

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]	0.632 ± 0.414	17314412	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.906 \pm 149.174) \times 10^{-2}$	17314412	0.223	0.421	9.828×10^{-3}	-186	503
sulfurdioxide total vertical column precision [DU]	0.595 ± 1.065	17314412	0.222	0.354	0.313	3.236×10^{-2}	144
sulfurdioxide slant column density corrected [DU]	$(1.935 \pm 36.162) \times 10^{-2}$	17314412	0.235	0.342	9.060×10^{-3}	-44.0	290
sulfurdioxide slant column density cobra [DU]	$(1.924 \pm 34.974) \times 10^{-2}$	17314412	0.235	0.342	9.060×10^{-3}	-44.0	112
sulfurdioxide slant column density cobra precision [DU]	0.275 ± 0.130	17314412	0.213	0.112	0.235	7.937×10^{-2}	32.0
sulfurdioxide slant column density window1 [DU]	0.163 ± 0.654	17314412	0.175	0.713	0.170	-147	131
sulfurdioxide slant column density window1 precision [DU]	0.275 ± 0.130	17314412	0.213	0.112	0.235	7.937×10^{-2}	32.0
sulfurdioxide slant column density corrected win1 [DU]	$(8.794 \pm 63.579) \times 10^{-2}$	17314412	7.500×10^{-2}	0.682	7.145×10^{-2}	-147	131
background so2 slant column offset window1 [DU]	$(-7.470 \pm 18.110) \times 10^{-2}$	17314412	-0.180	0.219	-0.128	-1.22	10.6
sulfurdioxide slant column density window2 [DU]	3.97 ± 8.68	17314412	3.25	10.9	3.81	-919	1.458×10^3
sulfurdioxide slant column density window2 precision [DU]	7.82 ± 2.22	17314412	6.97	2.51	7.45	2.19	646
sulfurdioxide slant column density corrected win2 [DU]	2.14 ± 8.46	17314412	2.25	10.6	2.18	-919	1.455×10^3
background so2 slant column offset window2 [DU]	-1.83 ± 2.38	17314412	-0.250	2.58	-1.10	-18.6	4.39
sulfurdioxide slant column density window3 [DU]	-23.2 ± 23.7	17314412	-24.1	29.4	-23.4	-524	430
sulfurdioxide slant column density window3 precision [DU]	27.7 ± 12.4	17314412	23.7	9.54	24.8	10.7	285
sulfurdioxide slant column density corrected win3 [DU]	-14.4 ± 22.8	17314412	-14.0	28.3	-14.5	-525	423
background so2 slant column offset window3 [DU]	8.72 ± 6.93	17314412	8.40	10.2	8.83	-12.8	30.4
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	17314412	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.717 \pm 14.209) \times 10^{-2}$	17314412	2.276×10^{-2}	2.698×10^{-2}	2.275×10^{-2}	2.352×10^{-4}	3.38
fitted radiance shift [nm]	$(-4.526 \pm 24.392) \times 10^{-4}$	17314412	-5.000×10^{-4}	1.663×10^{-3}	-4.897×10^{-4}	-5.384×10^{-2}	6.521×10^{-2}
fitted radiance squeeze [1]	$(-6.007 \pm 18.301) \times 10^{-5}$	17314412	-3.000×10^{-5}	2.152×10^{-4}	-5.100×10^{-5}	-1.575×10^{-2}	2.279×10^{-2}
fitted root mean square [1]	$(1.229 \pm 0.520) \times 10^{-3}$	17314412	9.750×10^{-4}	4.812×10^{-4}	1.081×10^{-3}	3.336×10^{-4}	0.102
sulfurdioxide total air mass factor polluted [1]	0.910 ± 0.619	17314412	0.580	0.664	0.742	5.000×10^{-2}	3.10
sulfurdioxide total air mass factor polluted precision [1]	0.133 ± 0.142	17314412	2.500×10^{-2}	0.157	7.535×10^{-2}	2.500×10^{-3}	1.63
sulfurdioxide clear air mass factor polluted [1]	0.812 ± 0.612	17314412	0.580	0.390	0.649	2.826×10^{-2}	3.11
number of spectral points in retrieval [1]	73.4 ± 0.5	17314412	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}	0.1000	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-3.10	-0.948	-0.539	-0.348	-0.196	0.224	0.391	0.606	1.09	3.86
sulfurdioxide total vertical column precision [DU]	8.044×10^{-2}	0.102	0.125	0.152	0.194	0.549	0.801	1.17	1.96	5.24
sulfurdioxide slant column density corrected [DU]	-0.801	-0.456	-0.331	-0.248	-0.160	0.182	0.275	0.366	0.512	0.995
sulfurdioxide slant column density cobra [DU]	-0.801	-0.456	-0.331	-0.248	-0.160	0.182	0.275	0.366	0.512	0.995
sulfurdioxide slant column density cobra precision [DU]	0.137	0.161	0.174	0.184	0.197	0.309	0.371	0.429	0.510	0.761
sulfurdioxide slant column density window1 [DU]	-1.57	-0.845	-0.570	-0.386	-0.192	0.521	0.702	0.876	1.14	1.90
sulfurdioxide slant column density window1 precision [DU]	0.137	0.161	0.174	0.184	0.197	0.309	0.371	0.429	0.510	0.761
sulfurdioxide slant column density corrected win1 [DU]	-1.50	-0.841	-0.601	-0.439	-0.265	0.416	0.602	0.784	1.07	1.90
background so2 slant column offset window1 [DU]	-0.388	-0.291	-0.258	-0.226	-0.193	2.587×10^{-2}	0.123	0.196	0.283	0.423
sulfurdioxide slant column density window2 [DU]	-16.3	-9.79	-6.61	-4.24	-1.58	9.30	12.1	14.7	18.2	26.2
sulfurdioxide slant column density window2 precision [DU]	4.23	5.01	5.49	5.88	6.35	8.86	9.76	10.7	11.9	14.5
sulfurdioxide slant column density corrected win2 [DU]	-18.7	-11.6	-8.26	-5.83	-3.15	7.47	10.1	12.5	15.7	22.6
background so2 slant column offset window2 [DU]	-9.46	-6.85	-5.08	-3.90	-2.80	-0.222	3.050×10^{-2}	0.244	0.565	1.99
sulfurdioxide slant column density window3 [DU]	-82.7	-61.5	-52.0	-45.2	-37.9	-8.45	-0.605	6.55	16.2	35.2
sulfurdioxide slant column density window3 precision [DU]	14.5	16.2	17.5	18.8	20.7	30.3	34.6	39.6	50.1	80.7
sulfurdioxide slant column density corrected win3 [DU]	-71.9	-51.6	-42.3	-35.7	-28.6	-0.218	7.11	13.8	23.0	41.7
background so2 slant column offset window3 [DU]	-5.99	-2.78	-0.844	1.07	3.78	14.0	16.2	17.8	19.8	22.7
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]	2.913×10^{-3}	6.045×10^{-3}	8.045×10^{-3}	1.006×10^{-2}	1.301×10^{-2}	3.999×10^{-2}	5.341×10^{-2}	7.079×10^{-2}	0.119	0.509
fitted radiance shift [nm]	-7.818×10^{-3}	-3.991×10^{-3}	-2.654×10^{-3}	-1.917×10^{-3}	-1.326×10^{-3}	3.369×10^{-4}	1.001×10^{-3}	1.844×10^{-3}	3.302×10^{-3}	7.302×10^{-3}
fitted radiance squeeze [1]	-5.583×10^{-4}	-3.644×10^{-4}	-2.822×10^{-4}	-2.246×10^{-4}	-1.634×10^{-4}	5.179×10^{-5}	1.024×10^{-4}	1.486×10^{-4}	2.142×10^{-4}	3.742×10^{-4}
fitted root mean square [1]	5.863×10^{-4}	7.096×10^{-4}	7.821×10^{-4}	8.384×10^{-4}	9.065×10^{-4}	1.388×10^{-3}	1.626×10^{-3}	1.869×10^{-3}	2.244×10^{-3}	3.172×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.142×10^{-2}	0.200	0.291	0.378	0.485	1.15	1.47	1.85	2.36	2.73
sulfurdioxide total air mass factor polluted precision [1]	8.349×10^{-3}	1.533×10^{-2}	2.128×10^{-2}	2.647×10^{-2}	3.367×10^{-2}	0.191	0.259	0.321	0.413	0.662
sulfurdioxide clear air mass factor polluted [1]	0.142	0.254	0.333	0.404	0.479	0.869	1.02	1.33	2.57	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]	0.710 ± 0.394	6328600	0.700	1.000	0.0	1.000	0.300	1.000
sulfurdioxide total vertical column [DU]	0.106 ± 2.335	6328600	0.658	1.850×10^{-2}	-186	503	-0.299	0.359
sulfurdioxide total vertical column precision [DU]	1.00 ± 1.59	6328600	0.770	0.472	4.932×10^{-2}	144	0.274	1.04
sulfurdioxide slant column density corrected [DU]	$(3.045 \pm 44.609) \times 10^{-2}$	6328600	0.401	1.310×10^{-2}	-44.0	112	-0.185	0.217
sulfurdioxide slant column density cobra [DU]	$(3.023 \pm 43.723) \times 10^{-2}$	6328600	0.401	1.310×10^{-2}	-44.0	112	-0.185	0.217
sulfurdioxide slant column density cobra precision [DU]	0.328 ± 0.165	6328600	0.173	0.279	8.475×10^{-2}	32.0	0.220	0.393
sulfurdioxide slant column density window1 [DU]	0.237 ± 0.770	6328600	0.802	0.244	-35.2	131	-0.160	0.642
sulfurdioxide slant column density window1 precision [DU]	0.328 ± 0.165	6328600	0.173	0.279	8.475×10^{-2}	32.0	0.220	0.393
sulfurdioxide slant column density corrected win1 [DU]	0.119 ± 0.768	6328600	0.794	9.167×10^{-2}	-35.2	131	-0.298	0.497
background so2 slant column offset window1 [DU]	-0.118 ± 0.158	6328600	0.154	-0.137	-0.854	3.51	-0.215	-6.158×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.77 ± 9.81	6328600	12.4	4.39	-797	1.458×10^3	-1.64	10.7
sulfurdioxide slant column density window2 precision [DU]	8.71 ± 2.31	6328600	2.86	8.36	2.48	583	7.11	9.97
sulfurdioxide slant column density corrected win2 [DU]	2.15 ± 9.42	6328600	11.9	2.17	-800	1.455×10^3	-3.80	8.12
background so2 slant column offset window2 [DU]	-2.61 ± 3.00	6328600	4.14	-1.36	-18.6	4.16	-4.53	-0.396
sulfurdioxide slant column density window3 [DU]	-26.3 ± 26.0	6328600	32.8	-25.9	-203	155	-42.4	-9.62
sulfurdioxide slant column density window3 precision [DU]	30.4 ± 12.3	6328600	9.43	27.6	11.0	216	23.6	33.1
sulfurdioxide slant column density corrected win3 [DU]	-14.7 ± 25.4	6328600	32.0	-14.6	-198	164	-30.6	1.43
background so2 slant column offset window3 [DU]	11.6 ± 5.9	6328600	9.53	11.0	-7.09	30.4	6.76	16.3
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.29	6328600	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(8.204 \pm 22.770) \times 10^{-2}$	6328600	4.884×10^{-2}	2.540×10^{-2}	5.662×10^{-4}	3.38	1.374×10^{-2}	6.259×10^{-2}
fitted radiance shift [nm]	$(-2.826 \pm 24.350) \times 10^{-4}$	6328600	1.630×10^{-3}	-3.091×10^{-4}	-5.384×10^{-2}	4.050×10^{-2}	-1.121×10^{-3}	5.096×10^{-4}
fitted radiance squeeze [1]	$(-1.094 \pm 19.446) \times 10^{-5}$	6328600	2.159×10^{-4}	-6.380×10^{-6}	-1.575×10^{-2}	2.279×10^{-2}	-1.154×10^{-4}	1.004×10^{-4}
fitted root mean square [1]	$(1.426 \pm 0.650) \times 10^{-3}$	6328600	7.176×10^{-4}	1.211×10^{-3}	3.670×10^{-4}	0.102	9.889×10^{-4}	1.706×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.652 ± 0.388	6328600	0.537	0.603	5.000×10^{-2}	2.91	0.345	0.883
sulfurdioxide total air mass factor polluted precision [1]	$(9.201 \pm 12.243) \times 10^{-2}$	6328600	8.846×10^{-2}	4.485×10^{-2}	2.500×10^{-3}	1.63	2.406×10^{-2}	0.113
sulfurdioxide clear air mass factor polluted [1]	0.579 ± 0.278	6328600	0.446	0.563	2.826×10^{-2}	2.35	0.343	0.789
number of spectral points in retrieval [1]	73.5 ± 0.5	6328600	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]	0.587 ± 0.419	10985812	0.840	0.490	0.0	1.000	0.160	1.000
sulfurdioxide total vertical column [DU]	$(1.608 \pm 60.321) \times 10^{-2}$	10985812	0.337	7.068×10^{-3}	-121	200	-0.160	0.178
sulfurdioxide total vertical column precision [DU]	0.359 ± 0.427	10985812	0.256	0.259	3.236×10^{-2}	48.7	0.162	0.417
sulfurdioxide slant column density corrected [DU]	$(1.295 \pm 30.225) \times 10^{-2}$	10985812	0.314	7.216×10^{-3}	-40.6	290	-0.149	0.165
sulfurdioxide slant column density cobra [DU]	$(1.290 \pm 28.730) \times 10^{-2}$	10985812	0.314	7.216×10^{-3}	-40.6	30.8	-0.149	0.165
sulfurdioxide slant column density cobra precision [DU]	0.244 ± 0.091	10985812	7.893×10^{-2}	0.219	7.937×10^{-2}	18.5	0.189	0.268
sulfurdioxide slant column density window1 [DU]	0.120 ± 0.572	10985812	0.666	0.135	-147	81.4	-0.207	0.459
sulfurdioxide slant column density window1 precision [DU]	0.244 ± 0.091	10985812	7.893×10^{-2}	0.219	7.937×10^{-2}	18.5	0.189	0.268
sulfurdioxide slant column density corrected win1 [DU]	$(7.025 \pm 54.474) \times 10^{-2}$	10985812	0.629	6.210×10^{-2}	-147	81.5	-0.250	0.378
background so2 slant column offset window1 [DU]	$(-4.958 \pm 18.884) \times 10^{-2}$	10985812	0.274	-0.118	-1.22	10.6	-0.186	8.772×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.51 ± 7.93	10985812	10.1	3.53	-919	920	-1.55	8.59
sulfurdioxide slant column density window2 precision [DU]	7.30 ± 1.98	10985812	2.10	7.02	2.19	646	6.07	8.16
sulfurdioxide slant column density corrected win2 [DU]	2.13 ± 7.86	10985812	9.97	2.18	-919	919	-2.82	7.15
background so2 slant column offset window2 [DU]	-1.38 ± 1.79	10985812	2.23	-0.961	-15.8	4.39	-2.37	-0.138
sulfurdioxide slant column density window3 [DU]	-21.4 ± 22.1	10985812	27.8	-22.3	-524	430	-35.6	-7.84
sulfurdioxide slant column density window3 precision [DU]	26.2 ± 12.2	10985812	8.62	23.3	10.7	285	19.4	28.0
sulfurdioxide slant column density corrected win3 [DU]	-14.3 ± 21.2	10985812	26.5	-14.5	-525	423	-27.6	-1.06
background so2 slant column offset window3 [DU]	7.09 ± 6.96	10985812	11.2	7.33	-12.8	25.9	1.34	12.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	10985812	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.709 \pm 2.916) \times 10^{-2}$	10985812	2.170×10^{-2}	2.173×10^{-2}	2.352×10^{-4}	1.63	1.256×10^{-2}	3.426×10^{-2}
fitted radiance shift [nm]	$(-5.505 \pm 24.363) \times 10^{-4}$	10985812	1.641×10^{-3}	-5.967×10^{-4}	-5.057×10^{-2}	6.521×10^{-2}	-1.420×10^{-3}	2.208×10^{-4}
fitted radiance squeeze [1]	$(-8.838 \pm 16.974) \times 10^{-5}$	10985812	2.099×10^{-4}	-7.548×10^{-5}	-1.256×10^{-2}	1.837×10^{-2}	-1.869×10^{-4}	2.295×10^{-5}
fitted root mean square [1]	$(1.115 \pm 0.383) \times 10^{-3}$	10985812	3.861×10^{-4}	1.026×10^{-3}	3.336×10^{-4}	6.842×10^{-2}	8.724×10^{-4}	1.258×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.06 ± 0.68	10985812	0.828	0.838	5.000×10^{-2}	3.10	0.562	1.39
sulfurdioxide total air mass factor polluted precision [1]	0.157 ± 0.147	10985812	0.190	0.113	5.871×10^{-3}	1.55	4.091×10^{-2}	0.231
sulfurdioxide clear air mass factor polluted [1]	0.946 ± 0.705	10985812	0.413	0.681	0.117	3.11	0.533	0.946
number of spectral points in retrieval [1]	73.4 ± 0.5	10985812	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]	0.678 ± 0.401	12291490	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(3.314 \pm 118.647) \times 10^{-2}$	12291490	0.429	9.159×10^{-3}	-186	503	-0.203	0.226
sulfurdioxide total vertical column precision [DU]	0.520 ± 0.827	12291490	0.295	0.311	4.705×10^{-2}	144	0.212	0.507
sulfurdioxide slant column density corrected [DU]	$(1.497 \pm 33.636) \times 10^{-2}$	12291490	0.326	7.538×10^{-3}	-44.0	290	-0.154	0.172
sulfurdioxide slant column density cobra [DU]	$(1.488 \pm 32.235) \times 10^{-2}$	12291490	0.326	7.538×10^{-3}	-44.0	112	-0.154	0.172
sulfurdioxide slant column density cobra precision [DU]	0.260 ± 0.121	12291490	9.418×10^{-2}	0.224	7.937×10^{-2}	32.0	0.192	0.286
sulfurdioxide slant column density window1 [DU]	0.181 ± 0.604	12291490	0.669	0.187	-35.5	131	-0.151	0.518
sulfurdioxide slant column density window1 precision [DU]	0.260 ± 0.121	12291490	9.418×10^{-2}	0.224	7.937×10^{-2}	32.0	0.192	0.286
sulfurdioxide slant column density corrected win1 [DU]	$(8.052 \pm 59.213) \times 10^{-2}$	12291490	0.650	6.843×10^{-2}	-35.5	131	-0.254	0.397
background so2 slant column offset window1 [DU]	-0.101 ± 0.153	12291490	0.175	-0.138	-0.765	6.47	-0.196	-2.089×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.57 ± 8.40	12291490	10.6	3.44	-919	654	-1.81	8.77
sulfurdioxide slant column density window2 precision [DU]	7.65 ± 2.09	12291490	2.34	7.32	2.19	540	6.28	8.63
sulfurdioxide slant column density corrected win2 [DU]	2.09 ± 8.27	12291490	10.4	2.14	-919	653	-3.11	7.34
background so2 slant column offset window2 [DU]	-1.48 ± 2.13	12291490	2.03	-0.897	-18.6	4.39	-2.20	-0.170
sulfurdioxide slant column density window3 [DU]	-20.3 ± 23.4	12291490	29.5	-20.8	-524	430	-35.2	-5.69
sulfurdioxide slant column density window3 precision [DU]	27.7 ± 11.8	12291490	8.79	24.8	10.7	207	21.2	30.0
sulfurdioxide slant column density corrected win3 [DU]	-12.7 ± 22.4	12291490	28.2	-13.1	-525	423	-26.9	1.32
background so2 slant column offset window3 [DU]	7.67 ± 6.40	12291490	8.97	7.84	-12.8	30.4	3.21	12.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	12291490	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.374 \pm 7.002) \times 10^{-2}$	12291490	2.346×10^{-2}	2.333×10^{-2}	6.968×10^{-4}	3.12	1.422×10^{-2}	3.769×10^{-2}
fitted radiance shift [nm]	$(-3.918 \pm 23.806) \times 10^{-4}$	12291490	1.737×10^{-3}	-3.984×10^{-4}	-5.384×10^{-2}	4.050×10^{-2}	-1.287×10^{-3}	4.494×10^{-4}
fitted radiance squeeze [1]	$(-5.189 \pm 17.031) \times 10^{-5}$	12291490	1.986×10^{-4}	-4.369×10^{-5}	-1.575×10^{-2}	2.279×10^{-2}	-1.465×10^{-4}	5.216×10^{-5}
fitted root mean square [1]	$(1.161 \pm 0.481) \times 10^{-3}$	12291490	3.941×10^{-4}	1.030×10^{-3}	3.336×10^{-4}	0.102	8.800×10^{-4}	1.274×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.806 ± 0.420	12291490	0.514	0.733	5.000×10^{-2}	2.70	0.510	1.02
sulfurdioxide total air mass factor polluted precision [1]	0.123 ± 0.128	12291490	0.137	6.820×10^{-2}	2.693×10^{-3}	1.43	3.566×10^{-2}	0.173
sulfurdioxide clear air mass factor polluted [1]	0.666 ± 0.247	12291490	0.310	0.640	5.387×10^{-2}	2.71	0.496	0.806
number of spectral points in retrieval [1]	73.4 ± 0.5	12291490	1.000	73.0	70.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.509 ± 0.422	4399796	0.900	0.440	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	$(7.244 \pm 179.198) \times 10^{-2}$	4399796	0.364	9.946×10^{-3}	-123	272	-0.163	0.201
sulfurdioxide total vertical column precision [DU]	0.699 ± 1.323	4399796	0.574	0.293	3.236×10^{-2}	37.9	0.123	0.697
sulfurdioxide slant column density corrected [DU]	$(2.817 \pm 40.469) \times 10^{-2}$	4399796	0.385	1.269×10^{-2}	-7.54	44.0	-0.177	0.208
sulfurdioxide slant column density cobra [DU]	$(2.801 \pm 39.652) \times 10^{-2}$	4399796	0.385	1.269×10^{-2}	-7.54	30.8	-0.177	0.208
sulfurdioxide slant column density cobra precision [DU]	0.305 ± 0.134	4399796	0.136	0.265	8.417×10^{-2}	18.5	0.219	0.354
sulfurdioxide slant column density window1 [DU]	0.103 ± 0.750	4399796	0.838	0.106	-147	81.4	-0.322	0.516
sulfurdioxide slant column density window1 precision [DU]	0.305 ± 0.134	4399796	0.136	0.265	8.417×10^{-2}	18.5	0.219	0.354
sulfurdioxide slant column density corrected win1 [DU]	0.103 ± 0.718	4399796	0.767	7.803×10^{-2}	-147	81.5	-0.298	0.468
background so2 slant column offset window1 [DU]	$(-5.842 \pm 2270.204) \times 10^{-4}$	4399796	0.378	-7.555×10^{-2}	-1.22	10.6	-0.182	0.196
sulfurdioxide slant column density window2 [DU]	4.92 ± 9.14	4399796	11.4	4.79	-772	1.458×10^3	-0.871	10.5
sulfurdioxide slant column density window2 precision [DU]	8.15 ± 2.42	4399796	2.82	7.74	2.20	646	6.52	9.34
sulfurdioxide slant column density corrected win2 [DU]	2.27 ± 8.83	4399796	11.0	2.29	-772	1.455×10^3	-3.21	7.77
background so2 slant column offset window2 [DU]	-2.64 ± 2.63	4399796	3.83	-2.28	-18.6	4.39	-4.26	-0.436
sulfurdioxide slant column density window3 [DU]	-30.1 ± 22.8	4399796	27.6	-29.7	-432	224	-43.6	-16.0
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 13.4	4399796	11.3	24.3	11.0	285	19.1	30.4
sulfurdioxide slant column density corrected win3 [DU]	-18.7 ± 23.2	4399796	28.2	-17.8	-436	222	-32.4	-4.18
background so2 slant column offset window3 [DU]	11.4 ± 7.4	4399796	11.4	13.3	-12.8	30.4	5.79	17.2
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.31	4399796	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.887 \pm 20.281) \times 10^{-2}$	4399796	3.795×10^{-2}	1.879×10^{-2}	2.352×10^{-4}	3.38	8.951×10^{-3}	4.691×10^{-2}
fitted radiance shift [nm]	$(-6.279 \pm 25.146) \times 10^{-4}$	4399796	1.376×10^{-3}	-7.196×10^{-4}	-4.536×10^{-2}	6.521×10^{-2}	-1.387×10^{-3}	-1.146×10^{-5}
fitted radiance squeeze [1]	$(-8.661 \pm 20.879) \times 10^{-5}$	4399796	2.622×10^{-4}	-8.241×10^{-5}	-1.256×10^{-2}	1.454×10^{-2}	-2.174×10^{-4}	4.479×10^{-5}
fitted root mean square [1]	$(1.382 \pm 0.547) \times 10^{-3}$	4399796	5.793×10^{-4}	1.250×10^{-3}	3.660×10^{-4}	6.842×10^{-2}	1.022×10^{-3}	1.602×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.24 ± 0.91	4399796	1.79	0.905	5.000×10^{-2}	3.10	0.420	2.21
sulfurdioxide total air mass factor polluted precision [1]	0.165 ± 0.171	4399796	0.215	0.125	2.500×10^{-3}	1.63	2.843×10^{-2}	0.243
sulfurdioxide clear air mass factor polluted [1]	1.26 ± 1.01	4399796	2.02	0.767	2.826×10^{-2}	3.11	0.414	2.43
number of spectral points in retrieval [1]	73.4 ± 0.5	4399796	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

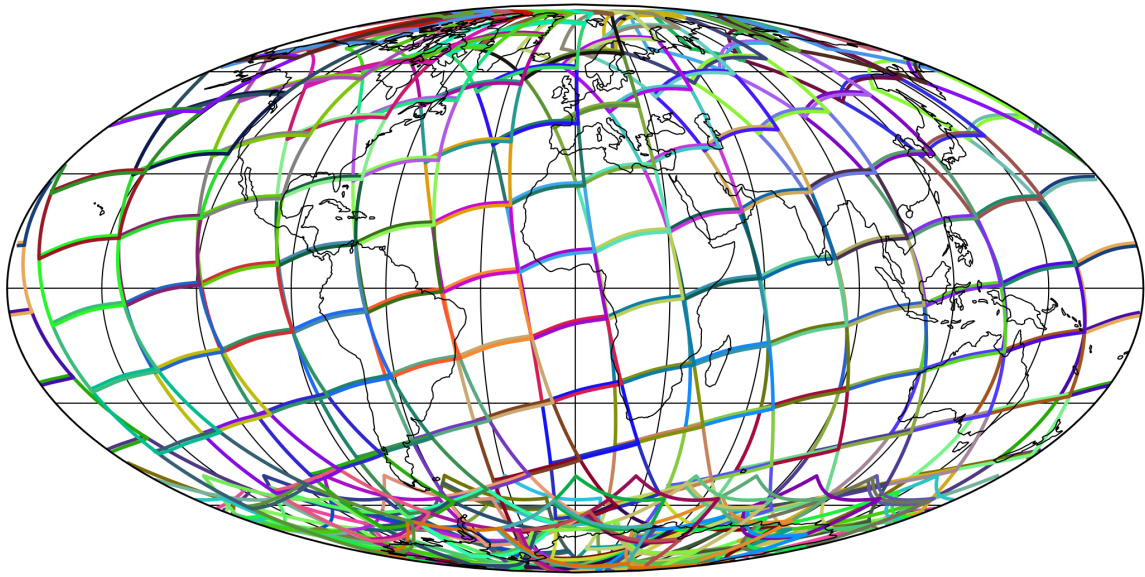


Figure 1: Outline of the granules.

