

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 $\frac{1}{2}$ 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]	0.616 ± 0.416	17315695	0.995	0.810	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(5.526 \pm 186.444) \times 10^{-2}$	17315695	0.235	0.421	1.012×10^{-2}	-252	762
sulfurdioxide total vertical column precision [DU]	0.645 ± 1.324	17315695	0.197	0.369	0.299	4.343×10^{-2}	192
sulfurdioxide slant column density corrected [DU]	$(1.917 \pm 35.500) \times 10^{-2}$	17315695	0.227	0.343	9.143×10^{-3}	-31.1	46.6
sulfurdioxide slant column density cobra [DU]	$(1.902 \pm 34.725) \times 10^{-2}$	17315695	0.227	0.343	9.143×10^{-3}	-31.1	46.5
sulfurdioxide slant column density cobra precision [DU]	0.278 ± 0.135	17315695	0.188	0.128	0.236	7.954×10^{-2}	27.3
sulfurdioxide slant column density window1 [DU]	0.180 ± 0.666	17315695	0.225	0.708	0.194	-46.3	116
sulfurdioxide slant column density window1 precision [DU]	0.278 ± 0.135	17315695	0.188	0.128	0.236	7.954×10^{-2}	27.3
sulfurdioxide slant column density corrected win1 [DU]	$(8.585 \pm 65.025) \times 10^{-2}$	17315695	7.500×10^{-2}	0.684	7.091×10^{-2}	-46.3	116
background so2 slant column offset window1 [DU]	$(-9.381 \pm 18.100) \times 10^{-2}$	17315695	-0.220	0.204	-0.136	-1.27	3.27
sulfurdioxide slant column density window2 [DU]	3.59 ± 8.75	17315695	2.75	11.0	3.38	-1.186×10^3	1.135×10^3
sulfurdioxide slant column density window2 precision [DU]	7.84 ± 2.16	17315695	6.97	2.48	7.49	2.17	515
sulfurdioxide slant column density corrected win2 [DU]	3.46 ± 8.46	17315695	3.75	10.7	3.48	-1.185×10^3	1.141×10^3
background so2 slant column offset window2 [DU]	-0.127 ± 2.704	17315695	1.75	2.95	0.761	-15.7	6.72
sulfurdioxide slant column density window3 [DU]	-19.6 ± 23.5	17315695	-19.6	29.6	-19.8	-890	265
sulfurdioxide slant column density window3 precision [DU]	27.5 ± 12.5	17315695	22.5	9.36	24.3	10.2	293
sulfurdioxide slant column density corrected win3 [DU]	-17.5 ± 22.5	17315695	-18.5	28.4	-17.6	-895	259
background so2 slant column offset window3 [DU]	2.17 ± 7.38	17315695	-1.68	11.2	2.01	-22.1	35.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17315695	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.438 \pm 9.347) \times 10^{-2}$	17315695	1.539×10^{-2}	1.776×10^{-2}	1.635×10^{-2}	3.917×10^{-4}	2.63
fitted radiance shift [nm]	$(-4.026 \pm 24.955) \times 10^{-4}$	17315695	-5.000×10^{-4}	1.799×10^{-3}	-4.164×10^{-4}	-4.915×10^{-2}	6.450×10^{-2}
fitted radiance squeeze [1]	$(-4.183 \pm 18.277) \times 10^{-5}$	17315695	-3.000×10^{-5}	2.024×10^{-4}	-3.500×10^{-5}	-1.437×10^{-2}	1.404×10^{-2}
fitted root mean square [1]	$(1.233 \pm 0.558) \times 10^{-3}$	17315695	9.250×10^{-4}	5.262×10^{-4}	1.069×10^{-3}	3.222×10^{-4}	6.605×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.877 ± 0.525	17315695	0.780	0.649	0.785	5.000×10^{-2}	2.97
sulfurdioxide total air mass factor polluted precision [1]	0.136 ± 0.149	17315695	3.500×10^{-2}	0.148	7.995×10^{-2}	2.500×10^{-3}	1.90
sulfurdioxide clear air mass factor polluted [1]	0.757 ± 0.462	17315695	0.580	0.409	0.667	2.636×10^{-2}	3.01
number of spectral points in retrieval [1]	73.4 ± 0.5	17315695	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	4.000×10^{-2}	9.000×10^{-2}	0.190	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-3.52	-0.989	-0.541	-0.346	-0.197	0.225	0.390	0.615	1.16	4.40
sulfurdioxide total vertical column precision [DU]	8.808×10^{-2}	0.113	0.135	0.159	0.192	0.562	0.838	1.24	2.18	6.48
sulfurdioxide slant column density corrected [DU]	-0.822	-0.465	-0.335	-0.249	-0.160	0.182	0.277	0.371	0.523	1.01
sulfurdioxide slant column density cobra [DU]	-0.822	-0.465	-0.335	-0.249	-0.160	0.182	0.277	0.371	0.523	1.01
sulfurdioxide slant column density cobra precision [DU]	0.133	0.157	0.170	0.180	0.194	0.321	0.379	0.436	0.533	0.784
sulfurdioxide slant column density window1 [DU]	-1.66	-0.846	-0.553	-0.363	-0.167	0.541	0.721	0.894	1.16	1.91
sulfurdioxide slant column density window1 precision [DU]	0.133	0.157	0.170	0.180	0.194	0.321	0.379	0.436	0.533	0.784
sulfurdioxide slant column density corrected win1 [DU]	-1.56	-0.861	-0.612	-0.444	-0.268	0.416	0.604	0.788	1.08	1.95
background so2 slant column offset window1 [DU]	-0.354	-0.295	-0.268	-0.246	-0.216	-1.291×10^{-2}	6.974×10^{-2}	0.147	0.248	0.464
sulfurdioxide slant column density window2 [DU]	-16.7	-10.2	-7.05	-4.70	-2.04	8.98	11.8	14.5	18.1	25.9
sulfurdioxide slant column density window2 precision [DU]	4.21	5.04	5.54	5.93	6.41	8.89	9.75	10.6	11.8	14.3
sulfurdioxide slant column density corrected win2 [DU]	-17.2	-10.3	-6.98	-4.57	-1.88	8.83	11.5	13.9	17.1	23.9
background so2 slant column offset window2 [DU]	-8.43	-6.04	-4.19	-2.69	-1.27	1.68	1.94	2.20	2.64	4.36
sulfurdioxide slant column density window3 [DU]	-77.6	-57.8	-48.6	-41.8	-34.4	-4.84	2.84	9.80	19.2	37.6
sulfurdioxide slant column density window3 precision [DU]	14.1	16.0	17.4	18.7	20.5	29.8	34.3	39.9	50.9	80.8
sulfurdioxide slant column density corrected win3 [DU]	-73.3	-54.1	-45.1	-38.7	-31.6	-3.28	4.02	10.6	19.5	37.6
background so2 slant column offset window3 [DU]	-11.8	-9.18	-7.57	-5.85	-3.51	7.69	10.1	12.0	14.2	18.6
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	2.280×10^{-3}	4.236×10^{-3}	5.879×10^{-3}	7.569×10^{-3}	9.907×10^{-3}	2.766×10^{-2}	3.635×10^{-2}	5.187×10^{-2}	0.105	0.386
fitted radiance shift [nm]	-7.889×10^{-3}	-4.101×10^{-3}	-2.759×10^{-3}	-1.993×10^{-3}	-1.344×10^{-3}	4.546×10^{-4}	1.154×10^{-3}	2.008×10^{-3}	3.468×10^{-3}	7.433×10^{-3}
fitted radiance squeeze [1]	-5.559×10^{-4}	-3.357×10^{-4}	-2.516×10^{-4}	-1.960×10^{-4}	-1.389×10^{-4}	6.348×10^{-5}	1.139×10^{-4}	1.611×10^{-4}	2.309×10^{-4}	4.081×10^{-4}
fitted root mean square [1]	5.712×10^{-4}	6.974×10^{-4}	7.676×10^{-4}	8.215×10^{-4}	8.876×10^{-4}	1.414×10^{-3}	1.652×10^{-3}	1.887×10^{-3}	2.272×10^{-3}	3.357×10^{-3}
sulfurdioxide total air mass factor polluted [1]	5.878×10^{-2}	0.178	0.285	0.379	0.502	1.15	1.38	1.61	1.92	2.47
sulfurdioxide total air mass factor polluted precision [1]	7.444×10^{-3}	1.489×10^{-2}	2.147×10^{-2}	2.794×10^{-2}	3.720×10^{-2}	0.186	0.250	0.319	0.430	0.715
sulfurdioxide clear air mass factor polluted [1]	0.142	0.244	0.326	0.401	0.488	0.897	1.03	1.16	1.61	2.71
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]	0.662 ± 0.410	7310508	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	0.107 ± 2.761	7310508	0.605	1.544×10^{-2}	-252	762	-0.276	0.329
sulfurdioxide total vertical column precision [DU]	1.02 ± 1.89	7310508	0.710	0.440	4.375×10^{-2}	192	0.249	0.959
sulfurdioxide slant column density corrected [DU]	$(2.807 \pm 43.109) \times 10^{-2}$	7310508	0.386	1.158×10^{-2}	-12.6	46.6	-0.178	0.208
sulfurdioxide slant column density cobra [DU]	$(2.773 \pm 41.598) \times 10^{-2}$	7310508	0.386	1.158×10^{-2}	-12.6	41.6	-0.178	0.208
sulfurdioxide slant column density cobra precision [DU]	0.320 ± 0.166	7310508	0.174	0.270	7.954×10^{-2}	16.6	0.209	0.383
sulfurdioxide slant column density window1 [DU]	0.229 ± 0.775	7310508	0.781	0.244	-13.3	101	-0.151	0.630
sulfurdioxide slant column density window1 precision [DU]	0.320 ± 0.166	7310508	0.174	0.270	7.954×10^{-2}	16.6	0.209	0.383
sulfurdioxide slant column density corrected win1 [DU]	0.108 ± 0.767	7310508	0.769	8.240×10^{-2}	-12.1	101	-0.295	0.474
background so2 slant column offset window1 [DU]	-0.121 ± 0.194	7310508	0.186	-0.161	-1.09	3.27	-0.242	-5.531×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.37 ± 9.48	7310508	12.0	4.03	-115	804	-1.84	10.2
sulfurdioxide slant column density window2 precision [DU]	8.40 ± 2.22	7310508	2.70	8.05	2.35	322	6.87	9.57
sulfurdioxide slant column density corrected win2 [DU]	3.31 ± 9.01	7310508	11.5	3.32	-123	806	-2.43	9.06
background so2 slant column offset window2 [DU]	-1.06 ± 3.40	7310508	5.22	0.294	-15.7	6.72	-3.65	1.57
sulfurdioxide slant column density window3 [DU]	-22.5 ± 24.5	7310508	31.2	-22.3	-354	155	-37.9	-6.74
sulfurdioxide slant column density window3 precision [DU]	28.9 ± 12.5	7310508	9.24	25.8	10.2	210	22.0	31.3
sulfurdioxide slant column density corrected win3 [DU]	-17.2 ± 23.8	7310508	30.2	-17.1	-336	160	-32.2	-1.97
background so2 slant column offset window3 [DU]	5.30 ± 6.76	7310508	10.9	4.91	-18.7	35.1	-0.414	10.5
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	7310508	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.586 \pm 13.837) \times 10^{-2}$	7310508	3.194×10^{-2}	2.057×10^{-2}	3.917×10^{-4}	2.63	1.057×10^{-2}	4.250×10^{-2}
fitted radiance shift [nm]	$(-2.446 \pm 25.019) \times 10^{-4}$	7310508	1.660×10^{-3}	-2.496×10^{-4}	-3.280×10^{-2}	3.707×10^{-2}	-1.089×10^{-3}	5.715×10^{-4}
fitted radiance squeeze [1]	$(-1.220 \pm 20.694) \times 10^{-5}$	7310508	2.167×10^{-4}	-6.300×10^{-6}	-3.201×10^{-3}	1.346×10^{-2}	-1.151×10^{-4}	1.016×10^{-4}
fitted root mean square [1]	$(1.398 \pm 0.686) \times 10^{-3}$	7310508	7.024×10^{-4}	1.176×10^{-3}	3.235×10^{-4}	5.331×10^{-2}	9.509×10^{-4}	1.653×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.687 ± 0.421	7310508	0.547	0.633	5.000×10^{-2}	2.79	0.369	0.915
sulfurdioxide total air mass factor polluted precision [1]	0.105 ± 0.146	7310508	9.956×10^{-2}	4.884×10^{-2}	2.500×10^{-3}	1.90	2.635×10^{-2}	0.126
sulfurdioxide clear air mass factor polluted [1]	0.590 ± 0.296	7310508	0.453	0.554	2.636×10^{-2}	2.28	0.350	0.803
number of spectral points in retrieval [1]	73.5 ± 0.5	7310508	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.582 ± 0.417	10005187	0.840	0.480	0.0	1.000	0.160	1.000
sulfurdioxide total vertical column [DU]	$(1.742 \pm 66.685) \times 10^{-2}$	10005187	0.339	7.680×10^{-3}	-52.5	197	-0.160	0.179
sulfurdioxide total vertical column precision [DU]	0.370 ± 0.495	10005187	0.235	0.245	4.343×10^{-2}	86.2	0.167	0.402
sulfurdioxide slant column density corrected [DU]	$(1.266 \pm 28.674) \times 10^{-2}$	10005187	0.316	7.662×10^{-3}	-31.1	46.5	-0.149	0.167
sulfurdioxide slant column density cobra [DU]	$(1.266 \pm 28.663) \times 10^{-2}$	10005187	0.316	7.662×10^{-3}	-31.1	46.5	-0.149	0.167
sulfurdioxide slant column density cobra precision [DU]	0.248 ± 0.097	10005187	9.538×10^{-2}	0.220	8.172×10^{-2}	27.3	0.186	0.281
sulfurdioxide slant column density window1 [DU]	0.144 ± 0.571	10005187	0.660	0.162	-46.3	116	-0.177	0.483
sulfurdioxide slant column density window1 precision [DU]	0.248 ± 0.097	10005187	9.538×10^{-2}	0.220	8.172×10^{-2}	27.3	0.186	0.281
sulfurdioxide slant column density corrected win1 [DU]	$(6.969 \pm 54.901) \times 10^{-2}$	10005187	0.632	6.394×10^{-2}	-46.3	116	-0.251	0.381
background so2 slant column offset window1 [DU]	$(-7.422 \pm 16.838) \times 10^{-2}$	10005187	0.222	-0.121	-1.27	1.72	-0.199	2.293×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.01 ± 8.13	10005187	10.3	2.97	-1.186×10^3	1.135×10^3	-2.17	8.16
sulfurdioxide slant column density window2 precision [DU]	7.43 ± 2.02	10005187	2.20	7.14	2.17	515	6.15	8.35
sulfurdioxide slant column density corrected win2 [DU]	3.57 ± 8.02	10005187	10.2	3.59	-1.185×10^3	1.141×10^3	-1.51	8.67
background so2 slant column offset window2 [DU]	0.559 ± 1.765	10005187	2.22	1.00	-11.1	6.46	-0.483	1.74
sulfurdioxide slant column density window3 [DU]	-17.6 ± 22.5	10005187	28.5	-18.2	-890	265	-32.0	-3.57
sulfurdioxide slant column density window3 precision [DU]	26.4 ± 12.4	10005187	9.04	23.2	10.5	293	19.5	28.5
sulfurdioxide slant column density corrected win3 [DU]	-17.7 ± 21.5	10005187	27.1	-17.9	-895	259	-31.3	-4.19
background so2 slant column offset window3 [DU]	-0.127 ± 6.952	10005187	11.5	-0.460	-22.1	19.6	-6.04	5.49
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	10005187	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.868 \pm 2.340) \times 10^{-2}$	10005187	1.284×10^{-2}	1.483×10^{-2}	6.512×10^{-4}	1.84	9.609×10^{-3}	2.245×10^{-2}
fitted radiance shift [nm]	$(-5.180 \pm 24.845) \times 10^{-4}$	10005187	1.844×10^{-3}	-5.567×10^{-4}	-4.915×10^{-2}	6.450×10^{-2}	-1.492×10^{-3}	3.516×10^{-4}
fitted radiance squeeze [1]	$(-6.347 \pm 15.941) \times 10^{-5}$	10005187	1.907×10^{-4}	-5.346×10^{-5}	-1.437×10^{-2}	1.404×10^{-2}	-1.533×10^{-4}	3.744×10^{-5}
fitted root mean square [1]	$(1.113 \pm 0.401) \times 10^{-3}$	10005187	4.223×10^{-4}	1.008×10^{-3}	3.222×10^{-4}	6.605×10^{-2}	8.537×10^{-4}	1.276×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.02 ± 0.55	10005187	0.708	0.907	5.000×10^{-2}	2.97	0.614	1.32
sulfurdioxide total air mass factor polluted precision [1]	0.158 ± 0.146	10005187	0.171	0.116	3.804×10^{-3}	1.53	4.792×10^{-2}	0.219
sulfurdioxide clear air mass factor polluted [1]	0.878 ± 0.520	10005187	0.413	0.724	0.162	3.01	0.569	0.981
number of spectral points in retrieval [1]	73.4 ± 0.5	10005187	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]	0.657 ± 0.408	12504204	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(3.817 \pm 136.476) \times 10^{-2}$	12504204	0.404	8.911×10^{-3}	-252	762	-0.191	0.213
sulfurdioxide total vertical column precision [DU]	0.539 ± 0.985	12504204	0.299	0.284	4.375×10^{-2}	192	0.195	0.495
sulfurdioxide slant column density corrected [DU]	$(1.492 \pm 31.786) \times 10^{-2}$	12504204	0.328	7.835×10^{-3}	-31.1	46.5	-0.155	0.173
sulfurdioxide slant column density cobra [DU]	$(1.487 \pm 31.474) \times 10^{-2}$	12504204	0.328	7.835×10^{-3}	-31.1	46.5	-0.155	0.173
sulfurdioxide slant column density cobra precision [DU]	0.264 ± 0.120	12504204	0.109	0.225	7.954×10^{-2}	27.3	0.190	0.299
sulfurdioxide slant column density window1 [DU]	0.180 ± 0.618	12504204	0.675	0.193	-46.3	116	-0.150	0.525
sulfurdioxide slant column density window1 precision [DU]	0.264 ± 0.120	12504204	0.109	0.225	7.954×10^{-2}	27.3	0.190	0.299
sulfurdioxide slant column density corrected win1 [DU]	$(7.465 \pm 60.402) \times 10^{-2}$	12504204	0.655	6.454×10^{-2}	-46.3	116	-0.261	0.394
background so2 slant column offset window1 [DU]	-0.106 ± 0.162	12504204	0.191	-0.138	-1.27	2.76	-0.217	-2.627×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.15 ± 8.46	12504204	10.7	3.01	-1.186×10^3	1.135×10^3	-2.28	8.40
sulfurdioxide slant column density window2 precision [DU]	7.67 ± 2.04	12504204	2.34	7.35	2.17	345	6.31	8.66
sulfurdioxide slant column density corrected win2 [DU]	3.42 ± 8.28	12504204	10.5	3.45	-1.185×10^3	1.141×10^3	-1.83	8.69
background so2 slant column offset window2 [DU]	0.268 ± 2.330	12504204	2.30	0.926	-15.7	6.72	-0.588	1.71
sulfurdioxide slant column density window3 [DU]	-16.8 ± 23.2	12504204	29.4	-17.2	-890	265	-31.6	-2.19
sulfurdioxide slant column density window3 precision [DU]	27.2 ± 12.1	12504204	8.88	24.1	10.5	293	20.5	29.4
sulfurdioxide slant column density corrected win3 [DU]	-15.5 ± 22.1	12504204	28.1	-15.9	-895	259	-29.7	-1.58
background so2 slant column offset window3 [DU]	1.31 ± 6.87	12504204	9.95	1.20	-22.1	35.1	-3.82	6.12
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.14	12504204	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.337 \pm 4.241) \times 10^{-2}$	12504204	1.468×10^{-2}	1.617×10^{-2}	9.196×10^{-4}	2.19	1.058×10^{-2}	2.526×10^{-2}
fitted radiance shift [nm]	$(-3.911 \pm 23.851) \times 10^{-4}$	12504204	1.784×10^{-3}	-3.796×10^{-4}	-4.915×10^{-2}	6.450×10^{-2}	-1.316×10^{-3}	4.682×10^{-4}
fitted radiance squeeze [1]	$(-4.561 \pm 16.981) \times 10^{-5}$	12504204	1.920×10^{-4}	-3.719×10^{-5}	-1.047×10^{-2}	1.404×10^{-2}	-1.360×10^{-4}	5.600×10^{-5}
fitted root mean square [1]	$(1.168 \pm 0.506) \times 10^{-3}$	12504204	4.314×10^{-4}	1.021×10^{-3}	3.404×10^{-4}	6.605×10^{-2}	8.699×10^{-4}	1.301×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.852 ± 0.433	12504204	0.557	0.798	5.000×10^{-2}	2.69	0.545	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.125 ± 0.123	12504204	0.134	7.700×10^{-2}	2.500×10^{-3}	1.75	3.998×10^{-2}	0.174
sulfurdioxide clear air mass factor polluted [1]	0.714 ± 0.281	12504204	0.344	0.678	2.636×10^{-2}	2.69	0.527	0.871
number of spectral points in retrieval [1]	73.4 ± 0.5	12504204	1.000	73.0	53.0	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]	0.520 ± 0.420	3947482	0.900	0.480	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	$(8.330 \pm 258.019) \times 10^{-2}$	3947482	0.442	1.194×10^{-2}	-186	266	-0.200	0.242
sulfurdioxide total vertical column precision [DU]	0.826 ± 1.783	3947482	0.591	0.336	4.343×10^{-2}	106	0.164	0.755
sulfurdioxide slant column density corrected [DU]	$(2.766 \pm 42.652) \times 10^{-2}$	3947482	0.381	1.224×10^{-2}	-10.2	46.6	-0.176	0.206
sulfurdioxide slant column density cobra [DU]	$(2.725 \pm 40.833) \times 10^{-2}$	3947482	0.381	1.224×10^{-2}	-10.2	41.6	-0.176	0.206
sulfurdioxide slant column density cobra precision [DU]	0.310 ± 0.156	3947482	0.149	0.270	8.224×10^{-2}	16.6	0.211	0.360
sulfurdioxide slant column density window1 [DU]	0.173 ± 0.750	3947482	0.799	0.192	-23.9	101	-0.221	0.578
sulfurdioxide slant column density window1 precision [DU]	0.310 ± 0.156	3947482	0.149	0.270	8.224×10^{-2}	16.6	0.211	0.360
sulfurdioxide slant column density corrected win1 [DU]	0.109 ± 0.726	3947482	0.756	8.788×10^{-2}	-23.9	101	-0.285	0.471
background so2 slant column offset window1 [DU]	$(-6.407 \pm 21.769) \times 10^{-2}$	3947482	0.258	-0.129	-0.975	3.27	-0.216	4.165×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.48 ± 9.21	3947482	11.7	4.28	-713	740	-1.46	10.2
sulfurdioxide slant column density window2 precision [DU]	8.20 ± 2.36	3947482	2.67	7.85	2.31	515	6.67	9.34
sulfurdioxide slant column density corrected win2 [DU]	3.59 ± 8.82	3947482	11.1	3.63	-712	744	-1.95	9.17
background so2 slant column offset window2 [DU]	-0.881 ± 3.075	3947482	4.63	-2.243×10^{-2}	-15.7	6.72	-3.01	1.62
sulfurdioxide slant column density window3 [DU]	-26.8 ± 22.5	3947482	28.1	-26.4	-499	177	-40.7	-12.6
sulfurdioxide slant column density window3 precision [DU]	28.1 ± 13.7	3947482	10.6	24.7	10.2	242	20.0	30.6
sulfurdioxide slant column density corrected win3 [DU]	-22.8 ± 22.7	3947482	28.2	-22.4	-508	165	-36.7	-8.44
background so2 slant column offset window3 [DU]	3.96 ± 8.02	3947482	13.3	5.25	-22.1	34.3	-2.77	10.6
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.32	3947482	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.730 \pm 14.710) \times 10^{-2}$	3947482	3.517×10^{-2}	1.658×10^{-2}	3.917×10^{-4}	2.63	7.277×10^{-3}	4.245×10^{-2}
fitted radiance shift [nm]	$(-4.547 \pm 27.886) \times 10^{-4}$	3947482	1.766×10^{-3}	-5.581×10^{-4}	-4.055×10^{-2}	4.522×10^{-2}	-1.408×10^{-3}	3.578×10^{-4}
fitted radiance squeeze [1]	$(-3.794 \pm 20.679) \times 10^{-5}$	3947482	2.324×10^{-4}	-3.313×10^{-5}	-1.364×10^{-2}	1.346×10^{-2}	-1.527×10^{-4}	7.967×10^{-5}
fitted root mean square [1]	$(1.364 \pm 0.604) \times 10^{-3}$	3947482	6.206×10^{-4}	1.234×10^{-3}	3.438×10^{-4}	5.331×10^{-2}	9.739×10^{-4}	1.595×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.00 ± 0.73	3947482	1.09	0.769	5.000×10^{-2}	2.97	0.406	1.50
sulfurdioxide total air mass factor polluted precision [1]	0.174 ± 0.203	3947482	0.207	0.104	2.500×10^{-3}	1.90	2.842×10^{-2}	0.235
sulfurdioxide clear air mass factor polluted [1]	0.937 ± 0.781	3947482	0.798	0.649	2.915×10^{-2}	3.01	0.372	1.17
number of spectral points in retrieval [1]	73.4 ± 0.5	3947482	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

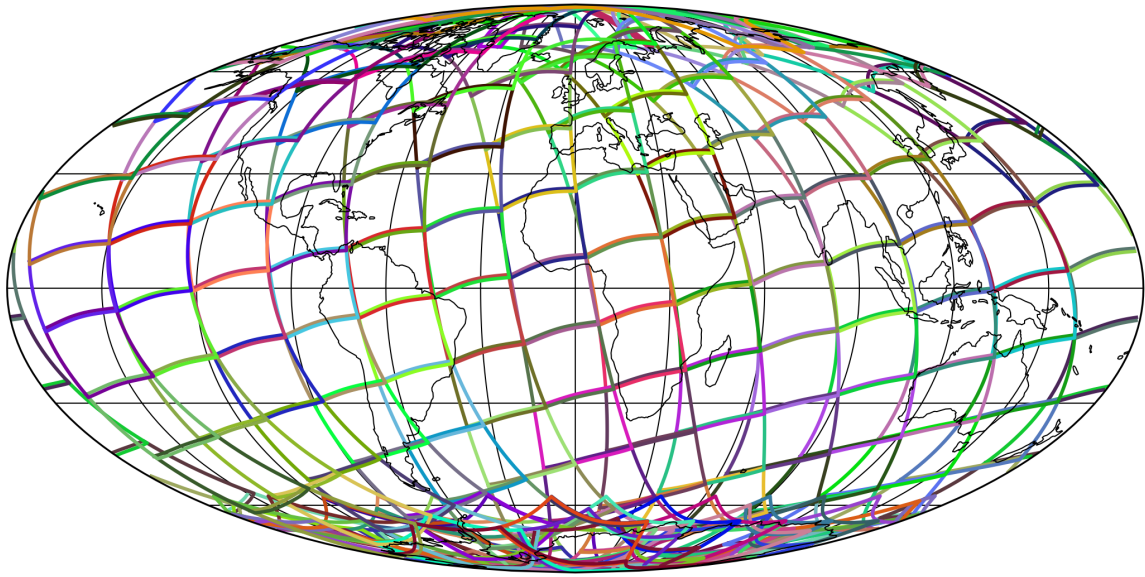


Figure 1: Outline of the granules.

