

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]	0.613 ± 0.416	17264191	0.995	0.810	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.485 \pm 147.758) \times 10^{-2}$	17264191	0.223	0.389	8.619×10^{-3}	-151	704
sulfurdioxide total vertical column precision [DU]	0.549 ± 1.049	17264191	0.122	0.321	0.291	3.483×10^{-2}	89.6
sulfurdioxide slant column density corrected [DU]	$(1.683 \pm 34.326) \times 10^{-2}$	17264191	0.227	0.337	8.430×10^{-3}	-20.9	191
sulfurdioxide slant column density cobra [DU]	$(1.672 \pm 33.011) \times 10^{-2}$	17264191	0.227	0.337	8.430×10^{-3}	-20.9	42.0
sulfurdioxide slant column density cobra precision [DU]	0.270 ± 0.121	17264191	0.213	0.110	0.232	8.232×10^{-2}	24.8
sulfurdioxide slant column density window1 [DU]	$(9.557 \pm 63.697) \times 10^{-2}$	17264191	0.125	0.709	0.103	-166	49.0
sulfurdioxide slant column density window1 precision [DU]	0.270 ± 0.121	17264191	0.213	0.110	0.232	8.232×10^{-2}	24.8
sulfurdioxide slant column density corrected win1 [DU]	$(4.417 \pm 61.604) \times 10^{-2}$	17264191	2.500×10^{-2}	0.672	2.955×10^{-2}	-166	48.9
background so2 slant column offset window1 [DU]	$(-5.139 \pm 18.401) \times 10^{-2}$	17264191	-0.140	0.223	-0.108	-1.50	9.26
sulfurdioxide slant column density window2 [DU]	1.18 ± 8.58	17264191	0.250	10.8	1.03	-391	891
sulfurdioxide slant column density window2 precision [DU]	7.76 ± 2.18	17264191	6.97	2.51	7.40	2.23	521
sulfurdioxide slant column density corrected win2 [DU]	1.20 ± 8.38	17264191	1.25	10.5	1.21	-389	892
background so2 slant column offset window2 [DU]	$(1.699 \pm 221.906) \times 10^{-2}$	17264191	1.25	2.53	0.640	-12.1	10.6
sulfurdioxide slant column density window3 [DU]	-5.57 ± 23.36	17264191	-7.28	29.0	-5.79	-3.921×10^3	354
sulfurdioxide slant column density window3 precision [DU]	26.7 ± 12.7	17264191	21.5	9.98	23.4	9.62	1.846×10^3
sulfurdioxide slant column density corrected win3 [DU]	-5.47 ± 22.42	17264191	-6.16	27.7	-5.52	-3.938×10^3	343
background so2 slant column offset window3 [DU]	$(9.151 \pm 643.986) \times 10^{-2}$	17264191	0.560	9.78	0.204	-19.5	20.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17264191	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.347 \pm 9.670) \times 10^{-2}$	17264191	2.276×10^{-2}	2.791×10^{-2}	2.378×10^{-2}	5.957×10^{-4}	2.81
fitted radiance shift [nm]	$(-3.235 \pm 24.496) \times 10^{-4}$	17264191	-5.000×10^{-4}	1.685×10^{-3}	-3.733×10^{-4}	-0.102	3.646×10^{-2}
fitted radiance squeeze [1]	$(-6.006 \pm 18.288) \times 10^{-5}$	17264191	-3.000×10^{-5}	2.167×10^{-4}	-5.072×10^{-5}	-1.671×10^{-2}	1.585×10^{-2}
fitted root mean square [1]	$(1.205 \pm 0.496) \times 10^{-3}$	17264191	9.250×10^{-4}	4.780×10^{-4}	1.064×10^{-3}	3.333×10^{-4}	5.787×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.961 ± 0.625	17264191	0.660	0.684	0.791	5.000×10^{-2}	3.11
sulfurdioxide total air mass factor polluted precision [1]	0.145 ± 0.149	17264191	3.500×10^{-2}	0.174	9.130×10^{-2}	2.500×10^{-3}	1.89
sulfurdioxide clear air mass factor polluted [1]	0.830 ± 0.621	17264191	0.620	0.369	0.660	2.627×10^{-2}	3.15
number of spectral points in retrieval [1]	73.4 ± 0.5	17264191	73.0	1.000	73.0	52.0	156

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	4.000×10^{-2}	9.000×10^{-2}	0.190	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.80	-0.860	-0.495	-0.322	-0.182	0.206	0.357	0.549	0.974	3.43
sulfurdioxide total vertical column precision [DU]	7.835×10^{-2}	9.783×10^{-2}	0.117	0.141	0.179	0.500	0.715	1.05	1.77	4.74
sulfurdioxide slant column density corrected [DU]	-0.786	-0.451	-0.327	-0.245	-0.159	0.178	0.270	0.359	0.500	0.937
sulfurdioxide slant column density cobra [DU]	-0.786	-0.451	-0.327	-0.245	-0.159	0.178	0.270	0.359	0.500	0.937
sulfurdioxide slant column density cobra precision [DU]	0.134	0.158	0.172	0.182	0.195	0.305	0.371	0.427	0.500	0.724
sulfurdioxide slant column density window1 [DU]	-1.58	-0.898	-0.631	-0.449	-0.257	0.452	0.632	0.803	1.06	1.78
sulfurdioxide slant column density window1 precision [DU]	0.134	0.158	0.172	0.182	0.195	0.305	0.371	0.427	0.500	0.724
sulfurdioxide slant column density corrected win1 [DU]	-1.50	-0.869	-0.634	-0.474	-0.302	0.369	0.552	0.729	1.00	1.78
background so2 slant column offset window1 [DU]	-0.358	-0.274	-0.237	-0.203	-0.172	5.024×10^{-2}	0.157	0.234	0.314	0.444
sulfurdioxide slant column density window2 [DU]	-19.0	-12.5	-9.29	-6.94	-4.30	6.46	9.23	11.8	15.3	23.2
sulfurdioxide slant column density window2 precision [DU]	4.18	4.97	5.44	5.83	6.31	8.82	9.71	10.6	11.8	14.4
sulfurdioxide slant column density corrected win2 [DU]	-19.3	-12.4	-9.12	-6.73	-4.08	6.47	9.10	11.5	14.7	21.8
background so2 slant column offset window2 [DU]	-7.04	-4.54	-3.02	-1.99	-1.02	1.51	1.76	2.00	2.32	4.10
sulfurdioxide slant column density window3 [DU]	-64.3	-43.3	-33.9	-27.3	-20.0	8.94	16.6	23.6	33.1	51.6
sulfurdioxide slant column density window3 precision [DU]	13.4	15.2	16.5	17.8	19.4	29.4	34.0	39.2	50.0	80.5
sulfurdioxide slant column density corrected win3 [DU]	-62.3	-42.0	-32.8	-26.3	-19.3	8.47	15.7	22.2	31.2	49.5
background so2 slant column offset window3 [DU]	-13.3	-10.5	-8.56	-6.91	-4.76	5.02	7.11	8.60	10.3	13.3
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]	1.904×10^{-3}	4.501×10^{-3}	7.543×10^{-3}	1.024×10^{-2}	1.356×10^{-2}	4.147×10^{-2}	5.598×10^{-2}	7.385×10^{-2}	0.120	0.395
fitted radiance shift [nm]	-7.692×10^{-3}	-3.890×10^{-3}	-2.534×10^{-3}	-1.791×10^{-3}	-1.208×10^{-3}	4.769×10^{-4}	1.153×10^{-3}	2.007×10^{-3}	3.472×10^{-3}	7.465×10^{-3}
fitted radiance squeeze [1]	-5.560×10^{-4}	-3.664×10^{-4}	-2.841×10^{-4}	-2.260×10^{-4}	-1.641×10^{-4}	5.255×10^{-5}	1.033×10^{-4}	1.497×10^{-4}	2.154×10^{-4}	3.735×10^{-4}
fitted root mean square [1]	5.705×10^{-4}	6.961×10^{-4}	7.703×10^{-4}	8.264×10^{-4}	8.931×10^{-4}	1.371×10^{-3}	1.603×10^{-3}	1.829×10^{-3}	2.159×10^{-3}	3.037×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.991×10^{-2}	0.210	0.319	0.417	0.537	1.22	1.56	1.94	2.40	2.72
sulfurdioxide total air mass factor polluted precision [1]	8.127×10^{-3}	1.594×10^{-2}	2.301×10^{-2}	2.892×10^{-2}	3.647×10^{-2}	0.210	0.277	0.343	0.438	0.663
sulfurdioxide clear air mass factor polluted [1]	0.133	0.261	0.350	0.423	0.505	0.874	1.01	1.47	2.60	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]	0.714 ± 0.388	6175010	0.670	1.000	0.0	1.000	0.330	1.000
sulfurdioxide total vertical column [DU]	0.101 ± 2.356	6175010	0.634	1.536×10^{-2}	-151	704	-0.293	0.341
sulfurdioxide total vertical column precision [DU]	0.947 ± 1.601	6175010	0.654	0.455	4.399×10^{-2}	89.6	0.280	0.934
sulfurdioxide slant column density corrected [DU]	$(2.542 \pm 43.405) \times 10^{-2}$	6175010	0.397	1.104×10^{-2}	-7.70	191	-0.185	0.212
sulfurdioxide slant column density cobra [DU]	$(2.516 \pm 40.828) \times 10^{-2}$	6175010	0.397	1.104×10^{-2}	-7.70	42.0	-0.185	0.212
sulfurdioxide slant column density cobra precision [DU]	0.324 ± 0.149	6175010	0.180	0.278	8.415×10^{-2}	4.48	0.218	0.398
sulfurdioxide slant column density window1 [DU]	0.170 ± 0.744	6175010	0.794	0.177	-10.6	49.0	-0.223	0.571
sulfurdioxide slant column density window1 precision [DU]	0.324 ± 0.149	6175010	0.180	0.278	8.415×10^{-2}	4.48	0.218	0.398
sulfurdioxide slant column density corrected win1 [DU]	$(6.915 \pm 74.218) \times 10^{-2}$	6175010	0.784	4.570×10^{-2}	-9.33	48.9	-0.340	0.445
background so2 slant column offset window1 [DU]	-0.101 ± 0.154	6175010	0.139	-0.118	-1.50	3.23	-0.192	-5.349×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.83 ± 9.73	6175010	12.4	1.47	-336	190	-4.54	7.82
sulfurdioxide slant column density window2 precision [DU]	8.71 ± 2.26	6175010	2.83	8.41	2.34	178	7.15	9.98
sulfurdioxide slant column density corrected win2 [DU]	1.14 ± 9.40	6175010	12.0	1.13	-336	191	-4.85	7.12
background so2 slant column offset window2 [DU]	-0.686 ± 2.829	6175010	3.83	0.412	-12.1	10.6	-2.45	1.37
sulfurdioxide slant column density window3 [DU]	-8.57 ± 25.80	6175010	32.7	-7.98	-191	294	-24.6	8.11
sulfurdioxide slant column density window3 precision [DU]	29.9 ± 12.6	6175010	10.1	26.8	9.73	227	22.9	32.9
sulfurdioxide slant column density corrected win3 [DU]	-5.99 ± 25.25	6175010	31.9	-5.73	-181	293	-21.8	10.2
background so2 slant column offset window3 [DU]	2.58 ± 5.31	6175010	8.61	2.16	-13.2	20.9	-1.84	6.77
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.26	6175010	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.250 \pm 15.183) \times 10^{-2}$	6175010	5.502×10^{-2}	2.934×10^{-2}	9.771×10^{-4}	2.81	1.465×10^{-2}	6.966×10^{-2}
fitted radiance shift [nm]	$(-1.603 \pm 24.949) \times 10^{-4}$	6175010	1.731×10^{-3}	-1.932×10^{-4}	-4.166×10^{-2}	3.222×10^{-2}	-1.055×10^{-3}	6.765×10^{-4}
fitted radiance squeeze [1]	$(-8.328 \pm 192.423) \times 10^{-6}$	6175010	2.165×10^{-4}	-4.104×10^{-6}	-2.537×10^{-3}	1.632×10^{-3}	-1.134×10^{-4}	1.031×10^{-4}
fitted root mean square [1]	$(1.400 \pm 0.612) \times 10^{-3}$	6175010	7.014×10^{-4}	1.210×10^{-3}	3.362×10^{-4}	8.802×10^{-3}	9.834×10^{-4}	1.685×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.666 ± 0.381	6175010	0.501	0.625	5.000×10^{-2}	2.80	0.375	0.876
sulfurdioxide total air mass factor polluted precision [1]	$(9.624 \pm 13.239) \times 10^{-2}$	6175010	9.267×10^{-2}	4.593×10^{-2}	2.500×10^{-3}	1.89	2.658×10^{-2}	0.119
sulfurdioxide clear air mass factor polluted [1]	0.578 ± 0.270	6175010	0.406	0.574	2.627×10^{-2}	2.01	0.360	0.766
number of spectral points in retrieval [1]	73.5 ± 0.5	6175010	1.000	73.0	53.0	156	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.557 ± 0.420	11089181	0.860	0.460	0.0	1.000	0.140	1.000
sulfurdioxide total vertical column [DU]	$(1.384 \pm 55.283) \times 10^{-2}$	11089181	0.308	6.656×10^{-3}	-56.2	61.1	-0.146	0.162
sulfurdioxide total vertical column precision [DU]	0.328 ± 0.385	11089181	0.227	0.234	3.483×10^{-2}	50.0	0.148	0.375
sulfurdioxide slant column density corrected [DU]	$(1.205 \pm 28.013) \times 10^{-2}$	11089181	0.310	7.271×10^{-3}	-20.9	46.4	-0.147	0.163
sulfurdioxide slant column density cobra [DU]	$(1.202 \pm 27.707) \times 10^{-2}$	11089181	0.310	7.271×10^{-3}	-20.9	36.5	-0.147	0.163
sulfurdioxide slant column density cobra precision [DU]	0.240 ± 0.089	11089181	7.679×10^{-2}	0.217	8.232×10^{-2}	24.8	0.187	0.264
sulfurdioxide slant column density window1 [DU]	$(5.394 \pm 56.415) \times 10^{-2}$	11089181	0.665	6.854×10^{-2}	-166	43.8	-0.273	0.392
sulfurdioxide slant column density window1 precision [DU]	0.240 ± 0.089	11089181	7.679×10^{-2}	0.217	8.232×10^{-2}	24.8	0.187	0.264
sulfurdioxide slant column density corrected win1 [DU]	$(3.027 \pm 53.251) \times 10^{-2}$	11089181	0.621	2.233×10^{-2}	-166	44.1	-0.286	0.335
background so2 slant column offset window1 [DU]	$(-2.368 \pm 19.349) \times 10^{-2}$	11089181	0.289	-9.804×10^{-2}	-1.17	9.26	-0.167	0.122
sulfurdioxide slant column density window2 [DU]	0.821 ± 7.845	11089181	10.0	0.827	-391	891	-4.19	5.83
sulfurdioxide slant column density window2 precision [DU]	7.23 ± 1.95	11089181	2.06	6.96	2.23	521	6.01	8.08
sulfurdioxide slant column density corrected win2 [DU]	1.23 ± 7.76	11089181	9.86	1.24	-389	892	-3.70	6.16
background so2 slant column offset window2 [DU]	0.409 ± 1.668	11089181	2.21	0.757	-8.68	9.76	-0.630	1.58
sulfurdioxide slant column density window3 [DU]	-3.89 ± 21.70	11089181	27.3	-4.78	-3.921×10^3	354	-17.9	9.37
sulfurdioxide slant column density window3 precision [DU]	24.9 ± 12.3	11089181	8.21	21.6	9.62	1.846×10^3	18.3	26.5
sulfurdioxide slant column density corrected win3 [DU]	-5.19 ± 20.68	11089181	25.8	-5.42	-3.938×10^3	343	-18.1	7.64
background so2 slant column offset window3 [DU]	-1.29 ± 6.60	11089181	10.5	-1.28	-19.5	19.3	-6.72	3.78
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.17	11089181	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.731 \pm 3.146) \times 10^{-2}$	11089181	2.235×10^{-2}	2.205×10^{-2}	5.957×10^{-4}	1.80	1.302×10^{-2}	3.536×10^{-2}
fitted radiance shift [nm]	$(-4.143 \pm 24.193) \times 10^{-4}$	11089181	1.626×10^{-3}	-4.685×10^{-4}	-0.102	3.646×10^{-2}	-1.275×10^{-3}	3.504×10^{-4}
fitted radiance squeeze [1]	$(-8.886 \pm 17.068) \times 10^{-5}$	11089181	2.118×10^{-4}	-7.554×10^{-5}	-1.671×10^{-2}	1.585×10^{-2}	-1.883×10^{-4}	2.347×10^{-5}
fitted root mean square [1]	$(1.096 \pm 0.375) \times 10^{-3}$	11089181	3.747×10^{-4}	1.006×10^{-3}	3.333×10^{-4}	5.787×10^{-2}	8.596×10^{-4}	1.234×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.13 ± 0.67	11089181	0.866	0.925	5.000×10^{-2}	3.11	0.629	1.50
sulfurdioxide total air mass factor polluted precision [1]	0.172 ± 0.151	11089181	0.204	0.133	4.412×10^{-3}	1.43	4.660×10^{-2}	0.251
sulfurdioxide clear air mass factor polluted [1]	0.970 ± 0.711	11089181	0.394	0.700	0.122	3.15	0.559	0.953
number of spectral points in retrieval [1]	73.4 ± 0.5	11089181	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]	0.659 ± 0.406	12189297	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.700 \pm 102.450) \times 10^{-2}$	12189297	0.393	8.193×10^{-3}	-86.1	158	-0.186	0.206
sulfurdioxide total vertical column precision [DU]	0.461 ± 0.710	12189297	0.263	0.289	4.248×10^{-2}	50.0	0.194	0.457
sulfurdioxide slant column density corrected [DU]	$(1.319 \pm 30.532) \times 10^{-2}$	12189297	0.321	7.270×10^{-3}	-13.4	59.0	-0.152	0.169
sulfurdioxide slant column density cobra [DU]	$(1.314 \pm 30.213) \times 10^{-2}$	12189297	0.321	7.270×10^{-3}	-13.4	36.5	-0.152	0.169
sulfurdioxide slant column density cobra precision [DU]	0.256 ± 0.112	12189297	9.179×10^{-2}	0.221	8.415×10^{-2}	24.8	0.190	0.282
sulfurdioxide slant column density window1 [DU]	0.120 ± 0.588	12189297	0.665	0.123	-166	43.8	-0.212	0.453
sulfurdioxide slant column density window1 precision [DU]	0.256 ± 0.112	12189297	9.179×10^{-2}	0.221	8.415×10^{-2}	24.8	0.190	0.282
sulfurdioxide slant column density corrected win1 [DU]	$(3.905 \pm 57.528) \times 10^{-2}$	12189297	0.642	2.726×10^{-2}	-166	44.1	-0.291	0.352
background so2 slant column offset window1 [DU]	$(-8.112 \pm 15.264) \times 10^{-2}$	12189297	0.174	-0.119	-1.17	5.08	-0.177	-2.890×10^{-3}
sulfurdioxide slant column density window2 [DU]	0.812 ± 8.322	12189297	10.5	0.686	-368	891	-4.52	5.97
sulfurdioxide slant column density window2 precision [DU]	7.59 ± 2.05	12189297	2.33	7.27	2.23	521	6.23	8.57
sulfurdioxide slant column density corrected win2 [DU]	1.16 ± 8.19	12189297	10.4	1.16	-367	892	-4.04	6.34
background so2 slant column offset window2 [DU]	0.344 ± 1.975	12189297	2.03	0.859	-12.1	10.6	-0.461	1.57
sulfurdioxide slant column density window3 [DU]	-2.57 ± 22.89	12189297	28.9	-3.00	-332	354	-17.1	11.8
sulfurdioxide slant column density window3 precision [DU]	26.5 ± 12.3	12189297	9.28	23.2	9.62	259	19.7	29.0
sulfurdioxide slant column density corrected win3 [DU]	-3.55 ± 21.88	12189297	27.6	-3.92	-339	343	-17.5	10.2
background so2 slant column offset window3 [DU]	-0.984 ± 5.915	12189297	8.45	-0.859	-19.5	20.9	-5.29	3.16
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.15	12189297	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.406 \pm 4.447) \times 10^{-2}$	12189297	2.383×10^{-2}	2.477×10^{-2}	1.595×10^{-3}	1.39	1.544×10^{-2}	3.927×10^{-2}
fitted radiance shift [nm]	$(-2.597 \pm 24.144) \times 10^{-4}$	12189297	1.764×10^{-3}	-2.699×10^{-4}	-0.102	3.345×10^{-2}	-1.168×10^{-3}	5.962×10^{-4}
fitted radiance squeeze [1]	$(-4.938 \pm 16.943) \times 10^{-5}$	12189297	1.988×10^{-4}	-4.196×10^{-5}	-1.655×10^{-2}	1.282×10^{-2}	-1.445×10^{-4}	5.433×10^{-5}
fitted root mean square [1]	$(1.138 \pm 0.455) \times 10^{-3}$	12189297	3.842×10^{-4}	1.012×10^{-3}	3.333×10^{-4}	5.787×10^{-2}	8.677×10^{-4}	1.252×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.866 ± 0.433	12189297	0.527	0.787	5.000×10^{-2}	2.71	0.570	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.132 ± 0.122	12189297	0.156	8.449×10^{-2}	3.057×10^{-3}	1.48	3.854×10^{-2}	0.195
sulfurdioxide clear air mass factor polluted [1]	0.677 ± 0.241	12189297	0.285	0.652	3.799×10^{-2}	2.71	0.524	0.809
number of spectral points in retrieval [1]	73.5 ± 0.5	12189297	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]	0.494 ± 0.418	4469994	0.910	0.390	0.0	1.000	9.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(7.024 \pm 183.548) \times 10^{-2}$	4469994	0.350	8.679×10^{-3}	-102	289	-0.160	0.190
sulfurdioxide total vertical column precision [DU]	0.679 ± 1.359	4469994	0.520	0.279	3.483×10^{-2}	46.0	0.119	0.640
sulfurdioxide slant column density corrected [DU]	$(2.404 \pm 41.511) \times 10^{-2}$	4469994	0.379	1.125×10^{-2}	-20.9	191	-0.176	0.203
sulfurdioxide slant column density cobra [DU]	$(2.377 \pm 38.180) \times 10^{-2}$	4469994	0.379	1.125×10^{-2}	-20.9	42.0	-0.176	0.203
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.129	4469994	0.139	0.263	8.232×10^{-2}	13.6	0.217	0.356
sulfurdioxide slant column density window1 [DU]	$(2.149 \pm 73.128) \times 10^{-2}$	4469994	0.835	2.696×10^{-2}	-21.0	49.0	-0.402	0.433
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.129	4469994	0.139	0.263	8.232×10^{-2}	13.6	0.217	0.356
sulfurdioxide slant column density corrected win1 [DU]	$(5.223 \pm 69.438) \times 10^{-2}$	4469994	0.753	3.338×10^{-2}	-20.9	48.9	-0.337	0.415
background so2 slant column offset window1 [DU]	$(3.073 \pm 23.127) \times 10^{-2}$	4469994	0.400	-5.541×10^{-2}	-1.50	9.26	-0.156	0.243
sulfurdioxide slant column density window2 [DU]	2.06 ± 9.02	4469994	11.3	1.95	-391	858	-3.64	7.62
sulfurdioxide slant column density window2 precision [DU]	8.11 ± 2.40	4469994	2.86	7.71	2.36	475	6.47	9.33
sulfurdioxide slant column density corrected win2 [DU]	1.31 ± 8.75	4469994	10.9	1.33	-389	859	-4.12	6.75
background so2 slant column offset window2 [DU]	-0.756 ± 2.470	4469994	3.59	-0.438	-12.1	10.6	-2.32	1.27
sulfurdioxide slant column density window3 [DU]	-12.9 ± 22.6	4469994	27.2	-12.5	-3.921×10^3	294	-26.2	0.979
sulfurdioxide slant column density window3 precision [DU]	26.6 ± 13.2	4469994	11.4	23.4	9.68	1.846×10^3	18.5	29.8
sulfurdioxide slant column density corrected win3 [DU]	-10.1 ± 22.8	4469994	27.4	-9.27	-3.938×10^3	293	-23.3	4.06
background so2 slant column offset window3 [DU]	2.85 ± 6.88	4469994	10.8	4.64	-19.5	20.9	-2.60	8.19
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.30	4469994	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.886 \pm 14.866) \times 10^{-2}$	4469994	4.519×10^{-2}	1.723×10^{-2}	5.957×10^{-4}	2.81	6.313×10^{-3}	5.150×10^{-2}
fitted radiance shift [nm]	$(-5.093 \pm 24.494) \times 10^{-4}$	4469994	1.363×10^{-3}	-6.291×10^{-4}	-4.550×10^{-2}	3.646×10^{-2}	-1.265×10^{-3}	9.817×10^{-5}
fitted radiance squeeze [1]	$(-9.392 \pm 20.945) \times 10^{-5}$	4469994	2.675×10^{-4}	-8.850×10^{-5}	-1.671×10^{-2}	1.585×10^{-2}	-2.272×10^{-4}	4.025×10^{-5}
fitted root mean square [1]	$(1.359 \pm 0.530) \times 10^{-3}$	4469994	5.730×10^{-4}	1.243×10^{-3}	3.455×10^{-4}	5.361×10^{-2}	1.012×10^{-3}	1.585×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.26 ± 0.92	4469994	1.80	0.908	5.000×10^{-2}	3.11	0.455	2.26
sulfurdioxide total air mass factor polluted precision [1]	0.184 ± 0.199	4469994	0.237	0.126	2.500×10^{-3}	1.89	3.001×10^{-2}	0.267
sulfurdioxide clear air mass factor polluted [1]	1.28 ± 1.02	4469994	2.00	0.766	2.819×10^{-2}	3.15	0.448	2.45
number of spectral points in retrieval [1]	73.4 ± 0.5	4469994	1.000	73.0	52.0	156	73.0	74.0

3 Granule outlines

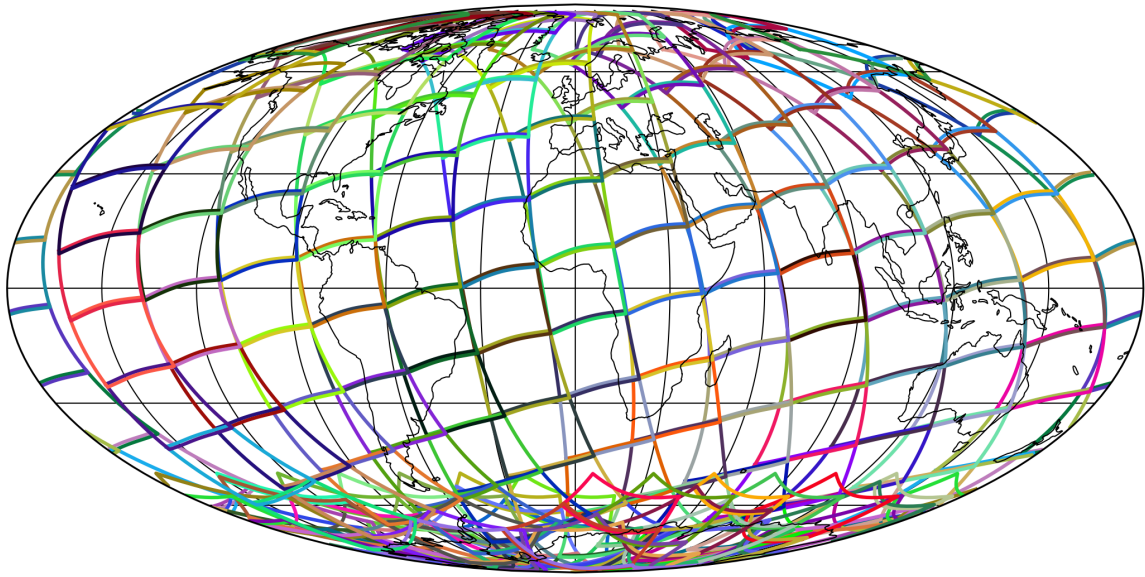


Figure 1: Outline of the granules.

