

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]	0.619 $\pm$ 0.416	17270174	0.995	0.810	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.818 \pm 163.236) \times 10^{-2}$	17270174	0.223	0.410	9.123×10^{-3}	-188	540
sulfurdioxide total vertical column precision [DU]	0.593 $\pm$ 1.141	17270174	0.222	0.349	0.302	3.970×10^{-2}	54.8
sulfurdioxide slant column density corrected [DU]	$(1.734 \pm 35.311) \times 10^{-2}$	17270174	0.242	0.338	8.513×10^{-3}	-19.3	131
sulfurdioxide slant column density cobra [DU]	$(1.712 \pm 33.349) \times 10^{-2}$	17270174	0.242	0.338	8.513×10^{-3}	-19.3	51.1
sulfurdioxide slant column density cobra precision [DU]	0.272 $\pm$ 0.124	17270174	0.213	0.113	0.233	8.125×10^{-2}	19.4
sulfurdioxide slant column density window1 [DU]	0.125 $\pm$ 0.641	17270174	0.175	0.705	0.134	-64.9	73.9
sulfurdioxide slant column density window1 precision [DU]	0.272 $\pm$ 0.124	17270174	0.213	0.113	0.233	8.125×10^{-2}	19.4
sulfurdioxide slant column density corrected win1 [DU]	$(7.055 \pm 62.361) \times 10^{-2}$	17270174	7.500×10^{-2}	0.673	5.593×10^{-2}	-64.9	73.8
background so2 slant column offset window1 [DU]	$(-5.396 \pm 18.746) \times 10^{-2}$	17270174	-0.140	0.226	-0.108	-1.31	3.37
sulfurdioxide slant column density window2 [DU]	3.40 $\pm$ 8.60	17270174	2.75	10.8	3.24	-772	807
sulfurdioxide slant column density window2 precision [DU]	7.76 $\pm$ 2.19	17270174	6.97	2.50	7.41	2.22	652
sulfurdioxide slant column density corrected win2 [DU]	3.16 $\pm$ 8.36	17270174	3.25	10.5	3.17	-770	808
background so2 slant column offset window2 [DU]	-0.236 $\pm$ 2.270	17270174	1.25	2.50	0.436	-17.3	6.82
sulfurdioxide slant column density window3 [DU]	-17.0 $\pm$ 23.6	17270174	-19.6	29.2	-17.3	-860	553
sulfurdioxide slant column density window3 precision [DU]	27.0 $\pm$ 12.6	17270174	22.5	9.81	24.0	9.58	1.081×10^3
sulfurdioxide slant column density corrected win3 [DU]	-15.2 $\pm$ 22.7	17270174	-16.2	28.2	-15.3	-871	542
background so2 slant column offset window3 [DU]	1.78 $\pm$ 6.79	17270174	1.68	10.2	1.75	-17.0	25.3
sulfurdioxide slant column cobra flag [1]	1.98 $\pm$ 0.21	17270174	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.492 \pm 11.521) \times 10^{-2}$	17270174	2.276×10^{-2}	2.874×10^{-2}	2.312×10^{-2}	1.405×10^{-4}	3.81
fitted radiance shift [nm]	$(-4.244 \pm 24.421) \times 10^{-4}$	17270174	-5.000×10^{-4}	1.708×10^{-3}	-4.722×10^{-4}	-4.174×10^{-2}	5.391×10^{-2}
fitted radiance squeeze [1]	$(-6.050 \pm 18.283) \times 10^{-5}$	17270174	-3.000×10^{-5}	2.146×10^{-4}	-5.118×10^{-5}	-1.566×10^{-2}	1.423×10^{-2}
fitted root mean square [1]	$(1.215 \pm 0.510) \times 10^{-3}$	17270174	9.250×10^{-4}	4.785×10^{-4}	1.073×10^{-3}	3.325×10^{-4}	7.392×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.922 $\pm$ 0.620	17270174	0.660	0.657	0.760	5.000×10^{-2}	3.12
sulfurdioxide total air mass factor polluted precision [1]	0.138 $\pm$ 0.151	17270174	3.500×10^{-2}	0.160	8.074×10^{-2}	2.500×10^{-3}	1.65
sulfurdioxide clear air mass factor polluted [1]	0.821 $\pm$ 0.617	17270174	0.580	0.380	0.653	2.200×10^{-2}	3.14
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	17270174	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}	9.000×10^{-2}	0.190	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-3.10	-0.934	-0.527	-0.340	-0.192	0.218	0.379	0.589	1.07	3.79
sulfurdioxide total vertical column precision [DU]	7.999×10^{-2}	0.101	0.123	0.149	0.190	0.539	0.784	1.16	1.96	5.47
sulfurdioxide slant column density corrected [DU]	-0.788	-0.452	-0.329	-0.246	-0.159	0.179	0.271	0.361	0.503	0.949
sulfurdioxide slant column density cobra [DU]	-0.788	-0.452	-0.329	-0.246	-0.159	0.179	0.271	0.361	0.503	0.949
sulfurdioxide slant column density cobra precision [DU]	0.132	0.158	0.171	0.182	0.195	0.308	0.368	0.423	0.504	0.737
sulfurdioxide slant column density window1 [DU]	-1.58	-0.871	-0.600	-0.417	-0.225	0.480	0.659	0.829	1.09	1.82
sulfurdioxide slant column density window1 precision [DU]	0.132	0.158	0.171	0.182	0.195	0.308	0.368	0.423	0.504	0.737
sulfurdioxide slant column density corrected win1 [DU]	-1.49	-0.849	-0.611	-0.450	-0.277	0.396	0.579	0.758	1.03	1.84
background so2 slant column offset window1 [DU]	-0.382	-0.281	-0.242	-0.208	-0.175	5.112×10^{-2}	0.147	0.223	0.310	0.463
sulfurdioxide slant column density window2 [DU]	-16.7	-10.2	-7.08	-4.74	-2.10	8.69	11.5	14.0	17.6	25.4
sulfurdioxide slant column density window2 precision [DU]	4.12	4.93	5.42	5.82	6.31	8.81	9.68	10.6	11.8	14.4
sulfurdioxide slant column density corrected win2 [DU]	-17.3	-10.4	-7.13	-4.75	-2.10	8.44	11.1	13.4	16.7	23.6
background so2 slant column offset window2 [DU]	-7.64	-4.98	-3.34	-2.22	-1.21	1.30	1.56	1.78	2.13	3.26
sulfurdioxide slant column density window3 [DU]	-75.9	-55.1	-45.6	-38.9	-31.7	-2.46	5.36	12.5	22.2	41.2
sulfurdioxide slant column density window3 precision [DU]	13.4	15.1	16.5	17.9	19.8	29.6	34.2	39.4	50.0	80.1
sulfurdioxide slant column density corrected win3 [DU]	-72.5	-52.2	-42.9	-36.4	-29.3	-1.12	6.21	12.9	22.0	40.7
background so2 slant column offset window3 [DU]	-12.1	-9.16	-7.35	-5.67	-3.27	6.94	9.12	10.8	12.8	16.1
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	2.030×10^{-3}	5.465×10^{-3}	7.949×10^{-3}	1.004×10^{-2}	1.304×10^{-2}	4.178×10^{-2}	5.470×10^{-2}	7.303×10^{-2}	0.122	0.441
fitted radiance shift [nm]	-7.742×10^{-3}	-3.995×10^{-3}	-2.654×10^{-3}	-1.913×10^{-3}	-1.320×10^{-3}	3.875×10^{-4}	1.061×10^{-3}	1.913×10^{-3}	3.374×10^{-3}	7.326×10^{-3}
fitted radiance squeeze [1]	-5.557×10^{-4}	-3.654×10^{-4}	-2.830×10^{-4}	-2.251×10^{-4}	-1.635×10^{-4}	5.110×10^{-5}	1.015×10^{-4}	1.475×10^{-4}	2.131×10^{-4}	3.737×10^{-4}
fitted root mean square [1]	5.675×10^{-4}	6.960×10^{-4}	7.717×10^{-4}	8.293×10^{-4}	8.979×10^{-4}	1.376×10^{-3}	1.607×10^{-3}	1.842×10^{-3}	2.204×10^{-3}	3.107×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.750×10^{-2}	0.186	0.291	0.388	0.499	1.16	1.49	1.86	2.37	2.74
sulfurdioxide total air mass factor polluted precision [1]	7.791×10^{-3}	1.535×10^{-2}	2.183×10^{-2}	2.725×10^{-2}	3.483×10^{-2}	0.195	0.261	0.324	0.418	0.703
sulfurdioxide clear air mass factor polluted [1]	0.136	0.260	0.346	0.416	0.492	0.872	1.02	1.39	2.59	2.96
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]	0.697 ± 0.398	6231813	0.720	1.000	0.0	1.000	0.280	1.000
sulfurdioxide total vertical column [DU]	0.111 ± 2.606	6231813	0.650	1.682×10^{-2}	-188	540	-0.297	0.354
sulfurdioxide total vertical column precision [DU]	1.02 ± 1.74	6231813	0.749	0.475	4.973×10^{-2}	54.8	0.271	1.02
sulfurdioxide slant column density corrected [DU]	$(2.855 \pm 45.736) \times 10^{-2}$	6231813	0.395	1.187×10^{-2}	-10.2	131	-0.183	0.212
sulfurdioxide slant column density cobra [DU]	$(2.796 \pm 41.597) \times 10^{-2}$	6231813	0.395	1.187×10^{-2}	-10.2	32.8	-0.183	0.212
sulfurdioxide slant column density cobra precision [DU]	0.323 ± 0.155	6231813	0.173	0.274	9.040×10^{-2}	12.5	0.217	0.390
sulfurdioxide slant column density window1 [DU]	0.195 ± 0.757	6231813	0.791	0.201	-13.5	71.9	-0.197	0.594
sulfurdioxide slant column density window1 precision [DU]	0.323 ± 0.155	6231813	0.173	0.274	9.040×10^{-2}	12.5	0.217	0.390
sulfurdioxide slant column density corrected win1 [DU]	$(9.547 \pm 75.615) \times 10^{-2}$	6231813	0.783	6.831×10^{-2}	-13.4	72.0	-0.316	0.467
background so2 slant column offset window1 [DU]	$(-9.948 \pm 16.919) \times 10^{-2}$	6231813	0.149	-0.119	-1.31	3.37	-0.198	-4.876×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.18 ± 9.72	6231813	12.3	3.82	-591	613	-2.17	10.1
sulfurdioxide slant column density window2 precision [DU]	8.66 ± 2.29	6231813	2.83	8.32	2.42	652	7.08	9.91
sulfurdioxide slant column density corrected win2 [DU]	3.22 ± 9.32	6231813	11.9	3.22	-589	614	-2.71	9.15
background so2 slant column offset window2 [DU]	-0.955 ± 2.868	6231813	3.84	0.201	-17.3	6.47	-2.69	1.16
sulfurdioxide slant column density window3 [DU]	-20.0 ± 25.7	6231813	32.5	-19.6	-201	227	-36.0	-3.54
sulfurdioxide slant column density window3 precision [DU]	29.9 ± 12.5	6231813	9.91	27.0	9.92	207	23.0	32.9
sulfurdioxide slant column density corrected win3 [DU]	-15.5 ± 25.2	6231813	31.8	-15.4	-193	227	-31.3	0.514
background so2 slant column offset window3 [DU]	4.49 ± 5.72	6231813	9.19	3.92	-13.4	25.3	-0.184	9.00
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	6231813	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.658 \pm 18.479) \times 10^{-2}$	6231813	5.410×10^{-2}	2.595×10^{-2}	5.658×10^{-4}	3.81	1.425×10^{-2}	6.835×10^{-2}
fitted radiance shift [nm]	$(-2.627 \pm 25.079) \times 10^{-4}$	6231813	1.755×10^{-3}	-2.906×10^{-4}	-3.056×10^{-2}	3.391×10^{-2}	-1.162×10^{-3}	5.928×10^{-4}
fitted radiance squeeze [1]	$(-1.007 \pm 19.185) \times 10^{-5}$	6231813	2.144×10^{-4}	-6.657×10^{-6}	-5.094×10^{-3}	1.267×10^{-2}	-1.147×10^{-4}	9.974×10^{-5}
fitted root mean square [1]	$(1.405 \pm 0.637) \times 10^{-3}$	6231813	6.981×10^{-4}	1.198×10^{-3}	3.341×10^{-4}	7.392×10^{-2}	9.812×10^{-4}	1.679×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.650 ± 0.383	6231813	0.522	0.613	5.000×10^{-2}	2.78	0.353	0.874
sulfurdioxide total air mass factor polluted precision [1]	$(9.687 \pm 13.710) \times 10^{-2}$	6231813	8.960×10^{-2}	4.477×10^{-2}	2.500×10^{-3}	1.59	2.577×10^{-2}	0.115
sulfurdioxide clear air mass factor polluted [1]	0.577 ± 0.270	6231813	0.429	0.555	2.200×10^{-2}	2.13	0.358	0.787
number of spectral points in retrieval [1]	73.5 ± 0.5	6231813	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]	0.574 ± 0.419	11038361	0.840	0.490	0.0	1.000	0.160	1.000
sulfurdioxide total vertical column [DU]	$(1.261 \pm 57.504) \times 10^{-2}$	11038361	0.328	6.757×10^{-3}	-37.0	75.2	-0.156	0.172
sulfurdioxide total vertical column precision [DU]	0.353 ± 0.412	11038361	0.246	0.250	3.970×10^{-2}	32.4	0.158	0.404
sulfurdioxide slant column density corrected [DU]	$(1.102 \pm 27.726) \times 10^{-2}$	11038361	0.311	7.000×10^{-3}	-19.3	51.1	-0.148	0.164
sulfurdioxide slant column density cobra [DU]	$(1.100 \pm 27.608) \times 10^{-2}$	11038361	0.311	7.000×10^{-3}	-19.3	51.1	-0.148	0.164
sulfurdioxide slant column density cobra precision [DU]	0.243 ± 0.092	11038361	8.177×10^{-2}	0.218	8.125×10^{-2}	19.4	0.187	0.269
sulfurdioxide slant column density window1 [DU]	$(8.474 \pm 56.158) \times 10^{-2}$	11038361	0.661	0.102	-64.9	73.9	-0.238	0.423
sulfurdioxide slant column density window1 precision [DU]	0.243 ± 0.092	11038361	8.177×10^{-2}	0.218	8.125×10^{-2}	19.4	0.187	0.269
sulfurdioxide slant column density corrected win1 [DU]	$(5.649 \pm 53.394) \times 10^{-2}$	11038361	0.622	5.035×10^{-2}	-64.9	73.8	-0.259	0.363
background so2 slant column offset window1 [DU]	$(-2.826 \pm 19.232) \times 10^{-2}$	11038361	0.277	-9.759×10^{-2}	-1.10	2.17	-0.167	0.110
sulfurdioxide slant column density window2 [DU]	2.96 ± 7.86	11038361	10.1	2.97	-772	807	-2.06	8.00
sulfurdioxide slant column density window2 precision [DU]	7.25 ± 1.95	11038361	2.11	6.99	2.22	597	6.02	8.13
sulfurdioxide slant column density corrected win2 [DU]	3.13 ± 7.76	11038361	9.89	3.15	-770	808	-1.80	8.09
background so2 slant column offset window2 [DU]	0.170 ± 1.721	11038361	2.17	0.548	-14.5	6.82	-0.801	1.37
sulfurdioxide slant column density window3 [DU]	-15.3 ± 22.1	11038361	27.6	-16.2	-860	553	-29.5	-1.90
sulfurdioxide slant column density window3 precision [DU]	25.3 ± 12.3	11038361	8.62	22.4	9.58	1.081×10^3	18.4	27.1
sulfurdioxide slant column density corrected win3 [DU]	-15.1 ± 21.2	11038361	26.4	-15.3	-871	542	-28.3	-1.94
background so2 slant column offset window3 [DU]	0.259 ± 6.875	11038361	11.1	0.184	-17.0	23.7	-5.49	5.56
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11038361	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.706 \pm 2.461) \times 10^{-2}$	11038361	2.450×10^{-2}	2.209×10^{-2}	1.405×10^{-4}	1.41	1.225×10^{-2}	3.675×10^{-2}
fitted radiance shift [nm]	$(-5.157 \pm 23.994) \times 10^{-4}$	11038361	1.649×10^{-3}	-5.711×10^{-4}	-4.174×10^{-2}	5.391×10^{-2}	-1.389×10^{-3}	2.607×10^{-4}
fitted radiance squeeze [1]	$(-8.897 \pm 17.109) \times 10^{-5}$	11038361	2.104×10^{-4}	-7.529×10^{-5}	-1.566×10^{-2}	1.423×10^{-2}	-1.875×10^{-4}	2.288×10^{-5}
fitted root mean square [1]	$(1.107 \pm 0.383) \times 10^{-3}$	11038361	3.904×10^{-4}	1.017×10^{-3}	3.325×10^{-4}	3.715×10^{-2}	8.651×10^{-4}	1.256×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.08 ± 0.67	11038361	0.827	0.869	5.000×10^{-2}	3.12	0.586	1.41
sulfurdioxide total air mass factor polluted precision [1]	0.161 ± 0.154	11038361	0.189	0.119	4.961×10^{-3}	1.65	4.301×10^{-2}	0.232
sulfurdioxide clear air mass factor polluted [1]	0.959 ± 0.709	11038361	0.400	0.689	0.158	3.14	0.552	0.951
number of spectral points in retrieval [1]	73.4 ± 0.5	11038361	1.000	73.0	70.0	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]	0.667 ± 0.403	12217900	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.014 \pm 122.506) \times 10^{-2}$	12217900	0.417	8.479×10^{-3}	-158	540	-0.198	0.219
sulfurdioxide total vertical column precision [DU]	0.509 ± 0.853	12217900	0.290	0.301	5.012×10^{-2}	54.8	0.206	0.497
sulfurdioxide slant column density corrected [DU]	$(1.379 \pm 31.920) \times 10^{-2}$	12217900	0.323	7.113×10^{-3}	-19.3	70.0	-0.153	0.170
sulfurdioxide slant column density cobra [DU]	$(1.365 \pm 30.787) \times 10^{-2}$	12217900	0.323	7.113×10^{-3}	-19.3	32.8	-0.153	0.170
sulfurdioxide slant column density cobra precision [DU]	0.258 ± 0.114	12217900	9.560×10^{-2}	0.222	8.125×10^{-2}	12.5	0.190	0.286
sulfurdioxide slant column density window1 [DU]	0.147 ± 0.595	12217900	0.662	0.152	-50.0	73.9	-0.182	0.480
sulfurdioxide slant column density window1 precision [DU]	0.258 ± 0.114	12217900	9.560×10^{-2}	0.222	8.125×10^{-2}	12.5	0.190	0.286
sulfurdioxide slant column density corrected win1 [DU]	$(6.403 \pm 58.411) \times 10^{-2}$	12217900	0.644	5.243×10^{-2}	-50.0	73.8	-0.267	0.377
background so2 slant column offset window1 [DU]	$(-8.282 \pm 15.802) \times 10^{-2}$	12217900	0.178	-0.119	-1.31	3.08	-0.180	-1.501×10^{-3}
sulfurdioxide slant column density window2 [DU]	3.02 ± 8.33	12217900	10.5	2.88	-772	613	-2.32	8.19
sulfurdioxide slant column density window2 precision [DU]	7.59 ± 2.05	12217900	2.36	7.29	2.22	652	6.24	8.59
sulfurdioxide slant column density corrected win2 [DU]	3.10 ± 8.16	12217900	10.4	3.11	-770	614	-2.08	8.29
background so2 slant column offset window2 [DU]	$(7.919 \pm 202.739) \times 10^{-2}$	12217900	1.98	0.611	-17.3	6.82	-0.642	1.34
sulfurdioxide slant column density window3 [DU]	-14.2 ± 23.2	12217900	29.3	-14.7	-833	256	-28.9	0.348
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 12.0	12217900	9.10	24.0	9.58	280	20.3	29.4
sulfurdioxide slant column density corrected win3 [DU]	-13.4 ± 22.2	12217900	28.1	-13.8	-839	259	-27.6	0.517
background so2 slant column offset window3 [DU]	0.797 ± 6.271	12217900	8.85	0.787	-17.0	25.3	-3.73	5.12
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.14	12217900	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.275 \pm 4.000) \times 10^{-2}$	12217900	2.554×10^{-2}	2.341×10^{-2}	1.120×10^{-3}	2.23	1.434×10^{-2}	3.988×10^{-2}
fitted radiance shift [nm]	$(-3.558 \pm 23.997) \times 10^{-4}$	12217900	1.787×10^{-3}	-3.641×10^{-4}	-4.000×10^{-2}	4.521×10^{-2}	-1.275×10^{-3}	5.121×10^{-4}
fitted radiance squeeze [1]	$(-5.173 \pm 16.977) \times 10^{-5}$	12217900	1.976×10^{-4}	-4.358×10^{-5}	-1.566×10^{-2}	1.381×10^{-2}	-1.458×10^{-4}	5.184×10^{-5}
fitted root mean square [1]	$(1.149 \pm 0.469) \times 10^{-3}$	12217900	3.983×10^{-4}	1.022×10^{-3}	3.325×10^{-4}	7.392×10^{-2}	8.712×10^{-4}	1.270×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.822 ± 0.426	12217900	0.516	0.749	5.000×10^{-2}	2.67	0.528	1.04
sulfurdioxide total air mass factor polluted precision [1]	0.124 ± 0.123	12217900	0.140	7.288×10^{-2}	2.861×10^{-3}	1.20	3.668×10^{-2}	0.177
sulfurdioxide clear air mass factor polluted [1]	0.673 ± 0.245	12217900	0.296	0.645	4.409×10^{-2}	2.72	0.511	0.807
number of spectral points in retrieval [1]	73.4 ± 0.5	12217900	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]	0.493 ± 0.420	4439473	0.910	0.390	0.0	1.000	9.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(7.367 \pm 207.145) \times 10^{-2}$	4439473	0.356	9.258×10^{-3}	-188	282	-0.162	0.194
sulfurdioxide total vertical column precision [DU]	0.701 ± 1.443	4439473	0.520	0.276	3.970×10^{-2}	54.3	0.125	0.645
sulfurdioxide slant column density corrected [DU]	$(2.347 \pm 40.505) \times 10^{-2}$	4439473	0.378	1.171×10^{-2}	-9.41	131	-0.175	0.203
sulfurdioxide slant column density cobra [DU]	$(2.317 \pm 37.868) \times 10^{-2}$	4439473	0.378	1.171×10^{-2}	-9.41	51.1	-0.175	0.203
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.136	4439473	0.134	0.262	8.415×10^{-2}	19.4	0.216	0.350
sulfurdioxide slant column density window1 [DU]	$(5.606 \pm 72.760) \times 10^{-2}$	4439473	0.826	6.511×10^{-2}	-64.9	63.9	-0.360	0.466
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.136	4439473	0.134	0.262	8.415×10^{-2}	19.4	0.216	0.350
sulfurdioxide slant column density corrected win1 [DU]	$(8.177 \pm 69.566) \times 10^{-2}$	4439473	0.752	6.402×10^{-2}	-64.9	64.0	-0.307	0.444
background so2 slant column offset window1 [DU]	$(2.571 \pm 23.239) \times 10^{-2}$	4439473	0.386	-5.349×10^{-2}	-0.813	3.37	-0.158	0.228
sulfurdioxide slant column density window2 [DU]	4.27 ± 9.03	4439473	11.3	4.17	-702	807	-1.43	9.84
sulfurdioxide slant column density window2 precision [DU]	8.08 ± 2.42	4439473	2.76	7.68	2.37	386	6.47	9.23
sulfurdioxide slant column density corrected win2 [DU]	3.31 ± 8.74	4439473	10.9	3.31	-705	808	-2.12	8.75
background so2 slant column offset window2 [DU]	-0.965 ± 2.526	4439473	3.67	-0.551	-15.4	6.82	-2.55	1.12
sulfurdioxide slant column density window3 [DU]	-24.0 ± 22.6	4439473	27.3	-23.6	-860	333	-37.5	-10.1
sulfurdioxide slant column density window3 precision [DU]	26.6 ± 13.7	4439473	11.5	23.4	9.60	1.081×10^3	18.2	29.6
sulfurdioxide slant column density corrected win3 [DU]	-19.8 ± 23.1	4439473	28.0	-18.8	-871	330	-33.3	-5.29
background so2 slant column offset window3 [DU]	4.30 ± 7.36	4439473	11.5	6.07	-17.0	24.9	-1.51	10.0
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.31	4439473	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.598 \pm 18.387) \times 10^{-2}$	4439473	4.165×10^{-2}	1.962×10^{-2}	1.405×10^{-4}	3.81	7.777×10^{-3}	4.943×10^{-2}
fitted radiance shift [nm]	$(-6.222 \pm 24.814) \times 10^{-4}$	4439473	1.373×10^{-3}	-7.279×10^{-4}	-4.174×10^{-2}	3.896×10^{-2}	-1.390×10^{-3}	-1.663×10^{-5}
fitted radiance squeeze [1]	$(-8.914 \pm 20.904) \times 10^{-5}$	4439473	2.624×10^{-4}	-8.417×10^{-5}	-1.290×10^{-2}	1.423×10^{-2}	-2.199×10^{-4}	4.243×10^{-5}
fitted root mean square [1]	$(1.364 \pm 0.545) \times 10^{-3}$	4439473	5.694×10^{-4}	1.233×10^{-3}	3.502×10^{-4}	3.459×10^{-2}	1.011×10^{-3}	1.580×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.24 ± 0.91	4439473	1.77	0.904	5.000×10^{-2}	3.12	0.444	2.21
sulfurdioxide total air mass factor polluted precision [1]	0.178 ± 0.204	4439473	0.220	0.126	2.500×10^{-3}	1.65	2.919×10^{-2}	0.249
sulfurdioxide clear air mass factor polluted [1]	1.27 ± 1.01	4439473	2.01	0.773	2.200×10^{-2}	3.14	0.438	2.45
number of spectral points in retrieval [1]	73.4 ± 0.5	4439473	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

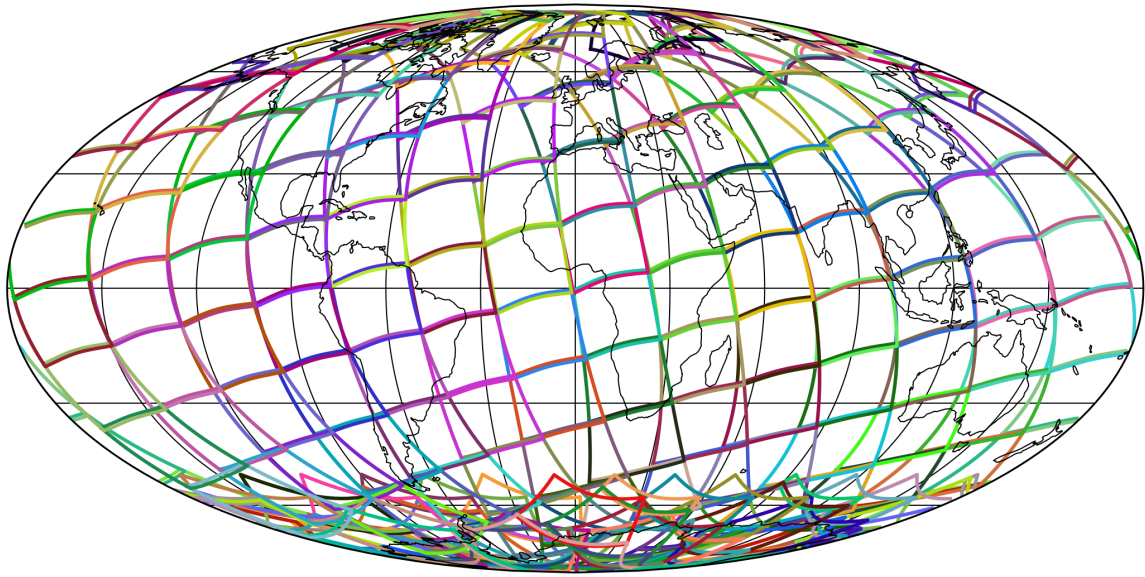


Figure 1: Outline of the granules.

