

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]	0.601 $\pm$ 0.420	18491618	0.995	0.830	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.279 \pm 151.214) \times 10^{-2}$	18491618	0.211	0.390	8.040×10^{-3}	-319	489
sulfurdioxide total vertical column precision [DU]	0.570 $\pm$ 1.116	18491618	0.122	0.327	0.288	3.478×10^{-2}	178
sulfurdioxide slant column density corrected [DU]	$(1.521 \pm 35.927) \times 10^{-2}$	18491618	0.235	0.335	7.745×10^{-3}	-30.9	496
sulfurdioxide slant column density cobra [DU]	$(1.509 \pm 33.375) \times 10^{-2}$	18491618	0.235	0.335	7.745×10^{-3}	-30.9	28.0
sulfurdioxide slant column density cobra precision [DU]	0.269 $\pm$ 0.126	18491618	0.213	0.105	0.230	7.920×10^{-2}	28.8
sulfurdioxide slant column density window1 [DU]	$(7.229 \pm 64.054) \times 10^{-2}$	18491618	0.125	0.705	8.095×10^{-2}	-86.1	59.2
sulfurdioxide slant column density window1 precision [DU]	0.269 $\pm$ 0.126	18491618	0.213	0.105	0.230	7.920×10^{-2}	28.8
sulfurdioxide slant column density corrected win1 [DU]	$(-1.017 \pm 619.213) \times 10^{-3}$	18491618	-2.500×10^{-2}	0.668	-1.577×10^{-2}	-86.1	59.1
background so2 slant column offset window1 [DU]	$(-7.331 \pm 18.627) \times 10^{-2}$	18491618	-0.180	0.233	-0.130	-1.11	4.80
sulfurdioxide slant column density window2 [DU]	$(-1.278 \pm 853.910) \times 10^{-2}$	18491618	-0.250	10.7	-0.129	-1.666×10^3	617
sulfurdioxide slant column density window2 precision [DU]	7.74 $\pm$ 2.17	18491618	6.97	2.43	7.37	2.24	555
sulfurdioxide slant column density corrected win2 [DU]	-0.962 $\pm$ 8.321	18491618	-0.750	10.5	-0.932	-1.665×10^3	618
background so2 slant column offset window2 [DU]	-0.950 $\pm$ 2.181	18491618	0.750	2.50	-0.267	-15.2	5.69
sulfurdioxide slant column density window3 [DU]	0.702 $\pm$ 22.994	18491618	-0.560	28.5	0.415	-2.552×10^3	2.103×10^3
sulfurdioxide slant column density window3 precision [DU]	27.0 $\pm$ 12.6	18491618	21.5	9.25	23.7	10.3	939
sulfurdioxide slant column density corrected win3 [DU]	7.14 $\pm$ 22.13	18491618	6.16	27.4	7.08	-2.555×10^3	2.100×10^3
background so2 slant column offset window3 [DU]	6.44 $\pm$ 6.31	18491618	6.16	9.48	6.49	-27.9	32.1
sulfurdioxide slant column cobra flag [1]	1.98 $\pm$ 0.21	18491618	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.033 \pm 10.877) \times 10^{-2}$	18491618	1.946×10^{-2}	2.473×10^{-2}	2.155×10^{-2}	5.018×10^{-4}	4.66
fitted radiance shift [nm]	$(-3.092 \pm 24.346) \times 10^{-4}$	18491618	-5.000×10^{-4}	1.621×10^{-3}	-3.485×10^{-4}	-4.723×10^{-2}	5.109×10^{-2}
fitted radiance squeeze [1]	$(-6.232 \pm 18.486) \times 10^{-5}$	18491618	-3.000×10^{-5}	2.171×10^{-4}	-5.108×10^{-5}	-1.372×10^{-2}	1.939×10^{-2}
fitted root mean square [1]	$(1.201 \pm 0.512) \times 10^{-3}$	18491618	9.250×10^{-4}	4.521×10^{-4}	1.057×10^{-3}	3.179×10^{-4}	7.717×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.950 $\pm$ 0.619	18491618	0.620	0.681	0.793	5.000×10^{-2}	3.08
sulfurdioxide total air mass factor polluted precision [1]	0.156 $\pm$ 0.169	18491618	3.500×10^{-2}	0.186	8.932×10^{-2}	2.500×10^{-3}	1.74
sulfurdioxide clear air mass factor polluted [1]	0.821 $\pm$ 0.598	18491618	0.540	0.406	0.648	2.650×10^{-2}	3.12
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	18491618	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	3.000×10^{-2}	7.000×10^{-2}	0.170	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-3.06	-0.872	-0.497	-0.323	-0.184	0.206	0.356	0.550	0.986	3.71
sulfurdioxide total vertical column precision [DU]	7.993×10^{-2}	0.100	0.119	0.143	0.181	0.508	0.716	1.06	1.86	5.60
sulfurdioxide slant column density corrected [DU]	-0.789	-0.448	-0.326	-0.244	-0.158	0.176	0.266	0.354	0.491	0.921
sulfurdioxide slant column density cobra [DU]	-0.789	-0.448	-0.326	-0.244	-0.158	0.176	0.266	0.354	0.491	0.921
sulfurdioxide slant column density cobra precision [DU]	0.135	0.160	0.172	0.182	0.195	0.300	0.361	0.419	0.502	0.736
sulfurdioxide slant column density window1 [DU]	-1.63	-0.917	-0.649	-0.468	-0.277	0.427	0.606	0.775	1.03	1.76
sulfurdioxide slant column density window1 precision [DU]	0.135	0.160	0.172	0.182	0.195	0.300	0.361	0.419	0.502	0.736
sulfurdioxide slant column density corrected win1 [DU]	-1.54	-0.908	-0.675	-0.516	-0.346	0.321	0.502	0.678	0.951	1.76
background so2 slant column offset window1 [DU]	-0.406	-0.296	-0.256	-0.223	-0.197	3.673×10^{-2}	0.138	0.212	0.282	0.405
sulfurdioxide slant column density window2 [DU]	-20.2	-13.6	-10.4	-8.08	-5.45	5.26	8.00	10.5	13.9	21.7
sulfurdioxide slant column density window2 precision [DU]	4.20	4.98	5.45	5.84	6.31	8.73	9.59	10.5	11.8	14.6
sulfurdioxide slant column density corrected win2 [DU]	-21.4	-14.5	-11.2	-8.83	-6.19	4.29	6.90	9.24	12.4	19.2
background so2 slant column offset window2 [DU]	-7.98	-5.54	-4.02	-2.99	-1.94	0.566	0.811	1.02	1.31	2.32
sulfurdioxide slant column density window3 [DU]	-56.8	-36.3	-27.2	-20.7	-13.6	15.0	22.6	29.5	38.9	57.2
sulfurdioxide slant column density window3 precision [DU]	14.4	16.2	17.5	18.6	20.0	29.3	33.8	39.1	50.1	81.6
sulfurdioxide slant column density corrected win3 [DU]	-48.7	-28.9	-19.8	-13.4	-6.51	20.9	28.0	34.5	43.3	61.4
background so2 slant column offset window3 [DU]	-6.56	-3.57	-2.06	-0.549	1.73	11.2	13.3	14.9	16.6	19.2
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]	2.126×10^{-3}	4.616×10^{-3}	7.608×10^{-3}	9.923×10^{-3}	1.291×10^{-2}	3.763×10^{-2}	4.878×10^{-2}	6.231×10^{-2}	9.971×10^{-2}	0.428
fitted radiance shift [nm]	-7.702×10^{-3}	-3.816×10^{-3}	-2.481×10^{-3}	-1.747×10^{-3}	-1.158×10^{-3}	4.626×10^{-4}	1.124×10^{-3}	1.960×10^{-3}	3.411×10^{-3}	7.446×10^{-3}
fitted radiance squeeze [1]	-5.752×10^{-4}	-3.725×10^{-4}	-2.873×10^{-4}	-2.279×10^{-4}	-1.652×10^{-4}	5.191×10^{-5}	1.022×10^{-4}	1.477×10^{-4}	2.114×10^{-4}	3.612×10^{-4}
fitted root mean square [1]	5.721×10^{-4}	7.004×10^{-4}	7.736×10^{-4}	8.282×10^{-4}	8.929×10^{-4}	1.345×10^{-3}	1.573×10^{-3}	1.808×10^{-3}	2.178×10^{-3}	3.168×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.778×10^{-2}	0.206	0.314	0.410	0.520	1.20	1.55	1.94	2.36	2.69
sulfurdioxide total air mass factor polluted precision [1]	8.244×10^{-3}	1.639×10^{-2}	2.335×10^{-2}	2.871×10^{-2}	3.704×10^{-2}	0.223	0.305	0.383	0.484	0.775
sulfurdioxide clear air mass factor polluted [1]	0.144	0.265	0.353	0.420	0.490	0.896	1.04	1.50	2.50	2.86
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 ± 0.398	6516617	0.720	1.000	0.0	1.000	0.280	1.000
sulfurdioxide total vertical column [DU]	$(9.613 \pm 240.045) \times 10^{-2}$	6516617	0.614	1.490×10^{-2}	-106	489	-0.283	0.331
sulfurdioxide total vertical column precision [DU]	0.986 ± 1.697	6516617	0.682	0.441	4.822×10^{-2}	44.3	0.260	0.942
sulfurdioxide slant column density corrected [DU]	$(2.492 \pm 42.665) \times 10^{-2}$	6516617	0.395	1.107×10^{-2}	-11.9	43.6	-0.184	0.211
sulfurdioxide slant column density cobra [DU]	$(2.477 \pm 42.052) \times 10^{-2}$	6516617	0.395	1.107×10^{-2}	-11.9	11.4	-0.184	0.211
sulfurdioxide slant column density cobra precision [DU]	0.325 ± 0.161	6516617	0.167	0.276	8.496×10^{-2}	22.2	0.219	0.386
sulfurdioxide slant column density window1 [DU]	0.142 ± 0.760	6516617	0.792	0.150	-30.6	10.5	-0.248	0.544
sulfurdioxide slant column density window1 precision [DU]	0.325 ± 0.161	6516617	0.167	0.276	8.496×10^{-2}	22.2	0.219	0.386
sulfurdioxide slant column density corrected win1 [DU]	$(2.567 \pm 75.817) \times 10^{-2}$	6516617	0.784	-2.107×10^{-3}	-30.6	11.8	-0.385	0.398
background so2 slant column offset window1 [DU]	-0.117 ± 0.169	6516617	0.137	-0.139	-0.779	4.80	-0.206	-6.940×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.659 ± 9.742	6516617	12.3	0.344	-1.666×10^3	227	-5.66	6.63
sulfurdioxide slant column density window2 precision [DU]	8.68 ± 2.30	6516617	2.80	8.34	2.24	333	7.10	9.90
sulfurdioxide slant column density corrected win2 [DU]	-0.965 ± 9.379	6516617	11.9	-0.952	-1.665×10^3	227	-6.90	4.98
background so2 slant column offset window2 [DU]	-1.62 ± 2.78	6516617	3.84	-0.465	-15.2	5.46	-3.40	0.441
sulfurdioxide slant column density window3 [DU]	-1.90 ± 25.51	6516617	32.2	-1.37	-326	156	-17.7	14.5
sulfurdioxide slant column density window3 precision [DU]	30.0 ± 12.6	6516617	9.68	26.9	10.4	311	23.1	32.8
sulfurdioxide slant column density corrected win3 [DU]	6.88 ± 25.03	6516617	31.7	7.19	-312	167	-8.73	22.9
background so2 slant column offset window3 [DU]	8.78 ± 5.38	6516617	8.29	8.01	-21.1	32.1	4.65	12.9
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.28	6516617	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.604 \pm 17.677) \times 10^{-2}$	6516617	3.563×10^{-2}	2.270×10^{-2}	6.516×10^{-4}	4.66	1.409×10^{-2}	4.972×10^{-2}
fitted radiance shift [nm]	$(-1.517 \pm 24.643) \times 10^{-4}$	6516617	1.619×10^{-3}	-1.568×10^{-4}	-4.723×10^{-2}	4.441×10^{-2}	-9.764×10^{-4}	6.427×10^{-4}
fitted radiance squeeze [1]	$(-1.626 \pm 19.734) \times 10^{-5}$	6516617	2.158×10^{-4}	-7.949×10^{-6}	-3.453×10^{-3}	1.802×10^{-3}	-1.176×10^{-4}	9.814×10^{-5}
fitted root mean square [1]	$(1.407 \pm 0.654) \times 10^{-3}$	6516617	6.685×10^{-4}	1.199×10^{-3}	3.586×10^{-4}	2.300×10^{-2}	9.822×10^{-4}	1.651×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.680 ± 0.387	6516617	0.537	0.640	5.000×10^{-2}	2.83	0.382	0.919
sulfurdioxide total air mass factor polluted precision [1]	$(9.930 \pm 14.446) \times 10^{-2}$	6516617	8.608×10^{-2}	4.767×10^{-2}	2.500×10^{-3}	1.74	2.702×10^{-2}	0.113
sulfurdioxide clear air mass factor polluted [1]	0.599 ± 0.273	6516617	0.423	0.588	2.650×10^{-2}	2.12	0.381	0.804
number of spectral points in retrieval [1]	73.5 ± 0.5	6516617	1.000	73.0	71.0	74.0	73.0	74.0

Table 4: Parameterlist and basic statistics for the analysis for observations in the southern hemisphere

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.548 ± 0.422	11975001	0.870	0.450	0.0	1.000	0.130	1.000
sulfurdioxide total vertical column [DU]	$(1.376 \pm 62.676) \times 10^{-2}$	11975001	0.315	5.973×10^{-3}	-319	315	-0.150	0.165
sulfurdioxide total vertical column precision [DU]	0.344 ± 0.461	11975001	0.234	0.239	3.478×10^{-2}	178	0.151	0.385
sulfurdioxide slant column density corrected [DU]	$(9.922 \pm 316.517) \times 10^{-3}$	11975001	0.308	6.319×10^{-3}	-30.9	496	-0.147	0.161
sulfurdioxide slant column density cobra [DU]	$(9.821 \pm 275.132) \times 10^{-3}$	11975001	0.308	6.319×10^{-3}	-30.9	28.0	-0.147	0.161
sulfurdioxide slant column density cobra precision [DU]	0.239 ± 0.088	11975001	7.253×10^{-2}	0.215	7.920×10^{-2}	28.8	0.188	0.260
sulfurdioxide slant column density window1 [DU]	$(3.415 \pm 56.110) \times 10^{-2}$	11975001	0.662	4.937×10^{-2}	-86.1	59.2	-0.290	0.371
sulfurdioxide slant column density window1 precision [DU]	0.239 ± 0.088	11975001	7.253×10^{-2}	0.215	7.920×10^{-2}	28.8	0.188	0.260
sulfurdioxide slant column density corrected win1 [DU]	$(-1.554 \pm 52.789) \times 10^{-2}$	11975001	0.616	-2.179×10^{-2}	-86.1	59.1	-0.329	0.288
background so2 slant column offset window1 [DU]	$(-4.969 \pm 19.080) \times 10^{-2}$	11975001	0.290	-0.119	-1.11	0.939	-0.194	9.642×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.378 ± 7.783	11975001	9.99	-0.339	-728	617	-5.35	4.64
sulfurdioxide slant column density window2 precision [DU]	7.22 ± 1.91	11975001	2.01	6.96	2.25	555	6.03	8.04
sulfurdioxide slant column density corrected win2 [DU]	-0.961 ± 7.684	11975001	9.82	-0.922	-725	618	-5.85	3.97
background so2 slant column offset window2 [DU]	-0.582 ± 1.660	11975001	2.20	-0.165	-10.5	5.69	-1.58	0.627
sulfurdioxide slant column density window3 [DU]	2.12 ± 21.37	11975001	26.9	1.22	-2.552×10^3	2.103×10^3	-11.7	15.2
sulfurdioxide slant column density window3 precision [DU]	25.4 ± 12.3	11975001	7.41	22.0	10.3	939	19.1	26.5
sulfurdioxide slant column density corrected win3 [DU]	7.28 ± 20.37	11975001	25.5	7.03	-2.555×10^3	2.100×10^3	-5.52	19.9
background so2 slant column offset window3 [DU]	5.16 ± 6.41	11975001	10.5	5.30	-27.9	24.9	-0.261	10.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.17	11975001	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.634 \pm 2.661) \times 10^{-2}$	11975001	2.273×10^{-2}	2.101×10^{-2}	5.018×10^{-4}	1.65	1.209×10^{-2}	3.482×10^{-2}
fitted radiance shift [nm]	$(-3.950 \pm 24.139) \times 10^{-4}$	11975001	1.577×10^{-3}	-4.526×10^{-4}	-4.277×10^{-2}	5.109×10^{-2}	-1.231×10^{-3}	3.459×10^{-4}
fitted radiance squeeze [1]	$(-8.739 \pm 17.261) \times 10^{-5}$	11975001	2.132×10^{-4}	-7.376×10^{-5}	-1.372×10^{-2}	1.939×10^{-2}	-1.874×10^{-4}	2.583×10^{-5}
fitted root mean square [1]	$(1.089 \pm 0.369) \times 10^{-3}$	11975001	3.547×10^{-4}	1.001×10^{-3}	3.179×10^{-4}	7.717×10^{-2}	8.613×10^{-4}	1.216×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.10 ± 0.67	11975001	0.880	0.892	5.000×10^{-2}	3.08	0.592	1.47
sulfurdioxide total air mass factor polluted precision [1]	0.187 ± 0.174	11975001	0.229	0.135	3.966×10^{-3}	1.57	4.657×10^{-2}	0.275
sulfurdioxide clear air mass factor polluted [1]	0.943 ± 0.686	11975001	0.442	0.680	9.696×10^{-2}	3.12	0.526	0.968
number of spectral points in retrieval [1]	73.4 ± 0.5	11975001	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]	0.645 ± 0.412	13309505	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(2.931 \pm 120.256) \times 10^{-2}$	13309505	0.406	8.154×10^{-3}	-102	489	-0.193	0.213
sulfurdioxide total vertical column precision [DU]	0.512 ± 0.896	13309505	0.290	0.295	4.721×10^{-2}	141	0.200	0.490
sulfurdioxide slant column density corrected [DU]	$(1.268 \pm 34.212) \times 10^{-2}$	13309505	0.320	6.978×10^{-3}	-12.2	496	-0.152	0.168
sulfurdioxide slant column density cobra [DU]	$(1.258 \pm 30.827) \times 10^{-2}$	13309505	0.320	6.978×10^{-3}	-12.2	28.0	-0.152	0.168
sulfurdioxide slant column density cobra precision [DU]	0.255 ± 0.117	13309505	8.842×10^{-2}	0.220	8.380×10^{-2}	22.2	0.190	0.279
sulfurdioxide slant column density window1 [DU]	0.102 ± 0.589	13309505	0.660	0.105	-85.3	35.2	-0.228	0.432
sulfurdioxide slant column density window1 precision [DU]	0.255 ± 0.117	13309505	8.842×10^{-2}	0.220	8.380×10^{-2}	22.2	0.190	0.279
sulfurdioxide slant column density corrected win1 [DU]	$(-2.982 \pm 576.811) \times 10^{-3}$	13309505	0.639	-1.532×10^{-2}	-85.3	35.2	-0.332	0.307
background so2 slant column offset window1 [DU]	-0.105 ± 0.156	13309505	0.179	-0.142	-1.11	2.63	-0.201	-2.141×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.360 ± 8.284	13309505	10.5	-0.454	-1.666×10^3	617	-5.65	4.80
sulfurdioxide slant column density window2 precision [DU]	7.56 ± 2.03	13309505	2.29	7.25	2.24	555	6.22	8.51
sulfurdioxide slant column density corrected win2 [DU]	-0.975 ± 8.129	13309505	10.3	-0.943	-1.665×10^3	618	-6.12	4.20
background so2 slant column offset window2 [DU]	-0.615 ± 1.941	13309505	1.99	-3.882×10^{-2}	-15.2	5.69	-1.36	0.625
sulfurdioxide slant column density window3 [DU]	3.55 ± 22.55	13309505	28.4	3.07	-548	477	-10.7	17.6
sulfurdioxide slant column density window3 precision [DU]	26.6 ± 12.0	13309505	8.68	23.4	10.3	394	20.0	28.7
sulfurdioxide slant column density corrected win3 [DU]	8.96 ± 21.64	13309505	27.3	8.59	-555	476	-4.80	22.5
background so2 slant column offset window3 [DU]	5.41 ± 5.80	13309505	8.32	5.56	-27.9	32.1	1.18	9.50
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.16	13309505	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.137 \pm 4.866) \times 10^{-2}$	13309505	2.174×10^{-2}	2.265×10^{-2}	9.287×10^{-4}	3.62	1.475×10^{-2}	3.649×10^{-2}
fitted radiance shift [nm]	$(-2.564 \pm 23.522) \times 10^{-4}$	13309505	1.685×10^{-3}	-2.647×10^{-4}	-4.723×10^{-2}	4.441×10^{-2}	-1.120×10^{-3}	5.648×10^{-4}
fitted radiance squeeze [1]	$(-4.756 \pm 16.824) \times 10^{-5}$	13309505	1.965×10^{-4}	-3.990×10^{-5}	-1.291×10^{-2}	1.939×10^{-2}	-1.411×10^{-4}	5.534×10^{-5}
fitted root mean square [1]	$(1.133 \pm 0.467) \times 10^{-3}$	13309505	3.663×10^{-4}	1.009×10^{-3}	3.379×10^{-4}	4.303×10^{-2}	8.677×10^{-4}	1.234×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.835 ± 0.436	13309505	0.530	0.766	5.000×10^{-2}	2.61	0.528	1.06
sulfurdioxide total air mass factor polluted precision [1]	0.136 ± 0.135	13309505	0.163	7.666×10^{-2}	2.500×10^{-3}	1.55	3.780×10^{-2}	0.201
sulfurdioxide clear air mass factor polluted [1]	0.664 ± 0.242	13309505	0.317	0.627	2.730×10^{-2}	2.69	0.496	0.814
number of spectral points in retrieval [1]	73.5 ± 0.5	13309505	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]	0.479 ± 0.418	4589115	0.920	0.340	0.0	1.000	8.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(6.496 \pm 181.857) \times 10^{-2}$	4589115	0.319	6.949×10^{-3}	-106	149	-0.148	0.171
sulfurdioxide total vertical column precision [DU]	0.638 ± 1.339	4589115	0.423	0.236	3.478×10^{-2}	53.3	0.119	0.542
sulfurdioxide slant column density corrected [DU]	$(2.003 \pm 39.397) \times 10^{-2}$	4589115	0.378	9.371×10^{-3}	-11.9	48.2	-0.178	0.200
sulfurdioxide slant column density cobra [DU]	$(1.988 \pm 38.527) \times 10^{-2}$	4589115	0.378	9.371×10^{-3}	-11.9	21.6	-0.178	0.200
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.137	4589115	0.128	0.261	7.920×10^{-2}	28.8	0.215	0.344
sulfurdioxide slant column density window1 [DU]	$(-1.976 \pm 74.549) \times 10^{-2}$	4589115	0.837	-1.258×10^{-2}	-86.1	59.2	-0.442	0.395
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.137	4589115	0.128	0.261	7.920×10^{-2}	28.8	0.215	0.344
sulfurdioxide slant column density corrected win1 [DU]	$(-1.520 \pm 708.126) \times 10^{-3}$	4589115	0.751	-2.064×10^{-2}	-86.1	59.1	-0.391	0.360
background so2 slant column offset window1 [DU]	$(1.824 \pm 23.074) \times 10^{-2}$	4589115	0.414	-5.036×10^{-2}	-1.10	2.96	-0.180	0.235
sulfurdioxide slant column density window2 [DU]	0.882 ± 9.006	4589115	11.2	0.811	-728	422	-4.78	6.43
sulfurdioxide slant column density window2 precision [DU]	8.13 ± 2.41	4589115	2.70	7.69	2.38	362	6.53	9.23
sulfurdioxide slant column density corrected win2 [DU]	-0.928 ± 8.719	4589115	10.8	-0.896	-725	423	-6.33	4.51
background so2 slant column offset window2 [DU]	-1.81 ± 2.43	4589115	3.70	-1.58	-15.2	5.62	-3.40	0.308
sulfurdioxide slant column density window3 [DU]	-6.79 ± 22.24	4589115	26.8	-6.43	-796	2.103×10^3	-20.0	6.85
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 13.8	4589115	10.4	24.1	11.1	939	19.8	30.2
sulfurdioxide slant column density corrected win3 [DU]	2.45 ± 22.42	4589115	27.0	3.23	-779	2.100×10^3	-10.6	16.4
background so2 slant column offset window3 [DU]	9.24 ± 6.74	4589115	10.5	11.0	-21.8	32.1	4.07	14.6
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.31	4589115	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.471 \pm 16.413) \times 10^{-2}$	4589115	3.341×10^{-2}	1.509×10^{-2}	5.098×10^{-4}	4.66	6.019×10^{-3}	3.943×10^{-2}
fitted radiance shift [nm]	$(-4.721 \pm 25.750) \times 10^{-4}$	4589115	1.343×10^{-3}	-5.755×10^{-4}	-4.277×10^{-2}	4.137×10^{-2}	-1.218×10^{-3}	1.252×10^{-4}
fitted radiance squeeze [1]	$(-1.094 \pm 2.171) \times 10^{-4}$	4589115	2.785×10^{-4}	-1.030×10^{-4}	-1.372×10^{-2}	1.290×10^{-2}	-2.463×10^{-4}	3.220×10^{-5}
fitted root mean square [1]	$(1.370 \pm 0.562) \times 10^{-3}$	4589115	5.537×10^{-4}	1.235×10^{-3}	3.179×10^{-4}	7.717×10^{-2}	1.012×10^{-3}	1.566×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.32 ± 0.88	4589115	1.72	1.08	5.000×10^{-2}	3.08	0.526	2.25
sulfurdioxide total air mass factor polluted precision [1]	0.216 ± 0.233	4589115	0.275	0.140	2.500×10^{-3}	1.74	3.579×10^{-2}	0.311
sulfurdioxide clear air mass factor polluted [1]	1.31 ± 0.97	4589115	1.91	0.895	2.650×10^{-2}	3.12	0.481	2.39
number of spectral points in retrieval [1]	73.4 ± 0.5	4589115	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

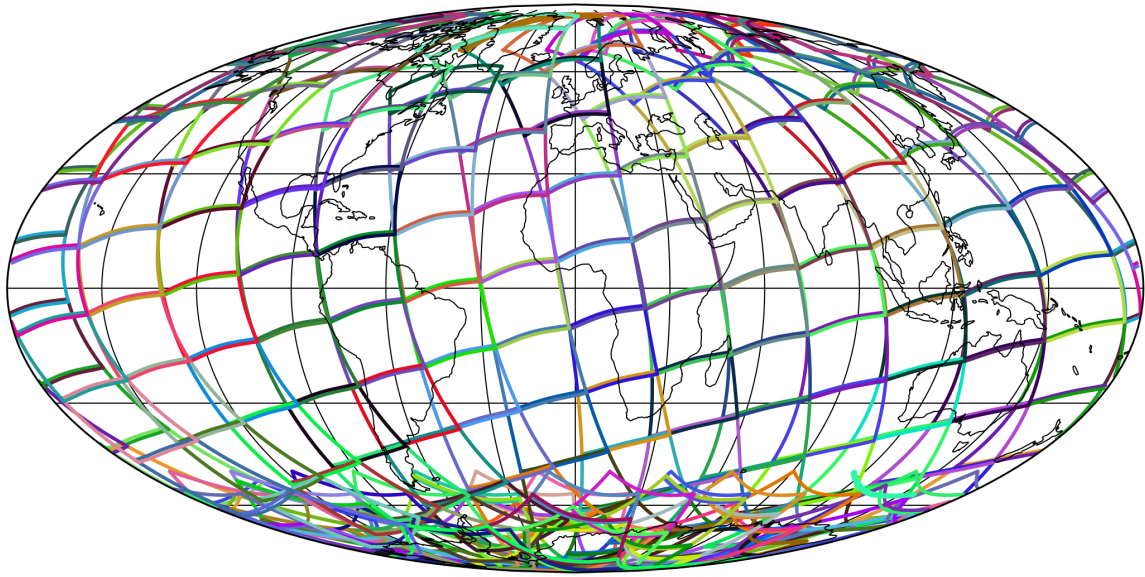


Figure 1: Outline of the granules.

