

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]	0.606 ± 0.420	17285820	0.995	0.830	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.119 \pm 160.629) \times 10^{-2}$	17285820	0.223	0.391	8.131×10^{-3}	-146	251
sulfurdioxide total vertical column precision [DU]	0.584 ± 1.179	17285820	0.197	0.328	0.290	2.886×10^{-2}	181
sulfurdioxide slant column density corrected [DU]	$(1.513 \pm 34.256) \times 10^{-2}$	17285820	0.235	0.335	7.865×10^{-3}	-13.2	257
sulfurdioxide slant column density cobra [DU]	$(1.503 \pm 32.996) \times 10^{-2}$	17285820	0.235	0.335	7.865×10^{-3}	-13.2	24.9
sulfurdioxide slant column density cobra precision [DU]	0.270 ± 0.124	17285820	0.213	0.107	0.230	7.298×10^{-2}	23.7
sulfurdioxide slant column density window1 [DU]	$(7.155 \pm 64.198) \times 10^{-2}$	17285820	0.125	0.709	8.078×10^{-2}	-31.5	47.8
sulfurdioxide slant column density window1 precision [DU]	0.270 ± 0.124	17285820	0.213	0.107	0.230	7.298×10^{-2}	23.7
sulfurdioxide slant column density corrected win1 [DU]	$(4.883 \pm 621.158) \times 10^{-3}$	17285820	-2.500×10^{-2}	0.673	-9.868×10^{-3}	-31.5	47.8
background so2 slant column offset window1 [DU]	$(-6.667 \pm 18.548) \times 10^{-2}$	17285820	-0.180	0.235	-0.126	-1.39	3.79
sulfurdioxide slant column density window2 [DU]	-0.339 ± 8.556	17285820	-0.750	10.7	-0.468	-1.884×10^3	724
sulfurdioxide slant column density window2 precision [DU]	7.77 ± 2.20	17285820	6.97	2.48	7.40	2.06	446
sulfurdioxide slant column density corrected win2 [DU]	-1.15 ± 8.34	17285820	-1.25	10.5	-1.12	-1.883×10^3	725
background so2 slant column offset window2 [DU]	-0.809 ± 2.209	17285820	0.750	2.53	-0.118	-14.2	5.96
sulfurdioxide slant column density window3 [DU]	0.430 ± 23.172	17285820	-0.560	28.7	0.195	-1.246×10^3	378
sulfurdioxide slant column density window3 precision [DU]	27.5 ± 12.6	17285820	21.5	9.53	24.1	10.3	339
sulfurdioxide slant column density corrected win3 [DU]	4.87 ± 22.35	17285820	3.92	27.7	4.86	-1.250×10^3	392
background so2 slant column offset window3 [DU]	4.44 ± 6.35	17285820	3.92	9.53	4.49	-27.9	24.2
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17285820	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.165 \pm 11.088) \times 10^{-2}$	17285820	1.800×10^{-2}	2.442×10^{-2}	2.041×10^{-2}	3.887×10^{-4}	3.54
fitted radiance shift [nm]	$(-2.973 \pm 24.540) \times 10^{-4}$	17285820	-5.000×10^{-4}	1.636×10^{-3}	-3.430×10^{-4}	-5.327×10^{-2}	4.630×10^{-2}
fitted radiance squeeze [1]	$(-5.923 \pm 18.429) \times 10^{-5}$	17285820	-3.000×10^{-5}	2.173×10^{-4}	-4.921×10^{-5}	-1.824×10^{-2}	2.139×10^{-2}
fitted root mean square [1]	$(1.207 \pm 0.510) \times 10^{-3}$	17285820	9.250×10^{-4}	4.621×10^{-4}	1.062×10^{-3}	3.090×10^{-4}	5.301×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.952 ± 0.627	17285820	0.580	0.683	0.792	5.000×10^{-2}	3.12
sulfurdioxide total air mass factor polluted precision [1]	0.151 ± 0.155	17285820	3.500×10^{-2}	0.179	9.233×10^{-2}	2.500×10^{-3}	1.93
sulfurdioxide clear air mass factor polluted [1]	0.827 ± 0.612	17285820	0.540	0.410	0.656	2.209×10^{-2}	3.17
number of spectral points in retrieval [1]	73.4 ± 0.5	17285820	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}	8.000×10^{-2}	0.170	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-3.21	-0.890	-0.503	-0.325	-0.184	0.207	0.360	0.557	1.00	3.85
sulfurdioxide total vertical column precision [DU]	7.837×10^{-2}	9.738×10^{-2}	0.117	0.142	0.182	0.510	0.736	1.07	1.93	5.94
sulfurdioxide slant column density corrected [DU]	-0.797	-0.450	-0.327	-0.245	-0.158	0.177	0.267	0.355	0.494	0.930
sulfurdioxide slant column density cobra [DU]	-0.797	-0.450	-0.327	-0.245	-0.158	0.177	0.267	0.355	0.494	0.930
sulfurdioxide slant column density cobra precision [DU]	0.133	0.158	0.171	0.182	0.195	0.302	0.365	0.425	0.508	0.741
sulfurdioxide slant column density window1 [DU]	-1.64	-0.927	-0.656	-0.473	-0.280	0.429	0.608	0.779	1.04	1.77
sulfurdioxide slant column density window1 precision [DU]	0.133	0.158	0.171	0.182	0.195	0.302	0.365	0.425	0.508	0.741
sulfurdioxide slant column density corrected win1 [DU]	-1.55	-0.911	-0.674	-0.514	-0.342	0.330	0.513	0.690	0.966	1.77
background so2 slant column offset window1 [DU]	-0.375	-0.291	-0.249	-0.218	-0.191	4.324×10^{-2}	0.150	0.222	0.290	0.408
sulfurdioxide slant column density window2 [DU]	-20.5	-13.9	-10.8	-8.42	-5.78	4.93	7.68	10.2	13.7	21.5
sulfurdioxide slant column density window2 precision [DU]	4.20	4.99	5.46	5.85	6.32	8.80	9.69	10.6	11.9	14.5
sulfurdioxide slant column density corrected win2 [DU]	-21.6	-14.7	-11.4	-9.03	-6.38	4.11	6.73	9.07	12.3	19.1
background so2 slant column offset window2 [DU]	-7.89	-5.49	-3.93	-2.85	-1.81	0.721	0.967	1.17	1.45	2.60
sulfurdioxide slant column density window3 [DU]	-57.9	-37.0	-27.7	-21.1	-13.9	14.8	22.4	29.4	38.8	57.3
sulfurdioxide slant column density window3 precision [DU]	14.9	16.8	18.0	19.1	20.4	30.0	34.3	39.5	50.6	81.6
sulfurdioxide slant column density corrected win3 [DU]	-51.9	-31.6	-22.4	-15.9	-8.88	18.8	26.0	32.5	41.4	59.5
background so2 slant column offset window3 [DU]	-8.79	-5.49	-4.07	-2.55	-0.289	9.24	11.3	12.9	14.5	17.3
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]	2.139×10^{-3}	4.285×10^{-3}	7.057×10^{-3}	9.386×10^{-3}	1.256×10^{-2}	3.698×10^{-2}	4.887×10^{-2}	6.453×10^{-2}	0.110	0.468
fitted radiance shift [nm]	-7.747×10^{-3}	-3.829×10^{-3}	-2.476×10^{-3}	-1.739×10^{-3}	-1.158×10^{-3}	4.775×10^{-4}	1.146×10^{-3}	1.995×10^{-3}	3.476×10^{-3}	7.545×10^{-3}
fitted radiance squeeze [1]	-5.633×10^{-4}	-3.675×10^{-4}	-2.840×10^{-4}	-2.253×10^{-4}	-1.630×10^{-4}	5.432×10^{-5}	1.050×10^{-4}	1.511×10^{-4}	2.160×10^{-4}	3.707×10^{-4}
fitted root mean square [1]	5.715×10^{-4}	6.988×10^{-4}	7.725×10^{-4}	8.282×10^{-4}	8.943×10^{-4}	1.356×10^{-3}	1.589×10^{-3}	1.832×10^{-3}	2.206×10^{-3}	3.123×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.308×10^{-2}	0.197	0.310	0.409	0.519	1.20	1.56	1.95	2.39	2.72
sulfurdioxide total air mass factor polluted precision [1]	7.964×10^{-3}	1.547×10^{-2}	2.260×10^{-2}	2.832×10^{-2}	3.733×10^{-2}	0.217	0.293	0.367	0.465	0.684
sulfurdioxide clear air mass factor polluted [1]	0.137	0.256	0.342	0.412	0.486	0.896	1.05	1.57	2.54	2.90
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]	0.709 ± 0.390	6130158	0.680	1.000	0.0	1.000	0.320	1.000
sulfurdioxide total vertical column [DU]	$(9.107 \pm 255.602) \times 10^{-2}$	6130158	0.615	1.397×10^{-2}	-146	251	-0.285	0.331
sulfurdioxide total vertical column precision [DU]	1.01 ± 1.80	6130158	0.674	0.443	5.075×10^{-2}	181	0.261	0.935
sulfurdioxide slant column density corrected [DU]	$(2.376 \pm 41.961) \times 10^{-2}$	6130158	0.397	1.045×10^{-2}	-9.29	79.5	-0.186	0.212
sulfurdioxide slant column density cobra [DU]	$(2.362 \pm 41.258) \times 10^{-2}$	6130158	0.397	1.045×10^{-2}	-9.29	13.7	-0.186	0.212
sulfurdioxide slant column density cobra precision [DU]	0.325 ± 0.156	6130158	0.170	0.275	8.344×10^{-2}	23.7	0.220	0.390
sulfurdioxide slant column density window1 [DU]	0.142 ± 0.762	6130158	0.802	0.151	-31.5	42.3	-0.253	0.549
sulfurdioxide slant column density window1 precision [DU]	0.325 ± 0.156	6130158	0.170	0.275	8.344×10^{-2}	23.7	0.220	0.390
sulfurdioxide slant column density corrected win1 [DU]	$(3.109 \pm 76.077) \times 10^{-2}$	6130158	0.794	4.945×10^{-3}	-31.5	42.6	-0.384	0.410
background so2 slant column offset window1 [DU]	-0.111 ± 0.164	6130158	0.139	-0.134	-0.991	3.79	-0.202	-6.291×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.344 ± 9.740	6130158	12.4	1.755×10^{-2}	-160	534	-6.03	6.34
sulfurdioxide slant column density window2 precision [DU]	8.74 ± 2.27	6130158	2.82	8.40	2.48	277	7.16	9.98
sulfurdioxide slant column density corrected win2 [DU]	-1.17 ± 9.38	6130158	12.0	-1.15	-165	524	-7.15	4.82
background so2 slant column offset window2 [DU]	-1.51 ± 2.82	6130158	3.96	-0.325	-14.2	5.96	-3.36	0.602
sulfurdioxide slant column density window3 [DU]	-2.36 ± 25.65	6130158	32.6	-1.74	-408	180	-18.3	14.3
sulfurdioxide slant column density window3 precision [DU]	30.6 ± 12.4	6130158	9.77	27.4	11.4	221	23.6	33.4
sulfurdioxide slant column density corrected win3 [DU]	4.39 ± 25.20	6130158	32.0	4.75	-398	187	-11.4	20.6
background so2 slant column offset window3 [DU]	6.75 ± 5.45	6130158	8.36	6.07	-21.1	24.1	2.60	11.0
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.27	6130158	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.281 \pm 17.939) \times 10^{-2}$	6130158	4.313×10^{-2}	2.267×10^{-2}	1.163×10^{-3}	3.54	1.399×10^{-2}	5.711×10^{-2}
fitted radiance shift [nm]	$(-1.391 \pm 24.902) \times 10^{-4}$	6130158	1.643×10^{-3}	-1.635×10^{-4}	-4.122×10^{-2}	3.273×10^{-2}	-9.803×10^{-4}	6.630×10^{-4}
fitted radiance squeeze [1]	$(-1.064 \pm 19.646) \times 10^{-5}$	6130158	2.176×10^{-4}	-4.393×10^{-6}	-2.865×10^{-3}	4.690×10^{-3}	-1.146×10^{-4}	1.030×10^{-4}
fitted root mean square [1]	$(1.418 \pm 0.644) \times 10^{-3}$	6130158	6.839×10^{-4}	1.210×10^{-3}	3.194×10^{-4}	5.220×10^{-2}	9.900×10^{-4}	1.674×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.682 ± 0.394	6130158	0.532	0.645	5.000×10^{-2}	2.80	0.379	0.912
sulfurdioxide total air mass factor polluted precision [1]	$(9.779 \pm 13.108) \times 10^{-2}$	6130158	9.325×10^{-2}	4.795×10^{-2}	2.500×10^{-3}	1.93	2.625×10^{-2}	0.119
sulfurdioxide clear air mass factor polluted [1]	0.593 ± 0.280	6130158	0.452	0.581	2.209×10^{-2}	2.18	0.360	0.812
number of spectral points in retrieval [1]	73.5 ± 0.5	6130158	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]	0.549 ± 0.424	11155662	0.880	0.450	0.0	1.000	0.120	1.000
sulfurdioxide total vertical column [DU]	$(1.378 \pm 63.703) \times 10^{-2}$	11155662	0.315	6.345×10^{-3}	-89.4	145	-0.150	0.166
sulfurdioxide total vertical column precision [DU]	0.350 ± 0.472	11155662	0.236	0.240	2.886×10^{-2}	116	0.150	0.387
sulfurdioxide slant column density corrected [DU]	$(1.039 \pm 29.156) \times 10^{-2}$	11155662	0.308	6.759×10^{-3}	-13.2	257	-0.146	0.161
sulfurdioxide slant column density cobra [DU]	$(1.031 \pm 27.404) \times 10^{-2}$	11155662	0.308	6.759×10^{-3}	-13.2	24.9	-0.146	0.161
sulfurdioxide slant column density cobra precision [DU]	0.239 ± 0.089	11155662	7.438×10^{-2}	0.215	7.298×10^{-2}	13.6	0.186	0.261
sulfurdioxide slant column density window1 [DU]	$(3.267 \pm 56.128) \times 10^{-2}$	11155662	0.663	4.855×10^{-2}	-19.9	47.8	-0.293	0.370
sulfurdioxide slant column density window1 precision [DU]	0.239 ± 0.089	11155662	7.438×10^{-2}	0.215	7.298×10^{-2}	13.6	0.186	0.261
sulfurdioxide slant column density corrected win1 [DU]	$(-9.518 \pm 528.421) \times 10^{-3}$	11155662	0.619	-1.631×10^{-2}	-19.9	47.8	-0.324	0.295
background so2 slant column offset window1 [DU]	$(-4.219 \pm 19.200) \times 10^{-2}$	11155662	0.297	-0.115	-1.39	1.40	-0.189	0.108
sulfurdioxide slant column density window2 [DU]	-0.714 ± 7.805	11155662	9.96	-0.682	-1.884×10^3	724	-5.67	4.29
sulfurdioxide slant column density window2 precision [DU]	7.24 ± 1.96	11155662	2.06	6.96	2.06	446	6.02	8.08
sulfurdioxide slant column density corrected win2 [DU]	-1.14 ± 7.71	11155662	9.80	-1.10	-1.883×10^3	725	-6.02	3.78
background so2 slant column offset window2 [DU]	-0.423 ± 1.667	11155662	2.22	-1.733×10^{-3}	-10.1	5.69	-1.43	0.788
sulfurdioxide slant column density window3 [DU]	1.96 ± 21.54	11155662	27.0	1.07	-1.246×10^3	378	-11.9	15.1
sulfurdioxide slant column density window3 precision [DU]	25.8 ± 12.3	11155662	7.65	22.4	10.3	339	19.5	27.1
sulfurdioxide slant column density corrected win3 [DU]	5.13 ± 20.61	11155662	25.7	4.91	-1.250×10^3	392	-7.76	17.9
background so2 slant column offset window3 [DU]	3.17 ± 6.45	11155662	10.5	3.30	-27.9	24.2	-2.25	8.22
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11155662	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.452 \pm 2.320) \times 10^{-2}$	11155662	2.094×10^{-2}	1.946×10^{-2}	3.887×10^{-4}	1.43	1.169×10^{-2}	3.263×10^{-2}
fitted radiance shift [nm]	$(-3.842 \pm 24.294) \times 10^{-4}$	11155662	1.594×10^{-3}	-4.422×10^{-4}	-5.327×10^{-2}	4.630×10^{-2}	-1.232×10^{-3}	3.615×10^{-4}
fitted radiance squeeze [1]	$(-8.594 \pm 17.148) \times 10^{-5}$	11155662	2.124×10^{-4}	-7.269×10^{-5}	-1.824×10^{-2}	2.139×10^{-2}	-1.857×10^{-4}	2.669×10^{-5}
fitted root mean square [1]	$(1.091 \pm 0.371) \times 10^{-3}$	11155662	3.627×10^{-4}	1.003×10^{-3}	3.090×10^{-4}	5.301×10^{-2}	8.591×10^{-4}	1.222×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.10 ± 0.68	11155662	0.886	0.891	5.000×10^{-2}	3.12	0.593	1.48
sulfurdioxide total air mass factor polluted precision [1]	0.180 ± 0.159	11155662	0.216	0.135	4.948×10^{-3}	1.34	4.718×10^{-2}	0.263
sulfurdioxide clear air mass factor polluted [1]	0.956 ± 0.701	11155662	0.437	0.688	0.112	3.17	0.533	0.970
number of spectral points in retrieval [1]	73.4 ± 0.5	11155662	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]	0.653 ± 0.410	12182414	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(2.649 \pm 115.215) \times 10^{-2}$	12182414	0.403	8.216×10^{-3}	-89.4	115	-0.191	0.212
sulfurdioxide total vertical column precision [DU]	0.505 ± 0.877	12182414	0.282	0.293	4.842×10^{-2}	181	0.199	0.481
sulfurdioxide slant column density corrected [DU]	$(1.244 \pm 30.090) \times 10^{-2}$	12182414	0.319	7.066×10^{-3}	-8.58	79.5	-0.151	0.168
sulfurdioxide slant column density cobra [DU]	$(1.240 \pm 29.781) \times 10^{-2}$	12182414	0.319	7.066×10^{-3}	-8.58	17.4	-0.151	0.168
sulfurdioxide slant column density cobra precision [DU]	0.254 ± 0.109	12182414	8.890×10^{-2}	0.220	7.833×10^{-2}	23.7	0.189	0.278
sulfurdioxide slant column density window1 [DU]	0.101 ± 0.587	12182414	0.661	0.104	-31.5	47.8	-0.229	0.432
sulfurdioxide slant column density window1 precision [DU]	0.254 ± 0.109	12182414	8.890×10^{-2}	0.220	7.833×10^{-2}	23.7	0.189	0.278
sulfurdioxide slant column density corrected win1 [DU]	$(2.567 \pm 575.150) \times 10^{-3}$	12182414	0.641	-9.539×10^{-3}	-31.5	47.8	-0.327	0.314
background so2 slant column offset window1 [DU]	$(-9.802 \pm 15.448) \times 10^{-2}$	12182414	0.182	-0.138	-0.991	3.79	-0.196	-1.362×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.704 ± 8.271	12182414	10.4	-0.805	-1.884×10^3	724	-5.99	4.45
sulfurdioxide slant column density window2 precision [DU]	7.58 ± 2.05	12182414	2.32	7.26	2.26	432	6.22	8.55
sulfurdioxide slant column density corrected win2 [DU]	-1.15 ± 8.13	12182414	10.3	-1.13	-1.883×10^3	725	-6.29	4.01
background so2 slant column offset window2 [DU]	-0.451 ± 1.934	12182414	1.98	0.110	-14.2	5.96	-1.20	0.782
sulfurdioxide slant column density window3 [DU]	3.46 ± 22.68	12182414	28.5	3.00	-1.246×10^3	378	-10.9	17.6
sulfurdioxide slant column density window3 precision [DU]	27.1 ± 12.0	12182414	8.98	23.8	10.3	283	20.4	29.4
sulfurdioxide slant column density corrected win3 [DU]	6.83 ± 21.79	12182414	27.5	6.50	-1.250×10^3	392	-7.00	20.5
background so2 slant column offset window3 [DU]	3.37 ± 5.78	12182414	8.23	3.56	-27.9	24.1	-0.783	7.45
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.12	12182414	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.199 \pm 6.848) \times 10^{-2}$	12182414	2.054×10^{-2}	2.125×10^{-2}	1.466×10^{-3}	2.41	1.456×10^{-2}	3.510×10^{-2}
fitted radiance shift [nm]	$(-2.433 \pm 23.760) \times 10^{-4}$	12182414	1.716×10^{-3}	-2.550×10^{-4}	-4.122×10^{-2}	4.630×10^{-2}	-1.126×10^{-3}	5.900×10^{-4}
fitted radiance squeeze [1]	$(-4.578 \pm 16.789) \times 10^{-5}$	12182414	1.968×10^{-4}	-3.862×10^{-5}	-1.824×10^{-2}	1.431×10^{-2}	-1.397×10^{-4}	5.703×10^{-5}
fitted root mean square [1]	$(1.133 \pm 0.459) \times 10^{-3}$	12182414	3.720×10^{-4}	1.009×10^{-3}	3.090×10^{-4}	5.301×10^{-2}	8.666×10^{-4}	1.239×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.840 ± 0.434	12182414	0.519	0.773	5.000×10^{-2}	2.58	0.537	1.06
sulfurdioxide total air mass factor polluted precision [1]	0.135 ± 0.130	12182414	0.159	8.111×10^{-2}	3.106×10^{-3}	1.61	3.866×10^{-2}	0.197
sulfurdioxide clear air mass factor polluted [1]	0.667 ± 0.245	12182414	0.324	0.639	3.571×10^{-2}	2.66	0.496	0.820
number of spectral points in retrieval [1]	73.4 ± 0.5	12182414	1.000	73.0	71.0	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]	0.483 ± 0.418	4495337	0.910	0.350	0.0	1.000	9.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(6.038 \pm 204.623) \times 10^{-2}$	4495337	0.328	6.966×10^{-3}	-146	161	-0.152	0.176
sulfurdioxide total vertical column precision [DU]	0.676 ± 1.488	4495337	0.470	0.249	2.886×10^{-2}	116	0.117	0.587
sulfurdioxide slant column density corrected [DU]	$(1.931 \pm 40.926) \times 10^{-2}$	4495337	0.377	9.373×10^{-3}	-13.2	257	-0.177	0.200
sulfurdioxide slant column density cobra [DU]	$(1.912 \pm 38.431) \times 10^{-2}$	4495337	0.377	9.373×10^{-3}	-13.2	18.9	-0.177	0.200
sulfurdioxide slant column density cobra precision [DU]	0.303 ± 0.141	4495337	0.134	0.259	7.298×10^{-2}	12.3	0.215	0.349
sulfurdioxide slant column density window1 [DU]	$(-1.414 \pm 74.320) \times 10^{-2}$	4495337	0.842	-6.568×10^{-3}	-17.9	44.3	-0.440	0.402
sulfurdioxide slant column density window1 precision [DU]	0.303 ± 0.141	4495337	0.134	0.259	7.298×10^{-2}	12.3	0.215	0.349
sulfurdioxide slant column density corrected win1 [DU]	$(4.575 \pm 706.852) \times 10^{-3}$	4495337	0.756	-1.421×10^{-2}	-17.9	44.3	-0.388	0.369
background so2 slant column offset window1 [DU]	$(1.871 \pm 22.941) \times 10^{-2}$	4495337	0.410	-5.736×10^{-2}	-1.39	2.00	-0.173	0.236
sulfurdioxide slant column density window2 [DU]	0.492 ± 9.025	4495337	11.2	0.408	-719	534	-5.19	6.04
sulfurdioxide slant column density window2 precision [DU]	8.17 ± 2.42	4495337	2.78	7.73	2.06	312	6.54	9.32
sulfurdioxide slant column density corrected win2 [DU]	-1.14 ± 8.75	4495337	10.9	-1.10	-718	525	-6.55	4.31
background so2 slant column offset window2 [DU]	-1.63 ± 2.46	4495337	3.70	-1.34	-14.2	5.69	-3.20	0.499
sulfurdioxide slant column density window3 [DU]	-6.92 ± 22.46	4495337	27.1	-6.52	-408	364	-20.2	6.89
sulfurdioxide slant column density window3 precision [DU]	28.2 ± 13.6	4495337	10.5	24.7	11.3	264	20.3	30.8
sulfurdioxide slant column density corrected win3 [DU]	0.162 ± 22.710	4495337	27.4	0.946	-398	359	-13.1	14.3
background so2 slant column offset window3 [DU]	7.08 ± 6.86	4495337	10.9	8.95	-27.9	24.2	1.65	12.5
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.34	4495337	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.520 \pm 14.960) \times 10^{-2}$	4495337	3.475×10^{-2}	1.488×10^{-2}	3.887×10^{-4}	3.54	5.791×10^{-3}	4.054×10^{-2}
fitted radiance shift [nm]	$(-4.520 \pm 25.805) \times 10^{-4}$	4495337	1.347×10^{-3}	-5.615×10^{-4}	-5.327×10^{-2}	3.933×10^{-2}	-1.207×10^{-3}	1.394×10^{-4}
fitted radiance squeeze [1]	$(-1.007 \pm 2.145) \times 10^{-4}$	4495337	2.739×10^{-4}	-9.515×10^{-5}	-1.425×10^{-2}	2.139×10^{-2}	-2.363×10^{-4}	3.758×10^{-5}
fitted root mean square [1]	$(1.372 \pm 0.561) \times 10^{-3}$	4495337	5.566×10^{-4}	1.233×10^{-3}	3.339×10^{-4}	3.427×10^{-2}	1.015×10^{-3}	1.571×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.30 ± 0.90	4495337	1.77	1.02	5.000×10^{-2}	3.12	0.493	2.26
sulfurdioxide total air mass factor polluted precision [1]	0.198 ± 0.201	4495337	0.257	0.137	2.500×10^{-3}	1.93	3.429×10^{-2}	0.292
sulfurdioxide clear air mass factor polluted [1]	1.30 ± 0.98	4495337	1.93	0.857	2.224×10^{-2}	3.17	0.471	2.41
number of spectral points in retrieval [1]	73.4 ± 0.5	4495337	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

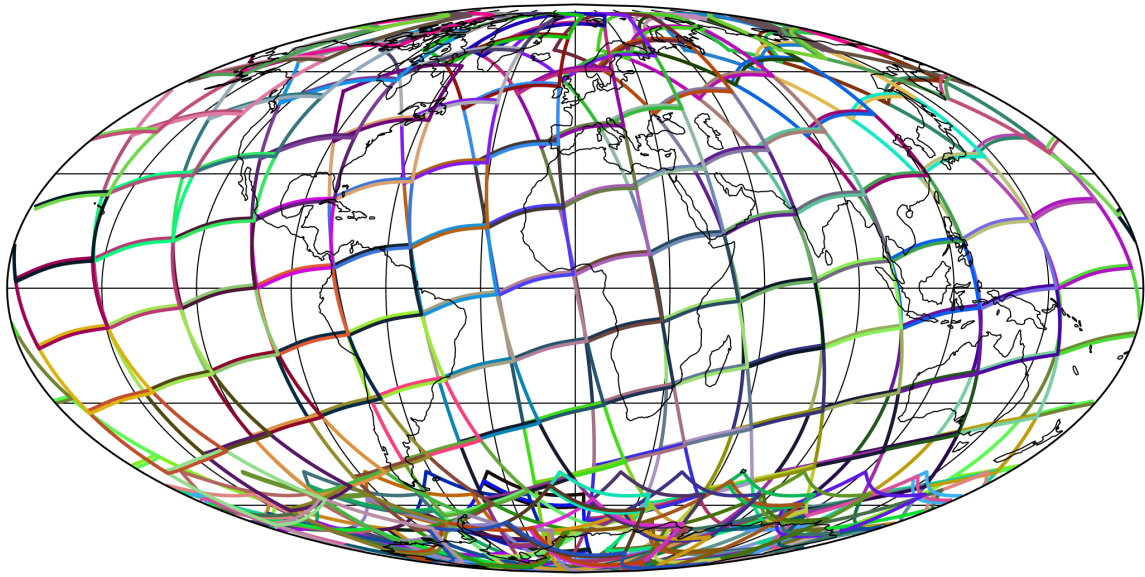


Figure 1: Outline of the granules.