4 Input data monitoring

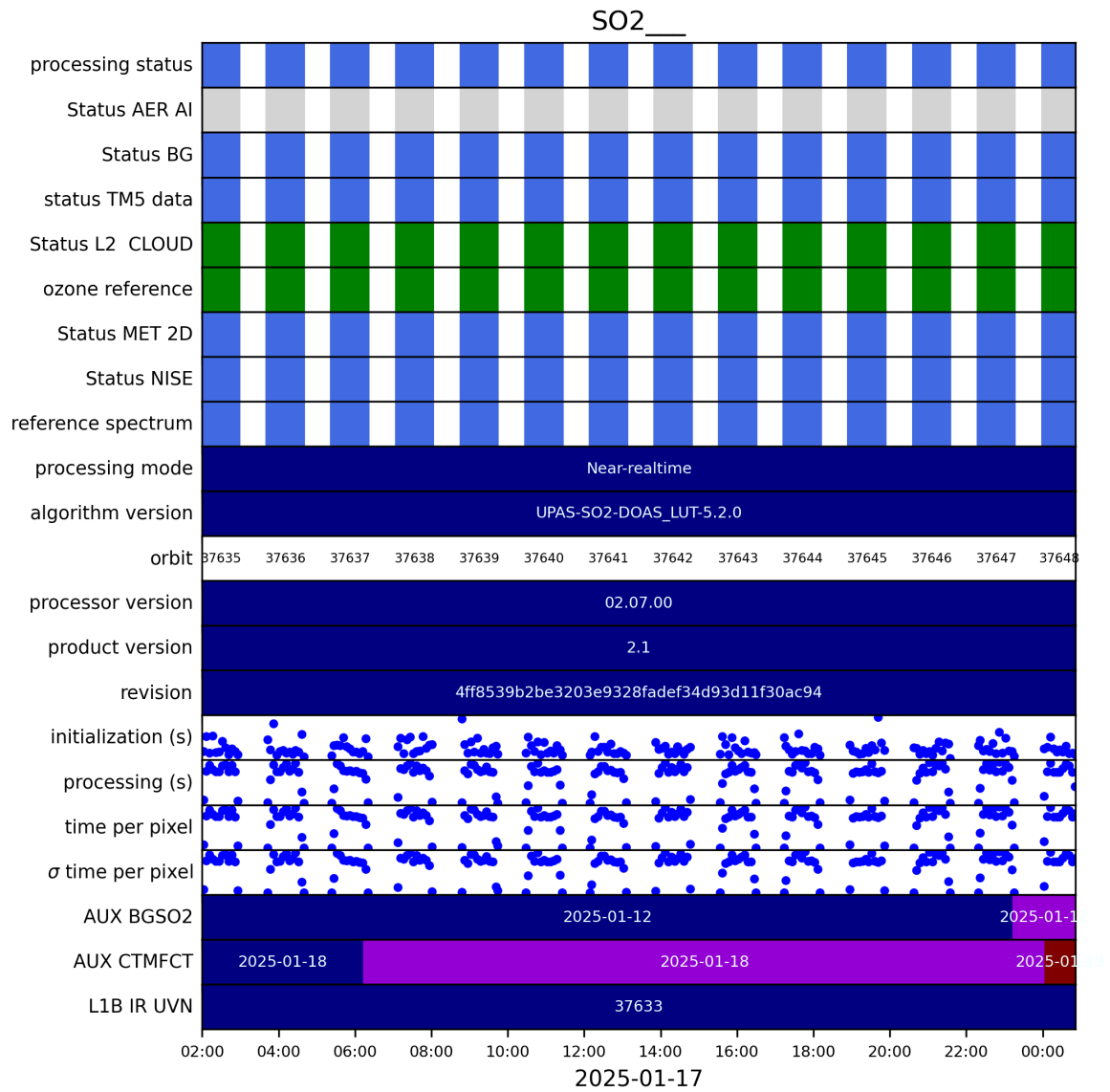


Figure 2: Input data per granule

5 Warnings and errors

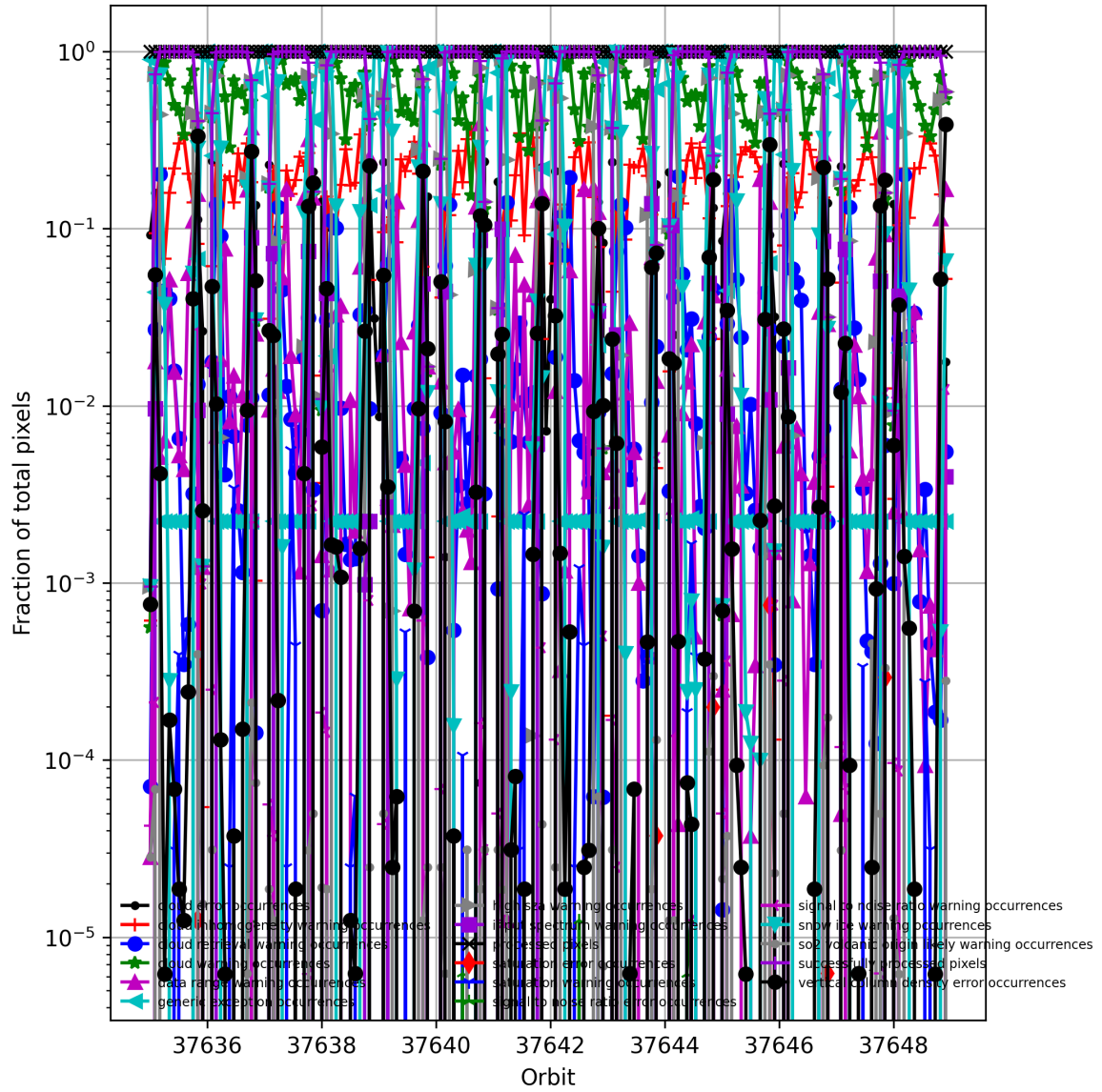


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

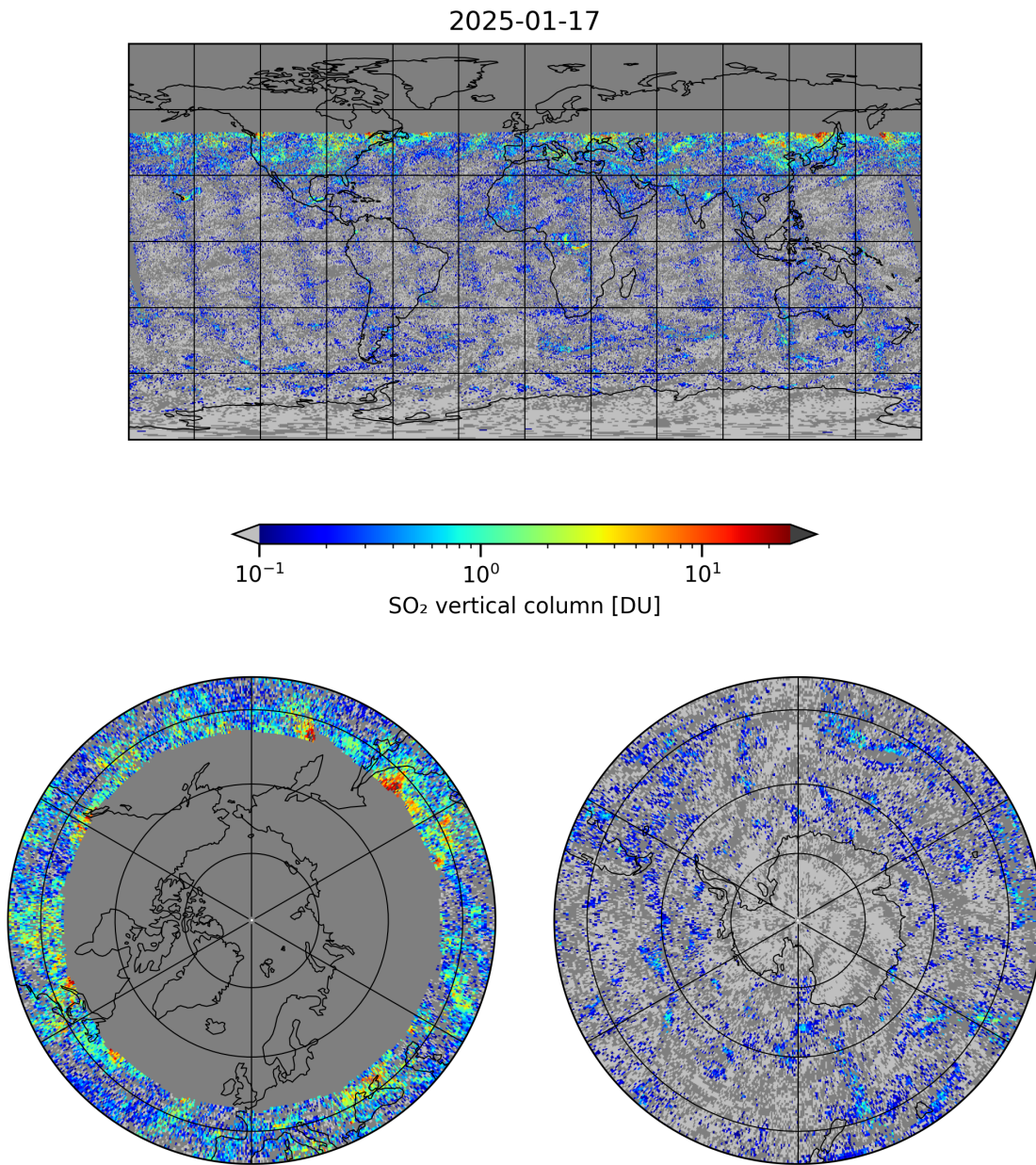


Figure 4: Map of “SO₂ vertical column” for 2025-01-17 to 2025-01-18

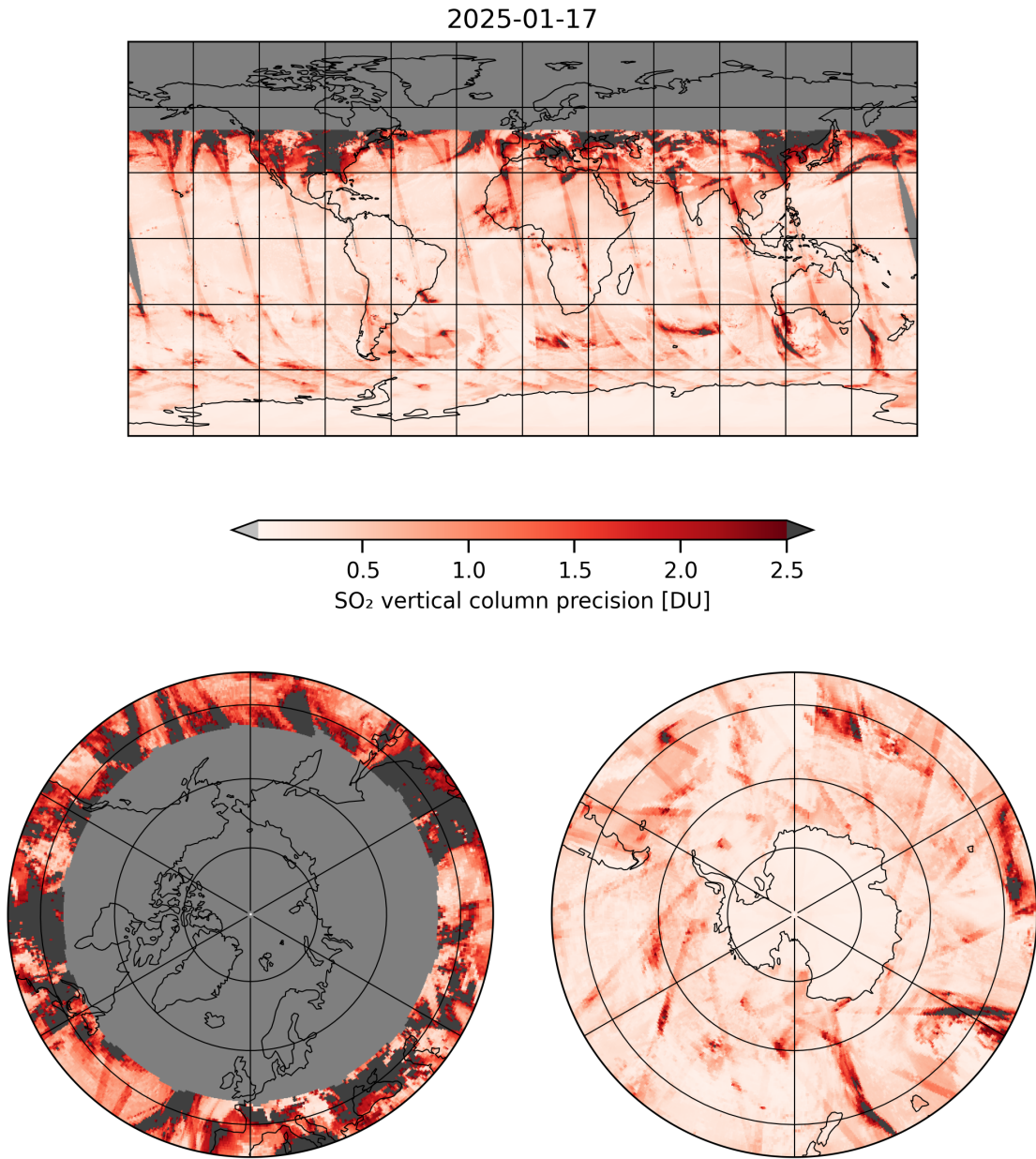


Figure 5: Map of “SO₂ vertical column precision” for 2025-01-17 to 2025-01-18

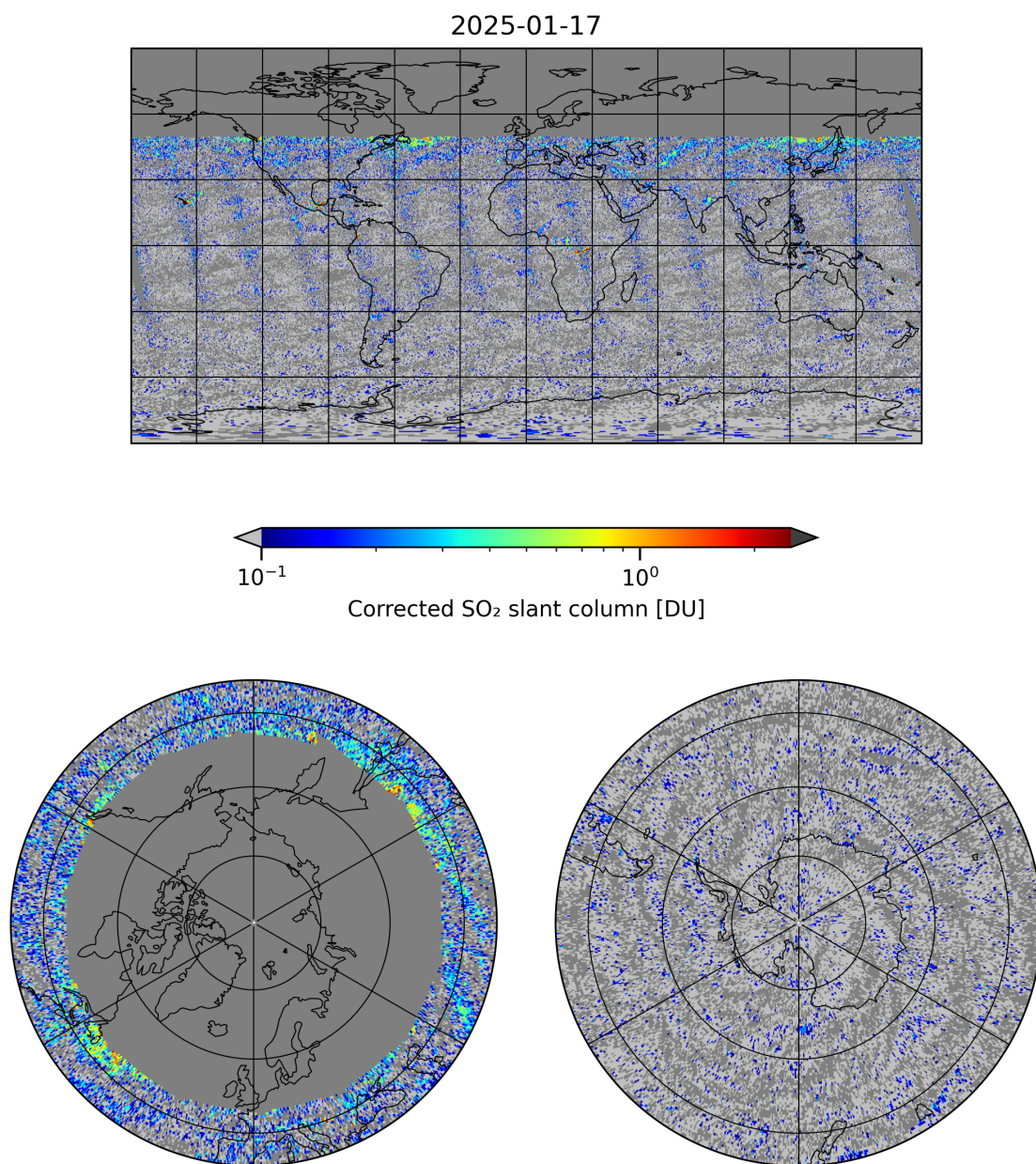


Figure 6: Map of “Corrected SO₂ slant column” for 2025-01-17 to 2025-01-18

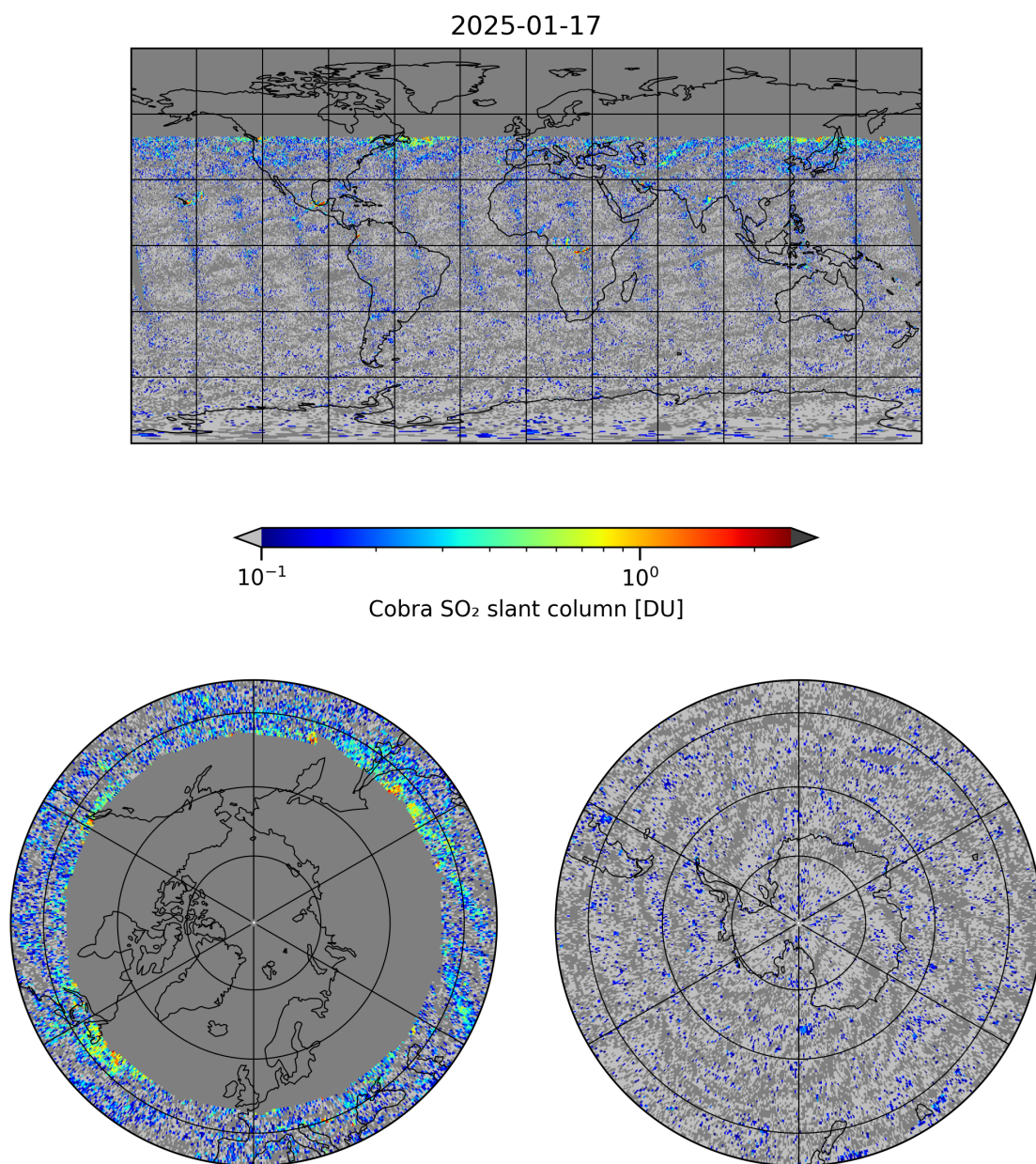


Figure 7: Map of “Cobra SO₂ slant column” for 2025-01-17 to 2025-01-18

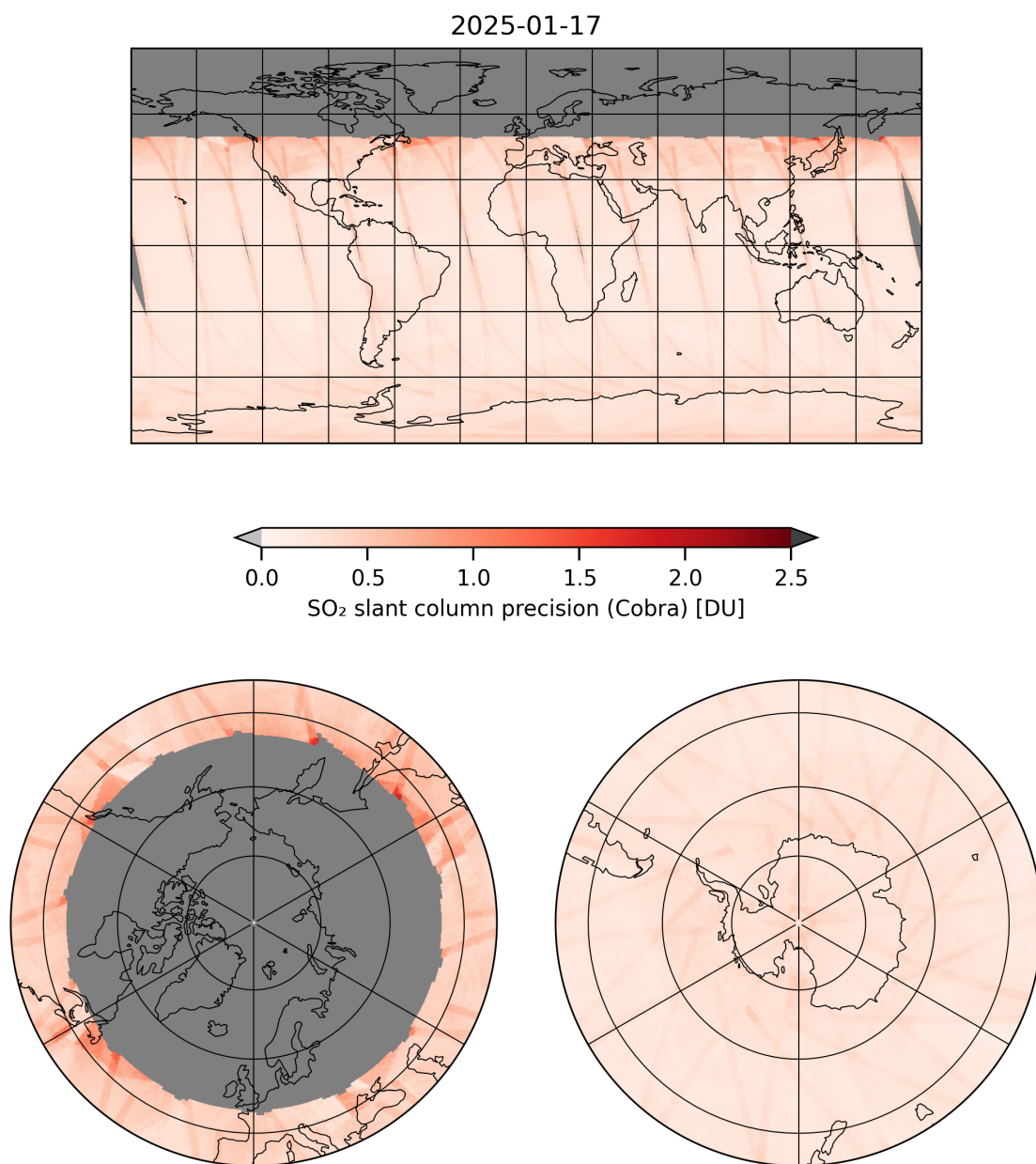


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-01-17 to 2025-01-18

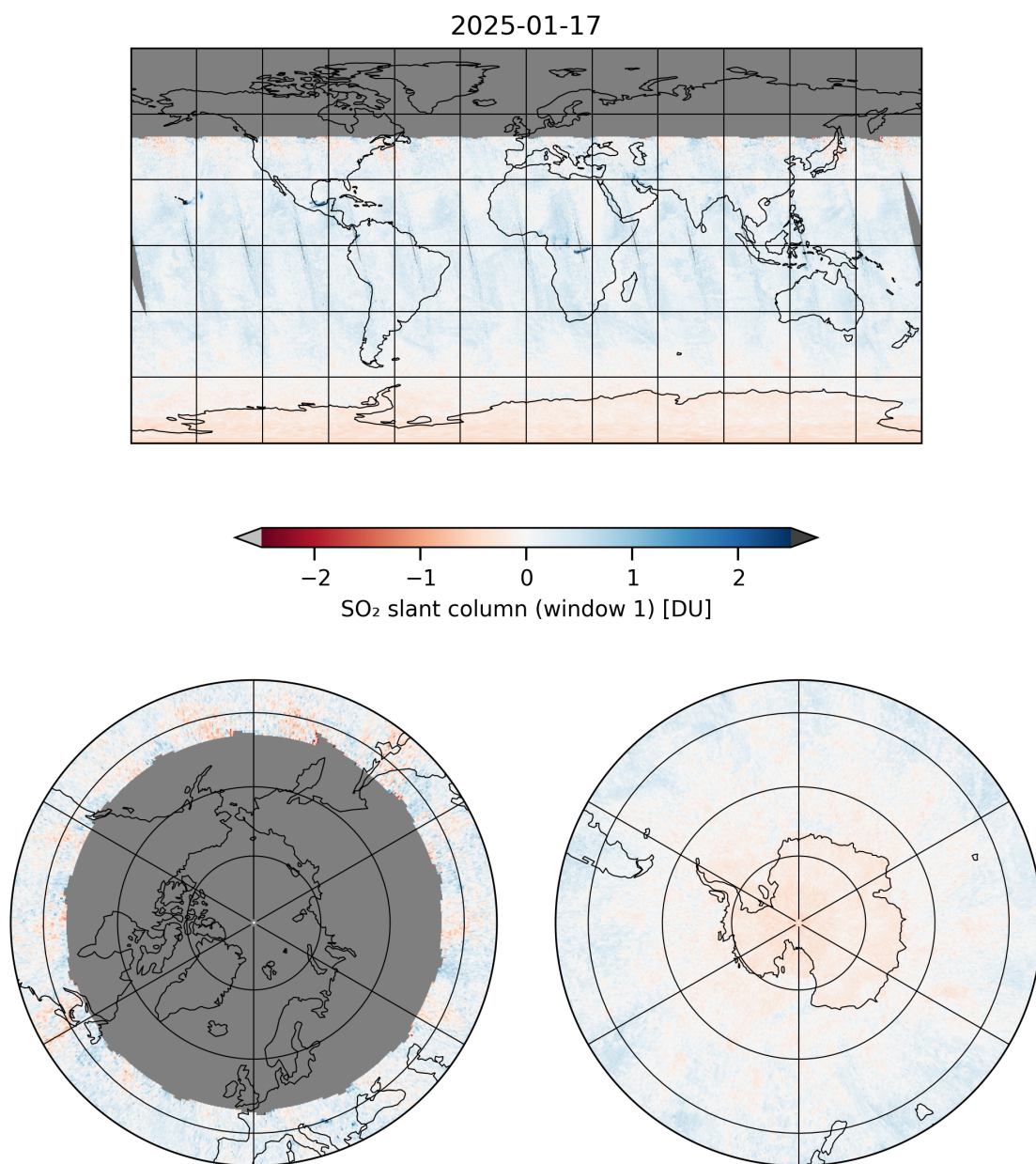


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-01-17 to 2025-01-18

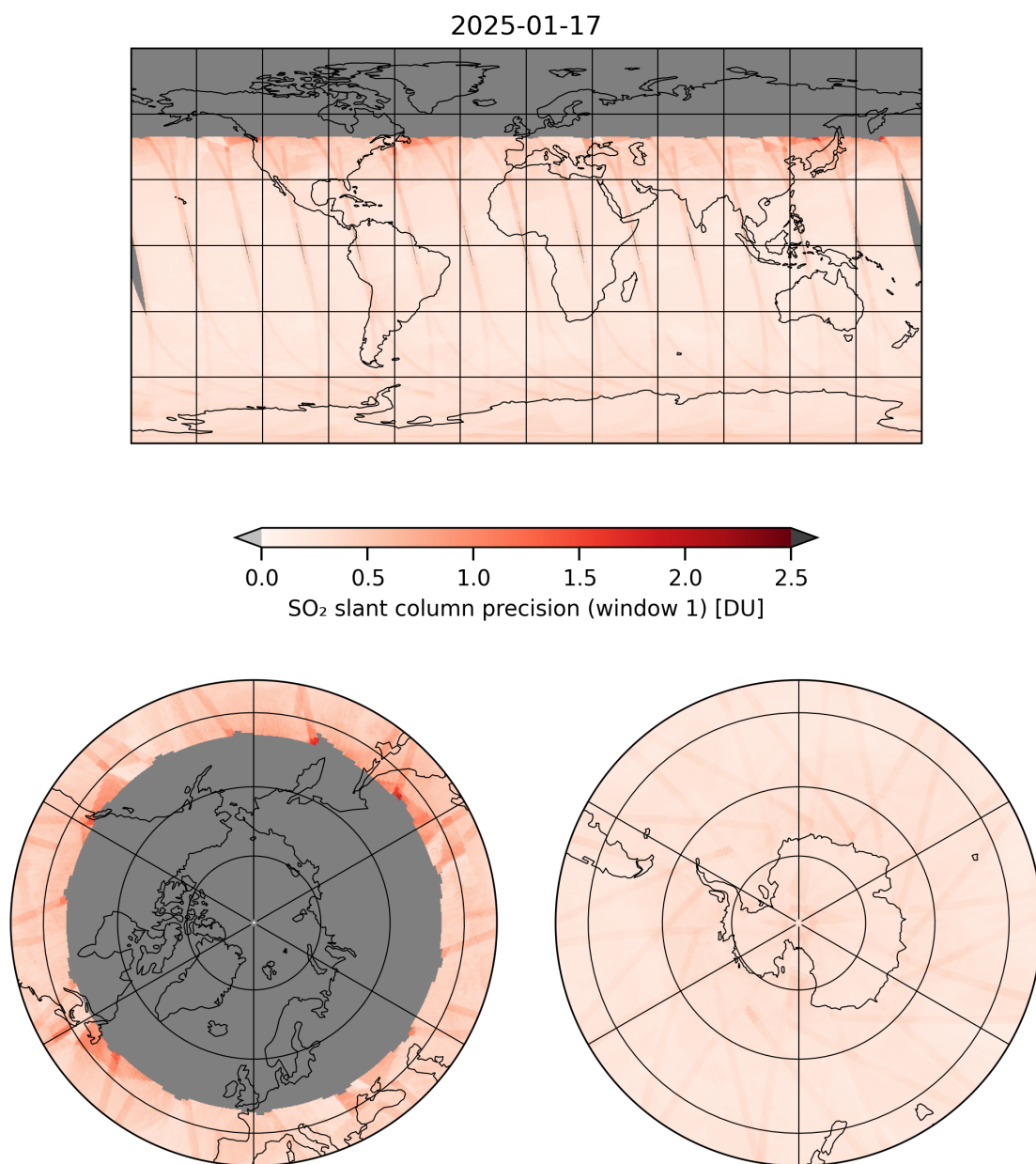


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-01-17 to 2025-01-18

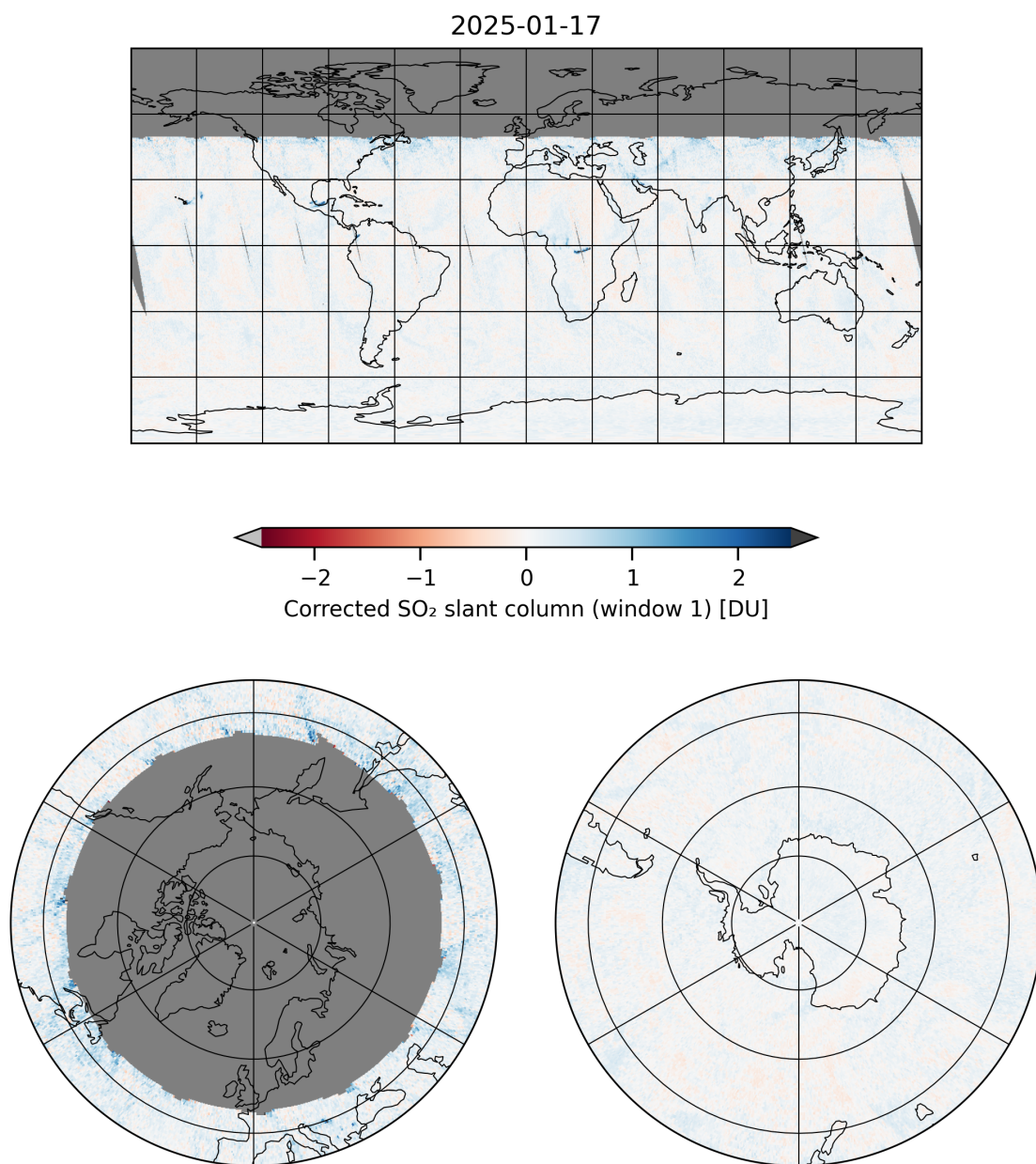


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-01-17 to 2025-01-18

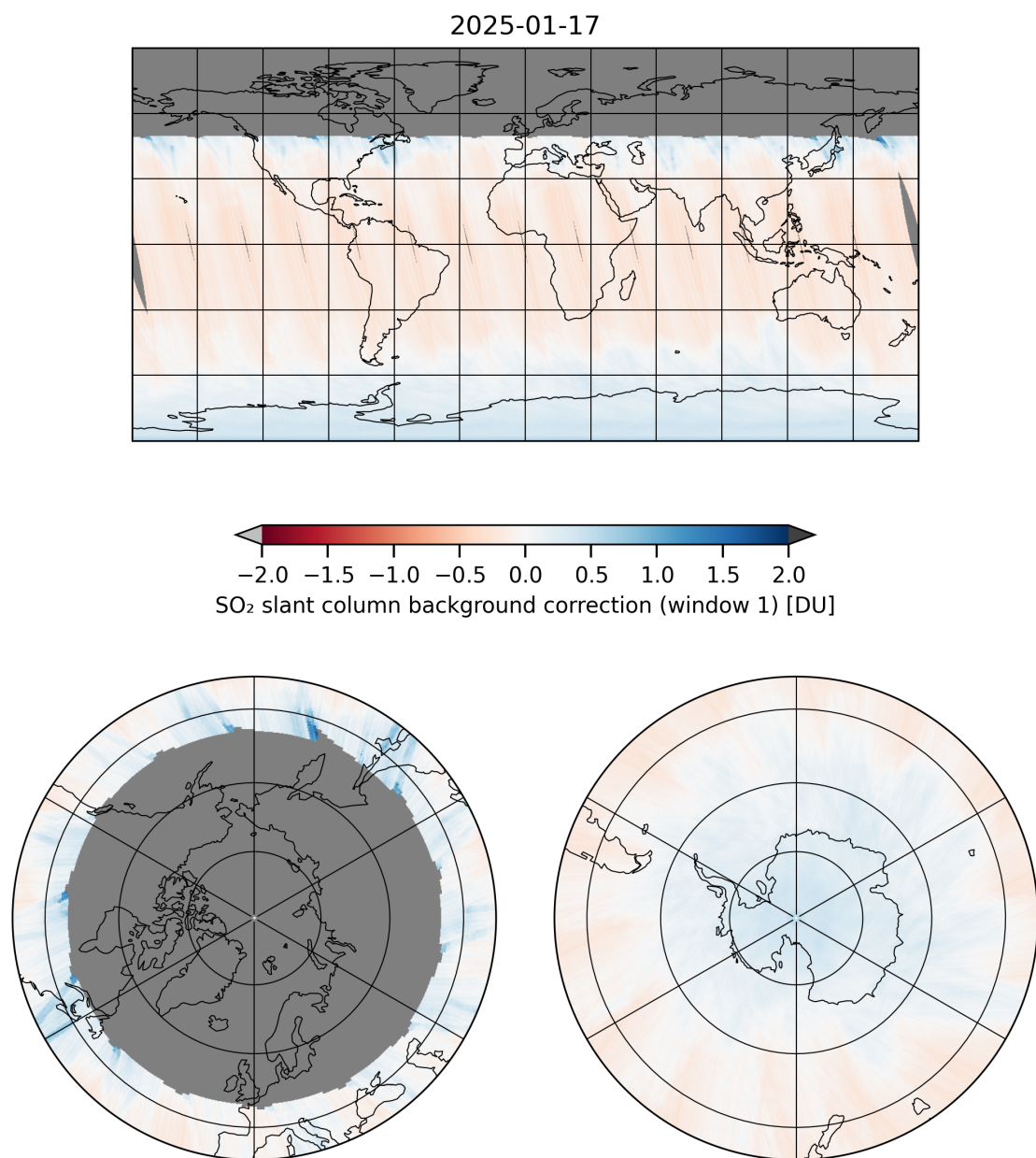


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-01-17 to 2025-01-18

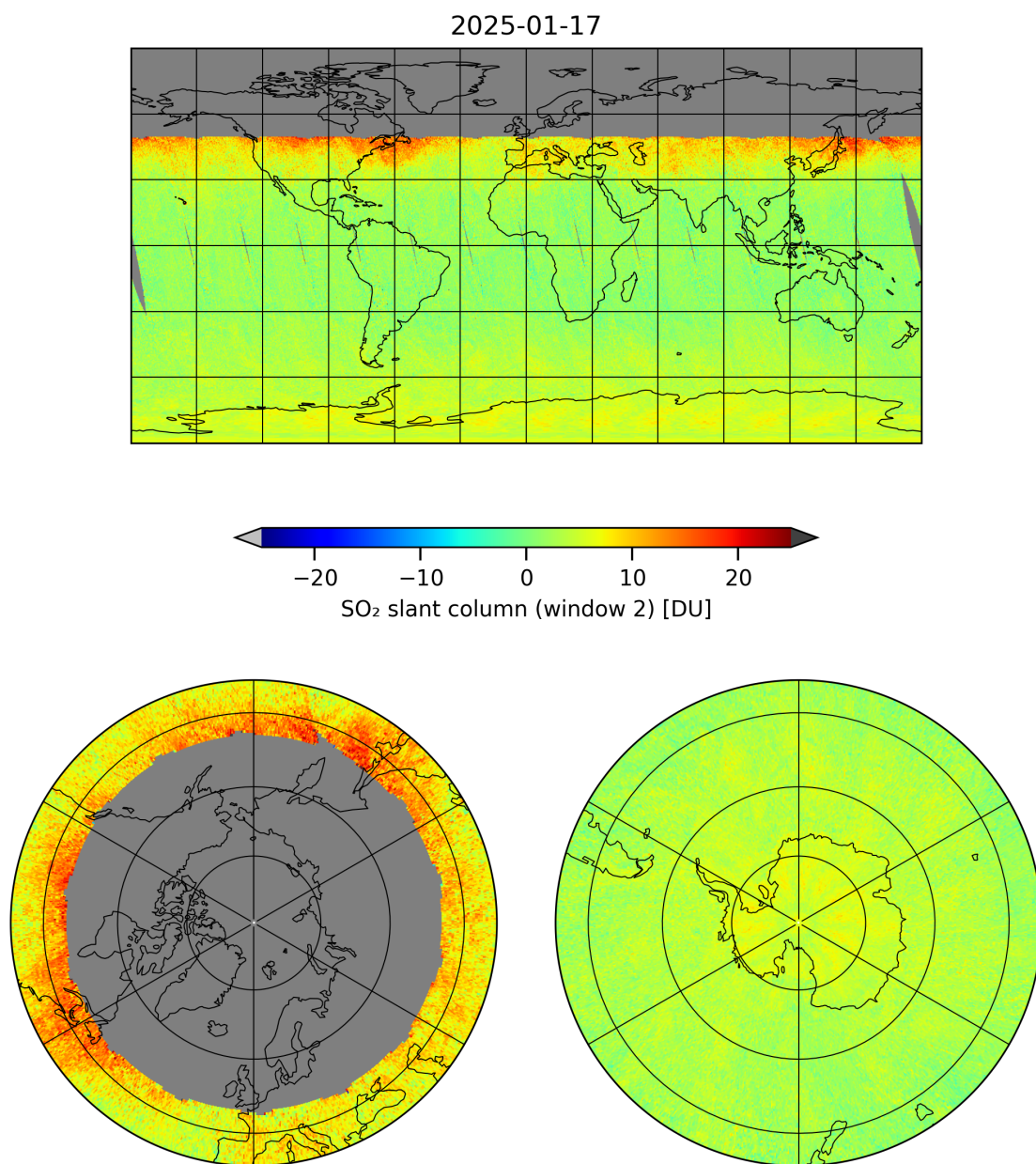


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-01-17 to 2025-01-18

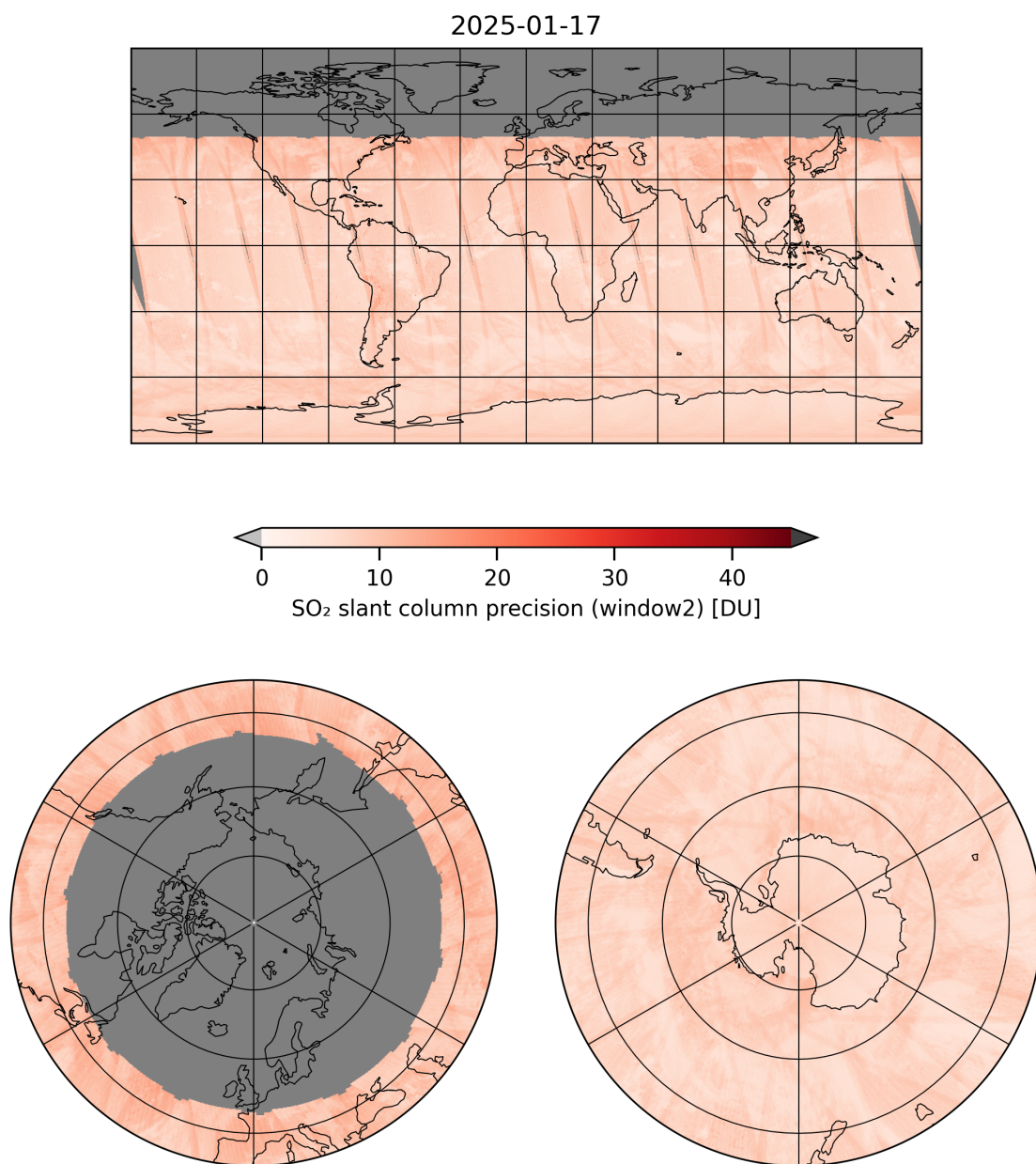


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-01-17 to 2025-01-18

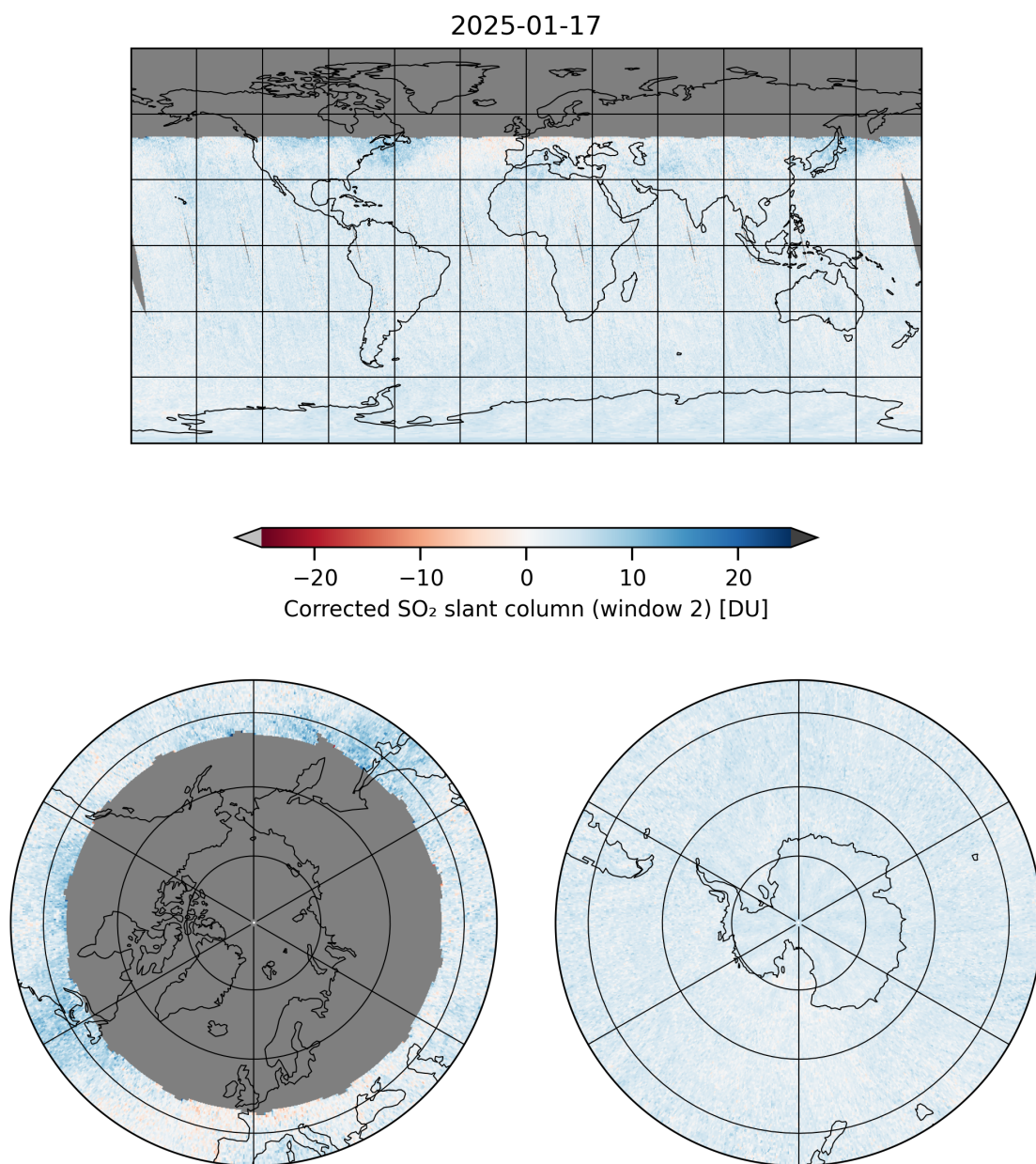


Figure 15: Map of "Corrected SO₂ slant column (window 2)" for 2025-01-17 to 2025-01-18