4 Input data monitoring

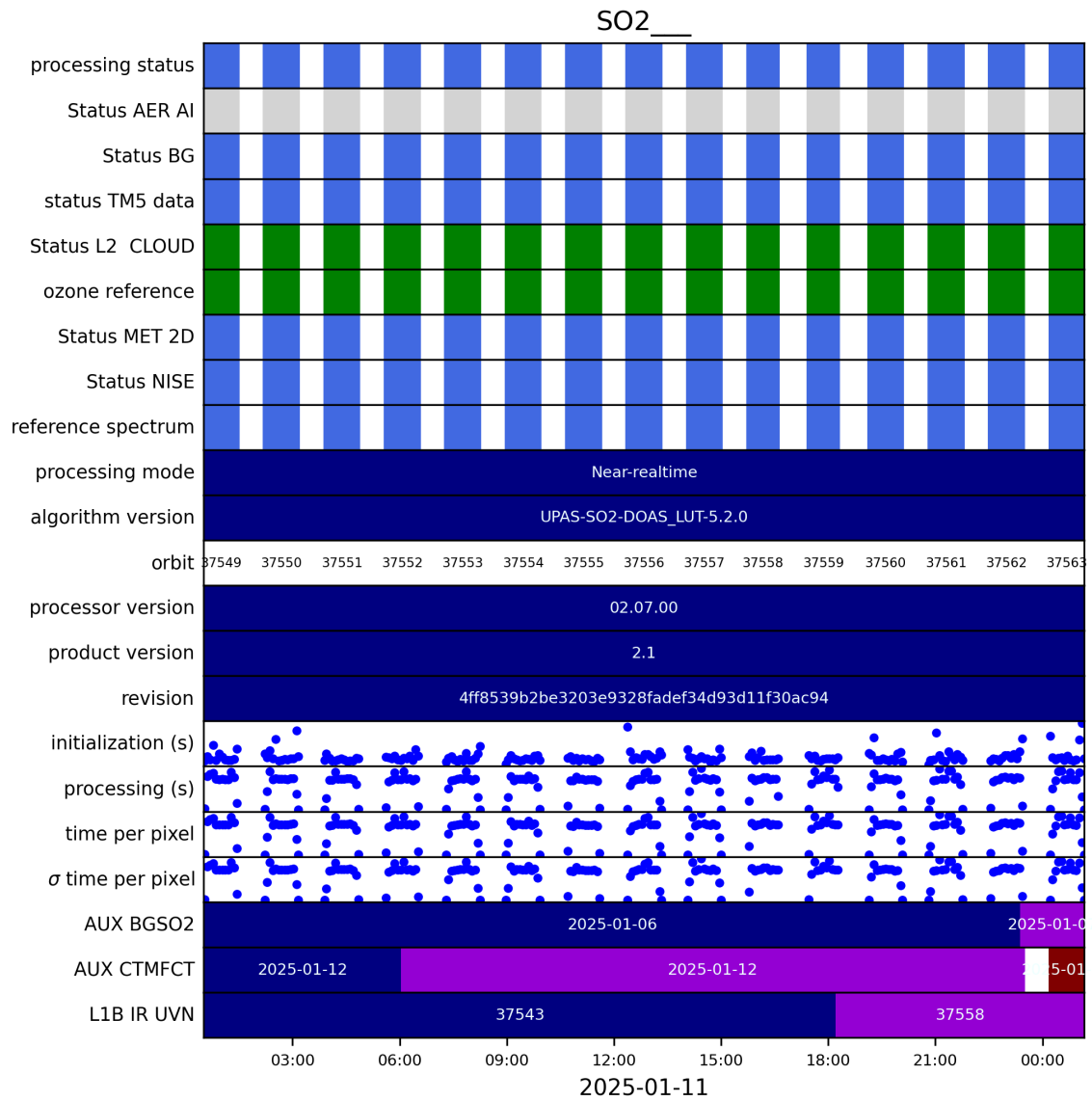


Figure 2: Input data per granule

5 Warnings and errors

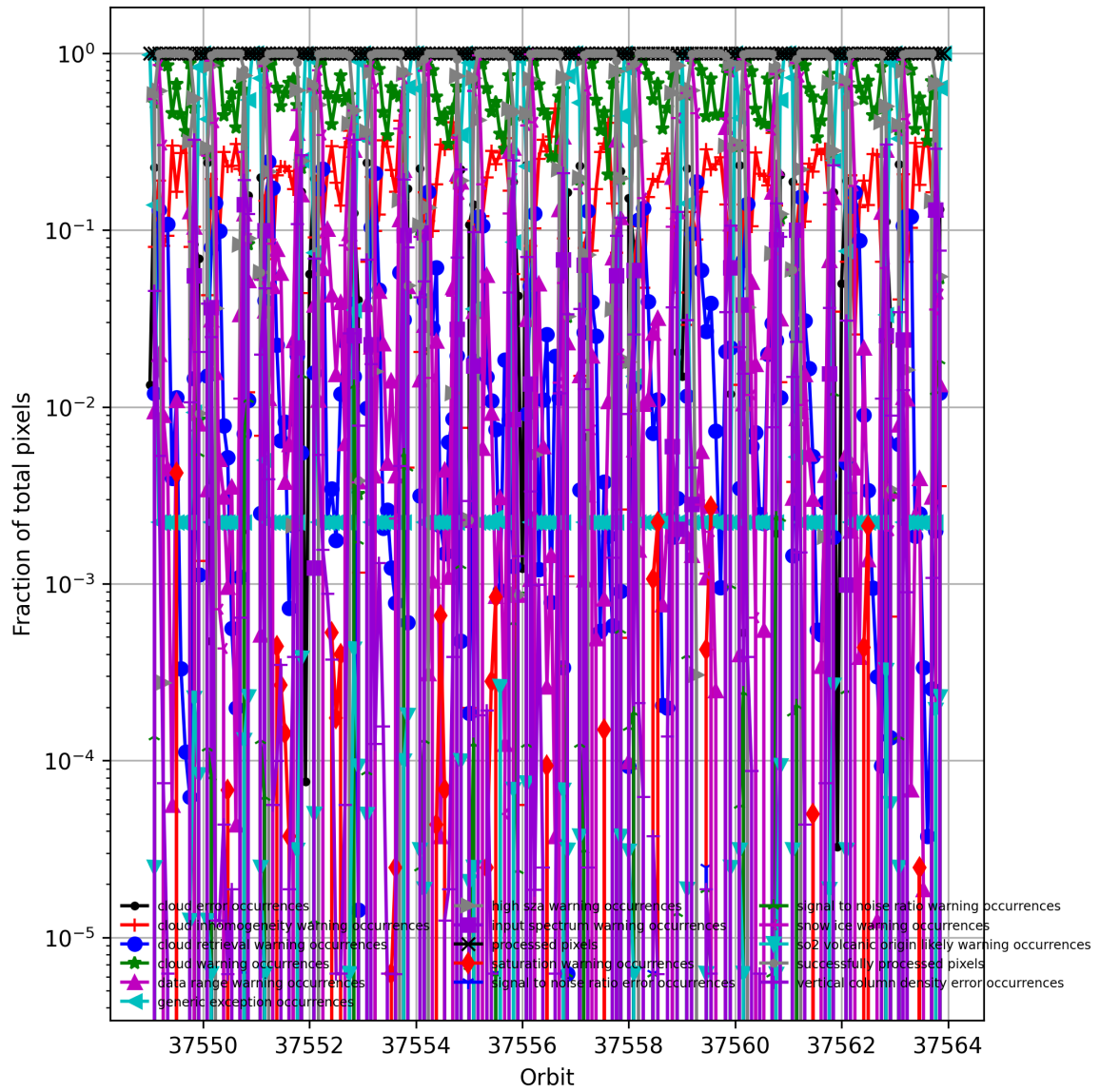


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

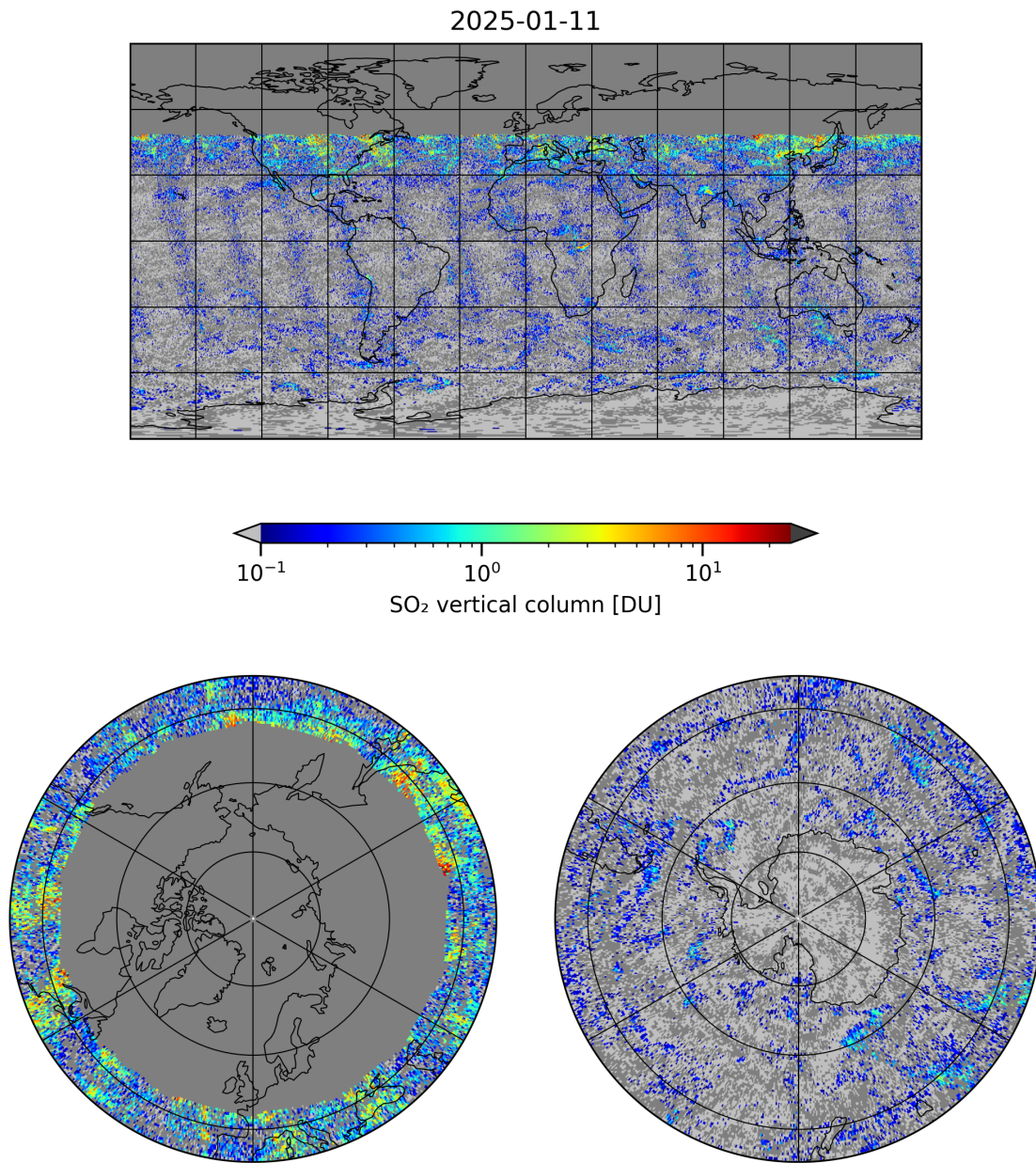


Figure 4: Map of “SO₂ vertical column” for 2025-01-11 to 2025-01-12

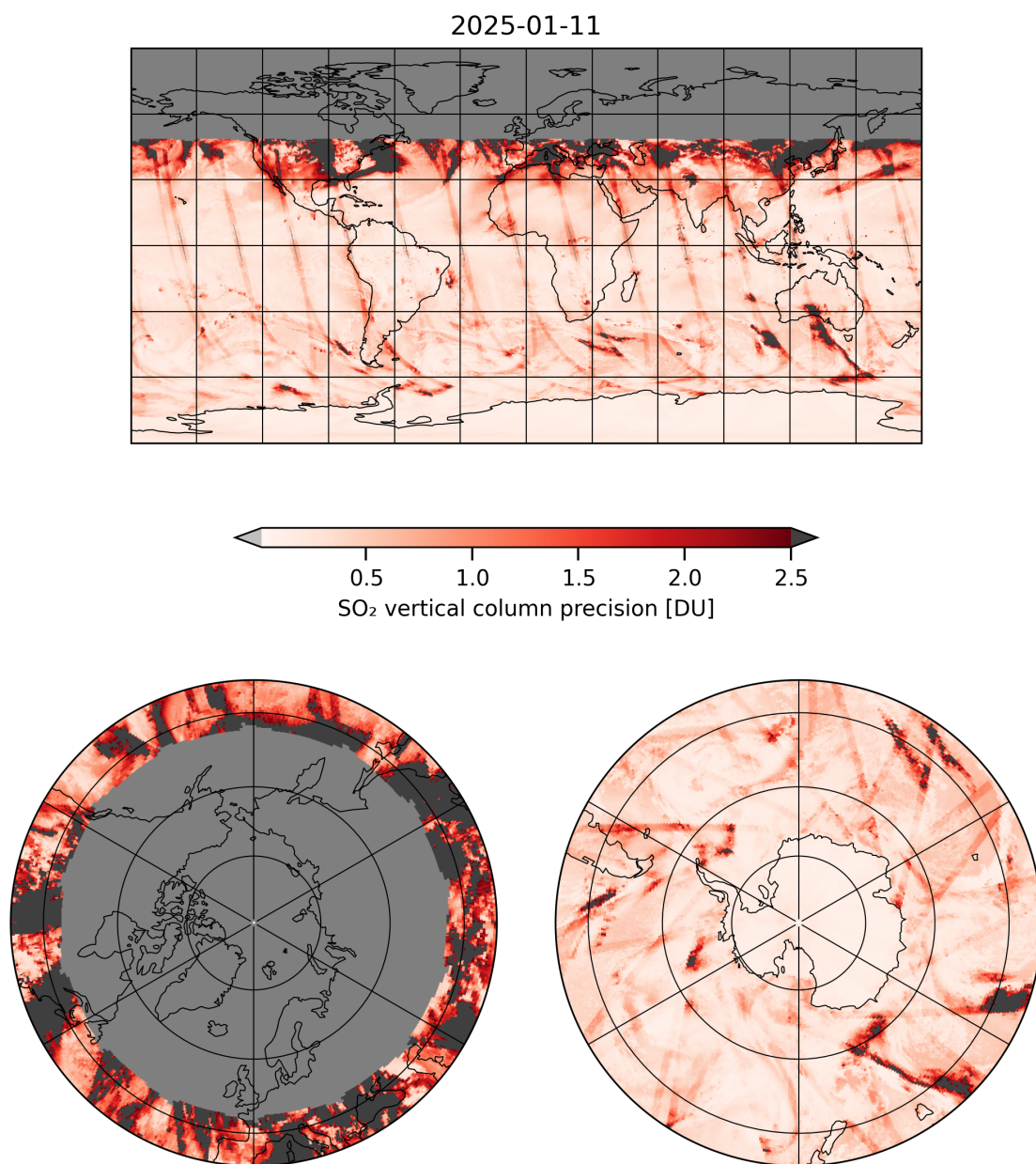


Figure 5: Map of “SO₂ vertical column precision” for 2025-01-11 to 2025-01-12

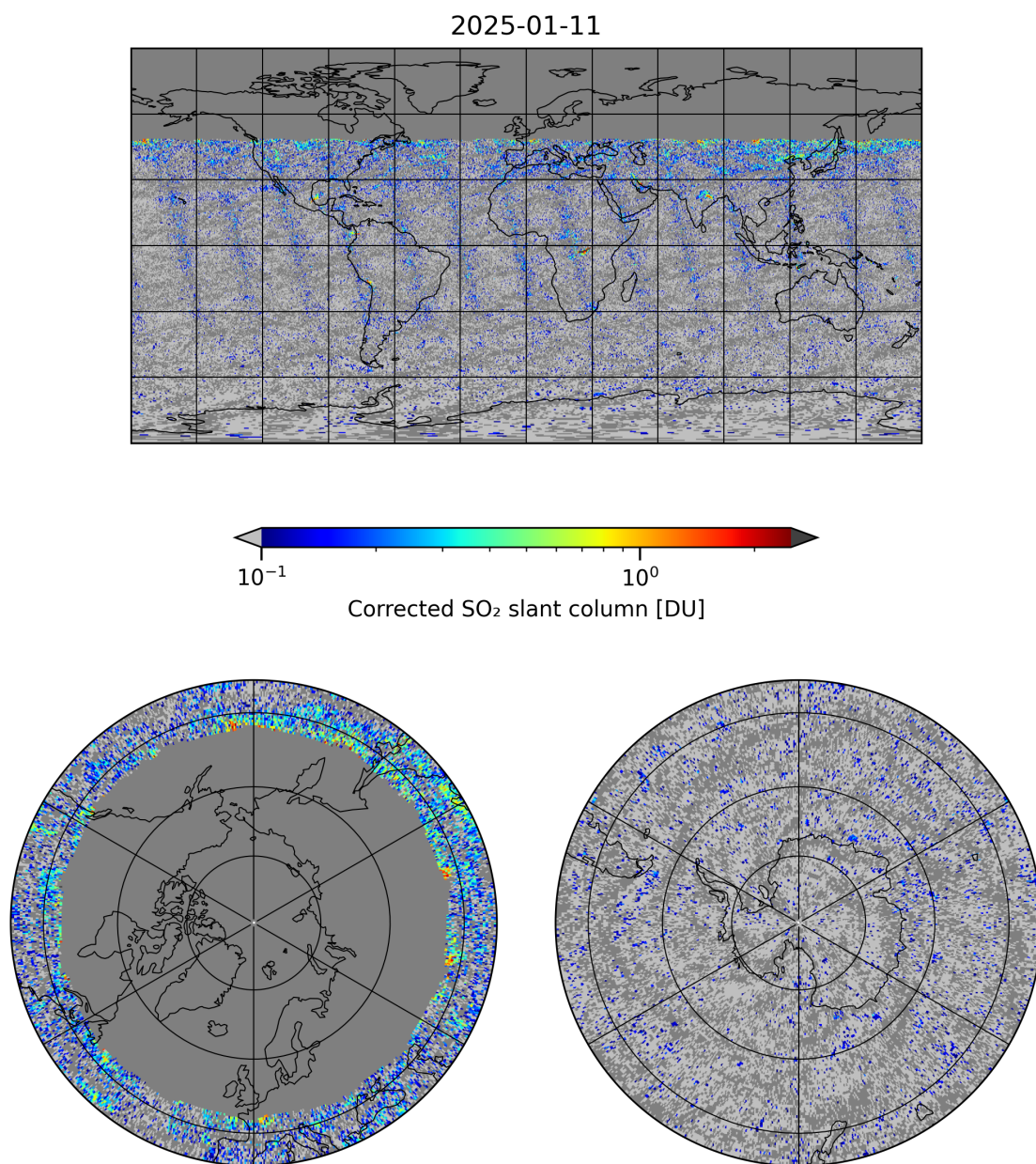


Figure 6: Map of “Corrected SO₂ slant column” for 2025-01-11 to 2025-01-12

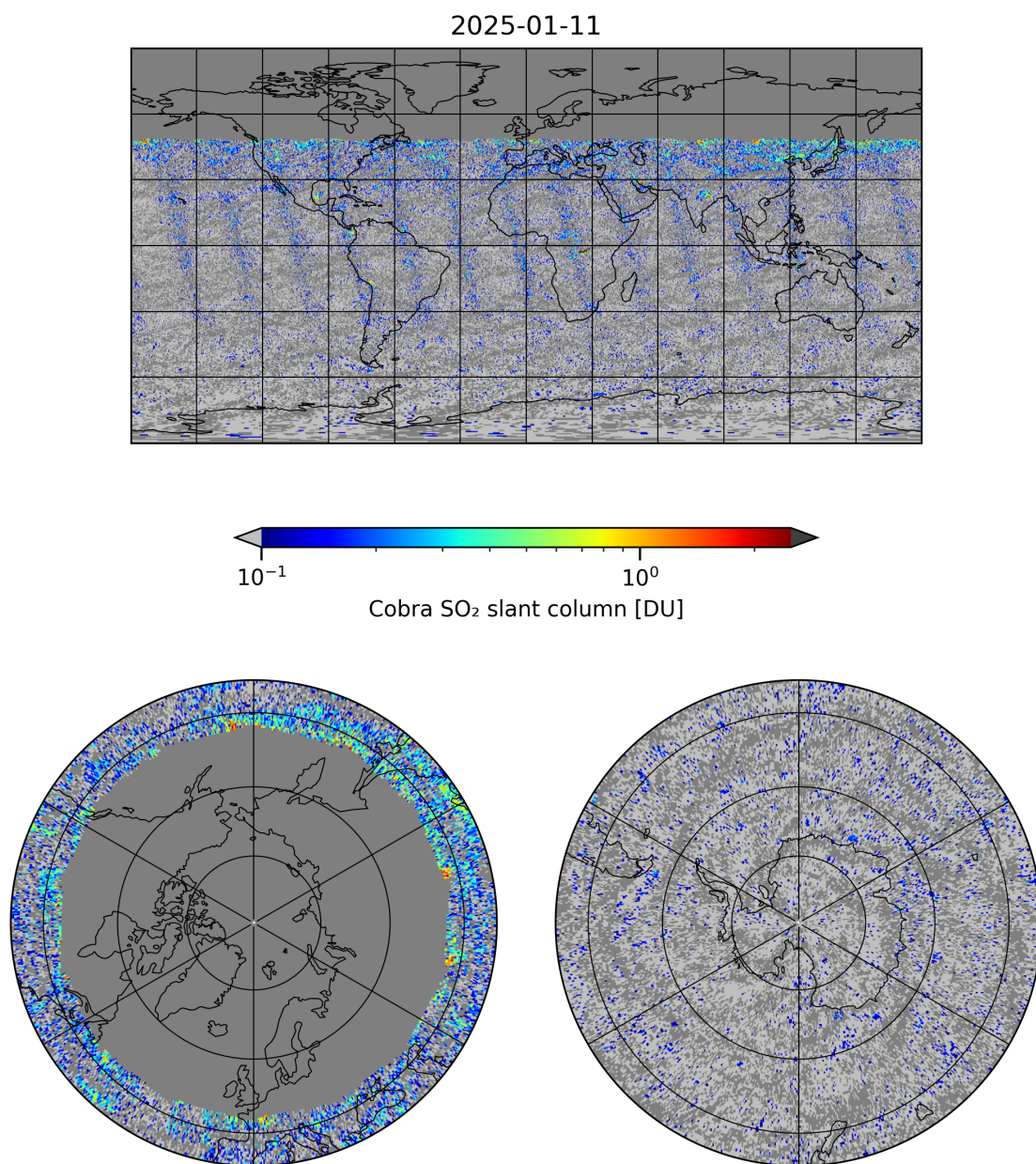


Figure 7: Map of “Cobra SO₂ slant column” for 2025-01-11 to 2025-01-12

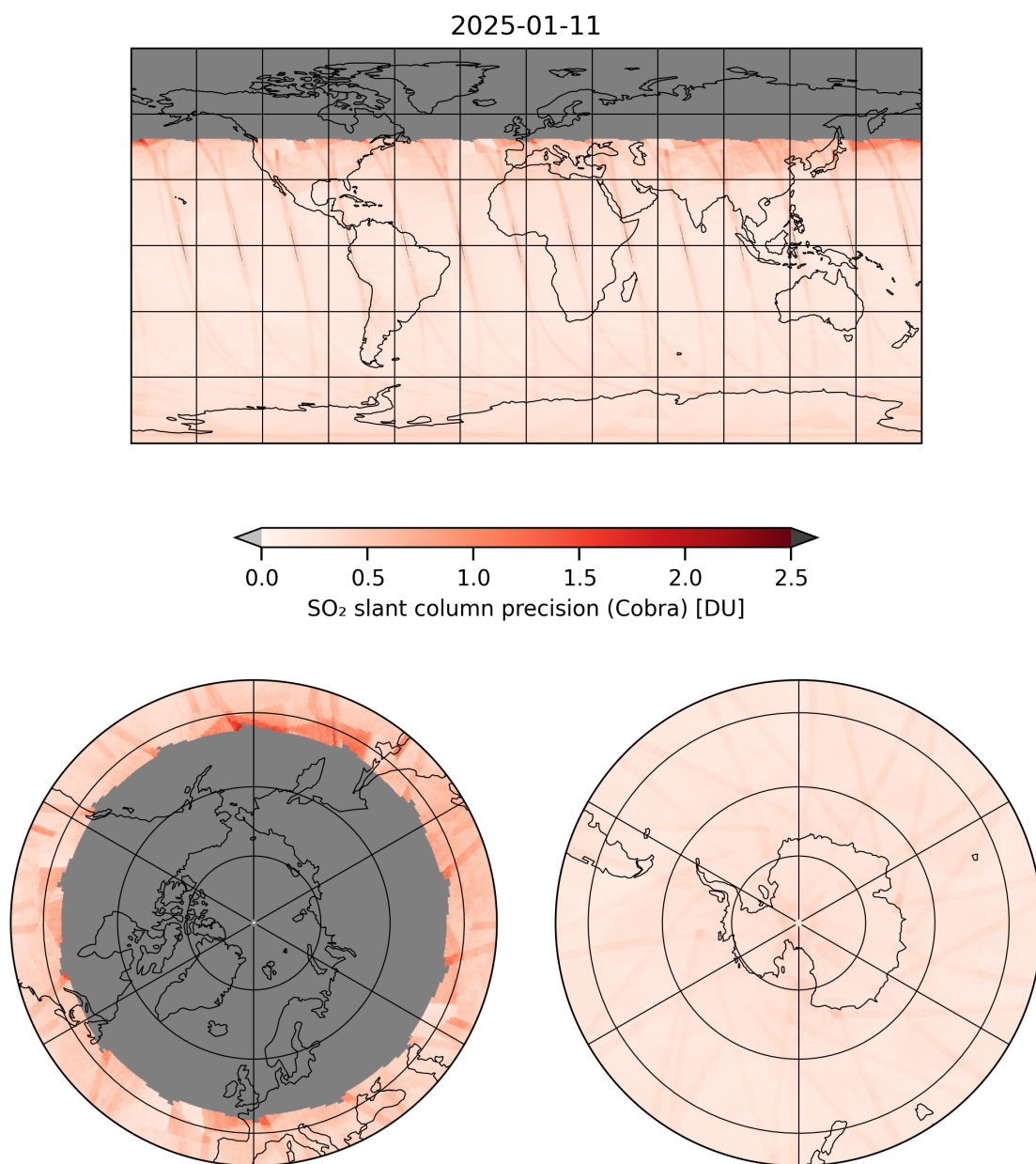


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-01-11 to 2025-01-12

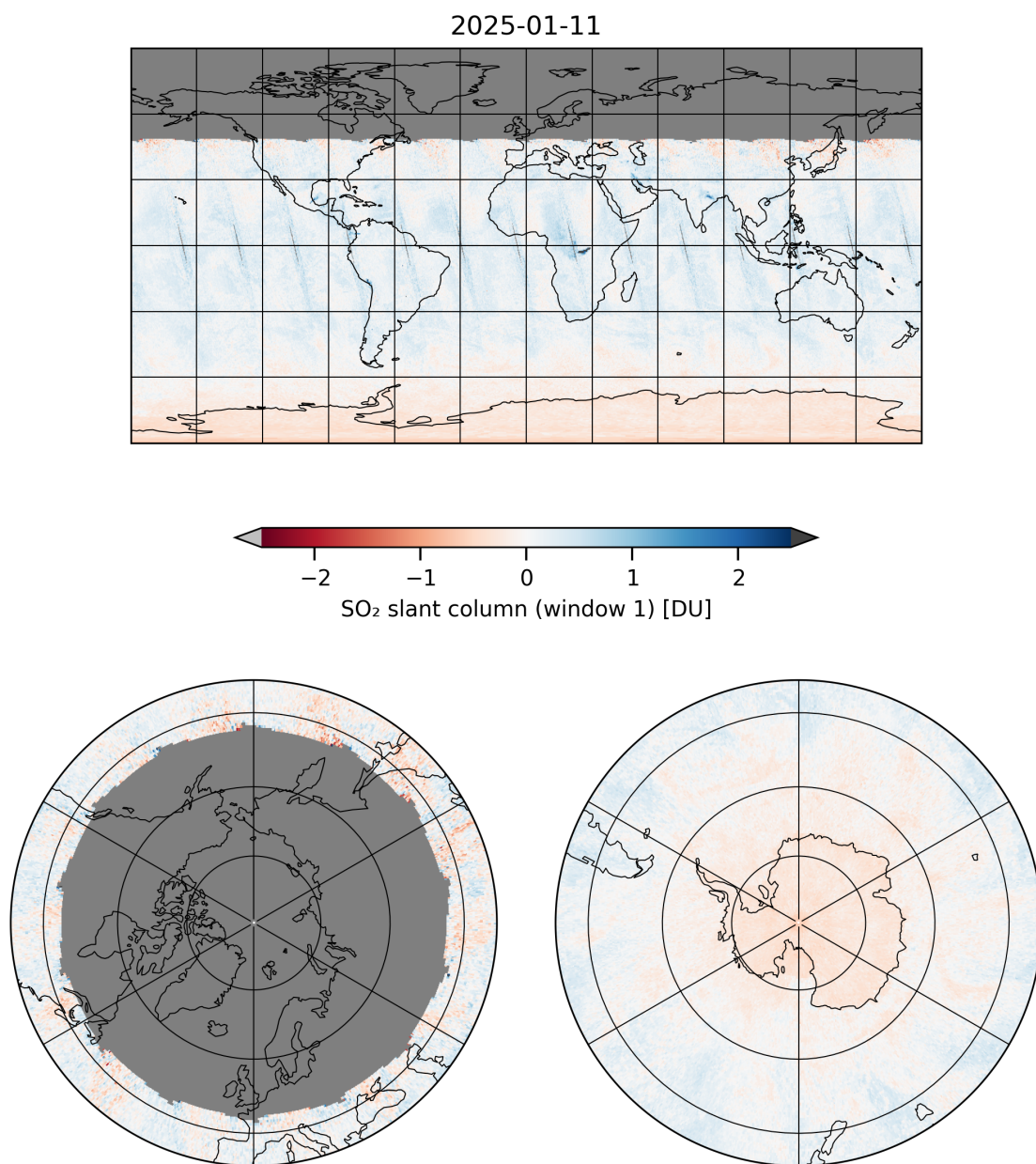


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-01-11 to 2025-01-12

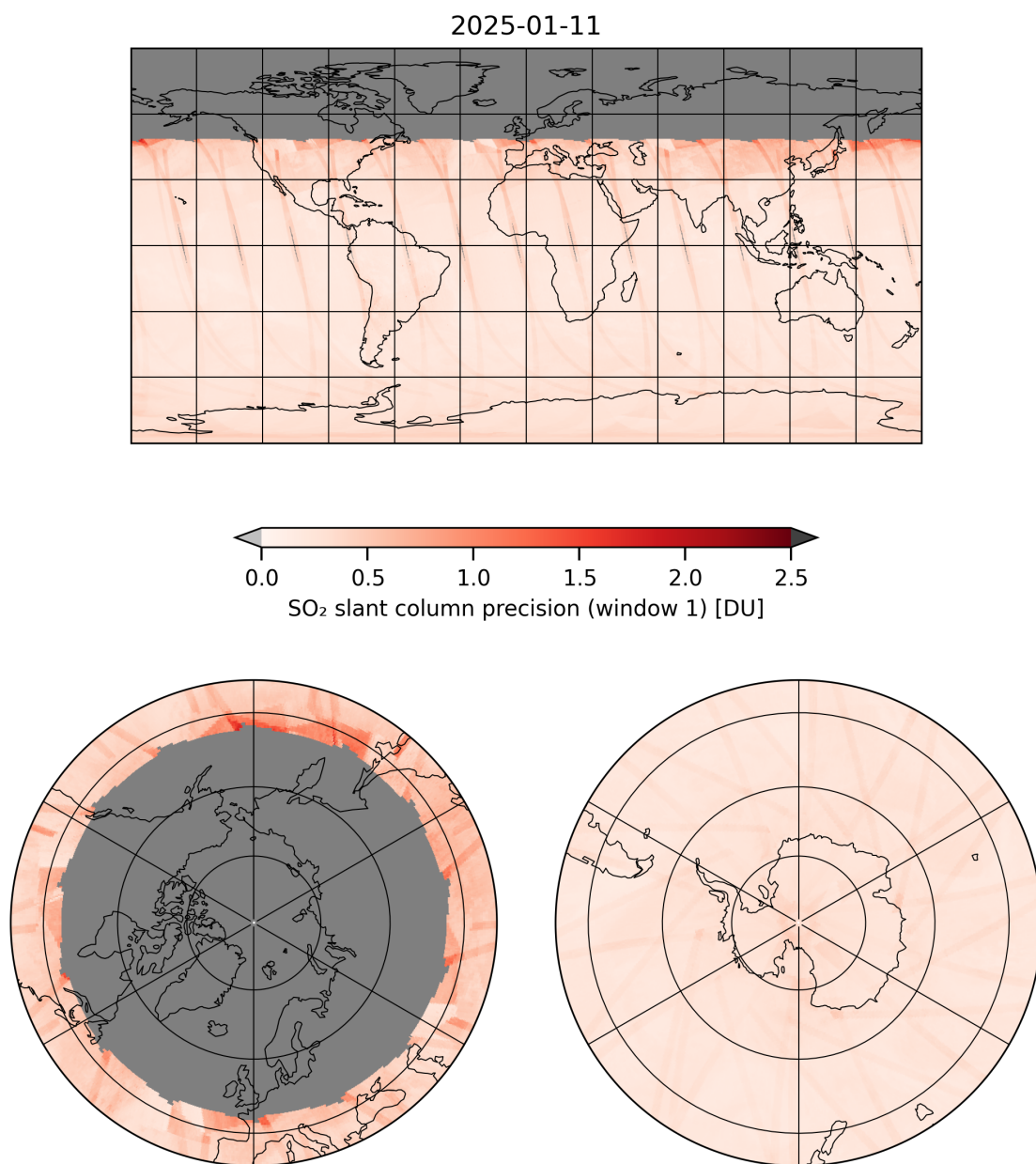


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-01-11 to 2025-01-12

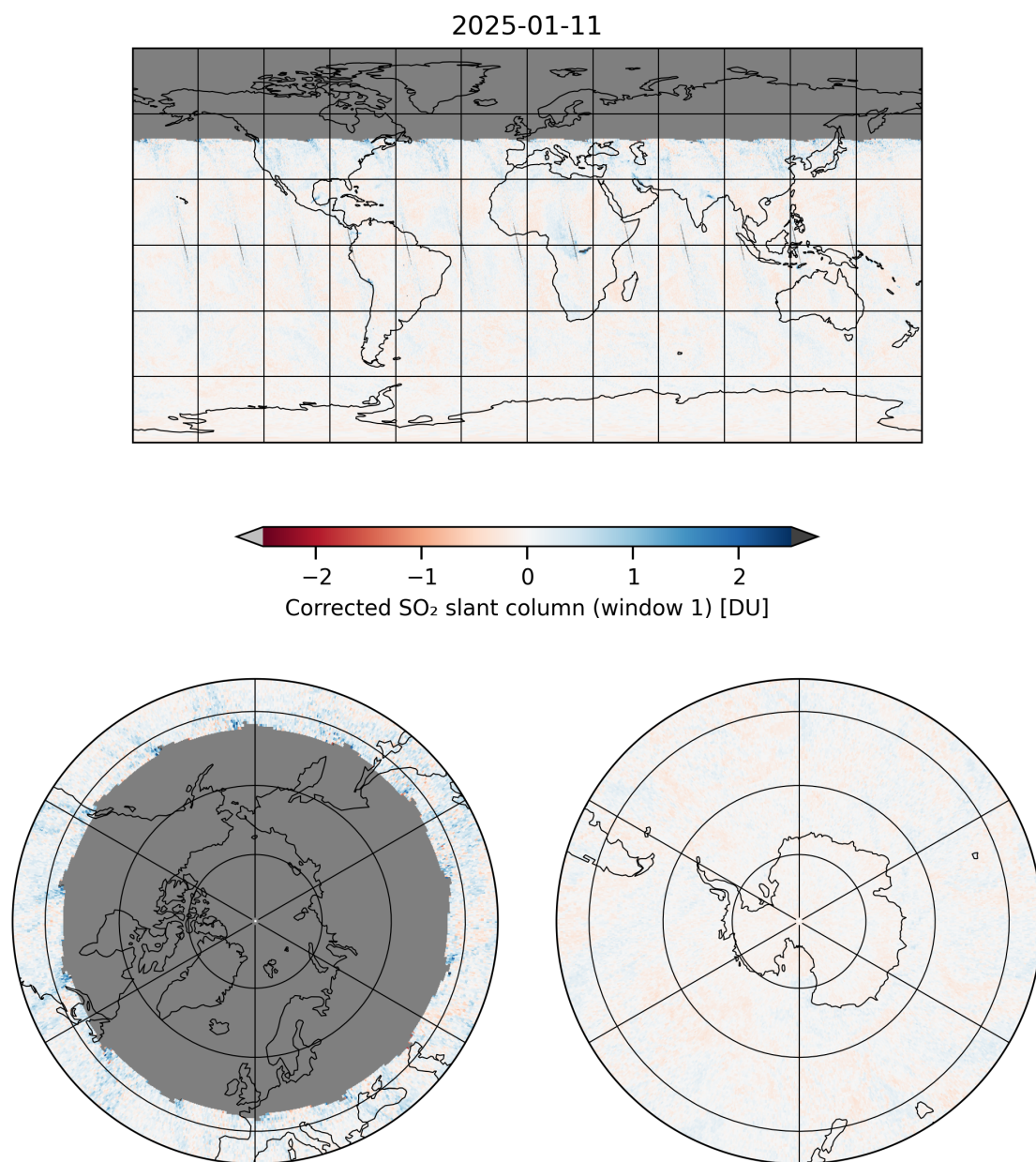


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-01-11 to 2025-01-12

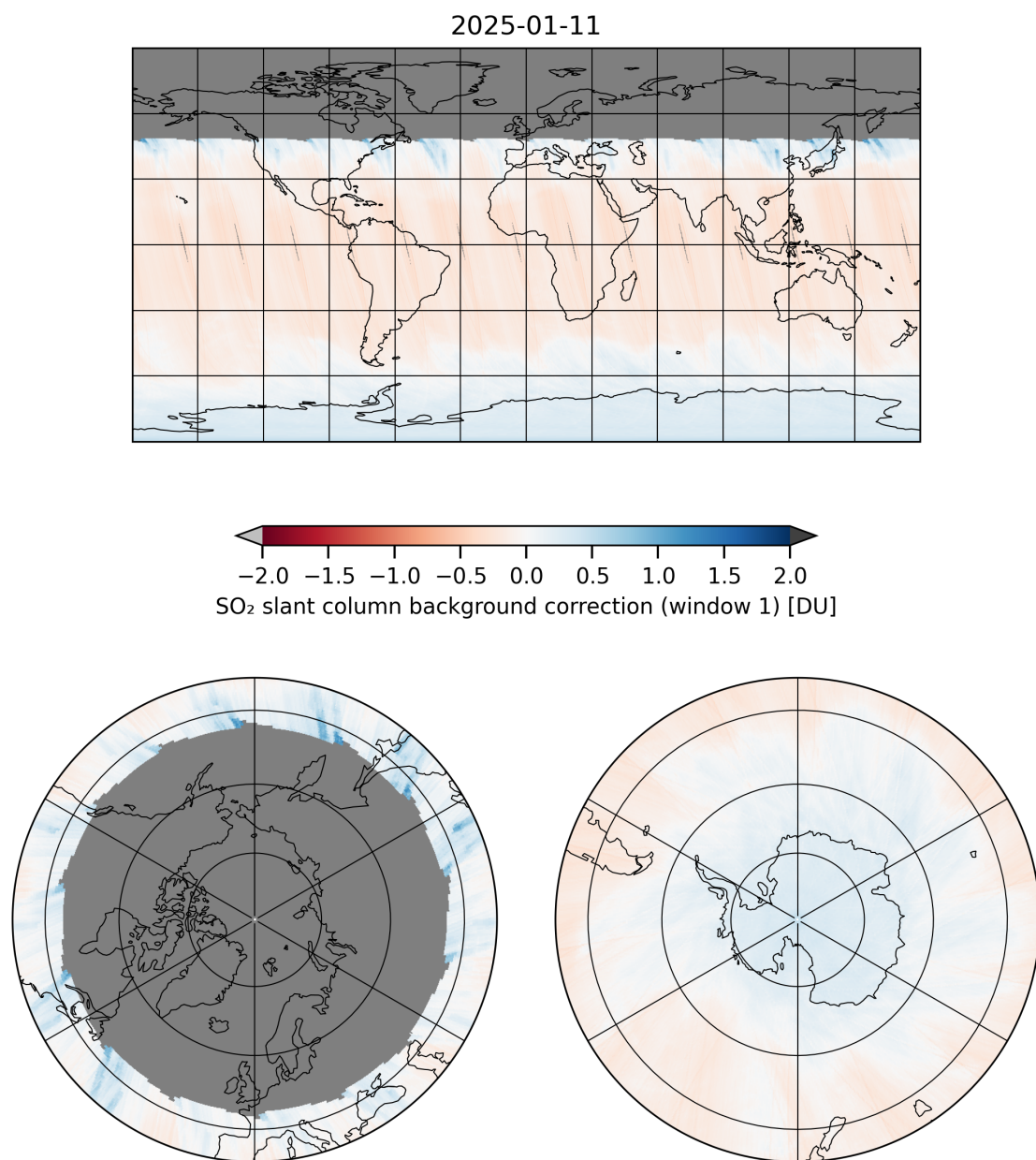


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-01-11 to 2025-01-12

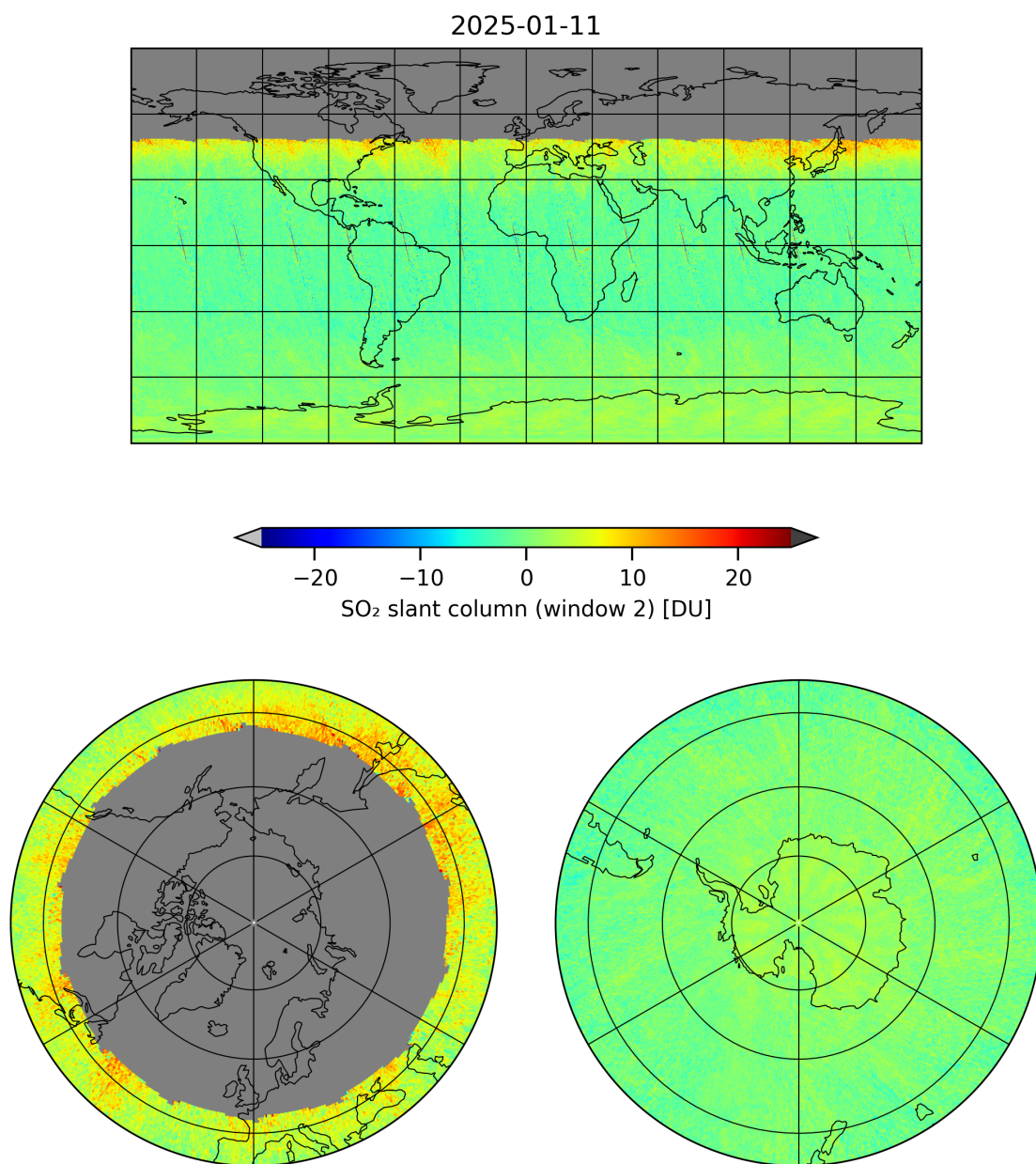


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-01-11 to 2025-01-12

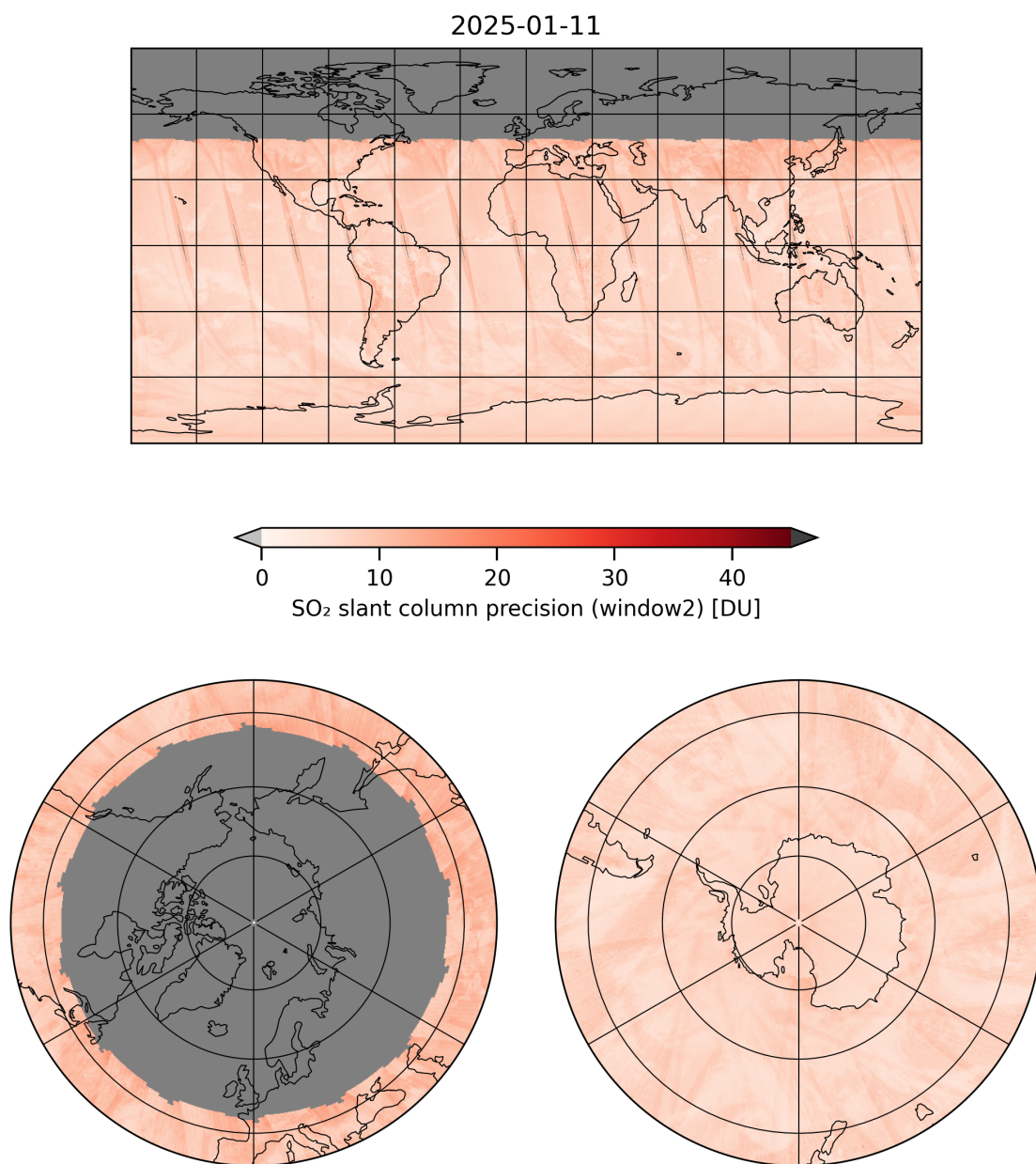


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-01-11 to 2025-01-12

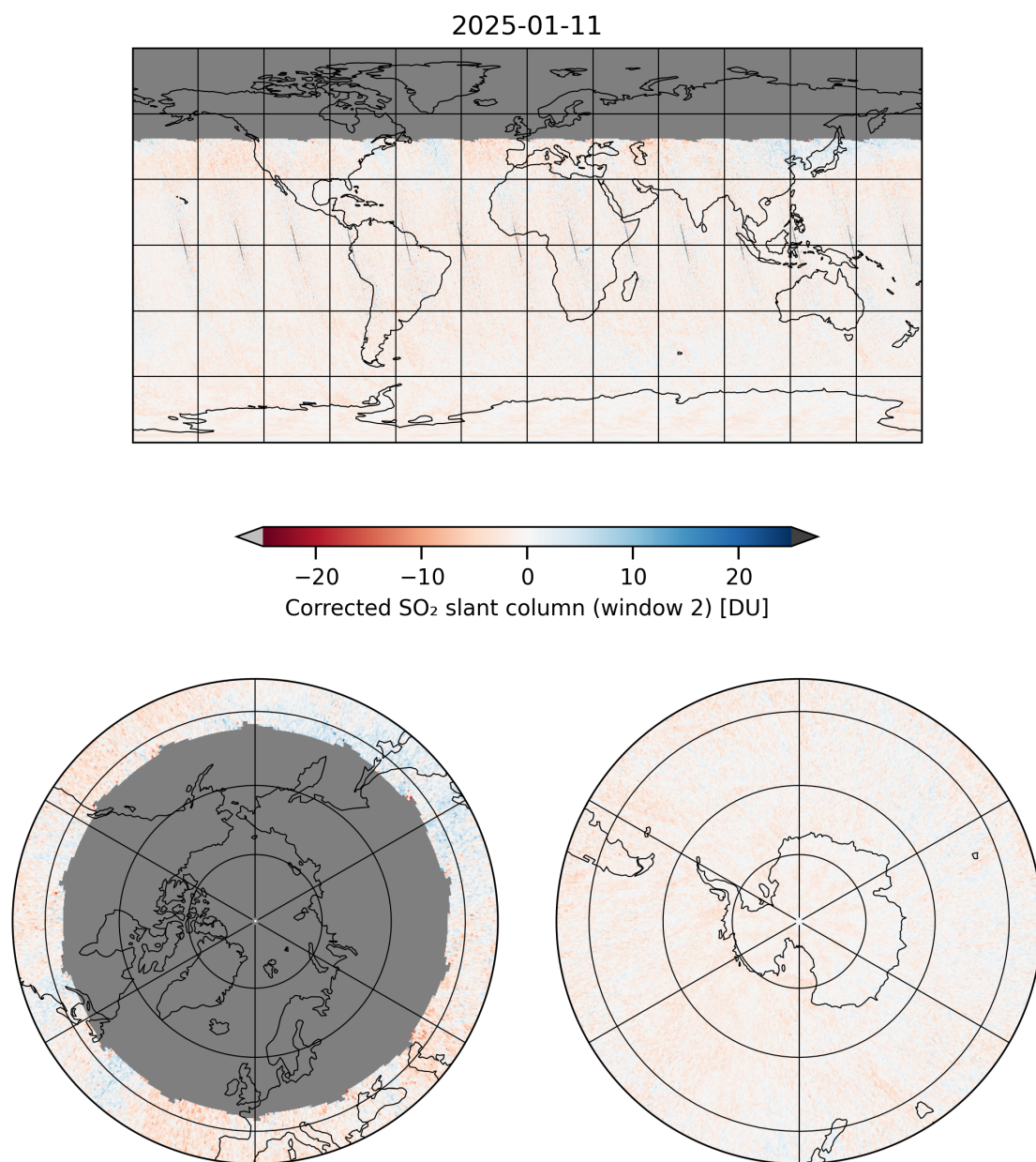


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-01-11 to 2025-01-12

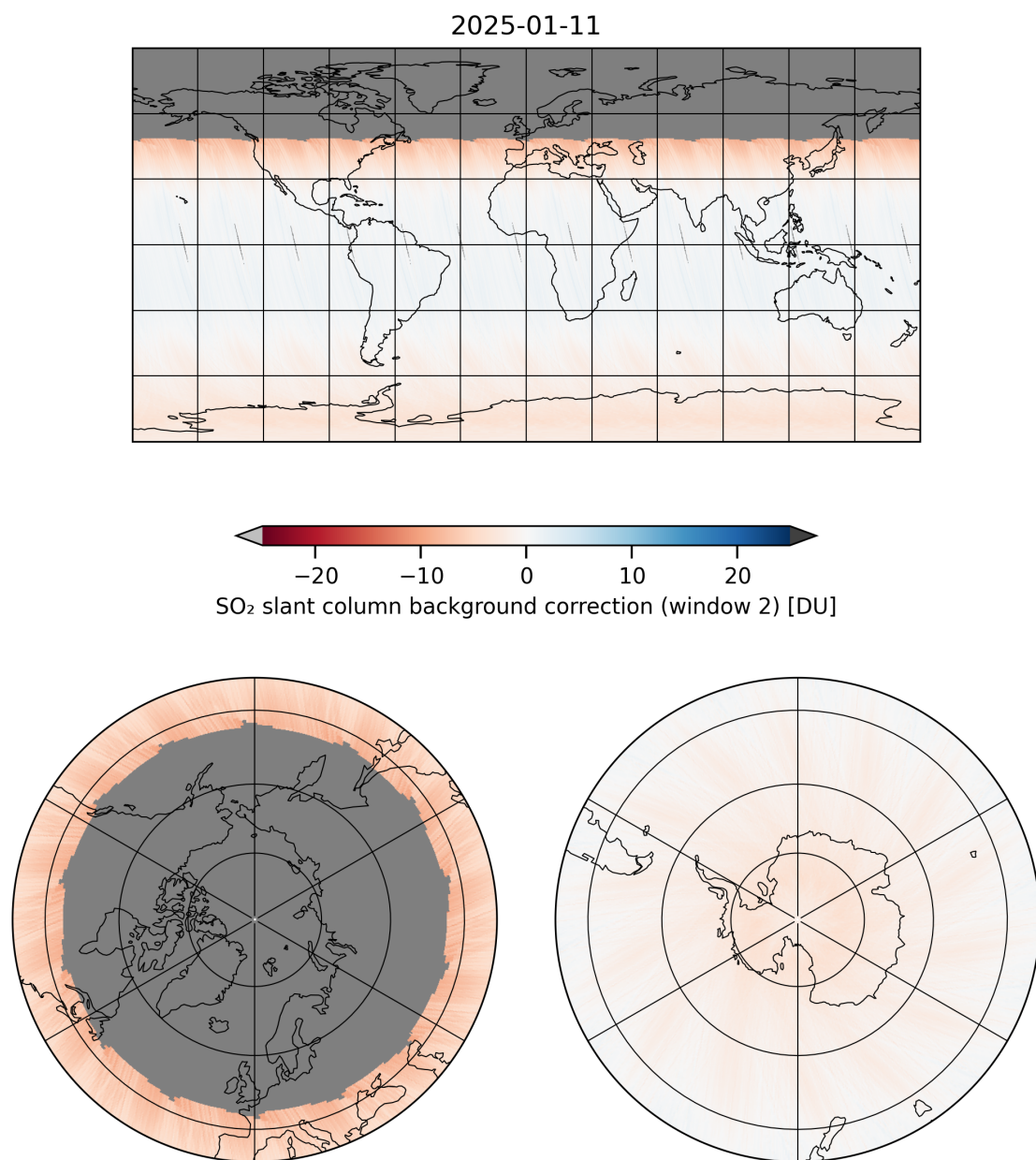


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-01-11 to 2025-01-12

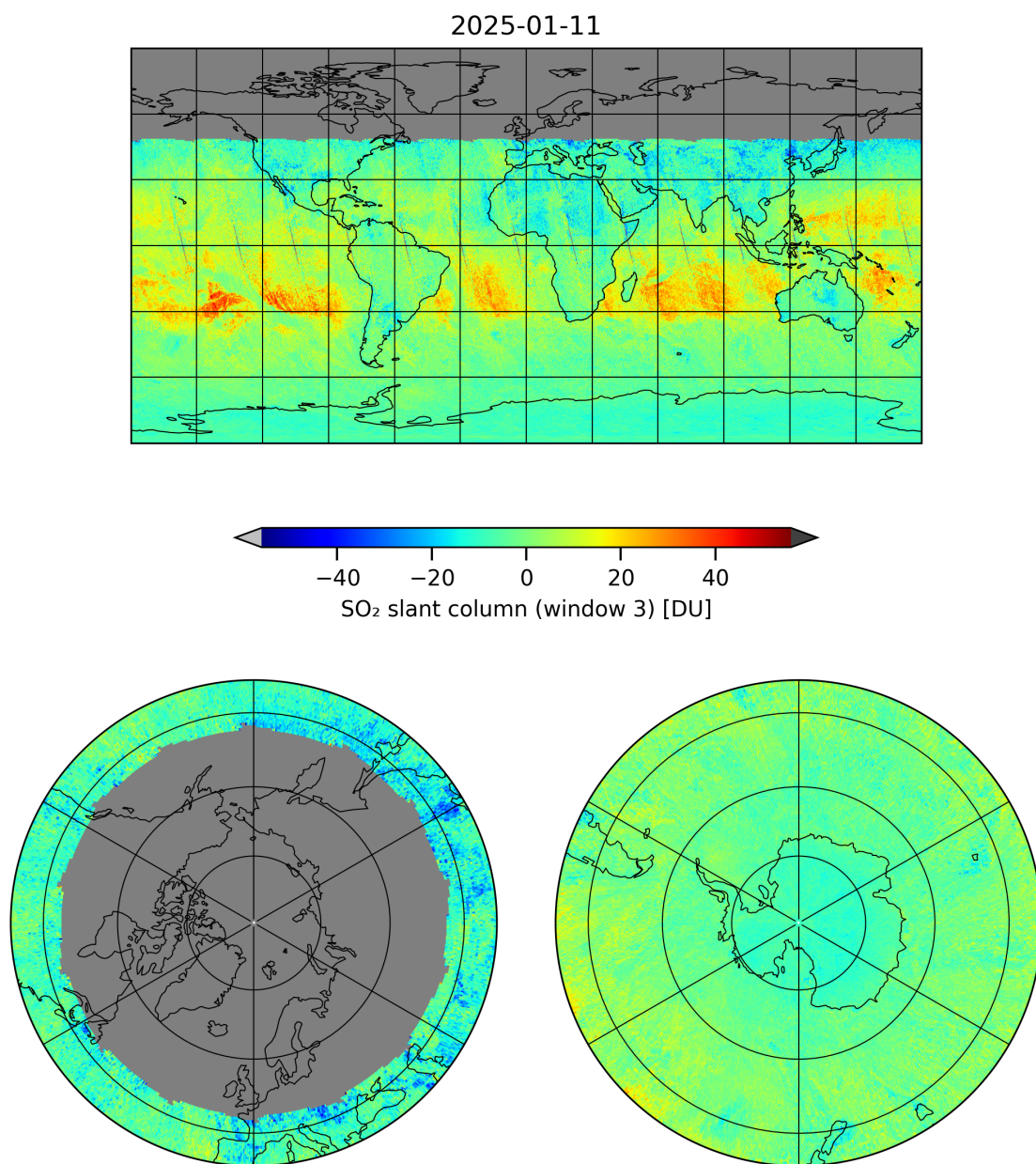


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-01-11 to 2025-01-12

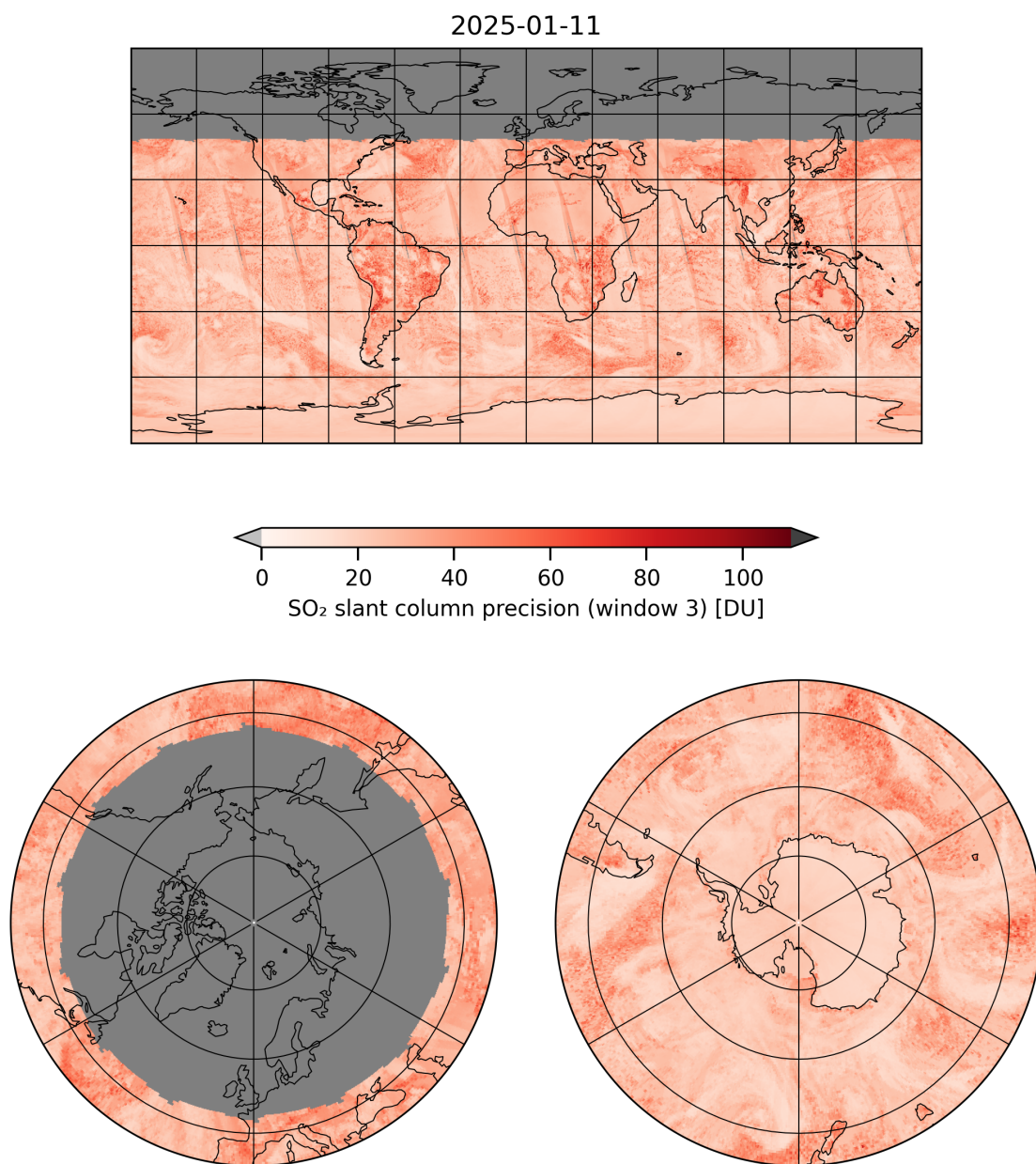


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-01-11 to 2025-01-12

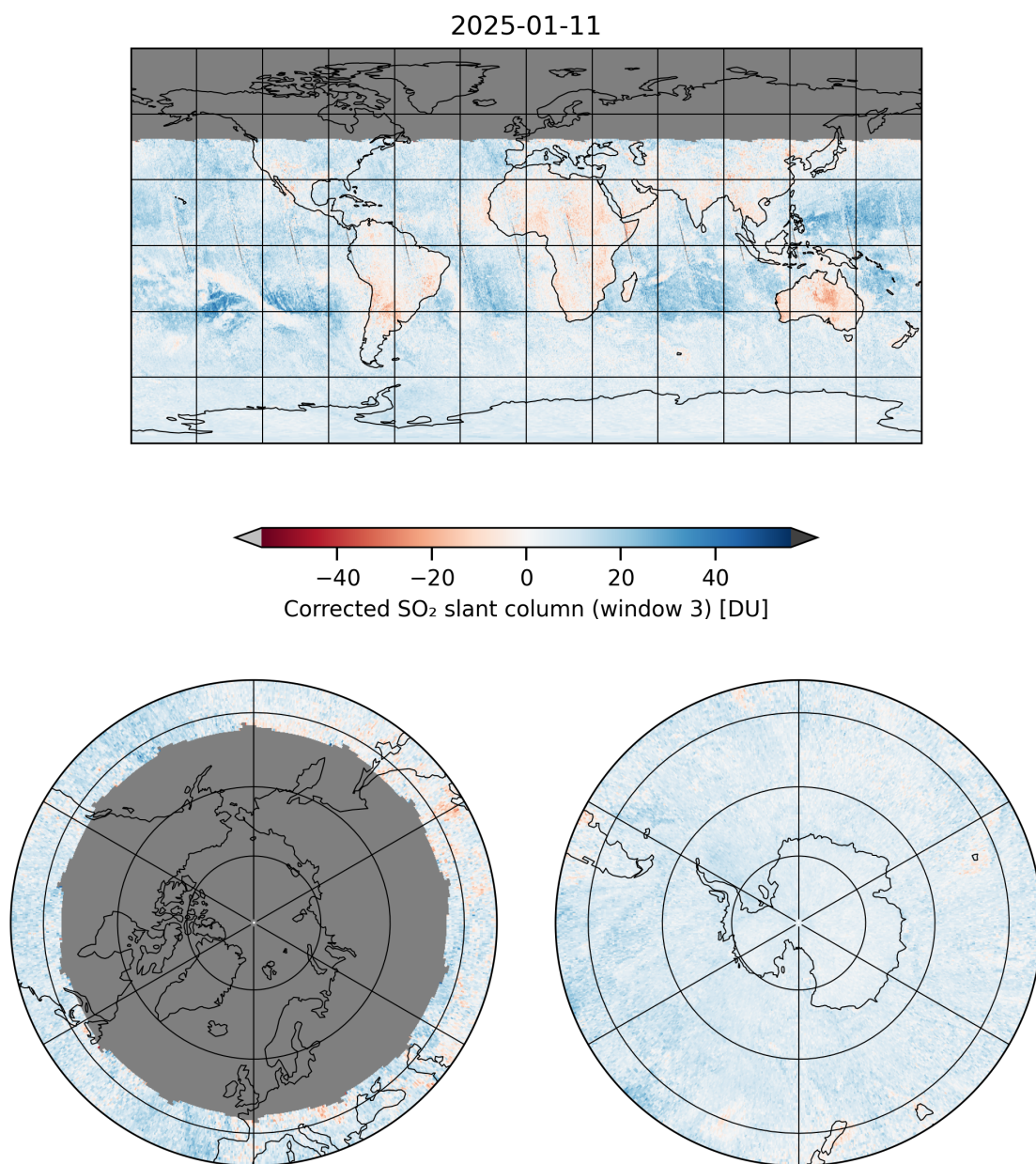