4 Input data monitoring

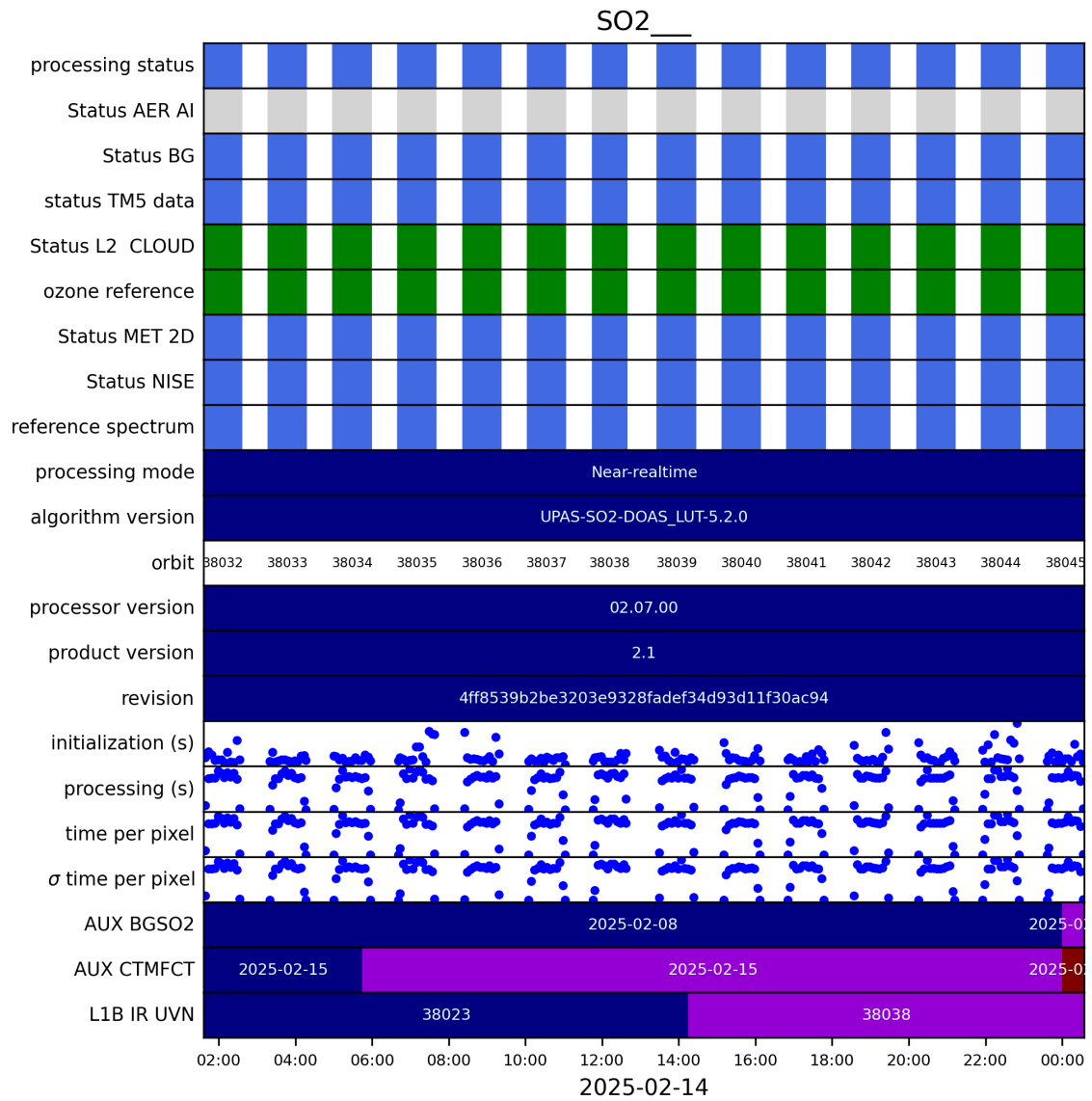


Figure 2: Input data per granule

5 Warnings and errors

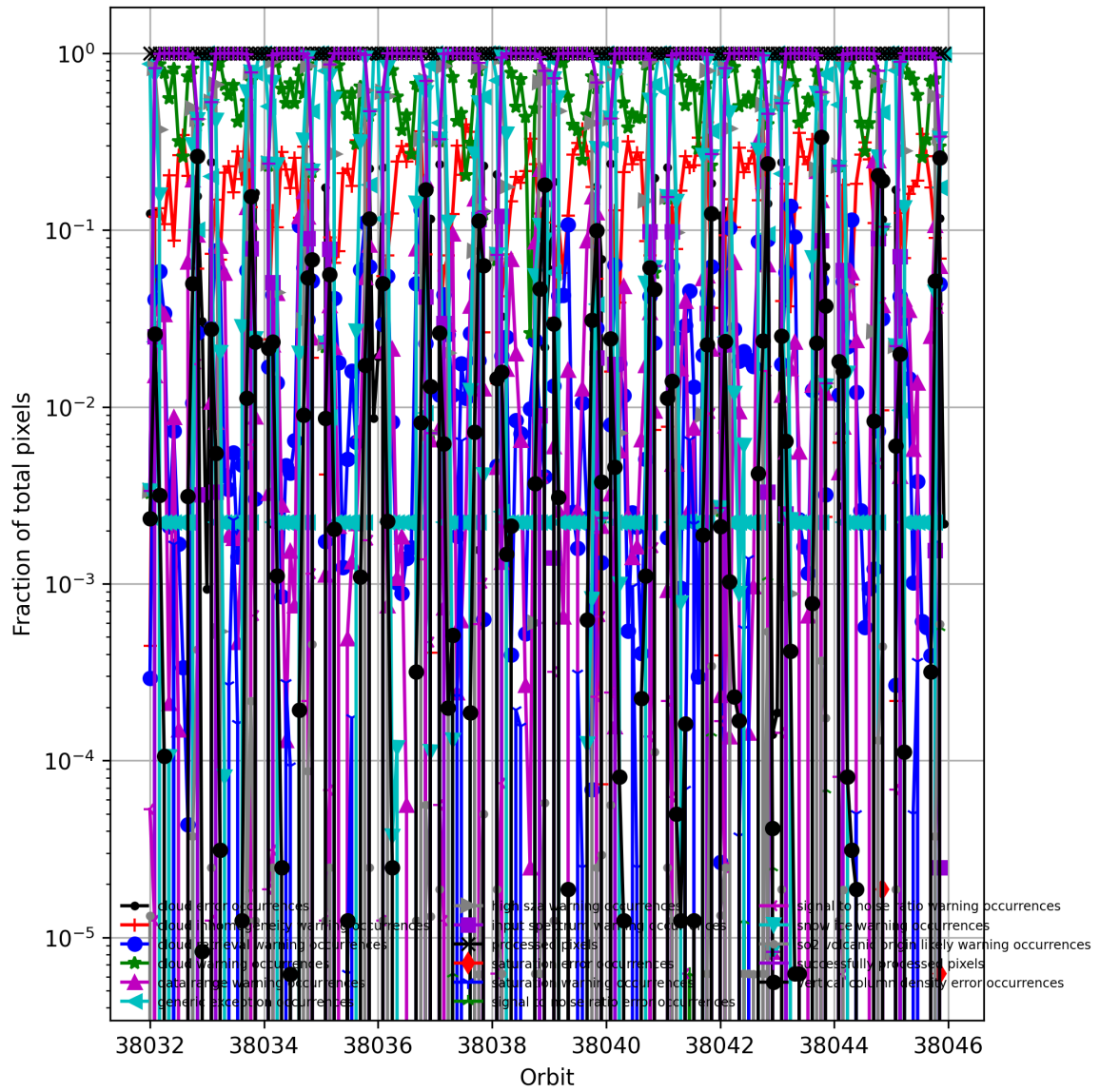


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

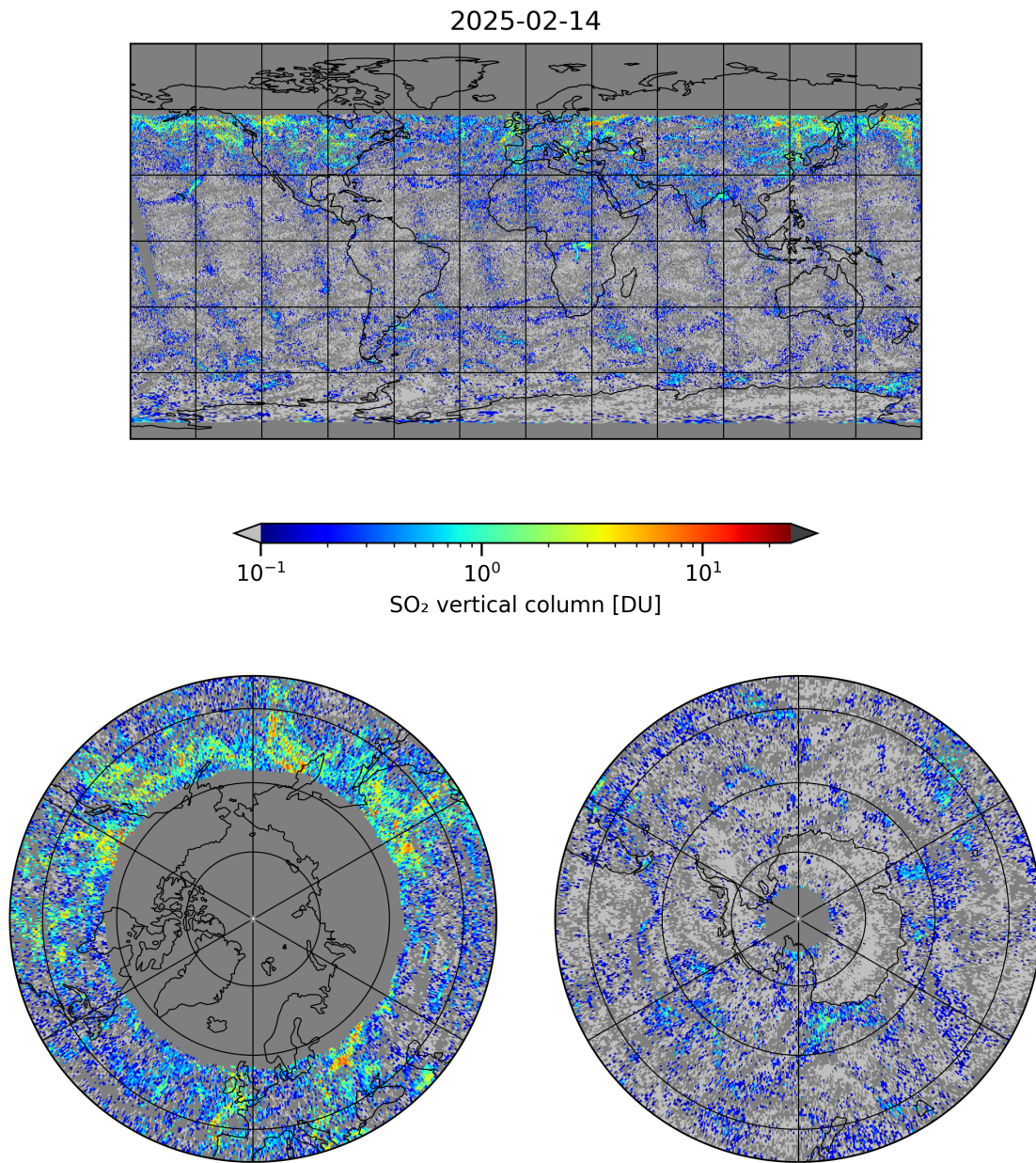


Figure 4: Map of “SO₂ vertical column” for 2025-02-14 to 2025-02-15

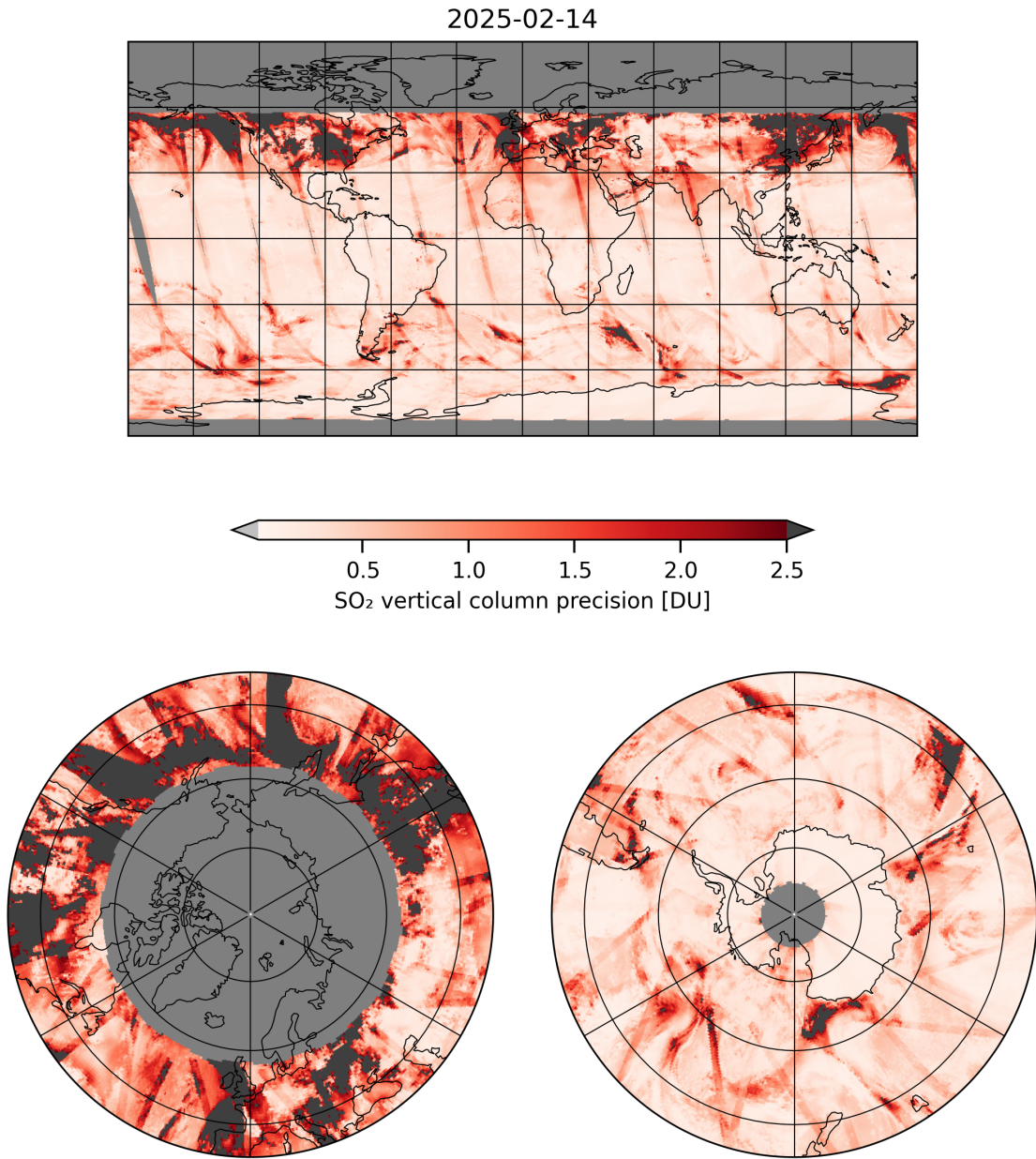


Figure 5: Map of “SO₂ vertical column precision” for 2025-02-14 to 2025-02-15

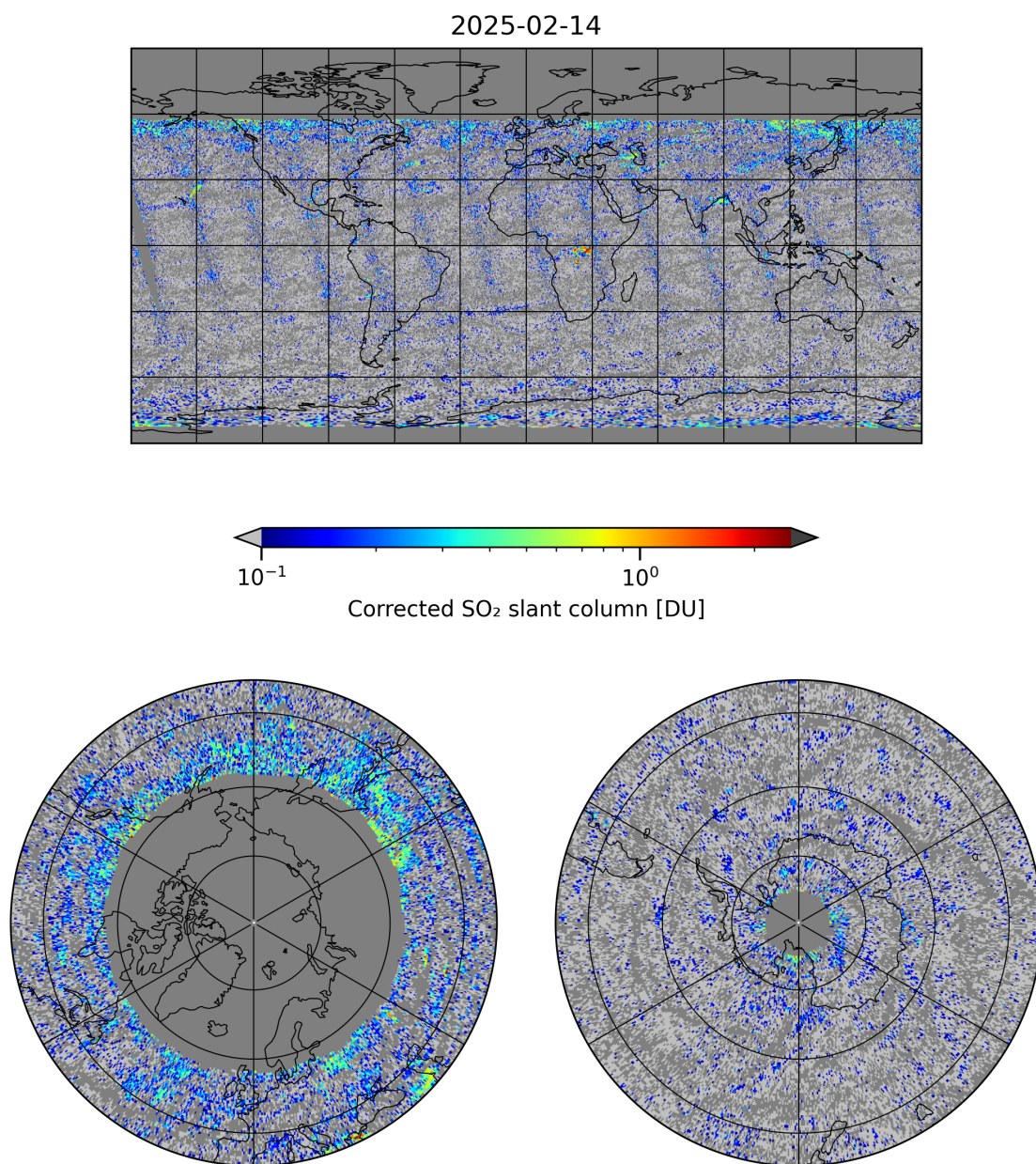


Figure 6: Map of “Corrected SO₂ slant column” for 2025-02-14 to 2025-02-15

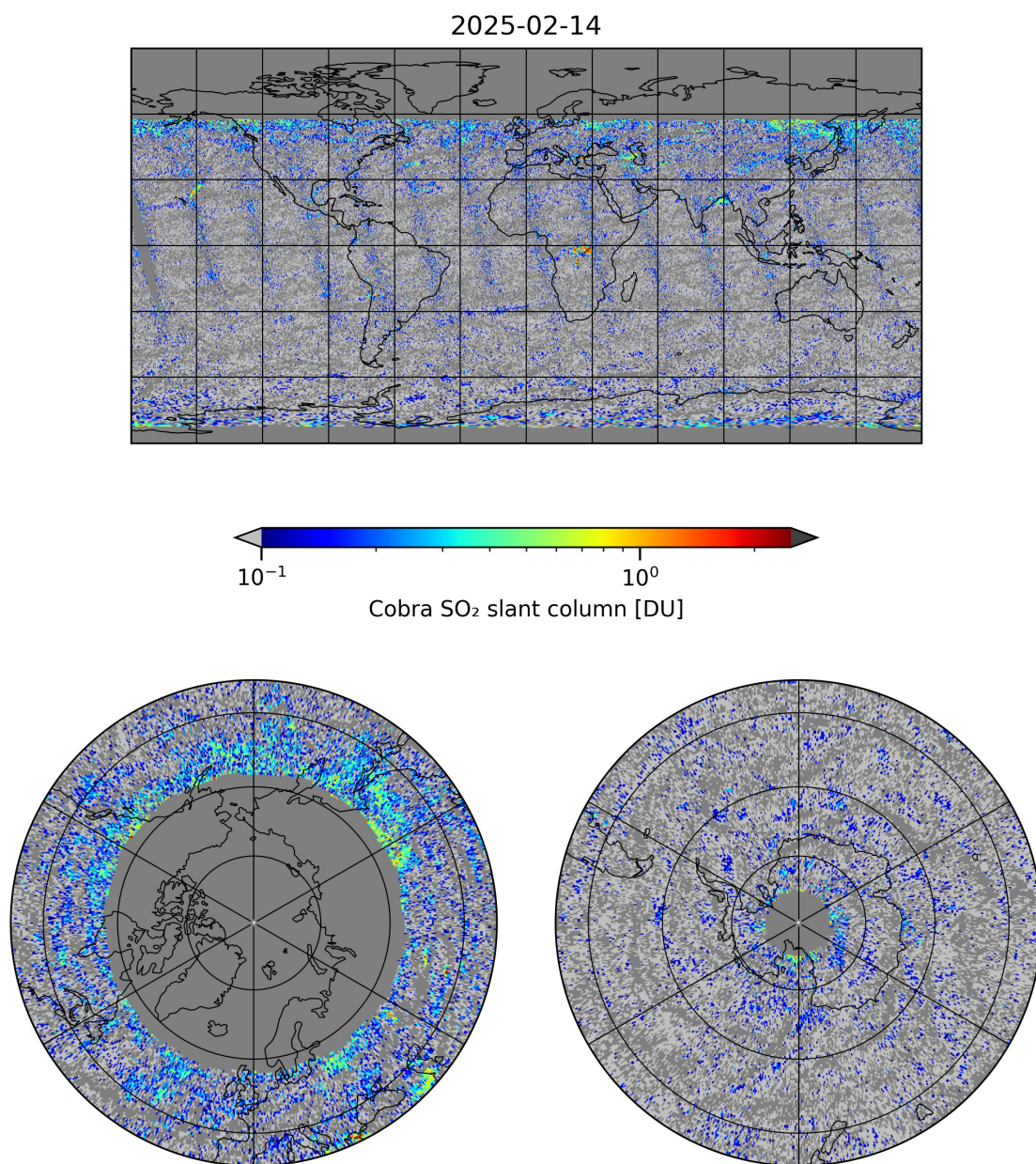


Figure 7: Map of “Cobra SO₂ slant column” for 2025-02-14 to 2025-02-15

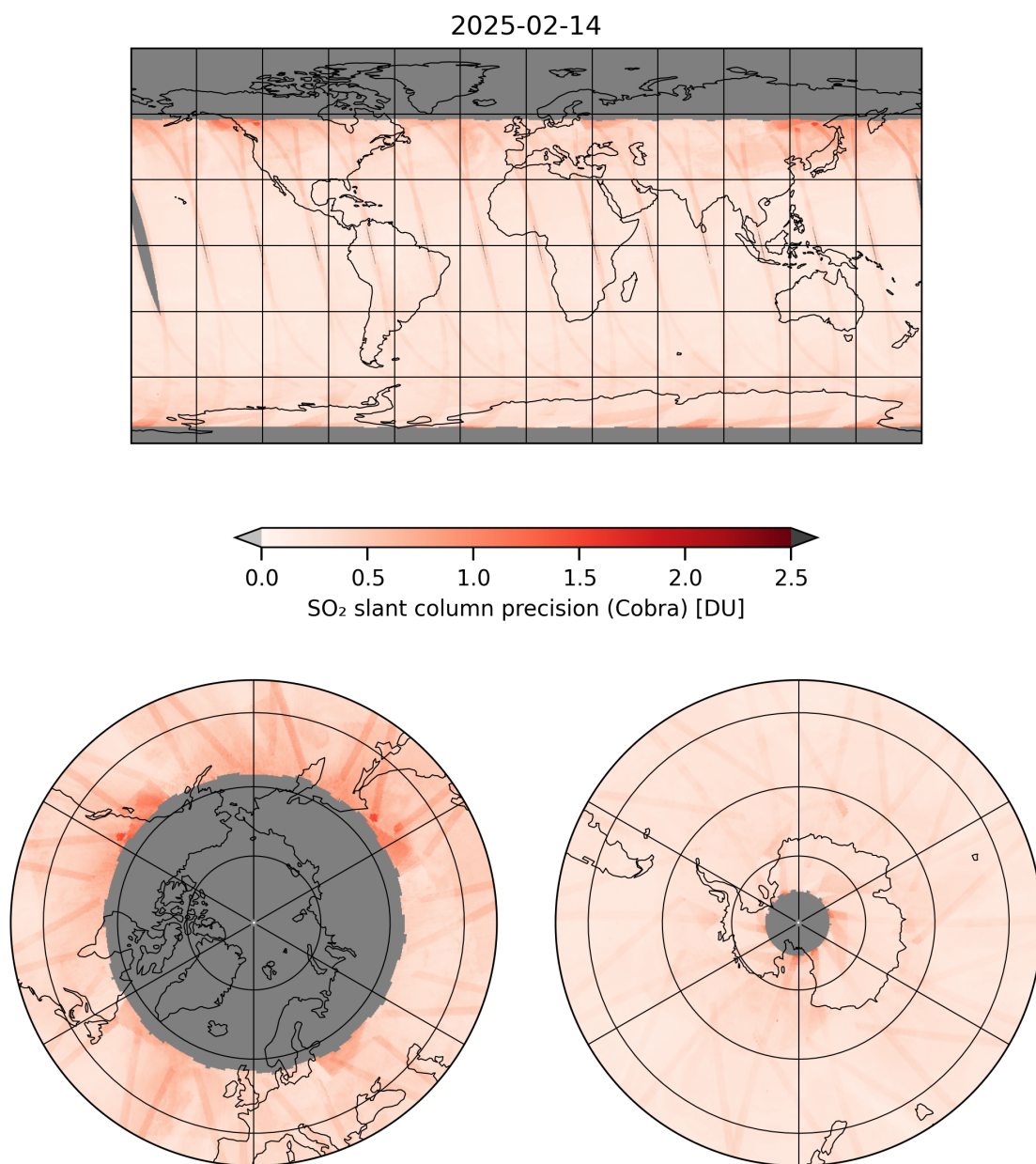


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-02-14 to 2025-02-15

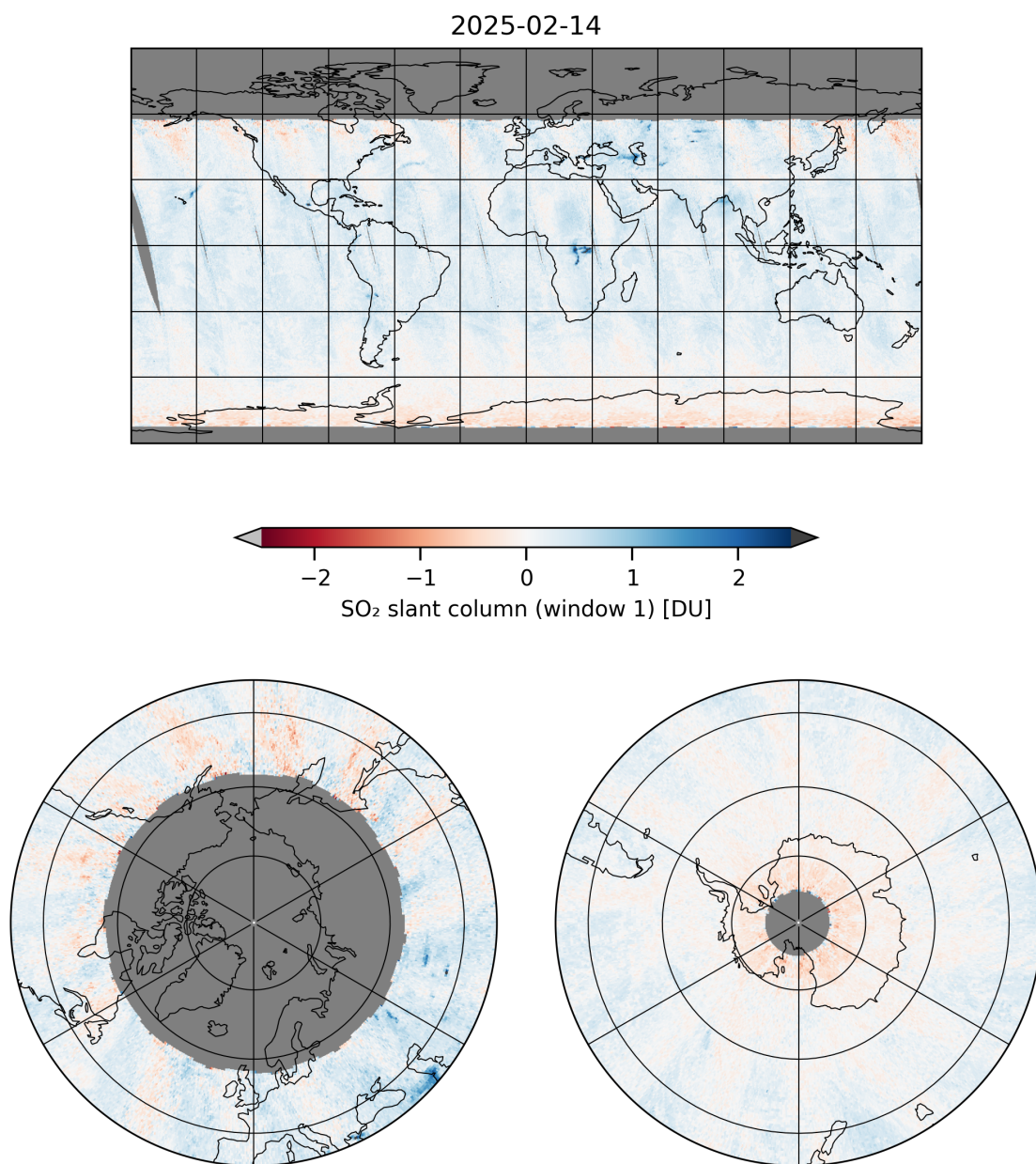


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-02-14 to 2025-02-15

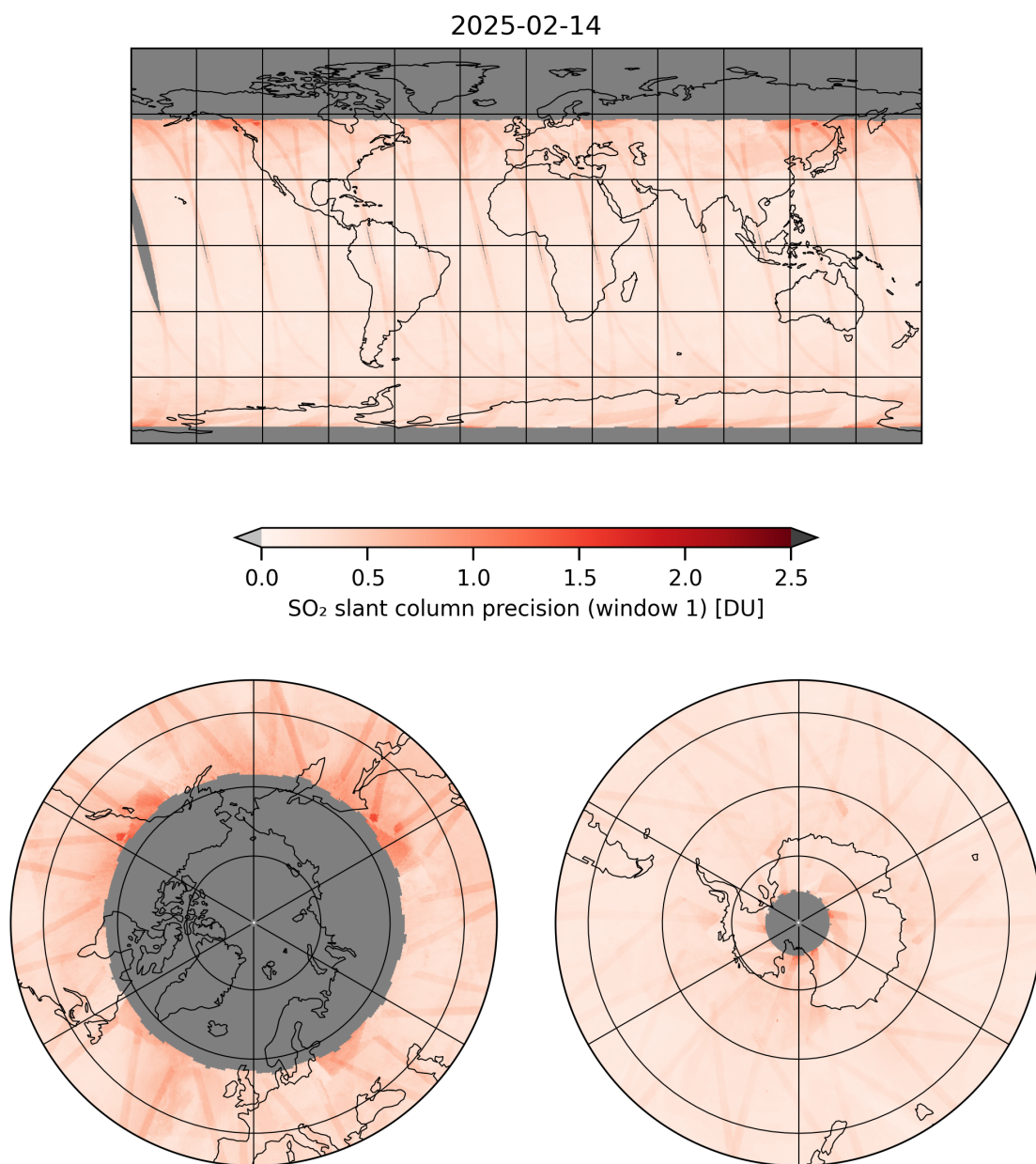


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-02-14 to 2025-02-15

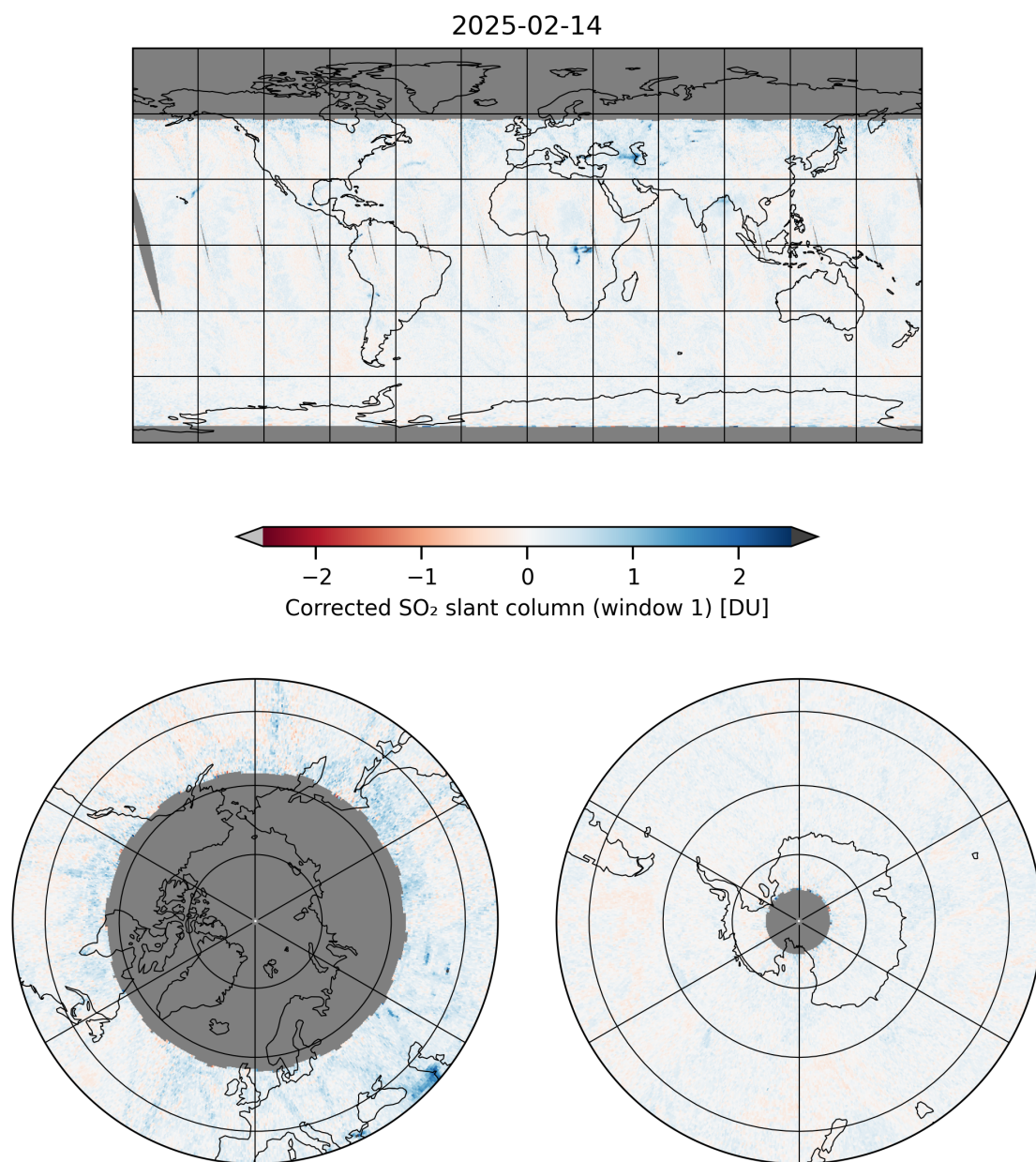


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-02-14 to 2025-02-15

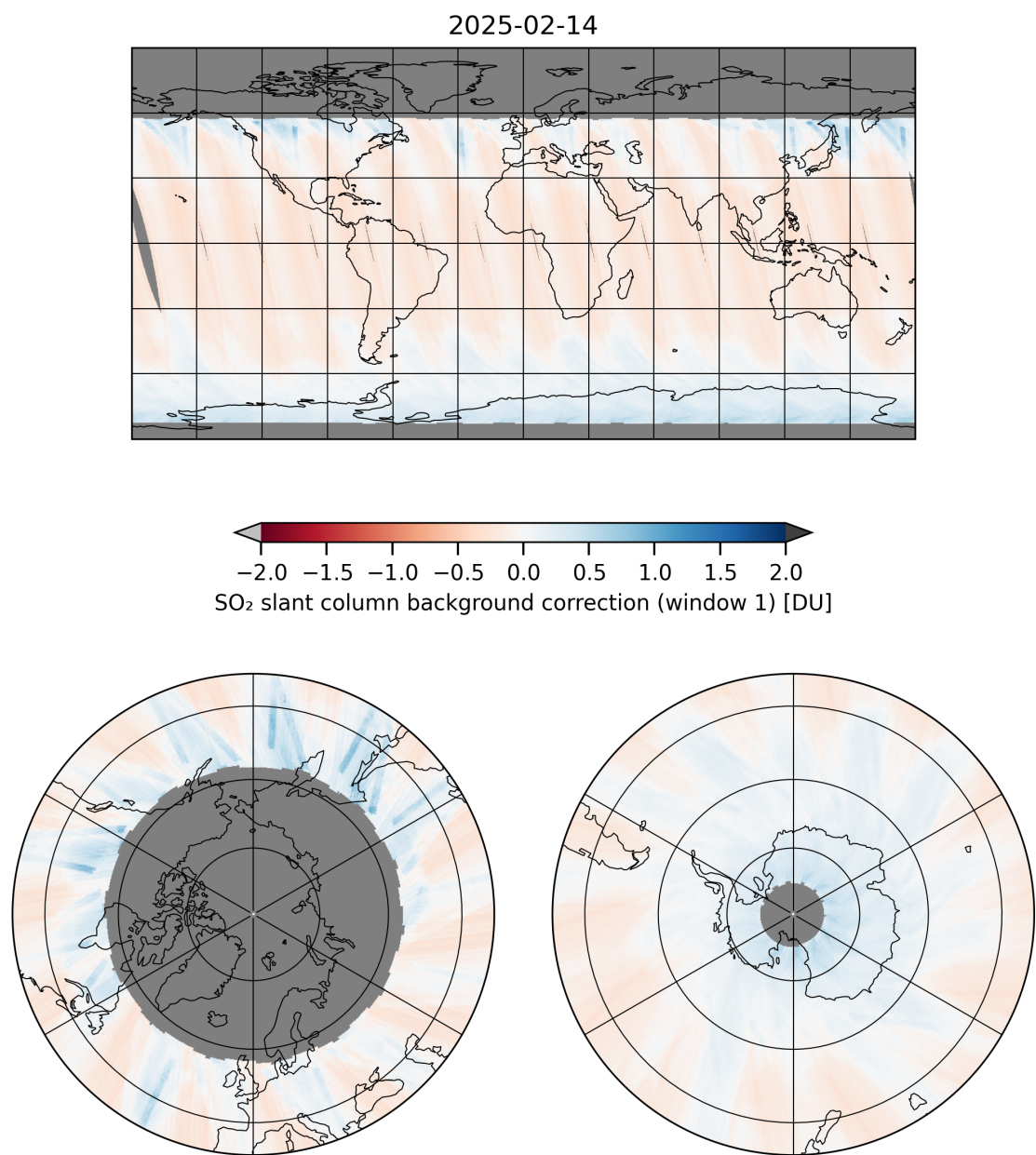


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-02-14 to 2025-02-15

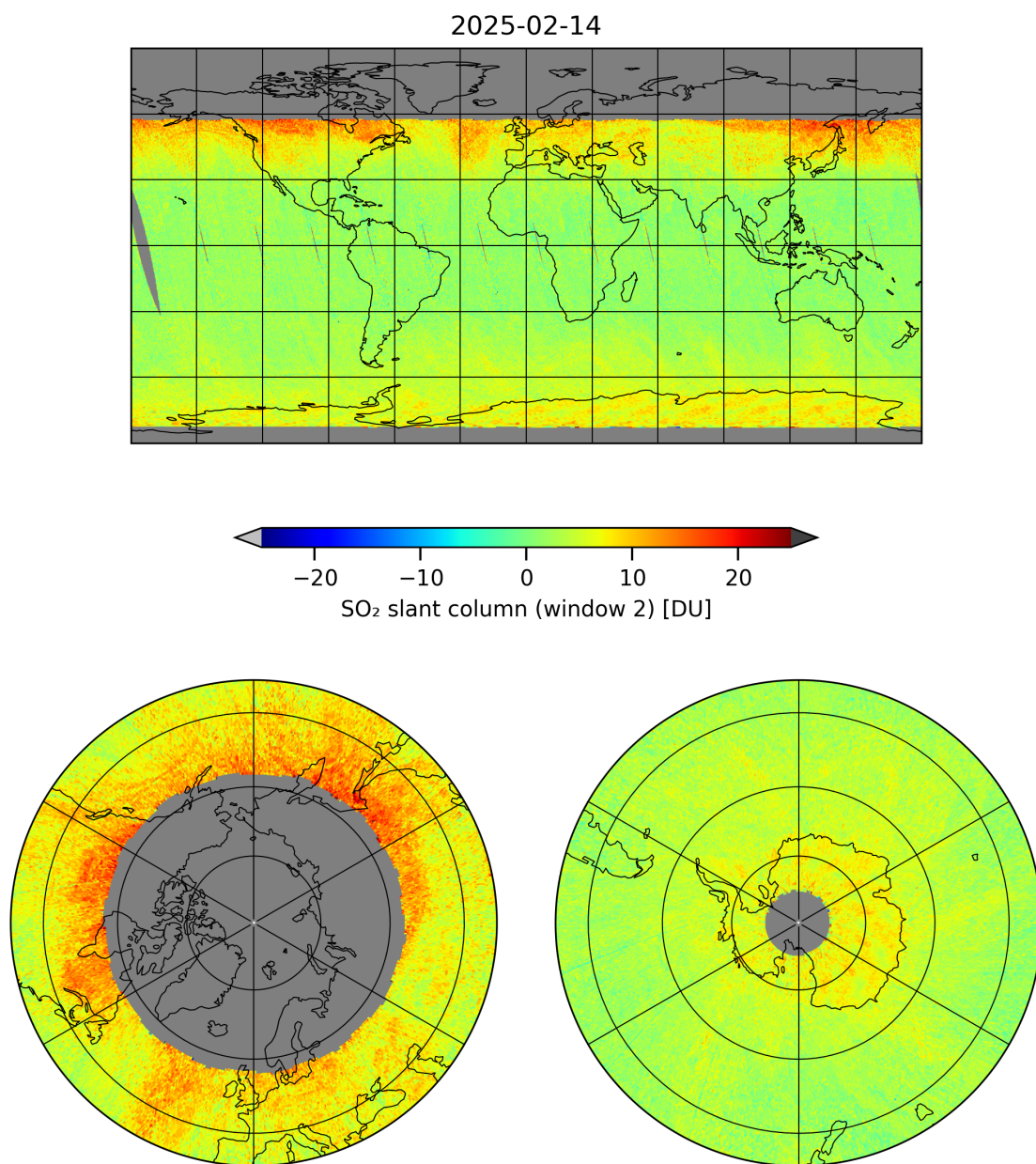


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-02-14 to 2025-02-15

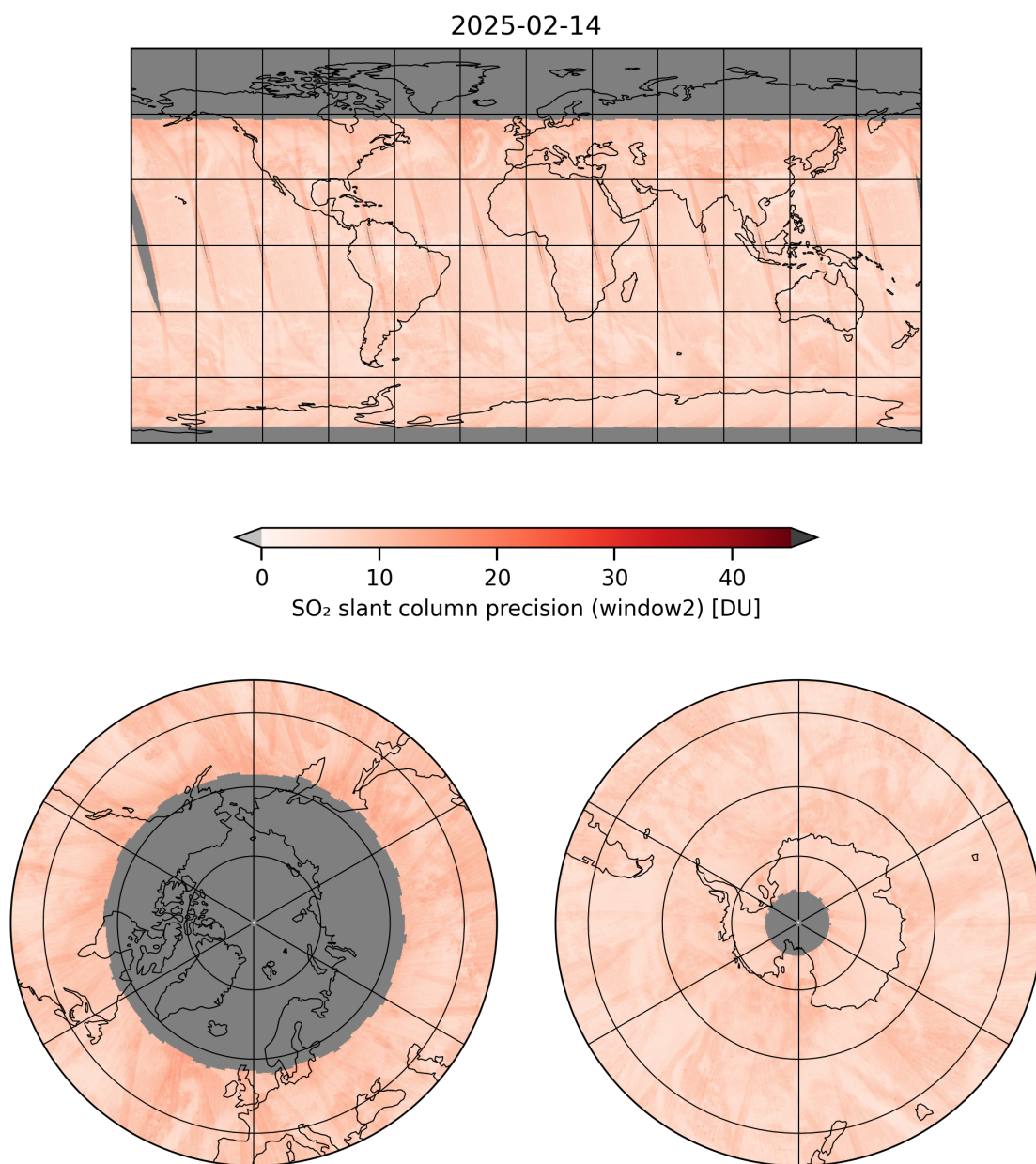


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-02-14 to 2025-02-15

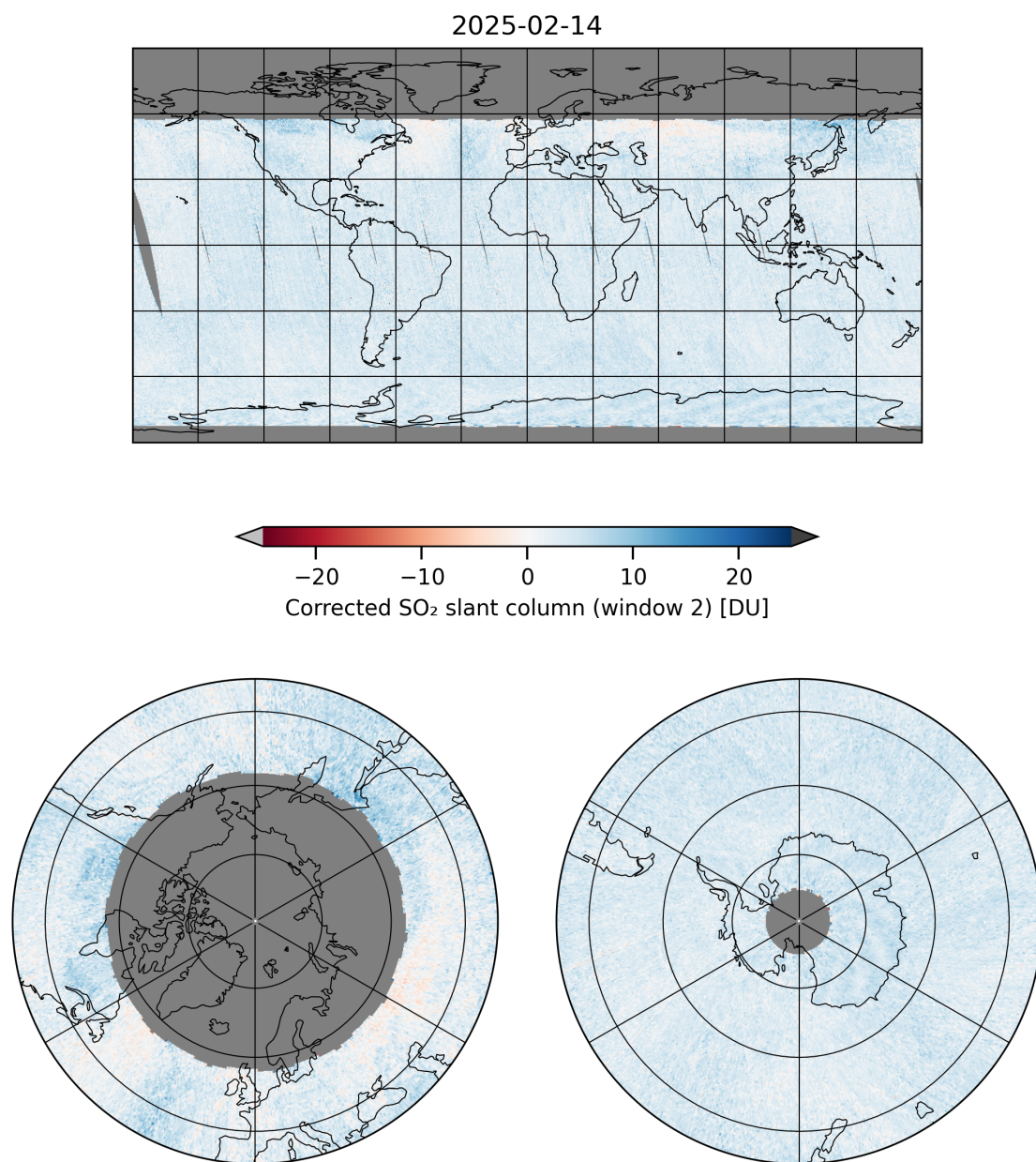


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-02-14 to 2025-02-15

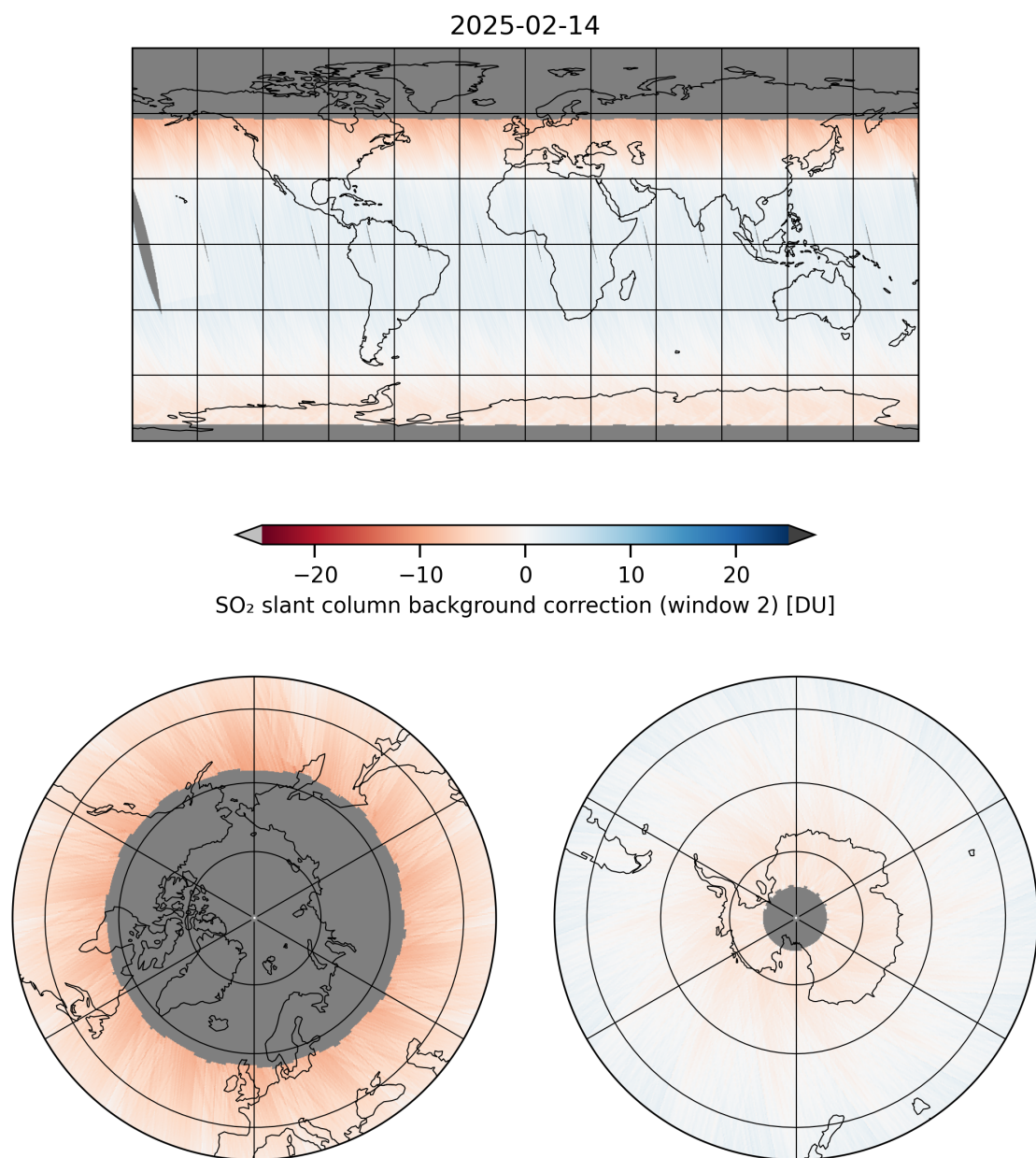


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-02-14 to 2025-02-15

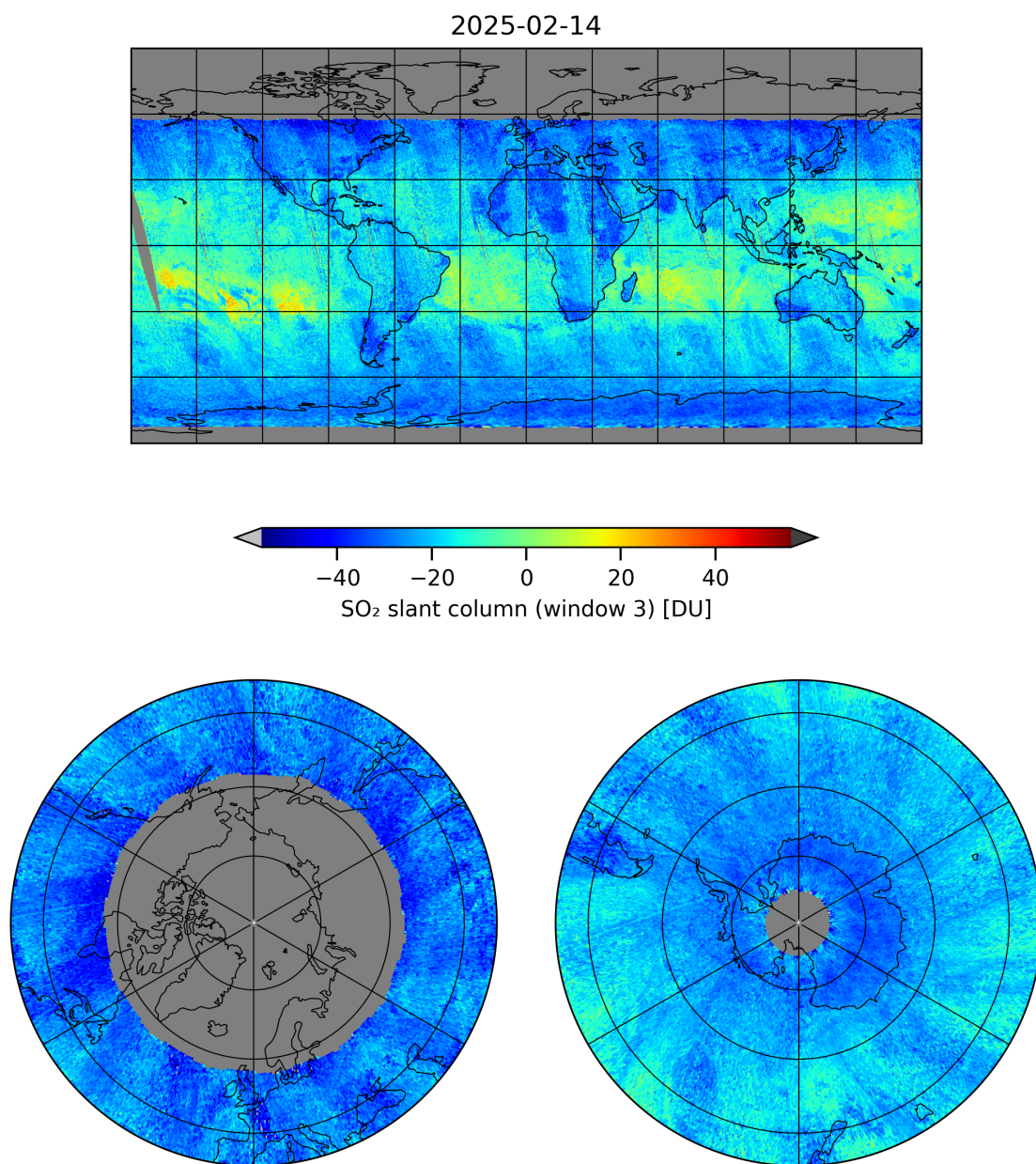


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-02-14 to 2025-02-15

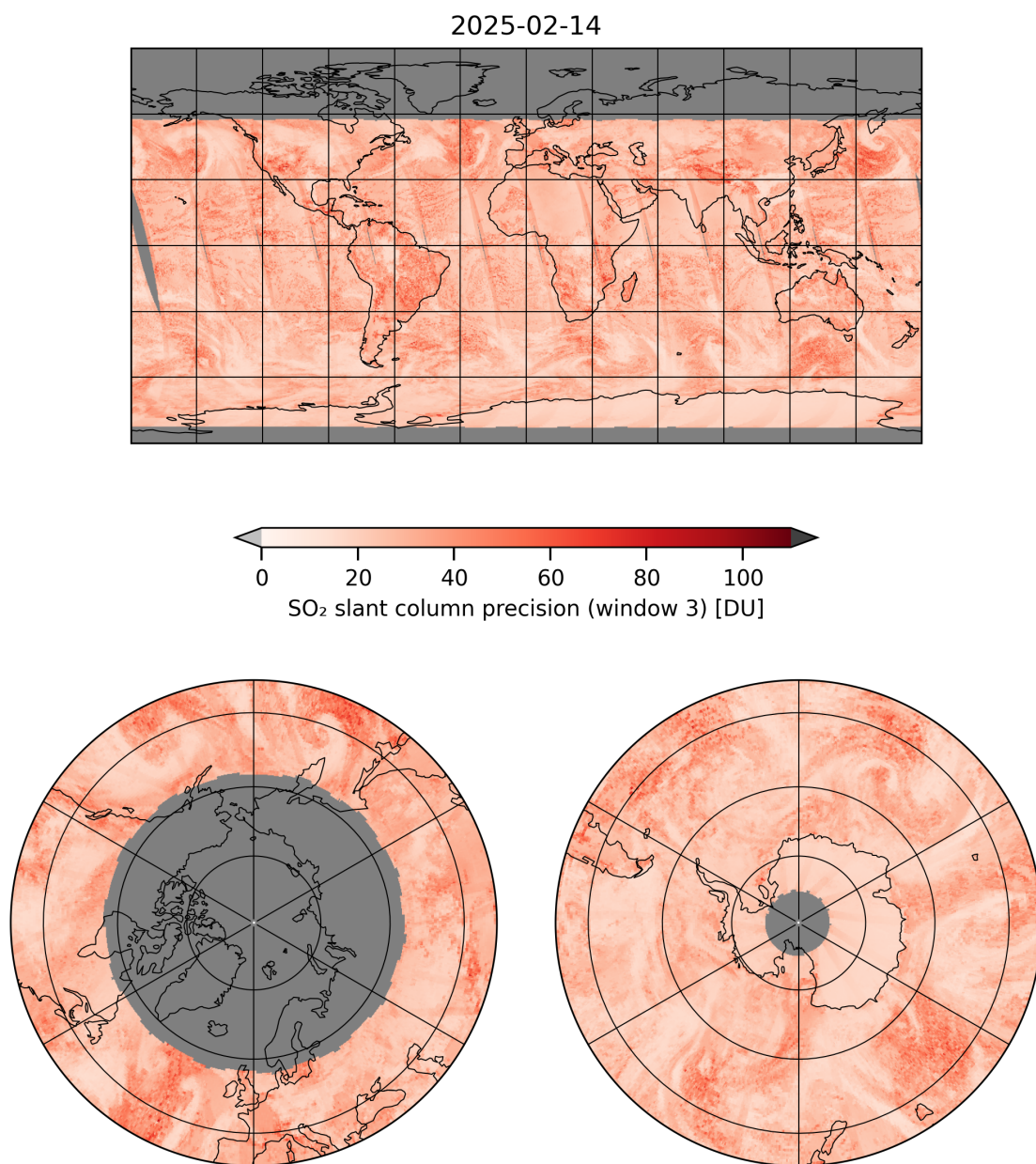


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-02-14 to 2025-02-15

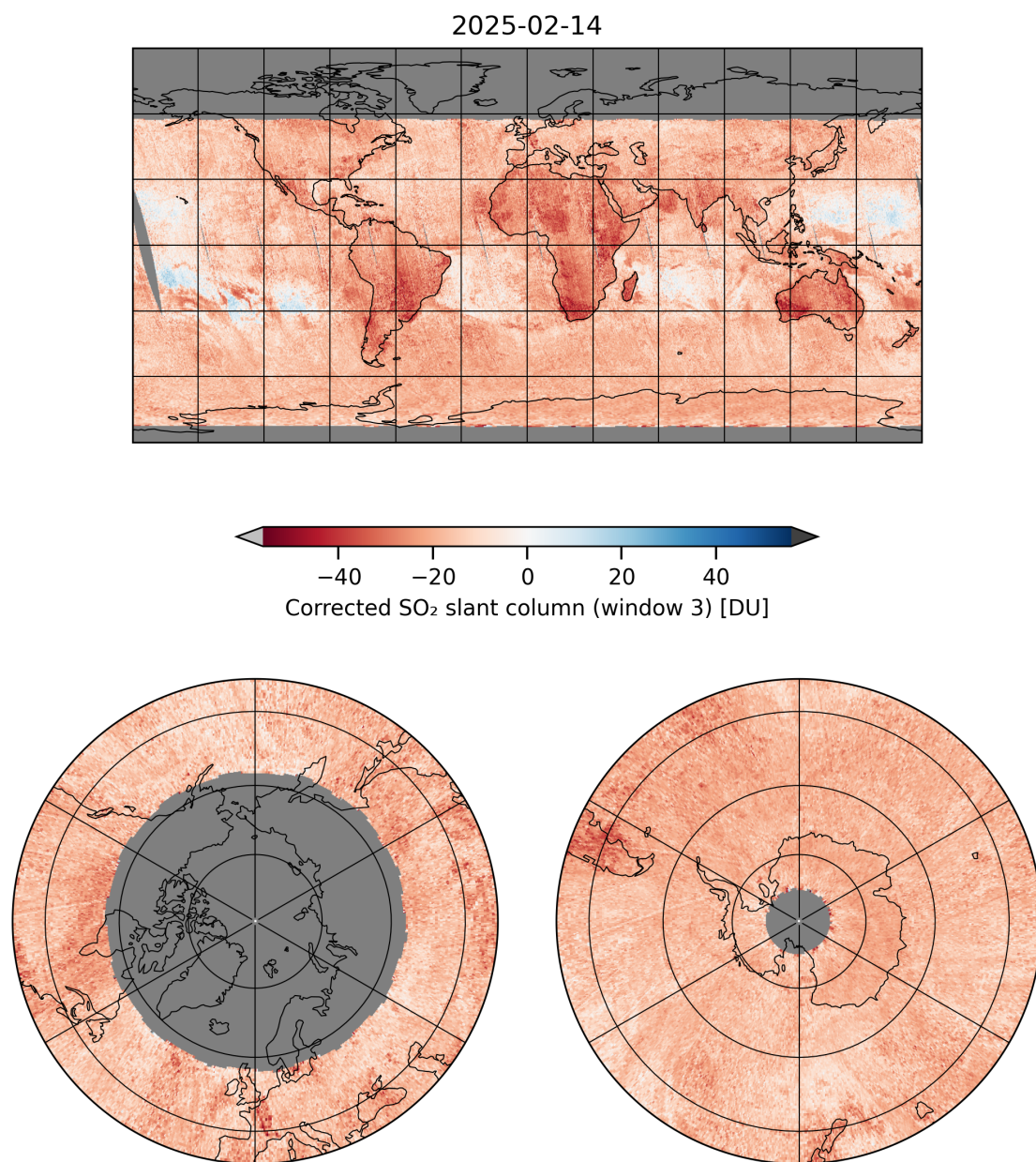


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-02-14 to 2025-02-15