4 Input data monitoring

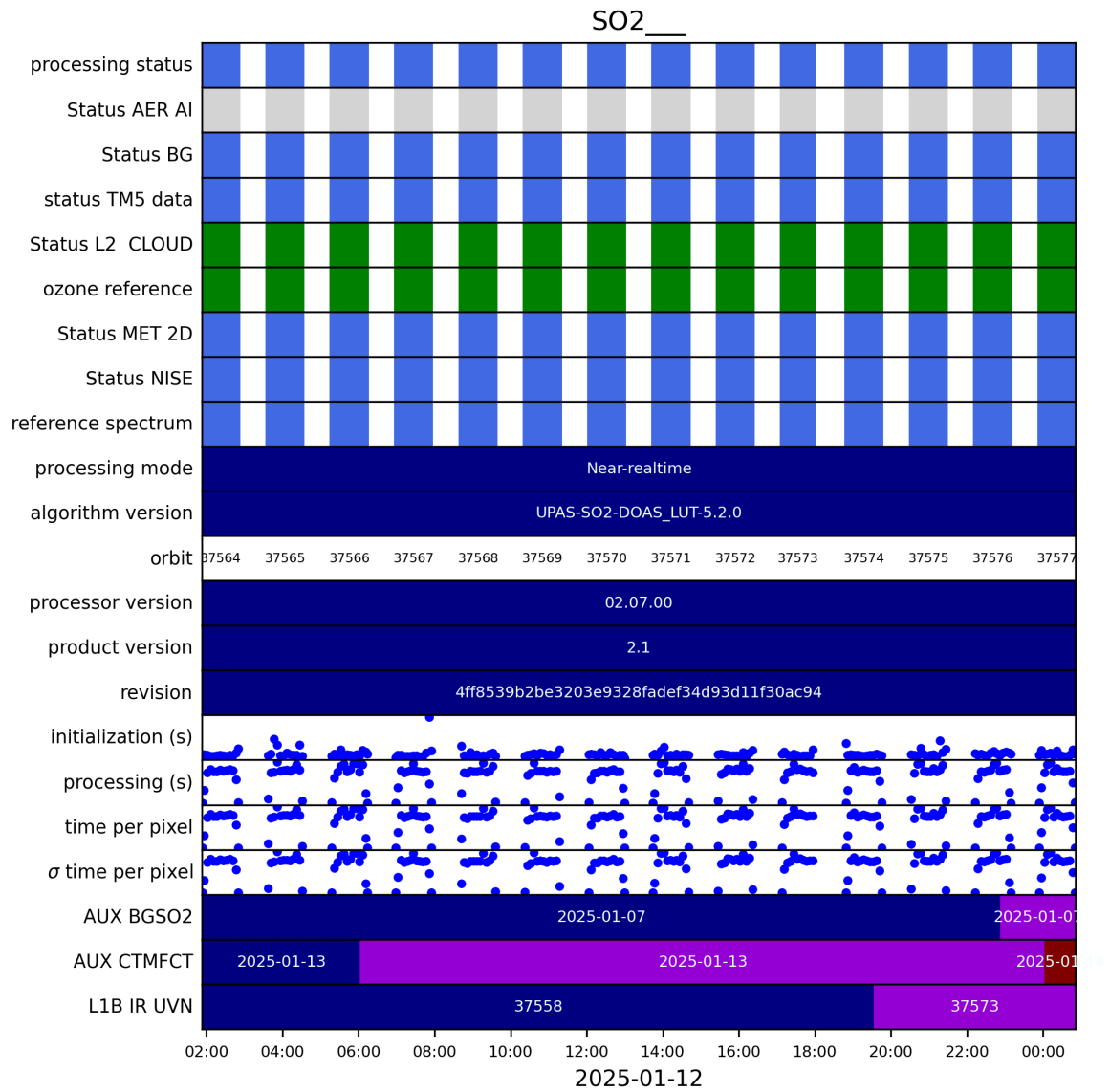


Figure 2: Input data per granule

5 Warnings and errors

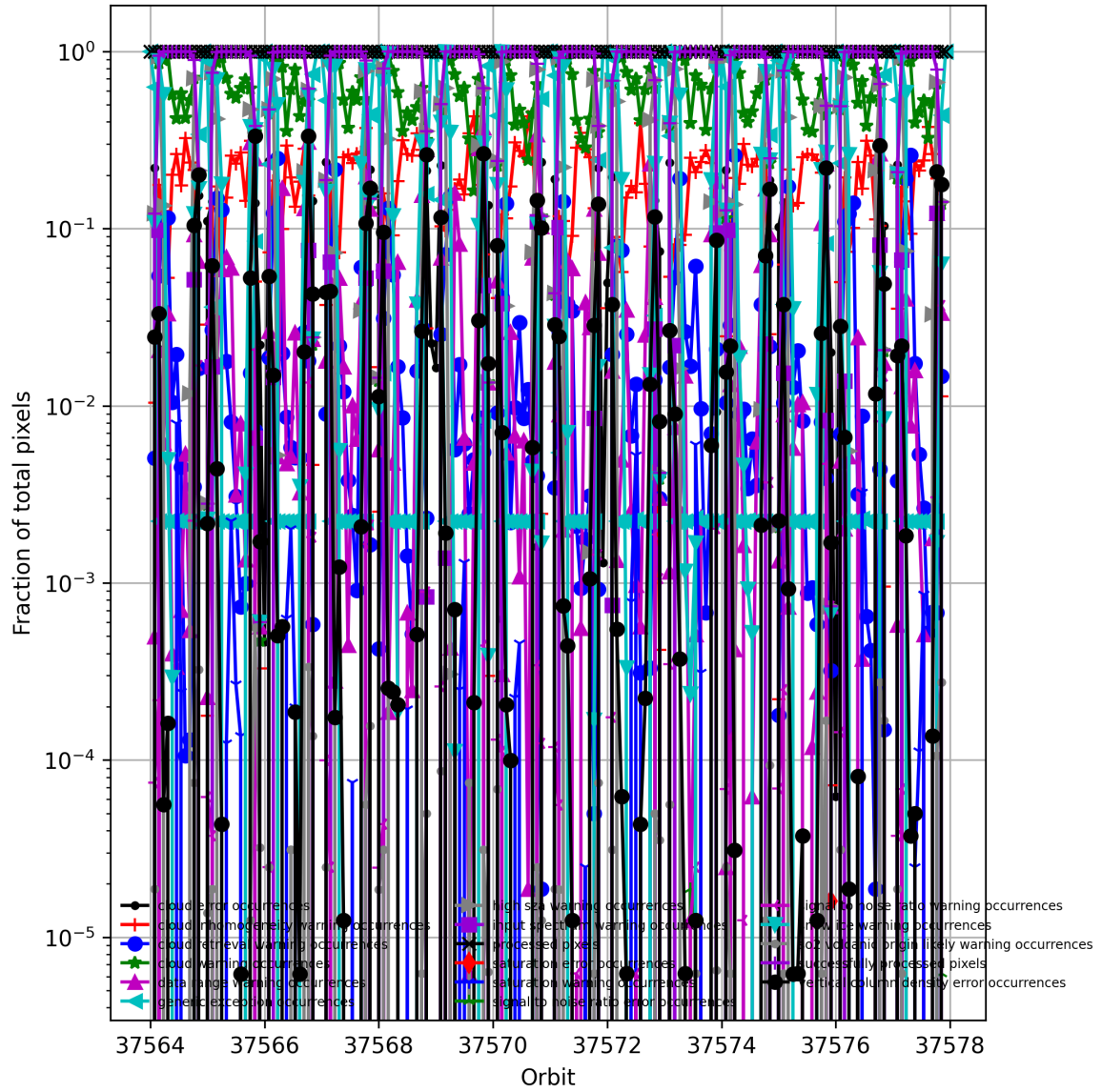


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

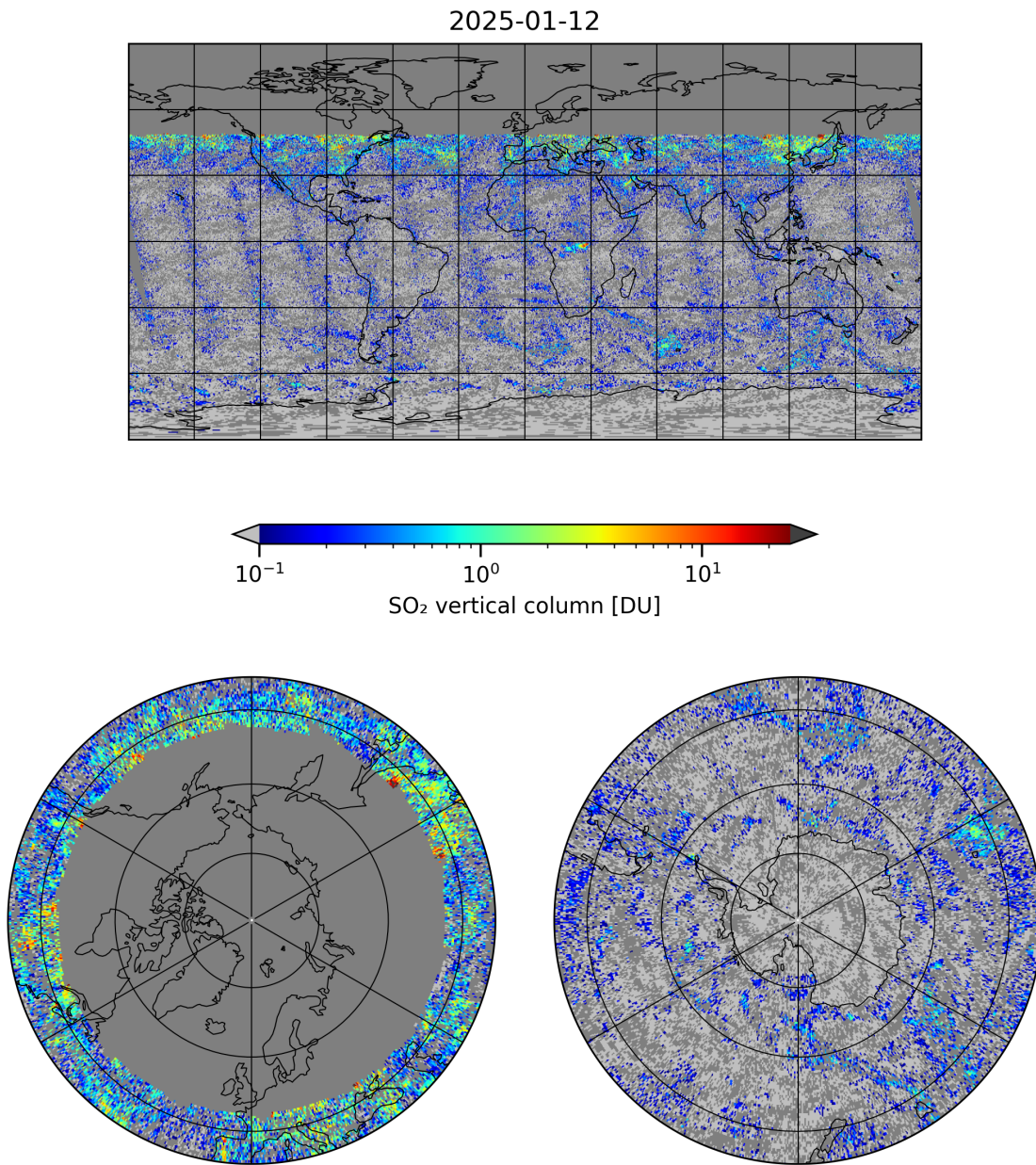


Figure 4: Map of “SO₂ vertical column” for 2025-01-12 to 2025-01-13

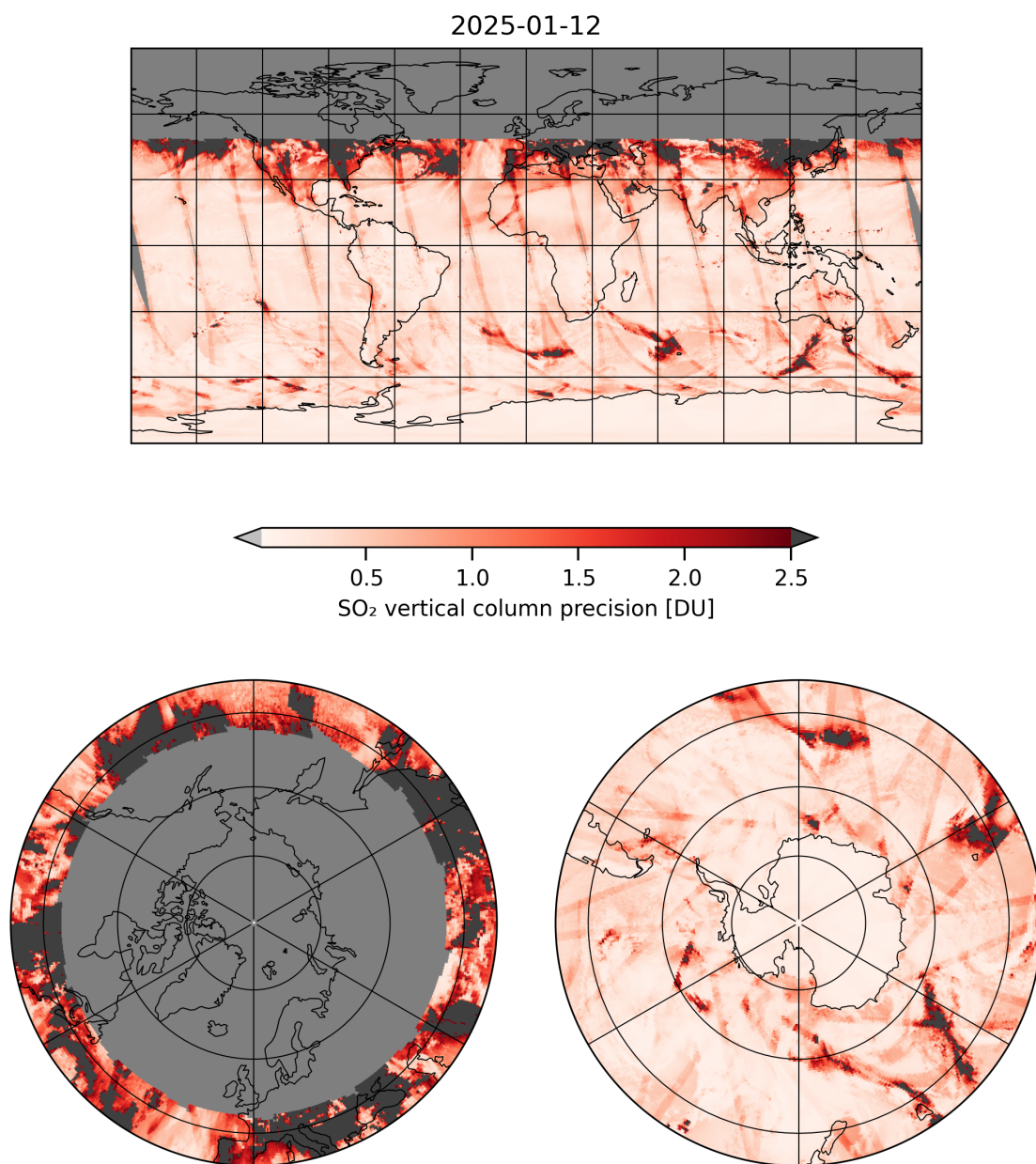


Figure 5: Map of “SO₂ vertical column precision” for 2025-01-12 to 2025-01-13

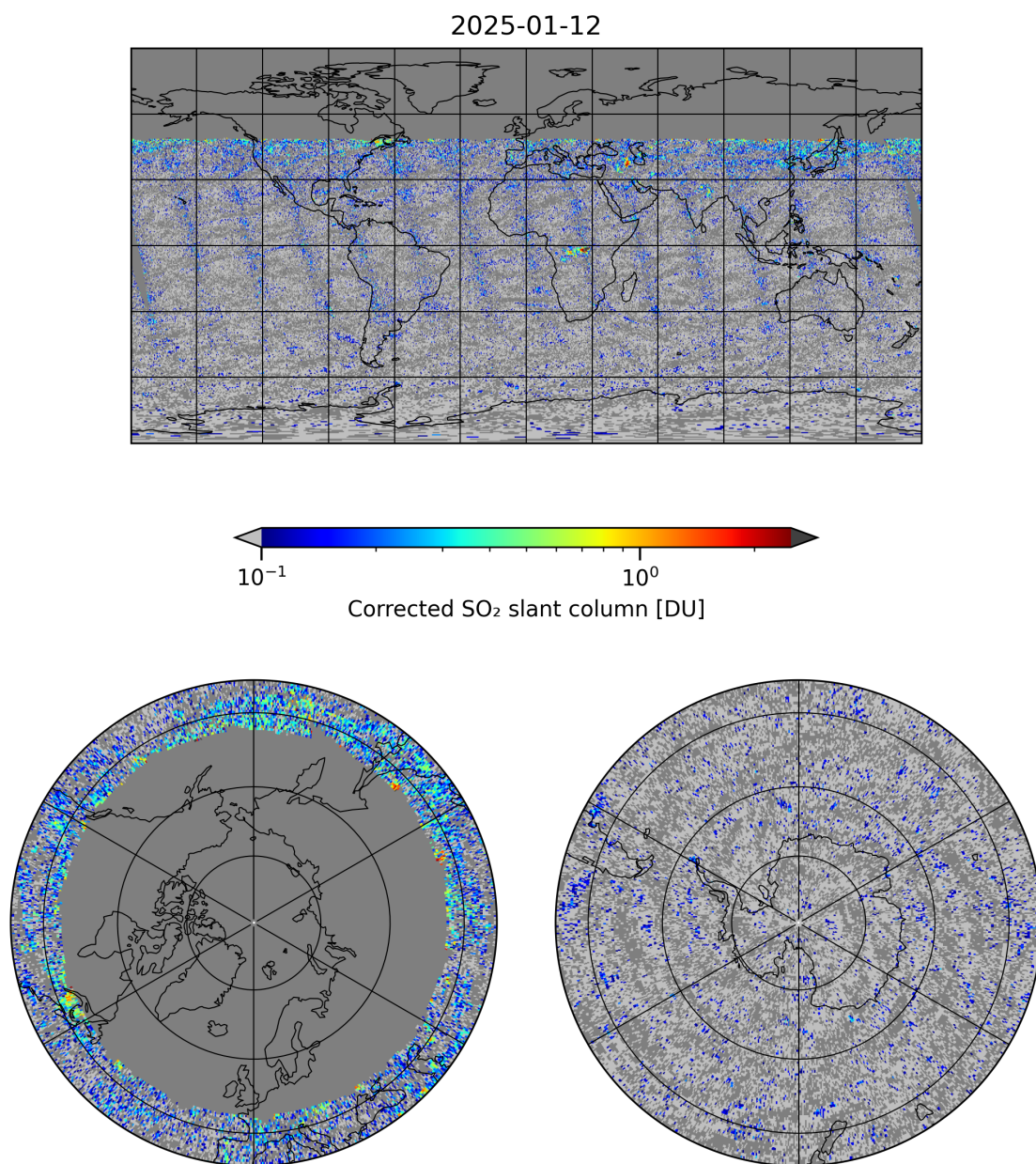


Figure 6: Map of “Corrected SO₂ slant column” for 2025-01-12 to 2025-01-13

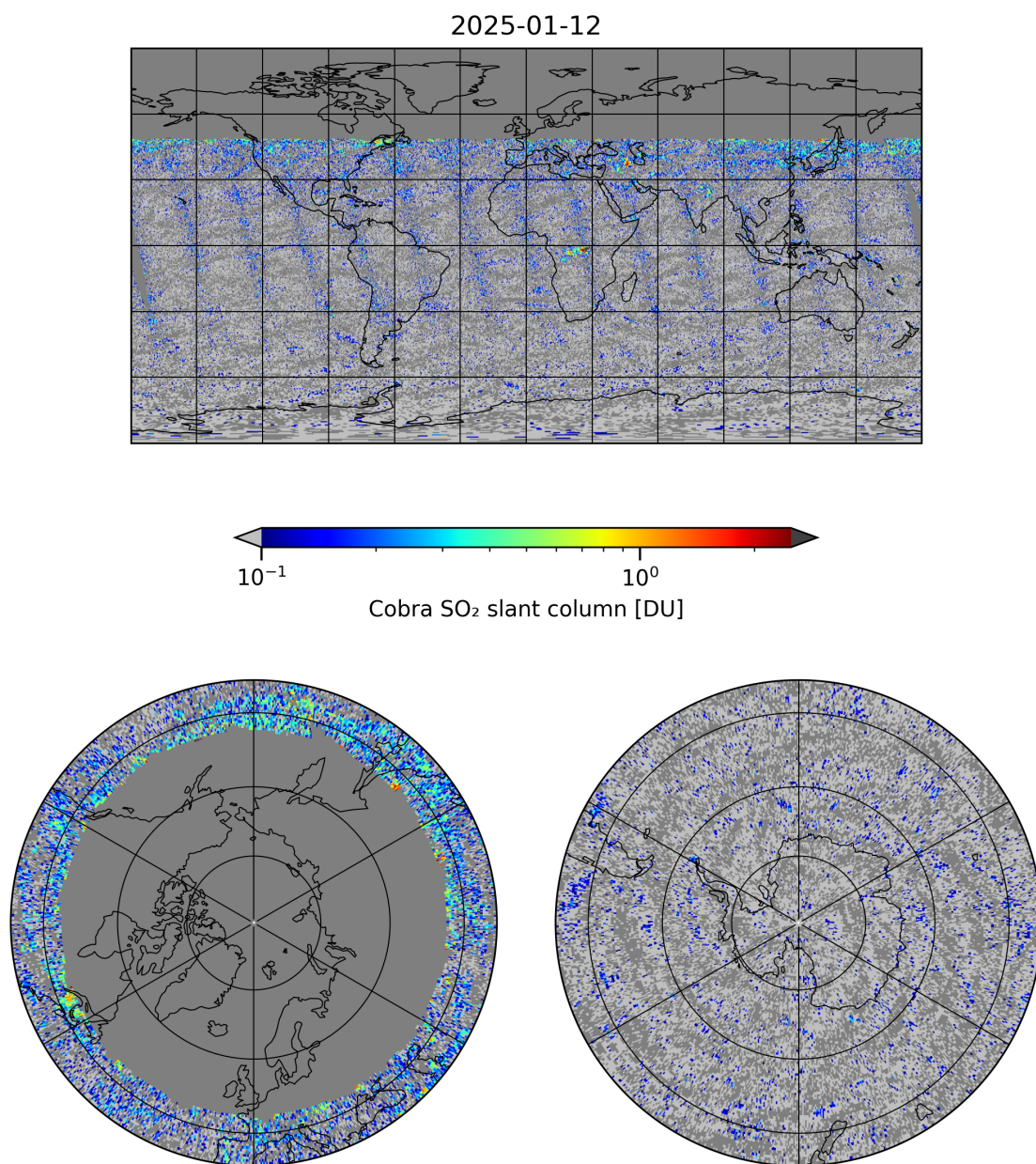


Figure 7: Map of “Cobra SO₂ slant column” for 2025-01-12 to 2025-01-13

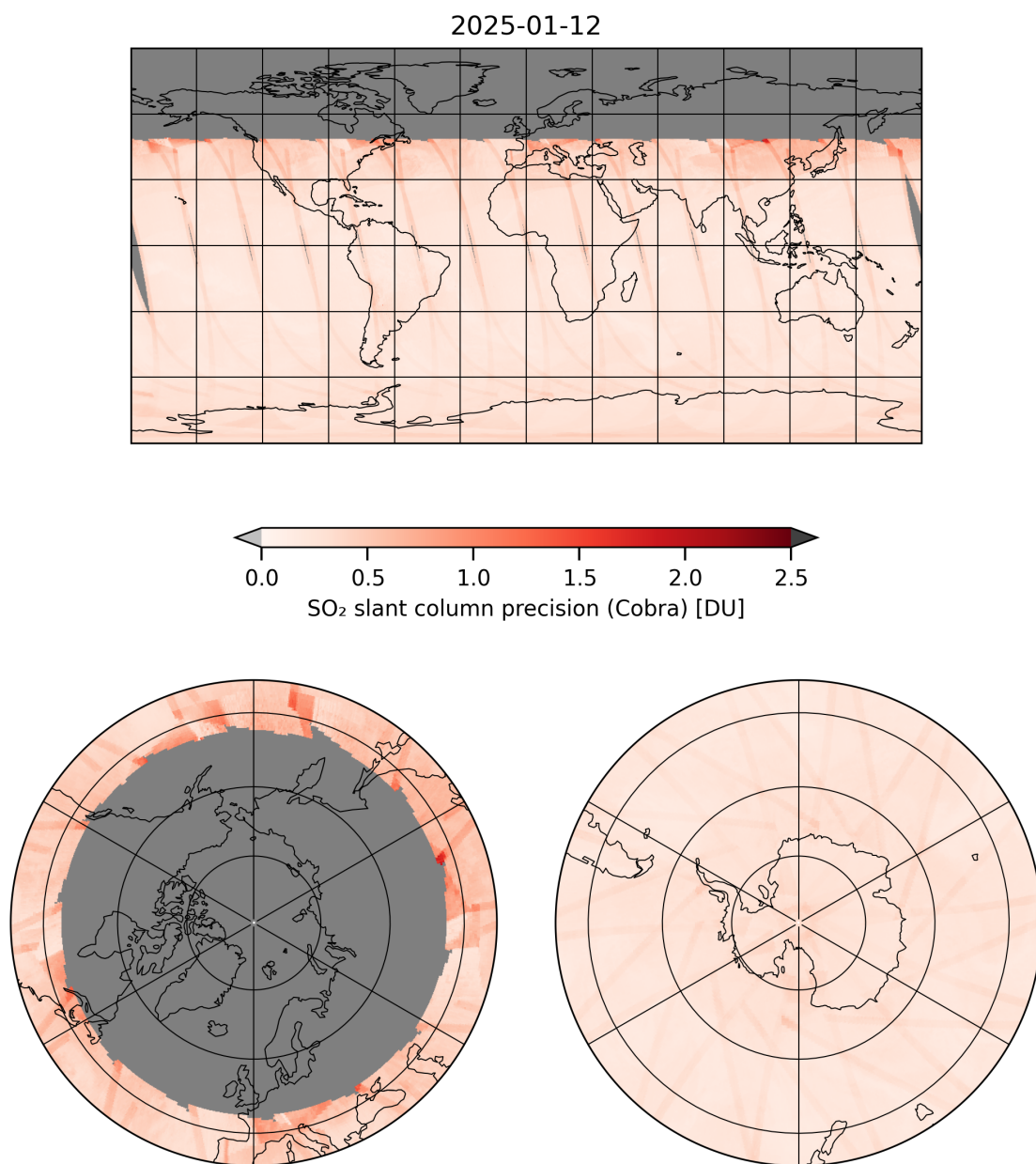


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-01-12 to 2025-01-13

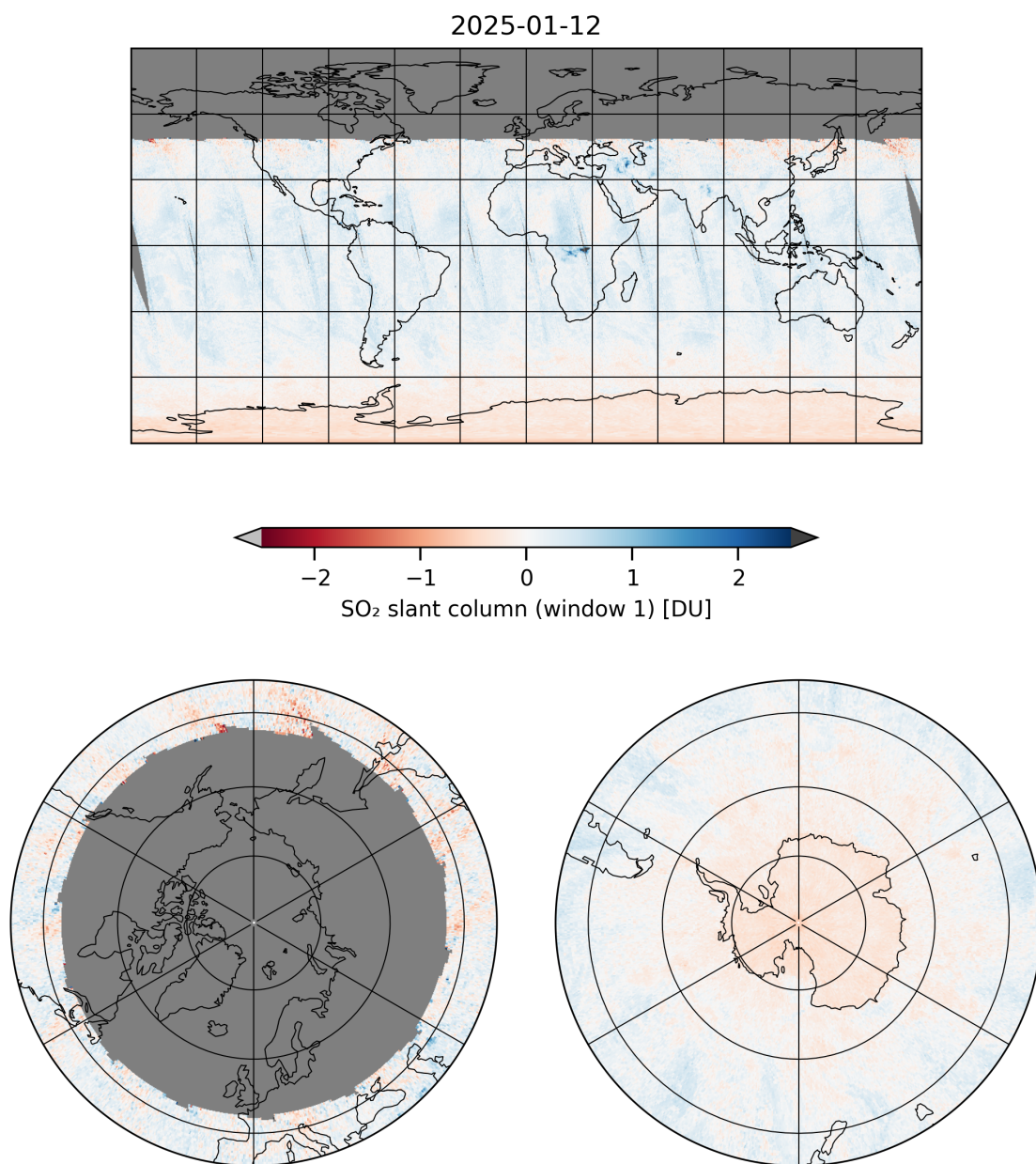


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-01-12 to 2025-01-13

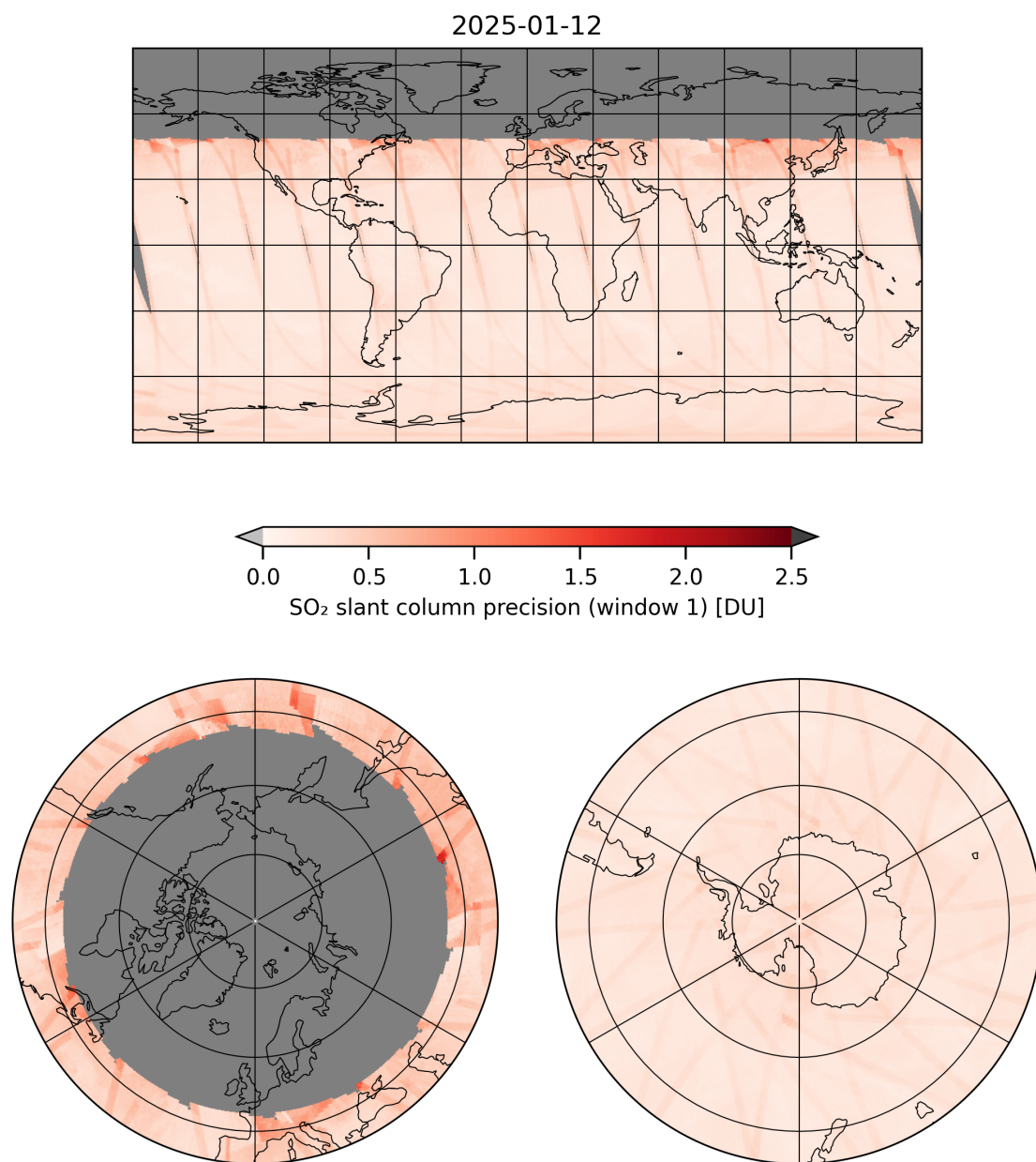


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-01-12 to 2025-01-13

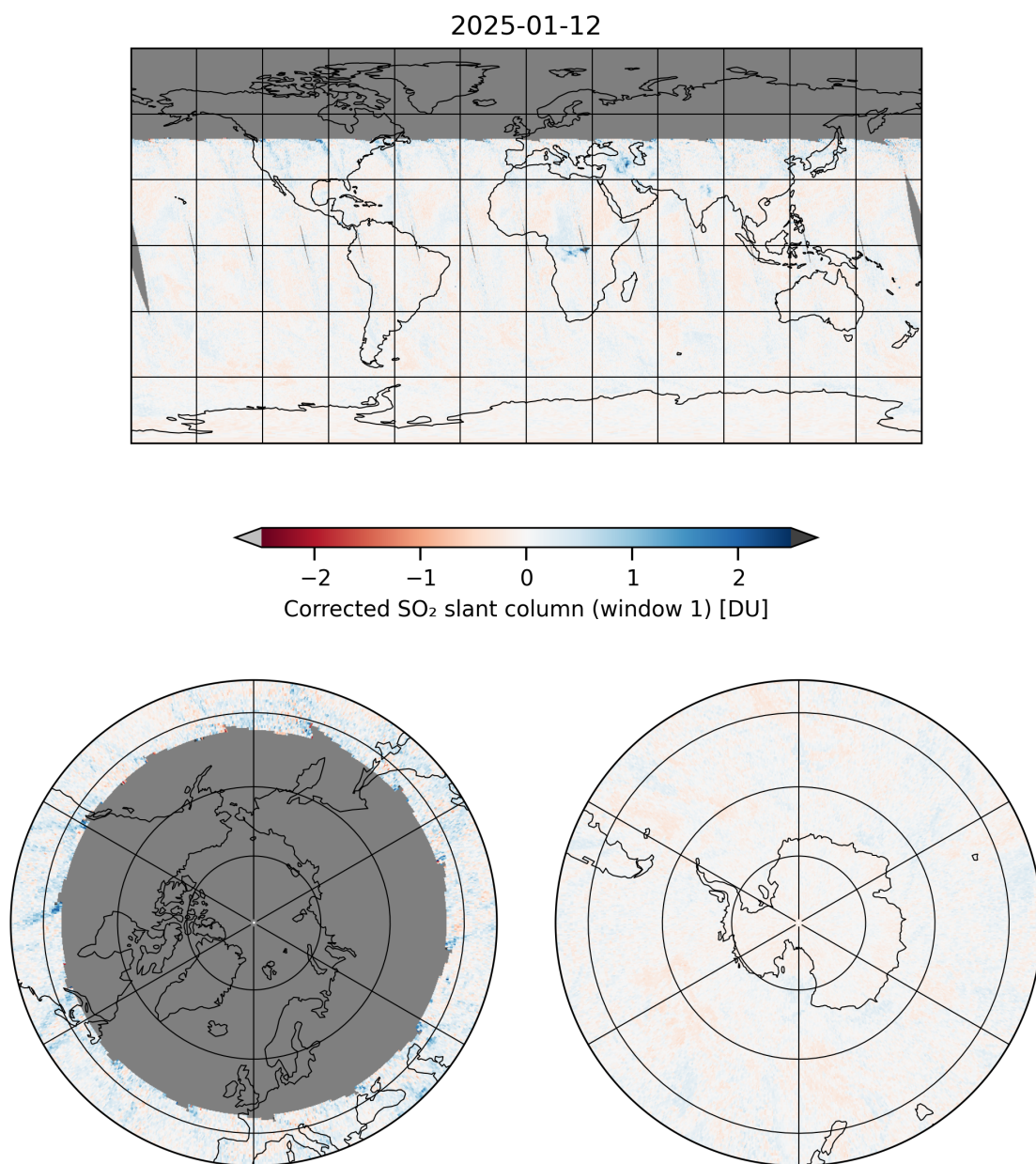


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-01-12 to 2025-01-13

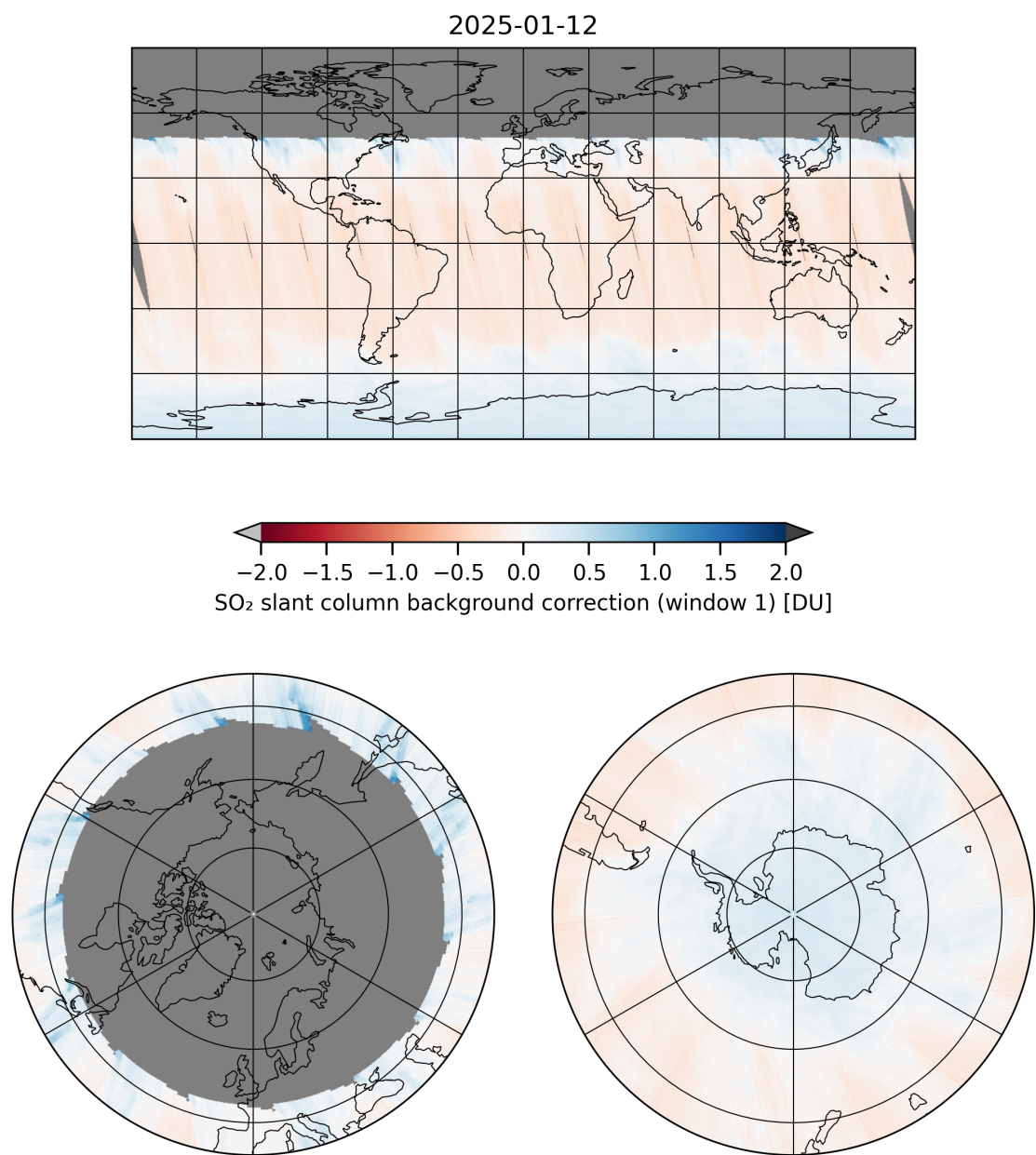


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-01-12 to 2025-01-13

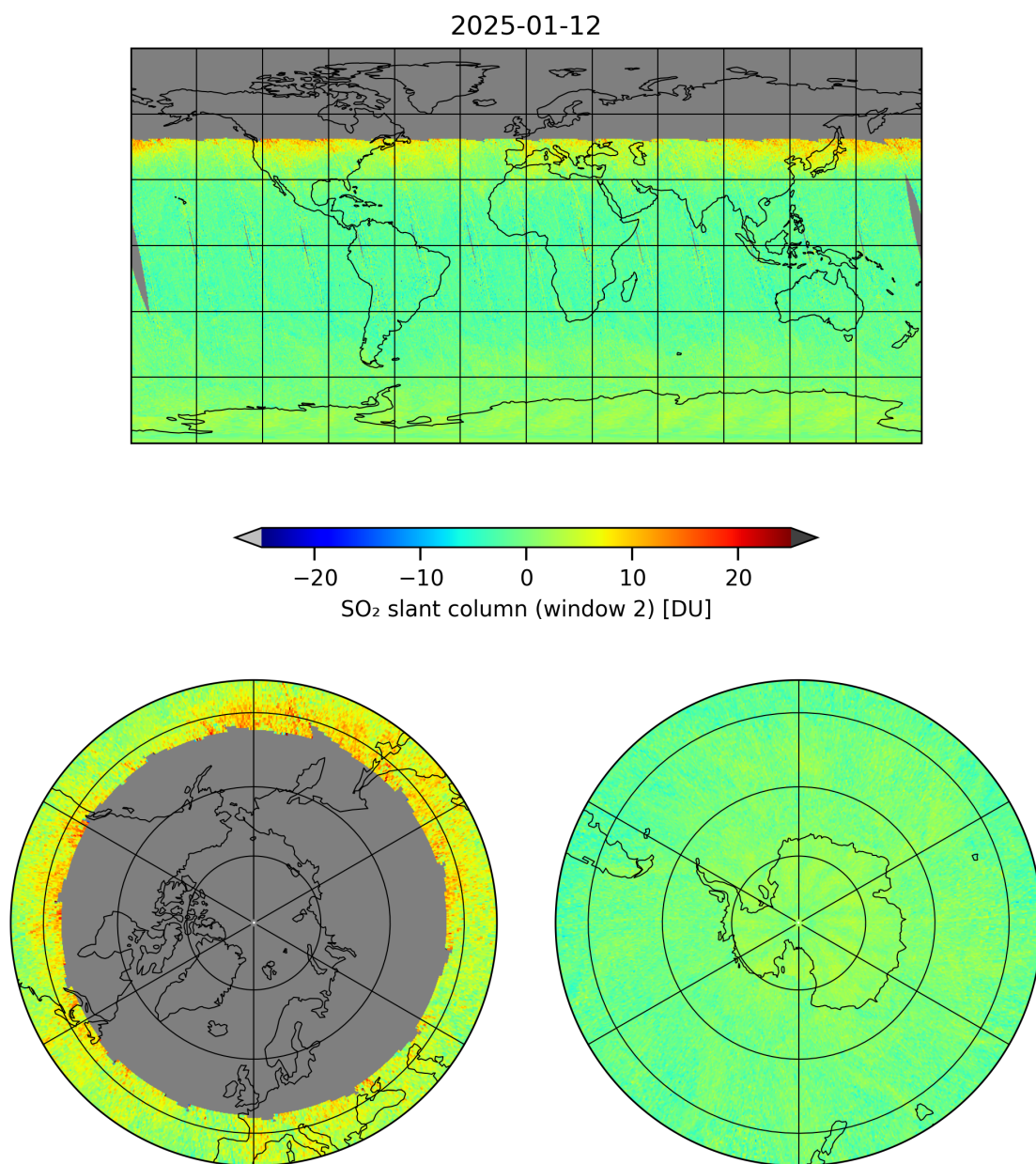


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-01-12 to 2025-01-13

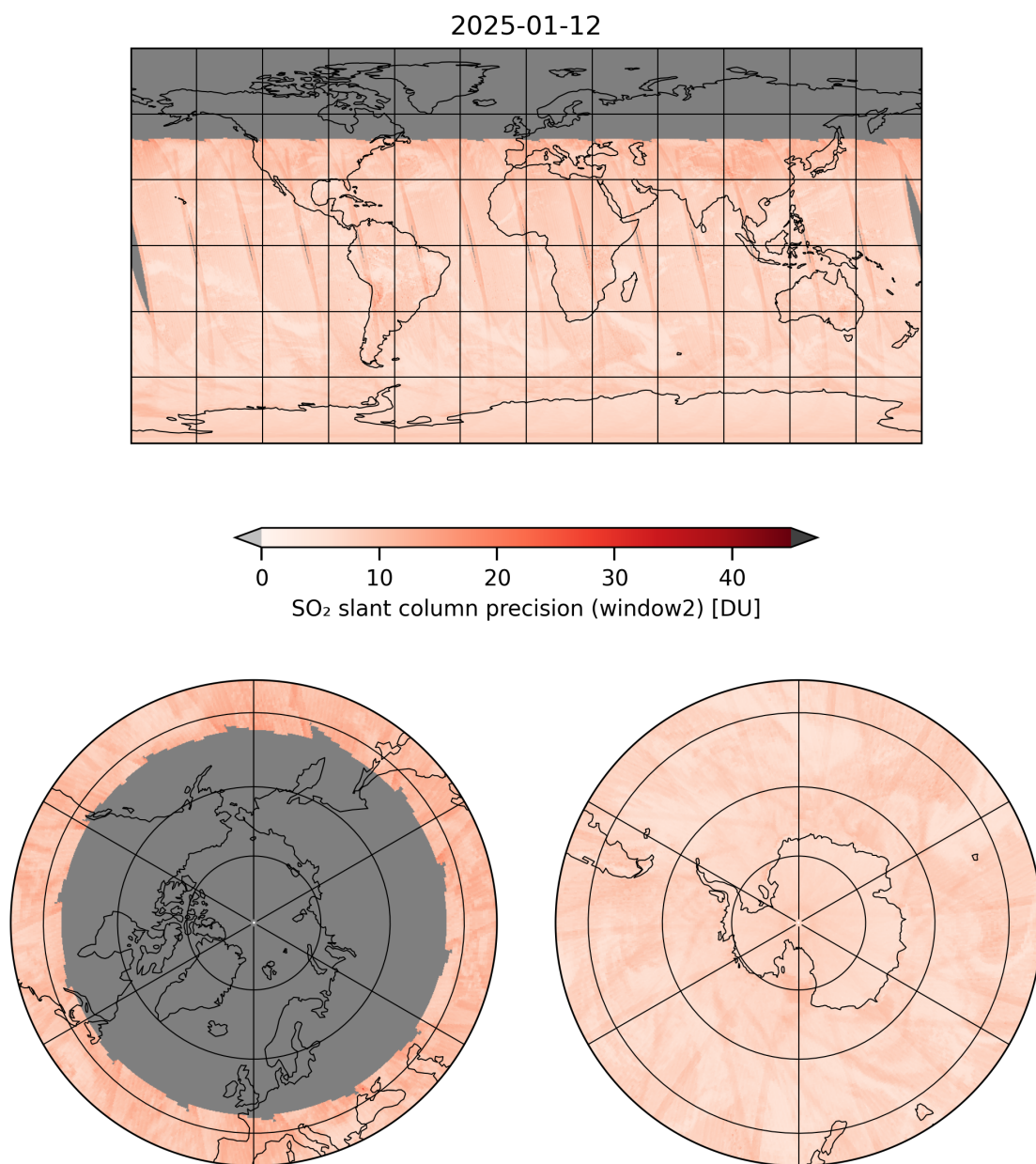


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-01-12 to 2025-01-13

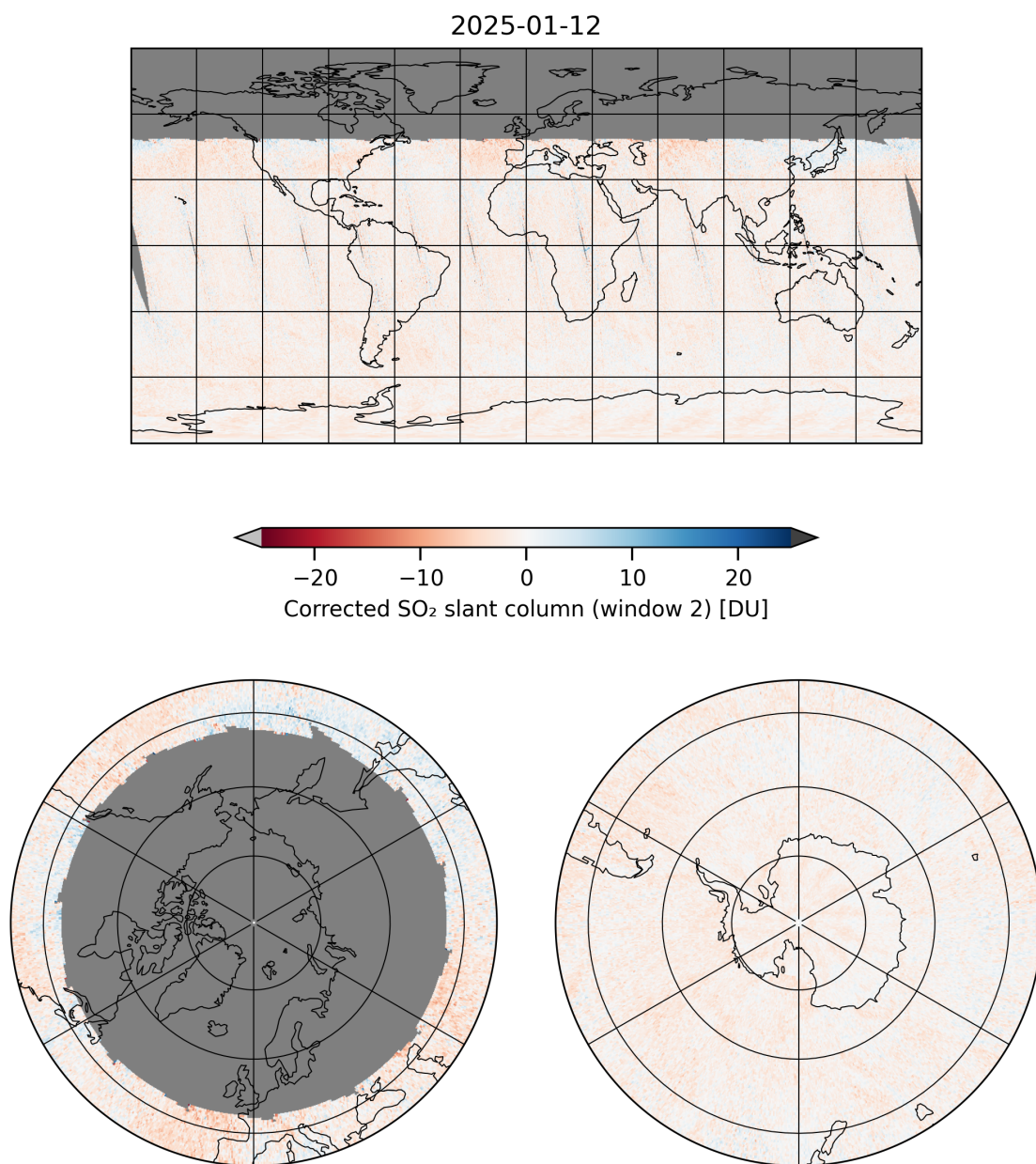


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-01-12 to 2025-01-13

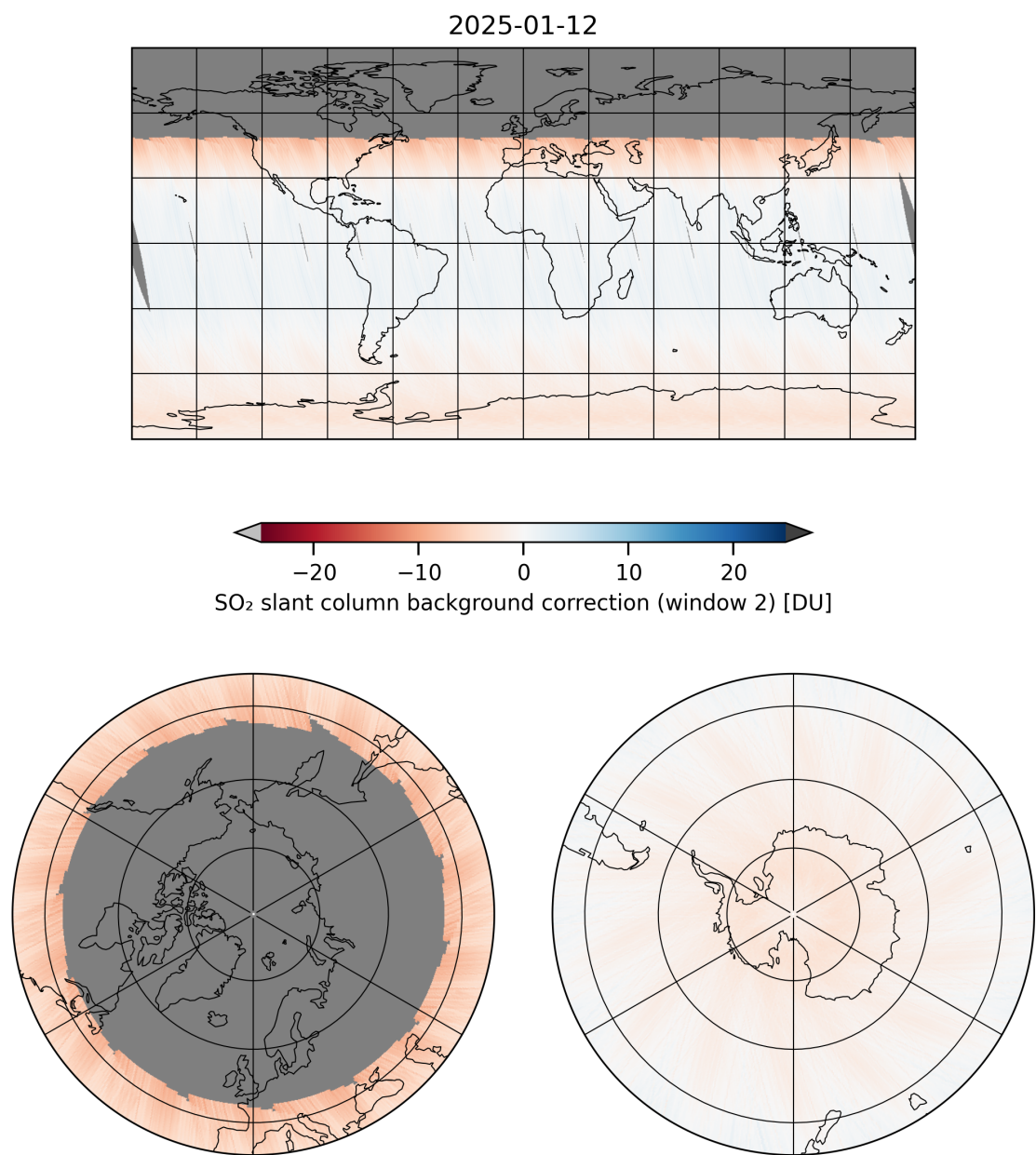


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-01-12 to 2025-01-13

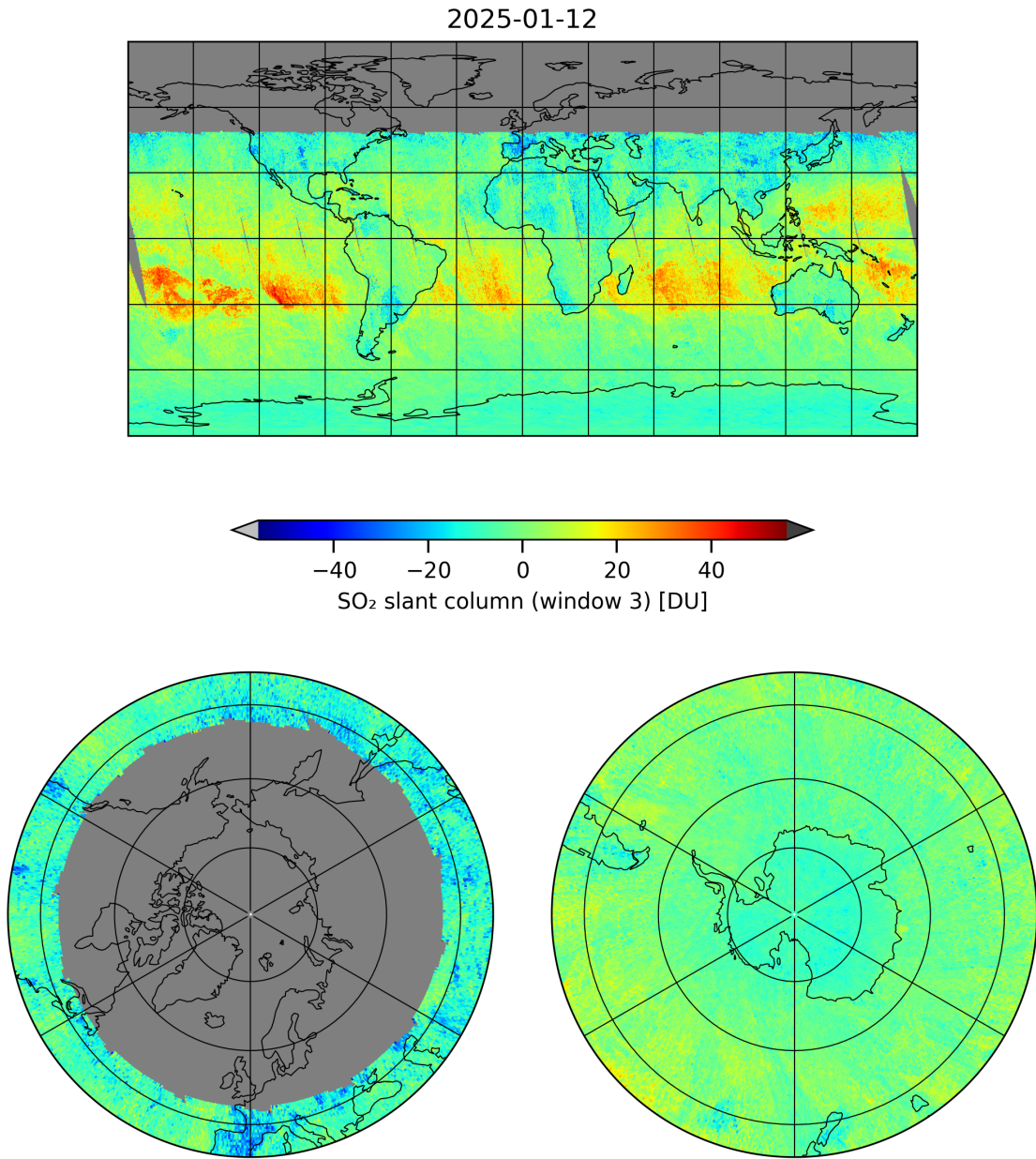


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-01-12 to 2025-01-13

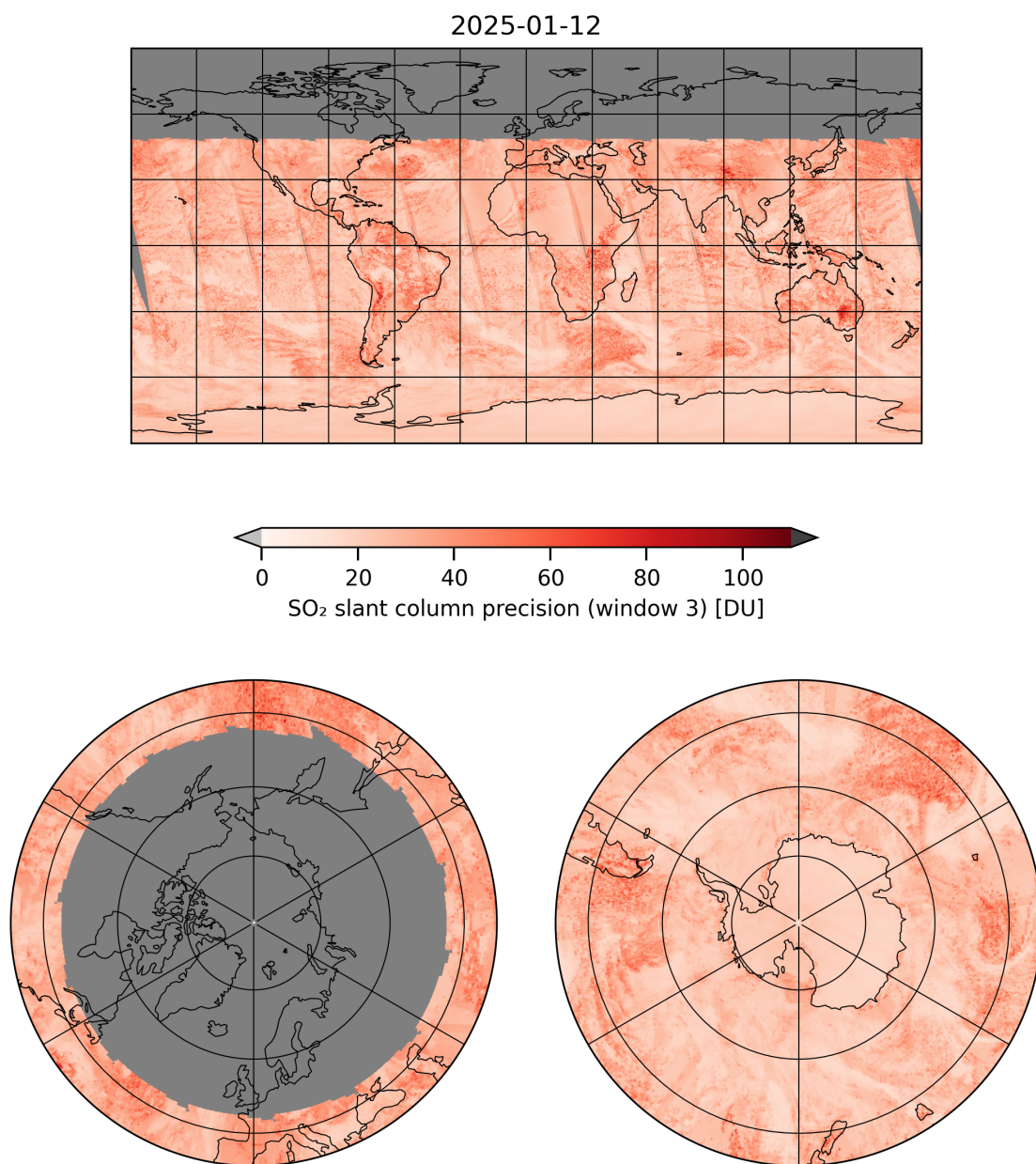


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-01-12 to 2025-01-13

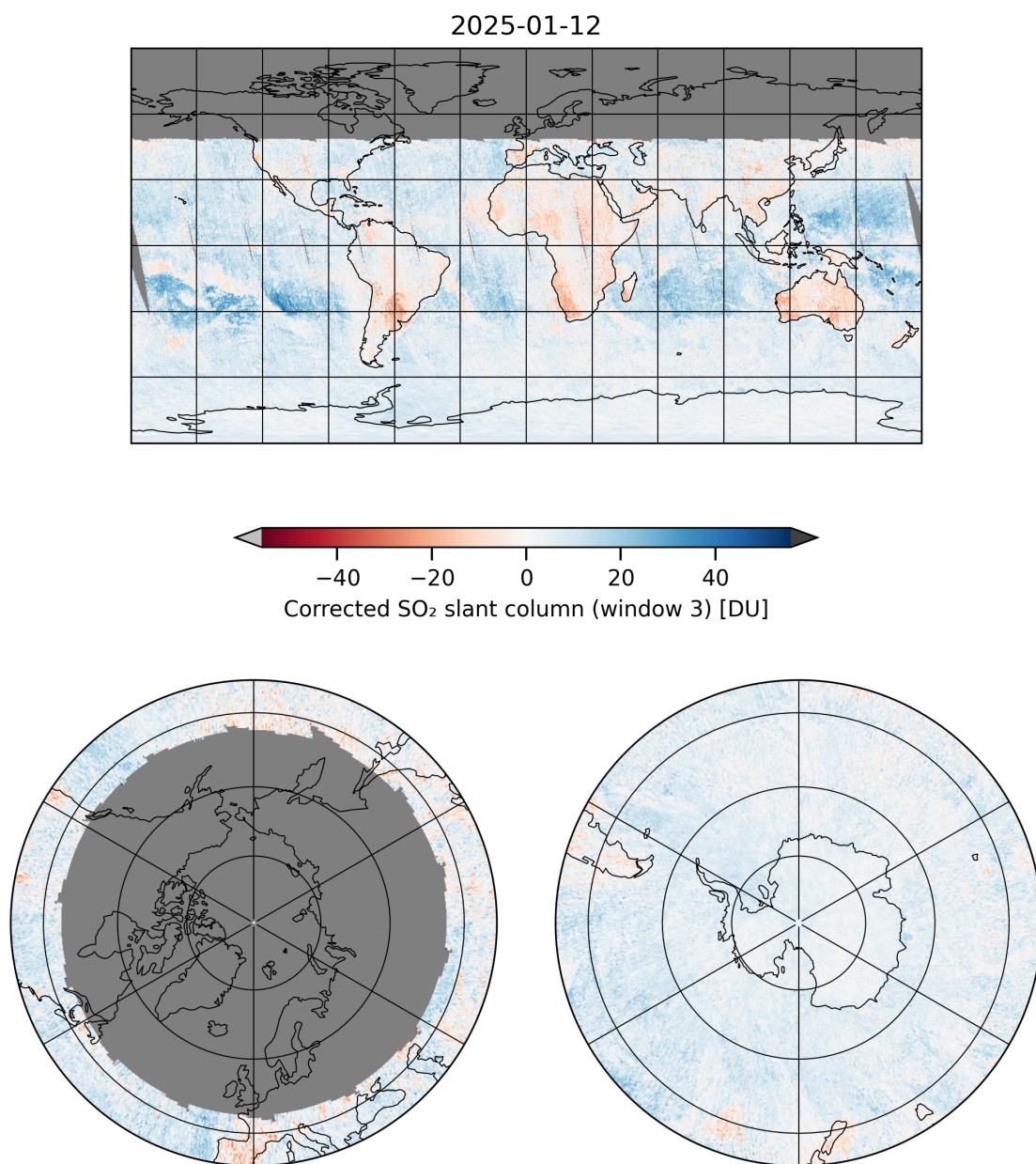