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-01-11 to 2025-01-12

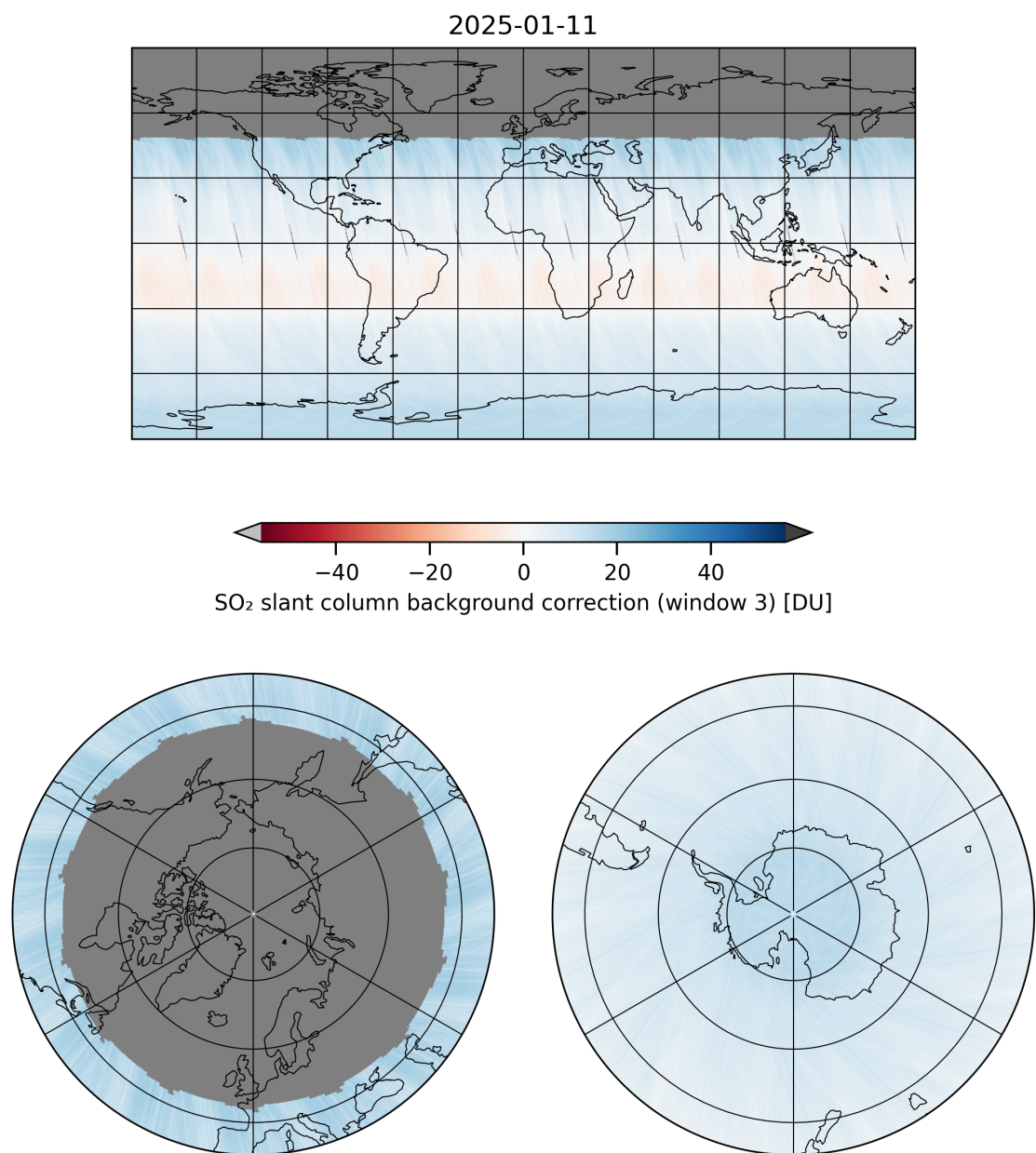


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-01-11 to 2025-01-12

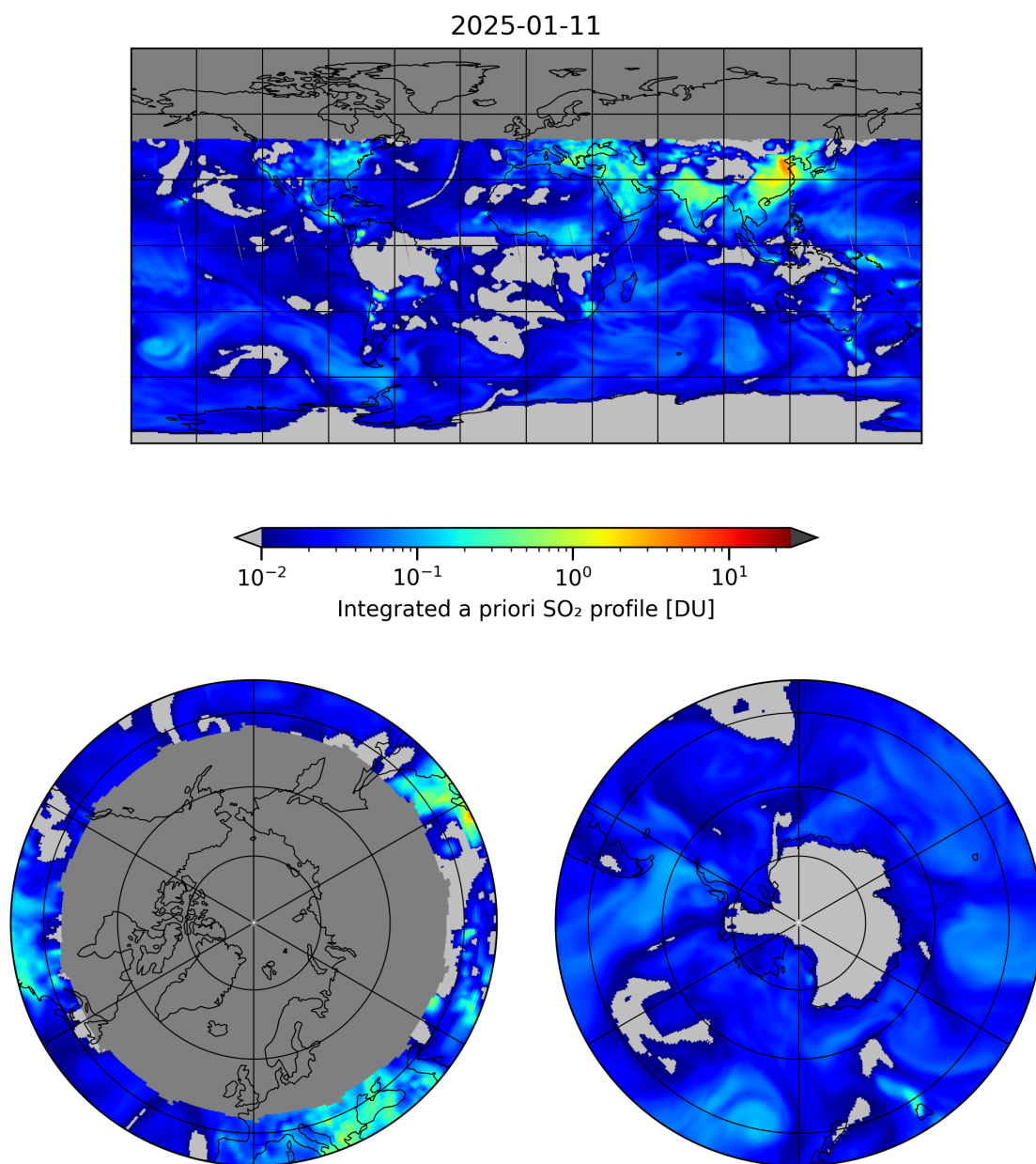


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-01-11 to 2025-01-12

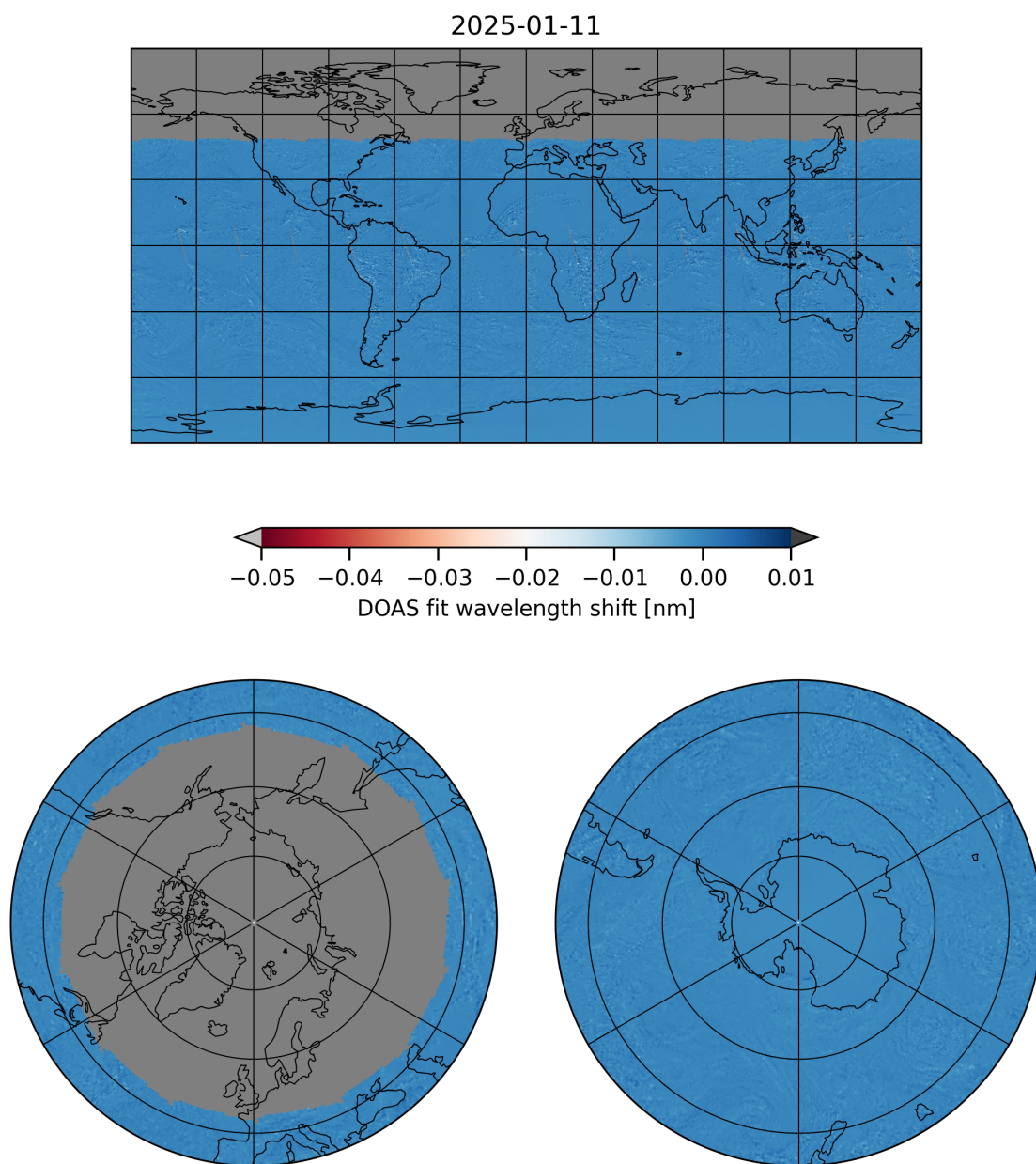


Figure 22: Map of “DOAS fit wavelength shift” for 2025-01-11 to 2025-01-12

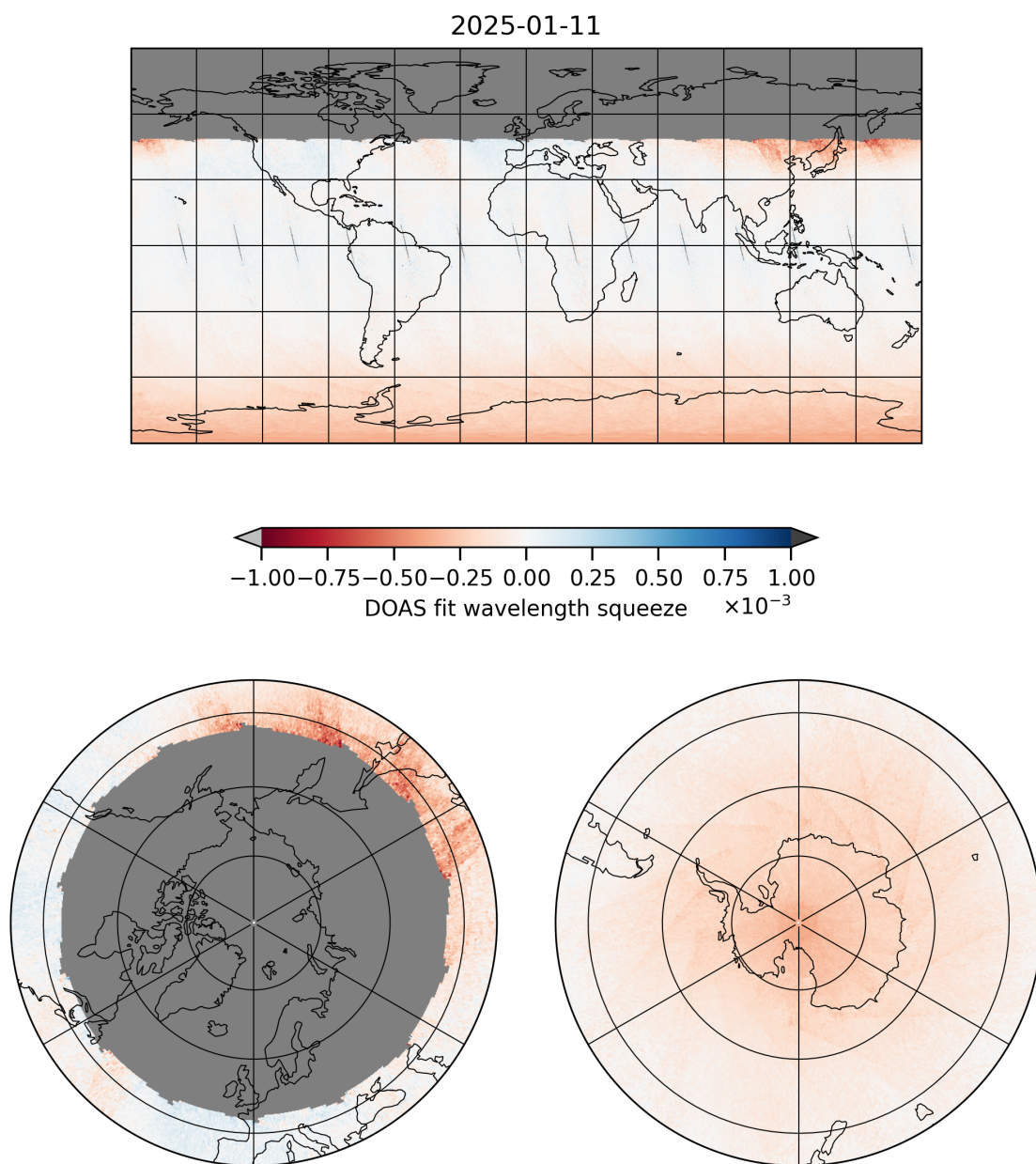


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-01-11 to 2025-01-12

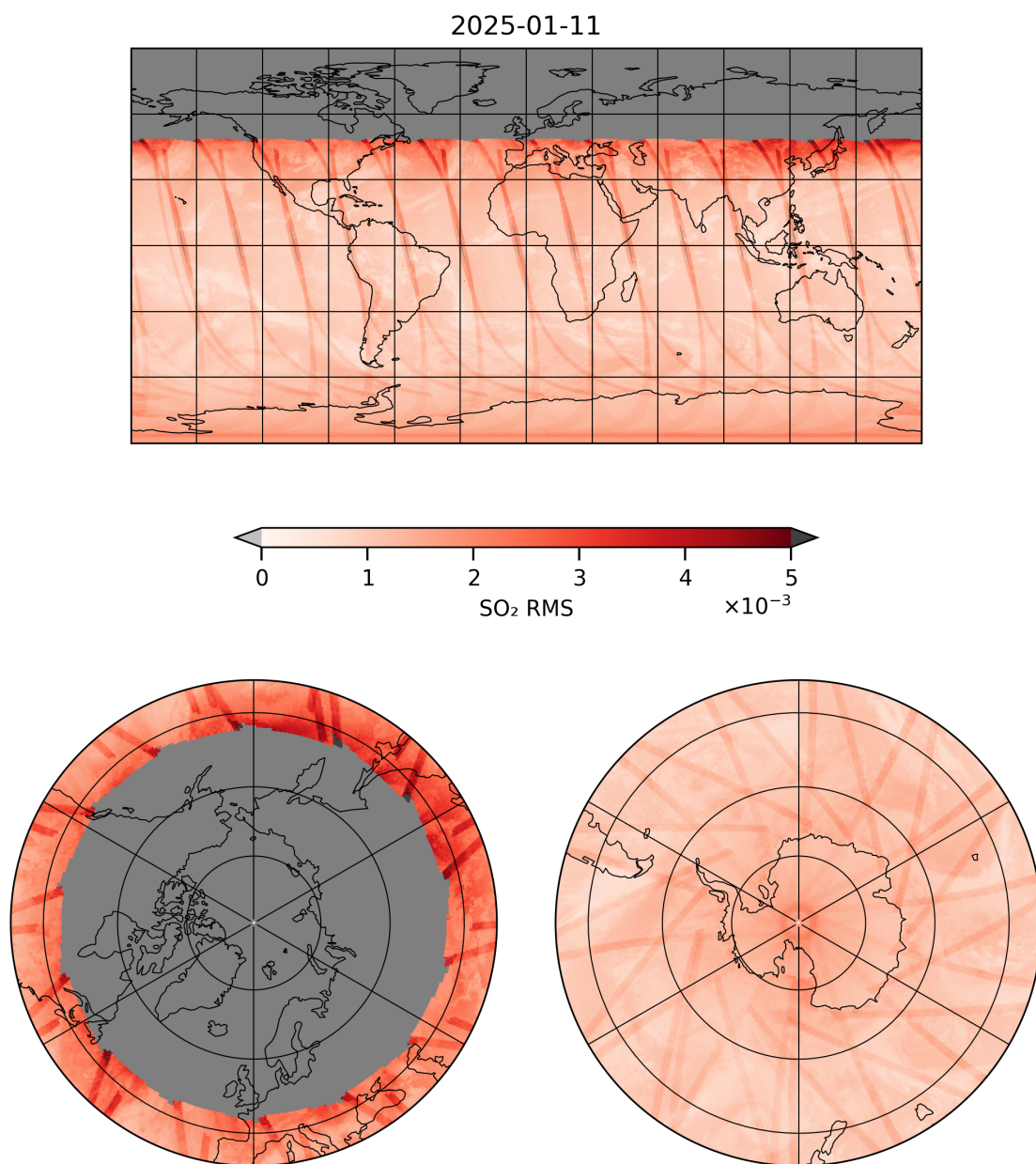


Figure 24: Map of “SO₂ RMS” for 2025-01-11 to 2025-01-12

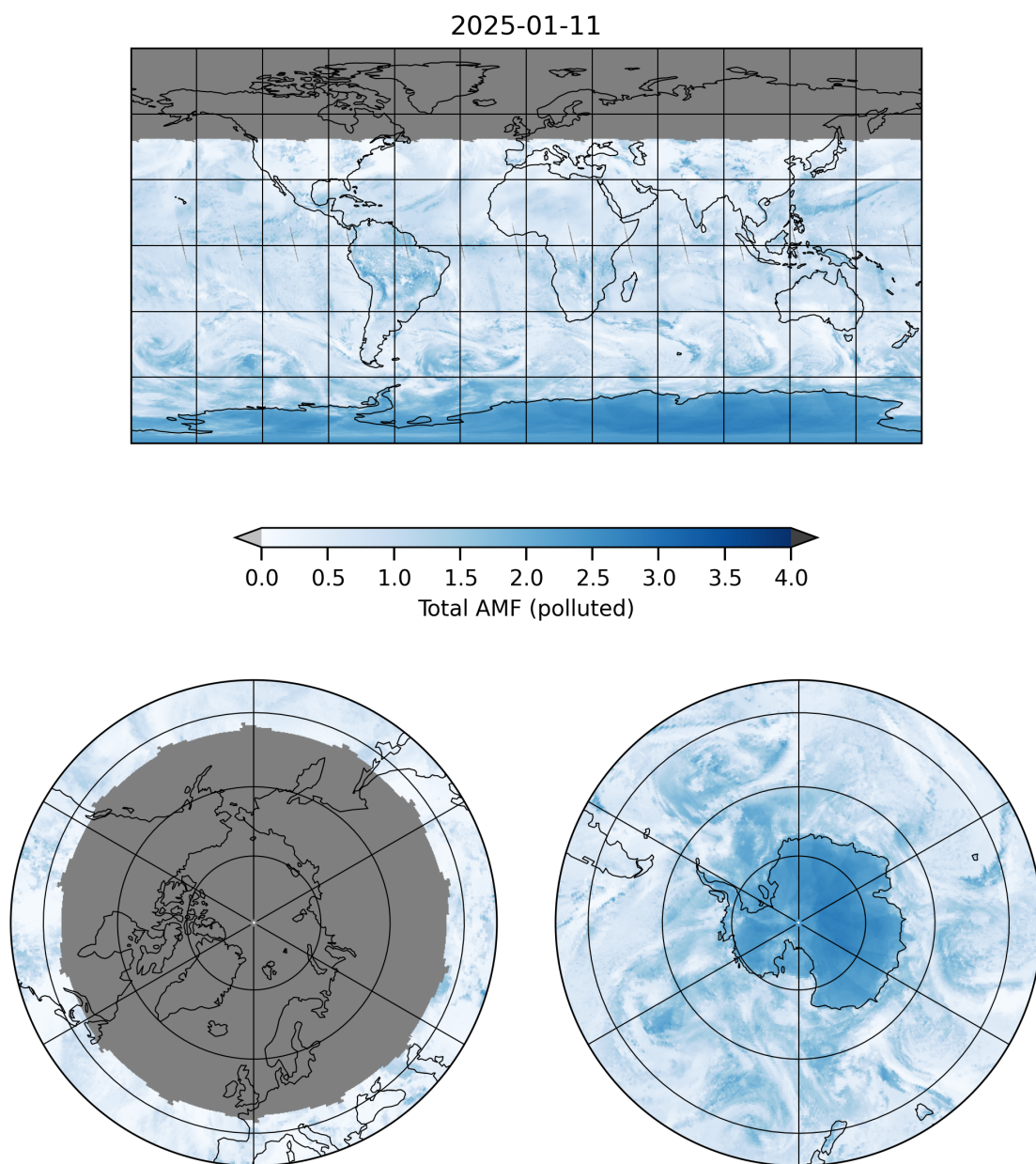


Figure 25: Map of “Total AMF (polluted)” for 2025-01-11 to 2025-01-12

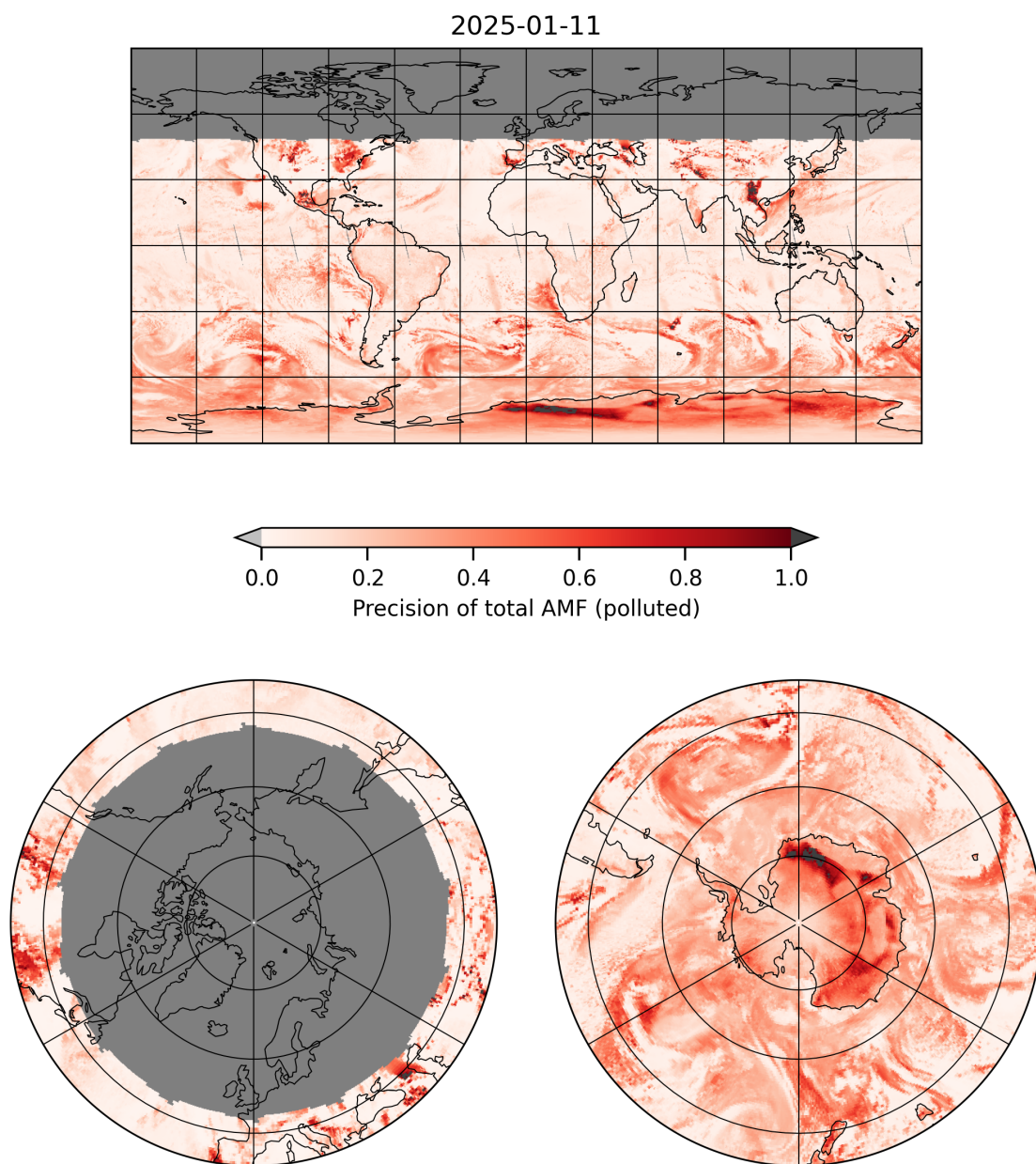


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-01-11 to 2025-01-12

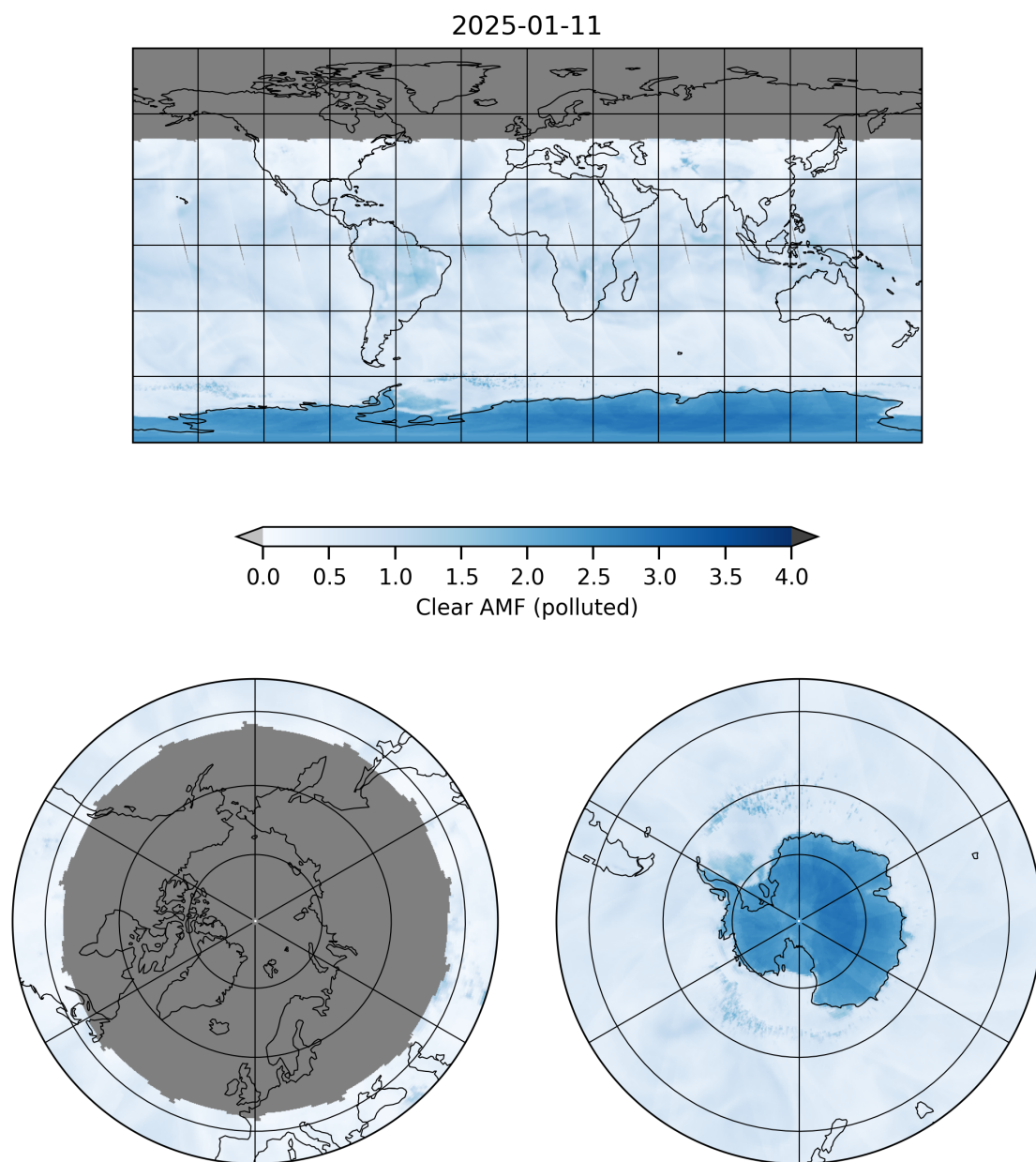


Figure 27: Map of “Clear AMF (polluted)” for 2025-01-11 to 2025-01-12

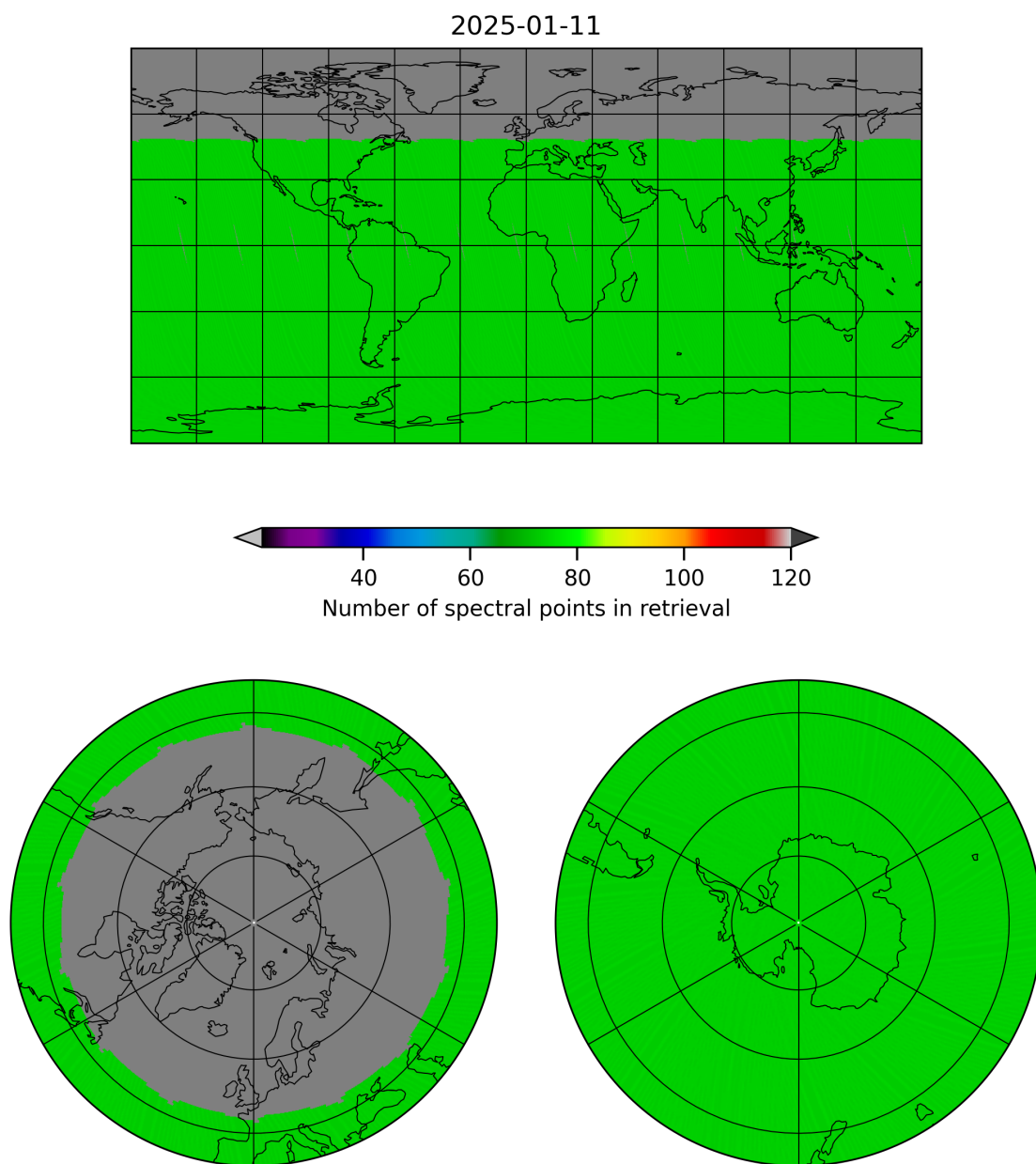


Figure 28: Map of “Number of spectral points in retrieval” for 2025-01-11 to 2025-01-12

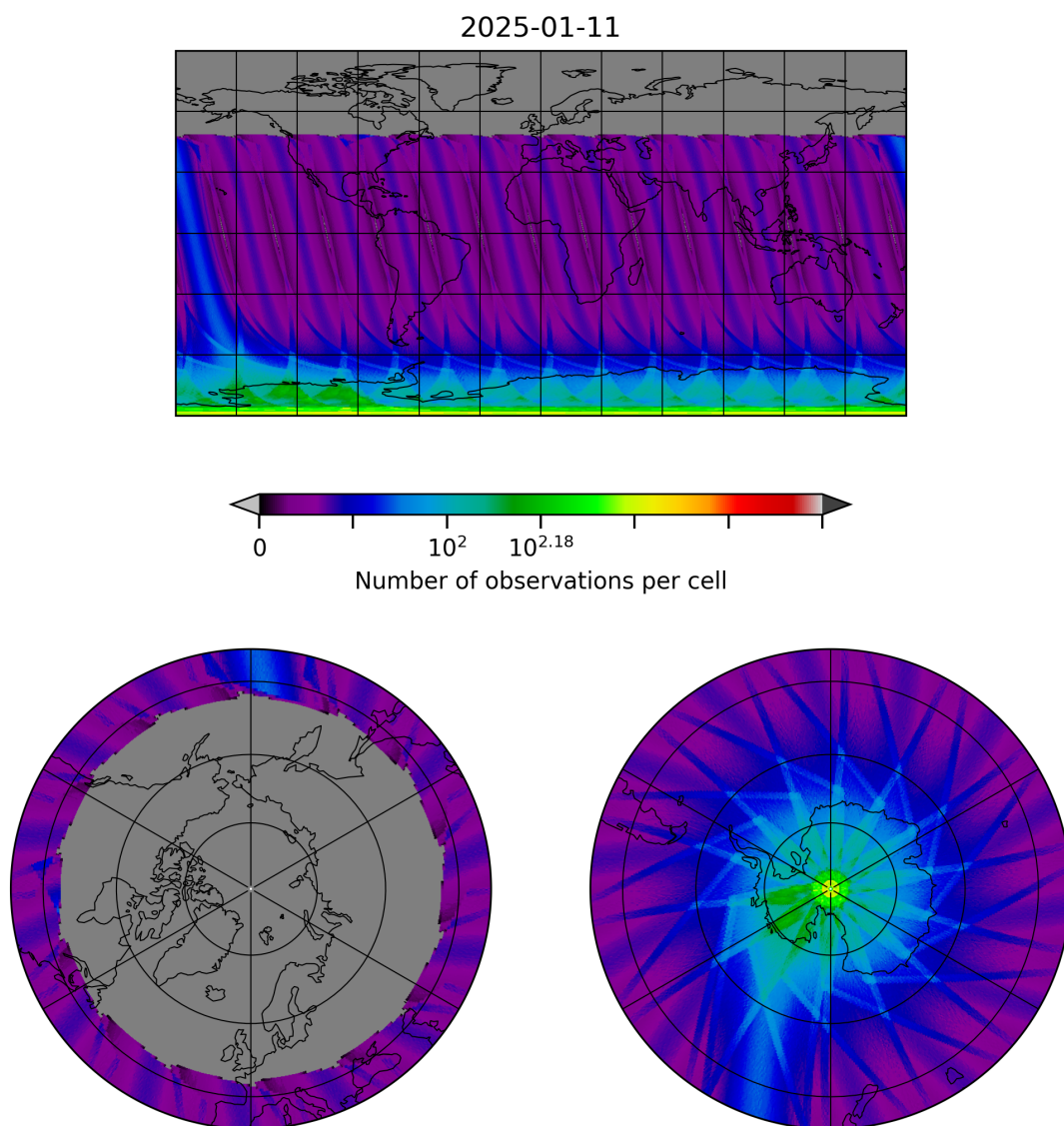


Figure 29: Map of the number of observations for 2025-01-11 to 2025-01-12

7 Zonal average

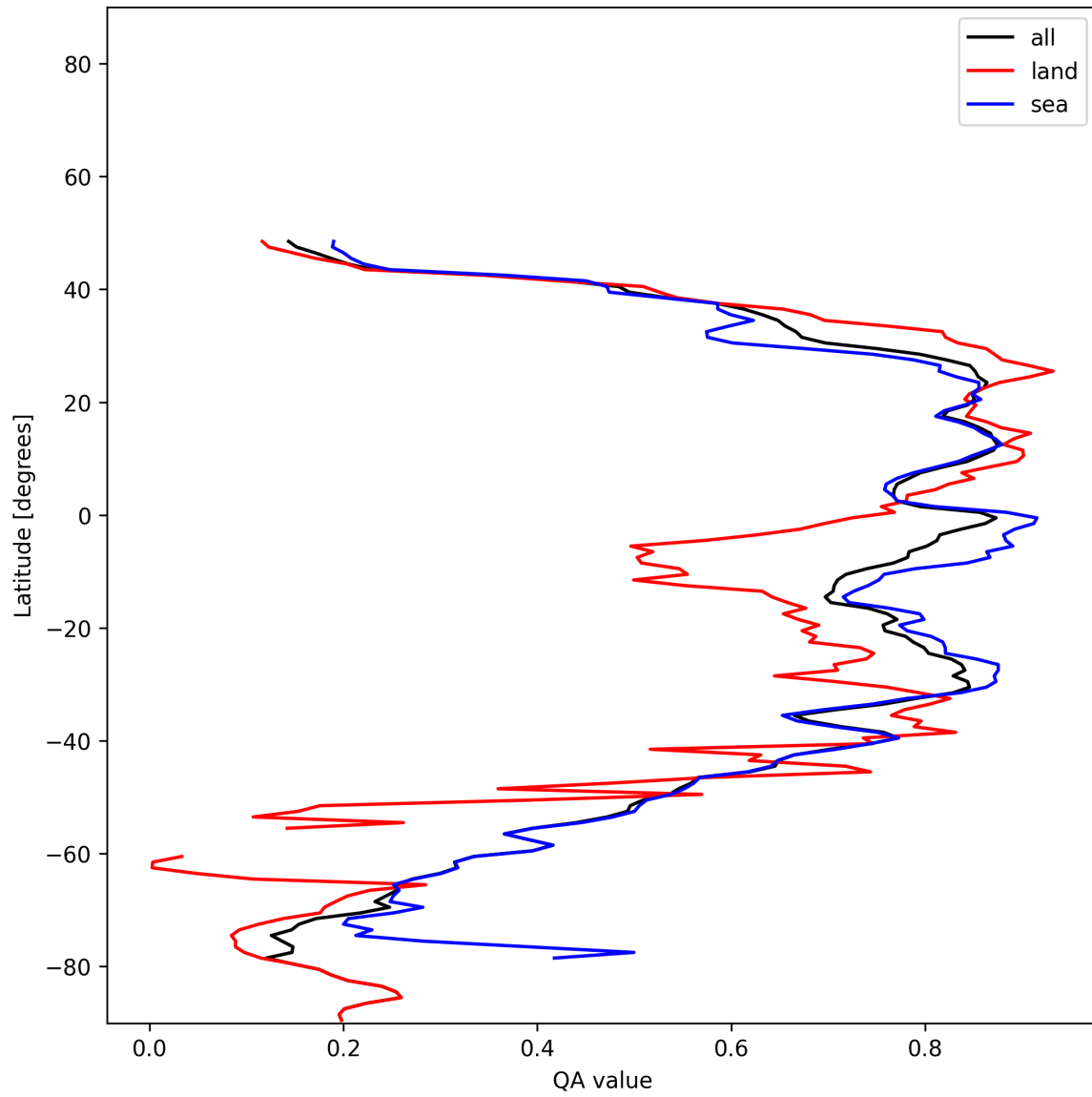


Figure 30: Zonal average of “QA value” for 2025-01-11 to 2025-01-12.

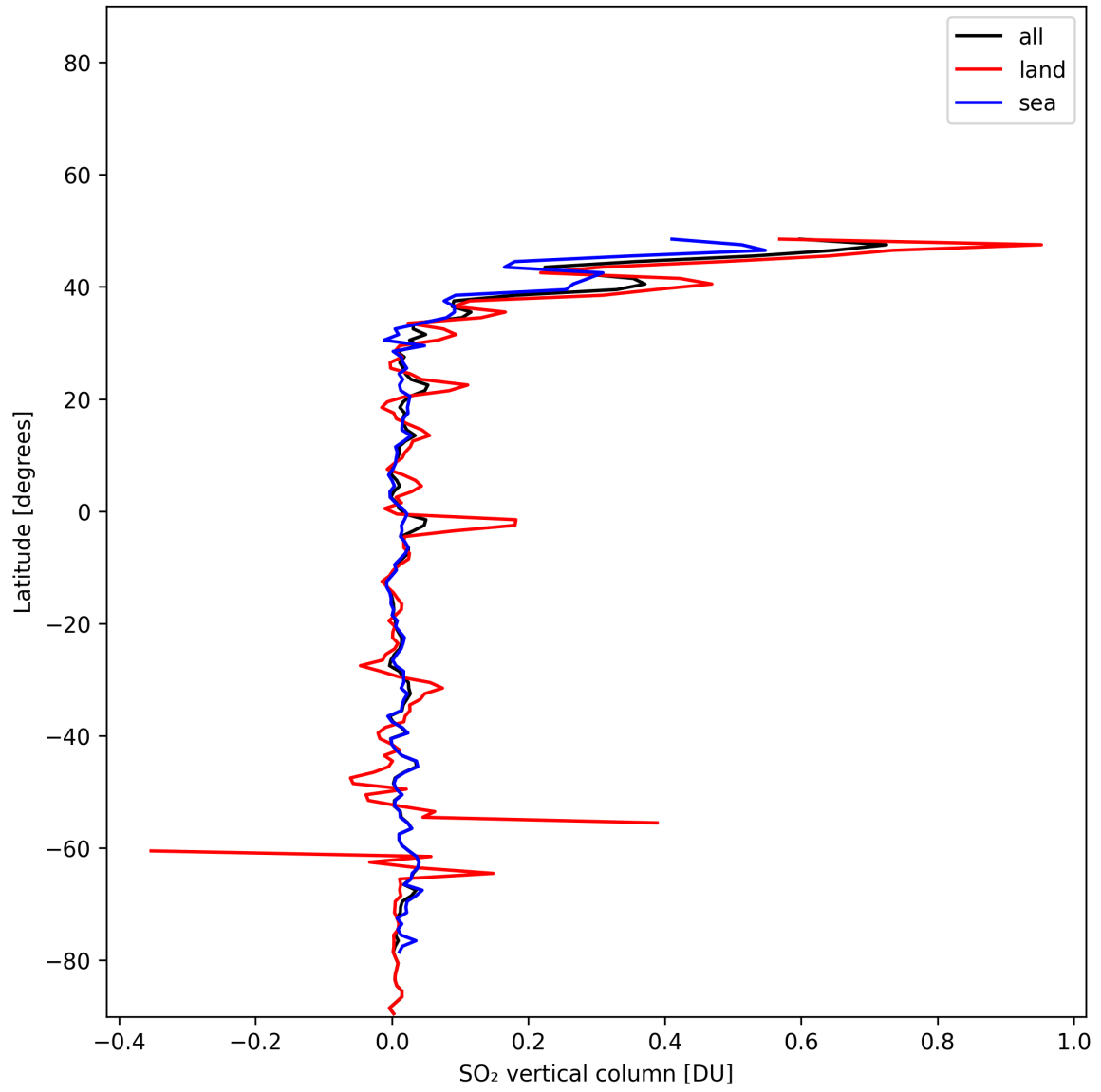


Figure 31: Zonal average of “SO₂ vertical column” for 2025-01-11 to 2025-01-12.

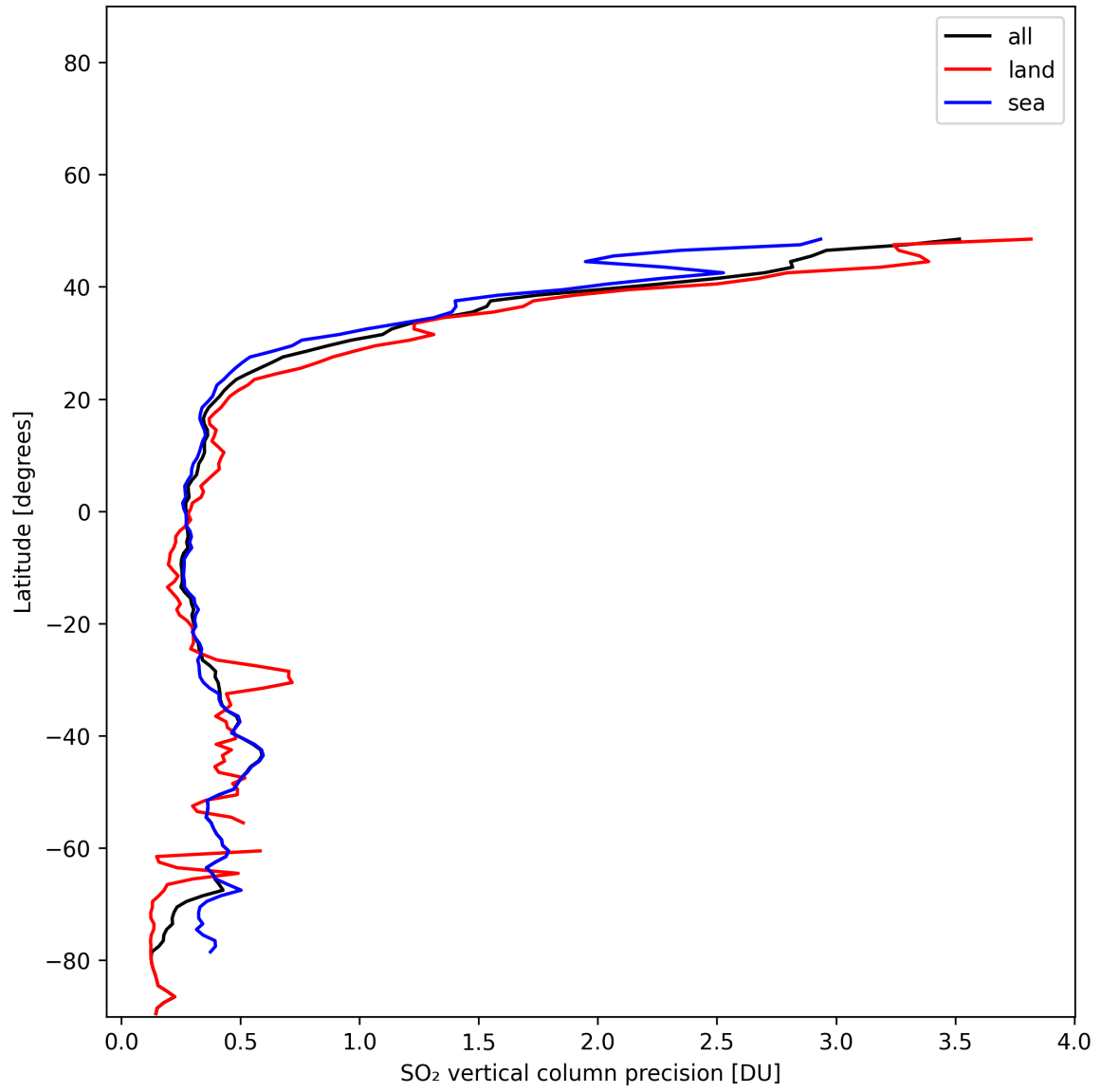


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-01-11 to 2025-01-12.

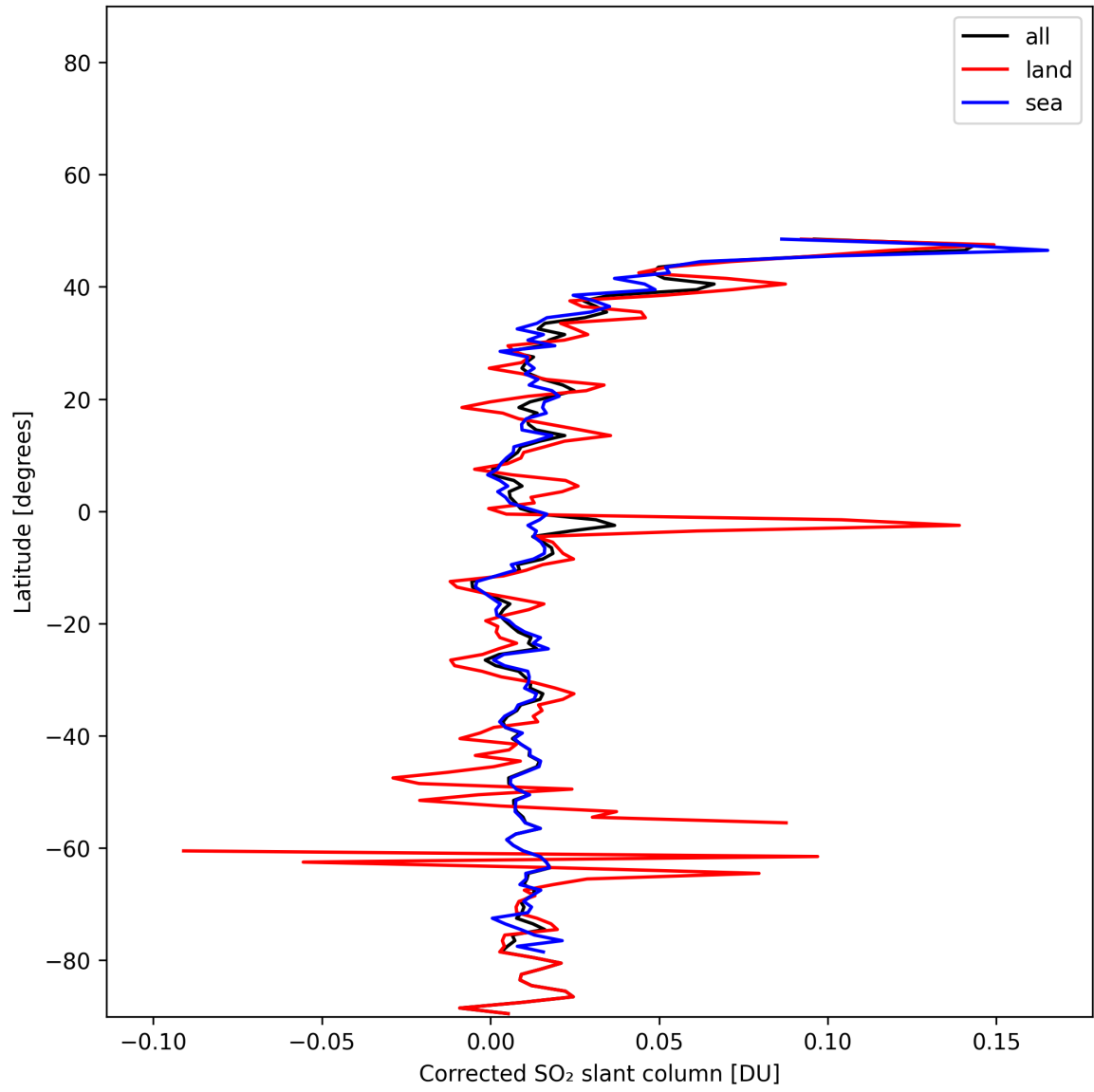


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-01-11 to 2025-01-12.

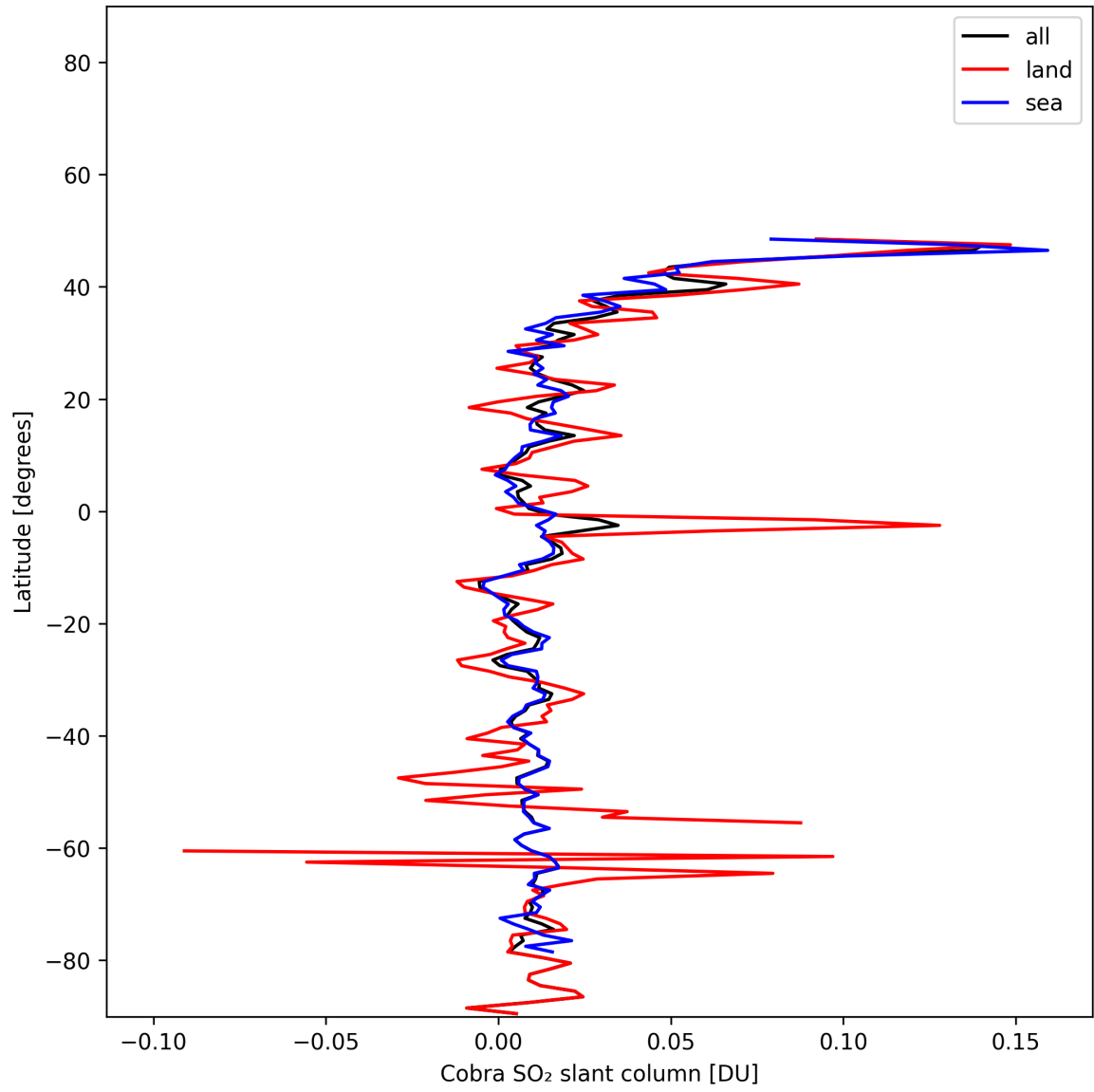


Figure 34: Zonal average of "Cobra SO₂ slant column" for 2025-01-11 to 2025-01-12.

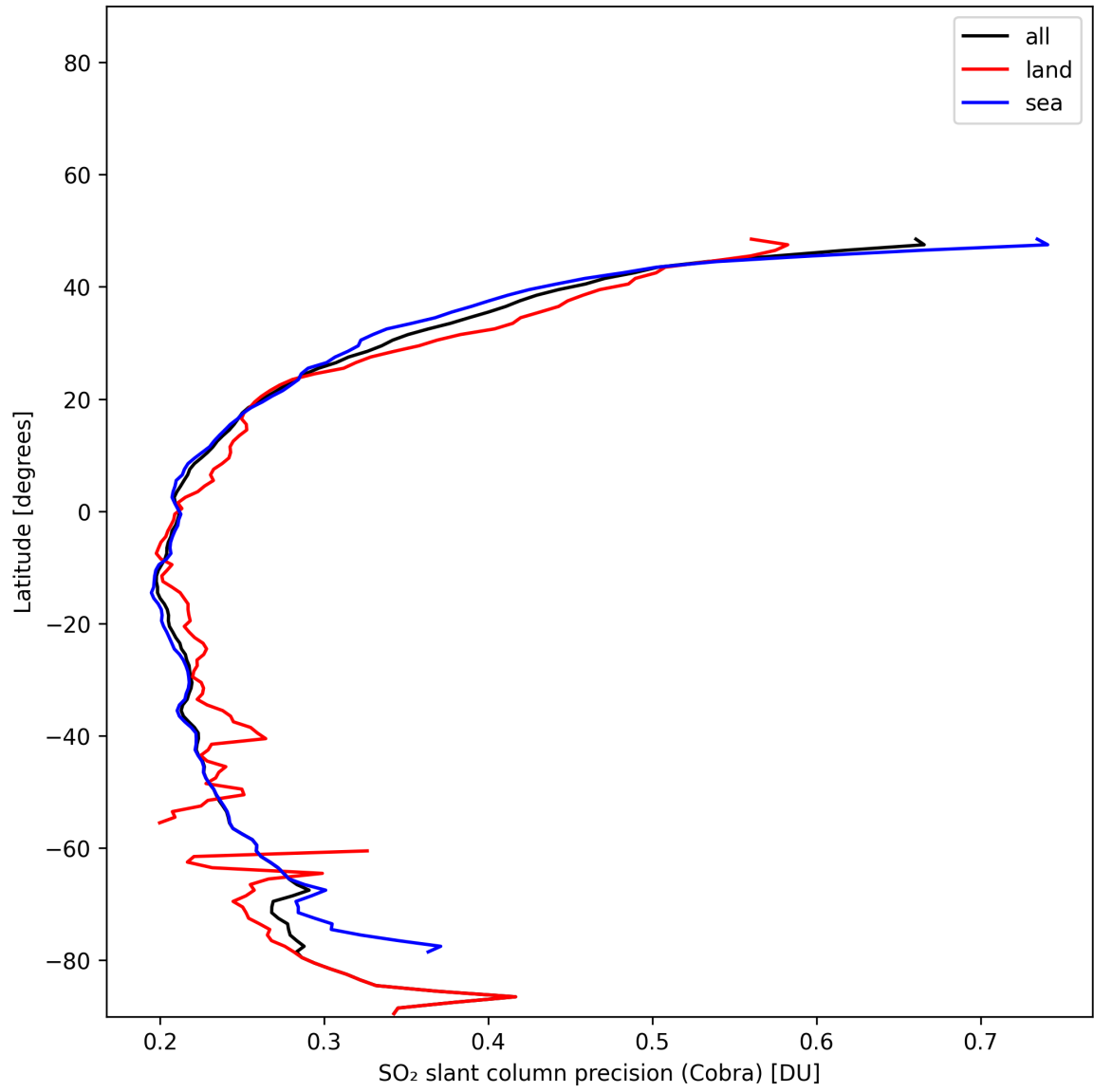


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-01-11 to 2025-01-12.

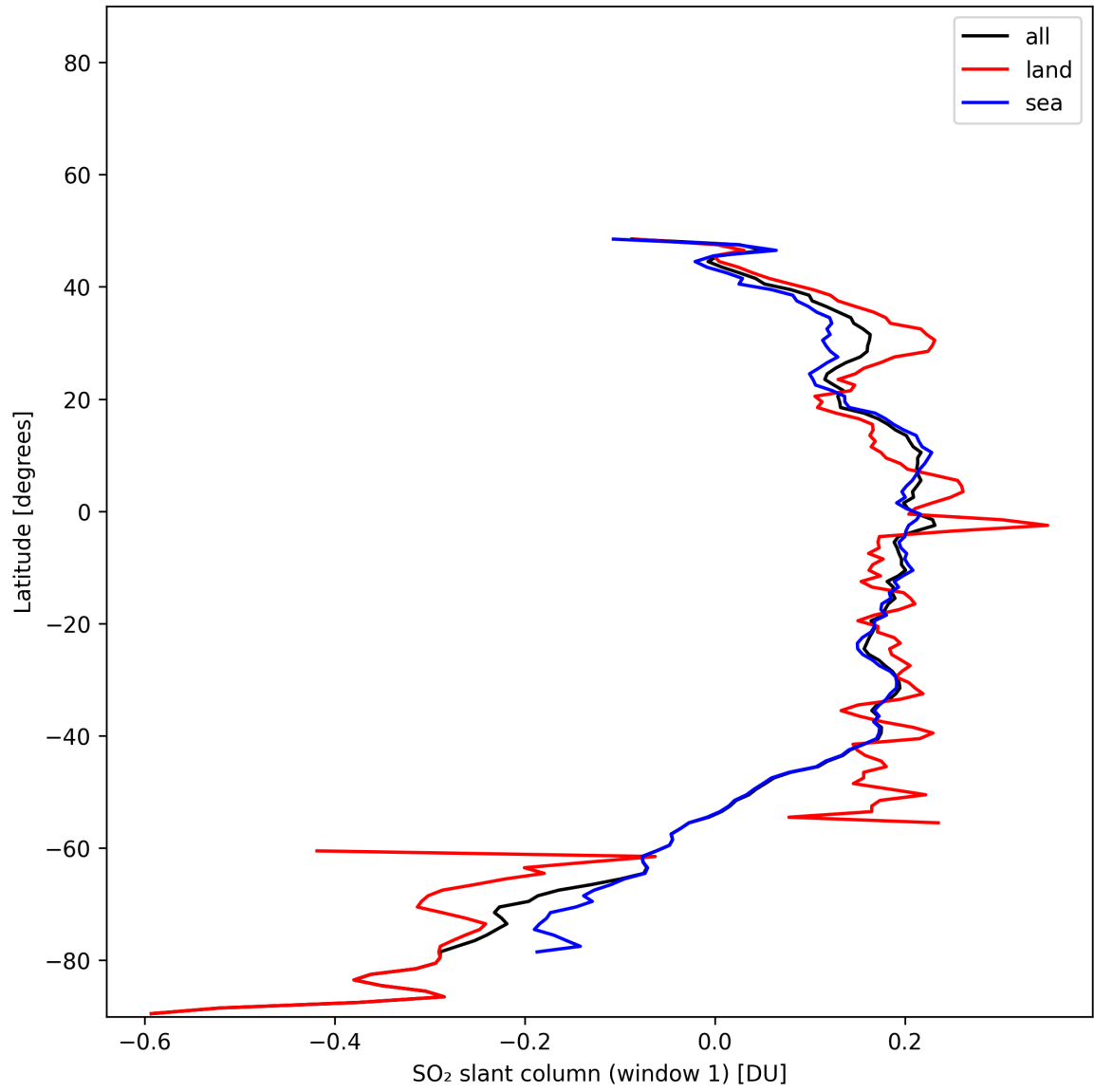


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-01-11 to 2025-01-12.

