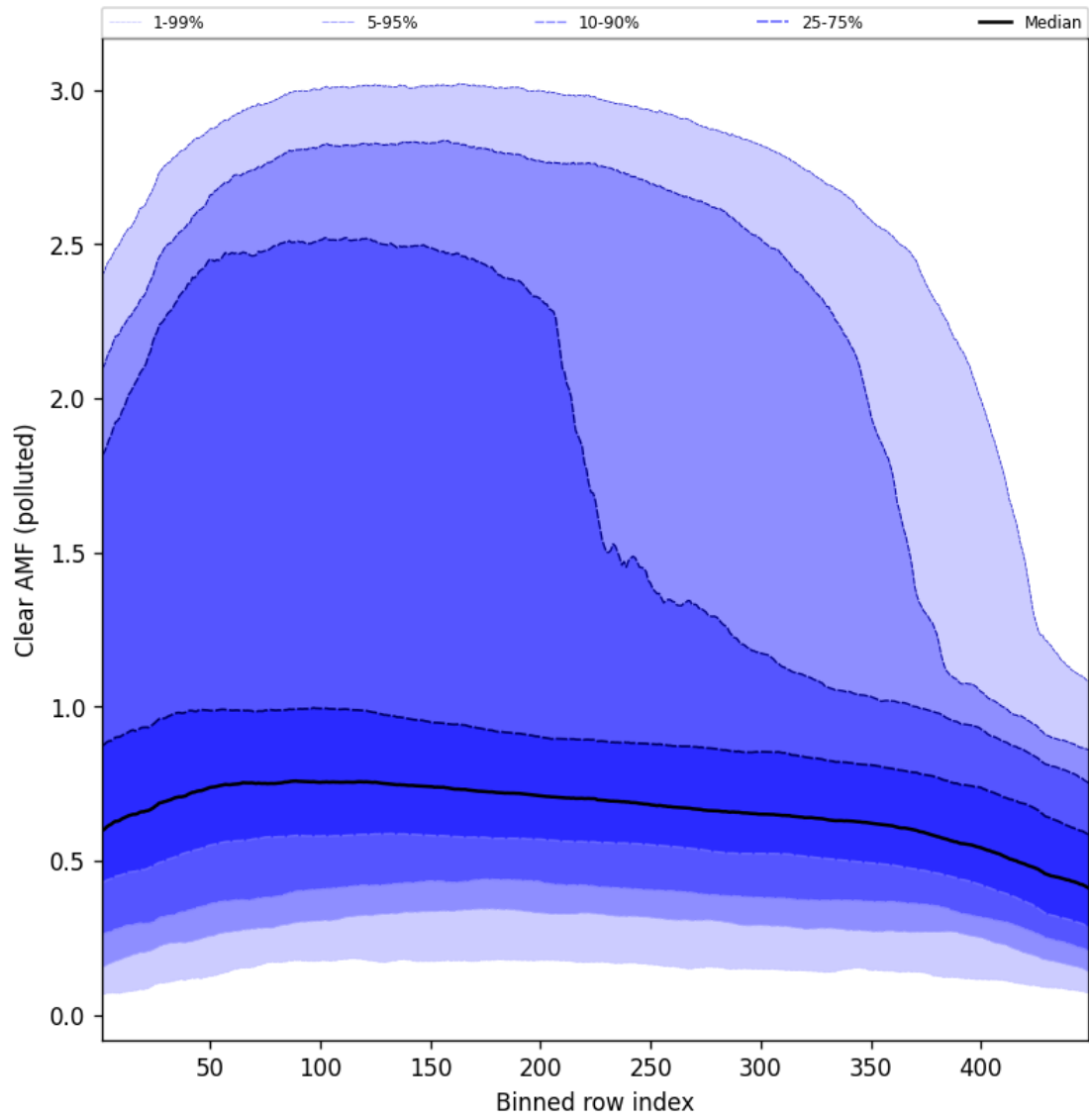


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-01-16 to 2025-01-17

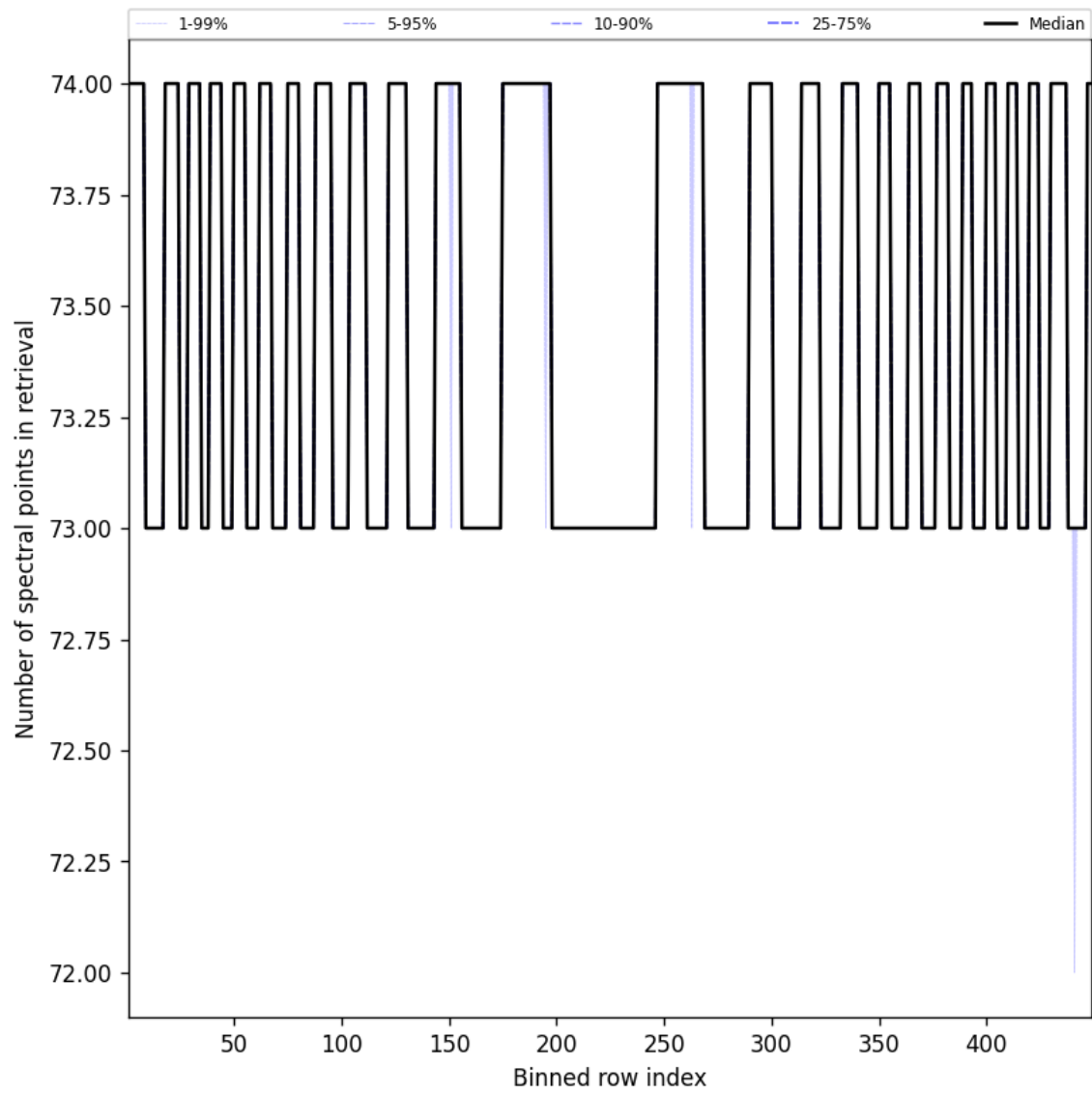


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-01-16 to 2025-01-17

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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