

PyCAMA report generated by tropl2-proc

tropl2-proc

2025-09-04 (03:34)

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]	0.692 ± 0.397	17163982	0.995	0.720	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.375 \pm 122.487) \times 10^{-2}$	17163982	0.278	0.462	1.109×10^{-2}	-65.4	1.378×10^3
sulfurdioxide total vertical column precision [DU]	0.499 ± 0.609	17163982	0.222	0.329	0.340	4.281×10^{-2}	77.9
sulfurdioxide slant column density corrected [DU]	$(2.301 \pm 137.246) \times 10^{-2}$	17163982	0.258	0.375	9.761×10^{-3}	-20.9	2.023×10^3
sulfurdioxide slant column density cobra [DU]	$(2.058 \pm 38.442) \times 10^{-2}$	17163982	0.258	0.375	9.761×10^{-3}	-20.9	55.3
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.139	17163982	0.213	0.141	0.260	8.481×10^{-2}	19.0
sulfurdioxide slant column density window1 [DU]	0.171 ± 0.705	17163982	0.175	0.752	0.173	-66.9	70.8
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.139	17163982	0.213	0.141	0.260	8.481×10^{-2}	19.0
sulfurdioxide slant column density corrected win1 [DU]	$(2.023 \pm 70.292) \times 10^{-2}$	17163982	-2.500×10^{-2}	0.744	-3.027×10^{-3}	-66.9	70.7
background so2 slant column offset window1 [DU]	-0.150 ± 0.138	17163982	-0.220	0.132	-0.179	-0.999	2.90
sulfurdioxide slant column density window2 [DU]	0.896 ± 9.477	17163982	0.750	11.8	0.663	-1.963×10^3	1.453×10^3
sulfurdioxide slant column density window2 precision [DU]	8.47 ± 2.37	17163982	7.43	2.74	8.12	2.40	612
sulfurdioxide slant column density corrected win2 [DU]	-2.54 ± 9.28	17163982	-2.25	11.6	-2.53	-1.968×10^3	1.451×10^3
background so2 slant column offset window2 [DU]	-3.43 ± 2.35	17163982	-1.75	2.92	-2.75	-15.2	5.50
sulfurdioxide slant column density window3 [DU]	-2.58 ± 25.14	17163982	-2.80	31.6	-2.32	-445	2.027×10^3
sulfurdioxide slant column density window3 precision [DU]	29.8 ± 13.9	17163982	23.7	10.5	26.1	9.56	271
sulfurdioxide slant column density corrected win3 [DU]	14.1 ± 24.5	17163982	15.1	31.0	14.3	-430	2.023×10^3
background so2 slant column offset window3 [DU]	16.7 ± 5.7	17163982	12.9	8.98	16.6	-5.28	36.5
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	17163982	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.390 \pm 6.389) \times 10^{-2}$	17163982	1.217×10^{-2}	2.170×10^{-2}	1.582×10^{-2}	2.098×10^{-4}	1.77
fitted radiance shift [nm]	$(-3.048 \pm 27.502) \times 10^{-4}$	17163982	-5.000×10^{-4}	1.897×10^{-3}	-3.059×10^{-4}	-4.739×10^{-2}	4.577×10^{-2}
fitted radiance squeeze [1]	$(-1.269 \pm 18.685) \times 10^{-5}$	17163982	-1.000×10^{-5}	2.122×10^{-4}	-9.647×10^{-6}	-1.656×10^{-2}	1.687×10^{-2}
fitted root mean square [1]	$(1.321 \pm 0.563) \times 10^{-3}$	17163982	9.750×10^{-4}	5.703×10^{-4}	1.161×10^{-3}	3.320×10^{-4}	7.575×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.870 ± 0.428	17163982	0.660	0.522	0.792	5.000×10^{-2}	3.05
sulfurdioxide total air mass factor polluted precision [1]	0.106 ± 0.104	17163982	3.500×10^{-2}	0.106	7.101×10^{-2}	3.850×10^{-3}	1.82
sulfurdioxide clear air mass factor polluted [1]	0.729 ± 0.275	17163982	0.660	0.323	0.696	0.112	2.96
number of spectral points in retrieval [1]	73.4 ± 0.5	17163982	73.0	1.000	73.0	52.0	156

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	1.000×10^{-2}	7.000×10^{-2}	0.140	0.280	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.07	-0.846	-0.533	-0.364	-0.216	0.246	0.406	0.594	0.953	2.46
sulfurdioxide total vertical column precision [DU]	9.696×10^{-2}	0.134	0.164	0.191	0.226	0.555	0.714	0.906	1.30	3.02
sulfurdioxide slant column density corrected [DU]	-0.885	-0.507	-0.367	-0.273	-0.176	0.199	0.303	0.405	0.568	1.08
sulfurdioxide slant column density cobra [DU]	-0.885	-0.507	-0.367	-0.273	-0.176	0.199	0.303	0.405	0.568	1.08
sulfurdioxide slant column density cobra precision [DU]	0.143	0.171	0.186	0.198	0.213	0.353	0.411	0.467	0.561	0.797
sulfurdioxide slant column density window1 [DU]	-1.69	-0.898	-0.603	-0.408	-0.205	0.547	0.745	0.937	1.23	2.03
sulfurdioxide slant column density window1 precision [DU]	0.143	0.171	0.186	0.198	0.213	0.353	0.411	0.467	0.561	0.797
sulfurdioxide slant column density corrected win1 [DU]	-1.69	-1.000	-0.737	-0.558	-0.369	0.376	0.584	0.790	1.11	2.02
background so2 slant column offset window1 [DU]	-0.387	-0.297	-0.272	-0.254	-0.232	-0.100	-4.399×10^{-2}	1.194×10^{-2}	9.377×10^{-2}	0.283
sulfurdioxide slant column density window2 [DU]	-20.9	-13.9	-10.5	-8.00	-5.15	6.68	9.77	12.6	16.5	24.8
sulfurdioxide slant column density window2 precision [DU]	4.42	5.39	5.95	6.39	6.92	9.66	10.6	11.5	12.7	15.4
sulfurdioxide slant column density corrected win2 [DU]	-24.9	-17.4	-13.9	-11.3	-8.34	3.26	6.17	8.78	12.3	19.8
background so2 slant column offset window2 [DU]	-10.3	-8.32	-6.80	-5.73	-4.68	-1.75	-1.50	-1.30	-0.973	0.709
sulfurdioxide slant column density window3 [DU]	-65.8	-44.3	-33.9	-26.4	-18.2	13.4	21.4	28.6	38.1	57.0
sulfurdioxide slant column density window3 precision [DU]	14.3	17.1	19.0	20.4	22.1	32.6	37.3	43.6	56.3	89.0
sulfurdioxide slant column density corrected win3 [DU]	-47.2	-26.4	-16.4	-9.10	-1.20	29.8	37.6	44.5	53.9	72.6
background so2 slant column offset window3 [DU]	4.57	8.06	9.54	10.8	12.3	21.2	22.8	24.0	25.6	28.7
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]	1.332×10^{-3}	2.627×10^{-3}	4.454×10^{-3}	6.579×10^{-3}	9.128×10^{-3}	3.083×10^{-2}	4.938×10^{-2}	7.519×10^{-2}	0.124	0.297
fitted radiance shift [nm]	-8.545×10^{-3}	-4.373×10^{-3}	-2.907×10^{-3}	-2.044×10^{-3}	-1.291×10^{-3}	6.056×10^{-4}	1.358×10^{-3}	2.293×10^{-3}	3.910×10^{-3}	8.324×10^{-3}
fitted radiance squeeze [1]	-5.144×10^{-4}	-3.095×10^{-4}	-2.285×10^{-4}	-1.740×10^{-4}	-1.169×10^{-4}	9.527×10^{-5}	1.497×10^{-4}	2.009×10^{-4}	2.756×10^{-4}	4.578×10^{-4}
fitted root mean square [1]	6.001×10^{-4}	7.472×10^{-4}	8.268×10^{-4}	8.867×10^{-4}	9.598×10^{-4}	1.530×10^{-3}	1.776×10^{-3}	2.017×10^{-3}	2.391×10^{-3}	3.363×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.109	0.294	0.397	0.481	0.576	1.10	1.29	1.48	1.70	2.10
sulfurdioxide total air mass factor polluted precision [1]	1.179×10^{-2}	2.071×10^{-2}	2.652×10^{-2}	3.108×10^{-2}	3.754×10^{-2}	0.144	0.182	0.220	0.286	0.491
sulfurdioxide clear air mass factor polluted [1]	0.259	0.355	0.418	0.476	0.547	0.870	0.964	1.06	1.19	1.58
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]	0.664 ± 0.410	10166563	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(2.463 \pm 122.825) \times 10^{-2}$	10166563	0.437	9.287×10^{-3}	-58.8	772	-0.207	0.230
sulfurdioxide total vertical column precision [DU]	0.478 ± 0.620	10166563	0.308	0.319	4.281×10^{-2}	32.6	0.215	0.523
sulfurdioxide slant column density corrected [DU]	$(1.934 \pm 171.971) \times 10^{-2}$	10166563	0.352	8.080×10^{-3}	-11.0	2.023×10^3	-0.166	0.186
sulfurdioxide slant column density cobra [DU]	$(1.559 \pm 34.236) \times 10^{-2}$	10166563	0.352	8.079×10^{-3}	-11.0	55.3	-0.166	0.186
sulfurdioxide slant column density cobra precision [DU]	0.278 ± 0.112	10166563	0.118	0.244	8.481×10^{-2}	18.2	0.205	0.322
sulfurdioxide slant column density window1 [DU]	0.166 ± 0.640	10166563	0.710	0.168	-17.7	70.8	-0.189	0.521
sulfurdioxide slant column density window1 precision [DU]	0.278 ± 0.112	10166563	0.118	0.244	8.481×10^{-2}	18.2	0.205	0.322
sulfurdioxide slant column density corrected win1 [DU]	$(4.784 \pm 634.253) \times 10^{-3}$	10166563	0.701	-1.095×10^{-2}	-17.7	70.7	-0.356	0.345
background so2 slant column offset window1 [DU]	-0.162 ± 0.112	10166563	0.132	-0.182	-0.999	2.05	-0.236	-0.103
sulfurdioxide slant column density window2 [DU]	0.486 ± 9.010	10166563	11.3	0.350	-235	1.453×10^3	-5.26	6.08
sulfurdioxide slant column density window2 precision [DU]	8.21 ± 2.27	10166563	2.69	7.88	2.40	555	6.69	9.38
sulfurdioxide slant column density corrected win2 [DU]	-2.43 ± 8.91	10166563	11.2	-2.43	-240	1.451×10^3	-8.03	3.16
background so2 slant column offset window2 [DU]	-2.92 ± 1.68	10166563	2.36	-2.52	-9.34	5.33	-4.07	-1.72
sulfurdioxide slant column density window3 [DU]	-1.95 ± 24.83	10166563	30.9	-1.78	-208	2.027×10^3	-17.2	13.7
sulfurdioxide slant column density window3 precision [DU]	29.3 ± 14.2	10166563	10.8	25.5	9.56	271	21.4	32.3
sulfurdioxide slant column density corrected win3 [DU]	14.1 ± 24.1	10166563	30.3	14.2	-196	2.023×10^3	-0.895	29.4
background so2 slant column offset window3 [DU]	16.0 ± 5.8	10166563	9.90	16.0	-5.28	33.3	11.1	21.0
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	10166563	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.932 \pm 7.445) \times 10^{-2}$	10166563	3.131×10^{-2}	1.661×10^{-2}	2.098×10^{-4}	1.77	8.109×10^{-3}	3.942×10^{-2}
fitted radiance shift [nm]	$(-4.903 \pm 285.786) \times 10^{-5}$	10166563	1.840×10^{-3}	-9.303×10^{-5}	-4.739×10^{-2}	4.577×10^{-2}	-9.862×10^{-4}	8.538×10^{-4}
fitted radiance squeeze [1]	$(-3.103 \pm 16.701) \times 10^{-5}$	10166563	1.998×10^{-4}	-2.431×10^{-5}	-1.461×10^{-2}	1.506×10^{-2}	-1.272×10^{-4}	7.261×10^{-5}
fitted root mean square [1]	$(1.228 \pm 0.462) \times 10^{-3}$	10166563	4.975×10^{-4}	1.106×10^{-3}	3.320×10^{-4}	7.575×10^{-2}	9.232×10^{-4}	1.421×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.873 ± 0.453	10166563	0.558	0.804	5.000×10^{-2}	3.05	0.554	1.11
sulfurdioxide total air mass factor polluted precision [1]	0.114 ± 0.118	10166563	0.113	7.324×10^{-2}	3.850×10^{-3}	1.82	3.869×10^{-2}	0.152
sulfurdioxide clear air mass factor polluted [1]	0.749 ± 0.310	10166563	0.380	0.717	0.112	2.96	0.530	0.910
number of spectral points in retrieval [1]	73.5 ± 0.5	10166563	1.000	73.0	52.0	156	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.733 ± 0.374	6997419	0.630	1.000	0.0	1.000	0.370	1.000
sulfurdioxide total vertical column [DU]	$(4.700 \pm 121.982) \times 10^{-2}$	6997419	0.501	1.408×10^{-2}	-65.4	1.378×10^3	-0.231	0.270
sulfurdioxide total vertical column precision [DU]	0.529 ± 0.592	6997419	0.357	0.368	5.292×10^{-2}	77.9	0.246	0.604
sulfurdioxide slant column density corrected [DU]	$(2.834 \pm 56.882) \times 10^{-2}$	6997419	0.415	1.264×10^{-2}	-20.9	668	-0.192	0.223
sulfurdioxide slant column density cobra [DU]	$(2.783 \pm 43.830) \times 10^{-2}$	6997419	0.415	1.264×10^{-2}	-20.9	33.8	-0.192	0.223
sulfurdioxide slant column density cobra precision [DU]	0.338 ± 0.165	6997419	0.170	0.293	8.637×10^{-2}	19.0	0.229	0.399
sulfurdioxide slant column density window1 [DU]	0.177 ± 0.789	6997419	0.820	0.181	-66.9	70.5	-0.231	0.589
sulfurdioxide slant column density window1 precision [DU]	0.338 ± 0.165	6997419	0.170	0.293	8.637×10^{-2}	19.0	0.229	0.399
sulfurdioxide slant column density corrected win1 [DU]	$(4.266 \pm 79.162) \times 10^{-2}$	6997419	0.816	1.027×10^{-2}	-66.9	70.4	-0.388	0.427
background so2 slant column offset window1 [DU]	-0.134 ± 0.168	6997419	0.133	-0.174	-0.856	2.90	-0.228	-9.433×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.49 ± 10.09	6997419	12.6	1.16	-1.963×10^3	670	-4.99	7.61
sulfurdioxide slant column density window2 precision [DU]	8.85 ± 2.47	6997419	2.76	8.47	2.45	612	7.27	10.0
sulfurdioxide slant column density corrected win2 [DU]	-2.69 ± 9.79	6997419	12.2	-2.69	-1.968×10^3	668	-8.82	3.42
background so2 slant column offset window2 [DU]	-4.18 ± 2.92	6997419	4.59	-3.22	-15.2	5.50	-6.41	-1.82
sulfurdioxide slant column density window3 [DU]	-3.50 ± 25.54	6997419	32.7	-3.14	-445	341	-19.6	13.0
sulfurdioxide slant column density window3 precision [DU]	30.5 ± 13.5	6997419	10.00	26.9	10.1	253	23.1	33.1
sulfurdioxide slant column density corrected win3 [DU]	14.2 ± 25.1	6997419	32.0	14.4	-430	360	-1.65	30.4
background so2 slant column offset window3 [DU]	17.7 ± 5.4	6997419	8.05	17.1	-2.80	36.5	13.6	21.6
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.27	6997419	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.603 \pm 4.307) \times 10^{-2}$	6997419	1.375×10^{-2}	1.522×10^{-2}	9.602×10^{-4}	0.952	9.954×10^{-3}	2.371×10^{-2}
fitted radiance shift [nm]	$(-6.763 \pm 25.403) \times 10^{-4}$	6997419	1.855×10^{-3}	-6.245×10^{-4}	-4.739×10^{-2}	4.223×10^{-2}	-1.645×10^{-3}	2.090×10^{-4}
fitted radiance squeeze [1]	$(1.396 \pm 20.957) \times 10^{-5}$	6997419	2.302×10^{-4}	1.492×10^{-5}	-1.656×10^{-2}	1.687×10^{-2}	-9.943×10^{-5}	1.308×10^{-4}
fitted root mean square [1]	$(1.457 \pm 0.661) \times 10^{-3}$	6997419	6.800×10^{-4}	1.255×10^{-3}	3.561×10^{-4}	4.770×10^{-2}	1.023×10^{-3}	1.703×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.866 ± 0.389	6997419	0.481	0.776	5.000×10^{-2}	2.83	0.596	1.08
sulfurdioxide total air mass factor polluted precision [1]	$(9.420 \pm 7.576) \times 10^{-2}$	6997419	9.785×10^{-2}	6.801×10^{-2}	4.982×10^{-3}	1.52	3.616×10^{-2}	0.134
sulfurdioxide clear air mass factor polluted [1]	0.701 ± 0.211	6997419	0.257	0.677	0.129	2.22	0.565	0.821
number of spectral points in retrieval [1]	73.4 ± 0.5	6997419	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]	0.701 ± 0.389	11420366	0.690	1.000	0.0	1.000	0.310	1.000
sulfurdioxide total vertical column [DU]	$(3.434 \pm 92.091) \times 10^{-2}$	11420366	0.451	1.091×10^{-2}	-65.4	230	-0.211	0.240
sulfurdioxide total vertical column precision [DU]	0.484 ± 0.587	11420366	0.310	0.324	5.111×10^{-2}	36.7	0.223	0.533
sulfurdioxide slant column density corrected [DU]	$(2.154 \pm 43.474) \times 10^{-2}$	11420366	0.375	9.689×10^{-3}	-17.4	215	-0.176	0.199
sulfurdioxide slant column density cobra [DU]	$(2.116 \pm 38.922) \times 10^{-2}$	11420366	0.375	9.689×10^{-3}	-17.4	34.0	-0.176	0.199
sulfurdioxide slant column density cobra precision [DU]	0.307 ± 0.150	11420366	0.154	0.256	8.481×10^{-2}	18.2	0.209	0.363
sulfurdioxide slant column density window1 [DU]	0.176 ± 0.716	11420366	0.753	0.182	-44.9	70.1	-0.197	0.556
sulfurdioxide slant column density window1 precision [DU]	0.307 ± 0.150	11420366	0.154	0.256	8.481×10^{-2}	18.2	0.209	0.363
sulfurdioxide slant column density corrected win1 [DU]	$(3.004 \pm 71.567) \times 10^{-2}$	11420366	0.747	4.758×10^{-3}	-44.9	69.8	-0.362	0.385
background so2 slant column offset window1 [DU]	-0.146 ± 0.151	11420366	0.136	-0.181	-0.999	2.90	-0.234	-9.822×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.05 ± 9.39	11420366	11.8	0.747	-1.599×10^3	606	-5.03	6.78
sulfurdioxide slant column density window2 precision [DU]	8.37 ± 2.27	11420366	2.69	8.01	2.40	453	6.85	9.54
sulfurdioxide slant column density corrected win2 [DU]	-2.55 ± 9.14	11420366	11.5	-2.55	-1.603×10^3	599	-8.32	3.21
background so2 slant column offset window2 [DU]	-3.60 ± 2.61	11420366	3.36	-2.66	-15.2	5.50	-5.08	-1.72
sulfurdioxide slant column density window3 [DU]	$(-2.585 \pm 24801.933) \times 10^{-3}$	11420366	31.5	0.122	-389	361	-15.6	15.9
sulfurdioxide slant column density window3 precision [DU]	28.7 ± 12.4	11420366	9.61	25.4	9.79	227	21.8	31.4
sulfurdioxide slant column density corrected win3 [DU]	16.6 ± 23.9	11420366	30.5	16.6	-373	368	1.46	32.0
background so2 slant column offset window3 [DU]	16.6 ± 5.8	11420366	9.02	16.1	-5.28	36.5	12.2	21.2
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.26	11420366	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.308 \pm 3.655) \times 10^{-2}$	11420366	1.434×10^{-2}	1.484×10^{-2}	4.065×10^{-4}	1.77	9.642×10^{-3}	2.398×10^{-2}
fitted radiance shift [nm]	$(-3.673 \pm 24.902) \times 10^{-4}$	11420366	1.887×10^{-3}	-3.305×10^{-4}	-4.534×10^{-2}	4.223×10^{-2}	-1.351×10^{-3}	5.362×10^{-4}
fitted radiance squeeze [1]	$(-3.841 \pm 190.799) \times 10^{-6}$	11420366	2.115×10^{-4}	-7.657×10^{-7}	-1.656×10^{-2}	1.687×10^{-2}	-1.073×10^{-4}	1.042×10^{-4}
fitted root mean square [1]	$(1.340 \pm 0.608) \times 10^{-3}$	11420366	6.289×10^{-4}	1.144×10^{-3}	3.323×10^{-4}	7.575×10^{-2}	9.466×10^{-4}	1.575×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.875 ± 0.390	11420366	0.484	0.817	5.000×10^{-2}	2.83	0.609	1.09
sulfurdioxide total air mass factor polluted precision [1]	$(9.987 \pm 9.275) \times 10^{-2}$	11420366	9.500×10^{-2}	6.940×10^{-2}	4.702×10^{-3}	1.82	3.977×10^{-2}	0.135
sulfurdioxide clear air mass factor polluted [1]	0.733 ± 0.228	11420366	0.293	0.713	0.129	2.32	0.578	0.871
number of spectral points in retrieval [1]	73.4 ± 0.5	11420366	1.000	73.0	52.0	156	73.0	74.0

