

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]	0.632 ± 0.412	17321813	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.295 \pm 158.489) \times 10^{-2}$	17321813	0.249	0.419	9.440×10^{-3}	-186	446
sulfurdioxide total vertical column precision [DU]	0.606 ± 1.147	17321813	0.197	0.347	0.299	3.697×10^{-2}	56.9
sulfurdioxide slant column density corrected [DU]	$(1.722 \pm 35.091) \times 10^{-2}$	17321813	0.235	0.344	8.562×10^{-3}	-26.7	81.8
sulfurdioxide slant column density cobra [DU]	$(1.716 \pm 34.712) \times 10^{-2}$	17321813	0.235	0.344	8.562×10^{-3}	-26.7	60.8
sulfurdioxide slant column density cobra precision [DU]	0.279 ± 0.131	17321813	0.188	0.129	0.238	7.837×10^{-2}	20.6
sulfurdioxide slant column density window1 [DU]	0.110 ± 0.664	17321813	0.125	0.713	0.121	-61.8	55.0
sulfurdioxide slant column density window1 precision [DU]	0.279 ± 0.131	17321813	0.188	0.129	0.238	7.837×10^{-2}	20.6
sulfurdioxide slant column density corrected win1 [DU]	$(-1.253 \pm 64.869) \times 10^{-2}$	17321813	-2.500×10^{-2}	0.687	-3.018×10^{-2}	-61.8	54.9
background so2 slant column offset window1 [DU]	-0.123 ± 0.174	17321813	-0.180	0.199	-0.170	-1.19	2.65
sulfurdioxide slant column density window2 [DU]	-1.13 ± 8.79	17321813	-1.75	11.1	-1.33	-1.206×10^3	1.086×10^3
sulfurdioxide slant column density window2 precision [DU]	7.93 ± 2.19	17321813	6.97	2.49	7.59	2.20	532
sulfurdioxide slant column density corrected win2 [DU]	-2.82 ± 8.55	17321813	-2.25	10.8	-2.75	-1.206×10^3	1.086×10^3
background so2 slant column offset window2 [DU]	-1.68 ± 2.82	17321813	0.250	3.06	-0.781	-20.7	8.00
sulfurdioxide slant column density window3 [DU]	4.18 ± 23.69	17321813	2.80	29.8	4.02	-484	464
sulfurdioxide slant column density window3 precision [DU]	29.2 ± 12.5	17321813	23.7	8.96	25.8	12.4	290
sulfurdioxide slant column density corrected win3 [DU]	11.6 ± 22.7	17321813	10.6	28.5	11.6	-475	463
background so2 slant column offset window3 [DU]	7.43 ± 7.01	17321813	3.92	10.8	7.49	-14.5	29.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17321813	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.707 \pm 10.492) \times 10^{-2}$	17321813	1.539×10^{-2}	1.879×10^{-2}	1.727×10^{-2}	1.901×10^{-4}	4.01
fitted radiance shift [nm]	$(-3.056 \pm 25.199) \times 10^{-4}$	17321813	-5.000×10^{-4}	1.764×10^{-3}	-3.168×10^{-4}	-5.190×10^{-2}	3.965×10^{-2}
fitted radiance squeeze [1]	$(-2.537 \pm 18.001) \times 10^{-5}$	17321813	-1.000×10^{-5}	2.041×10^{-4}	-1.946×10^{-5}	-1.620×10^{-2}	1.751×10^{-2}
fitted root mean square [1]	$(1.235 \pm 0.541) \times 10^{-3}$	17321813	9.250×10^{-4}	5.192×10^{-4}	1.074×10^{-3}	3.279×10^{-4}	6.125×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.885 ± 0.527	17321813	0.740	0.606	0.797	5.000×10^{-2}	3.09
sulfurdioxide total air mass factor polluted precision [1]	0.135 ± 0.144	17321813	3.500×10^{-2}	0.151	7.809×10^{-2}	2.500×10^{-3}	1.86
sulfurdioxide clear air mass factor polluted [1]	0.771 ± 0.492	17321813	0.580	0.414	0.675	2.357×10^{-2}	3.10
number of spectral points in retrieval [1]	73.4 ± 0.5	17321813	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.1000	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-3.23	-0.949	-0.529	-0.343	-0.197	0.223	0.382	0.592	1.08	3.89
sulfurdioxide total vertical column precision [DU]	8.769×10^{-2}	0.115	0.138	0.162	0.195	0.542	0.796	1.17	1.99	5.70
sulfurdioxide slant column density corrected [DU]	-0.831	-0.470	-0.338	-0.252	-0.162	0.182	0.277	0.371	0.521	0.985
sulfurdioxide slant column density cobra [DU]	-0.831	-0.470	-0.338	-0.252	-0.162	0.182	0.277	0.371	0.521	0.985
sulfurdioxide slant column density cobra precision [DU]	0.131	0.156	0.170	0.181	0.195	0.324	0.384	0.443	0.527	0.763
sulfurdioxide slant column density window1 [DU]	-1.69	-0.916	-0.626	-0.437	-0.241	0.471	0.654	0.829	1.10	1.86
sulfurdioxide slant column density window1 precision [DU]	0.131	0.156	0.170	0.181	0.195	0.324	0.384	0.443	0.527	0.763
sulfurdioxide slant column density corrected win1 [DU]	-1.64	-0.959	-0.711	-0.545	-0.369	0.318	0.508	0.695	0.991	1.85
background so2 slant column offset window1 [DU]	-0.394	-0.322	-0.290	-0.268	-0.240	-4.167×10^{-2}	4.083×10^{-2}	0.116	0.212	0.403
sulfurdioxide slant column density window2 [DU]	-21.5	-15.0	-11.8	-9.45	-6.78	4.28	7.15	9.77	13.4	21.3
sulfurdioxide slant column density window2 precision [DU]	4.27	5.11	5.61	6.02	6.50	8.99	9.85	10.7	11.9	14.5
sulfurdioxide slant column density corrected win2 [DU]	-23.9	-16.8	-13.4	-10.9	-8.18	2.62	5.28	7.66	10.9	17.6
background so2 slant column offset window2 [DU]	-10.6	-7.90	-5.69	-4.21	-2.83	0.231	0.488	0.695	1.01	2.60
sulfurdioxide slant column density window3 [DU]	-54.4	-34.4	-25.0	-18.2	-10.7	19.1	26.8	33.9	43.4	62.1
sulfurdioxide slant column density window3 precision [DU]	16.7	18.7	20.0	21.1	22.4	31.3	35.7	41.1	52.5	83.7
sulfurdioxide slant column density corrected win3 [DU]	-45.4	-25.5	-16.3	-9.74	-2.57	26.0	33.3	39.9	48.8	66.8
background so2 slant column offset window3 [DU]	-6.63	-3.88	-2.16	-0.401	2.08	12.9	15.0	16.7	18.6	21.5
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]	1.869×10^{-3}	4.016×10^{-3}	6.325×10^{-3}	8.299×10^{-3}	1.085×10^{-2}	2.963×10^{-2}	4.094×10^{-2}	5.894×10^{-2}	0.113	0.405
fitted radiance shift [nm]	-7.866×10^{-3}	-3.973×10^{-3}	-2.627×10^{-3}	-1.874×10^{-3}	-1.237×10^{-3}	5.274×10^{-4}	1.212×10^{-3}	2.070×10^{-3}	3.557×10^{-3}	7.664×10^{-3}
fitted radiance squeeze [1]	-5.183×10^{-4}	-3.182×10^{-4}	-2.364×10^{-4}	-1.813×10^{-4}	-1.242×10^{-4}	7.992×10^{-5}	1.306×10^{-4}	1.780×10^{-4}	2.473×10^{-4}	4.211×10^{-4}
fitted root mean square [1]	5.777×10^{-4}	7.026×10^{-4}	7.757×10^{-4}	8.303×10^{-4}	8.957×10^{-4}	1.415×10^{-3}	1.666×10^{-3}	1.909×10^{-3}	2.266×10^{-3}	3.222×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.537×10^{-2}	0.192	0.301	0.395	0.518	1.12	1.36	1.60	1.97	2.56
sulfurdioxide total air mass factor polluted precision [1]	8.119×10^{-3}	1.569×10^{-2}	2.236×10^{-2}	2.878×10^{-2}	3.758×10^{-2}	0.189	0.255	0.321	0.423	0.651
sulfurdioxide clear air mass factor polluted [1]	0.139	0.247	0.330	0.403	0.488	0.902	1.01	1.14	1.86	2.80
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]	0.680 ± 0.401	7092080	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(8.089 \pm 234.917) \times 10^{-2}$	7092080	0.597	1.378×10^{-2}	-186	446	-0.277	0.320
sulfurdioxide total vertical column precision [DU]	0.948 ± 1.638	7092080	0.656	0.421	4.684×10^{-2}	45.6	0.257	0.912
sulfurdioxide slant column density corrected [DU]	$(2.283 \pm 41.338) \times 10^{-2}$	7092080	0.392	1.034×10^{-2}	-14.1	56.6	-0.183	0.209
sulfurdioxide slant column density cobra [DU]	$(2.274 \pm 40.906) \times 10^{-2}$	7092080	0.392	1.034×10^{-2}	-14.1	13.3	-0.183	0.209
sulfurdioxide slant column density cobra precision [DU]	0.324 ± 0.158	7092080	0.184	0.277	8.794×10^{-2}	11.5	0.213	0.397
sulfurdioxide slant column density window1 [DU]	0.161 ± 0.770	7092080	0.791	0.173	-12.4	22.6	-0.226	0.564
sulfurdioxide slant column density window1 precision [DU]	0.324 ± 0.158	7092080	0.184	0.277	8.794×10^{-2}	11.5	0.213	0.397
sulfurdioxide slant column density corrected win1 [DU]	$(8.435 \pm 764.075) \times 10^{-3}$	7092080	0.778	-1.872×10^{-2}	-11.8	23.1	-0.399	0.379
background so2 slant column offset window1 [DU]	-0.153 ± 0.177	7092080	0.178	-0.186	-0.581	2.65	-0.264	-8.603×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.383 ± 9.544	7092080	12.2	-0.730	-97.9	307	-6.65	5.51
sulfurdioxide slant column density window2 precision [DU]	8.52 ± 2.24	7092080	2.73	8.19	2.20	182	6.99	9.72
sulfurdioxide slant column density corrected win2 [DU]	-2.99 ± 9.15	7092080	11.7	-2.92	-99.0	300	-8.78	2.88
background so2 slant column offset window2 [DU]	-2.60 ± 3.54	7092080	5.08	-1.17	-20.7	7.96	-4.98	0.100
sulfurdioxide slant column density window3 [DU]	1.25 ± 24.71	7092080	31.5	1.61	-174	199	-14.3	17.2
sulfurdioxide slant column density window3 precision [DU]	30.8 ± 12.7	7092080	9.09	27.4	12.4	237	24.0	33.1
sulfurdioxide slant column density corrected win3 [DU]	11.5 ± 24.1	7092080	30.5	11.7	-164	208	-3.62	26.9
background so2 slant column offset window3 [DU]	10.2 ± 6.0	7092080	10.1	9.87	-10.4	27.8	5.06	15.2
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	7092080	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.089 \pm 15.688) \times 10^{-2}$	7092080	3.590×10^{-2}	2.204×10^{-2}	1.901×10^{-4}	4.01	1.230×10^{-2}	4.820×10^{-2}
fitted radiance shift [nm]	$(-1.421 \pm 25.650) \times 10^{-4}$	7092080	1.644×10^{-3}	-1.492×10^{-4}	-3.822×10^{-2}	3.816×10^{-2}	-9.820×10^{-4}	6.617×10^{-4}
fitted radiance squeeze [1]	$(9.729 \pm 199.496) \times 10^{-6}$	7092080	2.158×10^{-4}	1.356×10^{-5}	-8.356×10^{-3}	1.200×10^{-2}	-9.473×10^{-5}	1.211×10^{-4}
fitted root mean square [1]	$(1.410 \pm 0.663) \times 10^{-3}$	7092080	7.465×10^{-4}	1.193×10^{-3}	3.279×10^{-4}	2.018×10^{-2}	9.641×10^{-4}	1.710×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.689 ± 0.387	7092080	0.518	0.664	5.000×10^{-2}	2.80	0.388	0.906
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.145	7092080	0.102	4.896×10^{-2}	2.500×10^{-3}	1.86	2.788×10^{-2}	0.130
sulfurdioxide clear air mass factor polluted [1]	0.589 ± 0.283	7092080	0.452	0.578	2.357×10^{-2}	1.94	0.353	0.805
number of spectral points in retrieval [1]	73.5 ± 0.5	7092080	1.000	73.0	71.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.598 ± 0.417	10229733	0.830	1.000	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(1.664 \pm 65.245) \times 10^{-2}$	10229733	0.341	7.583×10^{-3}	-52.8	73.6	-0.161	0.180
sulfurdioxide total vertical column precision [DU]	0.368 ± 0.480	10229733	0.237	0.244	3.697×10^{-2}	56.9	0.169	0.406
sulfurdioxide slant column density corrected [DU]	$(1.332 \pm 30.001) \times 10^{-2}$	10229733	0.317	7.543×10^{-3}	-26.7	81.8	-0.150	0.167
sulfurdioxide slant column density cobra [DU]	$(1.329 \pm 29.662) \times 10^{-2}$	10229733	0.317	7.543×10^{-3}	-26.7	60.8	-0.150	0.167
sulfurdioxide slant column density cobra precision [DU]	0.248 ± 0.096	10229733	9.351×10^{-2}	0.221	7.837×10^{-2}	20.6	0.187	0.281
sulfurdioxide slant column density window1 [DU]	$(7.503 \pm 57.677) \times 10^{-2}$	10229733	0.664	9.003×10^{-2}	-61.8	55.0	-0.250	0.414
sulfurdioxide slant column density window1 precision [DU]	0.248 ± 0.096	10229733	9.351×10^{-2}	0.221	7.837×10^{-2}	20.6	0.187	0.281
sulfurdioxide slant column density corrected win1 [DU]	$(-2.707 \pm 55.432) \times 10^{-2}$	10229733	0.635	-3.683×10^{-2}	-61.8	54.9	-0.352	0.283
background so2 slant column offset window1 [DU]	-0.102 ± 0.168	10229733	0.223	-0.157	-1.19	2.35	-0.224	-5.190×10^{-4}
sulfurdioxide slant column density window2 [DU]	-1.66 ± 8.18	10229733	10.4	-1.68	-1.206×10^3	1.086×10^3	-6.86	3.52
sulfurdioxide slant column density window2 precision [DU]	7.52 ± 2.06	10229733	2.18	7.23	2.29	532	6.24	8.43
sulfurdioxide slant column density corrected win2 [DU]	-2.70 ± 8.11	10229733	10.2	-2.65	-1.206×10^3	1.086×10^3	-7.79	2.45
background so2 slant column offset window2 [DU]	-1.05 ± 1.96	10229733	2.45	-0.558	-16.4	8.00	-2.15	0.297
sulfurdioxide slant column density window3 [DU]	6.22 ± 22.73	10229733	28.7	5.54	-484	464	-8.42	20.3
sulfurdioxide slant column density window3 precision [DU]	28.1 ± 12.2	10229733	8.20	24.6	12.4	290	21.6	29.8
sulfurdioxide slant column density corrected win3 [DU]	11.7 ± 21.7	10229733	27.3	11.5	-475	463	-1.93	25.3
background so2 slant column offset window3 [DU]	5.49 ± 6.99	10229733	11.8	5.45	-14.5	29.6	-0.562	11.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	10229733	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.056 \pm 3.018) \times 10^{-2}$	10229733	1.348×10^{-2}	1.568×10^{-2}	5.441×10^{-4}	2.04	9.911×10^{-3}	2.339×10^{-2}
fitted radiance shift [nm]	$(-4.189 \pm 24.818) \times 10^{-4}$	10229733	1.795×10^{-3}	-4.485×10^{-4}	-5.190×10^{-2}	3.965×10^{-2}	-1.377×10^{-3}	4.186×10^{-4}
fitted radiance squeeze [1]	$(-4.970 \pm 16.071) \times 10^{-5}$	10229733	1.935×10^{-4}	-3.986×10^{-5}	-1.620×10^{-2}	1.751×10^{-2}	-1.410×10^{-4}	5.250×10^{-5}
fitted root mean square [1]	$(1.114 \pm 0.395) \times 10^{-3}$	10229733	4.047×10^{-4}	1.012×10^{-3}	3.285×10^{-4}	6.125×10^{-2}	8.632×10^{-4}	1.268×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.02 ± 0.57	10229733	0.685	0.905	5.000×10^{-2}	3.09	0.616	1.30
sulfurdioxide total air mass factor polluted precision [1]	0.155 ± 0.139	10229733	0.176	0.109	5.777×10^{-3}	1.38	4.687×10^{-2}	0.223
sulfurdioxide clear air mass factor polluted [1]	0.897 ± 0.561	10229733	0.418	0.737	0.149	3.10	0.559	0.977
number of spectral points in retrieval [1]	73.4 ± 0.5	10229733	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]	0.665 ± 0.405	12466378	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(2.693 \pm 135.222) \times 10^{-2}$	12466378	0.406	8.375×10^{-3}	-186	446	-0.193	0.213
sulfurdioxide total vertical column precision [DU]	0.532 ± 0.989	12466378	0.291	0.288	4.135×10^{-2}	45.6	0.197	0.488
sulfurdioxide slant column density corrected [DU]	$(1.267 \pm 31.440) \times 10^{-2}$	12466378	0.327	7.279×10^{-3}	-19.4	81.8	-0.155	0.172
sulfurdioxide slant column density cobra [DU]	$(1.263 \pm 31.160) \times 10^{-2}$	12466378	0.327	7.279×10^{-3}	-19.4	24.3	-0.155	0.172
sulfurdioxide slant column density cobra precision [DU]	0.263 ± 0.118	12466378	0.109	0.225	7.837×10^{-2}	19.8	0.190	0.299
sulfurdioxide slant column density window1 [DU]	0.112 ± 0.610	12466378	0.673	0.121	-61.8	40.2	-0.220	0.454
sulfurdioxide slant column density window1 precision [DU]	0.263 ± 0.118	12466378	0.109	0.225	7.837×10^{-2}	19.8	0.190	0.299
sulfurdioxide slant column density corrected win1 [DU]	$(-2.601 \pm 59.689) \times 10^{-2}$	12466378	0.654	-3.858×10^{-2}	-61.8	40.2	-0.362	0.291
background so2 slant column offset window1 [DU]	-0.138 ± 0.153	12466378	0.180	-0.173	-1.19	2.65	-0.241	-6.113×10^{-2}
sulfurdioxide slant column density window2 [DU]	-1.56 ± 8.44	12466378	10.7	-1.70	-1.062×10^3	679	-6.99	3.69
sulfurdioxide slant column density window2 precision [DU]	7.73 ± 2.06	12466378	2.35	7.42	2.20	500	6.38	8.72
sulfurdioxide slant column density corrected win2 [DU]	-2.82 ± 8.31	12466378	10.6	-2.75	-1.062×10^3	679	-8.06	2.50
background so2 slant column offset window2 [DU]	-1.25 ± 2.42	12466378	2.41	-0.568	-20.7	8.00	-2.14	0.275
sulfurdioxide slant column density window3 [DU]	7.17 ± 23.20	12466378	29.4	6.78	-484	464	-7.61	21.8
sulfurdioxide slant column density window3 precision [DU]	28.6 ± 11.9	12466378	8.61	25.2	12.4	208	22.0	30.7
sulfurdioxide slant column density corrected win3 [DU]	13.7 ± 22.1	12466378	28.2	13.4	-475	463	-0.463	27.7
background so2 slant column offset window3 [DU]	6.53 ± 6.52	12466378	9.78	6.61	-14.5	27.8	1.66	11.4
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.16	12466378	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.488 \pm 3.640) \times 10^{-2}$	12466378	1.505×10^{-2}	1.679×10^{-2}	2.074×10^{-4}	1.97	1.127×10^{-2}	2.631×10^{-2}
fitted radiance shift [nm]	$(-2.836 \pm 24.098) \times 10^{-4}$	12466378	1.771×10^{-3}	-2.677×10^{-4}	-5.190×10^{-2}	3.965×10^{-2}	-1.201×10^{-3}	5.700×10^{-4}
fitted radiance squeeze [1]	$(-2.786 \pm 16.809) \times 10^{-5}$	12466378	1.919×10^{-4}	-2.070×10^{-5}	-1.620×10^{-2}	1.465×10^{-2}	-1.192×10^{-4}	7.273×10^{-5}
fitted root mean square [1]	$(1.163 \pm 0.490) \times 10^{-3}$	12466378	4.226×10^{-4}	1.022×10^{-3}	3.279×10^{-4}	6.125×10^{-2}	8.720×10^{-4}	1.295×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.848 ± 0.425	12466378	0.531	0.805	5.000×10^{-2}	2.57	0.549	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.126 ± 0.122	12466378	0.138	7.659×10^{-2}	2.792×10^{-3}	1.57	3.996×10^{-2}	0.178
sulfurdioxide clear air mass factor polluted [1]	0.707 ± 0.276	12466378	0.364	0.677	4.762×10^{-2}	2.71	0.516	0.879
number of spectral points in retrieval [1]	73.4 ± 0.5	12466378	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]	0.554 ± 0.421	4046435	0.880	0.490	0.0	1.000	0.120	1.000
sulfurdioxide total vertical column [DU]	$(7.126 \pm 190.712) \times 10^{-2}$	4046435	0.431	1.076×10^{-2}	-113	174	-0.197	0.235
sulfurdioxide total vertical column precision [DU]	0.731 ± 1.376	4046435	0.537	0.313	3.697×10^{-2}	56.9	0.171	0.708
sulfurdioxide slant column density corrected [DU]	$(2.669 \pm 41.486) \times 10^{-2}$	4046435	0.391	1.149×10^{-2}	-19.1	60.8	-0.181	0.210
sulfurdioxide slant column density cobra [DU]	$(2.661 \pm 41.002) \times 10^{-2}$	4046435	0.391	1.149×10^{-2}	-19.1	60.8	-0.181	0.210
sulfurdioxide slant column density cobra precision [DU]	0.314 ± 0.142	4046435	0.151	0.274	8.074×10^{-2}	20.6	0.220	0.371
sulfurdioxide slant column density window1 [DU]	$(9.789 \pm 76.739) \times 10^{-2}$	4046435	0.827	0.113	-19.3	55.0	-0.314	0.512
sulfurdioxide slant column density window1 precision [DU]	0.314 ± 0.142	4046435	0.151	0.274	8.074×10^{-2}	20.6	0.220	0.371
sulfurdioxide slant column density corrected win1 [DU]	$(1.680 \pm 74.178) \times 10^{-2}$	4046435	0.776	-7.143×10^{-3}	-19.3	54.9	-0.389	0.387
background so2 slant column offset window1 [DU]	$(-8.109 \pm 21.607) \times 10^{-2}$	4046435	0.289	-0.158	-0.819	2.18	-0.238	5.074×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.205 ± 9.364	4046435	11.9	-0.368	-1.206×10^3	584	-6.22	5.64
sulfurdioxide slant column density window2 precision [DU]	8.38 ± 2.39	4046435	2.67	8.00	2.30	532	6.84	9.50
sulfurdioxide slant column density corrected win2 [DU]	-2.78 ± 9.02	4046435	11.3	-2.71	-1.206×10^3	585	-8.41	2.93
background so2 slant column offset window2 [DU]	-2.57 ± 3.22	4046435	4.70	-1.90	-20.7	8.00	-4.60	0.100
sulfurdioxide slant column density window3 [DU]	-3.46 ± 23.05	4046435	28.8	-3.12	-299	220	-17.7	11.1
sulfurdioxide slant column density window3 precision [DU]	30.7 ± 13.9	4046435	9.19	27.0	13.1	290	23.3	32.4
sulfurdioxide slant column density corrected win3 [DU]	6.04 ± 23.21	4046435	28.7	6.71	-303	215	-7.95	20.8
background so2 slant column offset window3 [DU]	9.50 ± 7.66	4046435	12.6	11.1	-14.5	29.6	3.27	15.9
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.30	4046435	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.274 \pm 17.689) \times 10^{-2}$	4046435	3.781×10^{-2}	1.874×10^{-2}	1.922×10^{-4}	4.01	8.025×10^{-3}	4.584×10^{-2}
fitted radiance shift [nm]	$(-4.004 \pm 27.892) \times 10^{-4}$	4046435	1.657×10^{-3}	-4.902×10^{-4}	-3.804×10^{-2}	3.717×10^{-2}	-1.322×10^{-3}	3.352×10^{-4}
fitted radiance squeeze [1]	$(-2.678 \pm 20.378) \times 10^{-5}$	4046435	2.410×10^{-4}	-2.201×10^{-5}	-9.012×10^{-3}	1.751×10^{-2}	-1.466×10^{-4}	9.443×10^{-5}
fitted root mean square [1]	$(1.391 \pm 0.586) \times 10^{-3}$	4046435	6.270×10^{-4}	1.244×10^{-3}	3.459×10^{-4}	5.246×10^{-2}	1.005×10^{-3}	1.632×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.04 ± 0.75	4046435	1.05	0.801	5.000×10^{-2}	3.09	0.441	1.49
sulfurdioxide total air mass factor polluted precision [1]	0.164 ± 0.189	4046435	0.199	9.418×10^{-2}	2.500×10^{-3}	1.86	3.146×10^{-2}	0.231
sulfurdioxide clear air mass factor polluted [1]	1.01 ± 0.83	4046435	0.835	0.706	2.357×10^{-2}	3.10	0.395	1.23
number of spectral points in retrieval [1]	73.4 ± 0.5	4046435	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

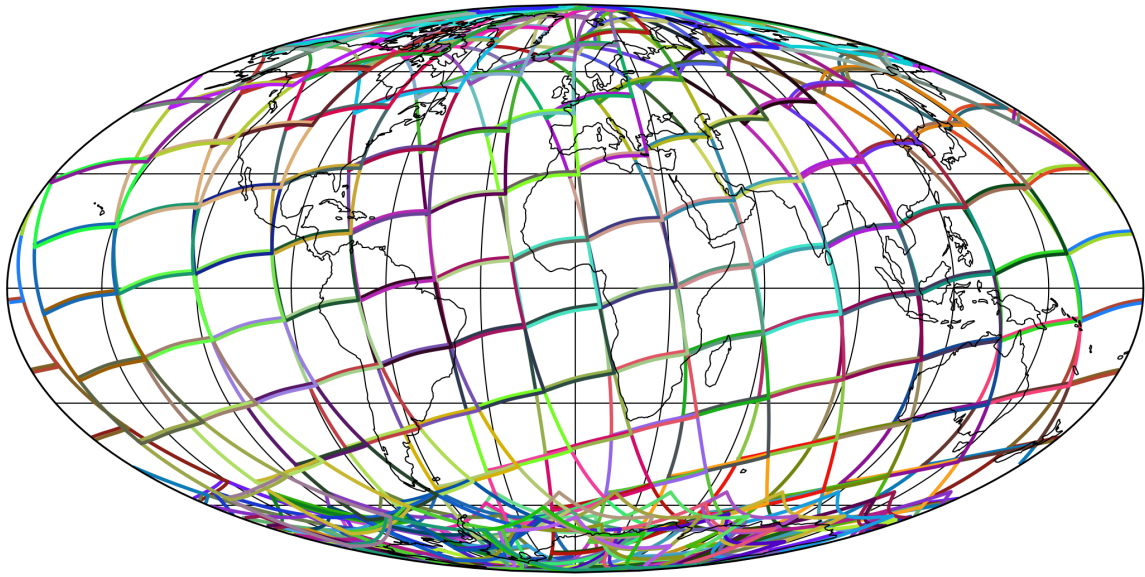


Figure 1: Outline of the granules.