4 Input data monitoring

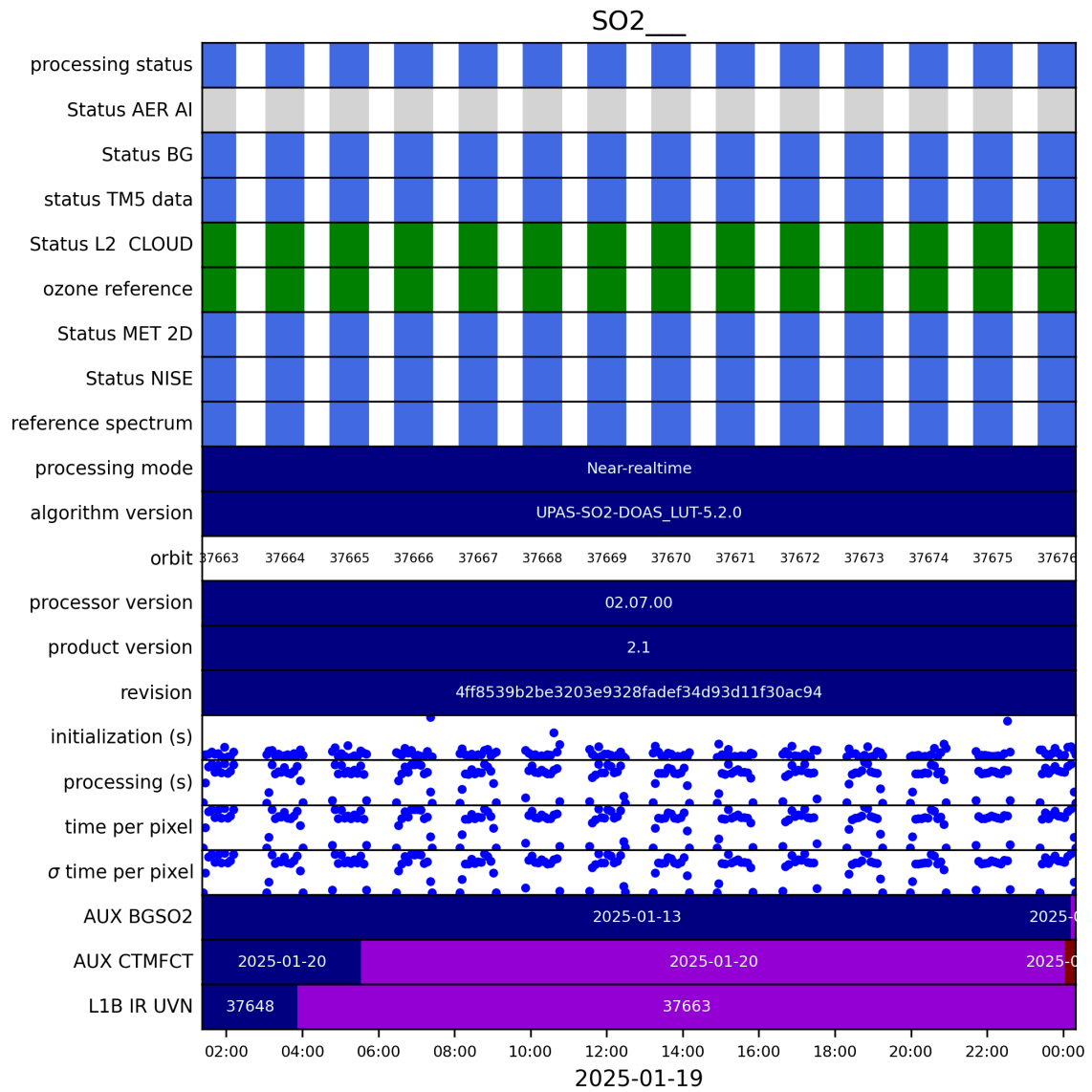


Figure 2: Input data per granule

5 Warnings and errors

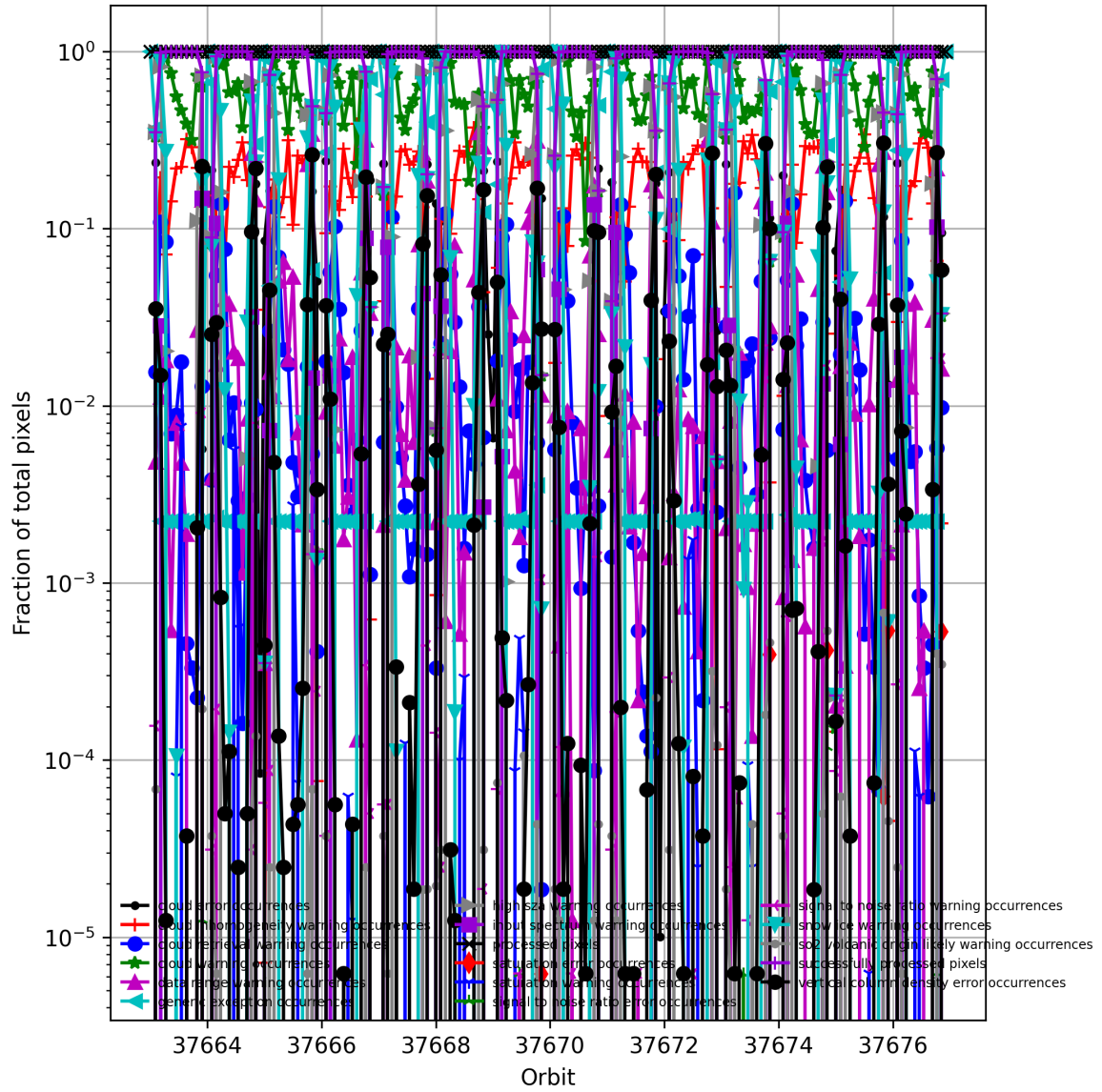


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

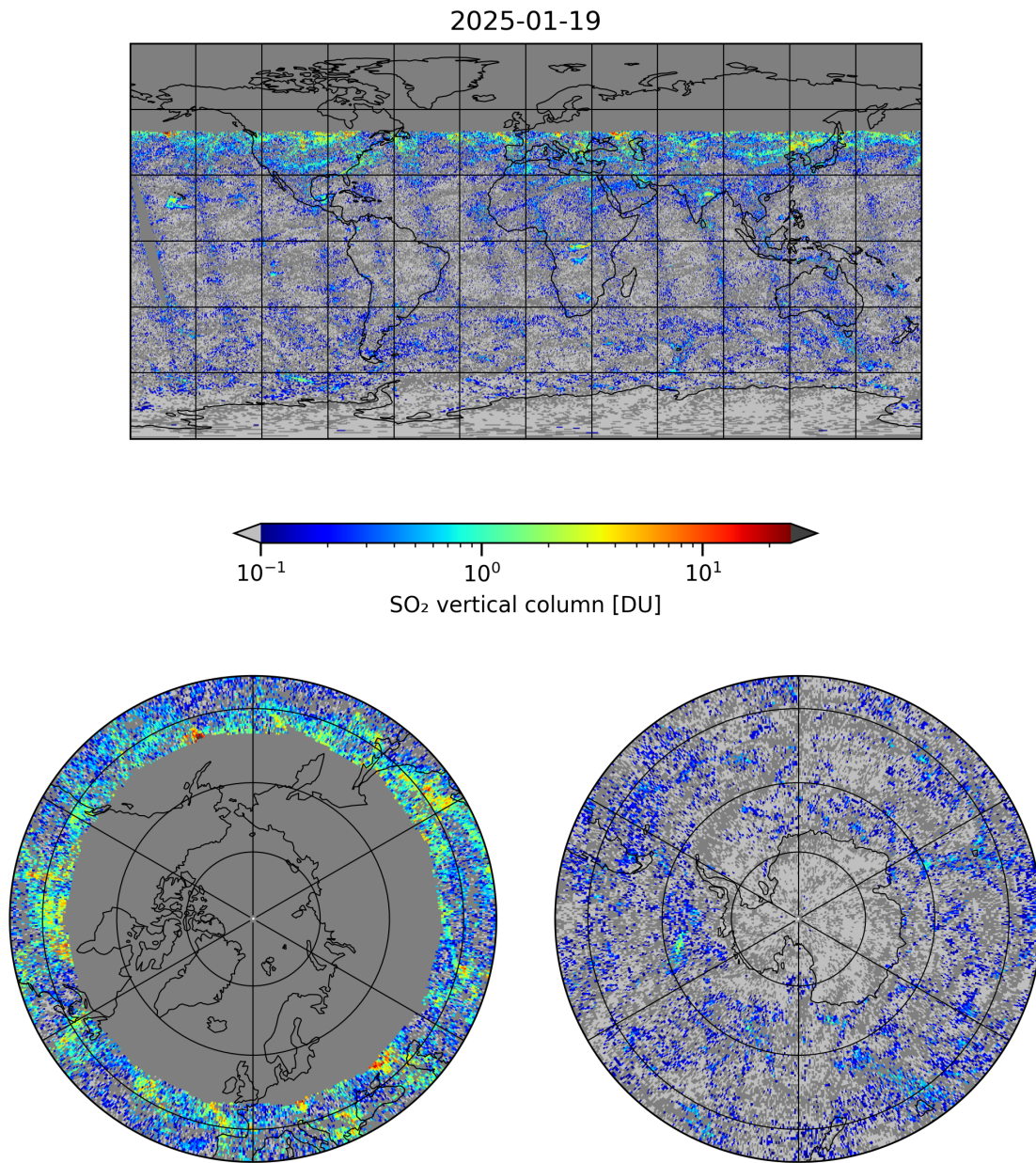


Figure 4: Map of “SO₂ vertical column” for 2025-01-19 to 2025-01-20

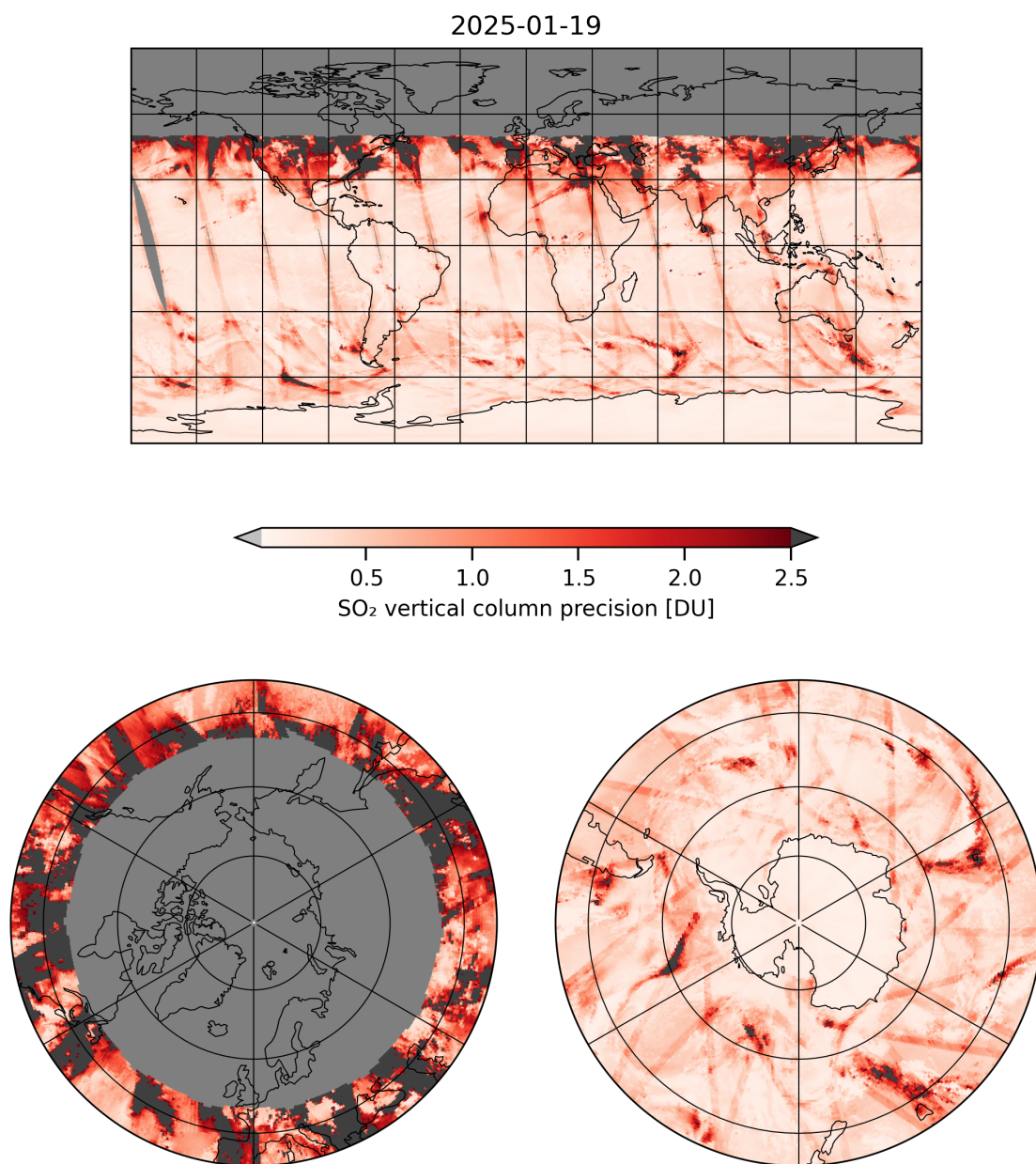


Figure 5: Map of “SO₂ vertical column precision” for 2025-01-19 to 2025-01-20

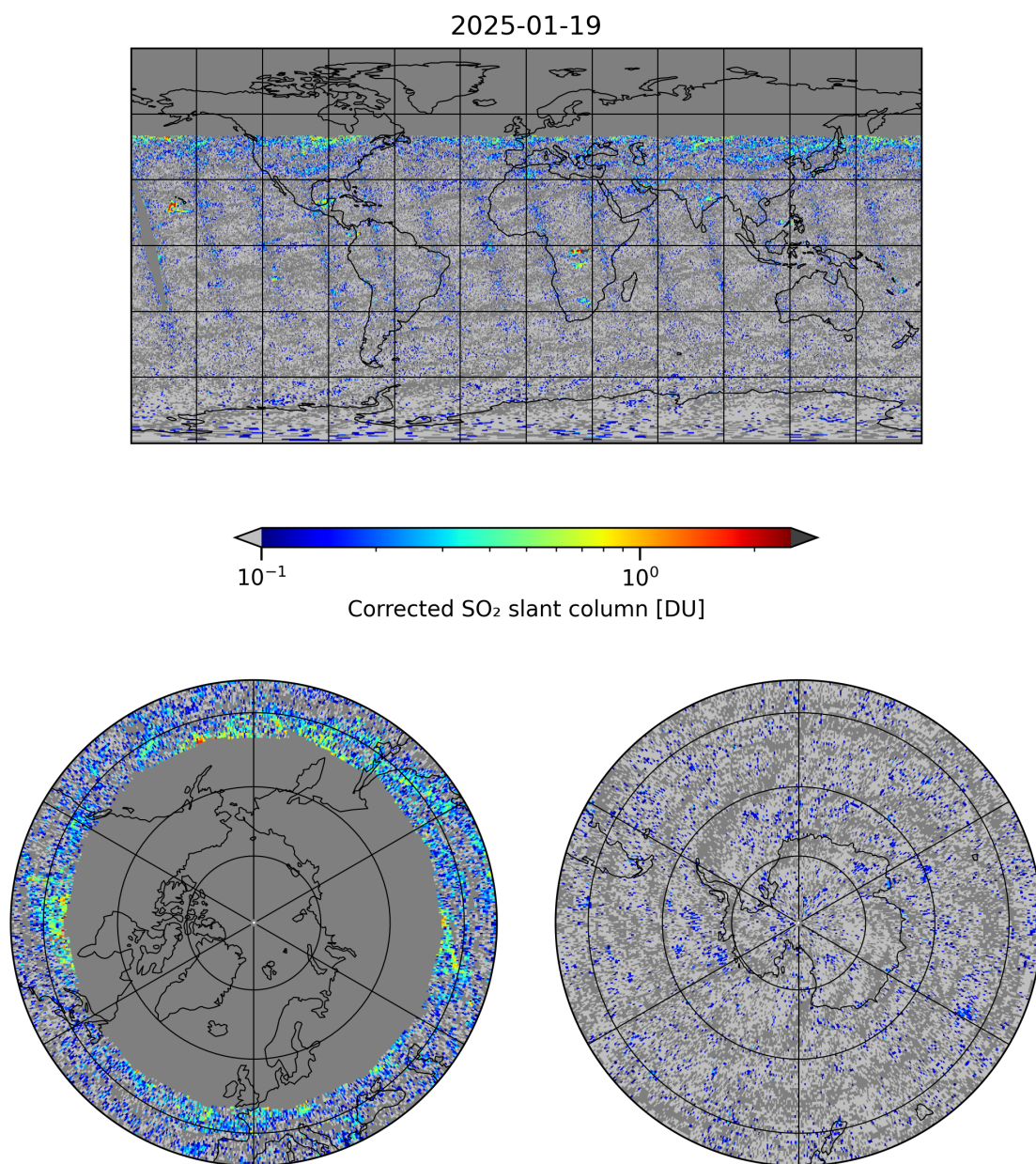


Figure 6: Map of “Corrected SO₂ slant column” for 2025-01-19 to 2025-01-20

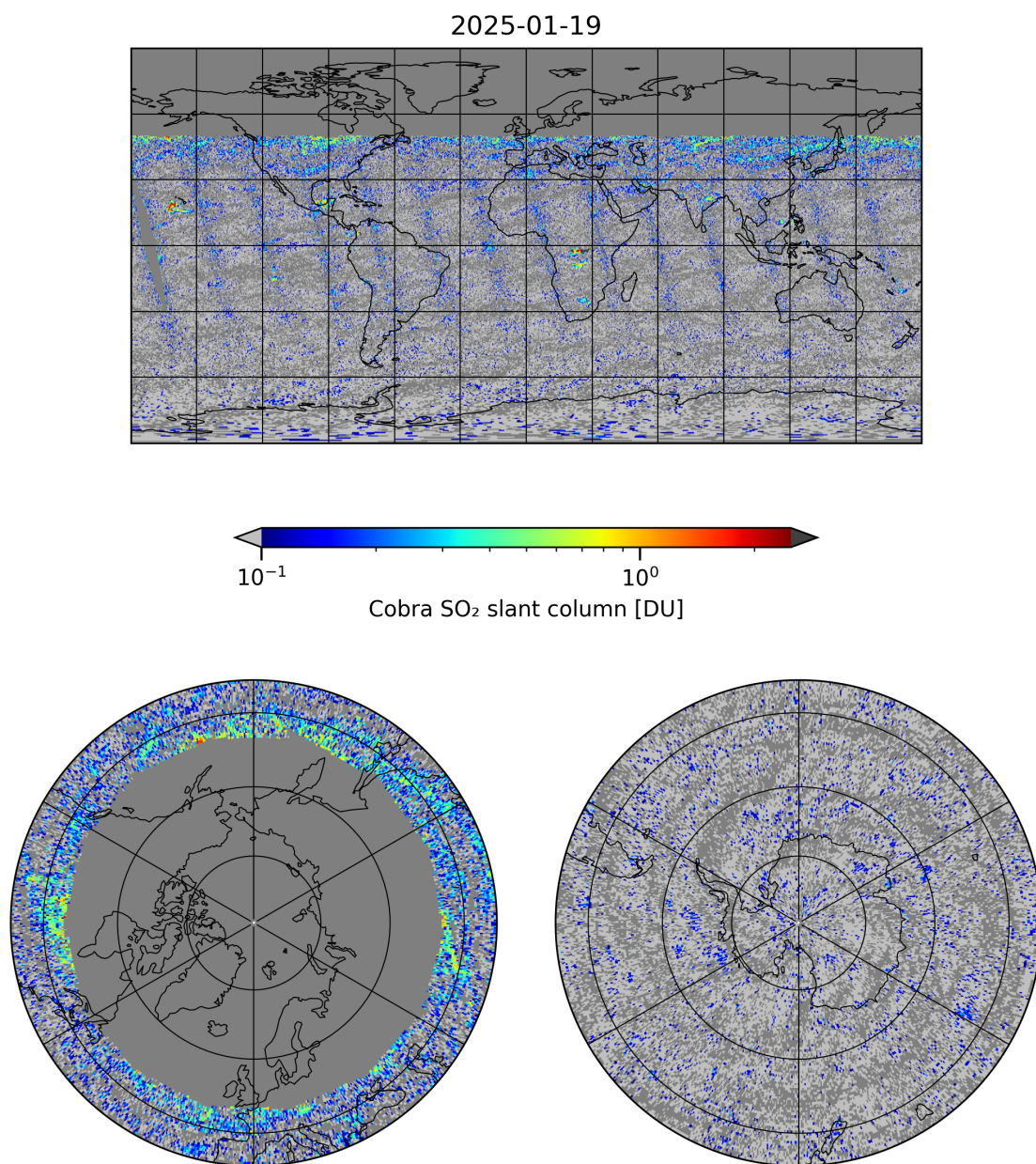


Figure 7: Map of “Cobra SO₂ slant column” for 2025-01-19 to 2025-01-20

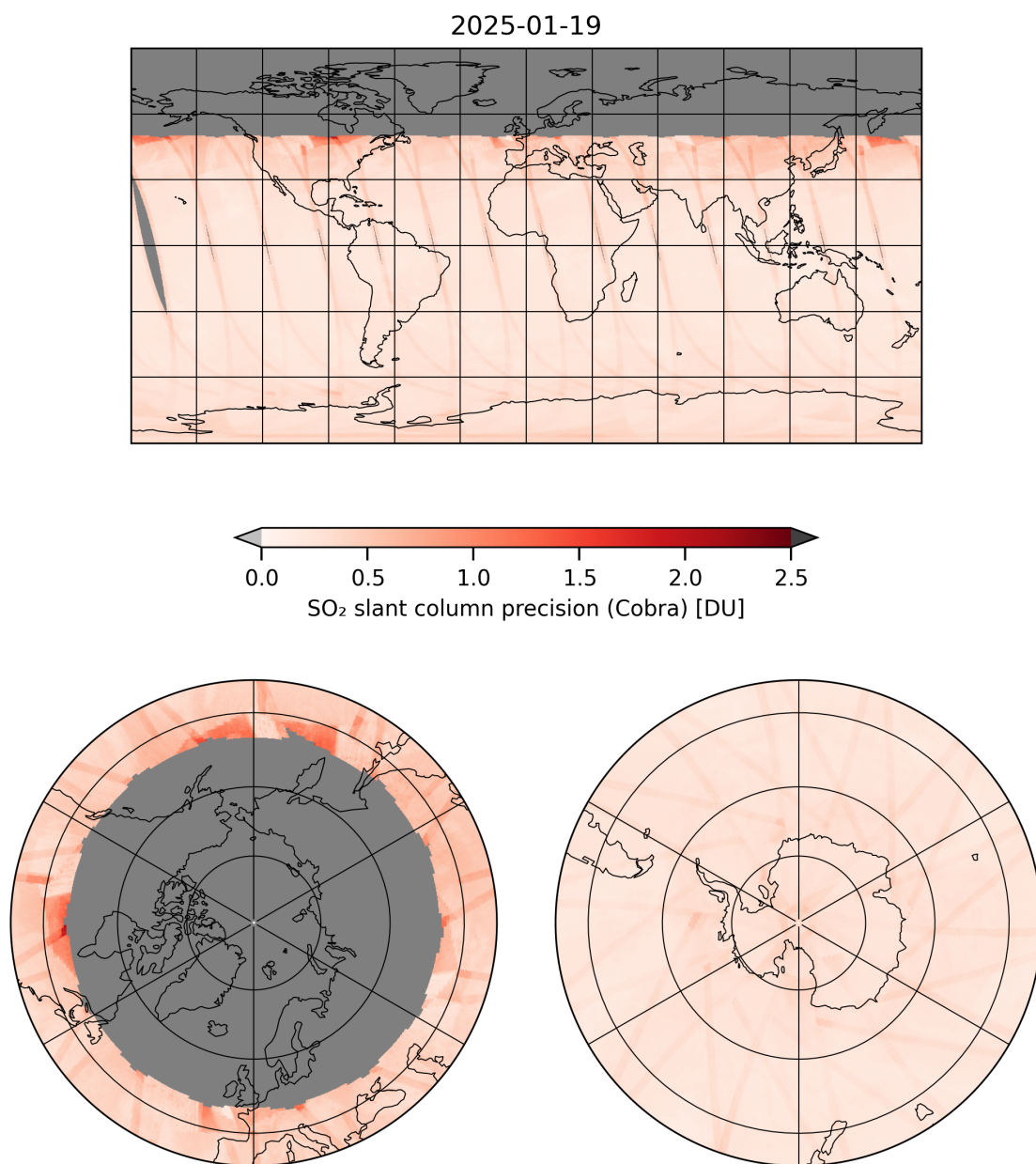


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-01-19 to 2025-01-20

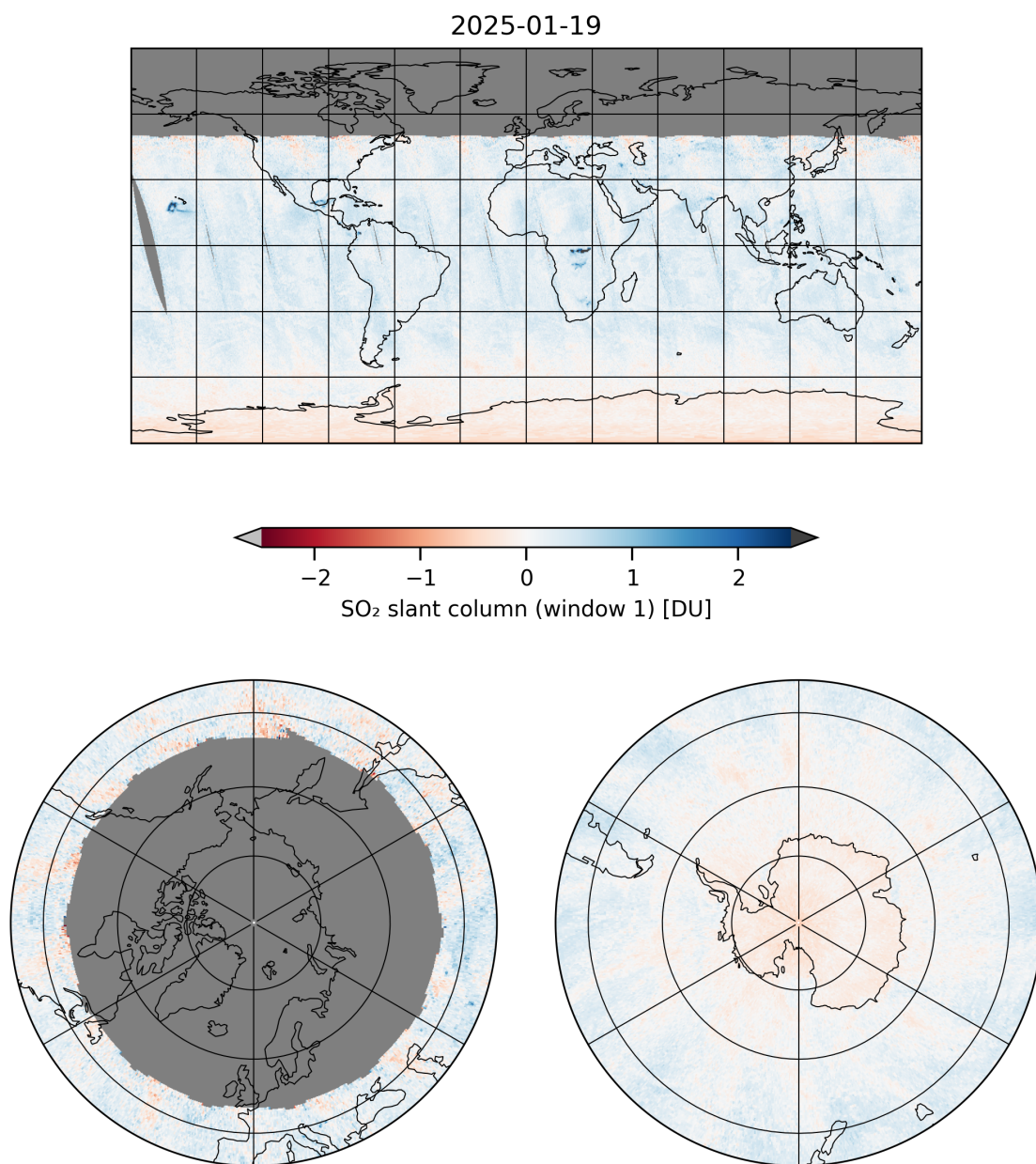


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-01-19 to 2025-01-20

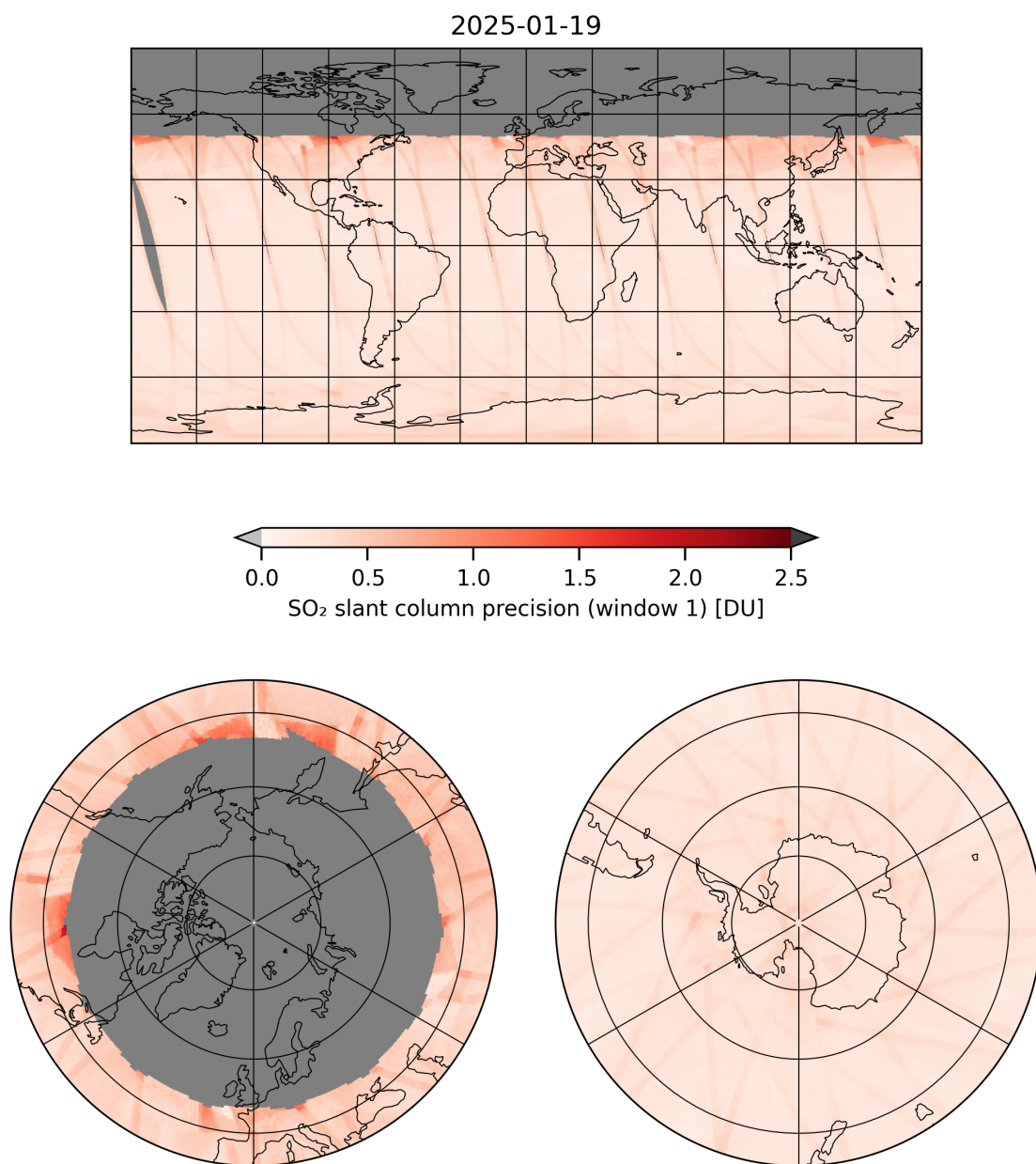


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-01-19 to 2025-01-20

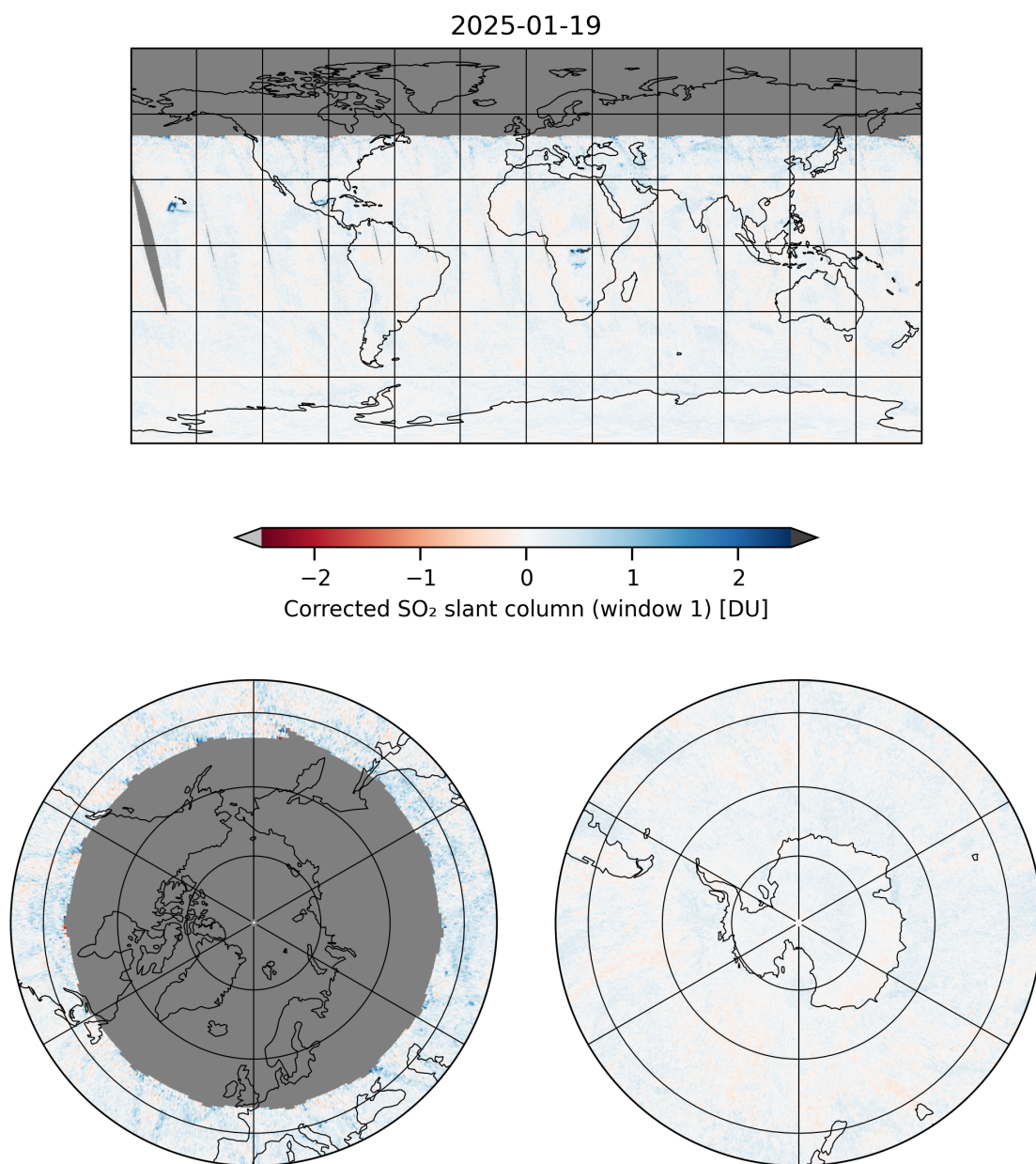


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-01-19 to 2025-01-20

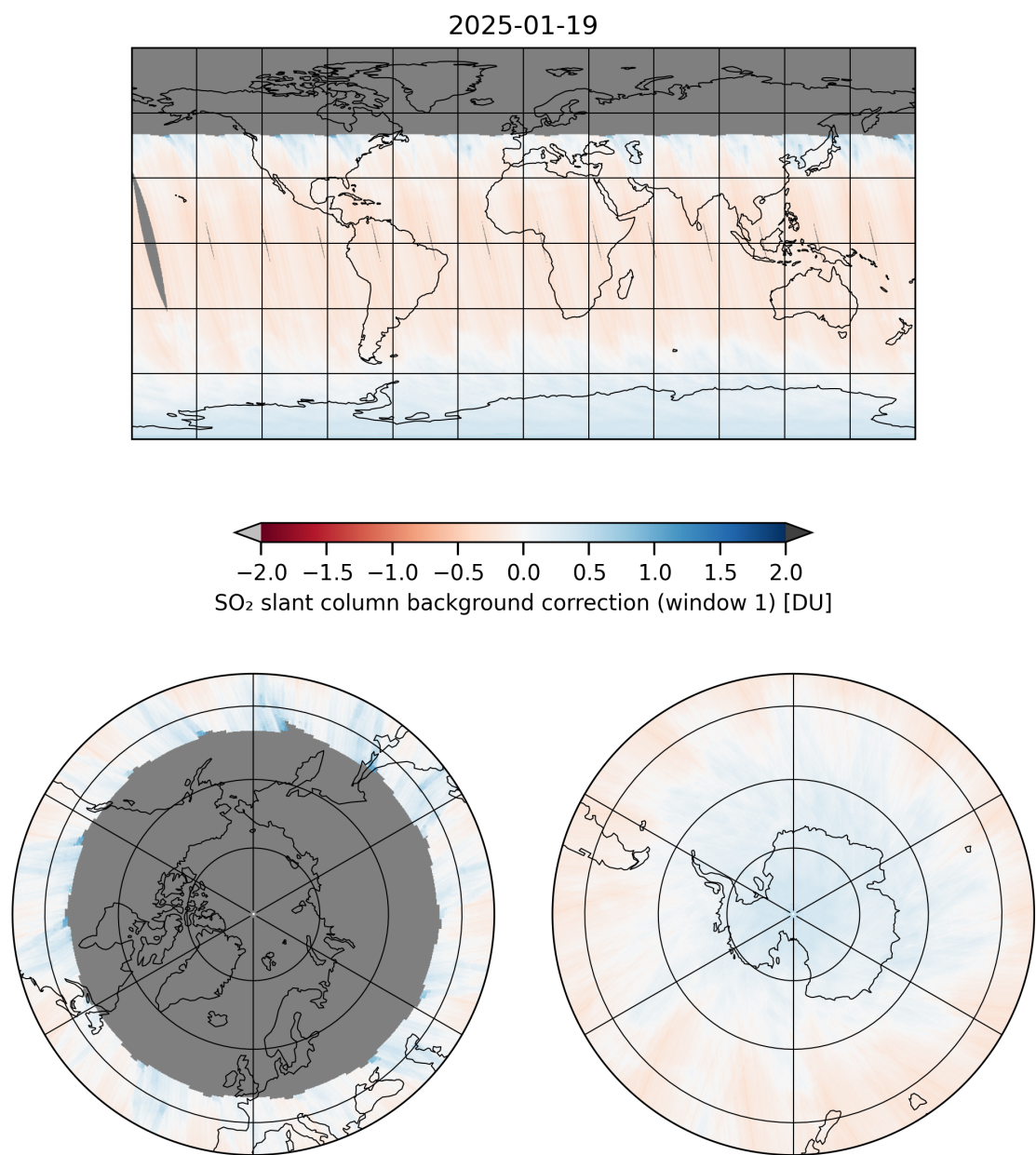


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-01-19 to 2025-01-20

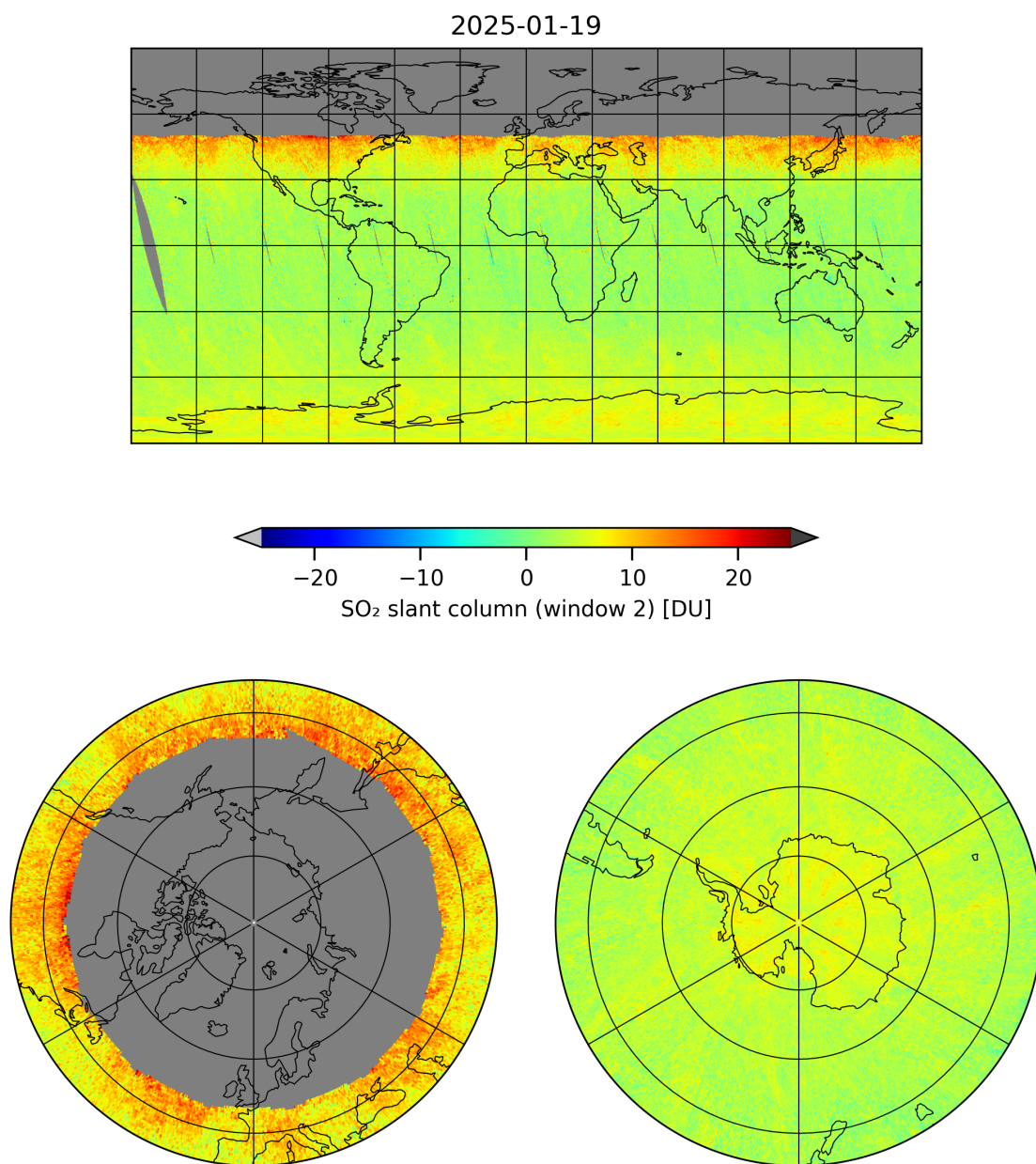


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-01-19 to 2025-01-20

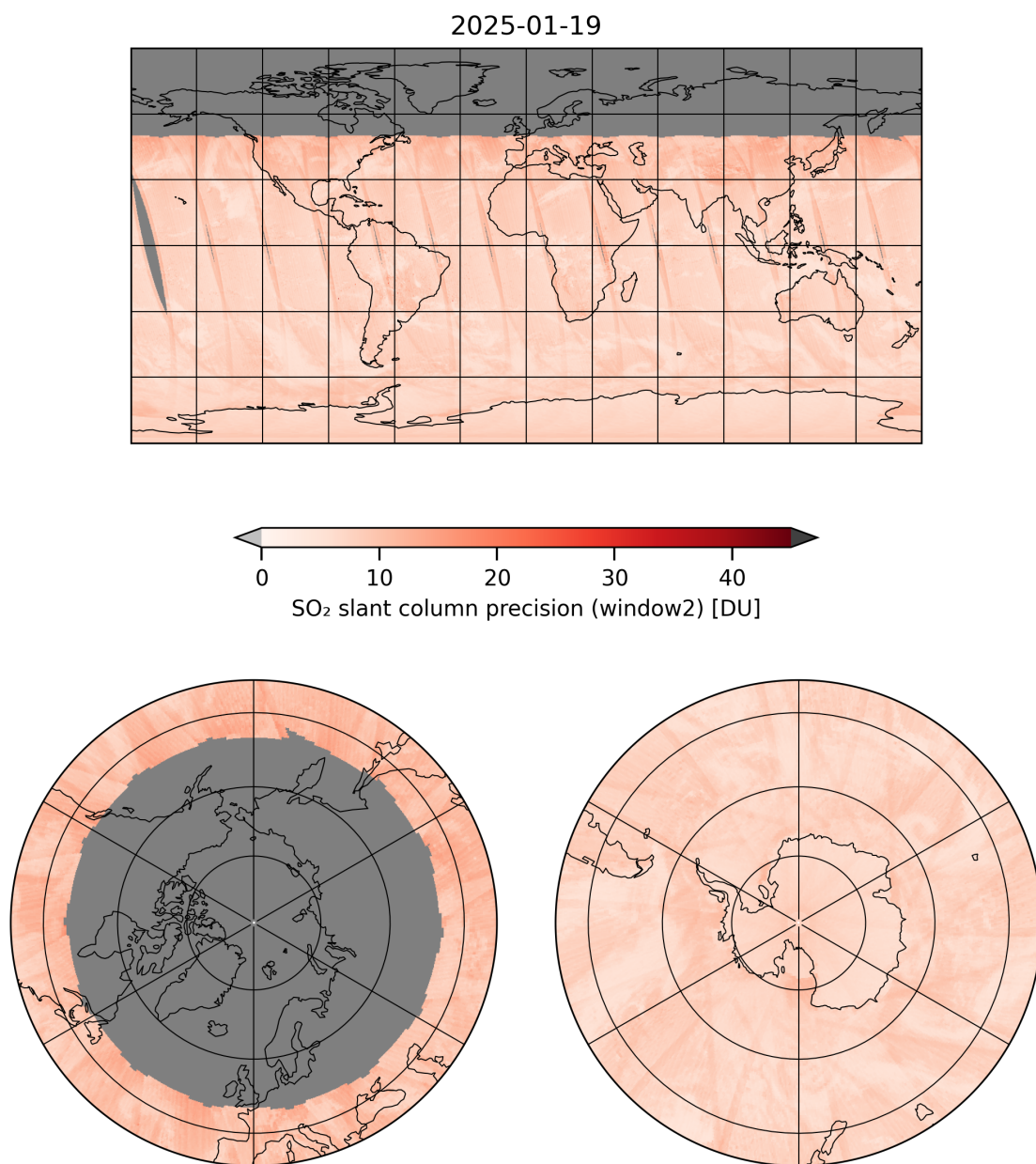


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-01-19 to 2025-01-20

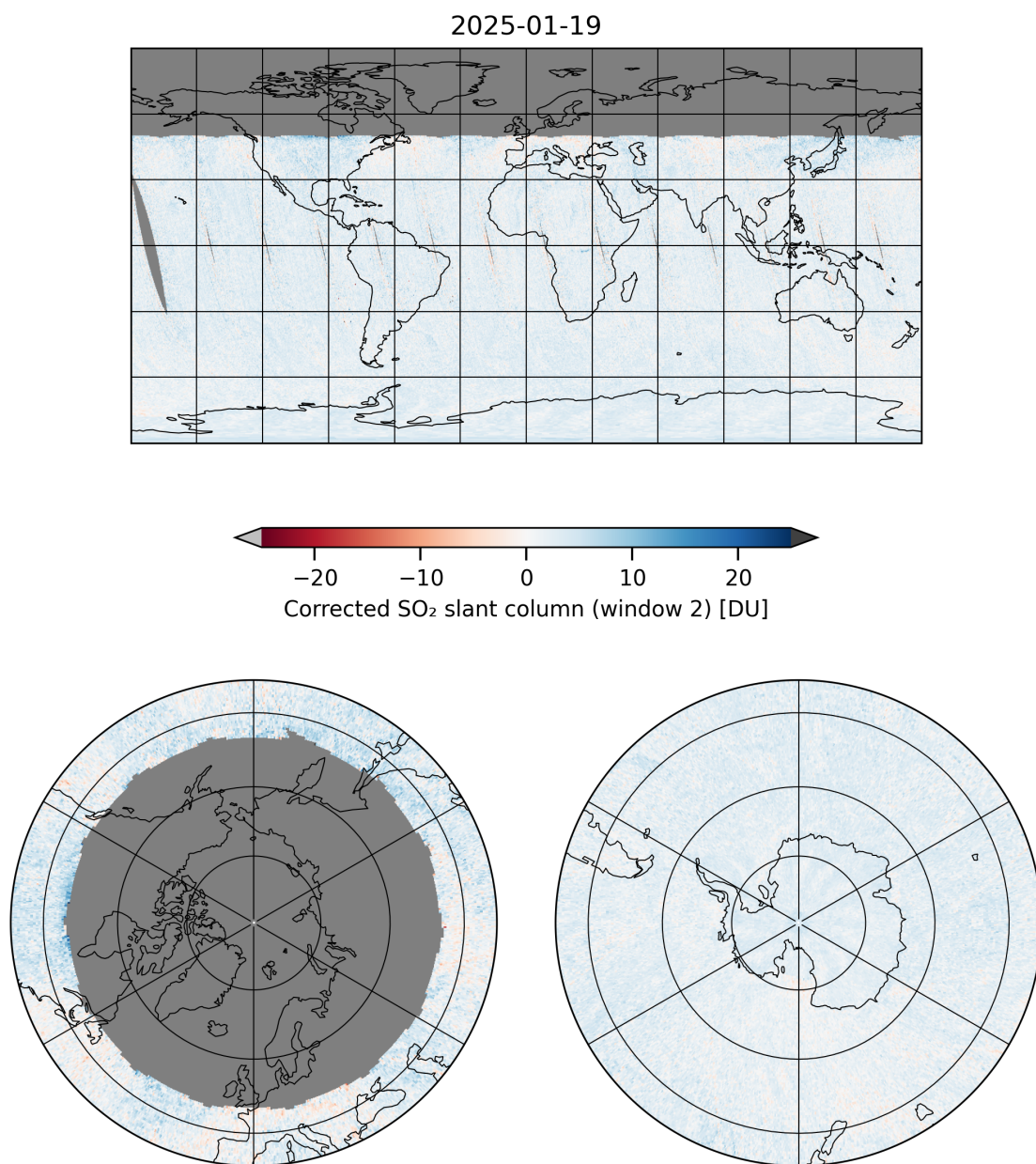


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-01-19 to 2025-01-20

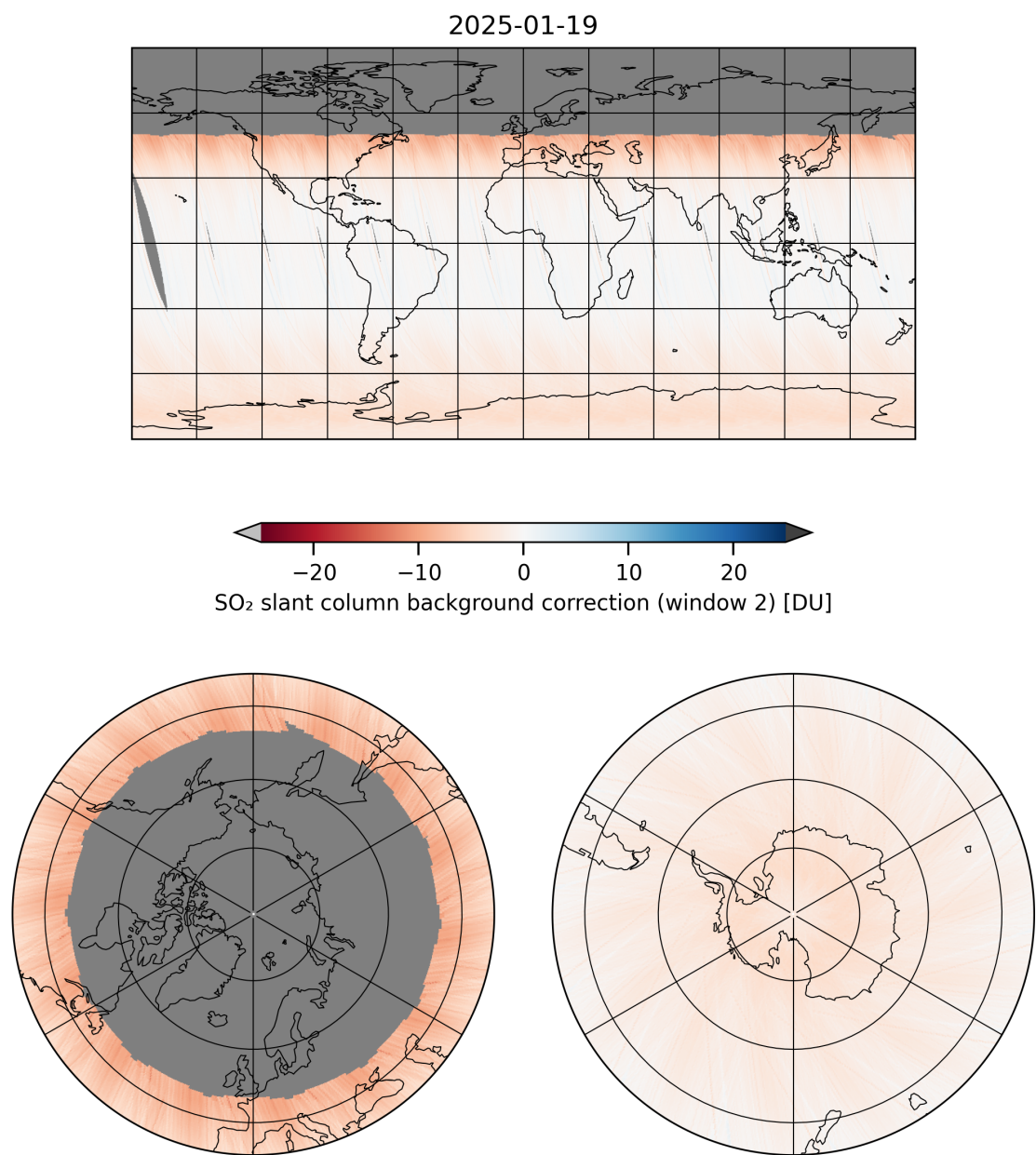


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-01-19 to 2025-01-20

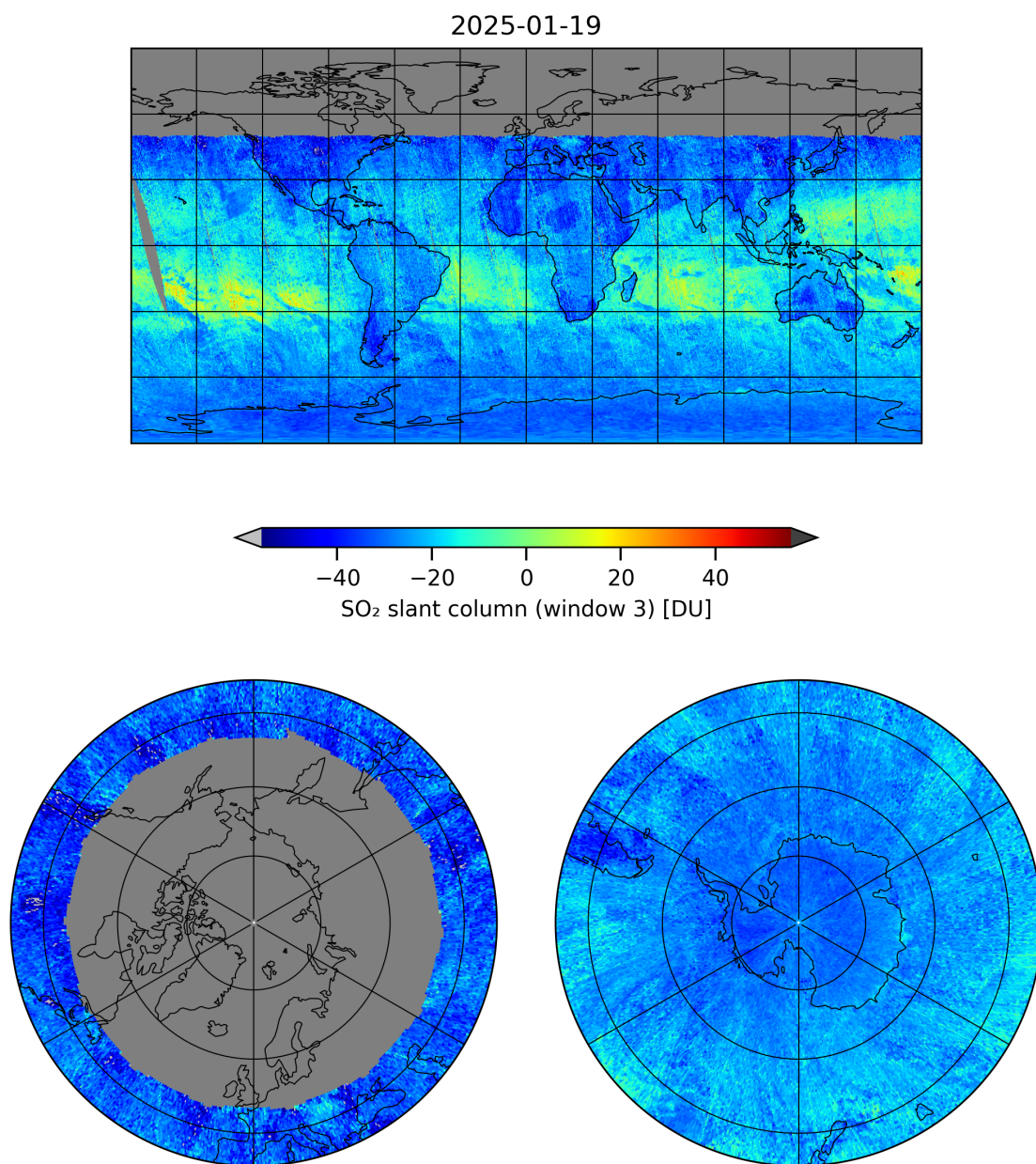


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-01-19 to 2025-01-20

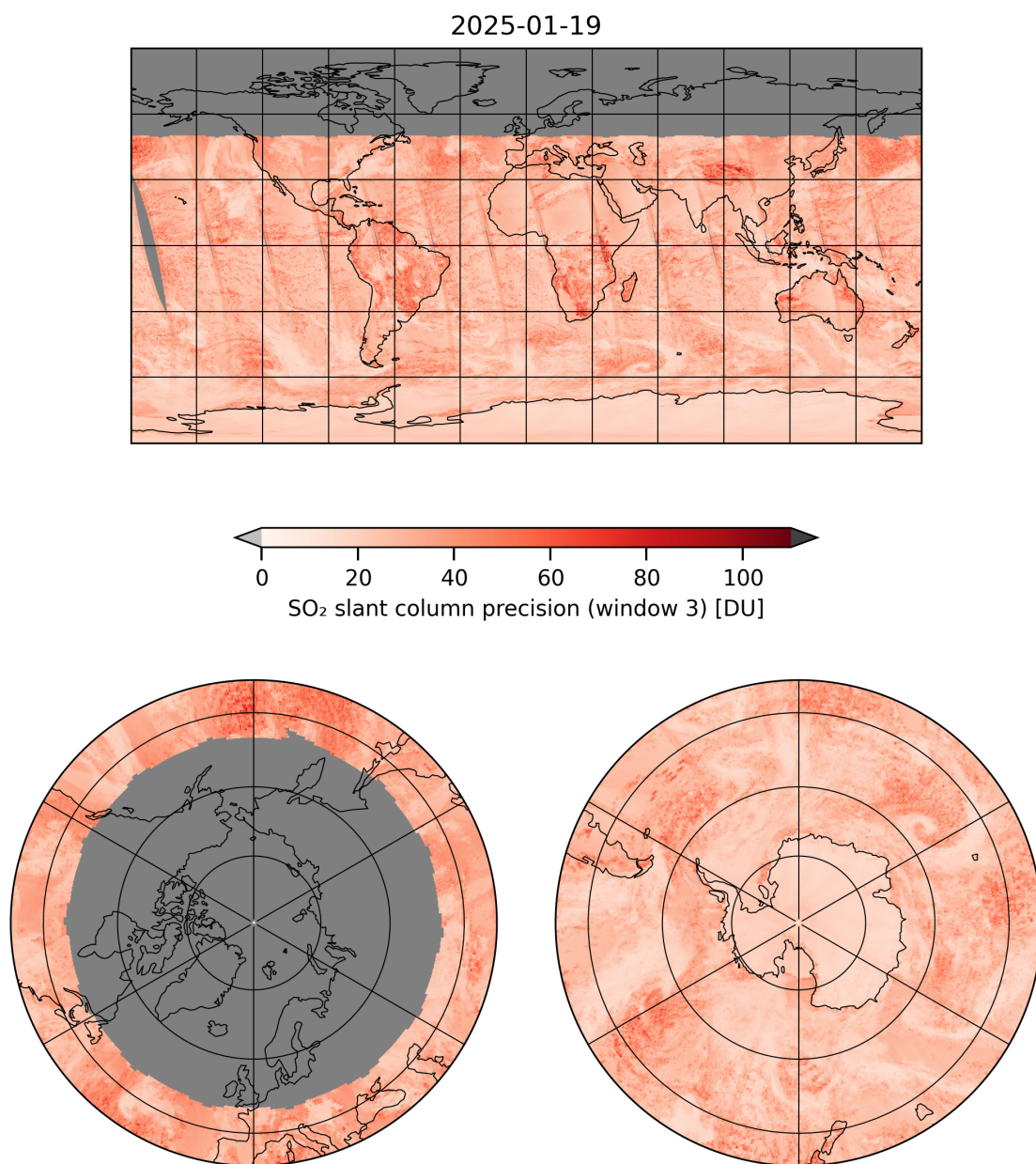


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-01-19 to 2025-01-20

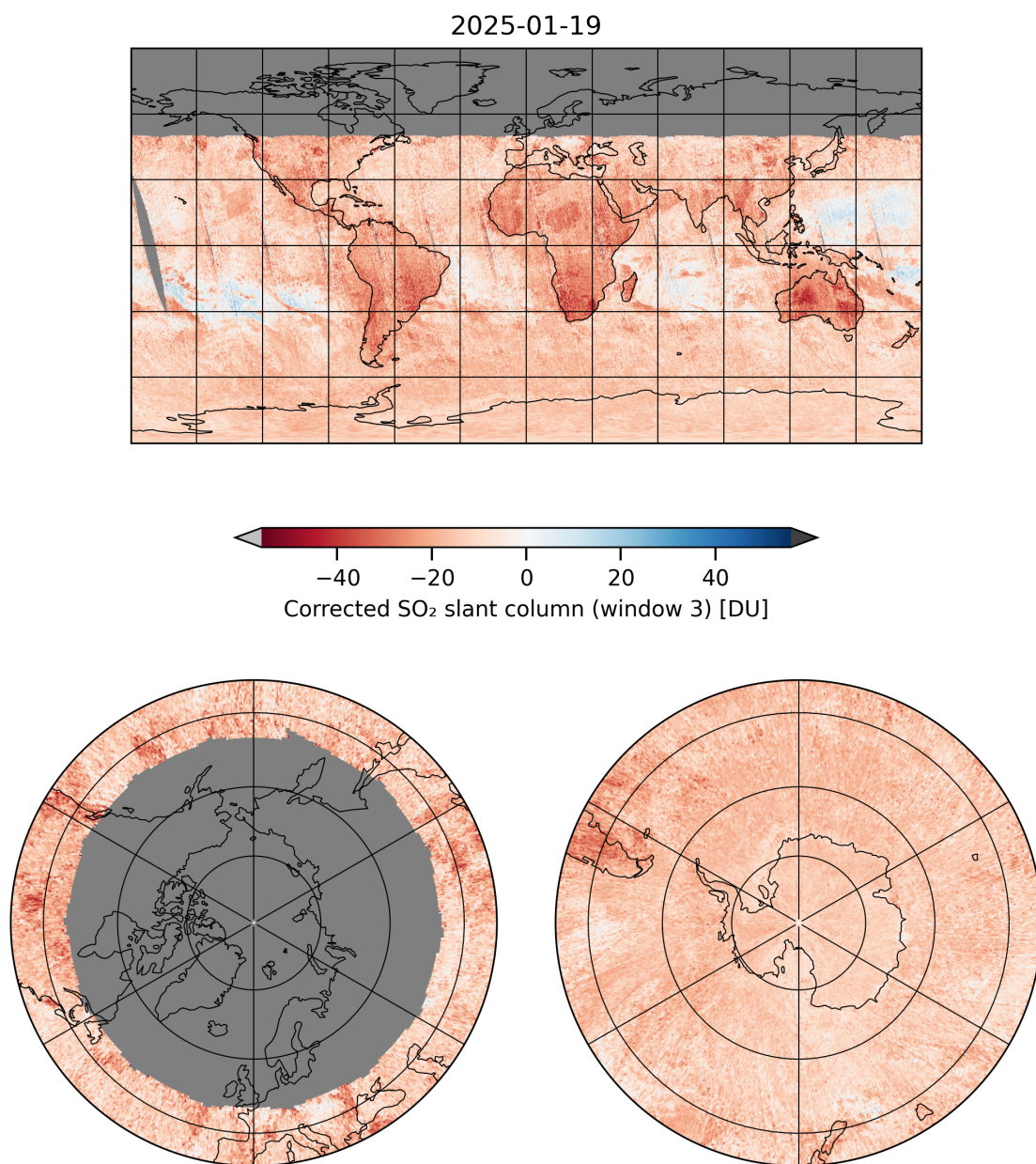


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-01-19 to 2025-01-20