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-01-12 to 2025-01-13

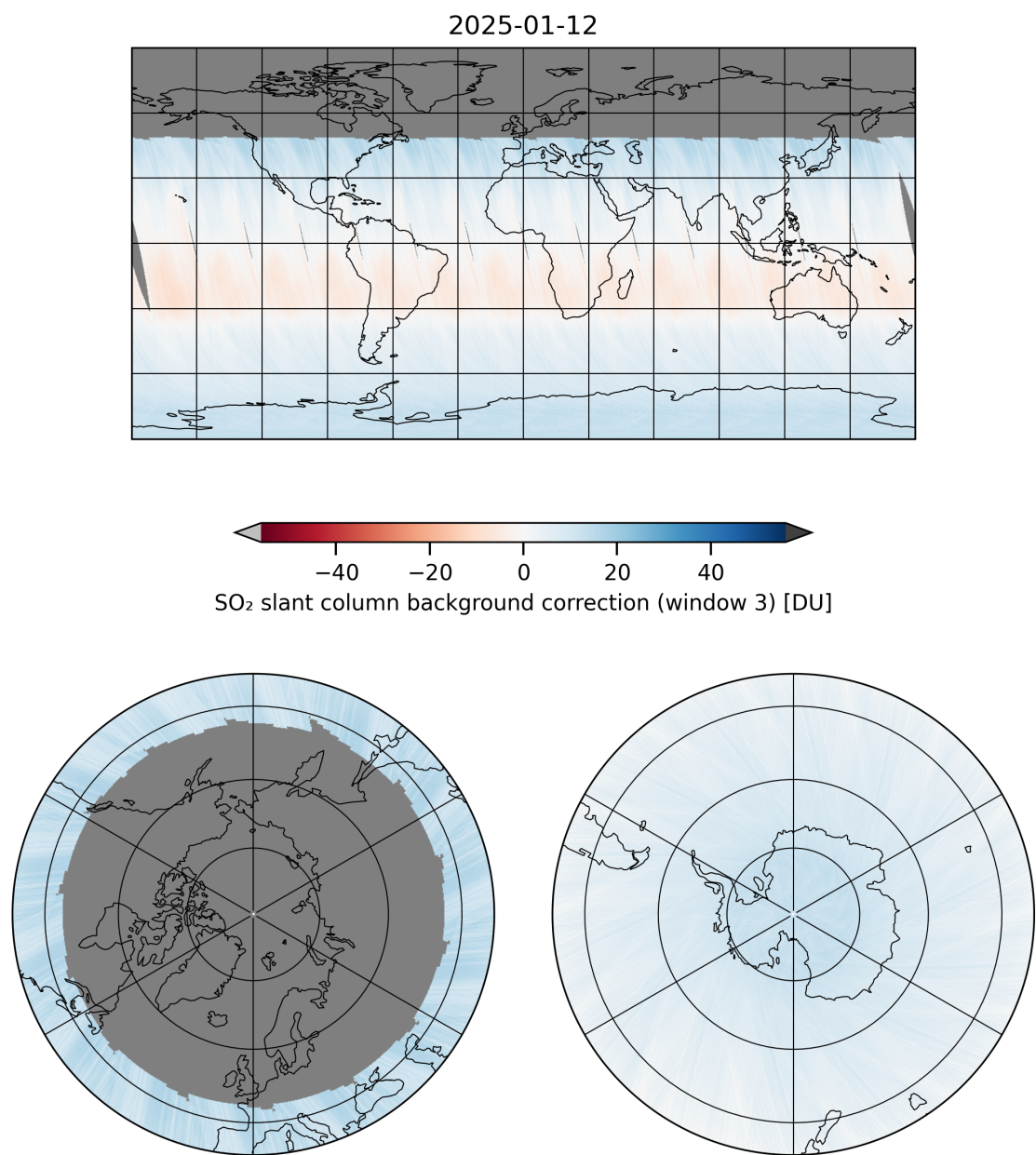


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-01-12 to 2025-01-13

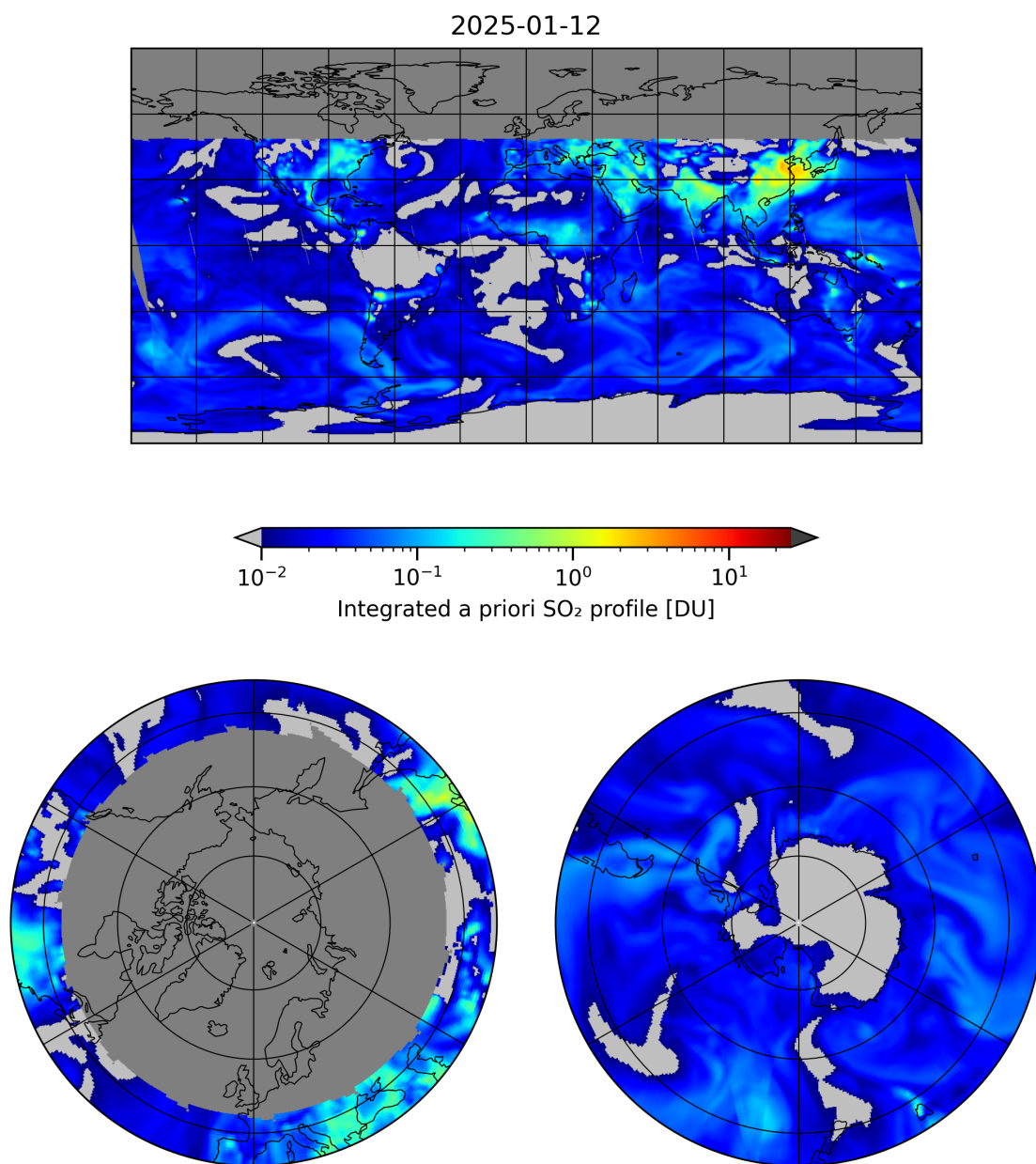


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-01-12 to 2025-01-13

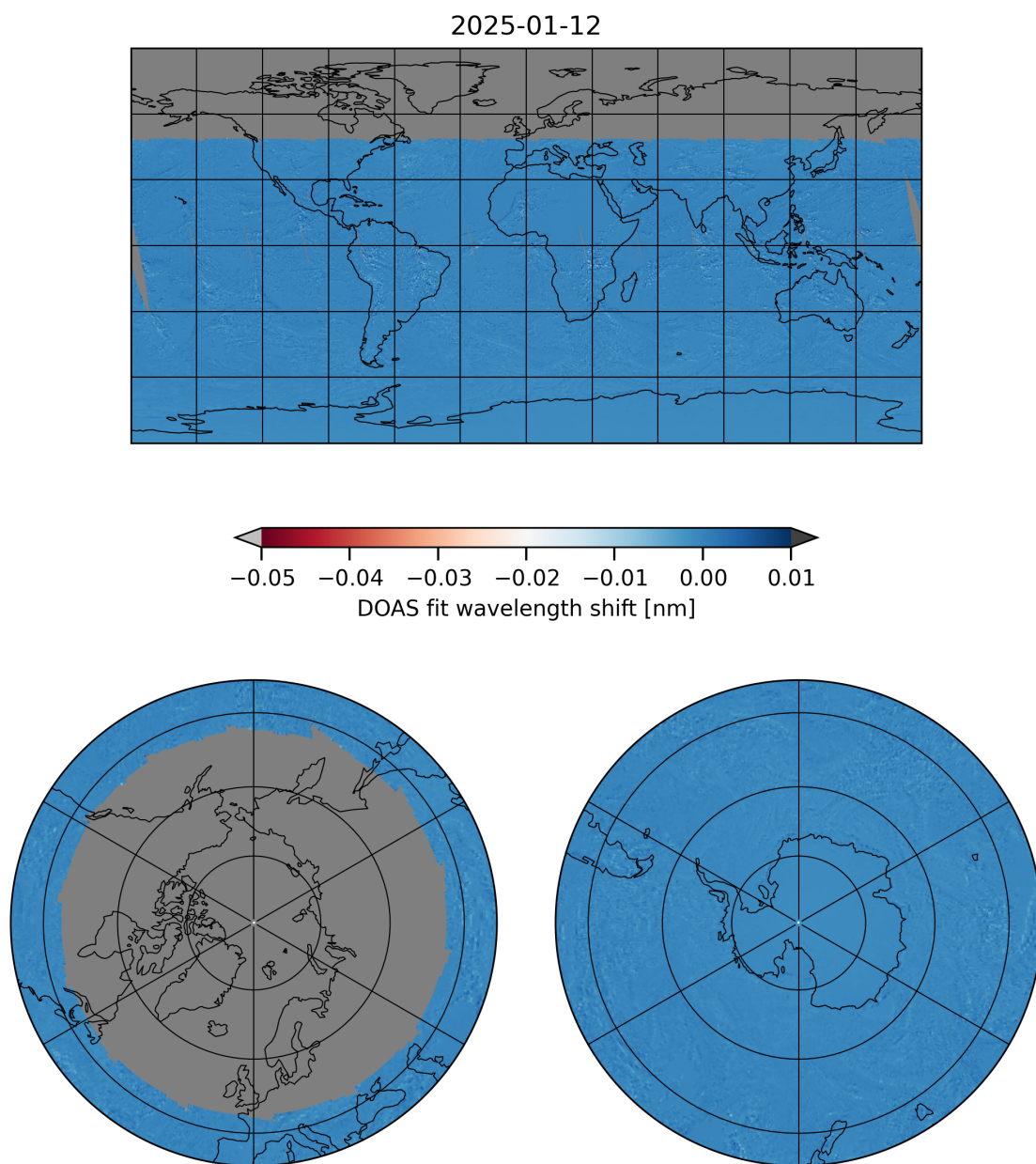


Figure 22: Map of “DOAS fit wavelength shift” for 2025-01-12 to 2025-01-13

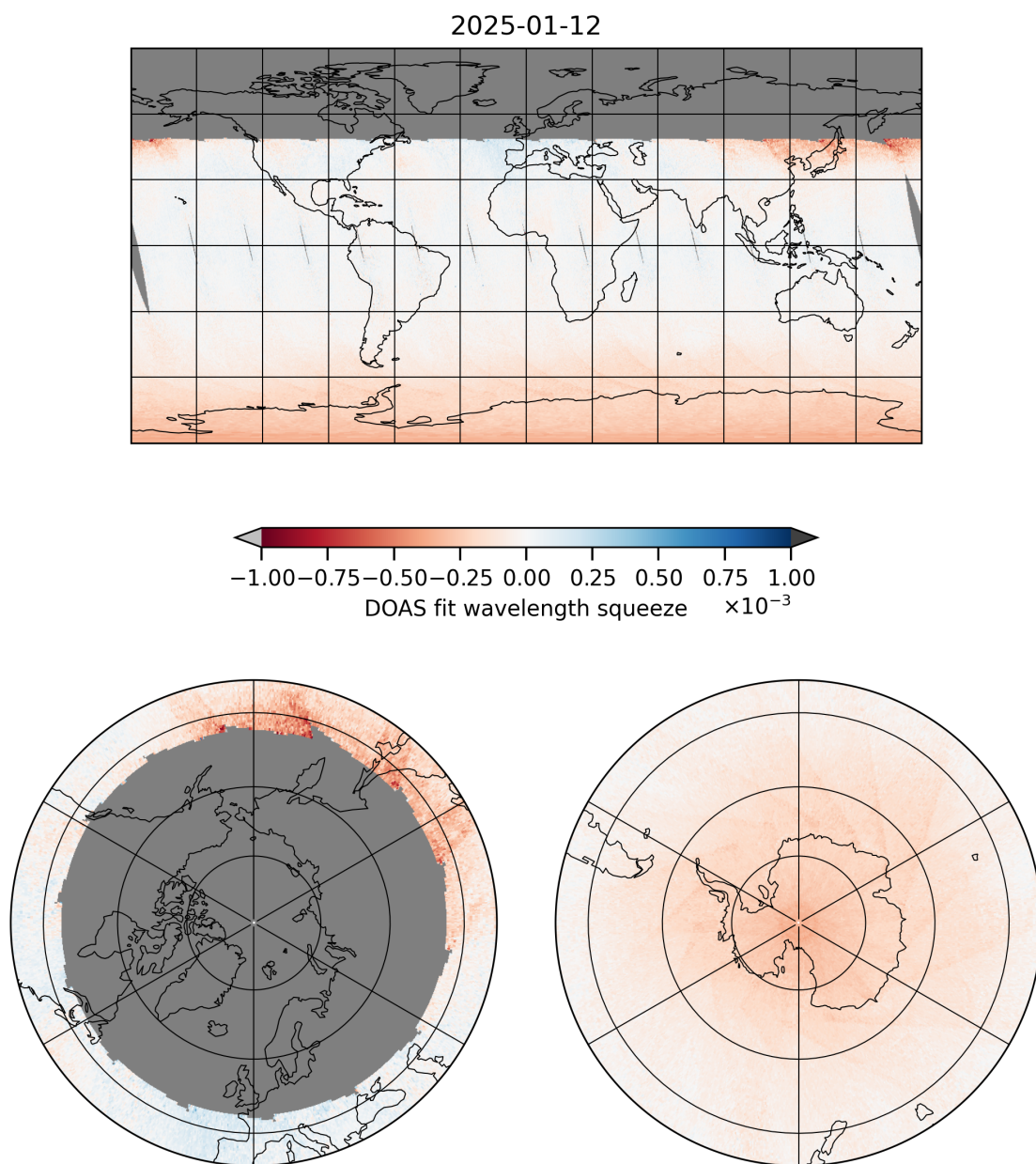


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-01-12 to 2025-01-13

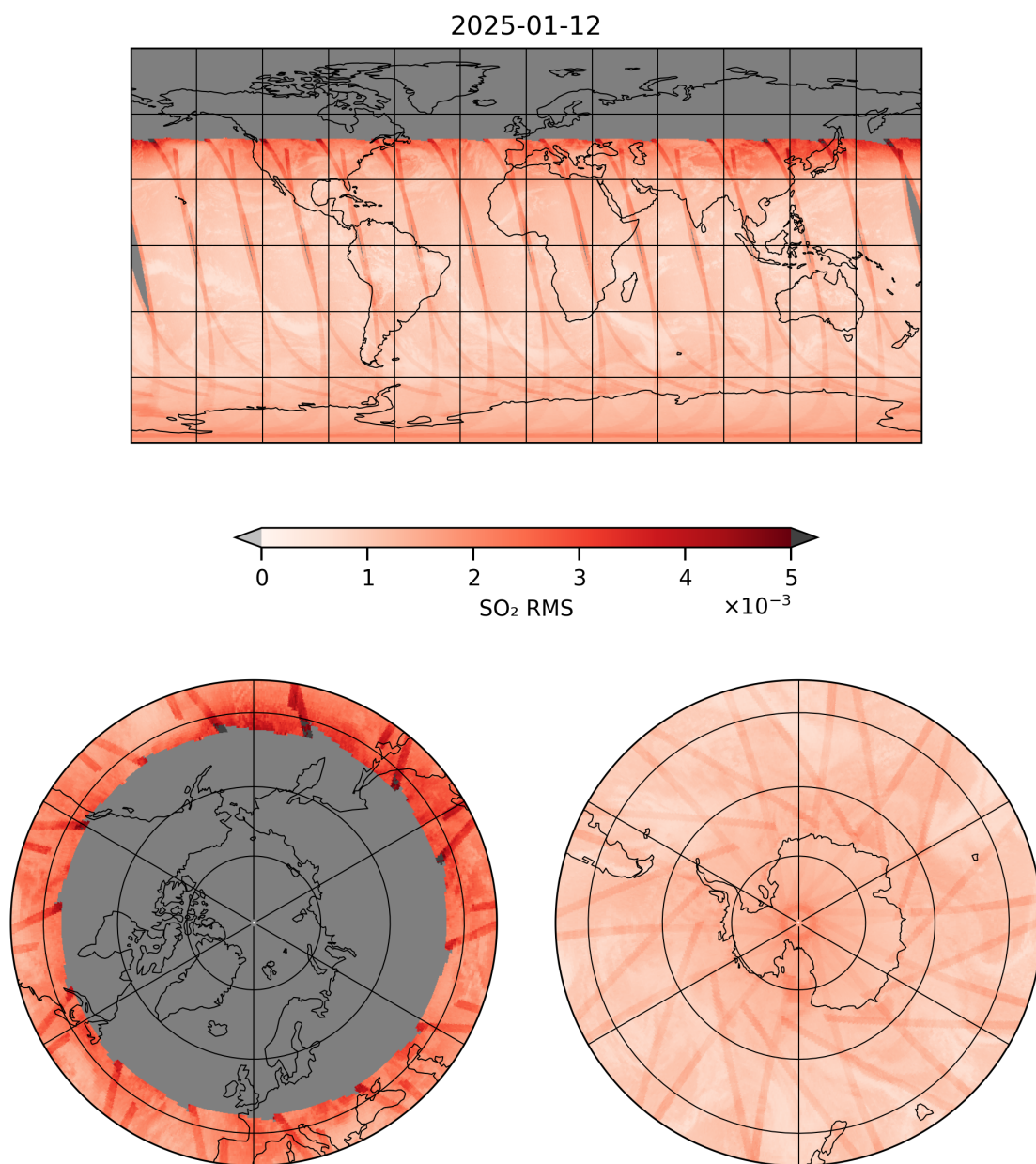


Figure 24: Map of “SO₂ RMS” for 2025-01-12 to 2025-01-13

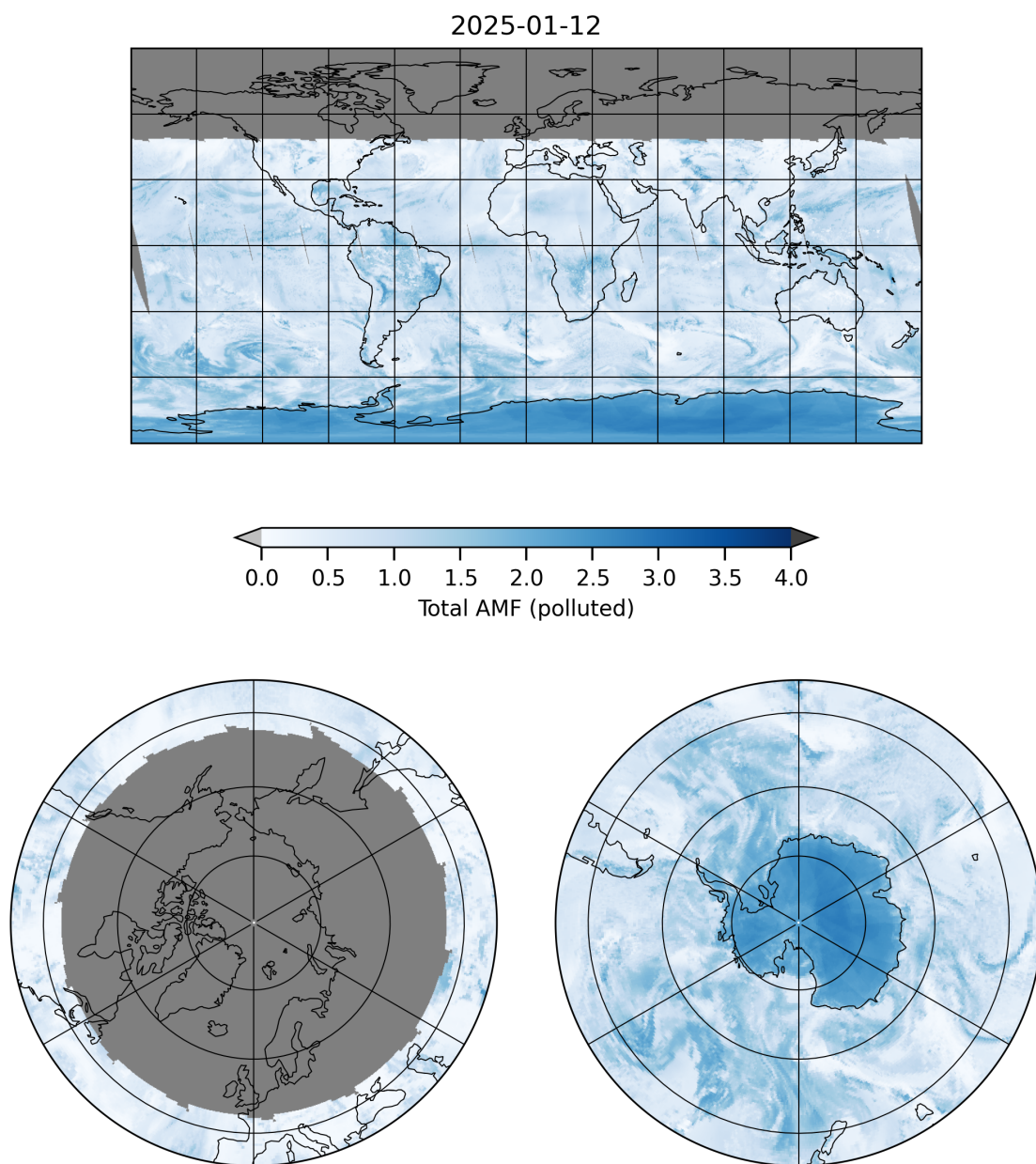


Figure 25: Map of “Total AMF (polluted)” for 2025-01-12 to 2025-01-13

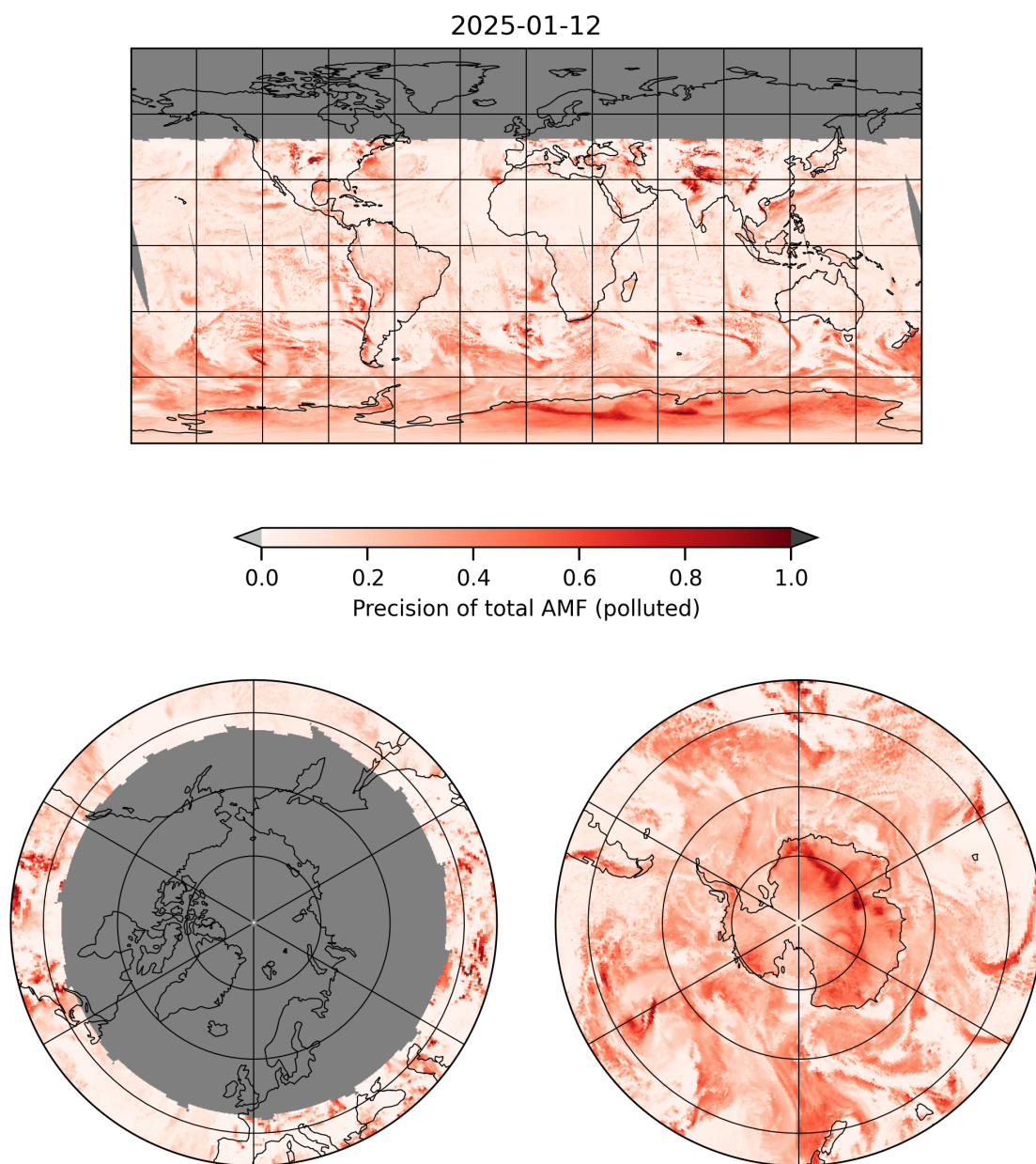


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-01-12 to 2025-01-13

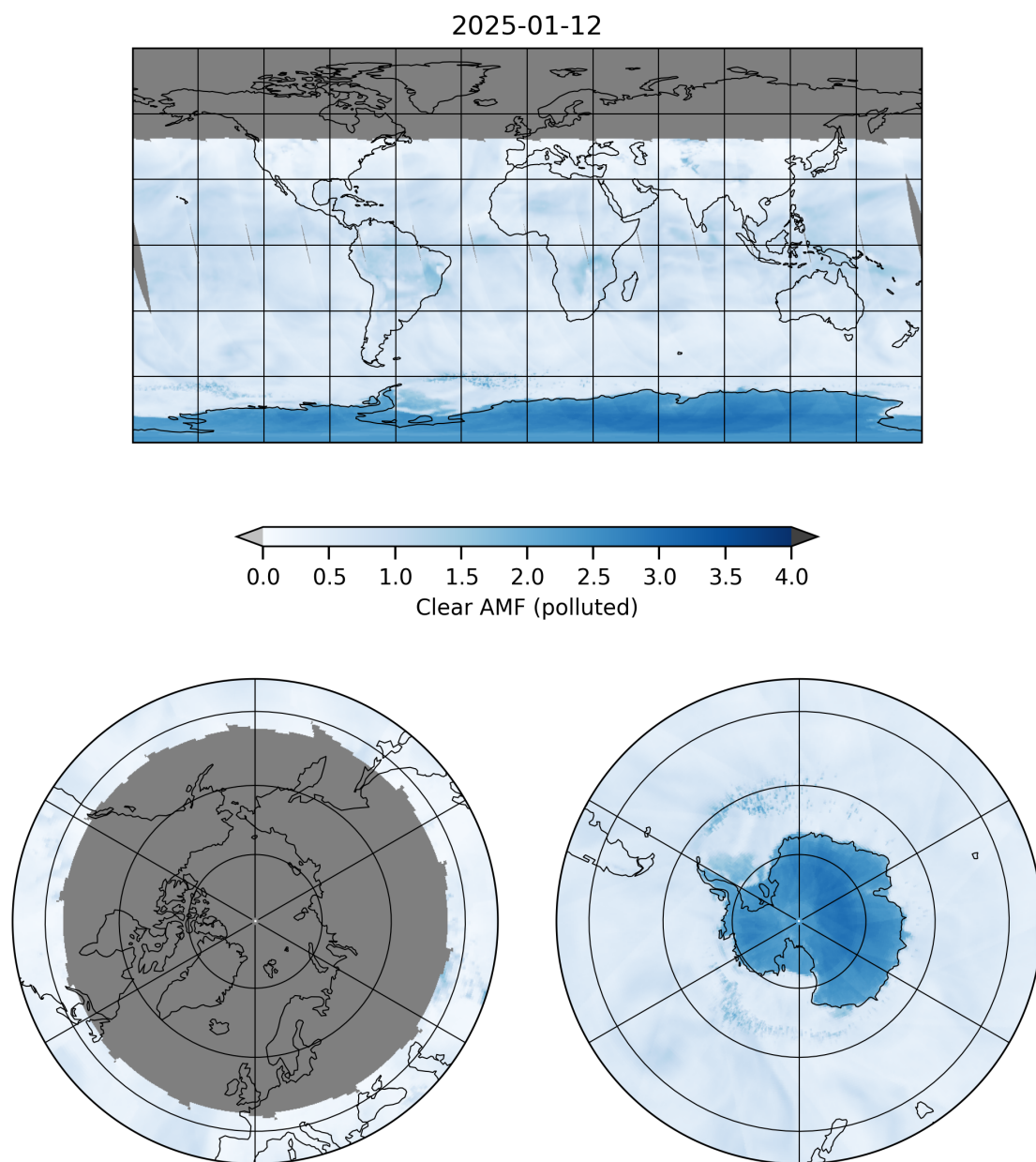


Figure 27: Map of “Clear AMF (polluted)” for 2025-01-12 to 2025-01-13

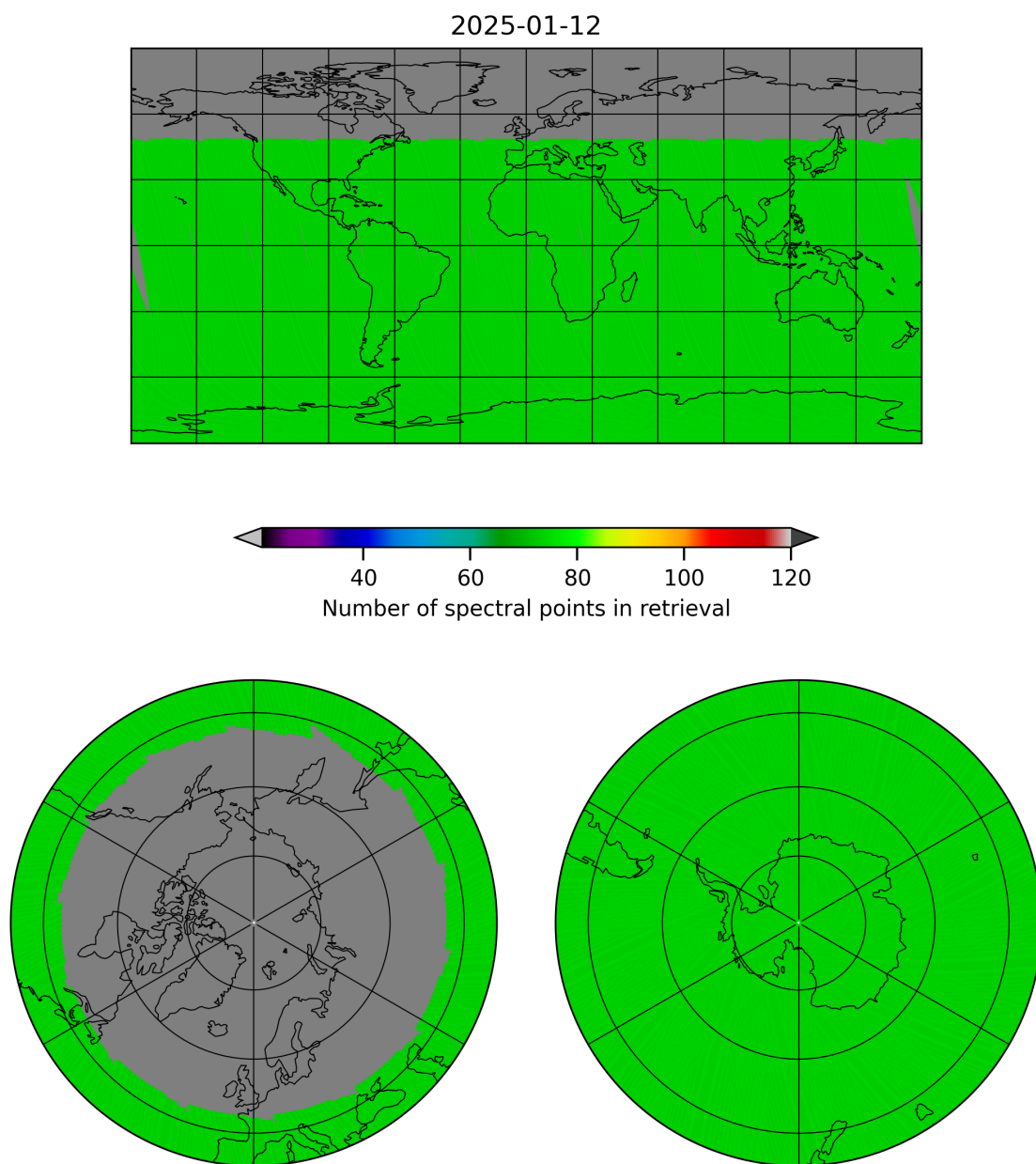


Figure 28: Map of “Number of spectral points in retrieval” for 2025-01-12 to 2025-01-13

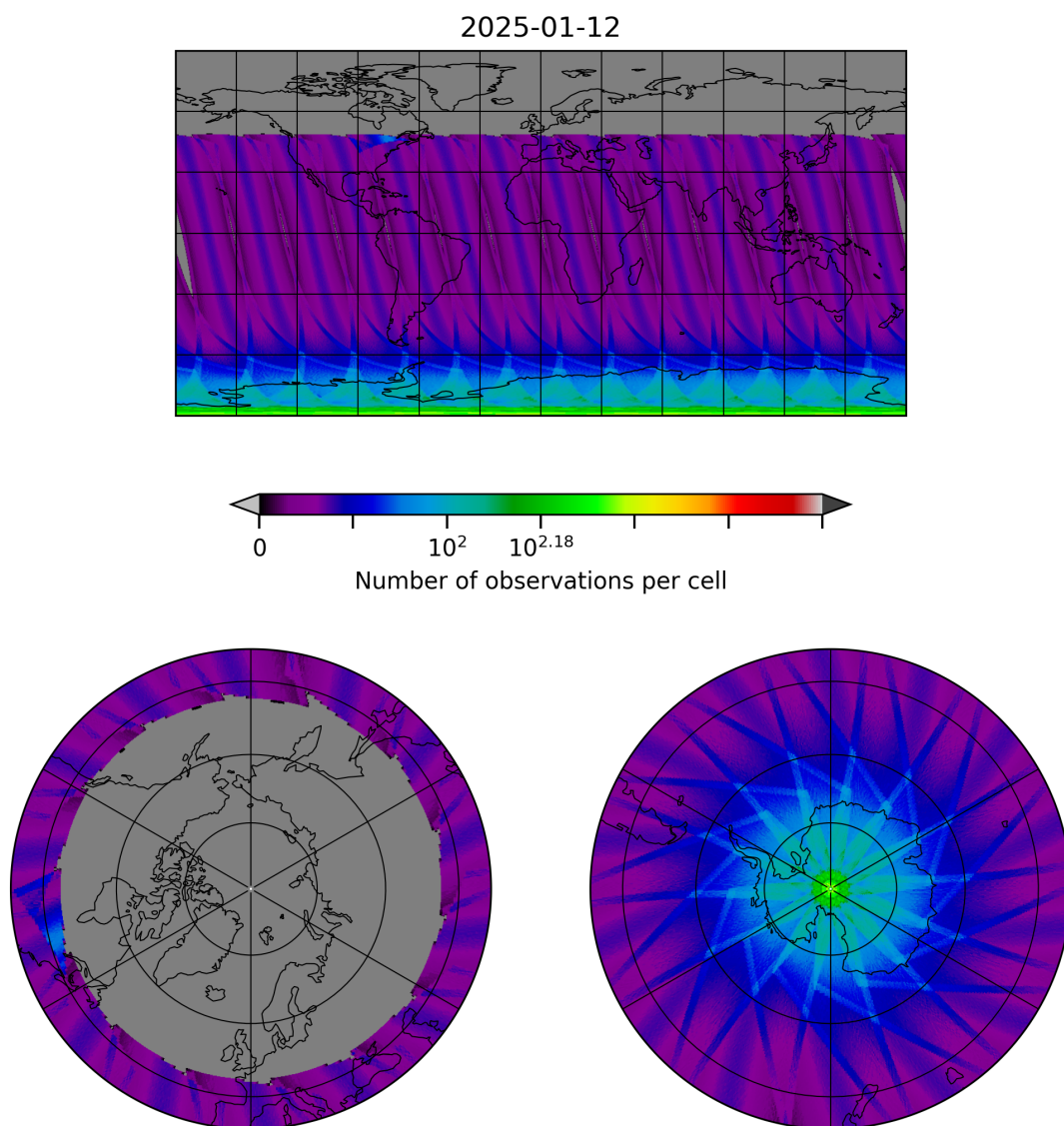


Figure 29: Map of the number of observations for 2025-01-12 to 2025-01-13

7 Zonal average

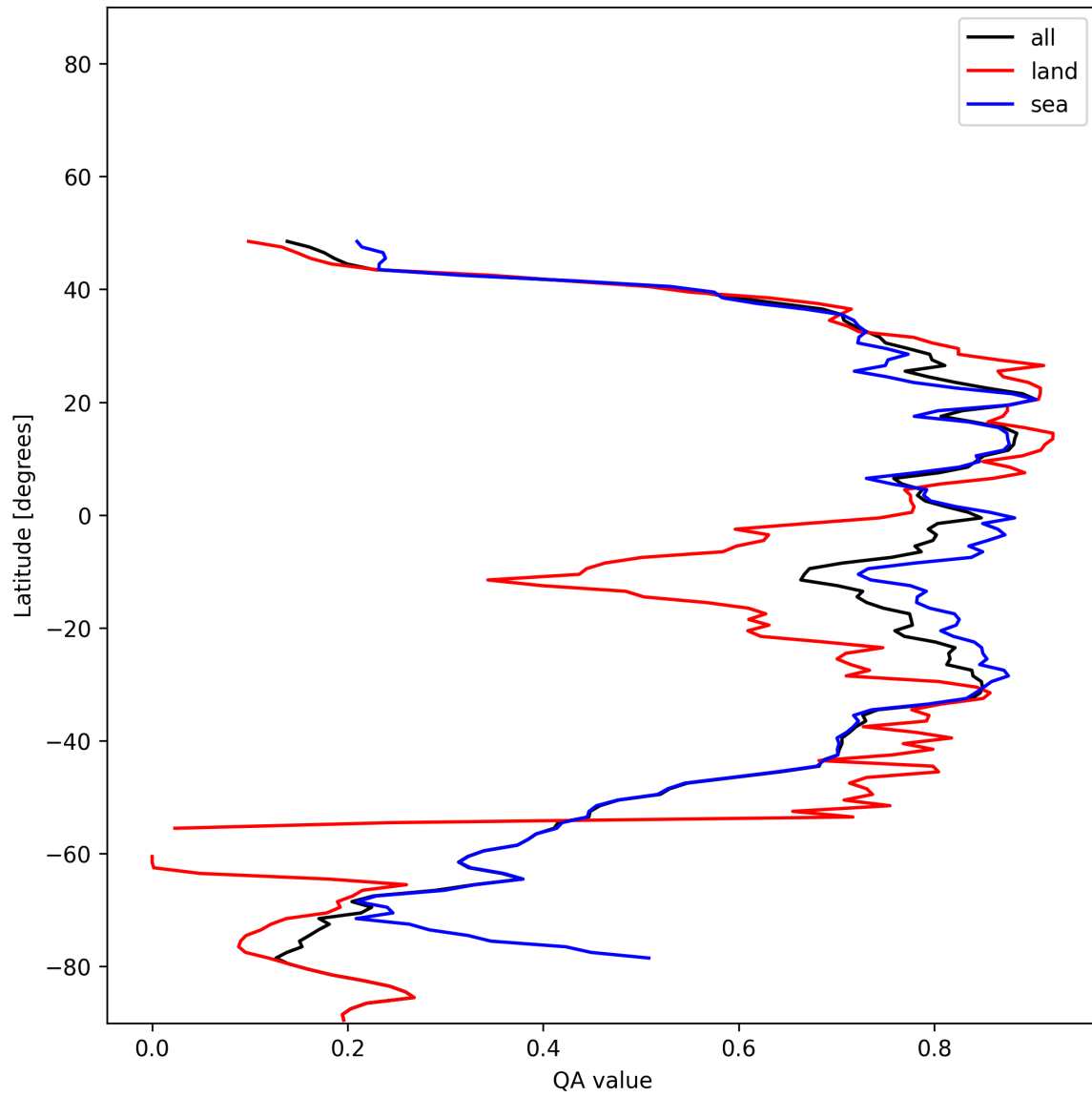


Figure 30: Zonal average of “QA value” for 2025-01-12 to 2025-01-13.

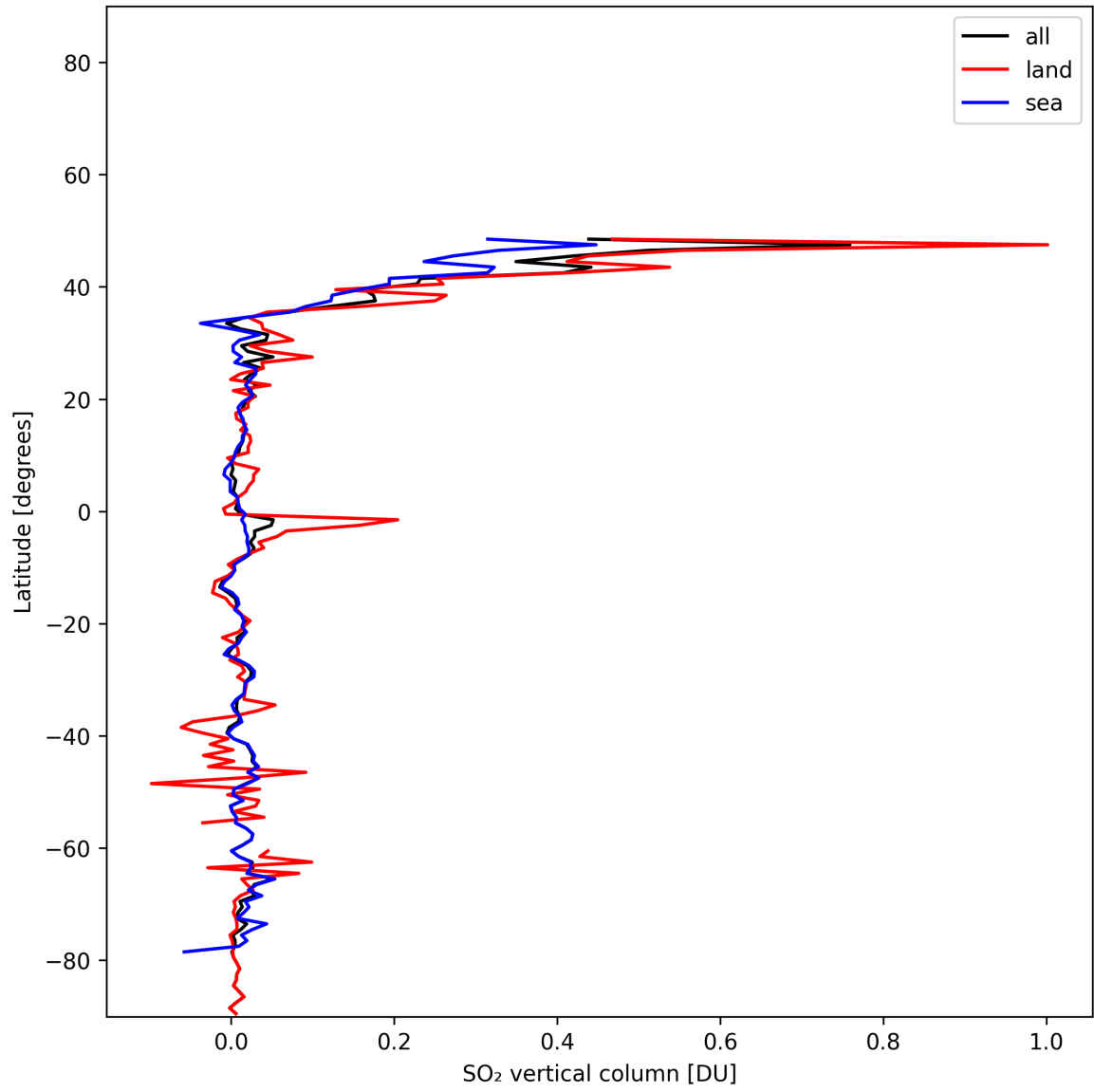


Figure 31: Zonal average of “SO₂ vertical column” for 2025-01-12 to 2025-01-13.

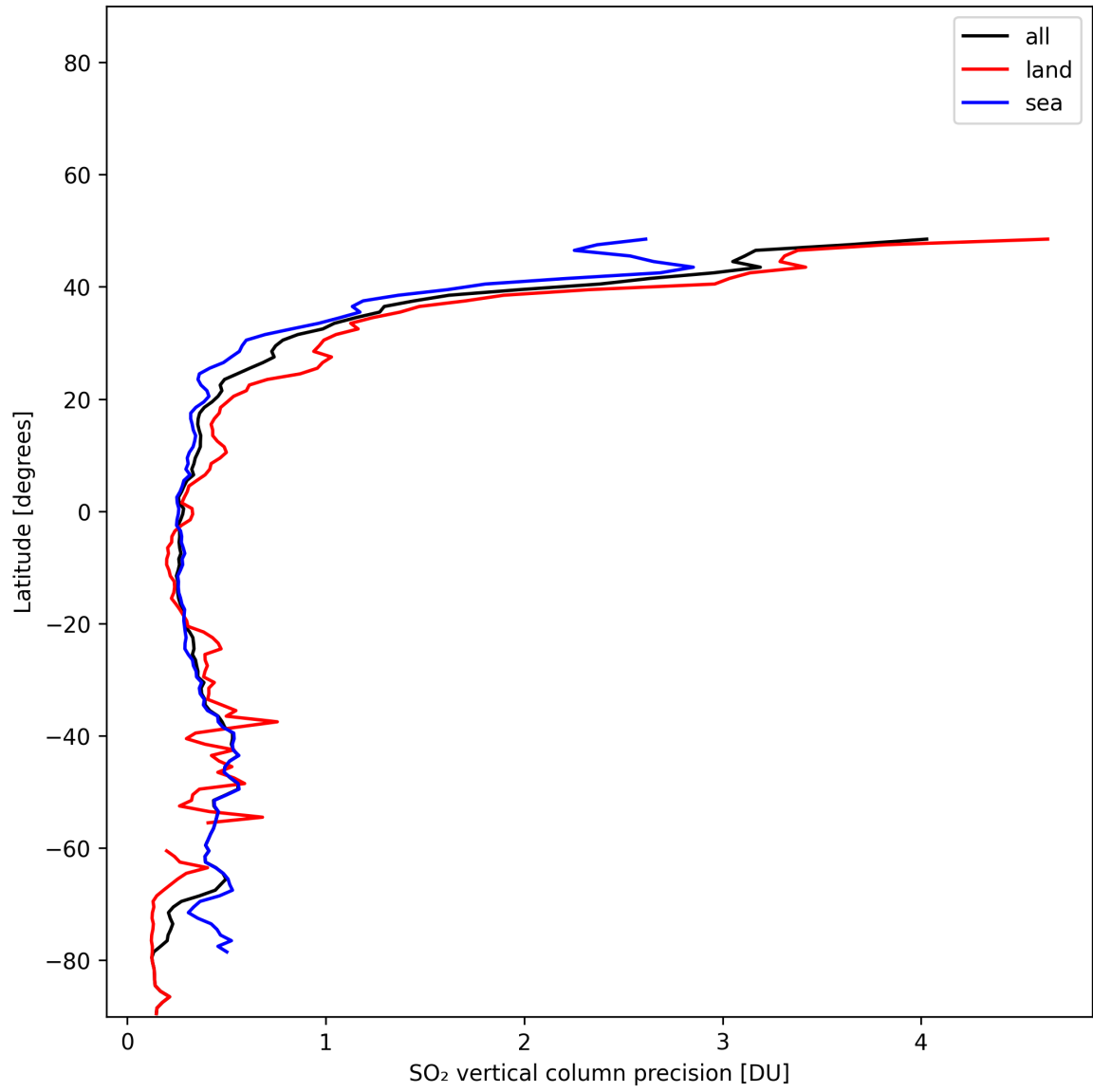


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-01-12 to 2025-01-13.

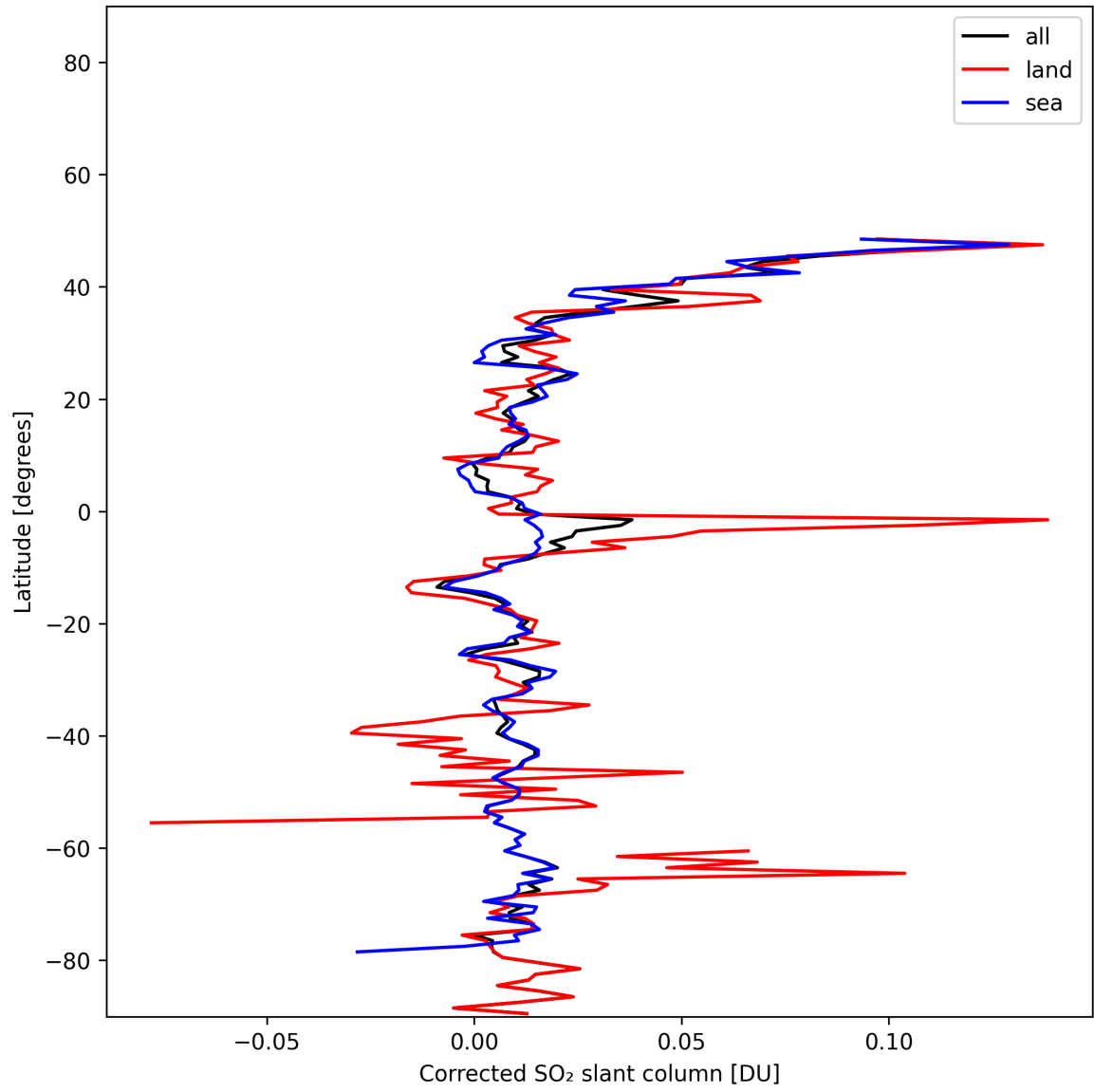


Figure 33: Zonal average of "Corrected SO₂ slant column" for 2025-01-12 to 2025-01-13.

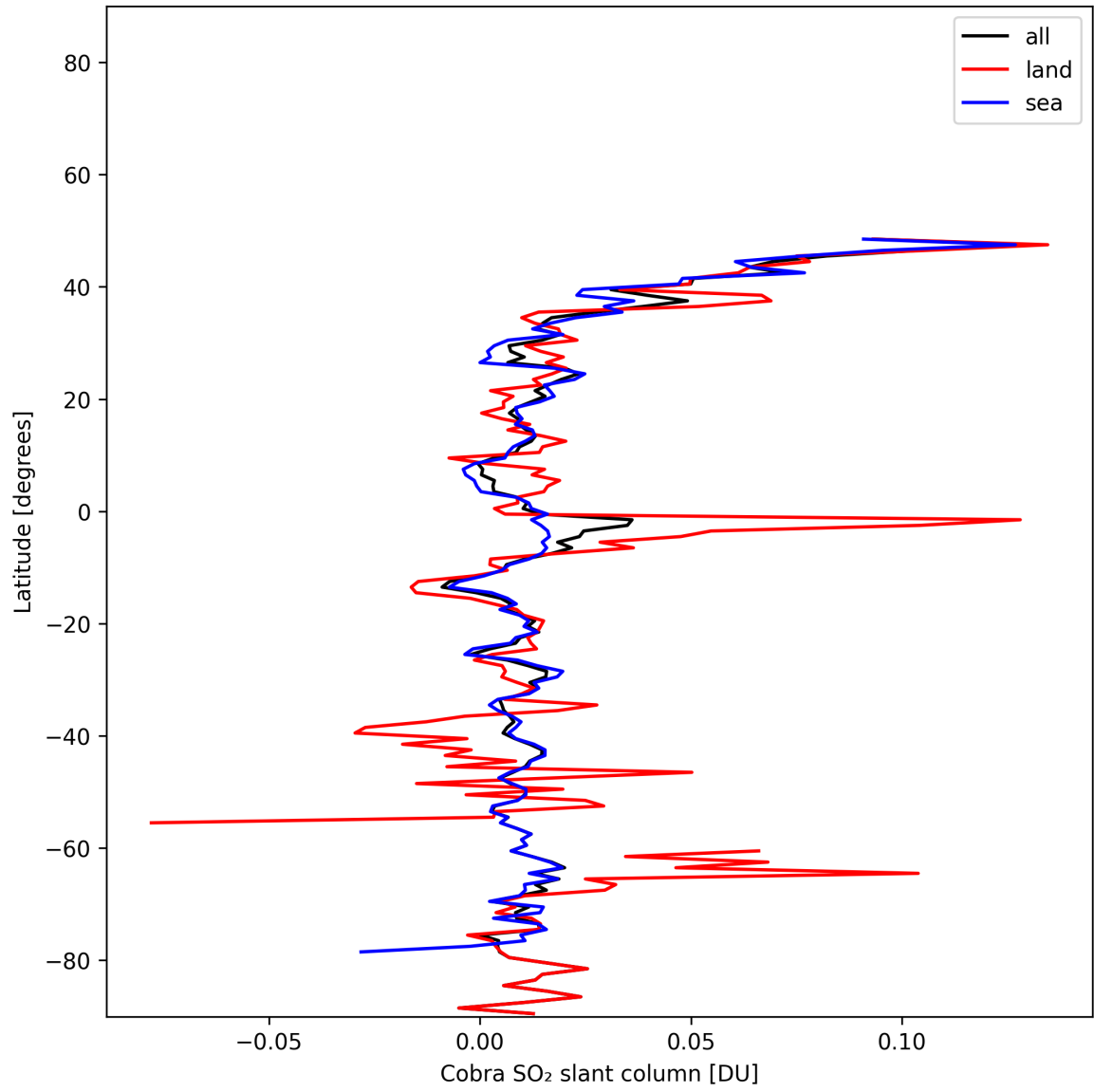


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-01-12 to 2025-01-13.

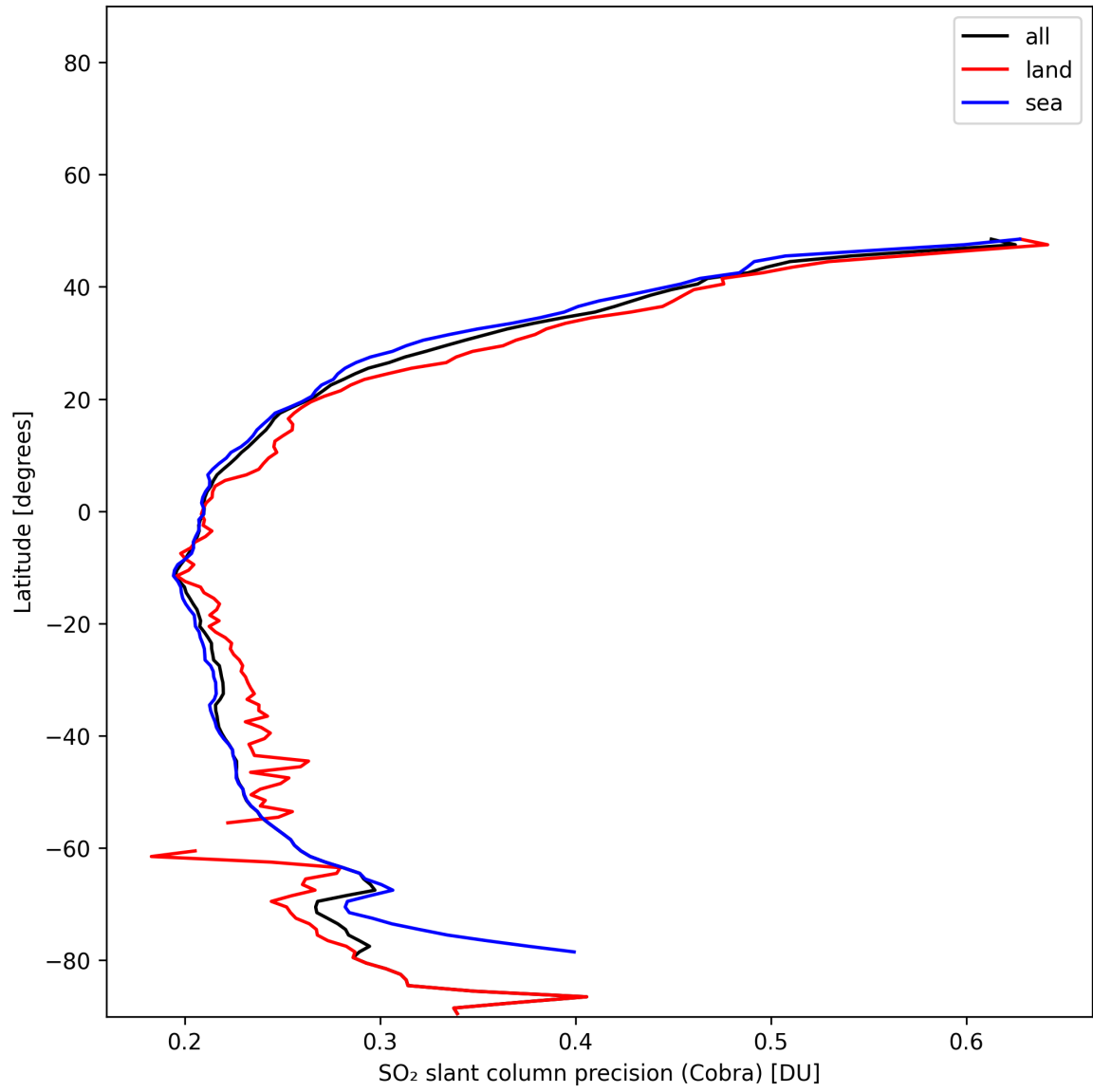


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-01-12 to 2025-01-13.

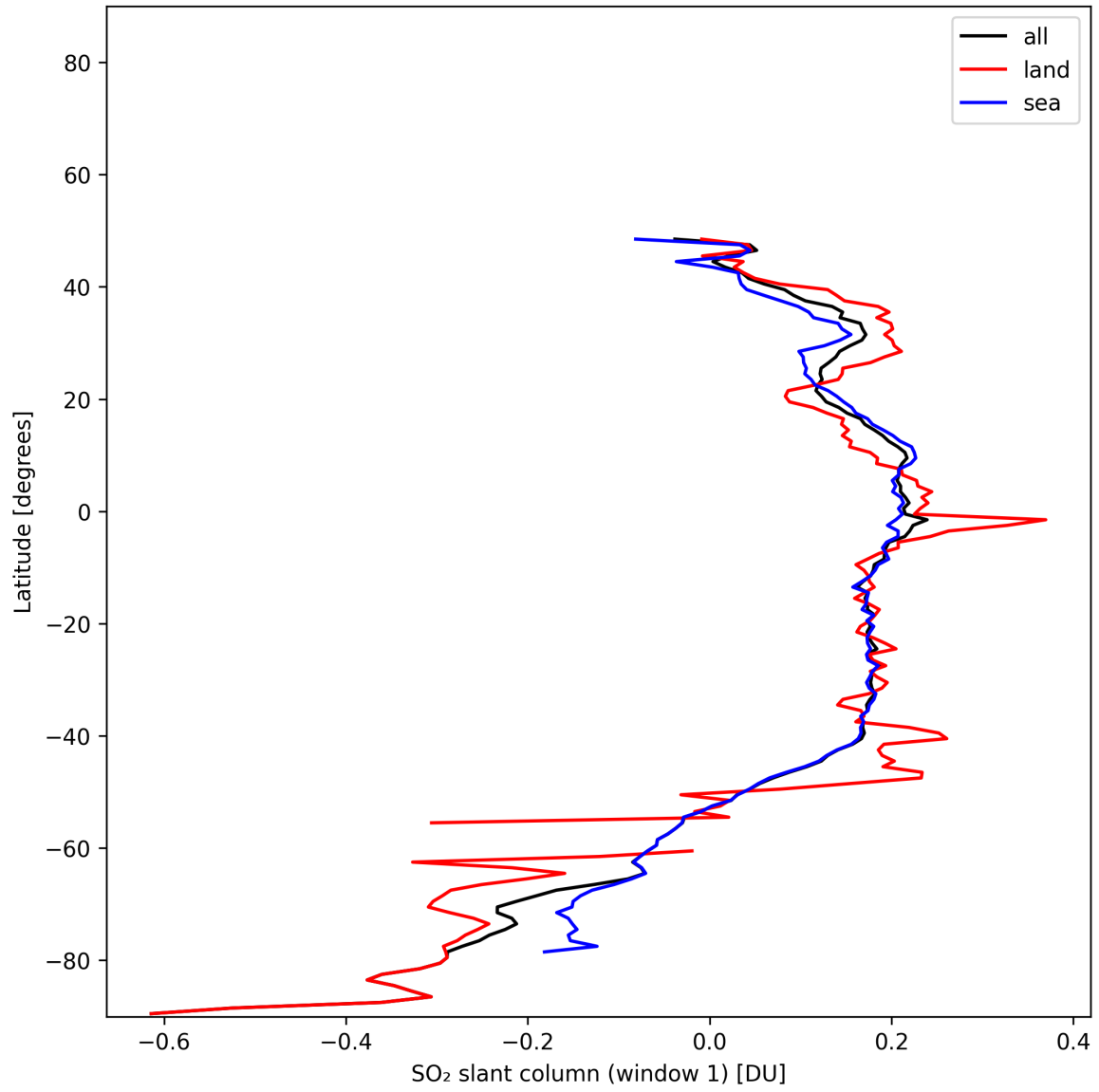


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-01-12 to 2025-01-13.