4 Input data monitoring

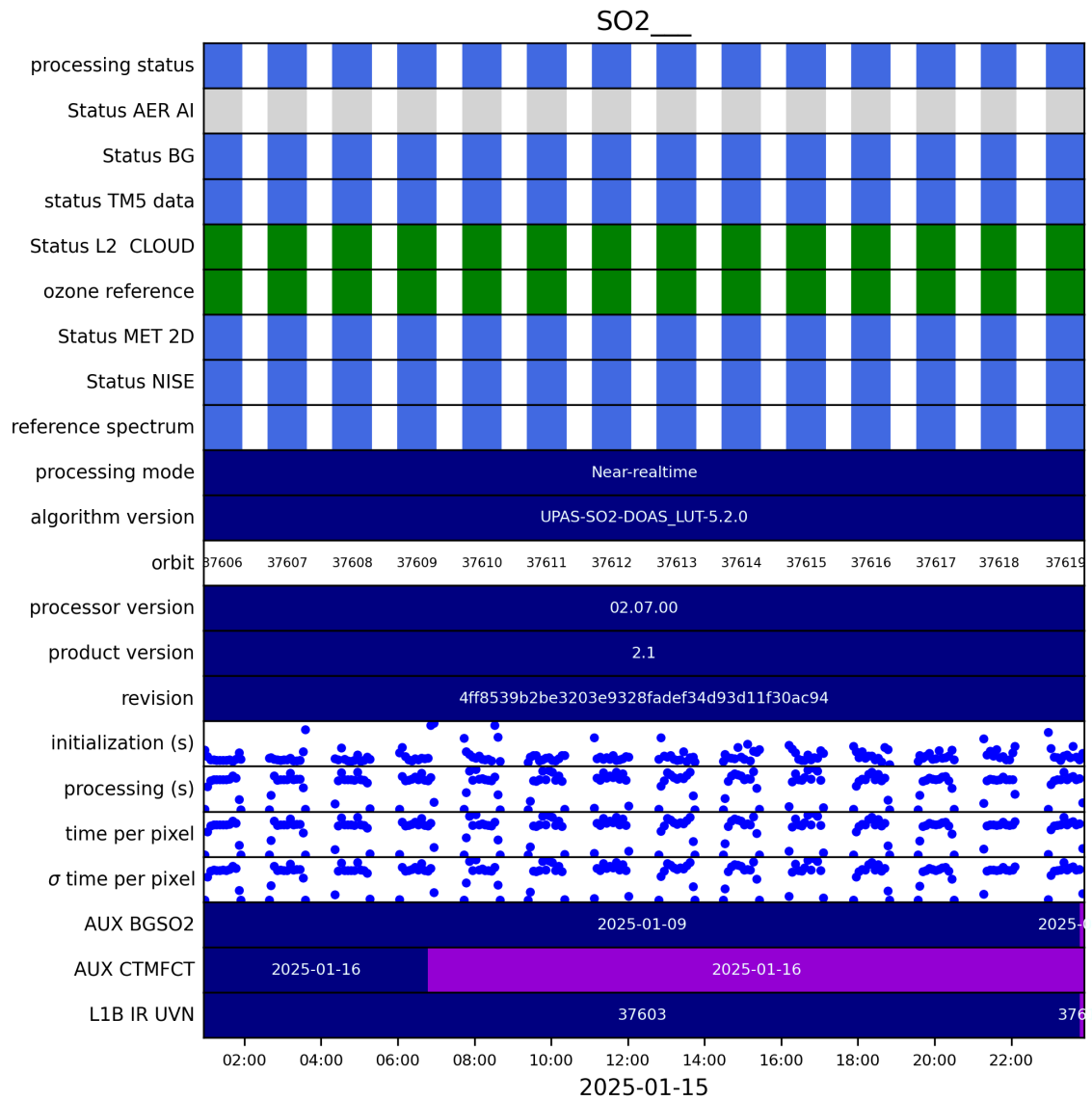


Figure 2: Input data per granule

5 Warnings and errors

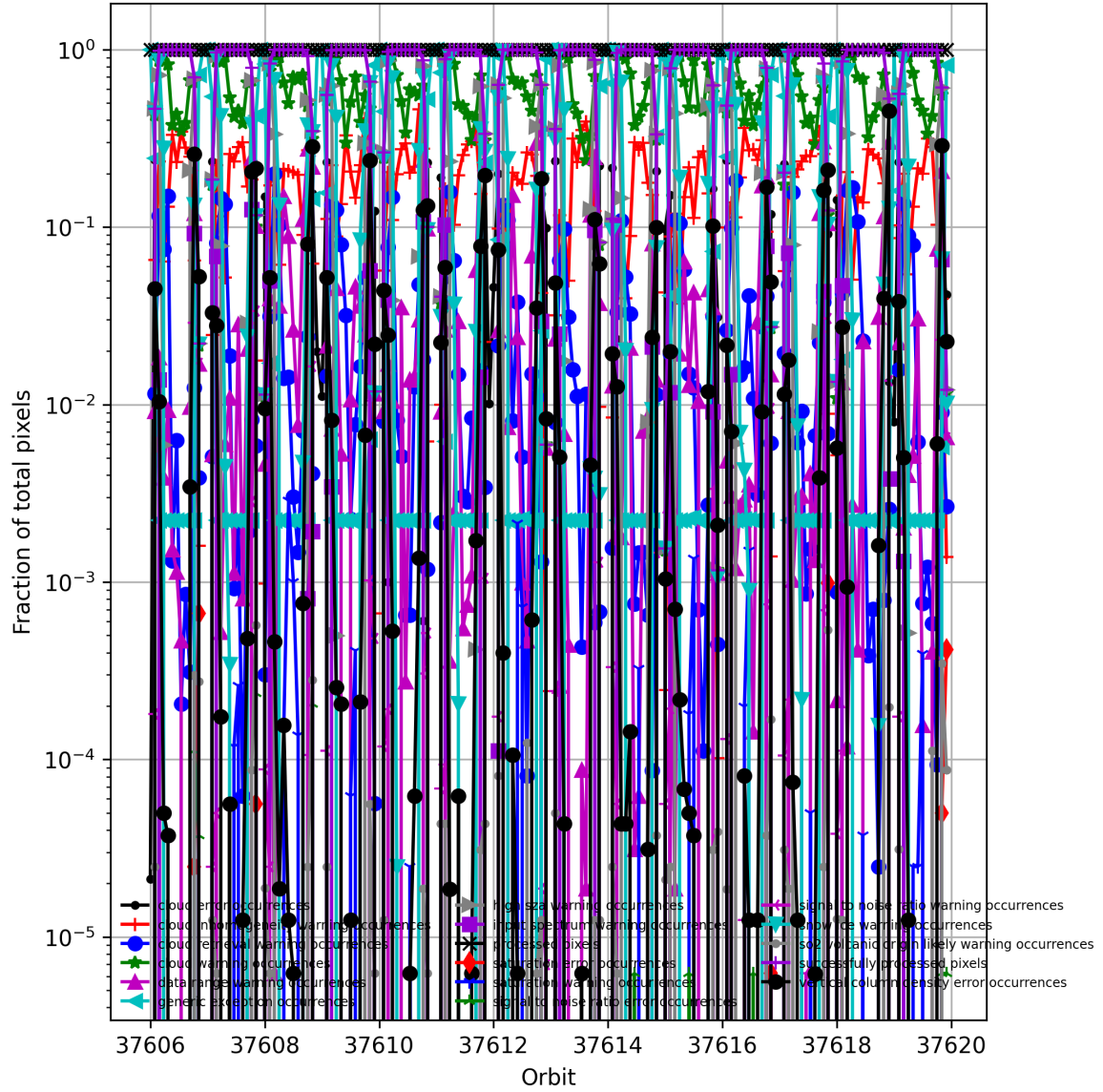


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

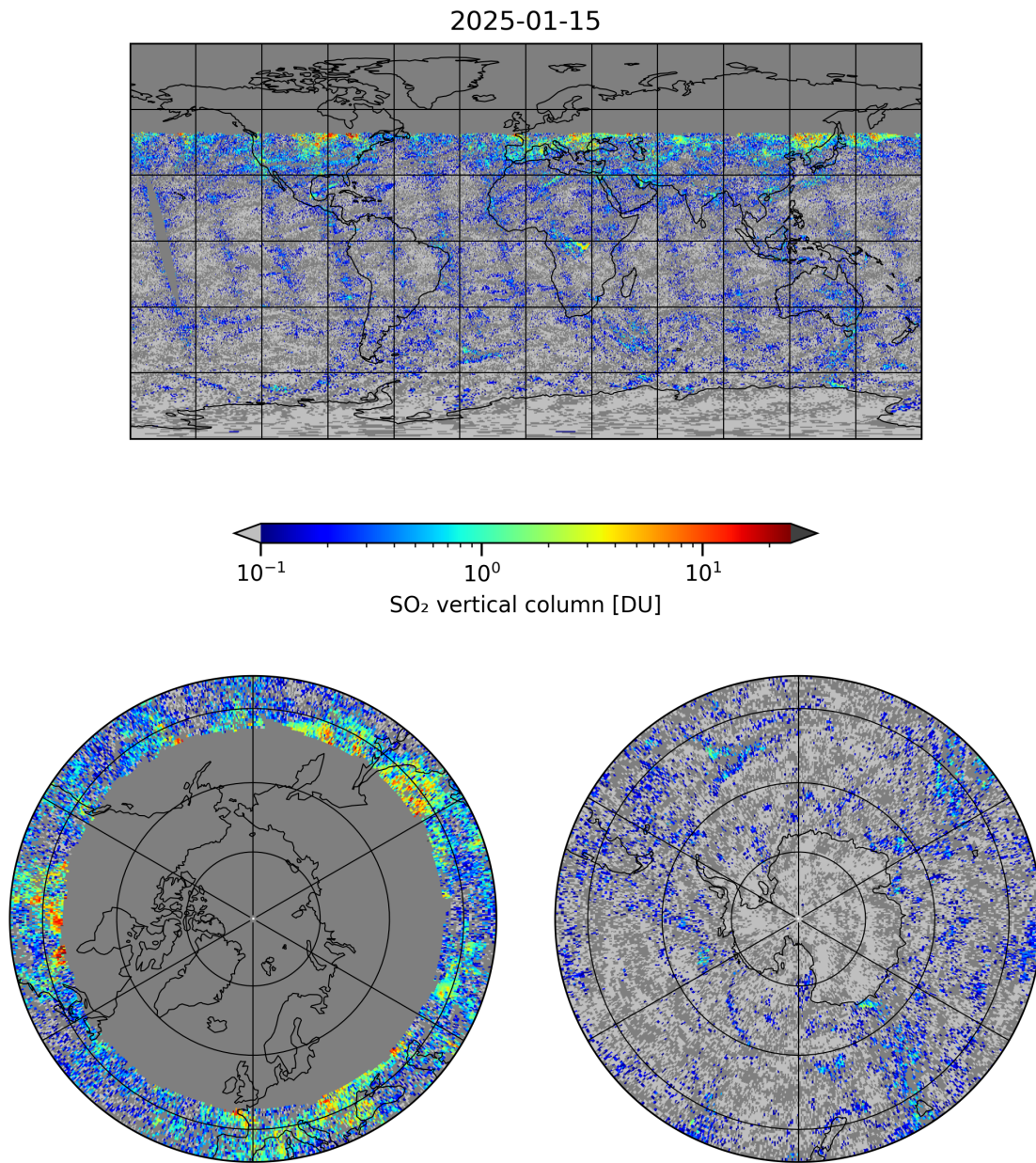


Figure 4: Map of “SO₂ vertical column” for 2025-01-15 to 2025-01-15

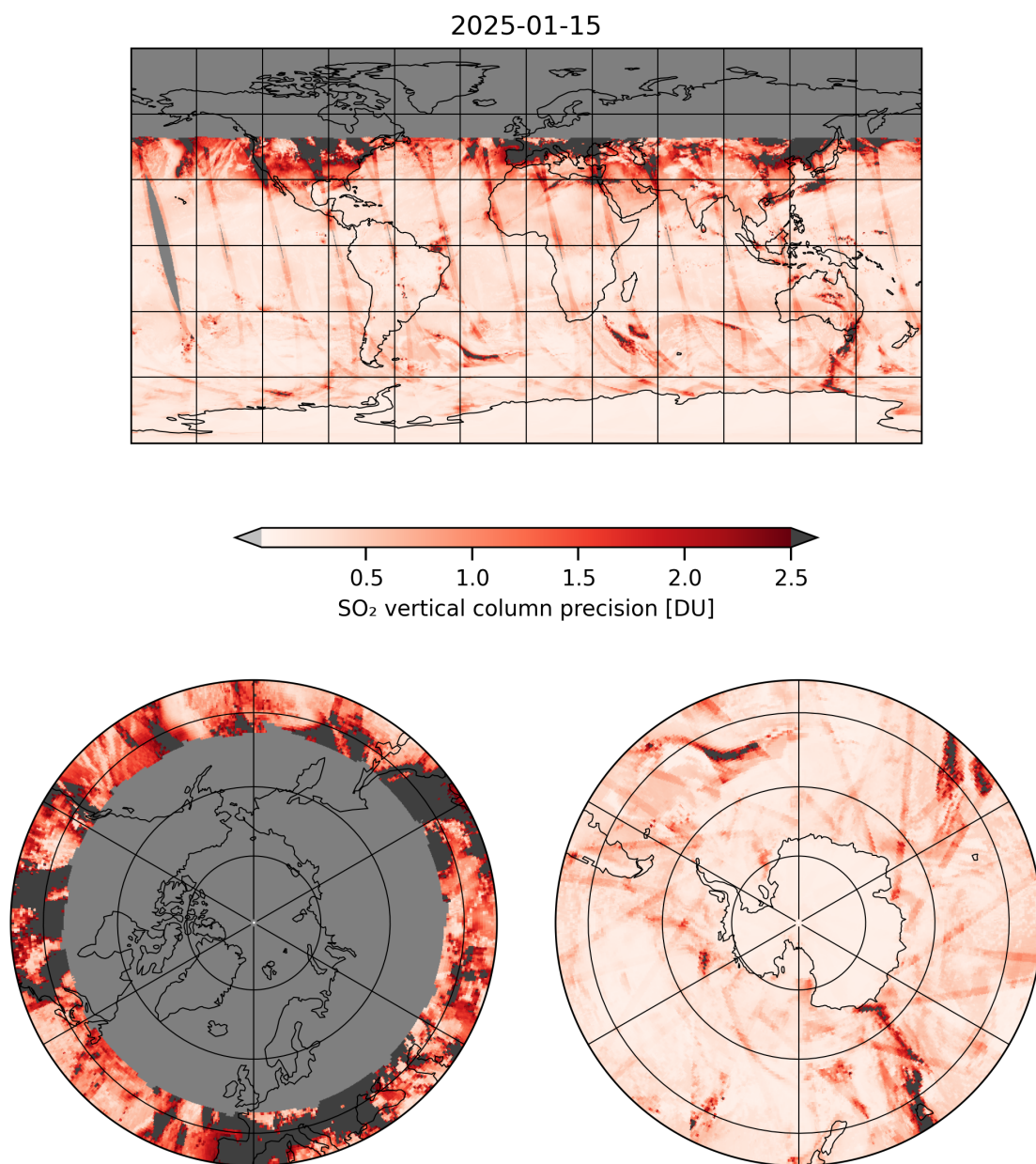


Figure 5: Map of “SO₂ vertical column precision” for 2025-01-15 to 2025-01-15

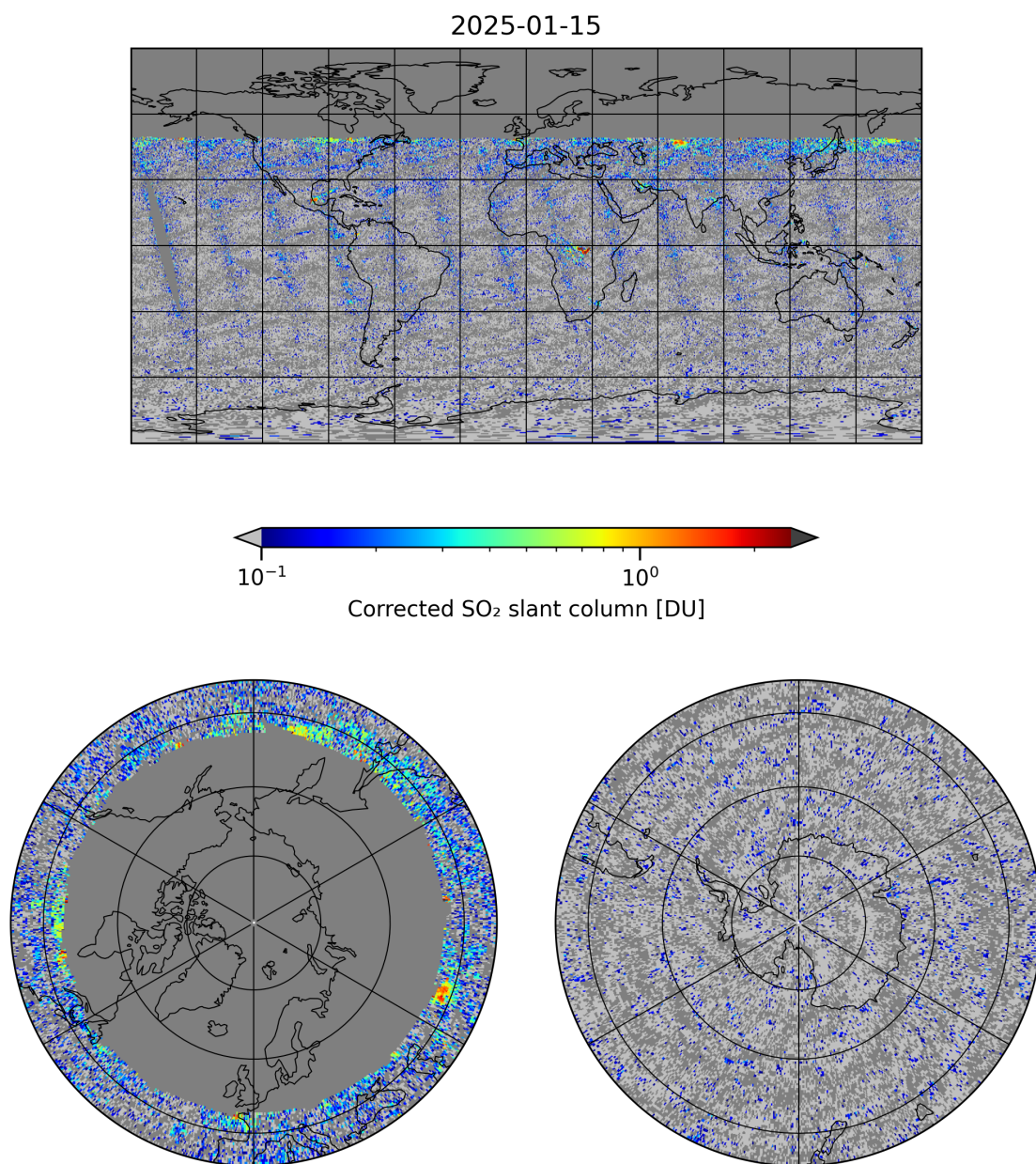


Figure 6: Map of “Corrected SO₂ slant column” for 2025-01-15 to 2025-01-15

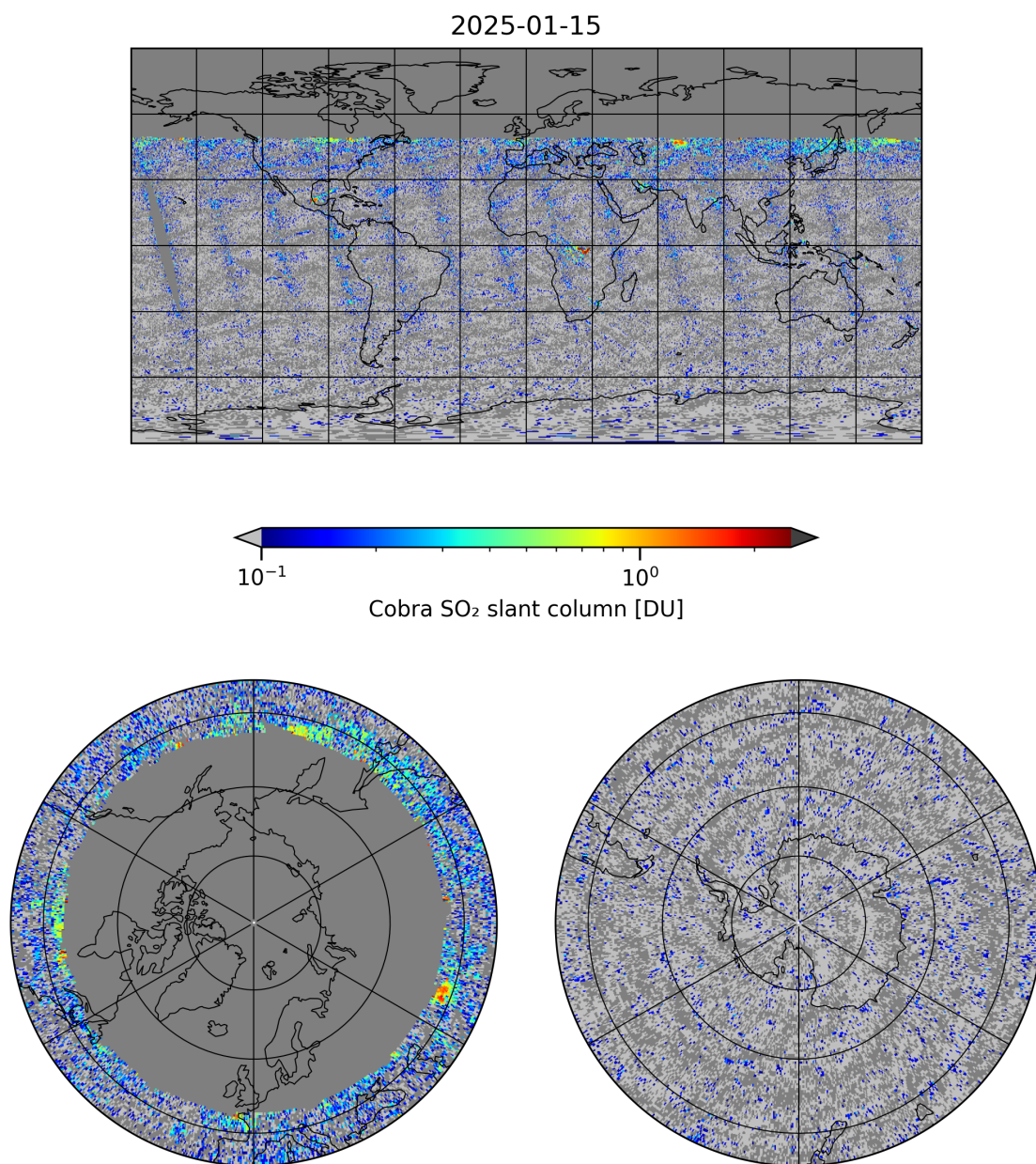


Figure 7: Map of “Cobra SO₂ slant column” for 2025-01-15 to 2025-01-15

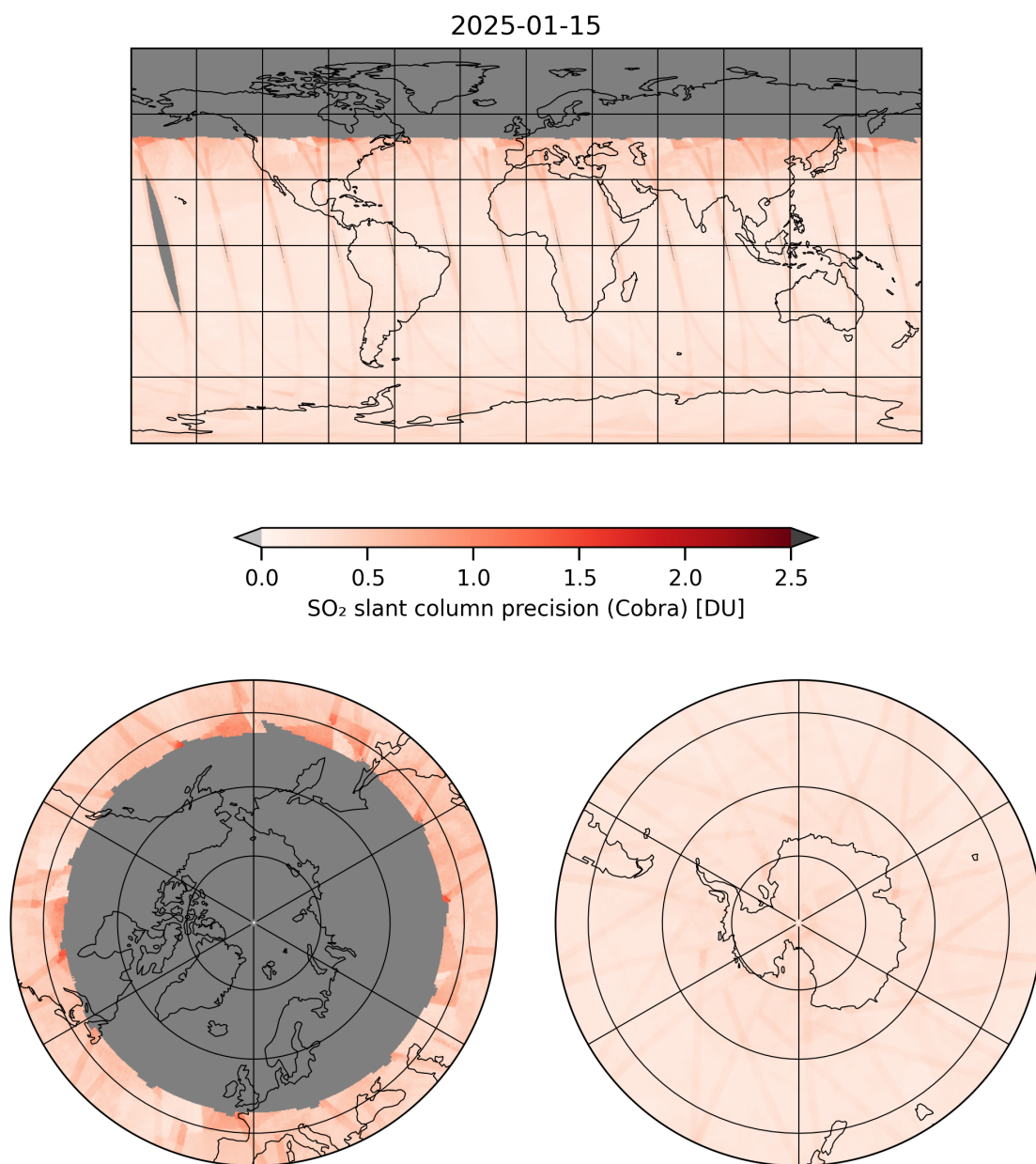


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-01-15 to 2025-01-15

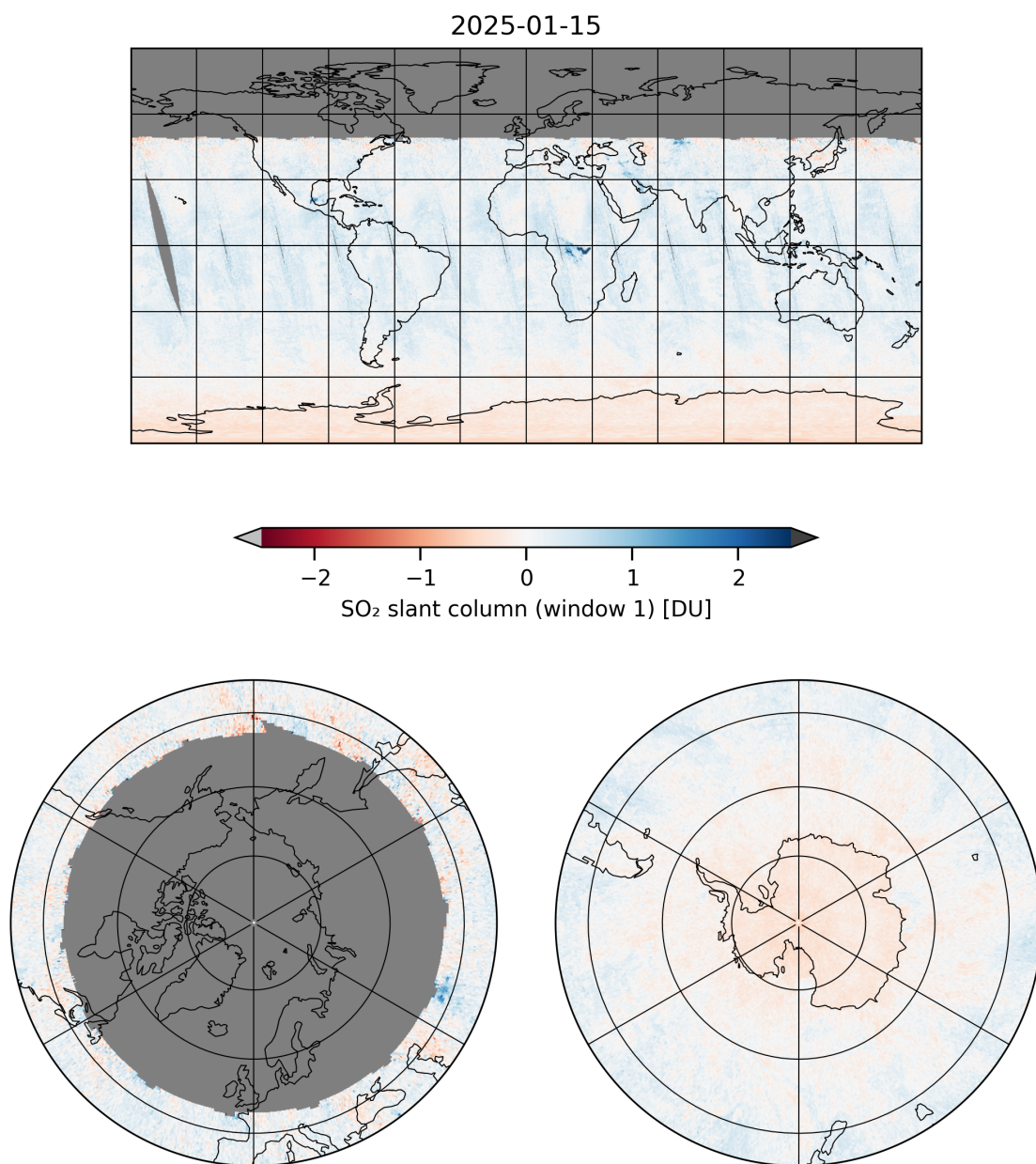


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-01-15 to 2025-01-15

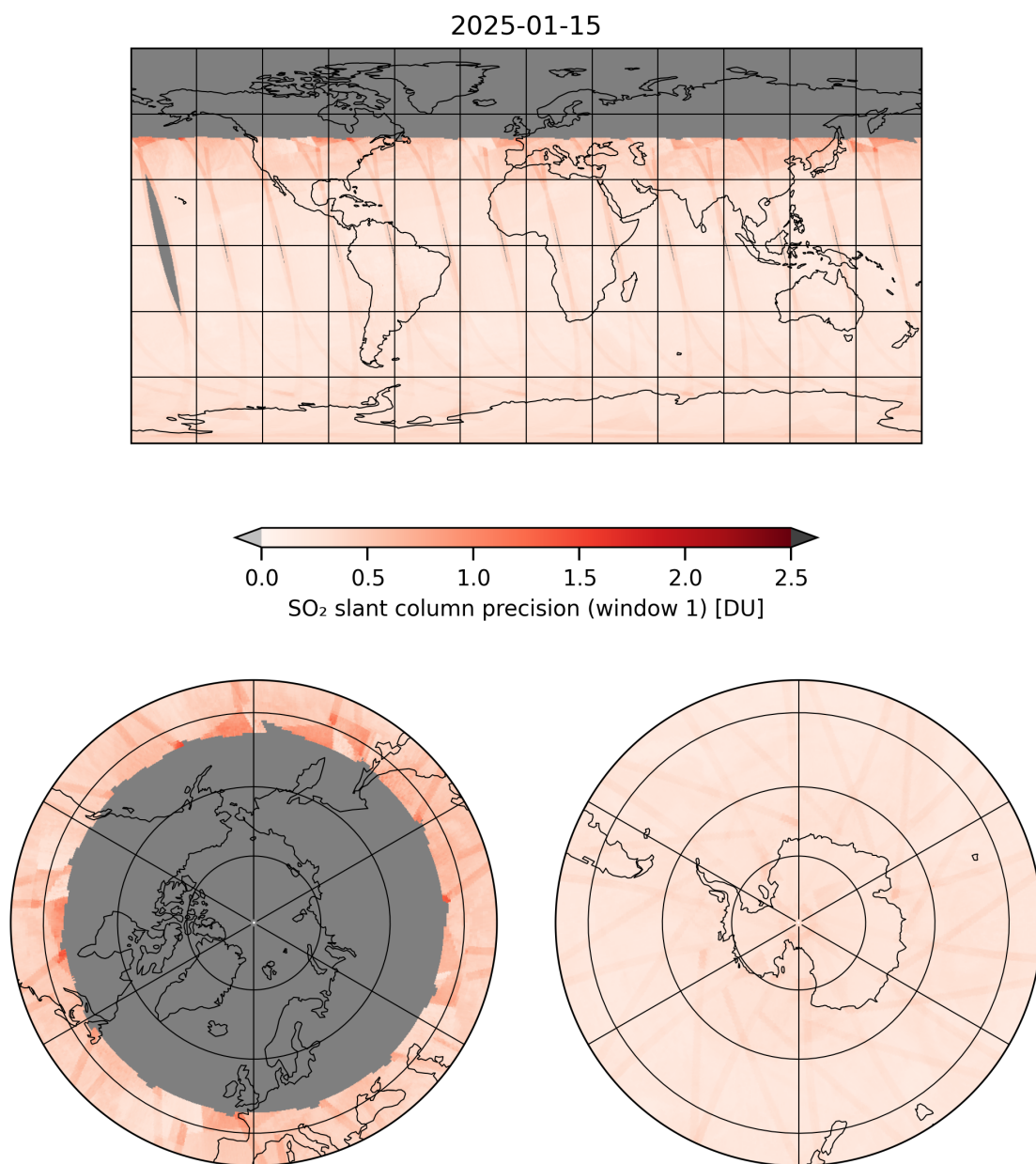


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-01-15 to 2025-01-15

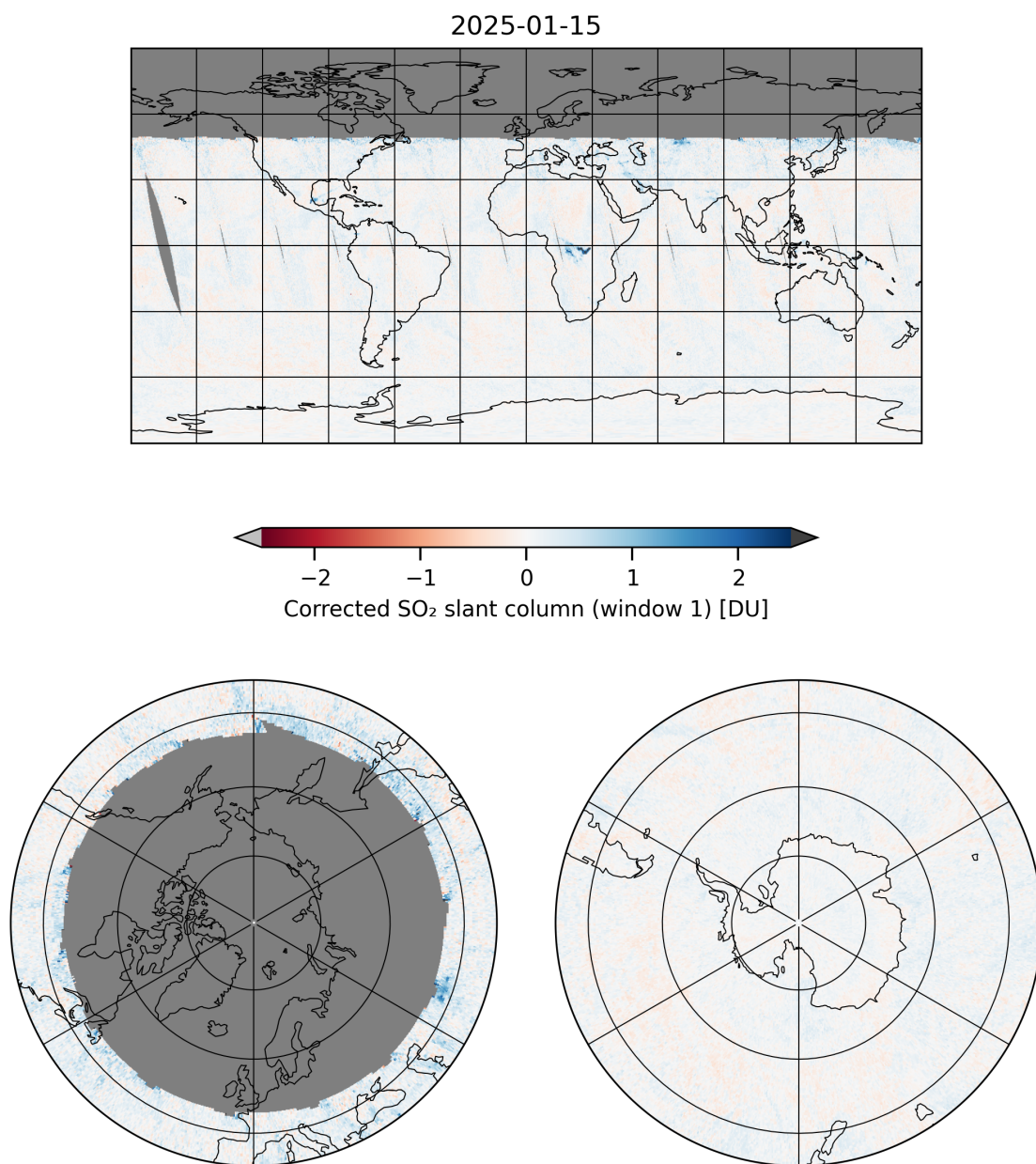


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-01-15 to 2025-01-15

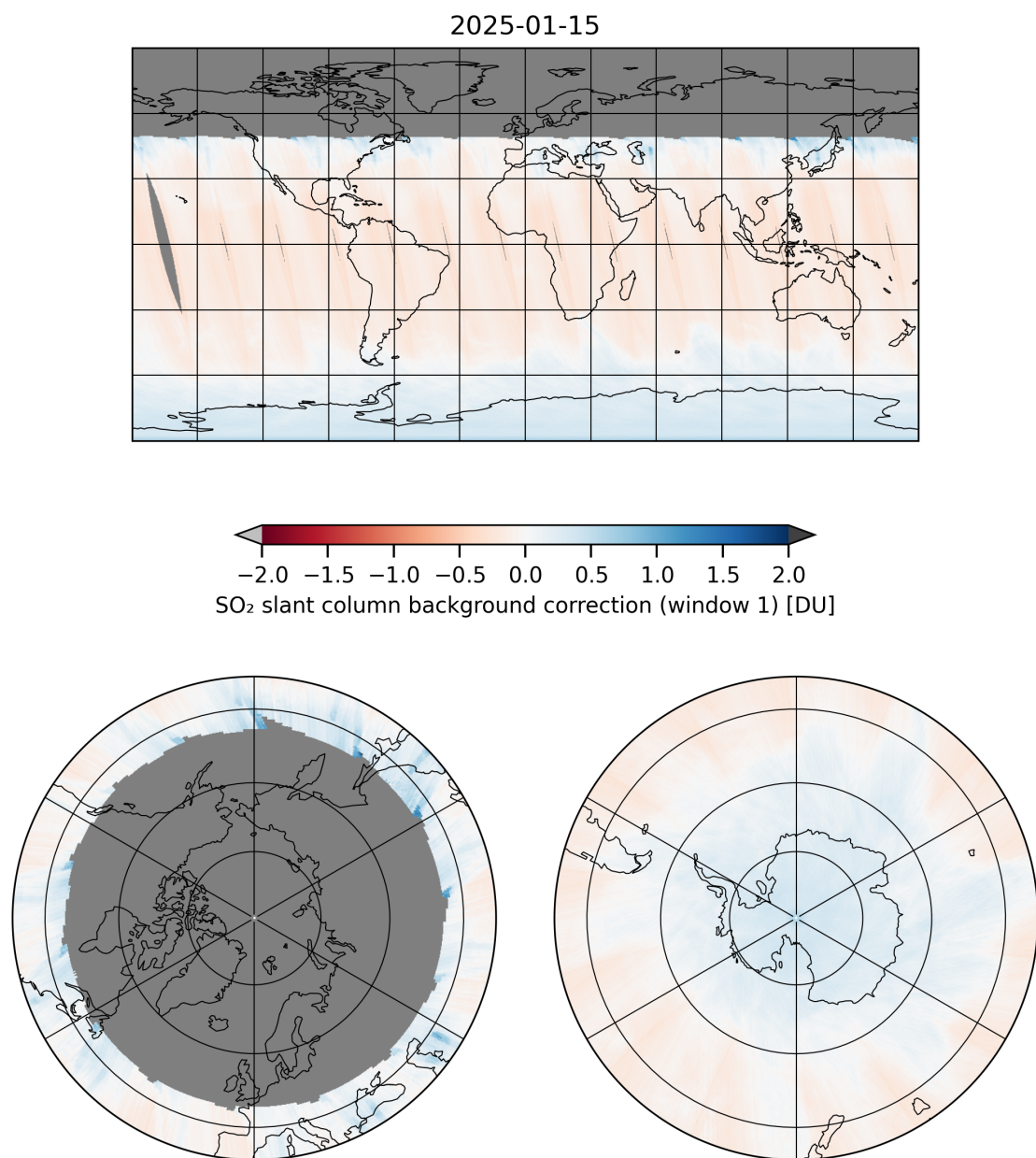


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-01-15 to 2025-01-15

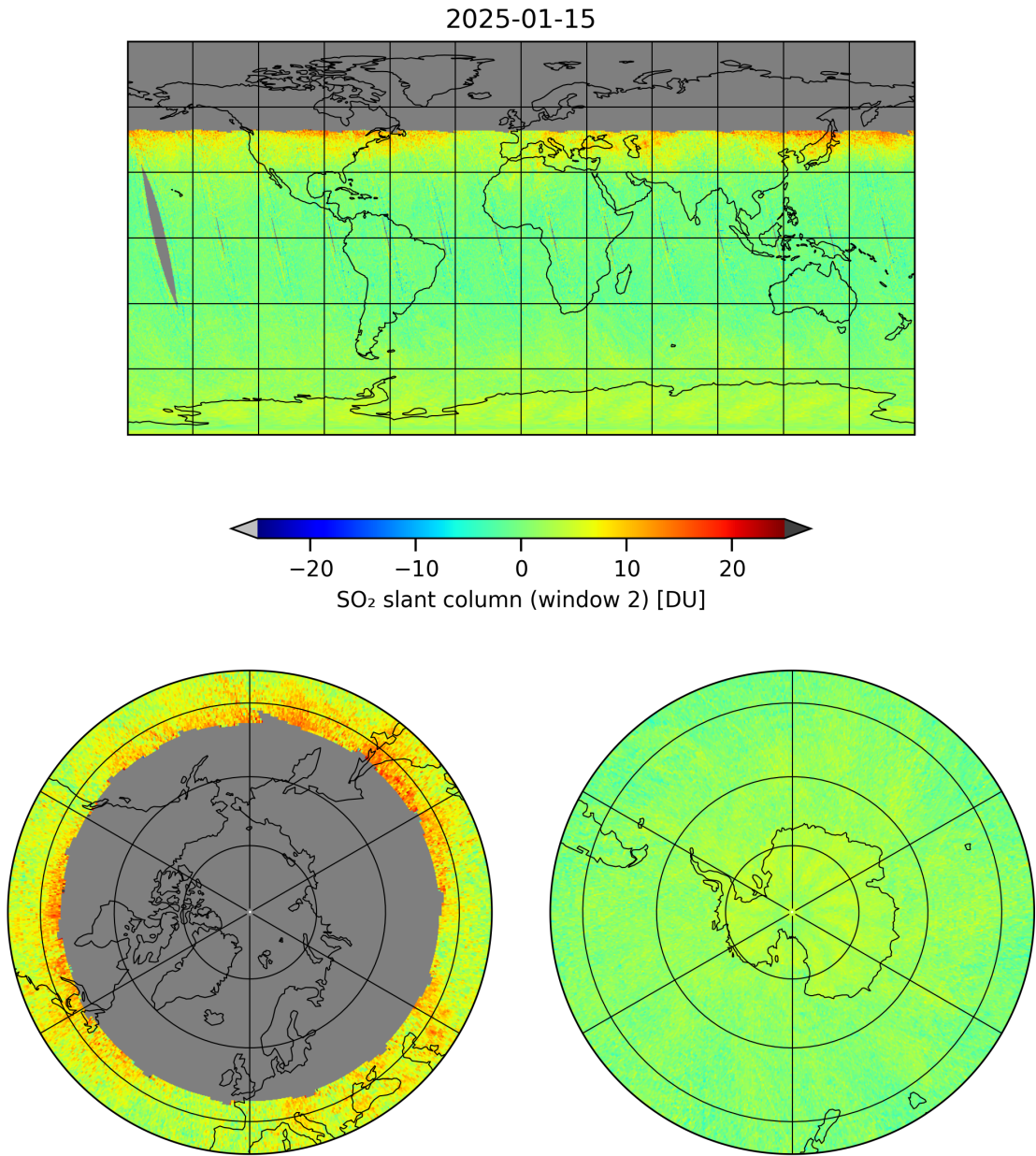


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-01-15 to 2025-01-15

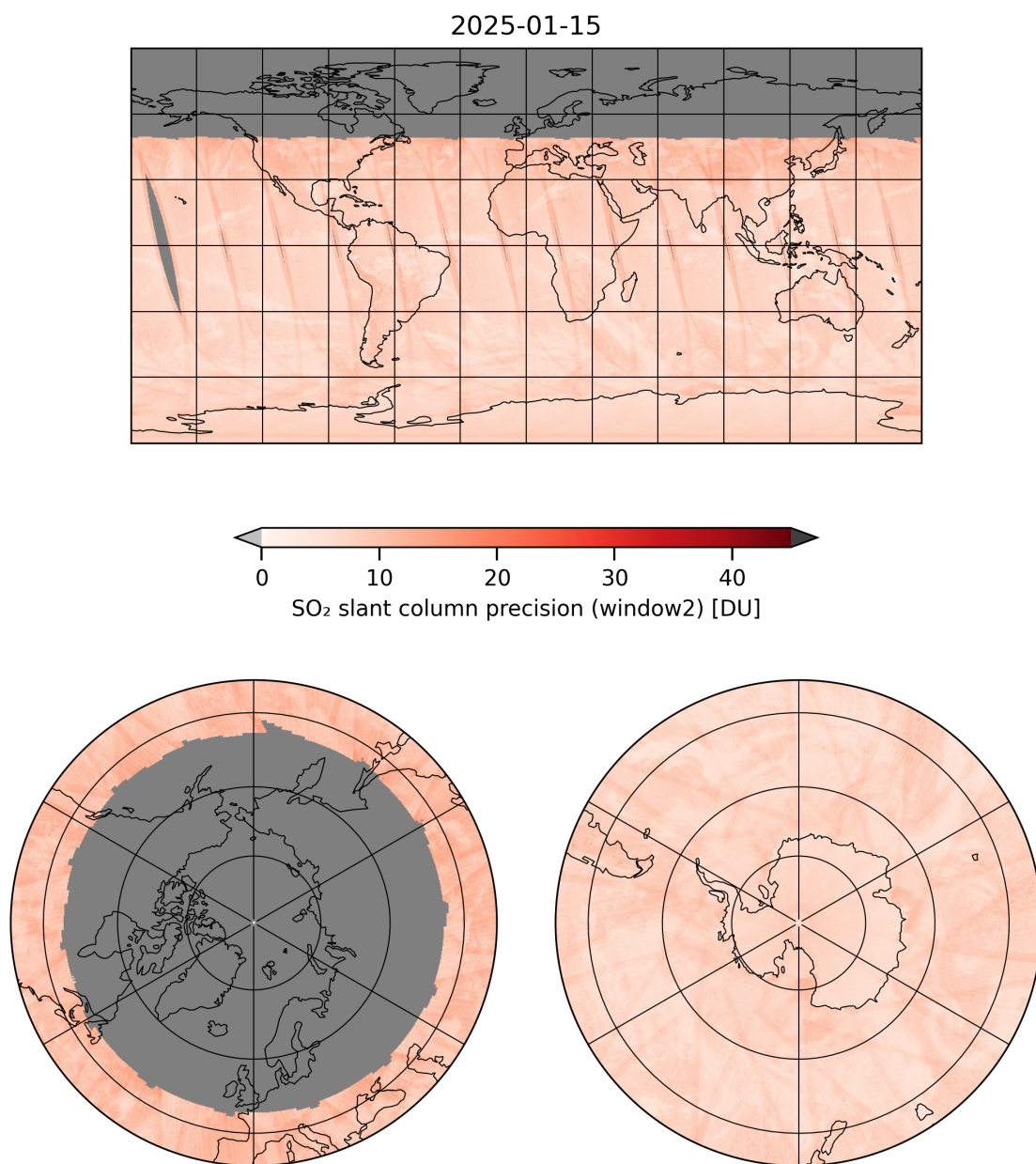


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-01-15 to 2025-01-15

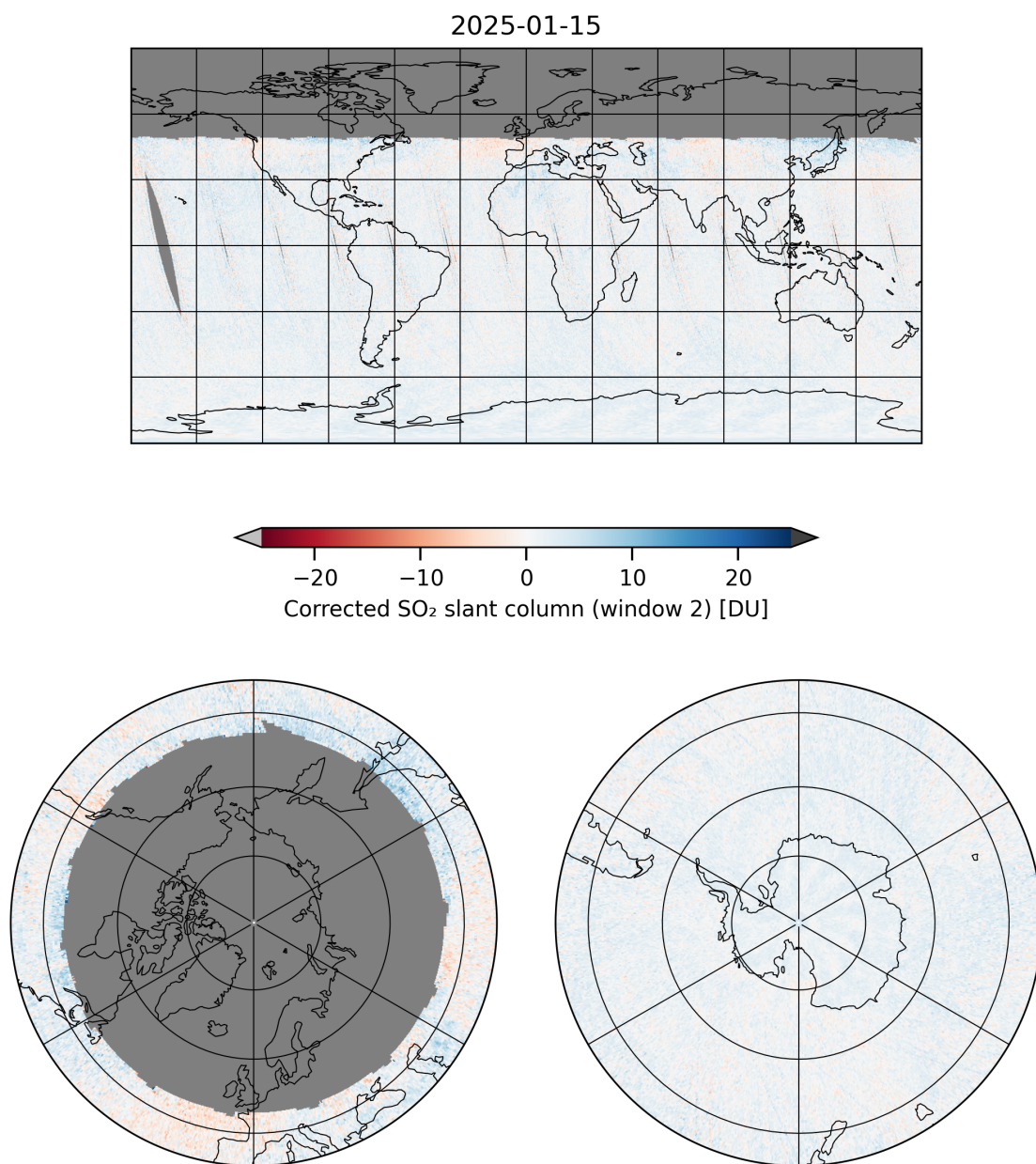


Figure 15: Map of "Corrected SO₂ slant column (window 2)" for 2025-01-15 to 2025-01-15