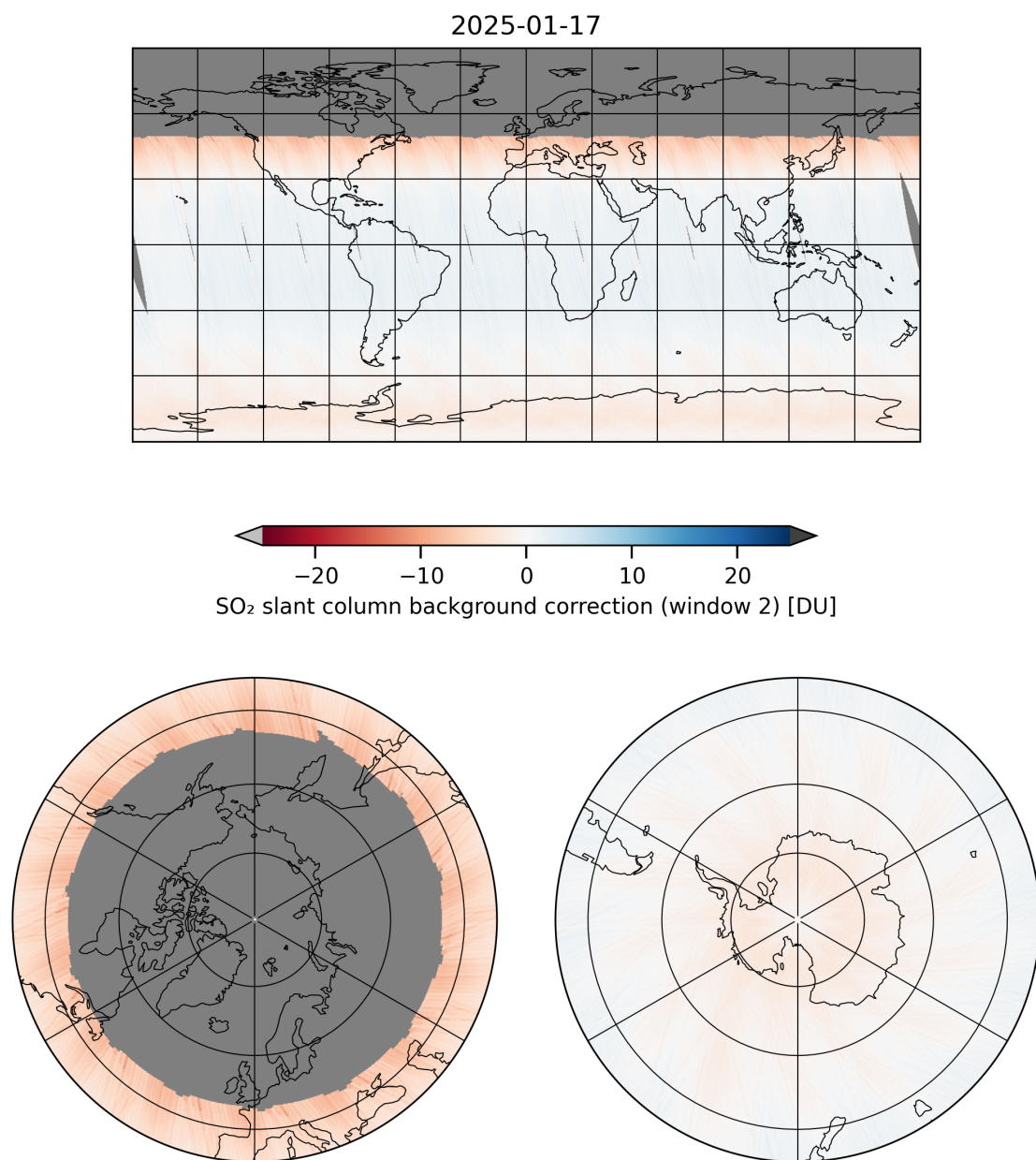


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-01-17 to 2025-01-18

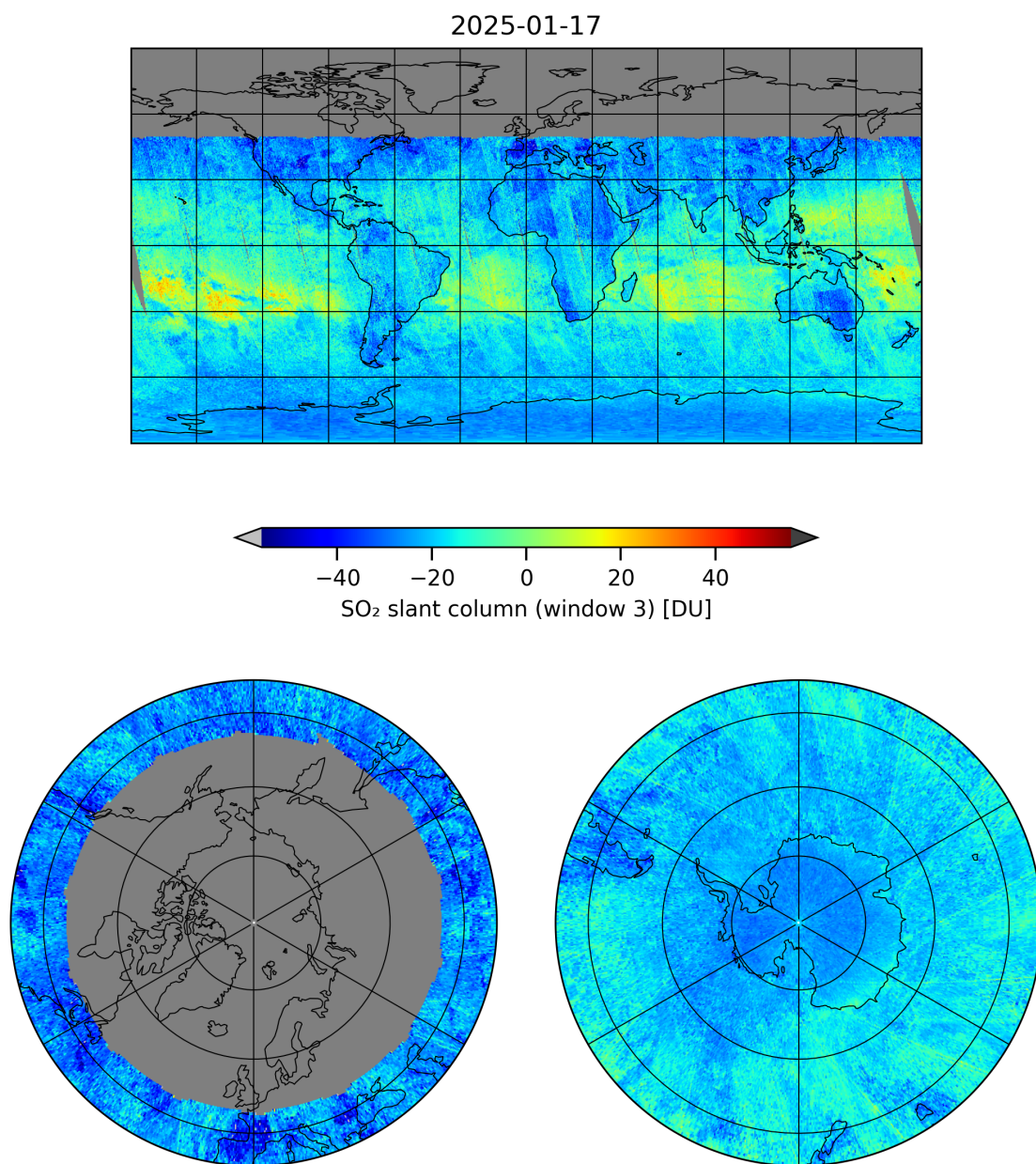


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-01-17 to 2025-01-18

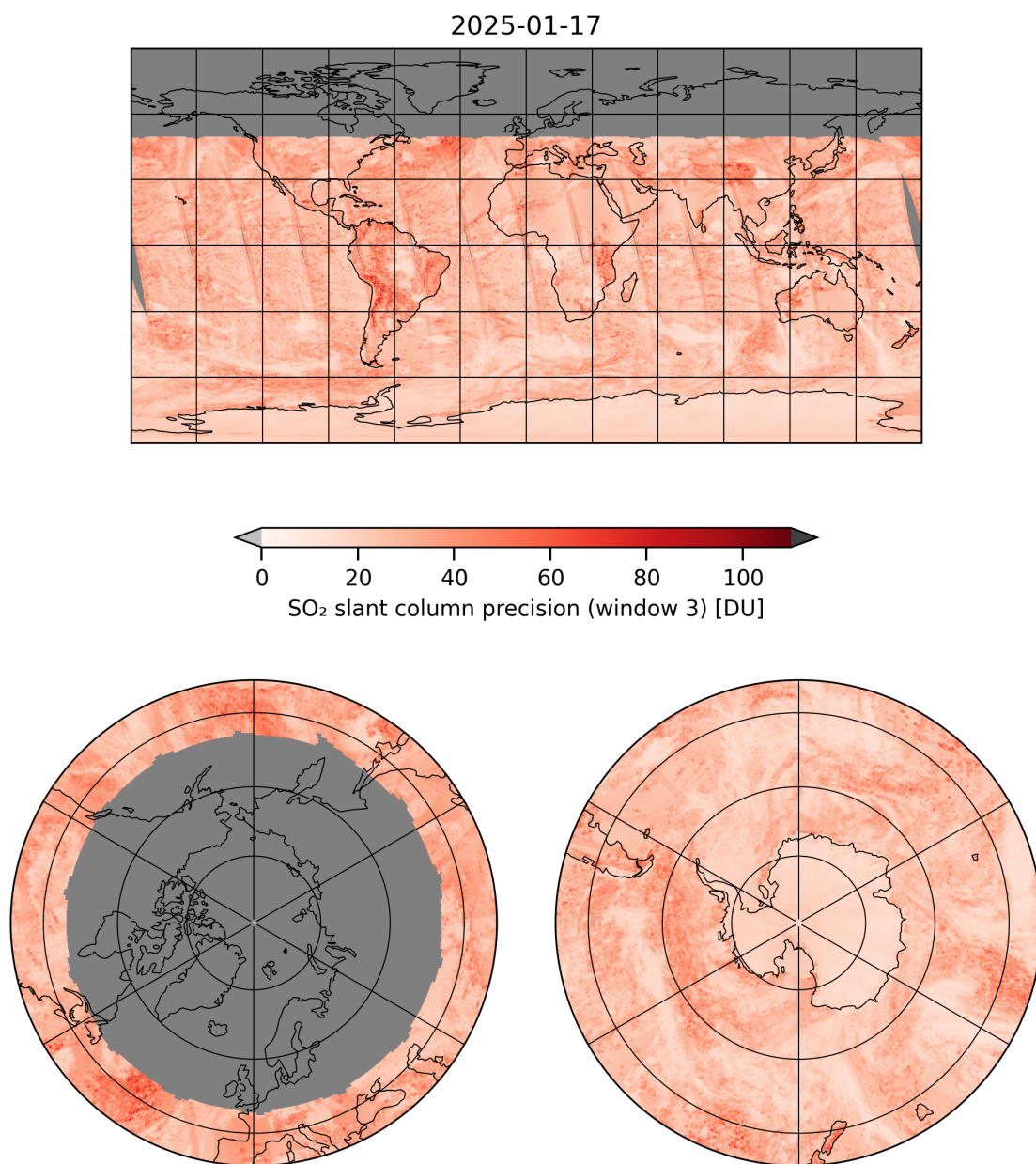


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-01-17 to 2025-01-18

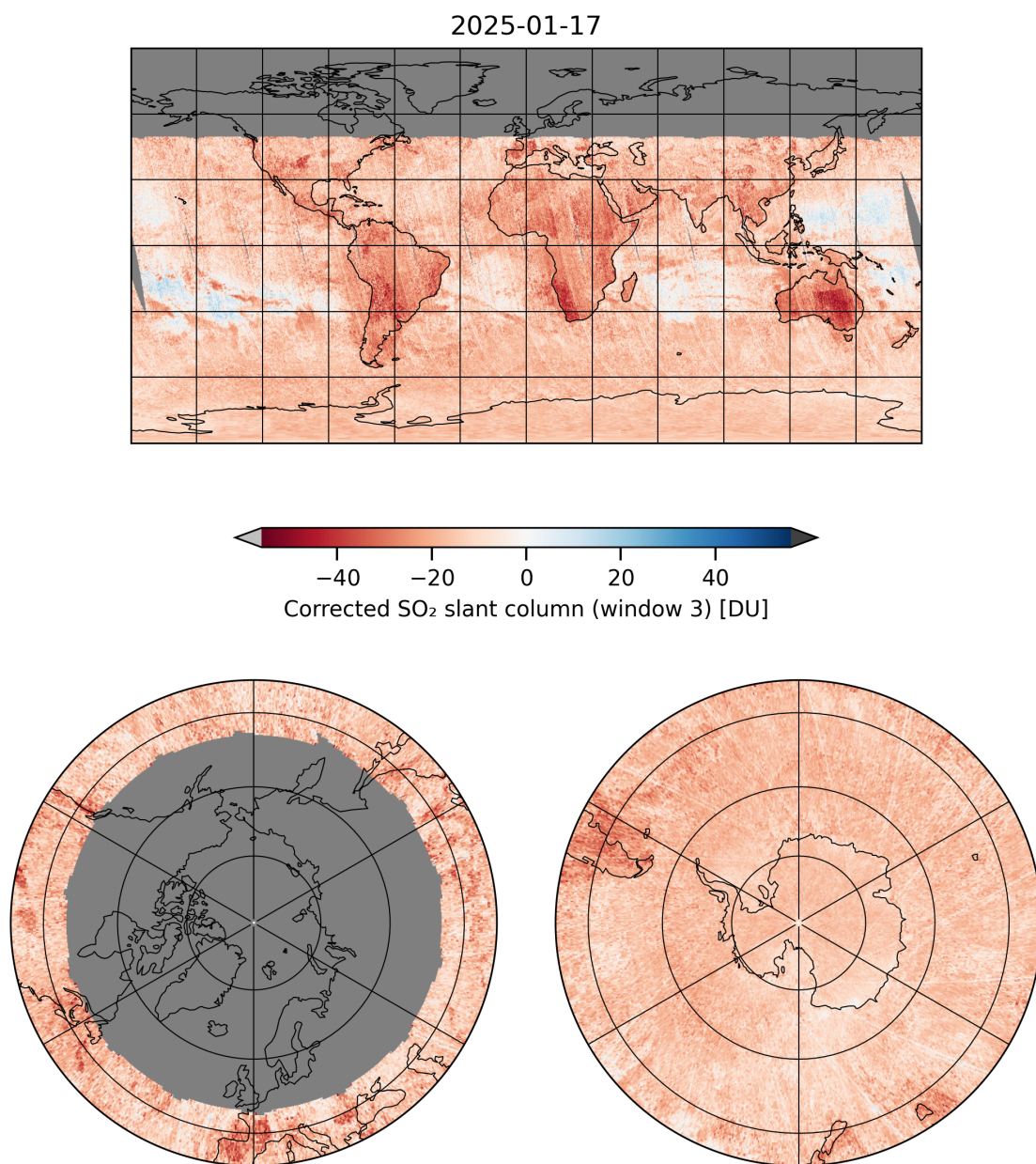


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-01-17 to 2025-01-18

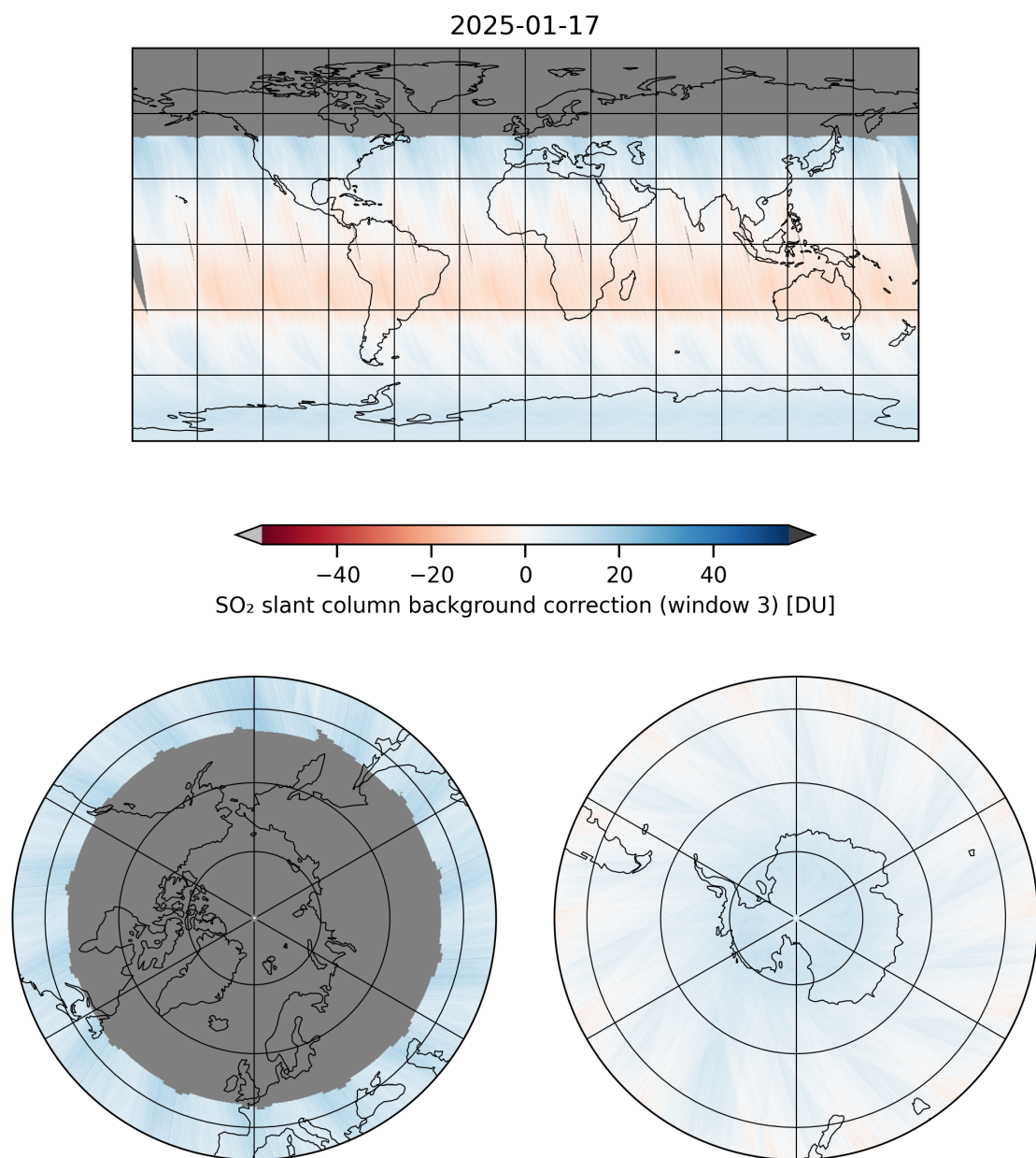


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-01-17 to 2025-01-18

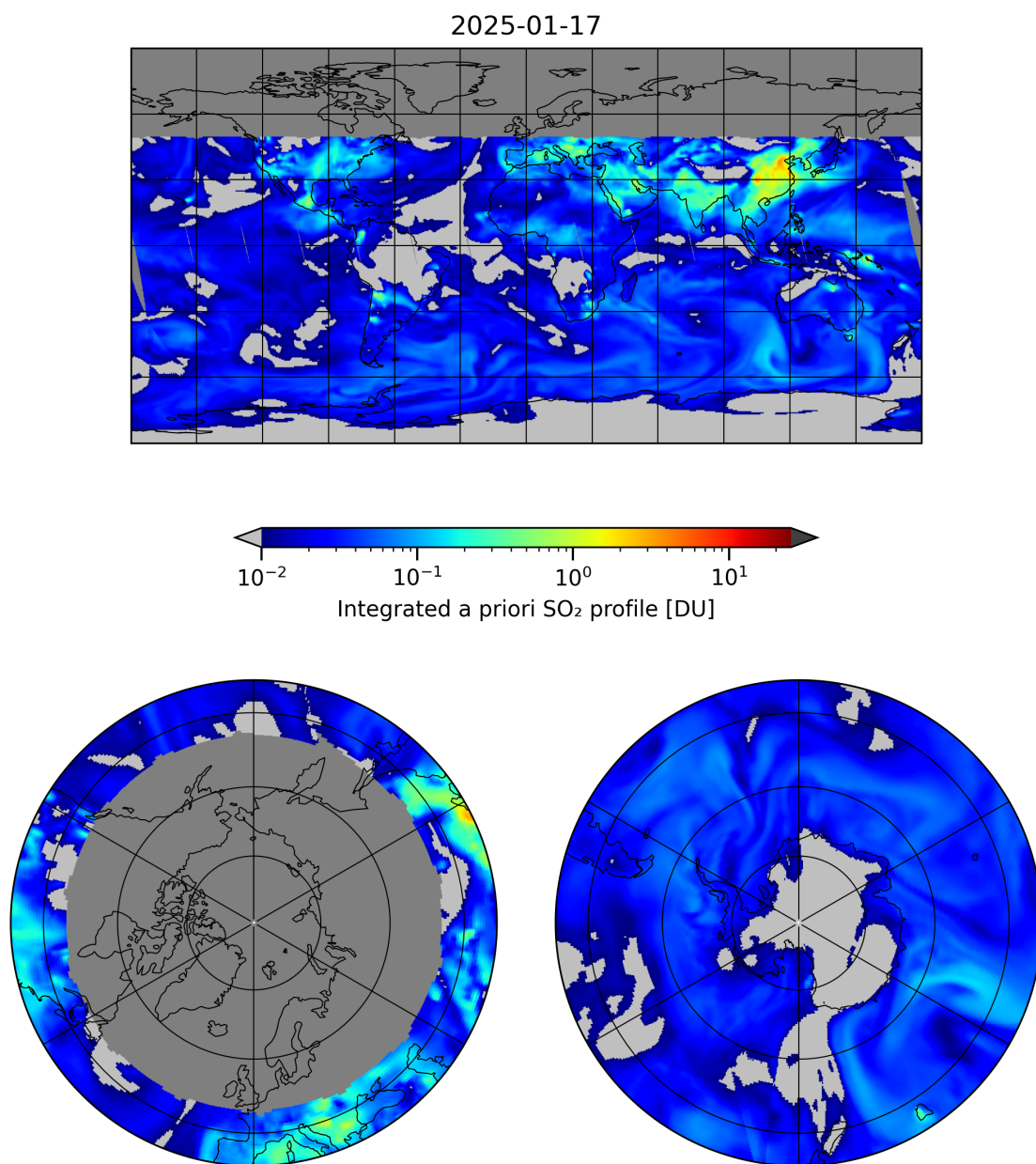


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-01-17 to 2025-01-18

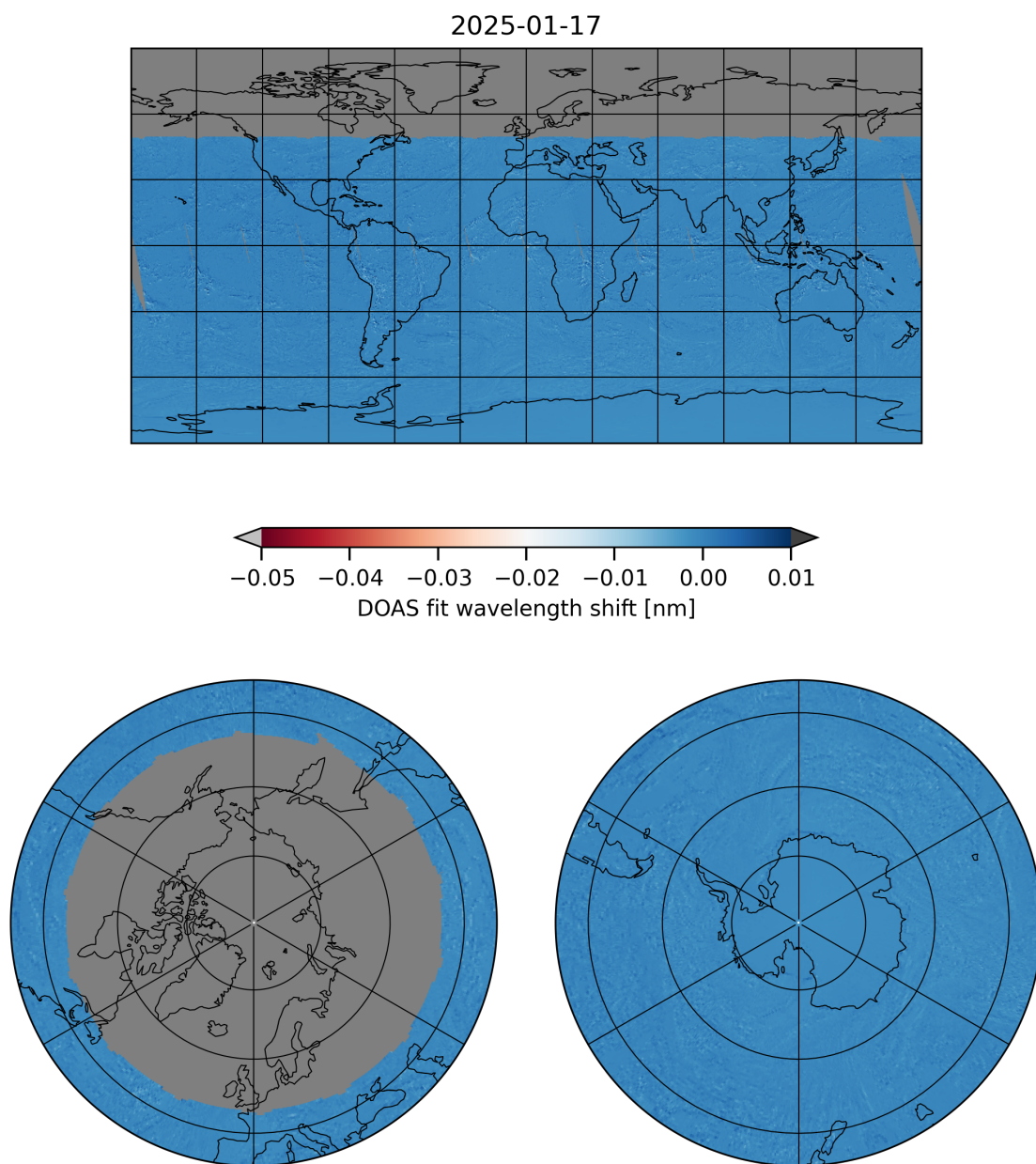


Figure 22: Map of “DOAS fit wavelength shift” for 2025-01-17 to 2025-01-18

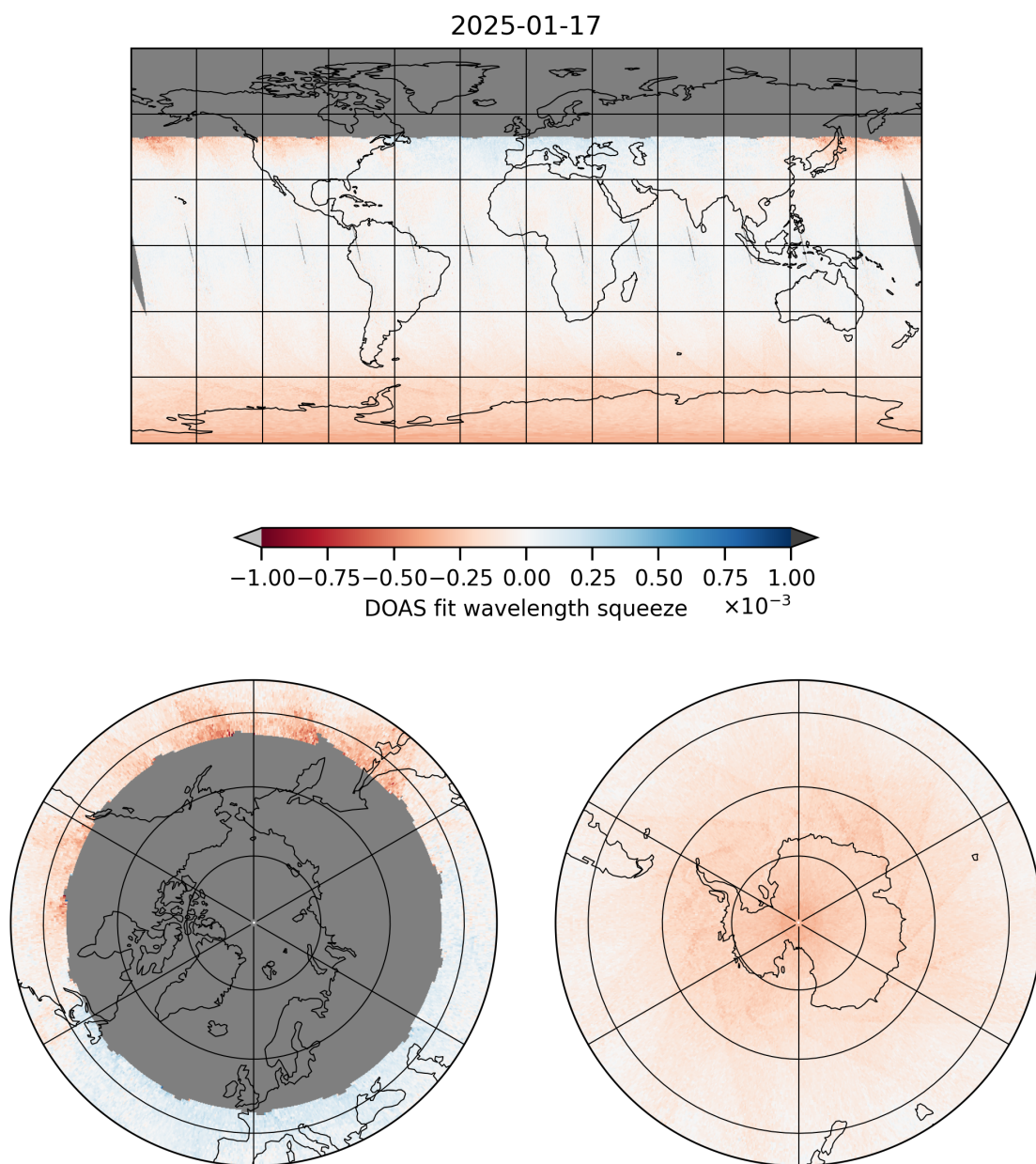


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-01-17 to 2025-01-18

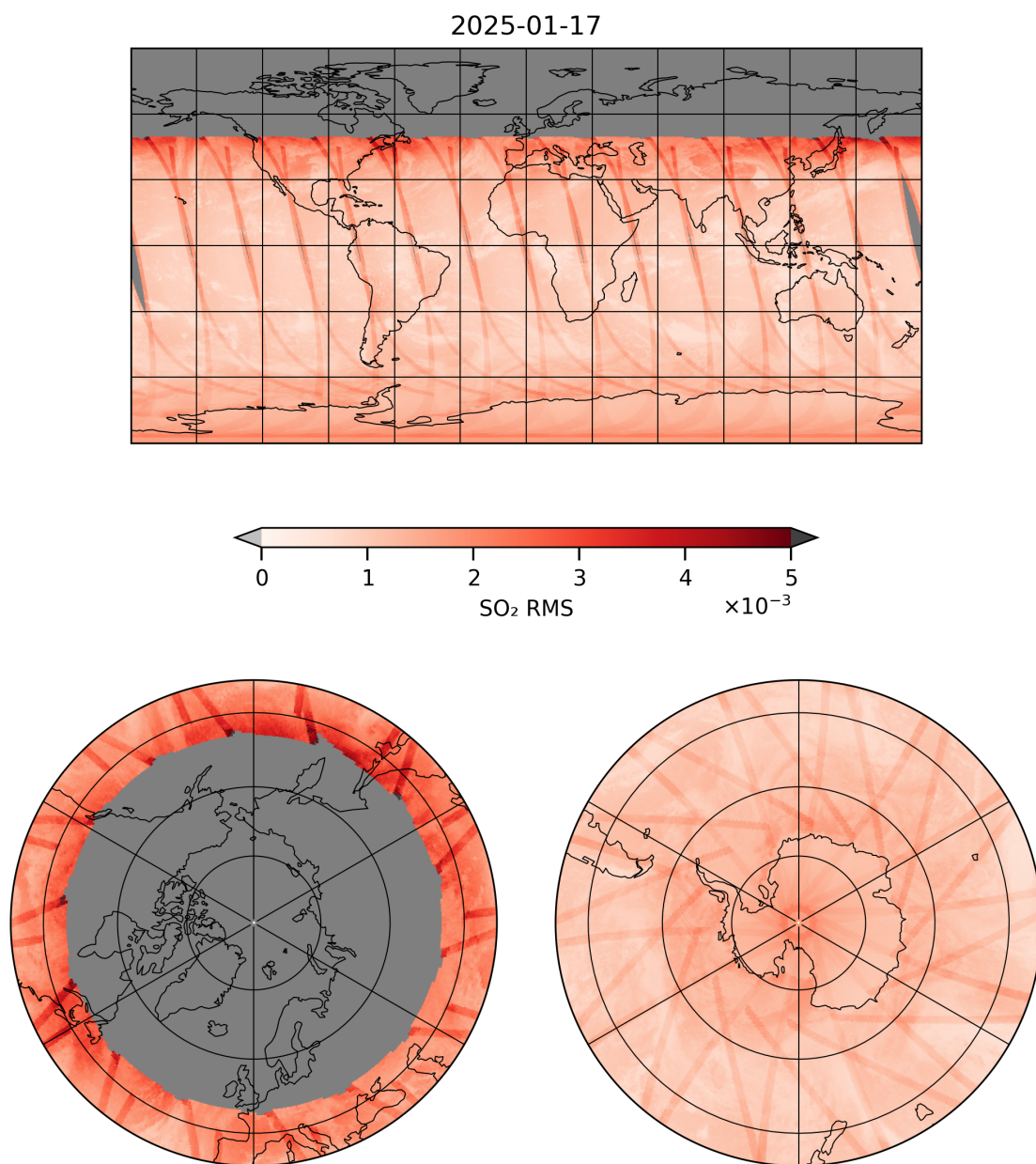


Figure 24: Map of “SO₂ RMS” for 2025-01-17 to 2025-01-18

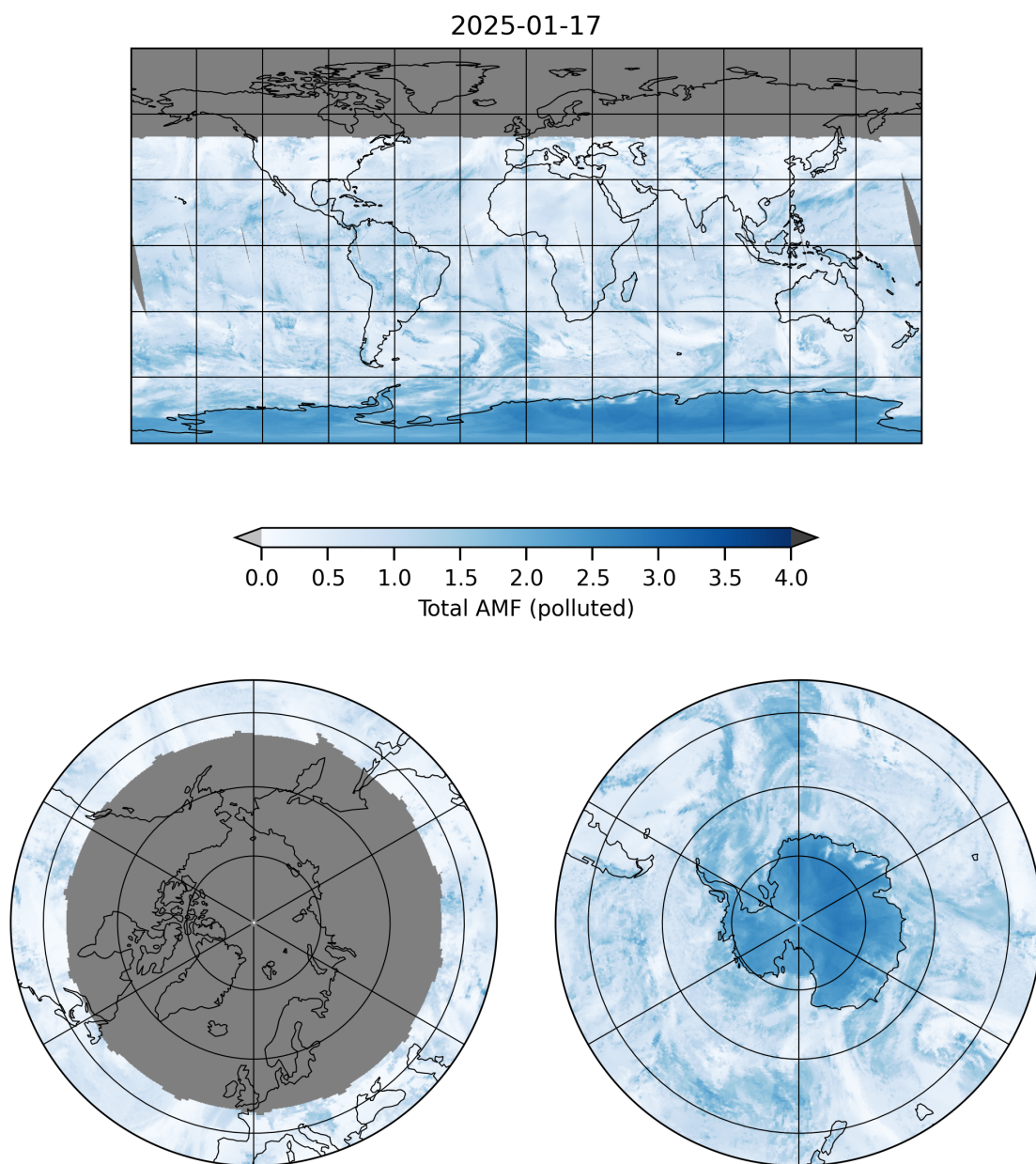


Figure 25: Map of “Total AMF (polluted)” for 2025-01-17 to 2025-01-18

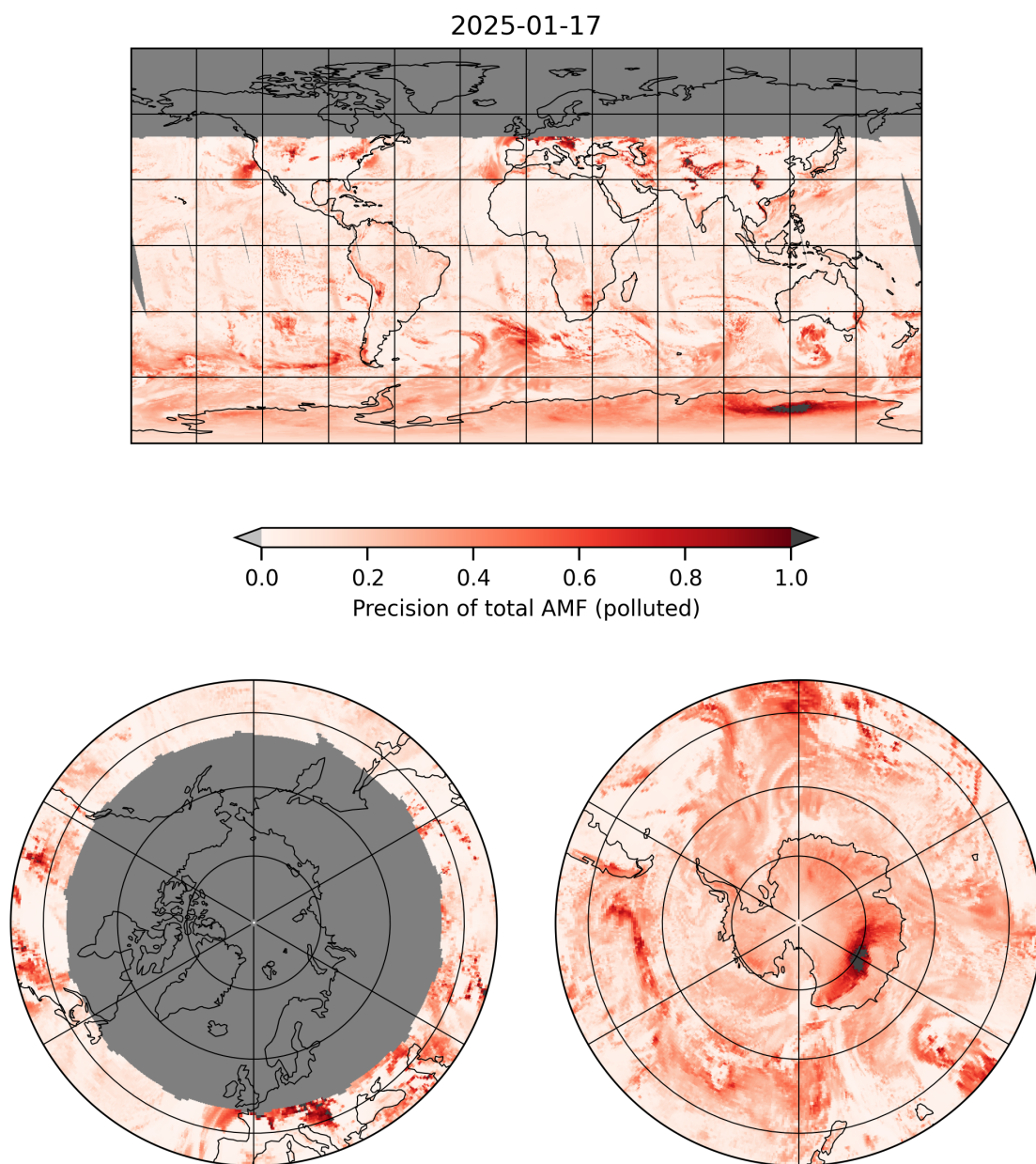


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-01-17 to 2025-01-18

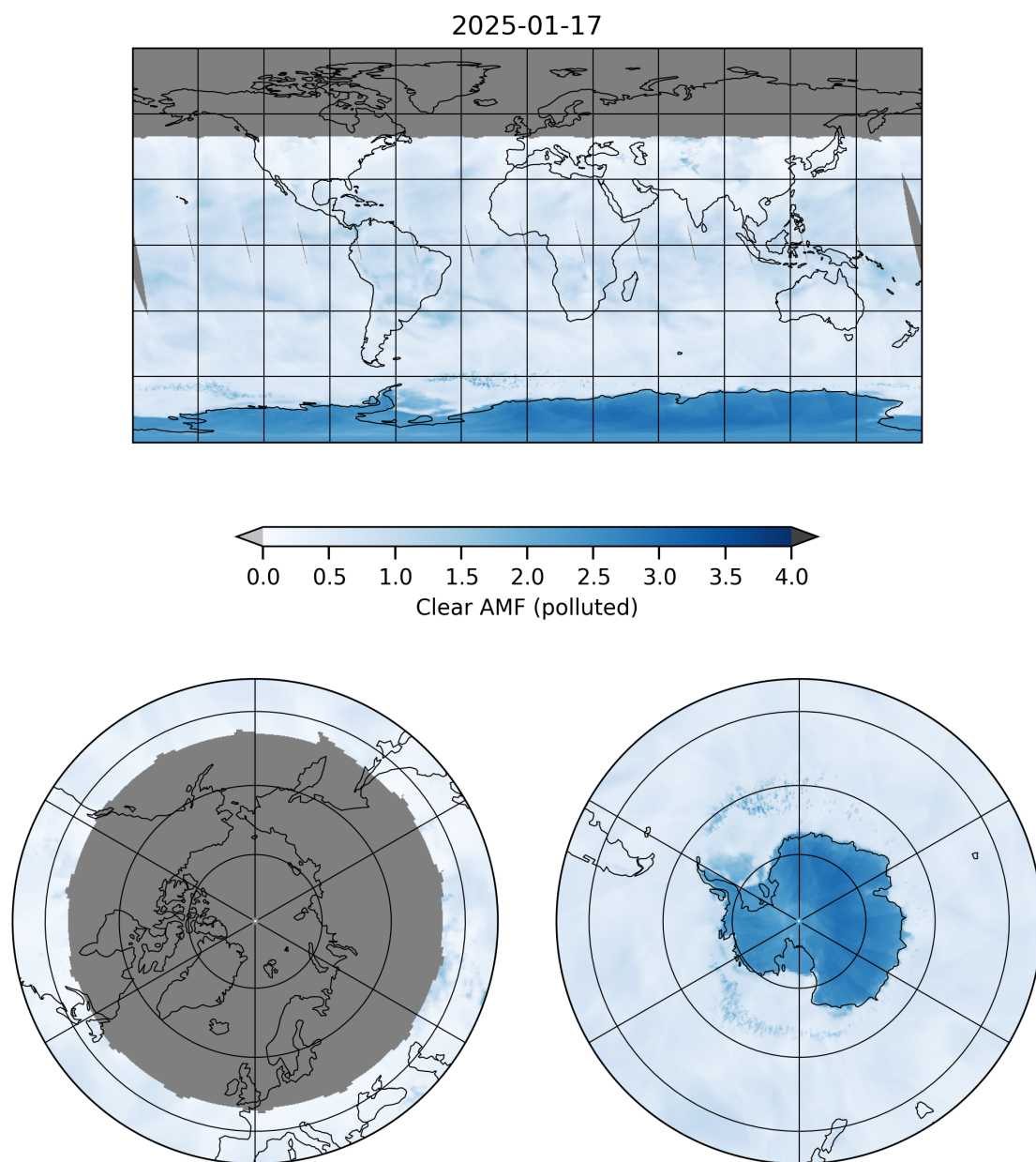


Figure 27: Map of “Clear AMF (polluted)” for 2025-01-17 to 2025-01-18

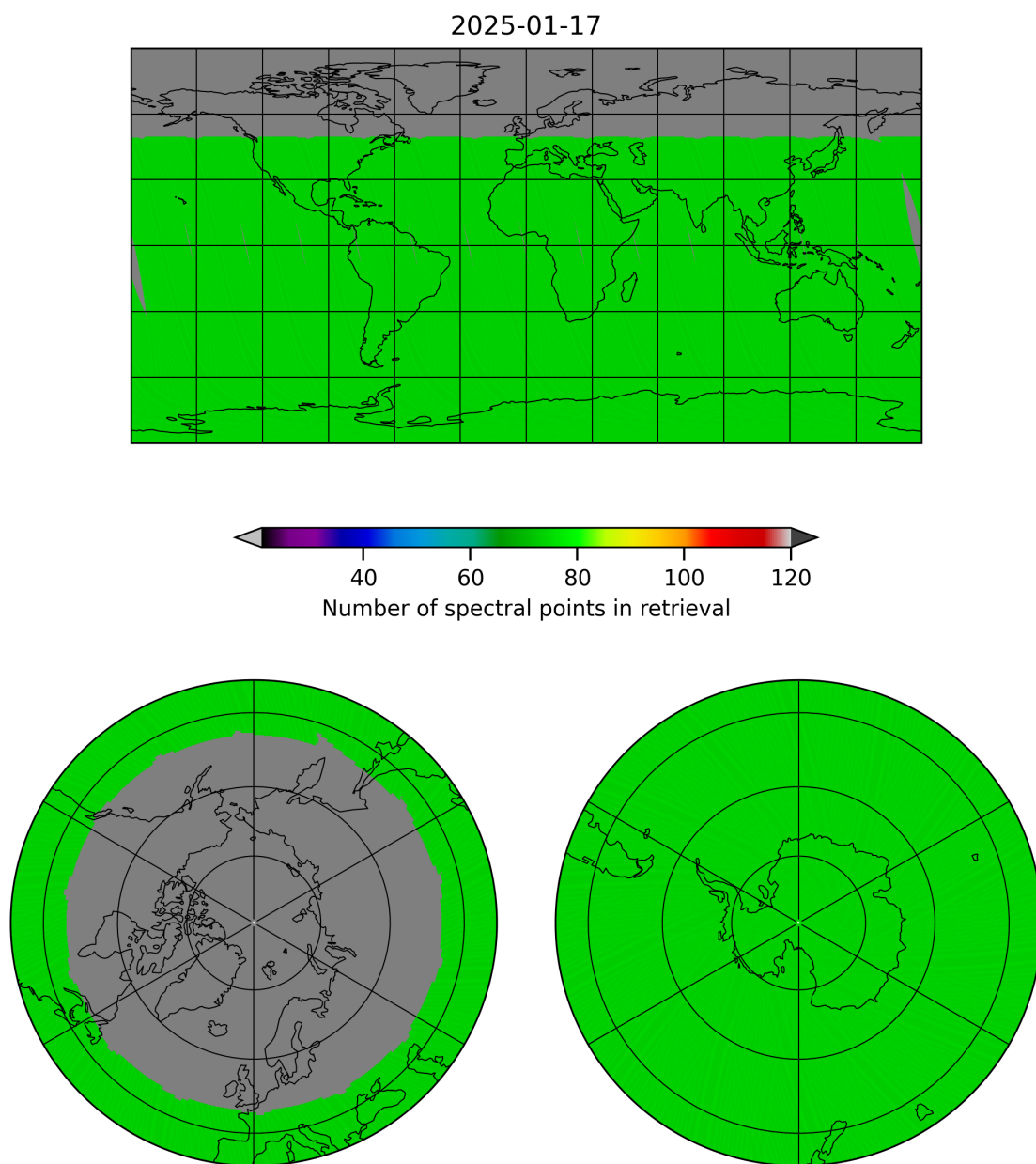


Figure 28: Map of “Number of spectral points in retrieval” for 2025-01-17 to 2025-01-18

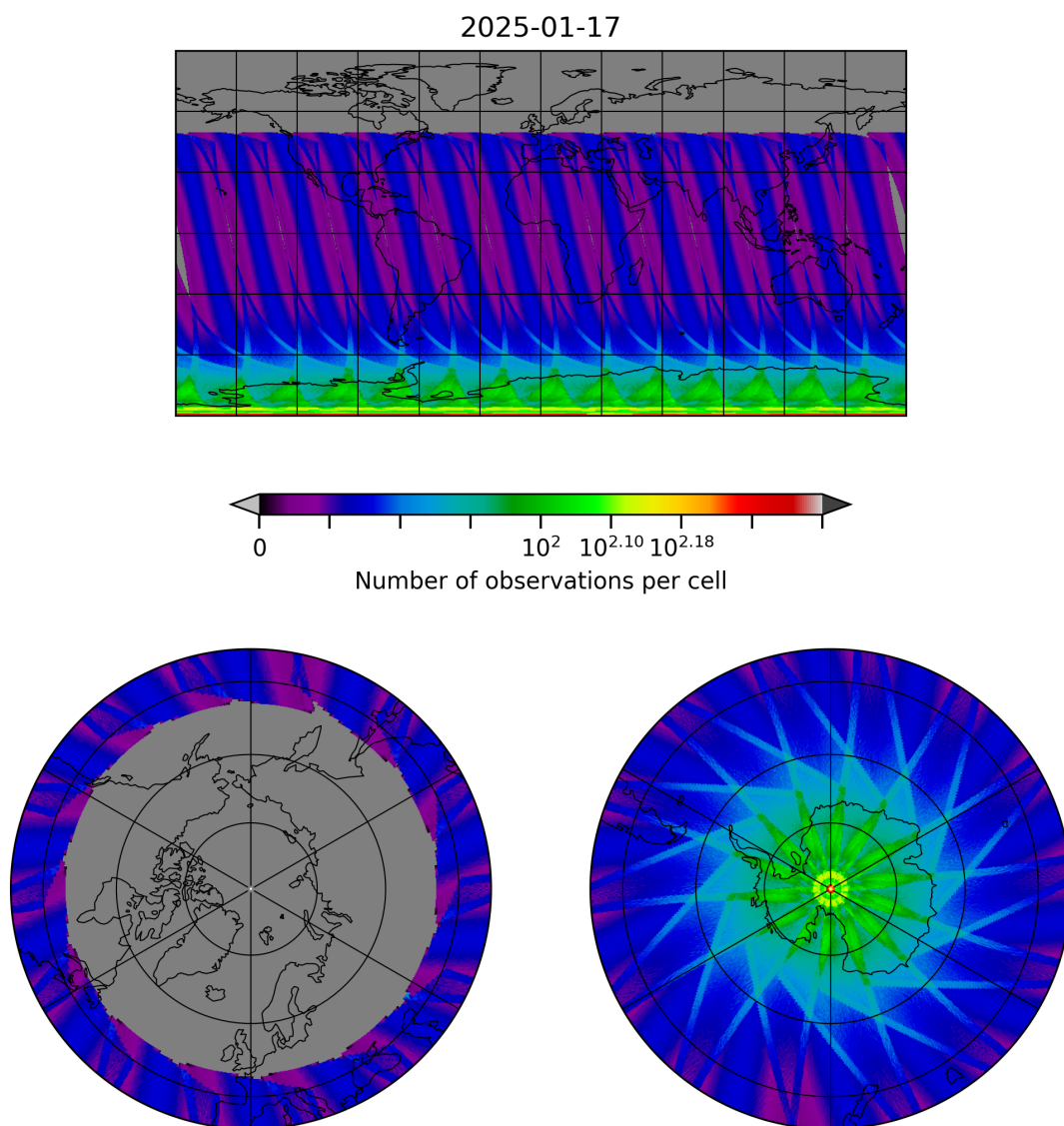


Figure 29: Map of the number of observations for 2025-01-17 to 2025-01-18

7 Zonal average

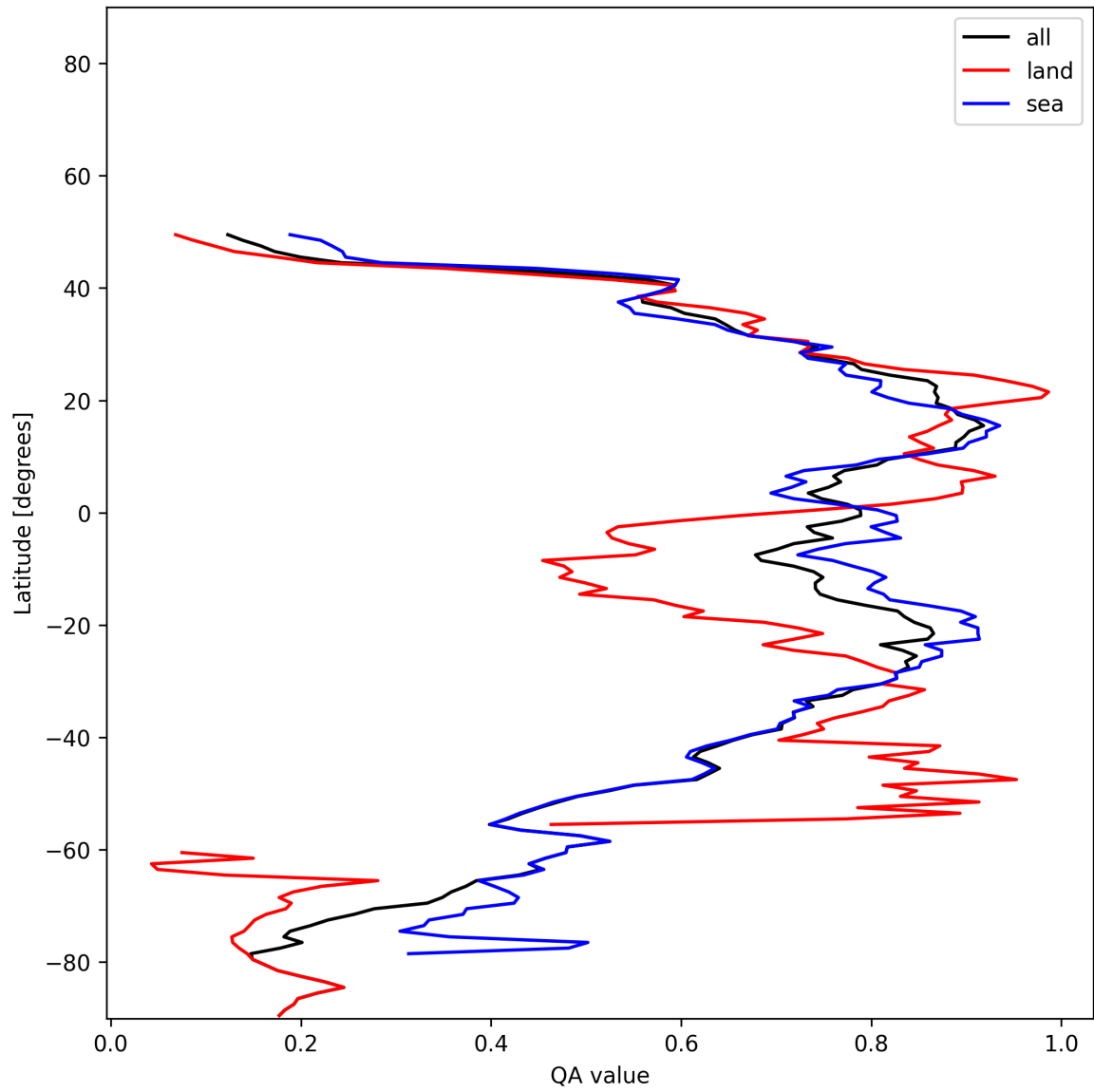


Figure 30: Zonal average of “QA value” for 2025-01-17 to 2025-01-18.

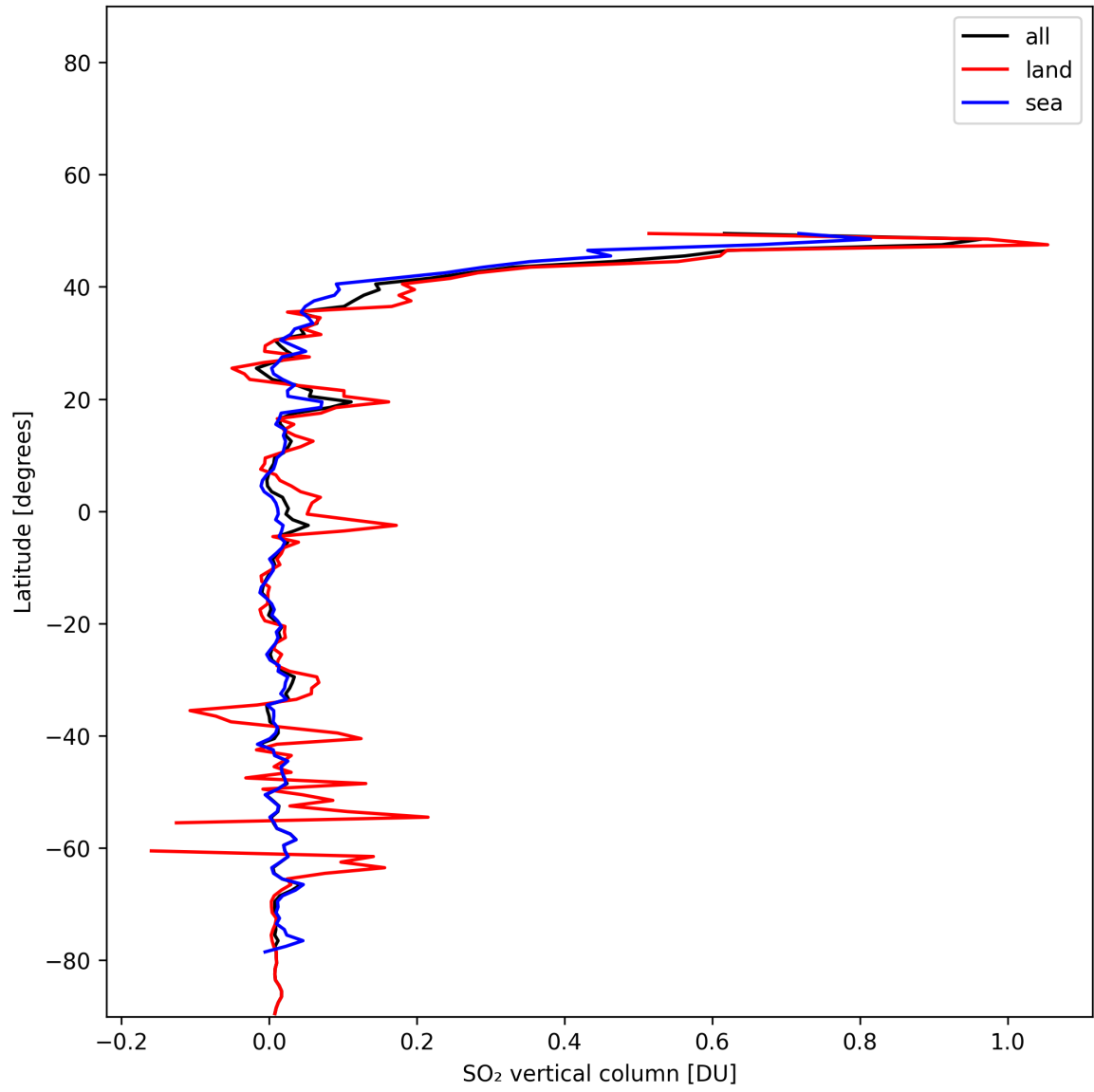


Figure 31: Zonal average of “SO₂ vertical column” for 2025-01-17 to 2025-01-18.

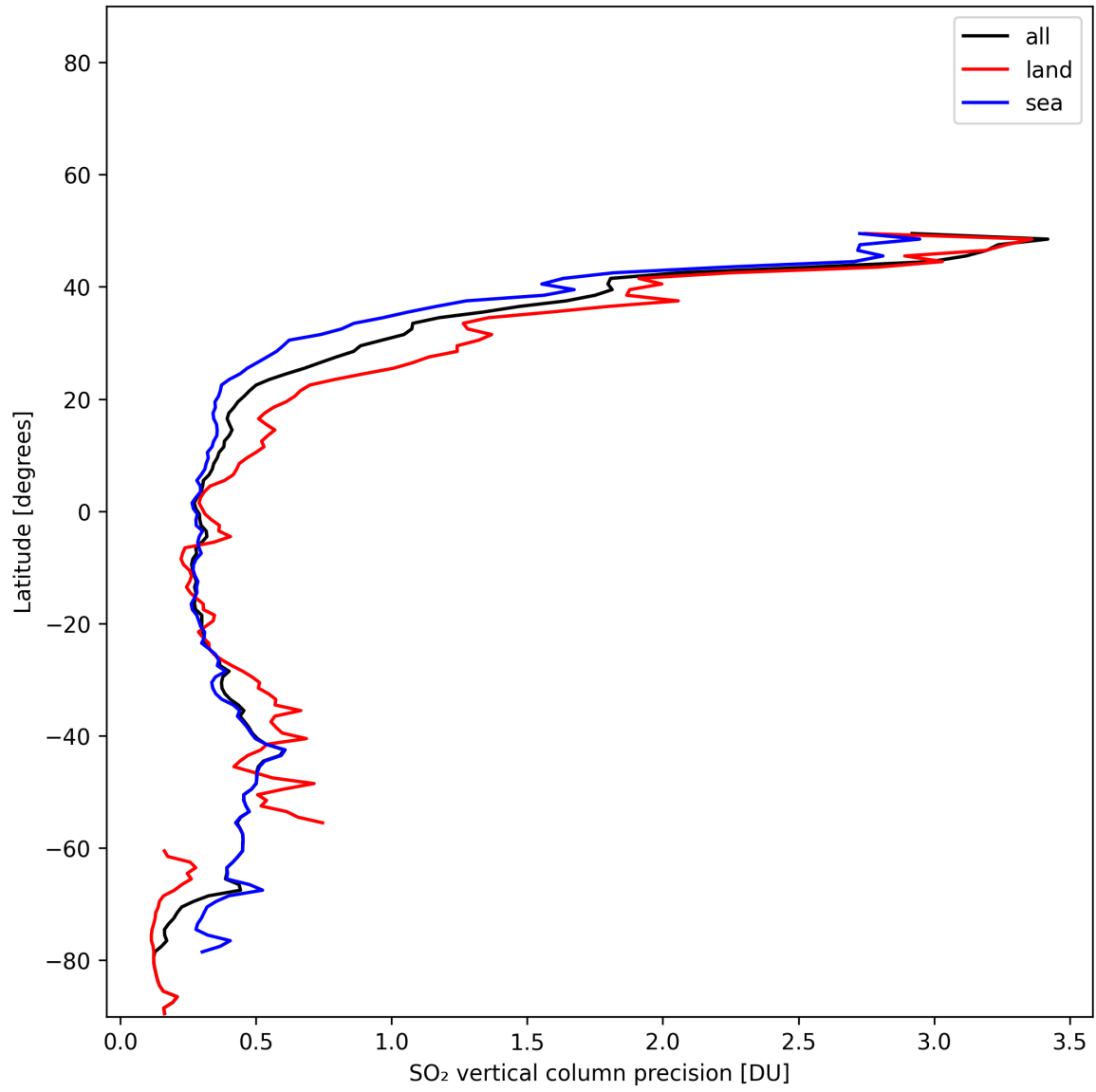


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-01-17 to 2025-01-18.

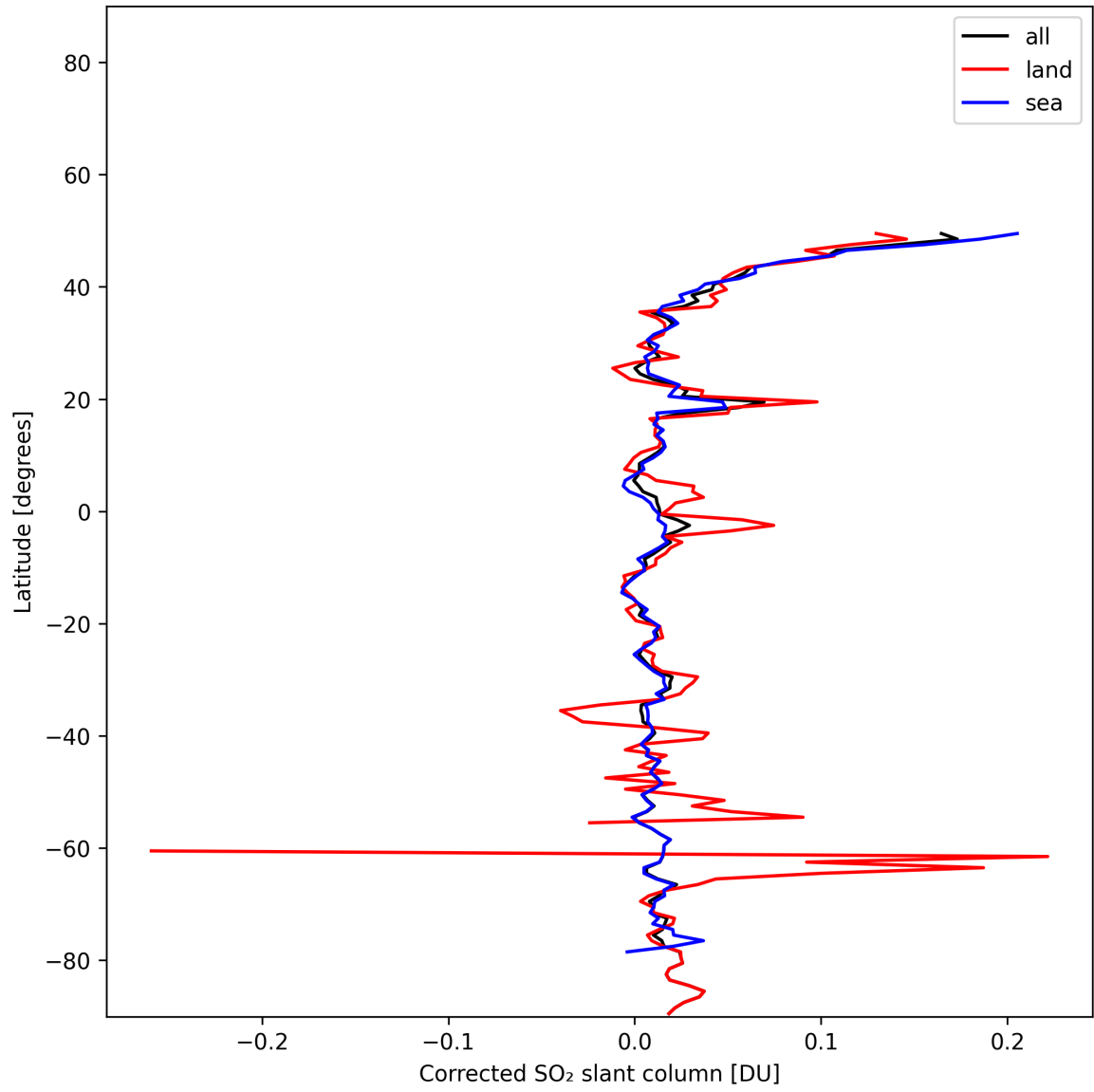


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-01-17 to 2025-01-18.

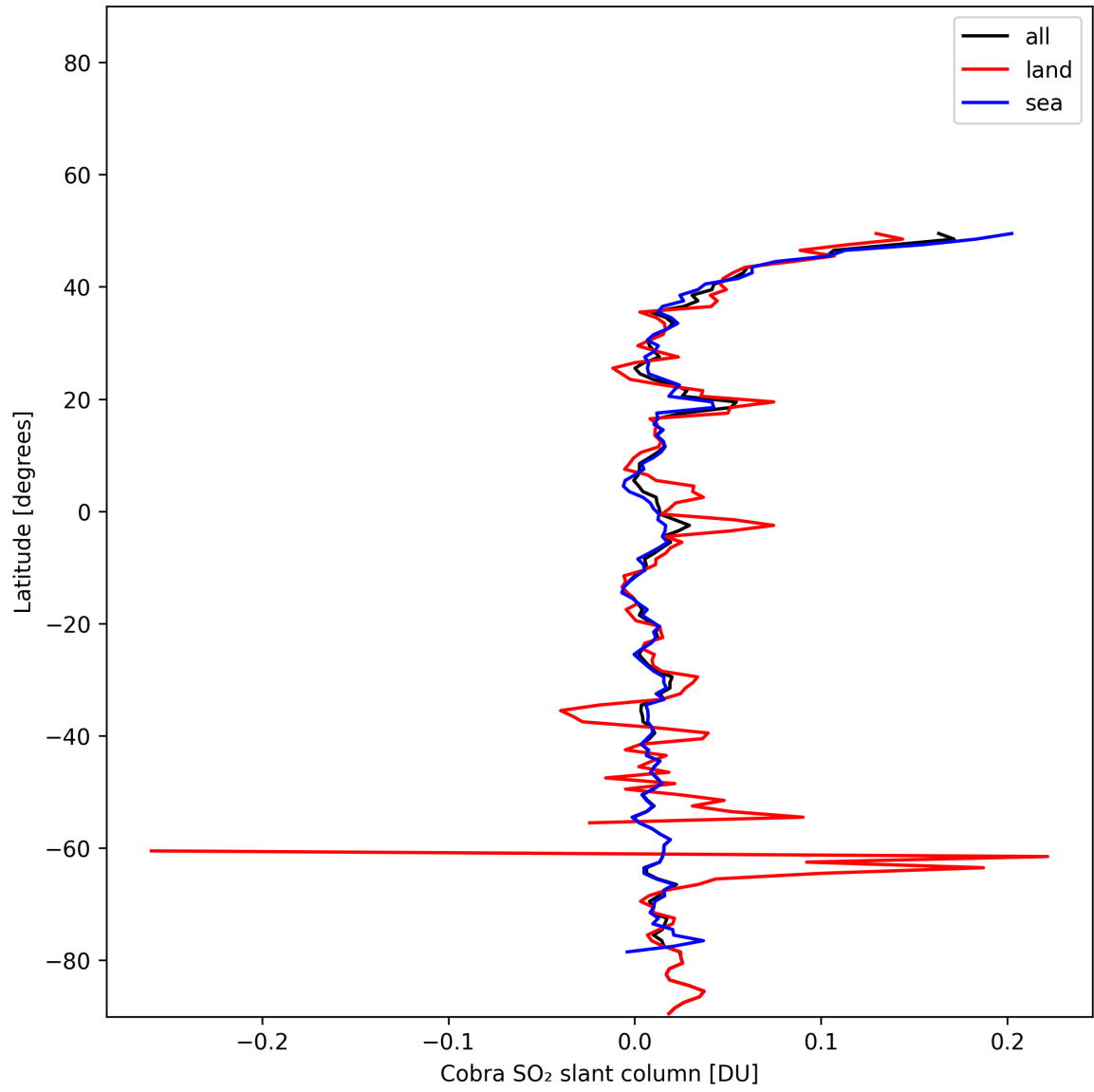


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-01-17 to 2025-01-18.

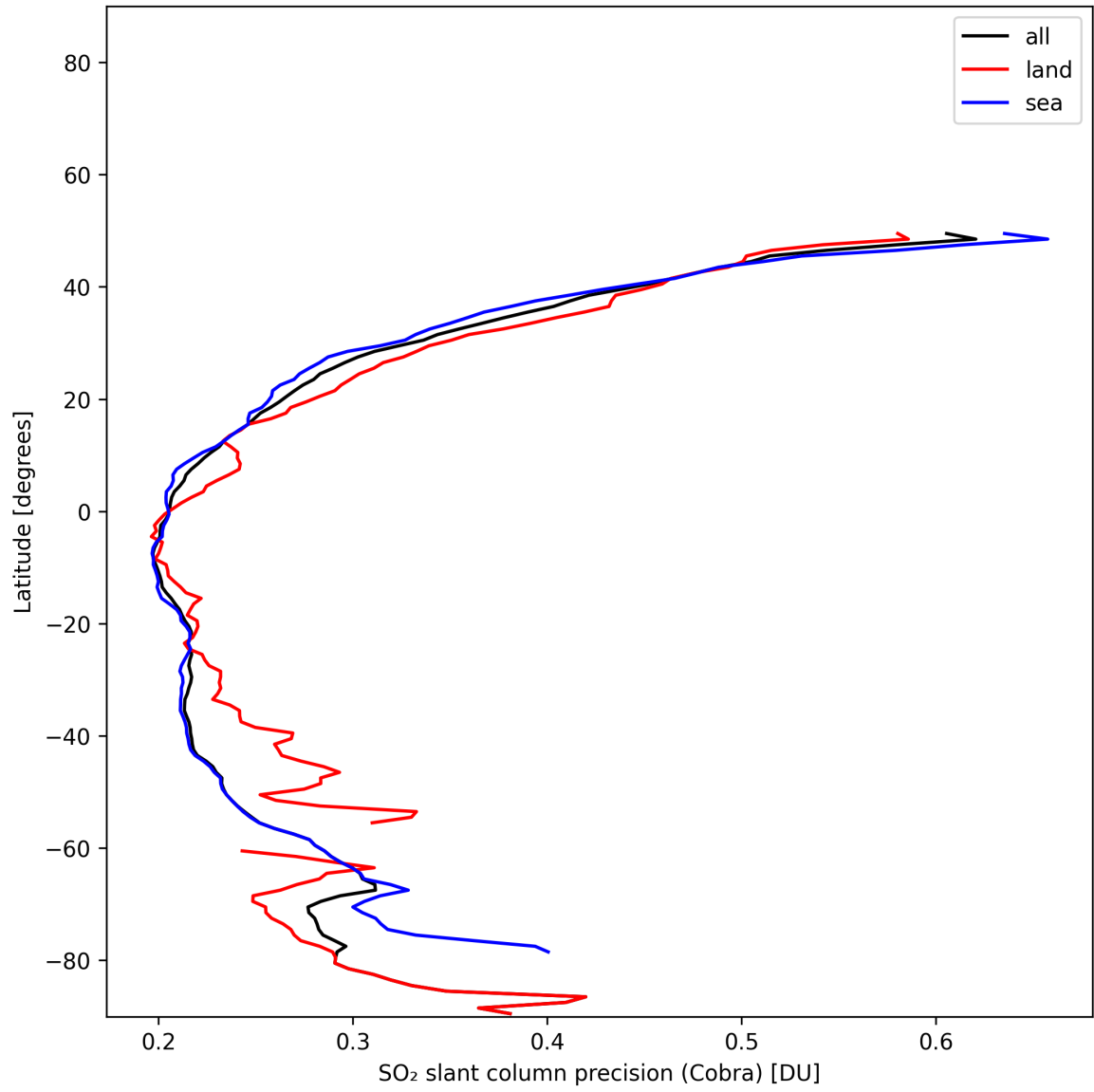


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-01-17 to 2025-01-18.

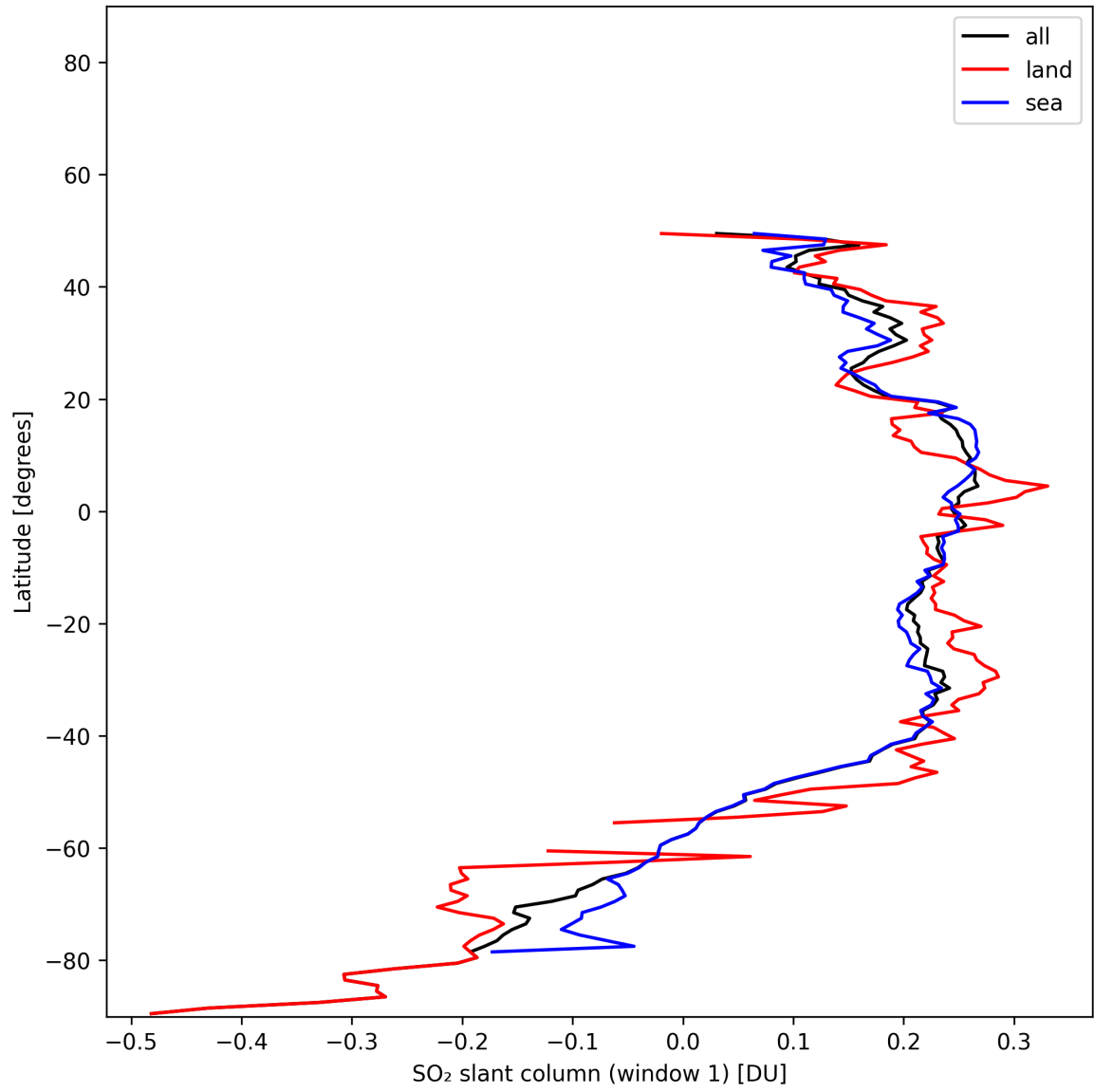


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-01-17 to 2025-01-18.