4 Input data monitoring

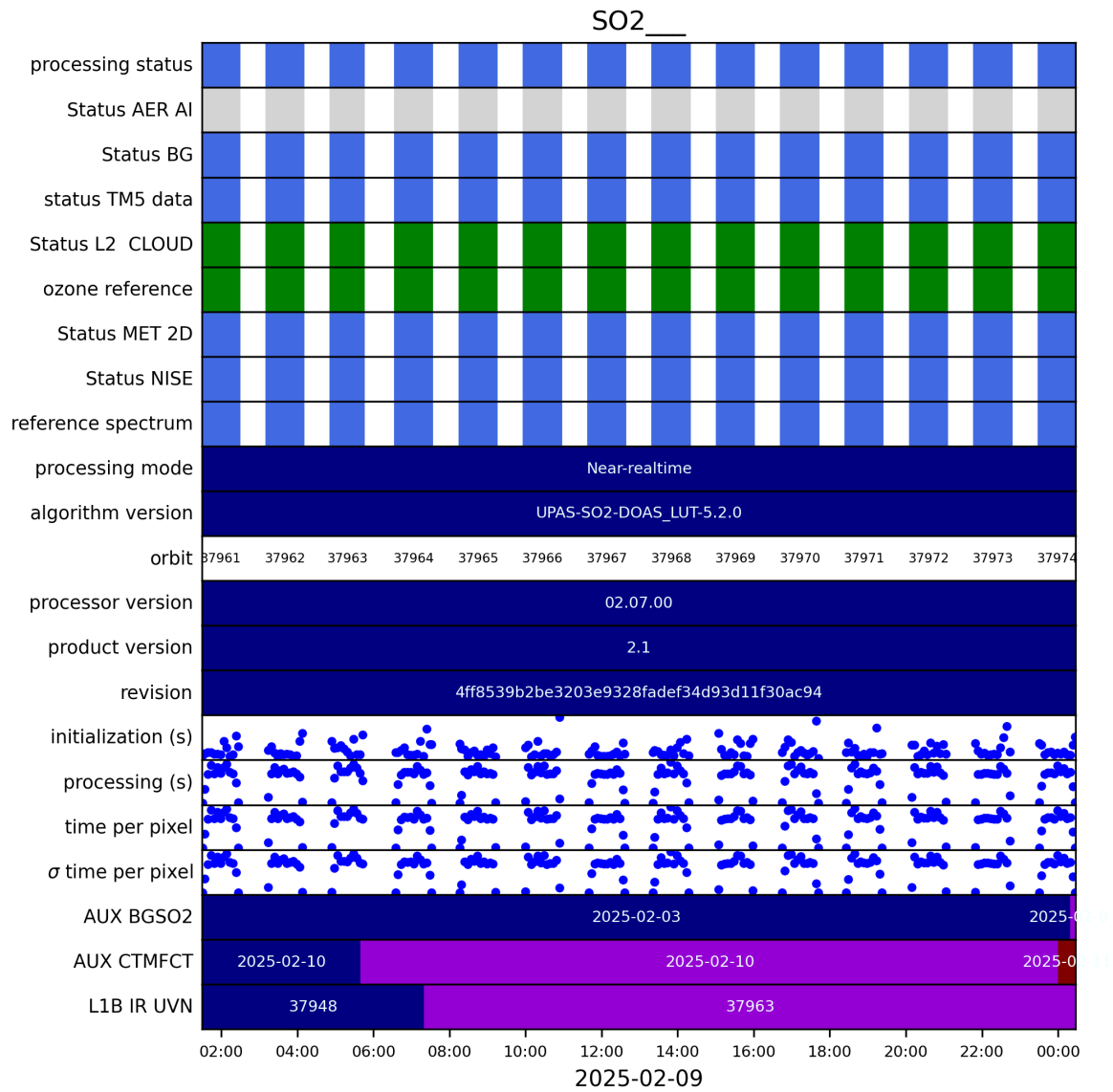


Figure 2: Input data per granule

5 Warnings and errors

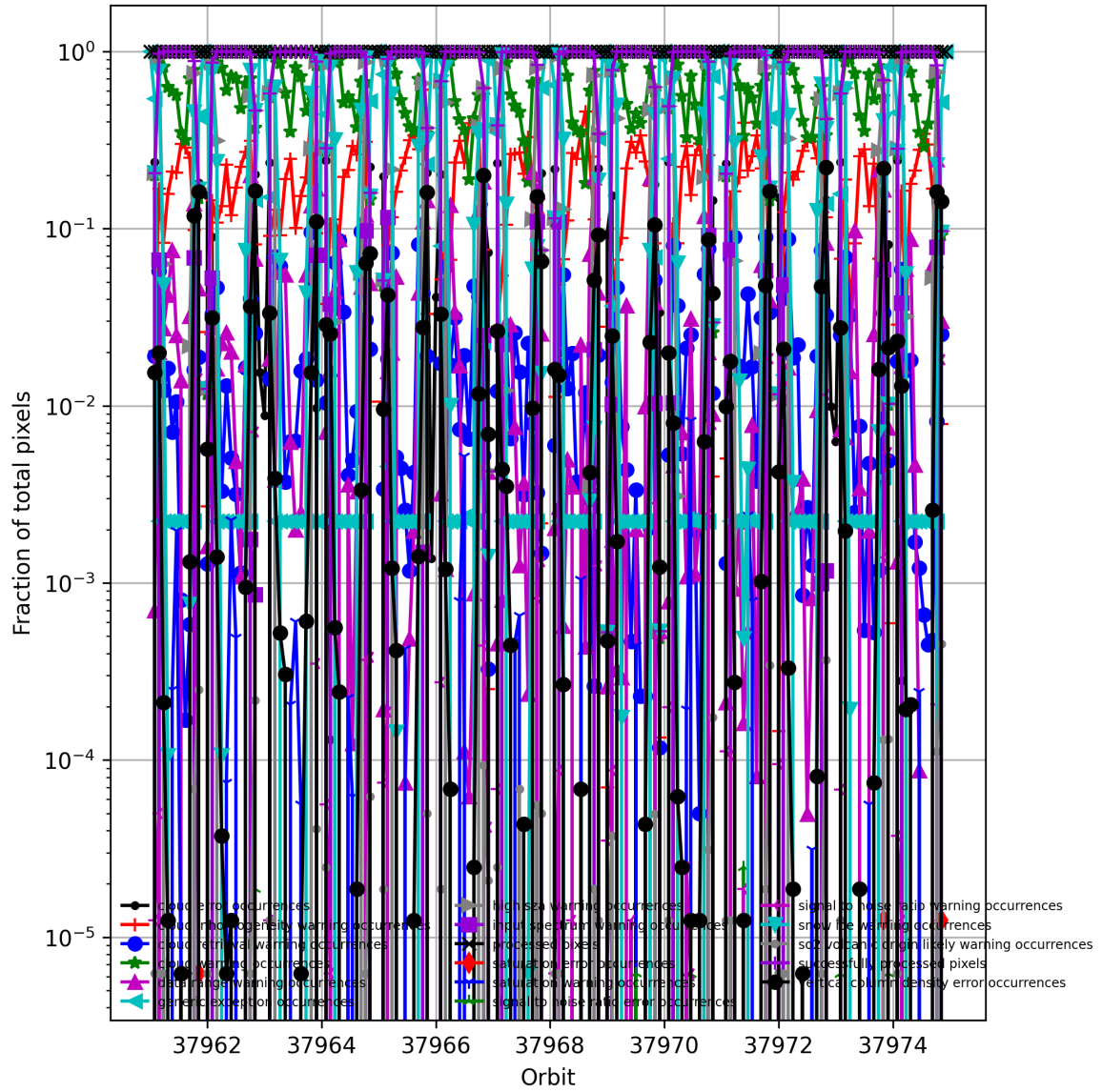


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

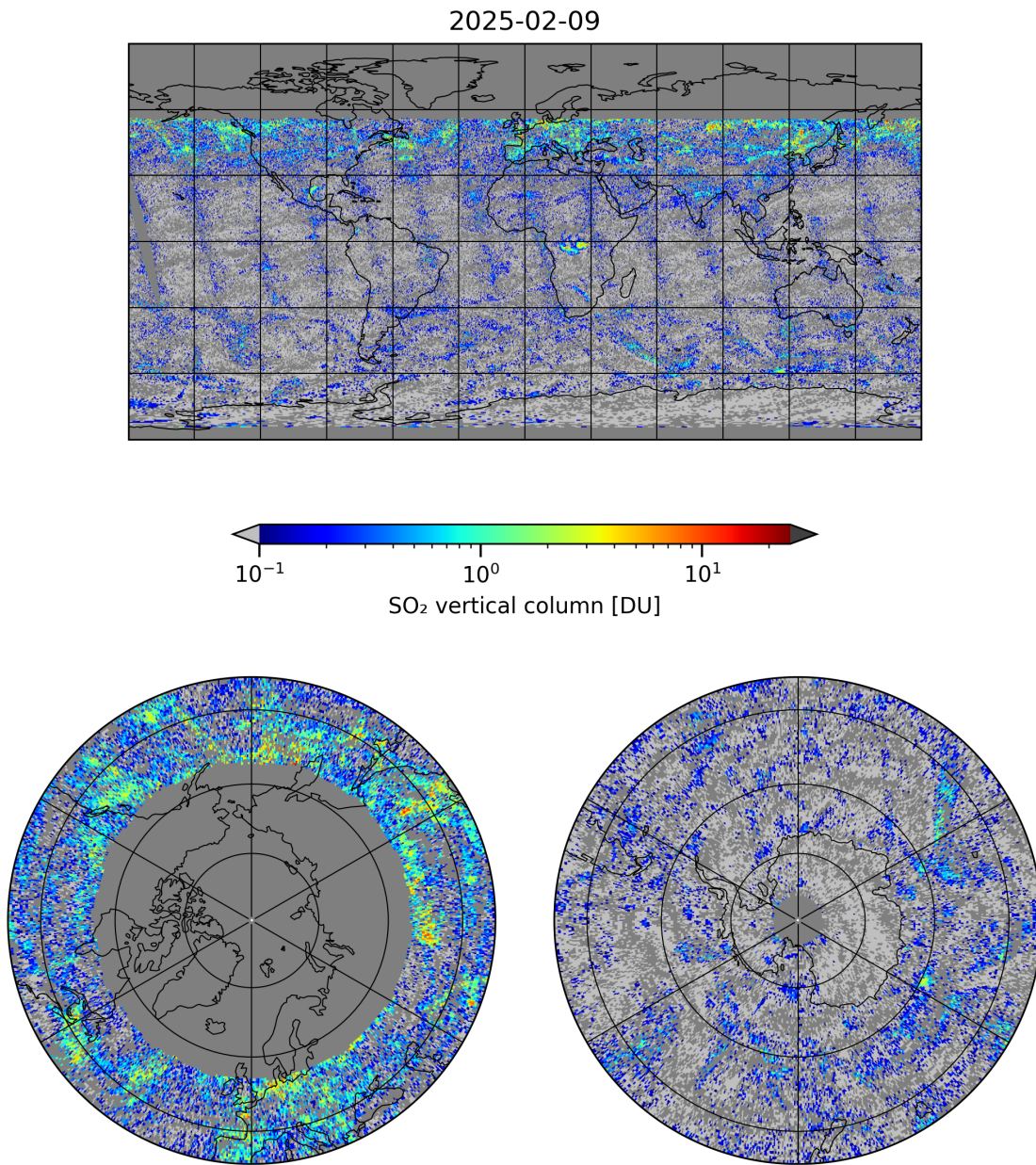


Figure 4: Map of “SO₂ vertical column” for 2025-02-09 to 2025-02-10

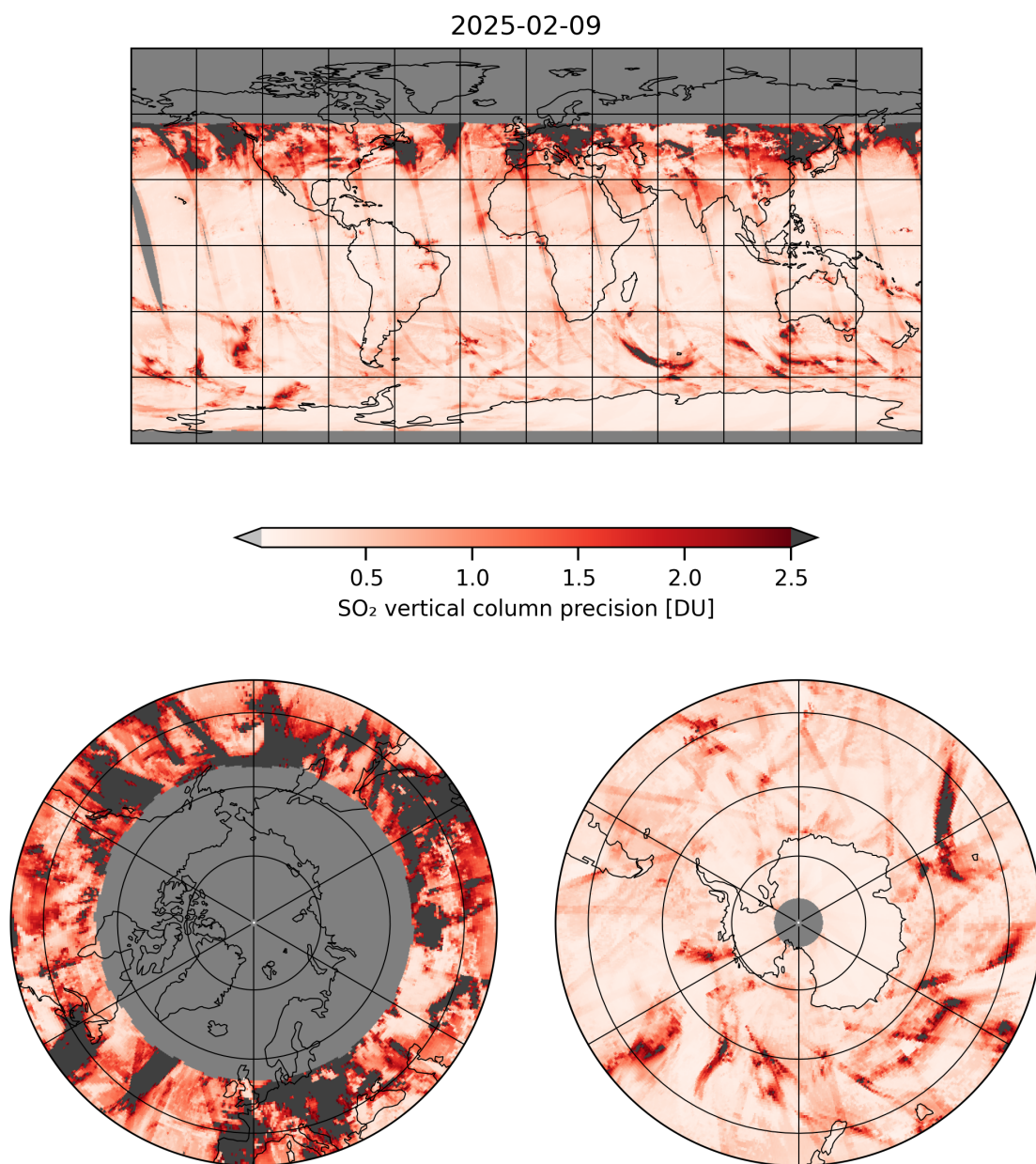


Figure 5: Map of “SO₂ vertical column precision” for 2025-02-09 to 2025-02-10

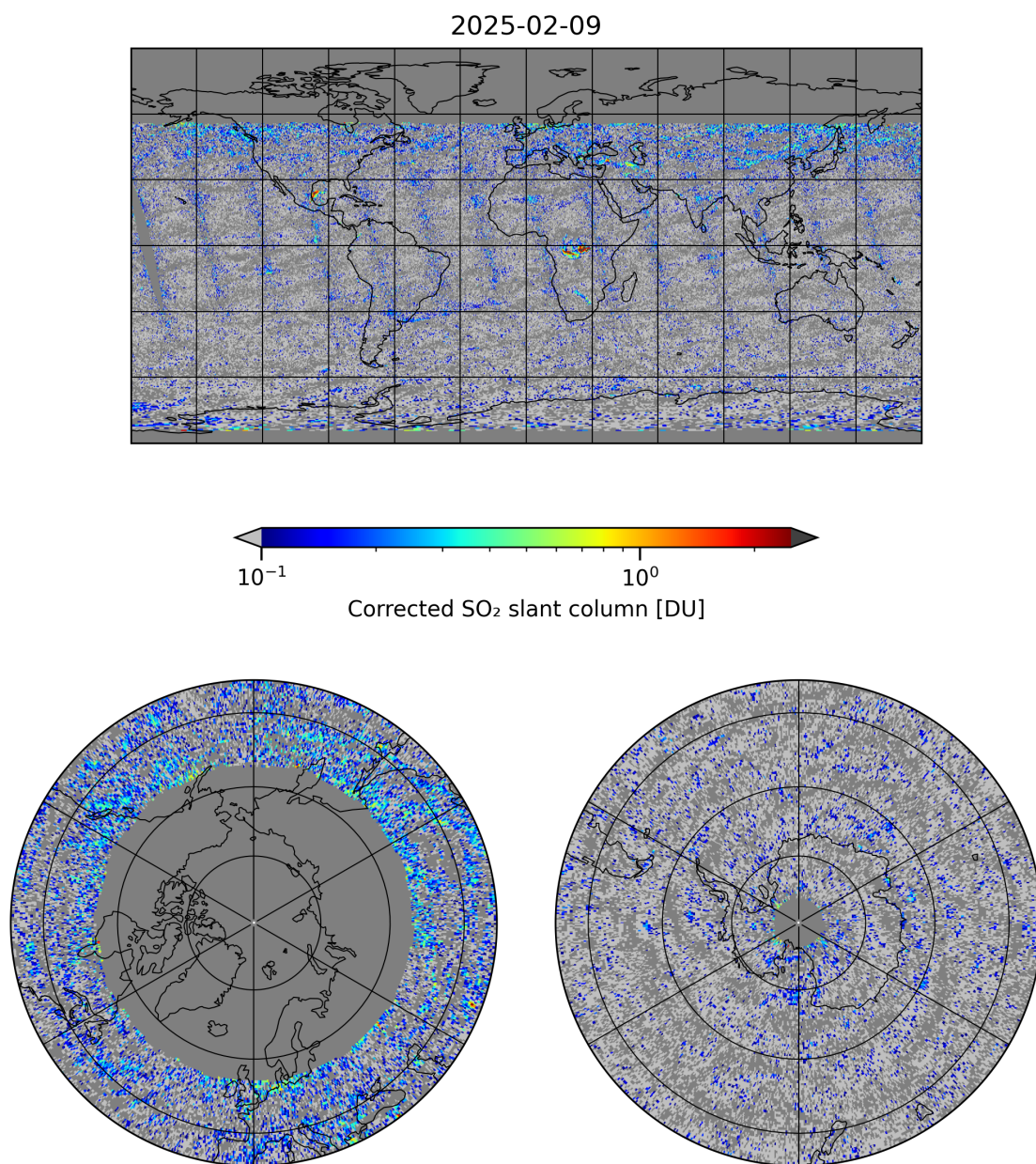


Figure 6: Map of “Corrected SO₂ slant column” for 2025-02-09 to 2025-02-10

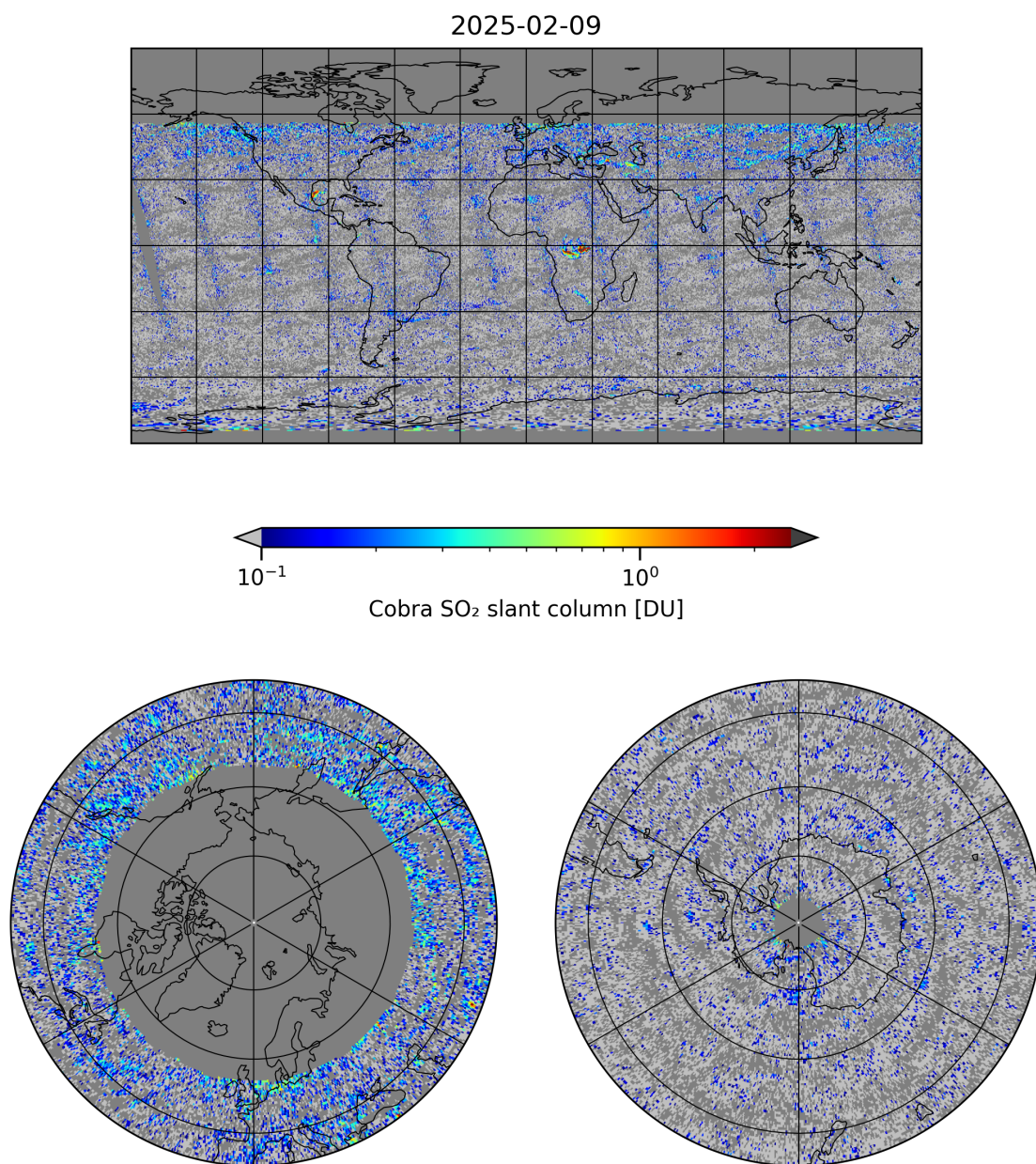


Figure 7: Map of “Cobra SO₂ slant column” for 2025-02-09 to 2025-02-10

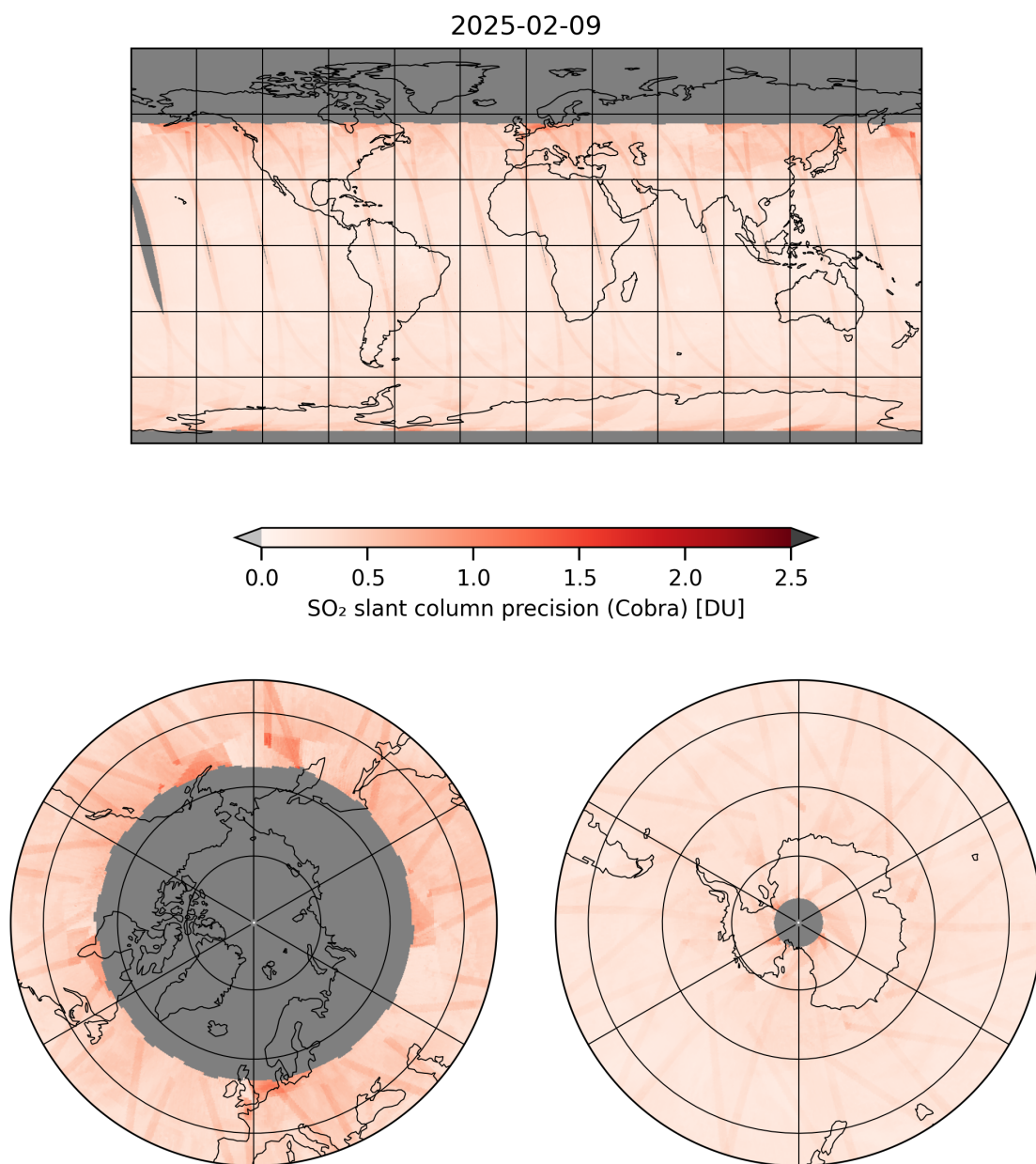


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-02-09 to 2025-02-10

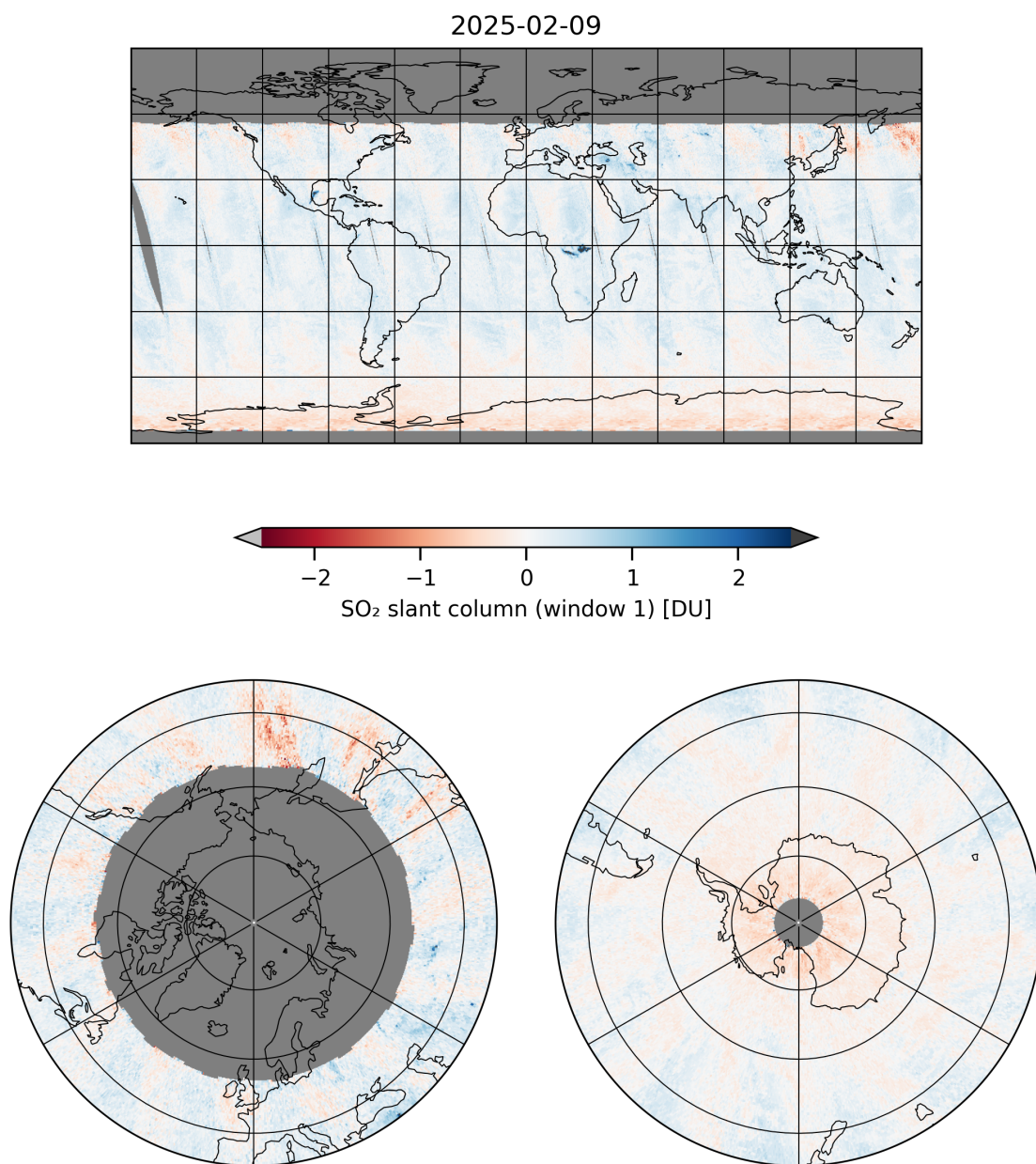


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-02-09 to 2025-02-10

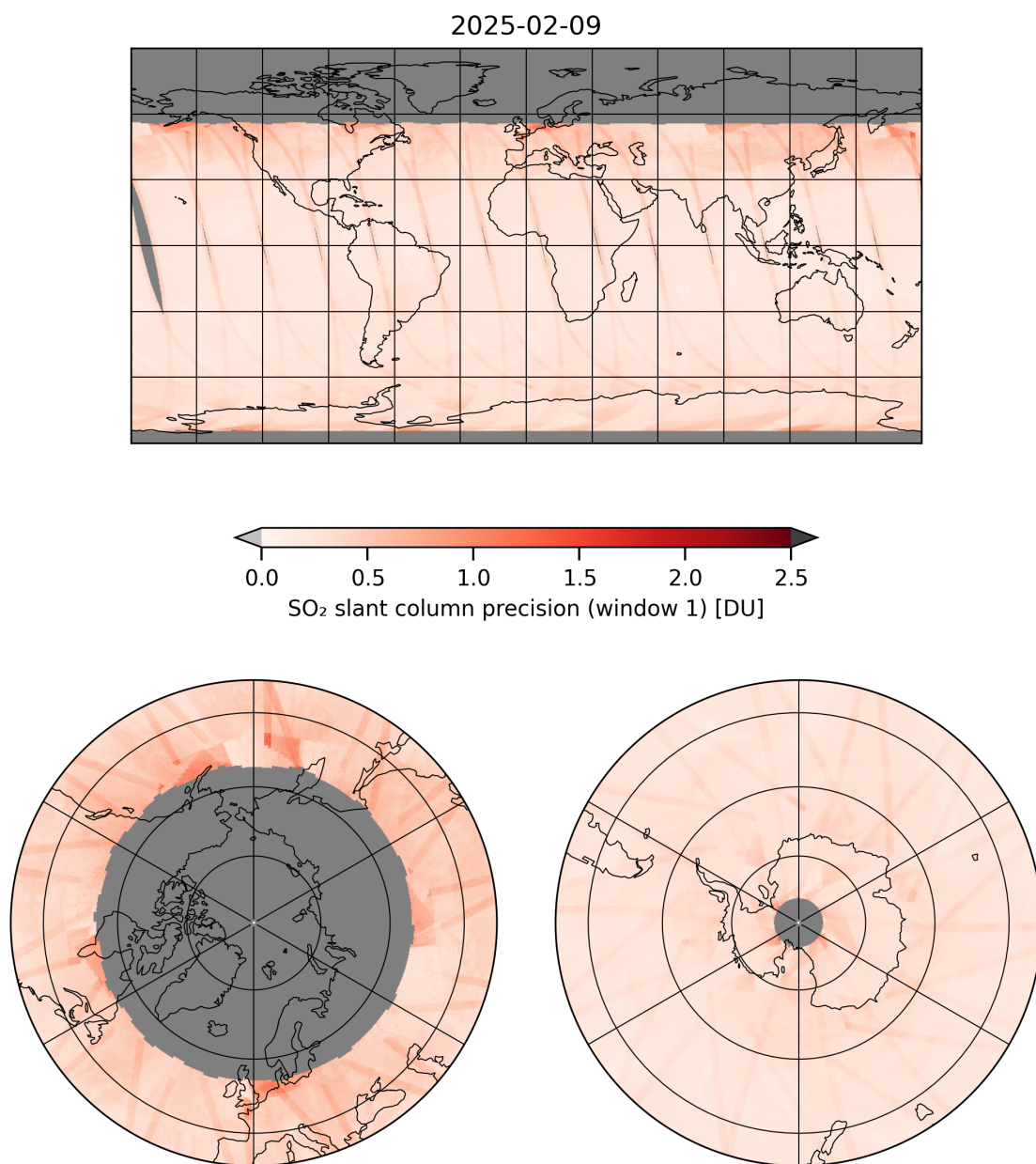


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-02-09 to 2025-02-10

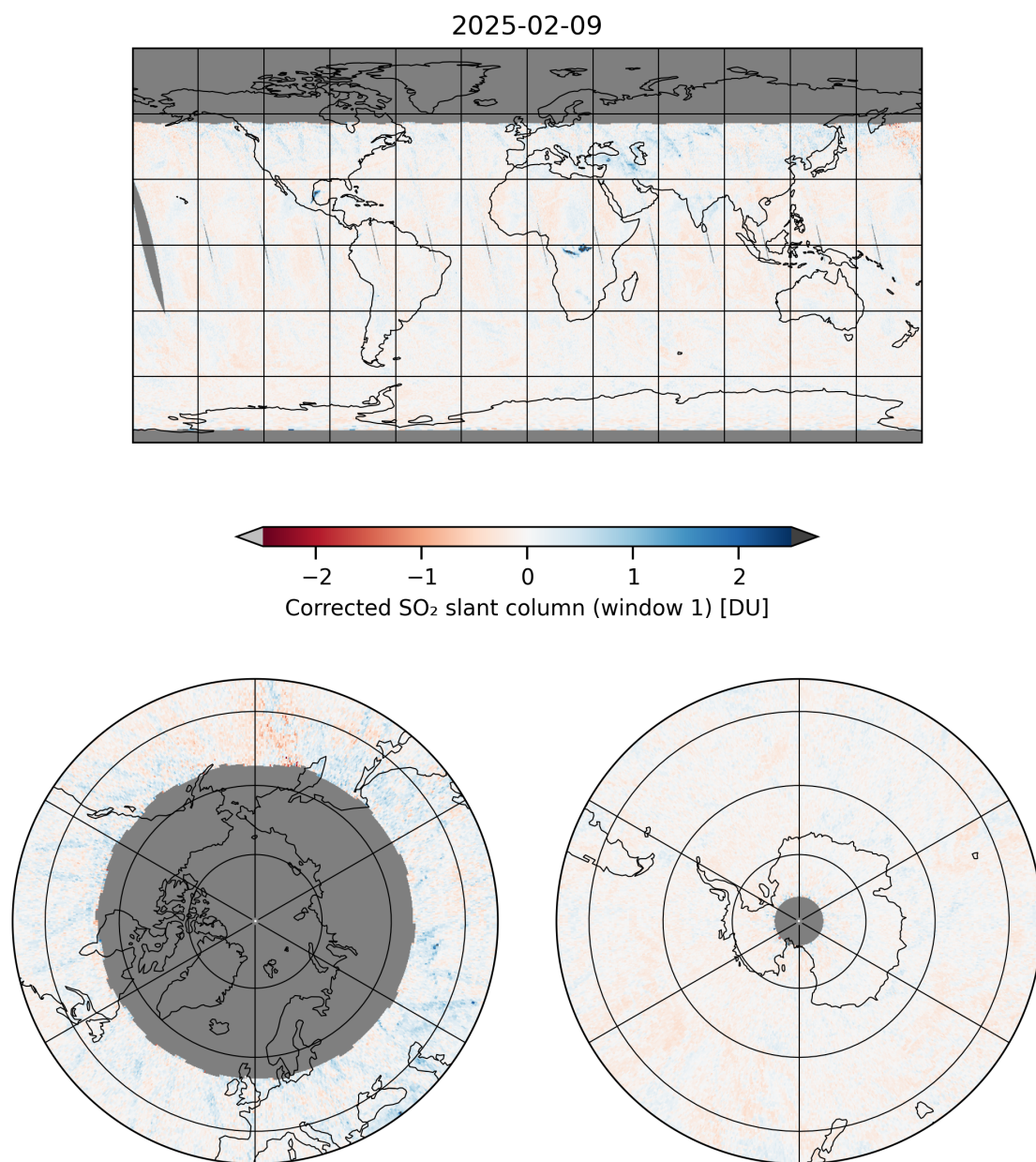


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-02-09 to 2025-02-10

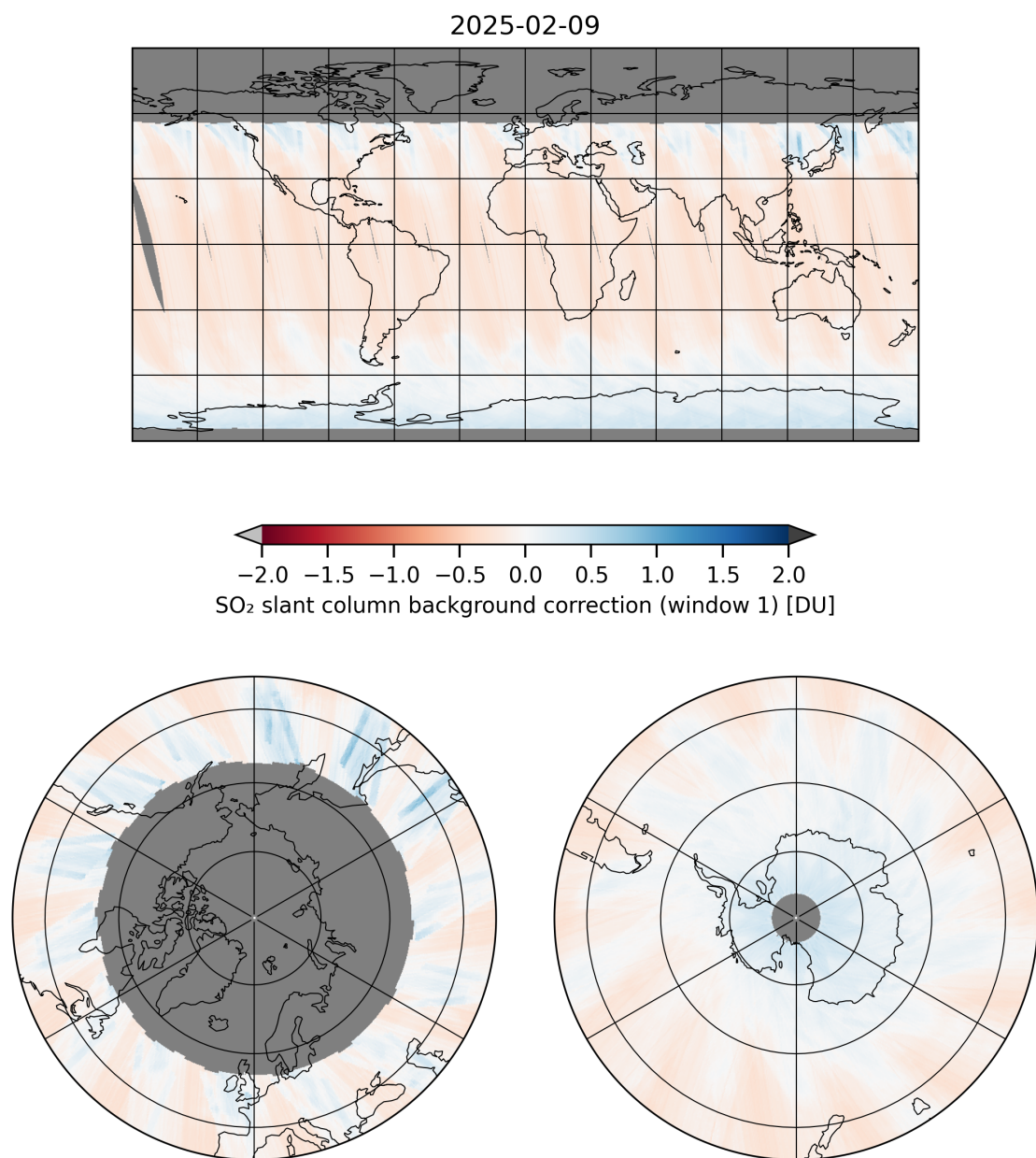


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-02-09 to 2025-02-10

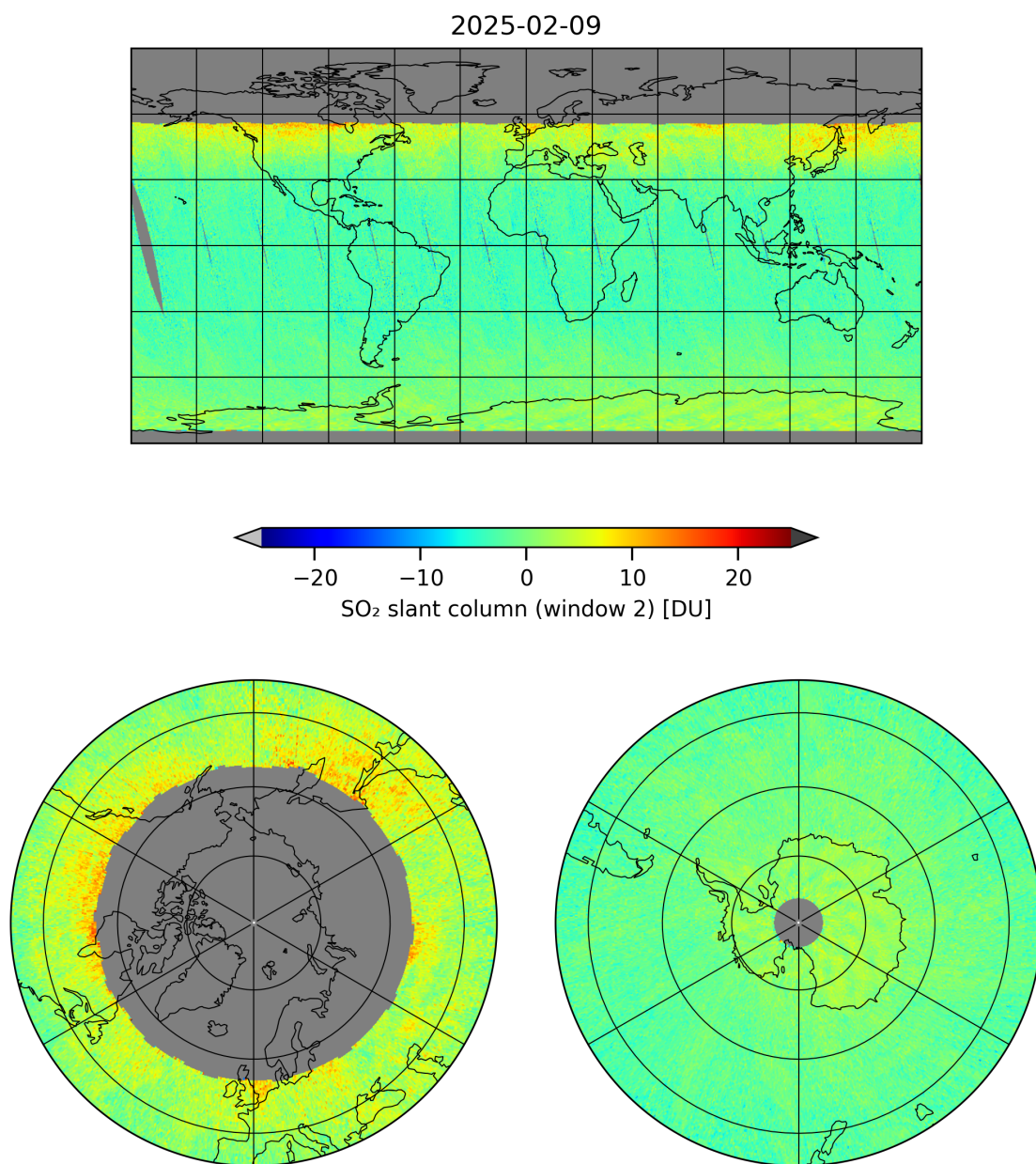


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-02-09 to 2025-02-10

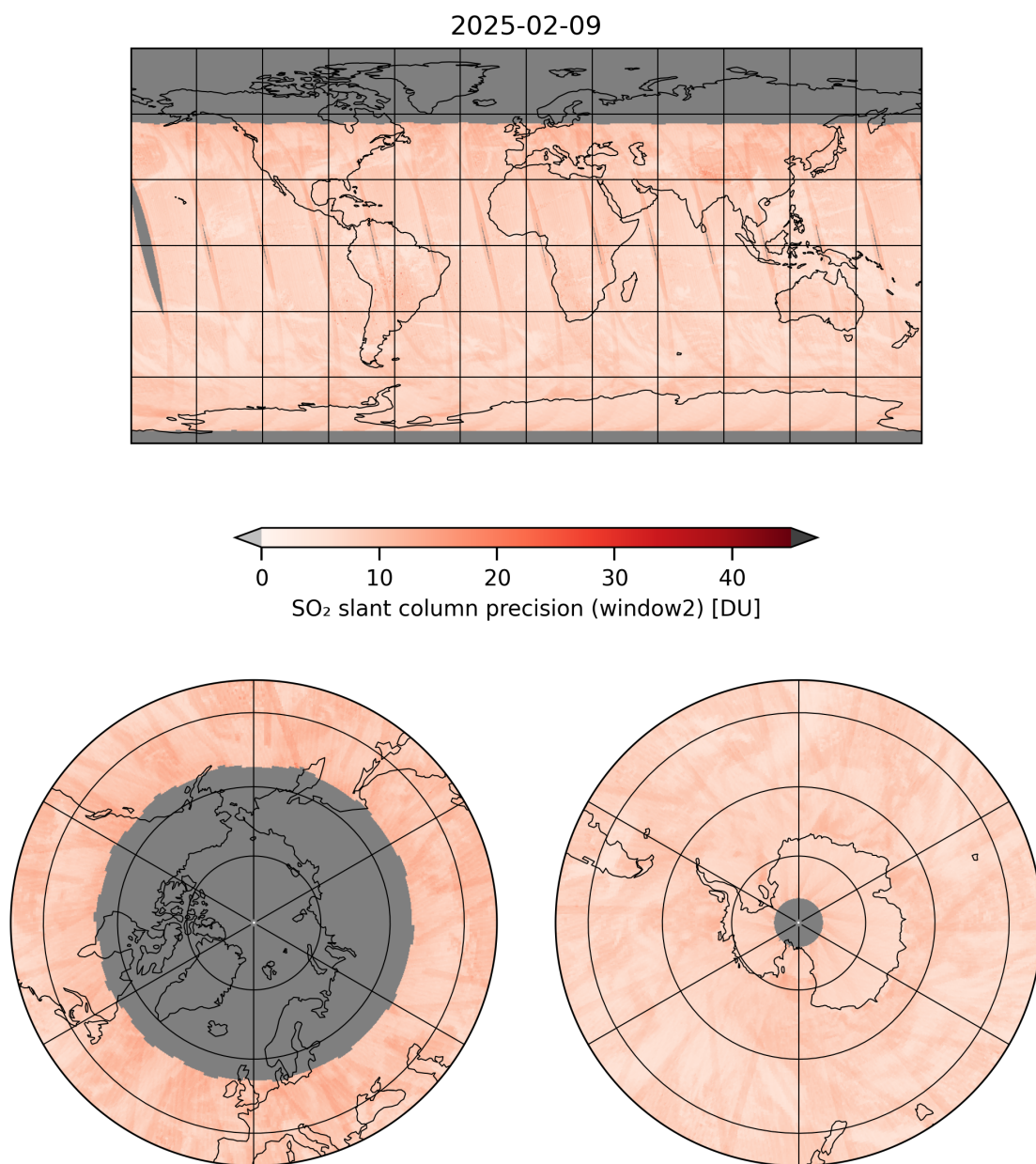


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-02-09 to 2025-02-10

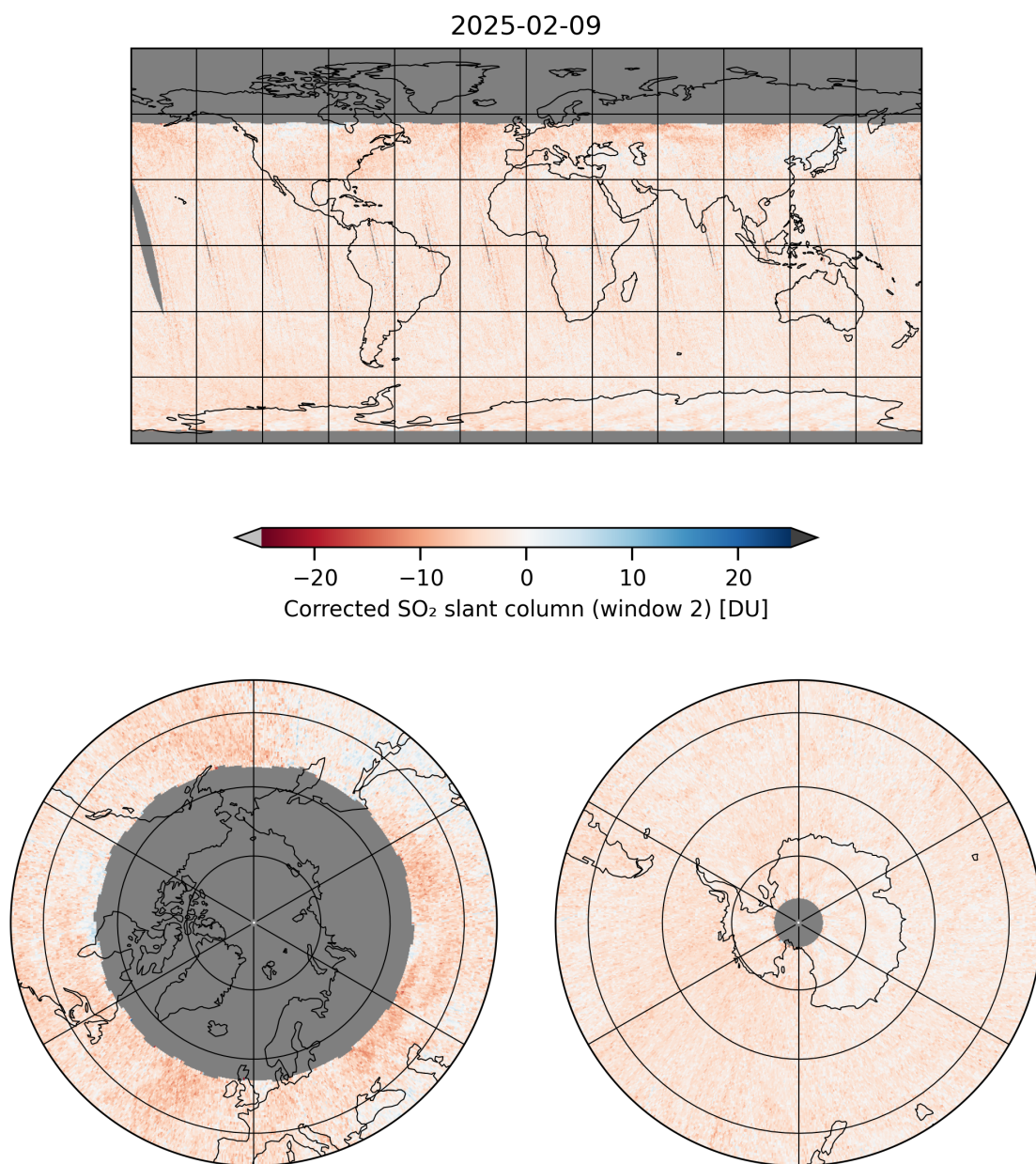


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-02-09 to 2025-02-10

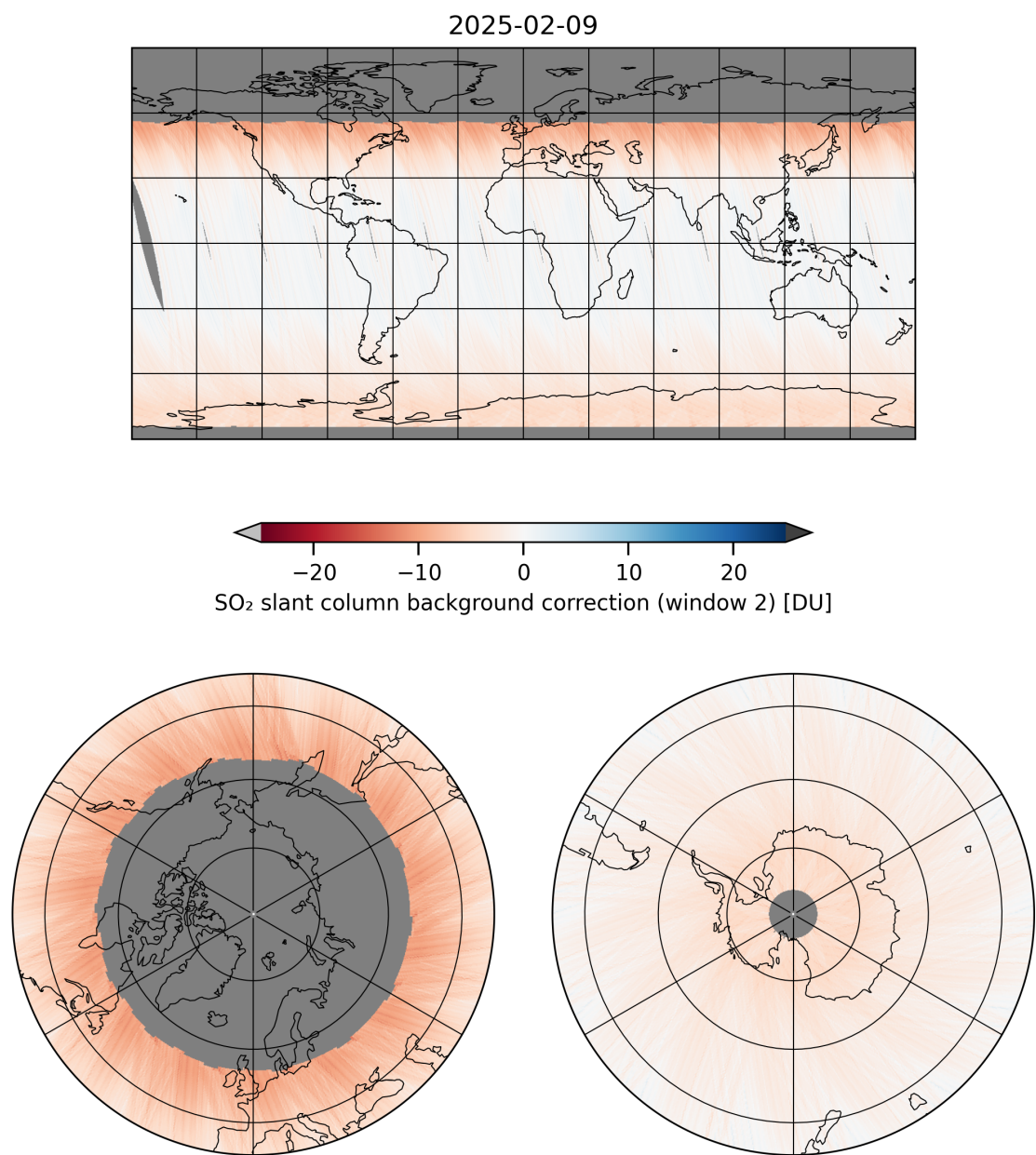


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-02-09 to 2025-02-10

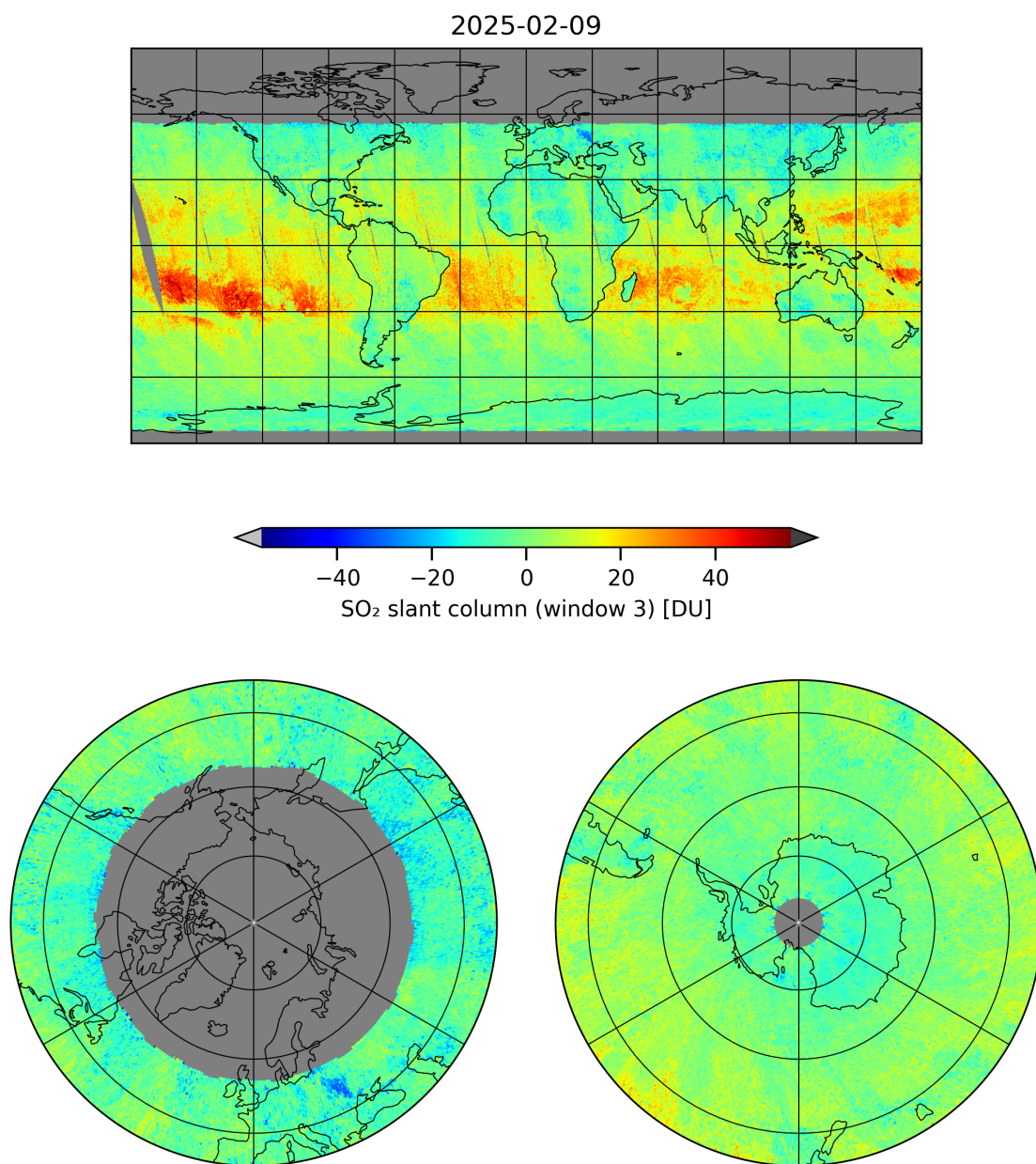


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-02-09 to 2025-02-10

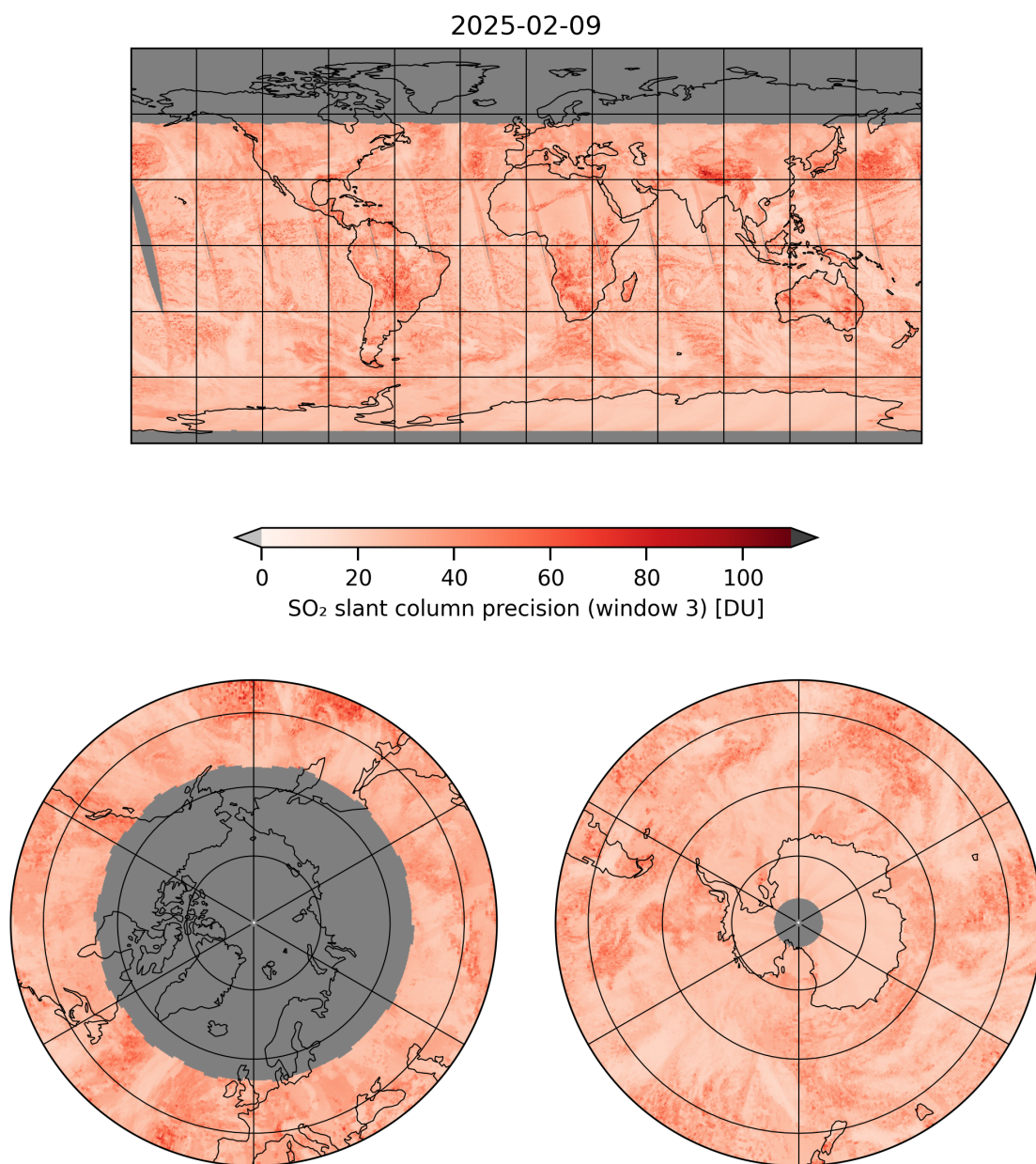


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-02-09 to 2025-02-10

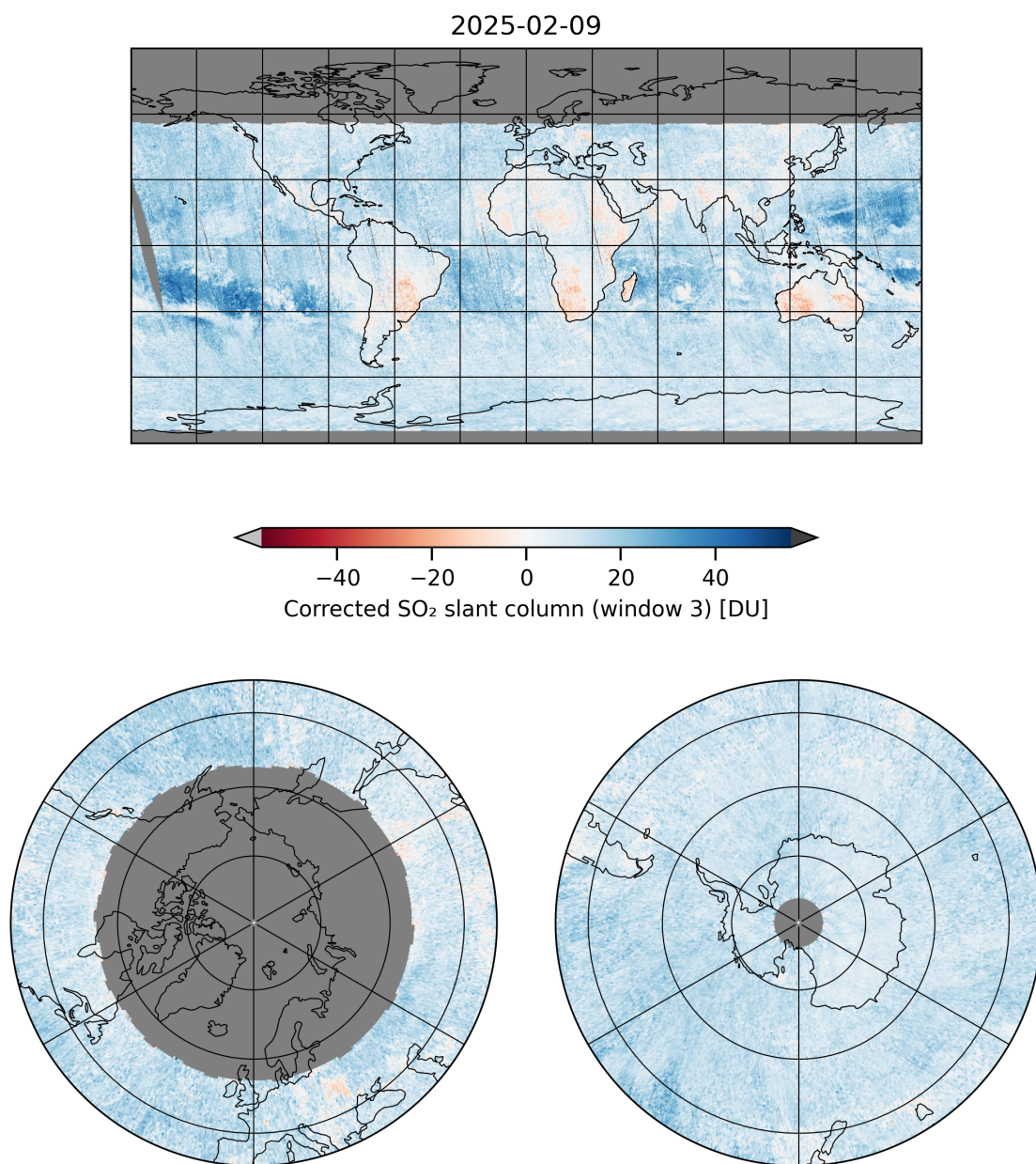