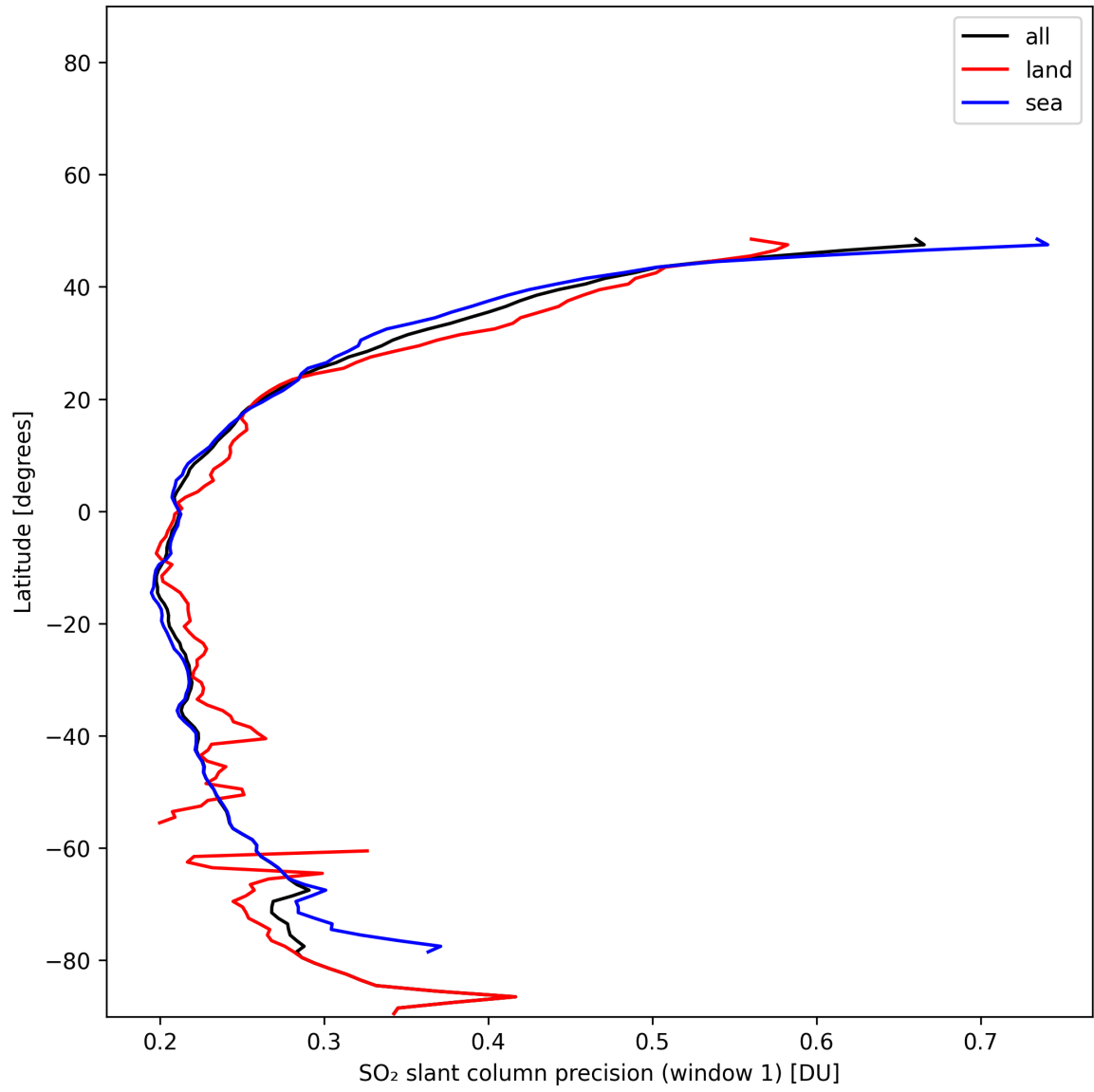


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-01-11 to 2025-01-12.

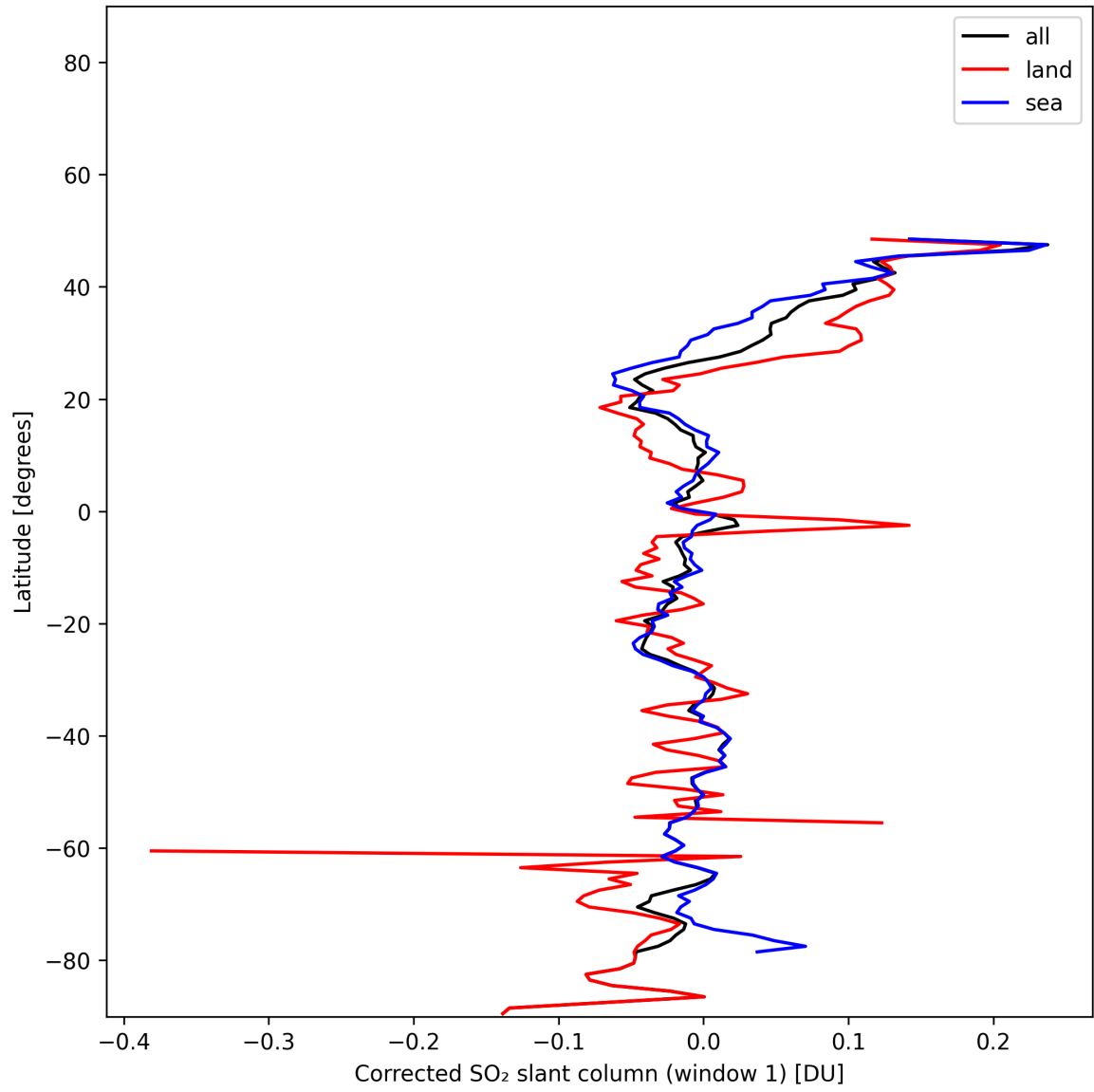


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-01-11 to 2025-01-12.

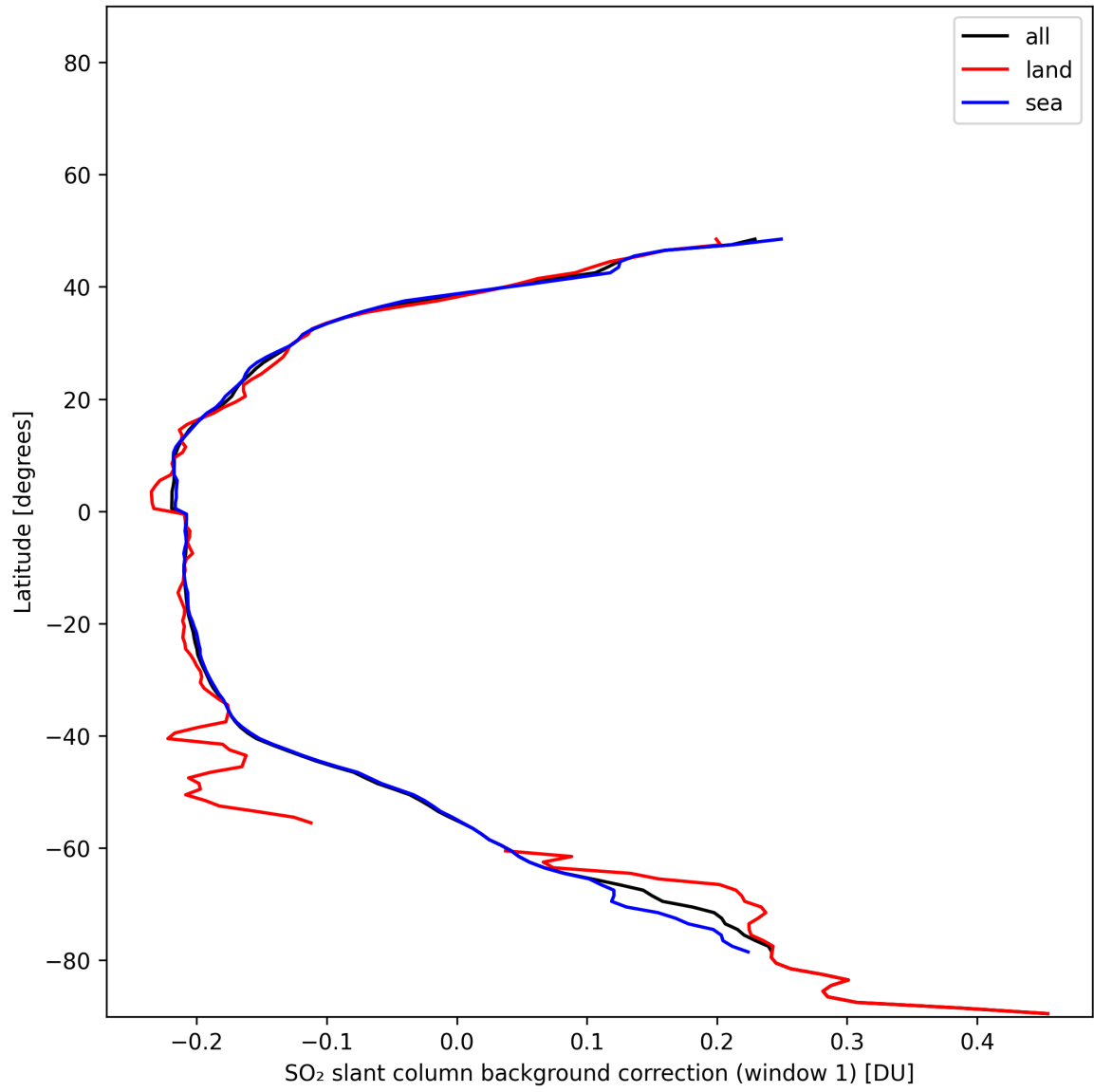


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-01-11 to 2025-01-12.

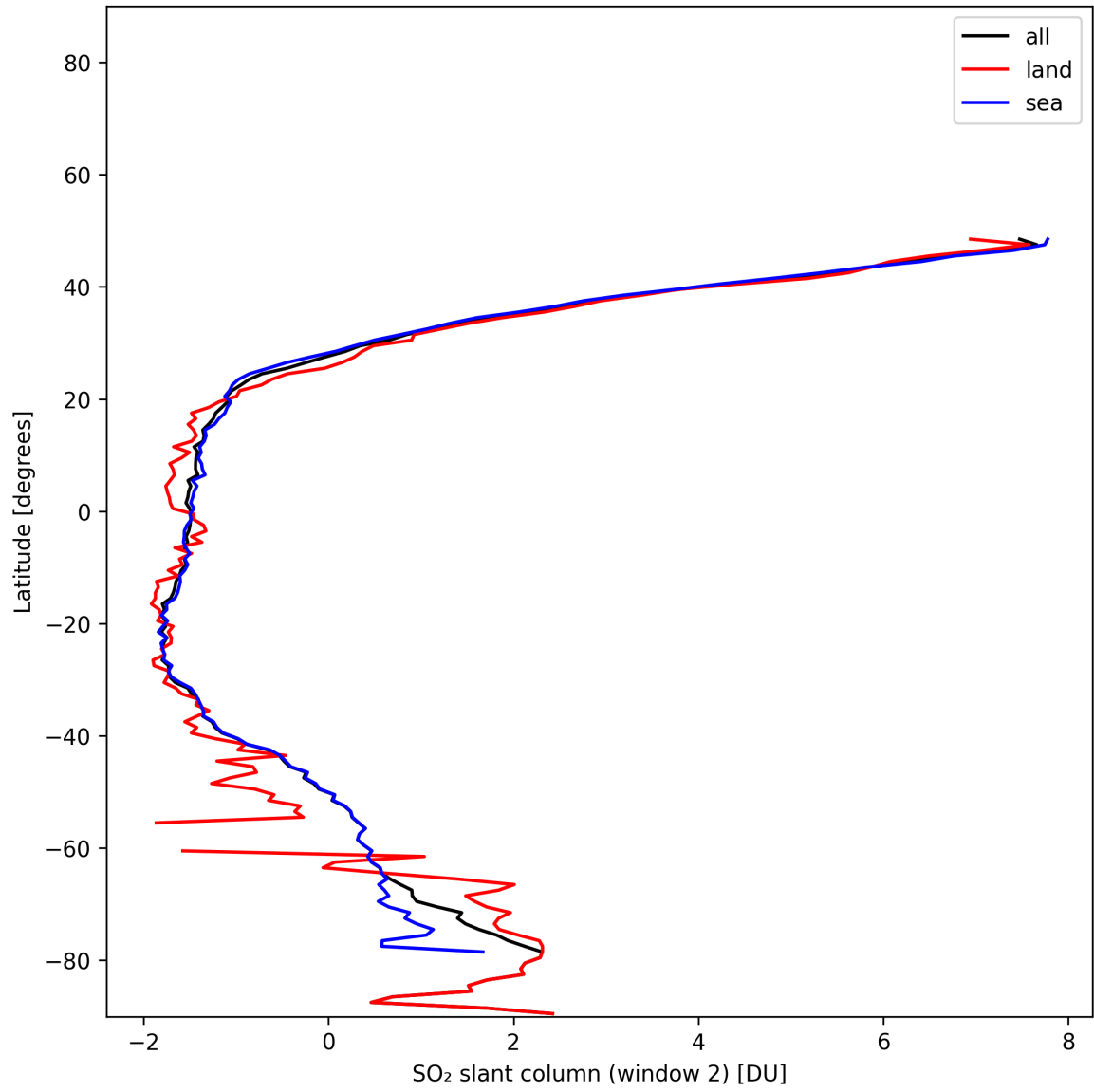


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-01-11 to 2025-01-12.

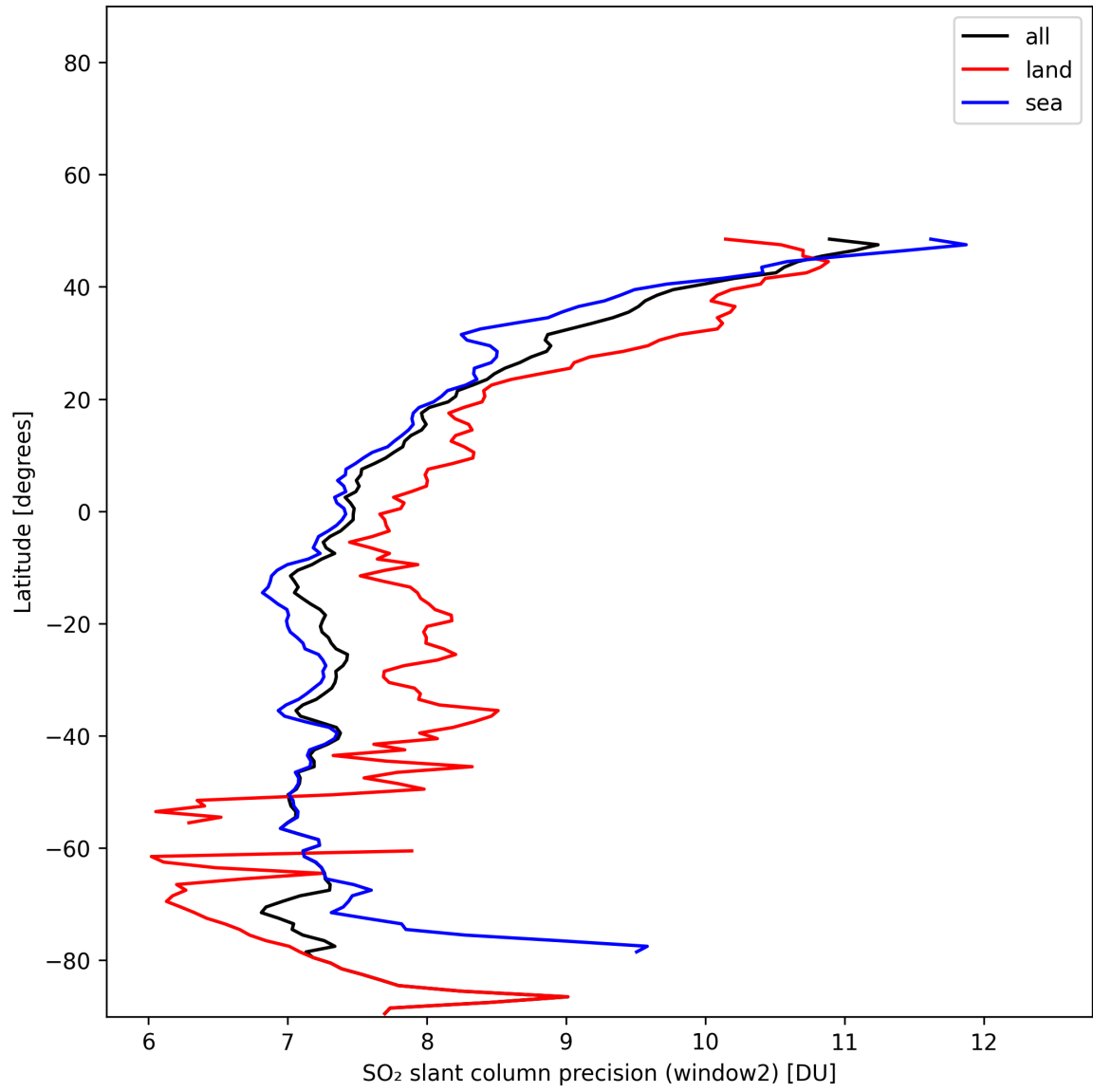


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-01-11 to 2025-01-12.

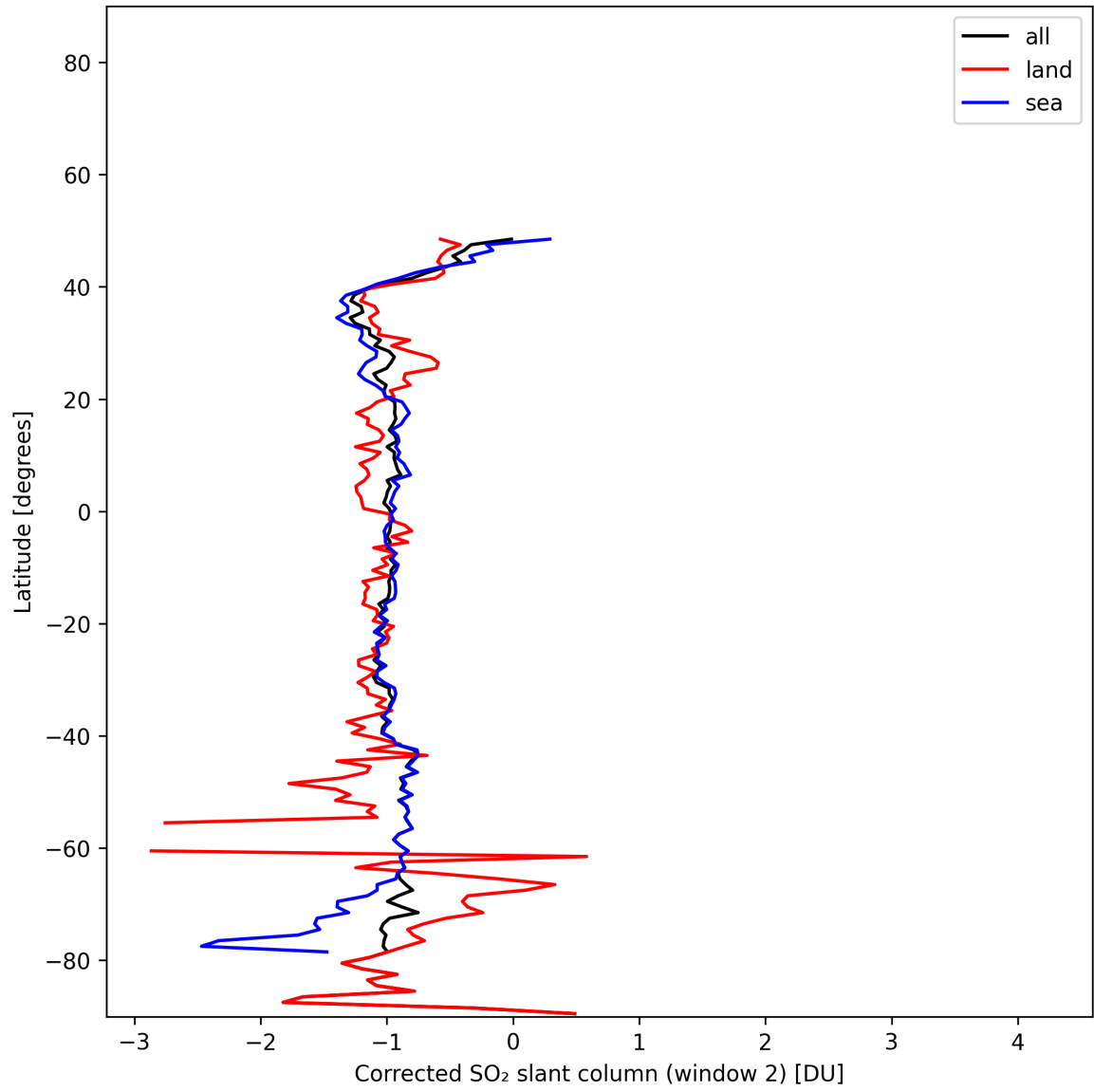


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-01-11 to 2025-01-12.

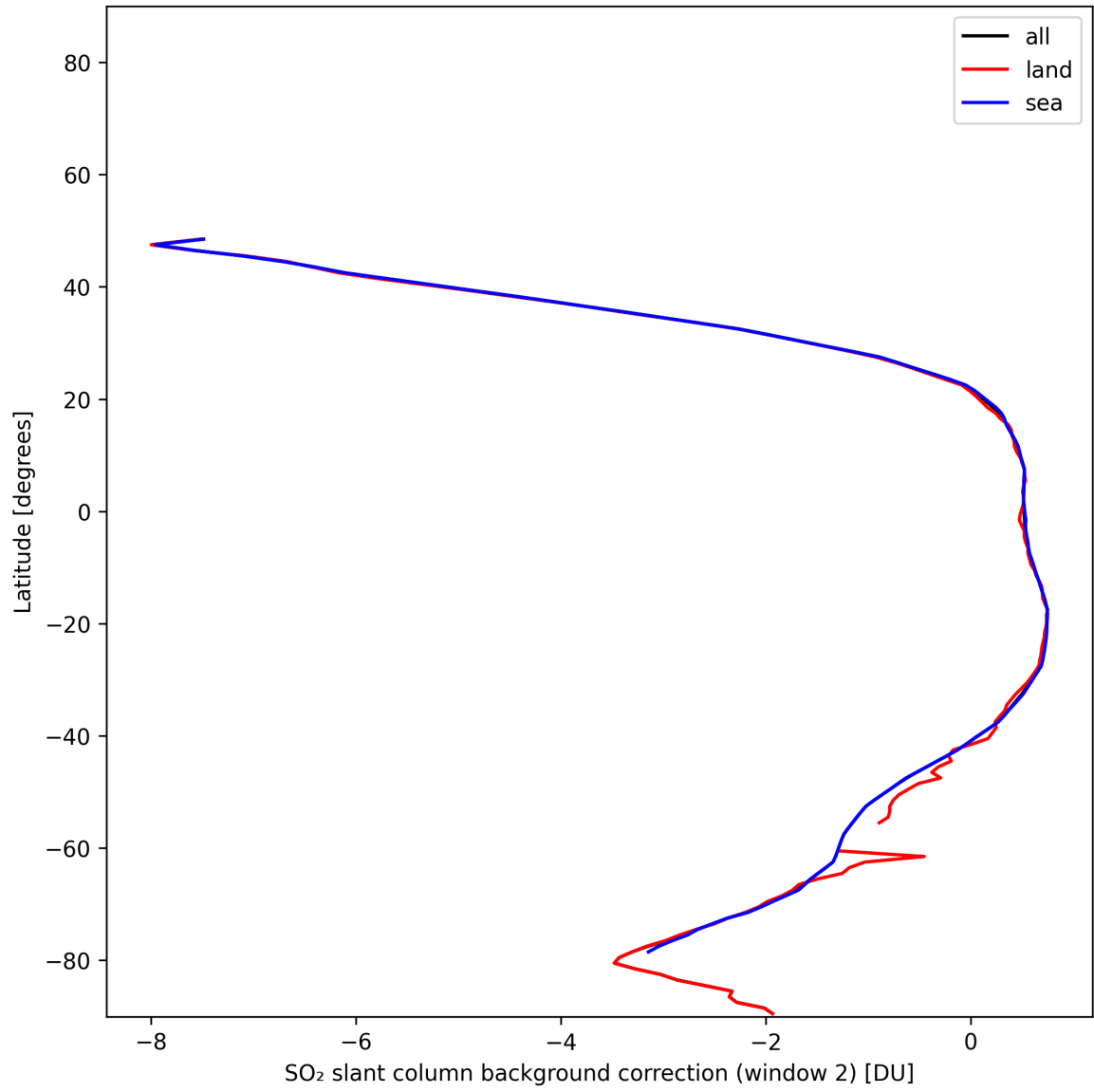


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-01-11 to 2025-01-12.

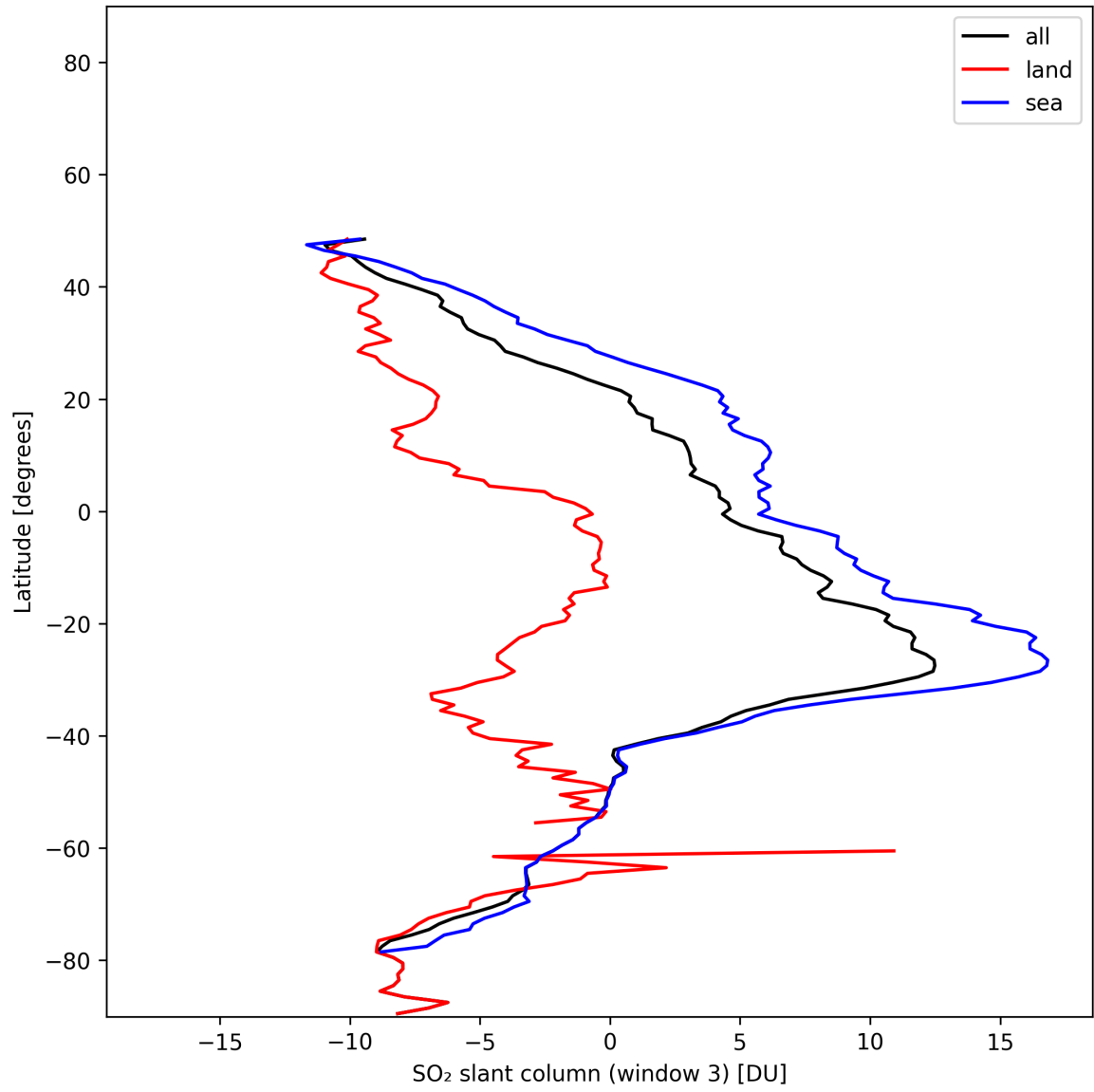


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-01-11 to 2025-01-12.

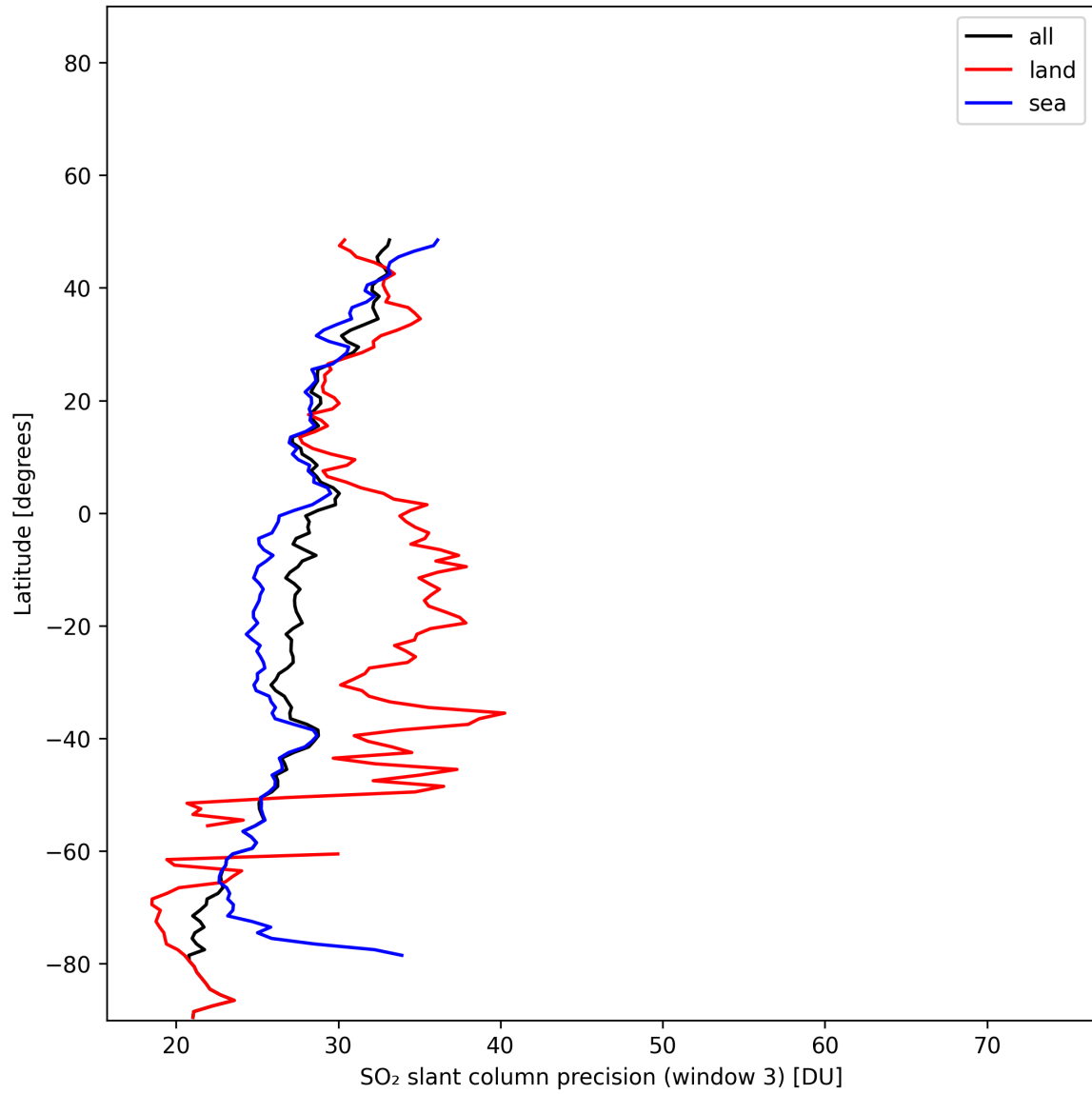


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-01-11 to 2025-01-12.

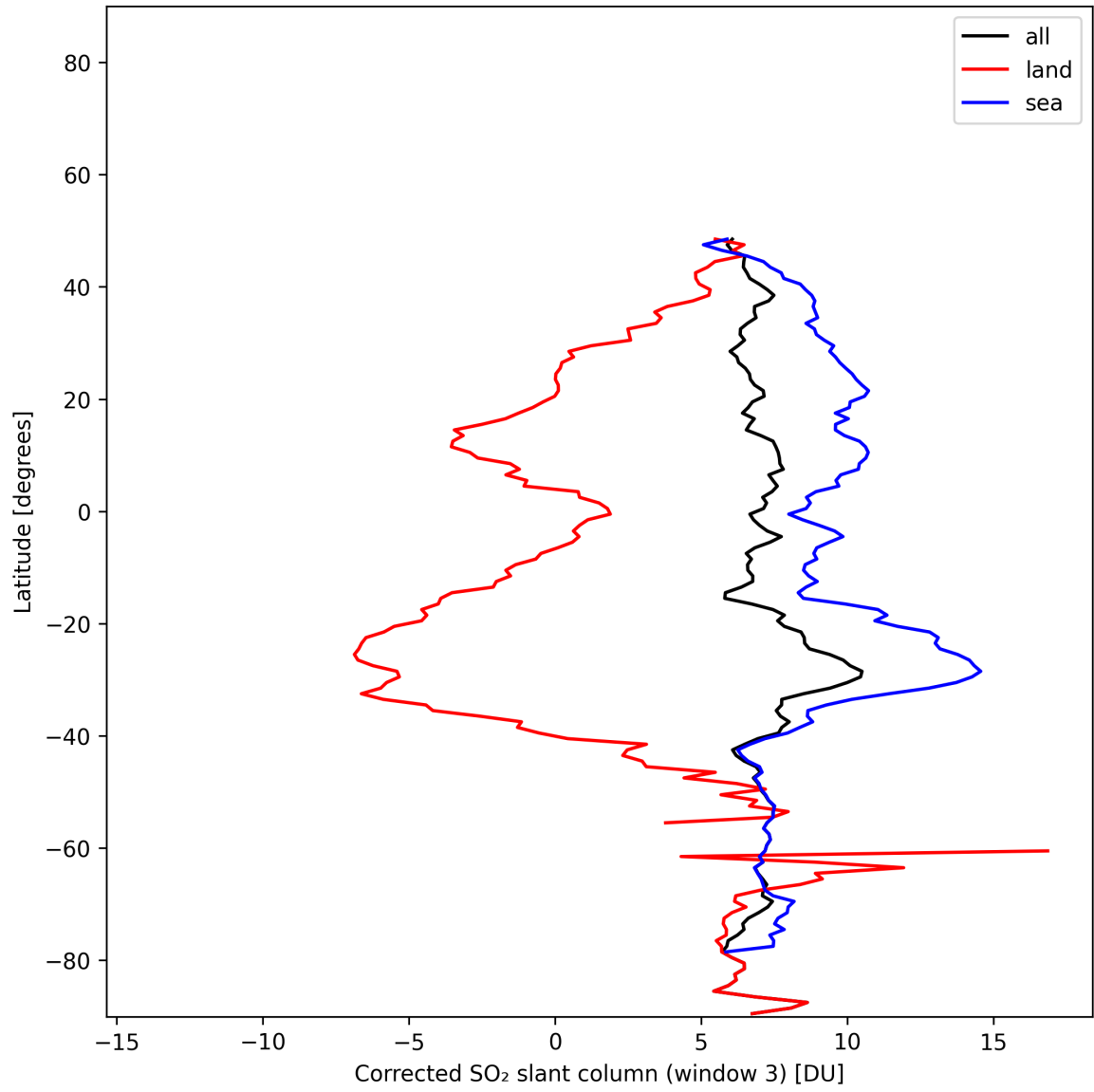


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-01-11 to 2025-01-12.

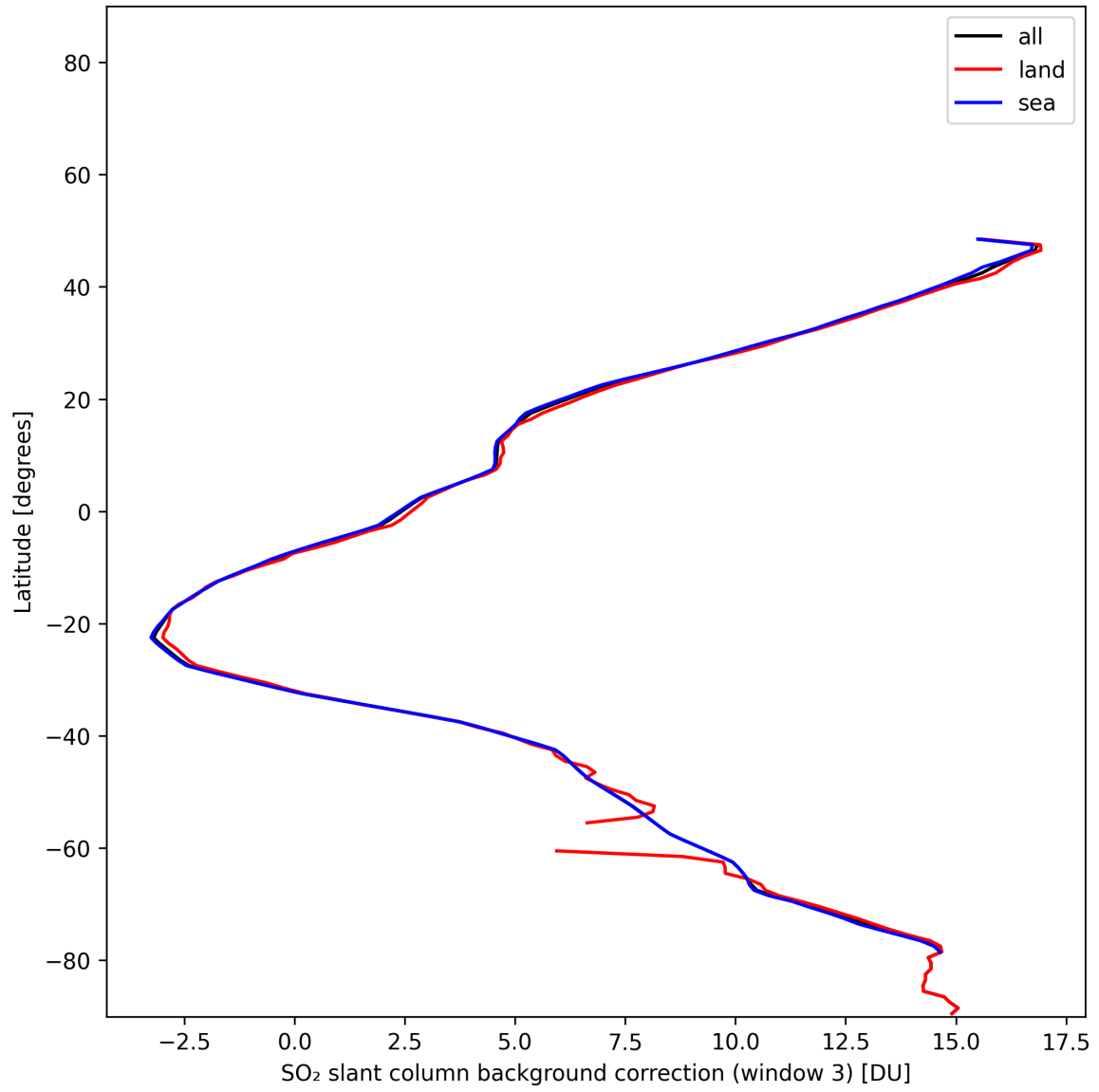


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-01-11 to 2025-01-12.

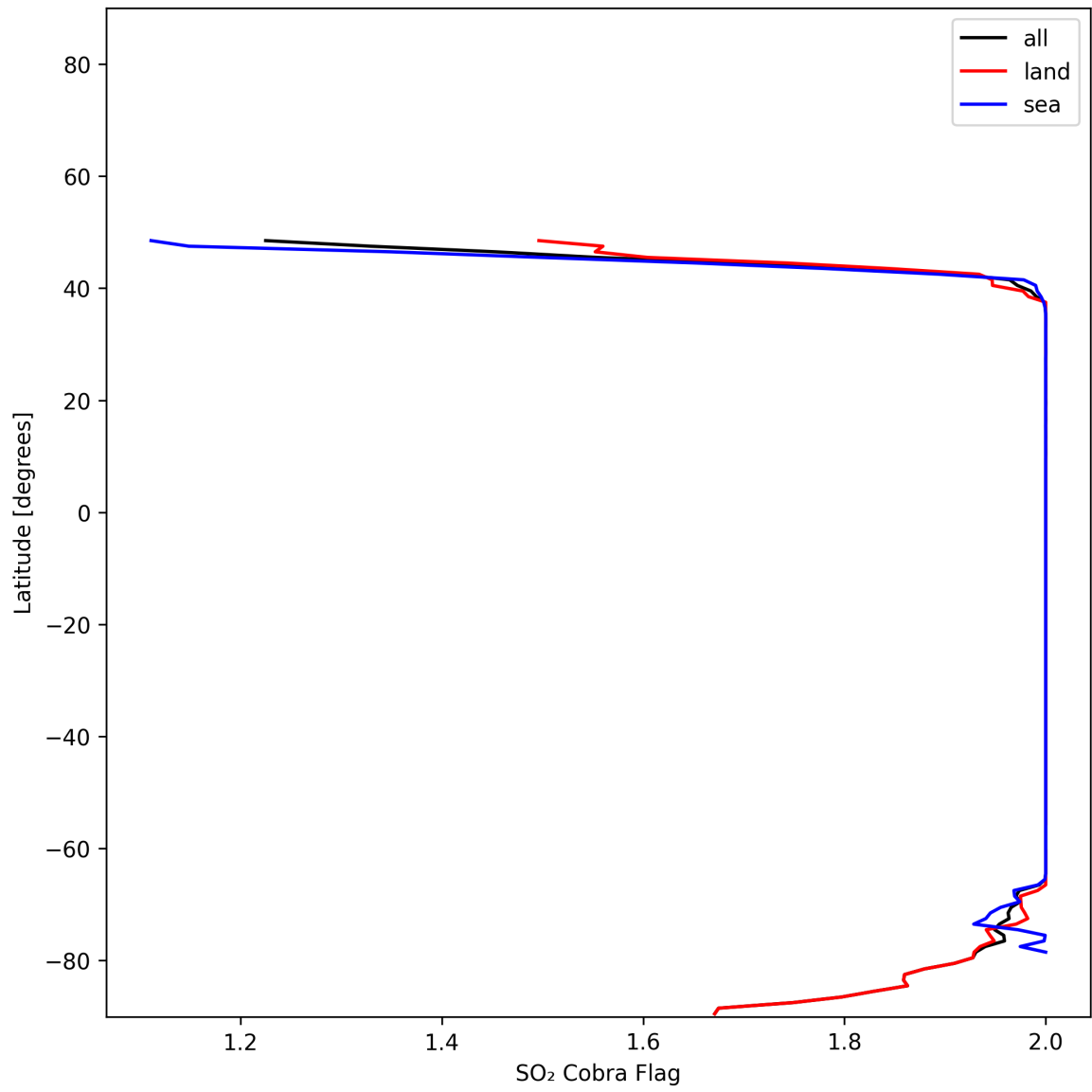


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-01-11 to 2025-01-12.

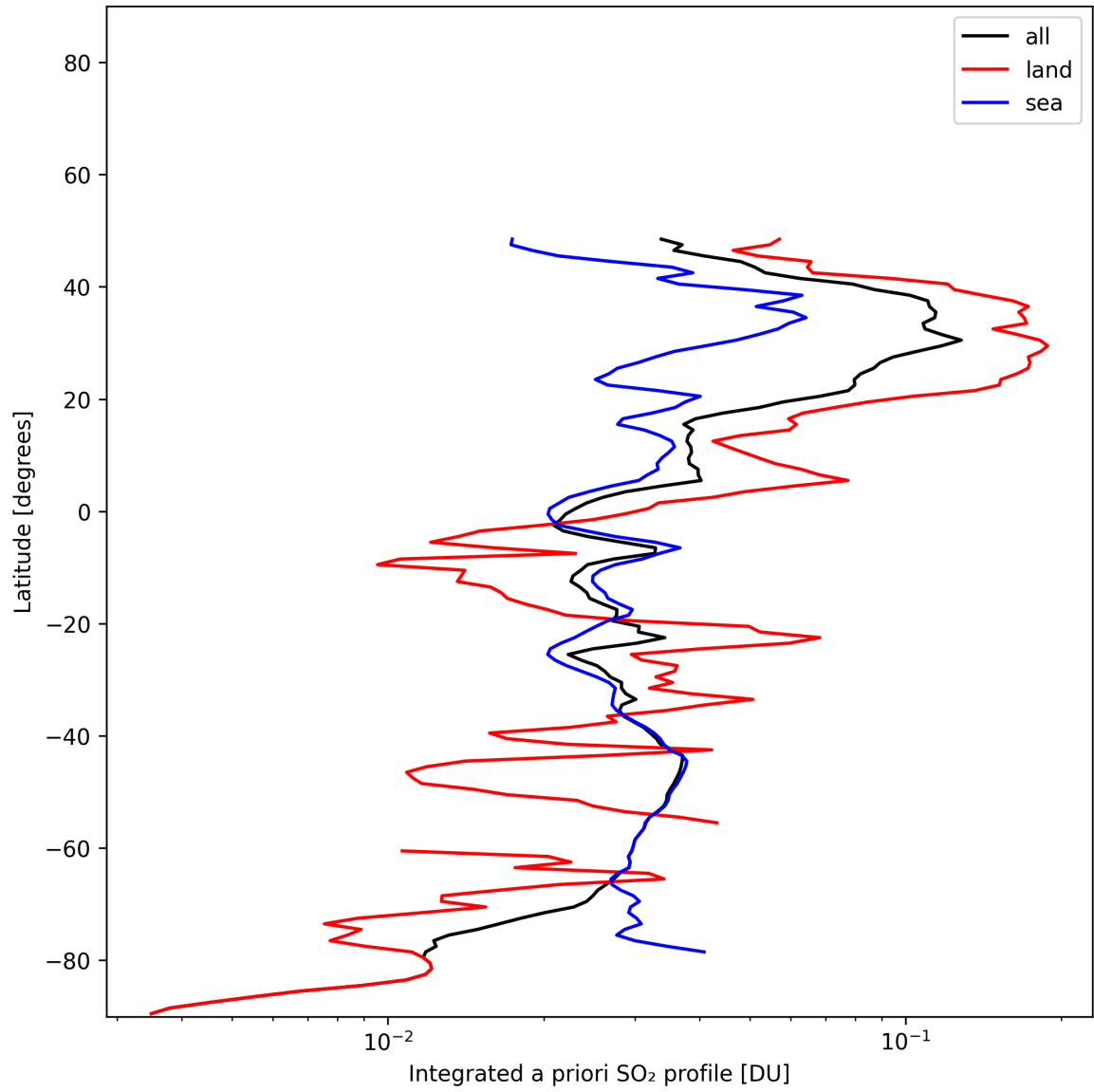


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-01-11 to 2025-01-12.

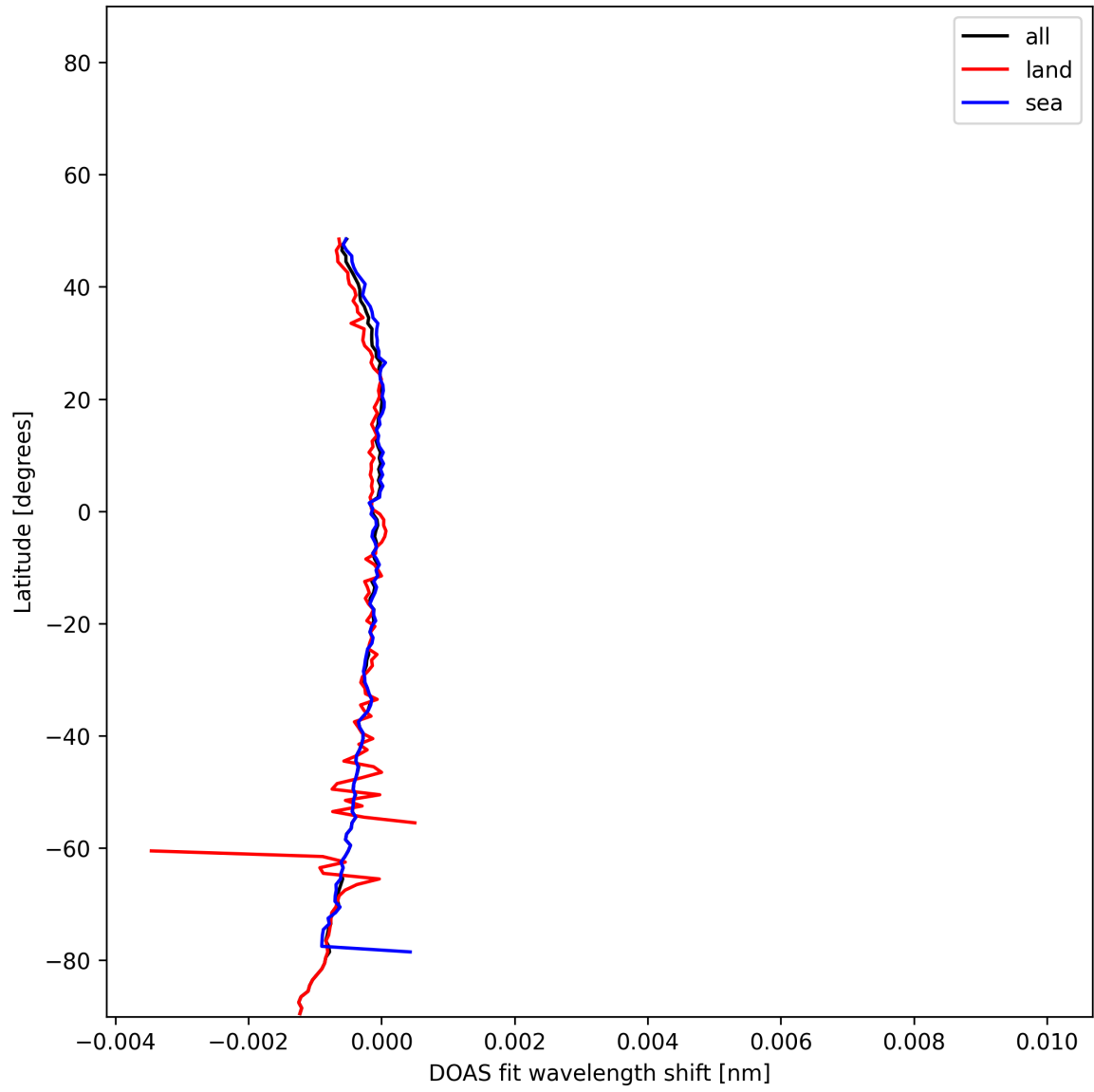


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2025-01-11 to 2025-01-12.

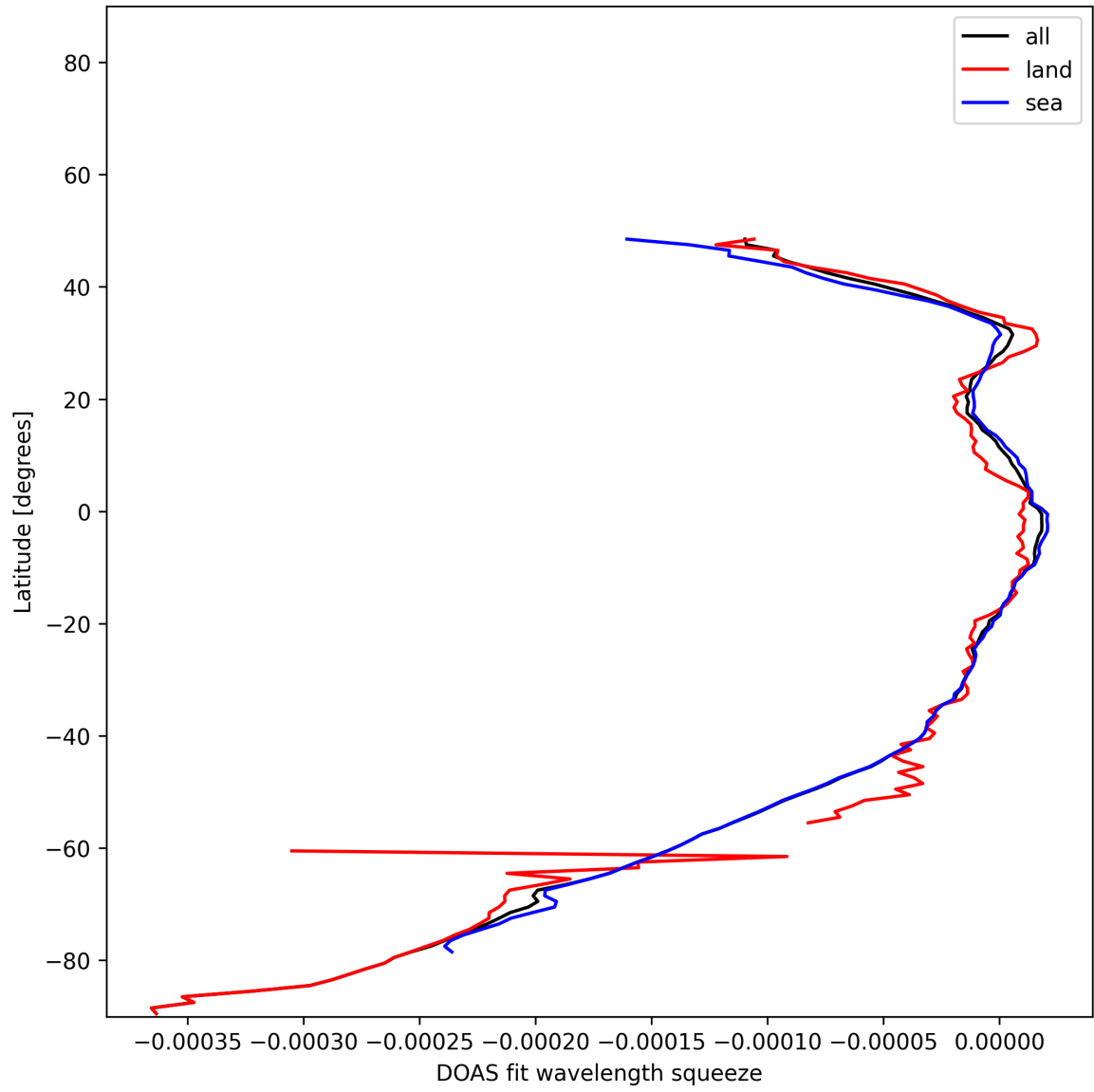


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-01-11 to 2025-01-12.