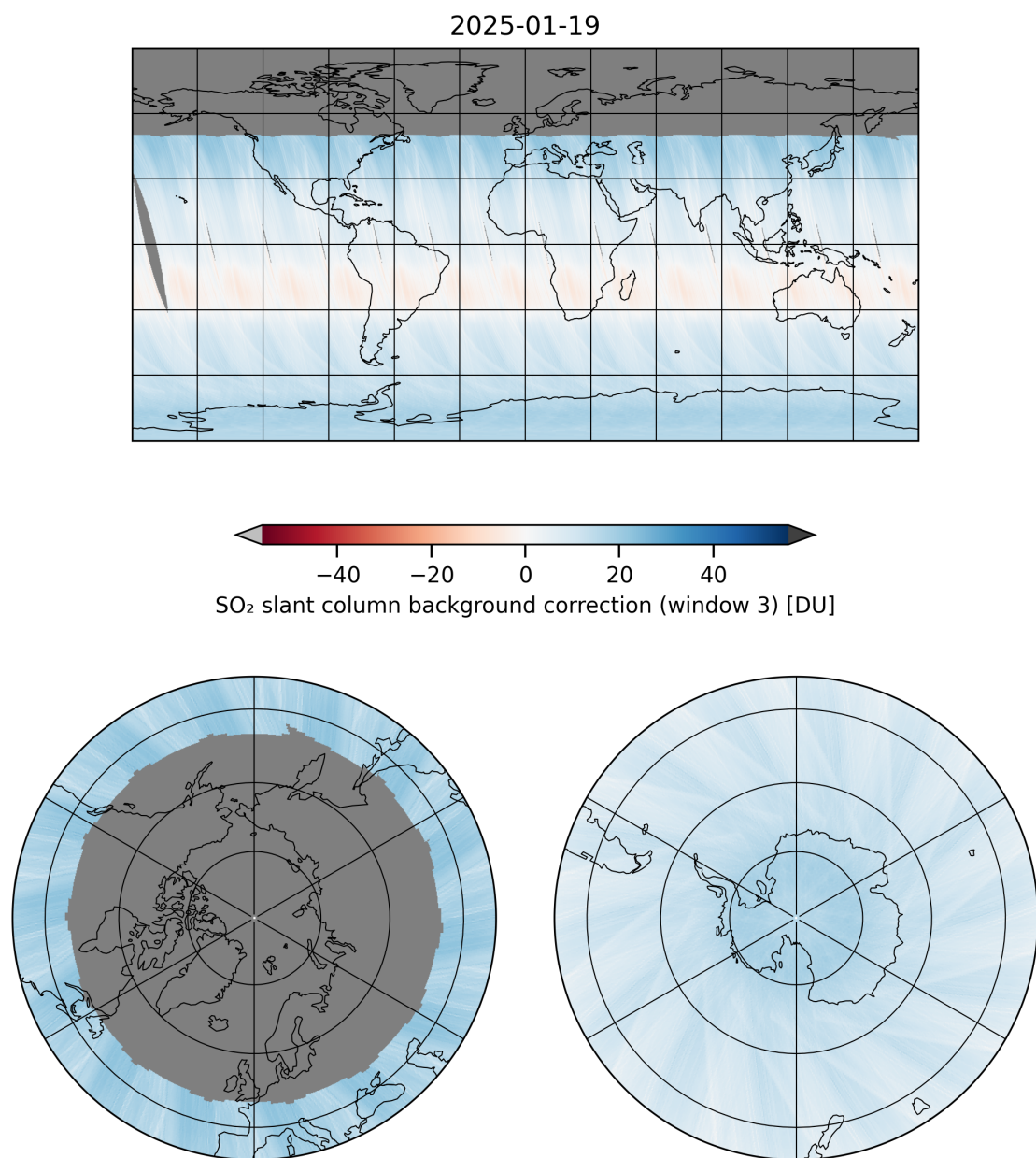


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-01-19 to 2025-01-20

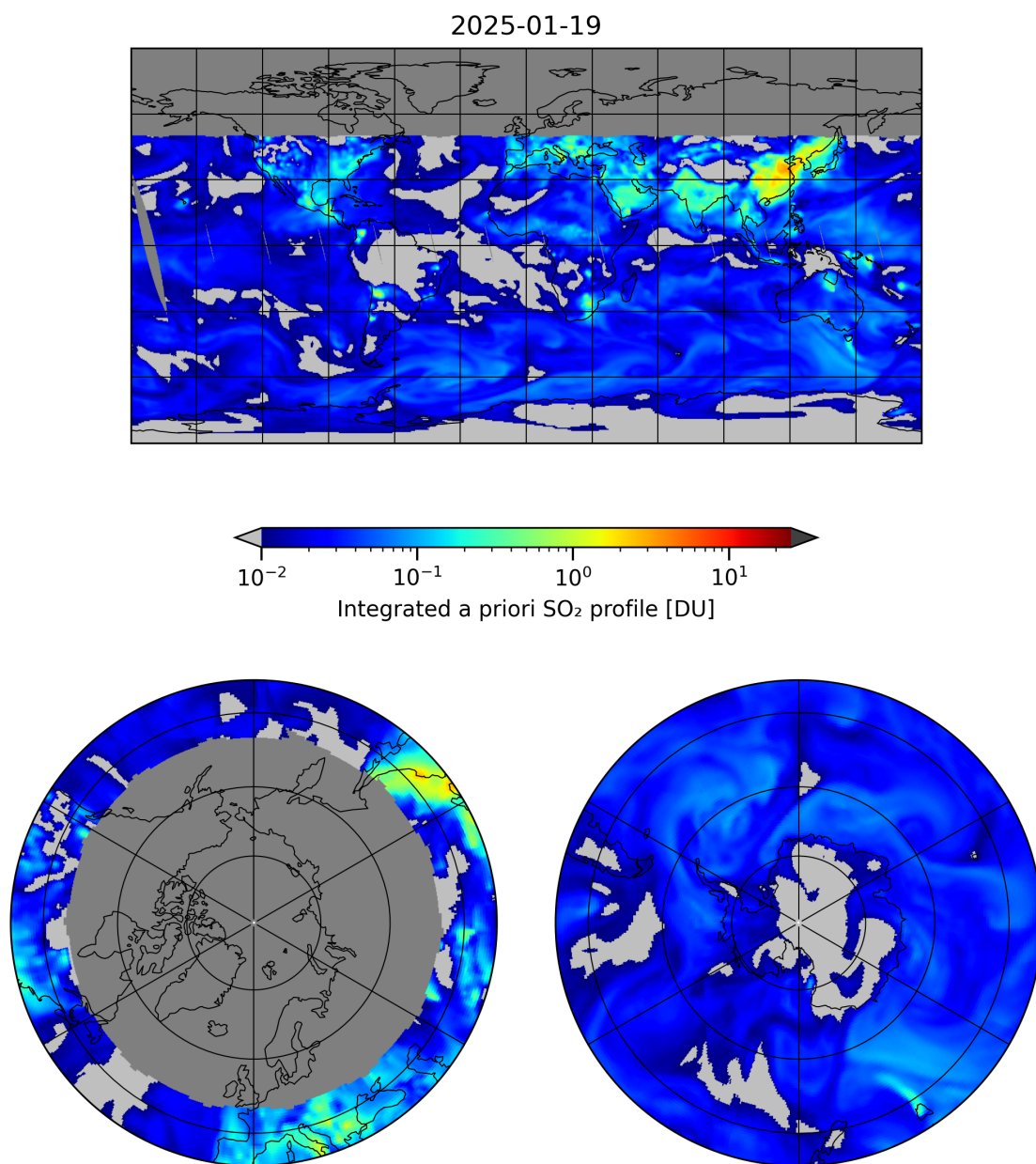


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-01-19 to 2025-01-20

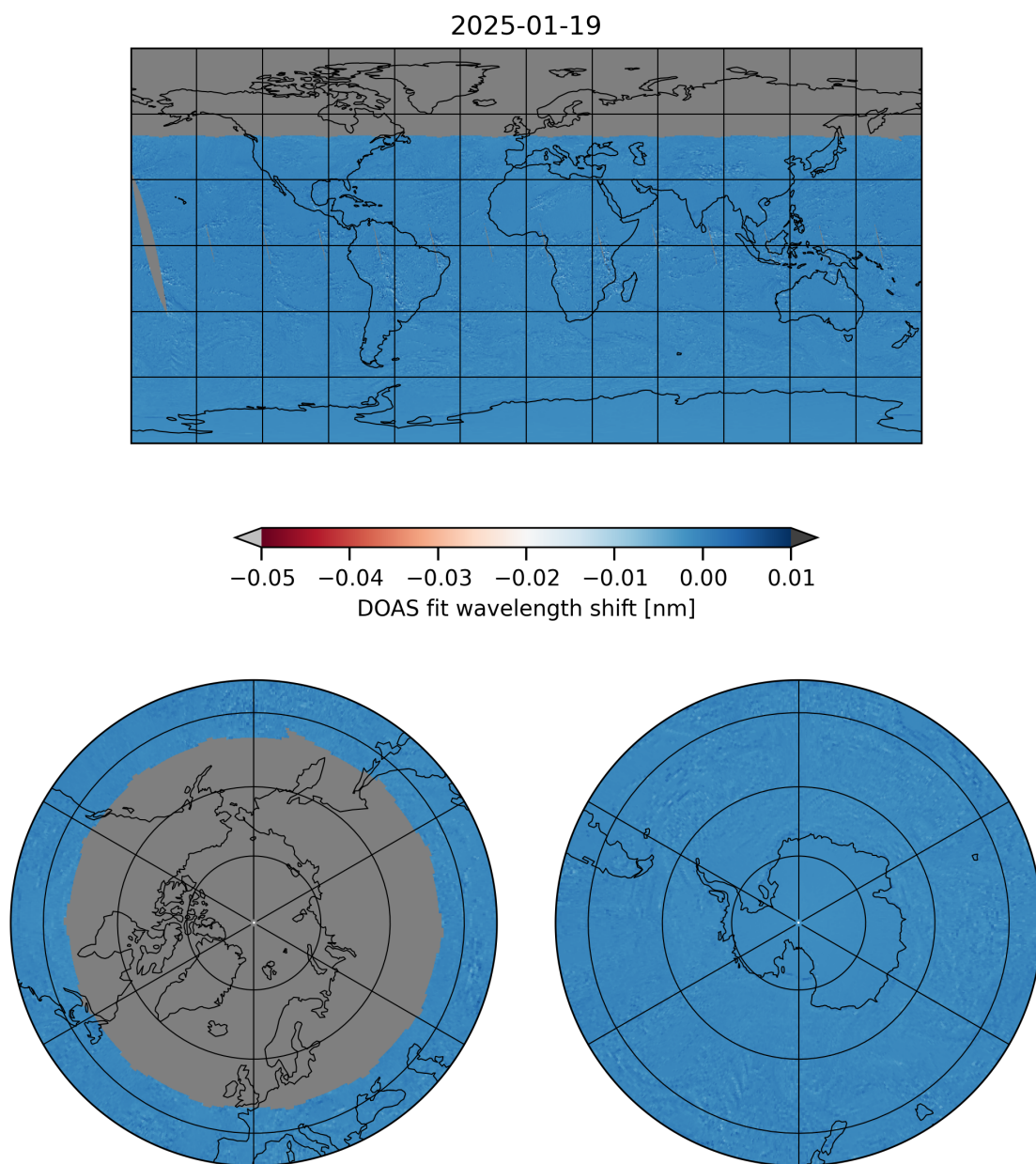


Figure 22: Map of “DOAS fit wavelength shift” for 2025-01-19 to 2025-01-20

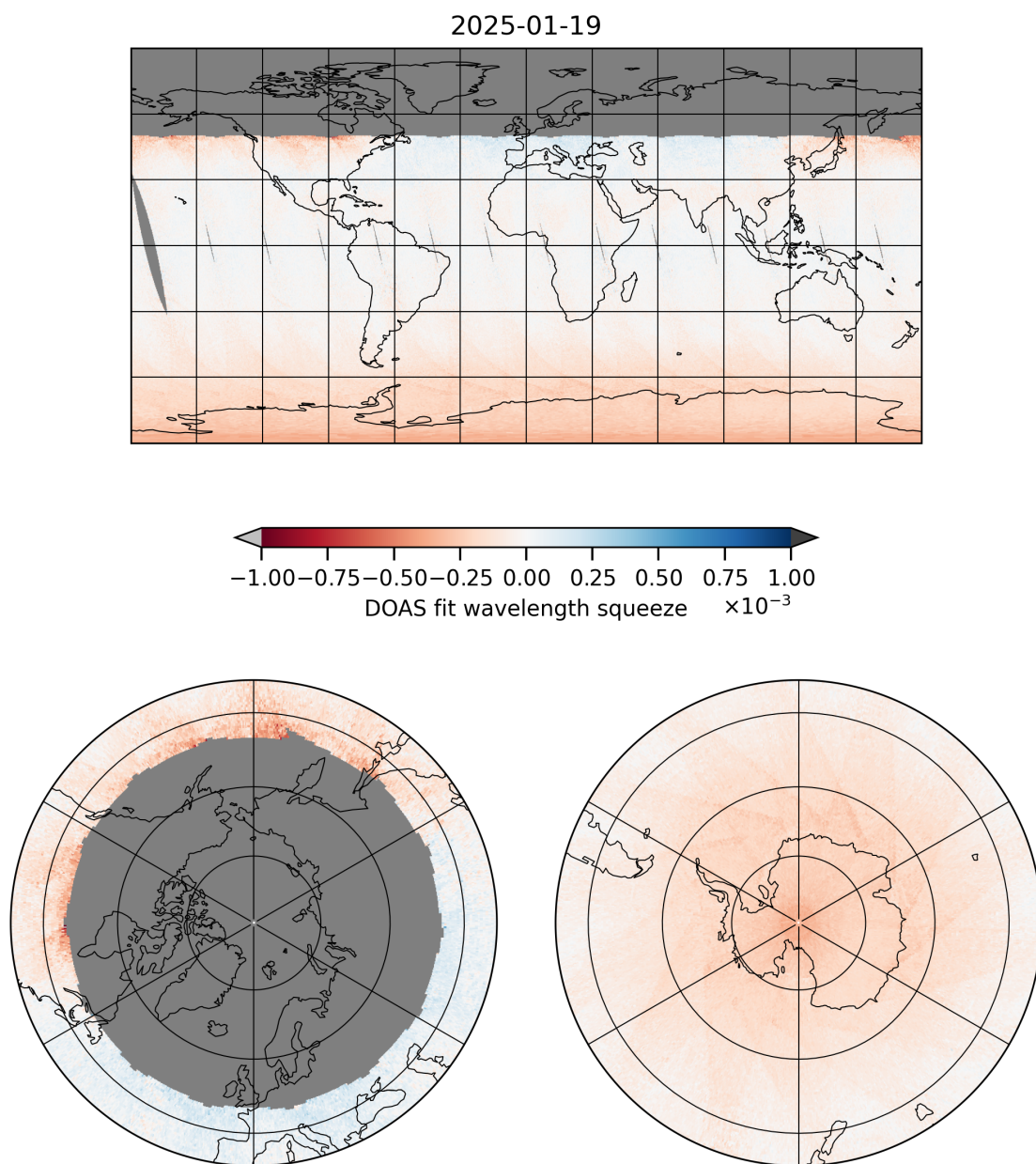


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-01-19 to 2025-01-20

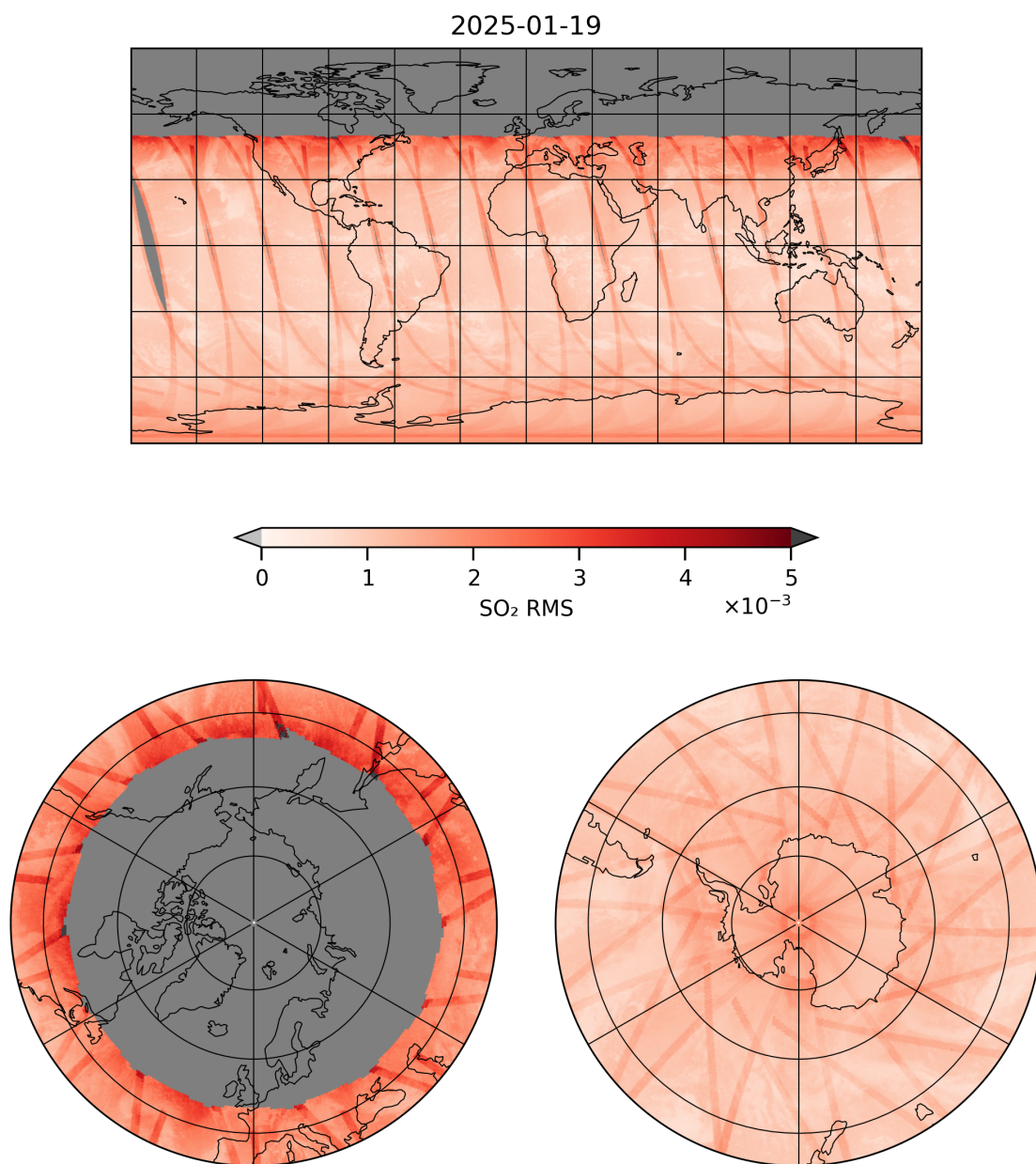


Figure 24: Map of “SO₂ RMS” for 2025-01-19 to 2025-01-20

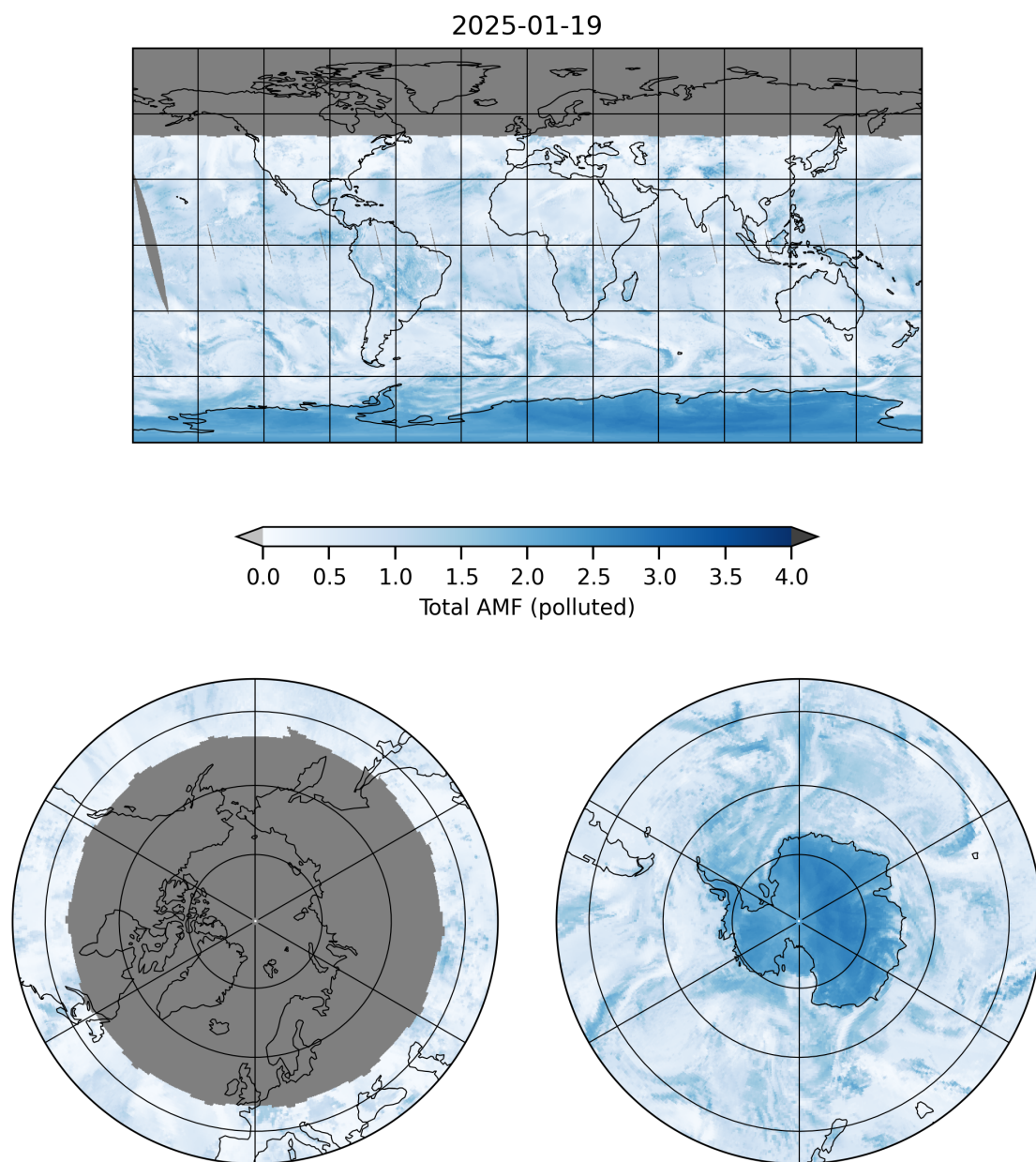


Figure 25: Map of “Total AMF (polluted)” for 2025-01-19 to 2025-01-20

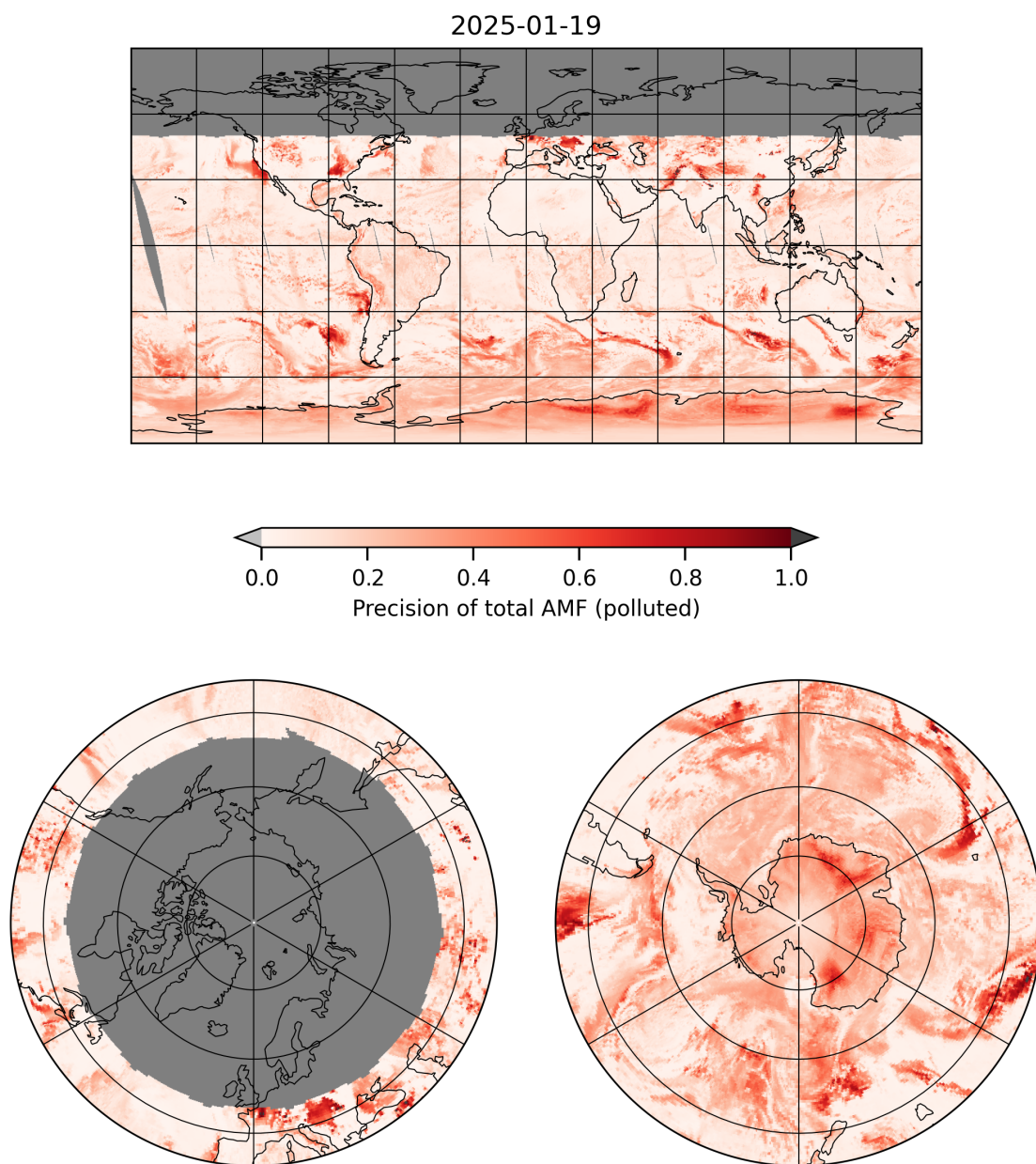


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-01-19 to 2025-01-20

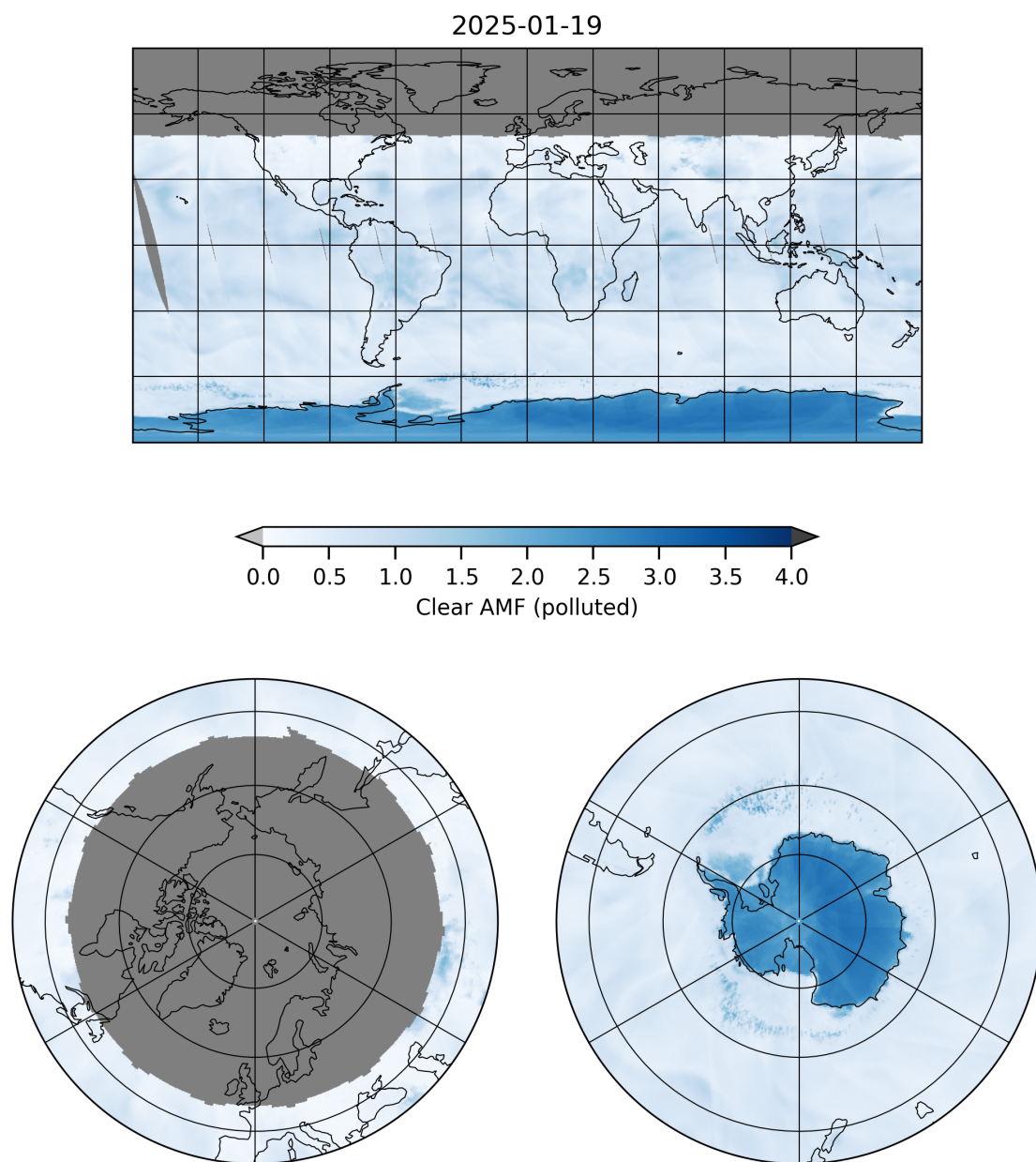


Figure 27: Map of “Clear AMF (polluted)” for 2025-01-19 to 2025-01-20

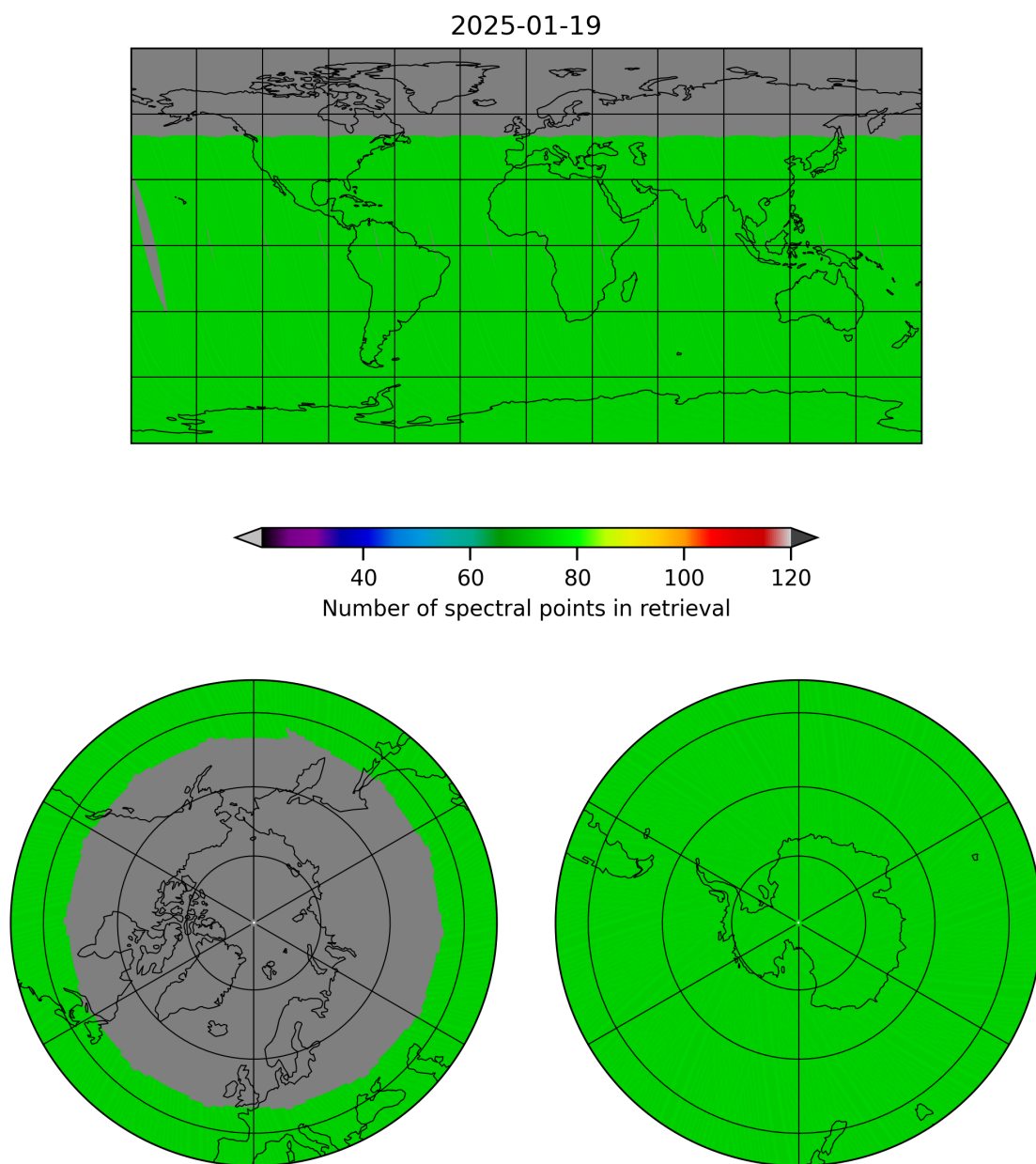


Figure 28: Map of “Number of spectral points in retrieval” for 2025-01-19 to 2025-01-20

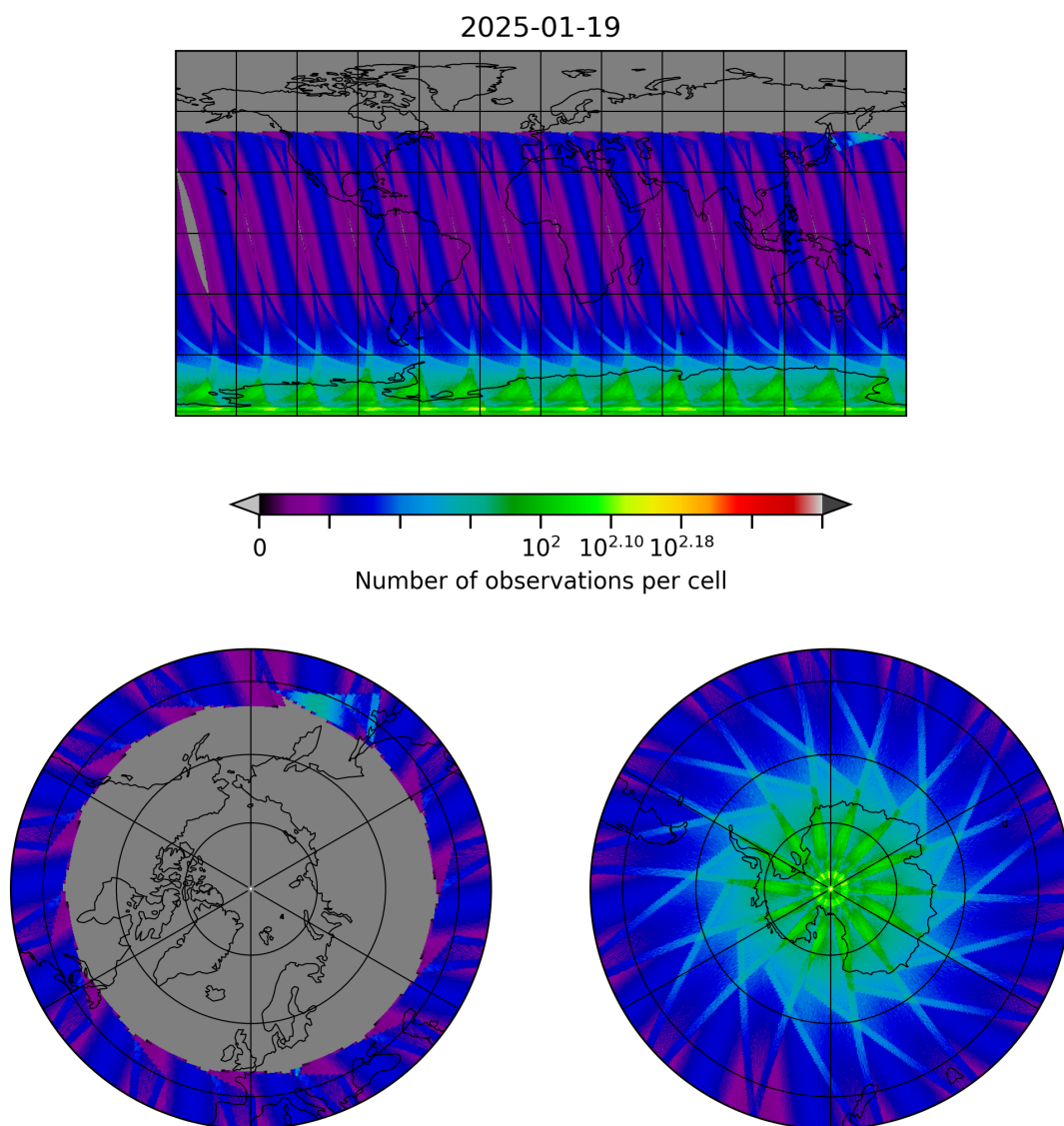


Figure 29: Map of the number of observations for 2025-01-19 to 2025-01-20

7 Zonal average

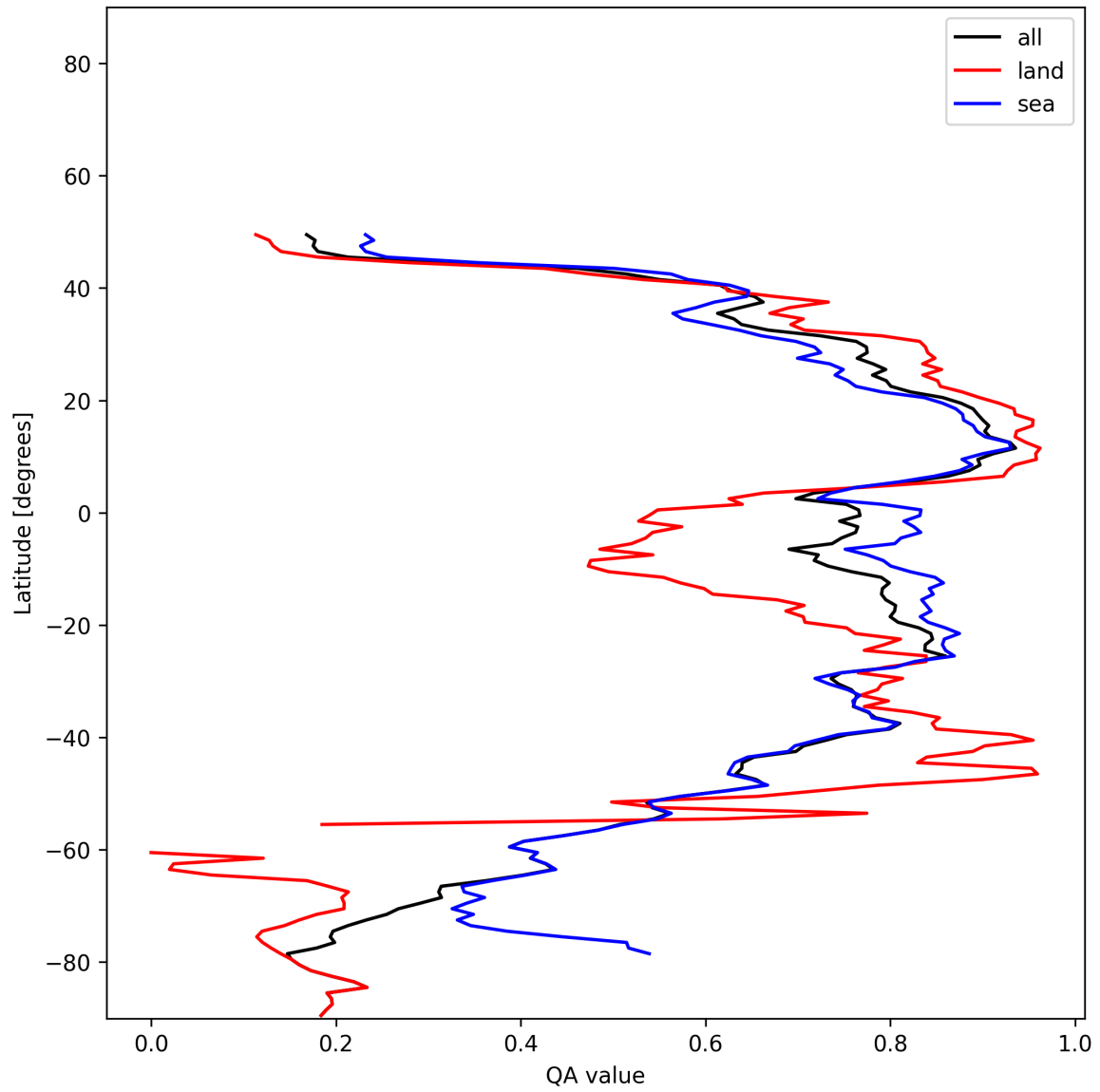


Figure 30: Zonal average of “QA value” for 2025-01-19 to 2025-01-20.

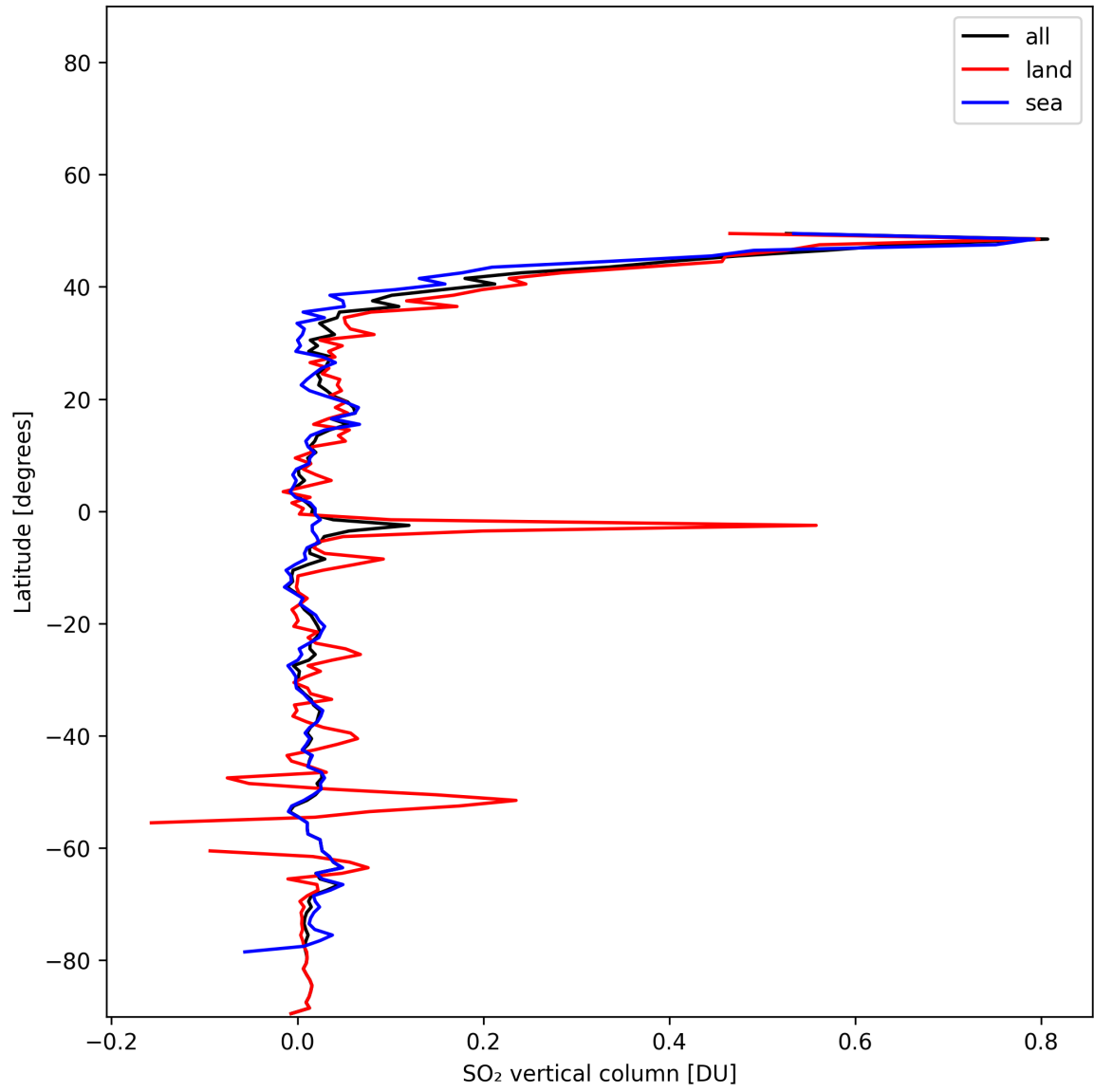


Figure 31: Zonal average of “SO₂ vertical column” for 2025-01-19 to 2025-01-20.

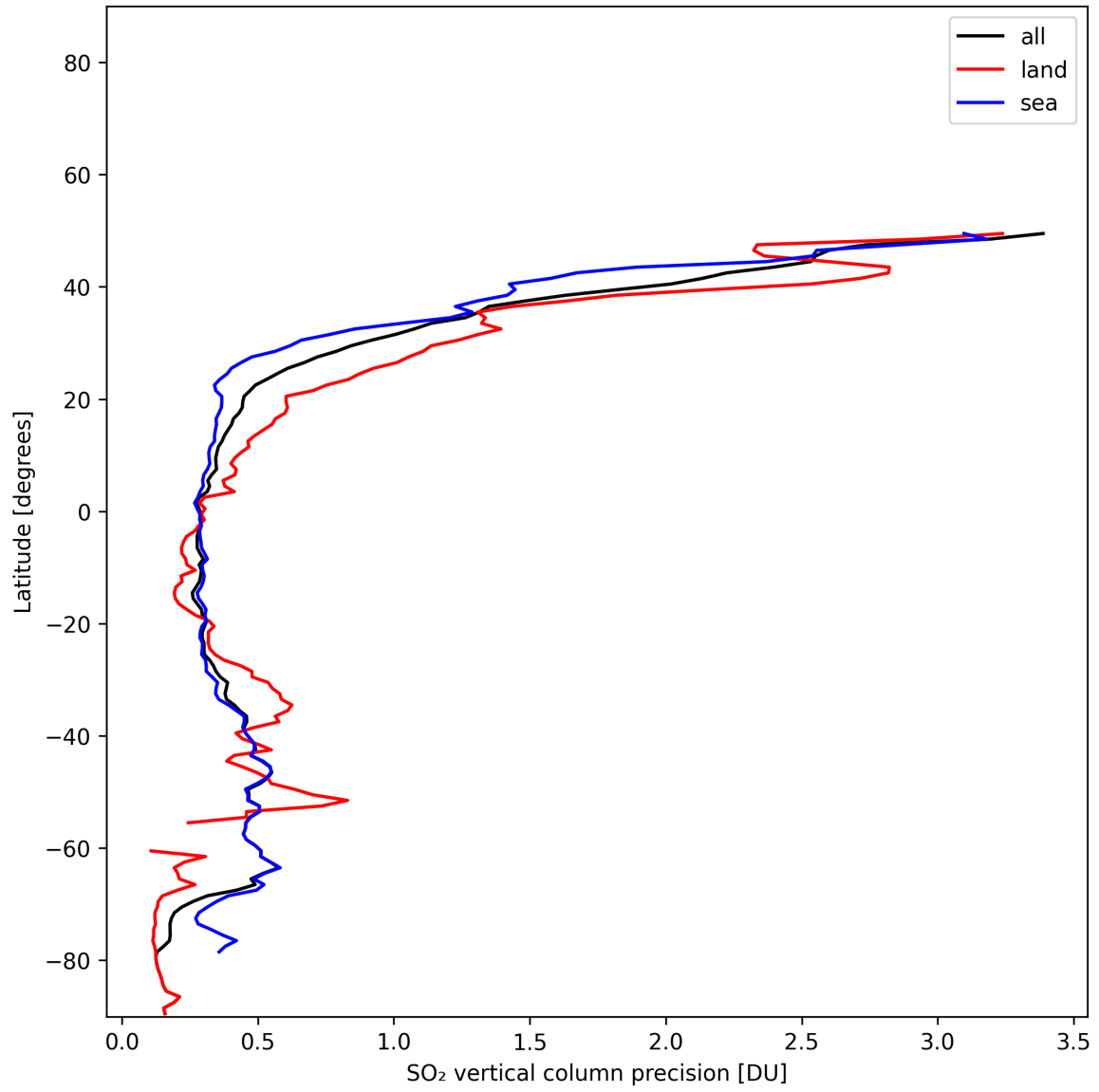


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-01-19 to 2025-01-20.

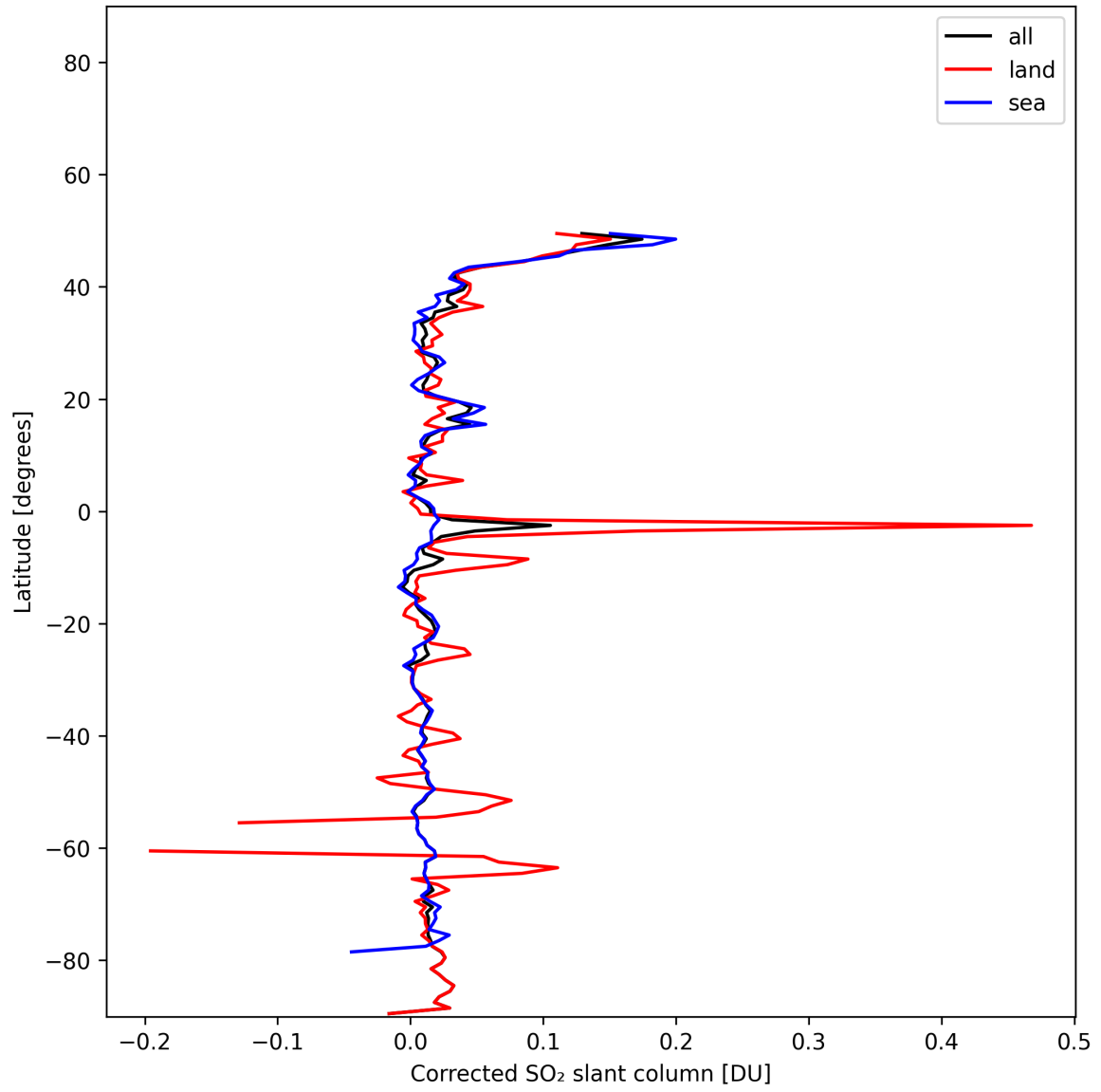


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-01-19 to 2025-01-20.

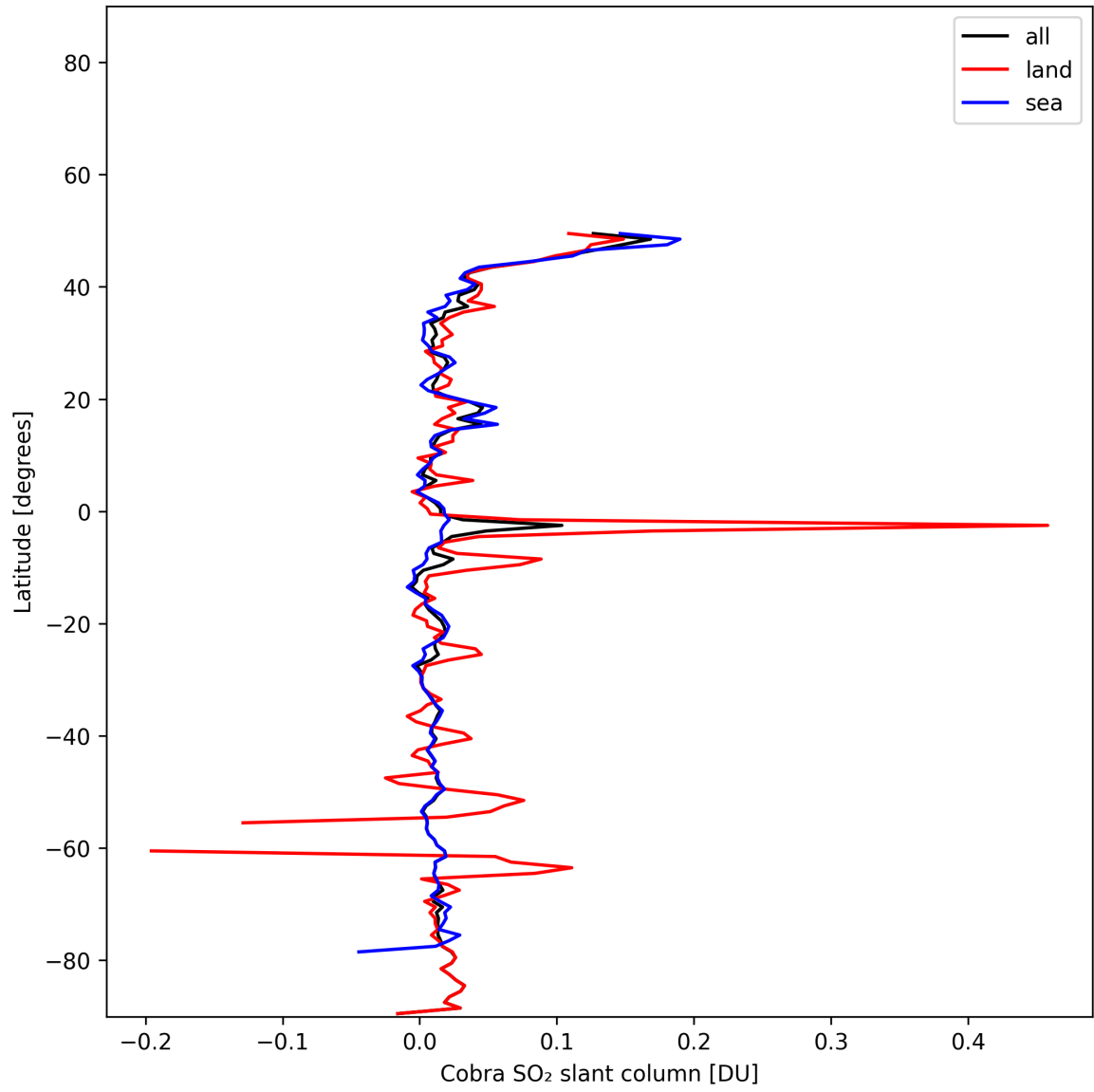


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-01-19 to 2025-01-20.

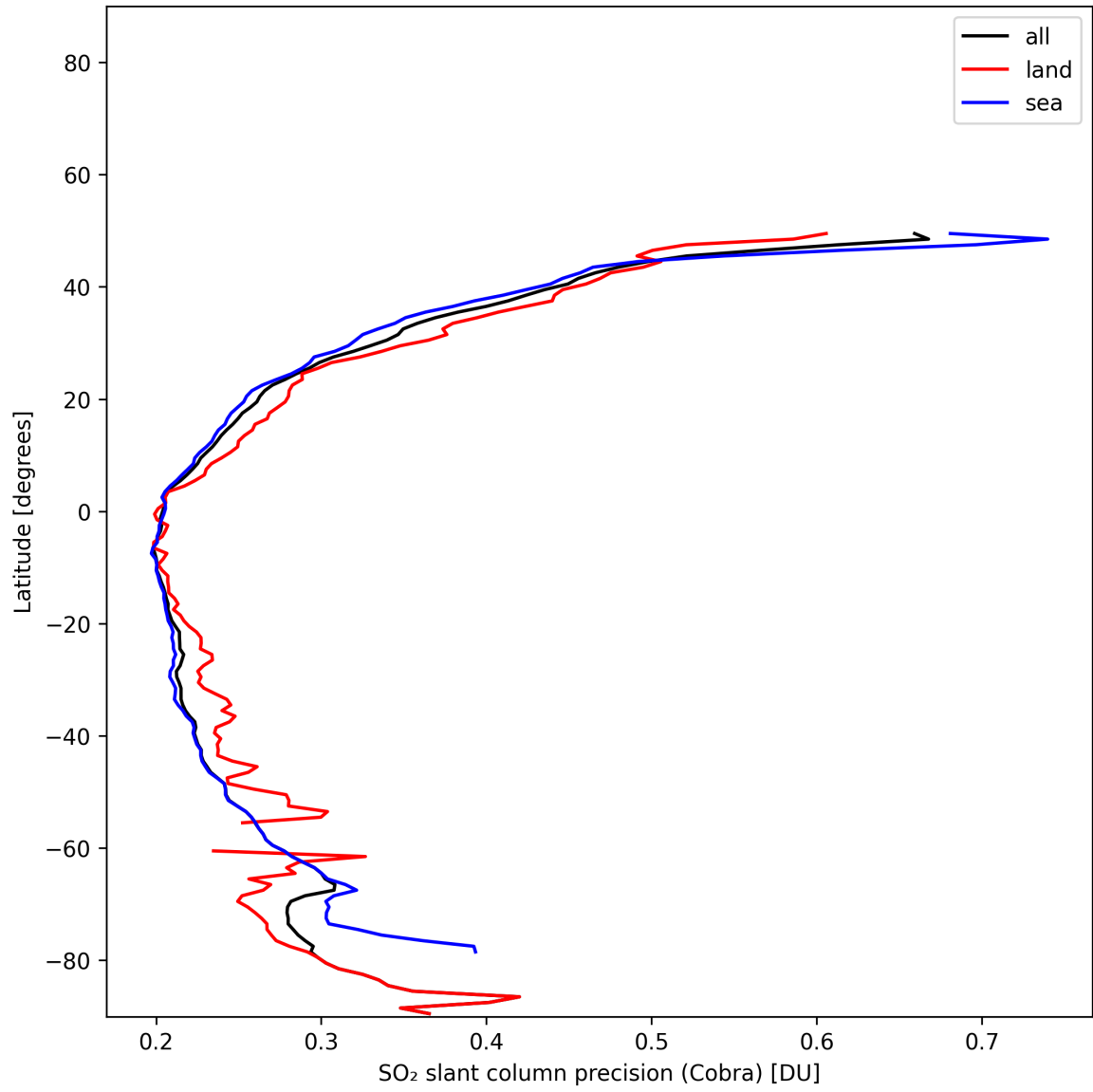


Figure 35: Zonal average of "SO₂ slant column precision (Cobra)" for 2025-01-19 to 2025-01-20.

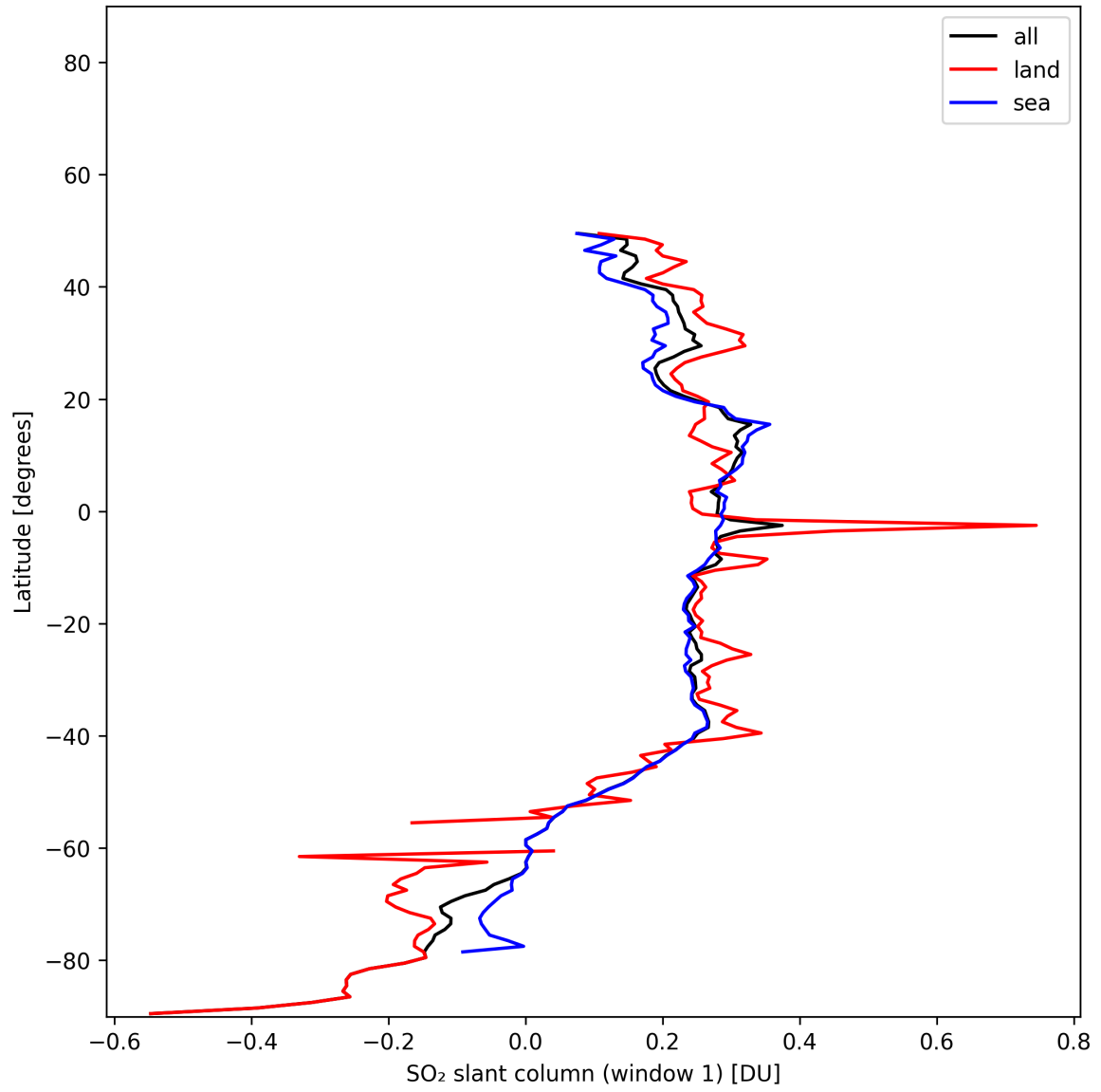


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-01-19 to 2025-01-20.