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-02-09 to 2025-02-10

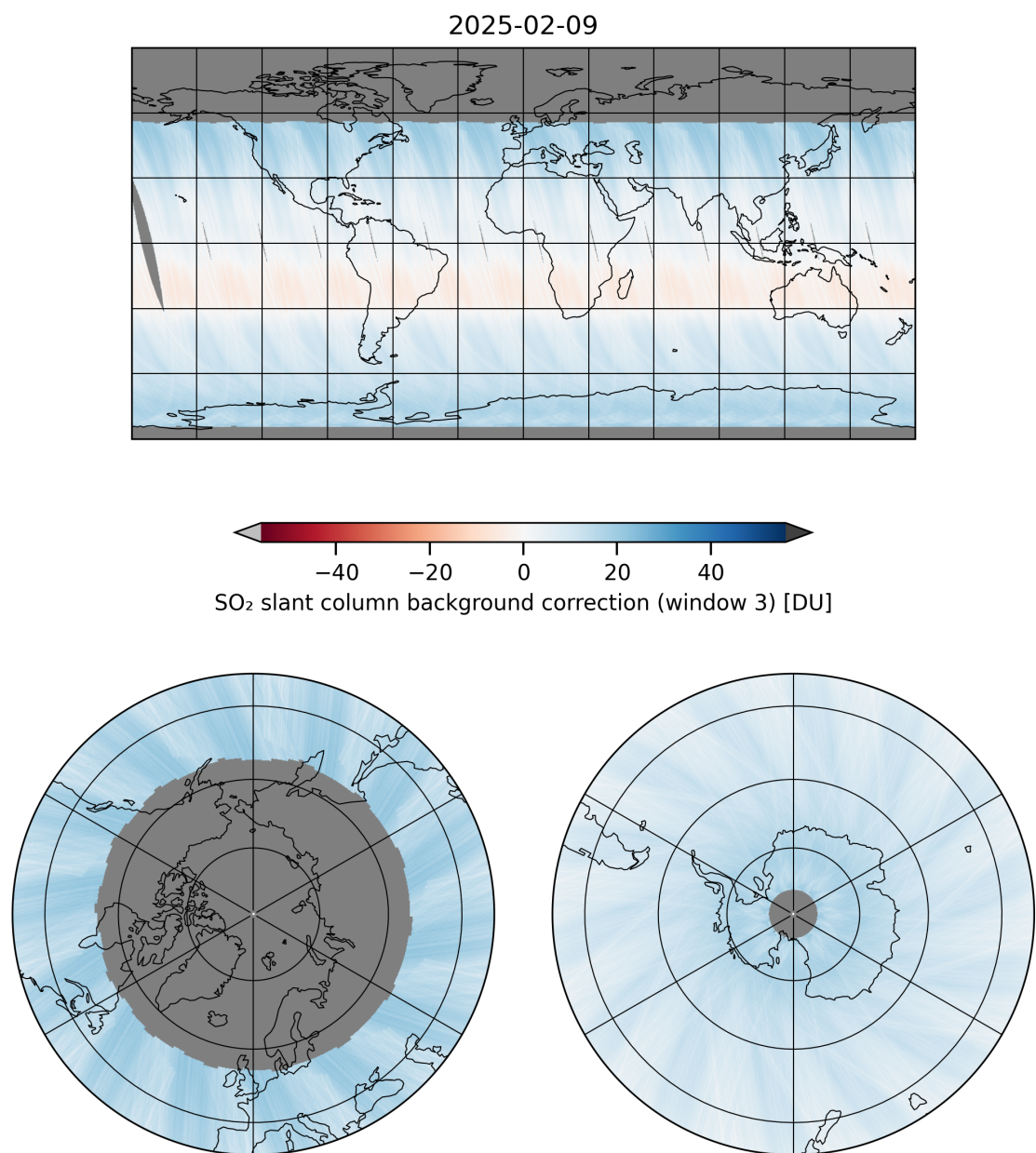


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-02-09 to 2025-02-10

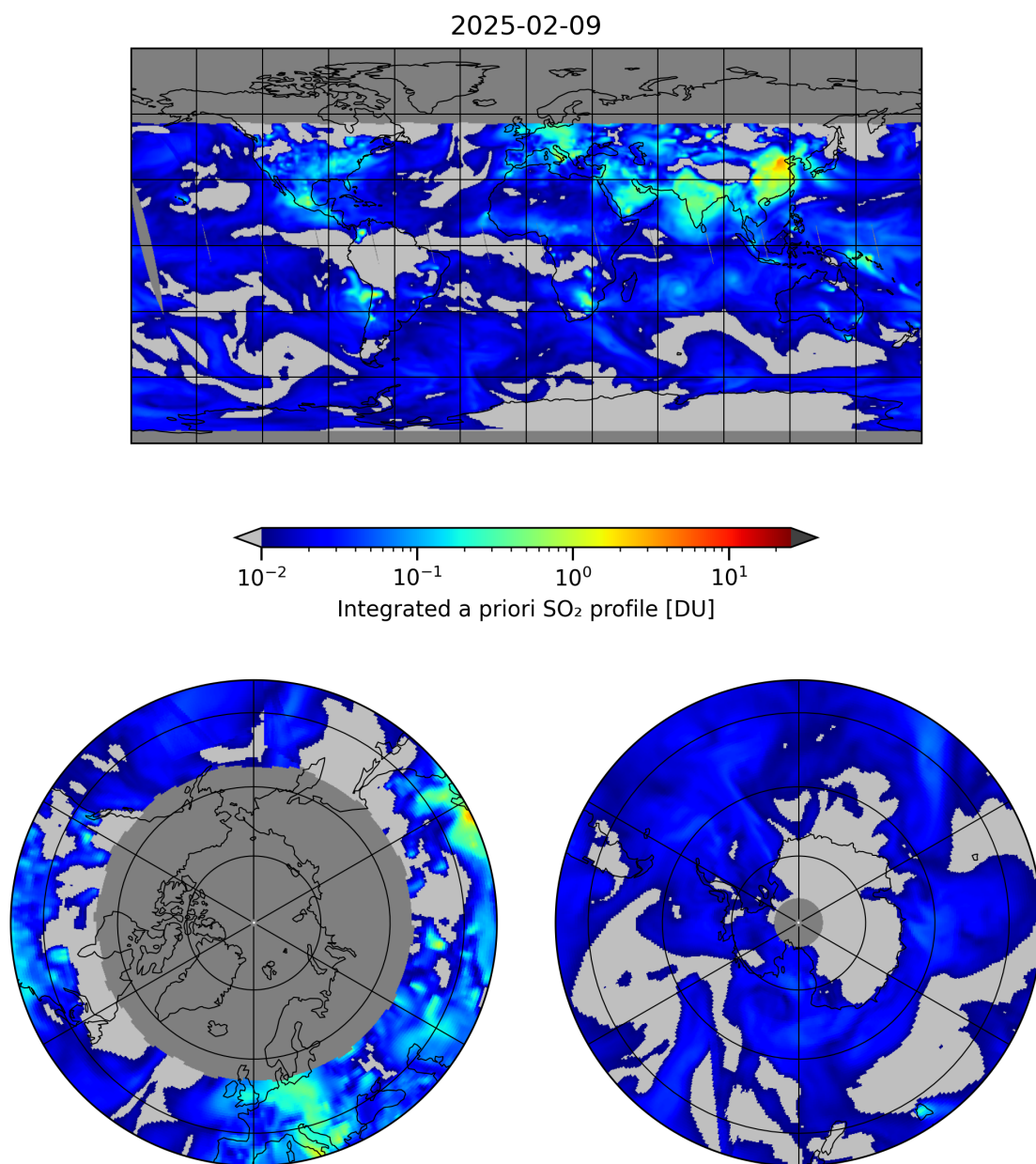


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-02-09 to 2025-02-10

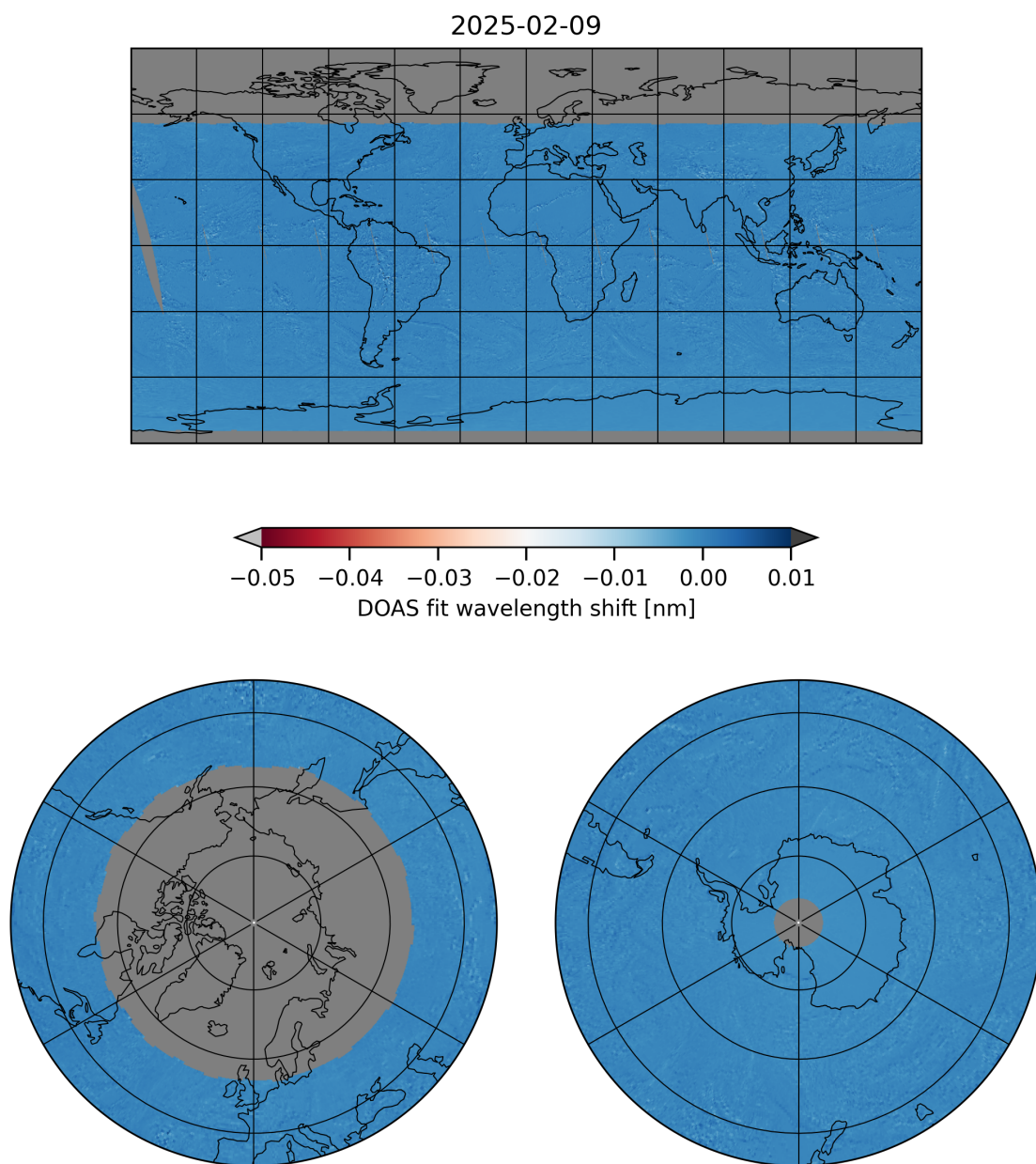


Figure 22: Map of “DOAS fit wavelength shift” for 2025-02-09 to 2025-02-10

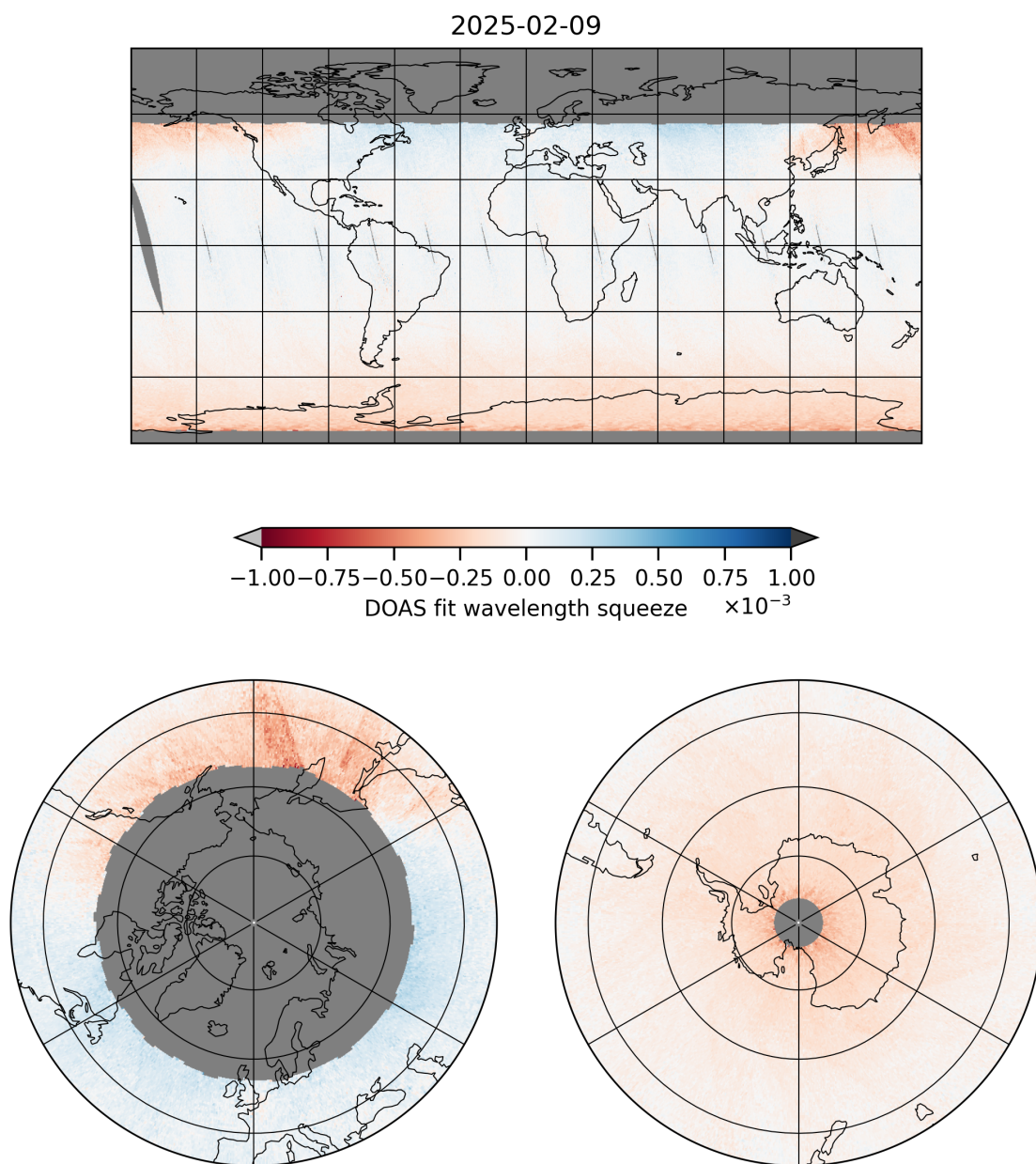


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-02-09 to 2025-02-10

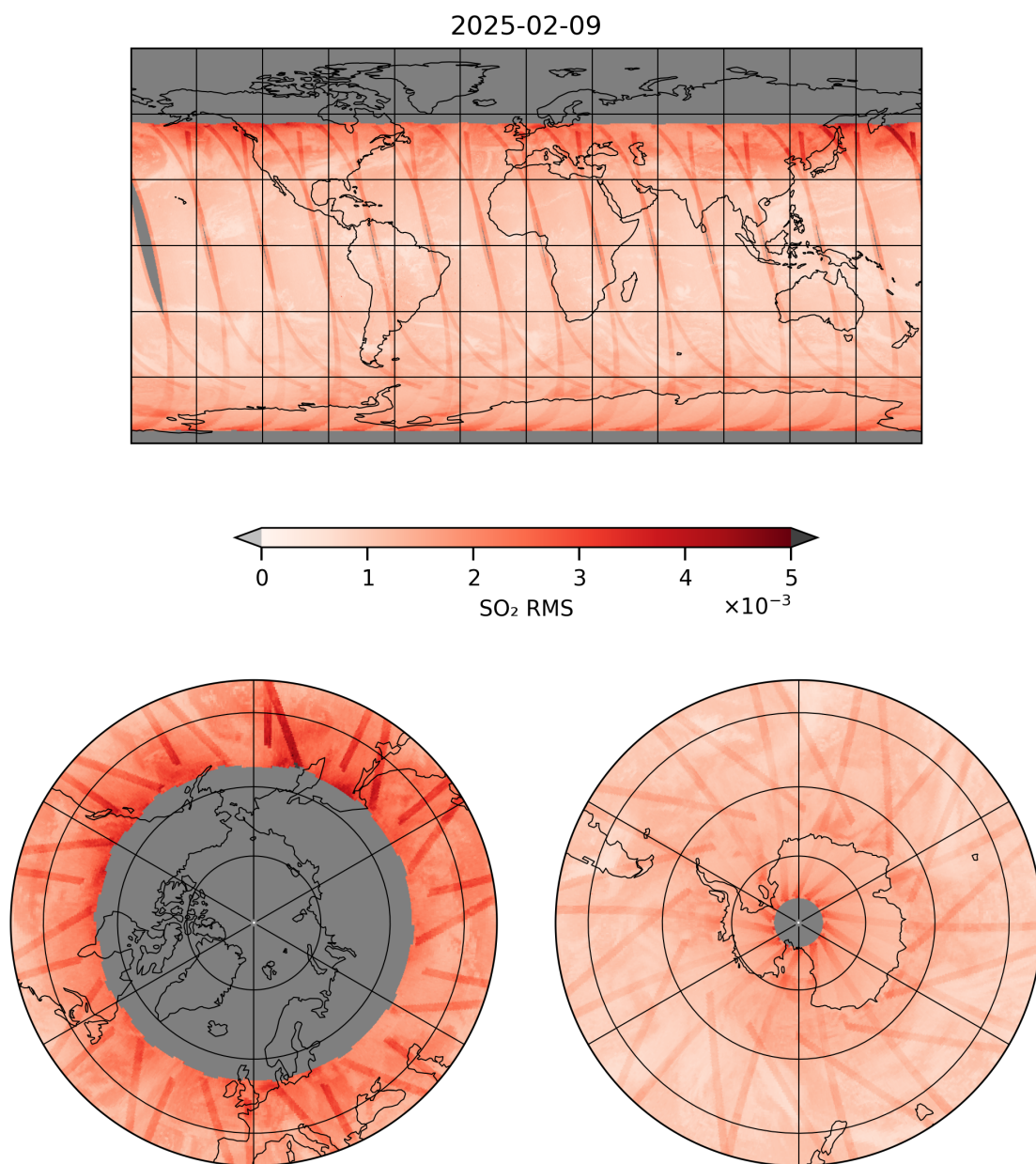


Figure 24: Map of “SO₂ RMS” for 2025-02-09 to 2025-02-10

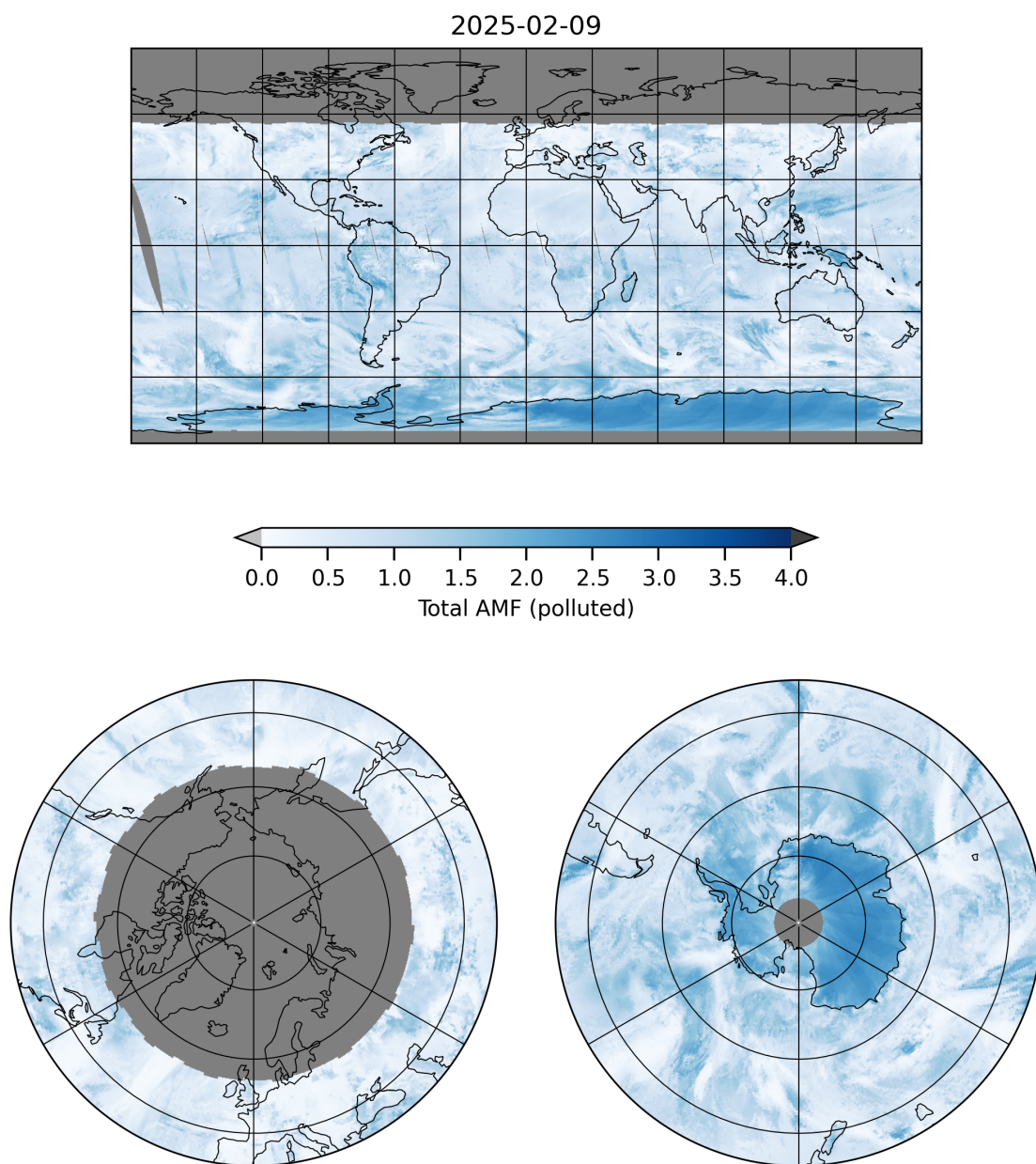


Figure 25: Map of “Total AMF (polluted)” for 2025-02-09 to 2025-02-10

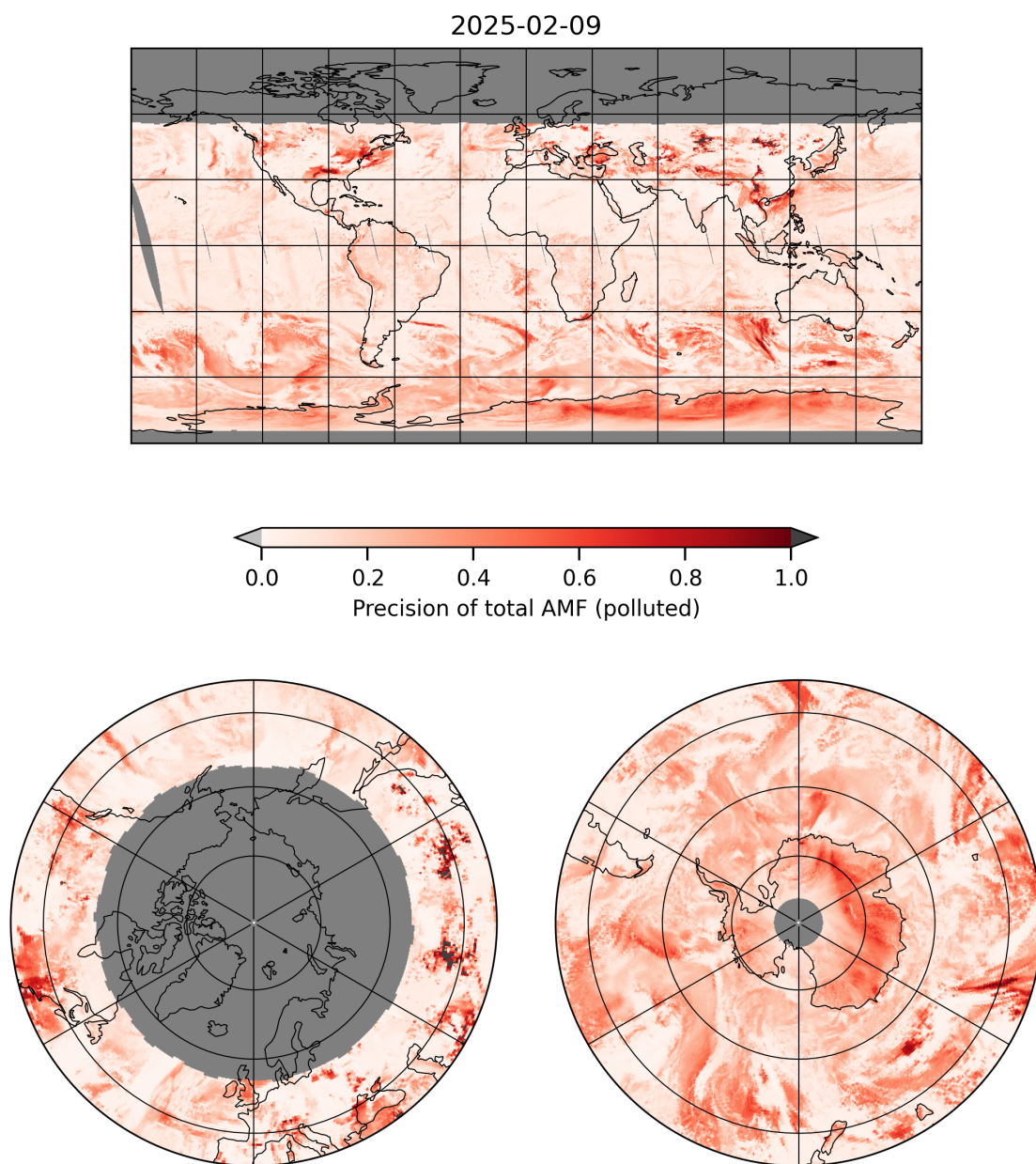


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-02-09 to 2025-02-10

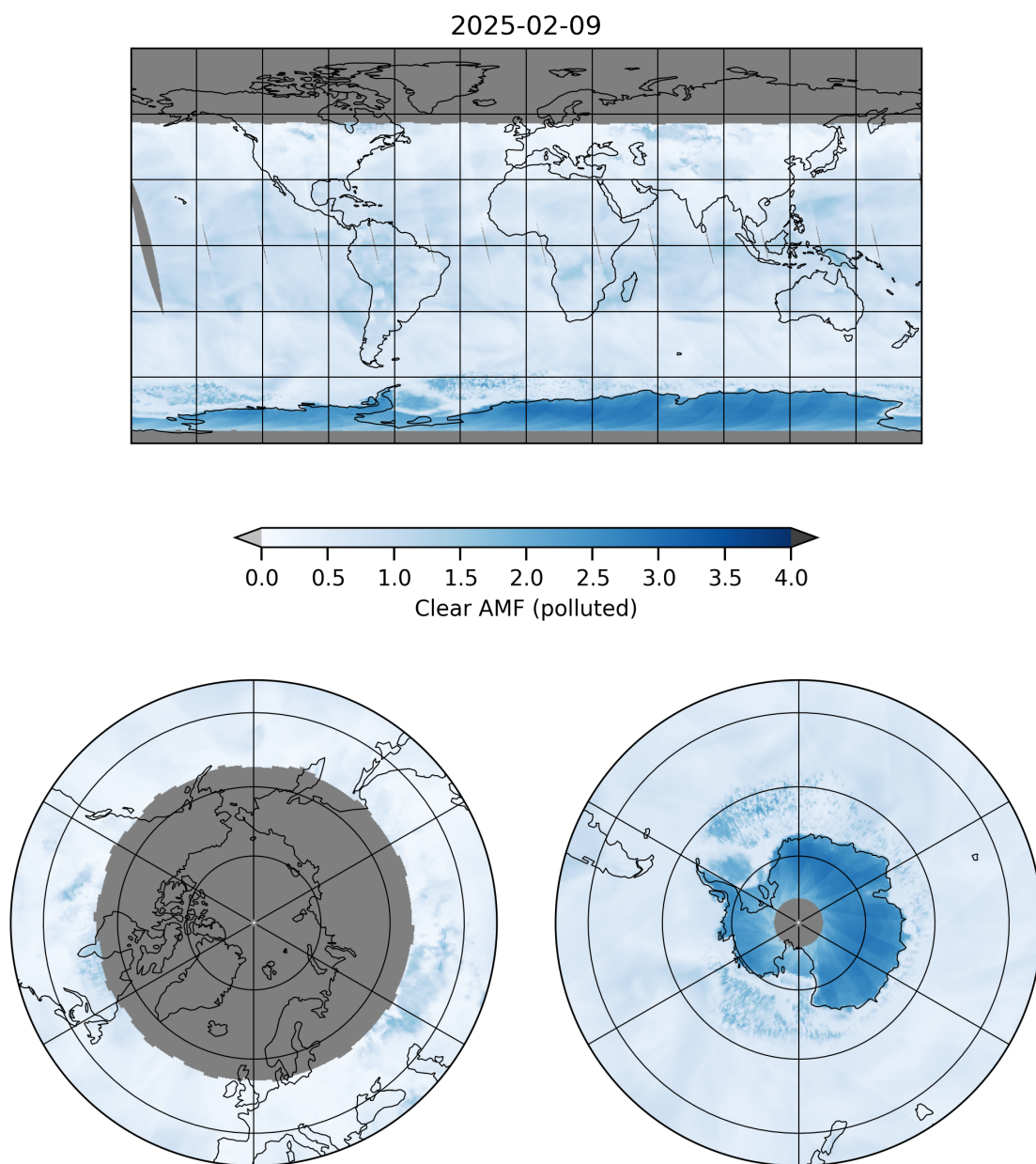


Figure 27: Map of “Clear AMF (polluted)” for 2025-02-09 to 2025-02-10

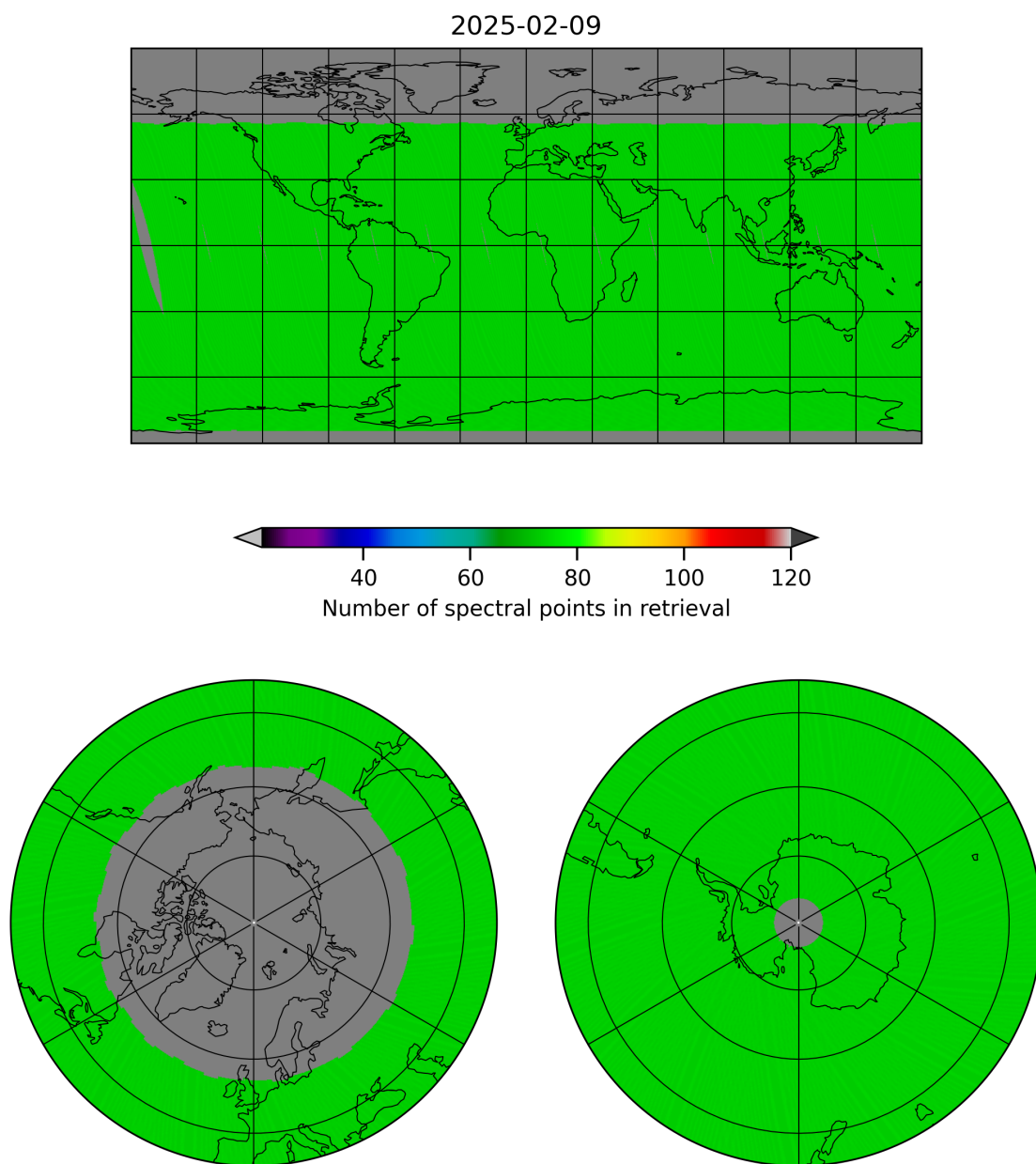


Figure 28: Map of “Number of spectral points in retrieval” for 2025-02-09 to 2025-02-10

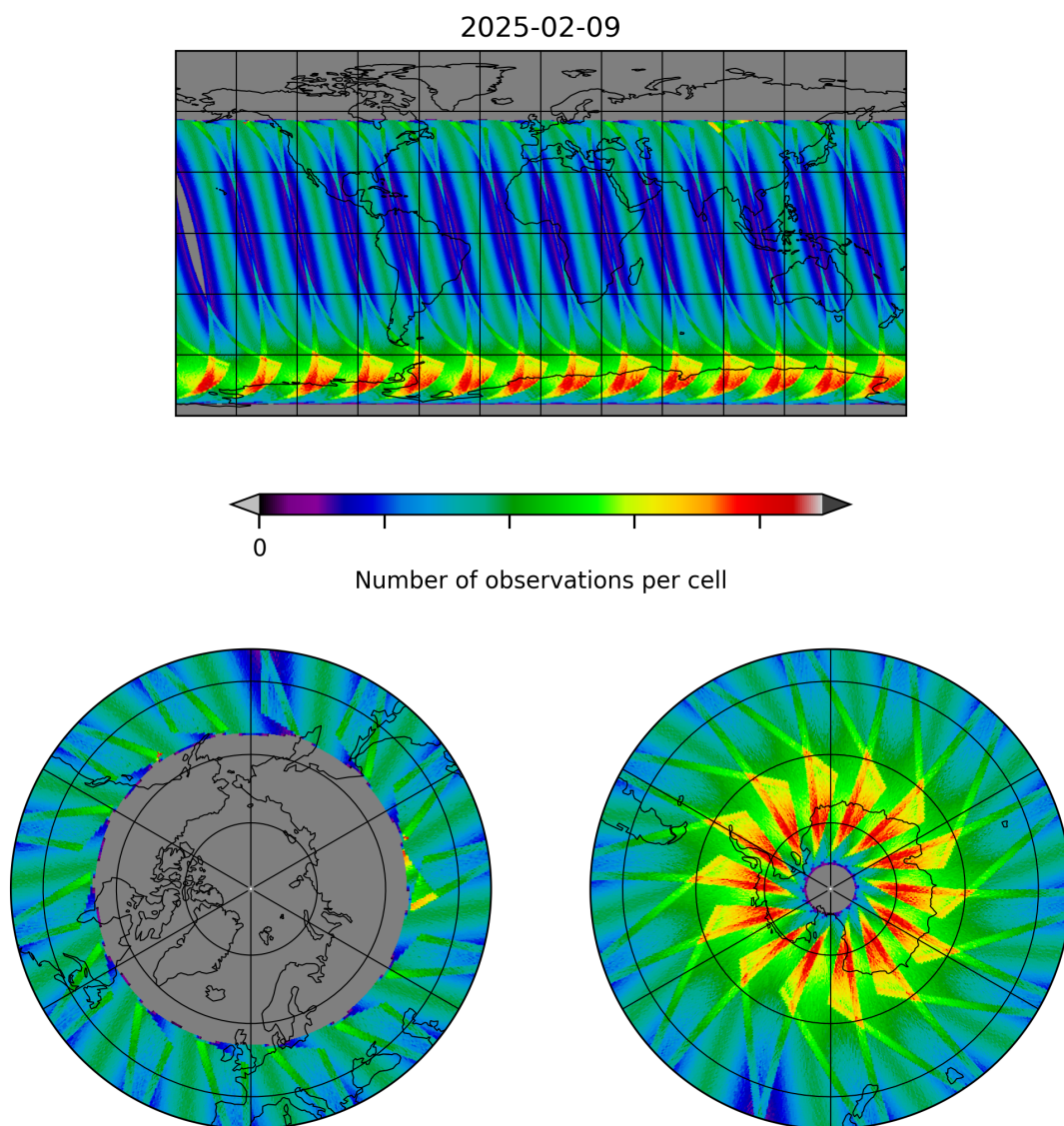


Figure 29: Map of the number of observations for 2025-02-09 to 2025-02-10

7 Zonal average

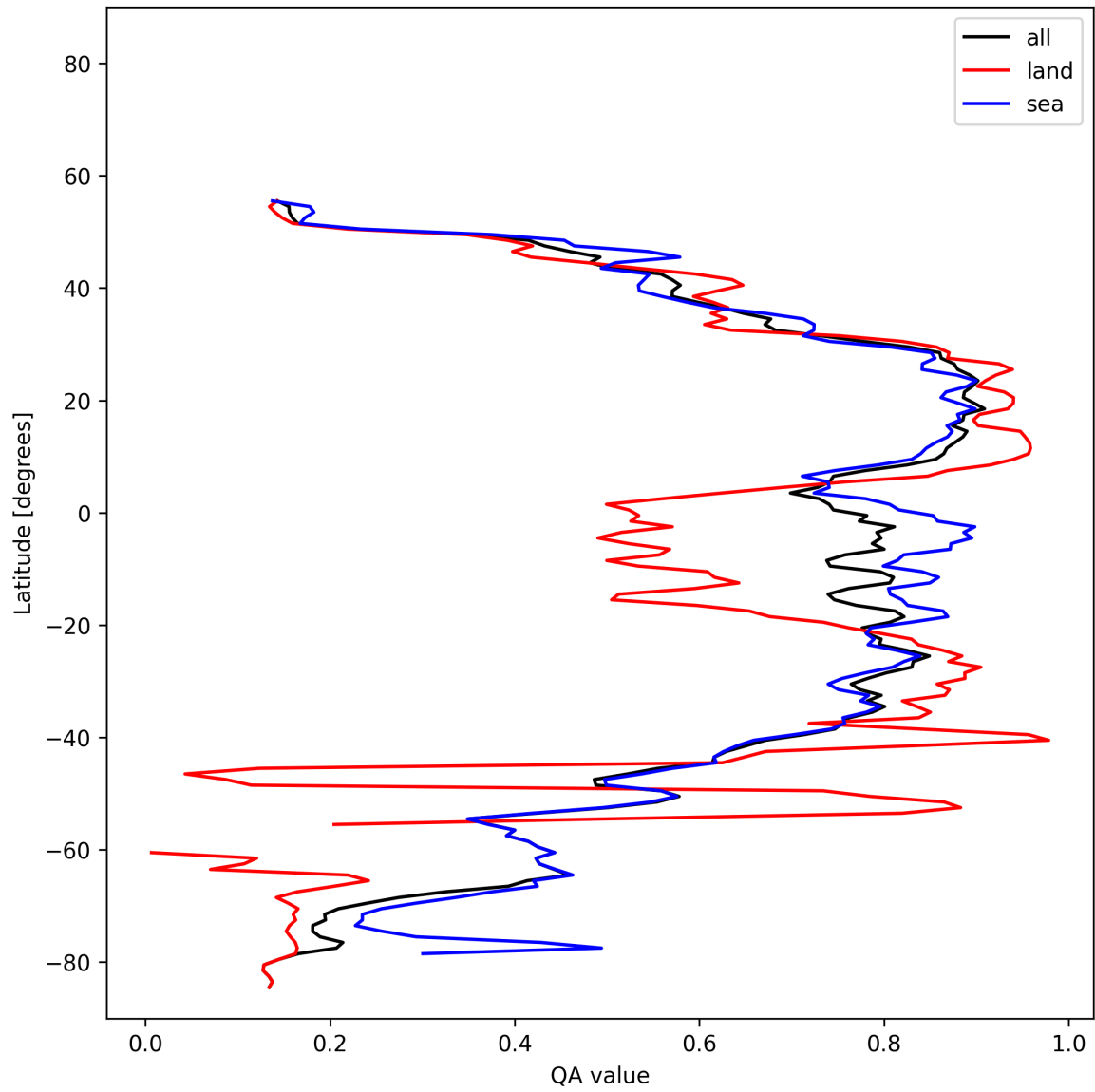


Figure 30: Zonal average of “QA value” for 2025-02-09 to 2025-02-10.

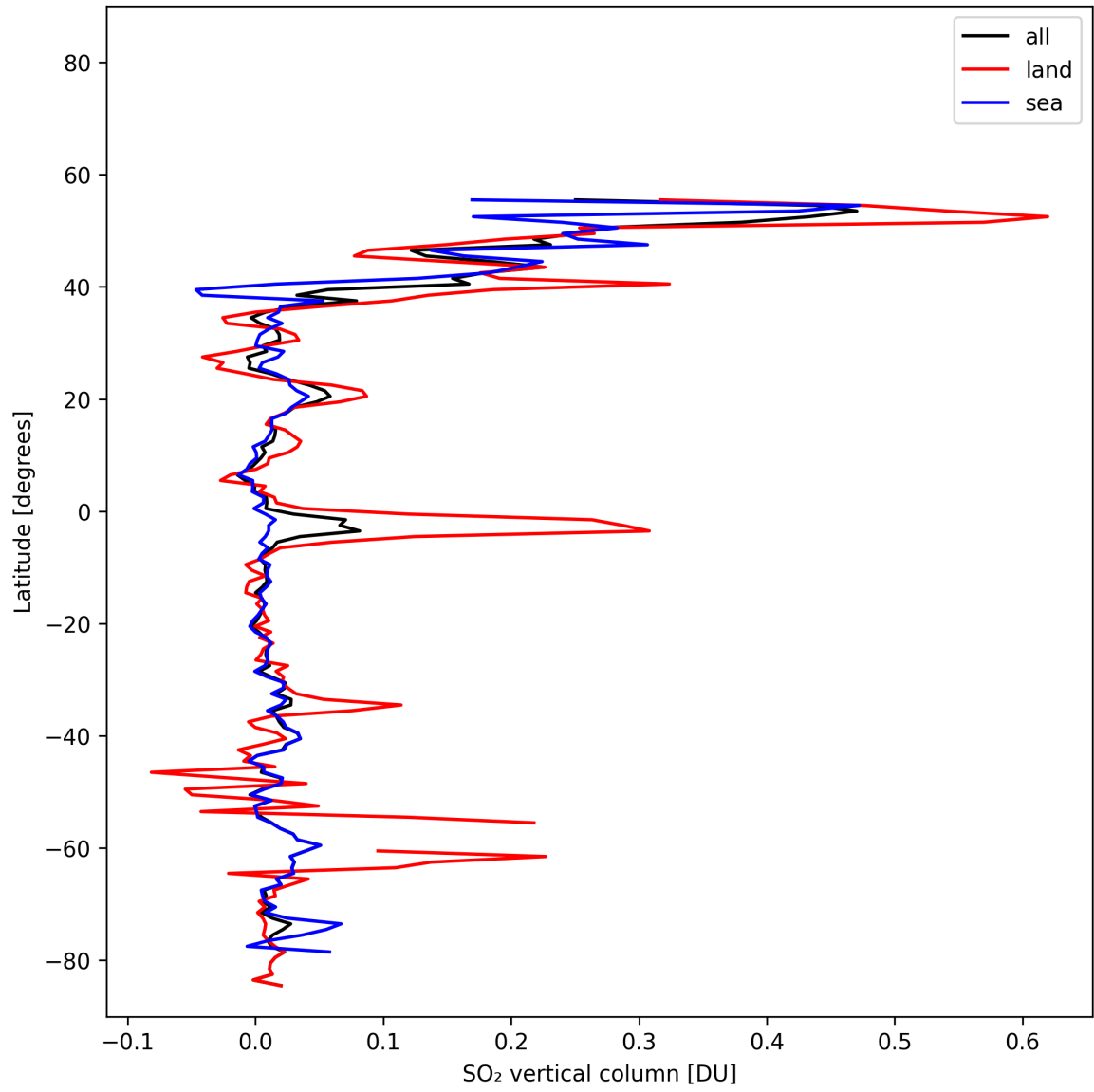


Figure 31: Zonal average of “SO₂ vertical column” for 2025-02-09 to 2025-02-10.

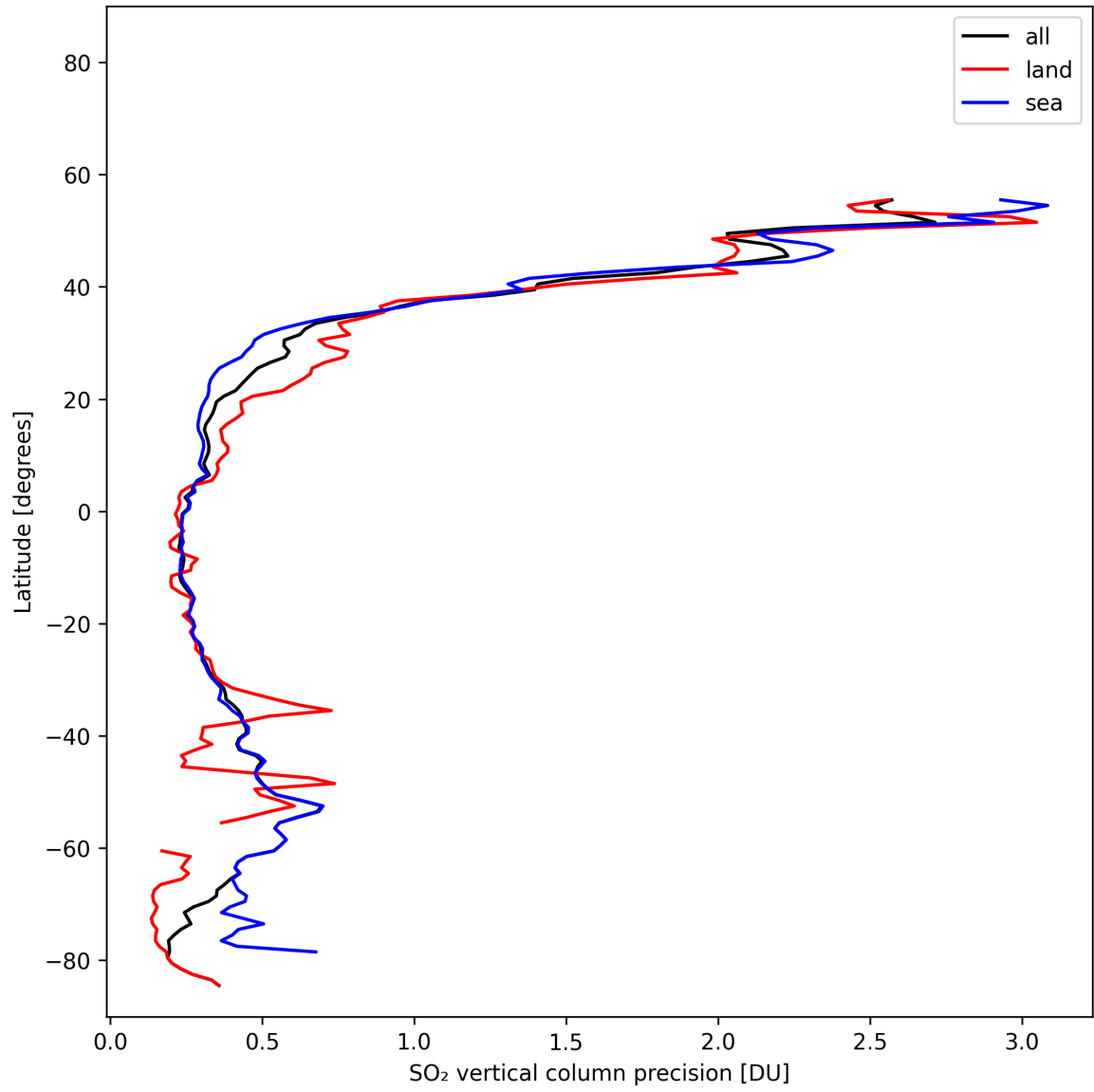


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-02-09 to 2025-02-10.

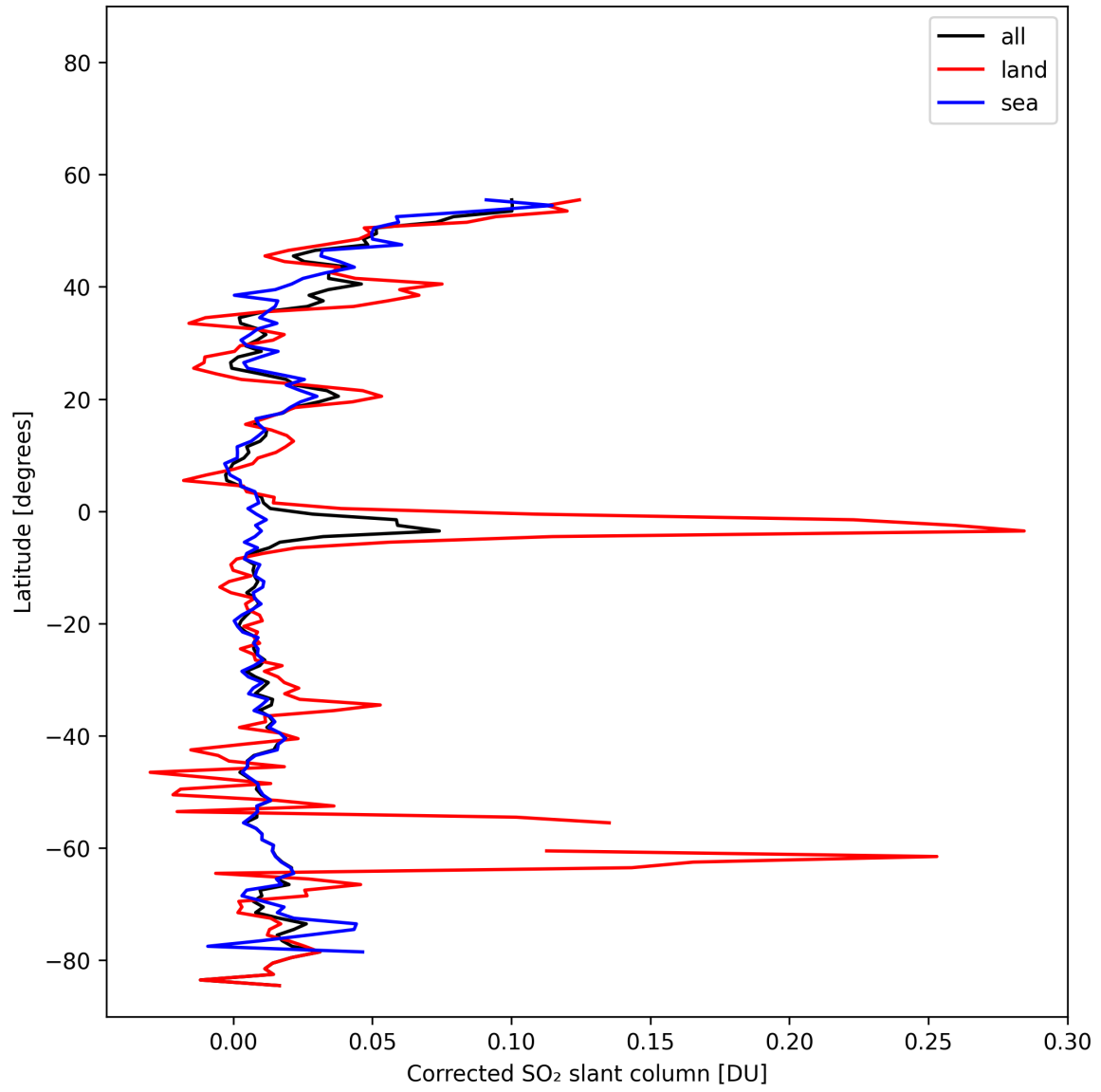


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-02-09 to 2025-02-10.

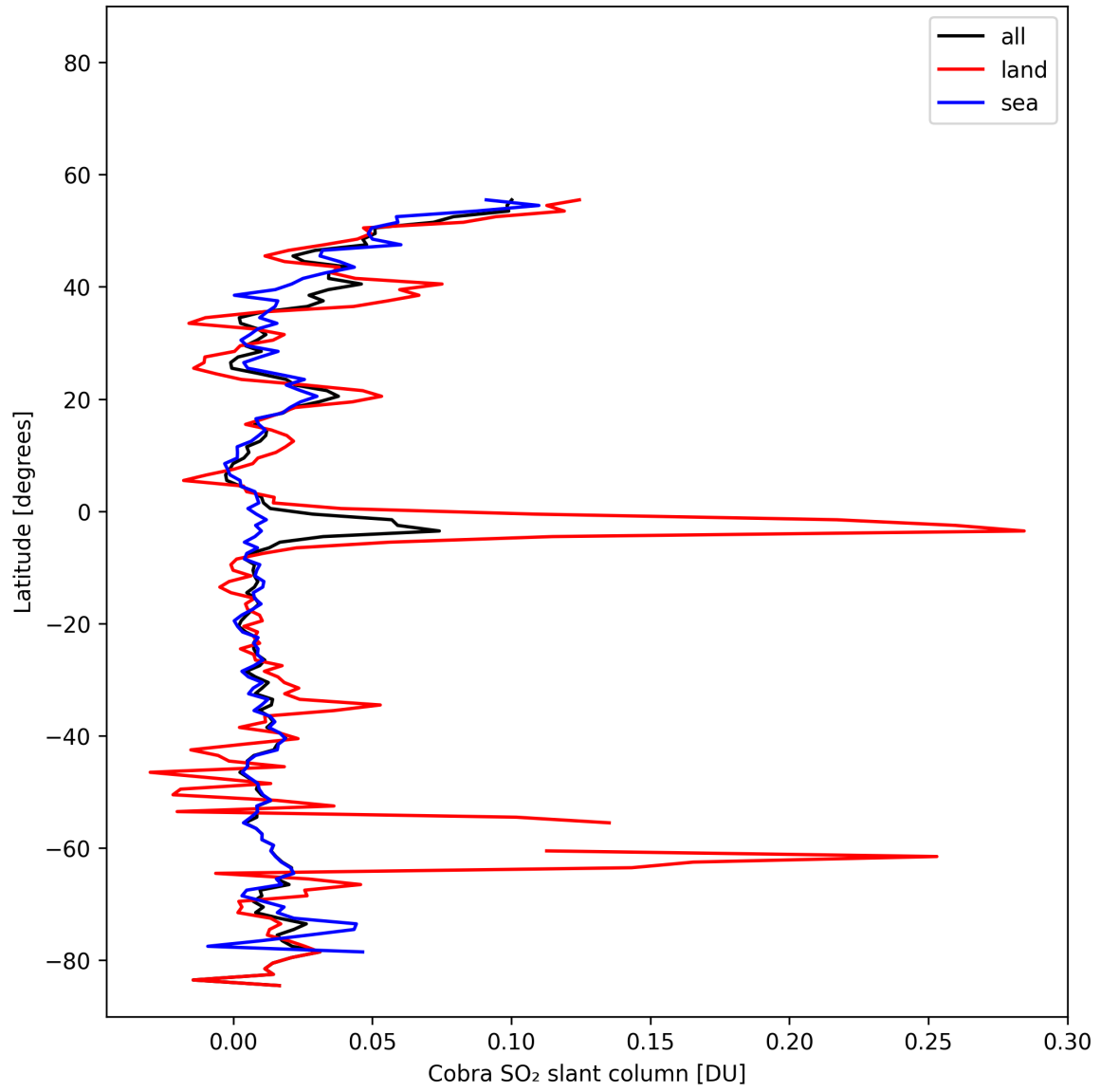


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-02-09 to 2025-02-10.

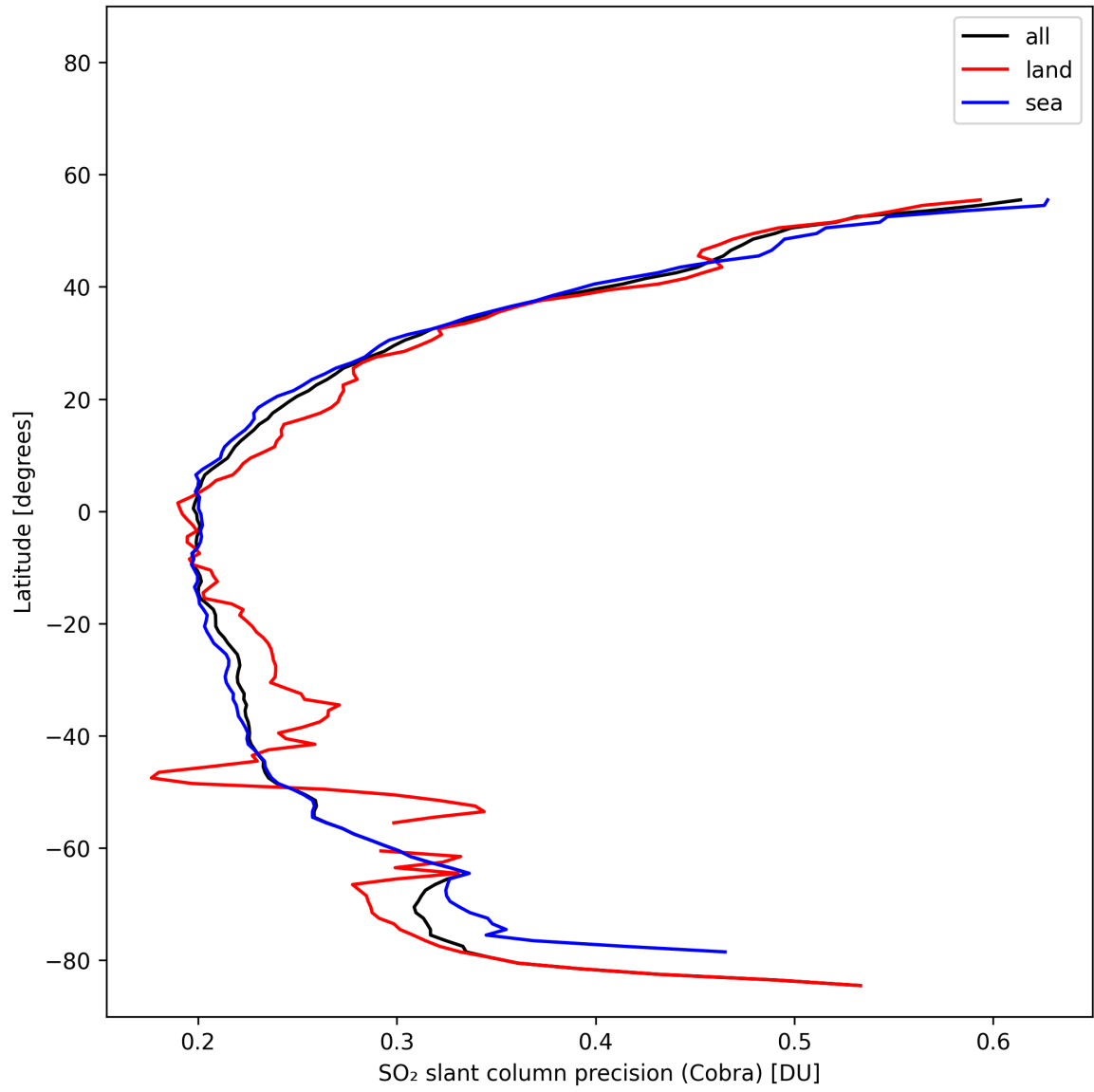


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-02-09 to 2025-02-10.

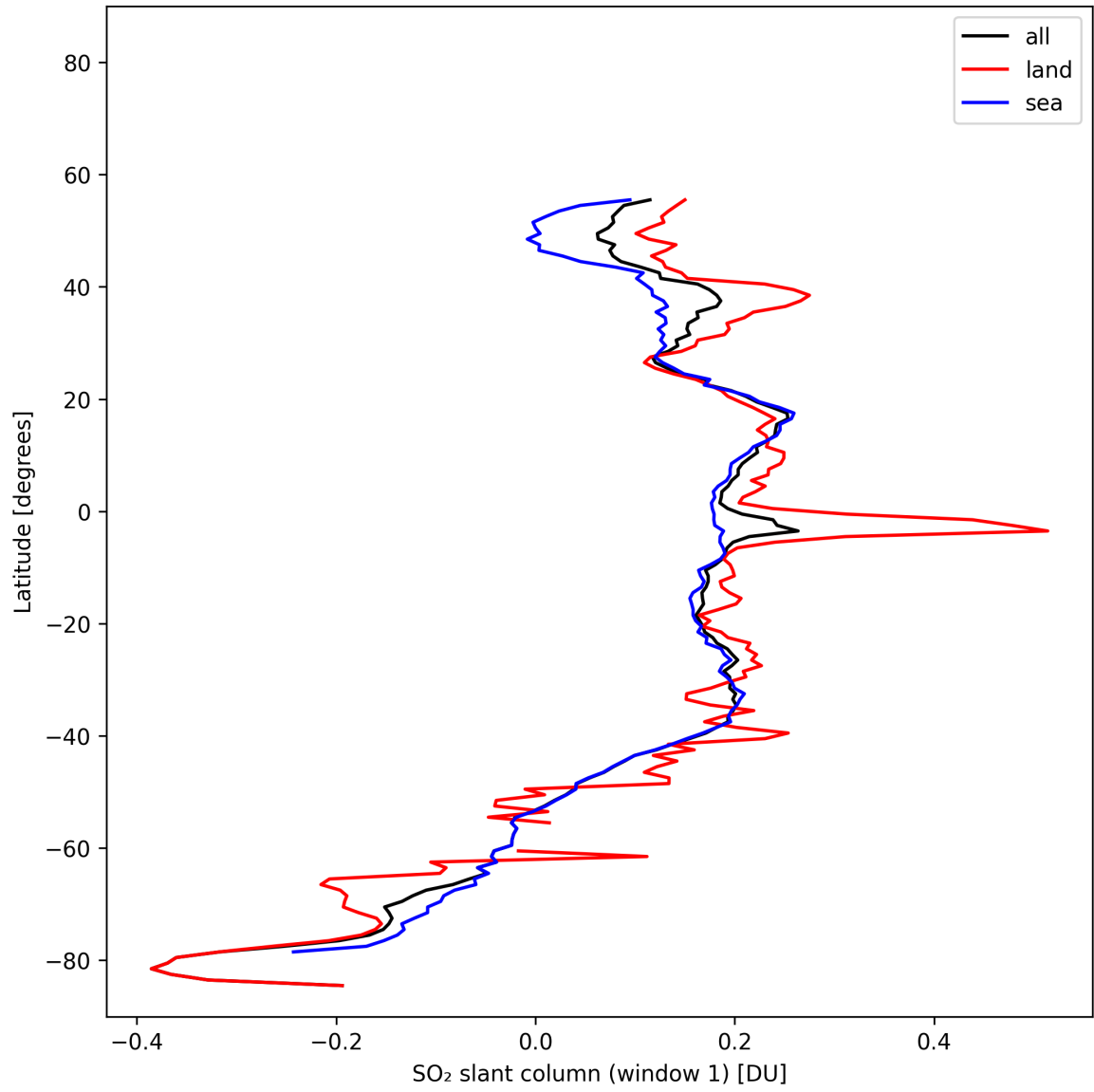


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-02-09 to 2025-02-10.