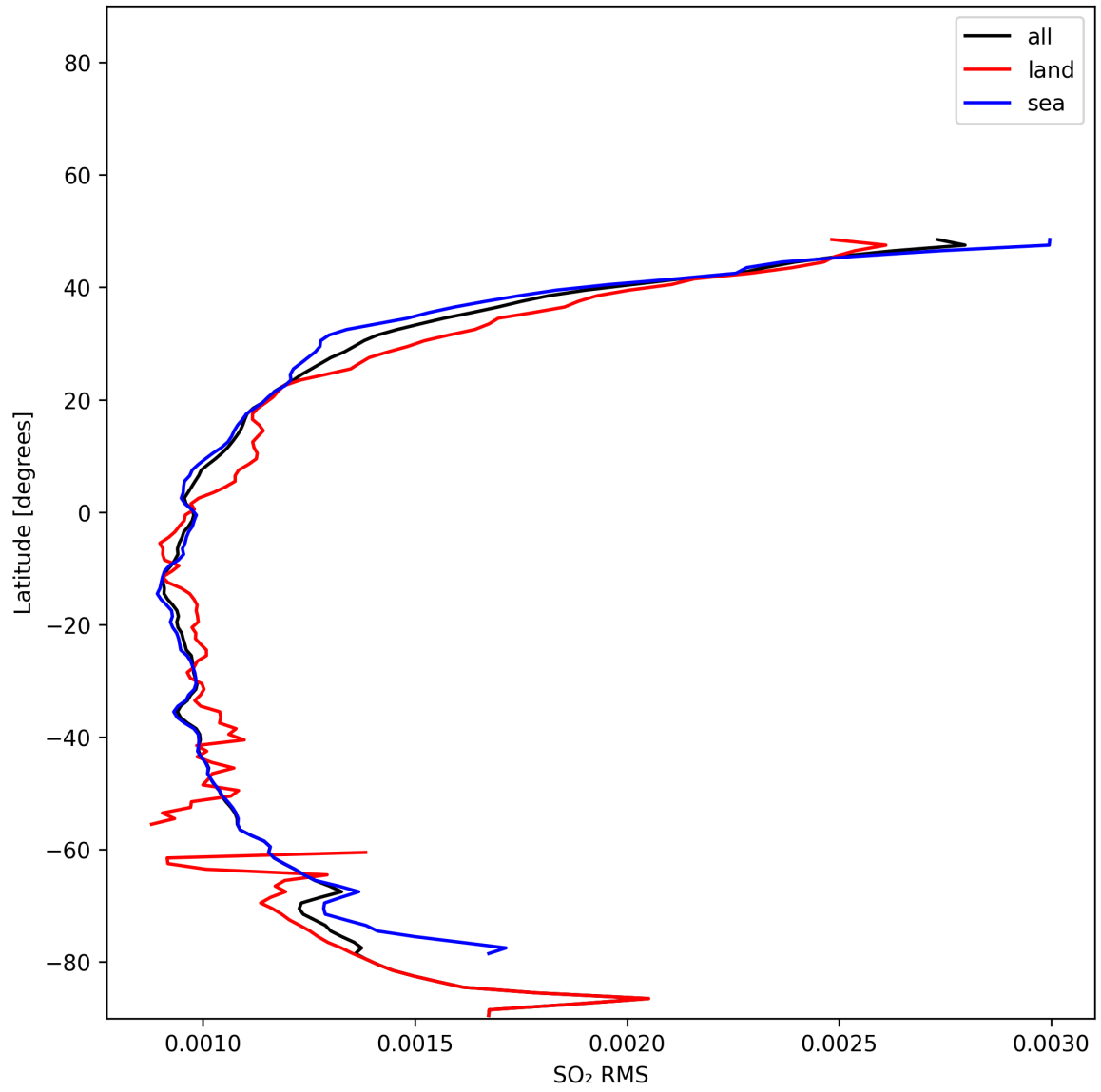


Figure 52: Zonal average of “SO₂ RMS” for 2025-01-11 to 2025-01-12.

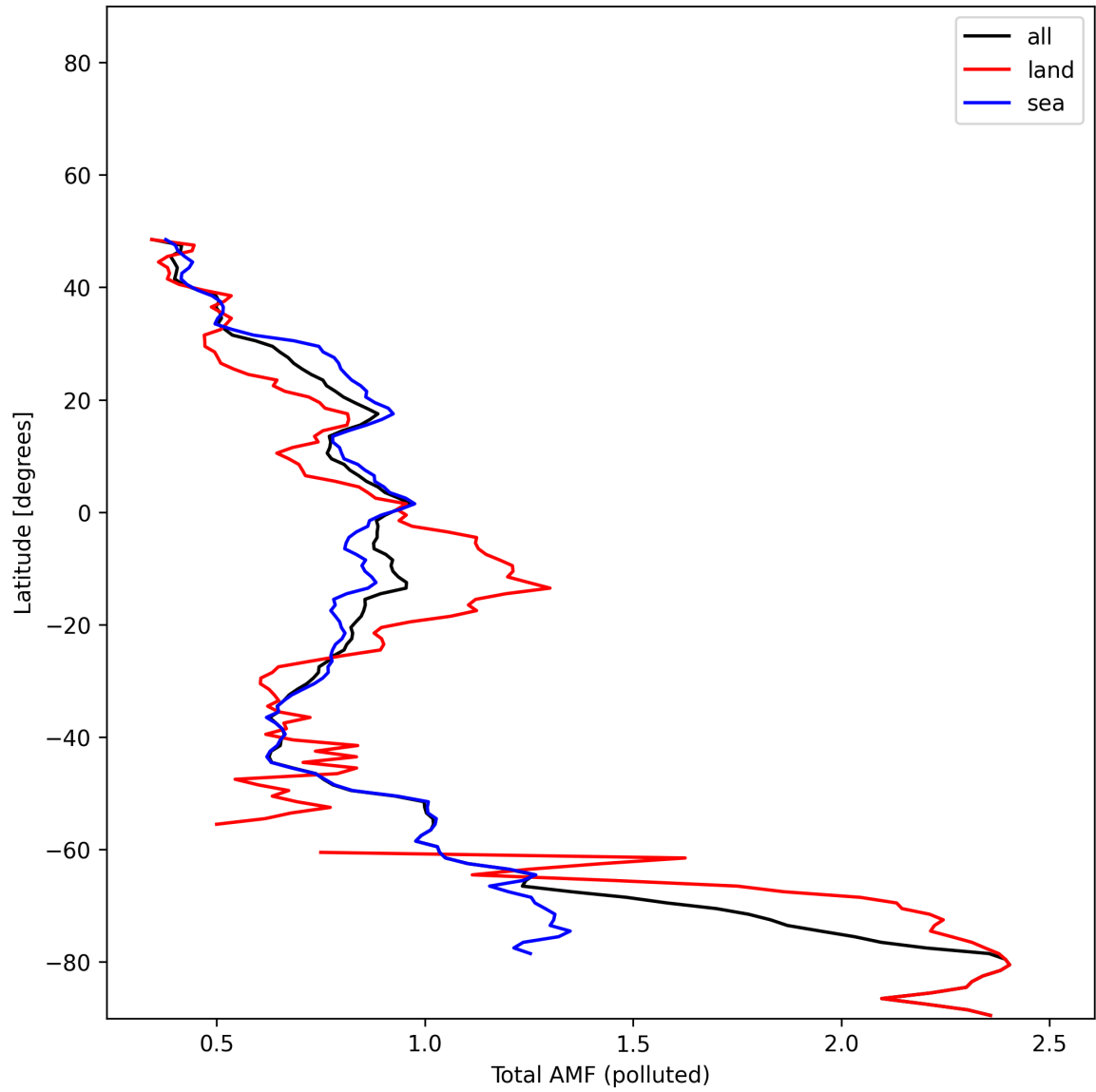


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-01-11 to 2025-01-12.

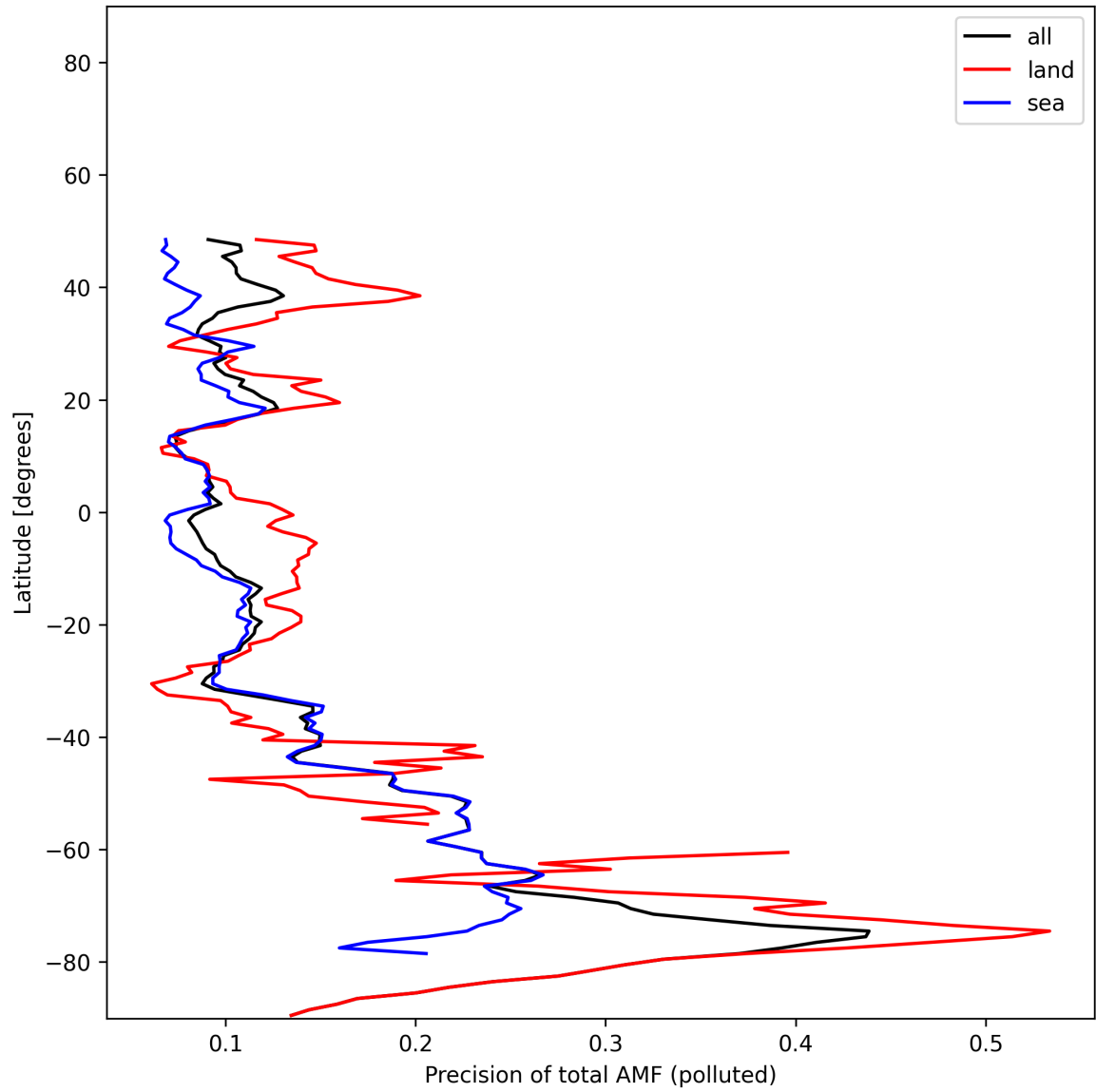


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-01-11 to 2025-01-12.

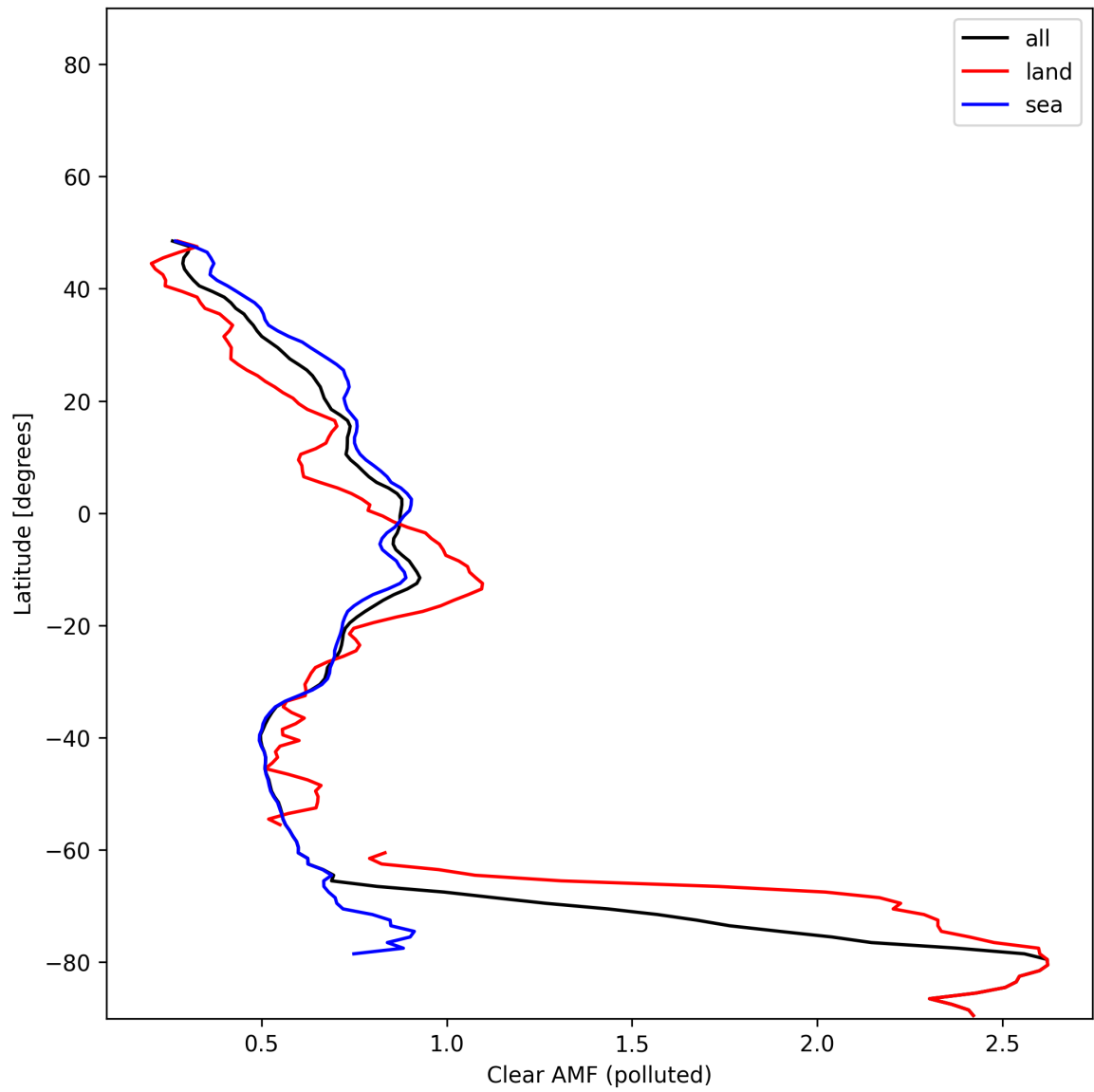


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-01-11 to 2025-01-12.

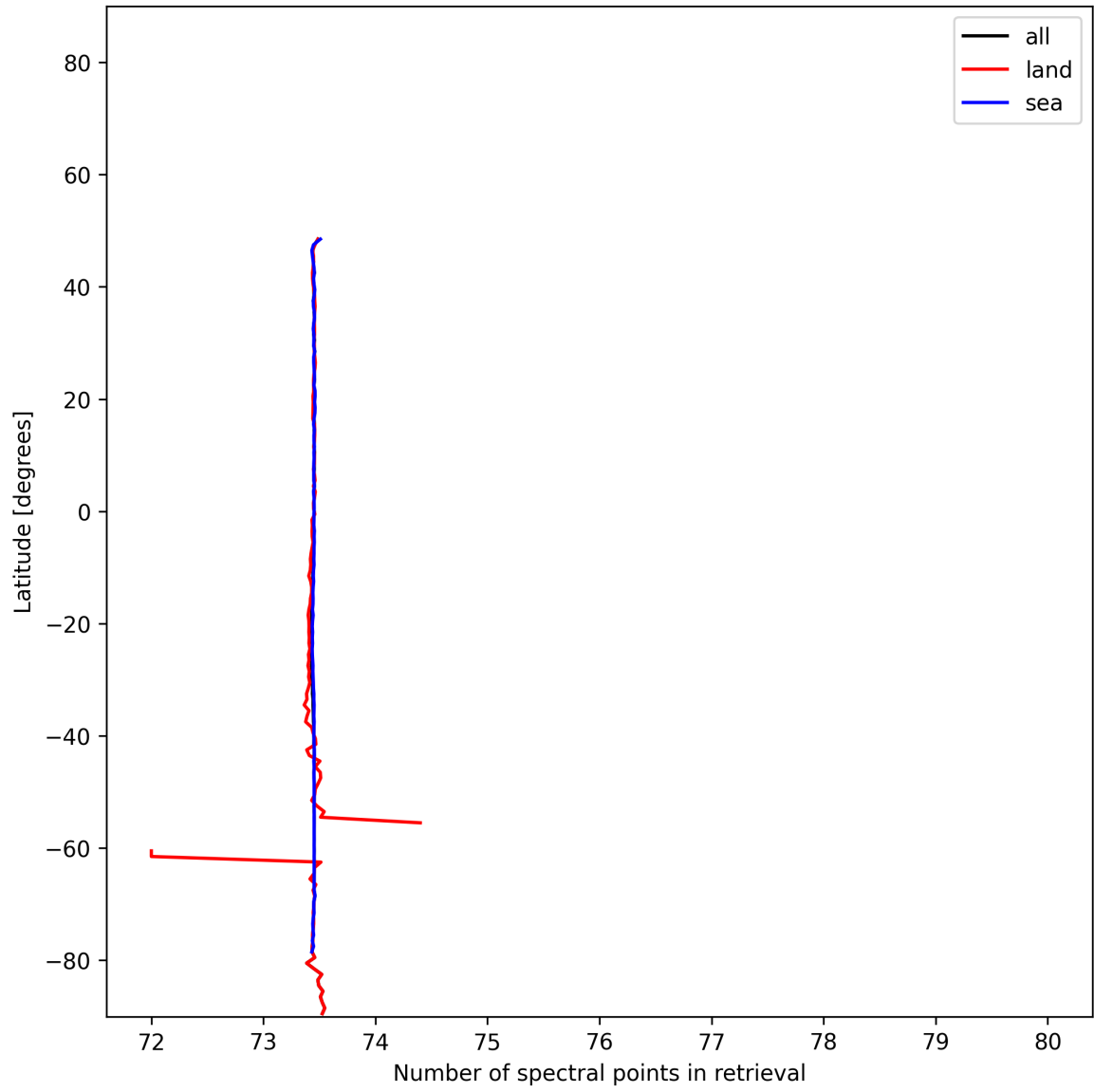


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-01-11 to 2025-01-12.