Table 6: Parameterlist and basic statistics for the analysis for observations over land

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.701 ± 0.406	4039851	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(3.093 \pm 181.468) \times 10^{-2}$	4039851	0.475	1.023×10^{-2}	-54.8	1.378×10^3	-0.223	0.251
sulfurdioxide total vertical column precision [DU]	0.523 ± 0.666	4039851	0.351	0.369	4.281×10^{-2}	77.9	0.229	0.580
sulfurdioxide slant column density corrected [DU]	$(2.542 \pm 260.618) \times 10^{-2}$	4039851	0.363	8.826×10^{-3}	-20.9	2.023×10^3	-0.171	0.192
sulfurdioxide slant column density cobra [DU]	$(1.772 \pm 36.131) \times 10^{-2}$	4039851	0.363	8.826×10^{-3}	-20.9	55.3	-0.171	0.192
sulfurdioxide slant column density cobra precision [DU]	0.283 ± 0.111	4039851	0.103	0.256	9.120×10^{-2}	19.0	0.216	0.319
sulfurdioxide slant column density window1 [DU]	0.173 ± 0.655	4039851	0.722	0.167	-38.4	70.8	-0.194	0.528
sulfurdioxide slant column density window1 precision [DU]	0.283 ± 0.111	4039851	0.103	0.256	9.120×10^{-2}	19.0	0.216	0.319
sulfurdioxide slant column density corrected win1 [DU]	$(-7.691 \pm 6506.257) \times 10^{-4}$	4039851	0.714	-1.864×10^{-2}	-38.4	70.7	-0.370	0.344
background so2 slant column offset window1 [DU]	-0.174 ± 0.101	4039851	0.112	-0.190	-0.666	1.08	-0.237	-0.125
sulfurdioxide slant column density window2 [DU]	0.338 ± 9.578	4039851	11.7	0.249	-1.963×10^3	1.453×10^3	-5.58	6.16
sulfurdioxide slant column density window2 precision [DU]	8.57 ± 2.58	4039851	2.70	8.23	2.45	612	7.01	9.71
sulfurdioxide slant column density corrected win2 [DU]	-2.46 ± 9.50	4039851	11.6	-2.47	-1.968×10^3	1.451×10^3	-8.27	3.34
background so2 slant column offset window2 [DU]	-2.80 ± 1.59	4039851	2.09	-2.46	-12.2	5.50	-3.80	-1.71
sulfurdioxide slant column density window3 [DU]	-7.65 ± 24.86	4039851	30.8	-7.06	-445	2.027×10^3	-22.8	8.03
sulfurdioxide slant column density window3 precision [DU]	32.1 ± 16.9	4039851	11.8	27.4	10.1	271	22.9	34.7
sulfurdioxide slant column density corrected win3 [DU]	8.24 ± 24.91	4039851	31.1	8.75	-430	2.023×10^3	-7.08	24.0
background so2 slant column offset window3 [DU]	15.9 ± 5.4	4039851	8.72	15.6	-5.27	33.3	11.7	20.4
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.16	4039851	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.009 \pm 9.536) \times 10^{-2}$	4039851	6.115×10^{-2}	2.608×10^{-2}	2.145×10^{-4}	1.33	9.390×10^{-3}	7.054×10^{-2}
fitted radiance shift [nm]	$(-1.951 \pm 33.140) \times 10^{-4}$	4039851	1.837×10^{-3}	-2.837×10^{-4}	-4.739×10^{-2}	4.577×10^{-2}	-1.143×10^{-3}	6.939×10^{-4}
fitted radiance squeeze [1]	$(-2.391 \pm 17.144) \times 10^{-5}$	4039851	2.048×10^{-4}	-2.179×10^{-5}	-1.412×10^{-2}	1.504×10^{-2}	-1.254×10^{-4}	7.938×10^{-5}
fitted root mean square [1]	$(1.238 \pm 0.431) \times 10^{-3}$	4039851	4.233×10^{-4}	1.151×10^{-3}	3.463×10^{-4}	3.939×10^{-2}	9.714×10^{-4}	1.395×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.849 ± 0.496	4039851	0.568	0.715	5.000×10^{-2}	3.05	0.511	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.117 ± 0.127	4039851	0.131	6.674×10^{-2}	3.850×10^{-3}	1.52	3.202×10^{-2}	0.163
sulfurdioxide clear air mass factor polluted [1]	0.720 ± 0.358	4039851	0.363	0.648	0.112	2.96	0.490	0.853
number of spectral points in retrieval [1]	73.4 ± 0.5	4039851	1.000	73.0	52.0	156	73.0	74.0

3 Granule outlines

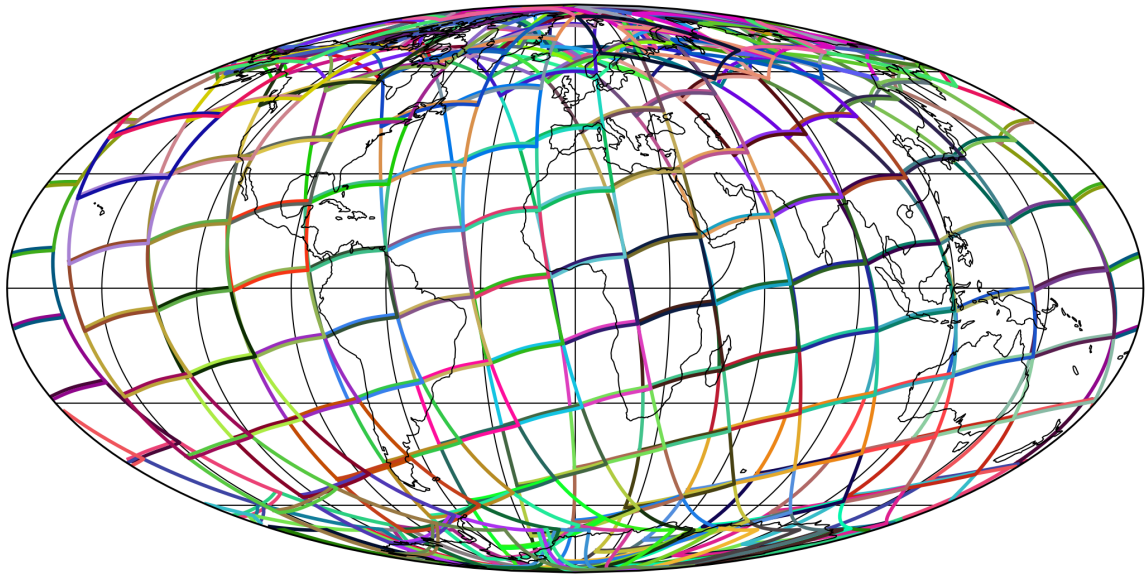


Figure 1: Outline of the granules.

