

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]	0.649 ± 0.401	17293509	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.344 \pm 121.087) \times 10^{-2}$	17293509	0.263	0.487	1.239×10^{-2}	-121	394
sulfurdioxide total vertical column precision [DU]	0.598 ± 0.871	17293509	0.222	0.393	0.350	4.299×10^{-2}	62.2
sulfurdioxide slant column density corrected [DU]	$(2.434 \pm 44.077) \times 10^{-2}$	17293509	0.242	0.372	1.038×10^{-2}	-15.8	356
sulfurdioxide slant column density cobra [DU]	$(2.377 \pm 39.651) \times 10^{-2}$	17293509	0.242	0.372	1.038×10^{-2}	-15.8	49.1
sulfurdioxide slant column density cobra precision [DU]	0.303 ± 0.147	17293509	0.213	0.158	0.256	8.277×10^{-2}	34.0
sulfurdioxide slant column density window1 [DU]	0.178 ± 0.731	17293509	0.225	0.753	0.194	-84.0	70.0
sulfurdioxide slant column density window1 precision [DU]	0.303 ± 0.147	17293509	0.213	0.158	0.256	8.277×10^{-2}	34.0
sulfurdioxide slant column density corrected win1 [DU]	$(3.894 \pm 72.262) \times 10^{-2}$	17293509	-2.500×10^{-2}	0.738	1.224×10^{-2}	-84.0	70.5
background so2 slant column offset window1 [DU]	-0.139 ± 0.201	17293509	-0.300	0.210	-0.187	-1.39	5.36
sulfurdioxide slant column density window2 [DU]	2.38 ± 9.23	17293509	1.25	11.7	2.14	-1.225×10^3	1.137×10^3
sulfurdioxide slant column density window2 precision [DU]	8.13 ± 2.22	17293509	7.43	2.54	7.81	2.24	564
sulfurdioxide slant column density corrected win2 [DU]	-0.610 ± 8.804	17293509	-0.250	11.2	-0.564	-1.226×10^3	1.133×10^3
background so2 slant column offset window2 [DU]	-2.99 ± 3.26	17293509	-0.750	3.92	-1.89	-21.8	7.50
sulfurdioxide slant column density window3 [DU]	-10.9 ± 24.0	17293509	-11.8	30.4	-11.2	-502	453
sulfurdioxide slant column density window3 precision [DU]	28.2 ± 13.1	17293509	22.5	9.51	24.6	9.58	308
sulfurdioxide slant column density corrected win3 [DU]	3.66 ± 23.09	17293509	3.92	29.0	3.62	-494	458
background so2 slant column offset window3 [DU]	14.5 ± 7.0	17293509	8.40	12.1	14.2	-3.37	34.7
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17293509	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.392 \pm 9.206) \times 10^{-2}$	17293509	1.539×10^{-2}	1.681×10^{-2}	1.476×10^{-2}	1.278×10^{-4}	1.90
fitted radiance shift [nm]	$(-3.861 \pm 25.970) \times 10^{-4}$	17293509	-5.000×10^{-4}	1.817×10^{-3}	-3.691×10^{-4}	-0.110	5.177×10^{-2}
fitted radiance squeeze [1]	$(-3.239 \pm 19.568) \times 10^{-5}$	17293509	-1.000×10^{-5}	2.084×10^{-4}	-1.694×10^{-5}	-1.679×10^{-2}	4.013×10^{-2}
fitted root mean square [1]	$(1.325 \pm 0.611) \times 10^{-3}$	17293509	9.750×10^{-4}	6.153×10^{-4}	1.134×10^{-3}	3.222×10^{-4}	8.604×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.817 ± 0.416	17293509	0.660	0.540	0.773	5.000×10^{-2}	2.87
sulfurdioxide total air mass factor polluted precision [1]	0.110 ± 0.119	17293509	3.500×10^{-2}	0.110	6.218×10^{-2}	2.777×10^{-3}	1.74
sulfurdioxide clear air mass factor polluted [1]	0.692 ± 0.277	17293509	0.660	0.373	0.664	6.029×10^{-2}	2.74
number of spectral points in retrieval [1]	73.4 ± 0.5	17293509	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	5.000×10^{-2}	0.120	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.83	-1.00	-0.592	-0.390	-0.226	0.261	0.442	0.672	1.16	3.38
sulfurdioxide total vertical column precision [DU]	9.932×10^{-2}	0.138	0.167	0.192	0.227	0.620	0.857	1.17	1.79	4.25
sulfurdioxide slant column density corrected [DU]	-0.895	-0.508	-0.364	-0.270	-0.173	0.198	0.303	0.408	0.579	1.15
sulfurdioxide slant column density cobra [DU]	-0.895	-0.508	-0.364	-0.270	-0.173	0.198	0.303	0.408	0.579	1.15
sulfurdioxide slant column density cobra precision [DU]	0.142	0.167	0.181	0.192	0.206	0.365	0.419	0.469	0.563	0.848
sulfurdioxide slant column density window1 [DU]	-1.89	-0.944	-0.609	-0.399	-0.189	0.565	0.759	0.947	1.24	2.07
sulfurdioxide slant column density window1 precision [DU]	0.142	0.167	0.181	0.192	0.206	0.365	0.419	0.469	0.563	0.848
sulfurdioxide slant column density corrected win1 [DU]	-1.75	-0.990	-0.717	-0.537	-0.349	0.388	0.598	0.809	1.15	2.17
background so2 slant column offset window1 [DU]	-0.444	-0.329	-0.309	-0.294	-0.272	-6.189×10^{-2}	1.667×10^{-2}	0.101	0.230	0.562
sulfurdioxide slant column density window2 [DU]	-18.8	-12.2	-8.89	-6.42	-3.62	8.13	11.2	14.0	17.8	25.6
sulfurdioxide slant column density window2 precision [DU]	4.34	5.24	5.77	6.19	6.69	9.23	10.1	10.9	12.1	14.7
sulfurdioxide slant column density corrected win2 [DU]	-22.2	-14.9	-11.5	-8.97	-6.16	4.99	7.75	10.2	13.6	20.5
background so2 slant column offset window2 [DU]	-12.5	-9.96	-7.93	-6.26	-4.57	-0.650	-0.368	-0.124	0.252	1.71
sulfurdioxide slant column density window3 [DU]	-69.4	-49.7	-40.4	-33.6	-26.2	4.27	12.2	19.4	29.0	48.0
sulfurdioxide slant column density window3 precision [DU]	13.8	16.3	18.1	19.5	21.1	30.6	35.1	41.1	53.0	84.1
sulfurdioxide slant column density corrected win3 [DU]	-53.7	-34.0	-24.8	-18.1	-10.8	18.2	25.7	32.4	41.5	60.1
background so2 slant column offset window3 [DU]	2.57	4.81	6.03	7.00	8.30	20.4	22.5	24.1	25.9	28.9
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]	9.252×10^{-4}	1.693×10^{-3}	2.963×10^{-3}	5.141×10^{-3}	8.020×10^{-3}	2.483×10^{-2}	3.583×10^{-2}	5.655×10^{-2}	0.108	0.503
fitted radiance shift [nm]	-8.241×10^{-3}	-4.235×10^{-3}	-2.833×10^{-3}	-2.032×10^{-3}	-1.332×10^{-3}	4.851×10^{-4}	1.168×10^{-3}	2.042×10^{-3}	3.579×10^{-3}	7.780×10^{-3}
fitted radiance squeeze [1]	-6.529×10^{-4}	-3.624×10^{-4}	-2.536×10^{-4}	-1.883×10^{-4}	-1.256×10^{-4}	8.290×10^{-5}	1.327×10^{-4}	1.782×10^{-4}	2.422×10^{-4}	3.911×10^{-4}
fitted root mean square [1]	5.975×10^{-4}	7.337×10^{-4}	8.057×10^{-4}	8.617×10^{-4}	9.317×10^{-4}	1.547×10^{-3}	1.809×10^{-3}	2.075×10^{-3}	2.508×10^{-3}	3.556×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.759×10^{-2}	0.214	0.315	0.406	0.518	1.06	1.22	1.38	1.59	1.99
sulfurdioxide total air mass factor polluted precision [1]	9.136×10^{-3}	1.628×10^{-2}	2.257×10^{-2}	2.829×10^{-2}	3.558×10^{-2}	0.145	0.197	0.250	0.342	0.574
sulfurdioxide clear air mass factor polluted [1]	0.181	0.279	0.350	0.413	0.495	0.867	0.972	1.06	1.17	1.44
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]	0.632 ± 0.400	9768066	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(6.036 \pm 148.046) \times 10^{-2}$	9768066	0.551	1.391×10^{-2}	-121	101	-0.254	0.297
sulfurdioxide total vertical column precision [DU]	0.725 ± 1.062	9768066	0.520	0.404	4.299×10^{-2}	30.8	0.244	0.764
sulfurdioxide slant column density corrected [DU]	$(3.013 \pm 48.241) \times 10^{-2}$	9768066	0.384	1.091×10^{-2}	-10.5	143	-0.178	0.206
sulfurdioxide slant column density cobra [DU]	$(2.928 \pm 43.403) \times 10^{-2}$	9768066	0.384	1.091×10^{-2}	-10.5	49.1	-0.178	0.206
sulfurdioxide slant column density cobra precision [DU]	0.318 ± 0.162	9768066	0.184	0.266	8.955×10^{-2}	26.1	0.206	0.390
sulfurdioxide slant column density window1 [DU]	0.176 ± 0.791	9768066	0.781	0.195	-32.9	70.0	-0.202	0.579
sulfurdioxide slant column density window1 precision [DU]	0.318 ± 0.162	9768066	0.184	0.266	8.955×10^{-2}	26.1	0.206	0.390
sulfurdioxide slant column density corrected win1 [DU]	$(5.577 \pm 78.271) \times 10^{-2}$	9768066	0.767	1.944×10^{-2}	-32.9	70.5	-0.354	0.413
background so2 slant column offset window1 [DU]	-0.120 ± 0.230	9768066	0.231	-0.183	-1.18	3.84	-0.271	-3.940×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.12 ± 9.23	9768066	11.9	2.82	-110	83.5	-2.99	8.92
sulfurdioxide slant column density window2 precision [DU]	7.99 ± 2.07	9768066	2.44	7.69	2.24	163	6.60	9.04
sulfurdioxide slant column density corrected win2 [DU]	-0.697 ± 8.580	9768066	11.0	-0.625	-119	80.1	-6.15	4.84
background so2 slant column offset window2 [DU]	-3.81 ± 3.77	9768066	5.80	-2.78	-21.8	7.43	-6.44	-0.641
sulfurdioxide slant column density window3 [DU]	-12.9 ± 23.1	9768066	29.2	-13.2	-181	178	-27.7	1.58
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 12.3	9768066	8.26	23.7	9.58	216	20.6	28.8
sulfurdioxide slant column density corrected win3 [DU]	3.75 ± 22.09	9768066	27.8	3.80	-163	196	-10.1	17.7
background so2 slant column offset window3 [DU]	16.7 ± 7.0	9768066	12.9	17.7	-1.69	34.7	9.74	22.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	9768066	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.554 \pm 11.856) \times 10^{-2}$	9768066	2.781×10^{-2}	1.465×10^{-2}	1.278×10^{-4}	1.90	5.631×10^{-3}	3.344×10^{-2}
fitted radiance shift [nm]	$(-2.547 \pm 24.706) \times 10^{-4}$	9768066	1.659×10^{-3}	-2.611×10^{-4}	-4.864×10^{-2}	4.115×10^{-2}	-1.123×10^{-3}	5.353×10^{-4}
fitted radiance squeeze [1]	$(-5.467 \pm 21.200) \times 10^{-5}$	9768066	2.203×10^{-4}	-2.909×10^{-5}	-1.236×10^{-2}	1.250×10^{-2}	-1.475×10^{-4}	7.284×10^{-5}
fitted root mean square [1]	$(1.388 \pm 0.687) \times 10^{-3}$	9768066	7.042×10^{-4}	1.163×10^{-3}	3.222×10^{-4}	6.140×10^{-2}	9.329×10^{-4}	1.637×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.759 ± 0.419	9768066	0.565	0.699	5.000×10^{-2}	2.87	0.447	1.01
sulfurdioxide total air mass factor polluted precision [1]	0.110 ± 0.135	9768066	0.105	5.584×10^{-2}	2.777×10^{-3}	1.74	3.046×10^{-2}	0.135
sulfurdioxide clear air mass factor polluted [1]	0.638 ± 0.297	9768066	0.413	0.594	6.029×10^{-2}	2.74	0.412	0.824
number of spectral points in retrieval [1]	73.4 ± 0.5	9768066	1.000	73.0	52.0	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]	0.672 ± 0.401	7525443	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.148 \pm 72.360) \times 10^{-2}$	7525443	0.423	1.078×10^{-2}	-51.5	394	-0.199	0.224
sulfurdioxide total vertical column precision [DU]	0.434 ± 0.480	7525443	0.284	0.302	4.950×10^{-2}	62.2	0.213	0.497
sulfurdioxide slant column density corrected [DU]	$(1.683 \pm 37.985) \times 10^{-2}$	7525443	0.357	9.722×10^{-3}	-15.8	356	-0.167	0.189
sulfurdioxide slant column density cobra [DU]	$(1.662 \pm 34.158) \times 10^{-2}$	7525443	0.357	9.722×10^{-3}	-15.8	26.9	-0.167	0.189
sulfurdioxide slant column density cobra precision [DU]	0.284 ± 0.121	7525443	0.125	0.248	8.277×10^{-2}	34.0	0.206	0.332
sulfurdioxide slant column density window1 [DU]	0.181 ± 0.645	7525443	0.721	0.194	-84.0	59.8	-0.173	0.548
sulfurdioxide slant column density window1 precision [DU]	0.284 ± 0.121	7525443	0.125	0.248	8.277×10^{-2}	34.0	0.206	0.332
sulfurdioxide slant column density corrected win1 [DU]	$(1.710 \pm 63.554) \times 10^{-2}$	7525443	0.702	3.649×10^{-3}	-84.0	60.3	-0.344	0.359
background so2 slant column offset window1 [DU]	-0.164 ± 0.153	7525443	0.183	-0.191	-1.39	5.36	-0.273	-8.964×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.43 ± 9.15	7525443	11.5	1.28	-1.225×10^3	1.137×10^3	-4.39	7.08
sulfurdioxide slant column density window2 precision [DU]	8.32 ± 2.39	7525443	2.66	7.99	2.25	564	6.81	9.47
sulfurdioxide slant column density corrected win2 [DU]	-0.496 ± 9.085	7525443	11.4	-0.482	-1.226×10^3	1.133×10^3	-6.18	5.21
background so2 slant column offset window2 [DU]	-1.93 ± 1.99	7525443	2.27	-1.48	-17.3	7.50	-2.93	-0.659
sulfurdioxide slant column density window3 [DU]	-8.19 ± 24.95	7525443	31.6	-8.30	-502	453	-23.9	7.66
sulfurdioxide slant column density window3 precision [DU]	29.7 ± 13.8	7525443	10.7	26.0	10.0	308	22.0	32.6
sulfurdioxide slant column density corrected win3 [DU]	3.55 ± 24.33	7525443	30.8	3.35	-494	458	-11.9	19.0
background so2 slant column offset window3 [DU]	11.7 ± 5.9	7525443	10.0	10.2	-3.37	30.9	6.91	17.0
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	7525443	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.883 \pm 2.871) \times 10^{-2}$	7525443	1.065×10^{-2}	1.481×10^{-2}	4.948×10^{-4}	1.69	9.906×10^{-3}	2.055×10^{-2}
fitted radiance shift [nm]	$(-5.566 \pm 27.431) \times 10^{-4}$	7525443	2.016×10^{-3}	-5.306×10^{-4}	-0.110	5.177×10^{-2}	-1.616×10^{-3}	3.998×10^{-4}
fitted radiance squeeze [1]	$(-3.465 \pm 167.854) \times 10^{-6}$	7525443	1.964×10^{-4}	-2.426×10^{-6}	-1.679×10^{-2}	4.013×10^{-2}	-1.011×10^{-4}	9.530×10^{-5}
fitted root mean square [1]	$(1.242 \pm 0.483) \times 10^{-3}$	7525443	5.095×10^{-4}	1.108×10^{-3}	3.534×10^{-4}	8.604×10^{-2}	9.302×10^{-4}	1.440×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.892 ± 0.400	7525443	0.489	0.849	5.000×10^{-2}	2.71	0.620	1.11
sulfurdioxide total air mass factor polluted precision [1]	0.110 ± 0.094	7525443	0.113	7.207×10^{-2}	5.382×10^{-3}	1.55	4.206×10^{-2}	0.155
sulfurdioxide clear air mass factor polluted [1]	0.762 ± 0.231	7525443	0.319	0.729	0.134	2.67	0.592	0.912
number of spectral points in retrieval [1]	73.4 ± 0.5	7525443	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]	0.689 ± 0.396	11702801	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(3.139 \pm 93.418) \times 10^{-2}$	11702801	0.452	1.063×10^{-2}	-121	101	-0.213	0.240
sulfurdioxide total vertical column precision [DU]	0.508 ± 0.628	11702801	0.337	0.318	4.299×10^{-2}	31.6	0.218	0.555
sulfurdioxide slant column density corrected [DU]	$(1.917 \pm 39.536) \times 10^{-2}$	11702801	0.357	8.977×10^{-3}	-13.2	143	-0.168	0.189
sulfurdioxide slant column density cobra [DU]	$(1.883 \pm 36.747) \times 10^{-2}$	11702801	0.357	8.977×10^{-3}	-13.2	49.1	-0.168	0.189
sulfurdioxide slant column density cobra precision [DU]	0.290 ± 0.138	11702801	0.139	0.244	8.474×10^{-2}	24.5	0.202	0.341
sulfurdioxide slant column density window1 [DU]	0.183 ± 0.685	11702801	0.727	0.197	-84.0	70.0	-0.172	0.555
sulfurdioxide slant column density window1 precision [DU]	0.290 ± 0.138	11702801	0.139	0.244	8.474×10^{-2}	24.5	0.202	0.341
sulfurdioxide slant column density corrected win1 [DU]	$(2.808 \pm 67.609) \times 10^{-2}$	11702801	0.712	7.416×10^{-3}	-84.0	70.5	-0.343	0.369
background so2 slant column offset window1 [DU]	-0.155 ± 0.177	11702801	0.194	-0.193	-1.39	5.36	-0.274	-7.987×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.85 ± 9.04	11702801	11.5	1.61	-1.225×10^3	733	-4.01	7.44
sulfurdioxide slant column density window2 precision [DU]	8.07 ± 2.14	11702801	2.54	7.74	2.24	564	6.64	9.18
sulfurdioxide slant column density corrected win2 [DU]	-0.648 ± 8.759	11702801	11.1	-0.615	-1.226×10^3	732	-6.19	4.93
background so2 slant column offset window2 [DU]	-2.50 ± 2.86	11702801	3.09	-1.62	-21.8	7.50	-3.67	-0.585
sulfurdioxide slant column density window3 [DU]	-7.79 ± 24.21	11702801	30.8	-8.05	-502	282	-23.2	7.63
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 12.2	11702801	9.31	24.5	9.84	308	21.0	30.3
sulfurdioxide slant column density corrected win3 [DU]	5.77 ± 23.12	11702801	29.4	5.55	-494	290	-8.97	20.4
background so2 slant column offset window3 [DU]	13.6 ± 6.6	11702801	11.1	12.5	-3.37	34.7	7.92	19.0
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	11702801	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.183 \pm 4.586) \times 10^{-2}$	11702801	1.272×10^{-2}	1.459×10^{-2}	4.194×10^{-4}	1.84	9.117×10^{-3}	2.183×10^{-2}
fitted radiance shift [nm]	$(-4.029 \pm 24.279) \times 10^{-4}$	11702801	1.782×10^{-3}	-3.685×10^{-4}	-0.110	3.932×10^{-2}	-1.326×10^{-3}	4.556×10^{-4}
fitted radiance squeeze [1]	$(-1.576 \pm 18.121) \times 10^{-5}$	11702801	1.980×10^{-4}	-6.111×10^{-6}	-1.573×10^{-2}	1.329×10^{-2}	-1.074×10^{-4}	9.053×10^{-5}
fitted root mean square [1]	$(1.273 \pm 0.564) \times 10^{-3}$	11702801	5.525×10^{-4}	1.092×10^{-3}	3.404×10^{-4}	8.604×10^{-2}	9.155×10^{-4}	1.468×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.829 ± 0.375	11702801	0.484	0.803	5.000×10^{-2}	2.79	0.568	1.05
sulfurdioxide total air mass factor polluted precision [1]	0.105 ± 0.104	11702801	0.100	6.350×10^{-2}	2.961×10^{-3}	1.41	3.879×10^{-2}	0.139
sulfurdioxide clear air mass factor polluted [1]	0.712 ± 0.245	11702801	0.335	0.691	6.275×10^{-2}	2.74	0.541	0.875
number of spectral points in retrieval [1]	73.4 ± 0.5	11702801	1.000	73.0	52.0	156	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]	0.606 ± 0.407	3956214	0.810	0.490	0.0	1.000	0.190	1.000
sulfurdioxide total vertical column [DU]	$(5.164 \pm 146.307) \times 10^{-2}$	3956214	0.531	1.357×10^{-2}	-51.5	394	-0.244	0.286
sulfurdioxide total vertical column precision [DU]	0.701 ± 1.097	3956214	0.456	0.396	4.402×10^{-2}	62.2	0.246	0.703
sulfurdioxide slant column density corrected [DU]	$(2.851 \pm 47.028) \times 10^{-2}$	3956214	0.380	1.131×10^{-2}	-15.8	356	-0.176	0.204
sulfurdioxide slant column density cobra [DU]	$(2.790 \pm 40.488) \times 10^{-2}$	3956214	0.380	1.131×10^{-2}	-15.8	24.7	-0.176	0.204
sulfurdioxide slant column density cobra precision [DU]	0.307 ± 0.145	3956214	0.159	0.263	8.277×10^{-2}	34.0	0.211	0.370
sulfurdioxide slant column density window1 [DU]	0.190 ± 0.745	3956214	0.758	0.202	-53.1	59.8	-0.182	0.576
sulfurdioxide slant column density window1 precision [DU]	0.307 ± 0.145	3956214	0.159	0.263	8.277×10^{-2}	34.0	0.211	0.370
sulfurdioxide slant column density corrected win1 [DU]	$(4.632 \pm 73.837) \times 10^{-2}$	3956214	0.742	1.471×10^{-2}	-53.1	60.3	-0.348	0.394
background so2 slant column offset window1 [DU]	-0.143 ± 0.210	3956214	0.204	-0.198	-1.18	3.20	-0.277	-7.344×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.66 ± 9.38	3956214	11.9	2.47	-1.018×10^3	1.137×10^3	-3.39	8.53
sulfurdioxide slant column density window2 precision [DU]	8.23 ± 2.44	3956214	2.53	7.91	2.40	515	6.76	9.29
sulfurdioxide slant column density corrected win2 [DU]	-0.572 ± 8.883	3956214	11.2	-0.508	-1.020×10^3	1.133×10^3	-6.12	5.03
background so2 slant column offset window2 [DU]	-3.23 ± 3.44	3956214	4.57	-1.93	-21.8	7.49	-5.23	-0.659
sulfurdioxide slant column density window3 [DU]	-16.9 ± 22.7	3956214	28.4	-16.7	-341	453	-31.0	-2.62
sulfurdioxide slant column density window3 precision [DU]	29.7 ± 15.5	3956214	10.7	25.3	9.58	261	21.2	31.9
sulfurdioxide slant column density corrected win3 [DU]	-1.77 ± 22.81	3956214	28.5	-1.18	-324	458	-15.7	12.8
background so2 slant column offset window3 [DU]	15.2 ± 7.2	3956214	12.9	15.1	-3.37	34.7	8.61	21.5
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.10	3956214	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.211 \pm 14.041) \times 10^{-2}$	3956214	4.146×10^{-2}	1.844×10^{-2}	1.278×10^{-4}	1.82	7.045×10^{-3}	4.851×10^{-2}
fitted radiance shift [nm]	$(-3.039 \pm 31.109) \times 10^{-4}$	3956214	1.944×10^{-3}	-3.219×10^{-4}	-5.397×10^{-2}	5.177×10^{-2}	-1.318×10^{-3}	6.268×10^{-4}
fitted radiance squeeze [1]	$(-4.728 \pm 20.080) \times 10^{-5}$	3956214	2.148×10^{-4}	-3.009×10^{-5}	-1.679×10^{-2}	4.013×10^{-2}	-1.430×10^{-4}	7.183×10^{-5}
fitted root mean square [1]	$(1.331 \pm 0.615) \times 10^{-3}$	3956214	5.907×10^{-4}	1.161×10^{-3}	3.222×10^{-4}	6.933×10^{-2}	9.474×10^{-4}	1.538×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.805 ± 0.493	3956214	0.636	0.681	5.000×10^{-2}	2.87	0.451	1.09
sulfurdioxide total air mass factor polluted precision [1]	0.125 ± 0.148	3956214	0.140	6.347×10^{-2}	2.777×10^{-3}	1.74	2.990×10^{-2}	0.170
sulfurdioxide clear air mass factor polluted [1]	0.653 ± 0.318	3956214	0.412	0.593	6.029×10^{-2}	2.54	0.419	0.831
number of spectral points in retrieval [1]	73.4 ± 0.5	3956214	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

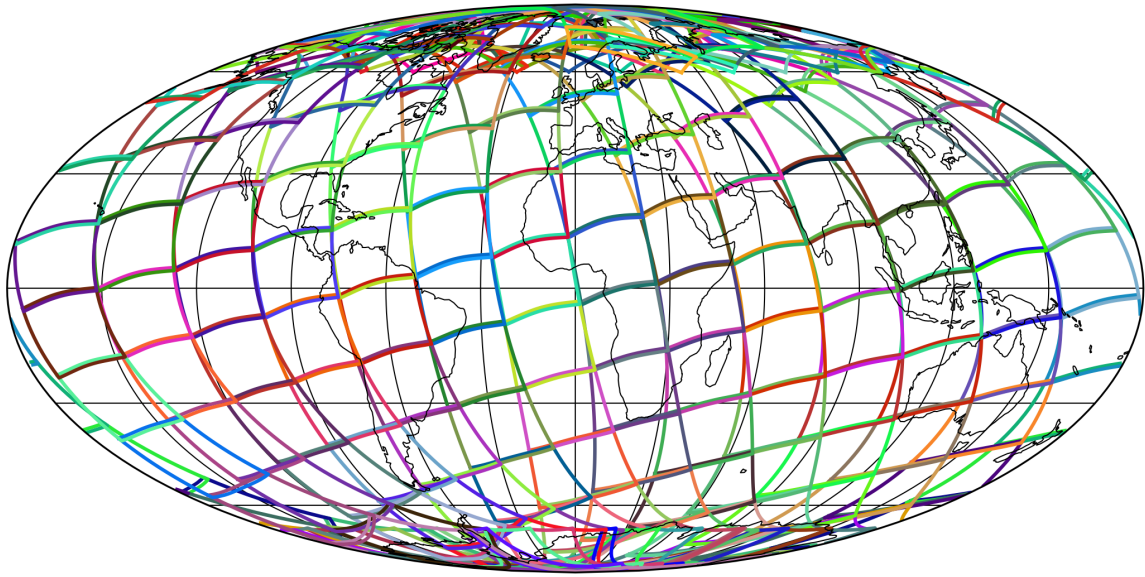


Figure 1: Outline of the granules.