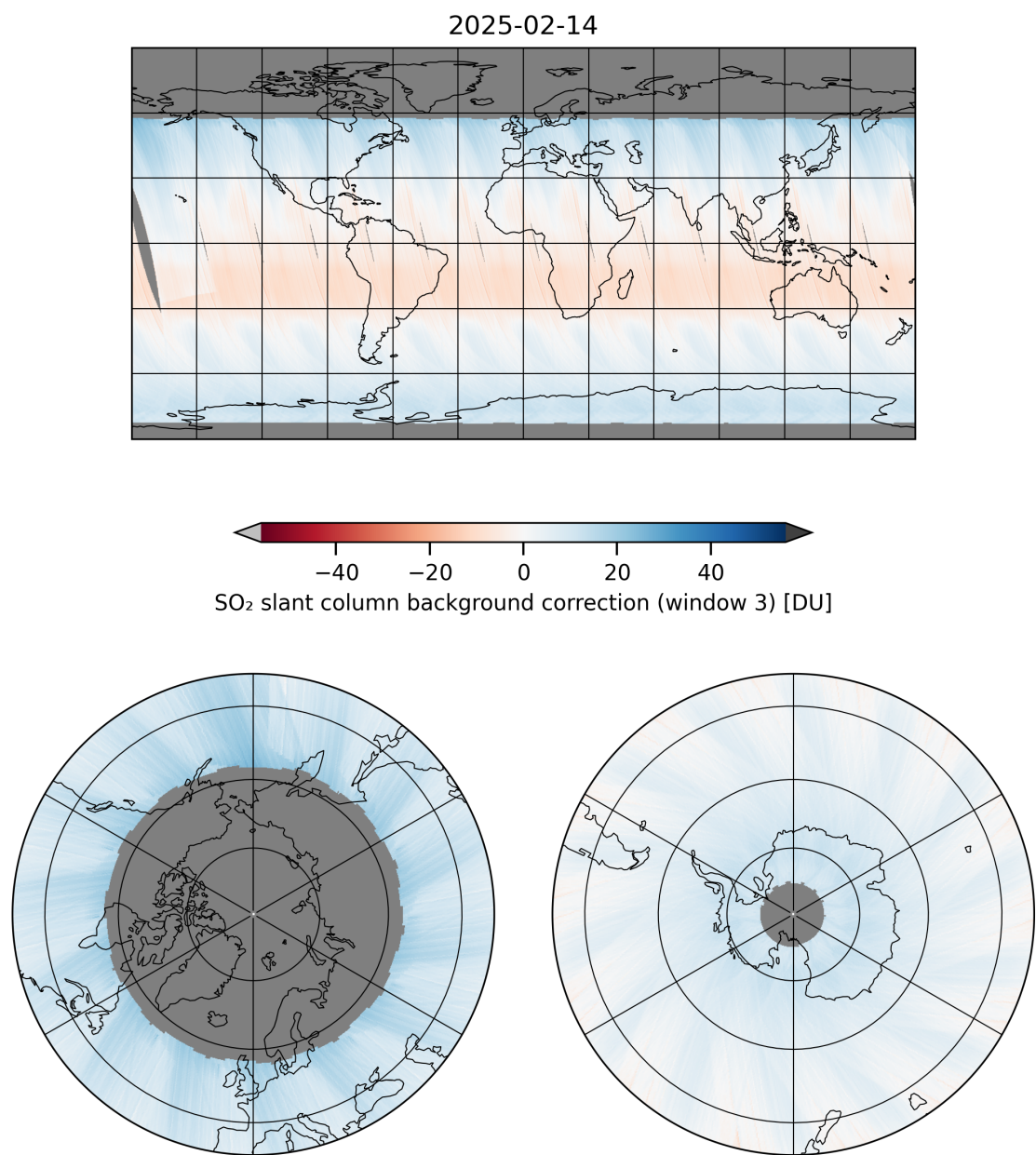


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-02-14 to 2025-02-15

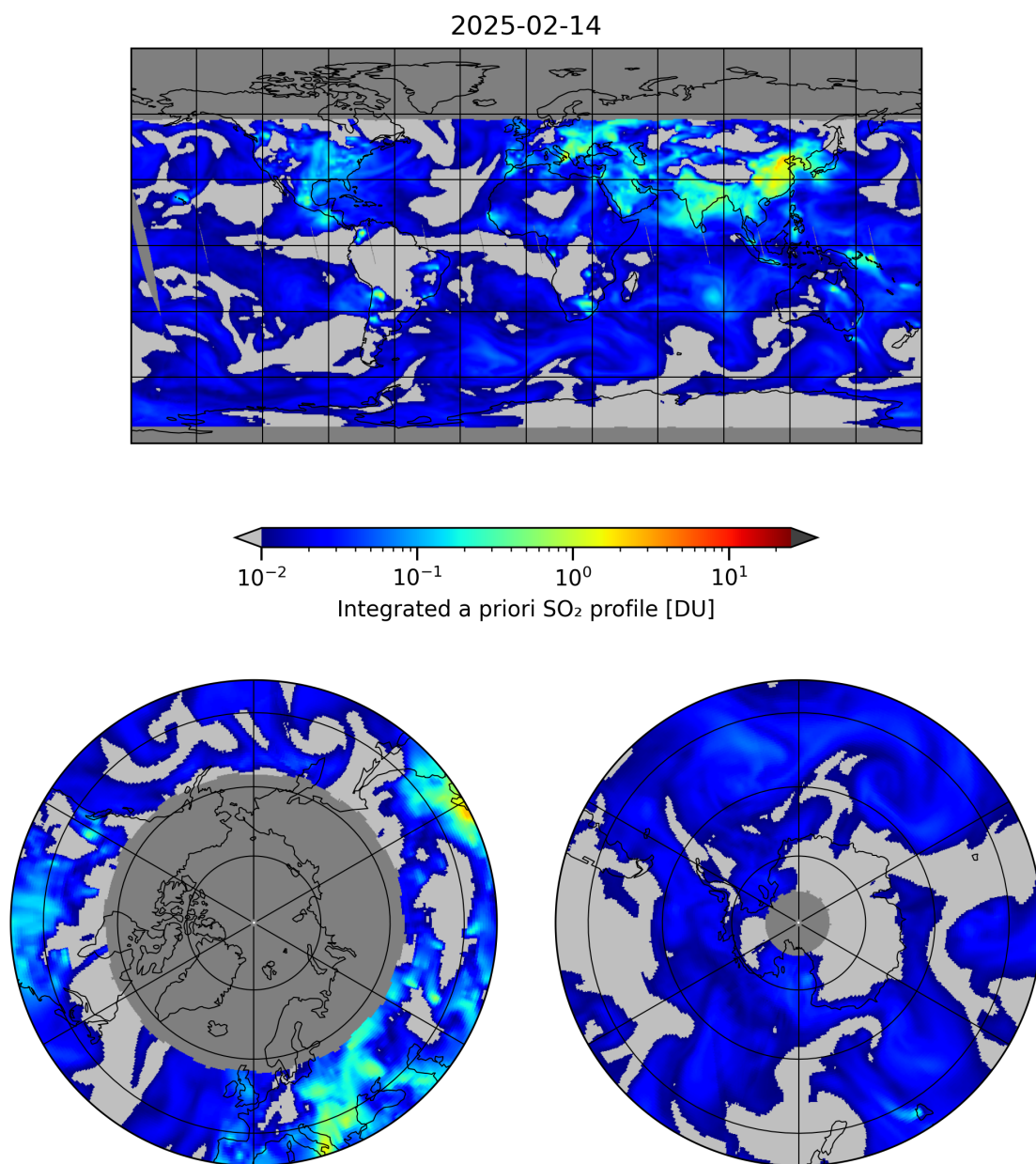


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-02-14 to 2025-02-15

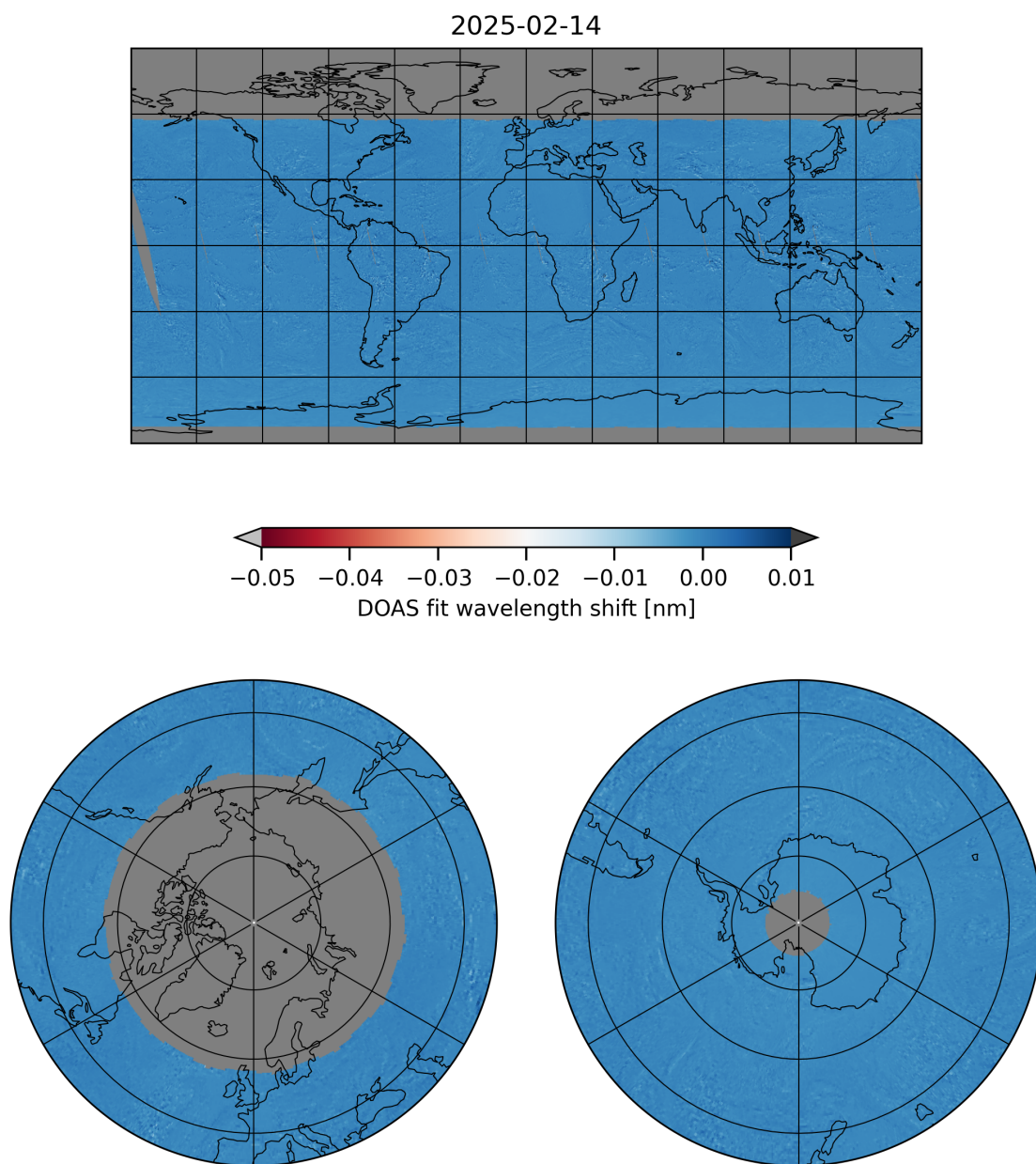


Figure 22: Map of “DOAS fit wavelength shift” for 2025-02-14 to 2025-02-15

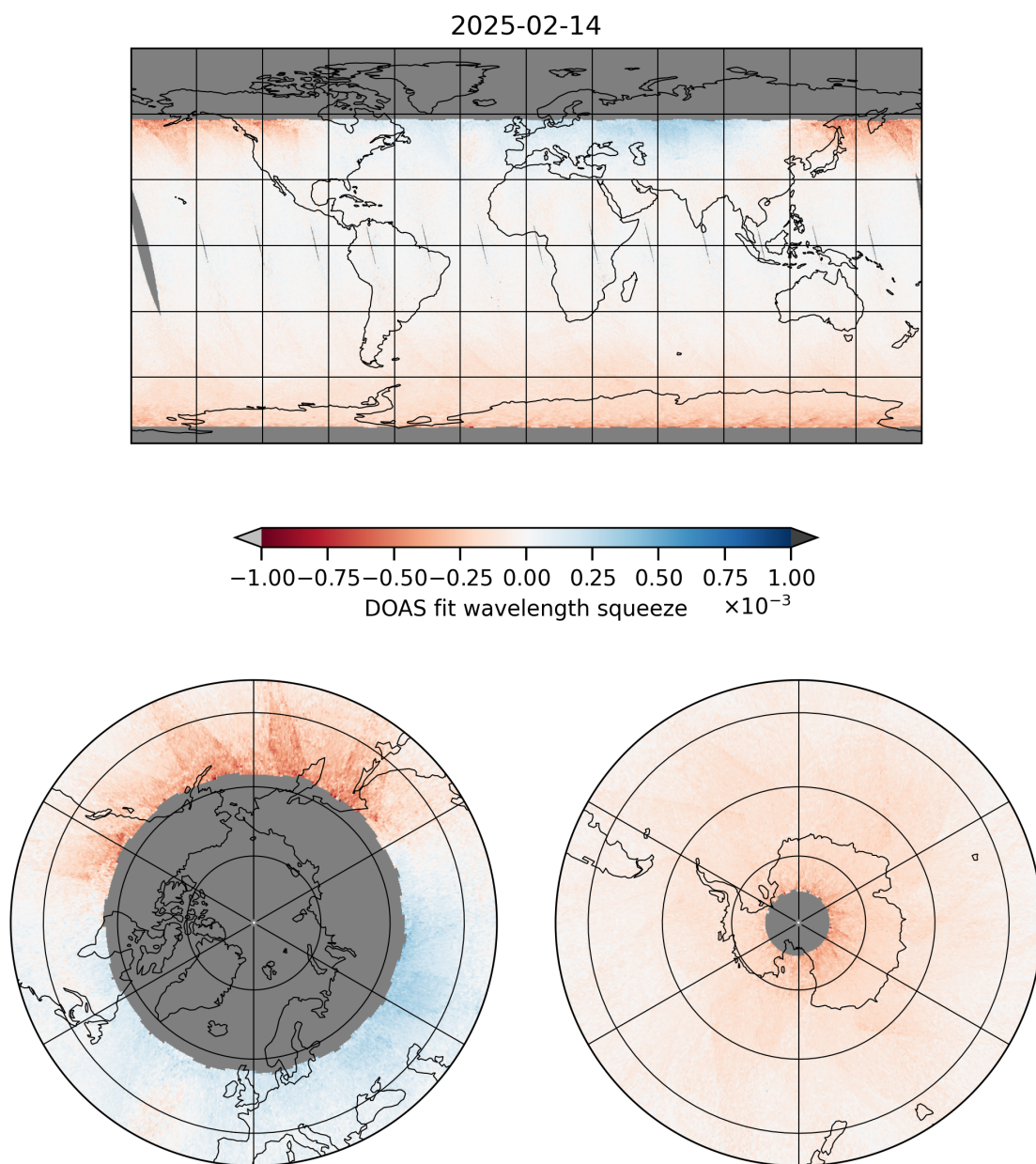


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-02-14 to 2025-02-15

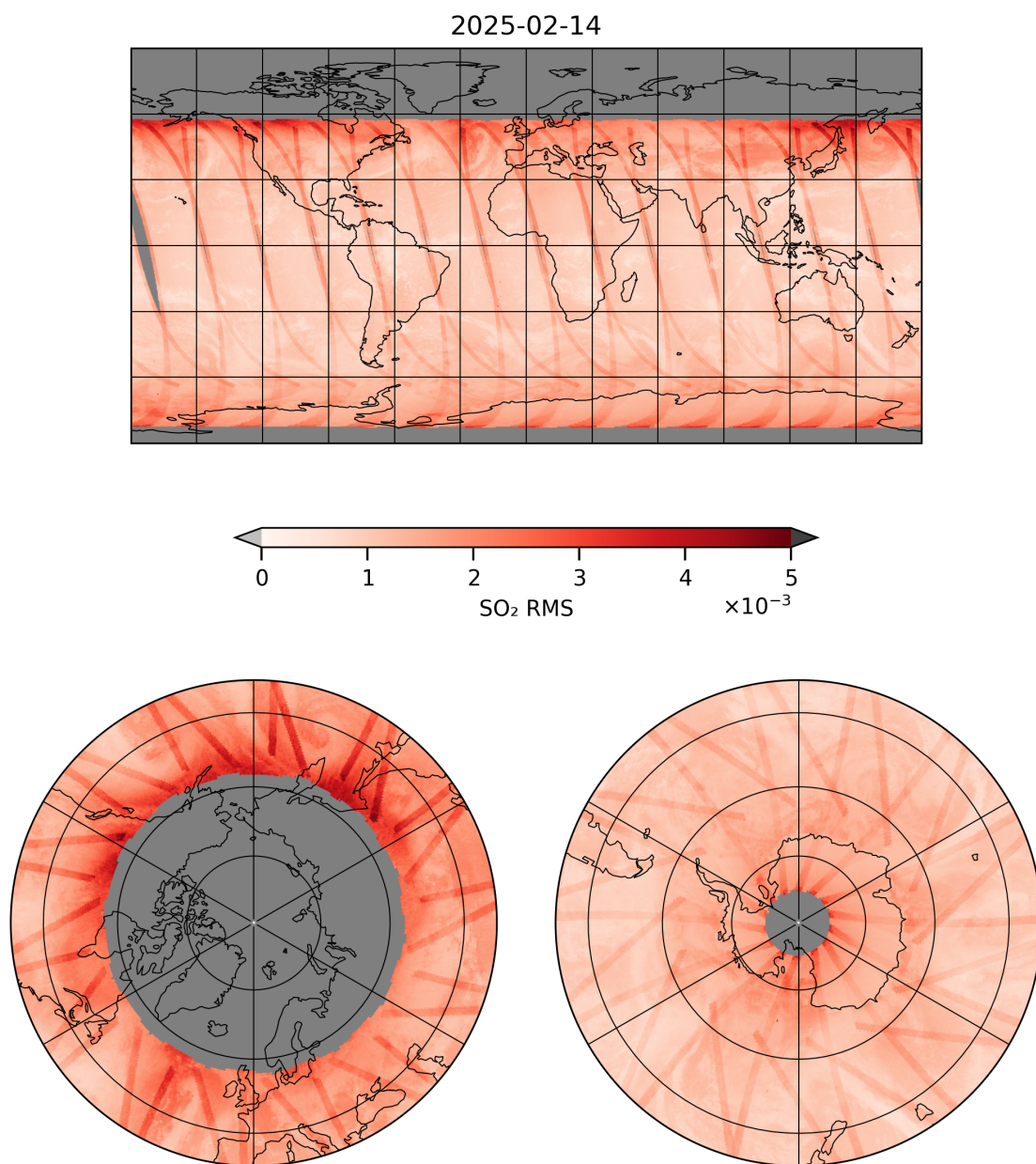


Figure 24: Map of “SO₂ RMS” for 2025-02-14 to 2025-02-15

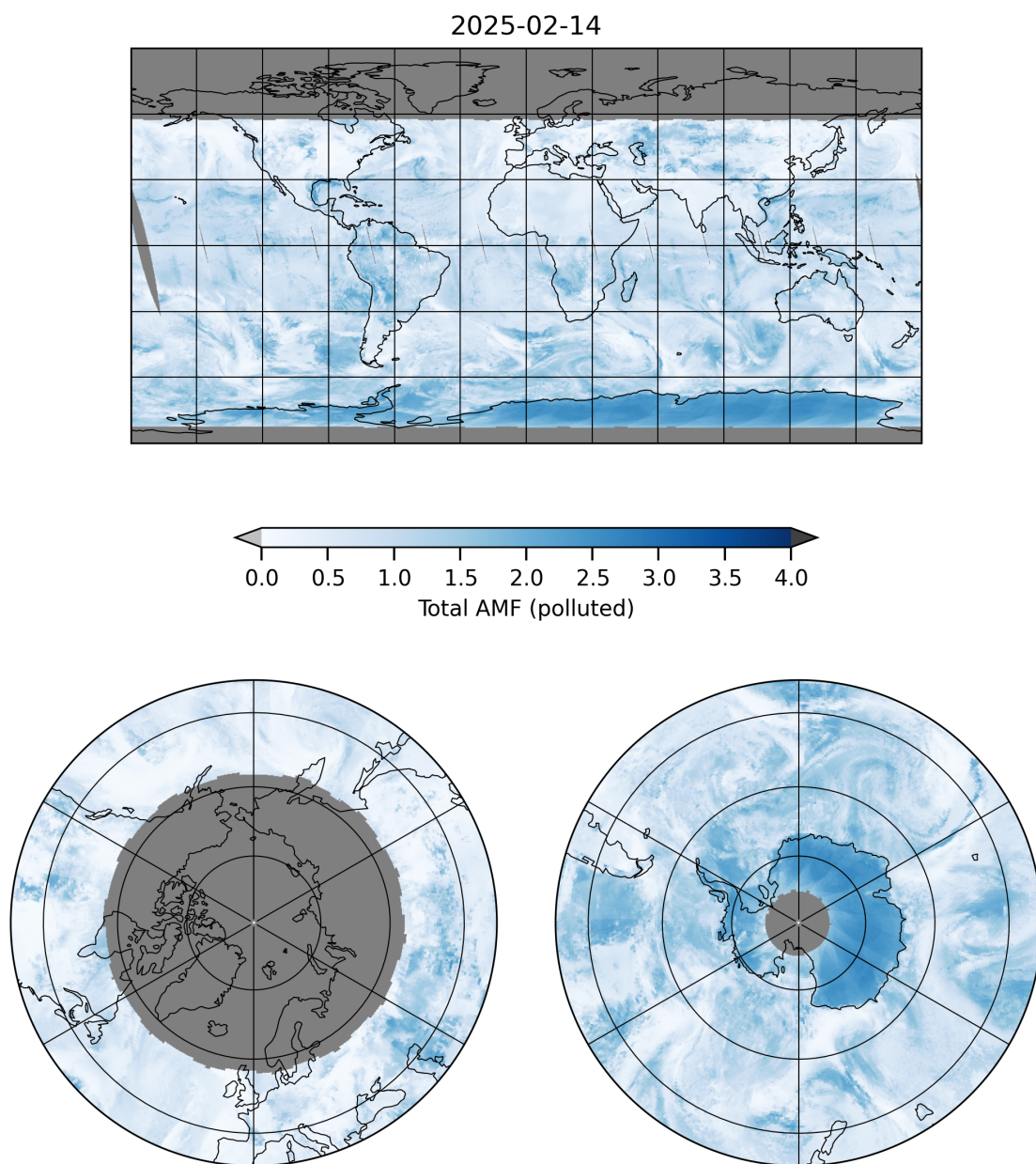


Figure 25: Map of “Total AMF (polluted)” for 2025-02-14 to 2025-02-15

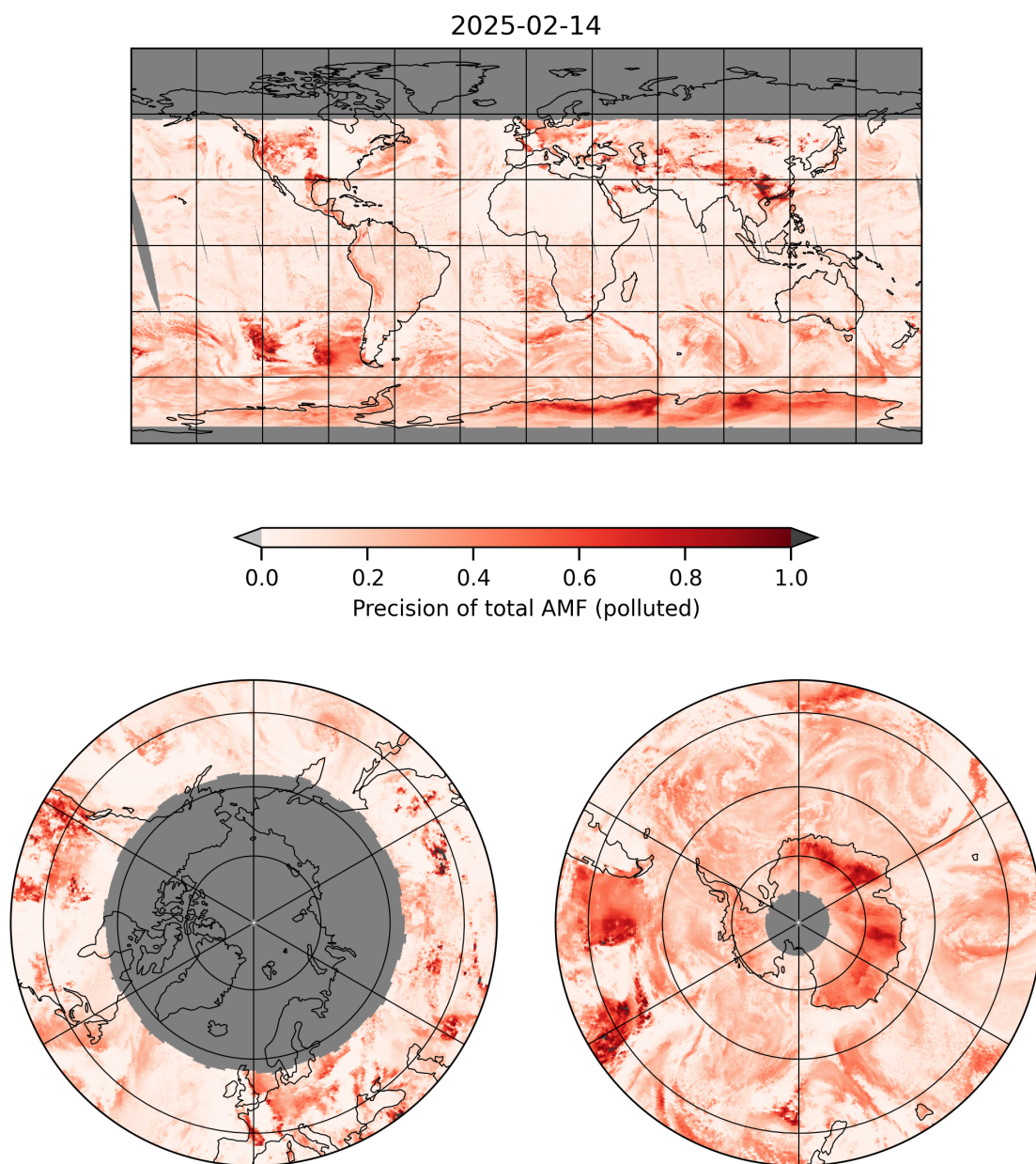


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-02-14 to 2025-02-15

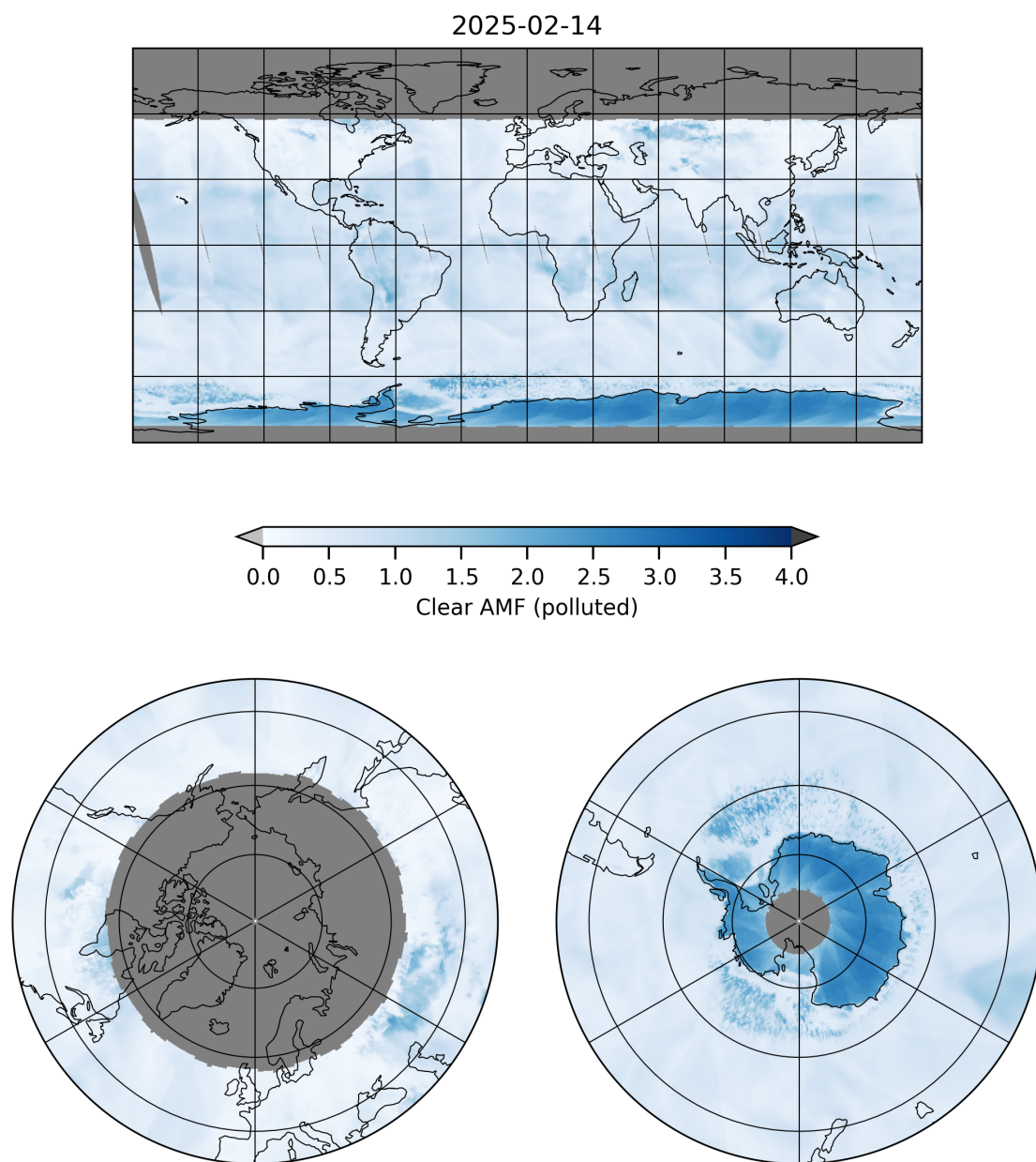


Figure 27: Map of “Clear AMF (polluted)” for 2025-02-14 to 2025-02-15

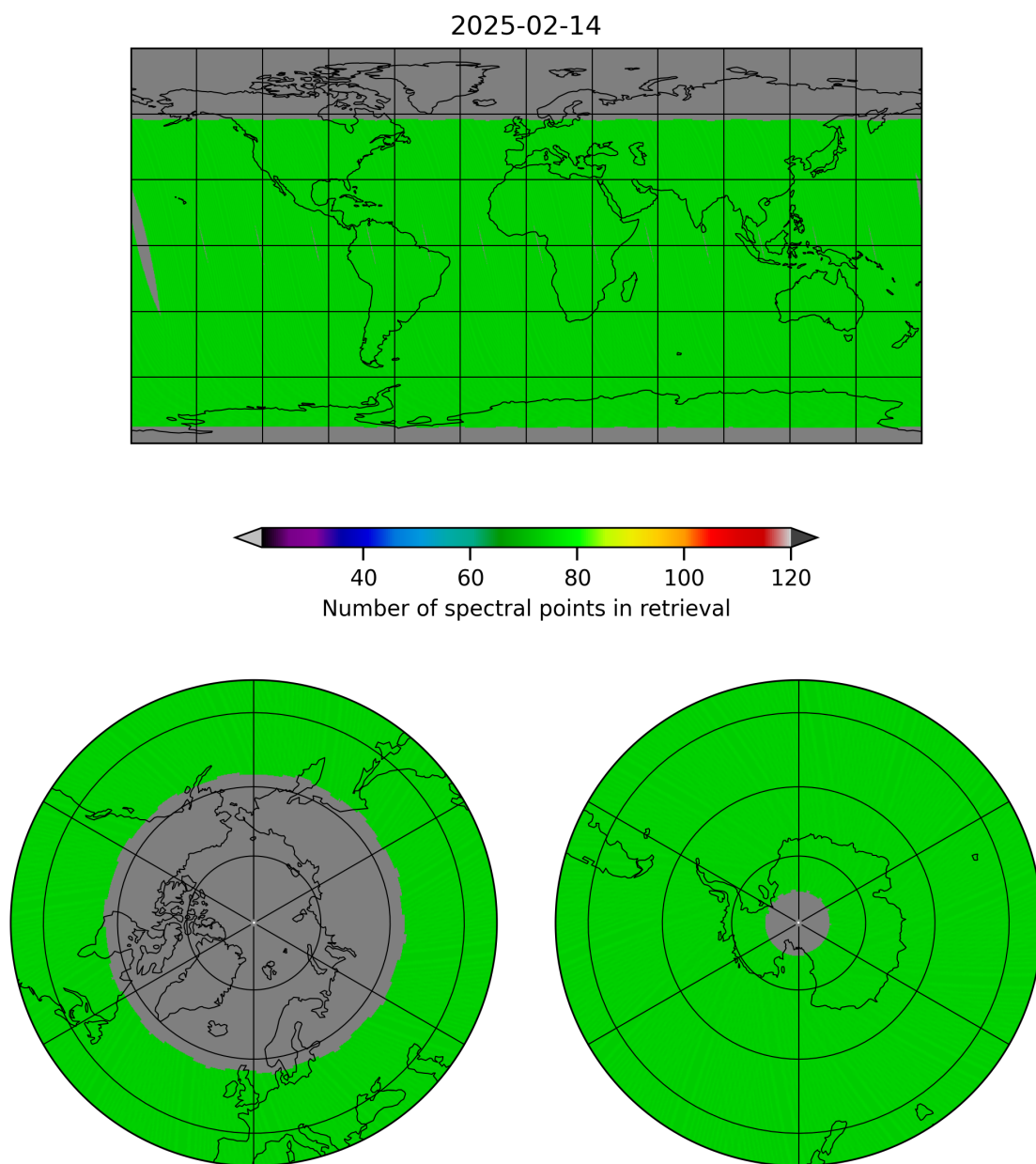


Figure 28: Map of “Number of spectral points in retrieval” for 2025-02-14 to 2025-02-15

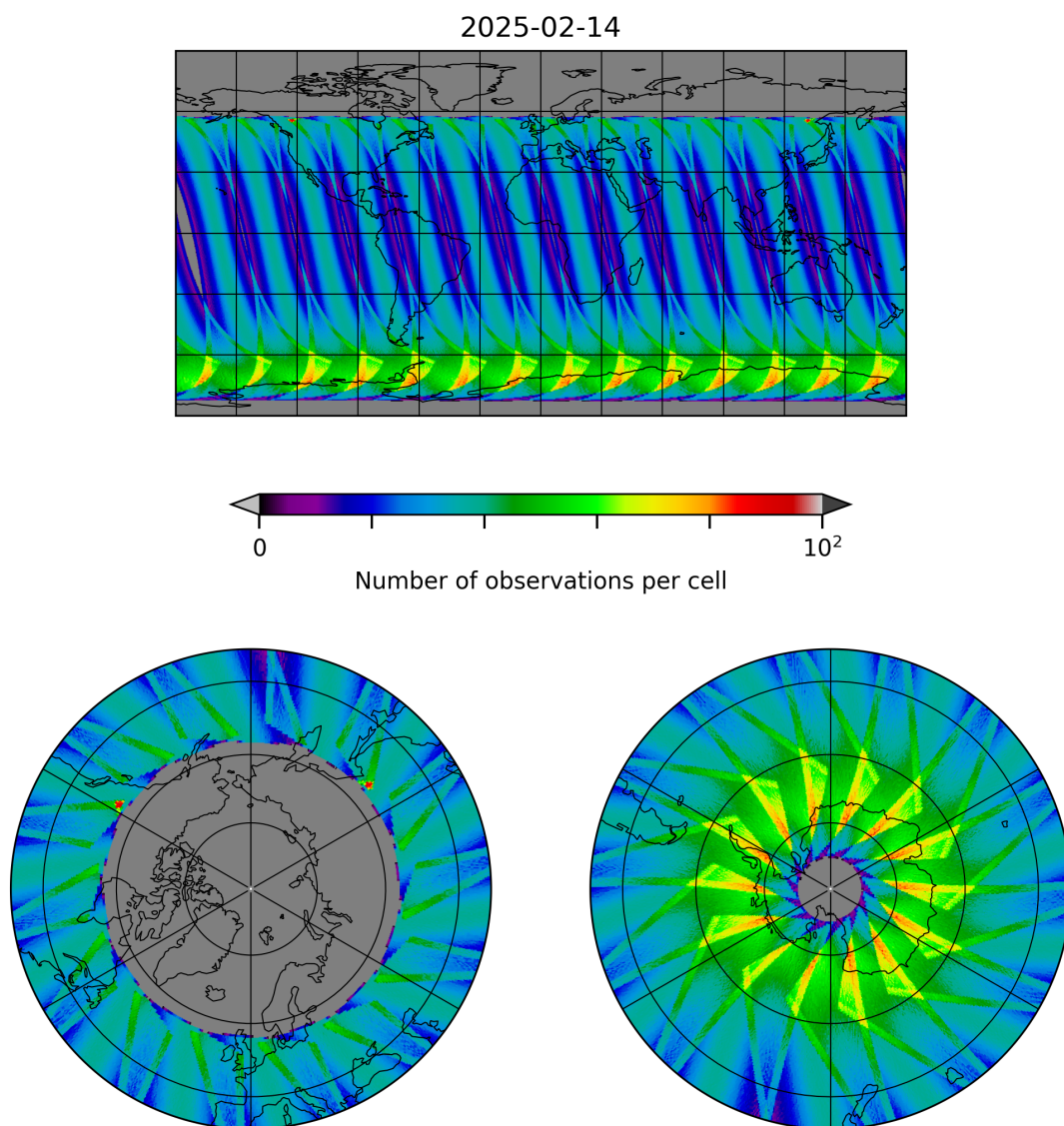


Figure 29: Map of the number of observations for 2025-02-14 to 2025-02-15

7 Zonal average

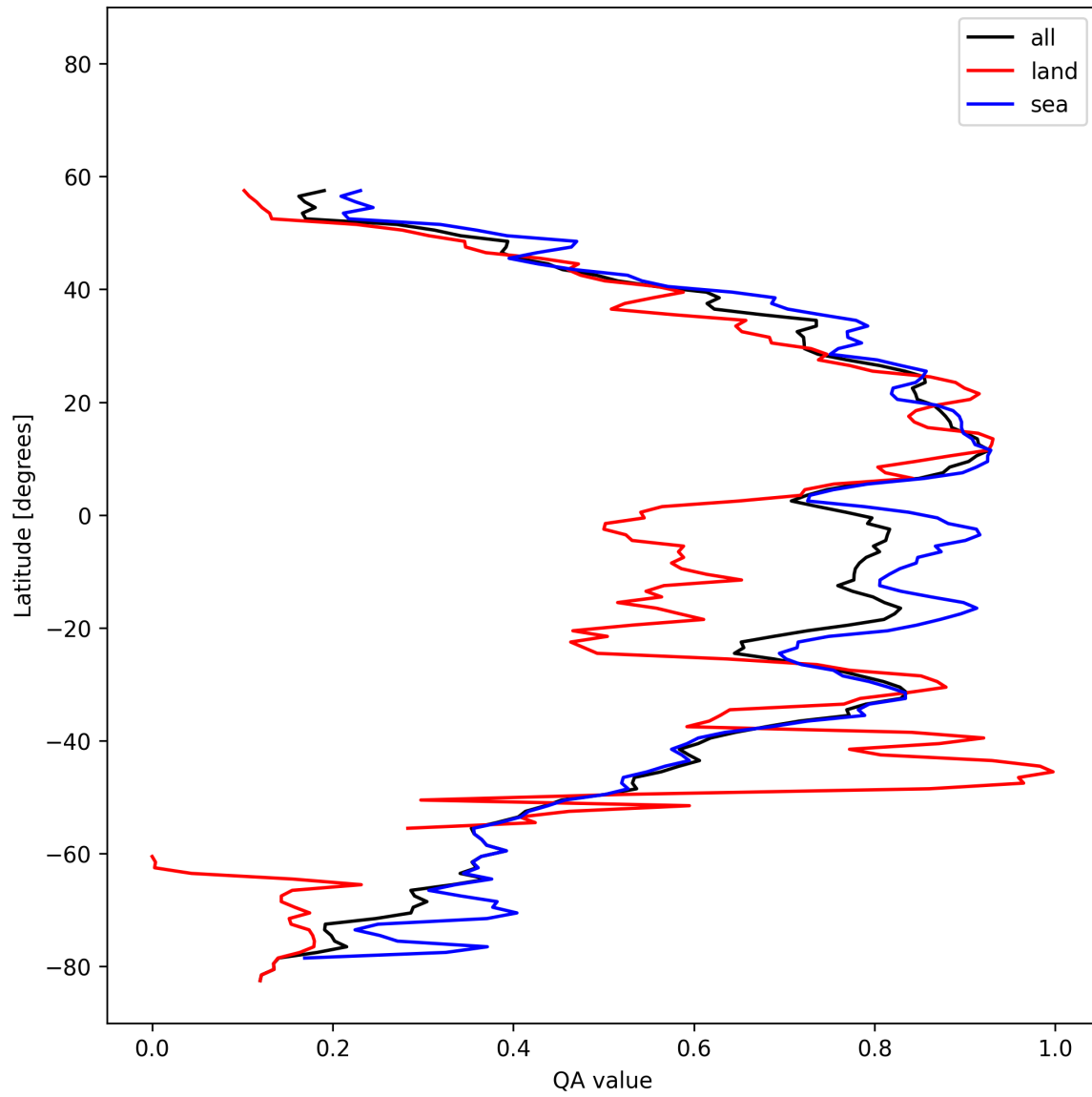


Figure 30: Zonal average of “QA value” for 2025-02-14 to 2025-02-15.

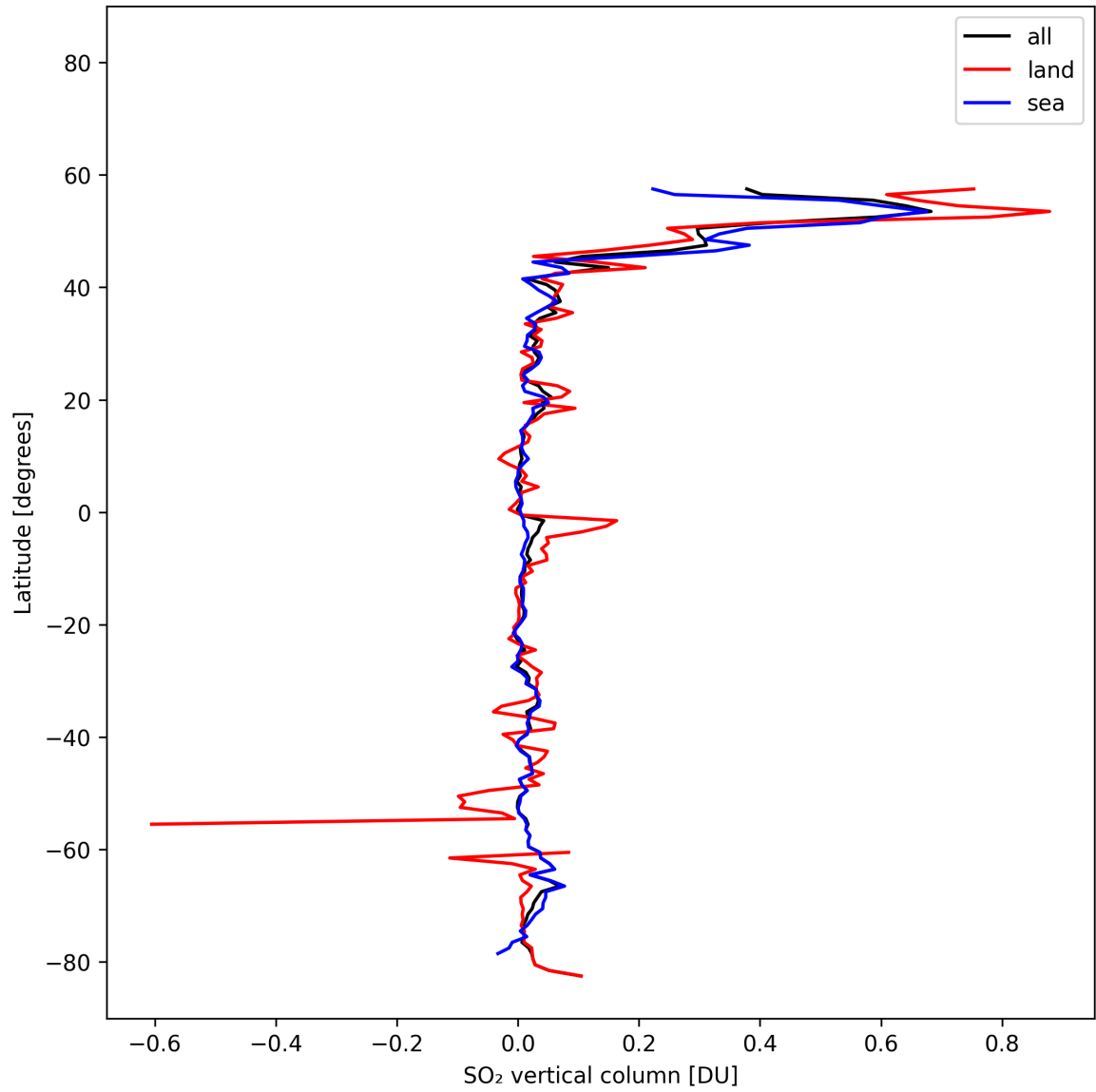


Figure 31: Zonal average of “SO₂ vertical column” for 2025-02-14 to 2025-02-15.

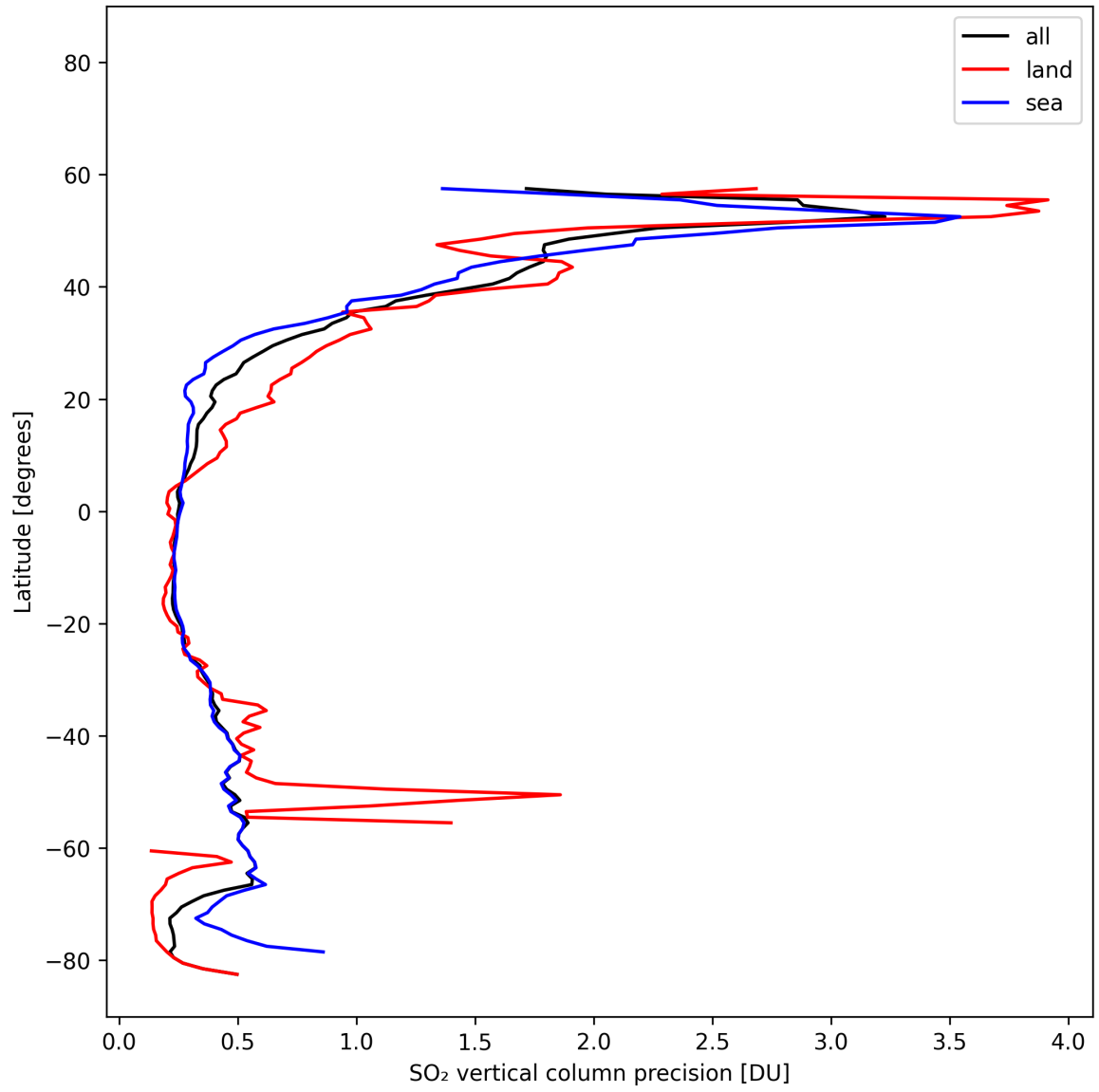


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-02-14 to 2025-02-15.

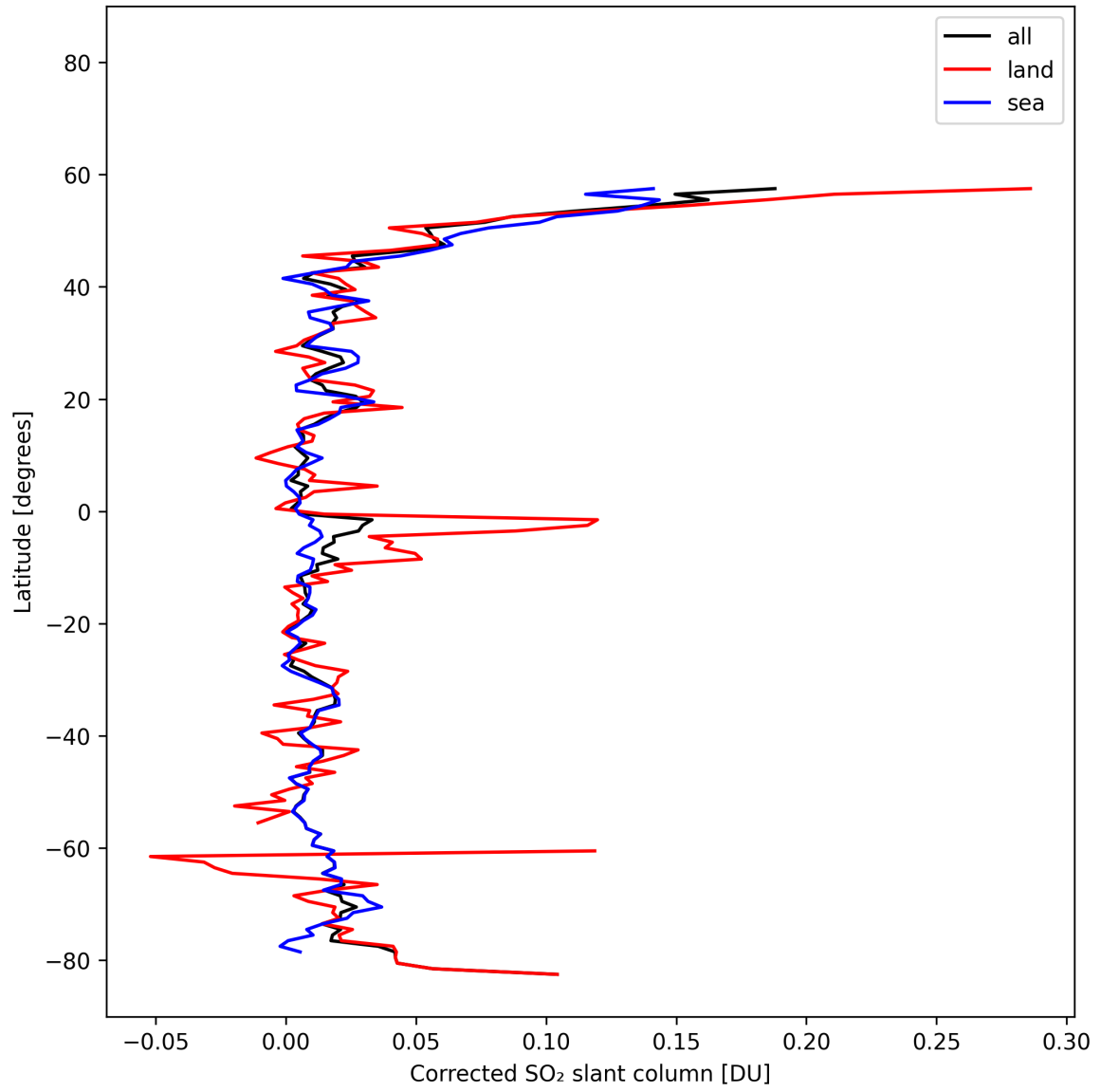


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-02-14 to 2025-02-15.

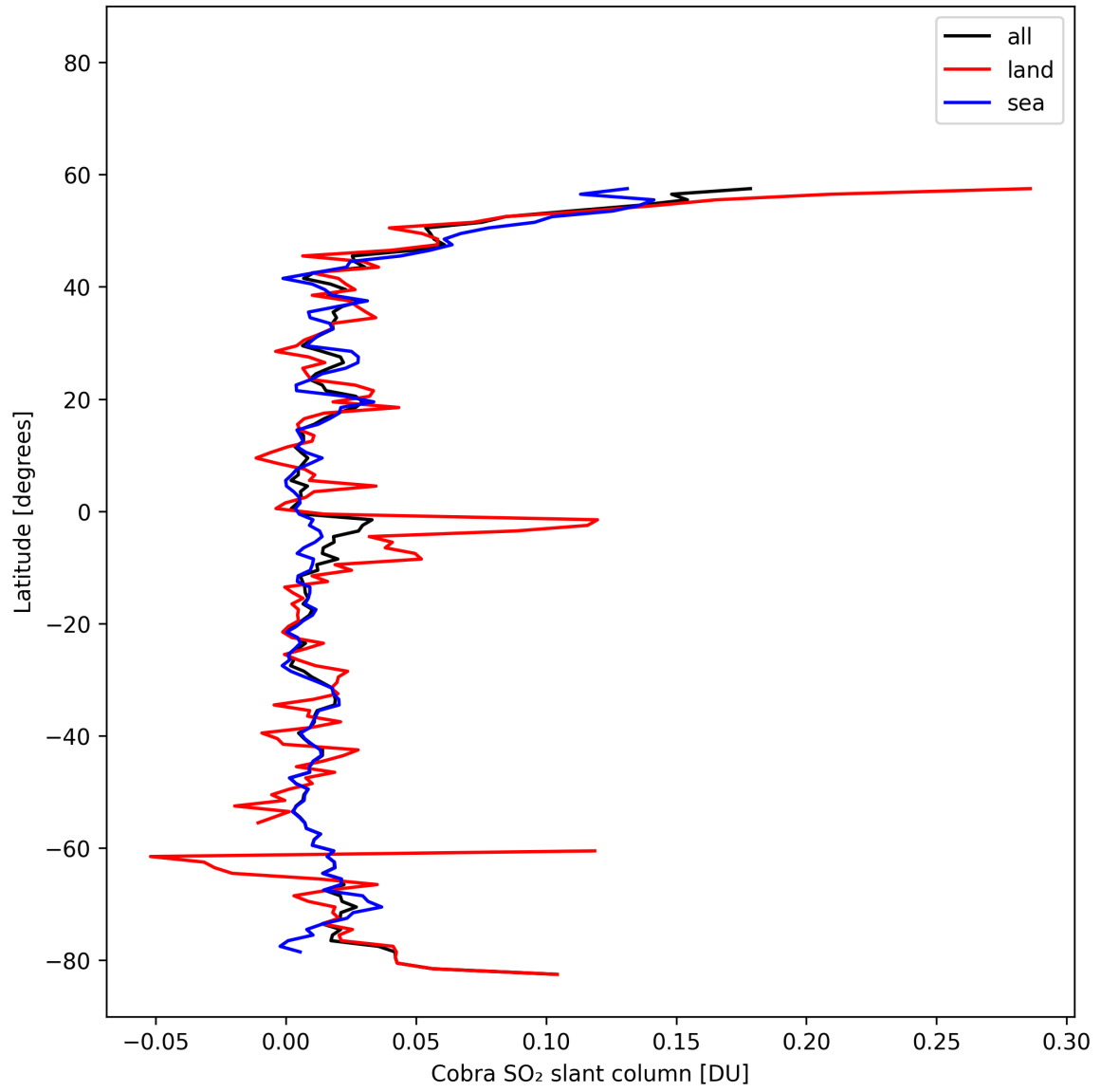


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-02-14 to 2025-02-15.

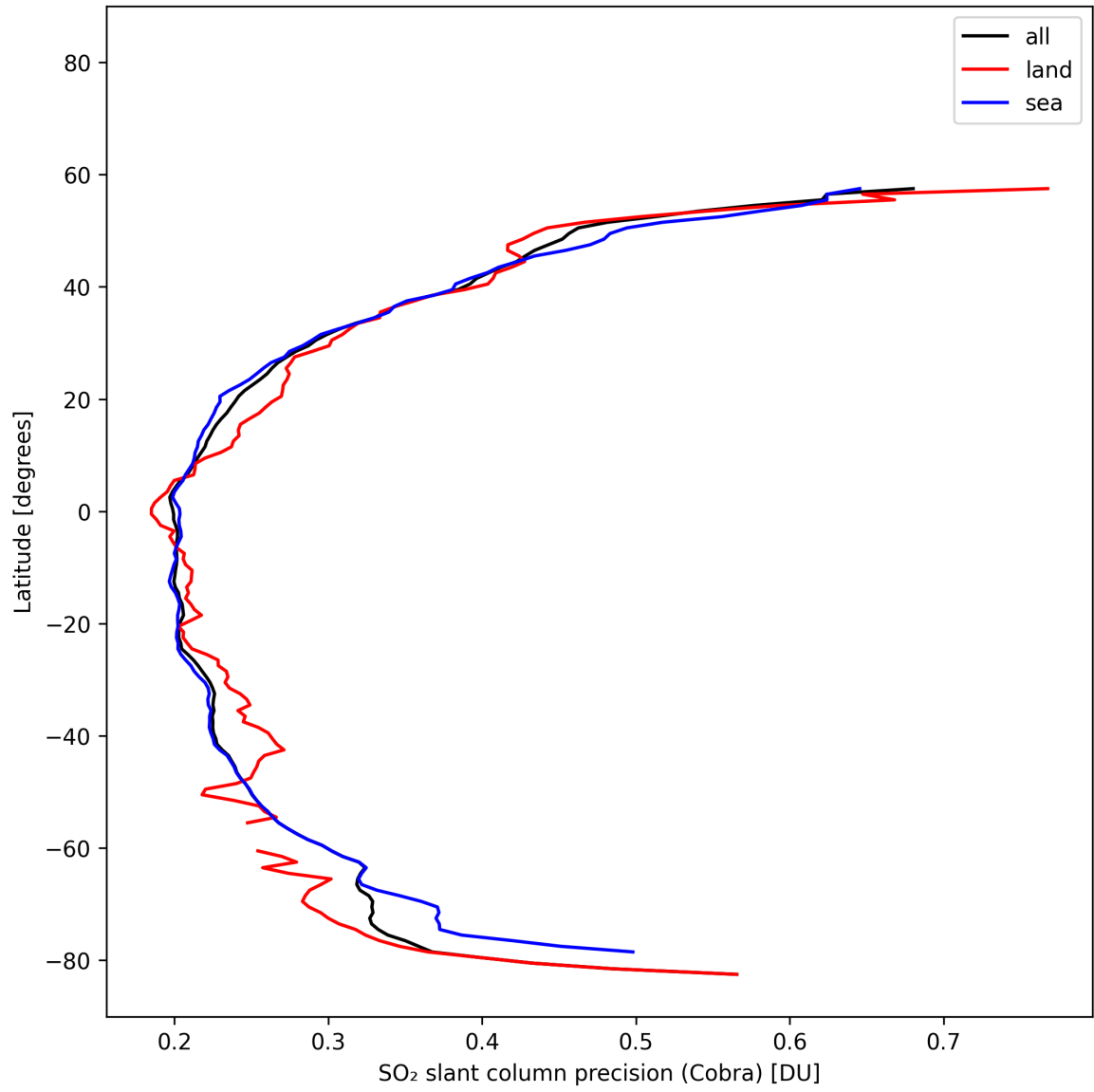


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-02-14 to 2025-02-15.

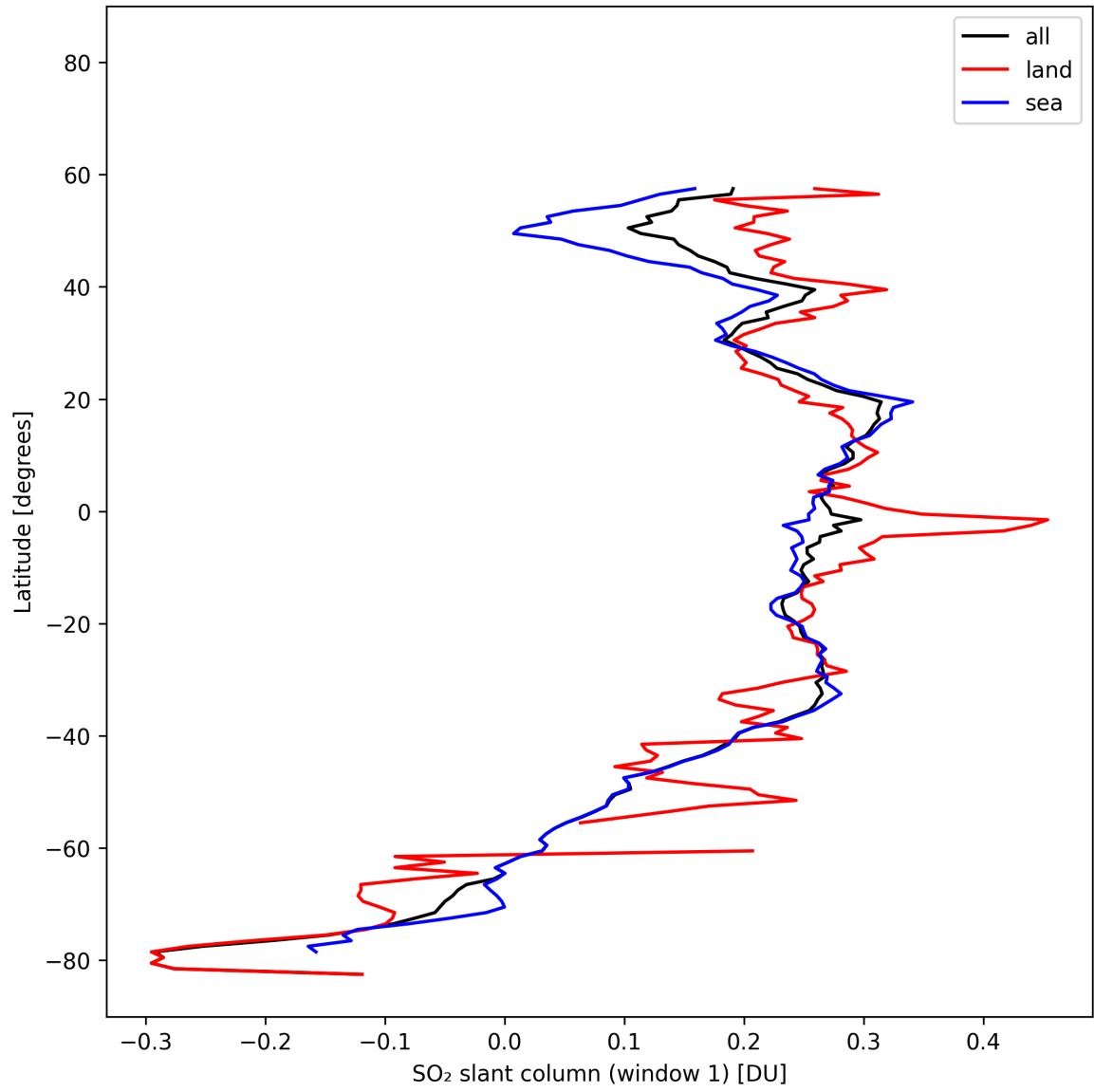


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-02-14 to 2025-02-15.

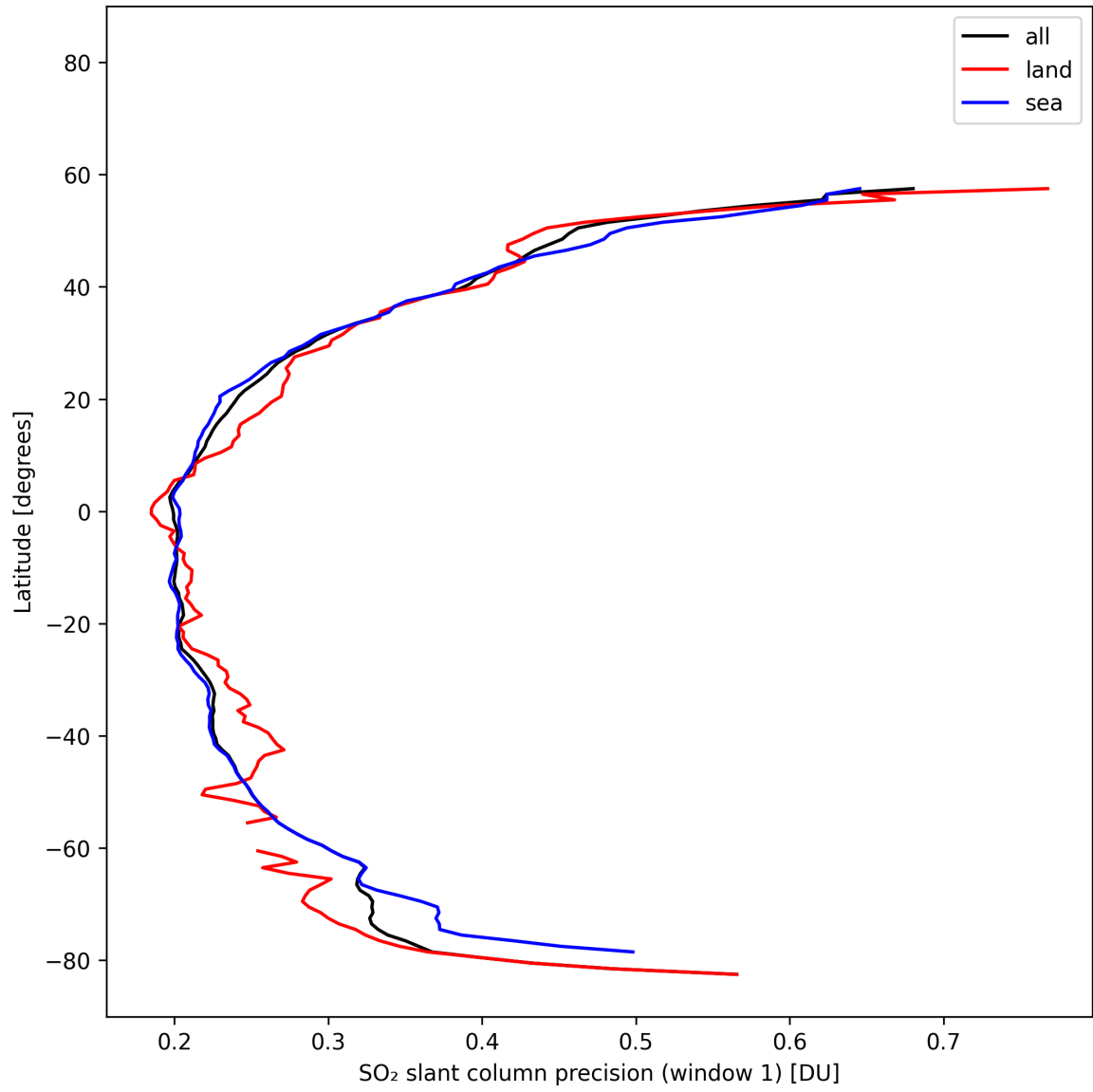


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-02-14 to 2025-02-15.