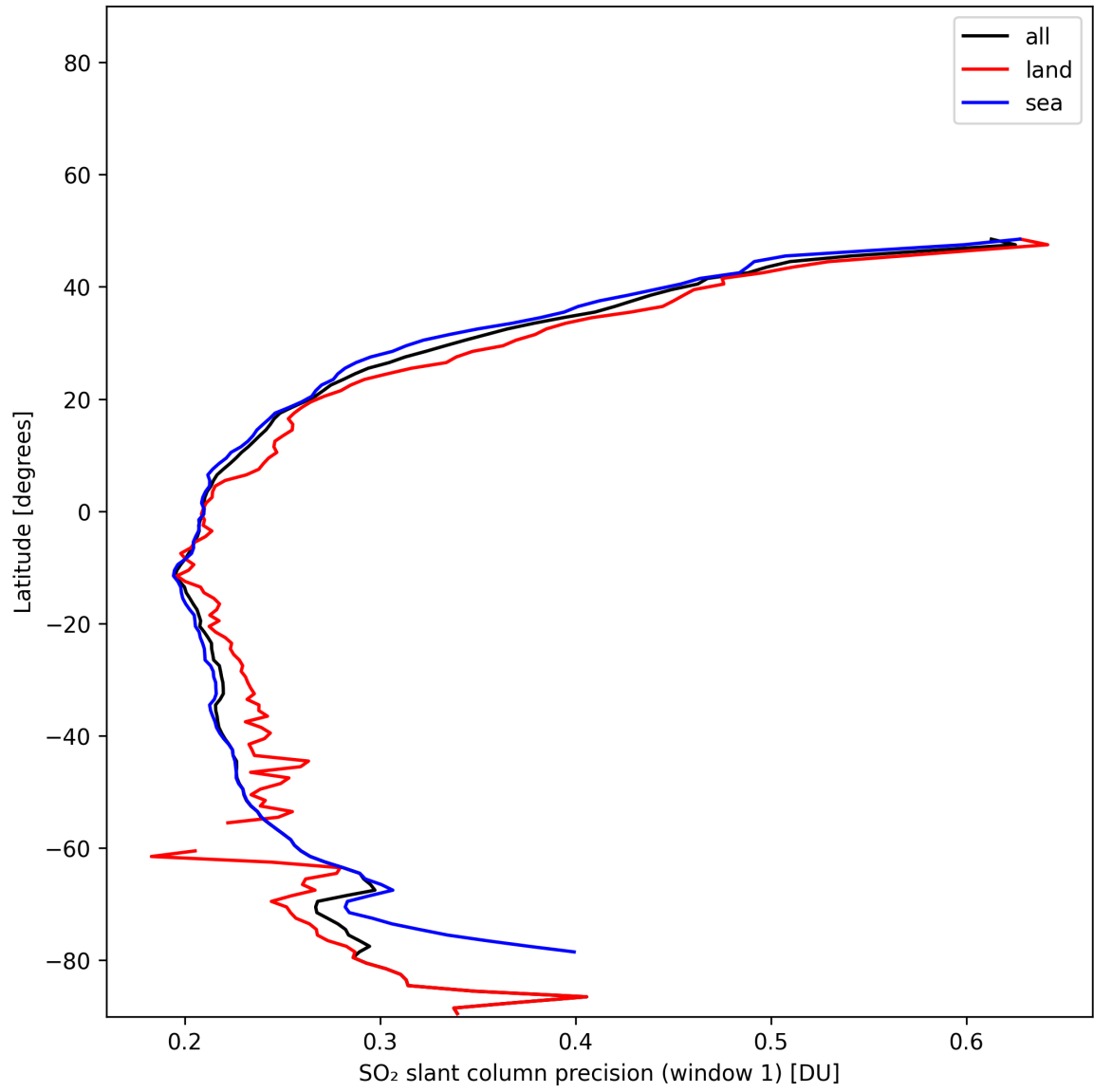


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-01-12 to 2025-01-13.

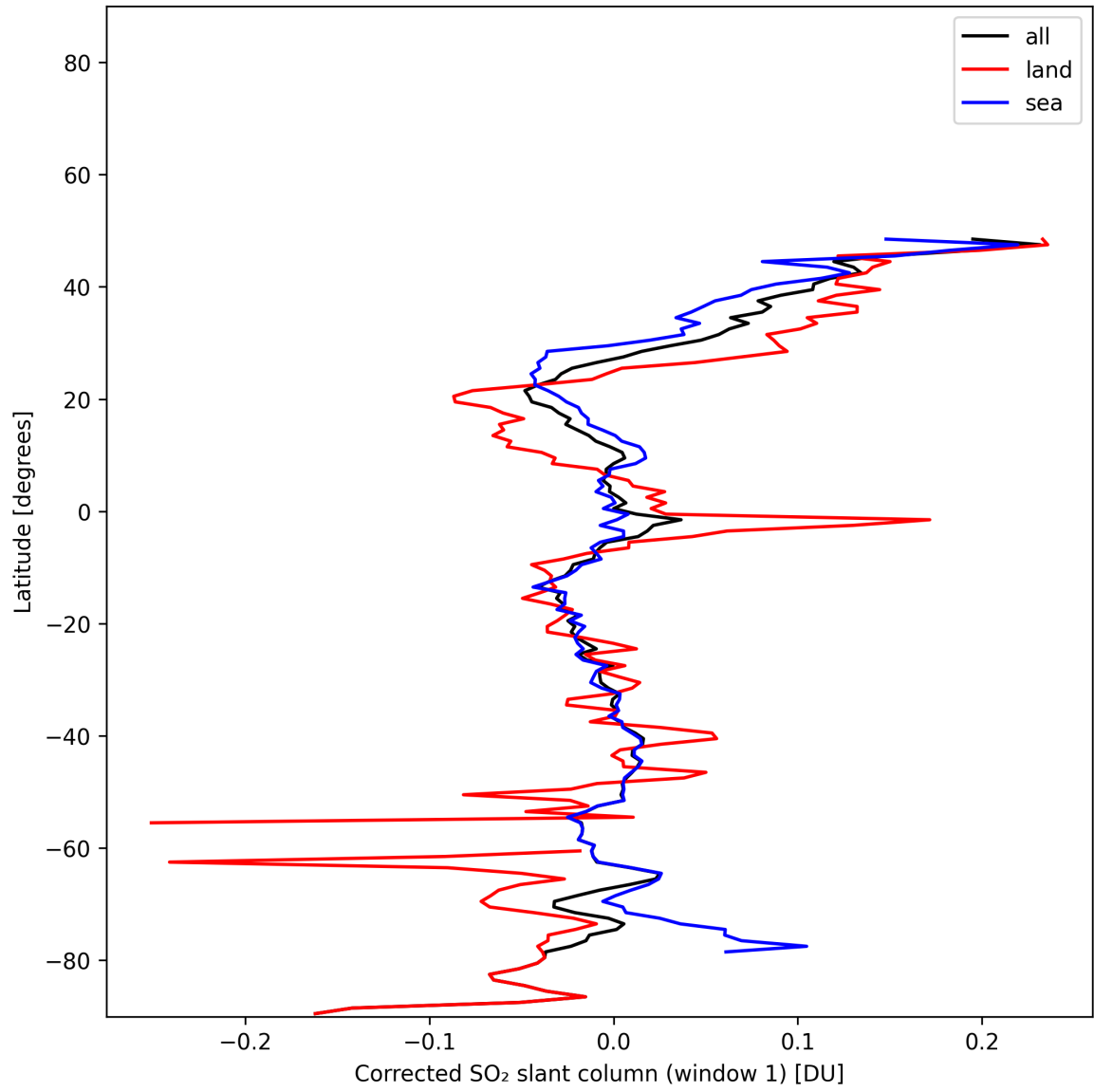


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-01-12 to 2025-01-13.

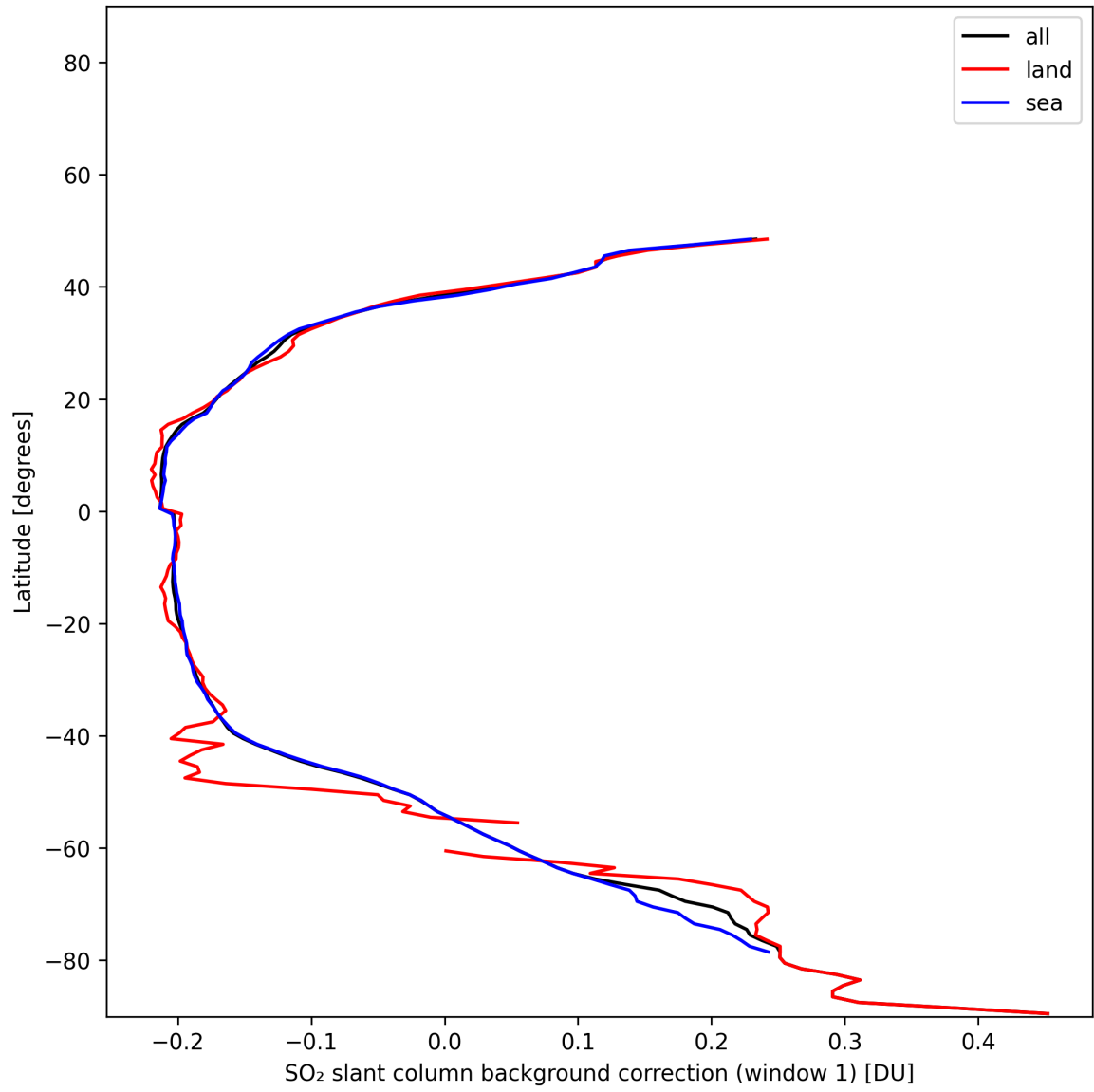


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-01-12 to 2025-01-13.

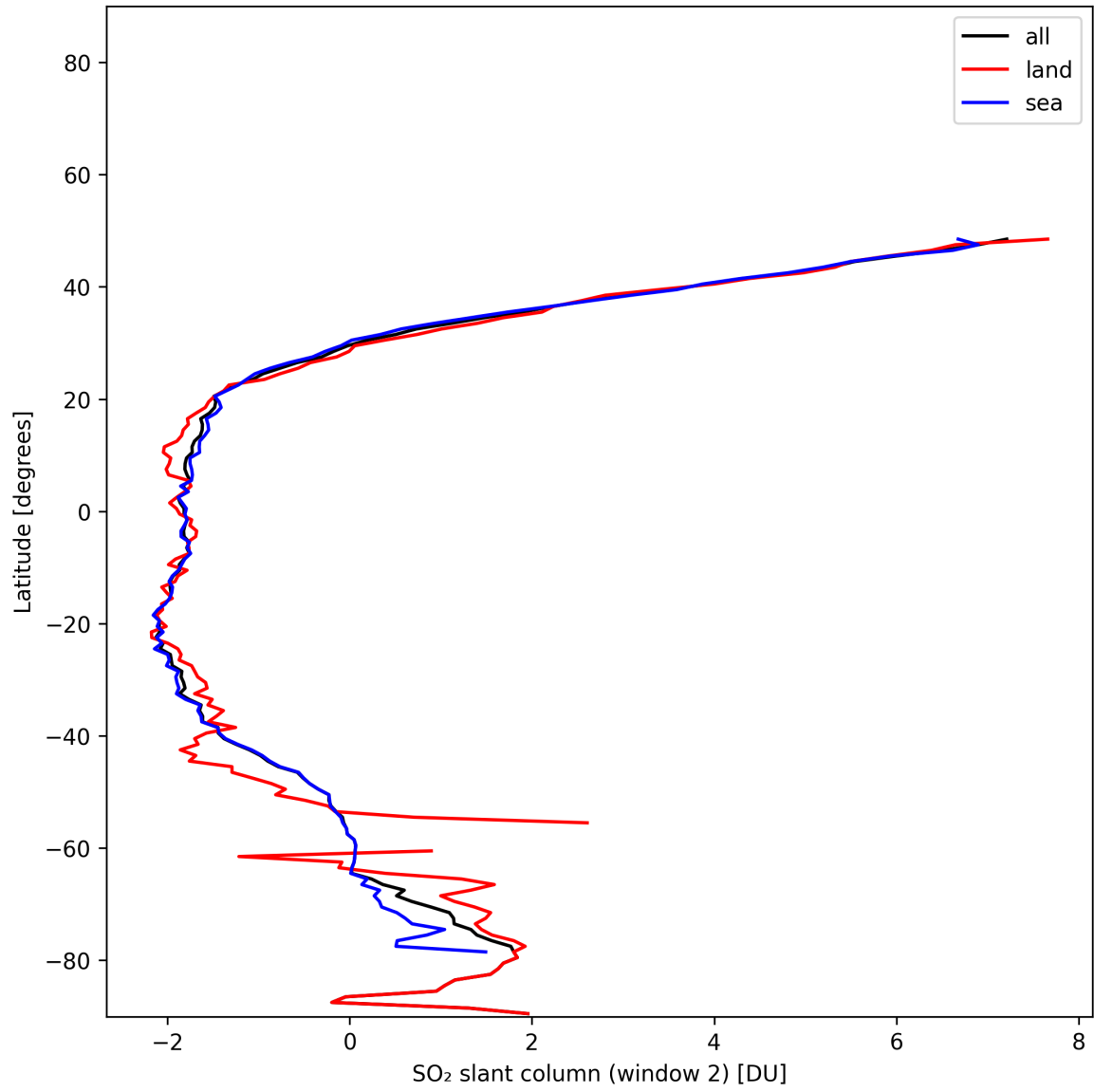


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-01-12 to 2025-01-13.

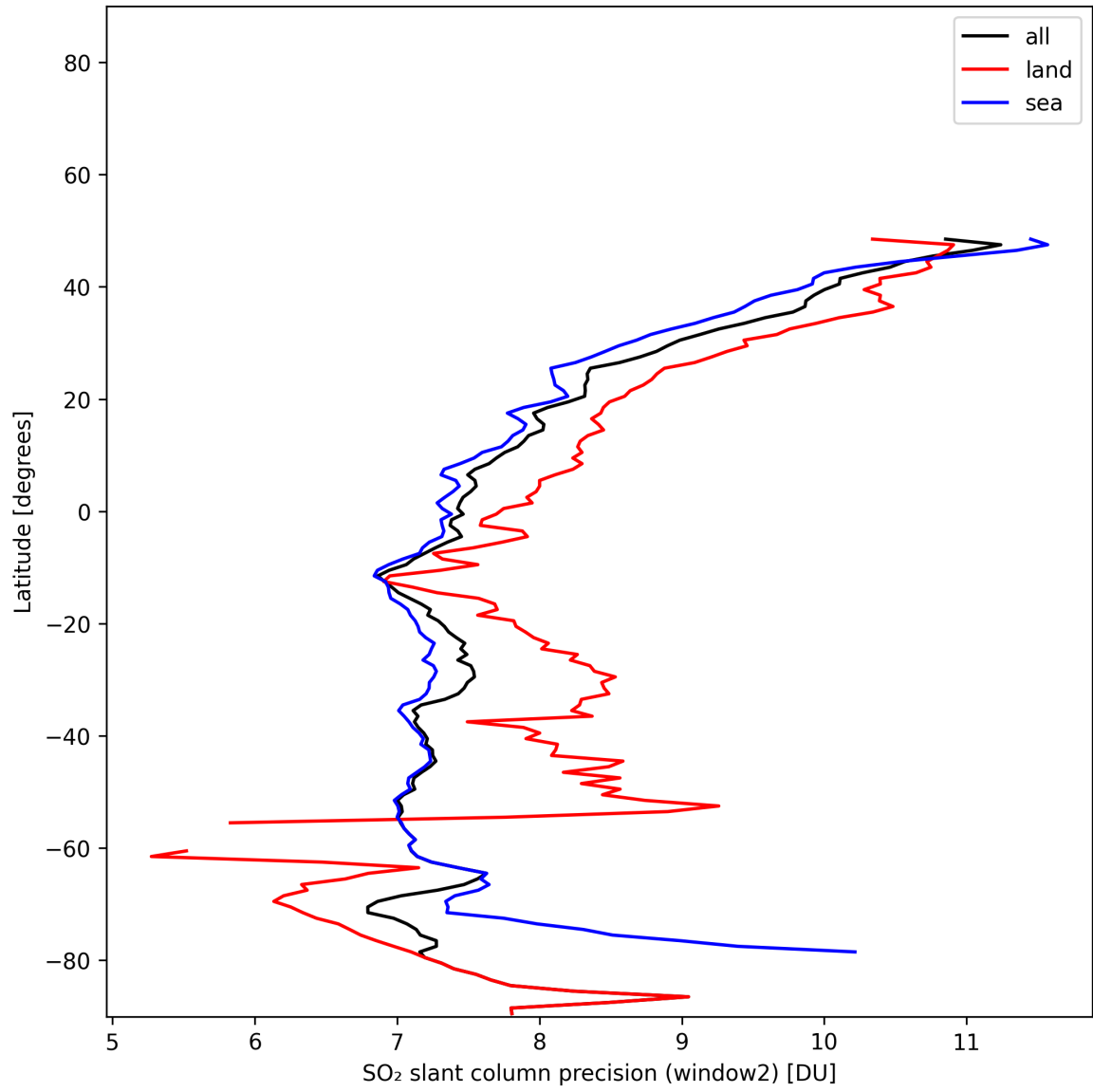


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-01-12 to 2025-01-13.

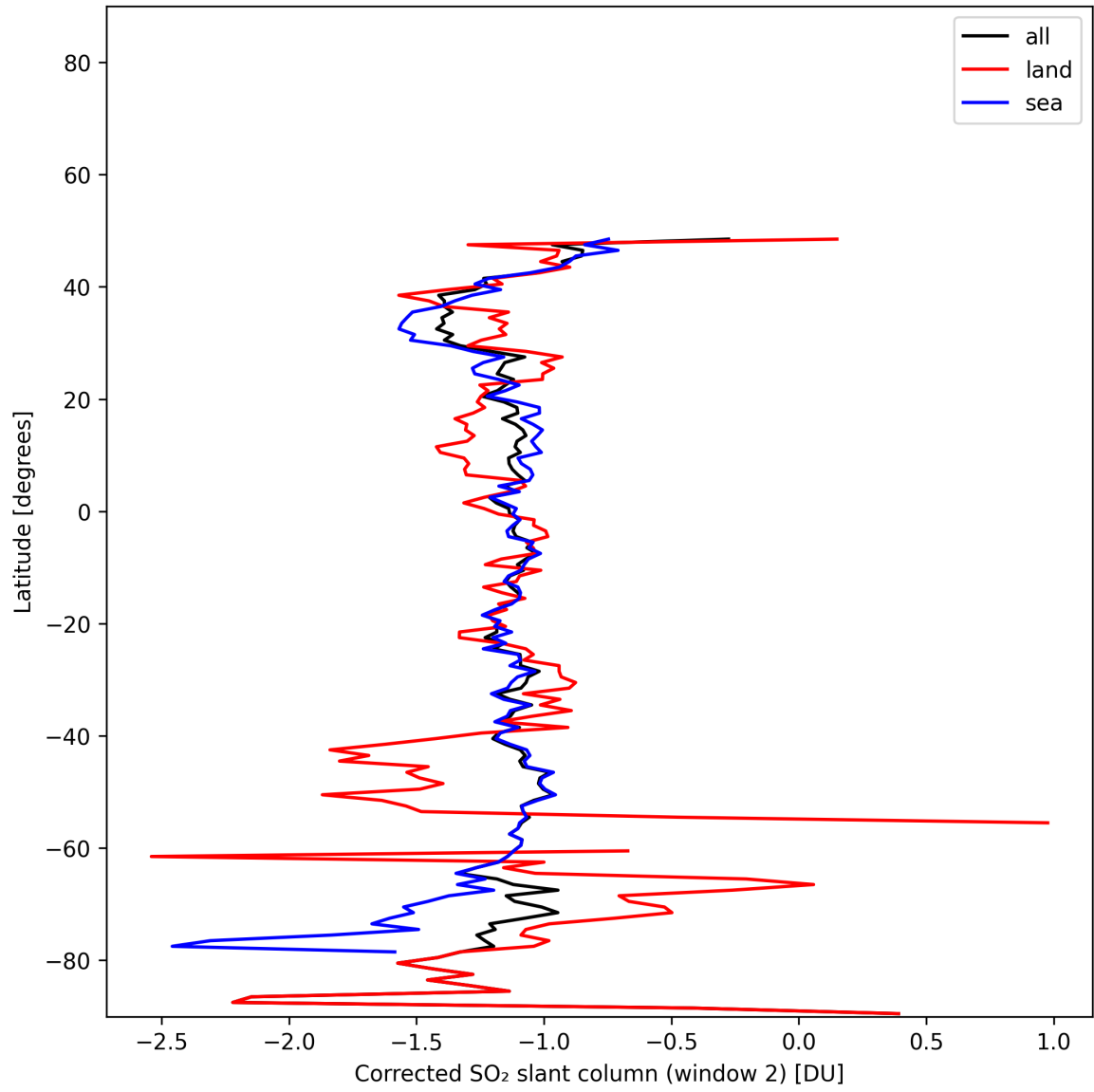


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-01-12 to 2025-01-13.

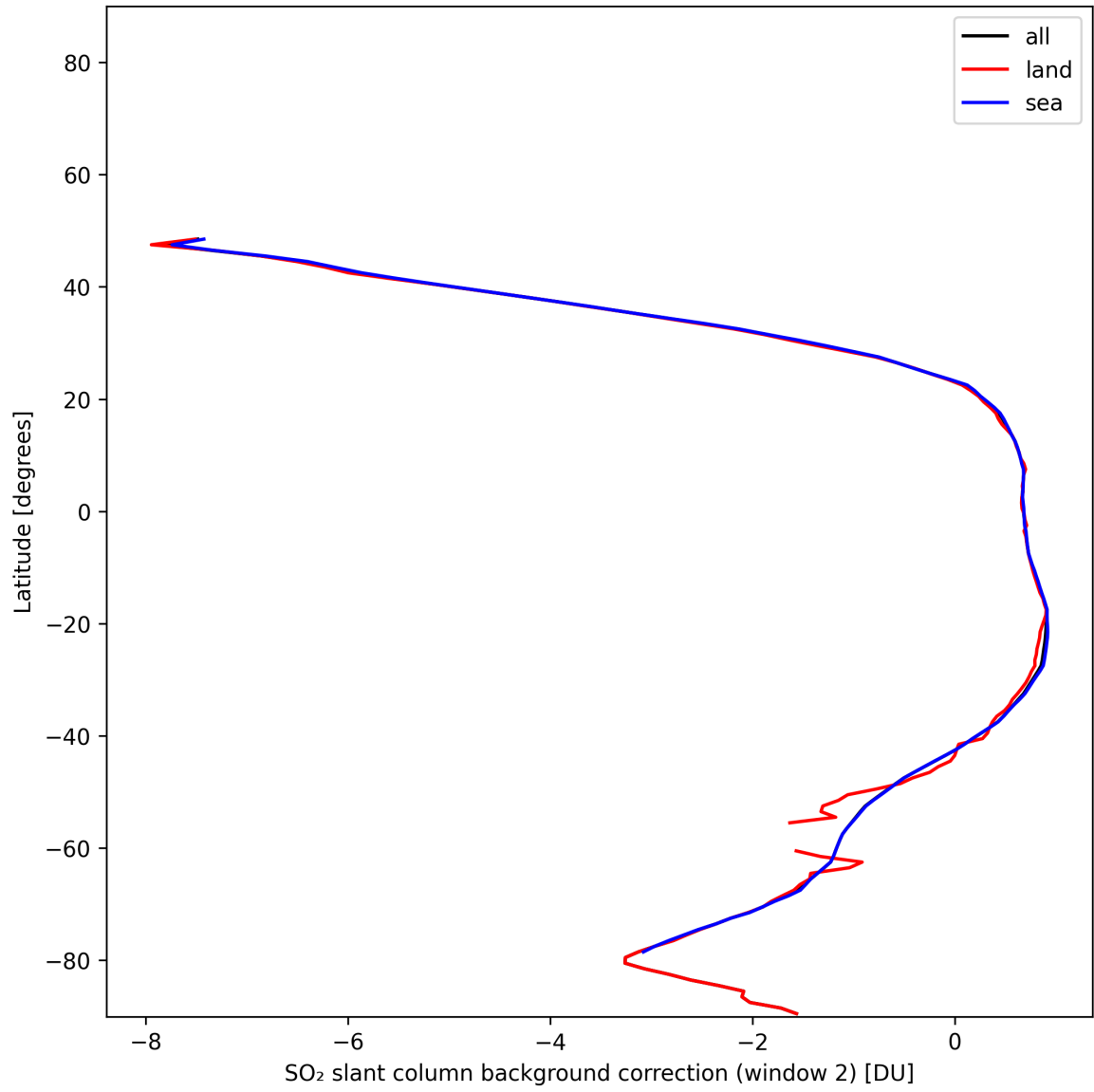


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-01-12 to 2025-01-13.

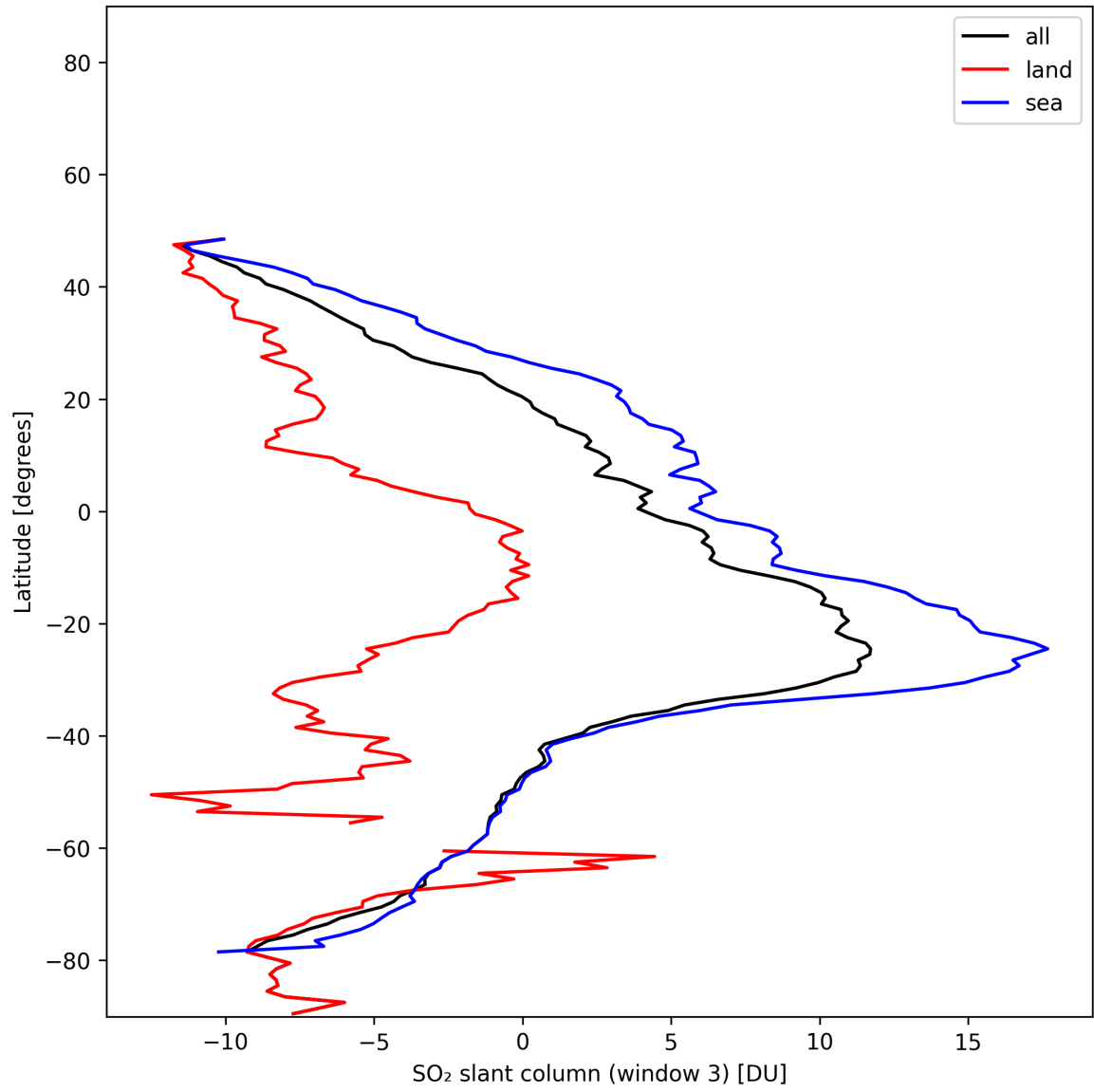


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-01-12 to 2025-01-13.

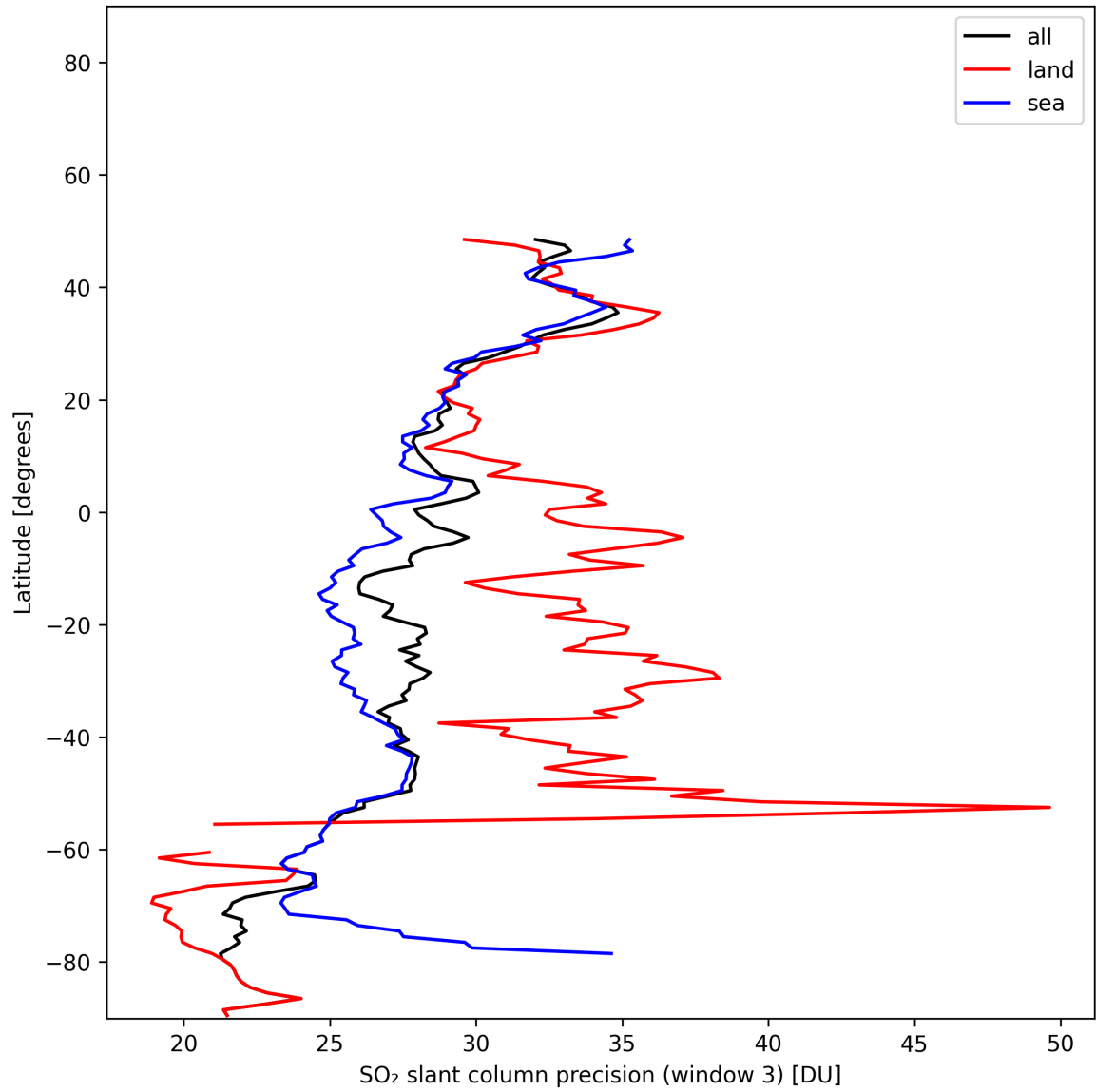


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-01-12 to 2025-01-13.

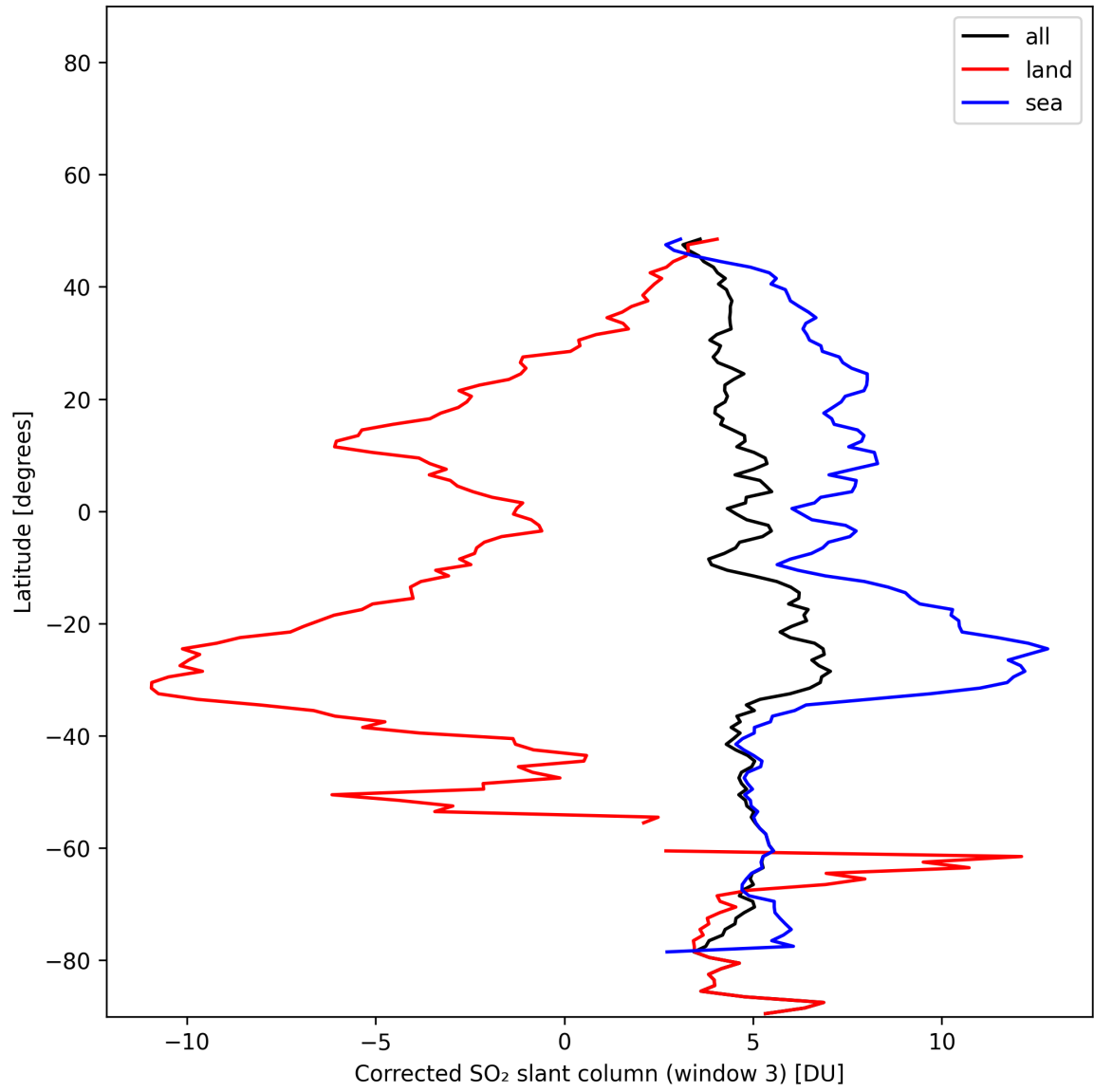


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-01-12 to 2025-01-13.

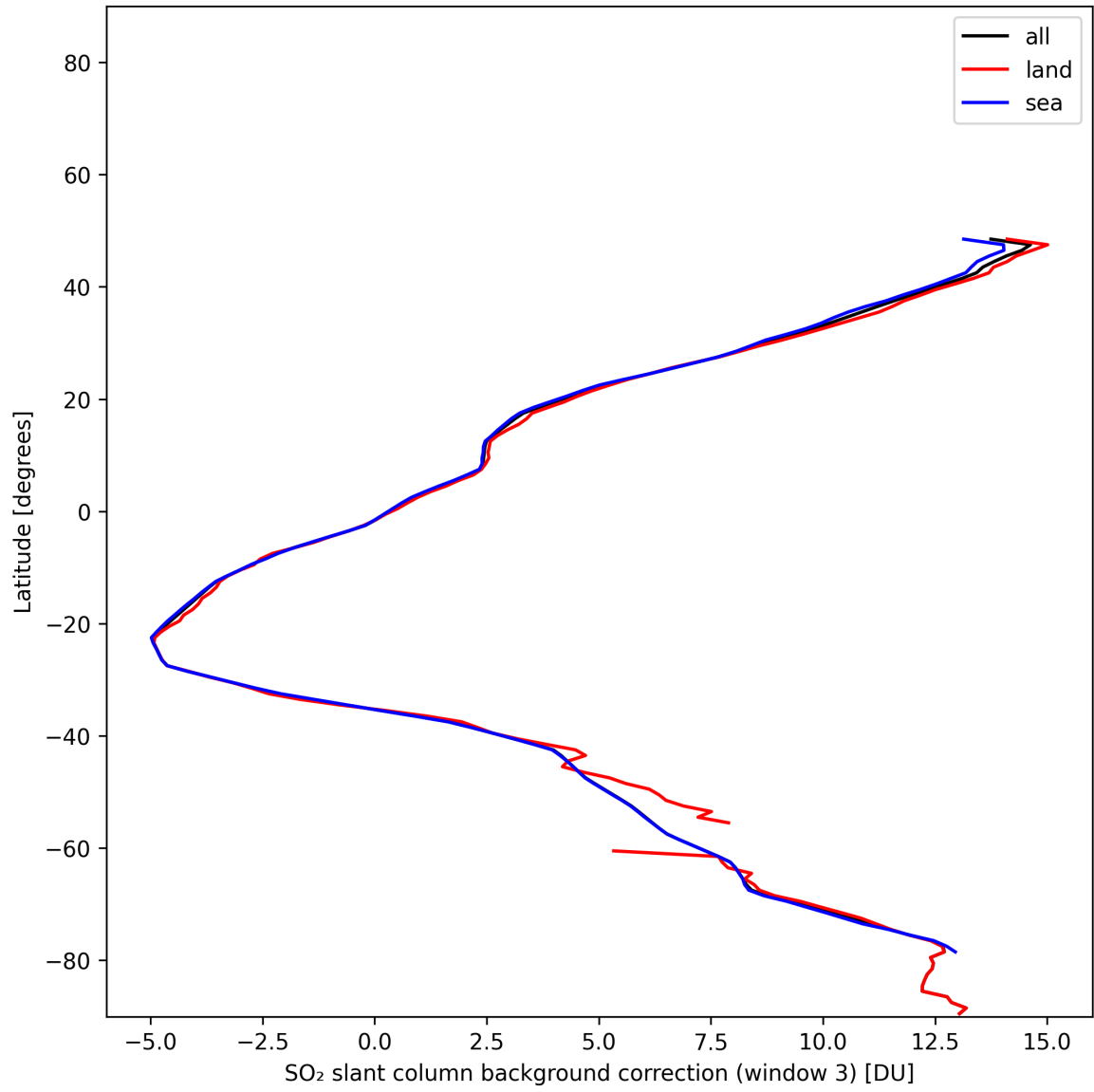


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-01-12 to 2025-01-13.

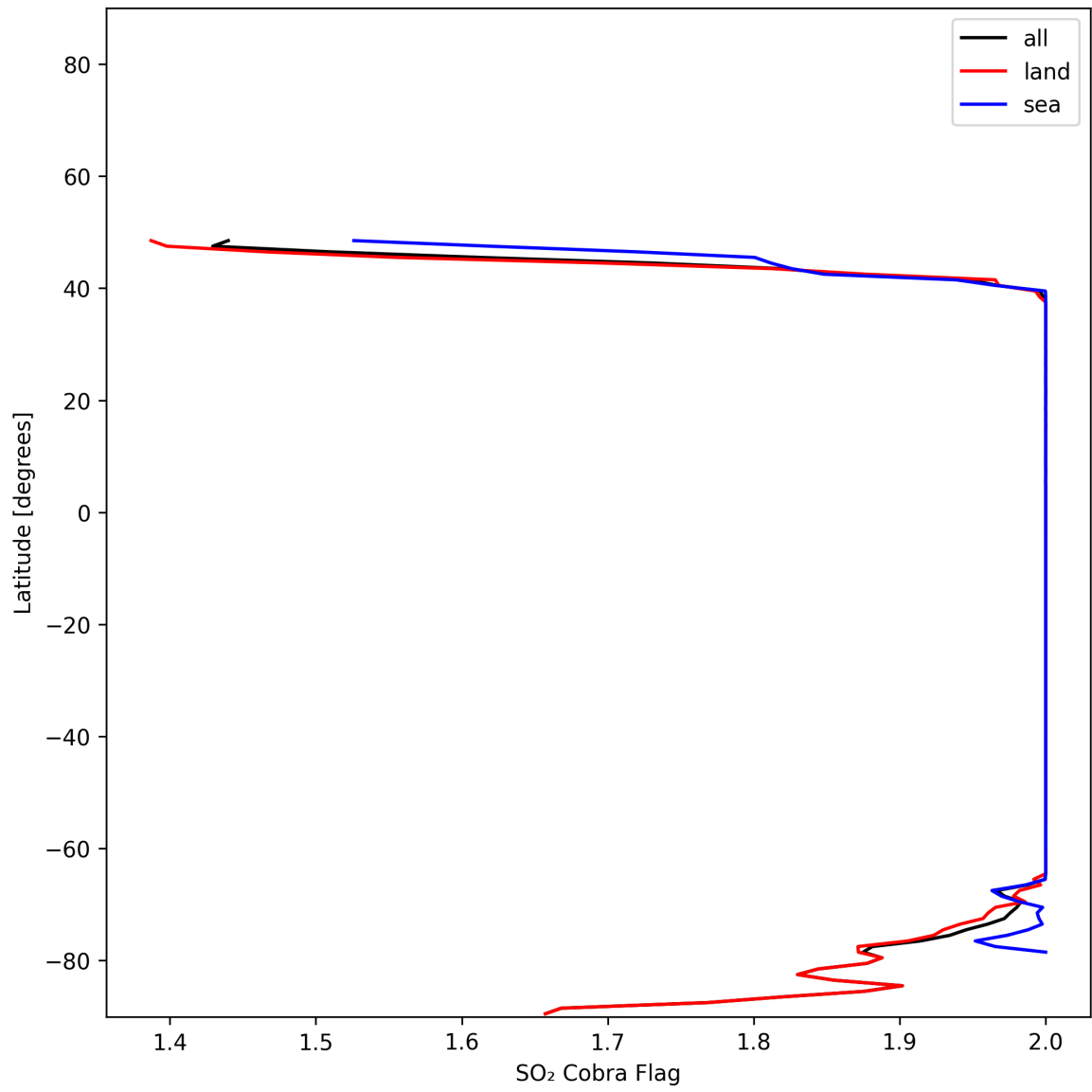


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-01-12 to 2025-01-13.

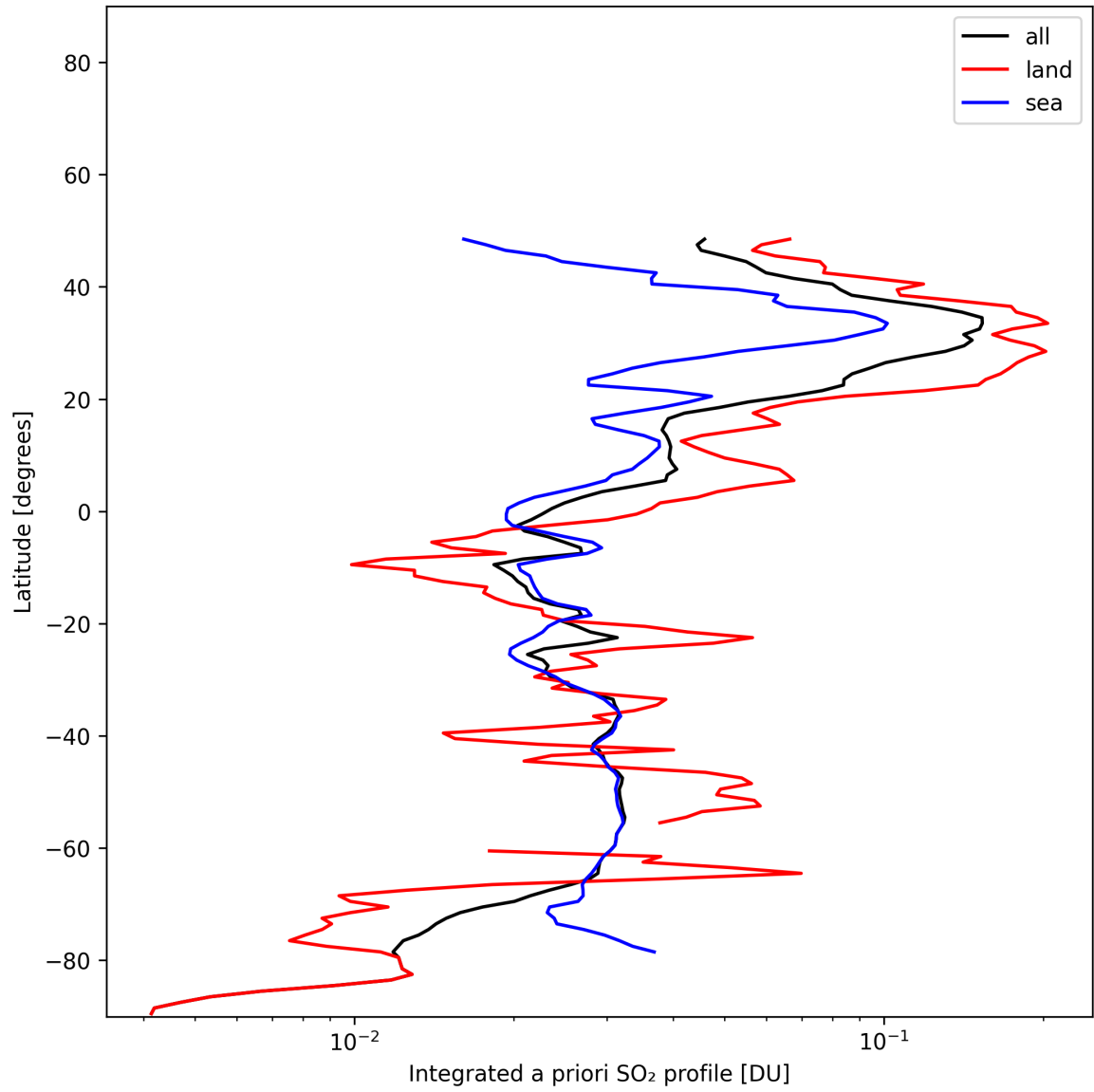


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-01-12 to 2025-01-13.

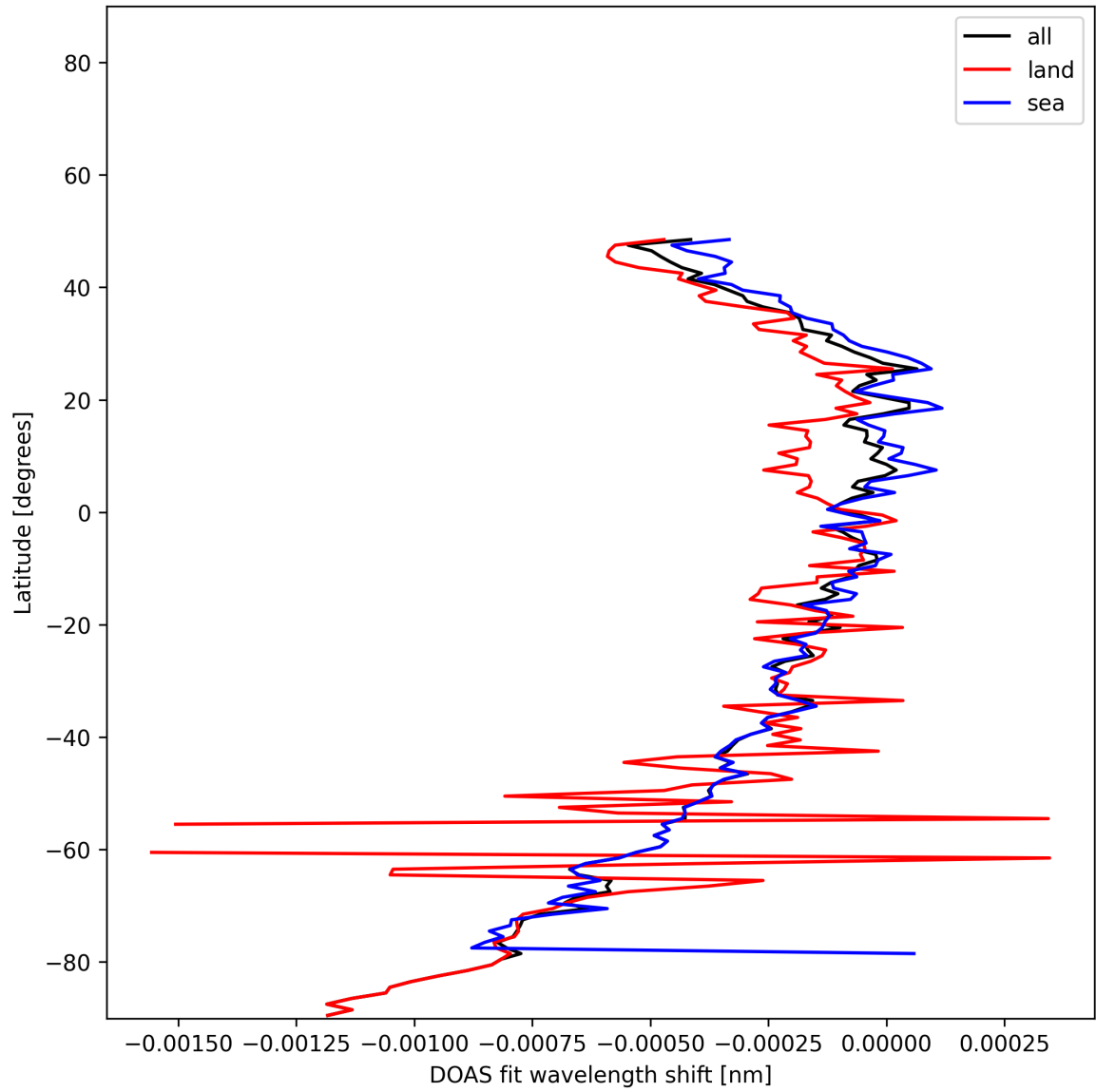


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-01-12 to 2025-01-13.

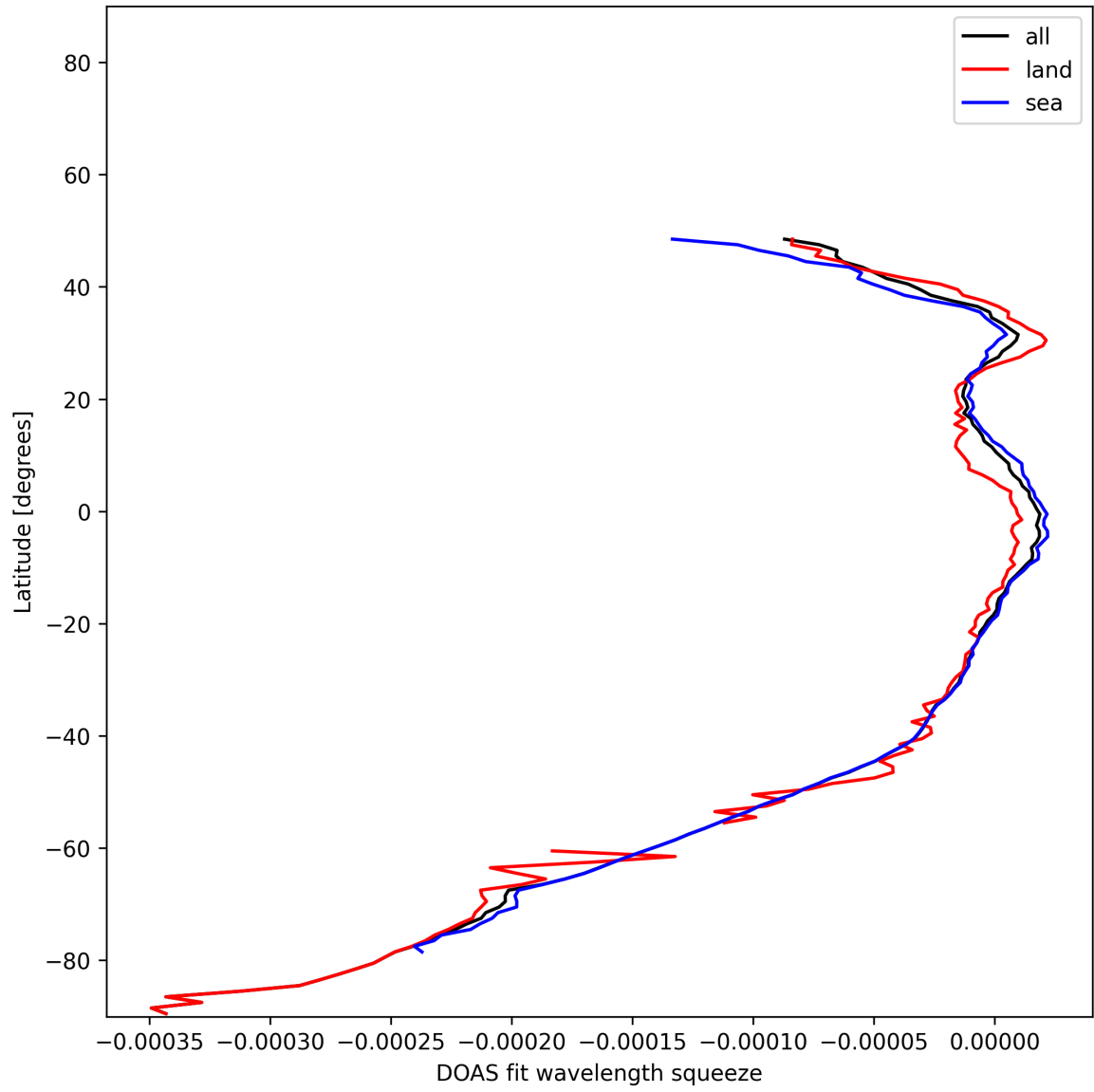


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-01-12 to 2025-01-13.