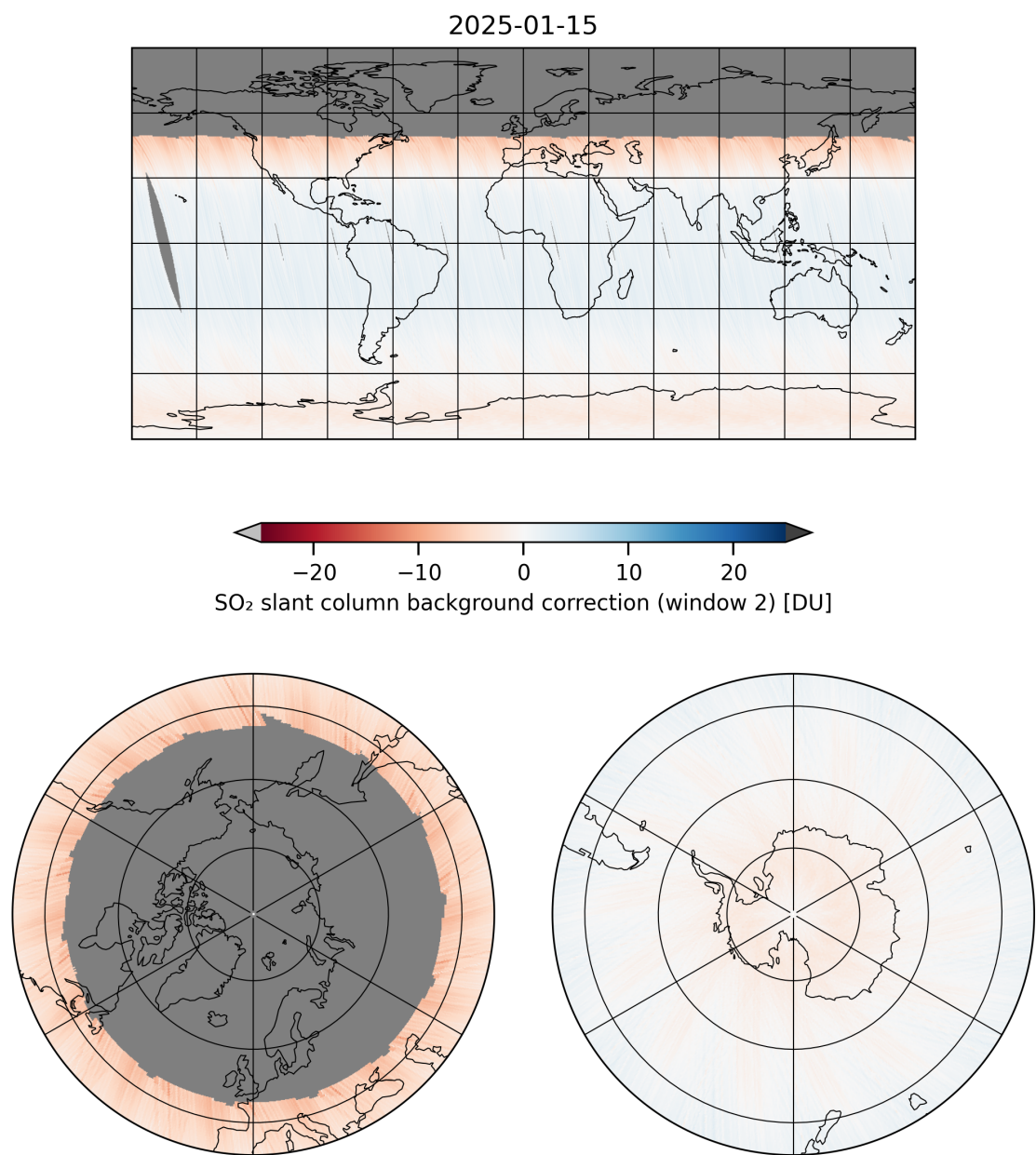


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-01-15 to 2025-01-15

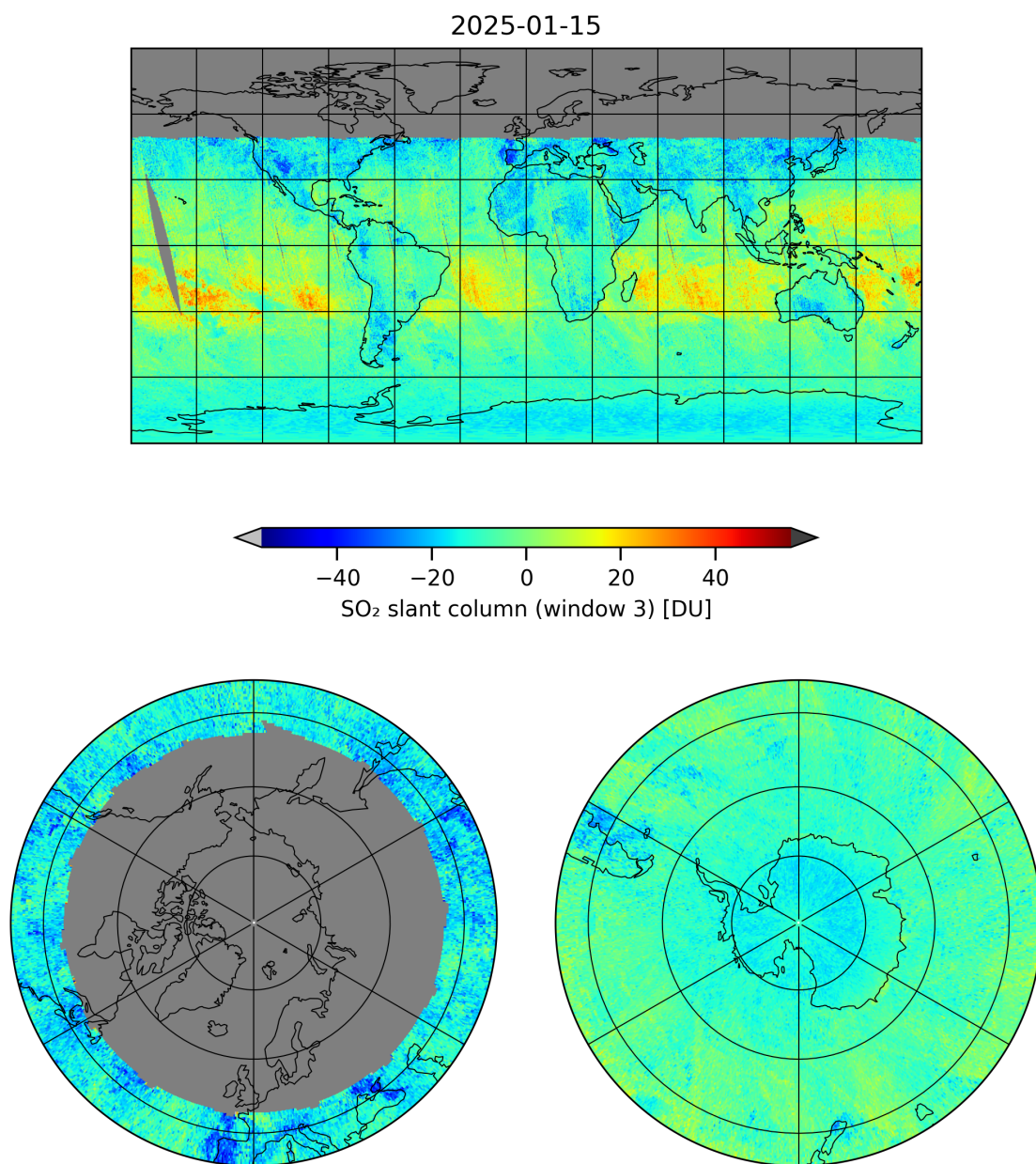


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-01-15 to 2025-01-15

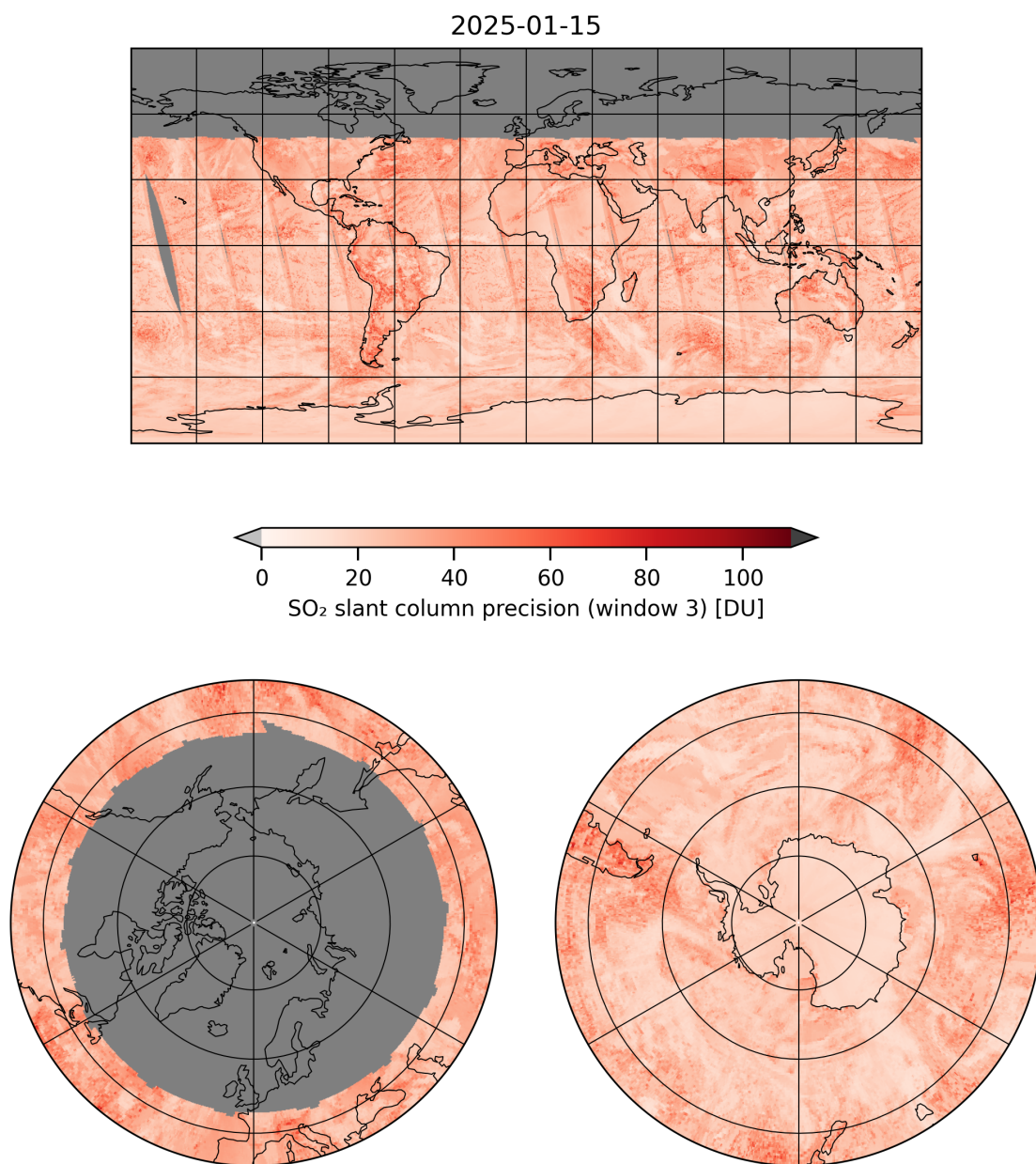


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-01-15 to 2025-01-15

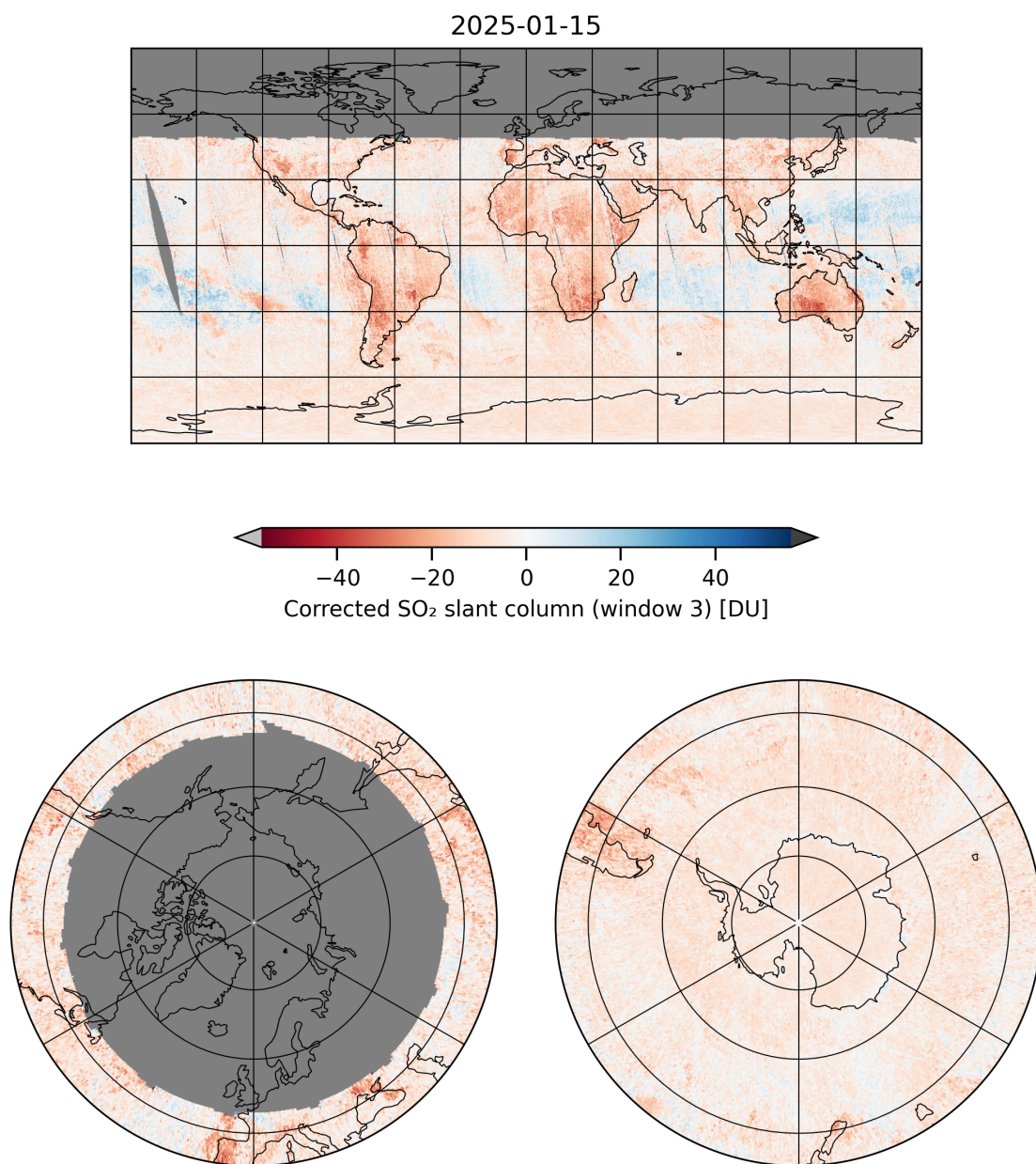


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-01-15 to 2025-01-15

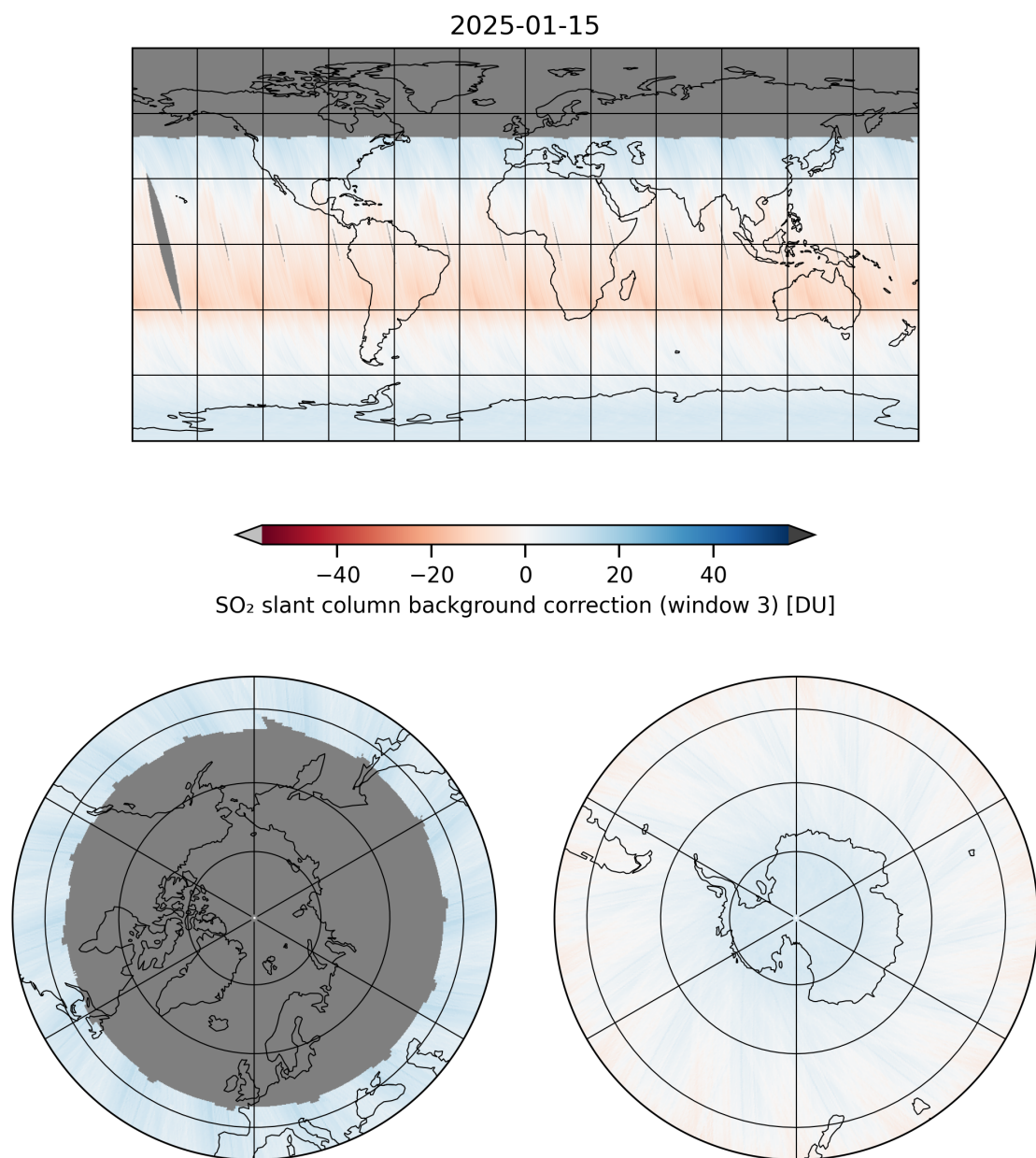


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-01-15 to 2025-01-15

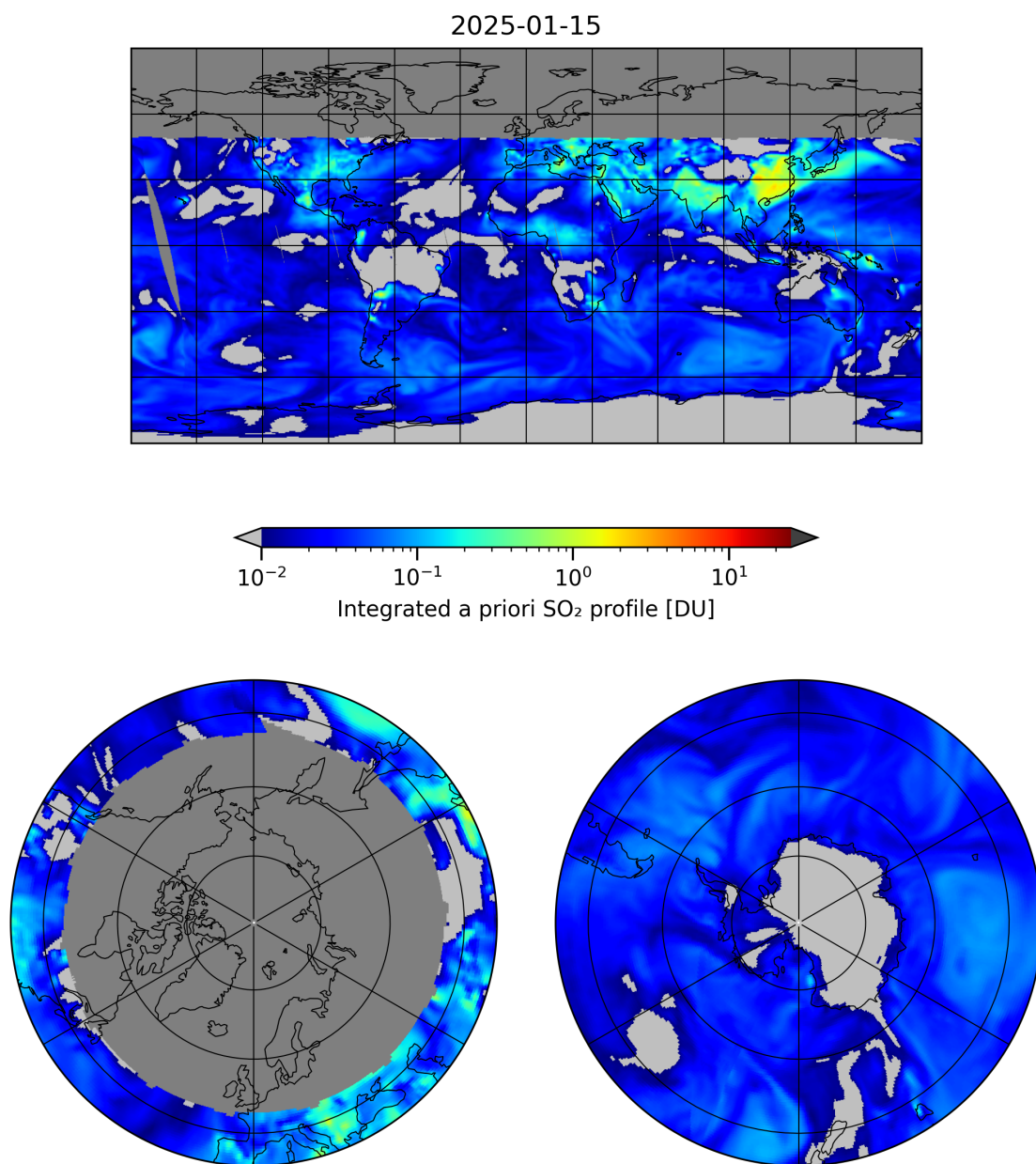


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-01-15 to 2025-01-15

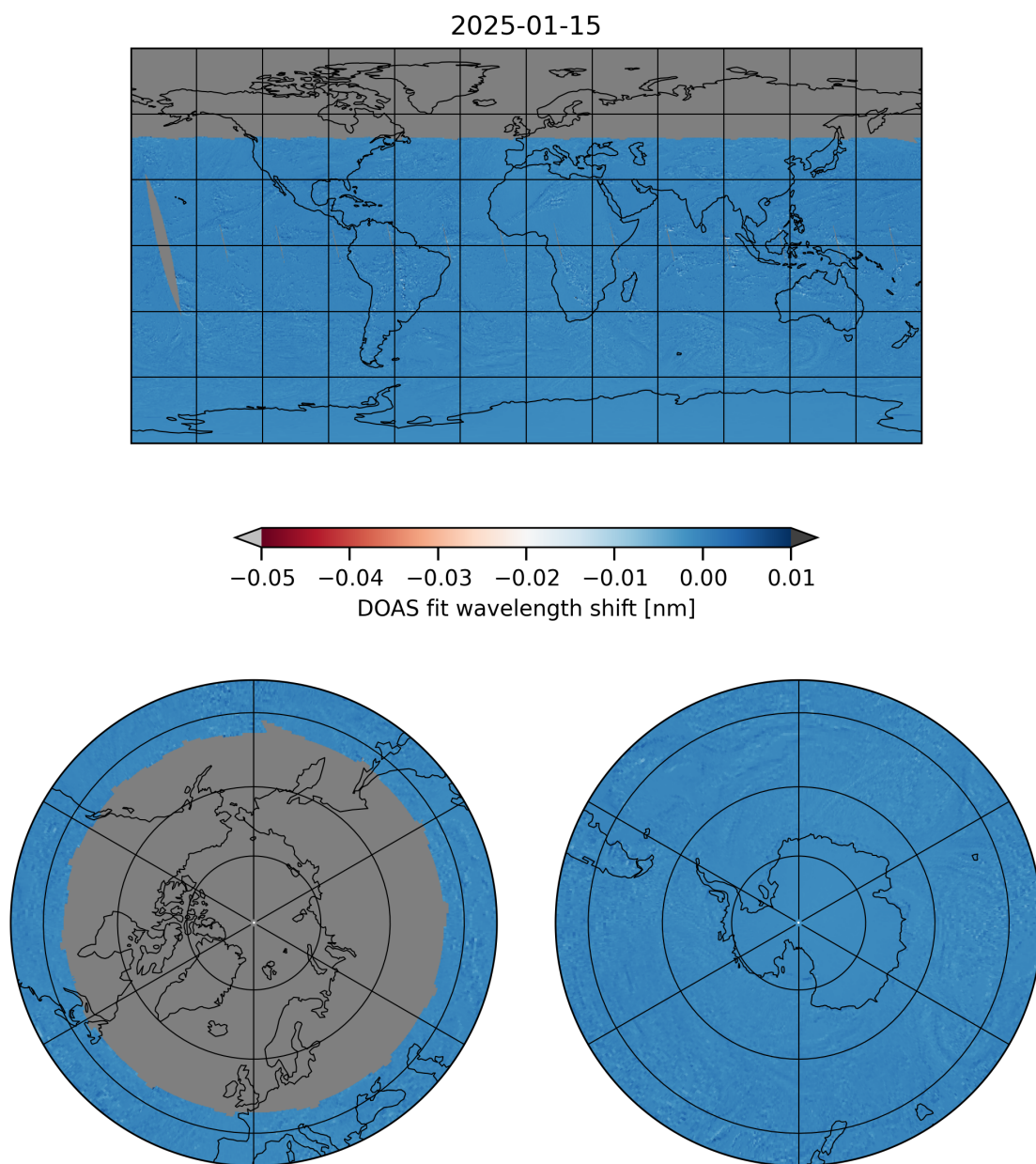


Figure 22: Map of “DOAS fit wavelength shift” for 2025-01-15 to 2025-01-15

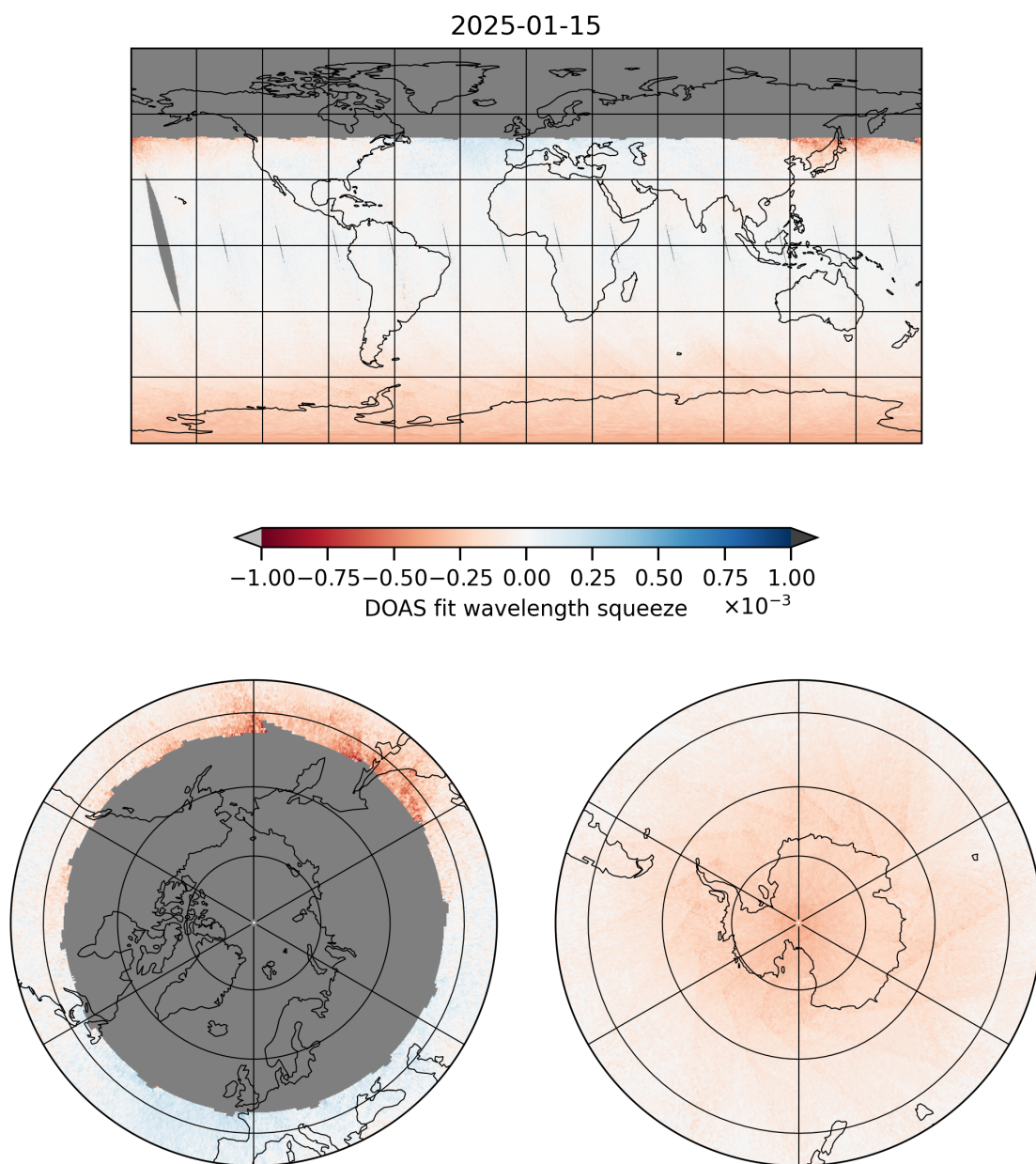


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-01-15 to 2025-01-15

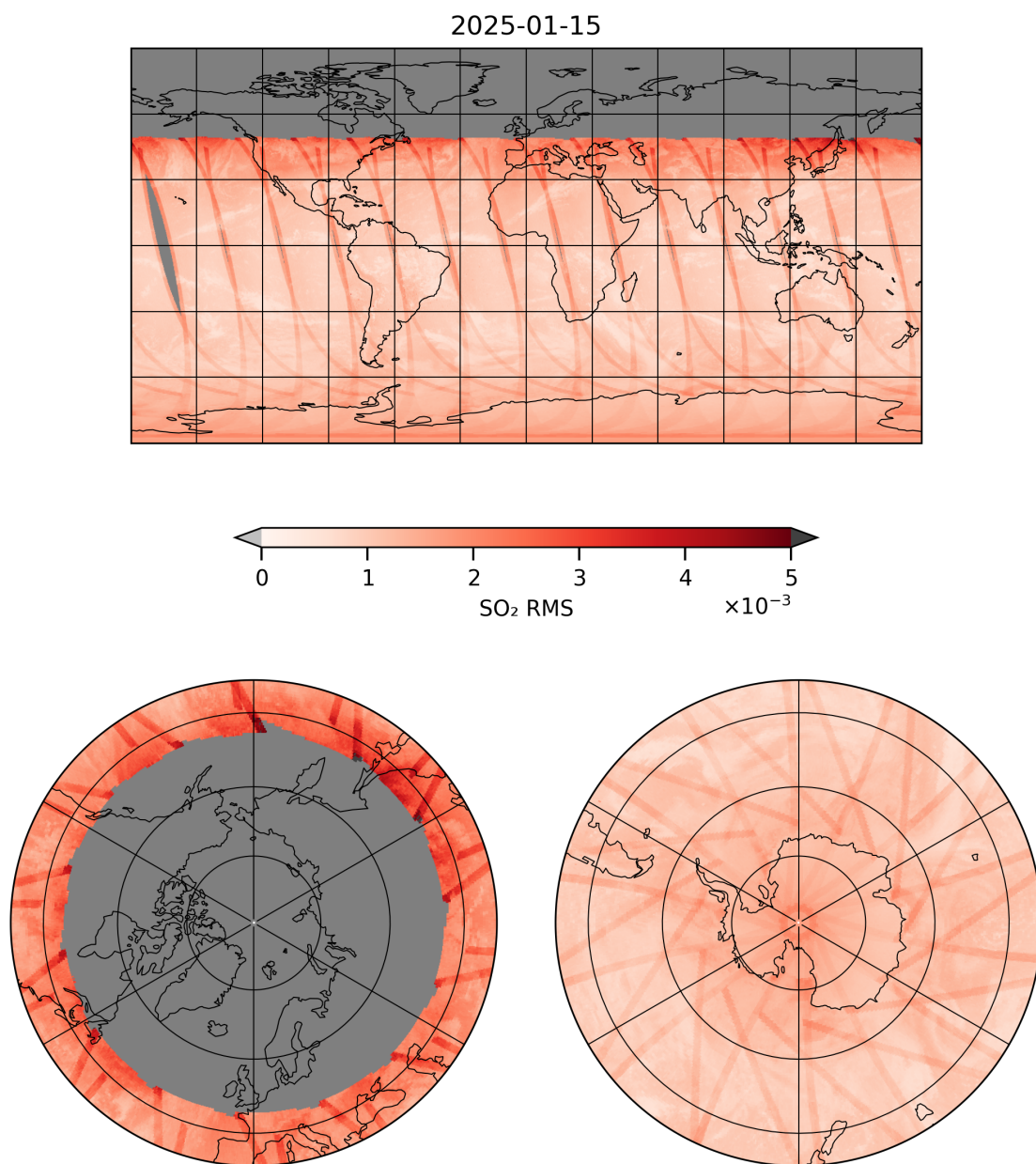


Figure 24: Map of “SO₂ RMS” for 2025-01-15 to 2025-01-15

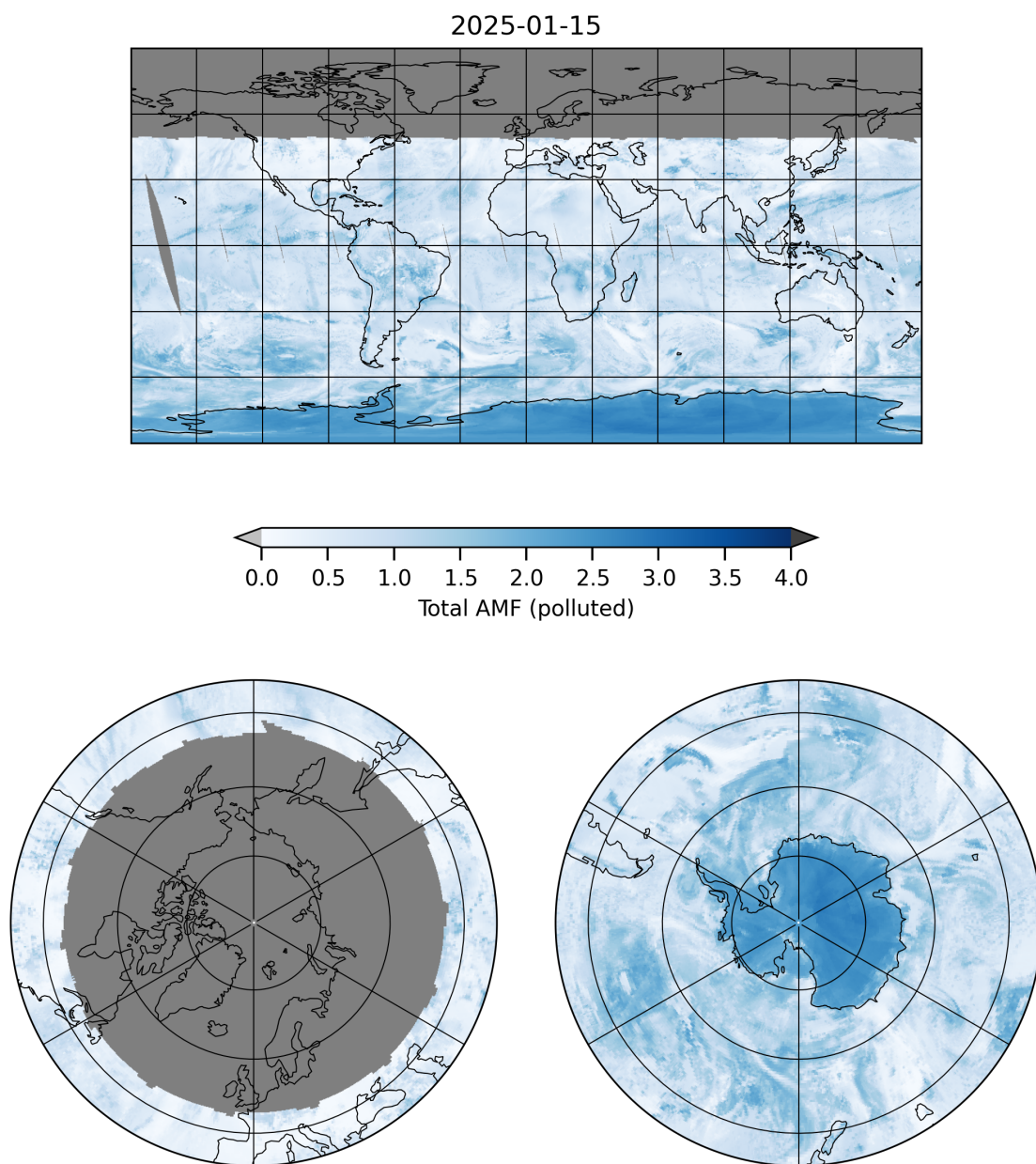


Figure 25: Map of “Total AMF (polluted)” for 2025-01-15 to 2025-01-15

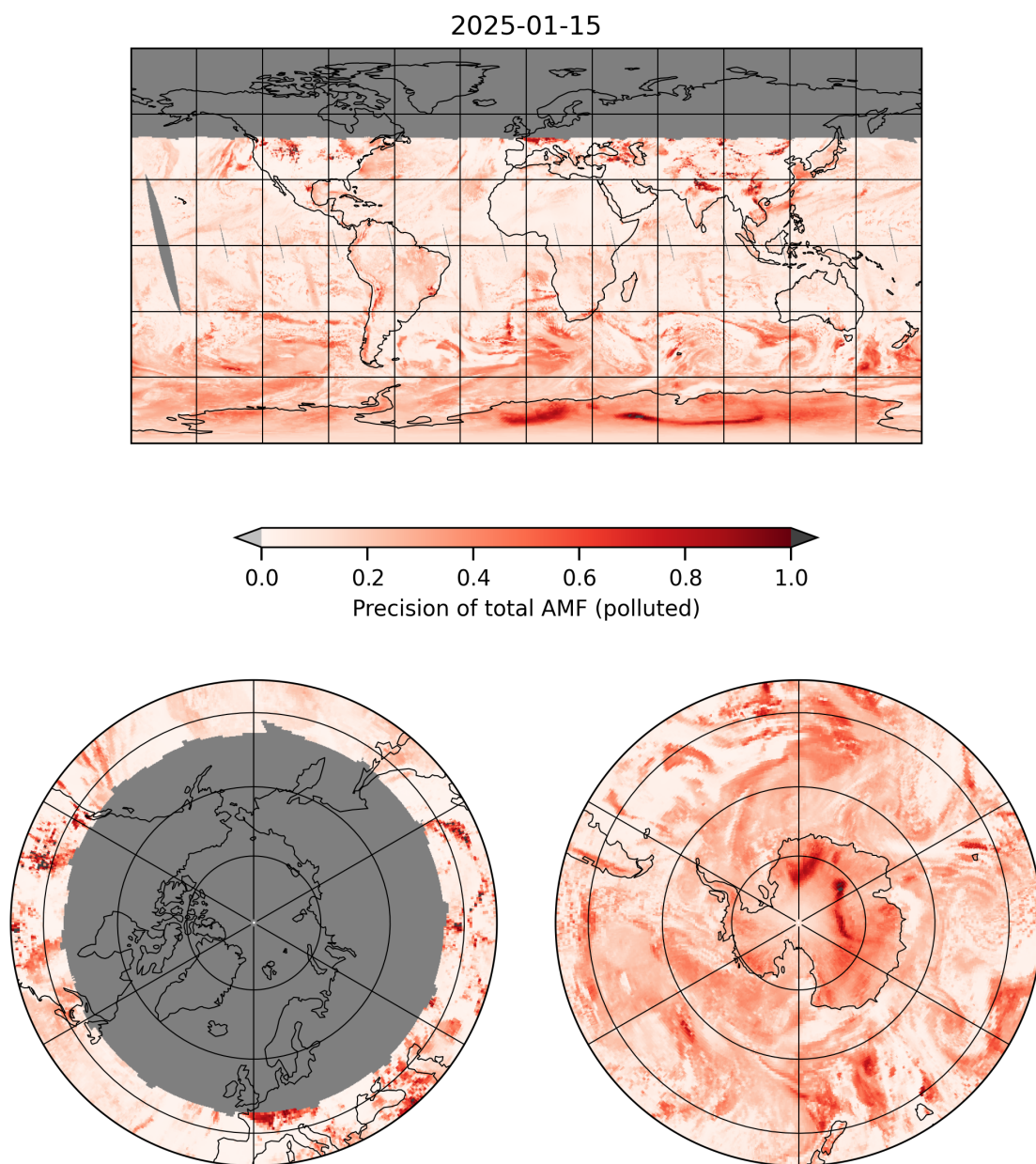


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-01-15 to 2025-01-15

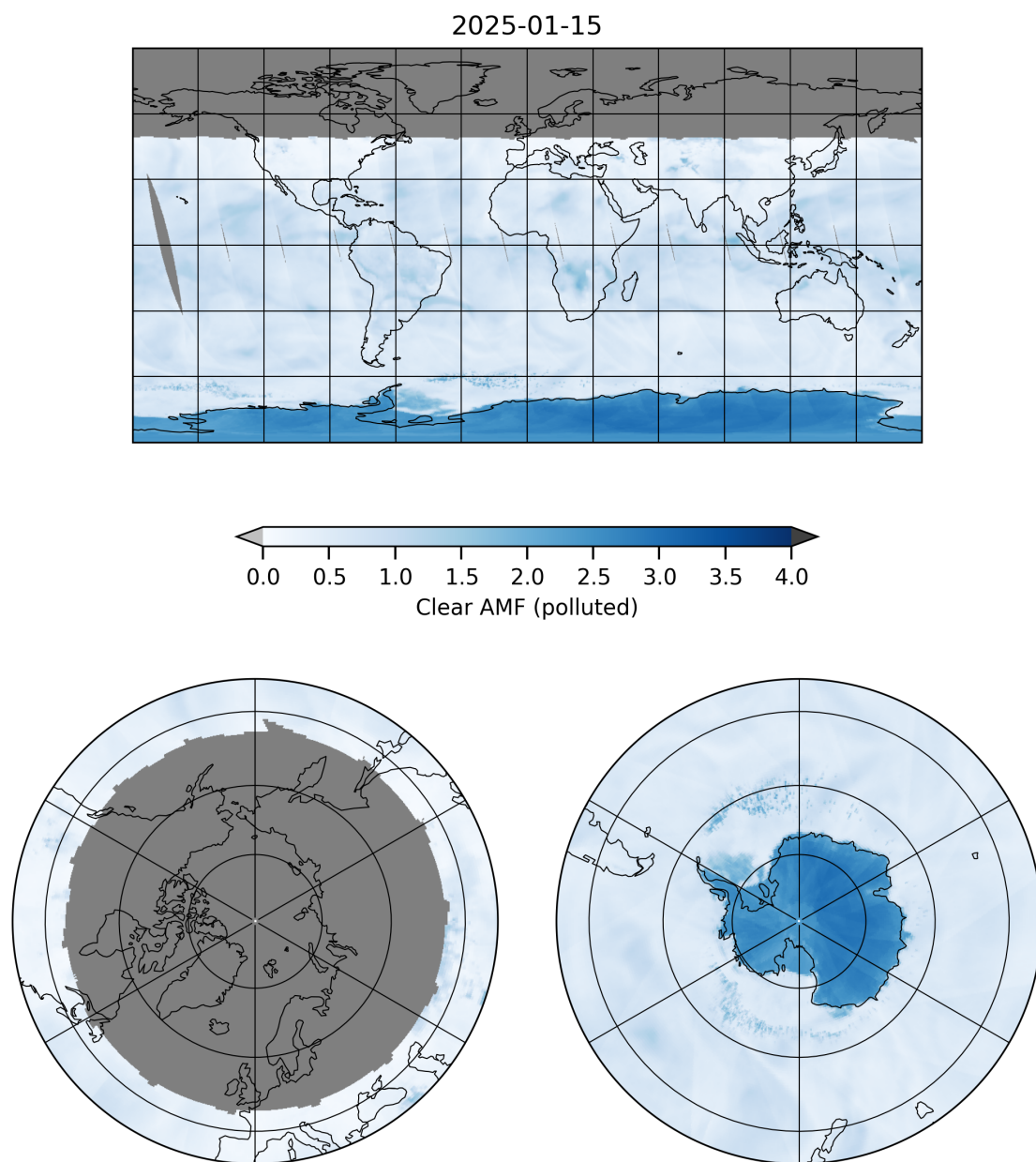


Figure 27: Map of “Clear AMF (polluted)” for 2025-01-15 to 2025-01-15

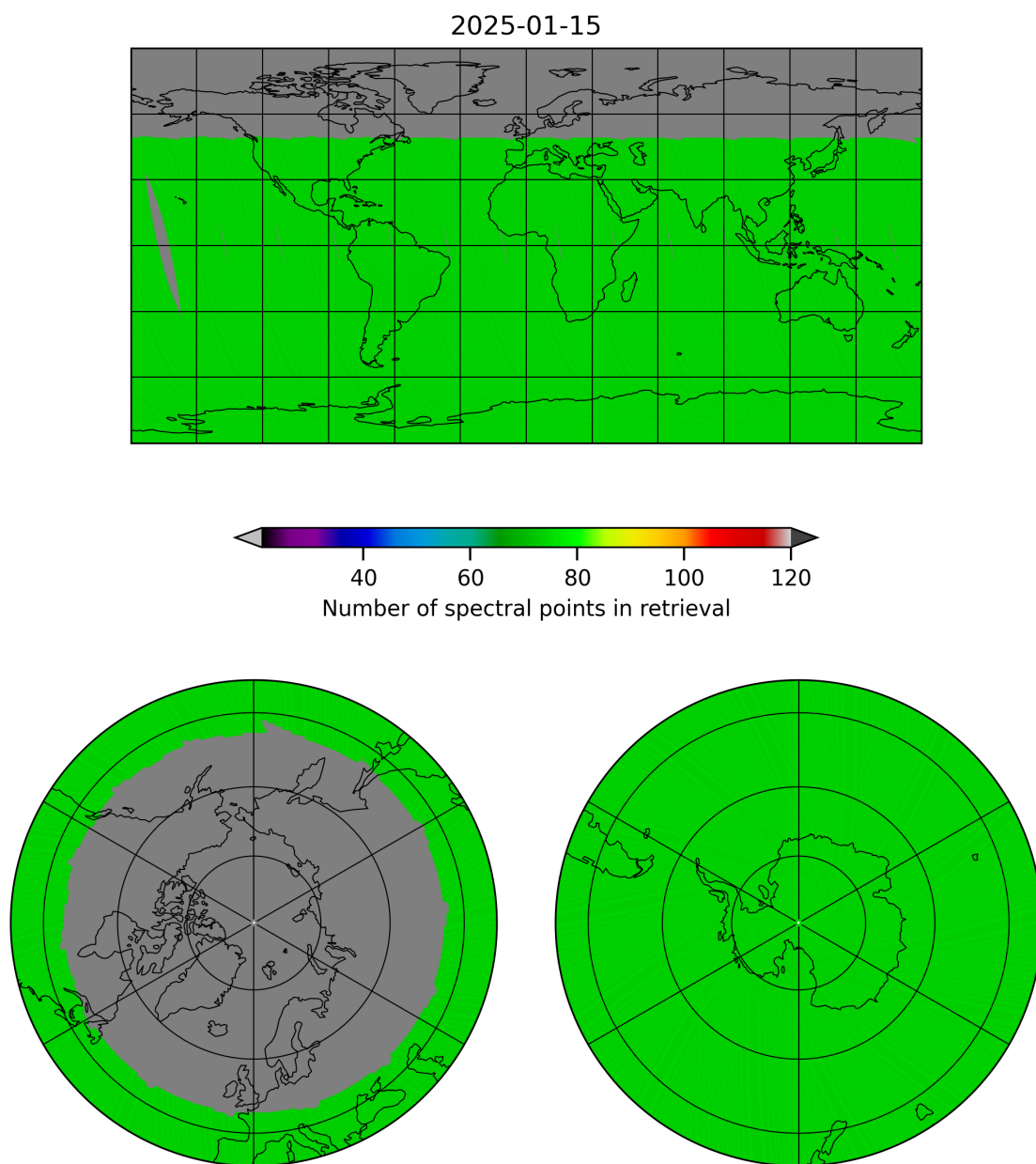


Figure 28: Map of “Number of spectral points in retrieval” for 2025-01-15 to 2025-01-15

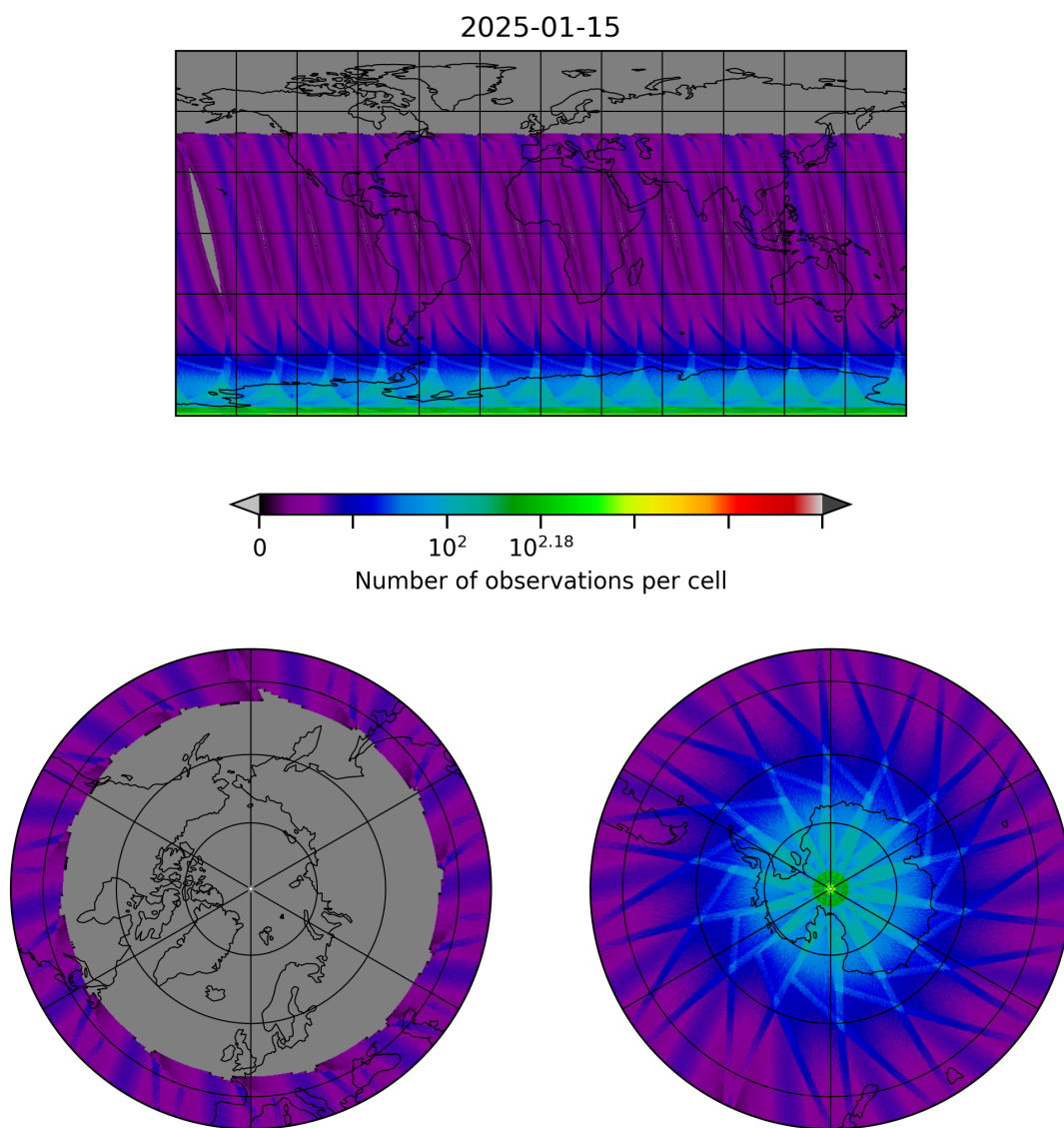


Figure 29: Map of the number of observations for 2025-01-15 to 2025-01-15

7 Zonal average

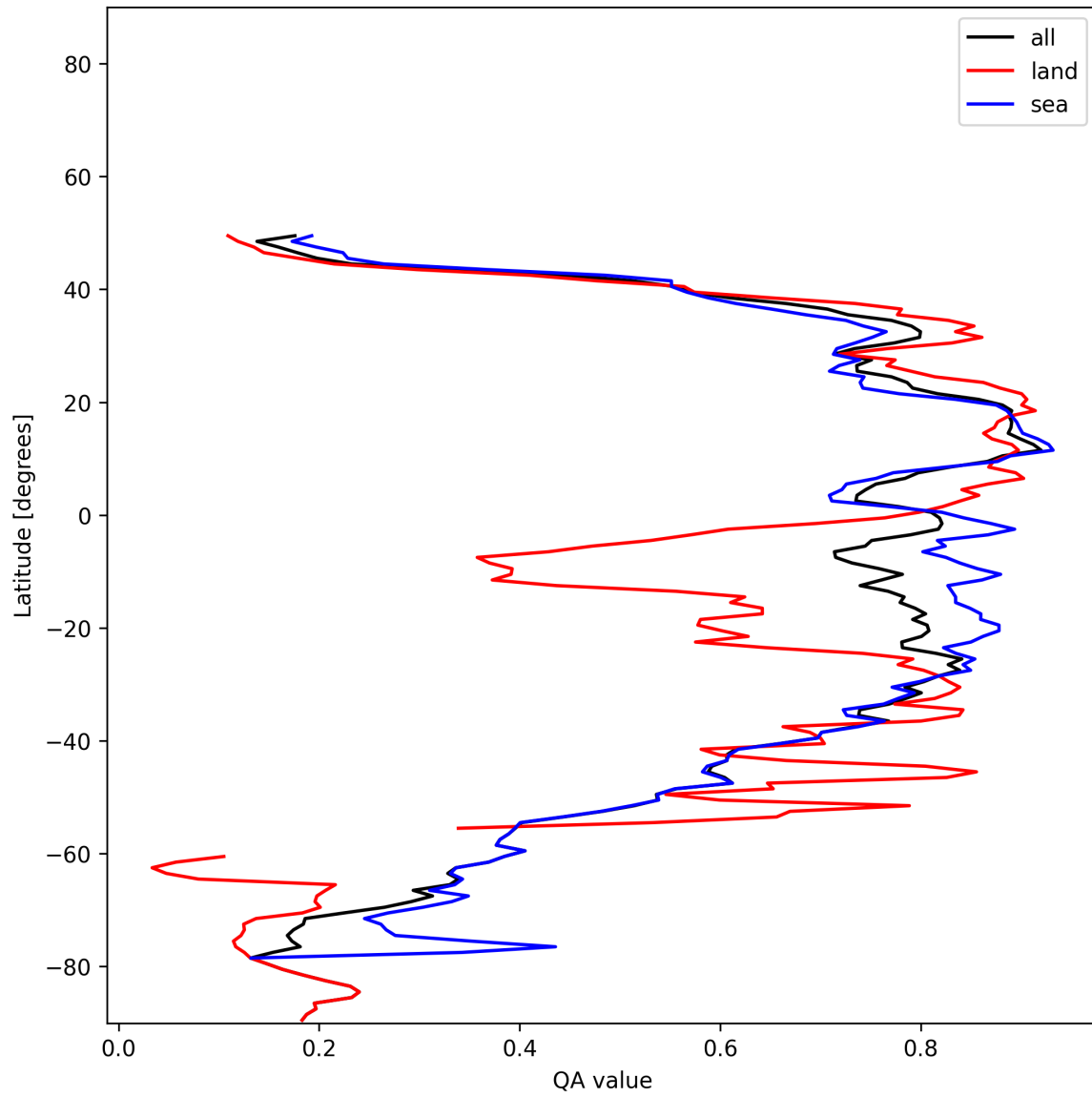


Figure 30: Zonal average of “QA value” for 2025-01-15 to 2025-01-15.

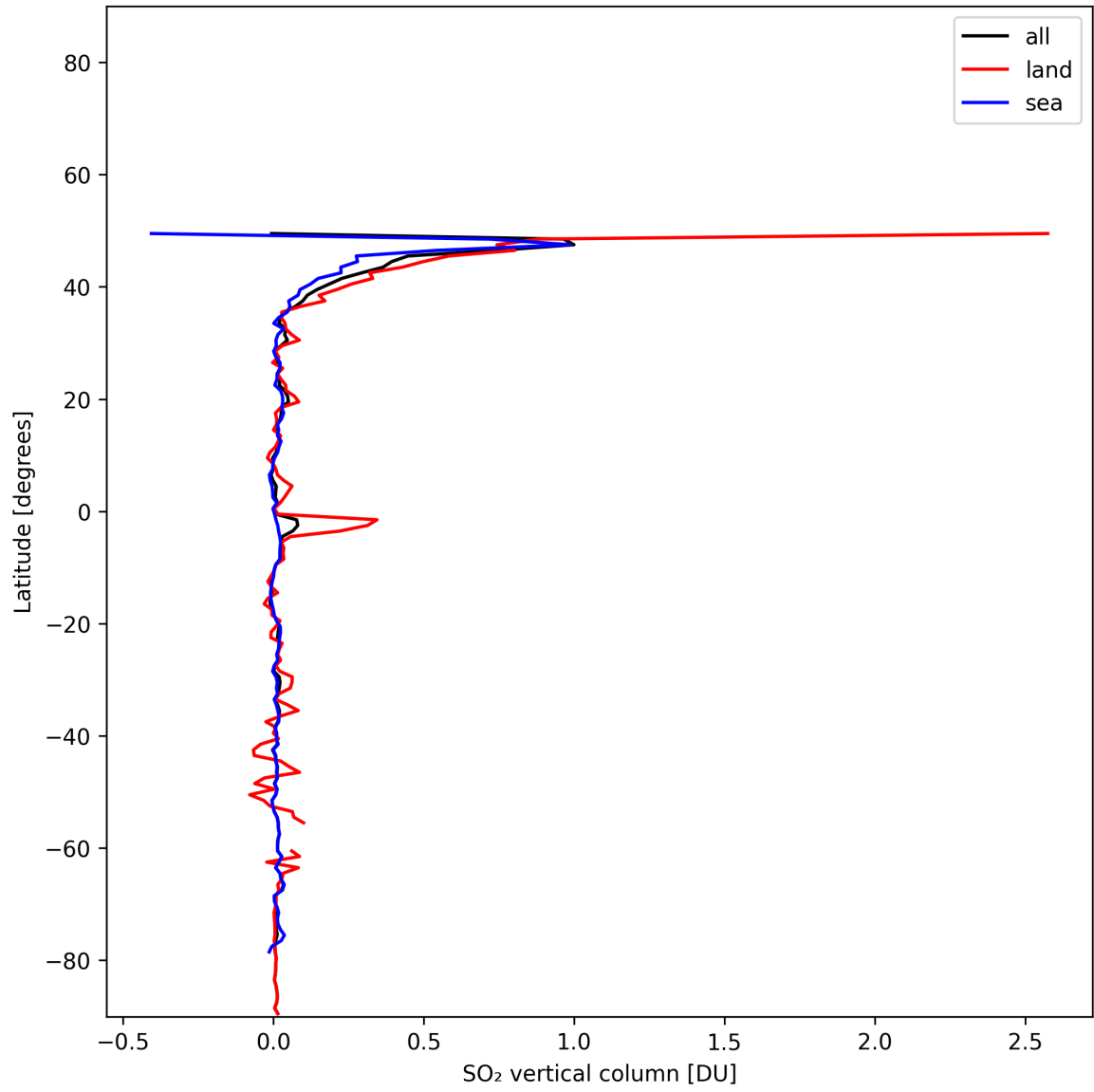


Figure 31: Zonal average of “SO₂ vertical column” for 2025-01-15 to 2025-01-15.

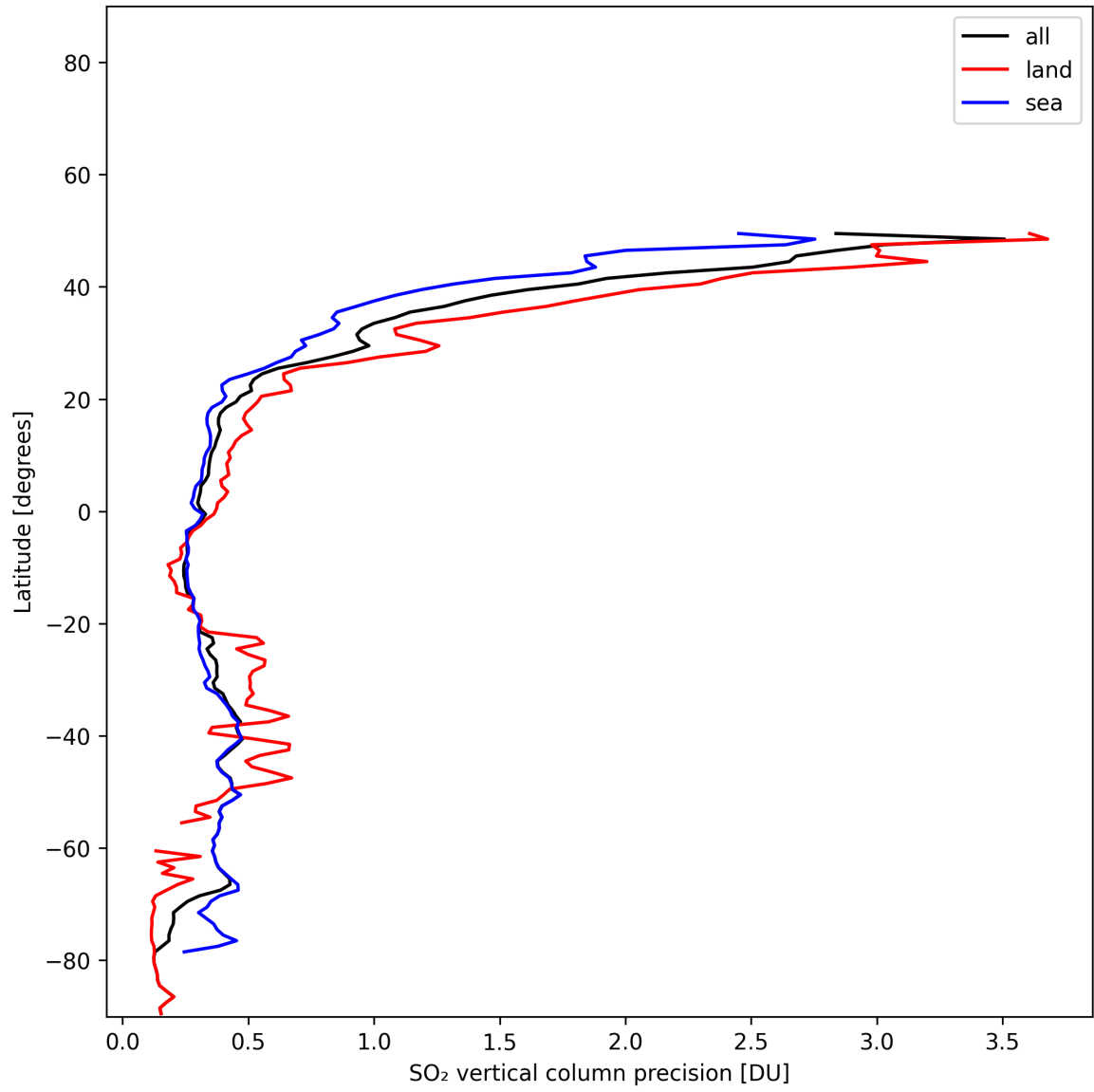


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-01-15 to 2025-01-15.

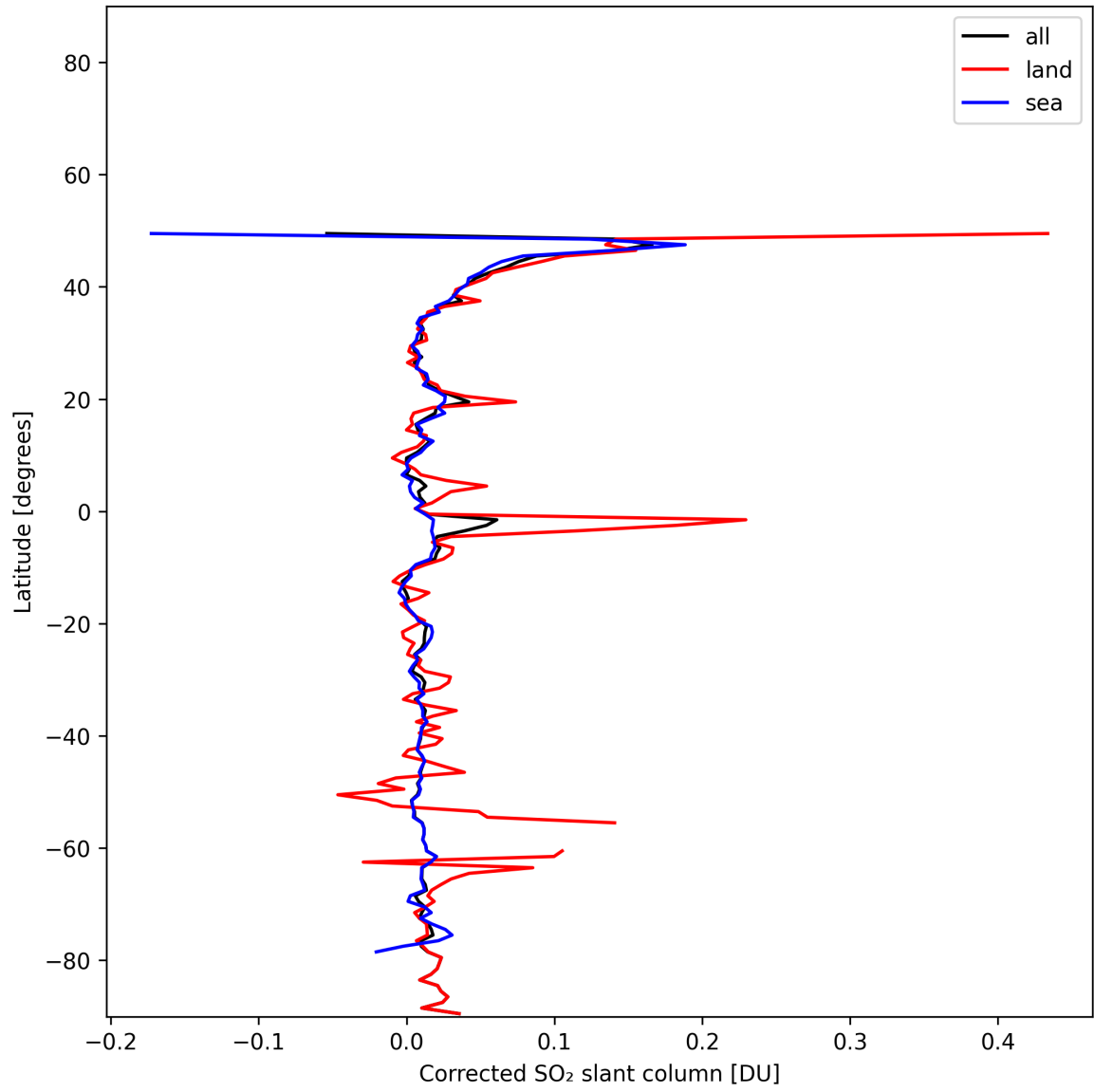


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-01-15 to 2025-01-15.

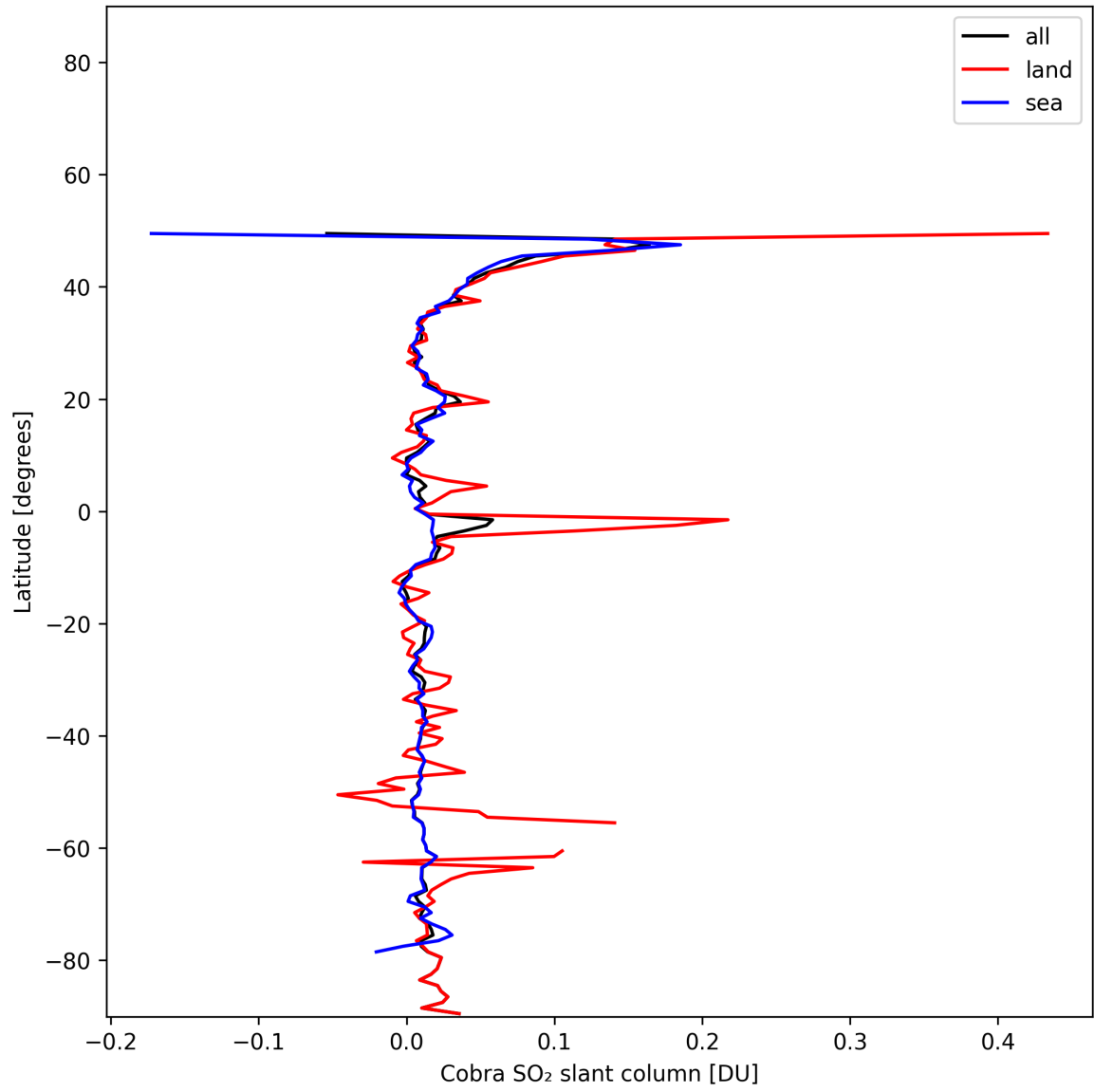


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-01-15 to 2025-01-15.

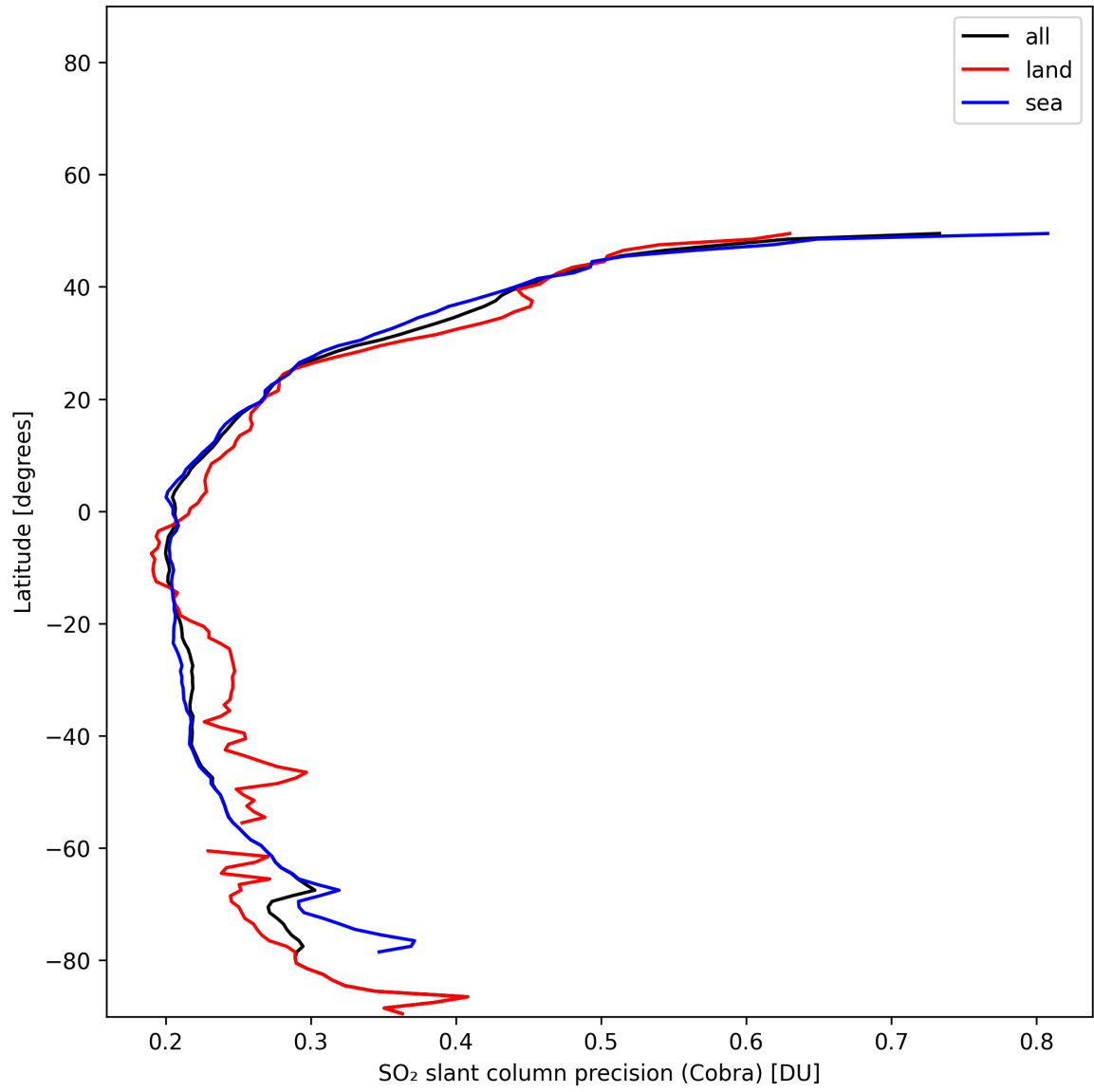


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-01-15 to 2025-01-15.

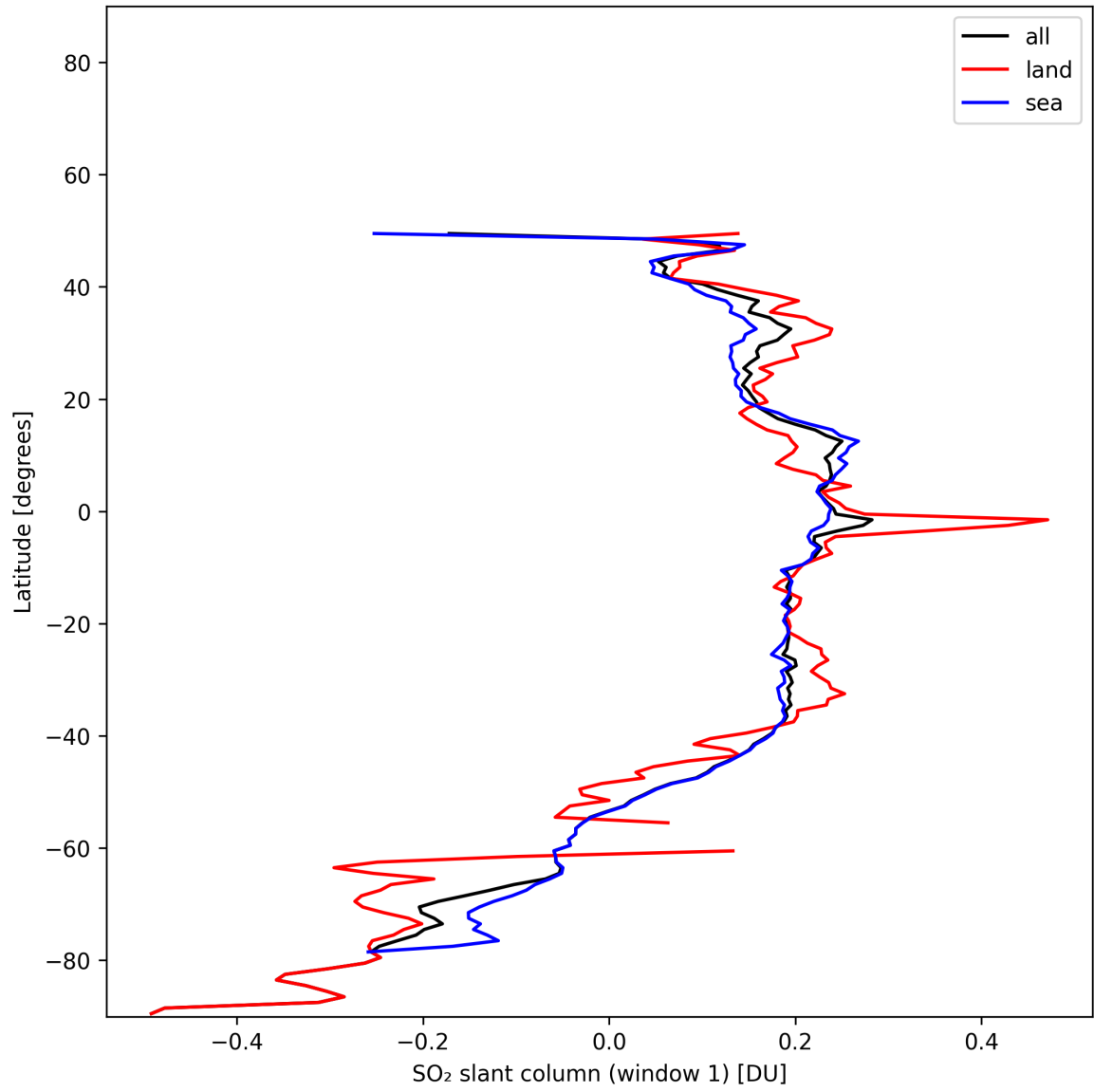


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-01-15 to 2025-01-15.