4 Input data monitoring

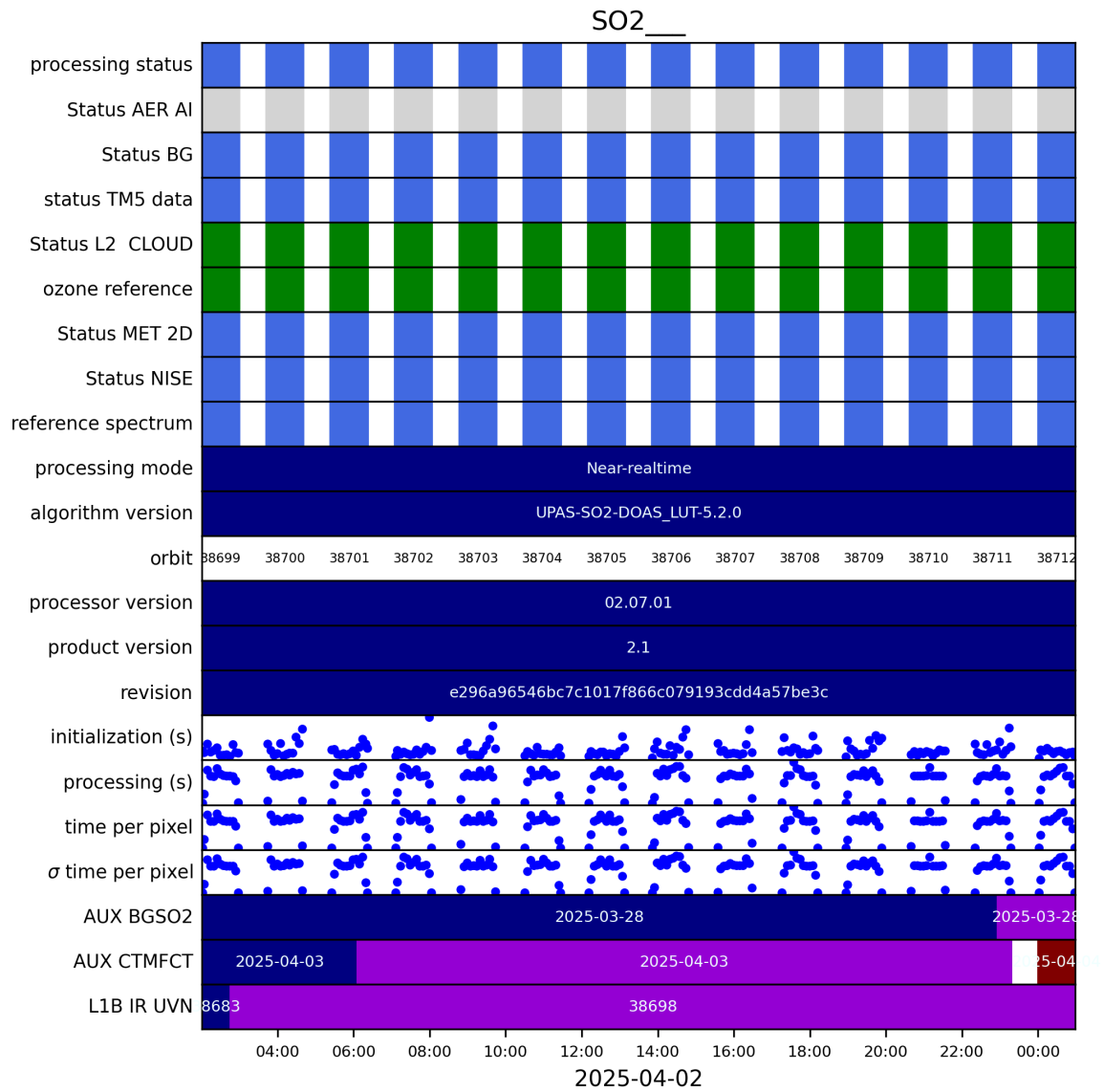


Figure 2: Input data per granule

5 Warnings and errors

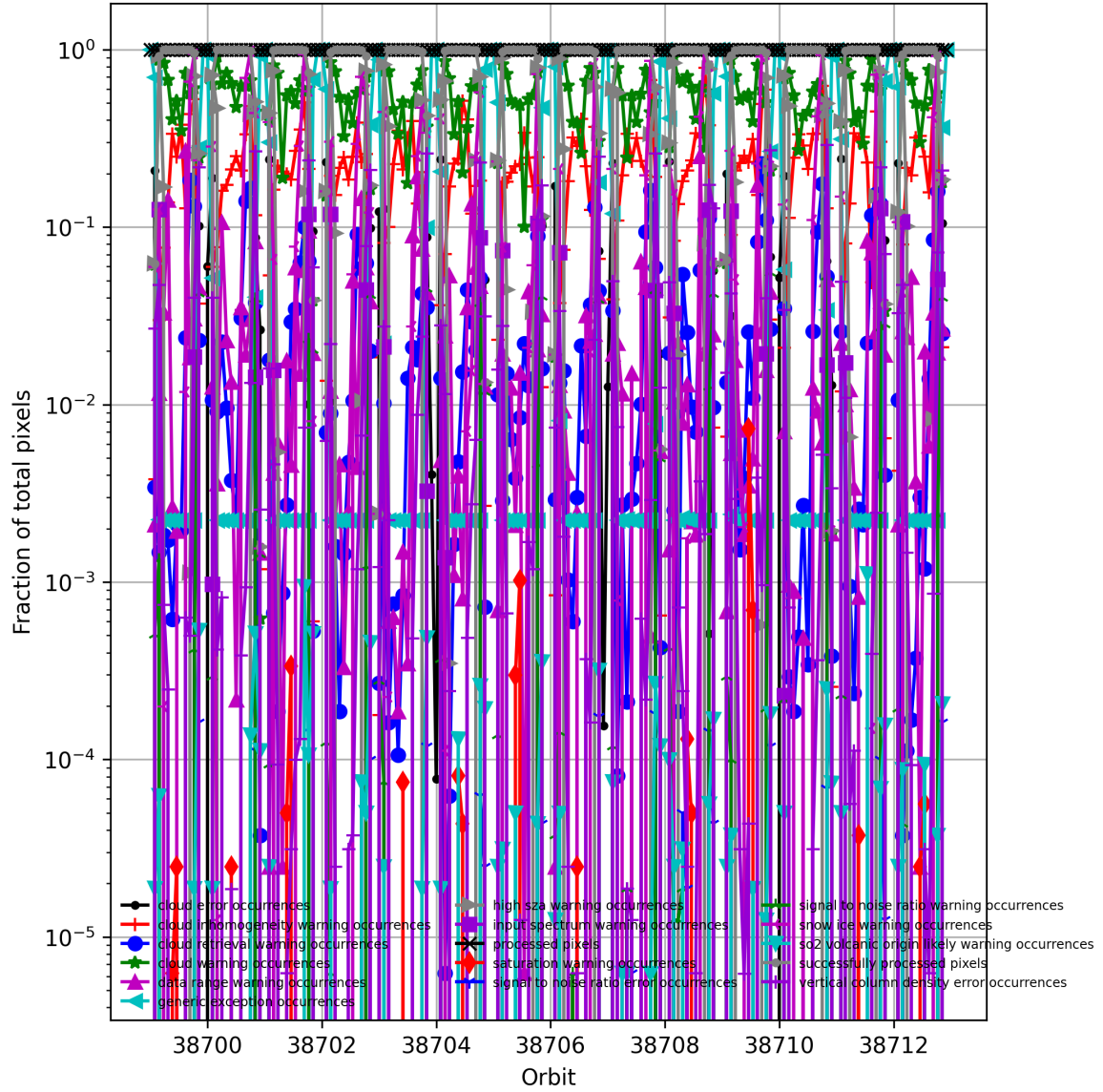


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

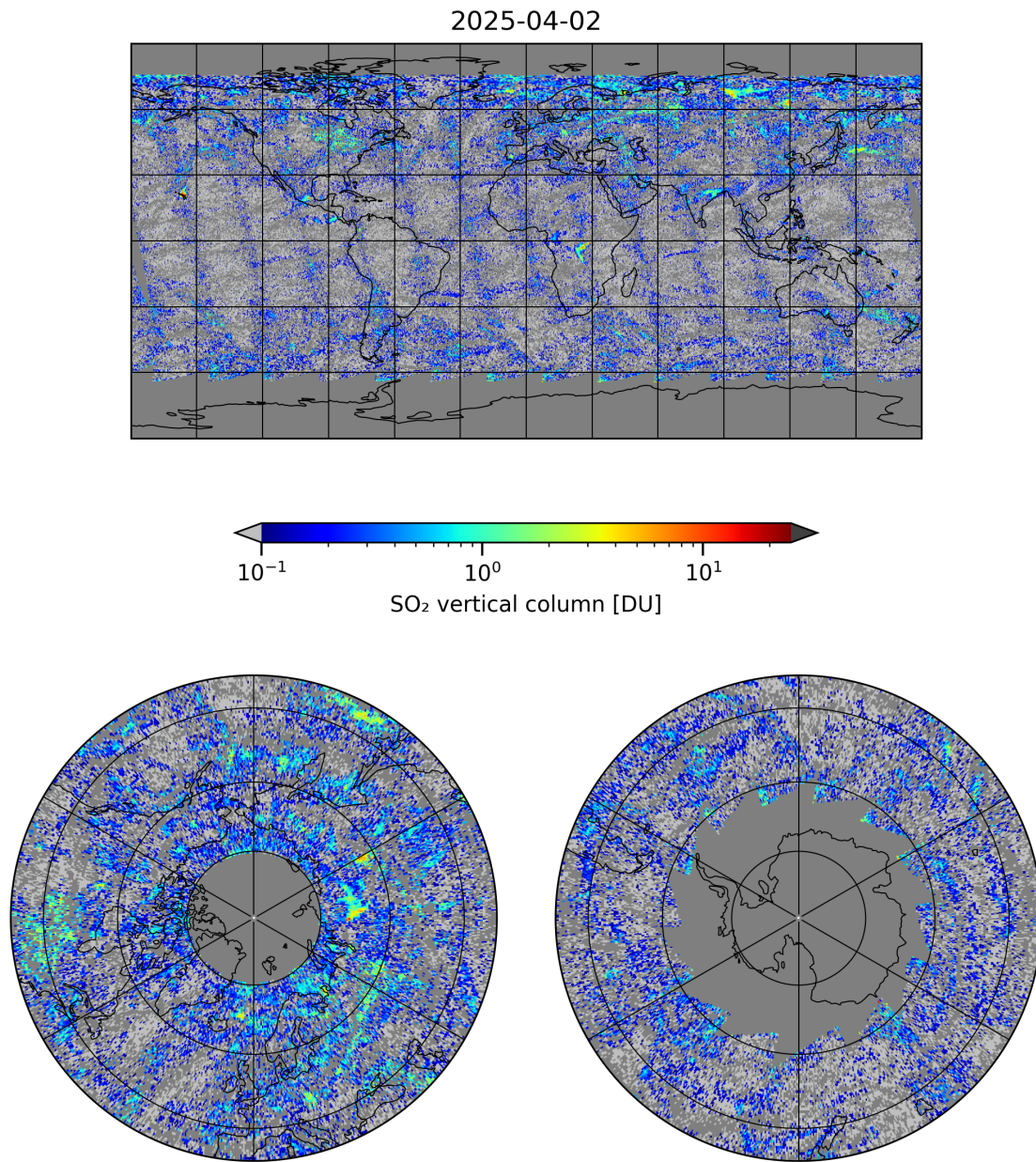


Figure 4: Map of “SO₂ vertical column” for 2025-04-02 to 2025-04-03

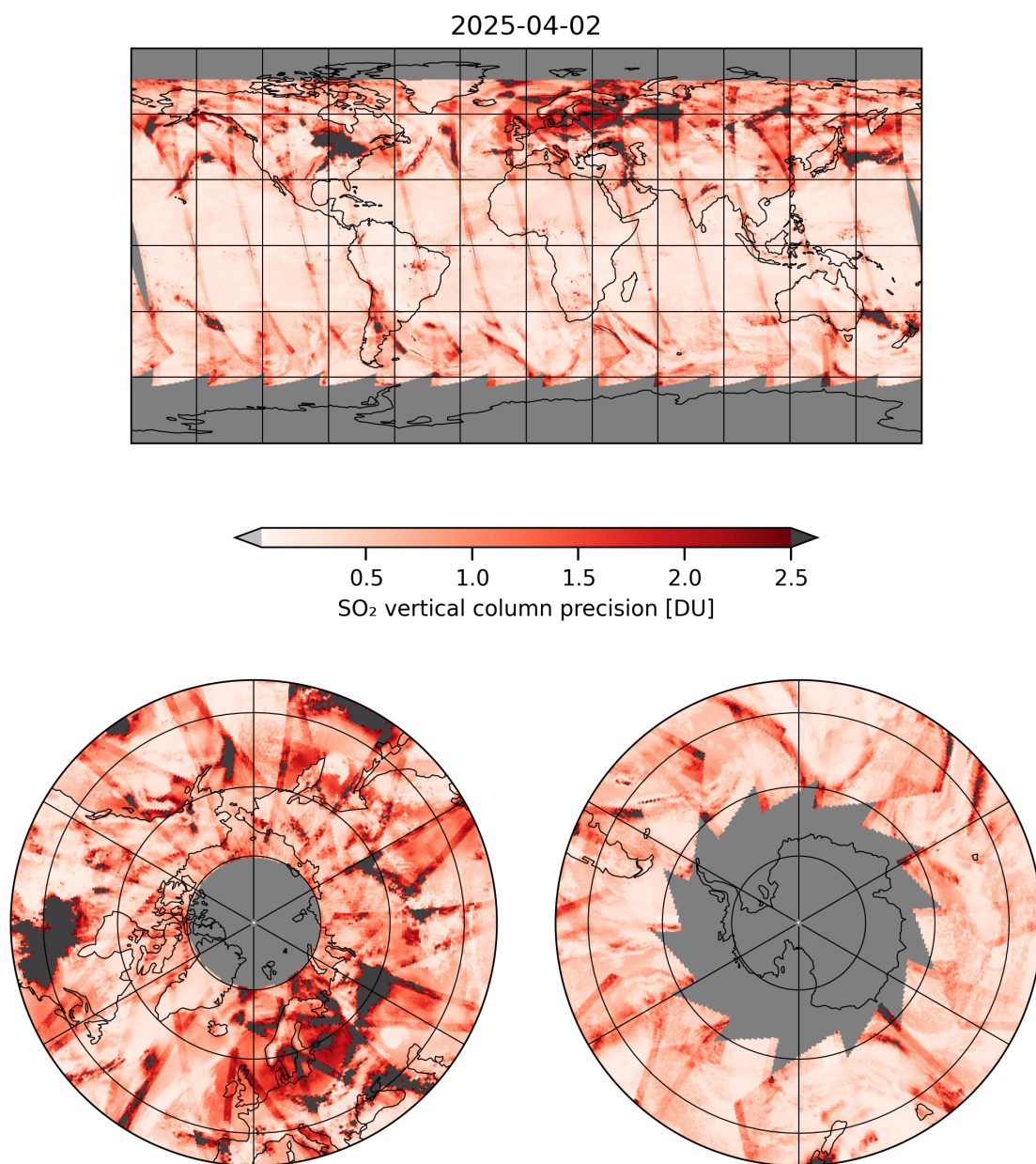


Figure 5: Map of “SO₂ vertical column precision” for 2025-04-02 to 2025-04-03

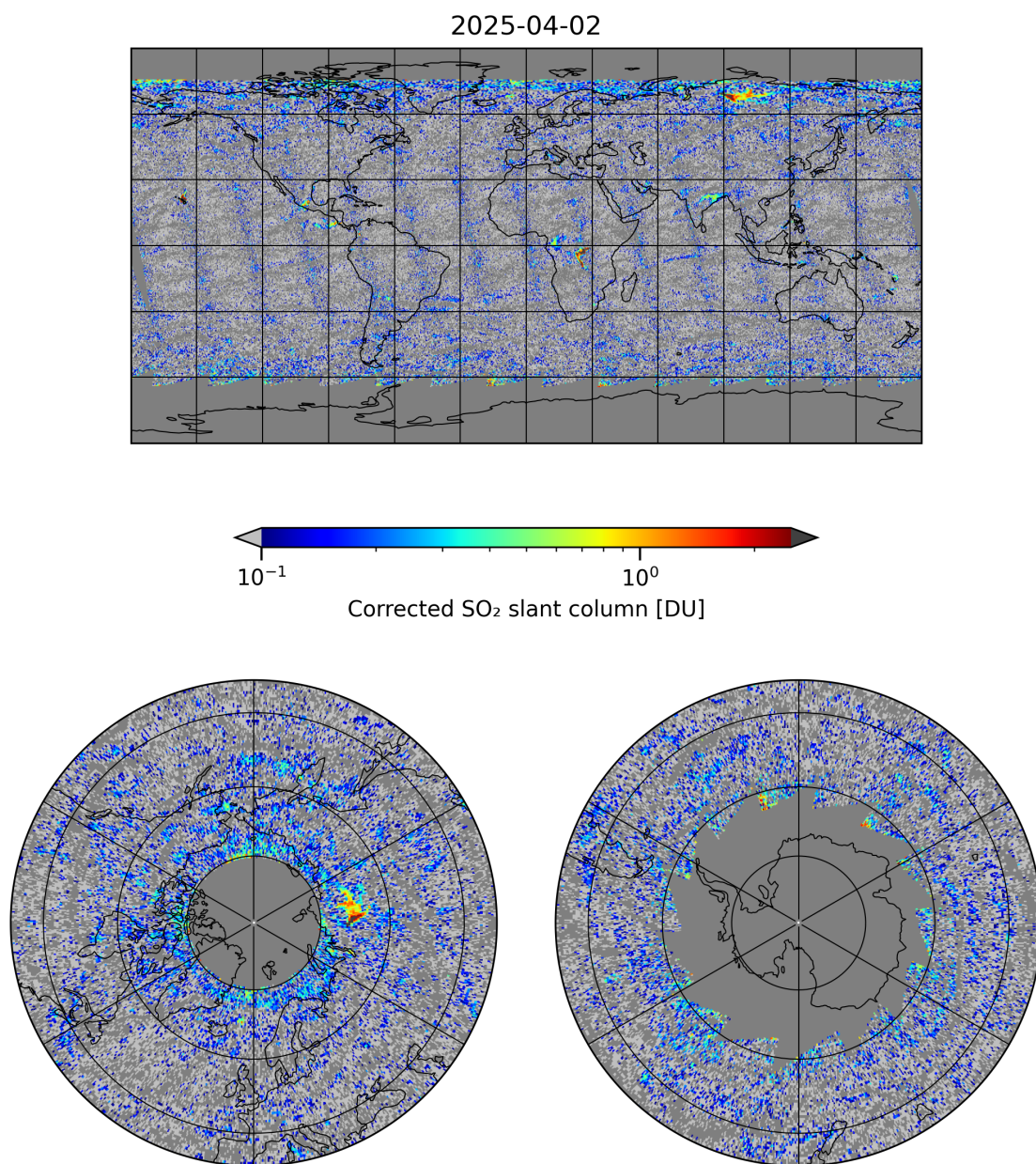


Figure 6: Map of “Corrected SO₂ slant column” for 2025-04-02 to 2025-04-03

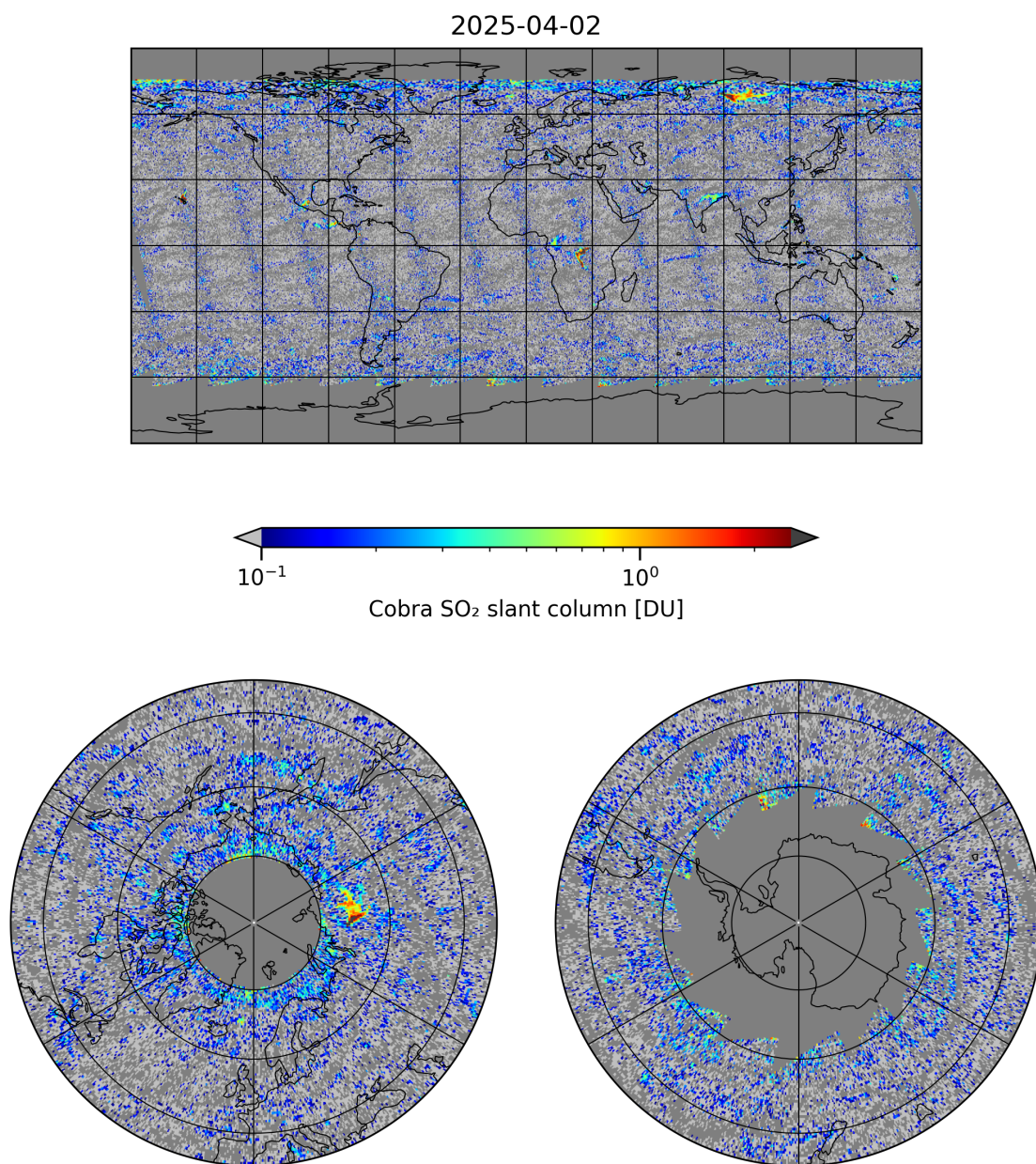


Figure 7: Map of “Cobra SO₂ slant column” for 2025-04-02 to 2025-04-03

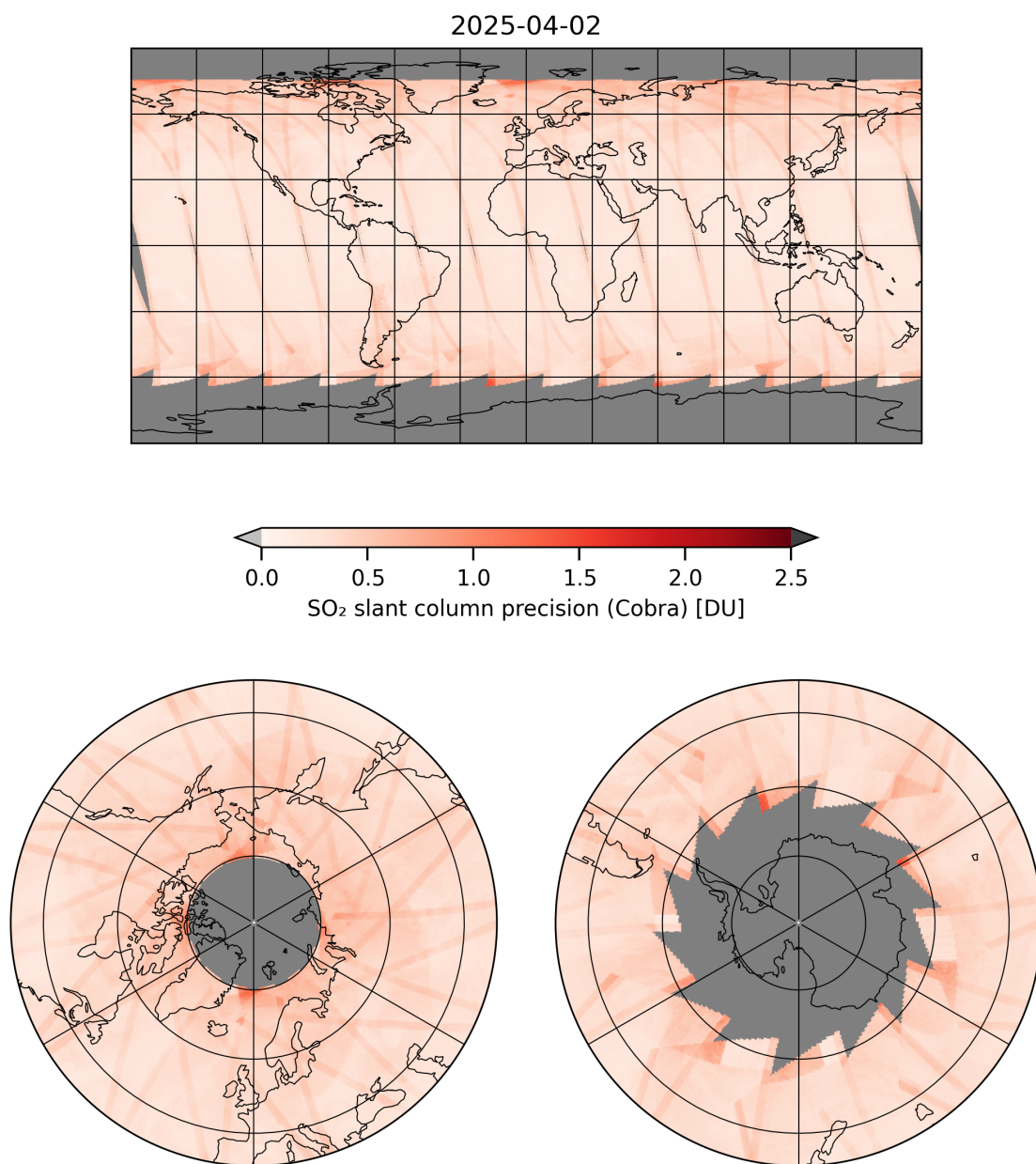


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-04-02 to 2025-04-03

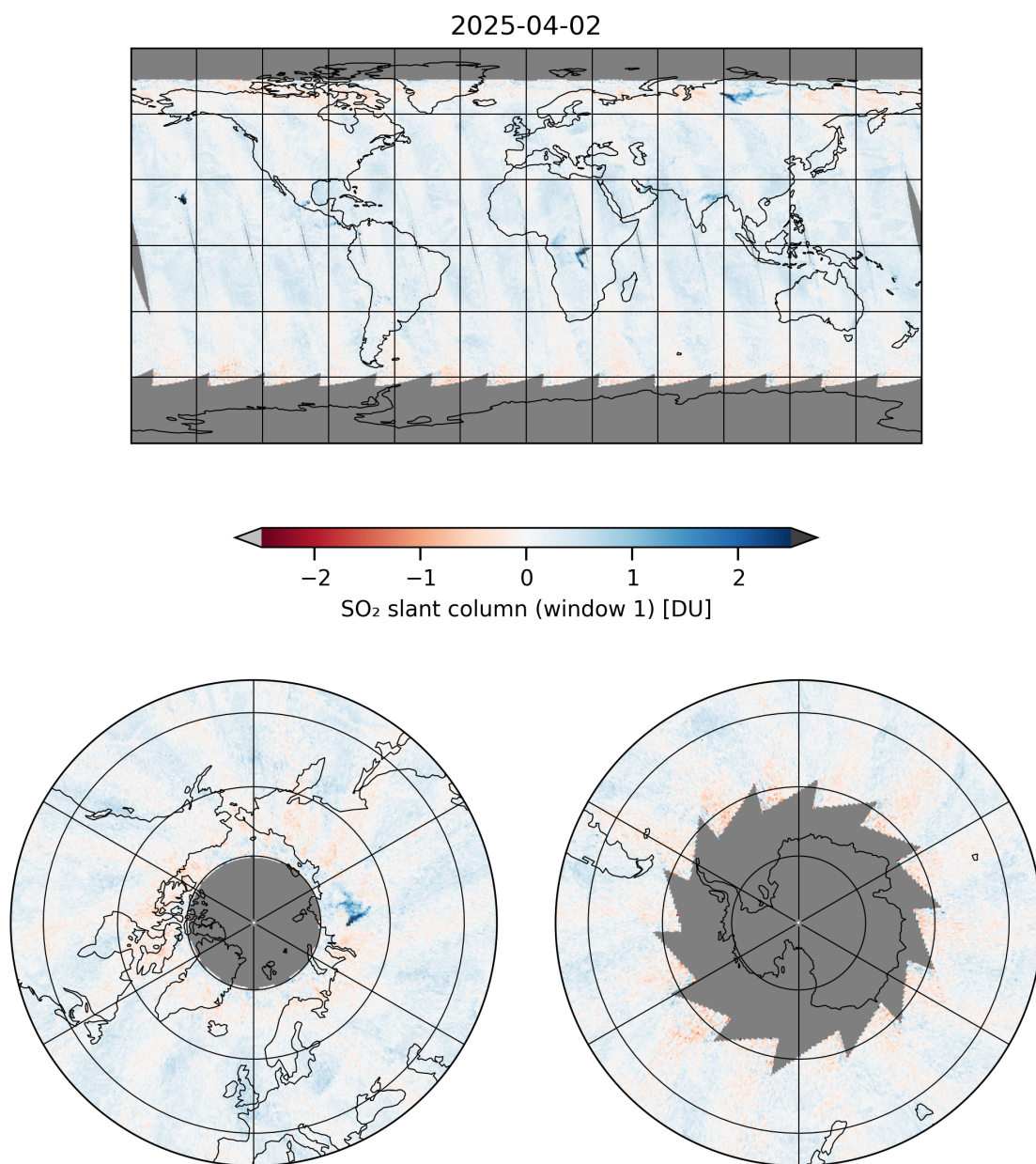


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-04-02 to 2025-04-03

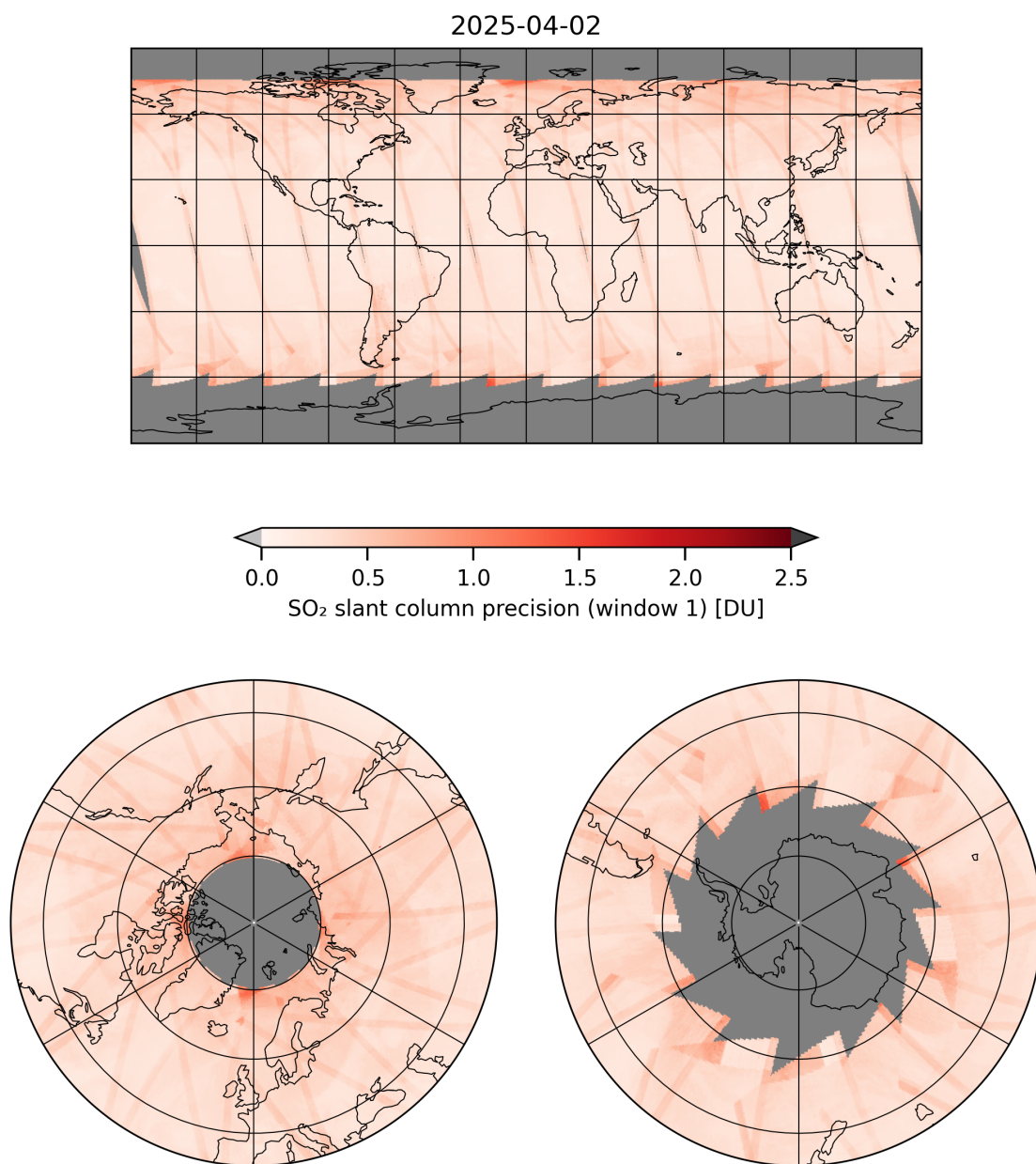


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-04-02 to 2025-04-03

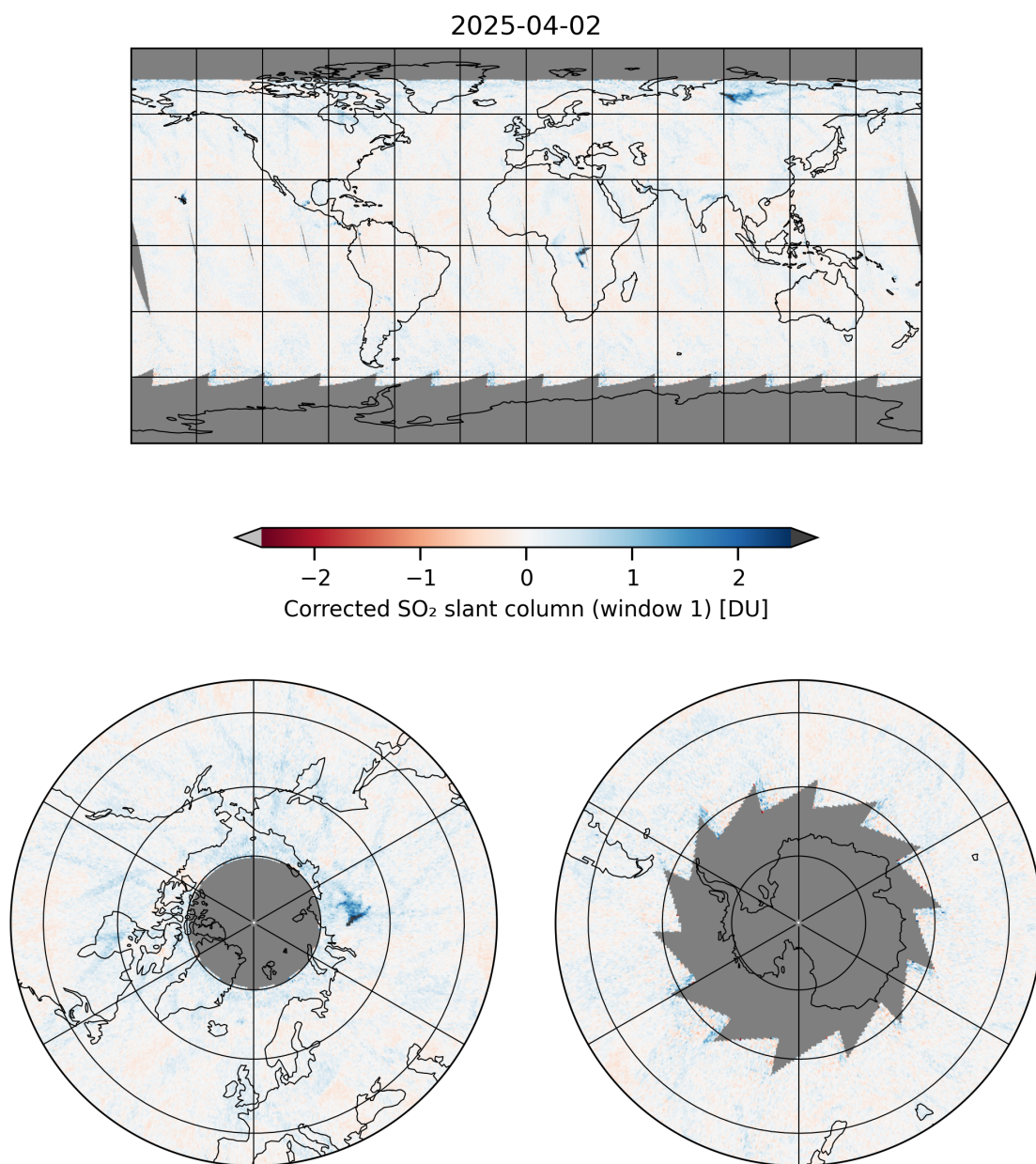


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-04-02 to 2025-04-03

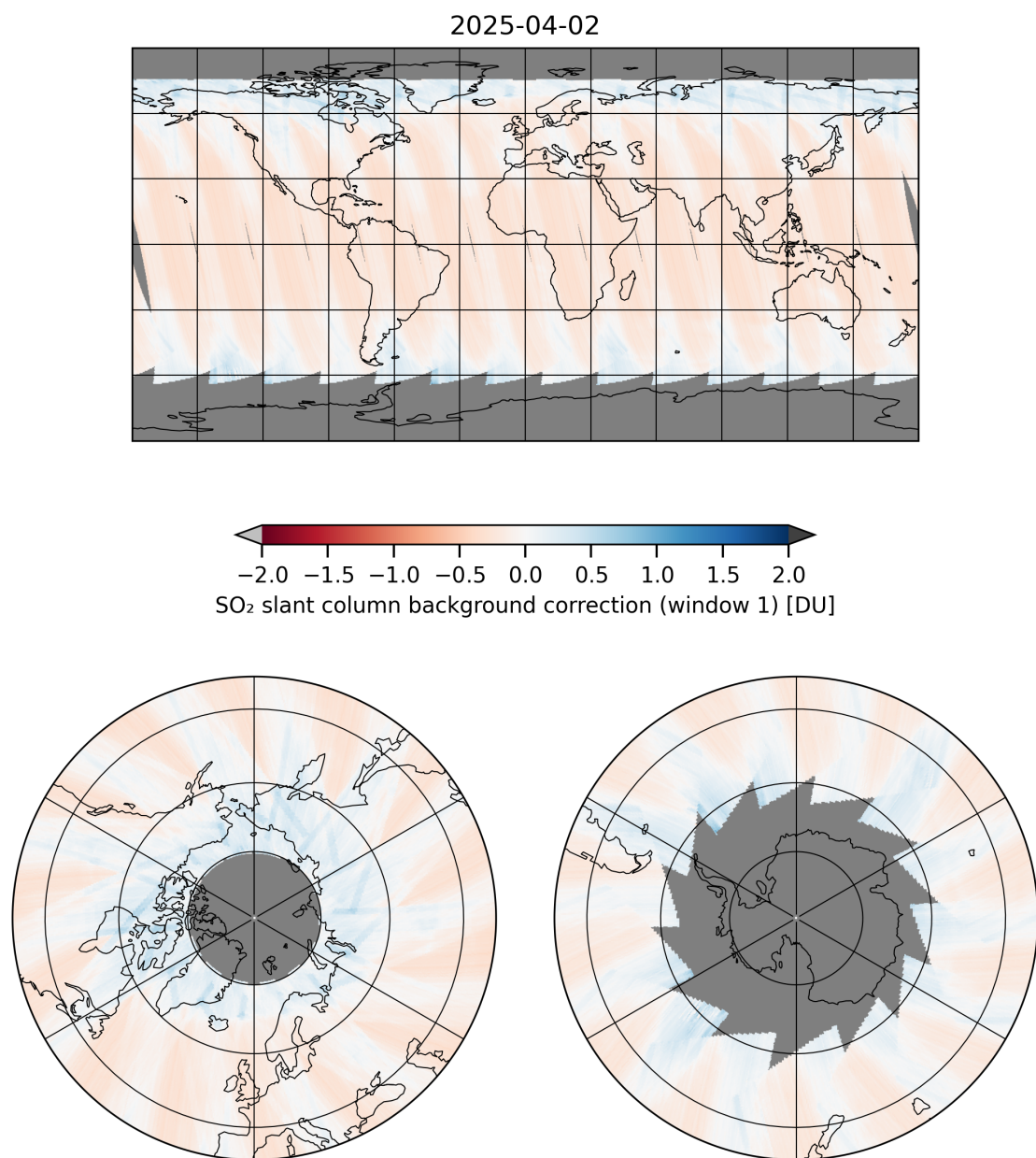


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-04-02 to 2025-04-03

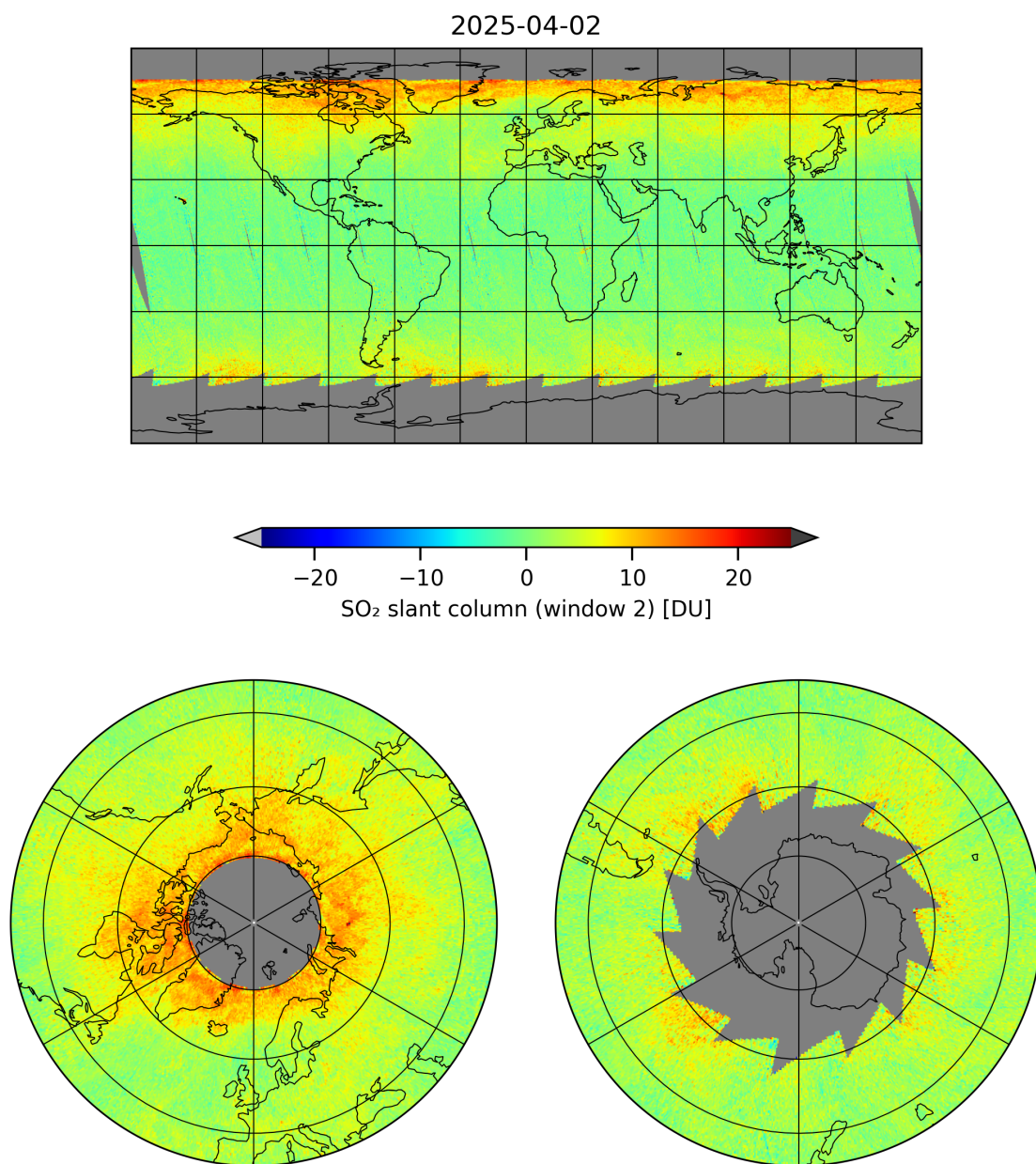


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-04-02 to 2025-04-03

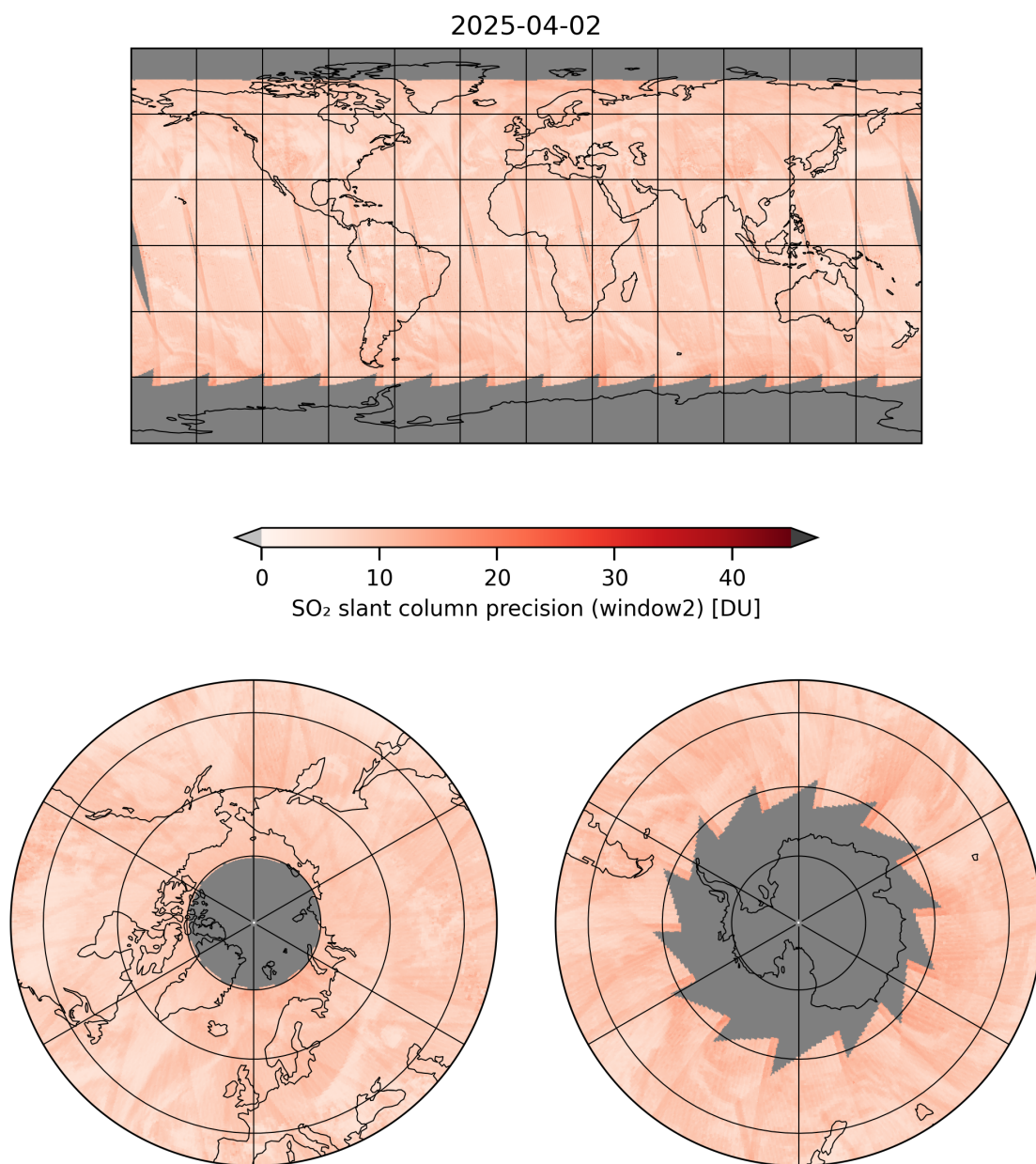


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-04-02 to 2025-04-03

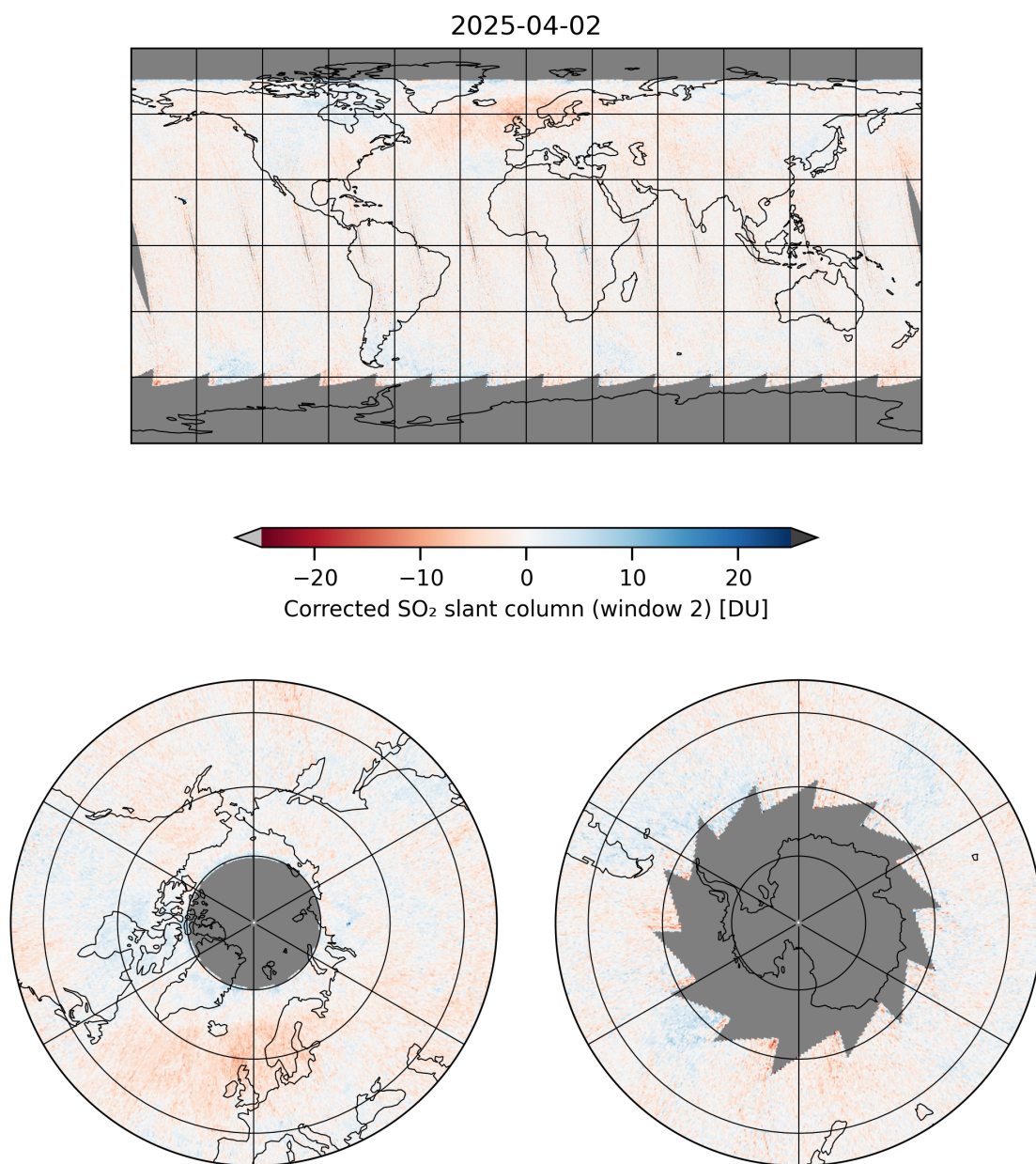


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-04-02 to 2025-04-03

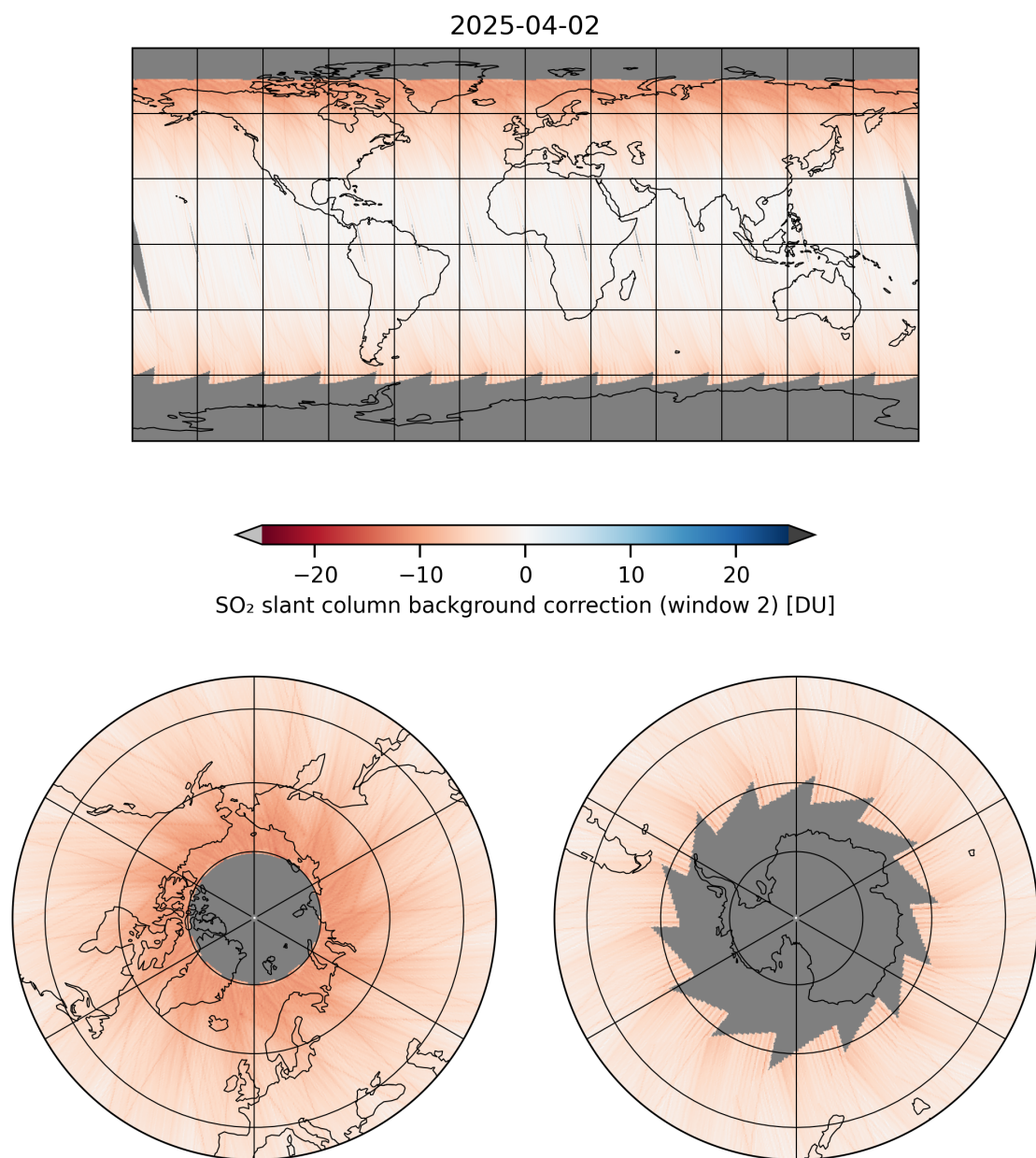


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-04-02 to 2025-04-03

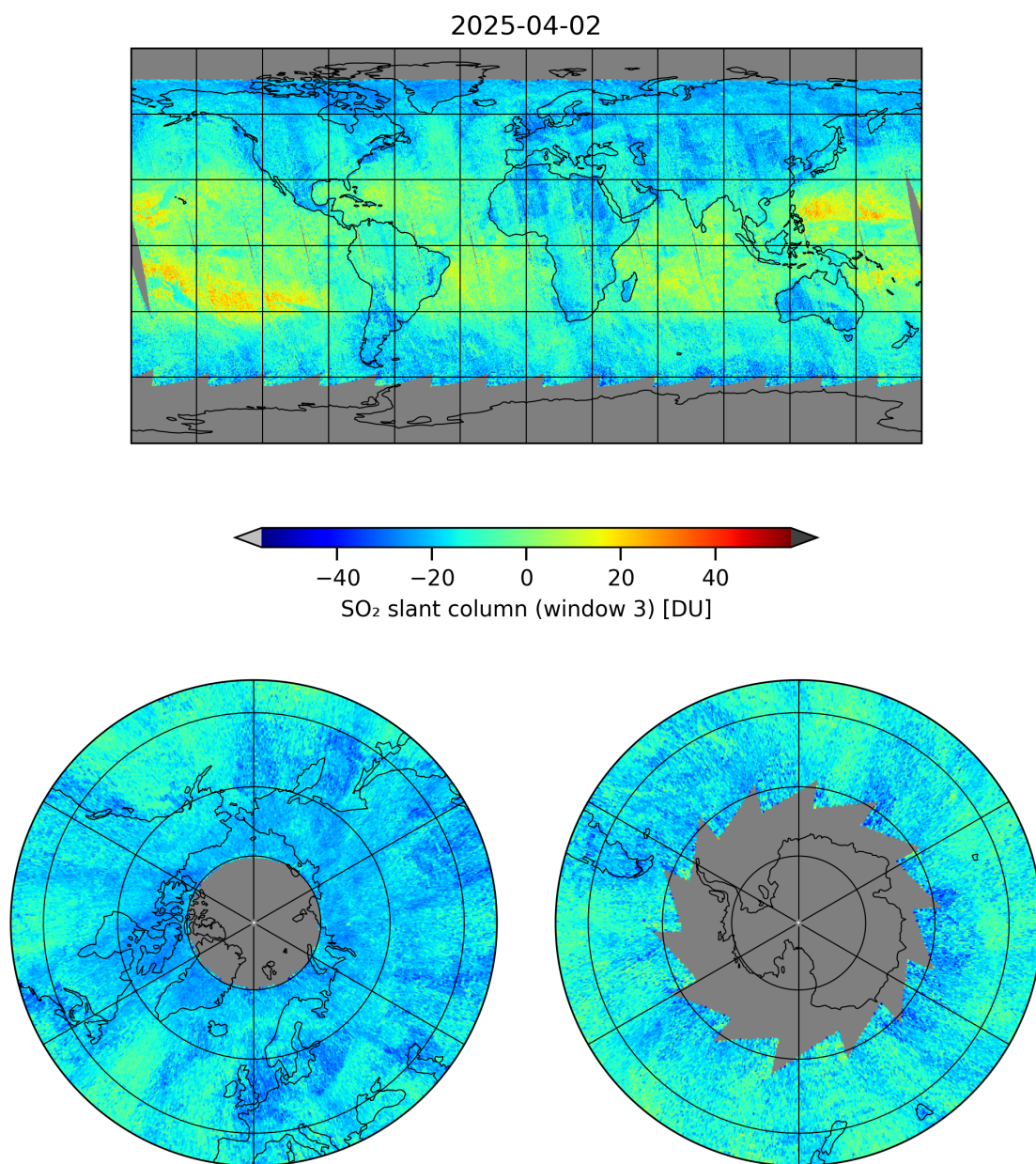


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-04-02 to 2025-04-03

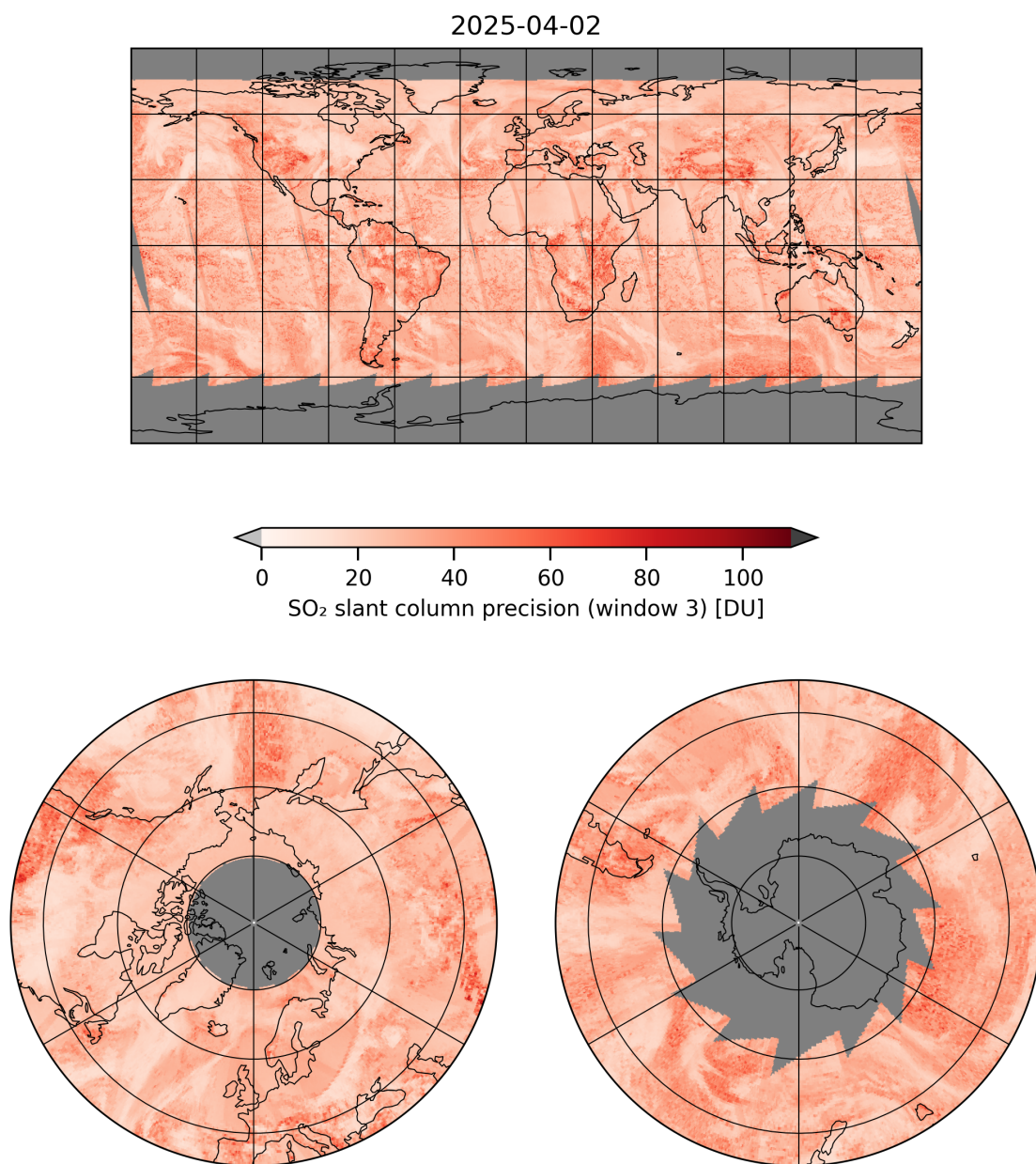


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-04-02 to 2025-04-03

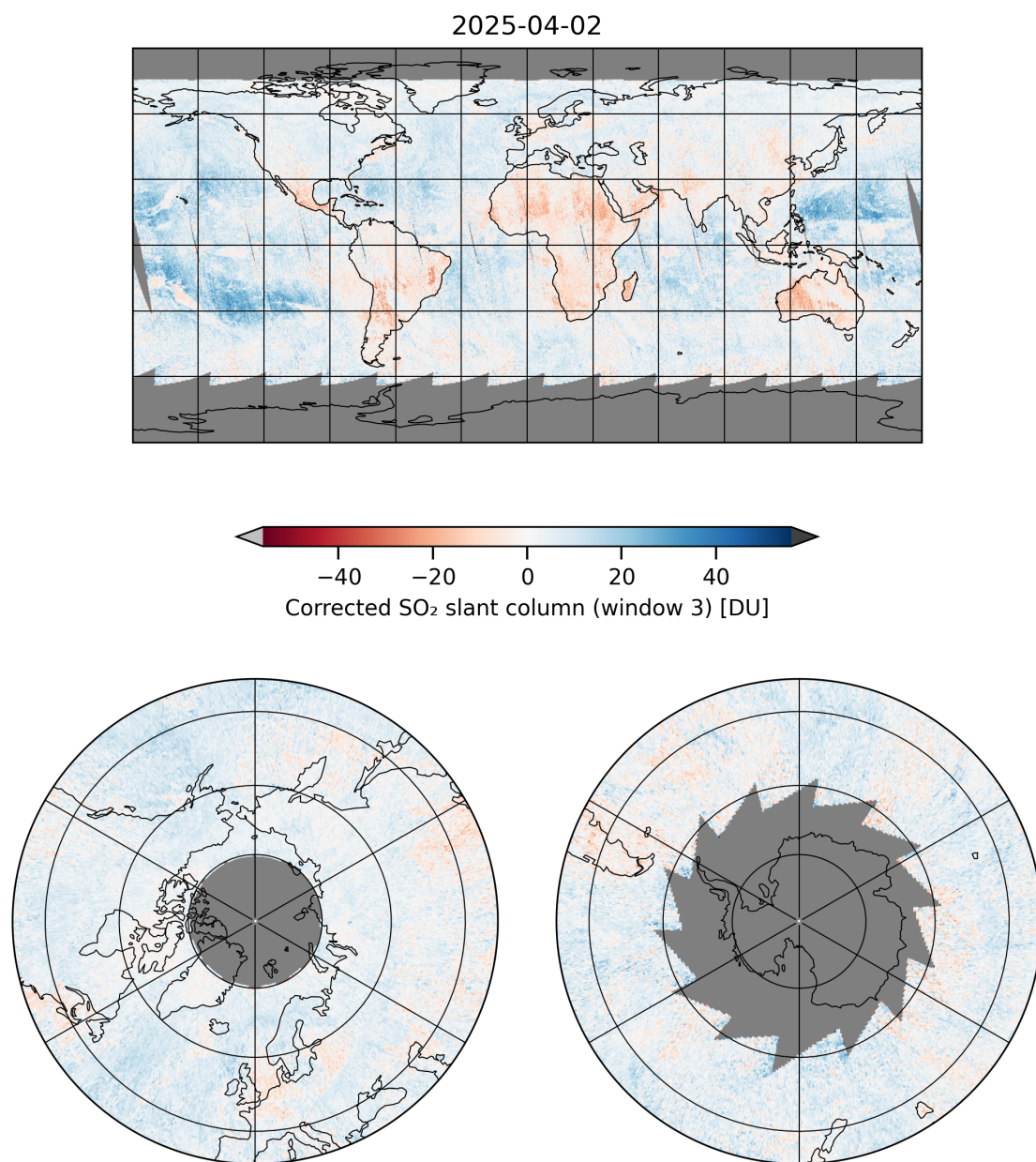


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-04-02 to 2025-04-03