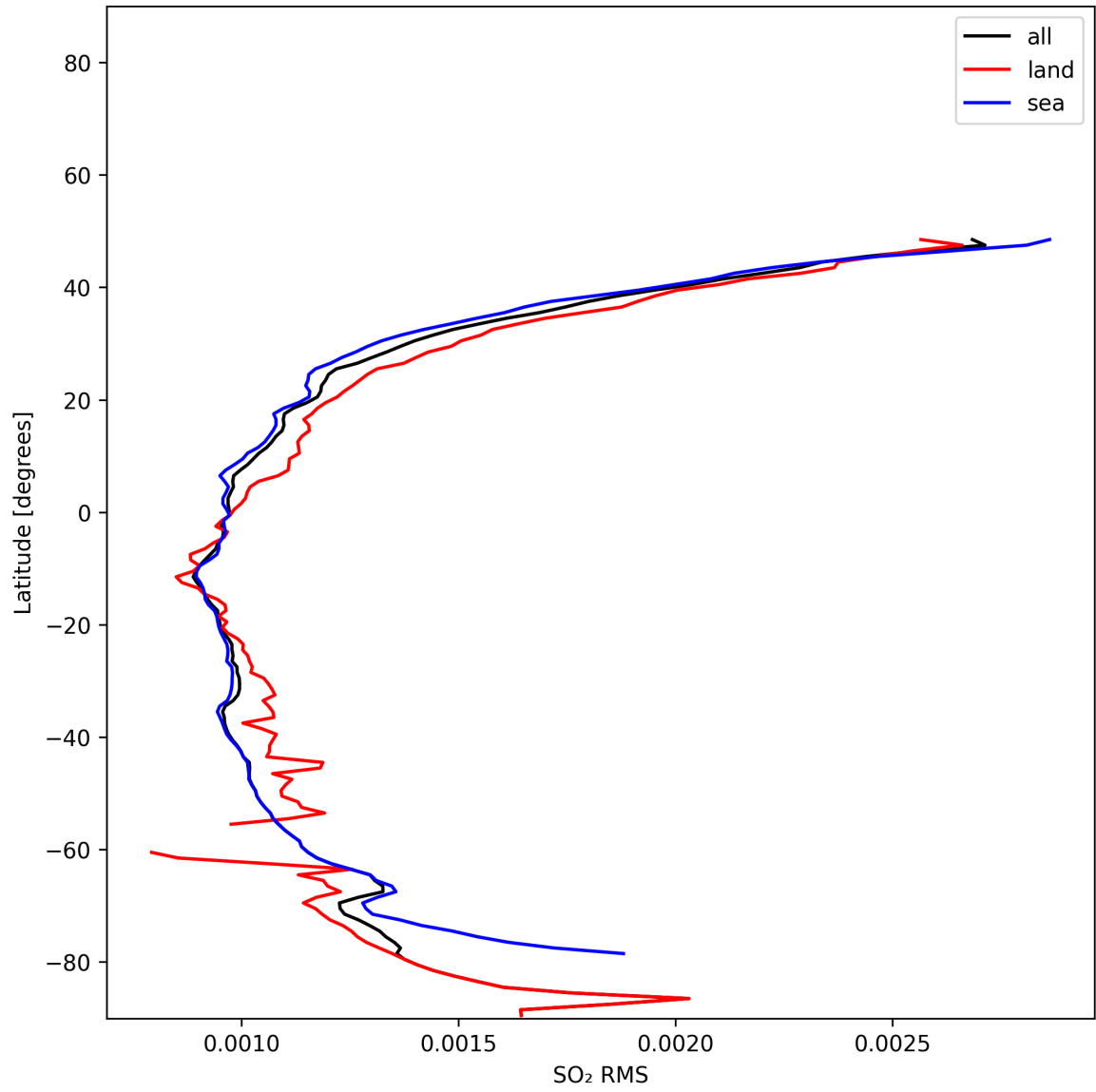


Figure 52: Zonal average of “SO₂ RMS” for 2025-01-12 to 2025-01-13.

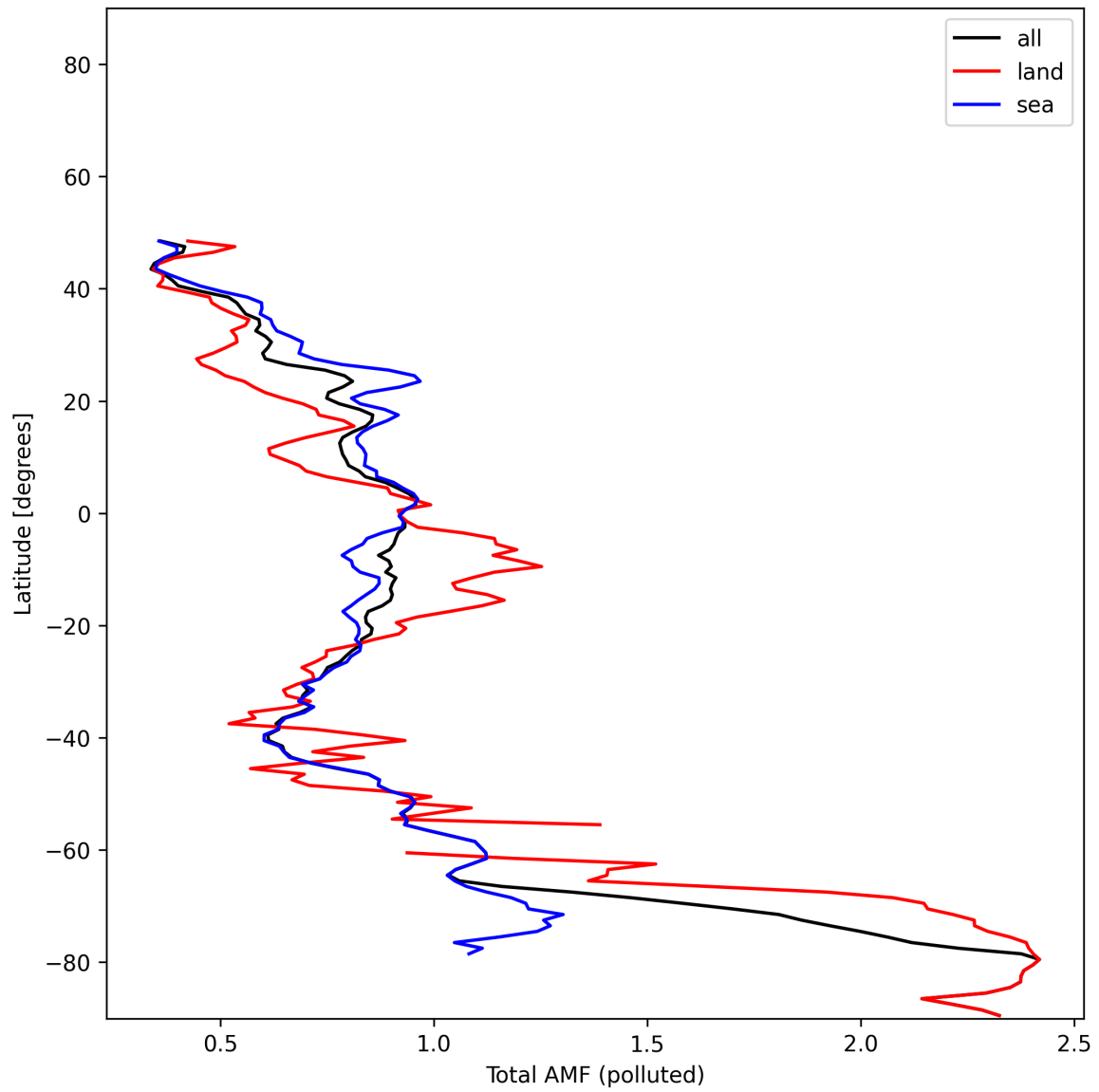


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-01-12 to 2025-01-13.

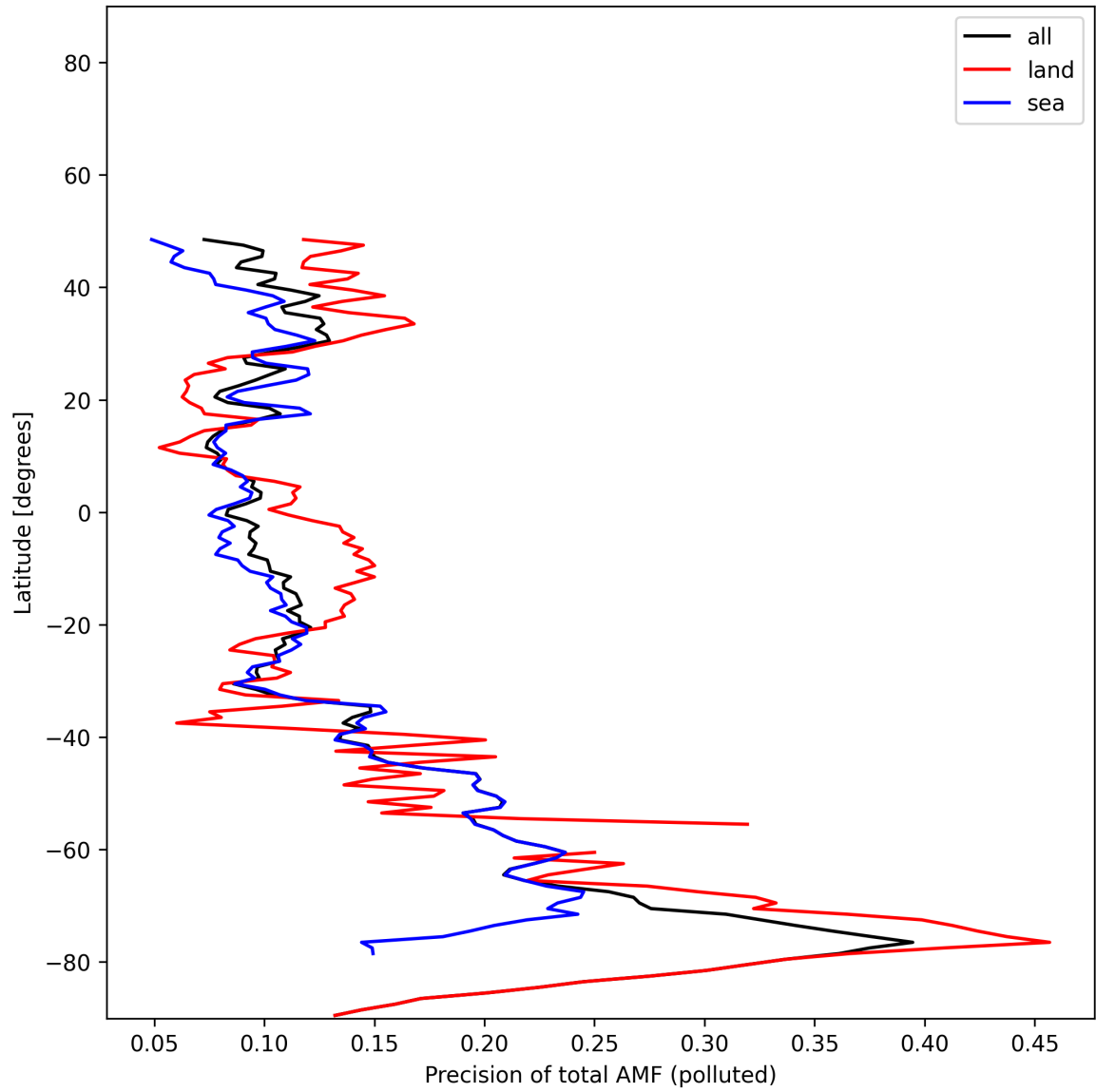


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-01-12 to 2025-01-13.

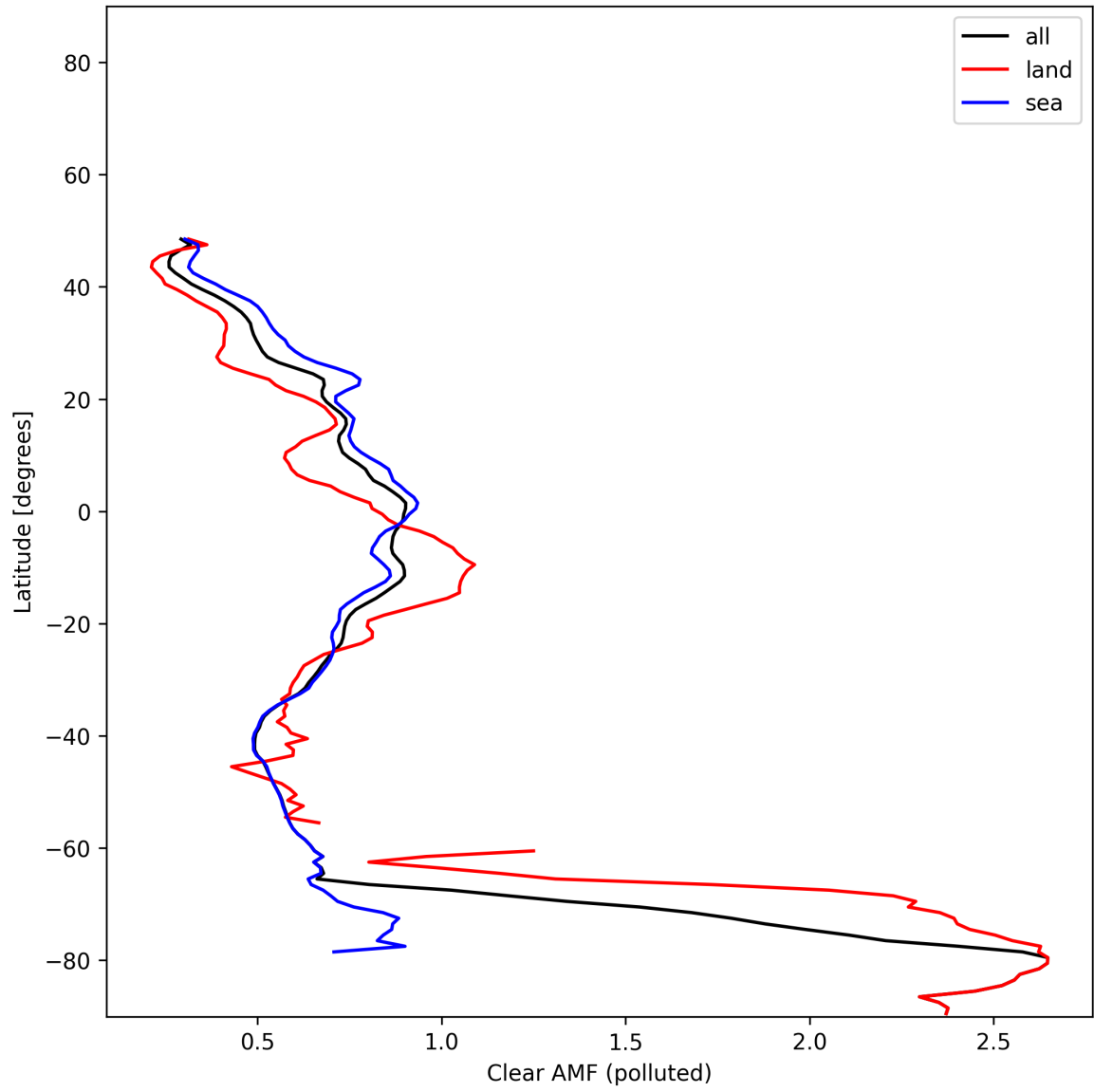


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-01-12 to 2025-01-13.

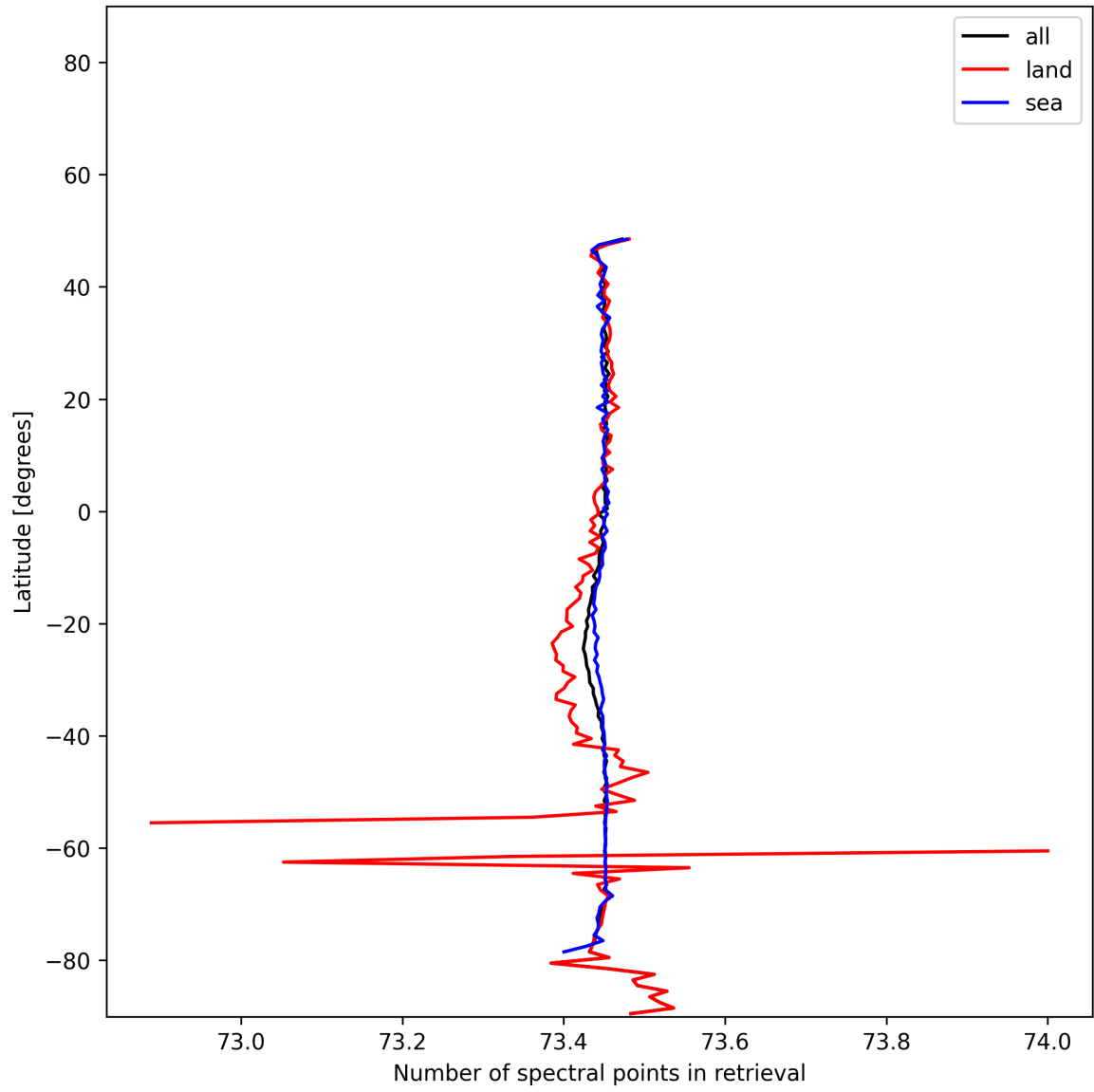


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-01-12 to 2025-01-13.