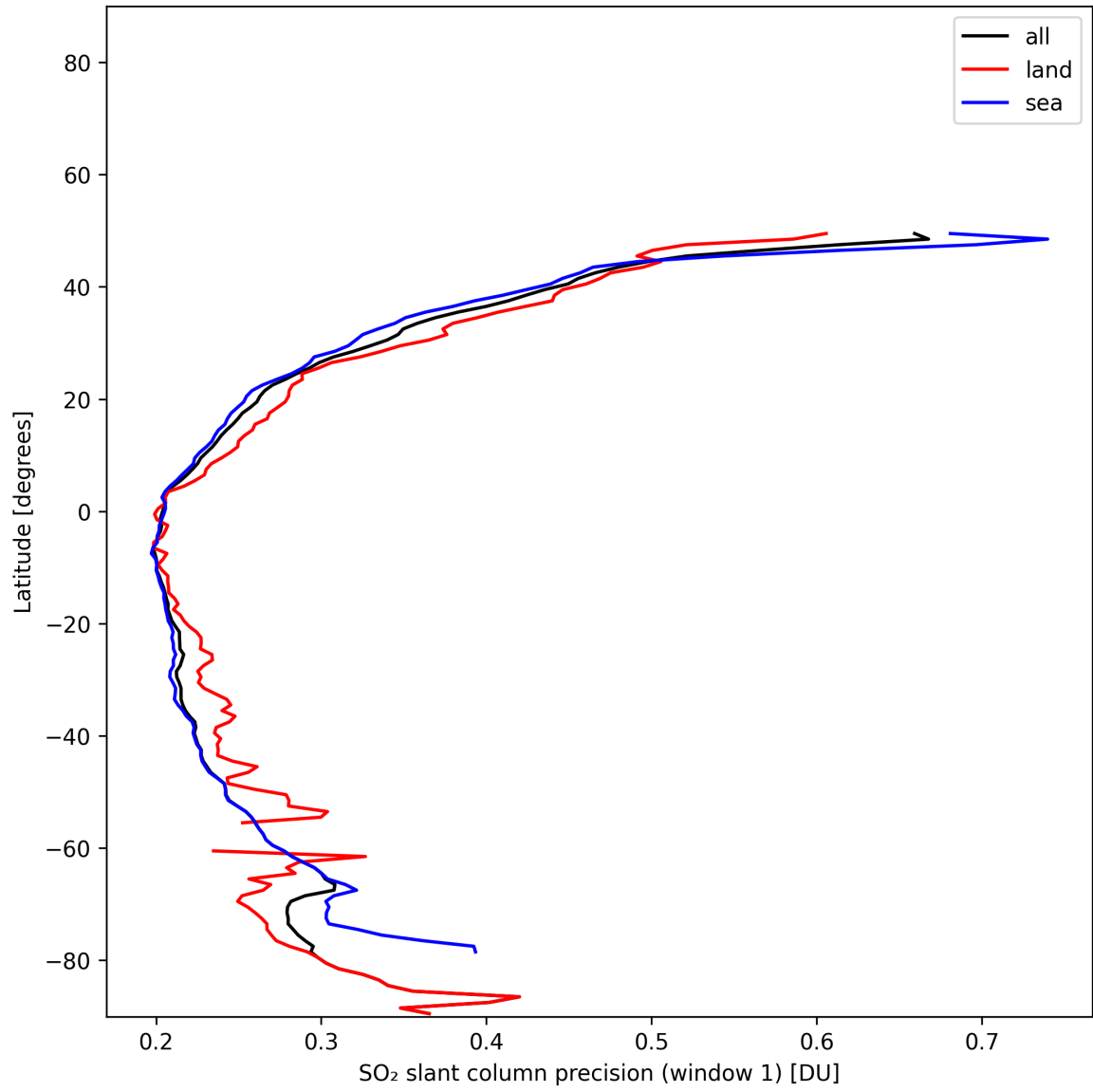


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-01-19 to 2025-01-20.

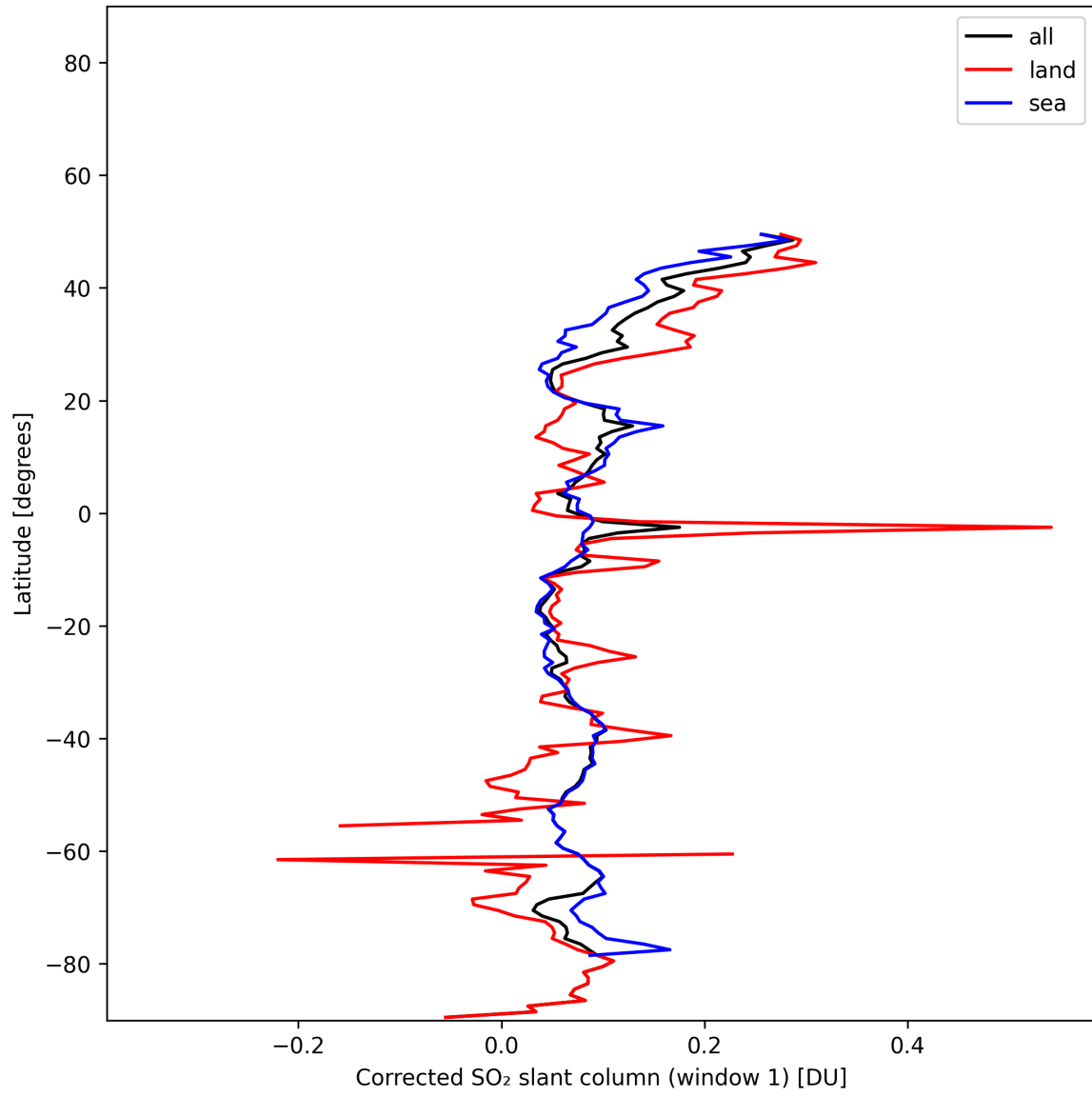


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-01-19 to 2025-01-20.

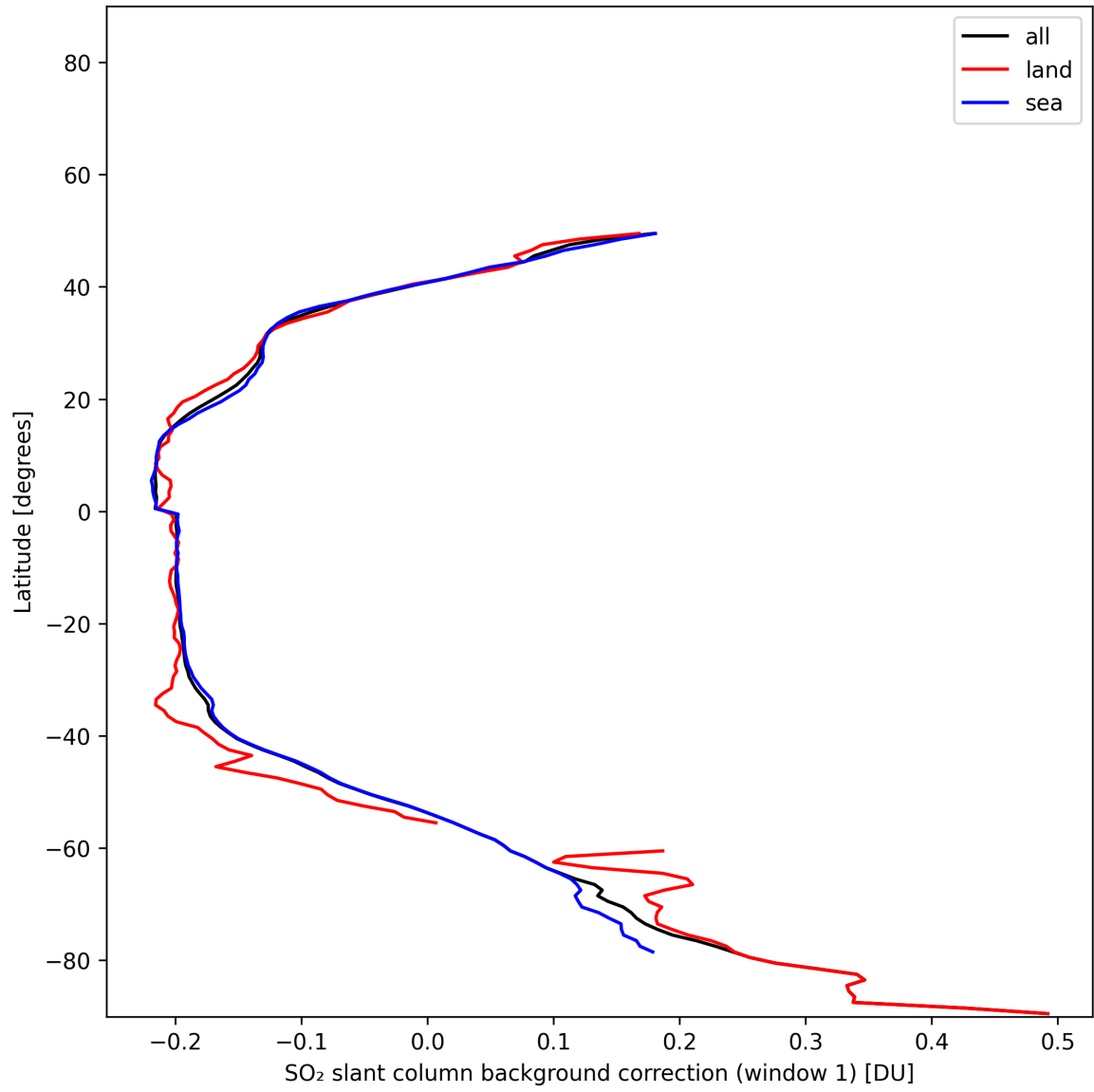


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-01-19 to 2025-01-20.

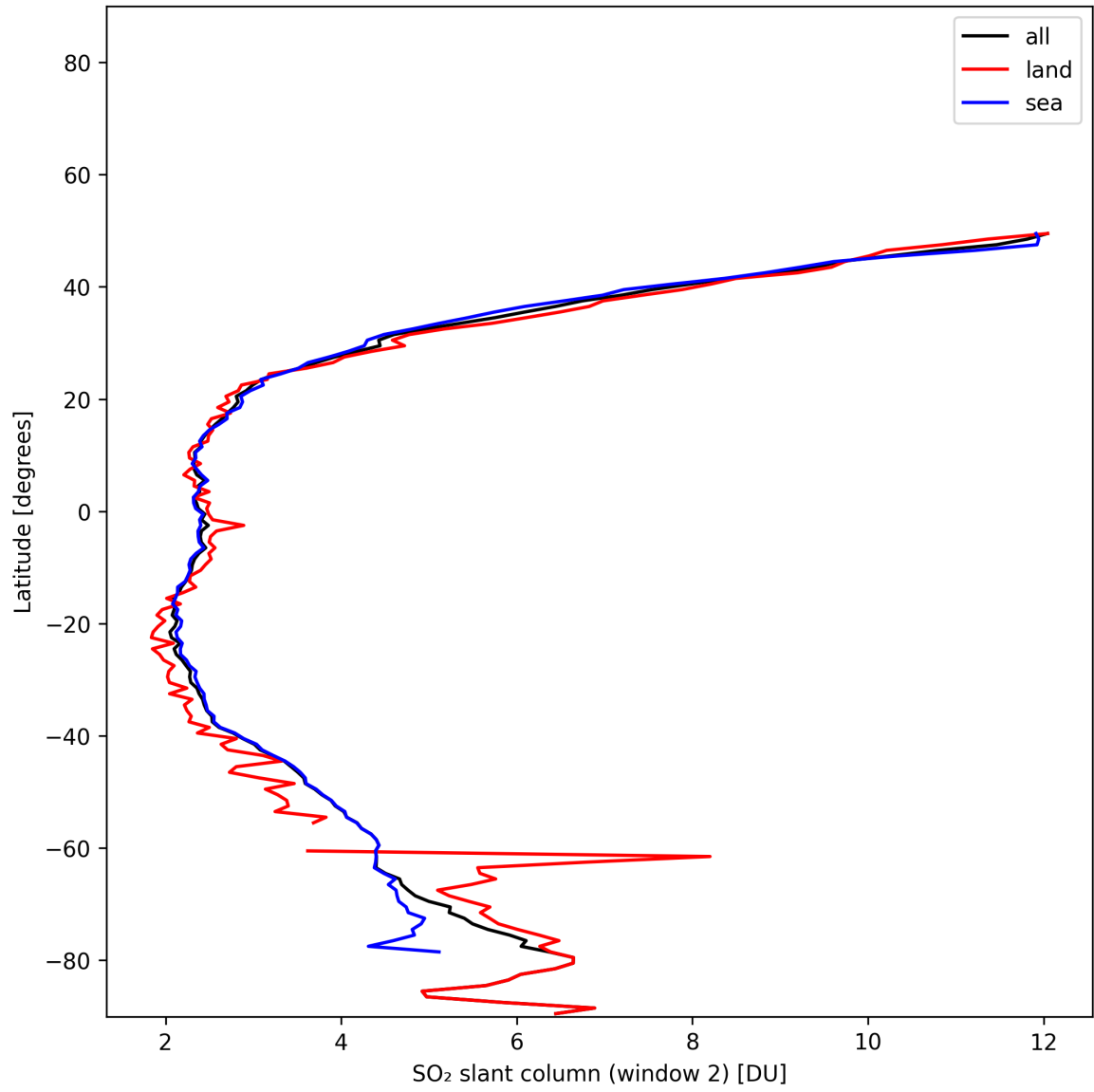


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-01-19 to 2025-01-20.

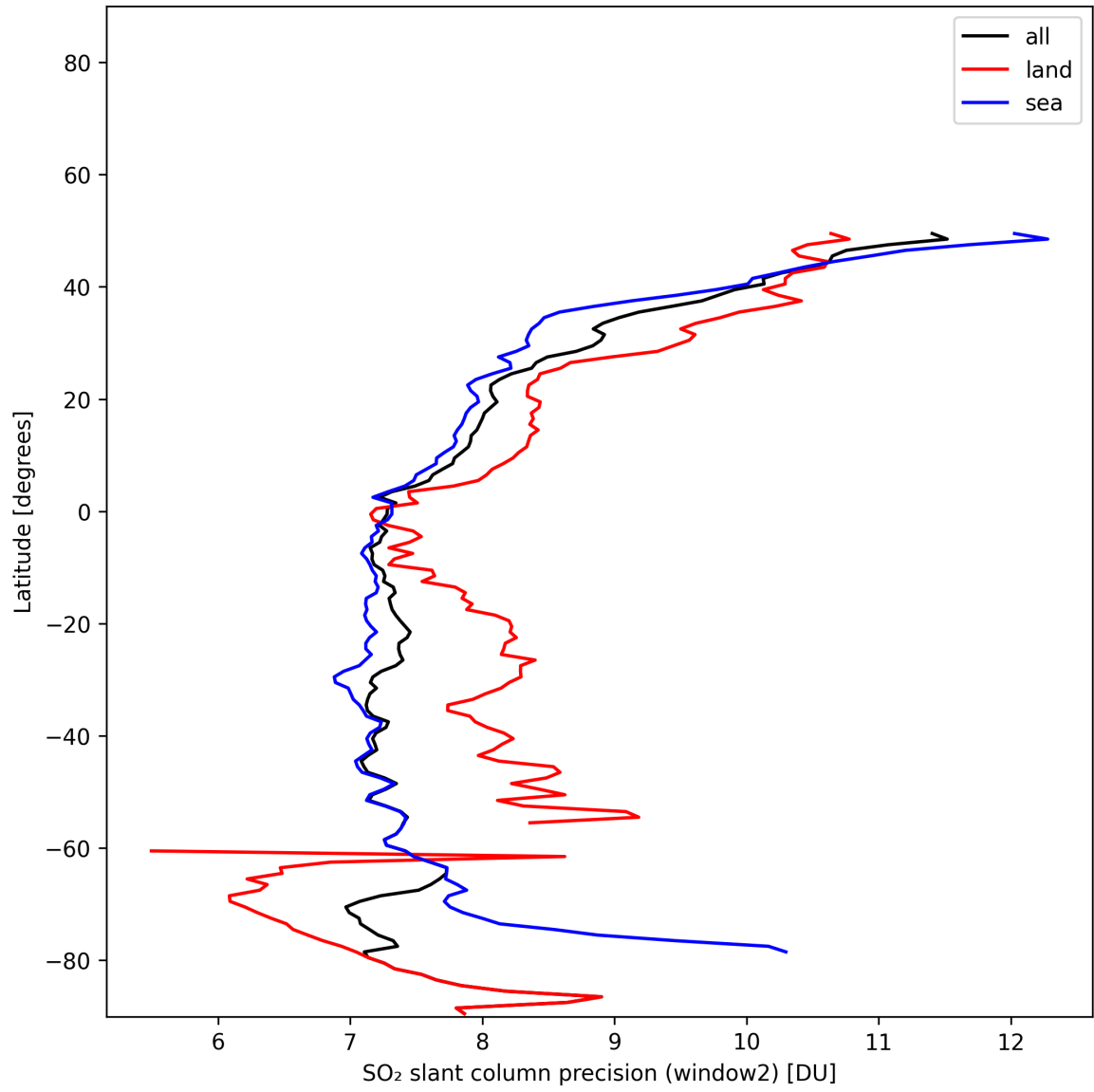


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-01-19 to 2025-01-20.

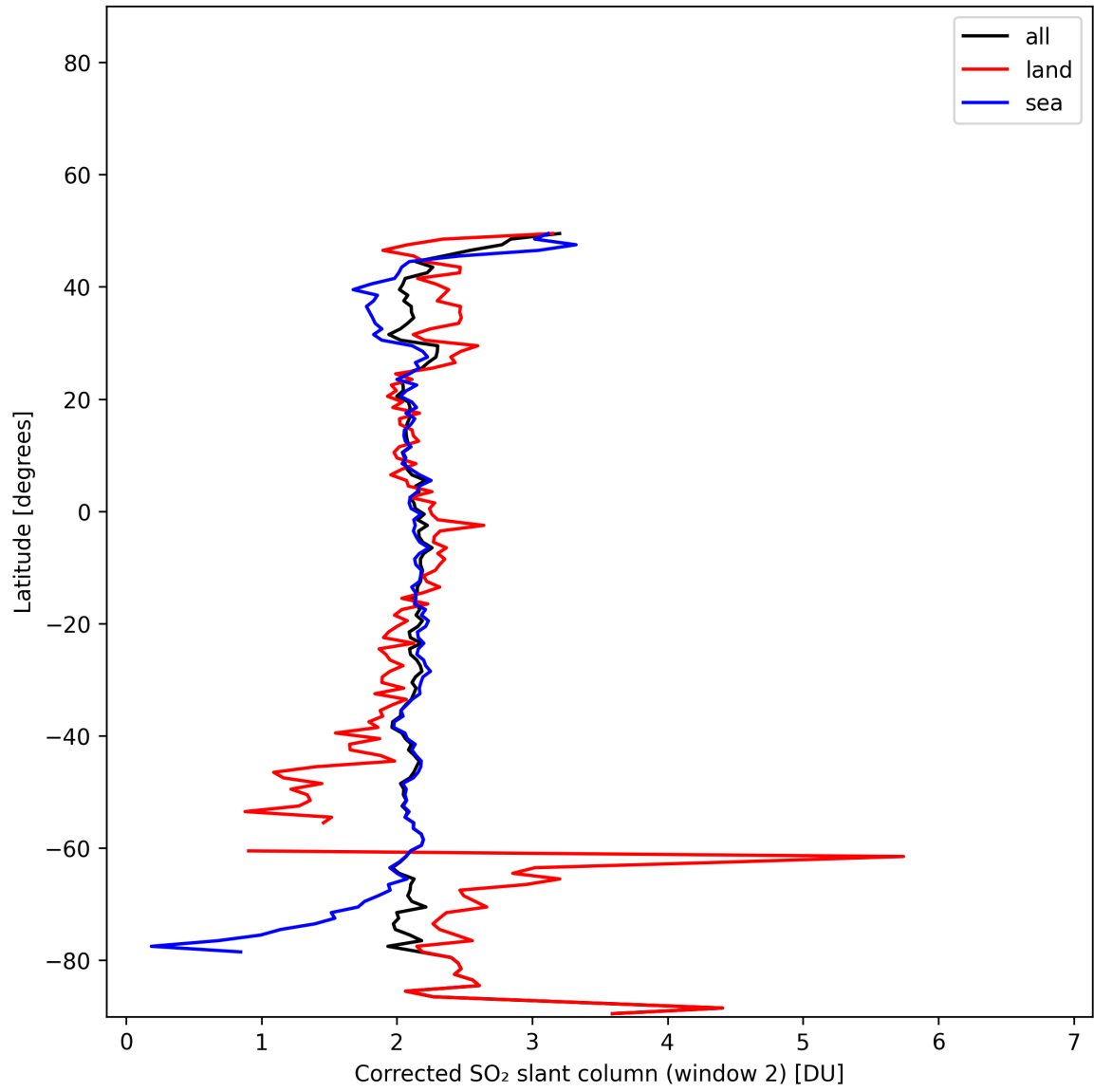


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-01-19 to 2025-01-20.

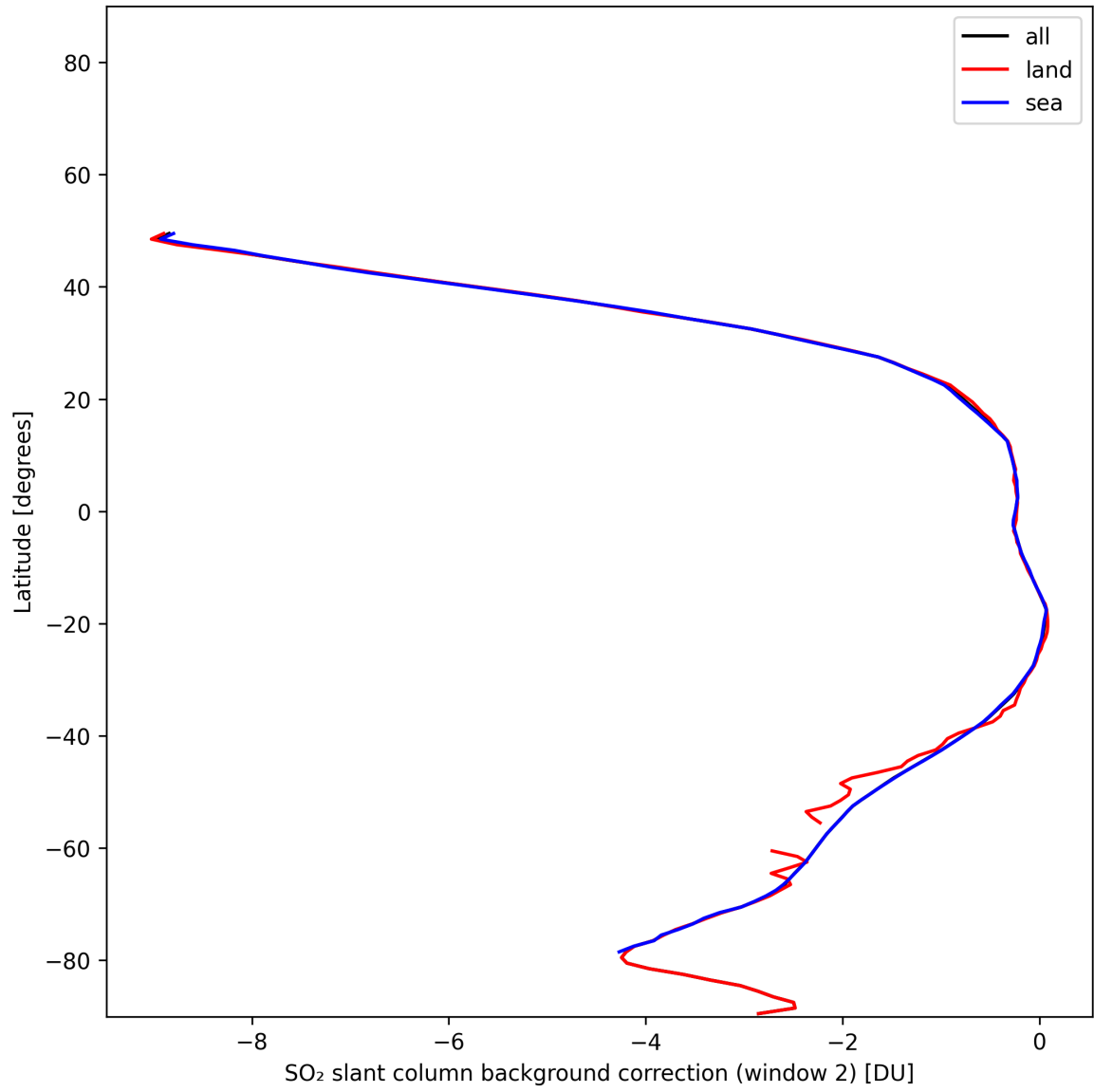


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-01-19 to 2025-01-20.

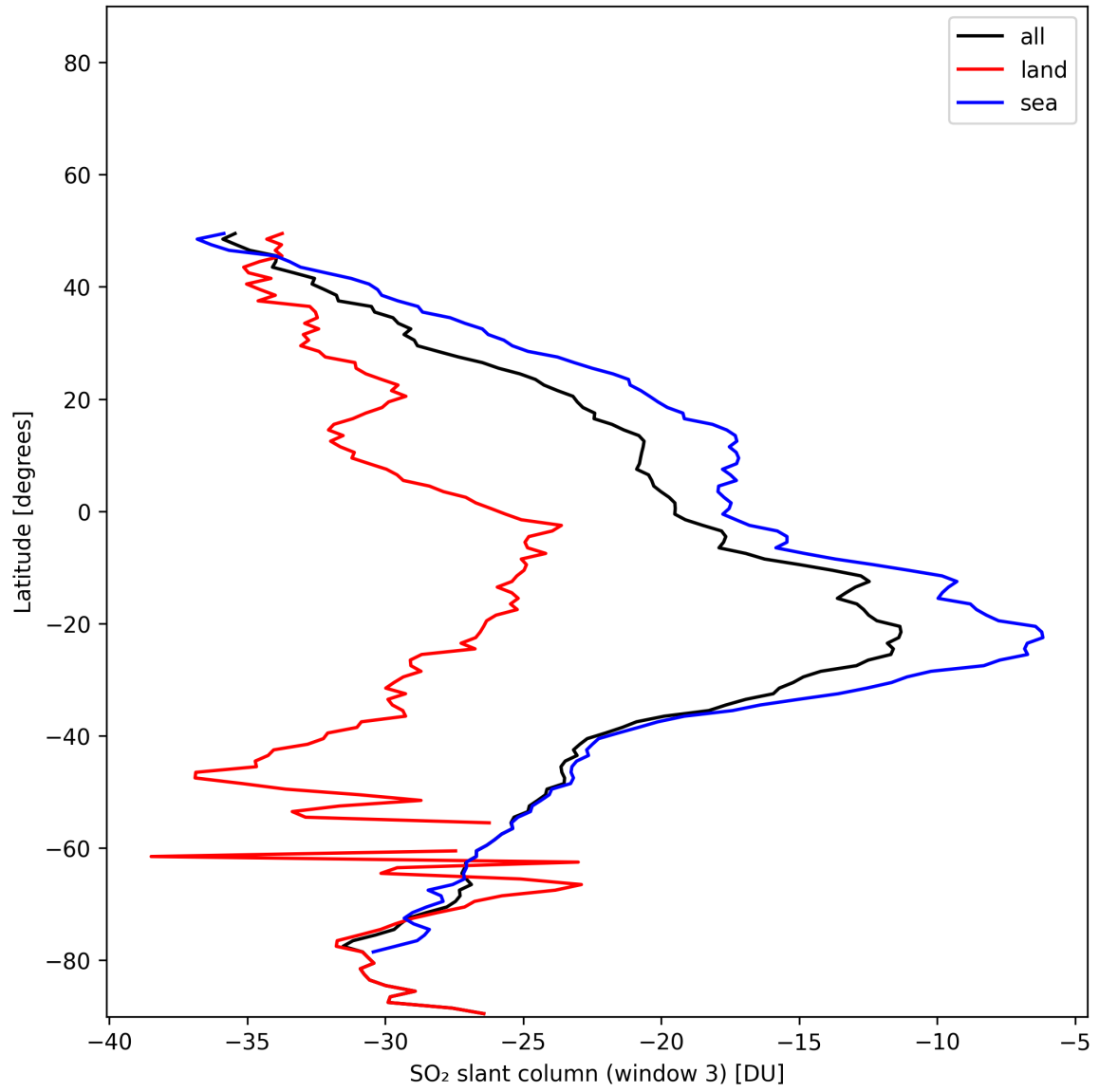


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-01-19 to 2025-01-20.

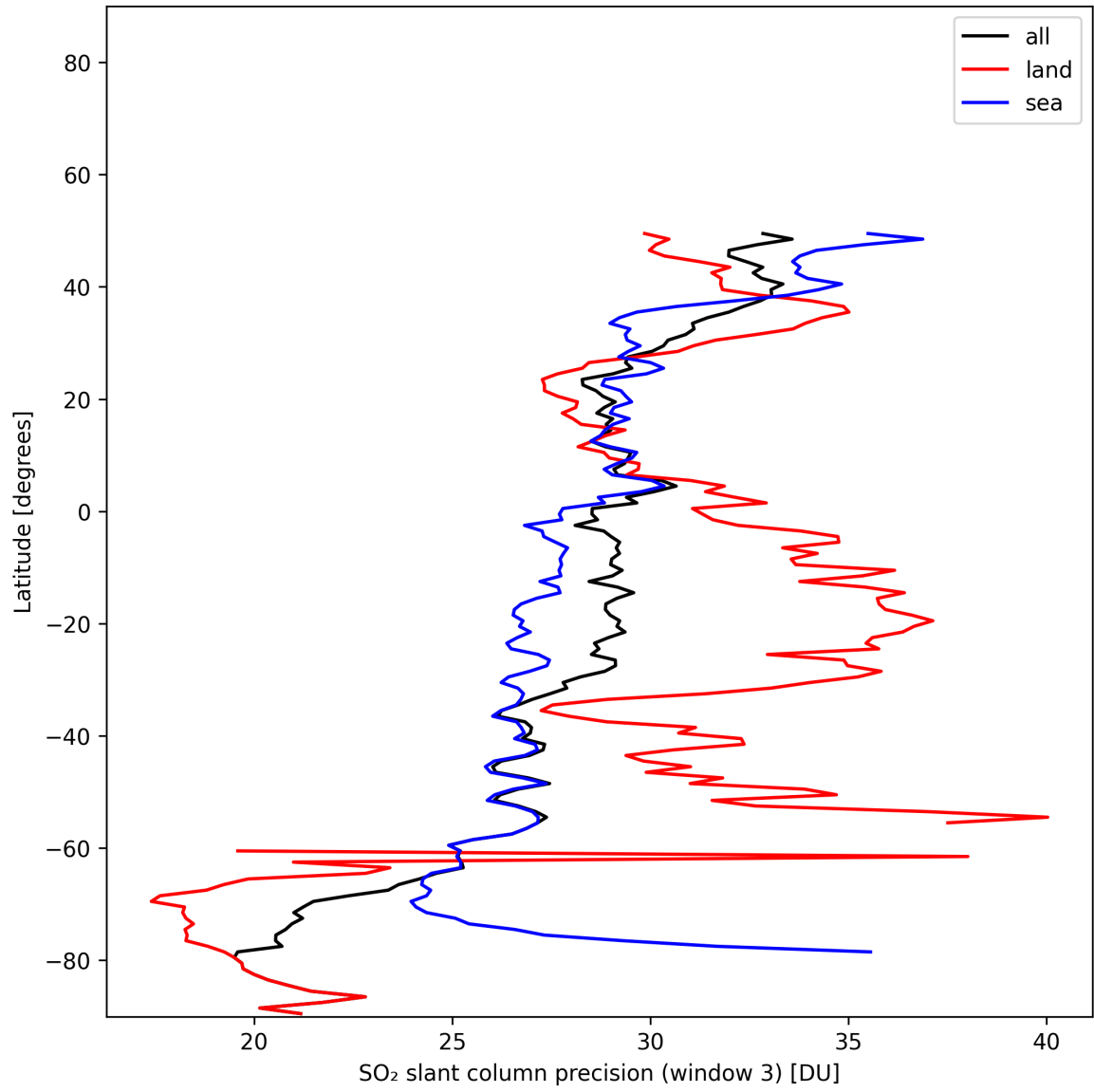


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-01-19 to 2025-01-20.

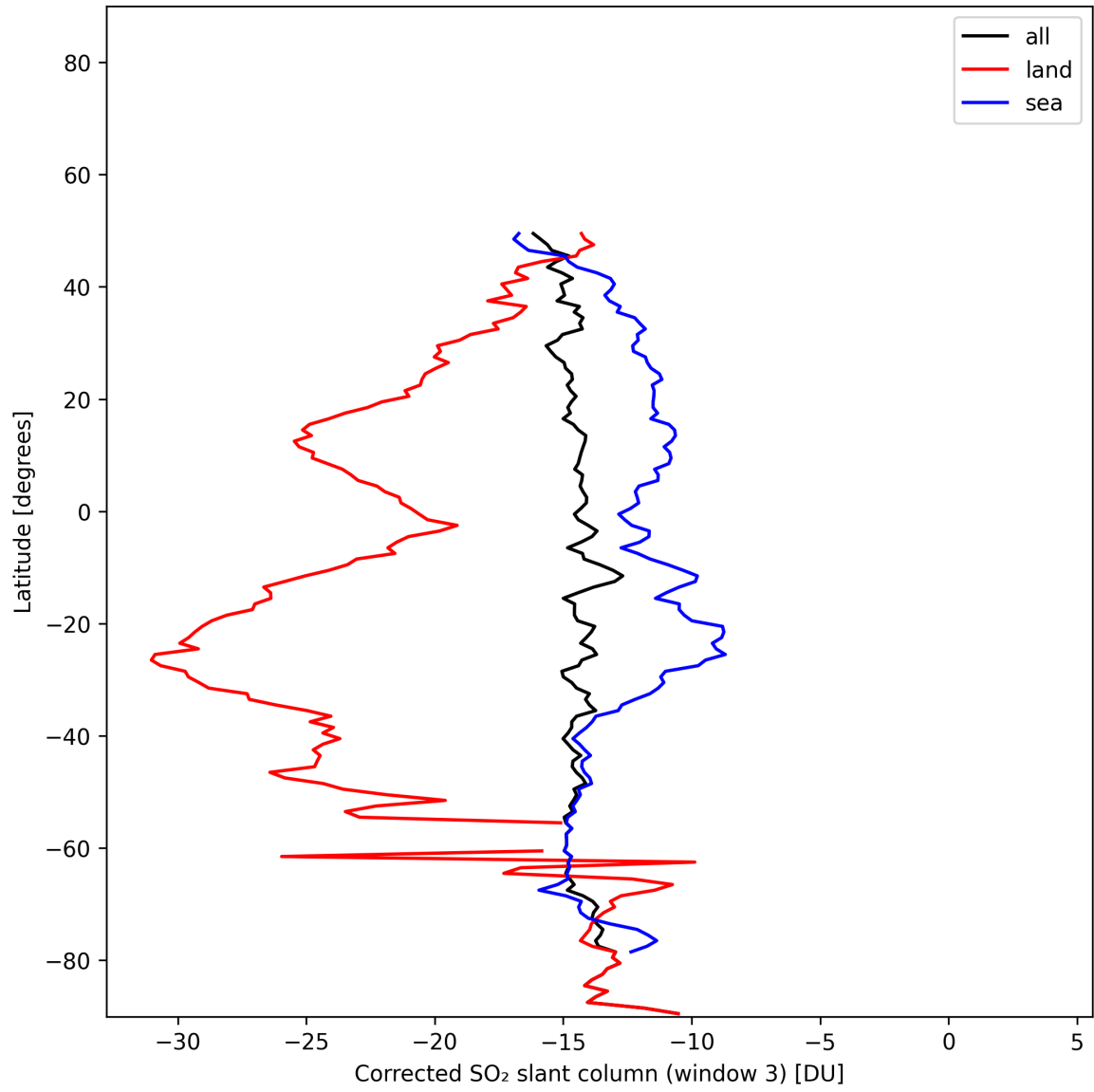


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-01-19 to 2025-01-20.

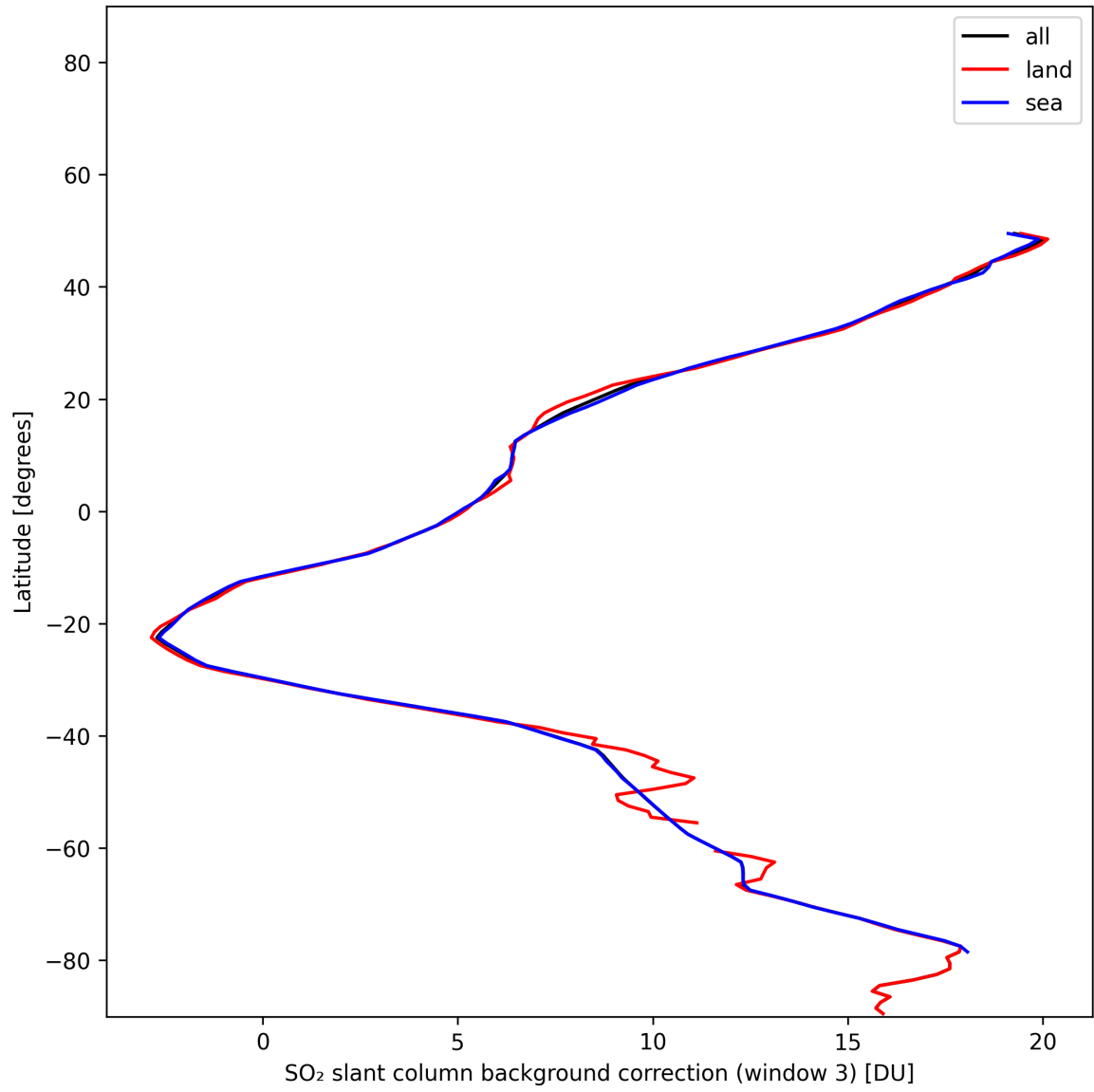


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-01-19 to 2025-01-20.

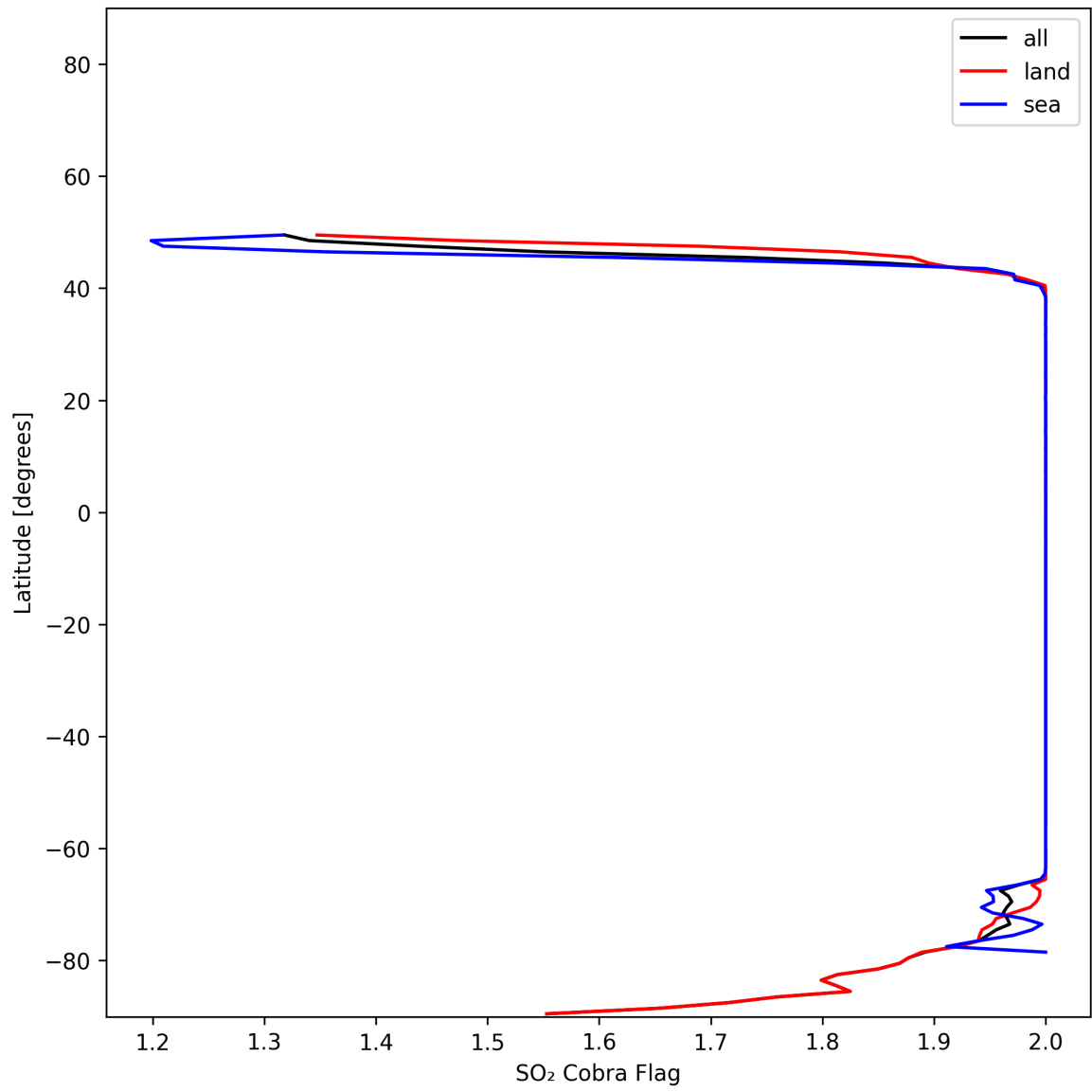


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-01-19 to 2025-01-20.

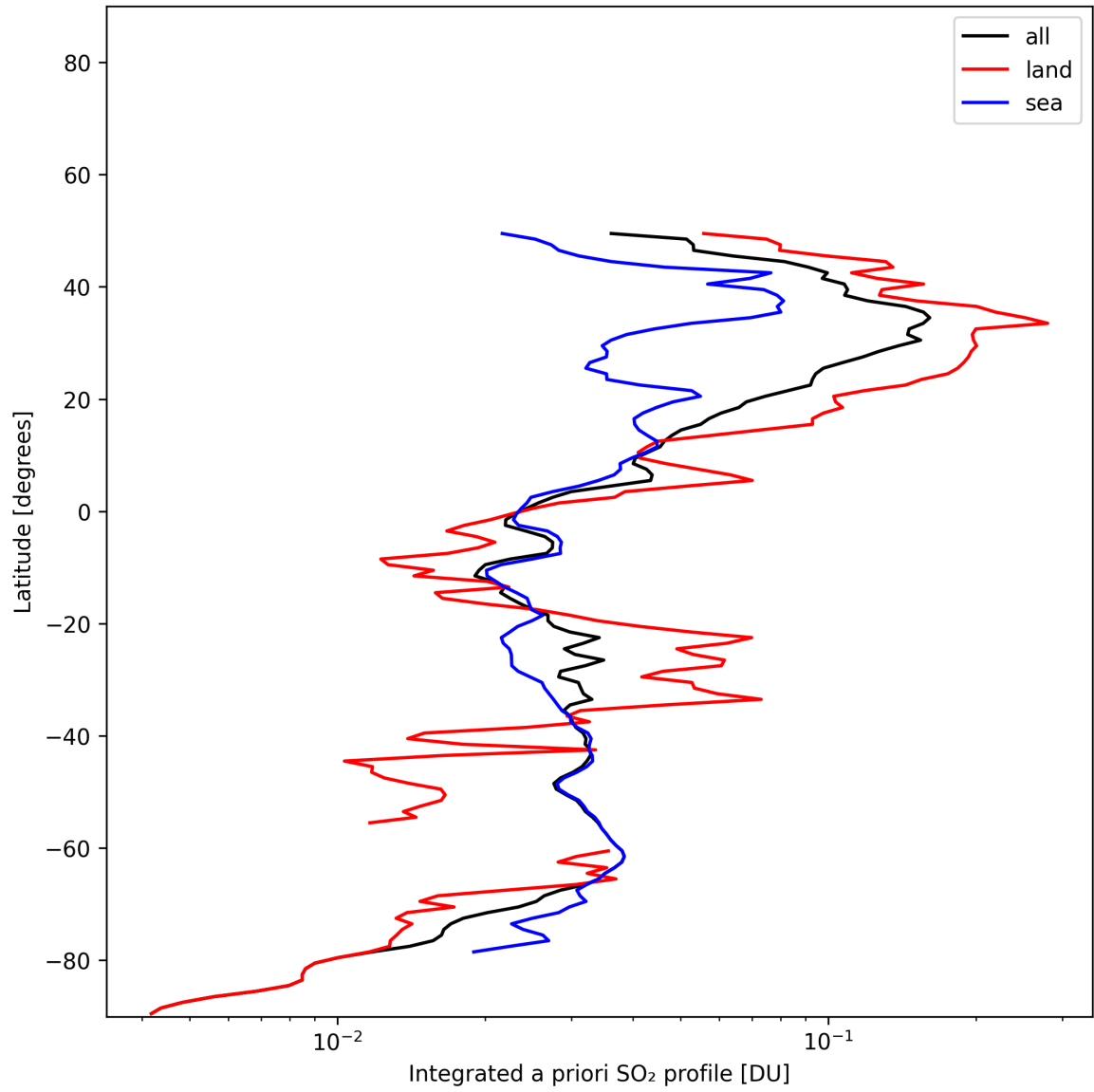


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-01-19 to 2025-01-20.

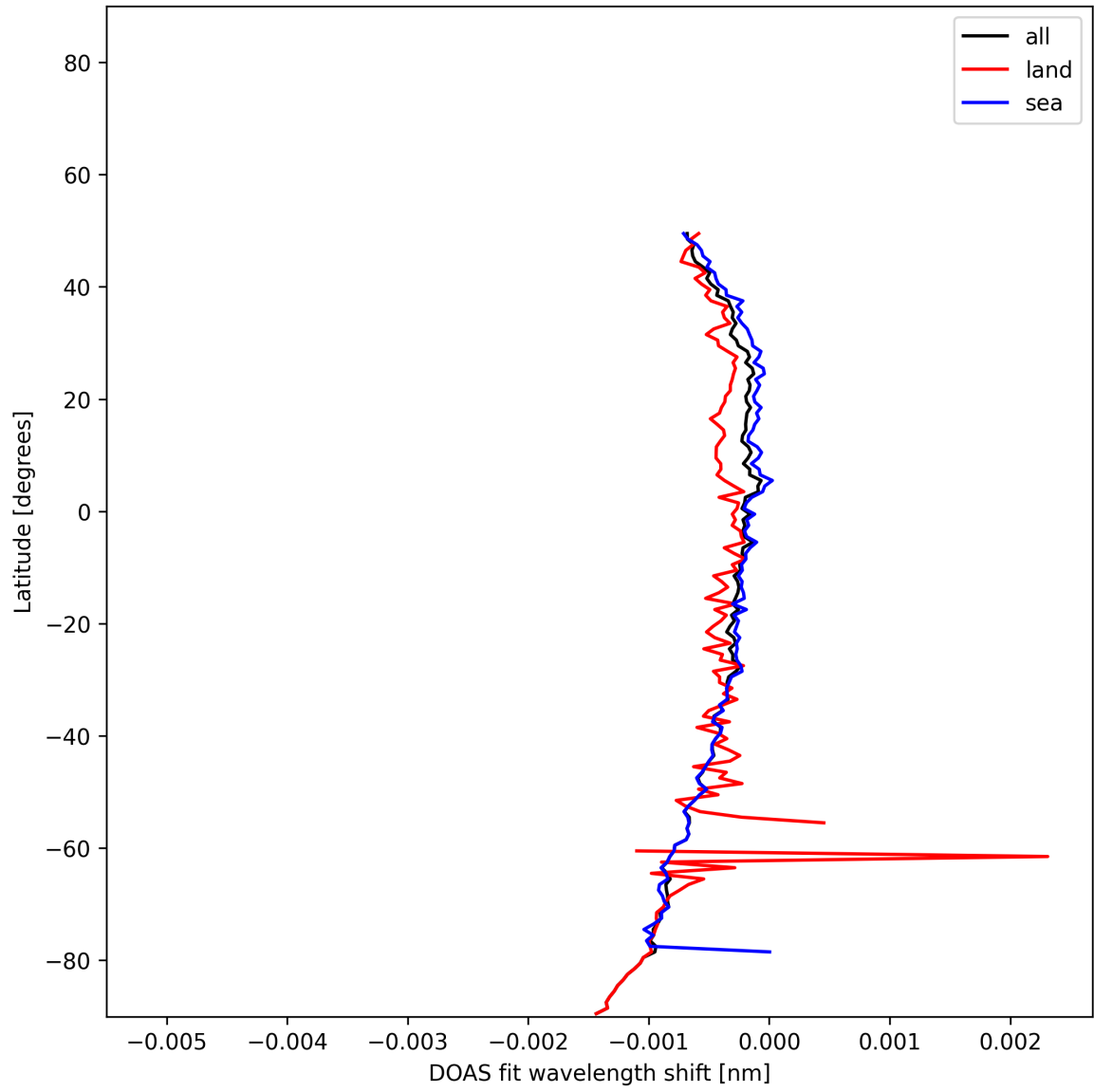


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2025-01-19 to 2025-01-20.

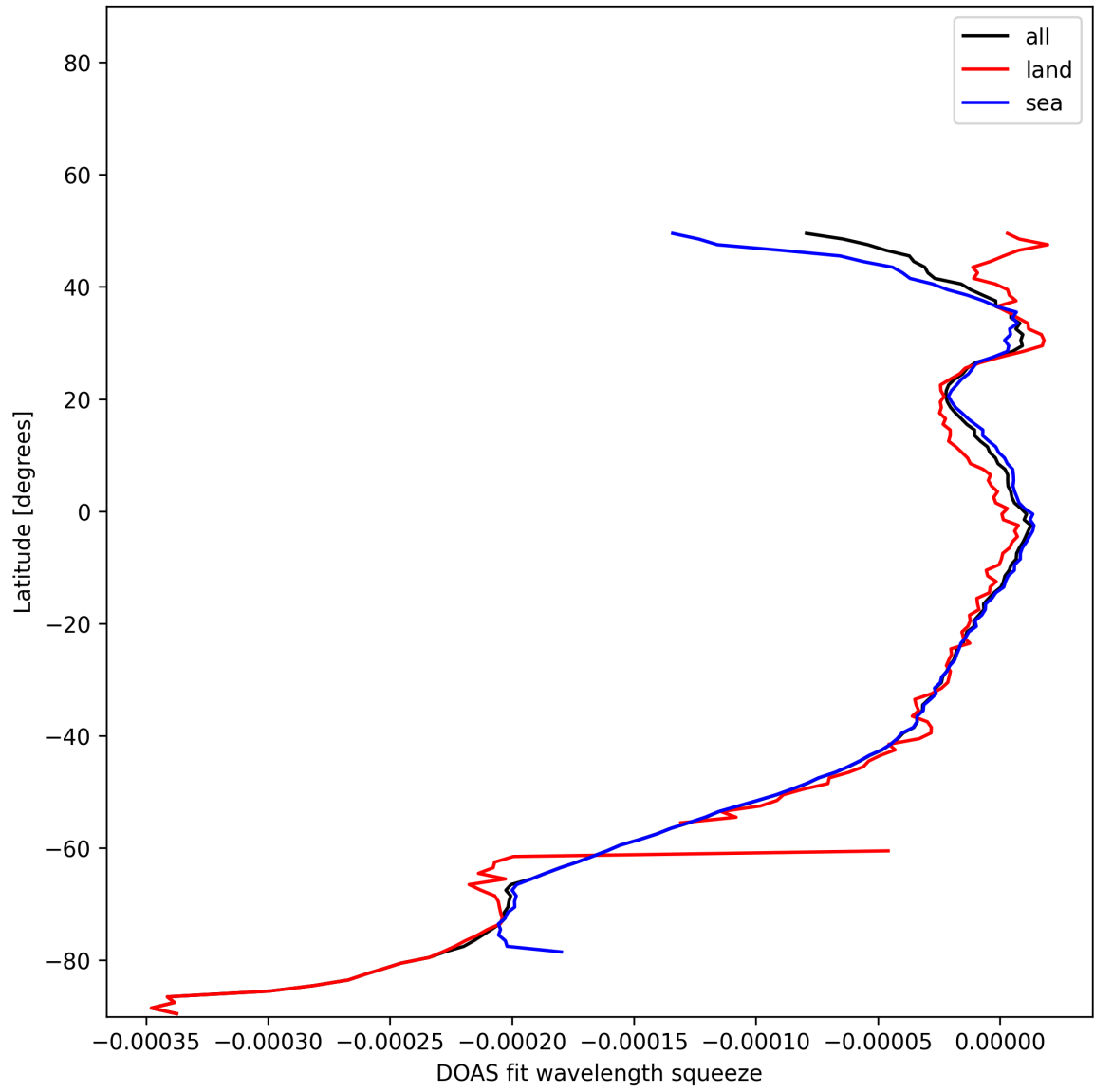


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-01-19 to 2025-01-20.