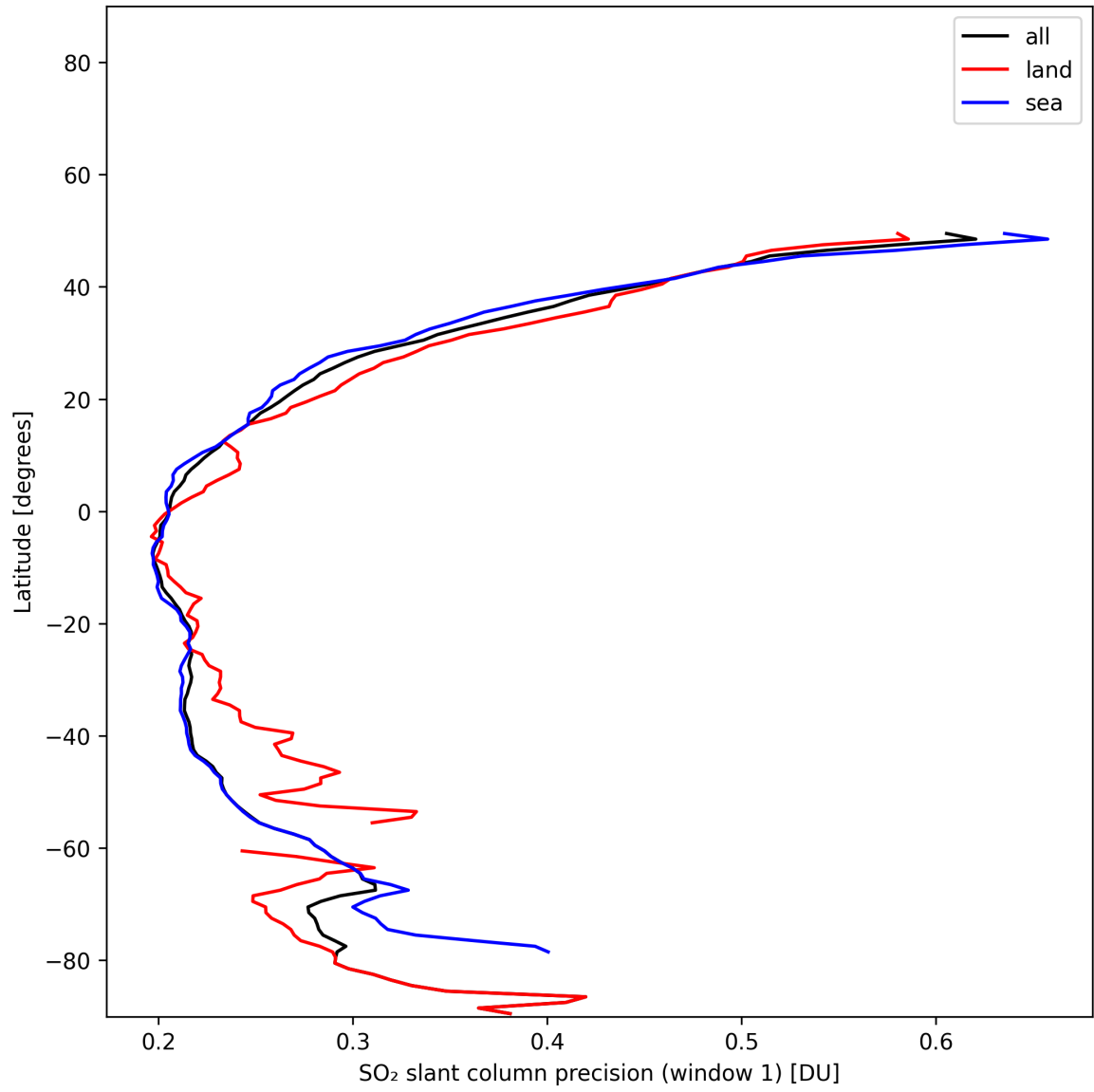


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-01-17 to 2025-01-18.

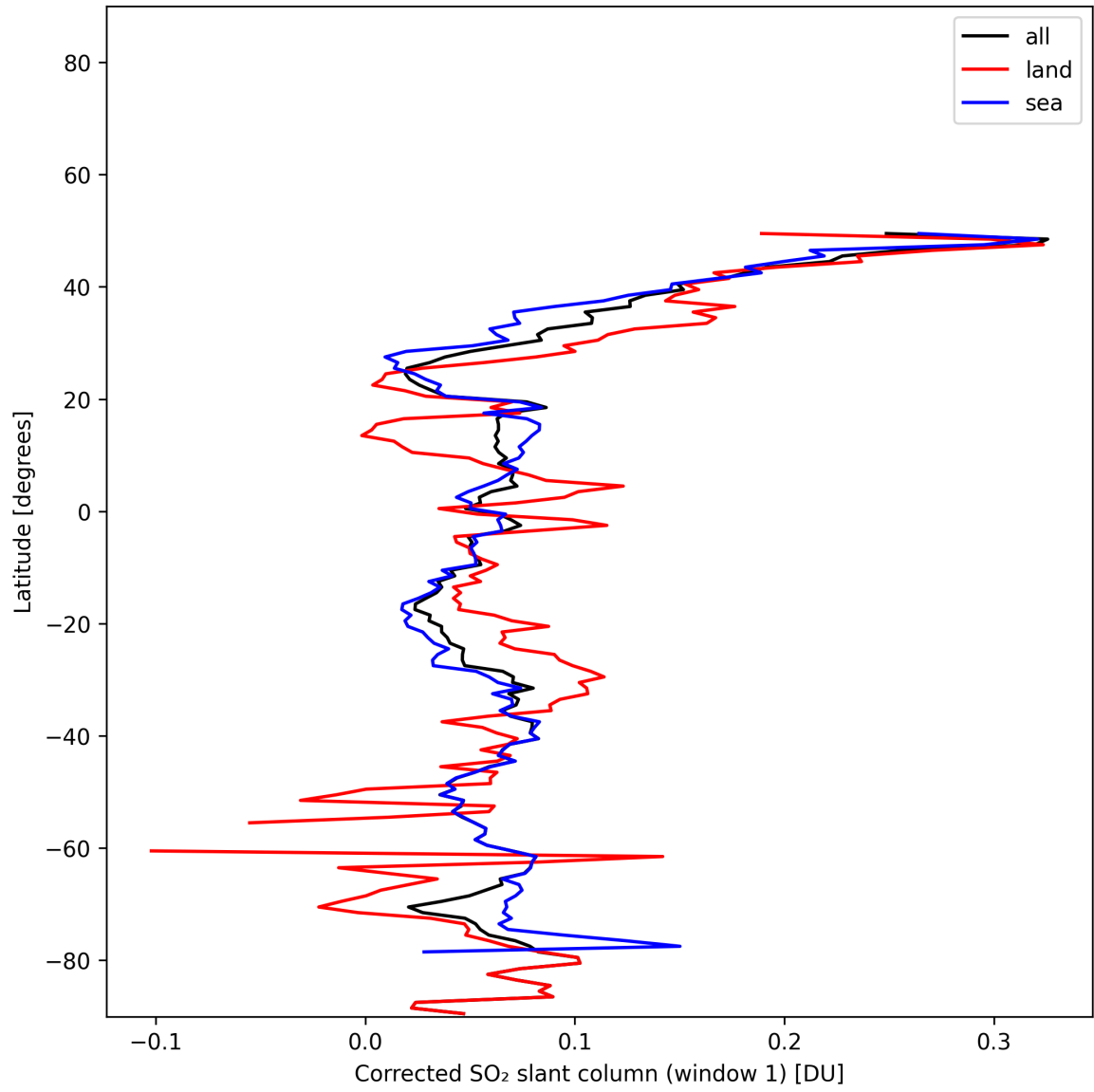


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-01-17 to 2025-01-18.

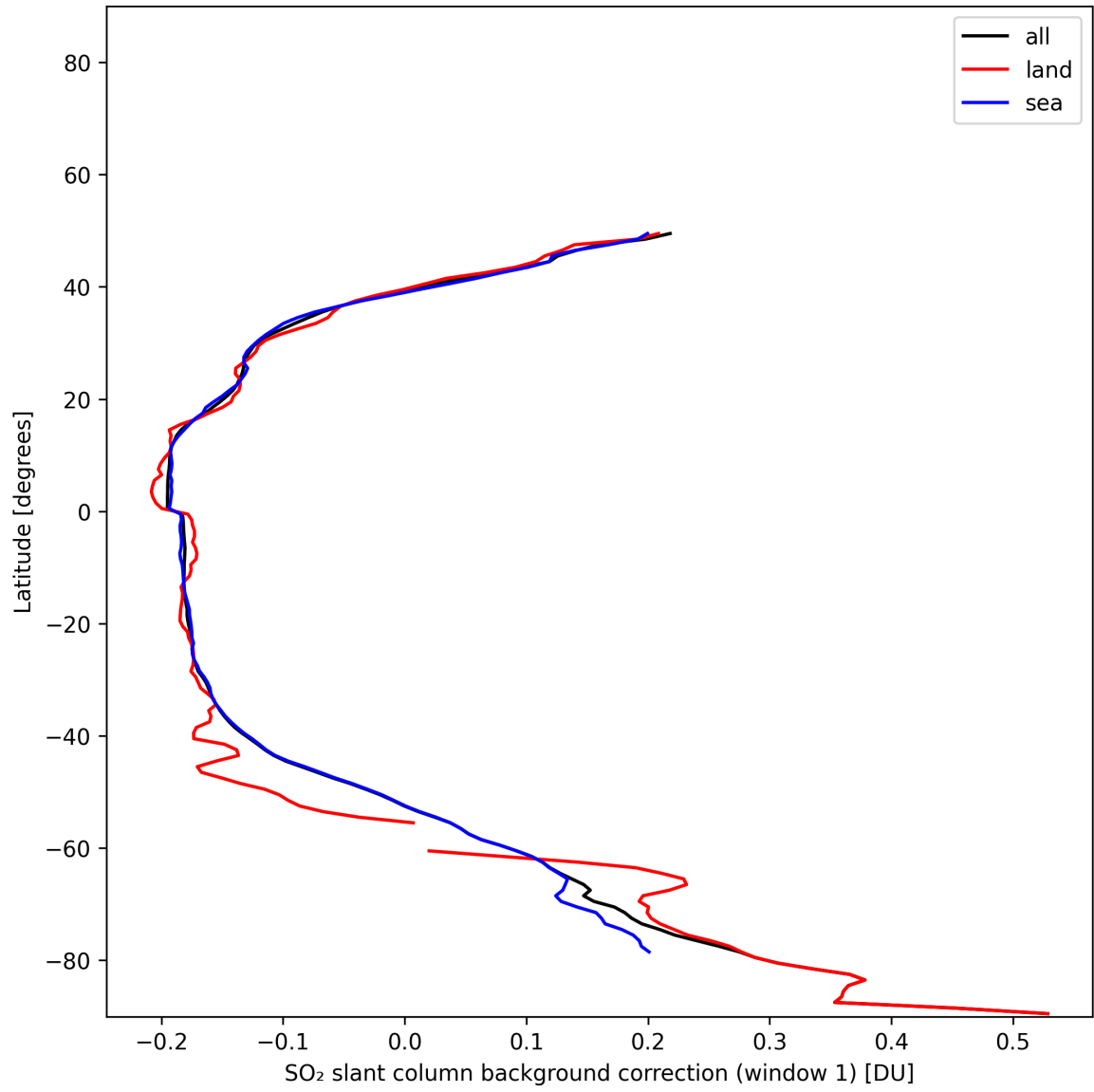


Figure 39: Zonal average of "SO₂ slant column background correction (window 1)" for 2025-01-17 to 2025-01-18.

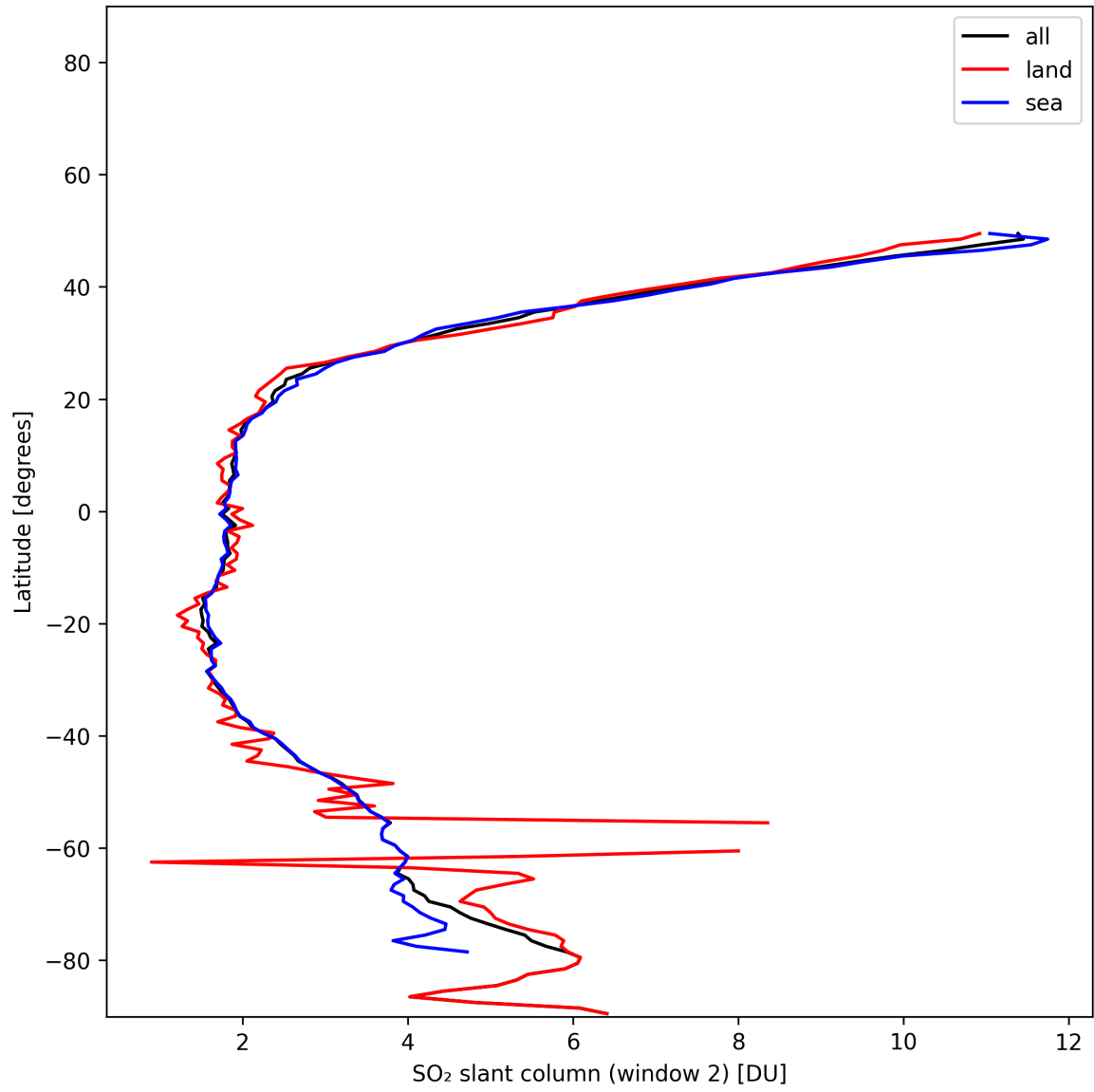


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-01-17 to 2025-01-18.

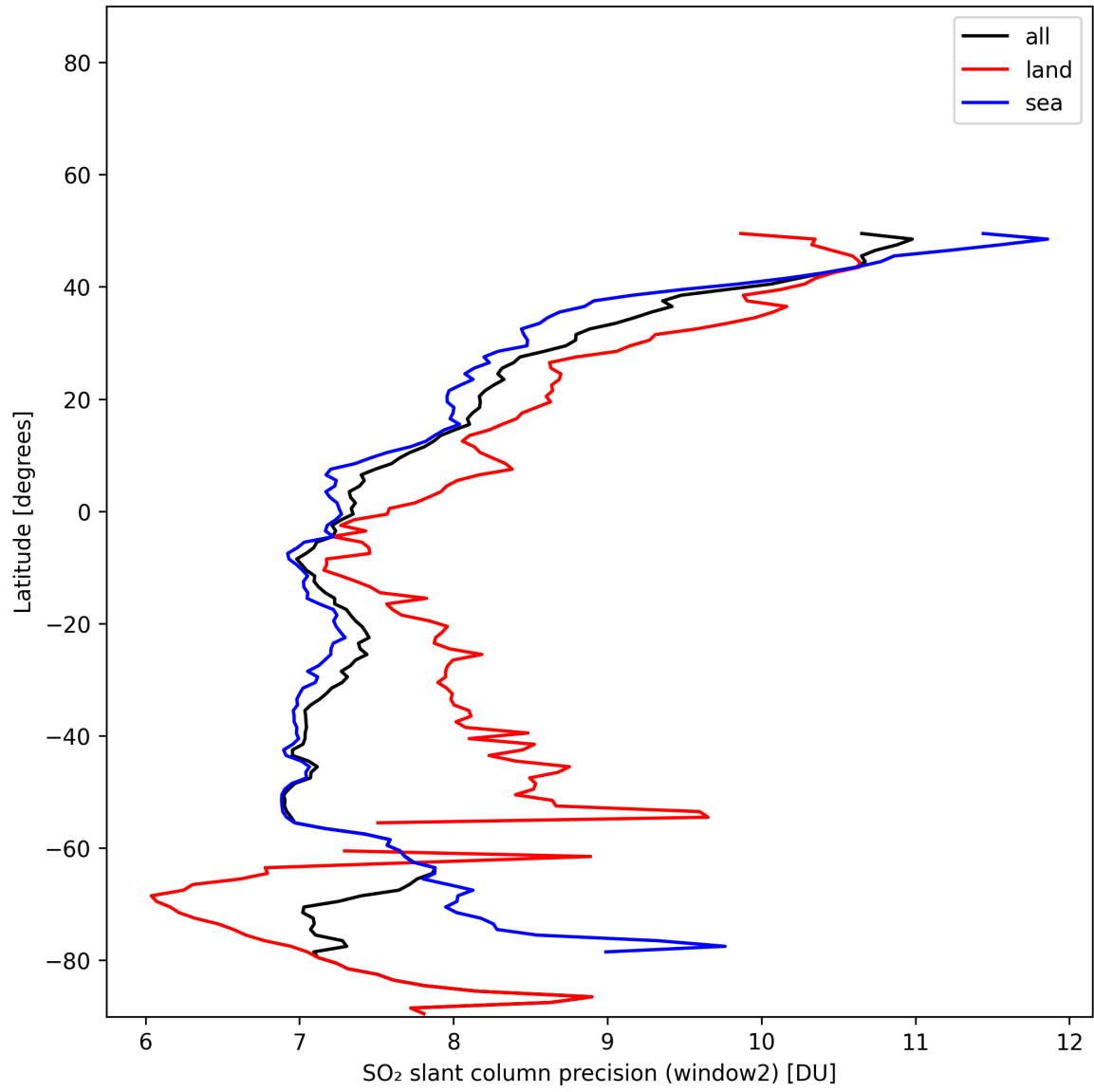


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-01-17 to 2025-01-18.

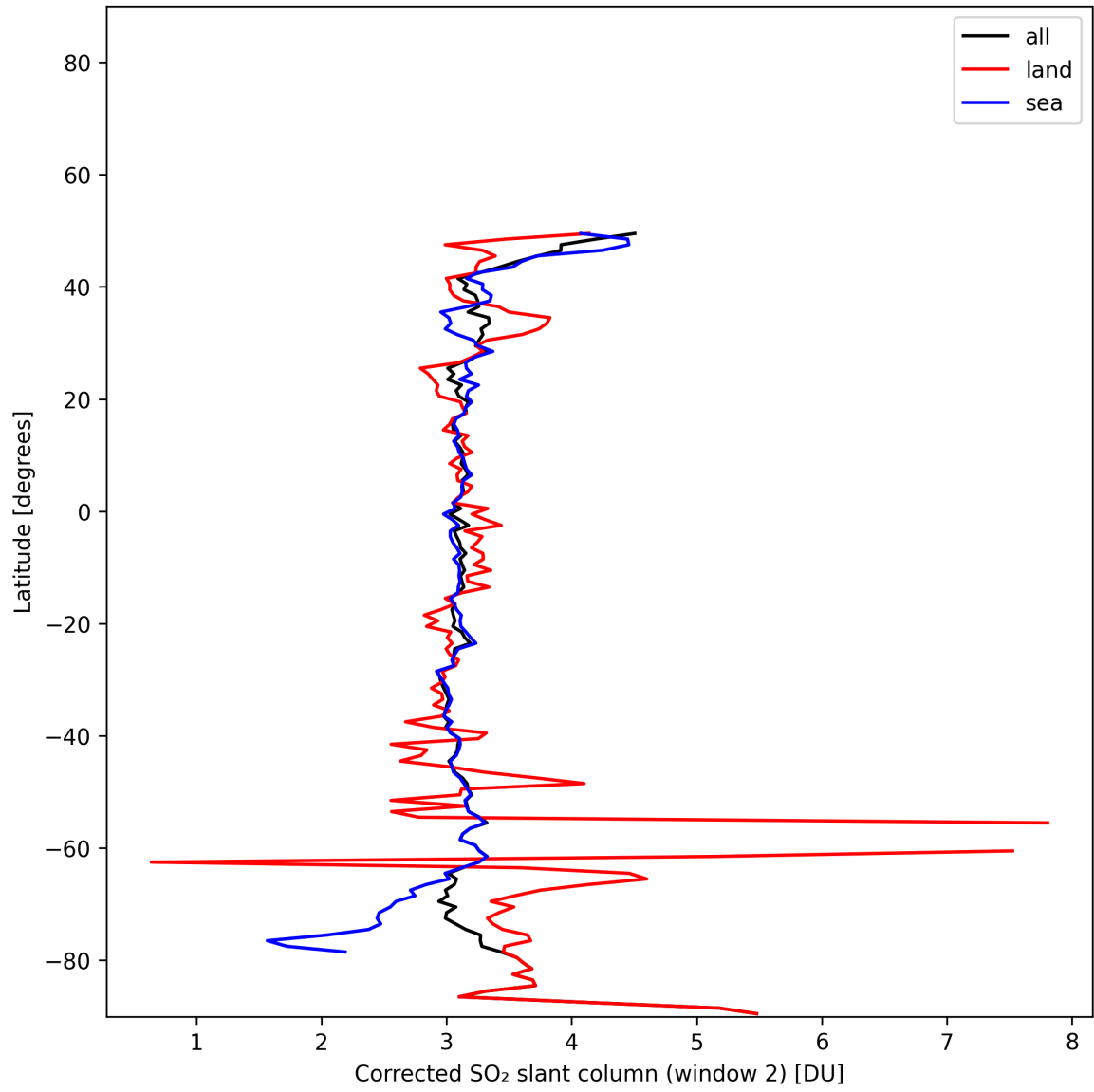


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-01-17 to 2025-01-18.

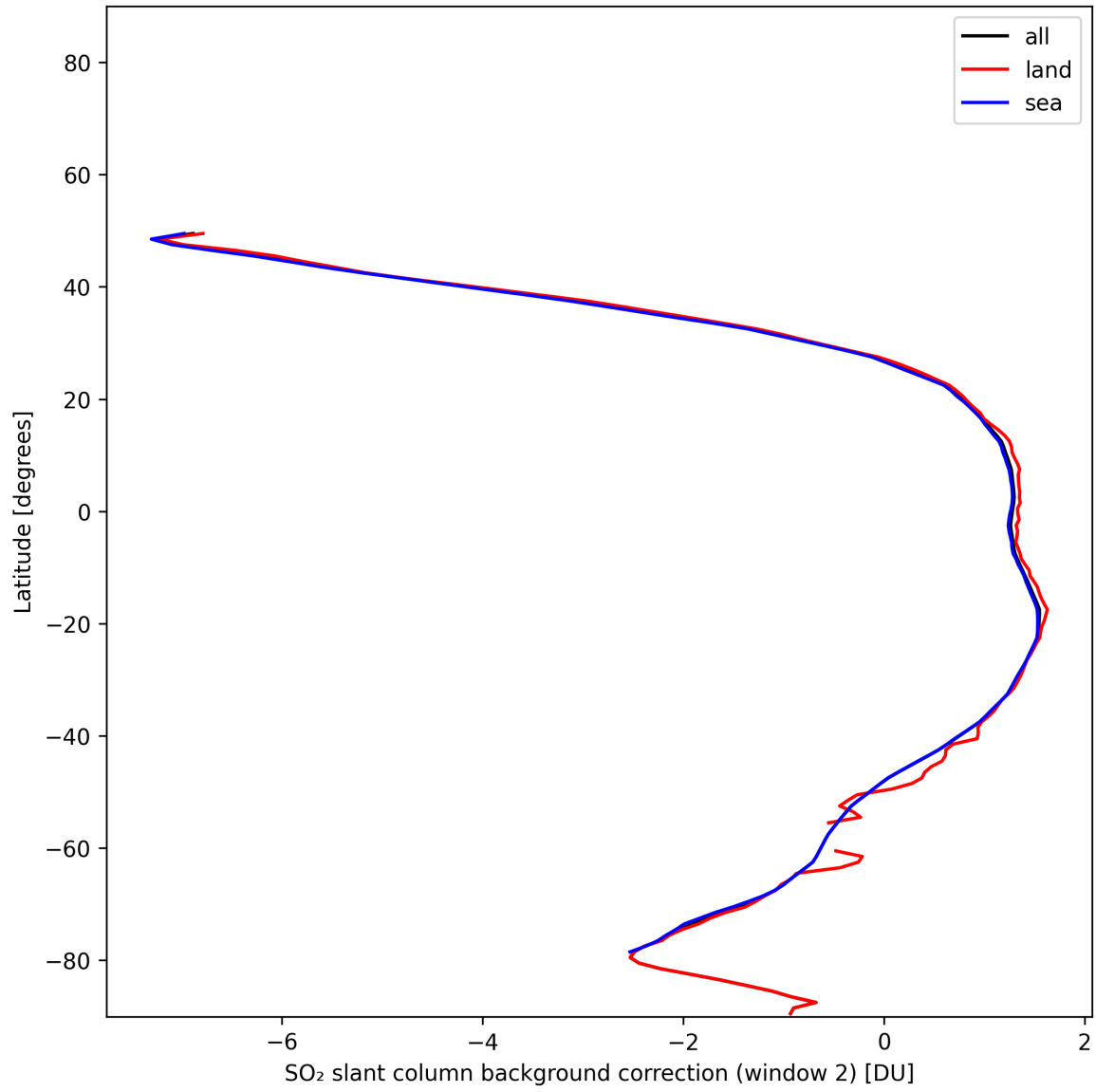


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-01-17 to 2025-01-18.

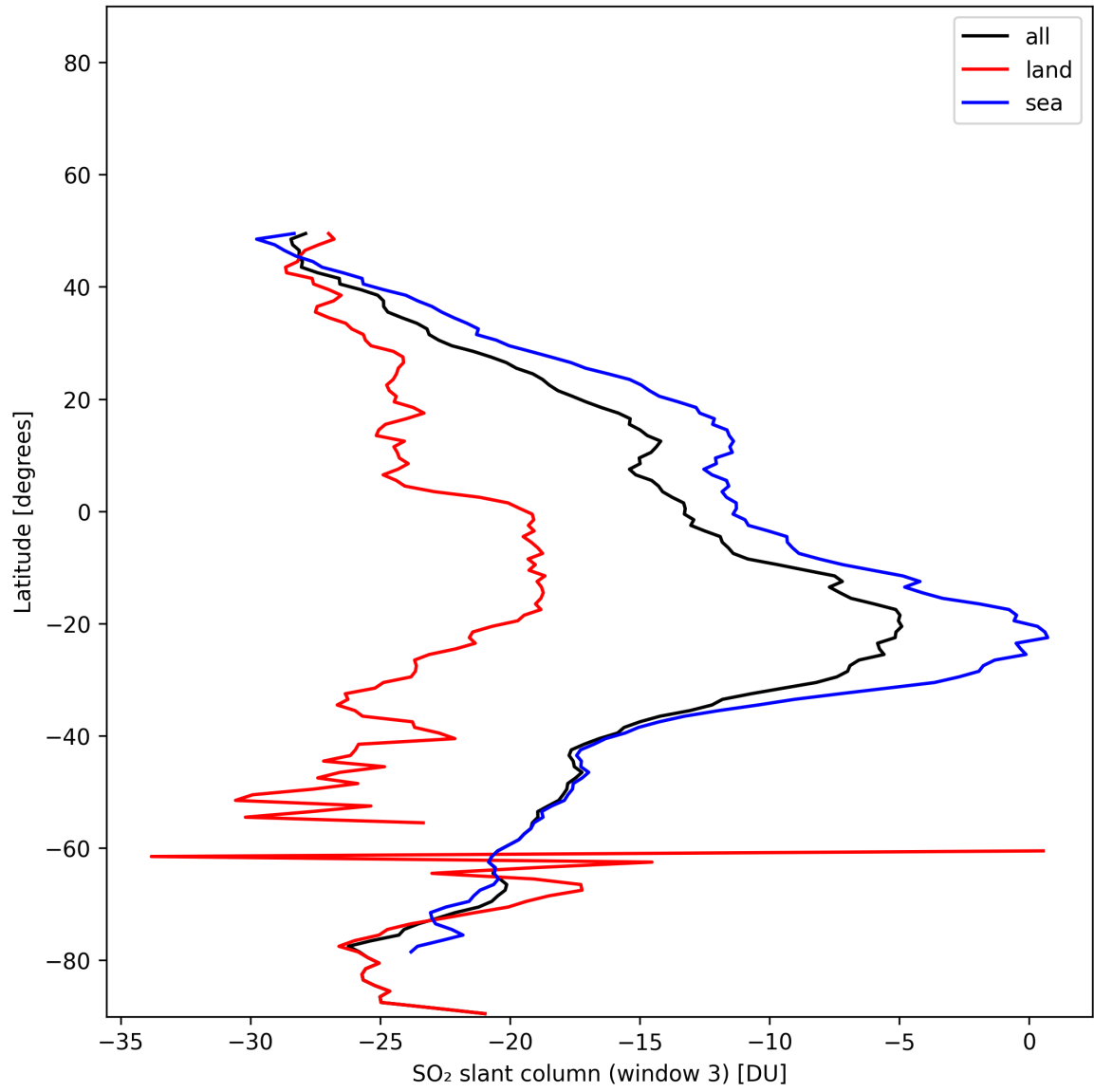


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-01-17 to 2025-01-18.

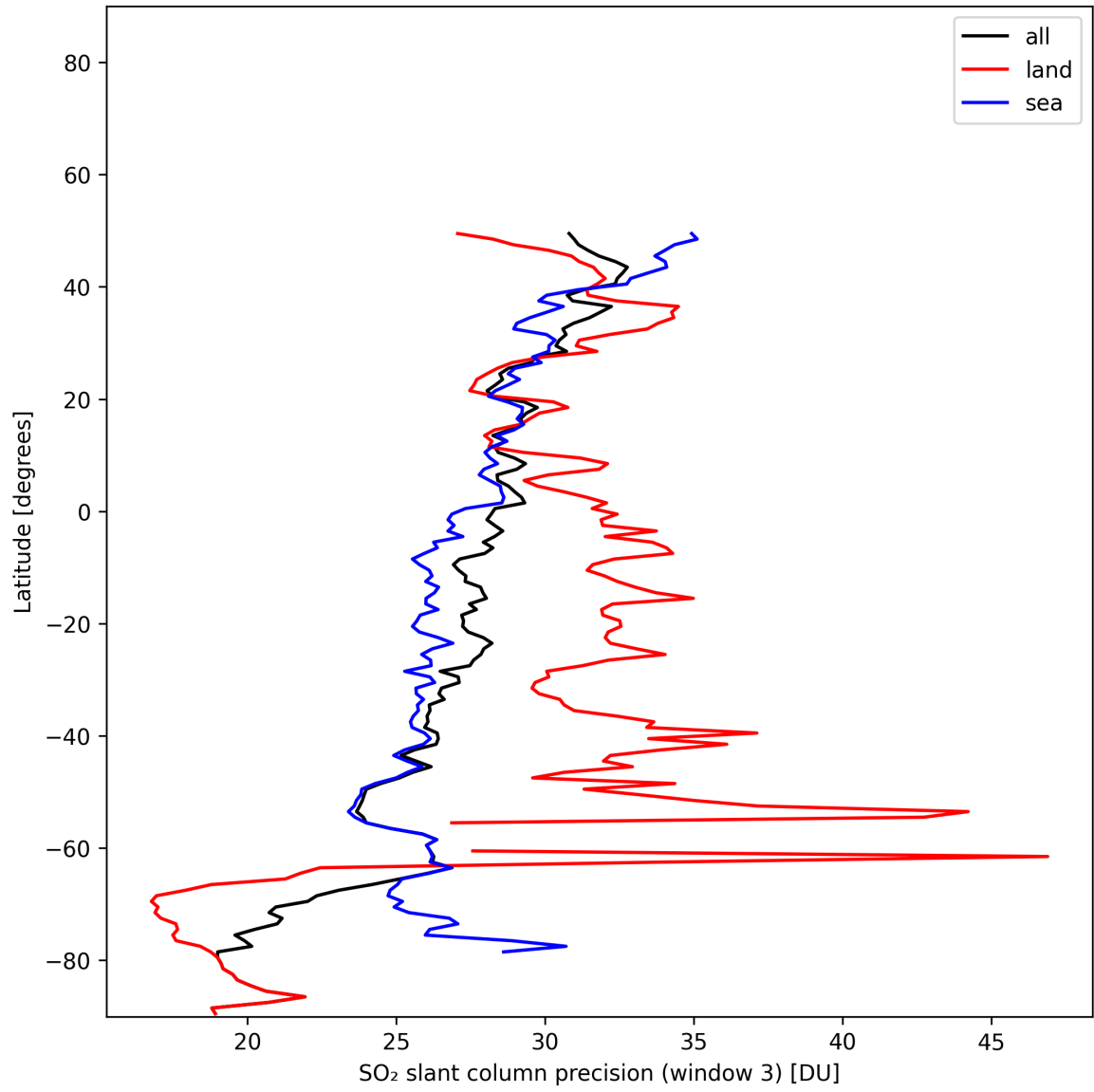


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-01-17 to 2025-01-18.

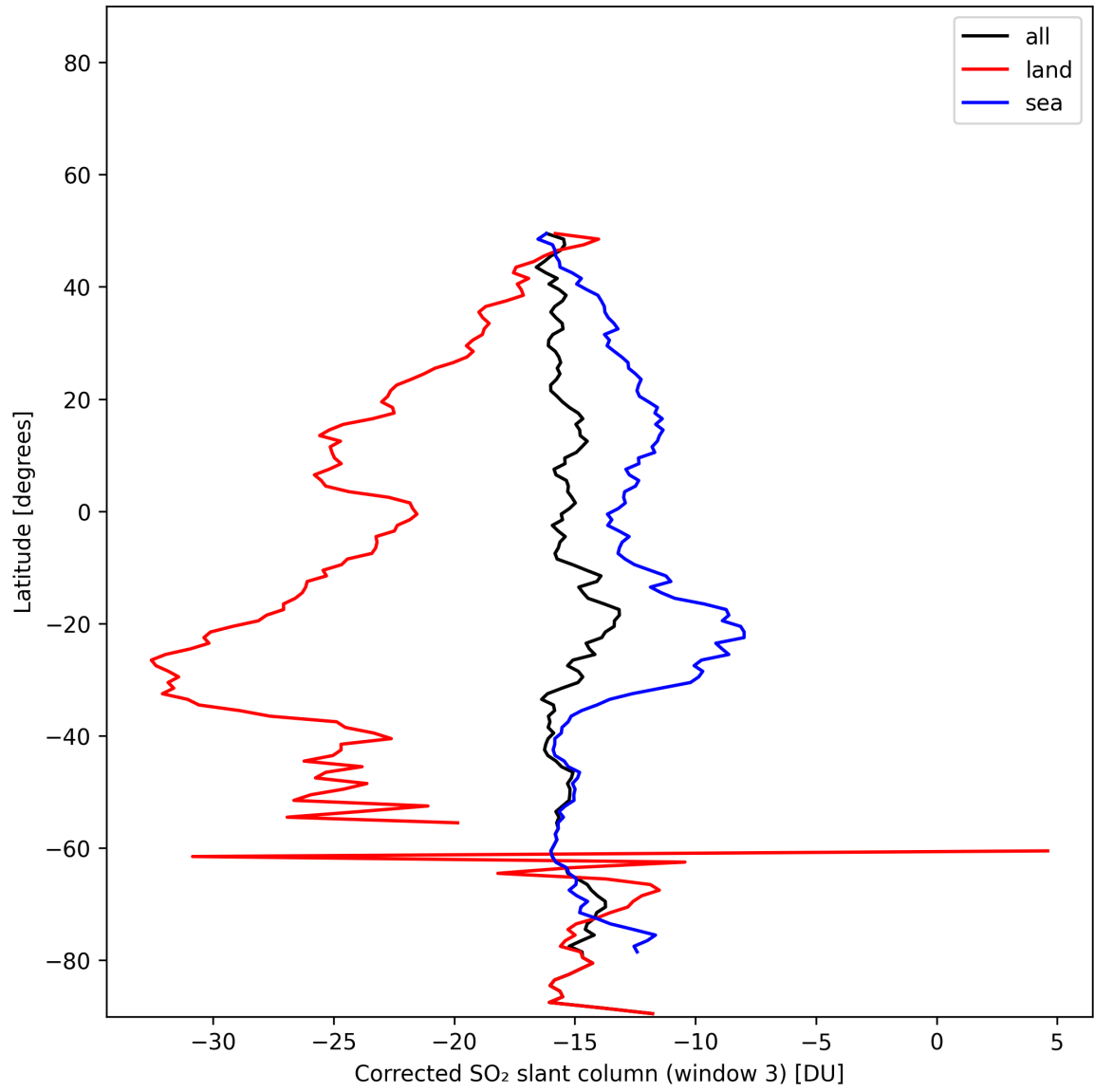


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-01-17 to 2025-01-18.

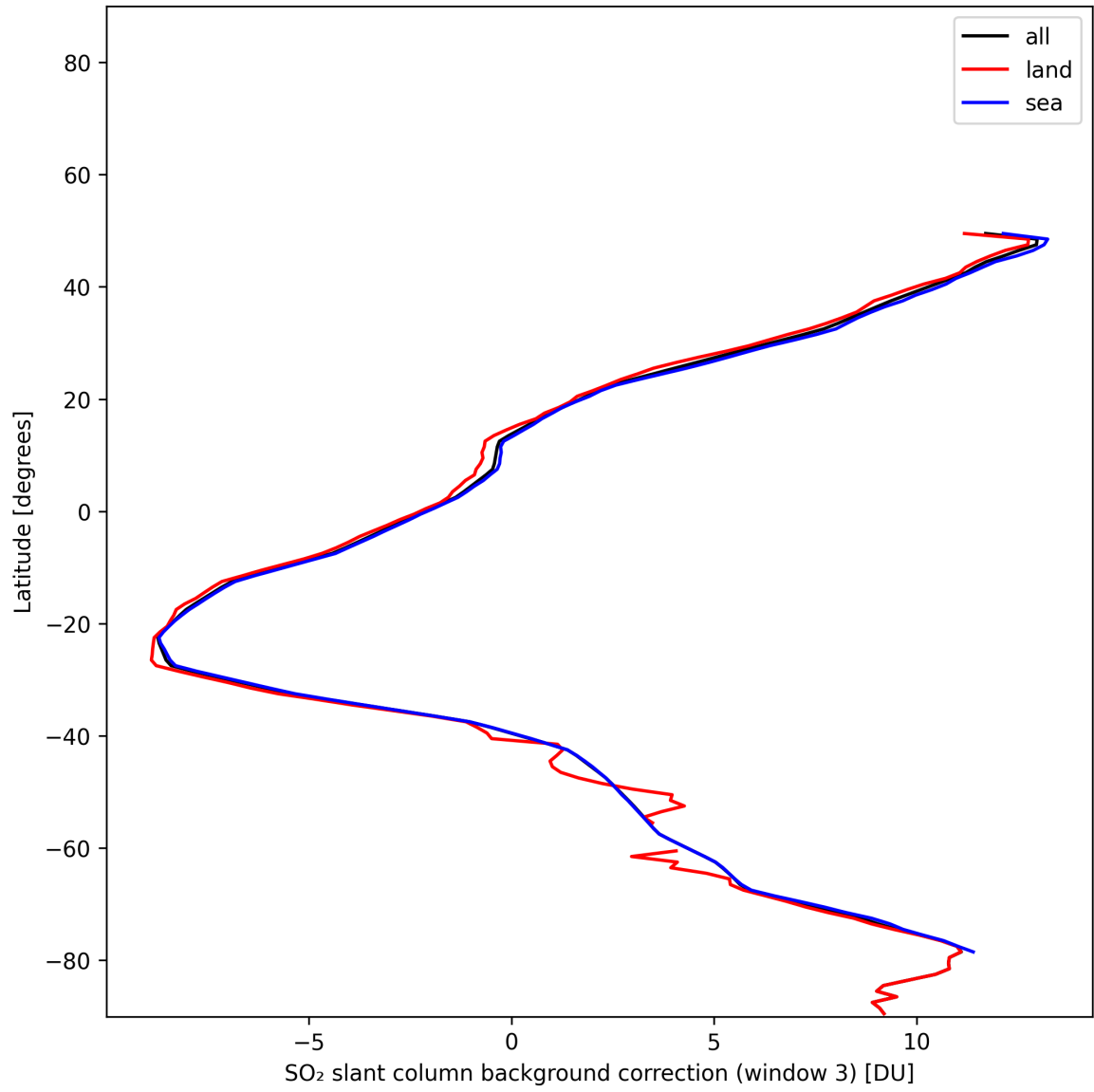


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-01-17 to 2025-01-18.

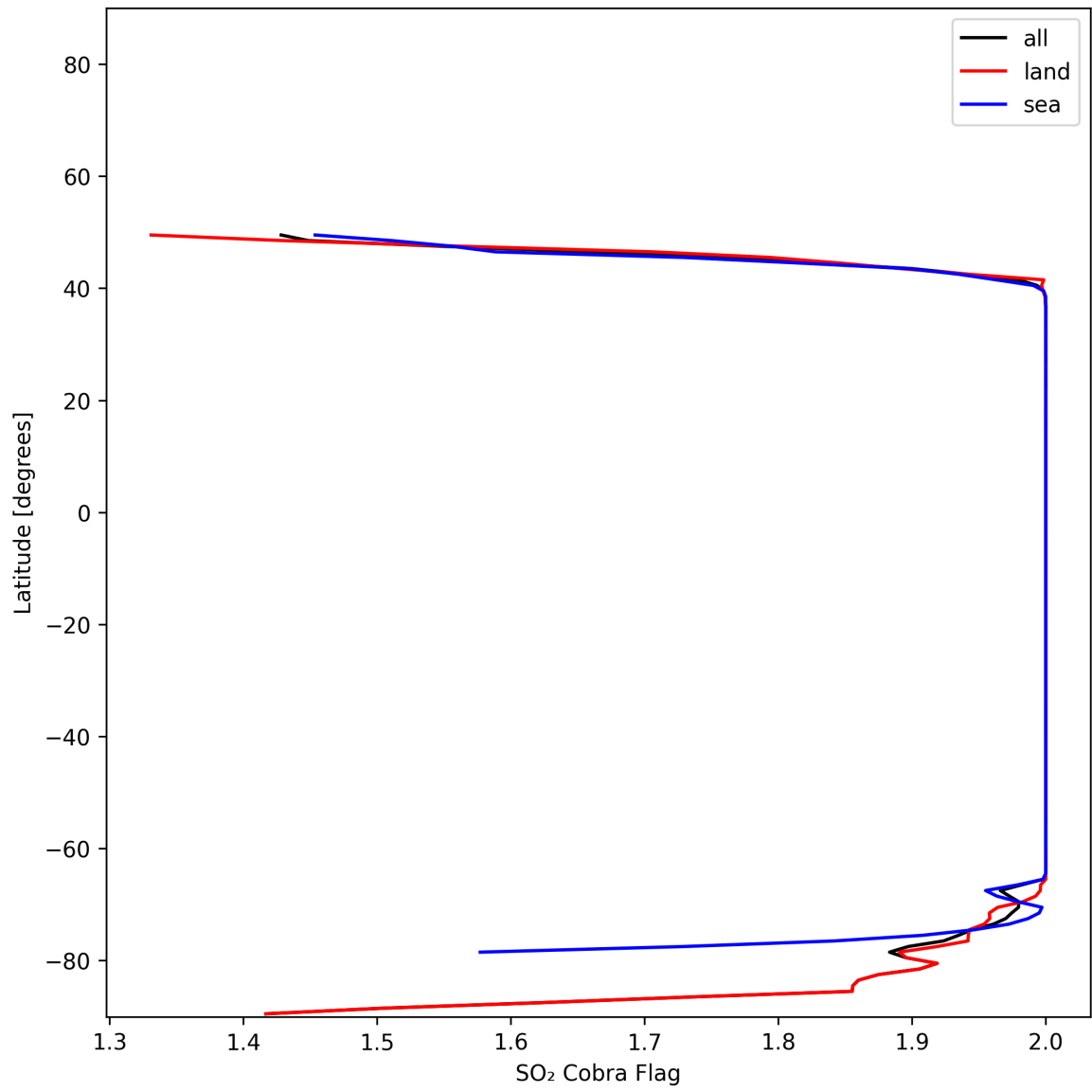


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-01-17 to 2025-01-18.

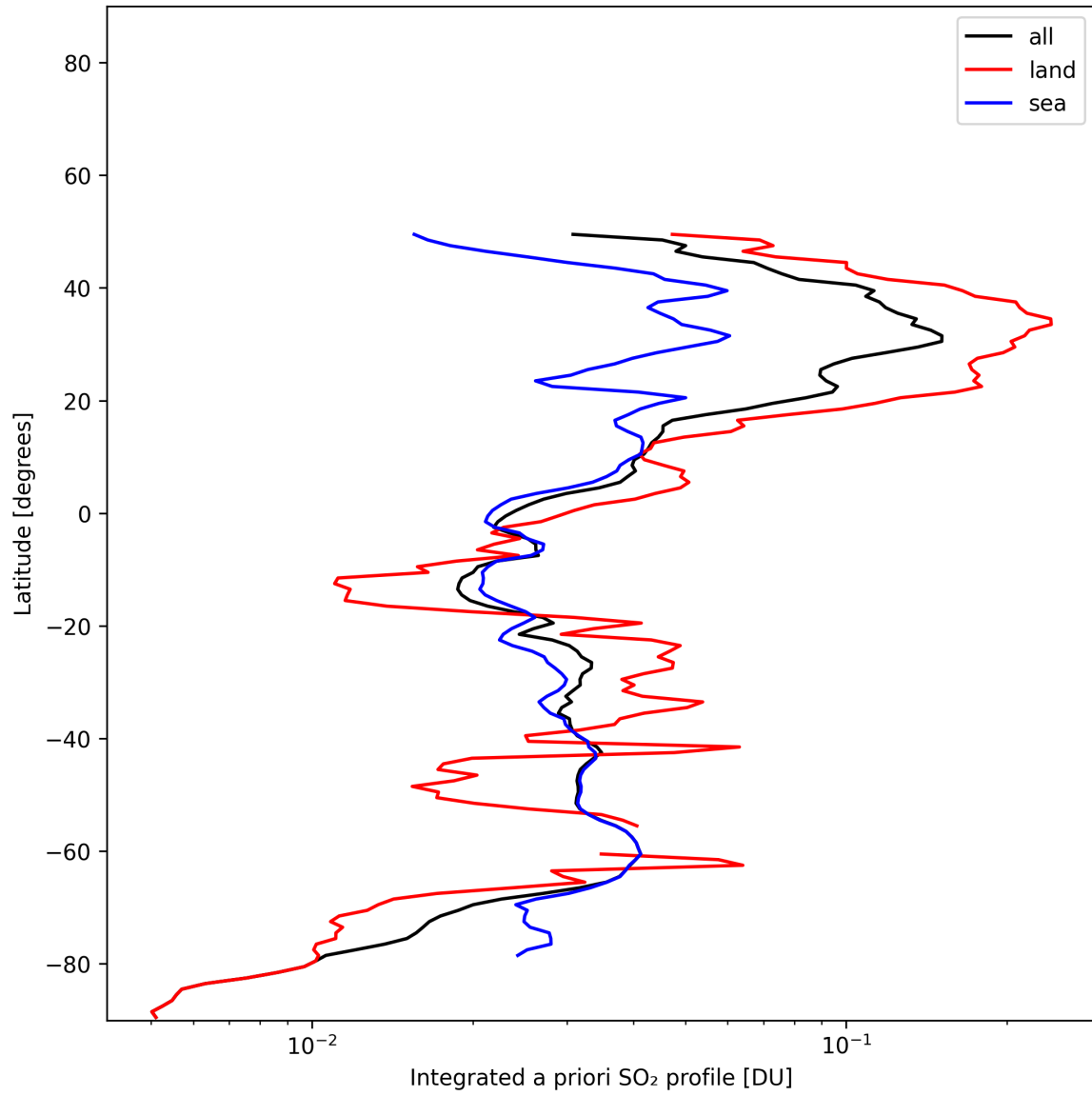


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-01-17 to 2025-01-18.

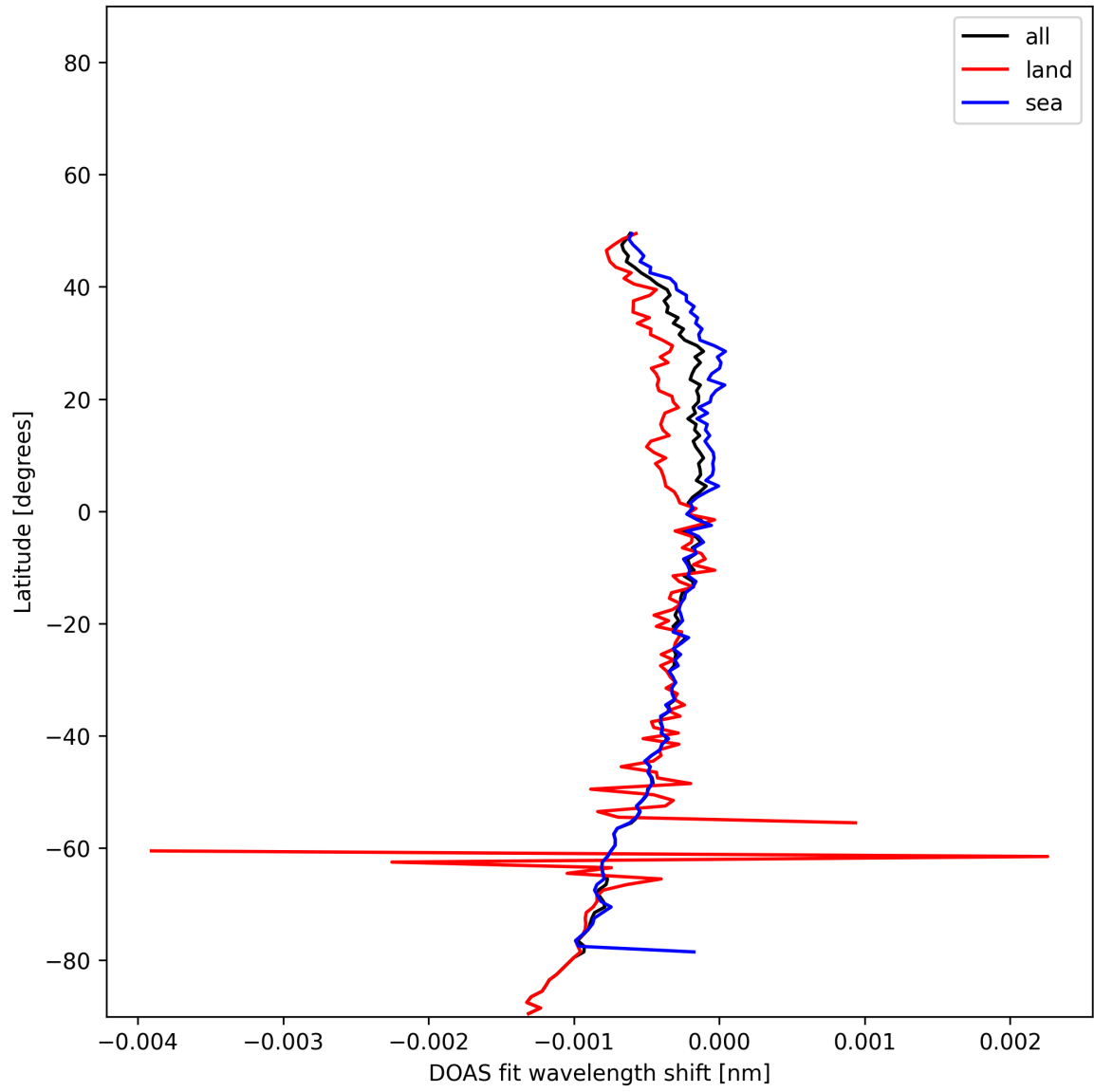


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-01-17 to 2025-01-18.

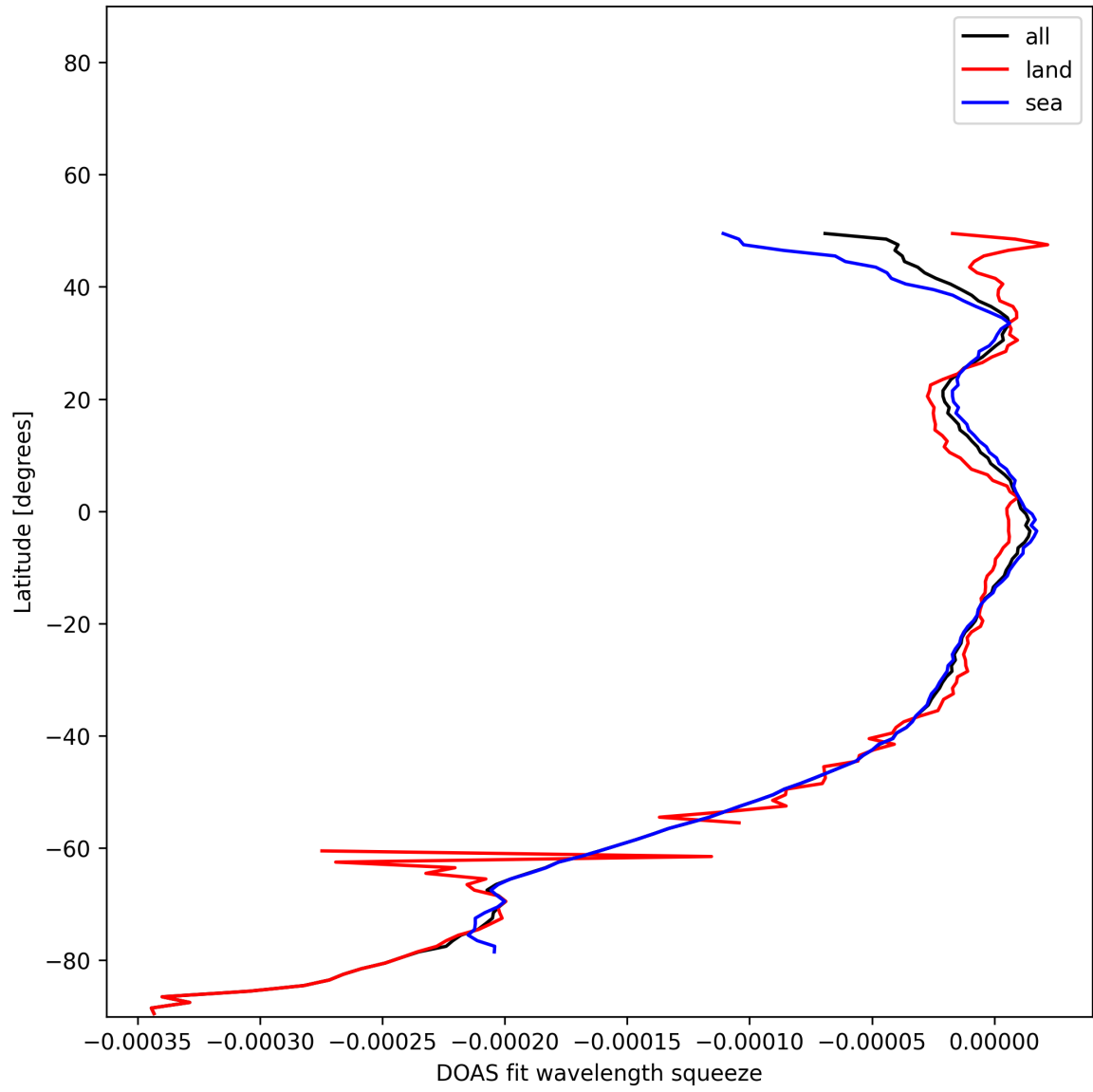


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-01-17 to 2025-01-18.