4 Input data monitoring

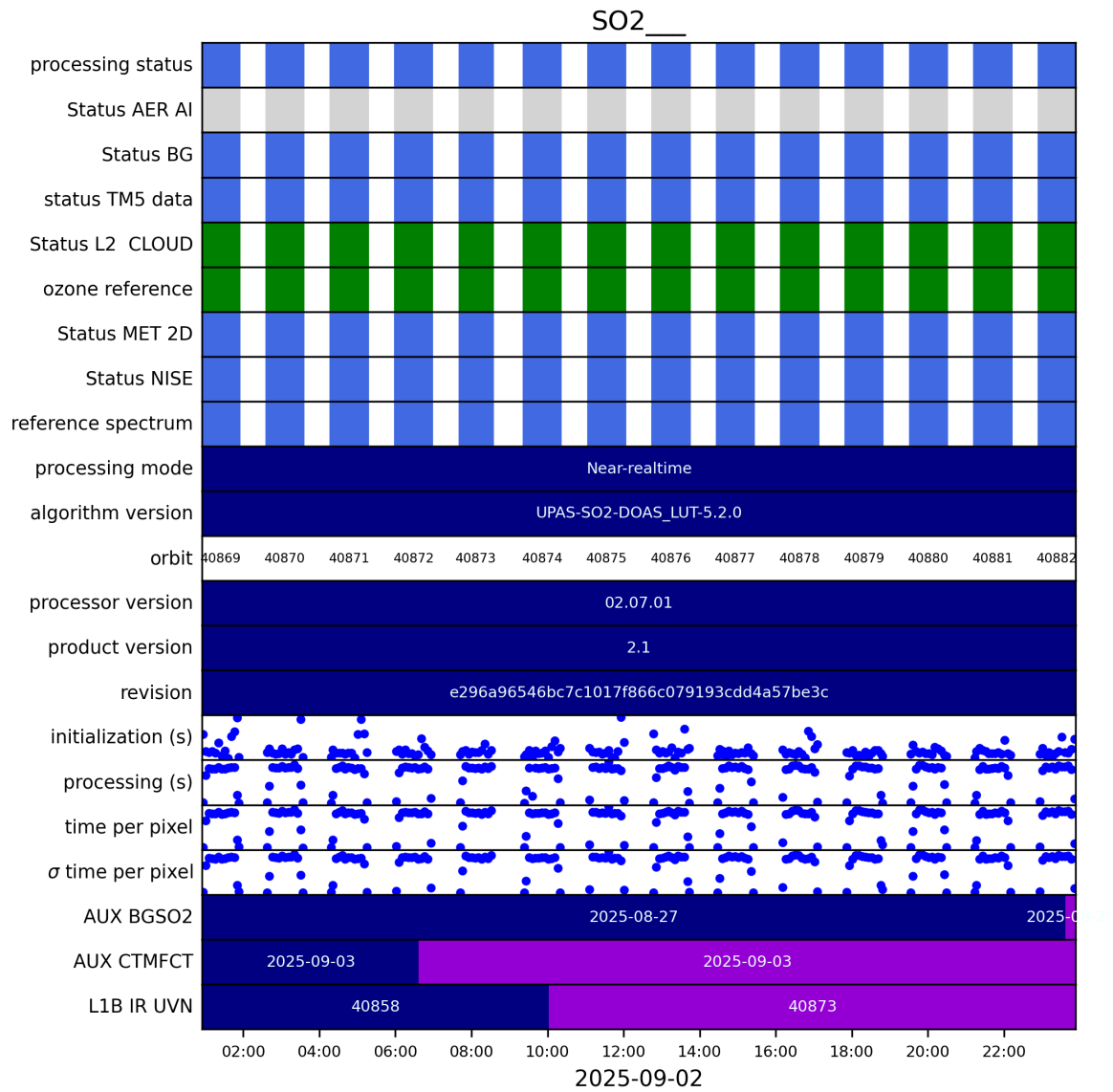


Figure 2: Input data per granule

5 Warnings and errors

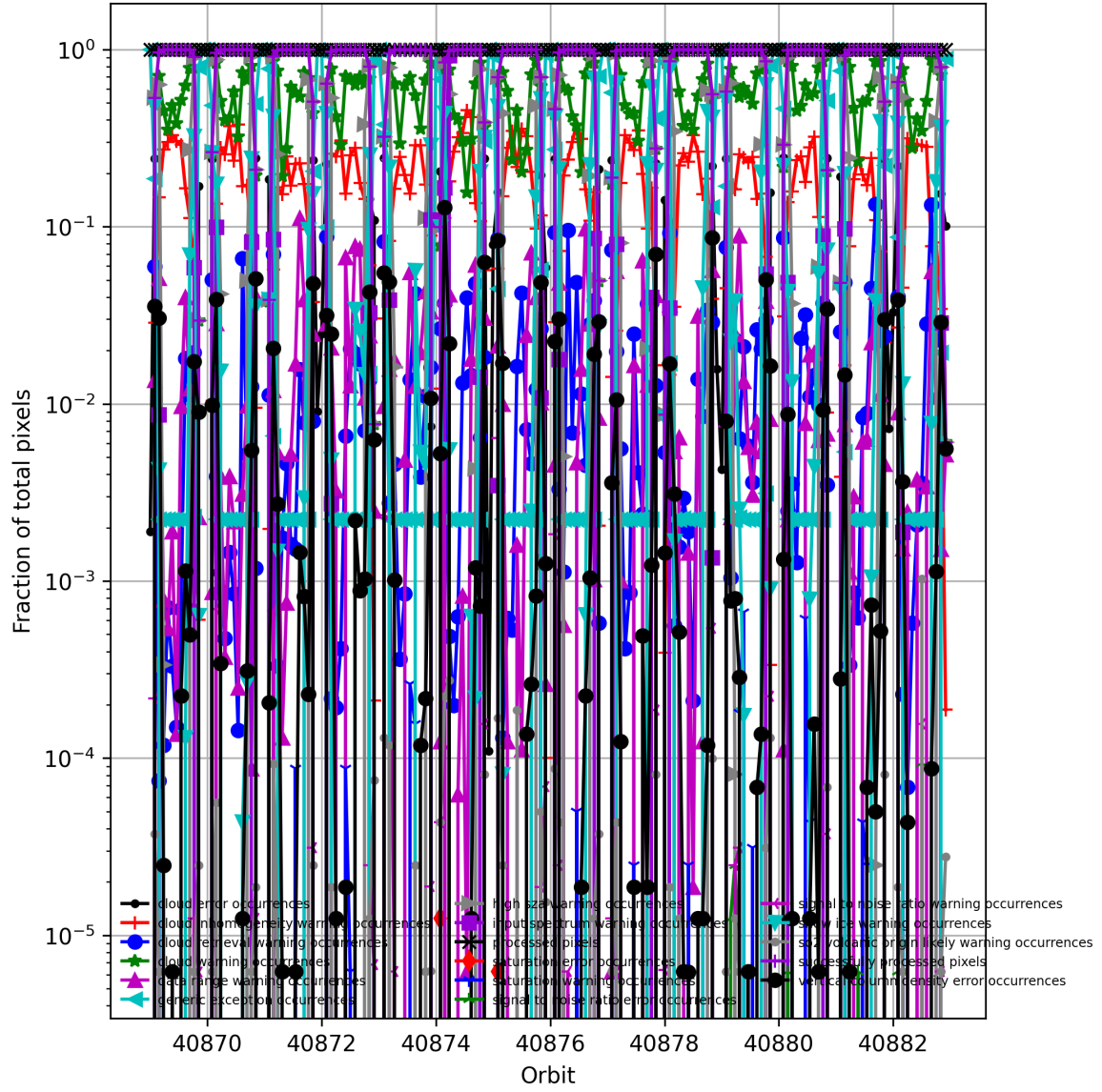


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

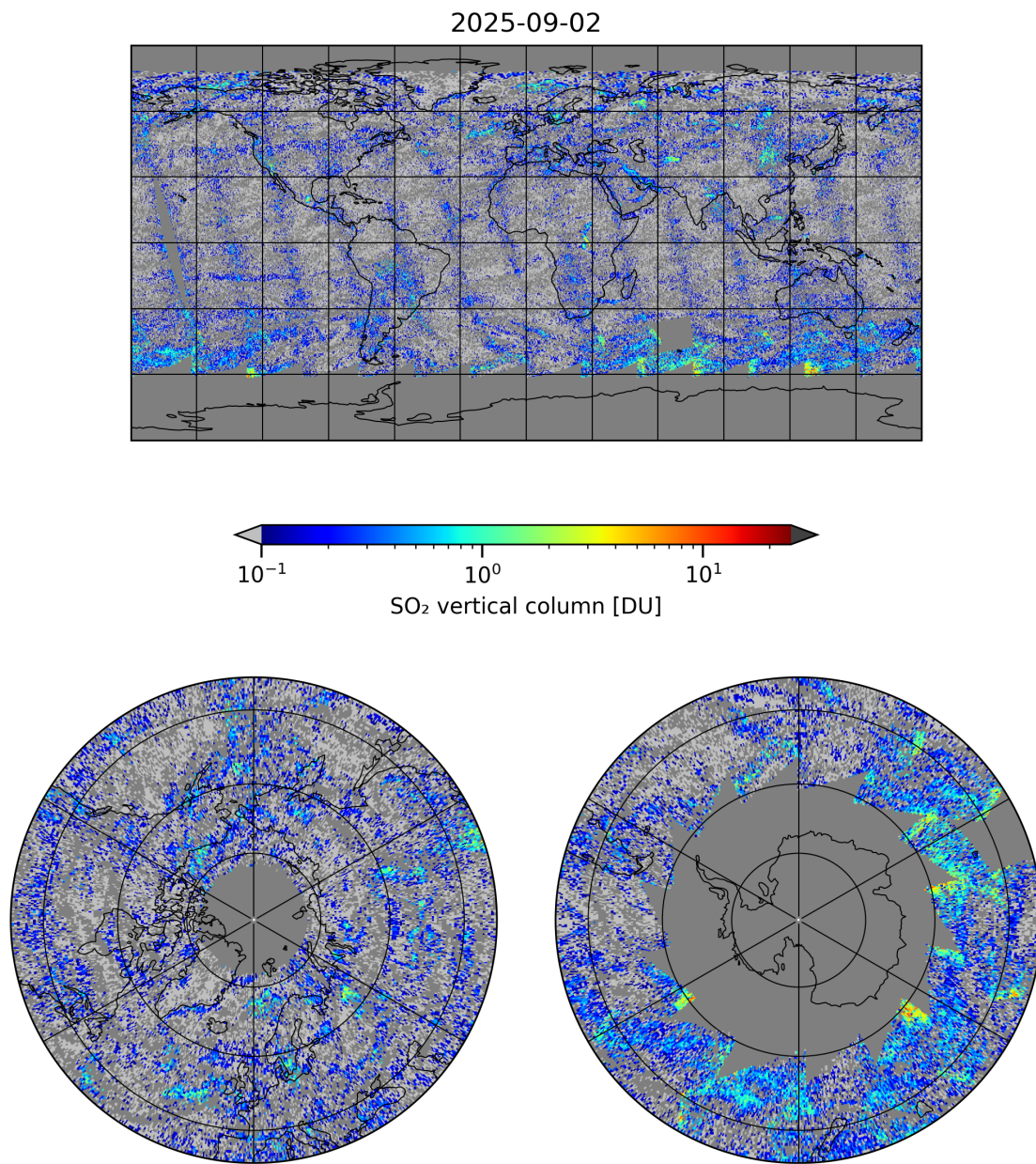


Figure 4: Map of “SO₂ vertical column” for 2025-09-02 to 2025-09-02

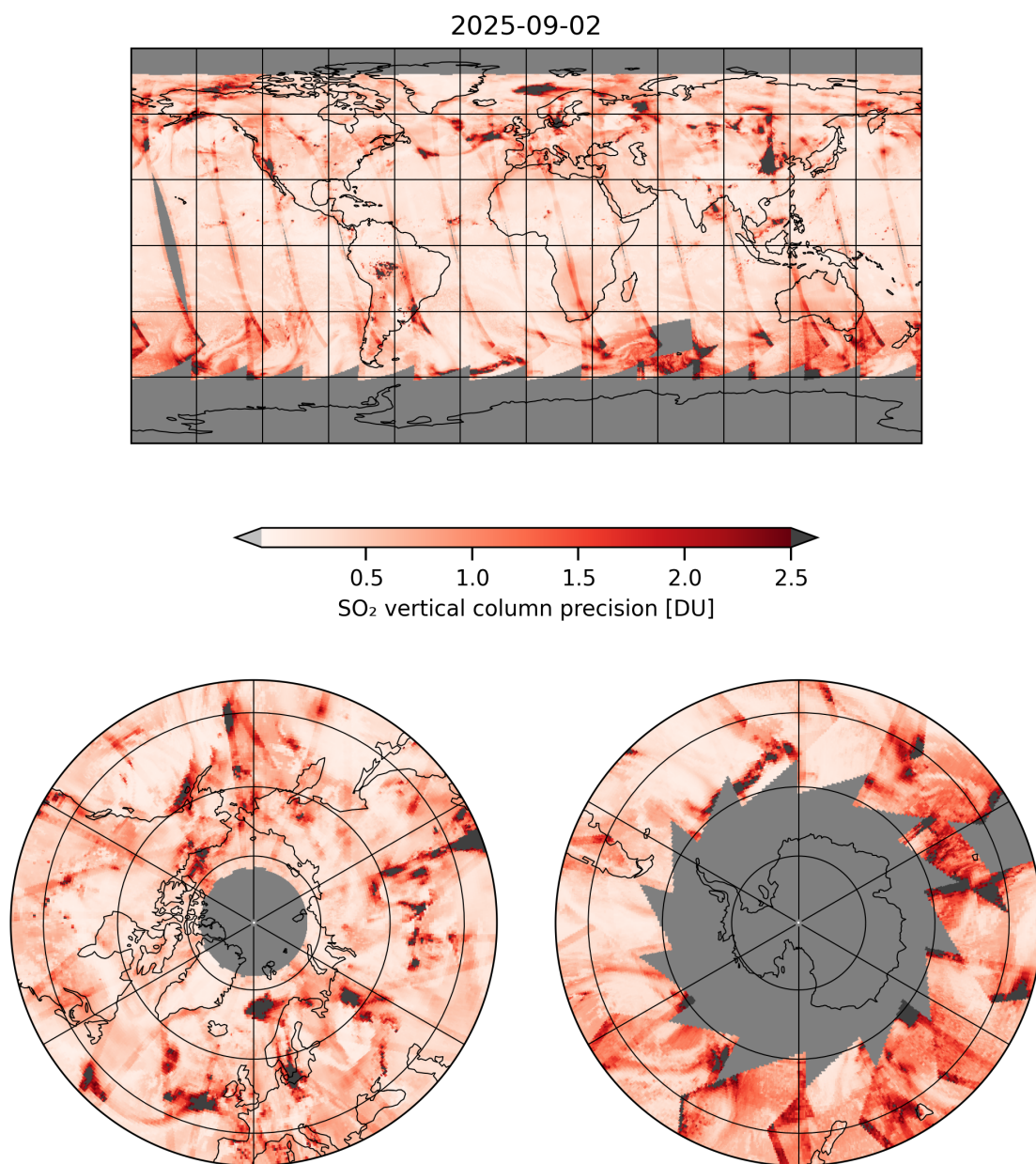


Figure 5: Map of “SO₂ vertical column precision” for 2025-09-02 to 2025-09-02

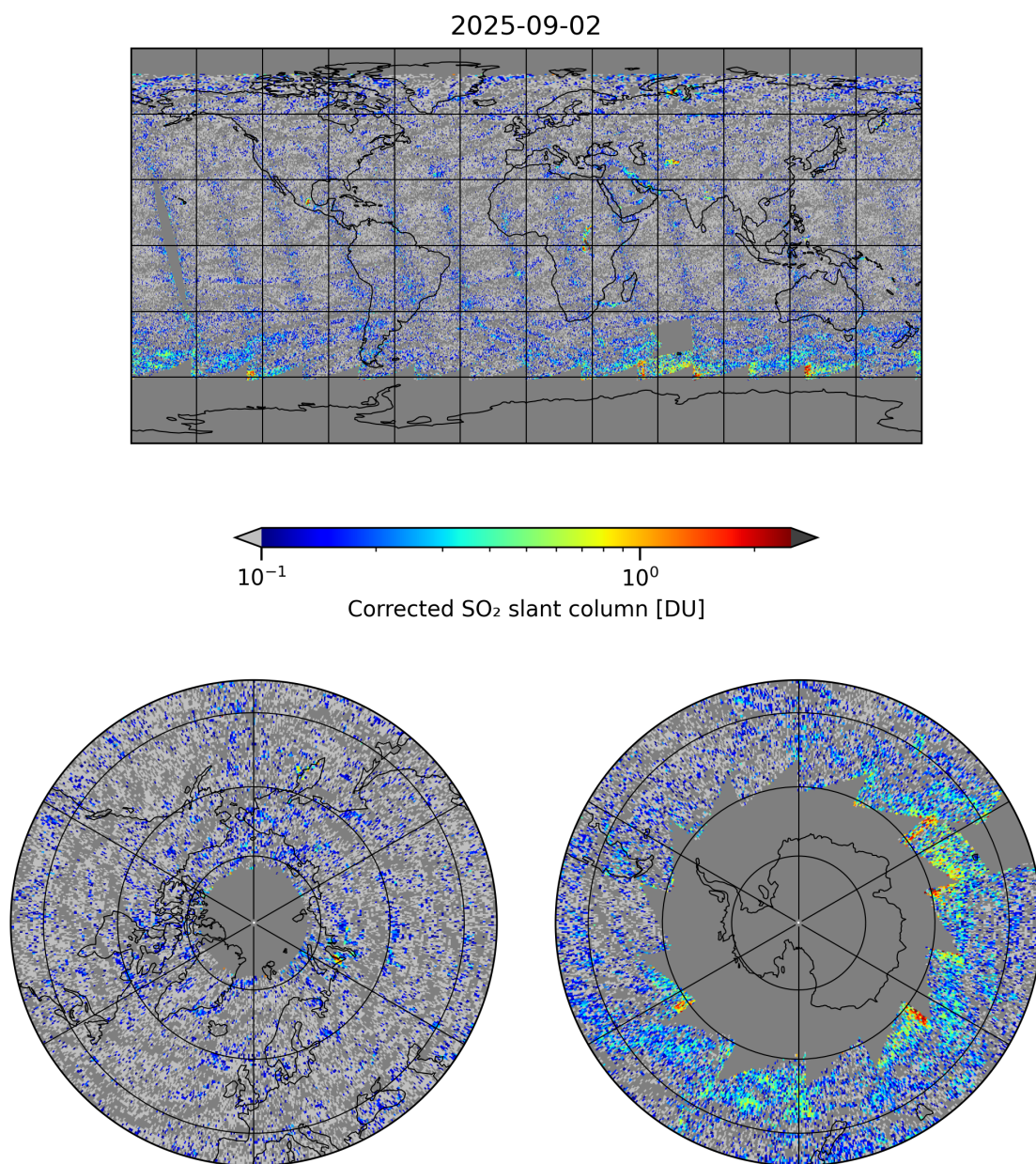


Figure 6: Map of “Corrected SO₂ slant column” for 2025-09-02 to 2025-09-02

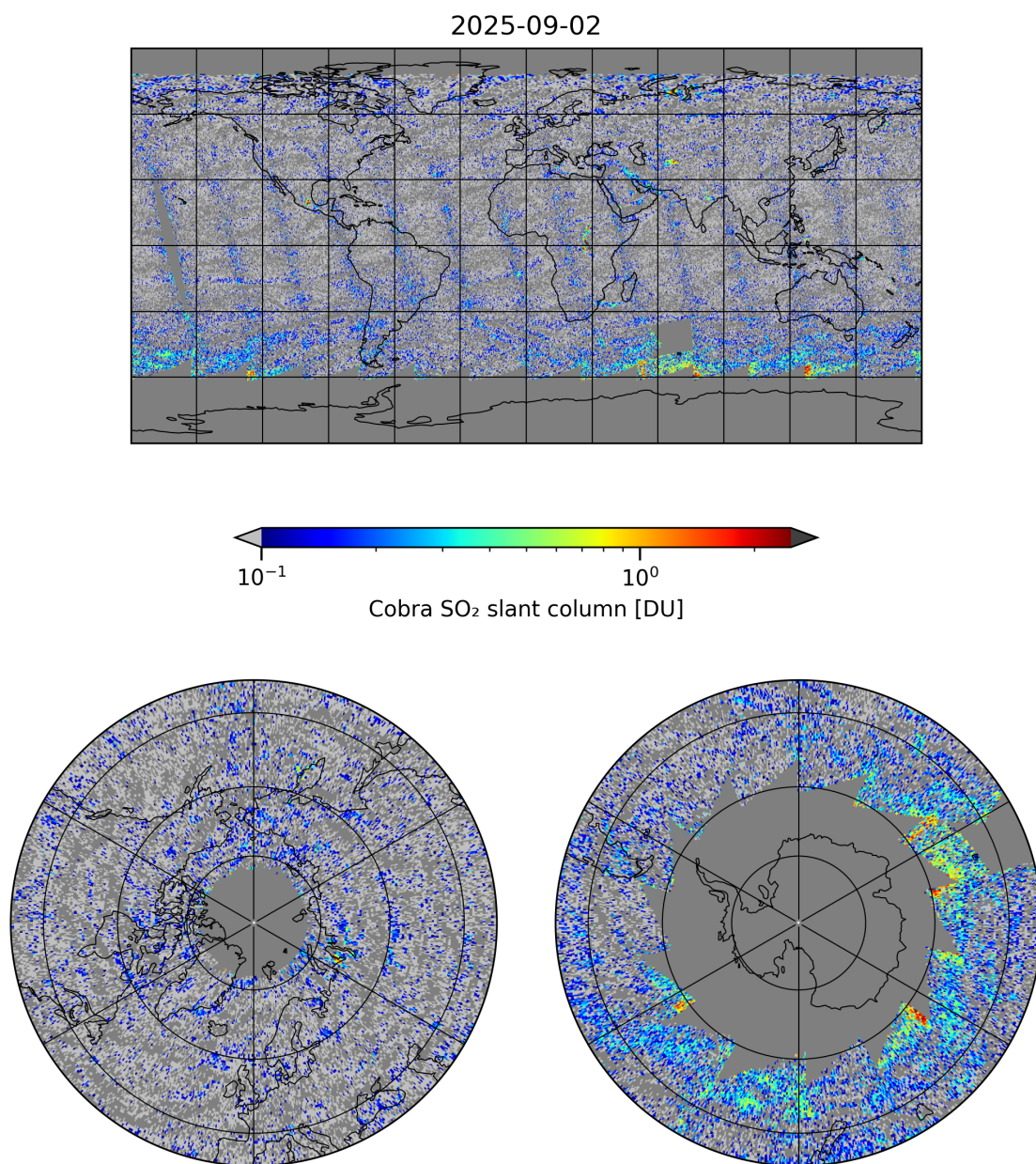


Figure 7: Map of “Cobra SO₂ slant column” for 2025-09-02 to 2025-09-02

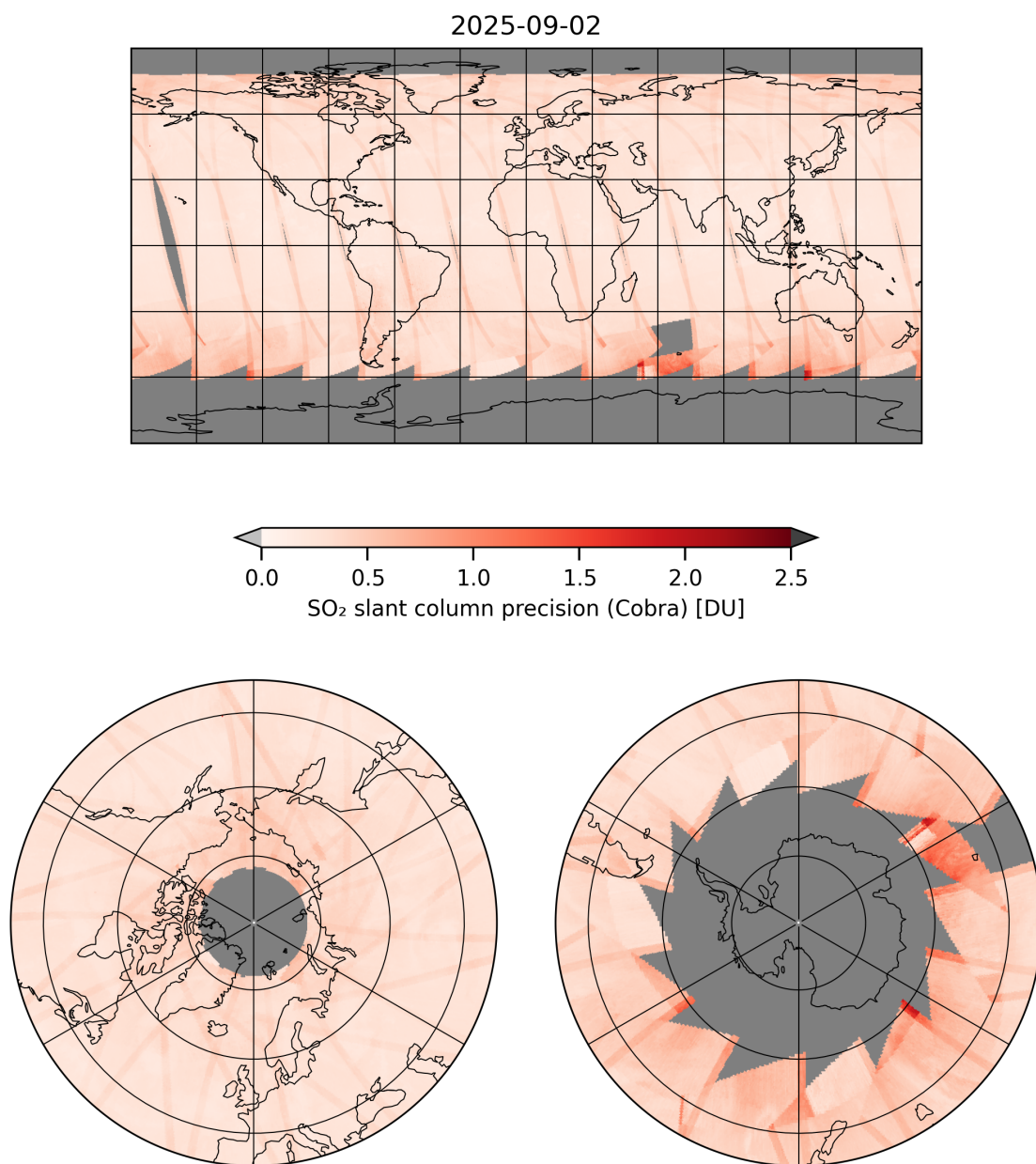