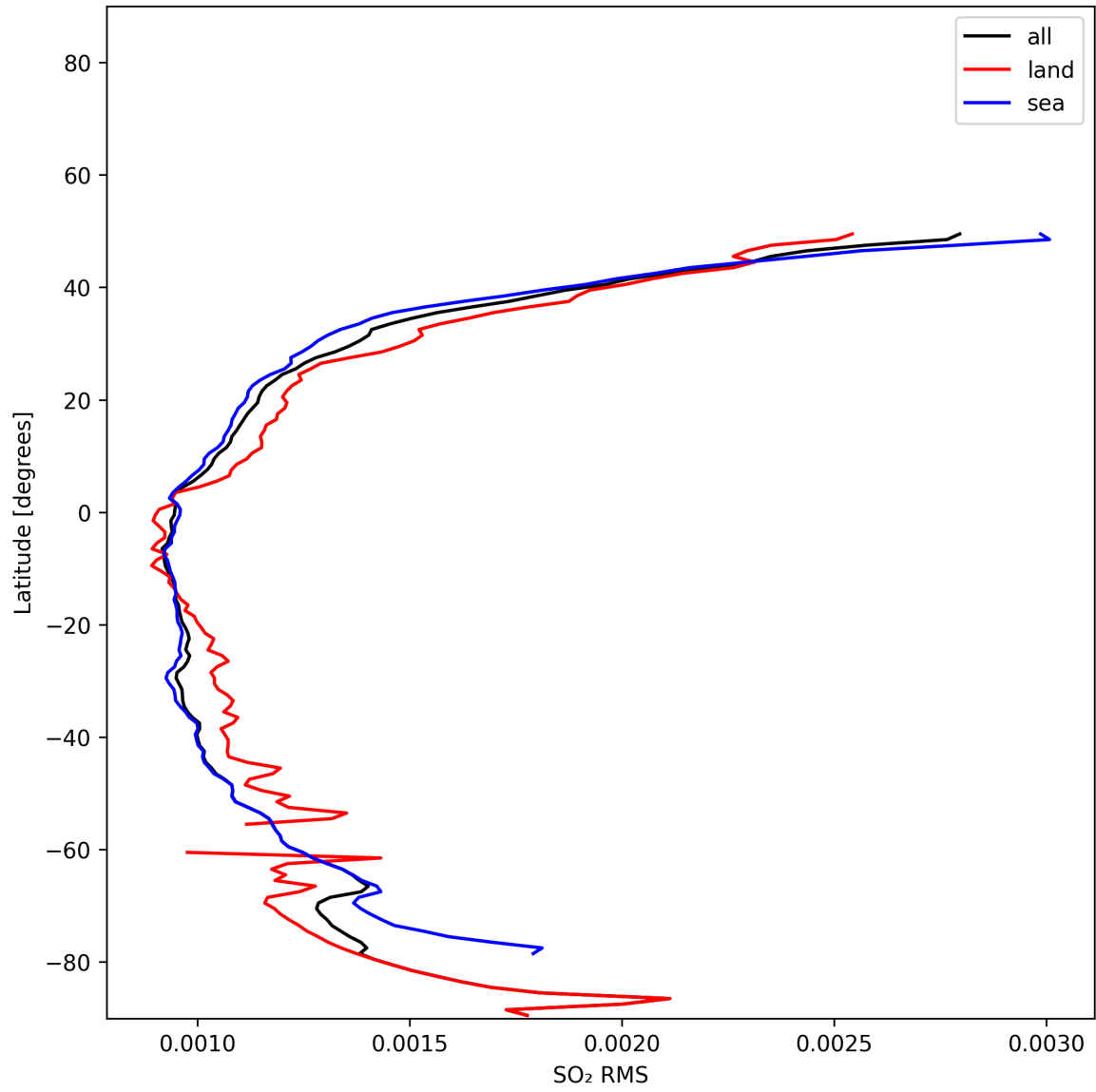


Figure 52: Zonal average of “SO₂ RMS” for 2025-01-19 to 2025-01-20.

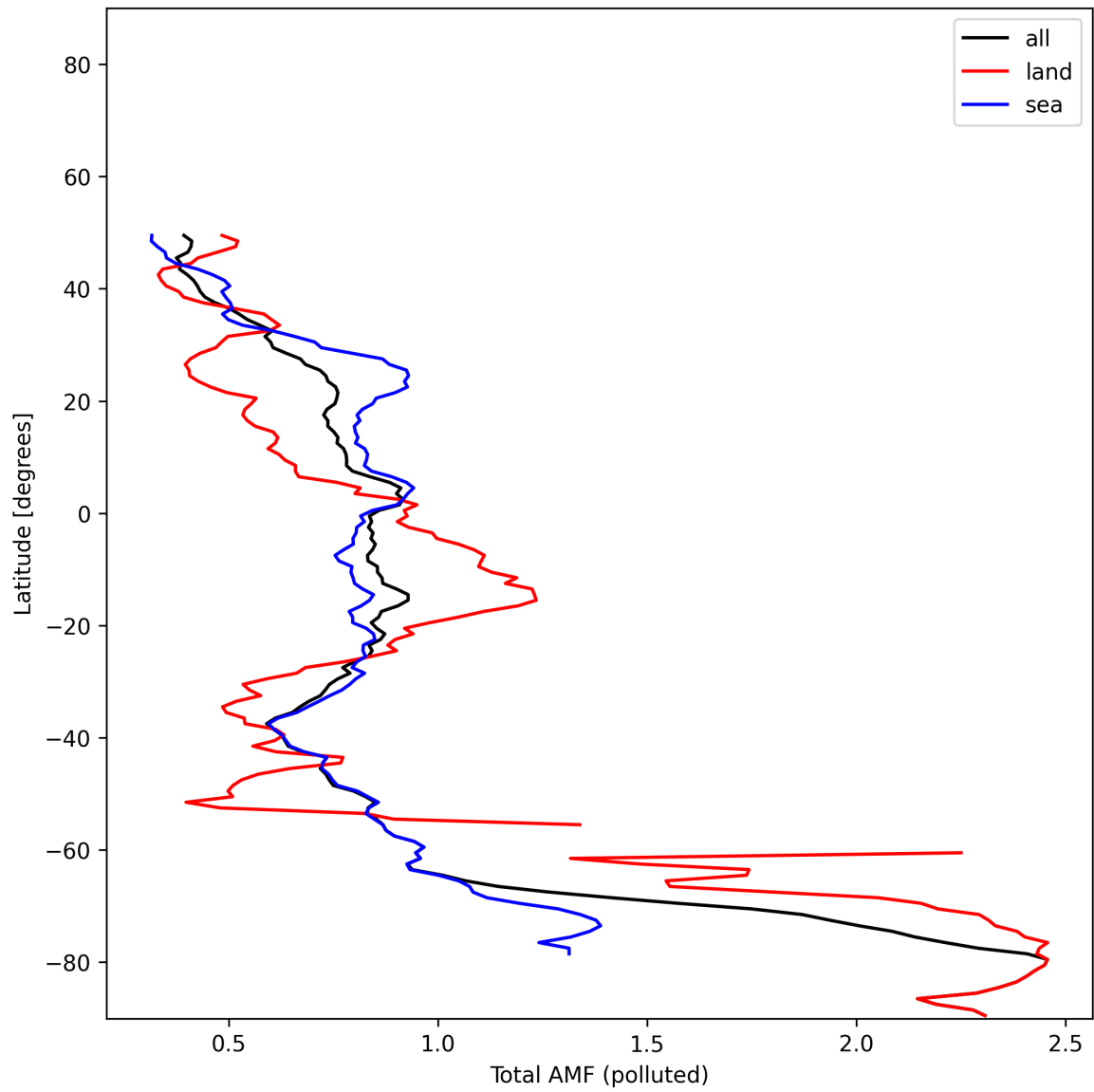


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-01-19 to 2025-01-20.

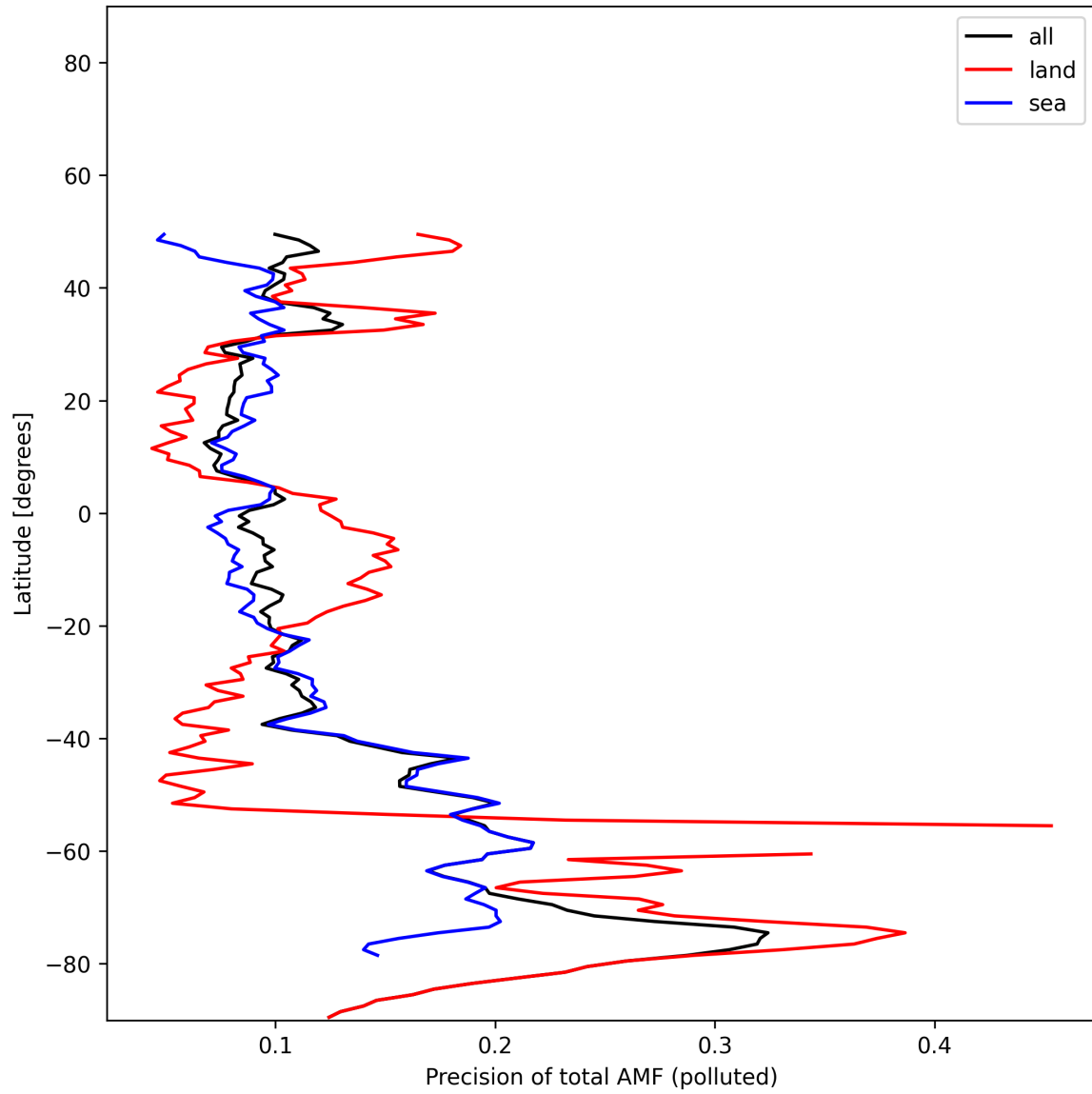


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-01-19 to 2025-01-20.

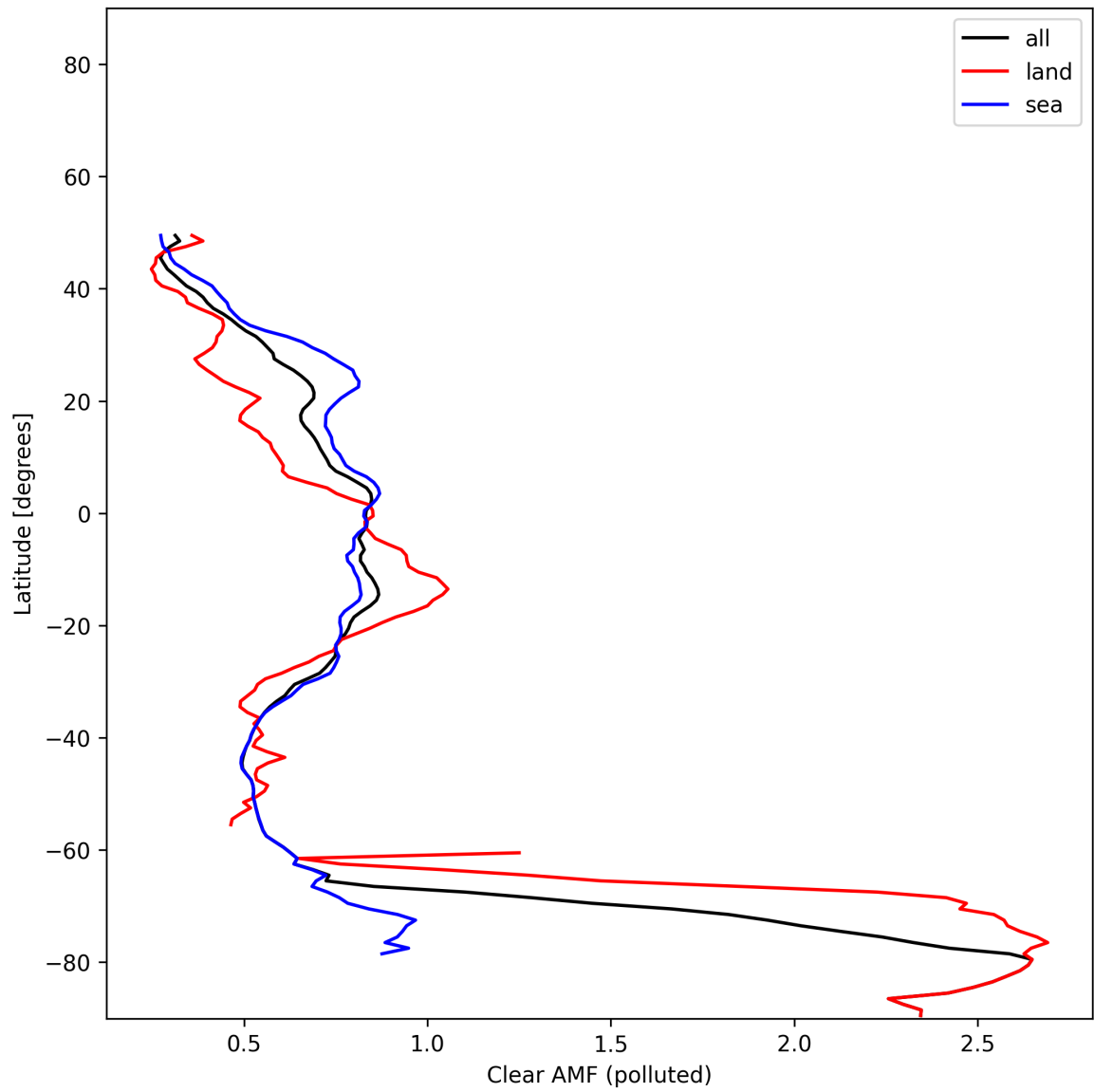


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-01-19 to 2025-01-20.

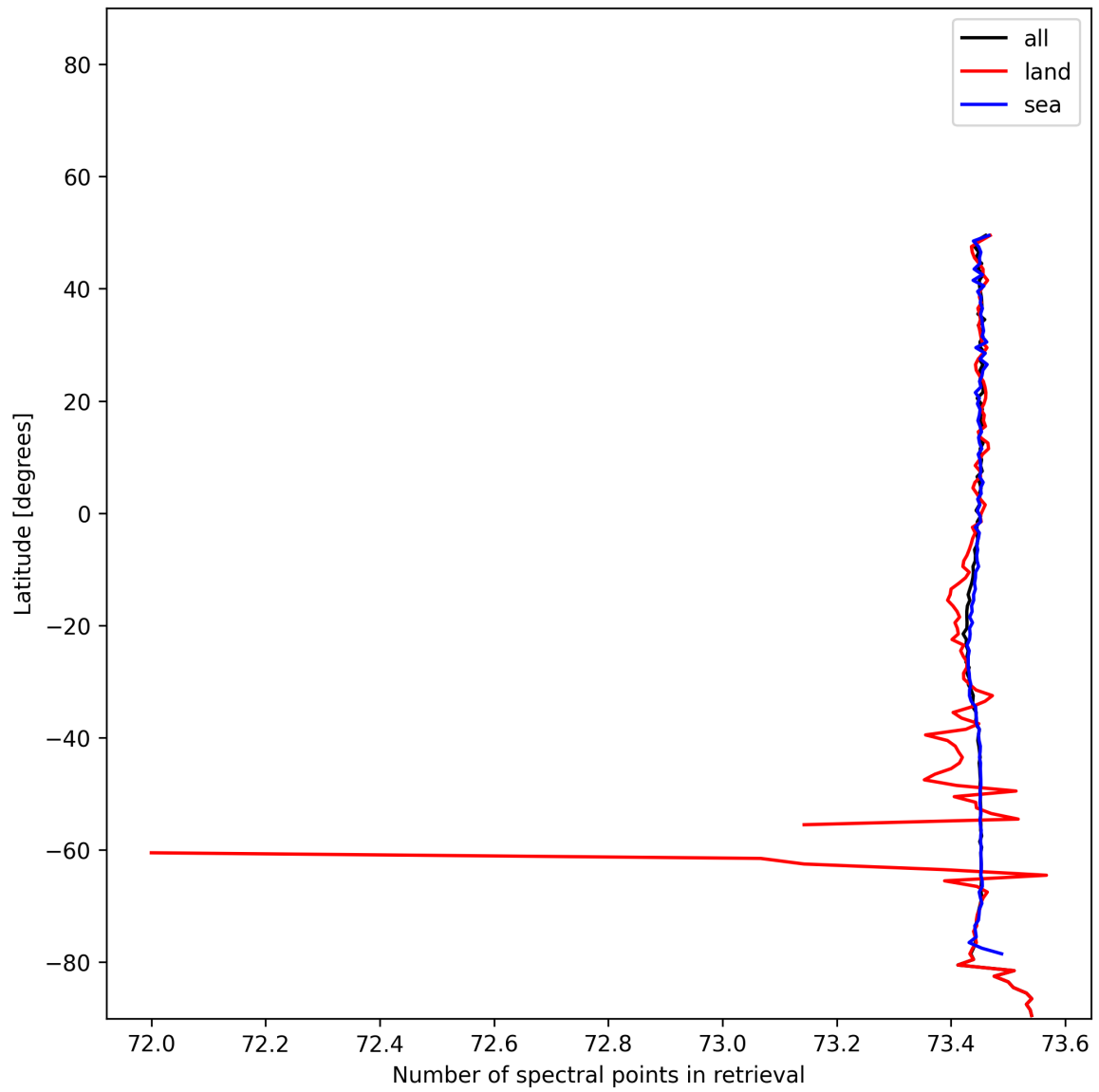


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-01-19 to 2025-01-20.