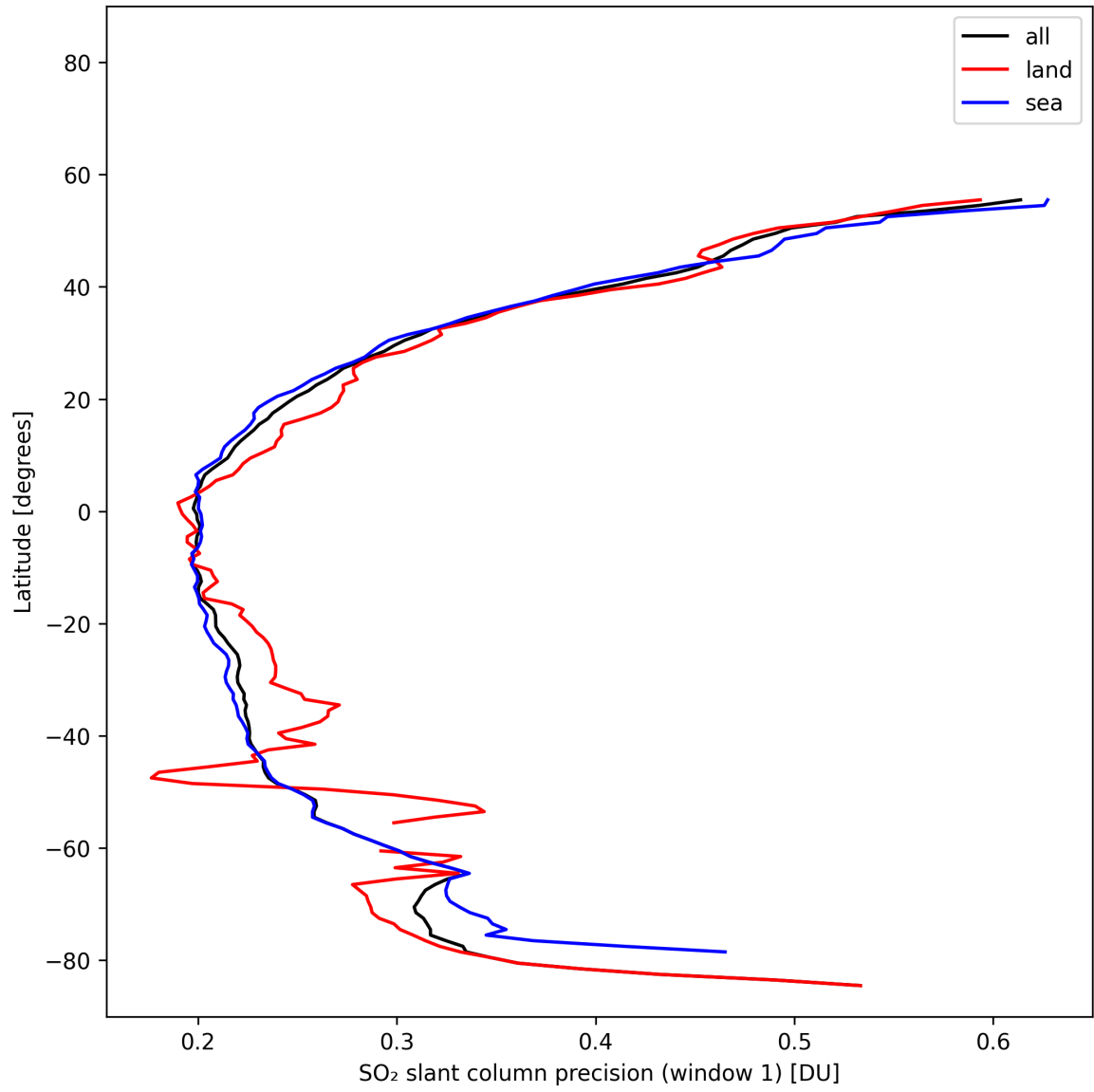


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-02-09 to 2025-02-10.

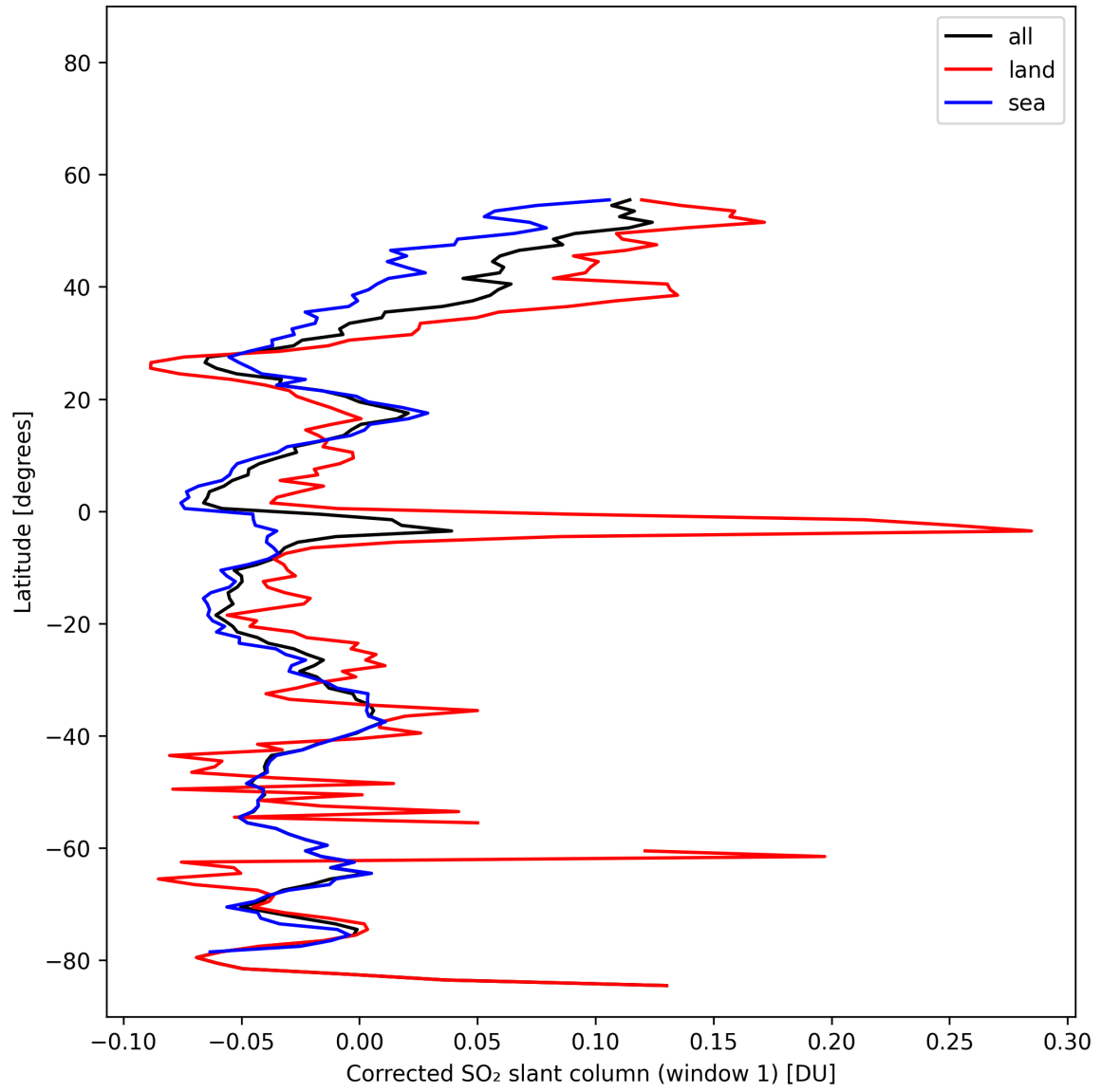


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-02-09 to 2025-02-10.

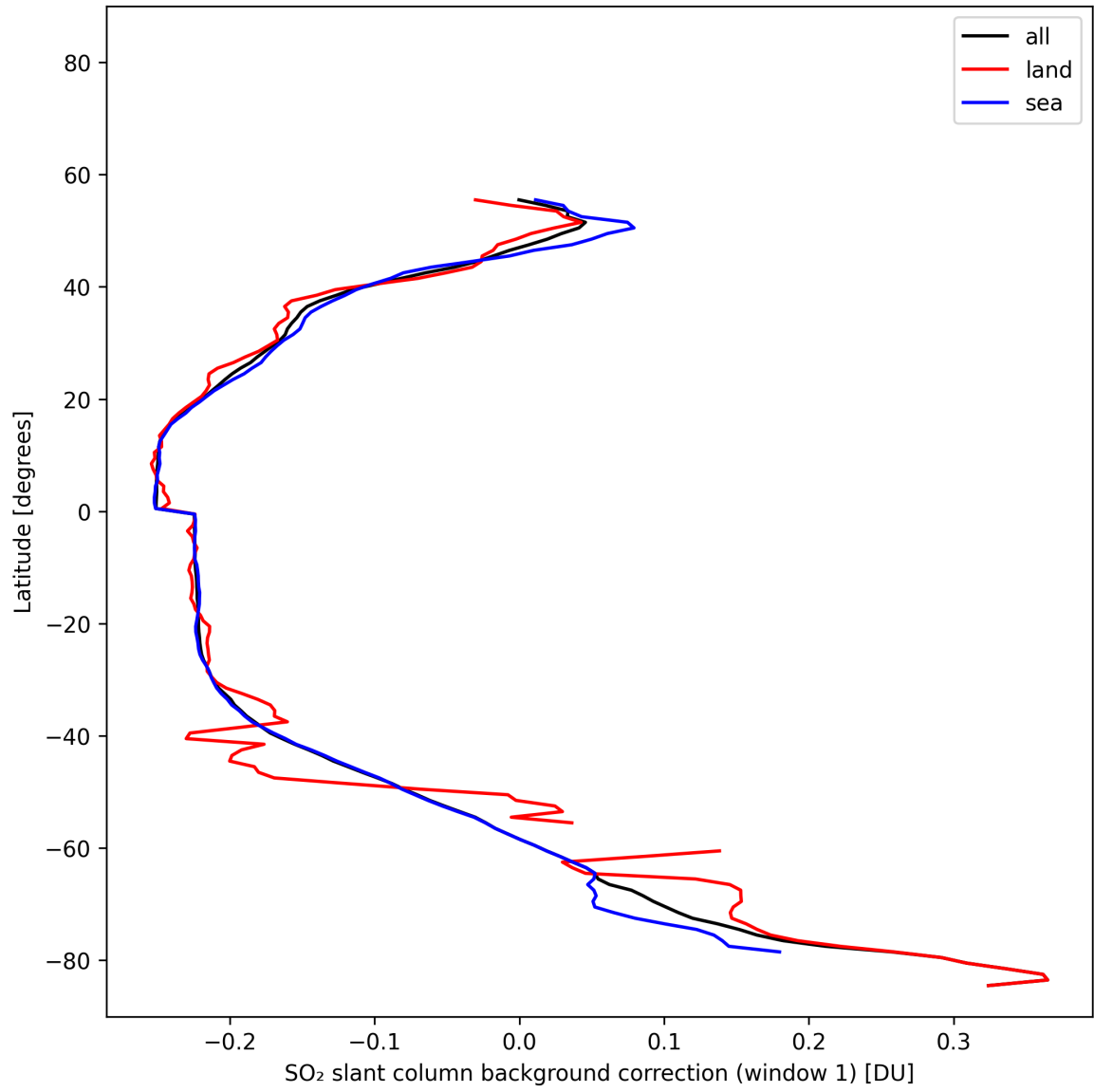


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-02-09 to 2025-02-10.

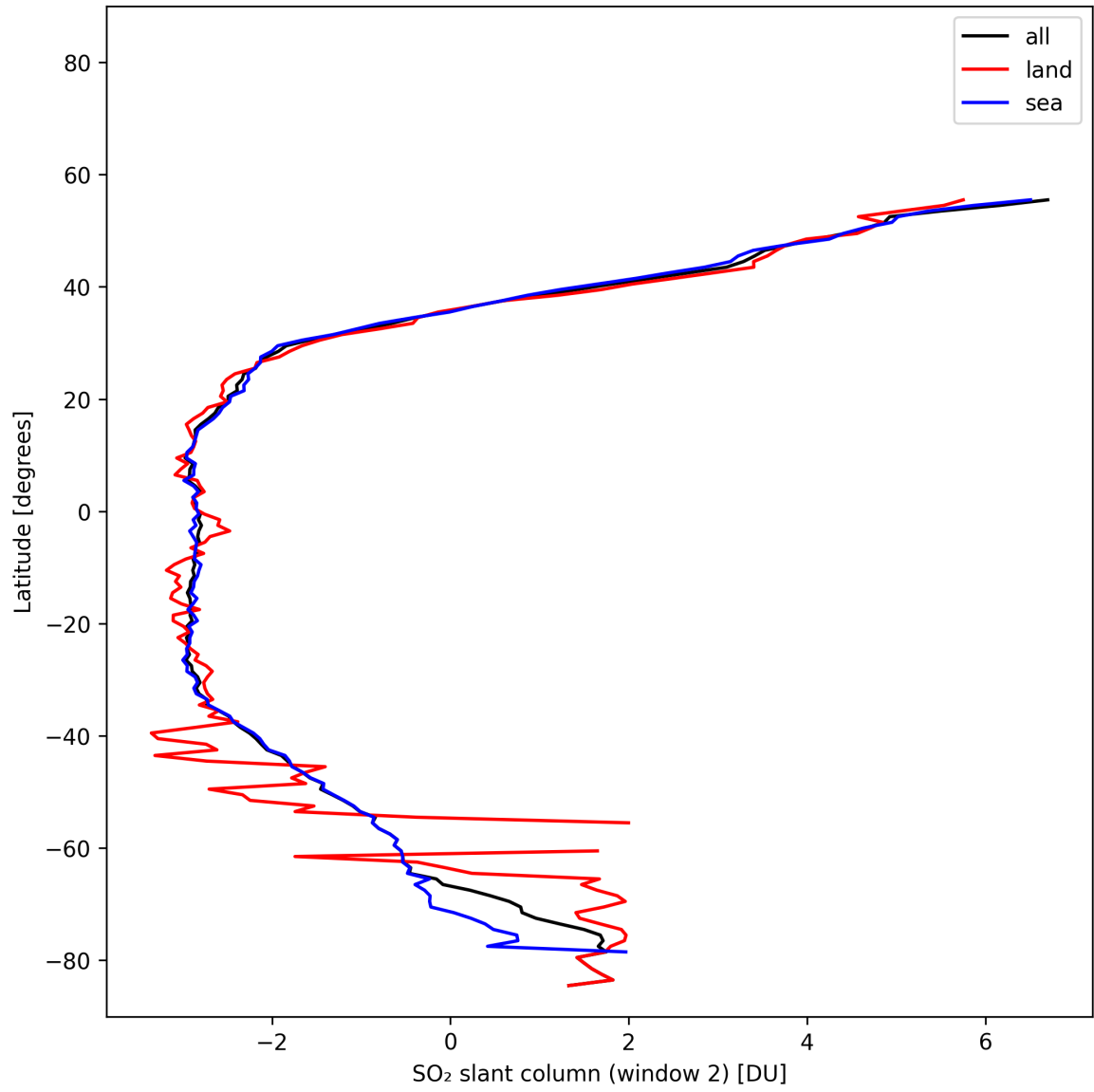


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-02-09 to 2025-02-10.

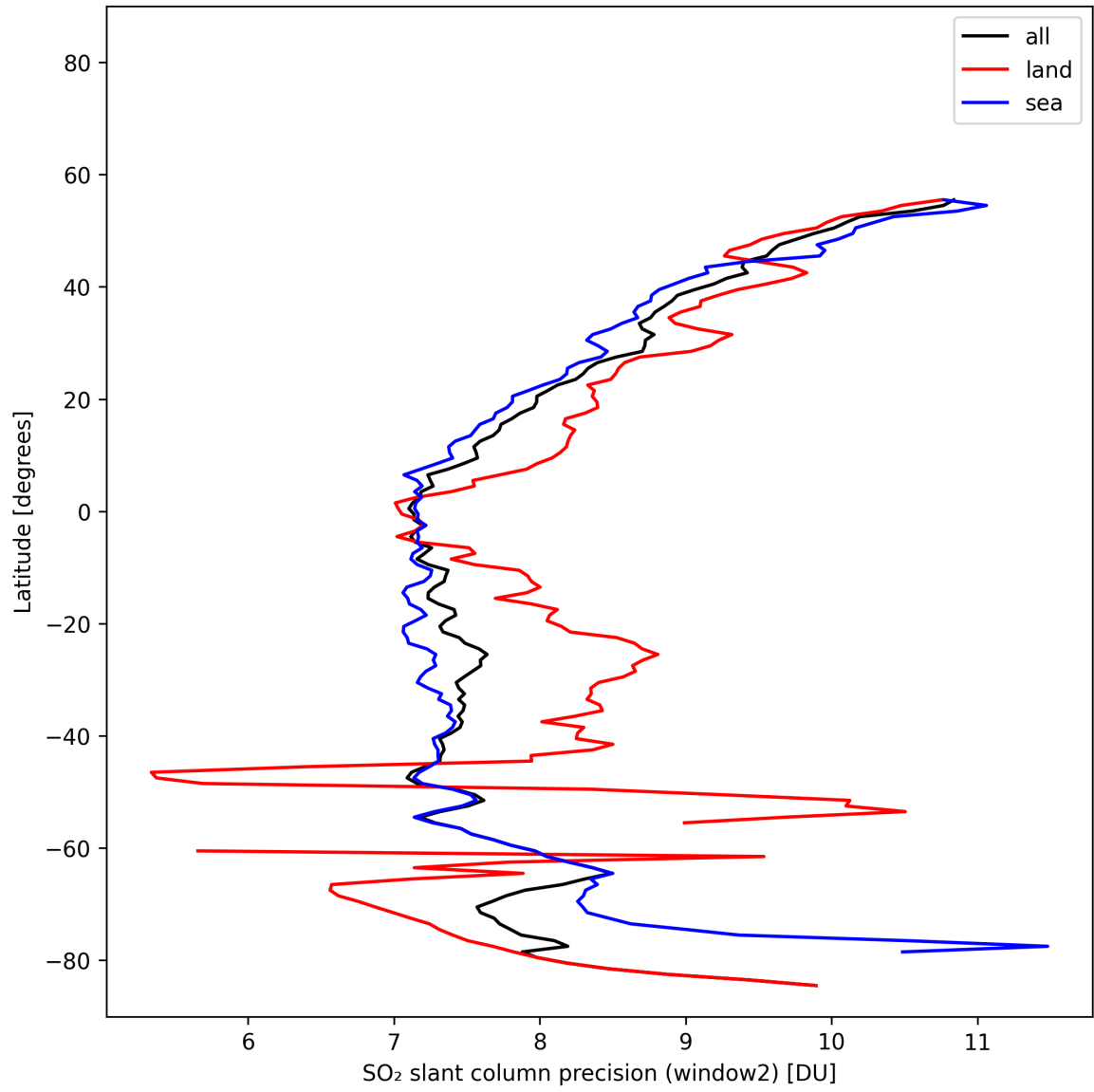


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-02-09 to 2025-02-10.

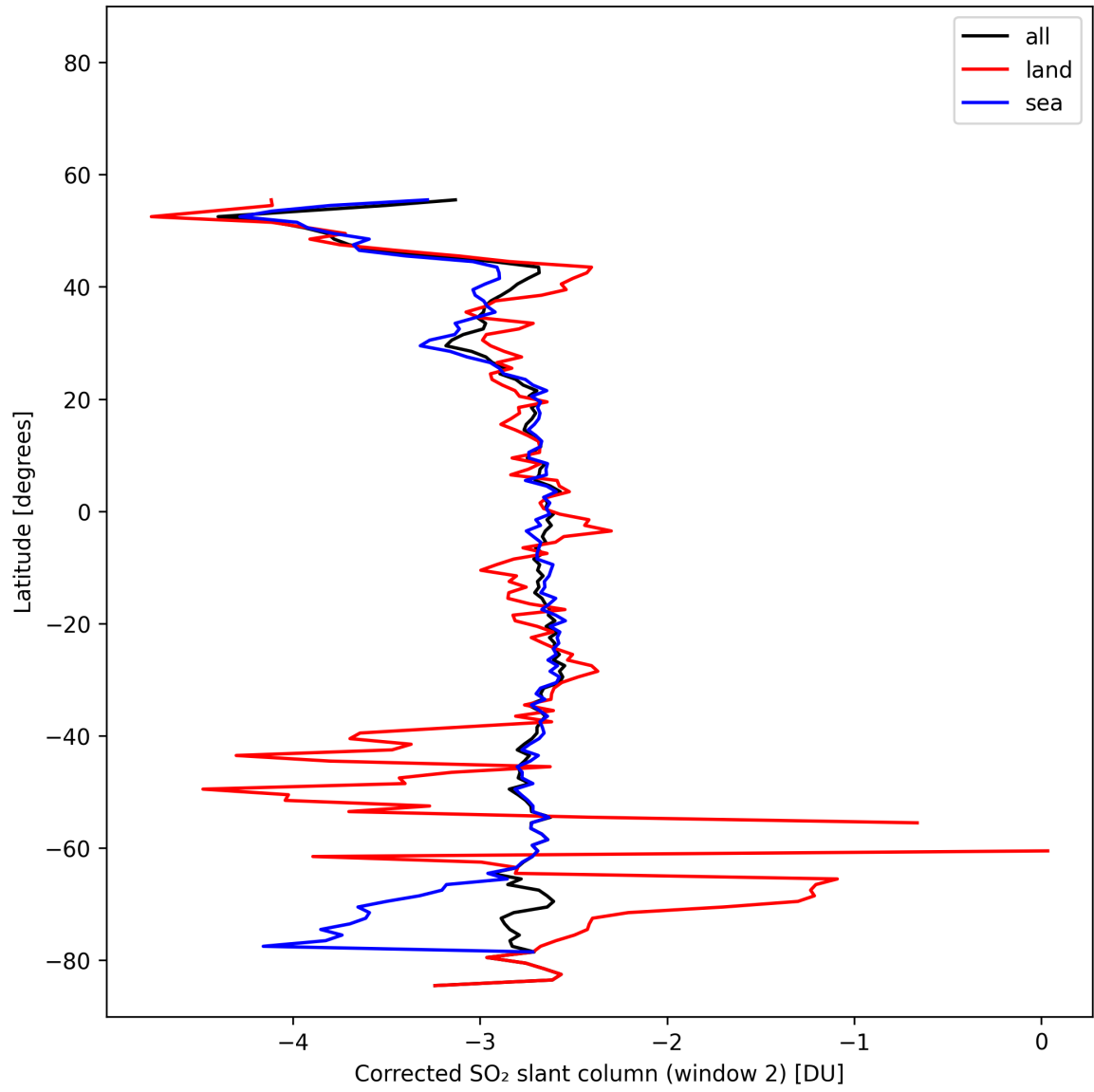


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-02-09 to 2025-02-10.

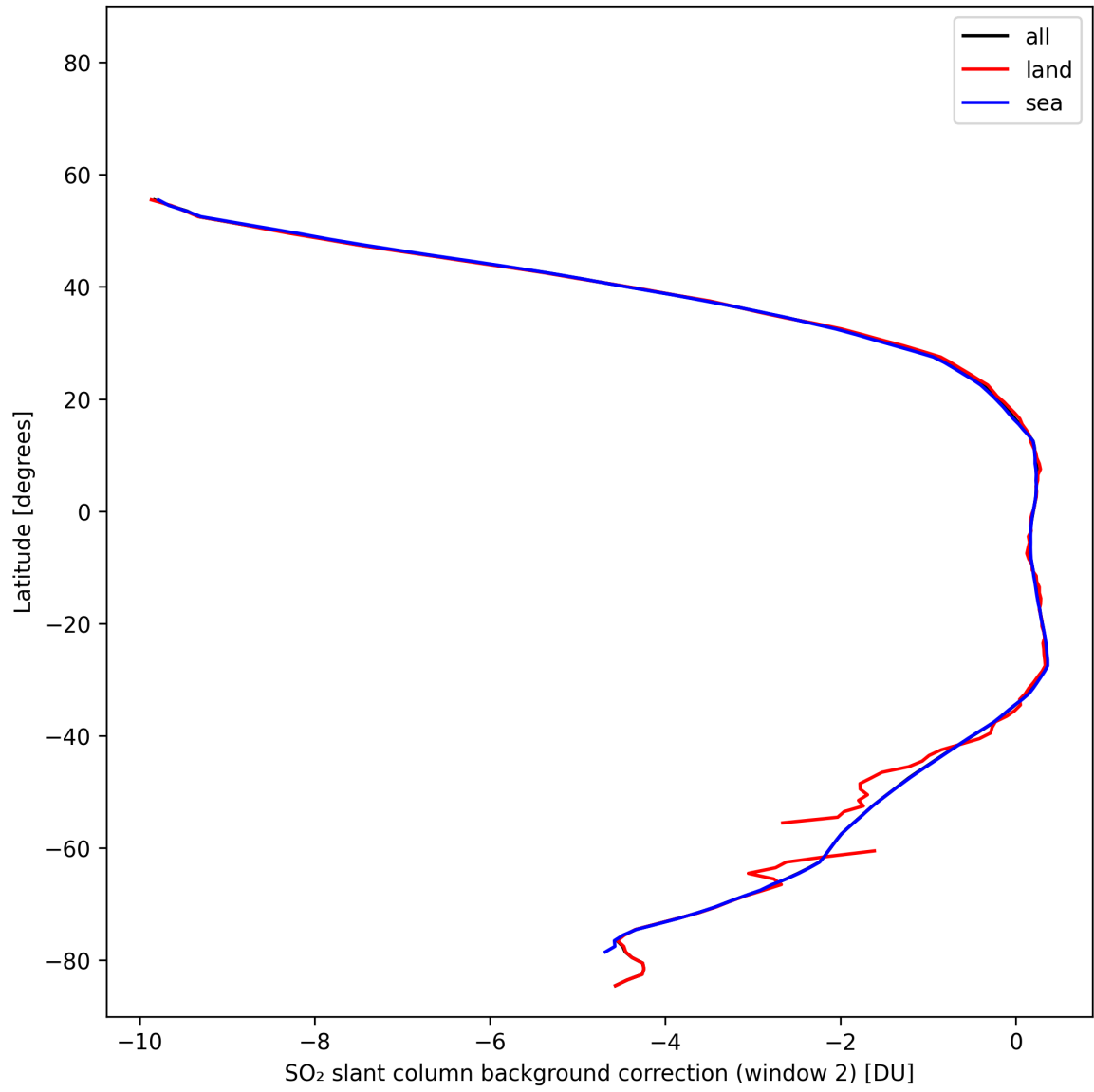


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-02-09 to 2025-02-10.

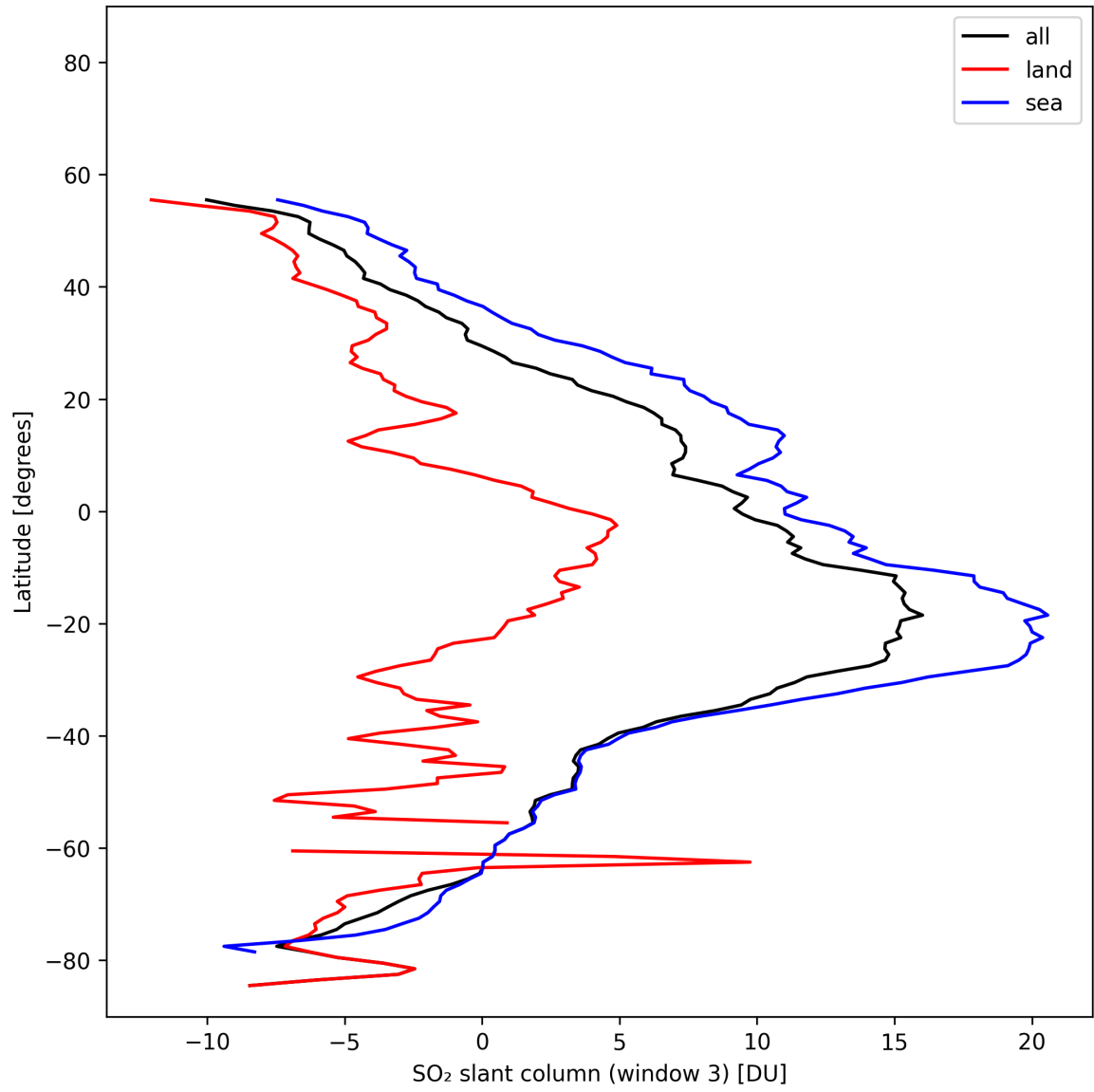


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-02-09 to 2025-02-10.

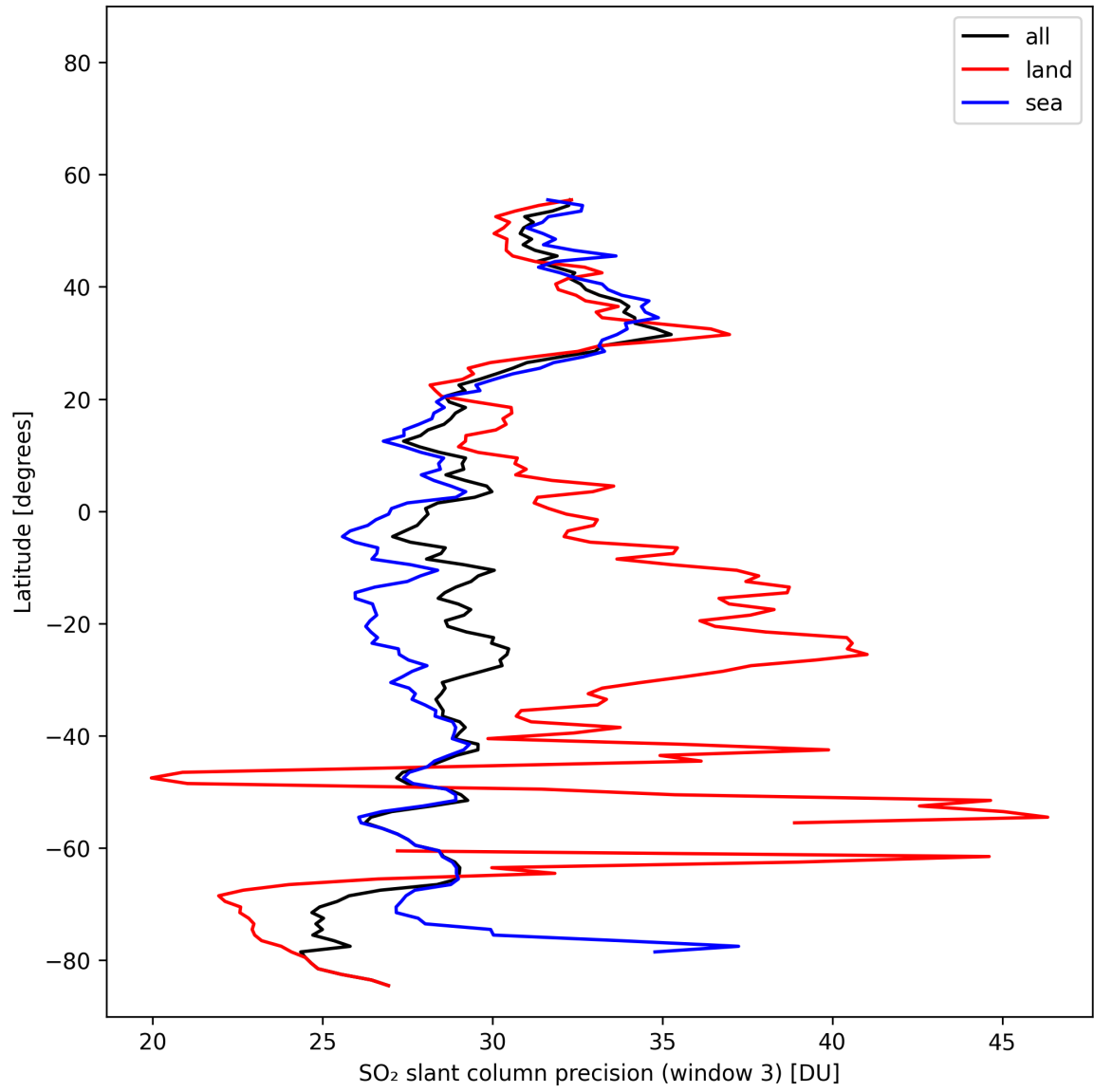


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-02-09 to 2025-02-10.

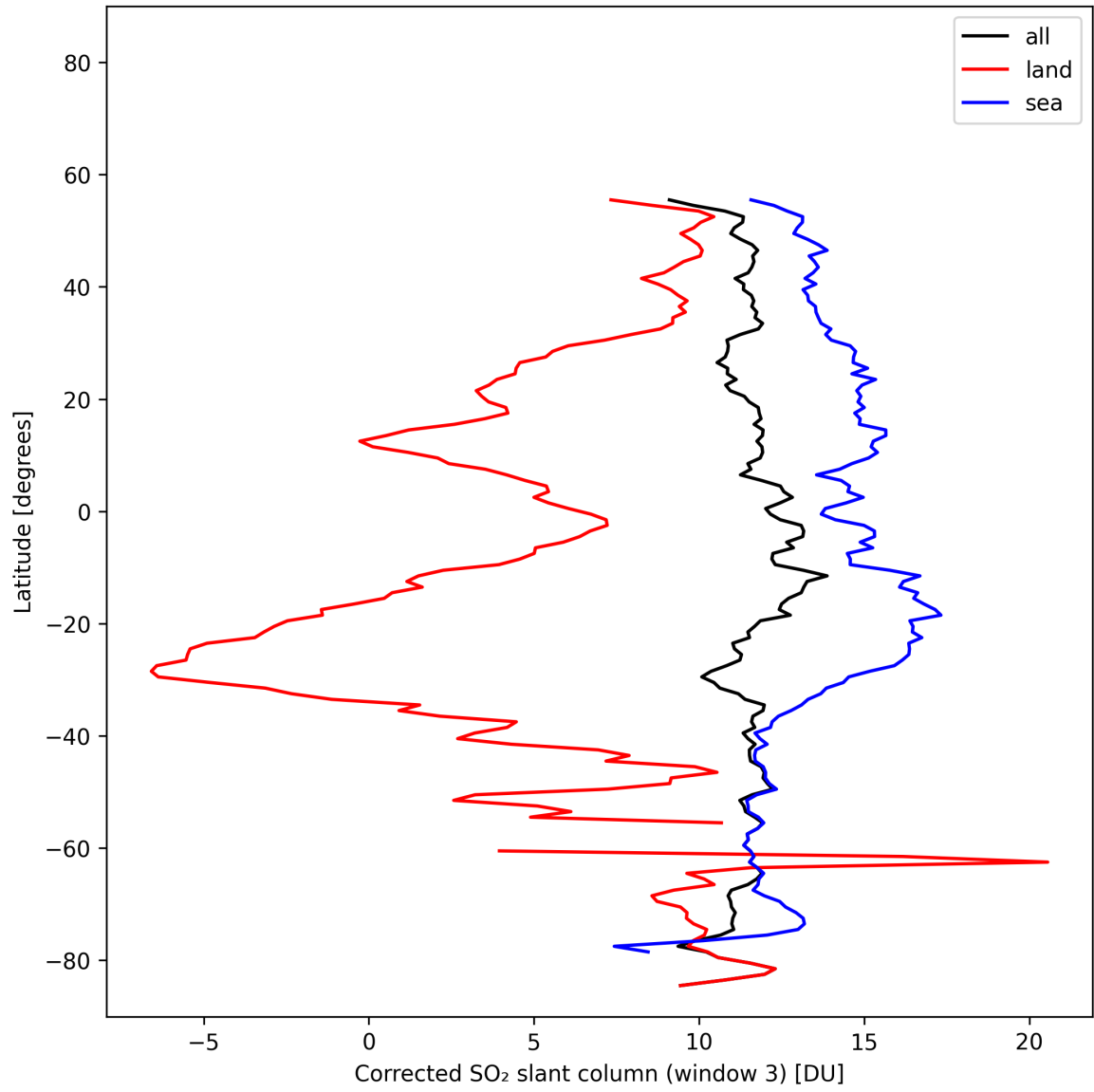


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-02-09 to 2025-02-10.

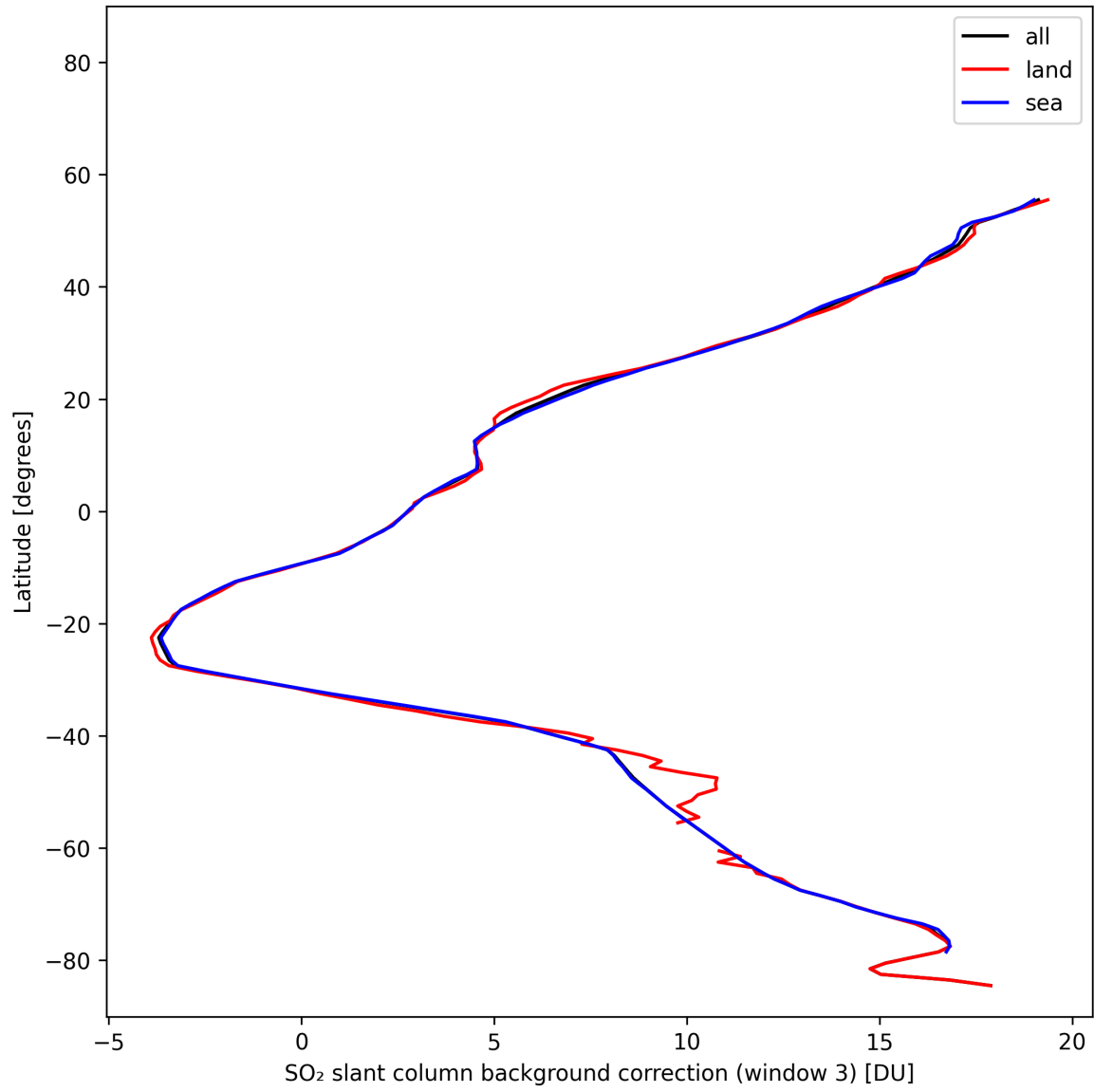


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-02-09 to 2025-02-10.

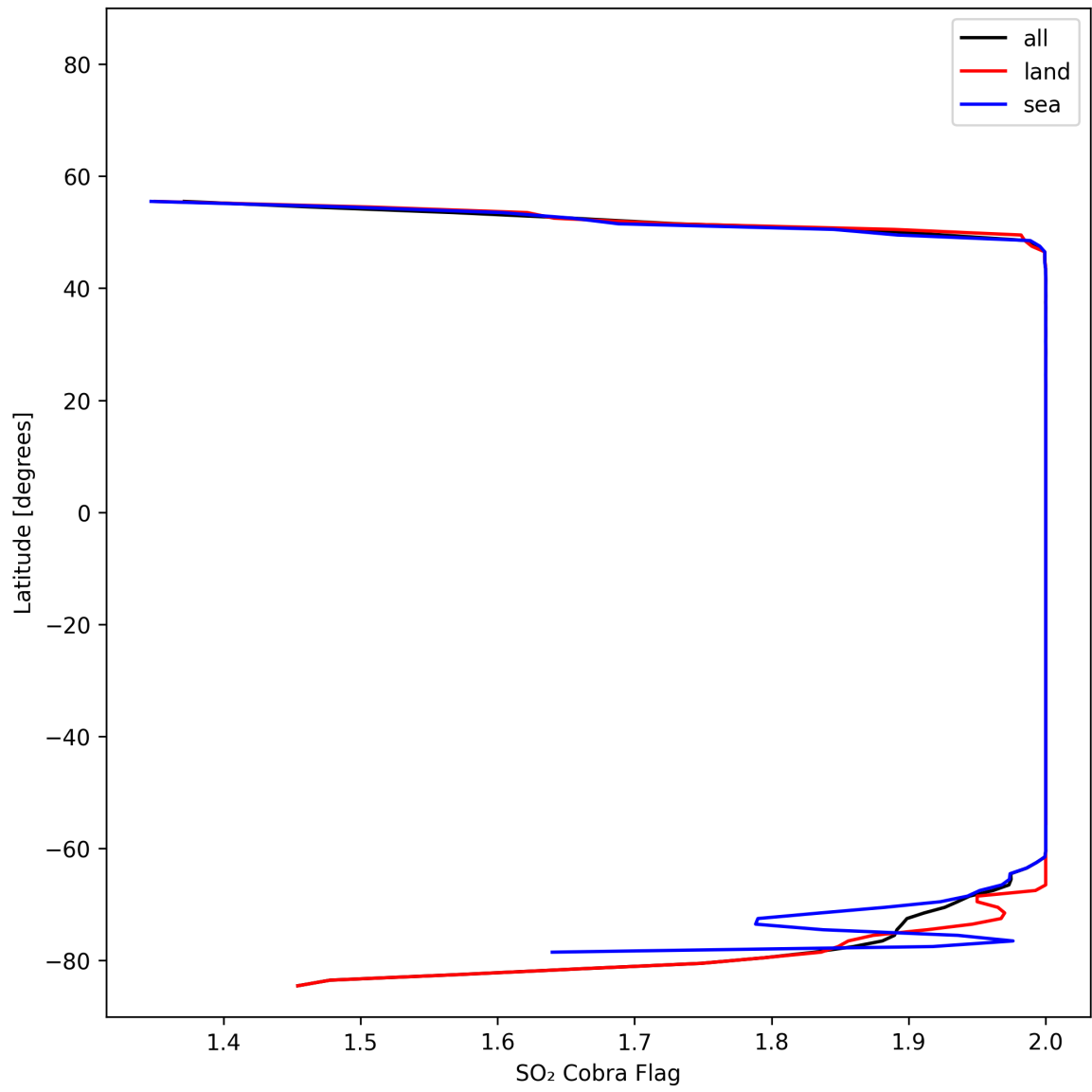


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-02-09 to 2025-02-10.

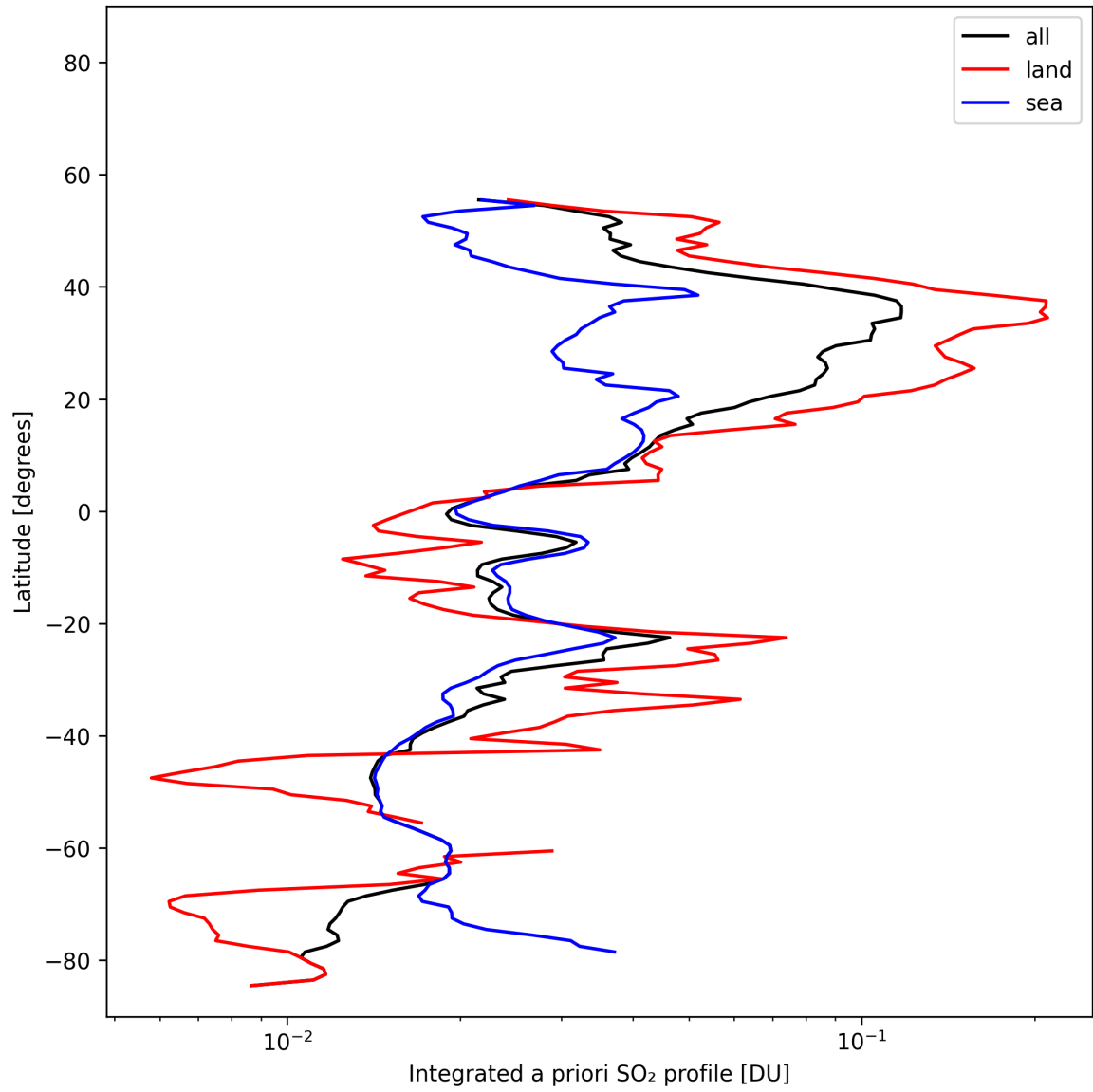


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-02-09 to 2025-02-10.

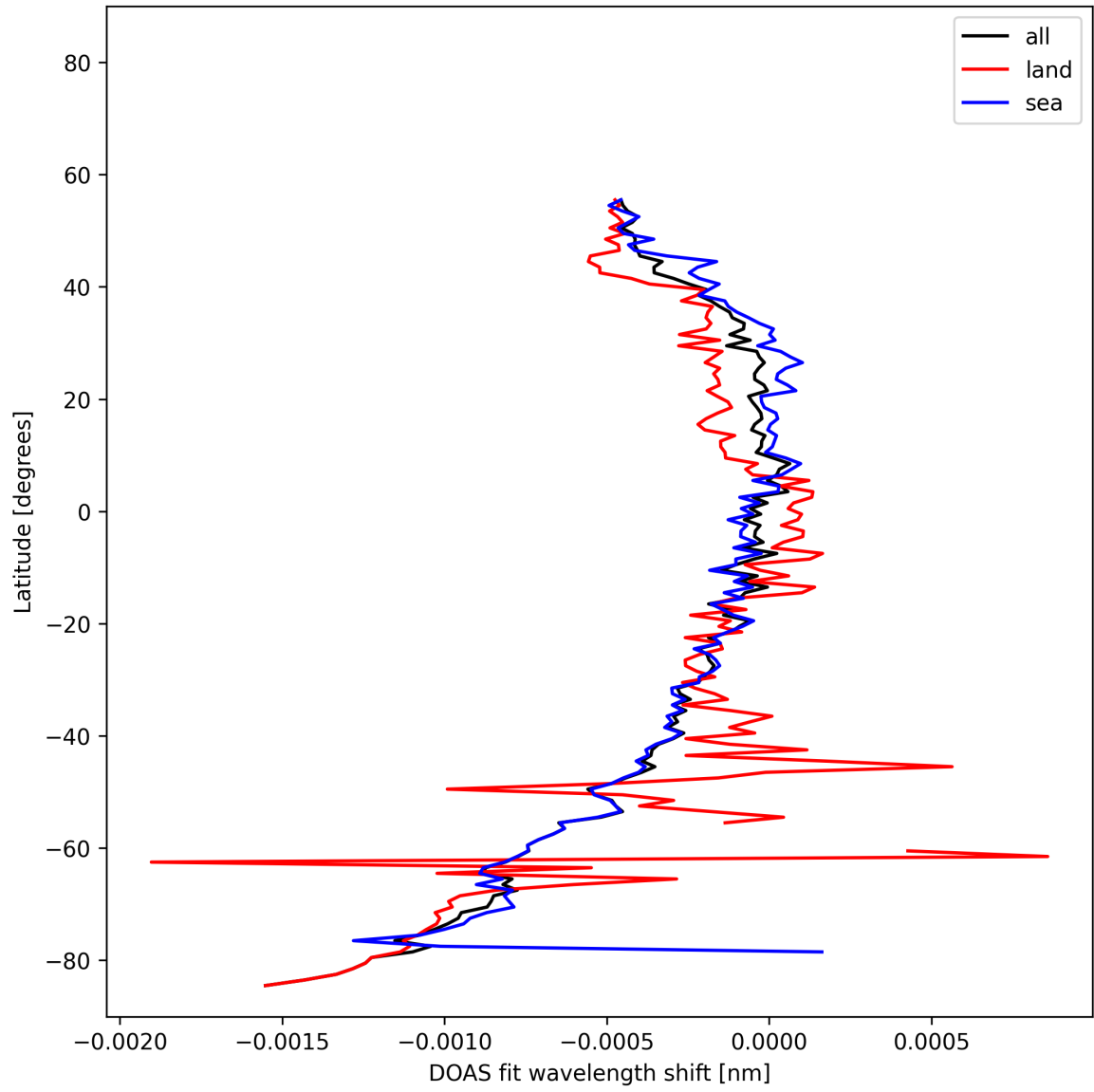


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2025-02-09 to 2025-02-10.

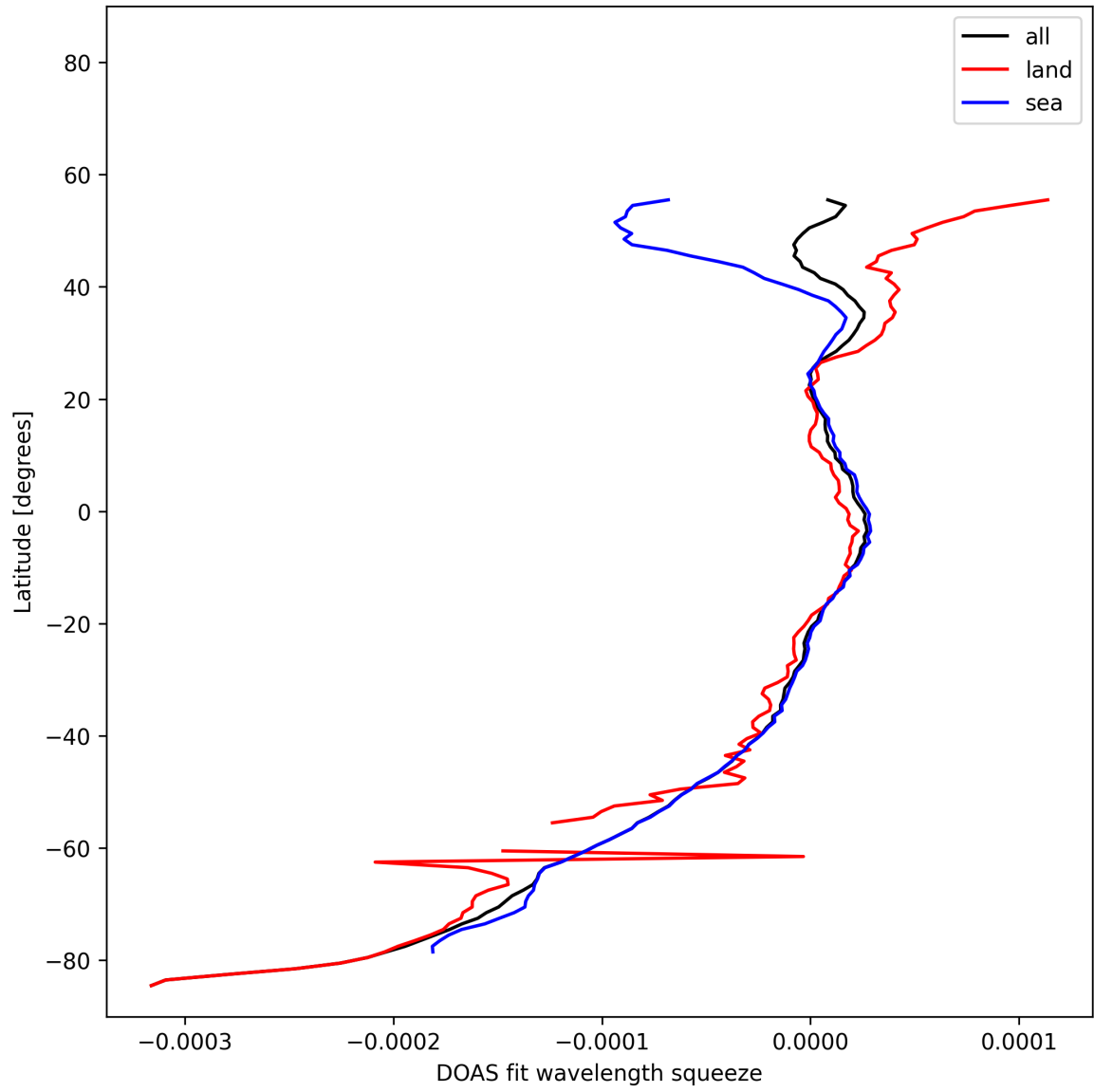


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-02-09 to 2025-02-10.