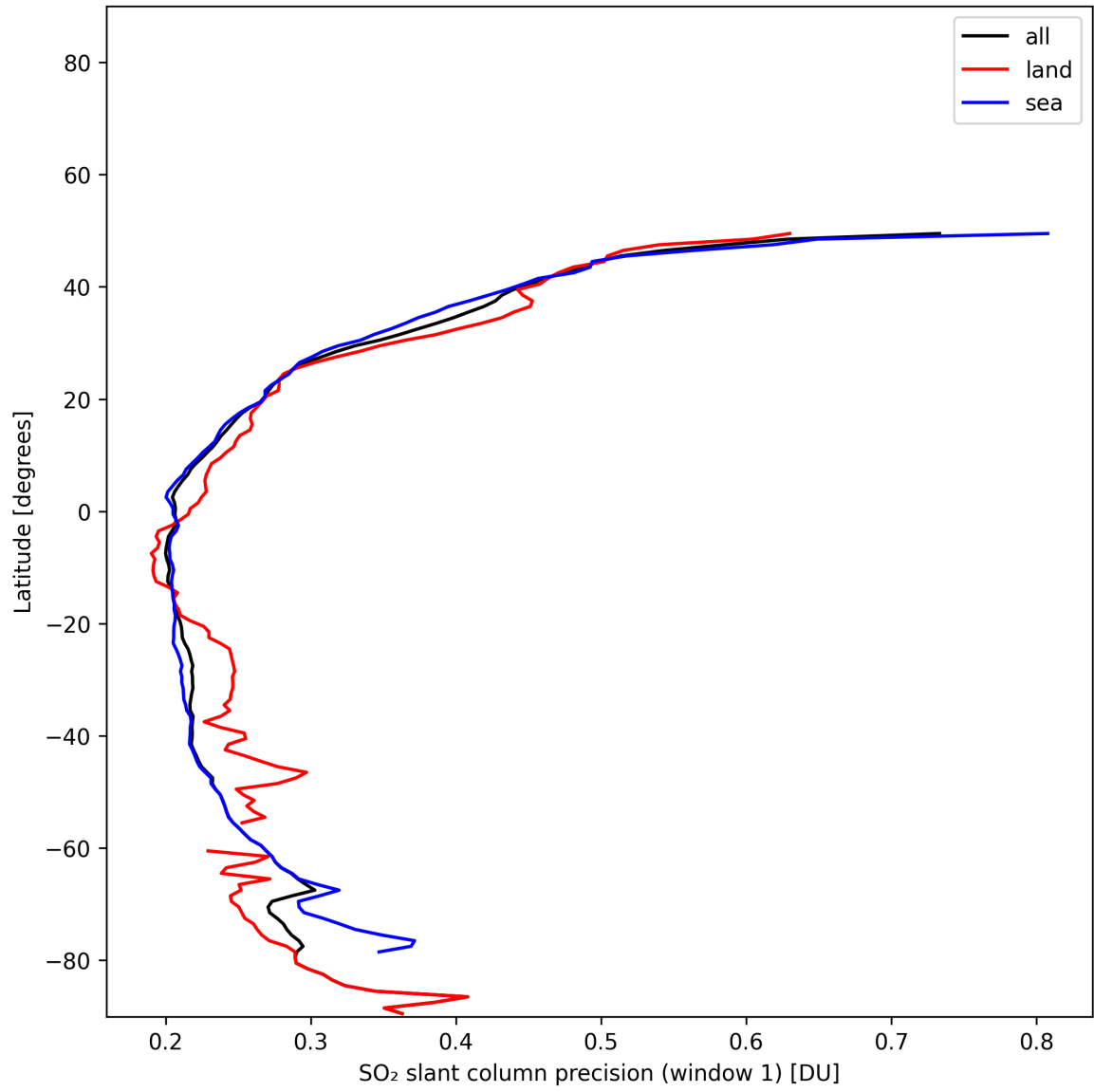


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-01-15 to 2025-01-15.

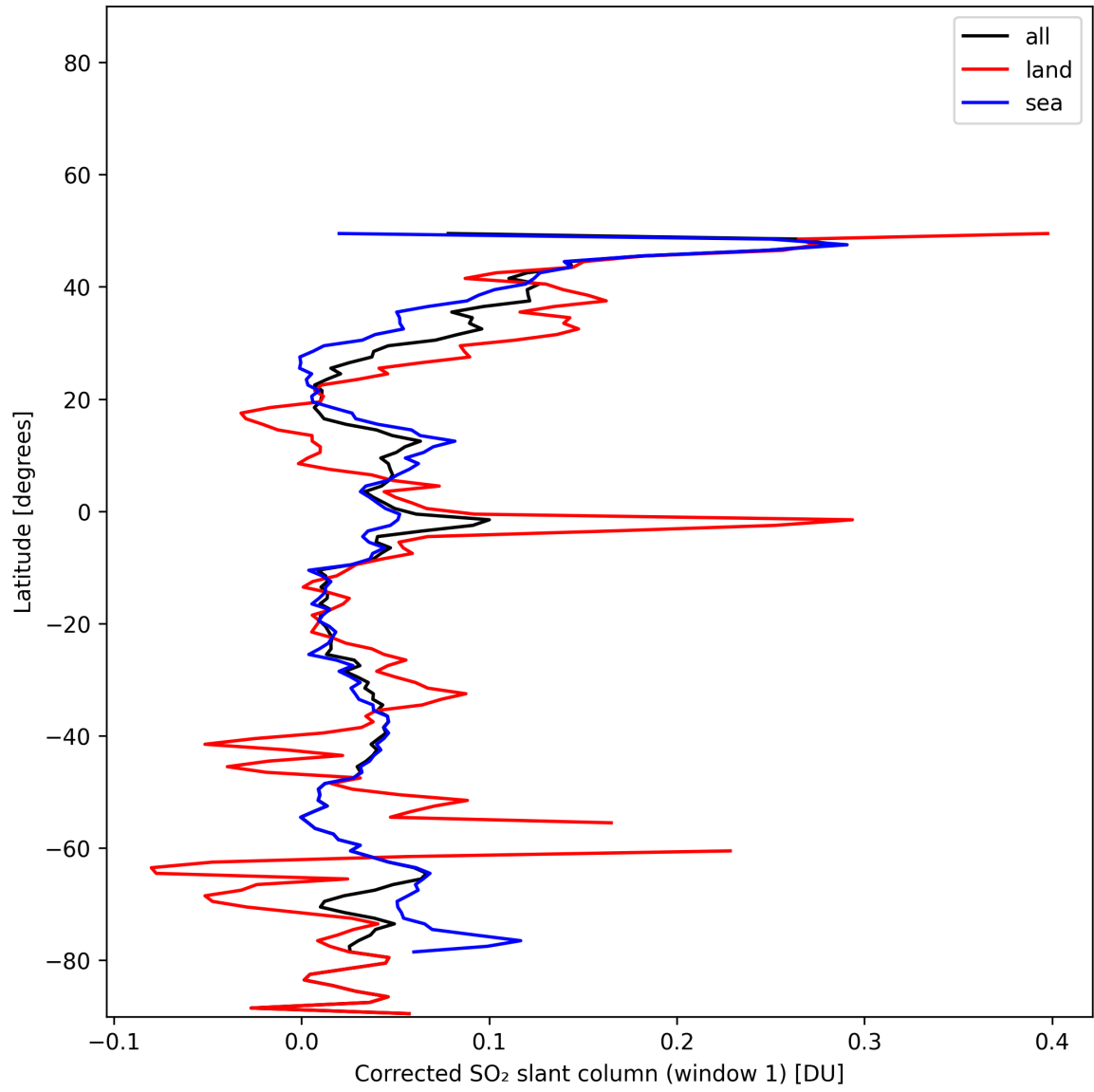


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-01-15 to 2025-01-15.

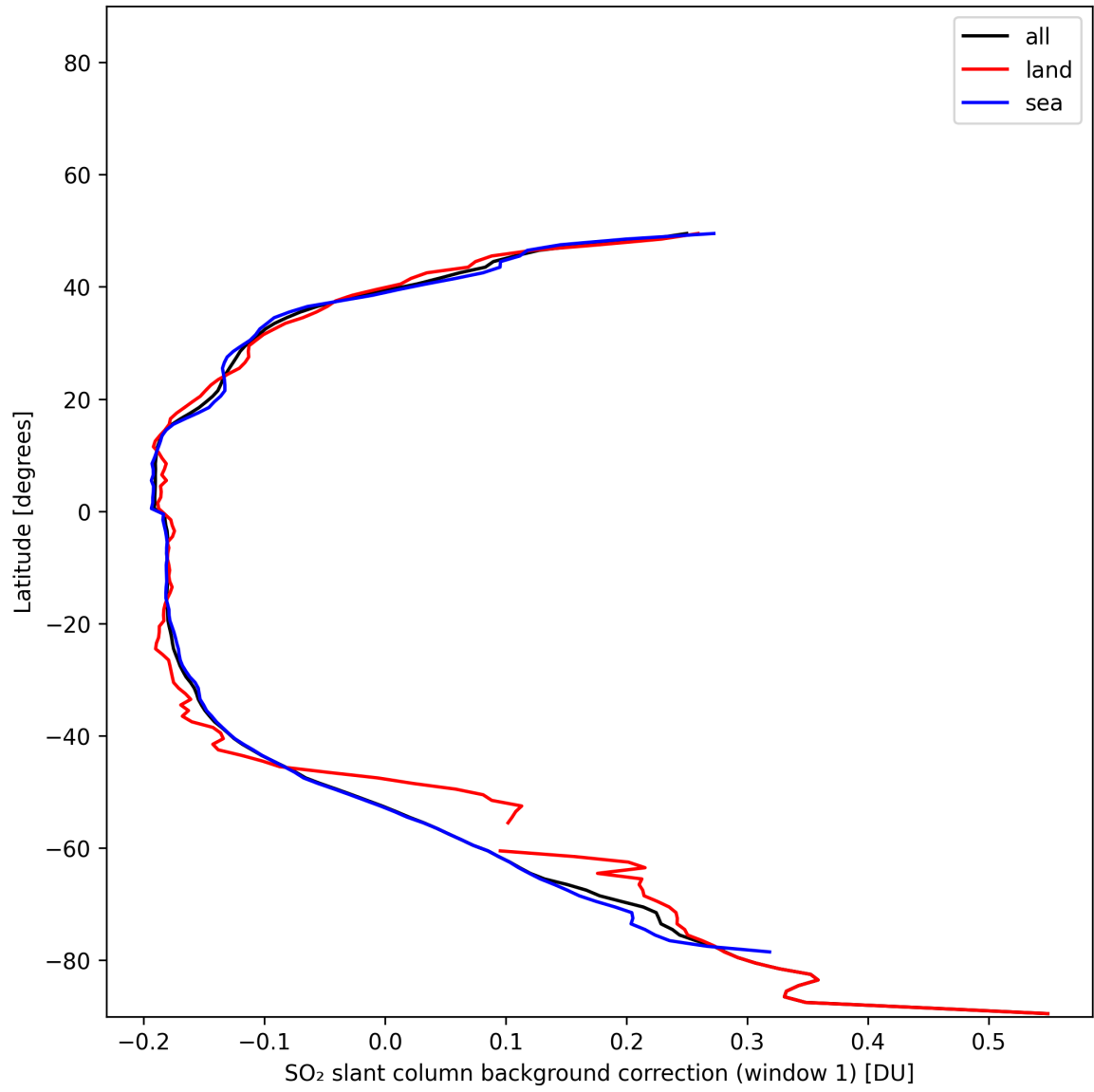


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-01-15 to 2025-01-15.

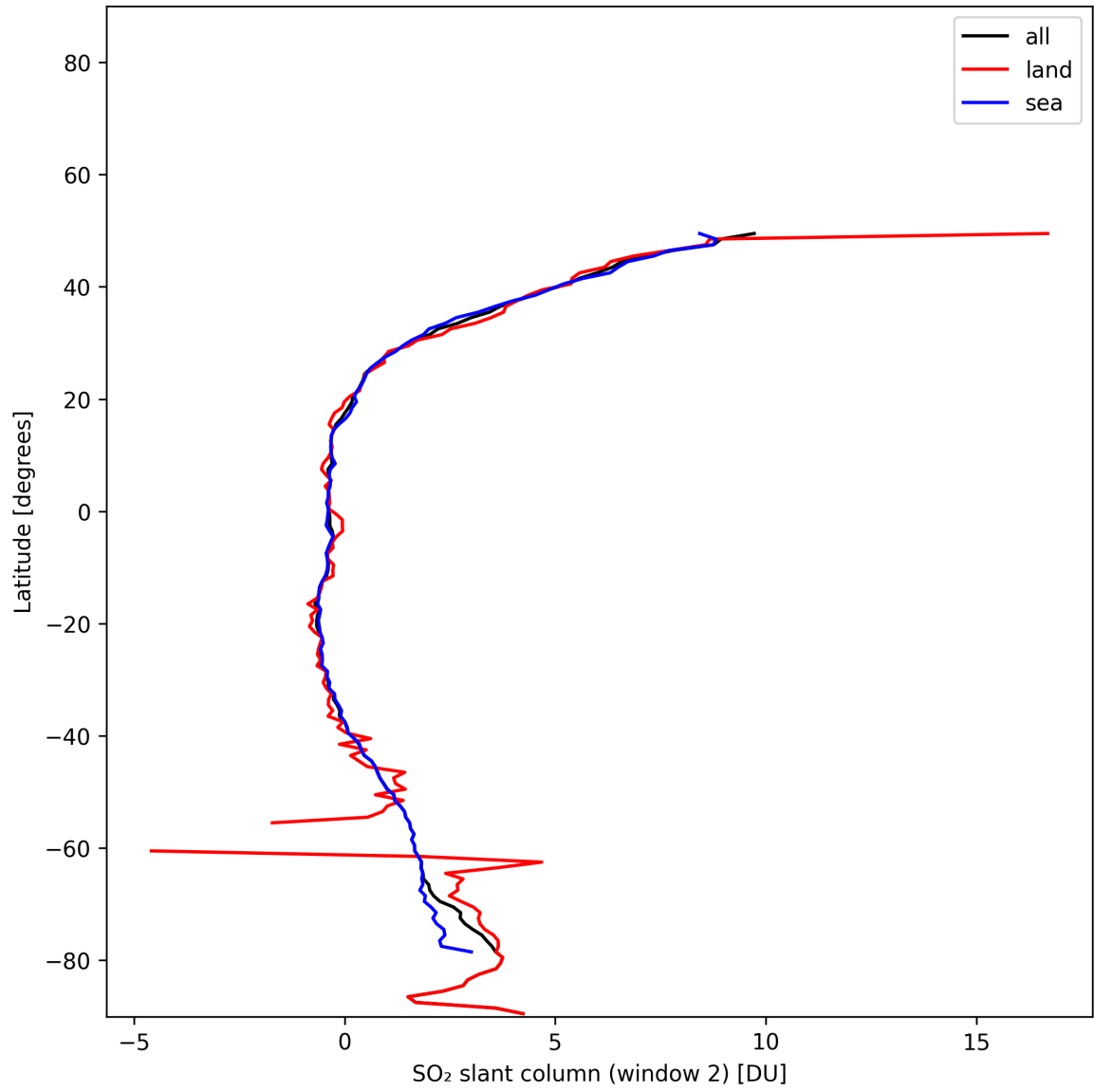


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-01-15 to 2025-01-15.

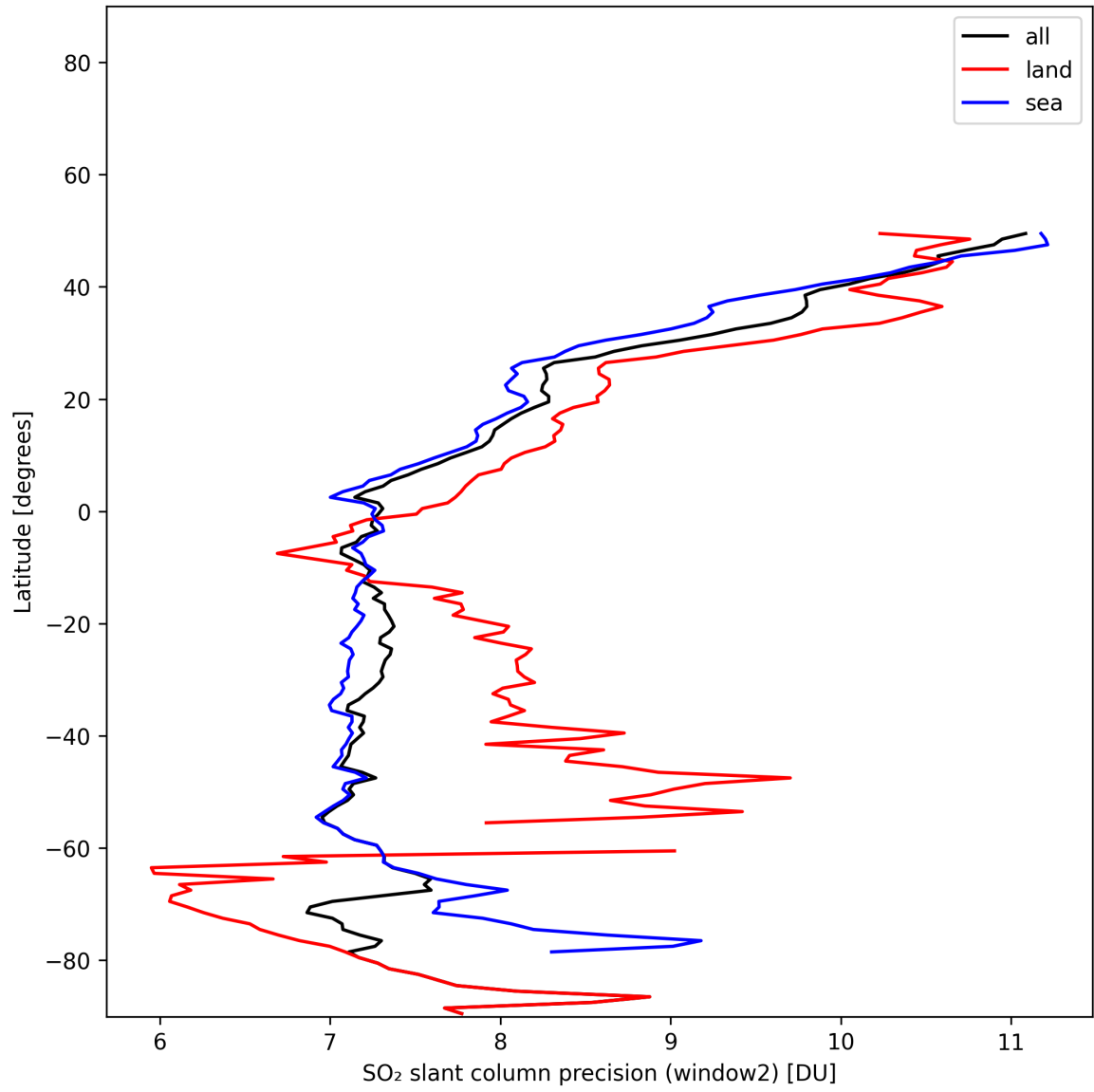


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-01-15 to 2025-01-15.

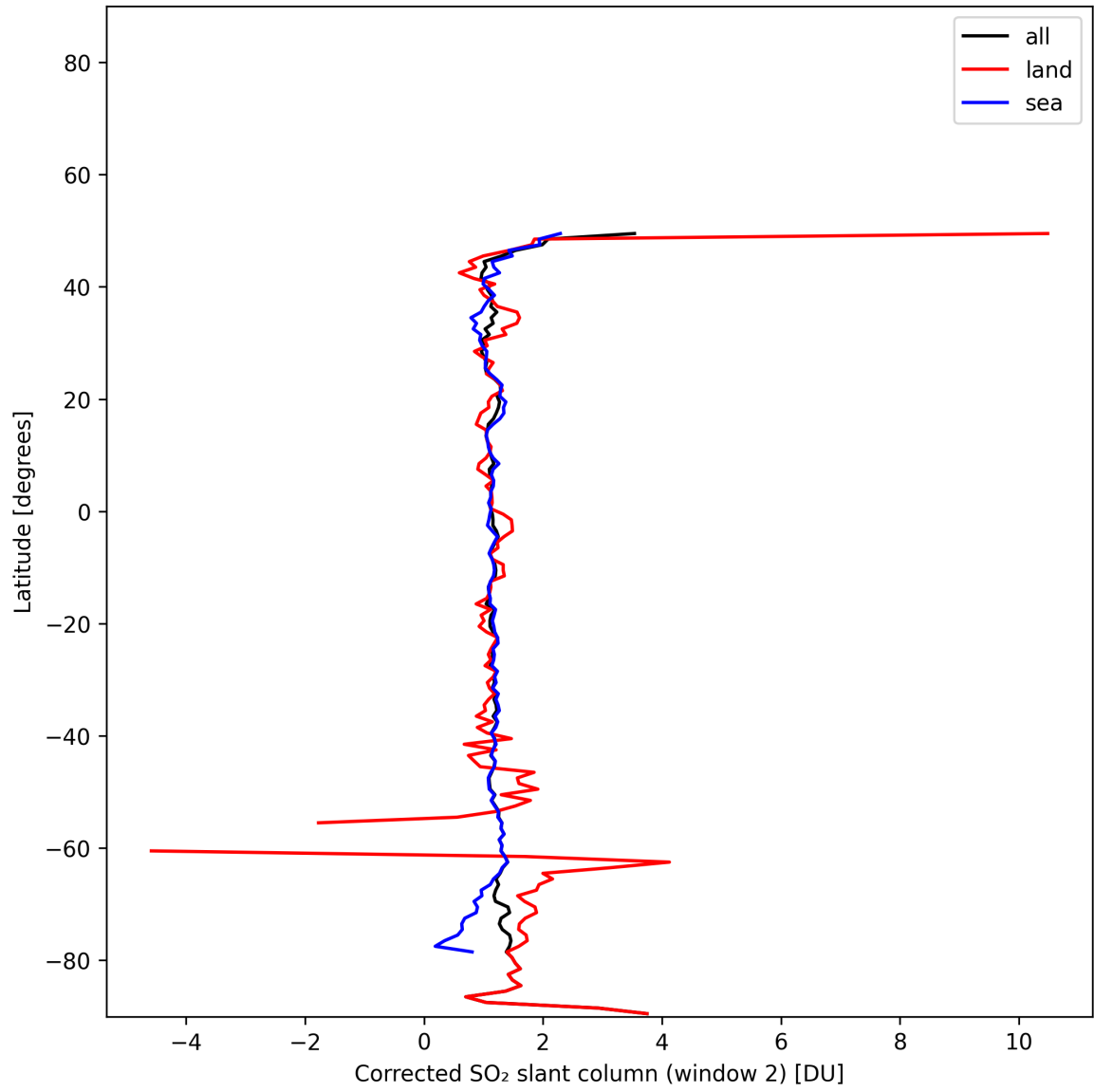


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-01-15 to 2025-01-15.

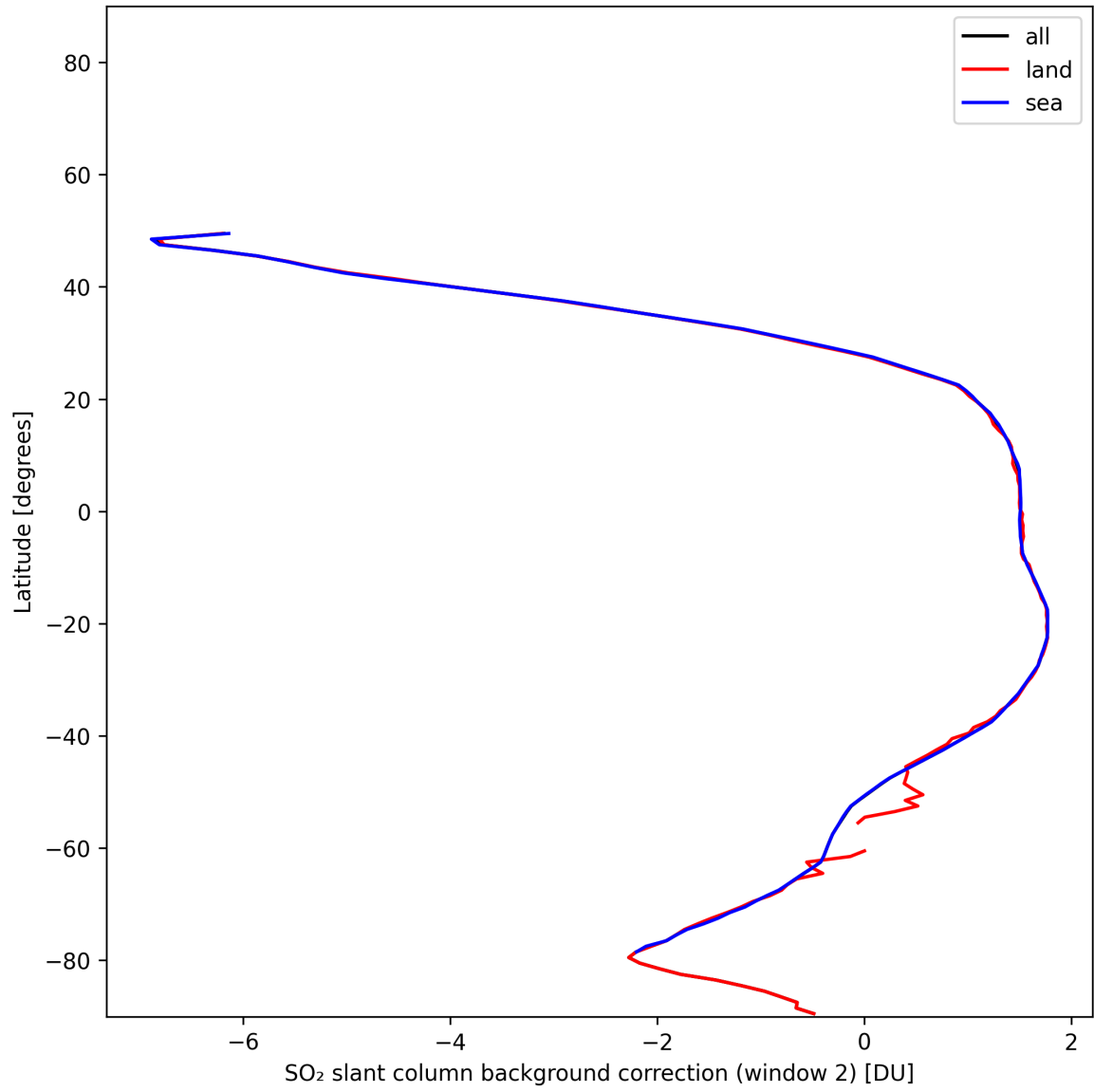


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-01-15 to 2025-01-15.

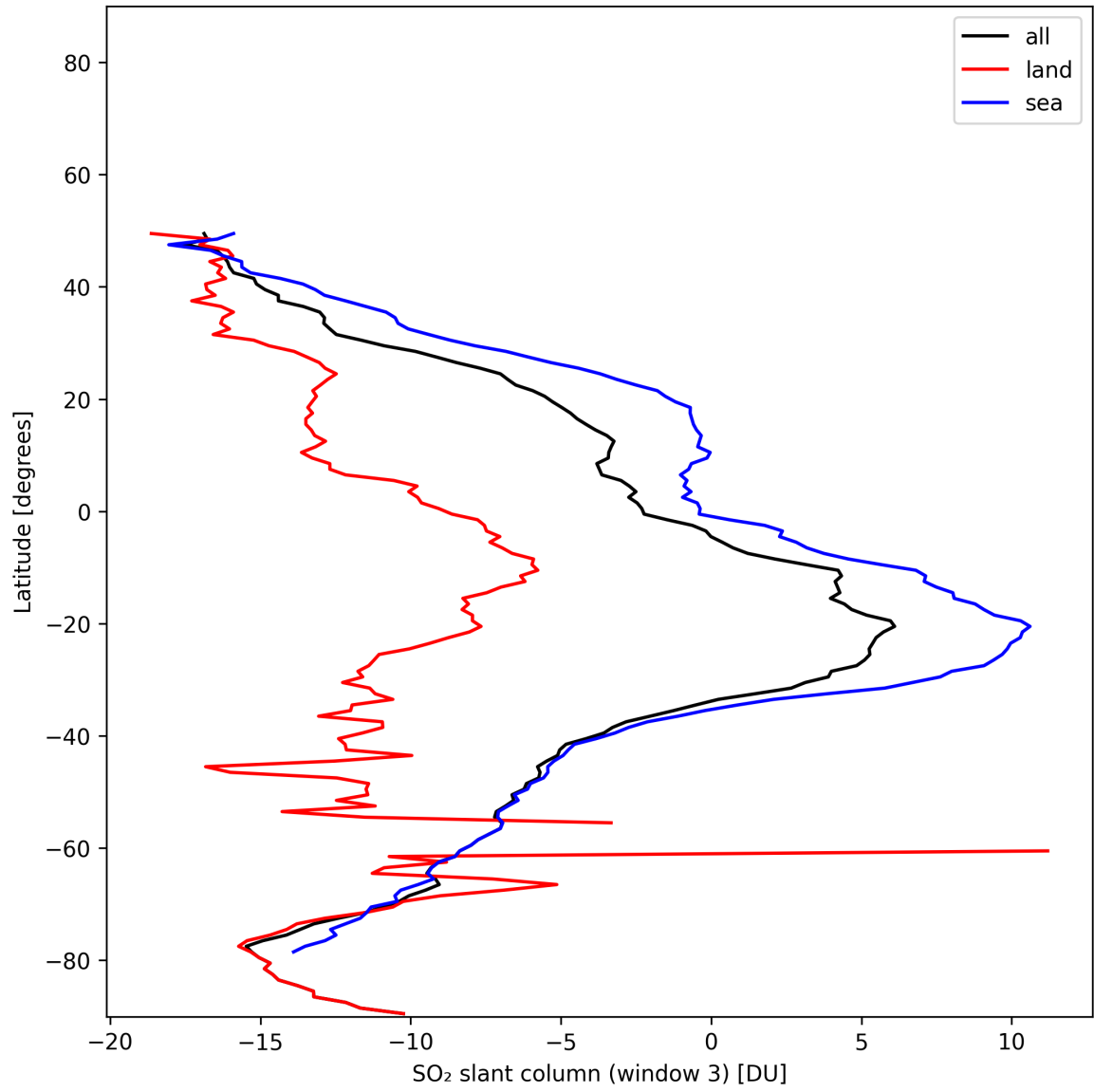


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-01-15 to 2025-01-15.

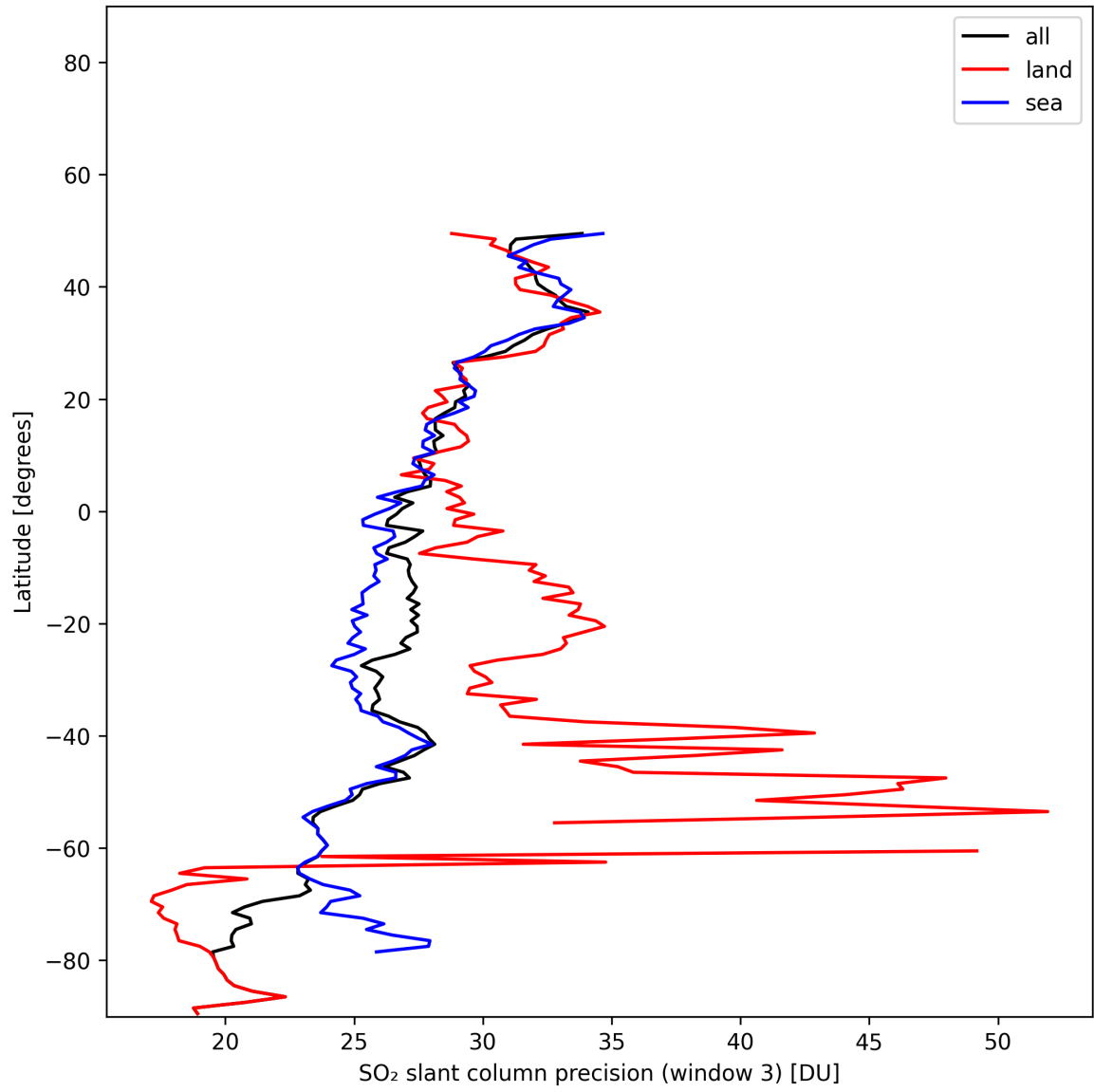


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-01-15 to 2025-01-15.

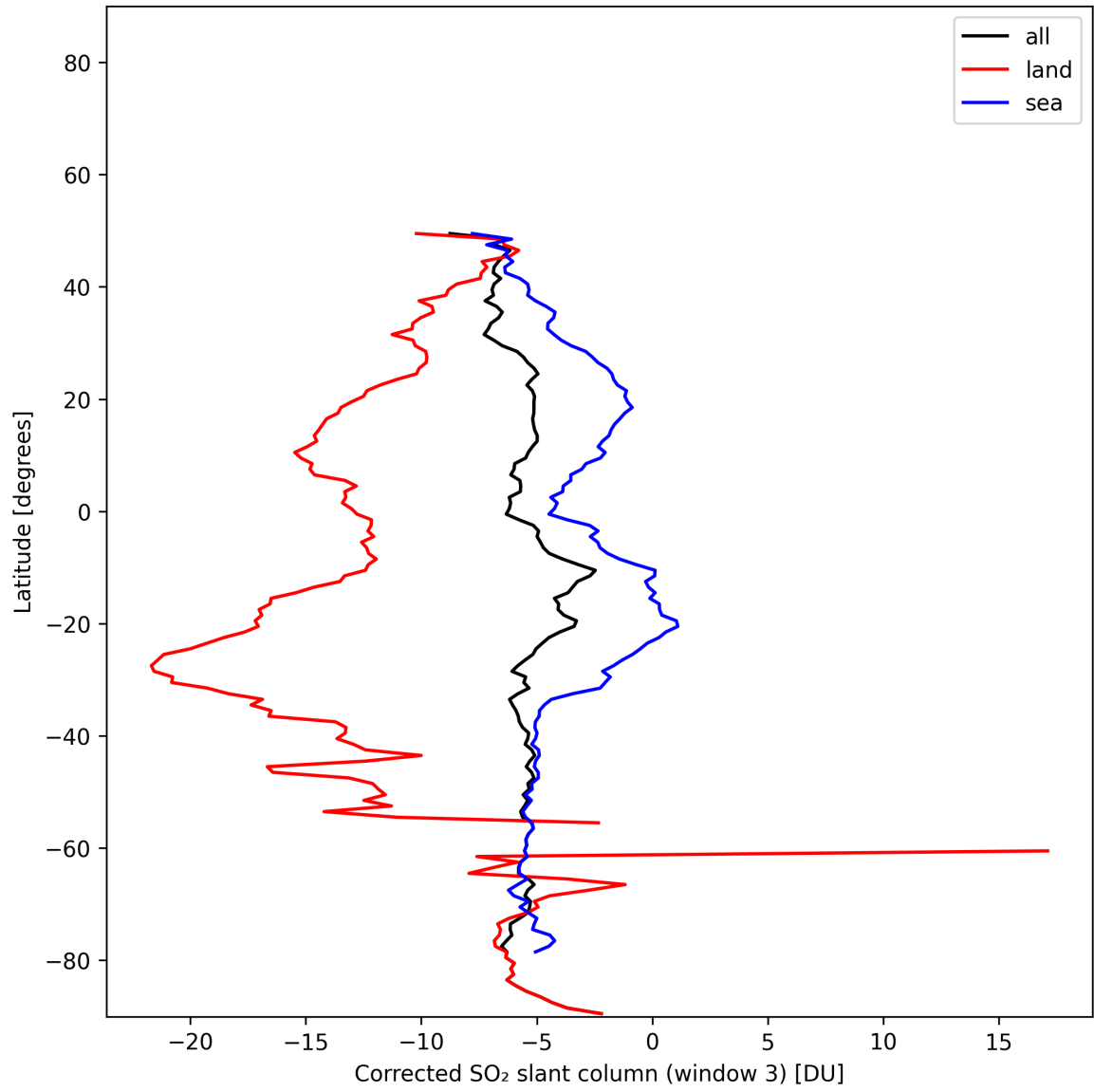


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-01-15 to 2025-01-15.

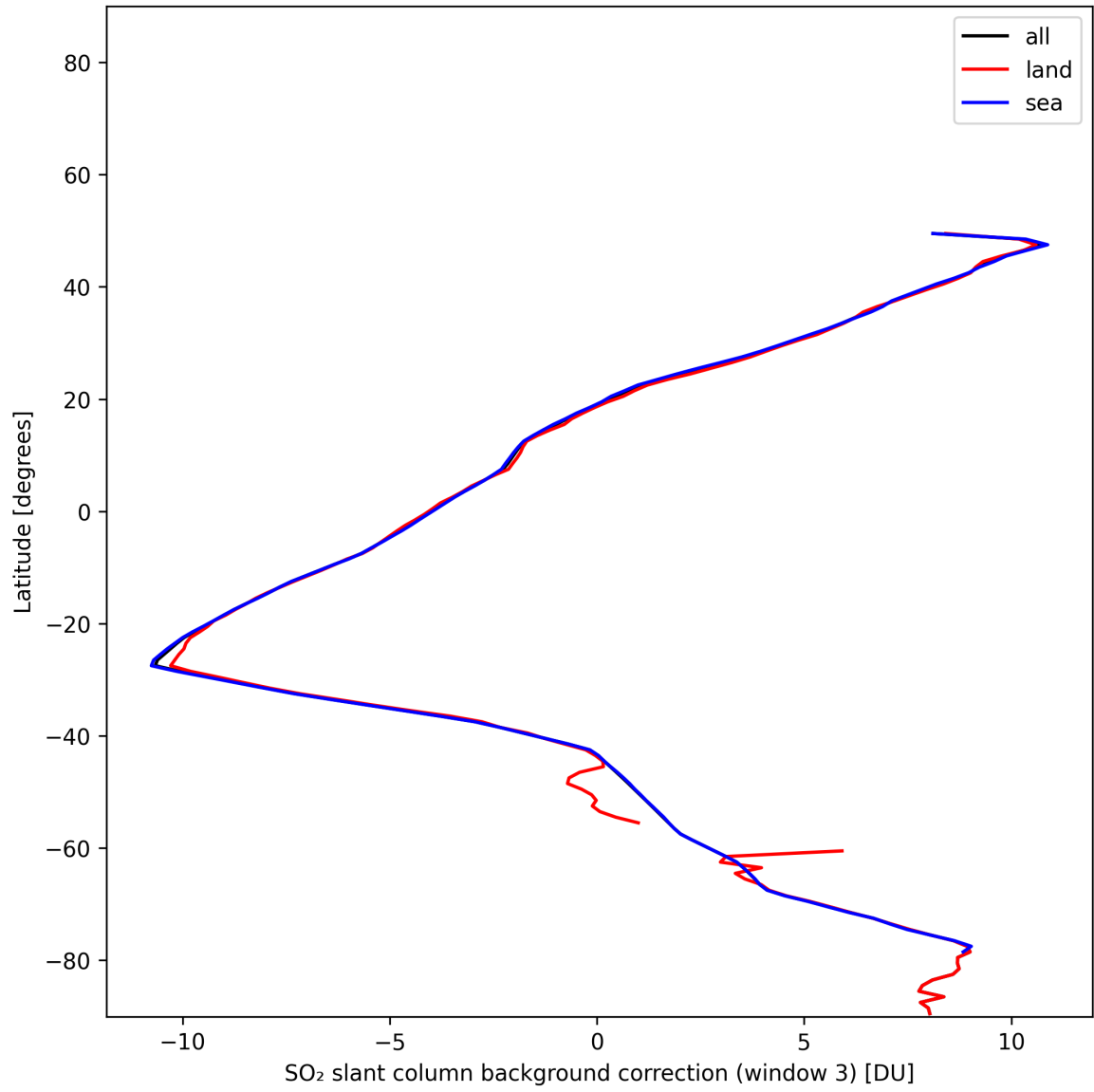


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-01-15 to 2025-01-15.

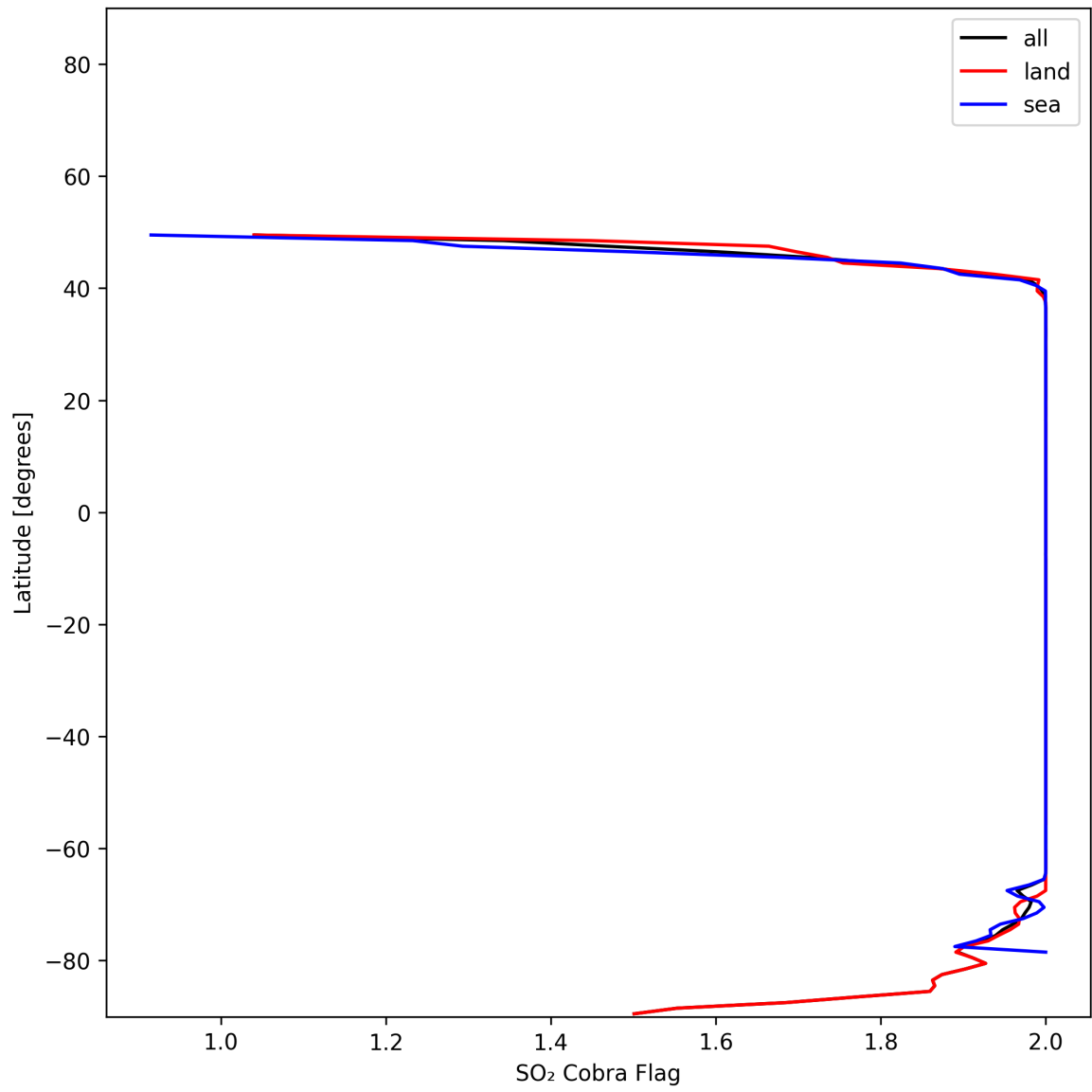


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-01-15 to 2025-01-15.

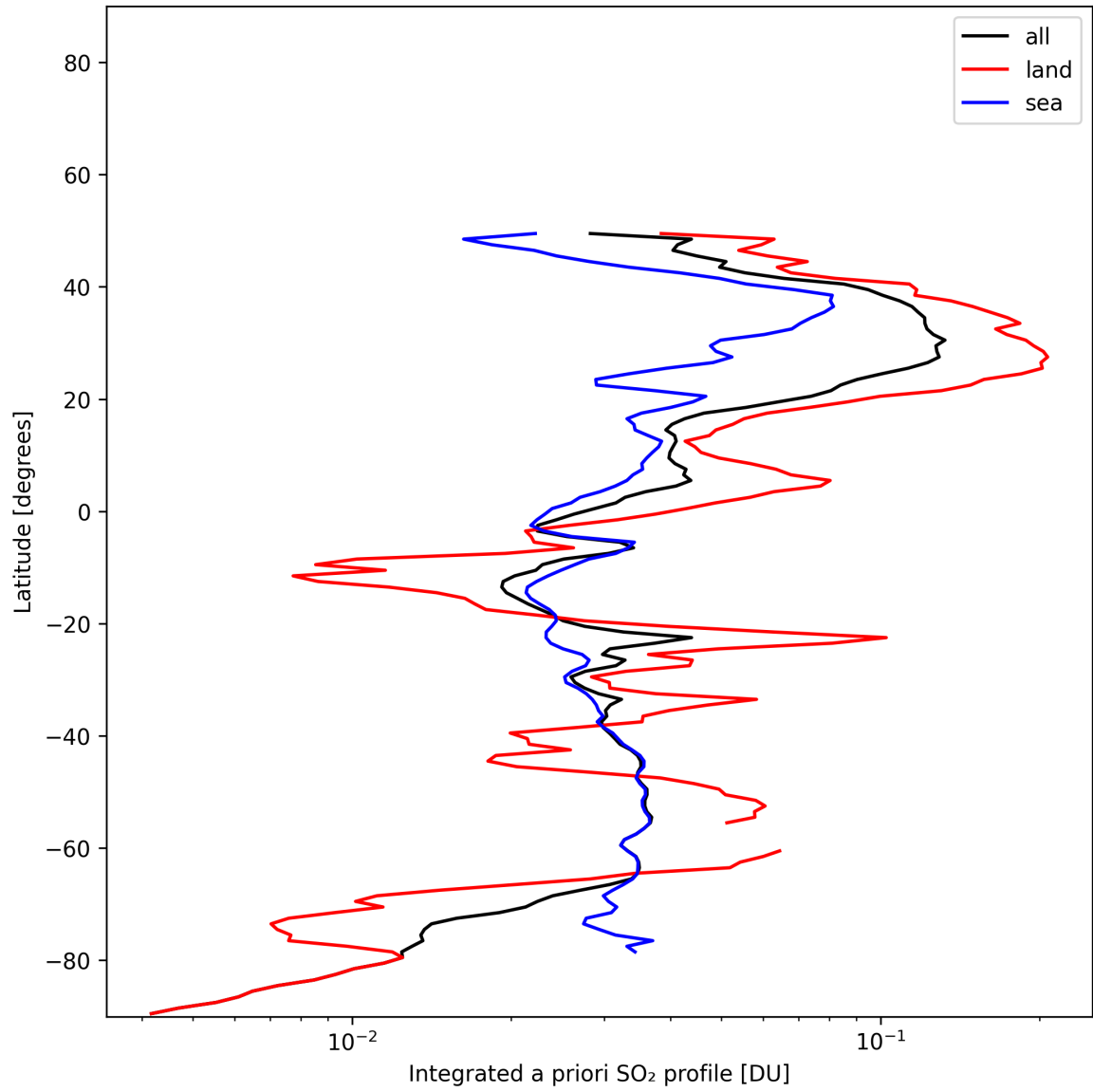


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-01-15 to 2025-01-15.

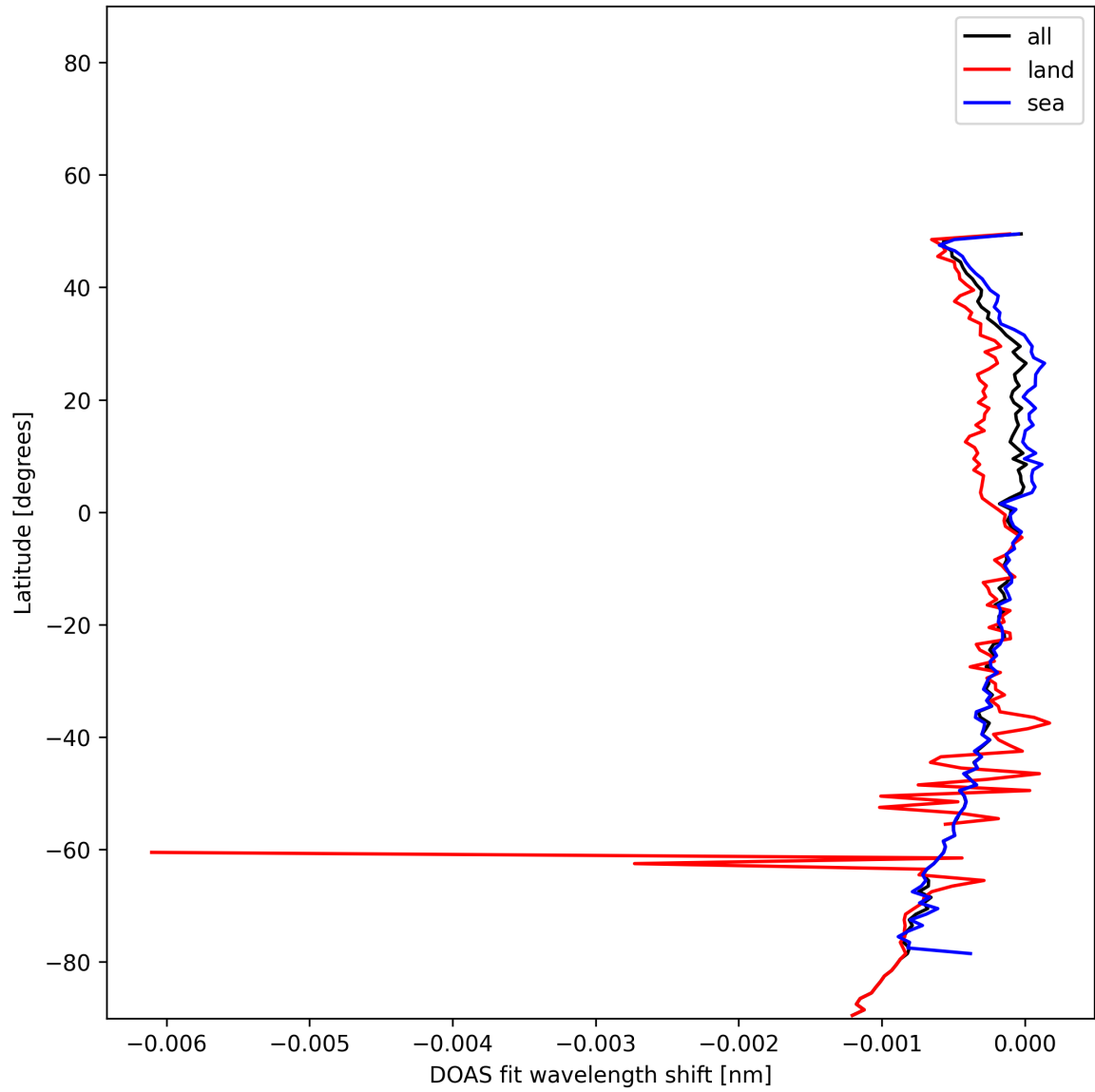


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-01-15 to 2025-01-15.

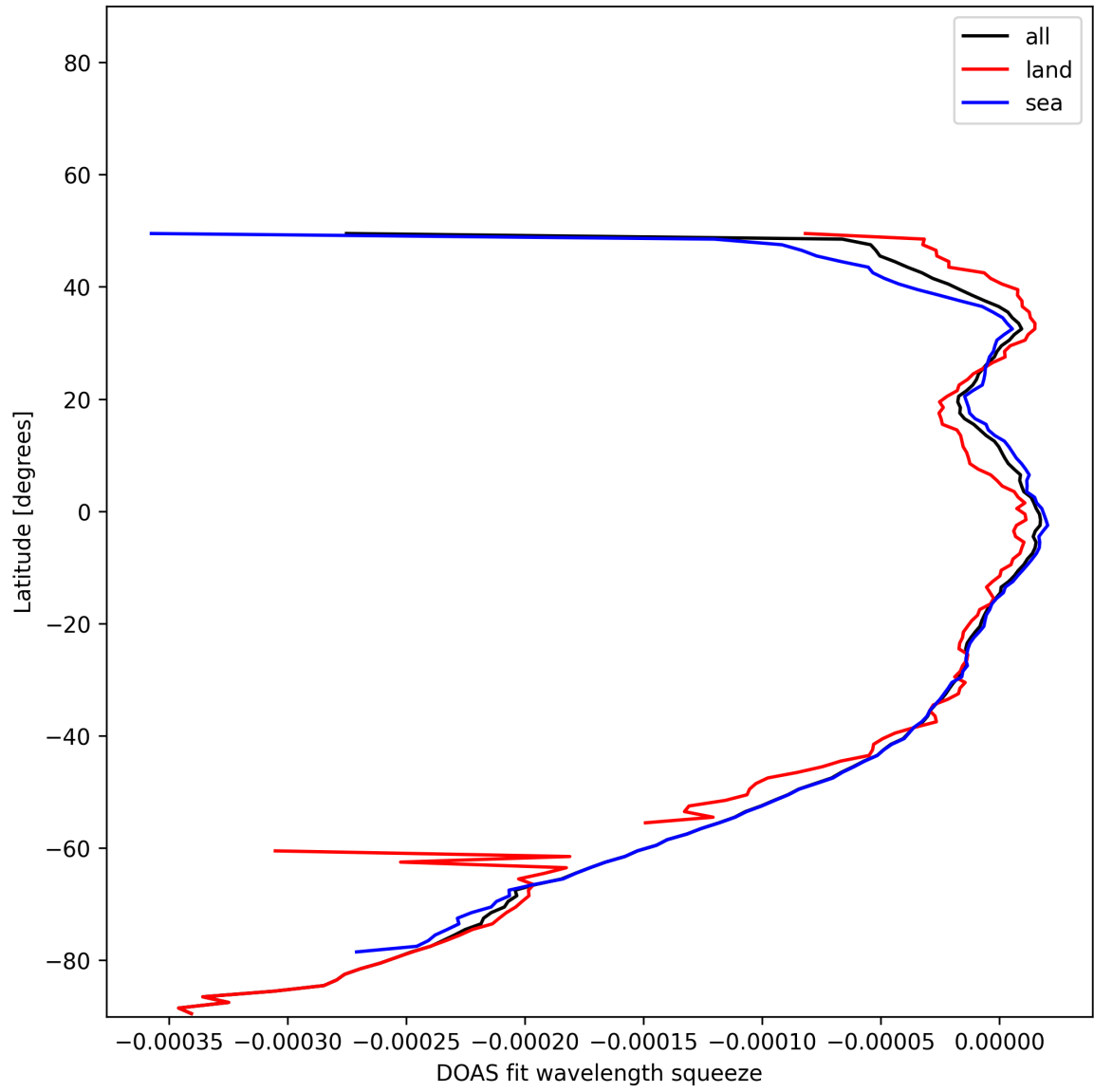


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-01-15 to 2025-01-15.