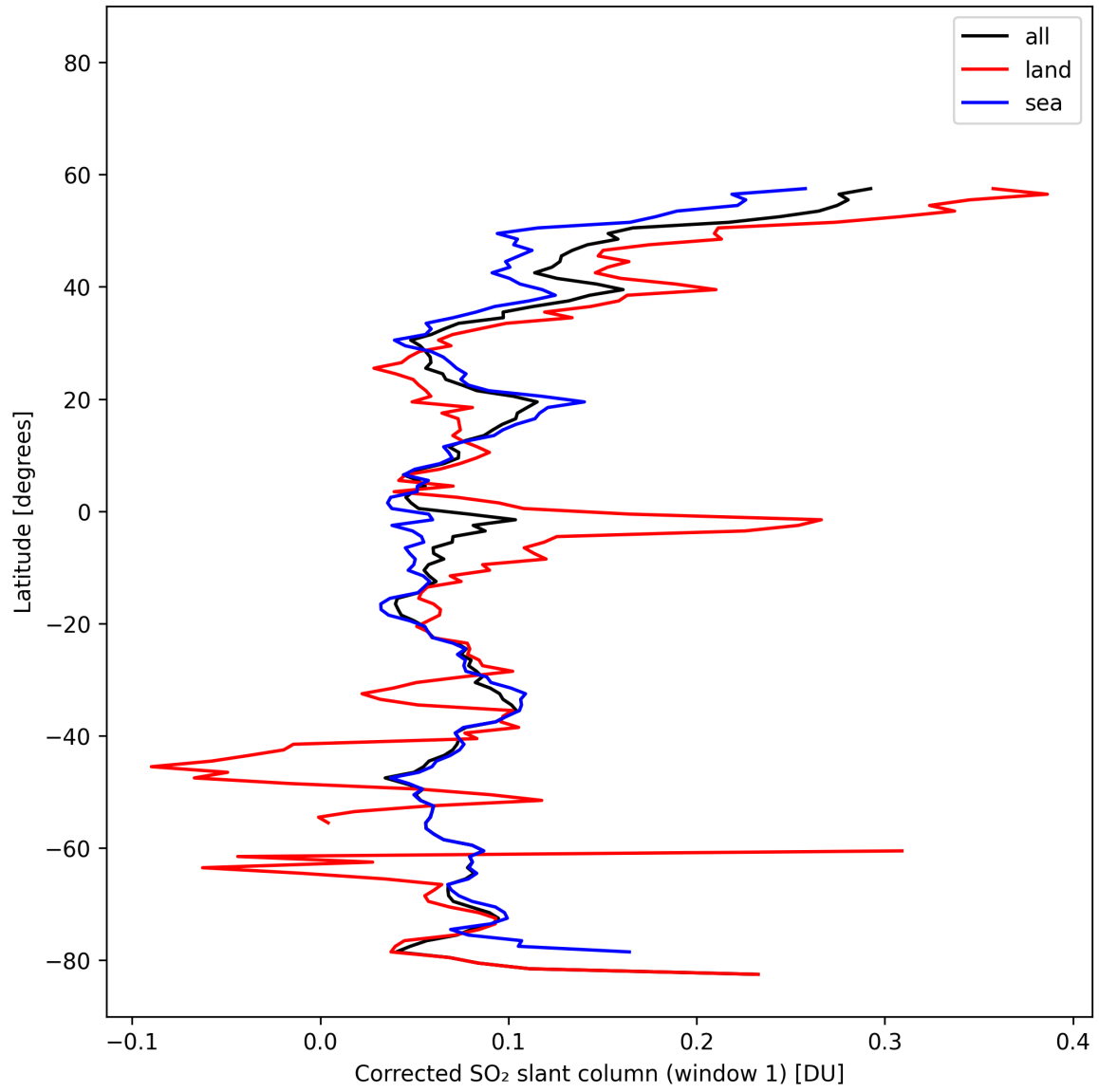


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-02-14 to 2025-02-15.

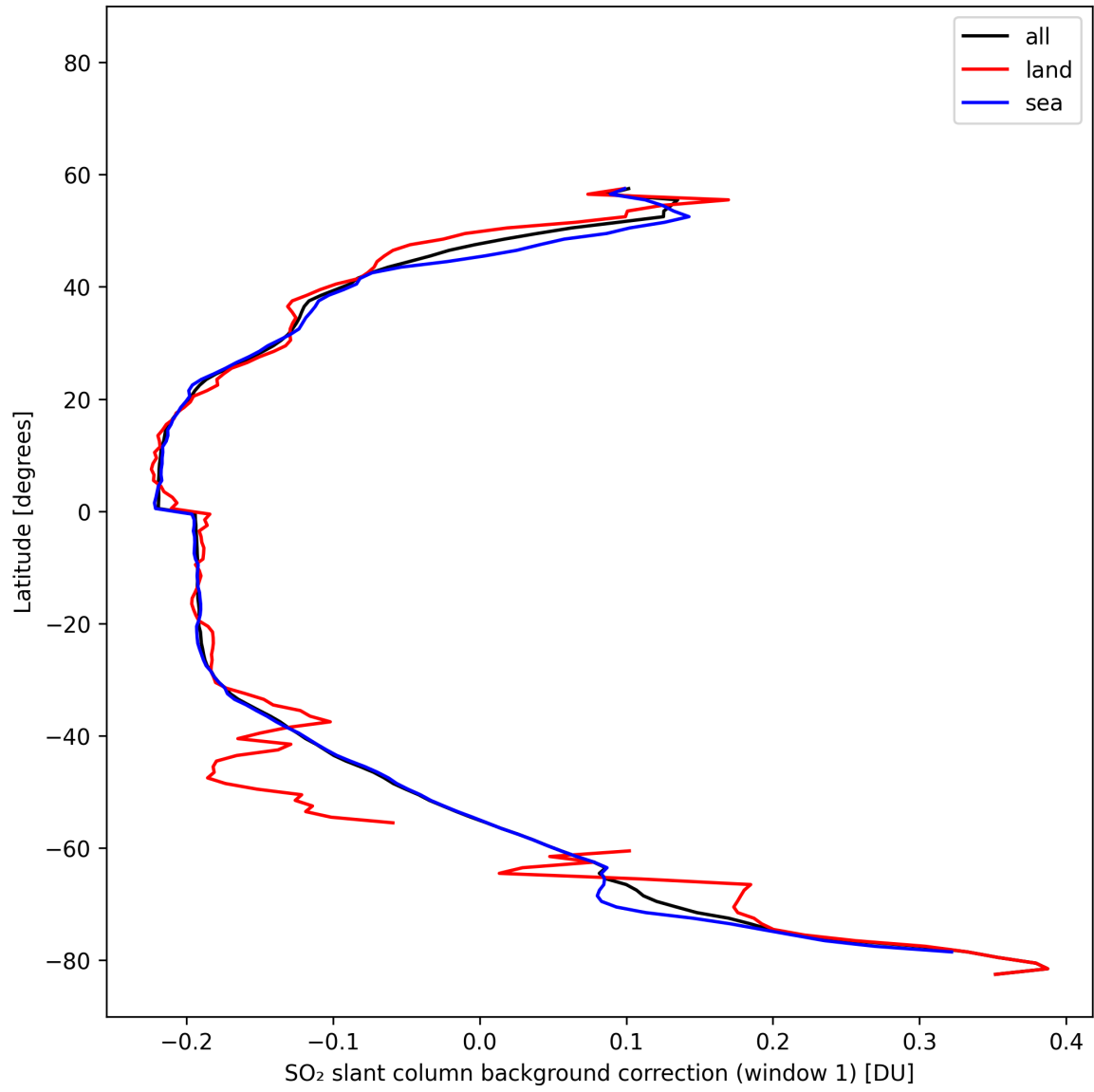


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-02-14 to 2025-02-15.

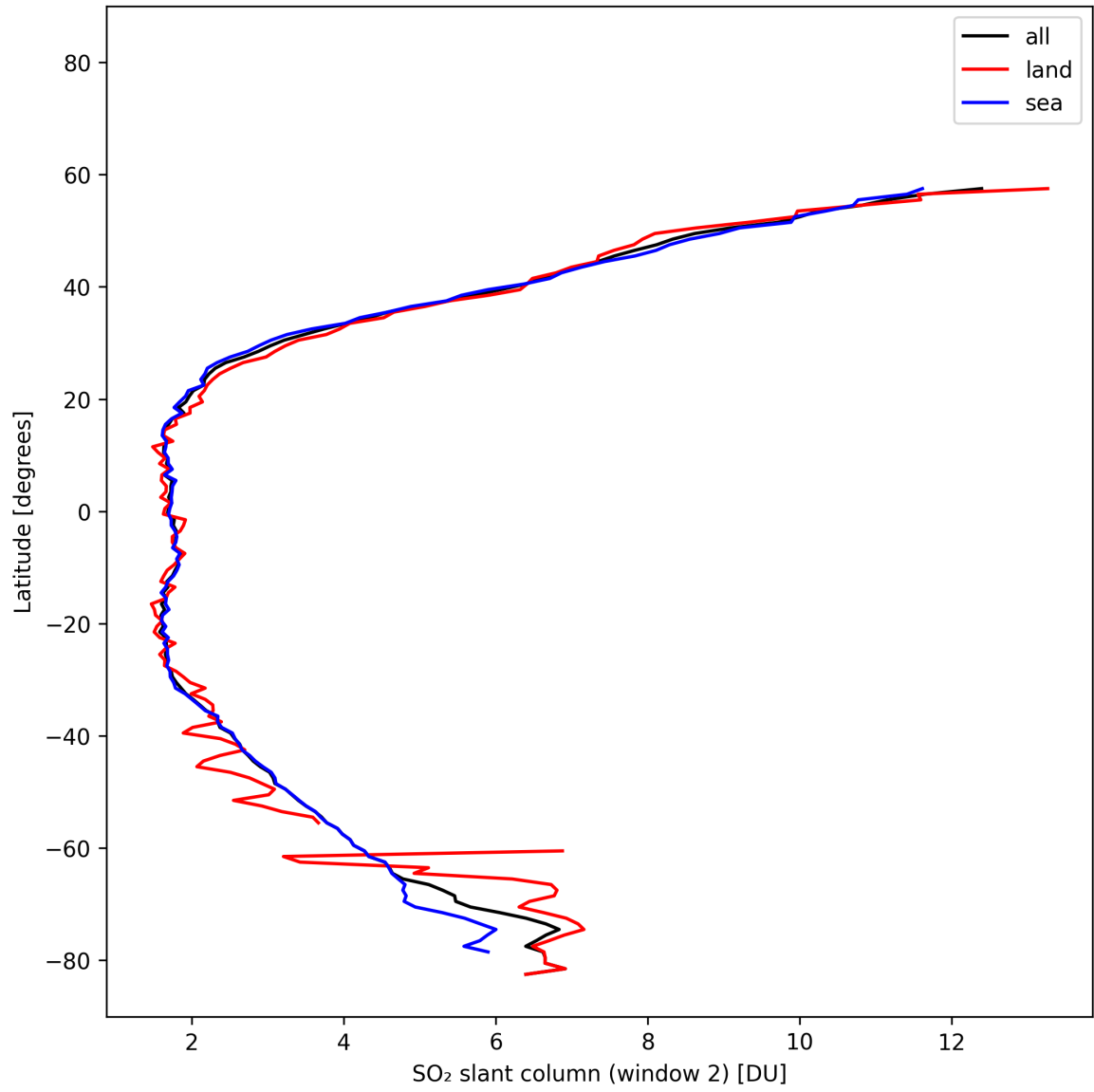


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-02-14 to 2025-02-15.

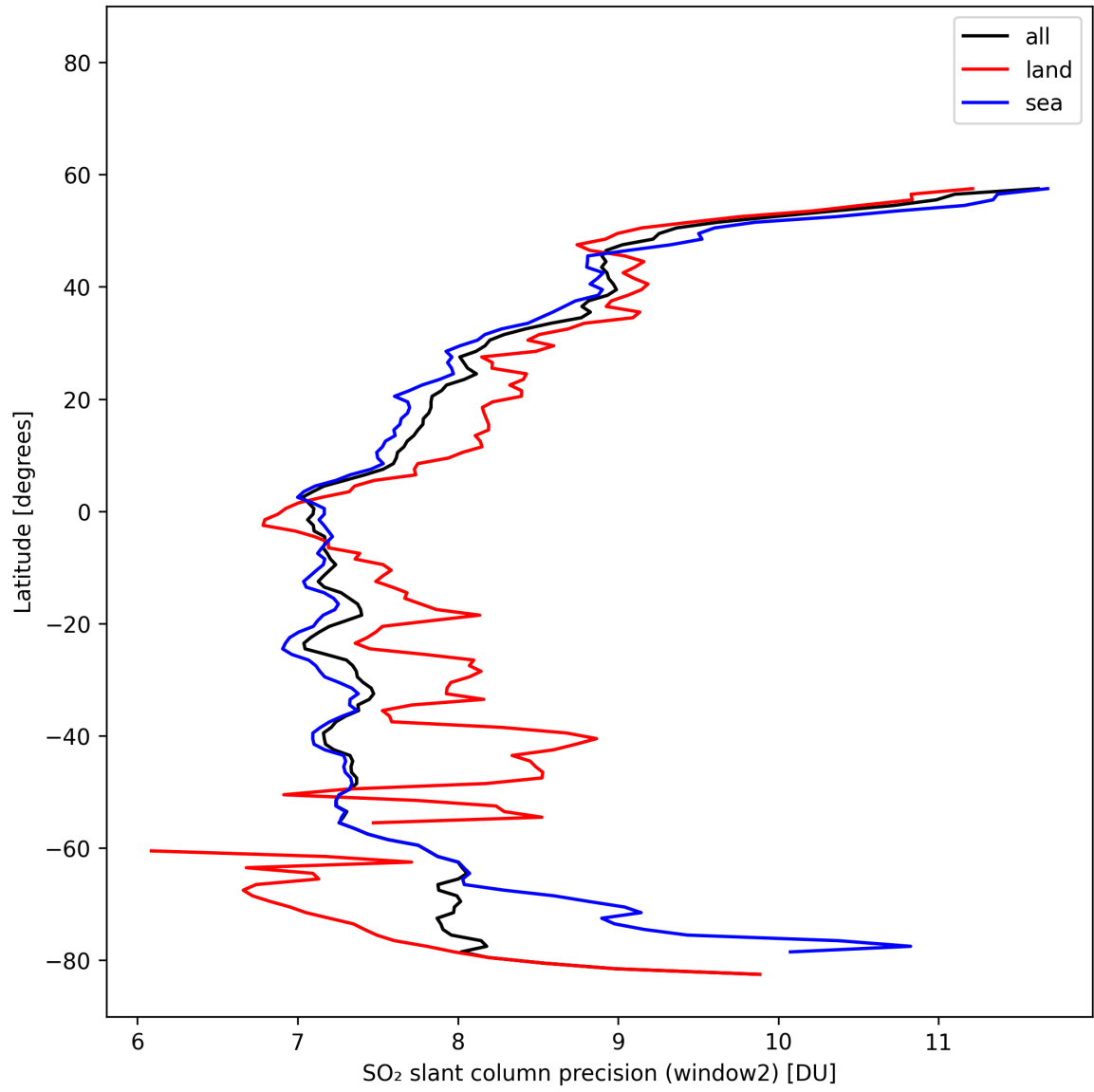


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-02-14 to 2025-02-15.

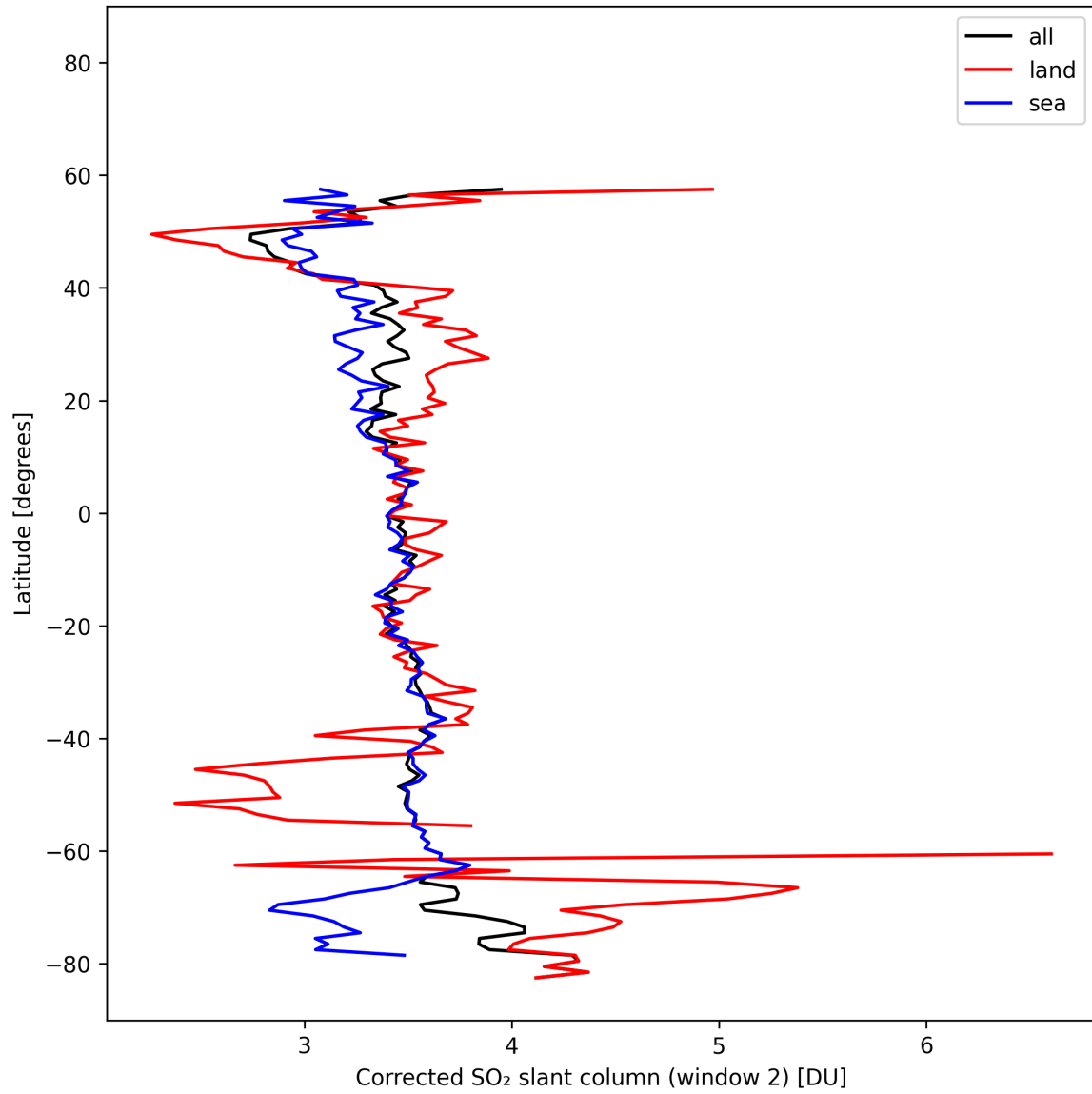


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-02-14 to 2025-02-15.

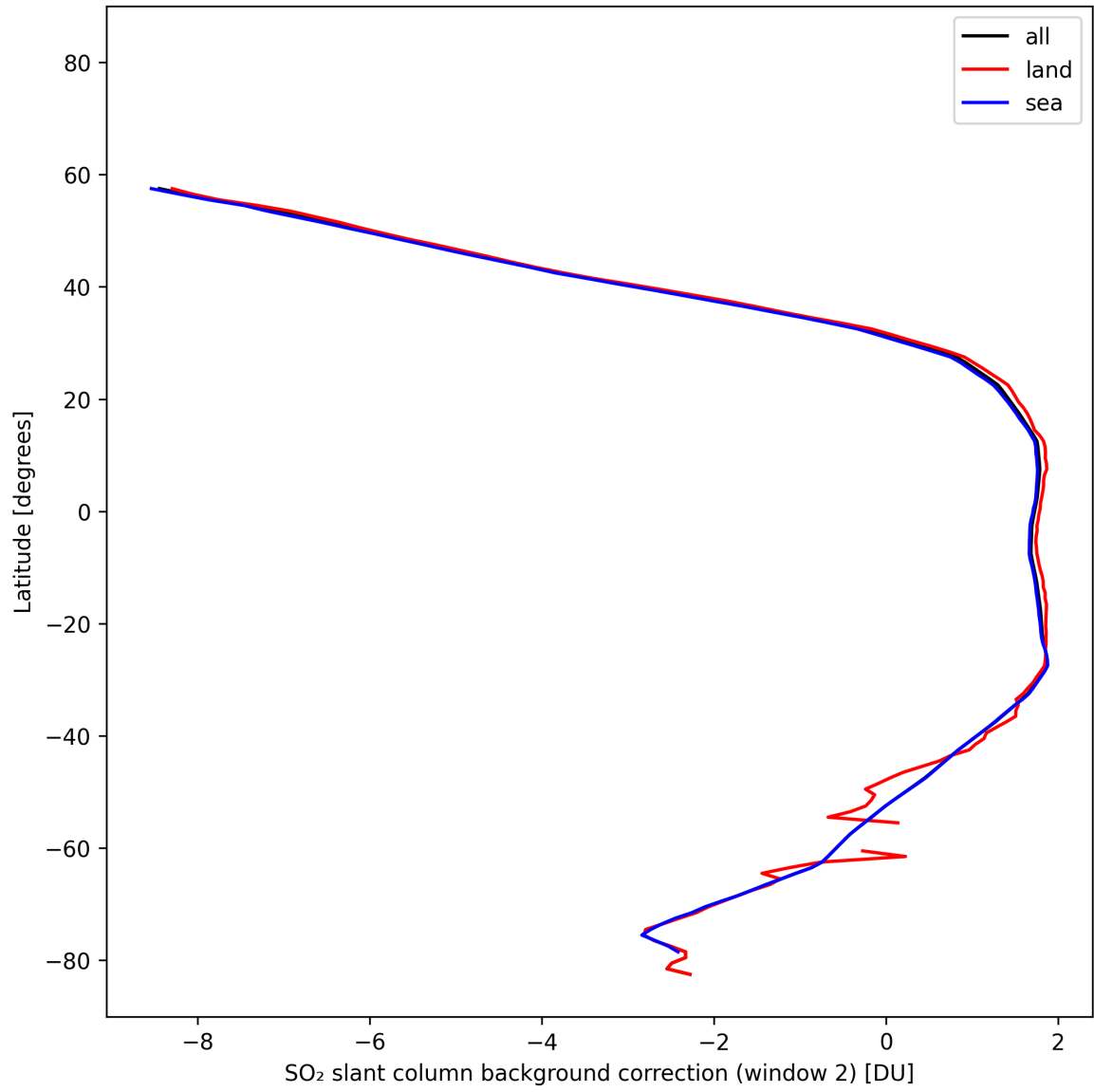


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-02-14 to 2025-02-15.

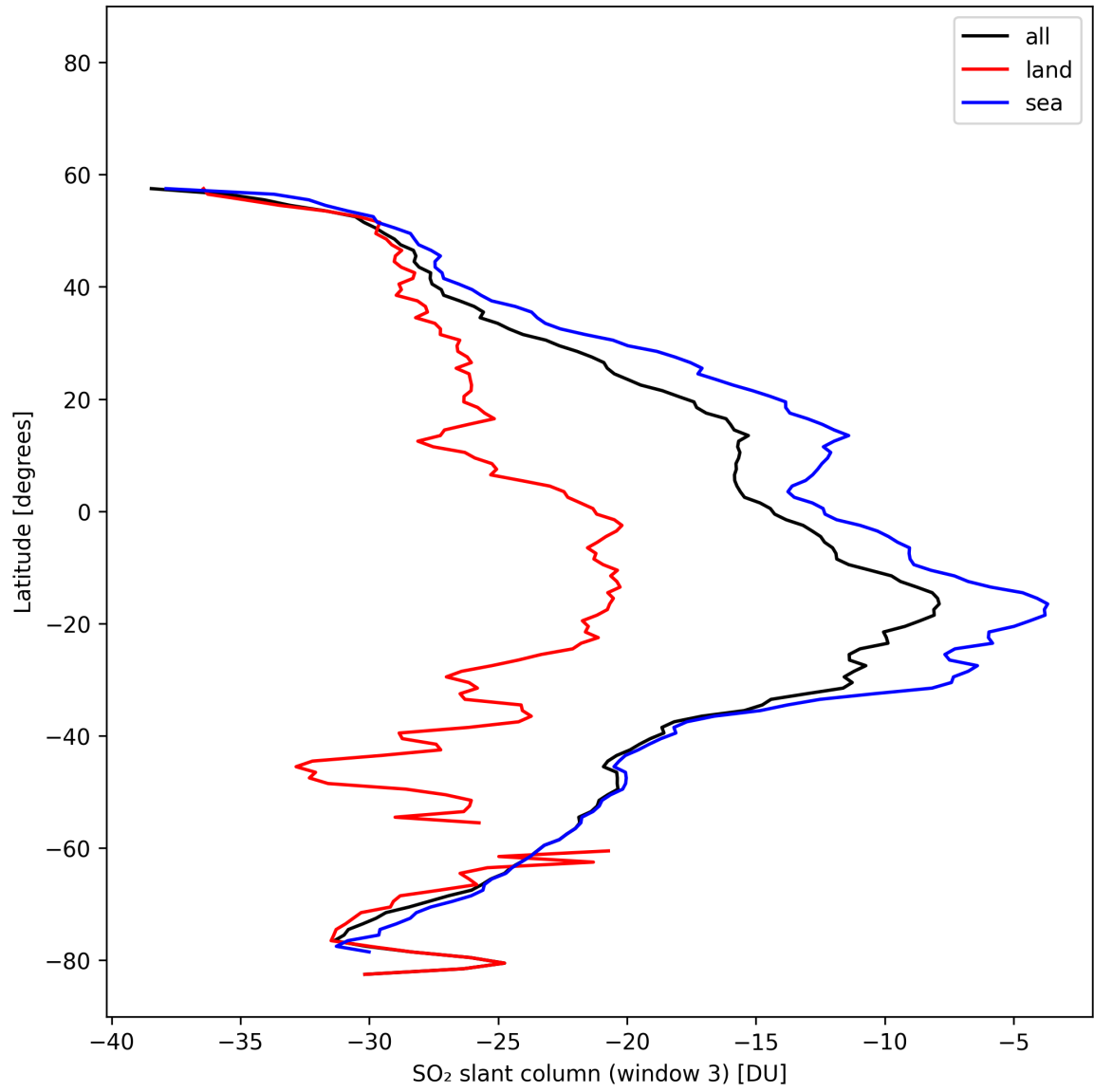


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-02-14 to 2025-02-15.

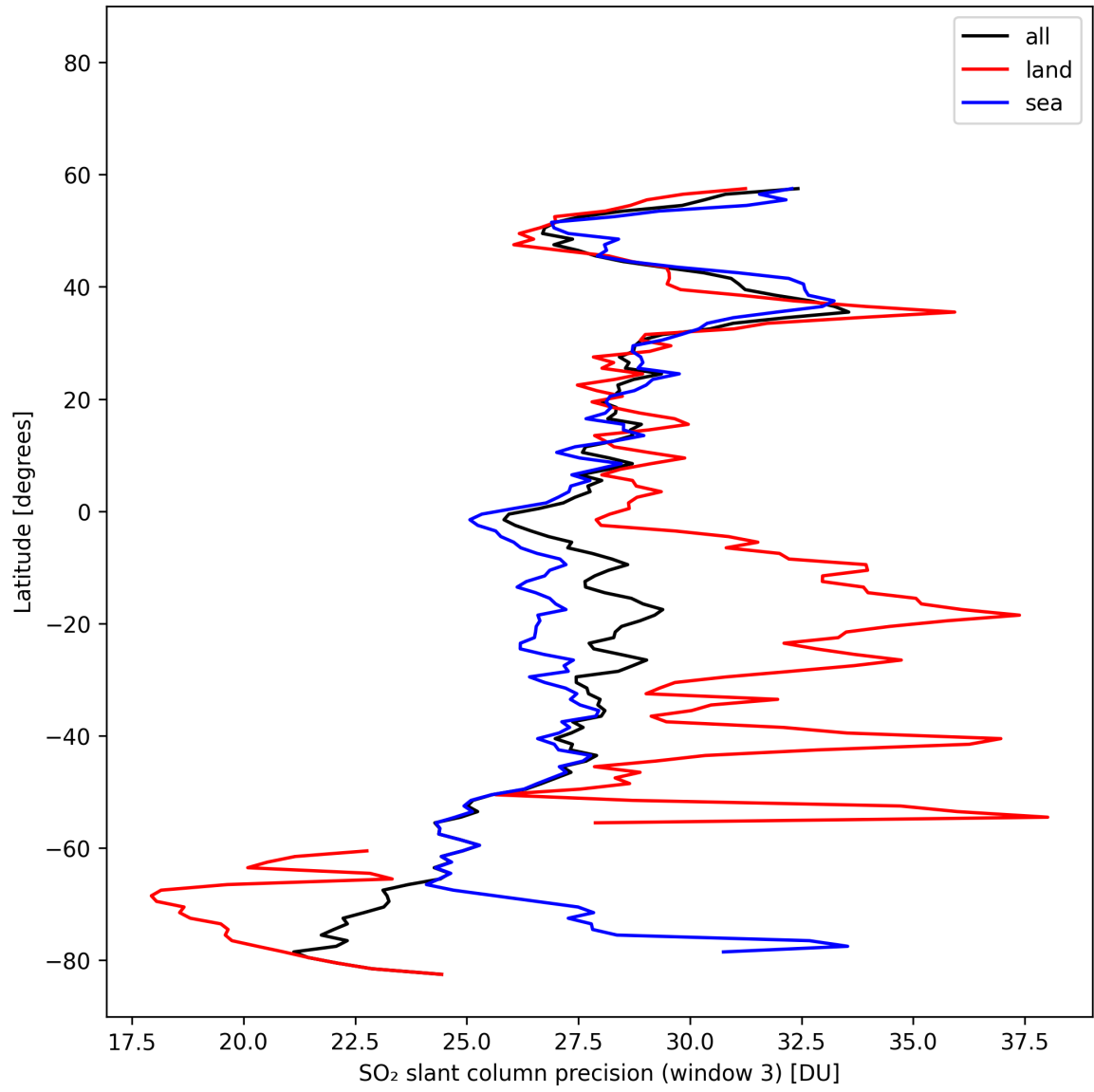


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-02-14 to 2025-02-15.

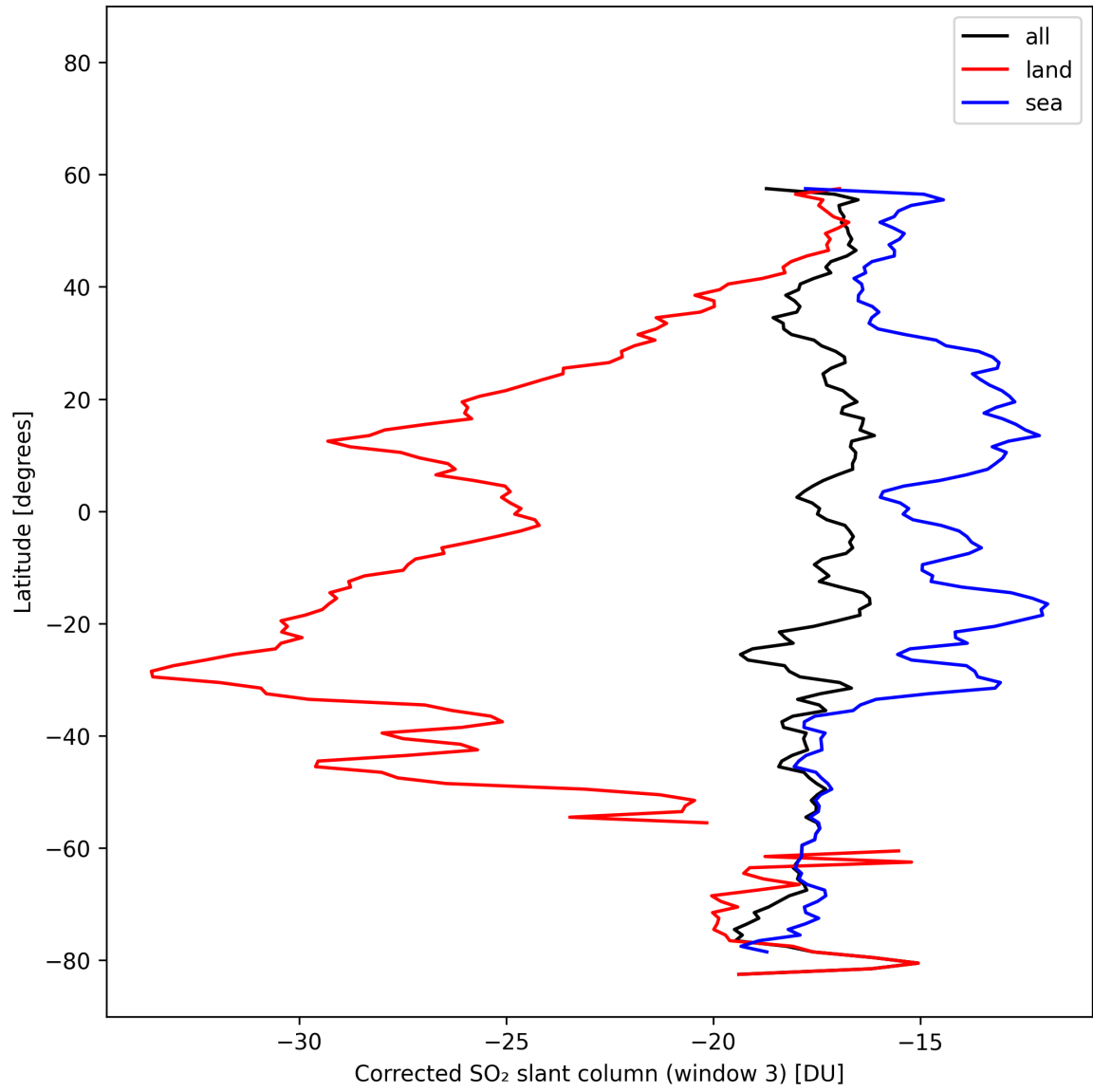


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-02-14 to 2025-02-15.

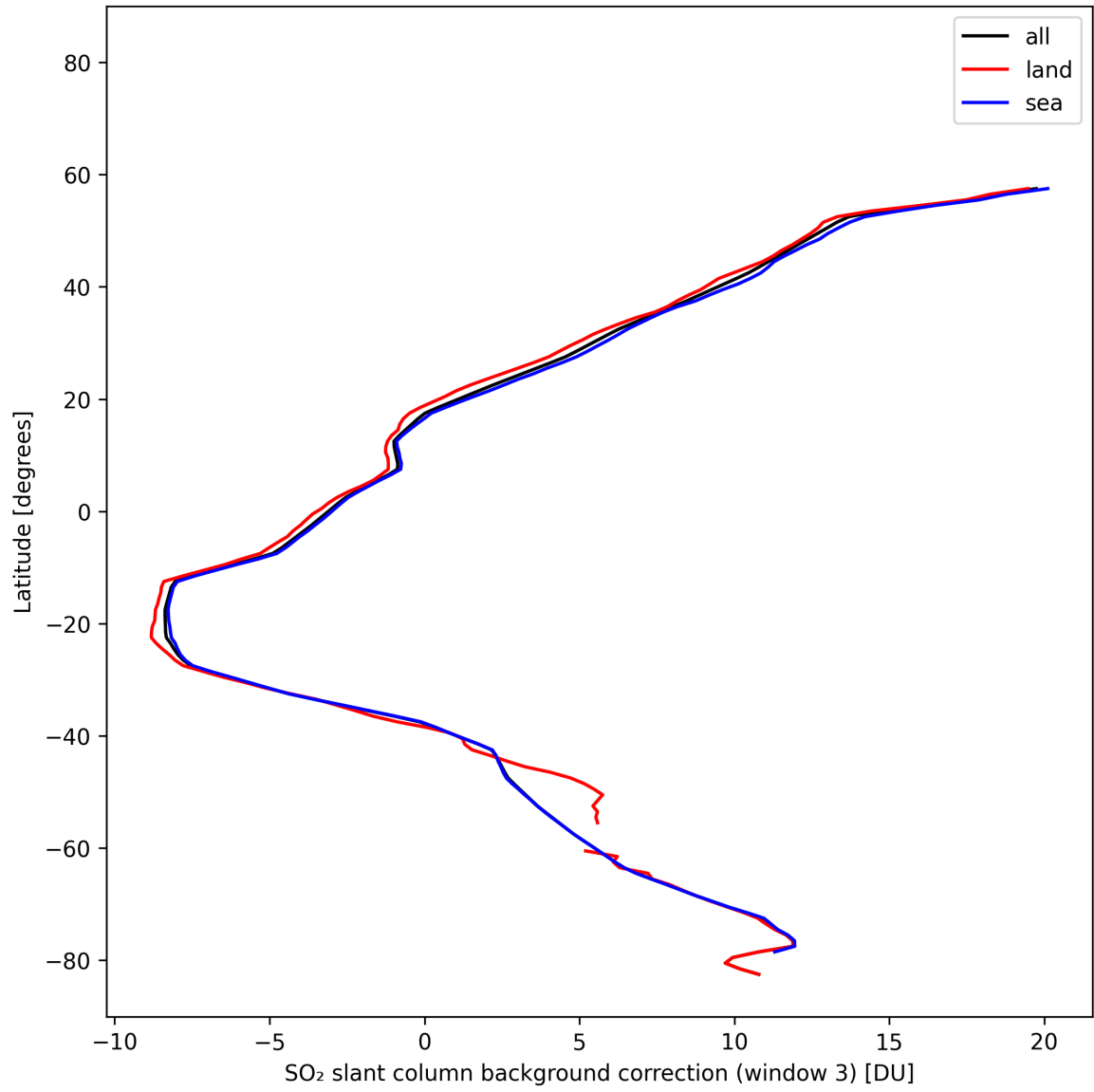


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-02-14 to 2025-02-15.

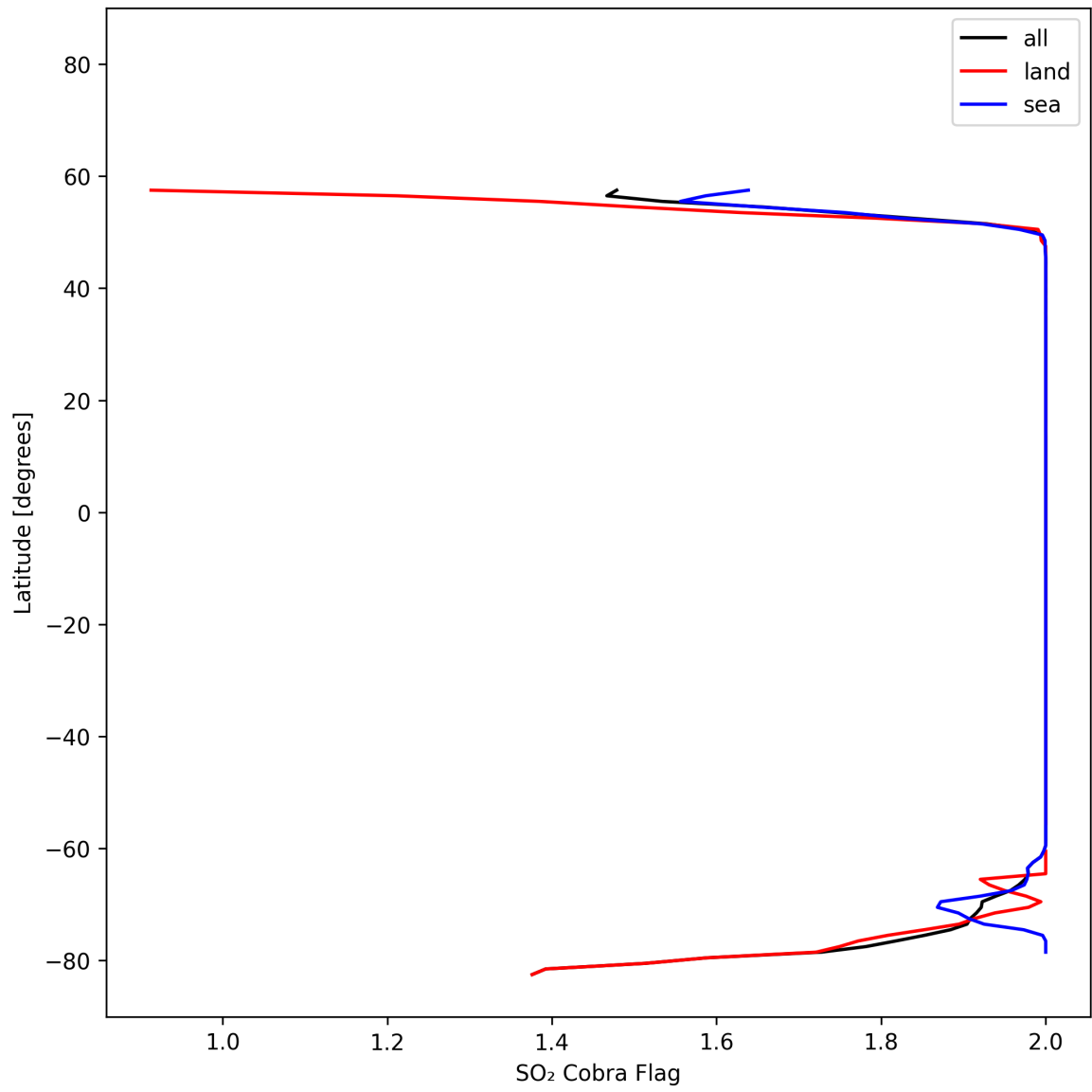


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-02-14 to 2025-02-15.

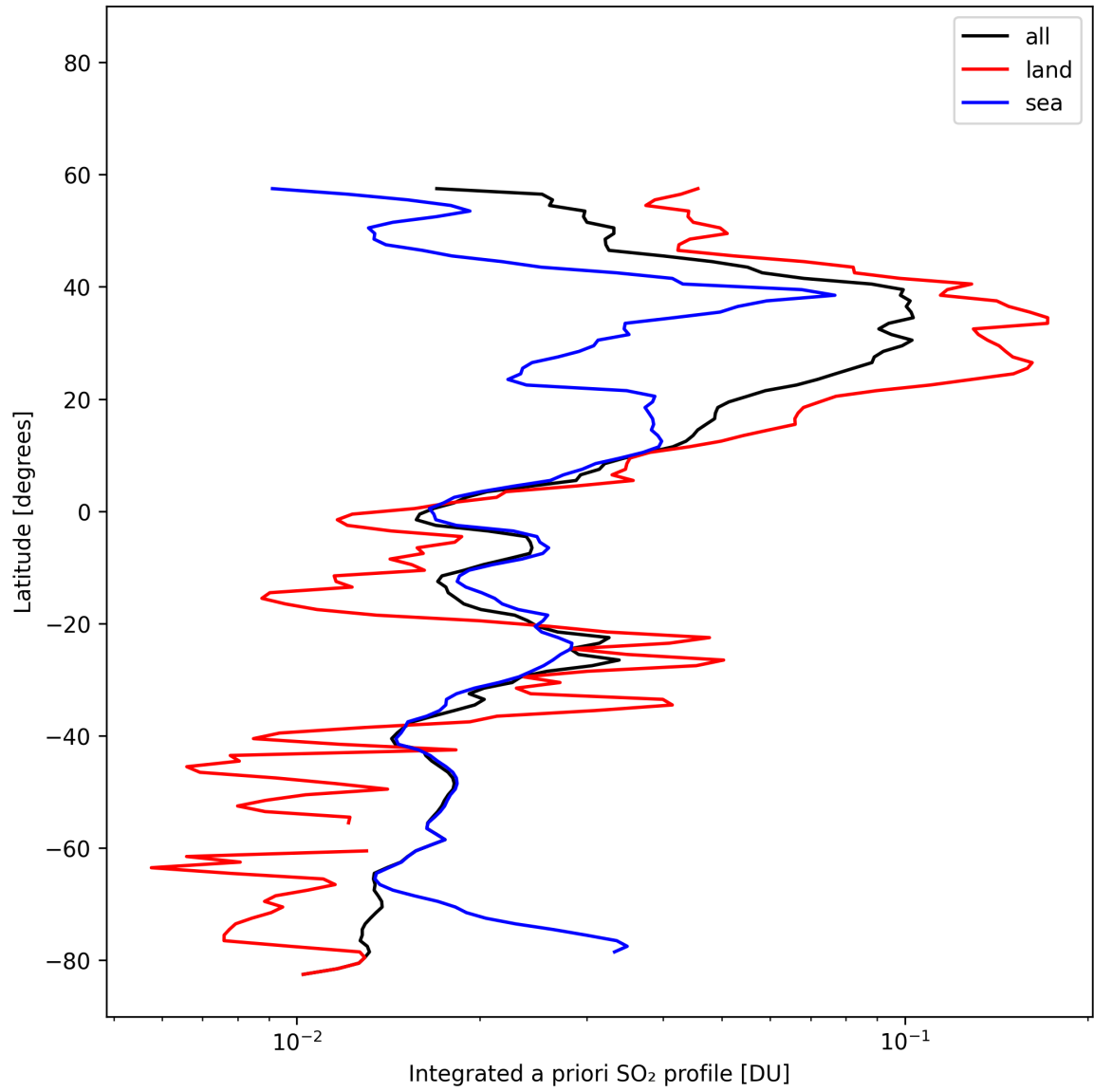


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-02-14 to 2025-02-15.

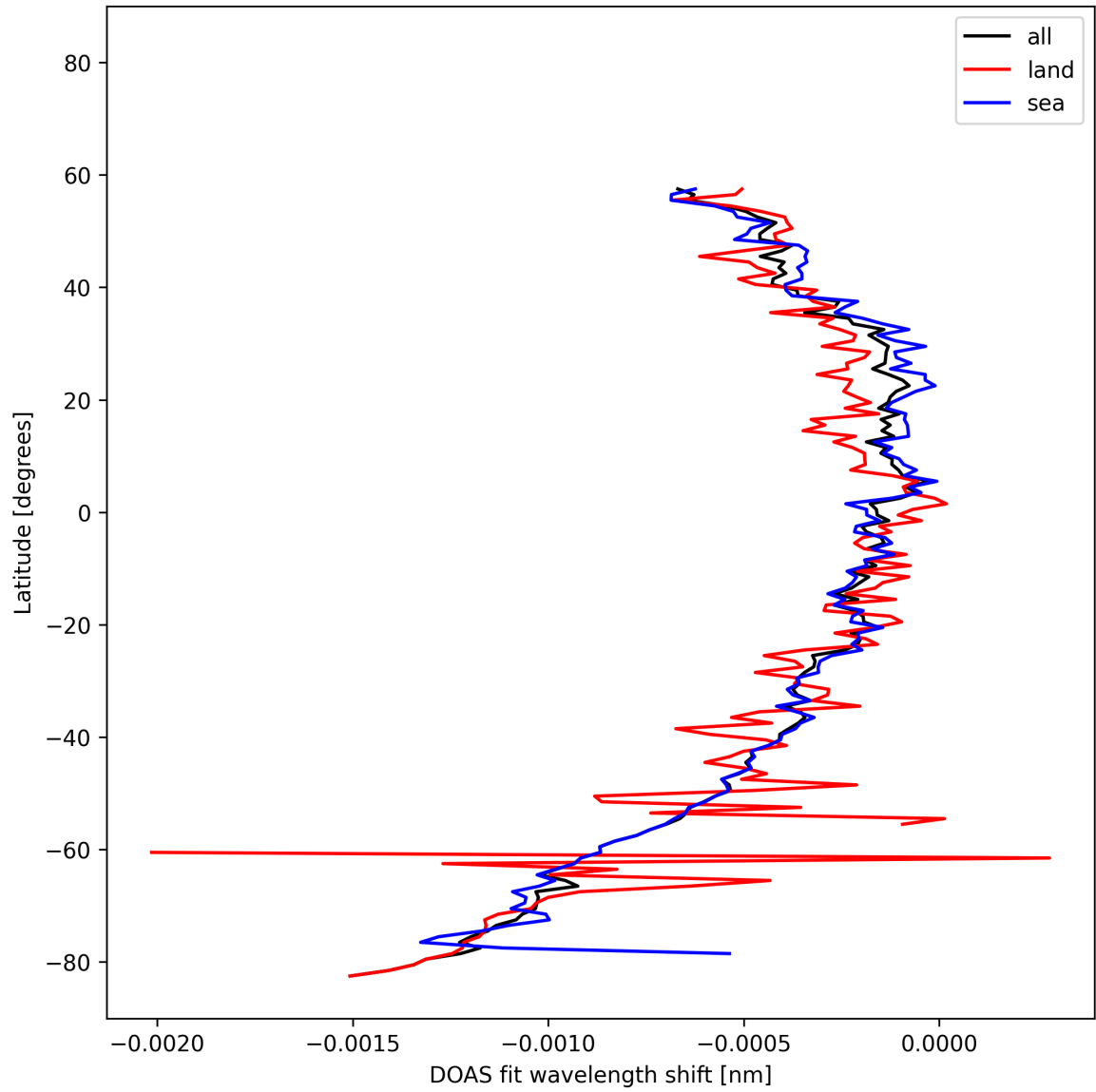


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-02-14 to 2025-02-15.

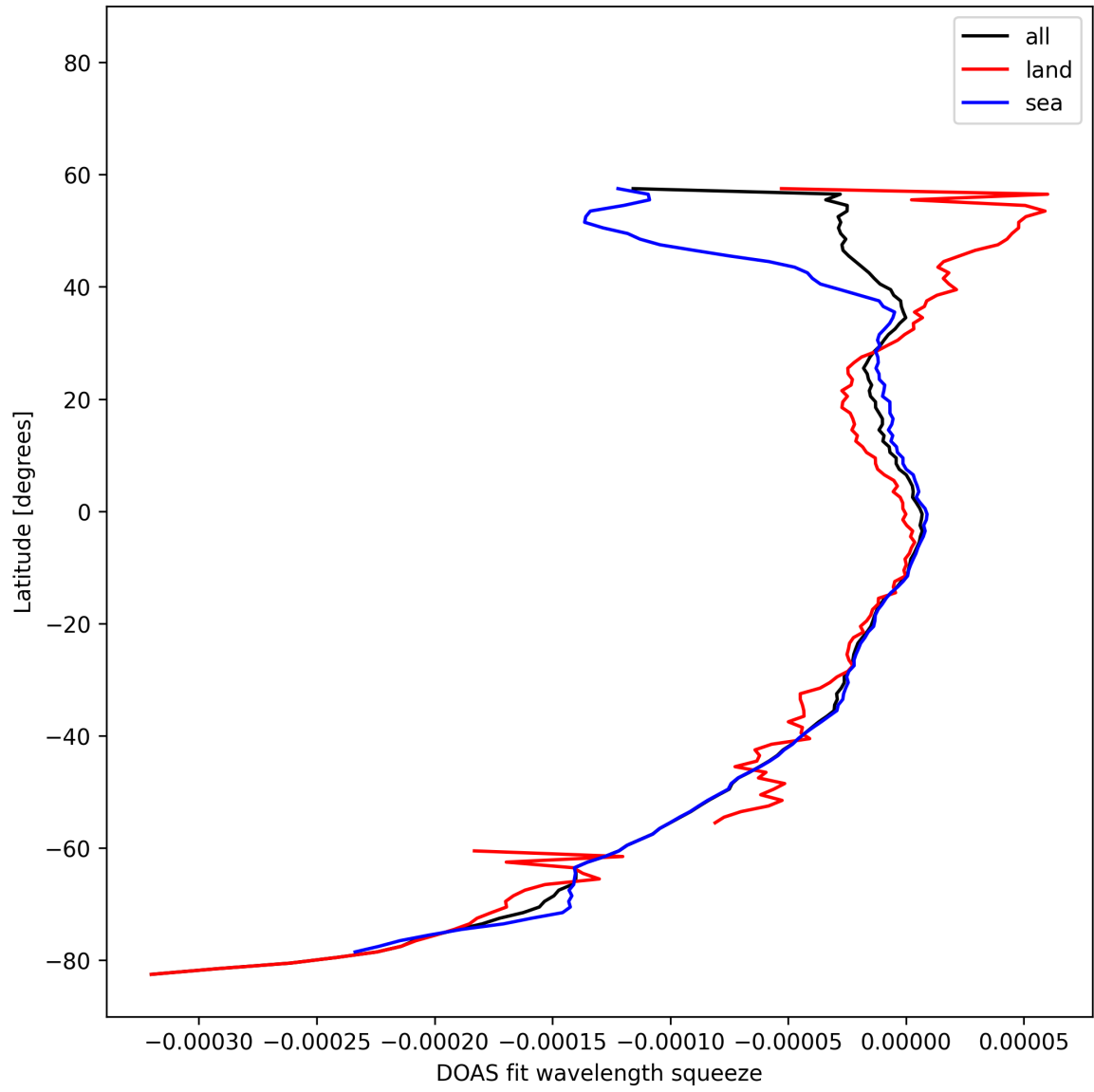


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-02-14 to 2025-02-15.