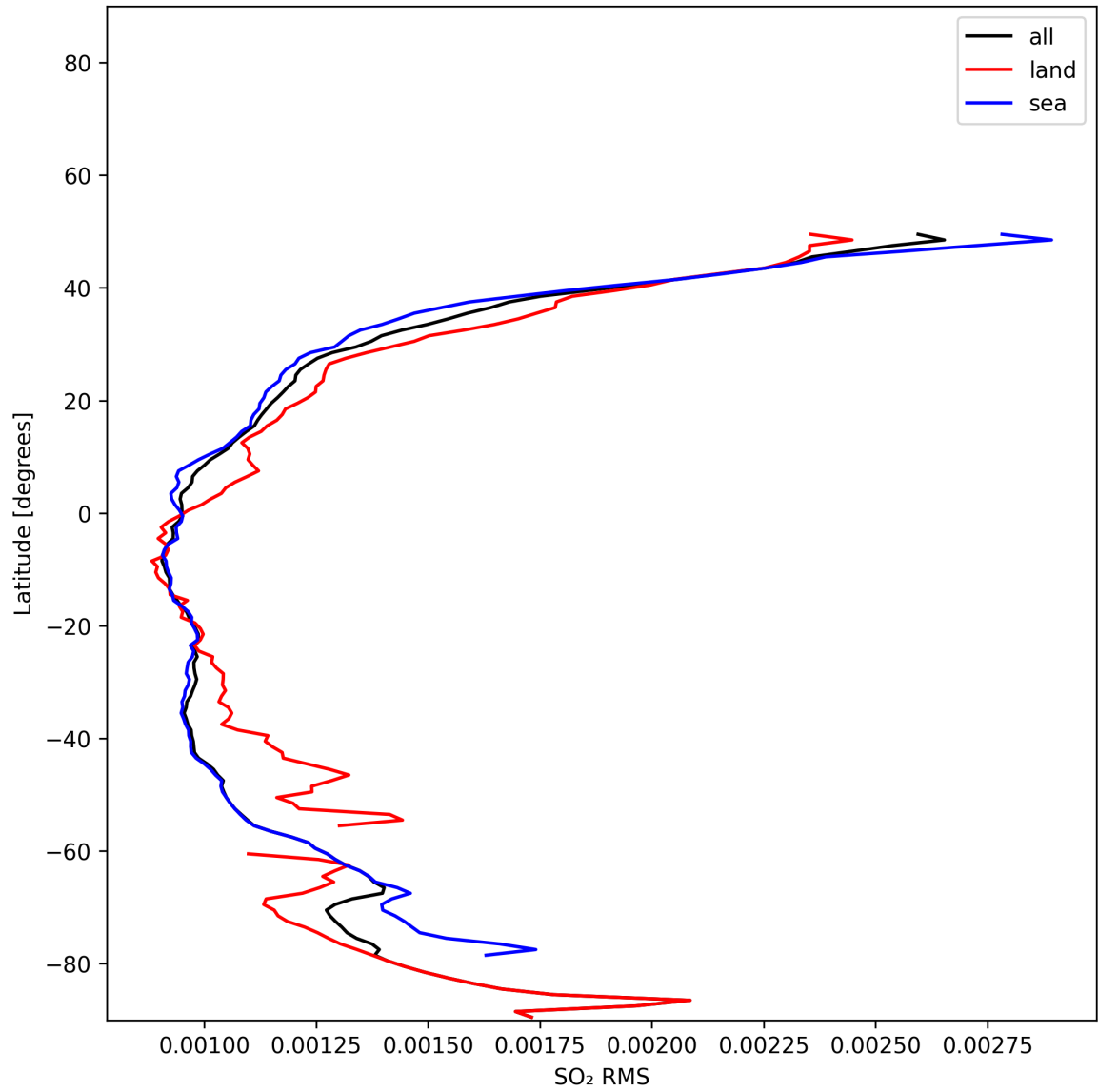


Figure 52: Zonal average of “SO₂ RMS” for 2025-01-17 to 2025-01-18.

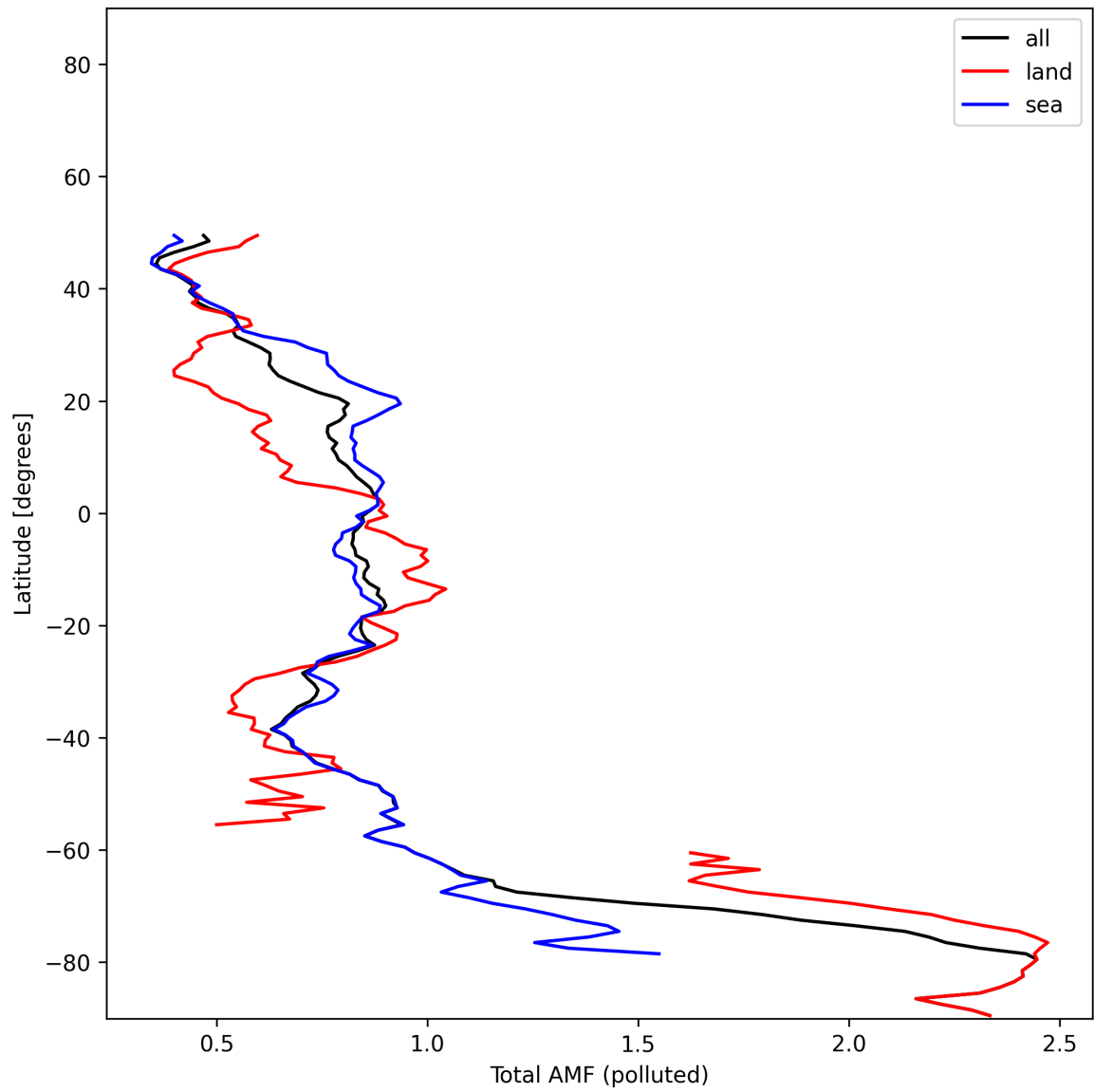


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-01-17 to 2025-01-18.

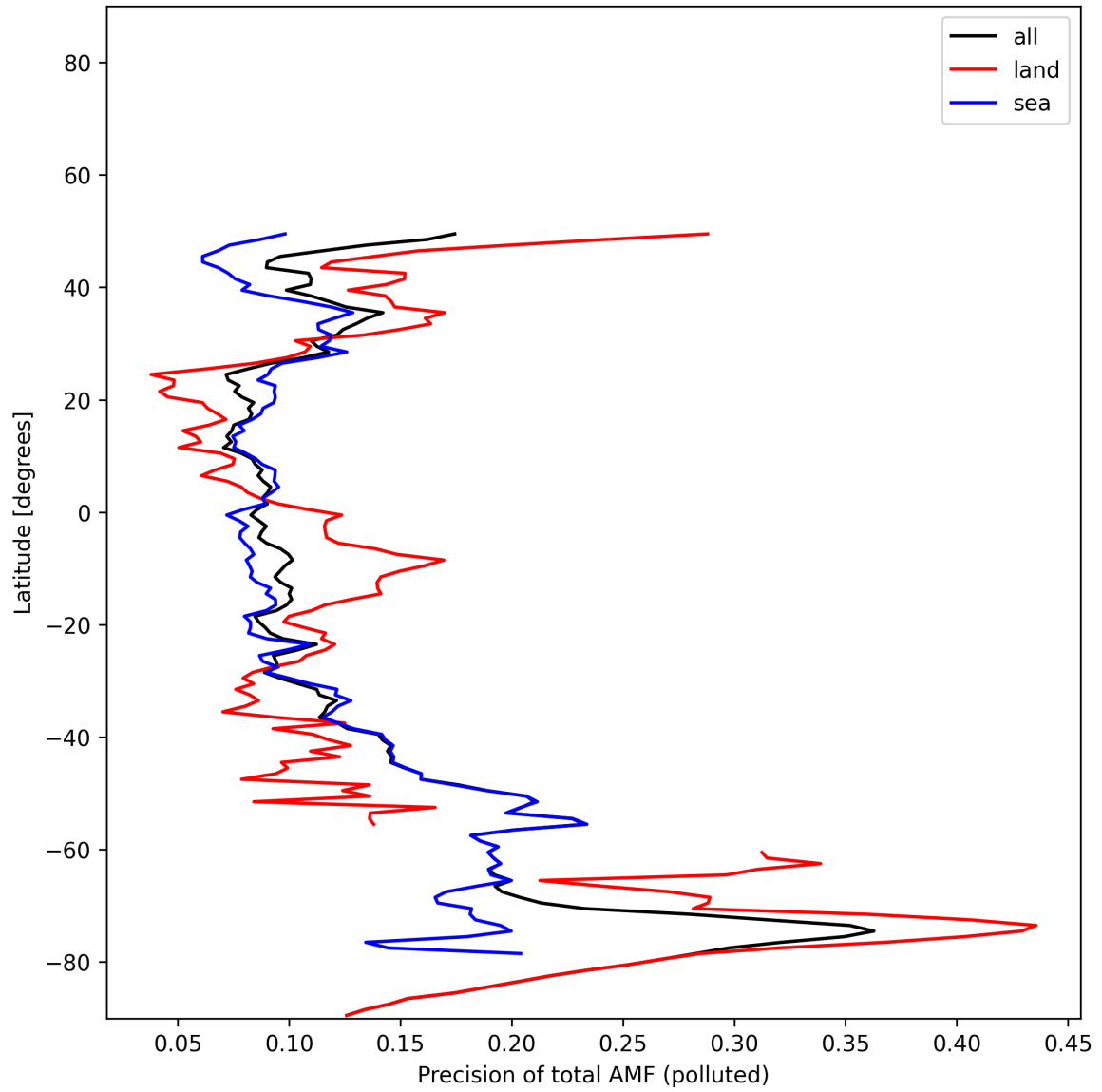


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-01-17 to 2025-01-18.

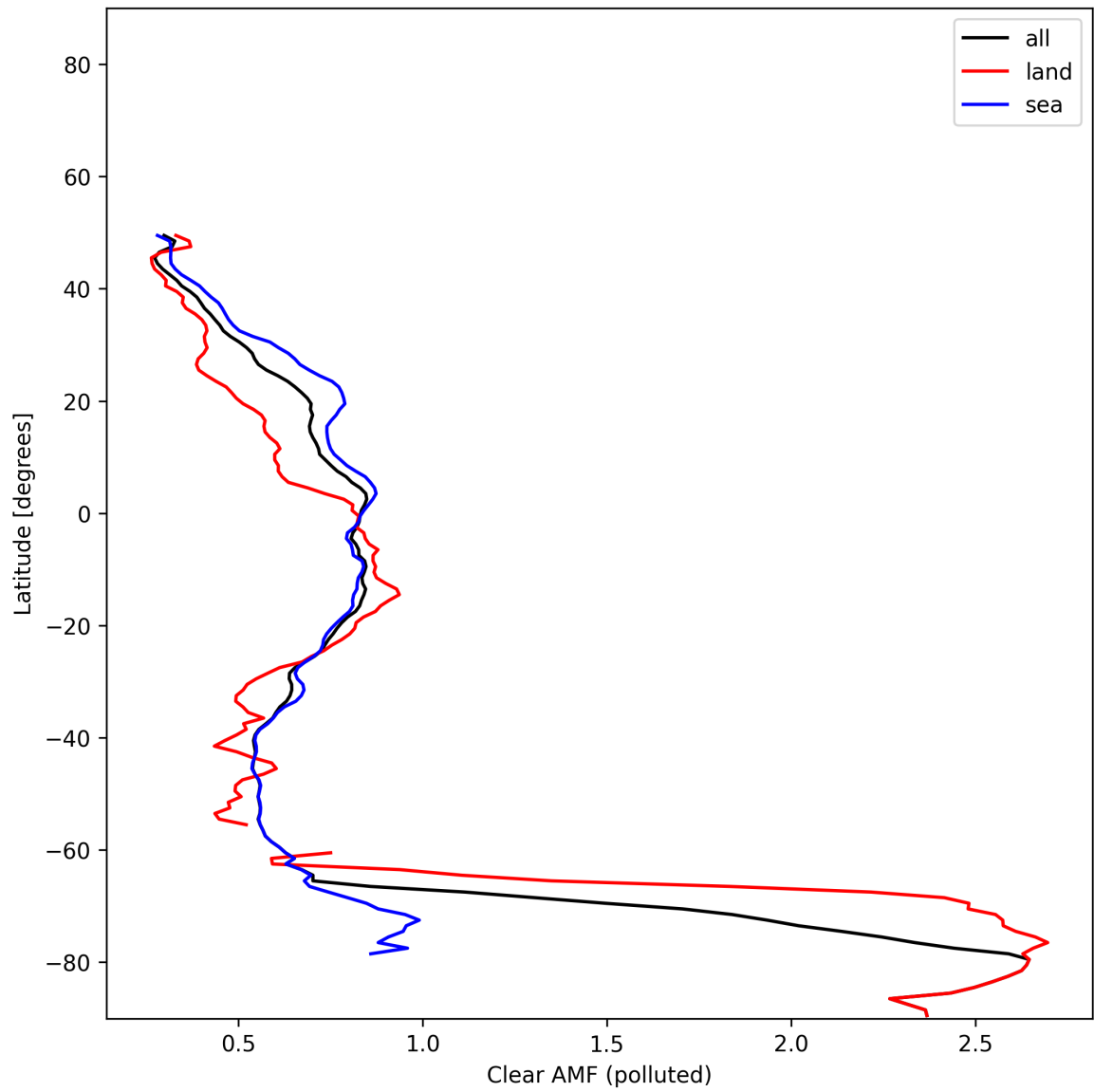


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-01-17 to 2025-01-18.

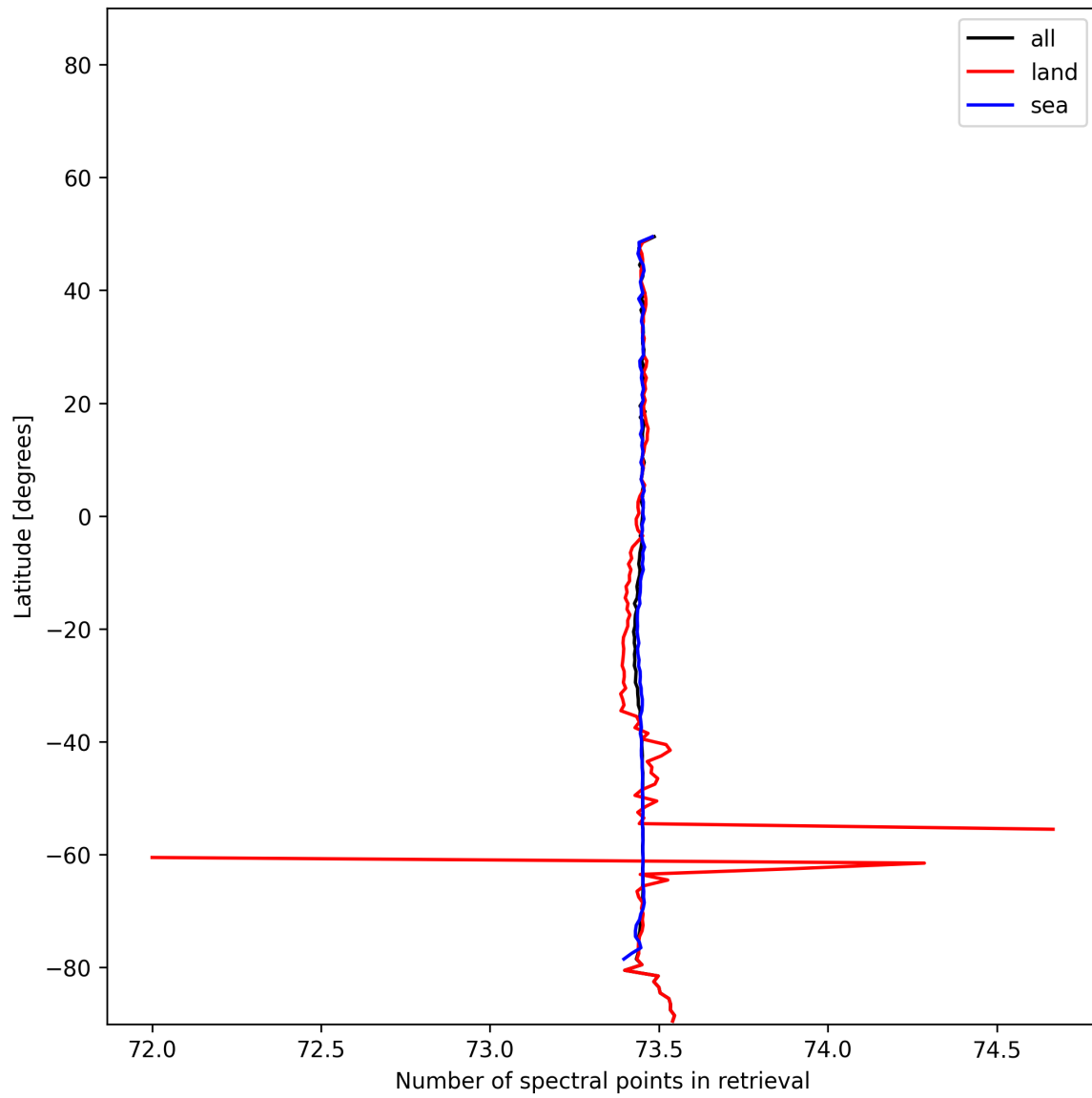


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-01-17 to 2025-01-18.