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-09-02 to 2025-09-02

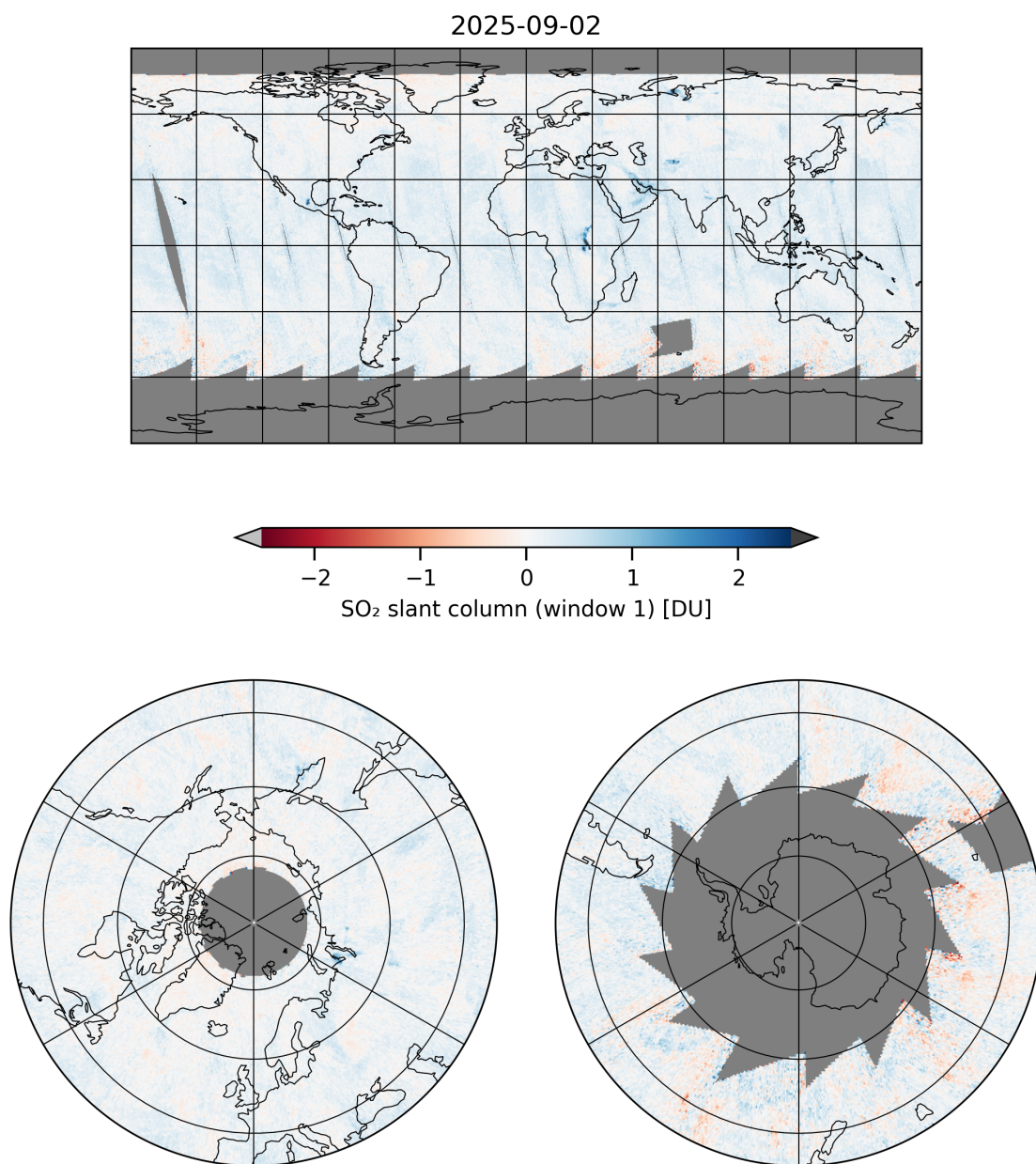


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-09-02 to 2025-09-02

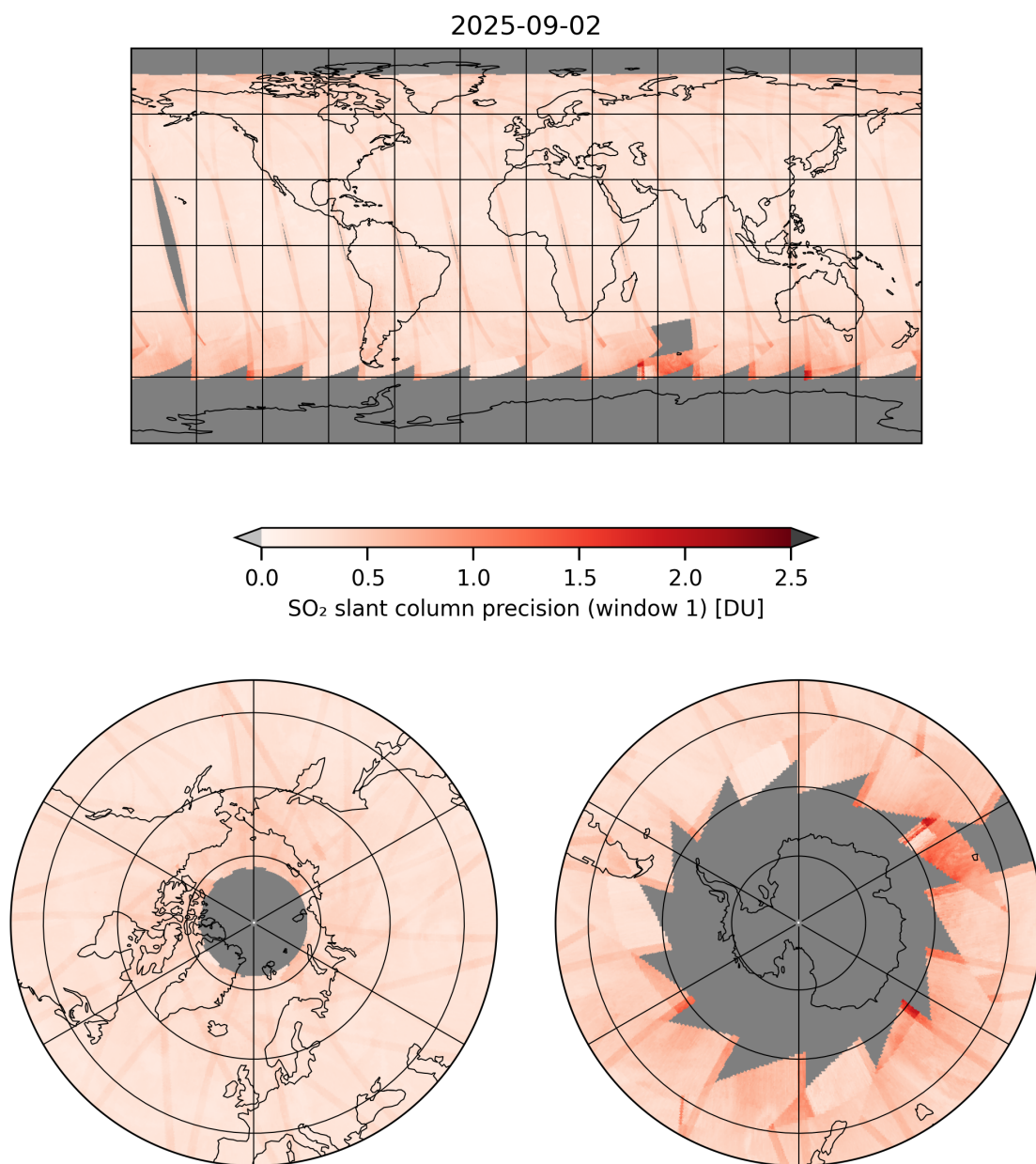


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-09-02 to 2025-09-02

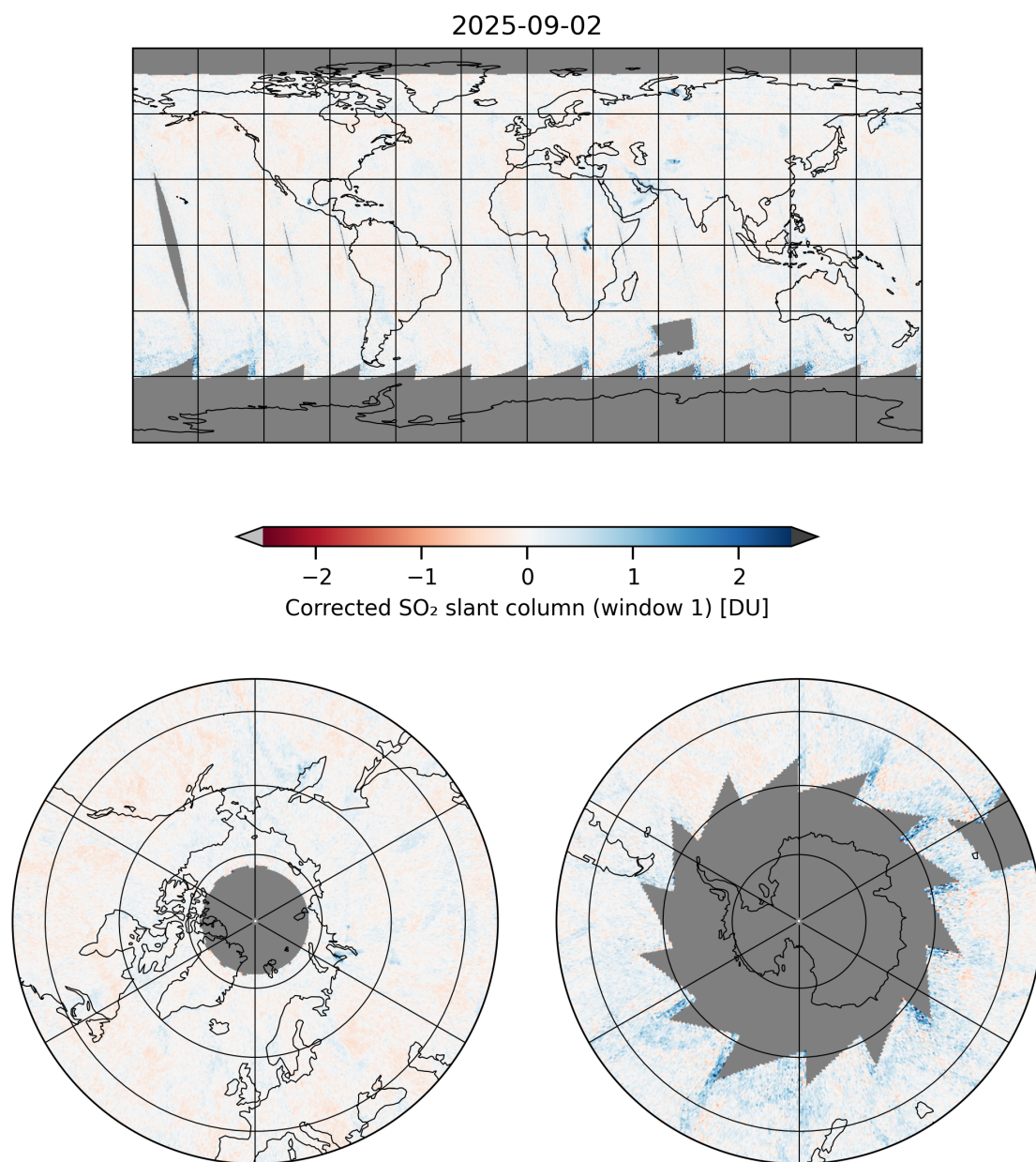


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-09-02 to 2025-09-02

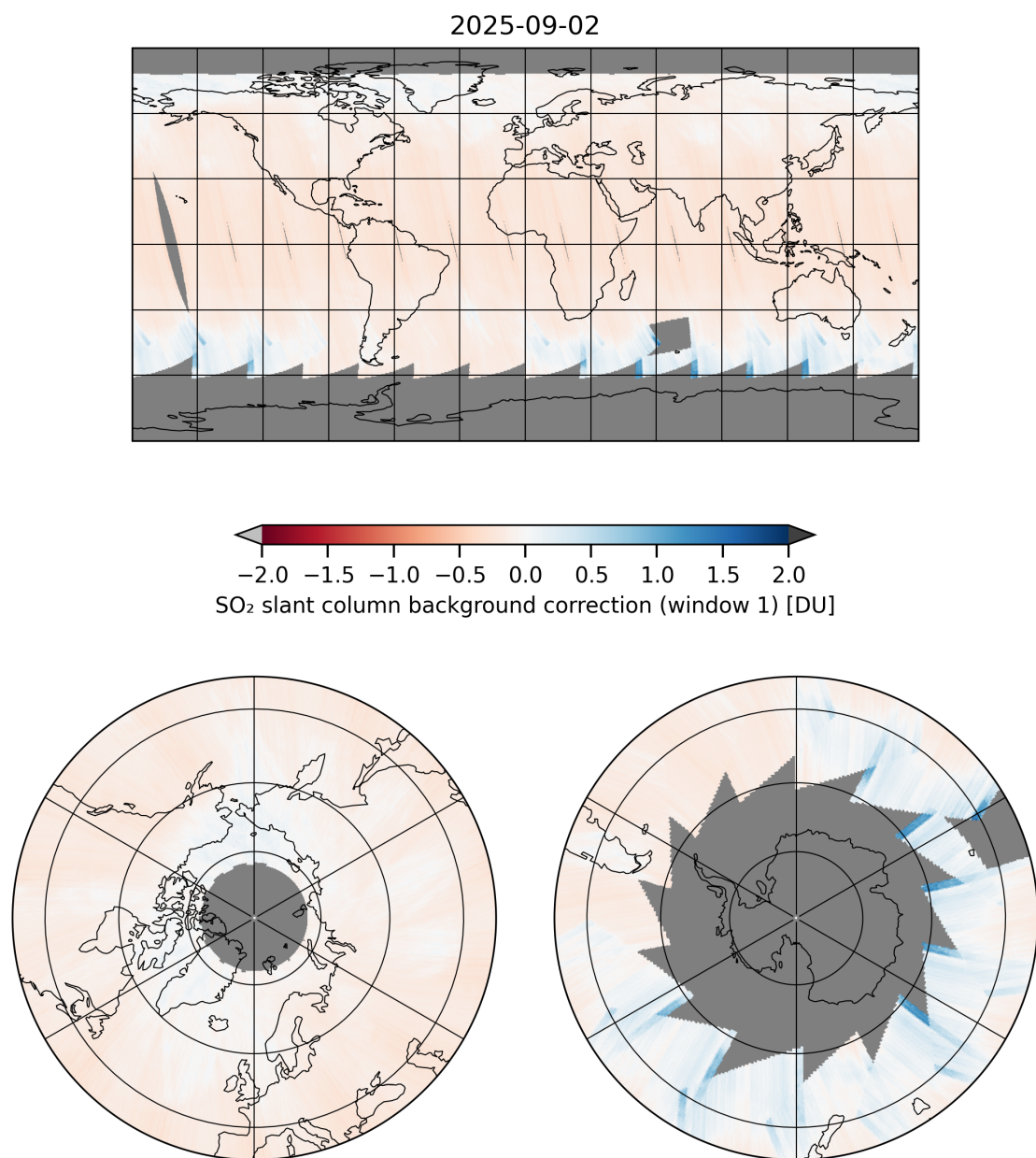


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-09-02 to 2025-09-02

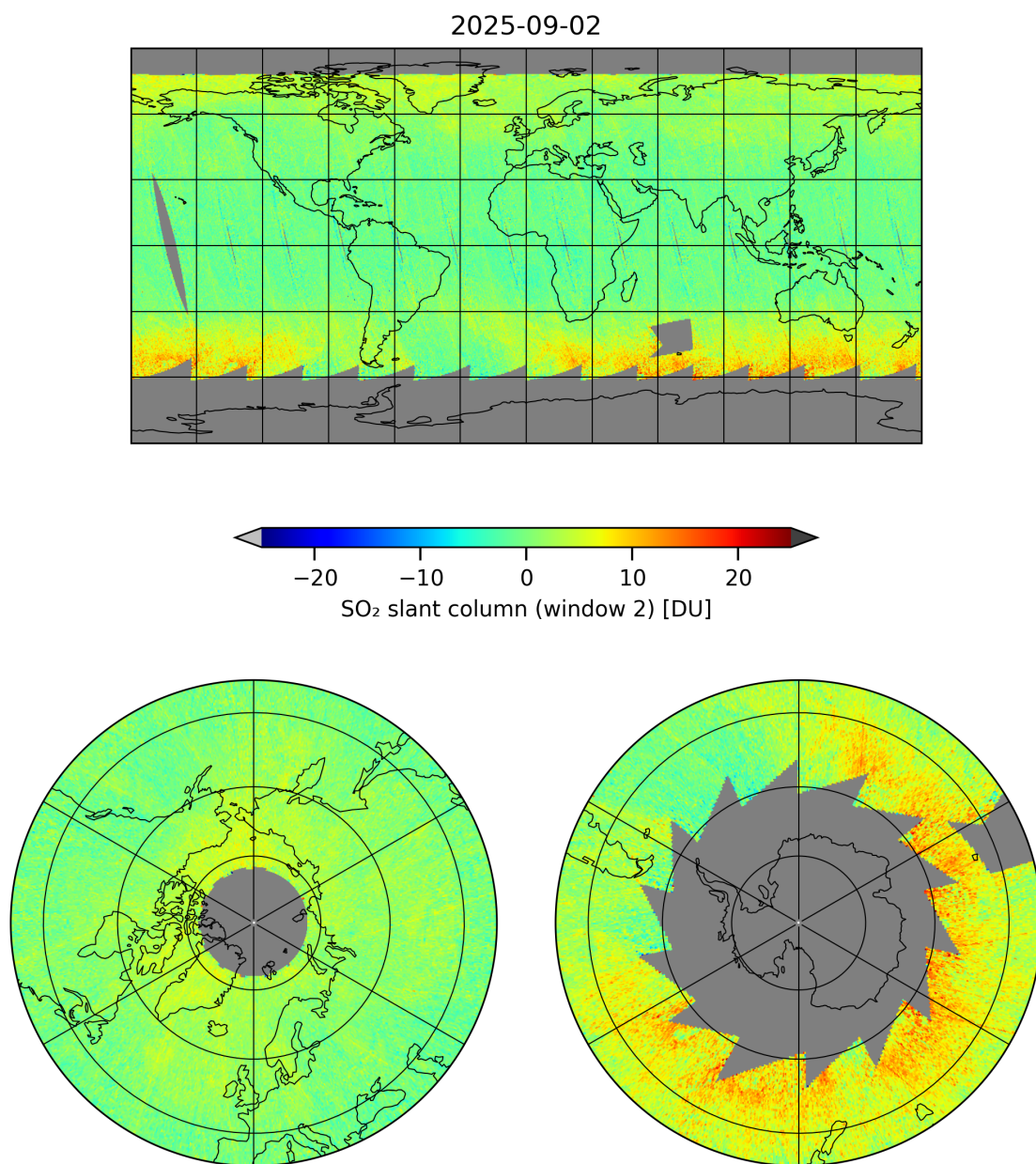


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-09-02 to 2025-09-02

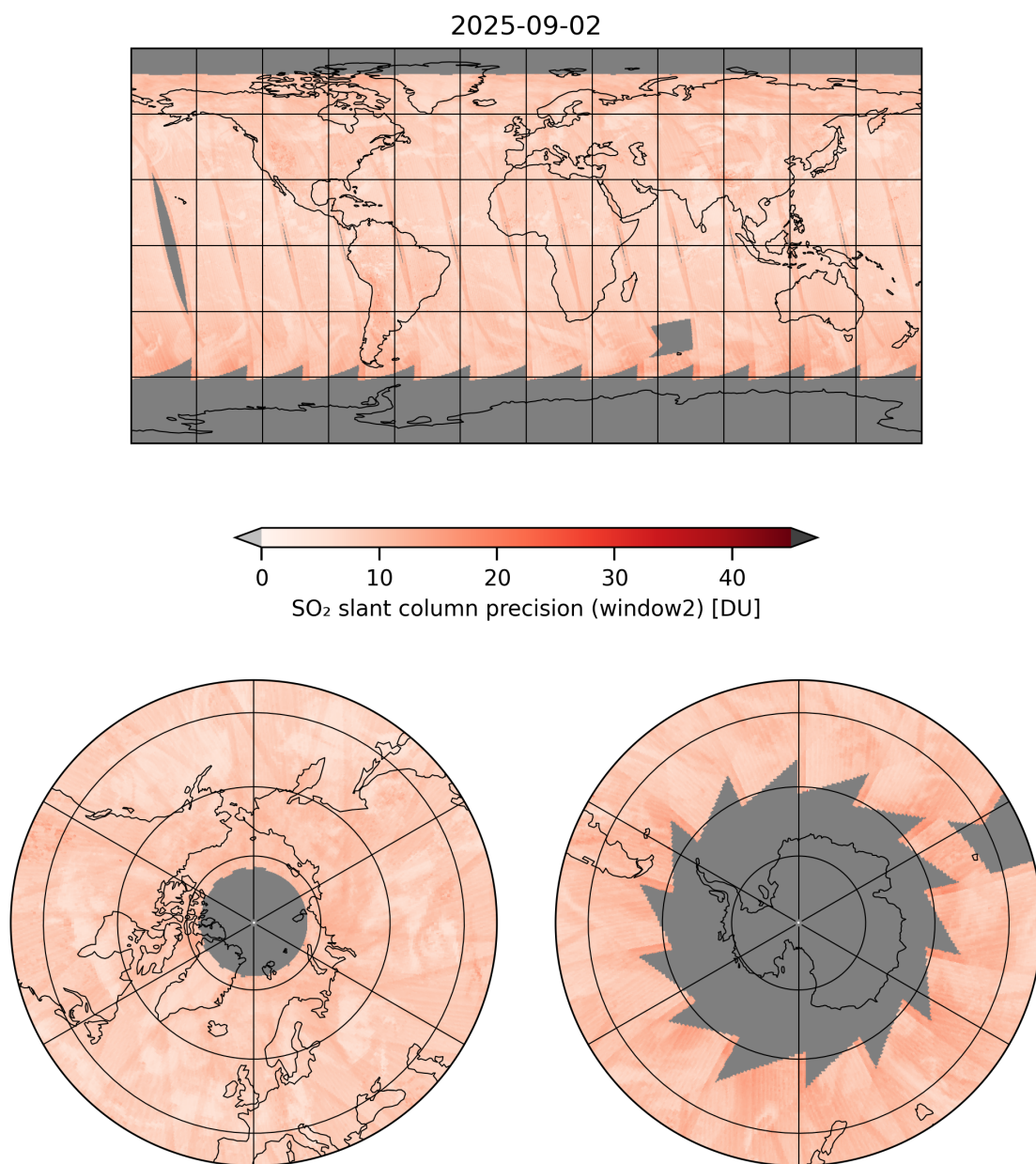