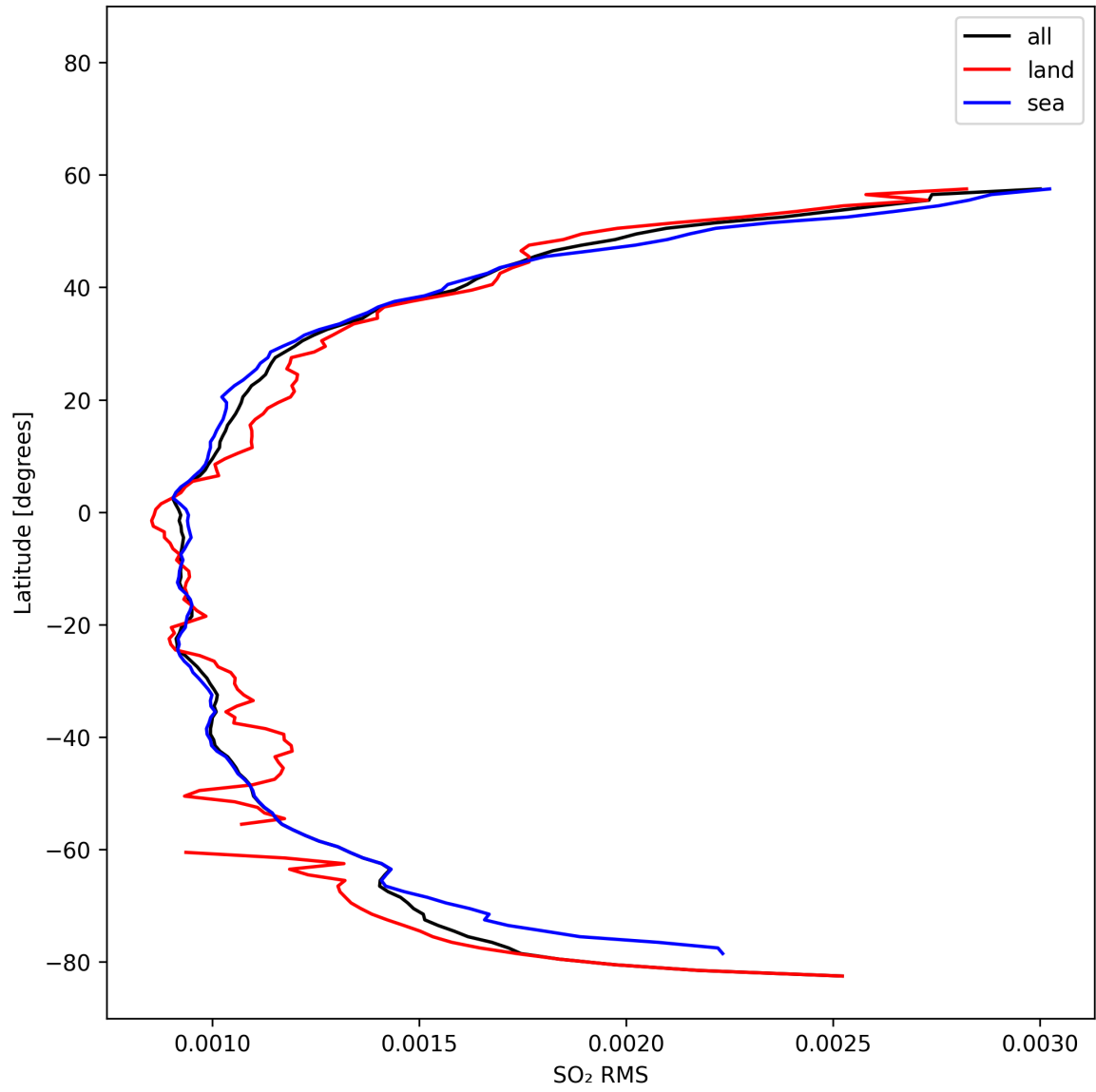


Figure 52: Zonal average of “SO₂ RMS” for 2025-02-14 to 2025-02-15.

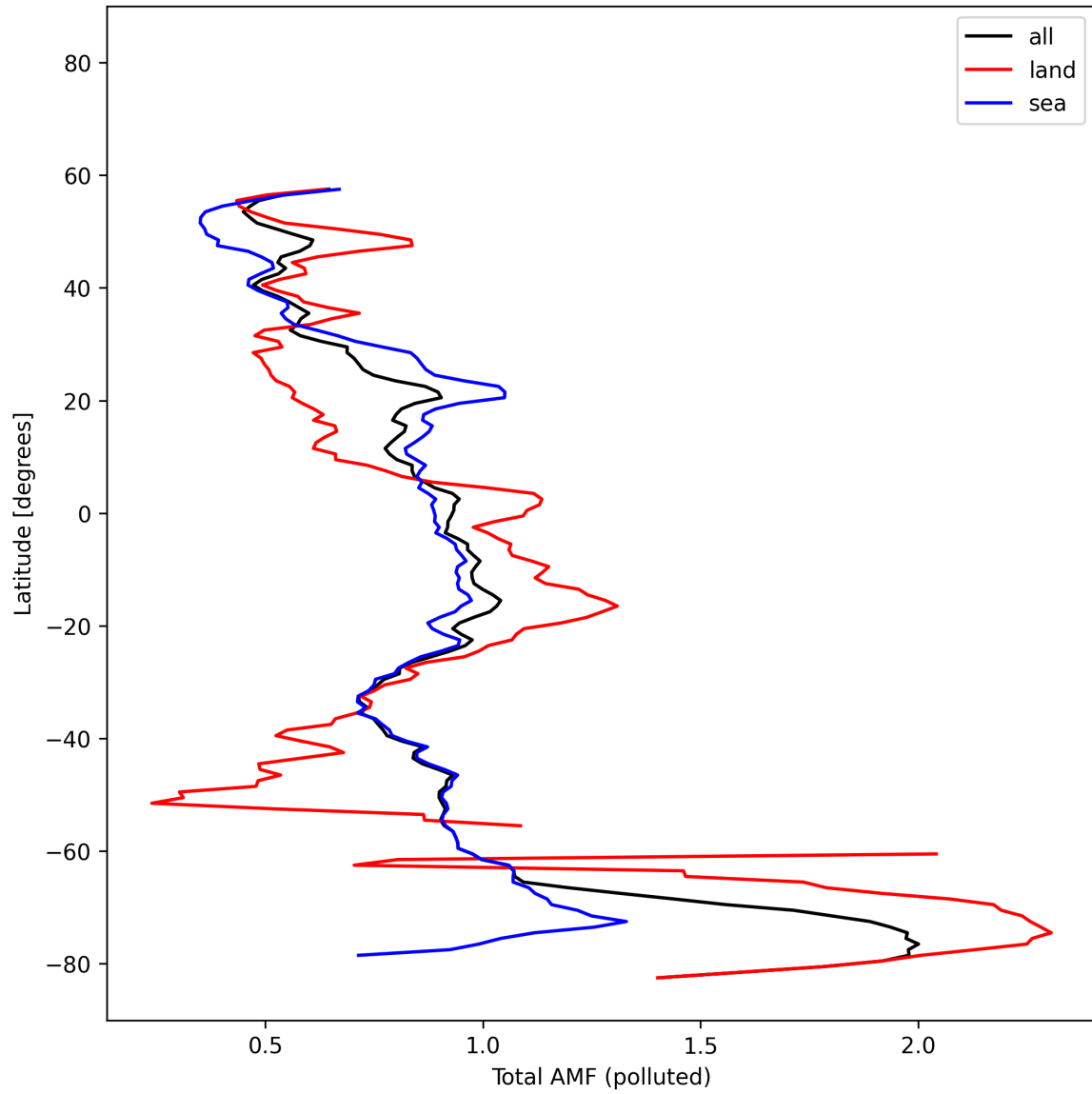


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-02-14 to 2025-02-15.

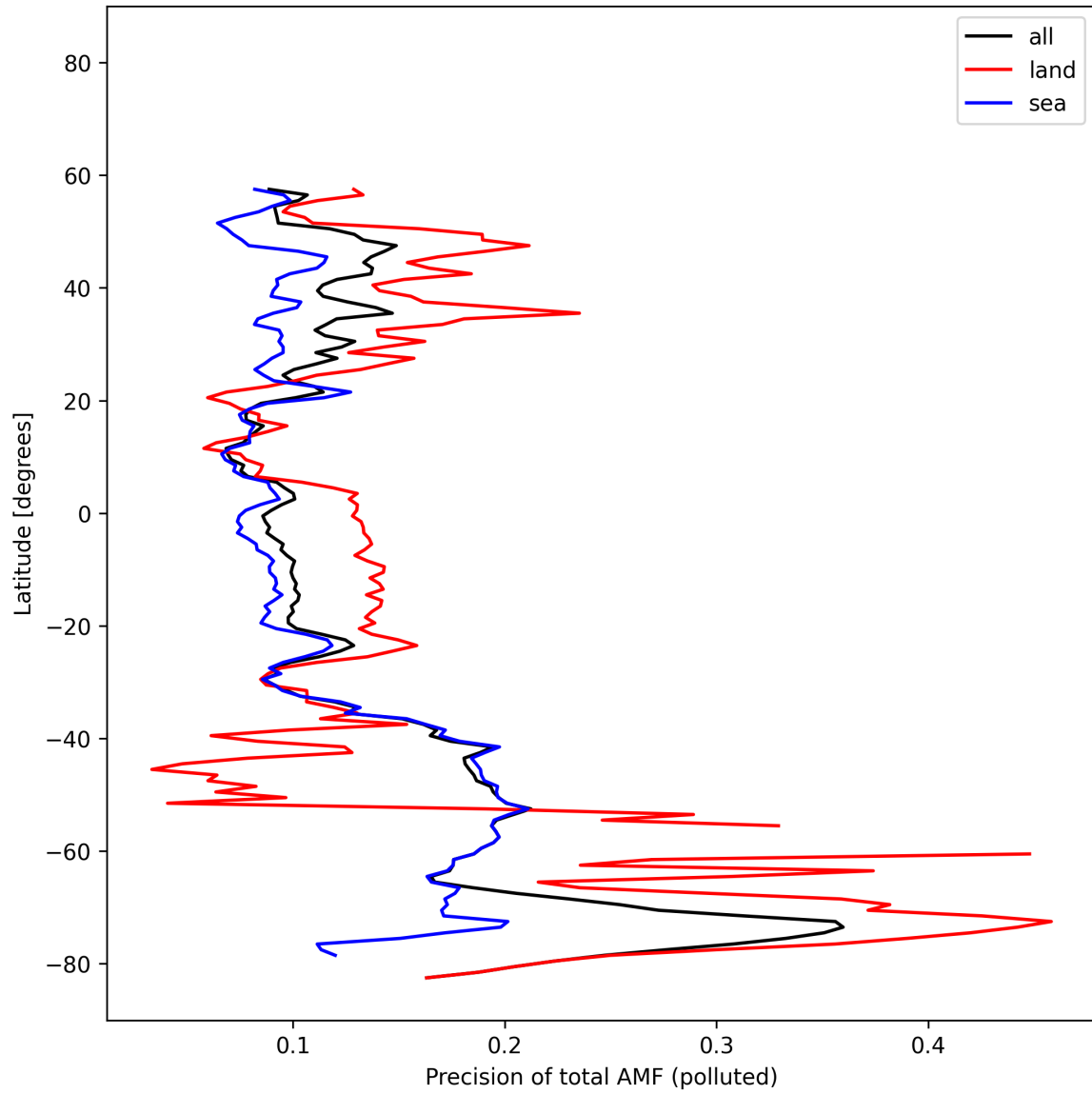


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-02-14 to 2025-02-15.

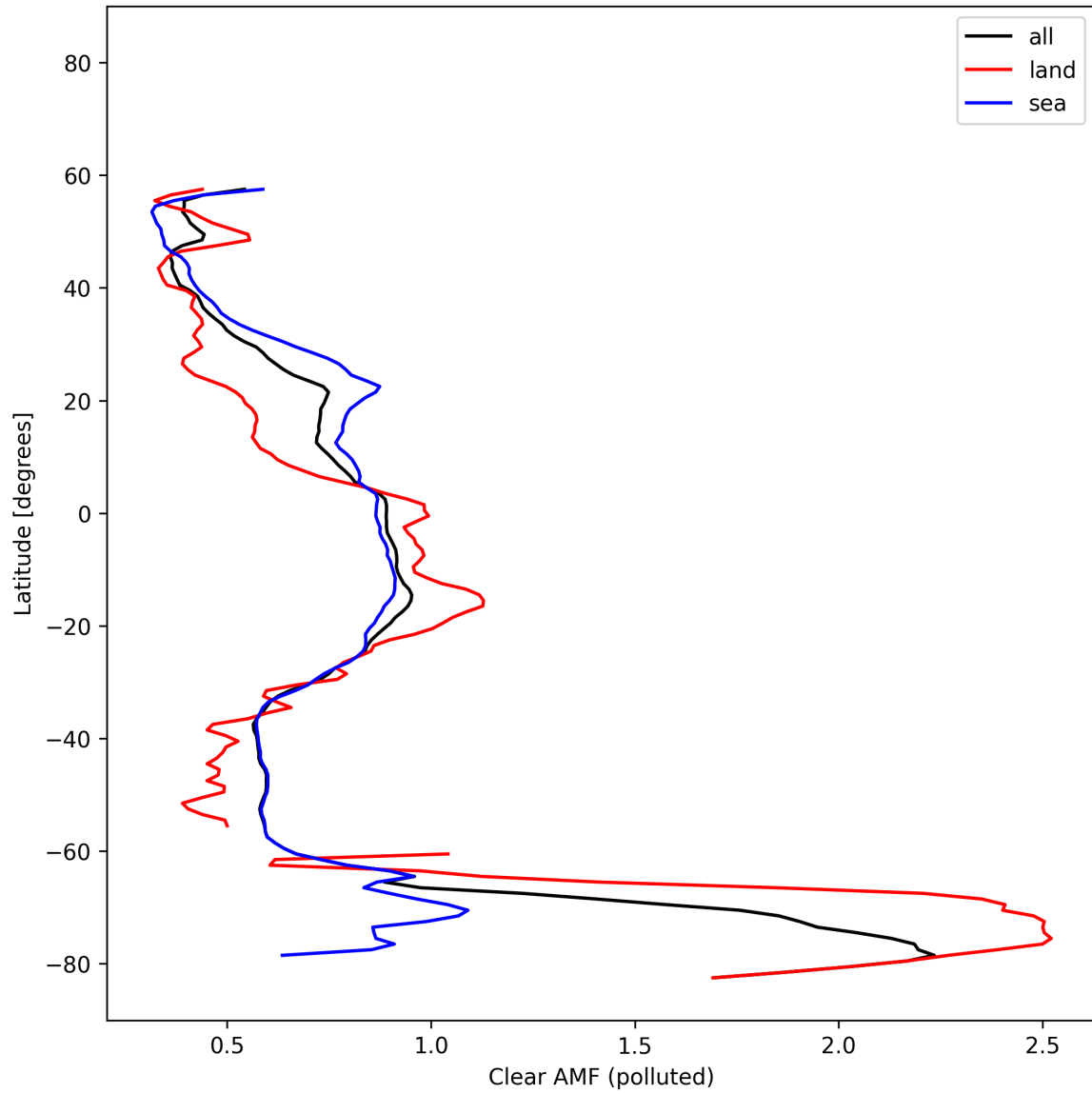


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-02-14 to 2025-02-15.

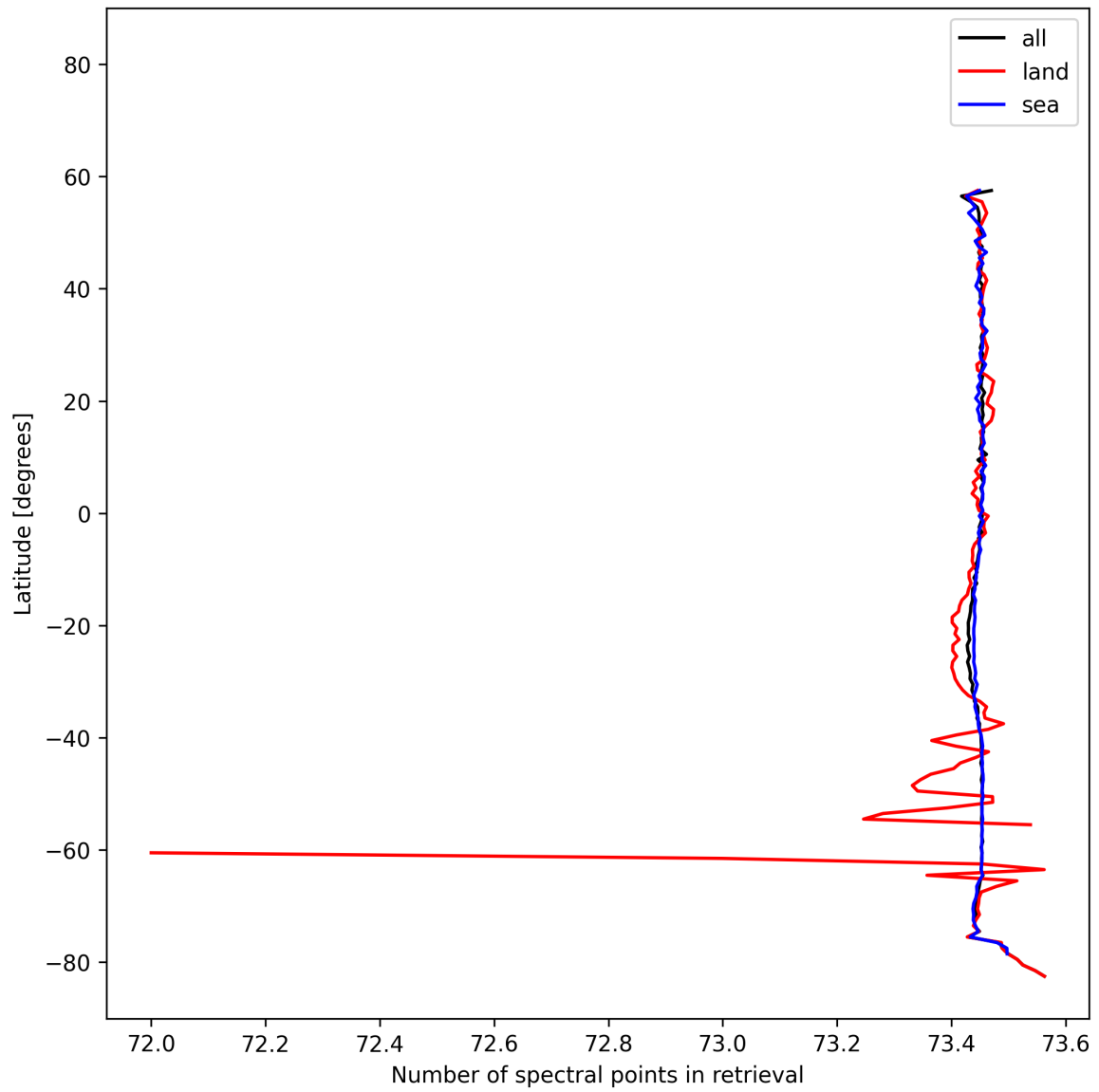


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-02-14 to 2025-02-15.