8 Histograms

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

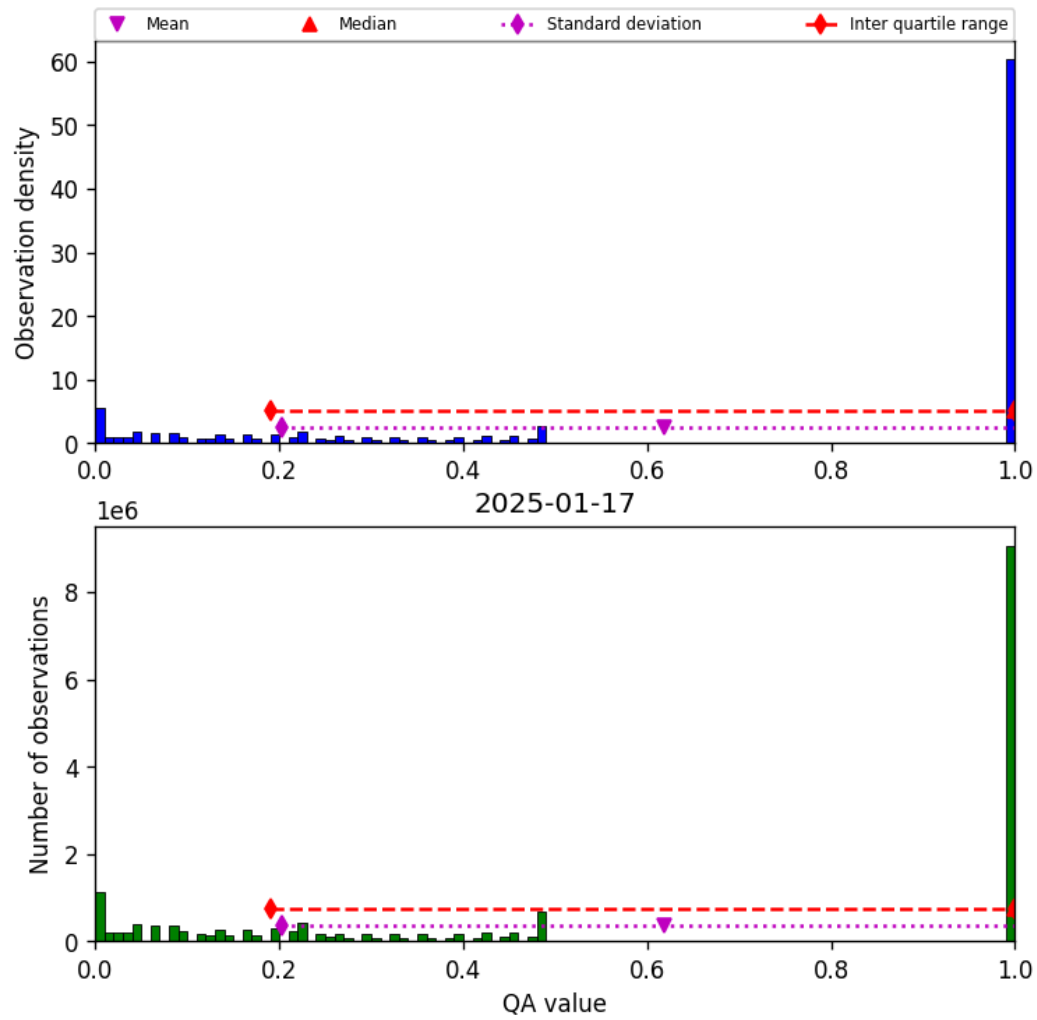


Figure 57: Histogram of “QA value” for 2025-01-17 to 2025-01-18

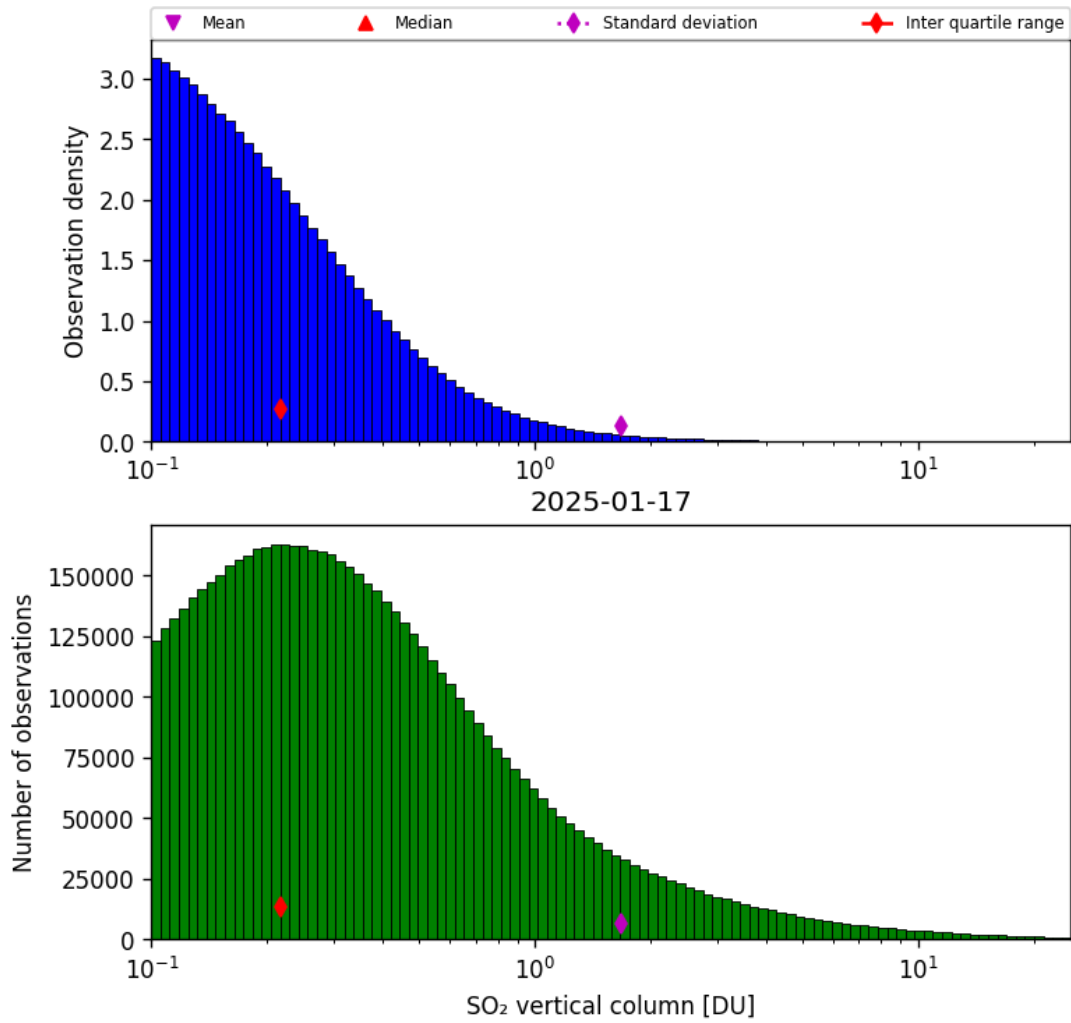


Figure 58: Histogram of “SO₂ vertical column” for 2025-01-17 to 2025-01-18

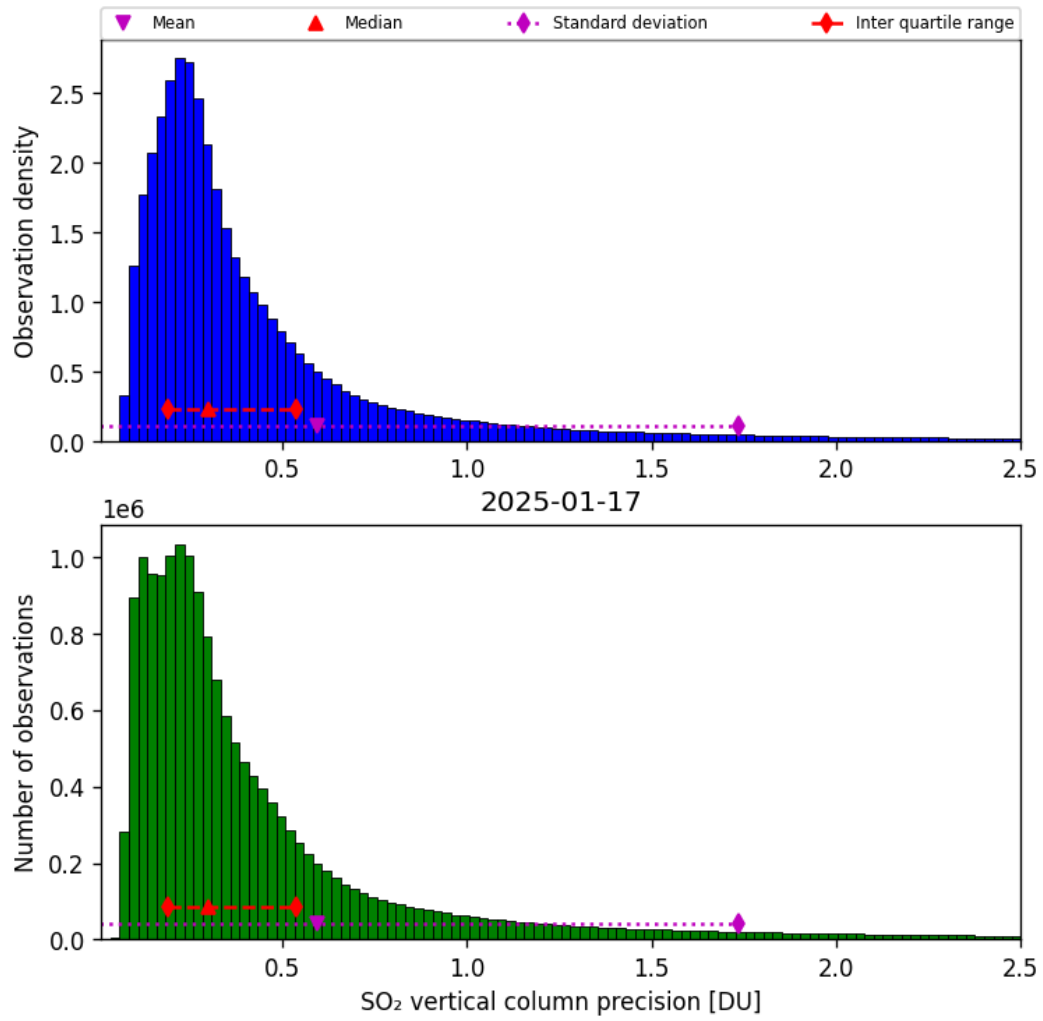


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-01-17 to 2025-01-18

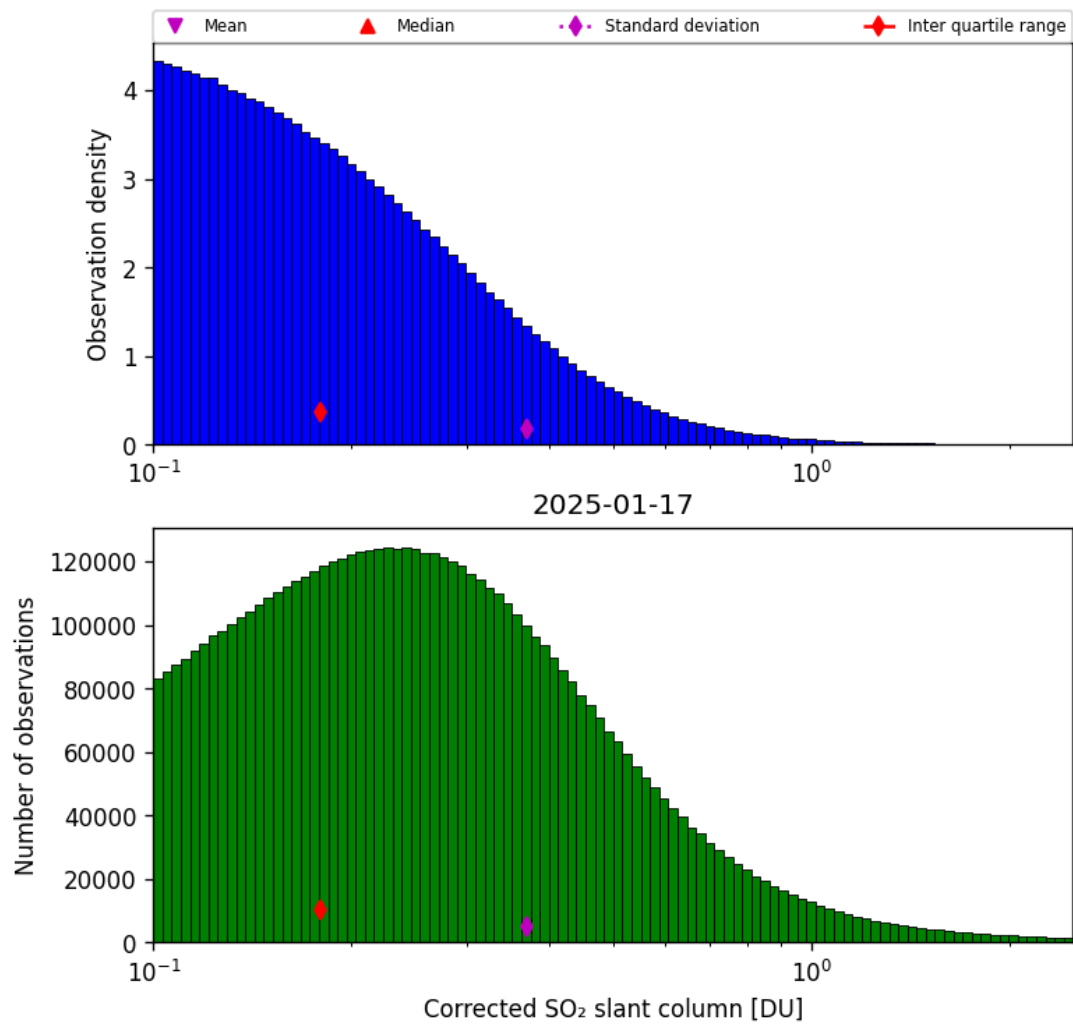


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-01-17 to 2025-01-18

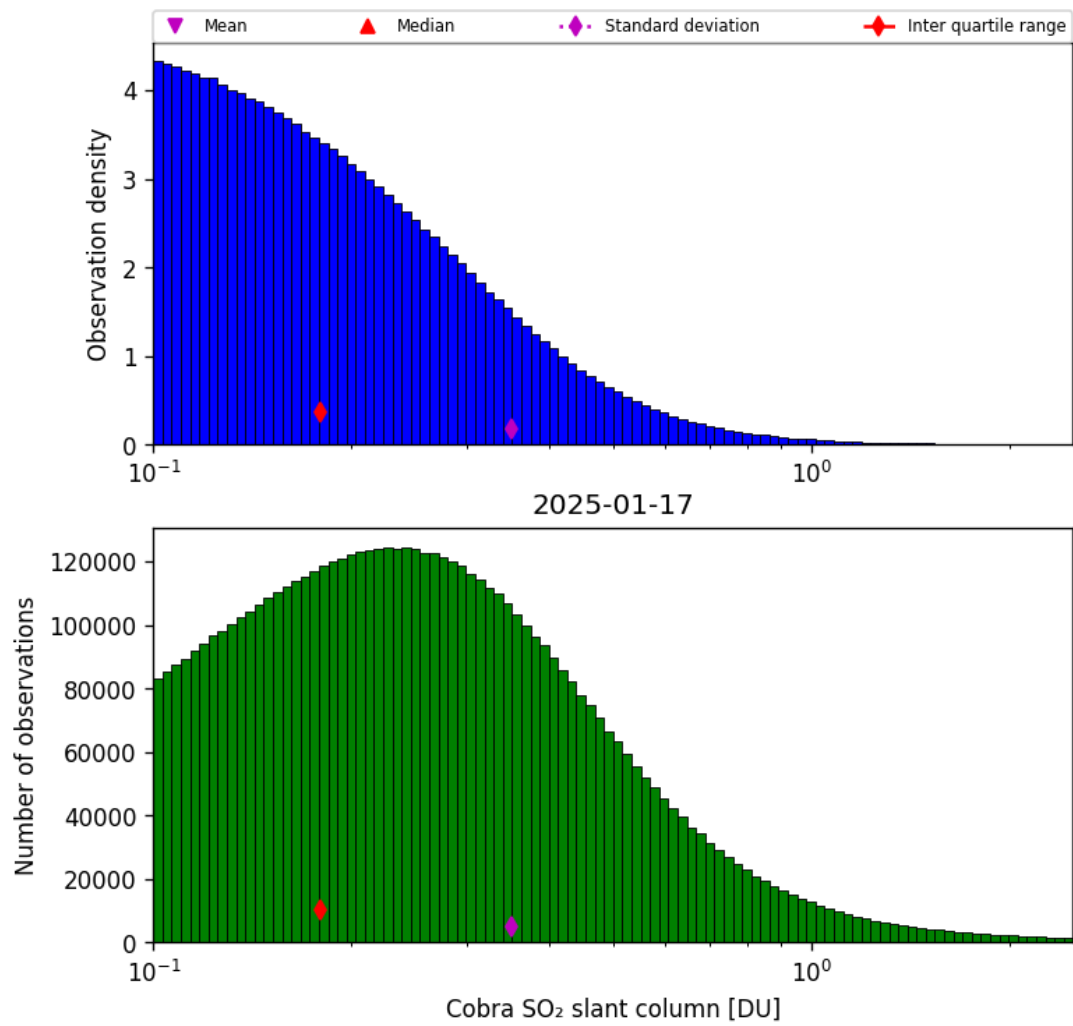


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-01-17 to 2025-01-18

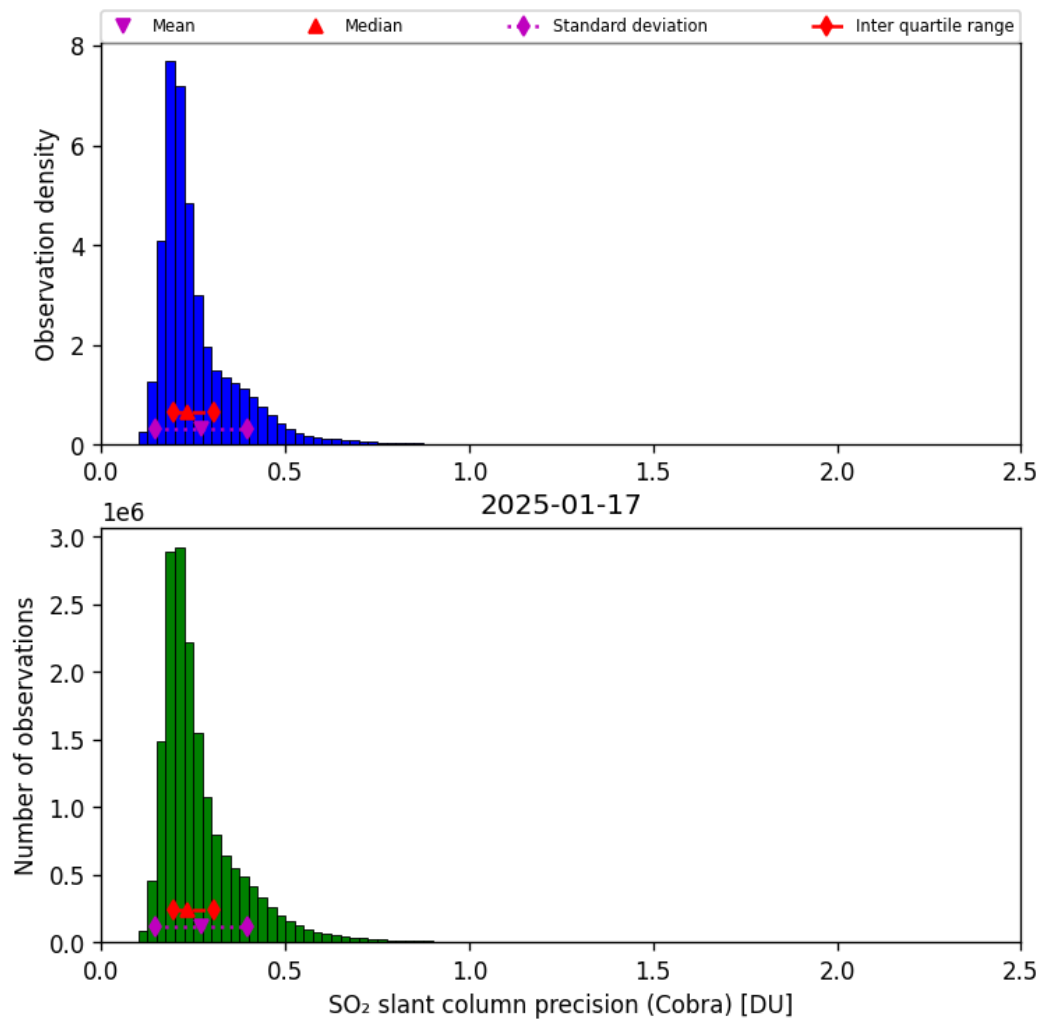


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-01-17 to 2025-01-18

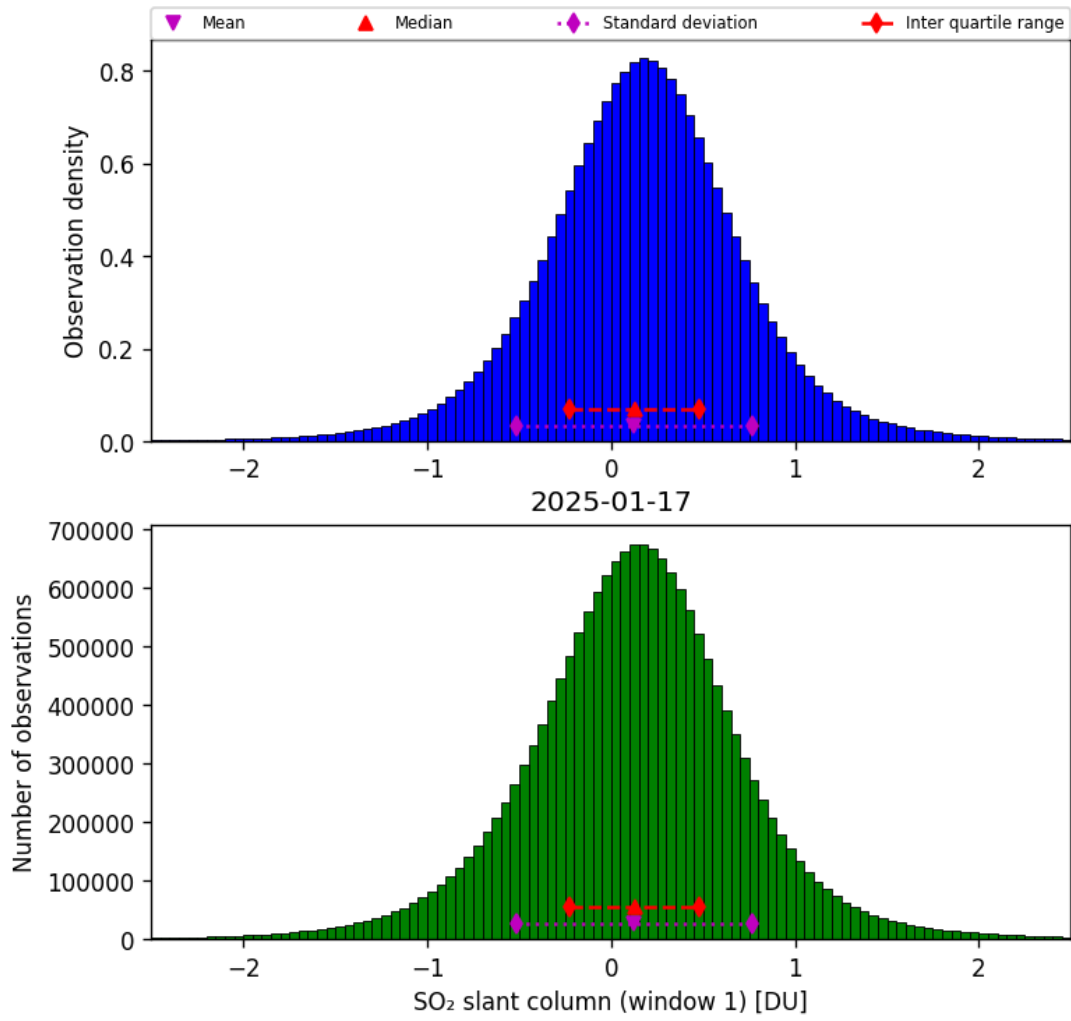


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-01-17 to 2025-01-18

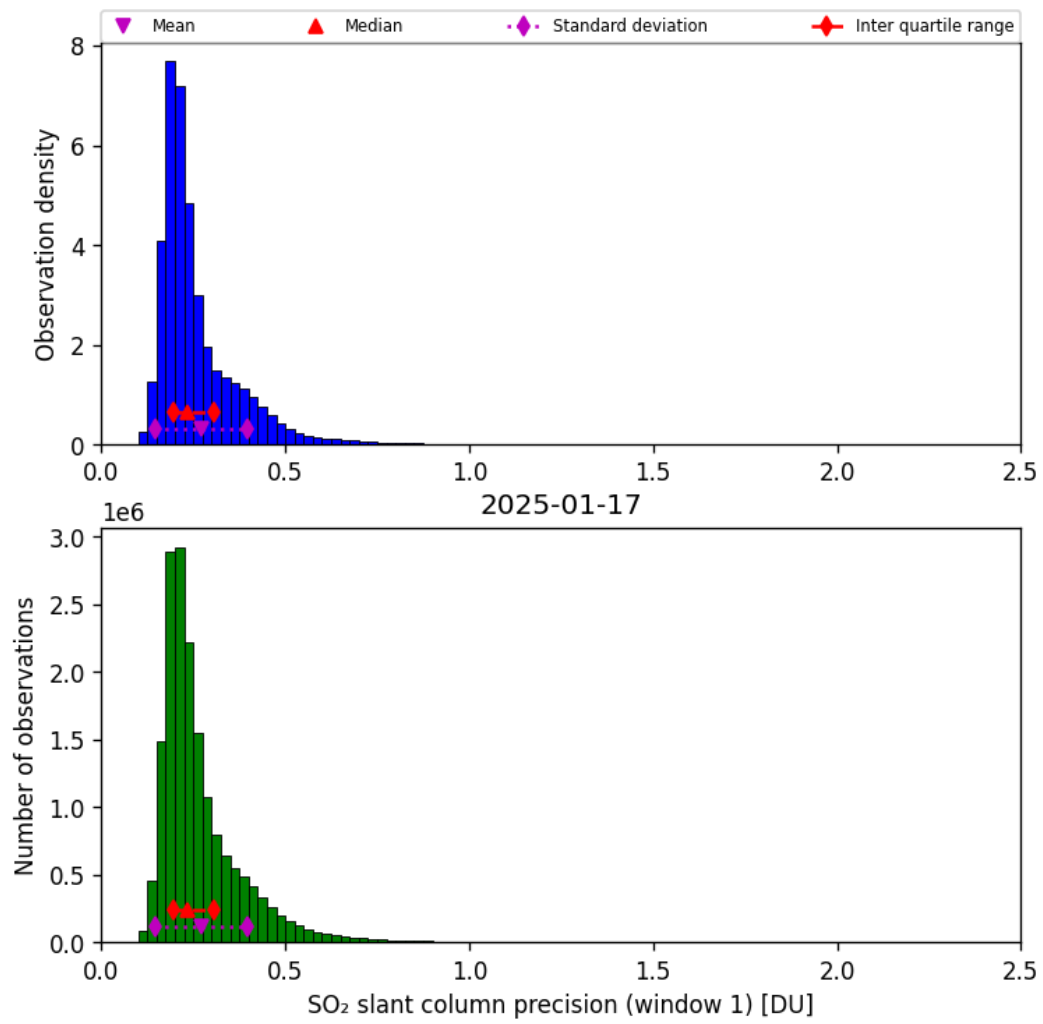


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-01-17 to 2025-01-18

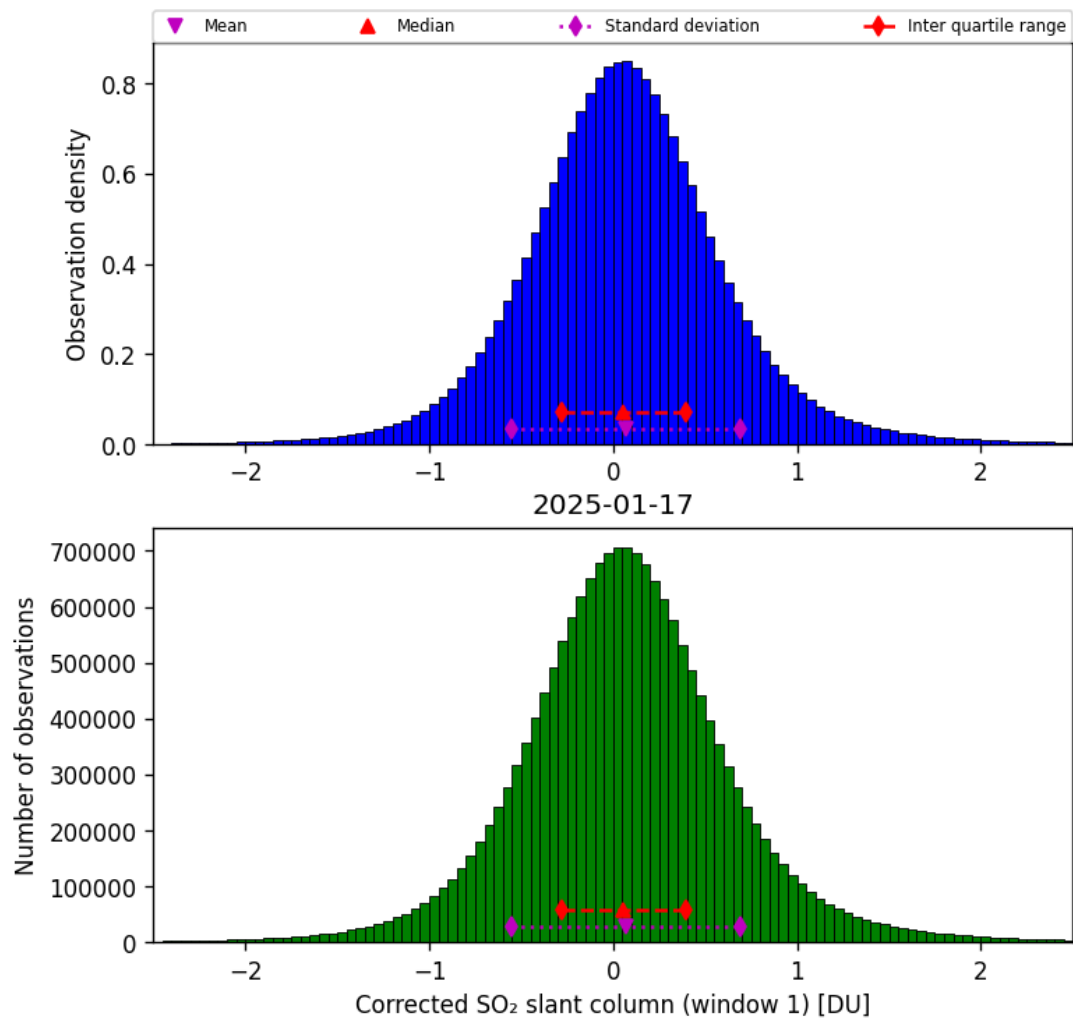


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-01-17 to 2025-01-18

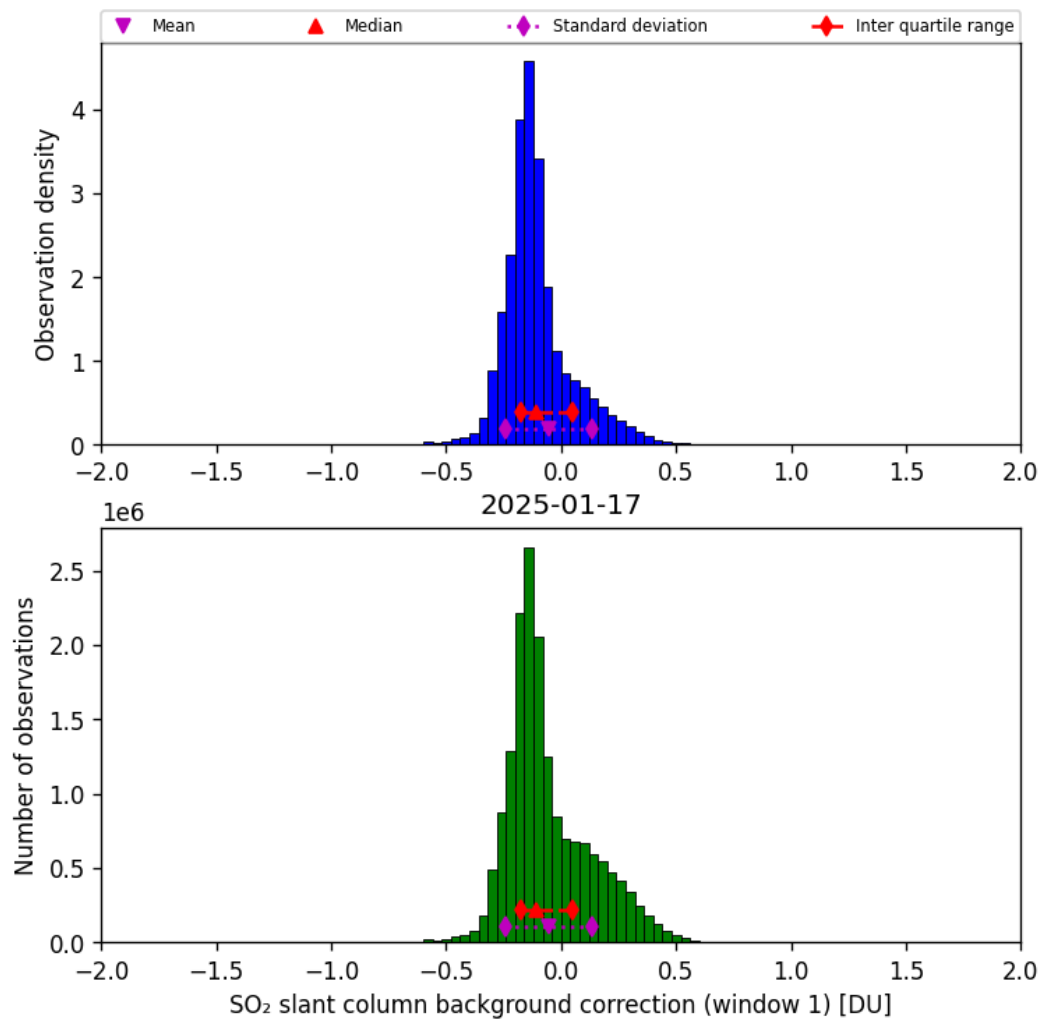


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-01-17 to 2025-01-18

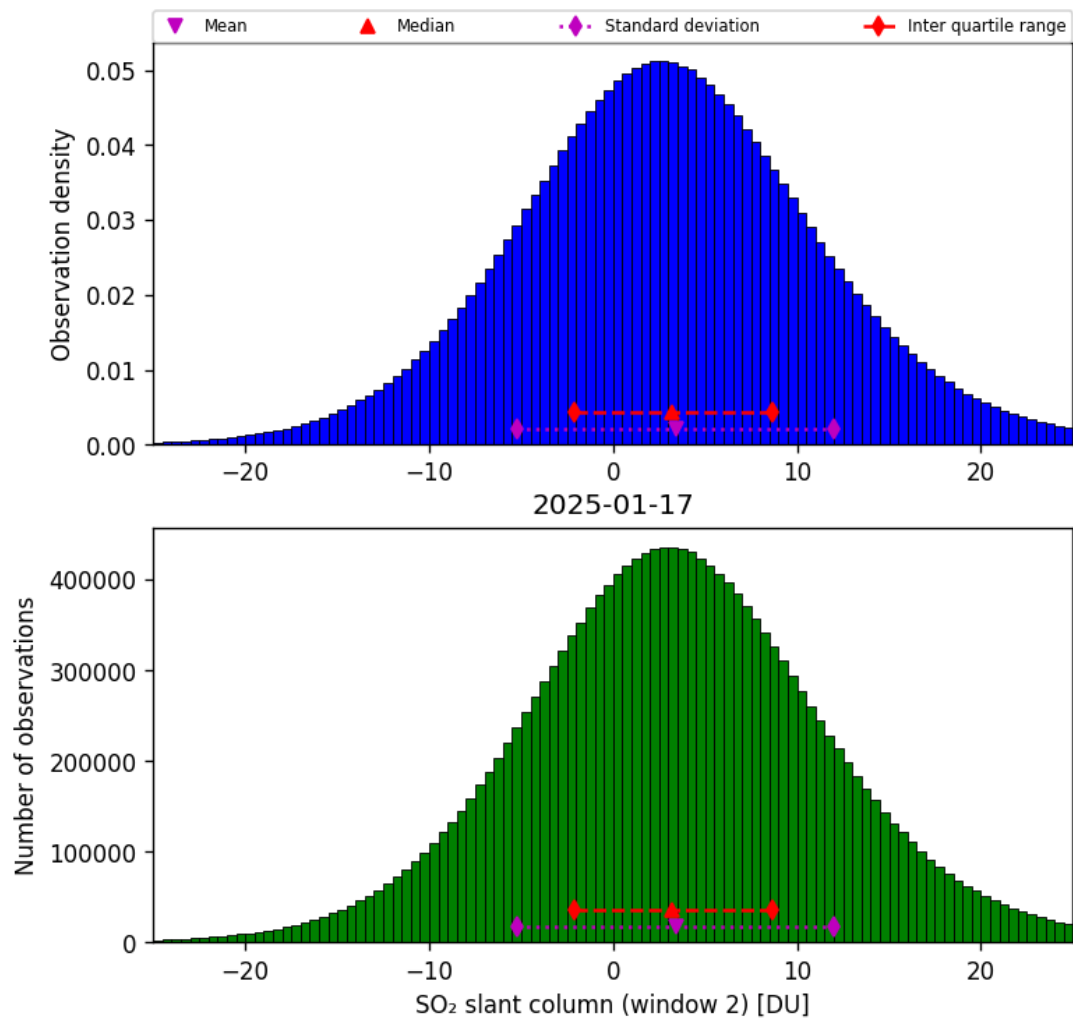


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-01-17 to 2025-01-18

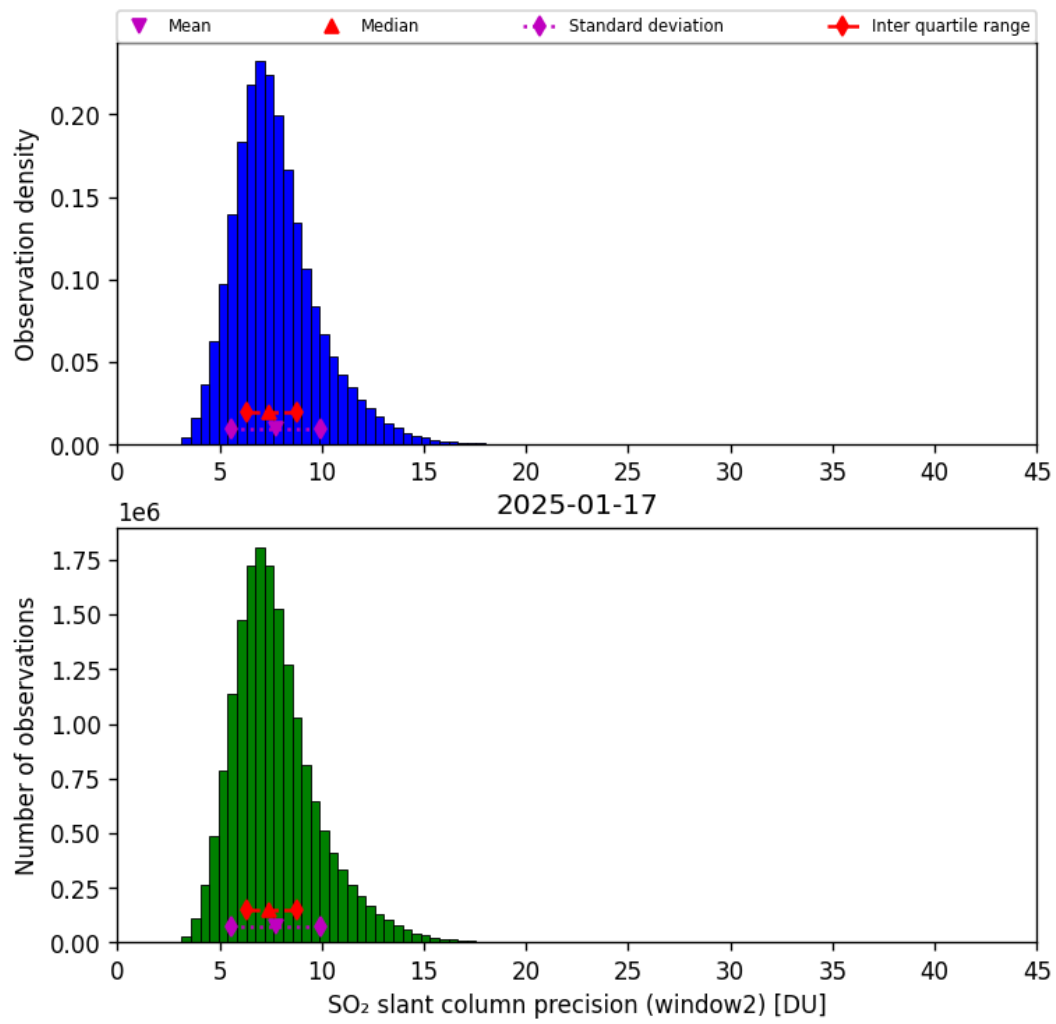


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-01-17 to 2025-01-18

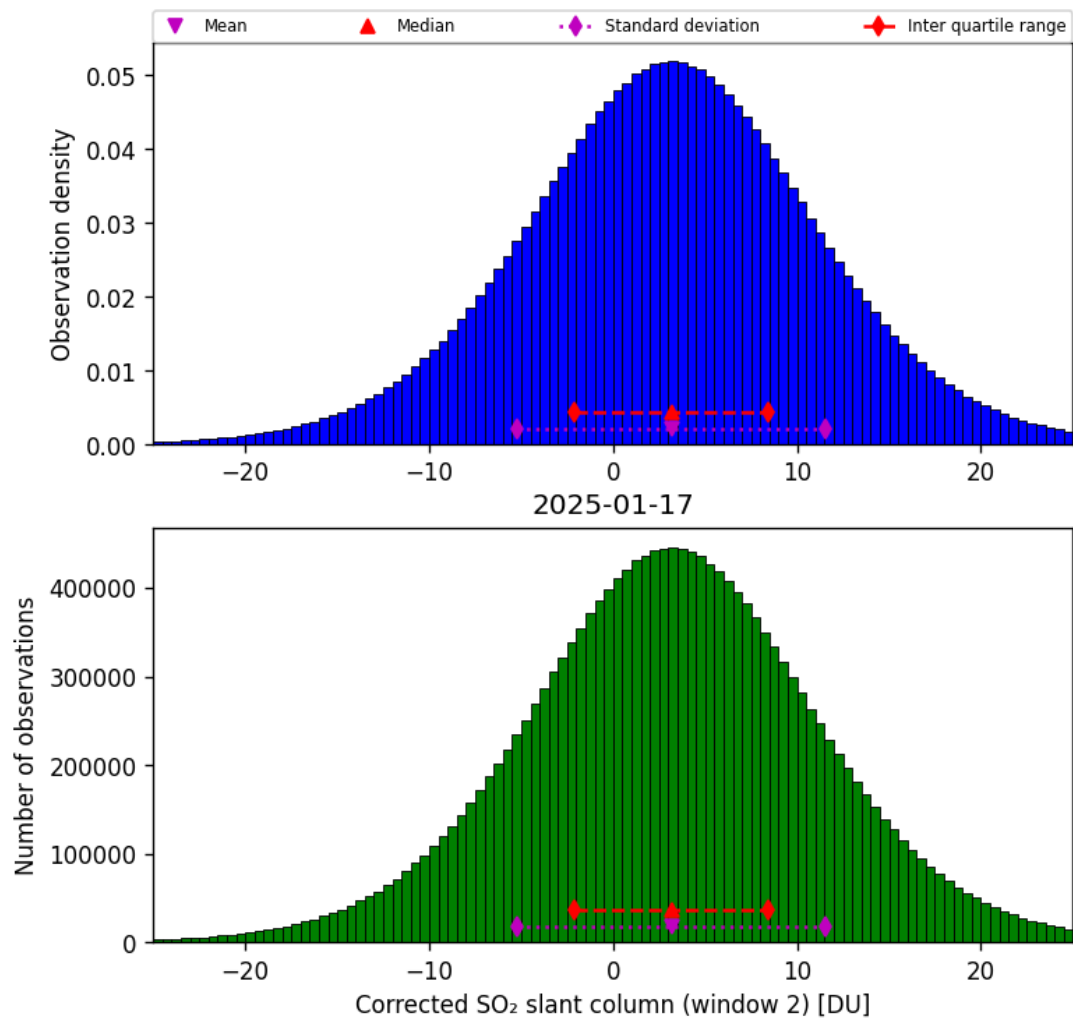


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-01-17 to 2025-01-18

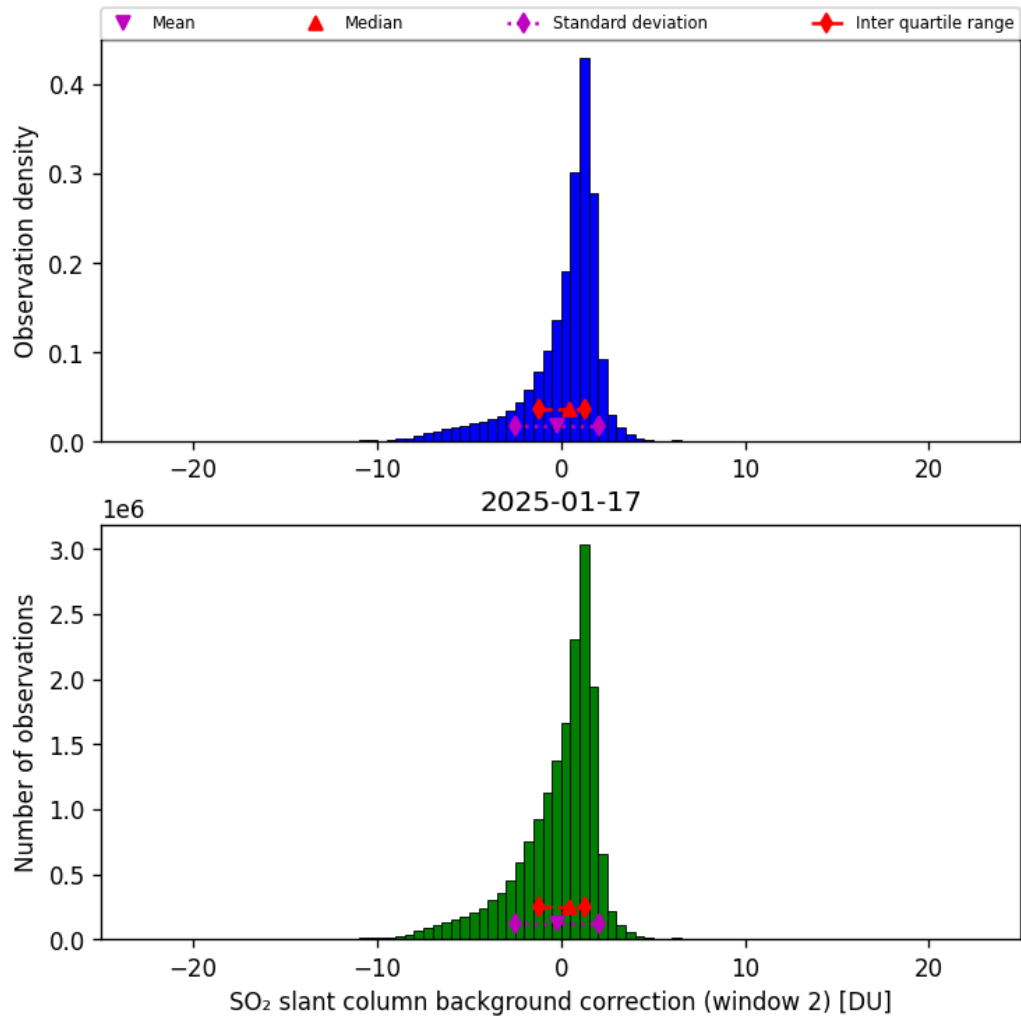


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-01-17 to 2025-01-18

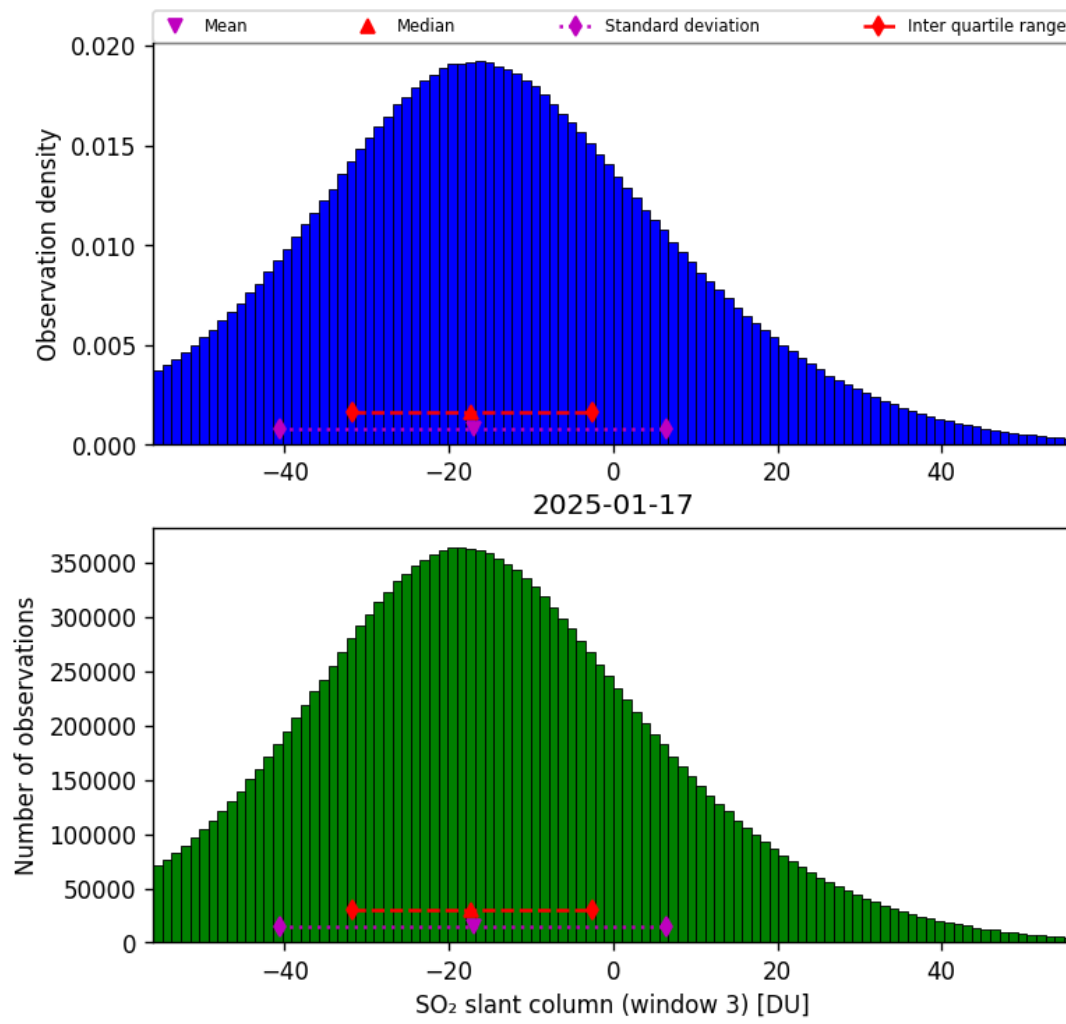


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-01-17 to 2025-01-18

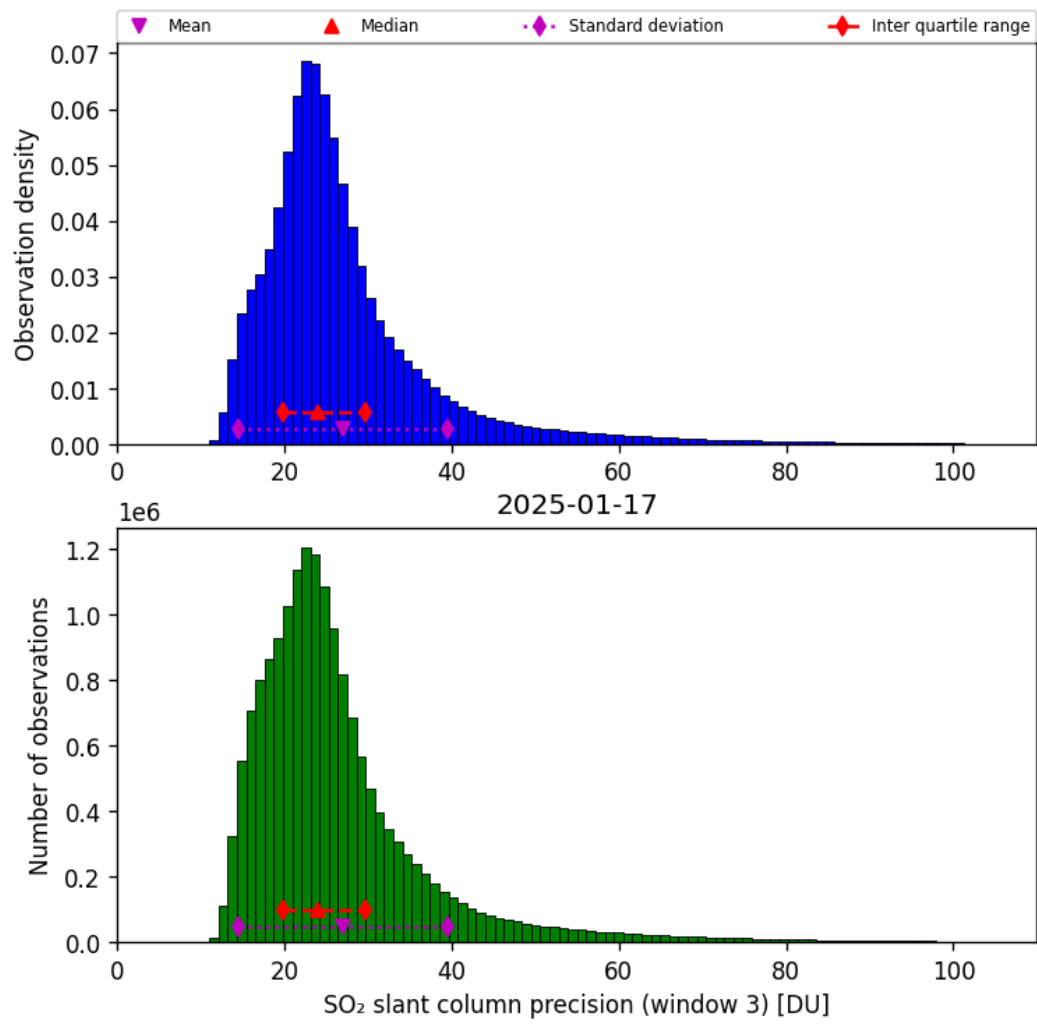


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-01-17 to 2025-01-18

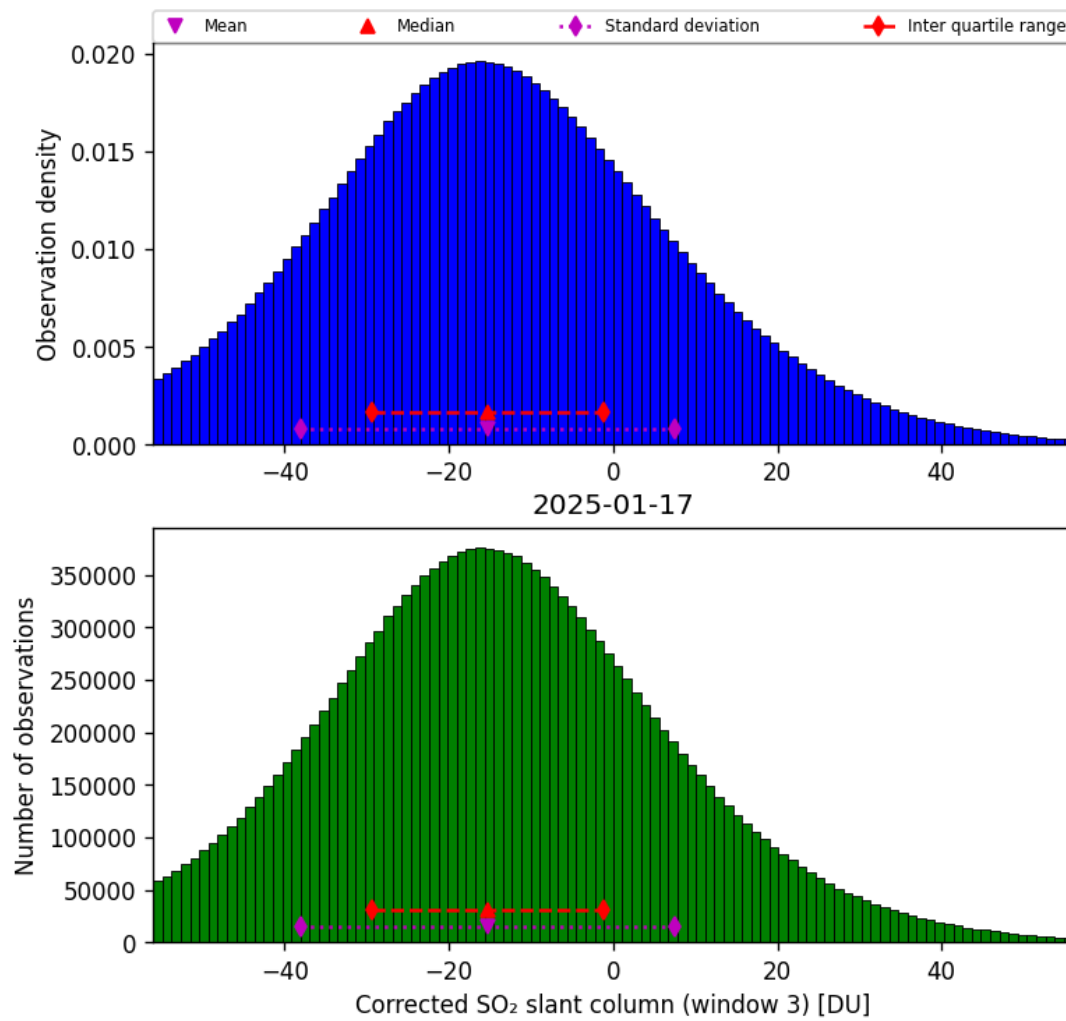


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-01-17 to 2025-01-18

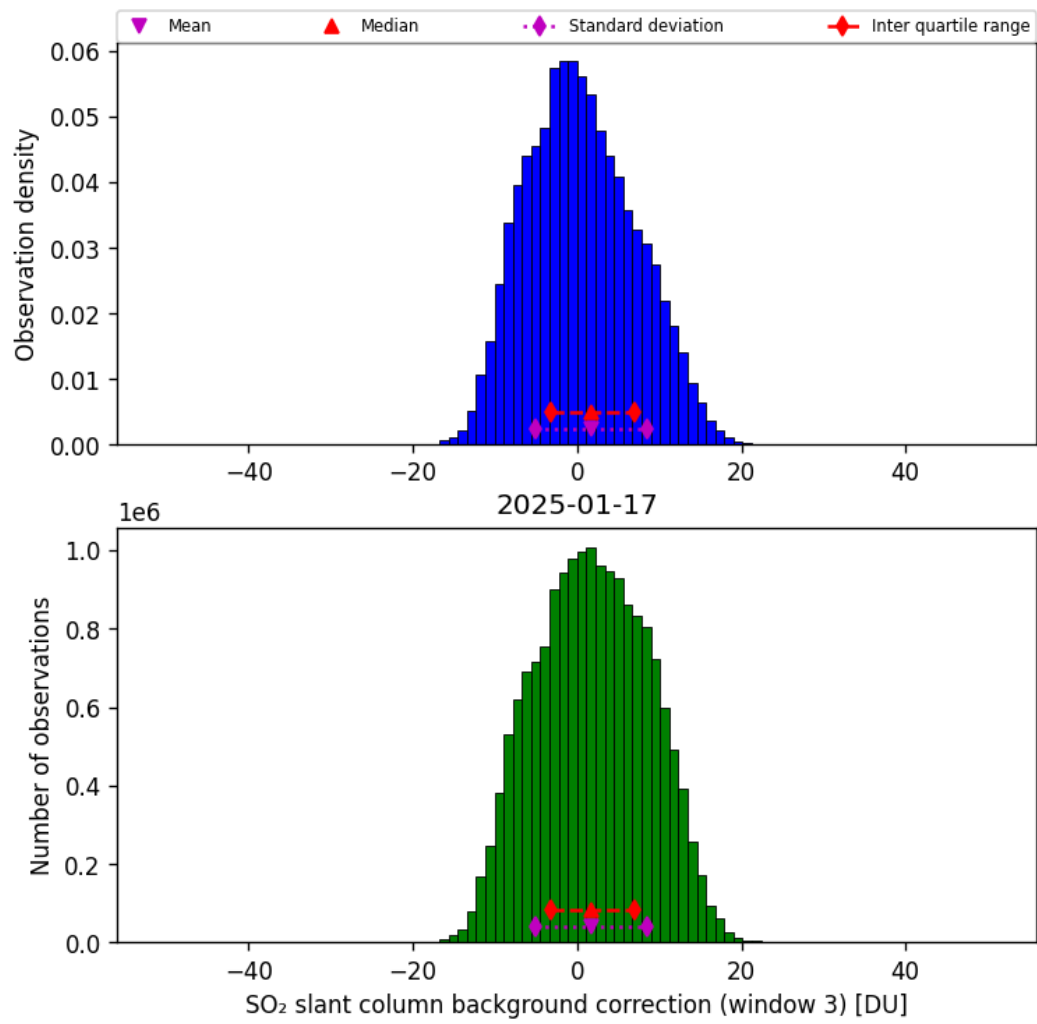


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-01-17 to 2025-01-18

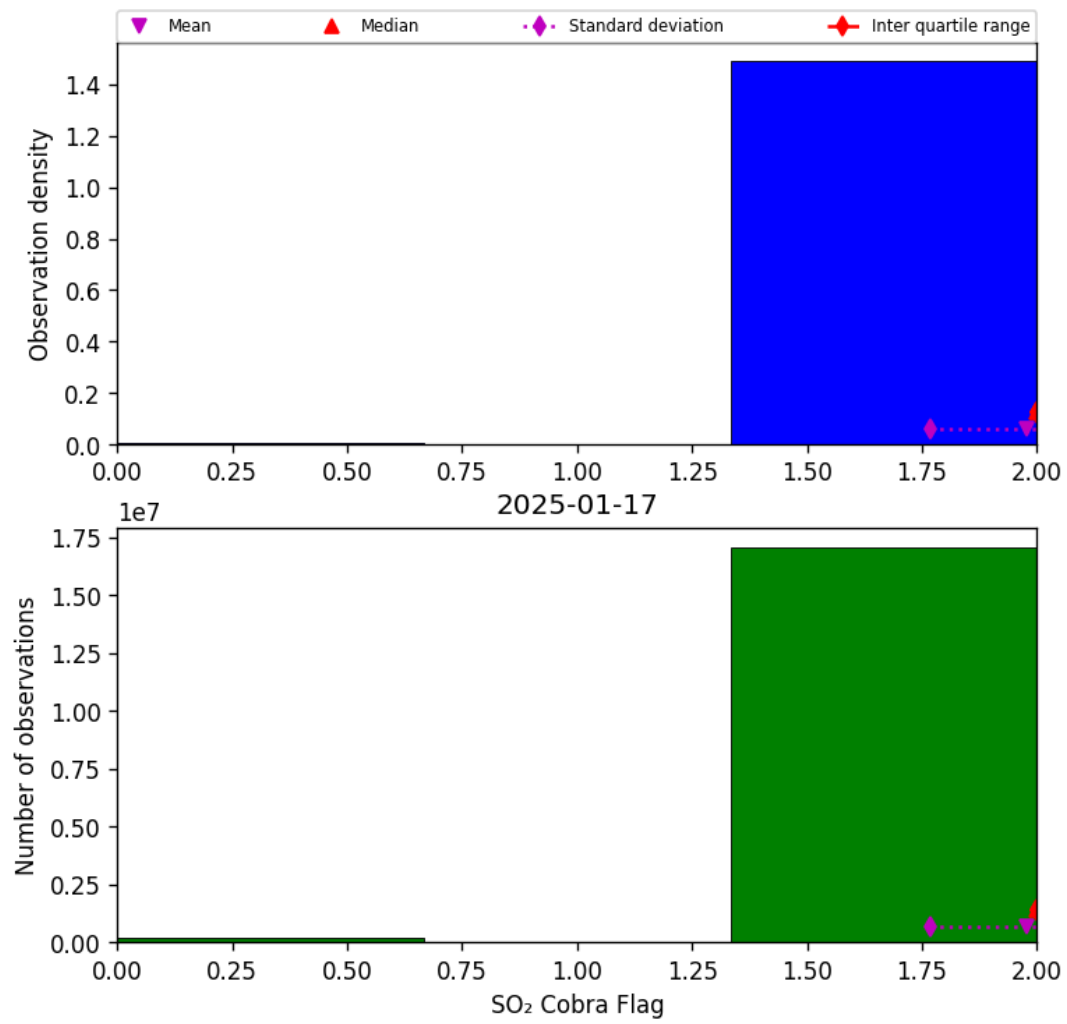


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-01-17 to 2025-01-18

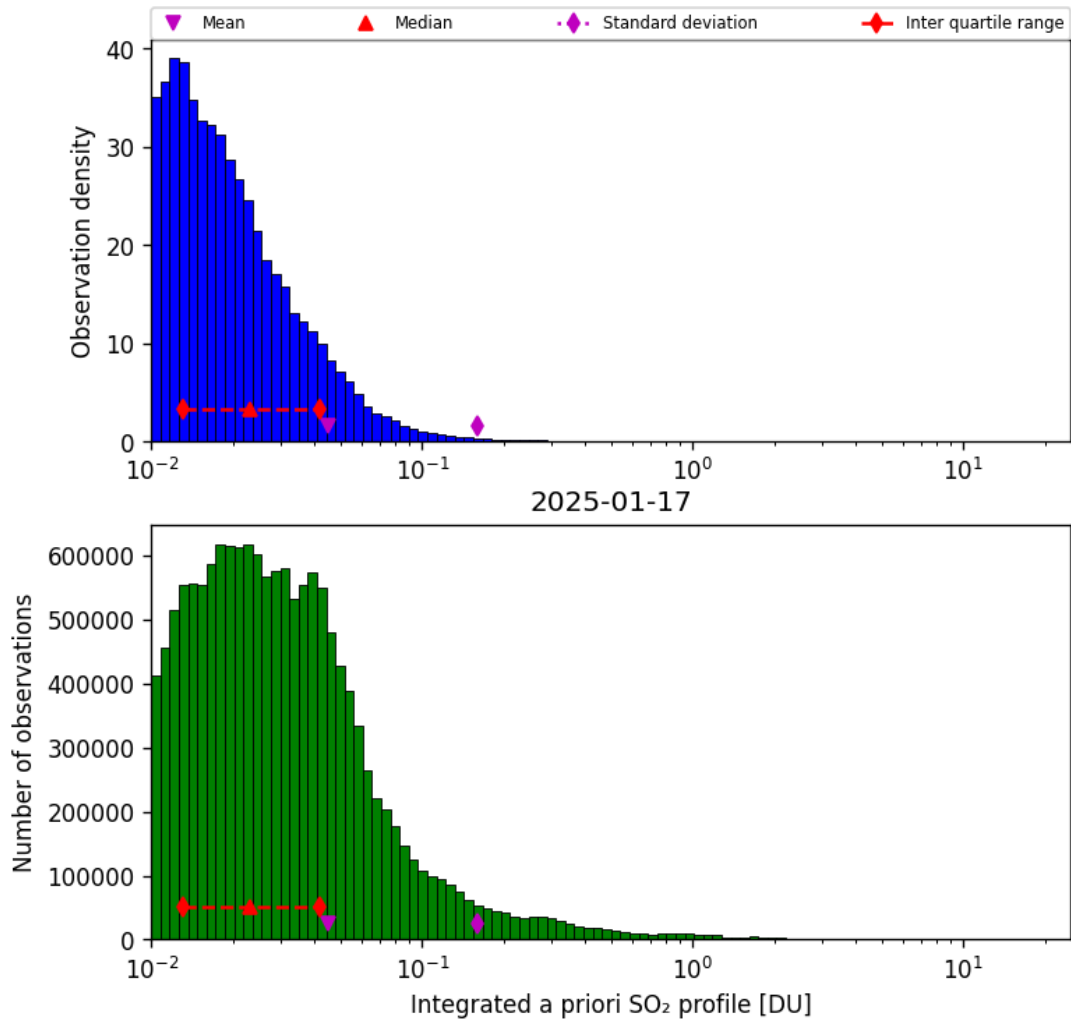


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-01-17 to 2025-01-18

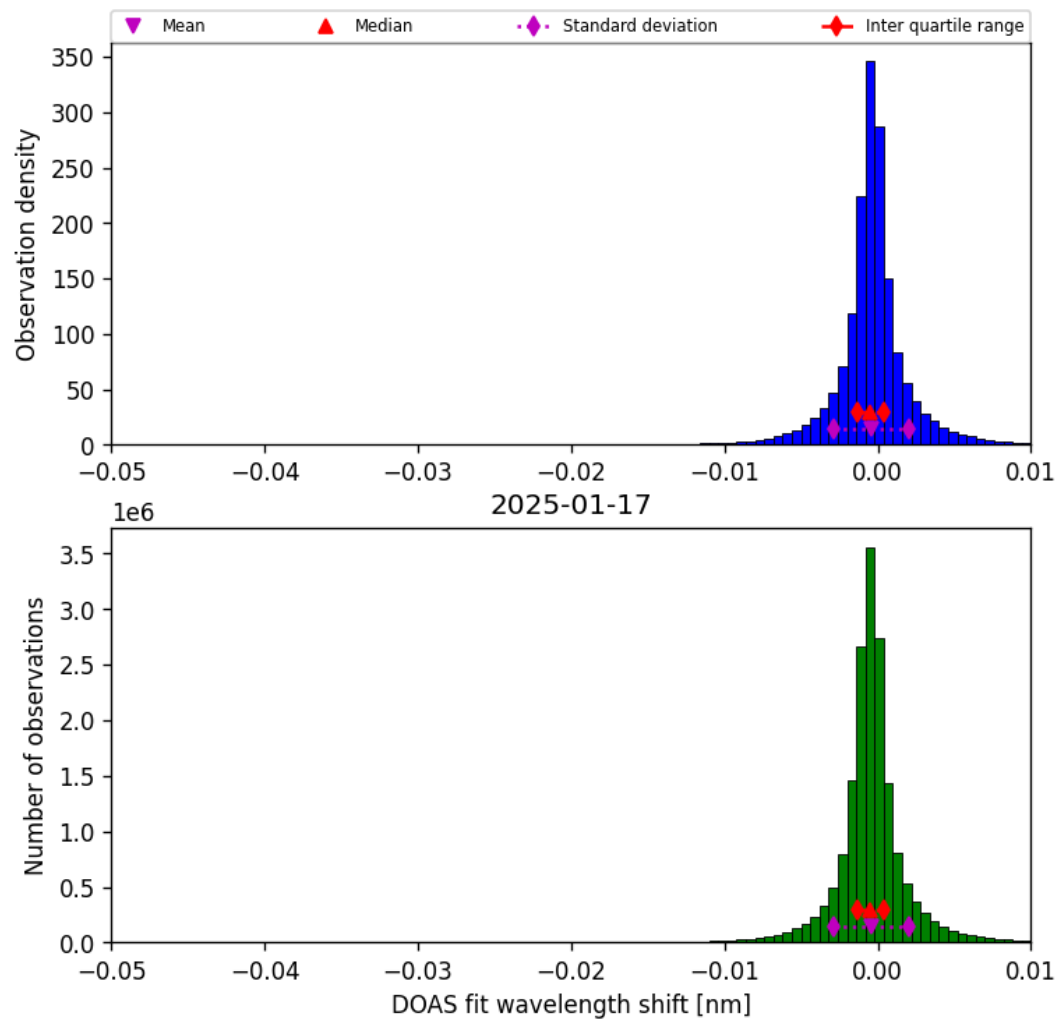


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-01-17 to 2025-01-18

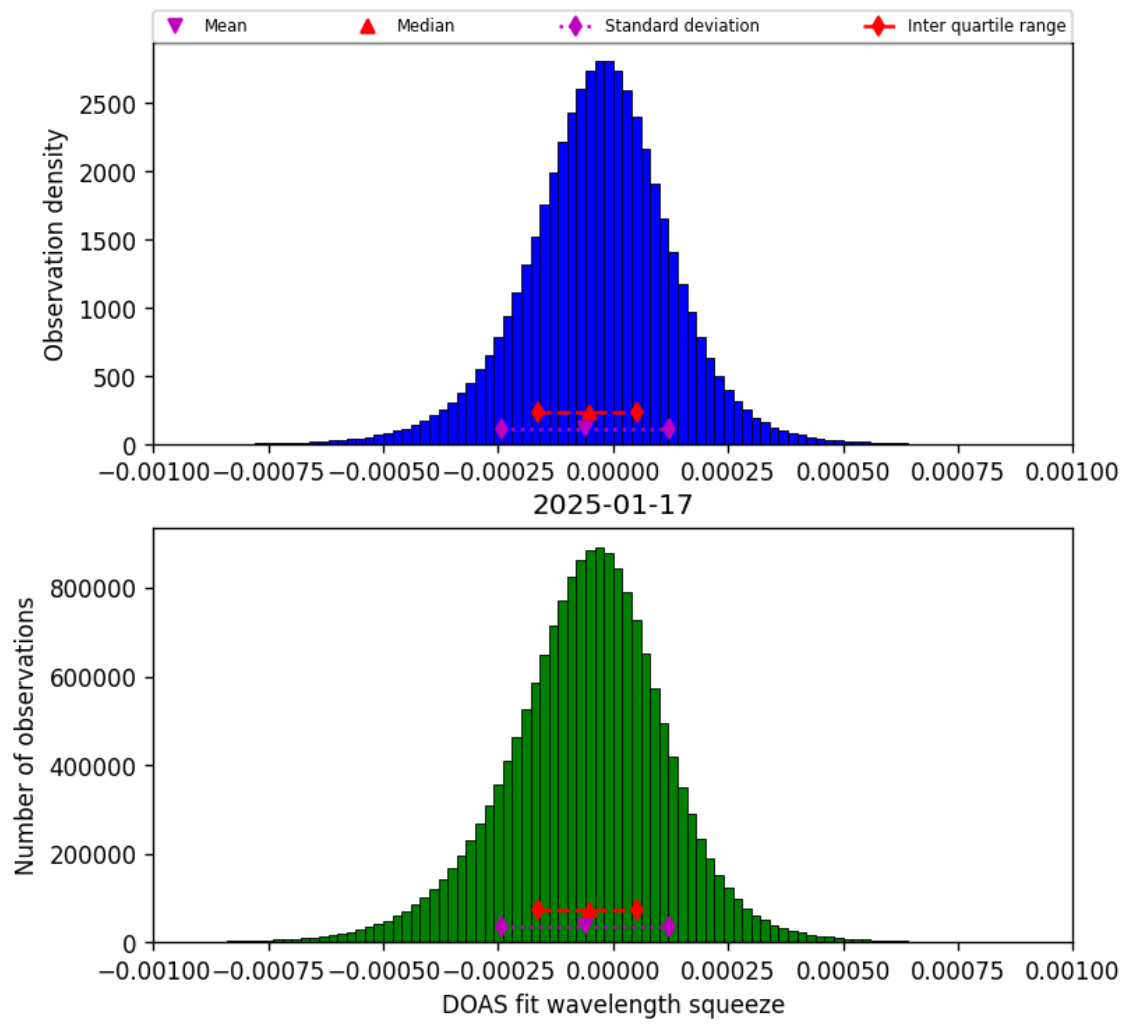


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-01-17 to 2025-01-18

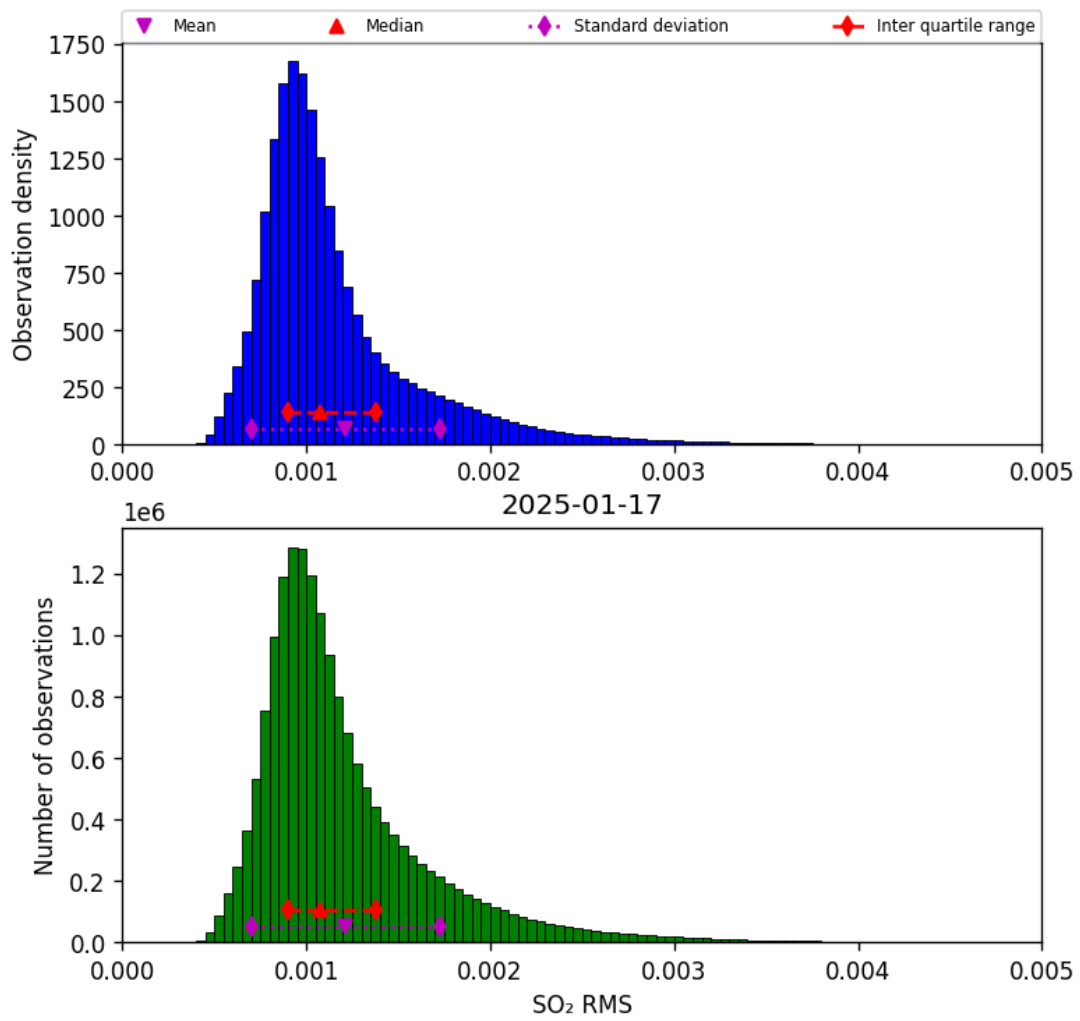


Figure 79: Histogram of “SO₂ RMS” for 2025-01-17 to 2025-01-18

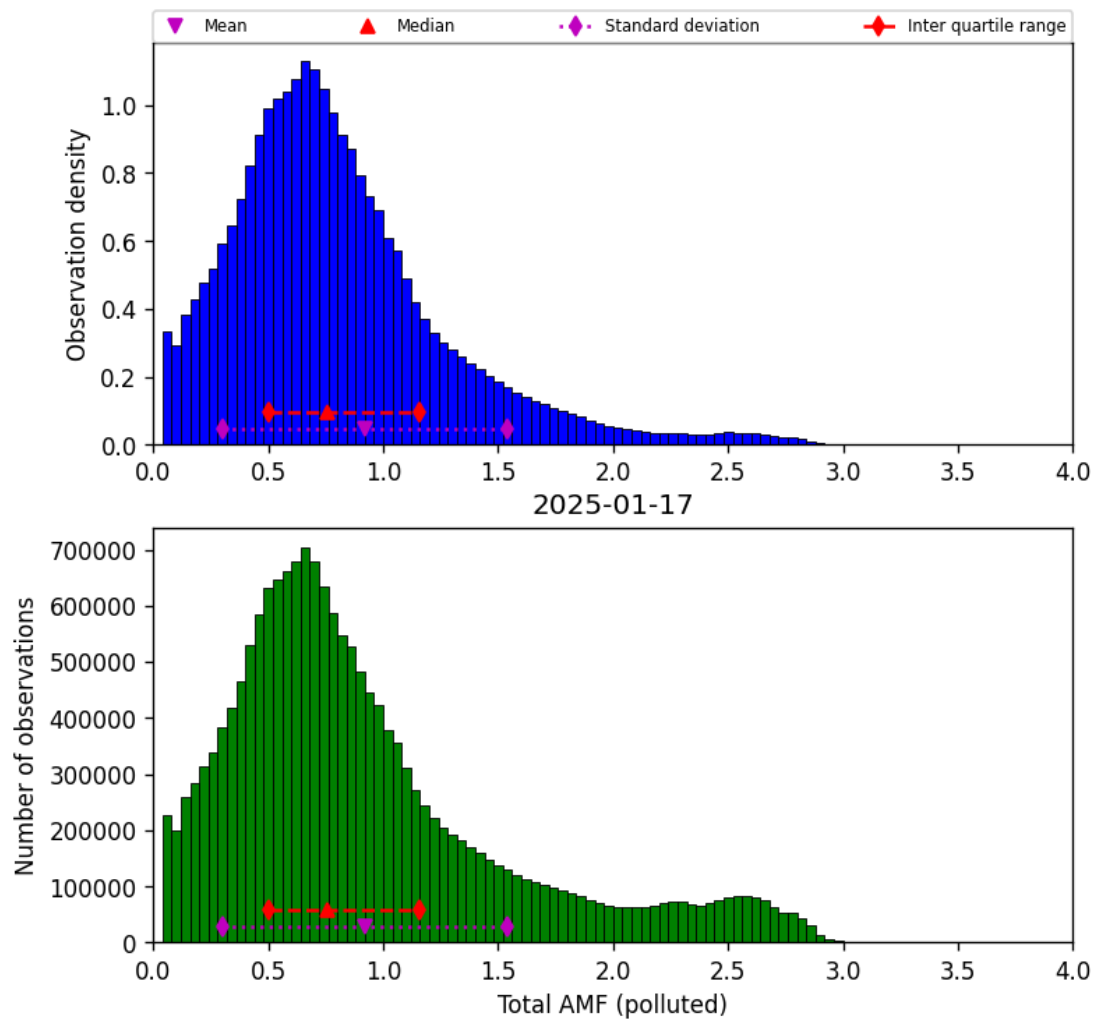


Figure 80: Histogram of “Total AMF (polluted)” for 2025-01-17 to 2025-01-18

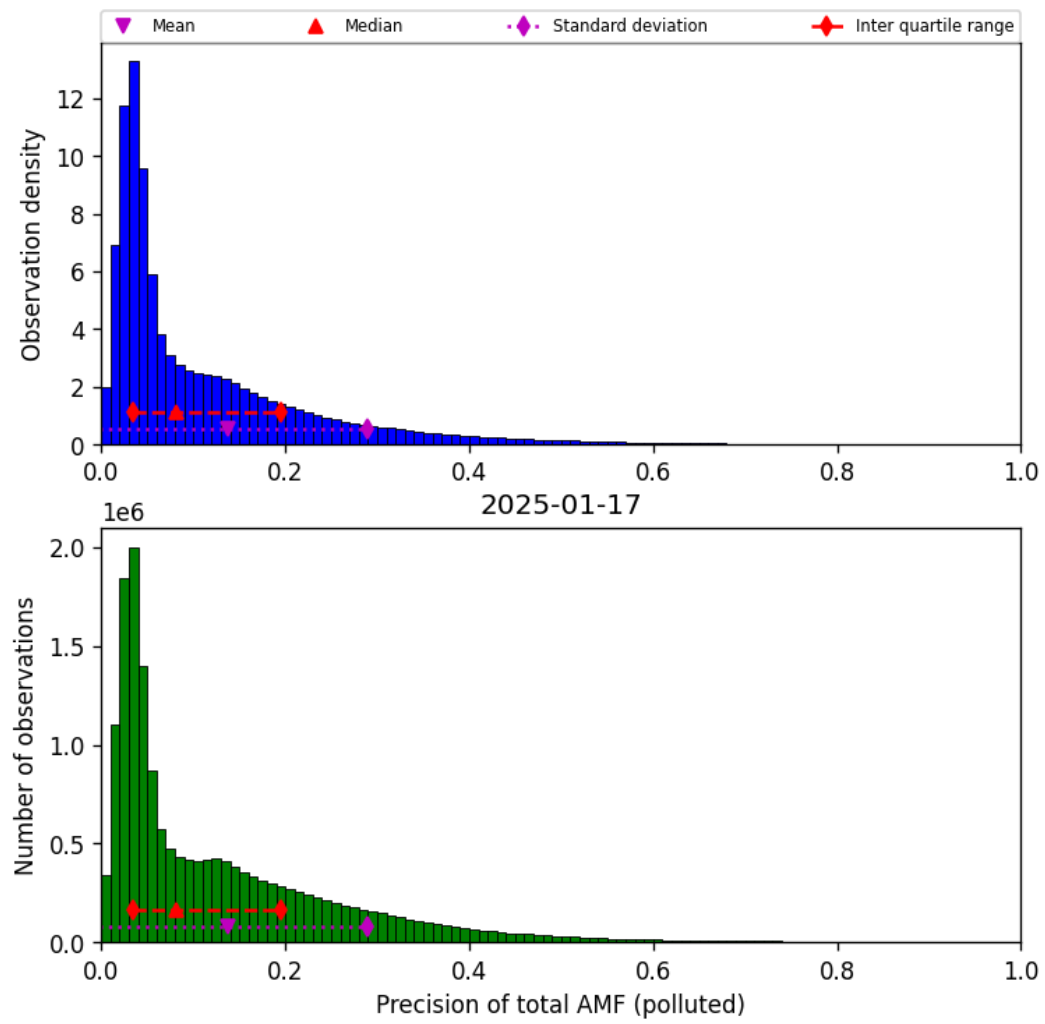


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-01-17 to 2025-01-18

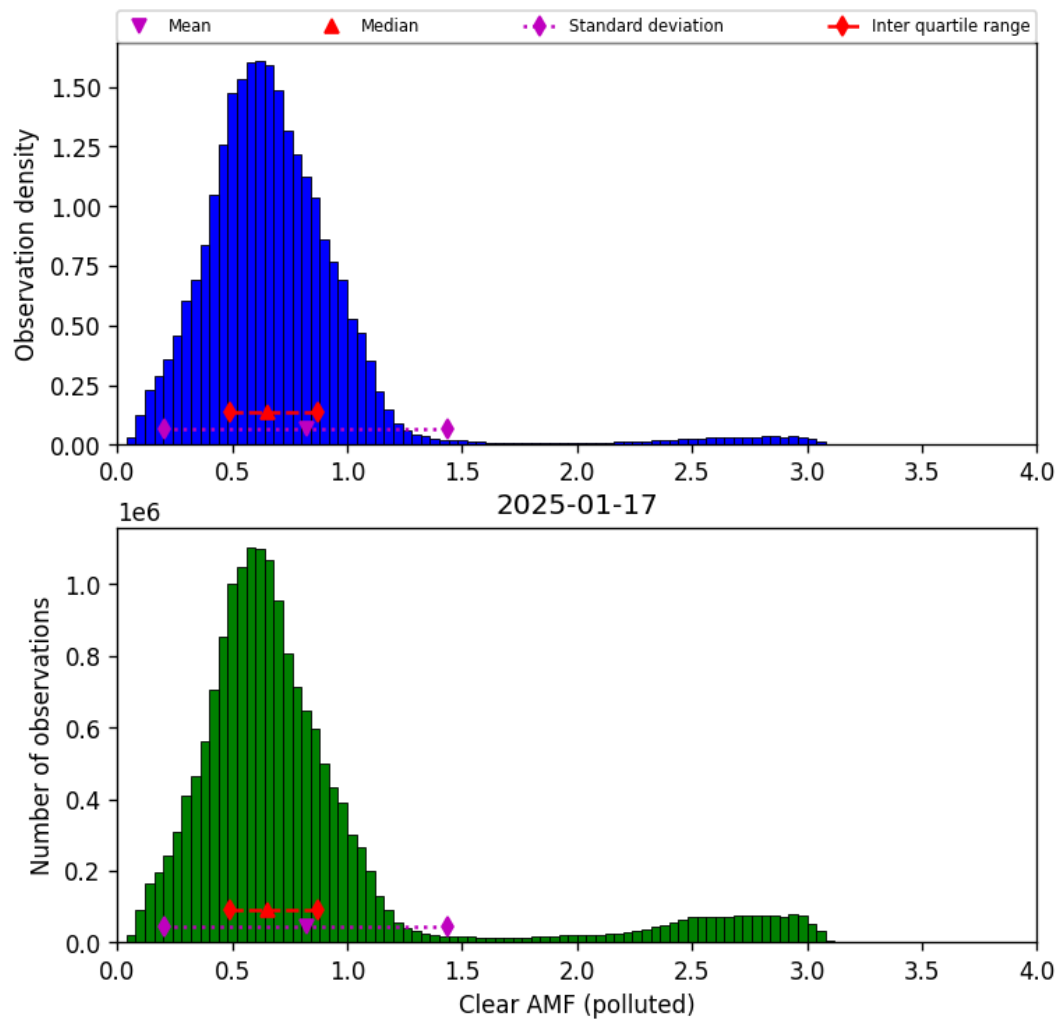


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-01-17 to 2025-01-18

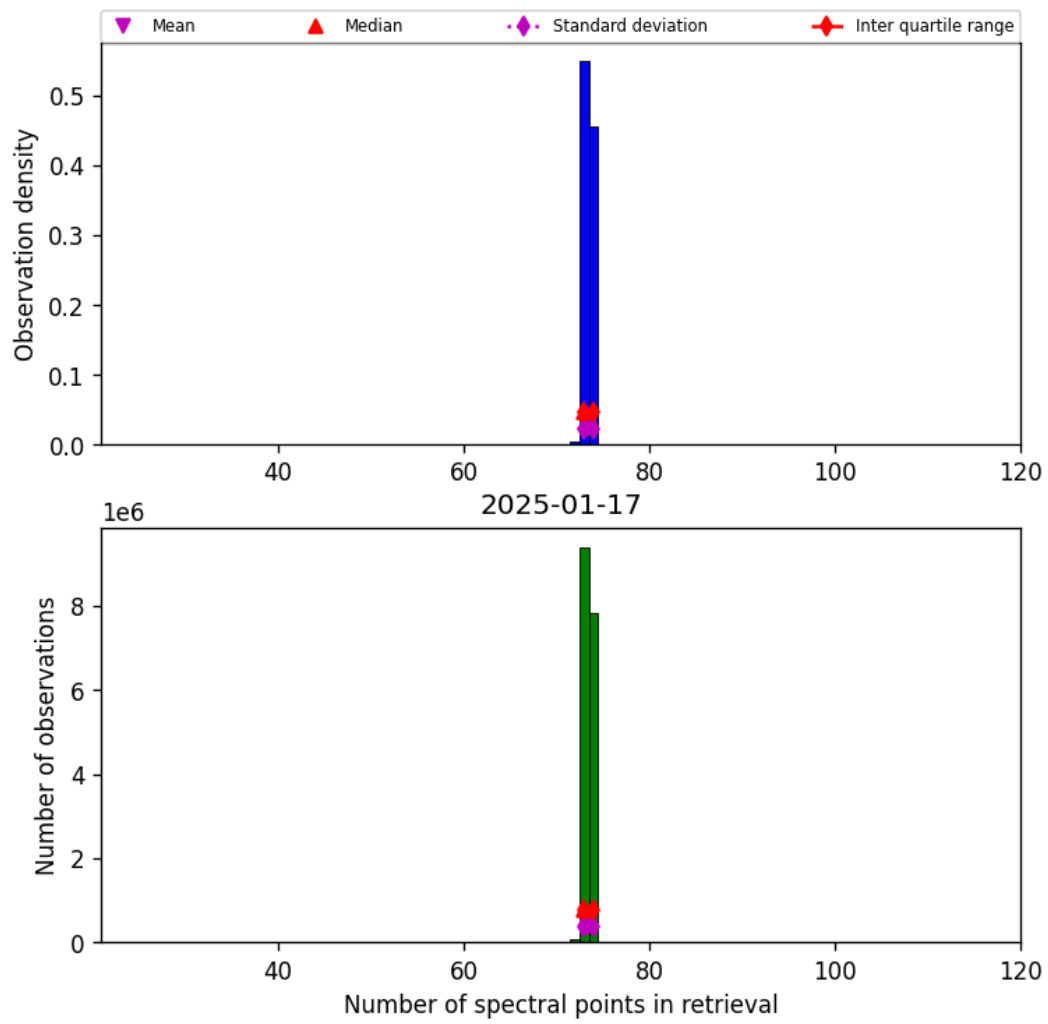


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-01-17 to 2025-01-18

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.