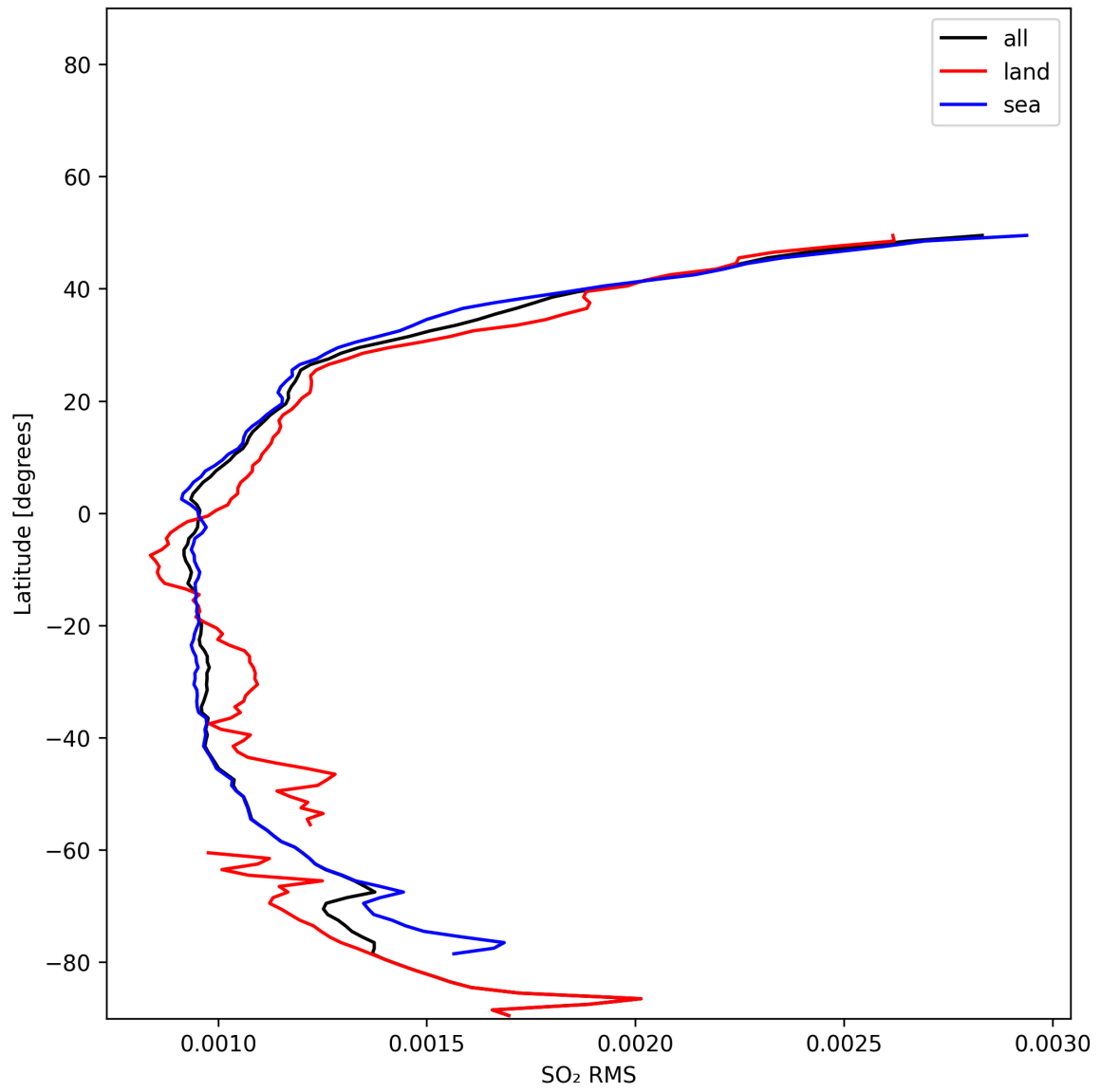


Figure 52: Zonal average of “SO₂ RMS” for 2025-01-15 to 2025-01-15.

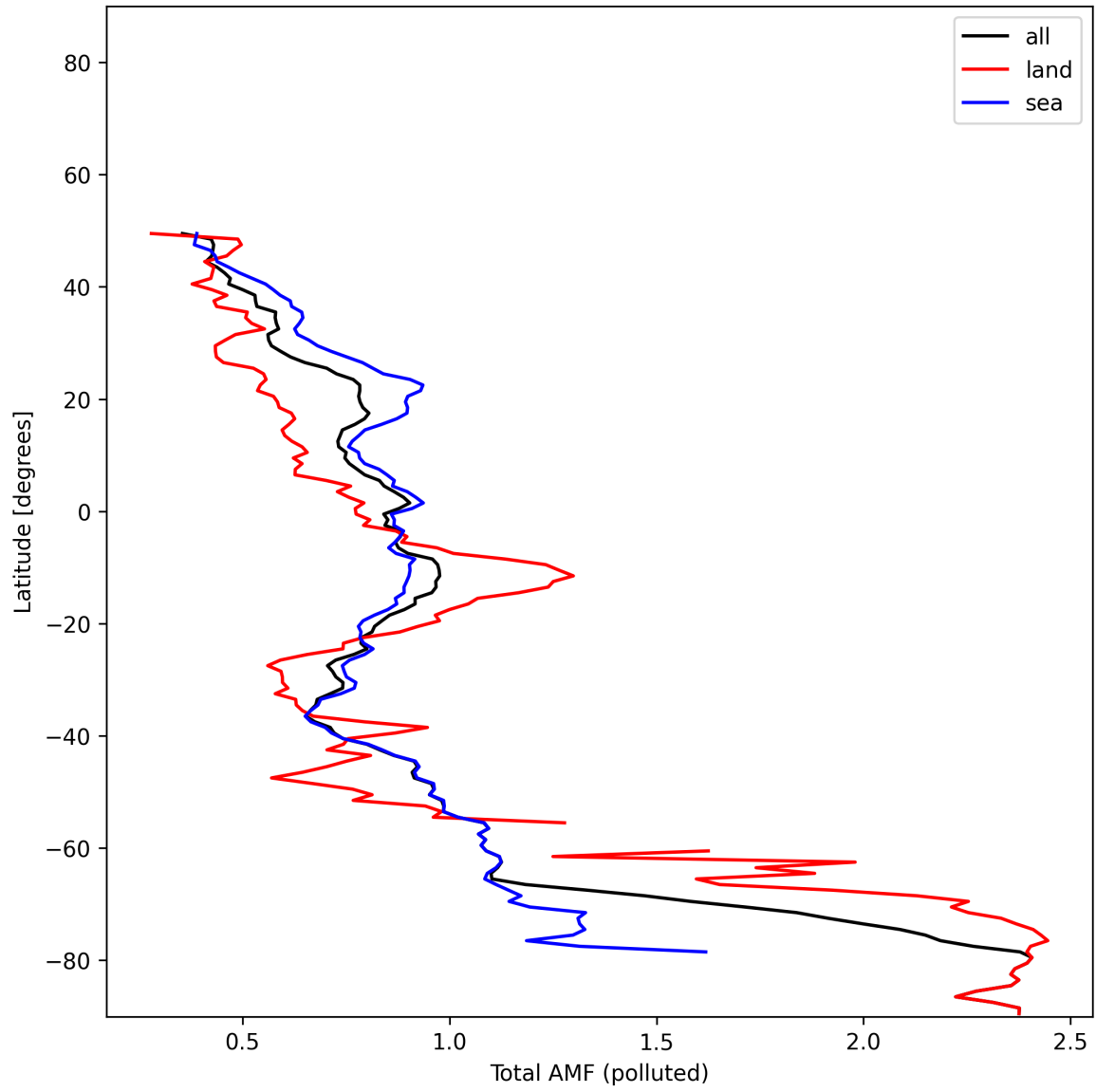


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-01-15 to 2025-01-15.

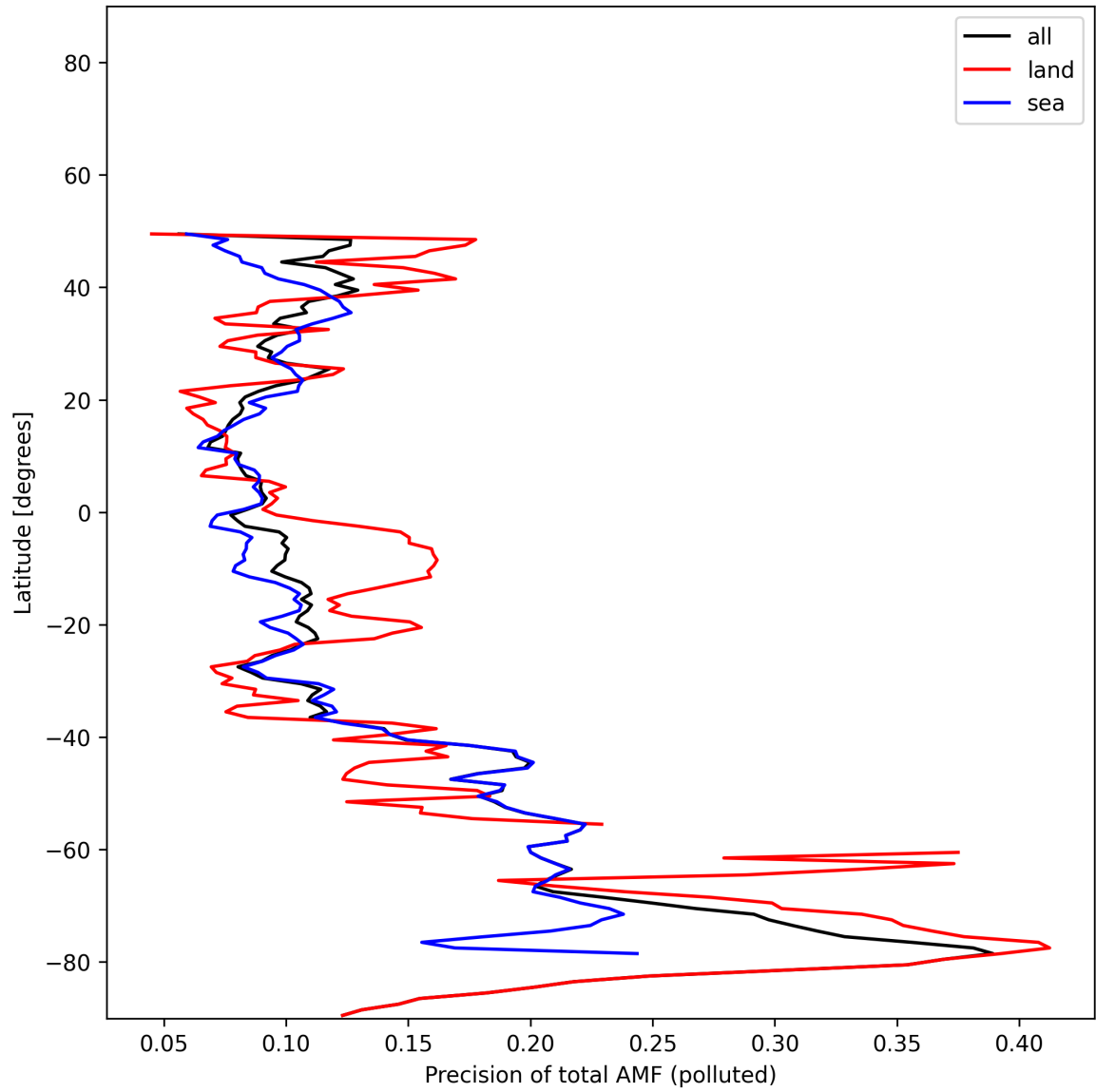


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-01-15 to 2025-01-15.

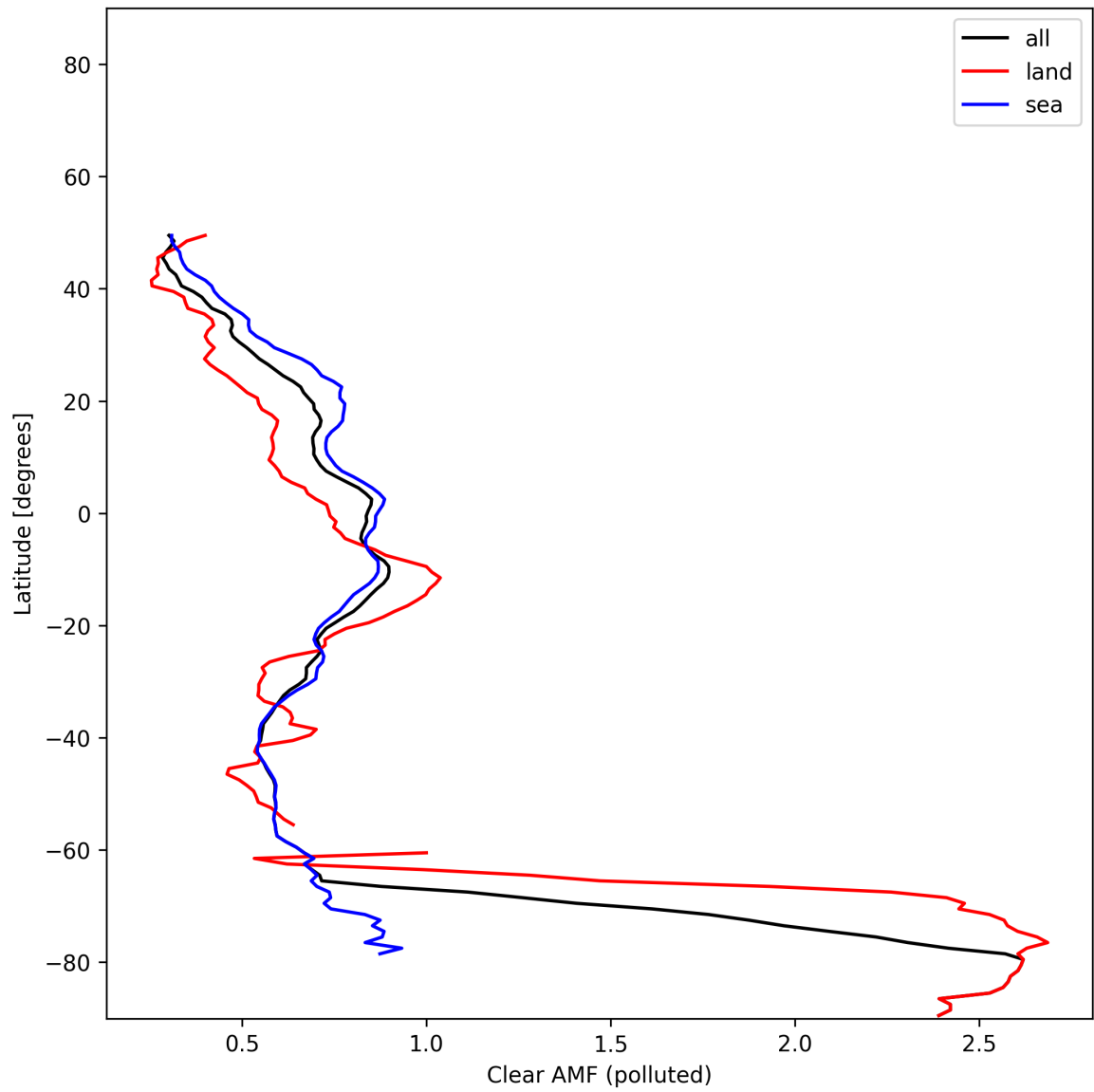


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-01-15 to 2025-01-15.

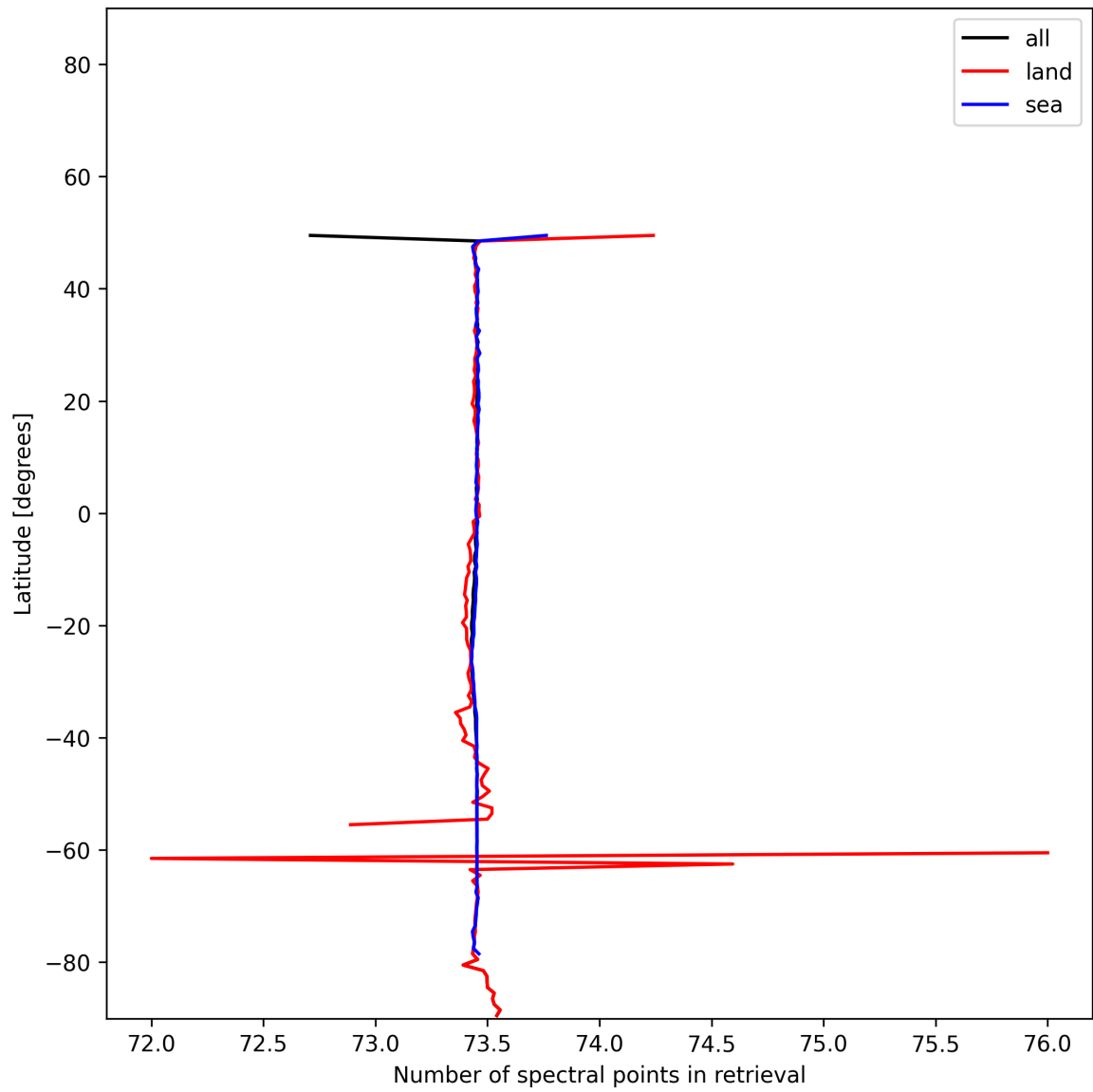


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-01-15 to 2025-01-15.