8 Histograms

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

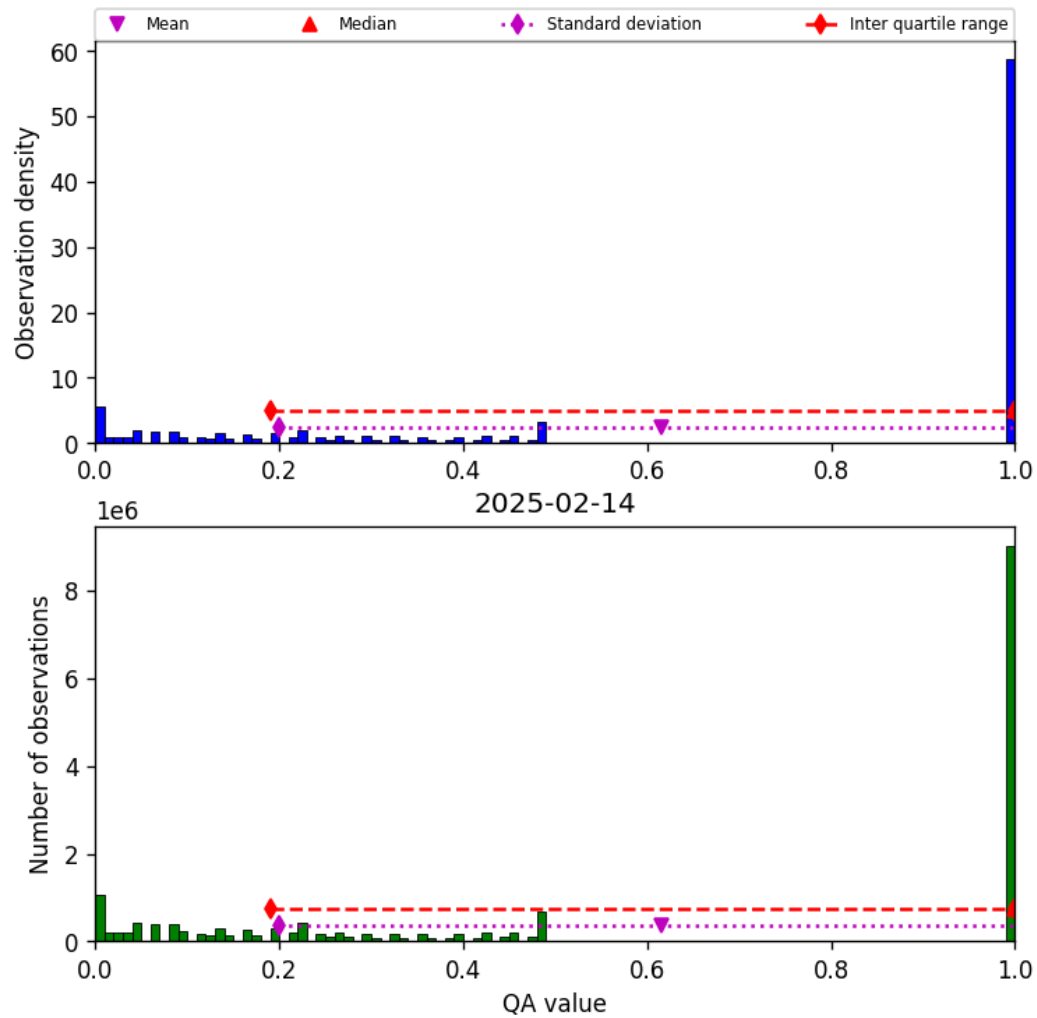


Figure 57: Histogram of “QA value” for 2025-02-14 to 2025-02-15

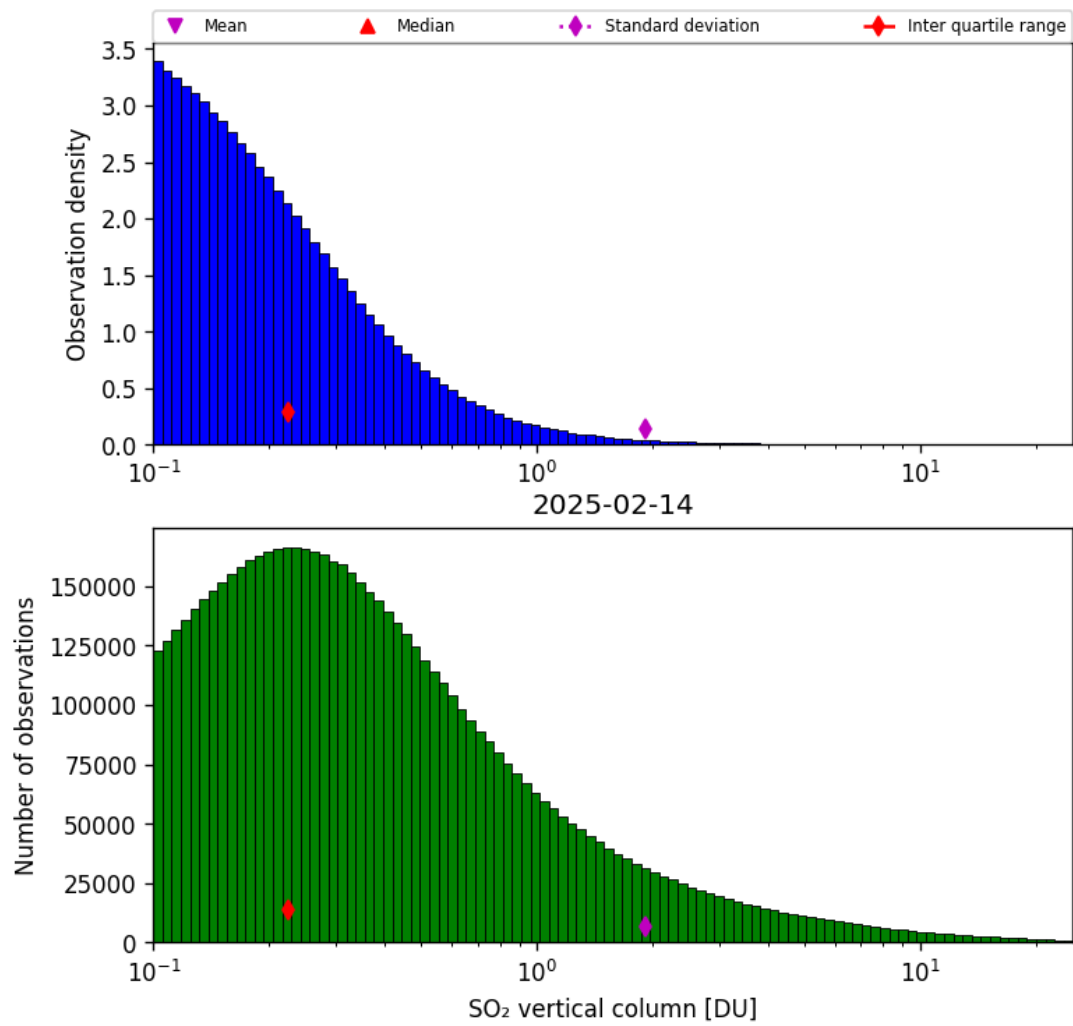


Figure 58: Histogram of “SO₂ vertical column” for 2025-02-14 to 2025-02-15

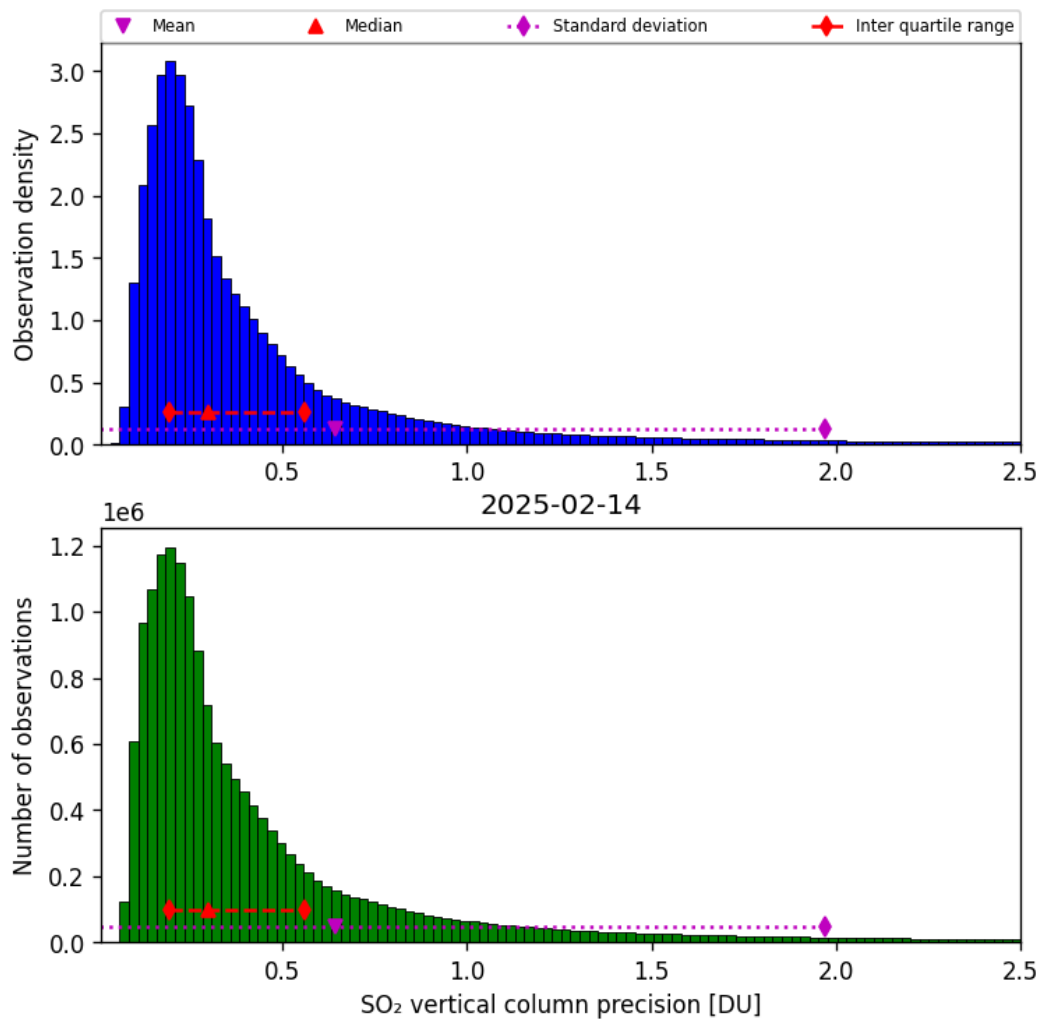


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-02-14 to 2025-02-15

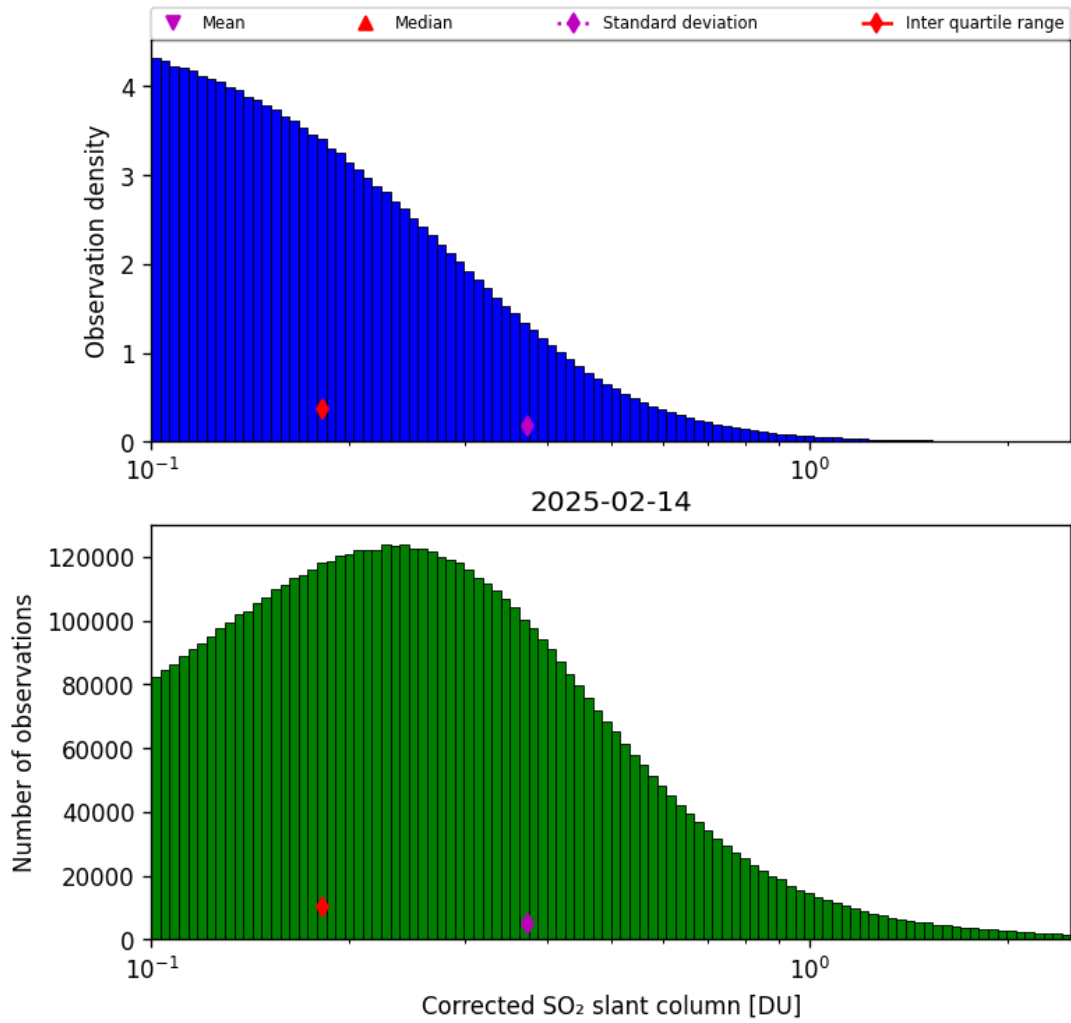


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-02-14 to 2025-02-15

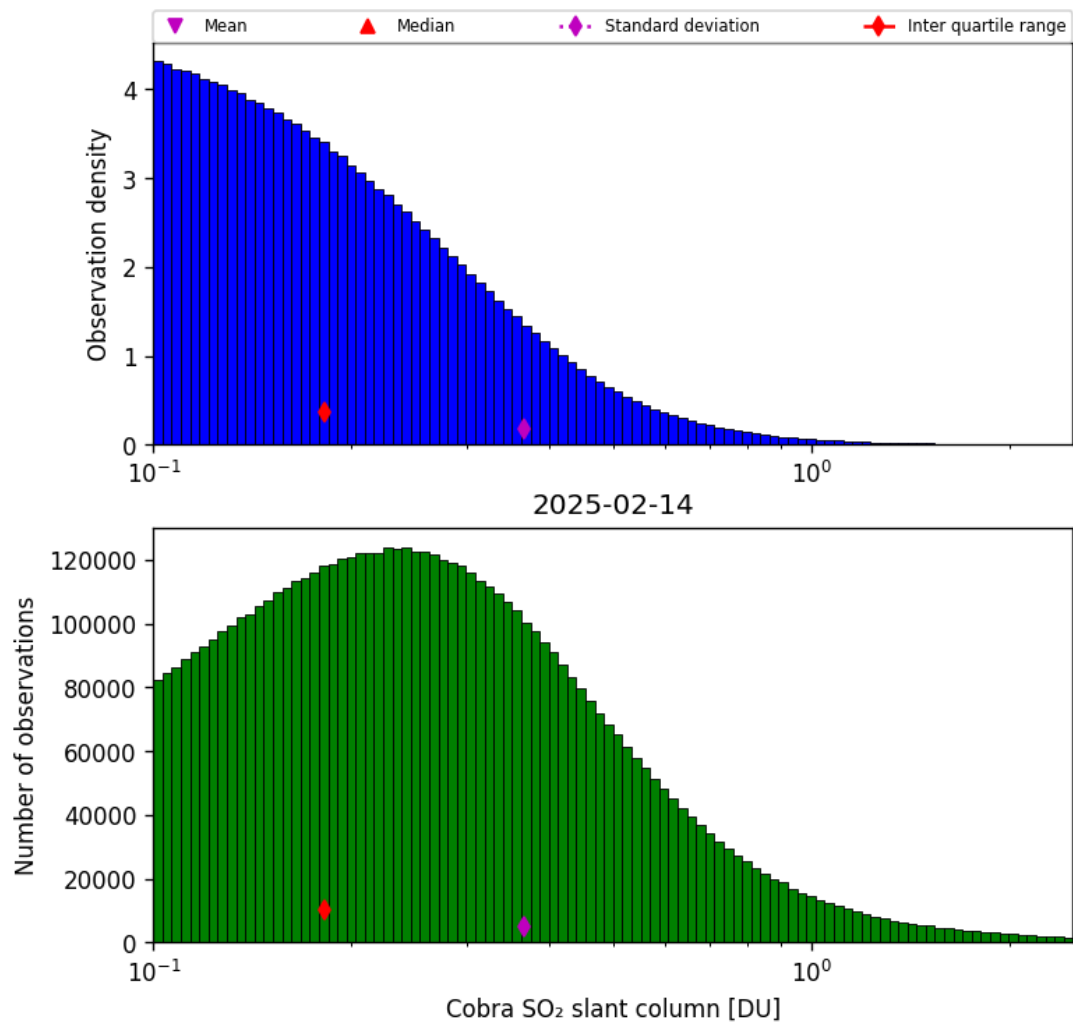


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-02-14 to 2025-02-15

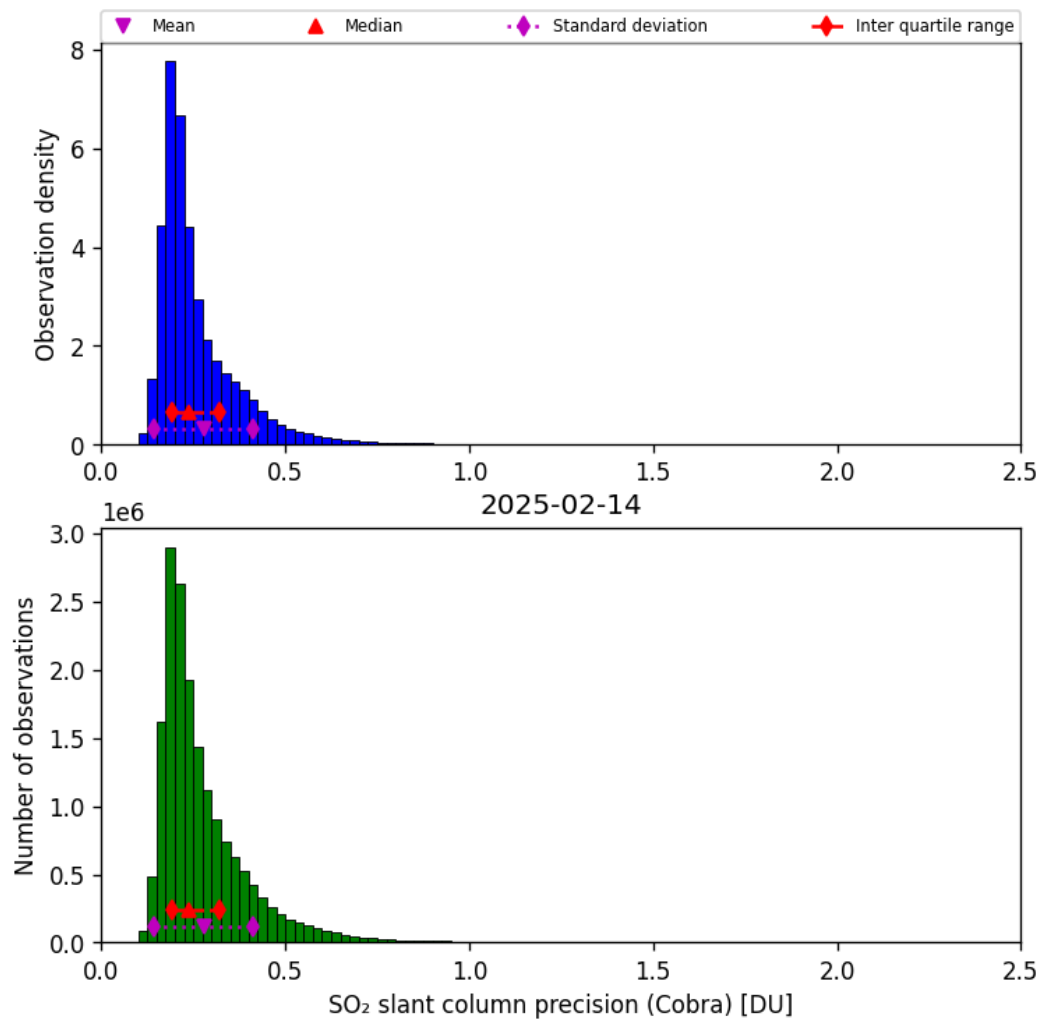


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-02-14 to 2025-02-15

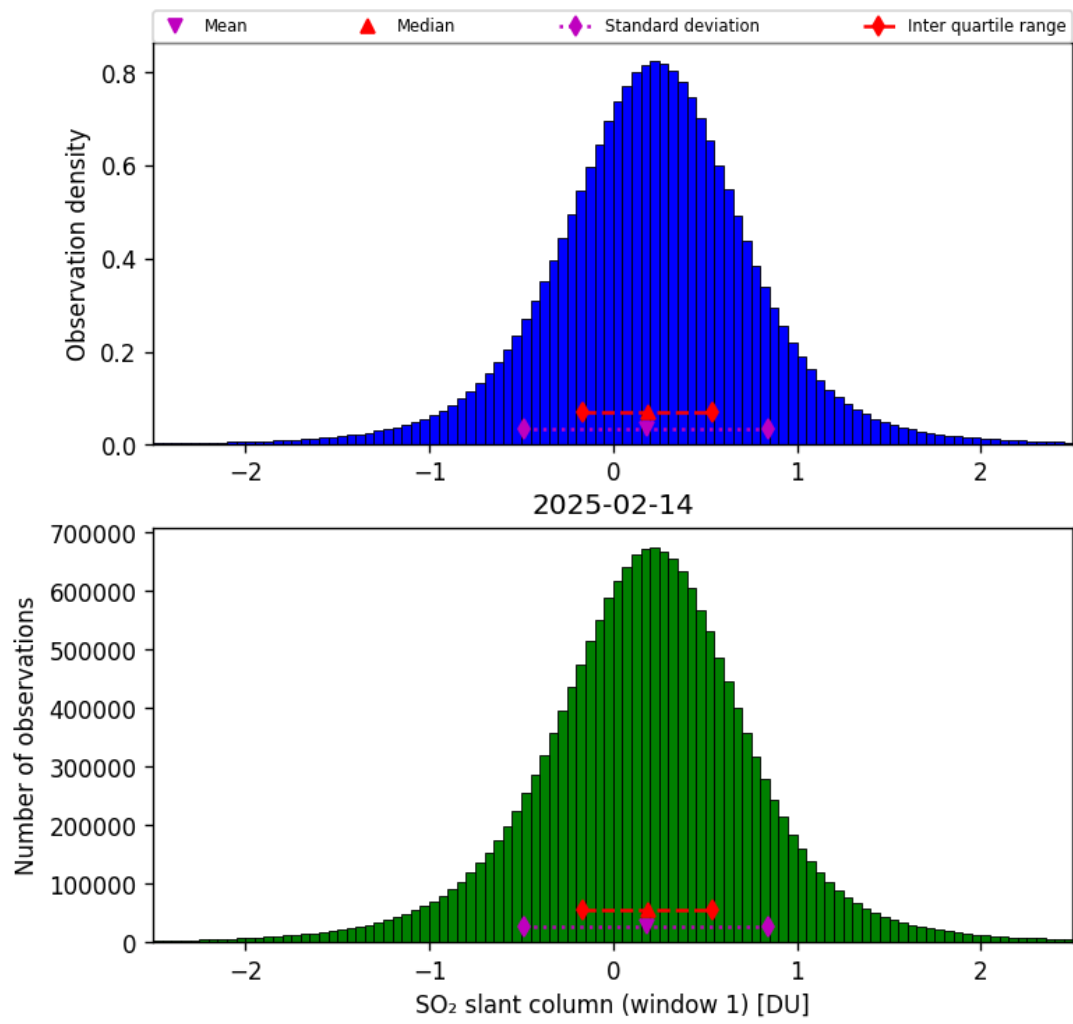


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-02-14 to 2025-02-15

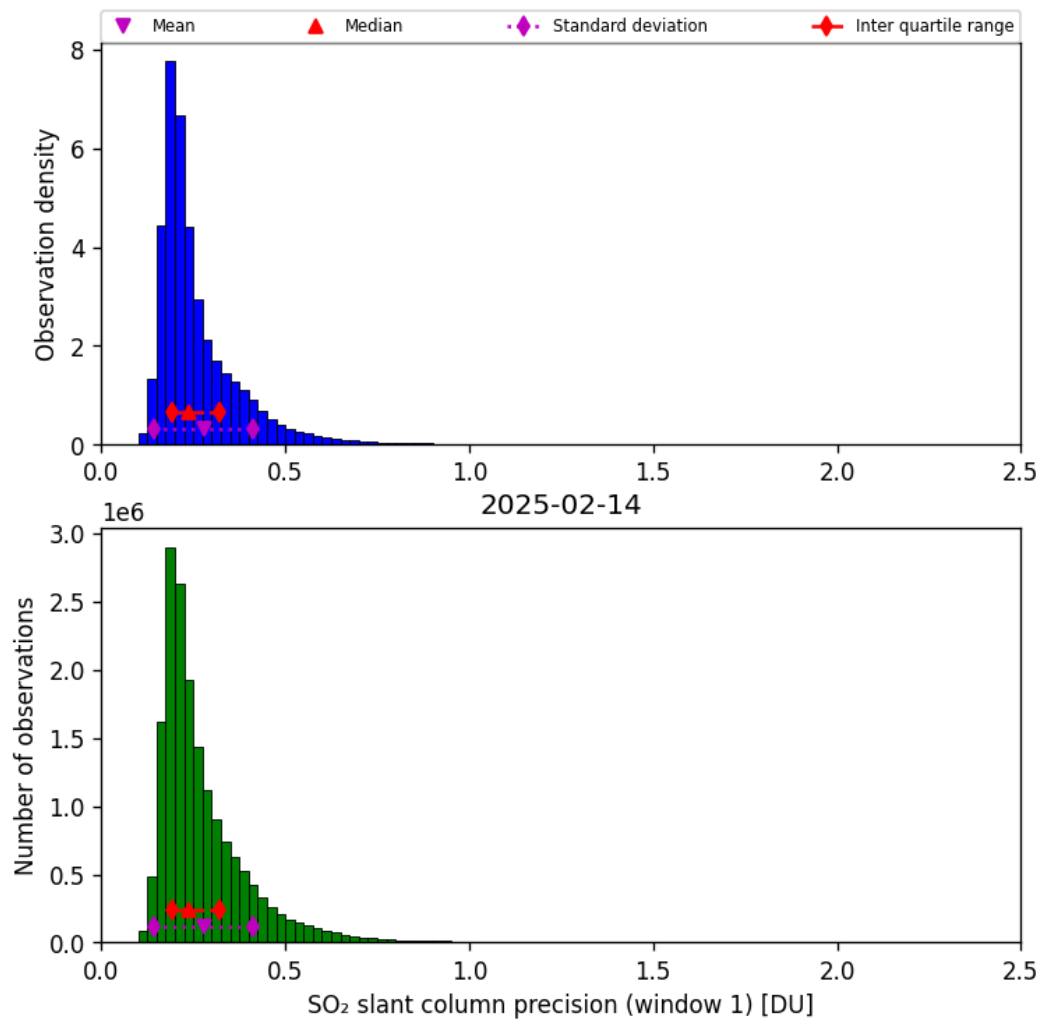


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-02-14 to 2025-02-15

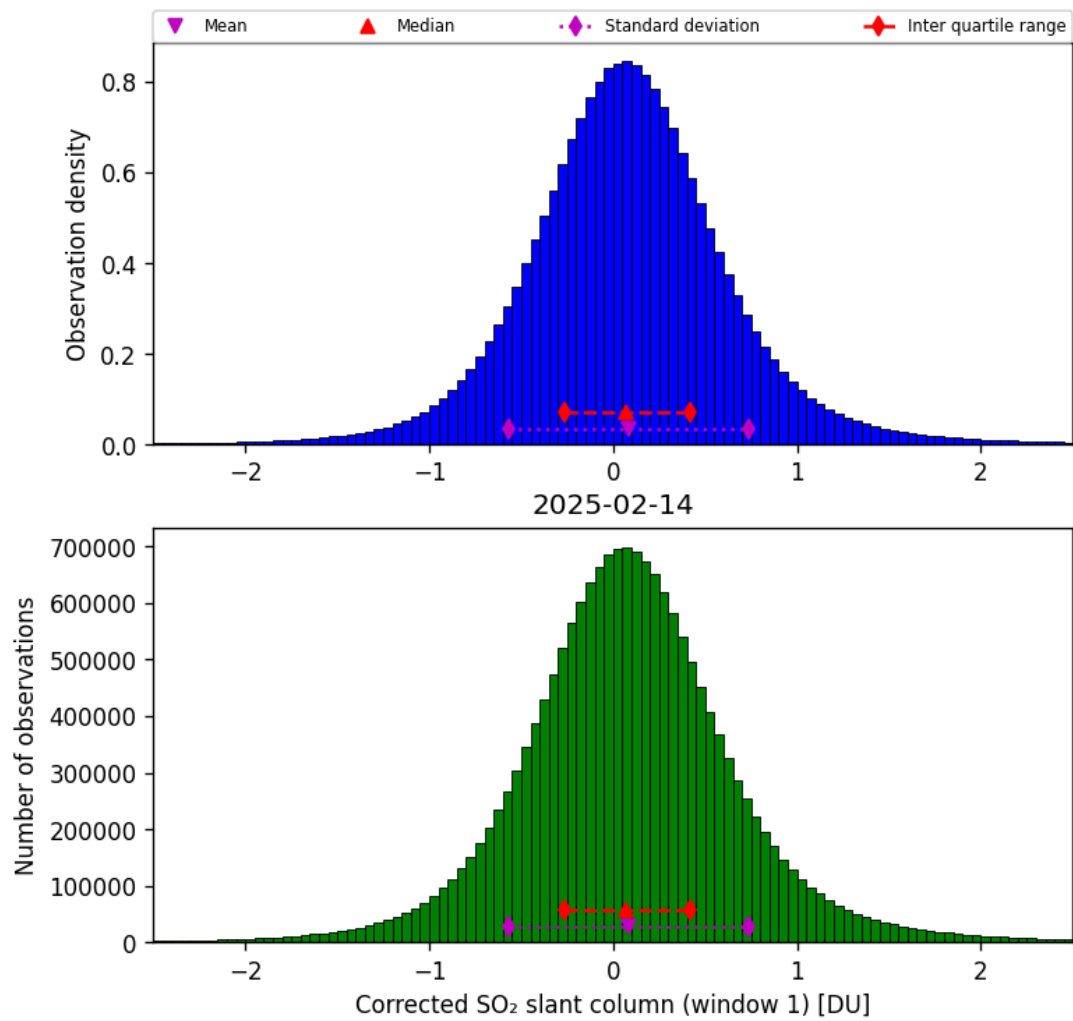


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-02-14 to 2025-02-15

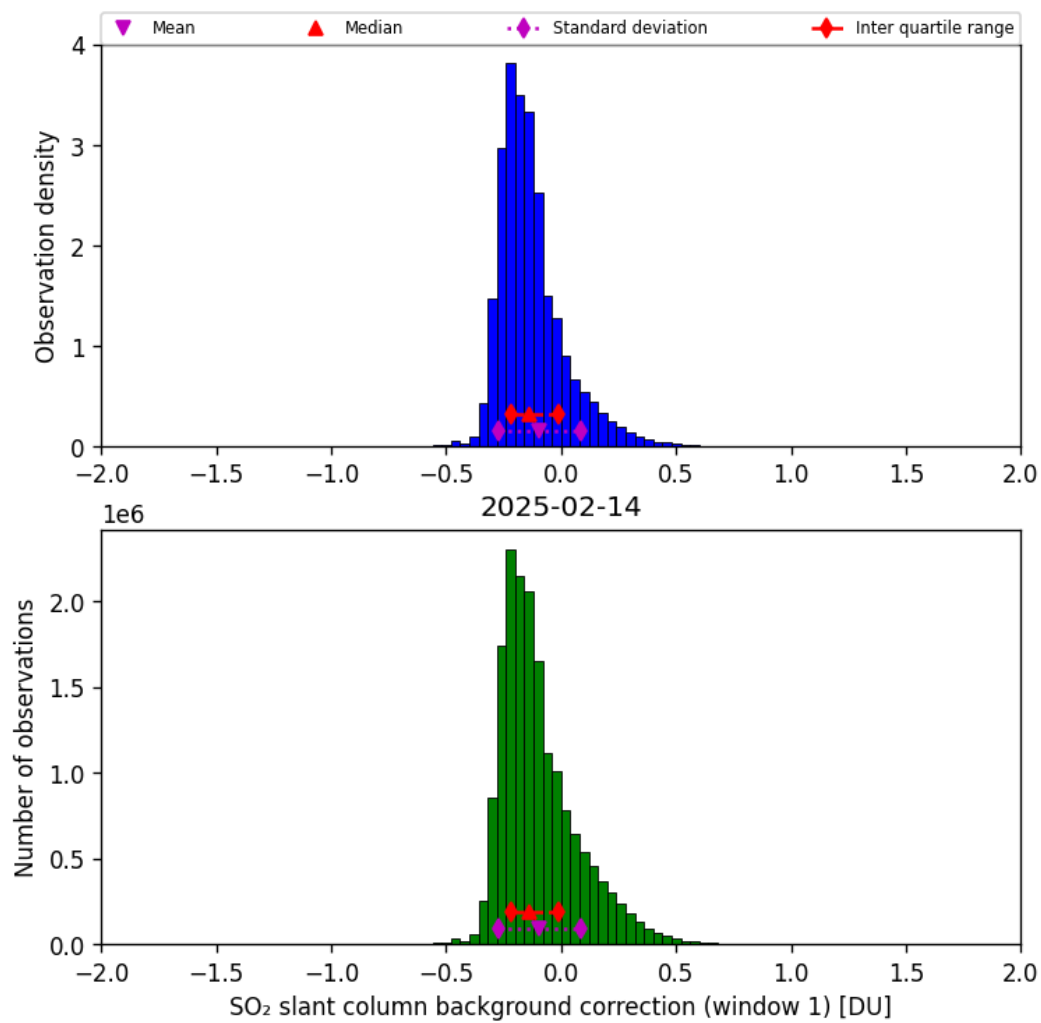


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-02-14 to 2025-02-15

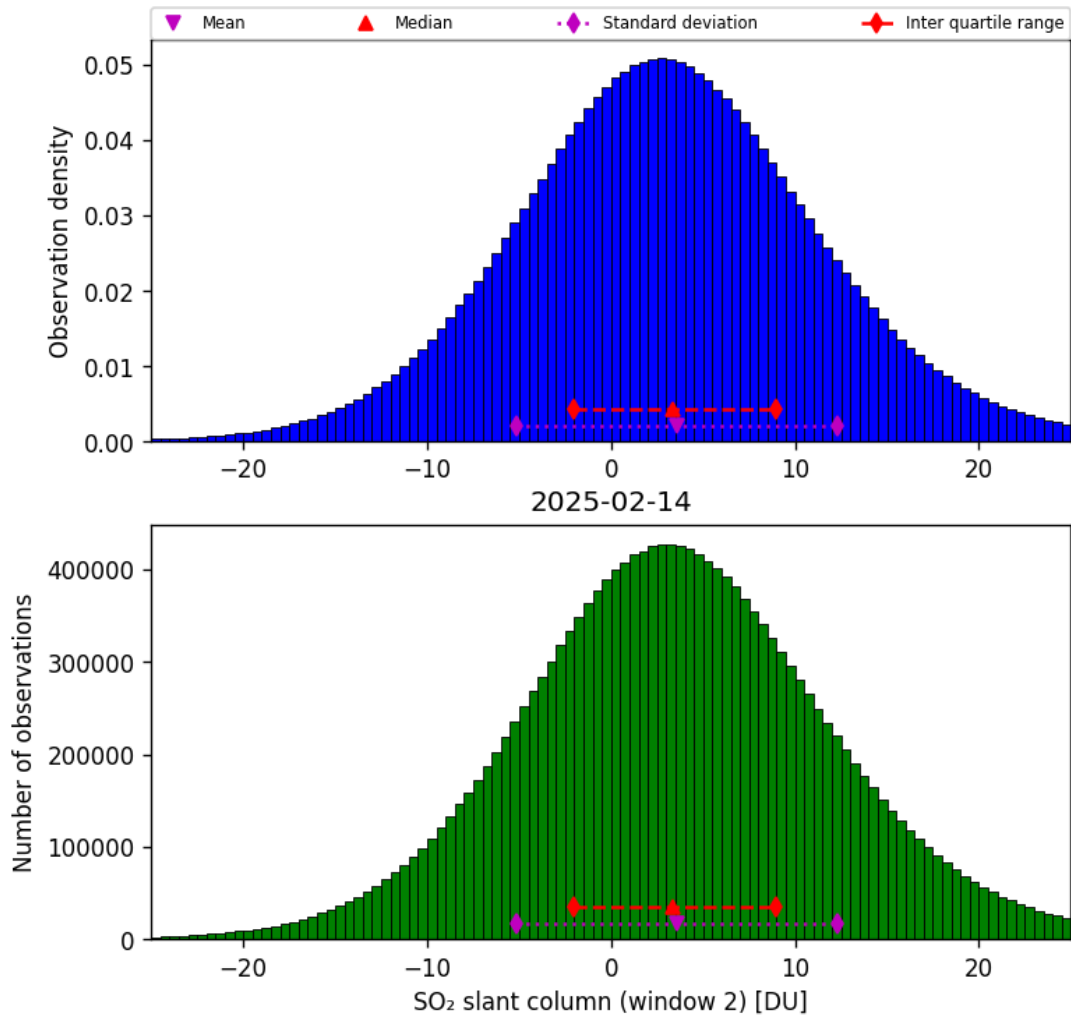


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-02-14 to 2025-02-15

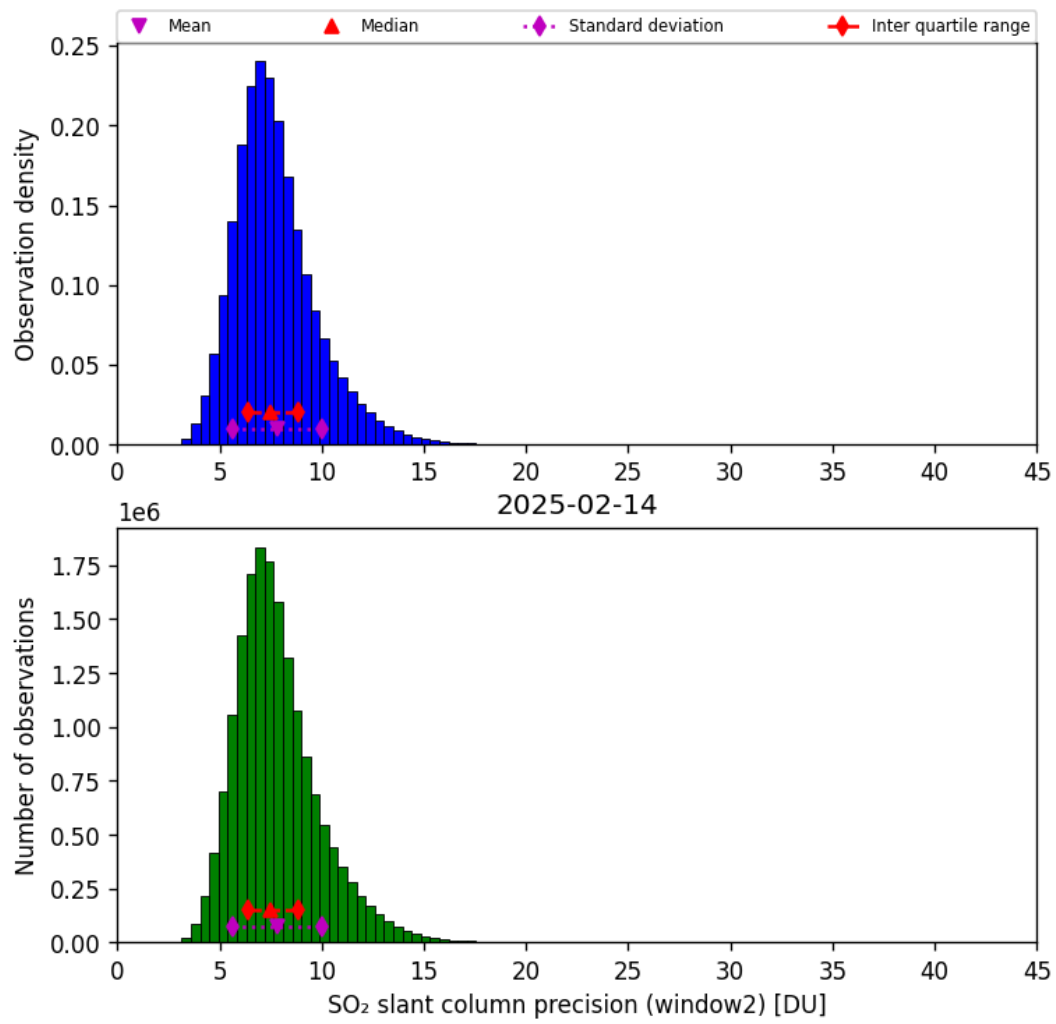


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-02-14 to 2025-02-15

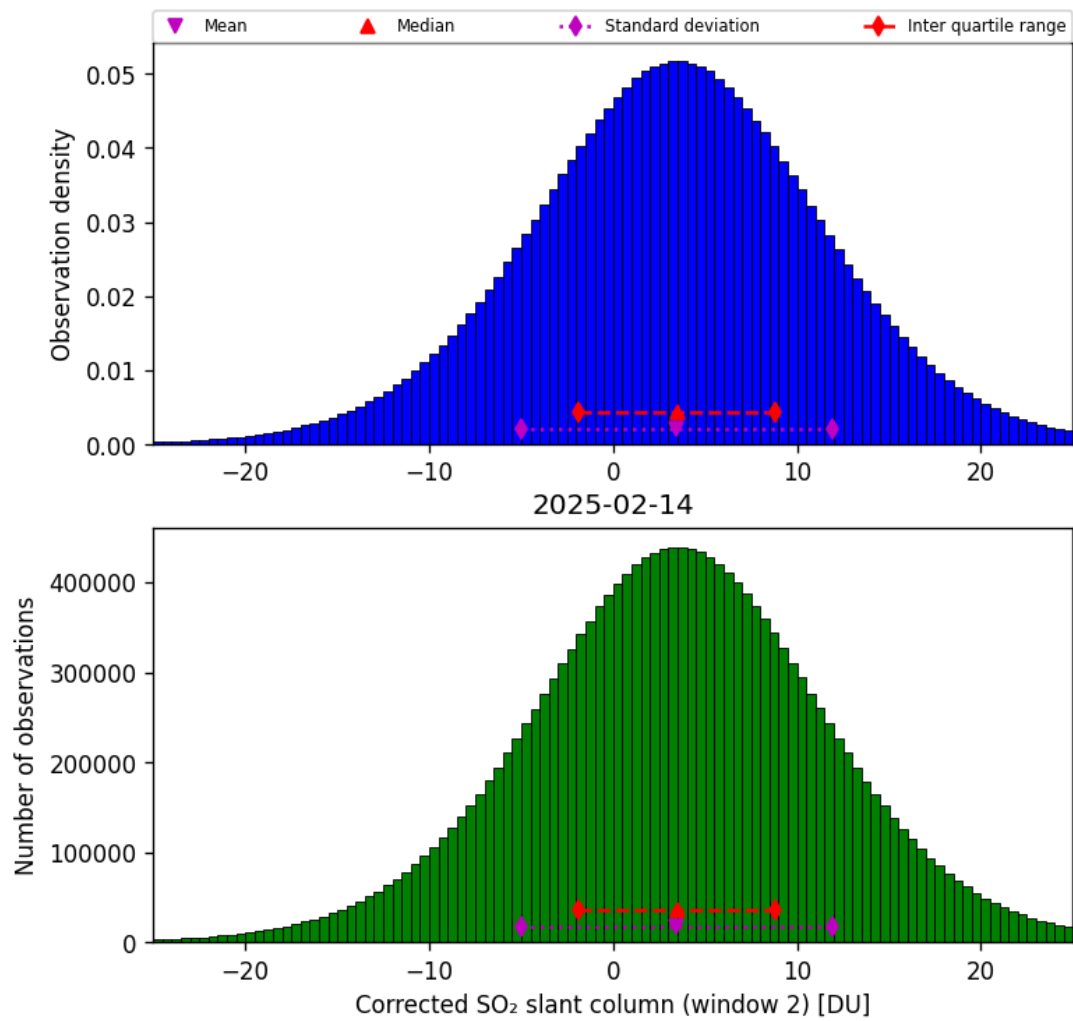


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-02-14 to 2025-02-15

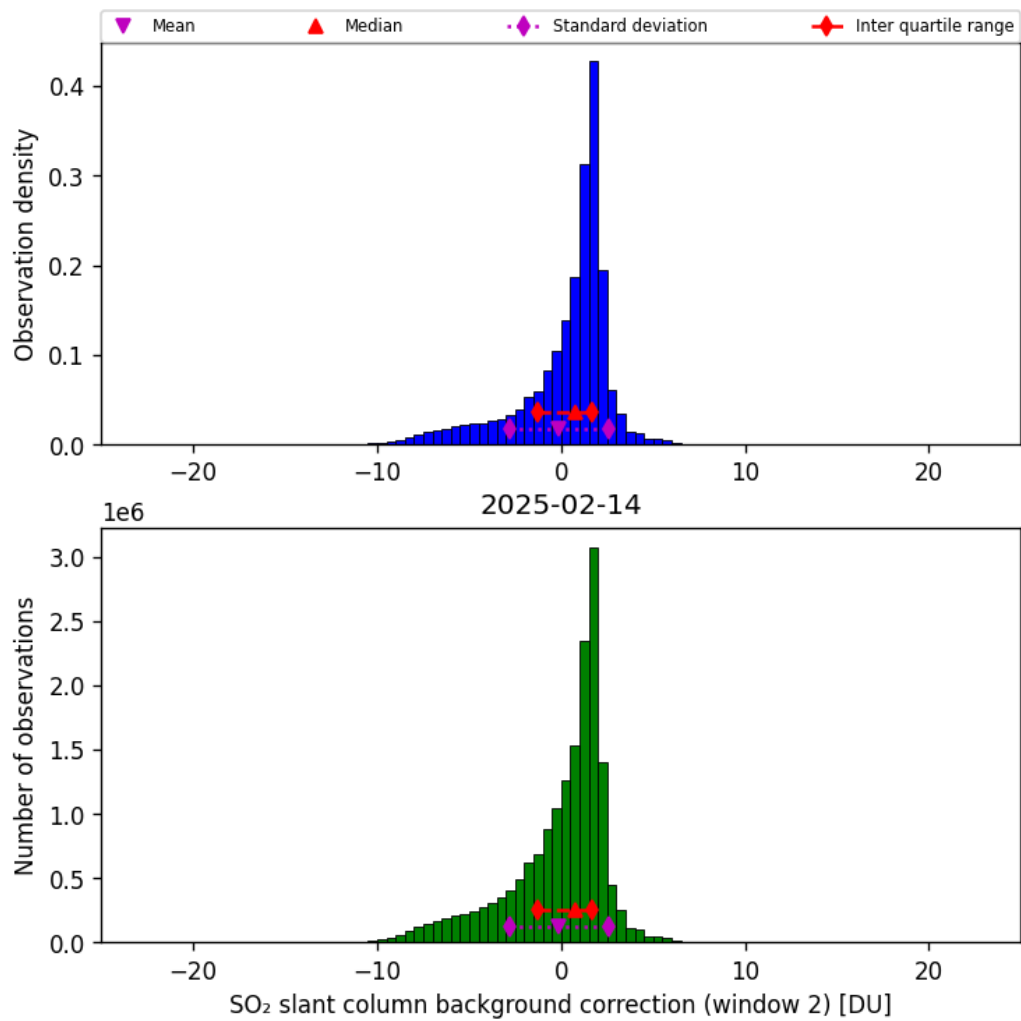


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-02-14 to 2025-02-15

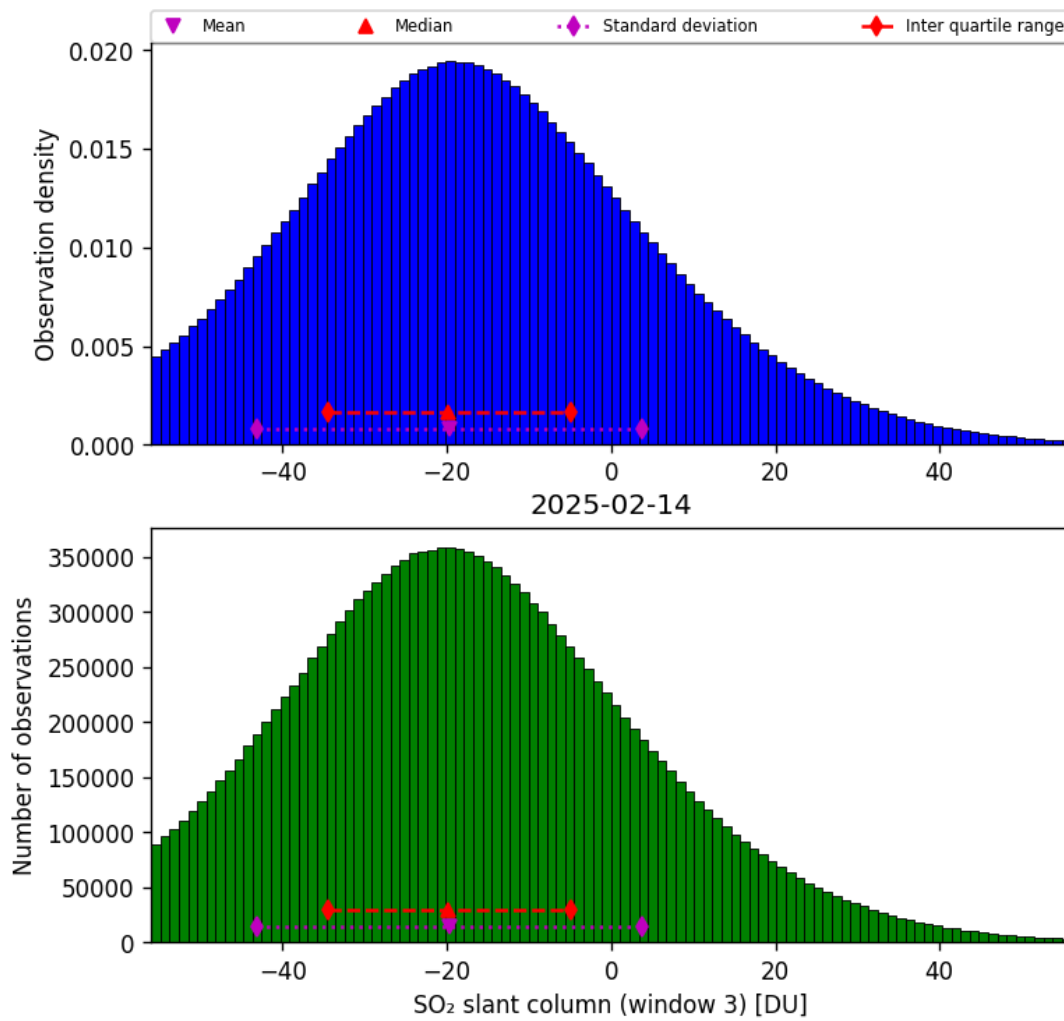


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-02-14 to 2025-02-15

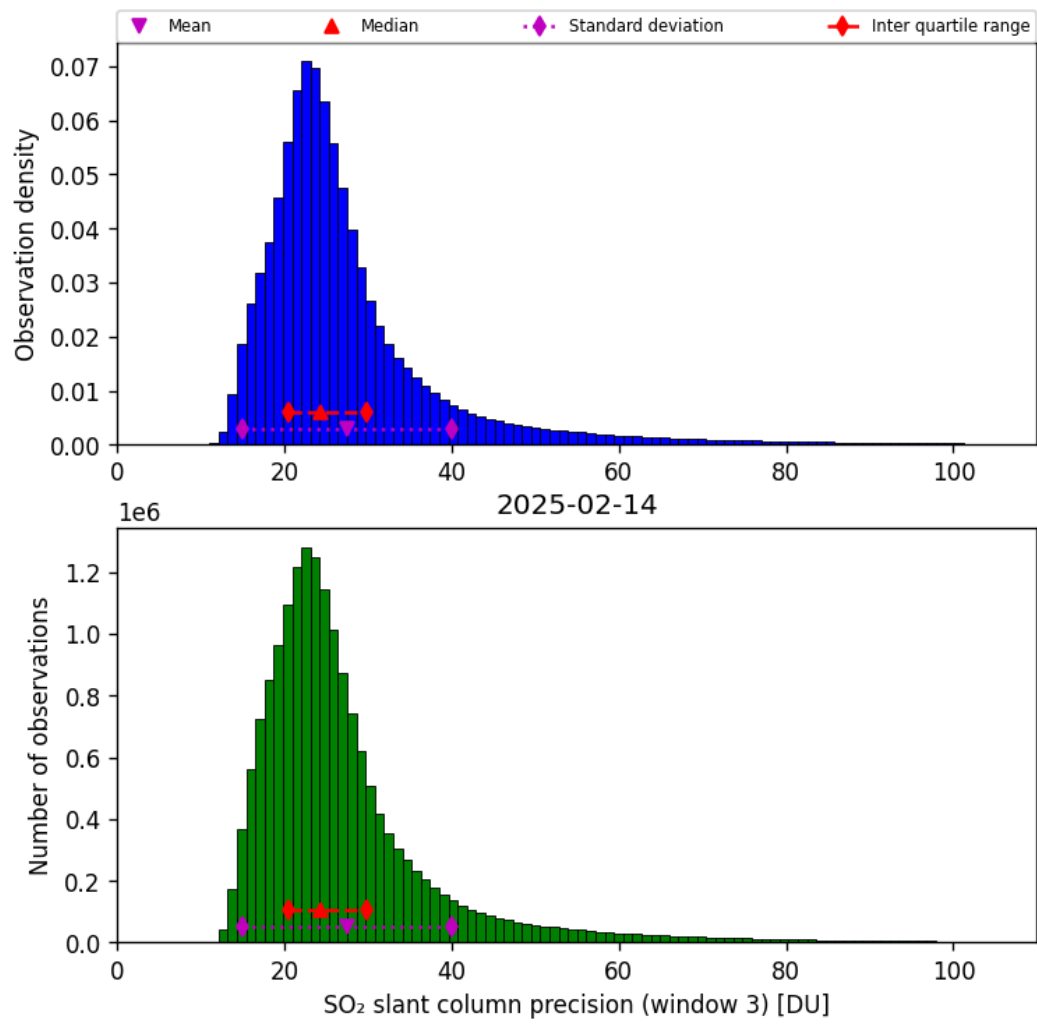


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-02-14 to 2025-02-15

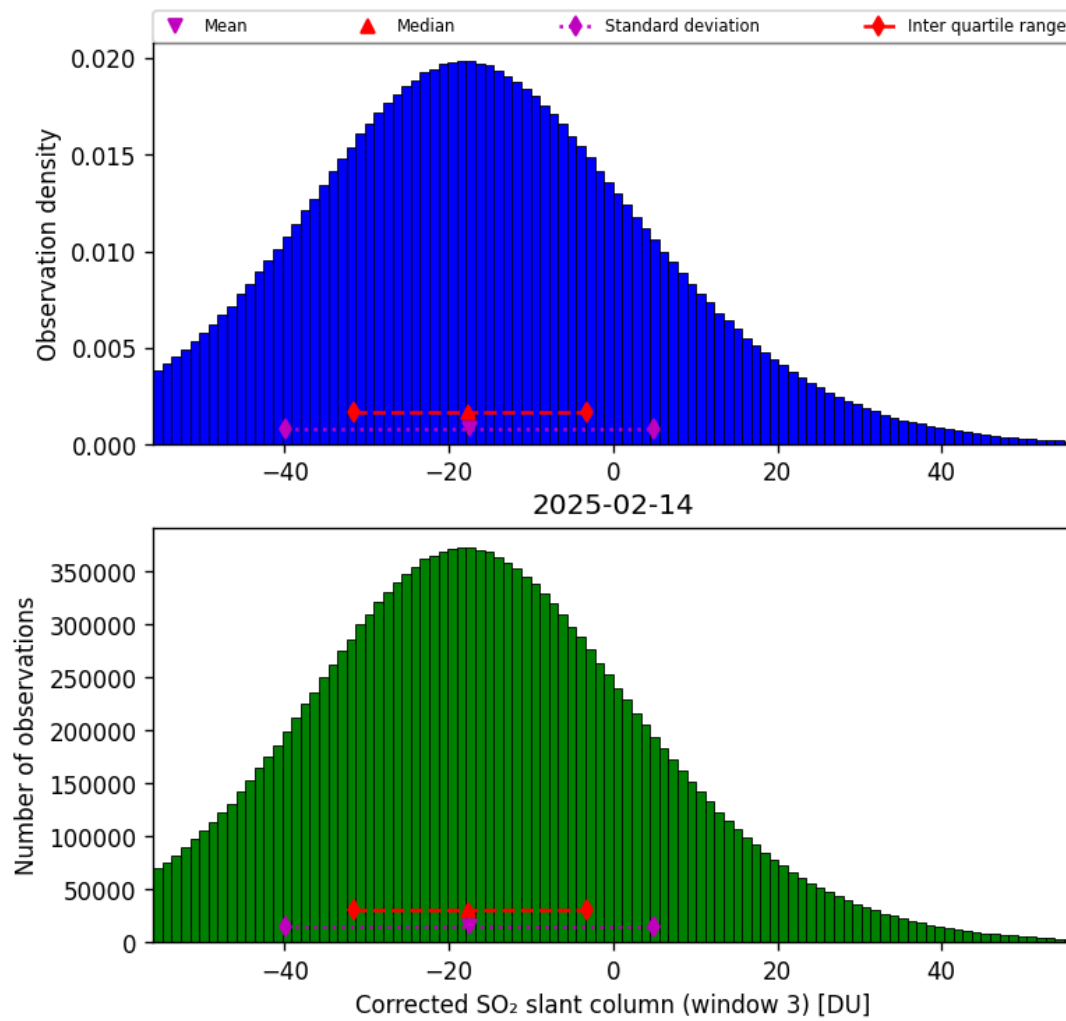


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-02-14 to 2025-02-15

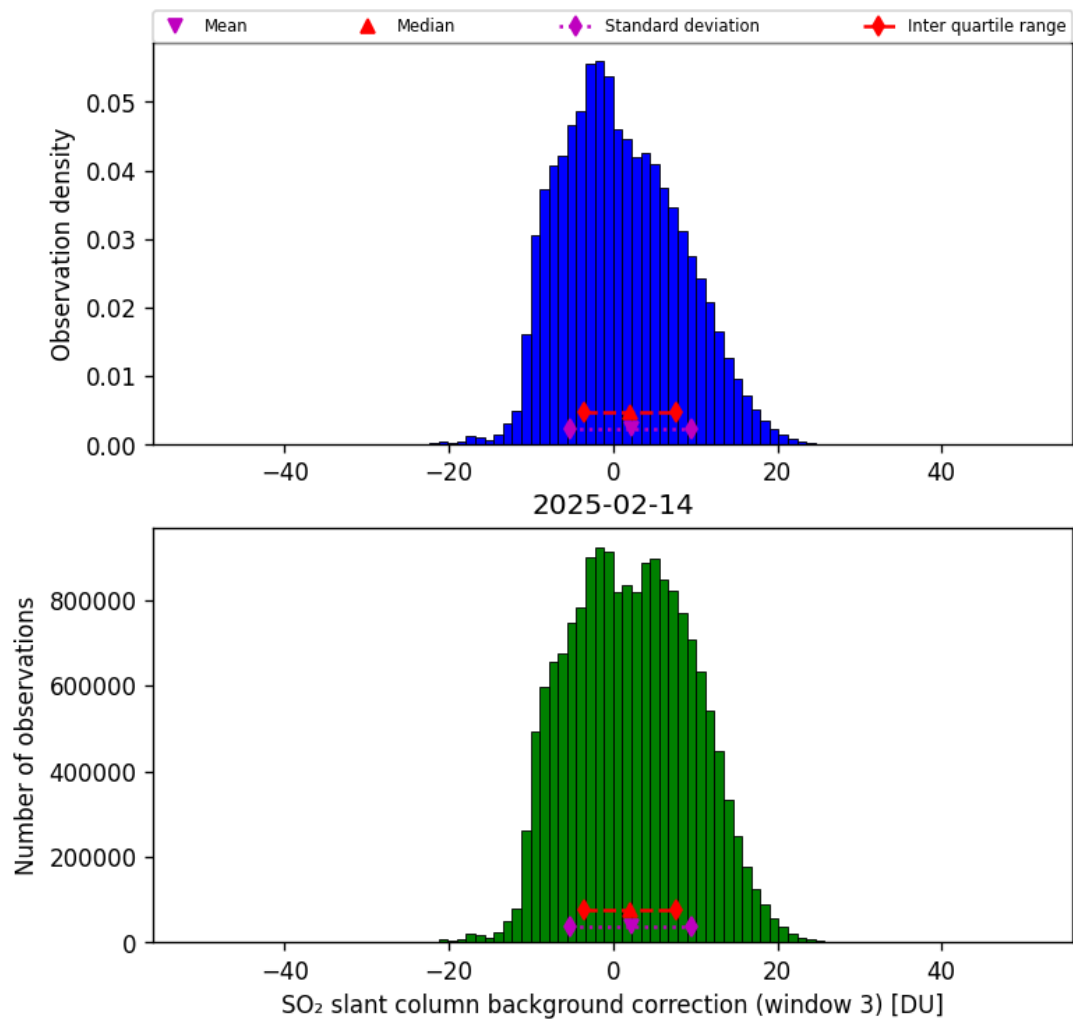


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-02-14 to 2025-02-15

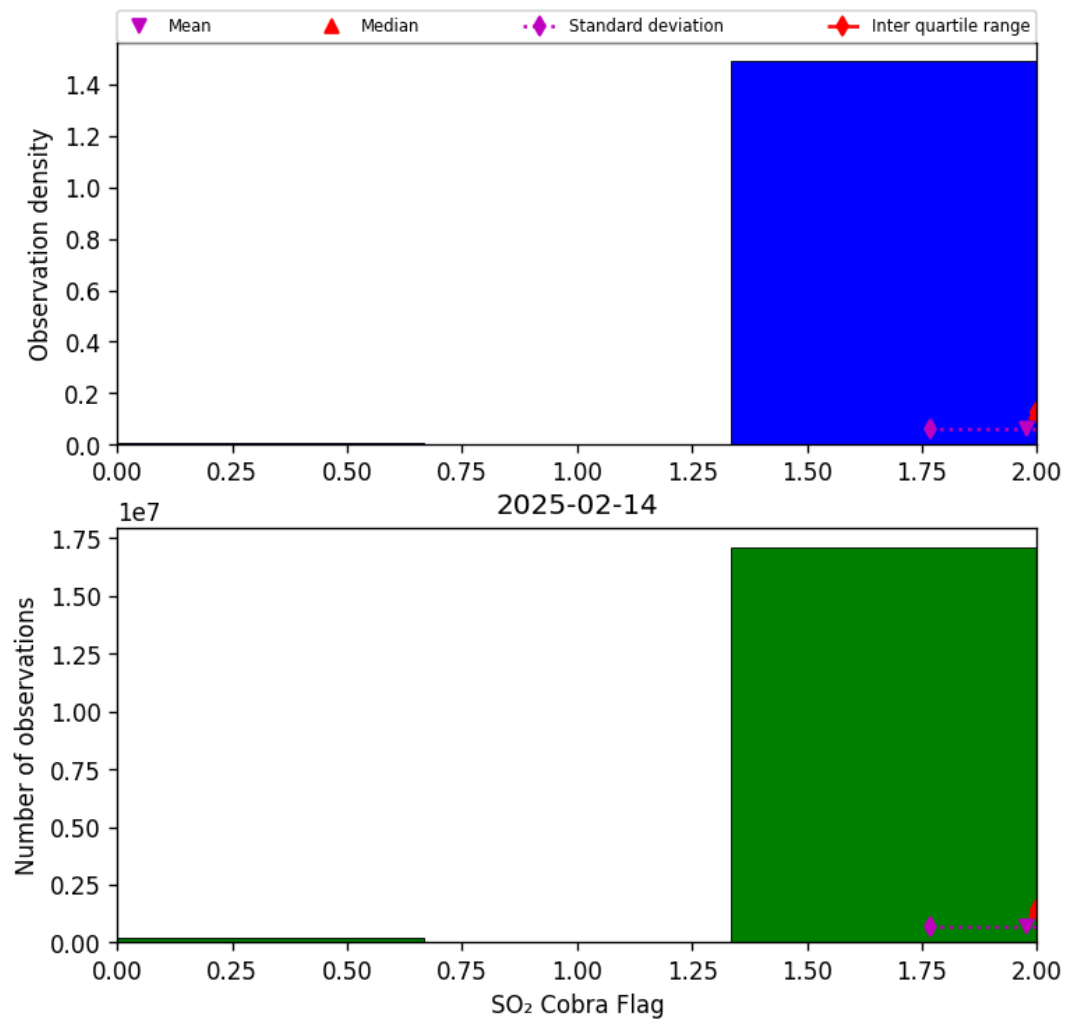


Figure 75: Histogram of "SO₂ Cobra Flag" for 2025-02-14 to 2025-02-15

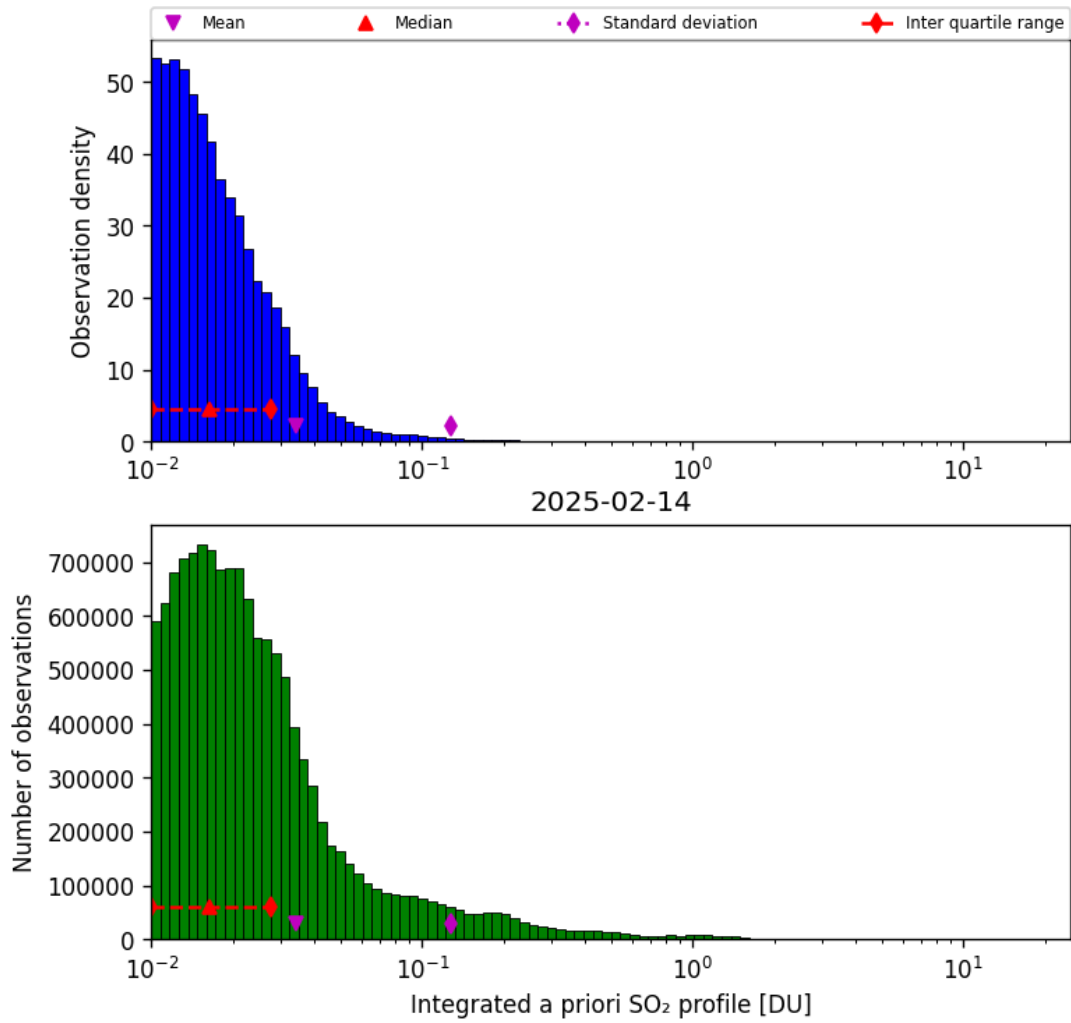


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-02-14 to 2025-02-15

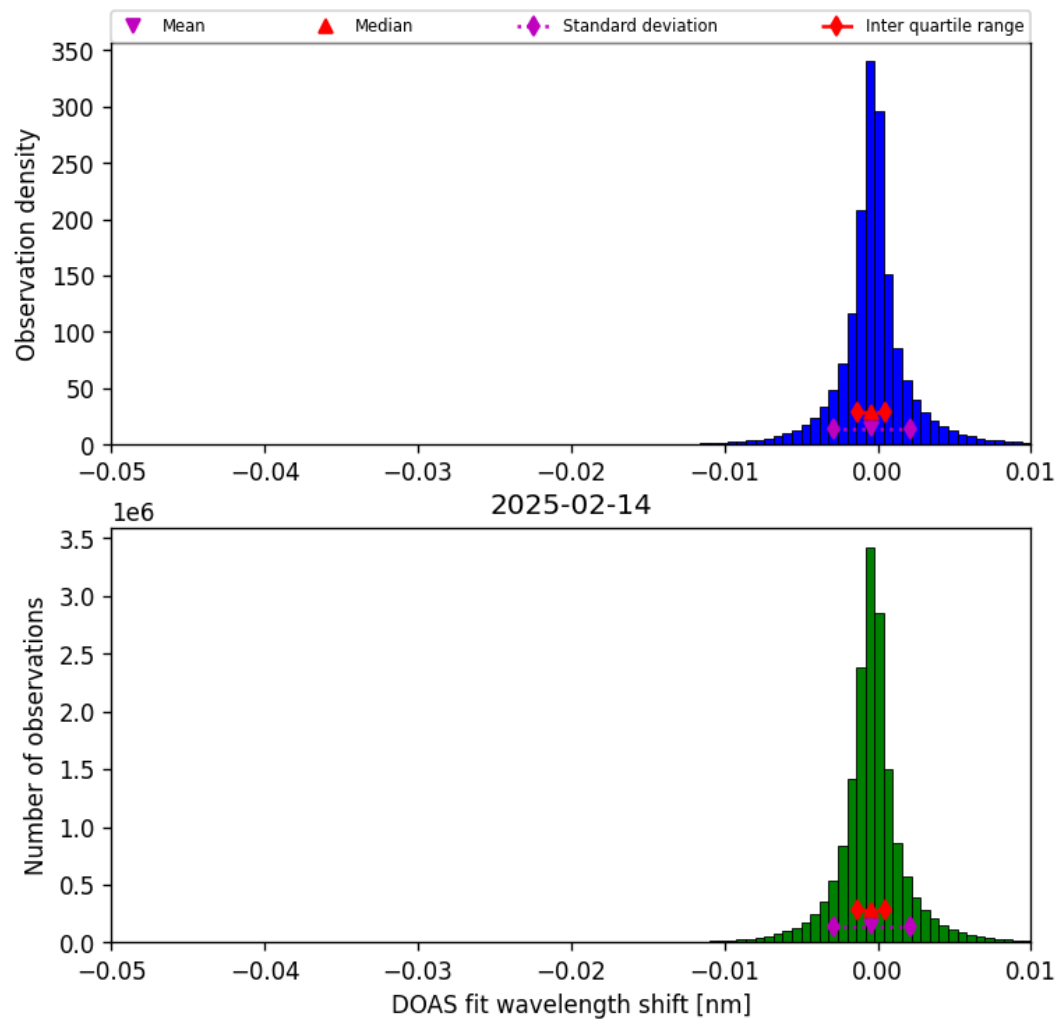


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-02-14 to 2025-02-15

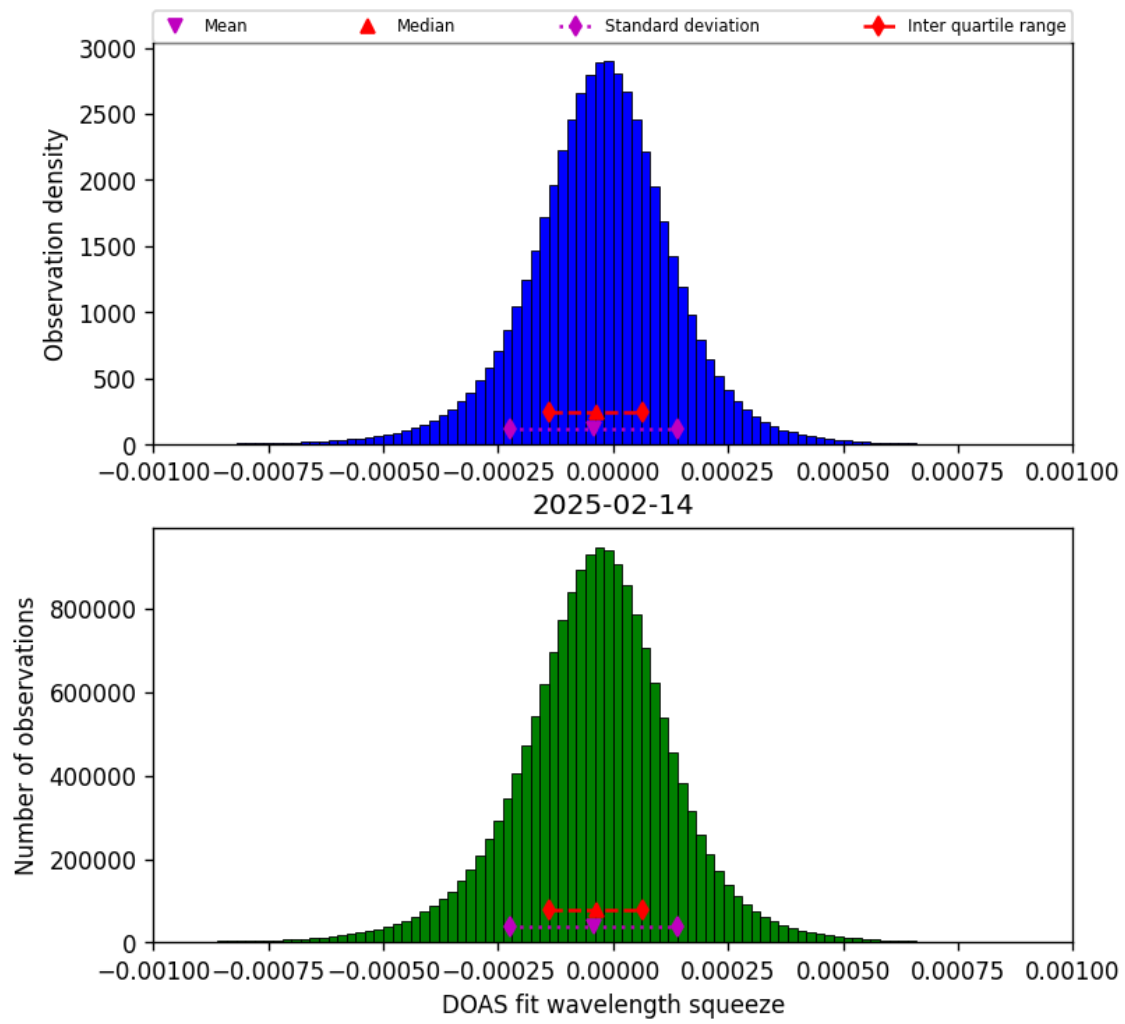


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-02-14 to 2025-02-15

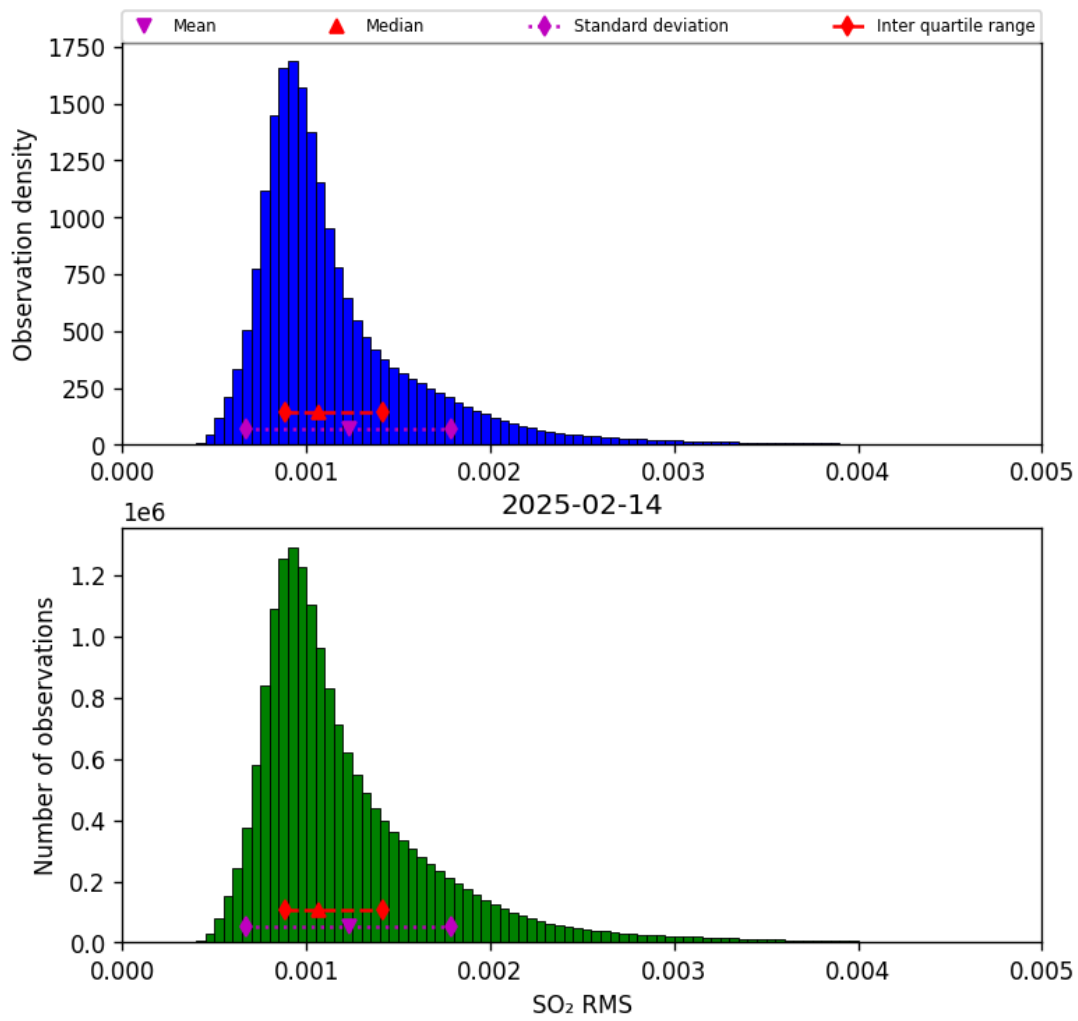


Figure 79: Histogram of “SO₂ RMS” for 2025-02-14 to 2025-02-15

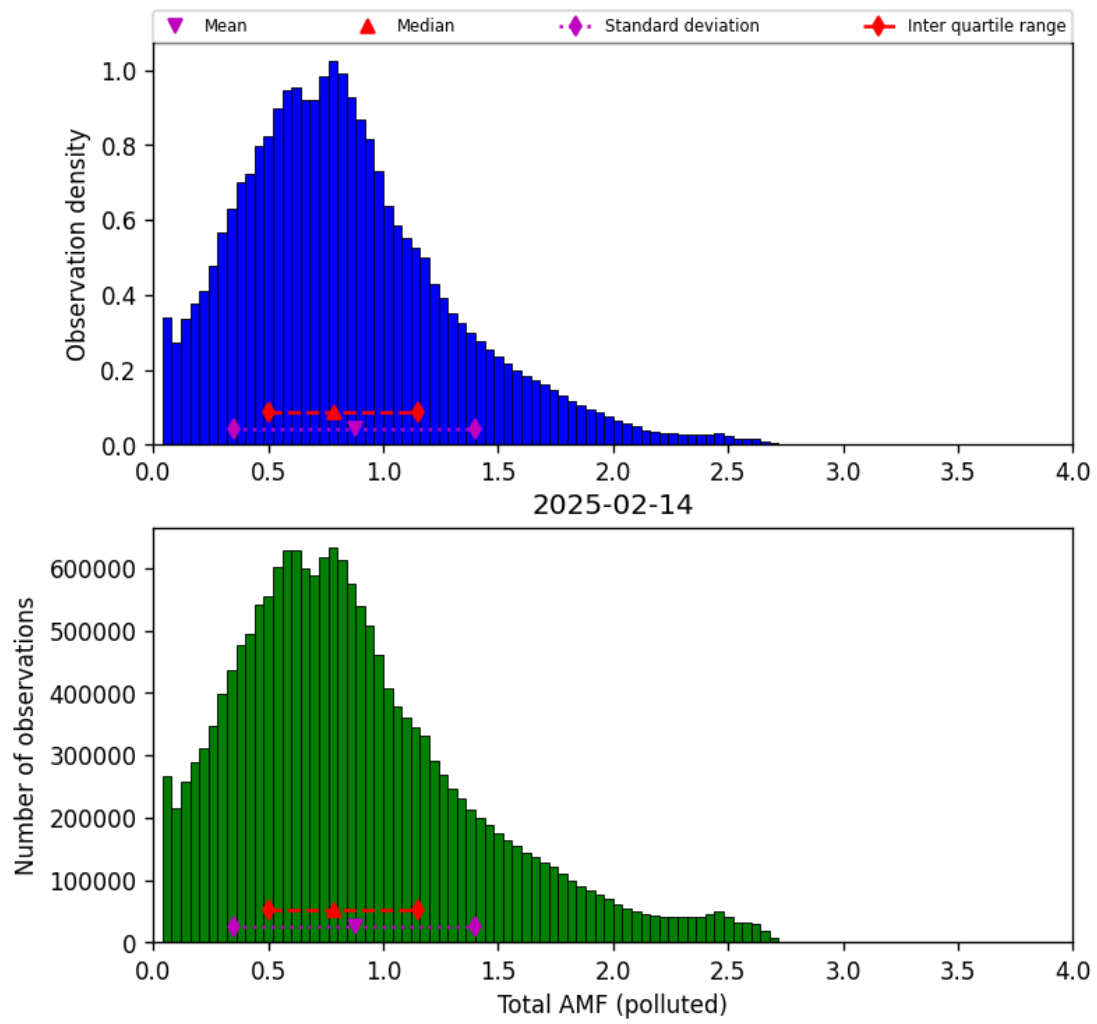


Figure 80: Histogram of “Total AMF (polluted)” for 2025-02-14 to 2025-02-15

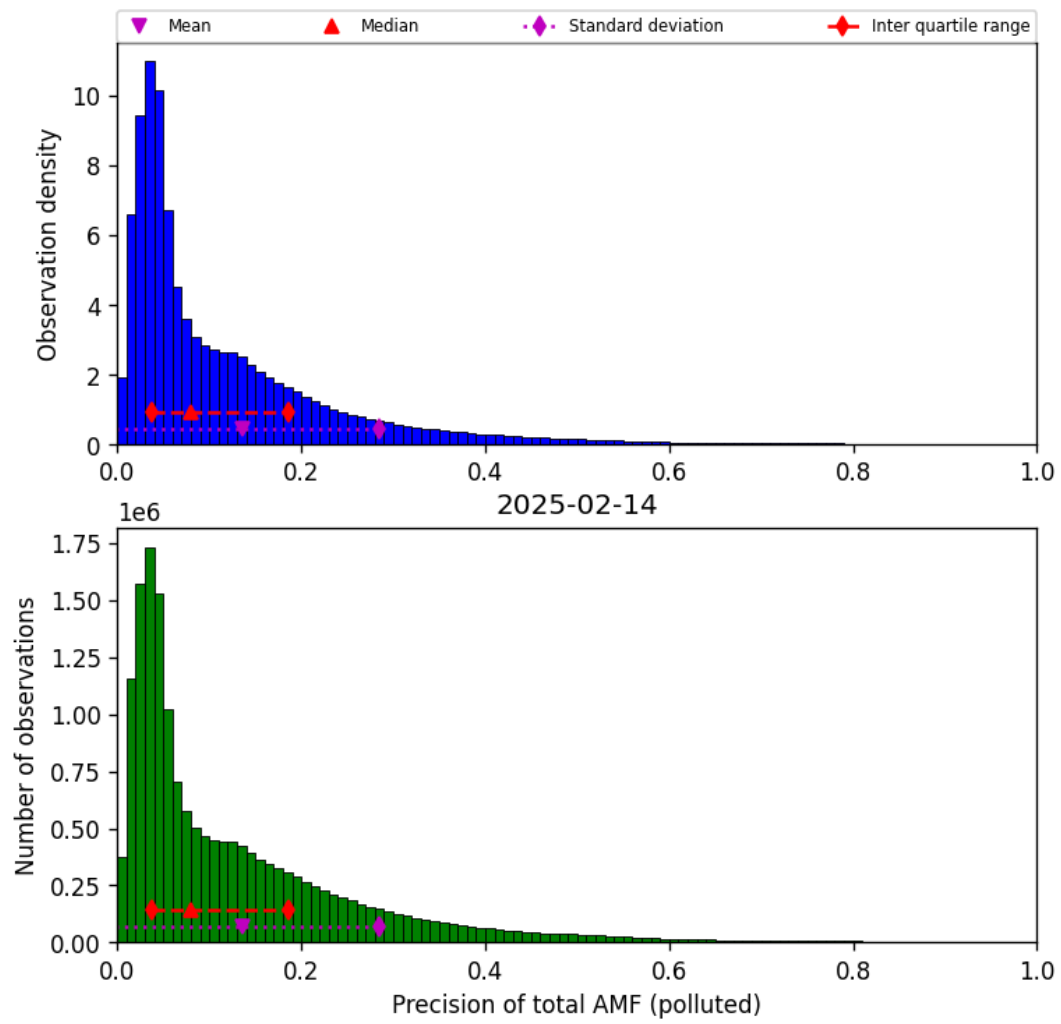


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-02-14 to 2025-02-15

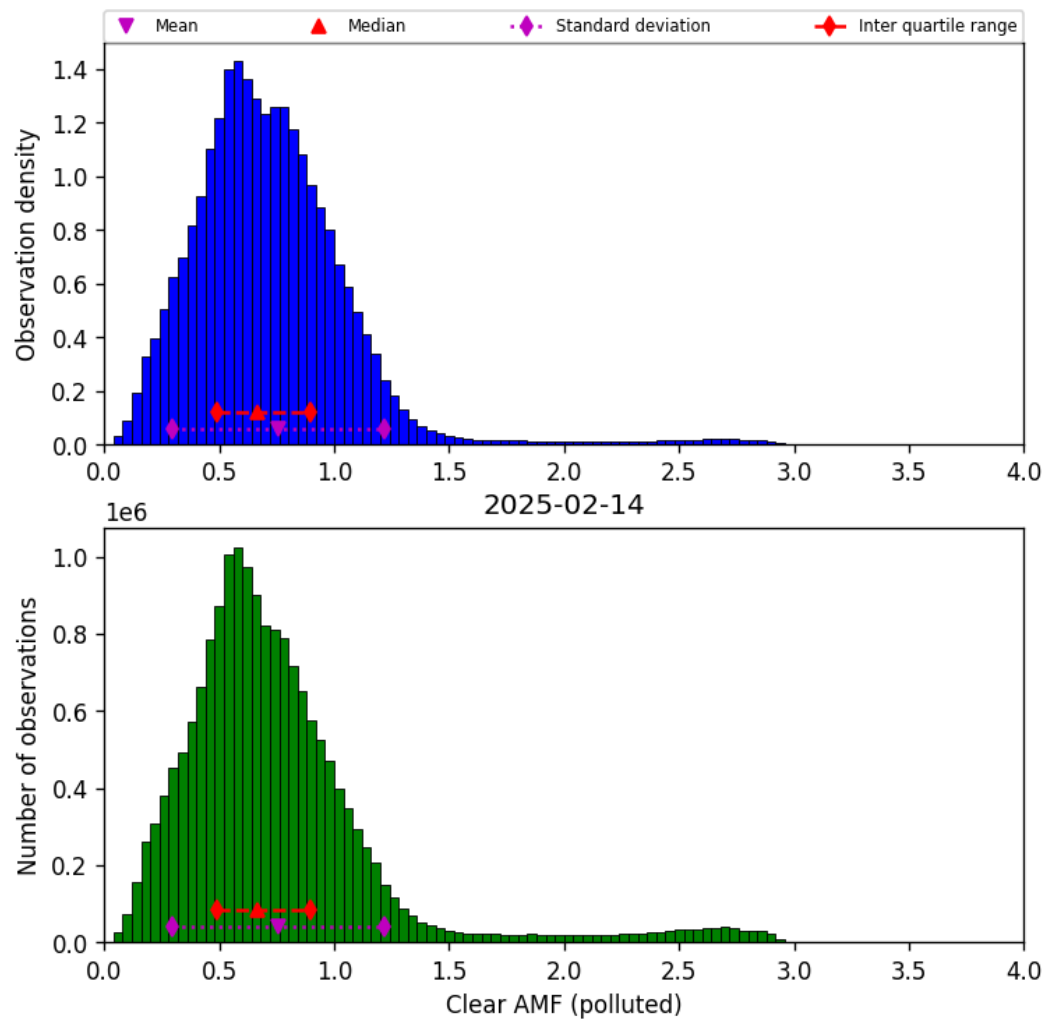


Figure 82: Histogram of "Clear AMF (polluted)" for 2025-02-14 to 2025-02-15

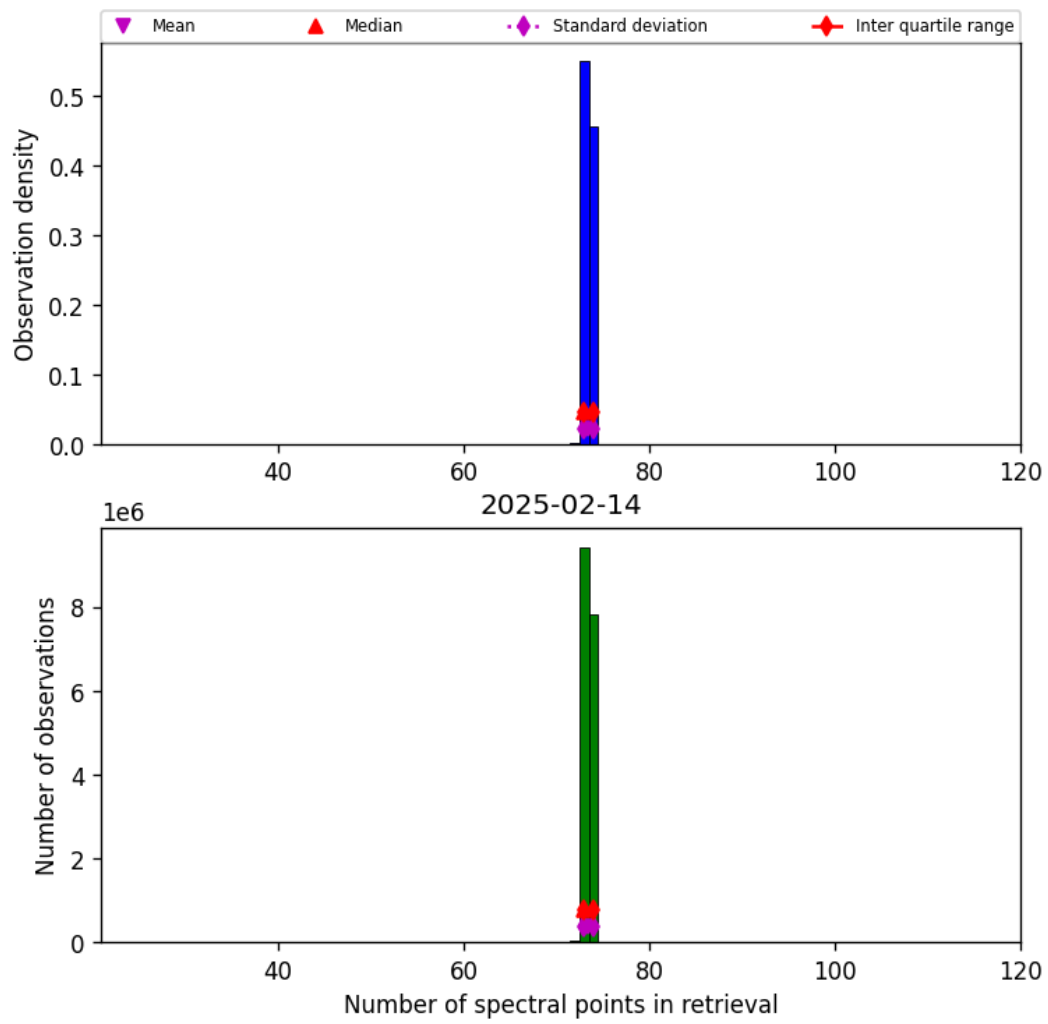


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-02-14 to 2025-02-15

9 Along track statistics

The TROPOMI instrument uses different binned detector rows for different viewing directions. In this section statistics are presented for each of the binned rows in the instrument.