8 Histograms

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

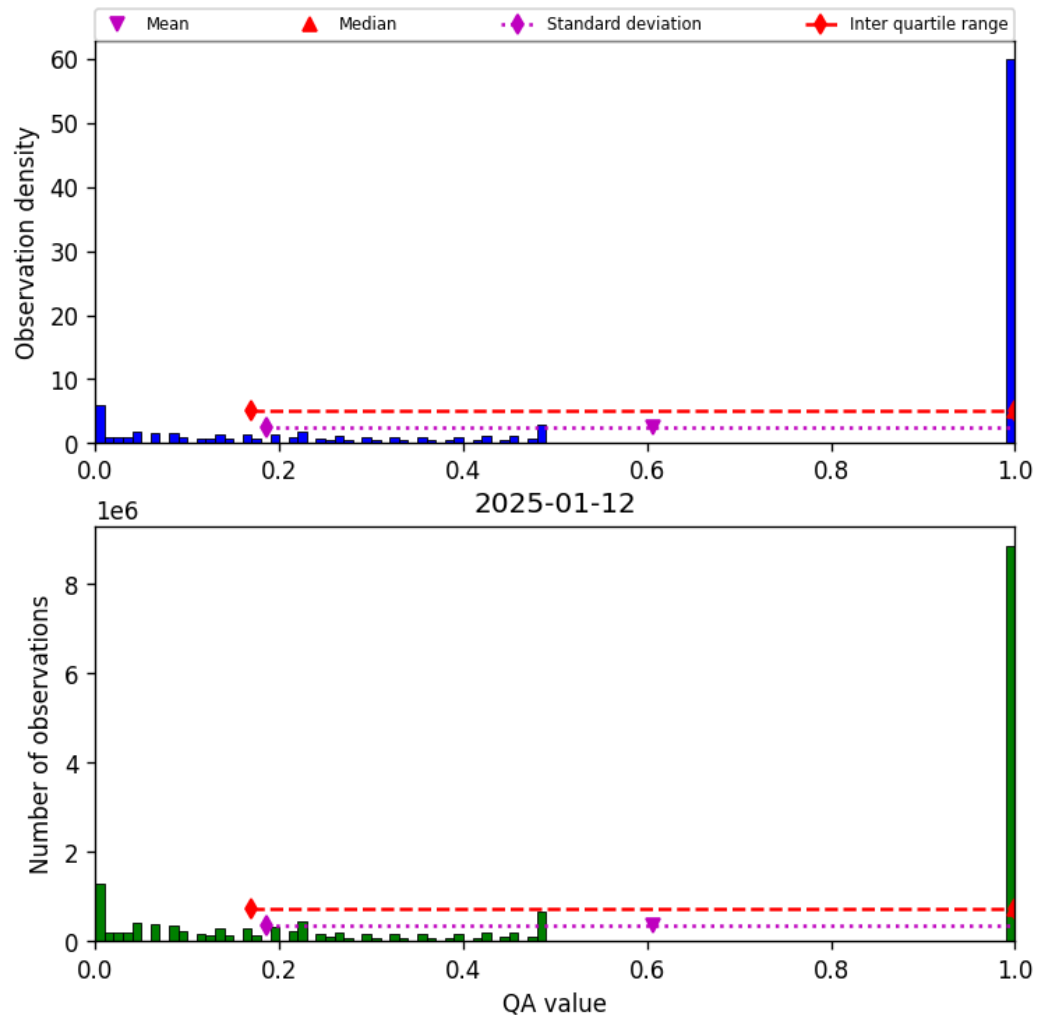


Figure 57: Histogram of “QA value” for 2025-01-12 to 2025-01-13

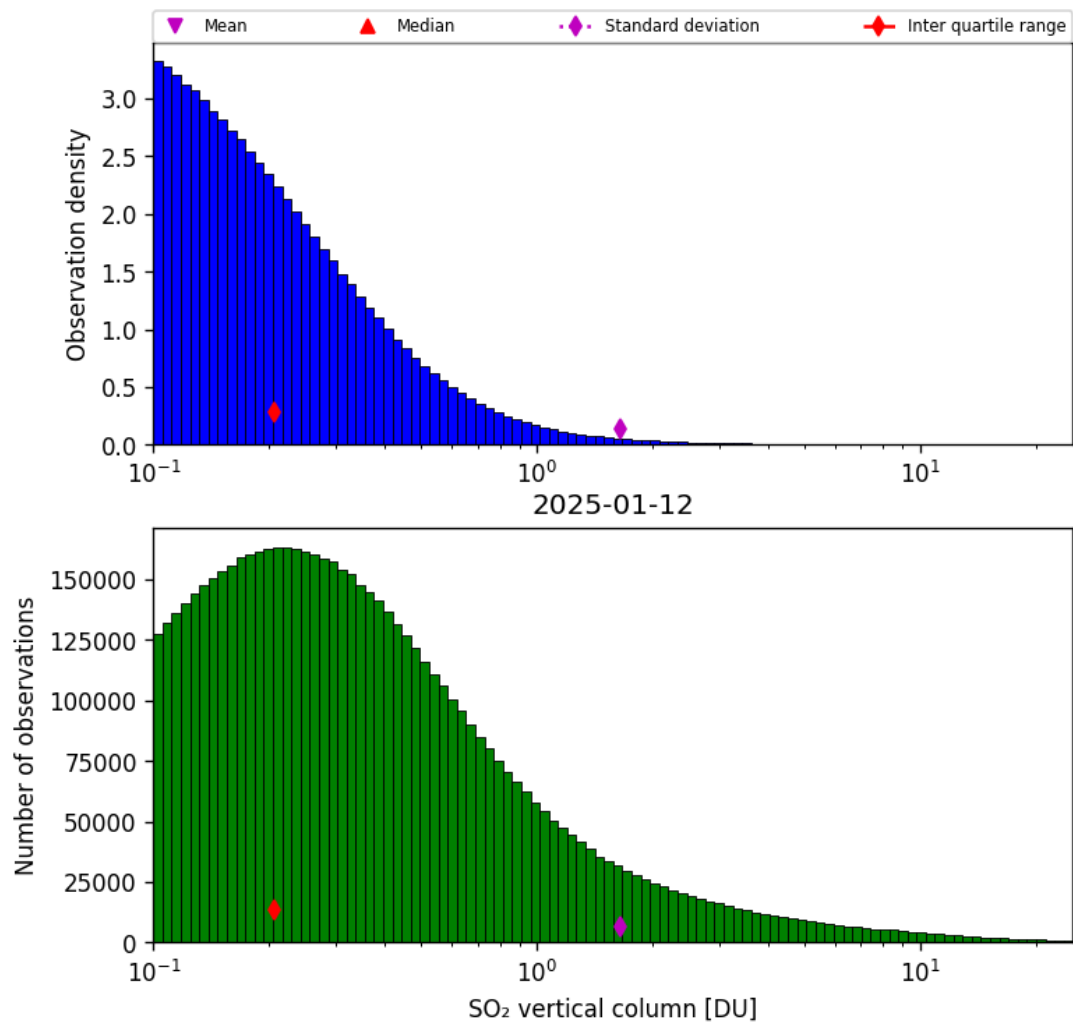


Figure 58: Histogram of “SO₂ vertical column” for 2025-01-12 to 2025-01-13

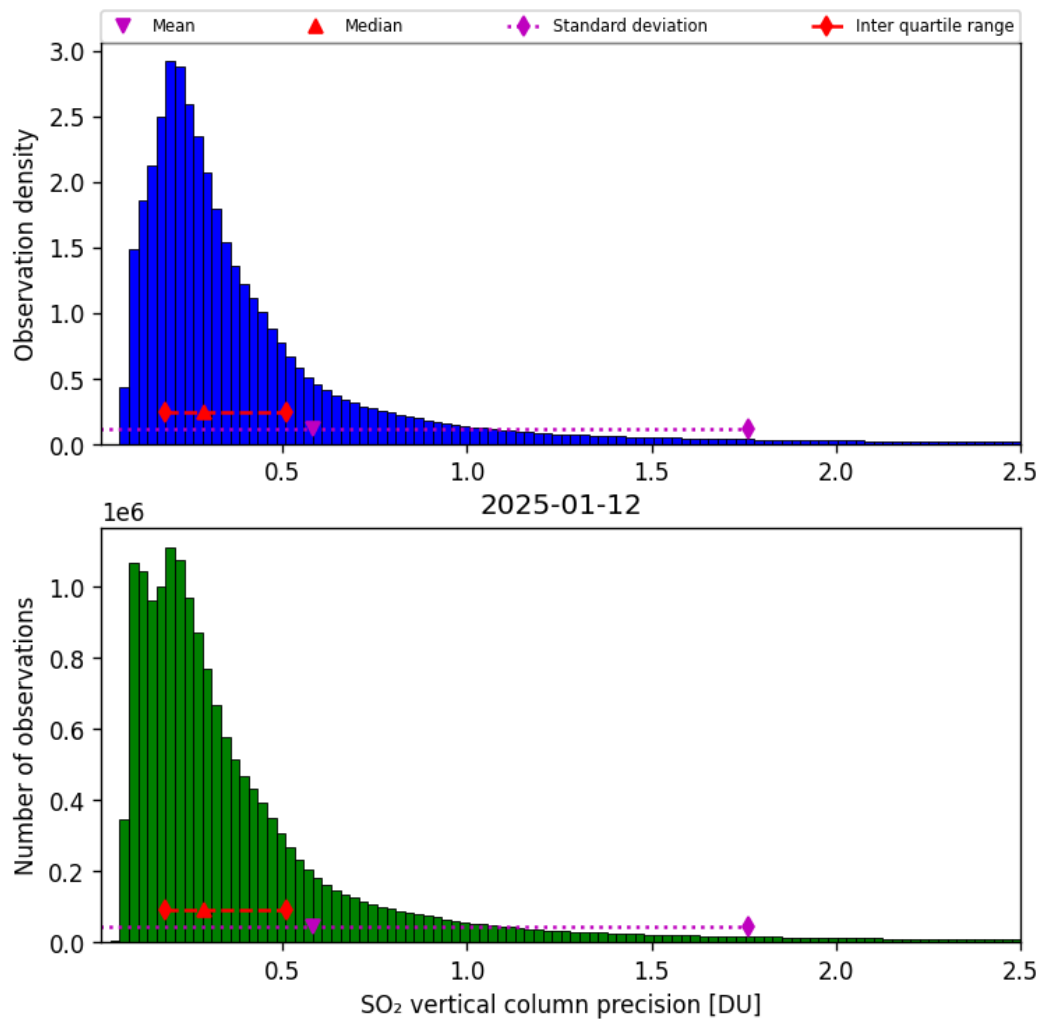


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-01-12 to 2025-01-13

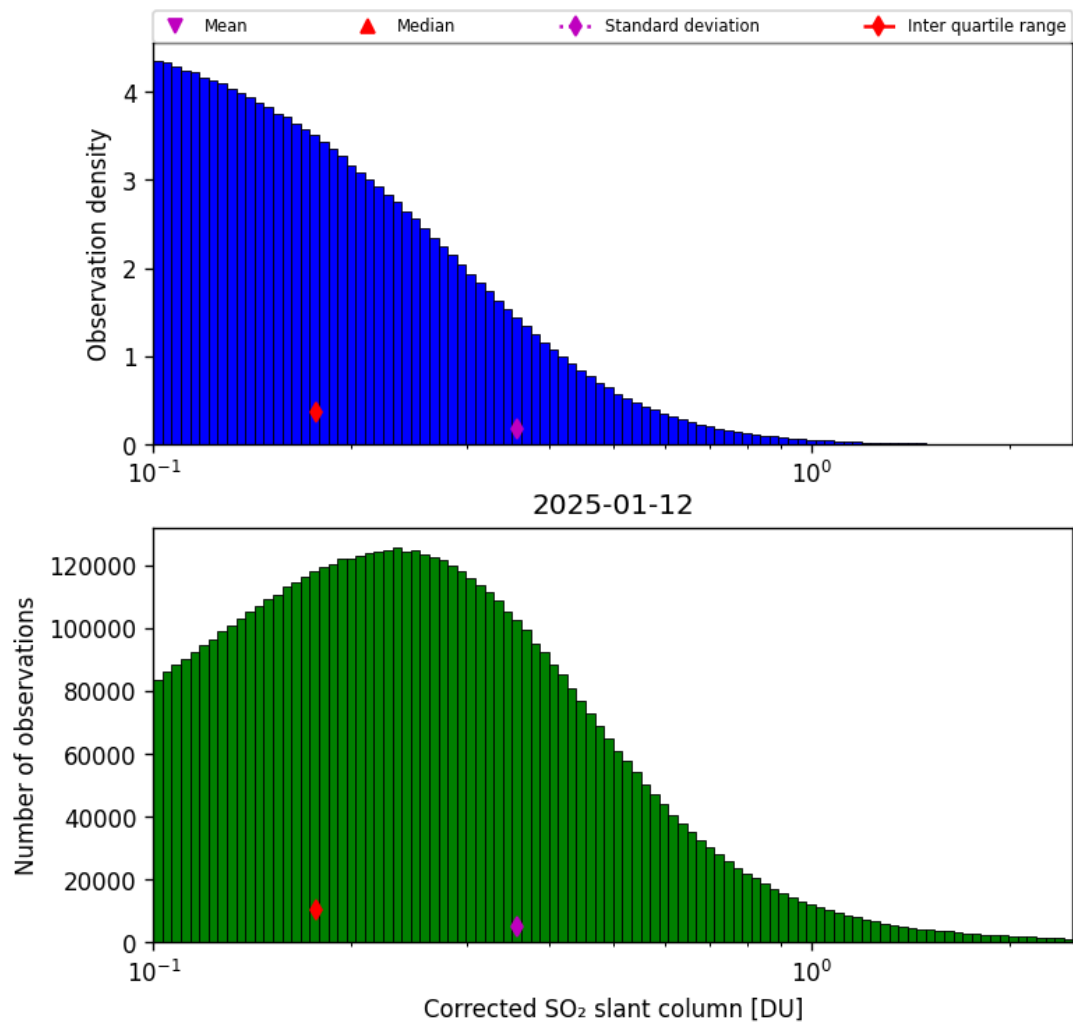


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-01-12 to 2025-01-13

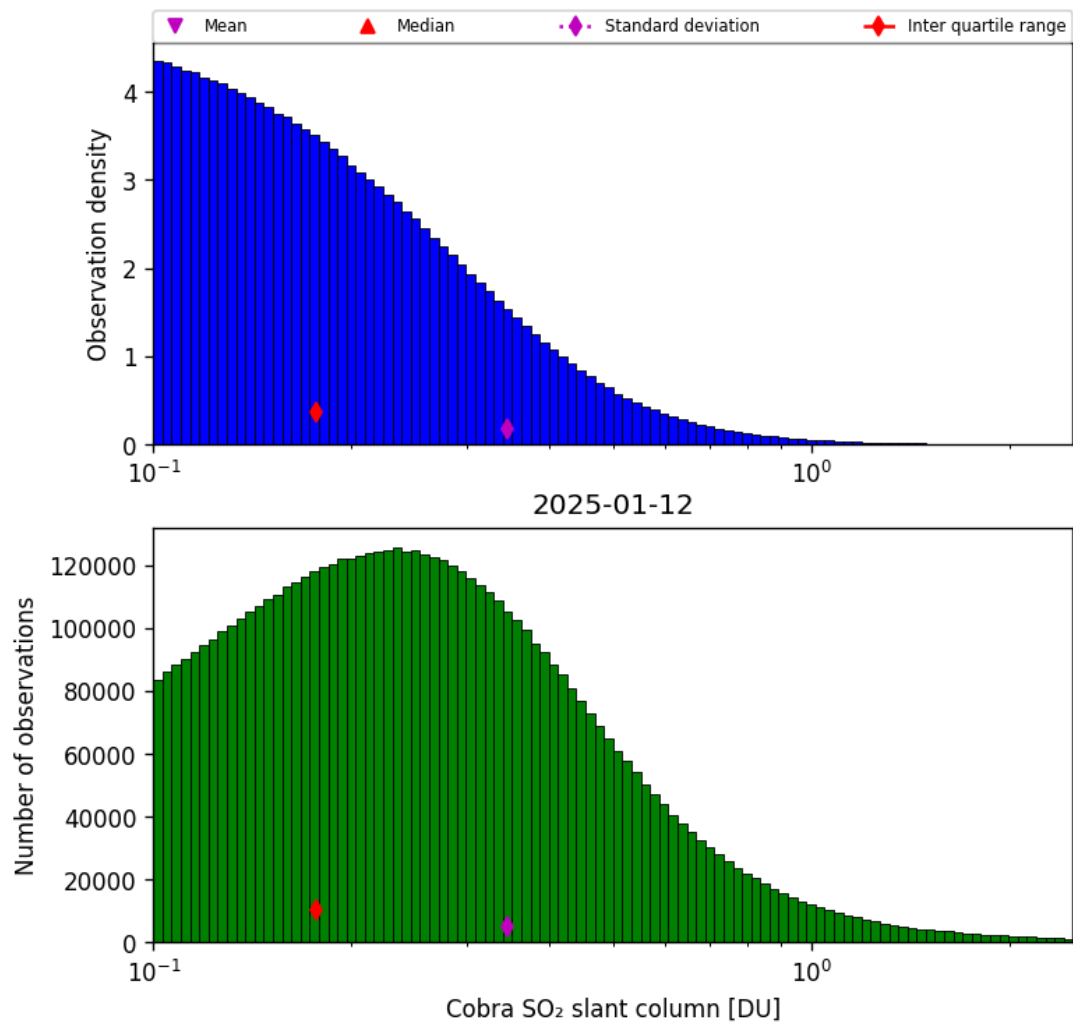


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-01-12 to 2025-01-13

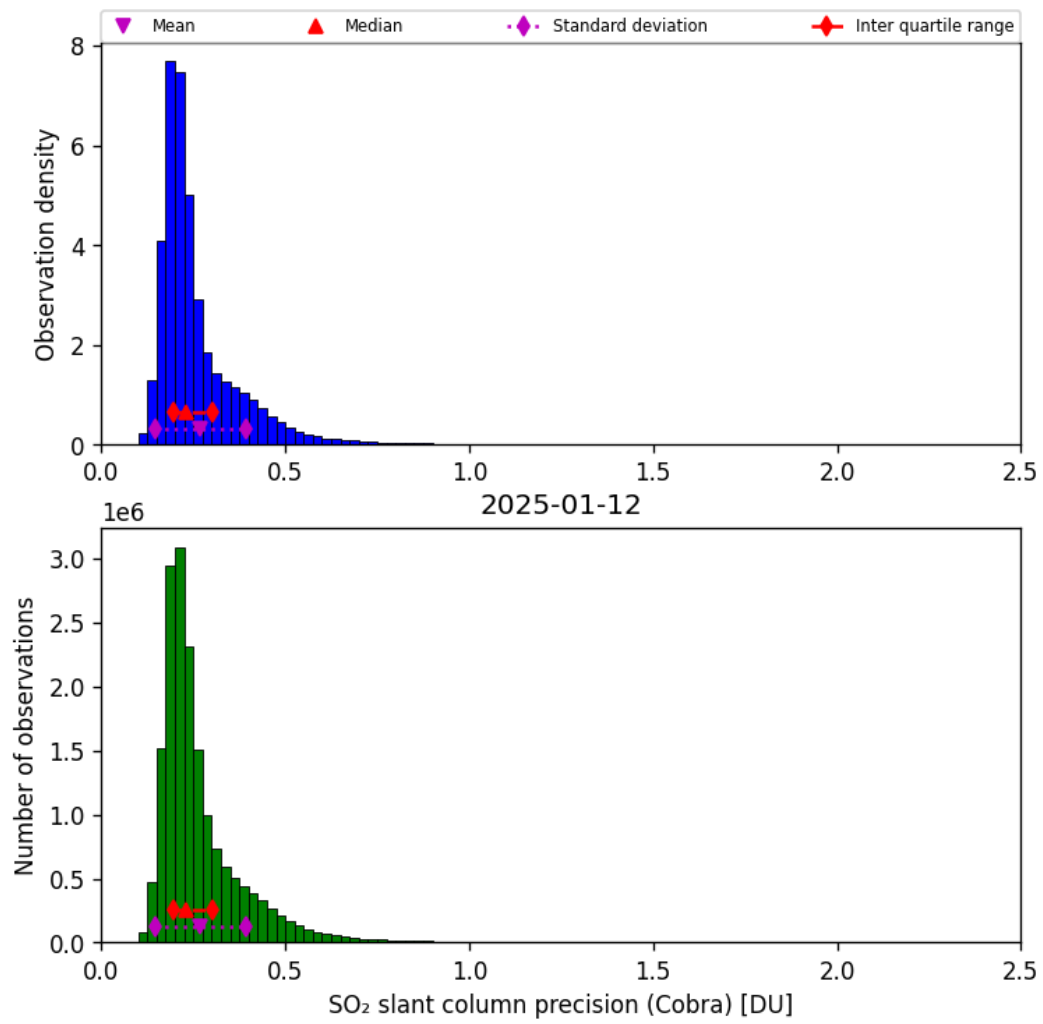


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-01-12 to 2025-01-13

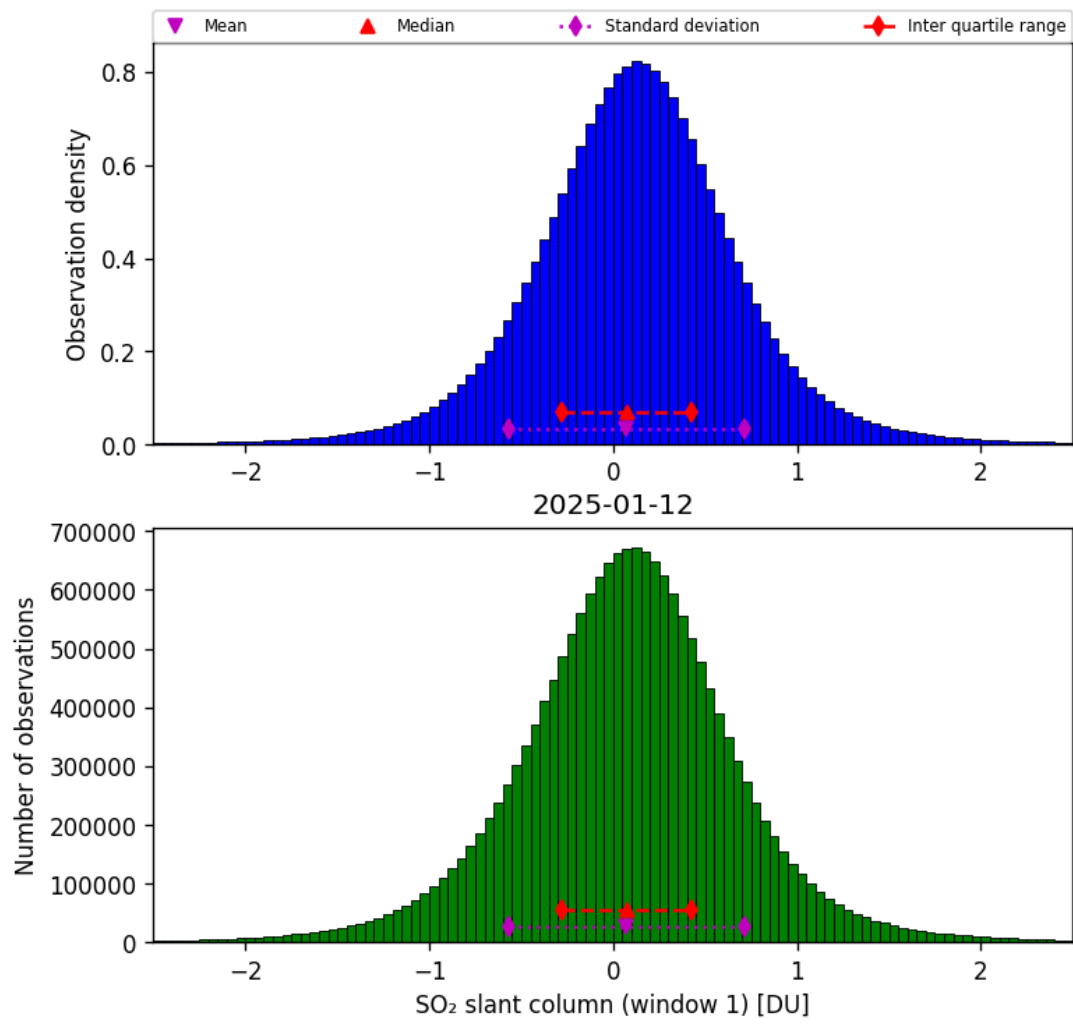


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-01-12 to 2025-01-13

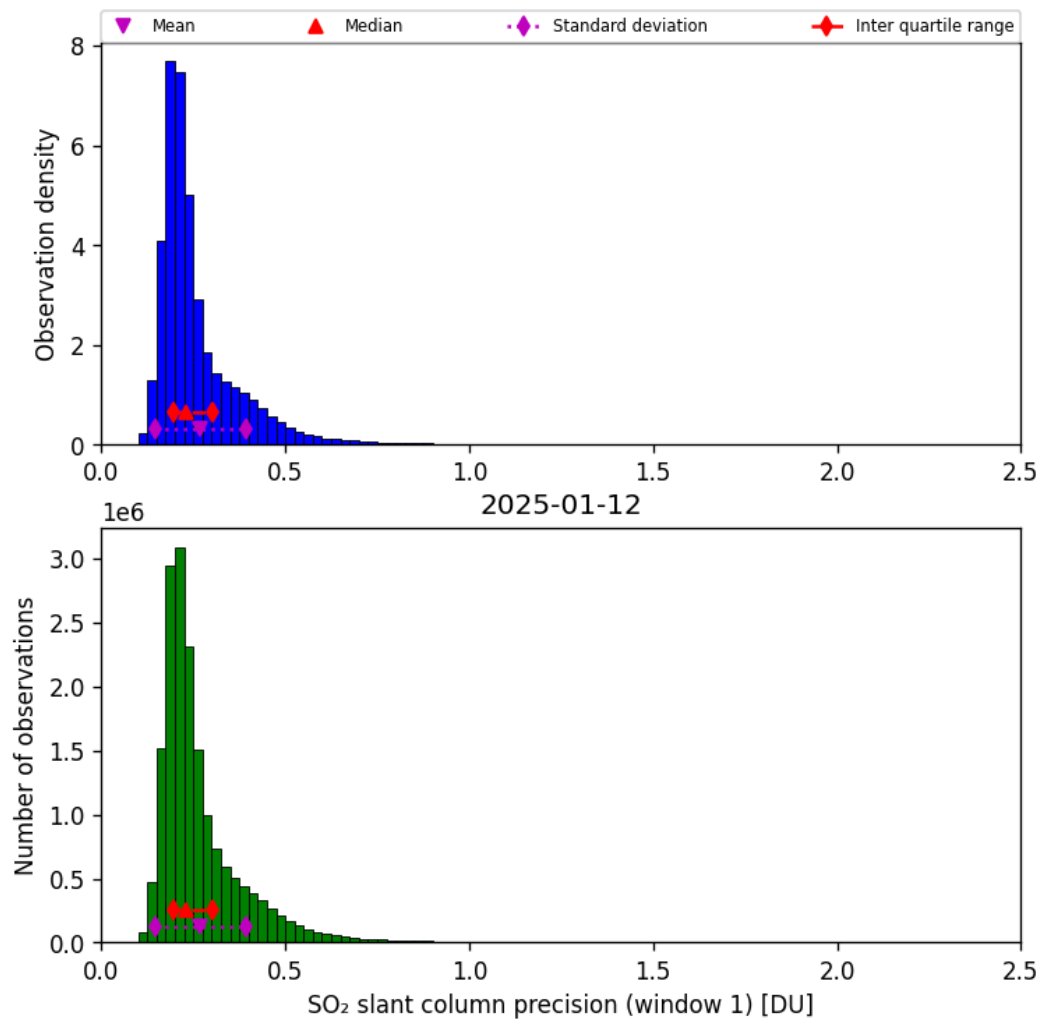


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-01-12 to 2025-01-13

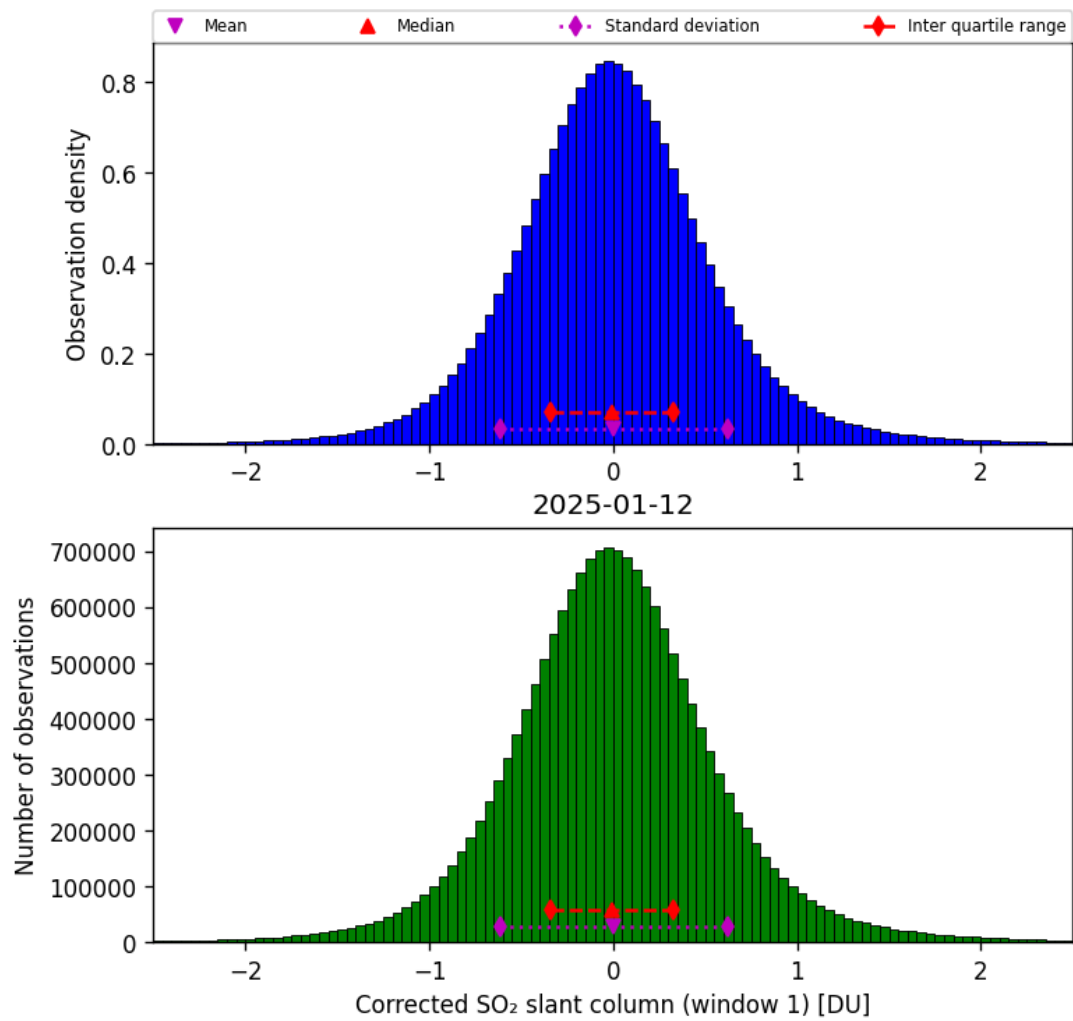


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-01-12 to 2025-01-13

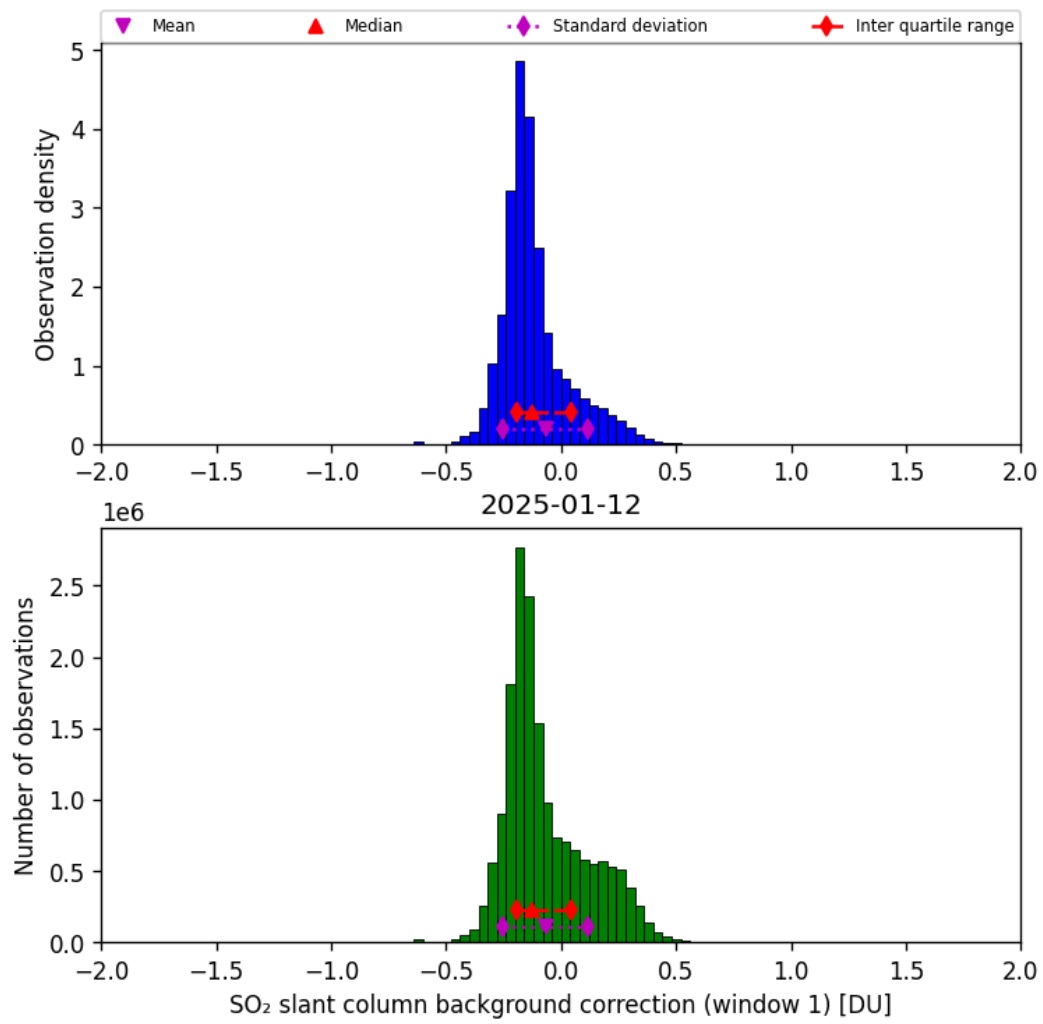


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-01-12 to 2025-01-13

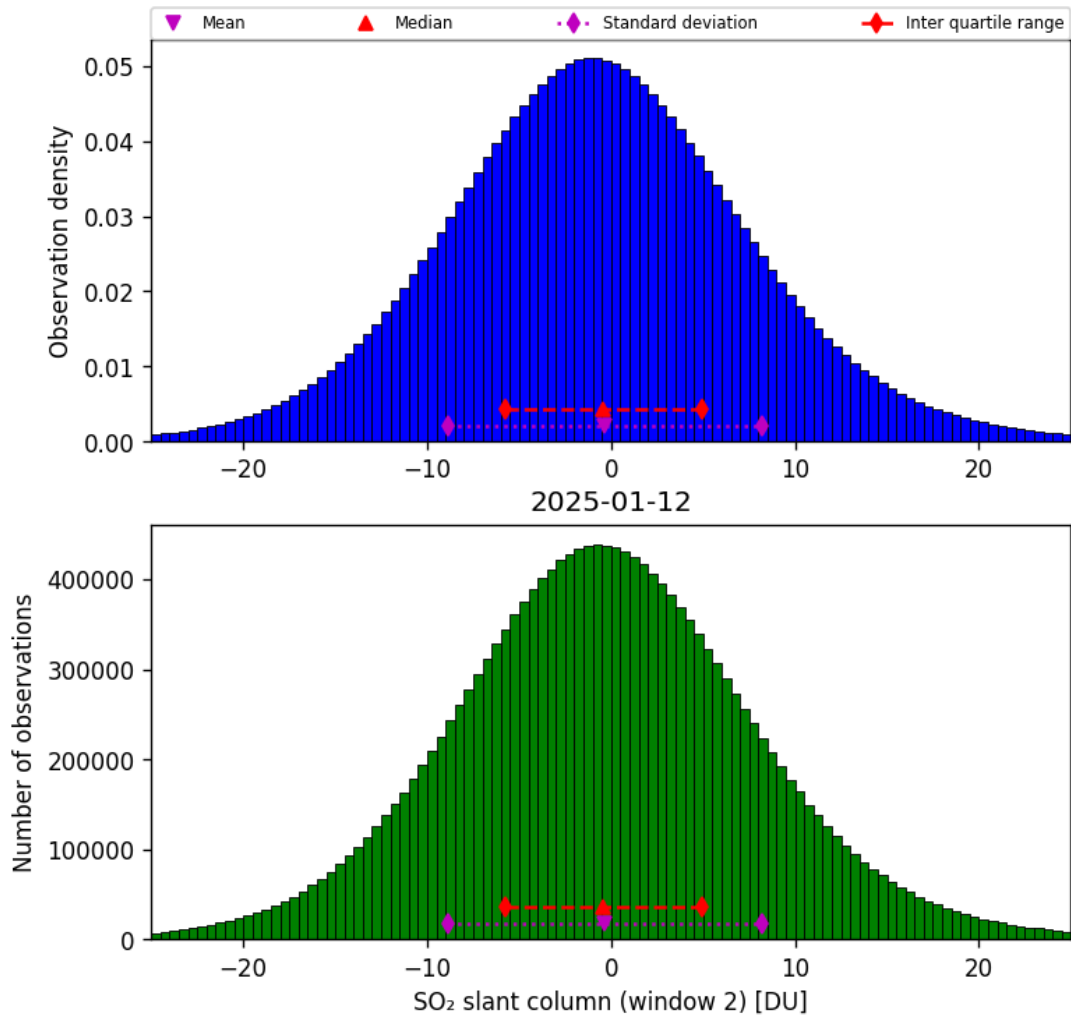


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-01-12 to 2025-01-13

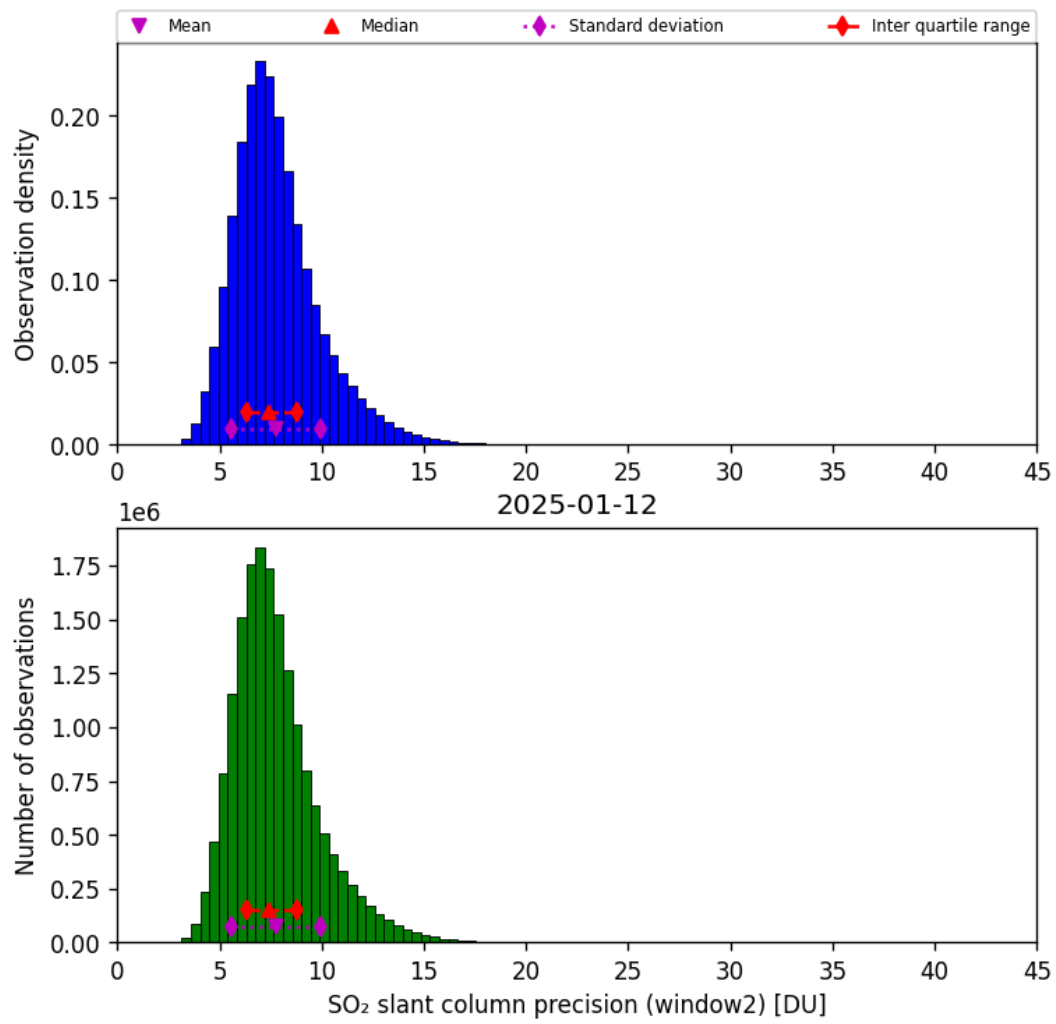


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-01-12 to 2025-01-13

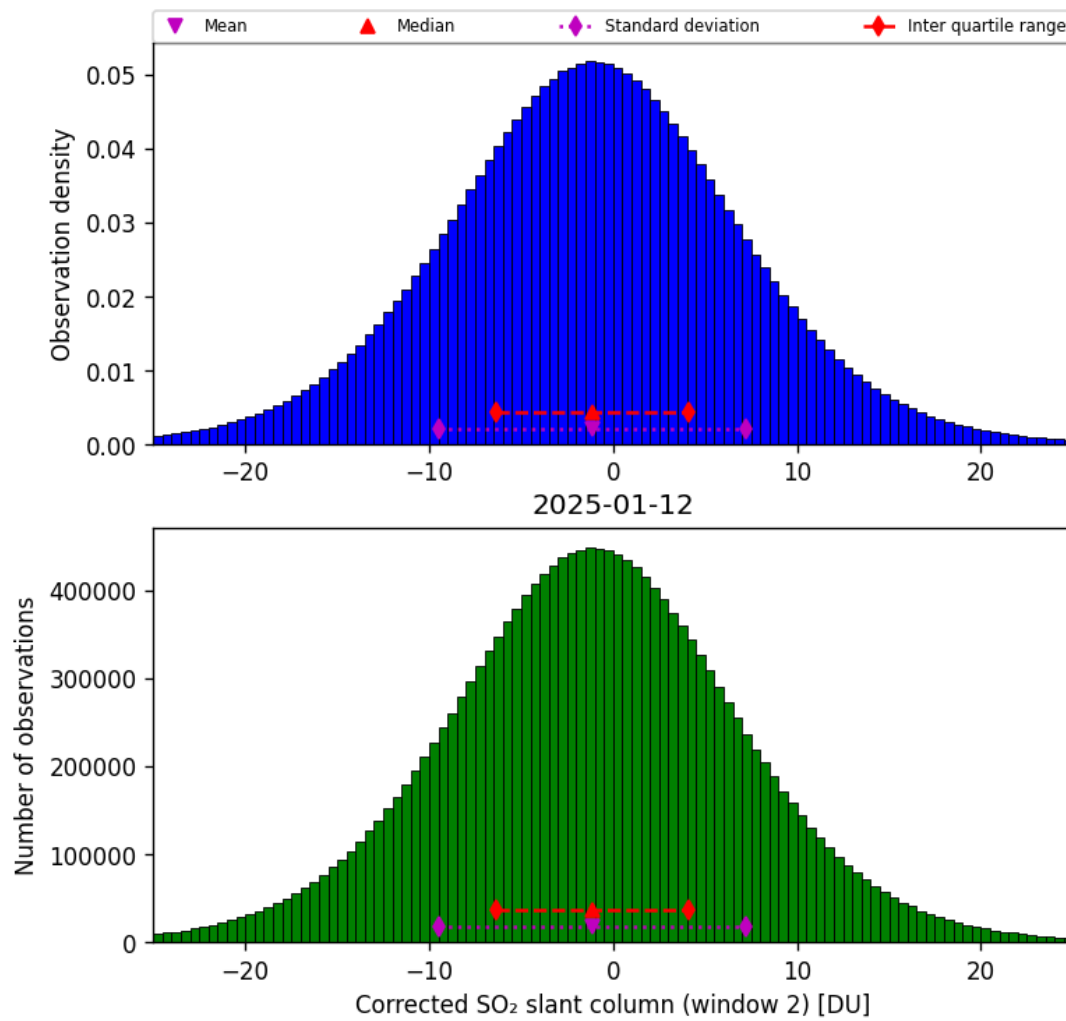


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-01-12 to 2025-01-13

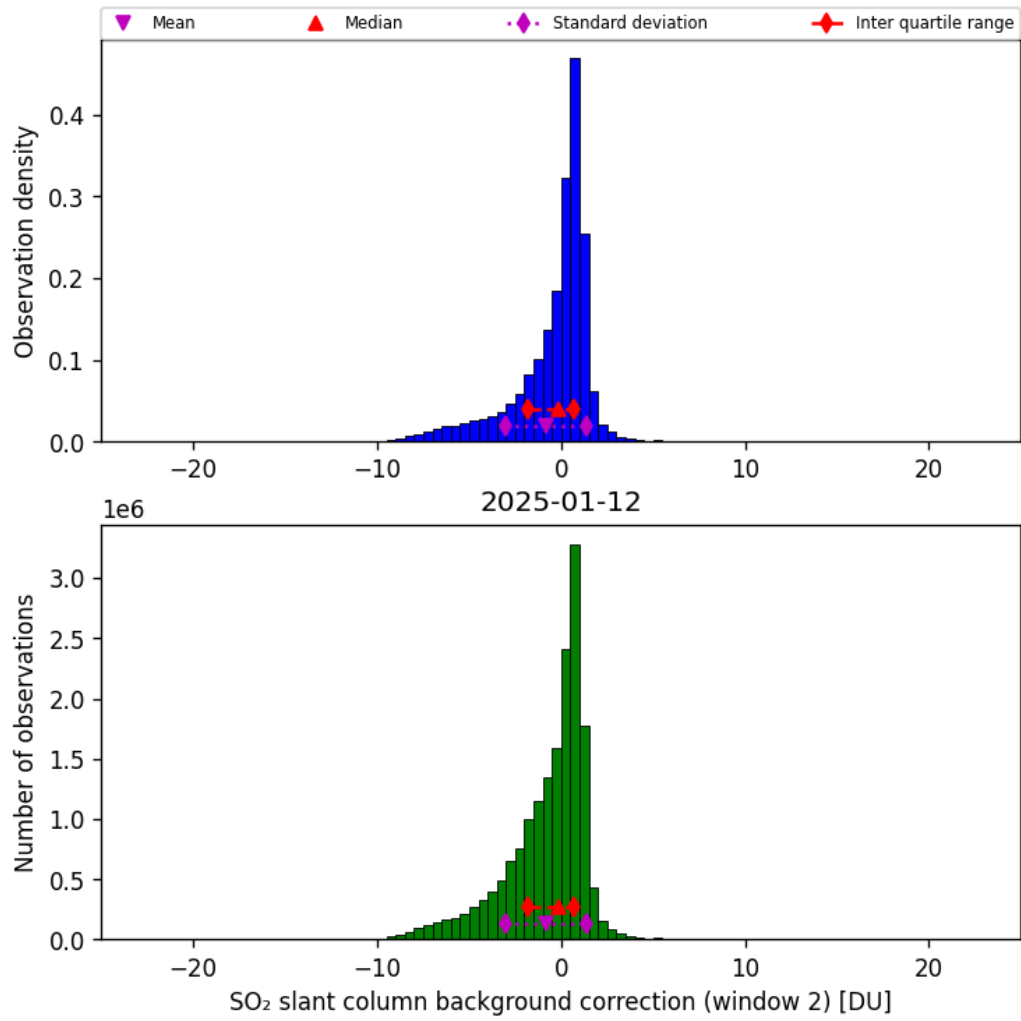


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-01-12 to 2025-01-13

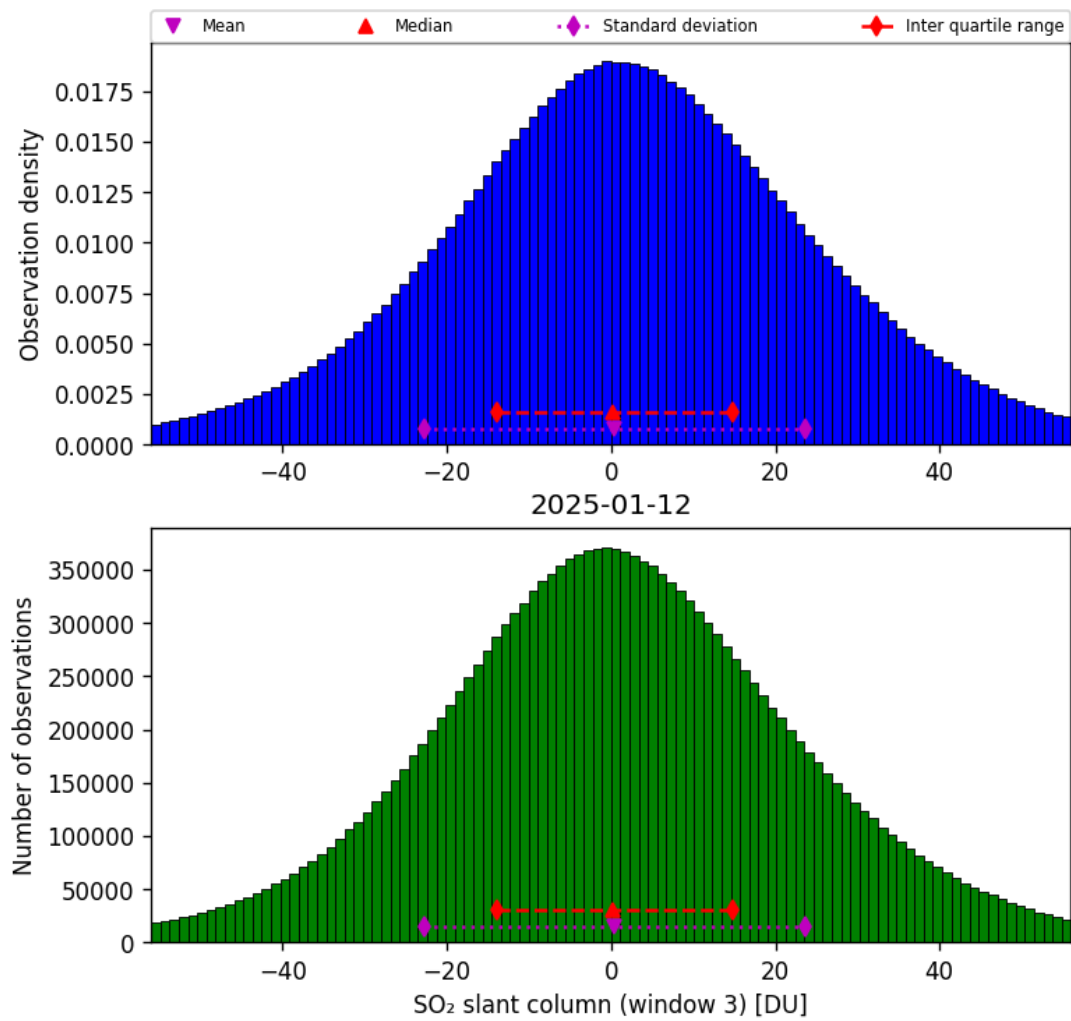


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-01-12 to 2025-01-13

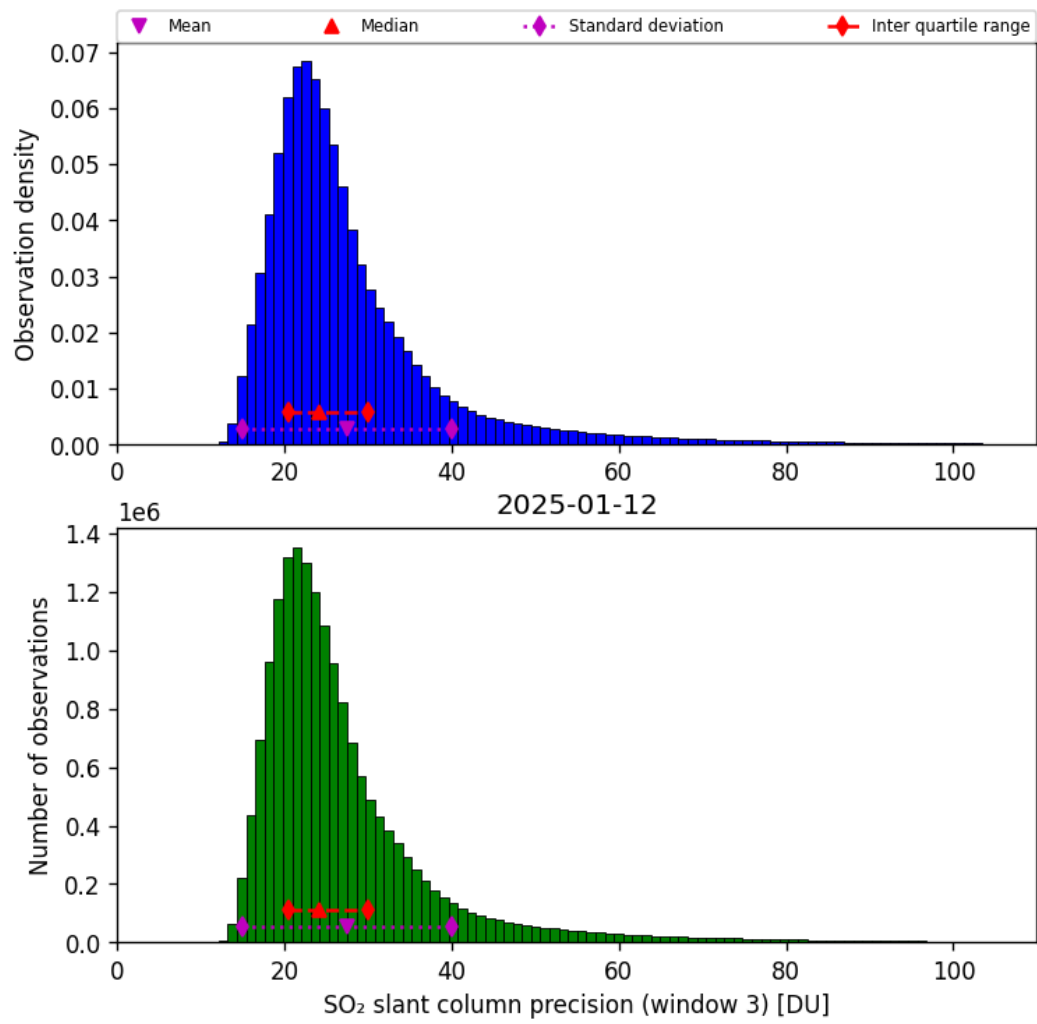


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-01-12 to 2025-01-13

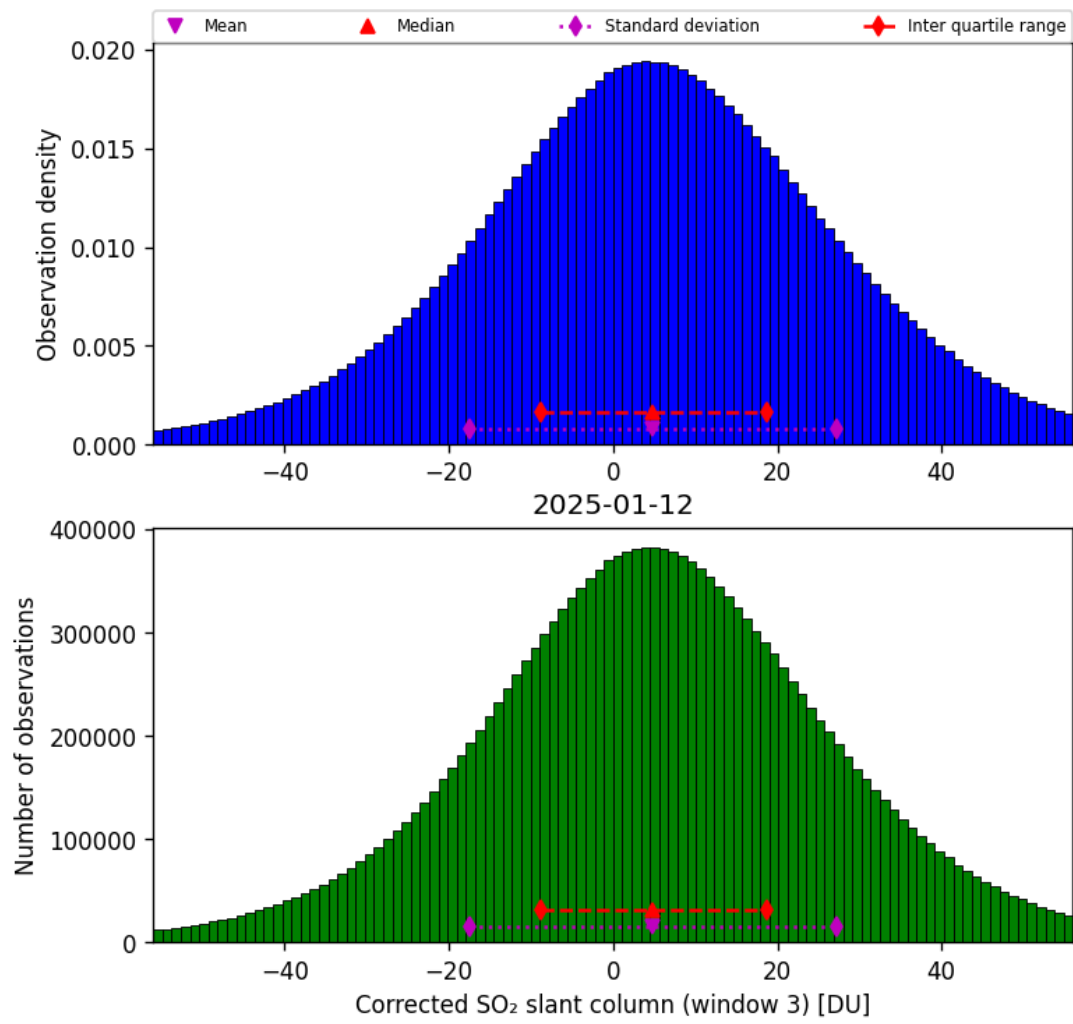


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-01-12 to 2025-01-13

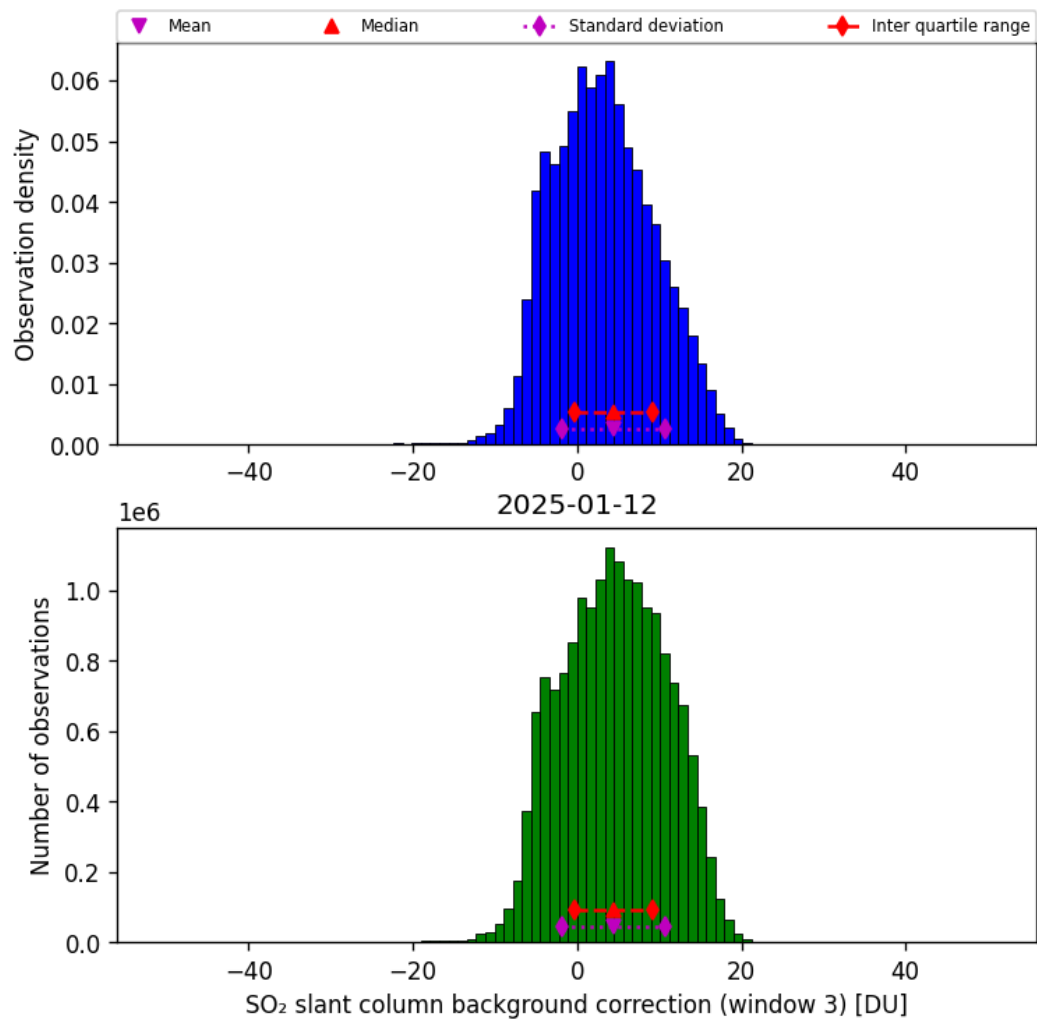


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-01-12 to 2025-01-13

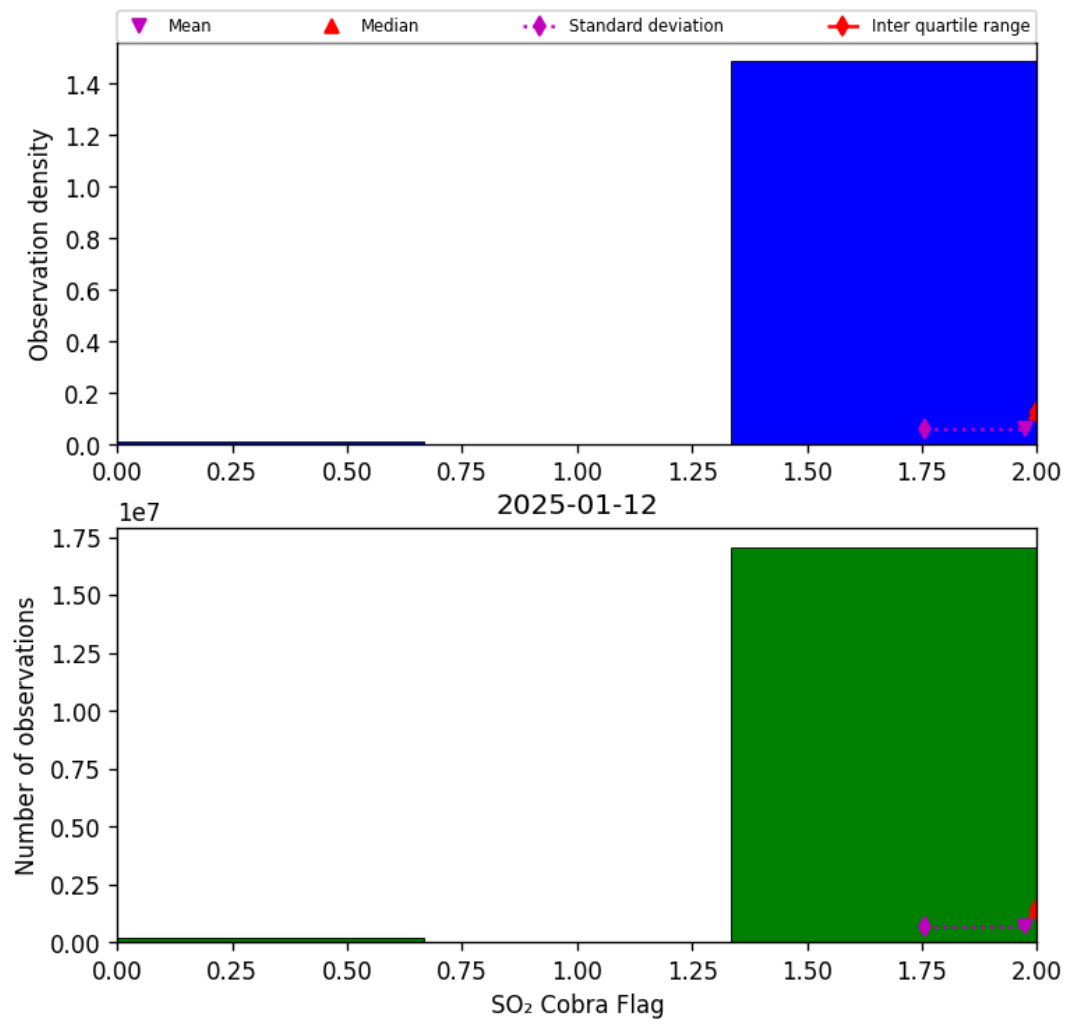


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-01-12 to 2025-01-13

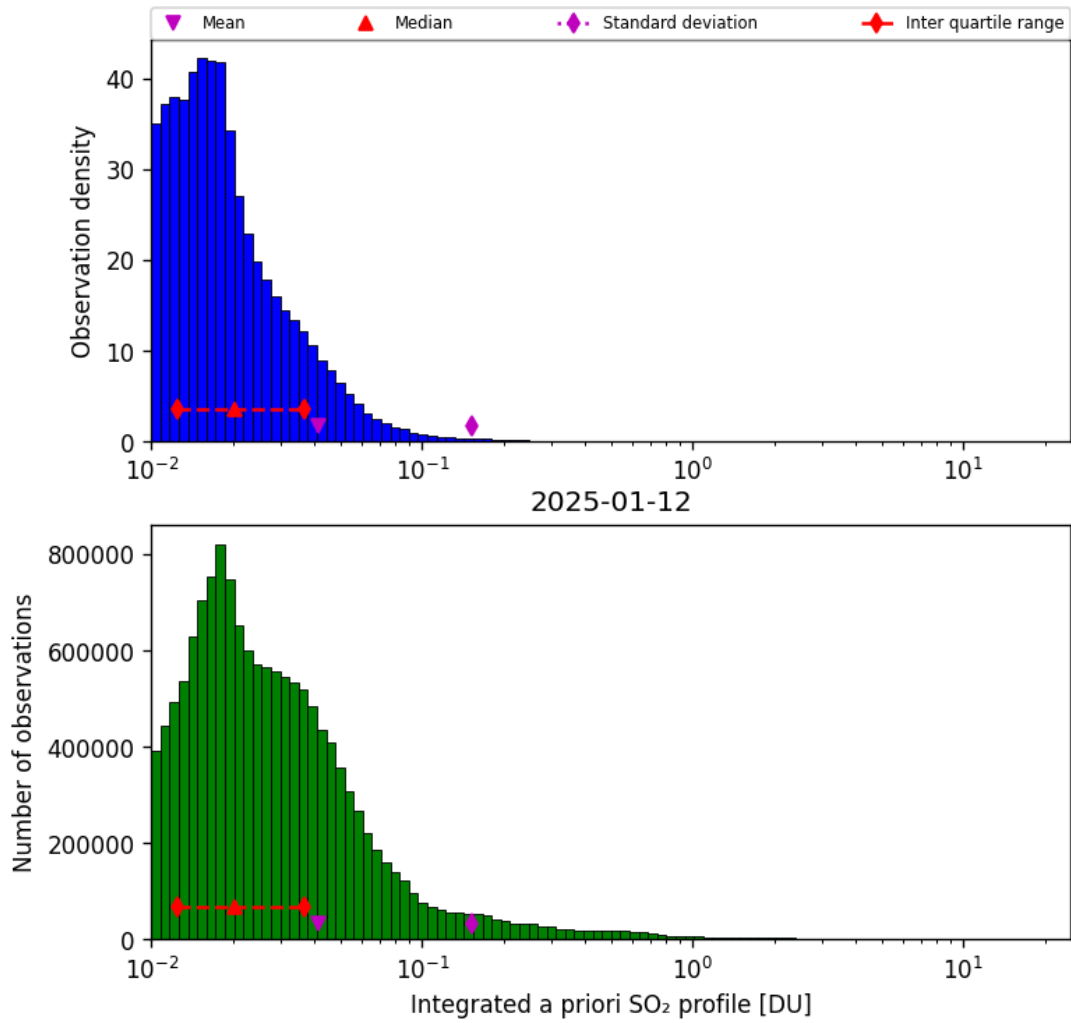


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-01-12 to 2025-01-13

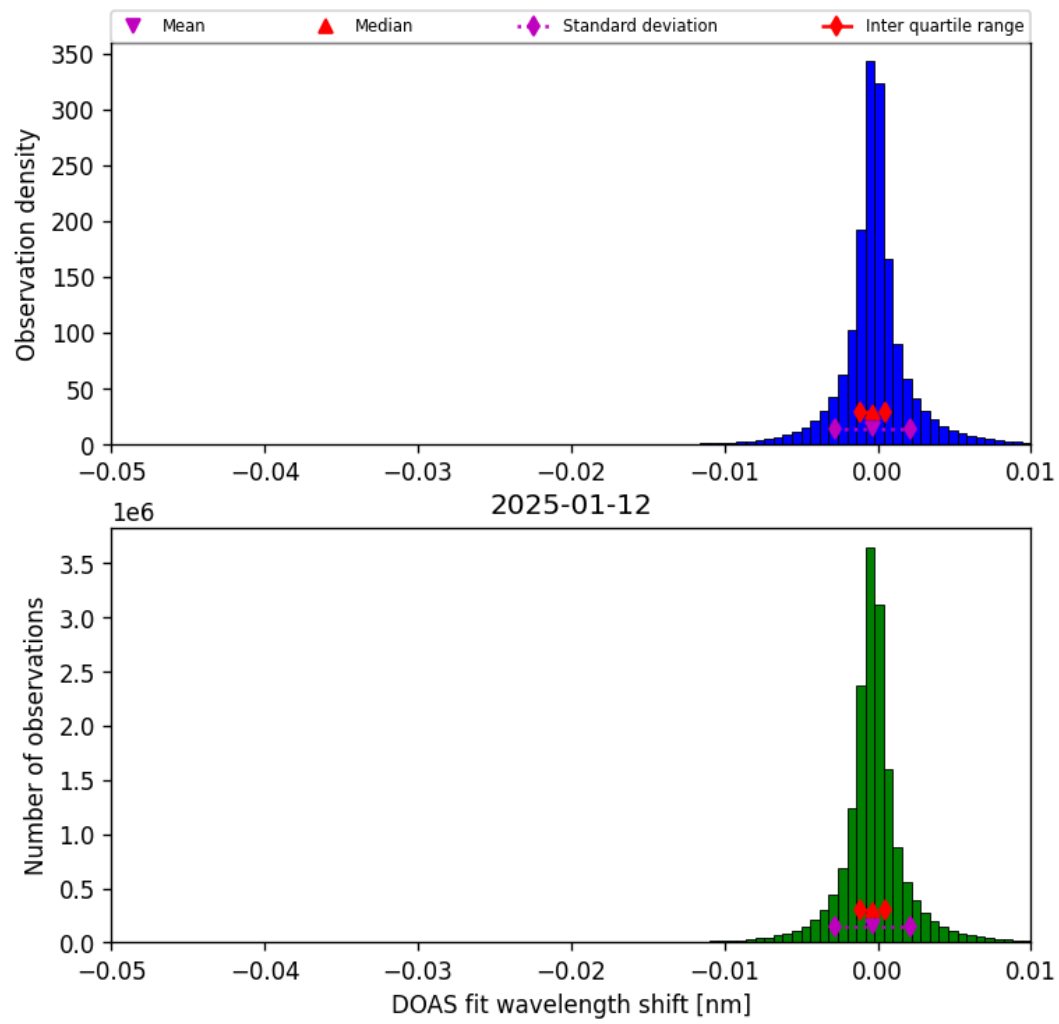


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-01-12 to 2025-01-13

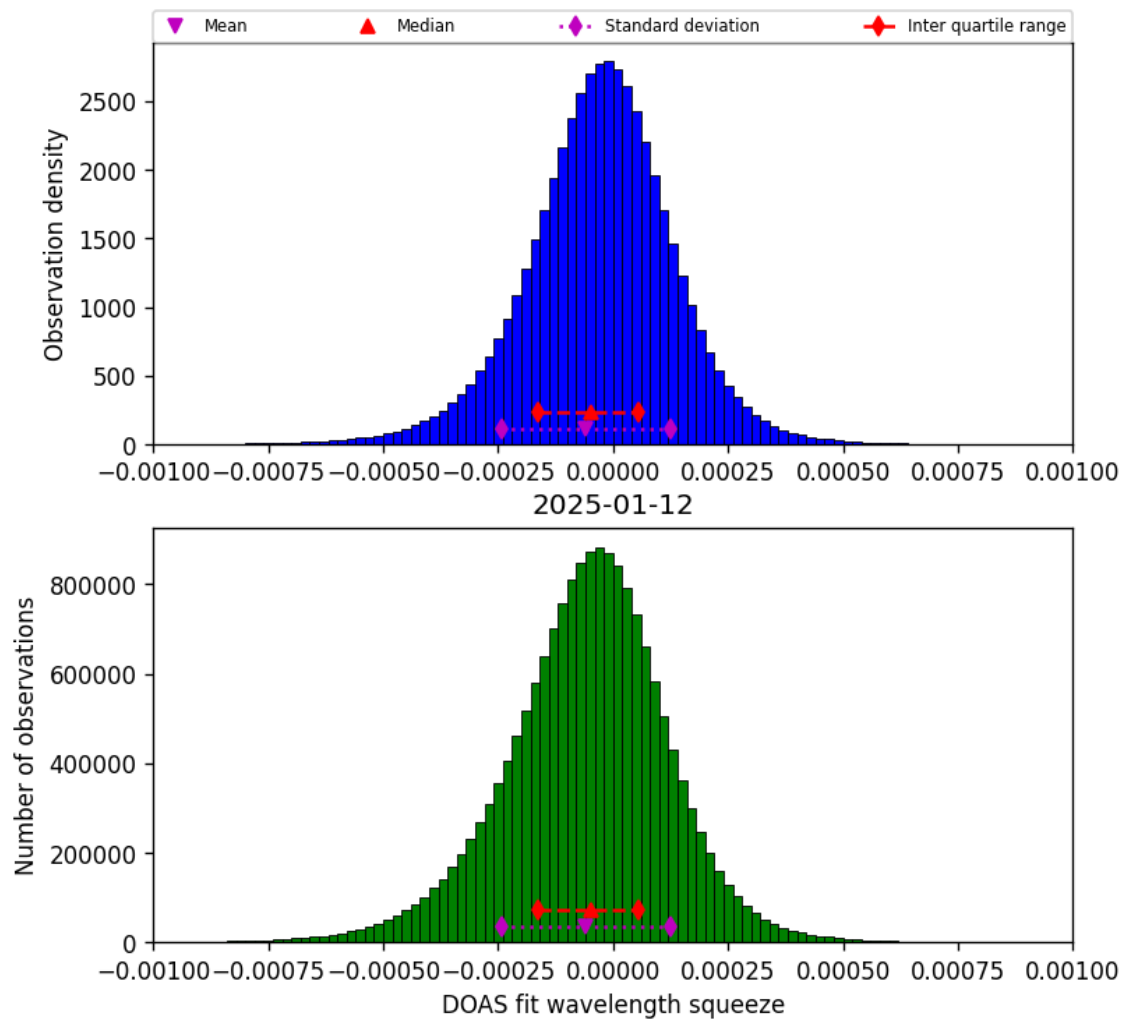


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-01-12 to 2025-01-13

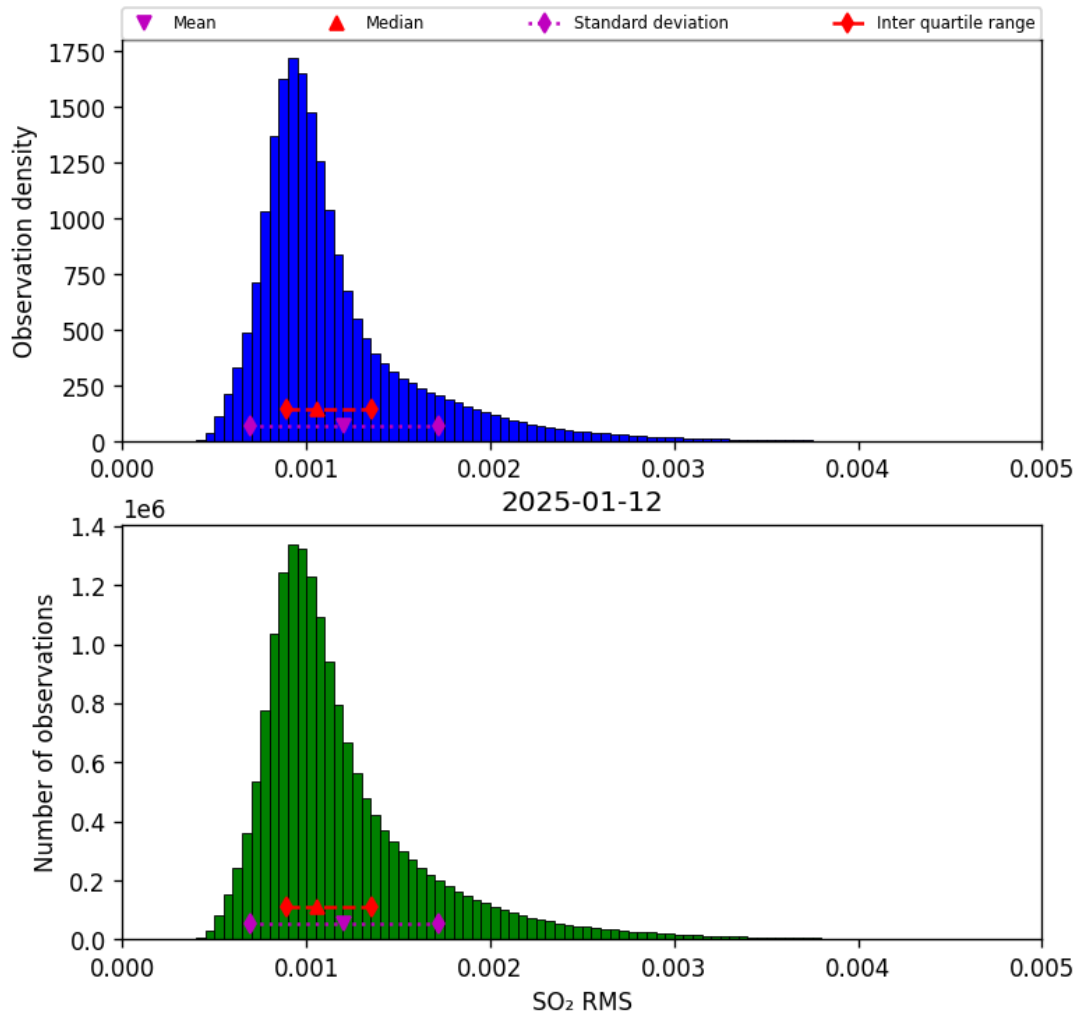


Figure 79: Histogram of “SO₂ RMS” for 2025-01-12 to 2025-01-13

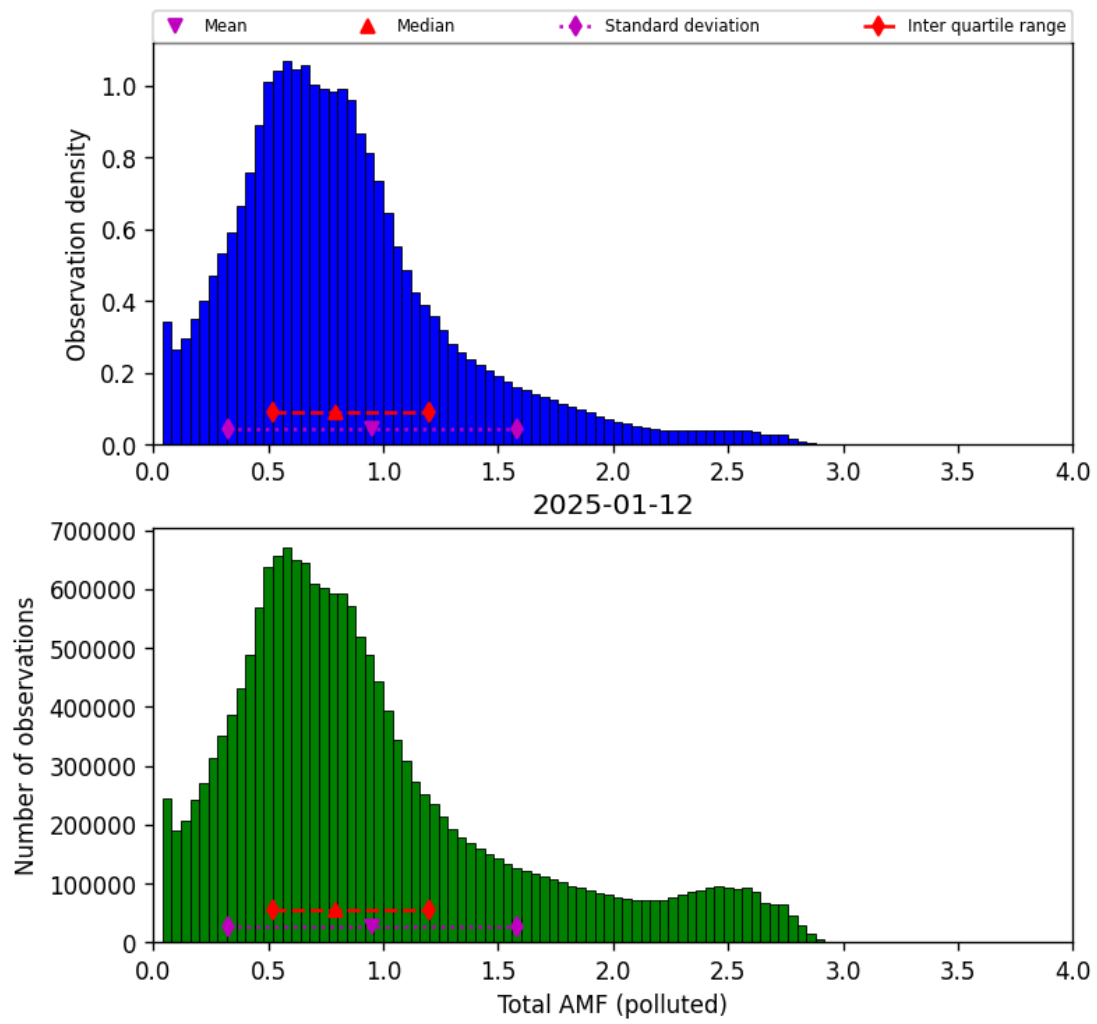


Figure 80: Histogram of “Total AMF (polluted)” for 2025-01-12 to 2025-01-13

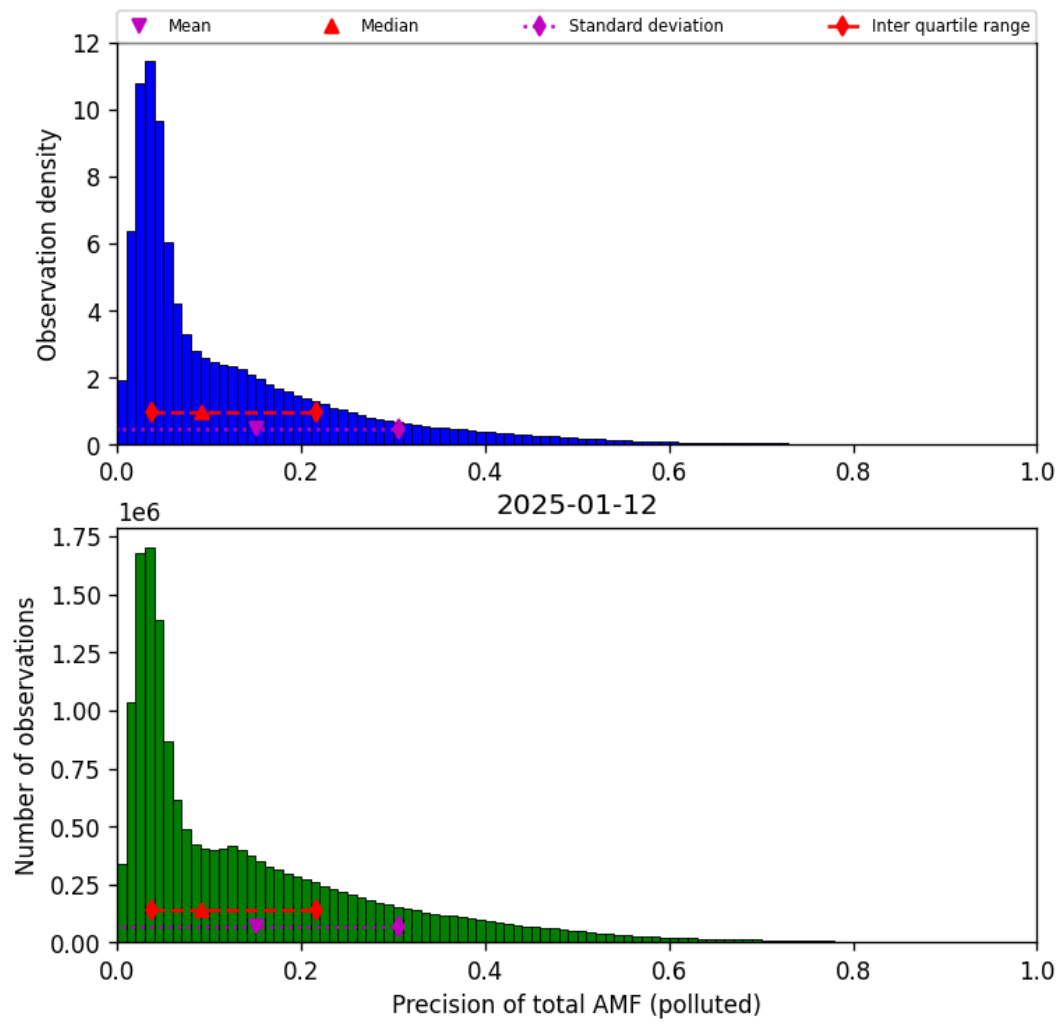


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-01-12 to 2025-01-13

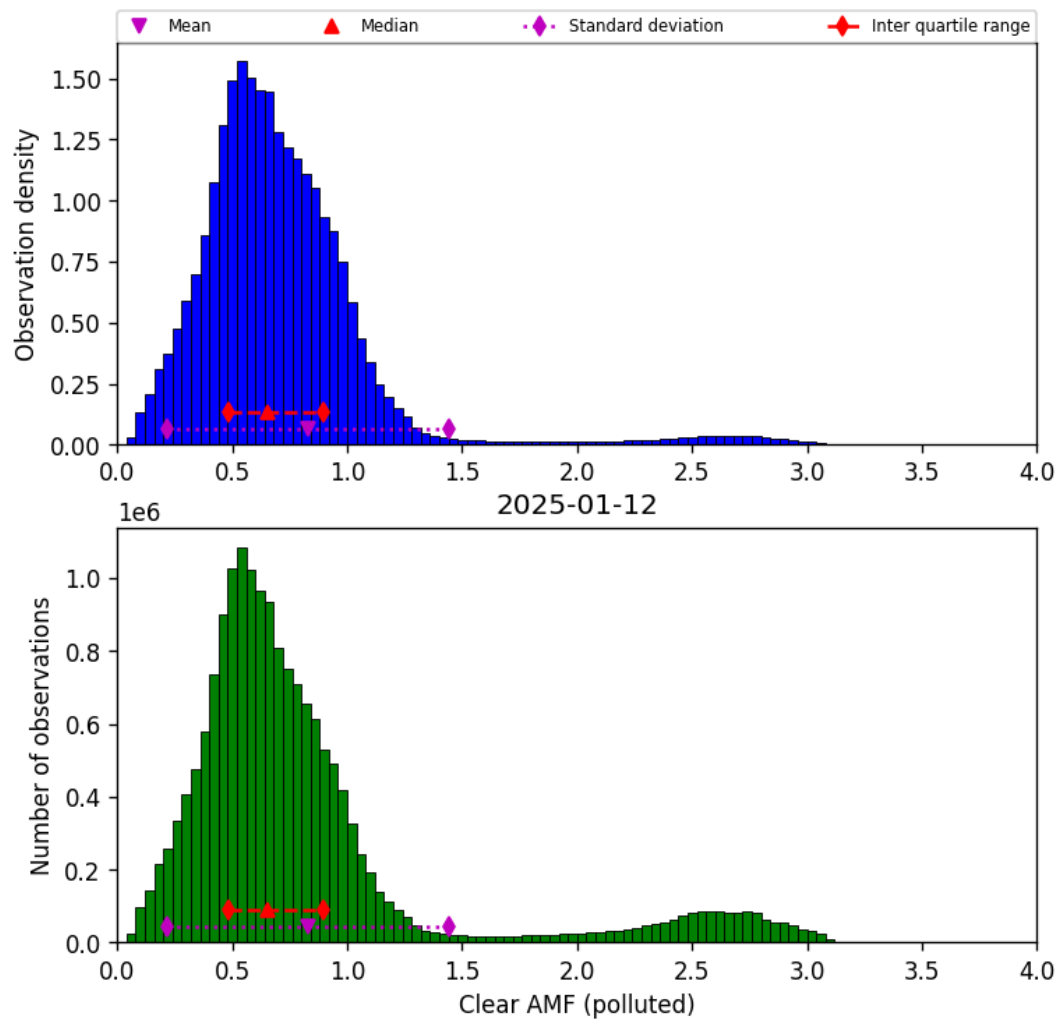


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-01-12 to 2025-01-13

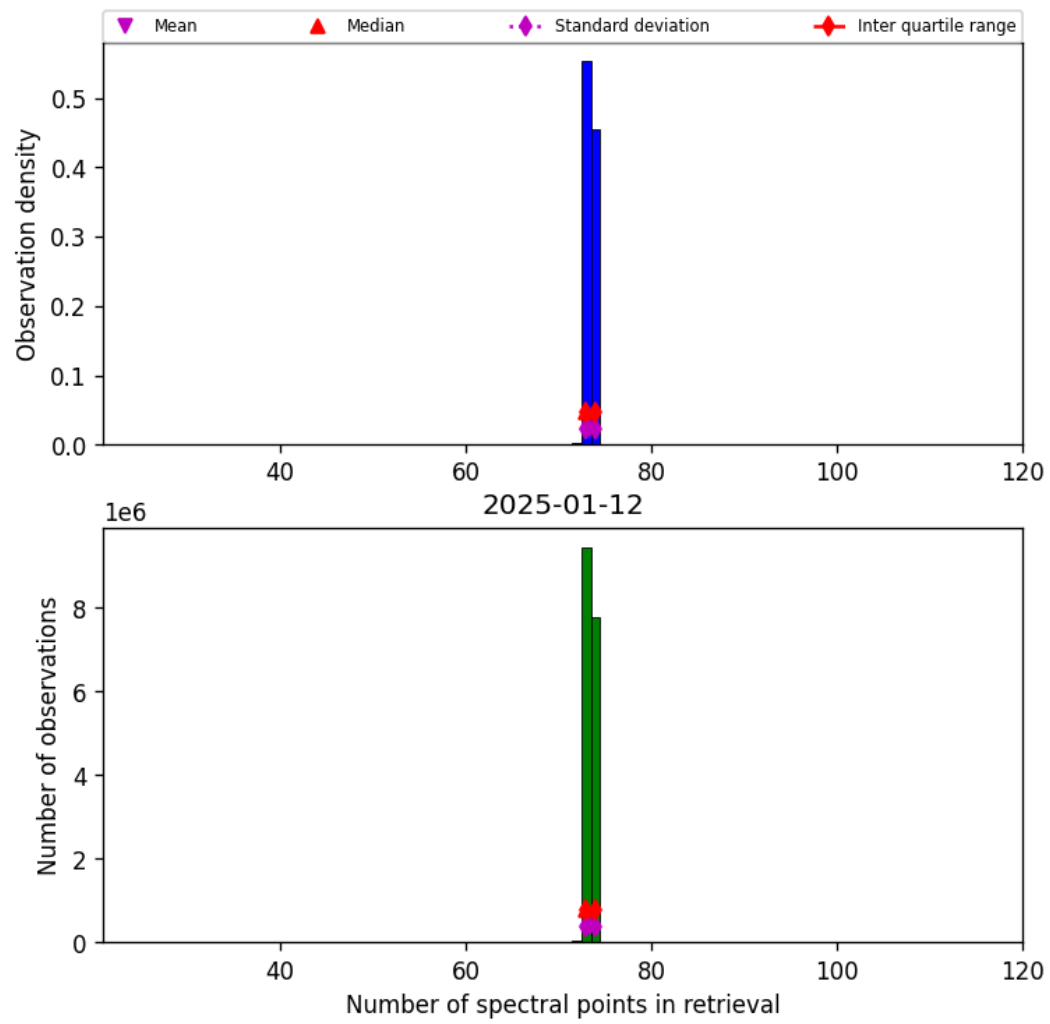


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-01-12 to 2025-01-13

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.