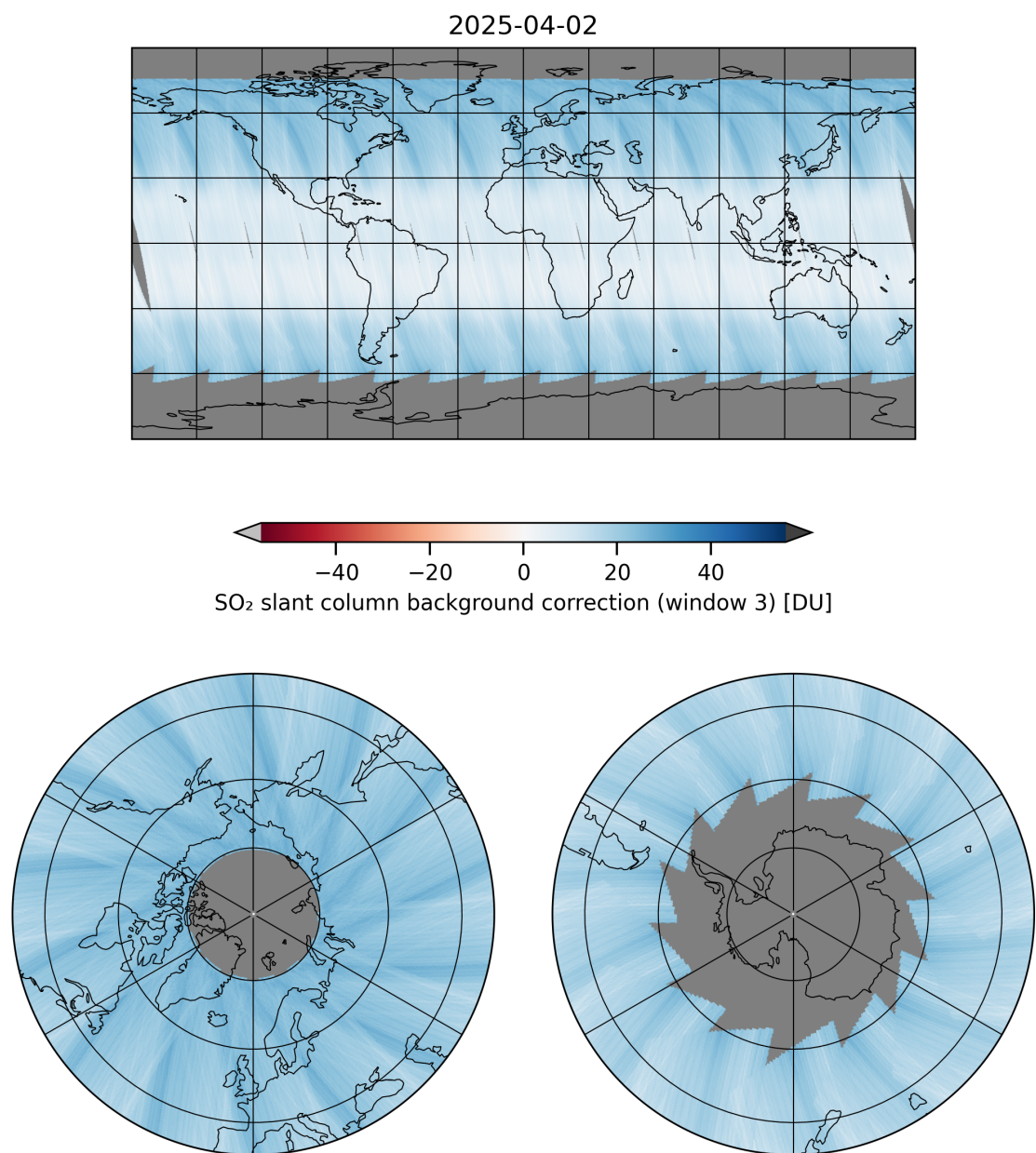


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-04-02 to 2025-04-03

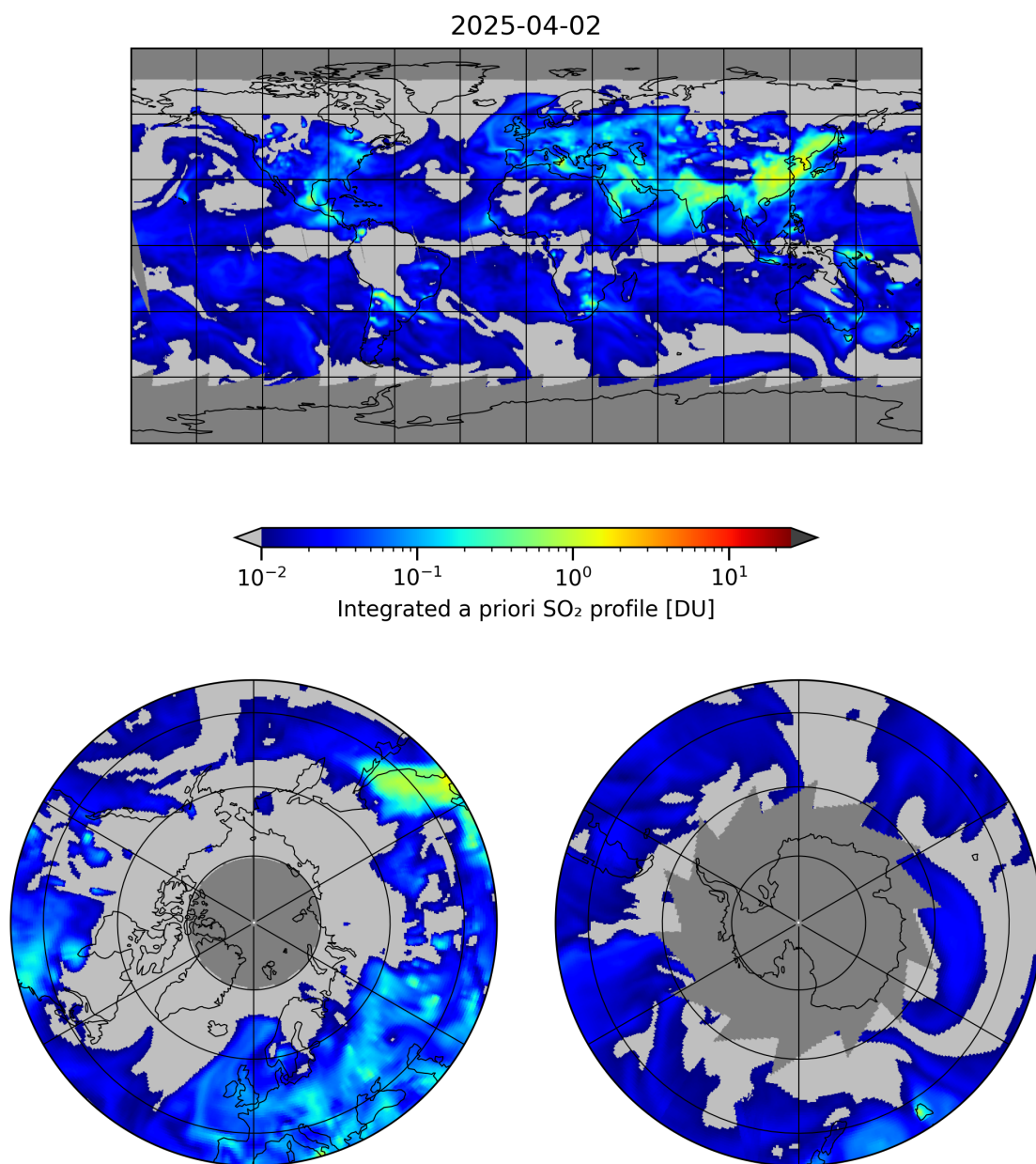


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-04-02 to 2025-04-03

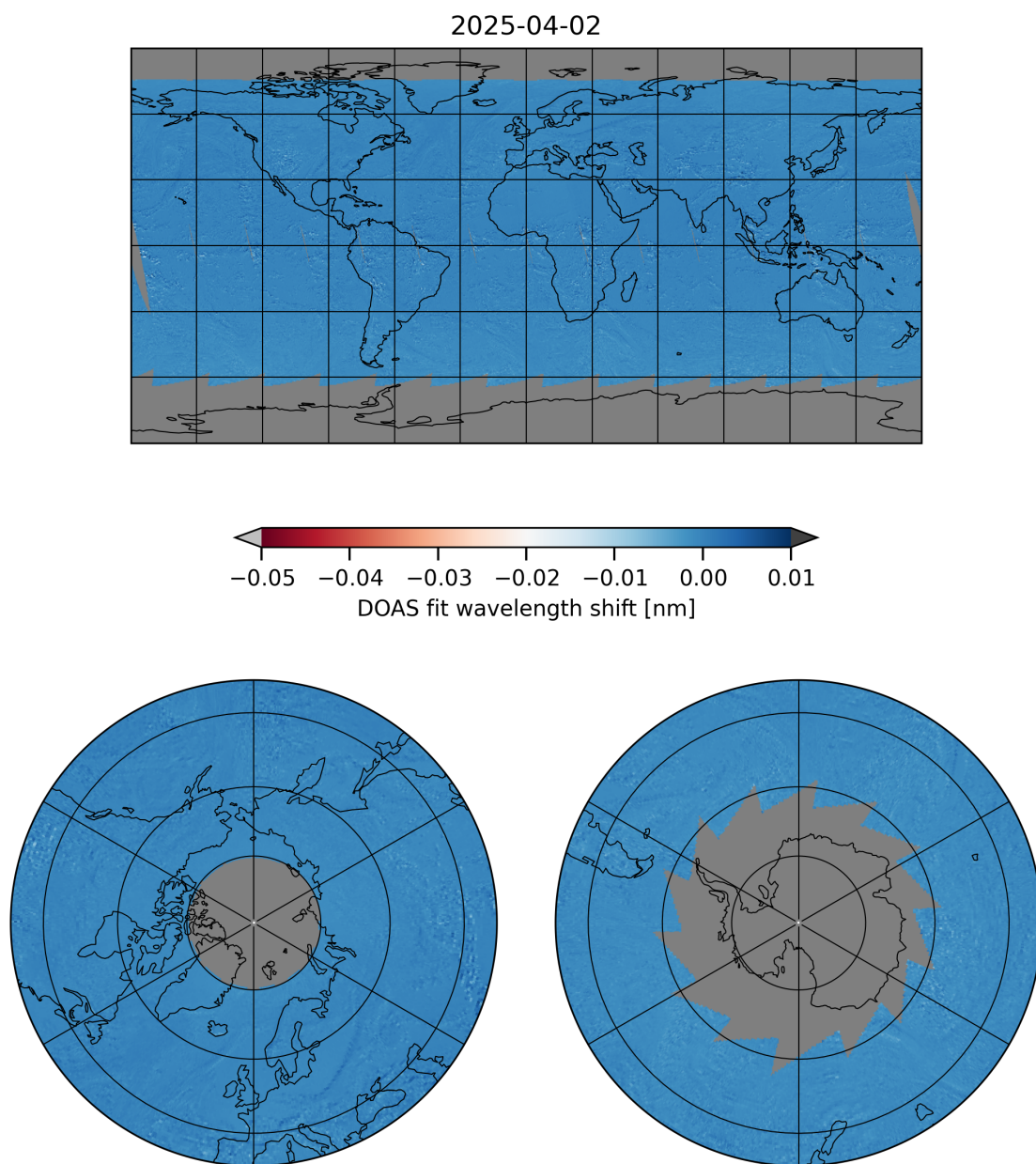


Figure 22: Map of “DOAS fit wavelength shift” for 2025-04-02 to 2025-04-03

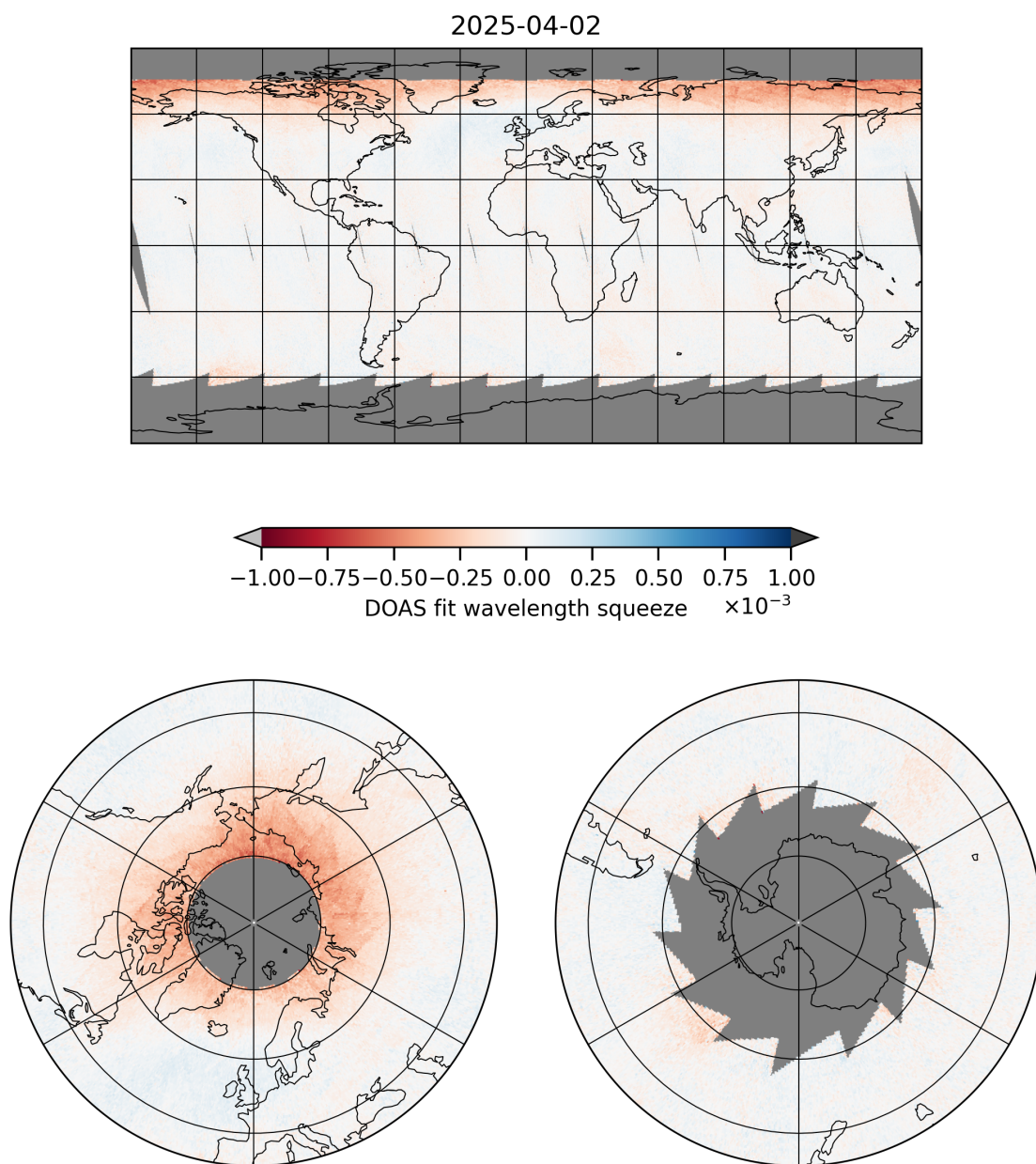


Figure 23: Map of "DOAS fit wavelength squeeze" for 2025-04-02 to 2025-04-03

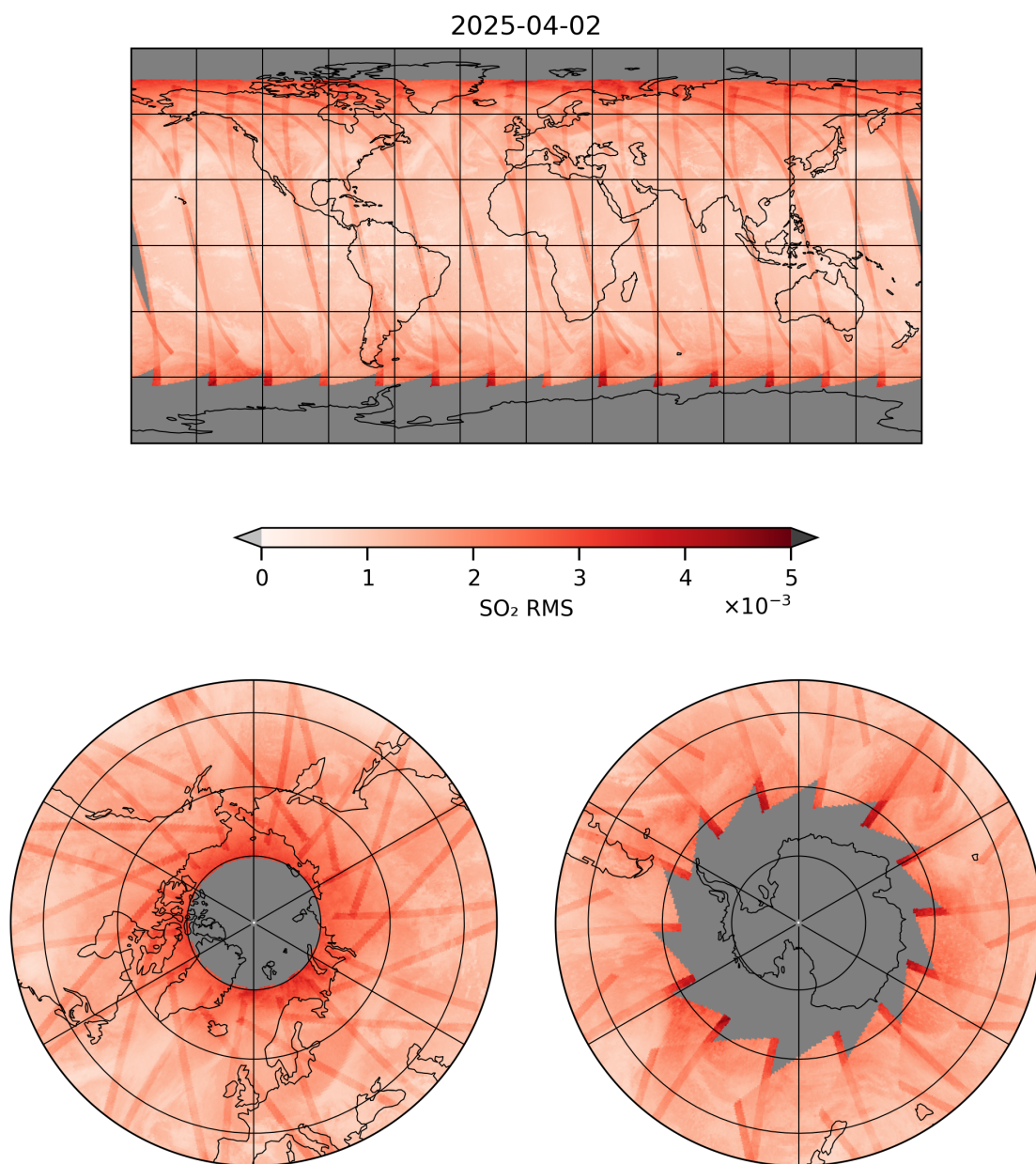


Figure 24: Map of “SO₂ RMS” for 2025-04-02 to 2025-04-03

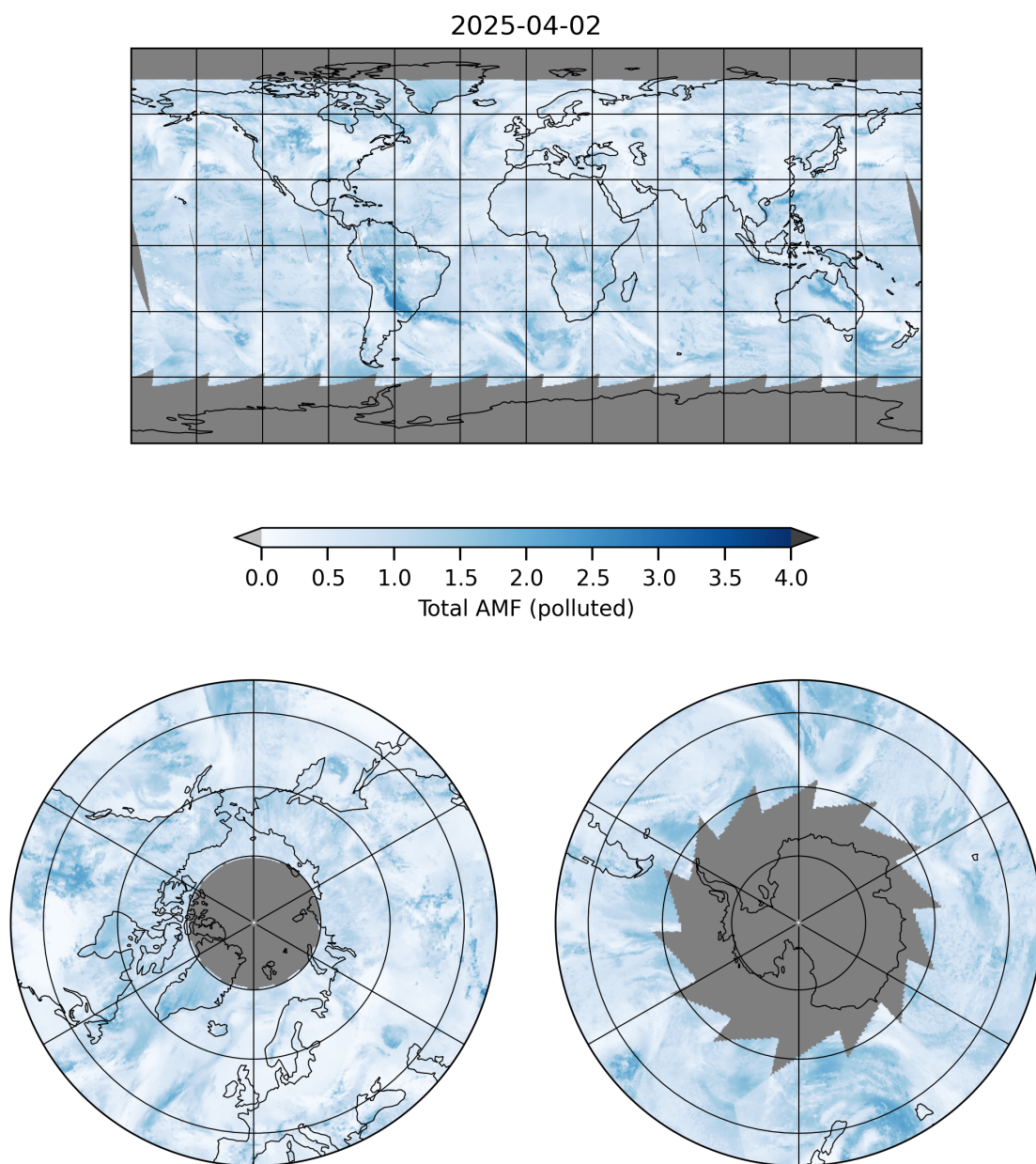


Figure 25: Map of “Total AMF (polluted)” for 2025-04-02 to 2025-04-03

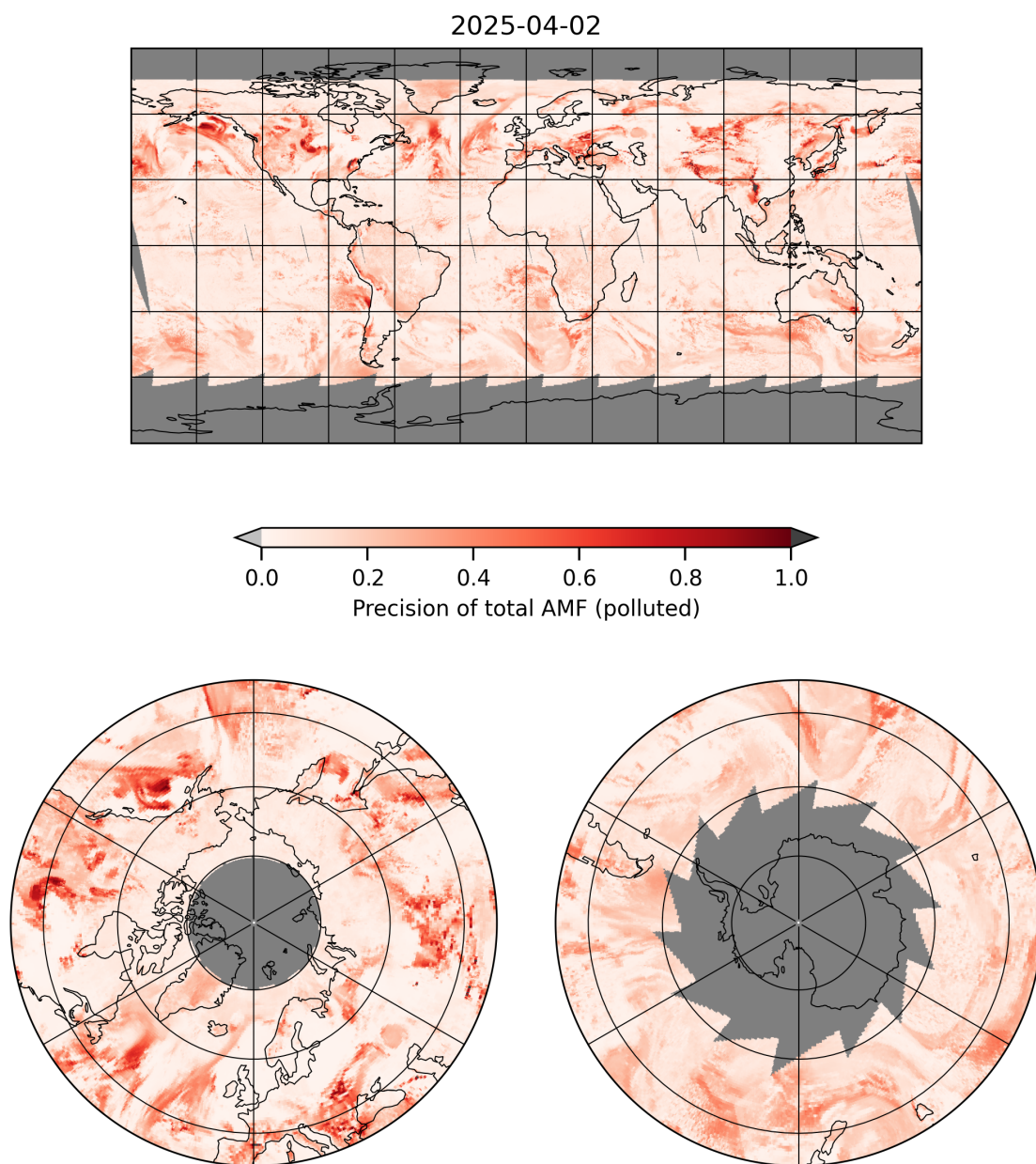


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-04-02 to 2025-04-03

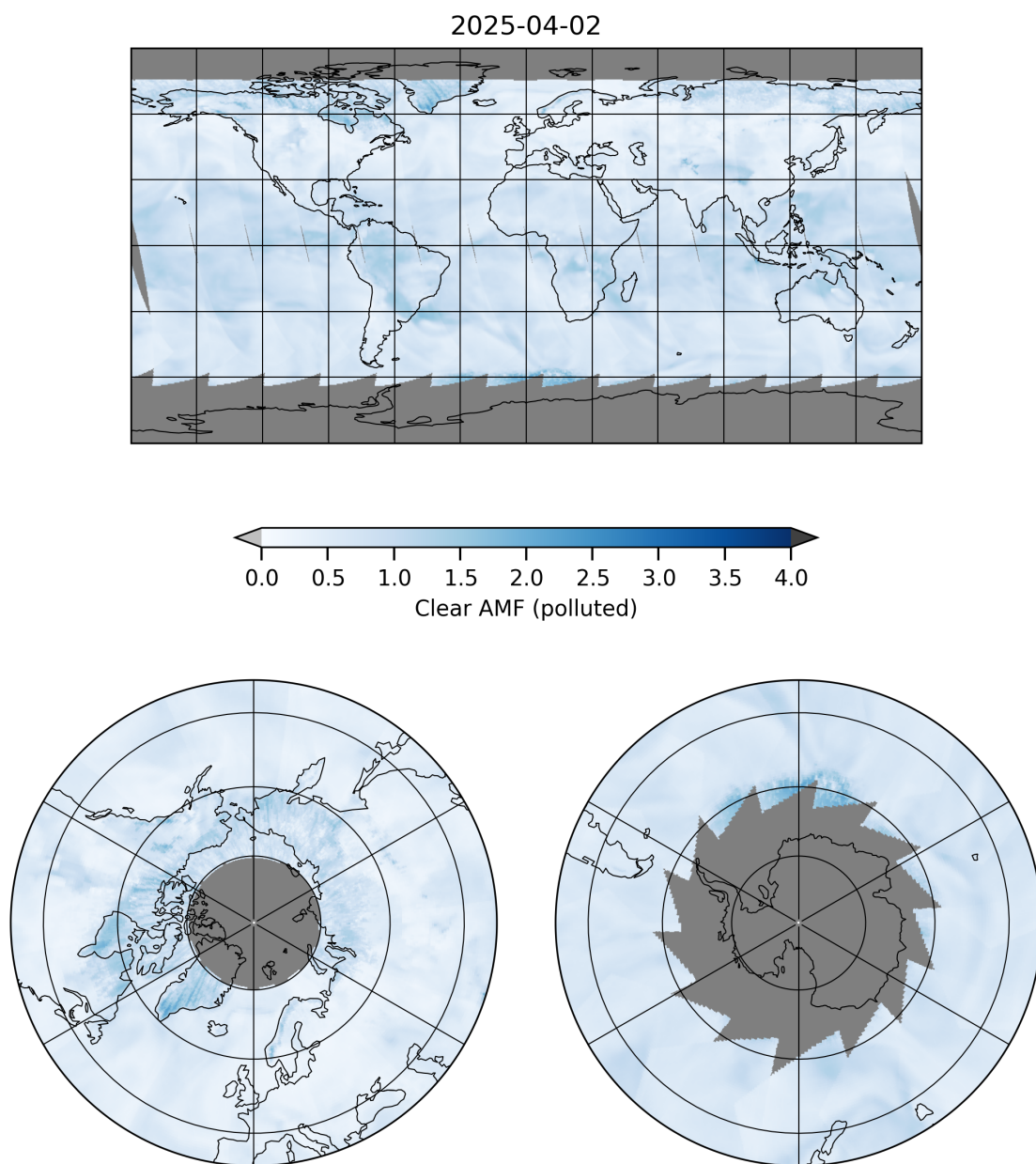


Figure 27: Map of “Clear AMF (polluted)” for 2025-04-02 to 2025-04-03

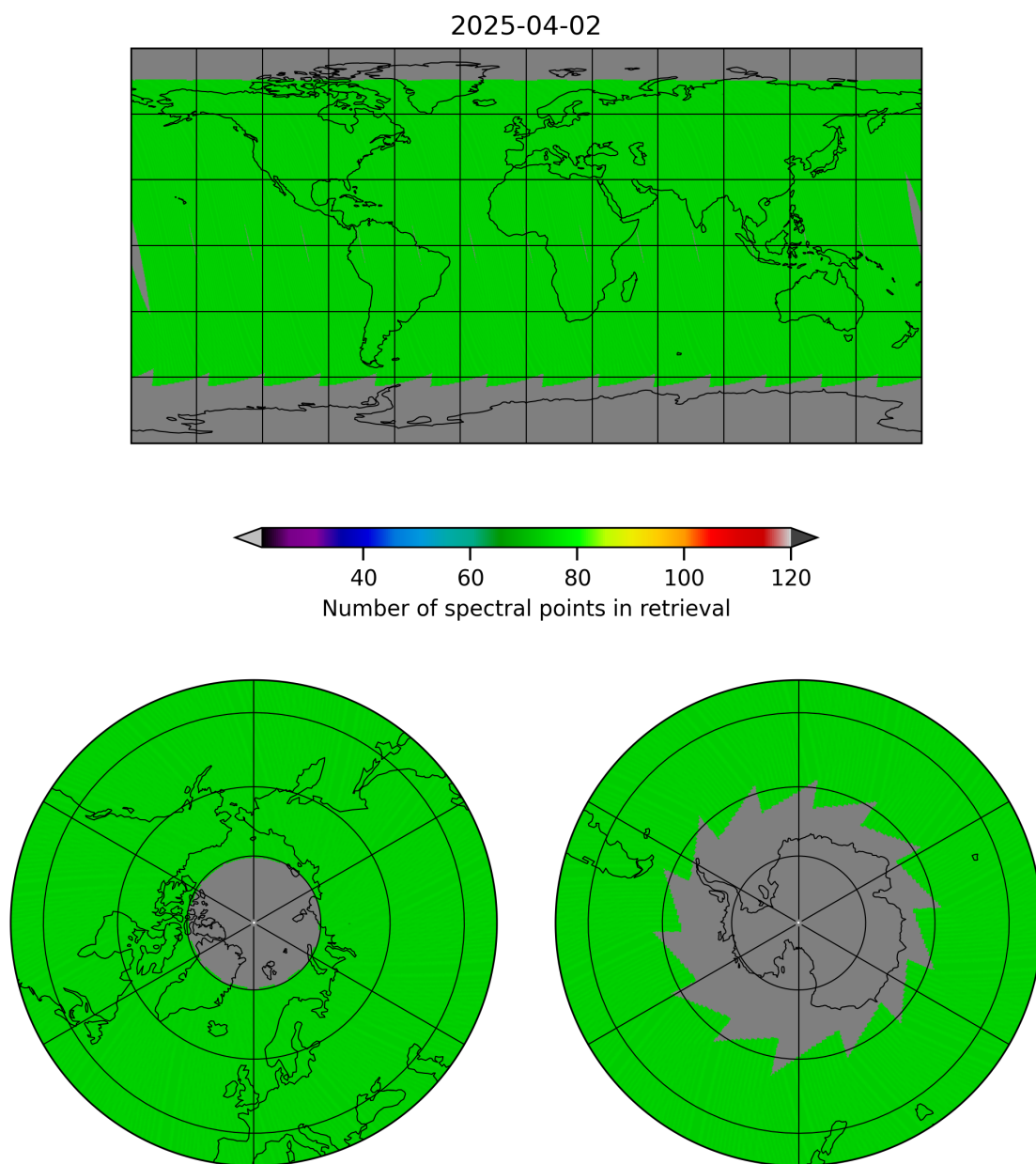


Figure 28: Map of “Number of spectral points in retrieval” for 2025-04-02 to 2025-04-03

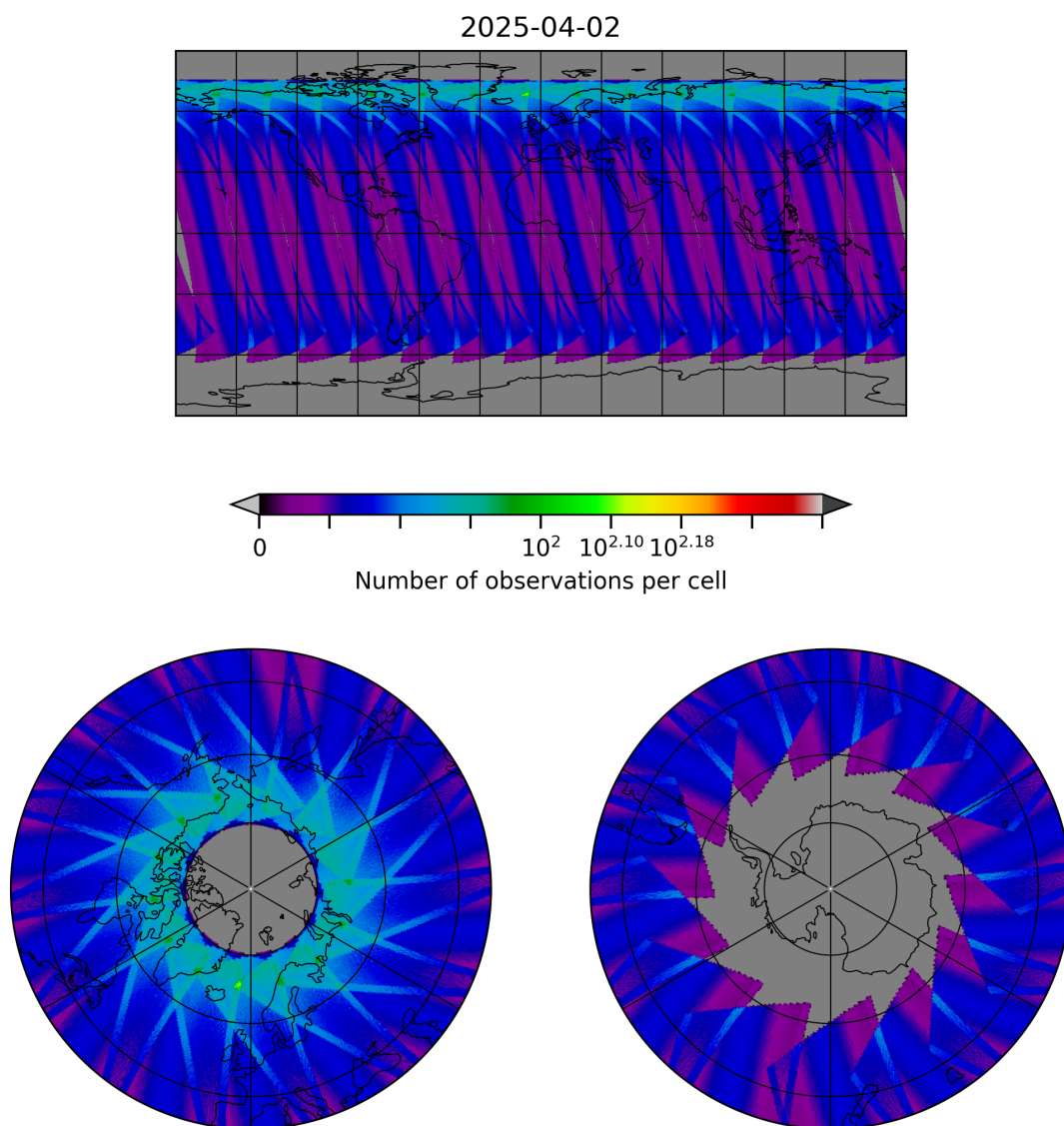


Figure 29: Map of the number of observations for 2025-04-02 to 2025-04-03

7 Zonal average

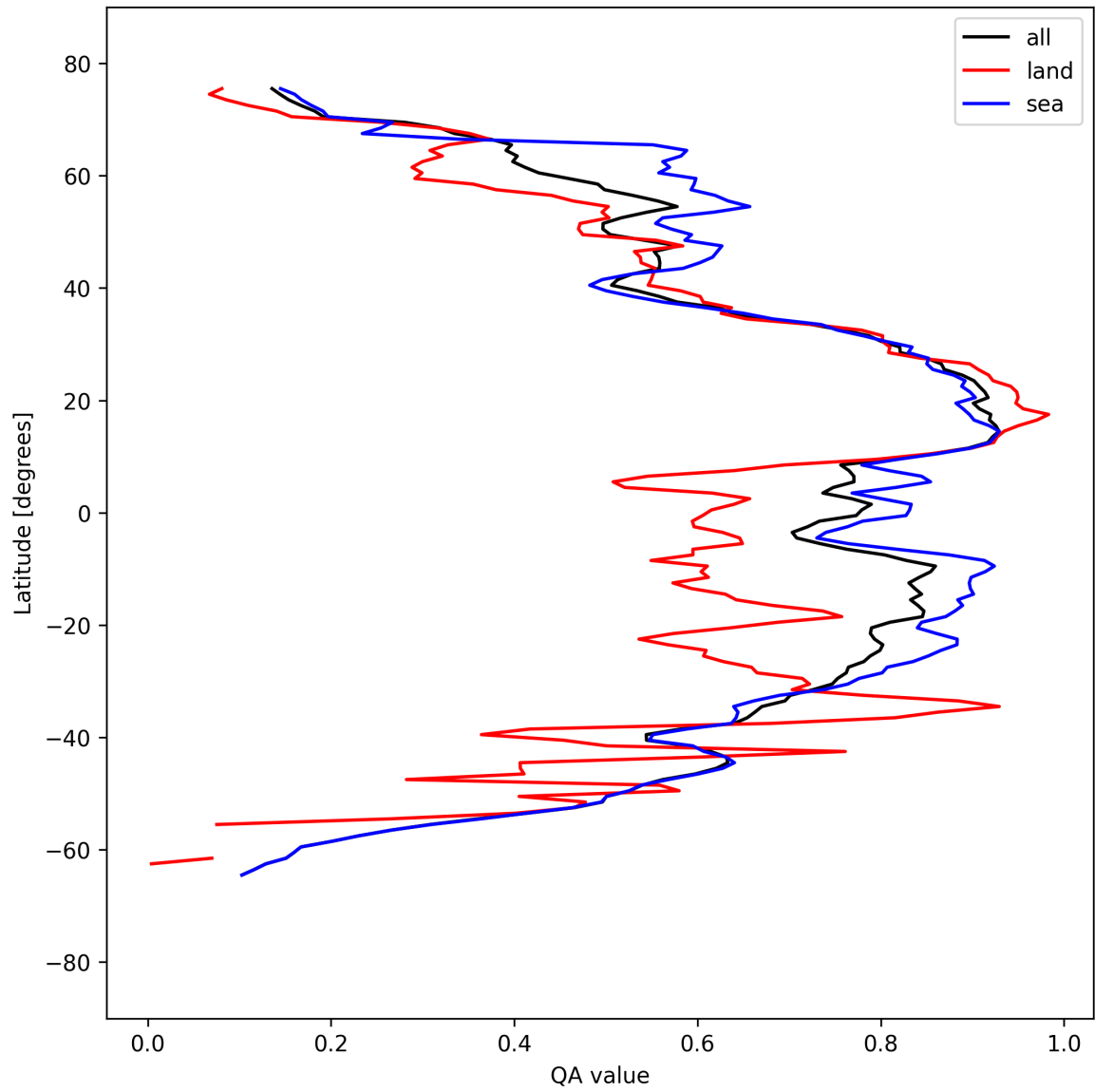


Figure 30: Zonal average of “QA value” for 2025-04-02 to 2025-04-03.

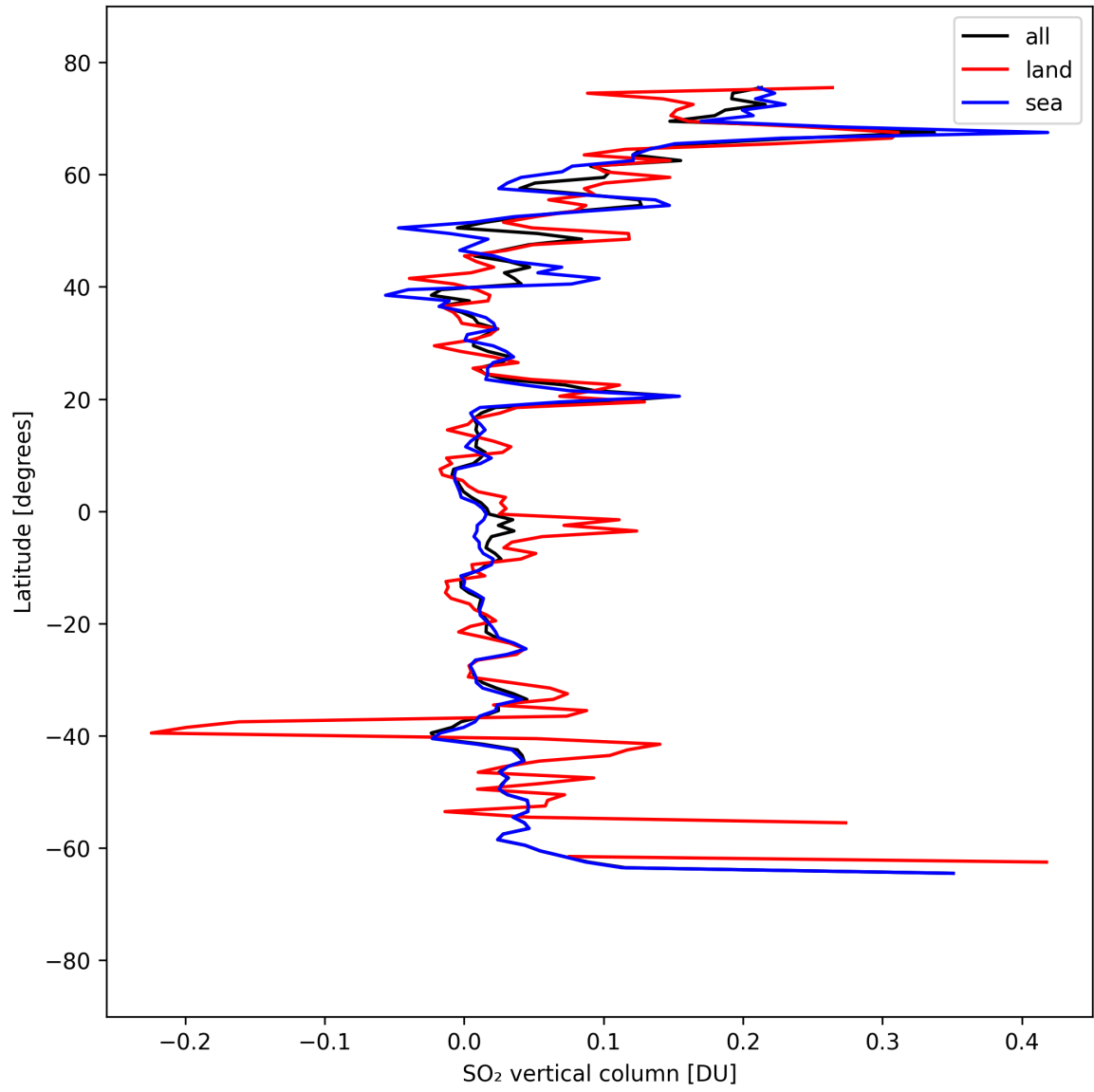


Figure 31: Zonal average of “SO₂ vertical column” for 2025-04-02 to 2025-04-03.

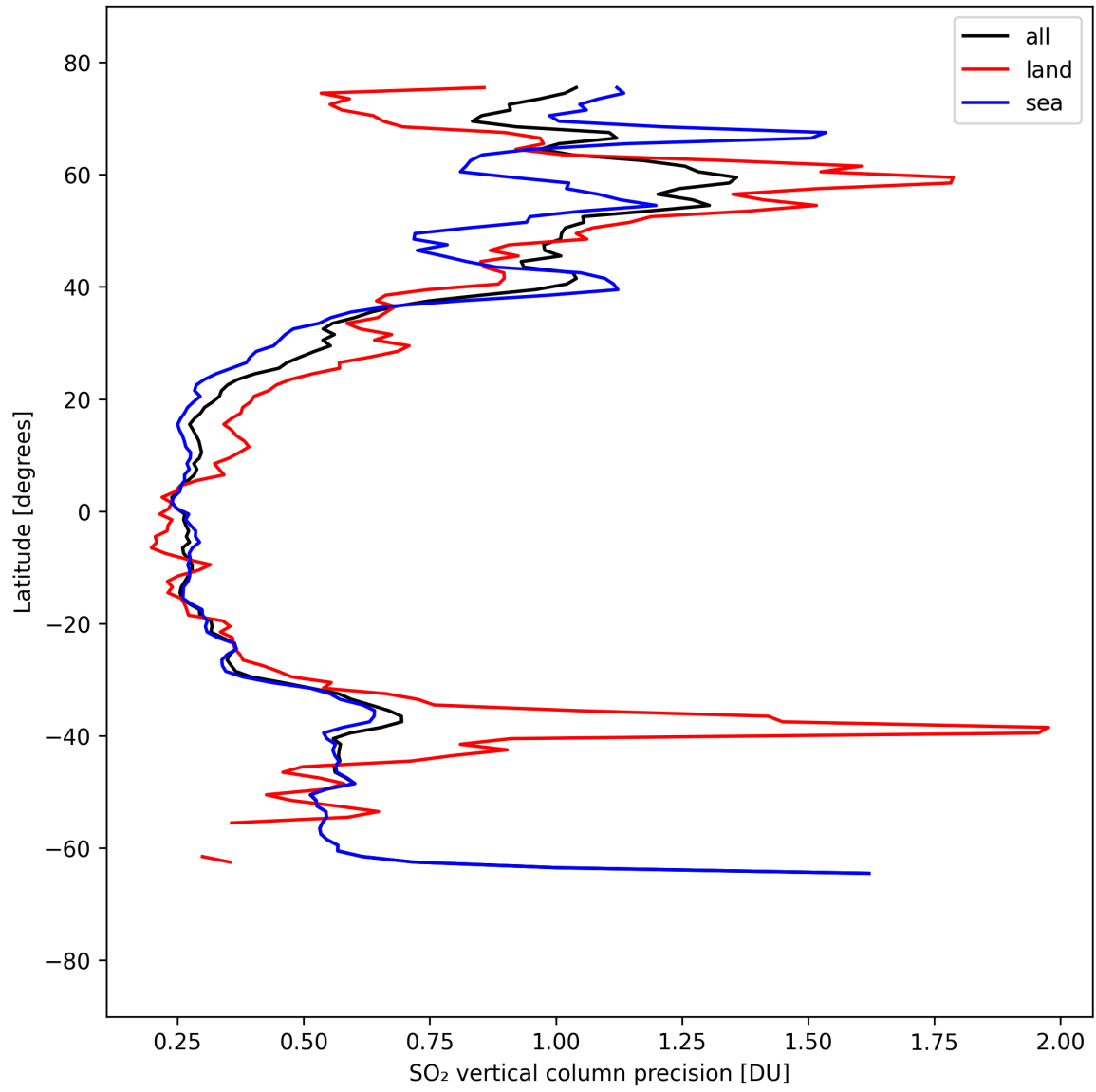


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-04-02 to 2025-04-03.

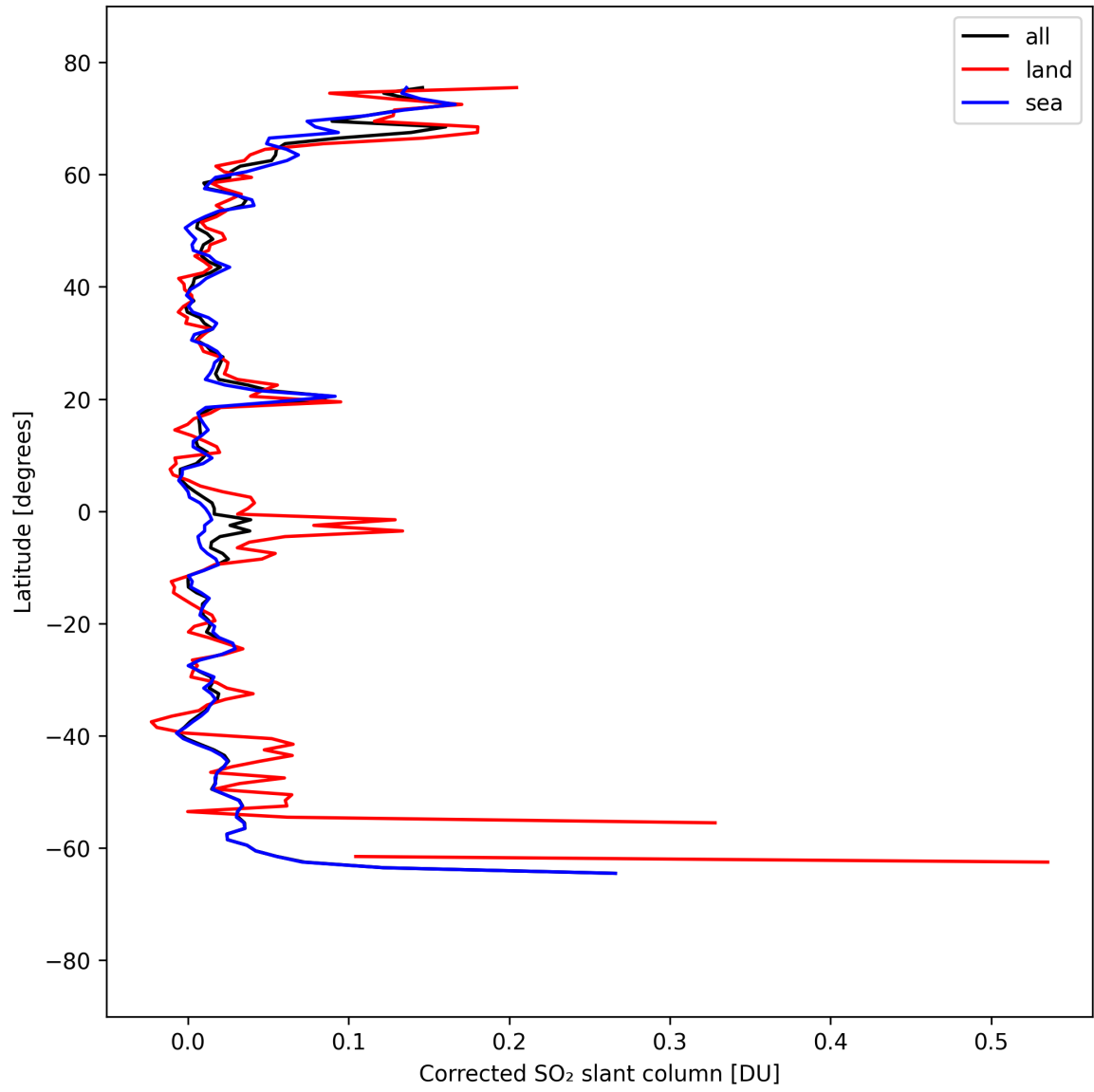


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-04-02 to 2025-04-03.

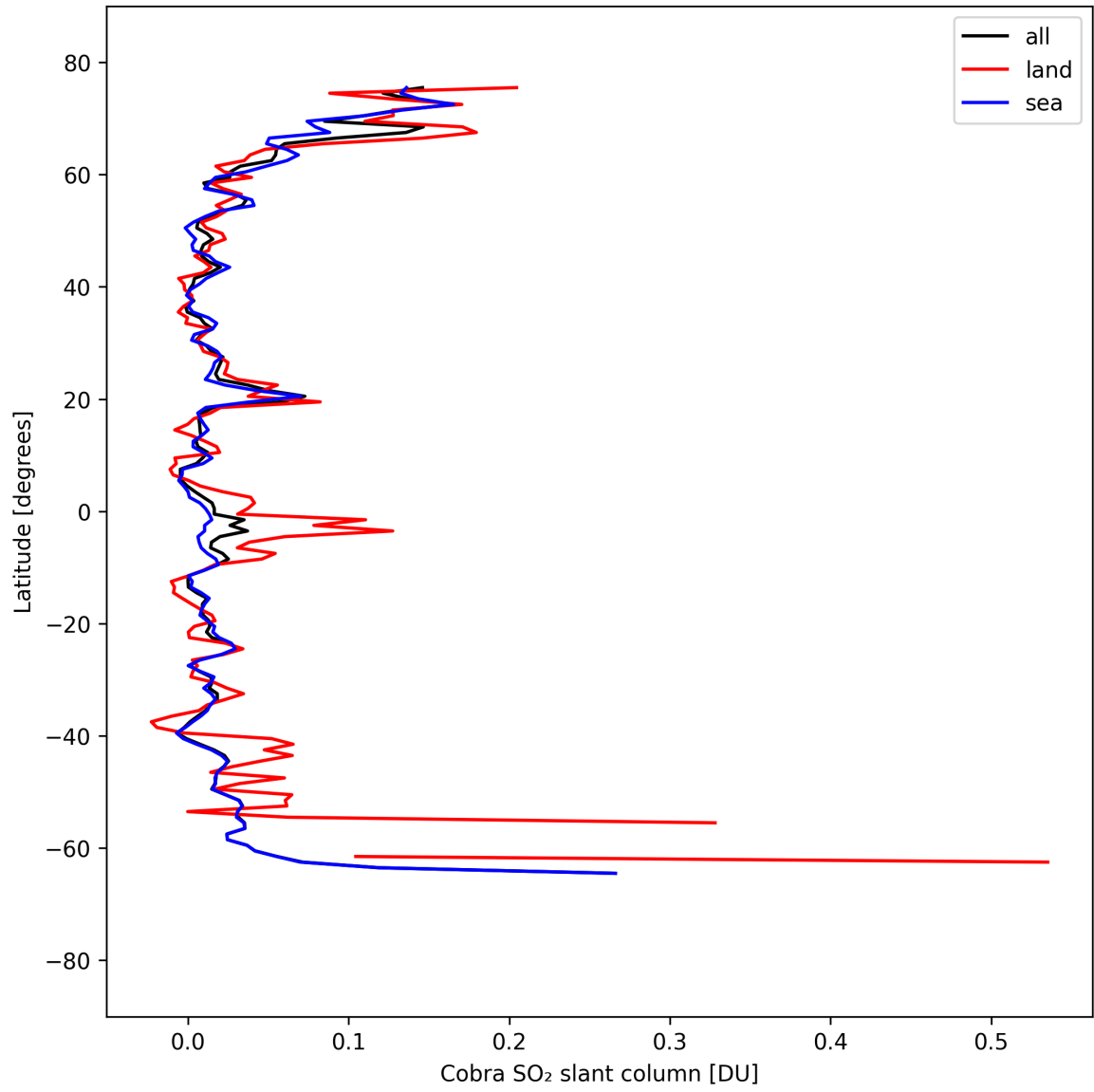


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-04-02 to 2025-04-03.

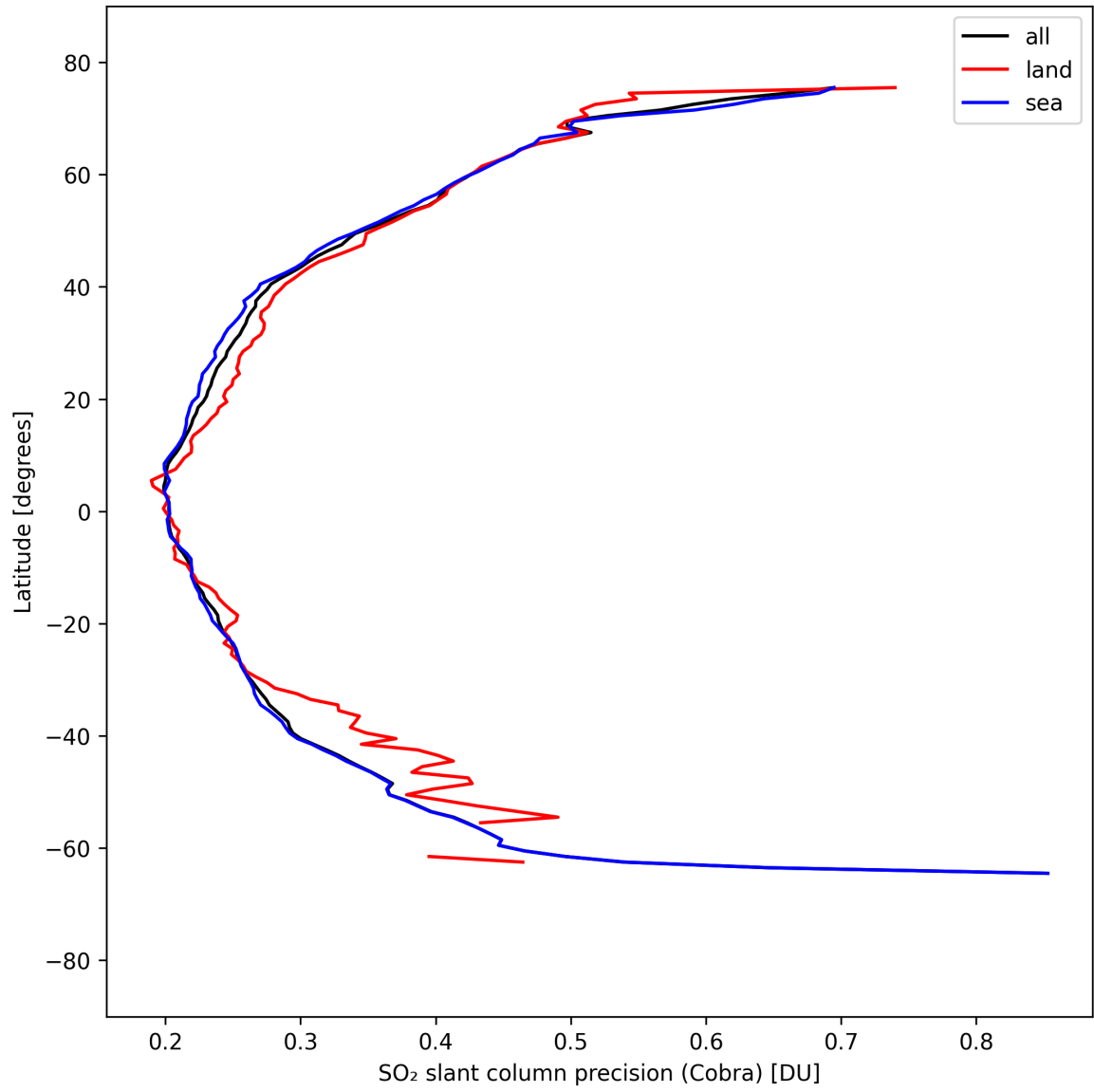


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-04-02 to 2025-04-03.

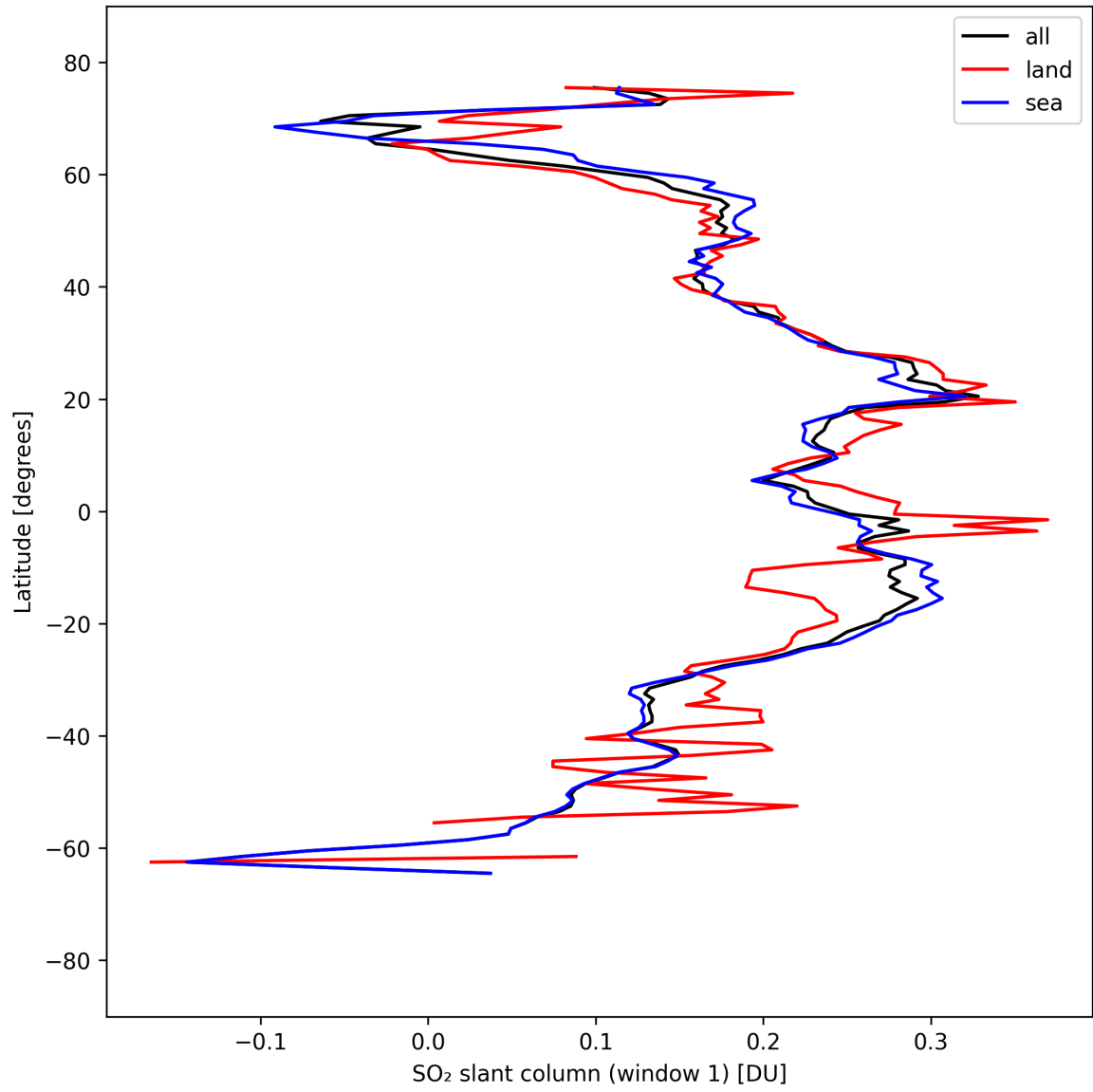


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-04-02 to 2025-04-03.

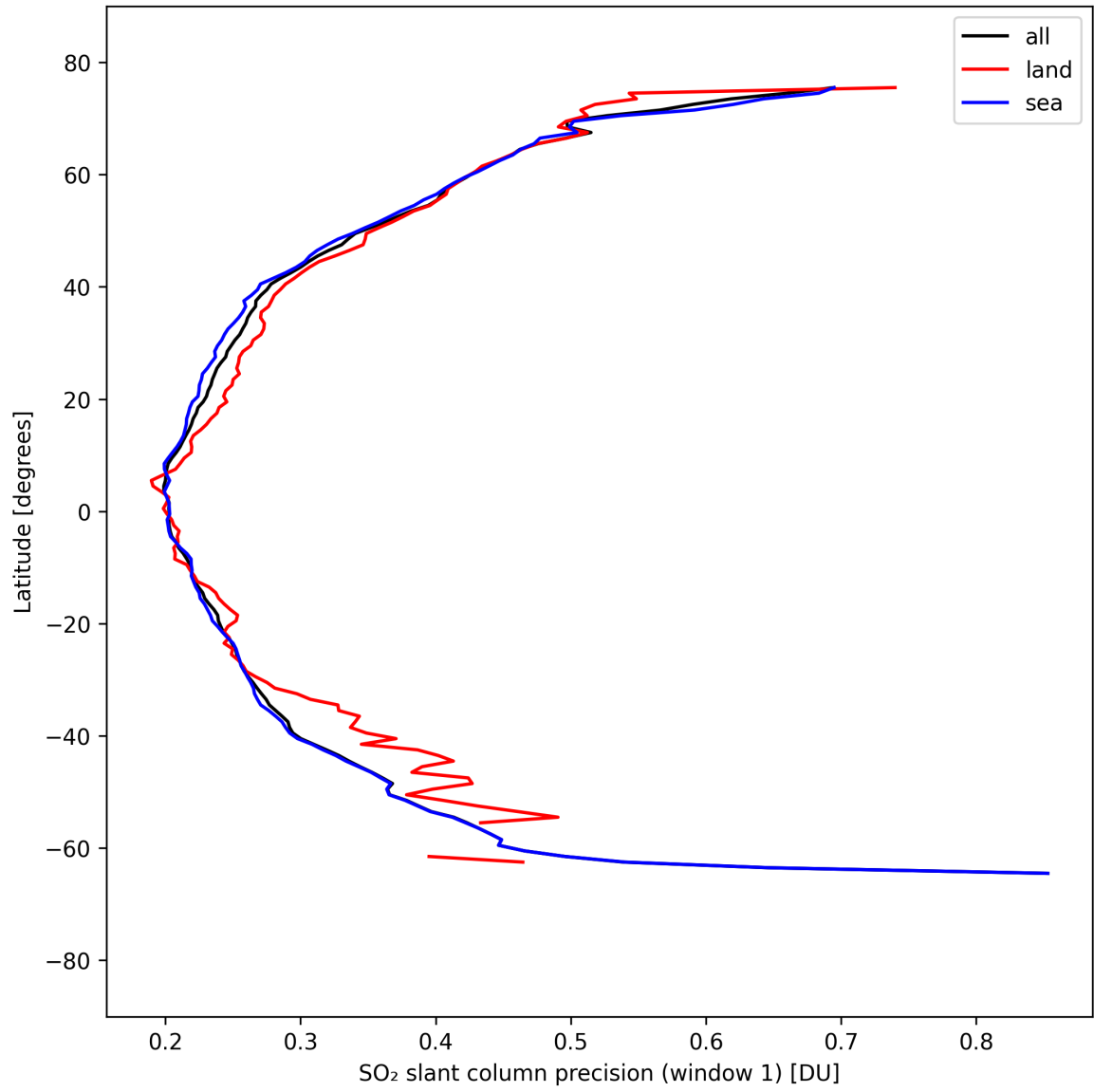


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-04-02 to 2025-04-03.