8 Histograms

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

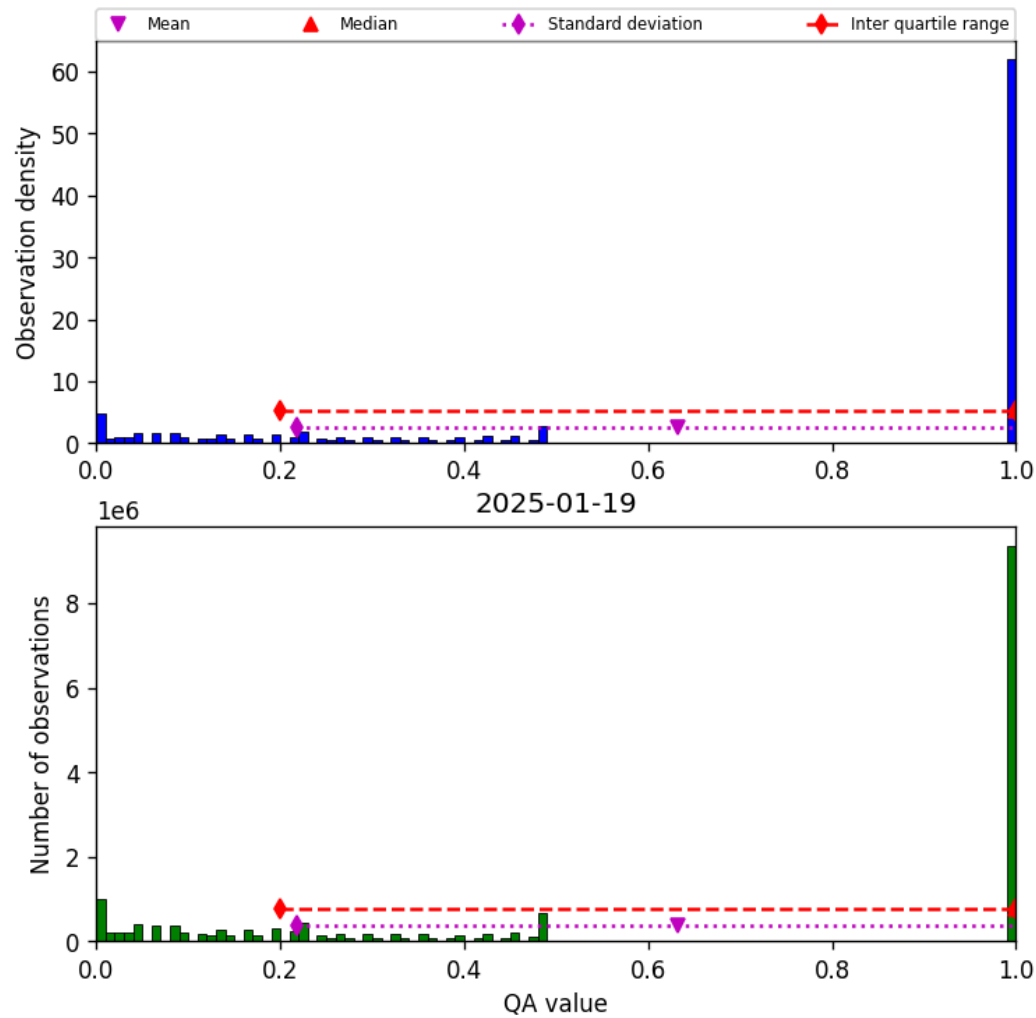


Figure 57: Histogram of “QA value” for 2025-01-19 to 2025-01-20

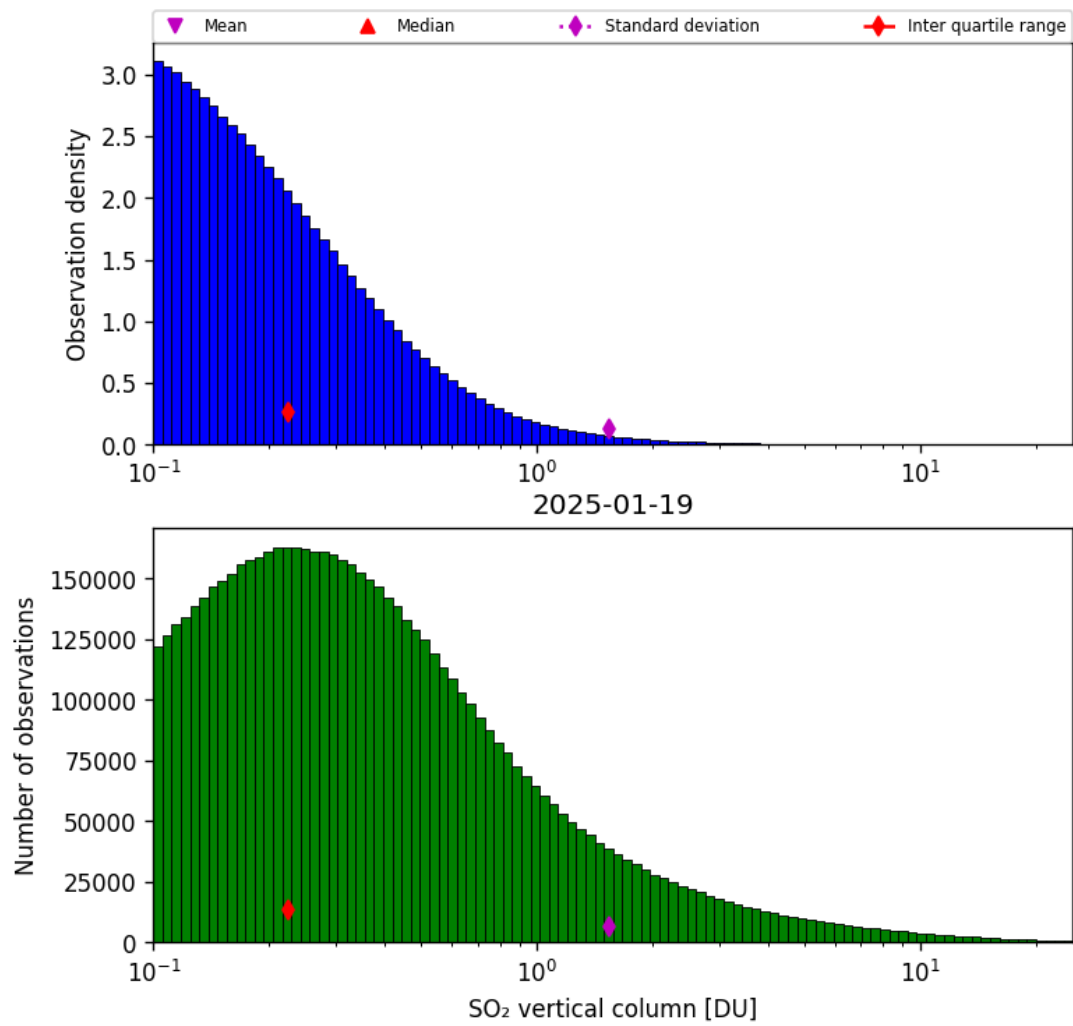


Figure 58: Histogram of “SO₂ vertical column” for 2025-01-19 to 2025-01-20

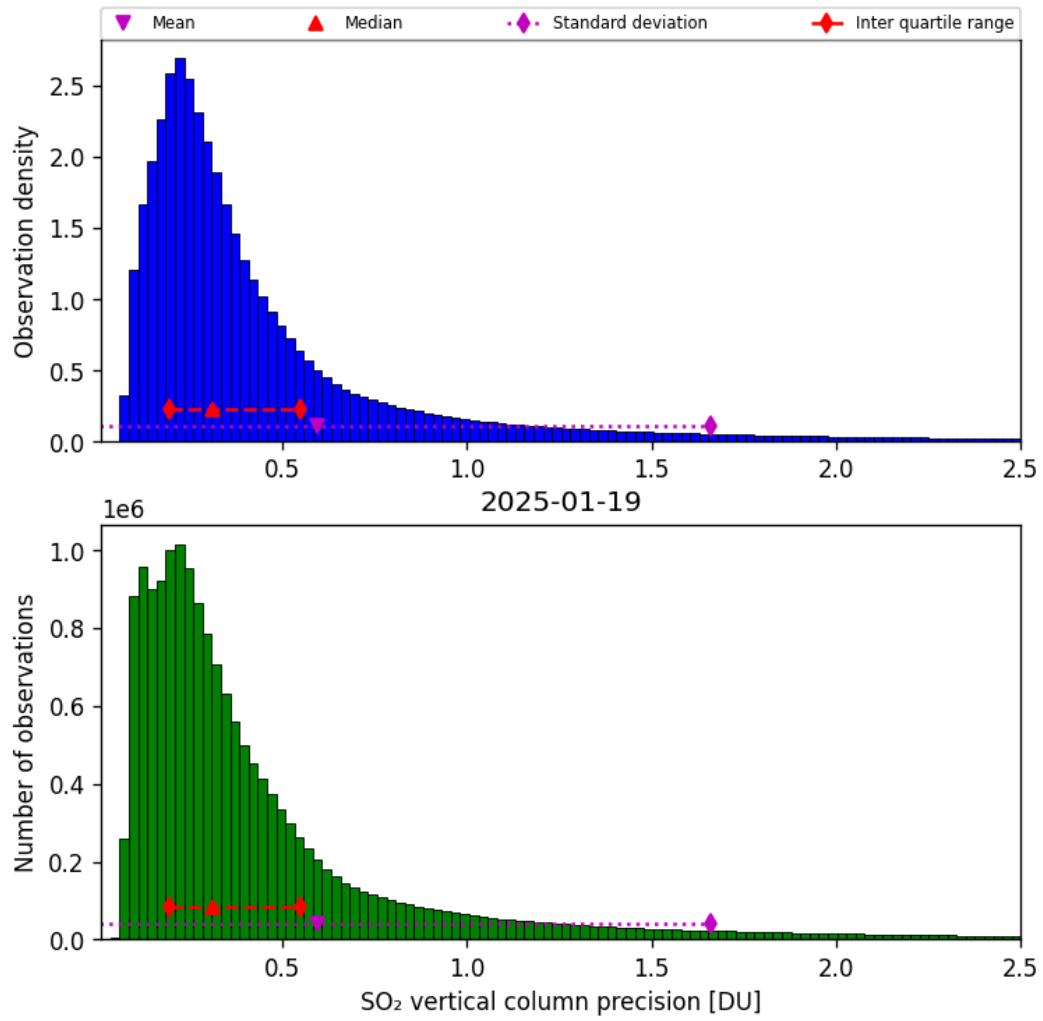


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-01-19 to 2025-01-20

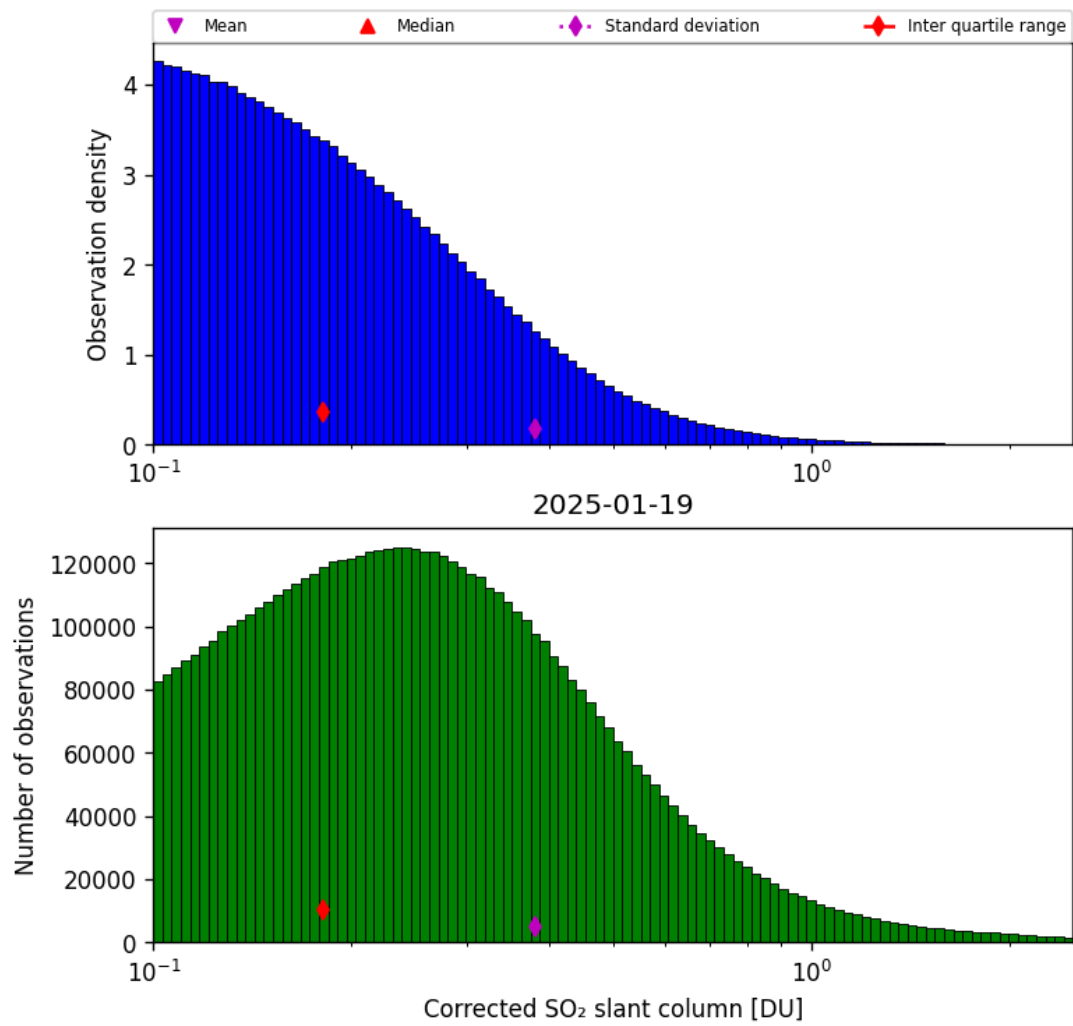


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-01-19 to 2025-01-20

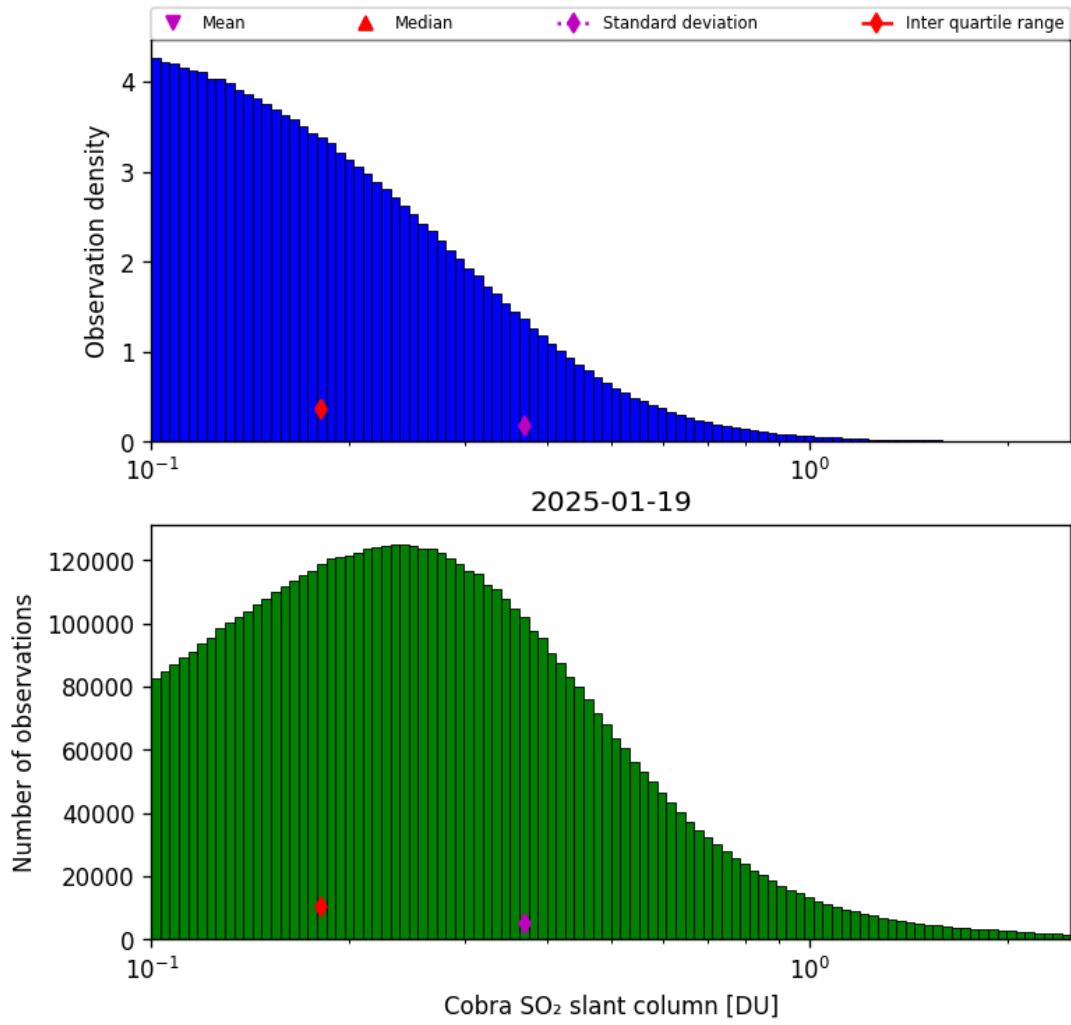


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-01-19 to 2025-01-20

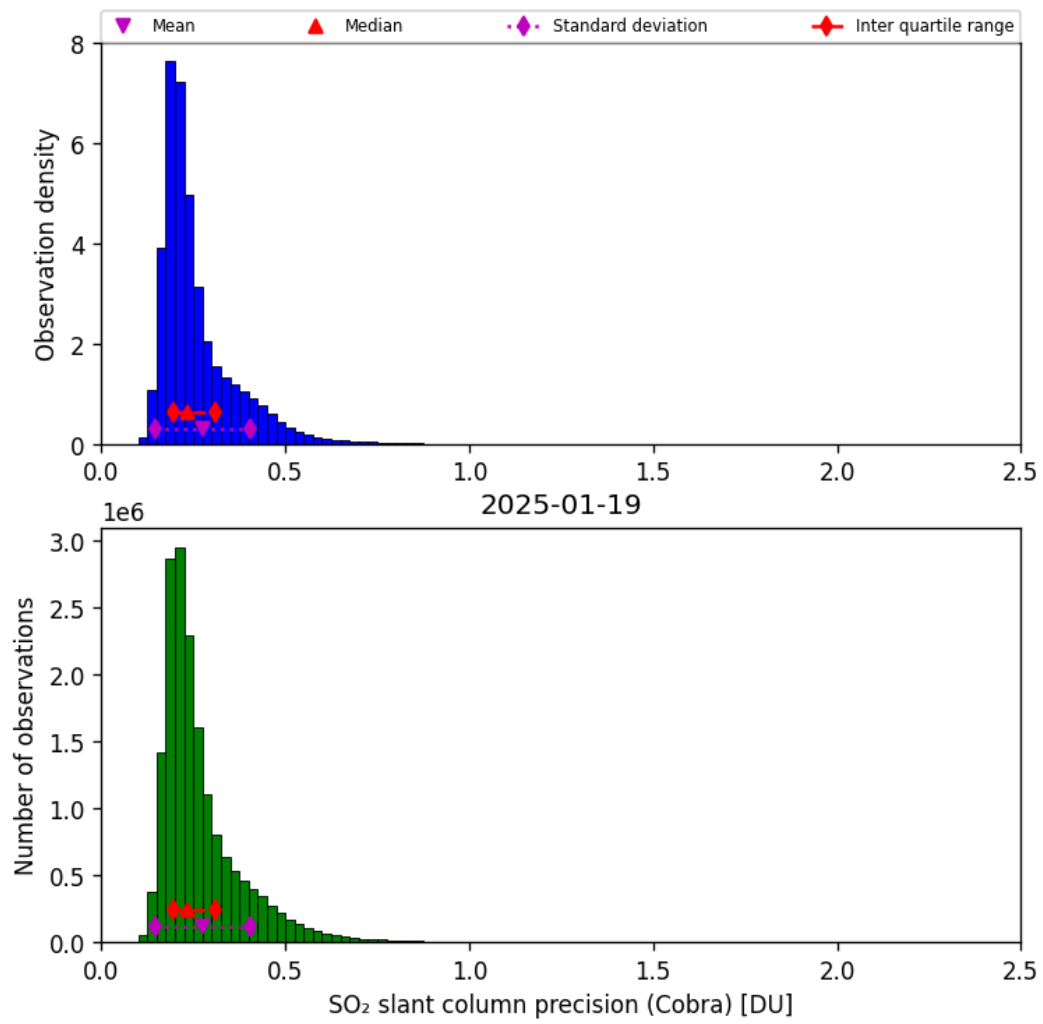


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-01-19 to 2025-01-20

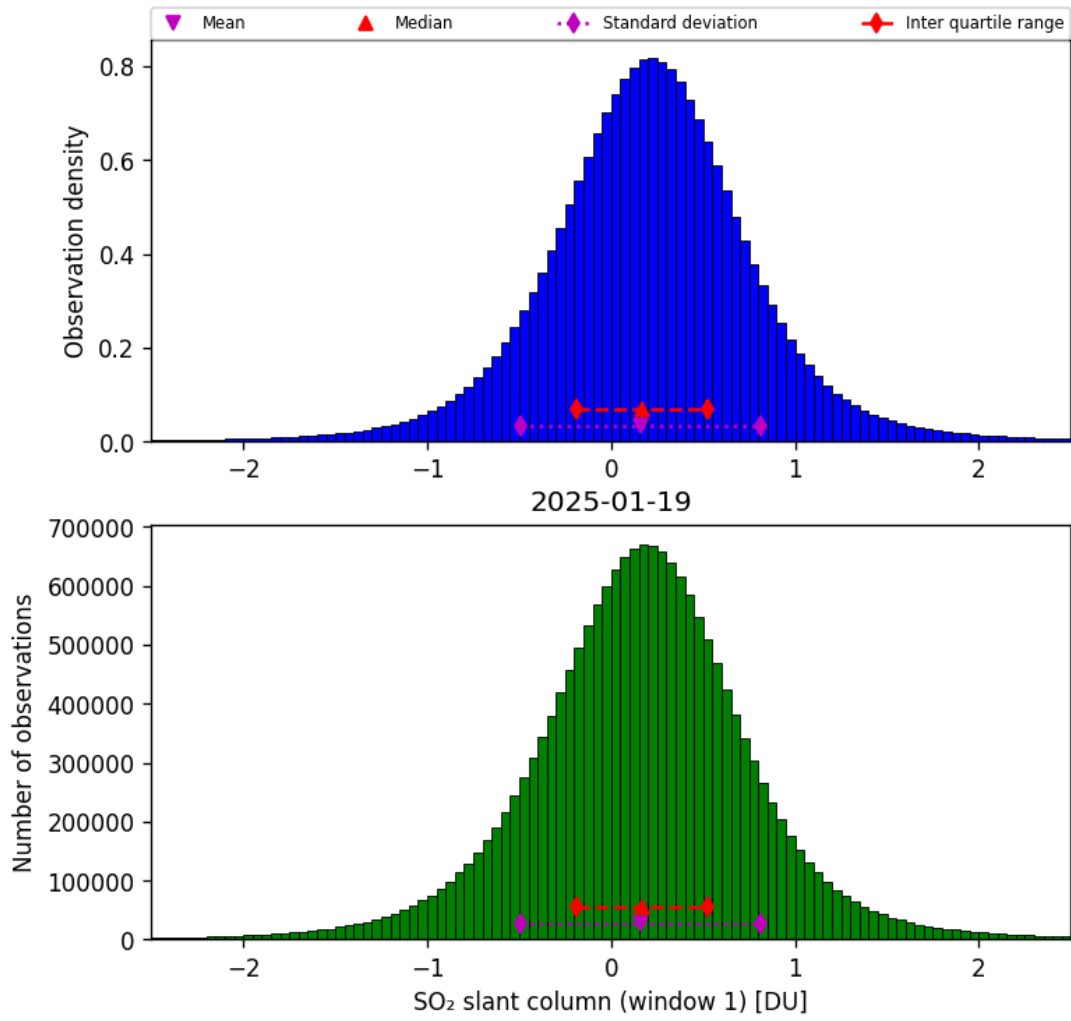


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-01-19 to 2025-01-20

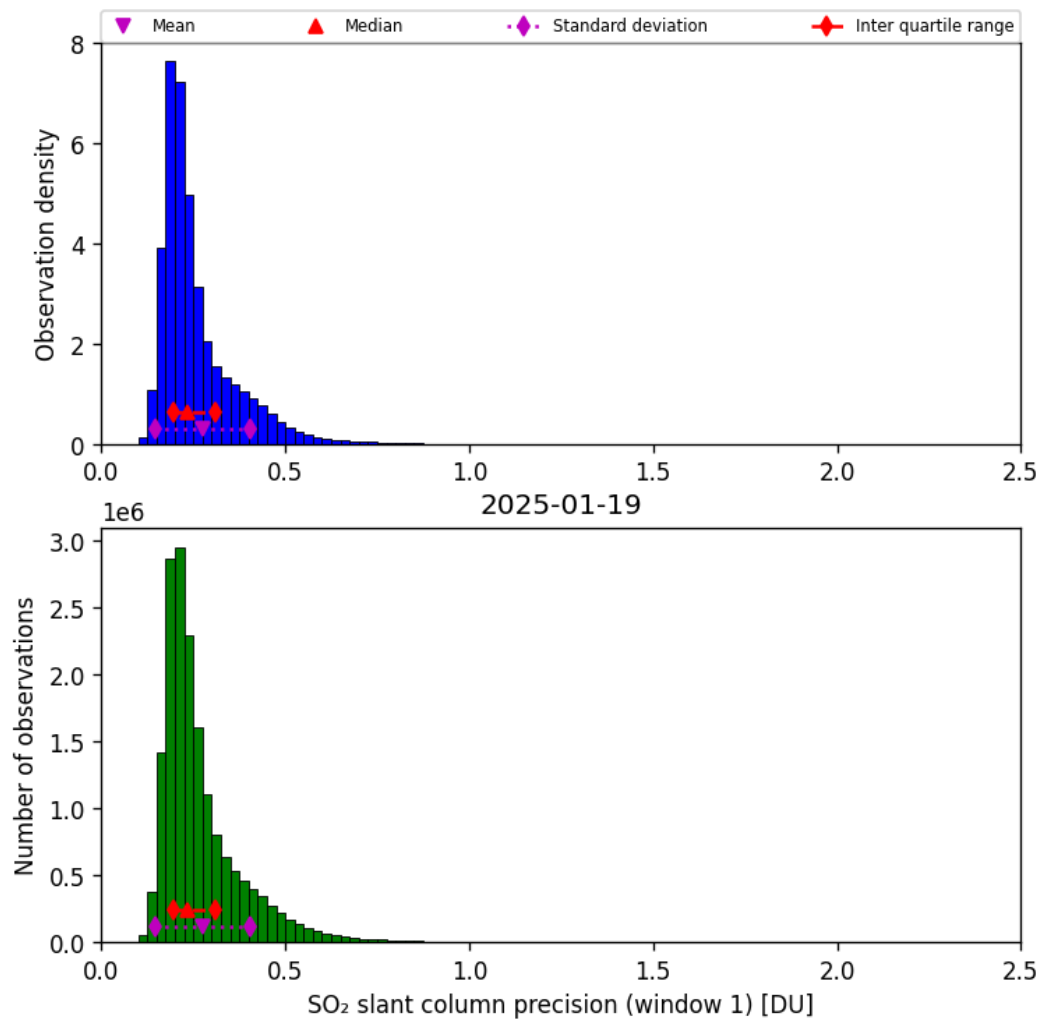


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-01-19 to 2025-01-20

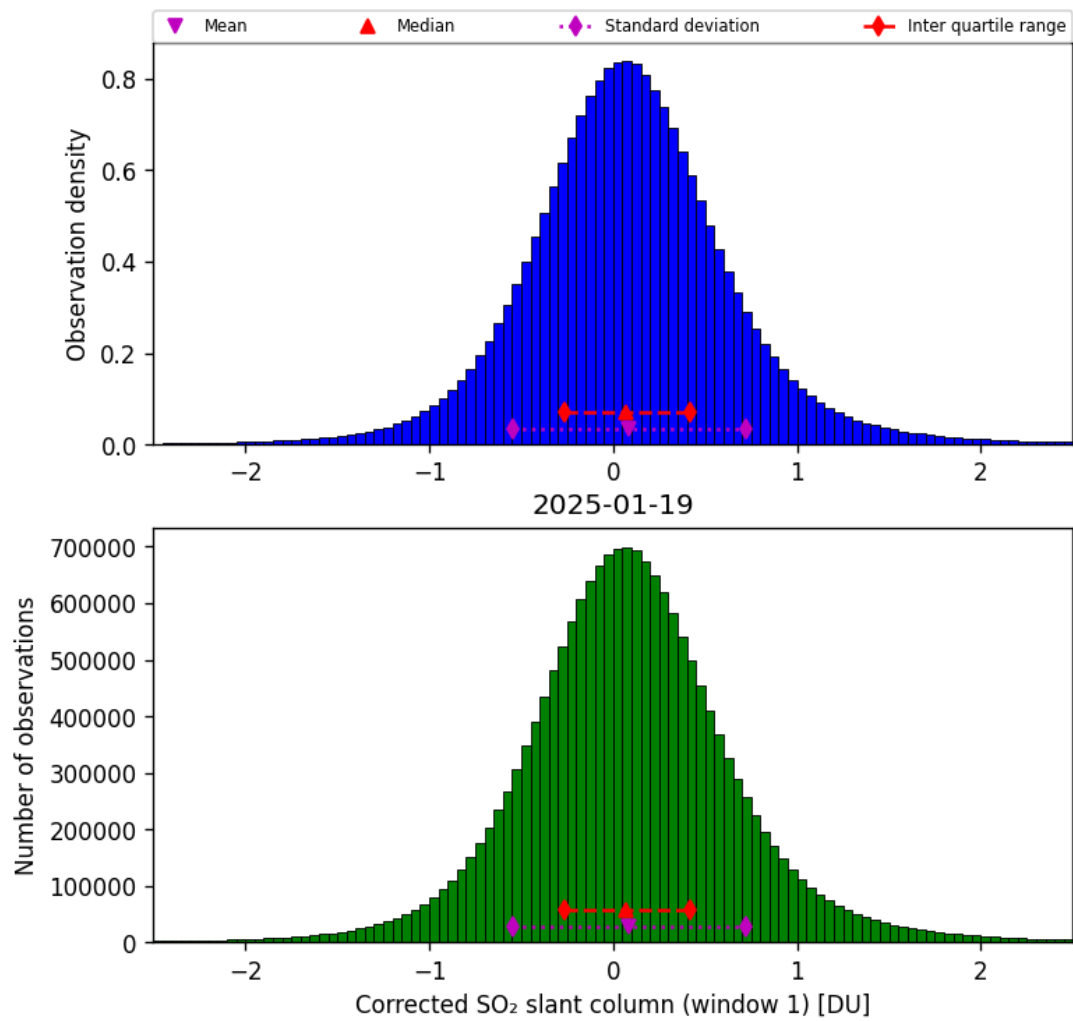


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-01-19 to 2025-01-20

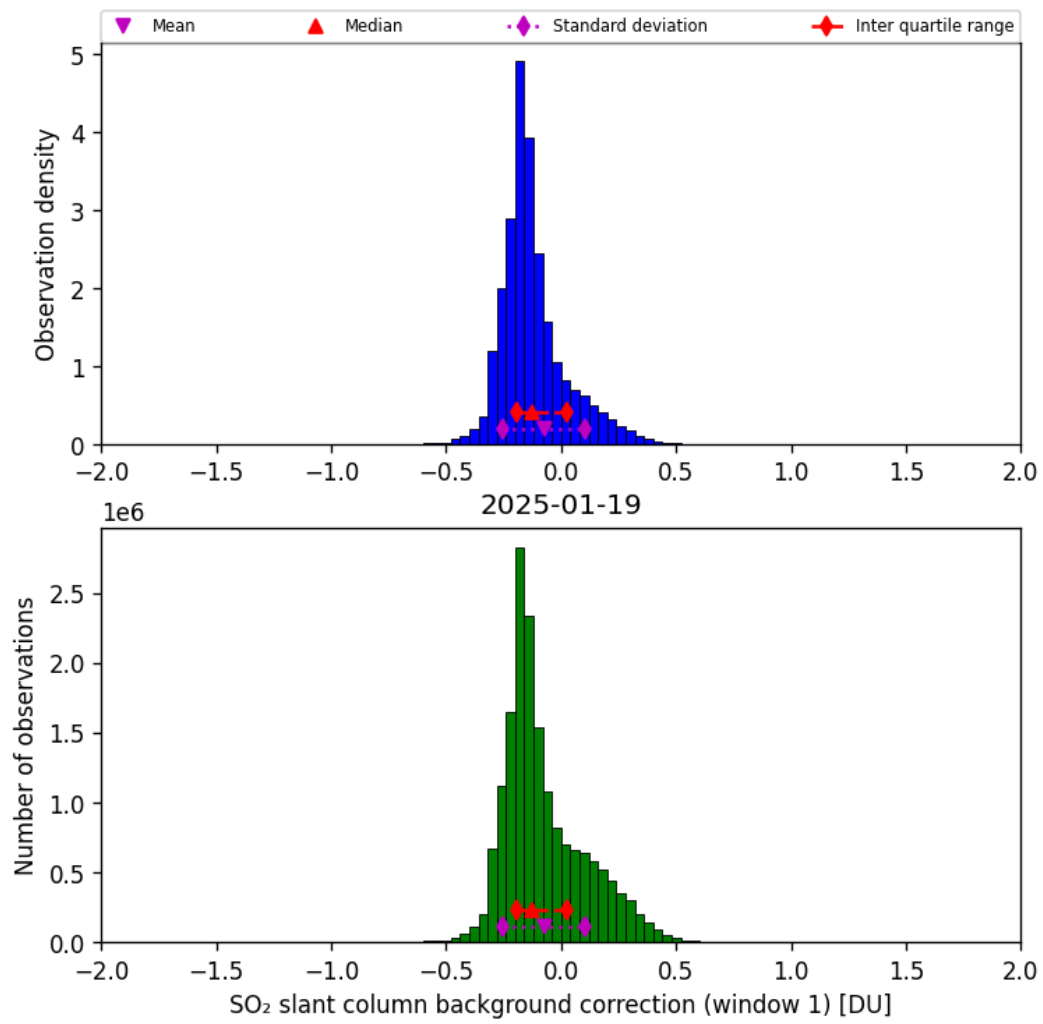


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-01-19 to 2025-01-20

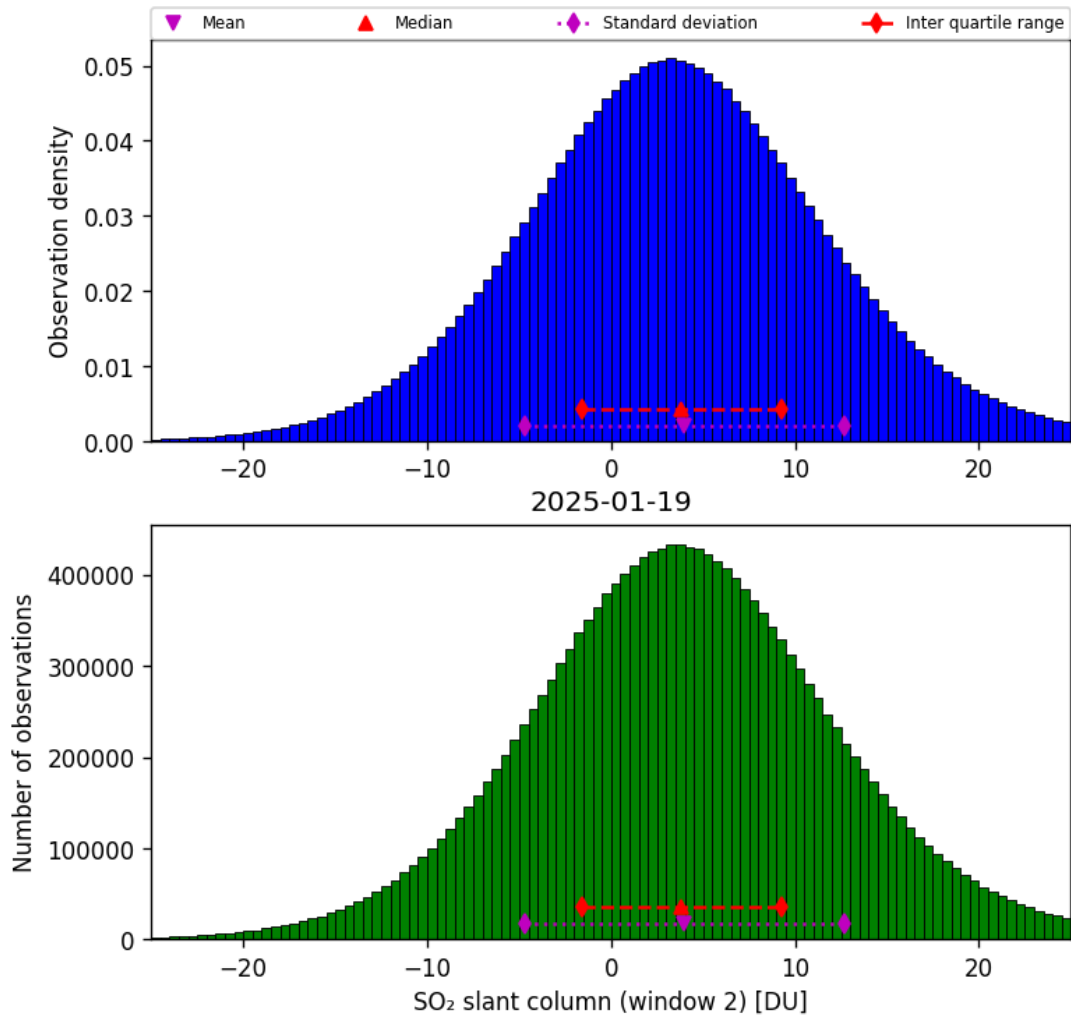


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-01-19 to 2025-01-20

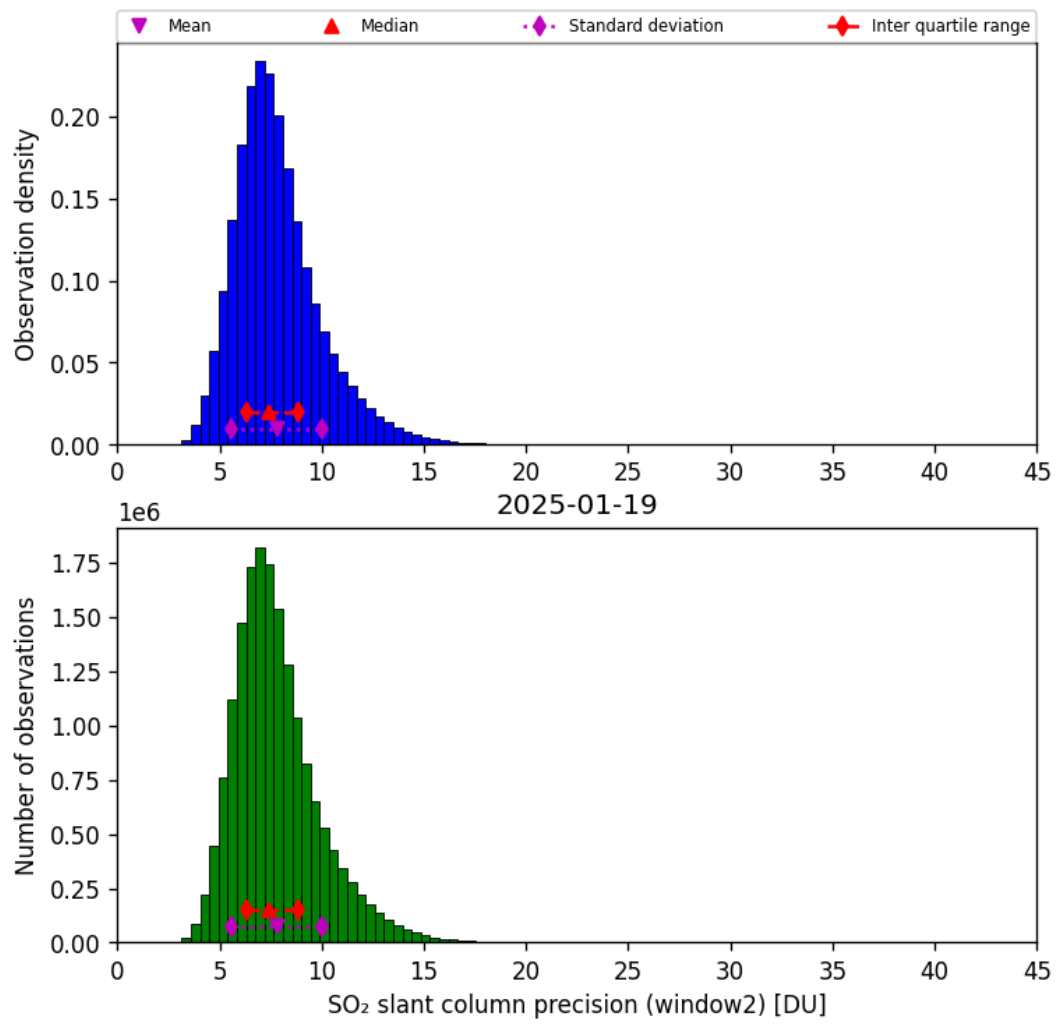


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-01-19 to 2025-01-20

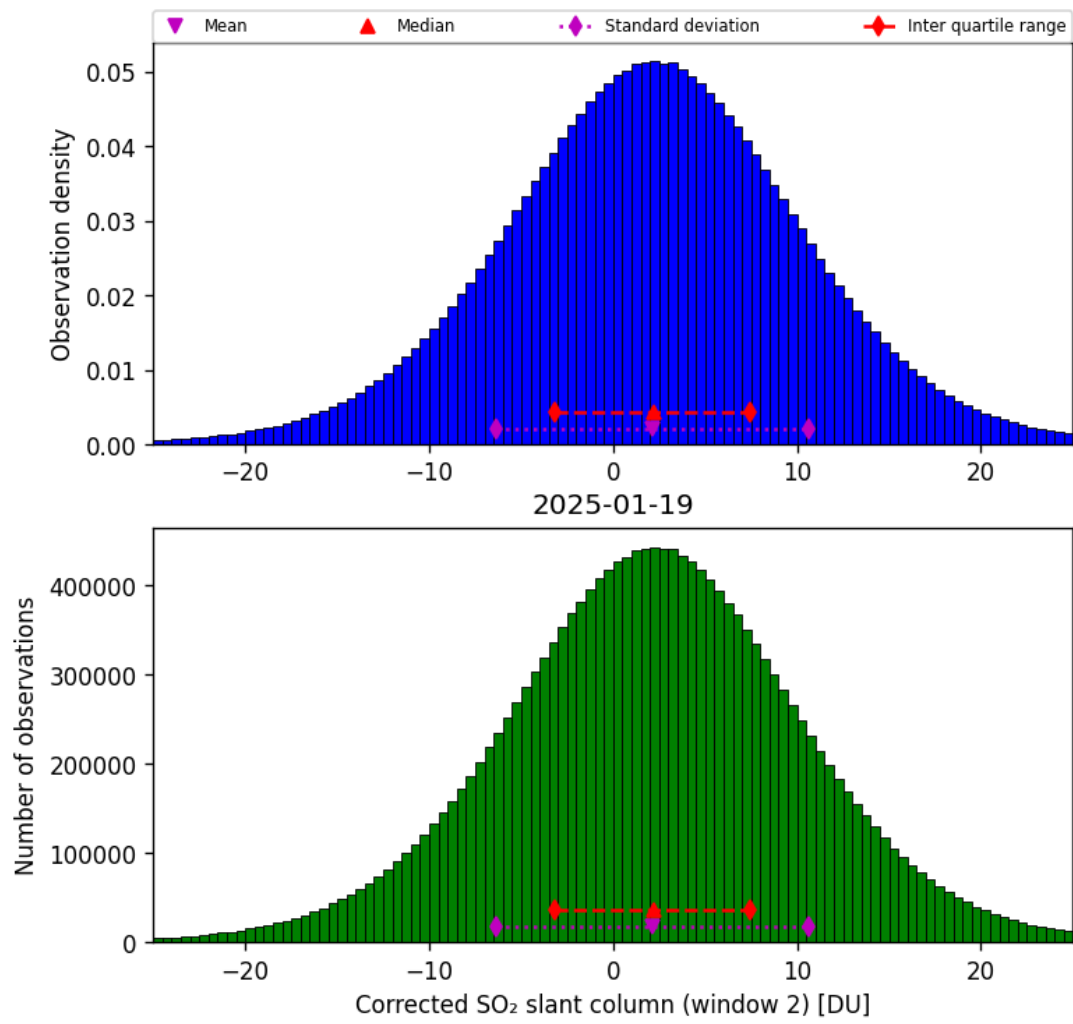


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-01-19 to 2025-01-20

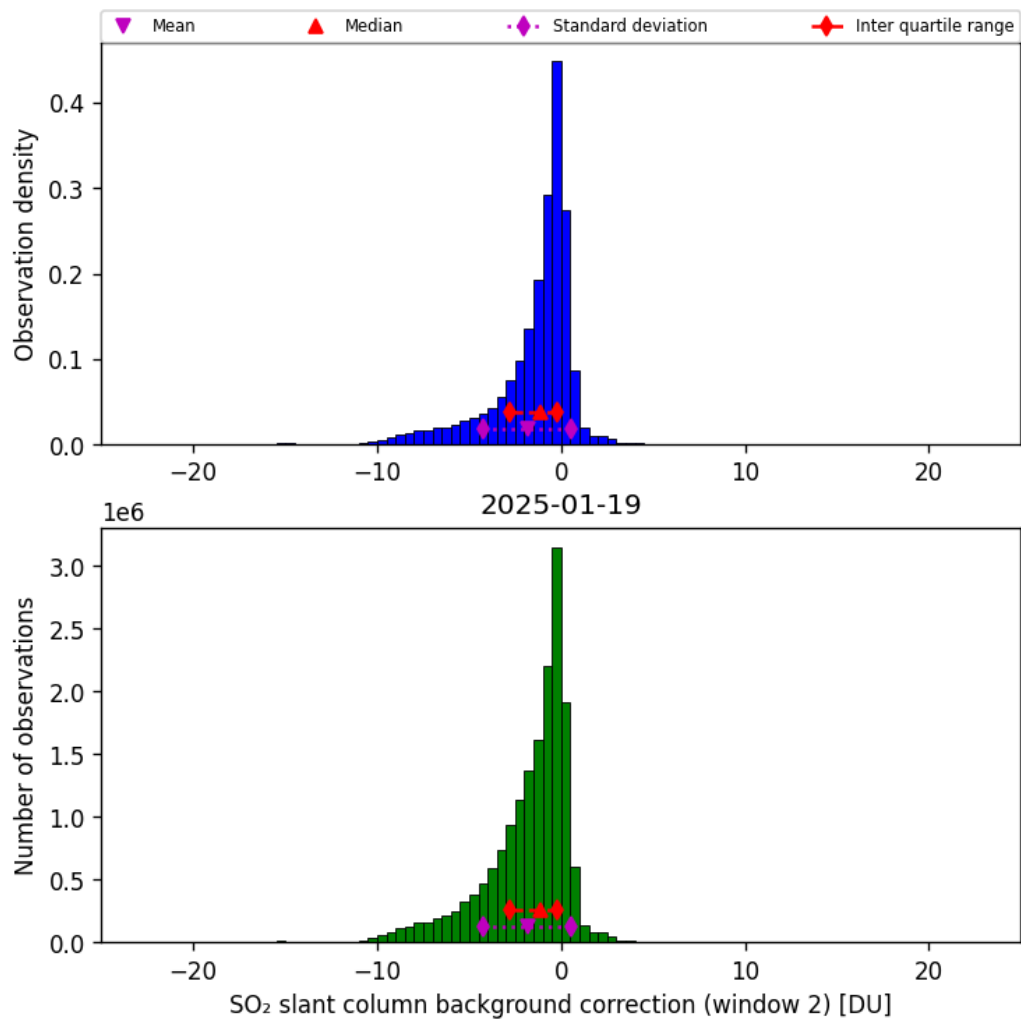


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-01-19 to 2025-01-20

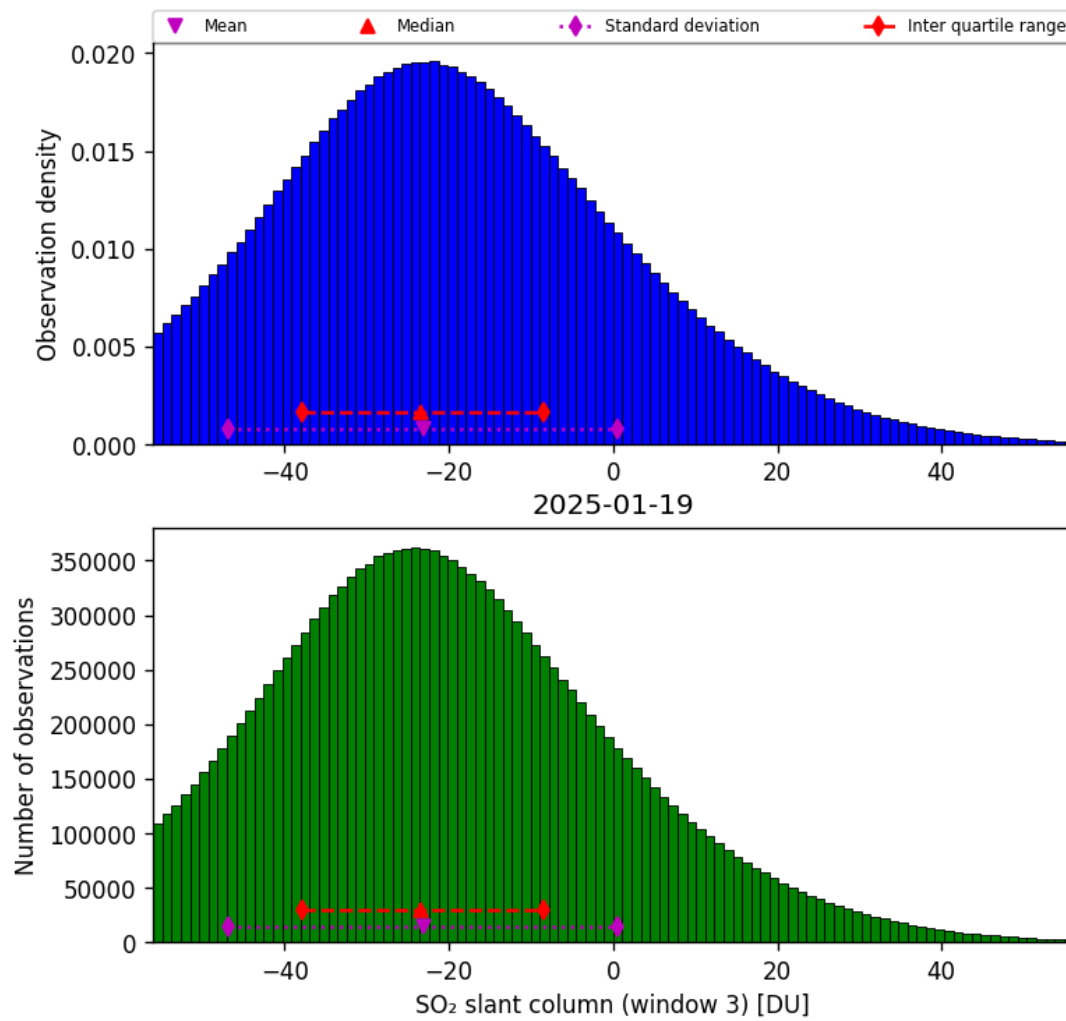


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-01-19 to 2025-01-20

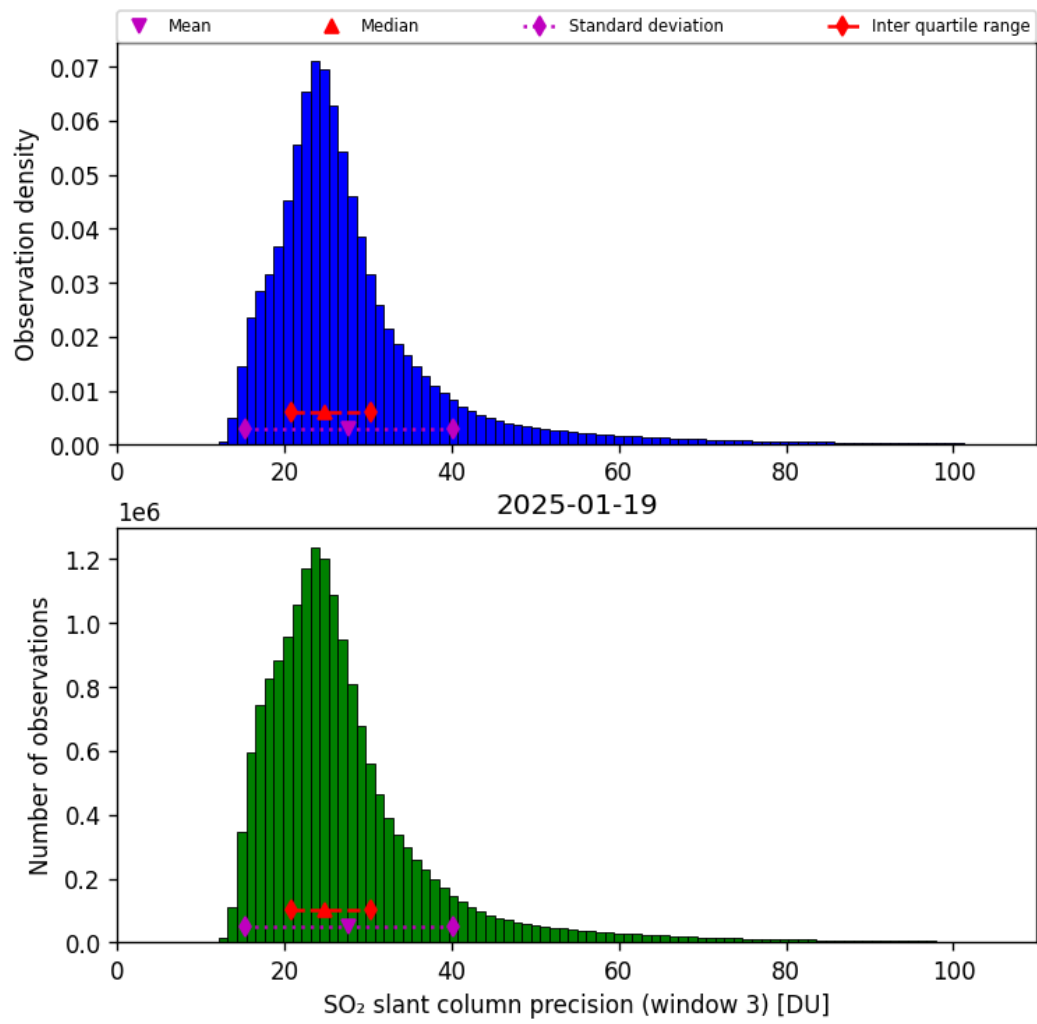


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-01-19 to 2025-01-20

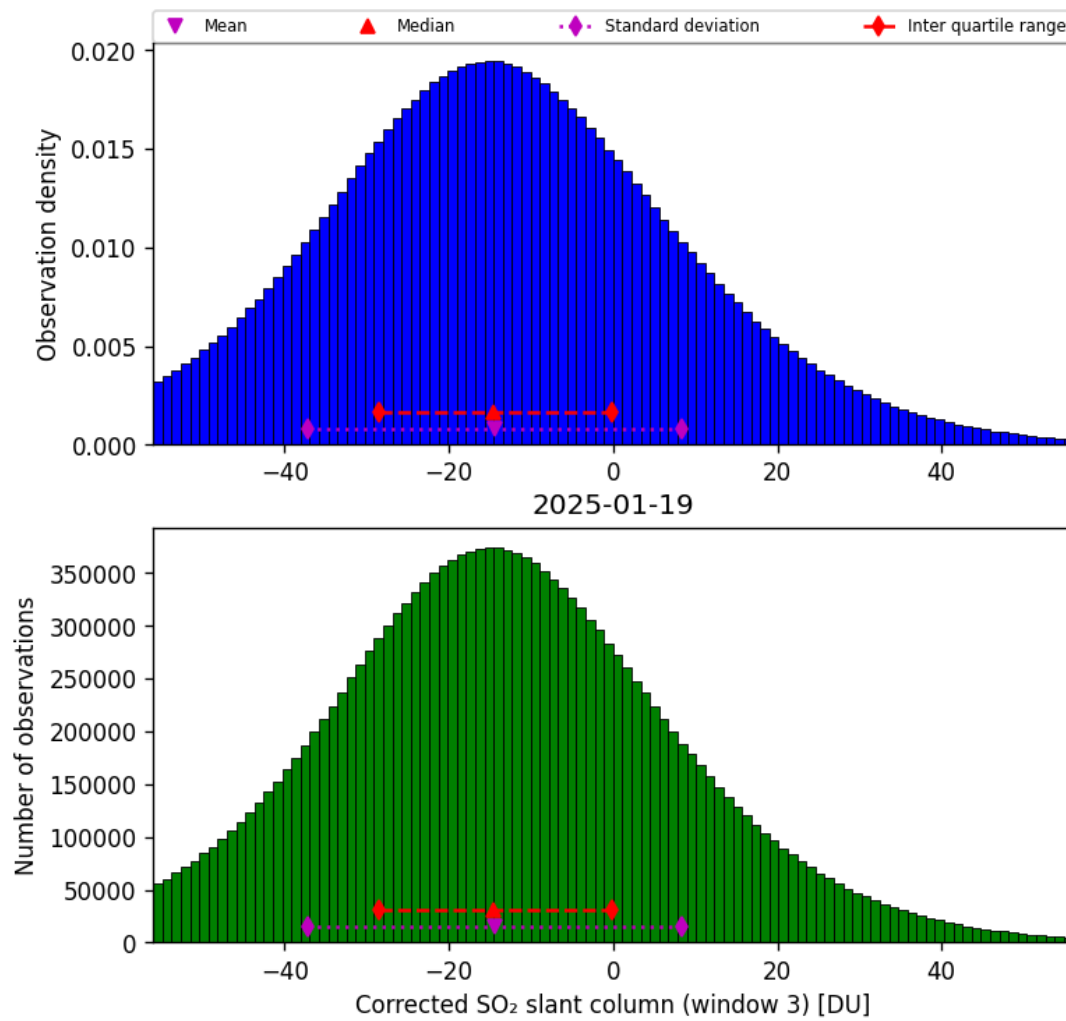


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-01-19 to 2025-01-20

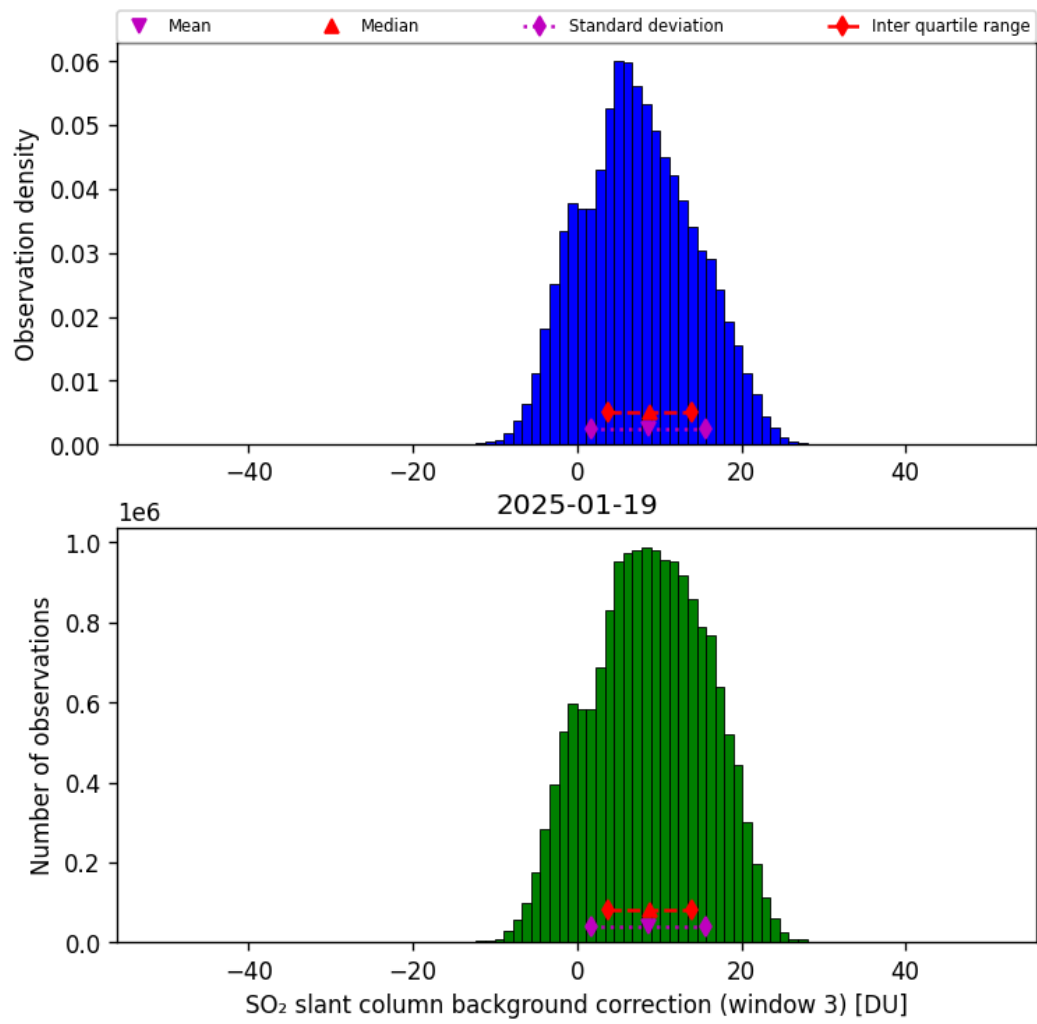


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-01-19 to 2025-01-20

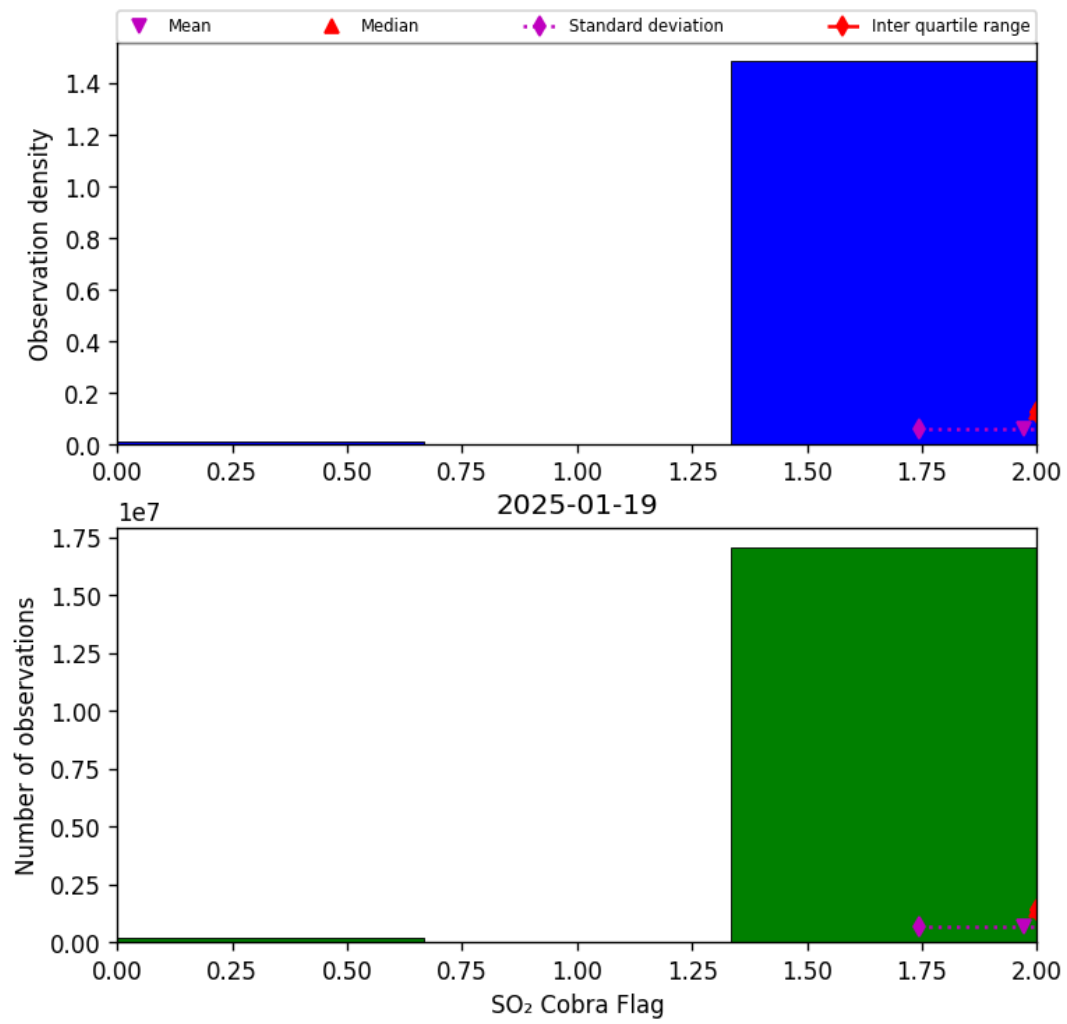


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-01-19 to 2025-01-20

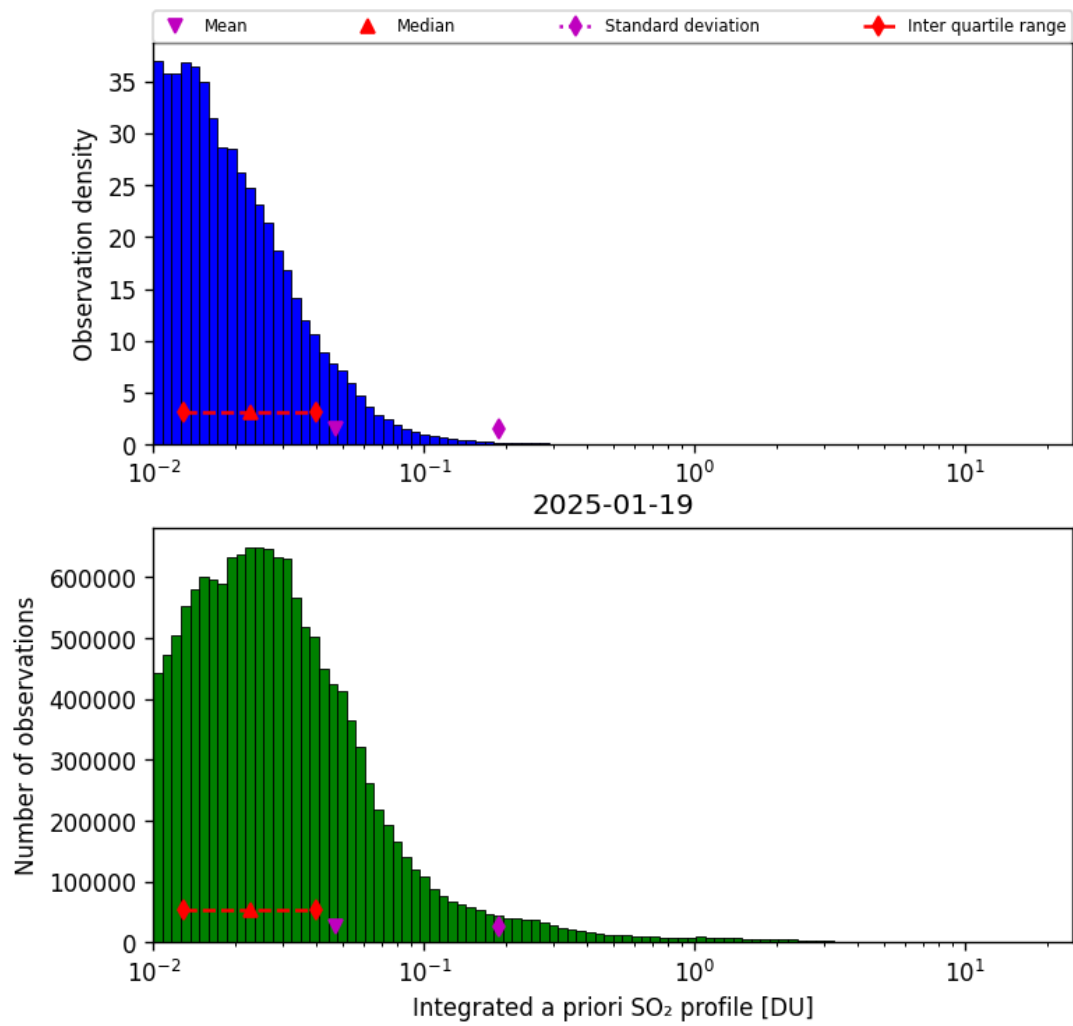


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-01-19 to 2025-01-20

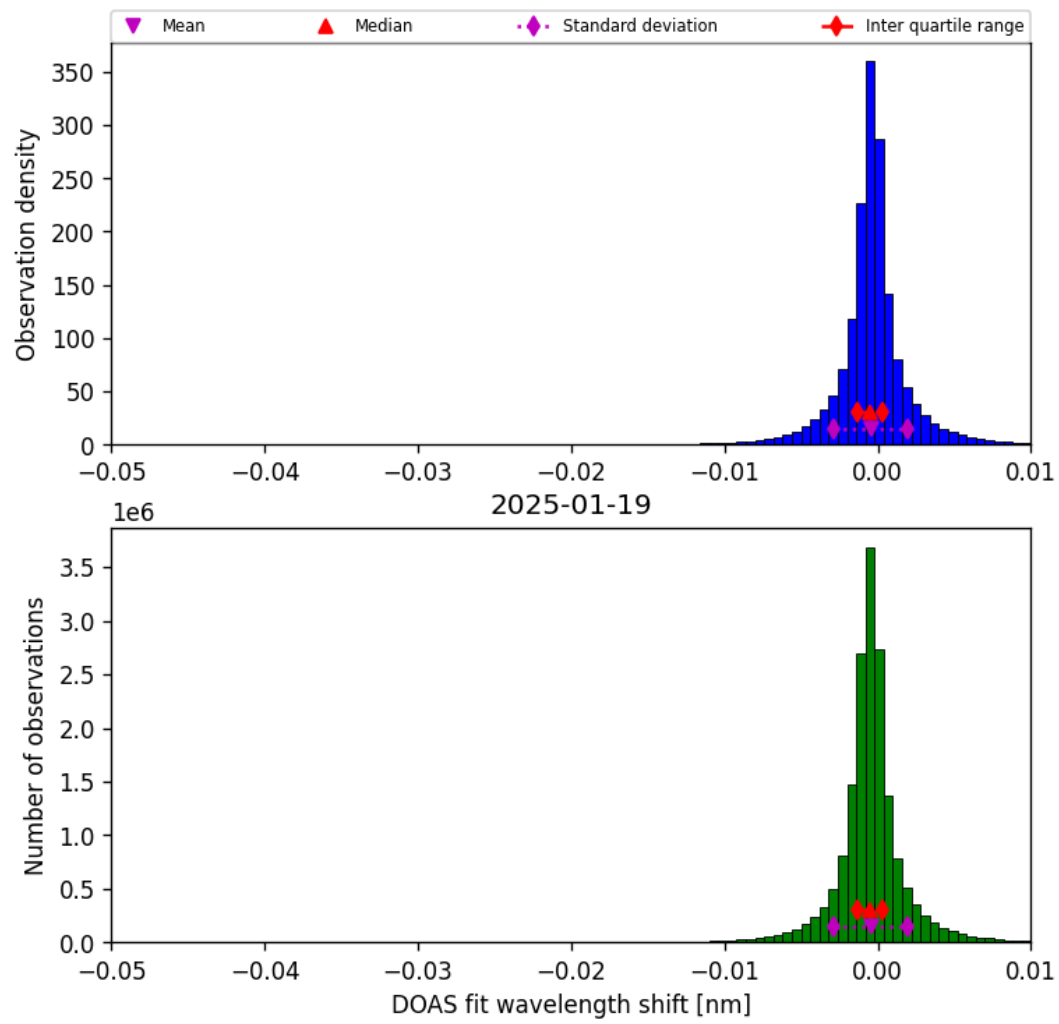


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-01-19 to 2025-01-20

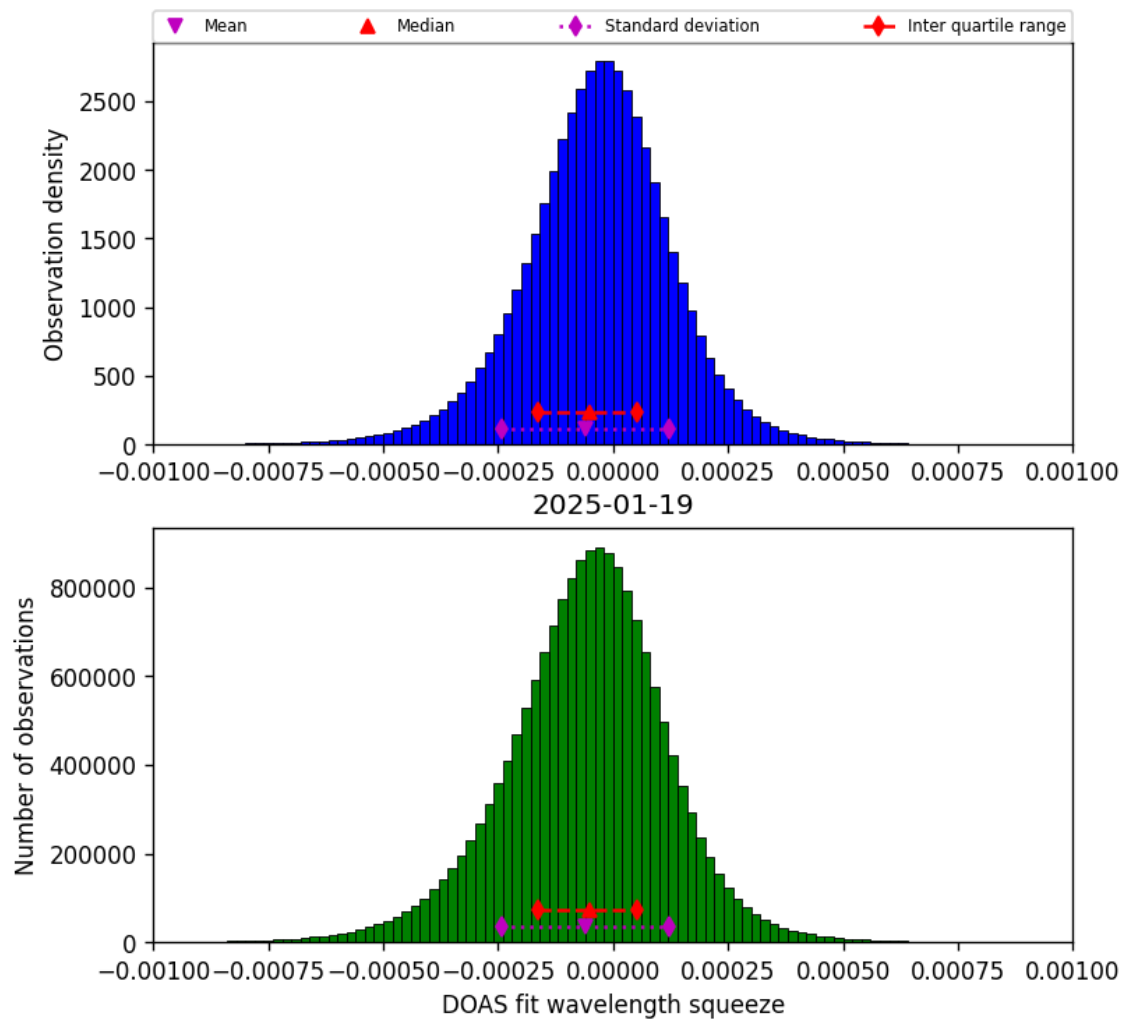


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-01-19 to 2025-01-20

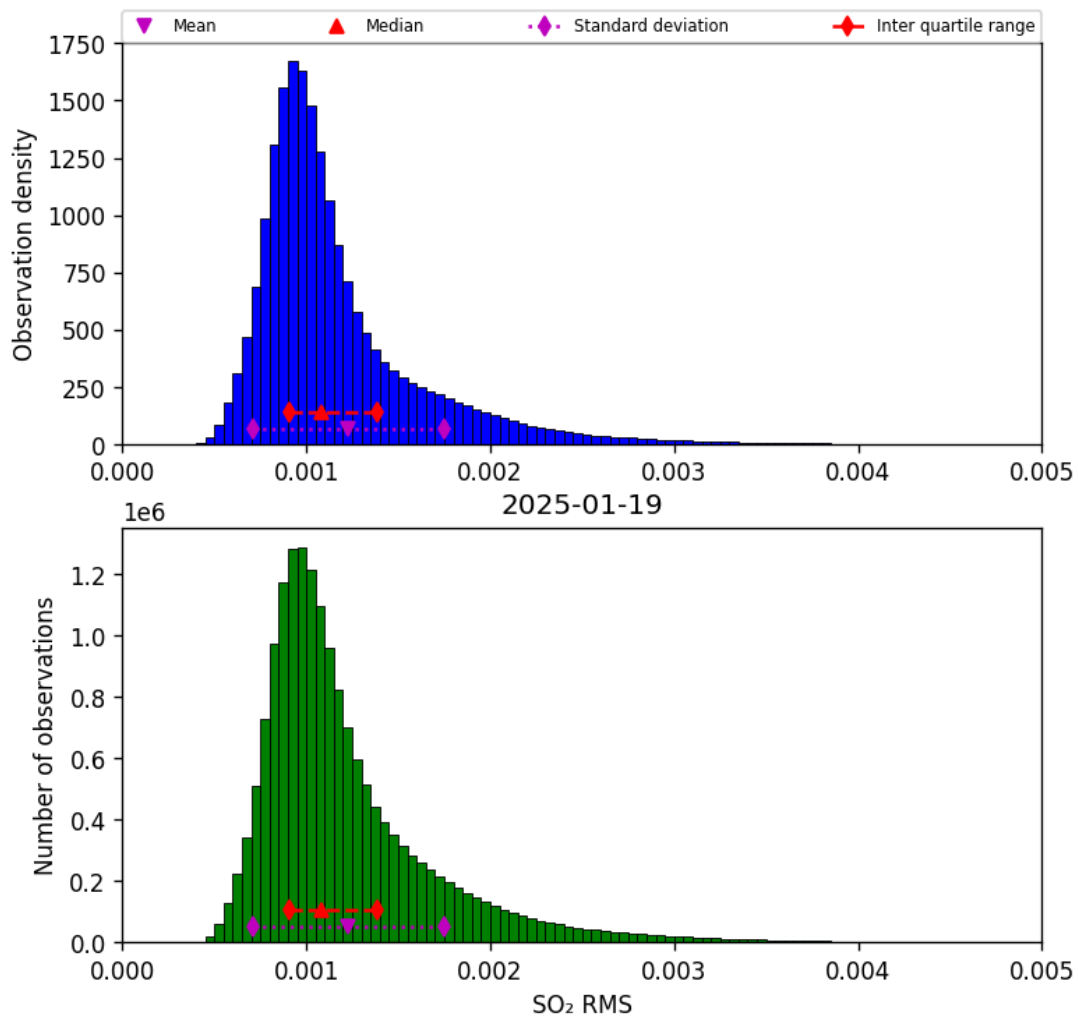


Figure 79: Histogram of “SO₂ RMS” for 2025-01-19 to 2025-01-20

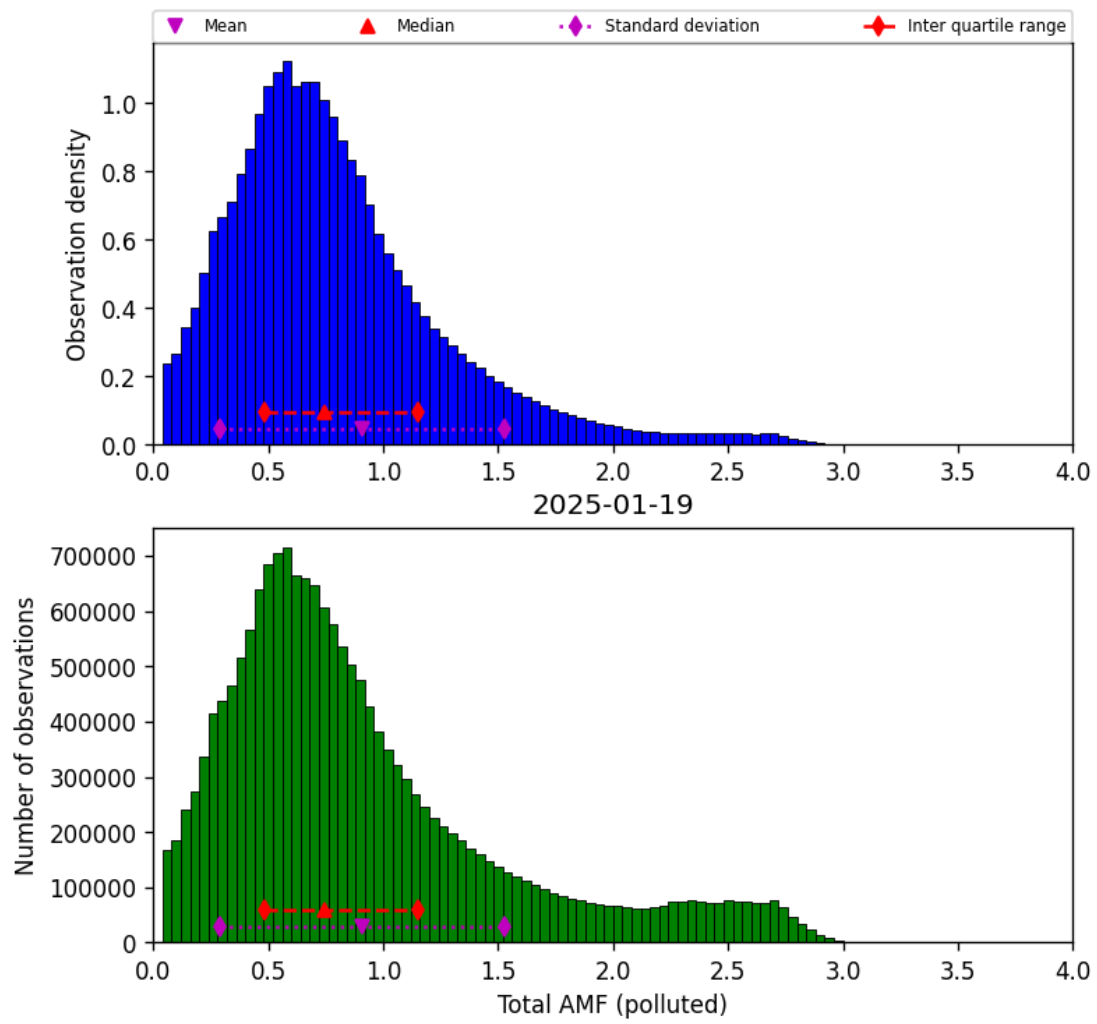


Figure 80: Histogram of “Total AMF (polluted)” for 2025-01-19 to 2025-01-20

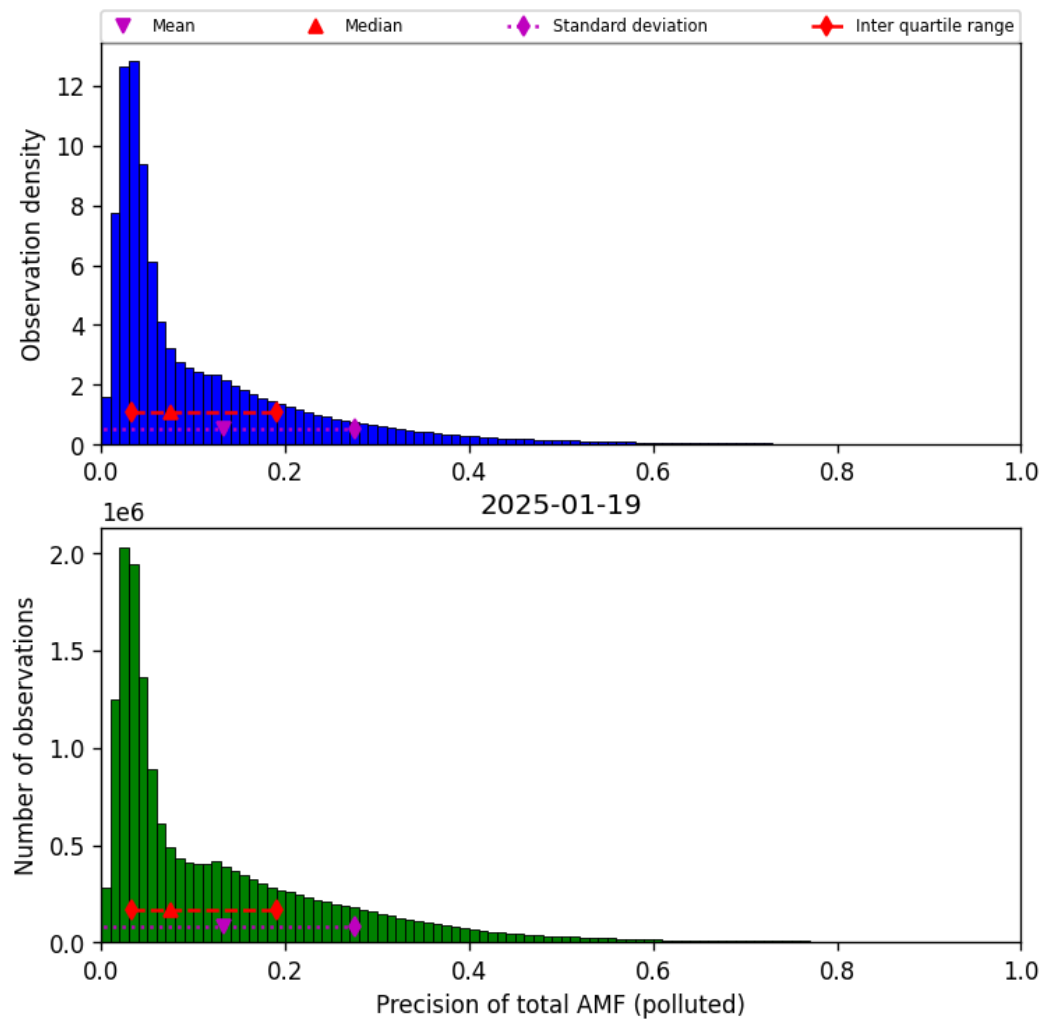


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-01-19 to 2025-01-20

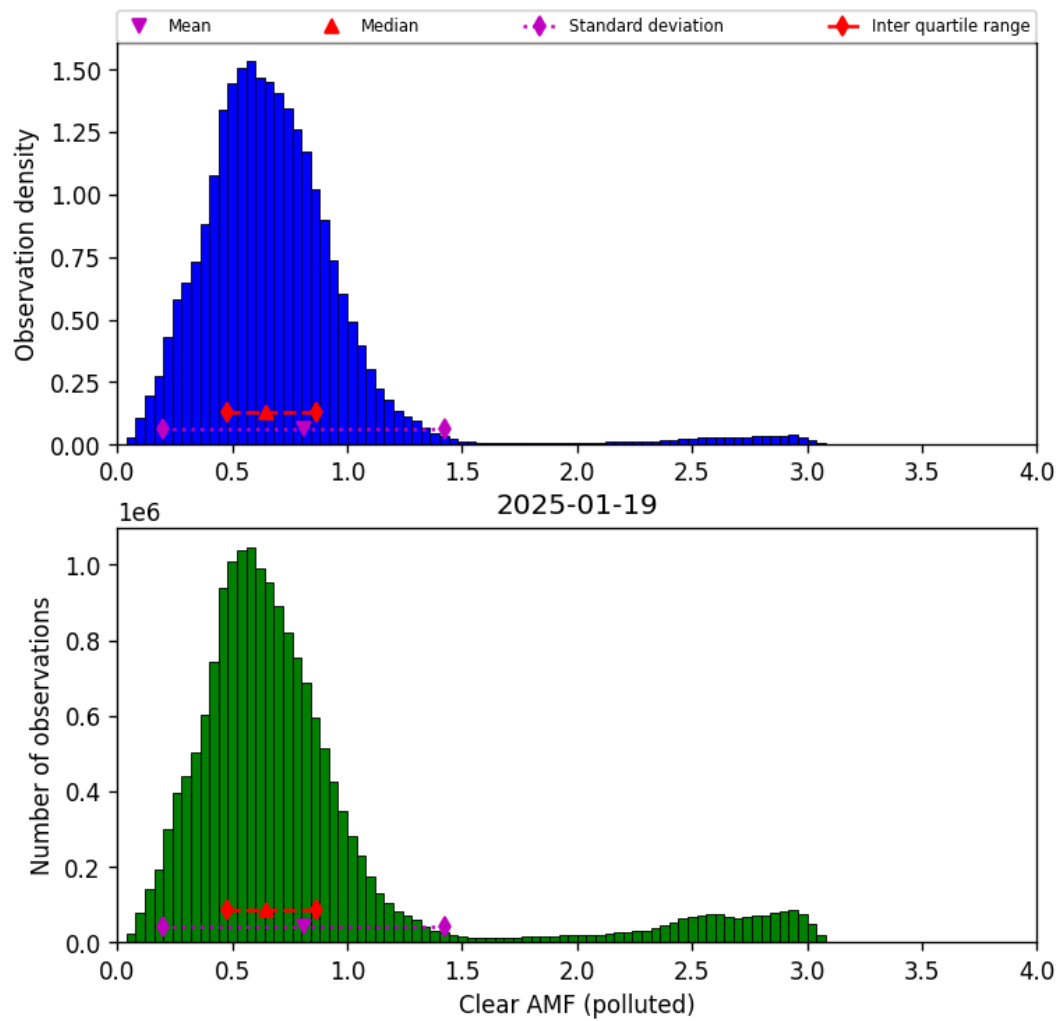


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-01-19 to 2025-01-20

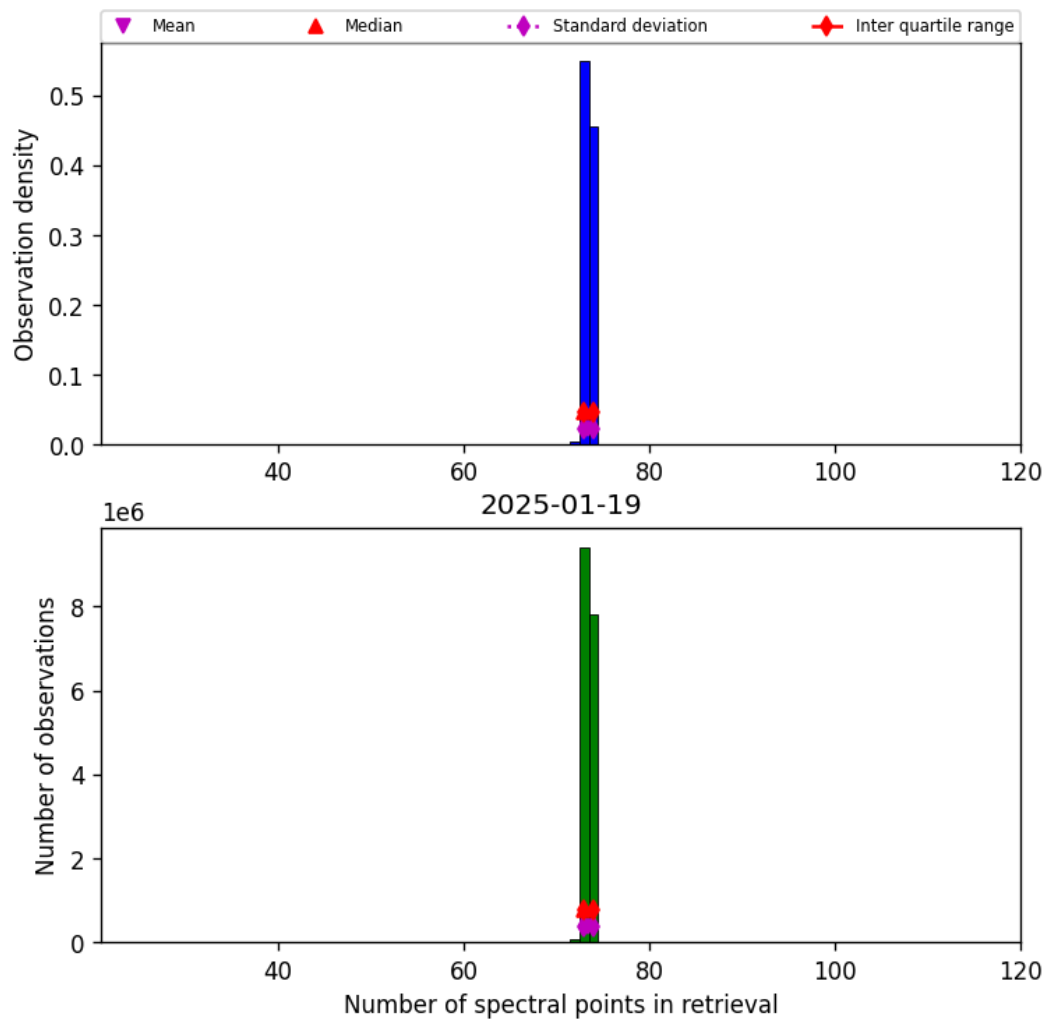


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-01-19 to 2025-01-20

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.