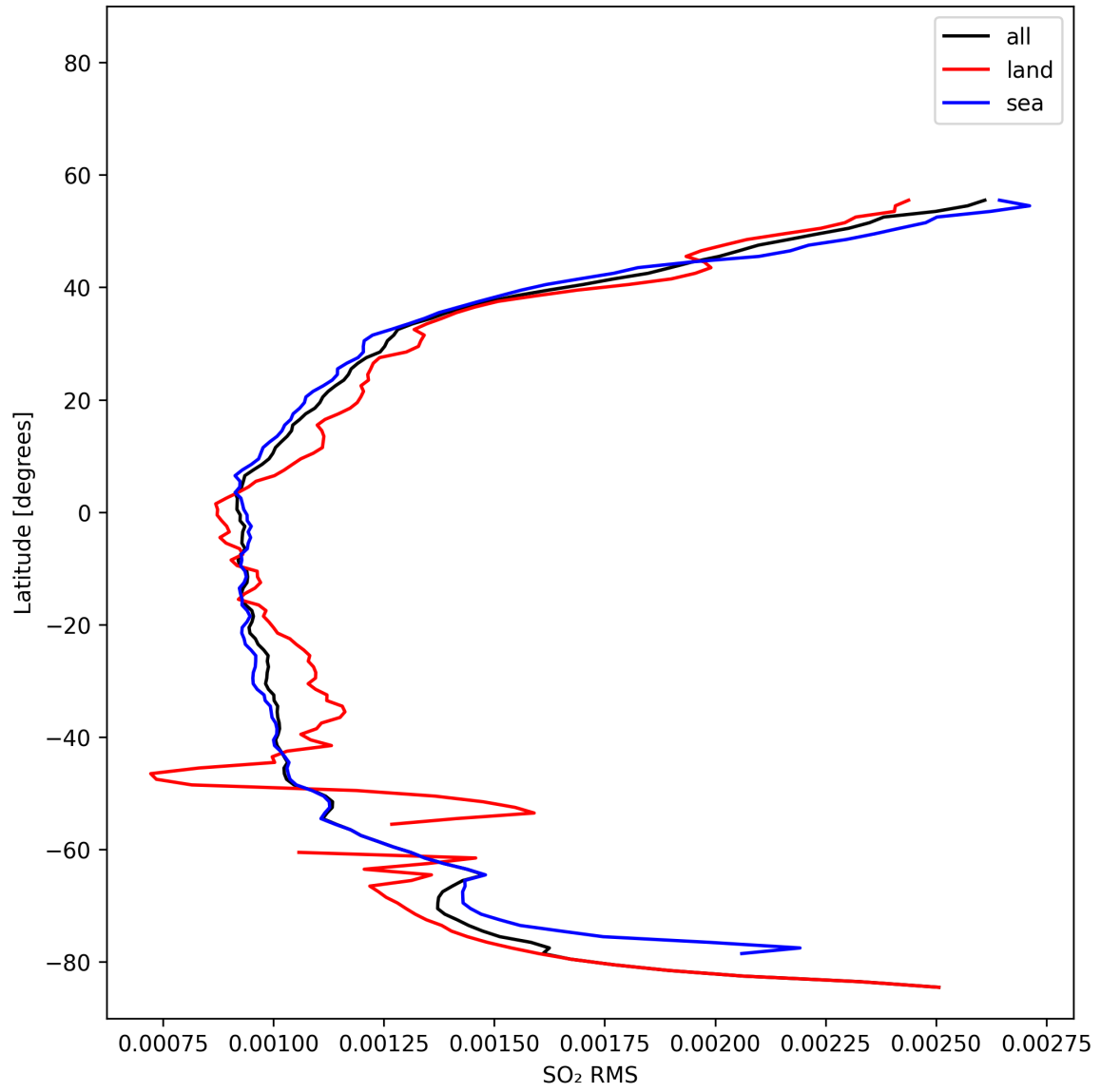


Figure 52: Zonal average of “SO₂ RMS” for 2025-02-09 to 2025-02-10.

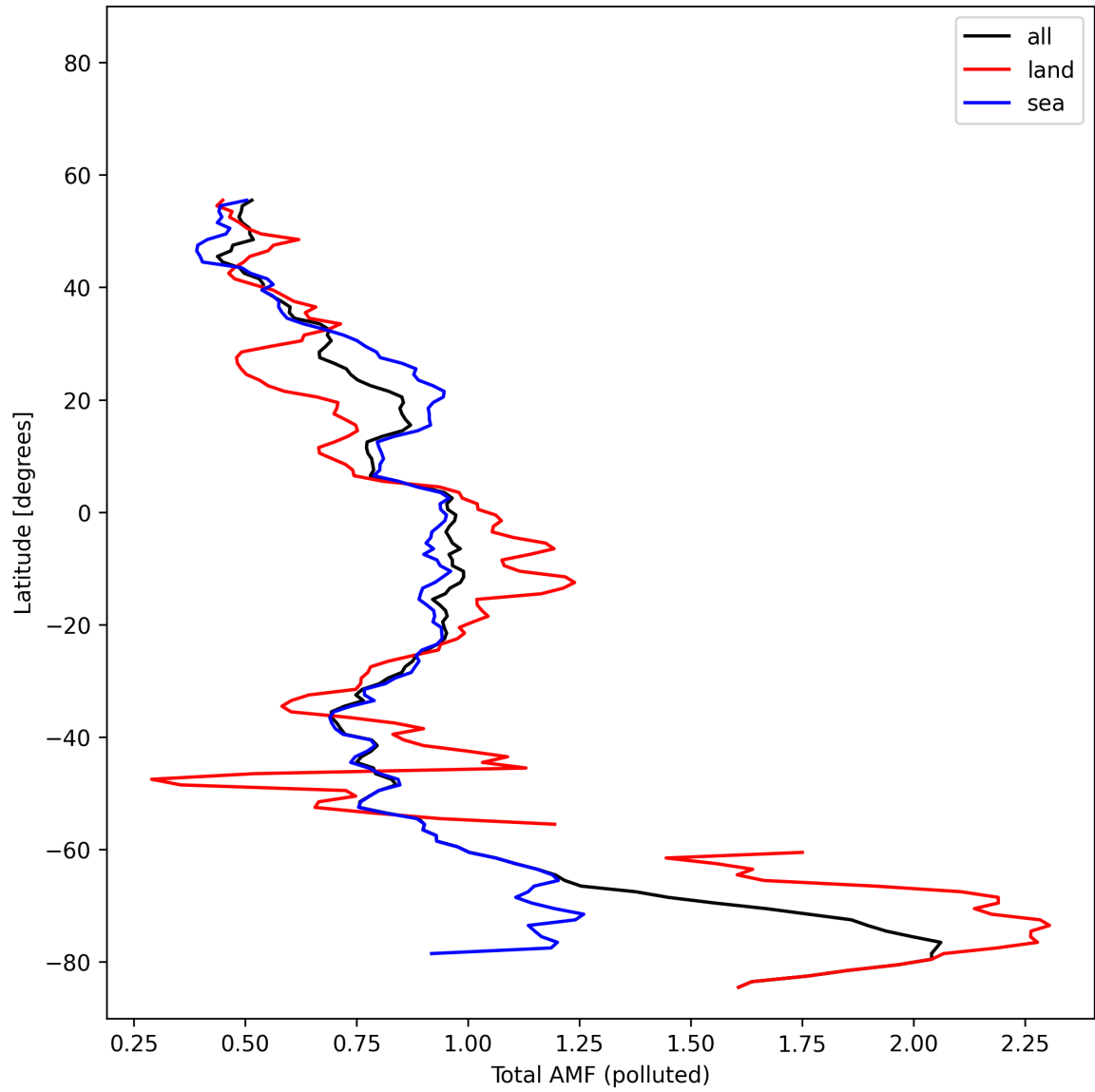


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-02-09 to 2025-02-10.

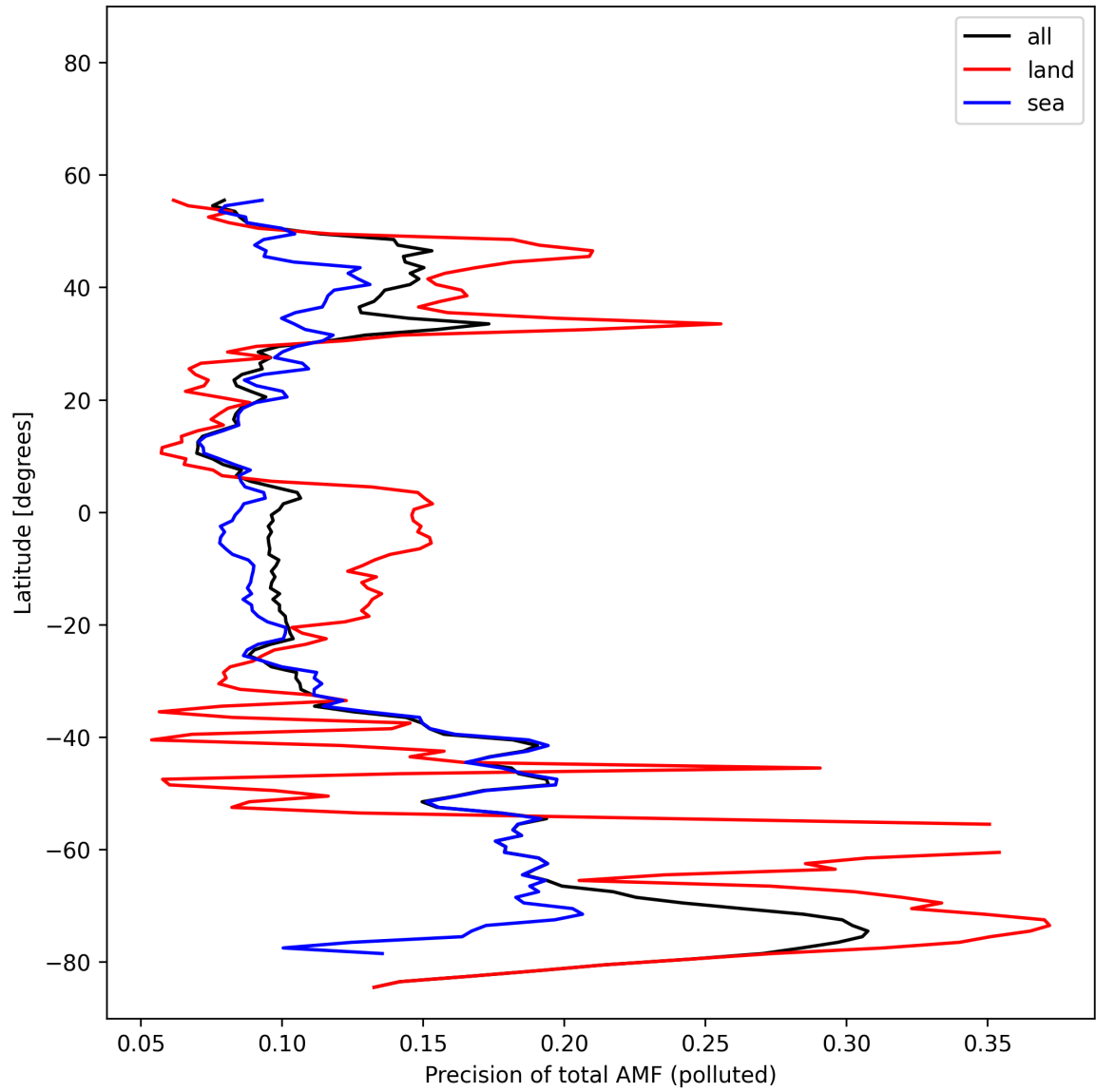


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-02-09 to 2025-02-10.

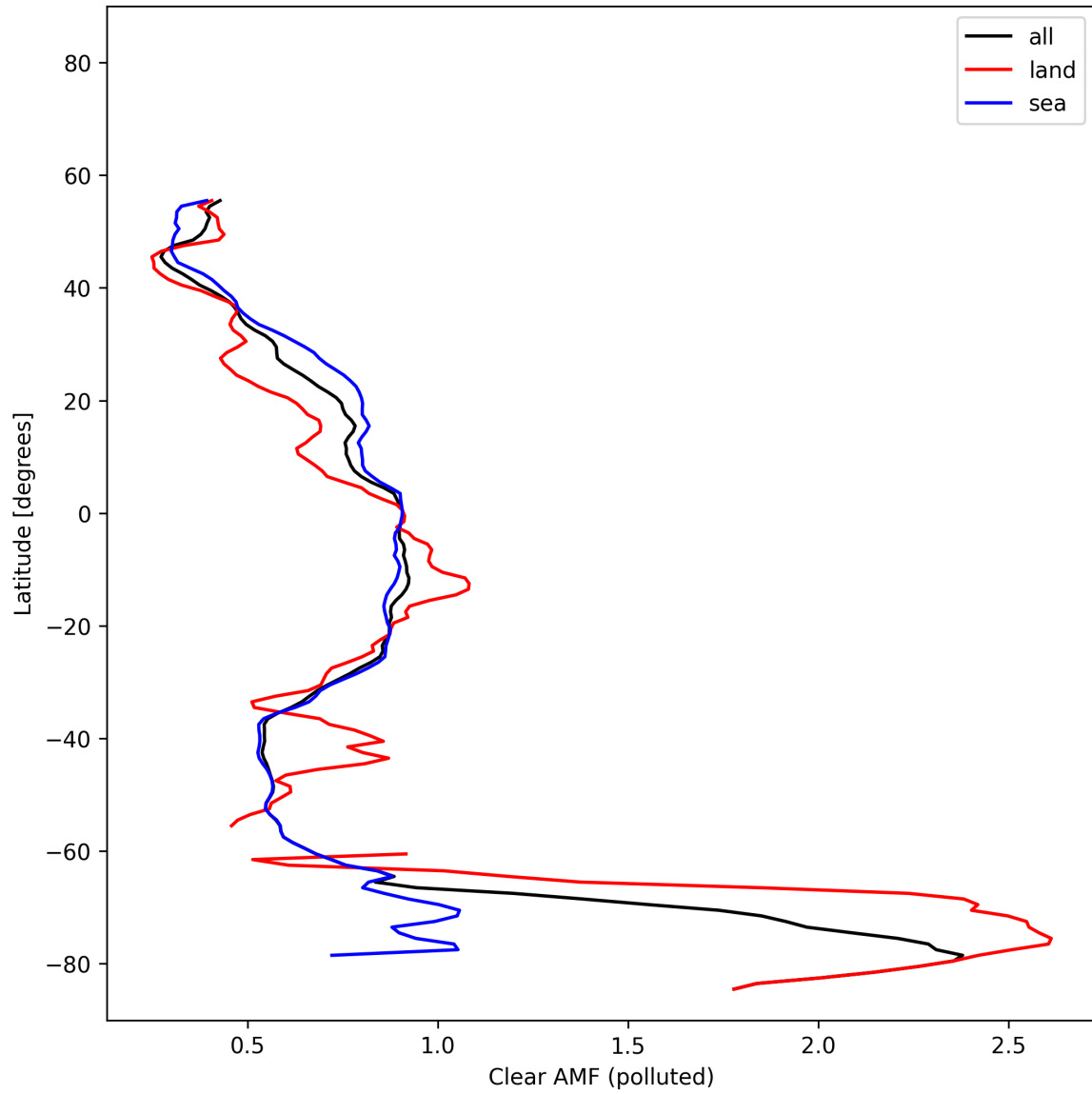


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-02-09 to 2025-02-10.

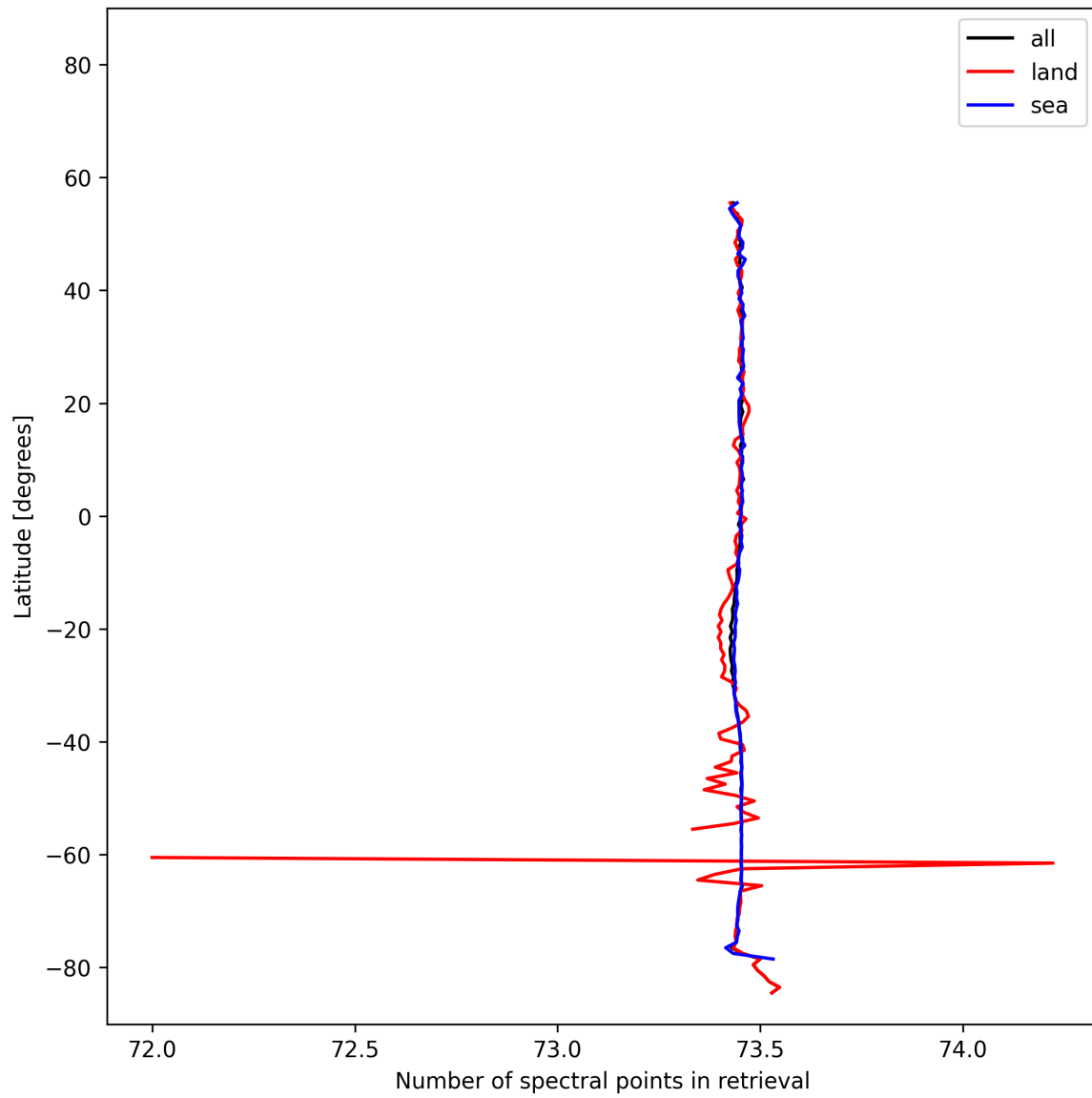


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-02-09 to 2025-02-10.

8 Histograms

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

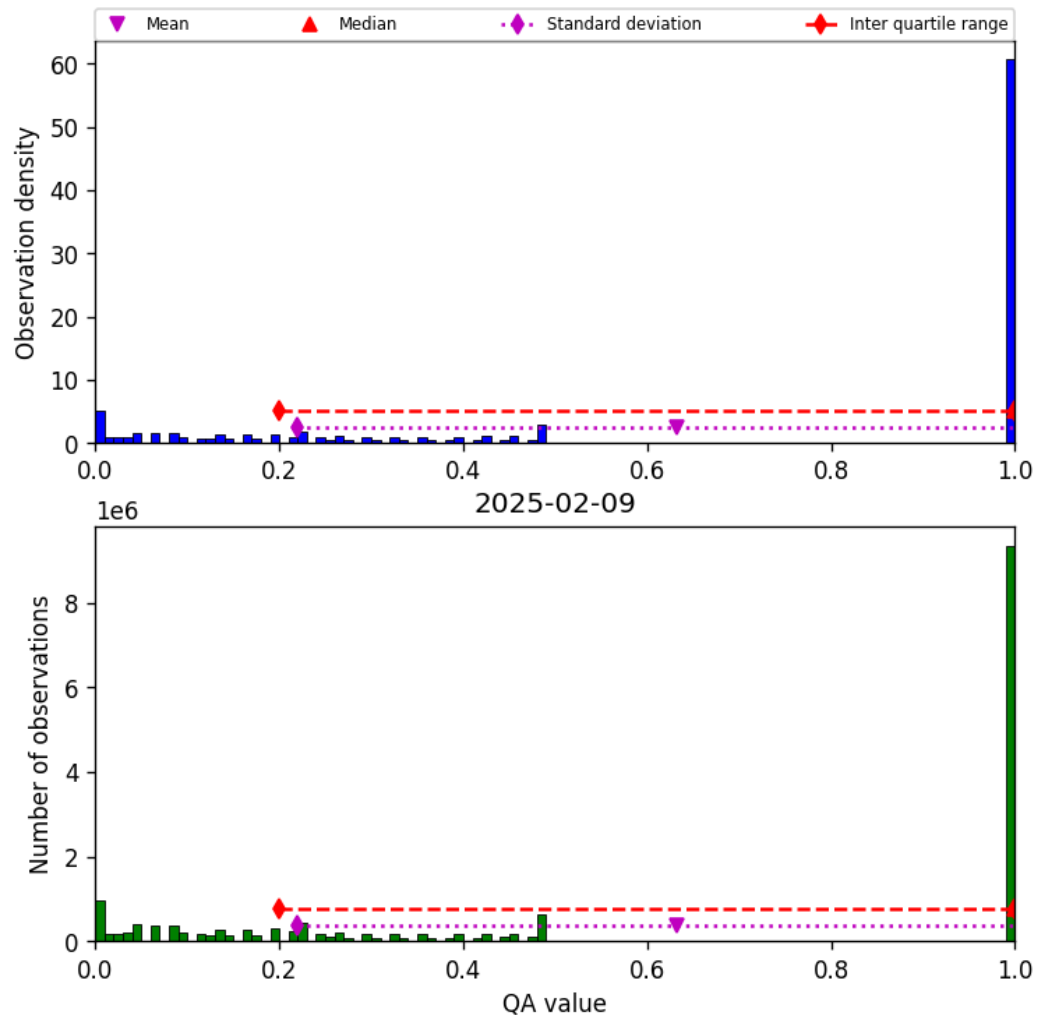


Figure 57: Histogram of “QA value” for 2025-02-09 to 2025-02-10

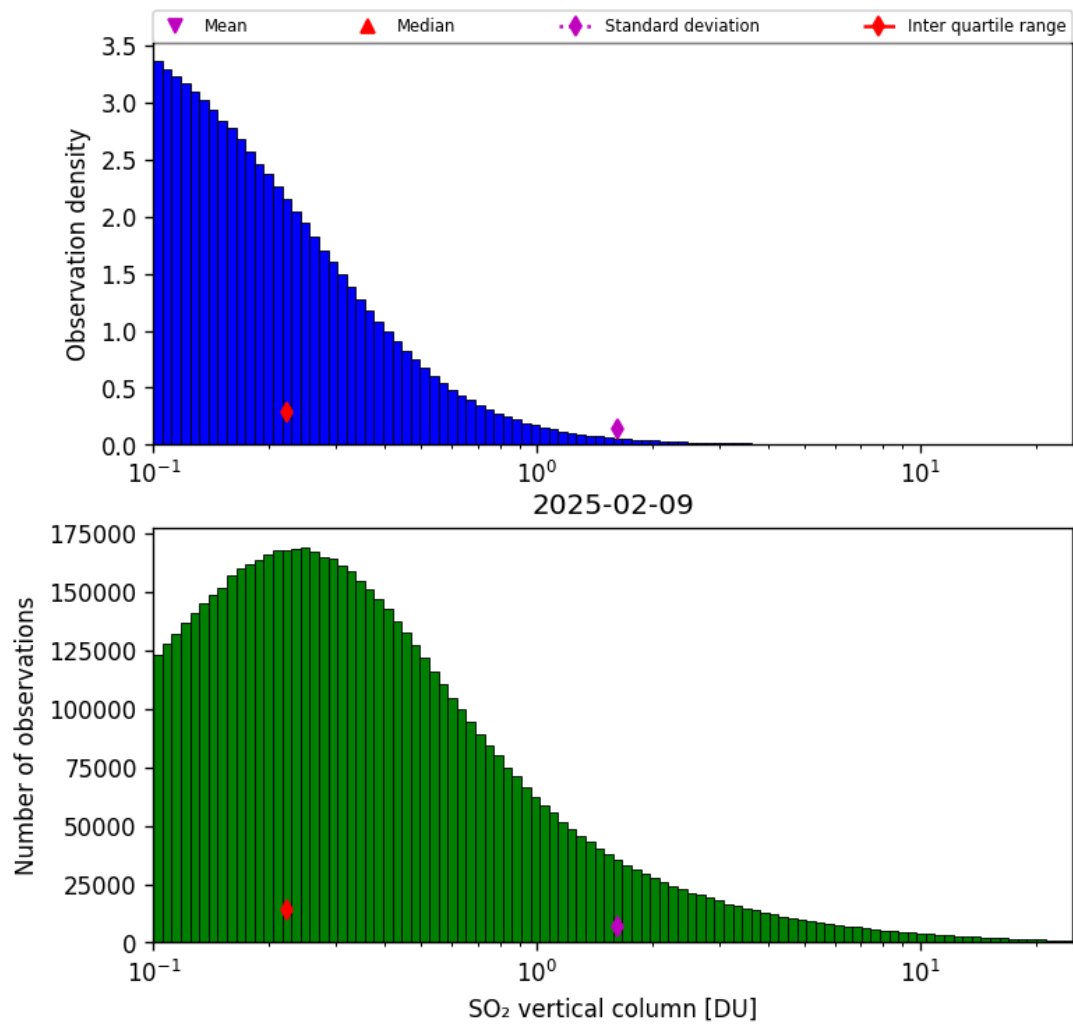


Figure 58: Histogram of “SO₂ vertical column” for 2025-02-09 to 2025-02-10

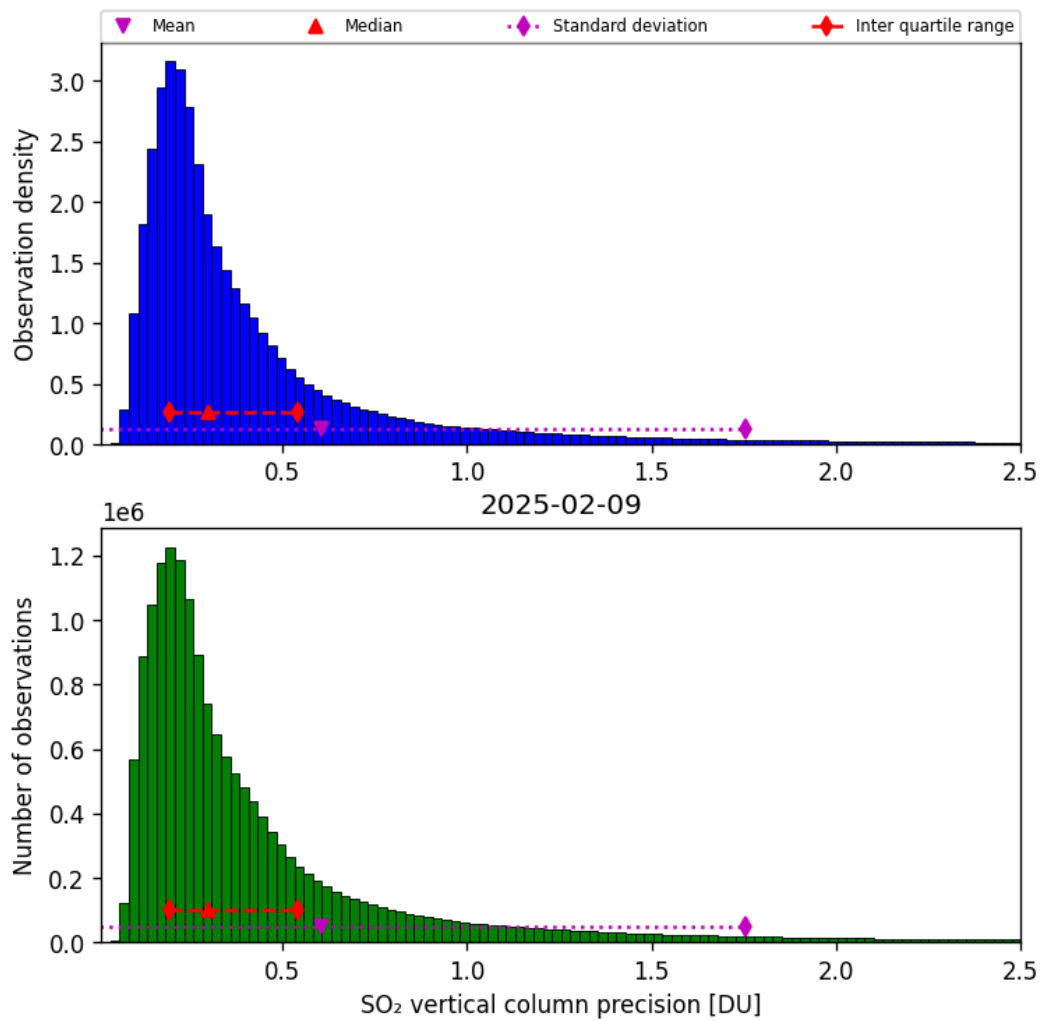


Figure 59: Histogram of "SO₂ vertical column precision" for 2025-02-09 to 2025-02-10