8 Histograms

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

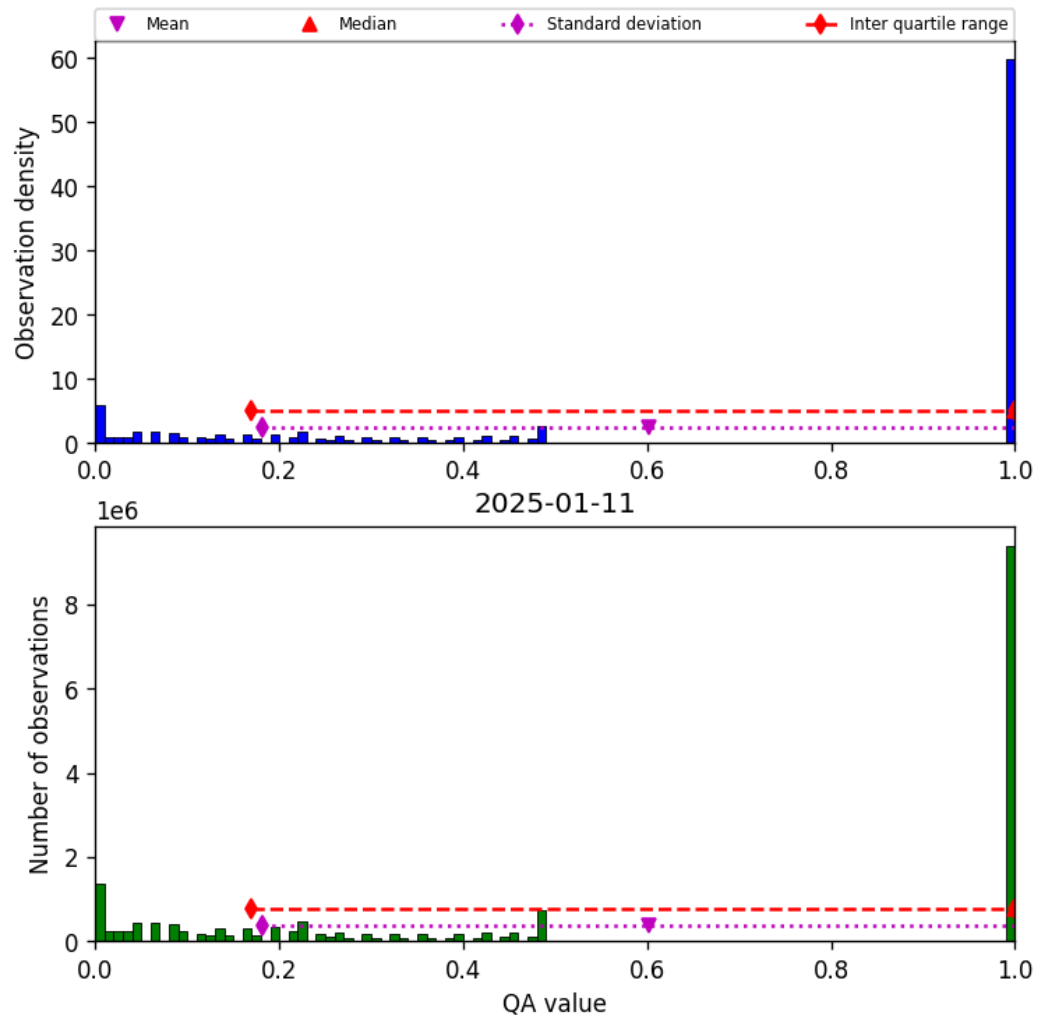


Figure 57: Histogram of “QA value” for 2025-01-11 to 2025-01-12

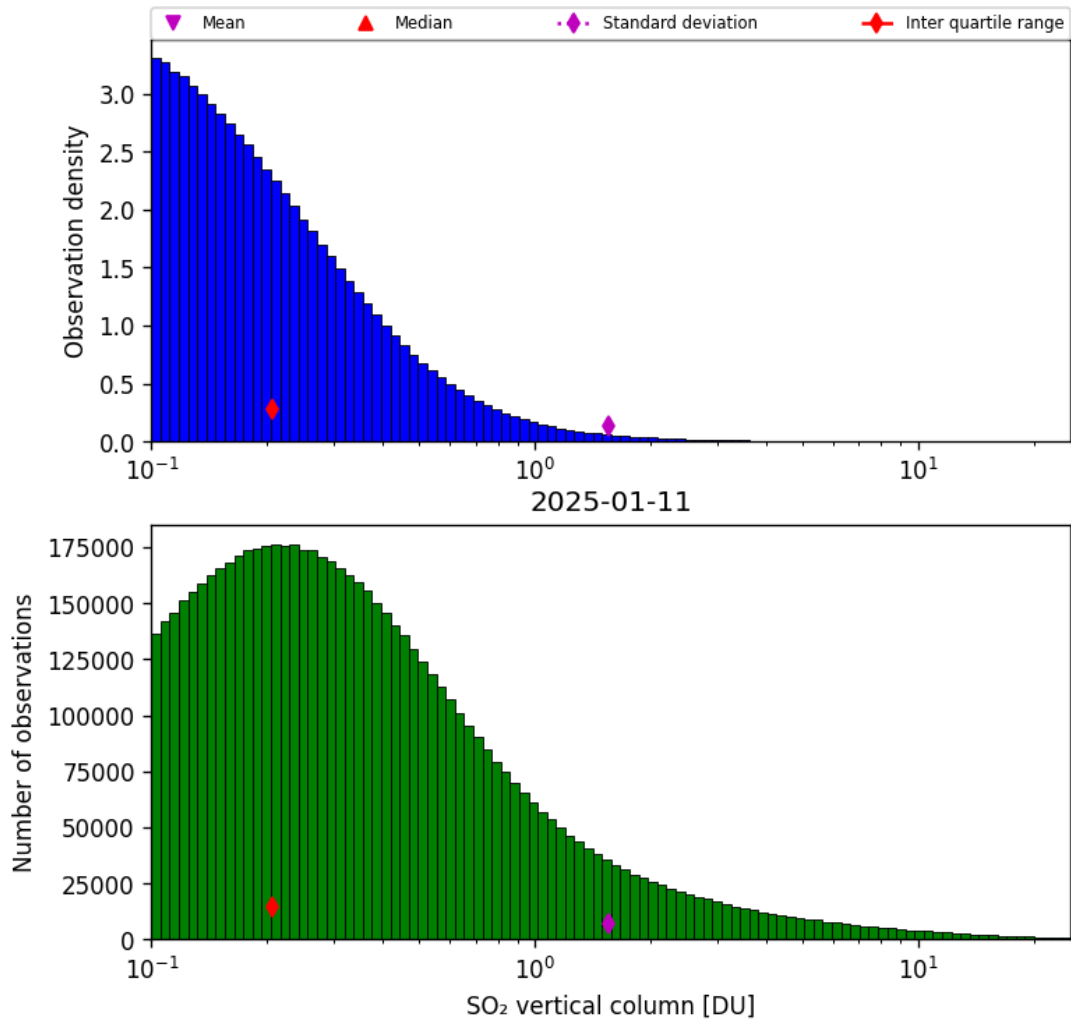


Figure 58: Histogram of “SO₂ vertical column” for 2025-01-11 to 2025-01-12

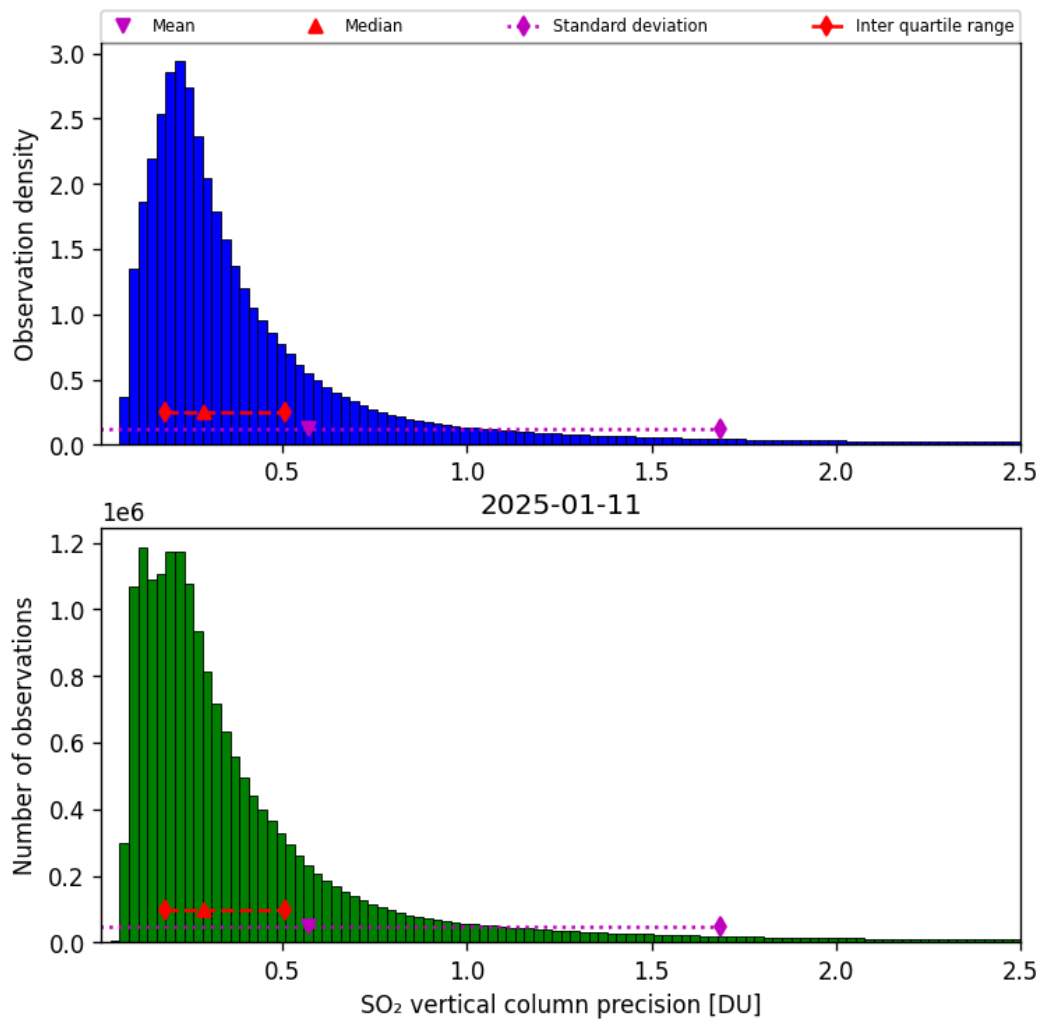


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-01-11 to 2025-01-12

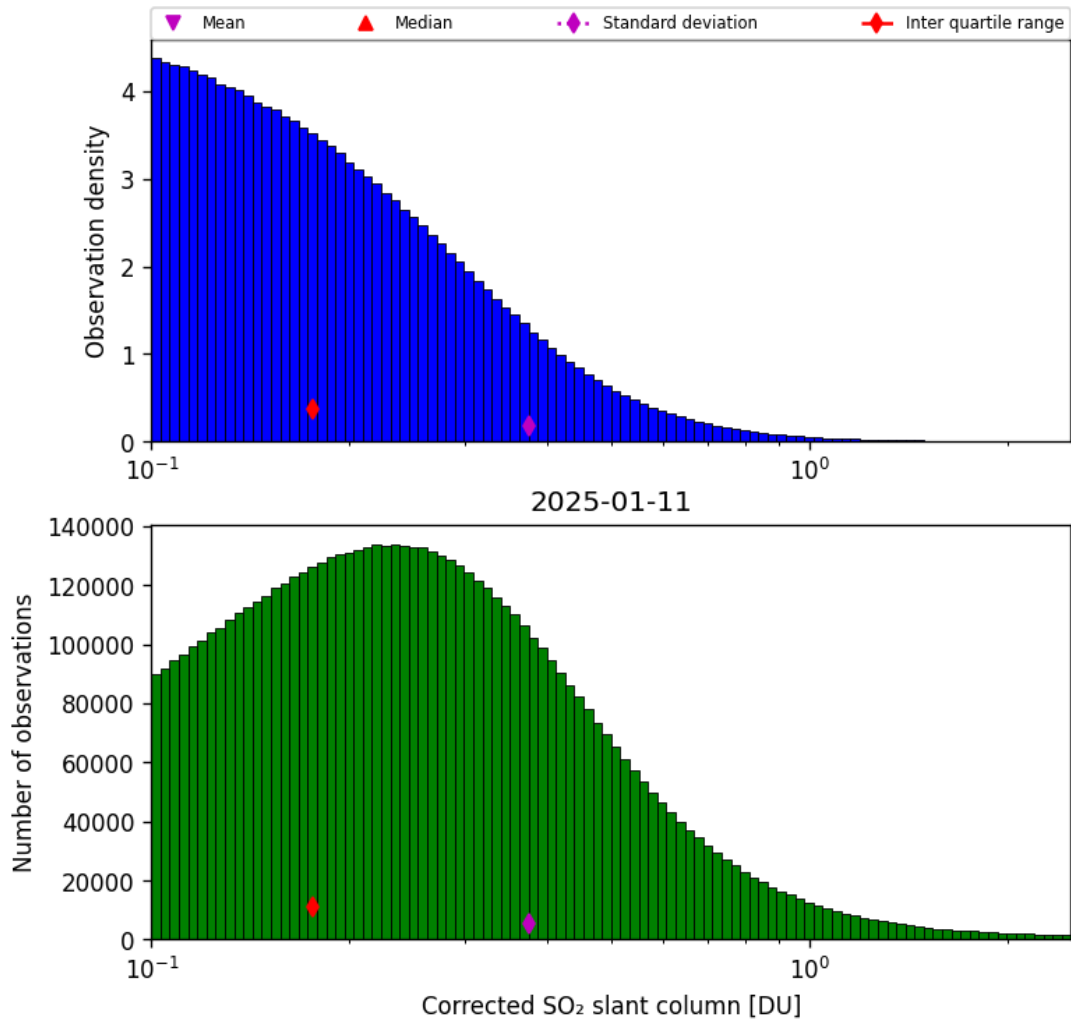


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-01-11 to 2025-01-12

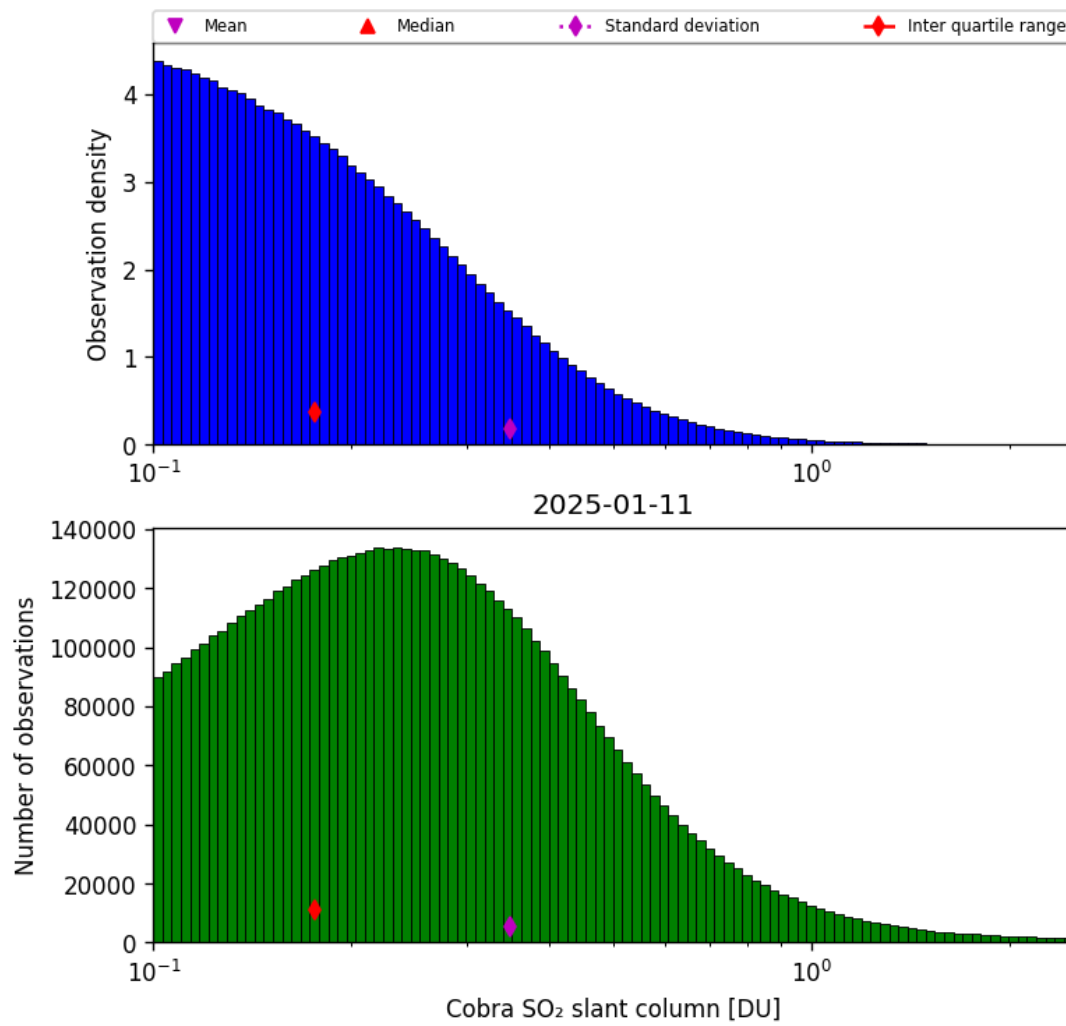


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-01-11 to 2025-01-12

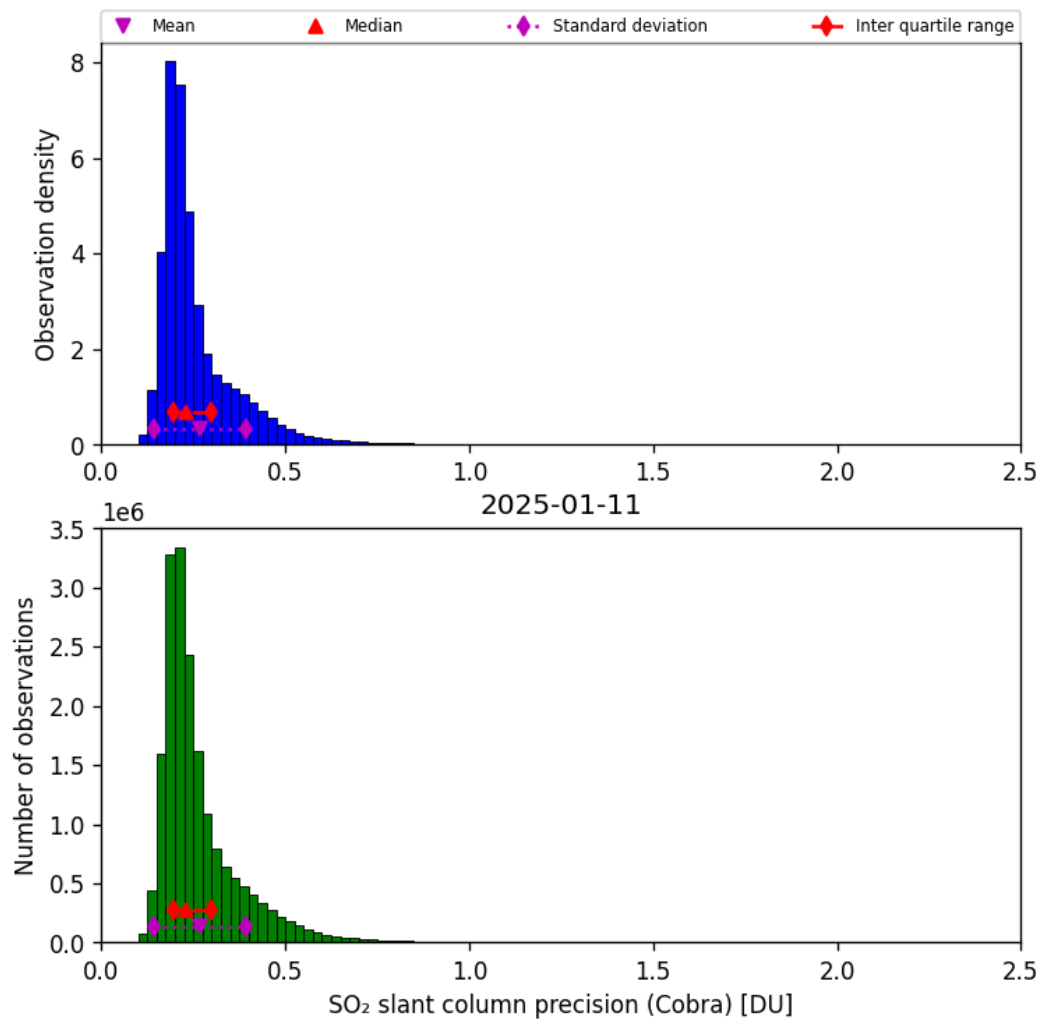


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-01-11 to 2025-01-12

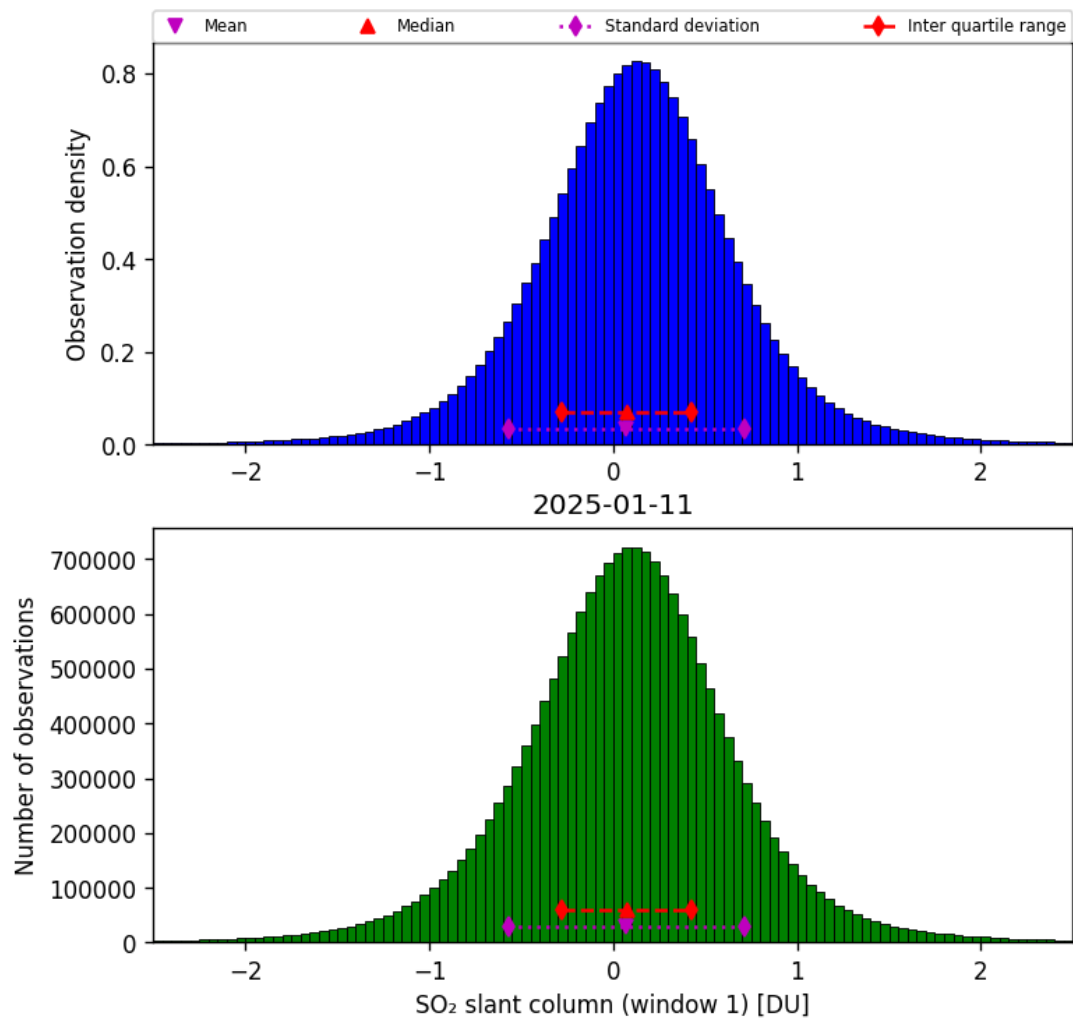


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-01-11 to 2025-01-12

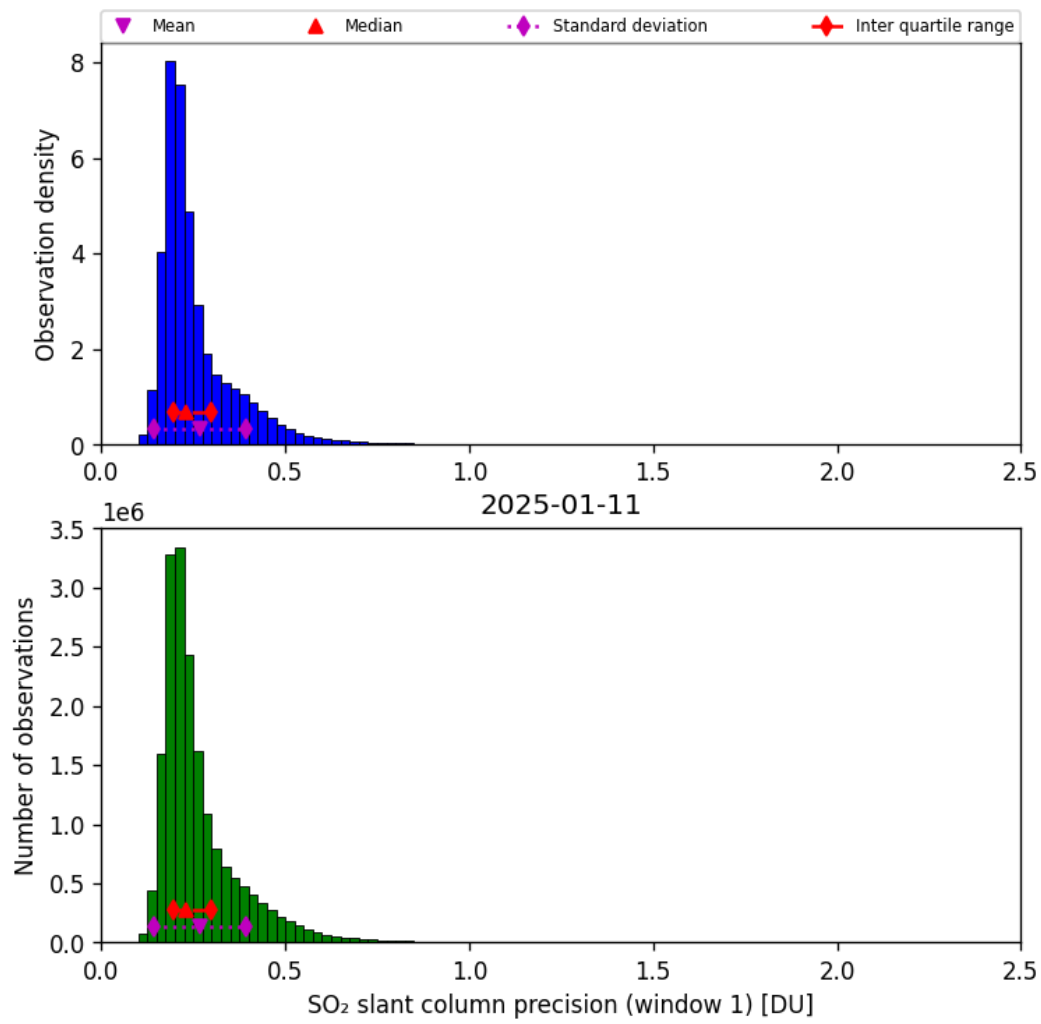


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-01-11 to 2025-01-12

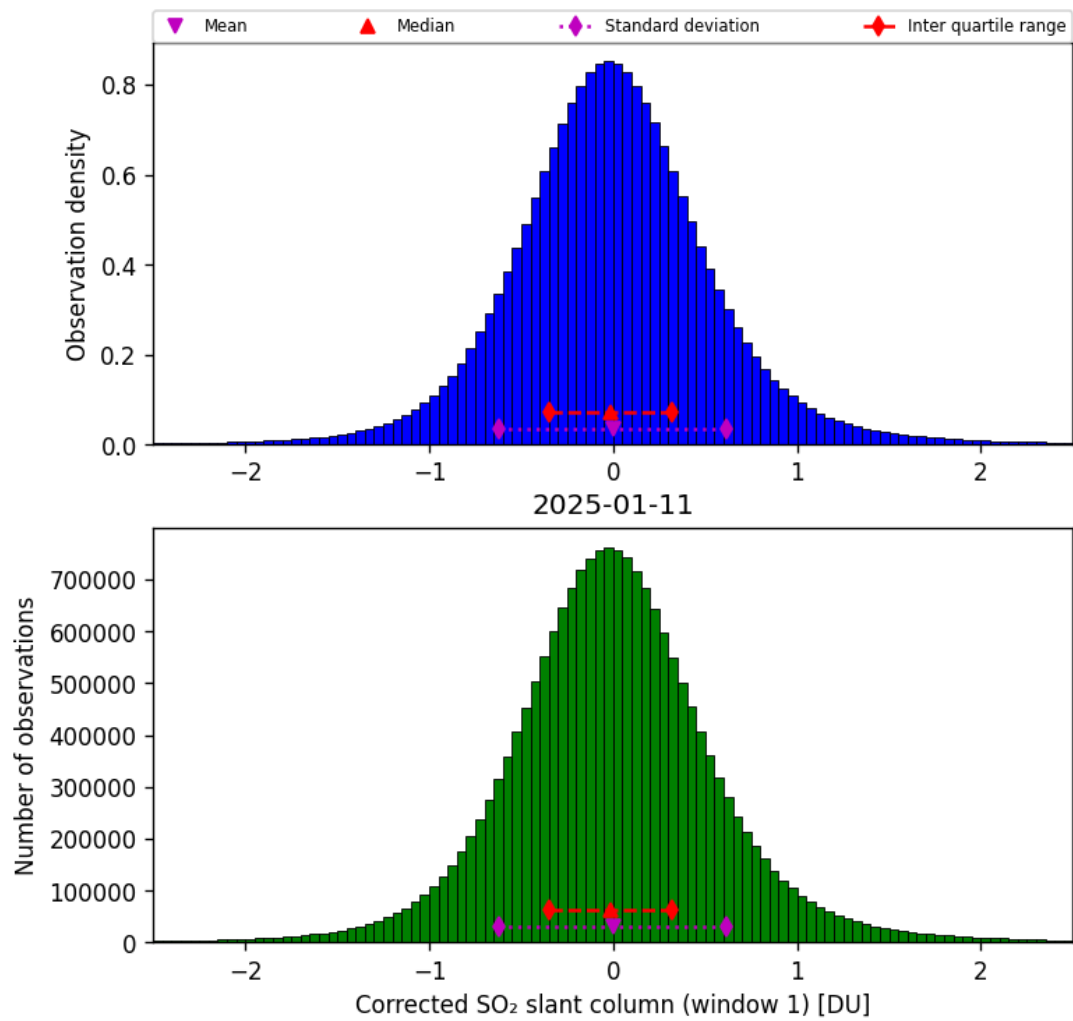


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-01-11 to 2025-01-12

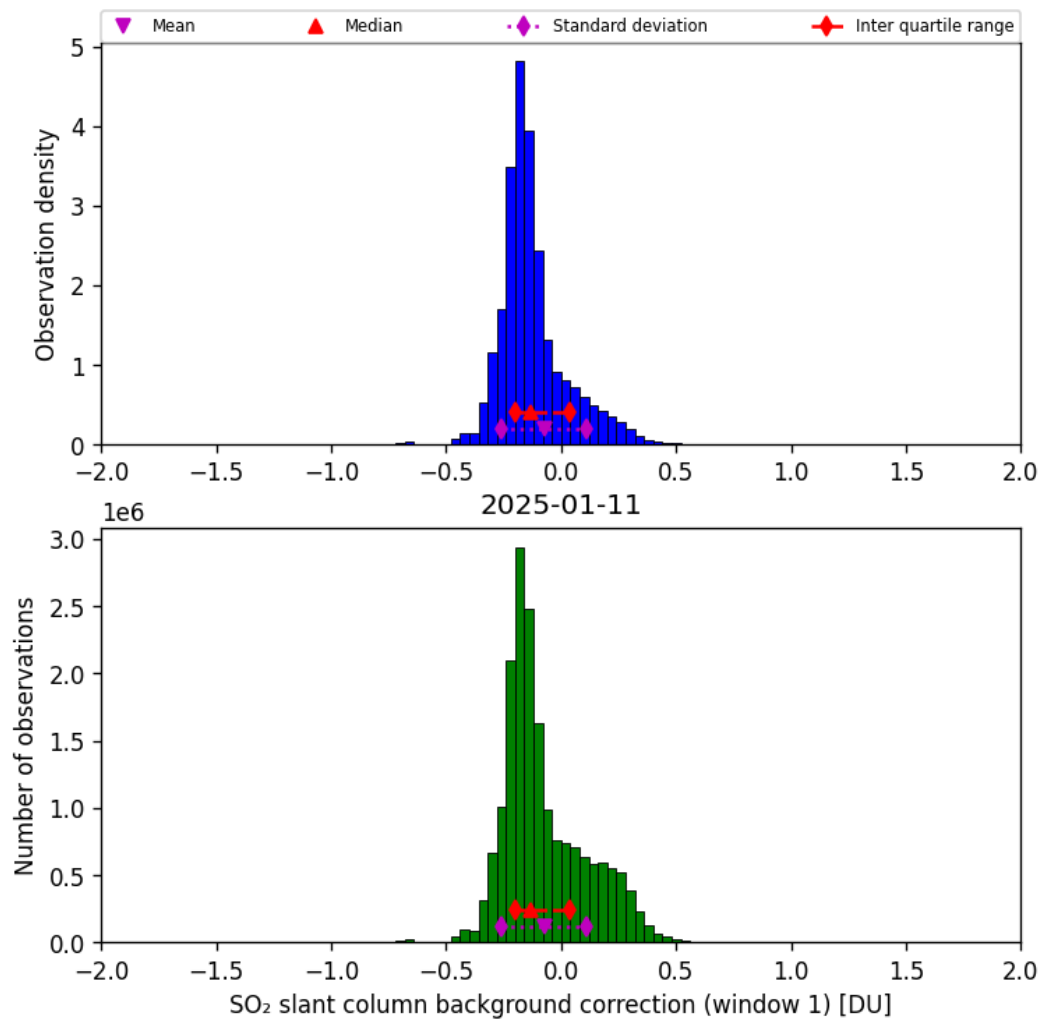


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-01-11 to 2025-01-12

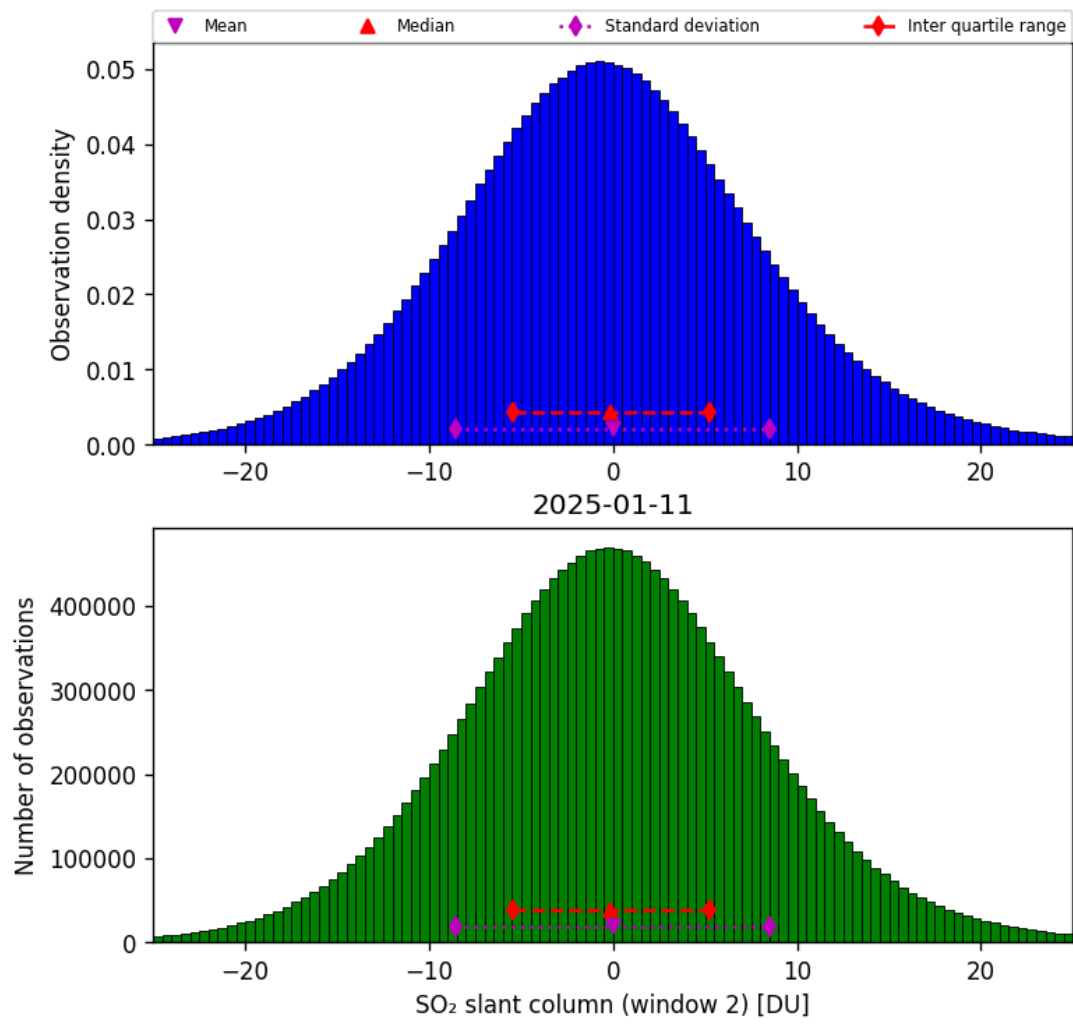


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-01-11 to 2025-01-12

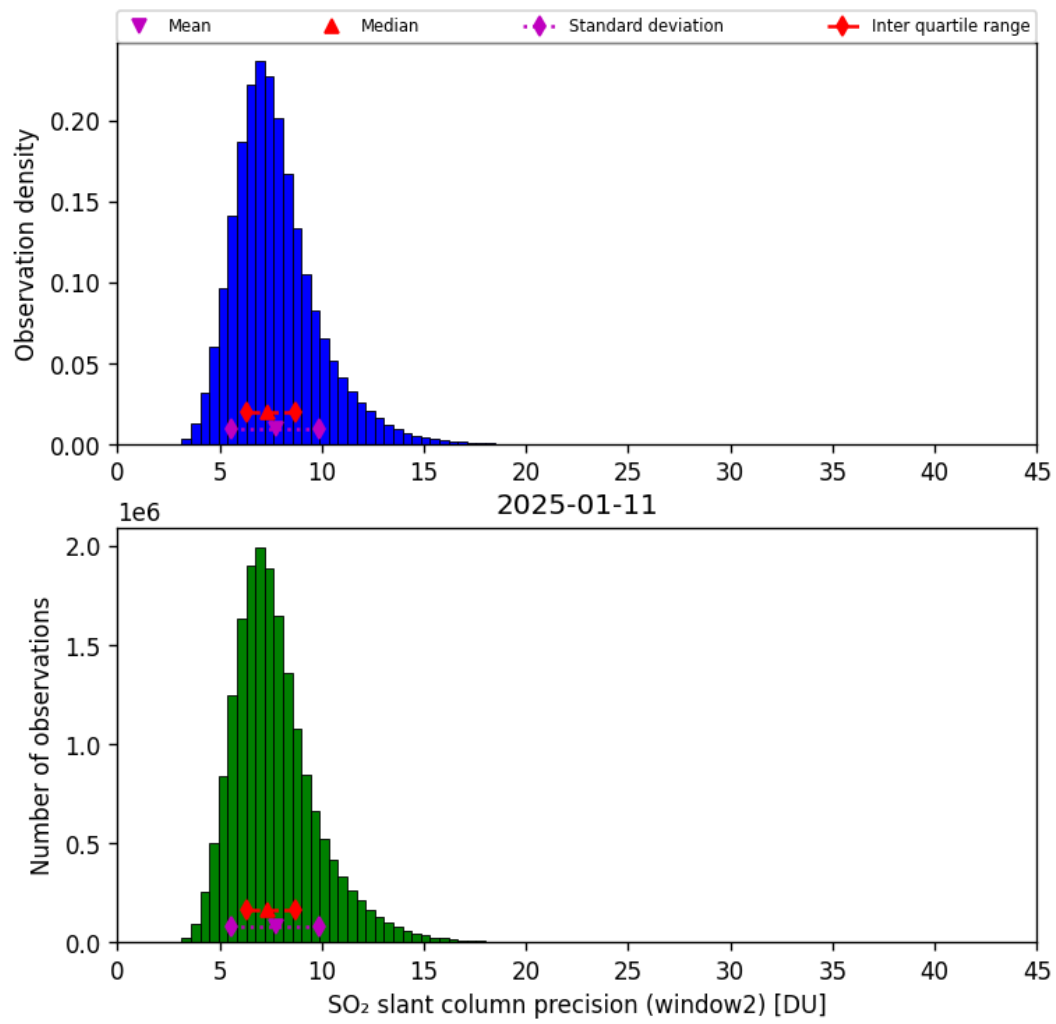


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-01-11 to 2025-01-12

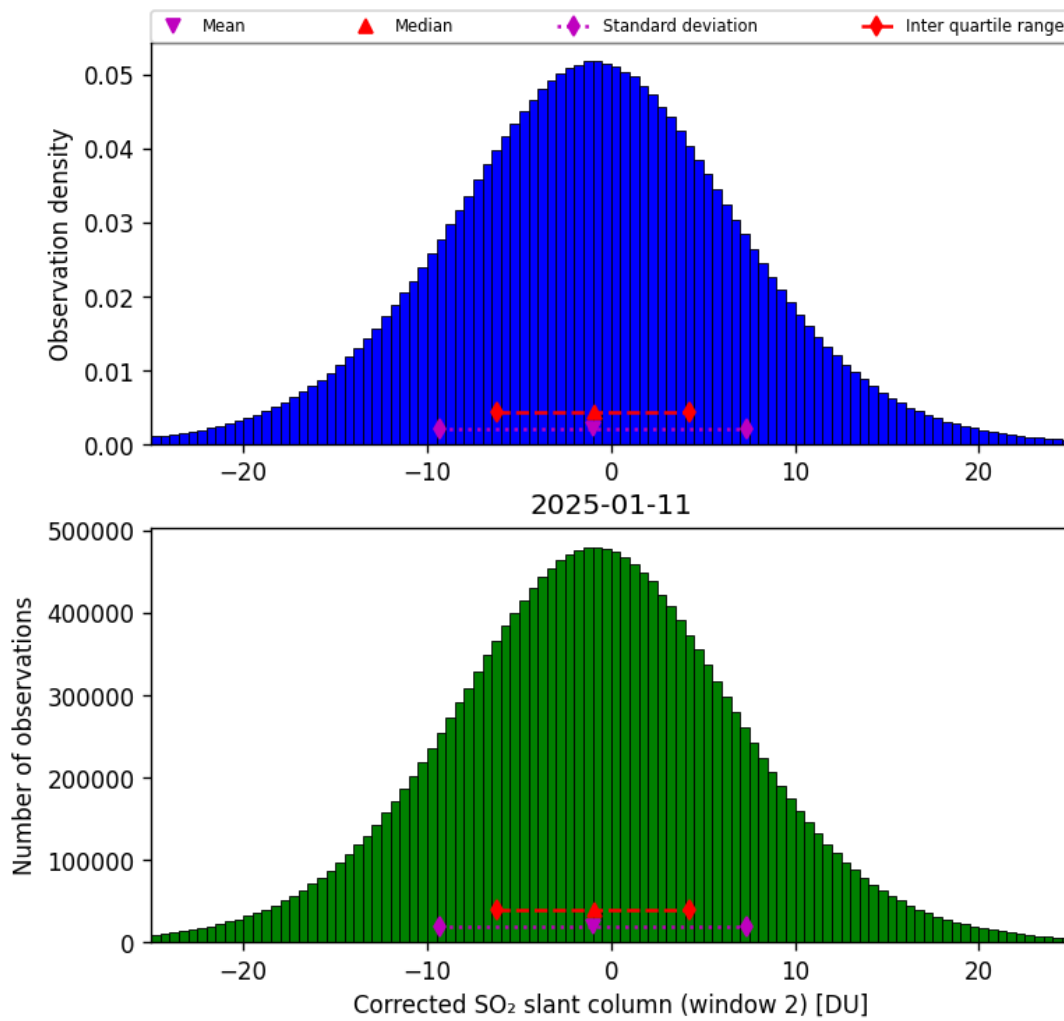


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-01-11 to 2025-01-12

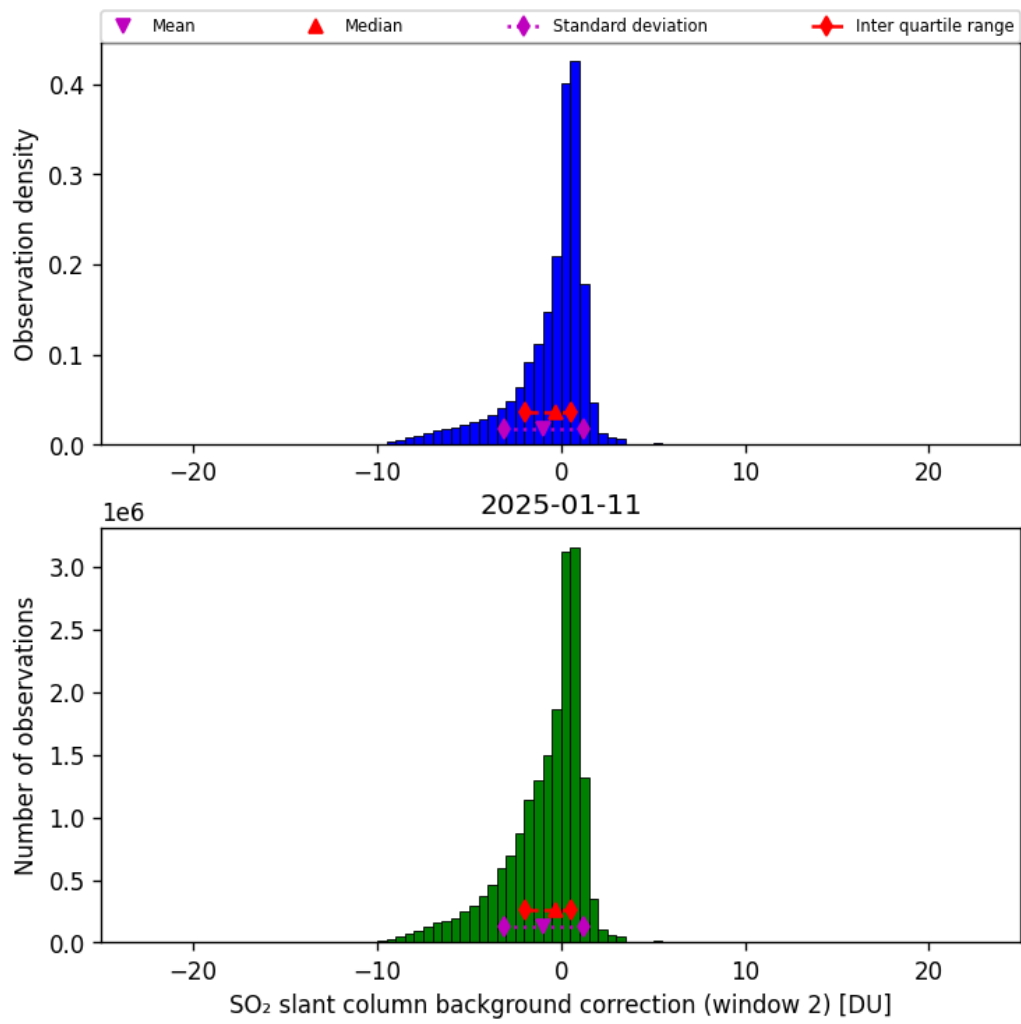


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-01-11 to 2025-01-12

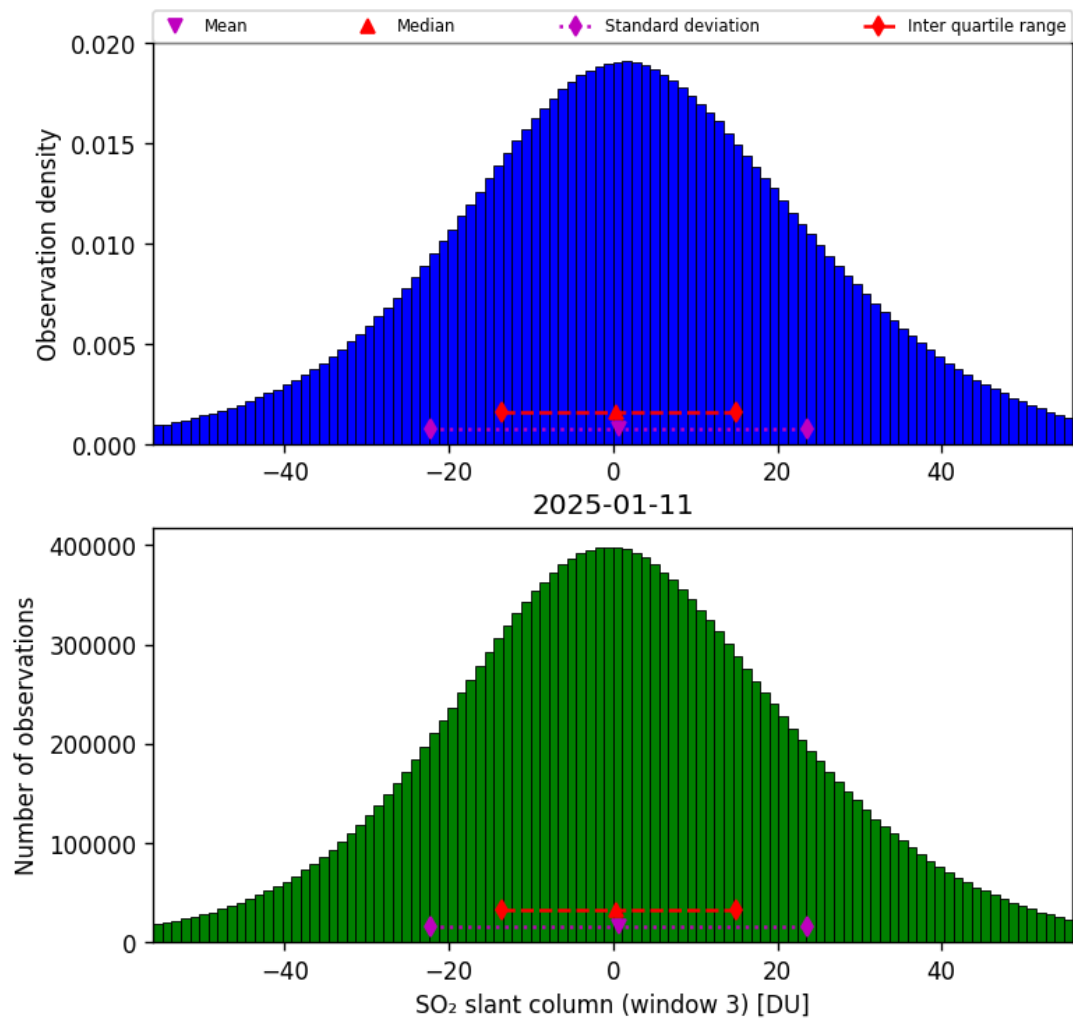


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-01-11 to 2025-01-12

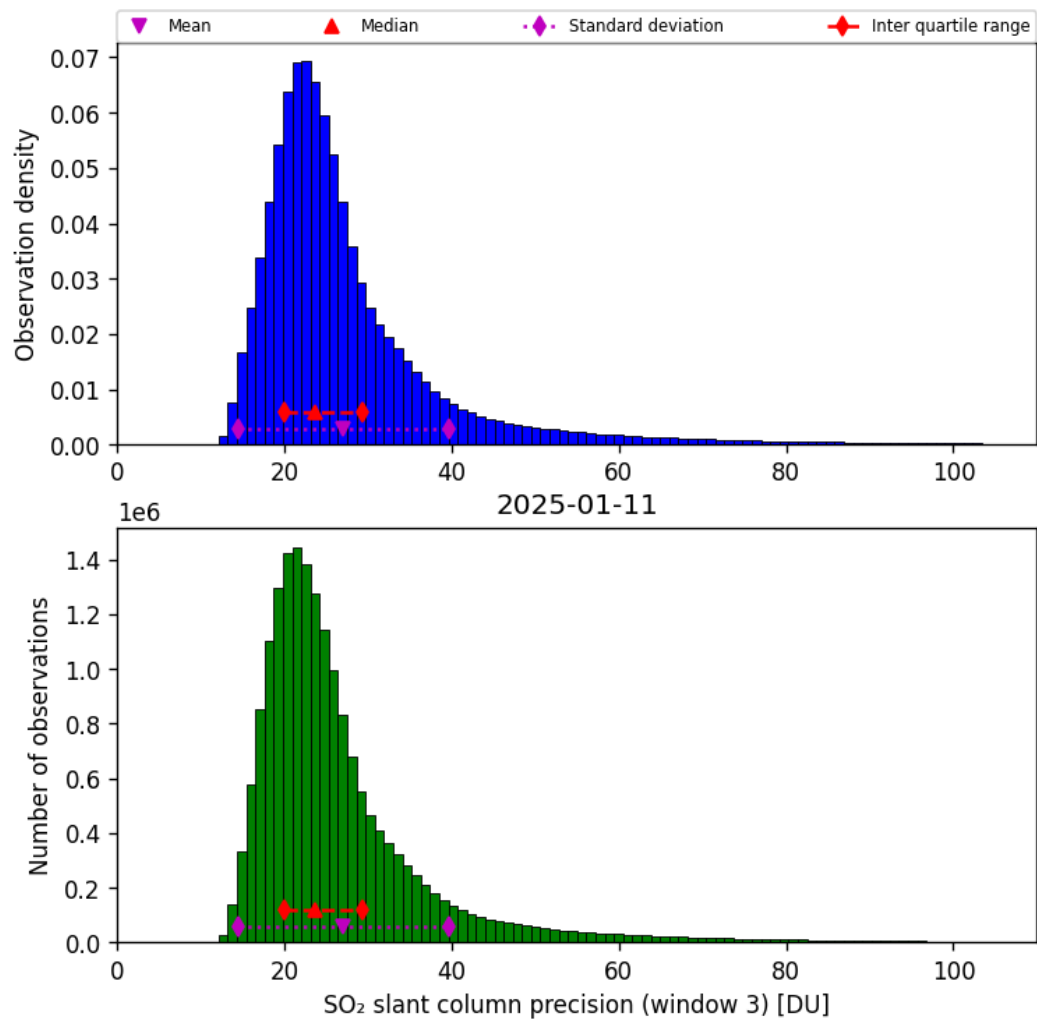


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-01-11 to 2025-01-12

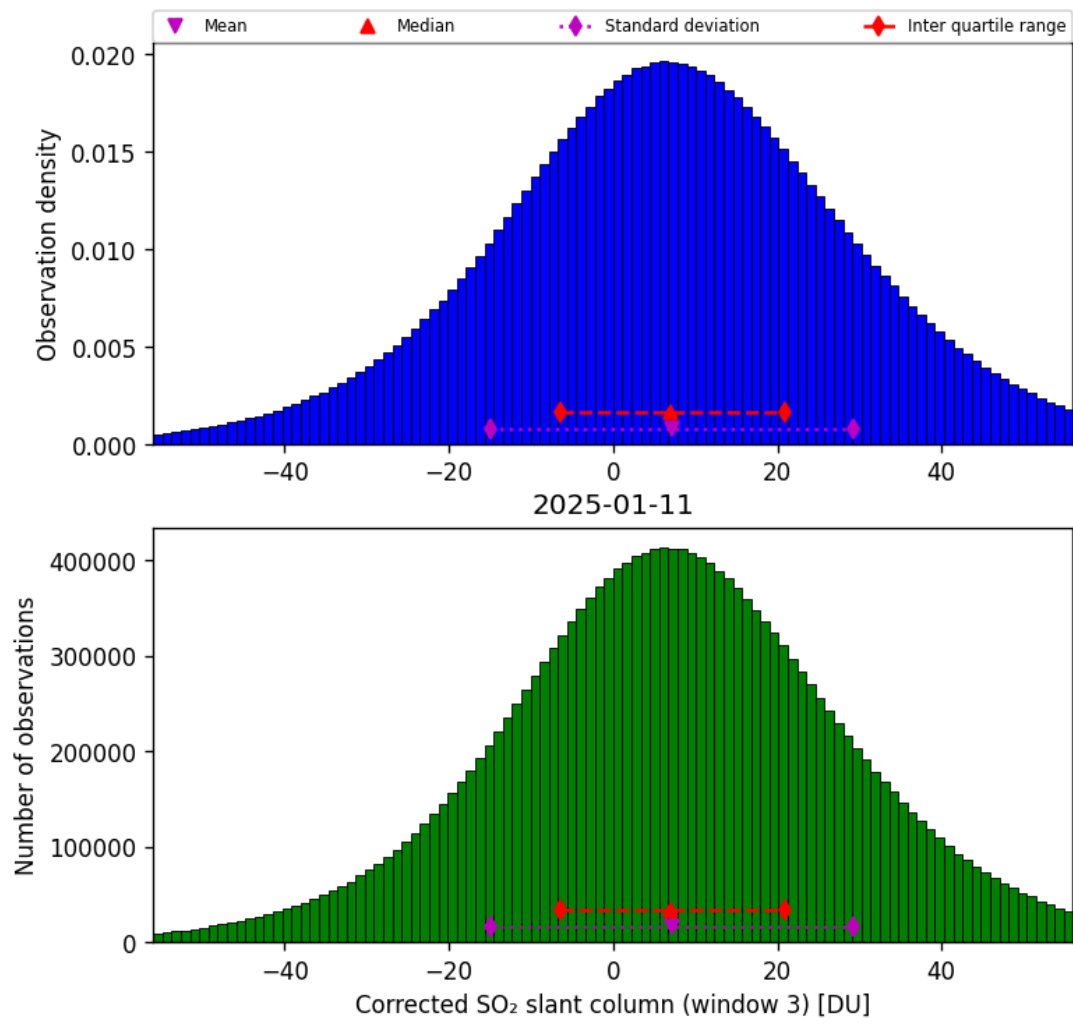


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-01-11 to 2025-01-12

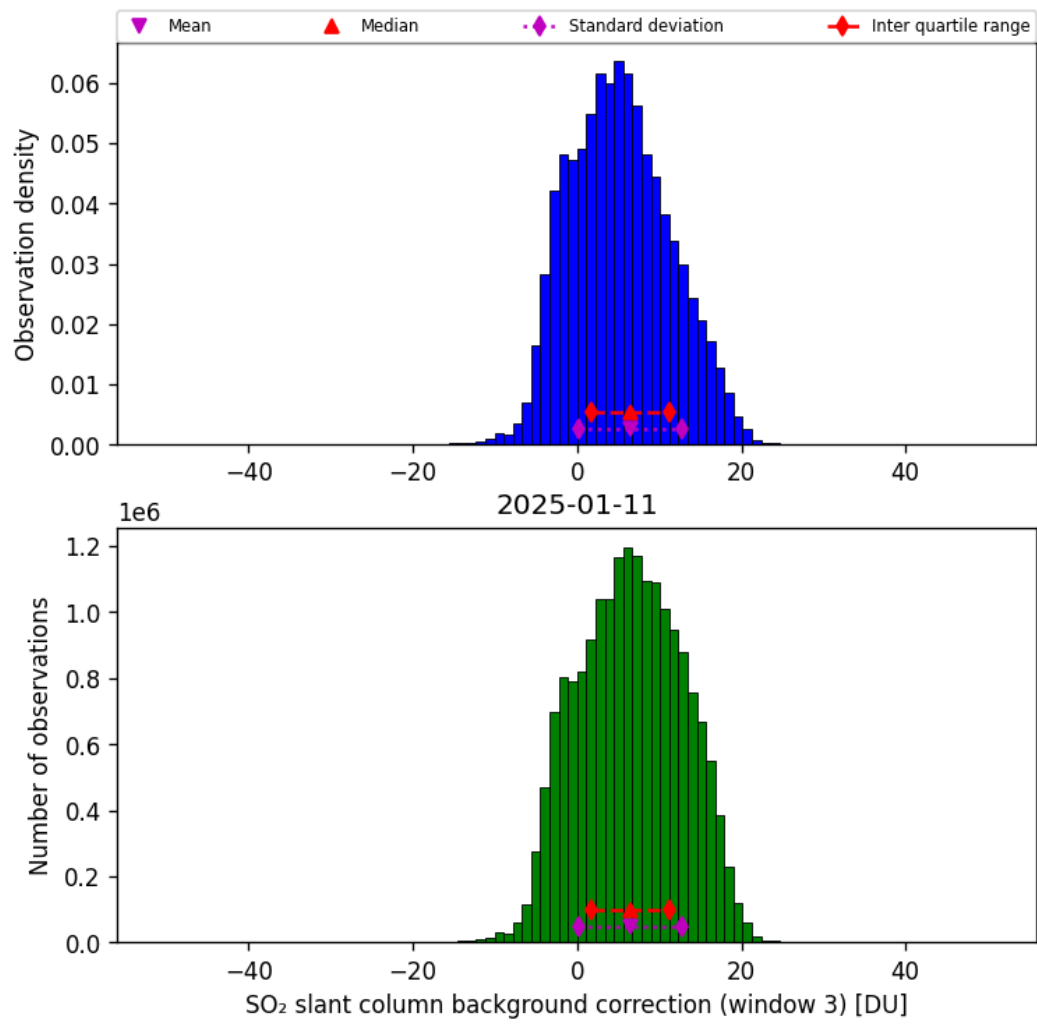


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-01-11 to 2025-01-12

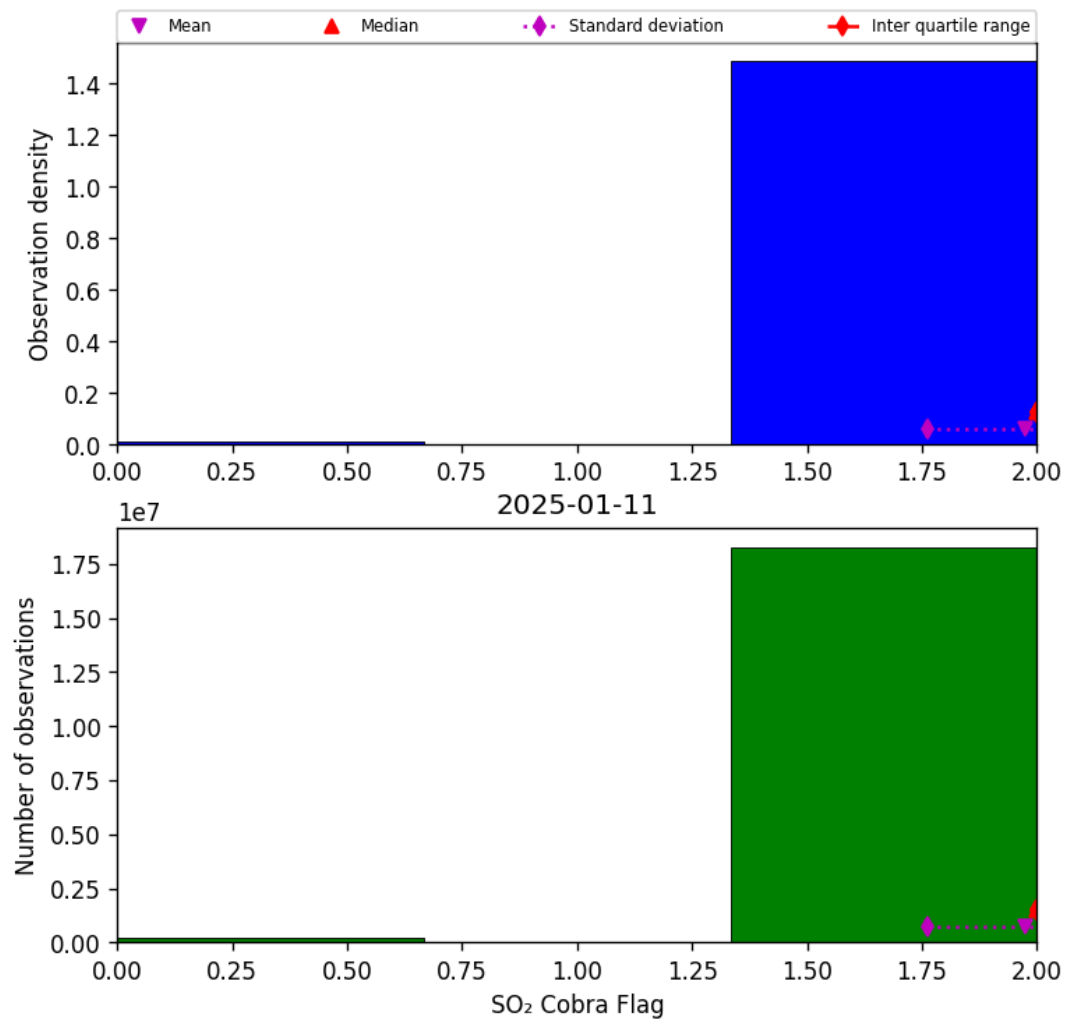


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-01-11 to 2025-01-12

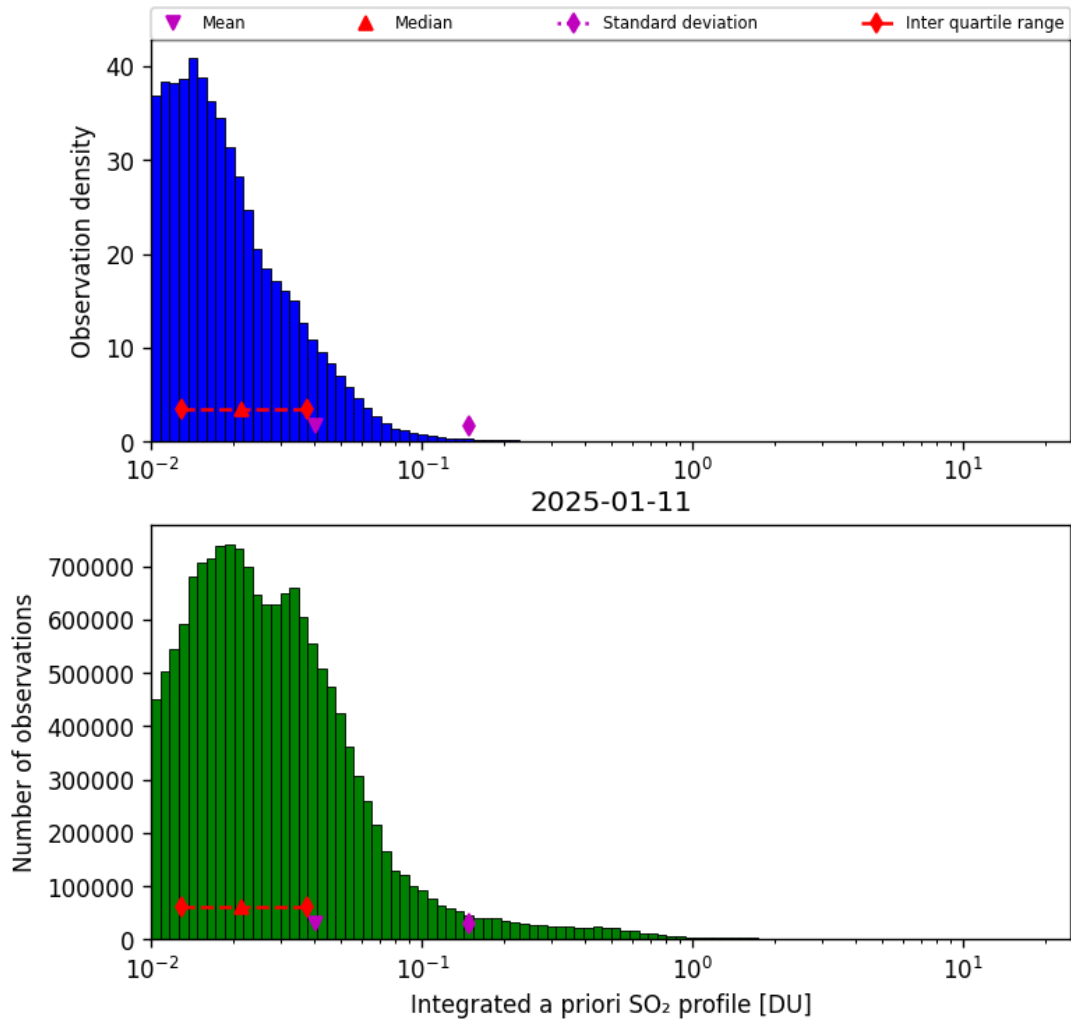


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-01-11 to 2025-01-12

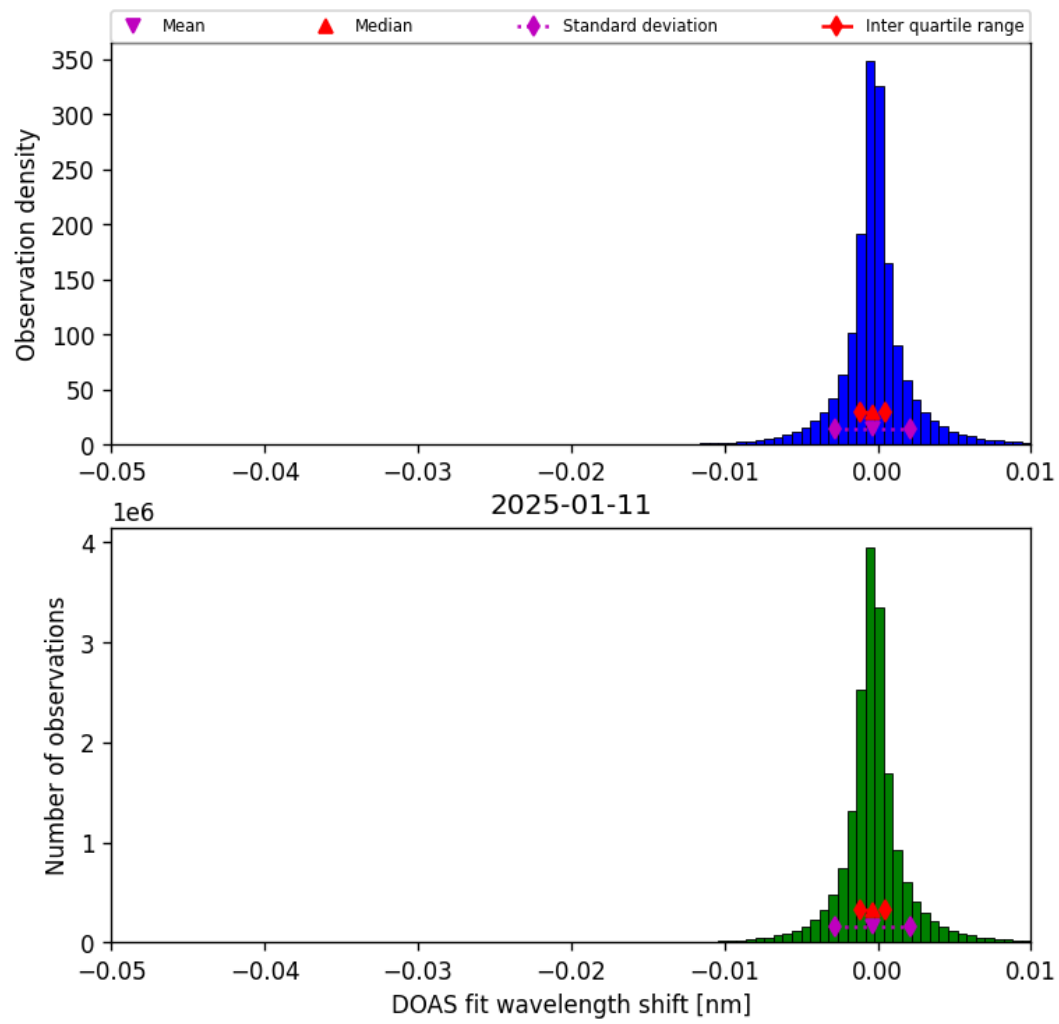


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-01-11 to 2025-01-12

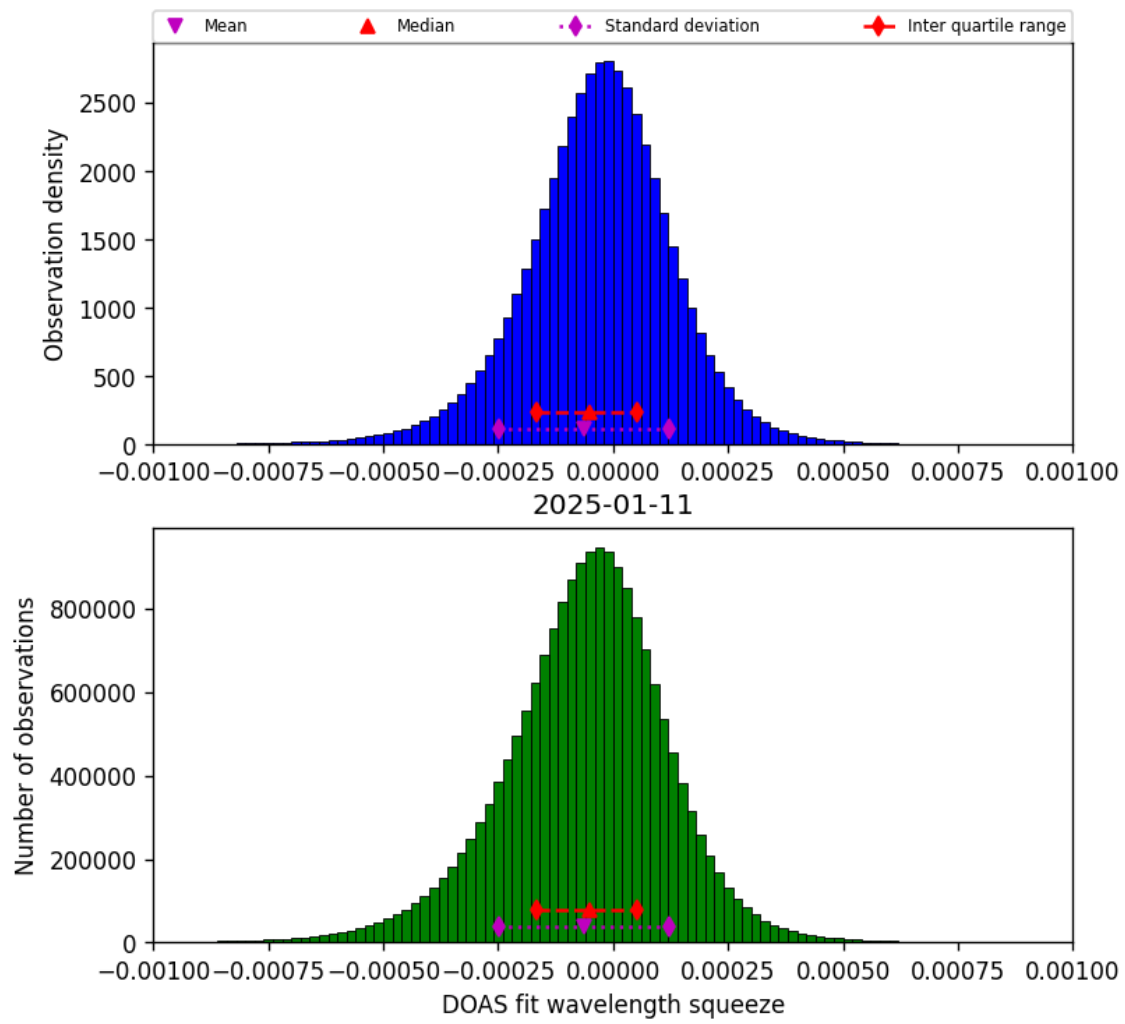


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-01-11 to 2025-01-12

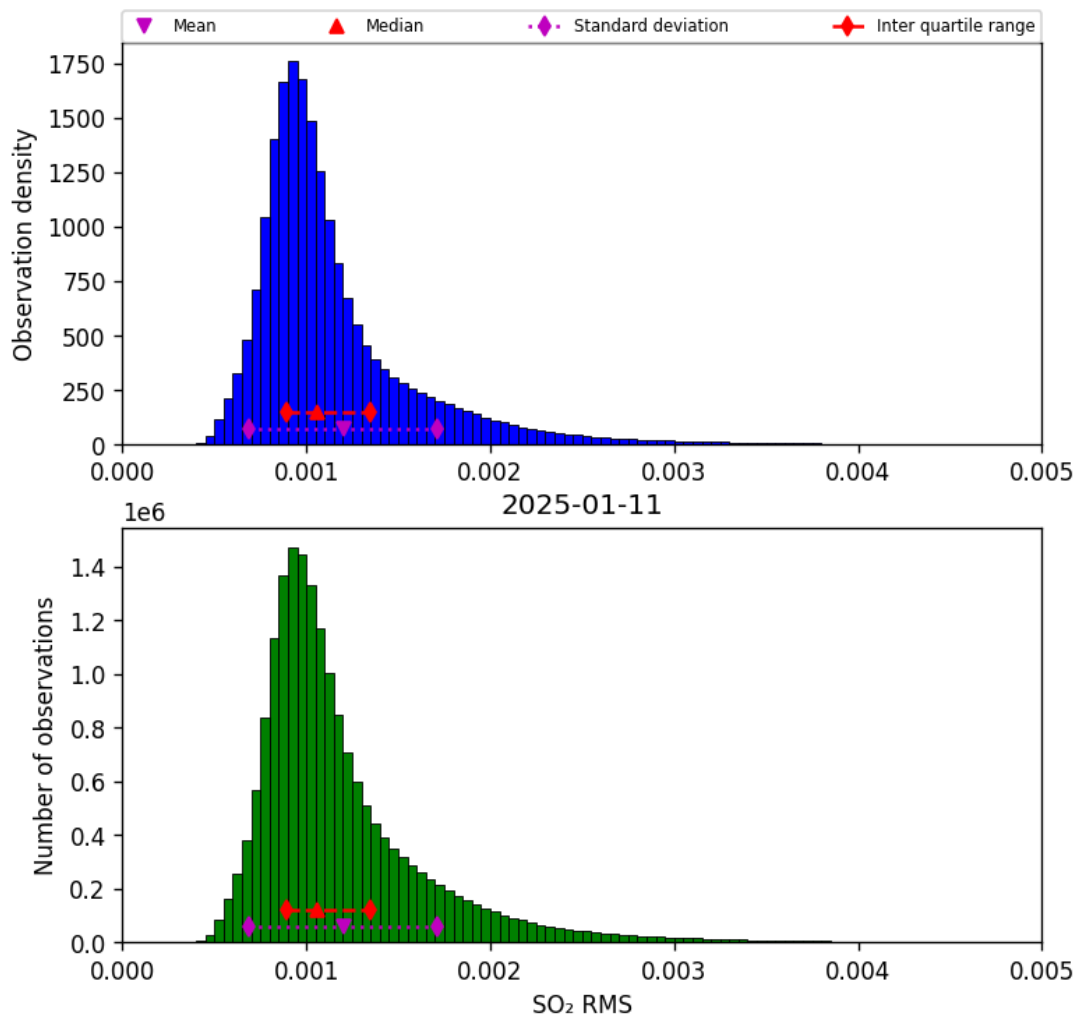


Figure 79: Histogram of “SO₂ RMS” for 2025-01-11 to 2025-01-12

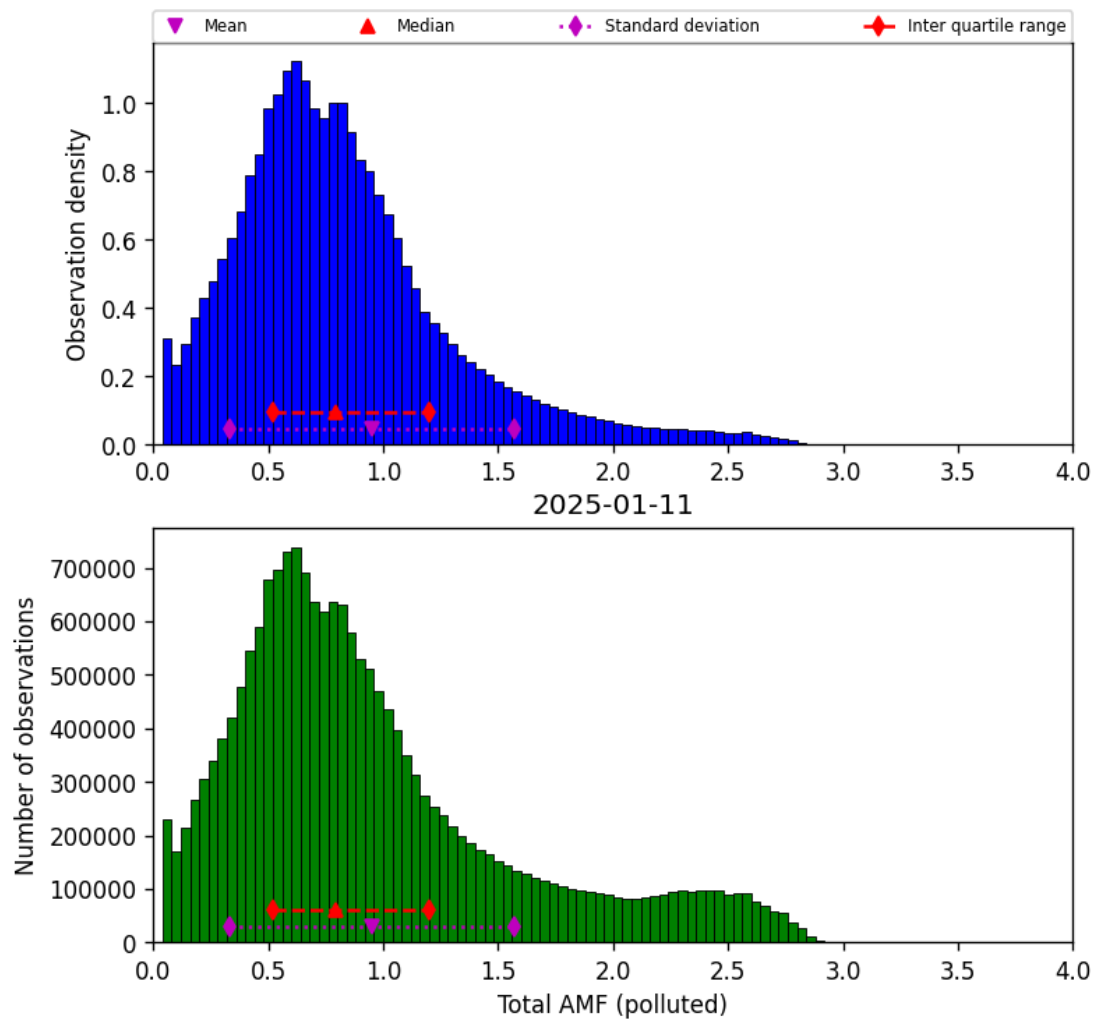


Figure 80: Histogram of “Total AMF (polluted)” for 2025-01-11 to 2025-01-12

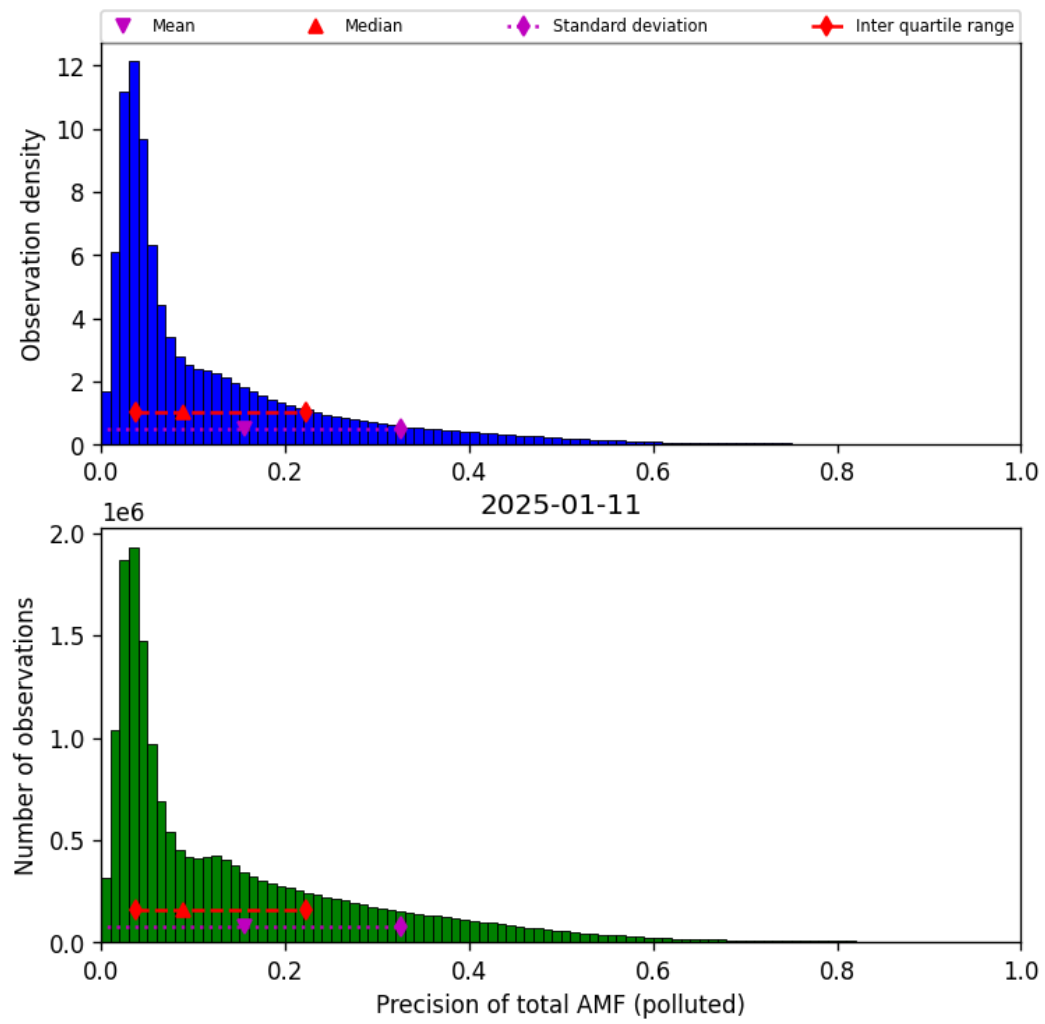


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-01-11 to 2025-01-12

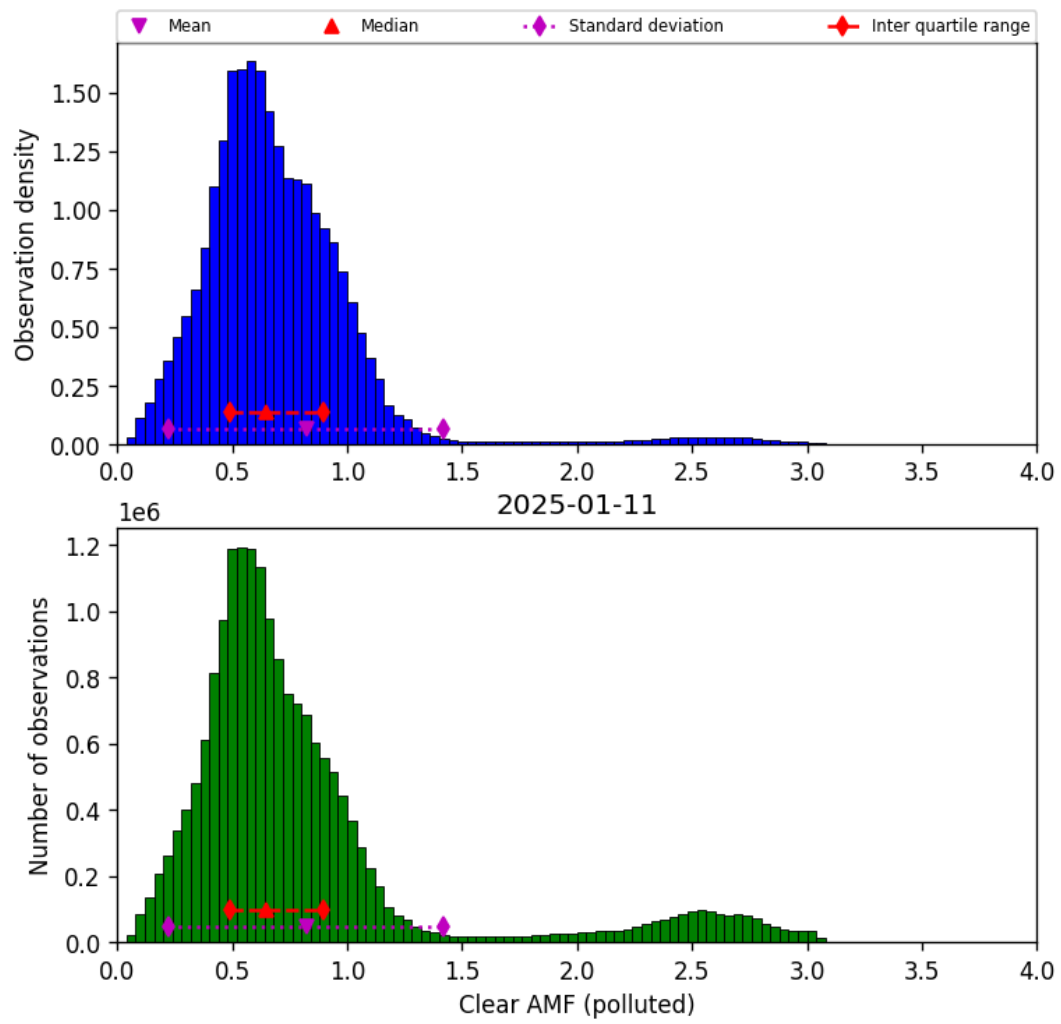


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-01-11 to 2025-01-12

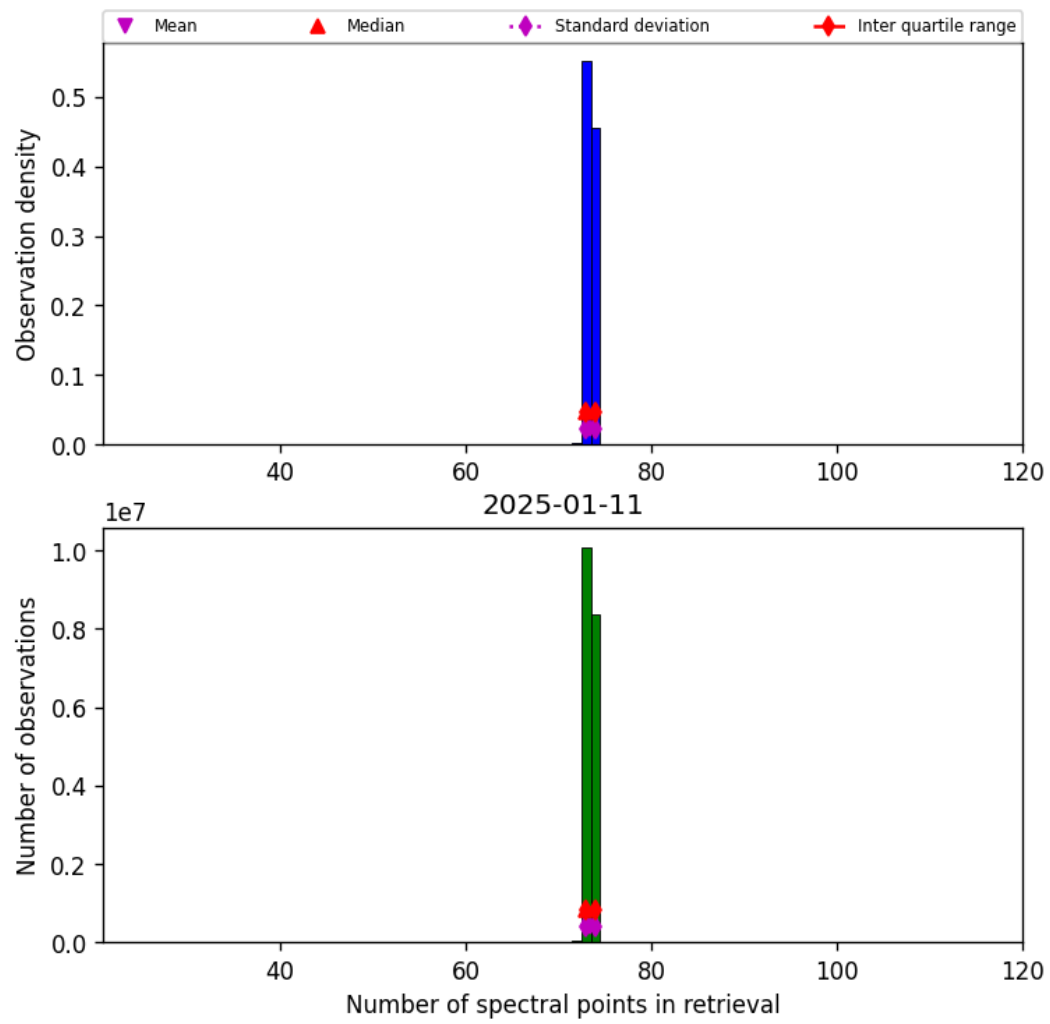


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-01-11 to 2025-01-12

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.