8 Histograms

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

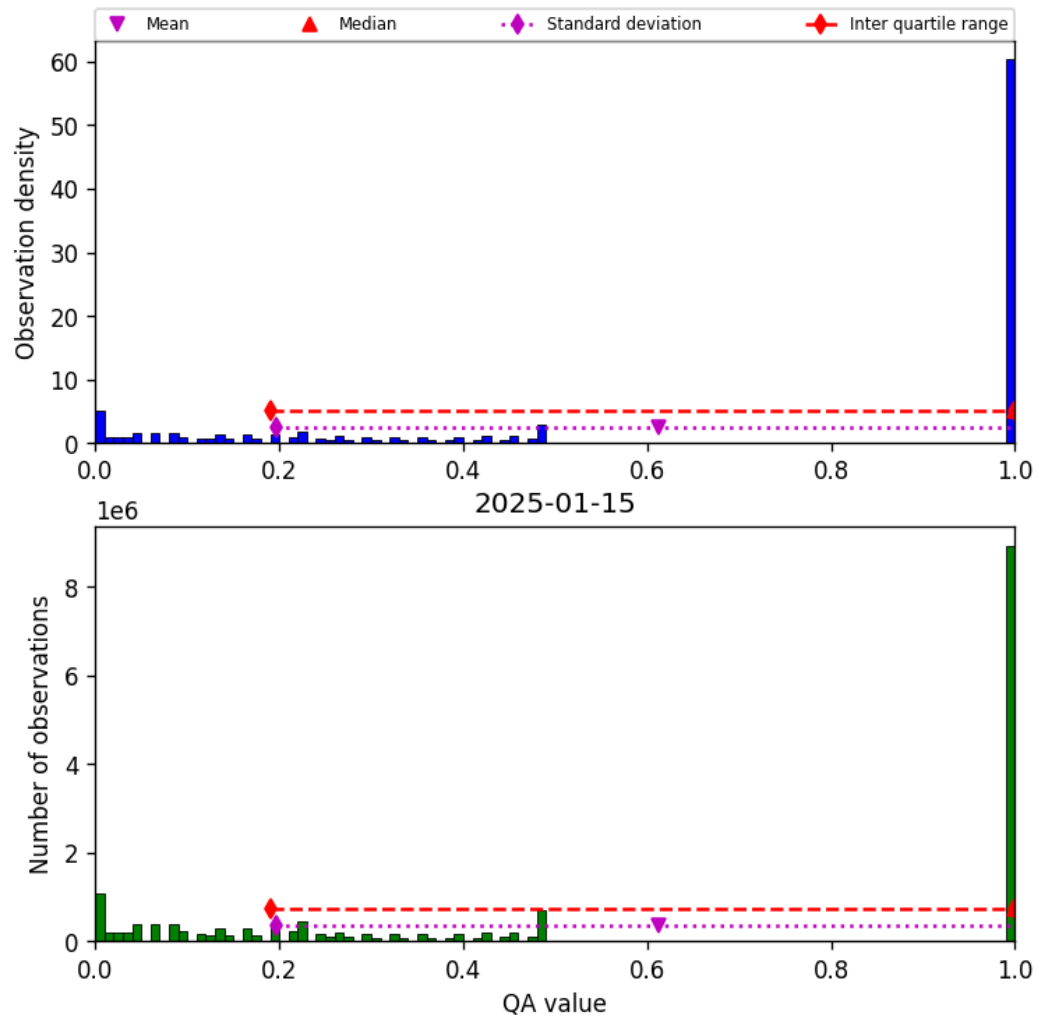


Figure 57: Histogram of “QA value” for 2025-01-15 to 2025-01-15

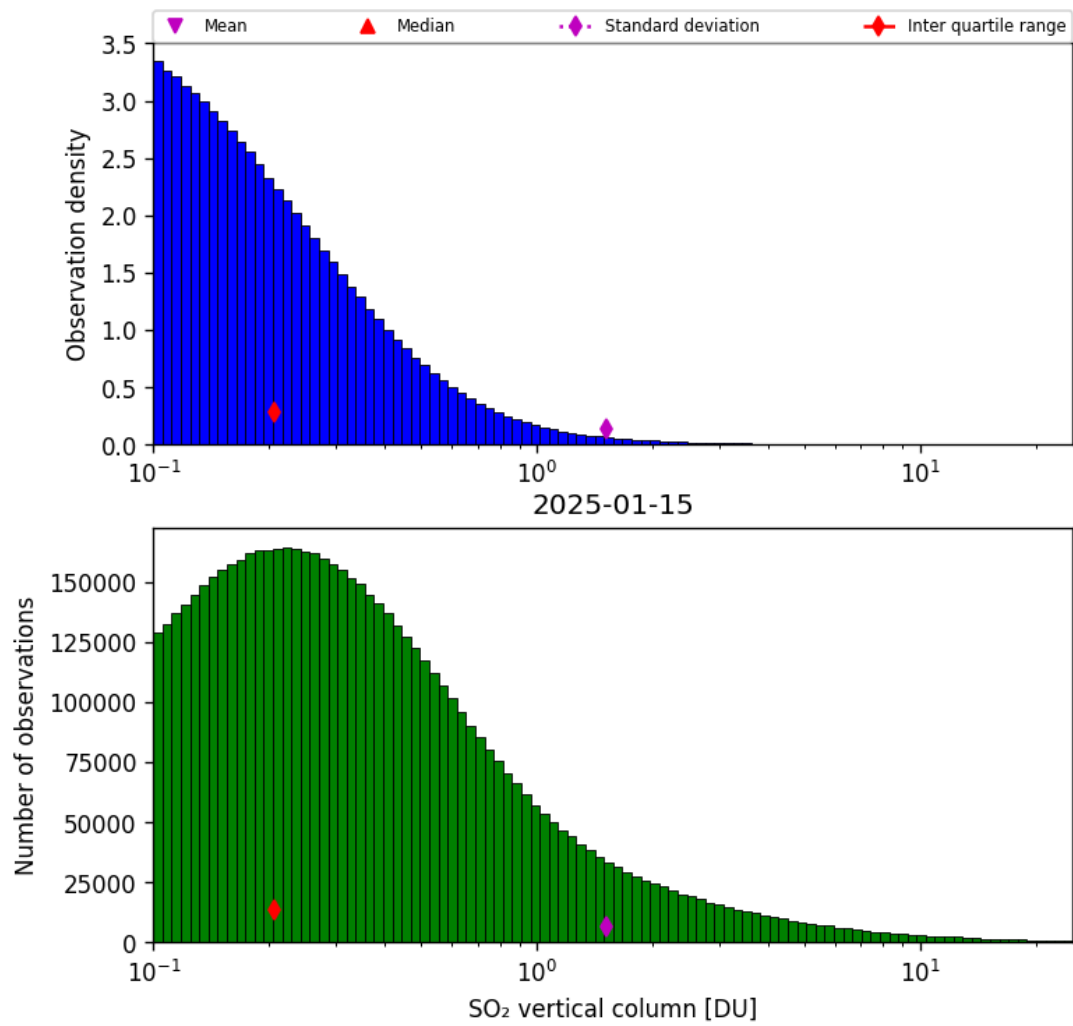


Figure 58: Histogram of “SO₂ vertical column” for 2025-01-15 to 2025-01-15

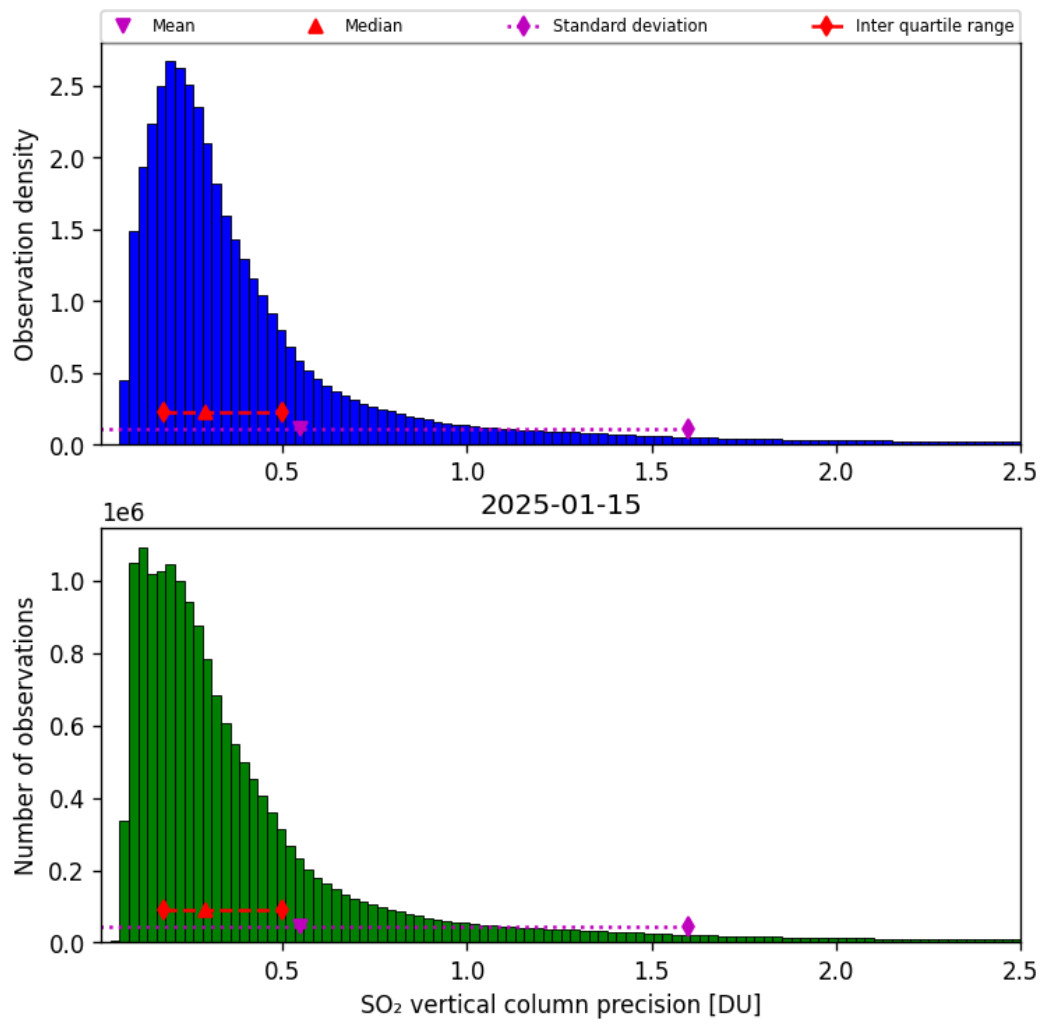


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-01-15 to 2025-01-15

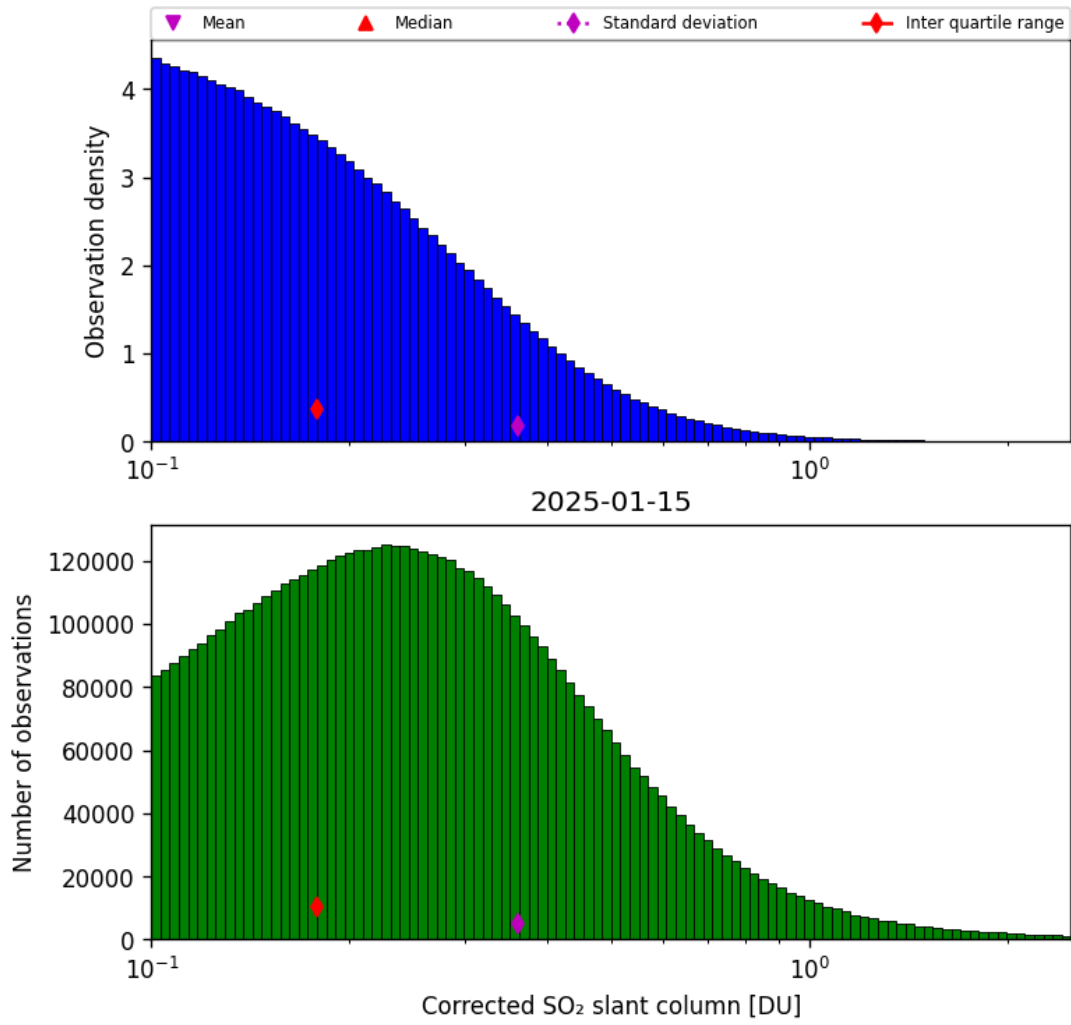


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-01-15 to 2025-01-15

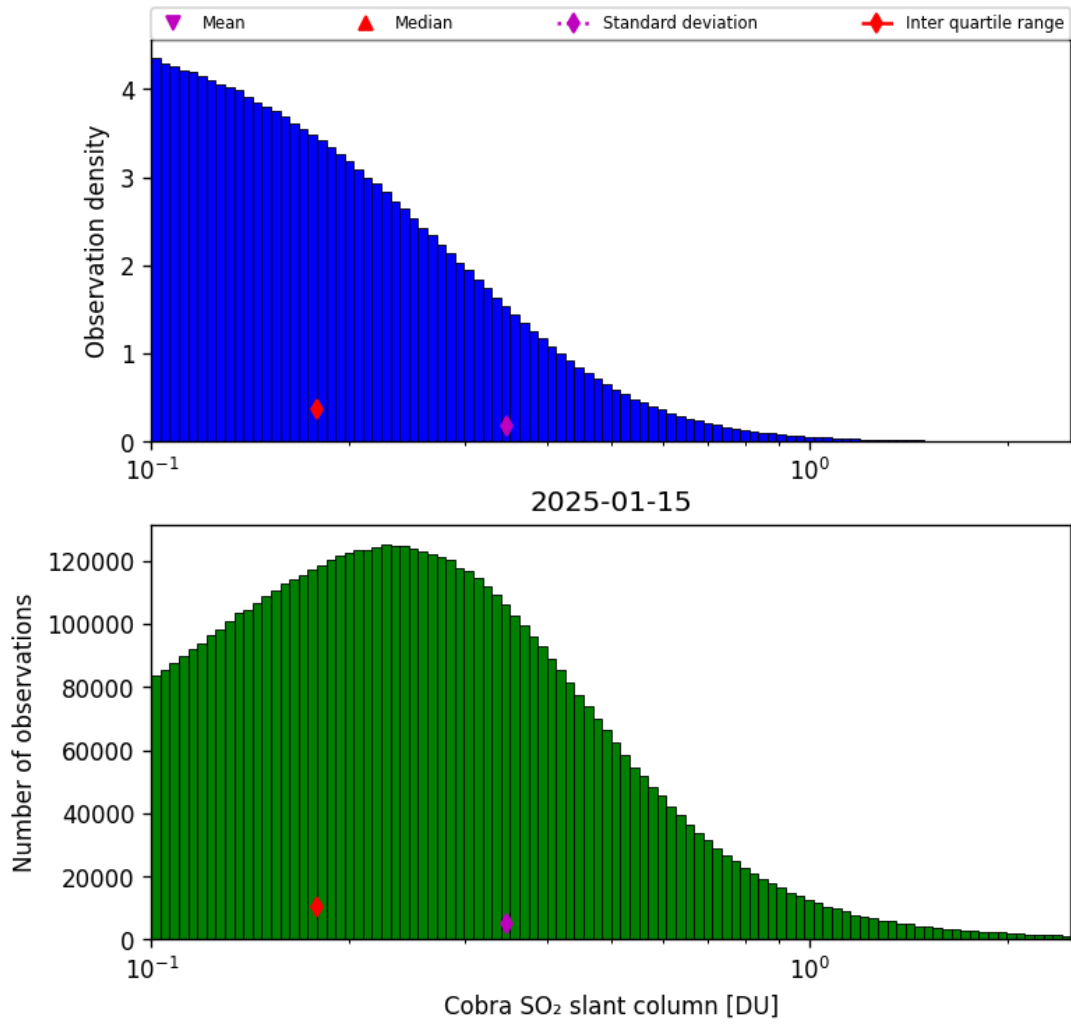


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-01-15 to 2025-01-15

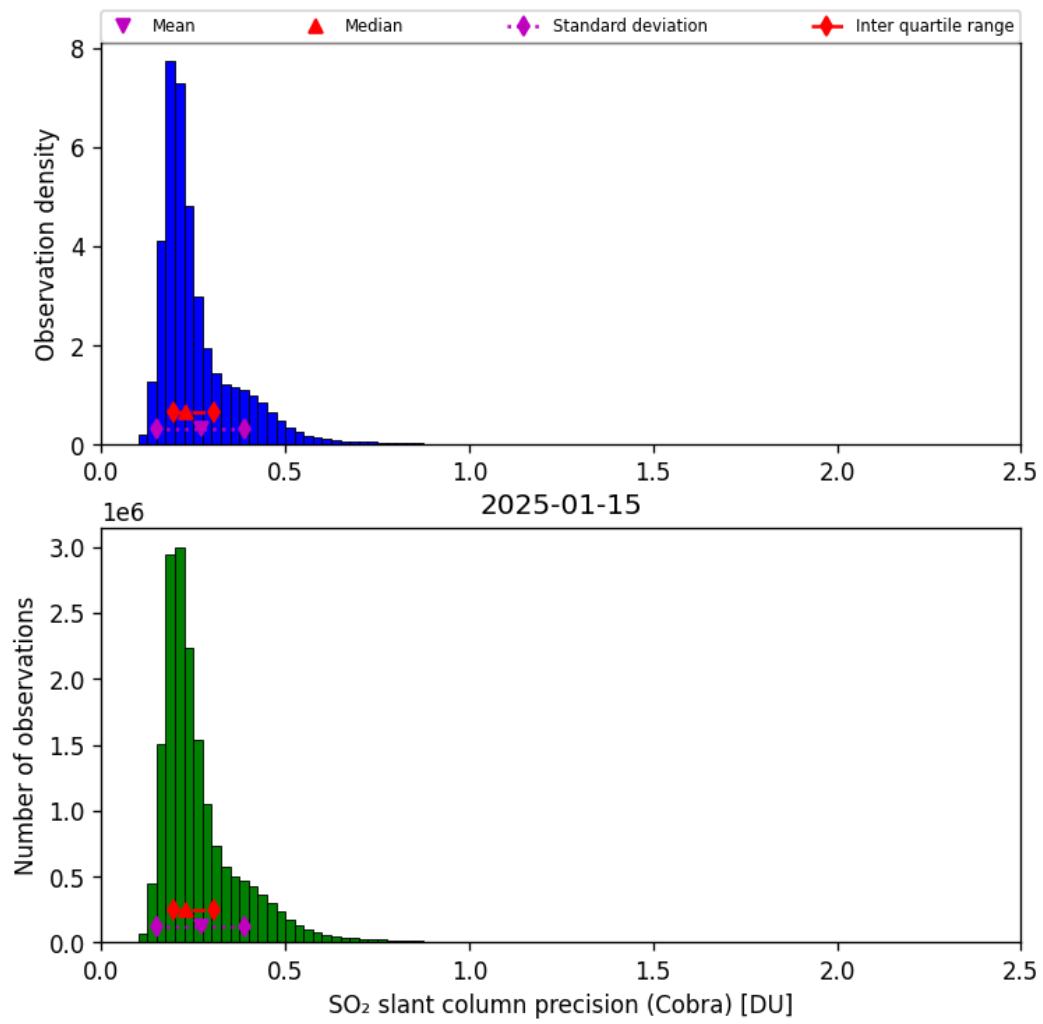


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-01-15 to 2025-01-15

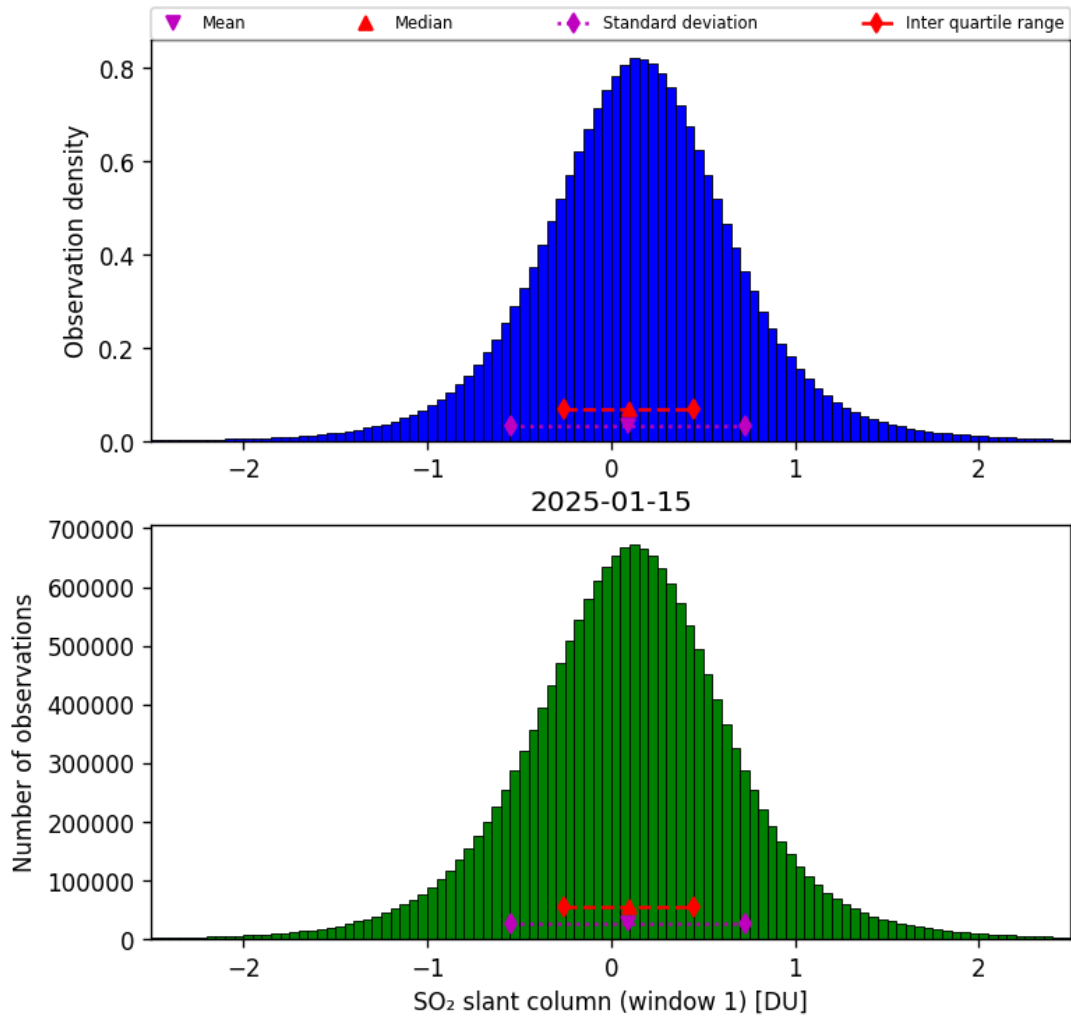


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-01-15 to 2025-01-15

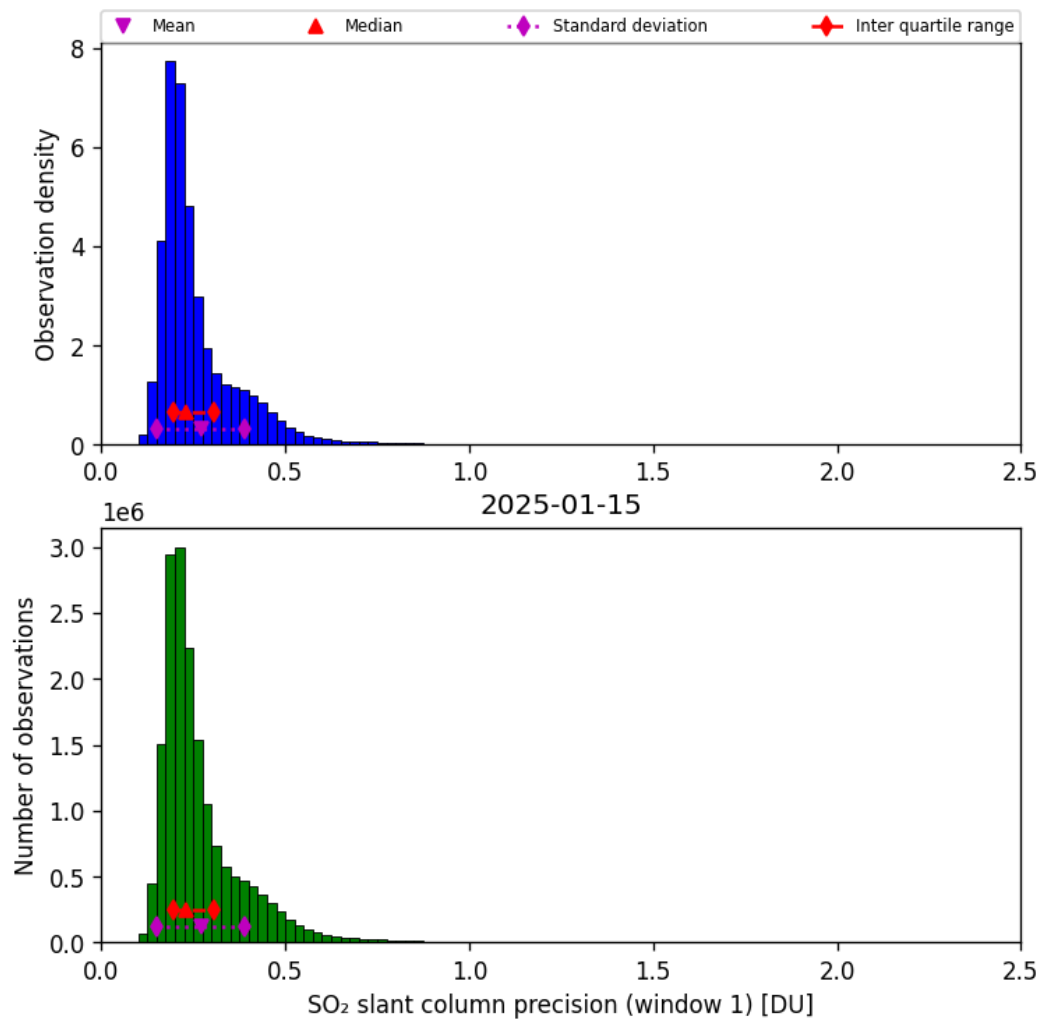


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-01-15 to 2025-01-15

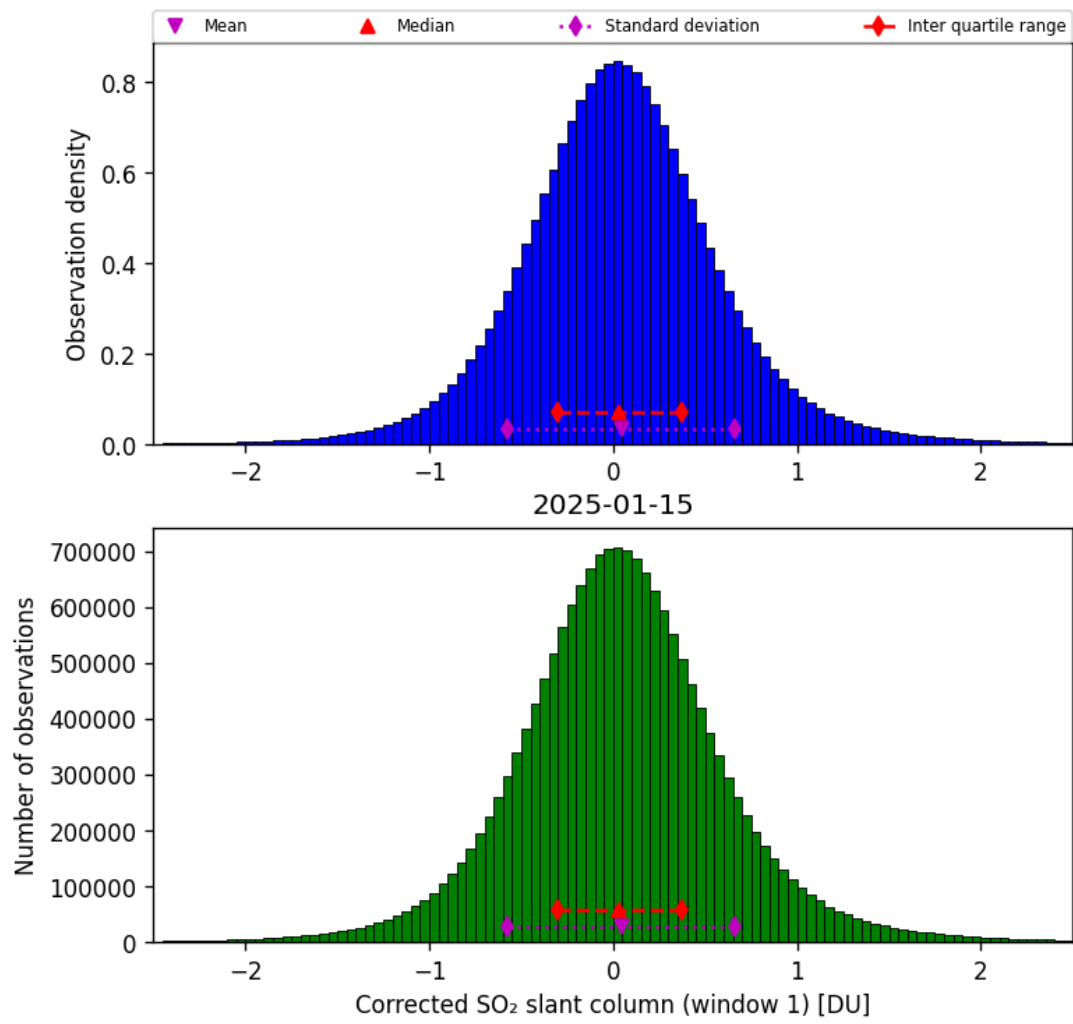


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-01-15 to 2025-01-15

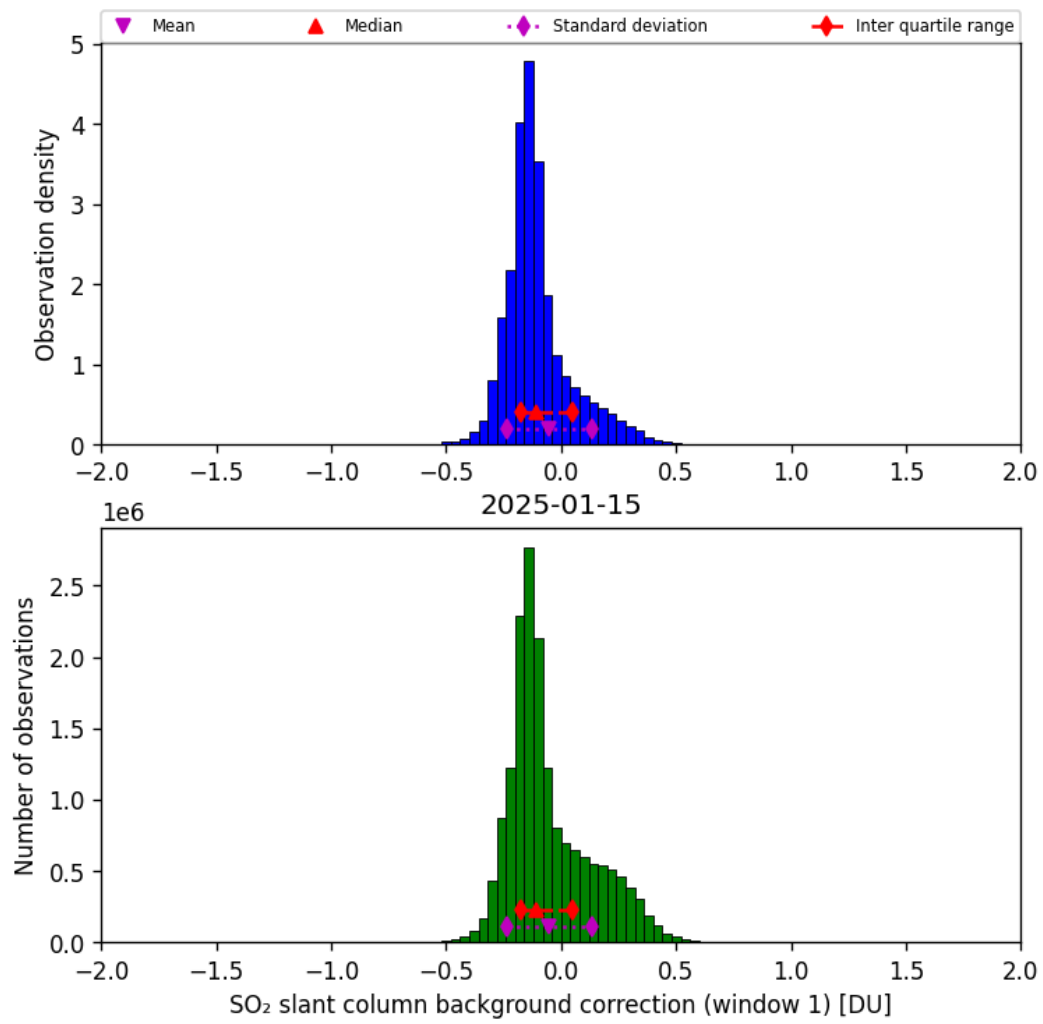


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-01-15 to 2025-01-15

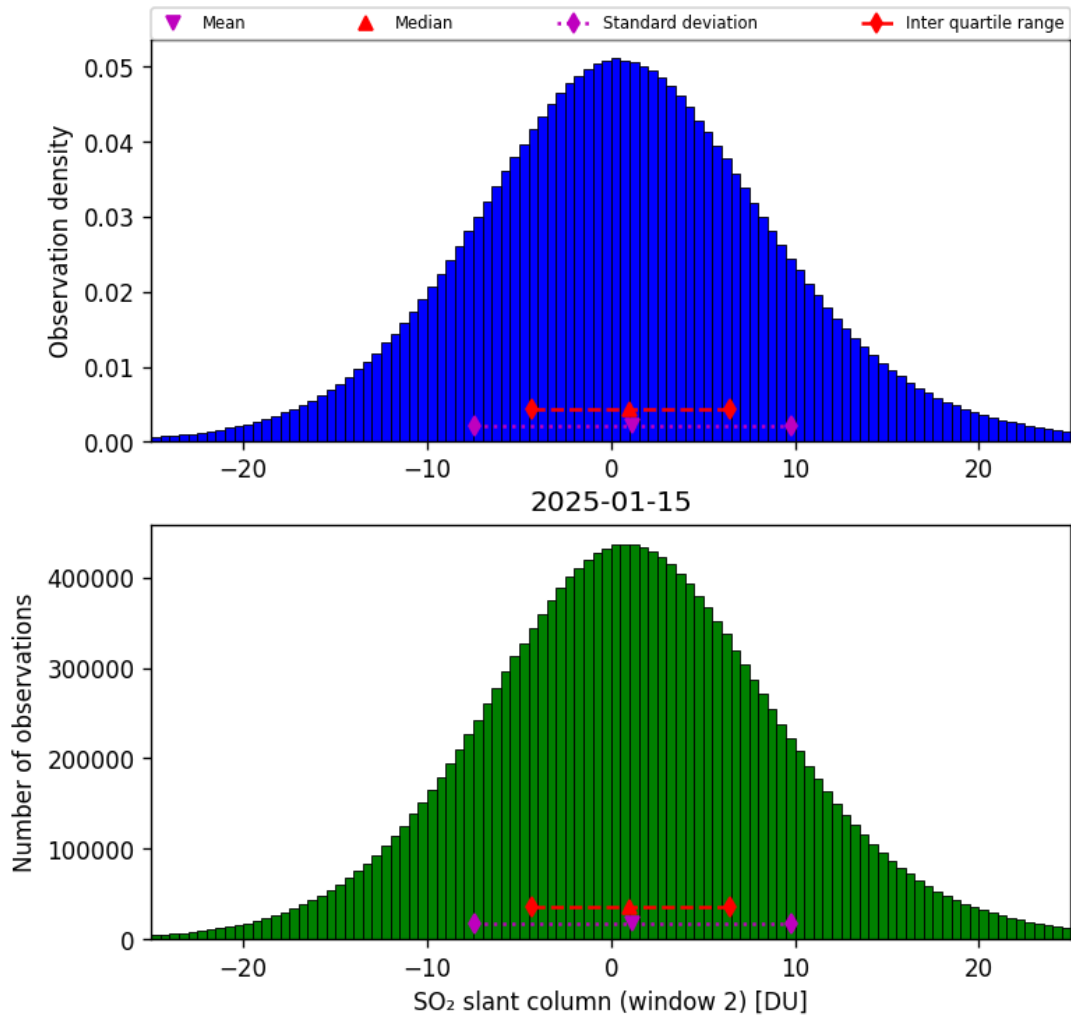


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-01-15 to 2025-01-15

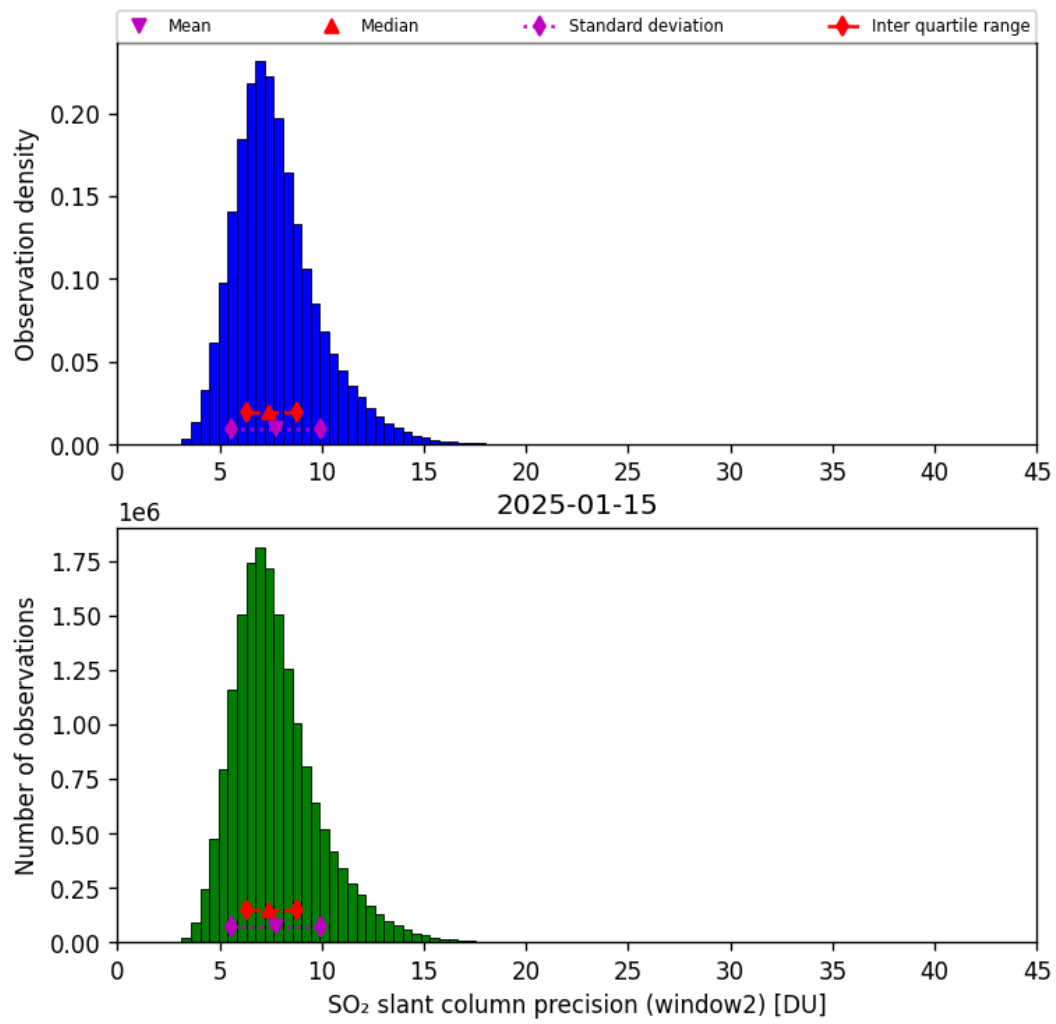


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-01-15 to 2025-01-15

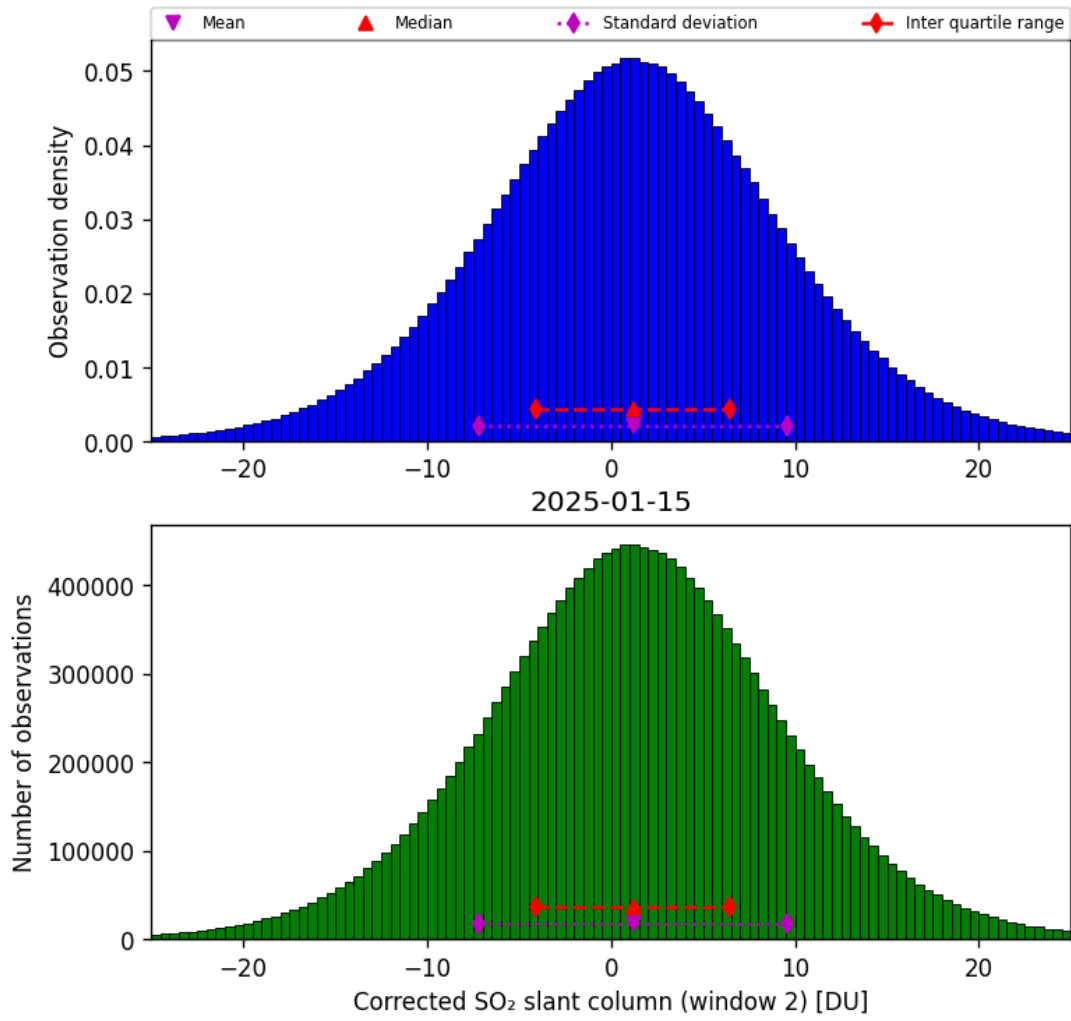


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-01-15 to 2025-01-15

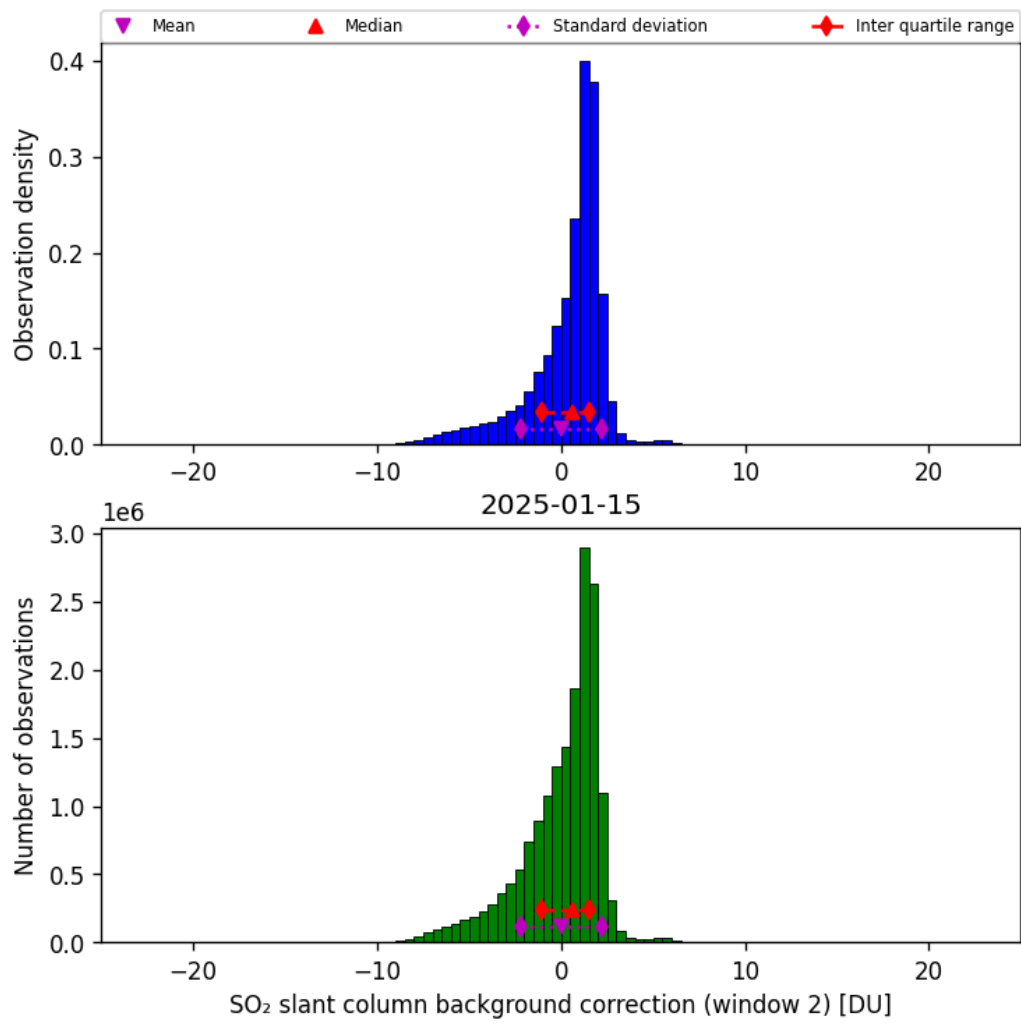


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-01-15 to 2025-01-15

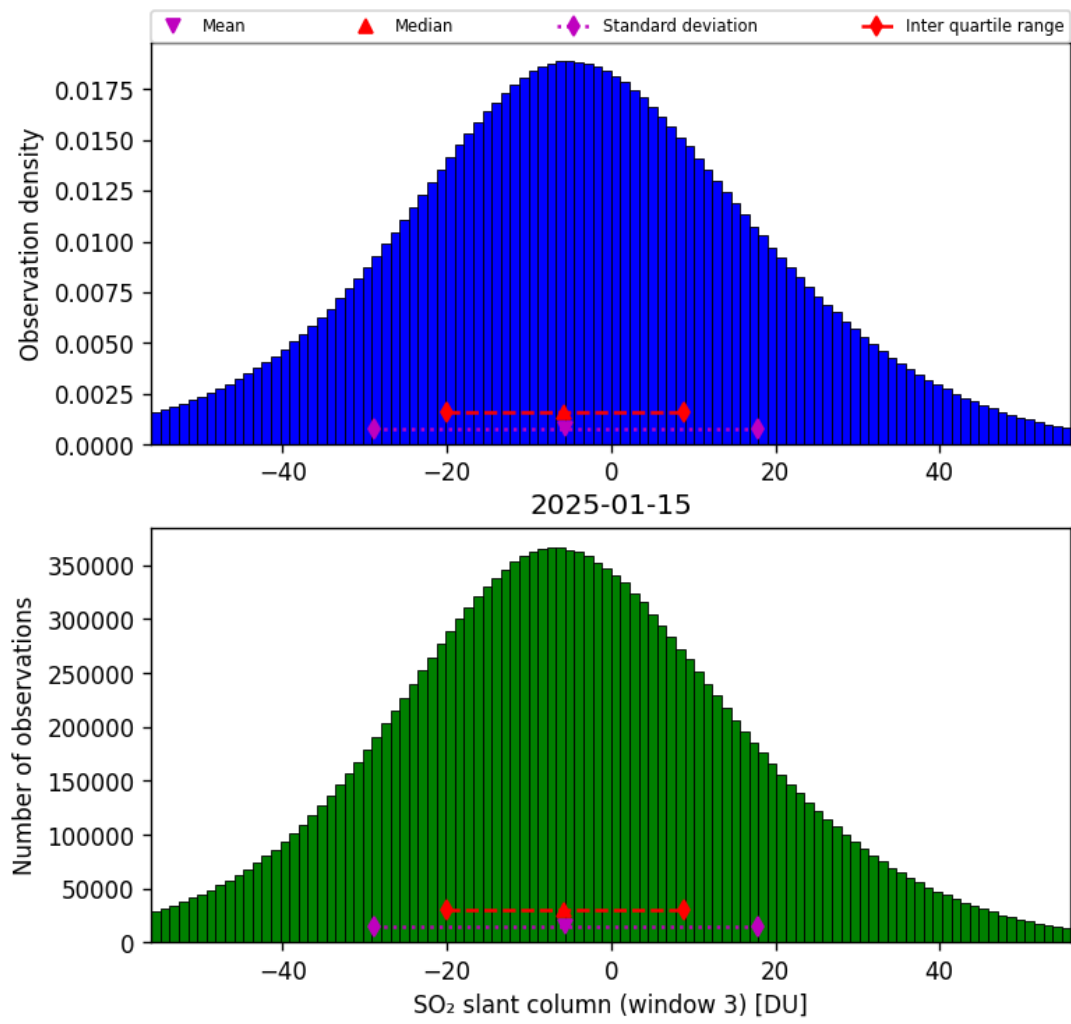


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-01-15 to 2025-01-15

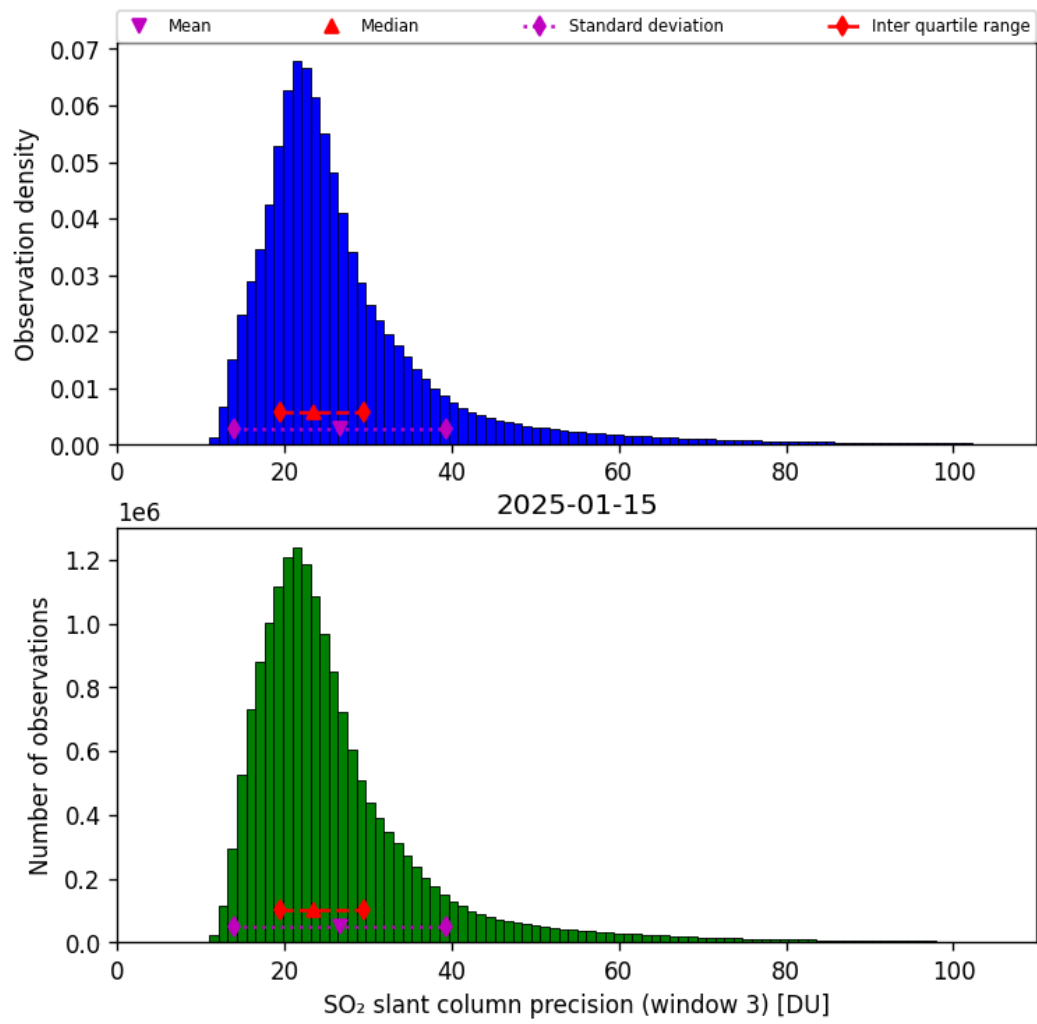


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-01-15 to 2025-01-15

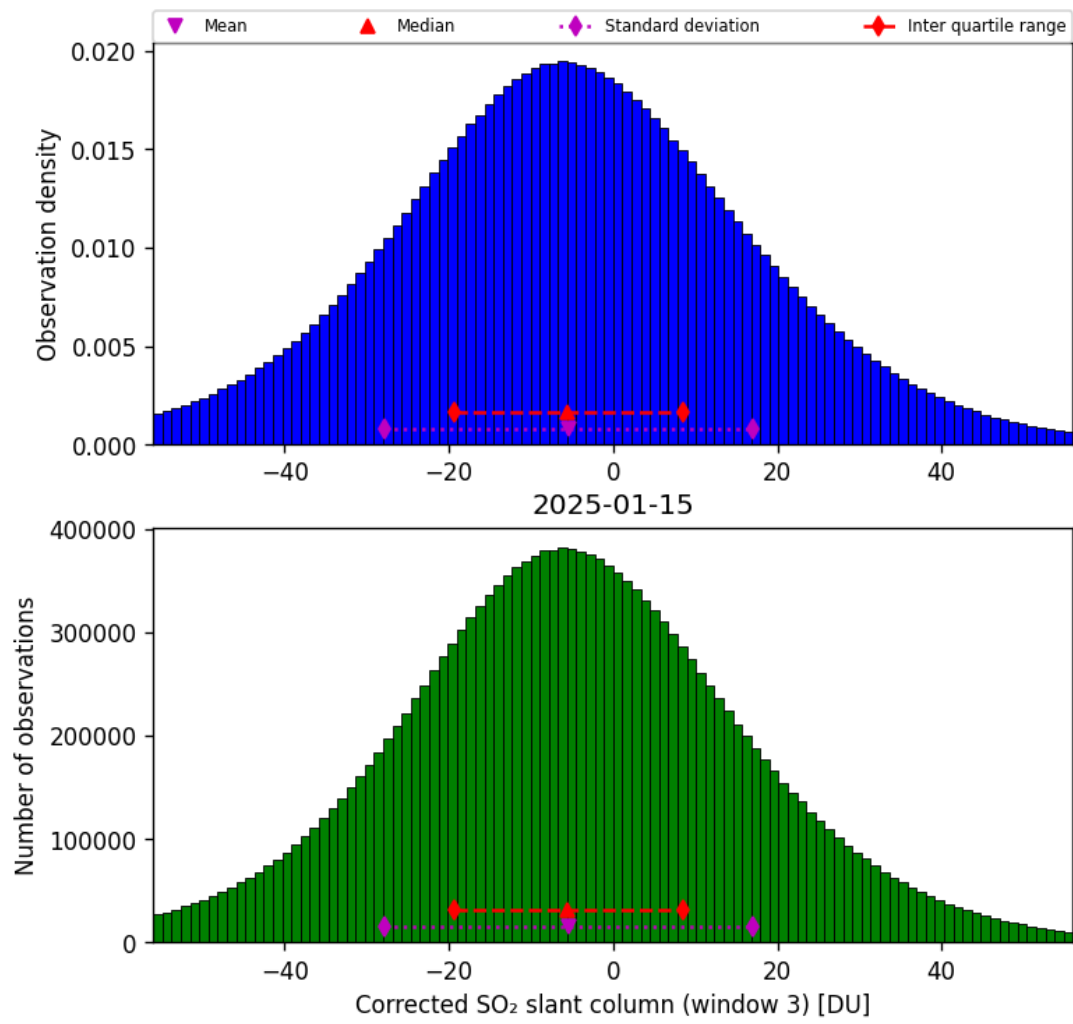


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-01-15 to 2025-01-15

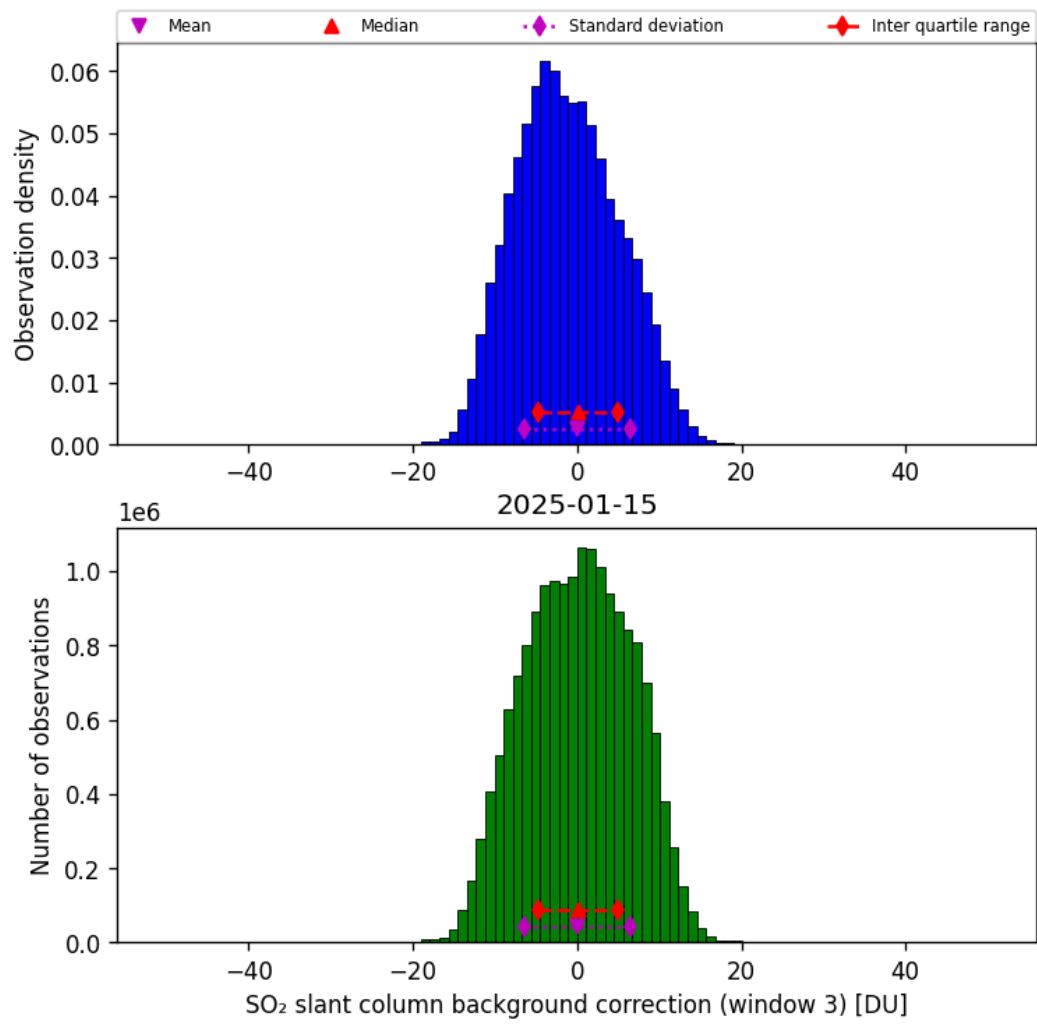


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-01-15 to 2025-01-15

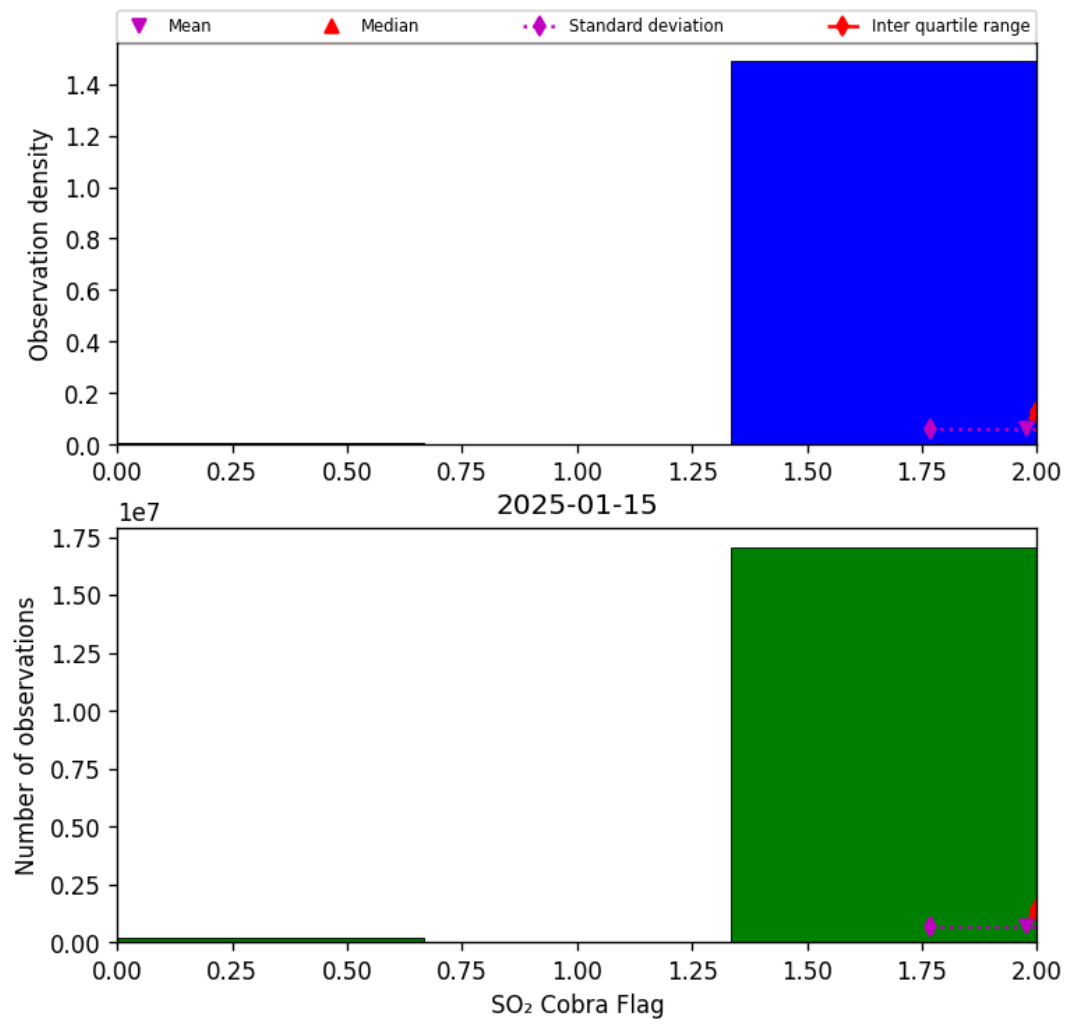


Figure 75: Histogram of "SO₂ Cobra Flag" for 2025-01-15 to 2025-01-15

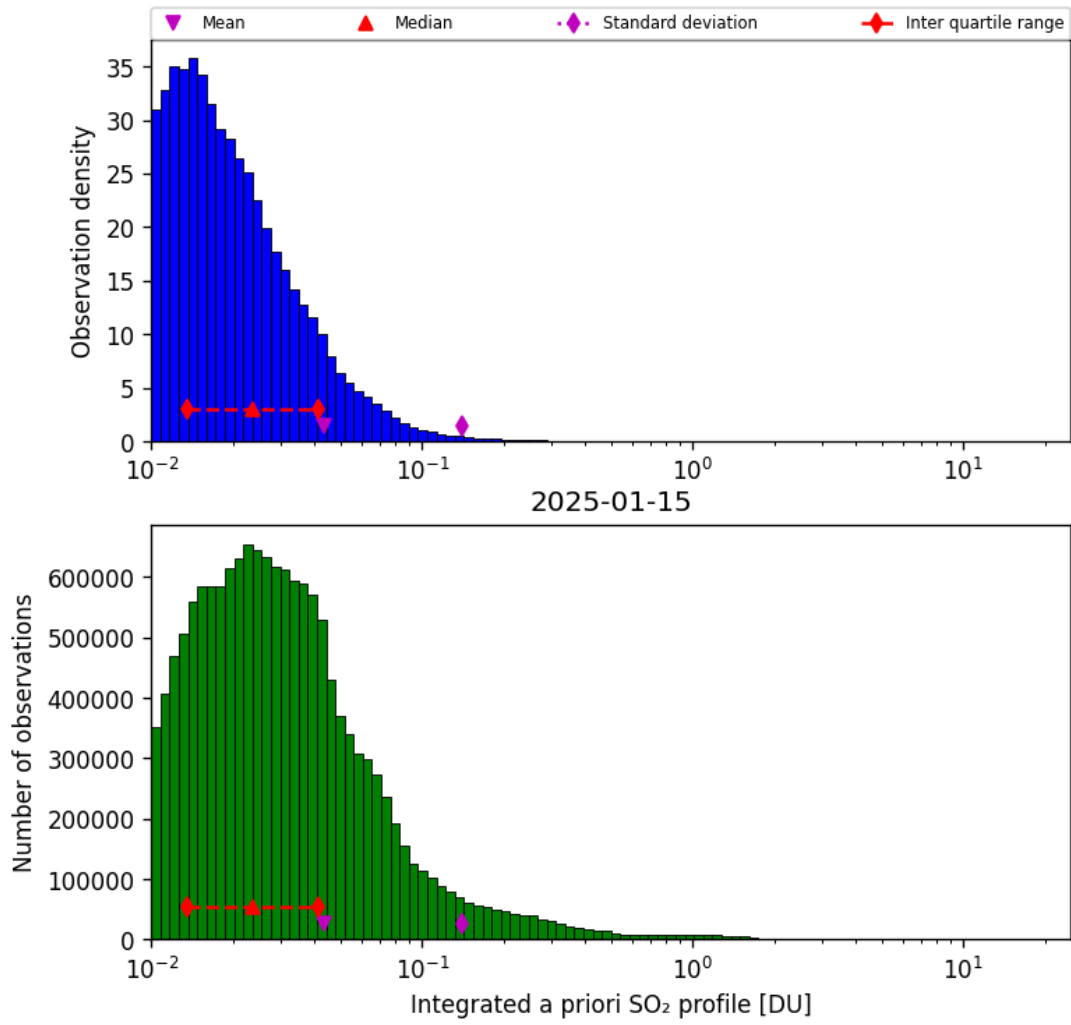


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-01-15 to 2025-01-15

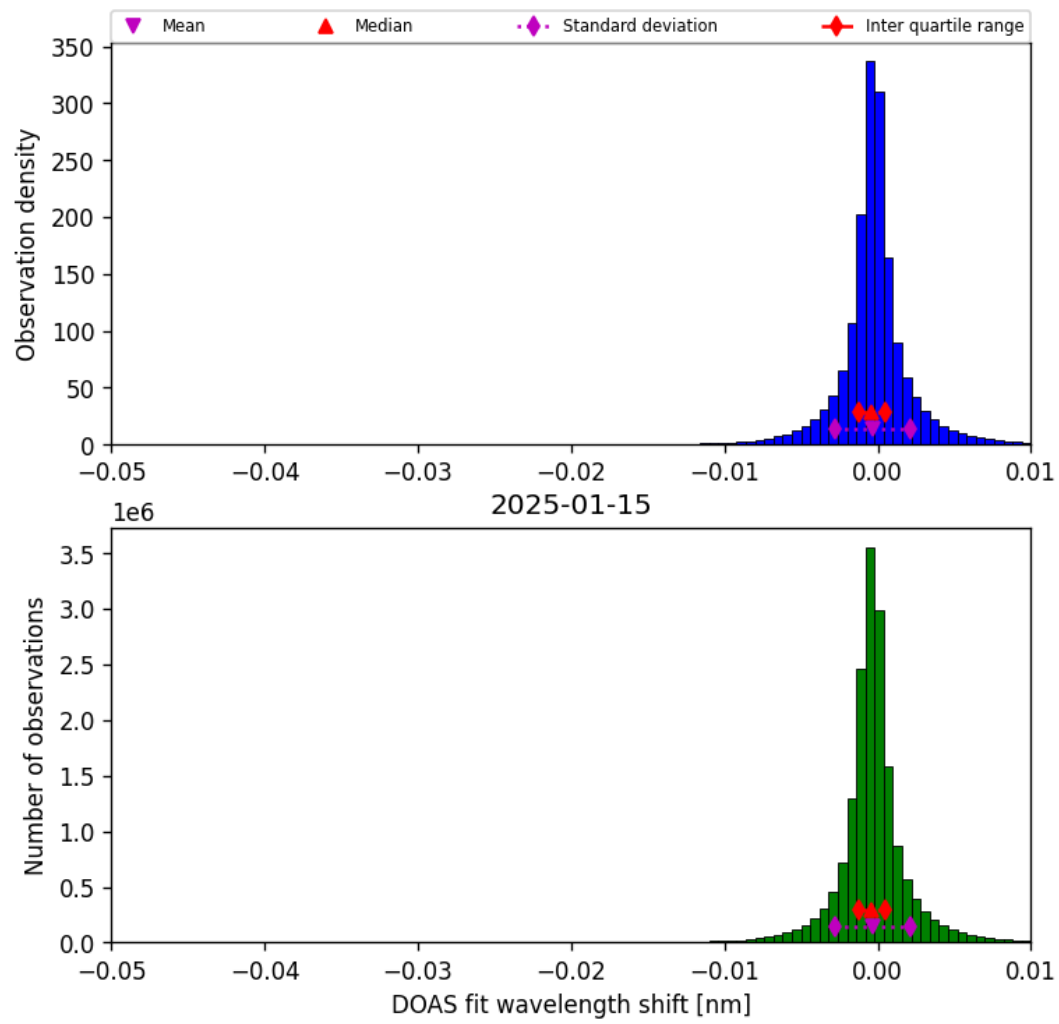


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-01-15 to 2025-01-15

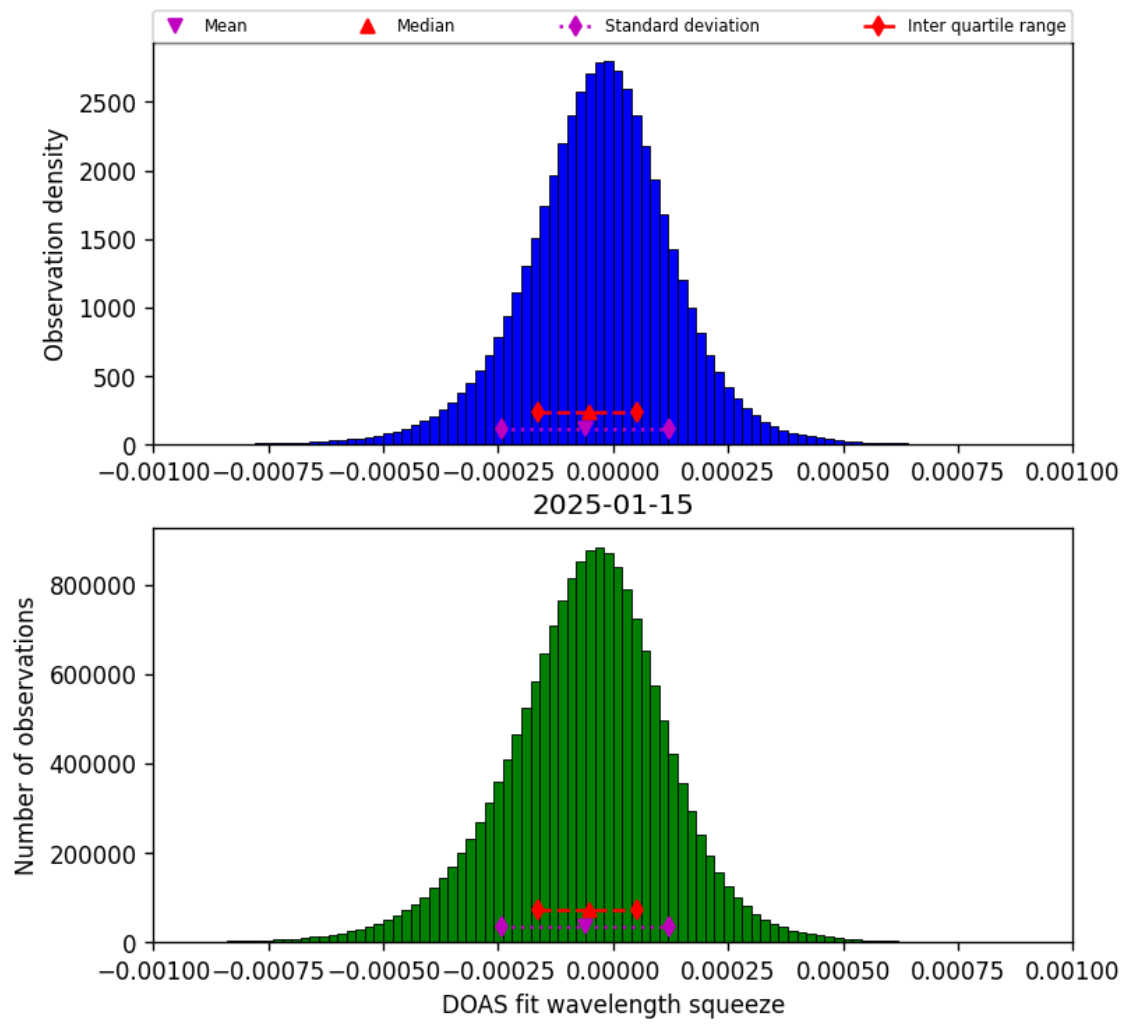


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-01-15 to 2025-01-15

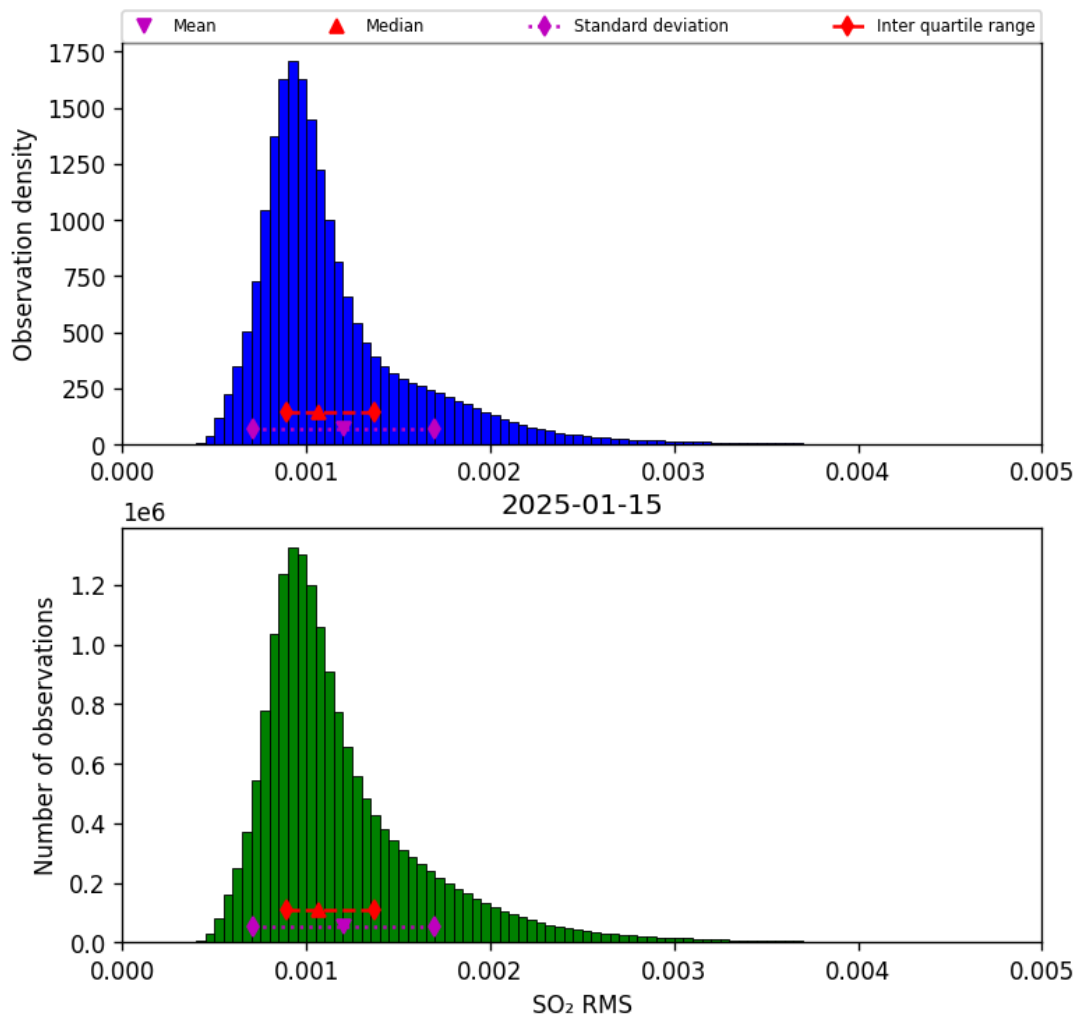


Figure 79: Histogram of “SO₂ RMS” for 2025-01-15 to 2025-01-15

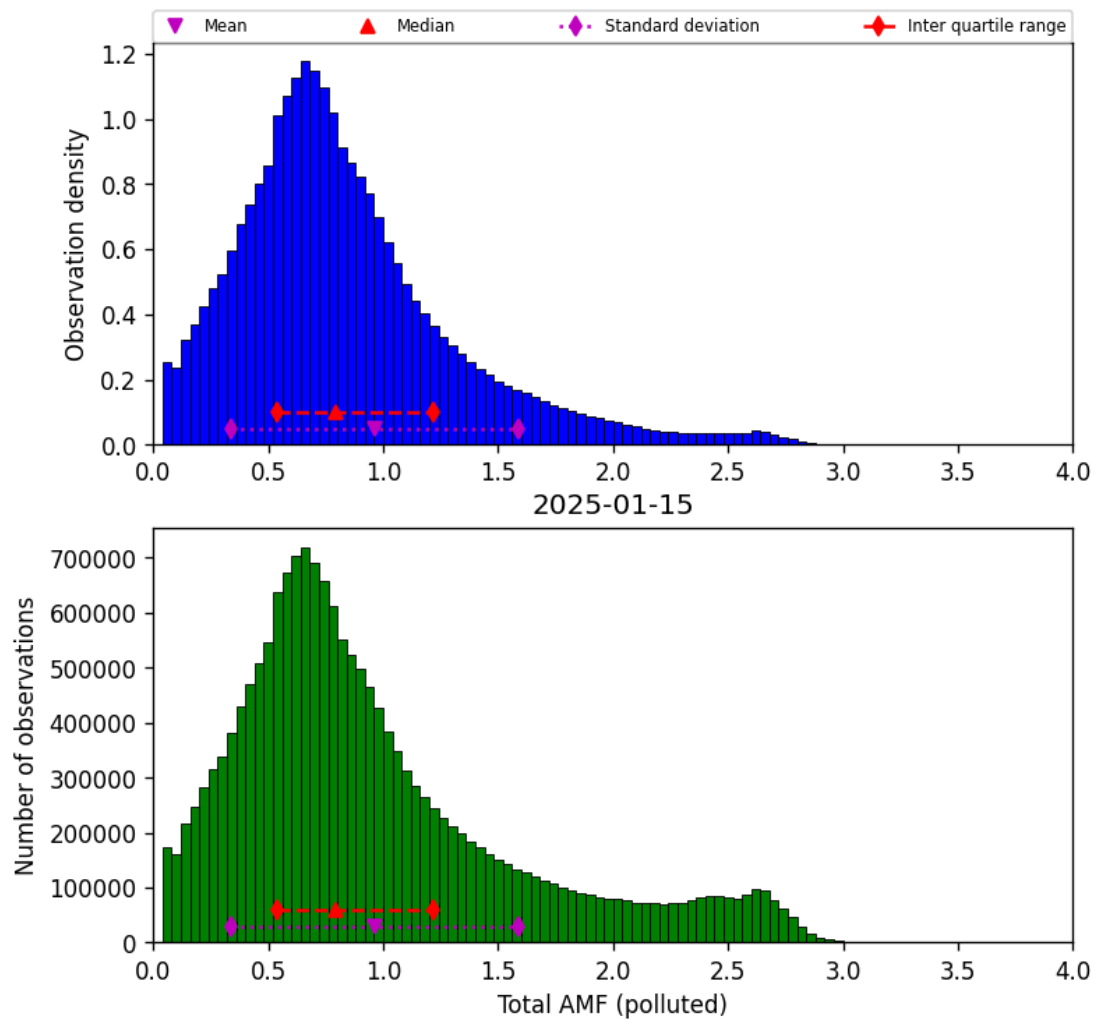


Figure 80: Histogram of “Total AMF (polluted)” for 2025-01-15 to 2025-01-15

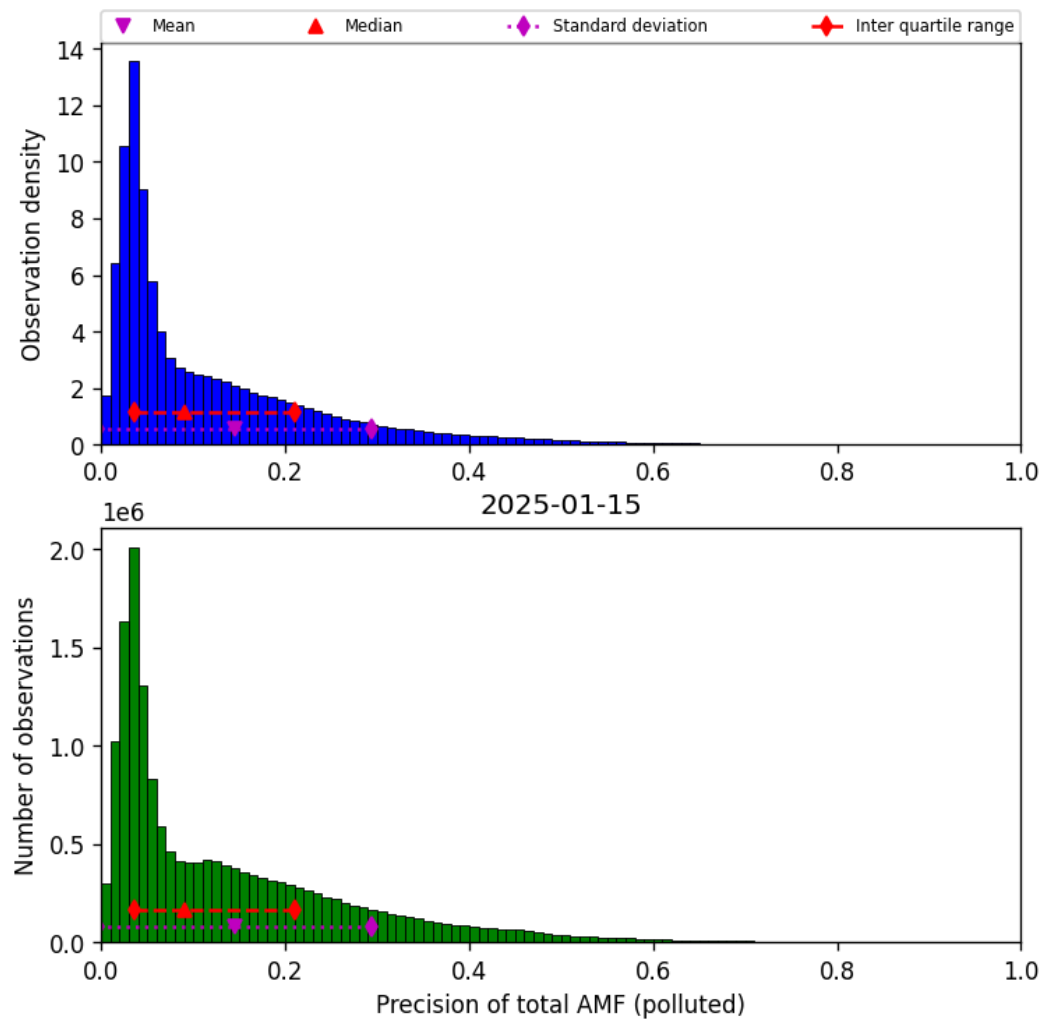


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-01-15 to 2025-01-15

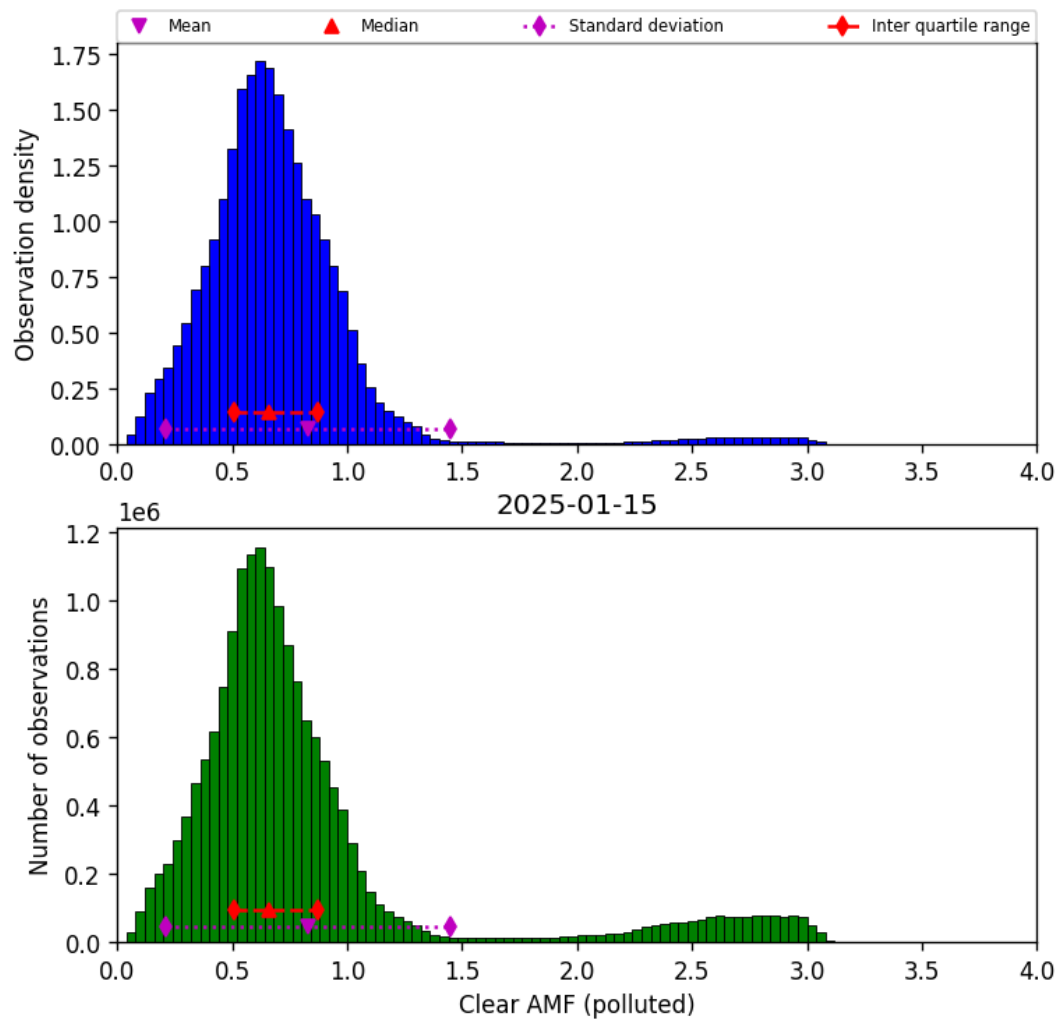


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-01-15 to 2025-01-15

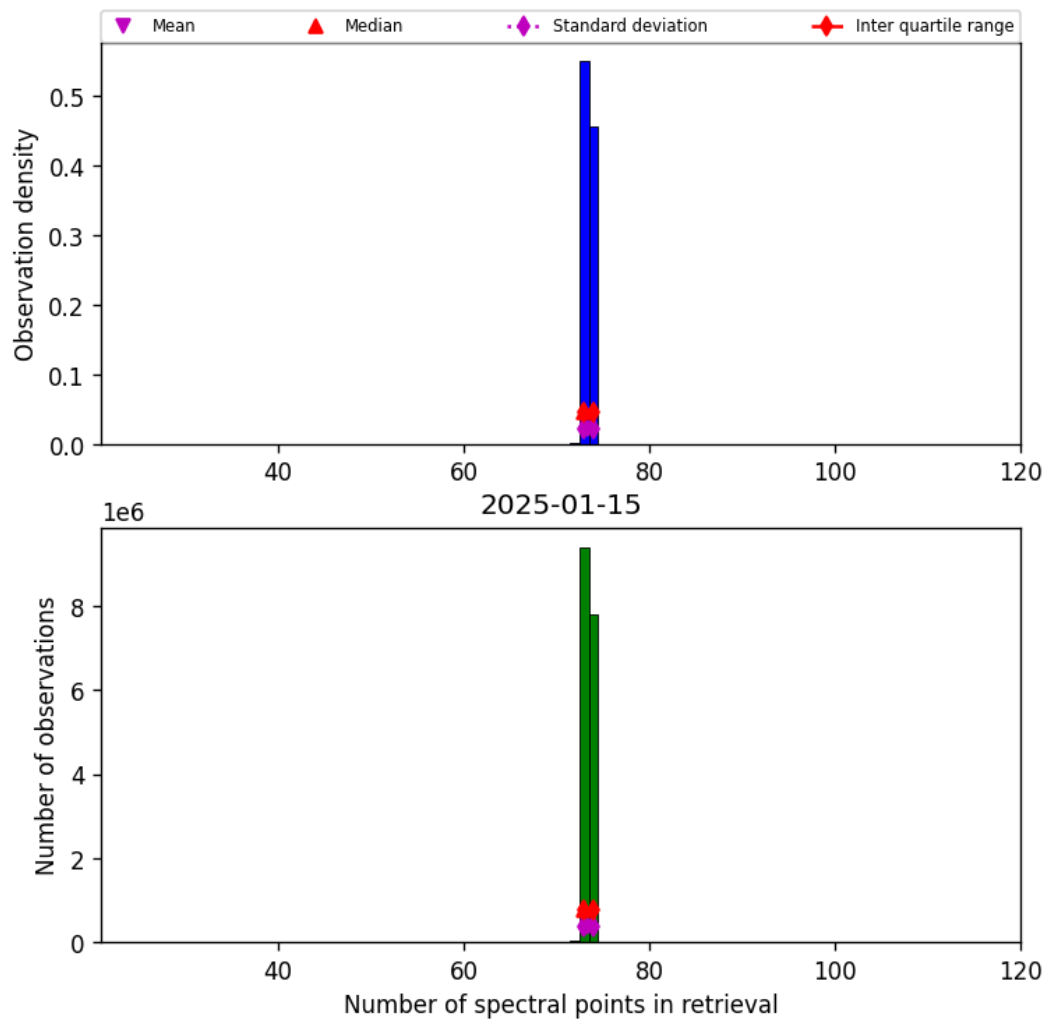


Figure 83: Histogram of "Number of spectral points in retrieval" for 2025-01-15 to 2025-01-15

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.