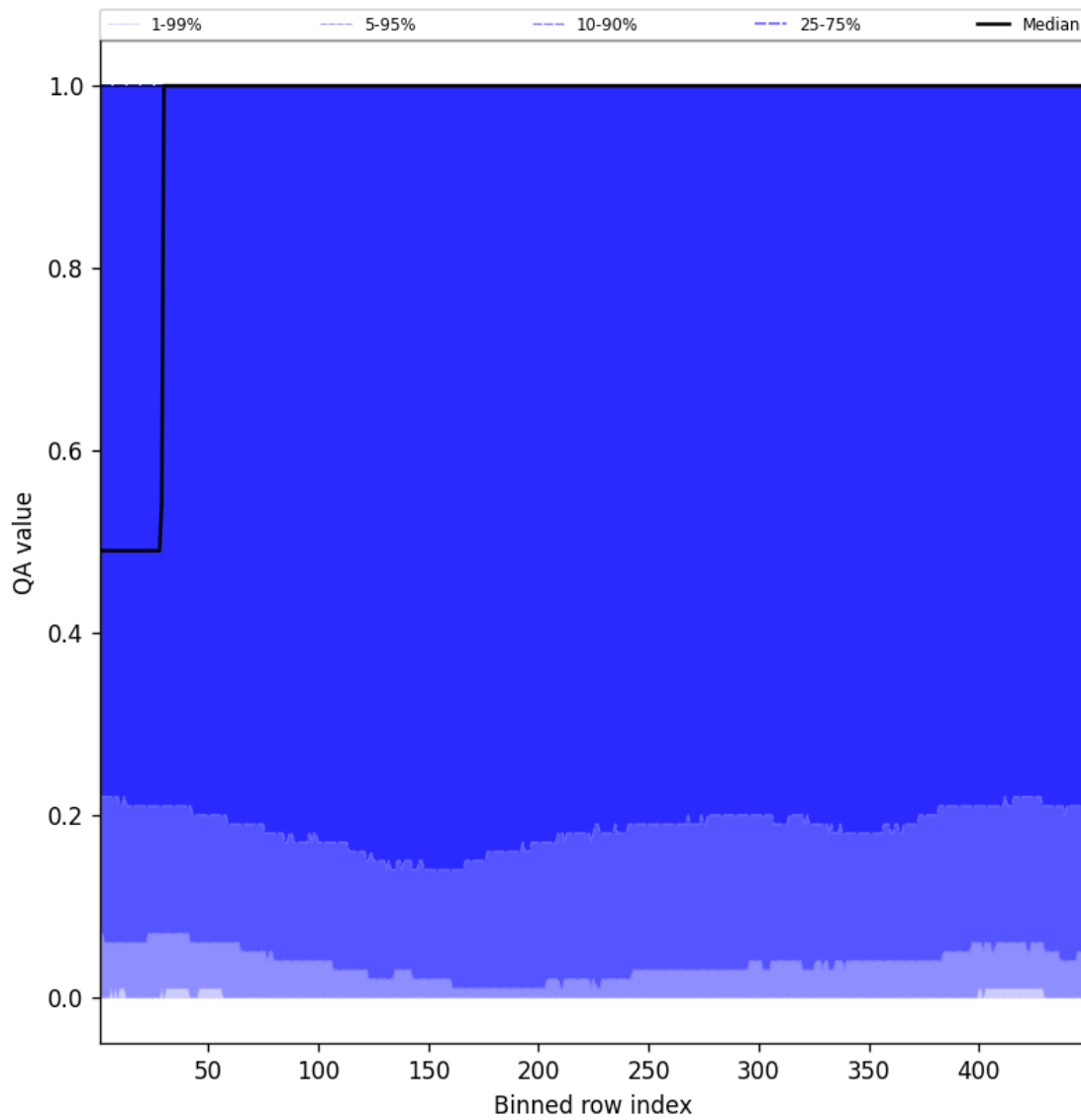


Figure 84: Along track statistics of “QA value” for 2025-01-17 to 2025-01-18

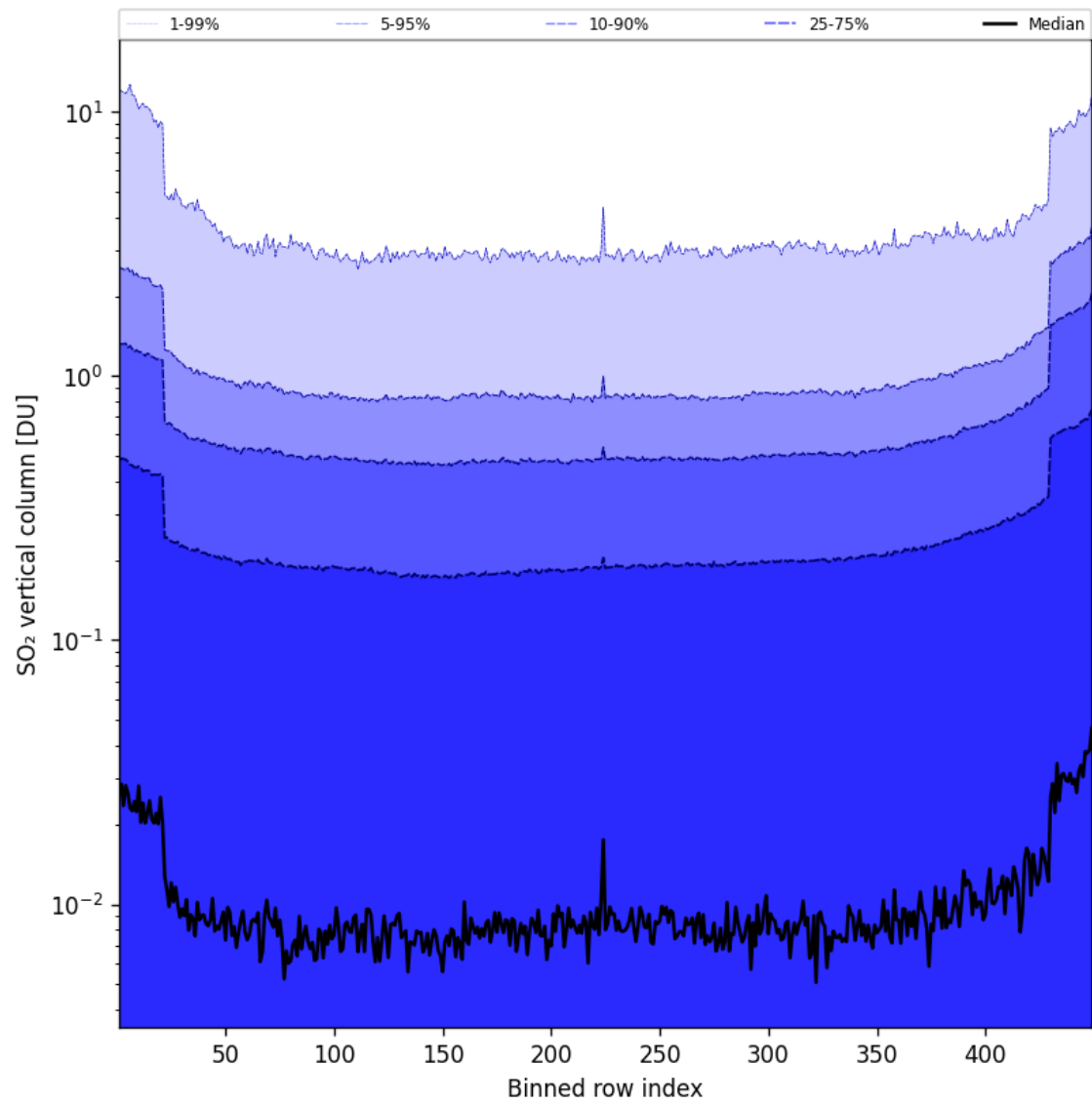


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-01-17 to 2025-01-18

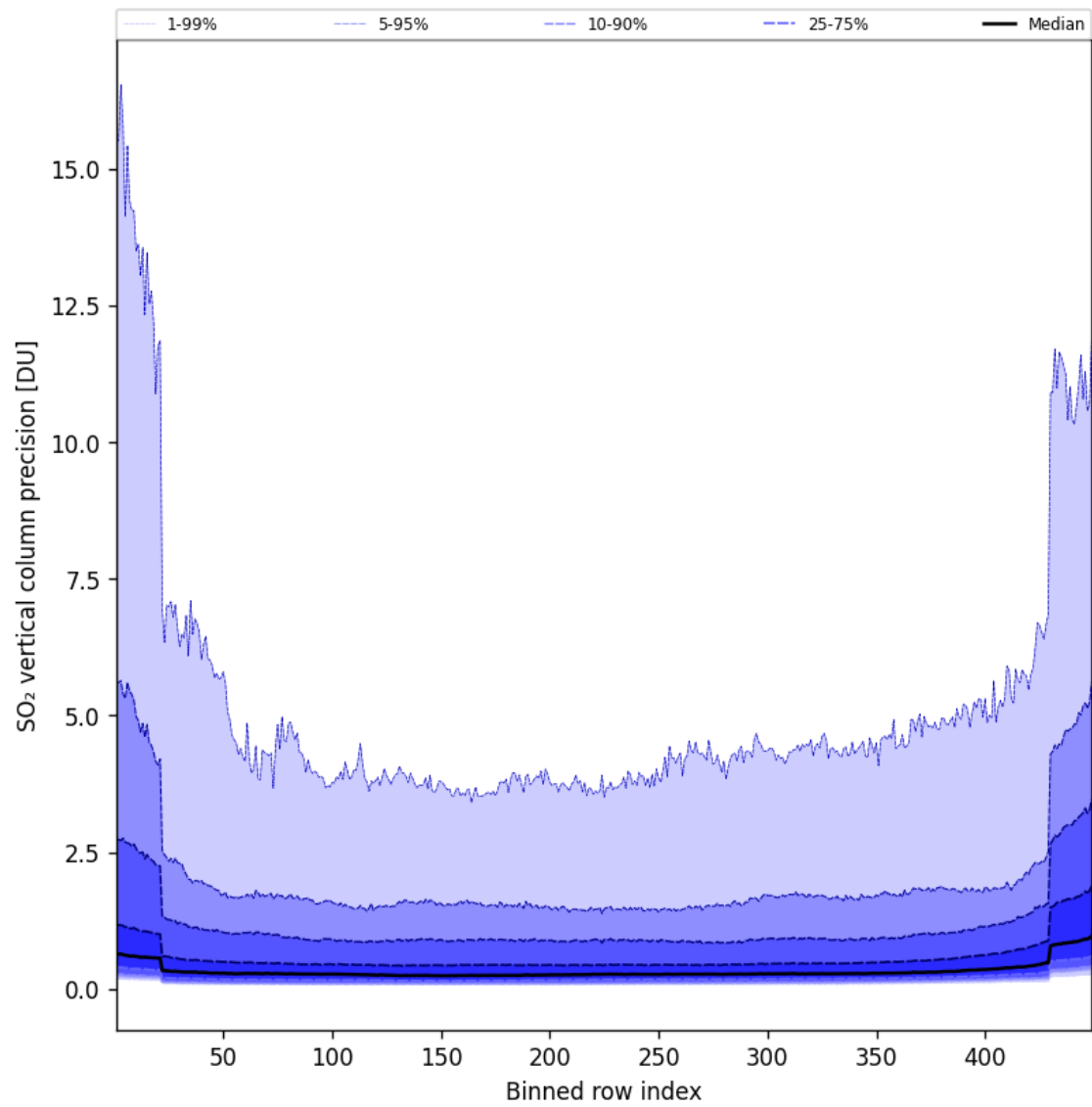


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-01-17 to 2025-01-18

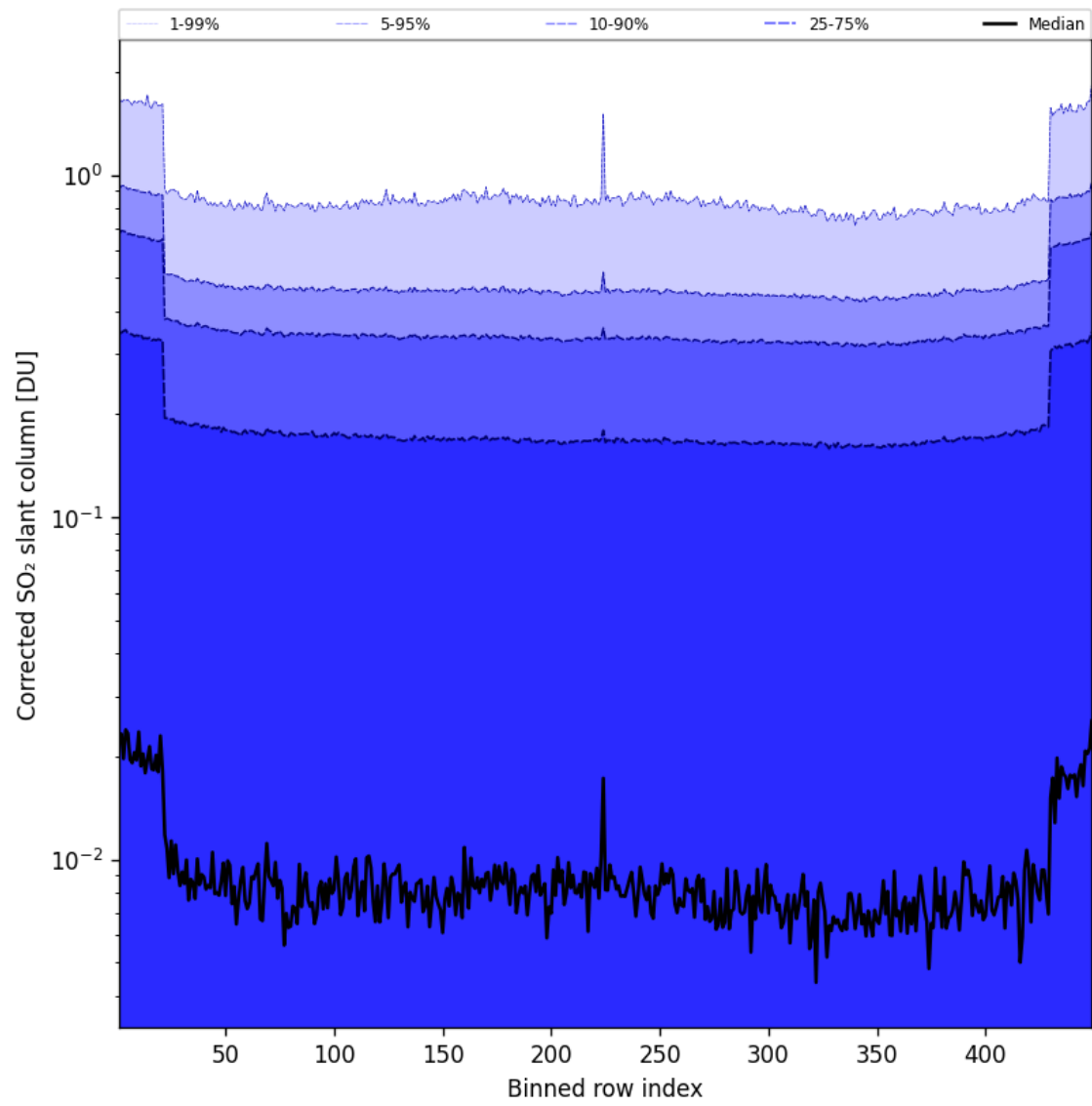


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-01-17 to 2025-01-18

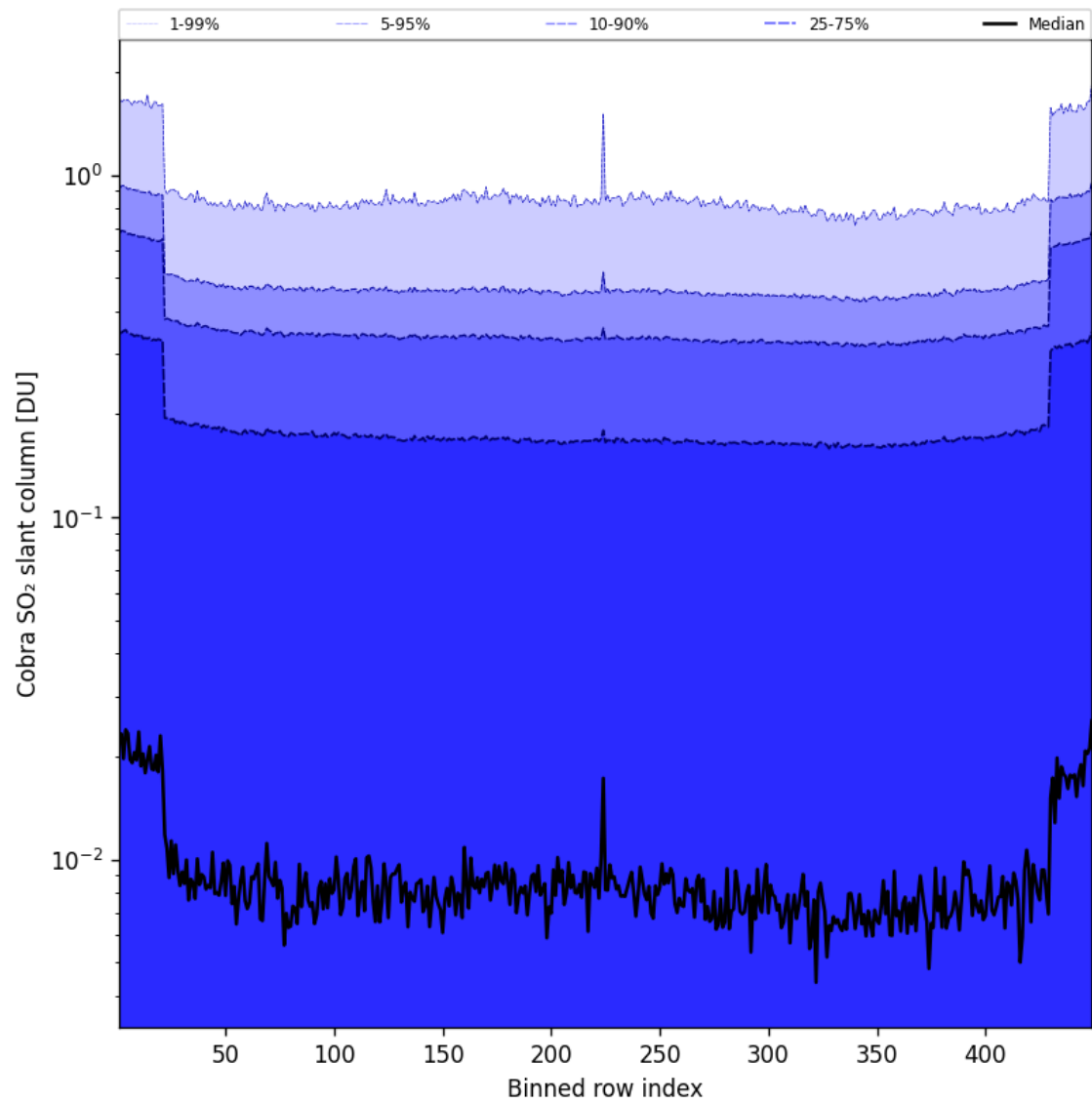


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-01-17 to 2025-01-18

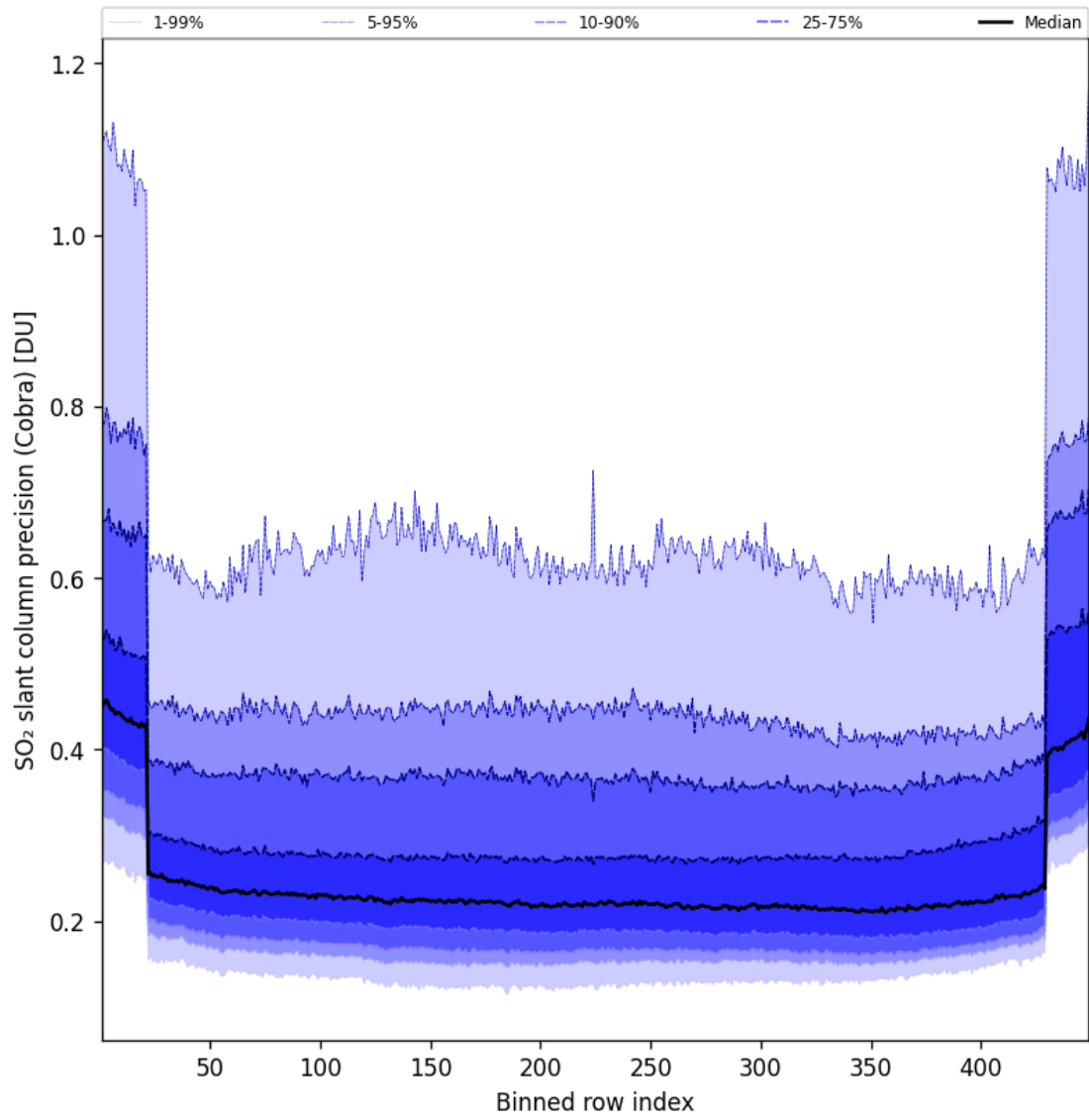


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-01-17 to 2025-01-18

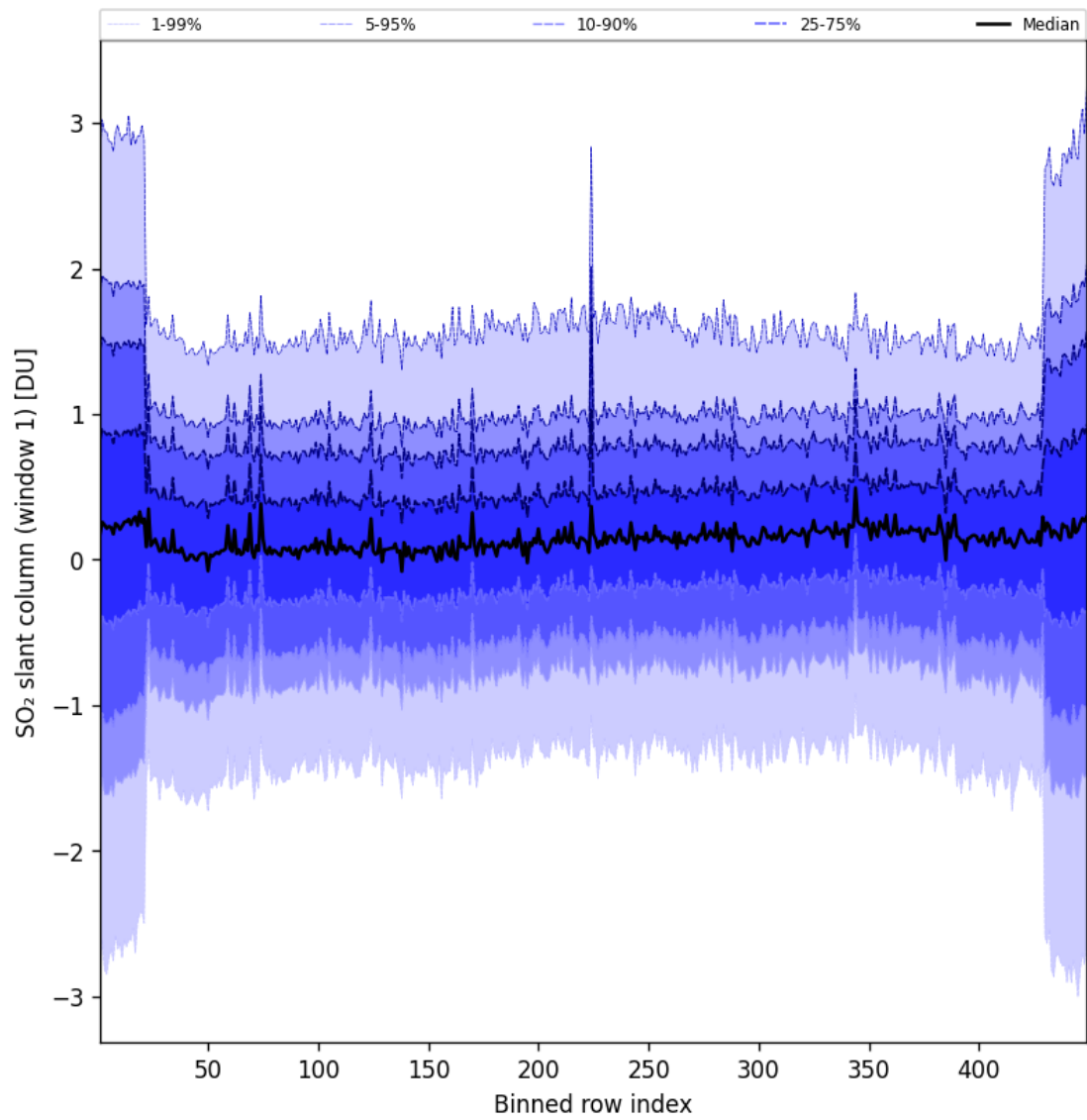


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-01-17 to 2025-01-18

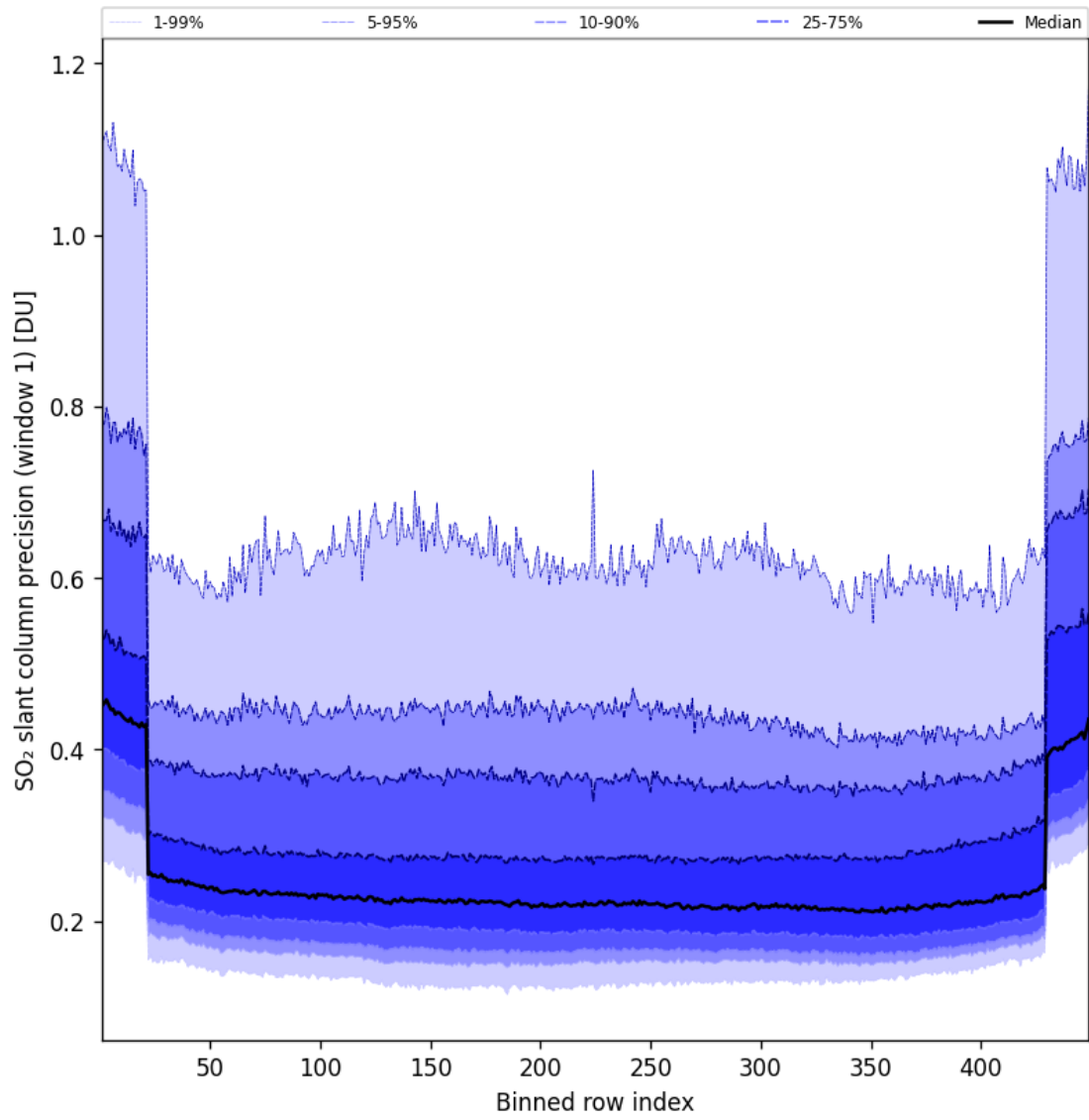


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-01-17 to 2025-01-18

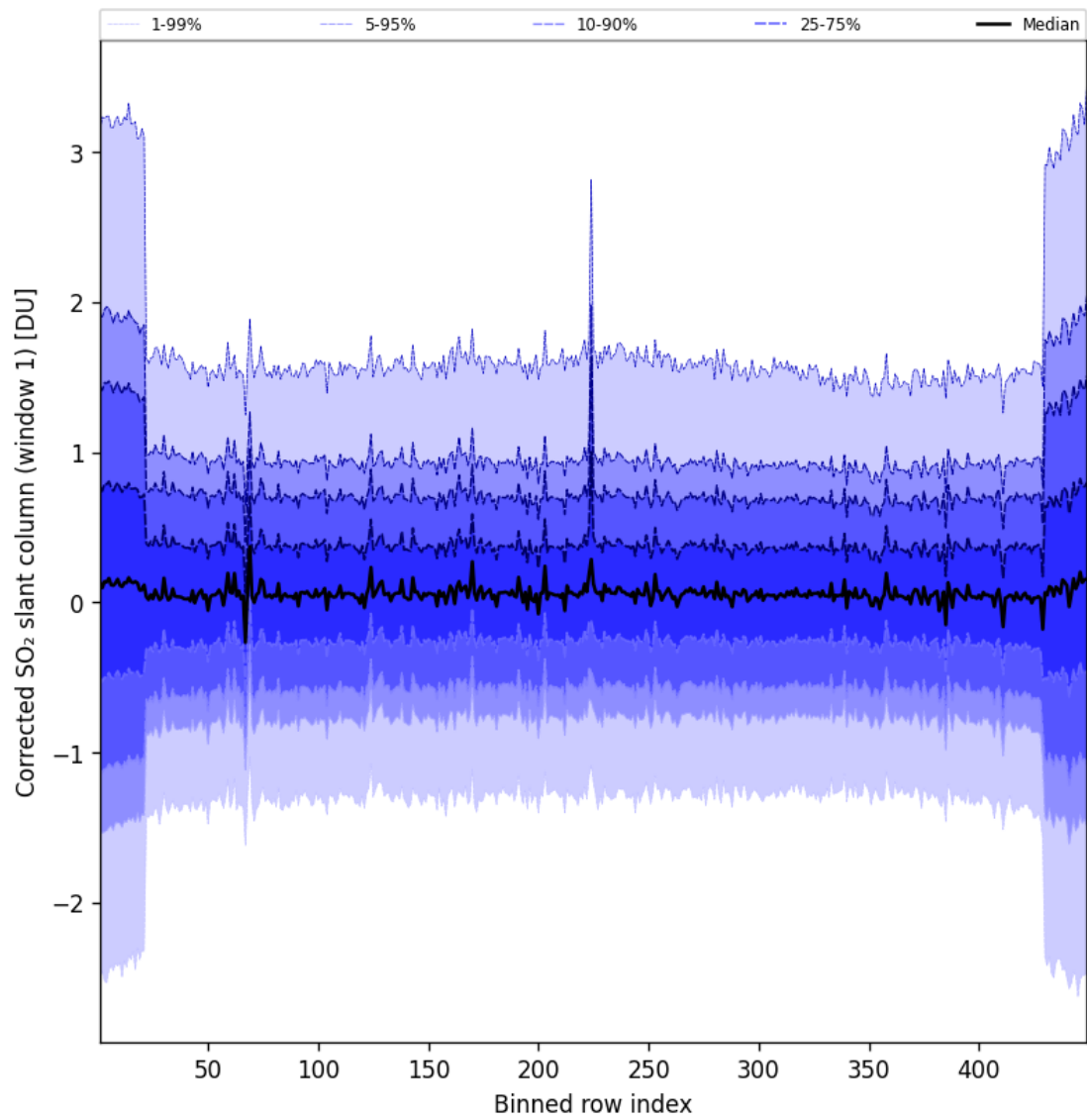


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-01-17 to 2025-01-18

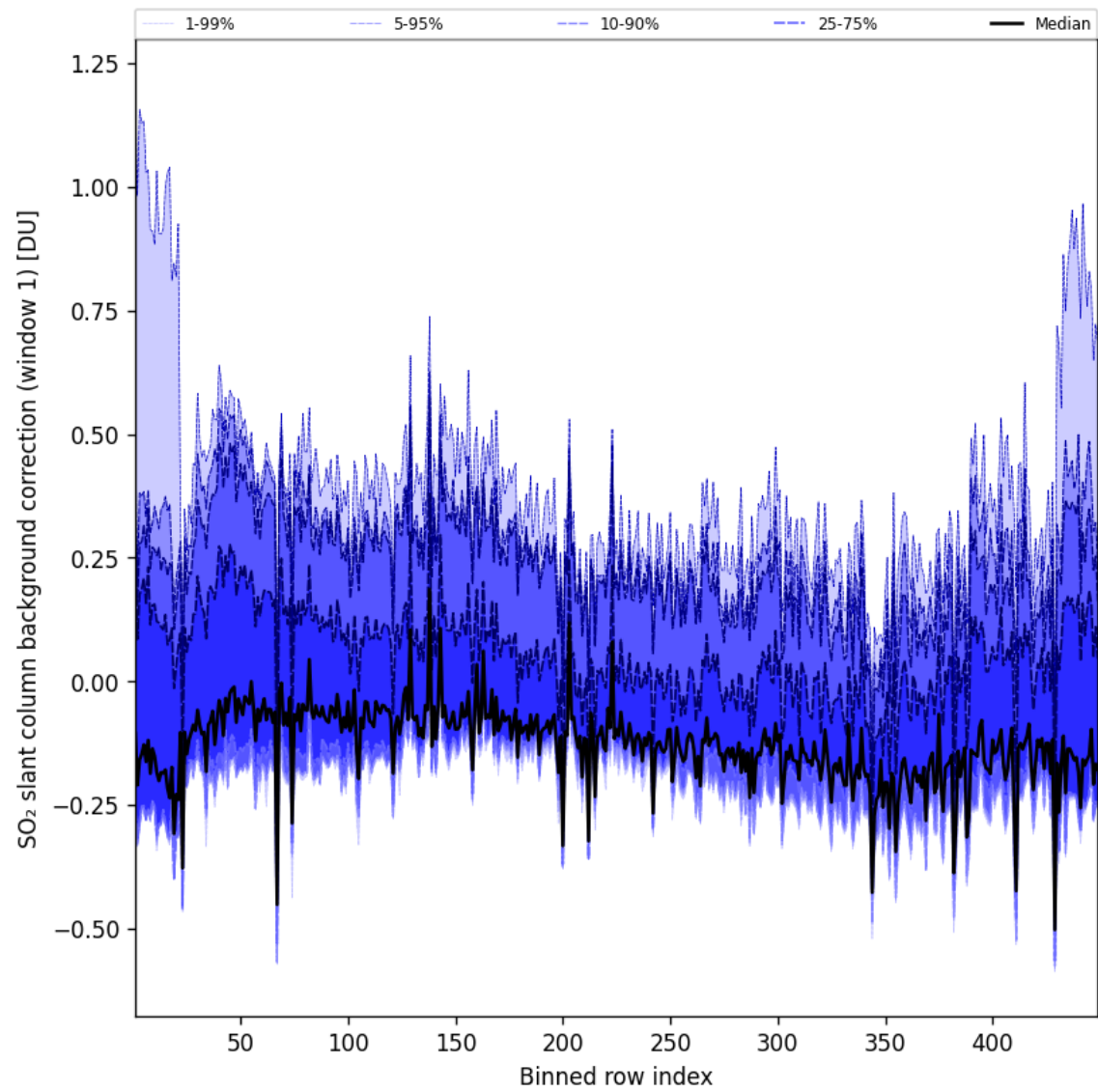


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-01-17 to 2025-01-18

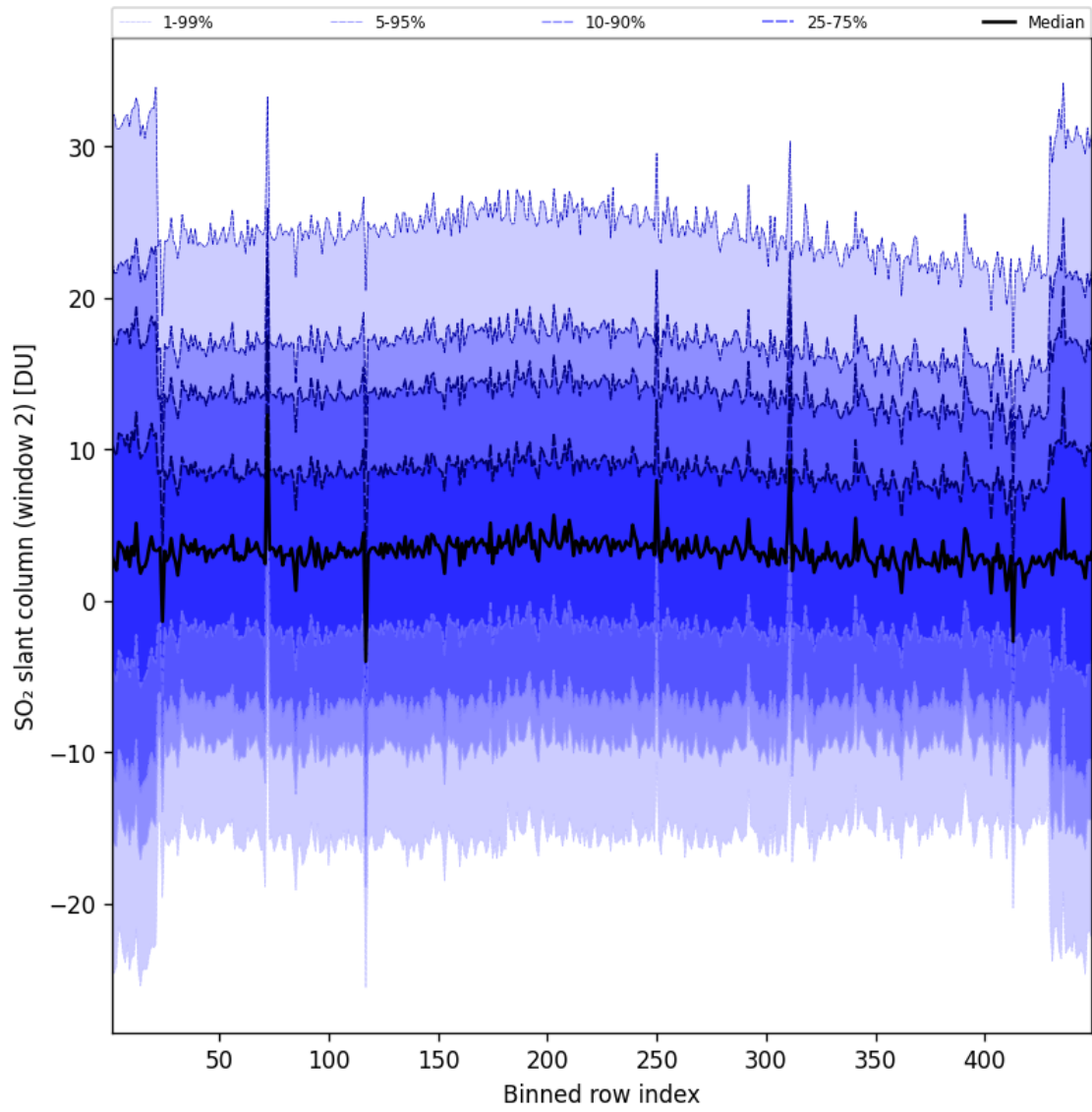


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-01-17 to 2025-01-18

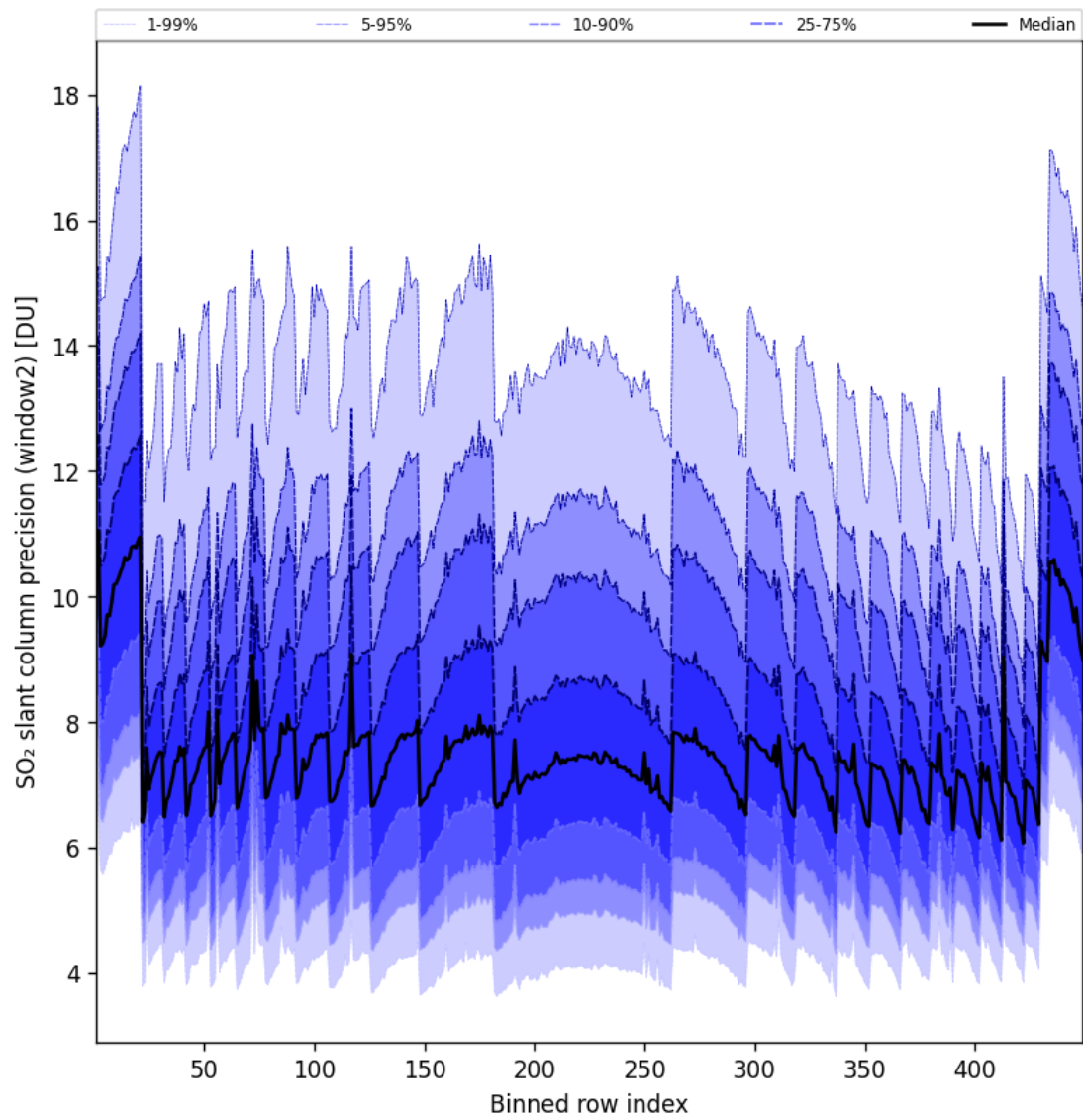


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-01-17 to 2025-01-18

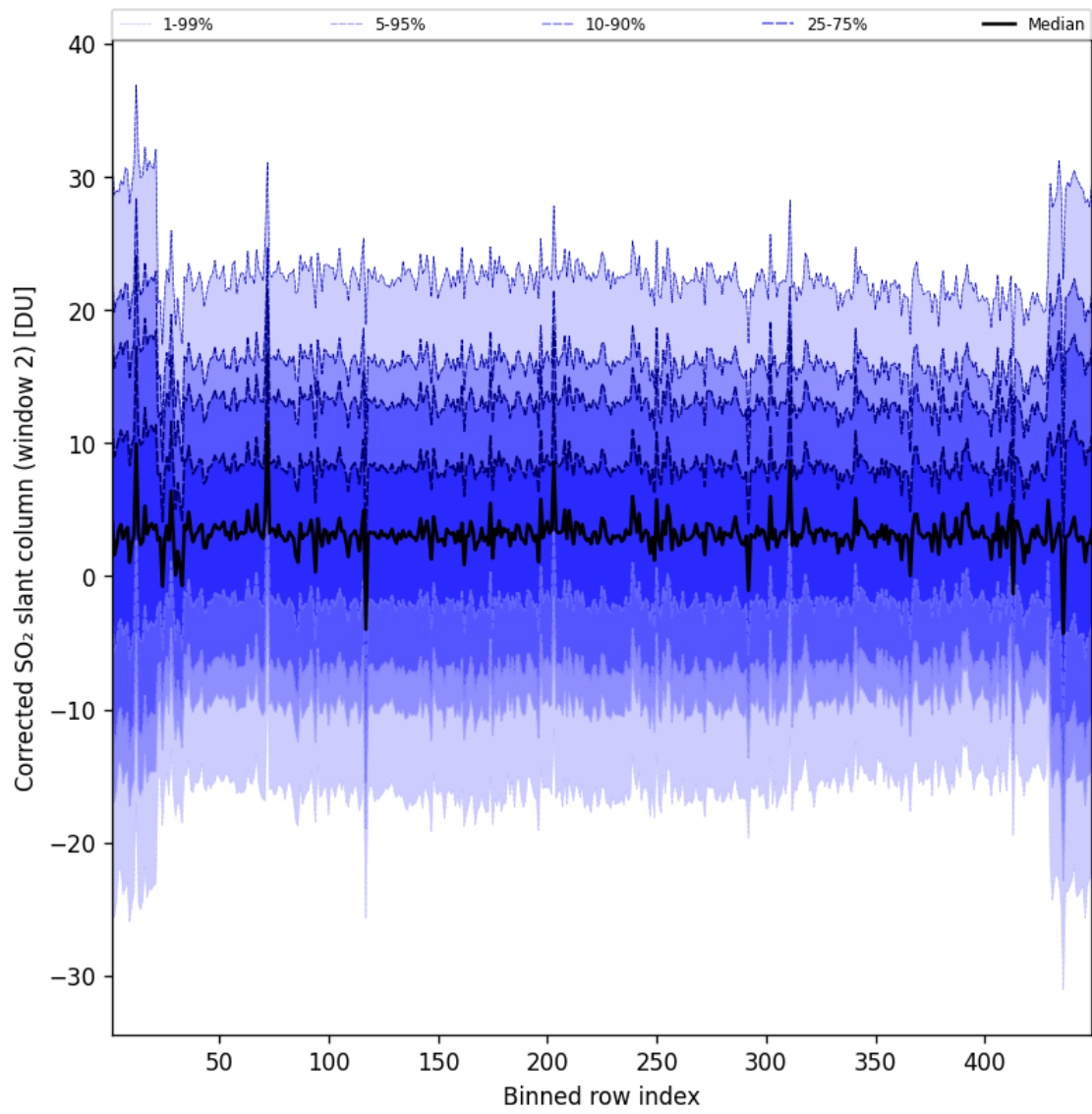


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-01-17 to 2025-01-18

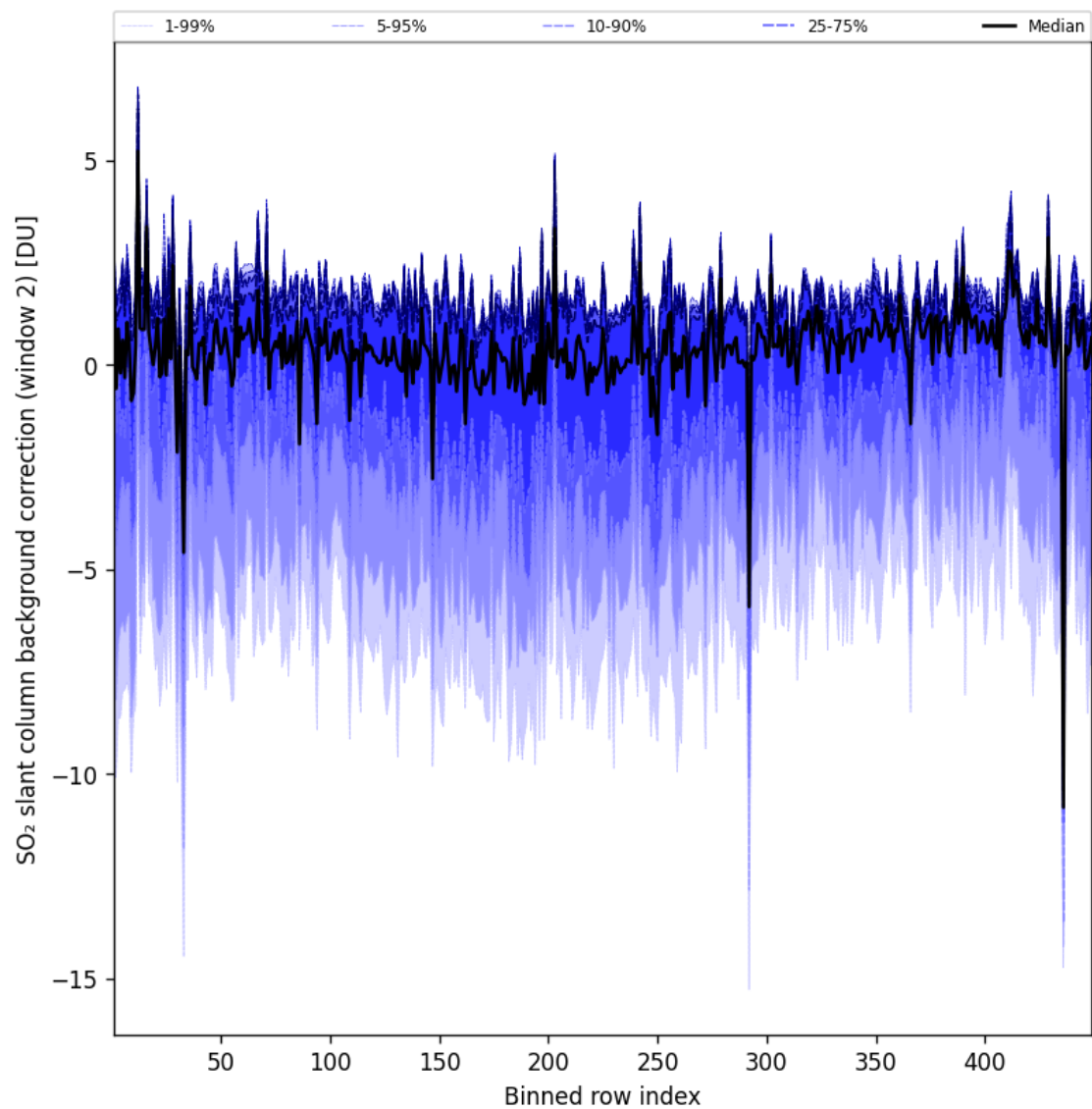


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-01-17 to 2025-01-18