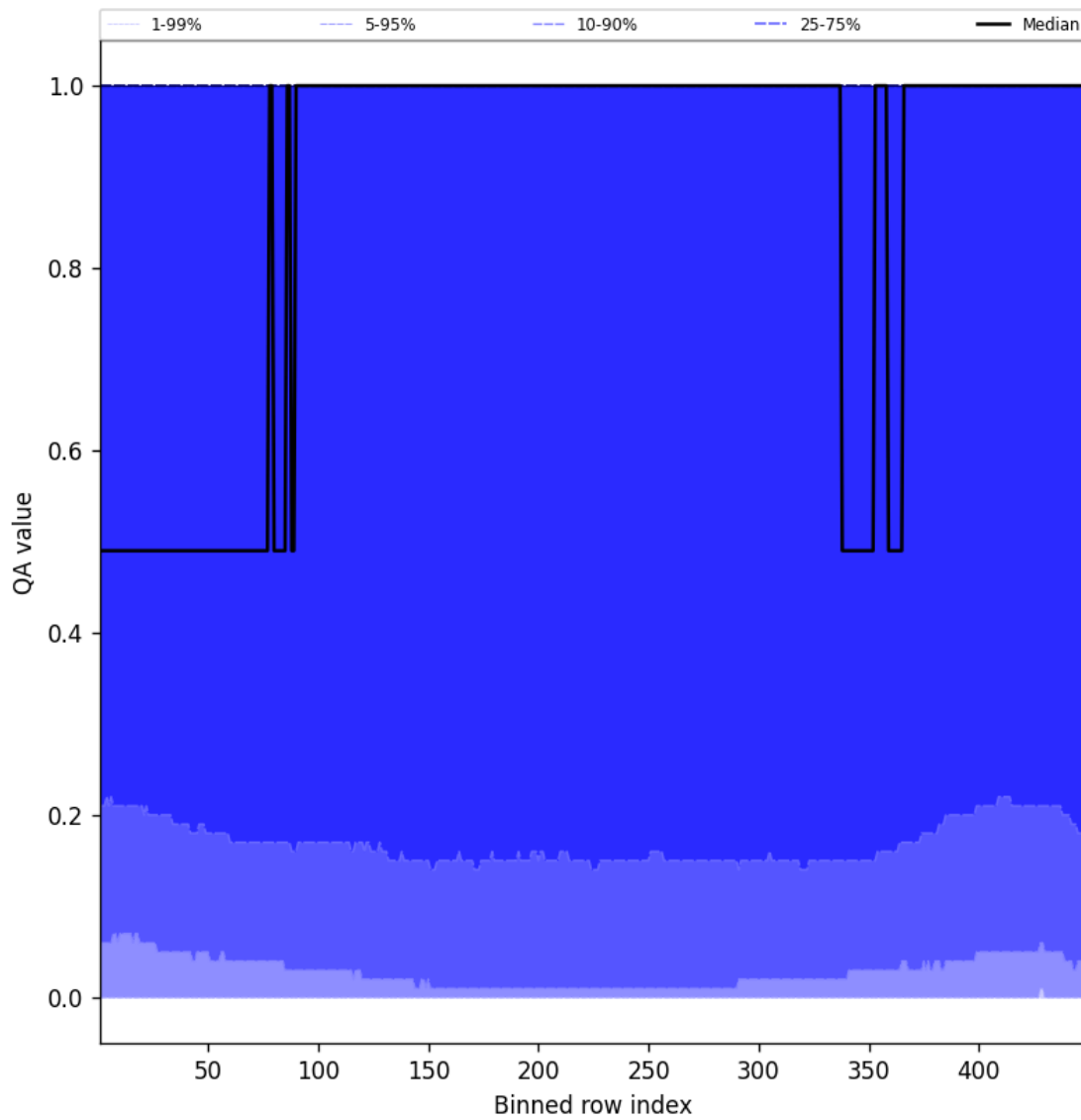


Figure 84: Along track statistics of “QA value” for 2025-01-12 to 2025-01-13

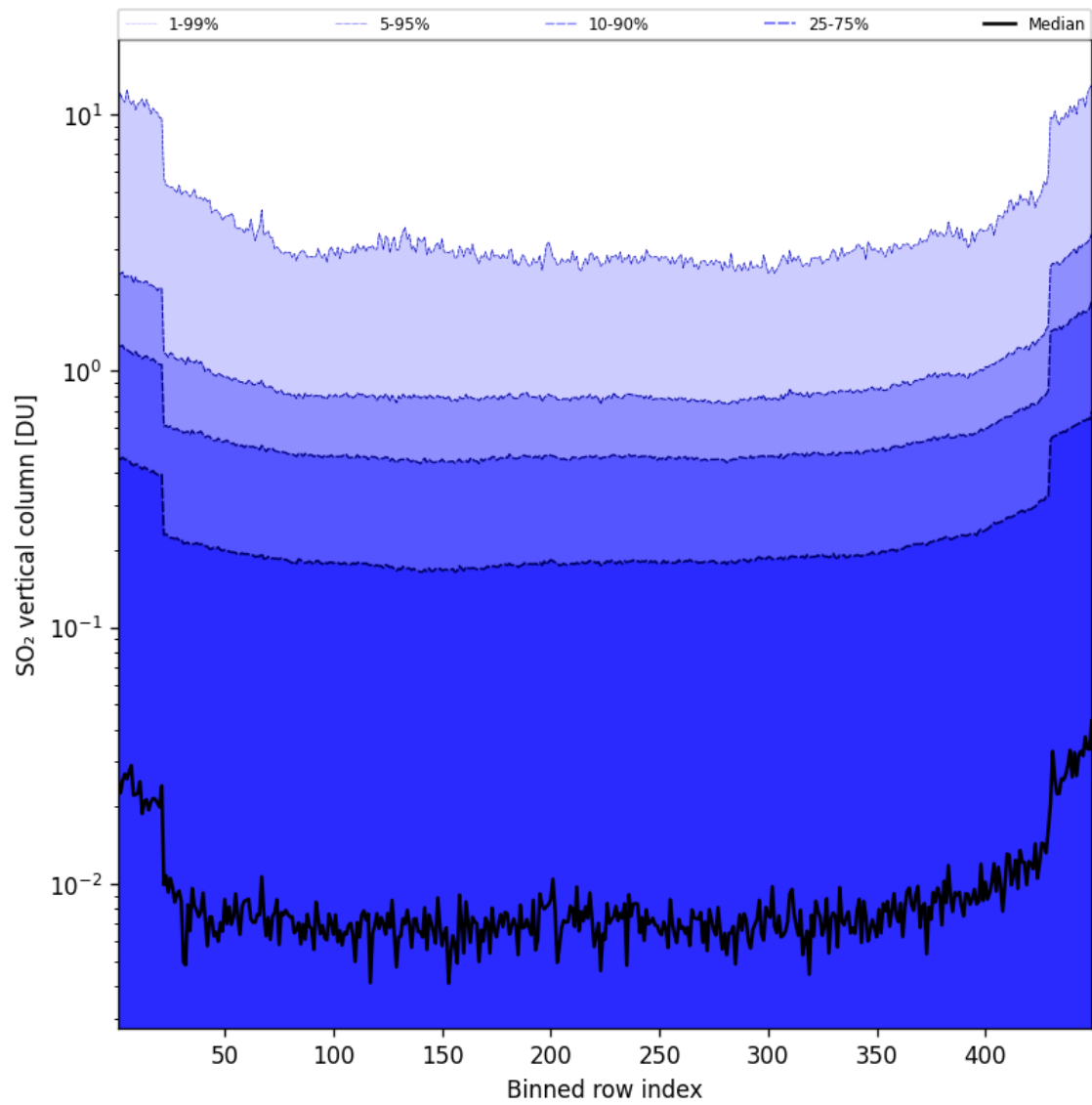


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-01-12 to 2025-01-13

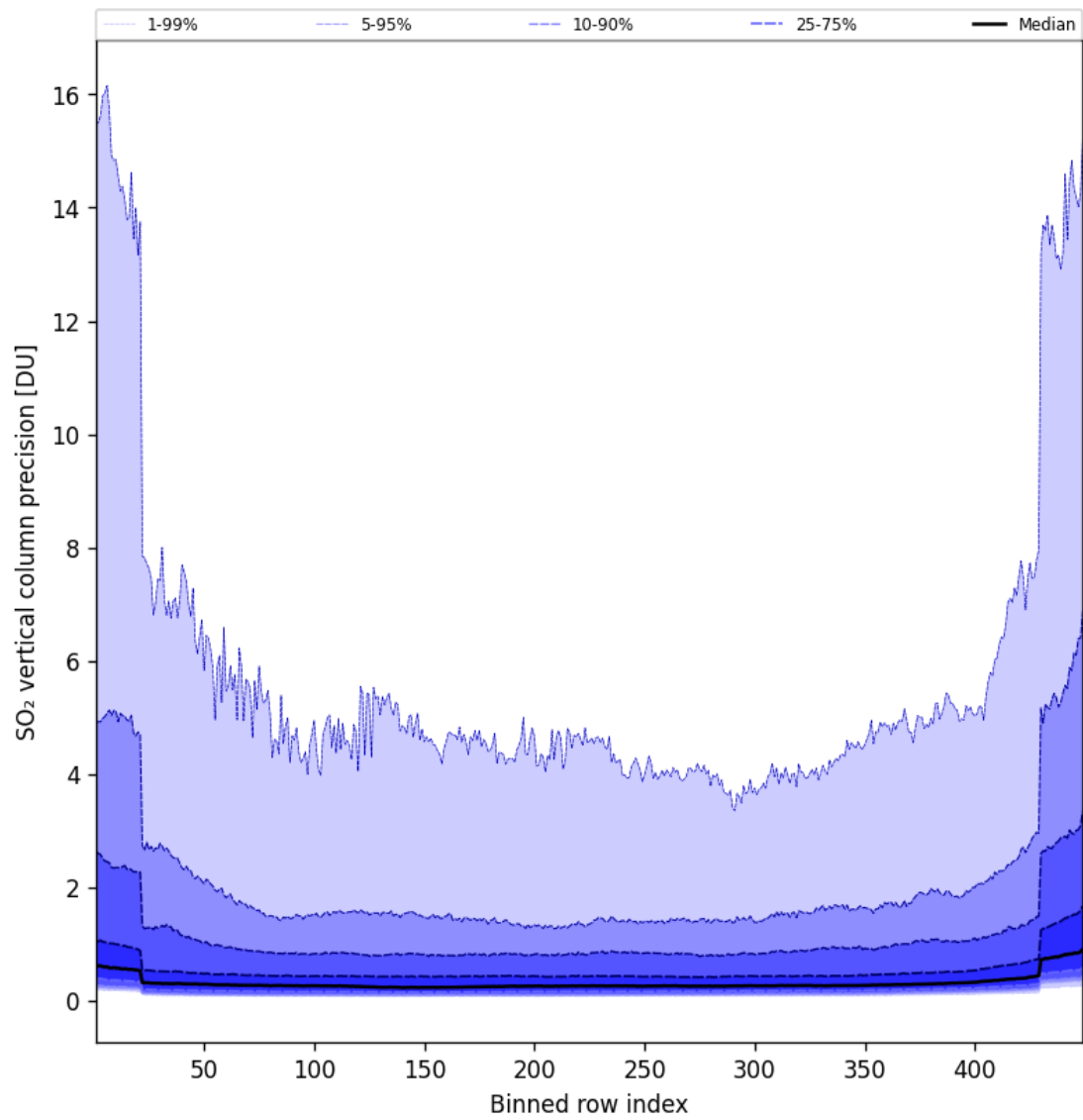


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-01-12 to 2025-01-13

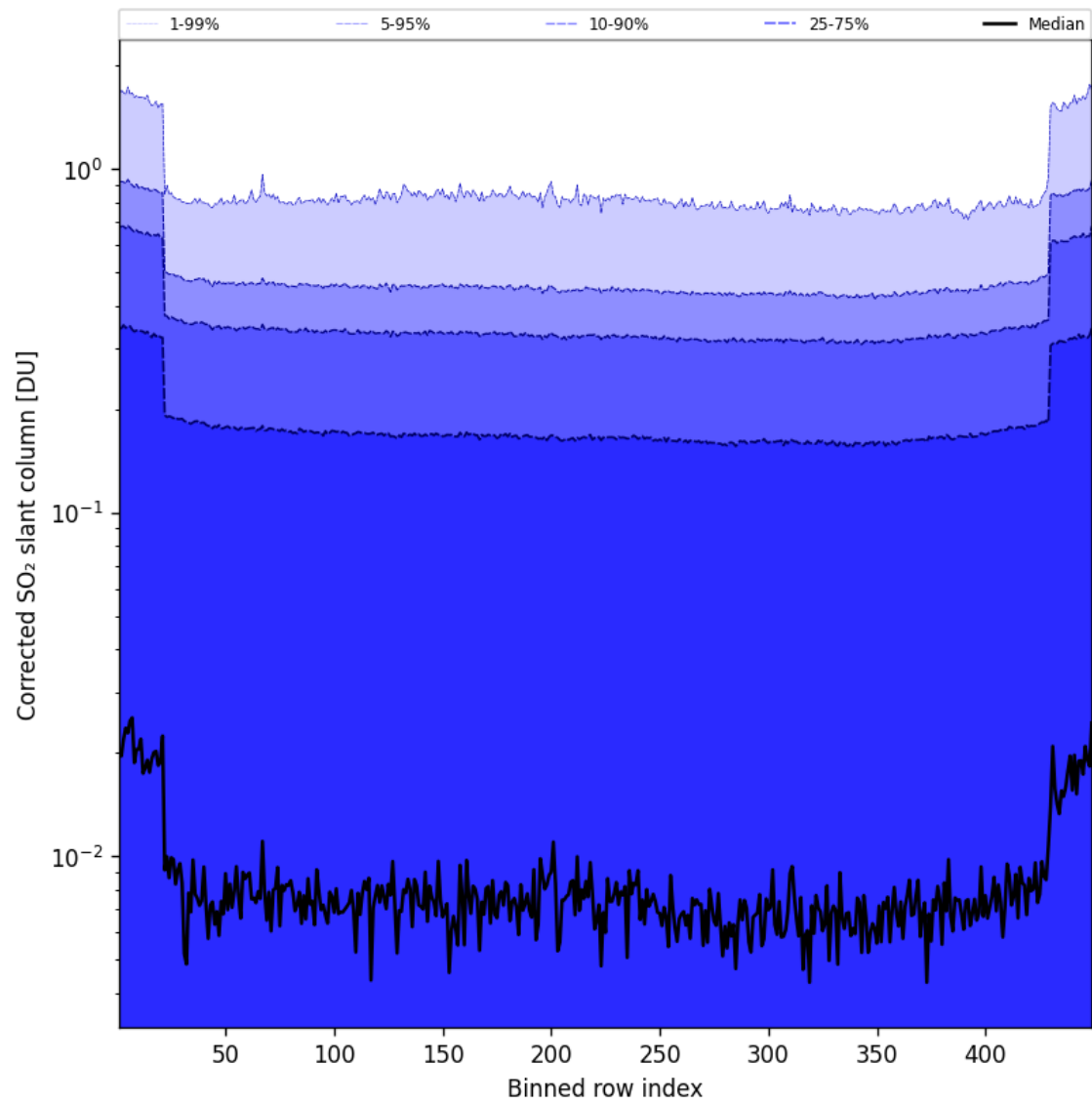


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-01-12 to 2025-01-13

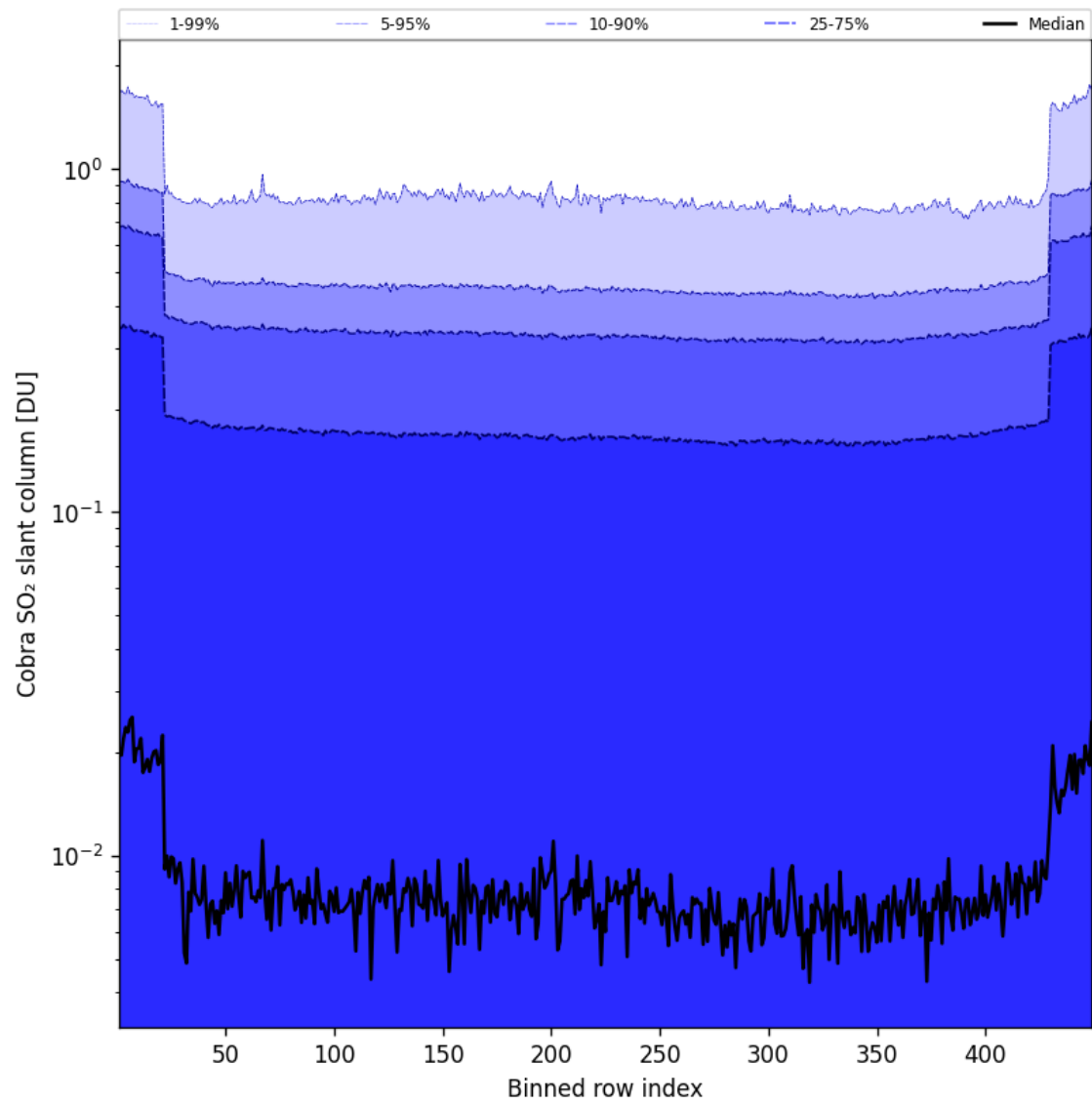


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-01-12 to 2025-01-13

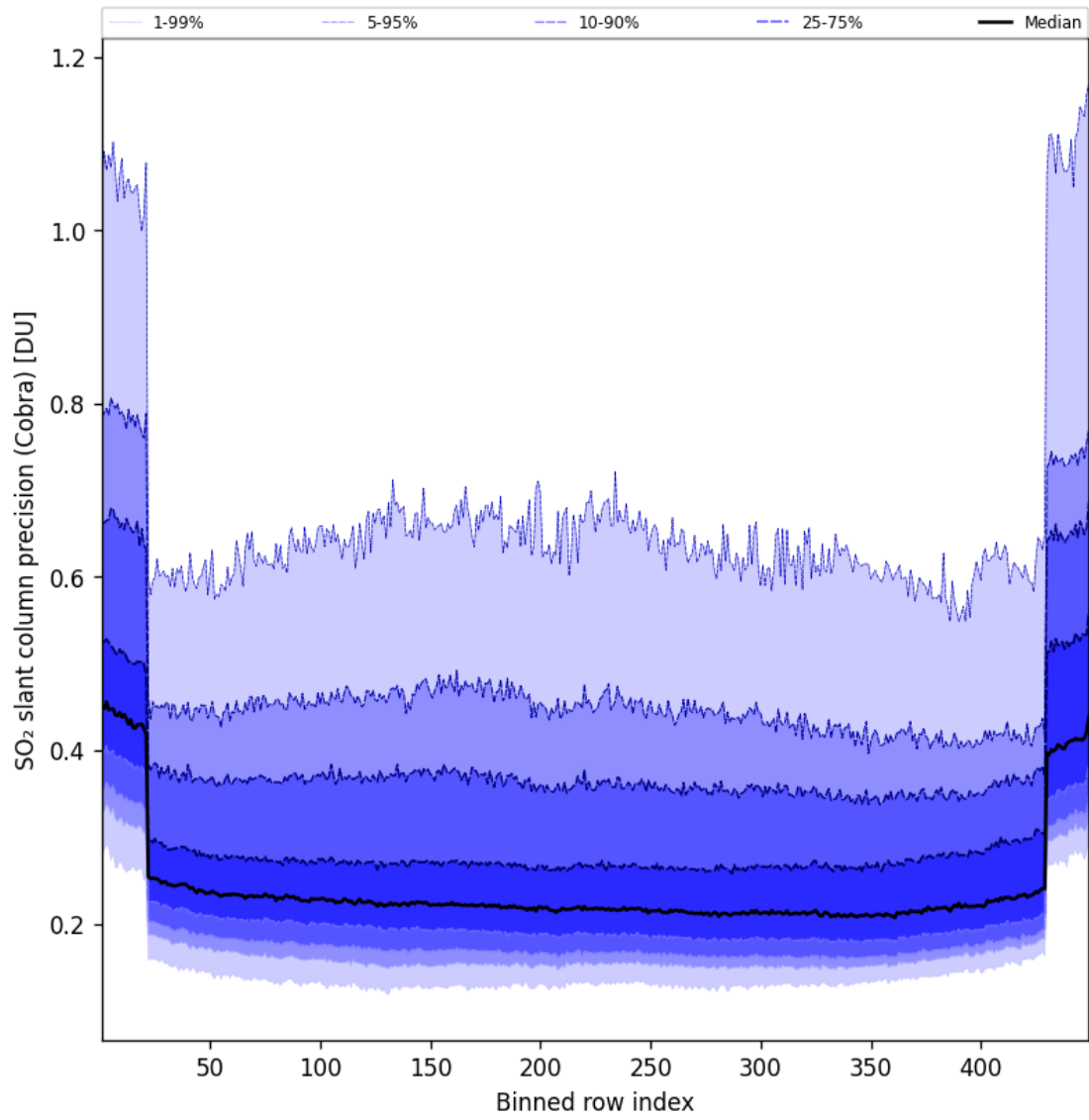


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-01-12 to 2025-01-13

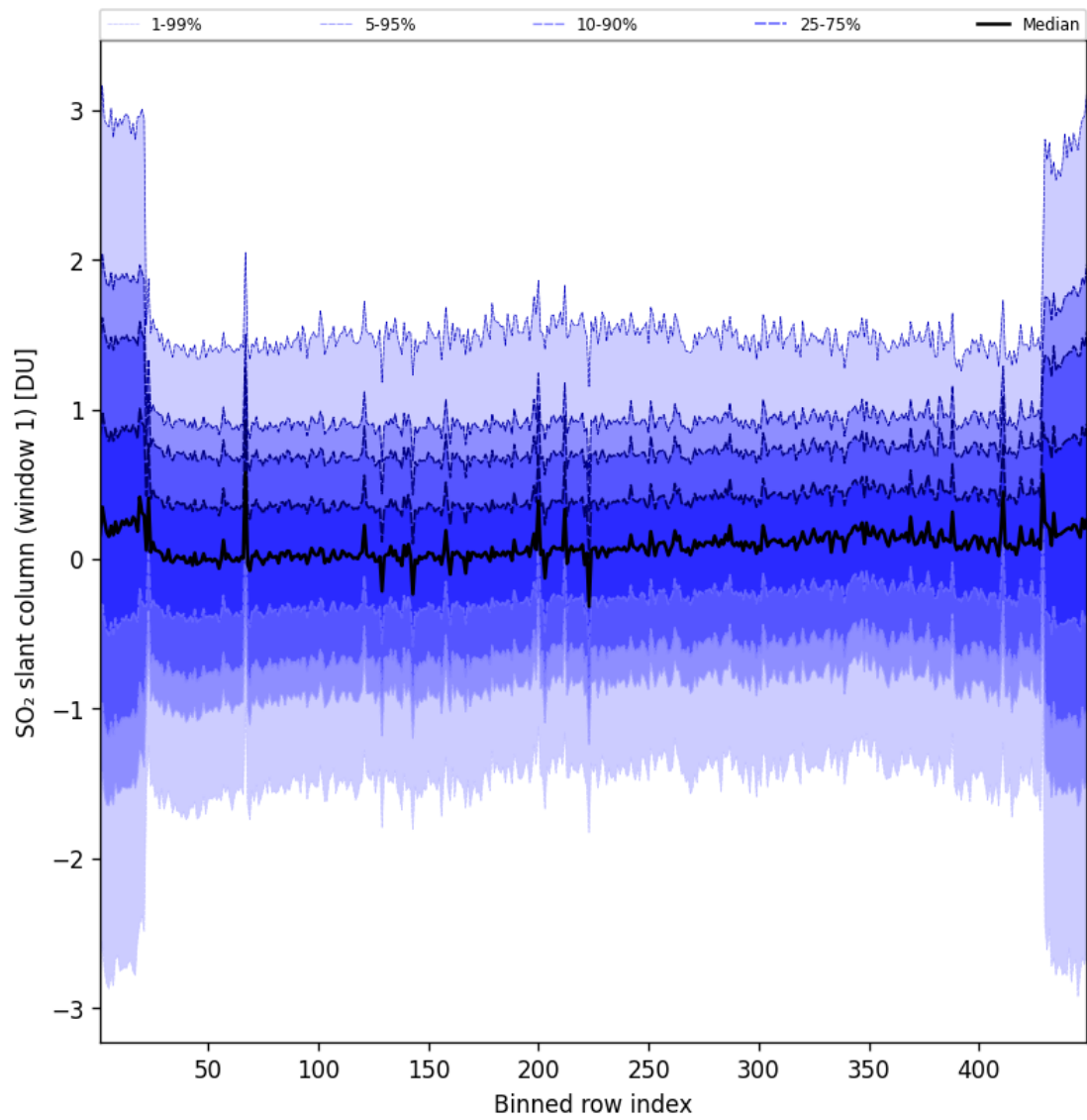


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-01-12 to 2025-01-13

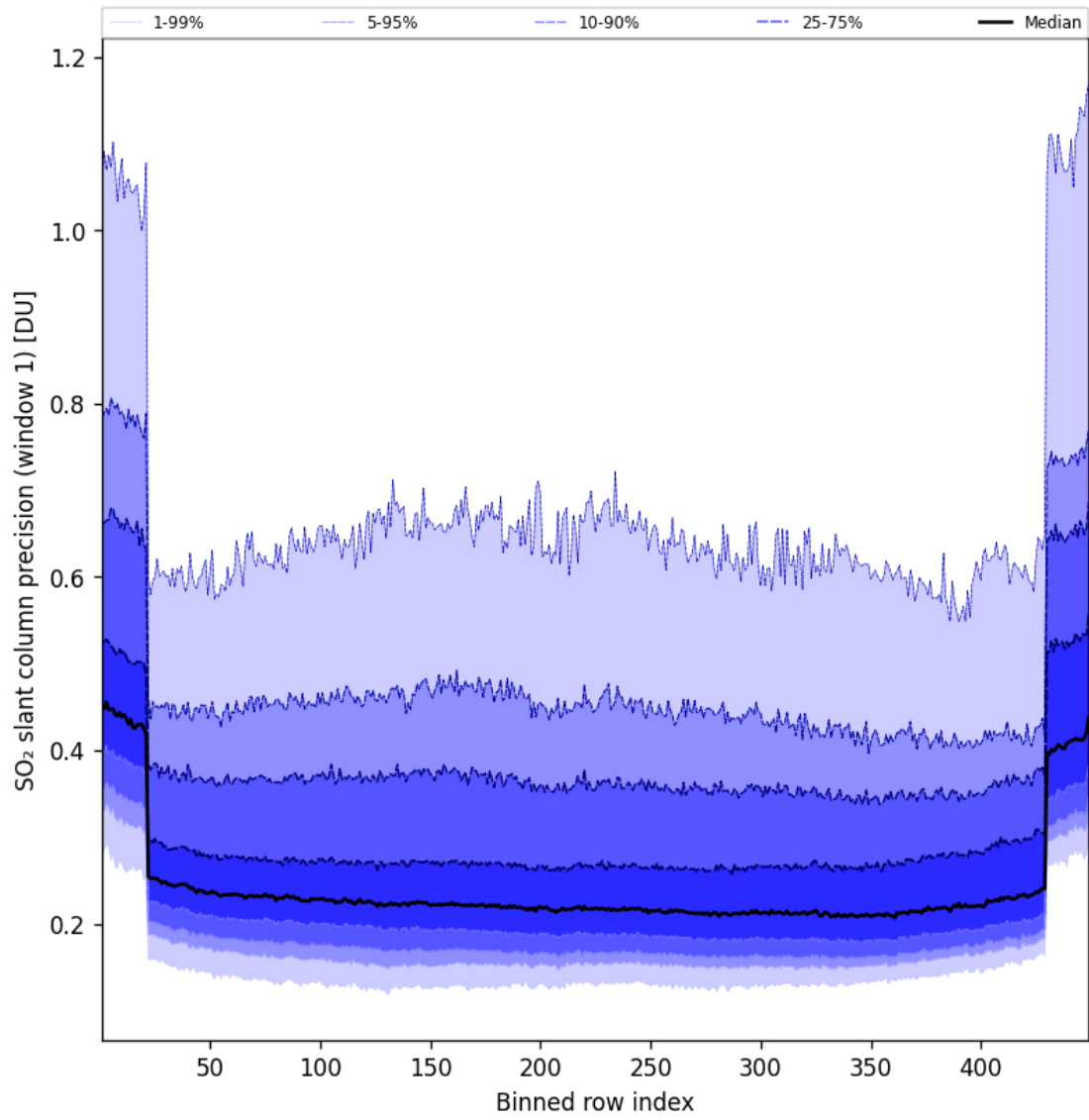


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-01-12 to 2025-01-13

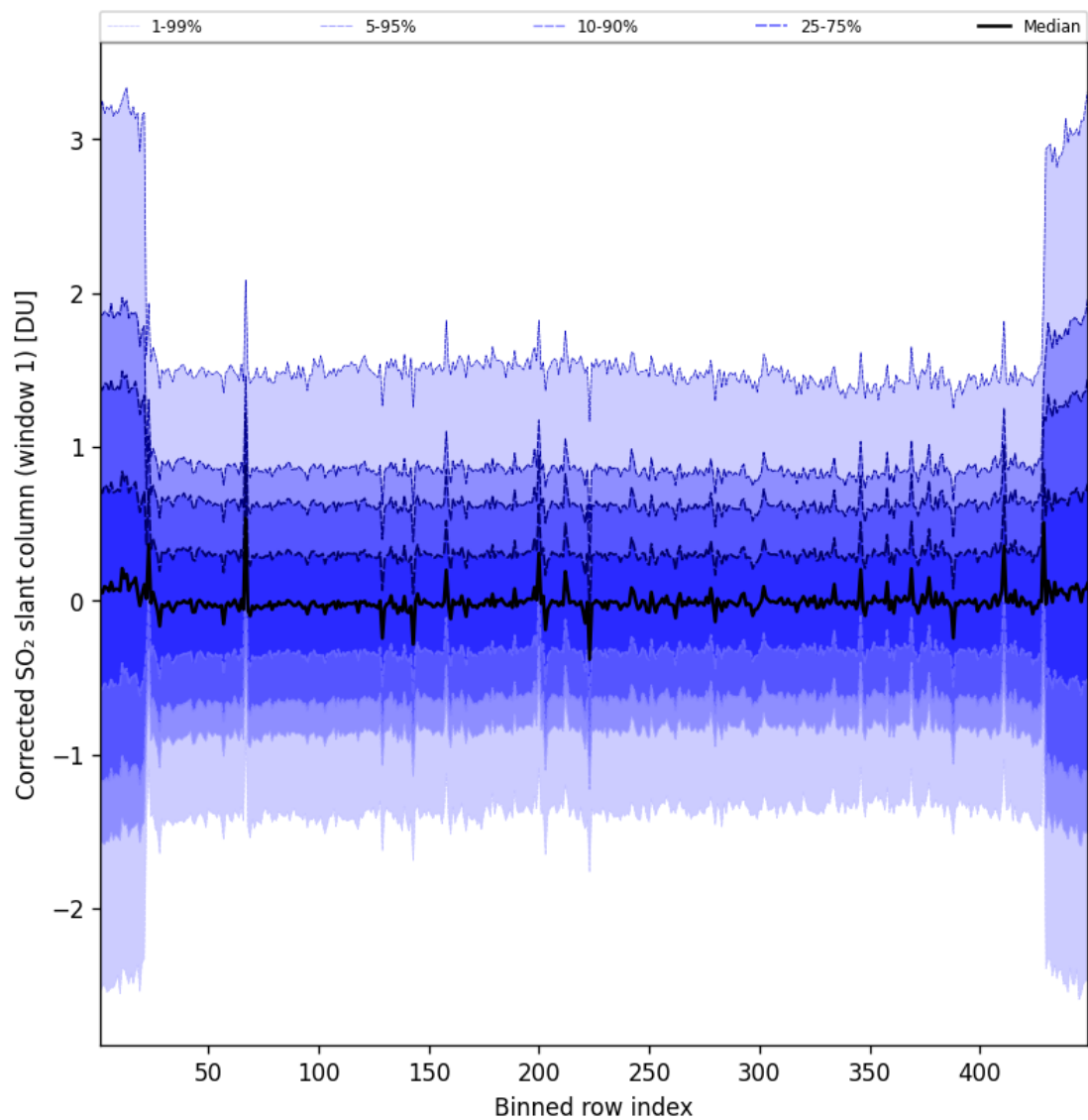


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-01-12 to 2025-01-13

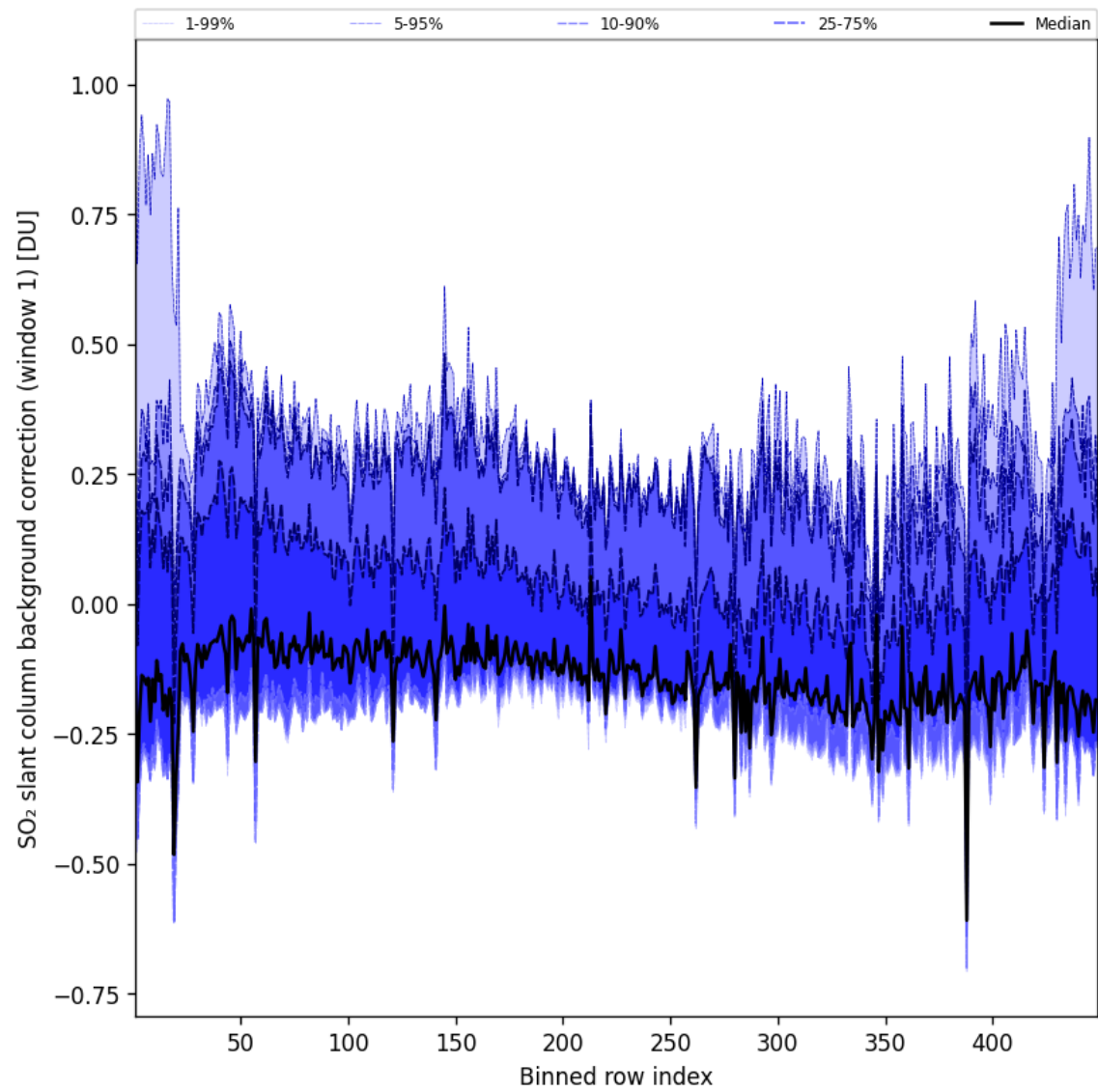


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-01-12 to 2025-01-13

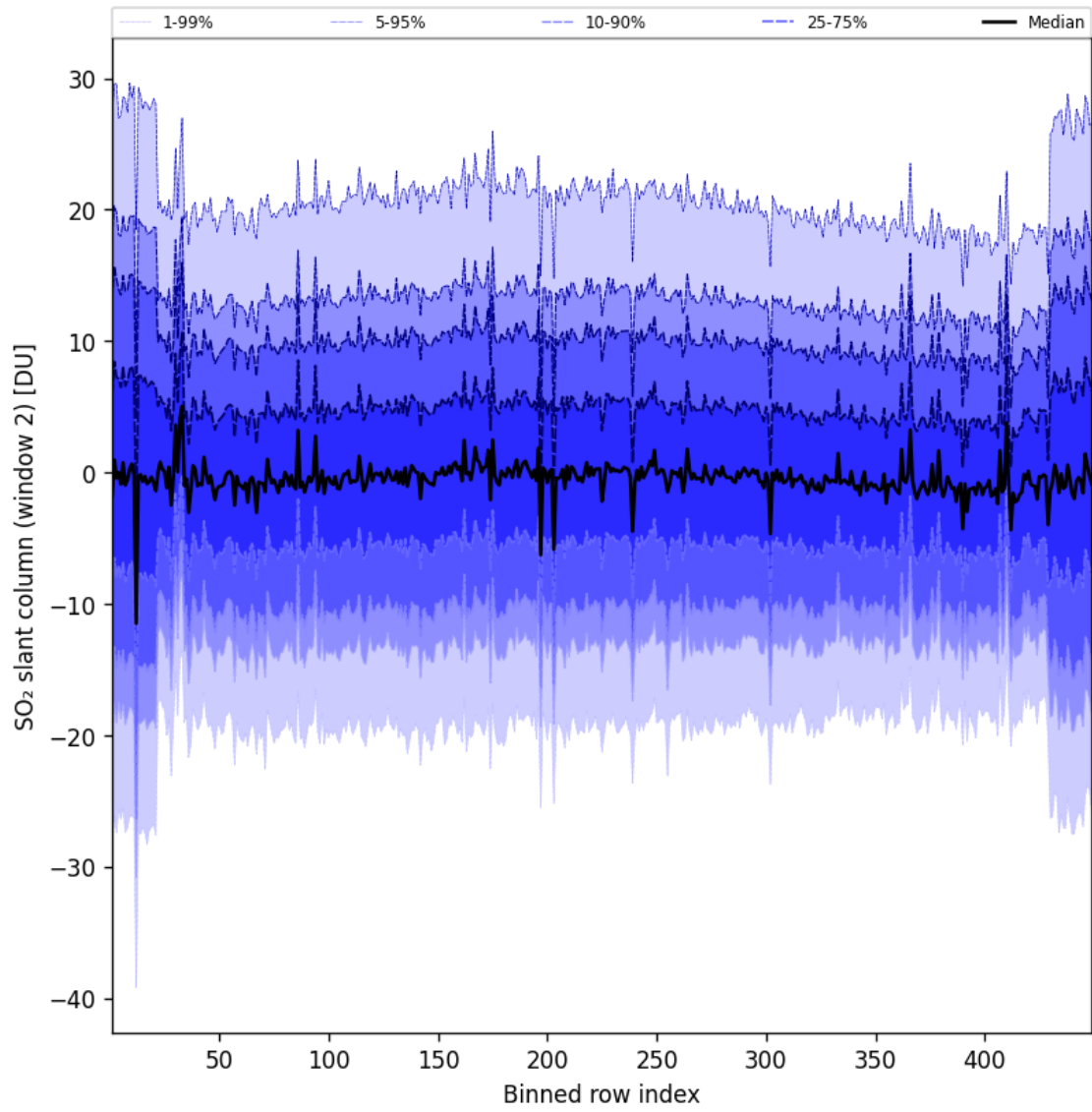


Figure 94: Along track statistics of "SO₂ slant column (window 2)" for 2025-01-12 to 2025-01-13