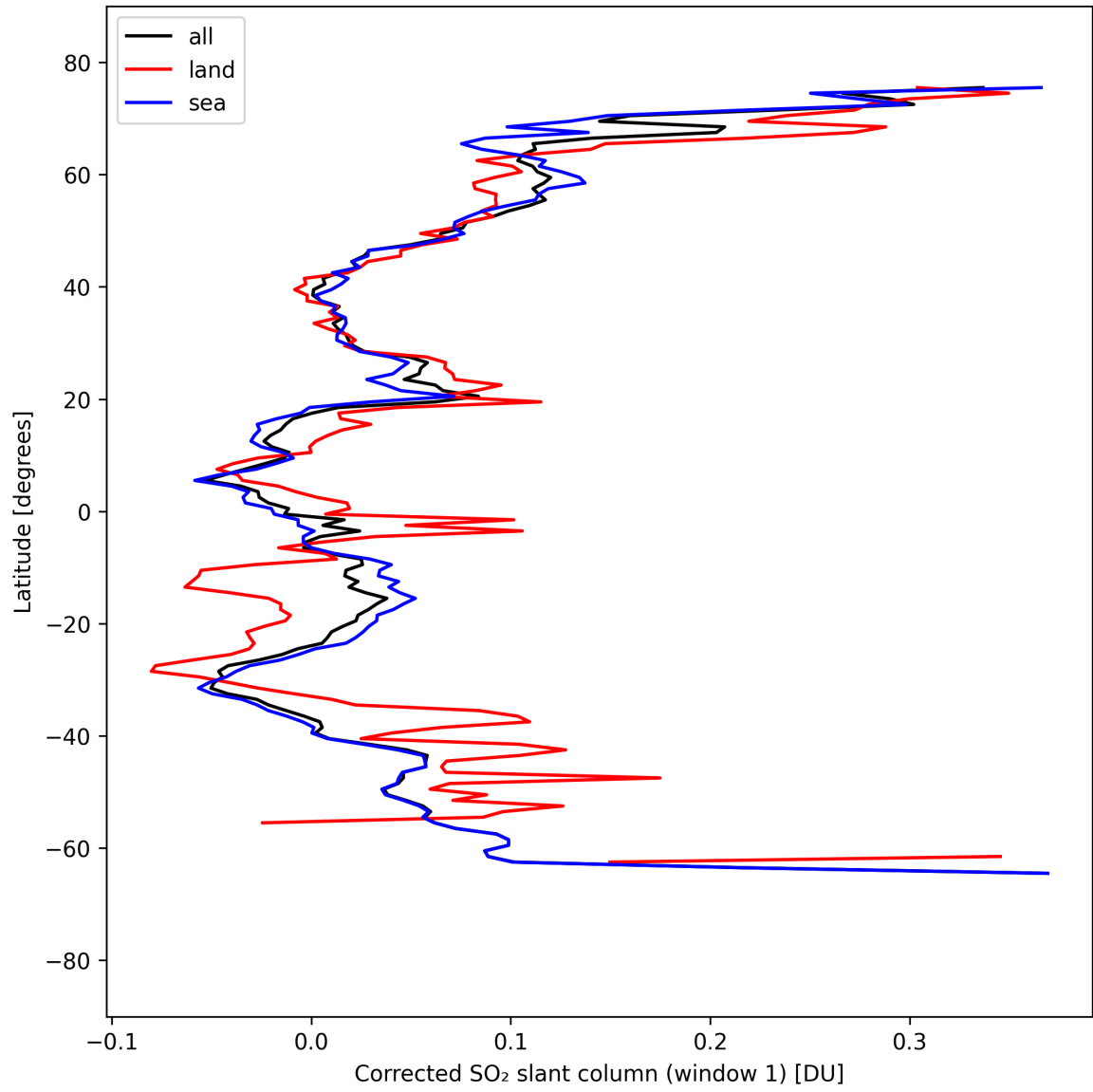


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-04-02 to 2025-04-03.

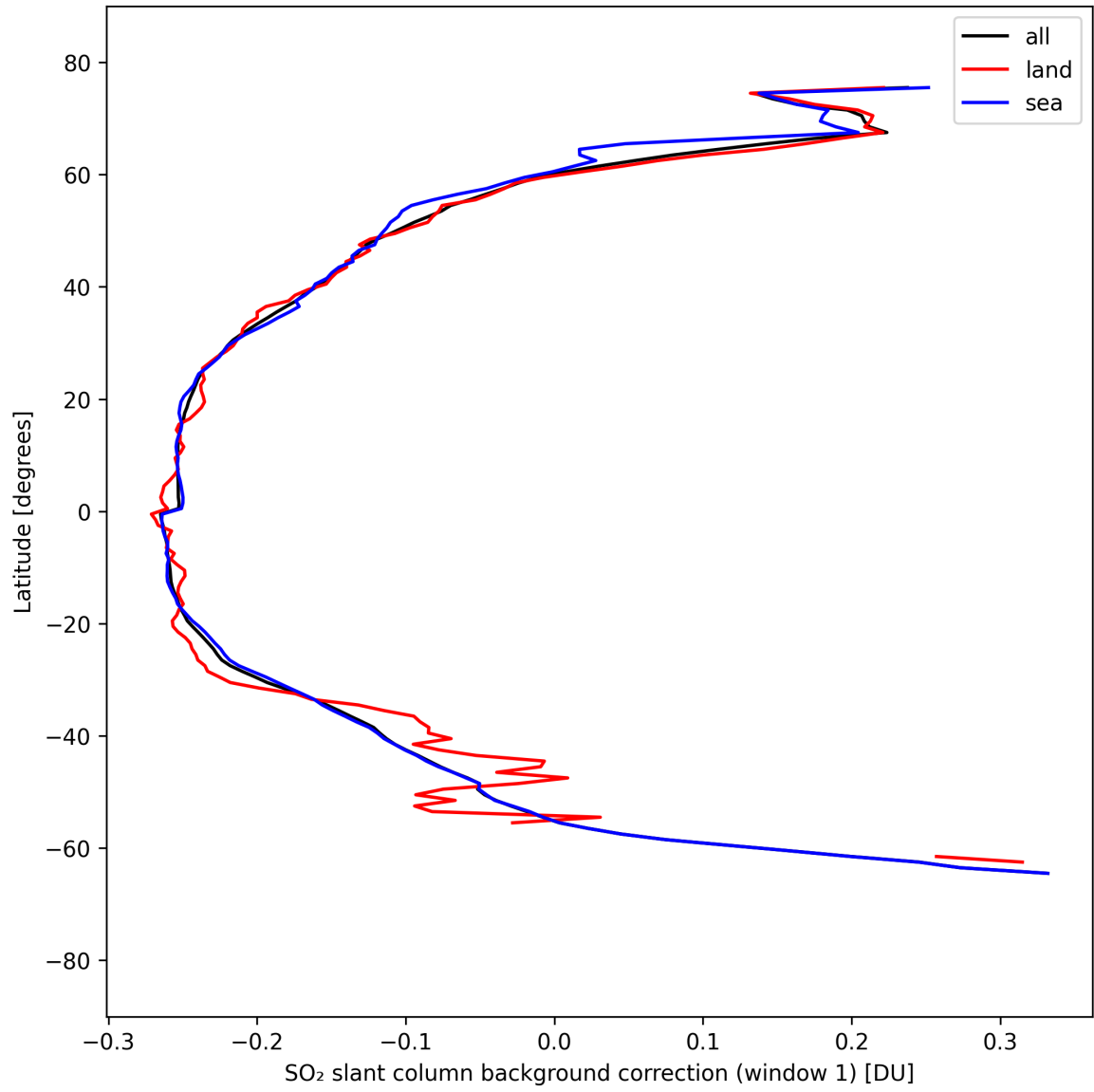


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-04-02 to 2025-04-03.

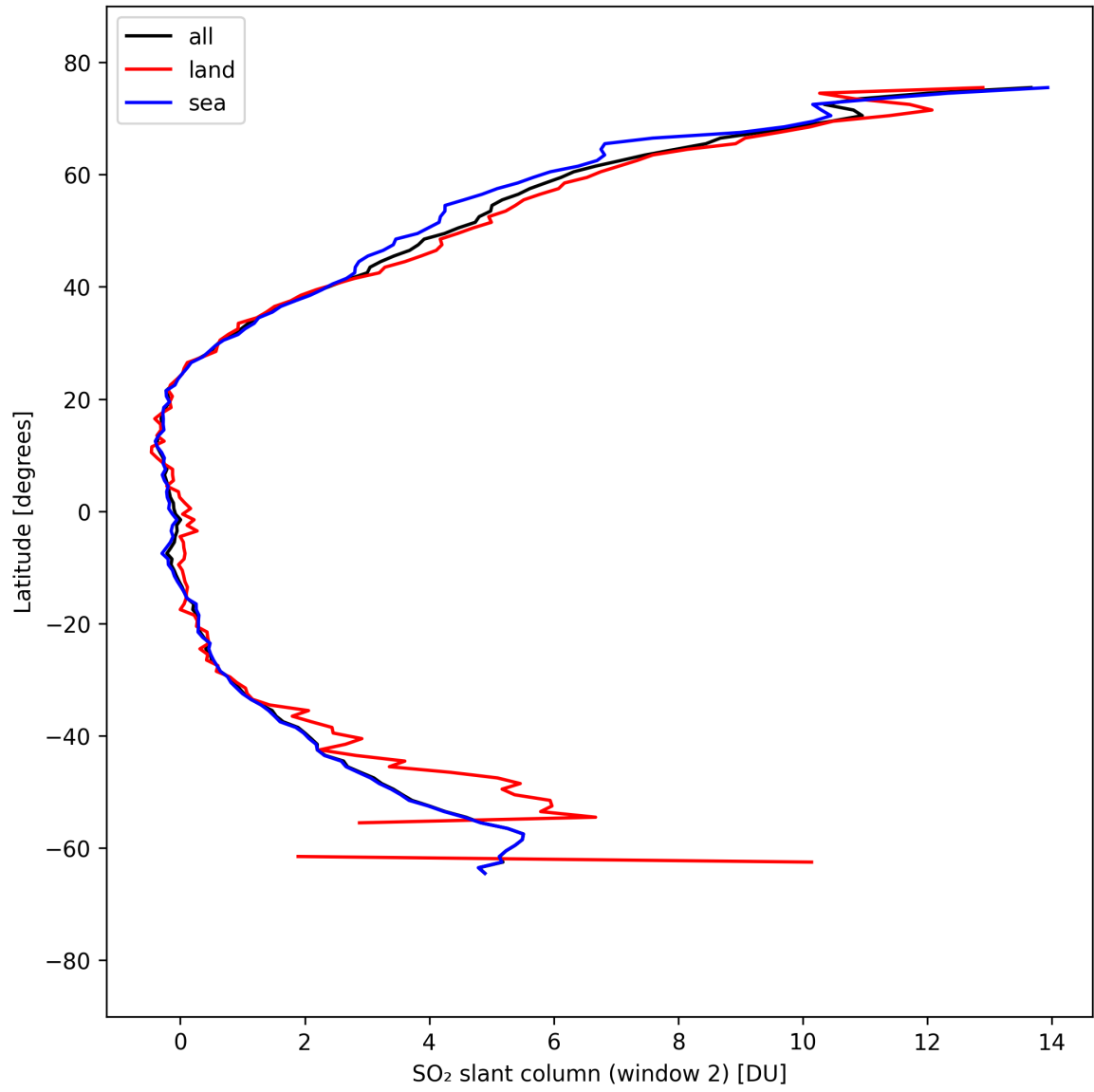


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-04-02 to 2025-04-03.

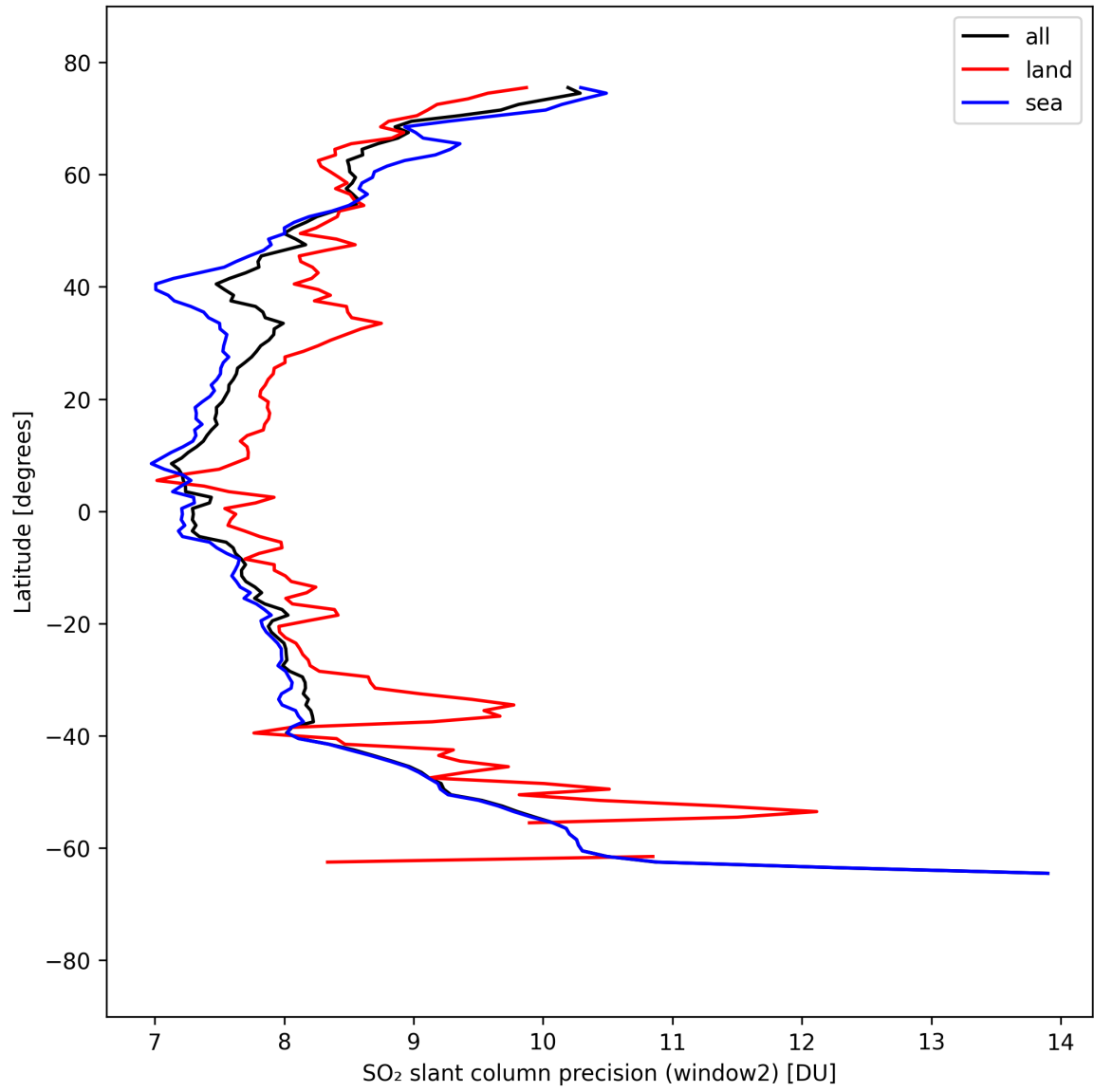


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-04-02 to 2025-04-03.

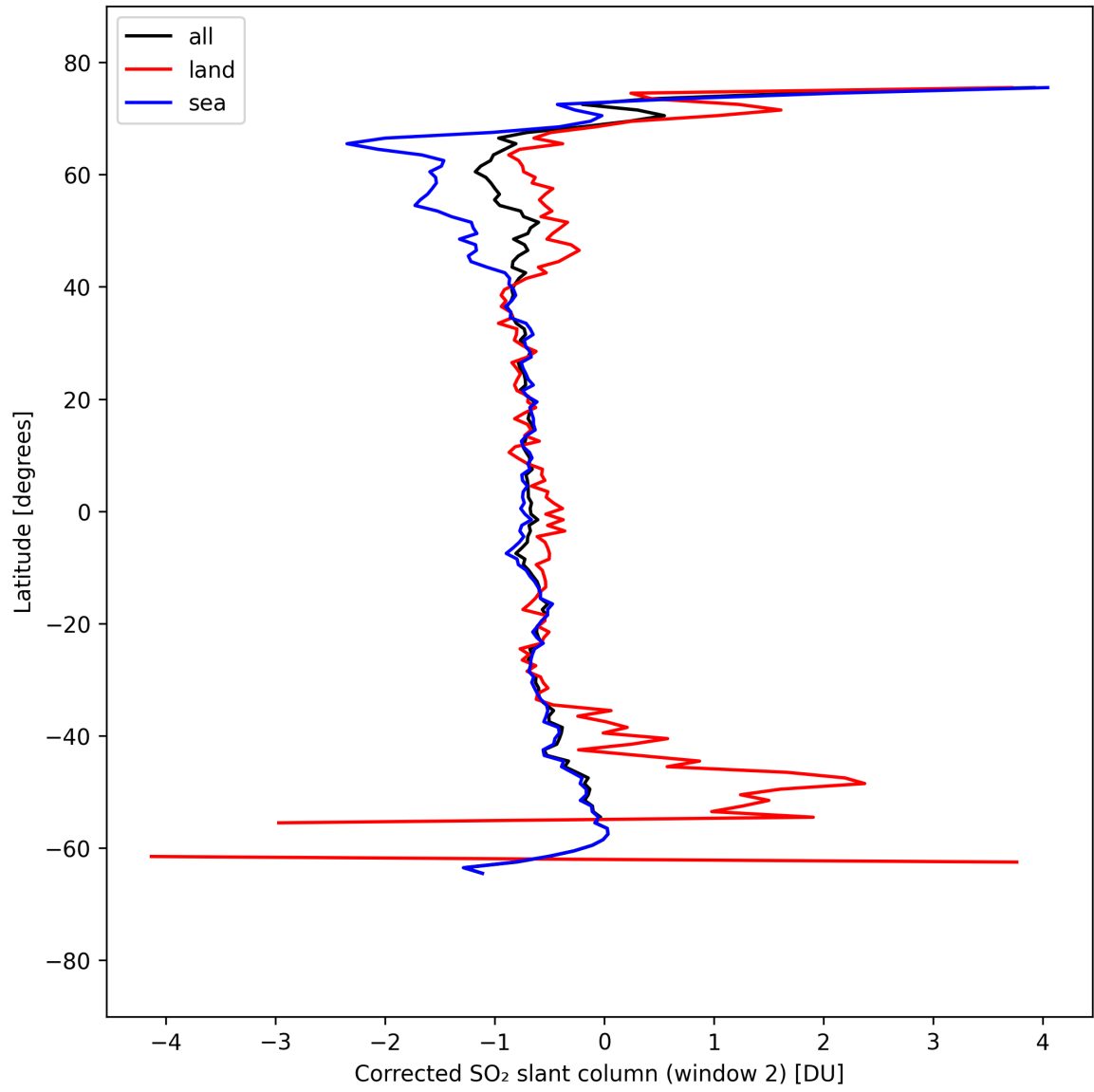


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-04-02 to 2025-04-03.

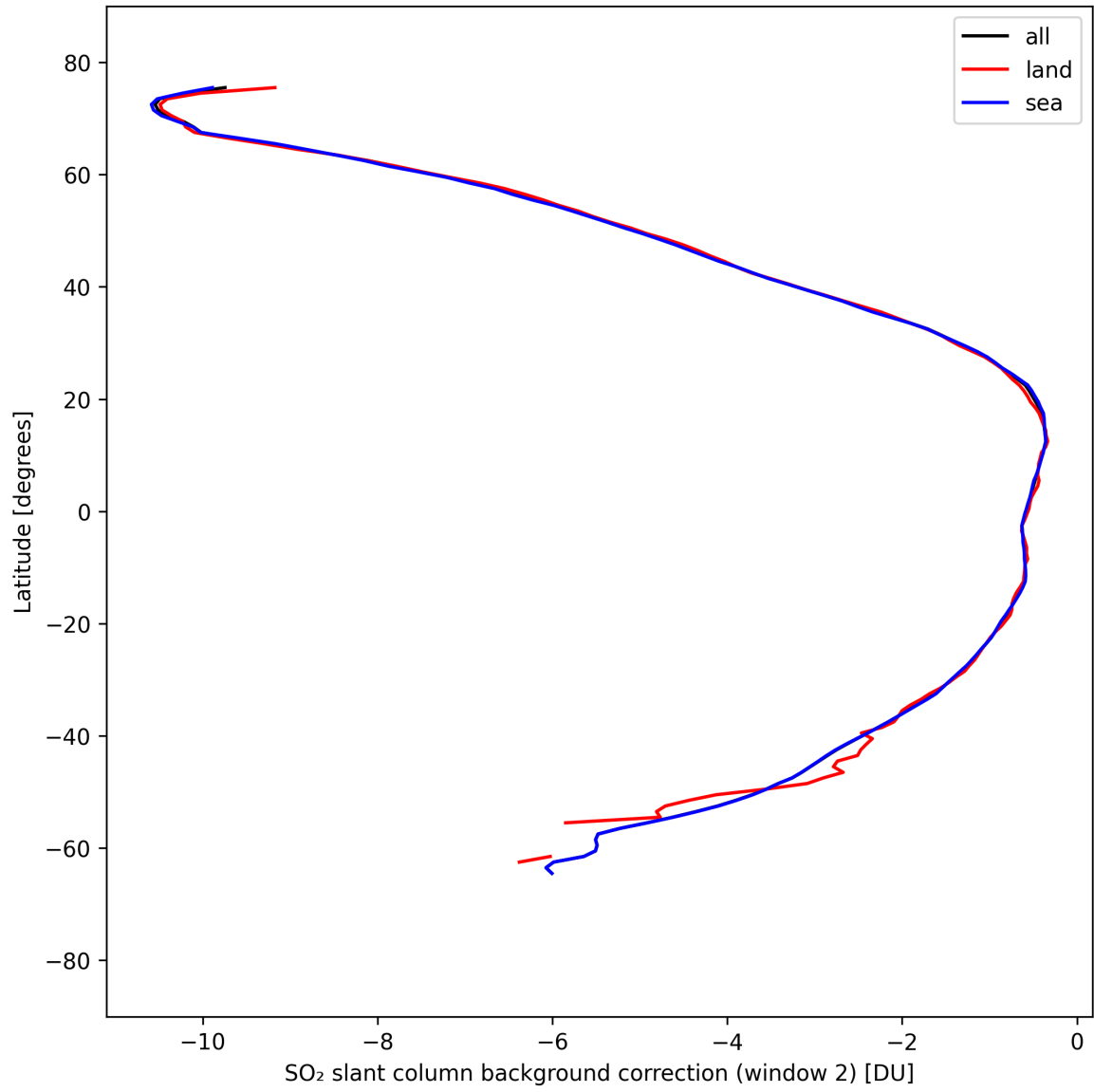


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-04-02 to 2025-04-03.

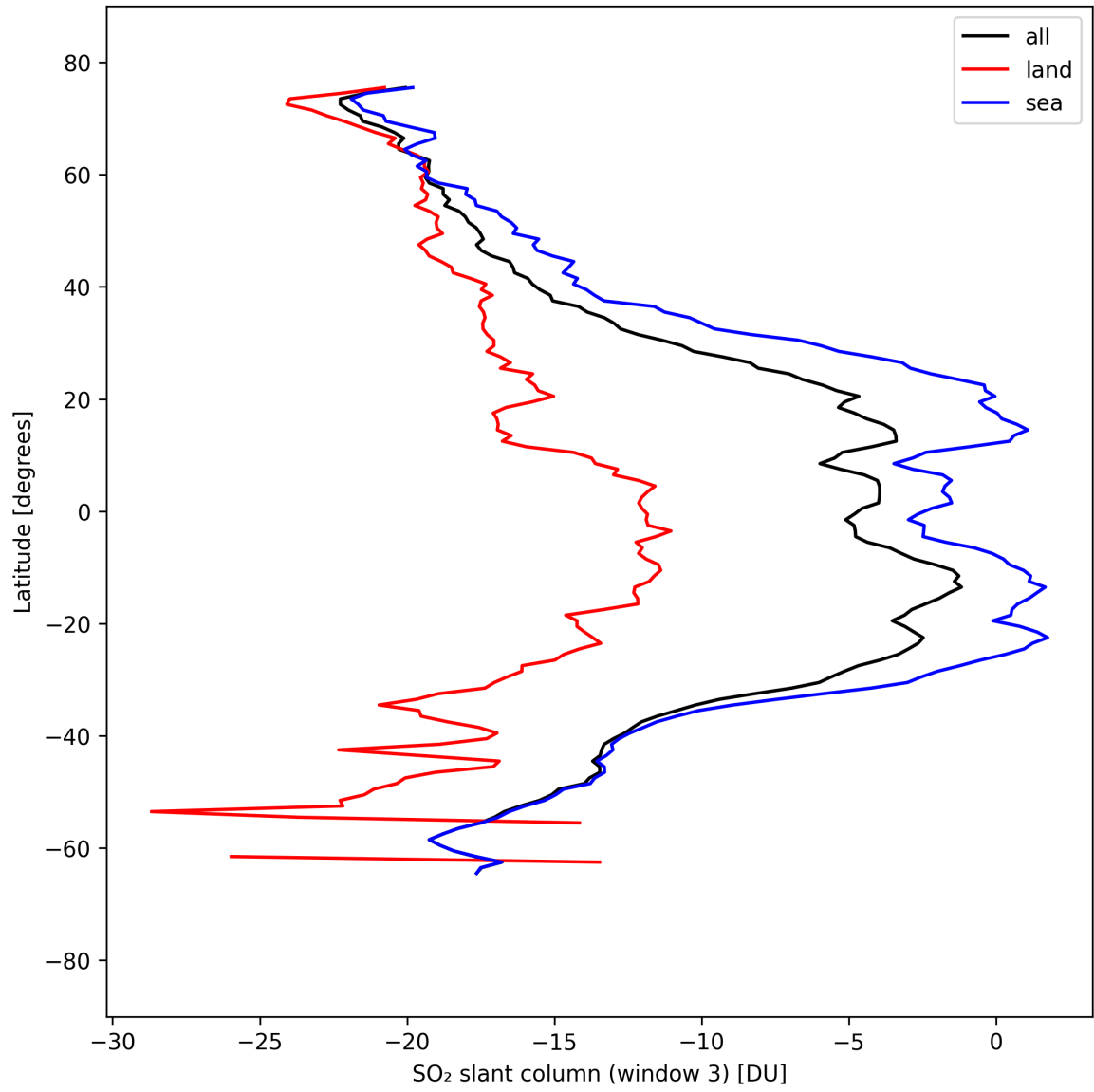


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-04-02 to 2025-04-03.

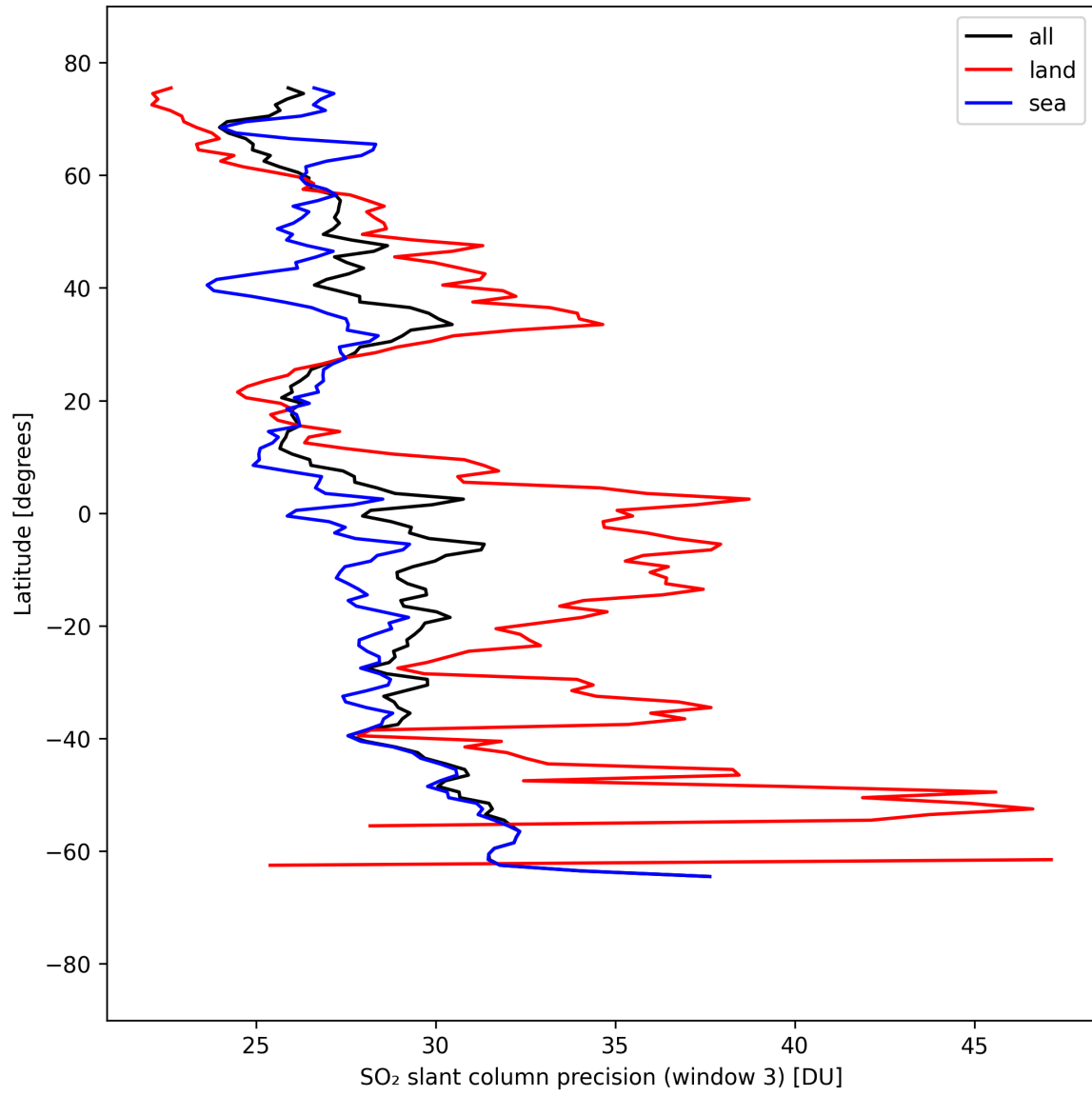


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-04-02 to 2025-04-03.

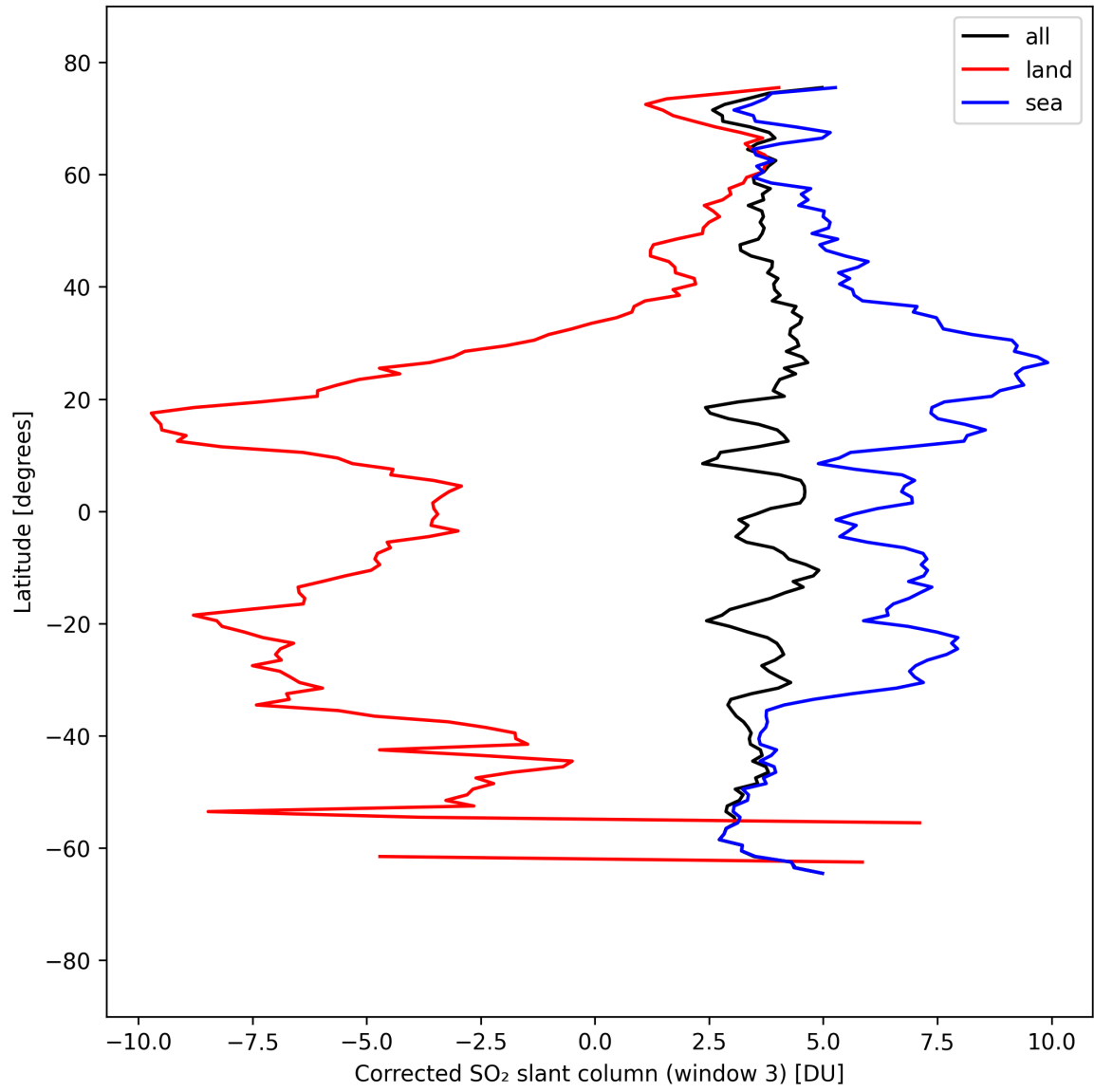


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-04-02 to 2025-04-03.

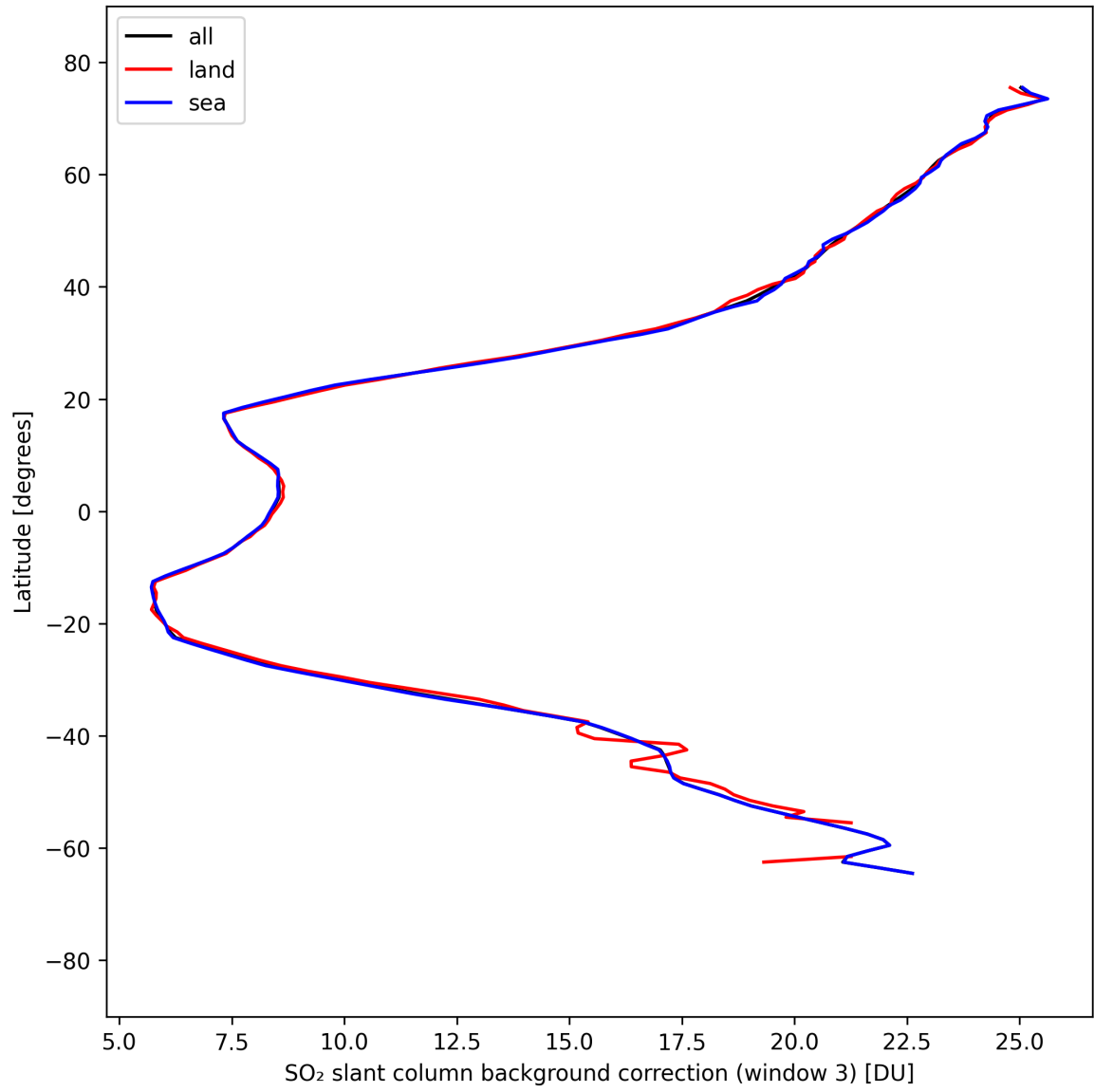


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-04-02 to 2025-04-03.

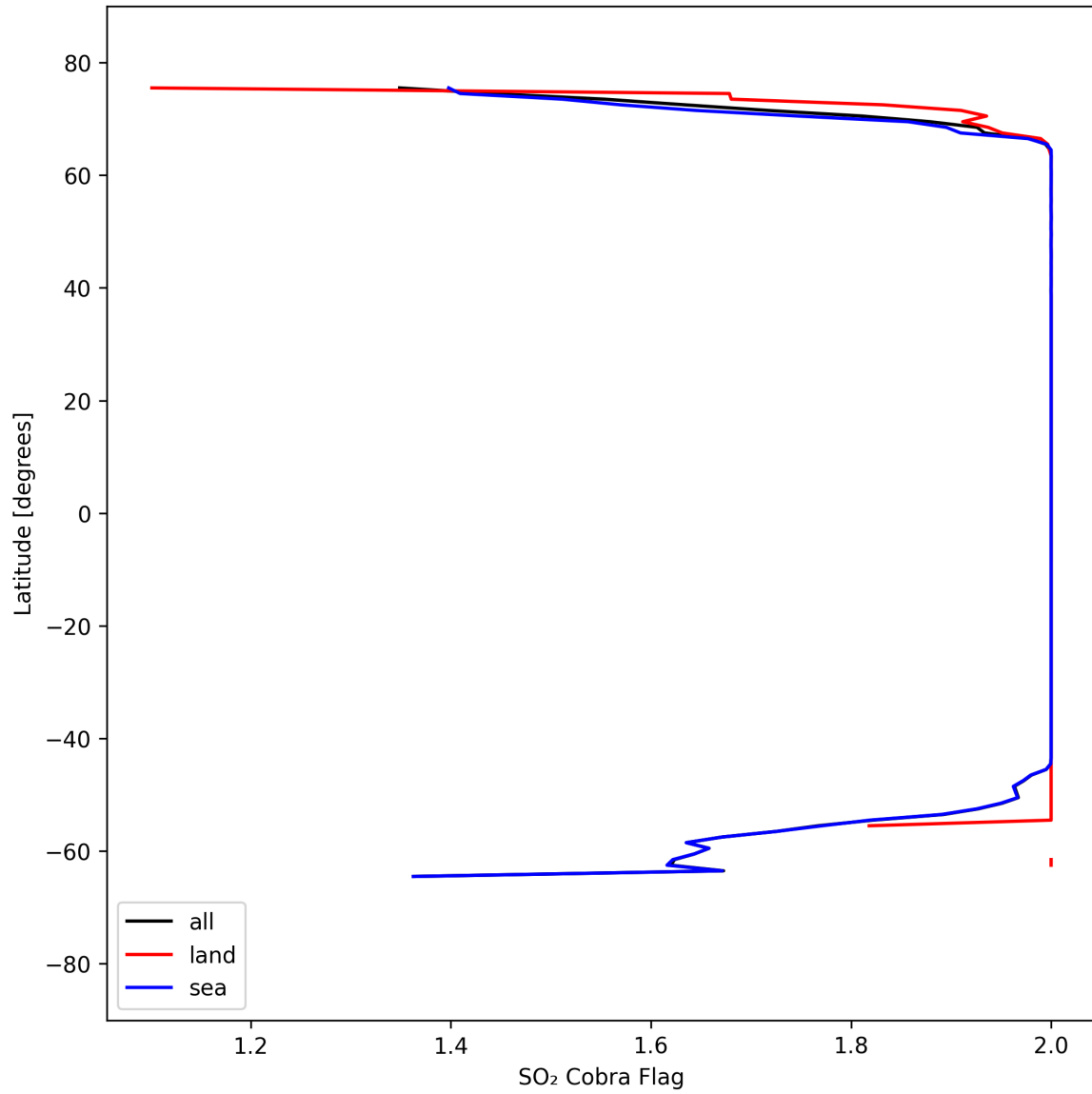


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-04-02 to 2025-04-03.

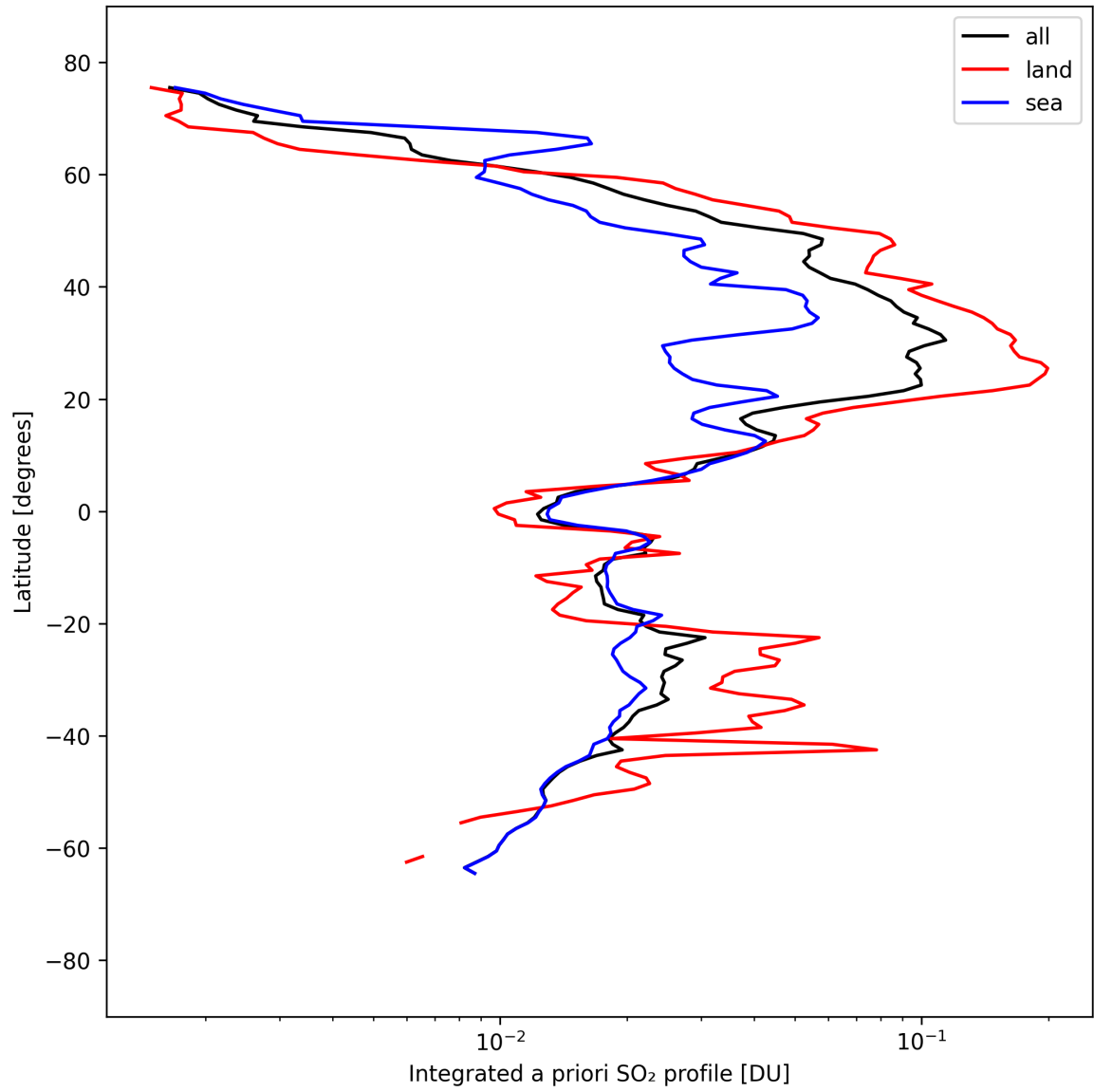


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-04-02 to 2025-04-03.

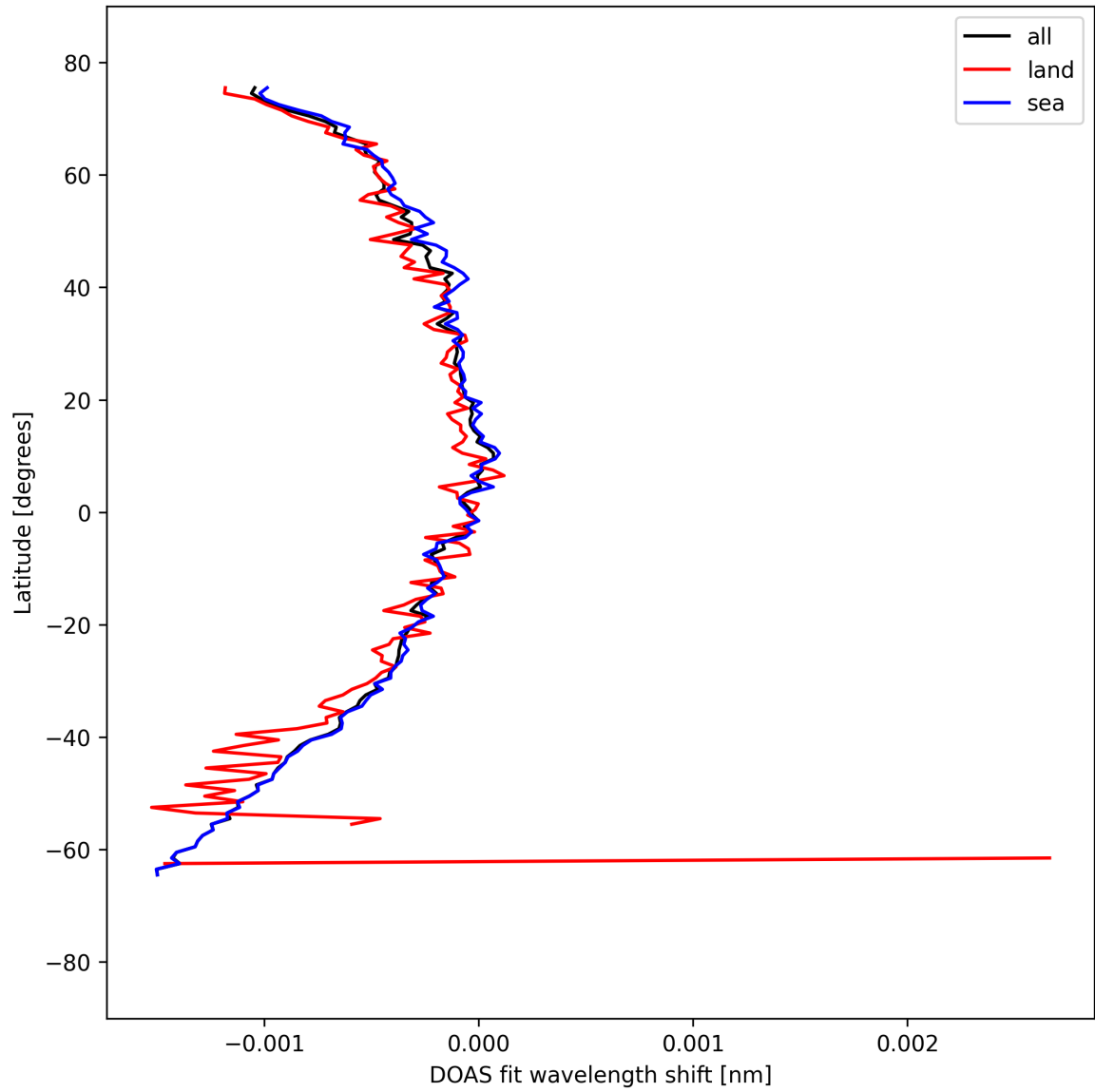


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-04-02 to 2025-04-03.

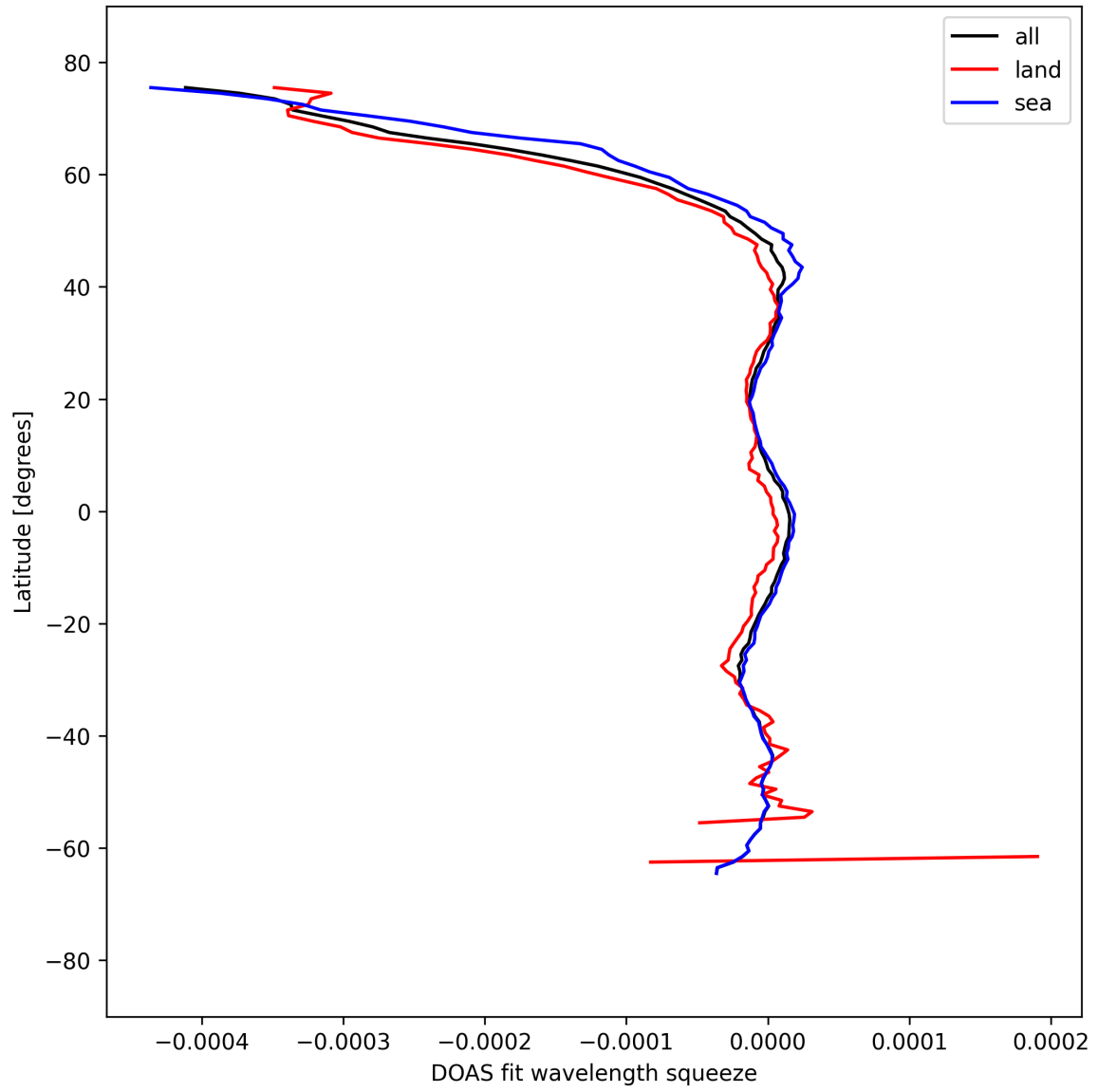


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-04-02 to 2025-04-03.