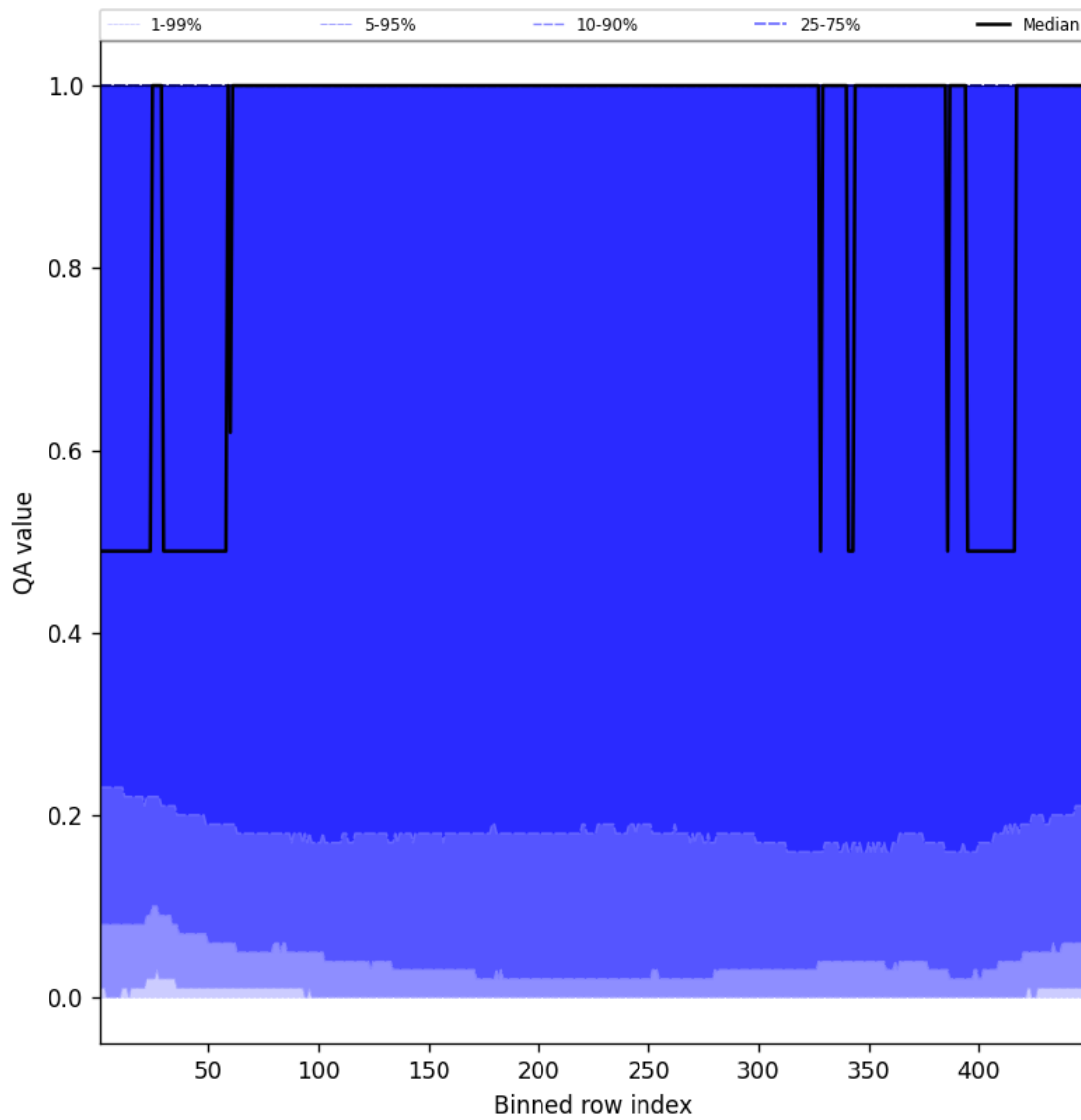


Figure 84: Along track statistics of “QA value” for 2025-01-15 to 2025-01-15

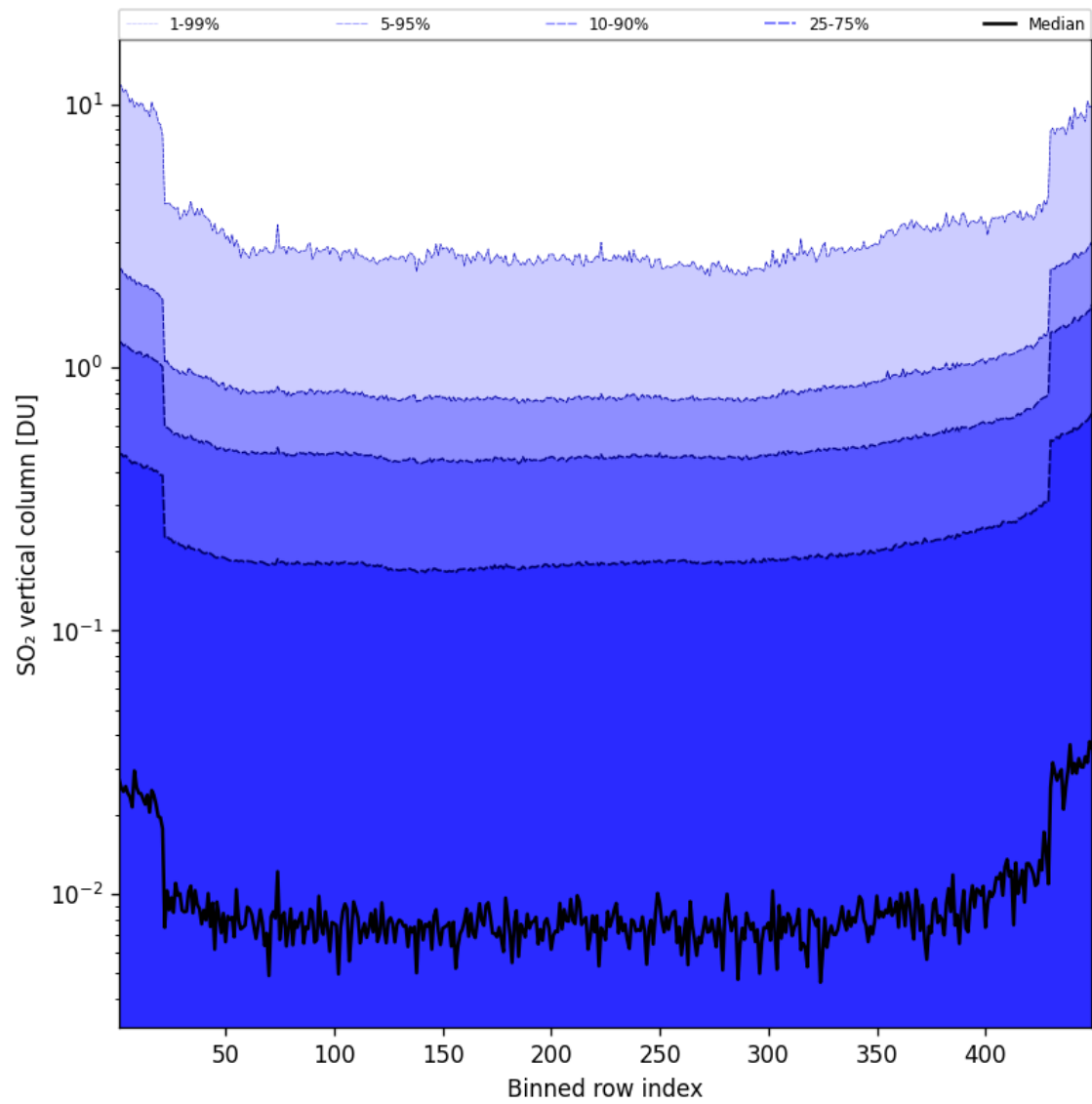


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-01-15 to 2025-01-15

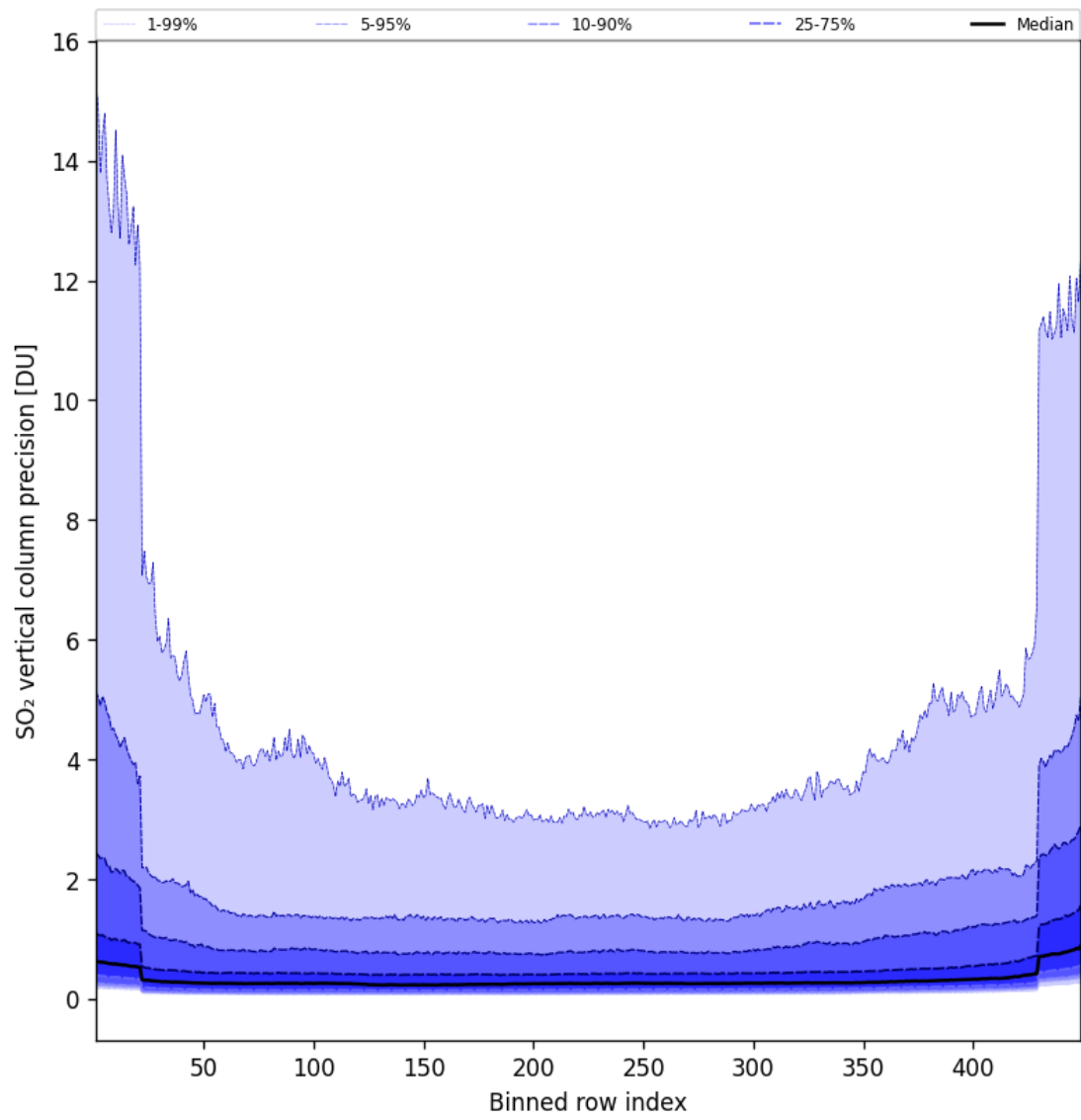


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-01-15 to 2025-01-15

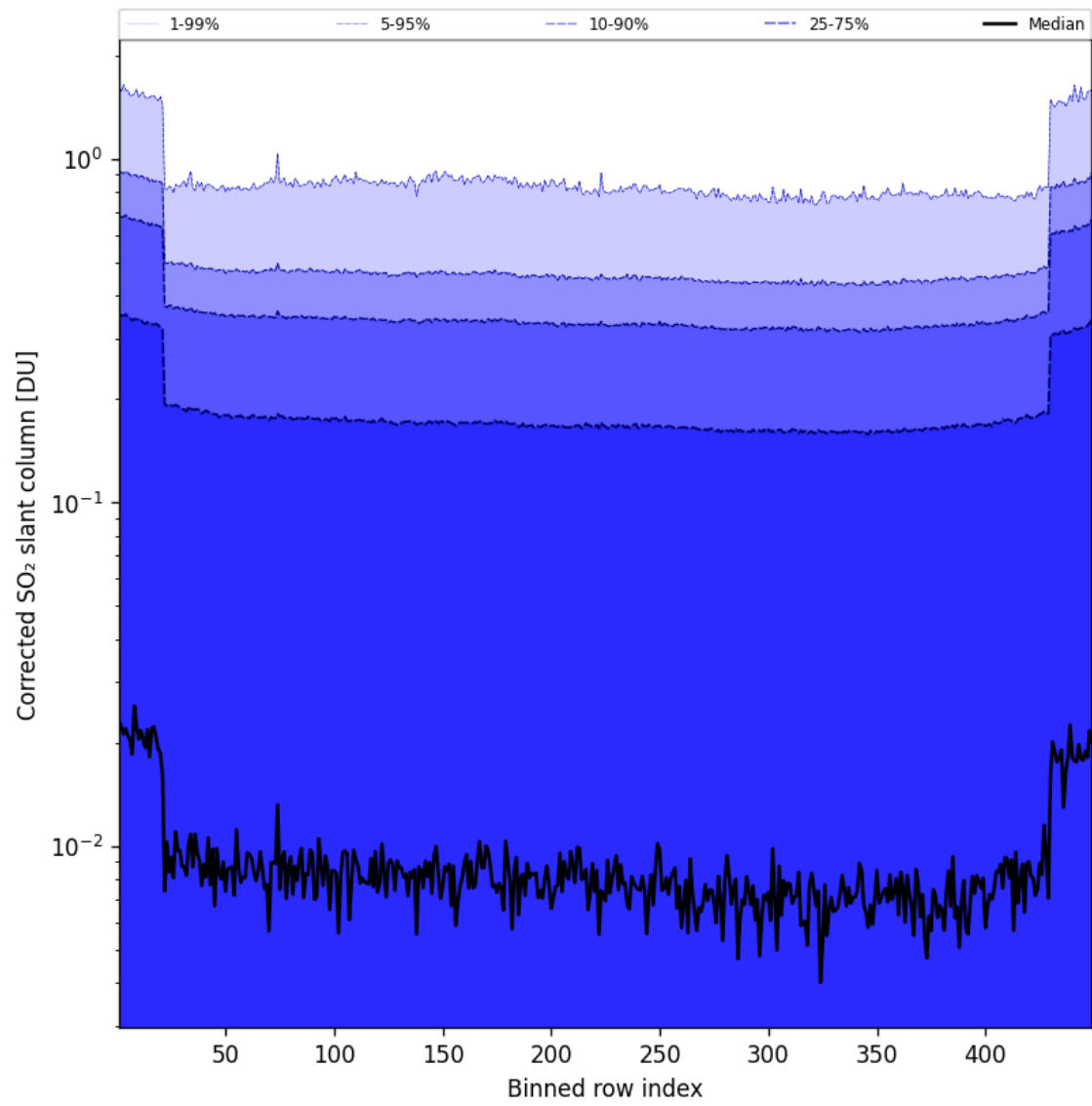


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-01-15 to 2025-01-15

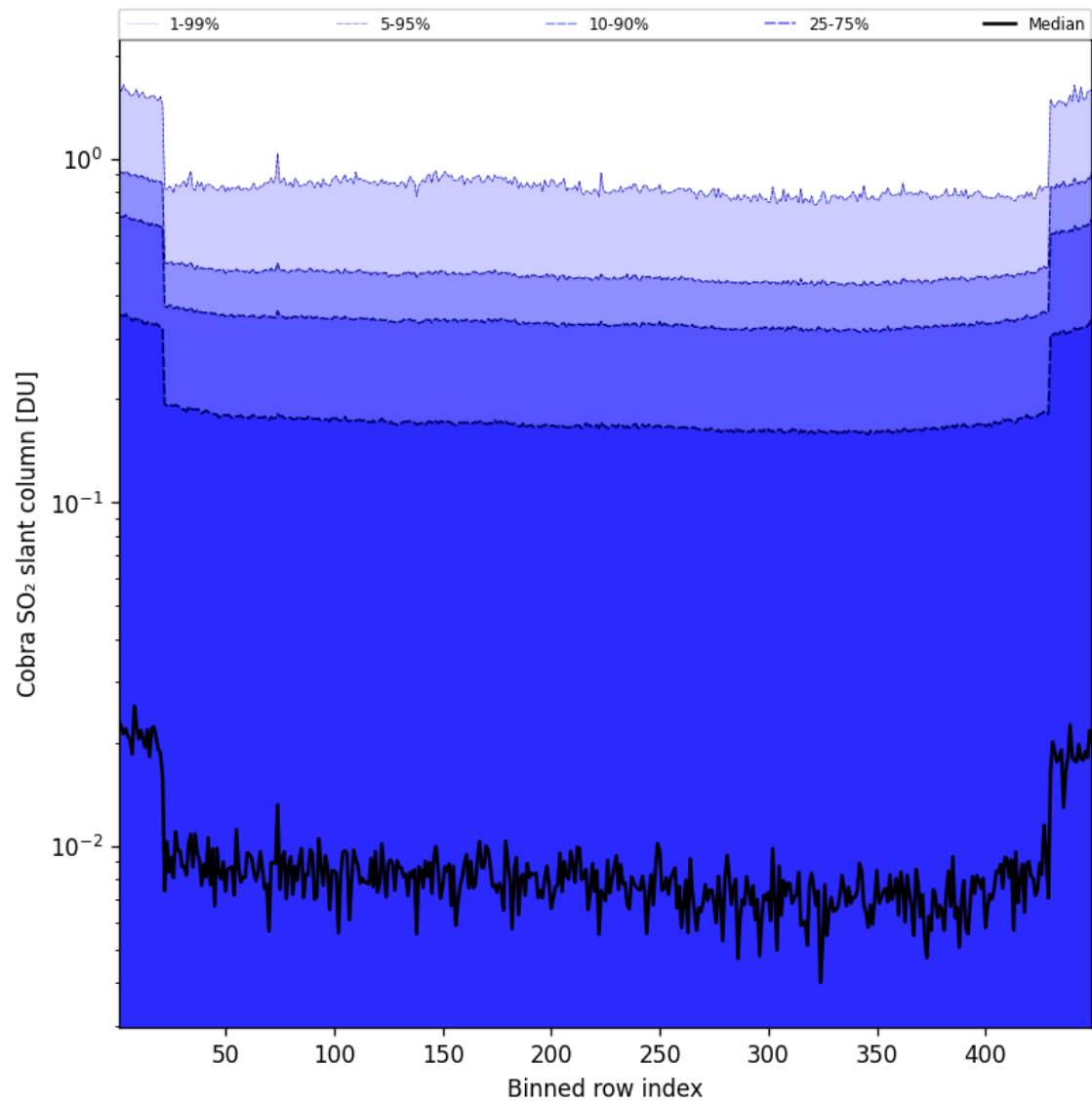


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-01-15 to 2025-01-15

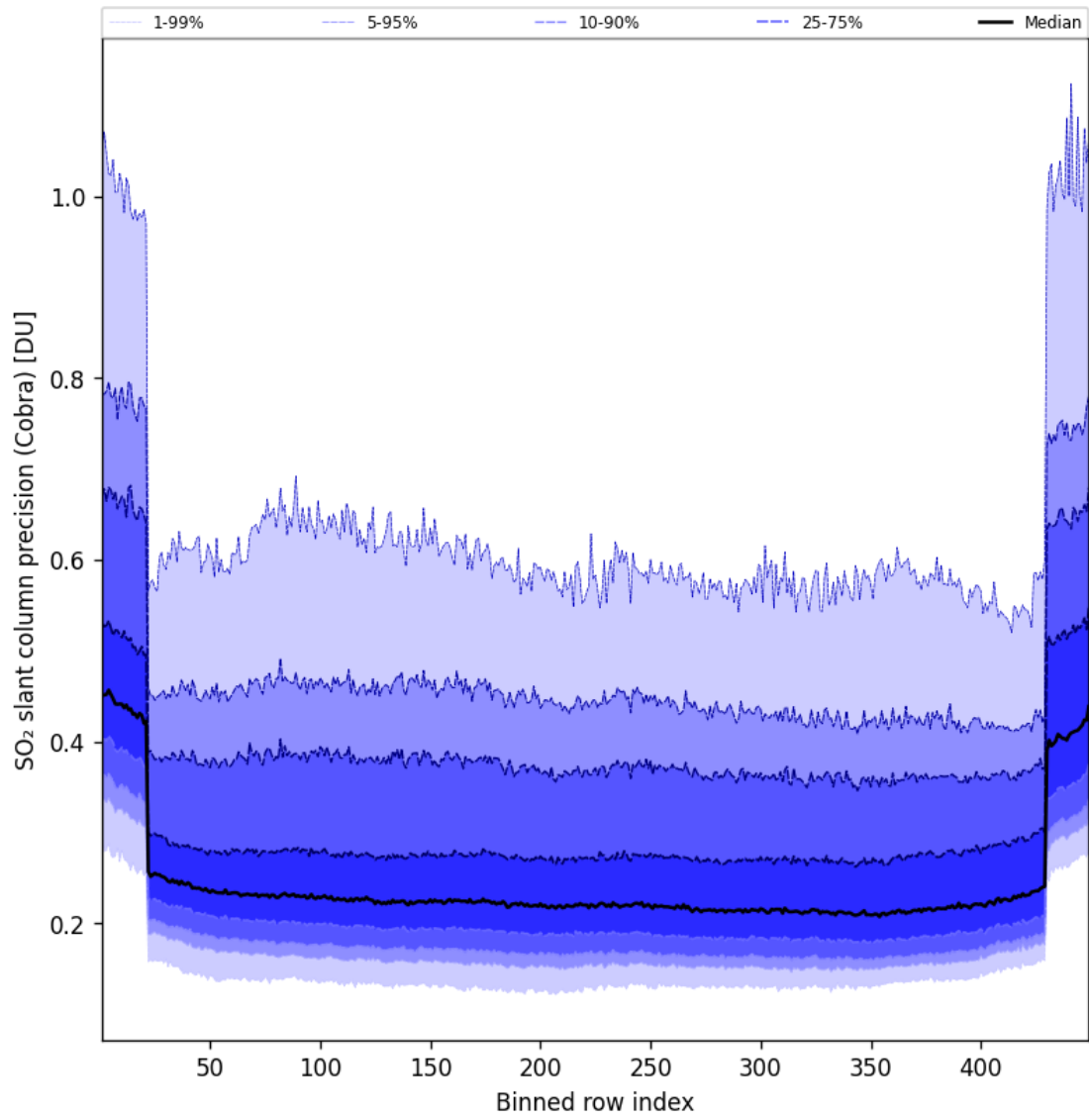


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-01-15 to 2025-01-15

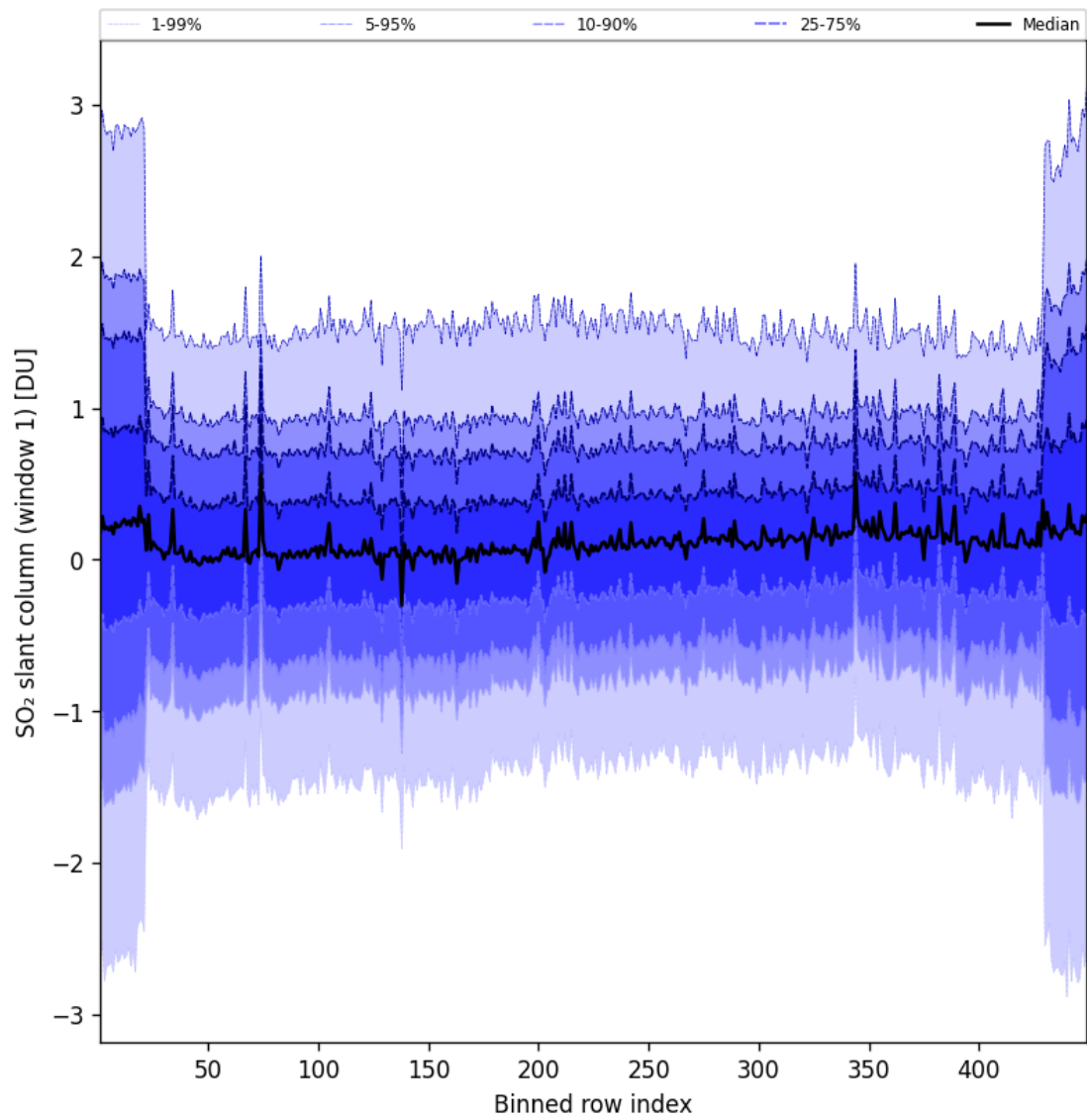


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-01-15 to 2025-01-15

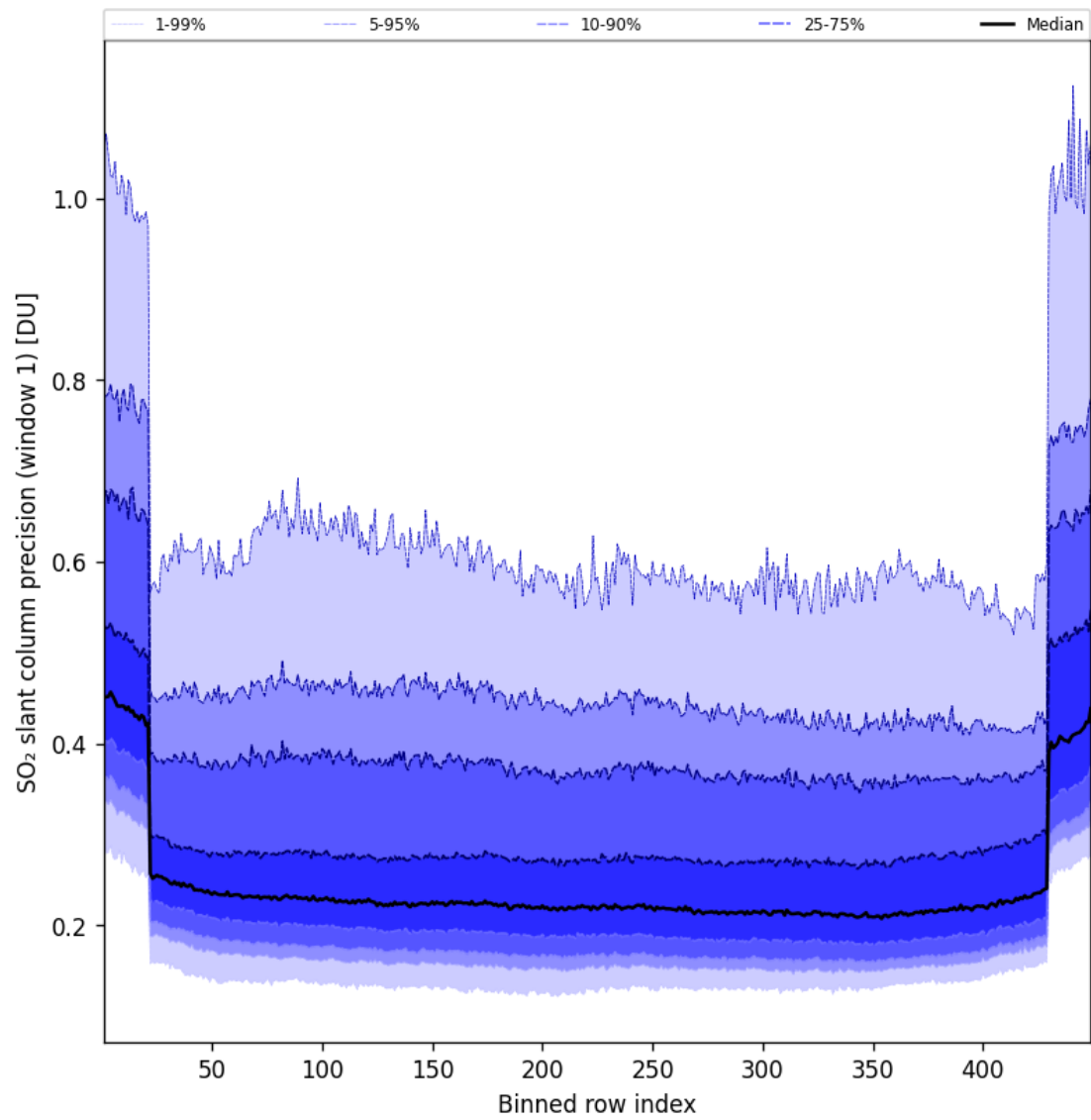


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-01-15 to 2025-01-15

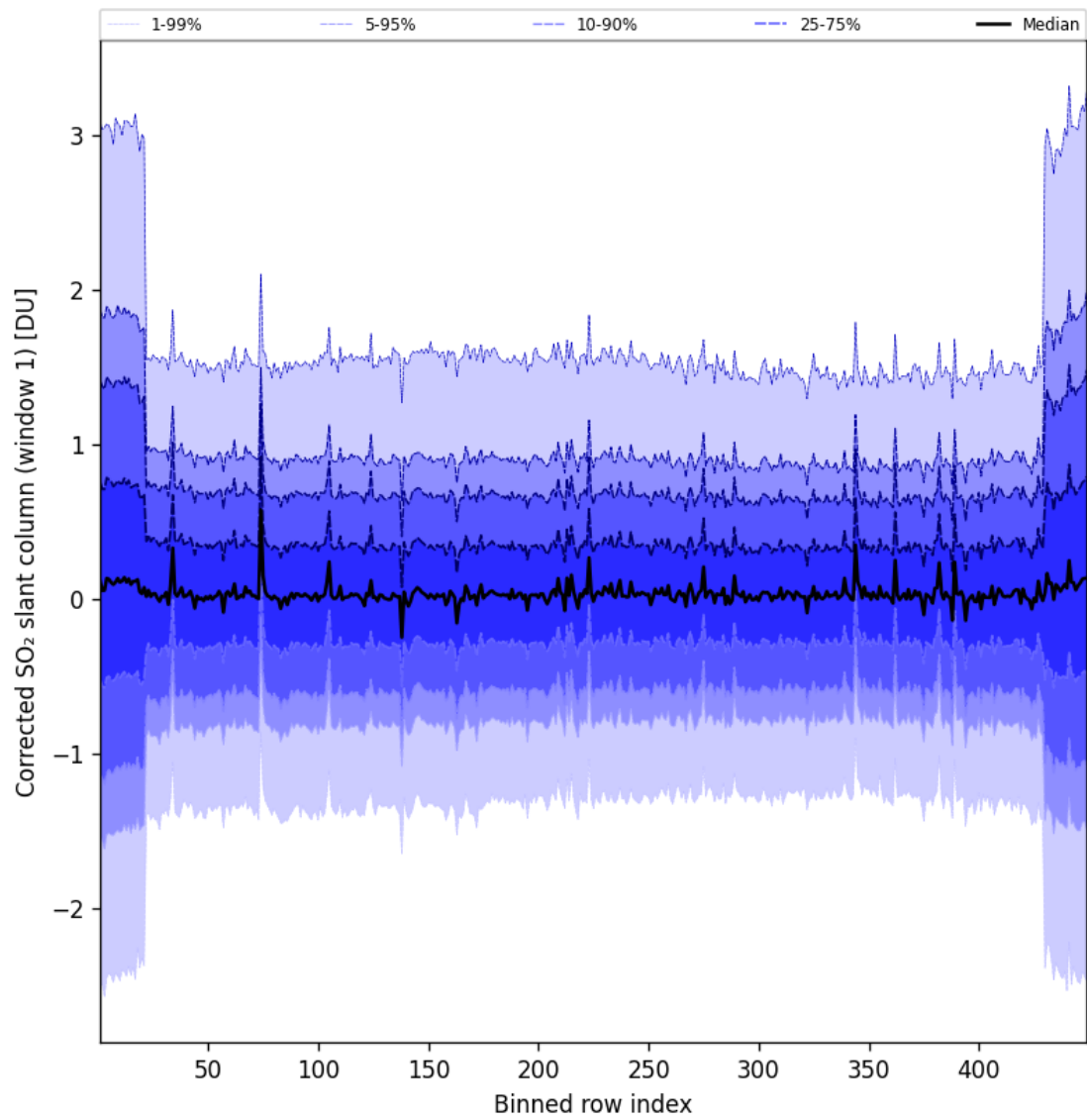


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-01-15 to 2025-01-15

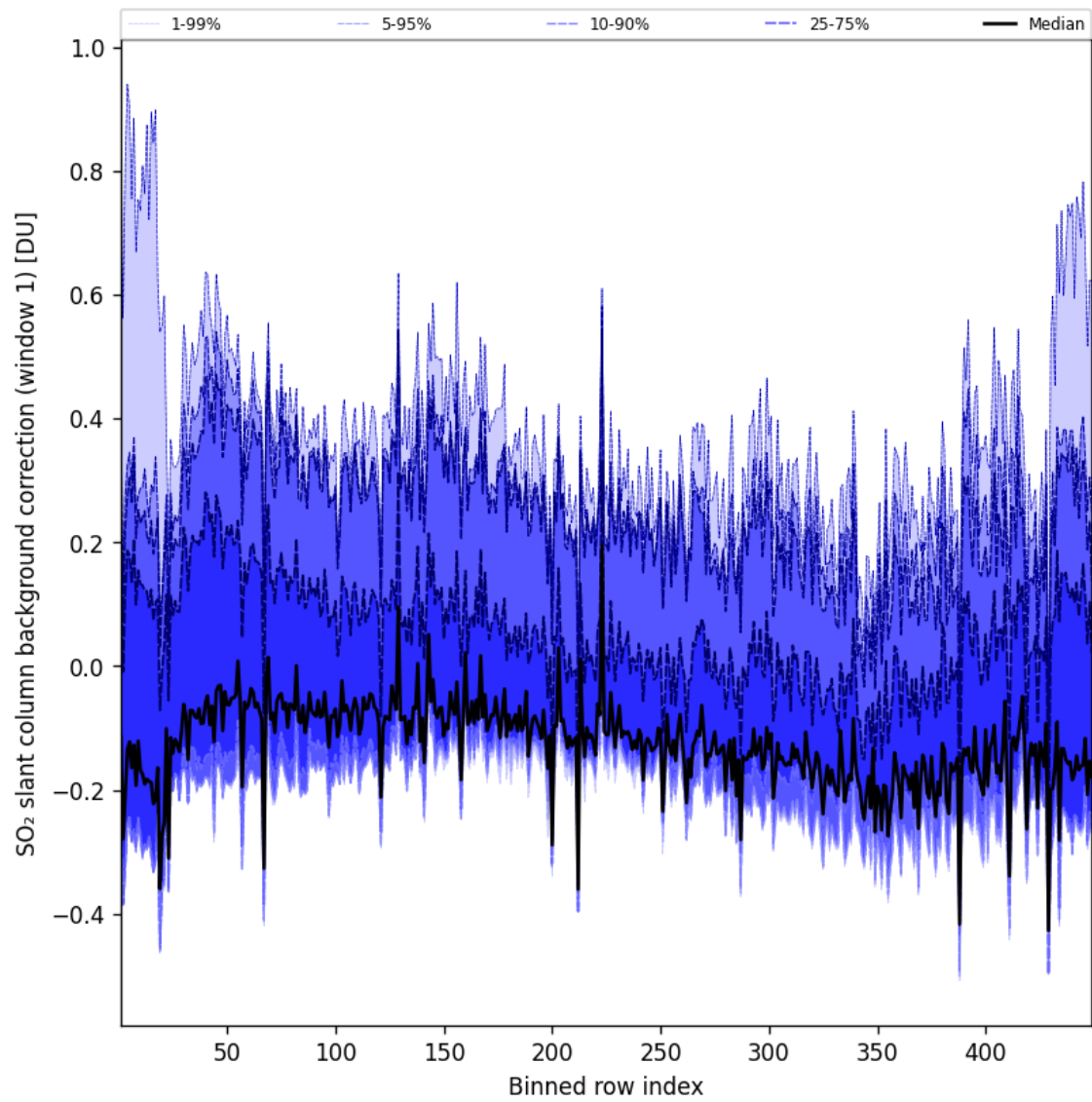


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-01-15 to 2025-01-15

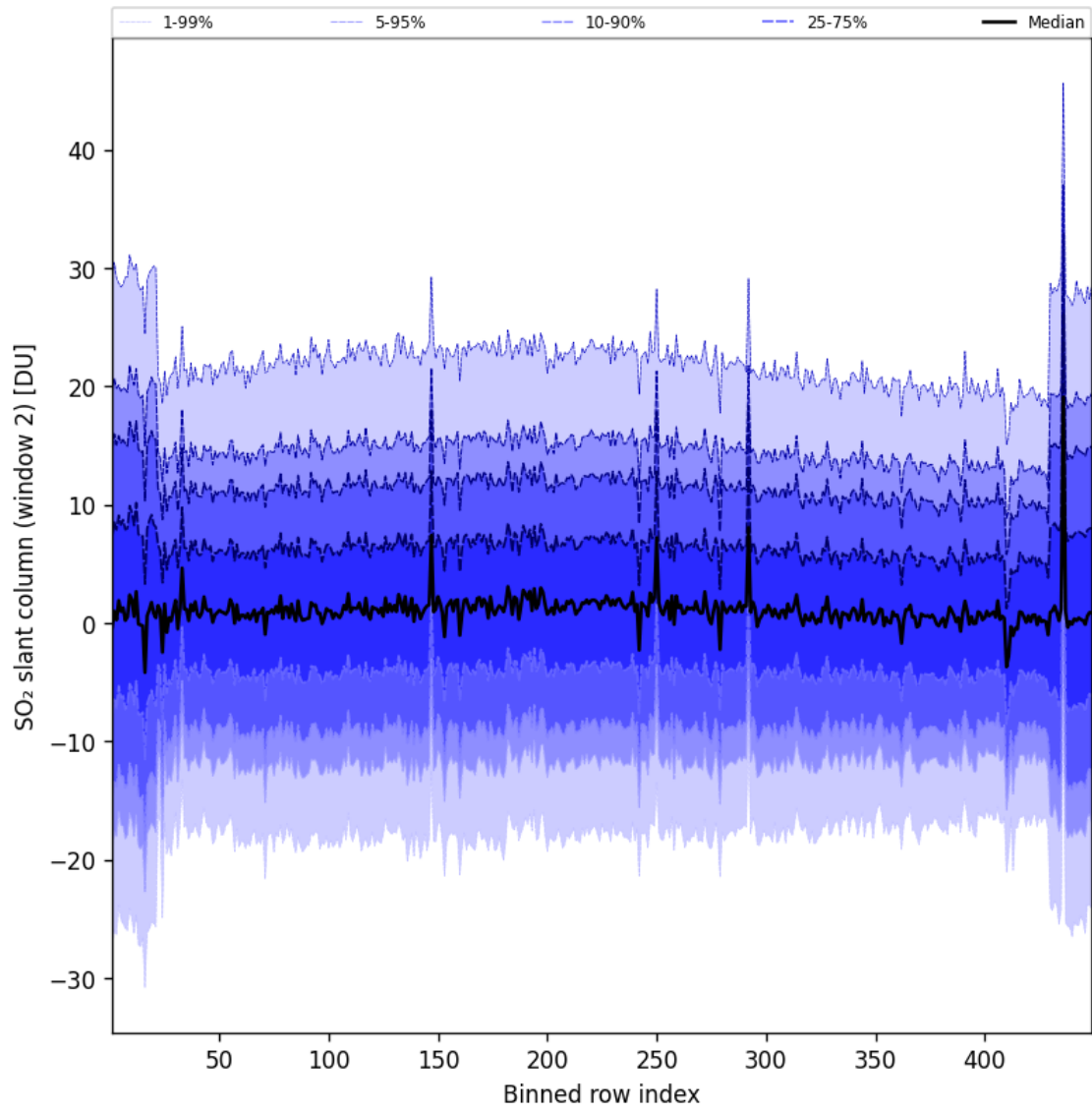


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-01-15 to 2025-01-15

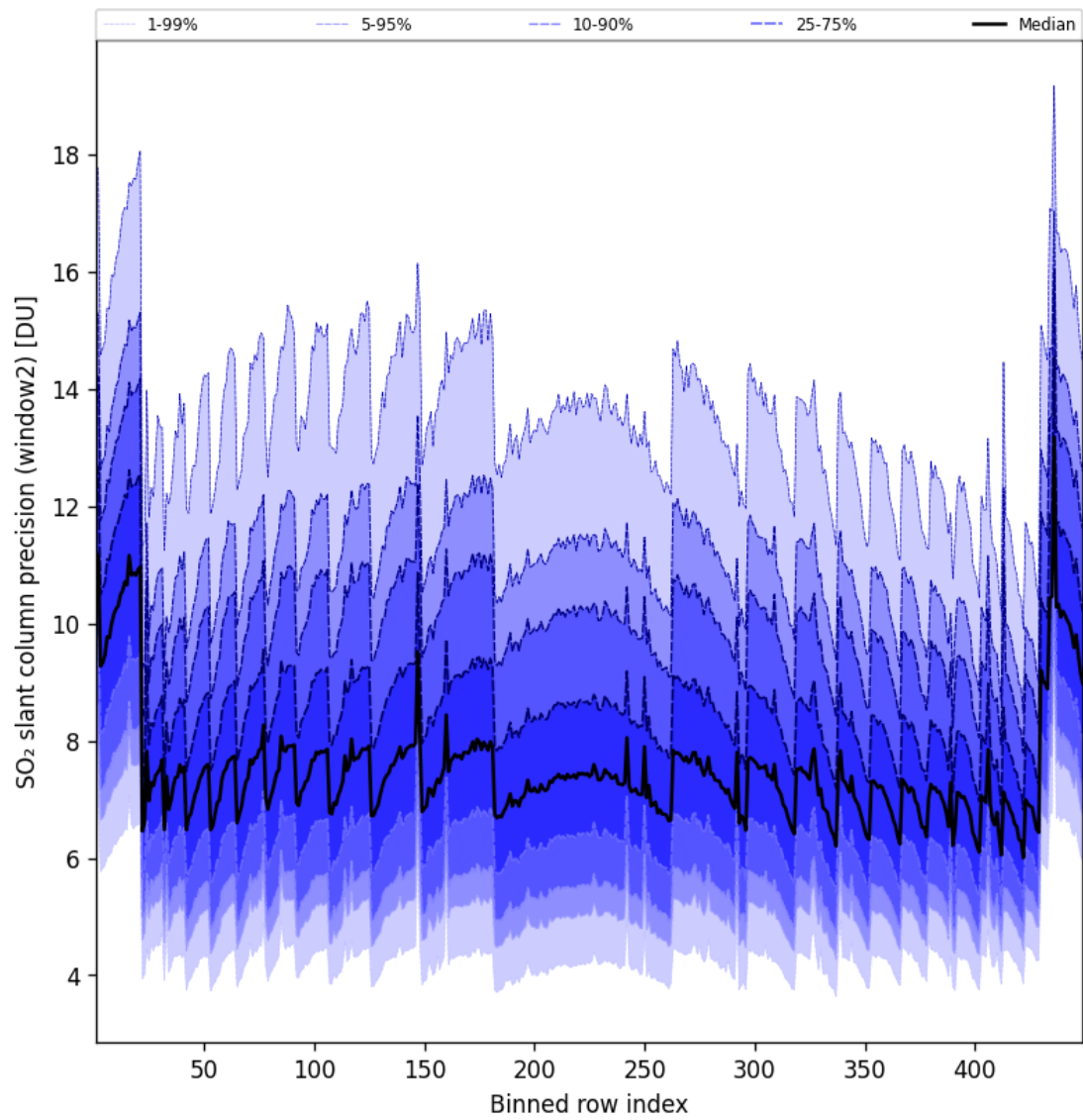


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-01-15 to 2025-01-15

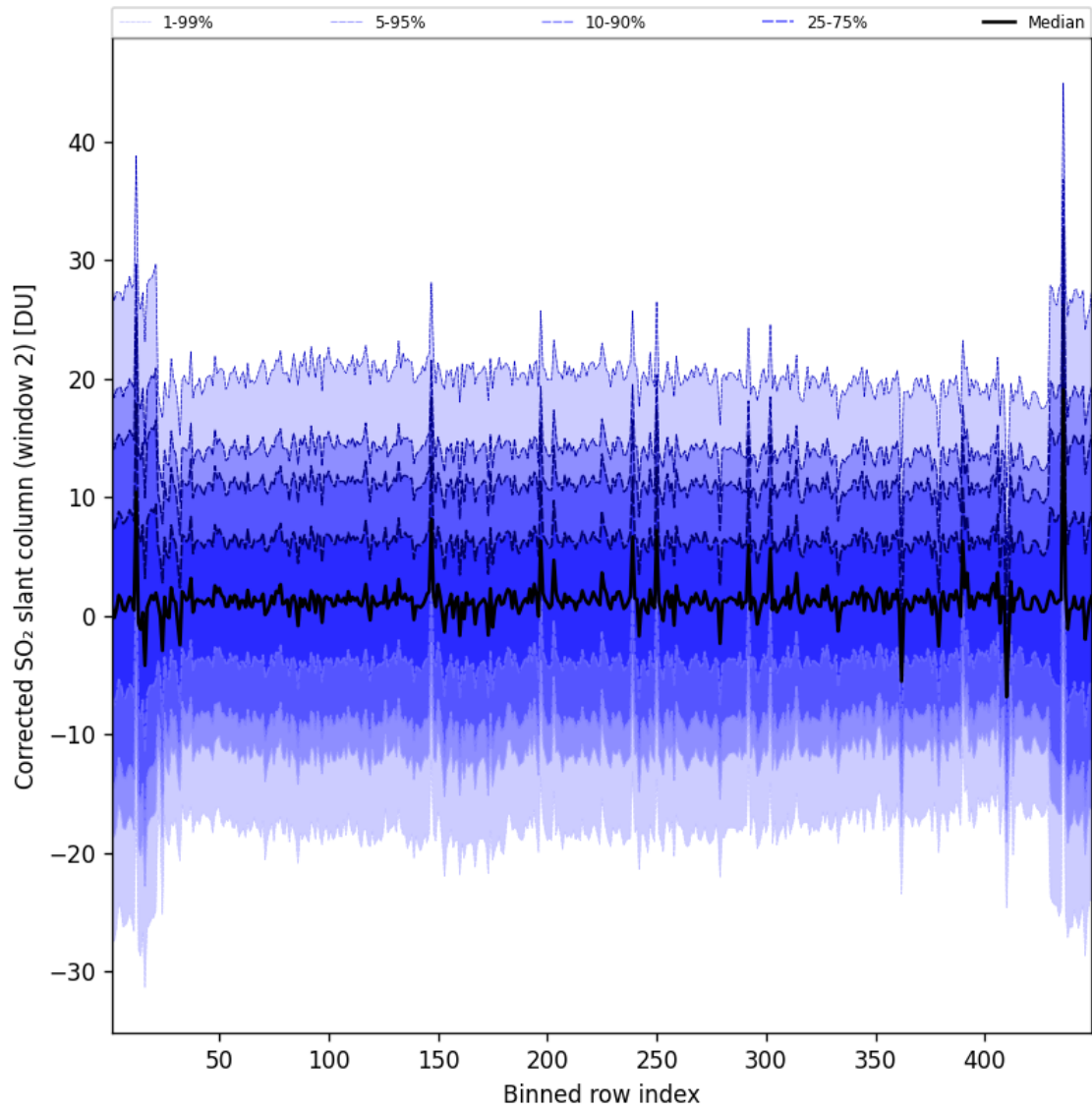


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-01-15 to 2025-01-15

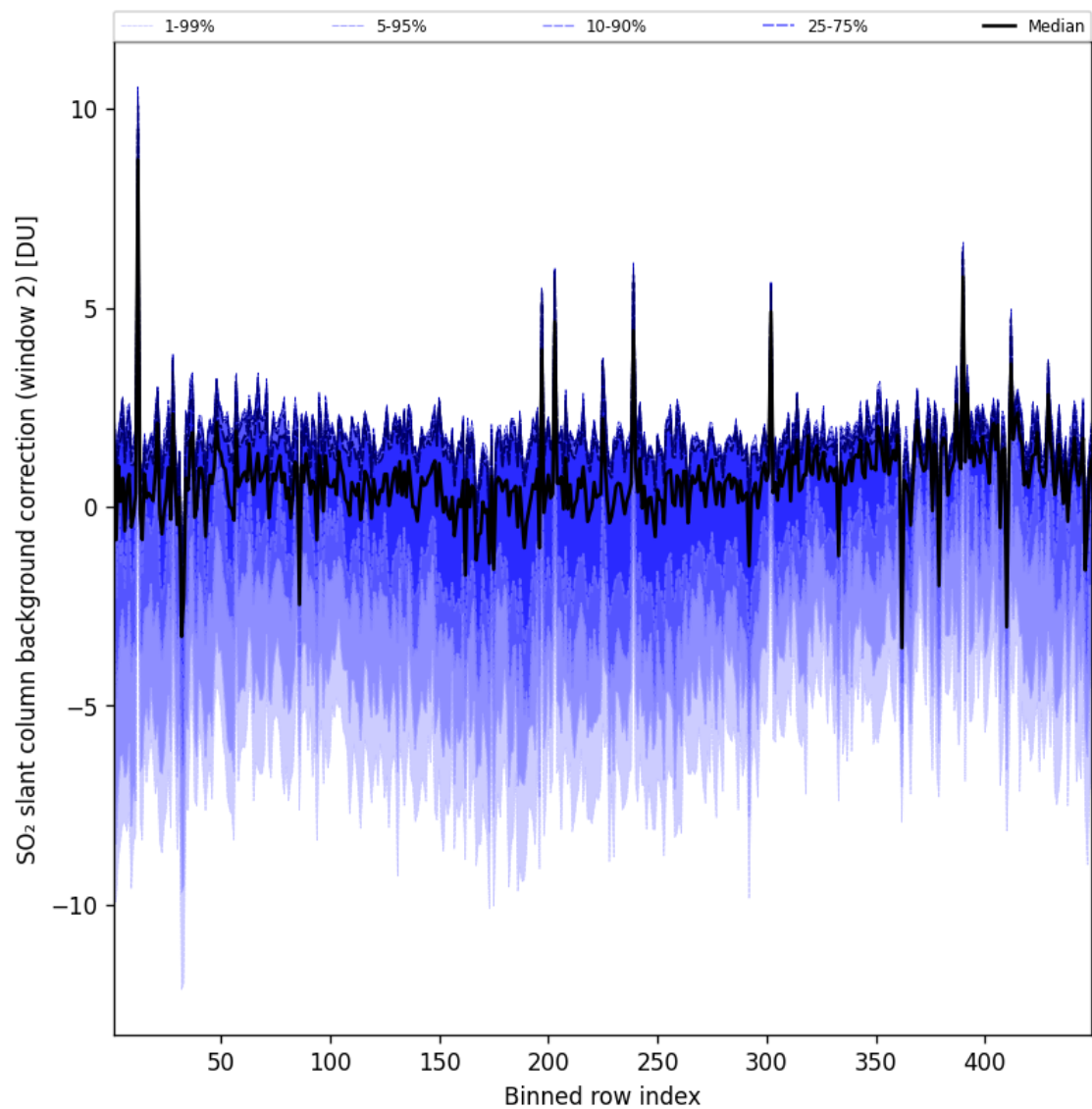


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-01-15 to 2025-01-15