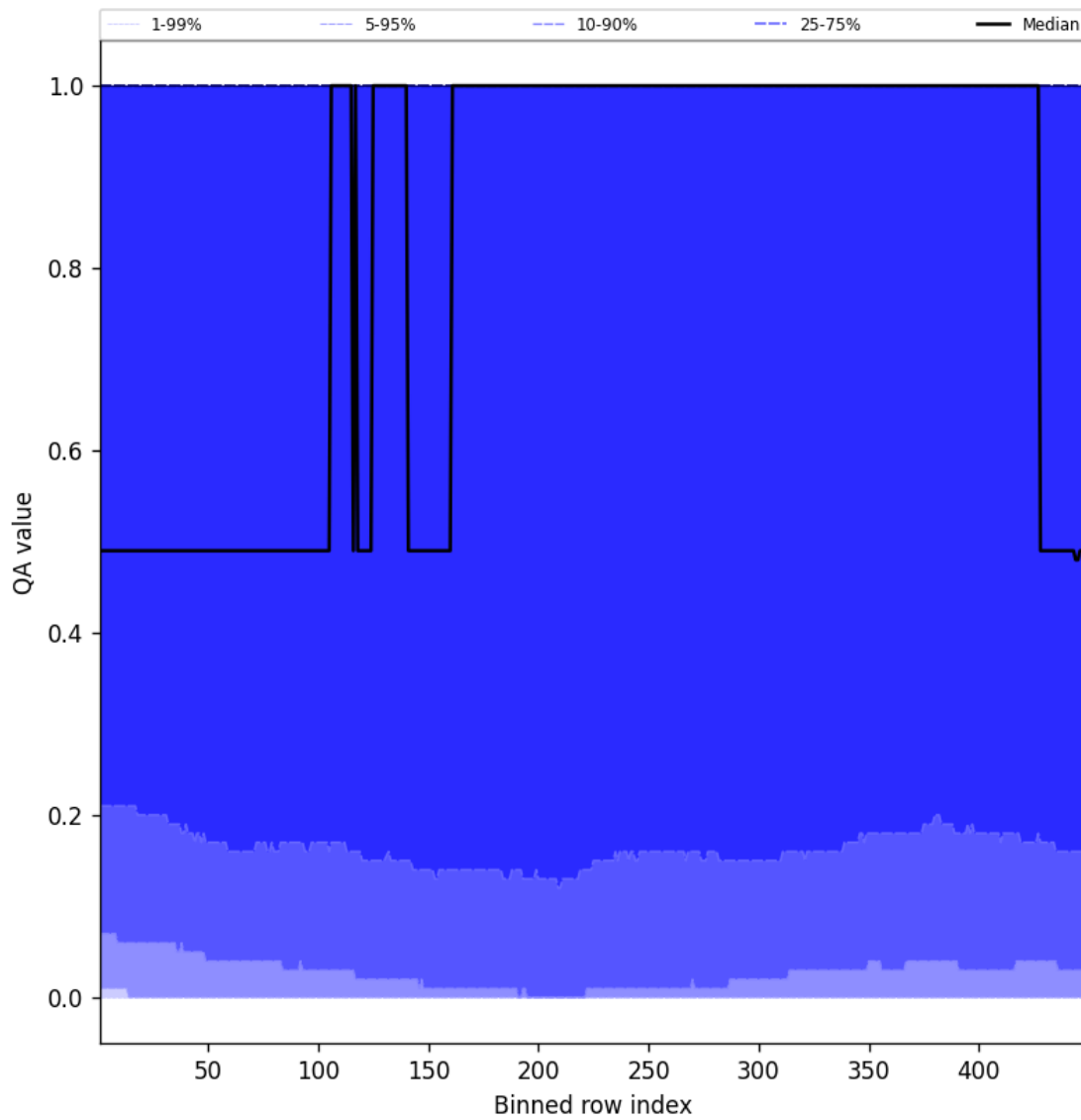


Figure 84: Along track statistics of “QA value” for 2025-01-11 to 2025-01-12

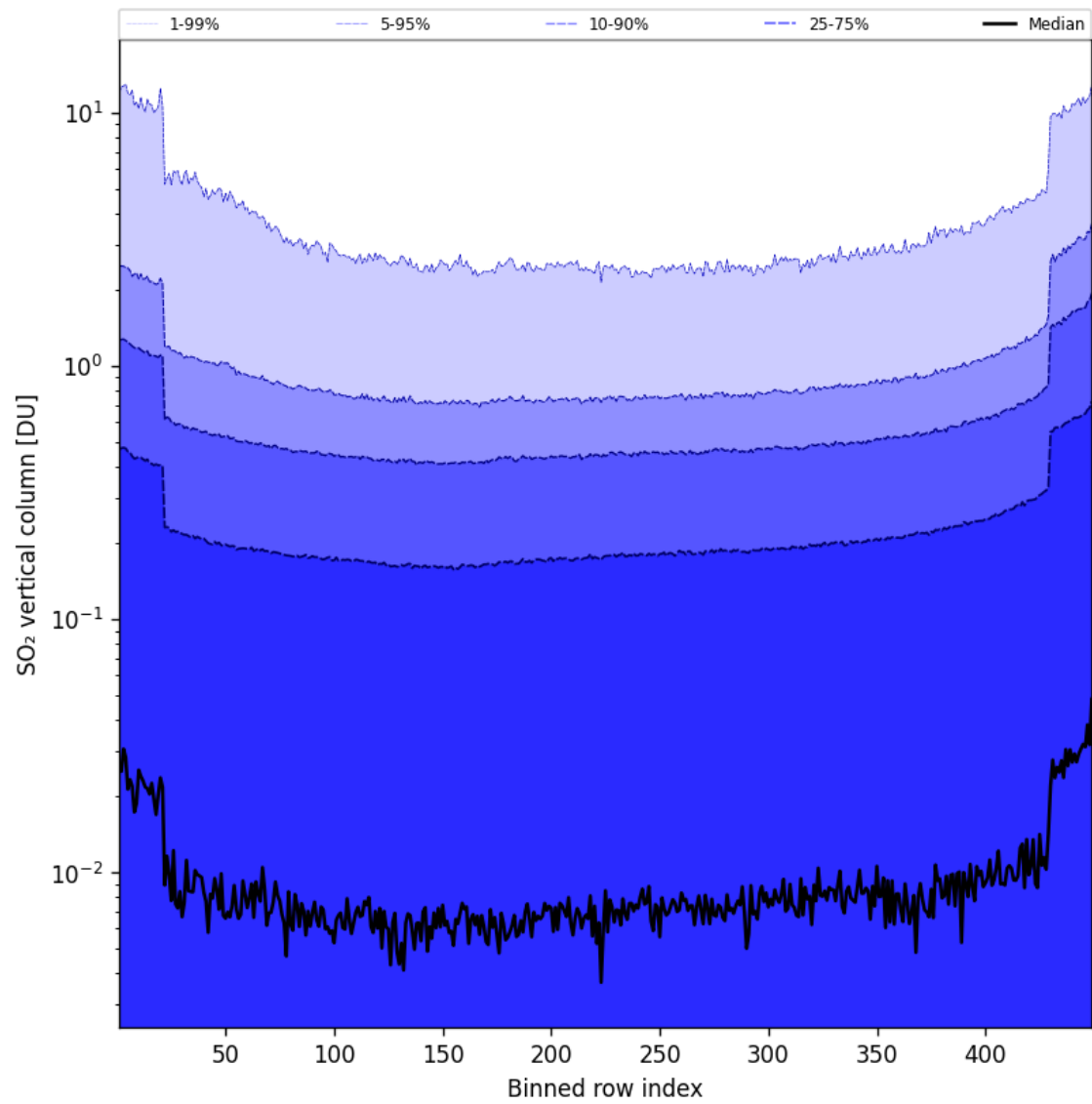


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-01-11 to 2025-01-12

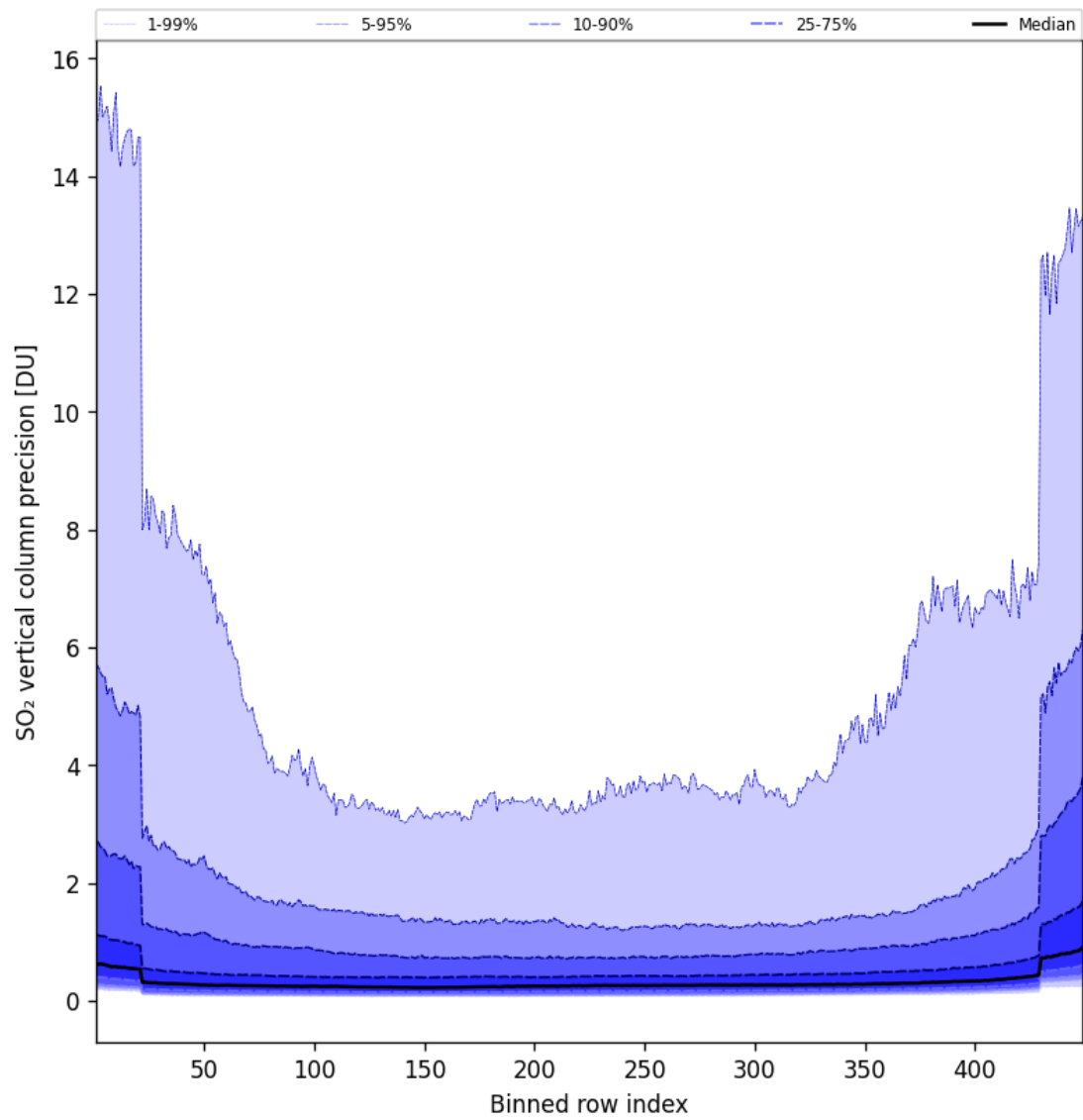


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-01-11 to 2025-01-12

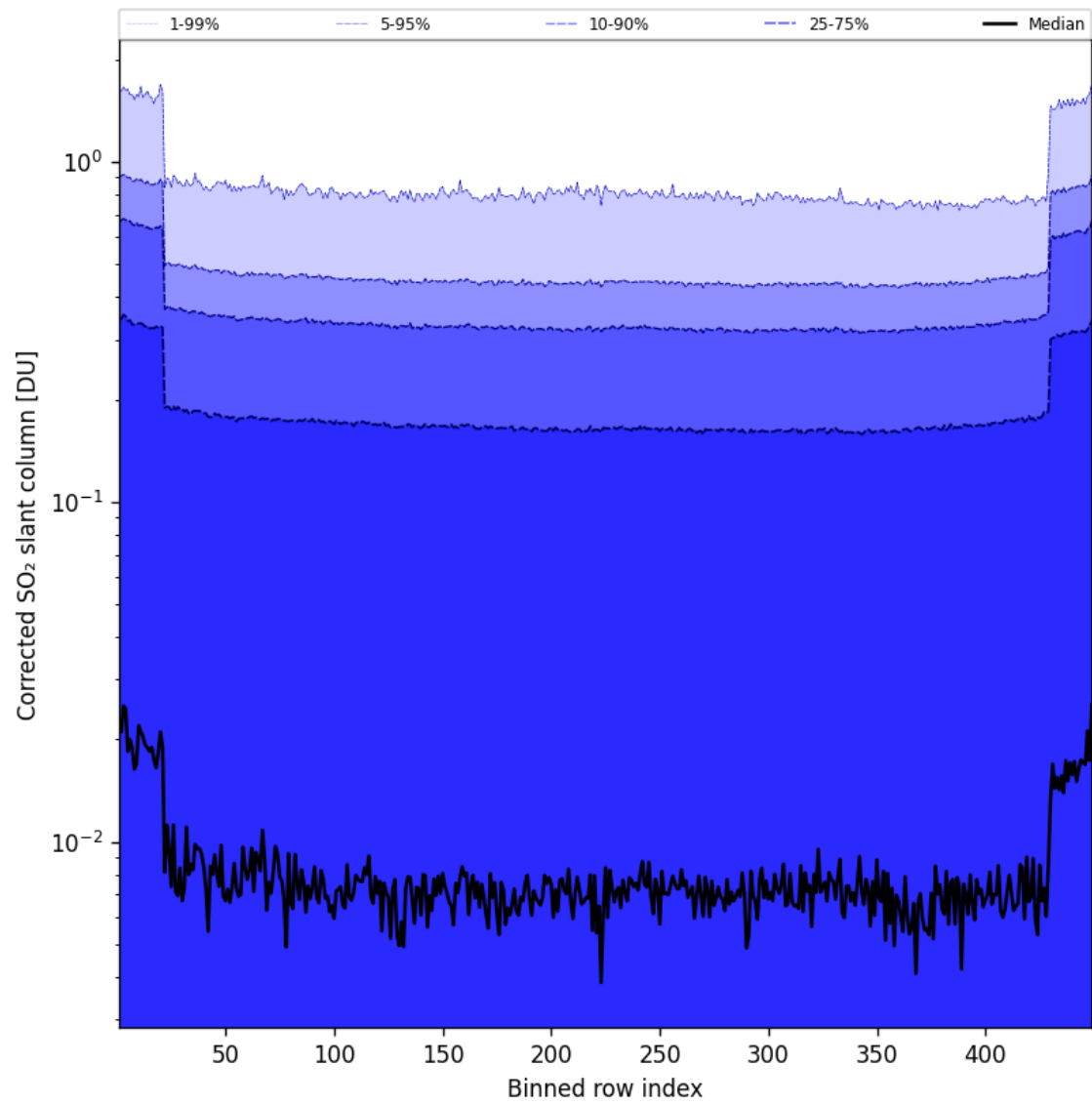


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-01-11 to 2025-01-12

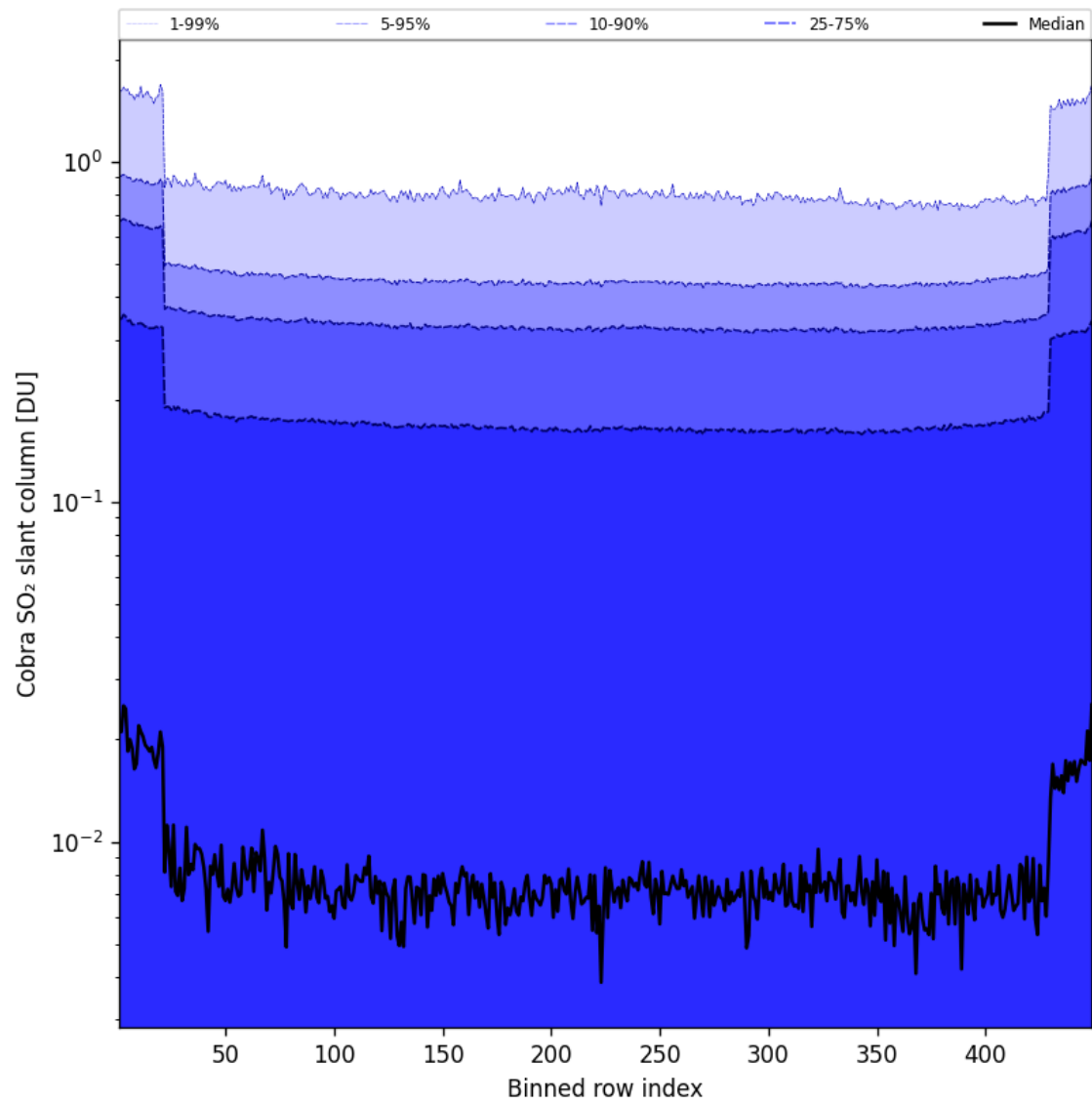


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-01-11 to 2025-01-12

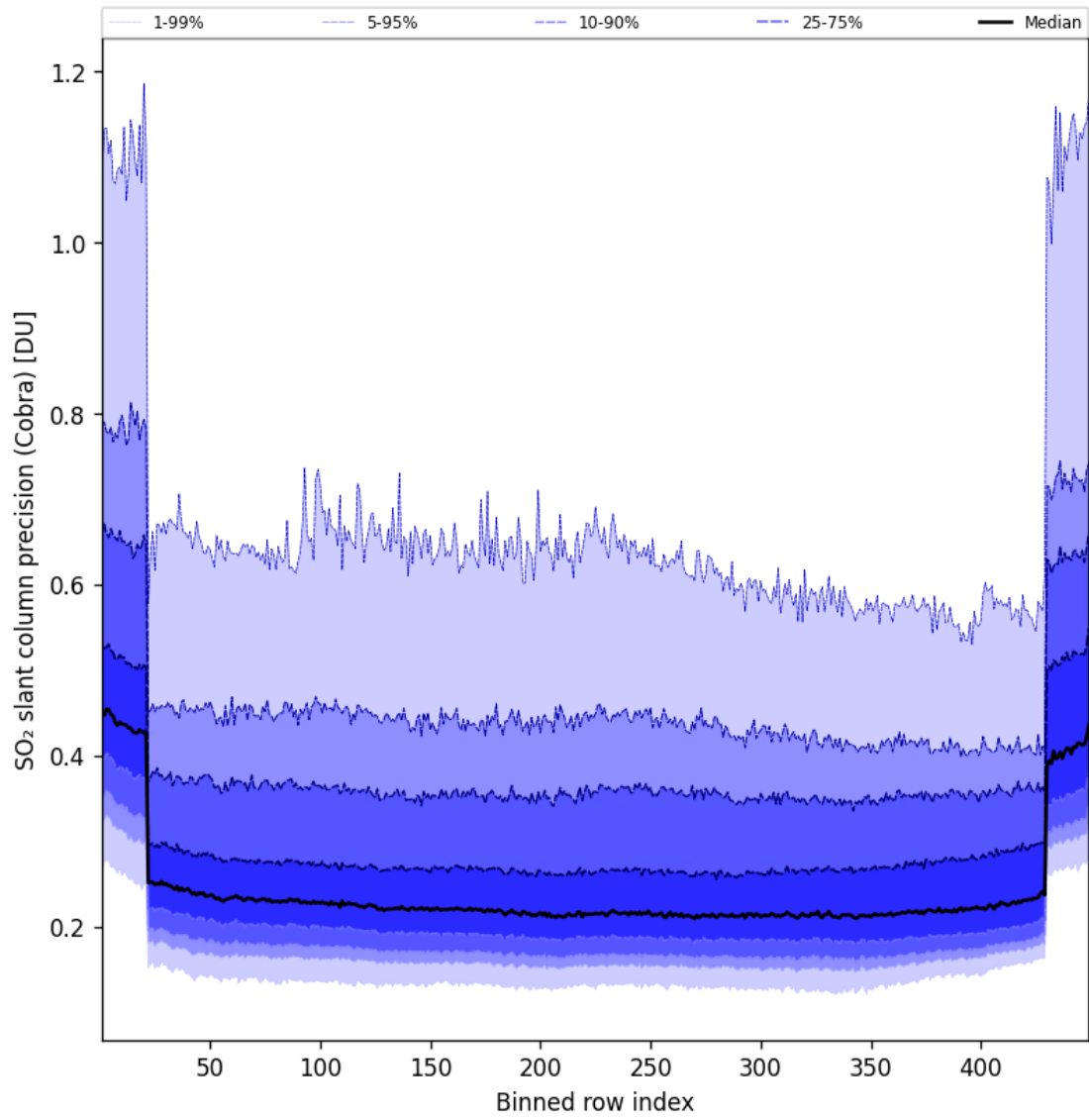


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-01-11 to 2025-01-12

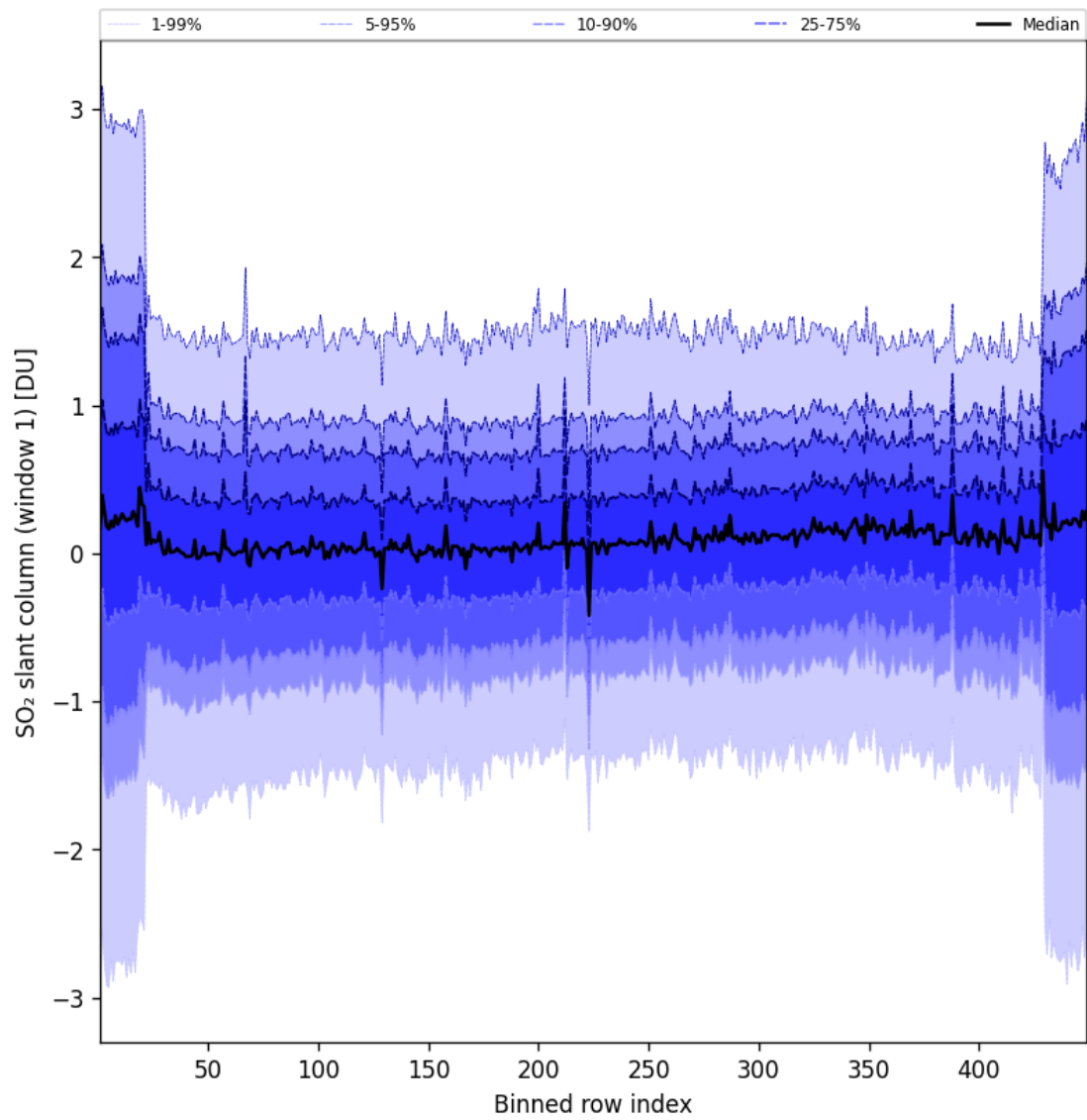


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-01-11 to 2025-01-12

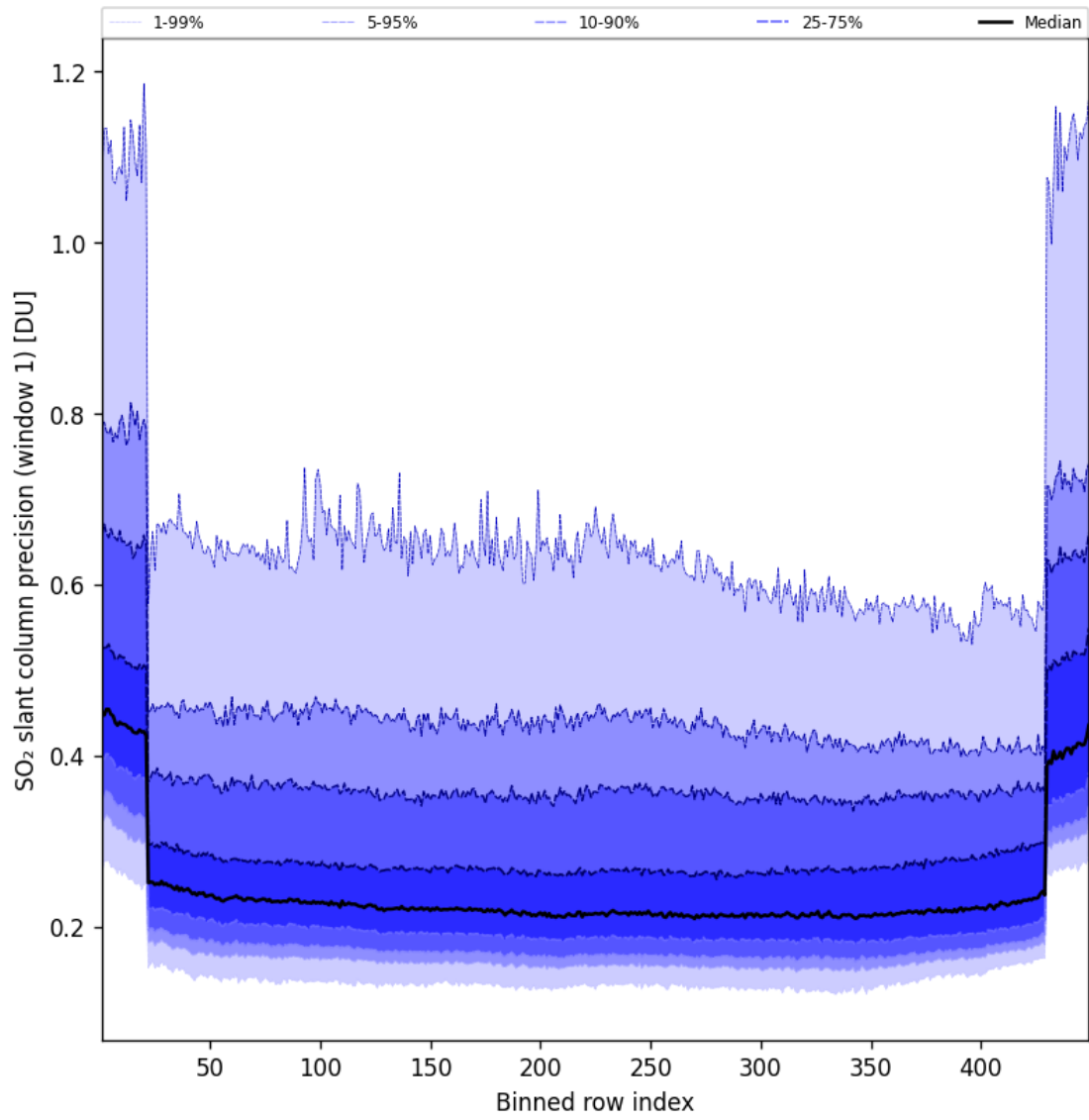


Figure 91: Along track statistics of "SO₂ slant column precision (window 1)" for 2025-01-11 to 2025-01-12

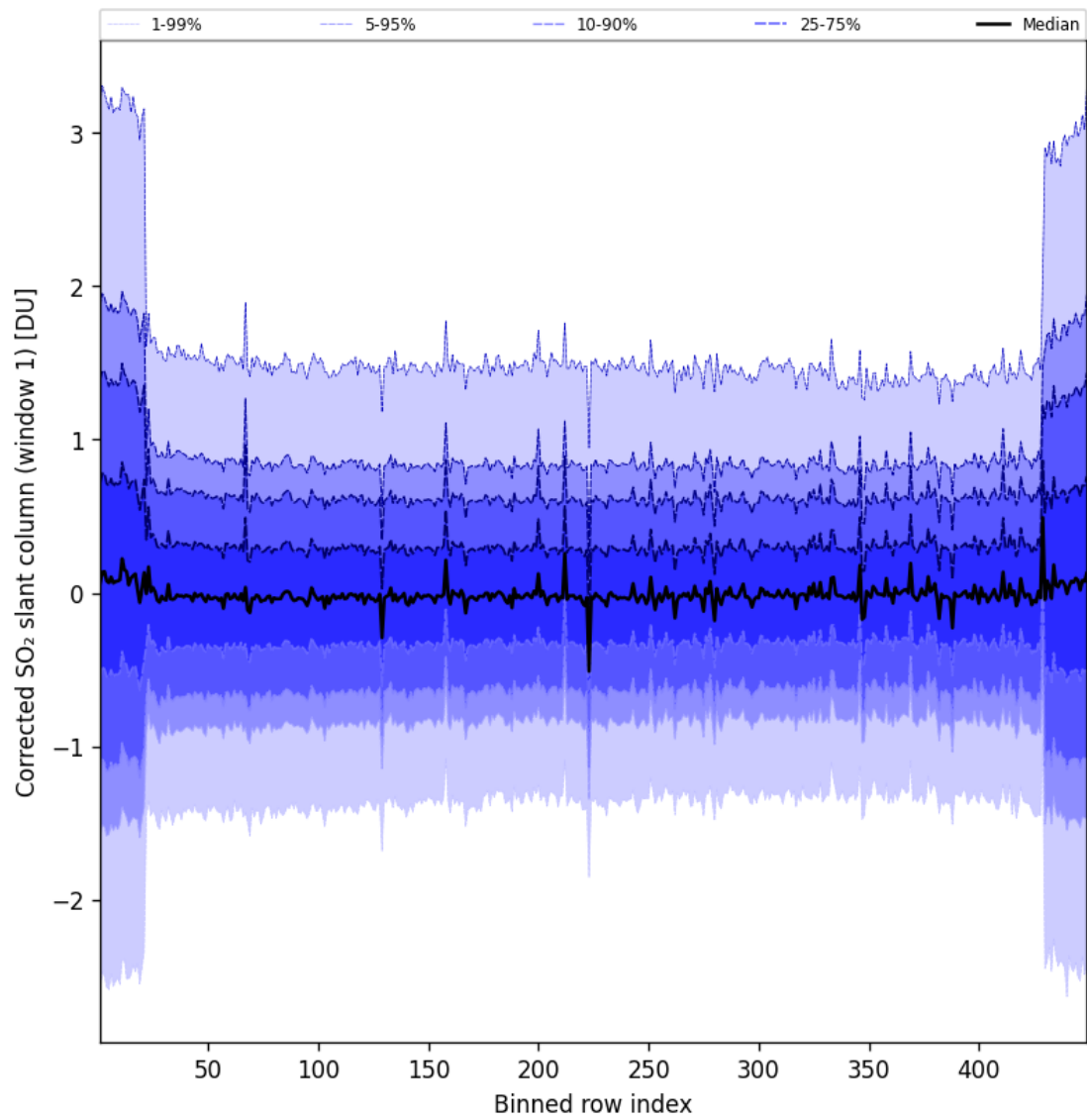


Figure 92: Along track statistics of "Corrected SO₂ slant column (window 1)" for 2025-01-11 to 2025-01-12