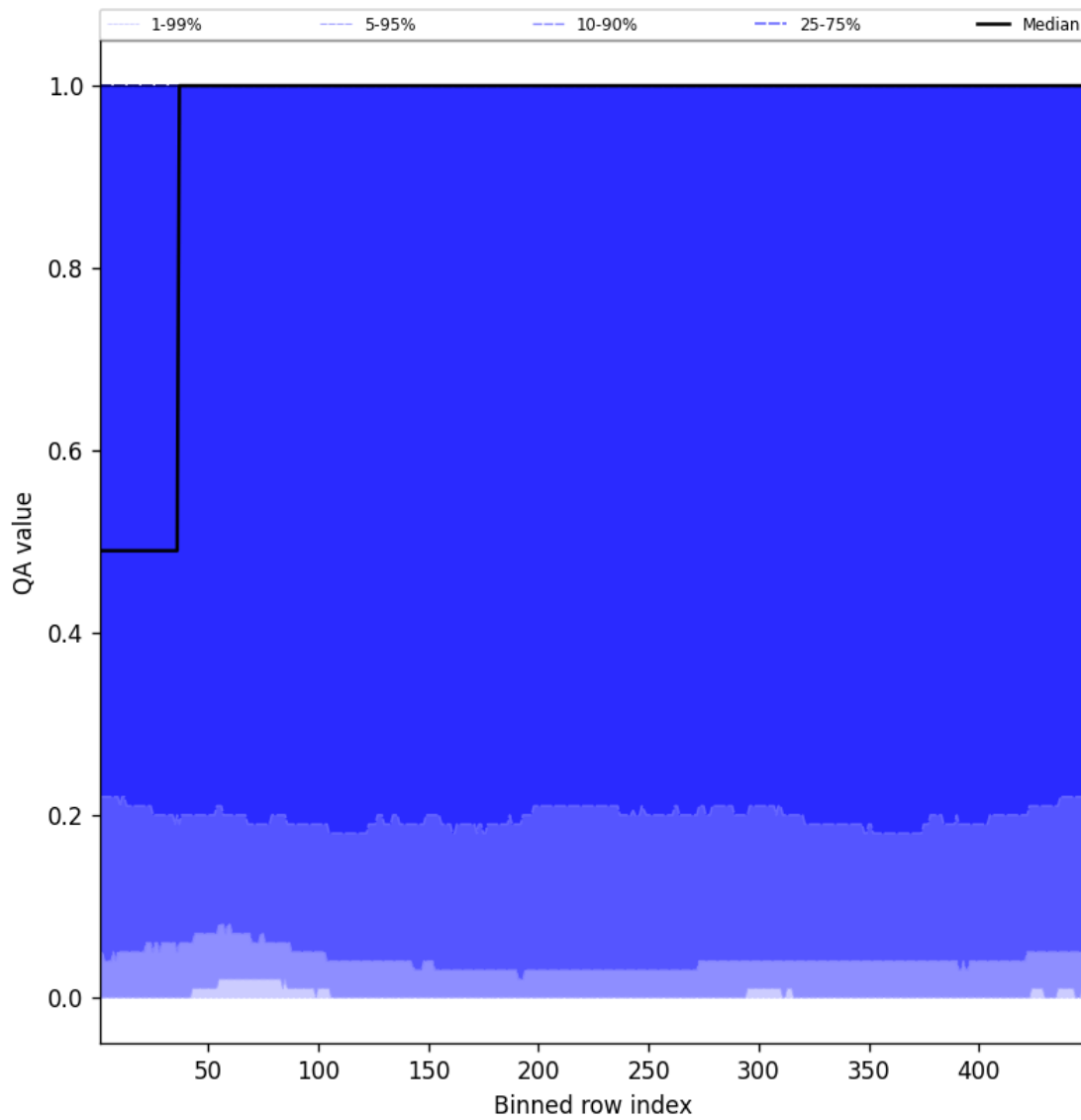


Figure 84: Along track statistics of “QA value” for 2025-01-19 to 2025-01-20

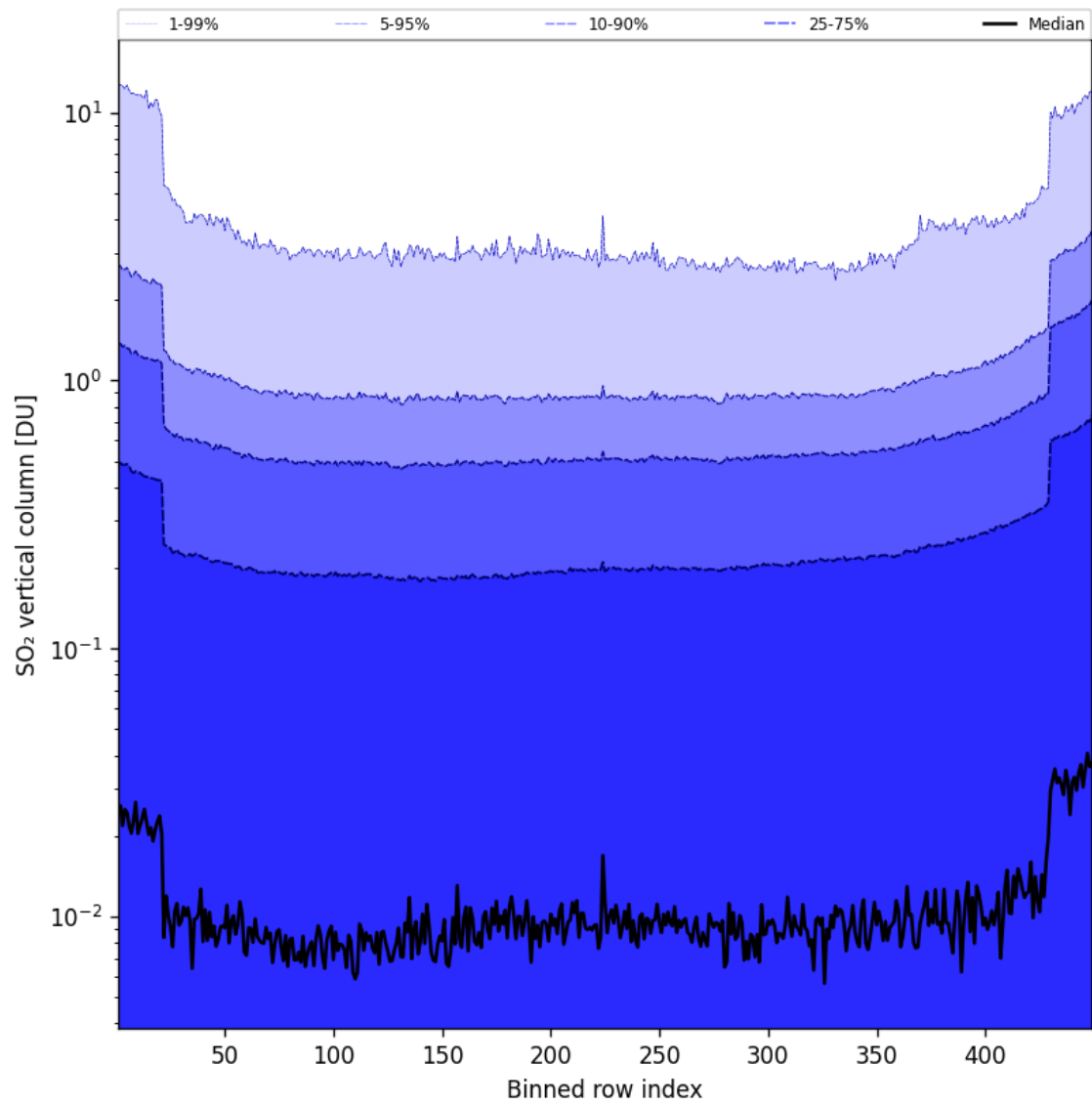


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-01-19 to 2025-01-20

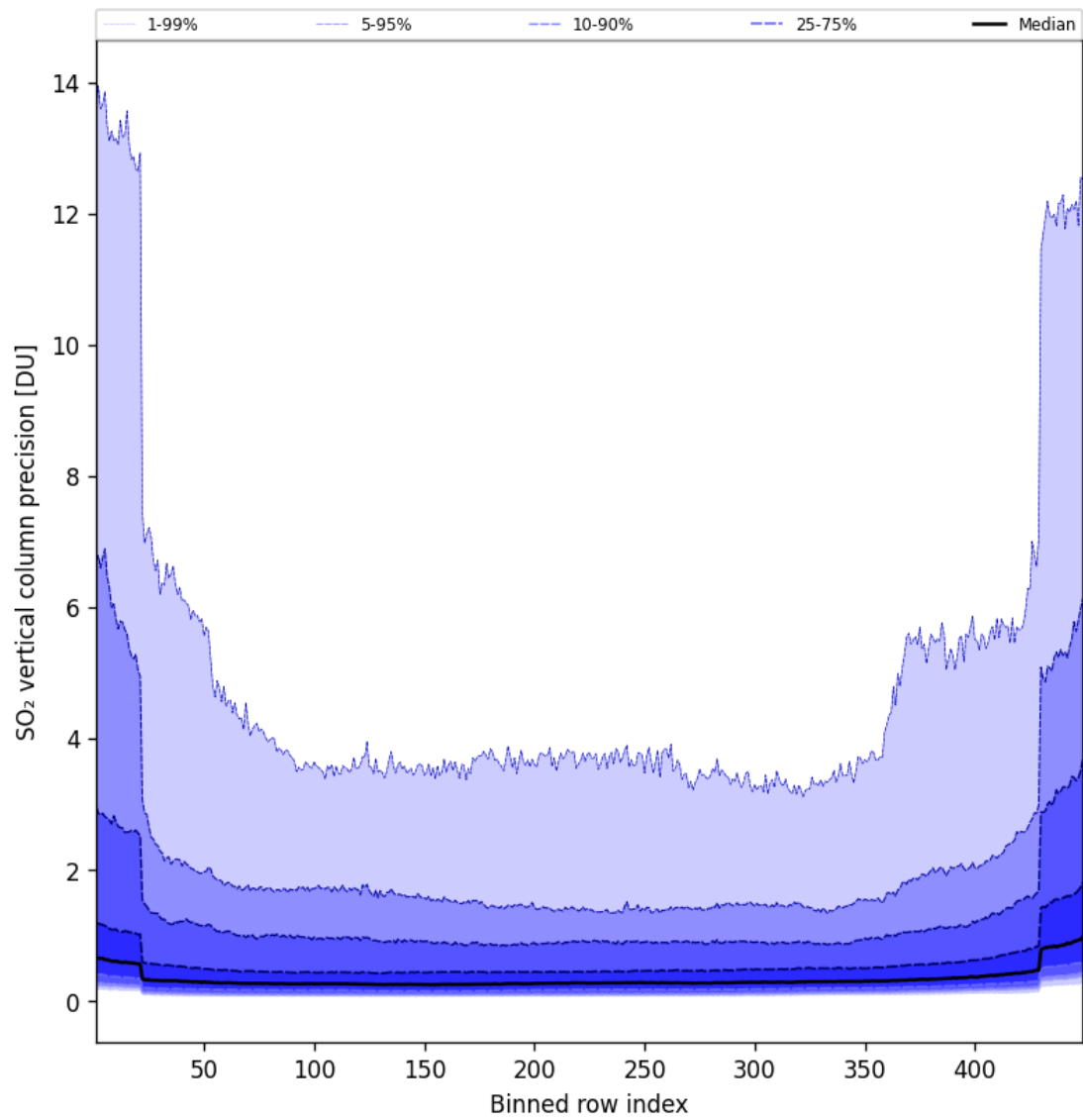


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-01-19 to 2025-01-20

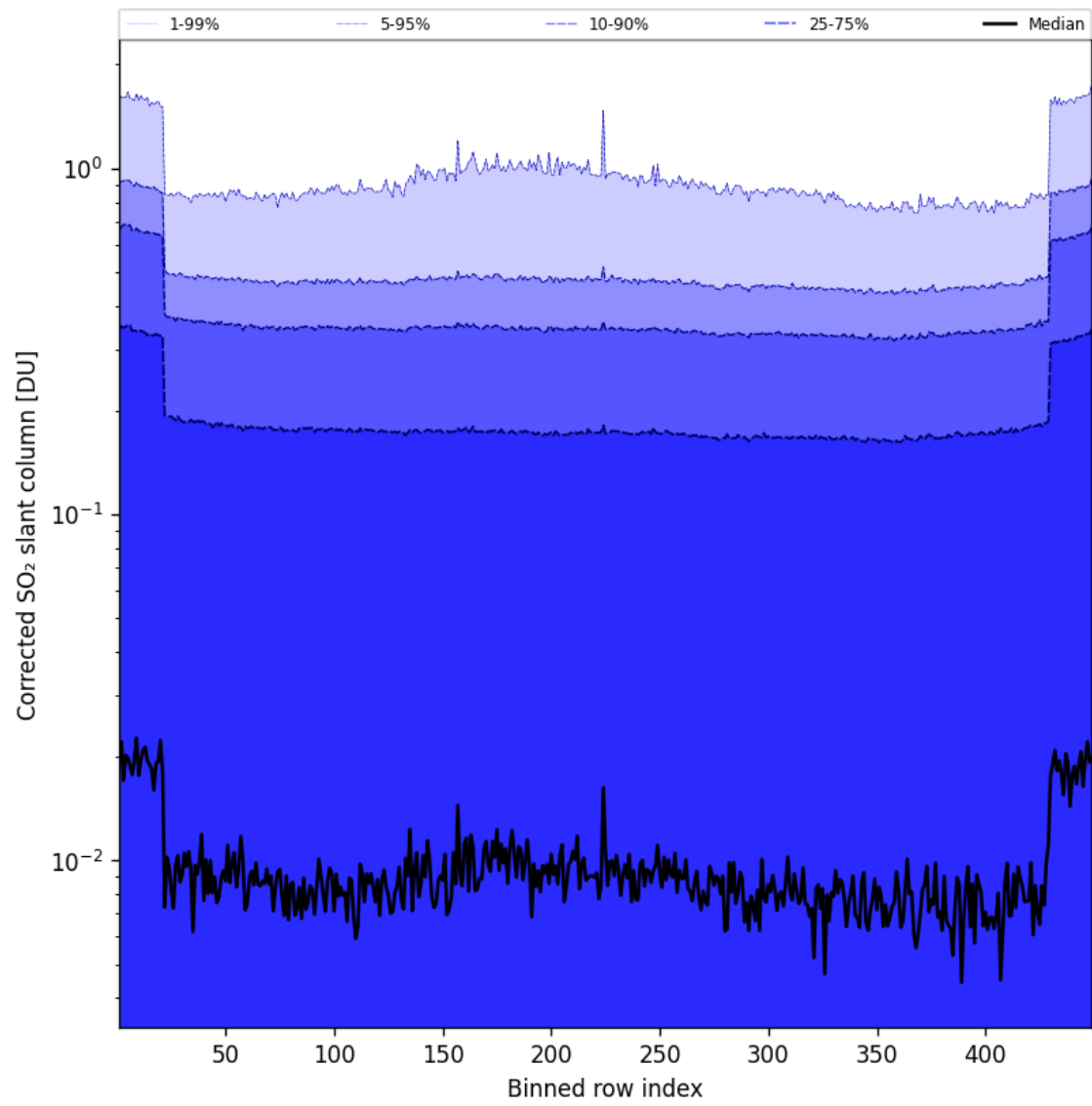


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-01-19 to 2025-01-20

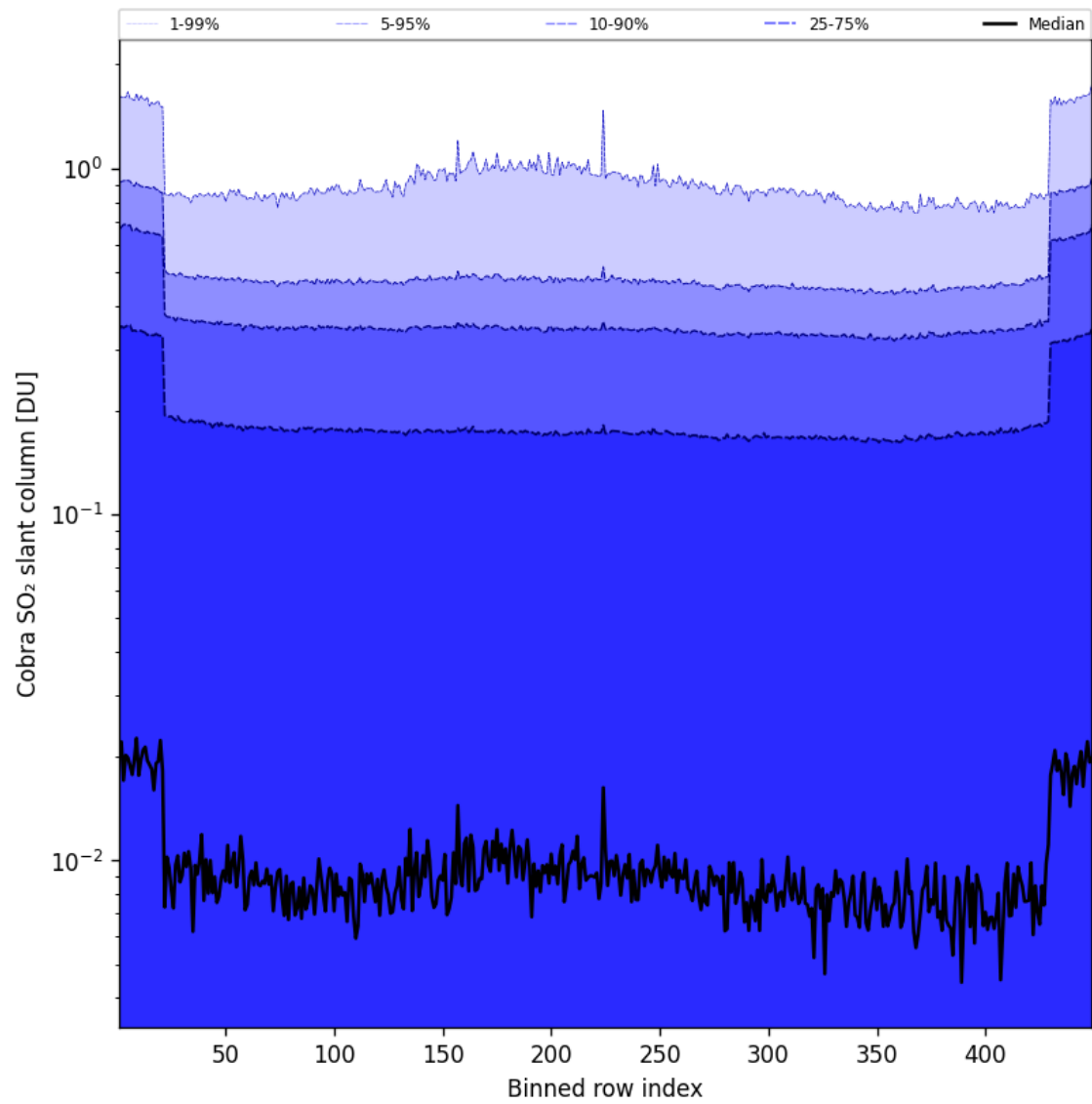


Figure 88: Along track statistics of "Cobra SO₂ slant column" for 2025-01-19 to 2025-01-20

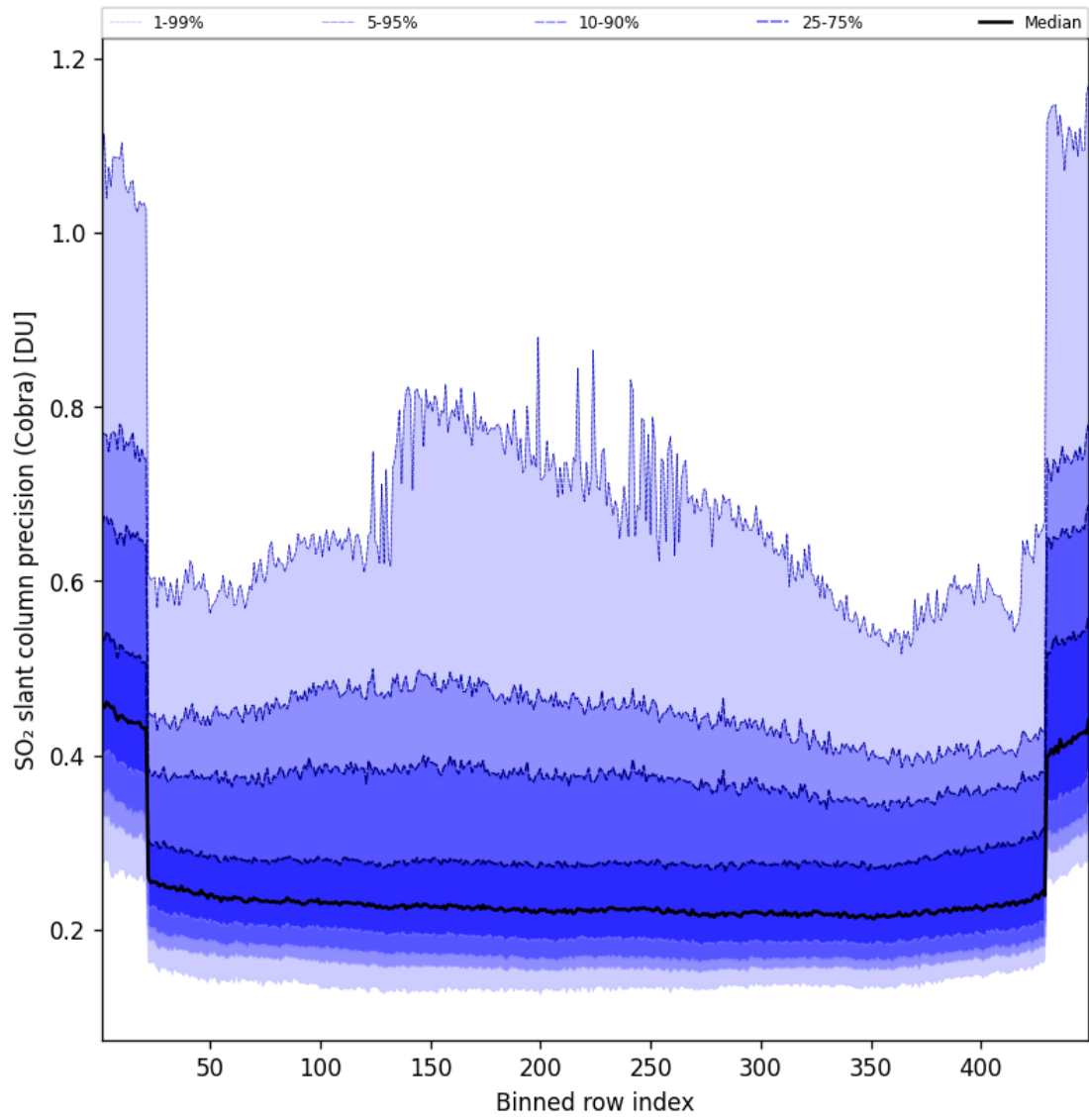


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-01-19 to 2025-01-20

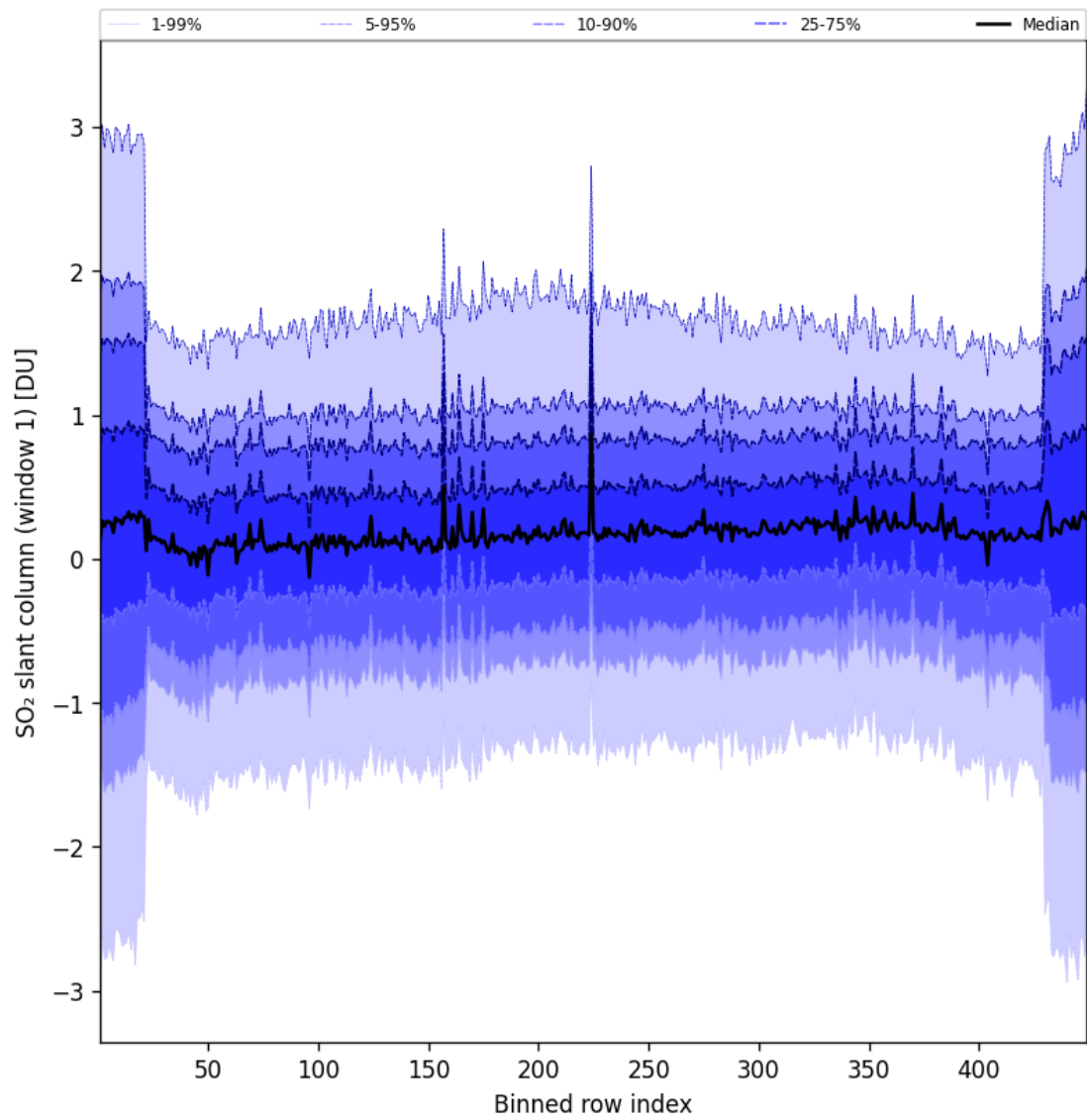


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-01-19 to 2025-01-20

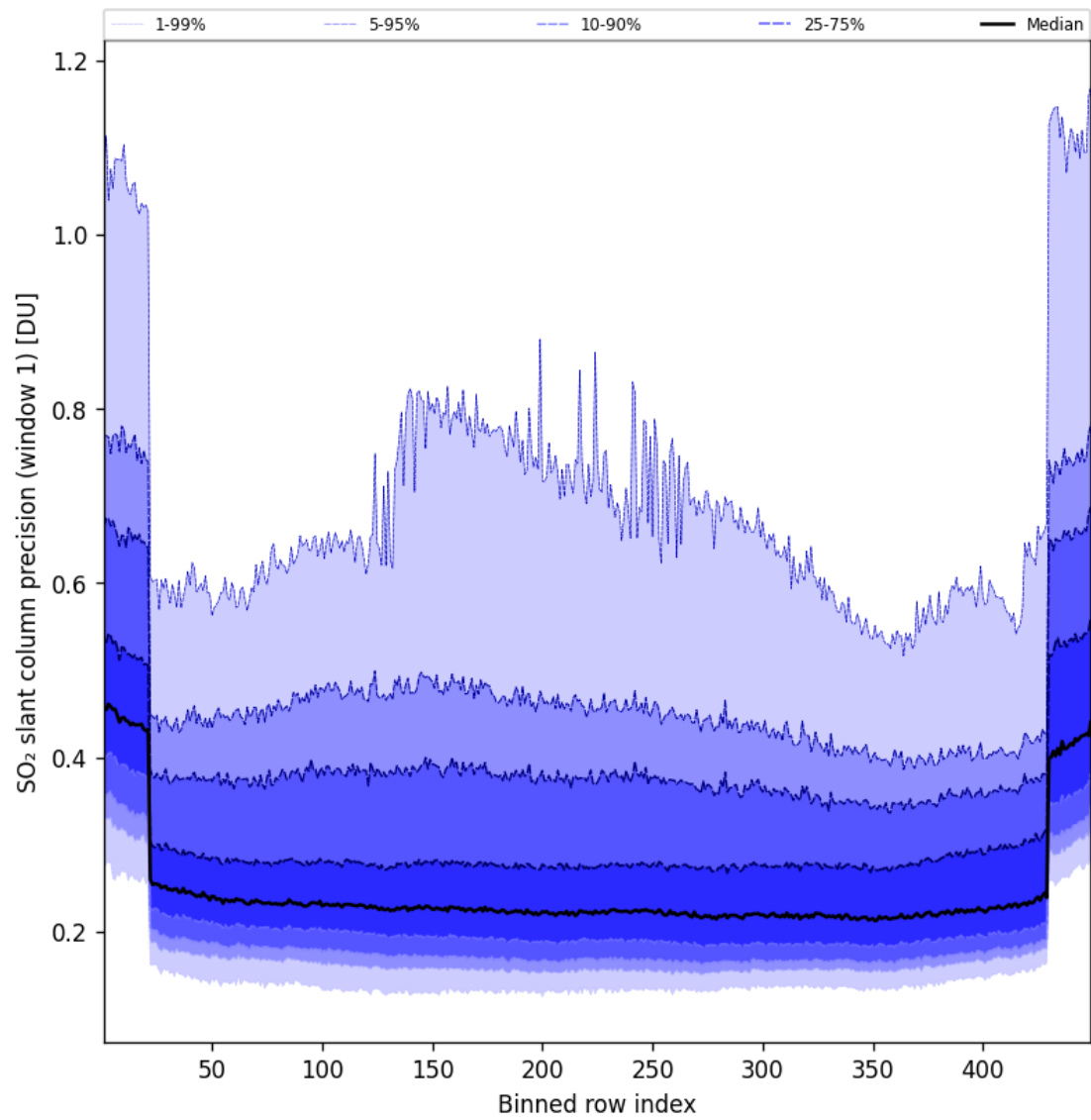


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-01-19 to 2025-01-20

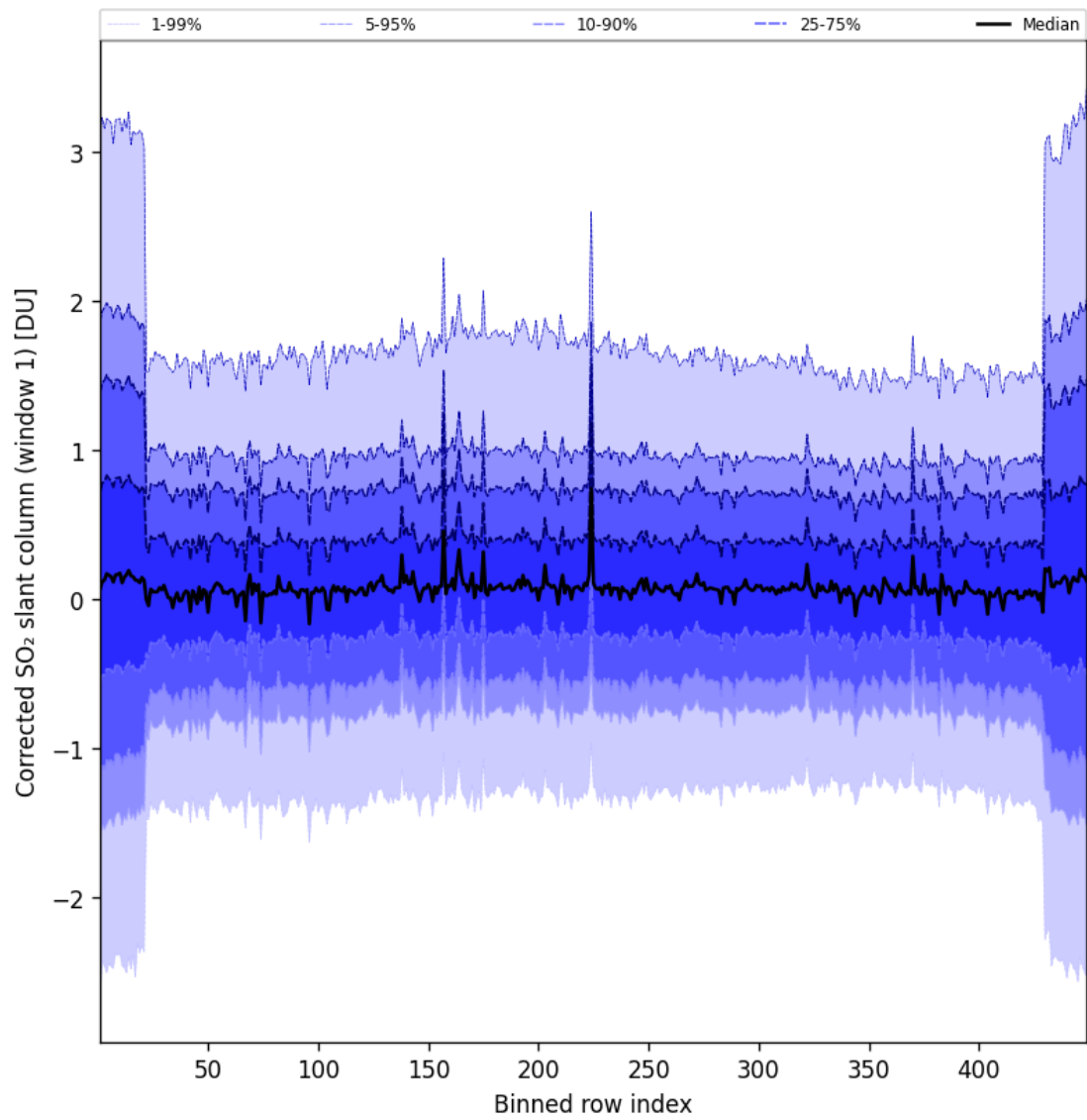


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-01-19 to 2025-01-20

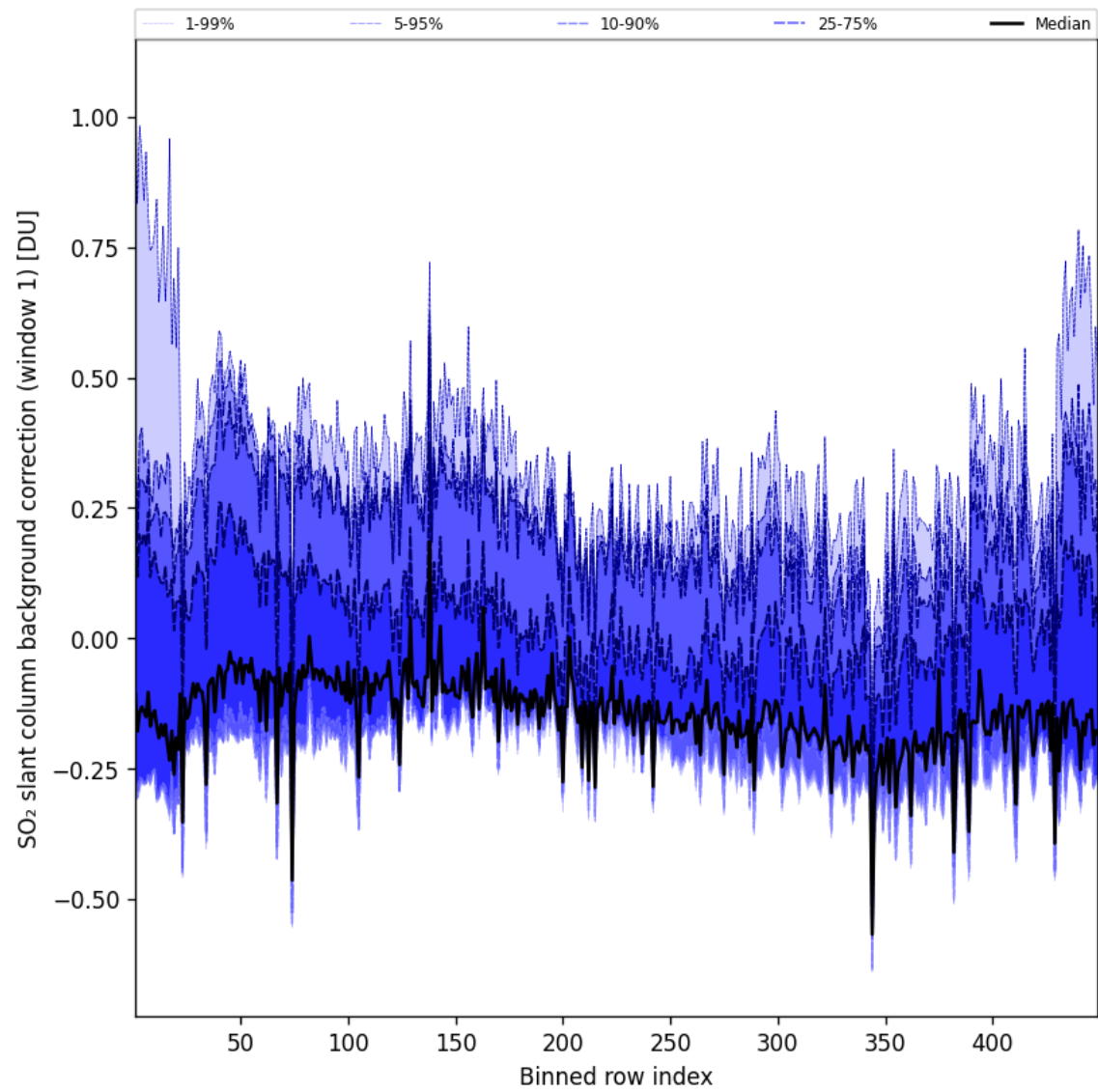


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-01-19 to 2025-01-20

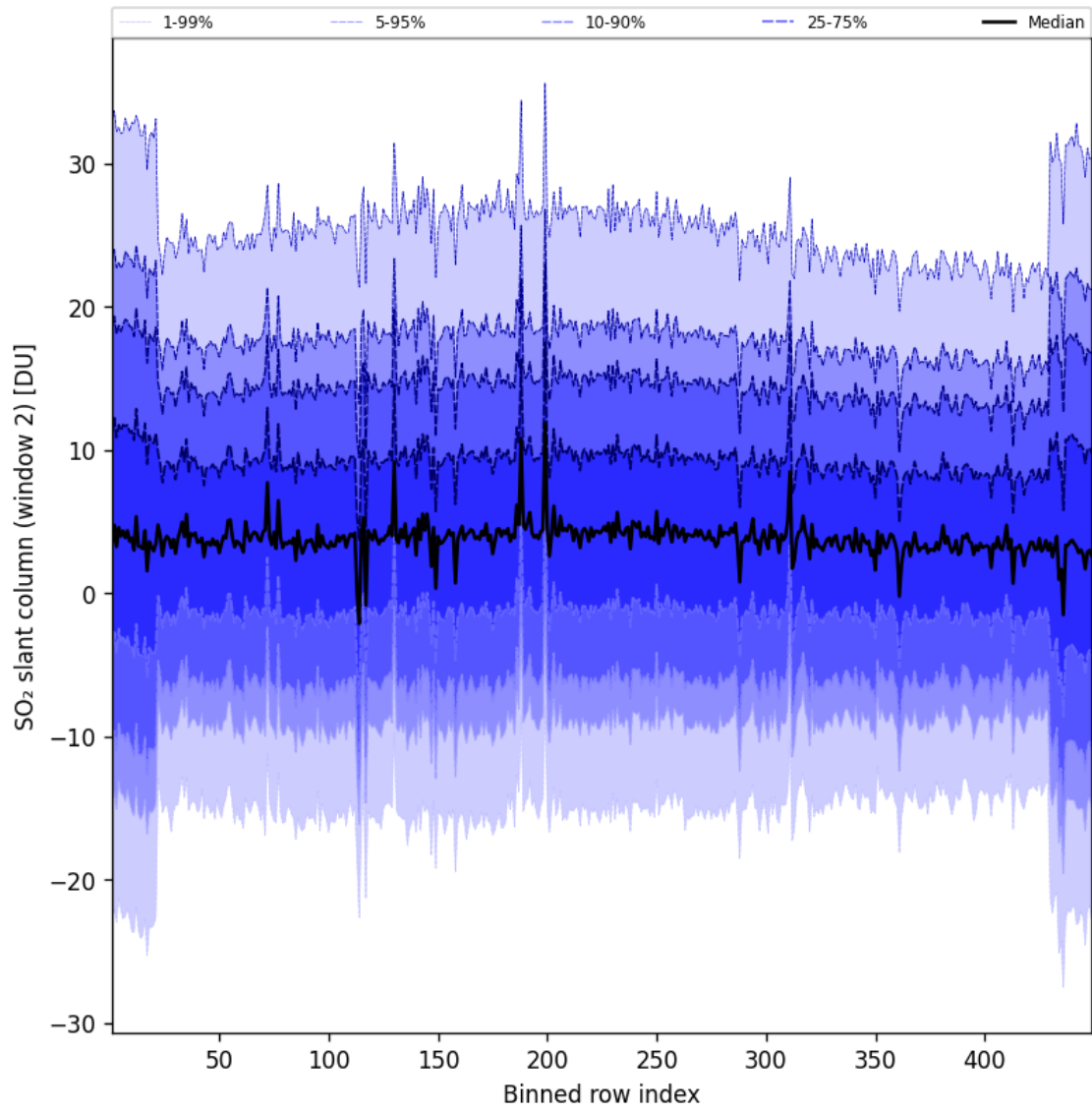


Figure 94: Along track statistics of "SO₂ slant column (window 2)" for 2025-01-19 to 2025-01-20