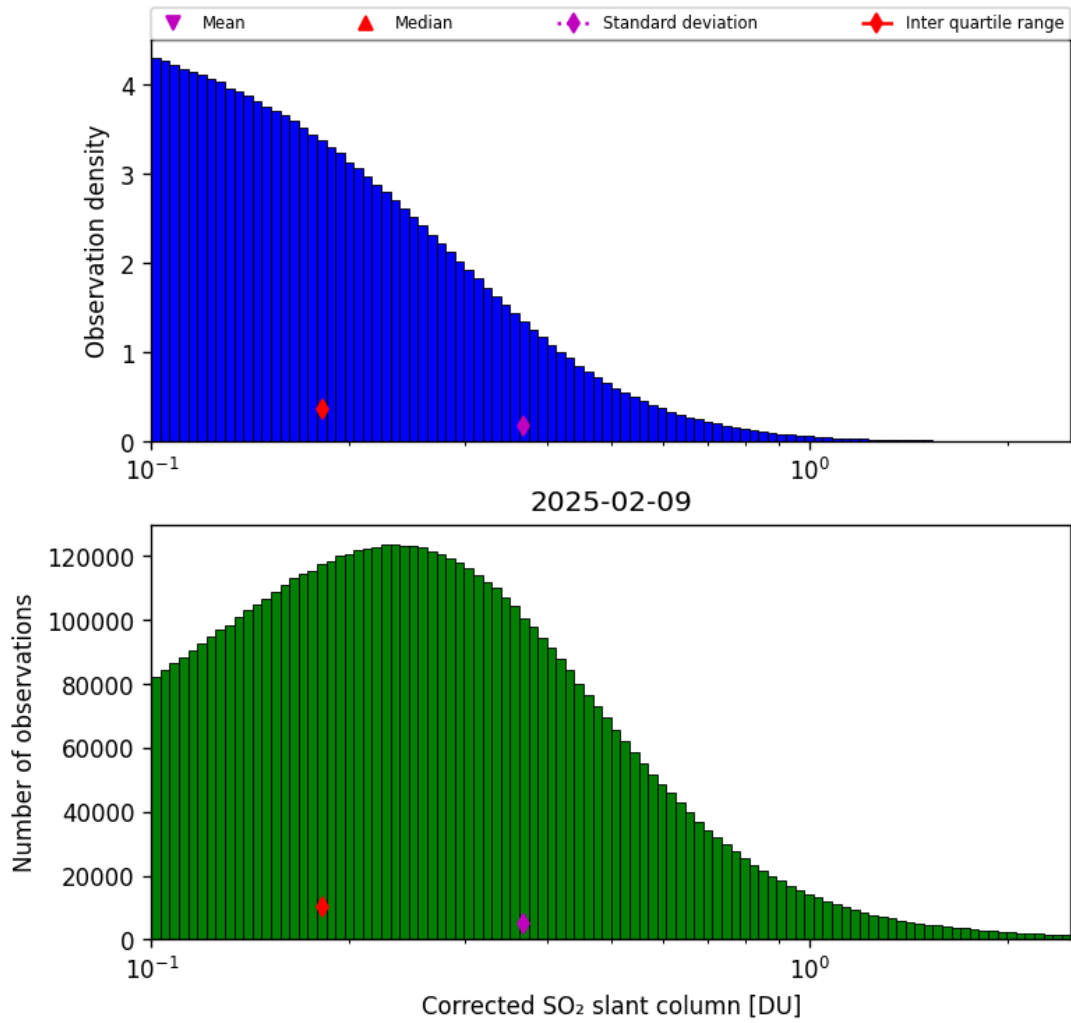


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-02-09 to 2025-02-10

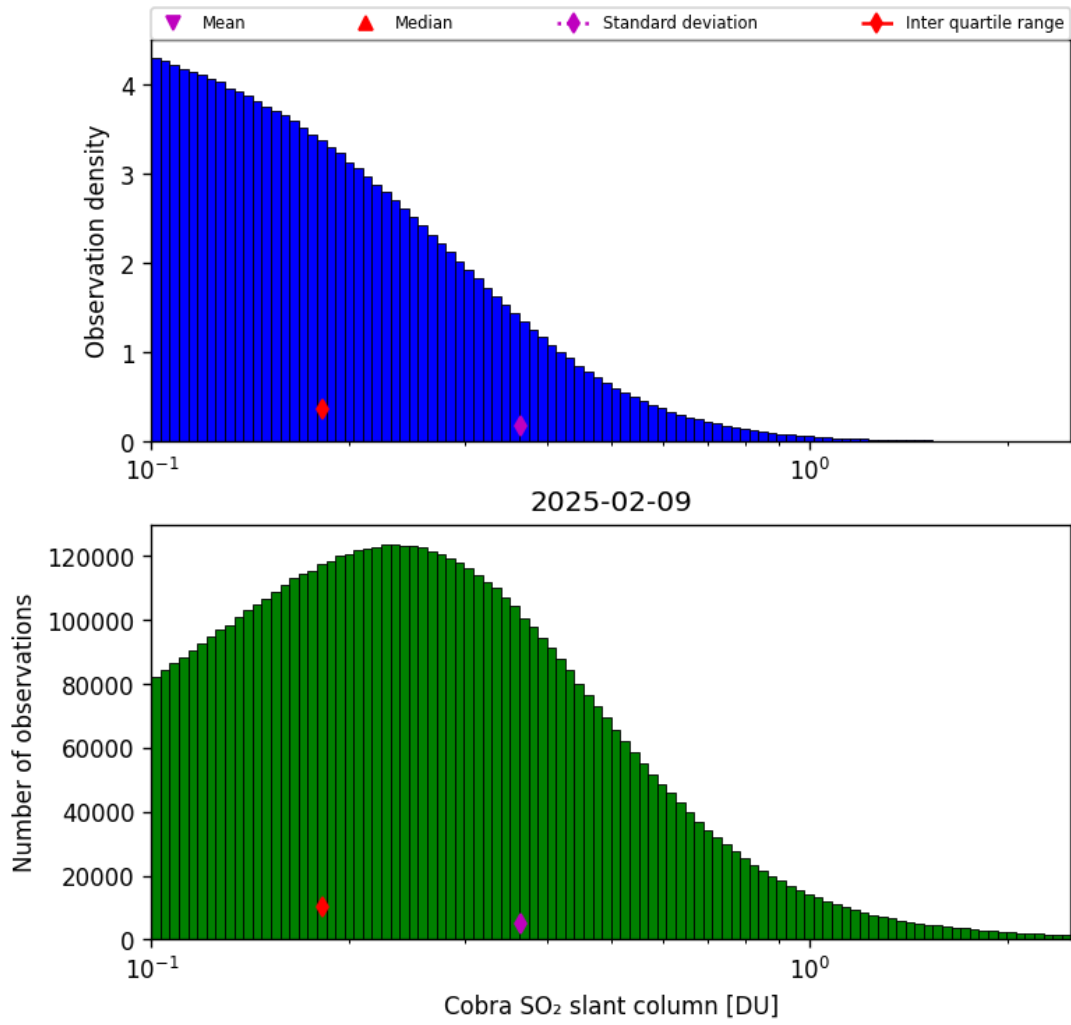


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-02-09 to 2025-02-10

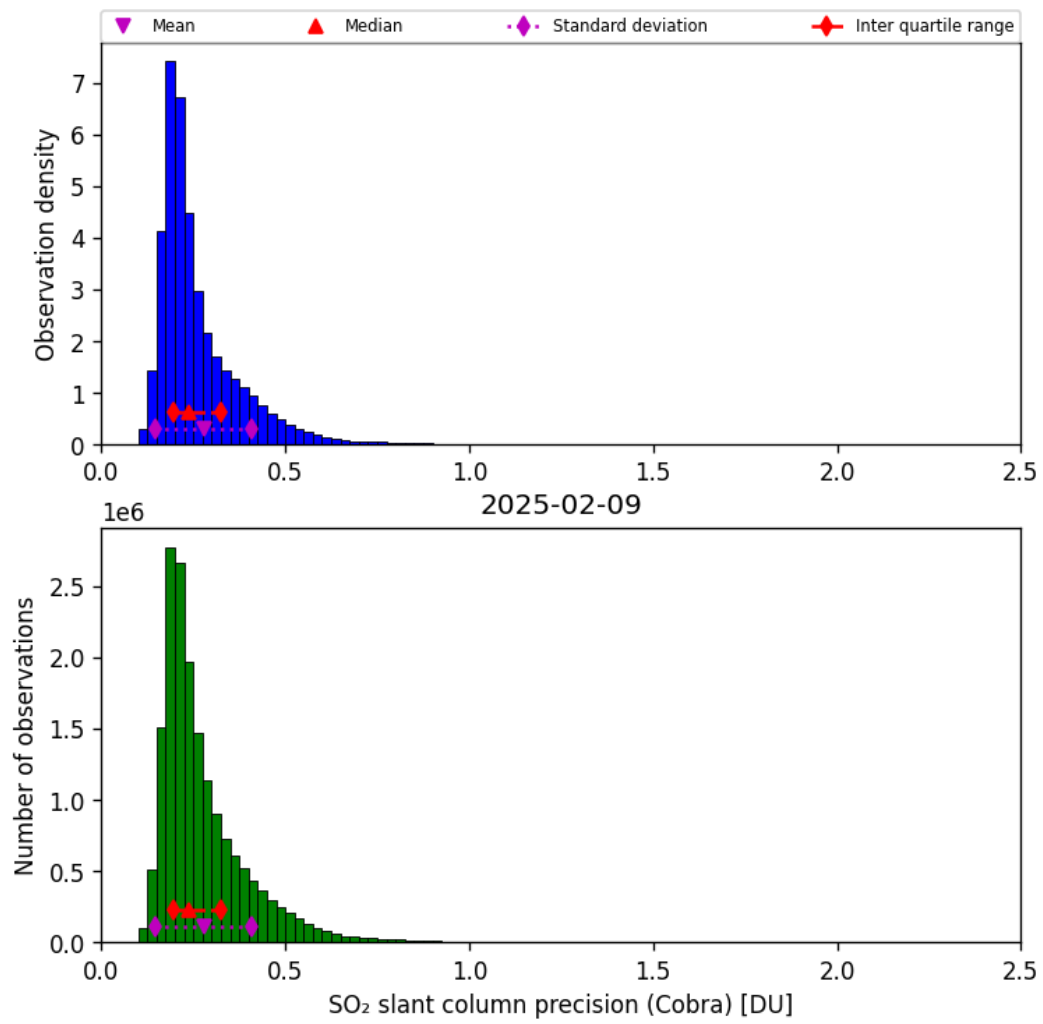


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-02-09 to 2025-02-10

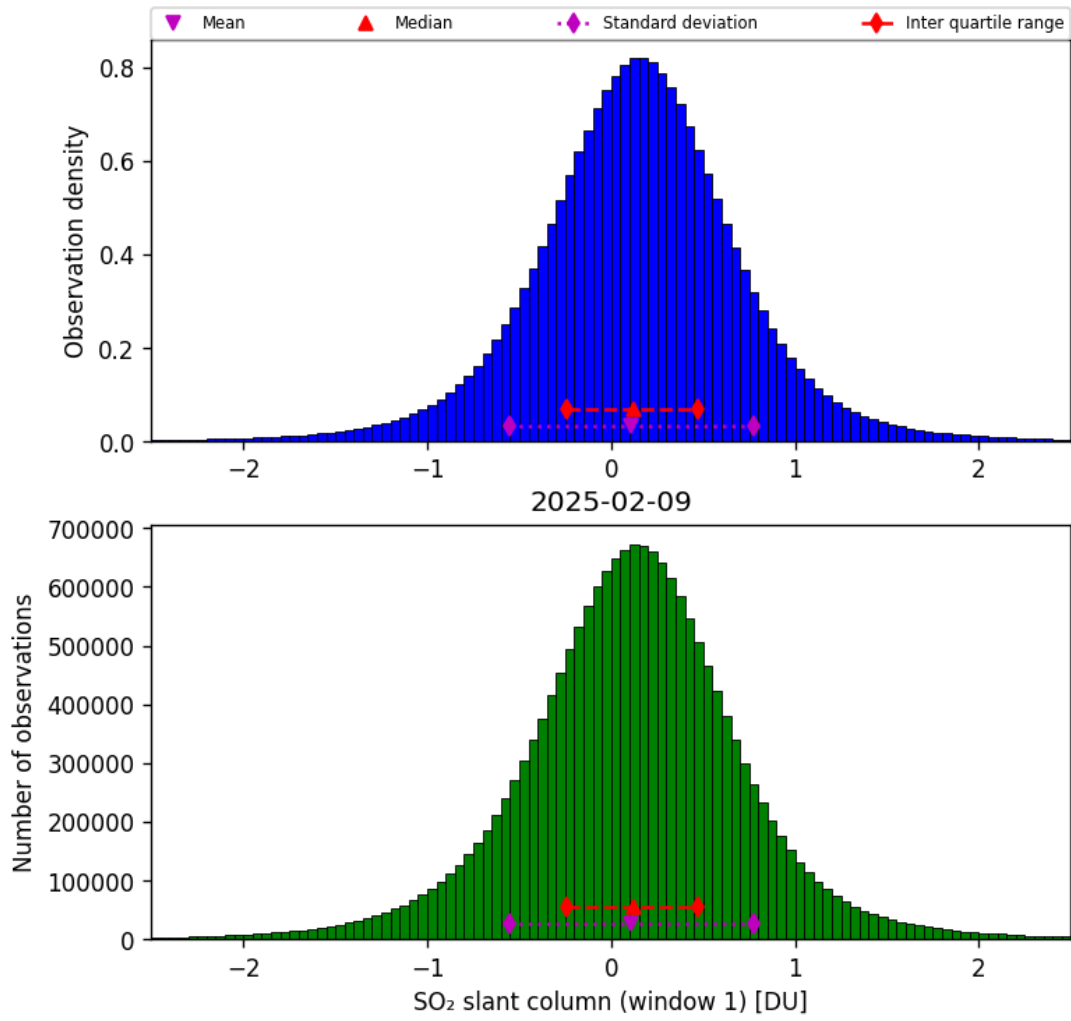


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-02-09 to 2025-02-10

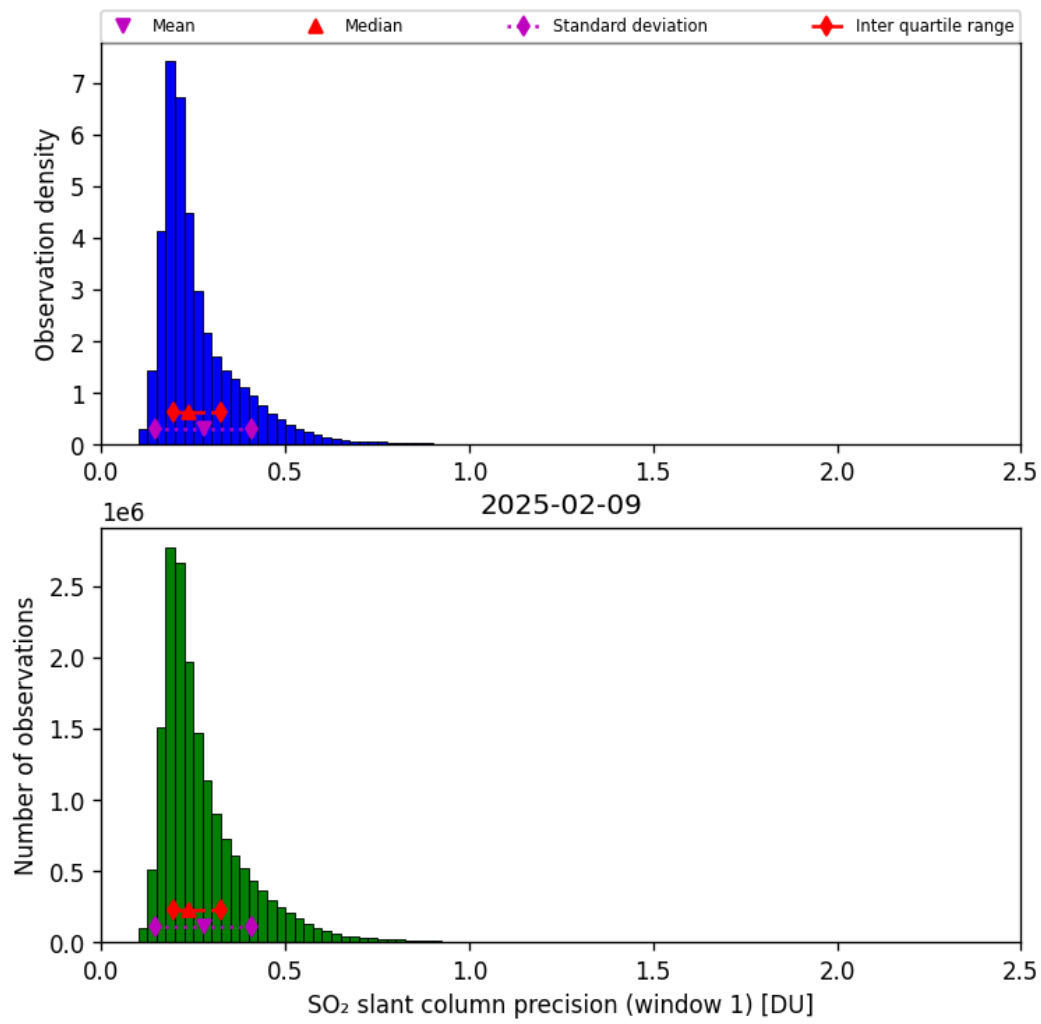


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-02-09 to 2025-02-10

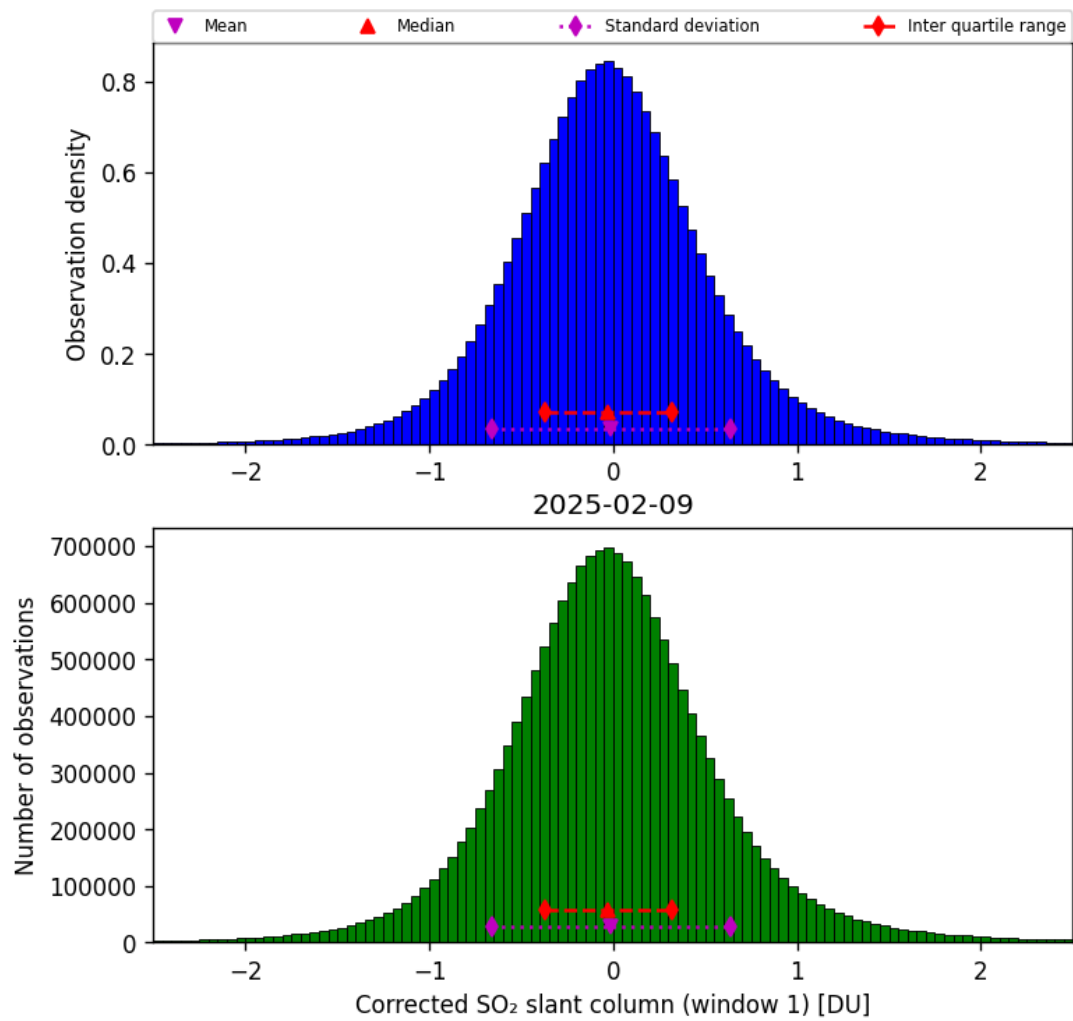


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-02-09 to 2025-02-10

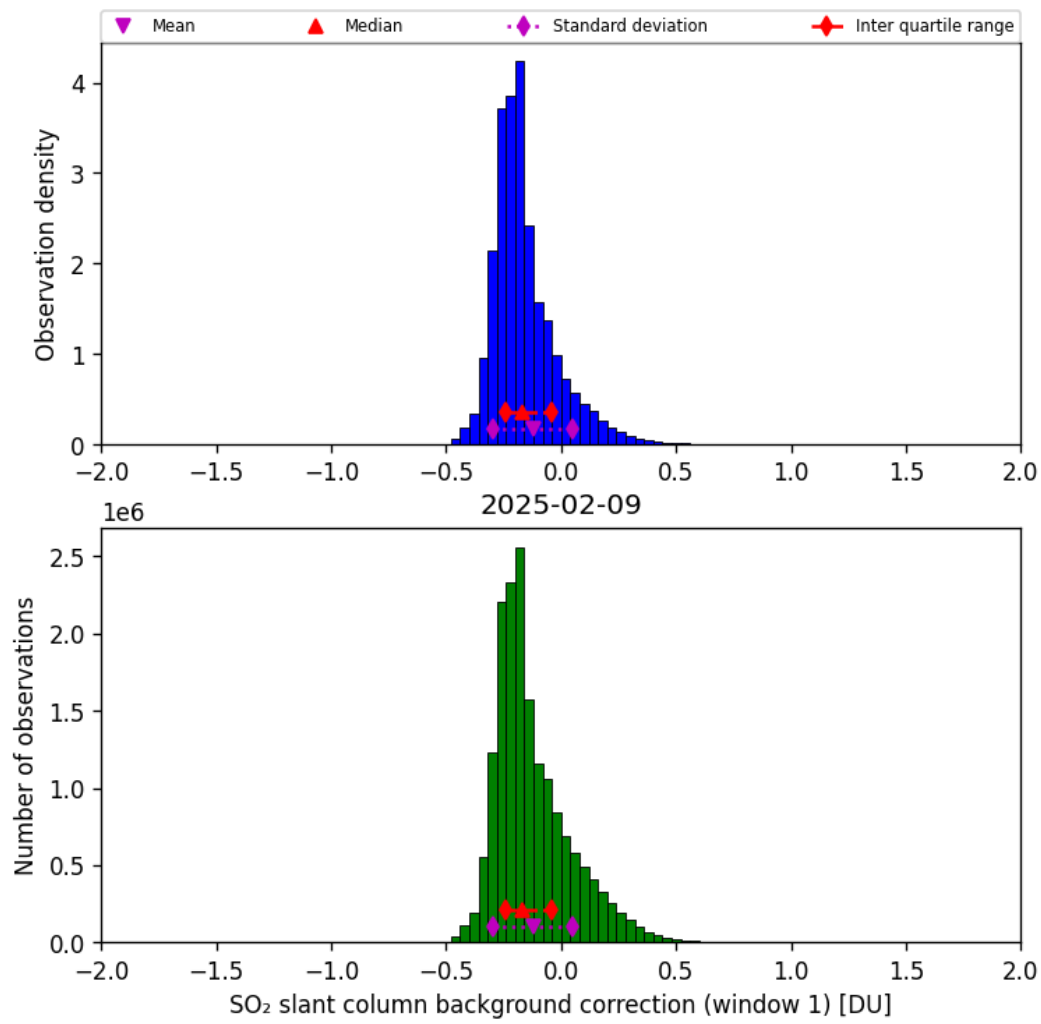


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-02-09 to 2025-02-10

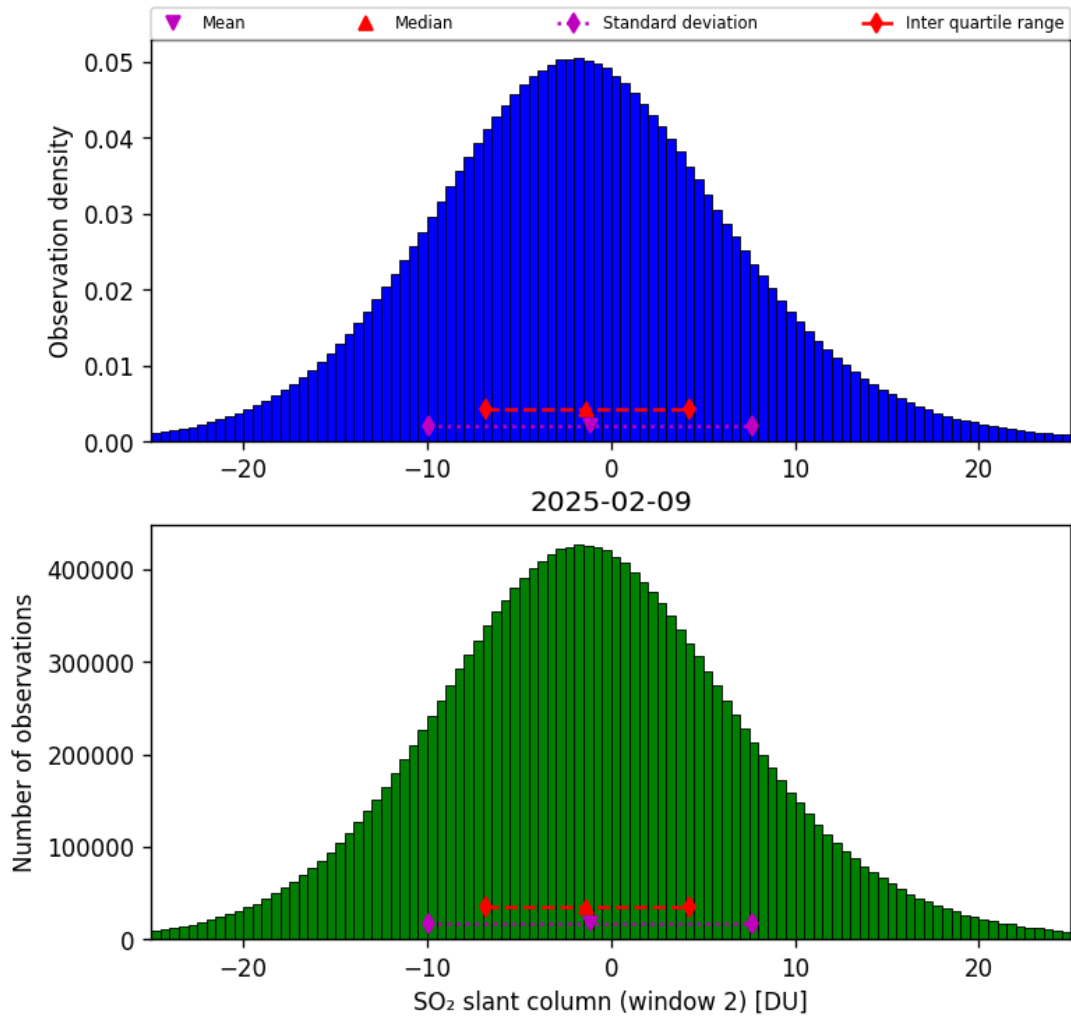


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-02-09 to 2025-02-10

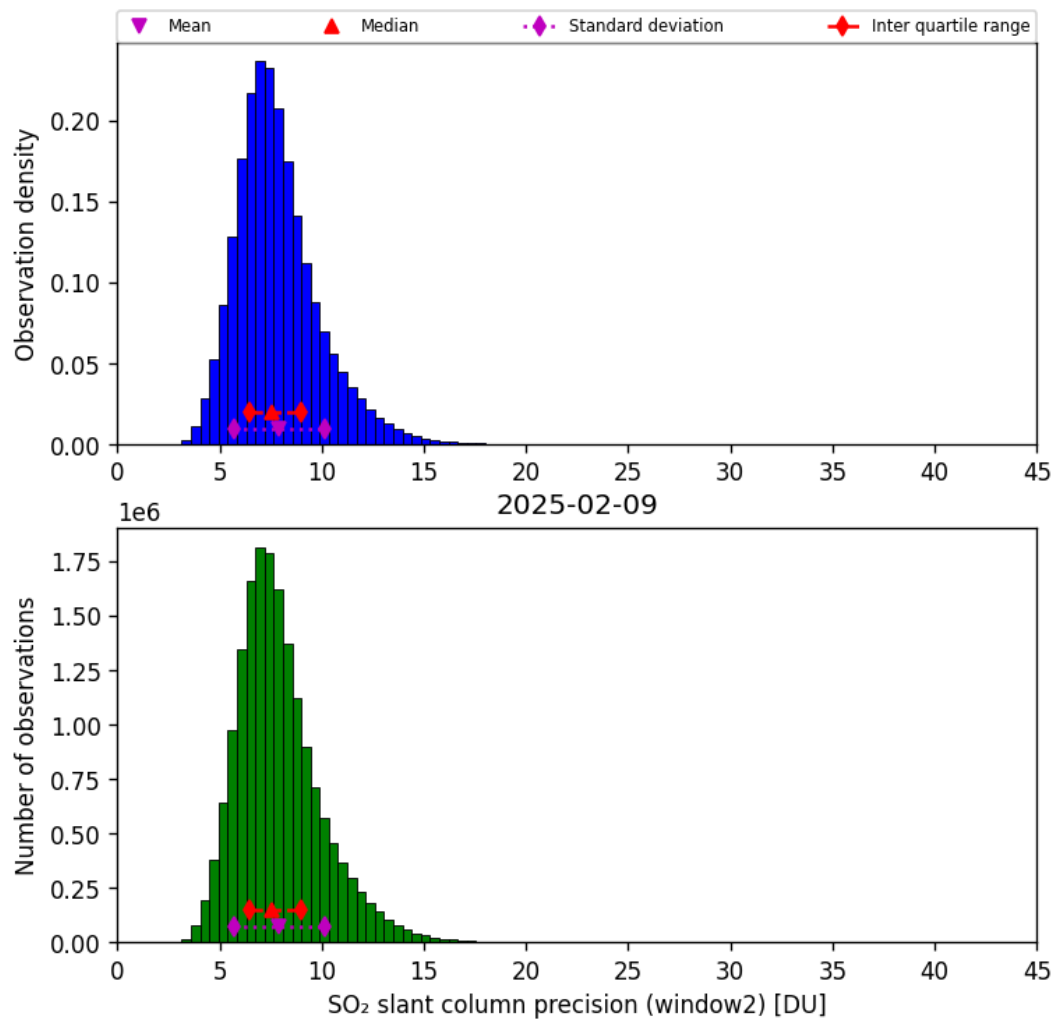


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-02-09 to 2025-02-10

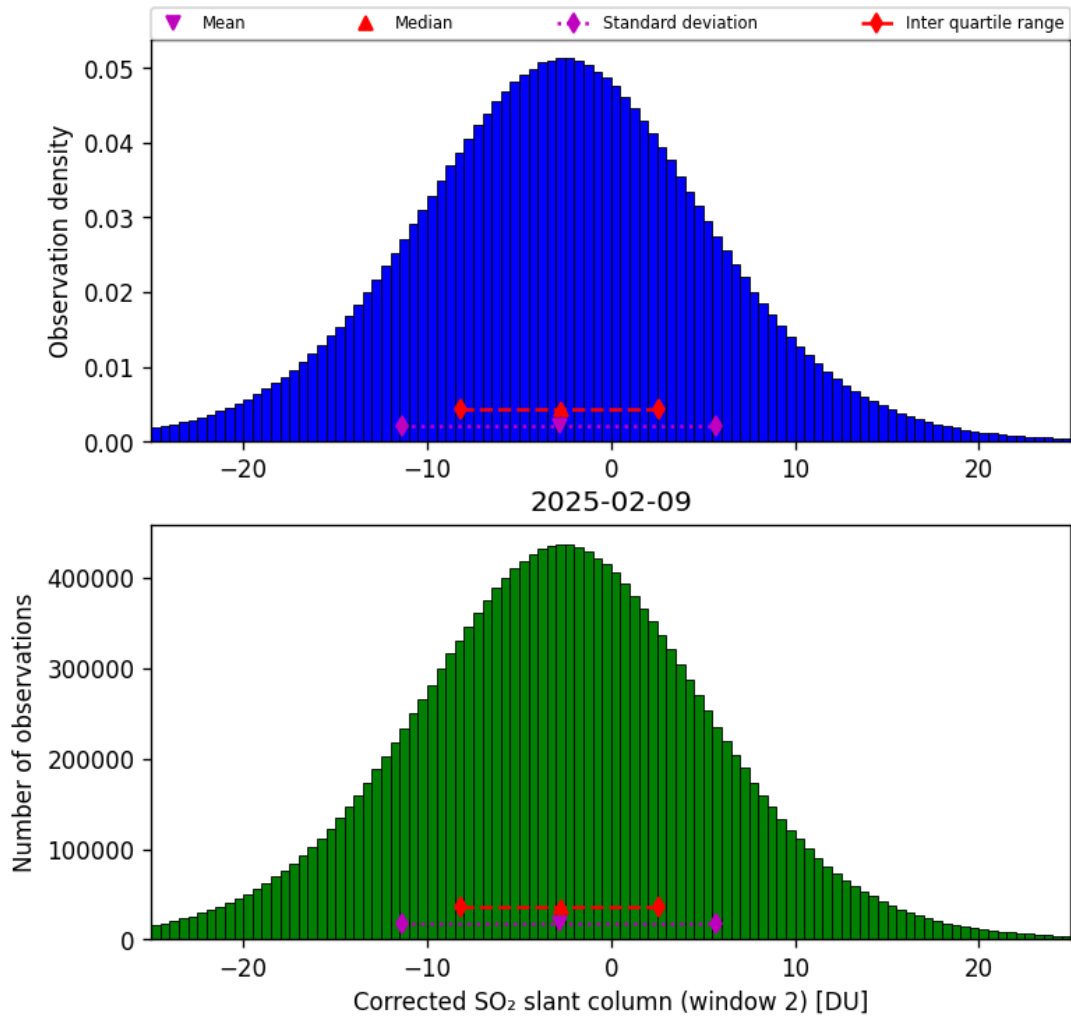


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-02-09 to 2025-02-10

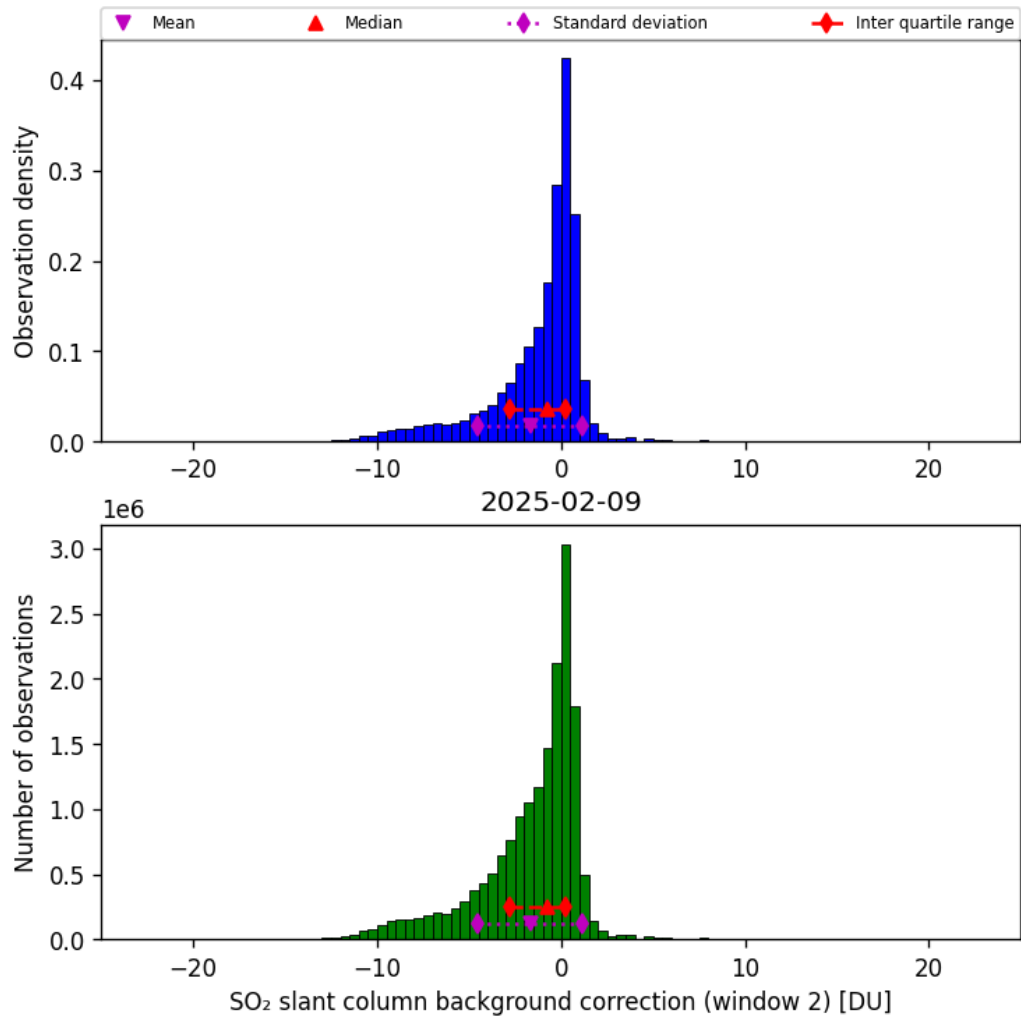


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-02-09 to 2025-02-10

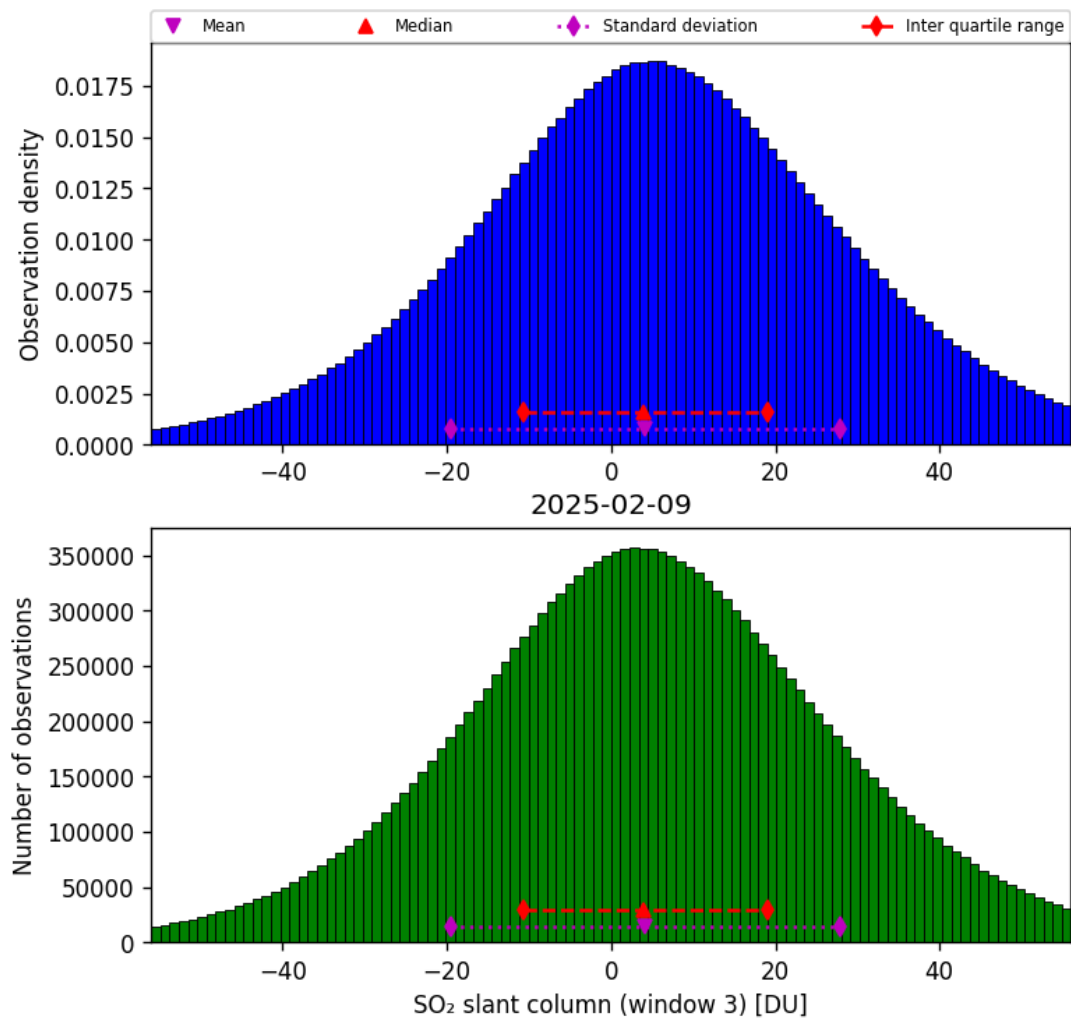


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-02-09 to 2025-02-10

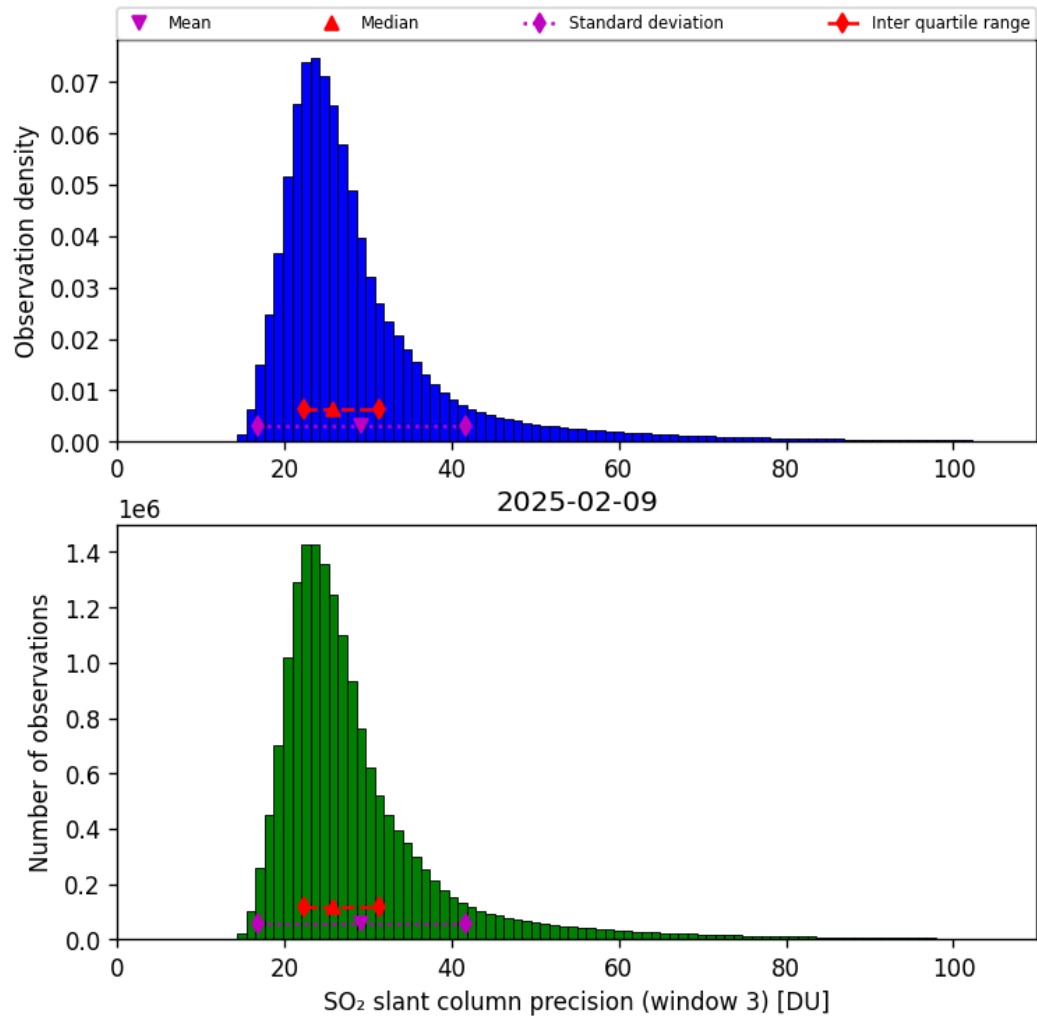


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-02-09 to 2025-02-10

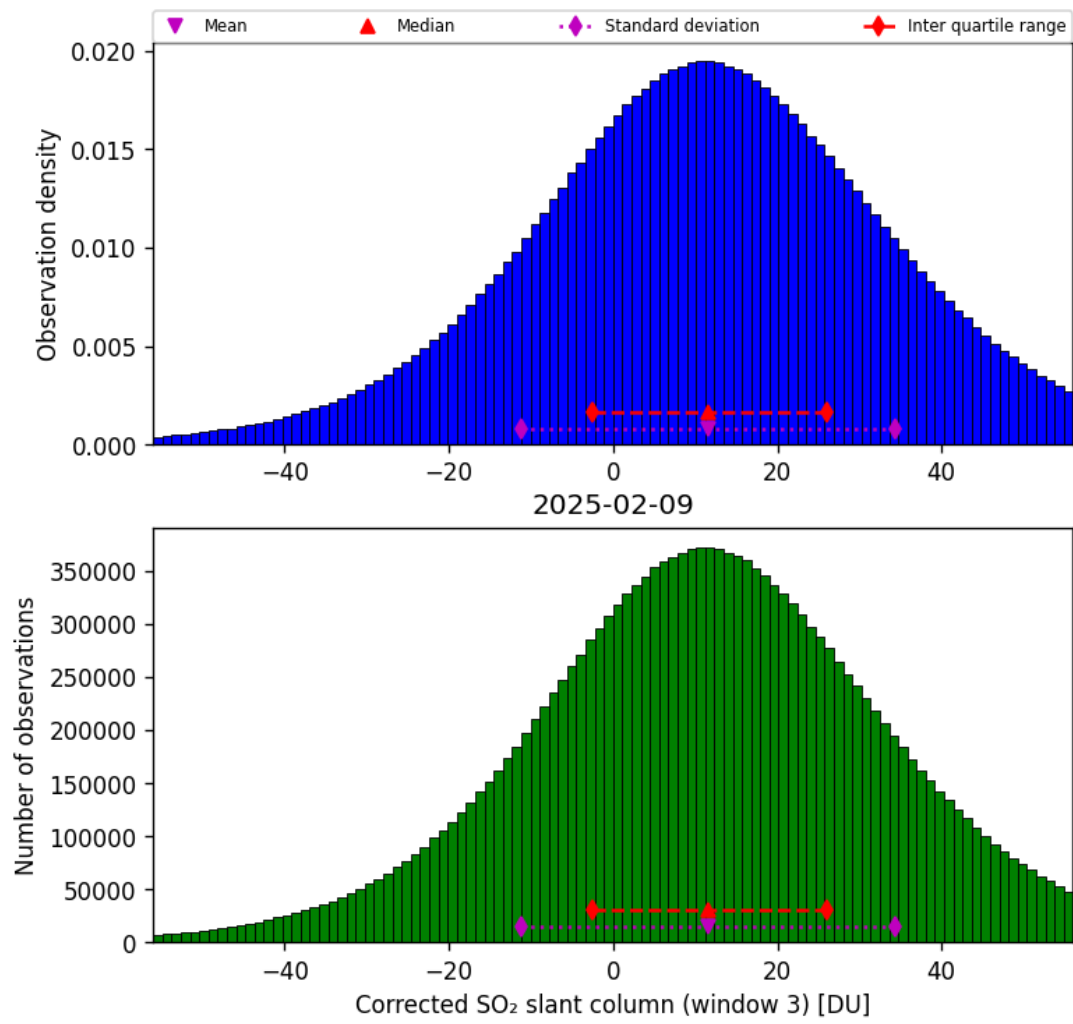


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-02-09 to 2025-02-10

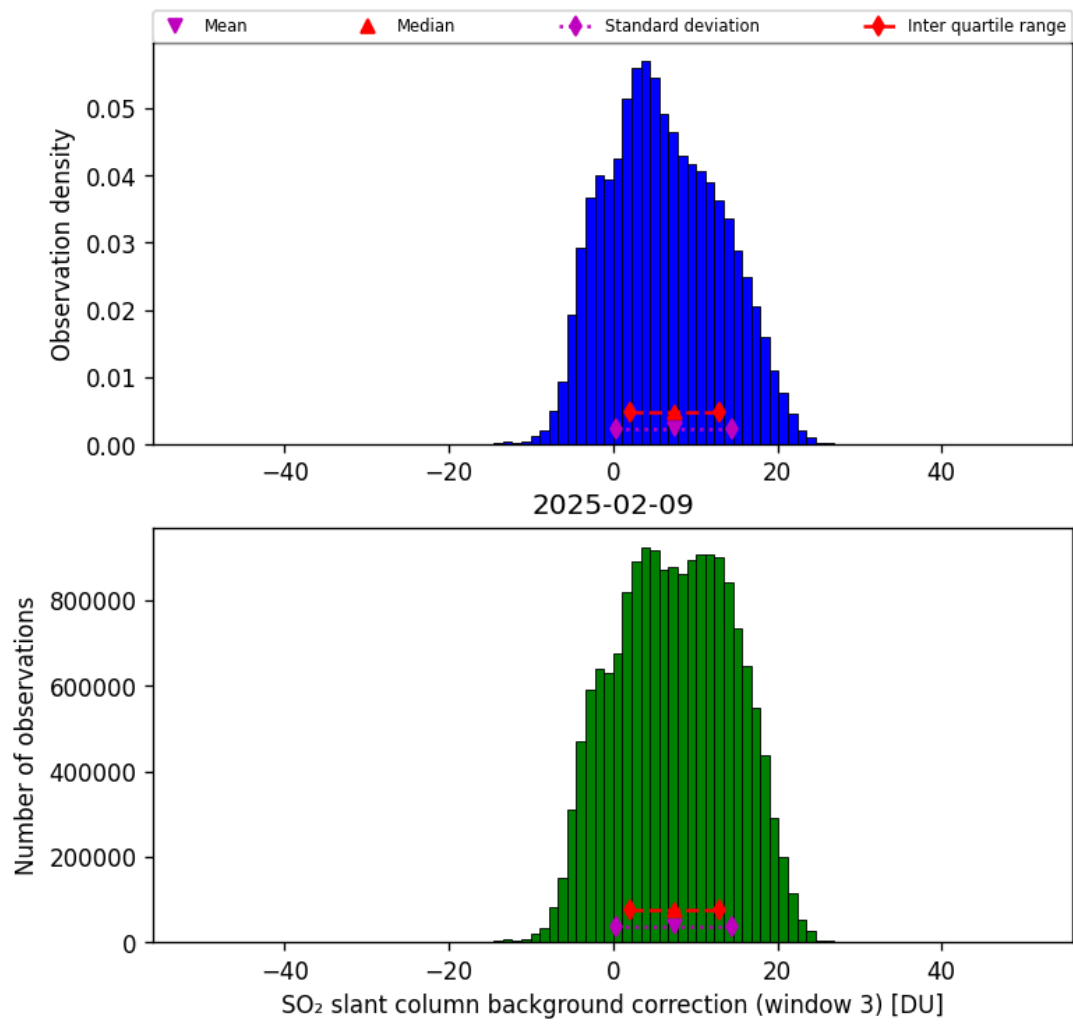


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-02-09 to 2025-02-10

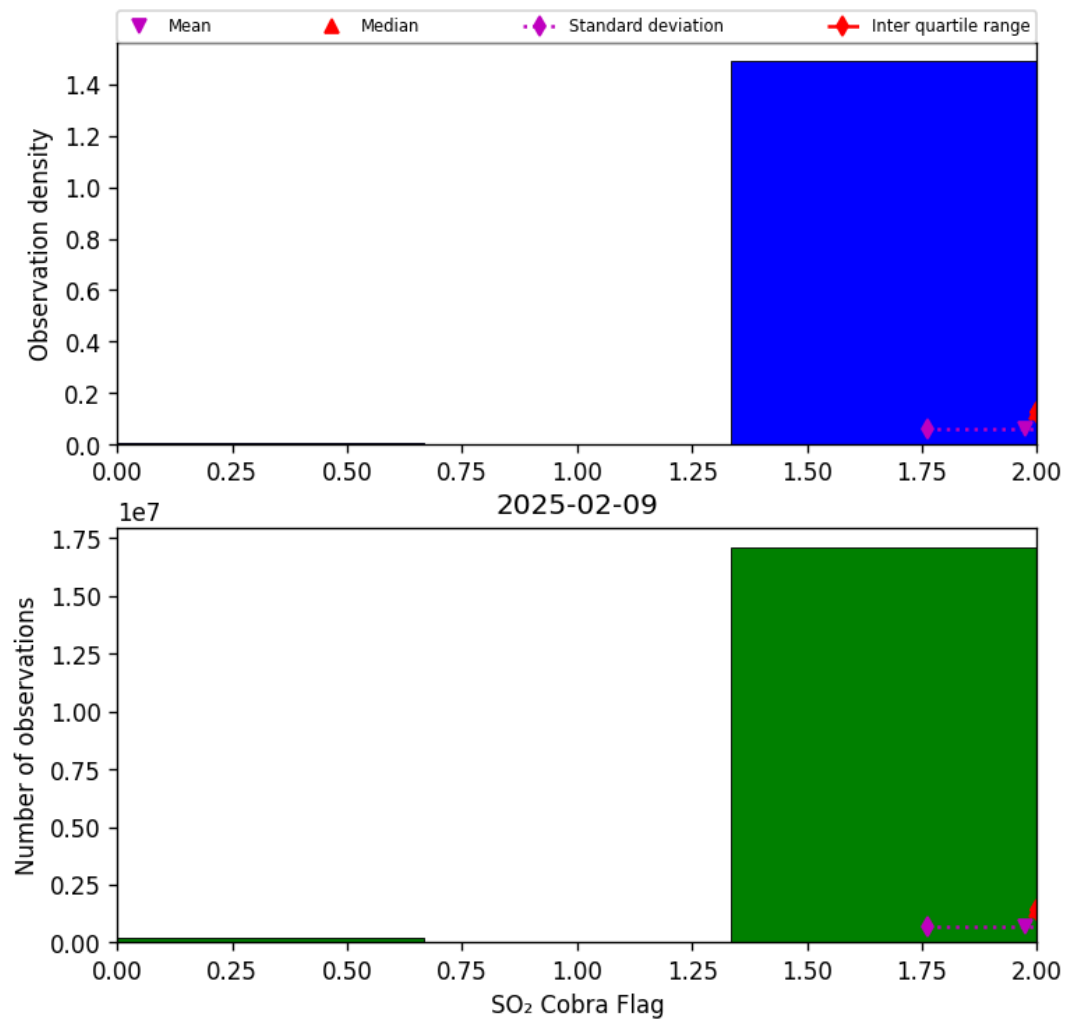


Figure 75: Histogram of "SO₂ Cobra Flag" for 2025-02-09 to 2025-02-10

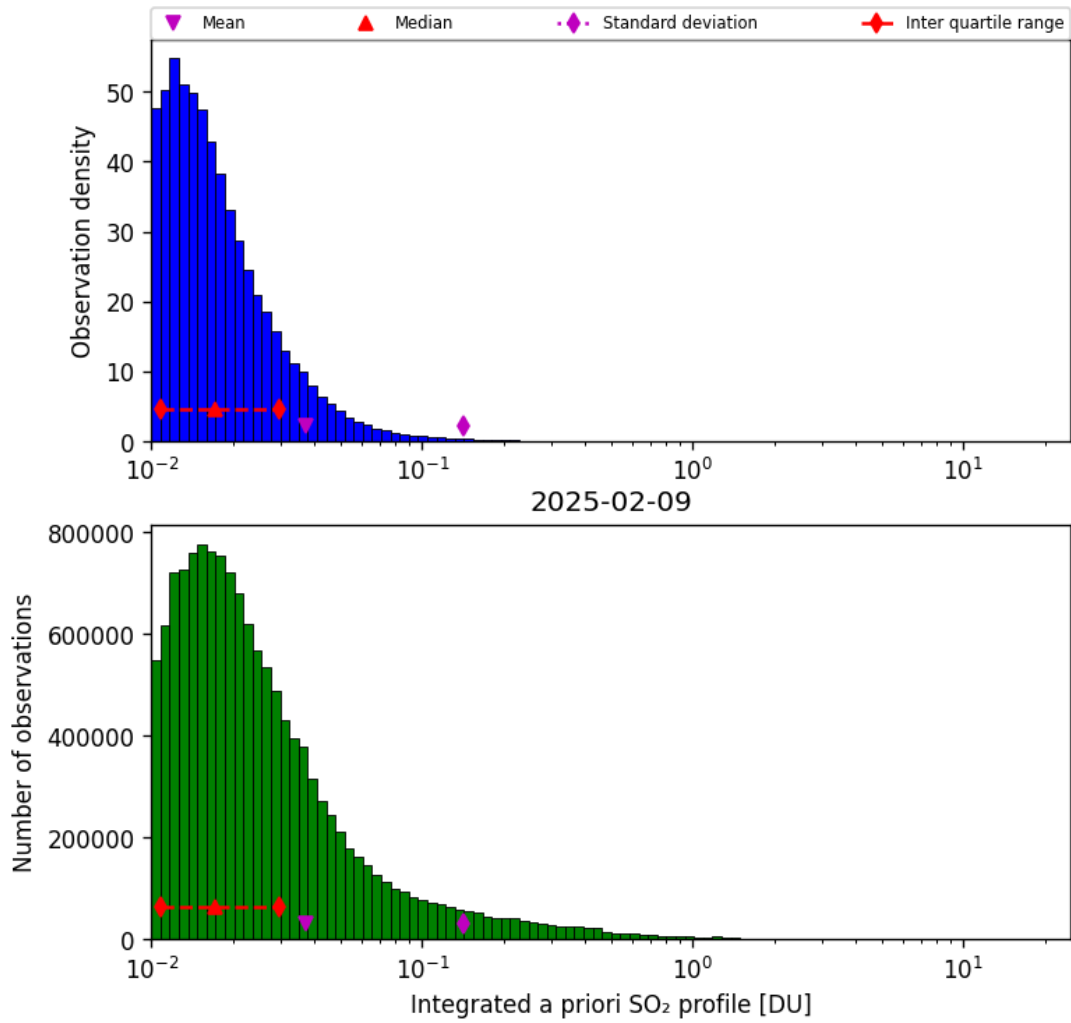


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-02-09 to 2025-02-10

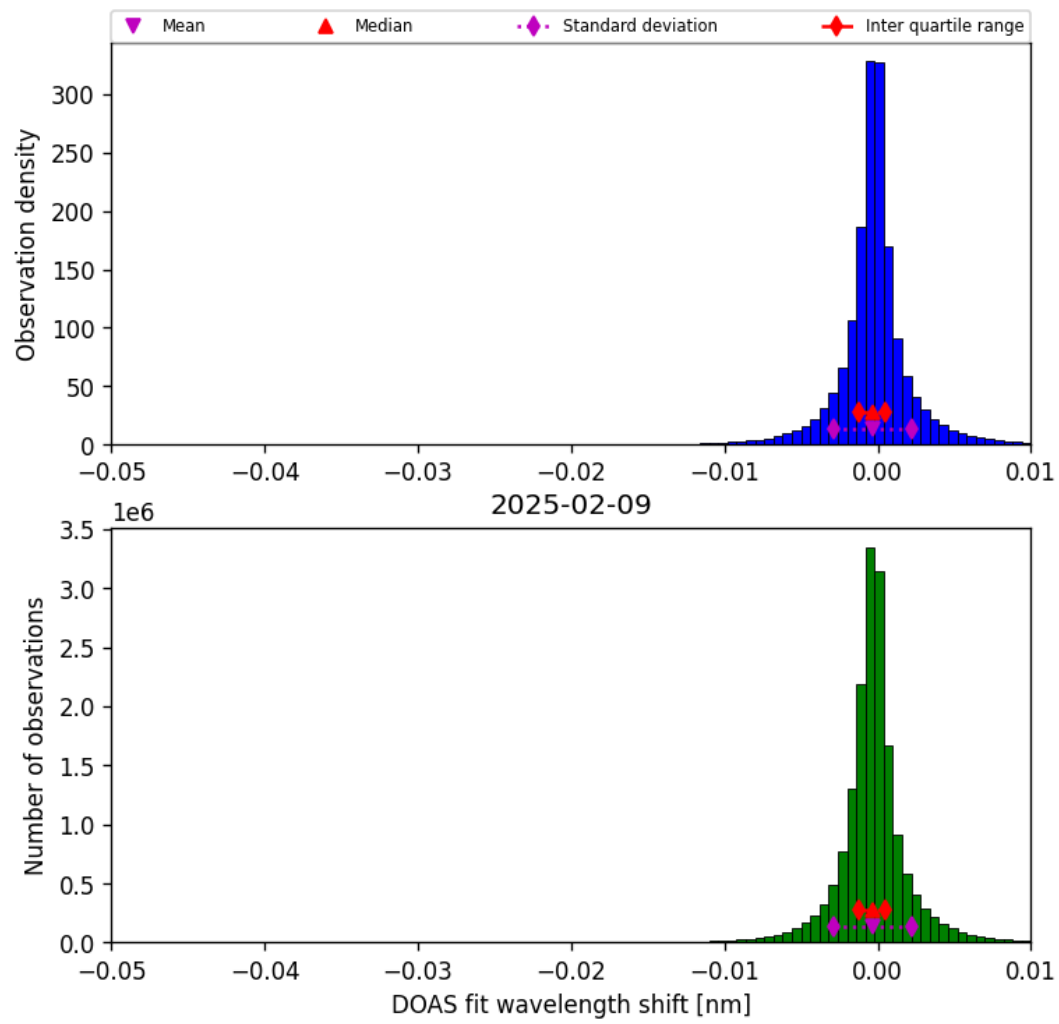


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-02-09 to 2025-02-10

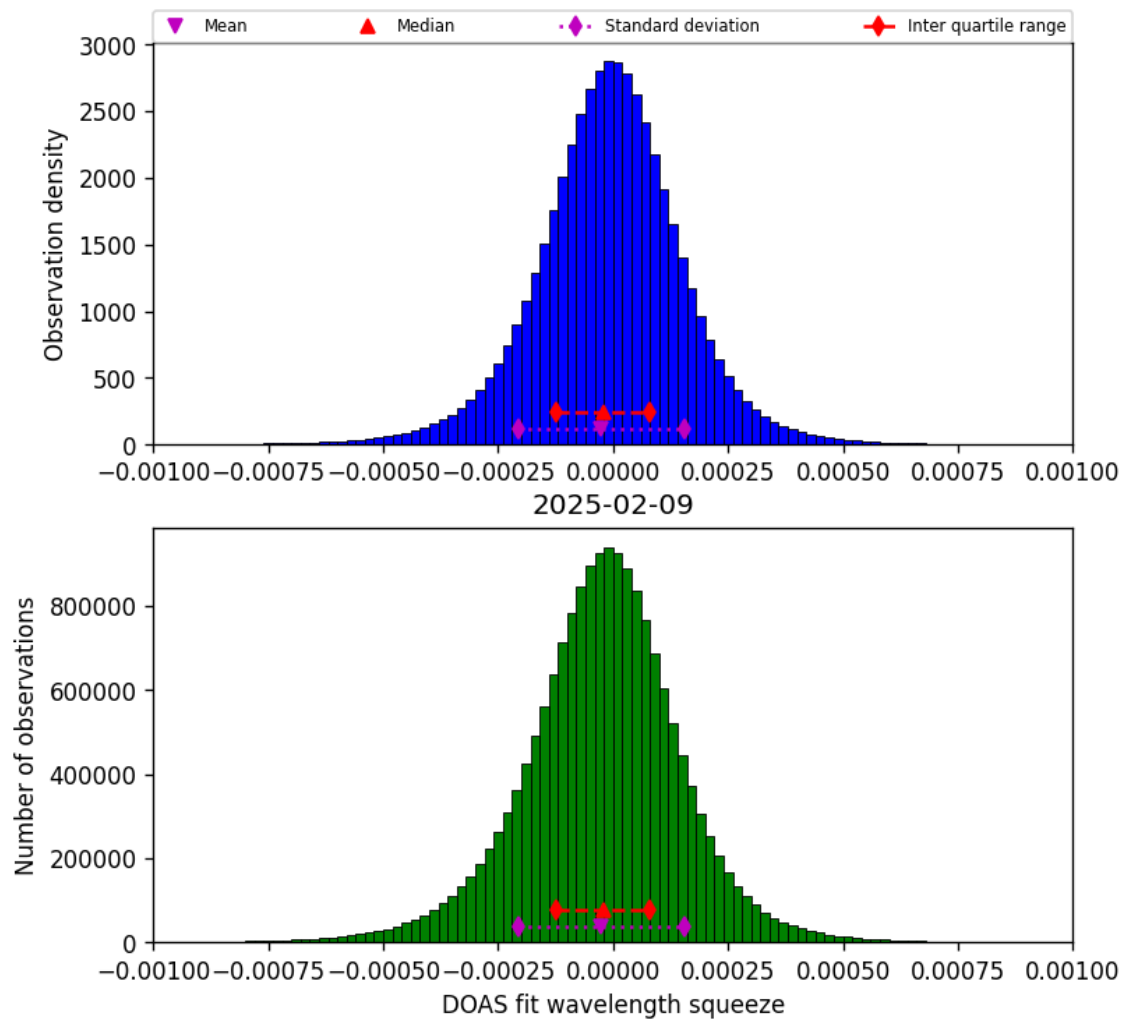


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-02-09 to 2025-02-10

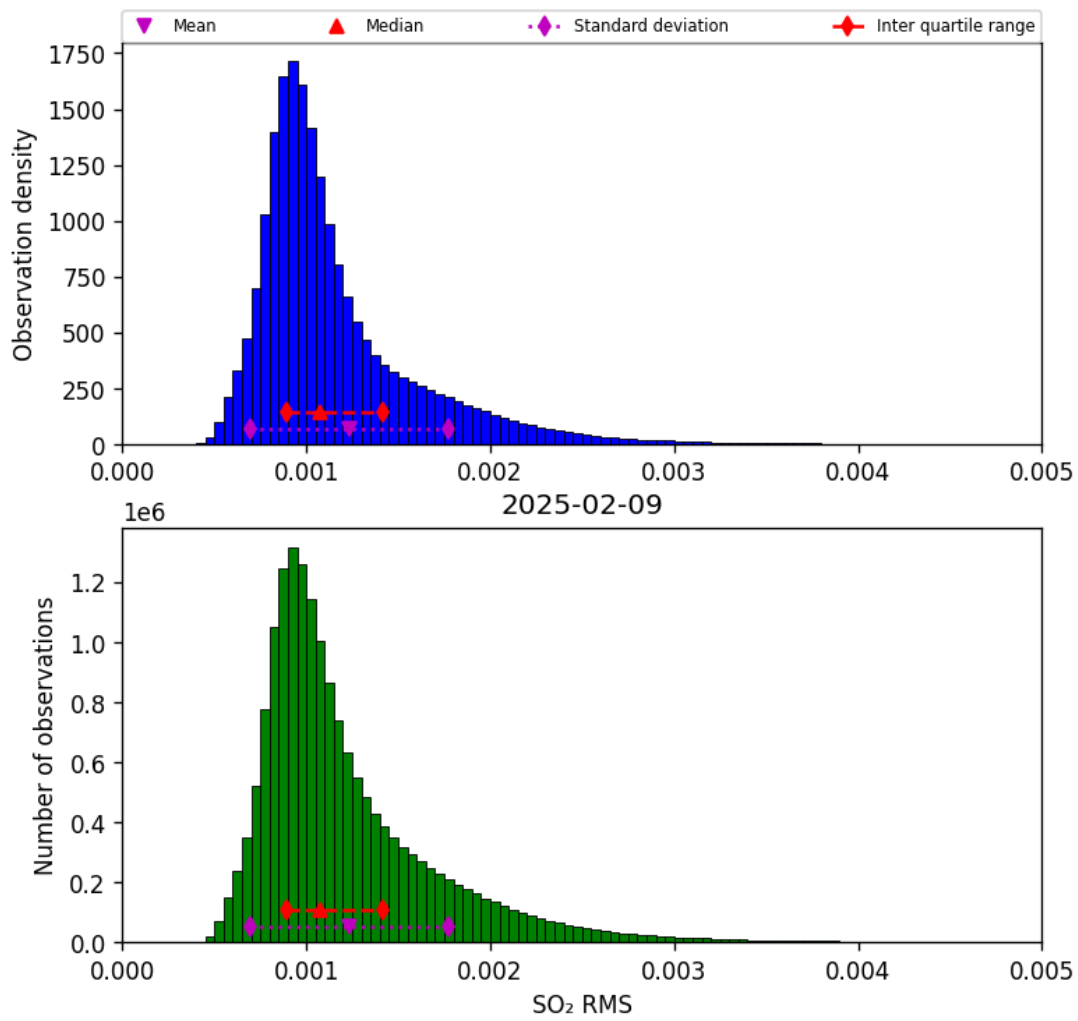


Figure 79: Histogram of “SO₂ RMS” for 2025-02-09 to 2025-02-10

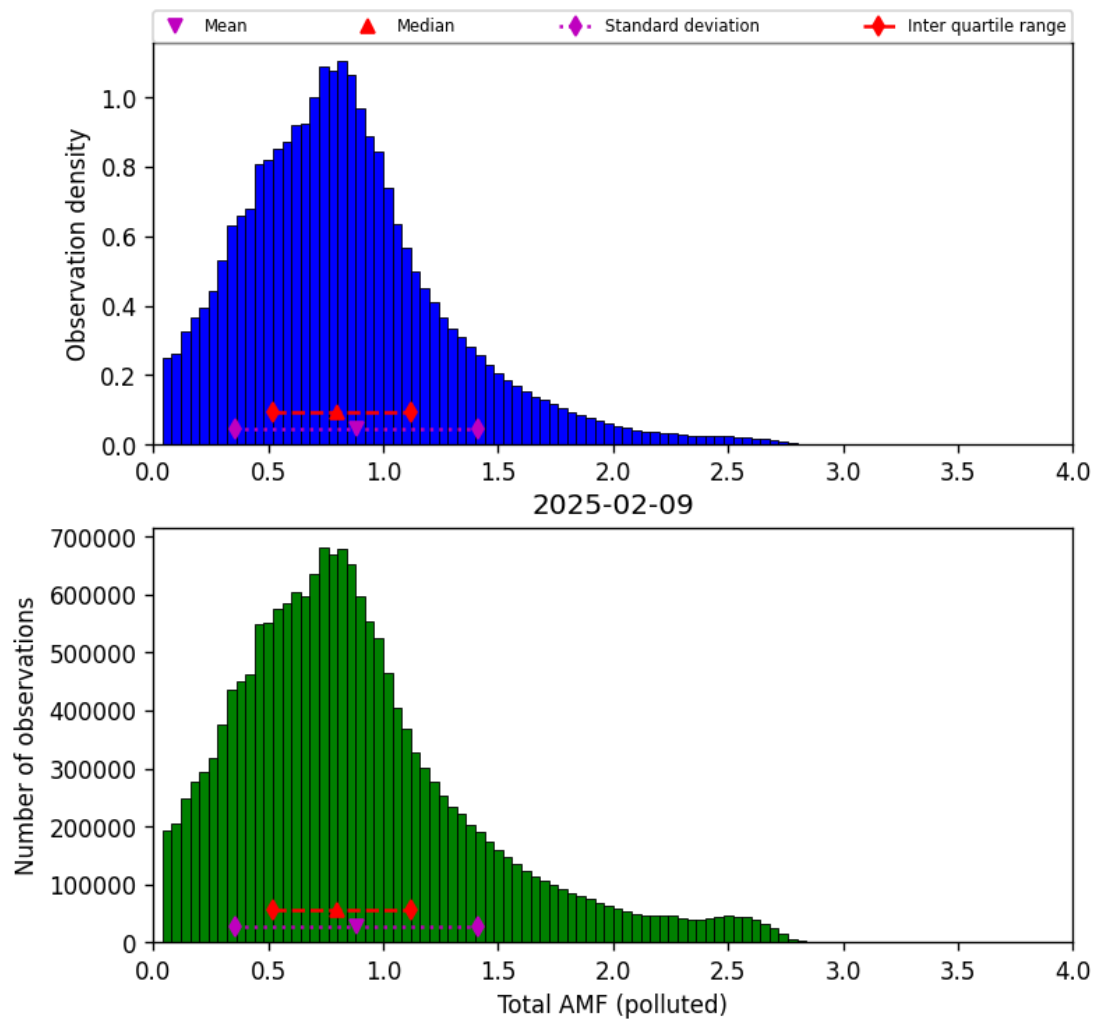


Figure 80: Histogram of “Total AMF (polluted)” for 2025-02-09 to 2025-02-10

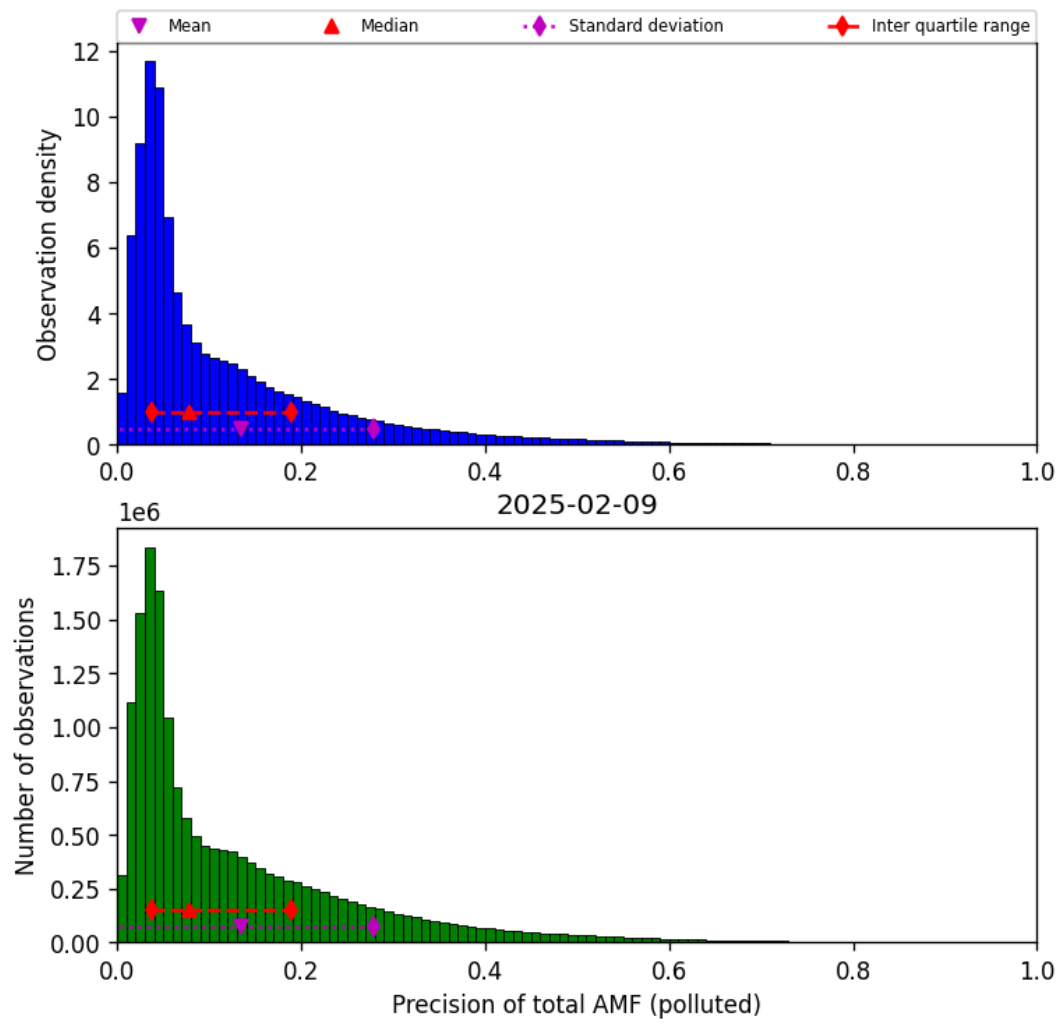


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-02-09 to 2025-02-10

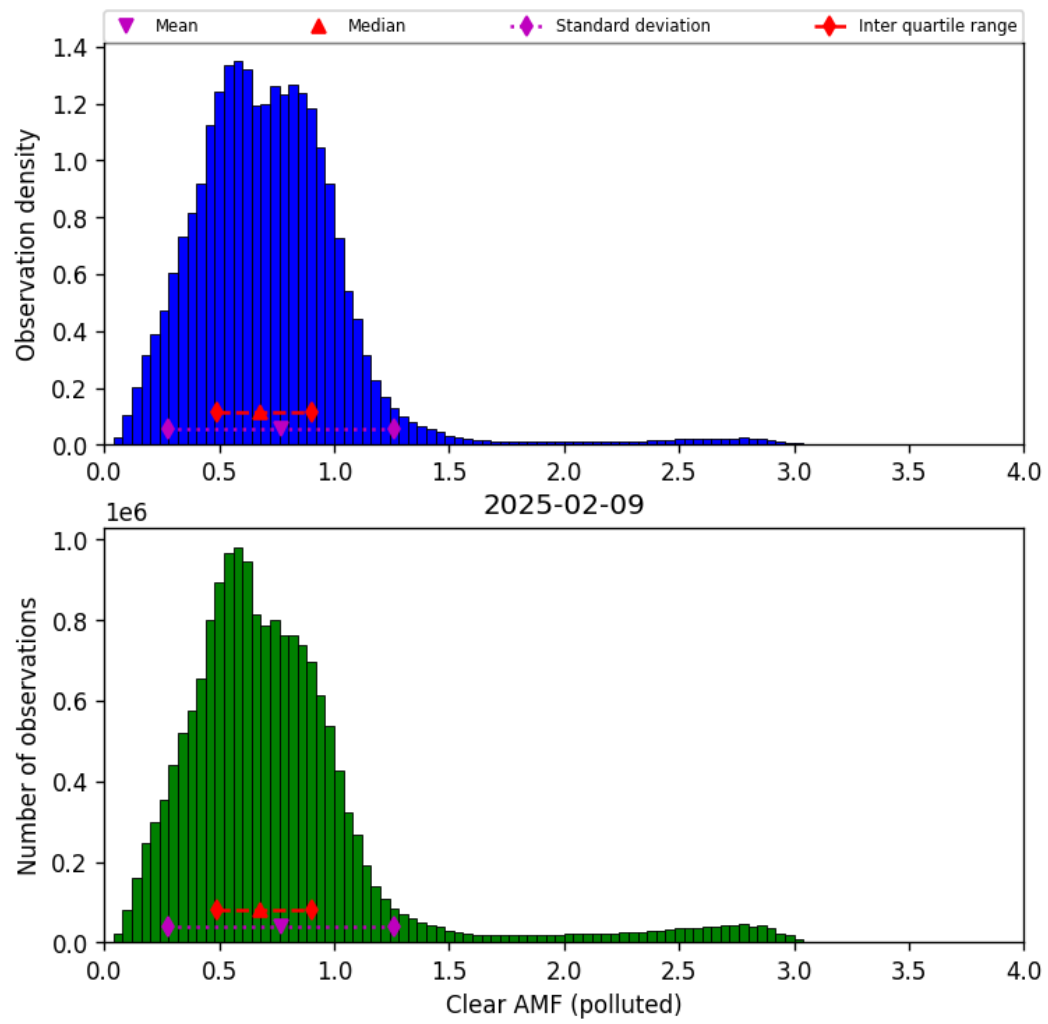


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-02-09 to 2025-02-10

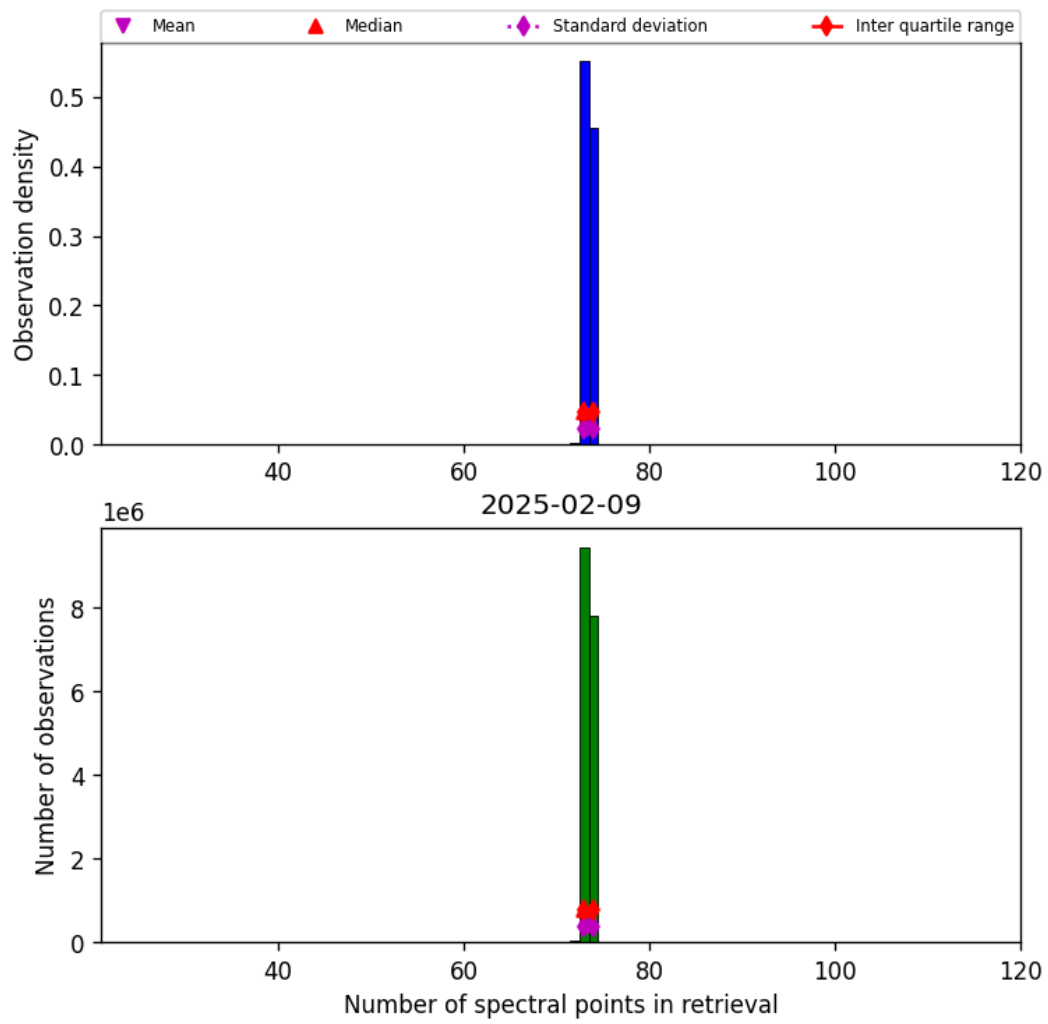


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-02-09 to 2025-02-10

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.