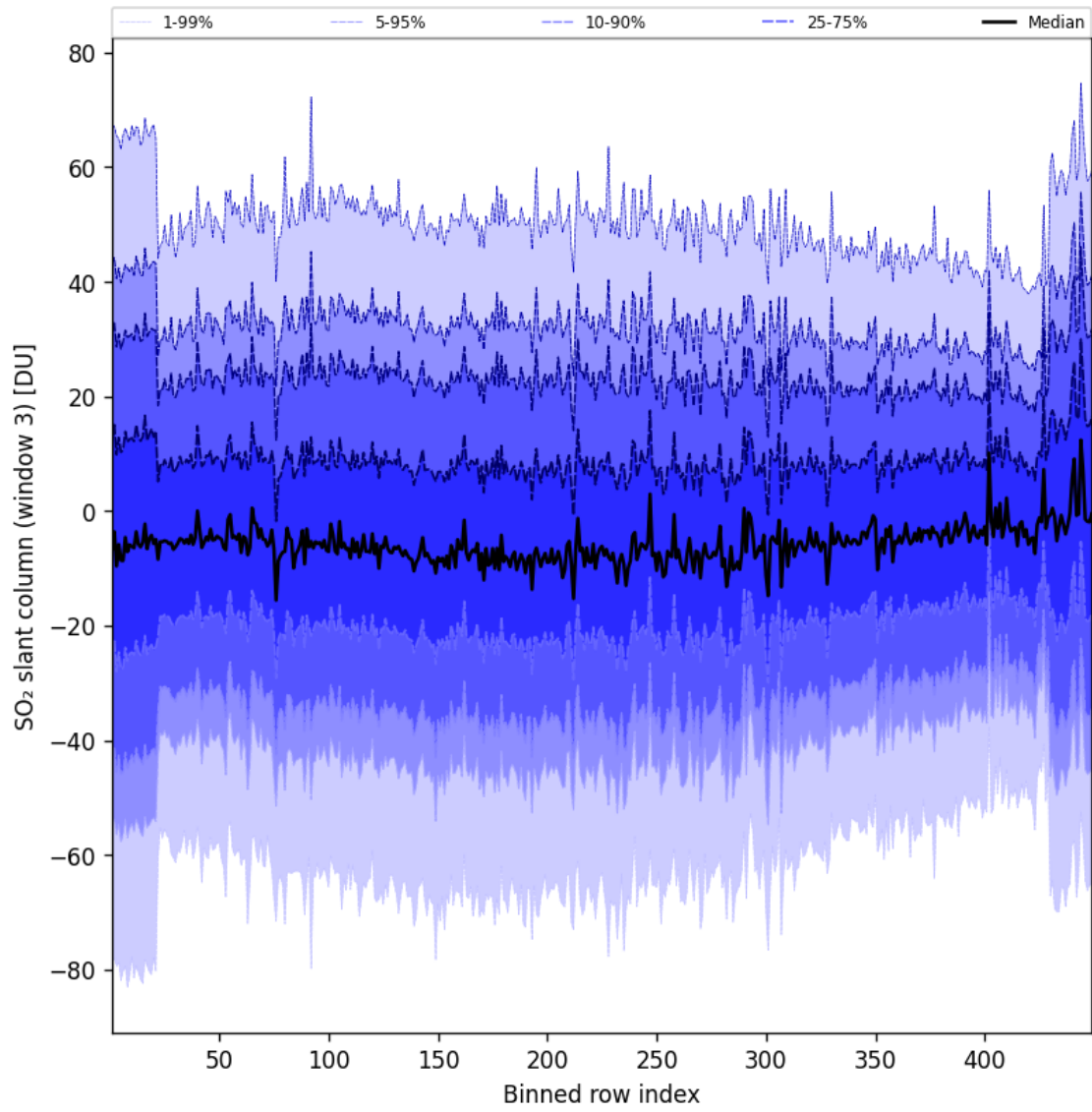


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-01-15 to 2025-01-15

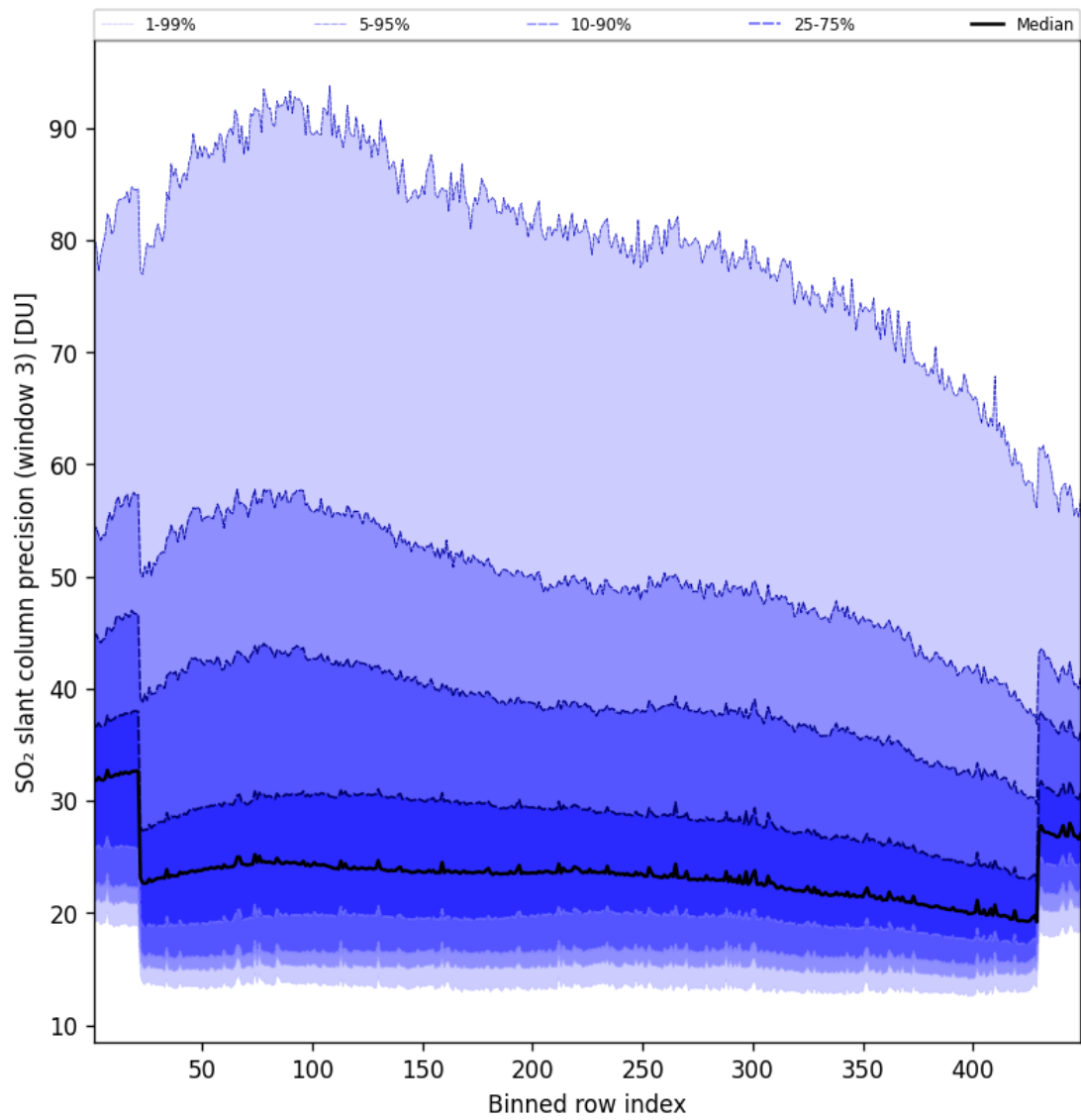


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-01-15 to 2025-01-15

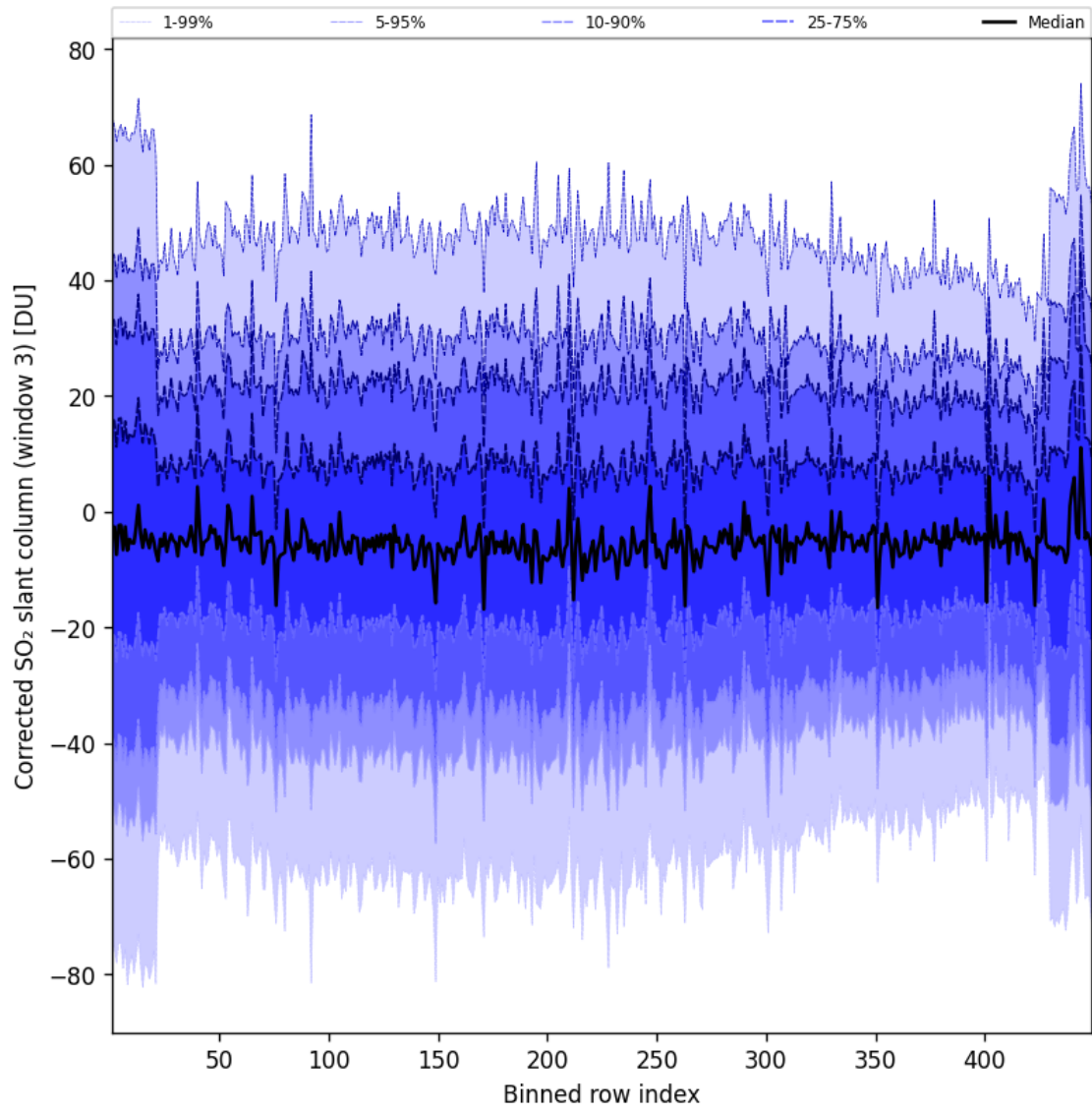


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-01-15 to 2025-01-15

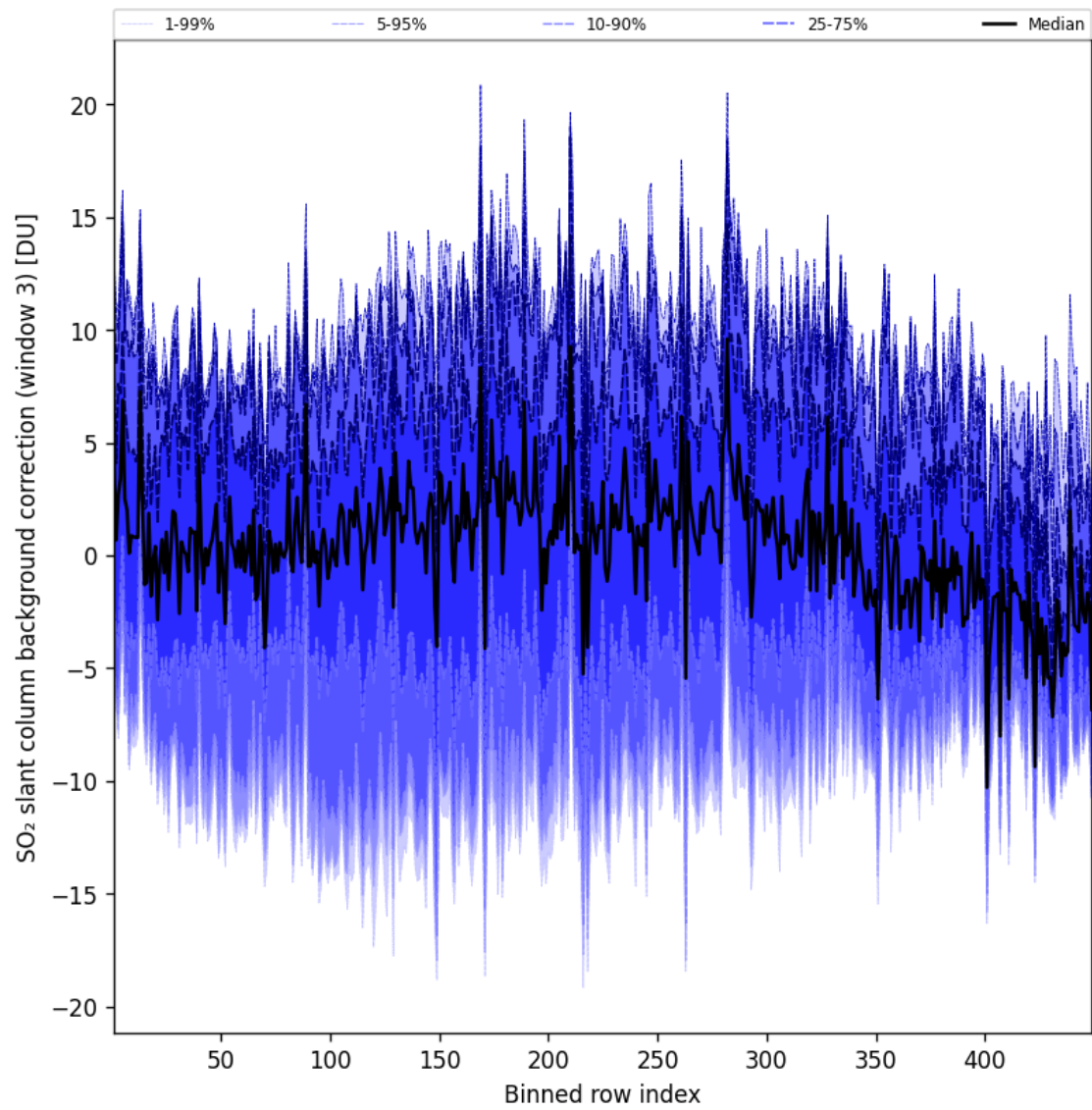


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-01-15 to 2025-01-15

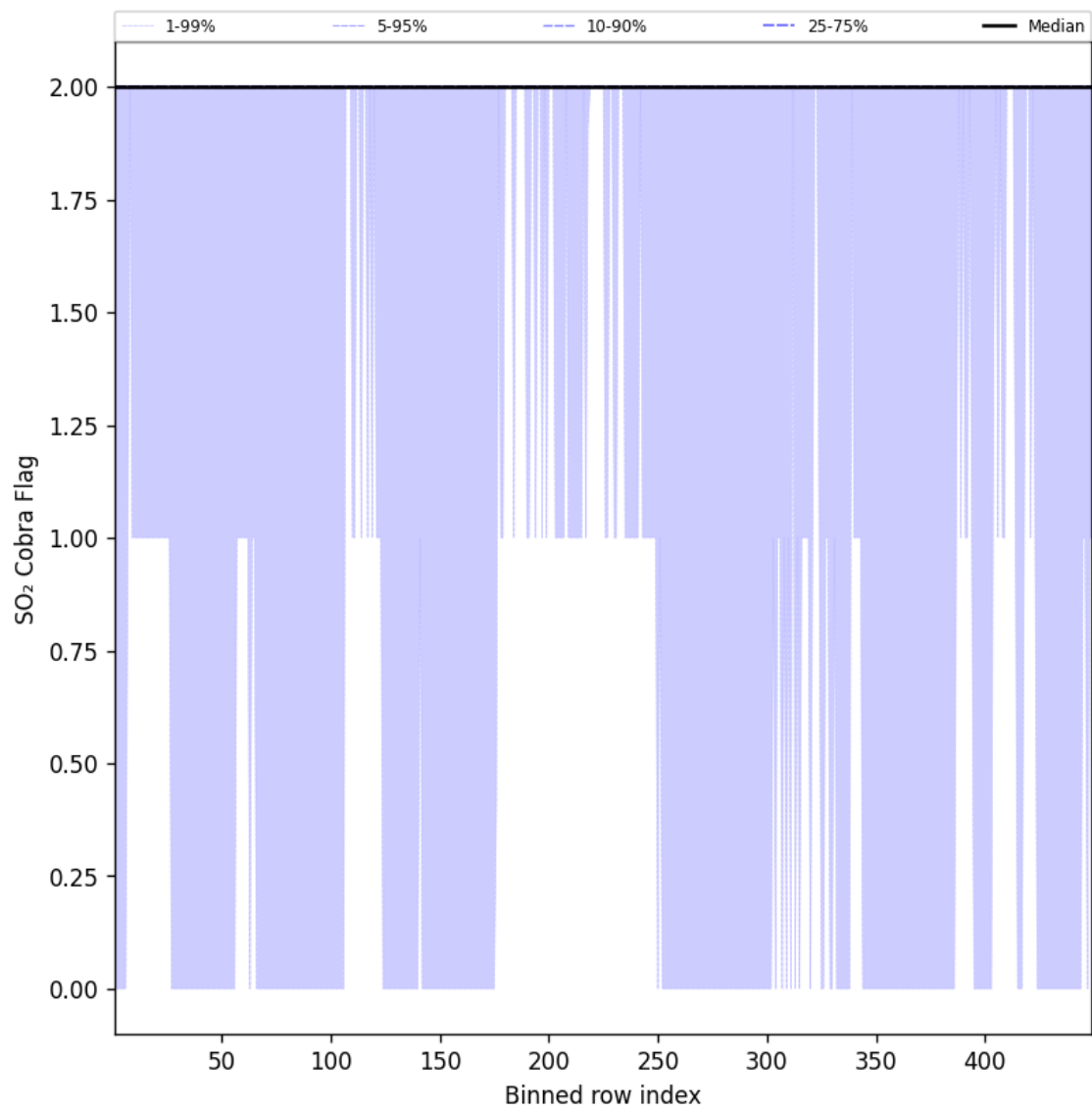


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-01-15 to 2025-01-15

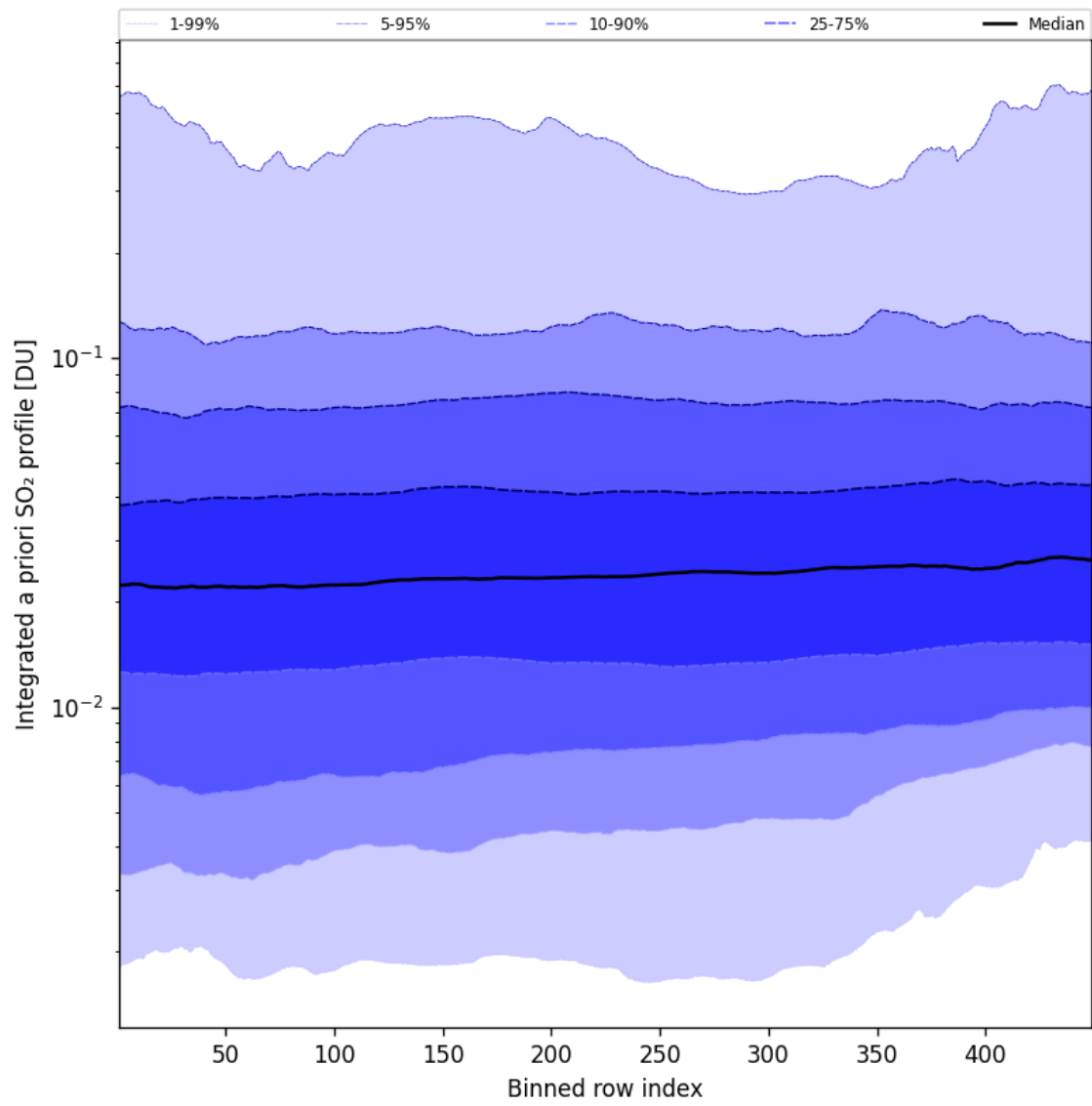


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-01-15 to 2025-01-15

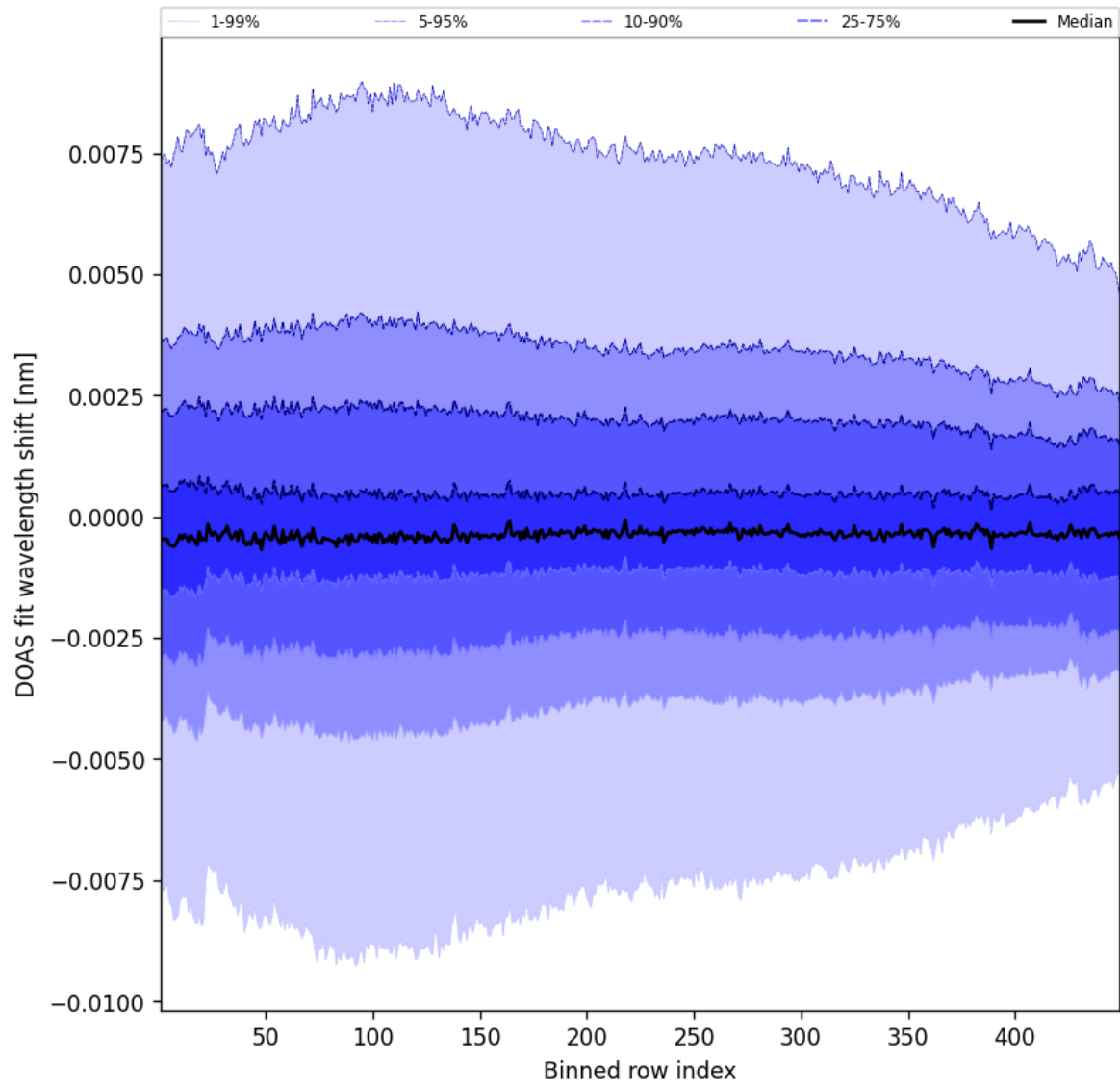


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-01-15 to 2025-01-15

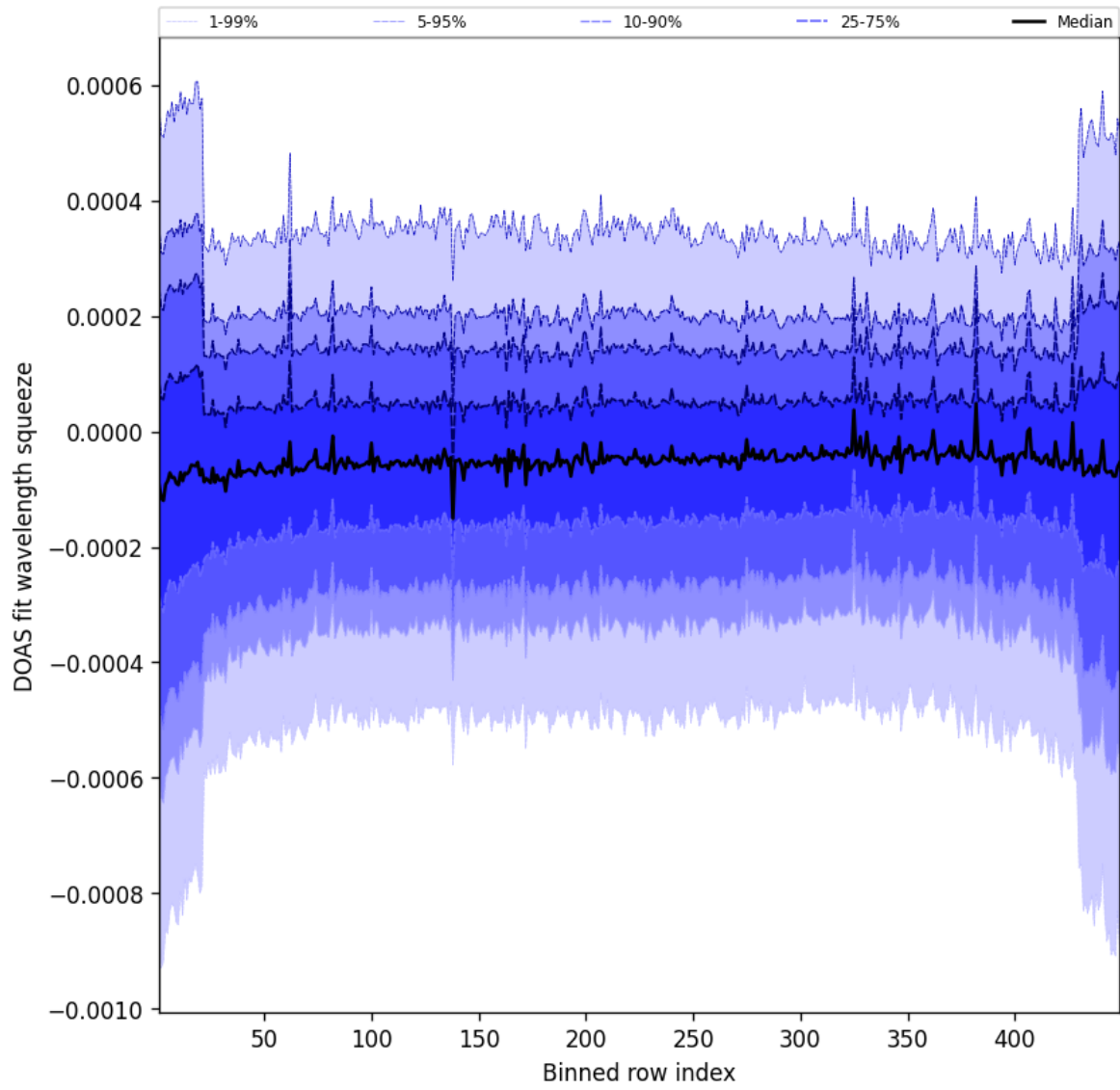


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-01-15 to 2025-01-15

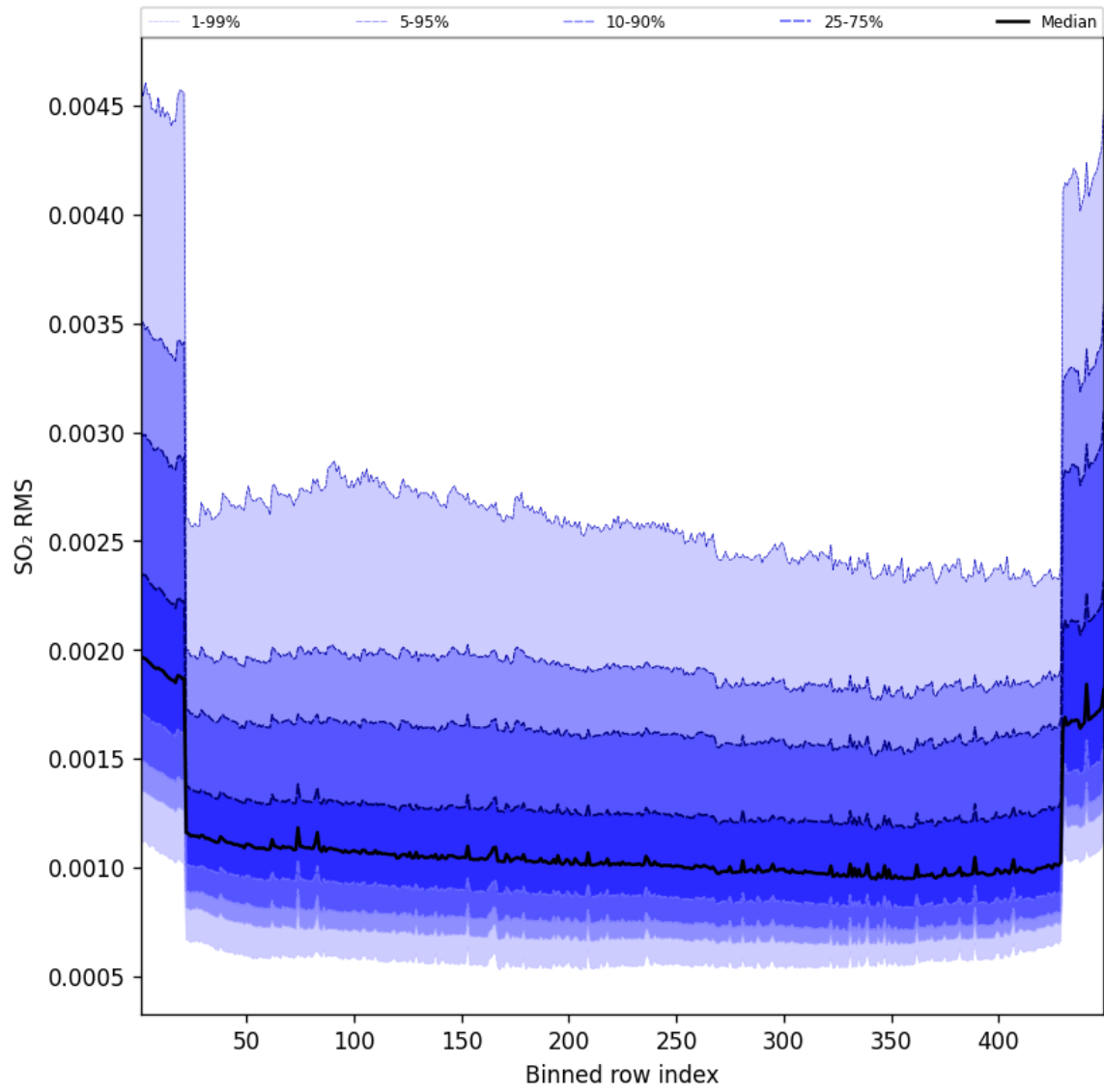


Figure 106: Along track statistics of "SO₂ RMS" for 2025-01-15 to 2025-01-15

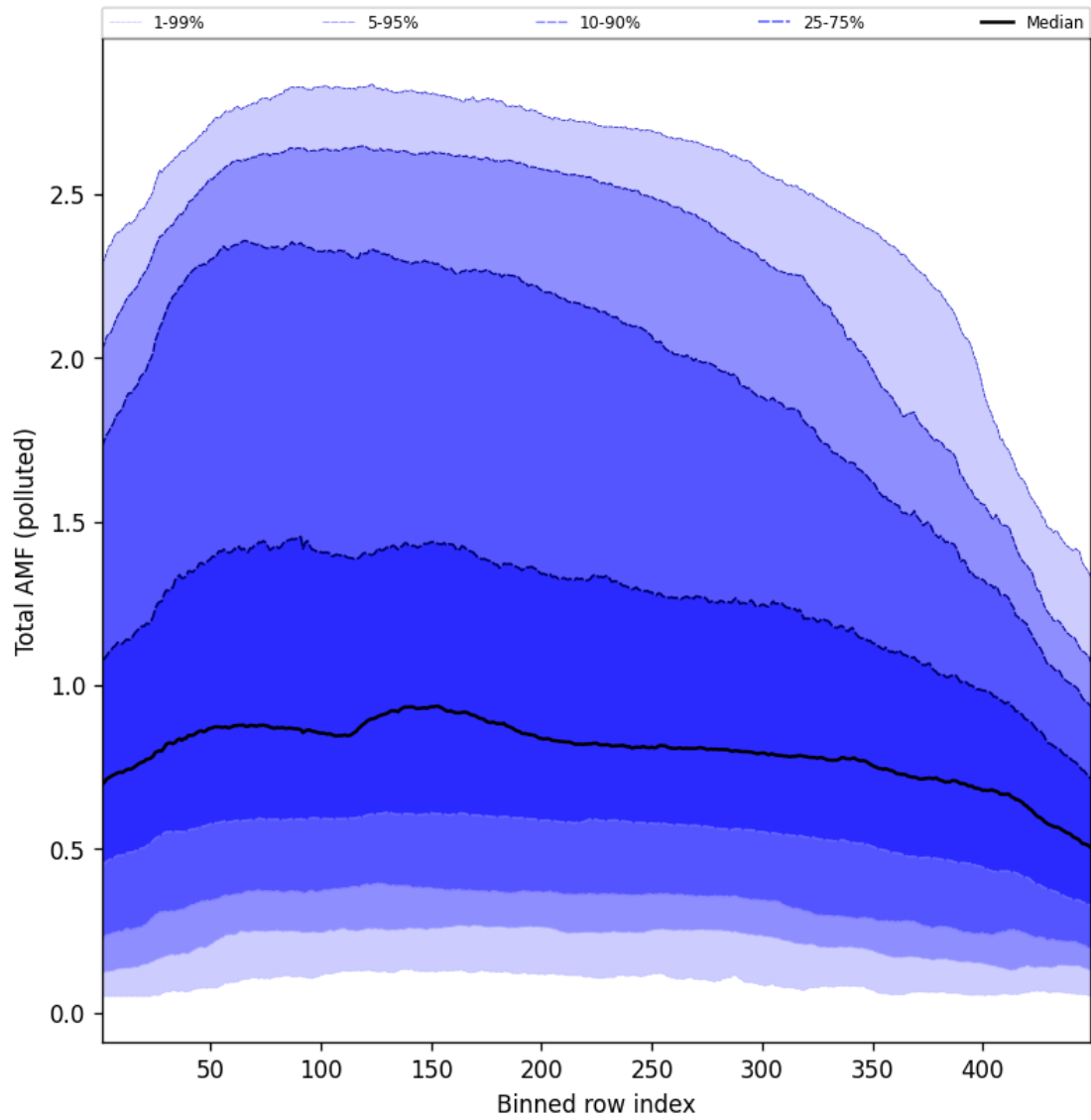


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-01-15 to 2025-01-15

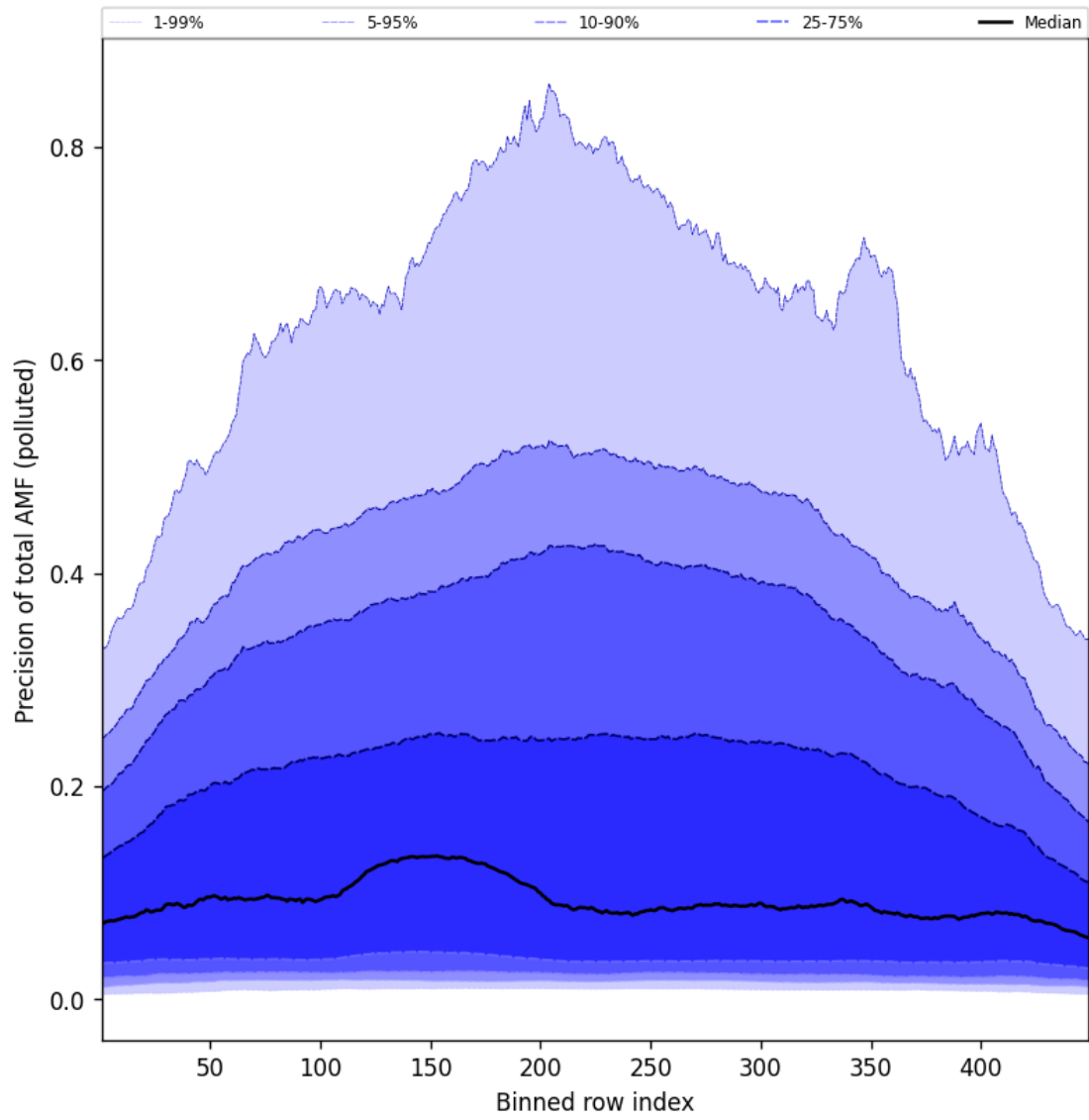


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-01-15 to 2025-01-15

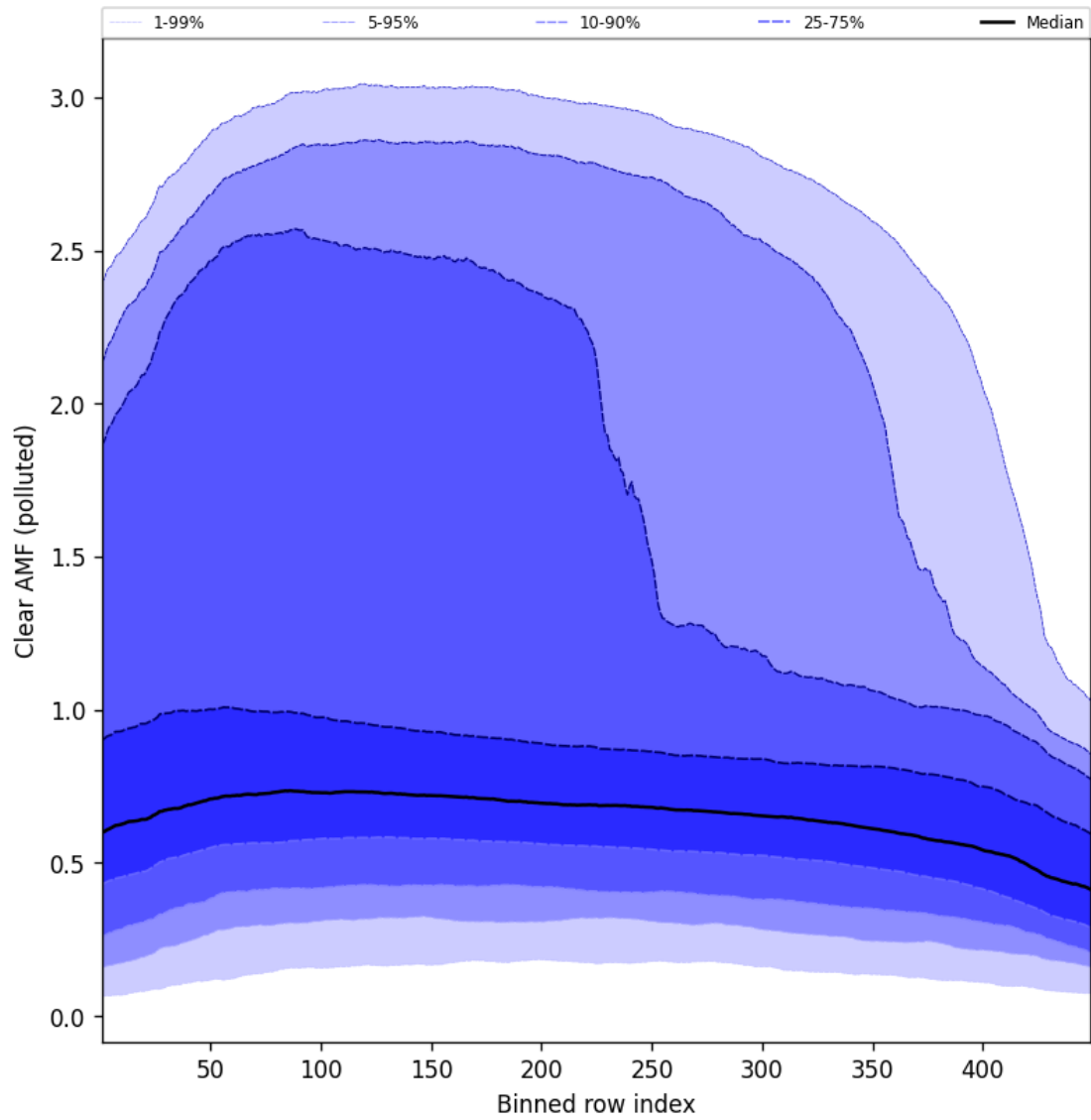


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-01-15 to 2025-01-15

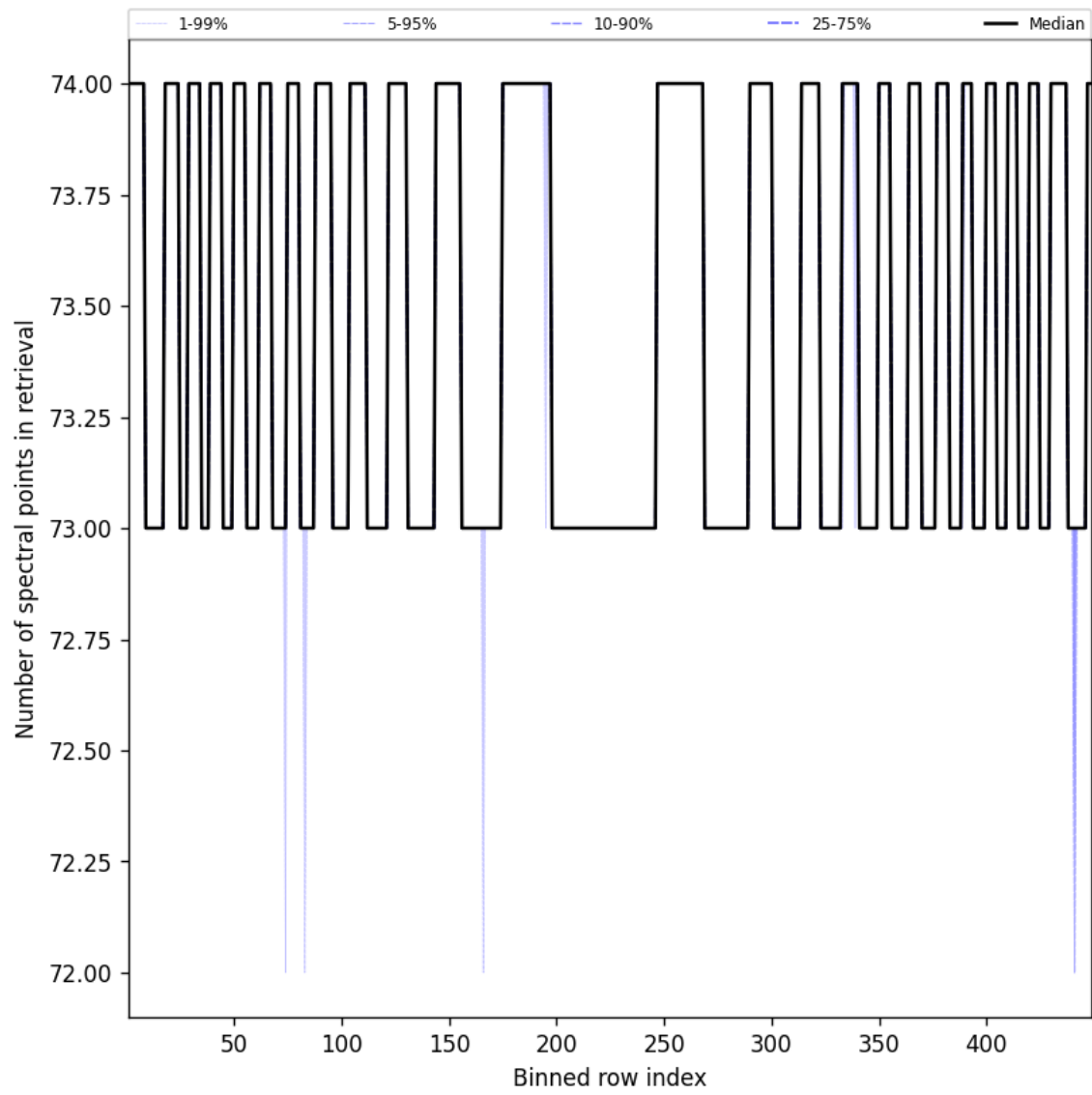


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-01-15 to 2025-01-15

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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Maarten Sneep (maarten.sneep@knmi.nl).