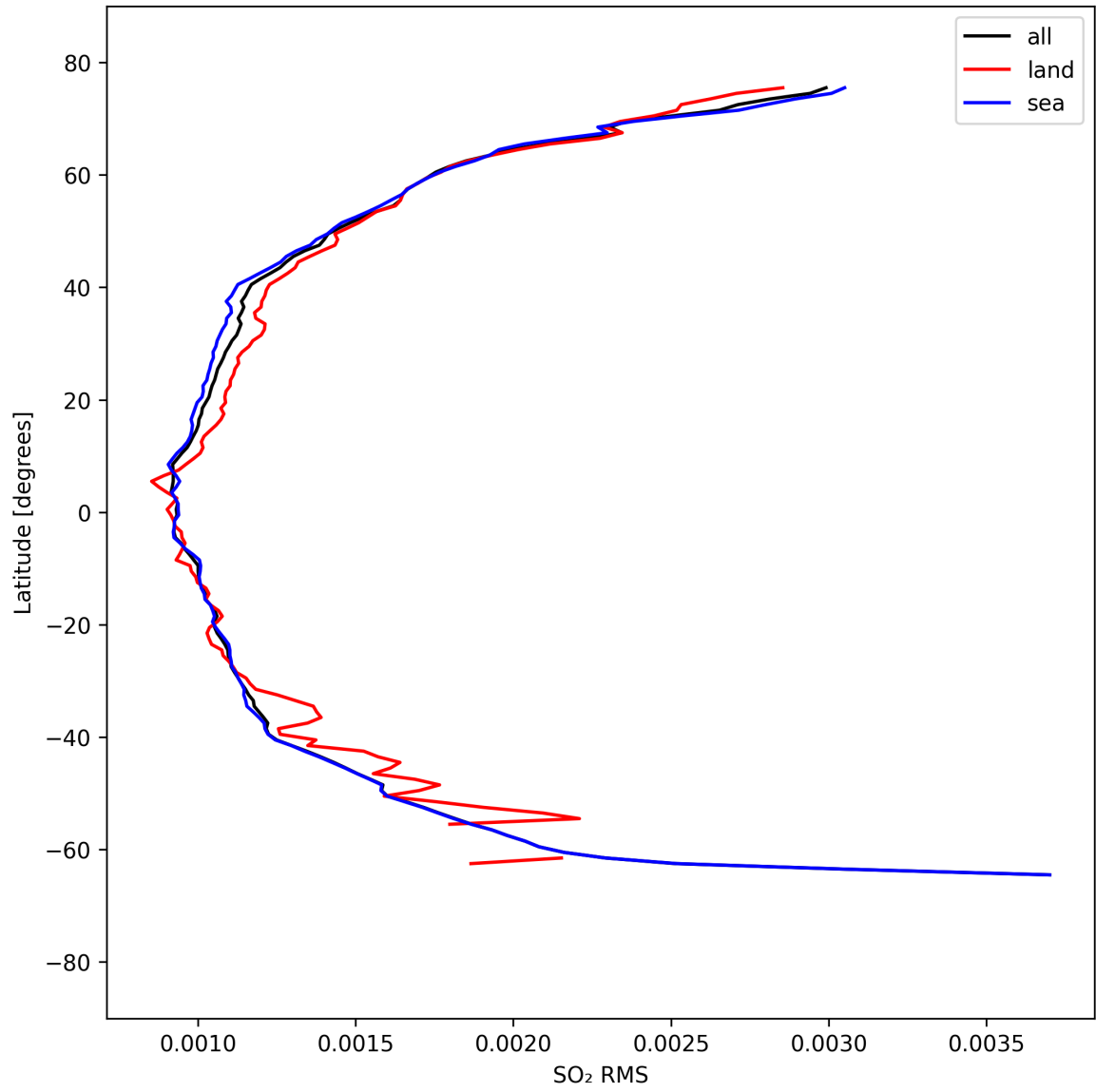


Figure 52: Zonal average of “SO₂ RMS” for 2025-04-02 to 2025-04-03.

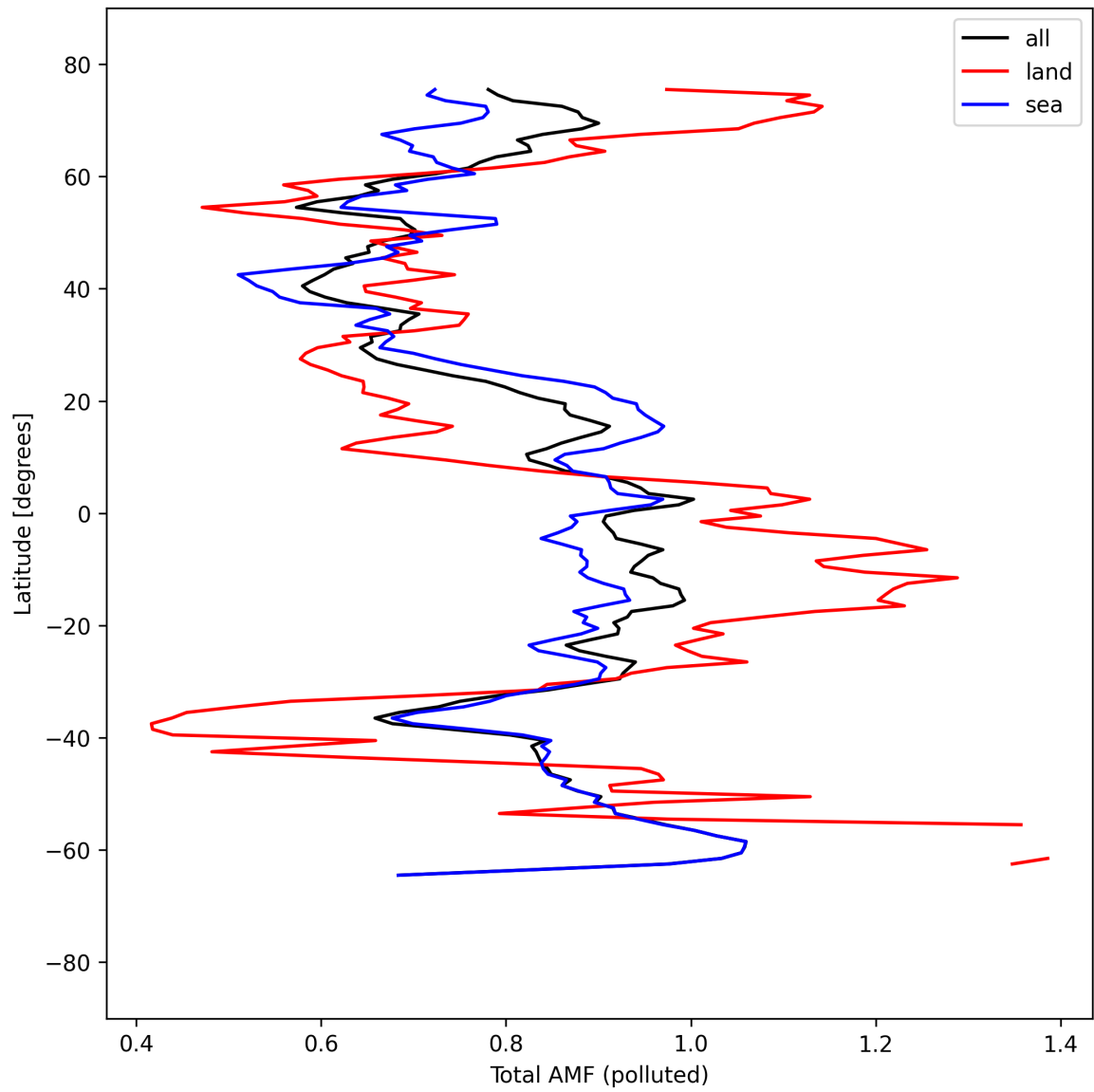


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-04-02 to 2025-04-03.

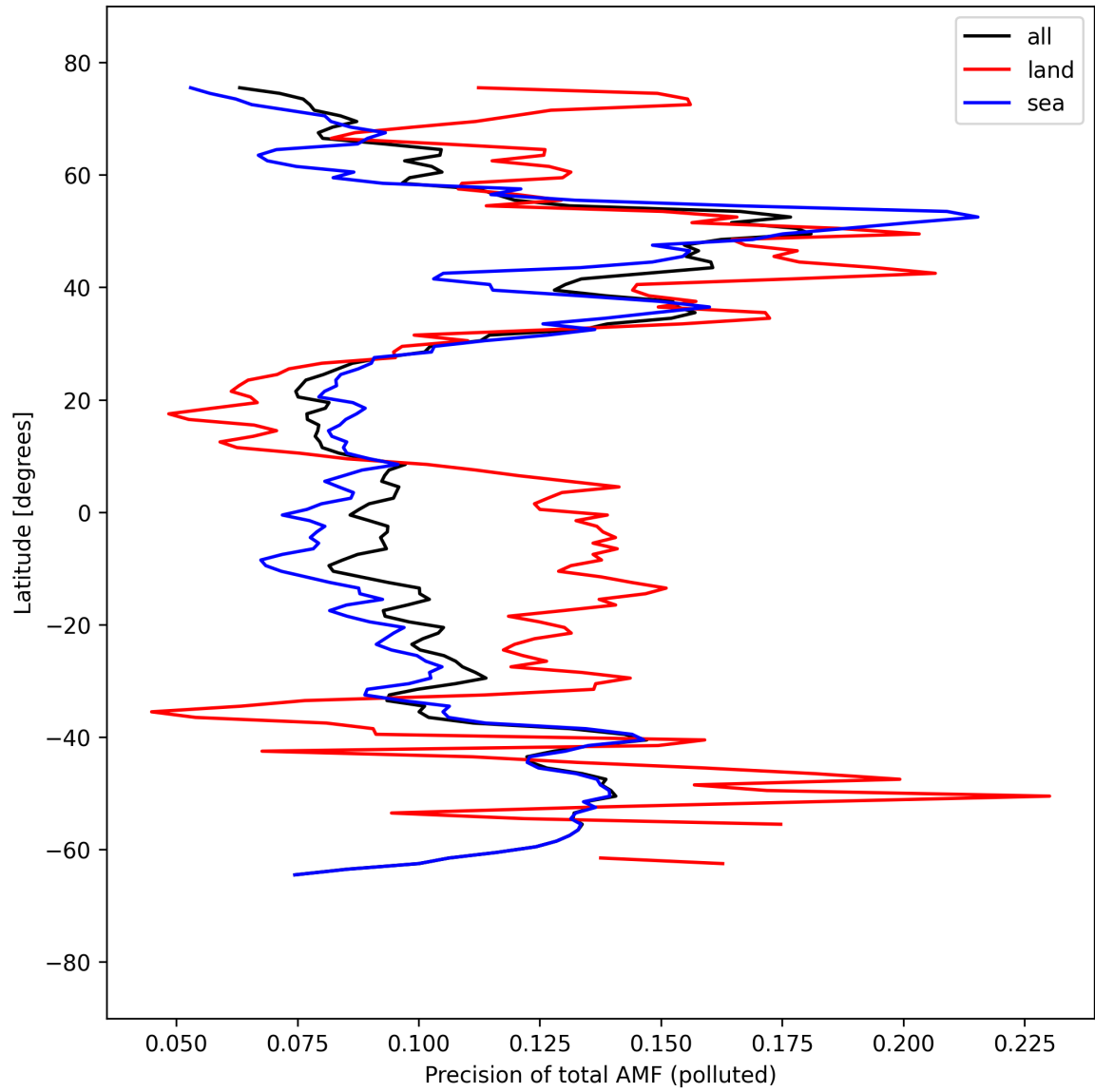


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-04-02 to 2025-04-03.

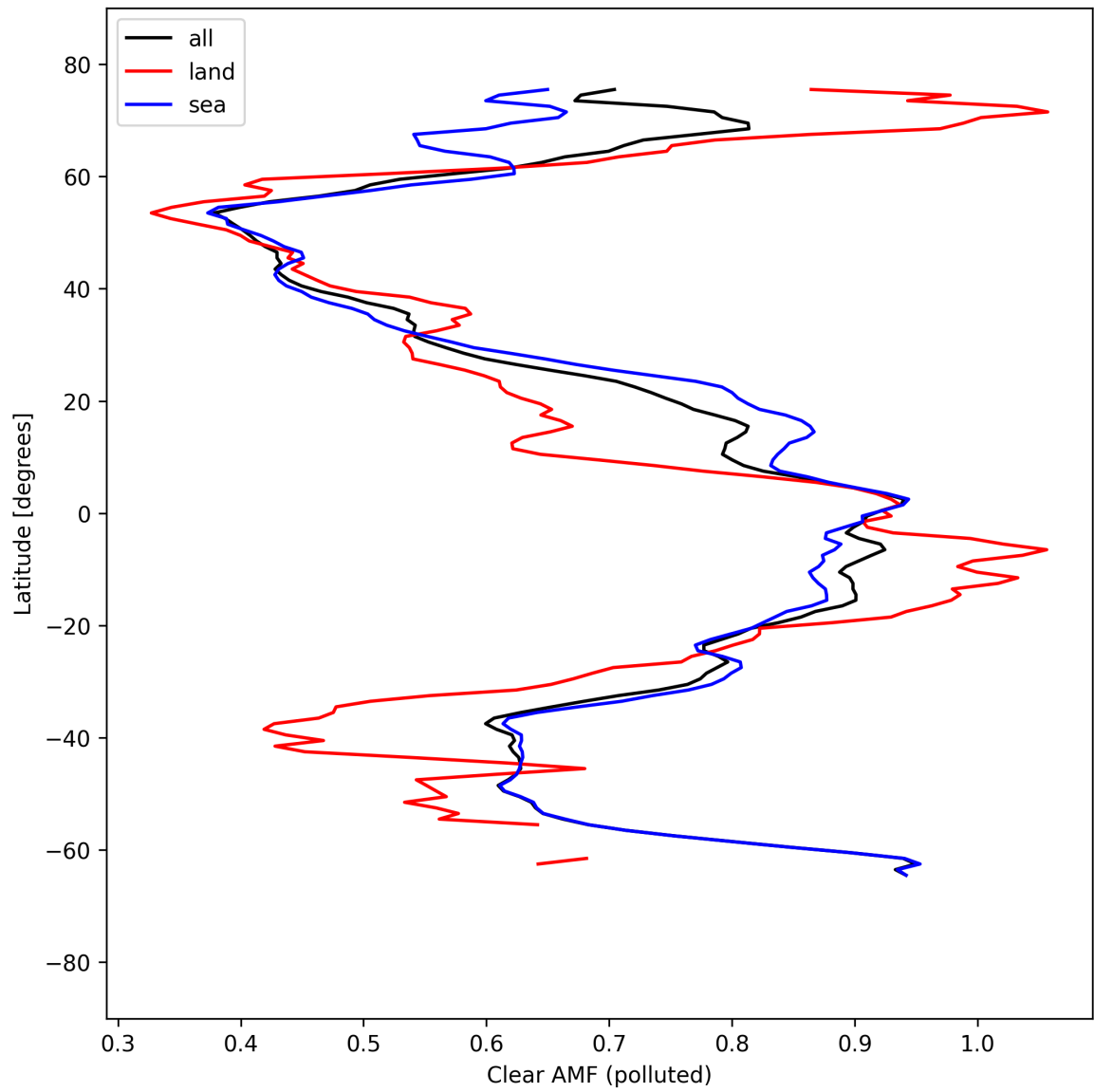


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-04-02 to 2025-04-03.

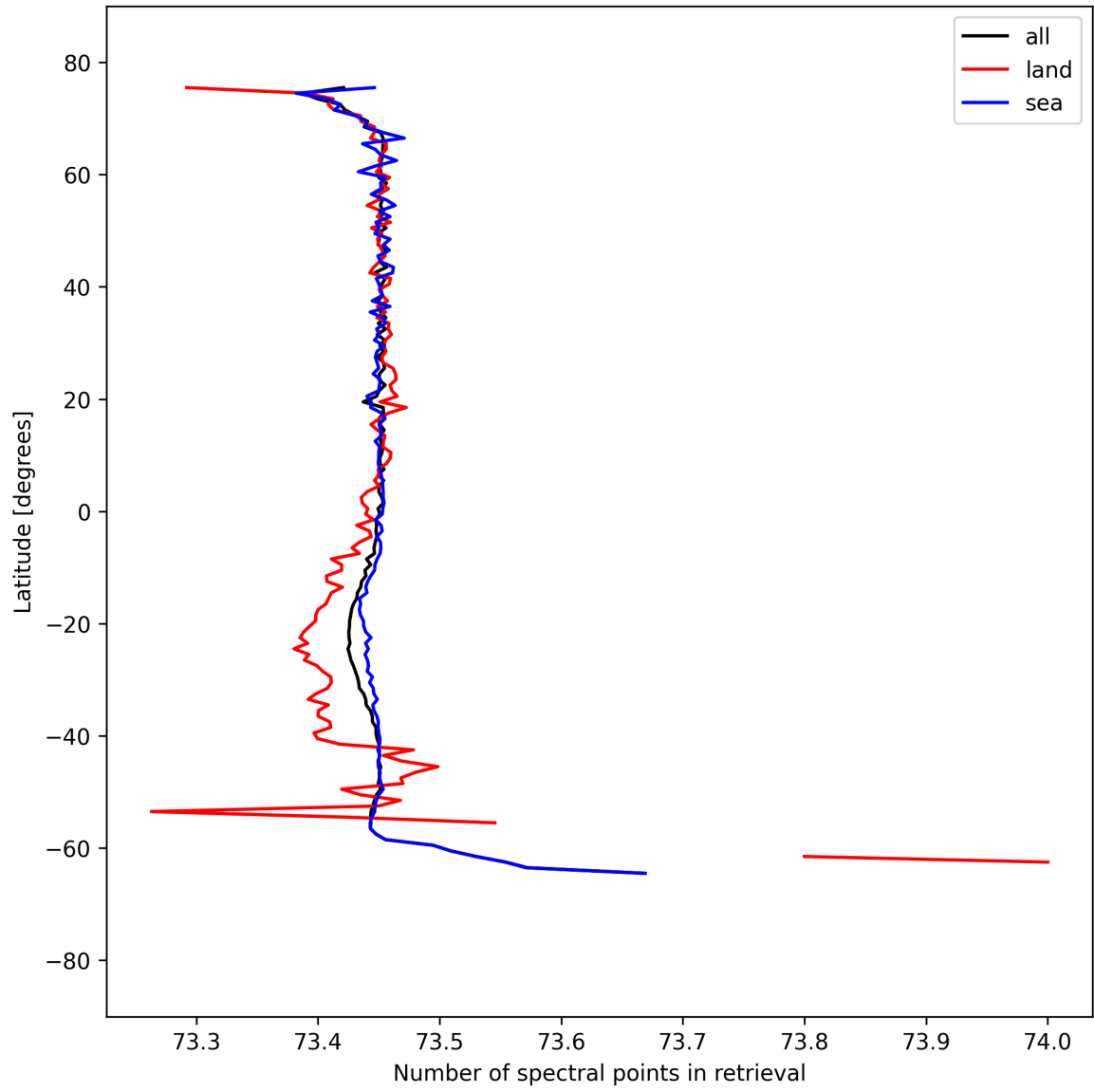


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-04-02 to 2025-04-03.