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-09-02 to 2025-09-02

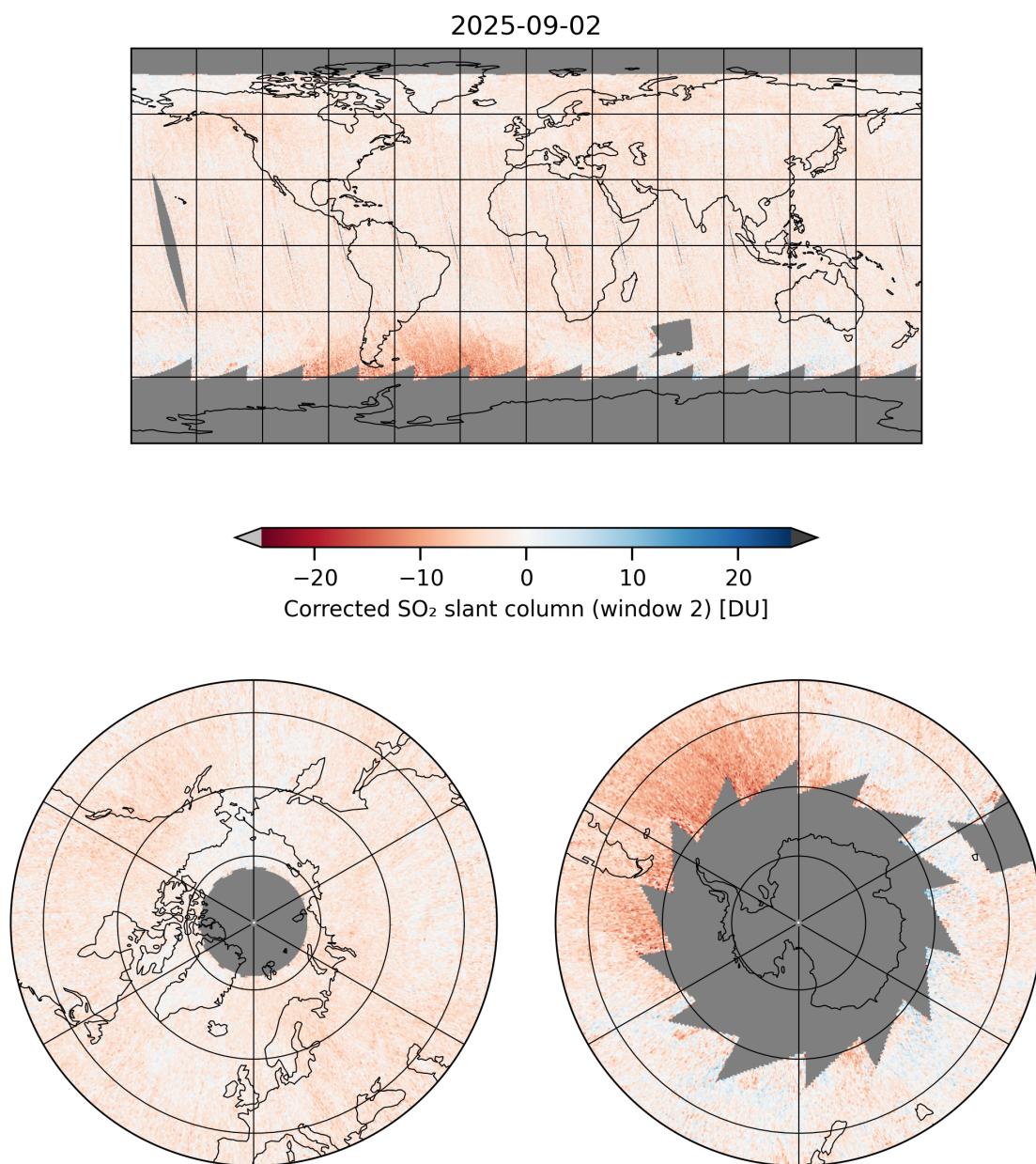


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-09-02 to 2025-09-02

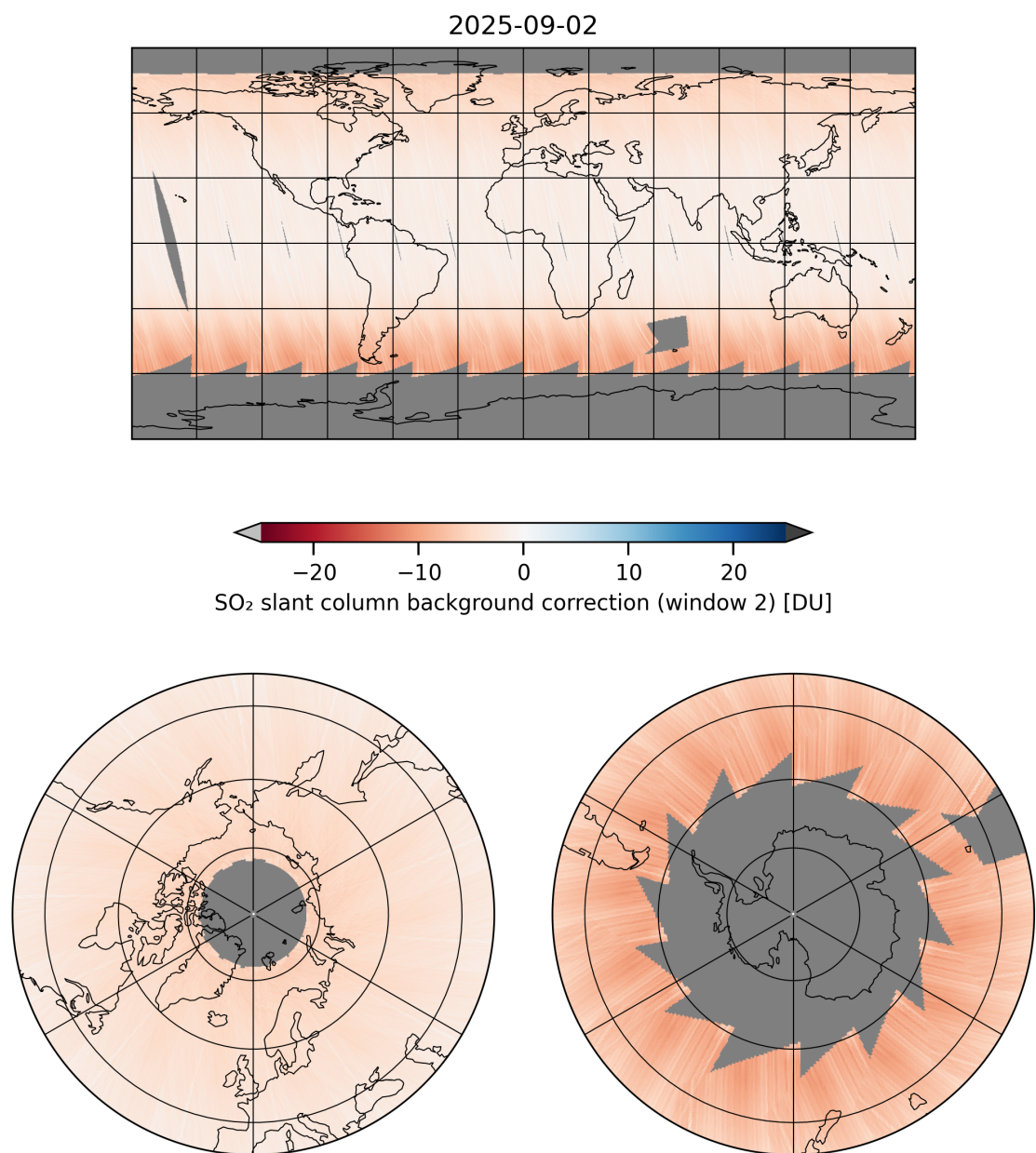


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-09-02 to 2025-09-02

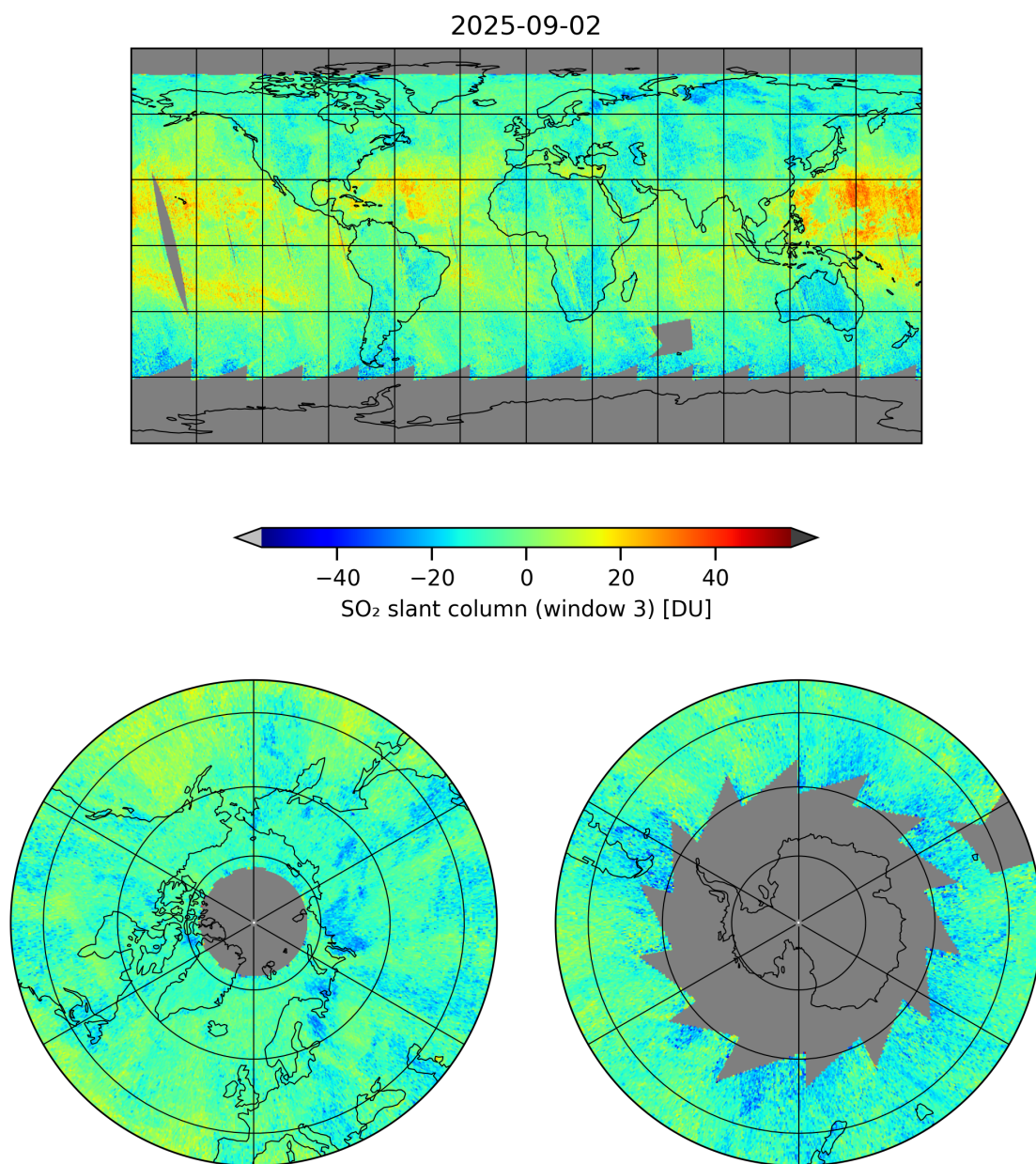


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-09-02 to 2025-09-02

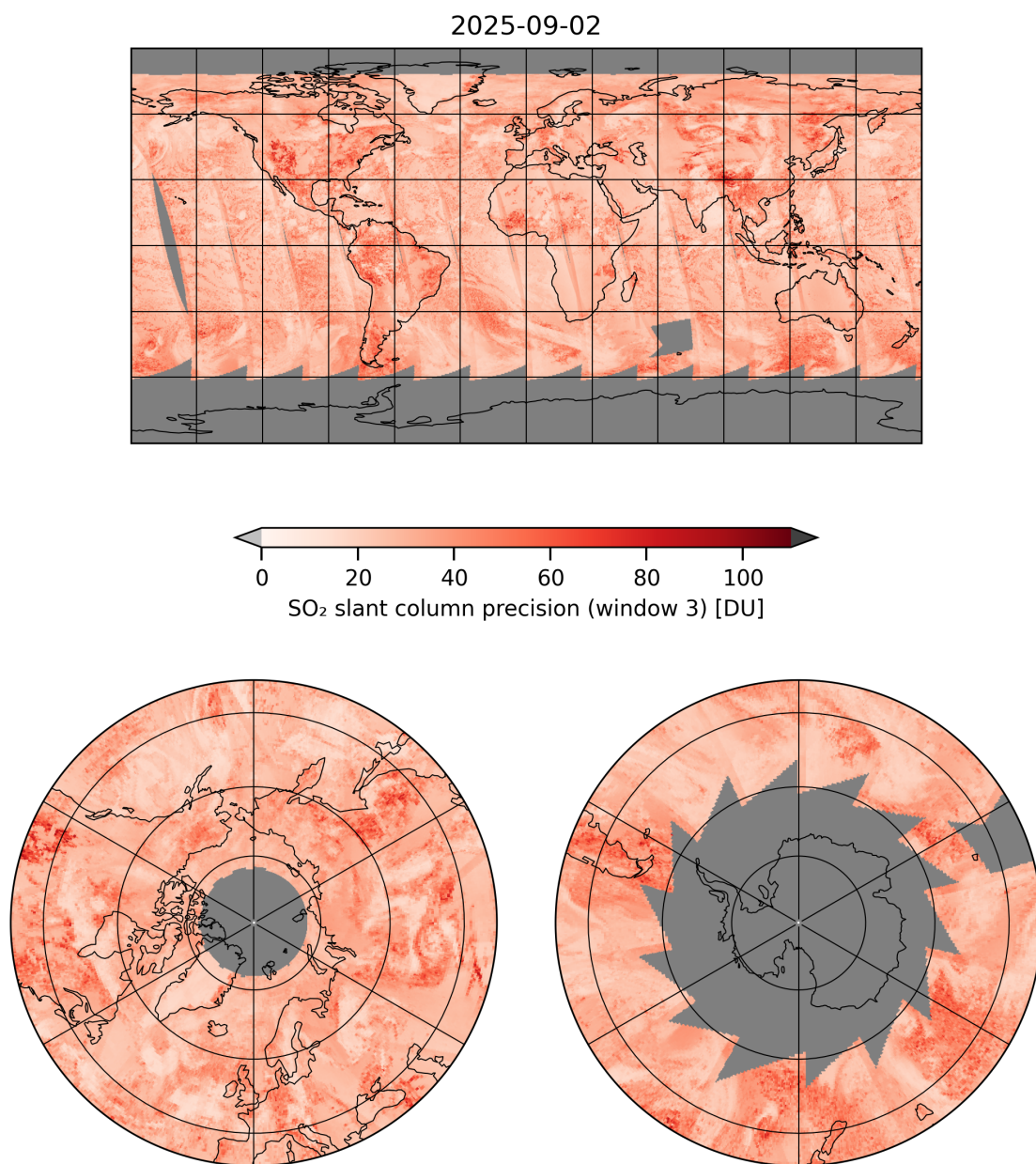


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-09-02 to 2025-09-02

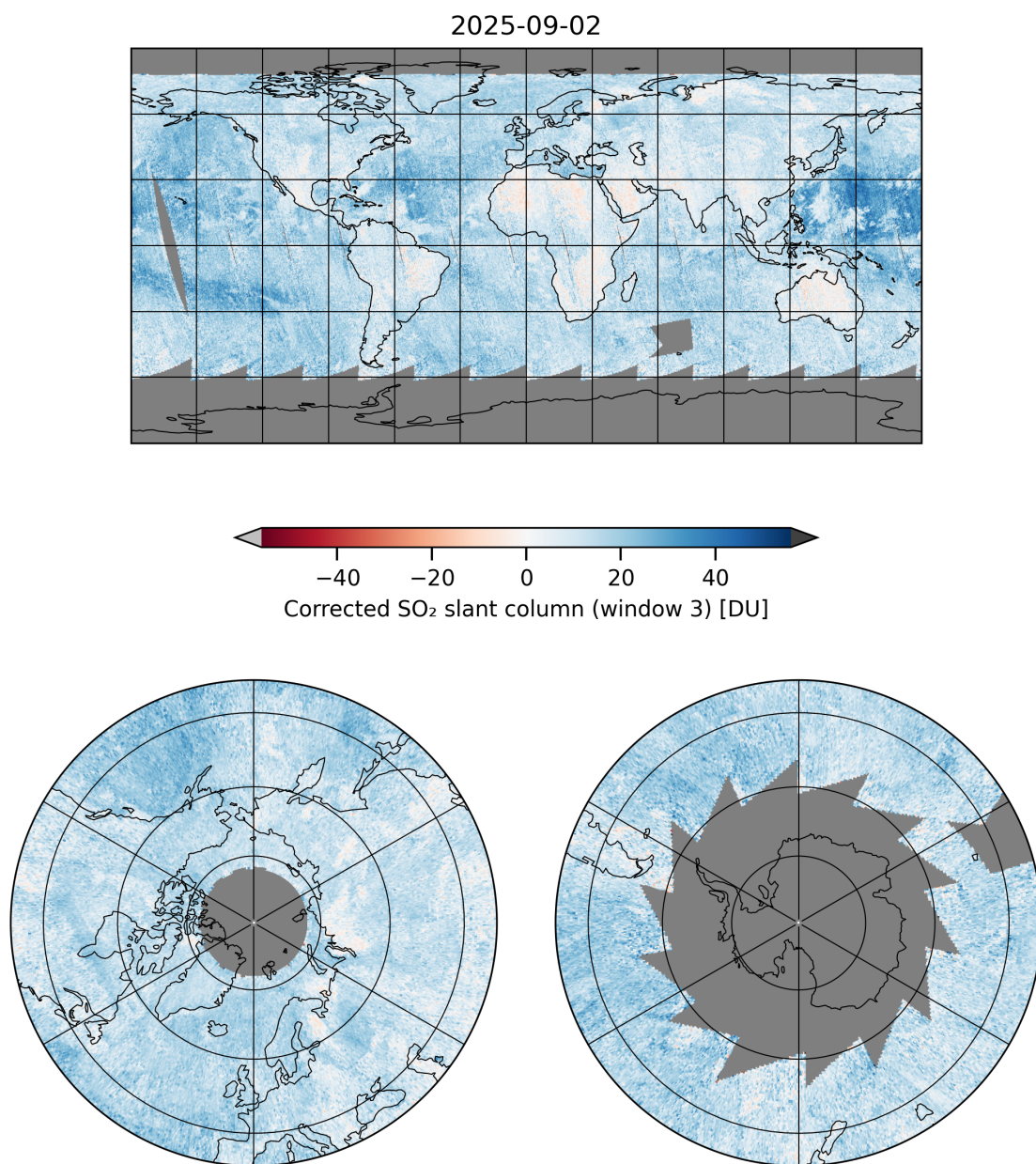


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-09-02 to 2025-09-02

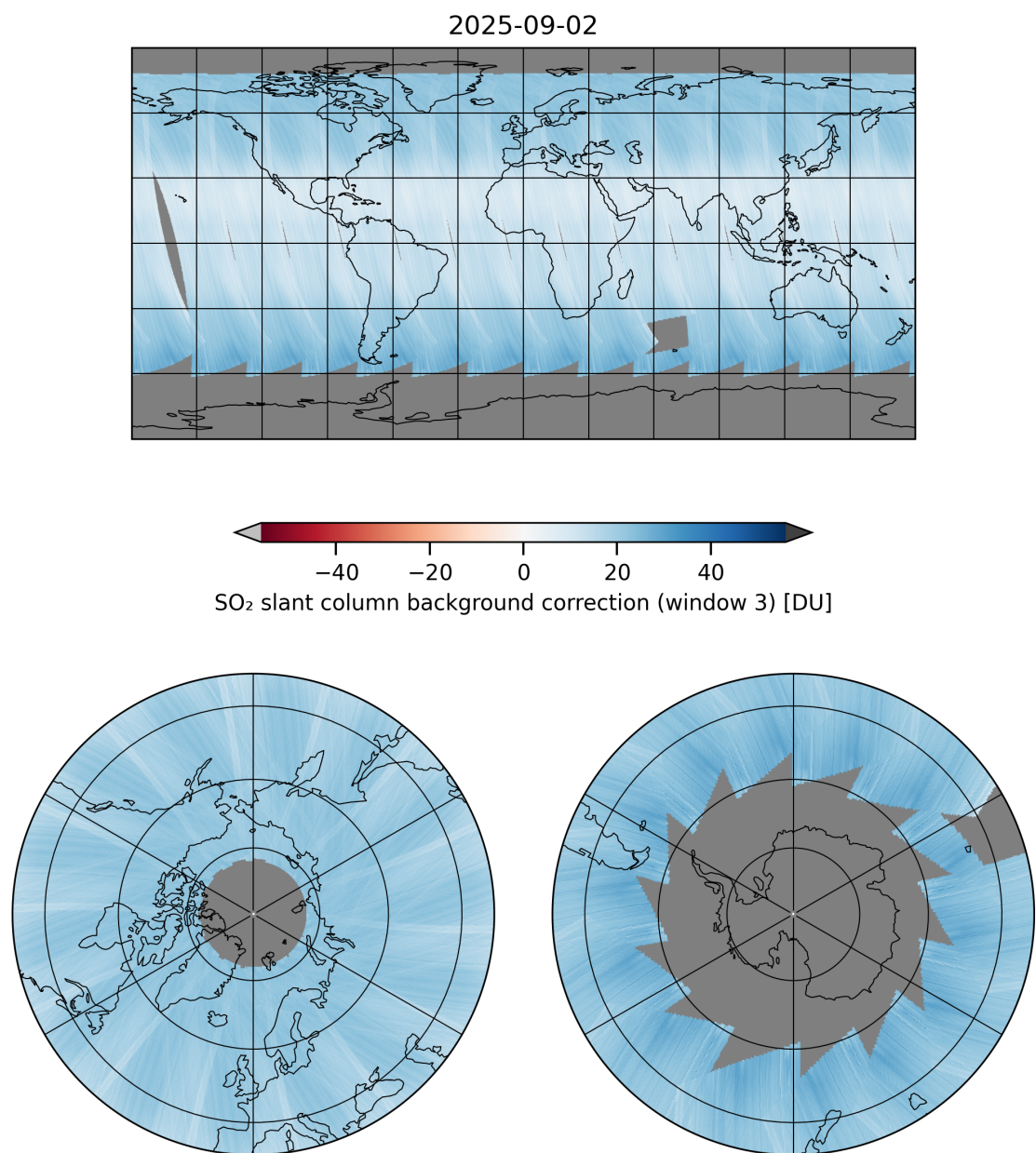


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-09-02 to 2025-09-02