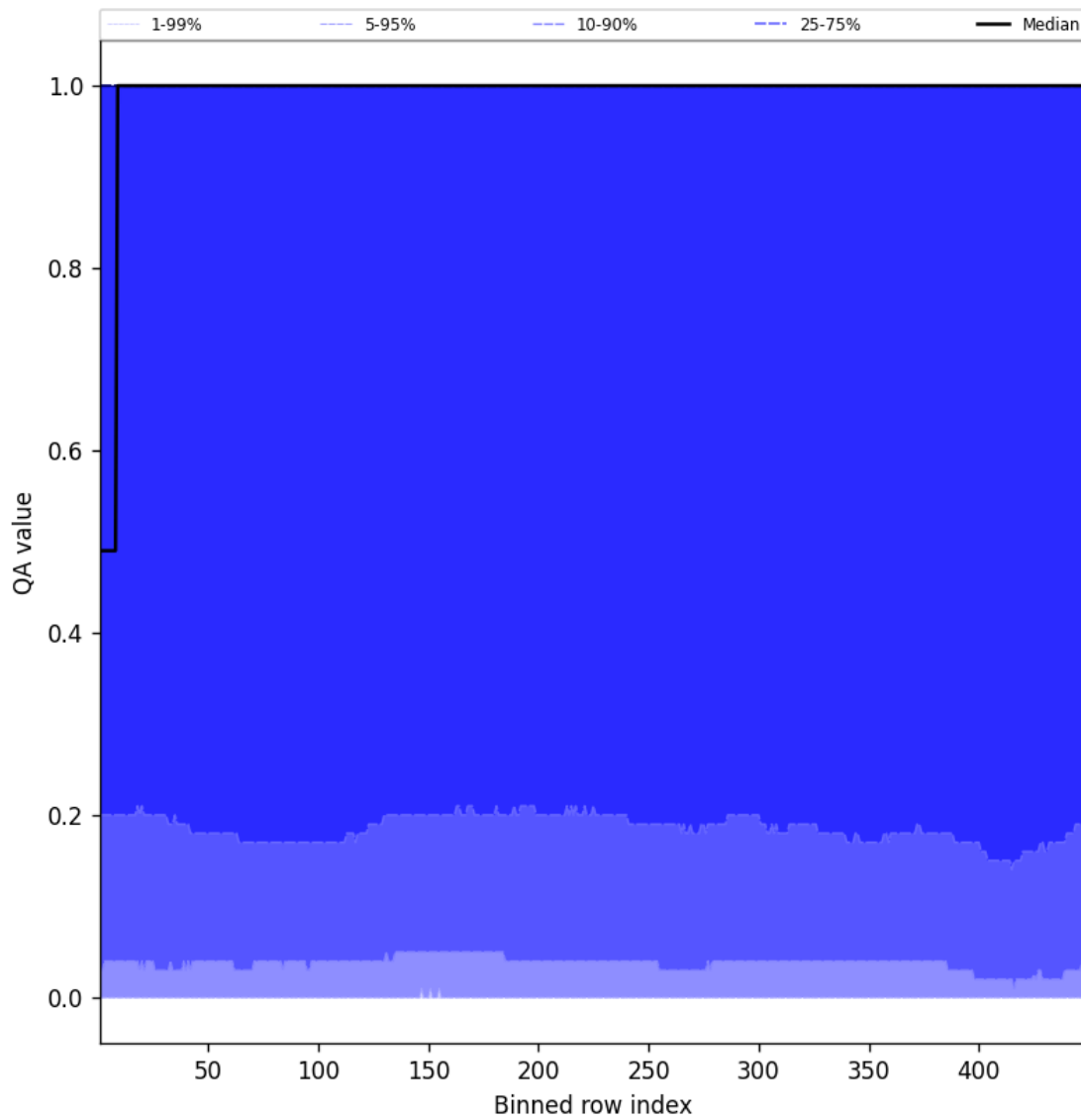


Figure 84: Along track statistics of “QA value” for 2025-02-14 to 2025-02-15

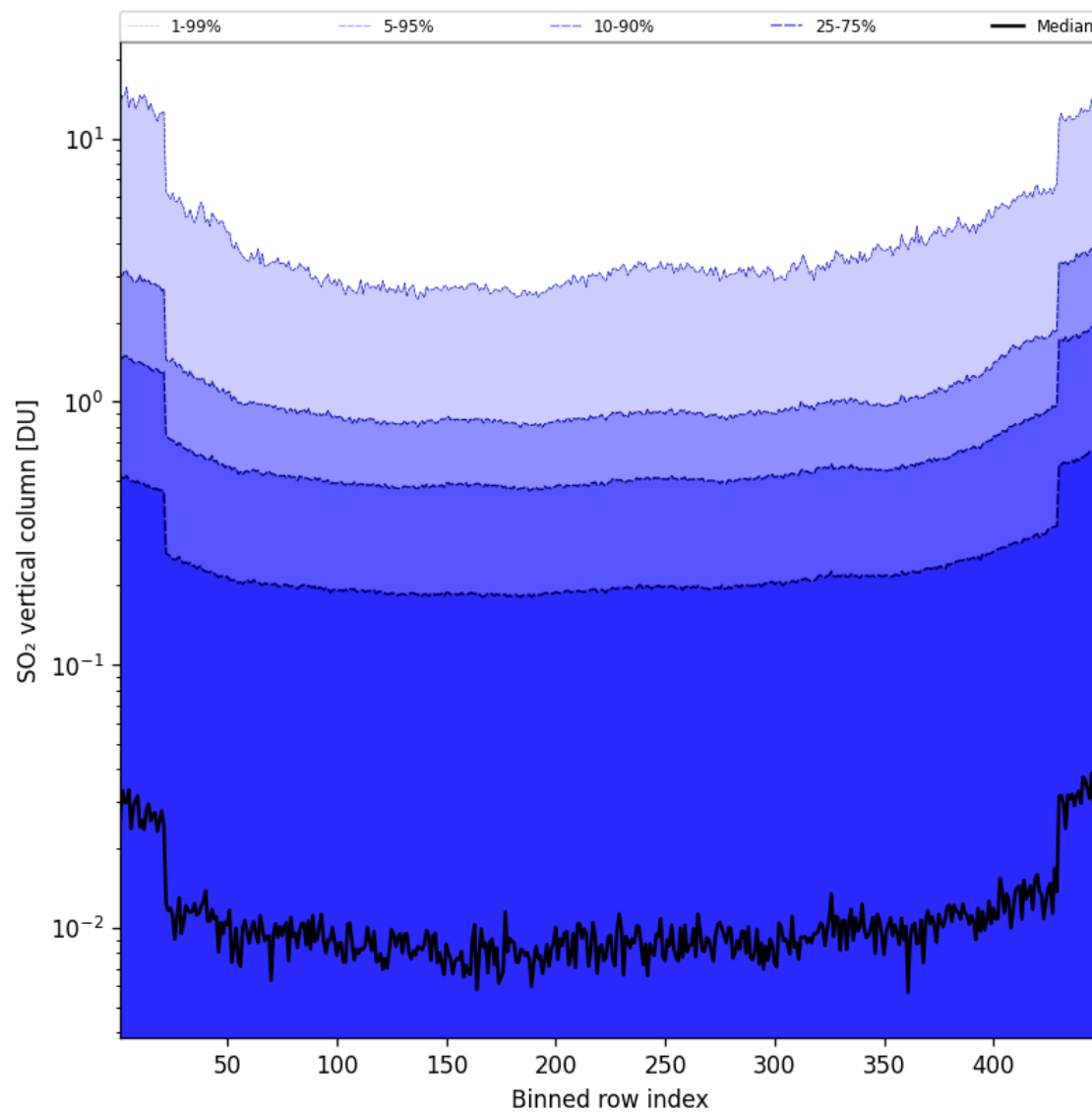


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-02-14 to 2025-02-15

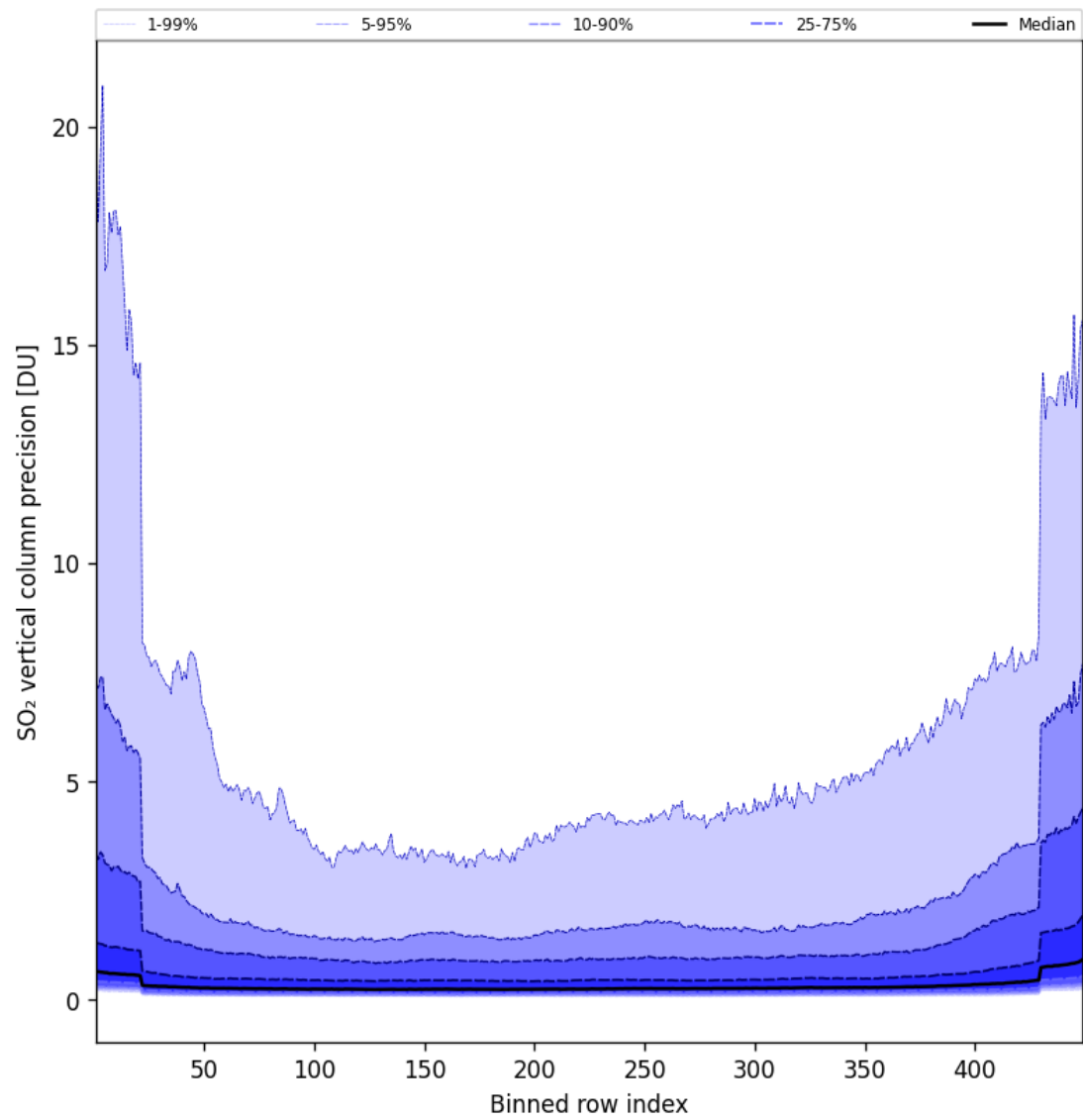


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-02-14 to 2025-02-15

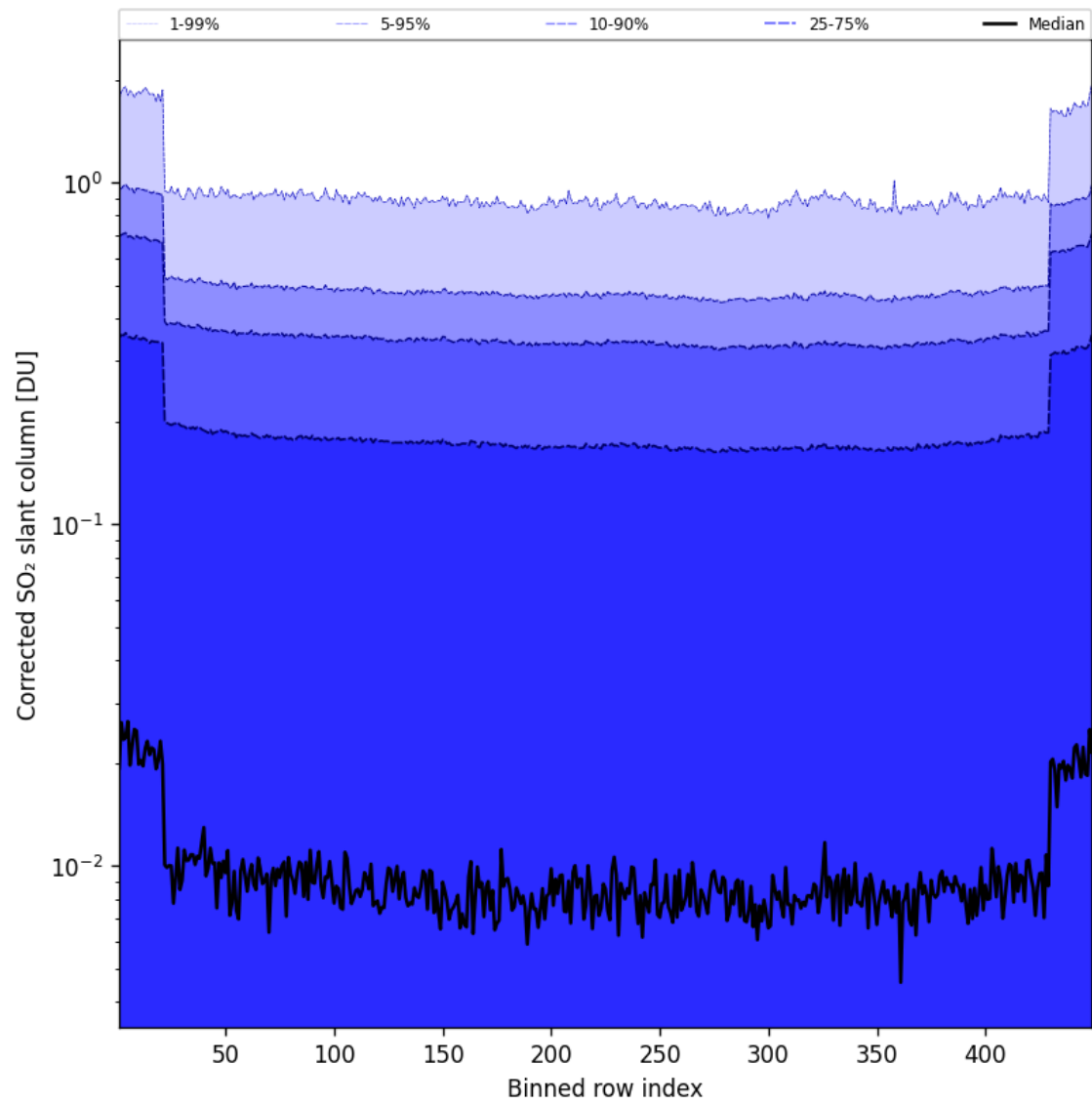


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-02-14 to 2025-02-15

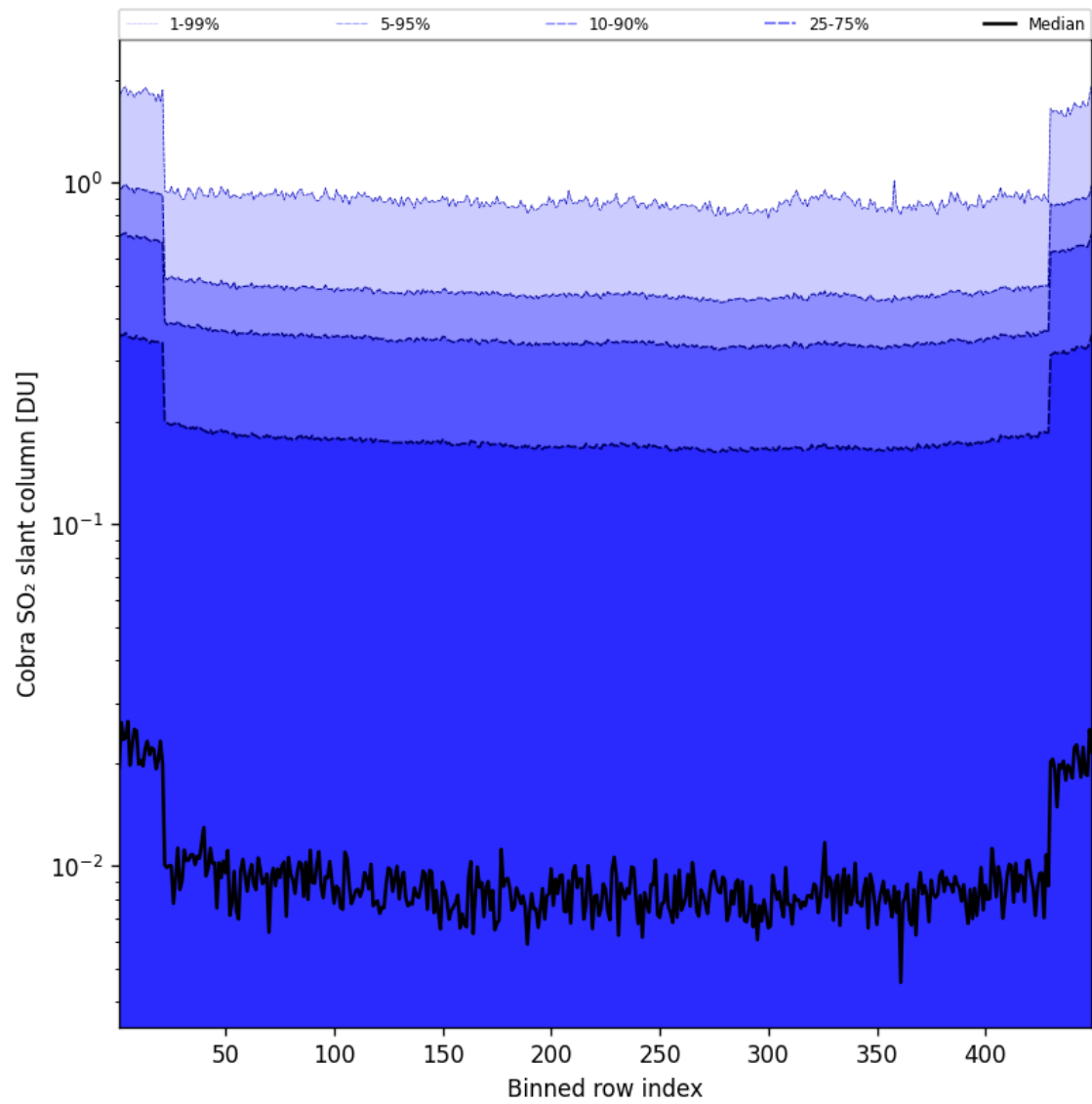


Figure 88: Along track statistics of "Cobra SO₂ slant column" for 2025-02-14 to 2025-02-15