8 Histograms

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

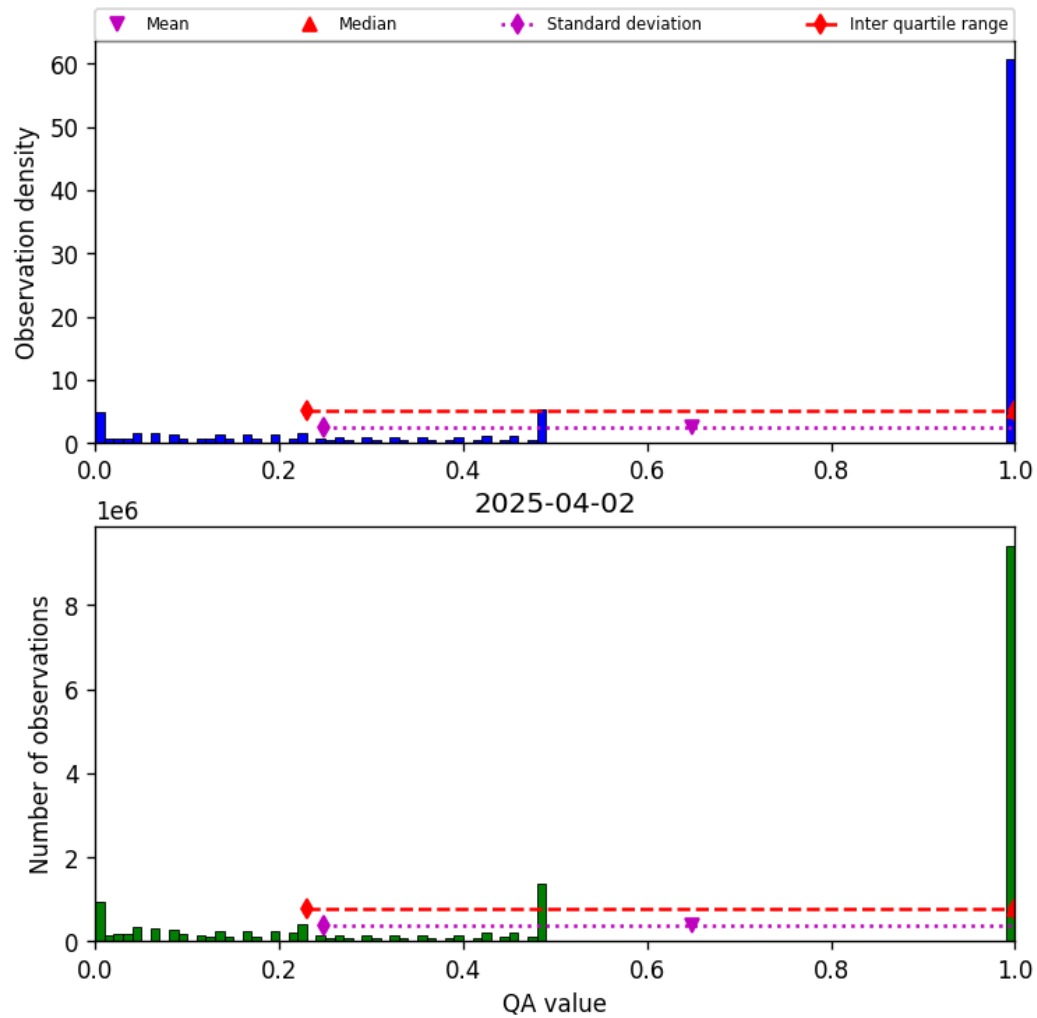


Figure 57: Histogram of “QA value” for 2025-04-02 to 2025-04-03

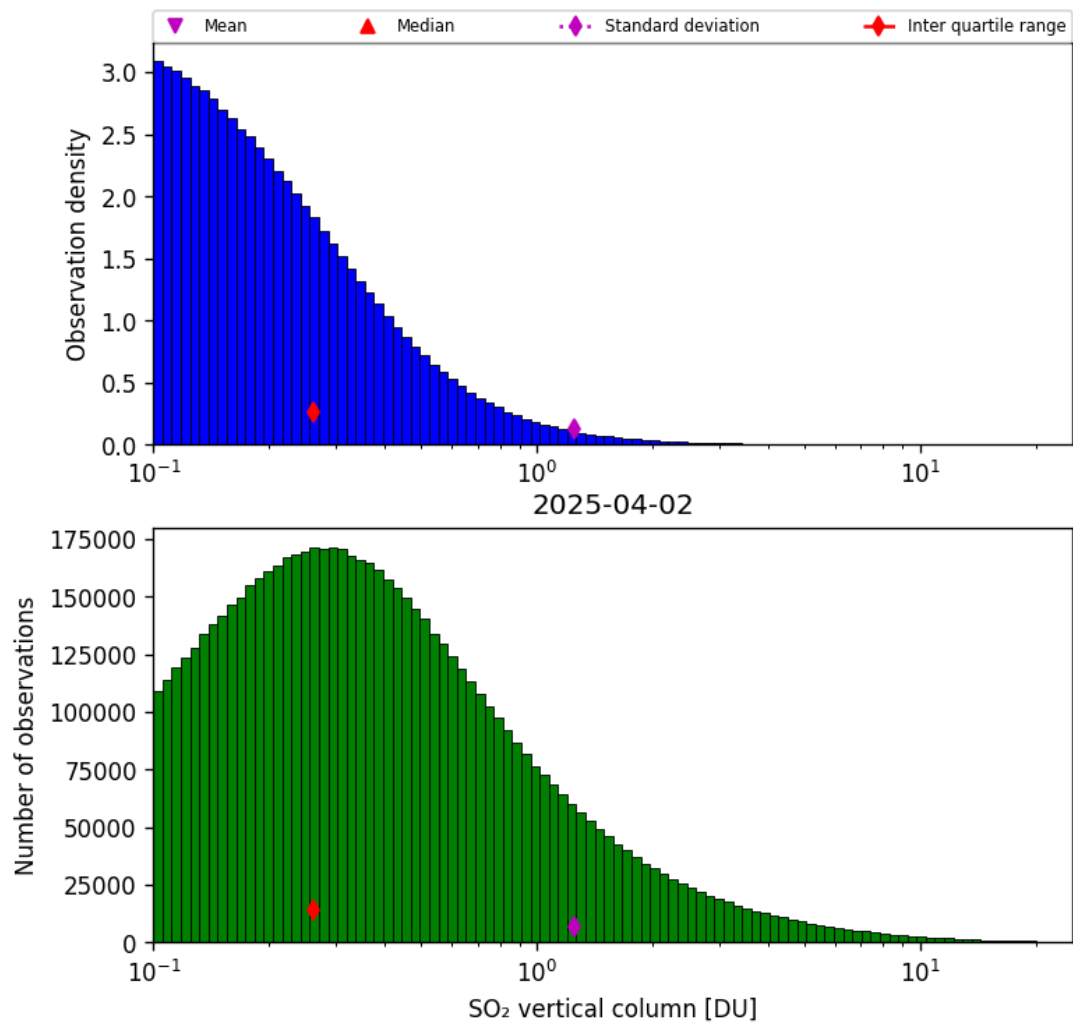


Figure 58: Histogram of “SO₂ vertical column” for 2025-04-02 to 2025-04-03

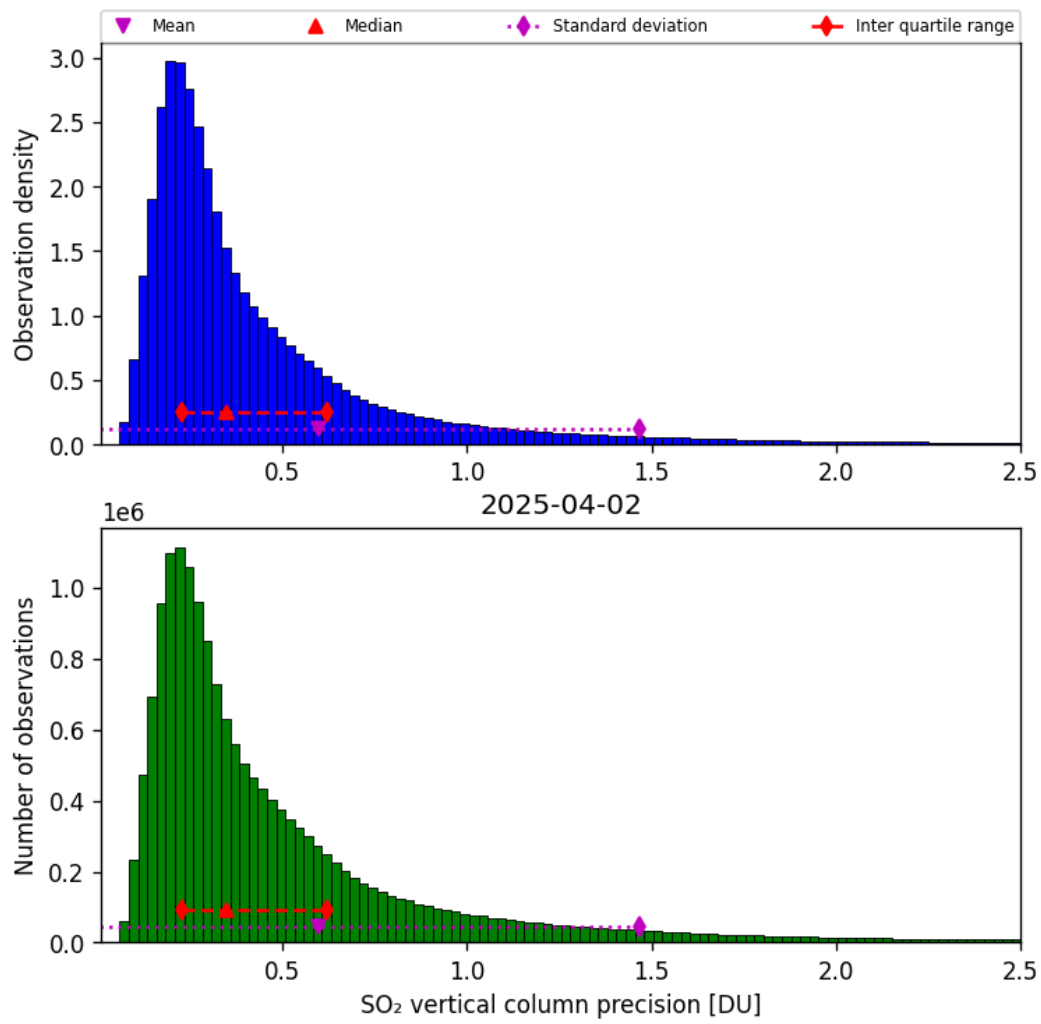


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-04-02 to 2025-04-03

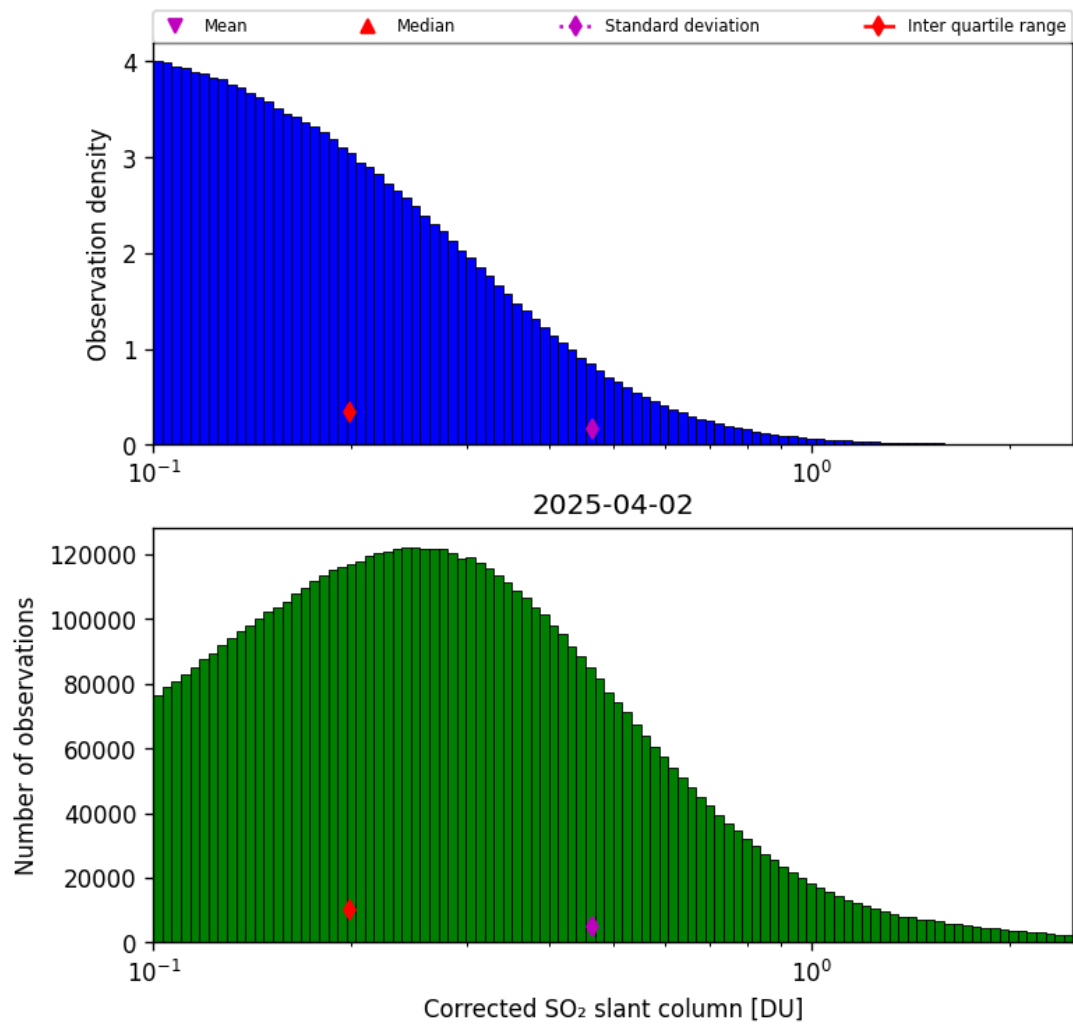


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-04-02 to 2025-04-03

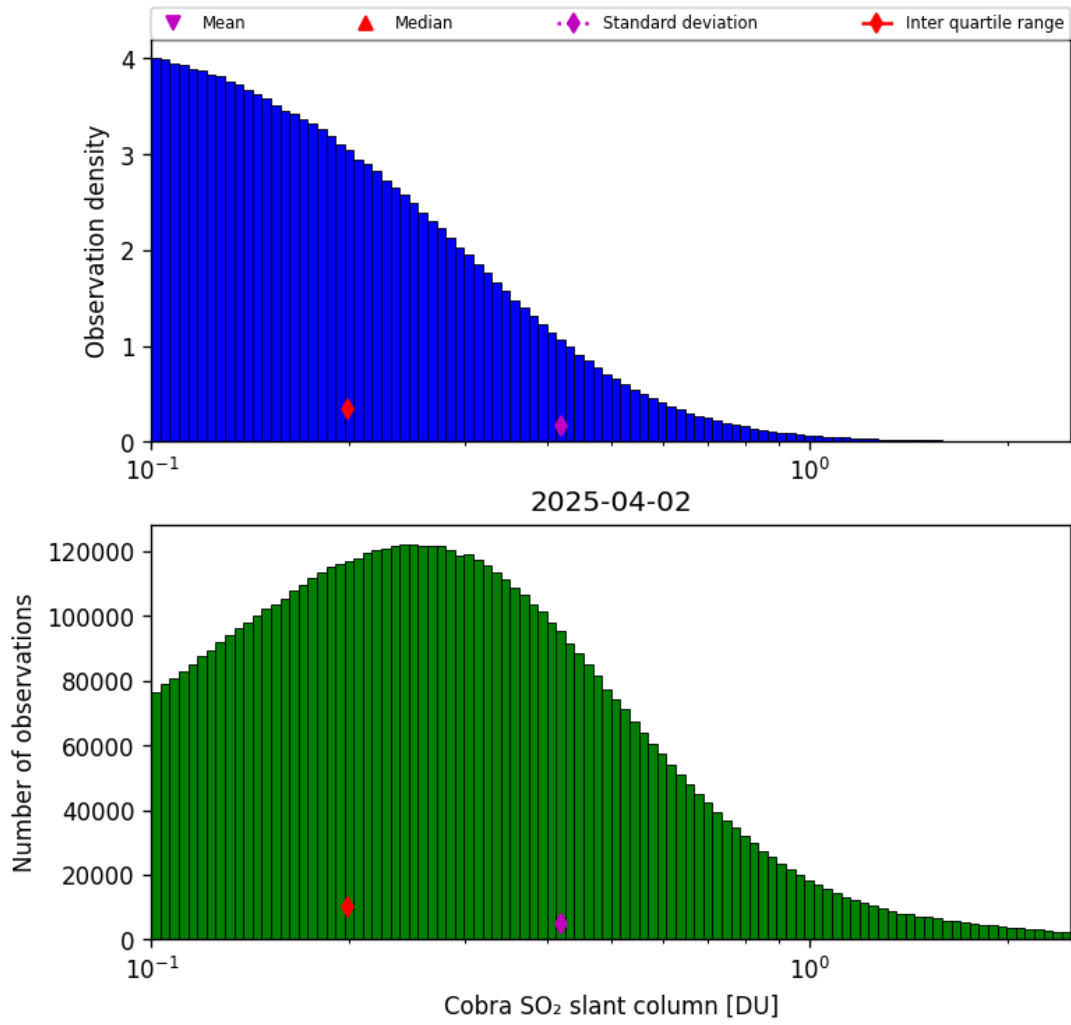


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-04-02 to 2025-04-03

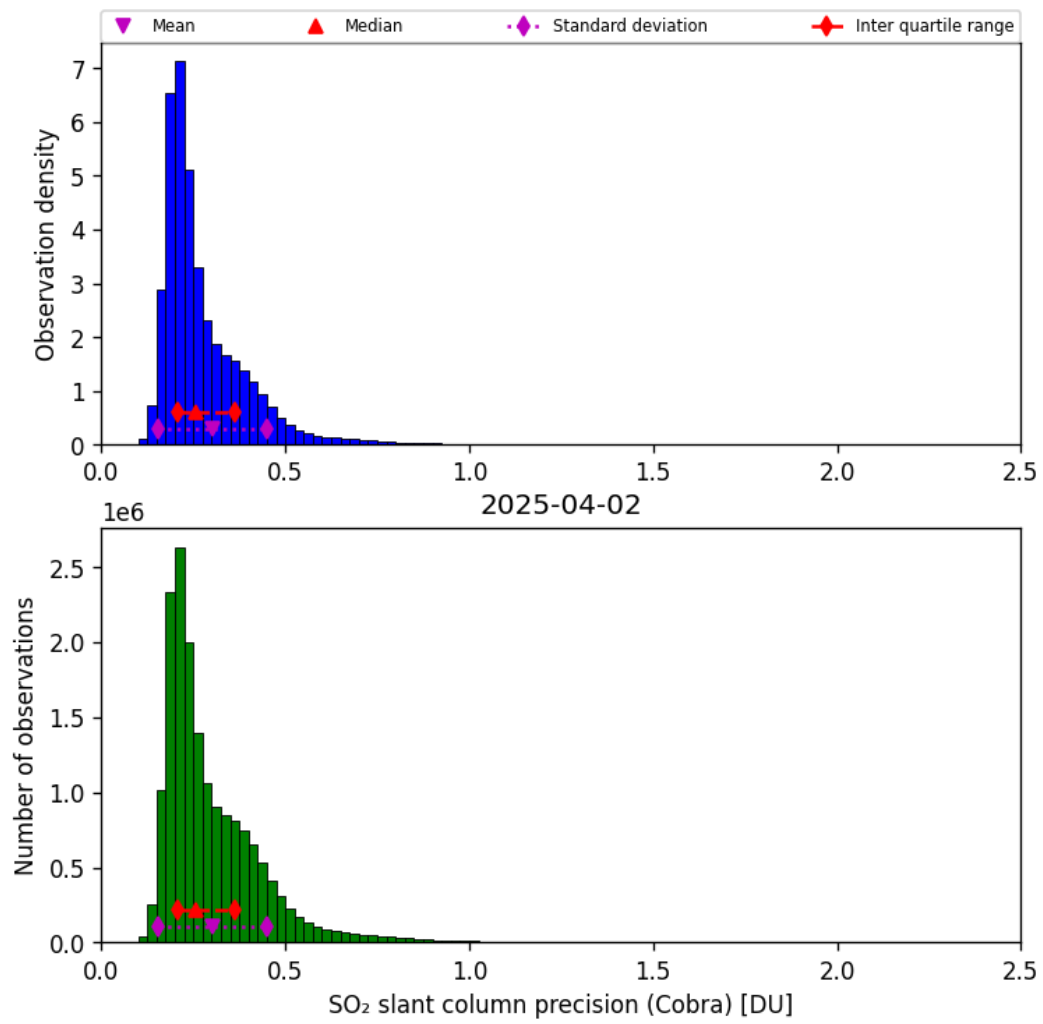


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-04-02 to 2025-04-03

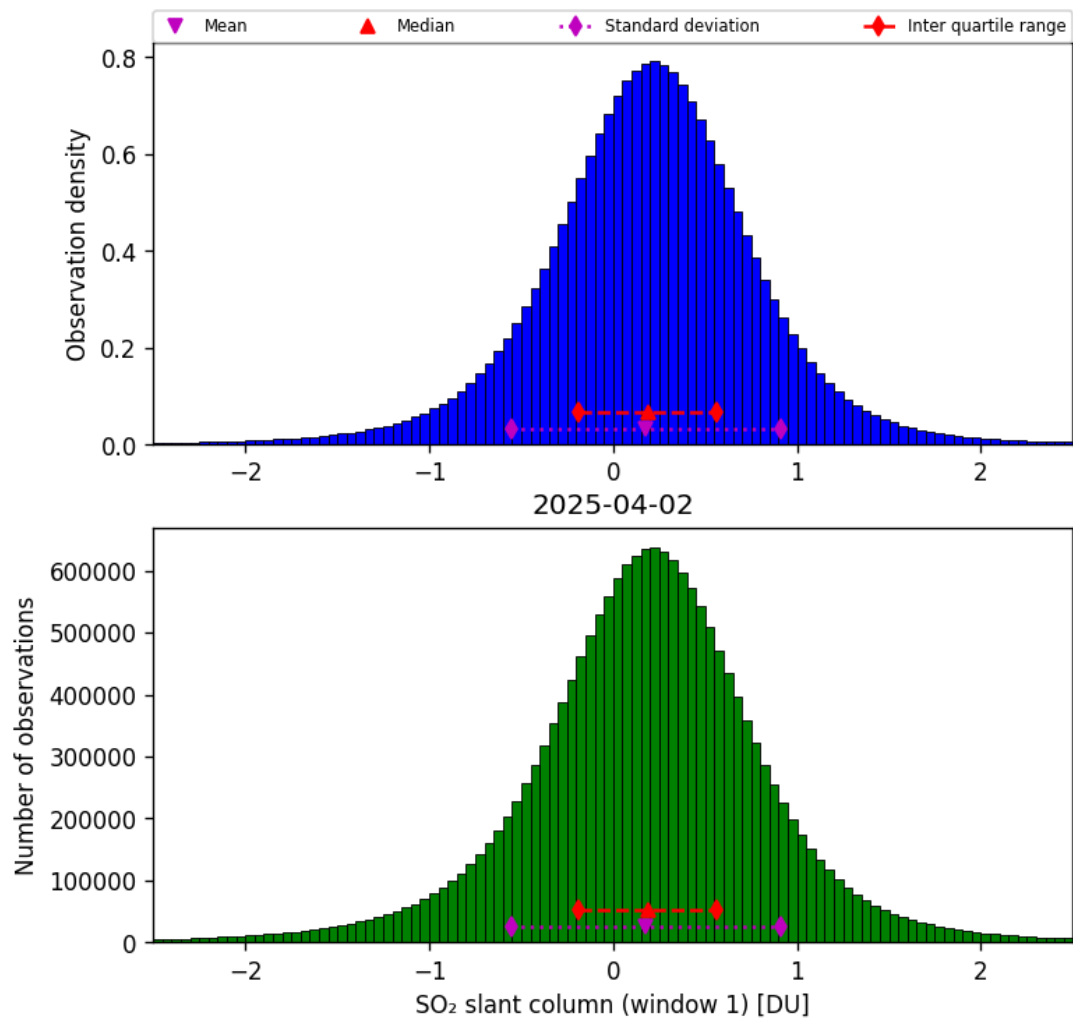


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-04-02 to 2025-04-03

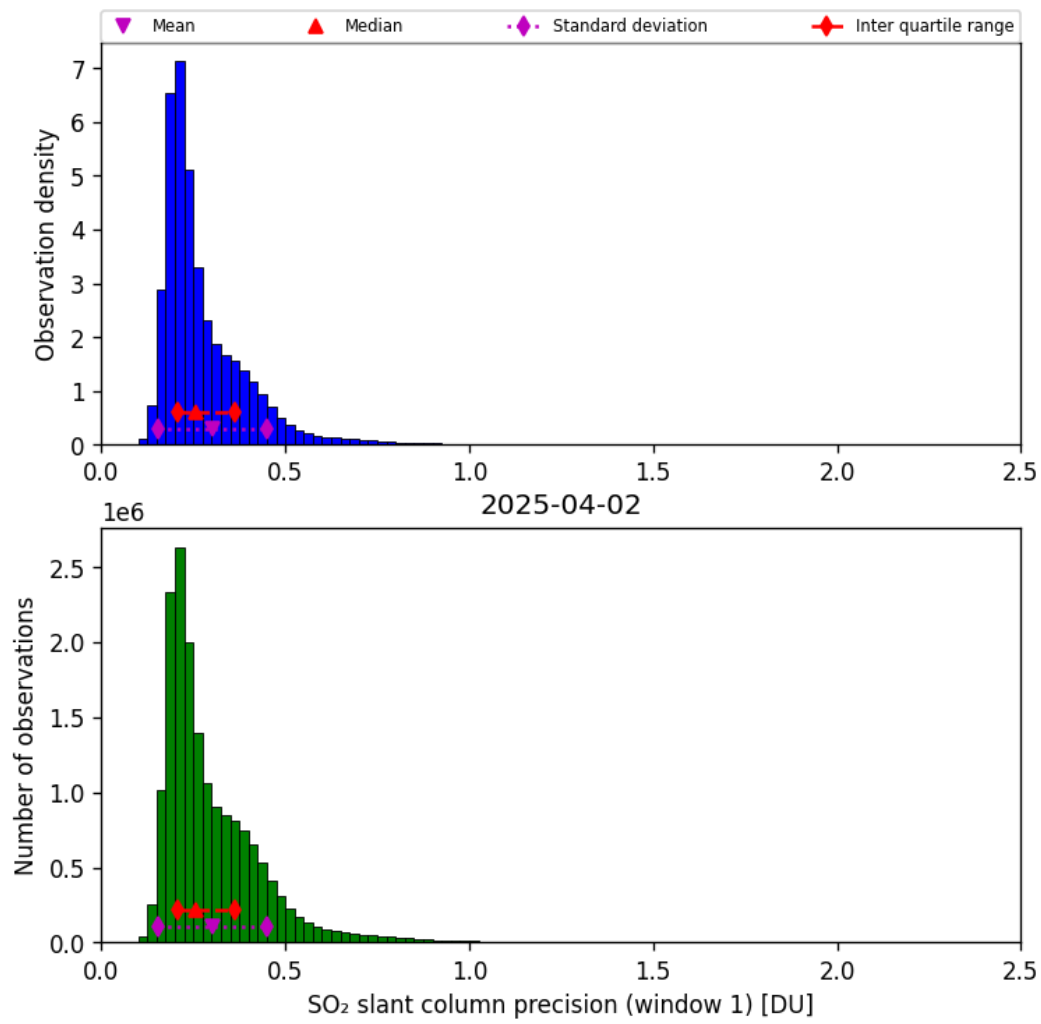


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-04-02 to 2025-04-03

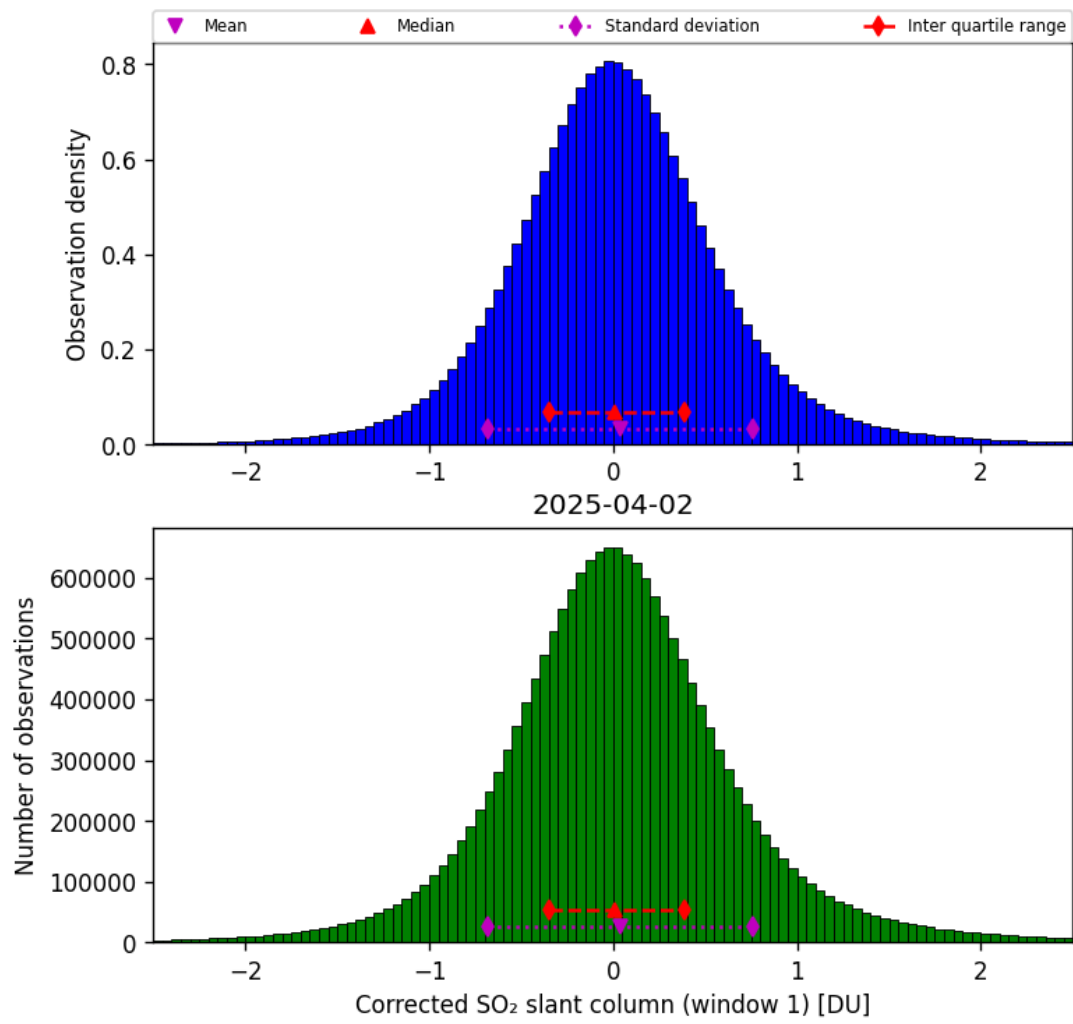


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-04-02 to 2025-04-03

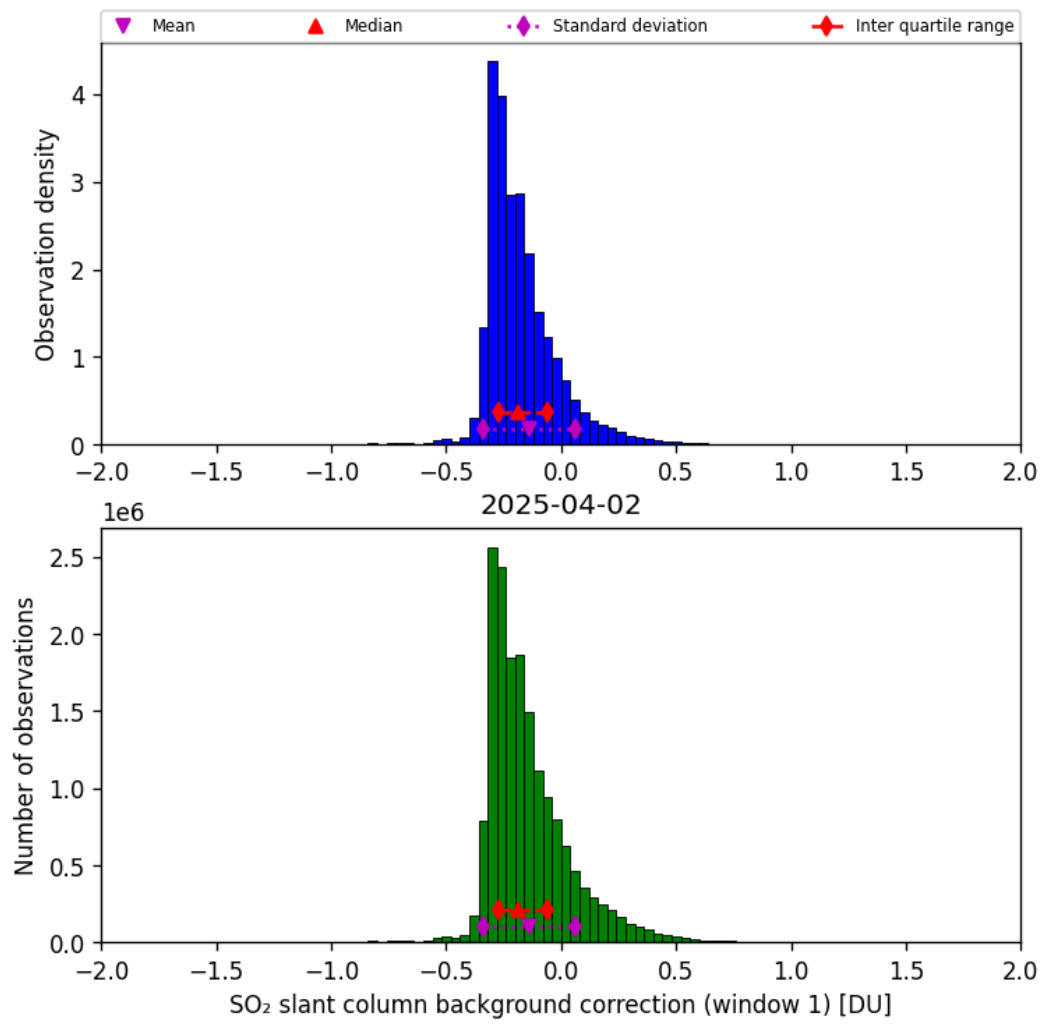


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-04-02 to 2025-04-03

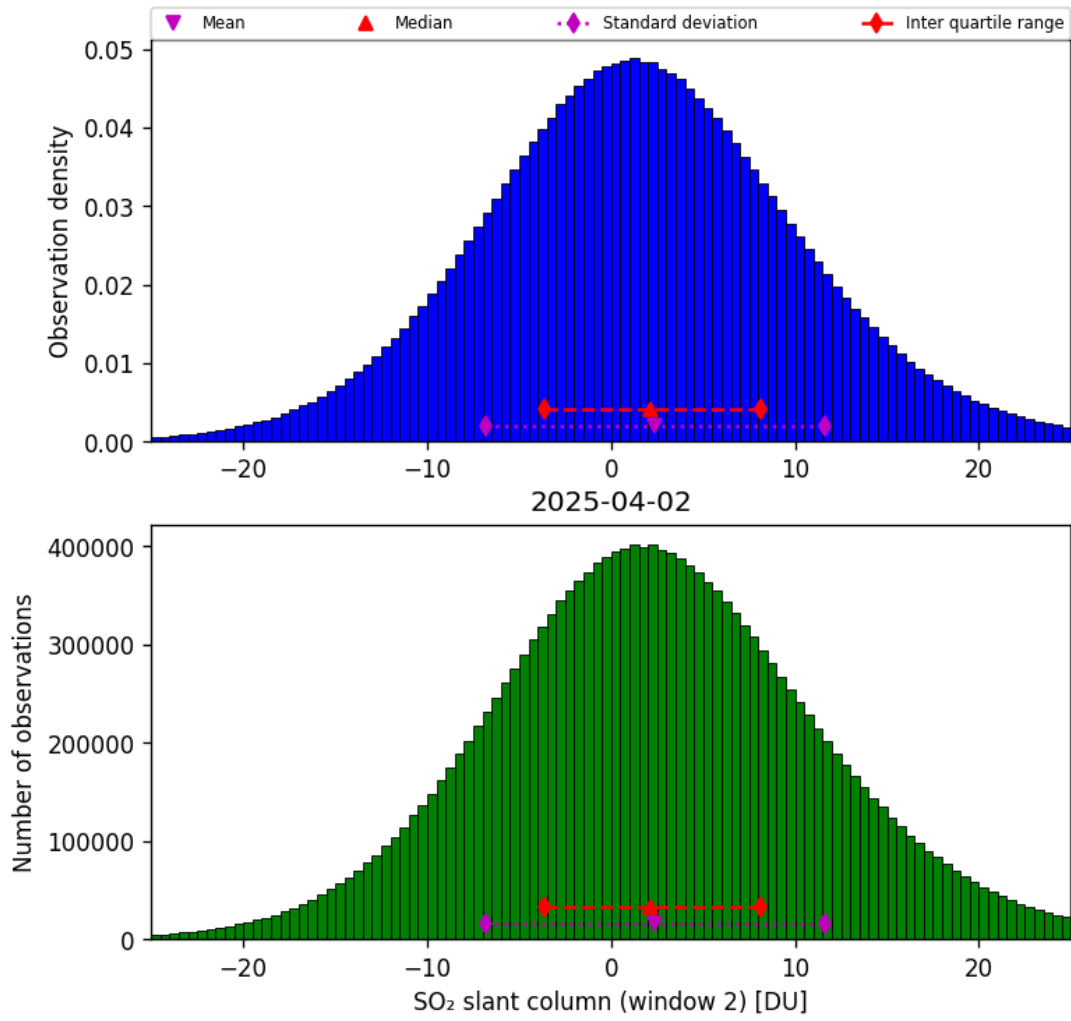


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-04-02 to 2025-04-03

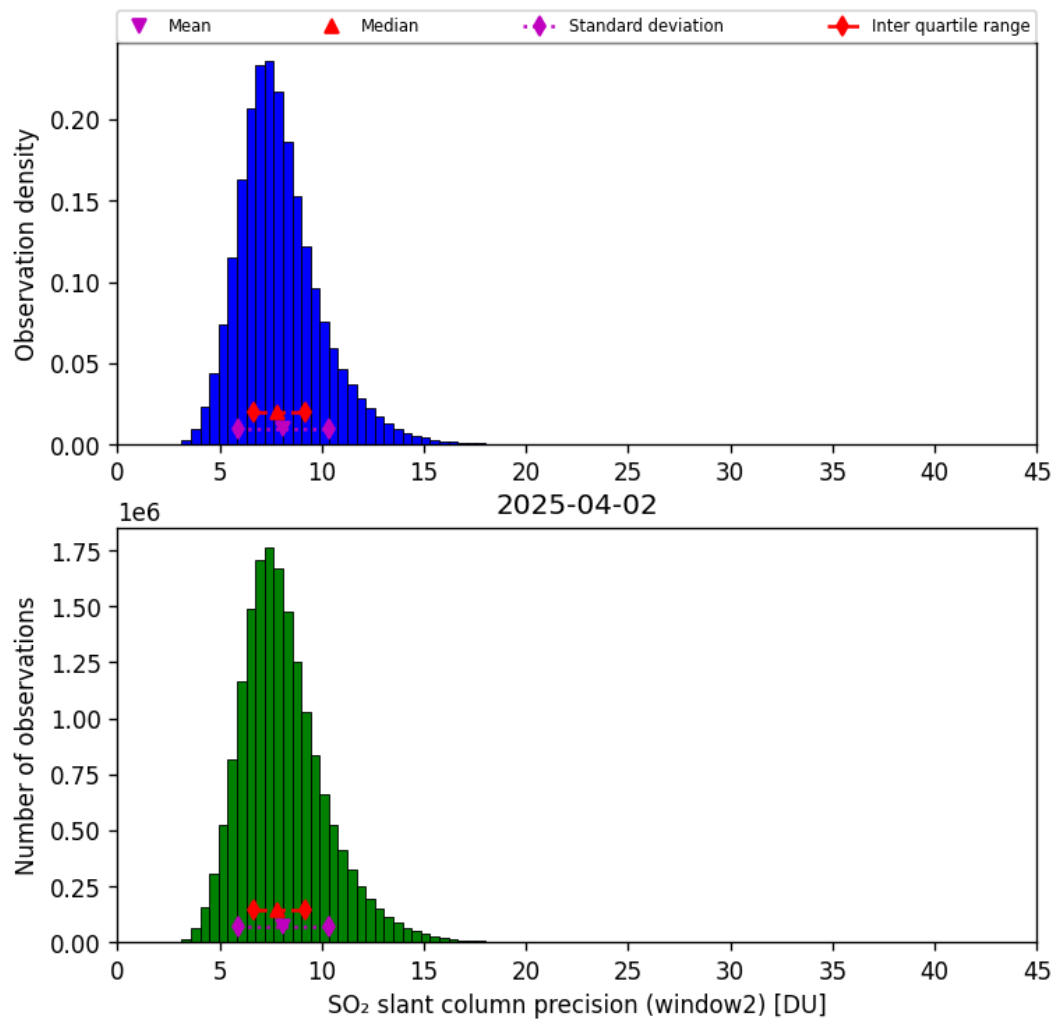


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-04-02 to 2025-04-03

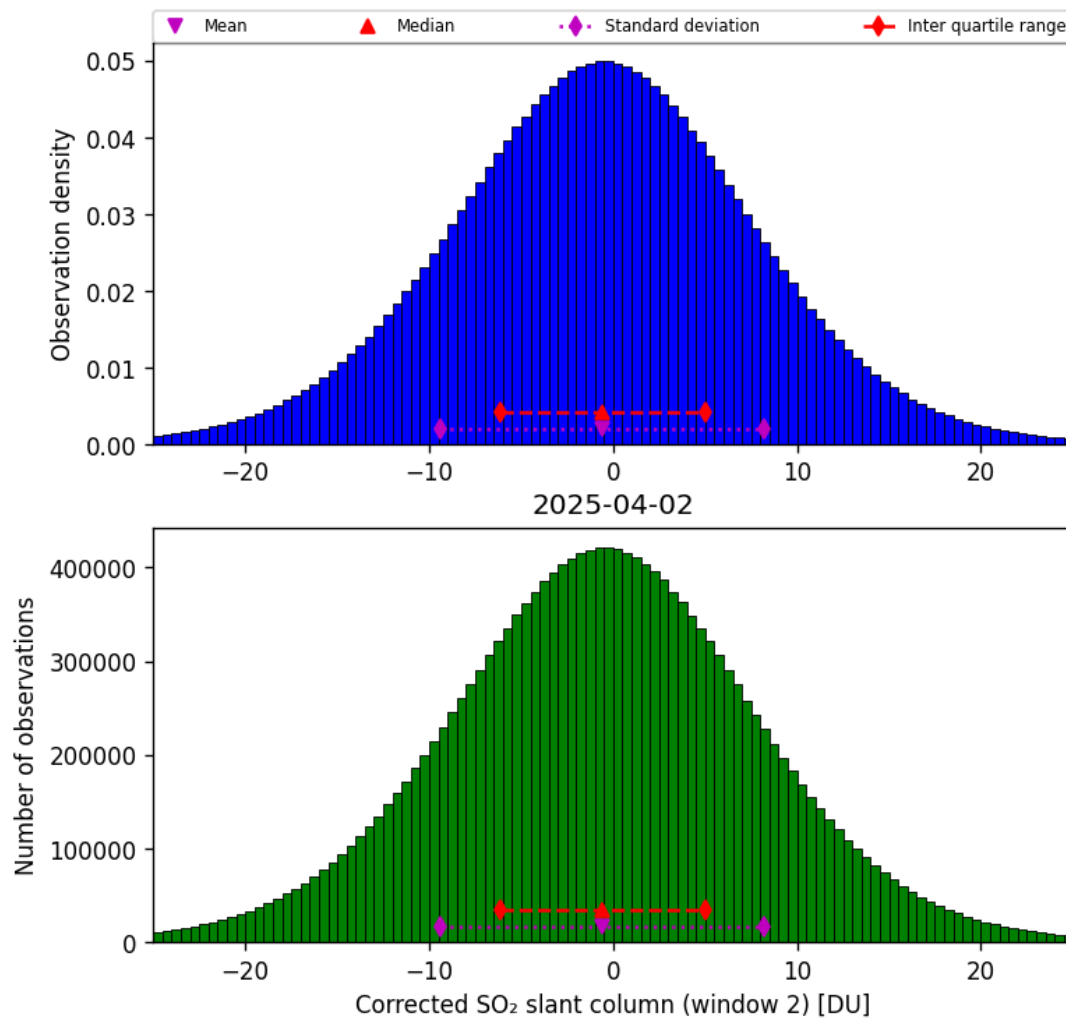


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-04-02 to 2025-04-03

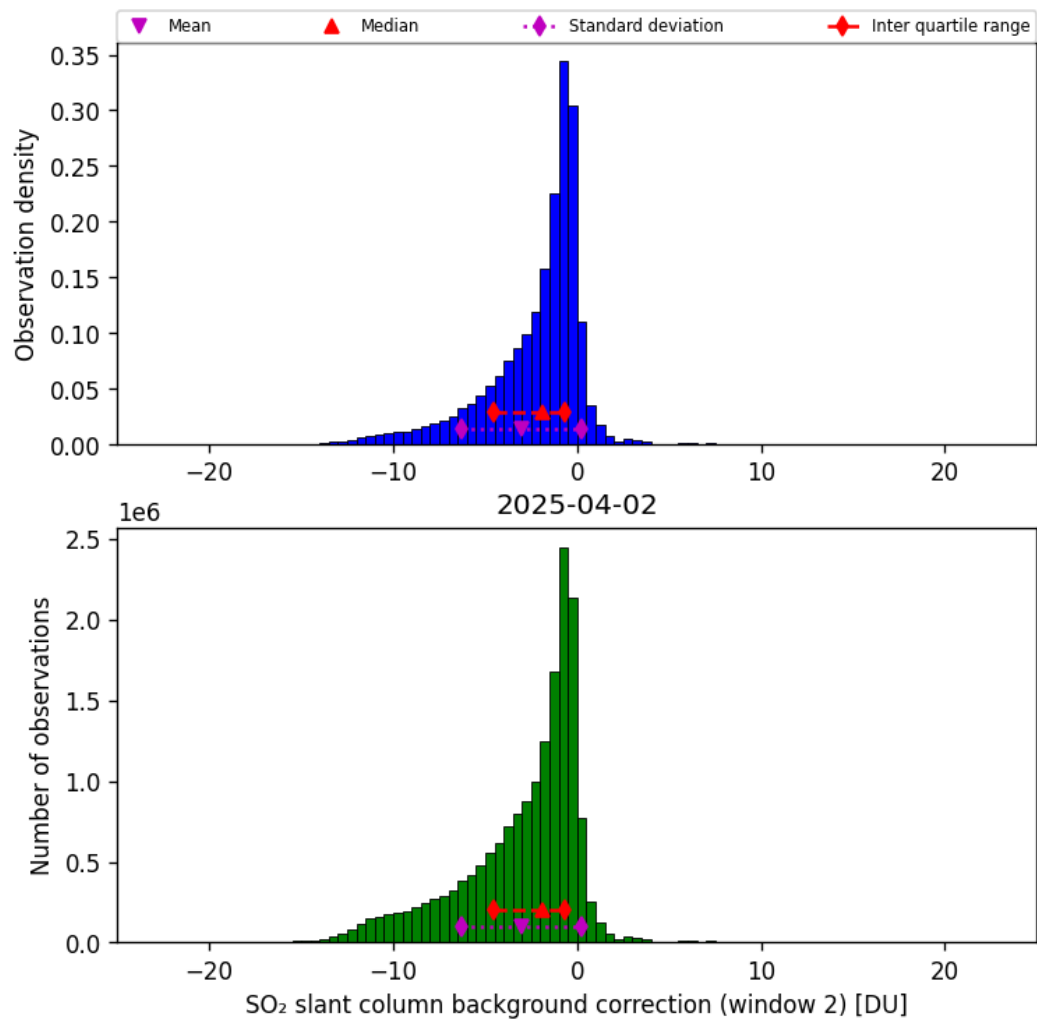


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-04-02 to 2025-04-03

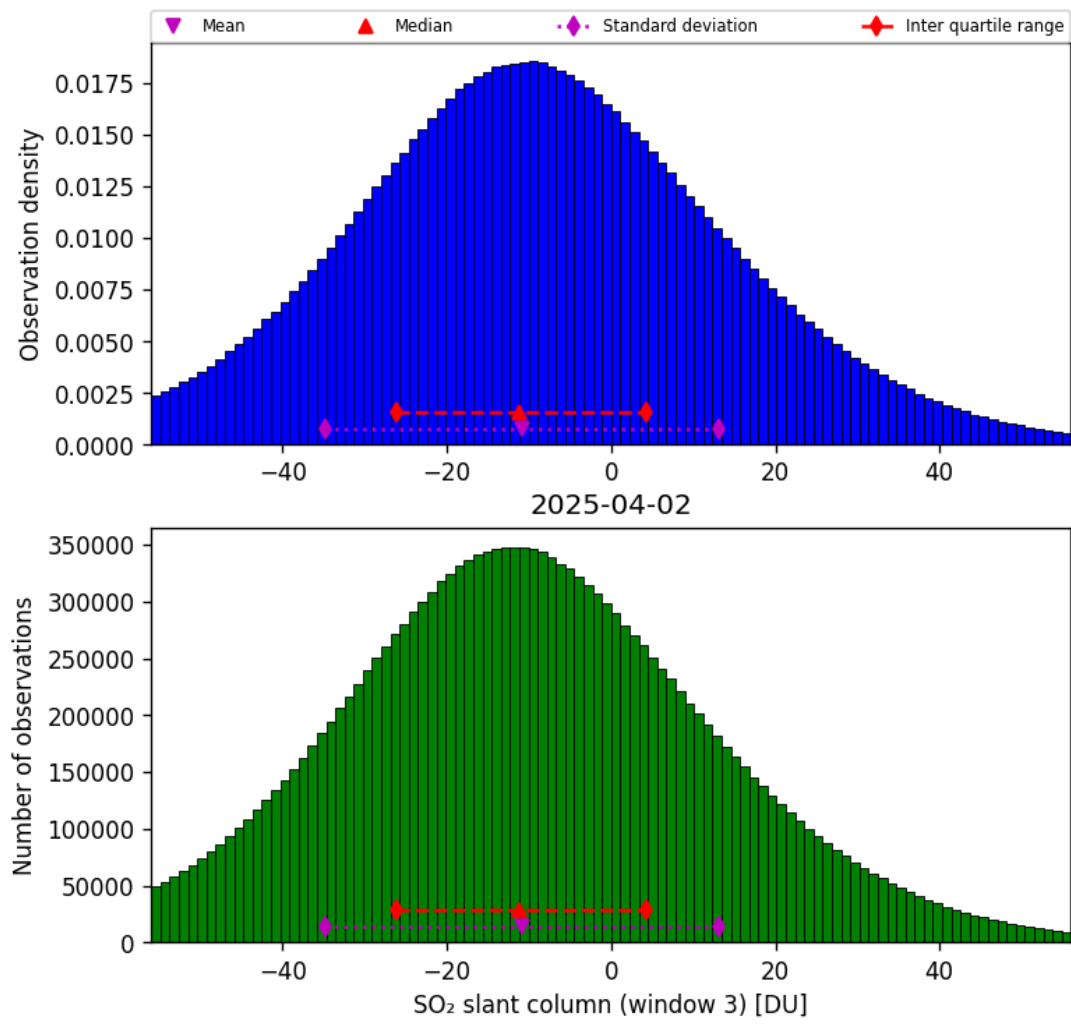


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-04-02 to 2025-04-03

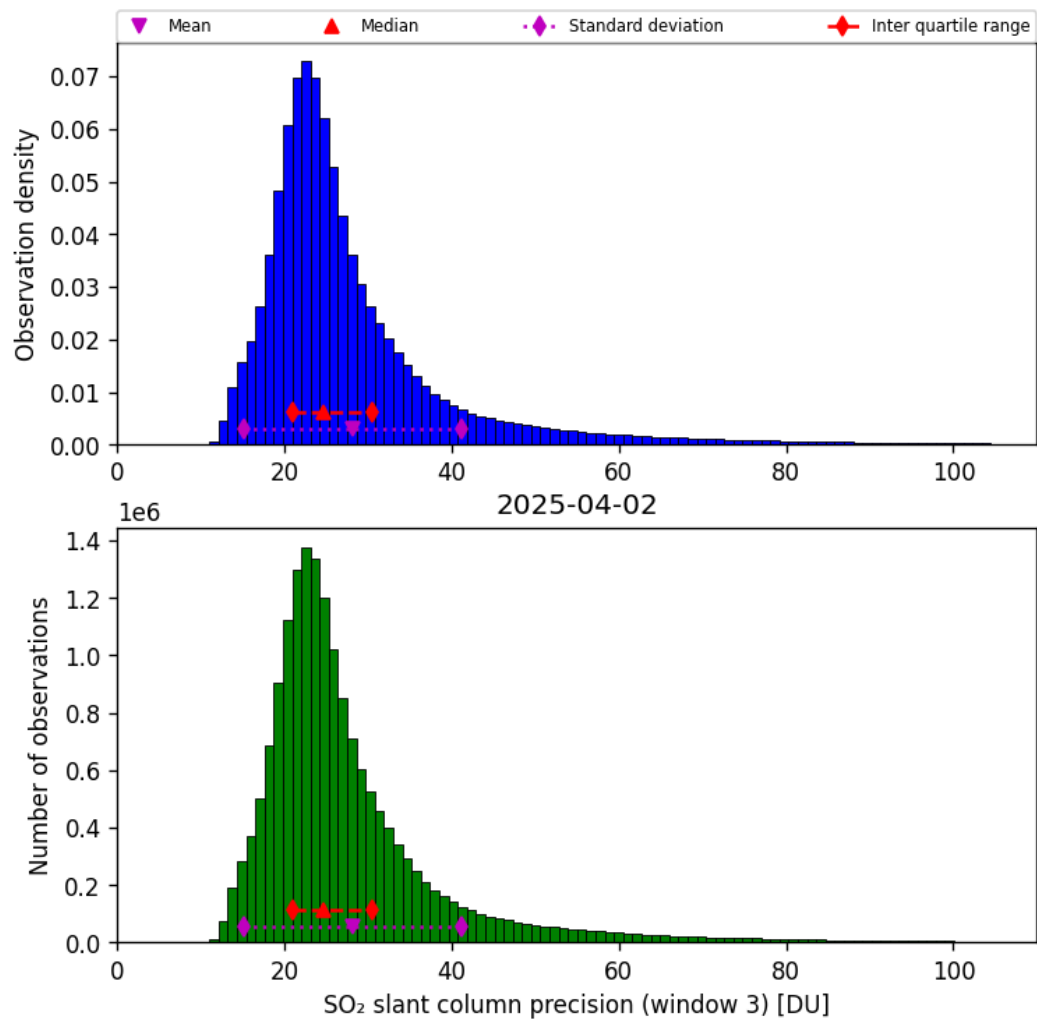


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-04-02 to 2025-04-03

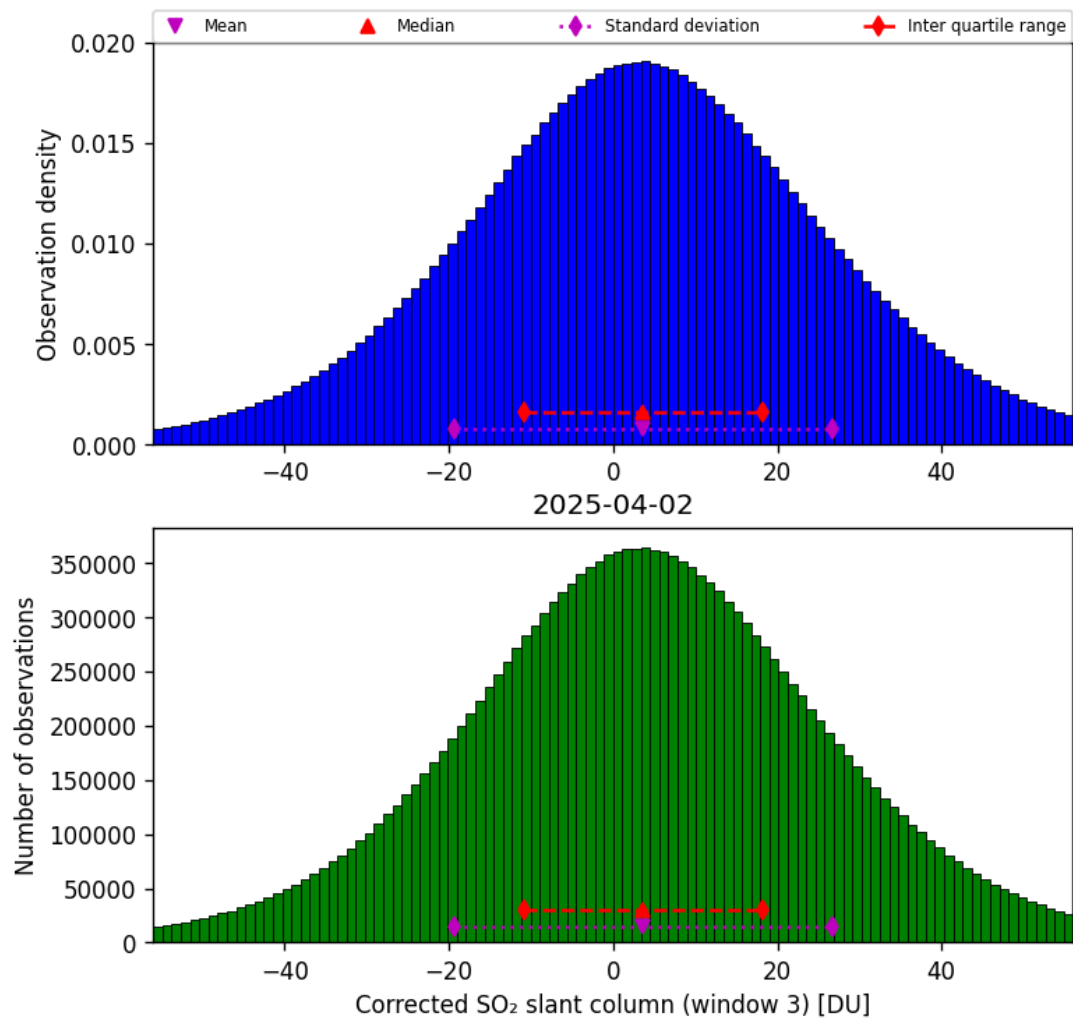


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-04-02 to 2025-04-03

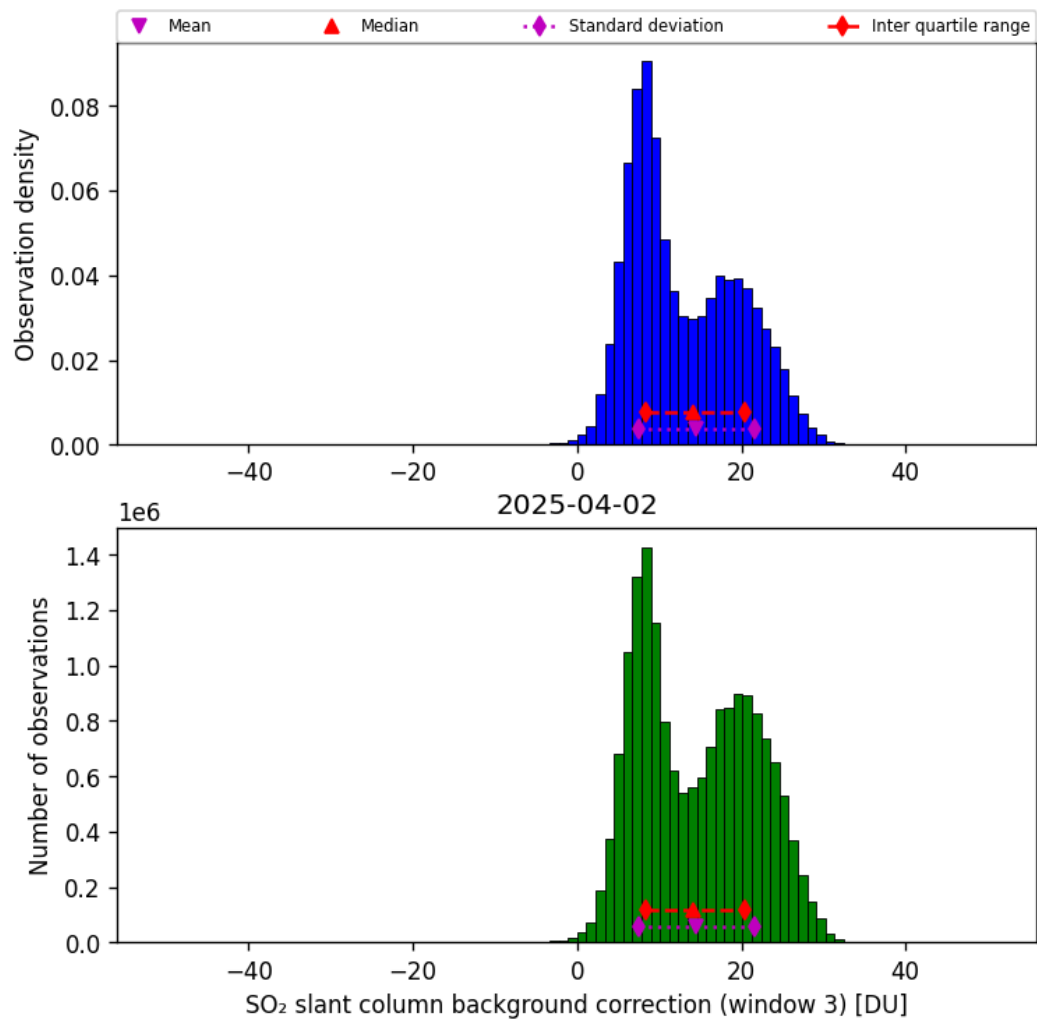


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-04-02 to 2025-04-03

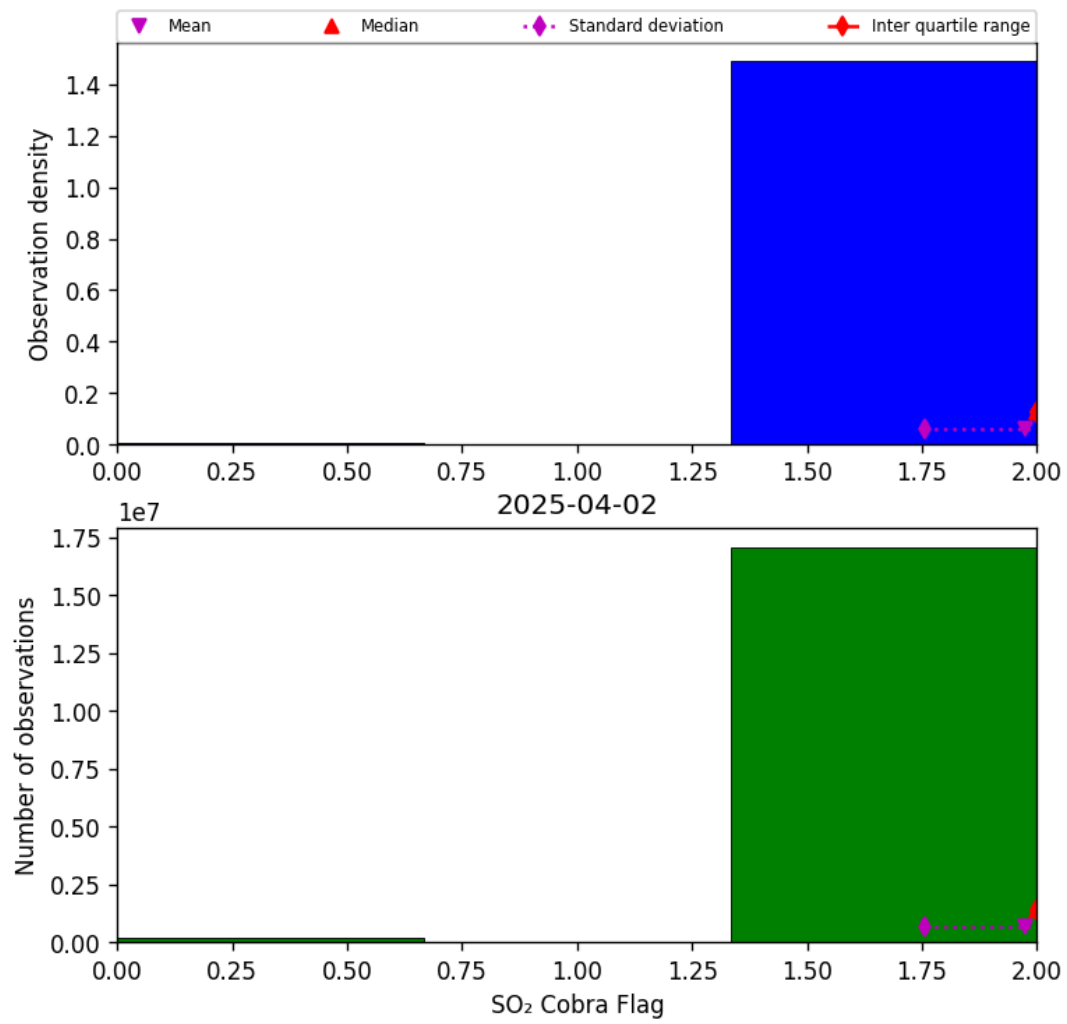


Figure 75: Histogram of "SO₂ Cobra Flag" for 2025-04-02 to 2025-04-03

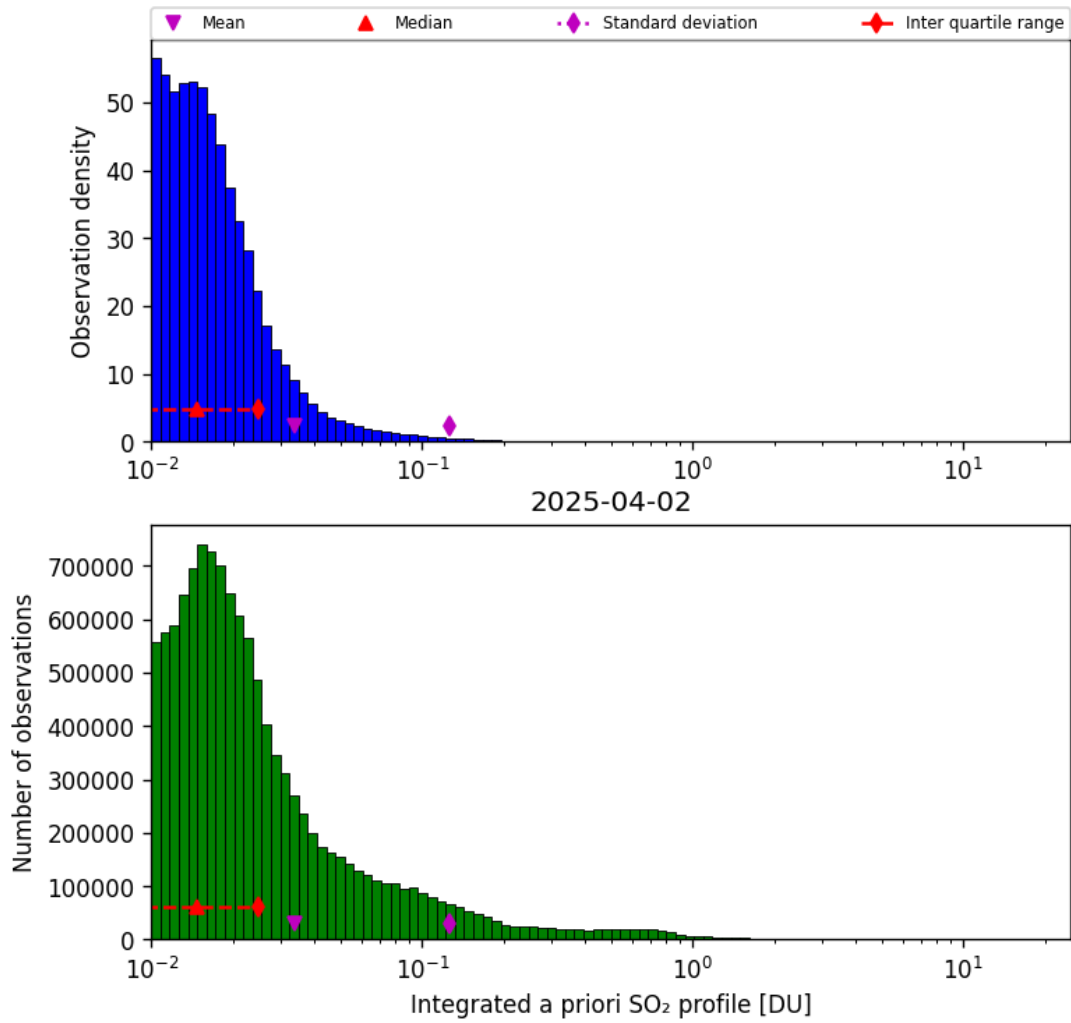


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-04-02 to 2025-04-03

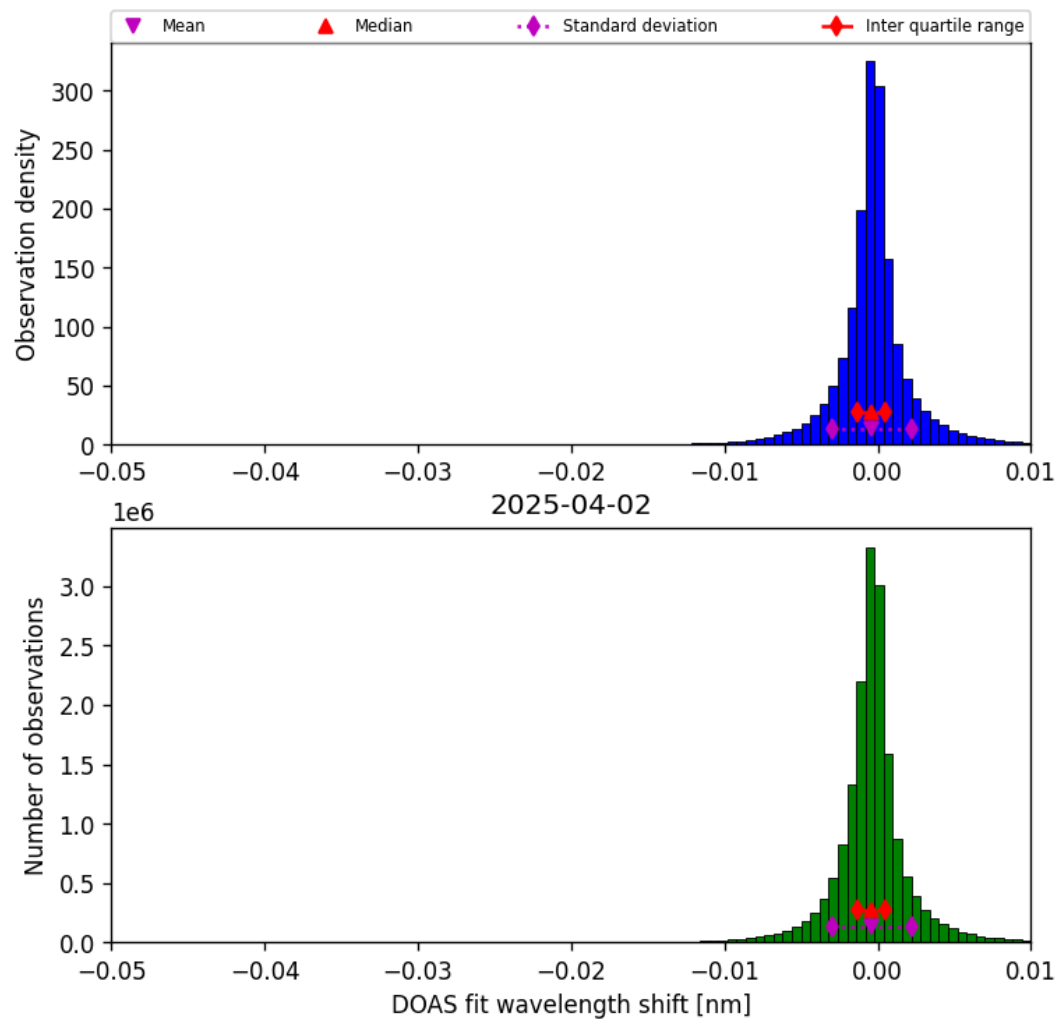


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-04-02 to 2025-04-03

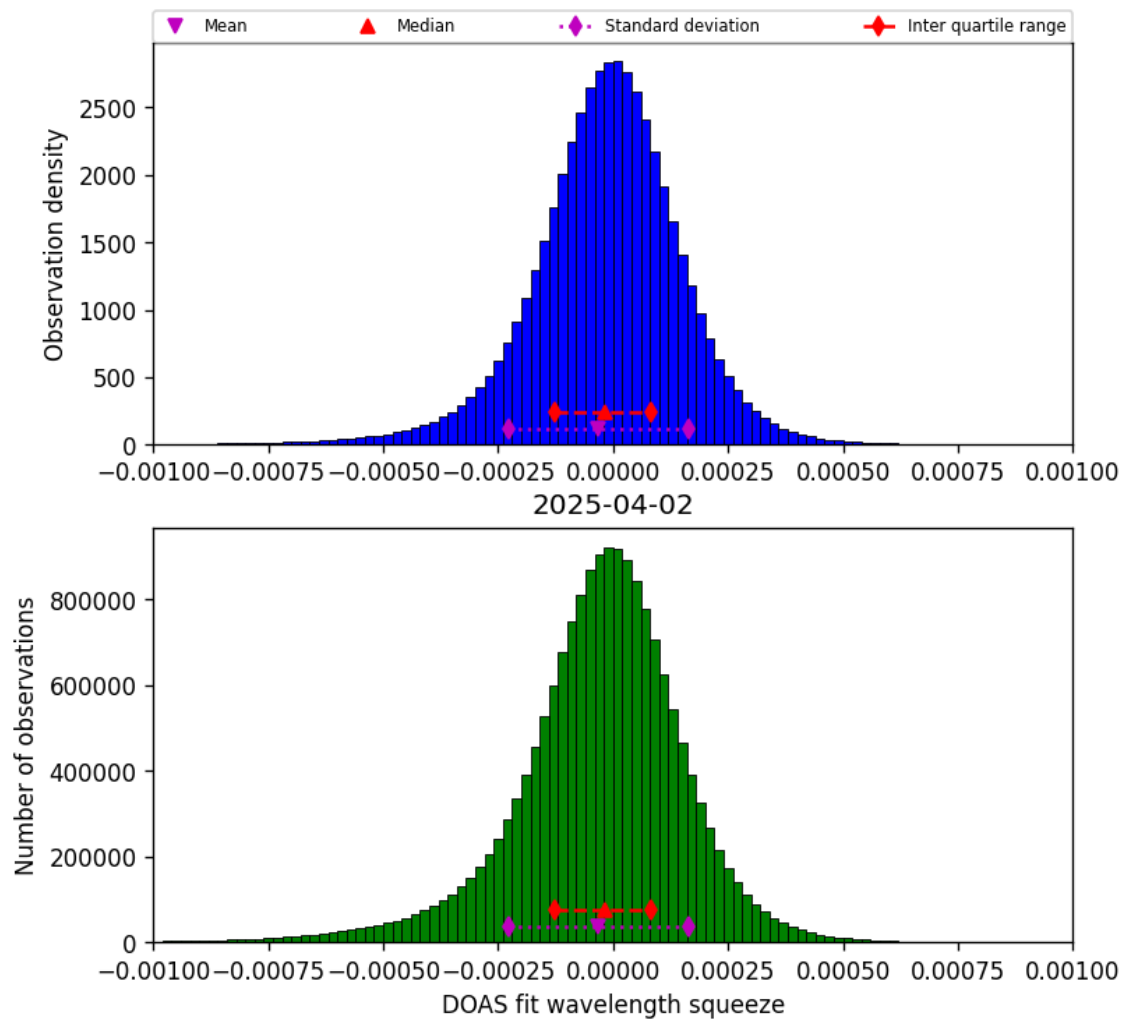


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-04-02 to 2025-04-03

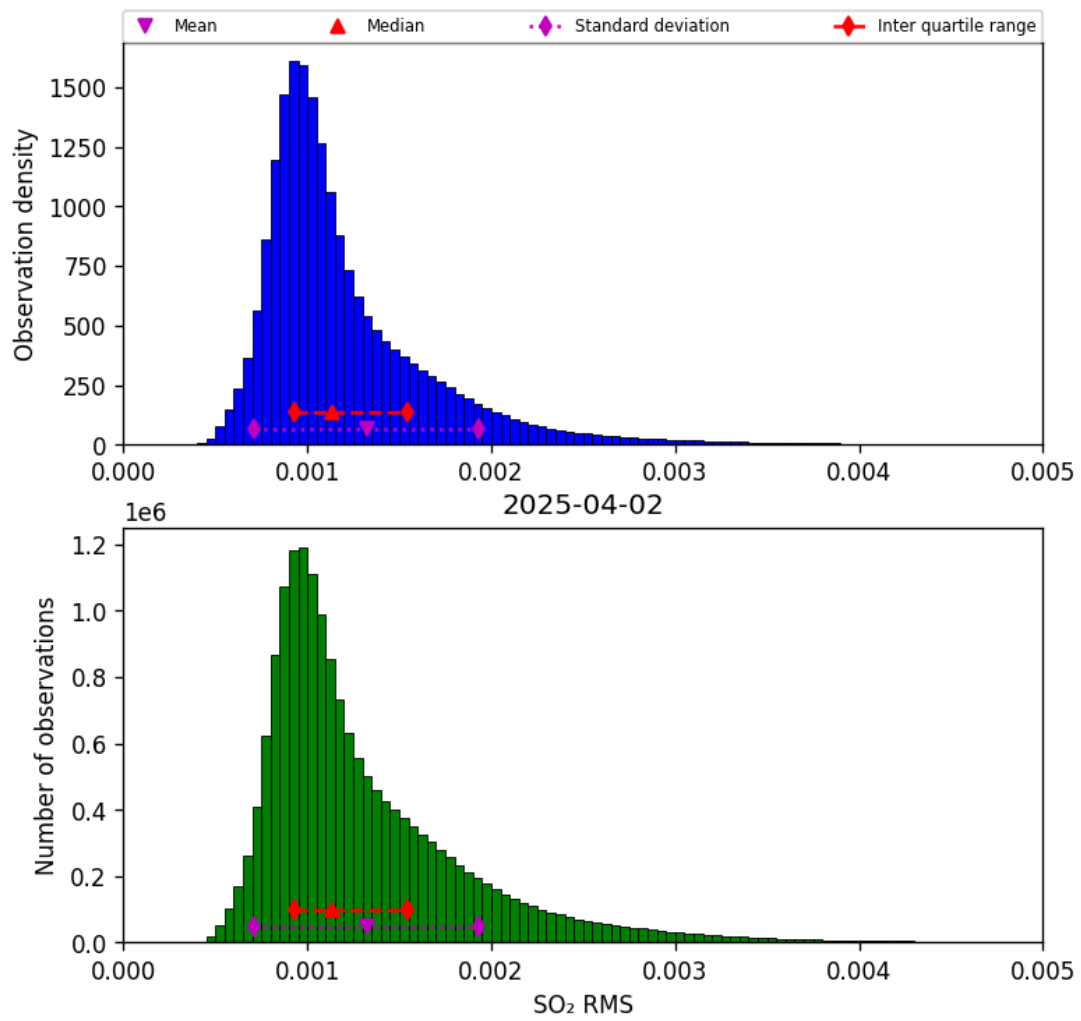


Figure 79: Histogram of “SO₂ RMS” for 2025-04-02 to 2025-04-03

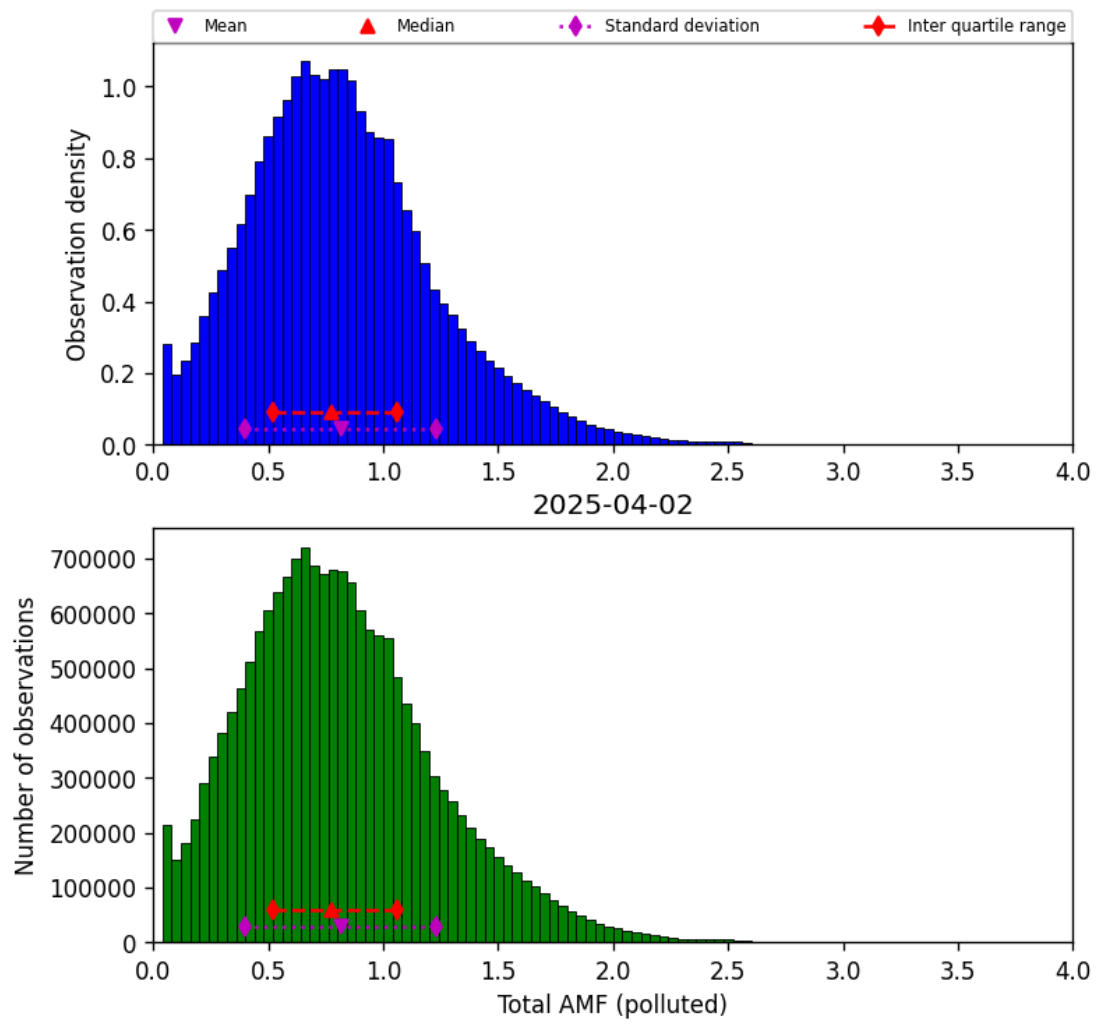


Figure 80: Histogram of “Total AMF (polluted)” for 2025-04-02 to 2025-04-03

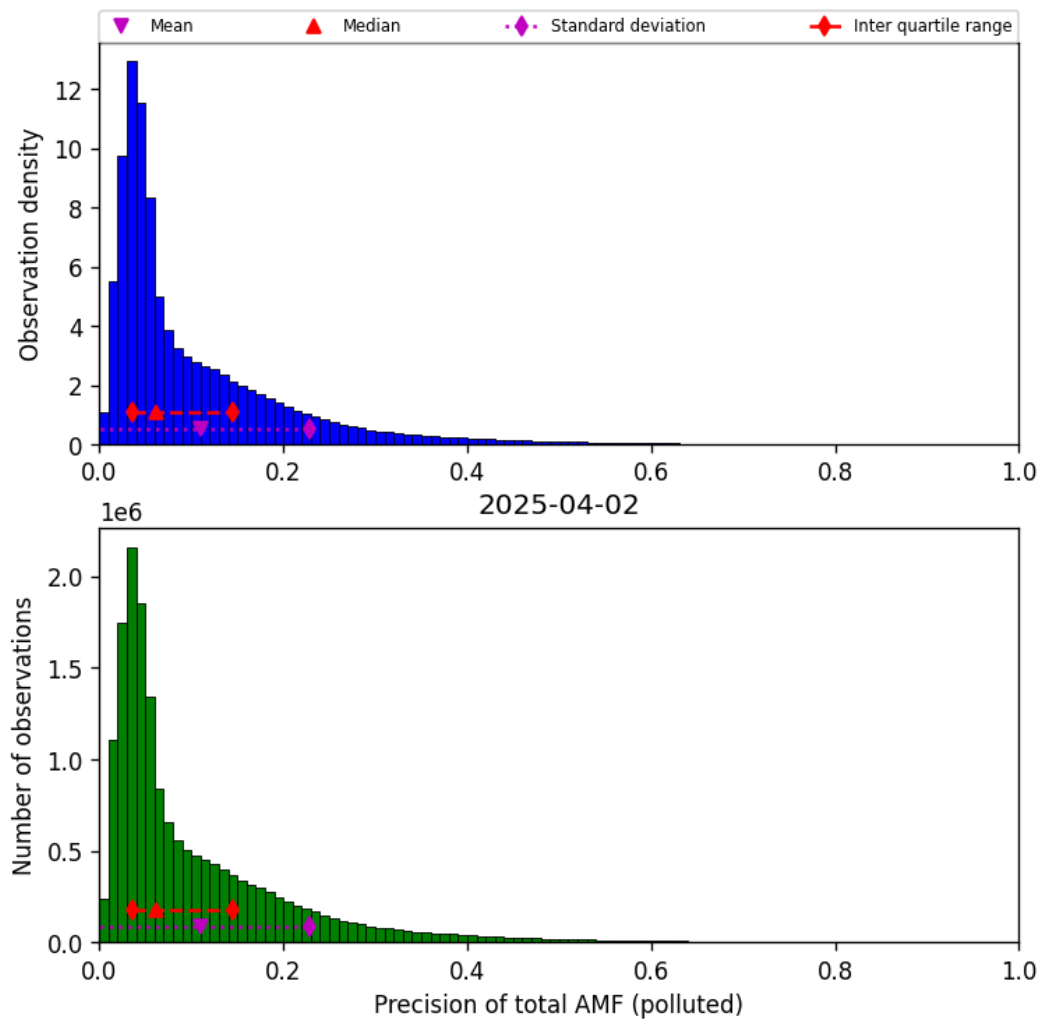


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-04-02 to 2025-04-03

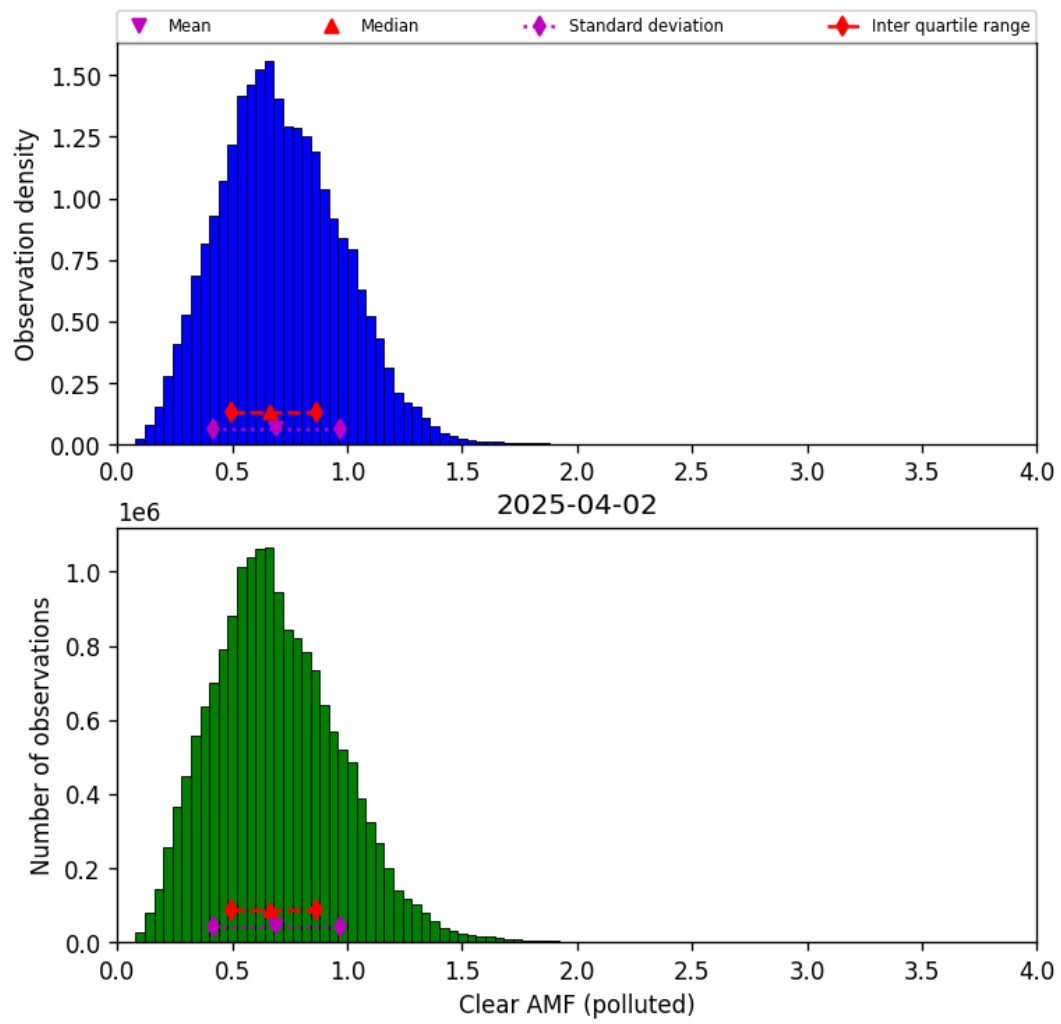


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-04-02 to 2025-04-03

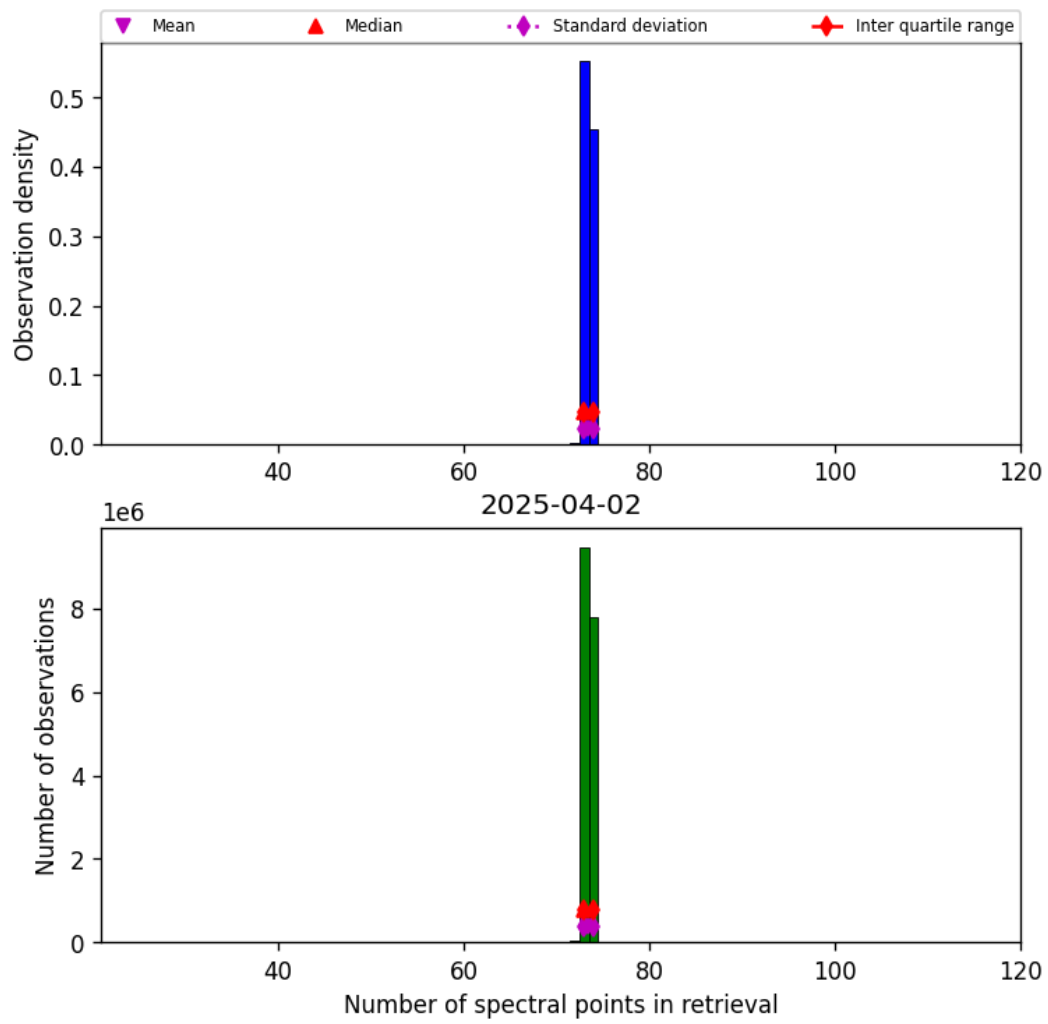


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-04-02 to 2025-04-03

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.