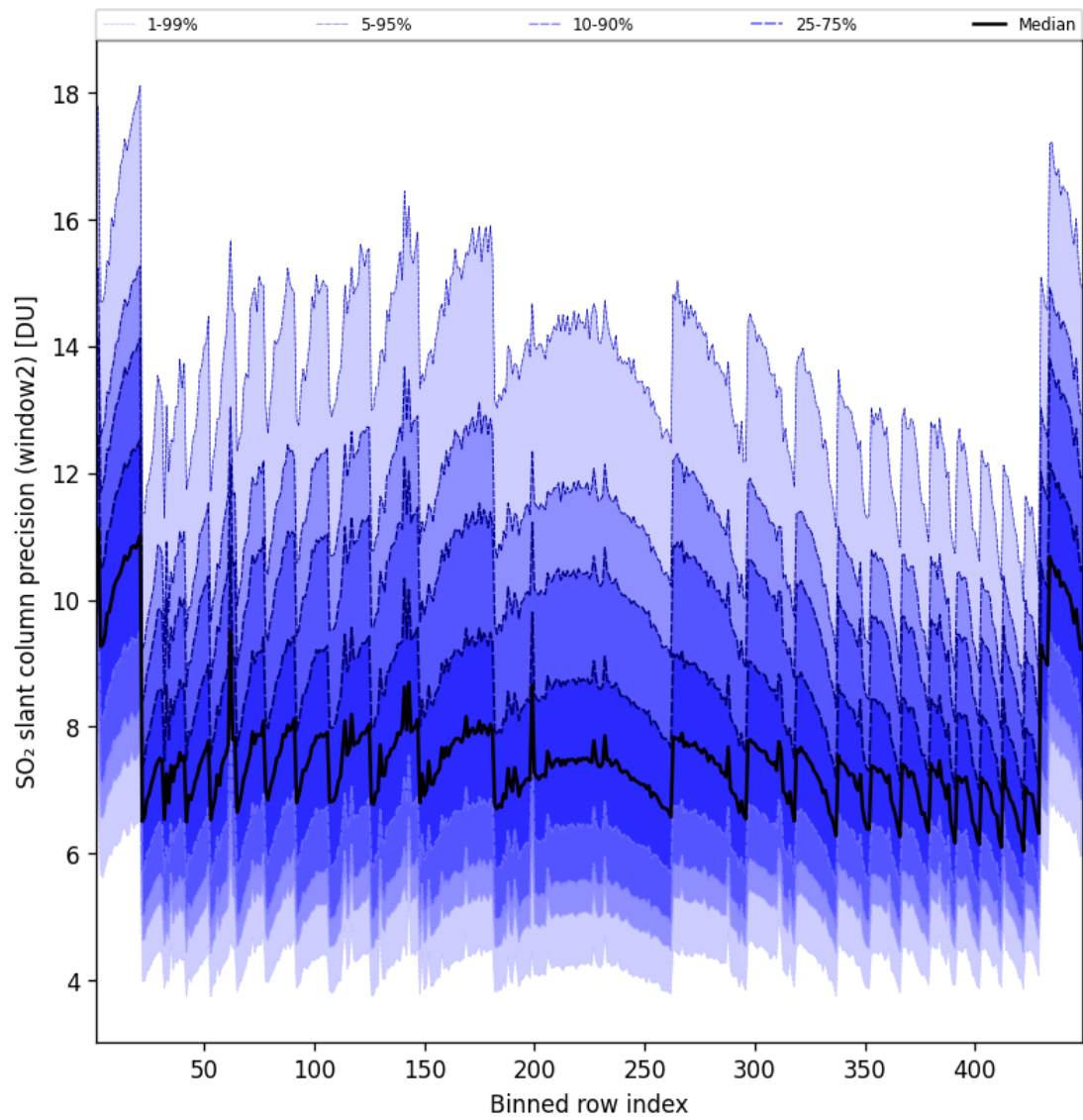


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-01-19 to 2025-01-20

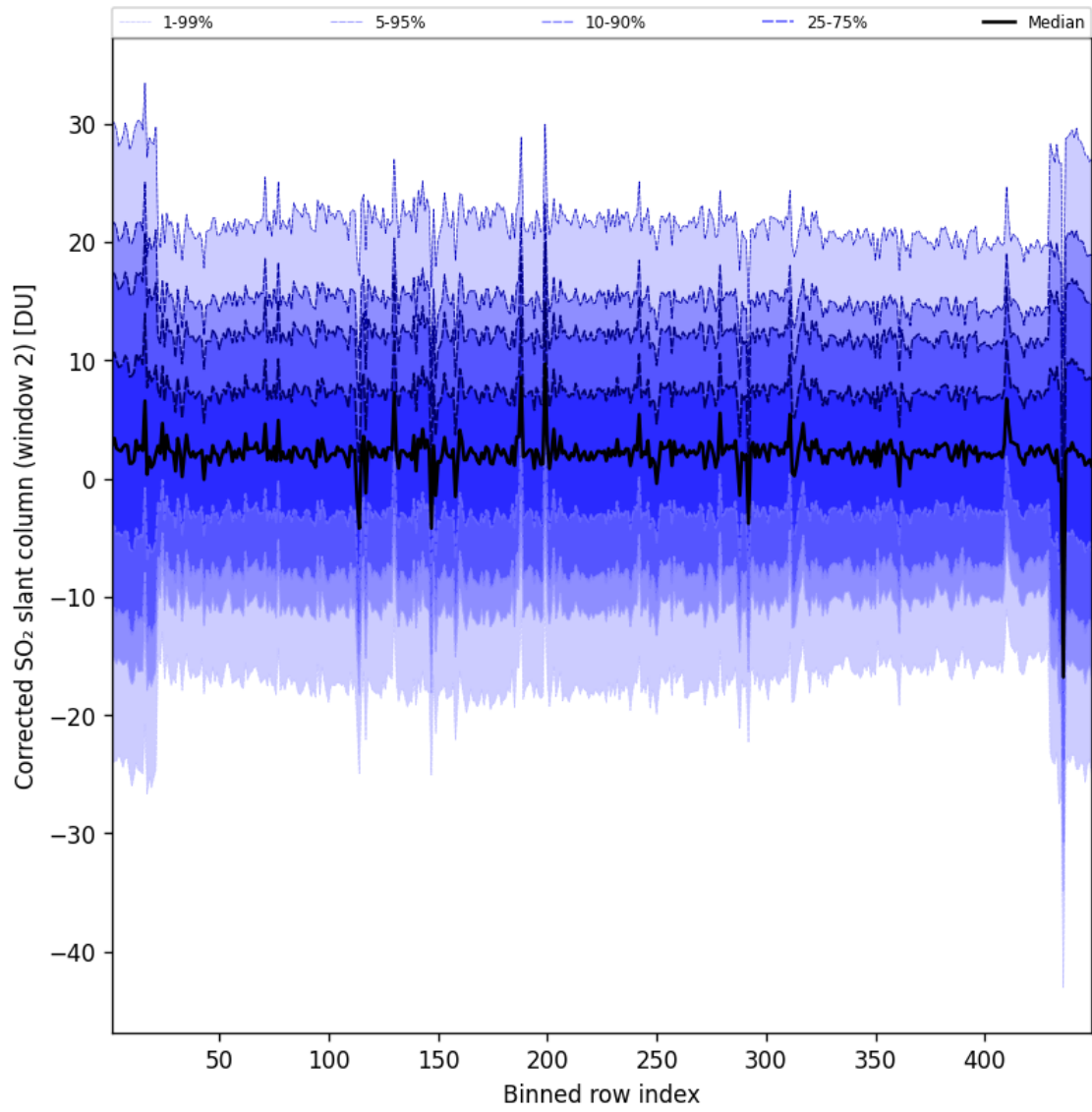


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-01-19 to 2025-01-20

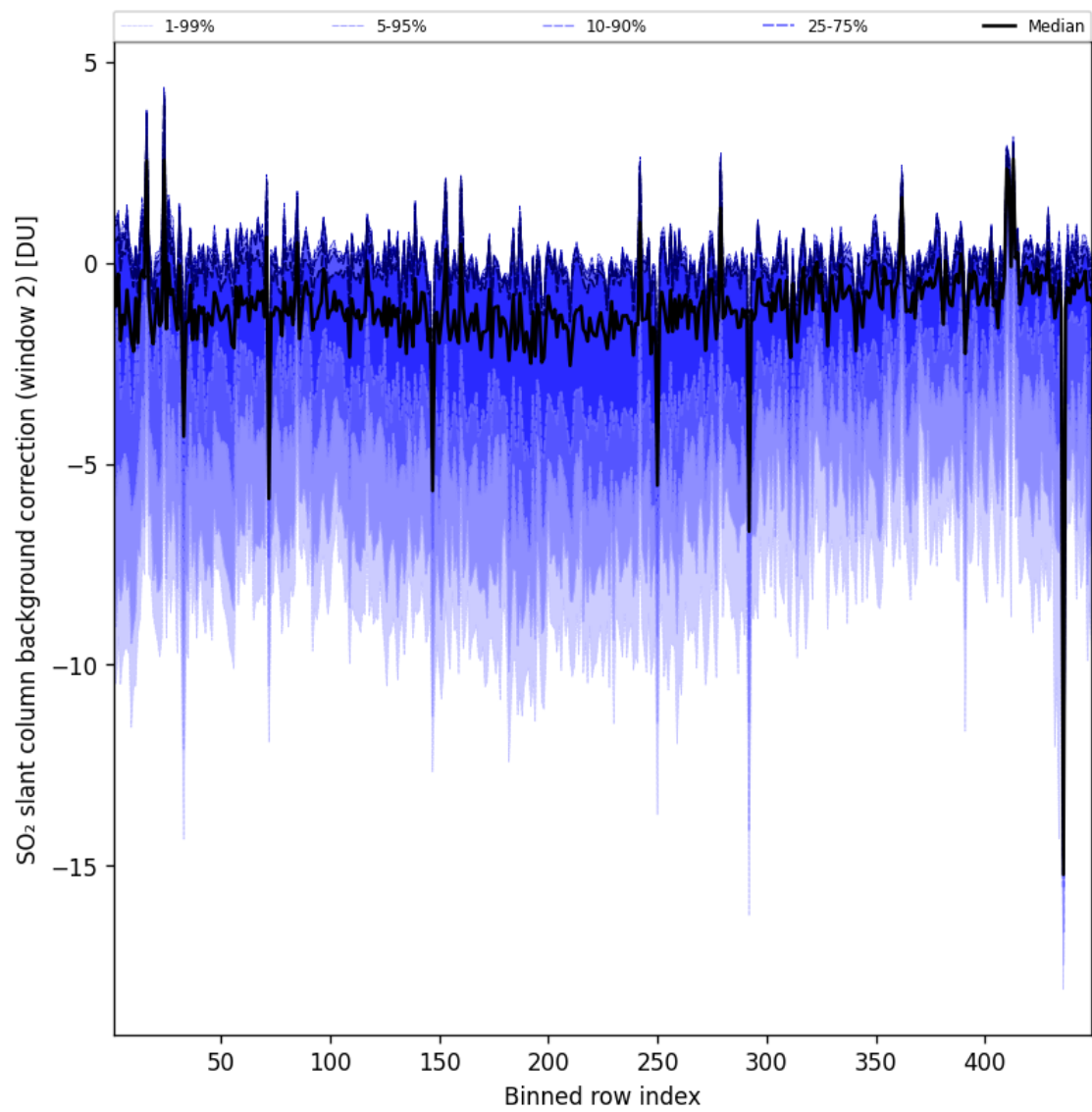


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-01-19 to 2025-01-20

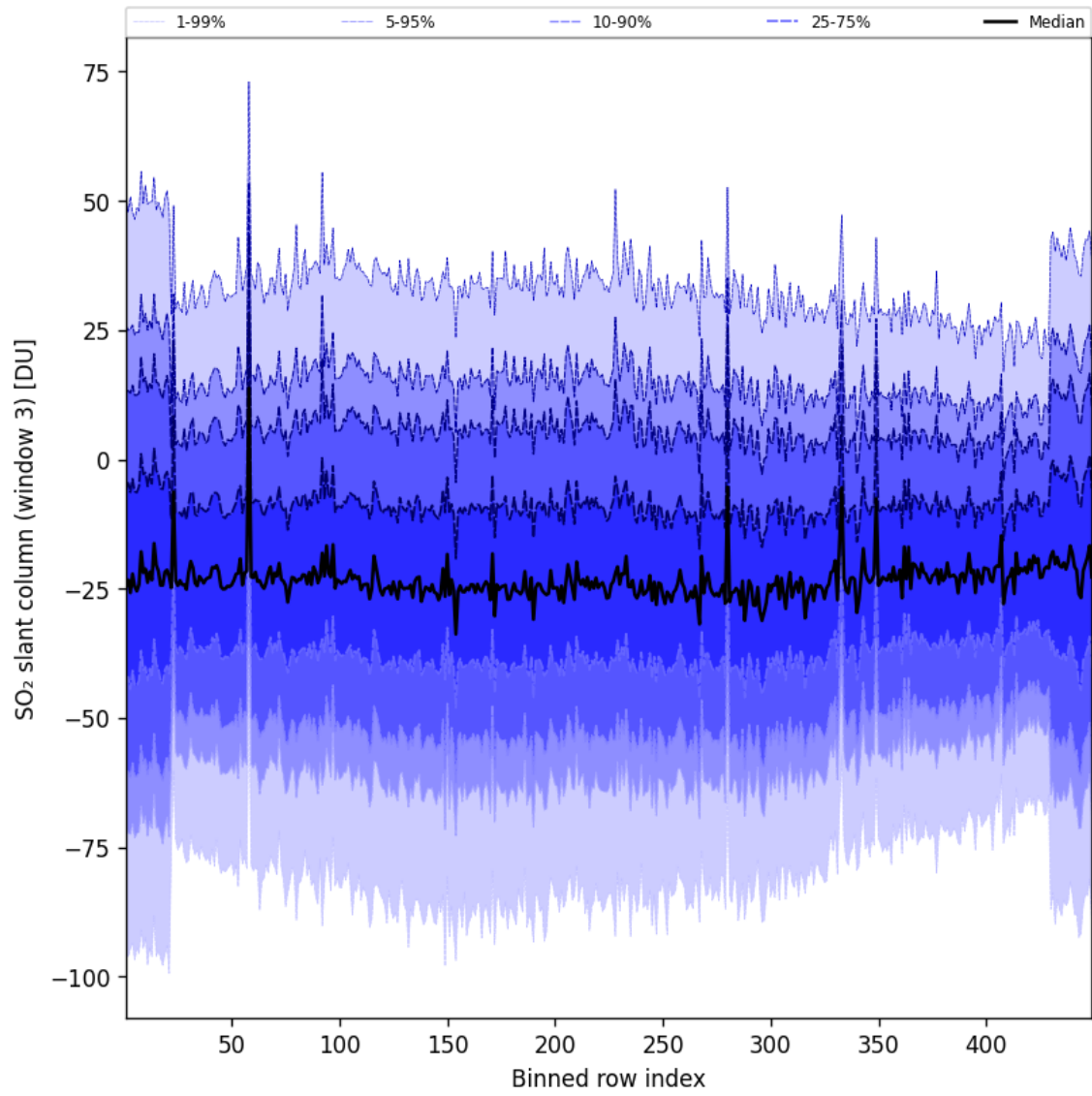


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-01-19 to 2025-01-20

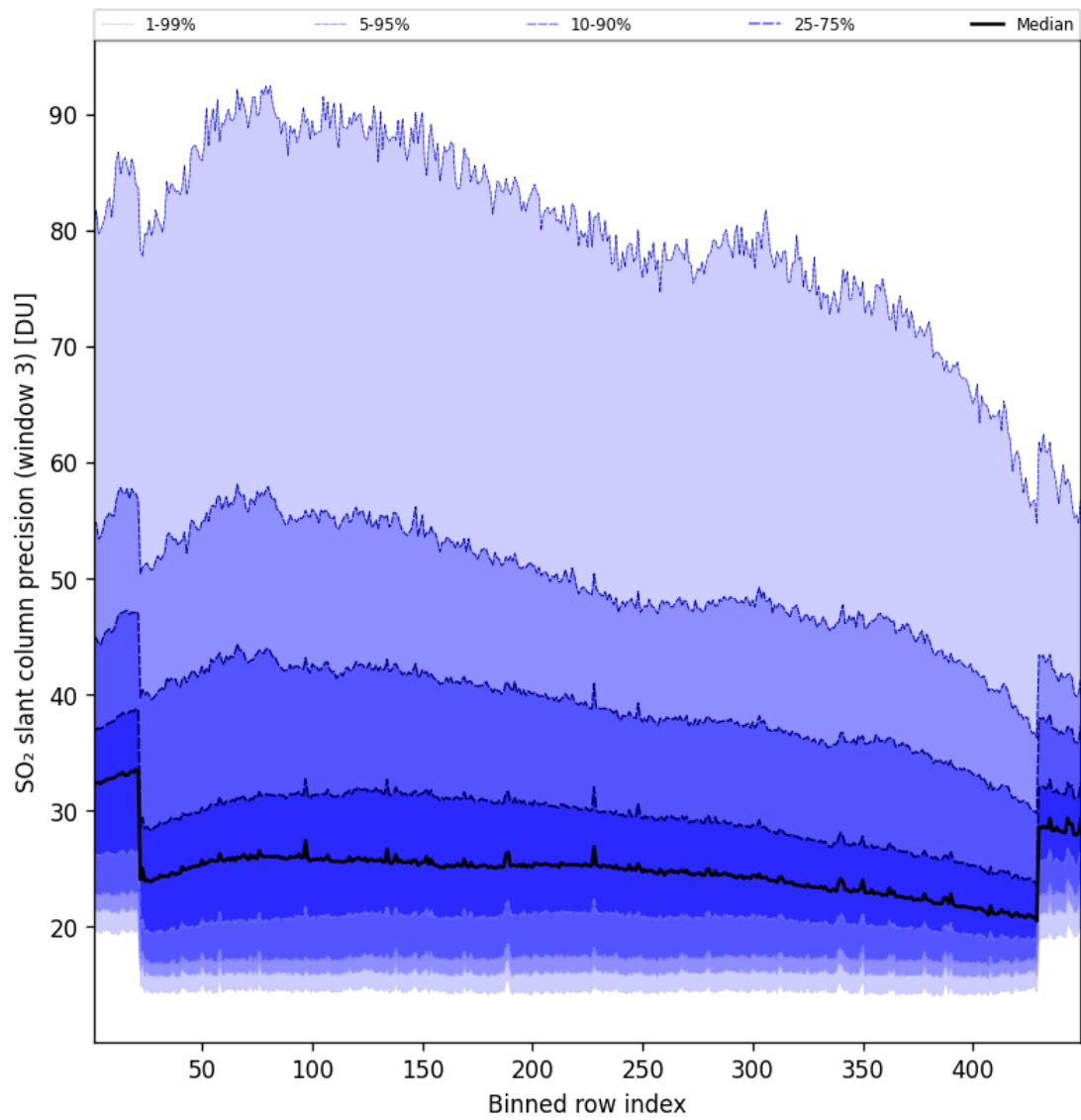


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-01-19 to 2025-01-20

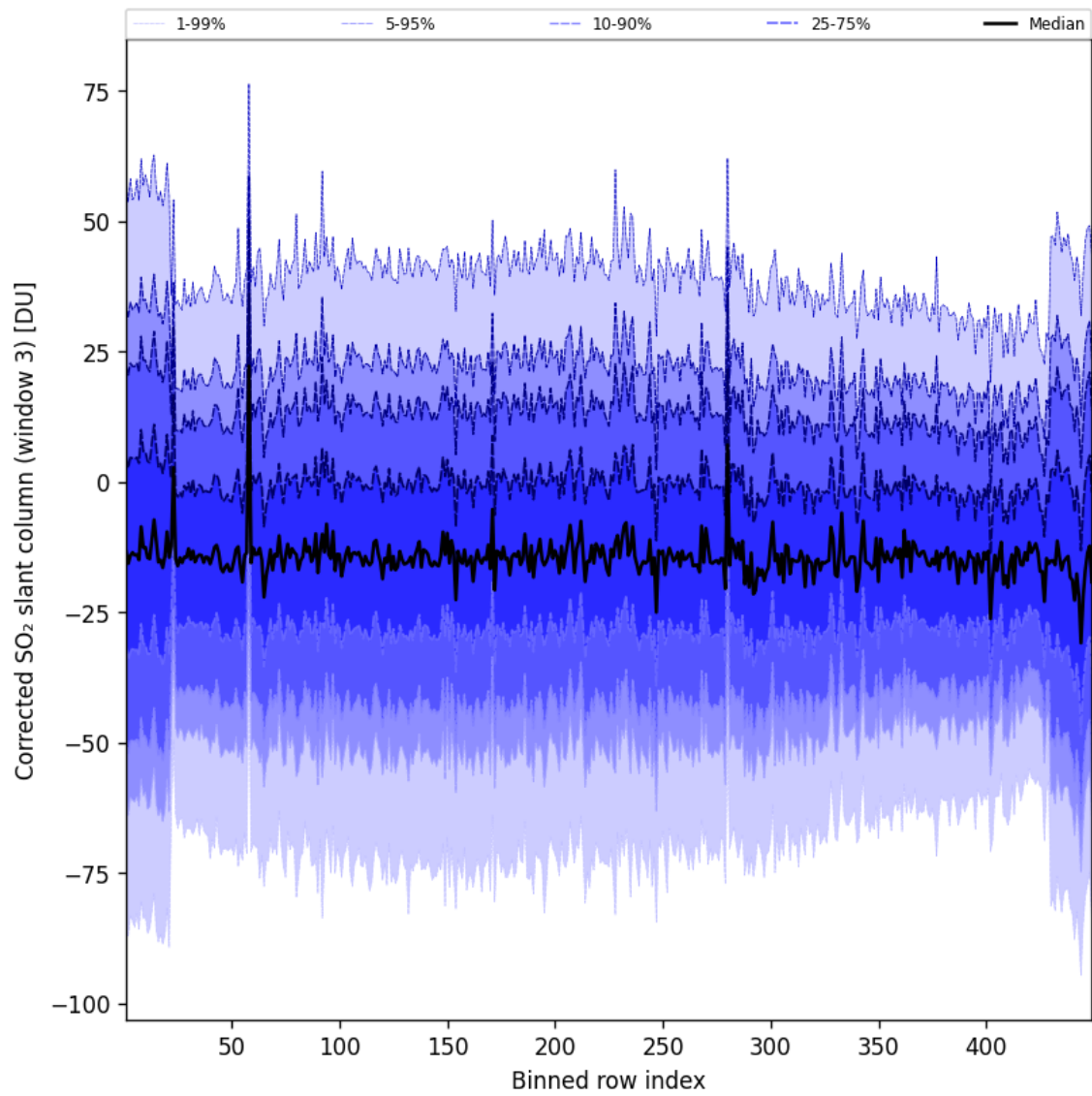


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-01-19 to 2025-01-20

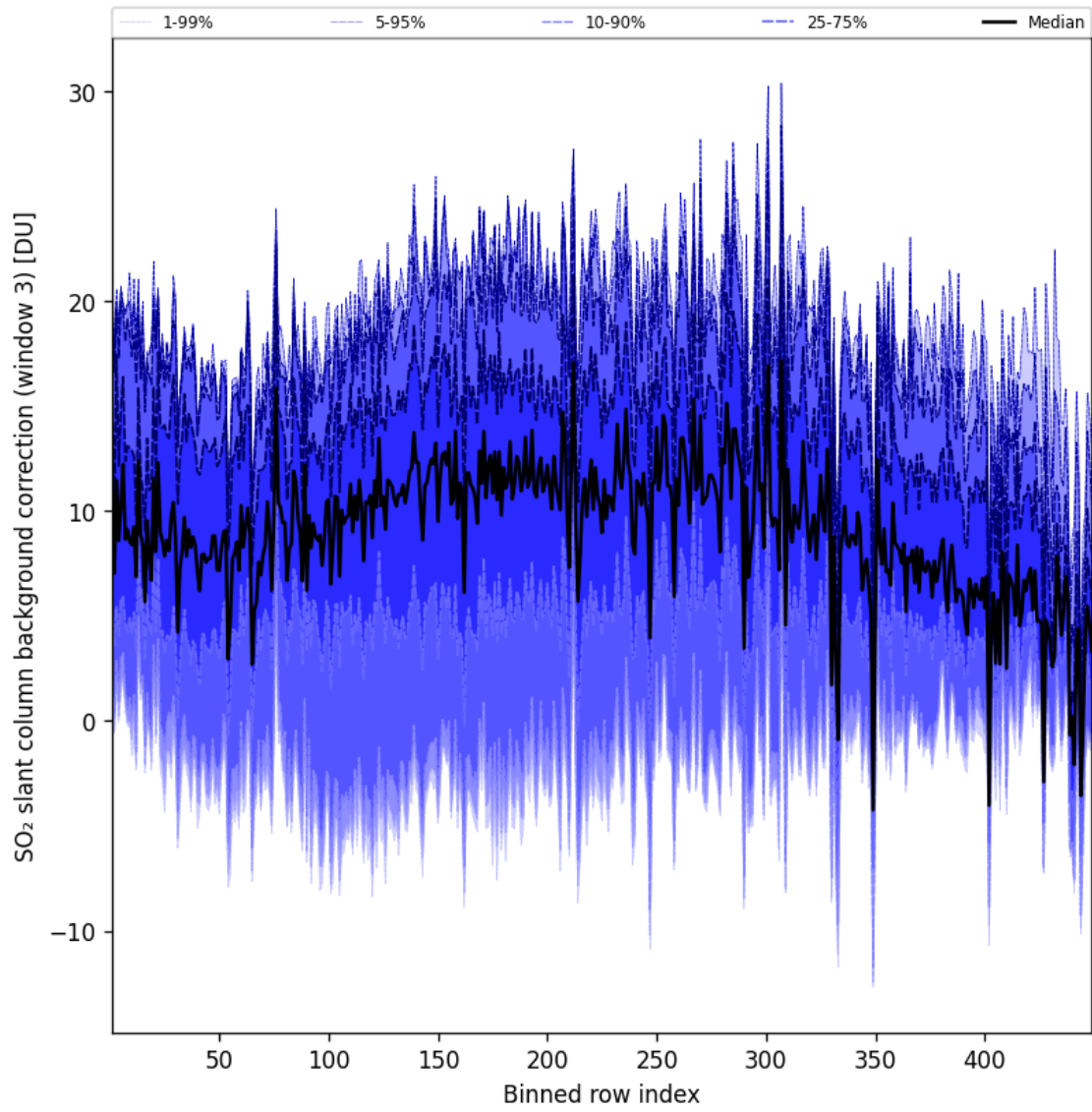


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-01-19 to 2025-01-20

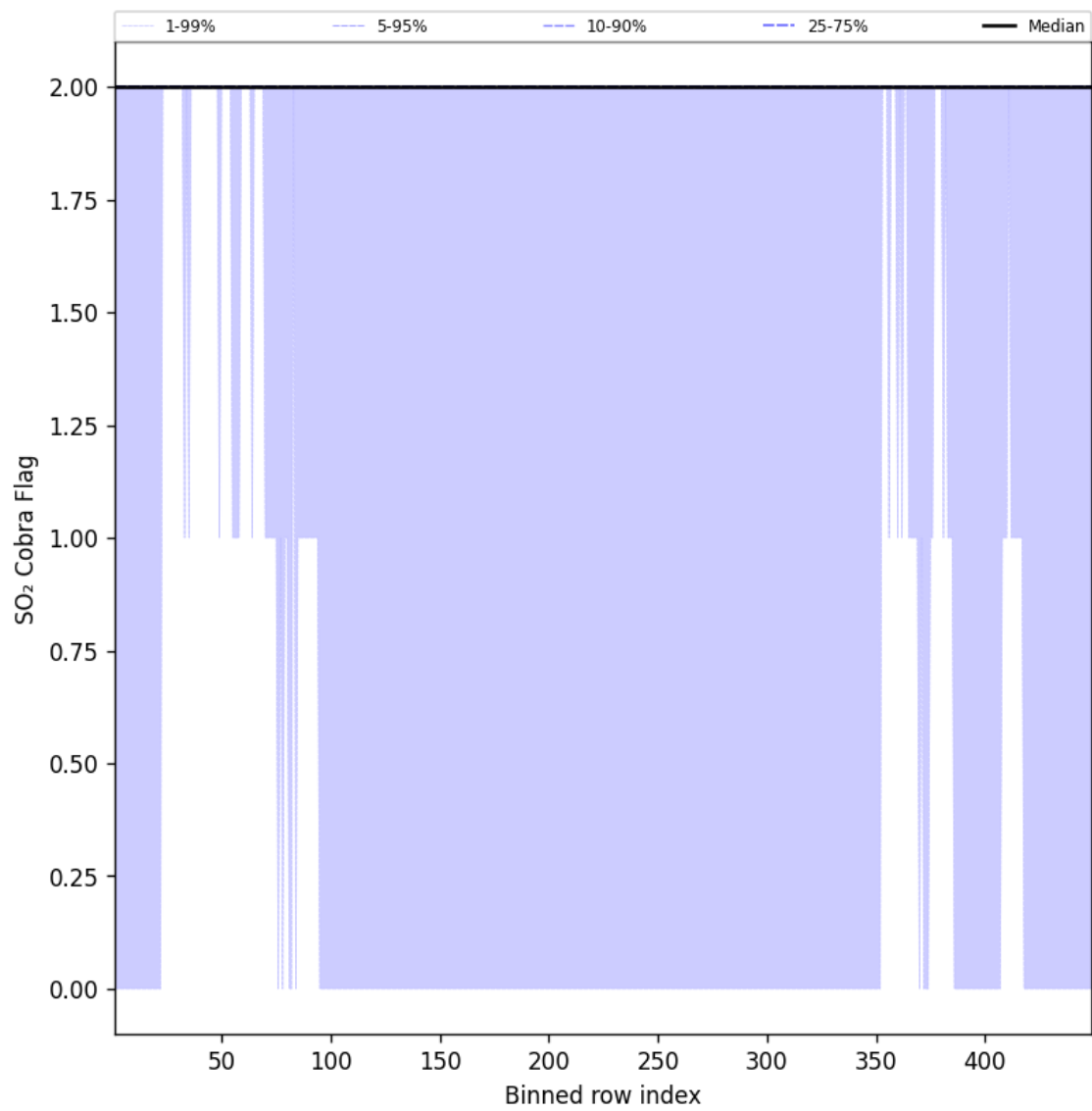


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-01-19 to 2025-01-20

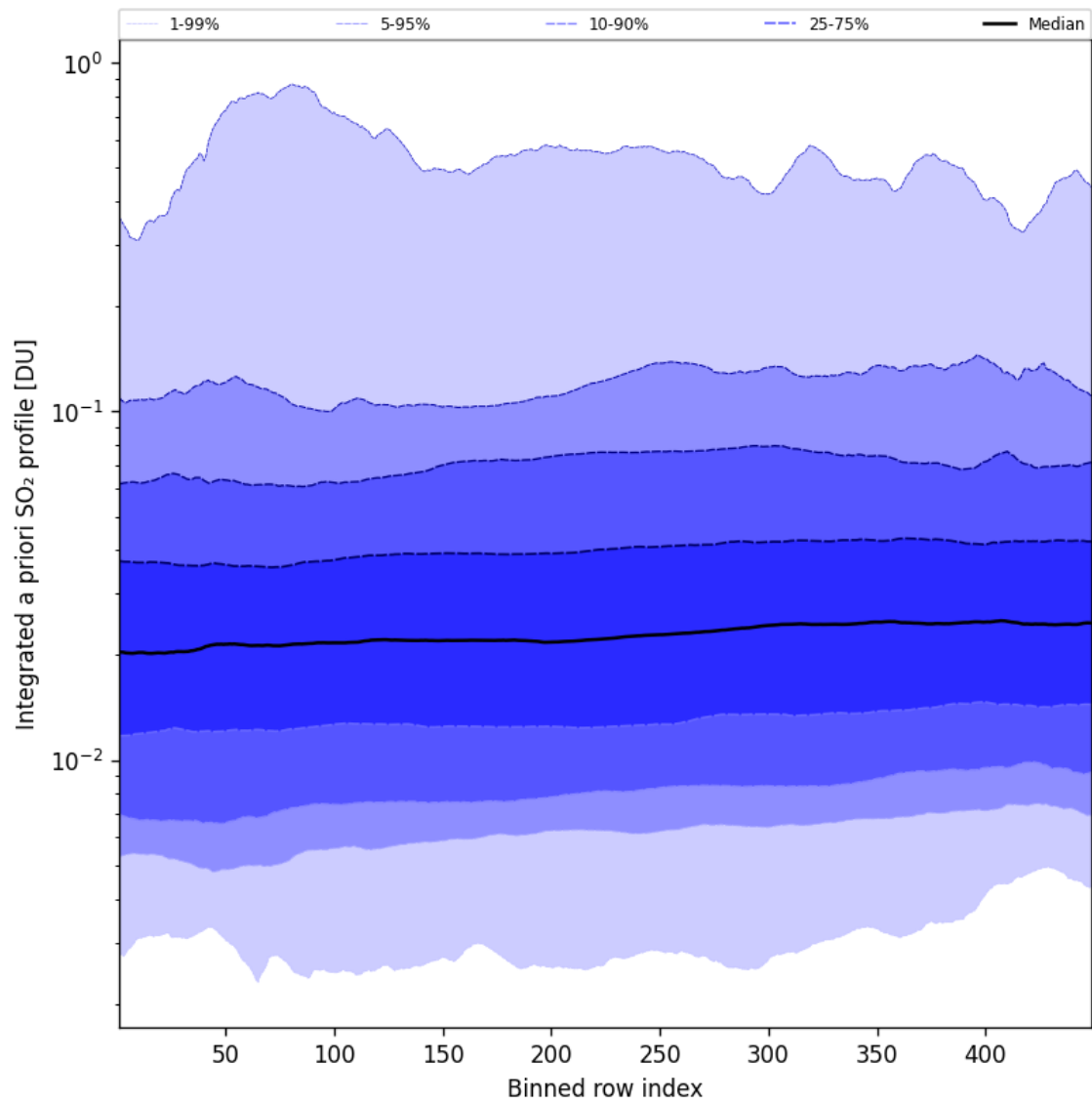


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-01-19 to 2025-01-20

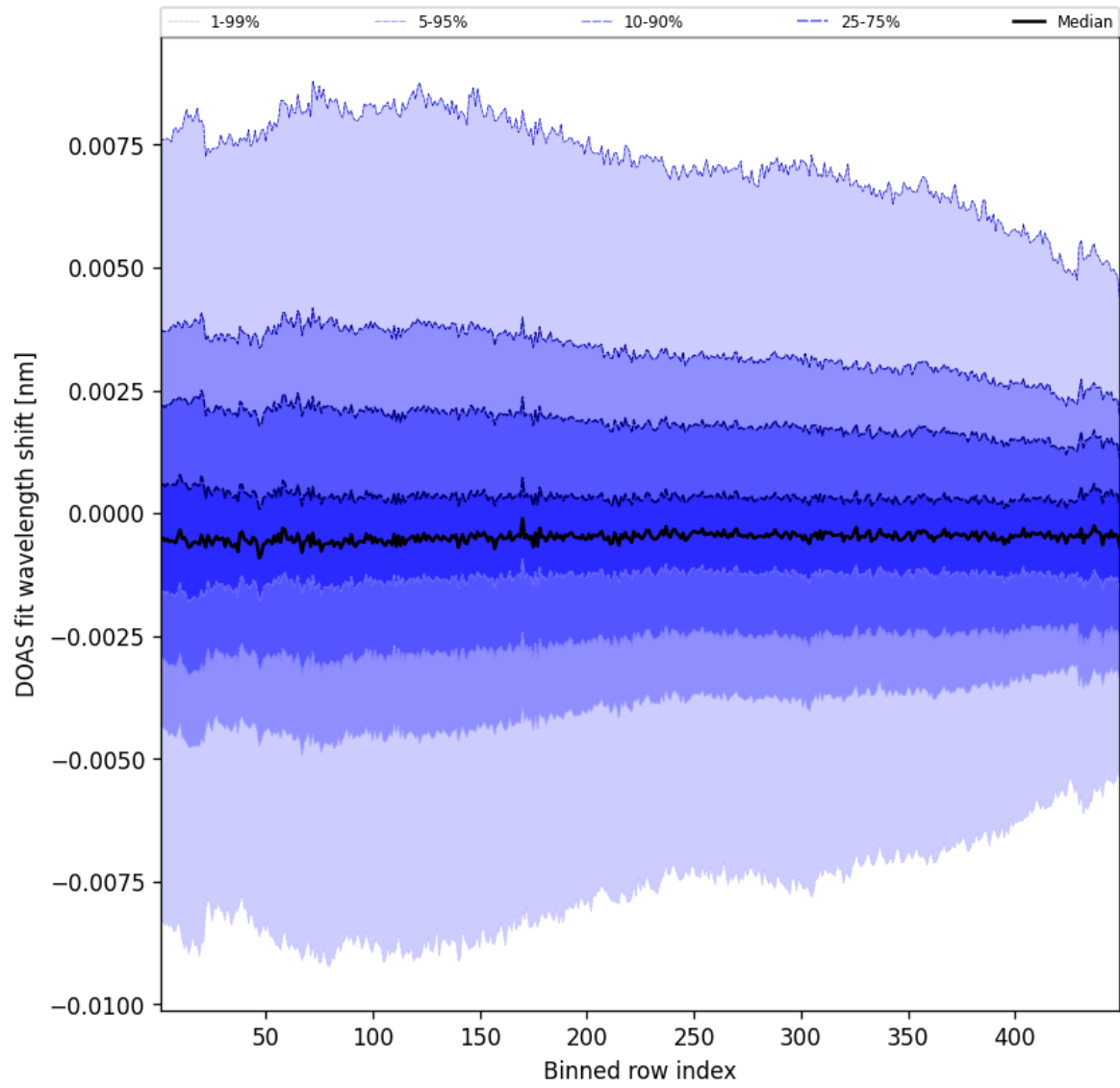


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-01-19 to 2025-01-20

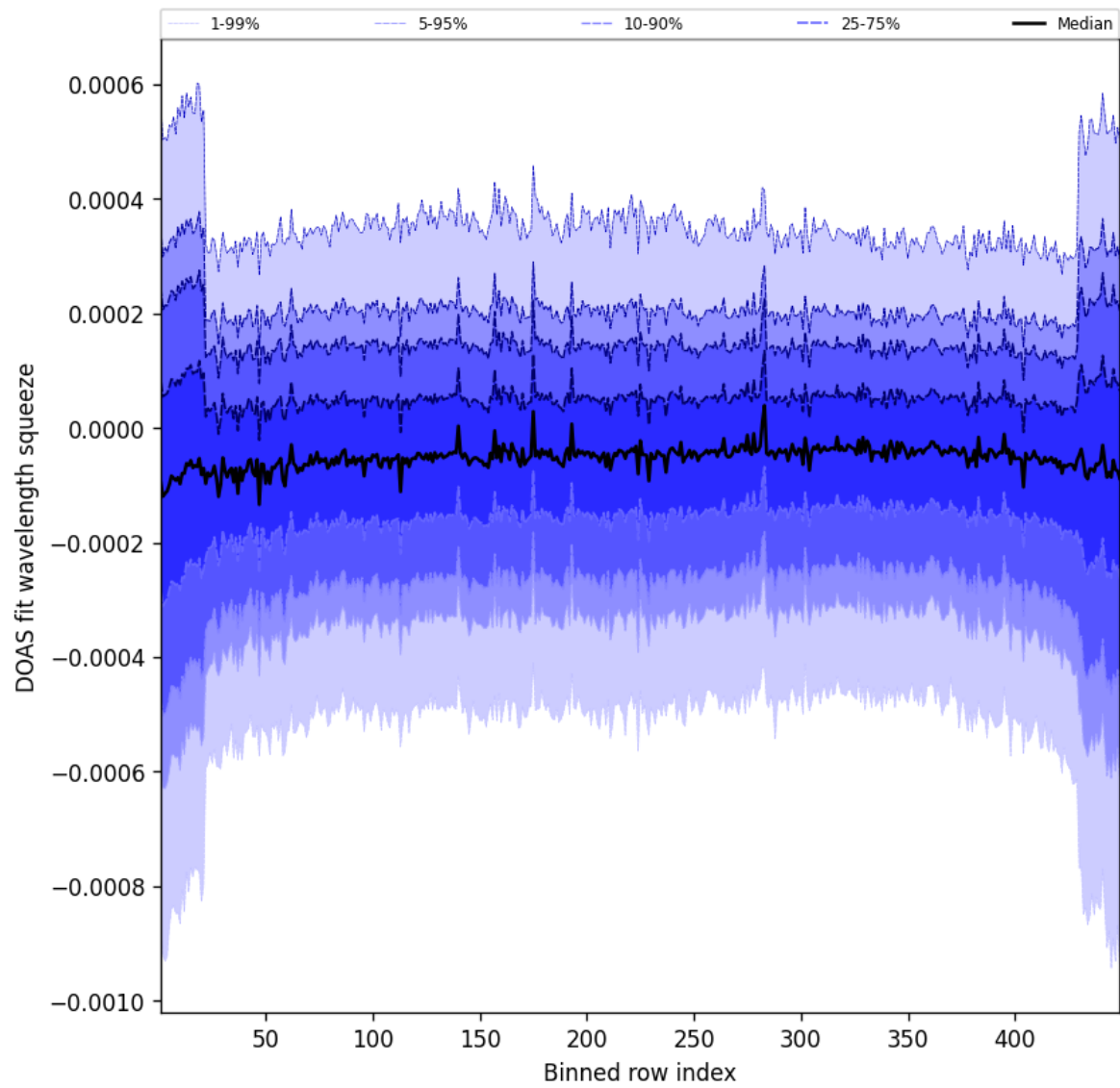


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-01-19 to 2025-01-20

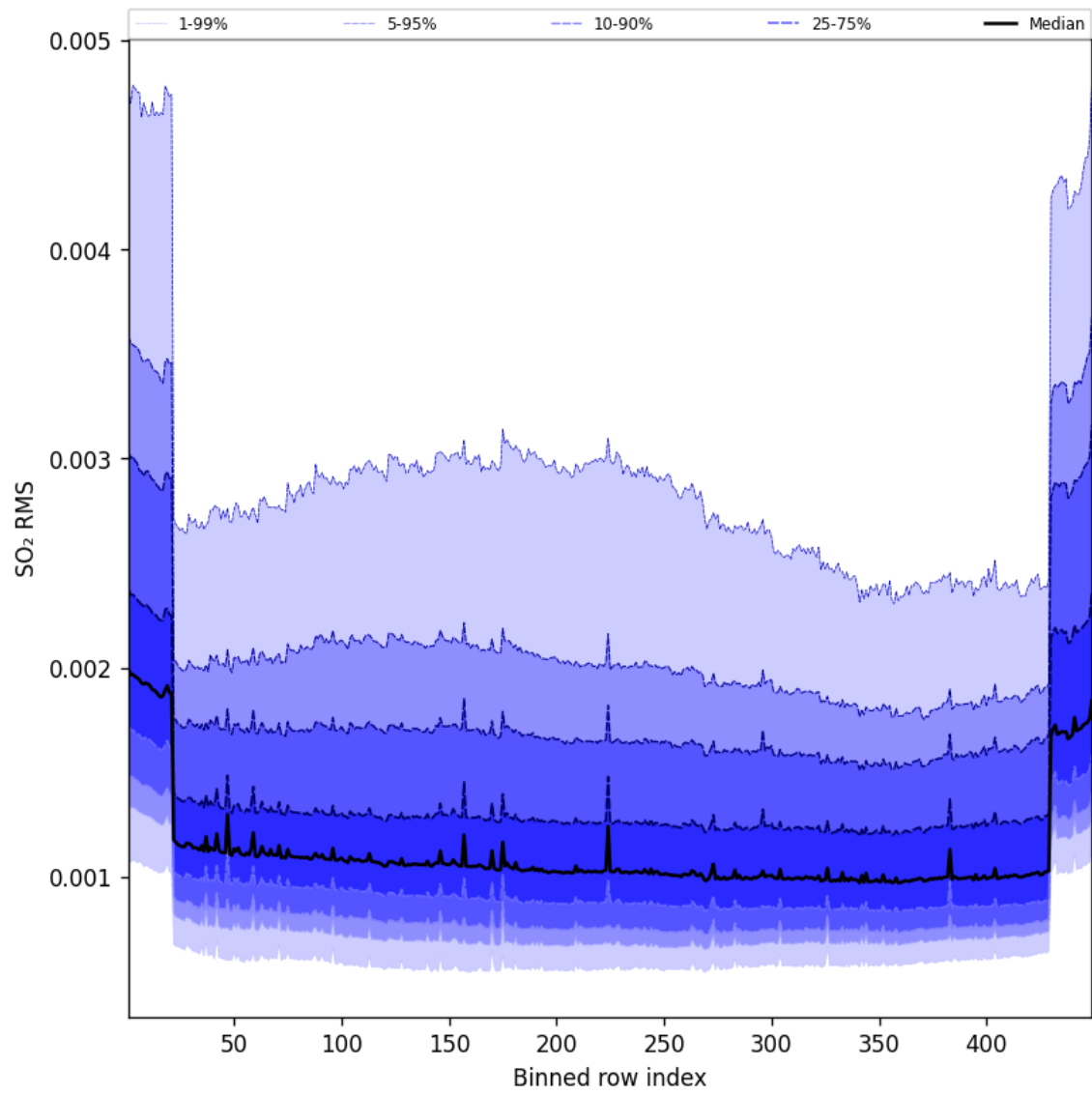


Figure 106: Along track statistics of “SO₂ RMS” for 2025-01-19 to 2025-01-20

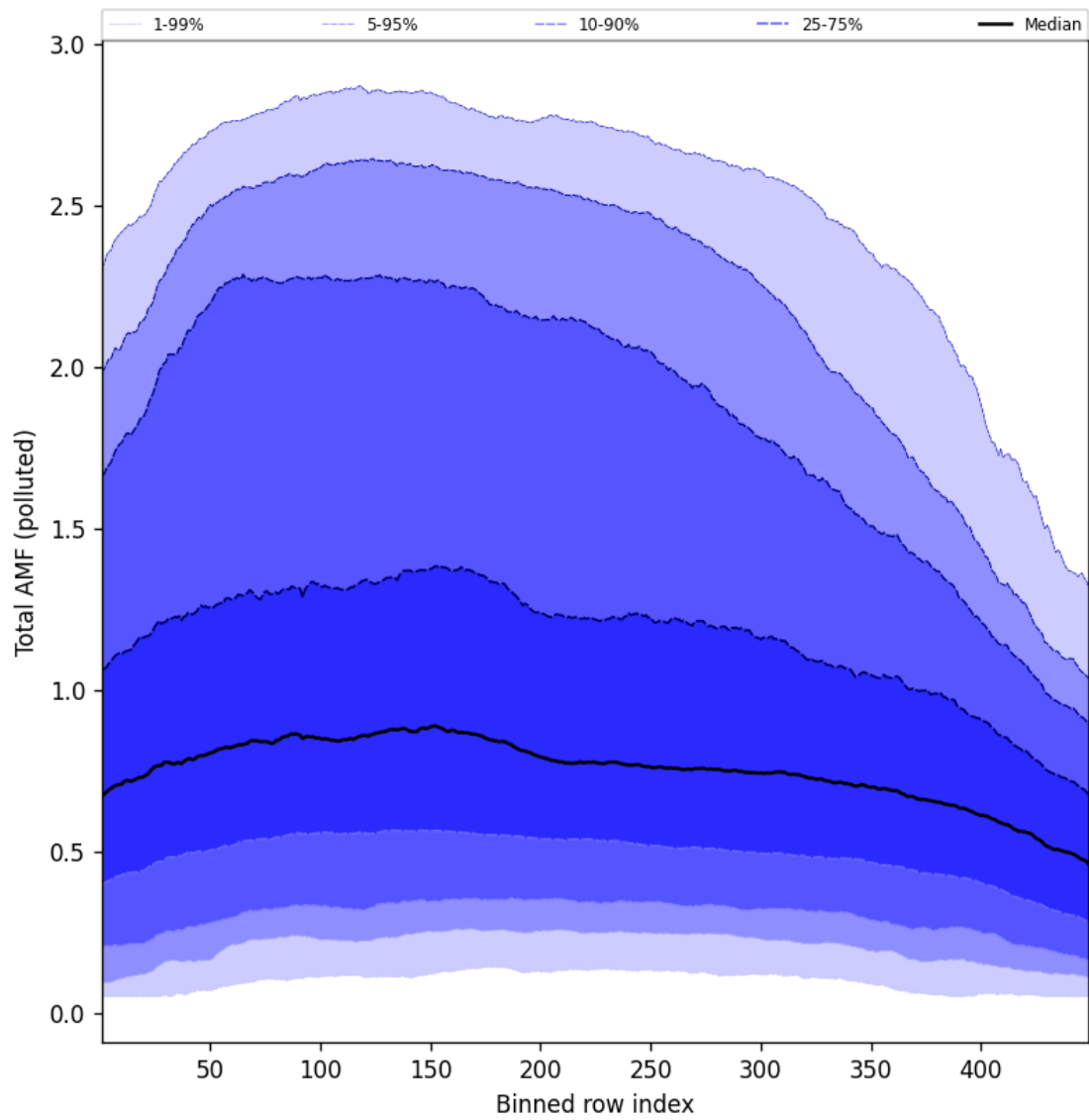


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-01-19 to 2025-01-20

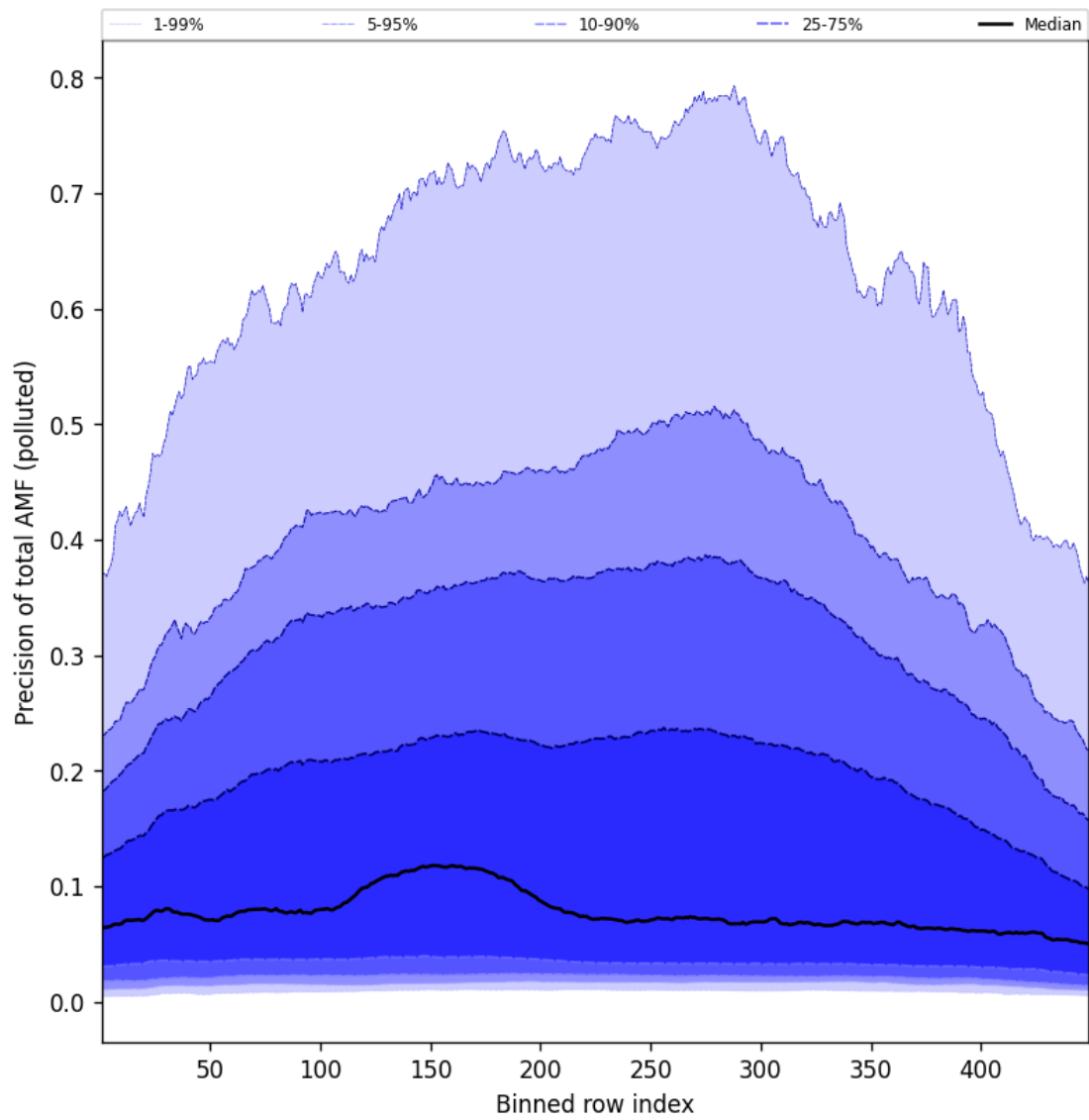


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-01-19 to 2025-01-20

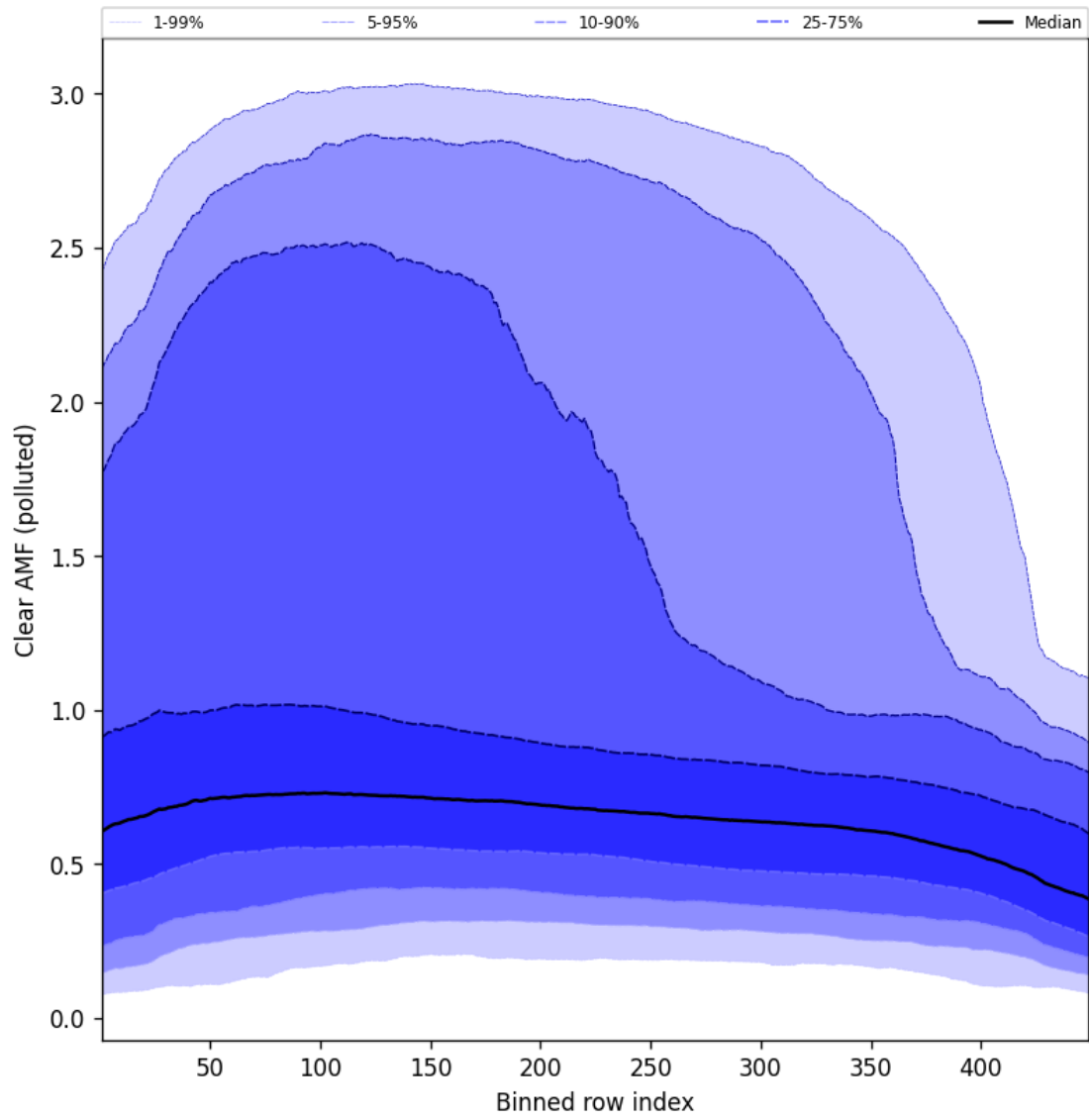


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-01-19 to 2025-01-20

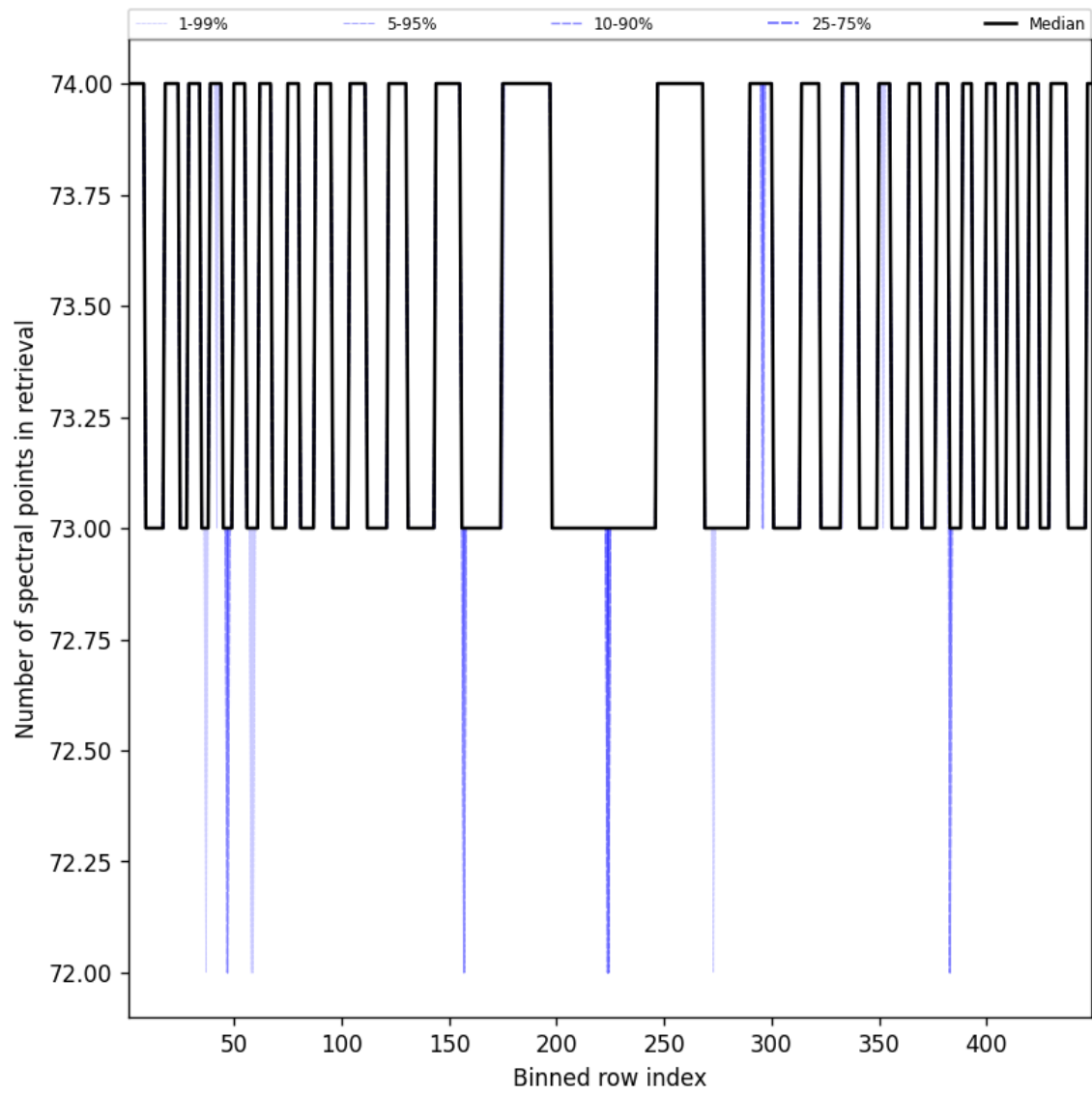


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-01-19 to 2025-01-20

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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