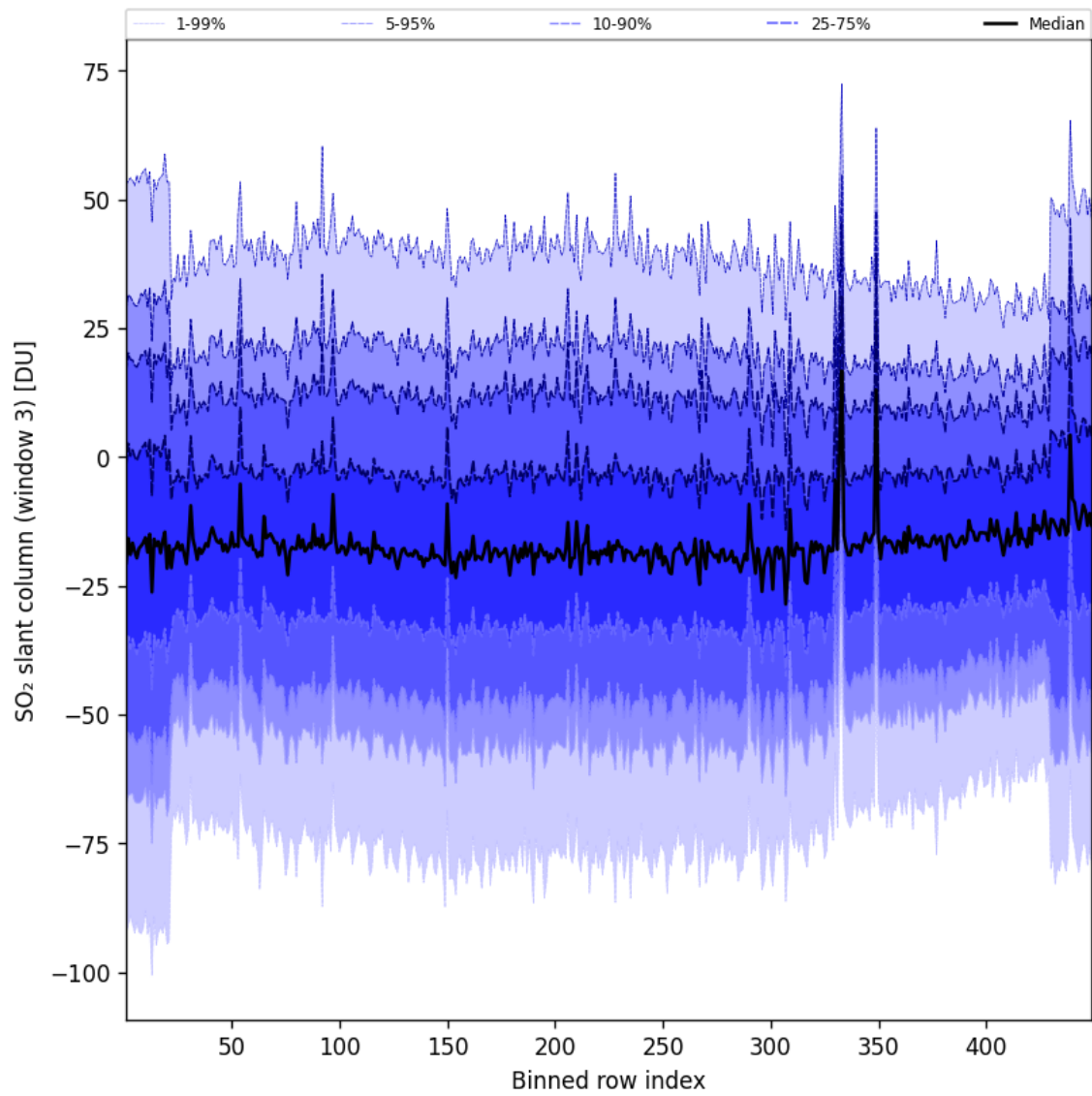


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-01-17 to 2025-01-18

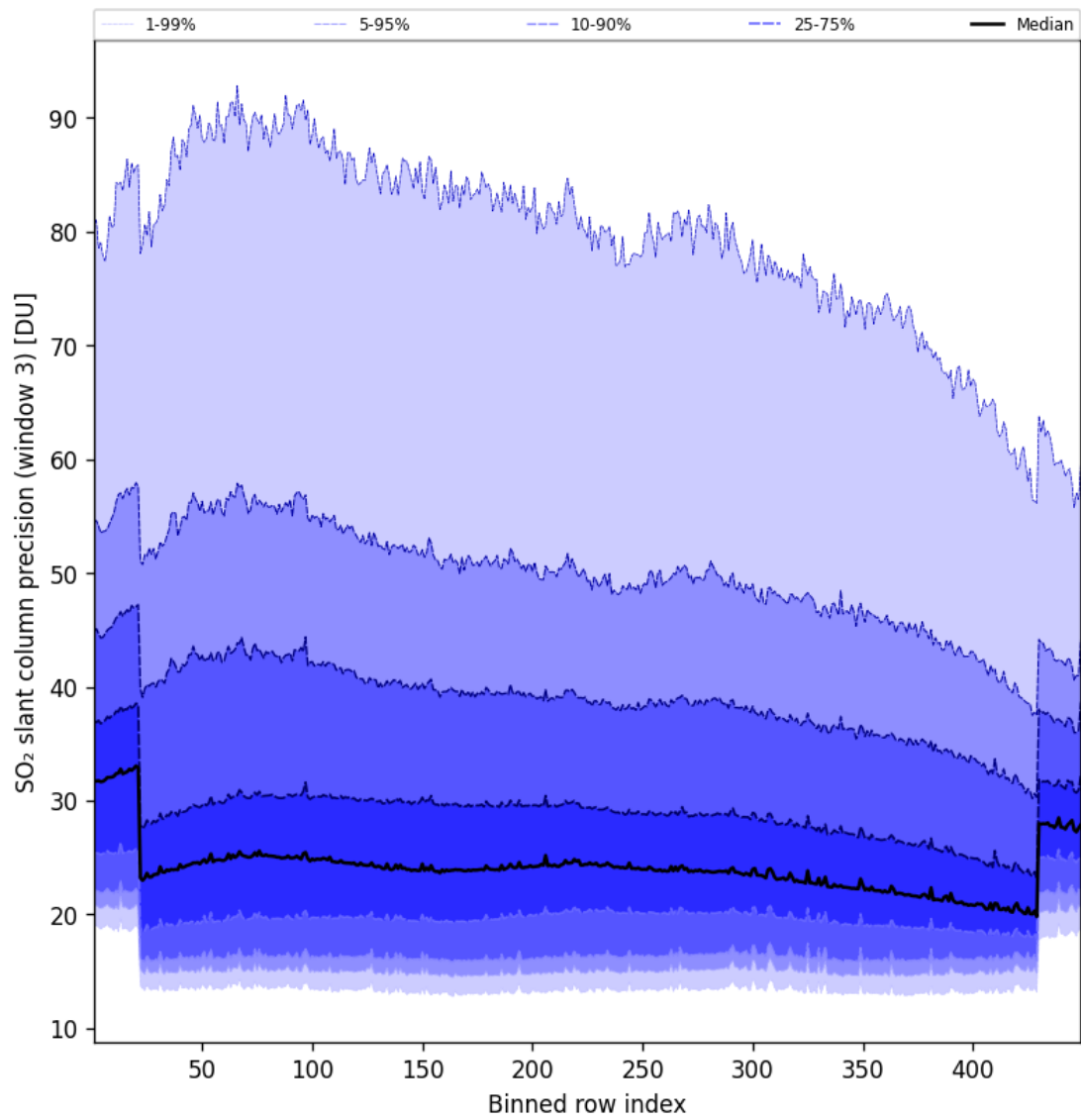


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-01-17 to 2025-01-18

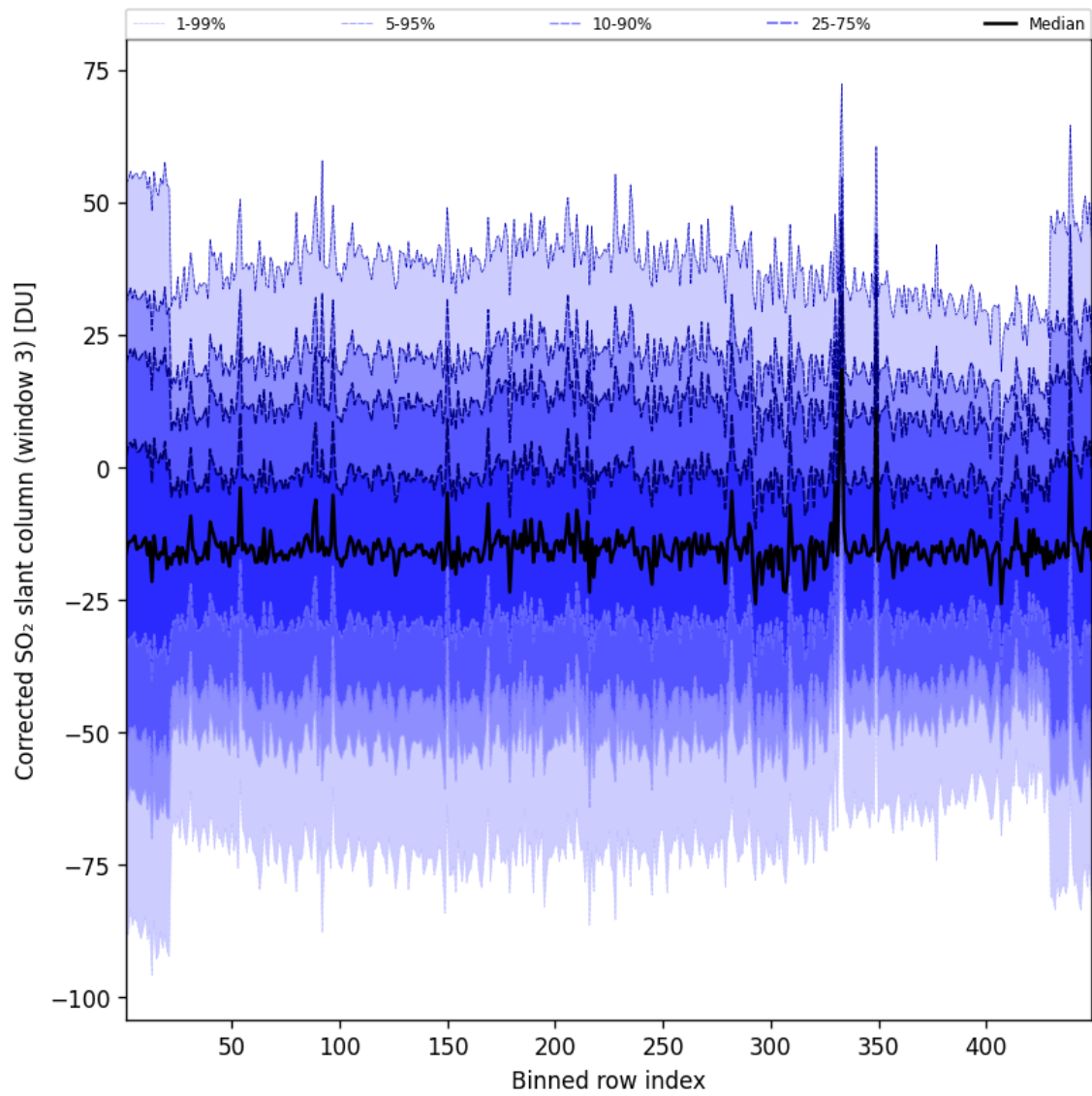


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-01-17 to 2025-01-18

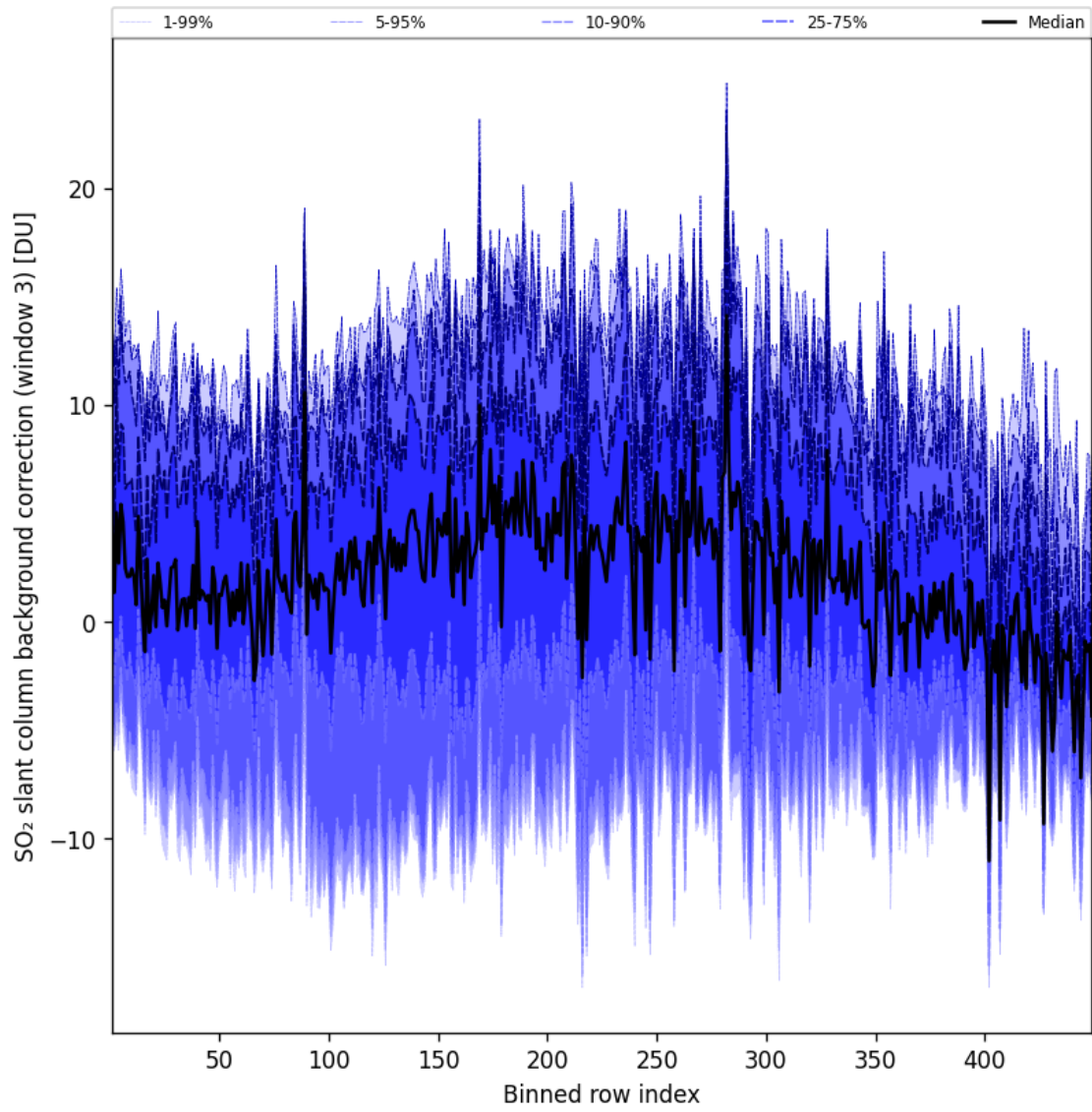


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-01-17 to 2025-01-18

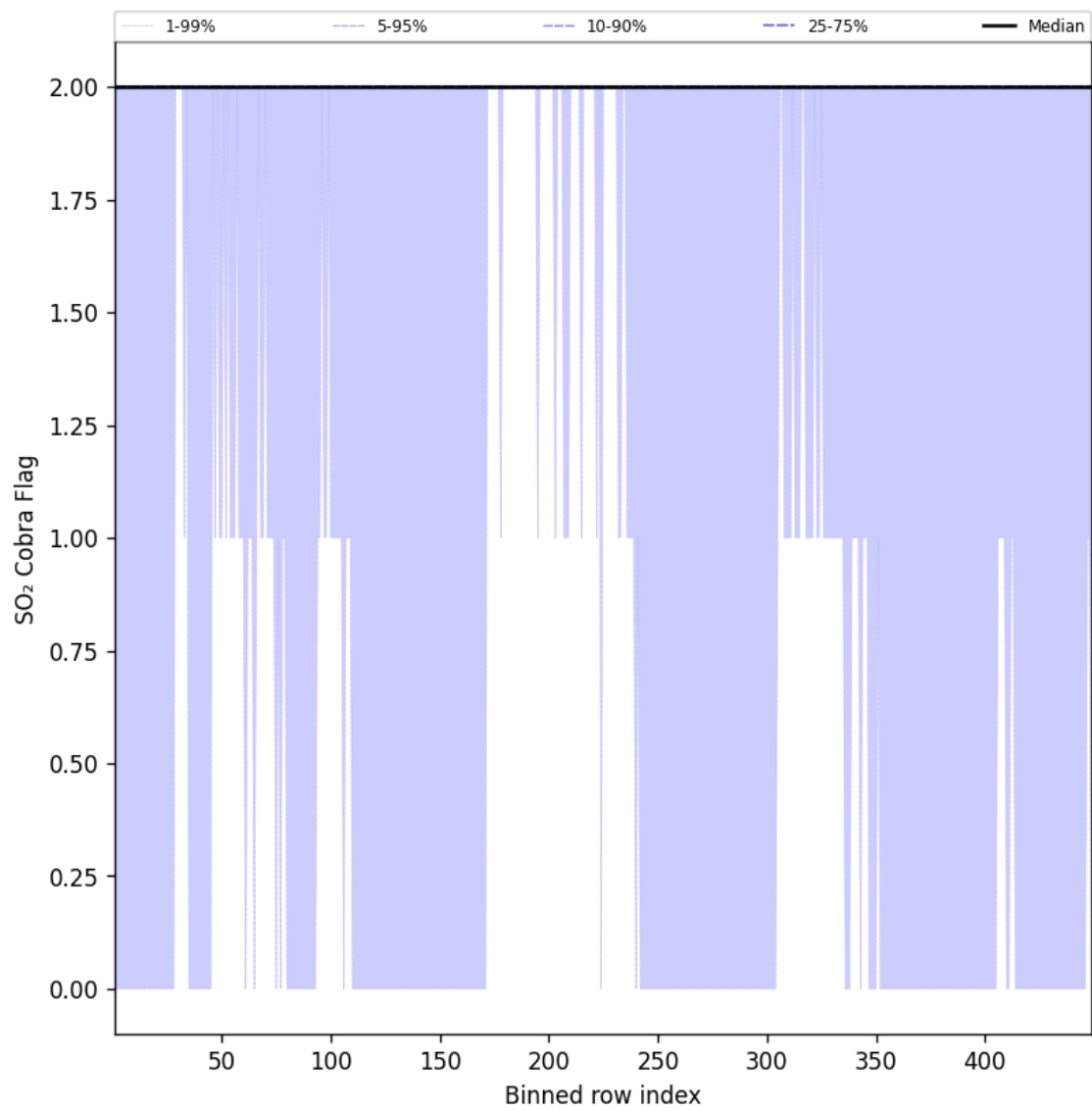


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-01-17 to 2025-01-18

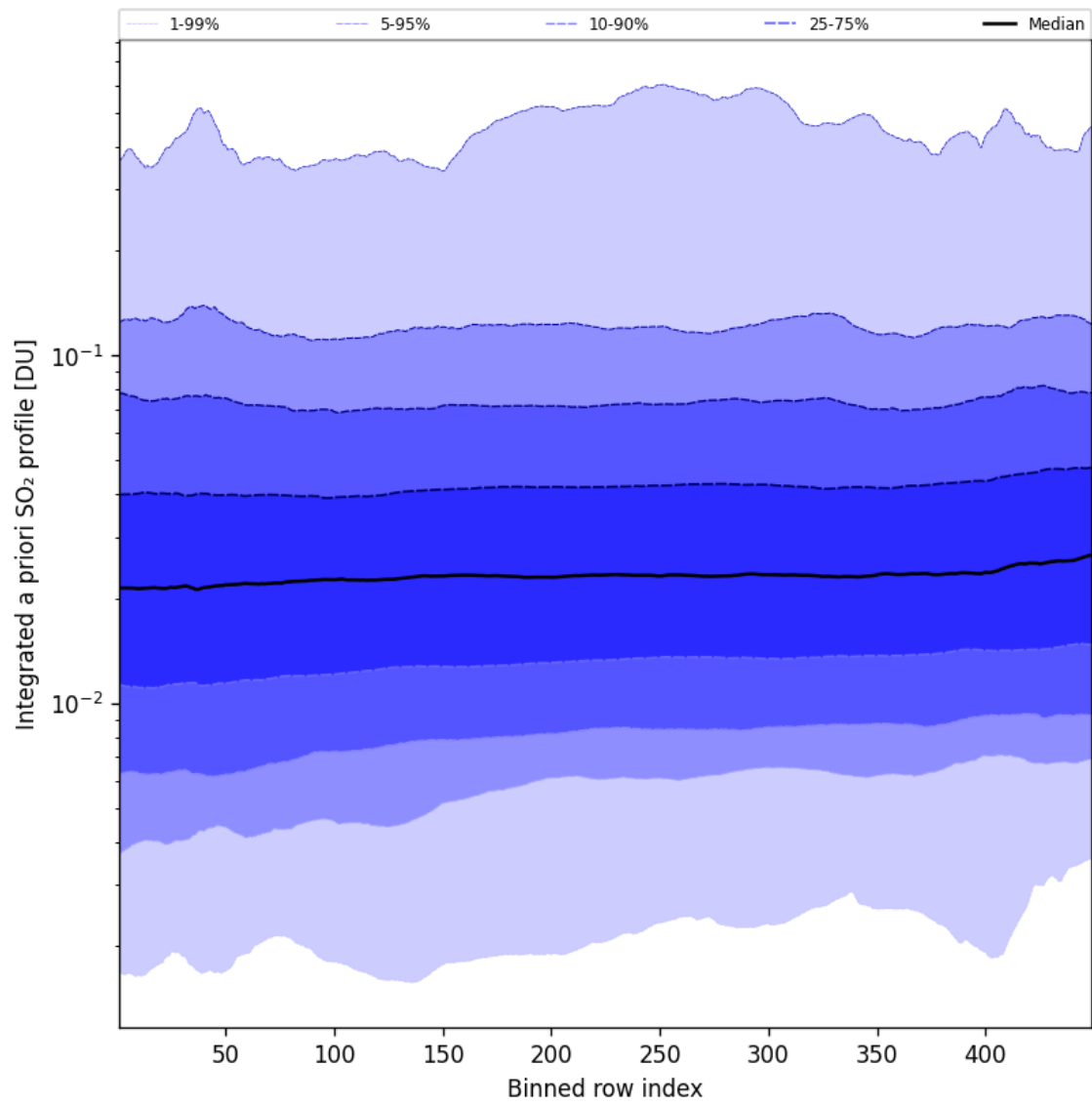


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-01-17 to 2025-01-18

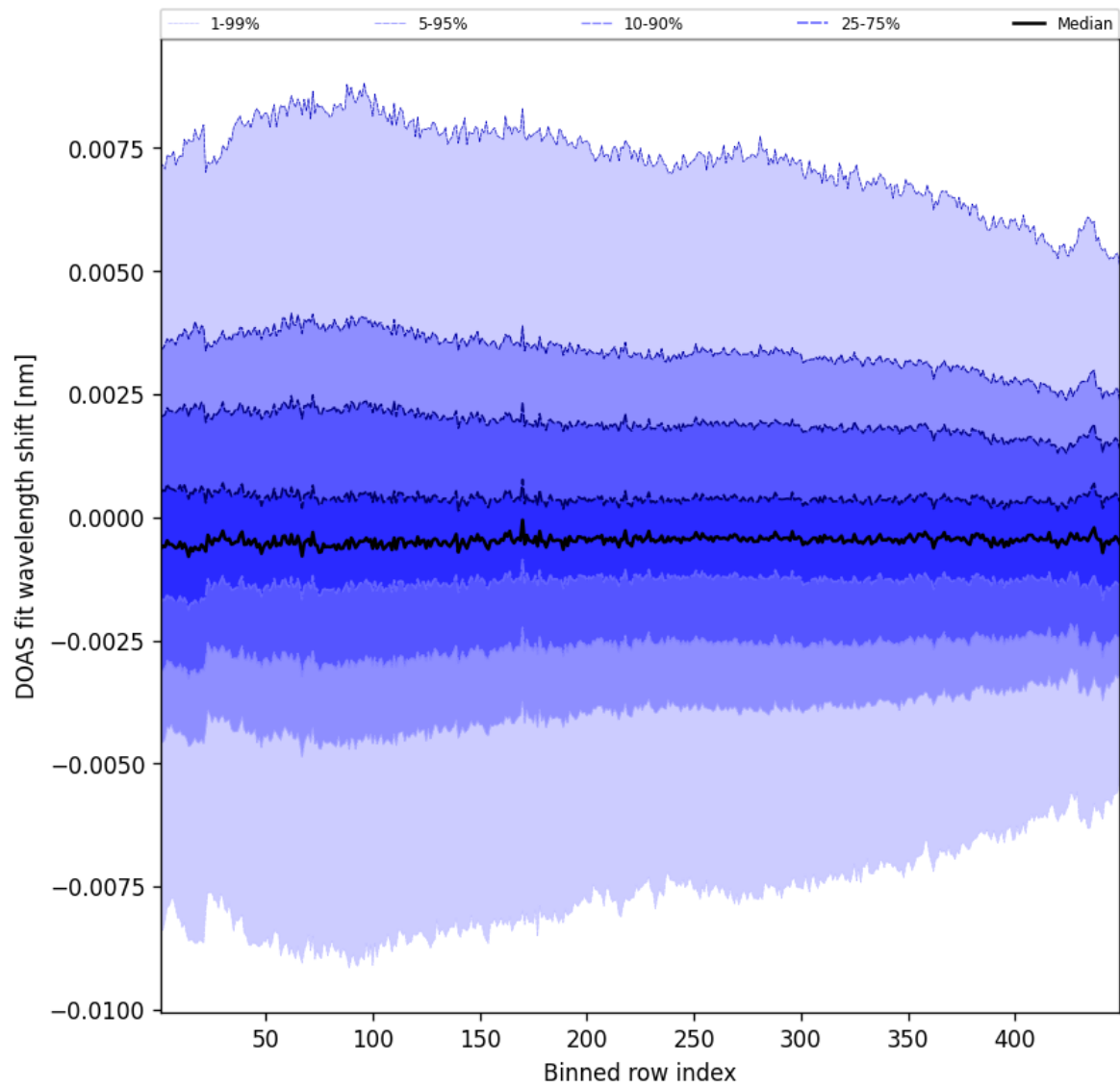


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-01-17 to 2025-01-18

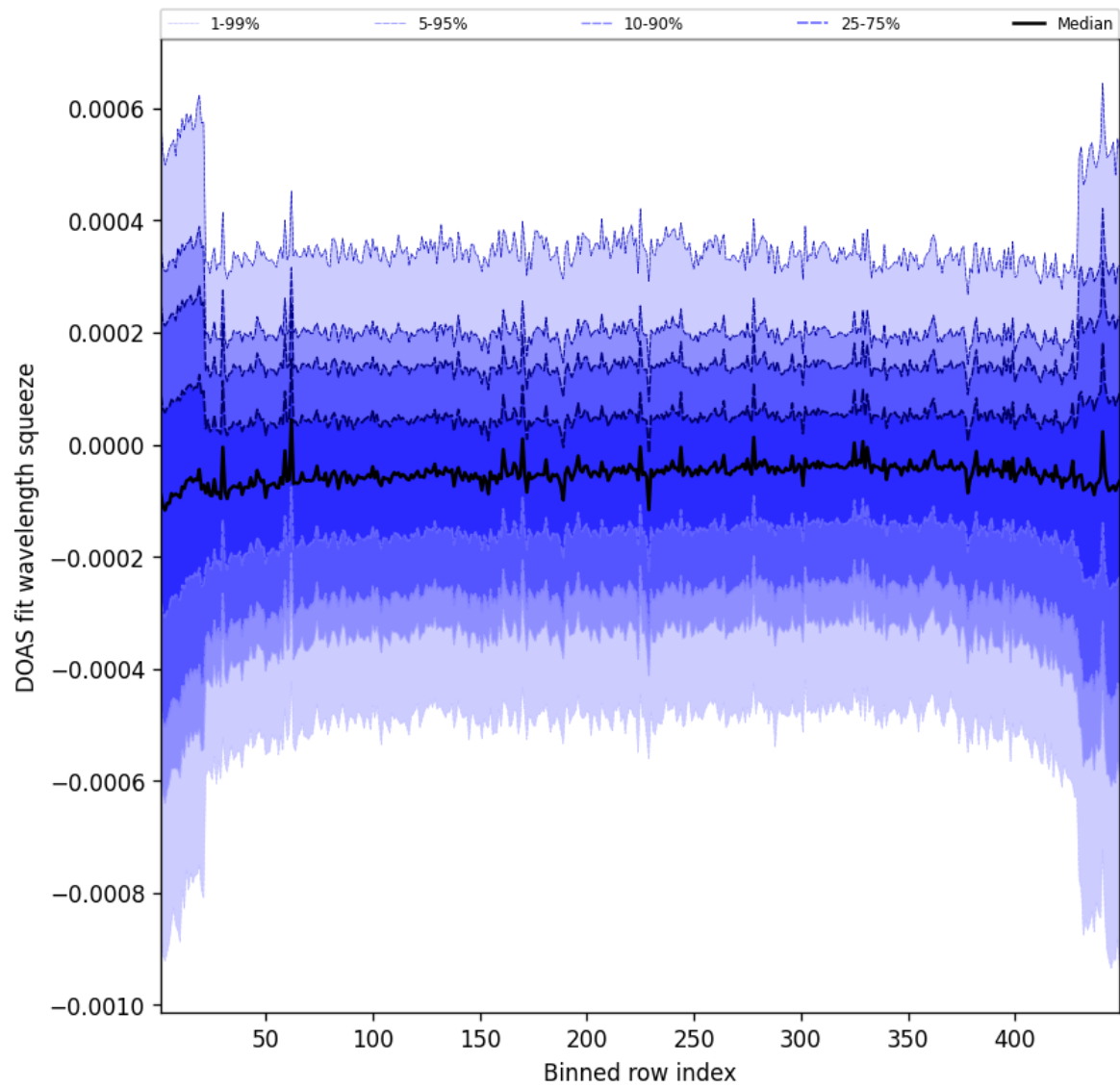


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-01-17 to 2025-01-18

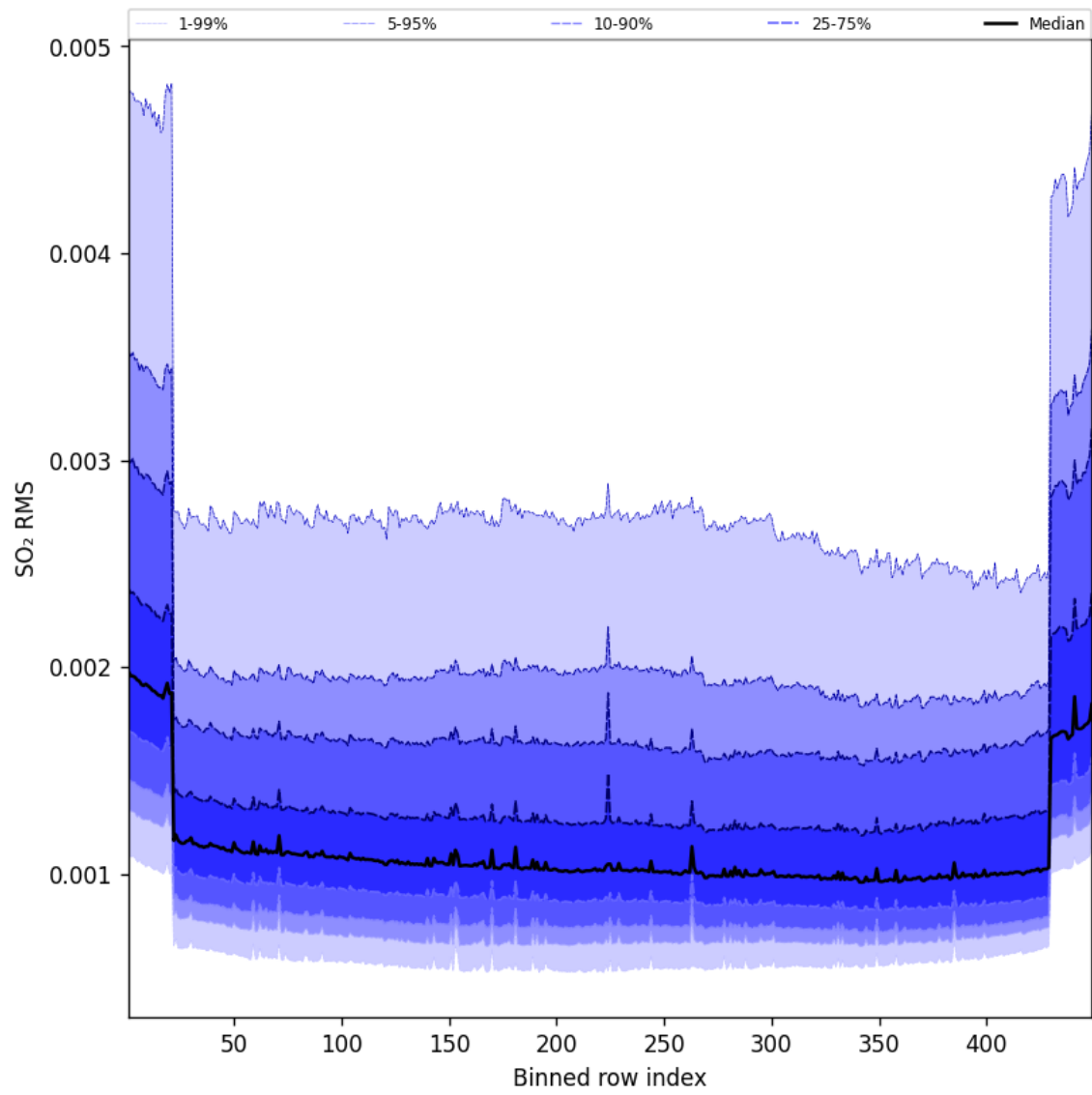


Figure 106: Along track statistics of “SO₂ RMS” for 2025-01-17 to 2025-01-18

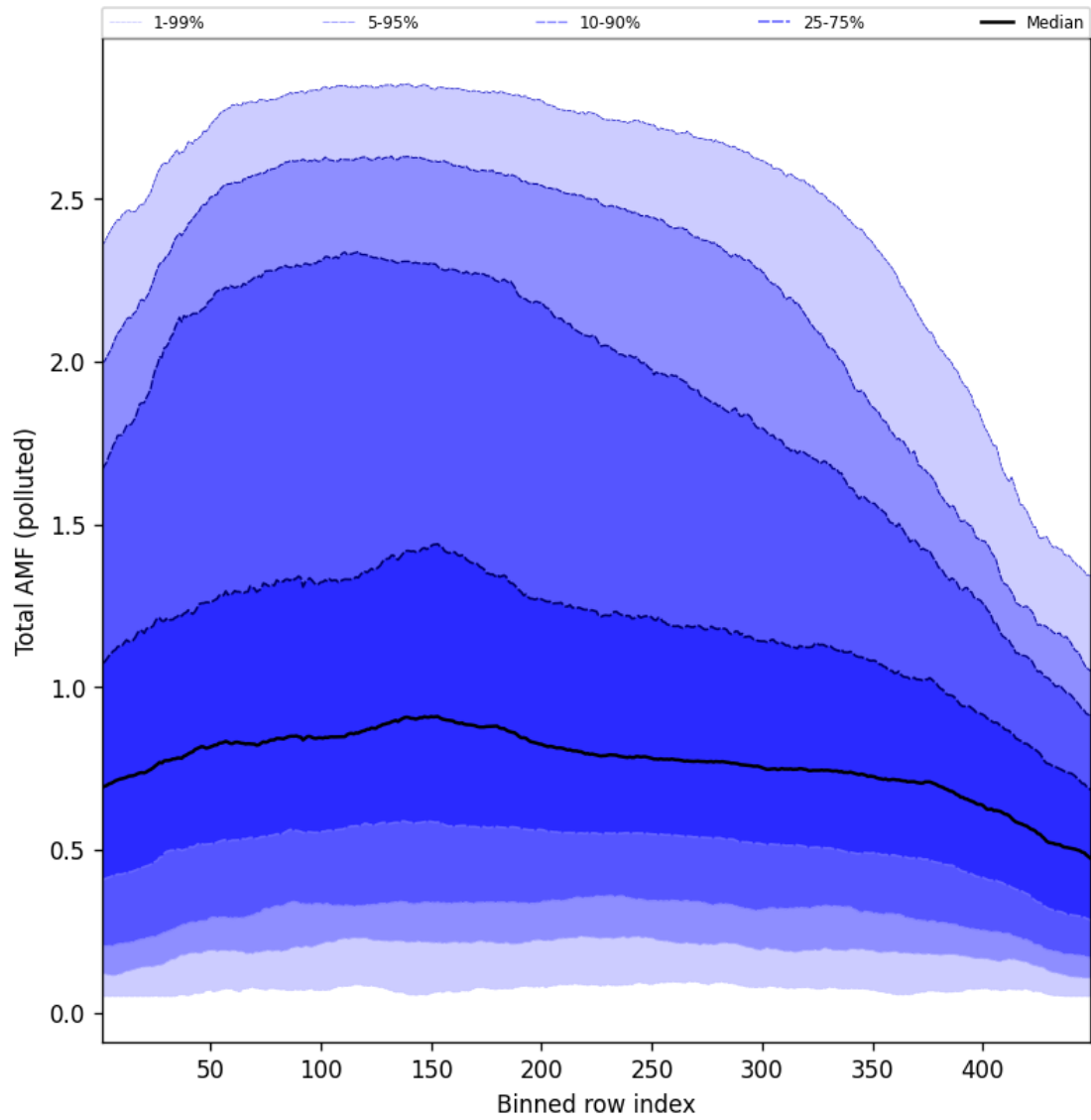


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-01-17 to 2025-01-18

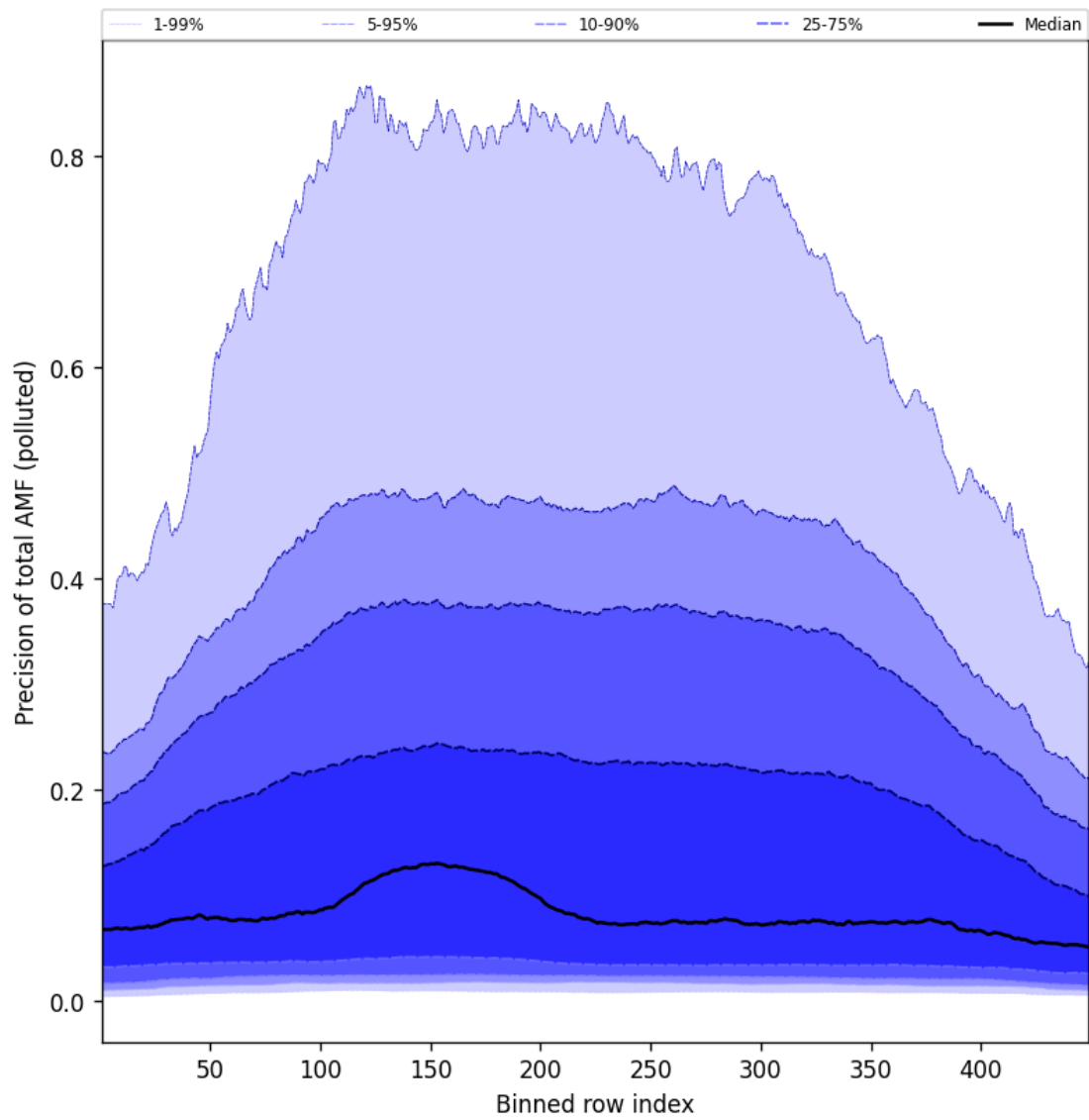


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-01-17 to 2025-01-18

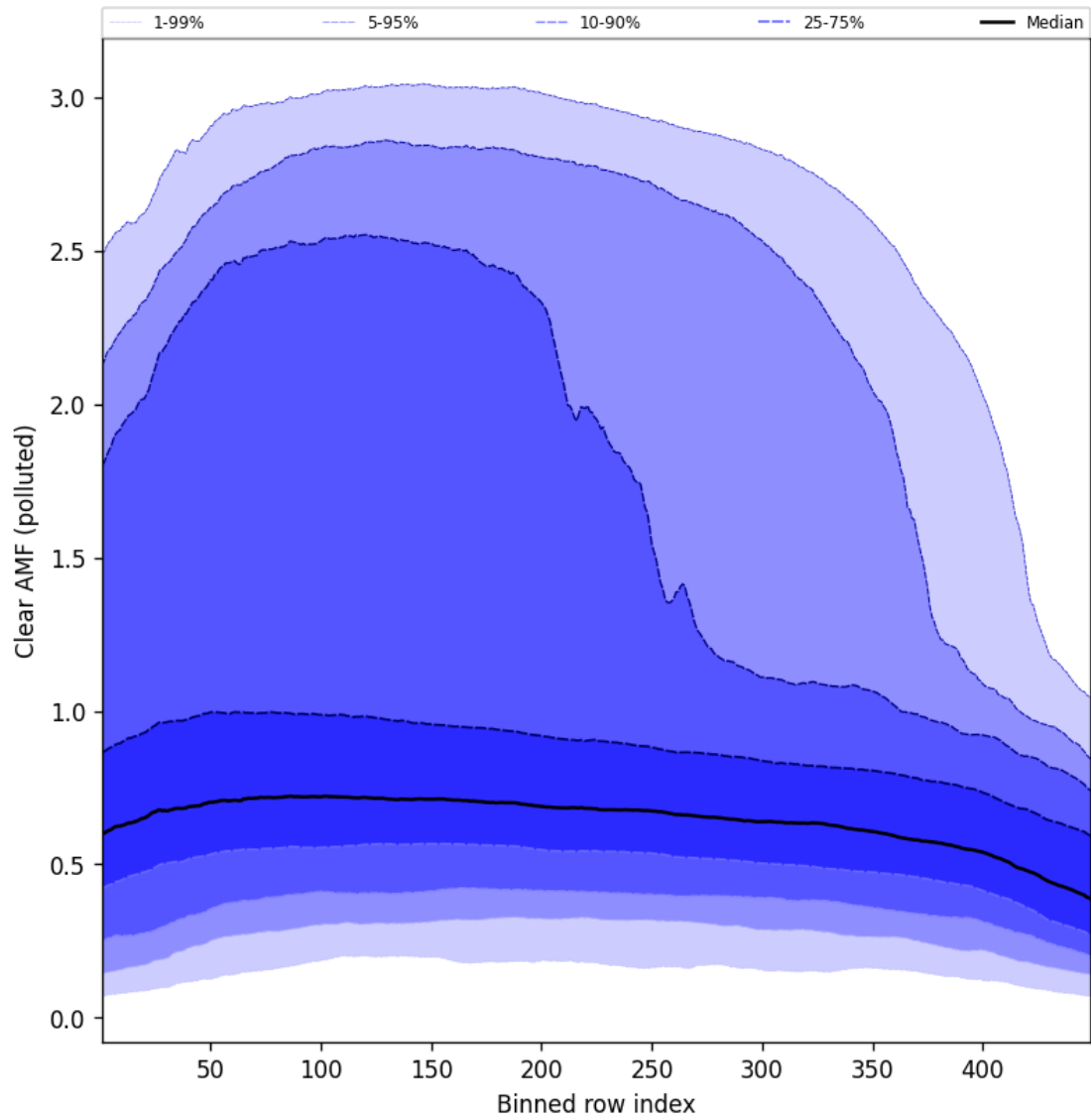


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-01-17 to 2025-01-18

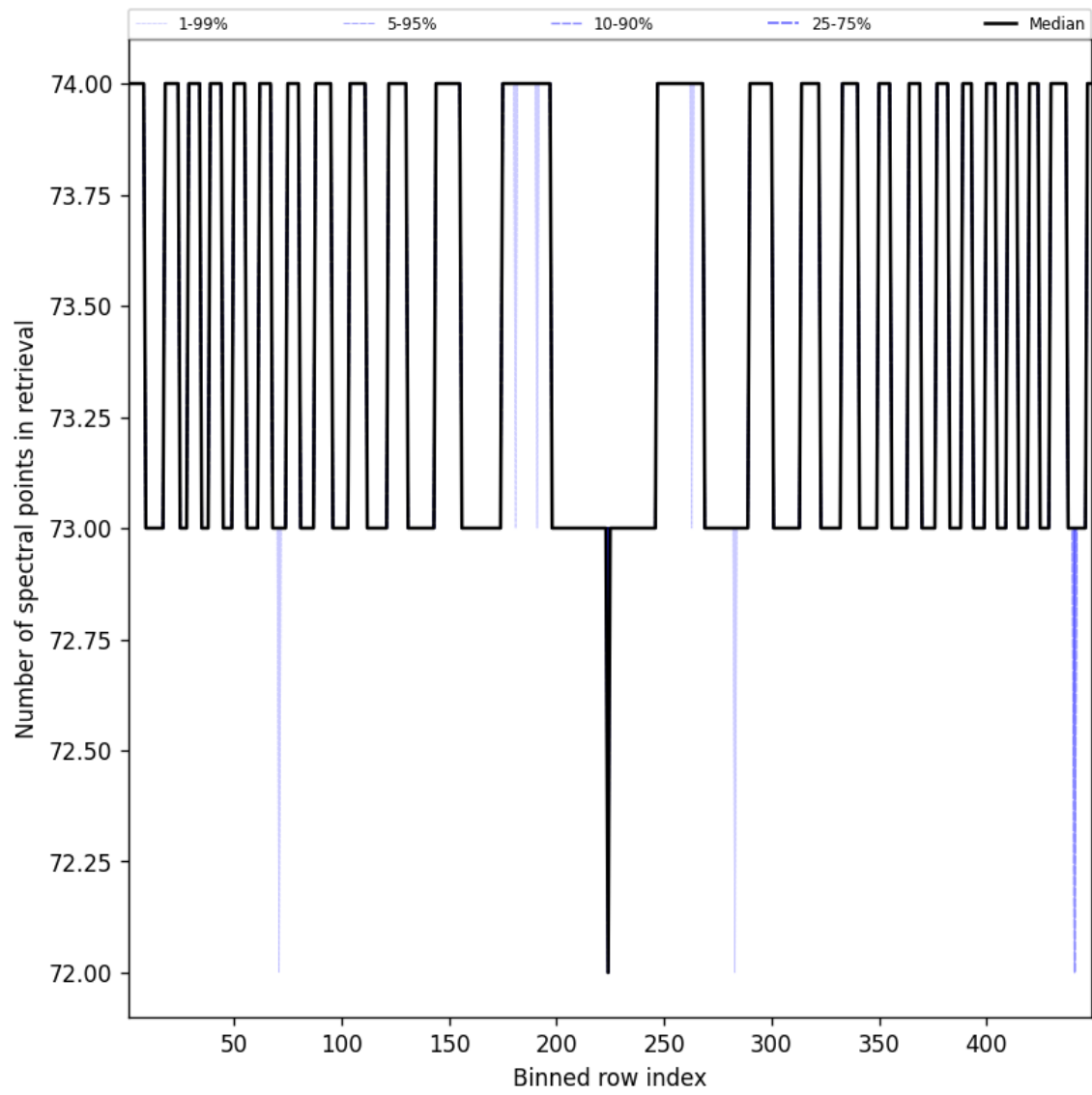


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-01-17 to 2025-01-18

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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