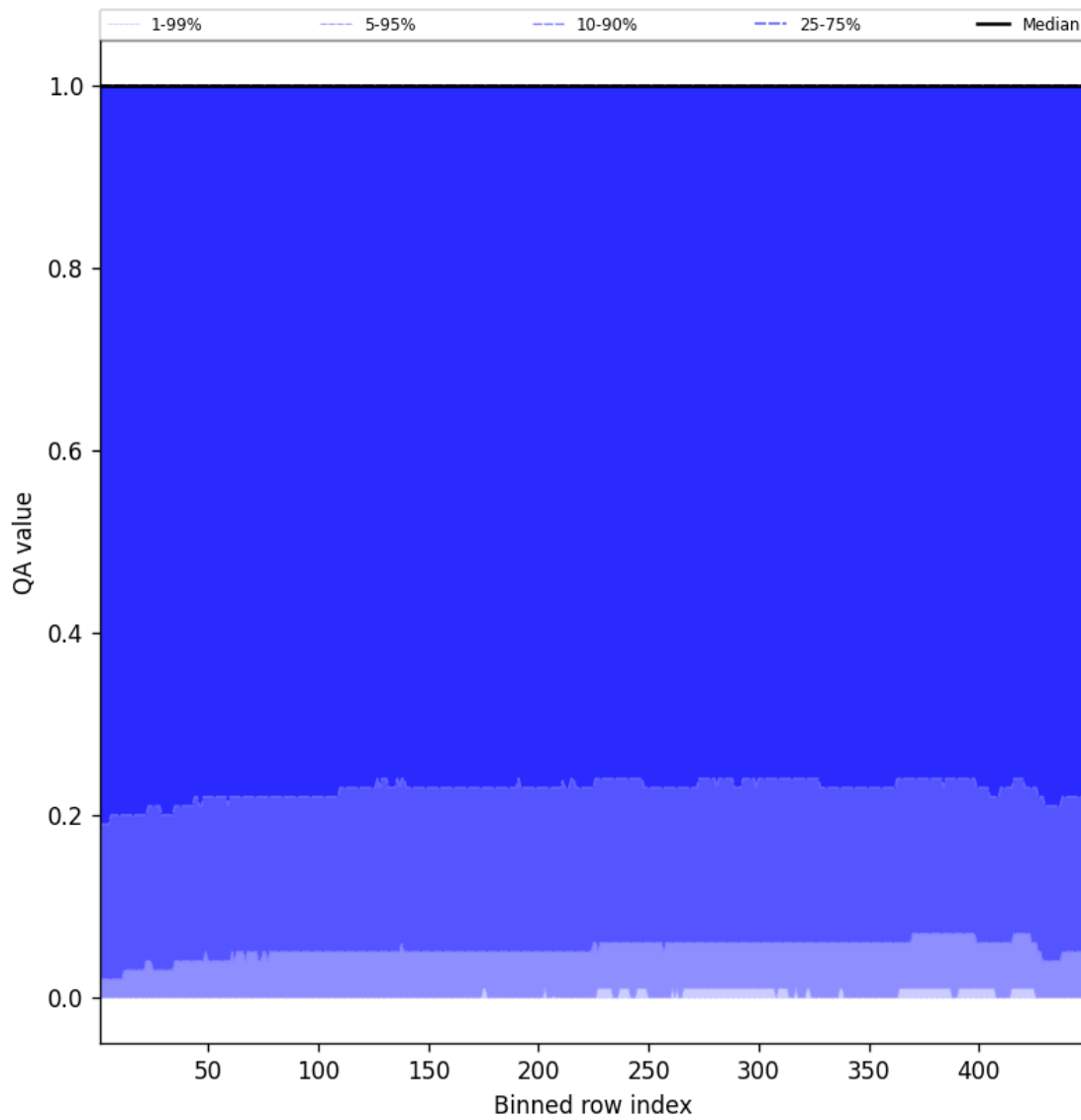


Figure 84: Along track statistics of “QA value” for 2025-04-02 to 2025-04-03

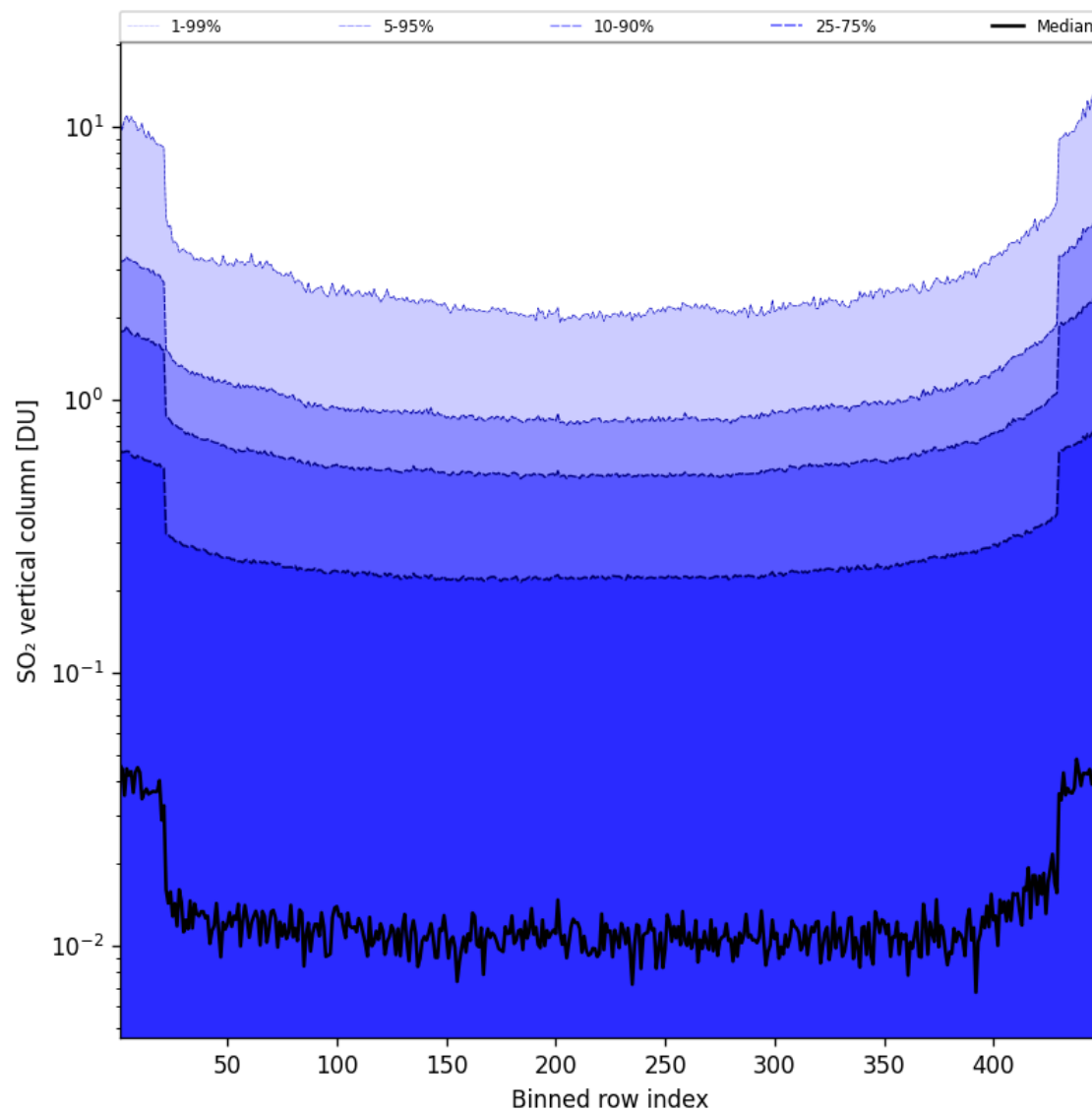


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-04-02 to 2025-04-03

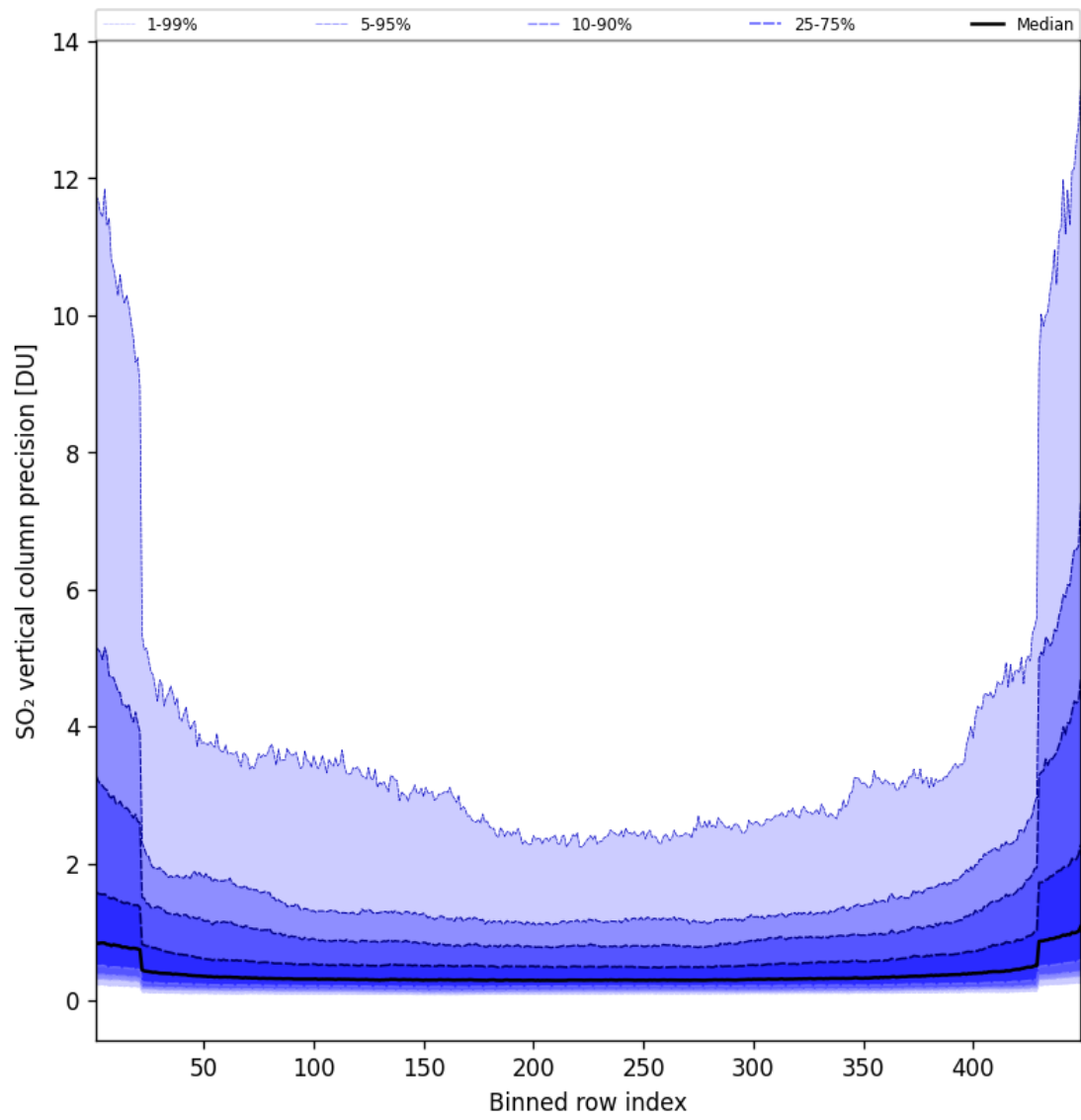


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-04-02 to 2025-04-03

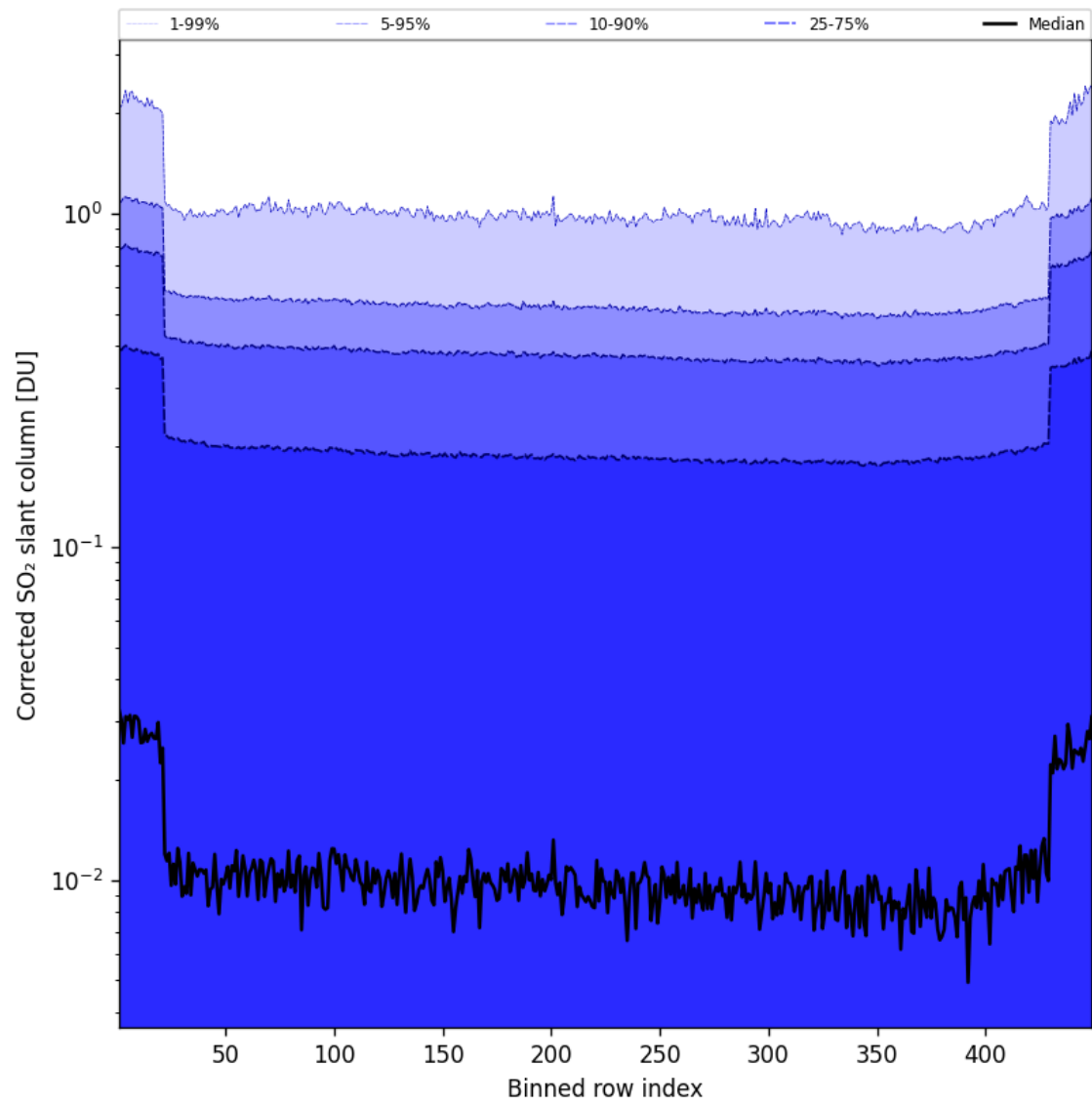


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-04-02 to 2025-04-03

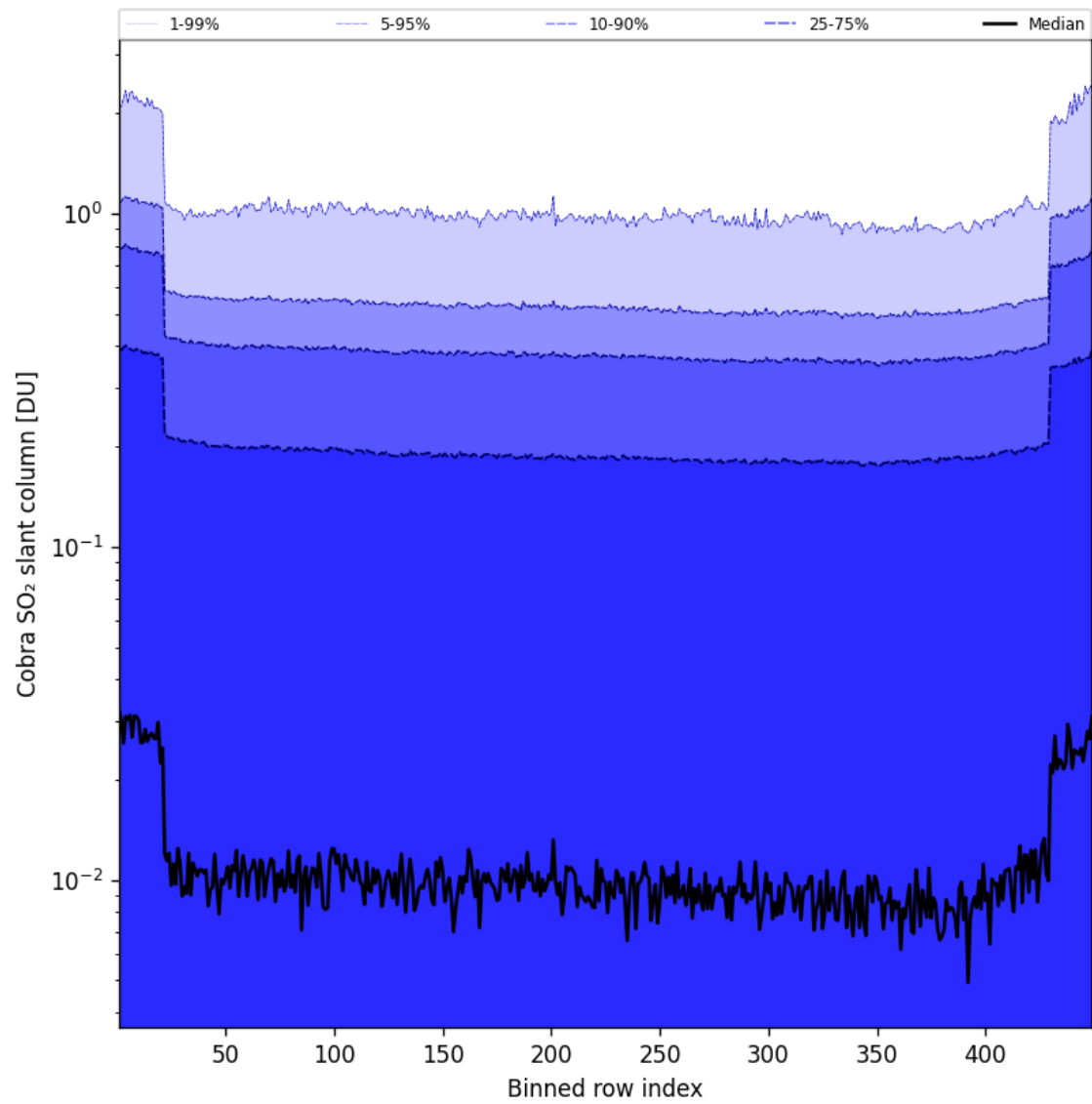


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-04-02 to 2025-04-03

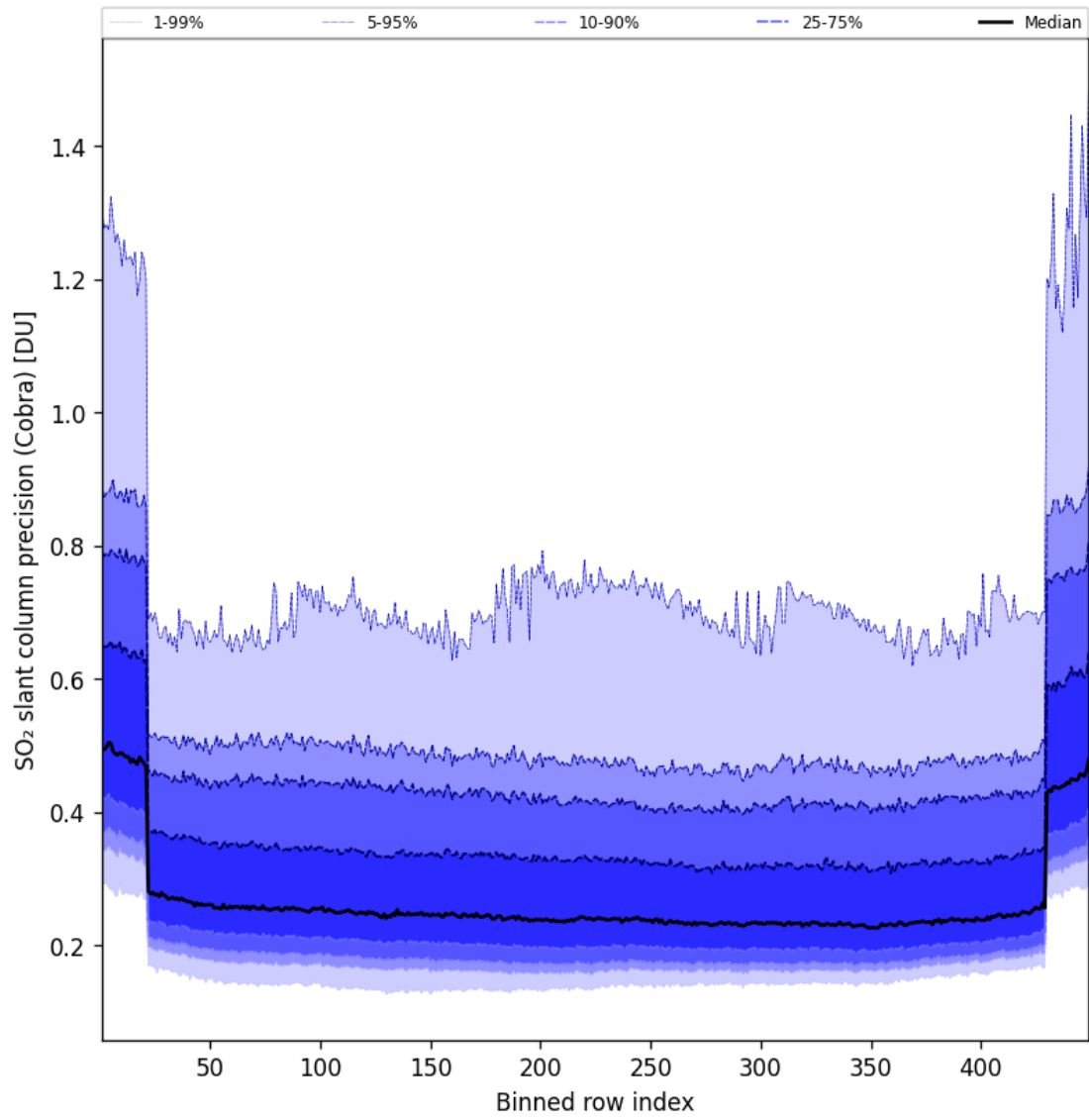


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-04-02 to 2025-04-03

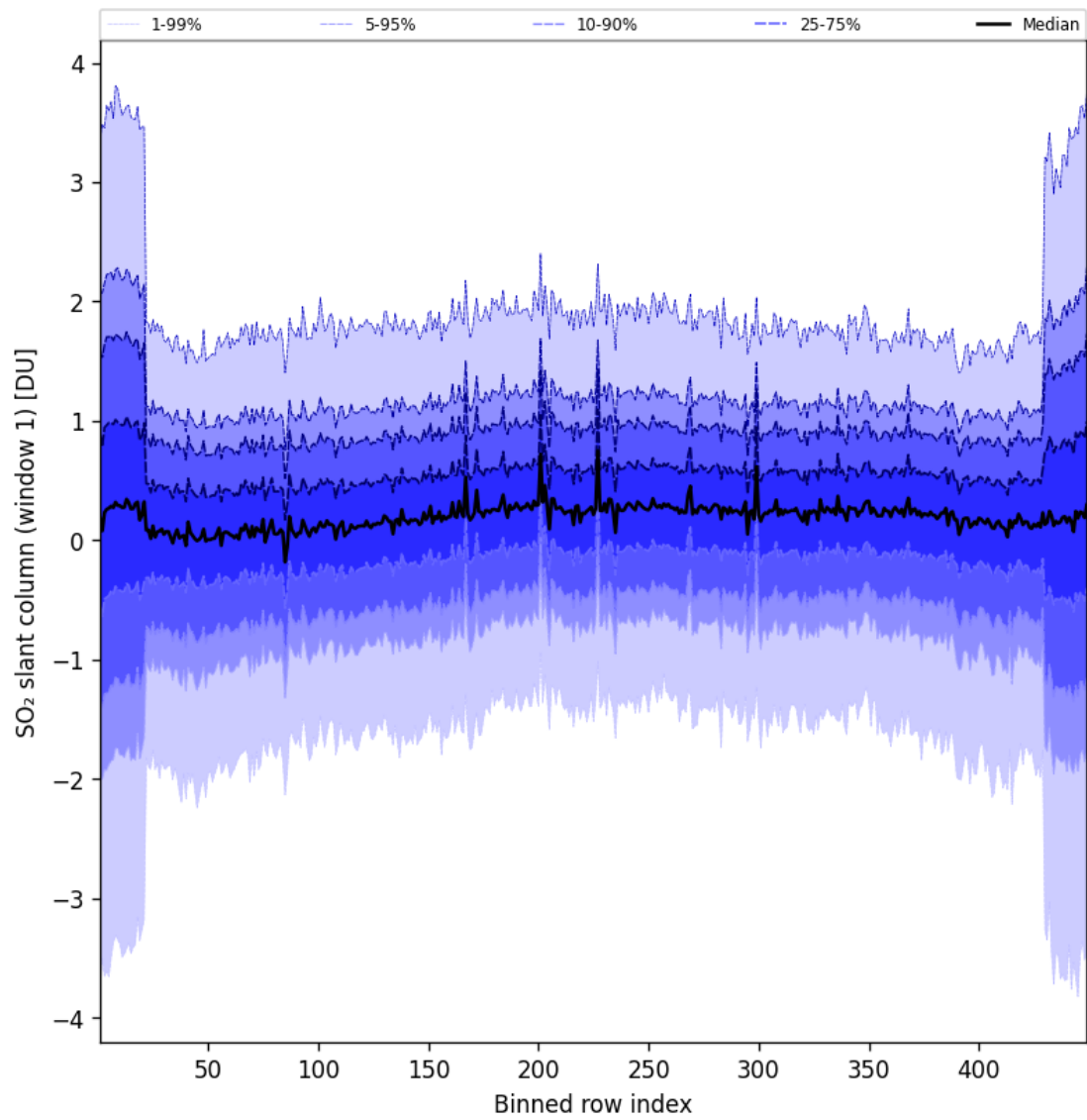


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-04-02 to 2025-04-03

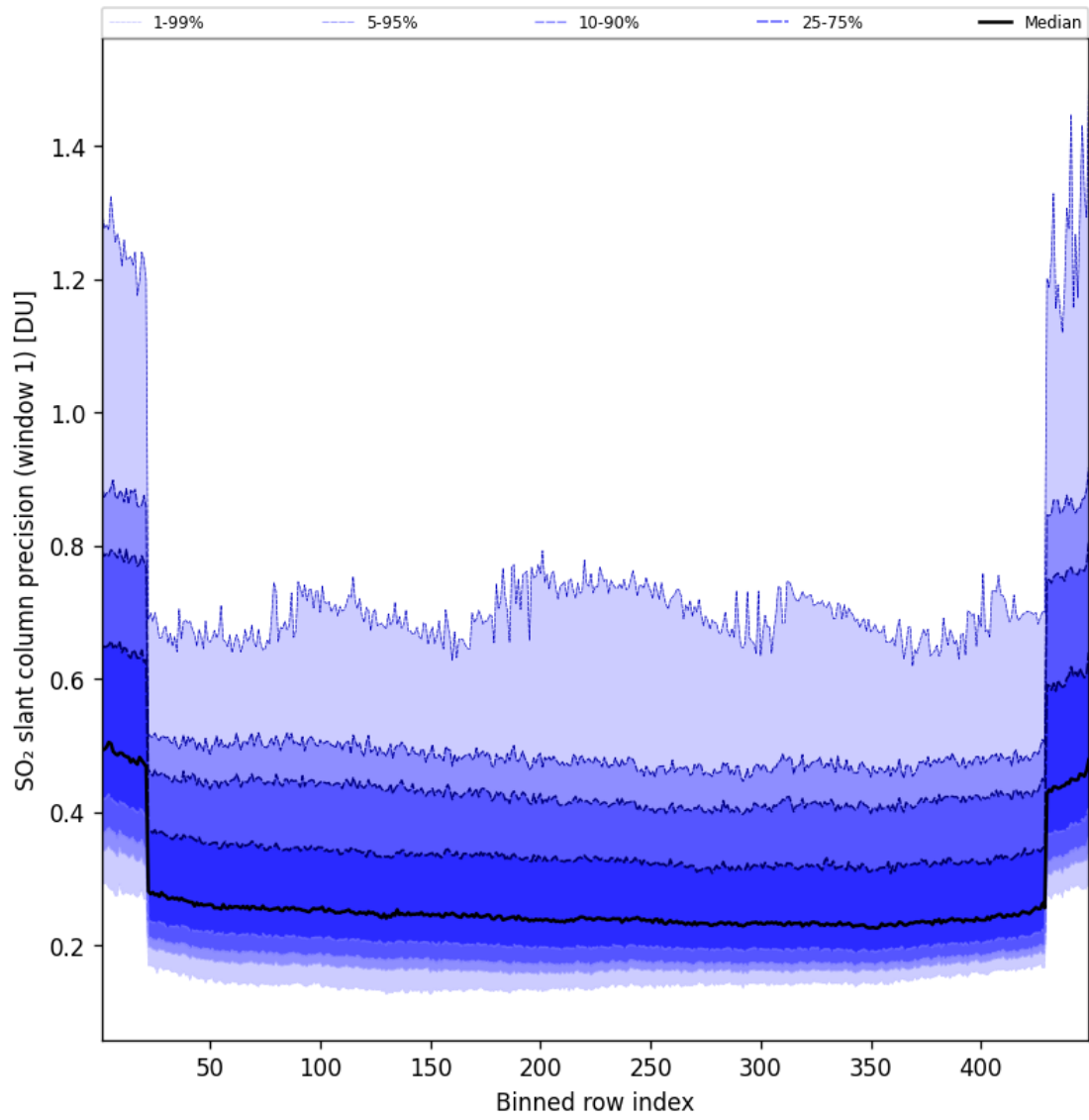


Figure 91: Along track statistics of "SO₂ slant column precision (window 1)" for 2025-04-02 to 2025-04-03