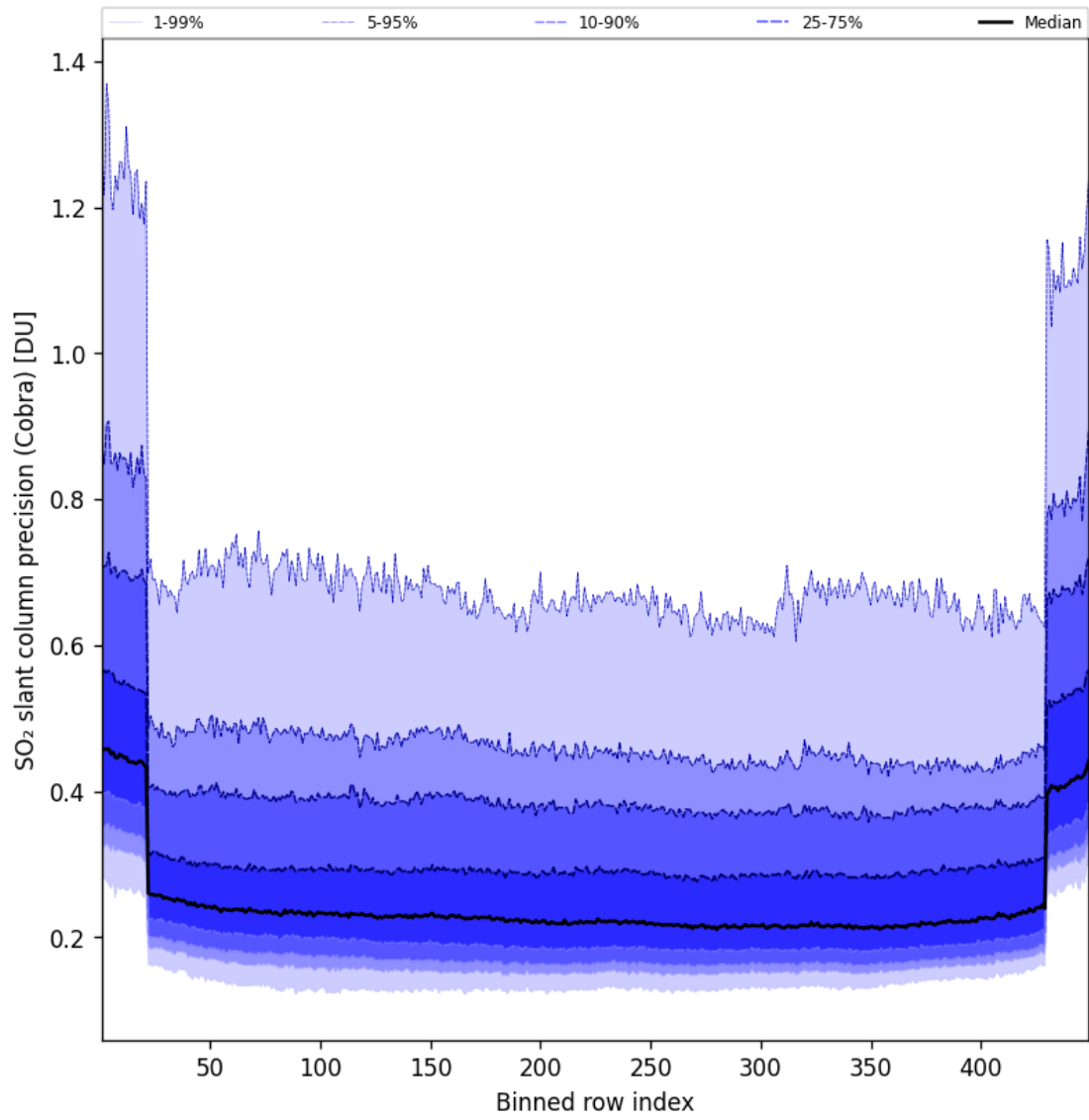


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-02-14 to 2025-02-15

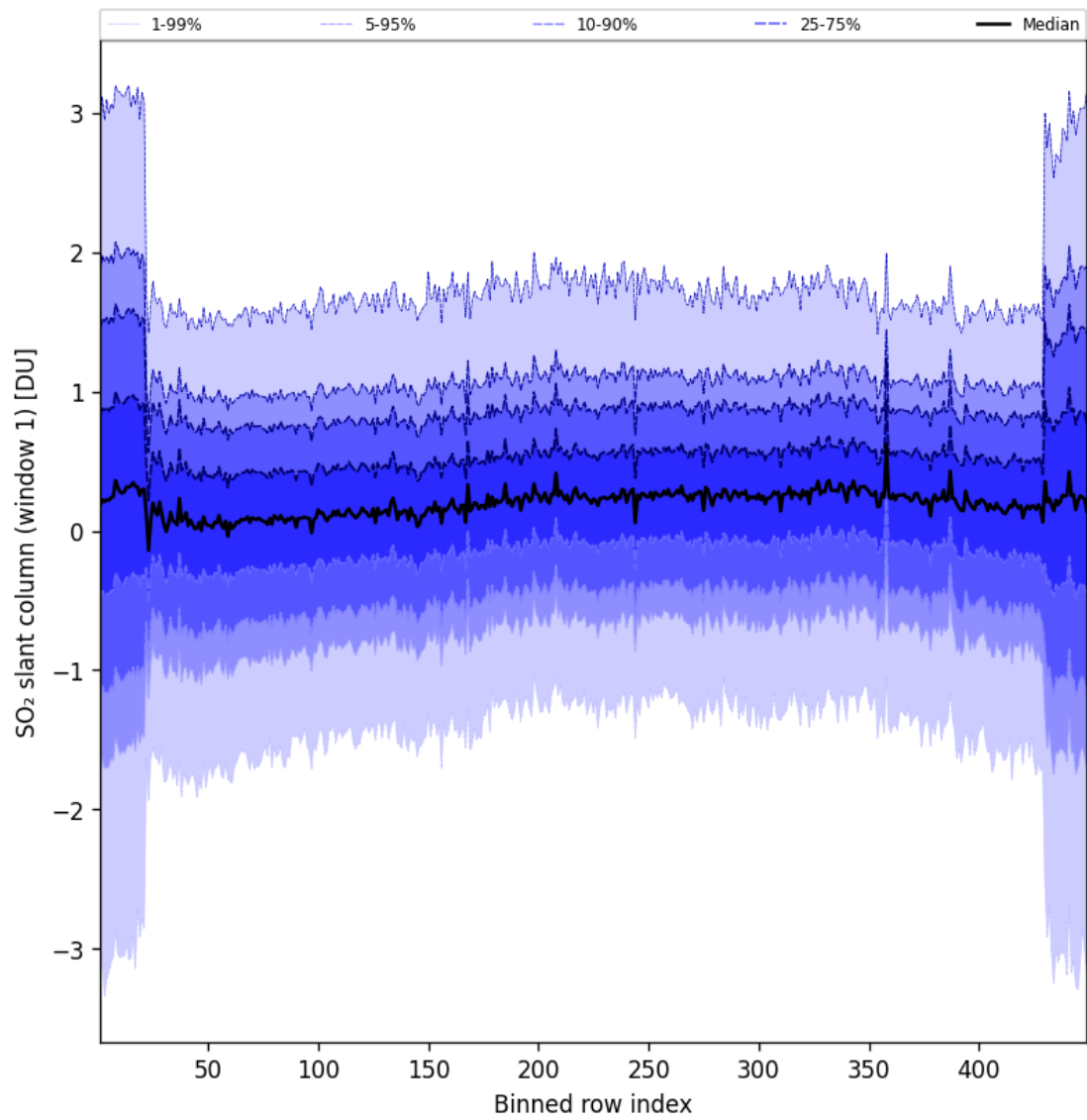


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-02-14 to 2025-02-15

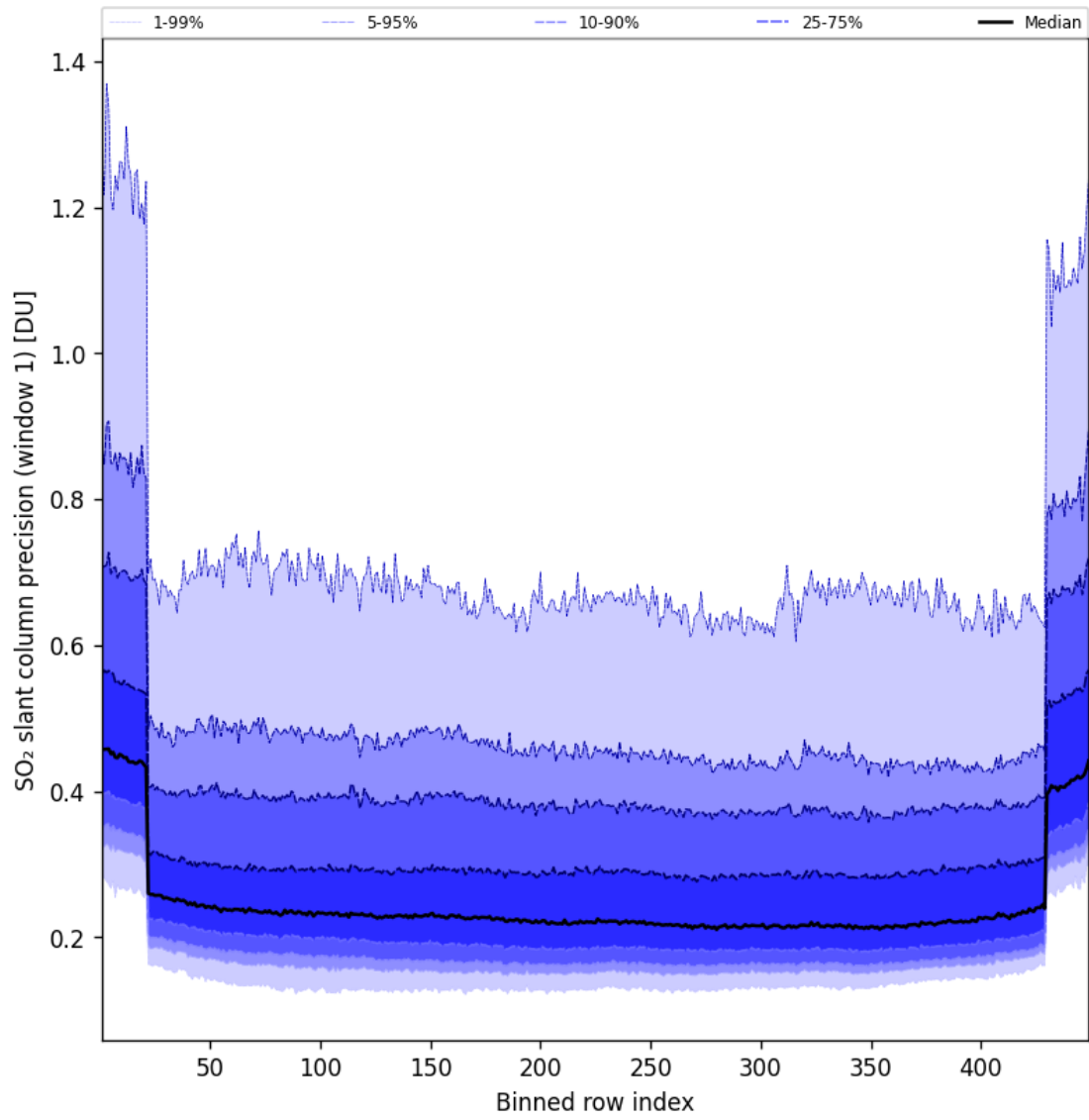


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-02-14 to 2025-02-15

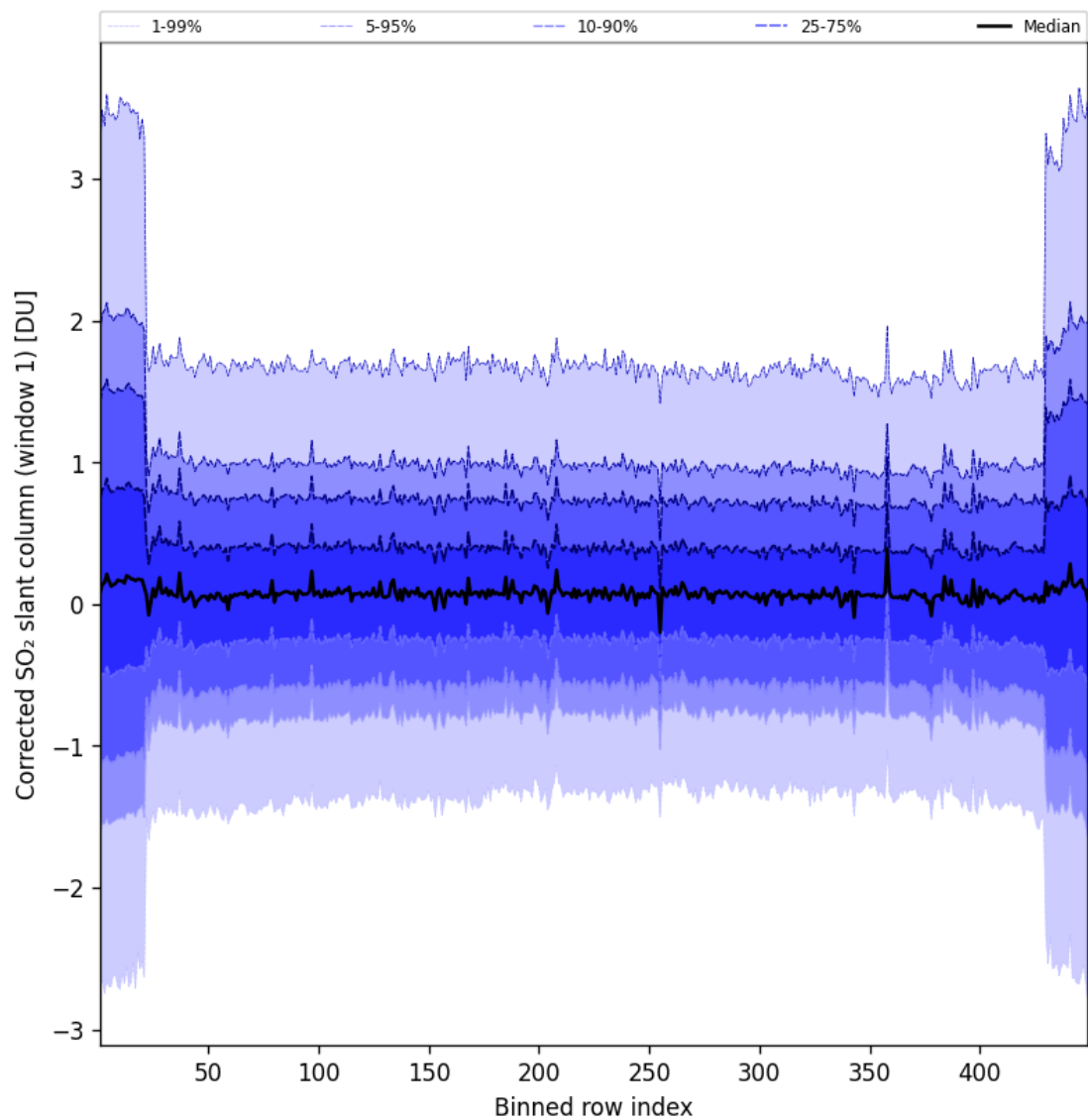


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-02-14 to 2025-02-15

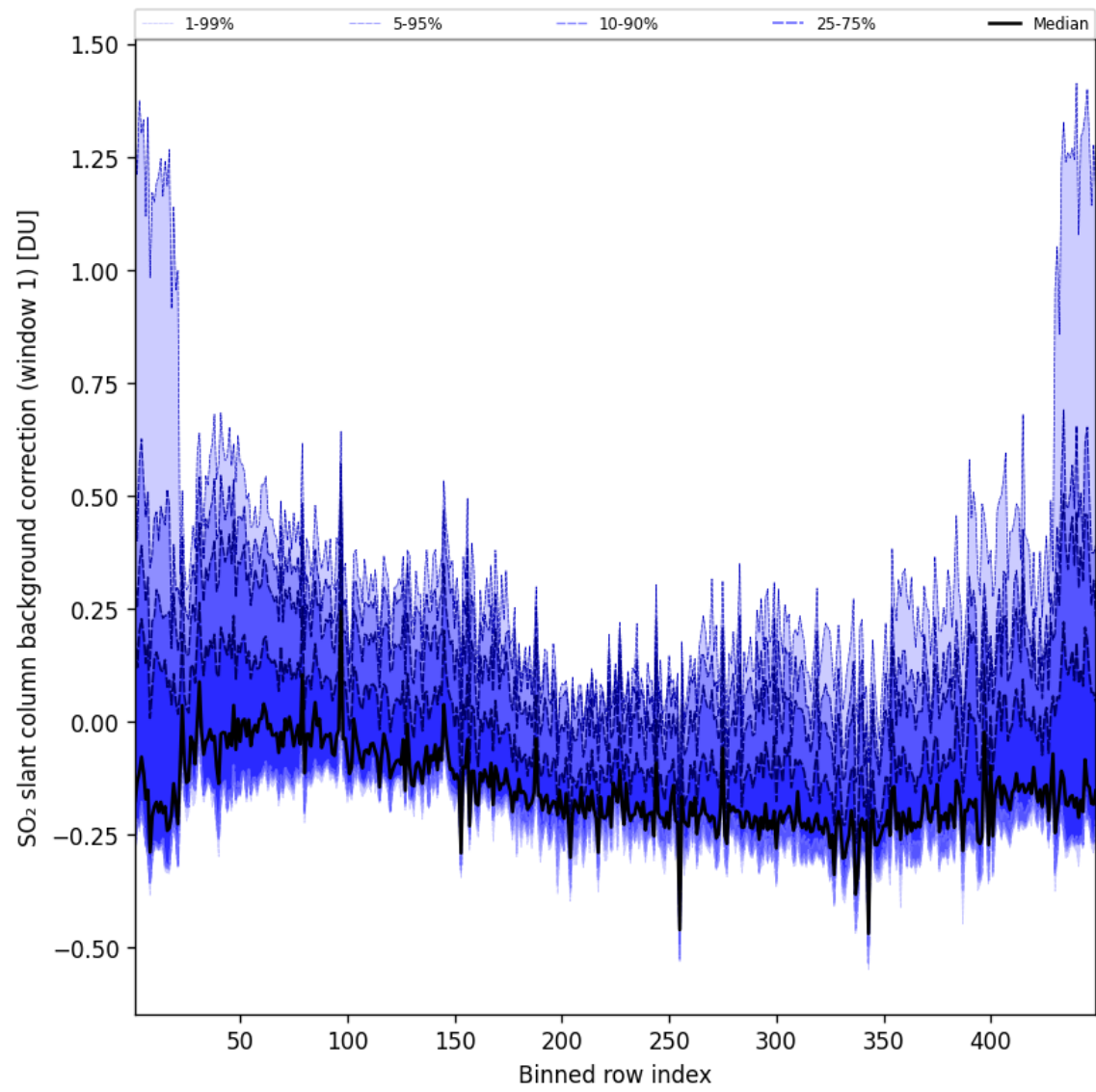


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-02-14 to 2025-02-15

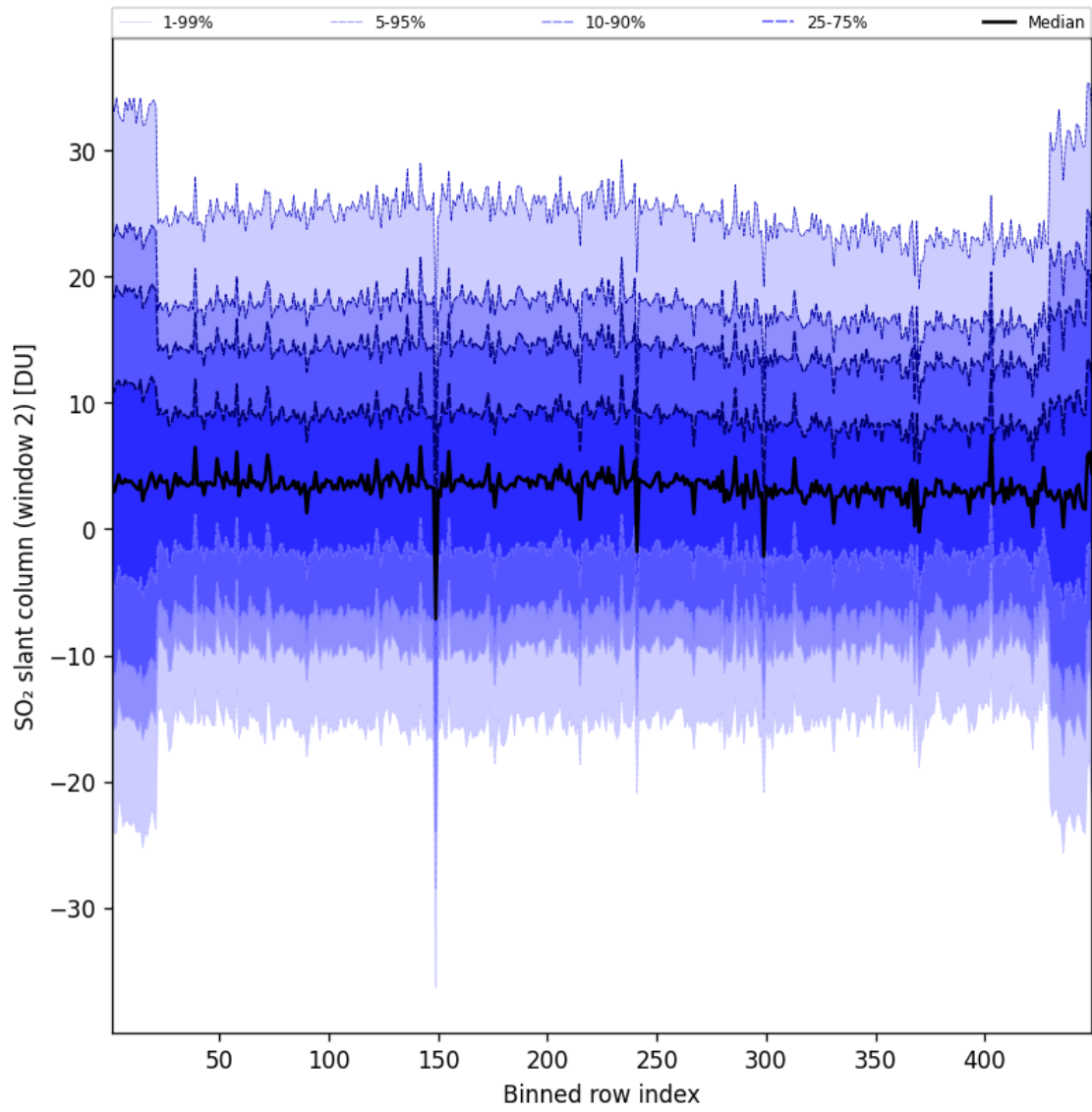


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-02-14 to 2025-02-15

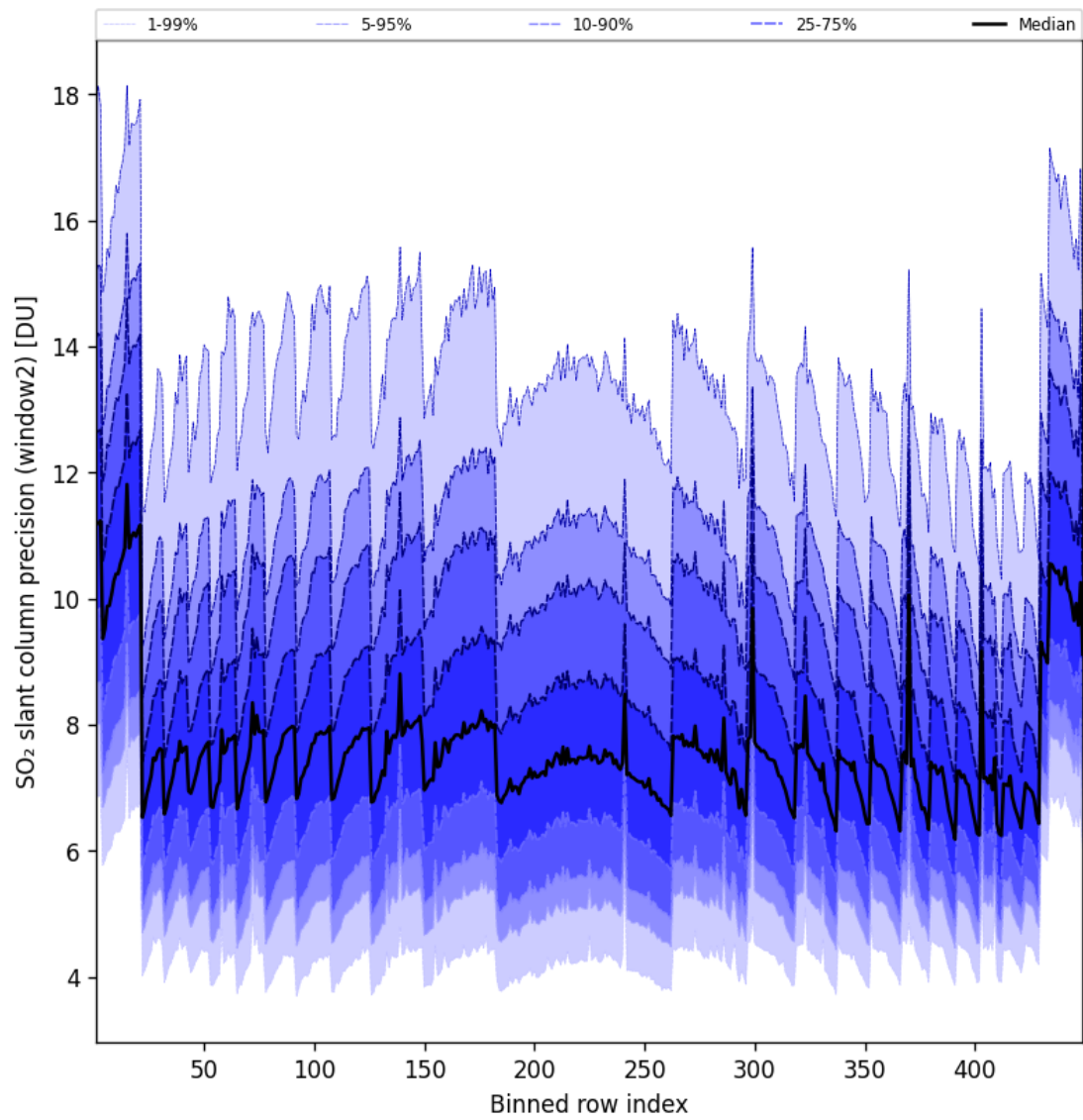


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-02-14 to 2025-02-15

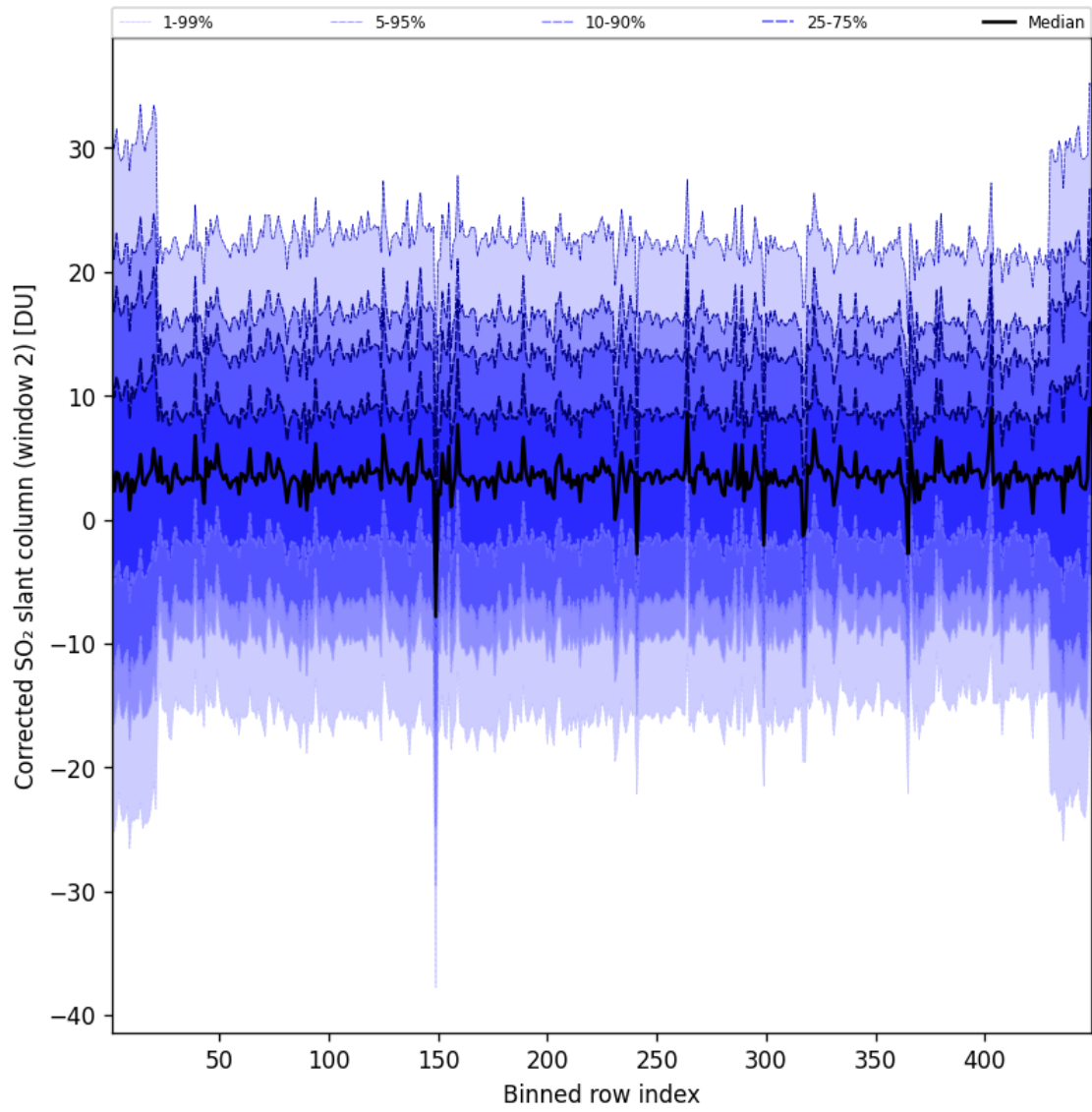


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-02-14 to 2025-02-15

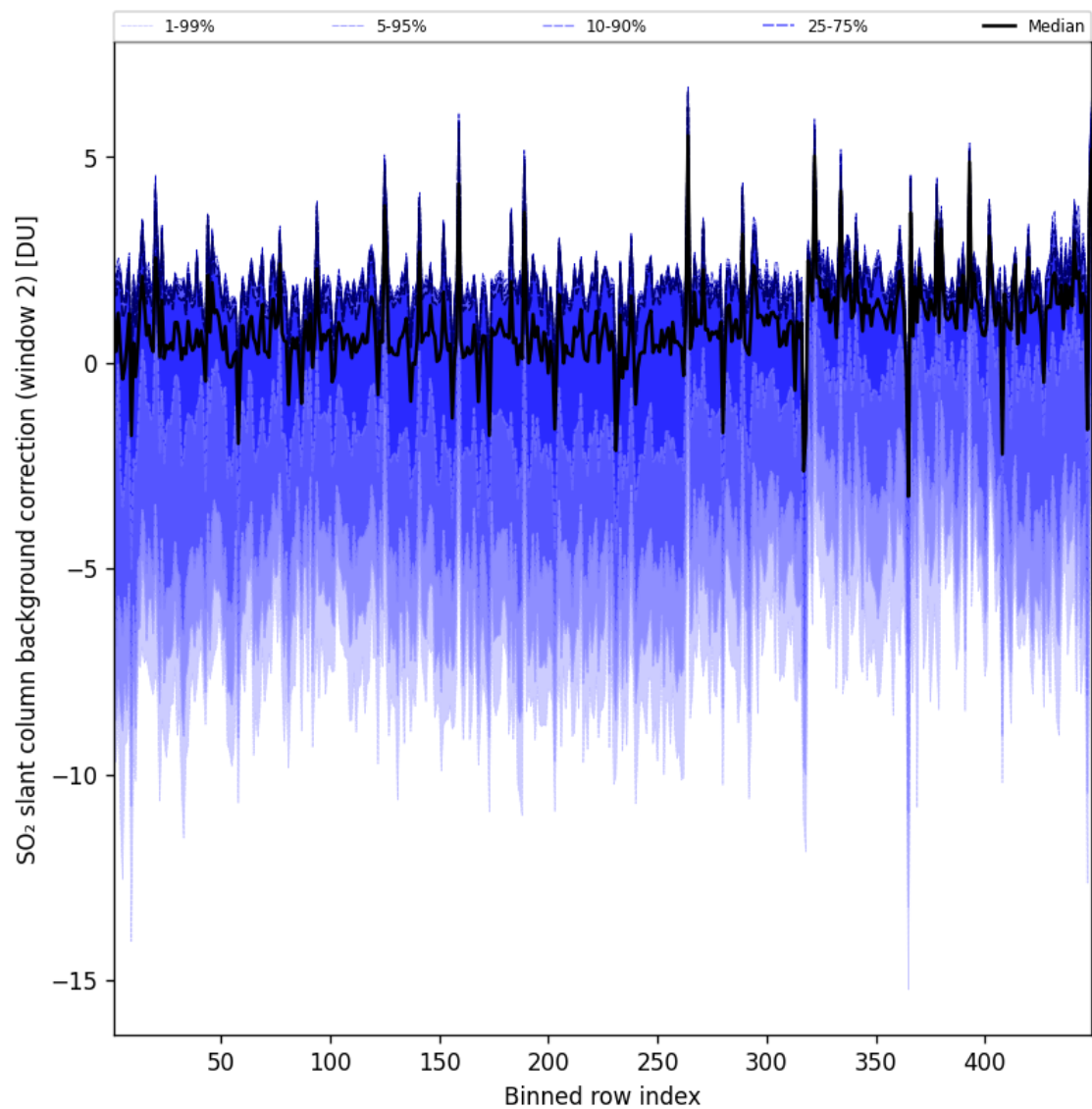


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-02-14 to 2025-02-15

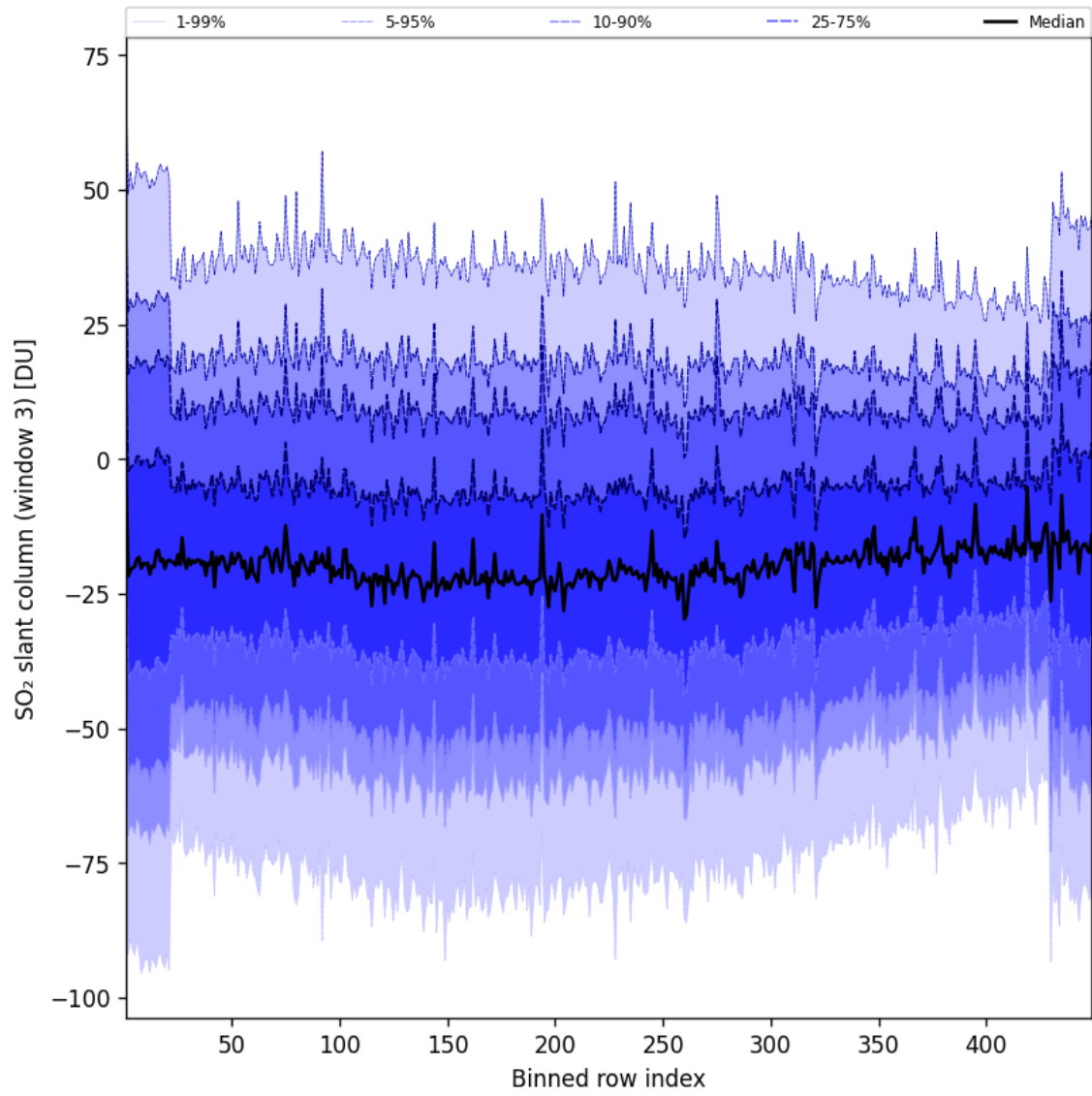


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-02-14 to 2025-02-15

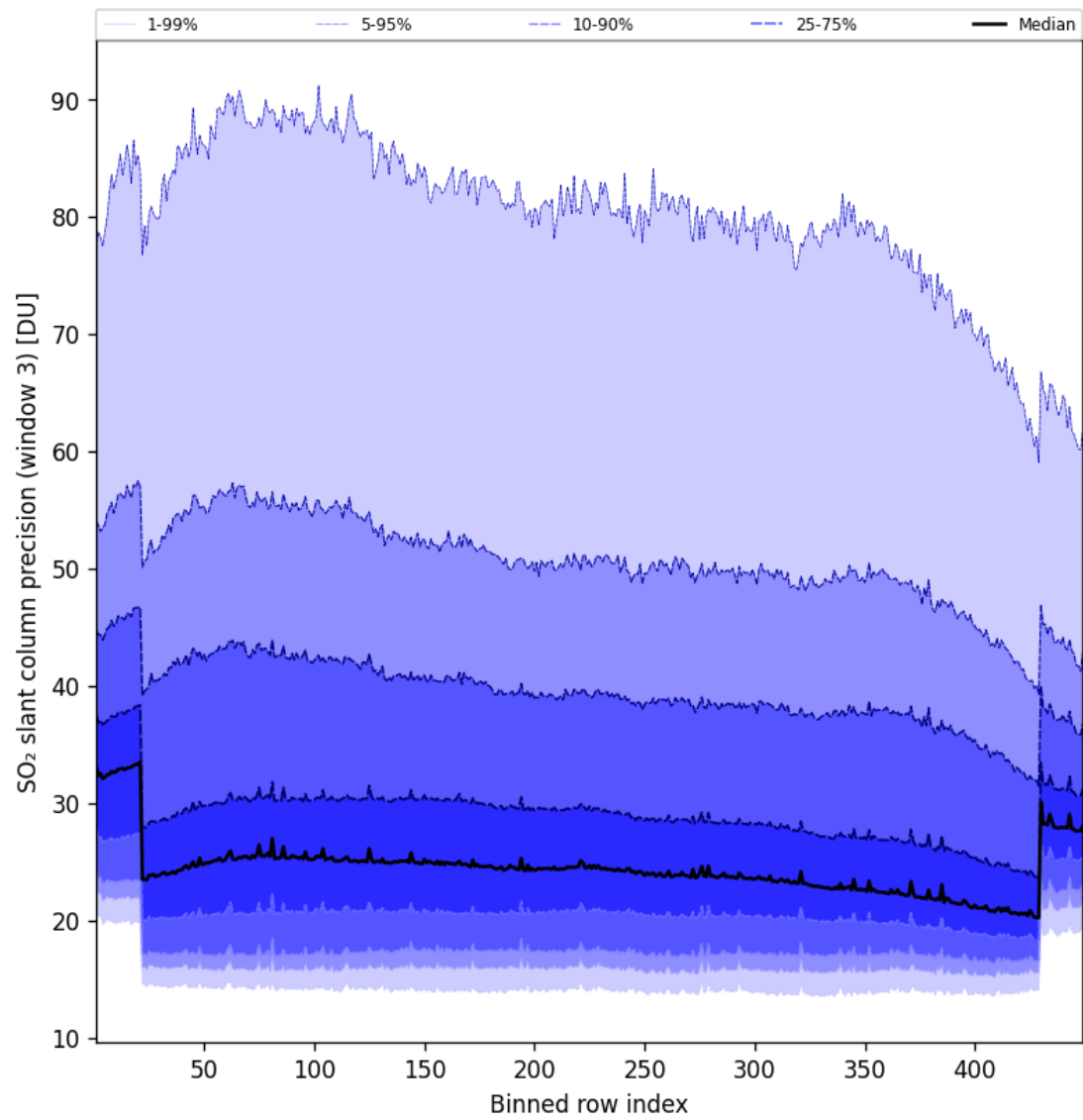


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-02-14 to 2025-02-15

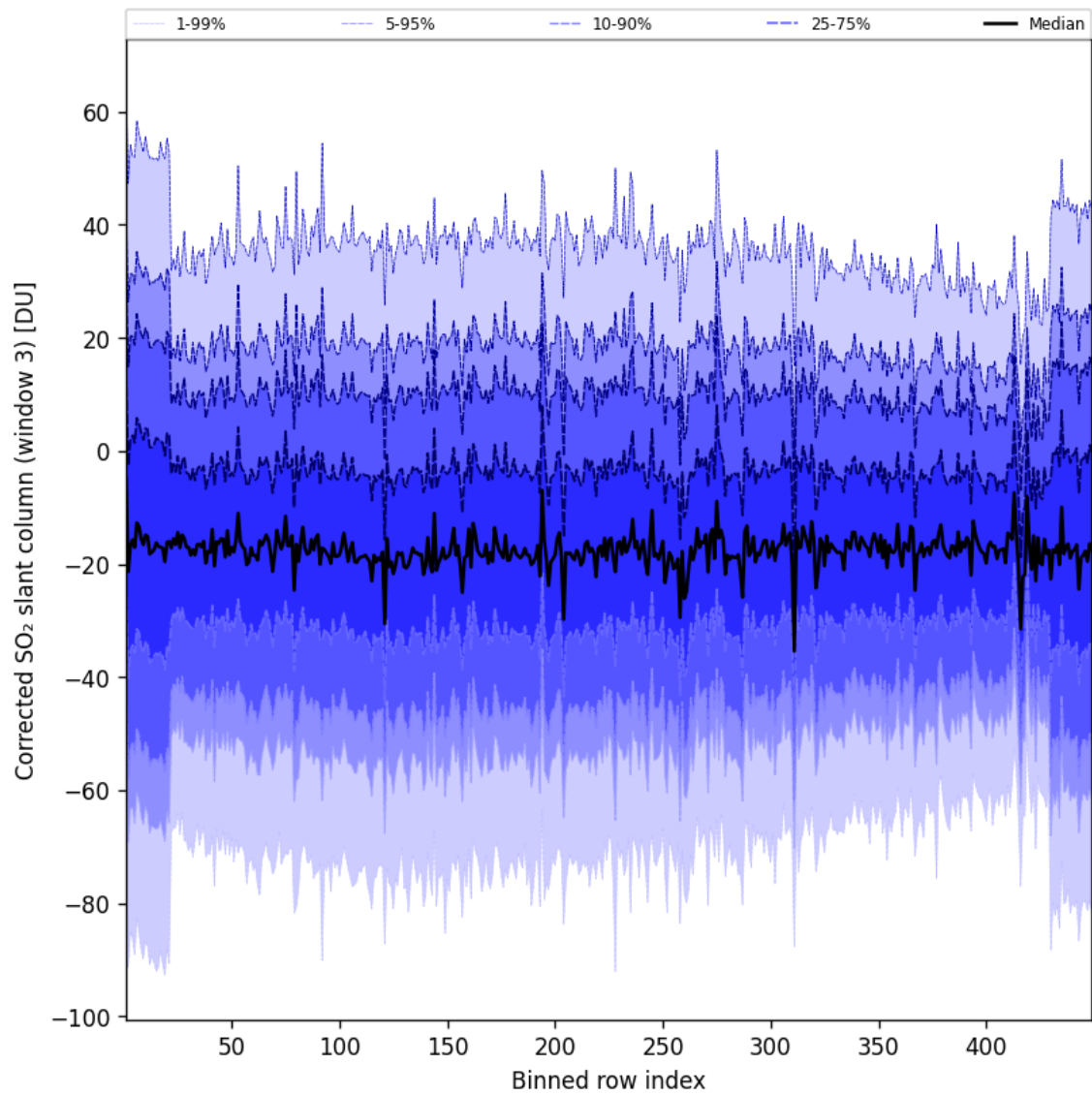


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-02-14 to 2025-02-15

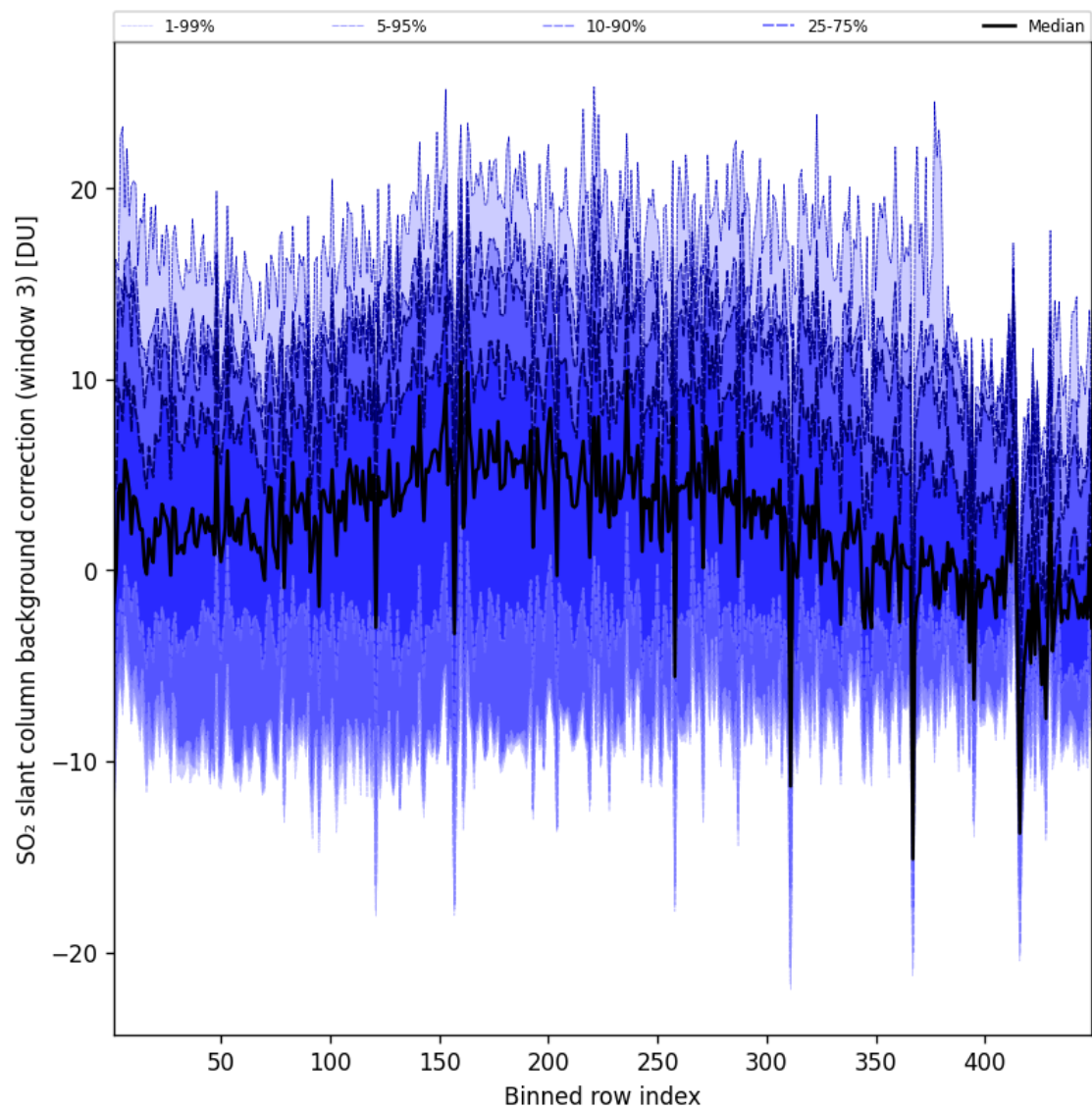


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-02-14 to 2025-02-15

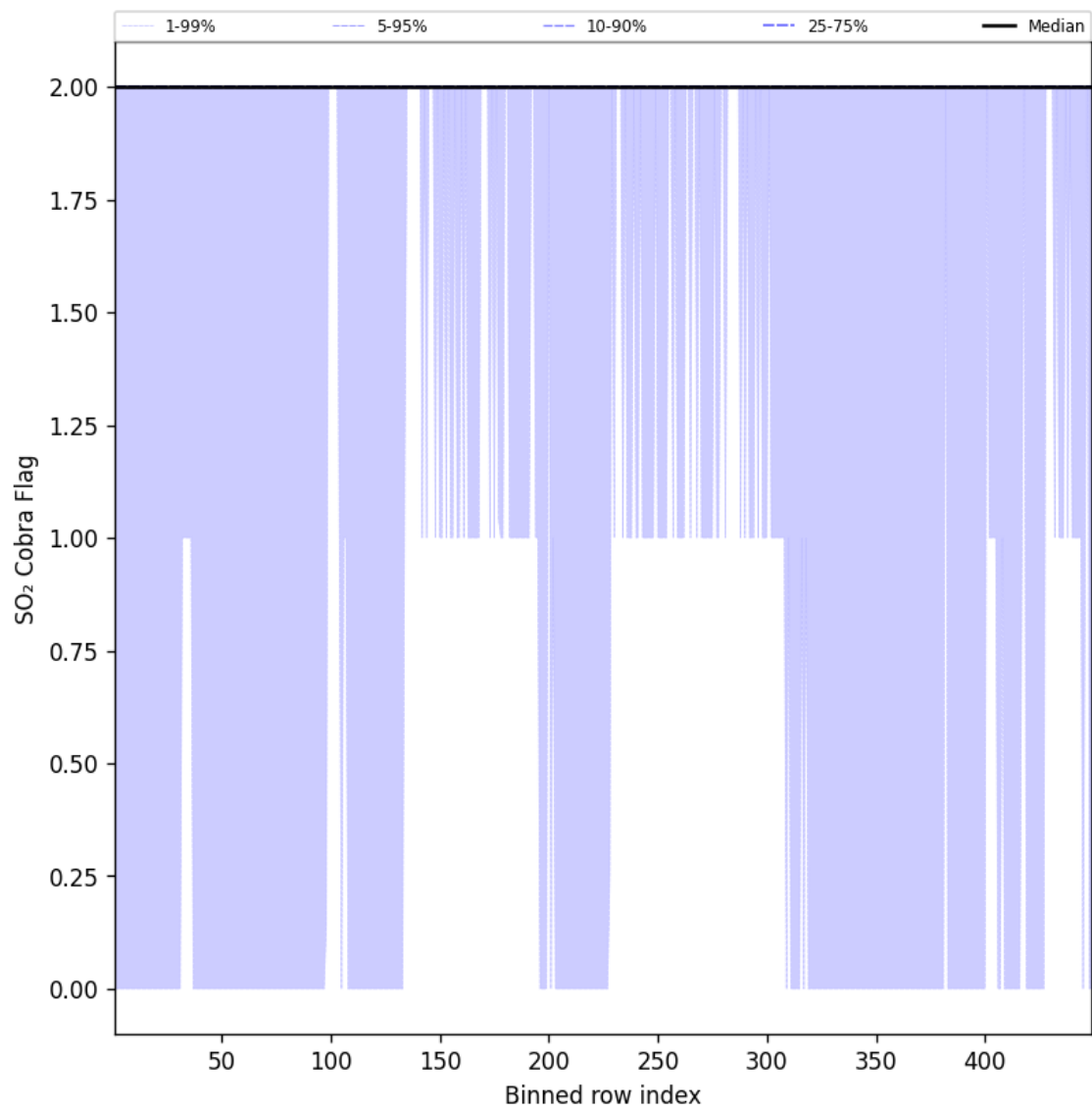


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-02-14 to 2025-02-15

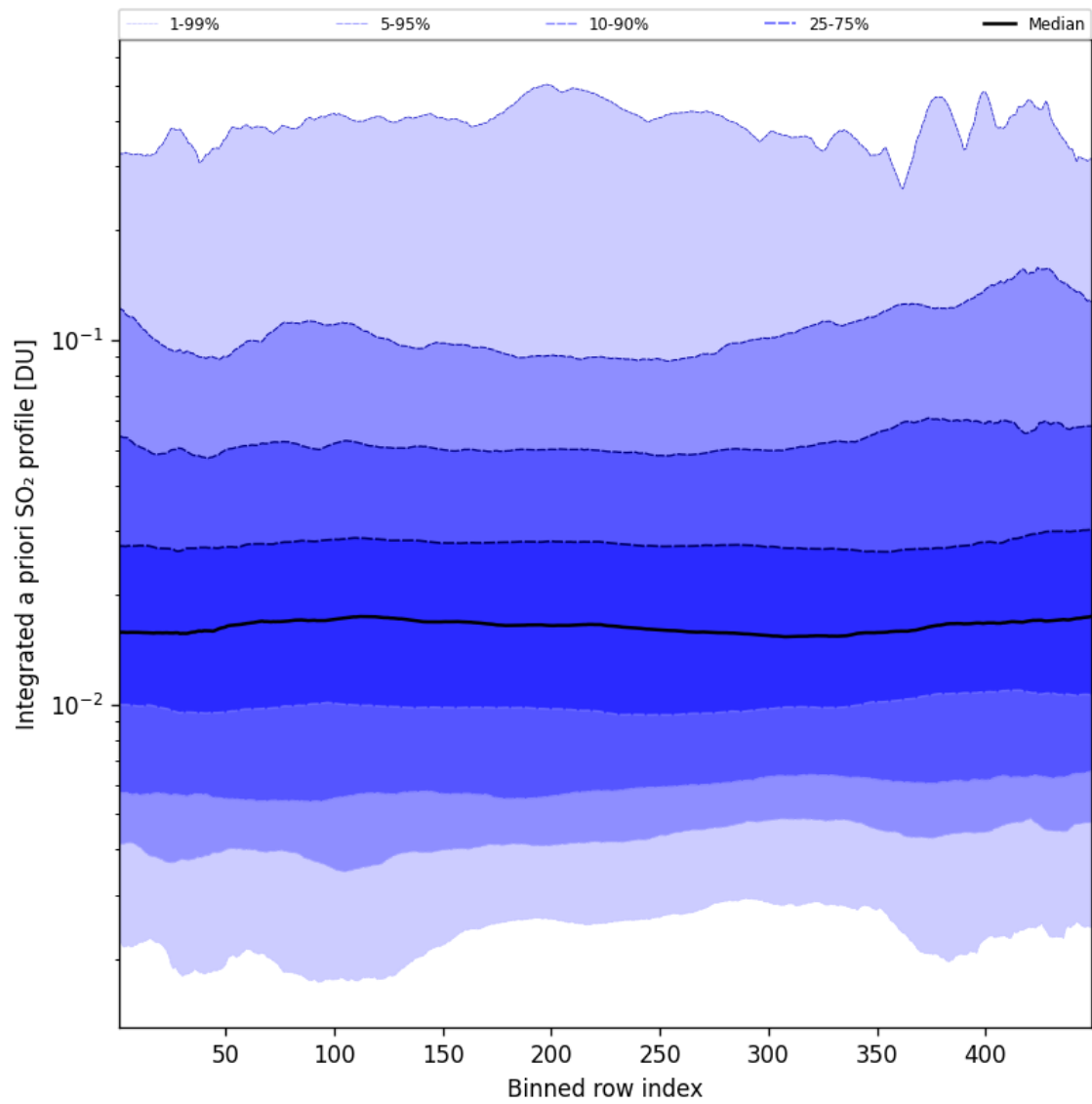


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-02-14 to 2025-02-15

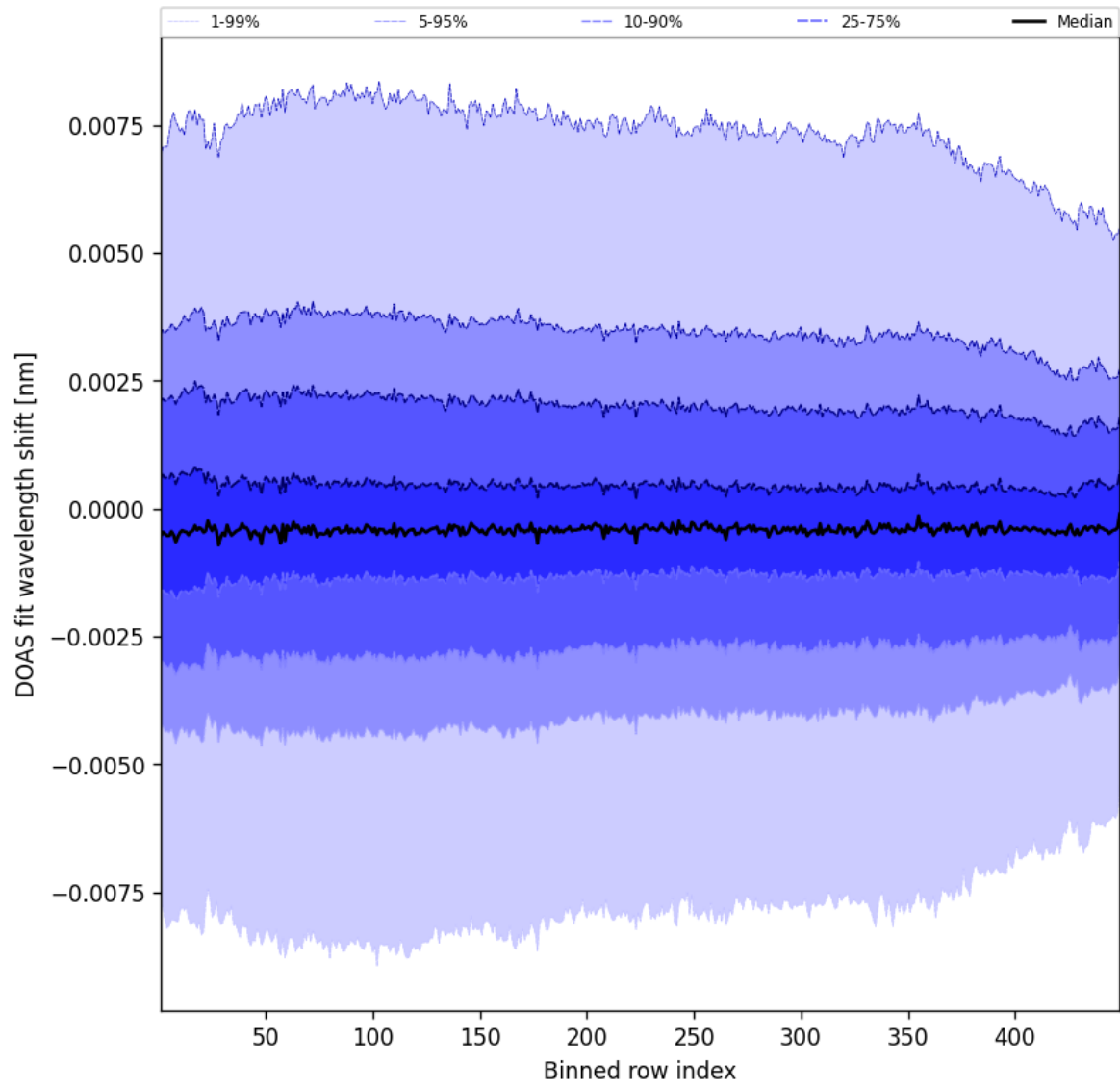


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-02-14 to 2025-02-15

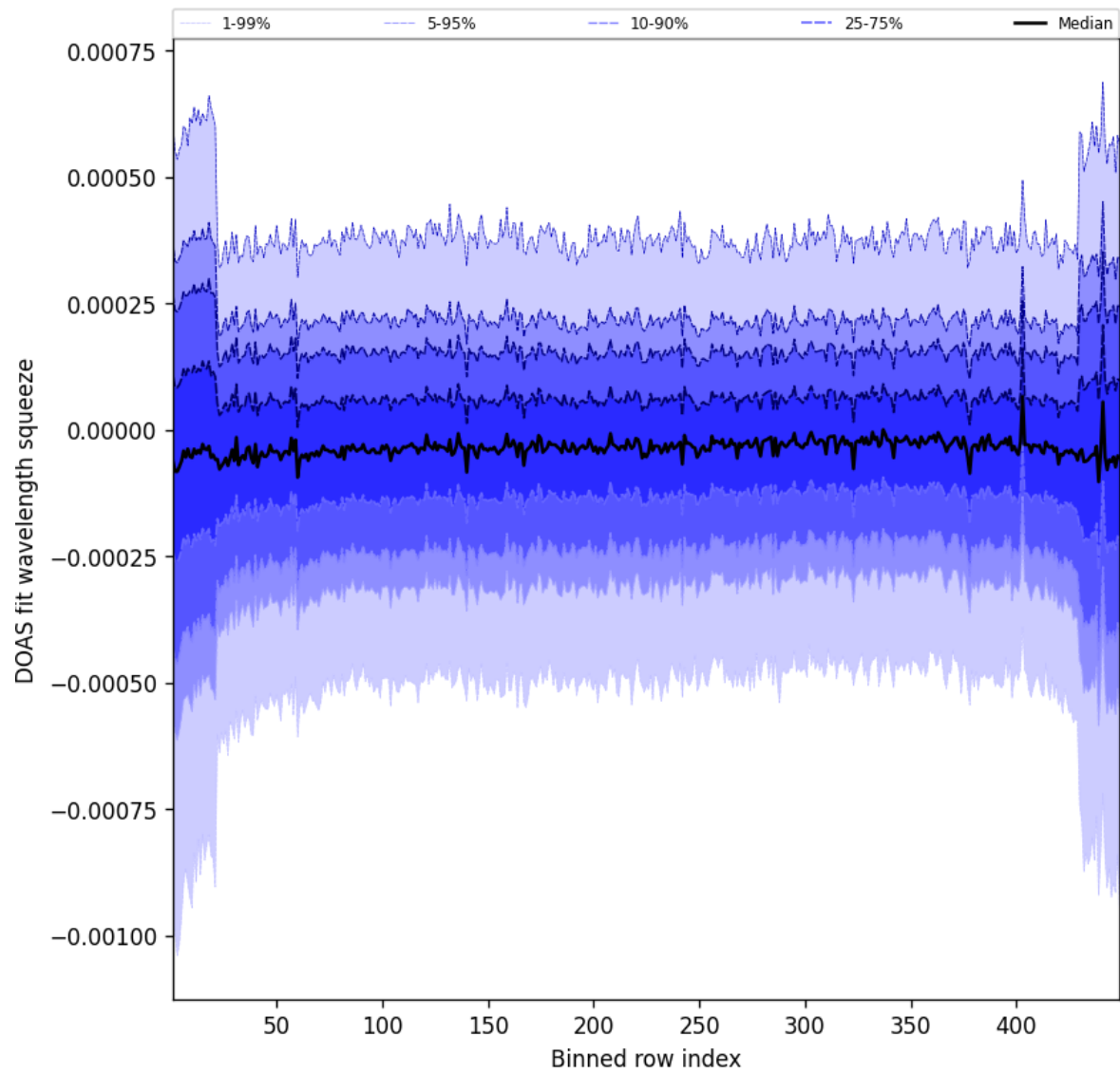


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-02-14 to 2025-02-15

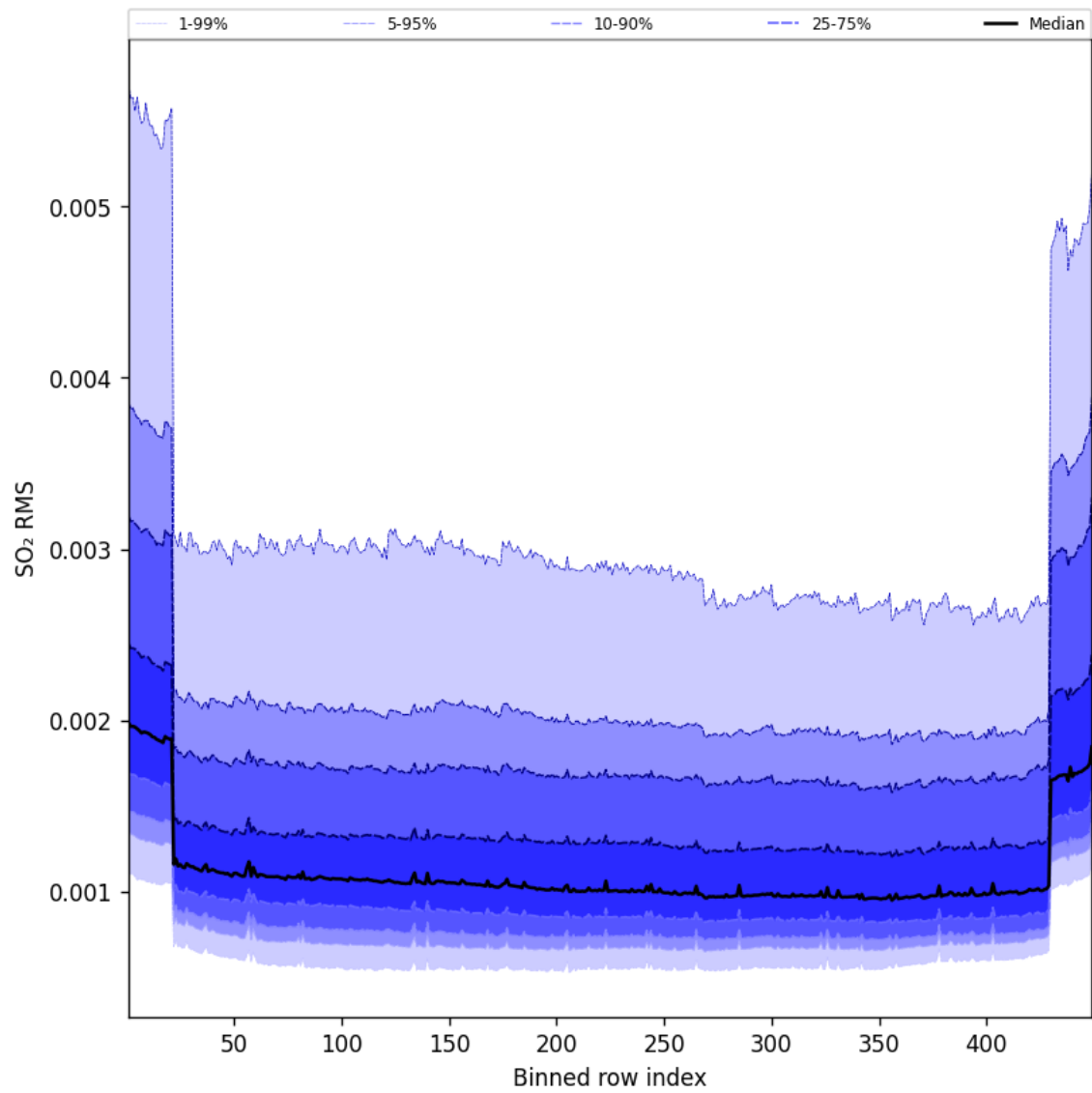


Figure 106: Along track statistics of “SO₂ RMS” for 2025-02-14 to 2025-02-15

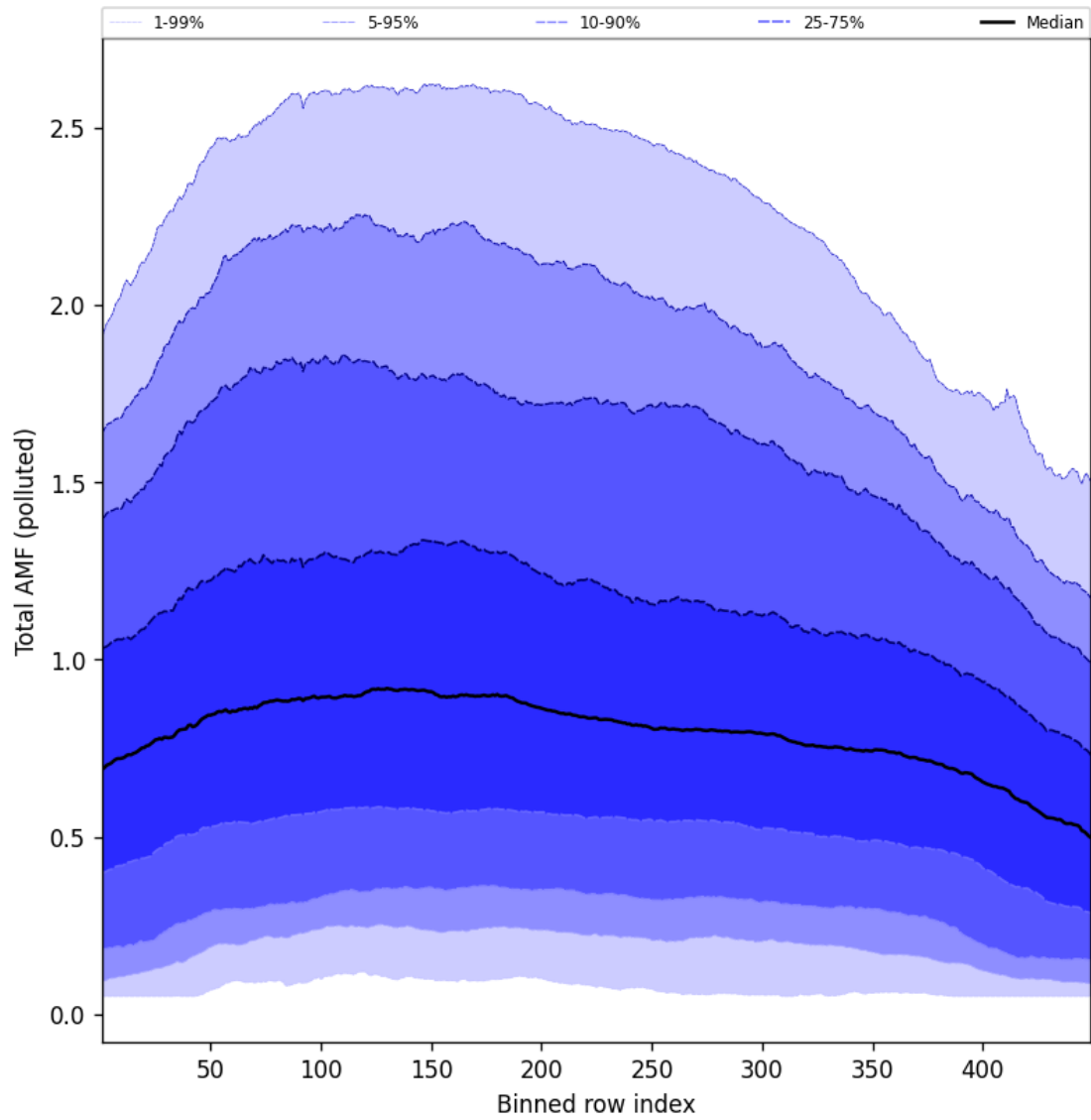


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-02-14 to 2025-02-15

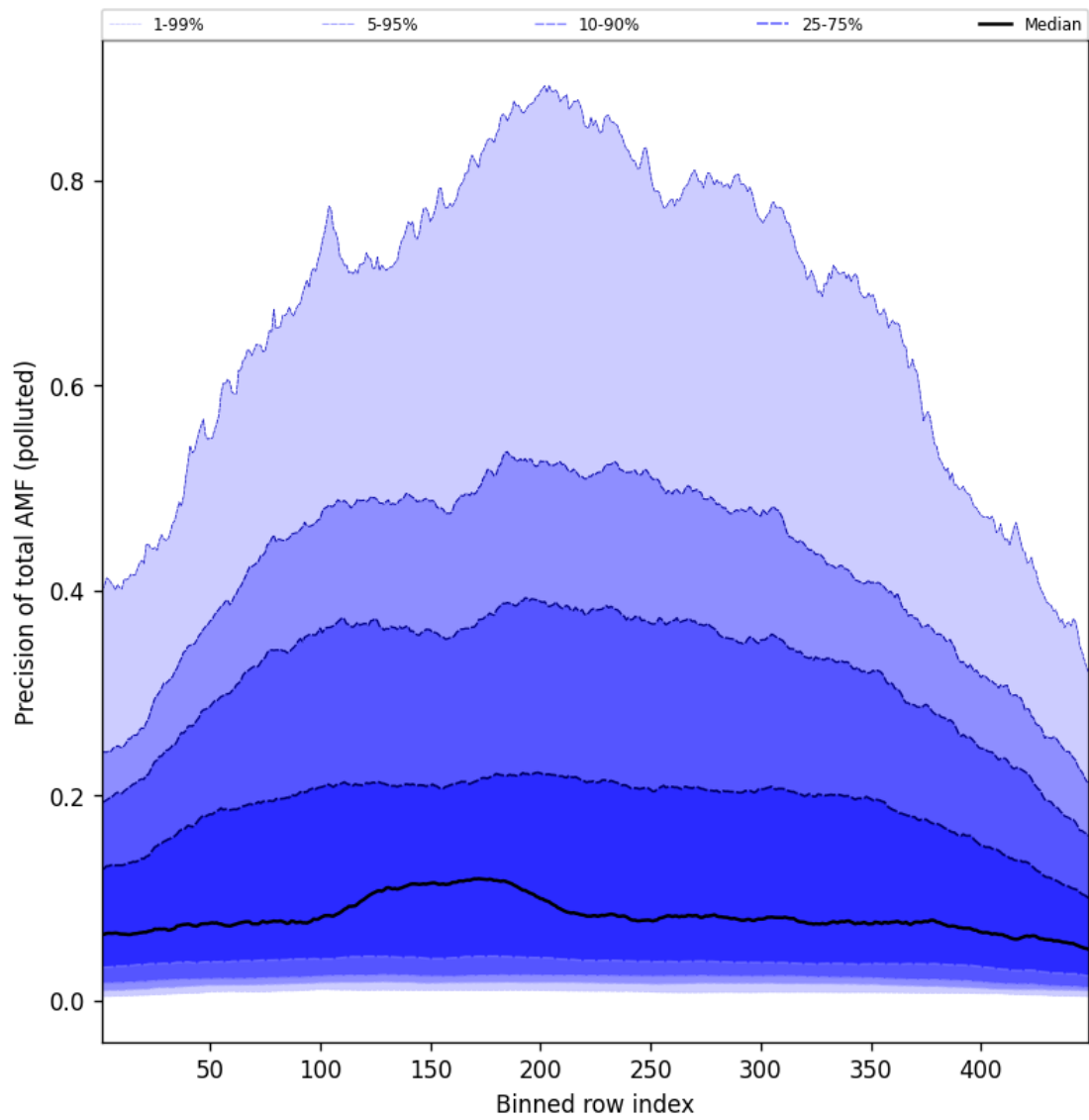


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-02-14 to 2025-02-15

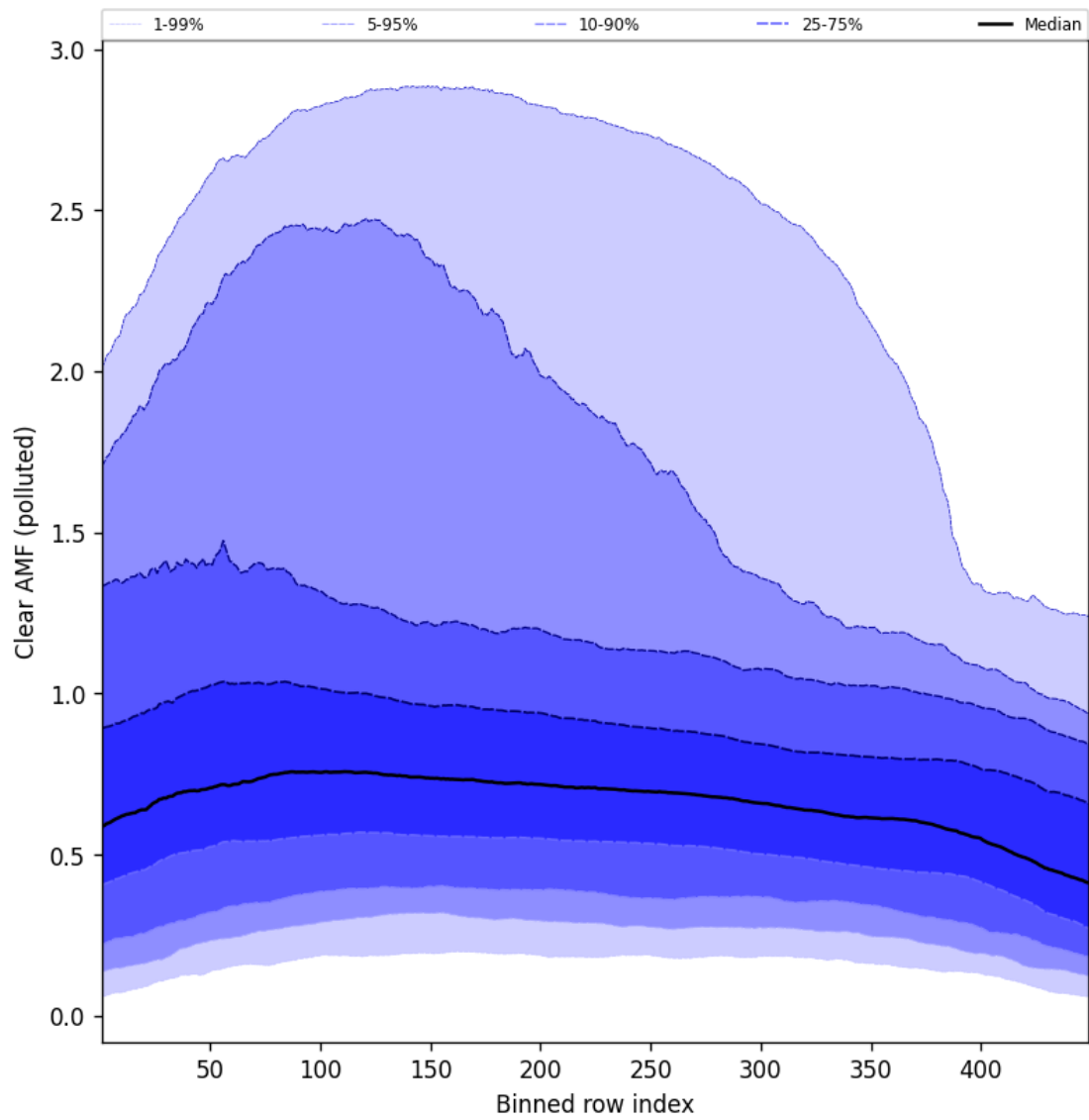


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-02-14 to 2025-02-15

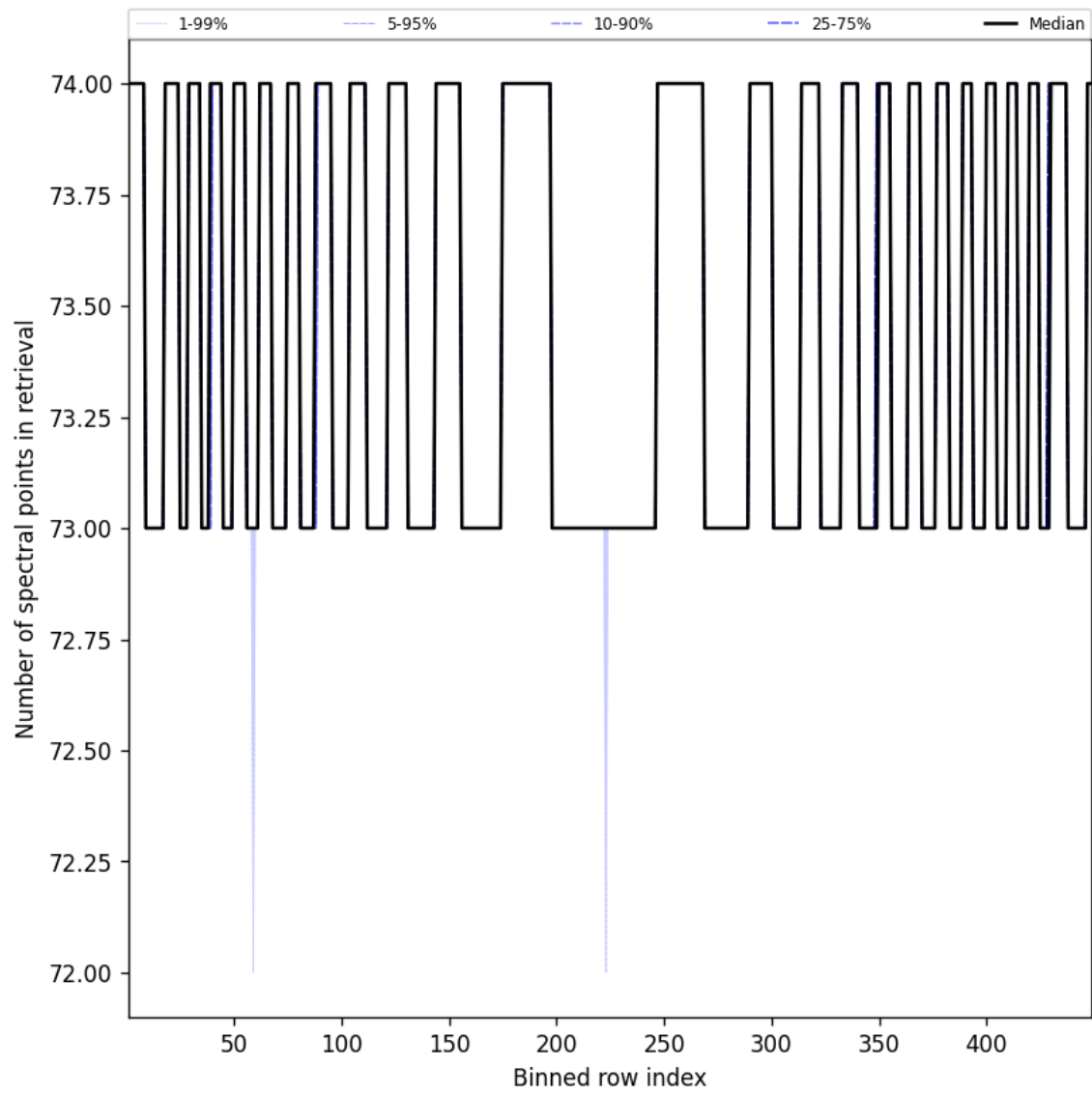


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-02-14 to 2025-02-15

10 Coincidence density

To investigate the relation between parameters scatter density plots are produced. These include some ‘hidden’ parameters, latitude and the solar- and viewing geometries, in addition to all configured parameters. All combinations of pairs of parameters are included *once*, in one direction alone.

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