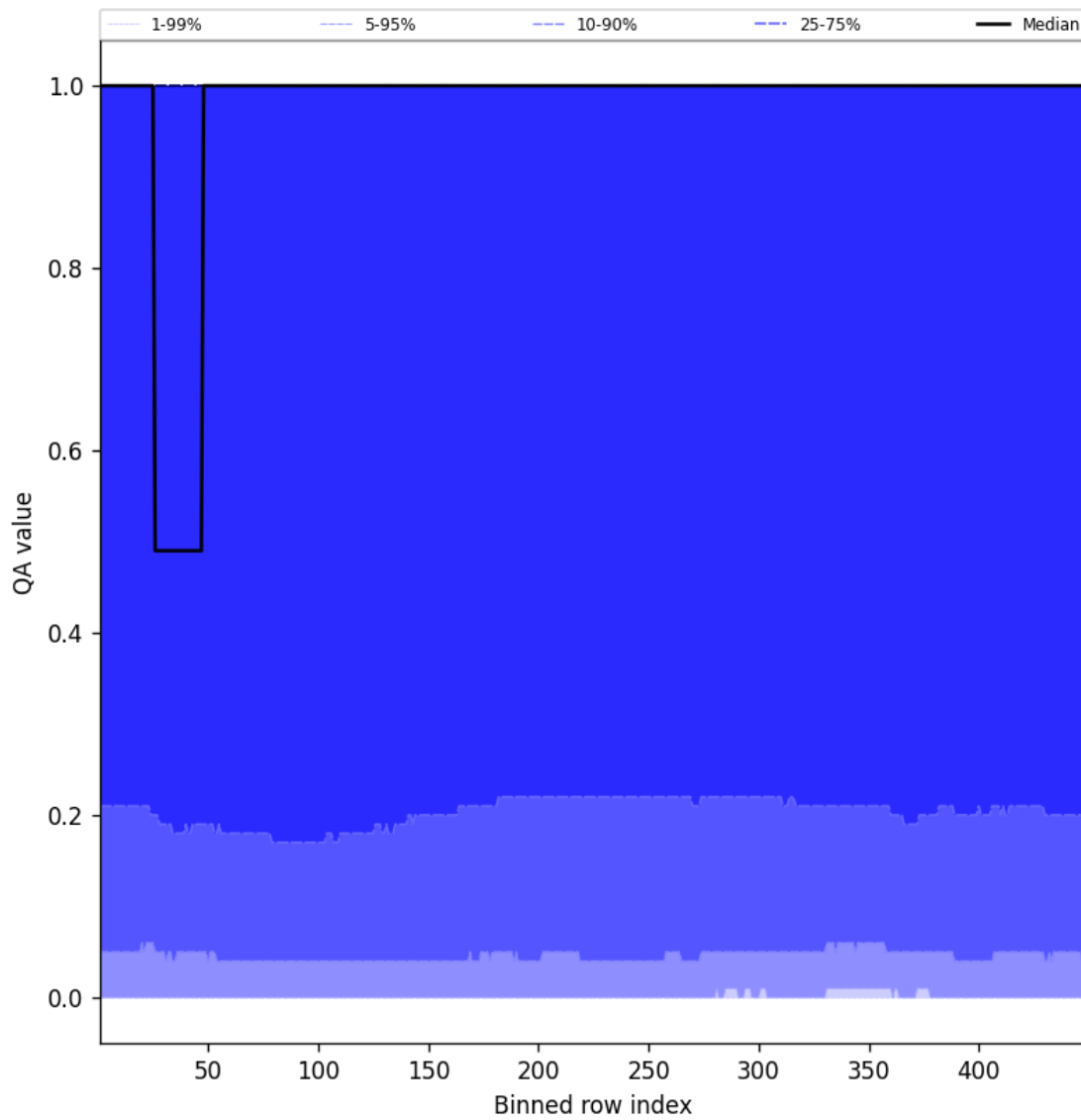


Figure 84: Along track statistics of “QA value” for 2025-02-09 to 2025-02-10

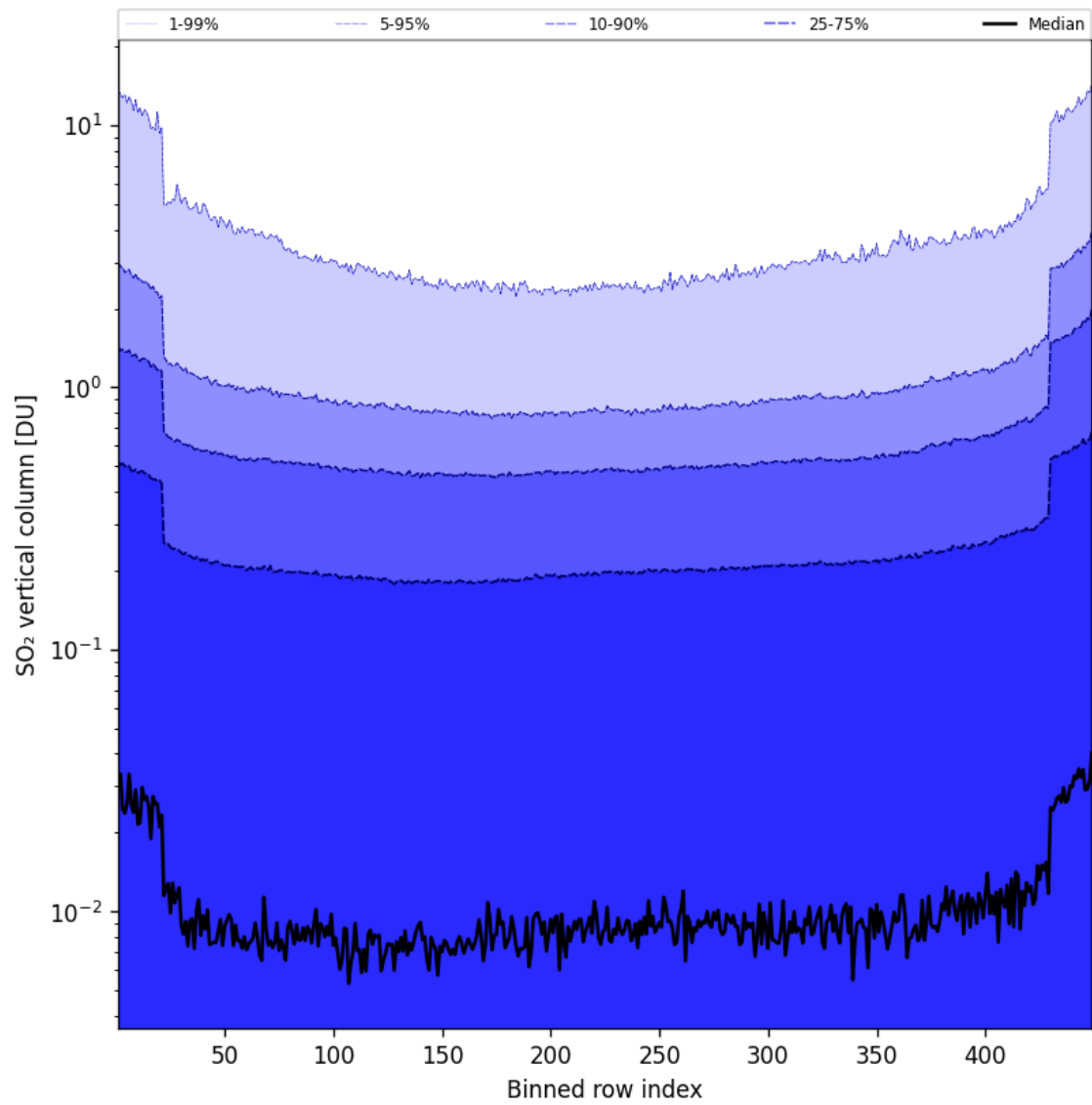


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-02-09 to 2025-02-10

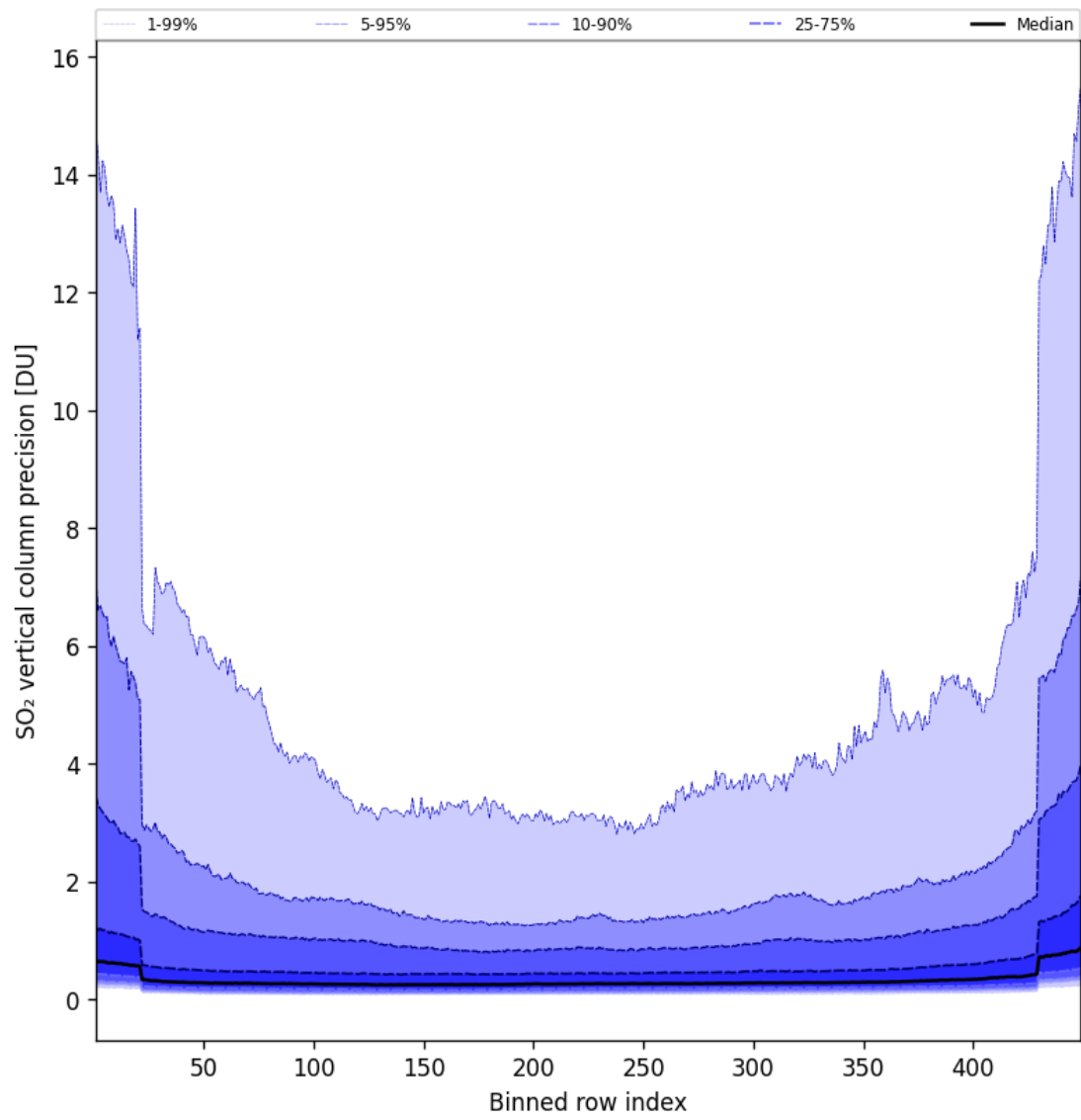


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-02-09 to 2025-02-10

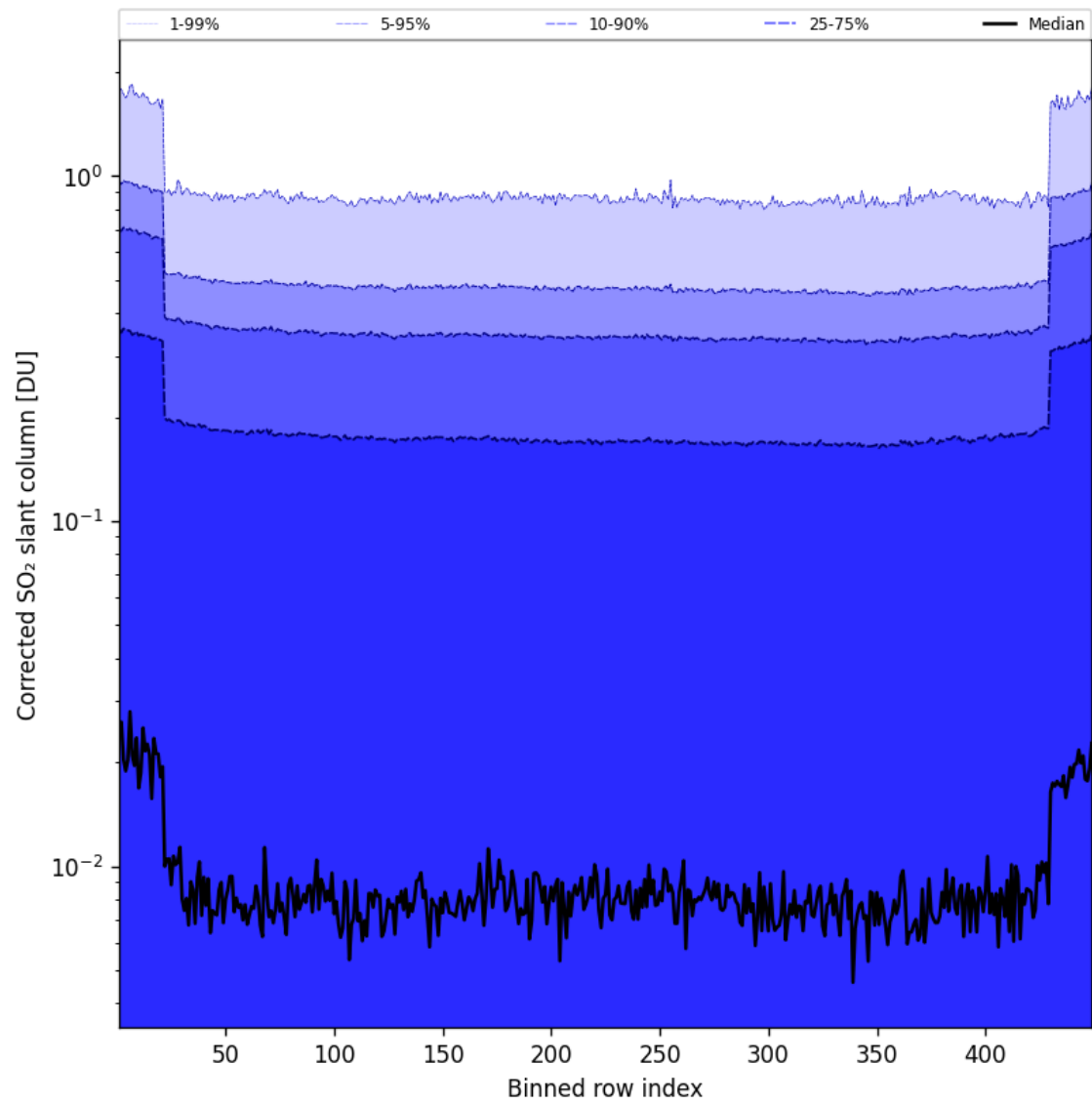


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-02-09 to 2025-02-10

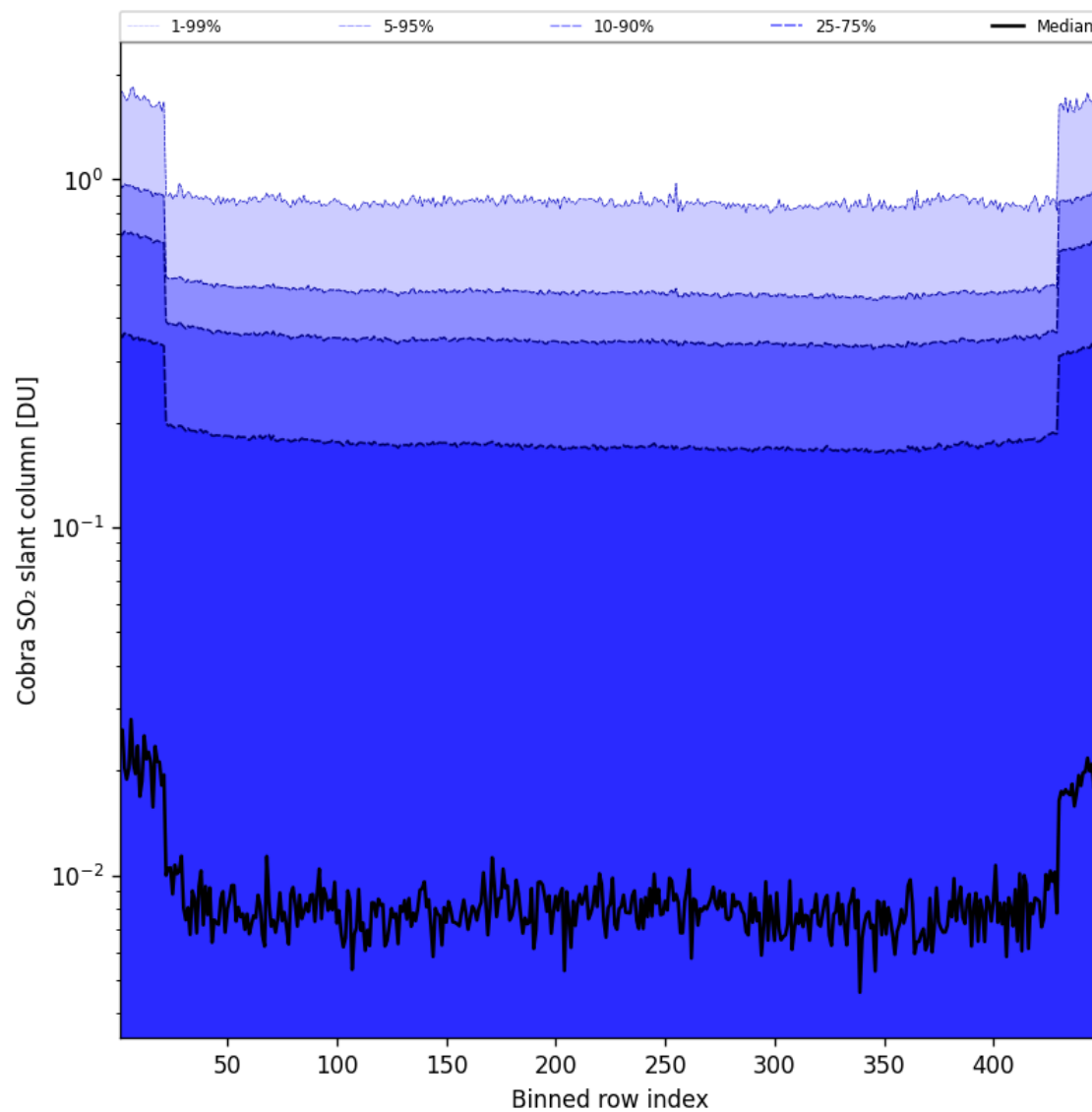


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-02-09 to 2025-02-10

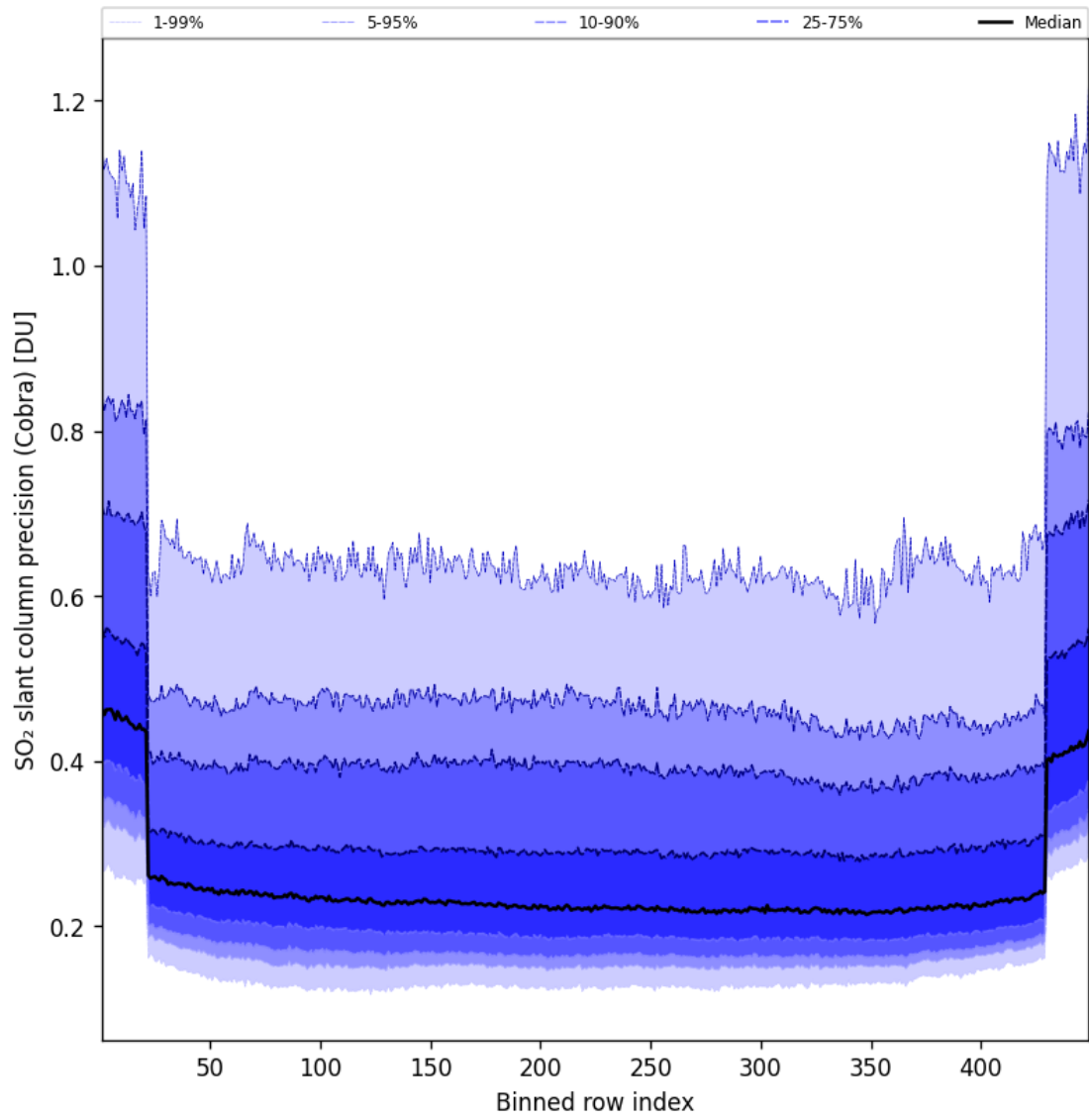


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-02-09 to 2025-02-10

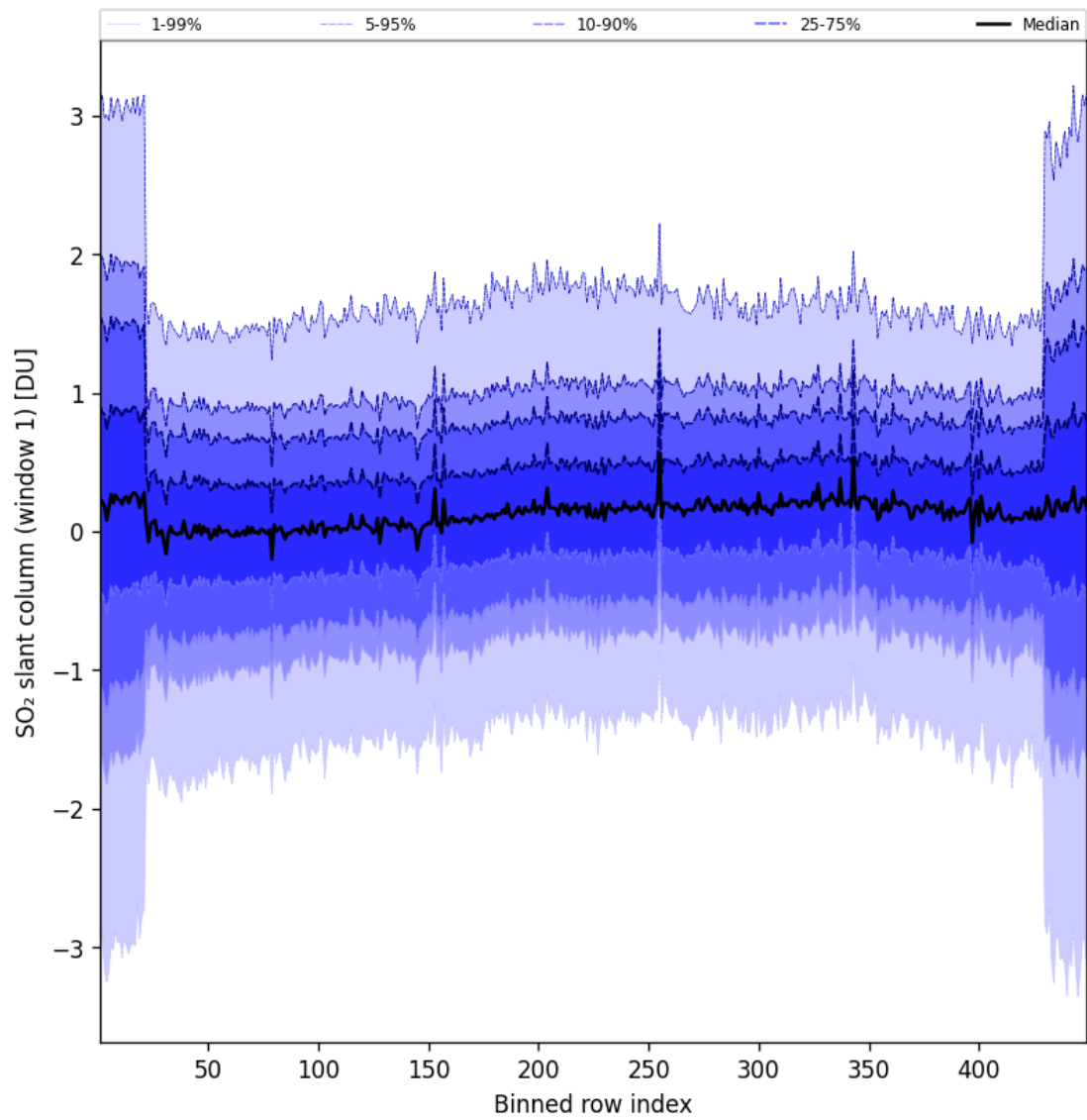


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-02-09 to 2025-02-10

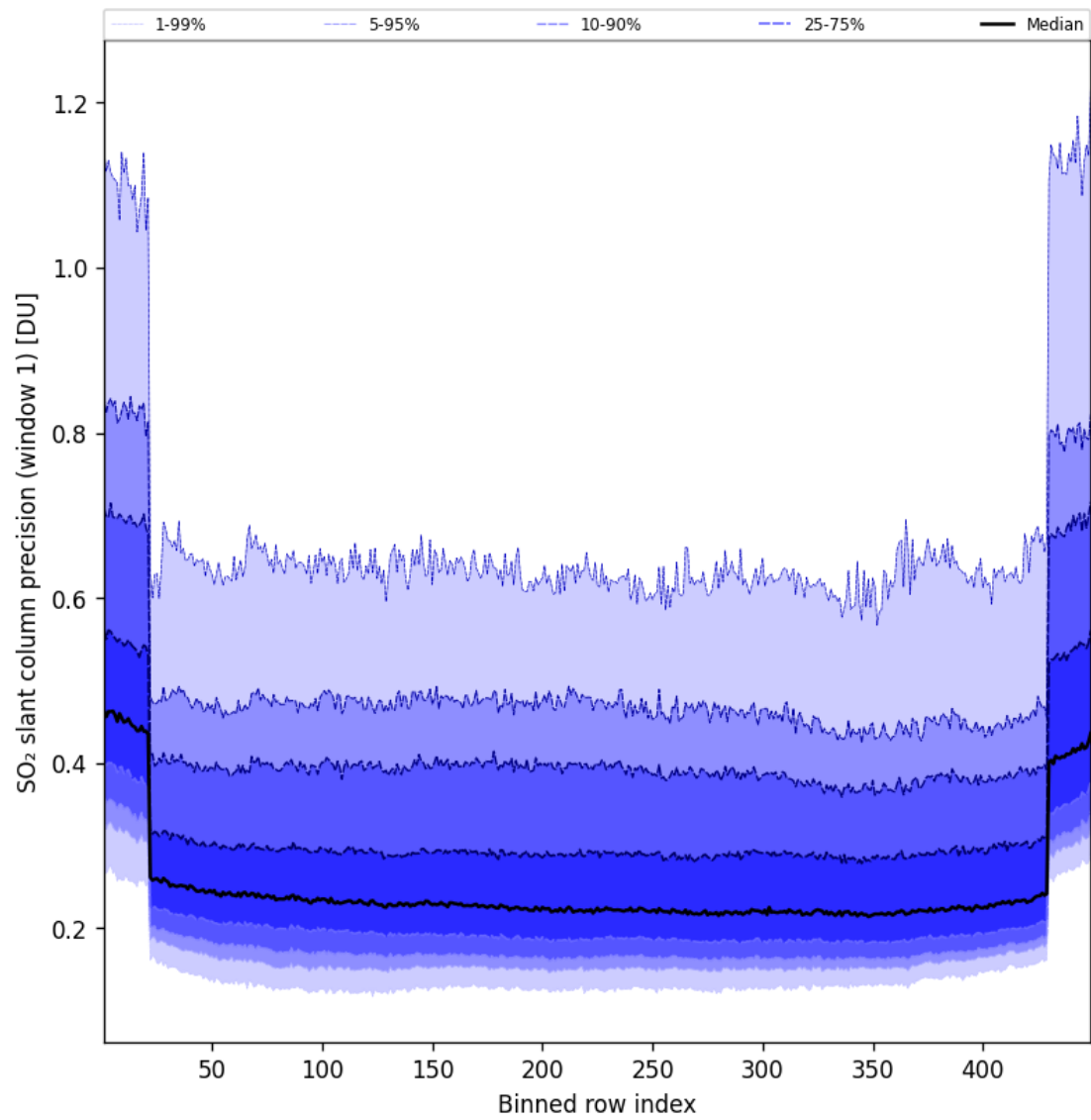


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-02-09 to 2025-02-10

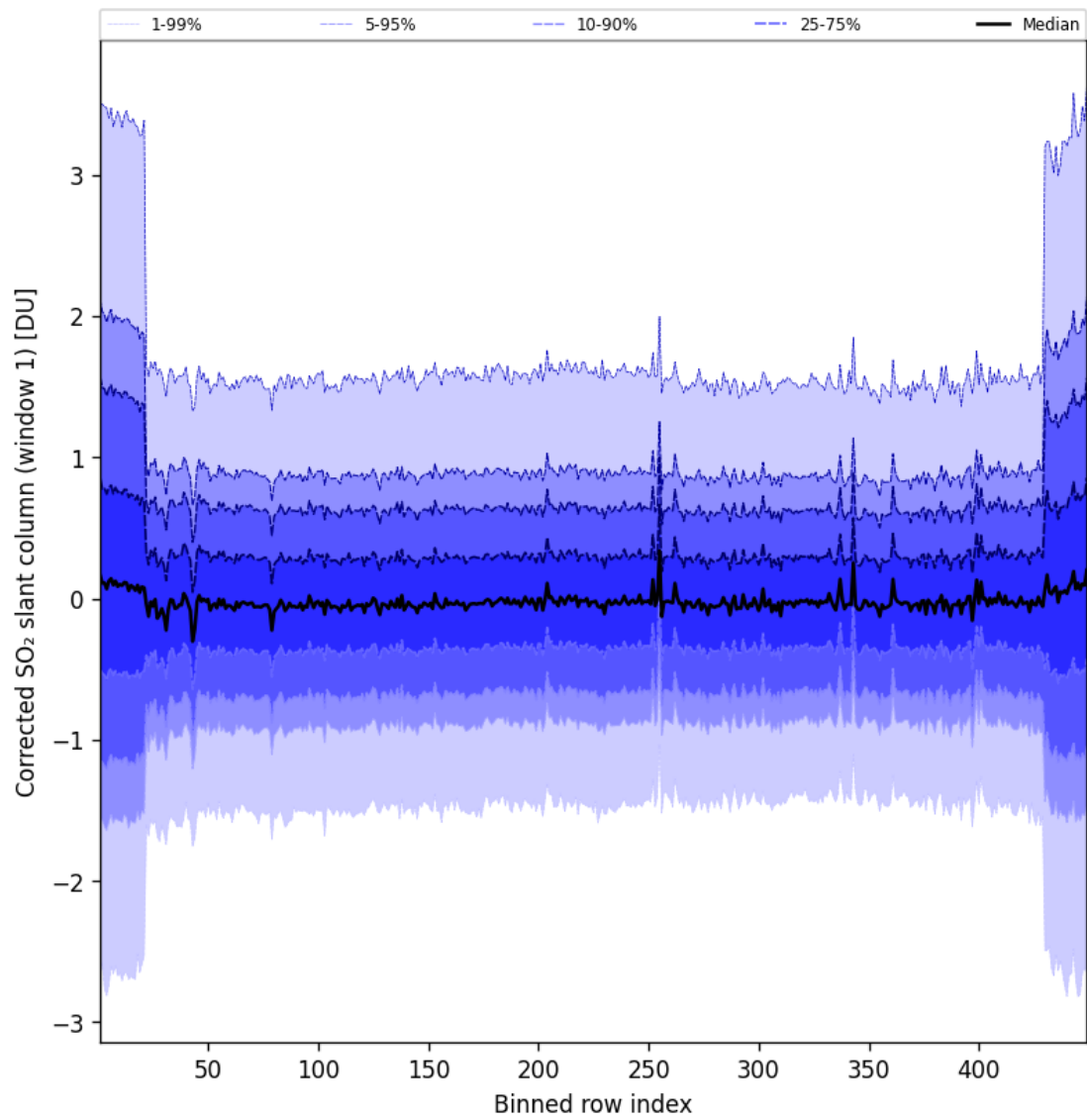


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-02-09 to 2025-02-10

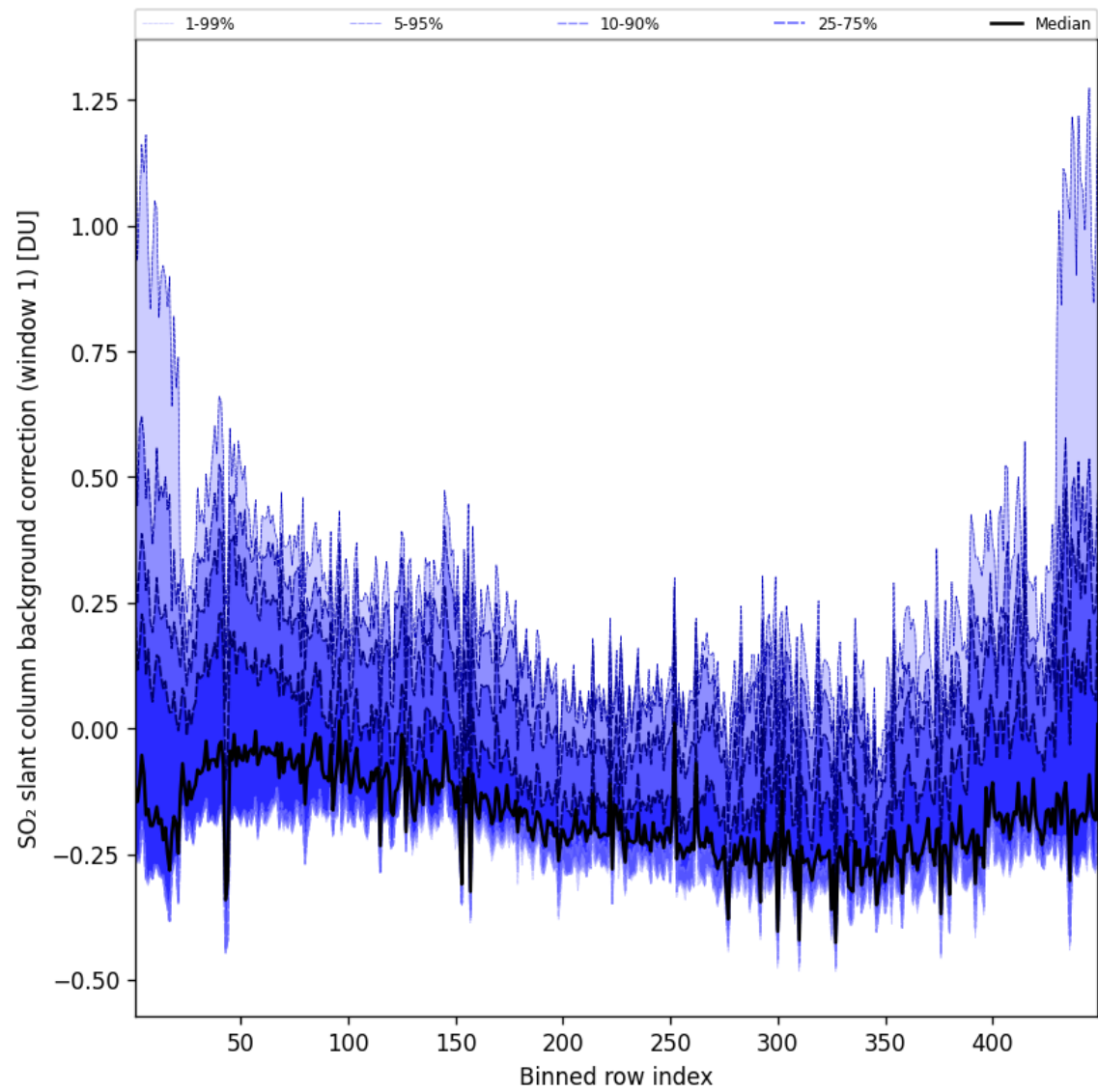


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-02-09 to 2025-02-10

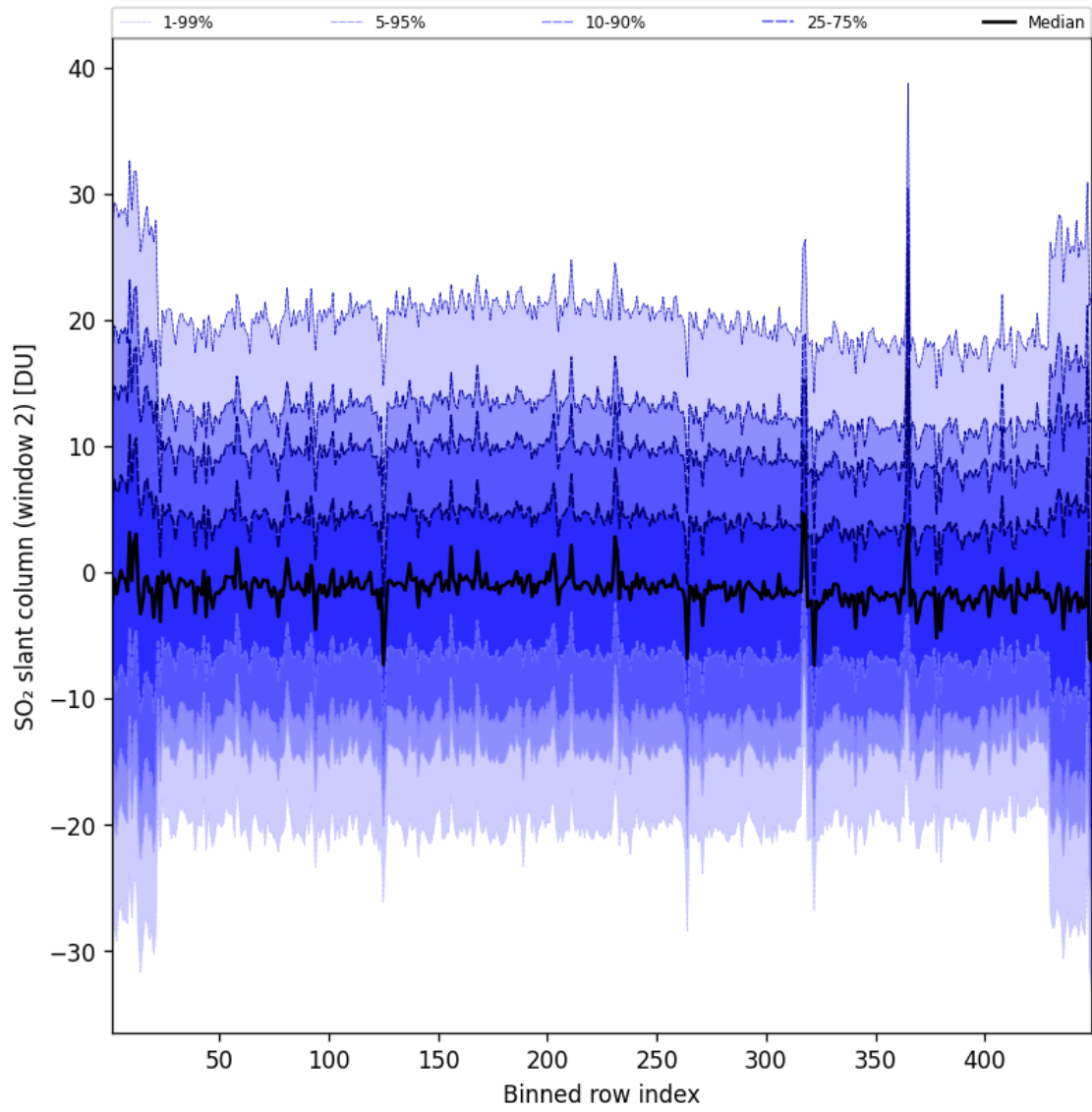


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-02-09 to 2025-02-10

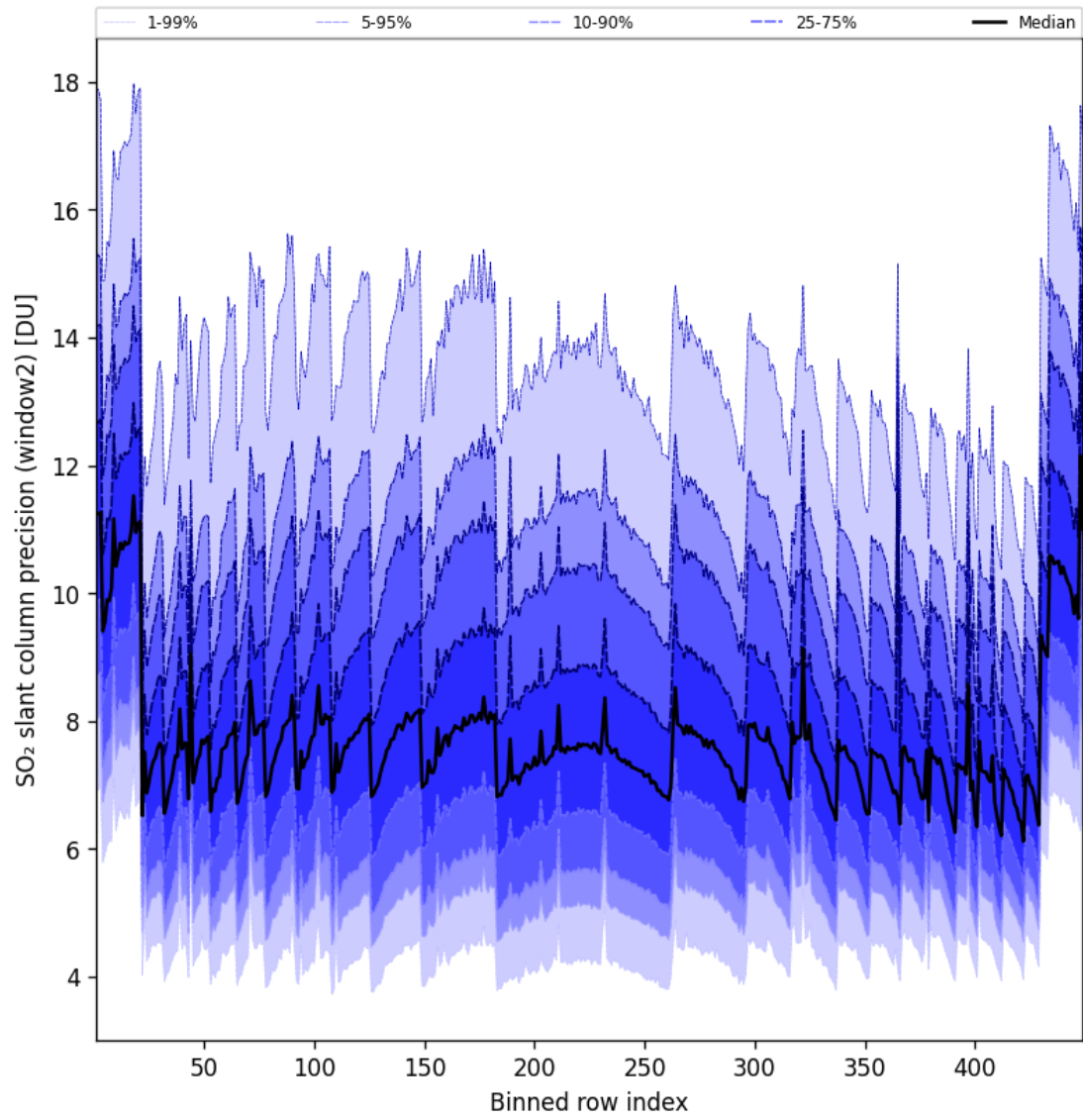


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-02-09 to 2025-02-10

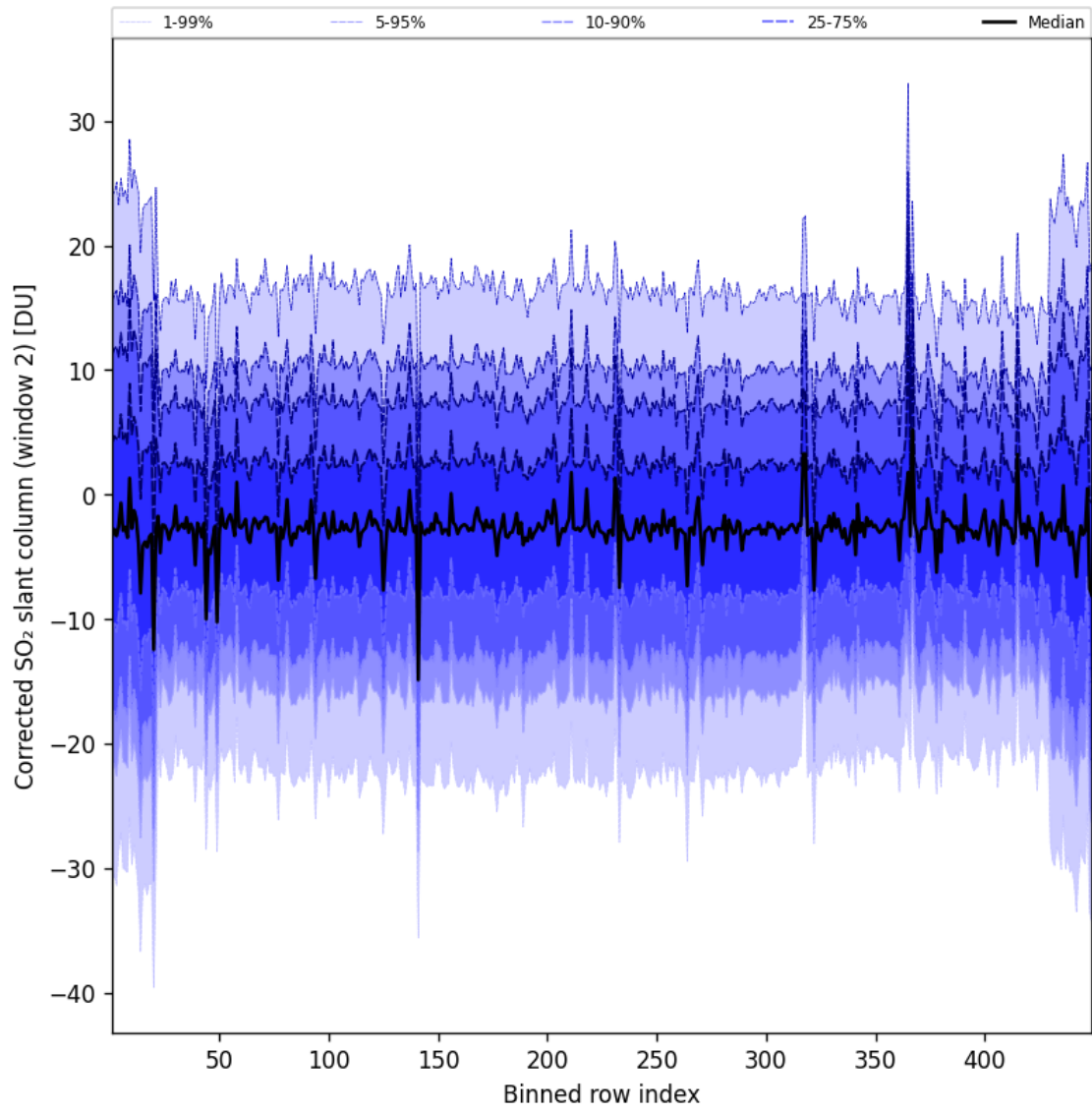


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-02-09 to 2025-02-10

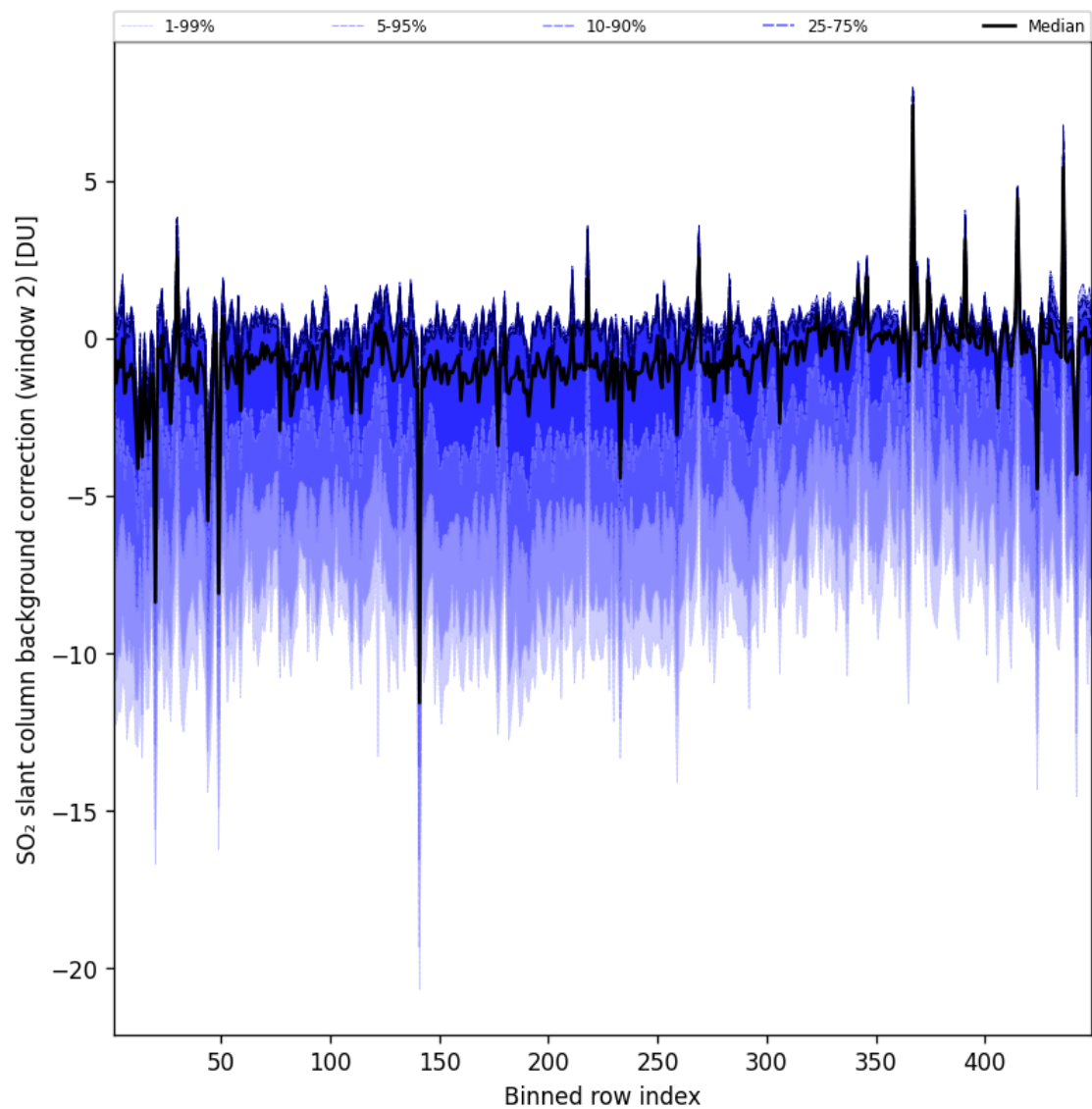


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-02-09 to 2025-02-10