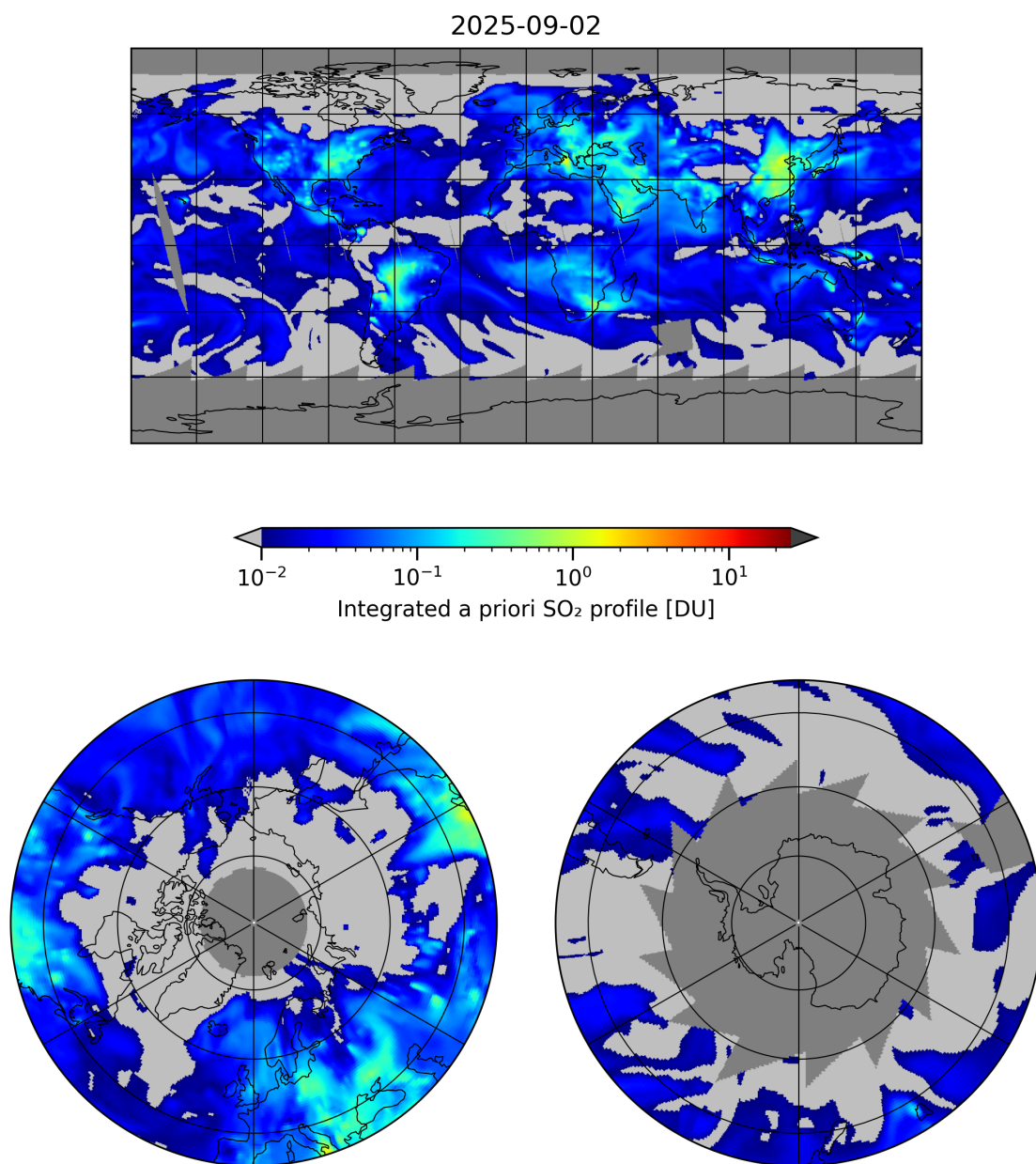


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-09-02 to 2025-09-02

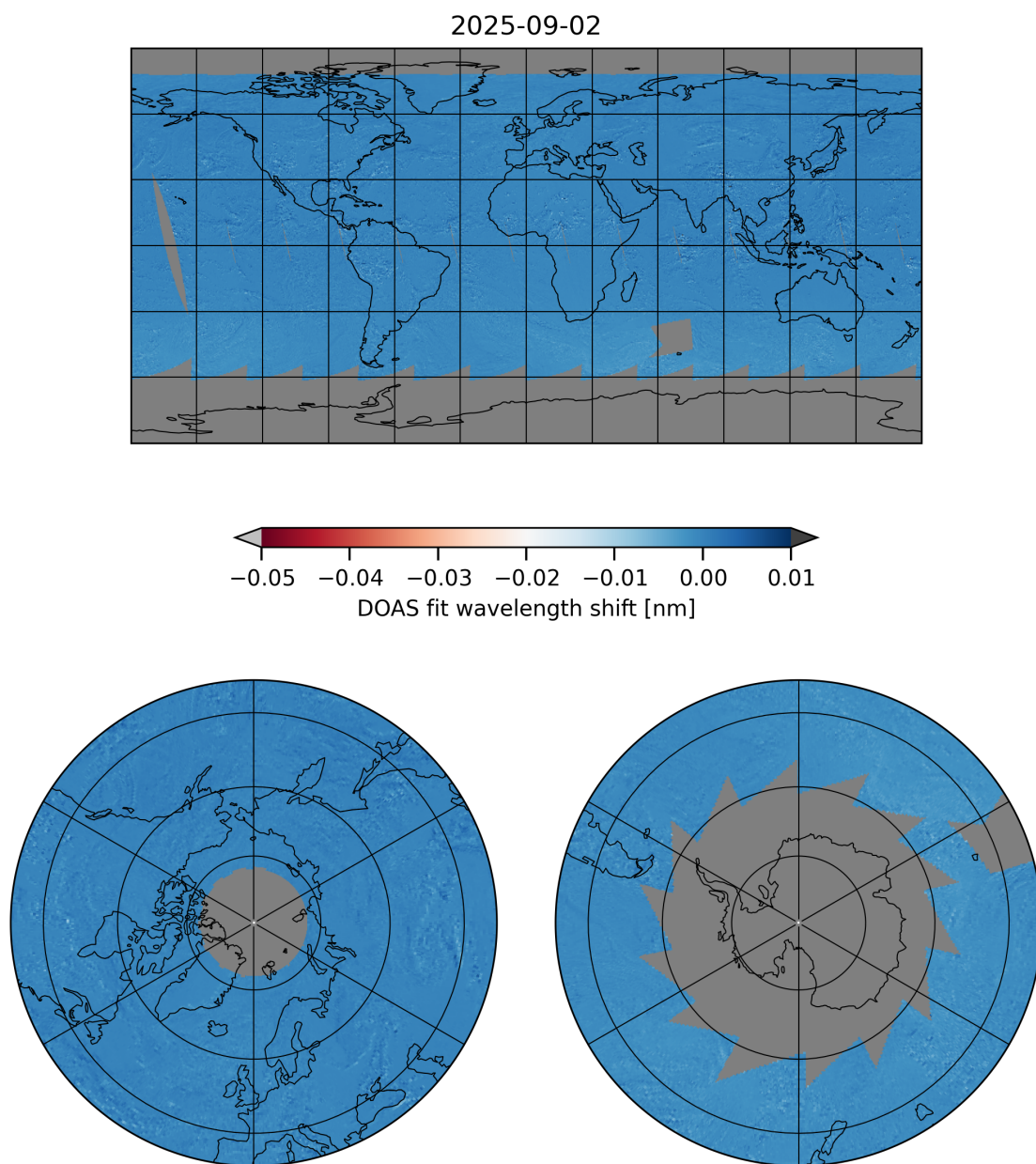


Figure 22: Map of “DOAS fit wavelength shift” for 2025-09-02 to 2025-09-02

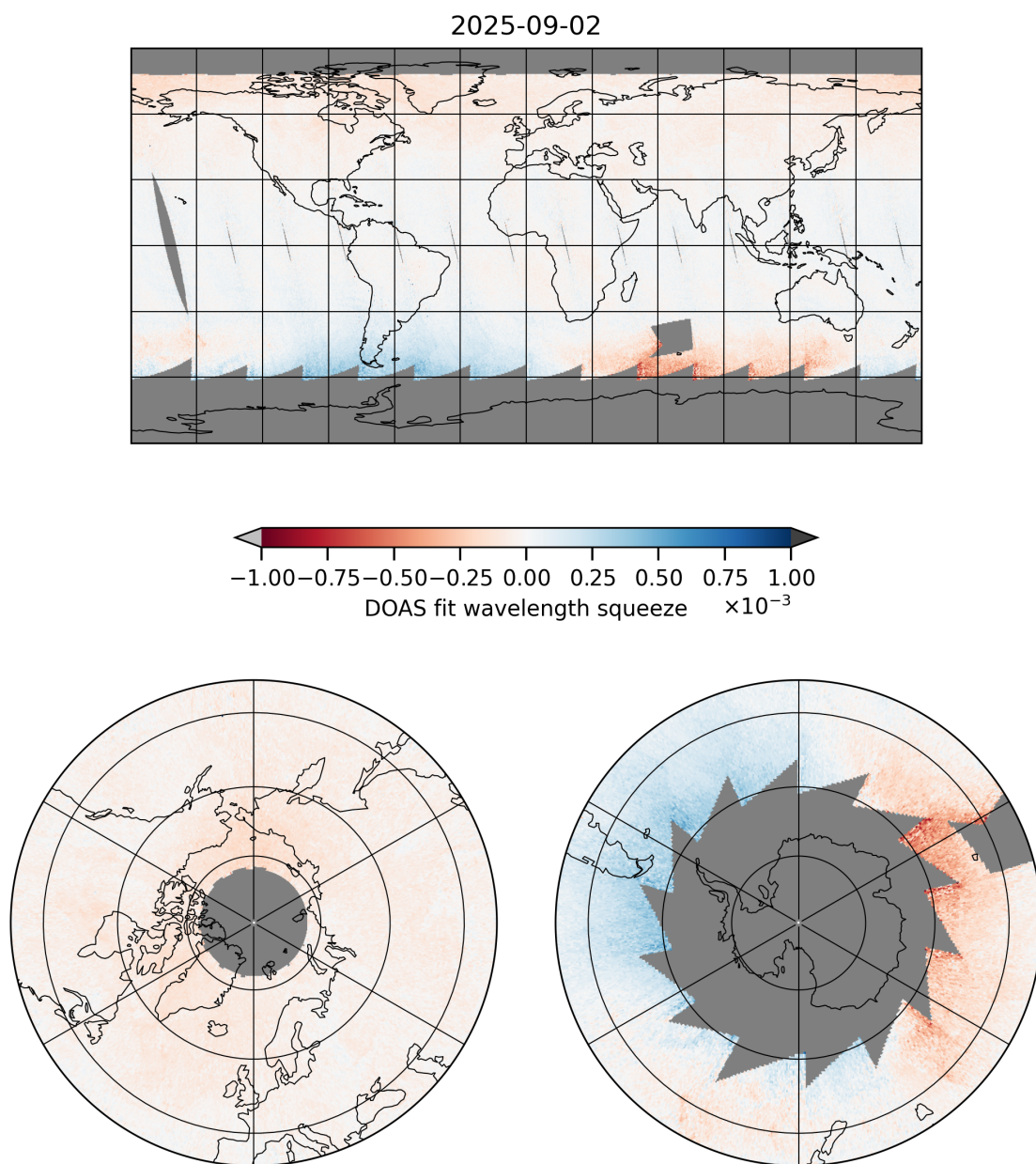


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-09-02 to 2025-09-02

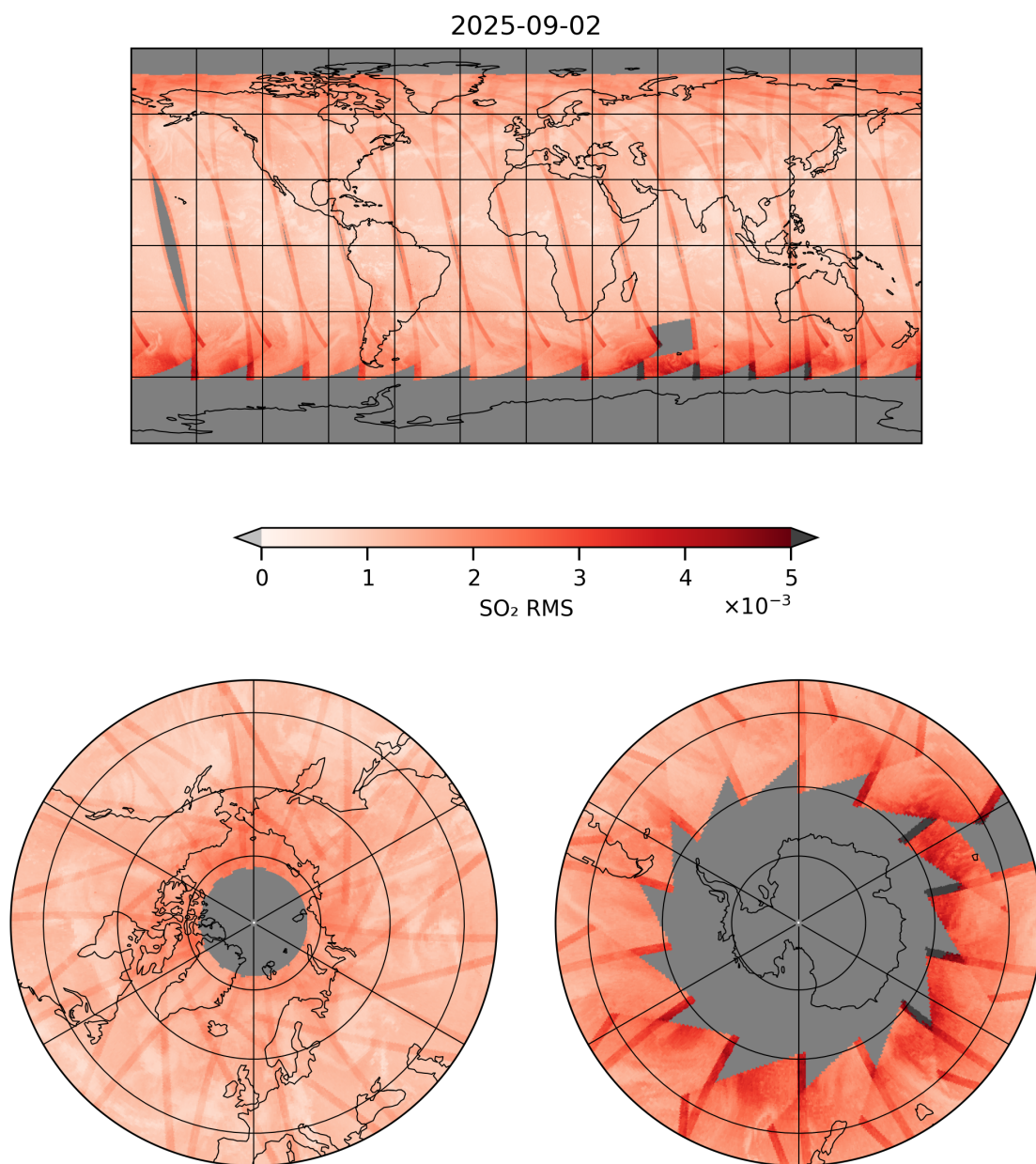


Figure 24: Map of “SO₂ RMS” for 2025-09-02 to 2025-09-02

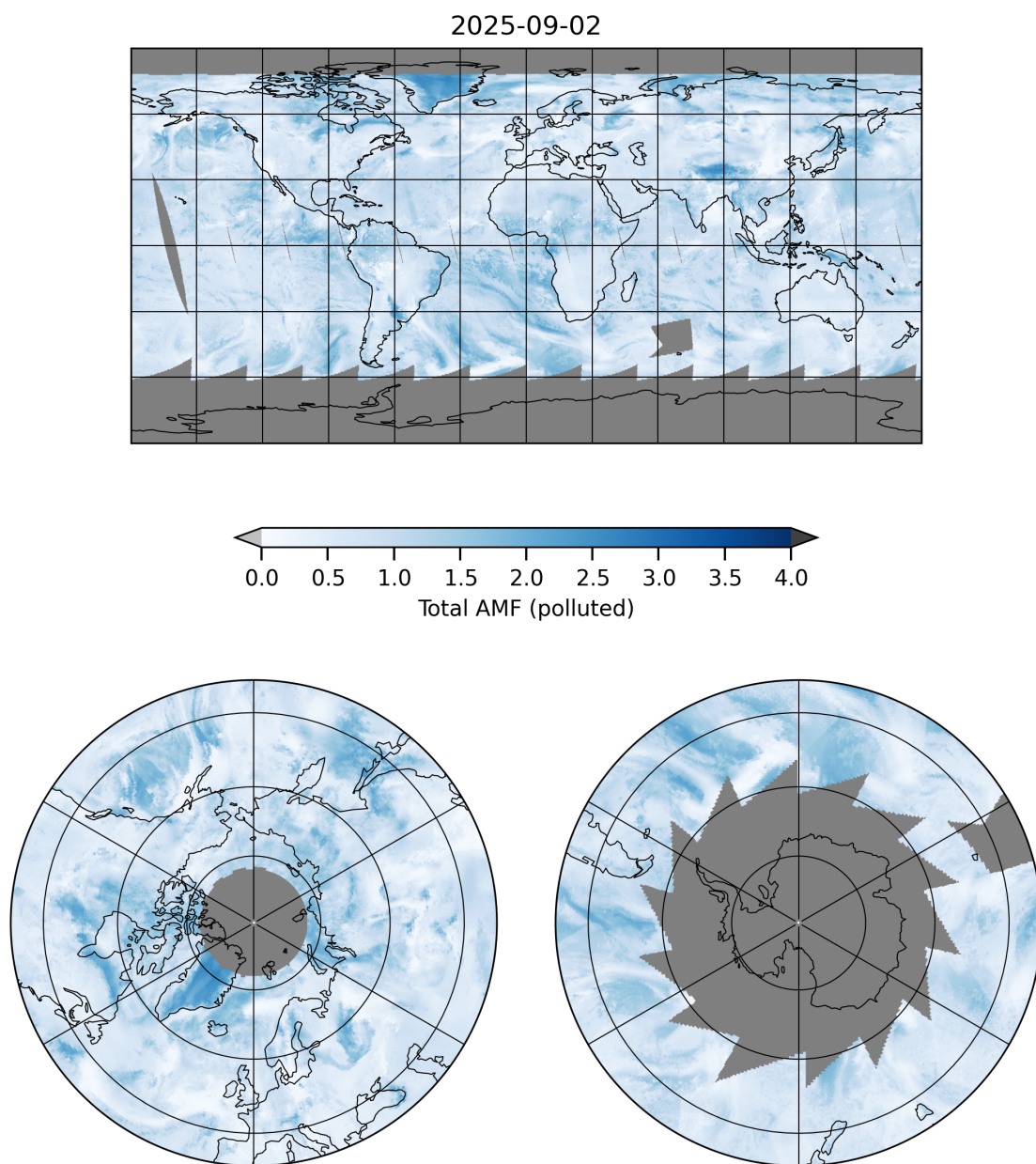


Figure 25: Map of “Total AMF (polluted)” for 2025-09-02 to 2025-09-02

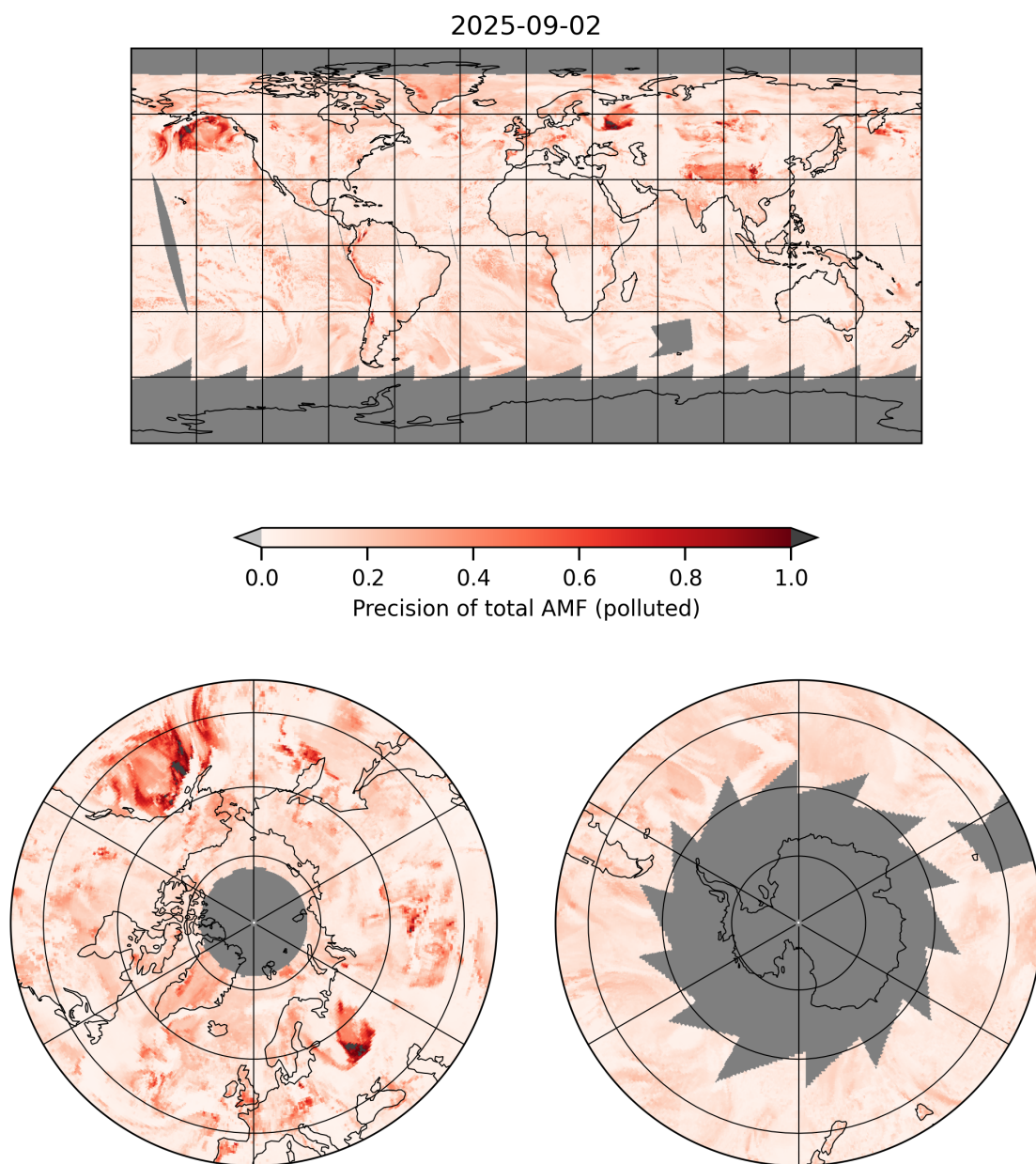


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-09-02 to 2025-09-02