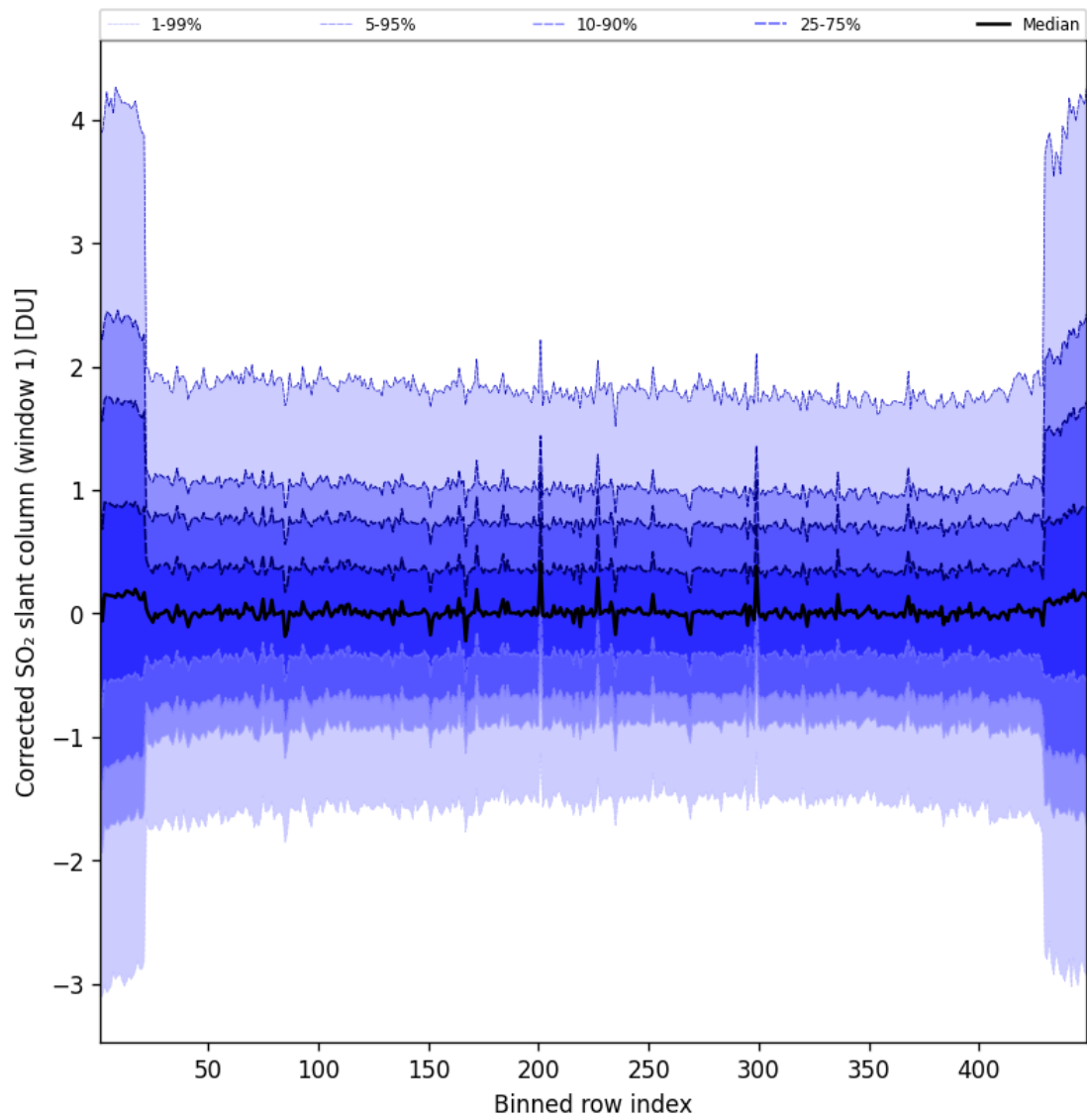


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-04-02 to 2025-04-03

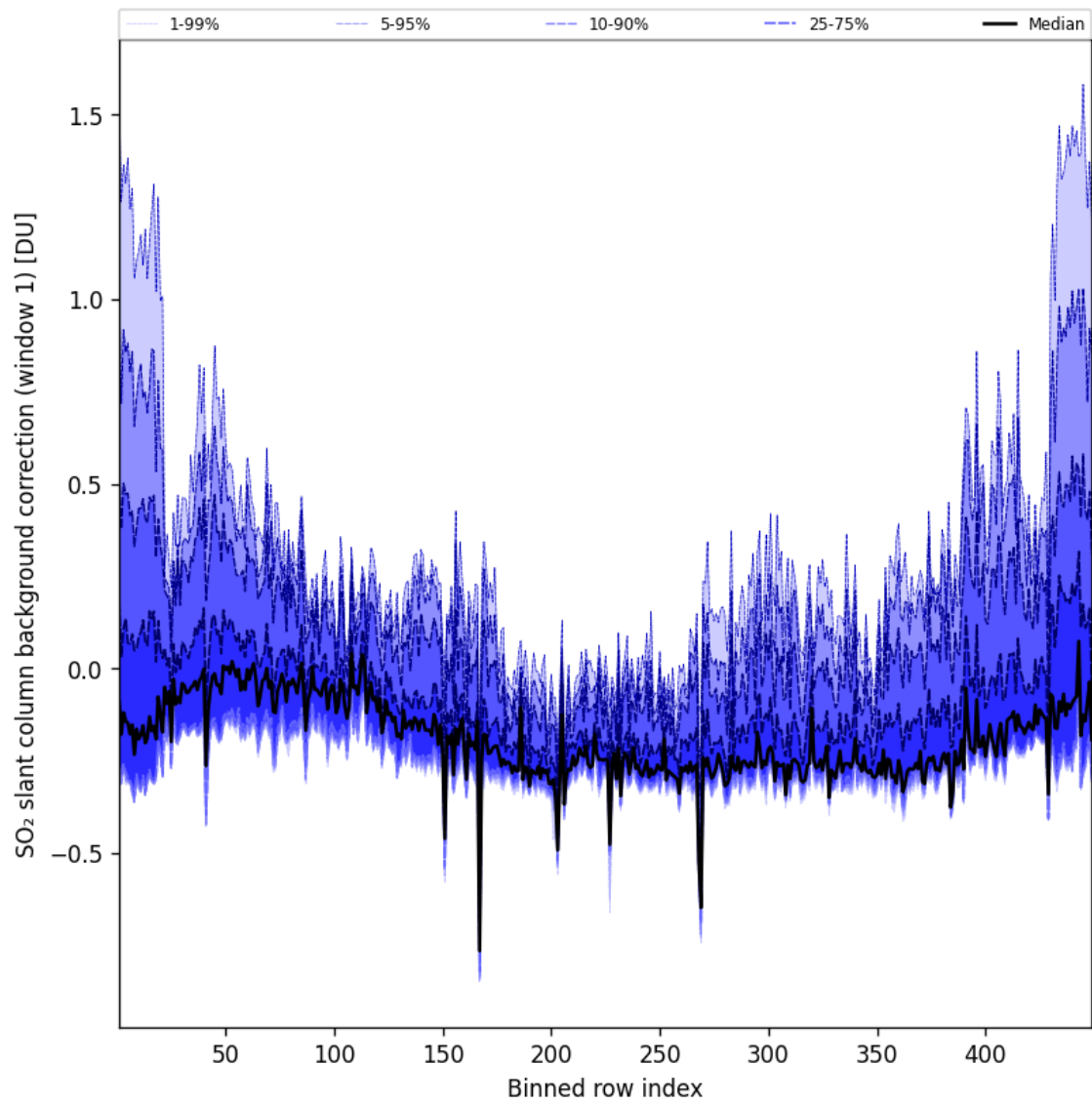


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-04-02 to 2025-04-03

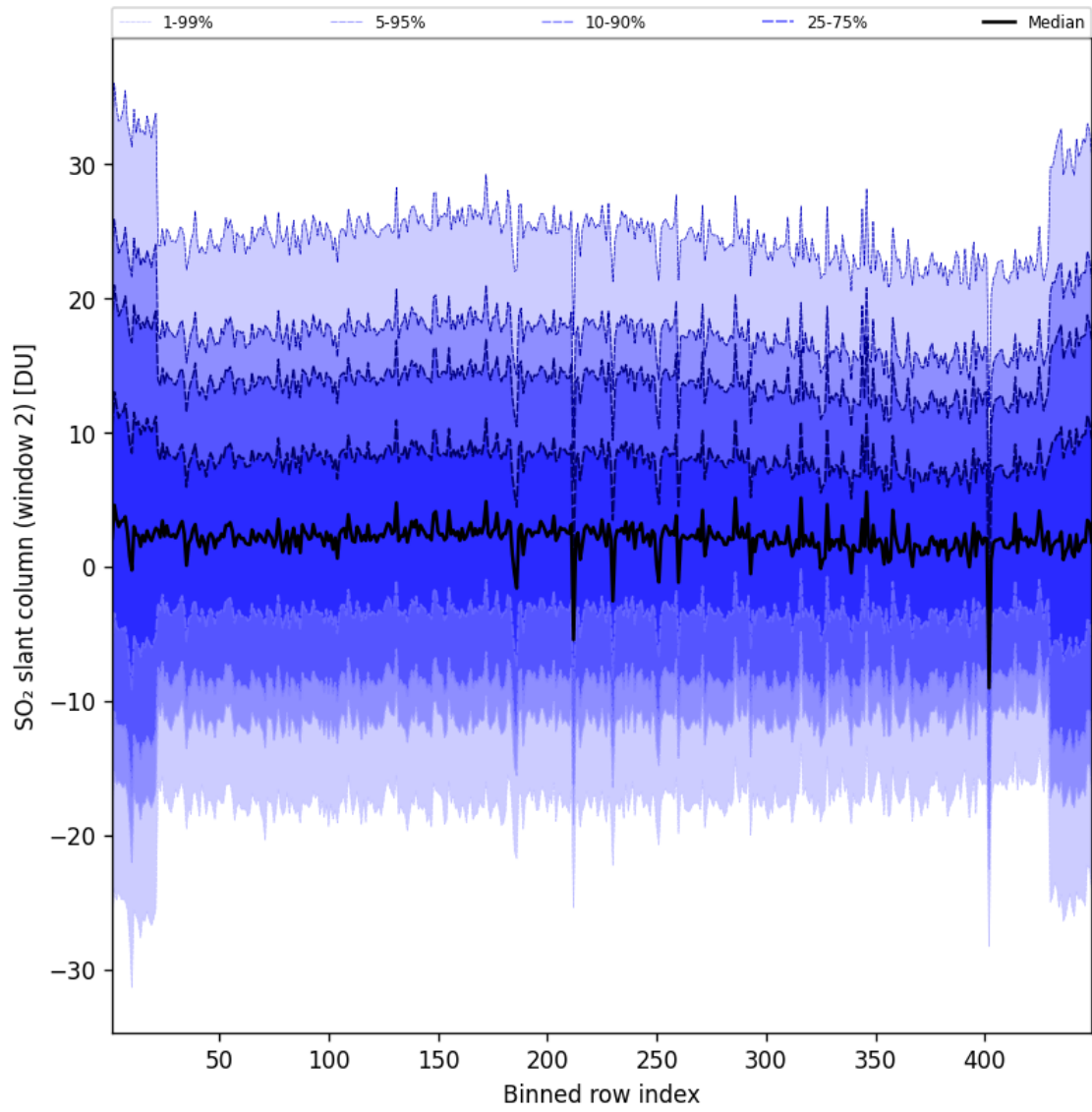


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-04-02 to 2025-04-03

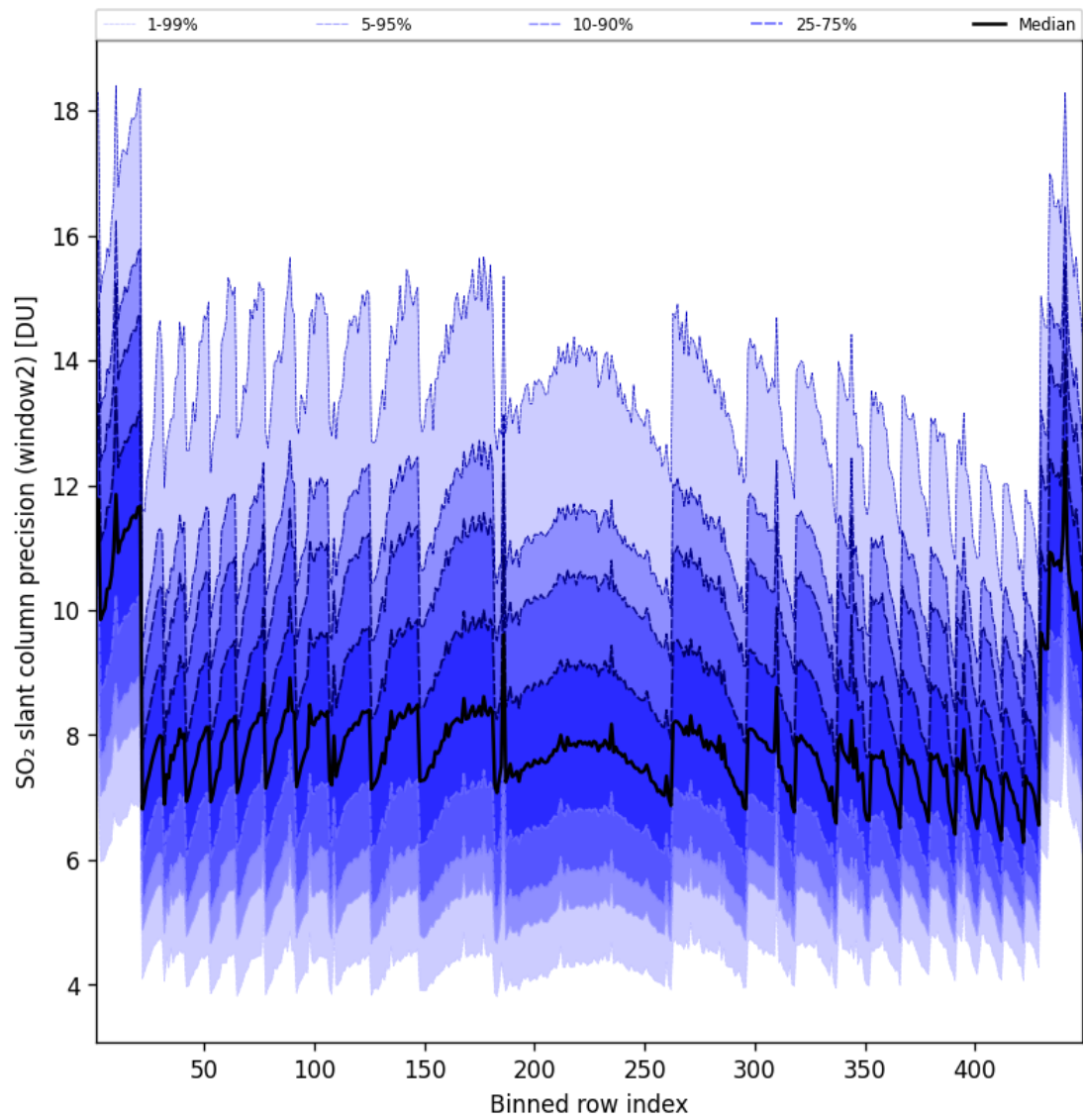


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-04-02 to 2025-04-03

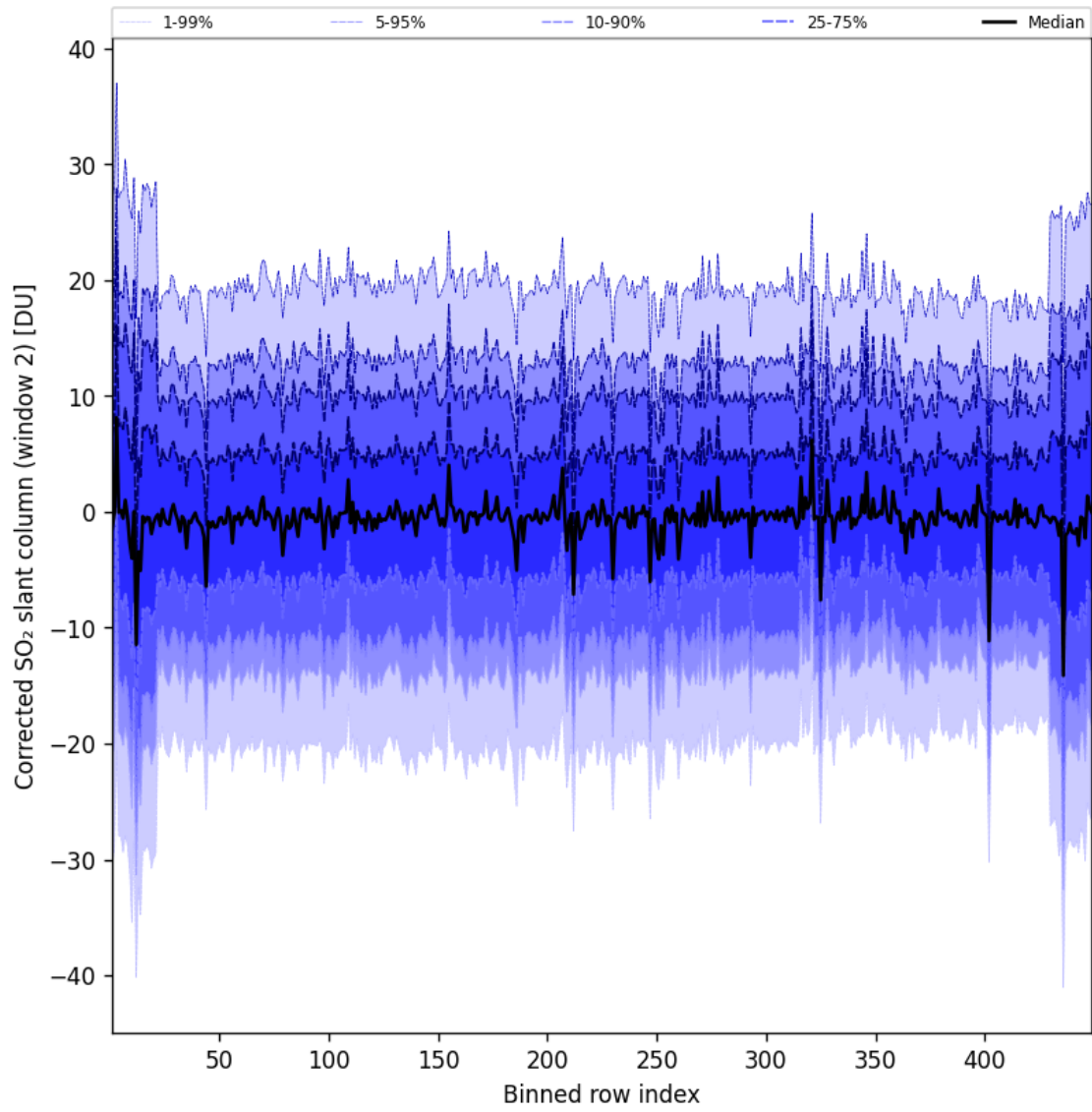


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-04-02 to 2025-04-03

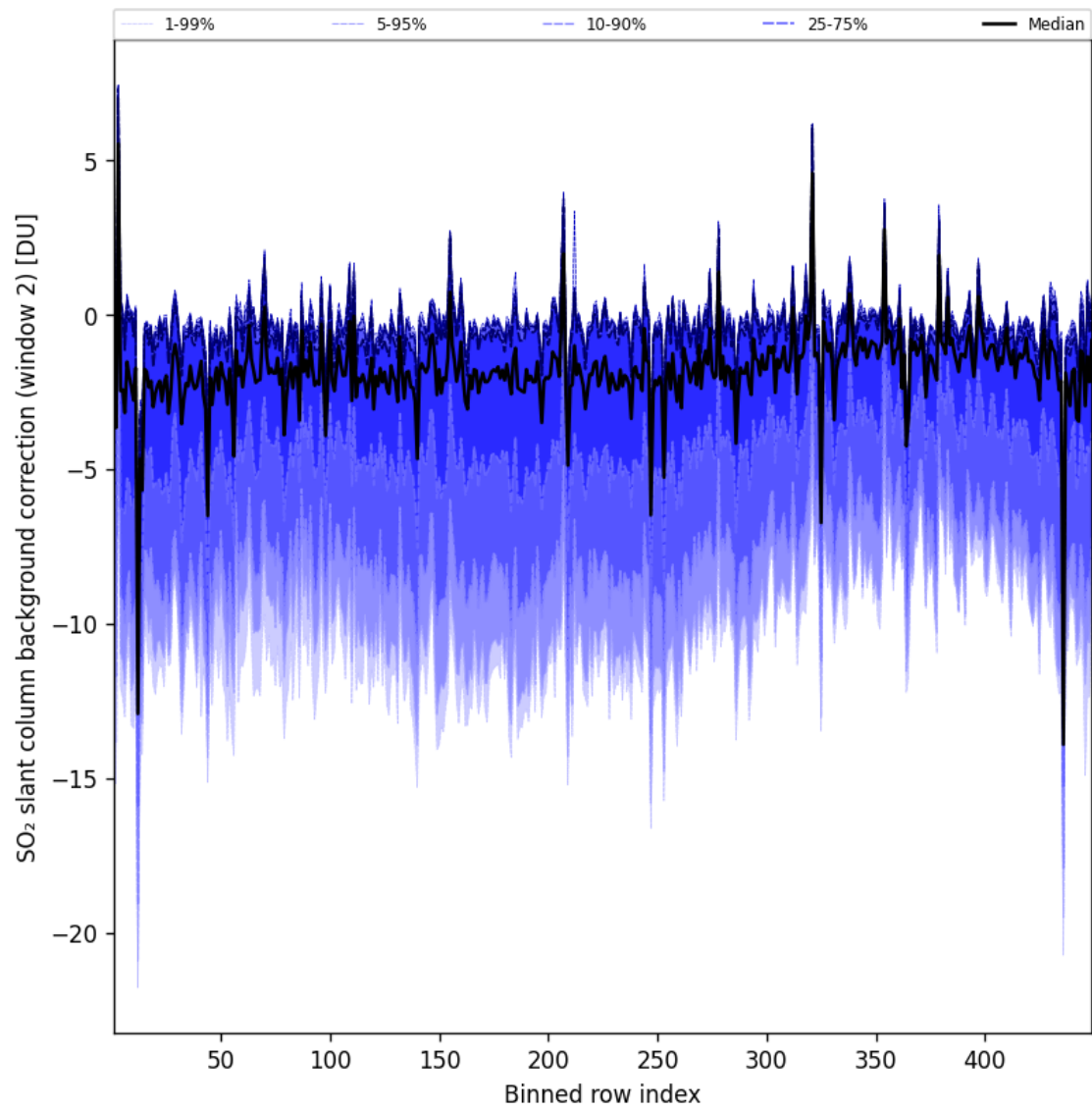


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-04-02 to 2025-04-03

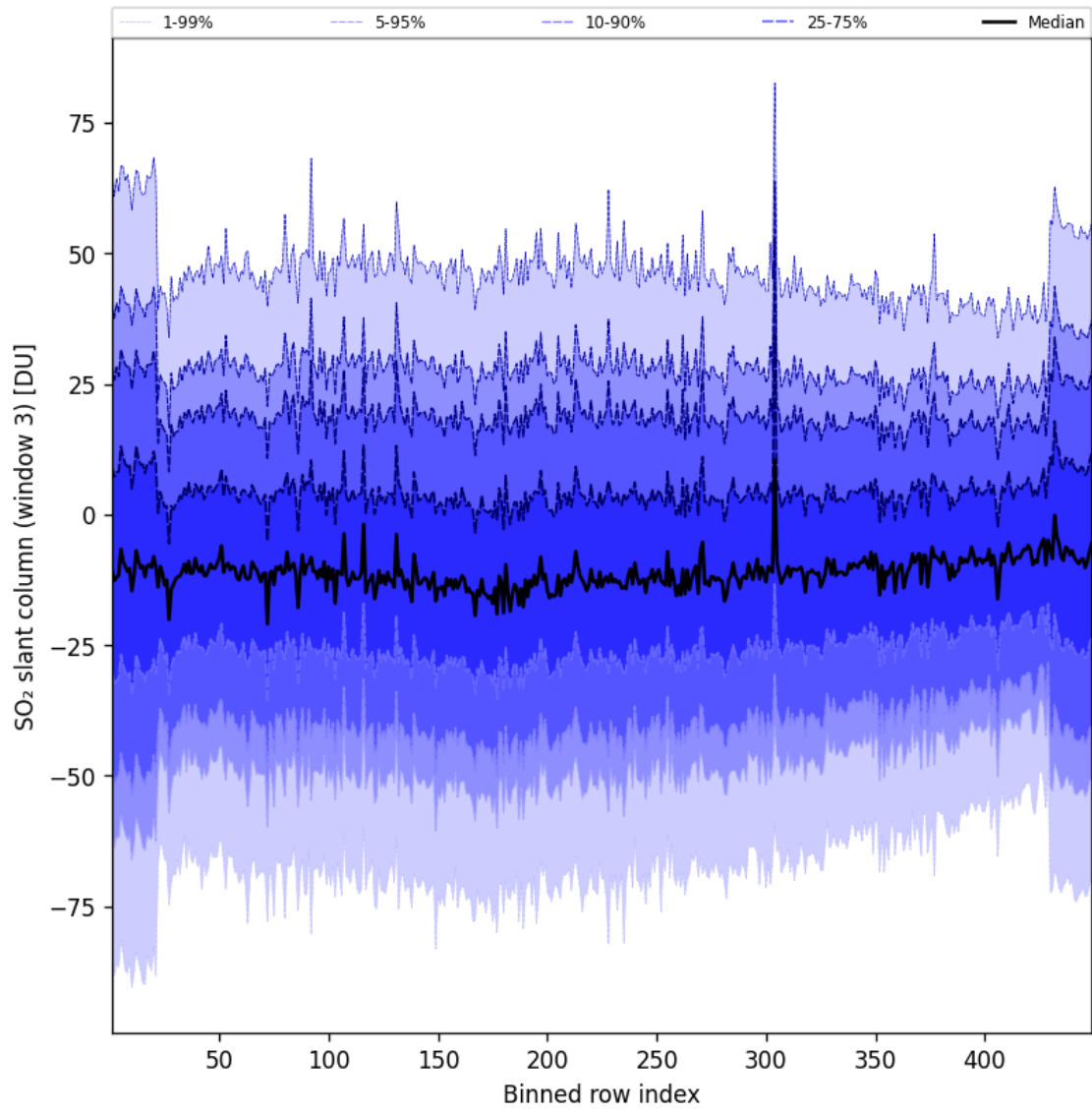


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-04-02 to 2025-04-03

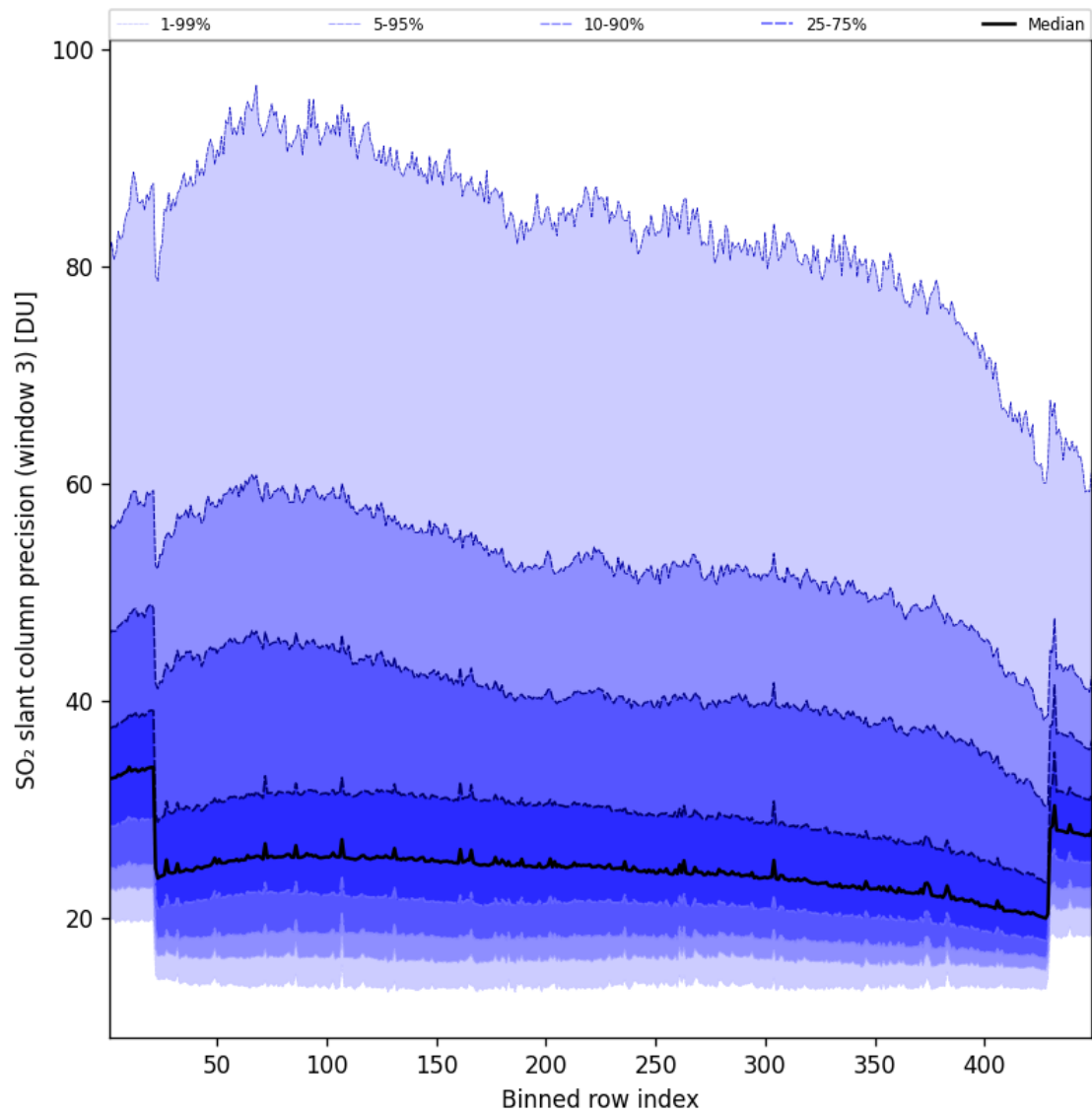


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-04-02 to 2025-04-03

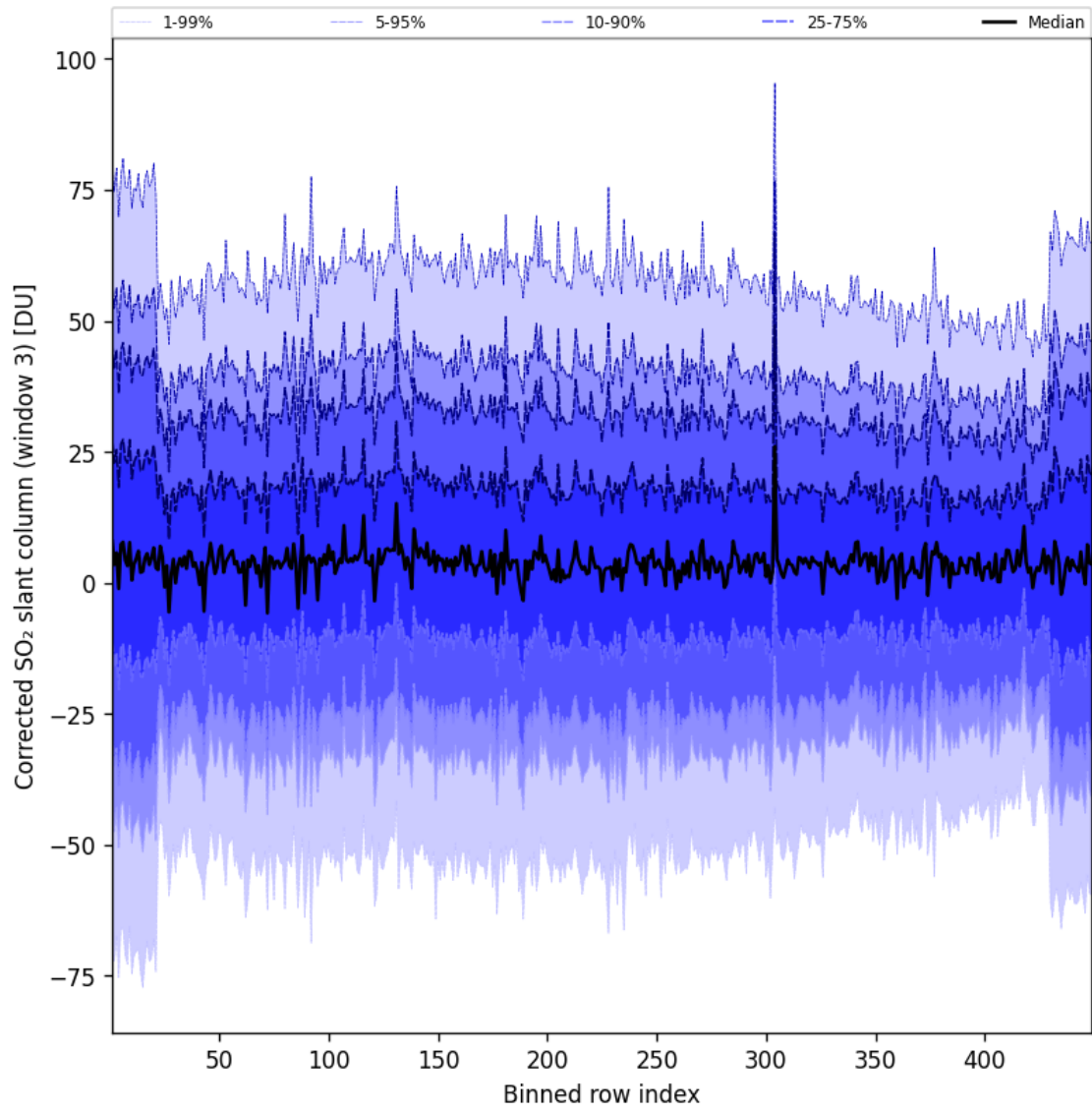


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-04-02 to 2025-04-03

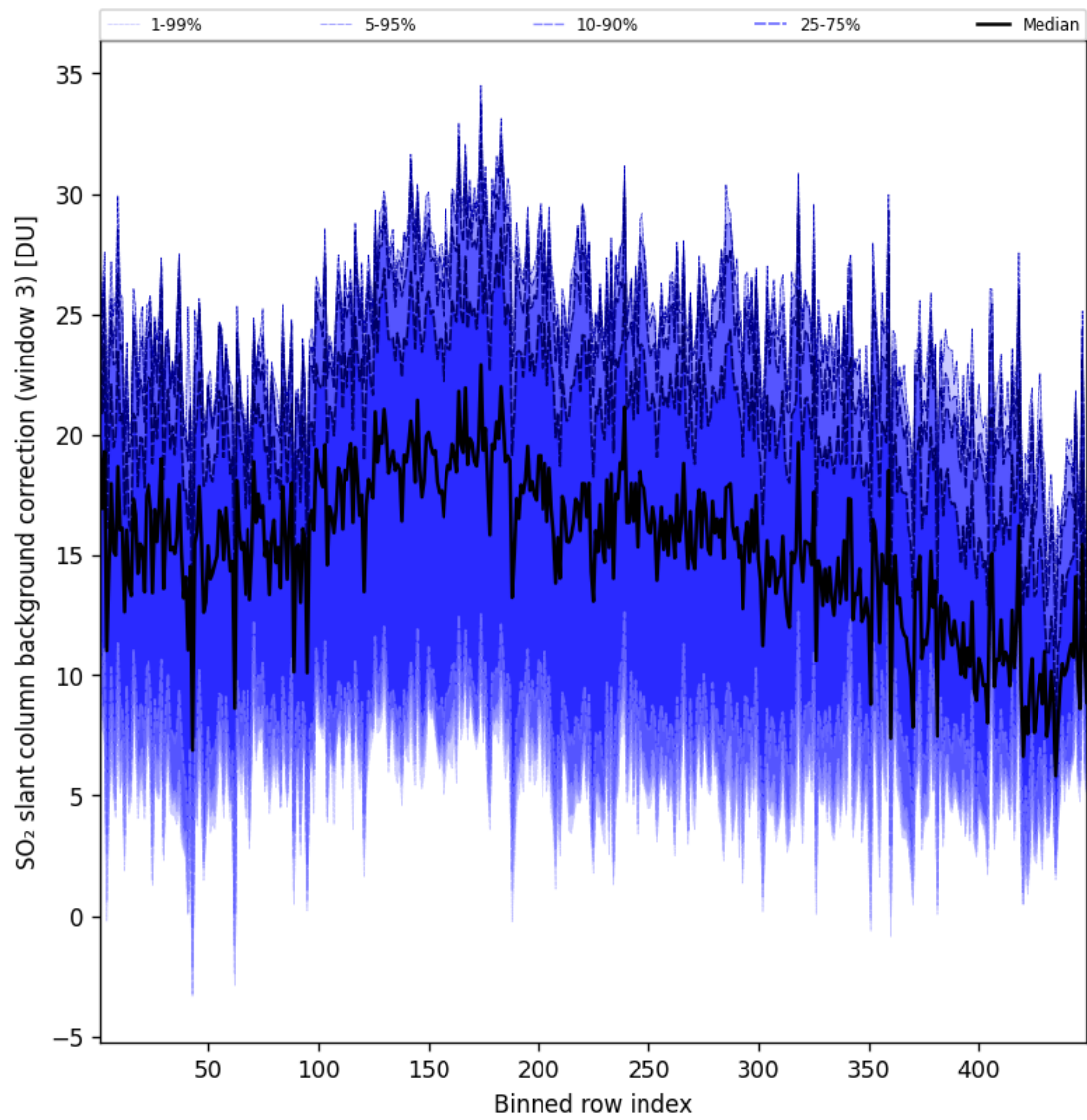


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-04-02 to 2025-04-03

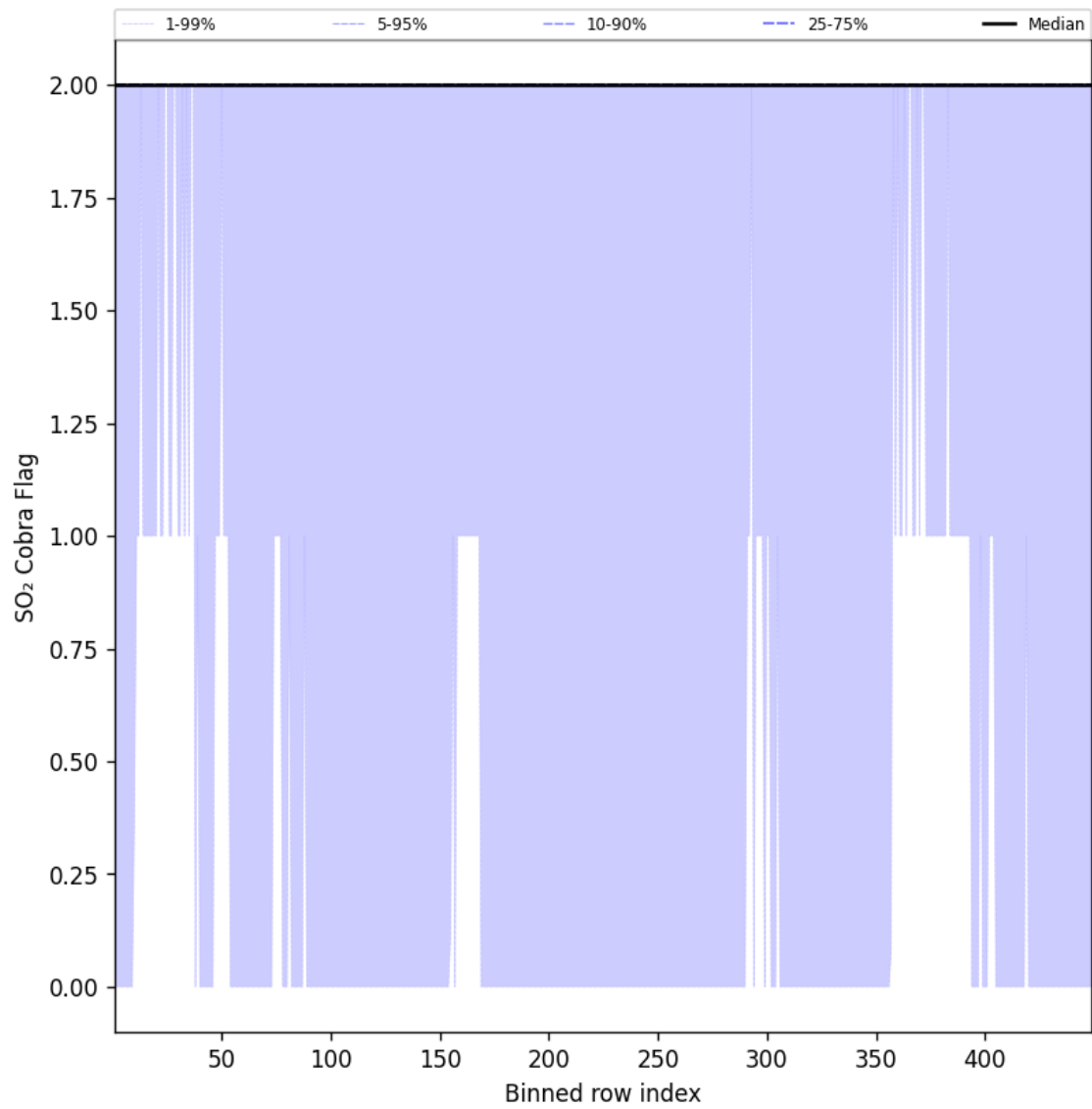


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-04-02 to 2025-04-03

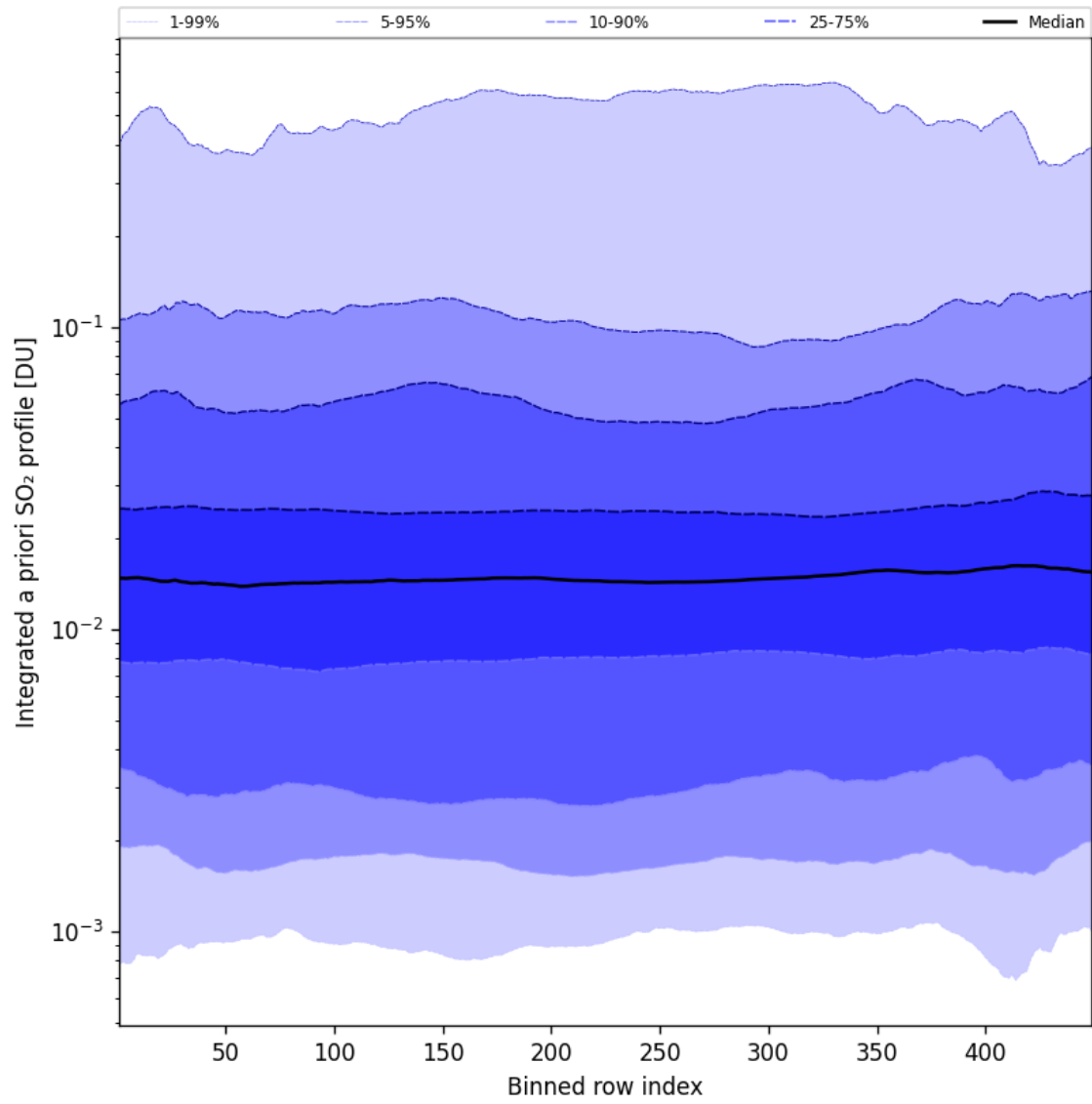


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-04-02 to 2025-04-03

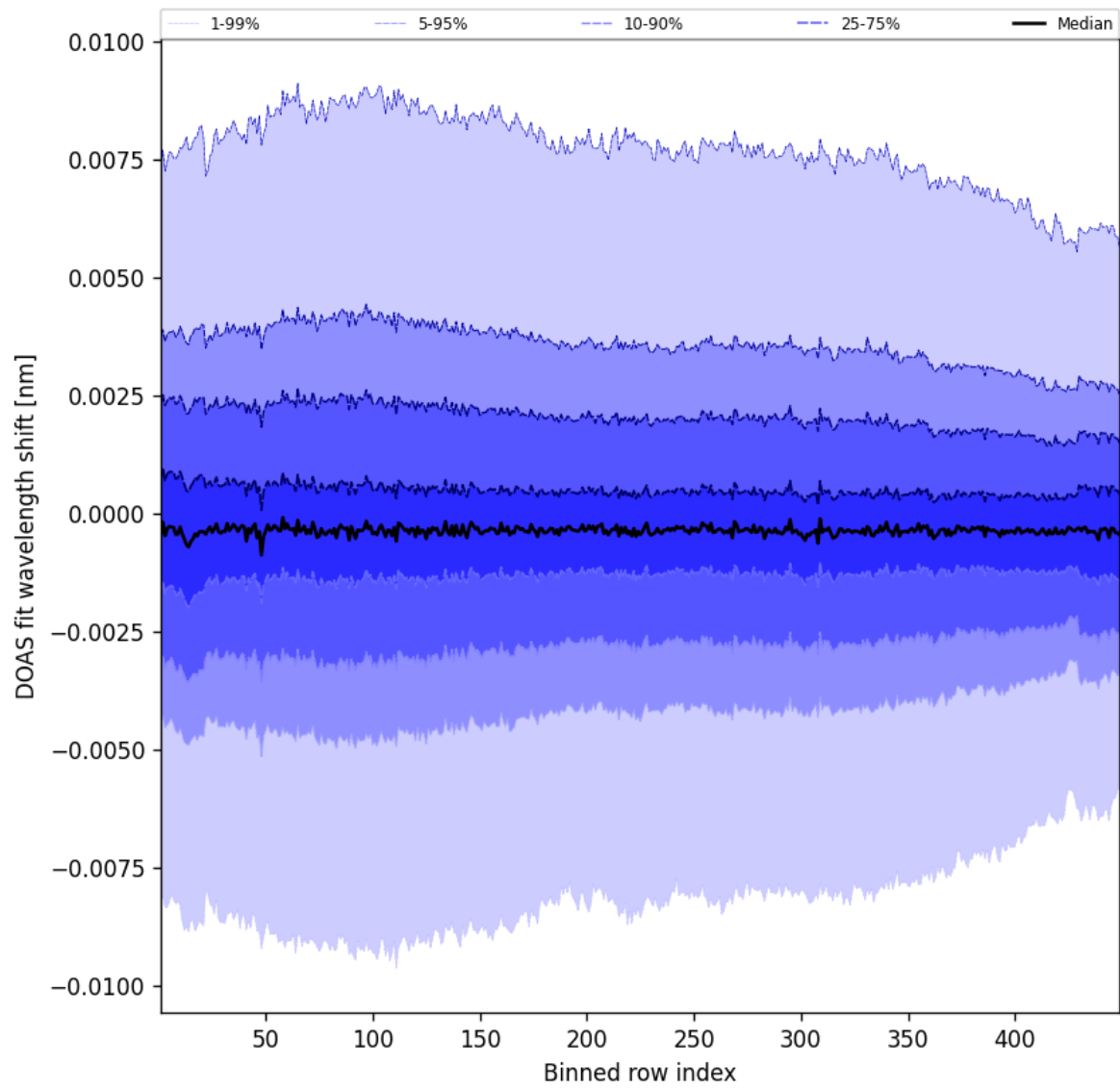


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-04-02 to 2025-04-03

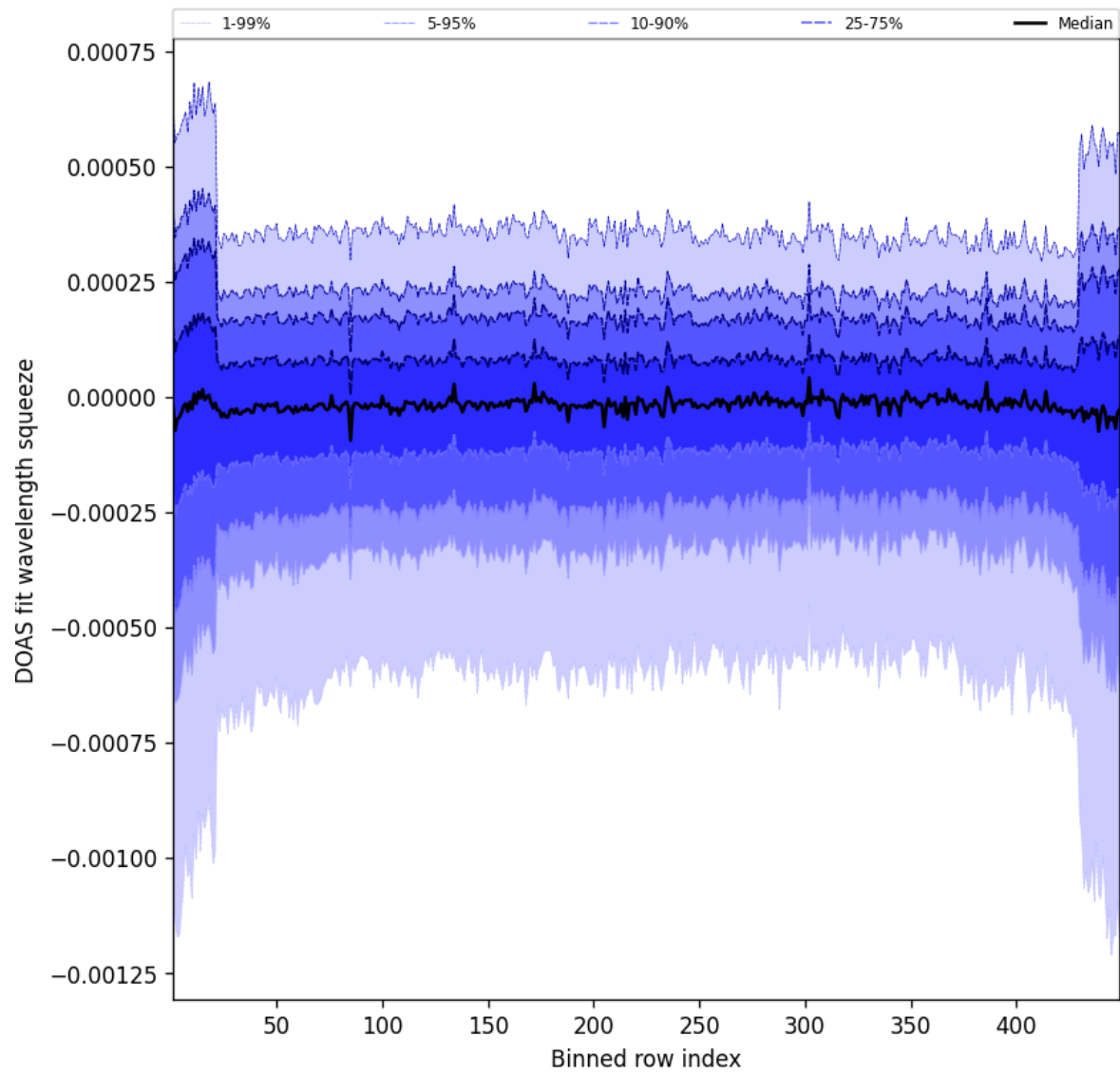


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-04-02 to 2025-04-03

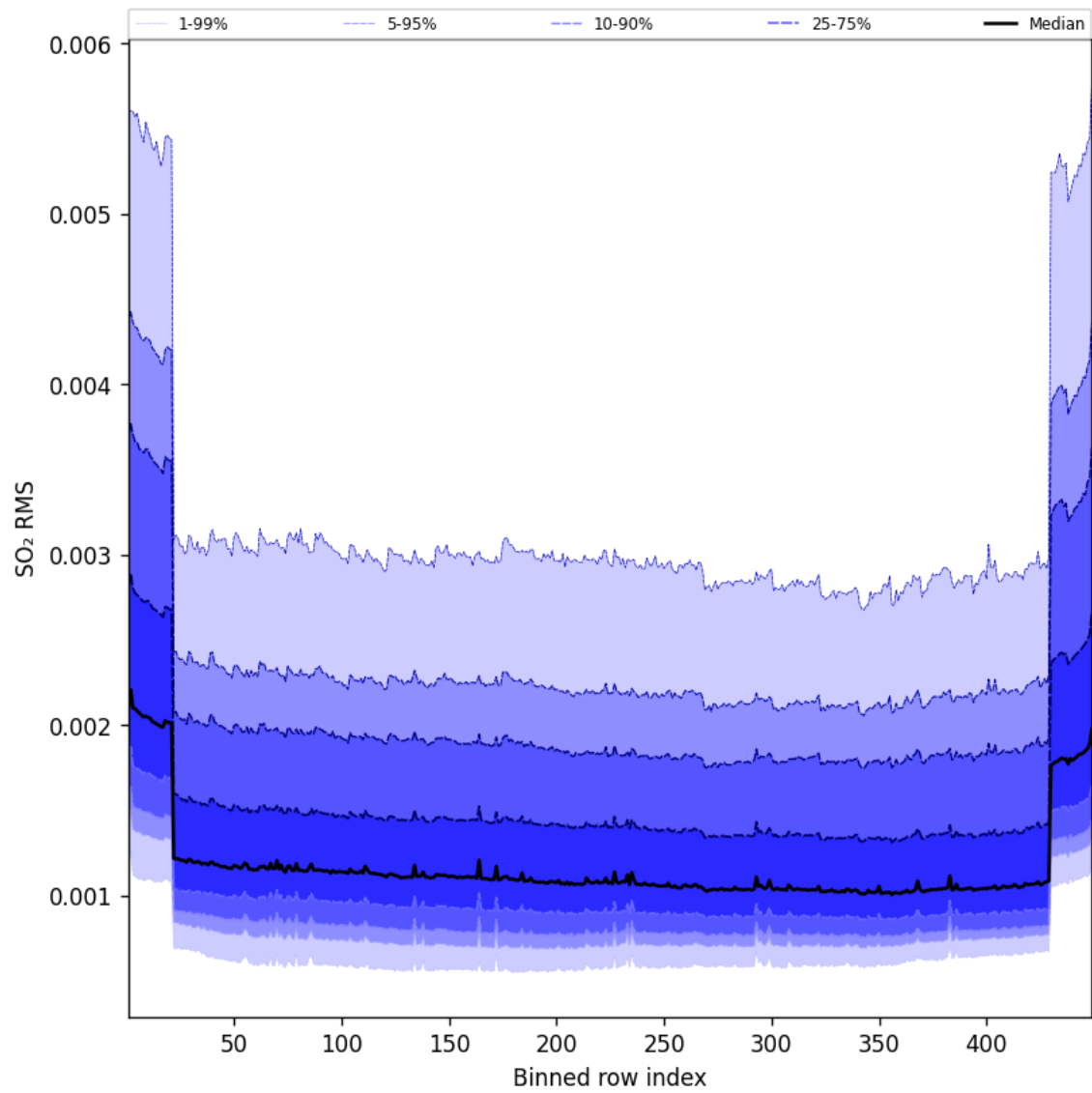


Figure 106: Along track statistics of “SO₂ RMS” for 2025-04-02 to 2025-04-03

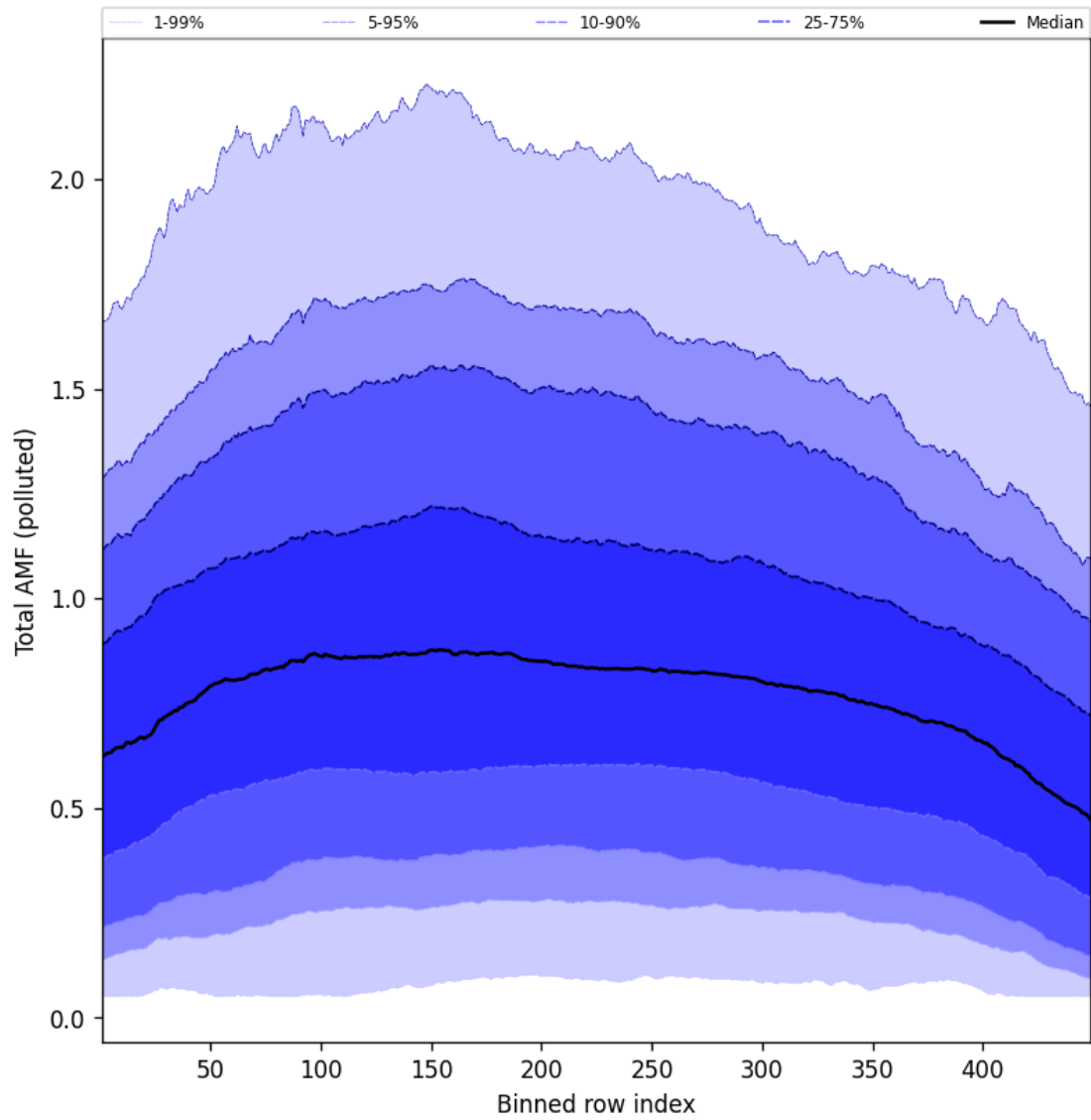


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-04-02 to 2025-04-03

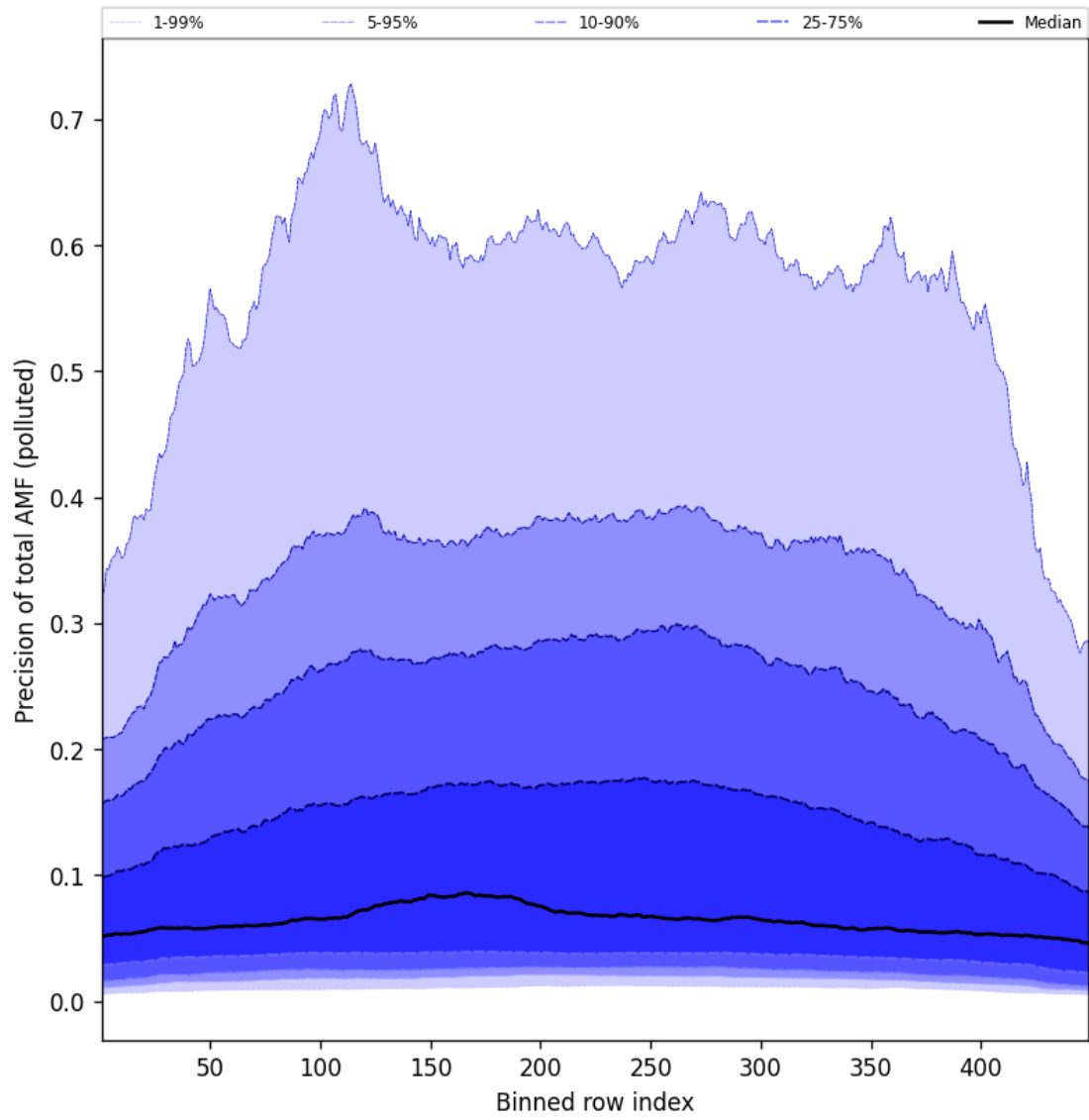


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-04-02 to 2025-04-03

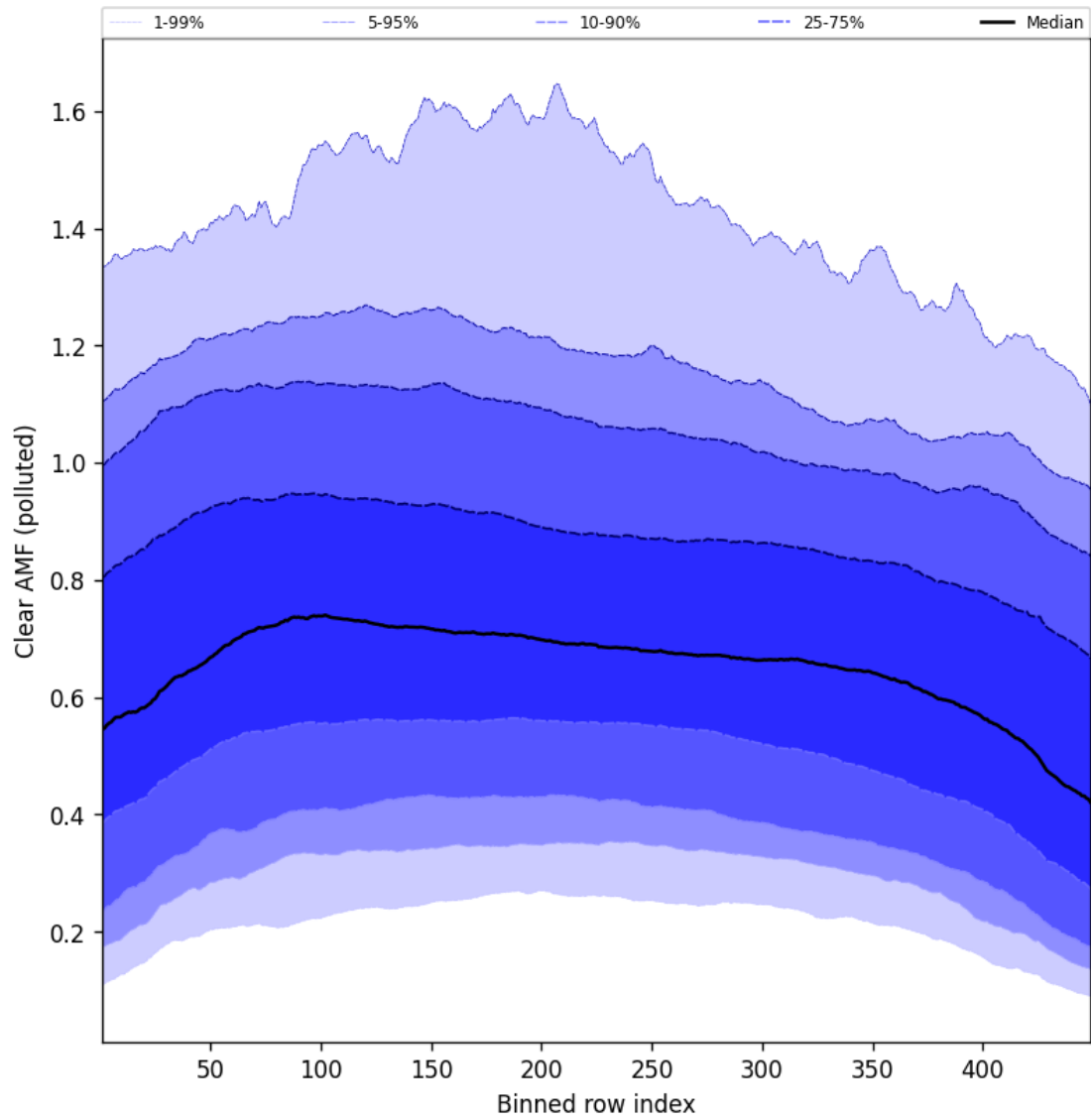


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-04-02 to 2025-04-03

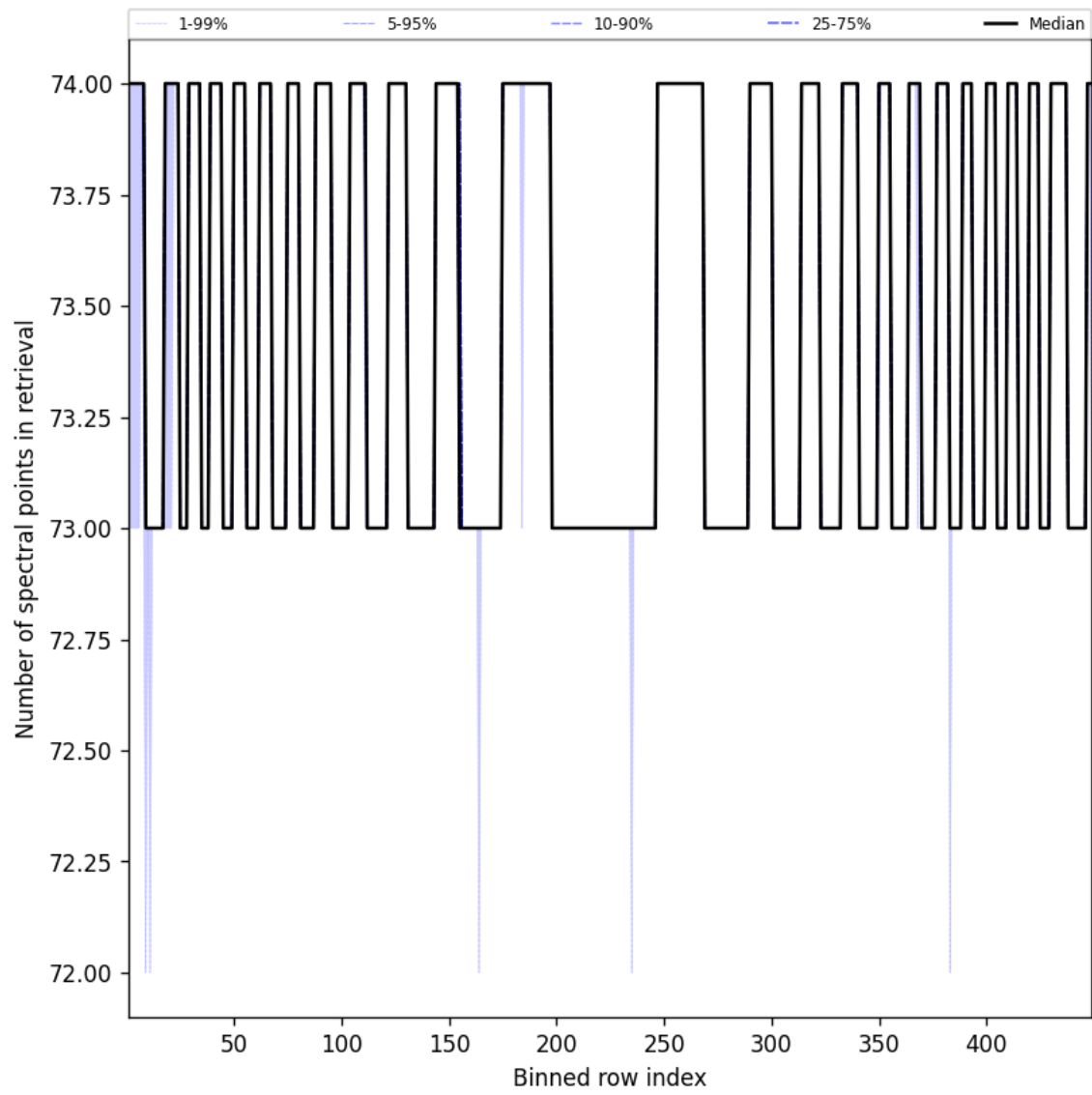


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-04-02 to 2025-04-03

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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