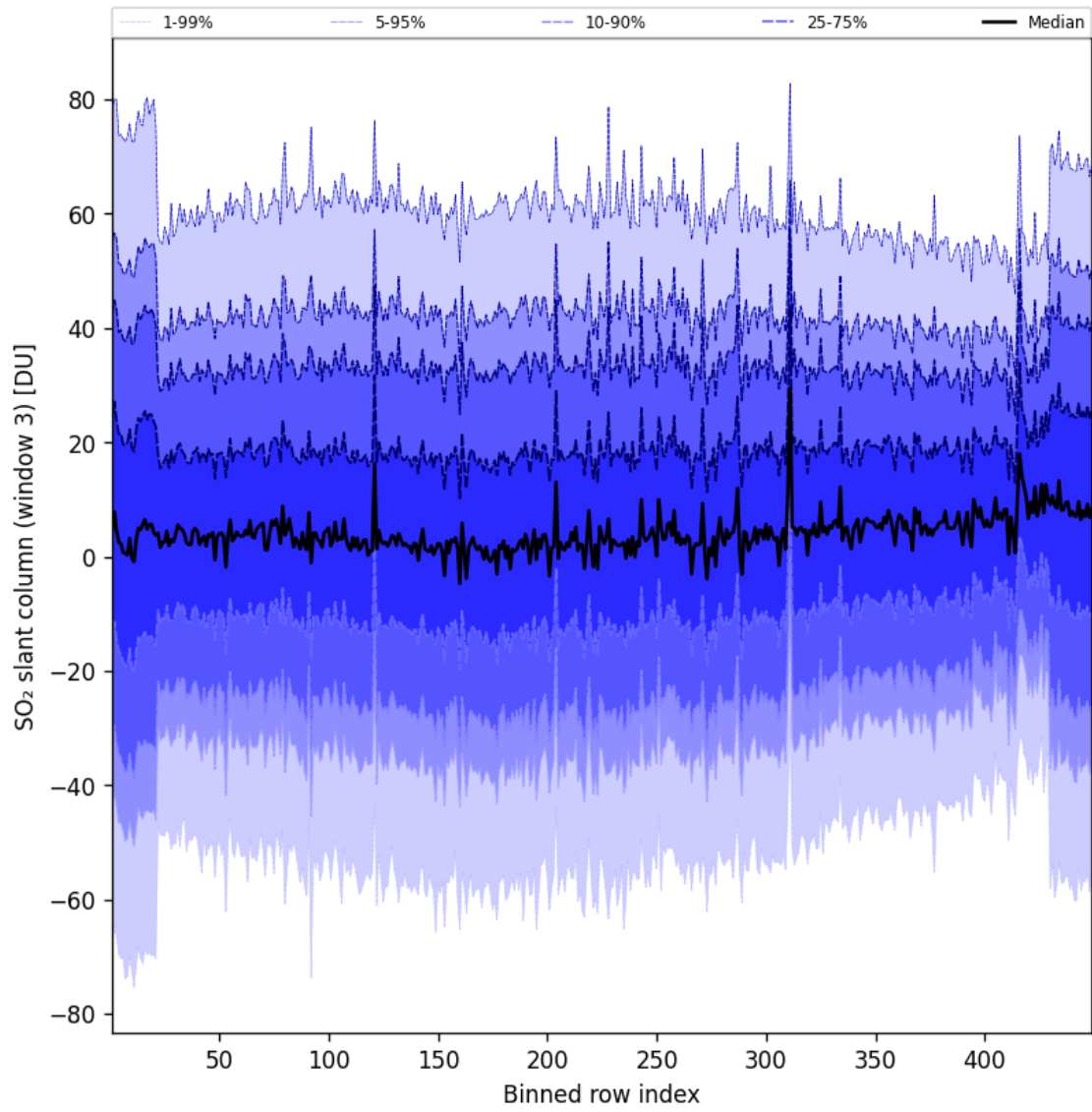


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-02-09 to 2025-02-10

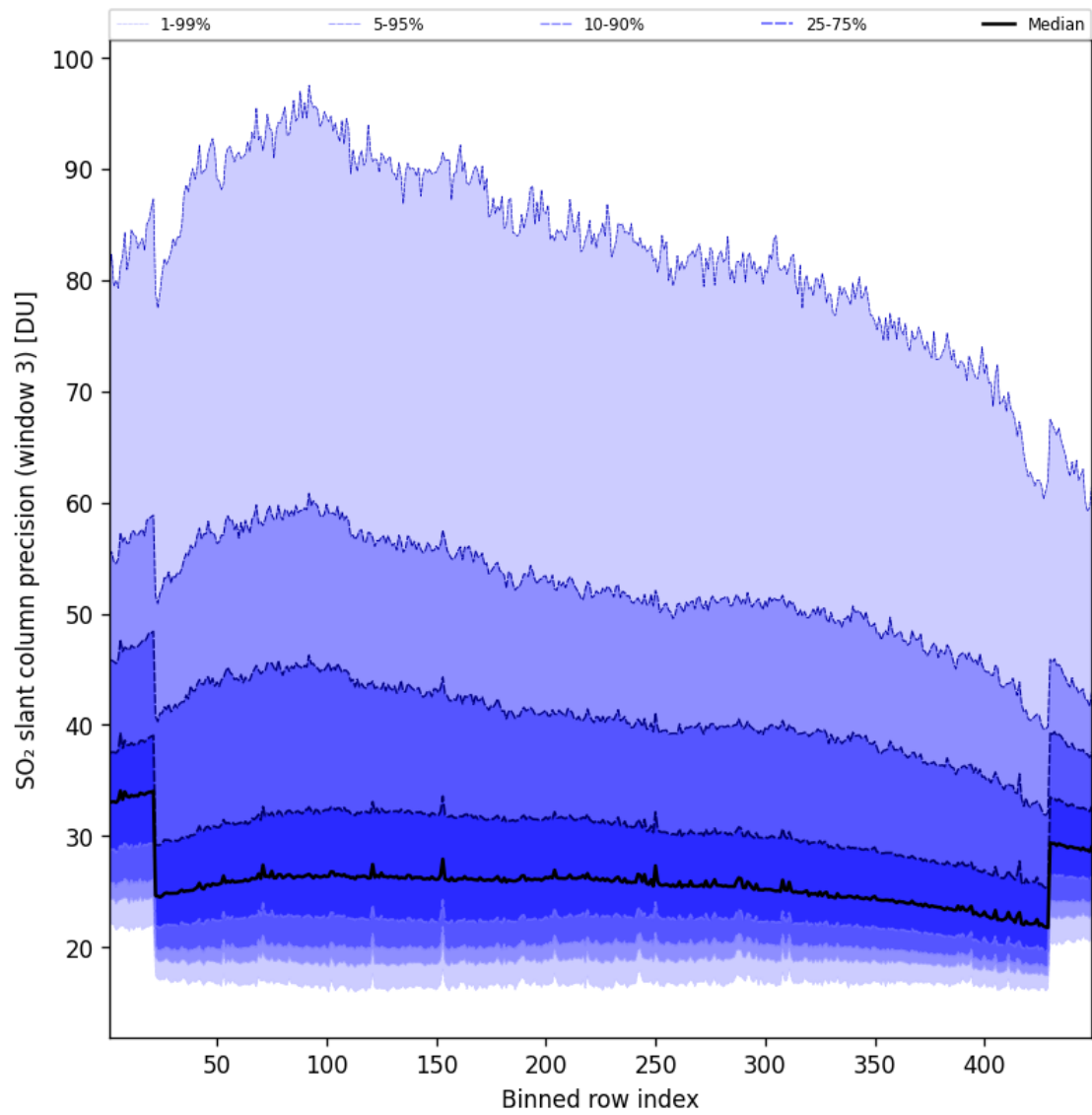


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-02-09 to 2025-02-10

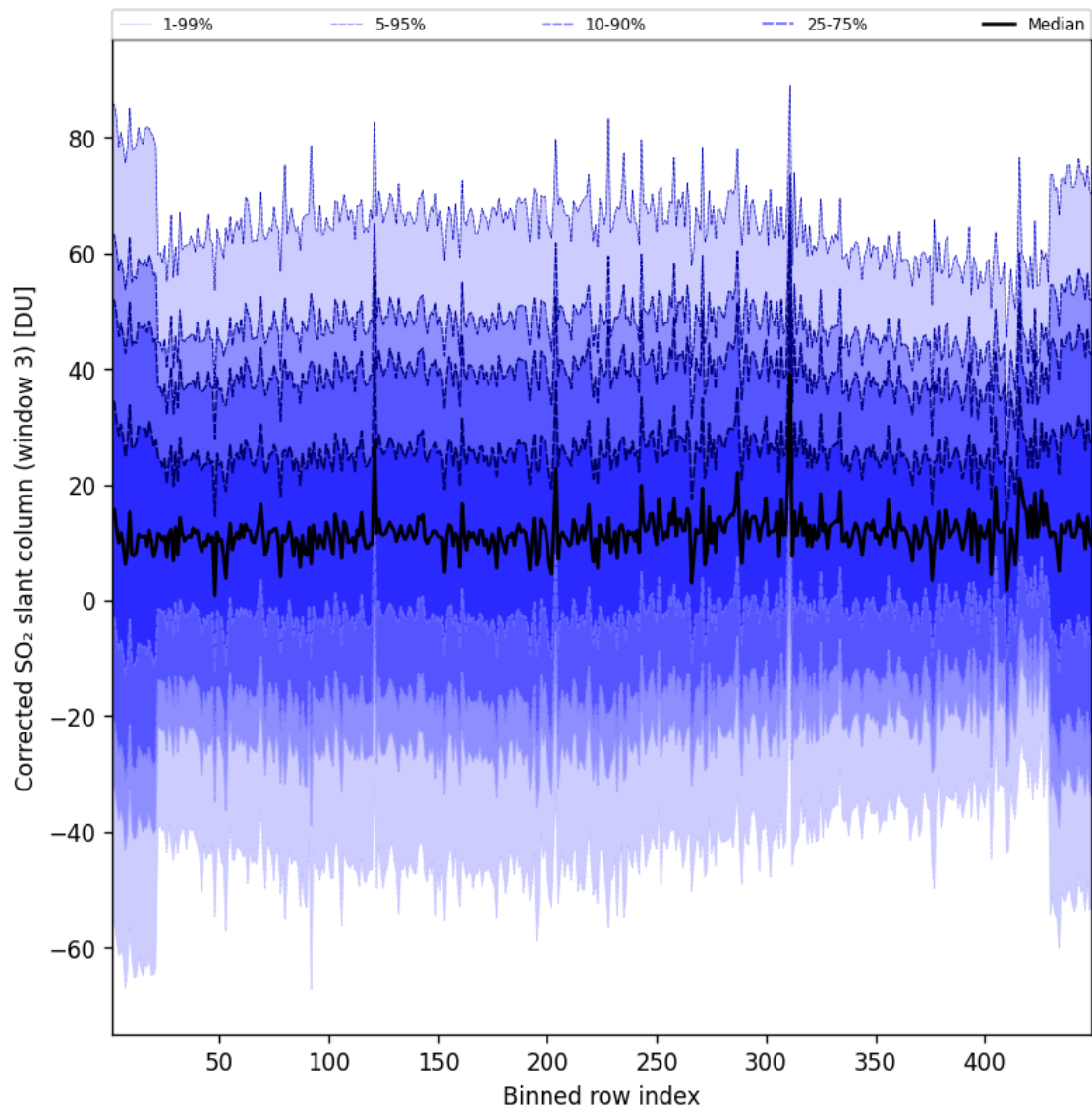


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-02-09 to 2025-02-10

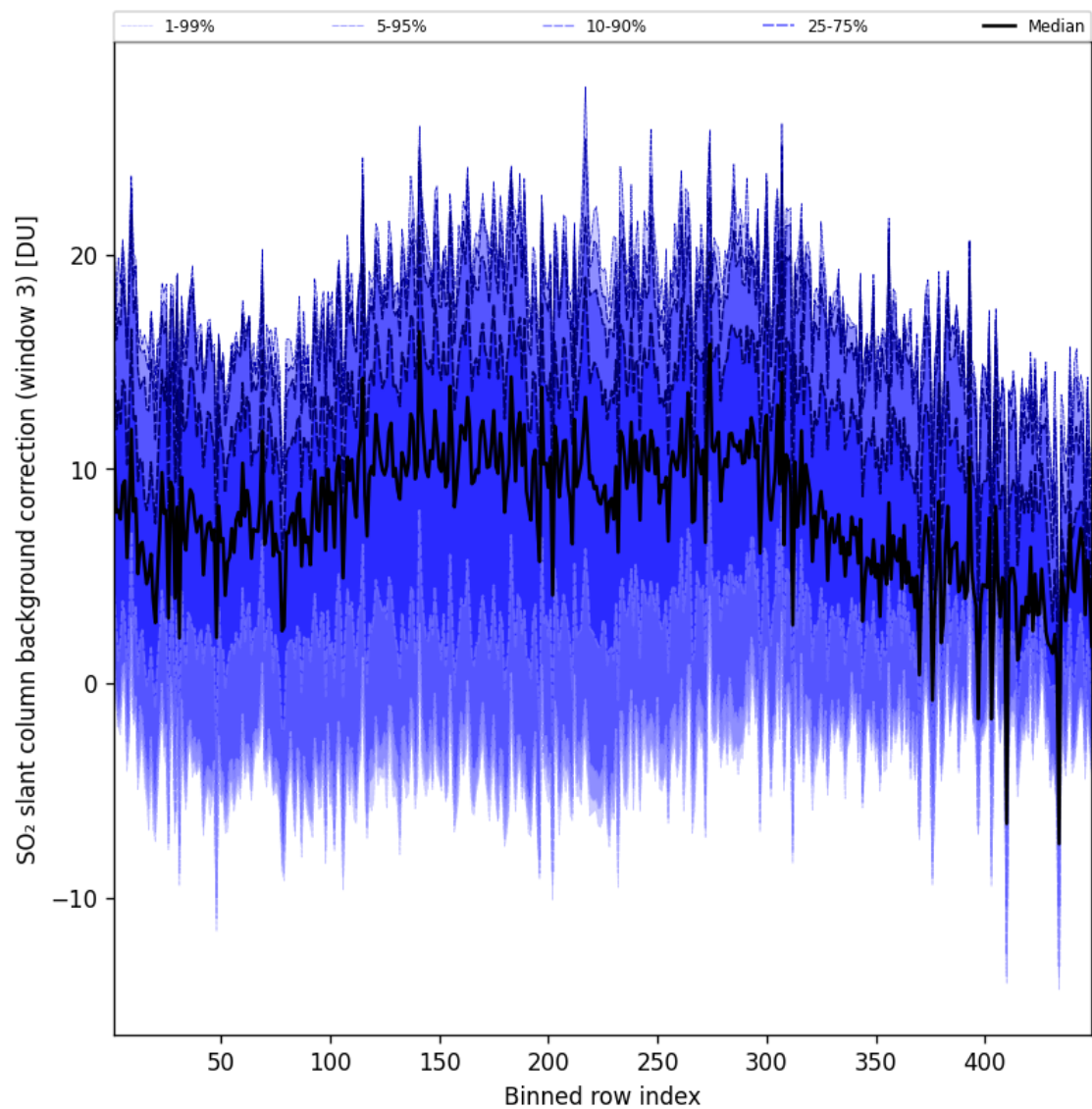


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-02-09 to 2025-02-10

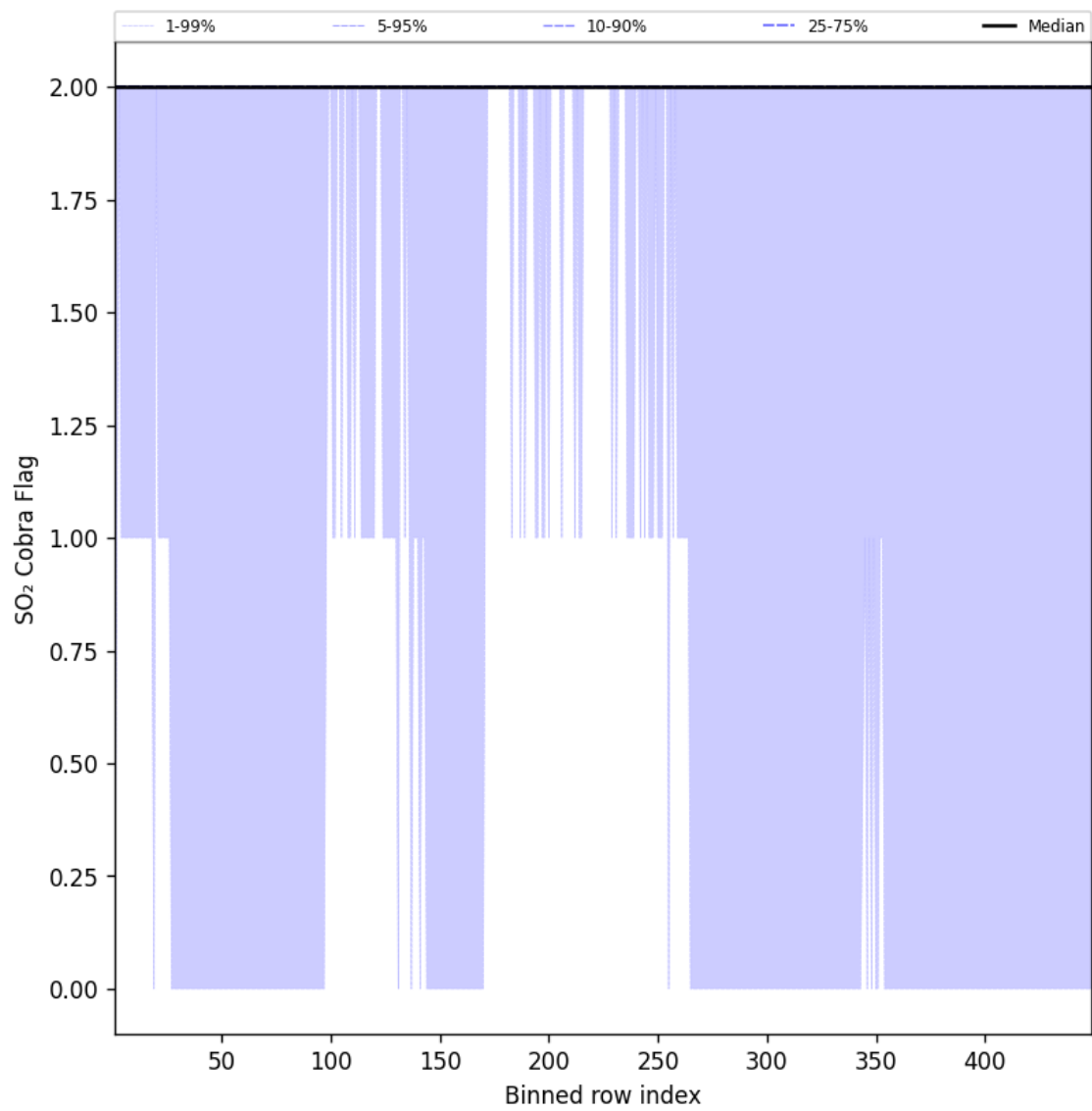


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-02-09 to 2025-02-10

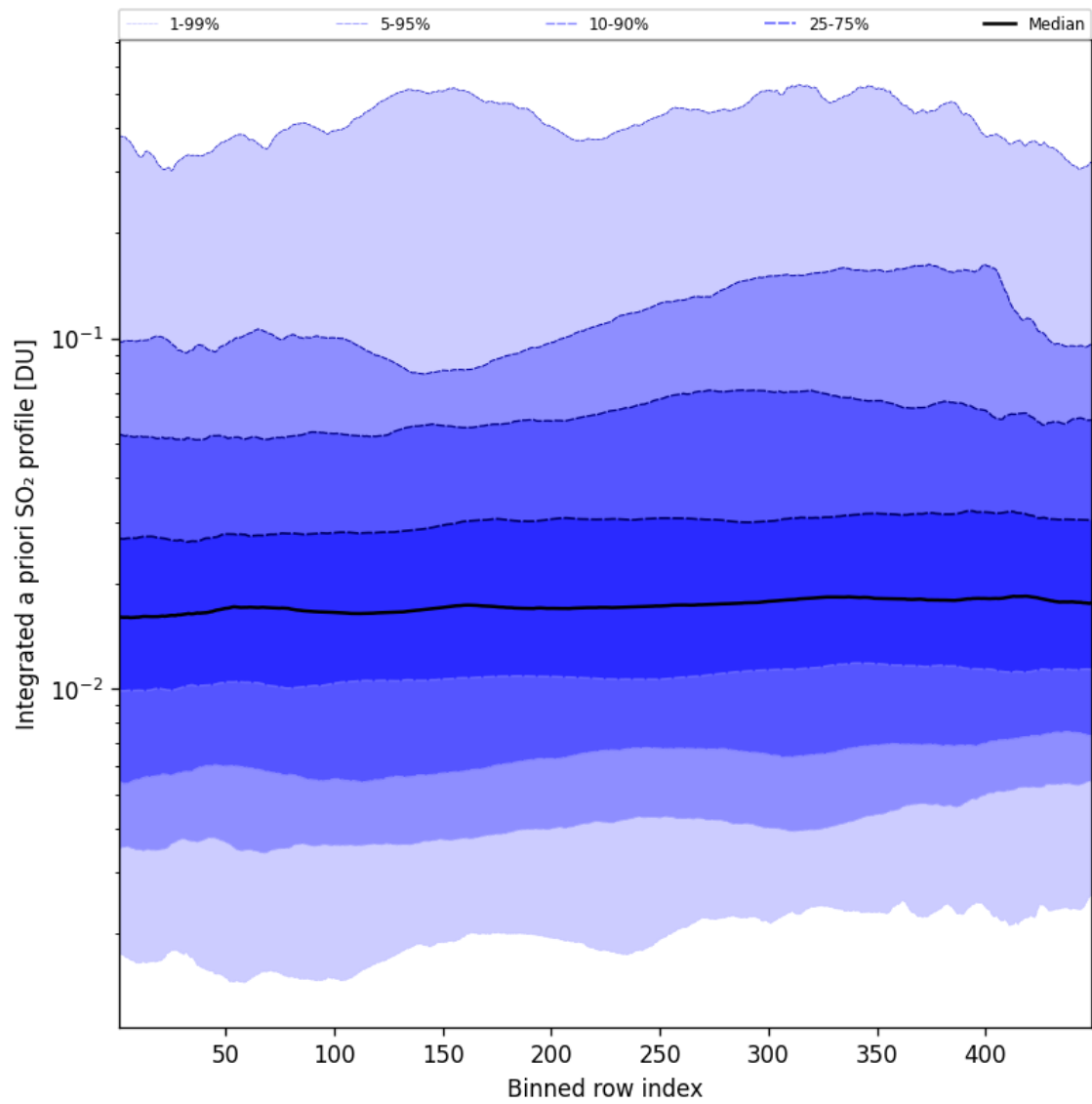


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-02-09 to 2025-02-10

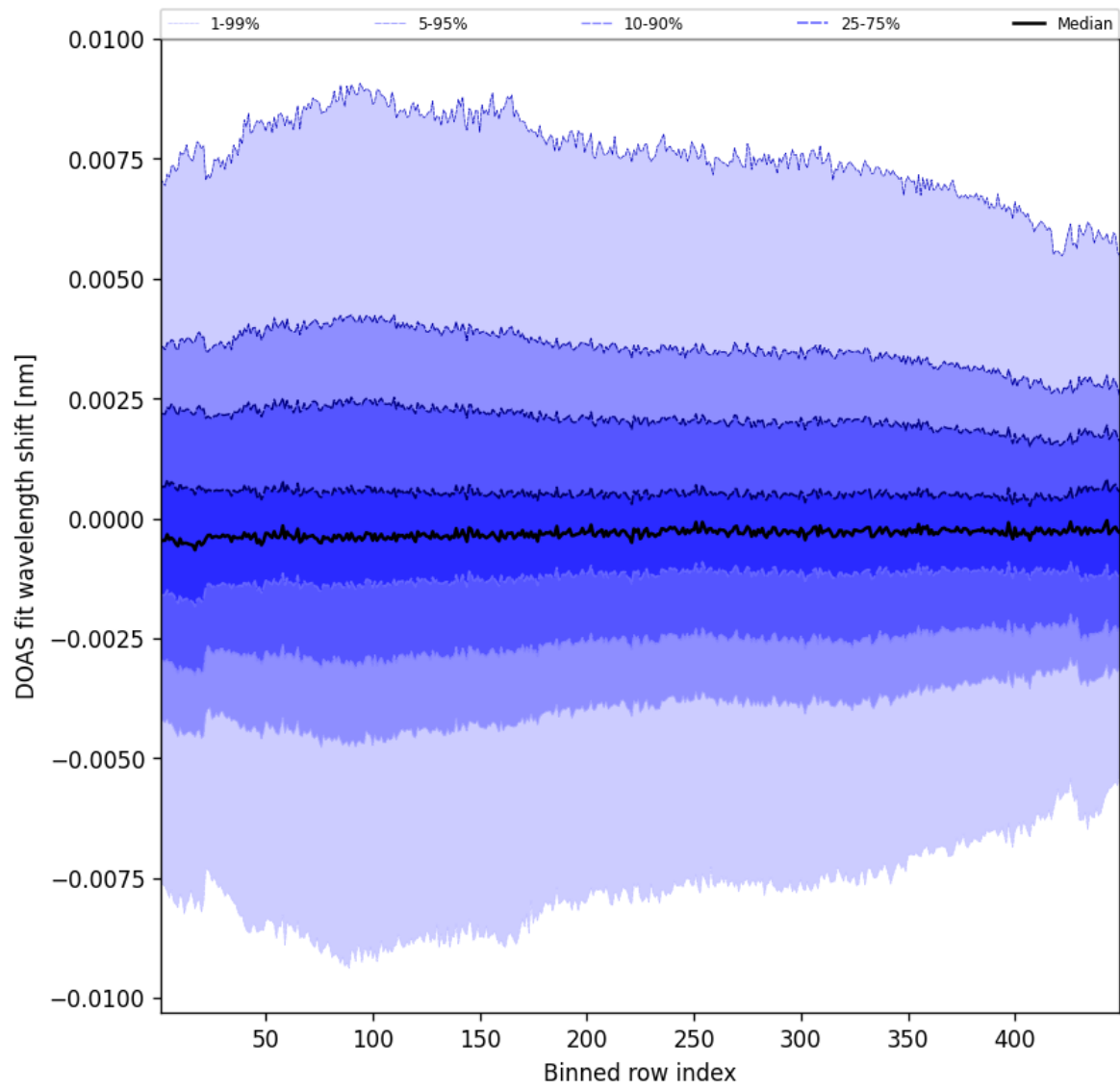


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-02-09 to 2025-02-10

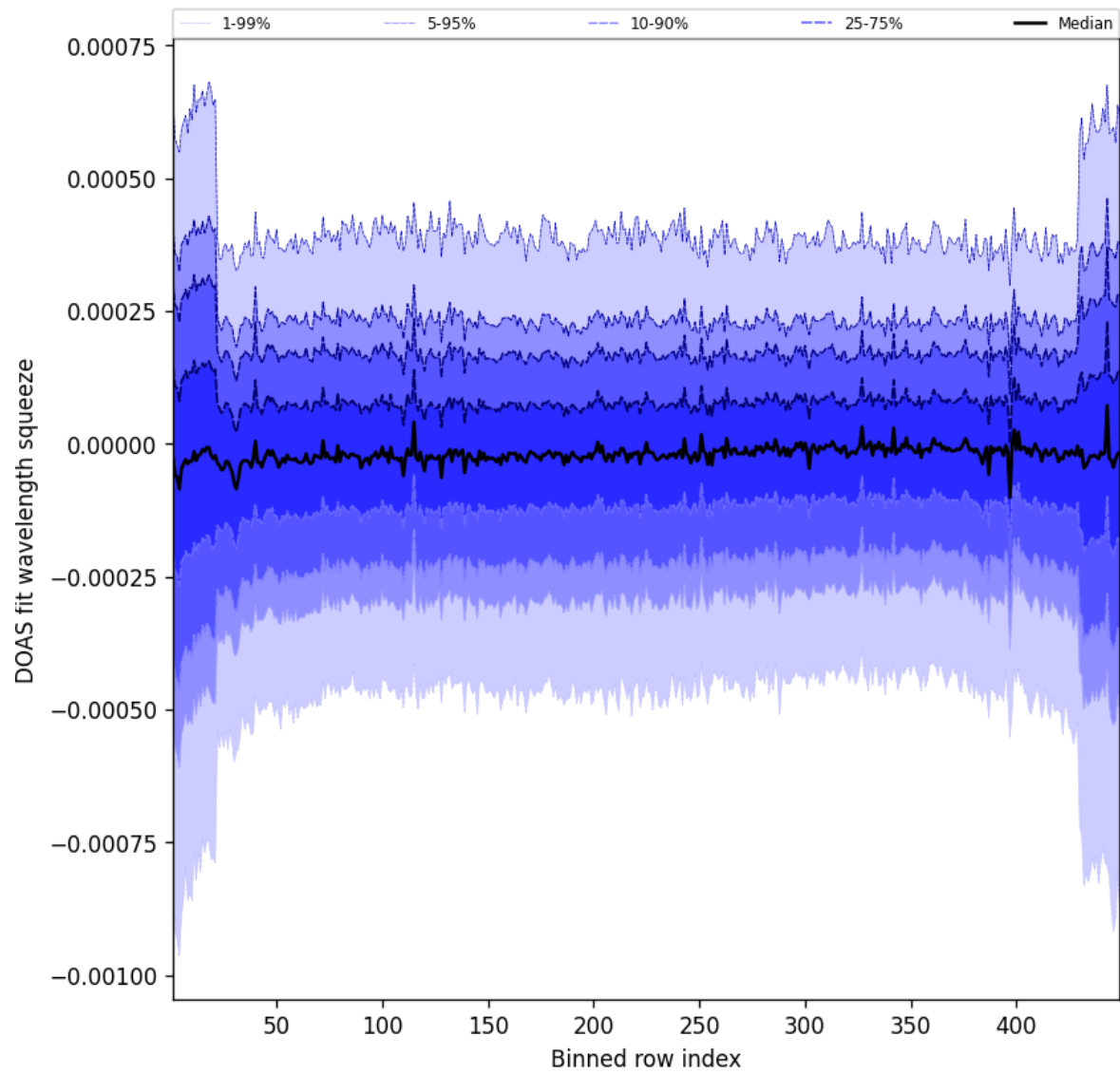


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-02-09 to 2025-02-10

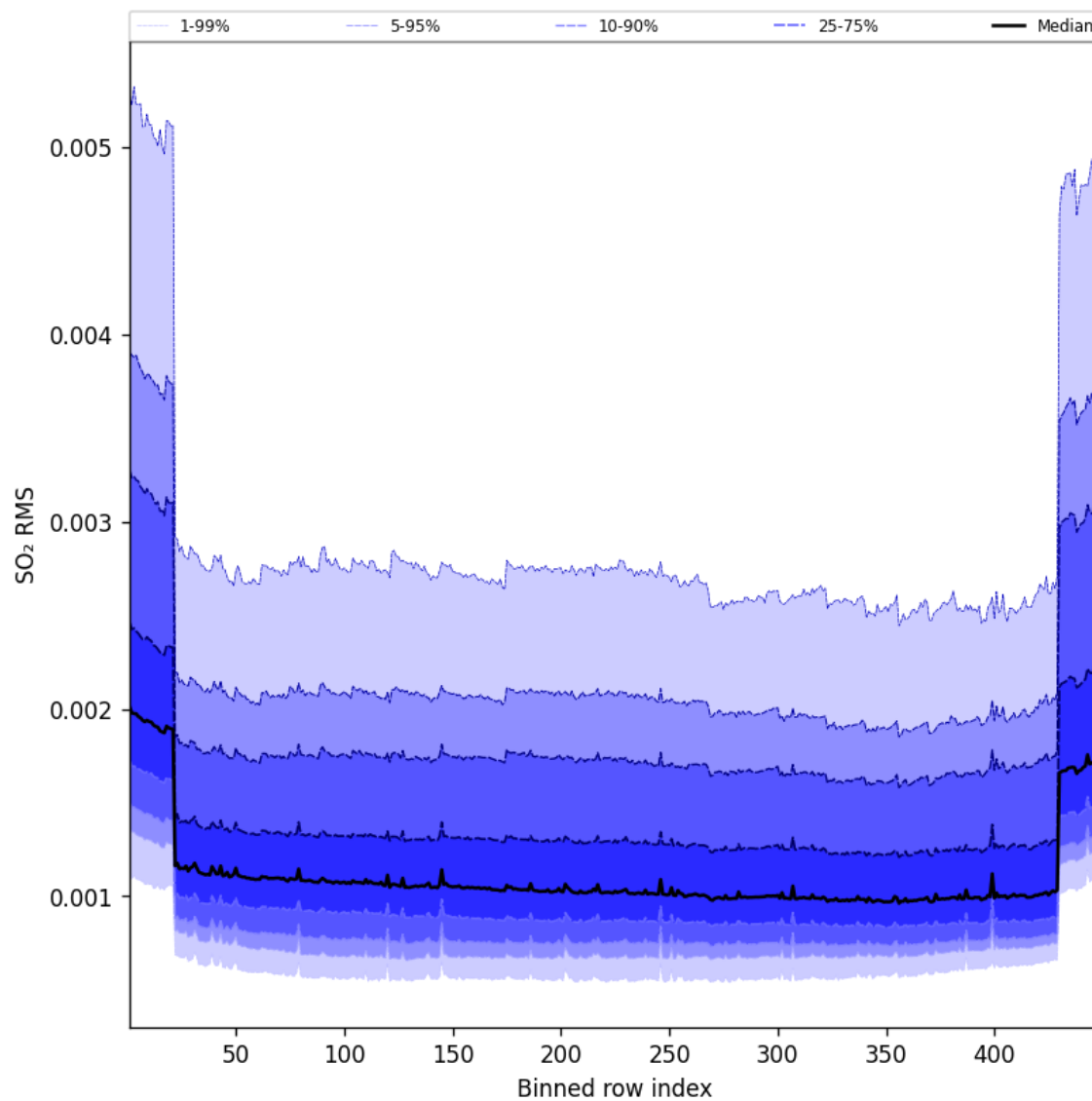


Figure 106: Along track statistics of “SO₂ RMS” for 2025-02-09 to 2025-02-10

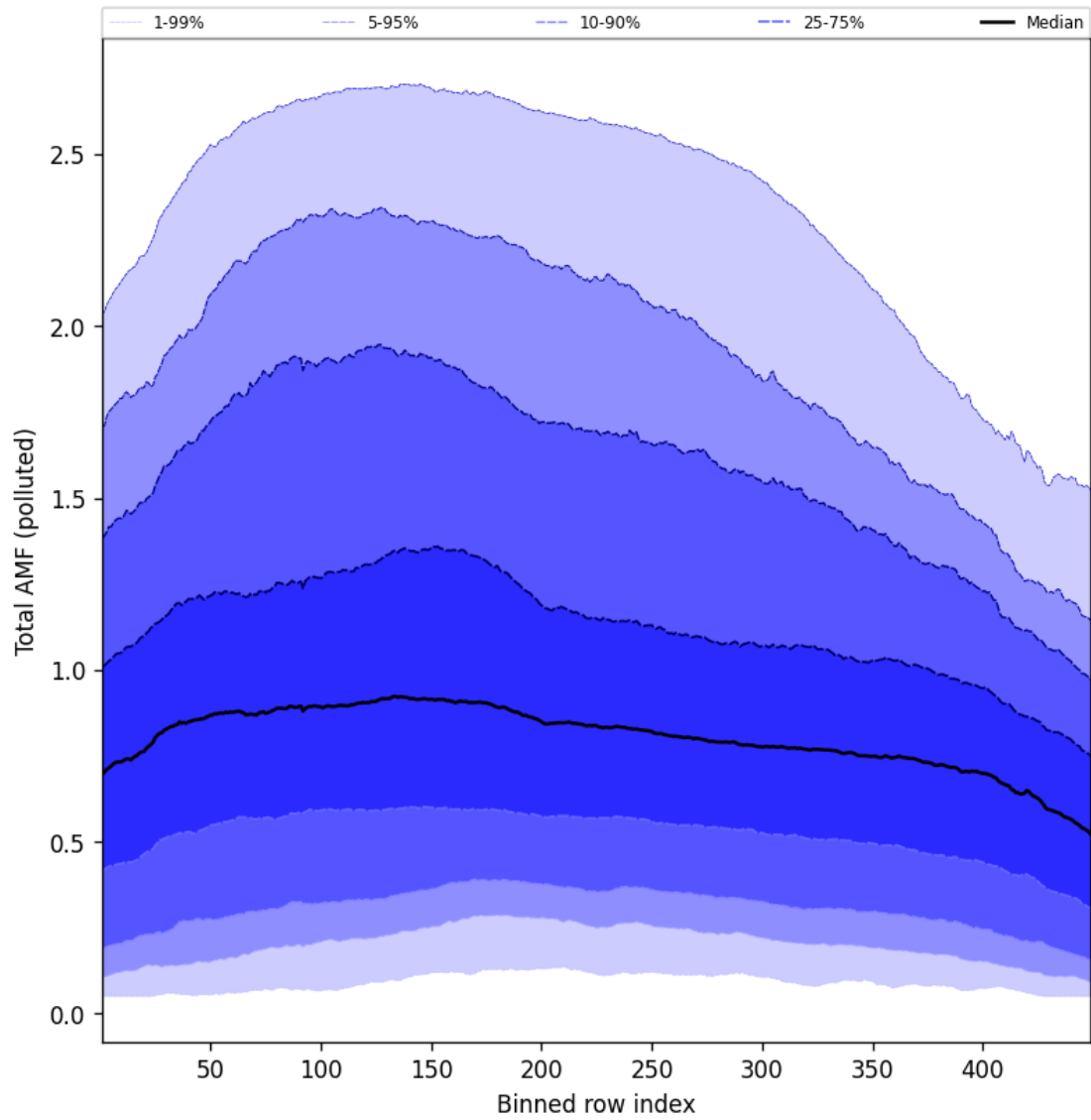


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-02-09 to 2025-02-10

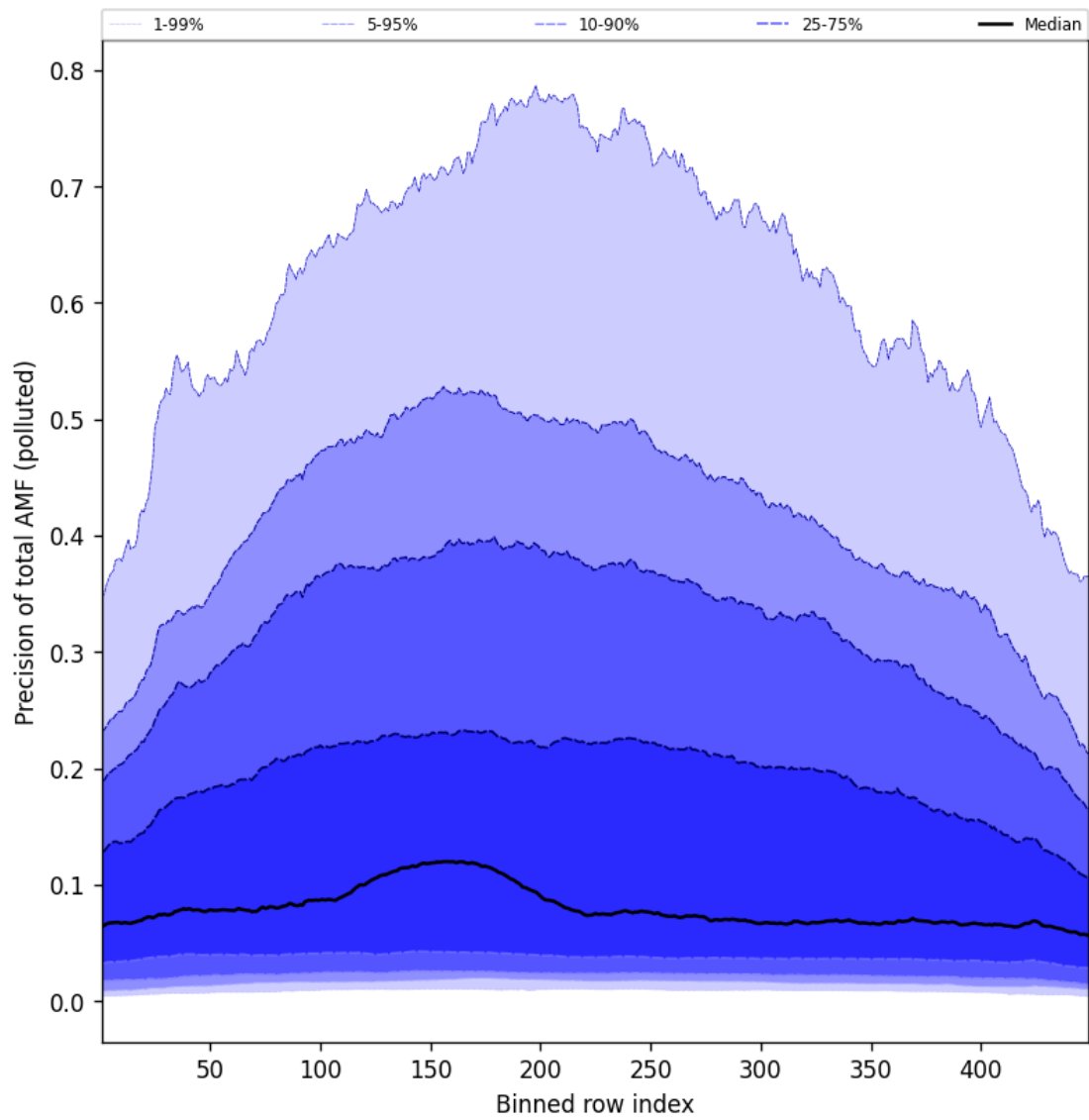


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-02-09 to 2025-02-10

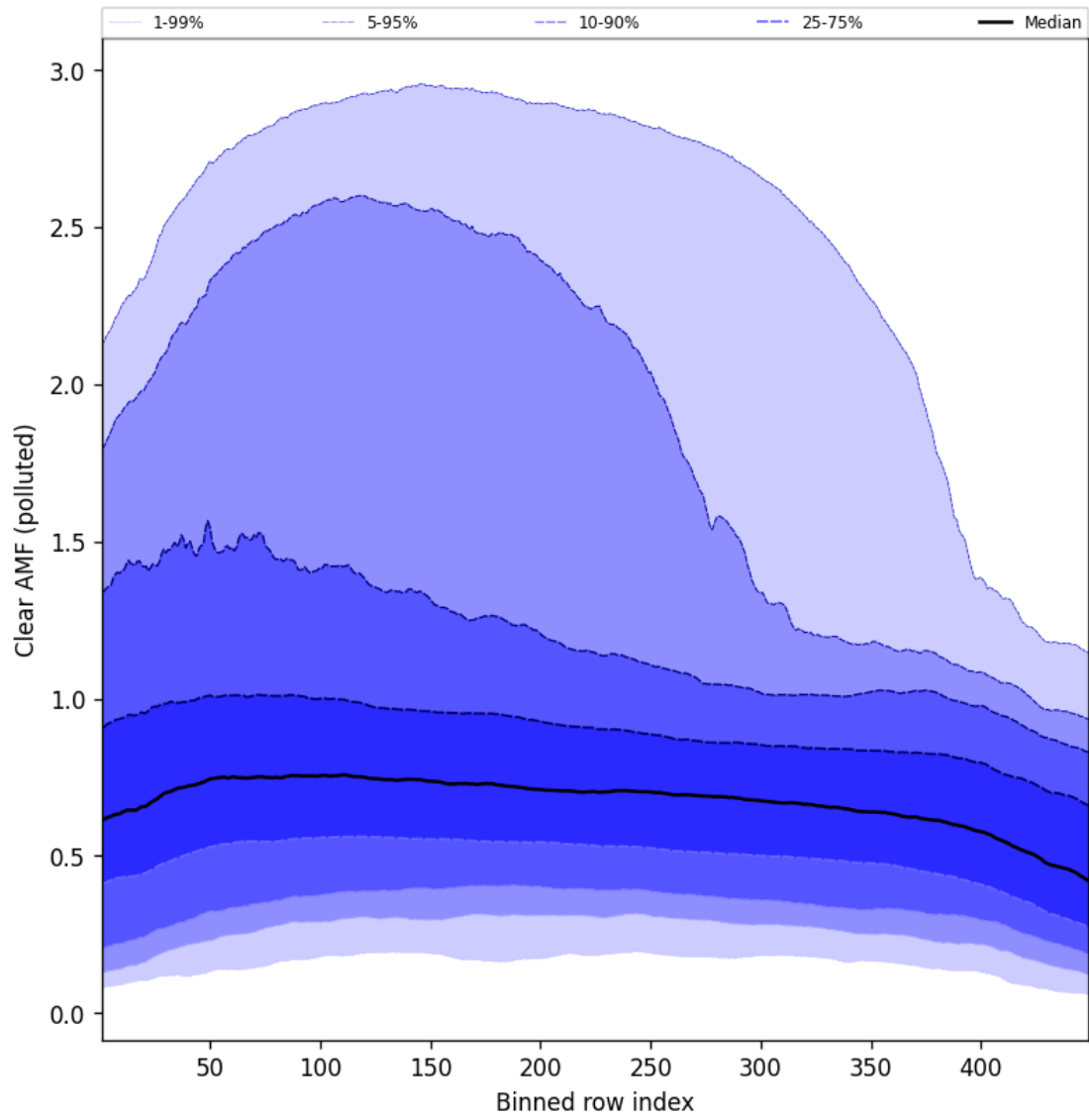


Figure 109: Along track statistics of "Clear AMF (polluted)" for 2025-02-09 to 2025-02-10

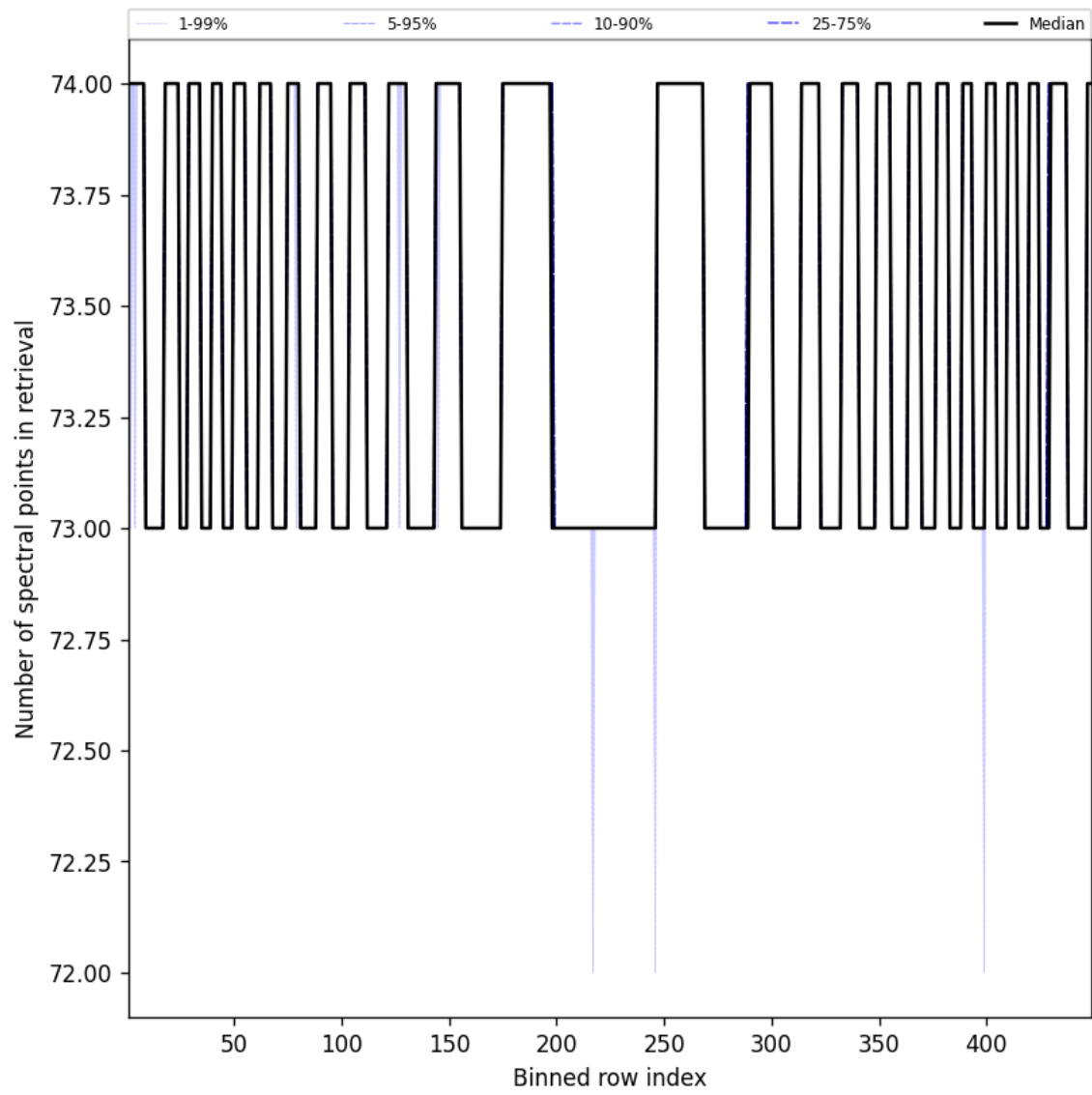


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-02-09 to 2025-02-10

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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