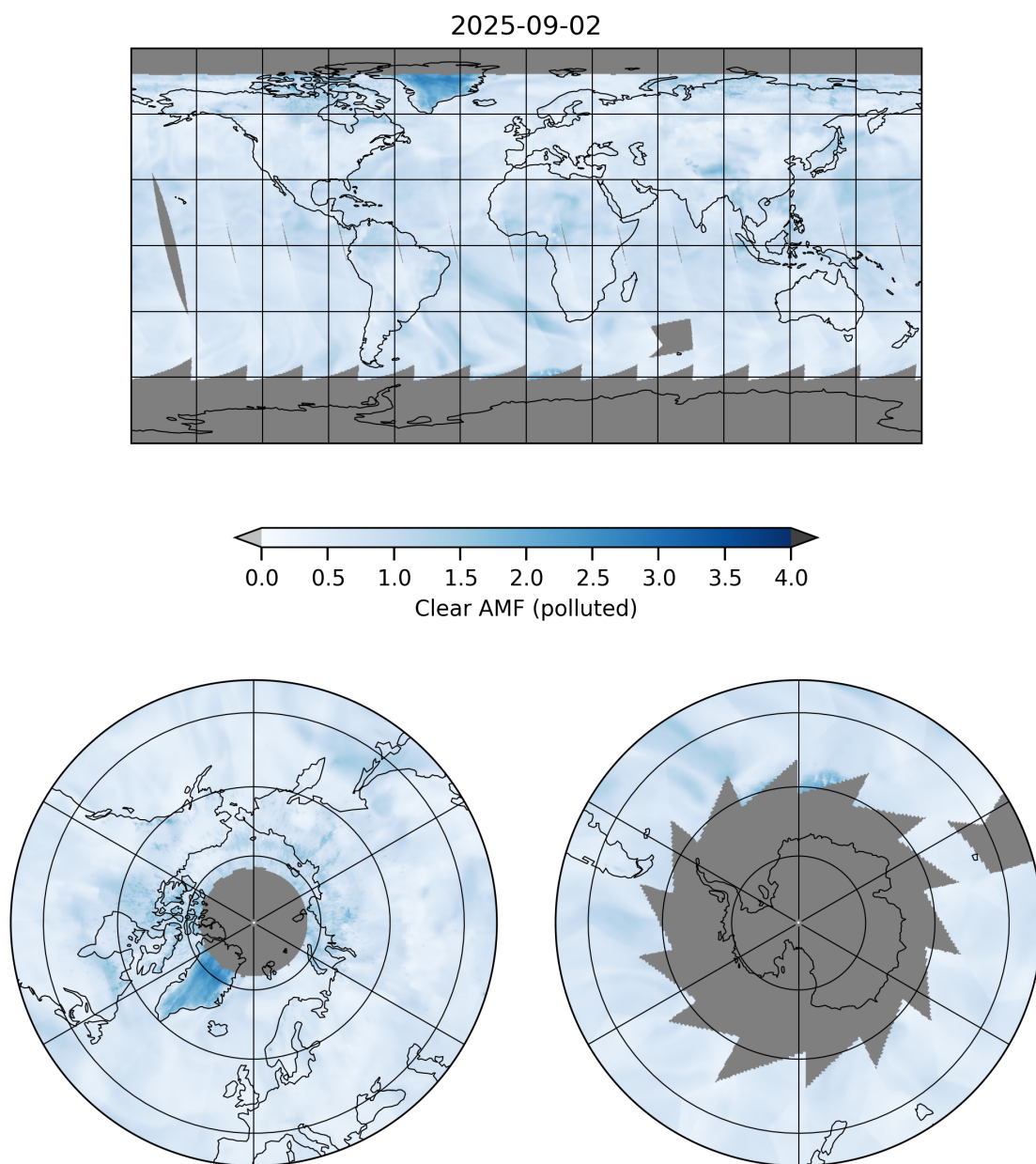


Figure 27: Map of “Clear AMF (polluted)” for 2025-09-02 to 2025-09-02

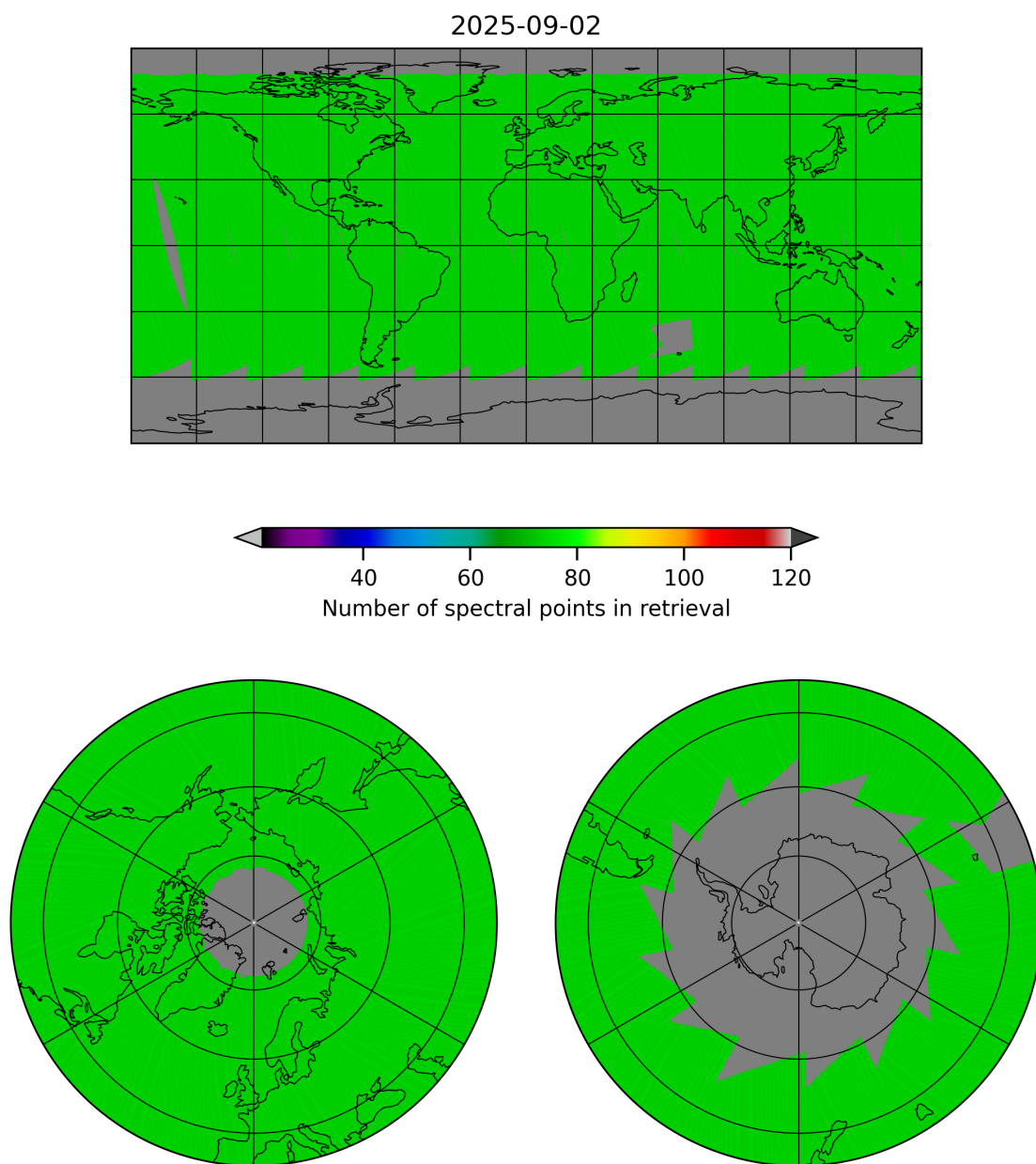


Figure 28: Map of “Number of spectral points in retrieval” for 2025-09-02 to 2025-09-02

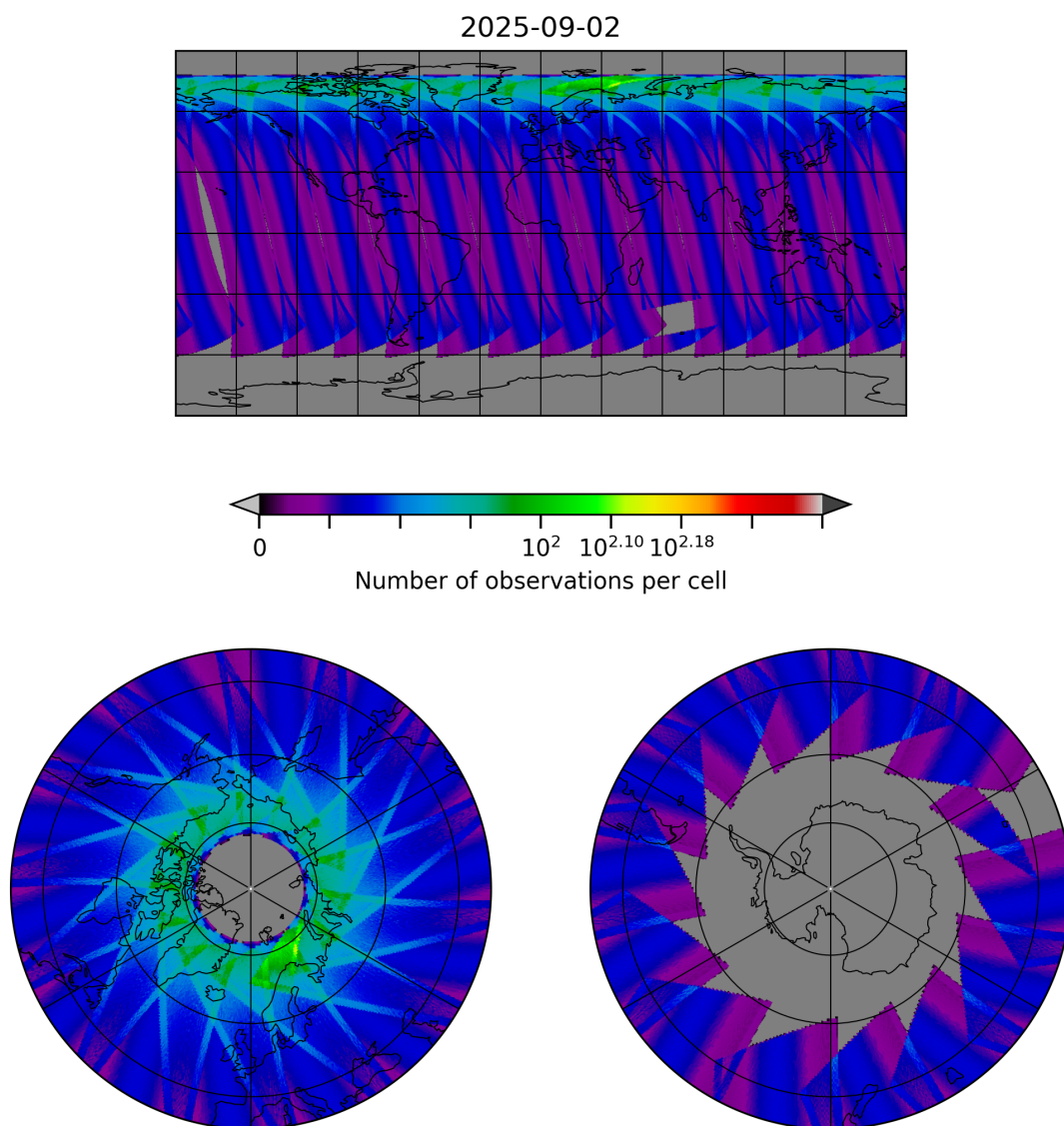


Figure 29: Map of the number of observations for 2025-09-02 to 2025-09-02

7 Zonal average

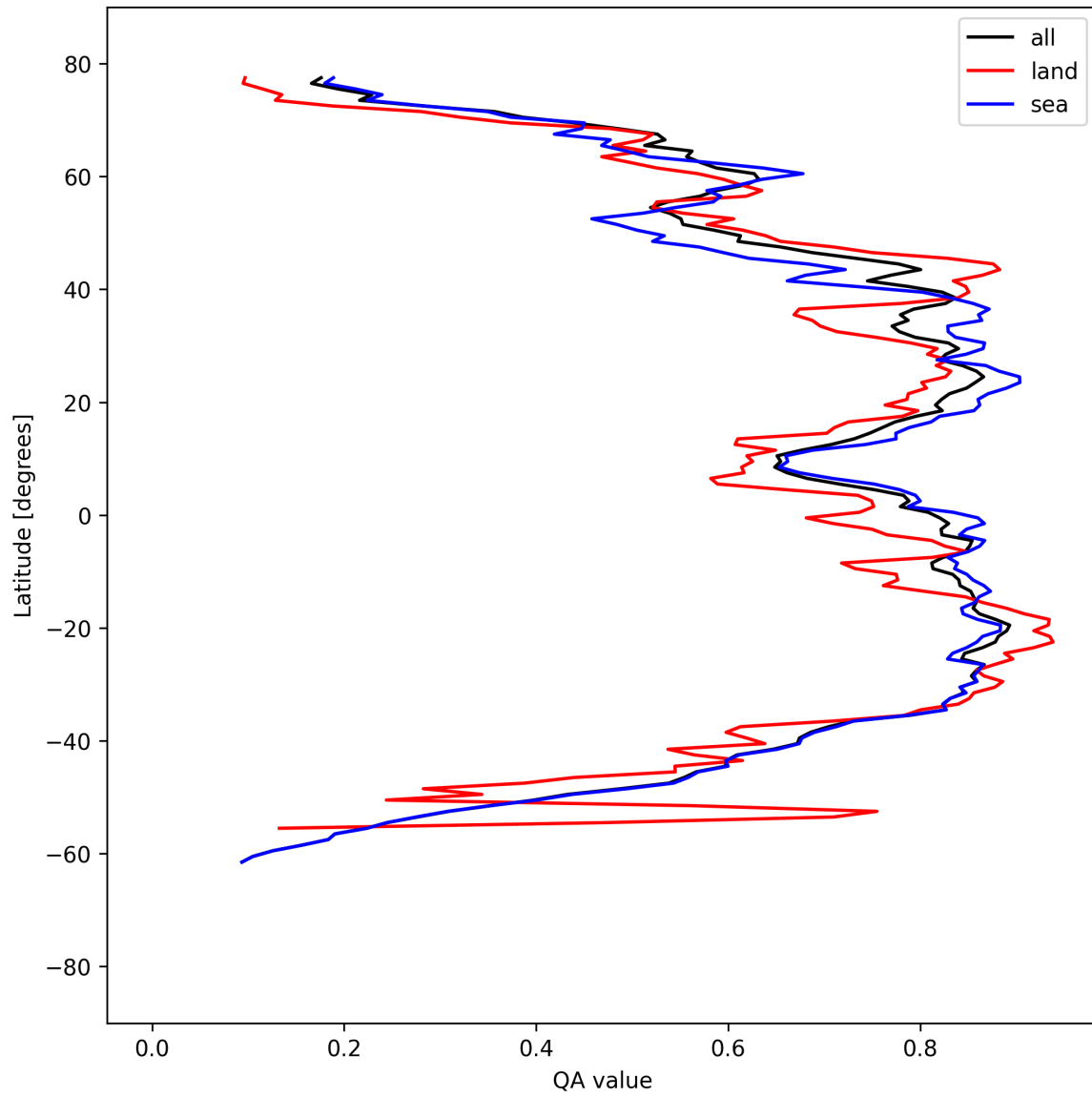


Figure 30: Zonal average of “QA value” for 2025-09-02 to 2025-09-02.

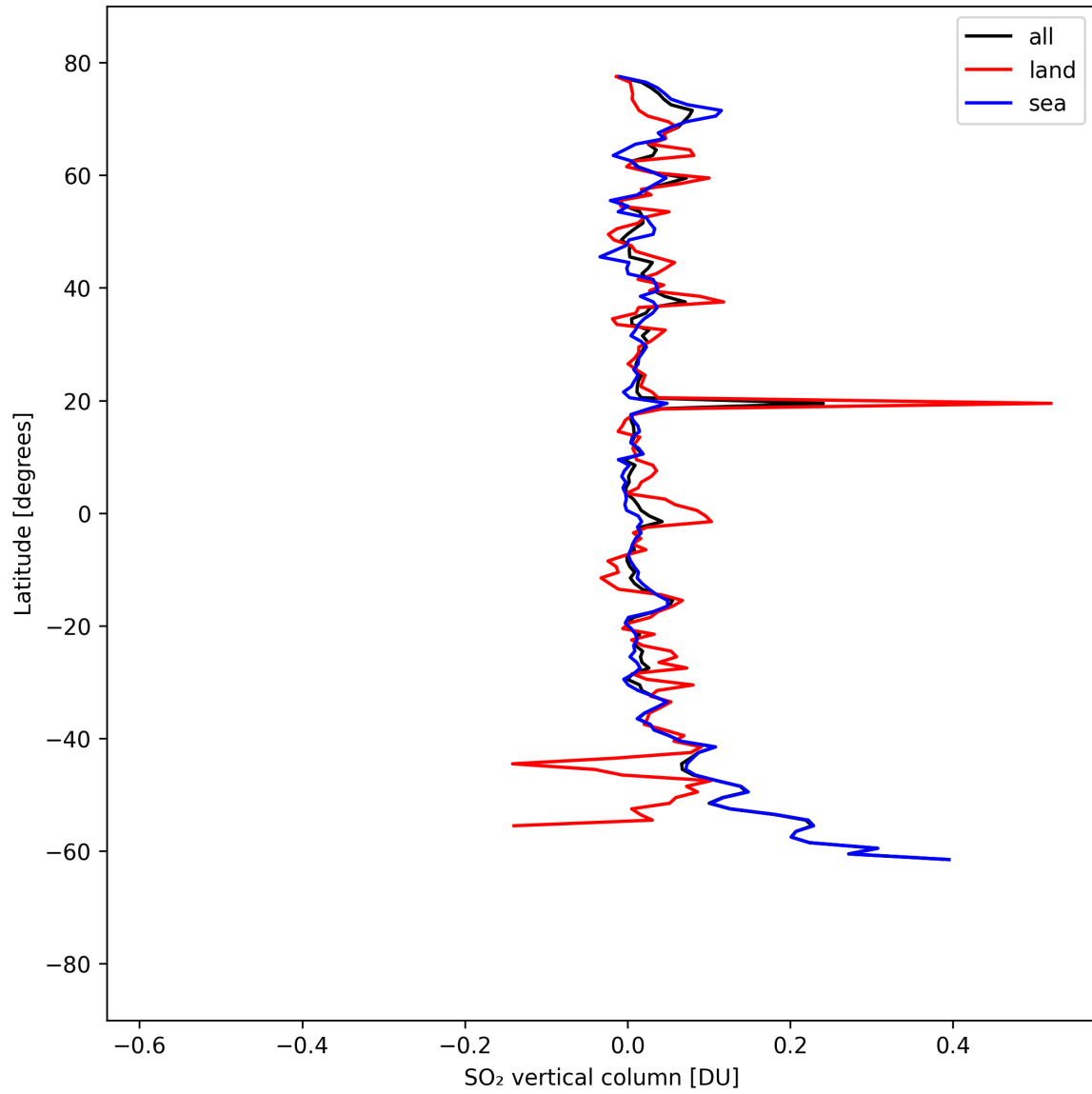


Figure 31: Zonal average of “SO₂ vertical column” for 2025-09-02 to 2025-09-02.

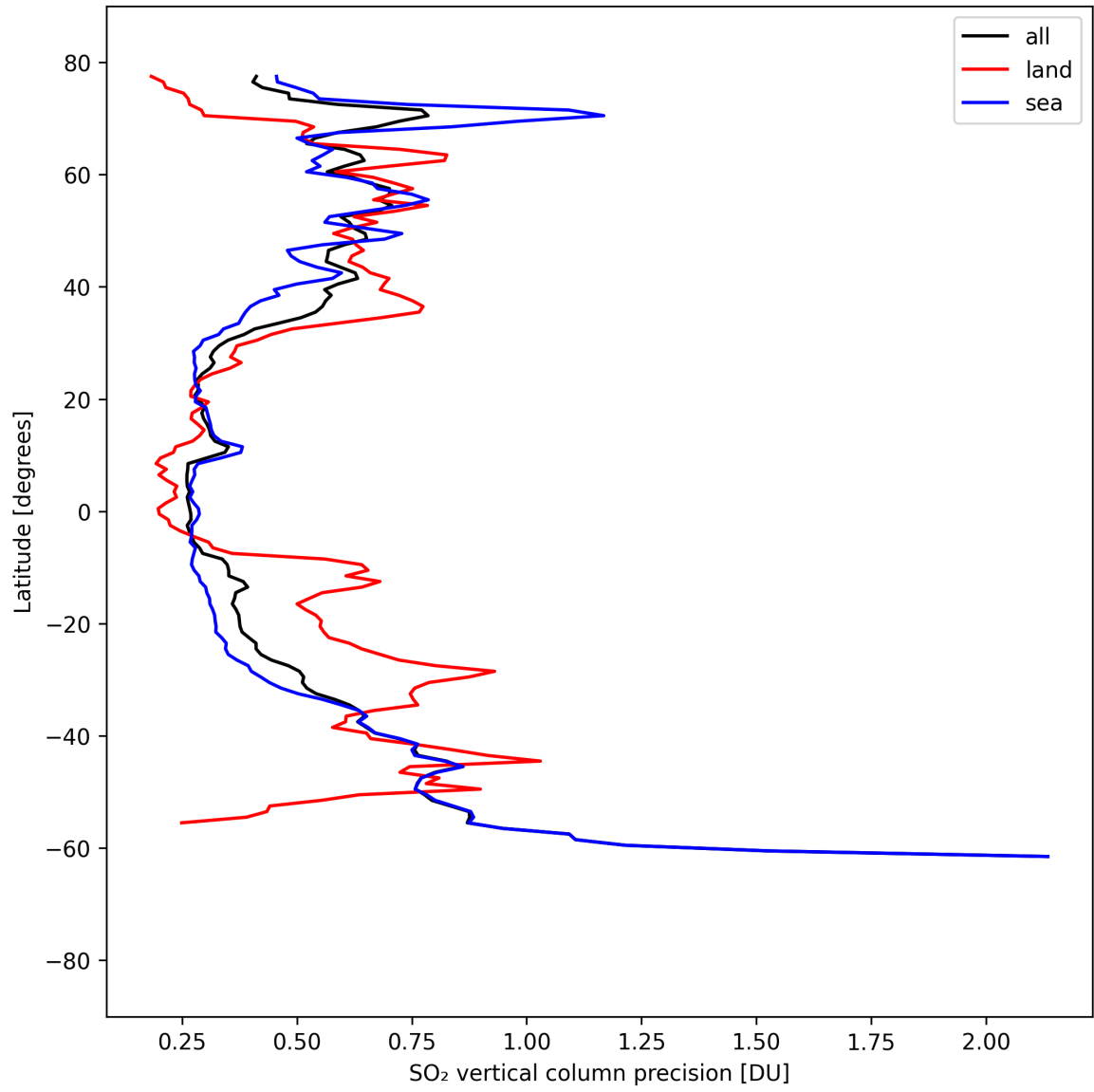


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-09-02 to 2025-09-02.