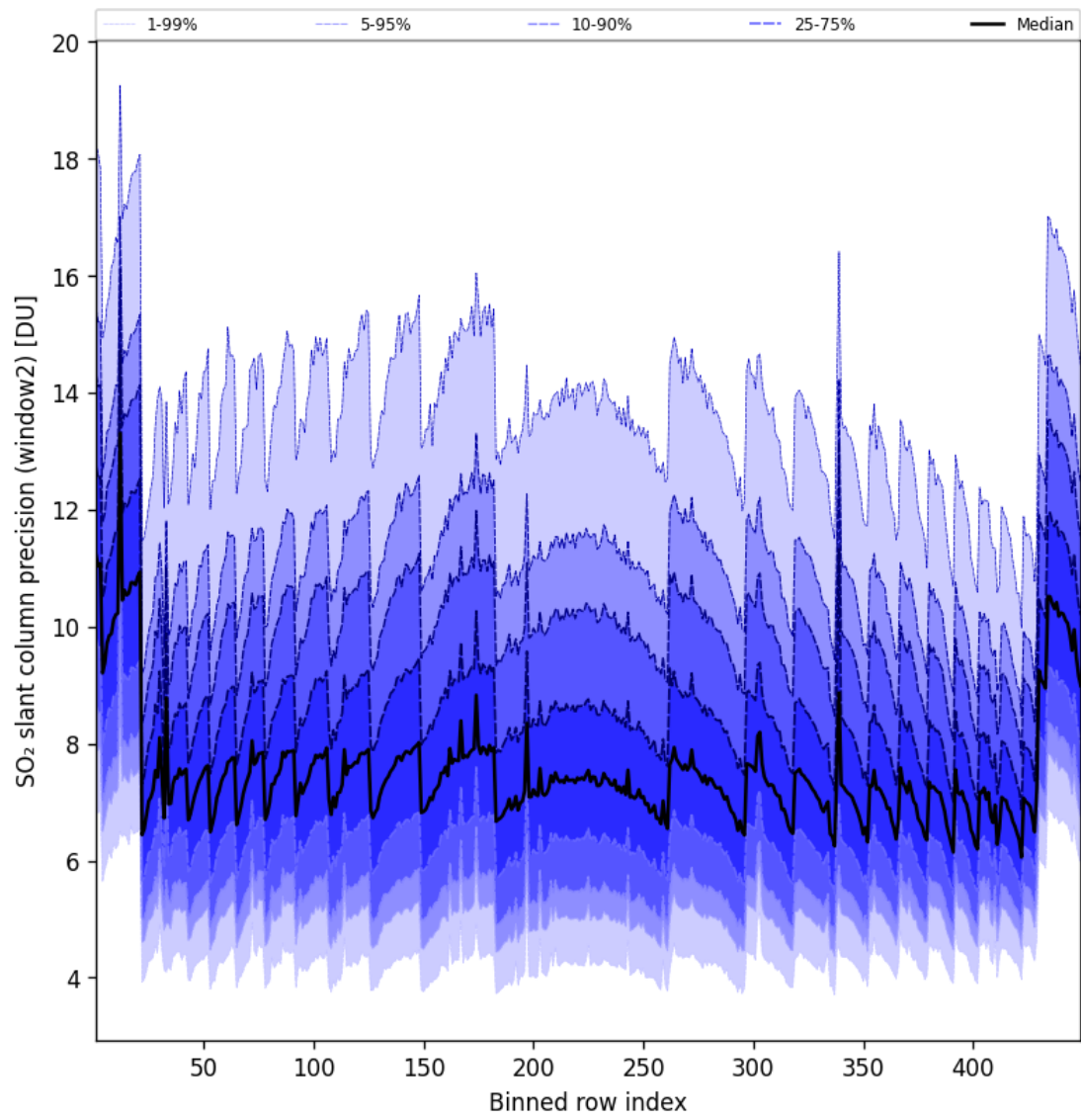


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-01-12 to 2025-01-13

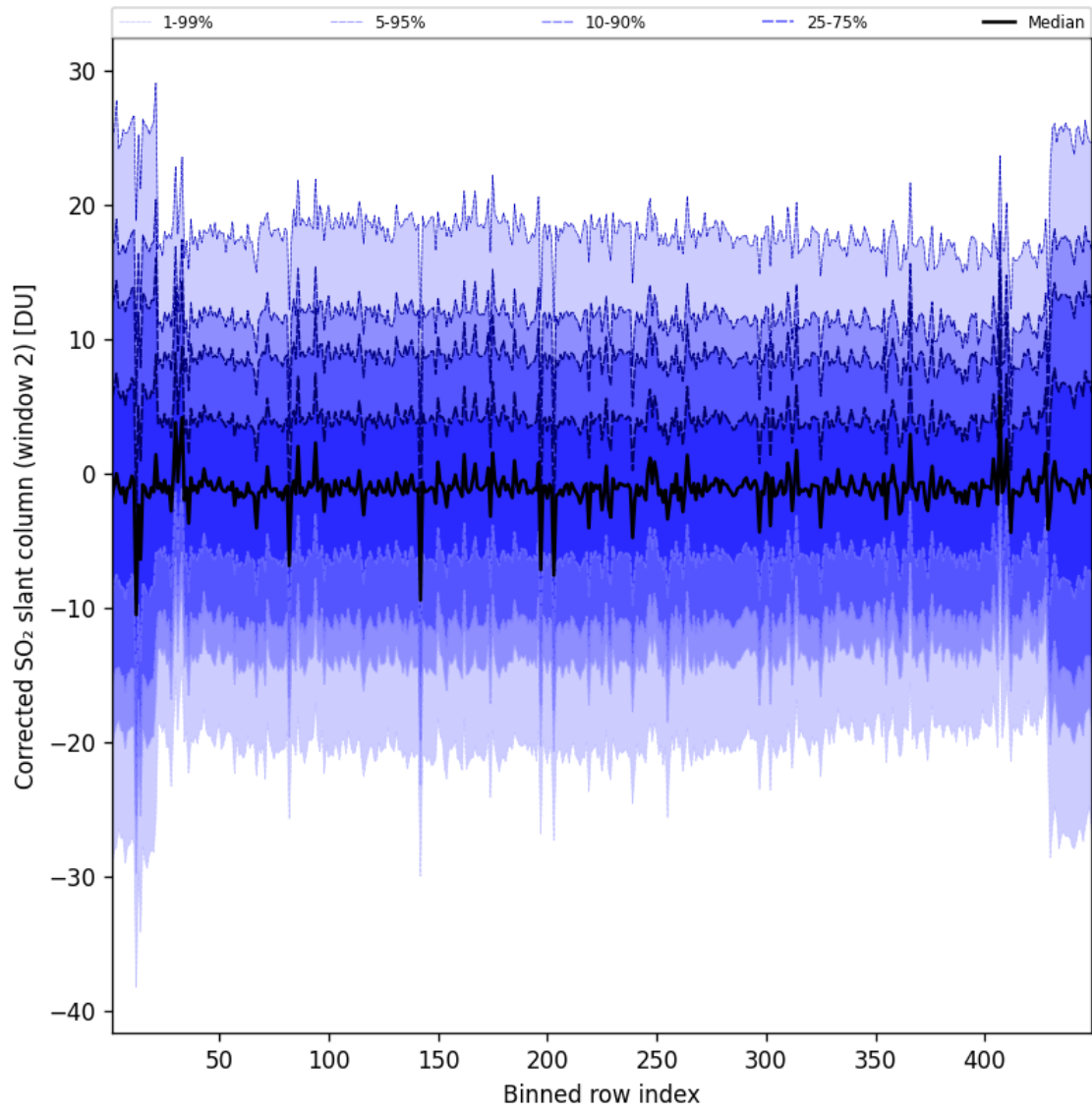


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-01-12 to 2025-01-13

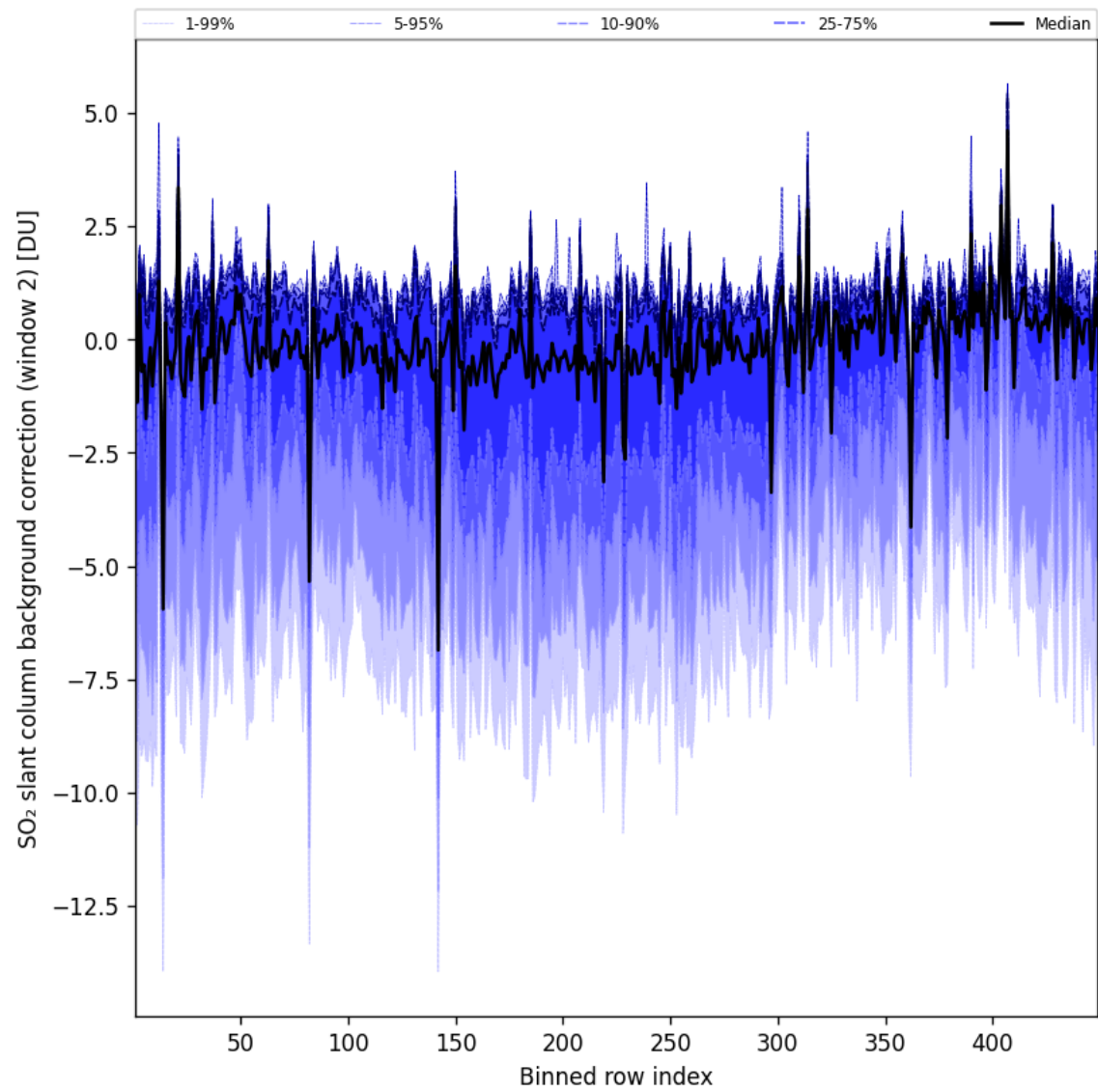


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-01-12 to 2025-01-13

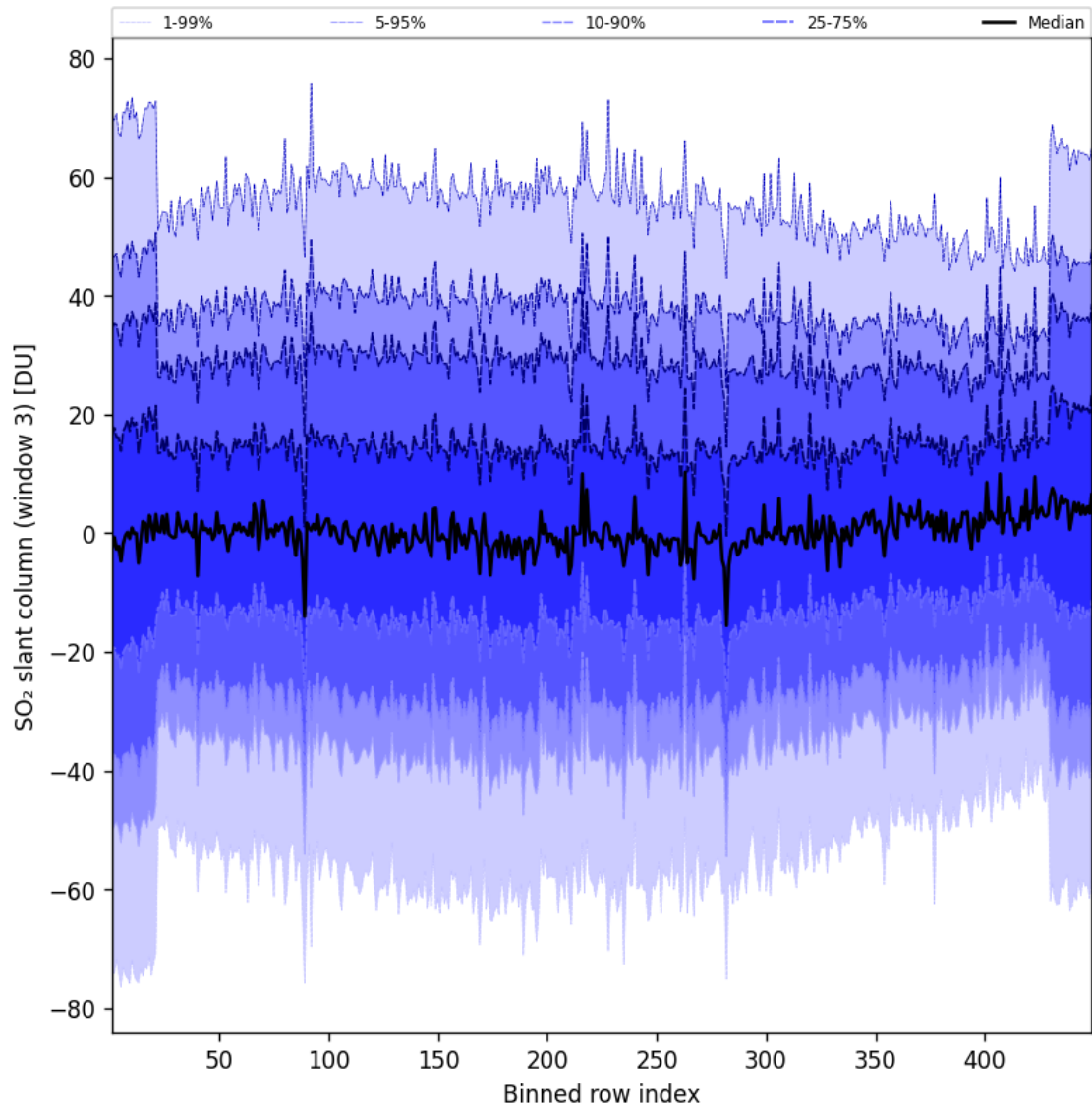


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-01-12 to 2025-01-13

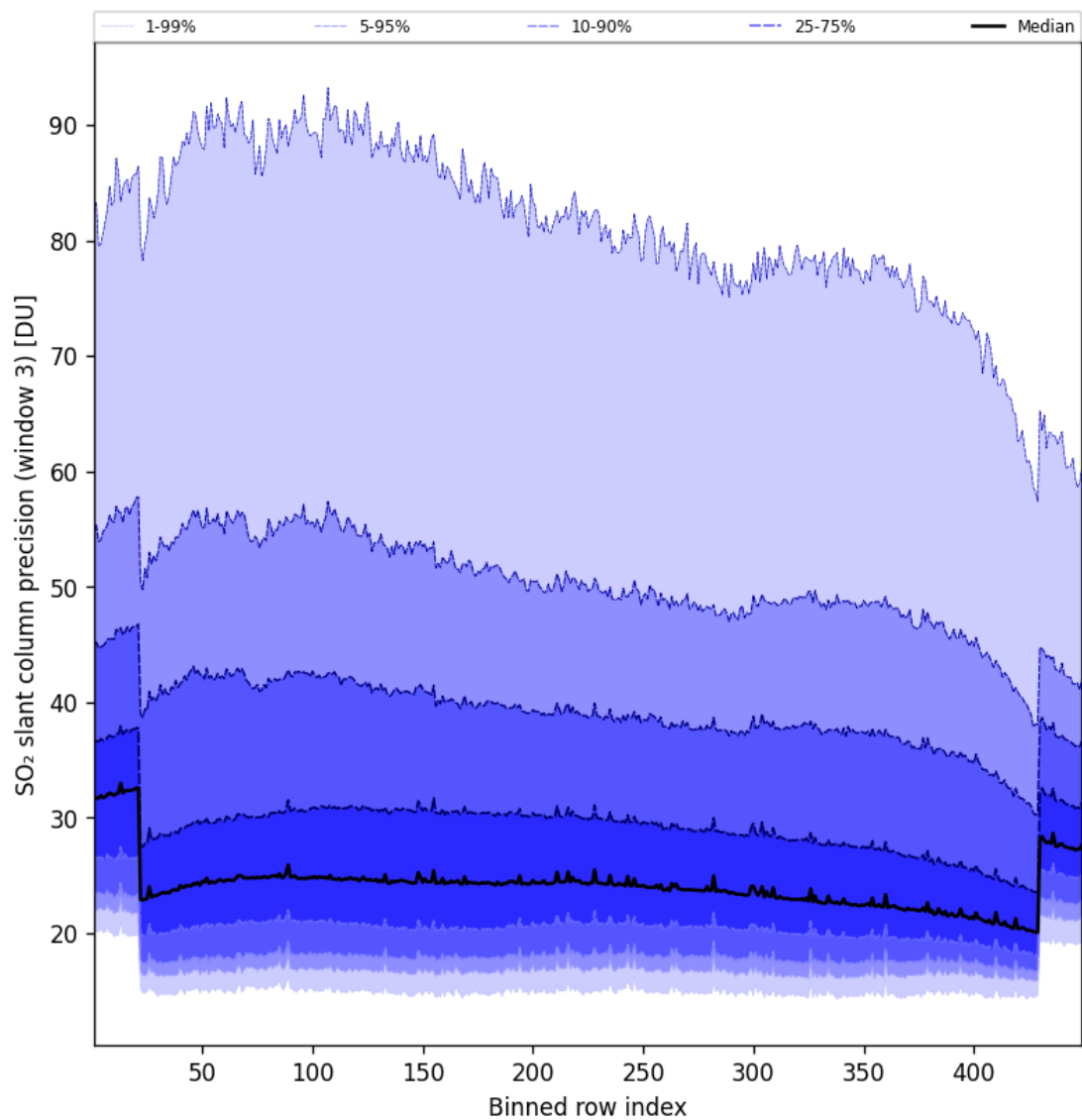


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-01-12 to 2025-01-13

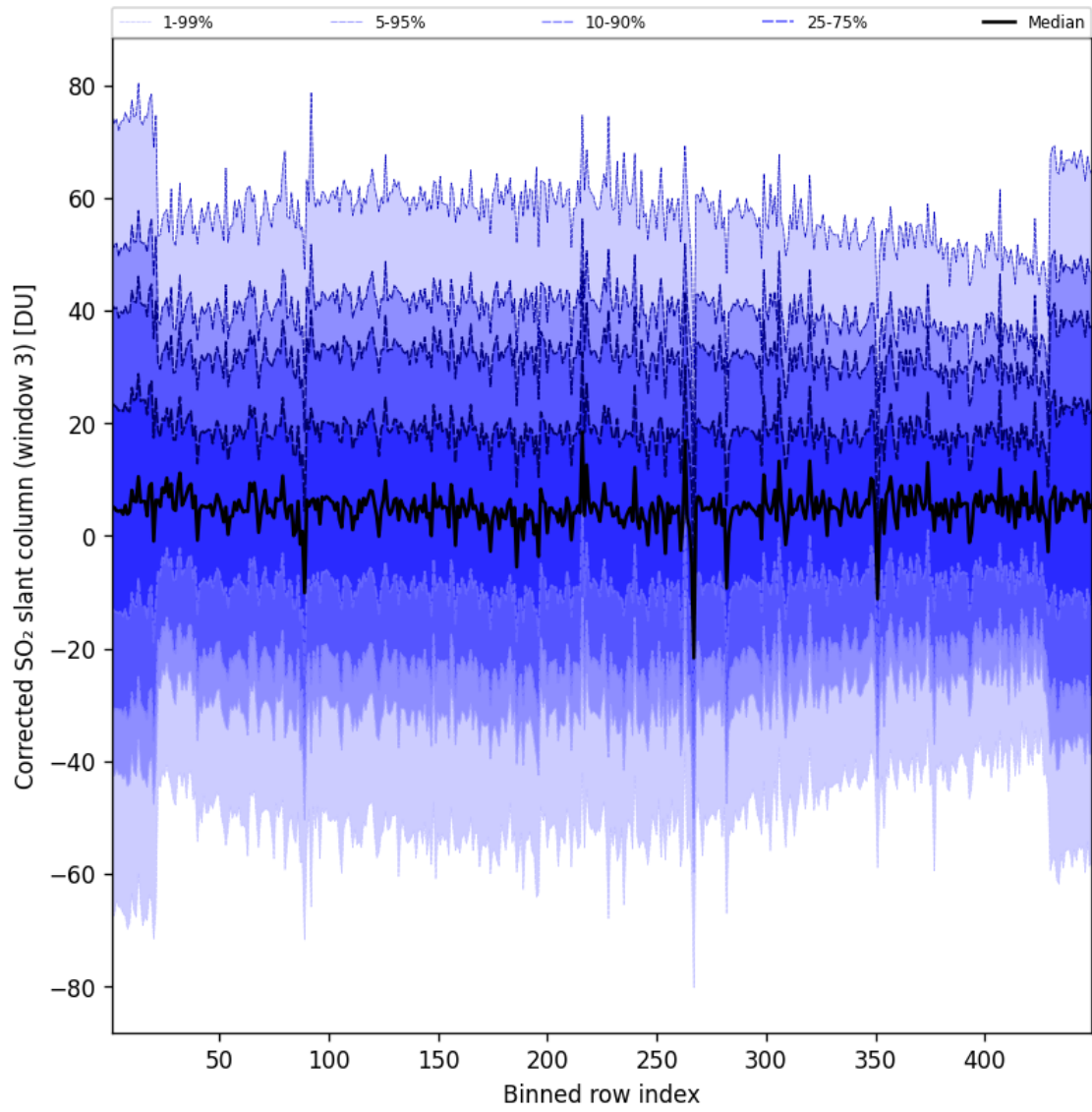


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-01-12 to 2025-01-13

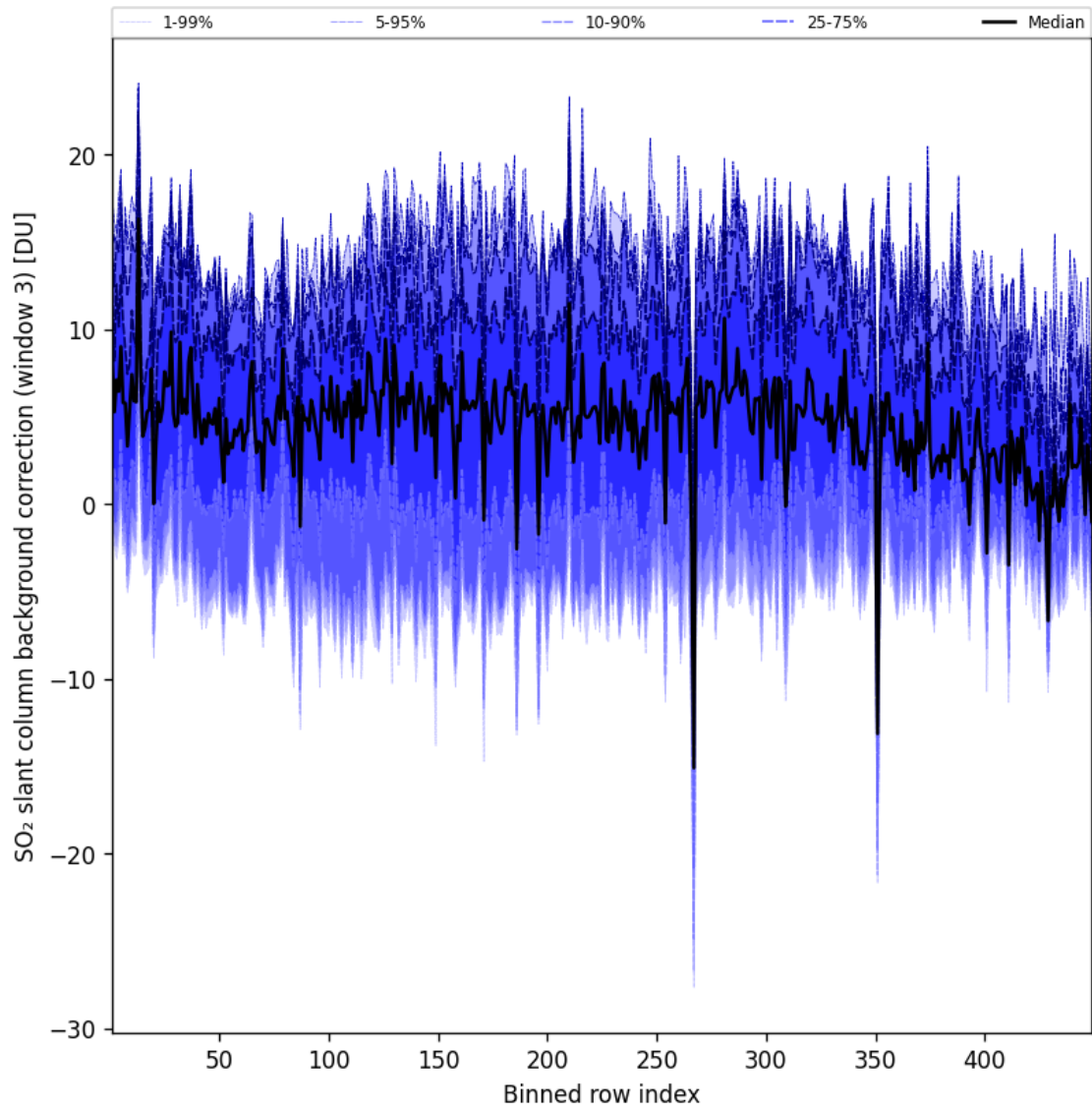


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-01-12 to 2025-01-13

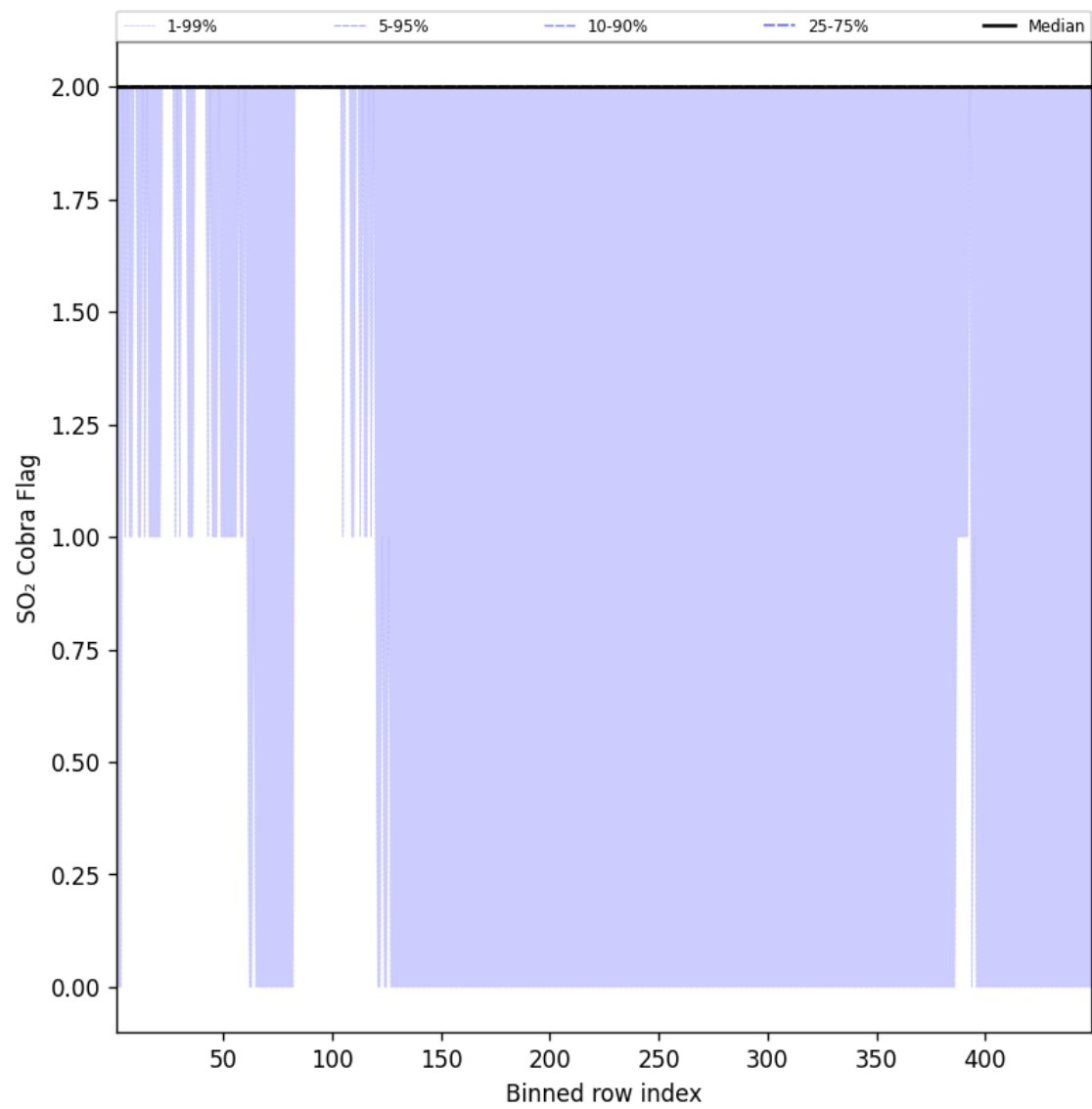


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-01-12 to 2025-01-13

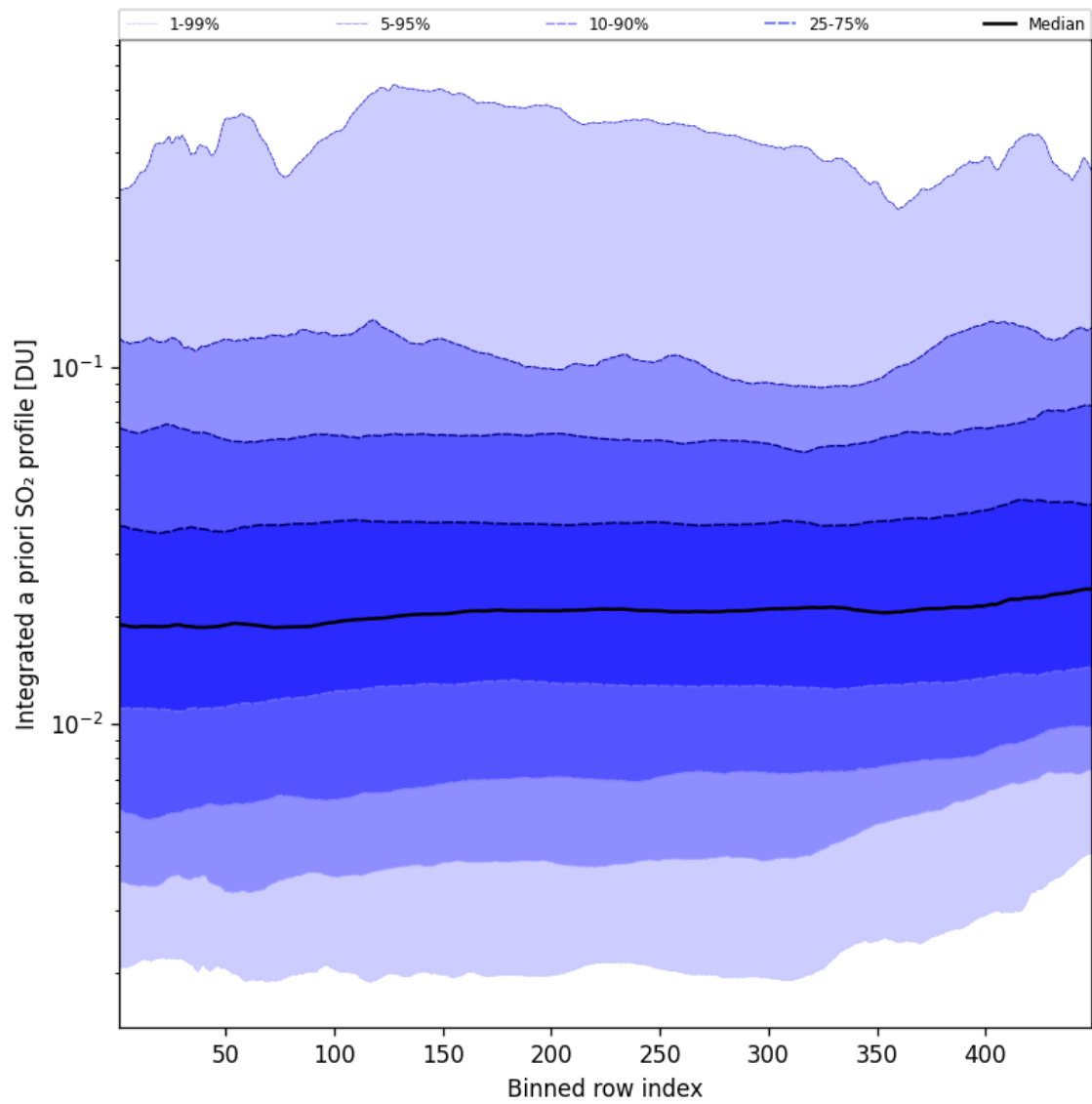


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-01-12 to 2025-01-13

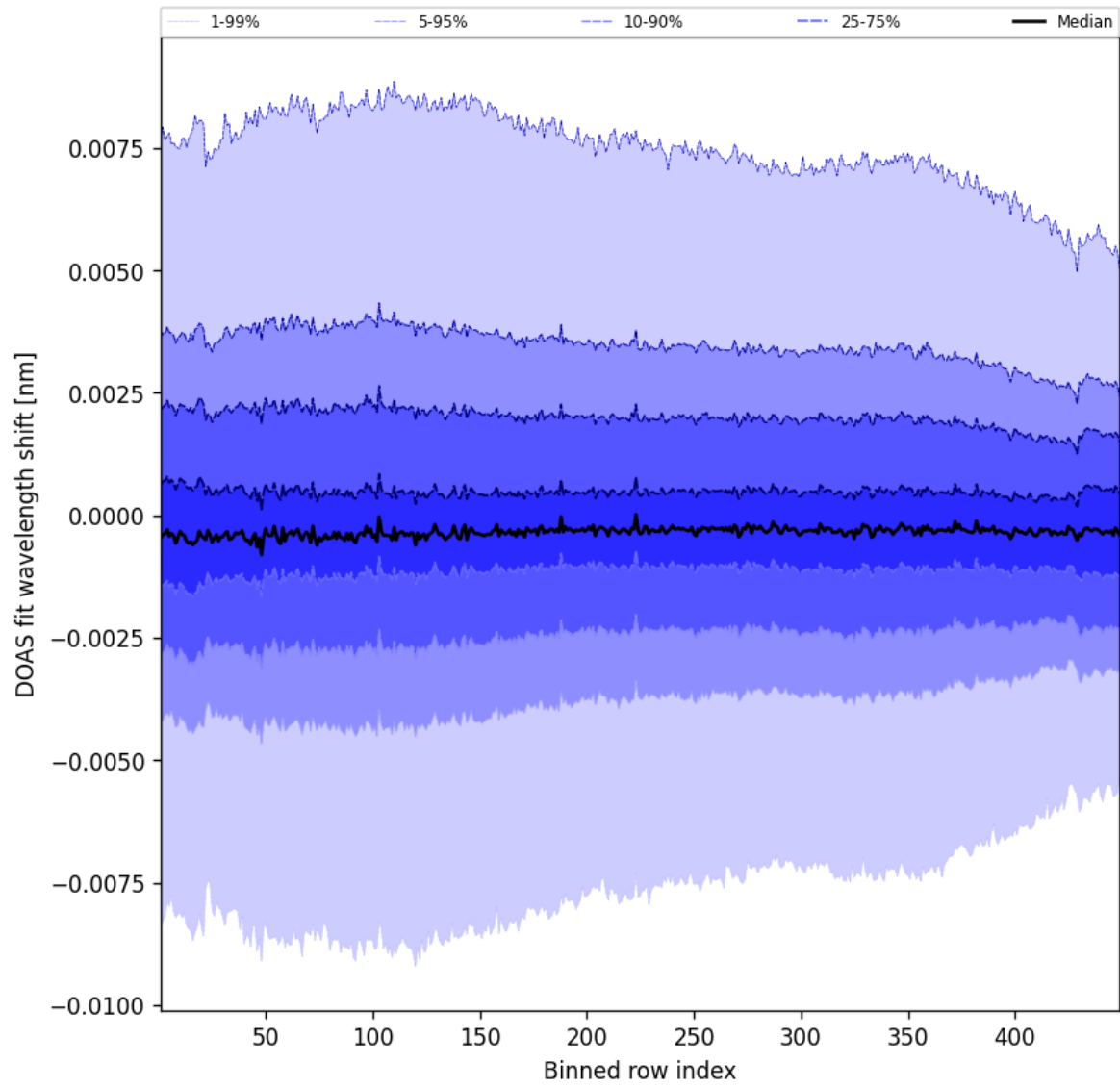


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-01-12 to 2025-01-13

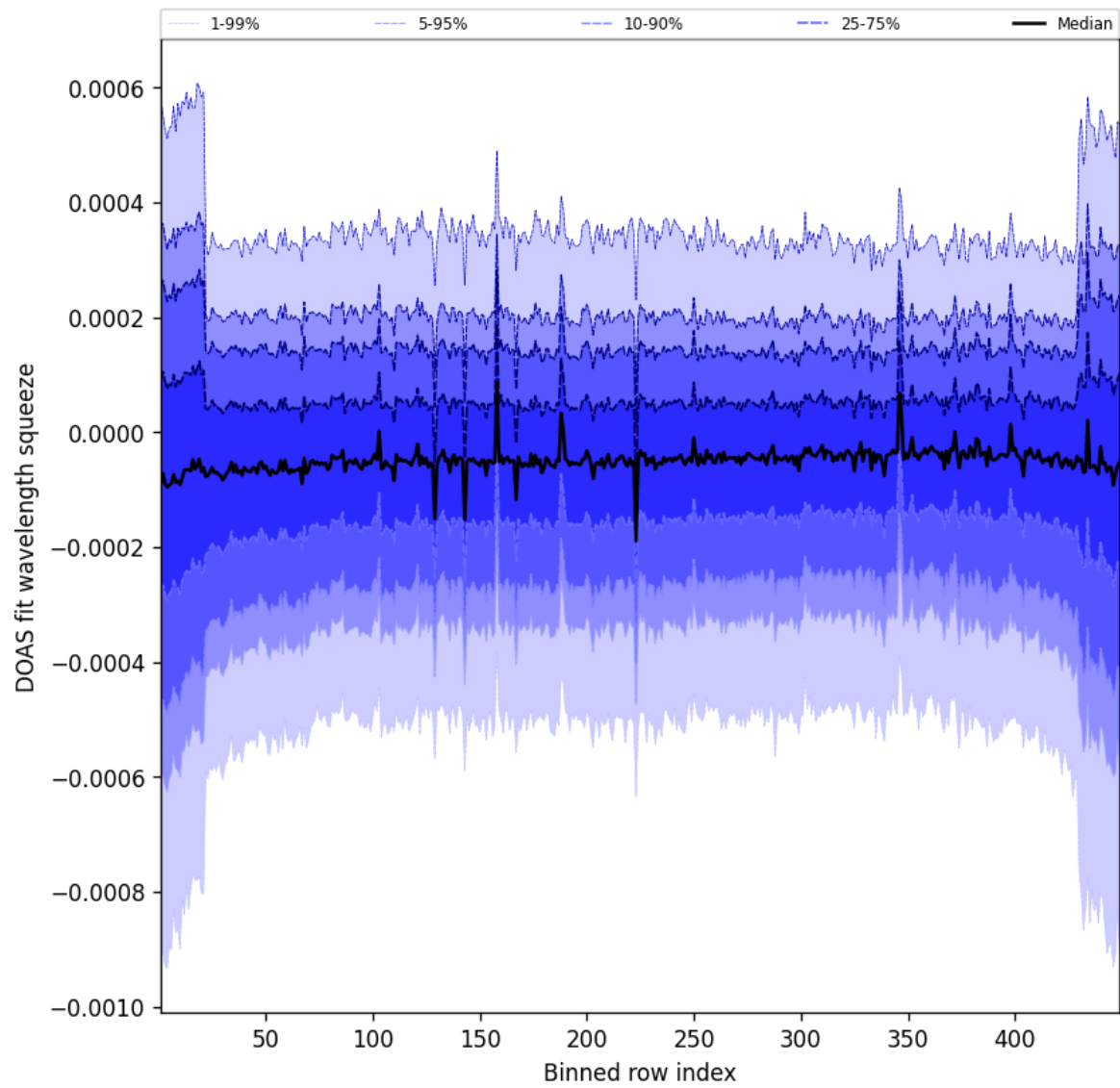


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-01-12 to 2025-01-13

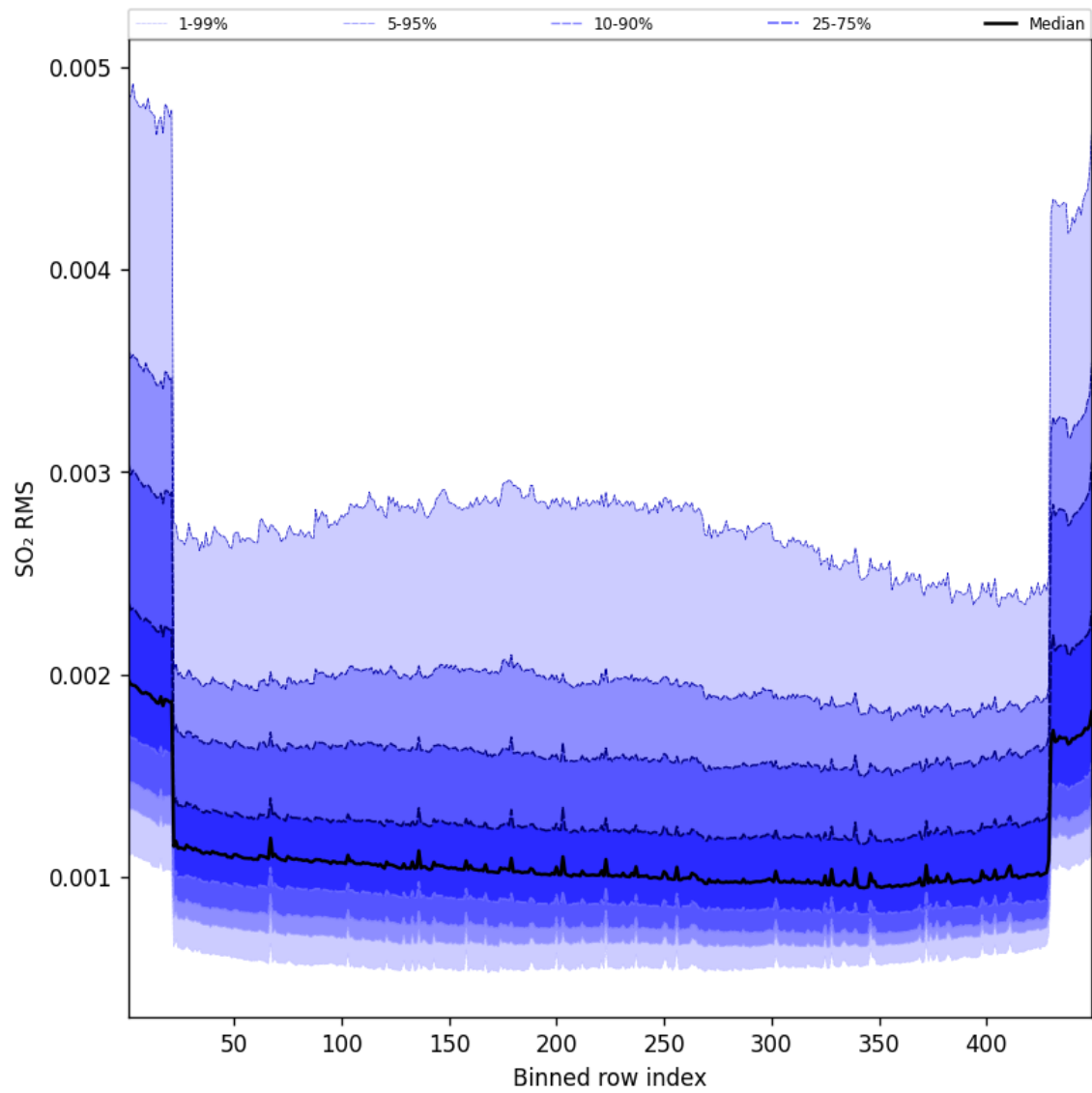


Figure 106: Along track statistics of “SO₂ RMS” for 2025-01-12 to 2025-01-13

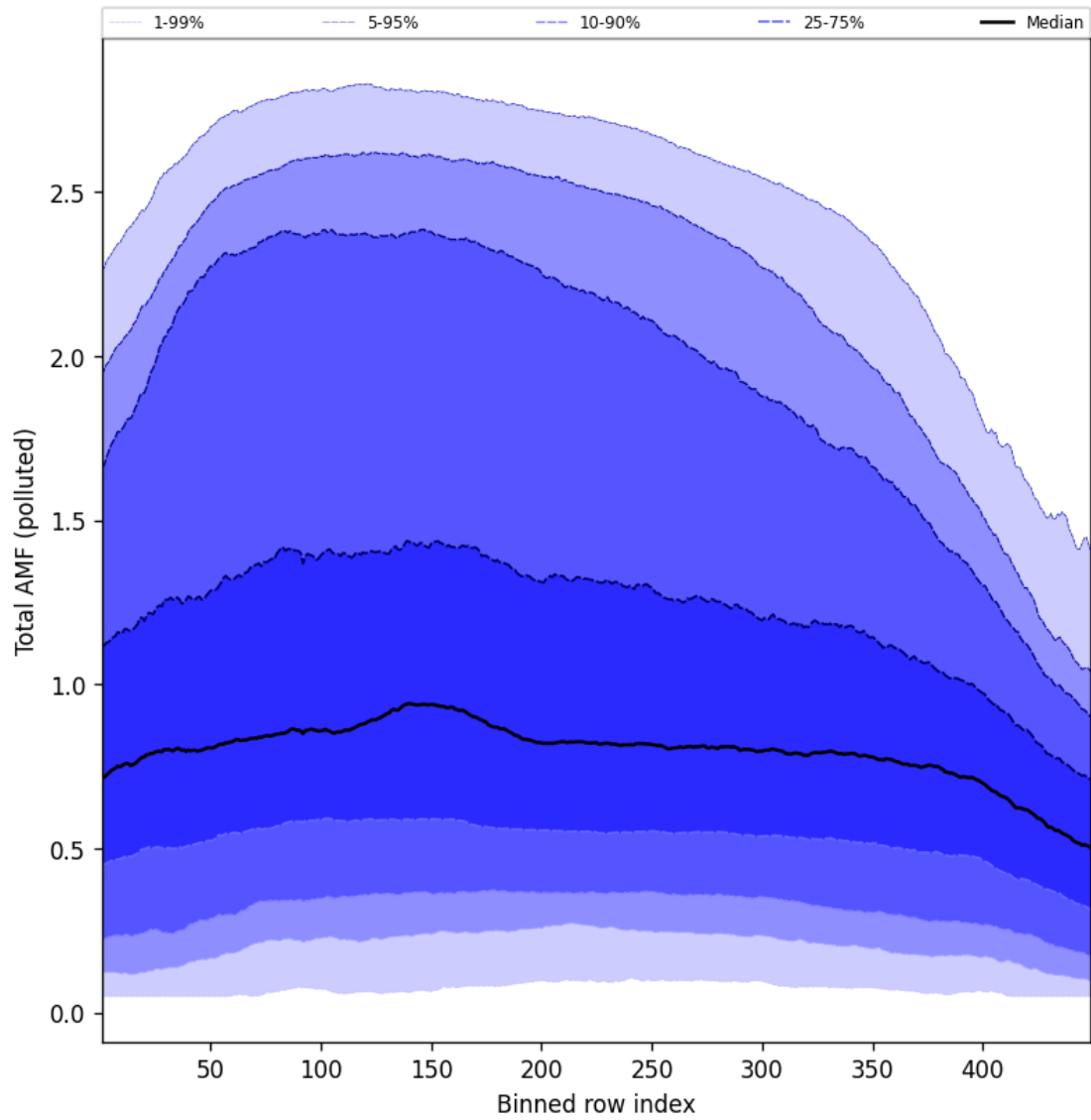


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-01-12 to 2025-01-13

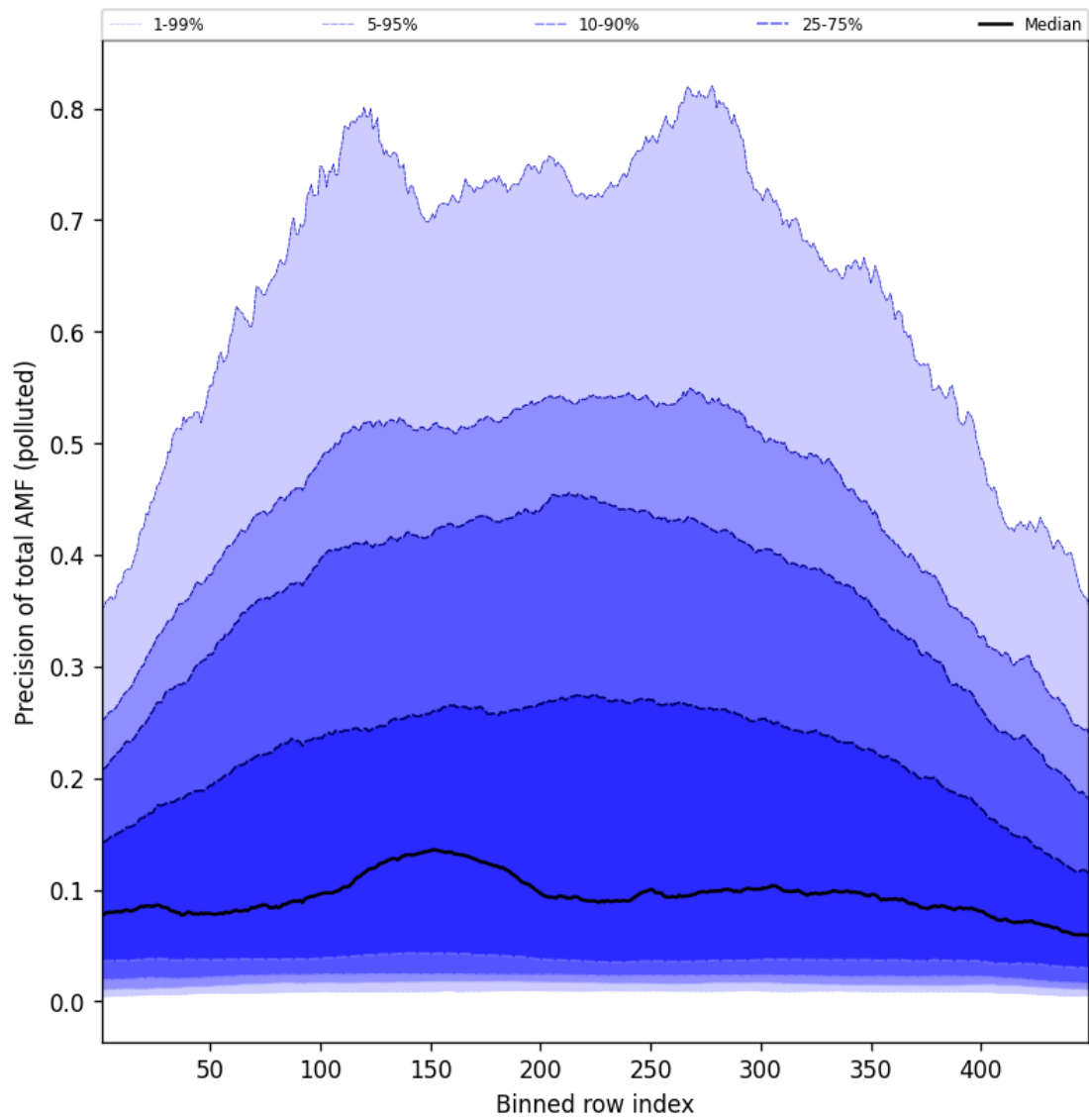


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-01-12 to 2025-01-13

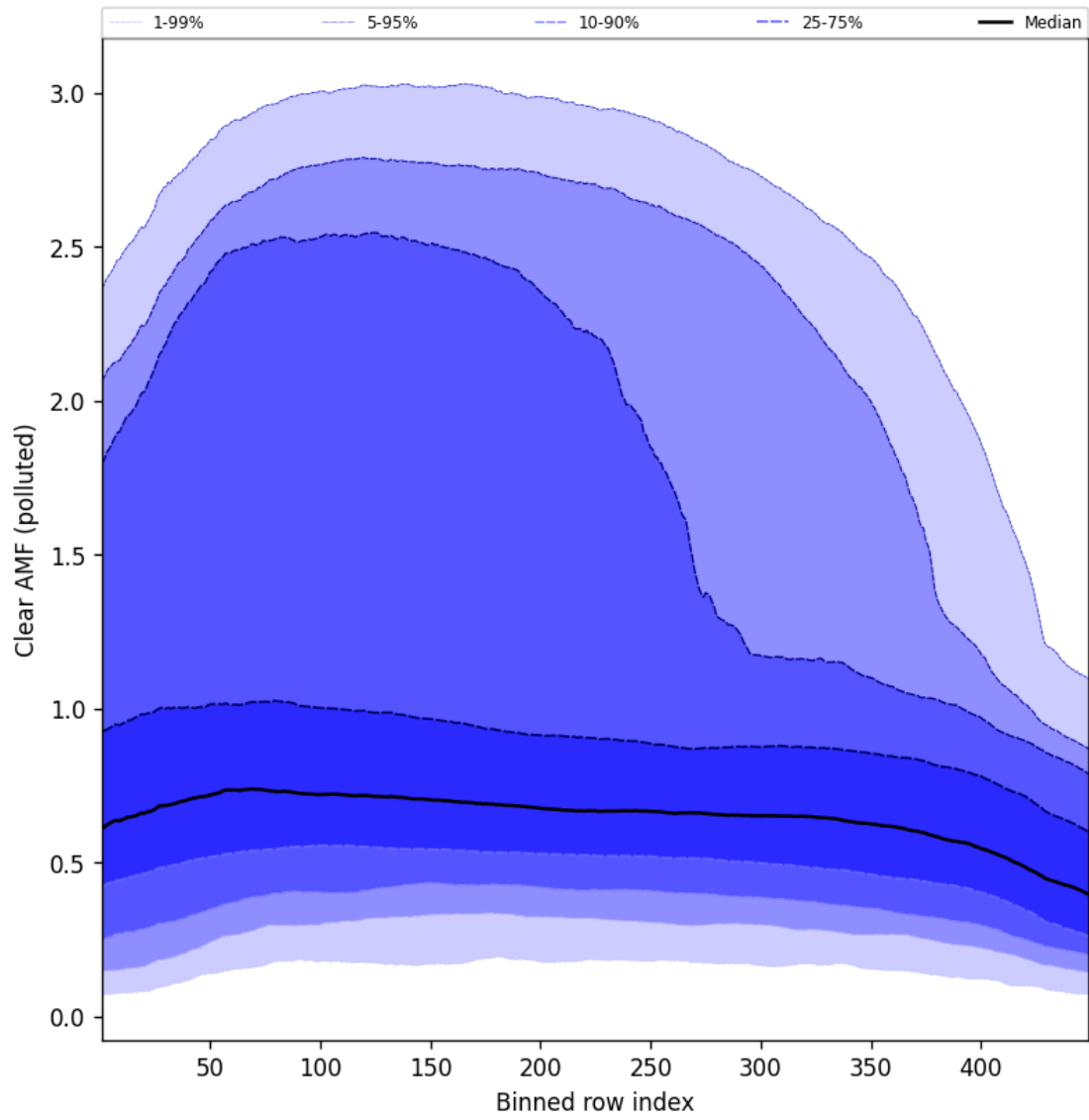


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-01-12 to 2025-01-13

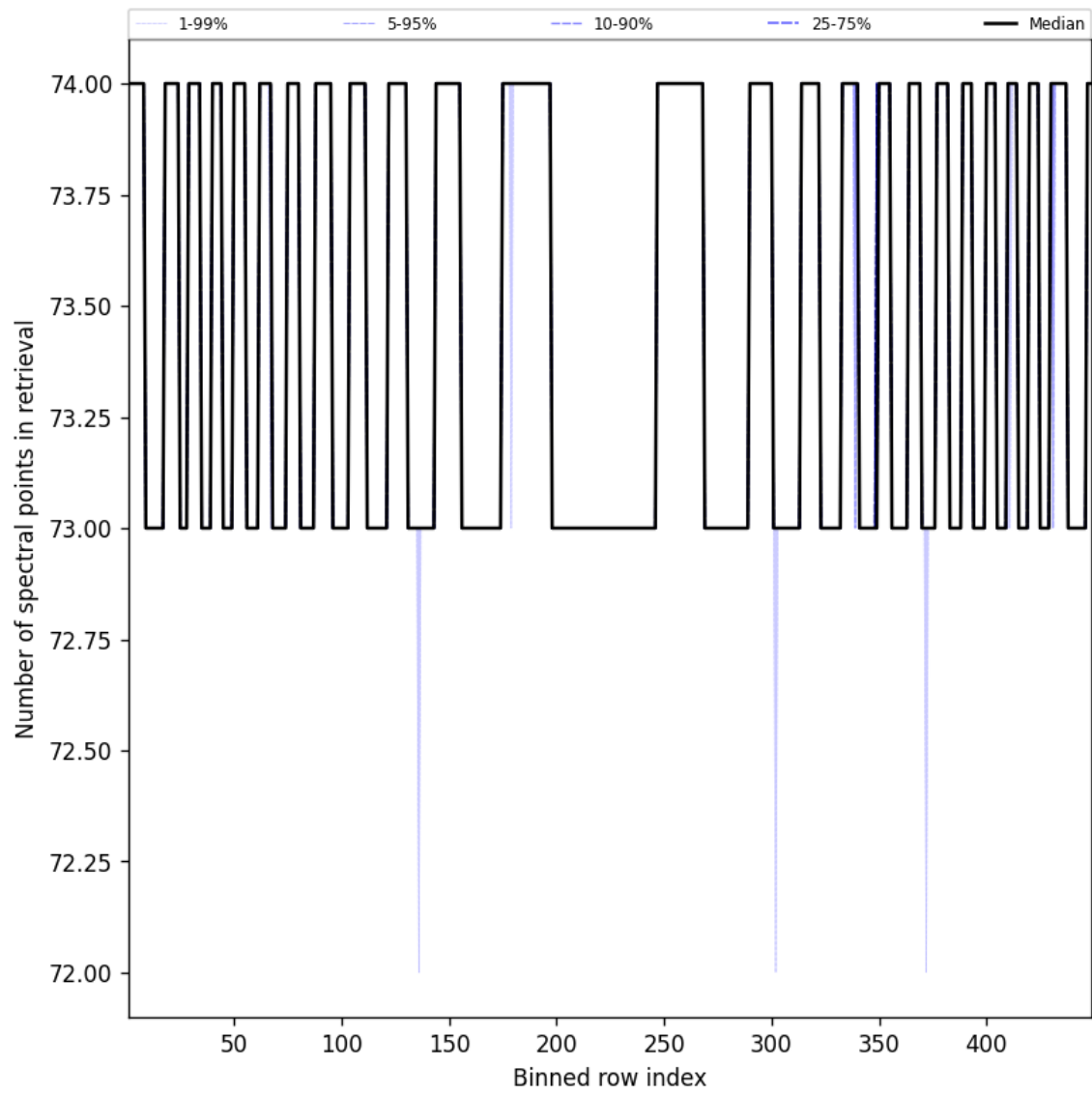


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-01-12 to 2025-01-13

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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