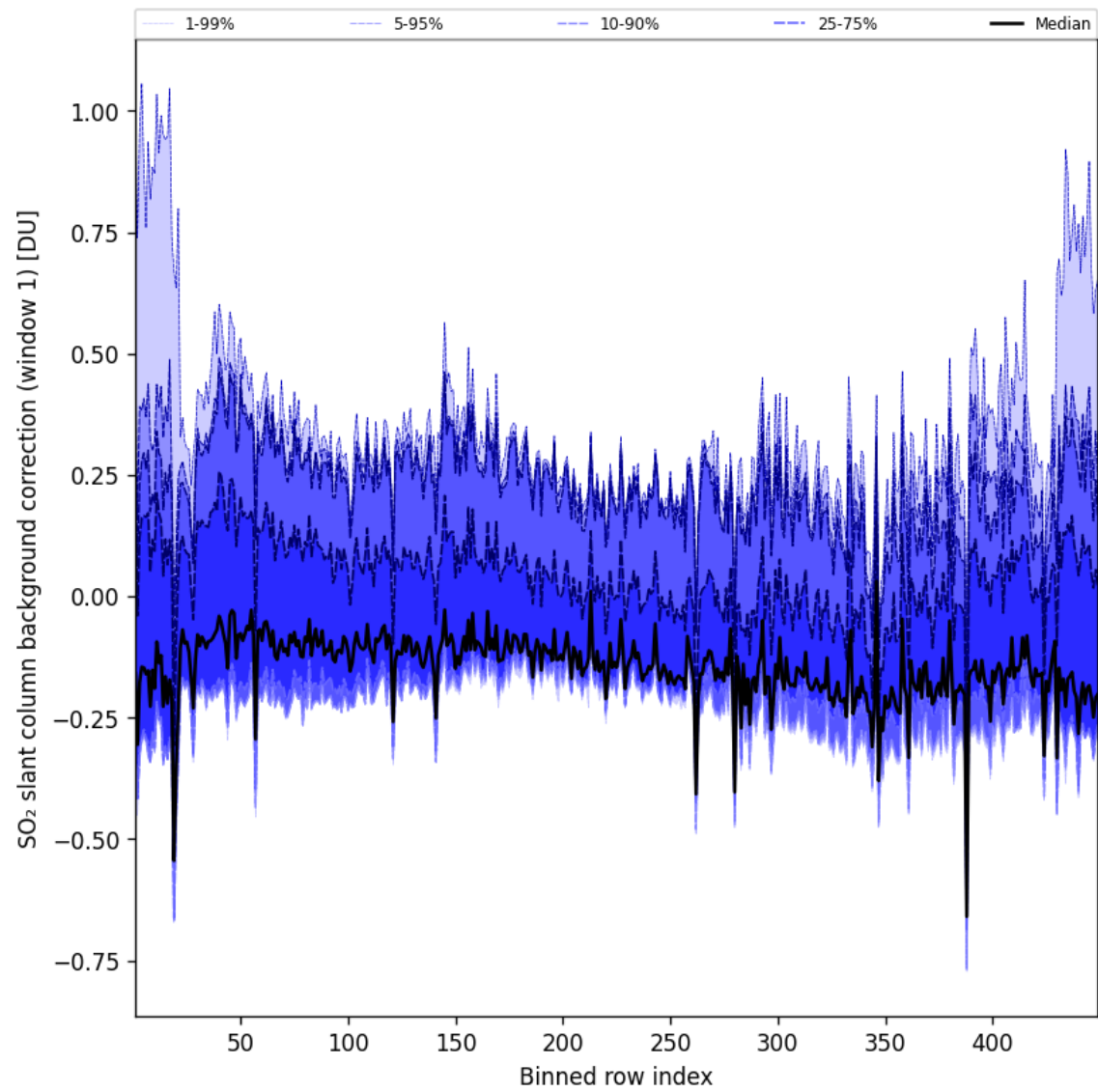


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-01-11 to 2025-01-12

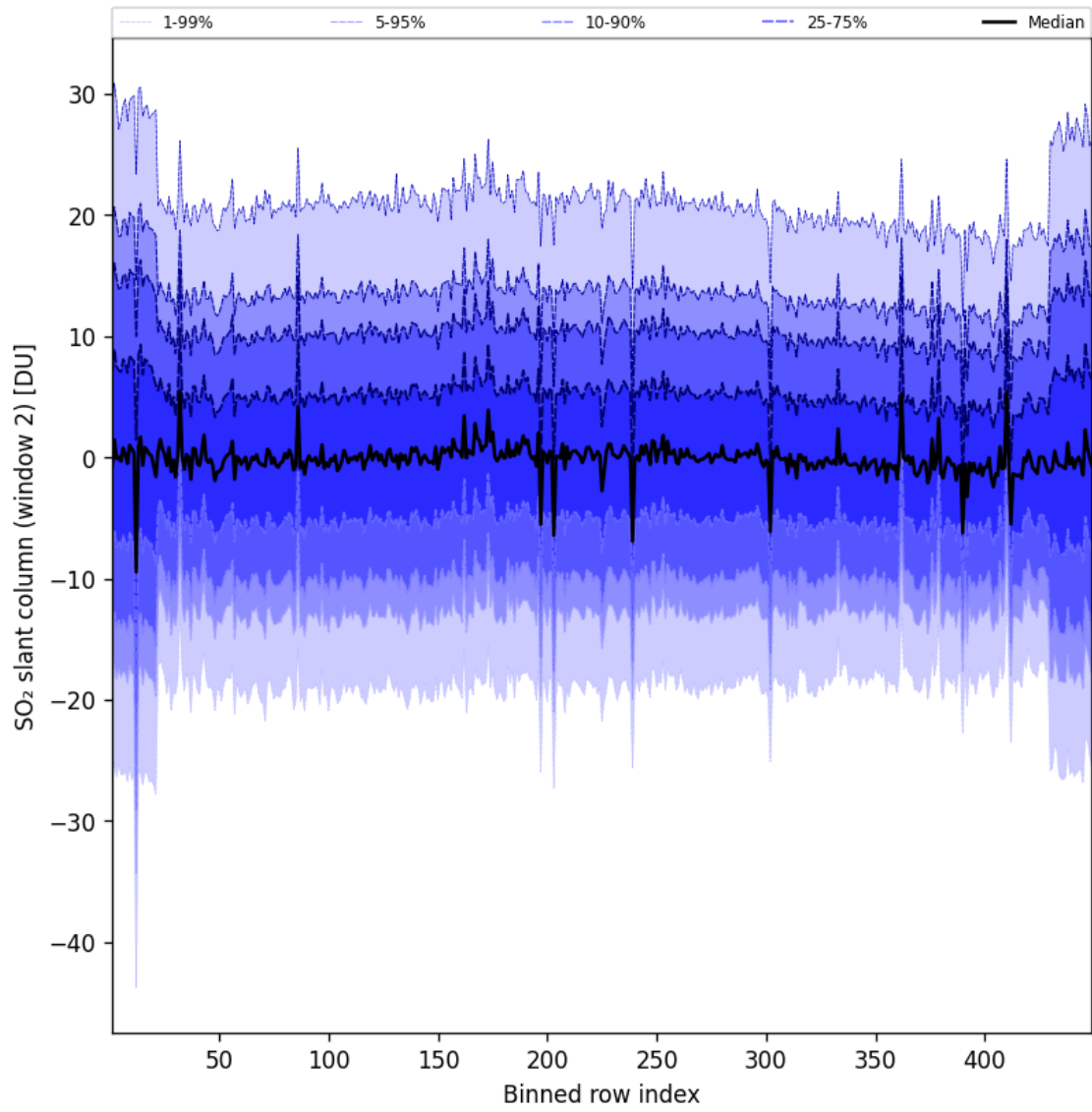


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-01-11 to 2025-01-12

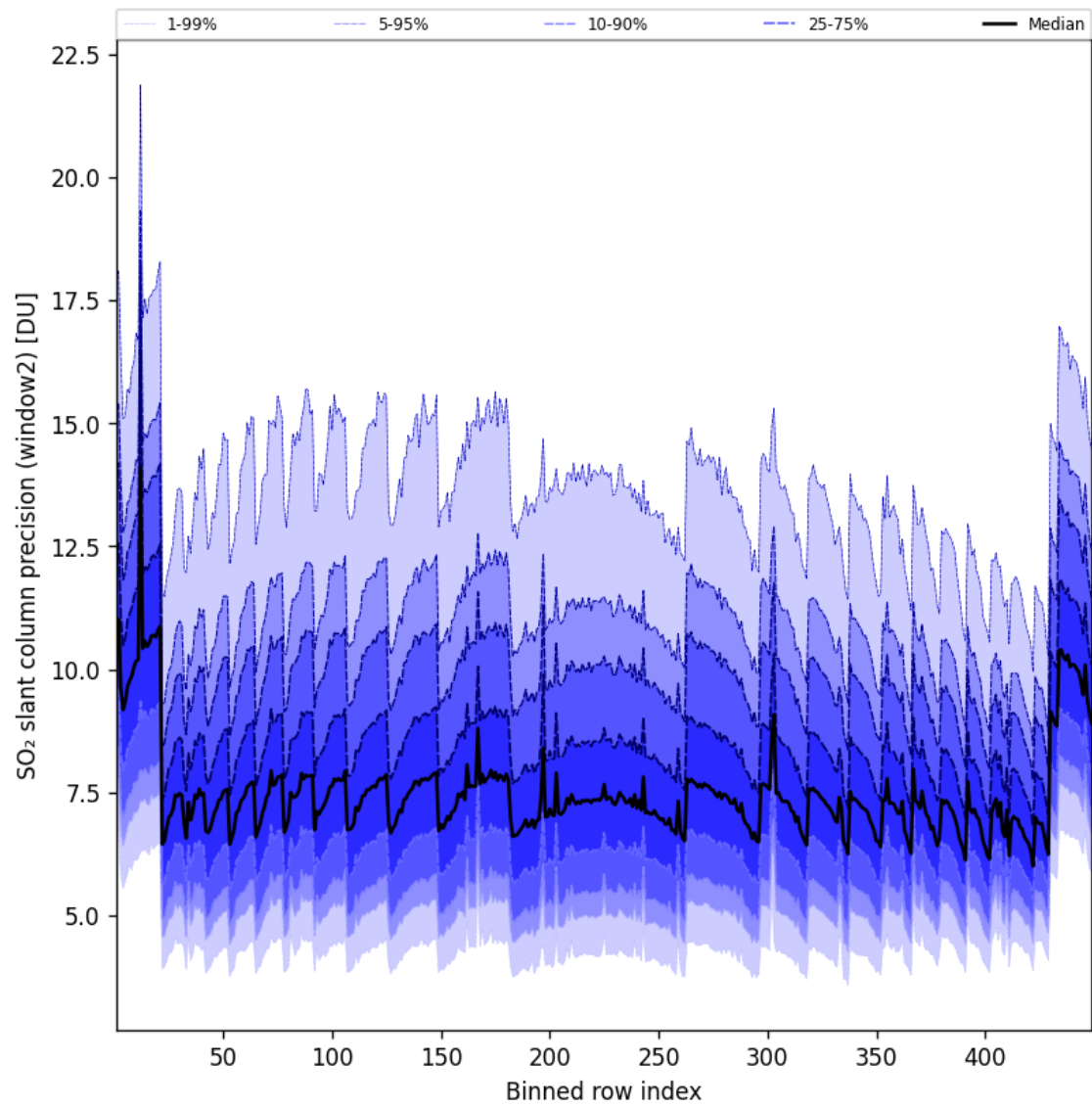


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-01-11 to 2025-01-12

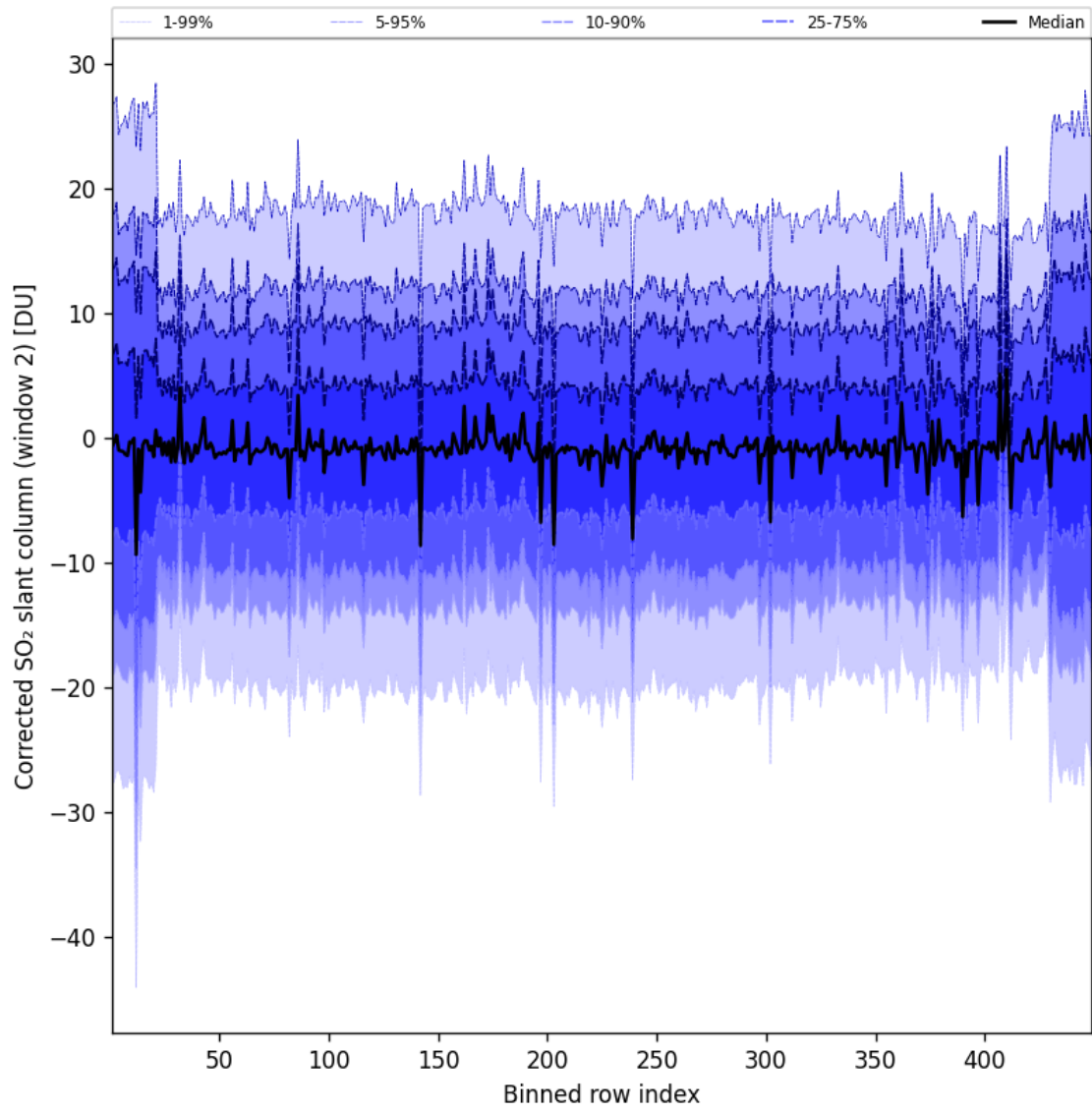


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-01-11 to 2025-01-12

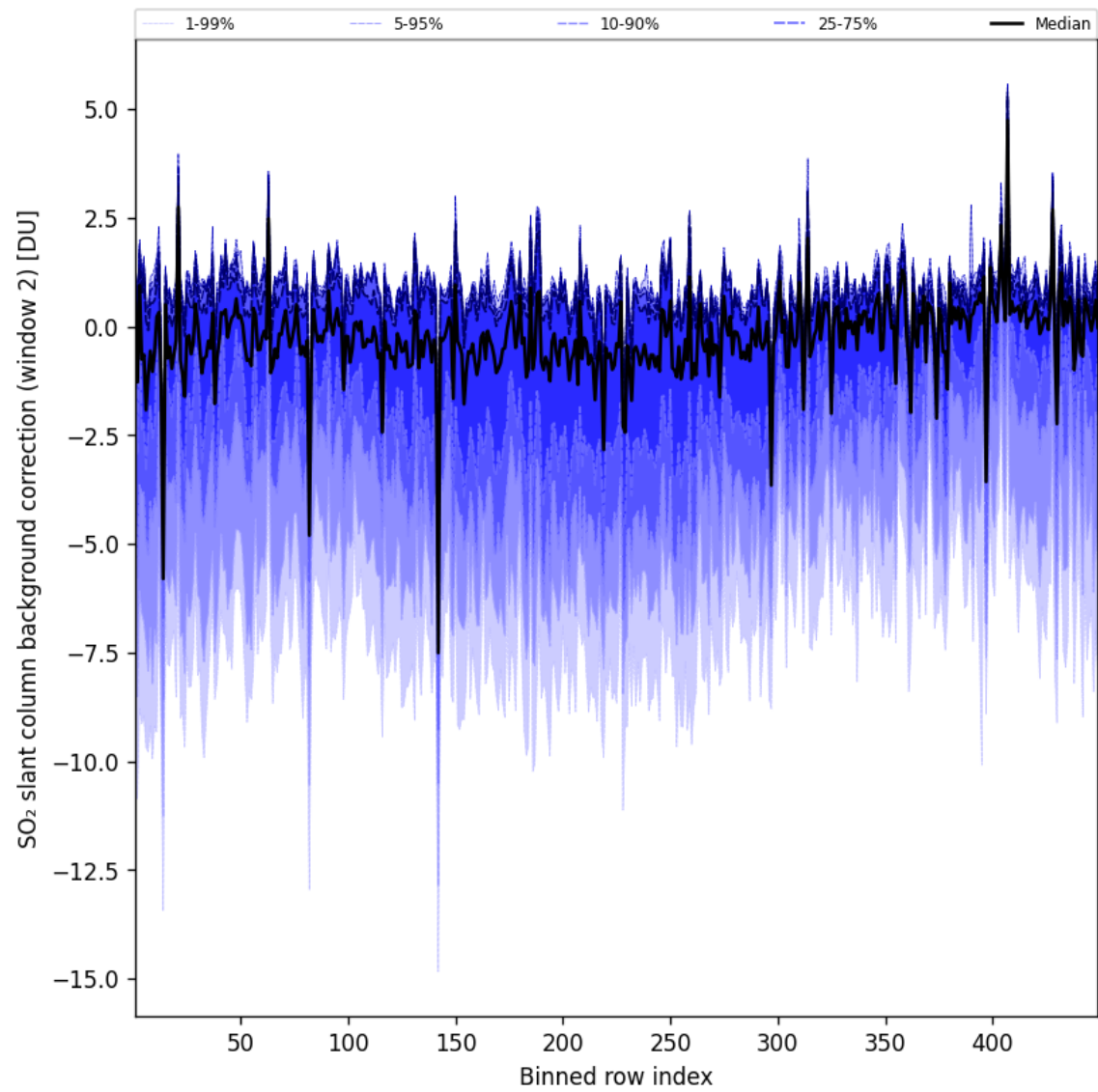


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-01-11 to 2025-01-12

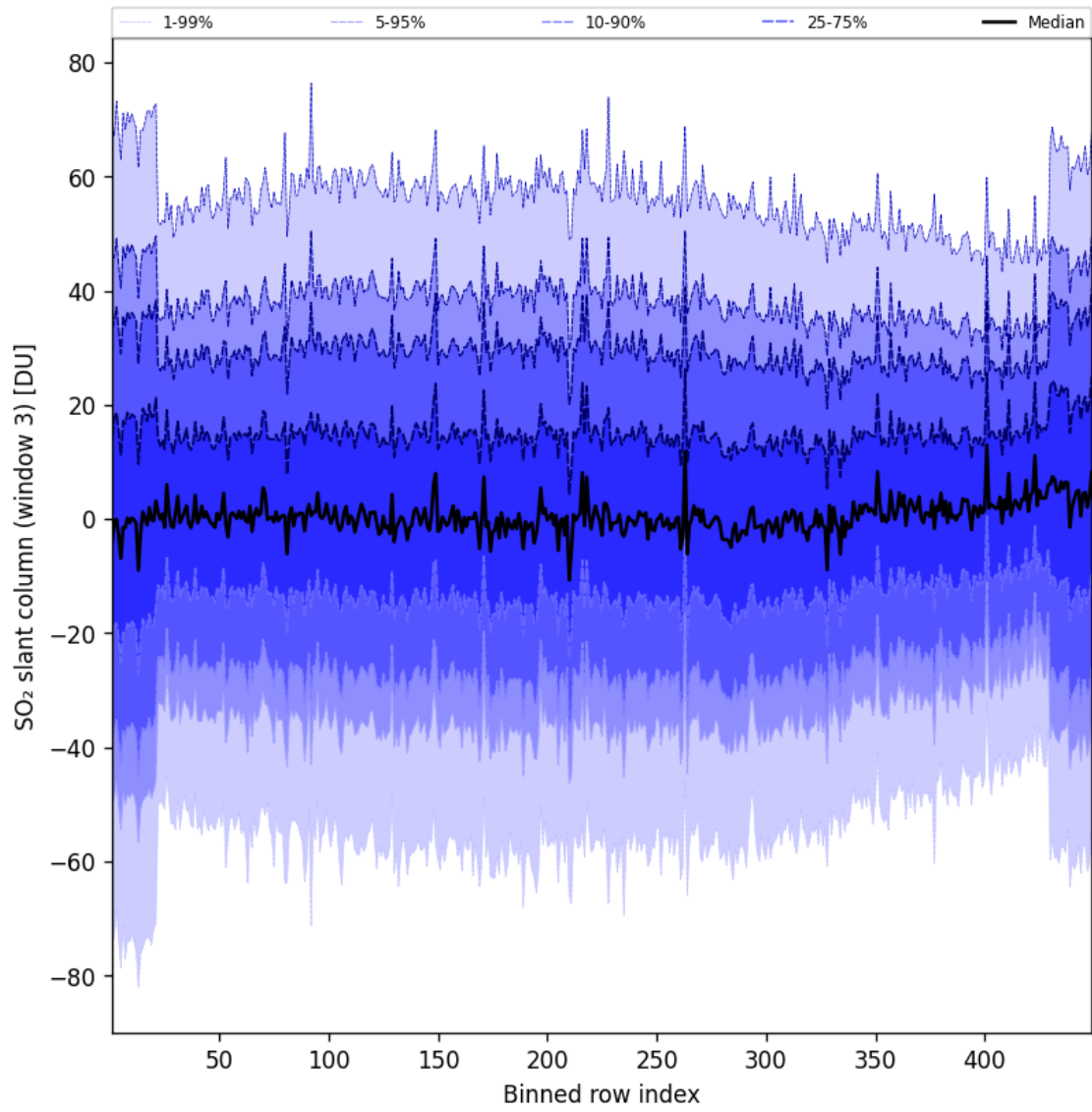


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-01-11 to 2025-01-12

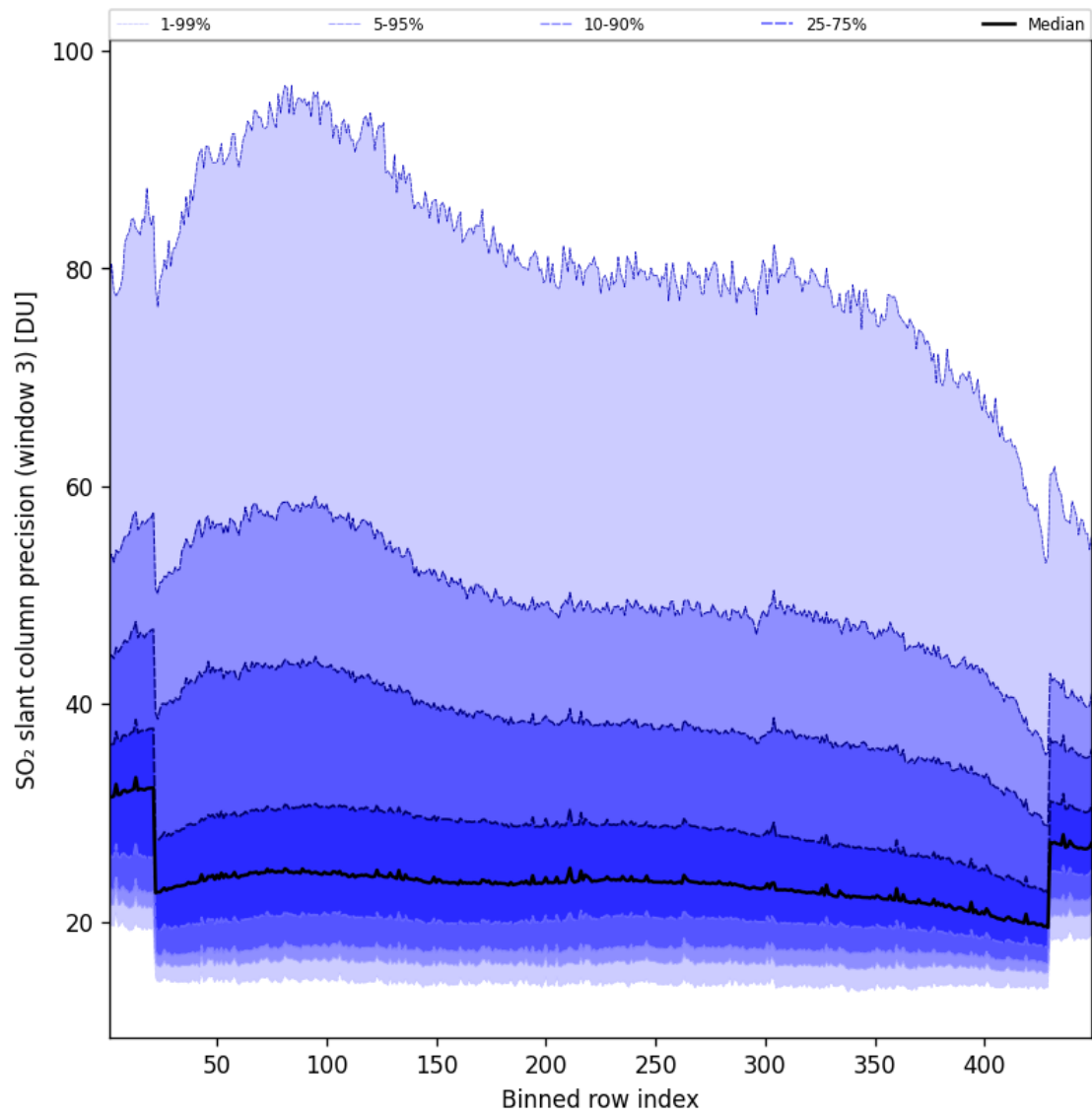


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-01-11 to 2025-01-12

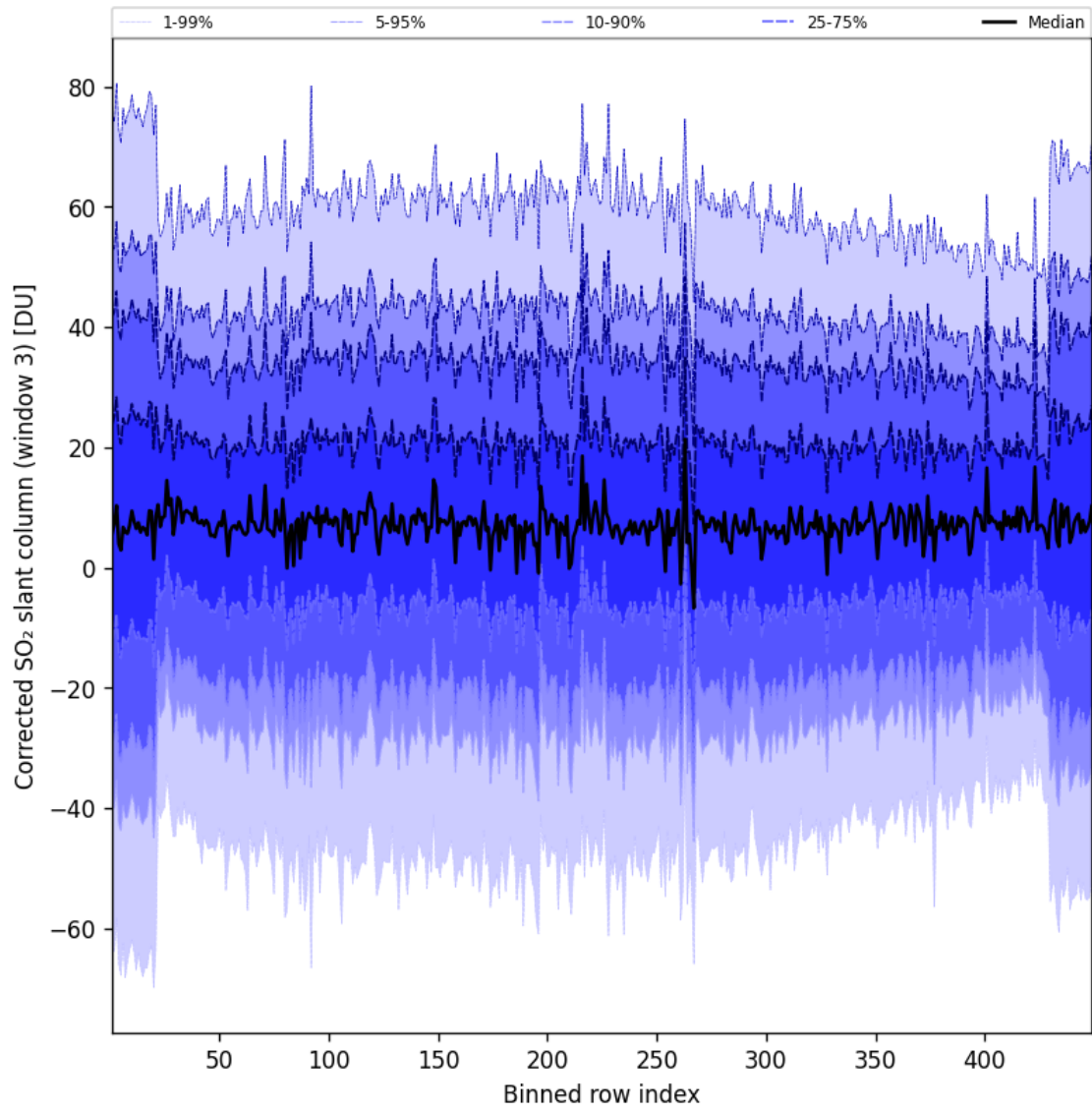


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-01-11 to 2025-01-12

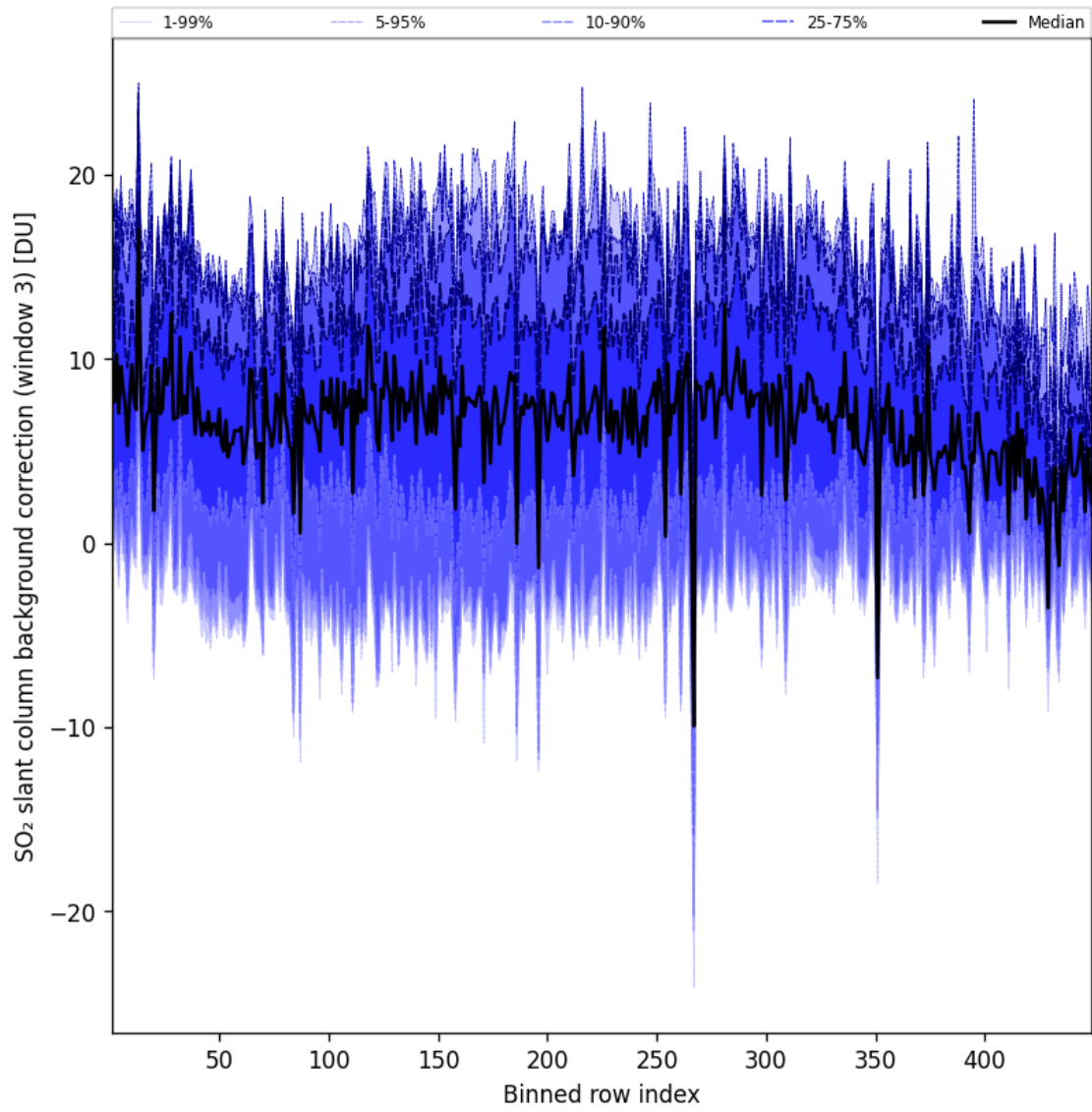


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-01-11 to 2025-01-12

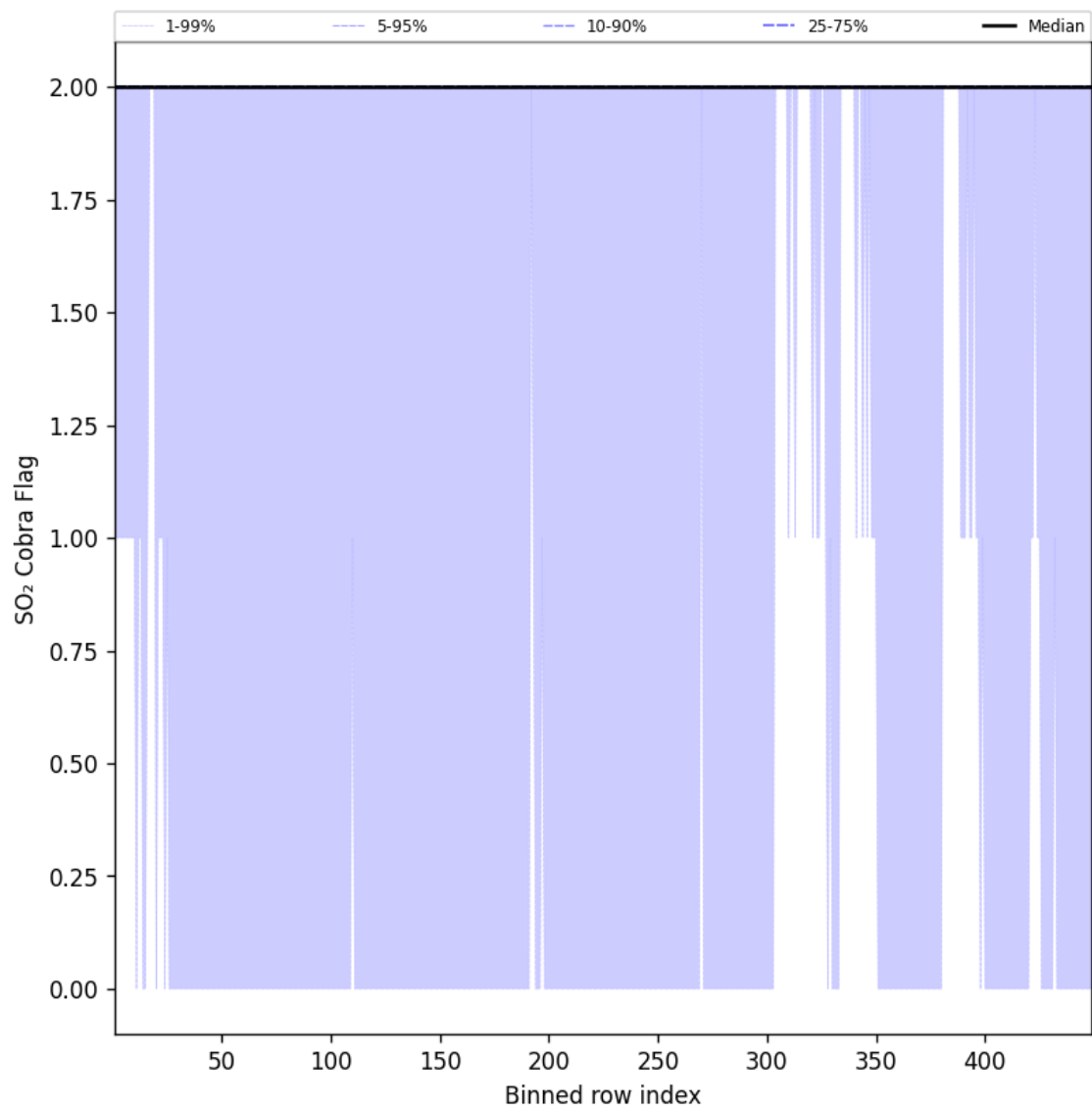


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-01-11 to 2025-01-12

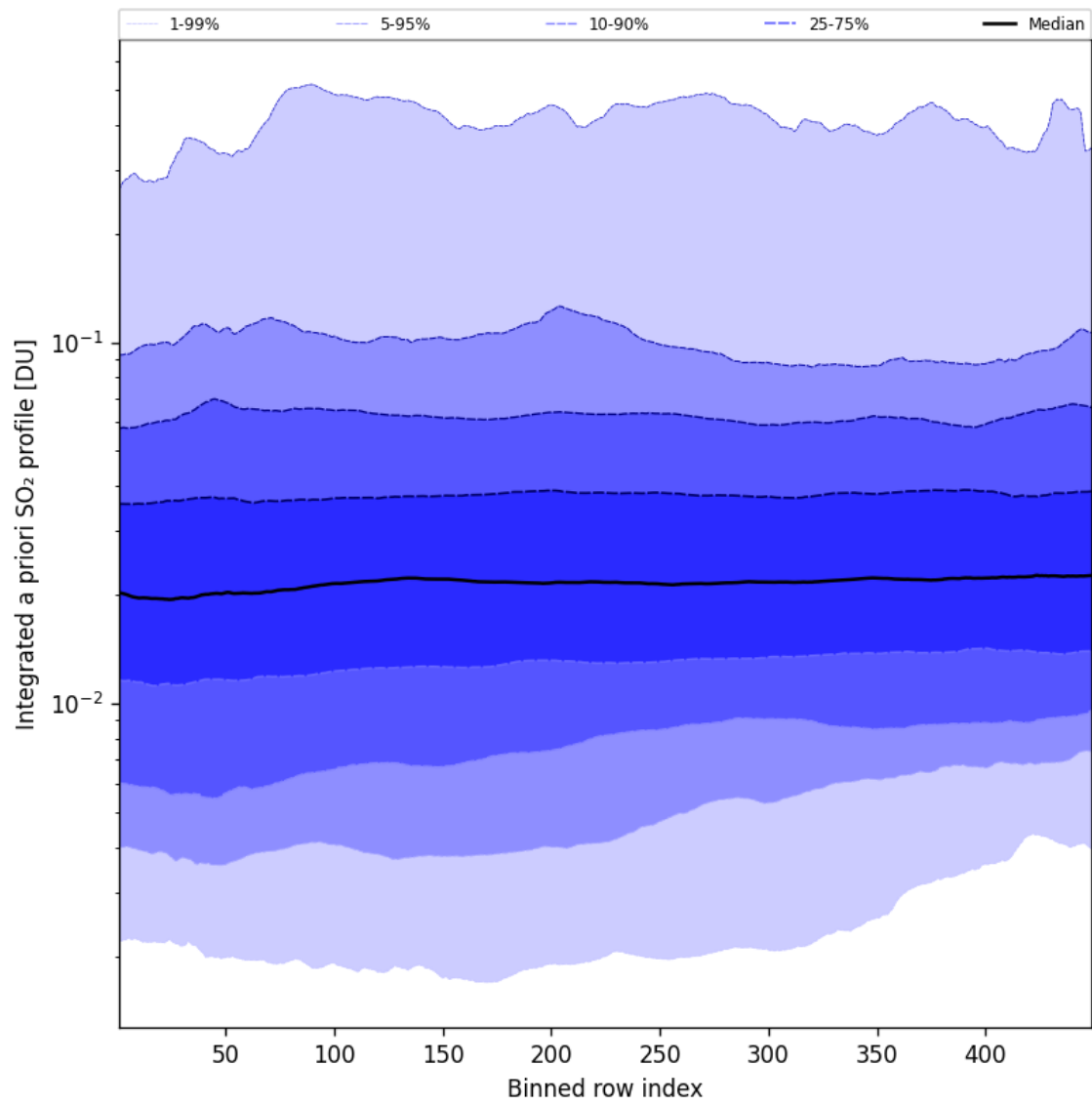


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-01-11 to 2025-01-12

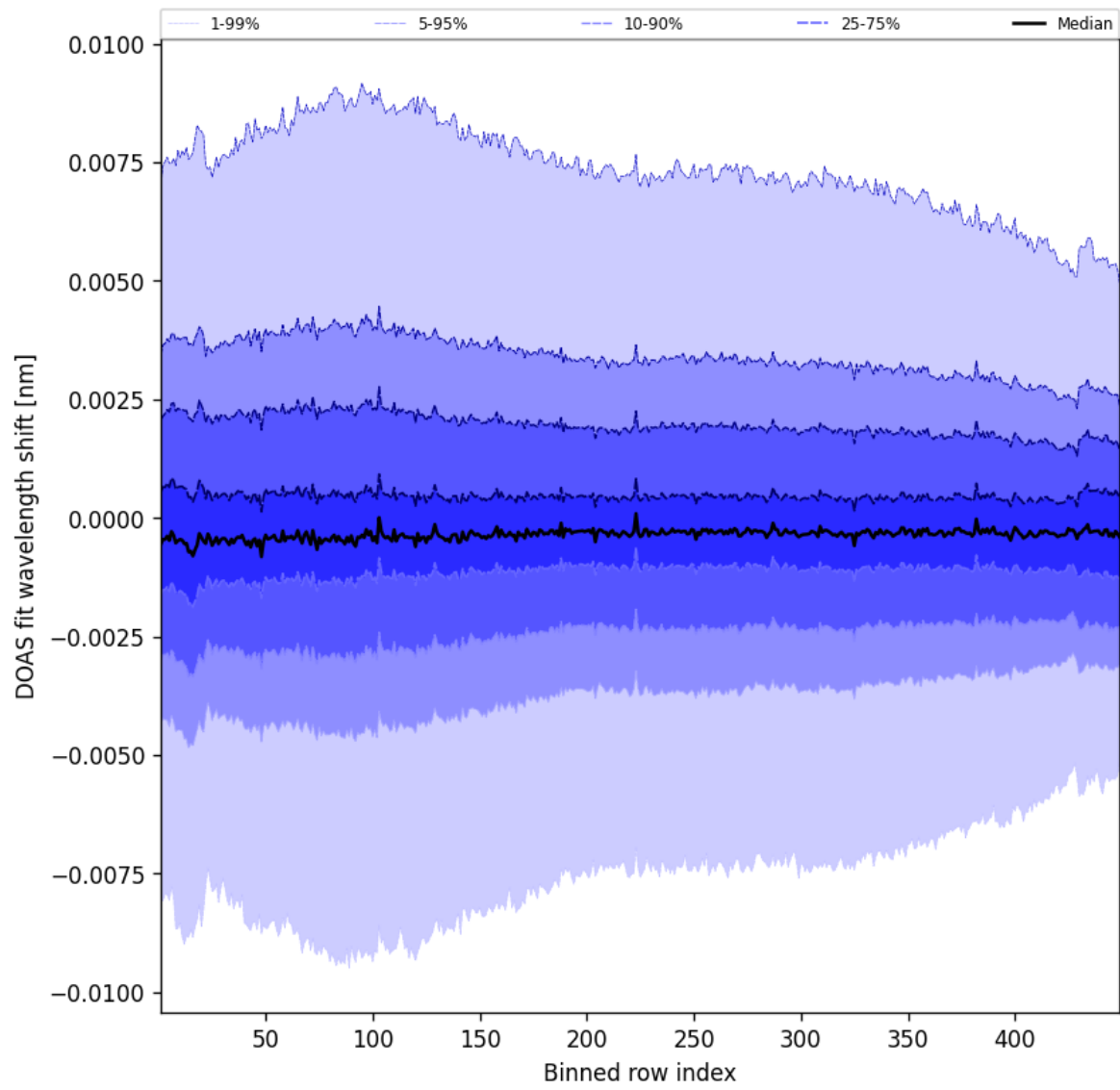


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-01-11 to 2025-01-12

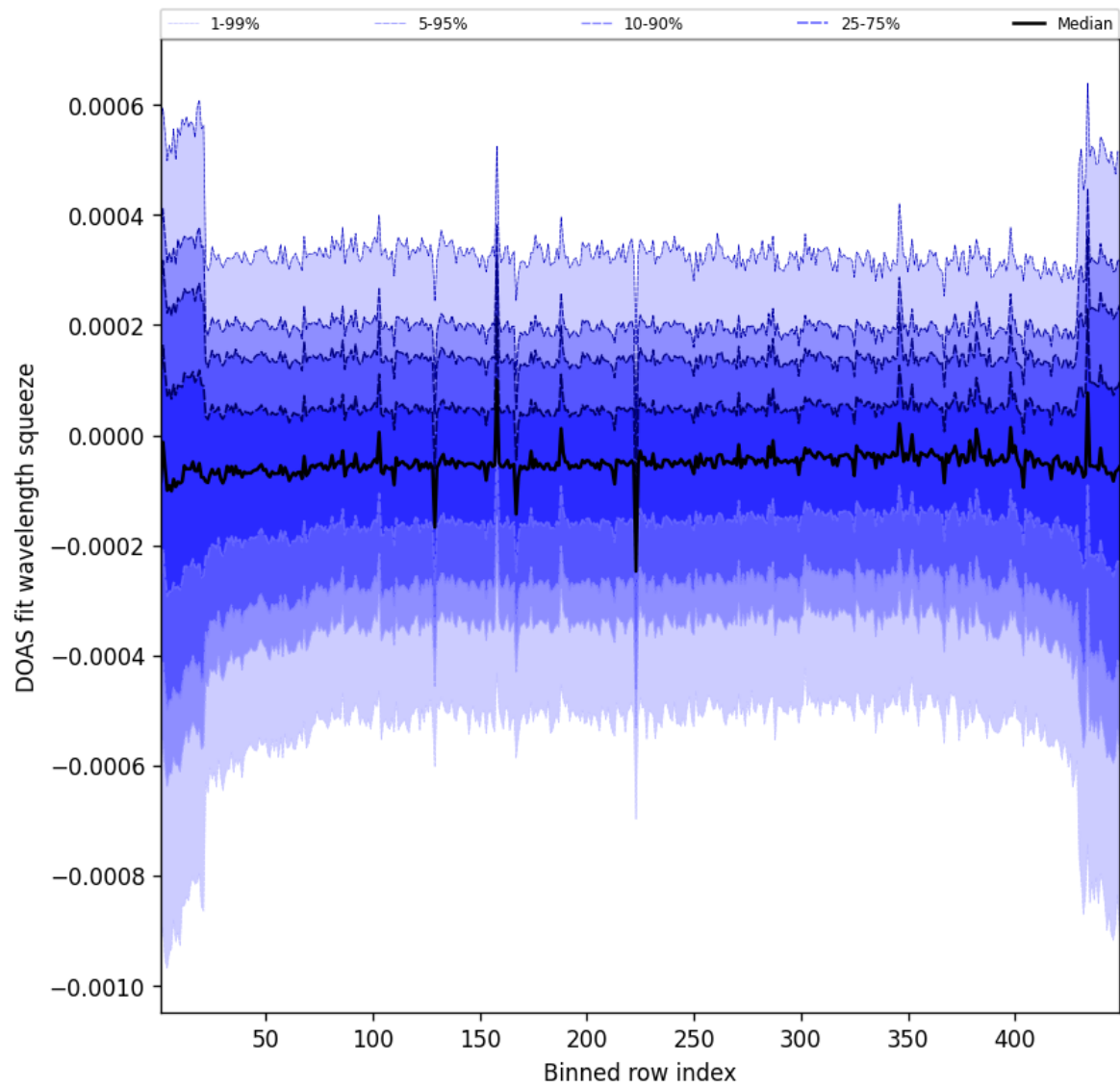


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-01-11 to 2025-01-12

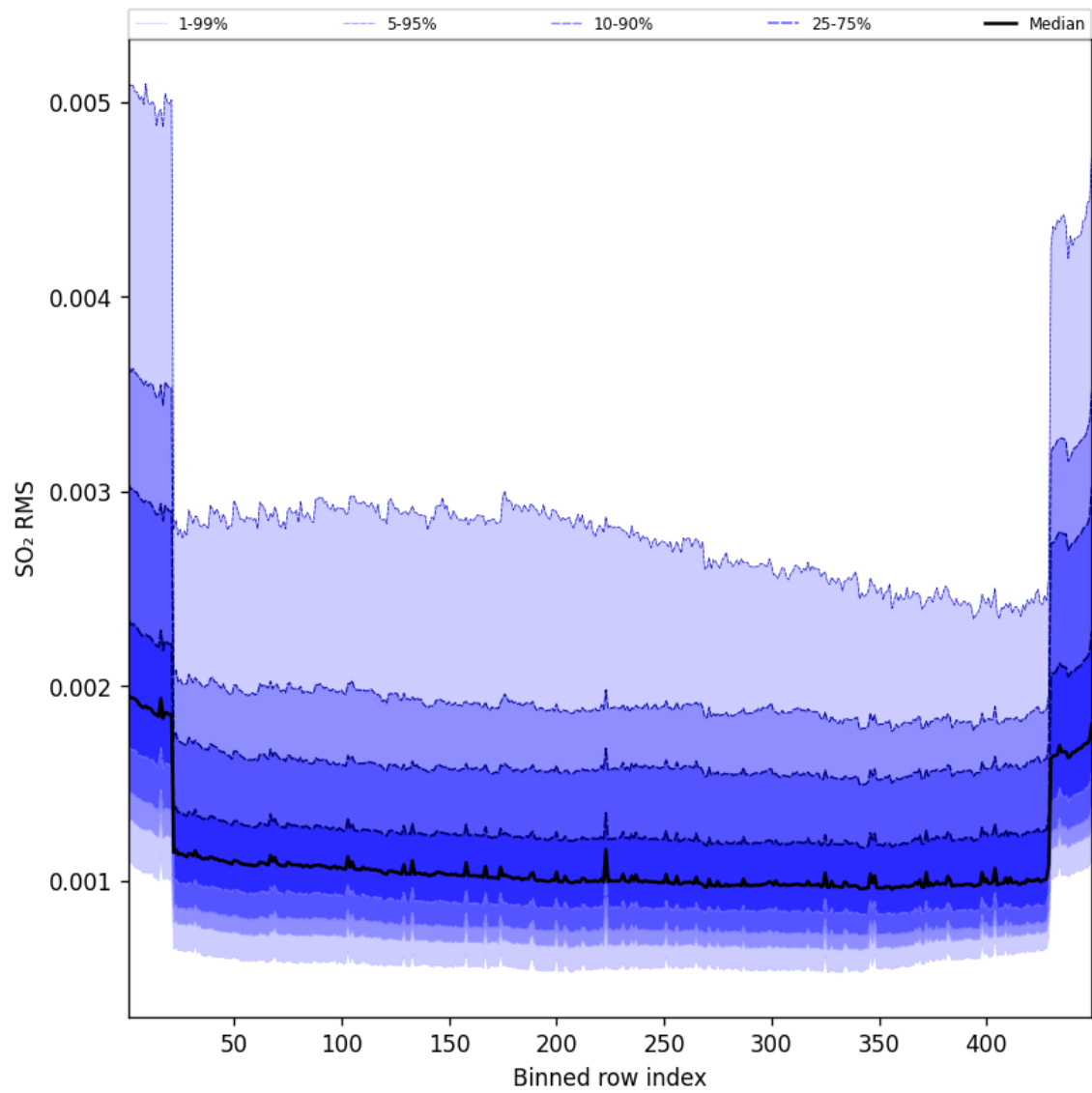


Figure 106: Along track statistics of “SO₂ RMS” for 2025-01-11 to 2025-01-12

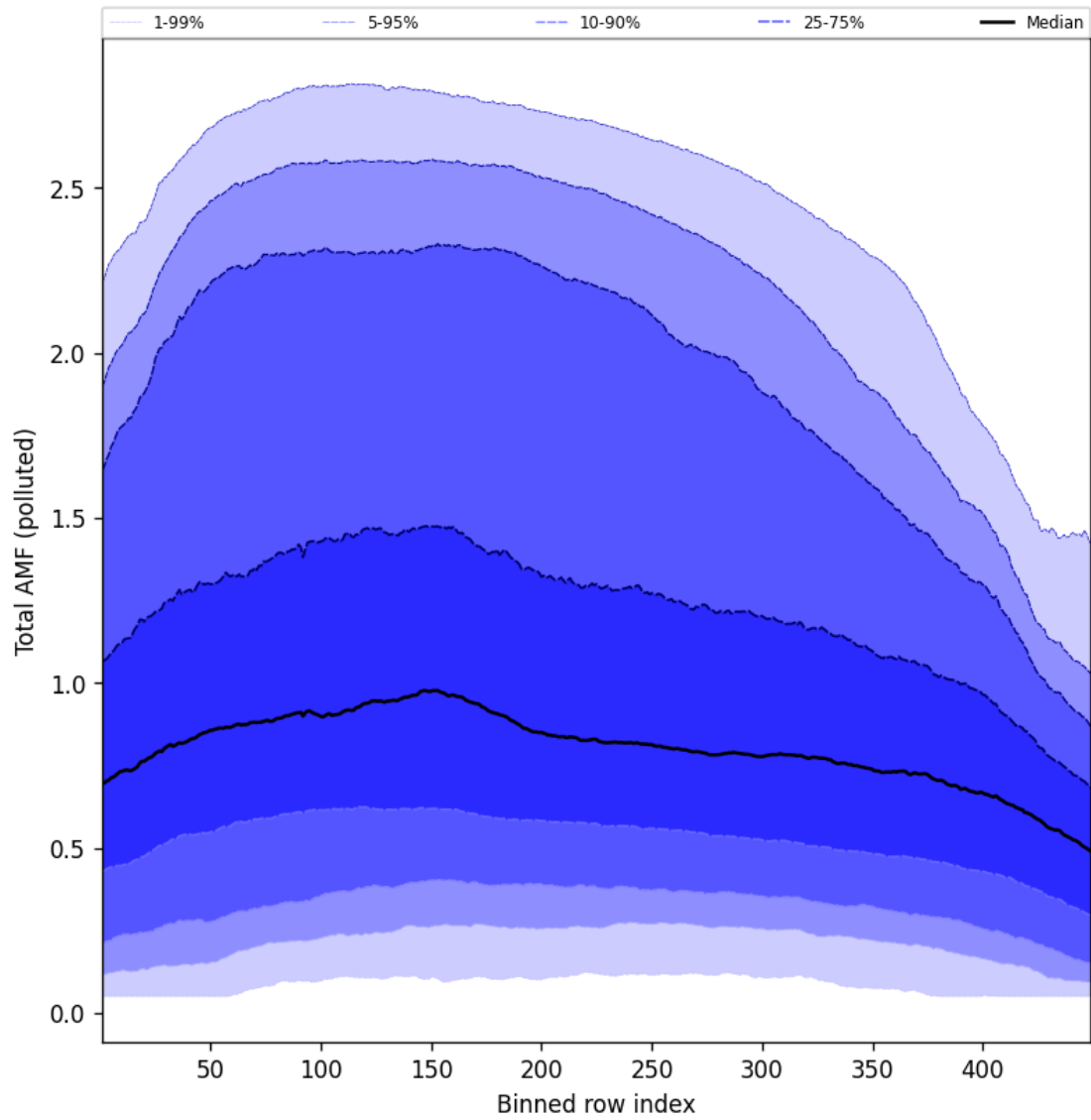


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-01-11 to 2025-01-12

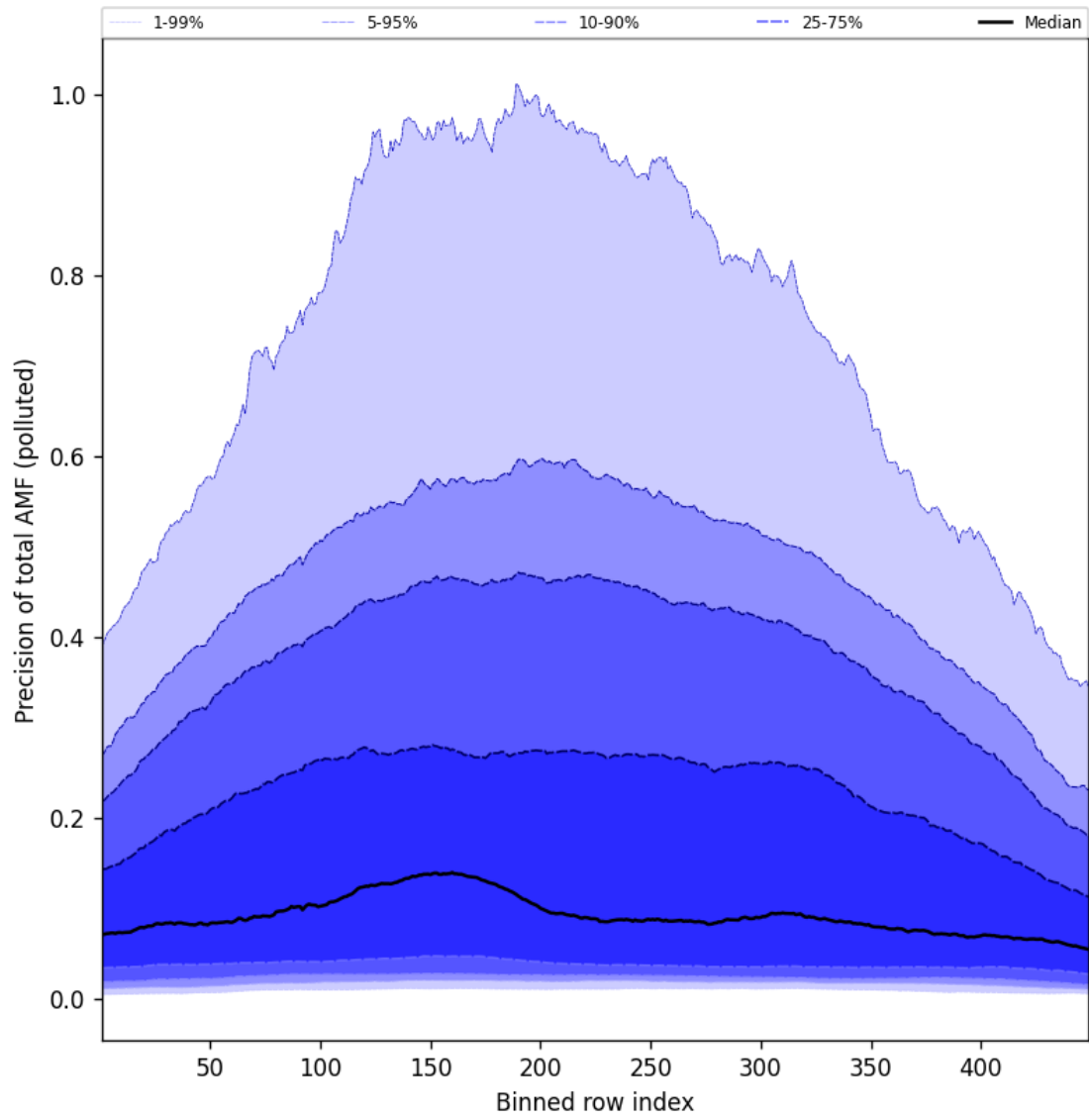


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-01-11 to 2025-01-12

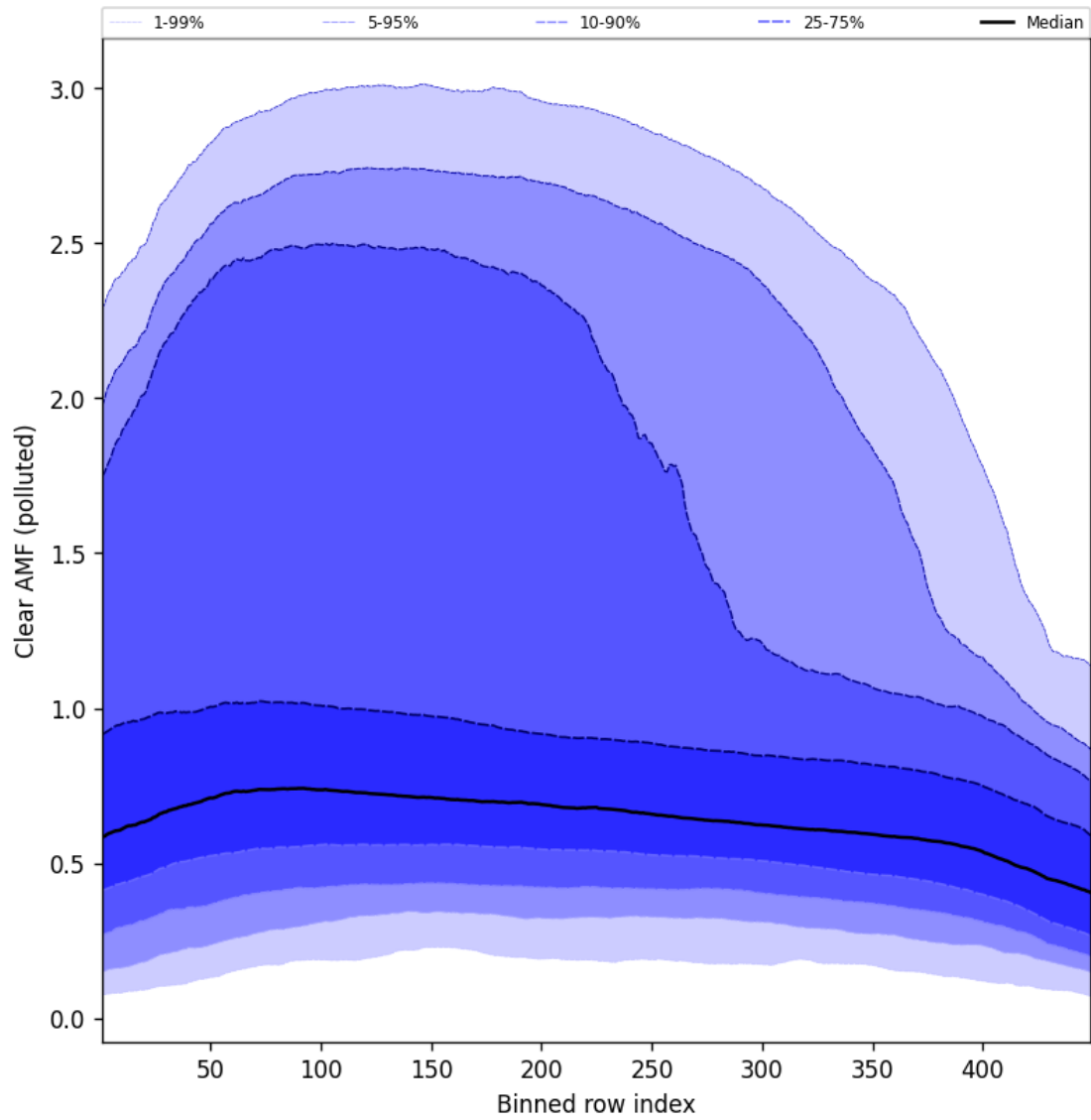


Figure 109: Along track statistics of "Clear AMF (polluted)" for 2025-01-11 to 2025-01-12

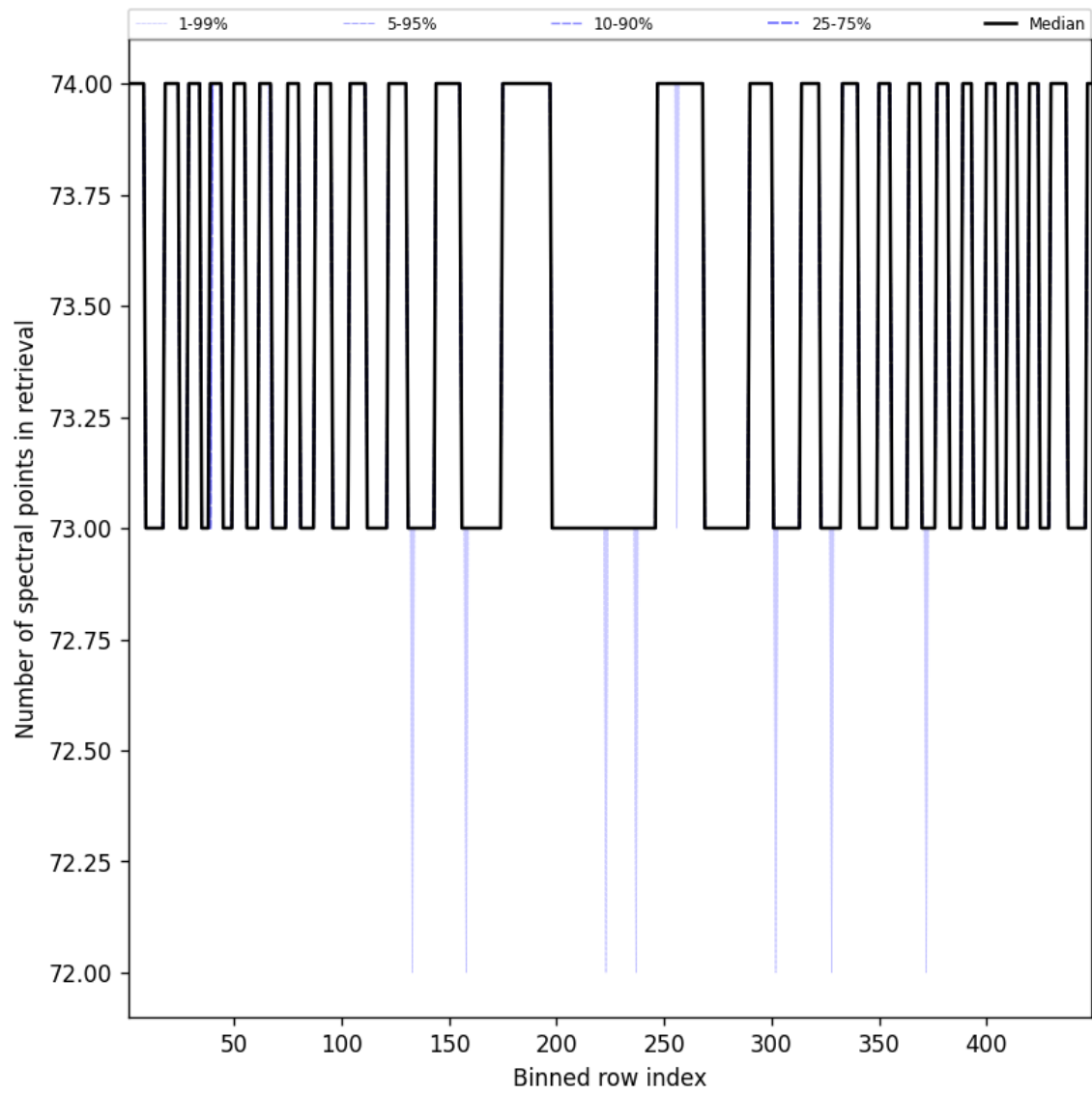


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-01-11 to 2025-01-12

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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