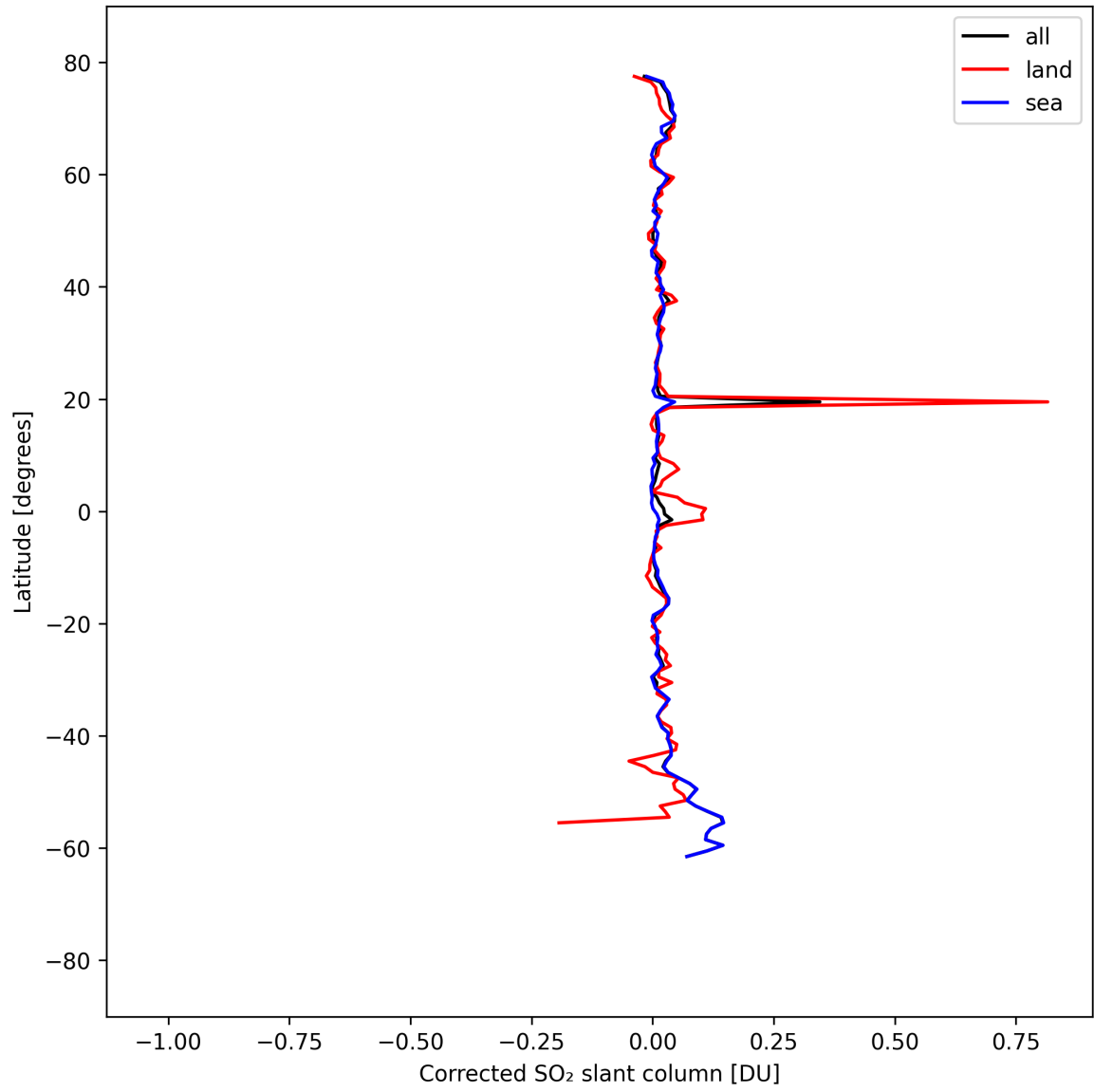


Figure 33: Zonal average of "Corrected SO₂ slant column" for 2025-09-02 to 2025-09-02.

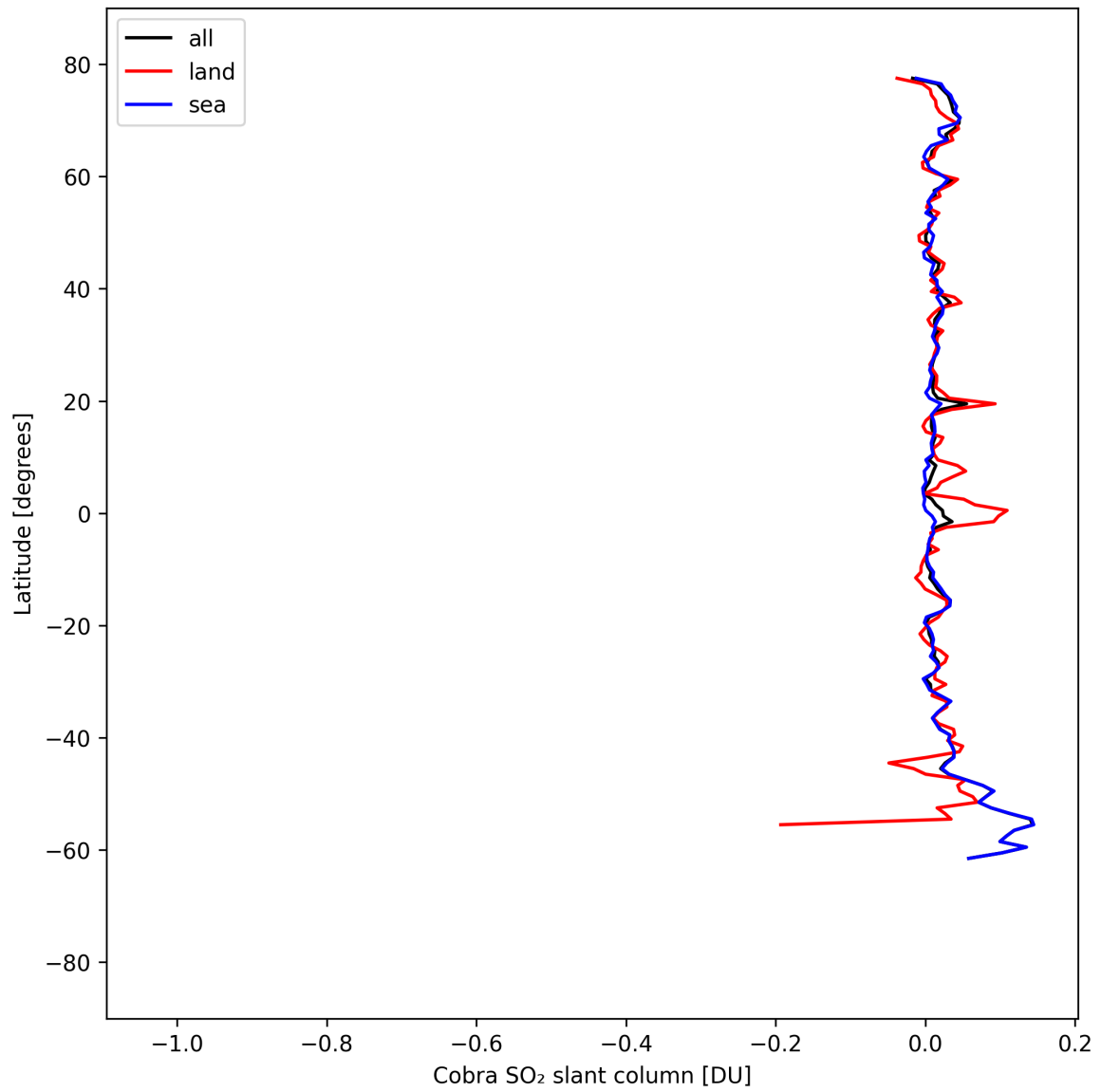


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-09-02 to 2025-09-02.

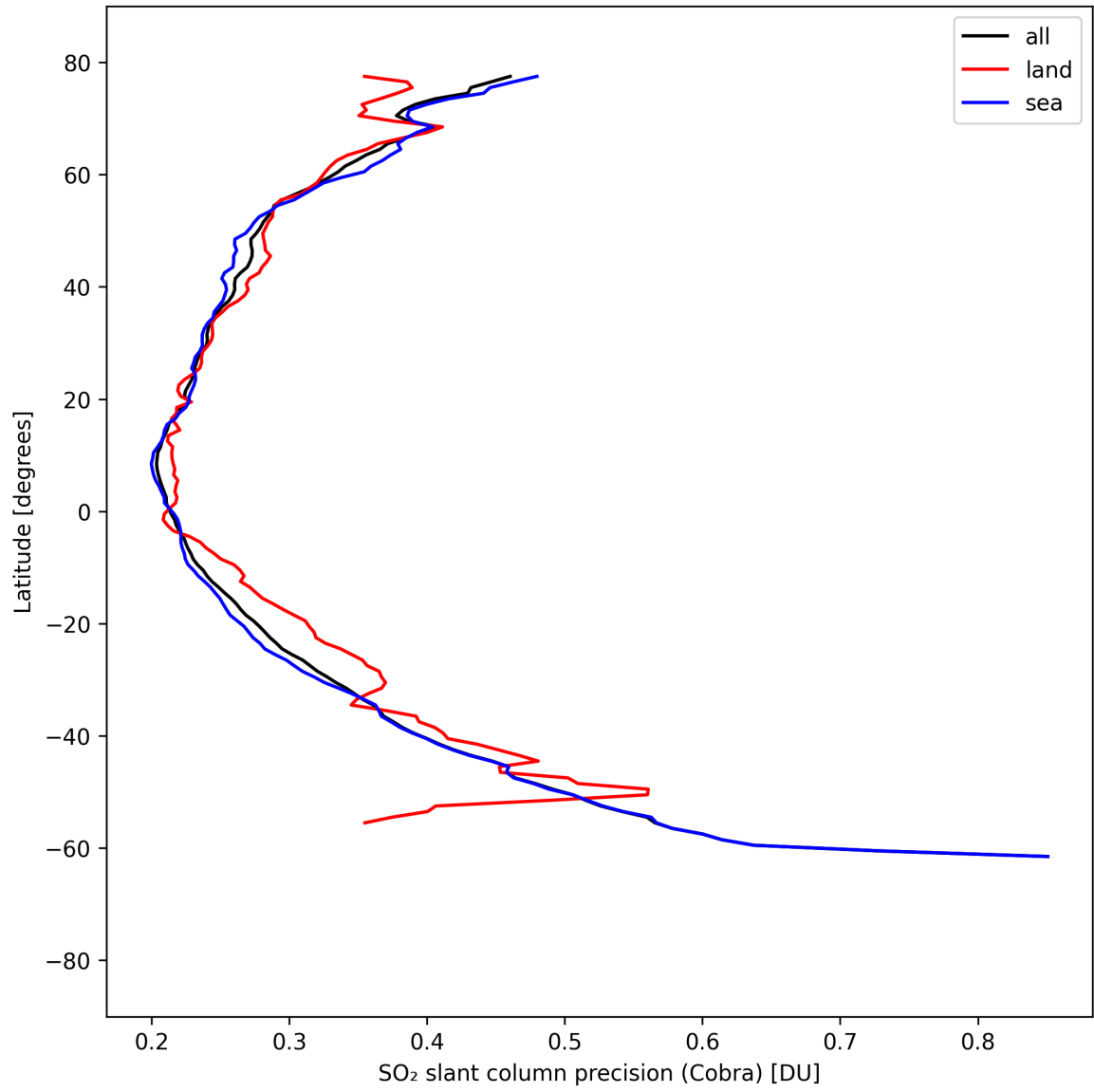


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-09-02 to 2025-09-02.

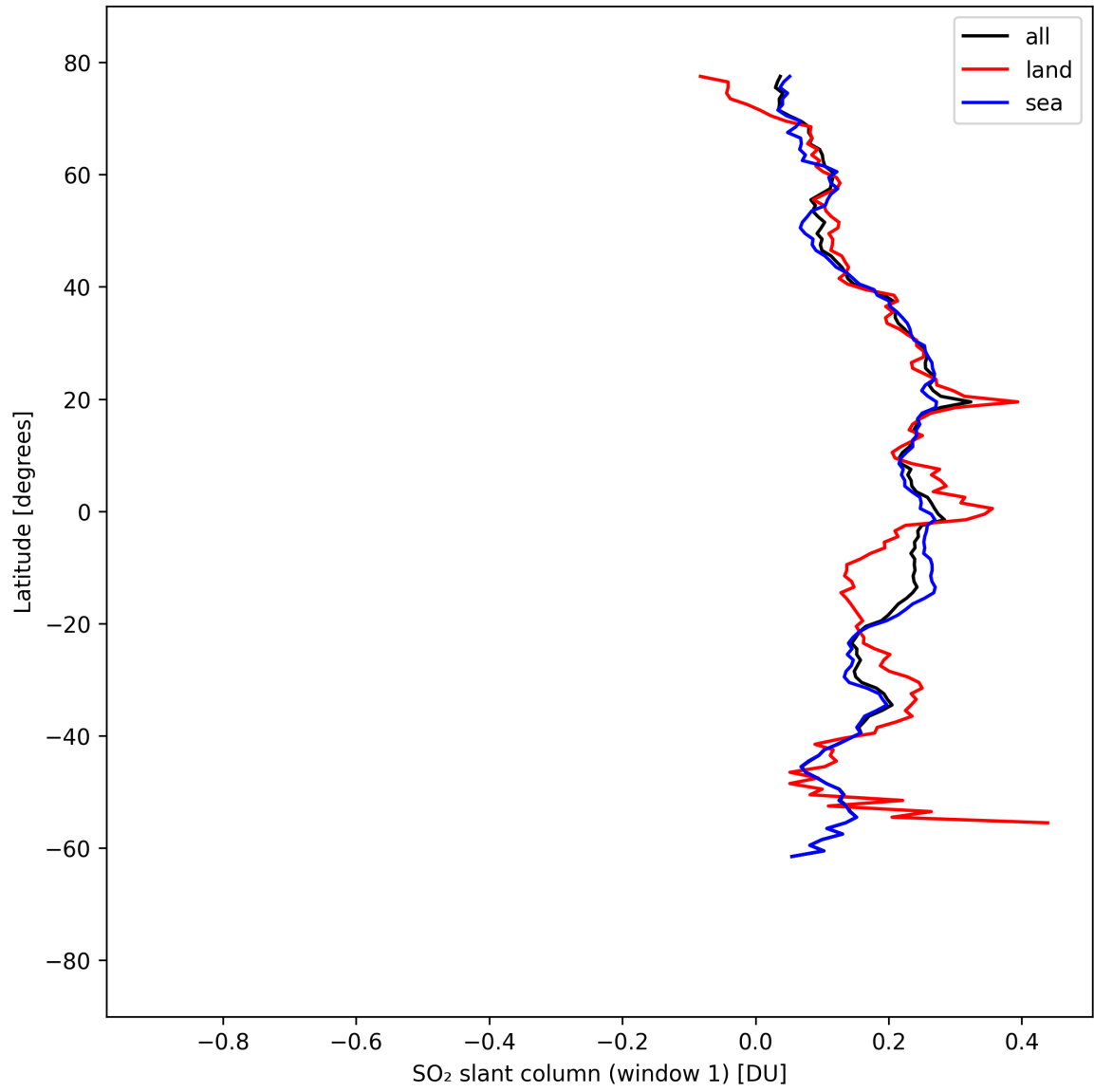


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-09-02 to 2025-09-02.

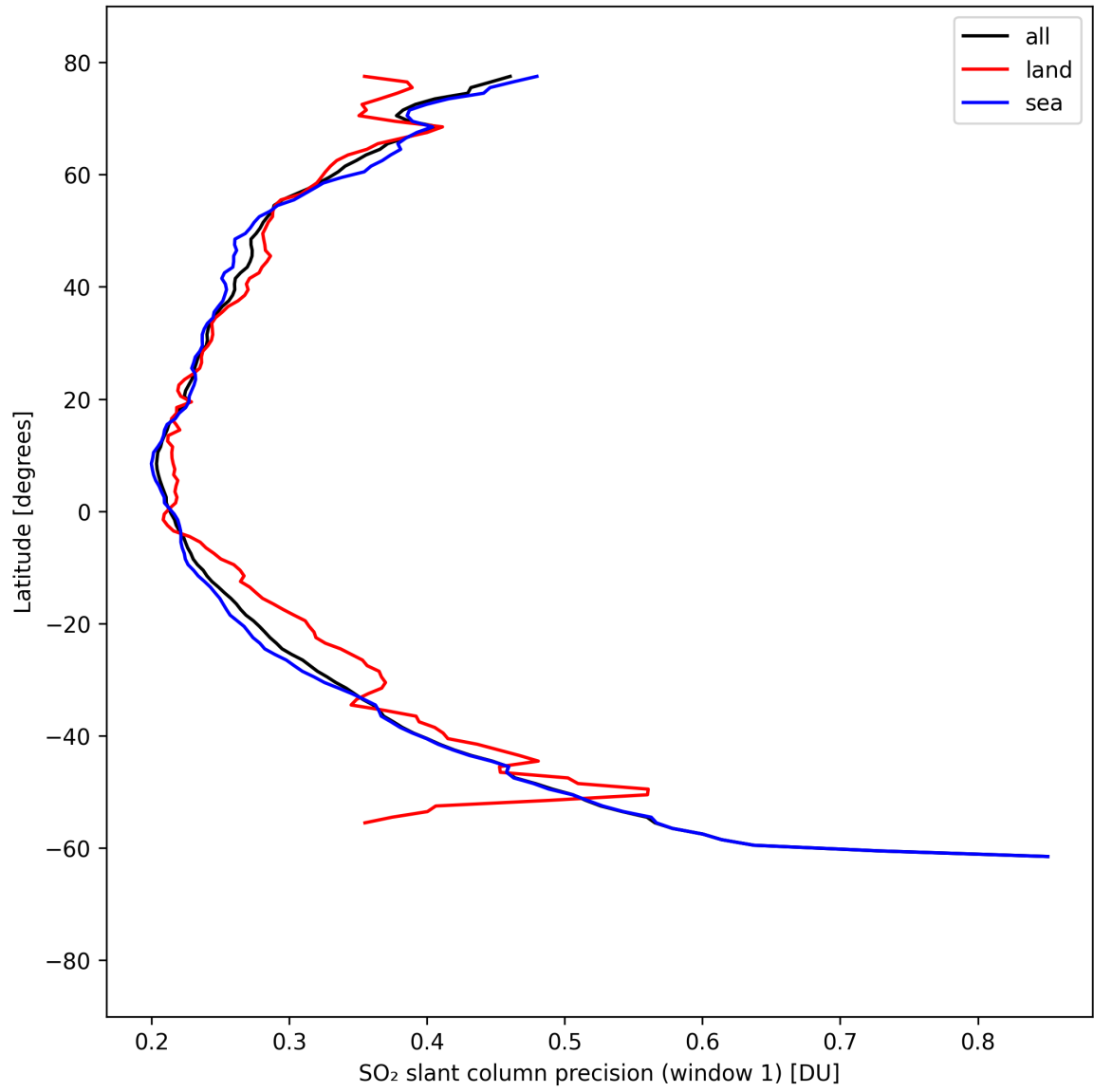


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-09-02 to 2025-09-02.

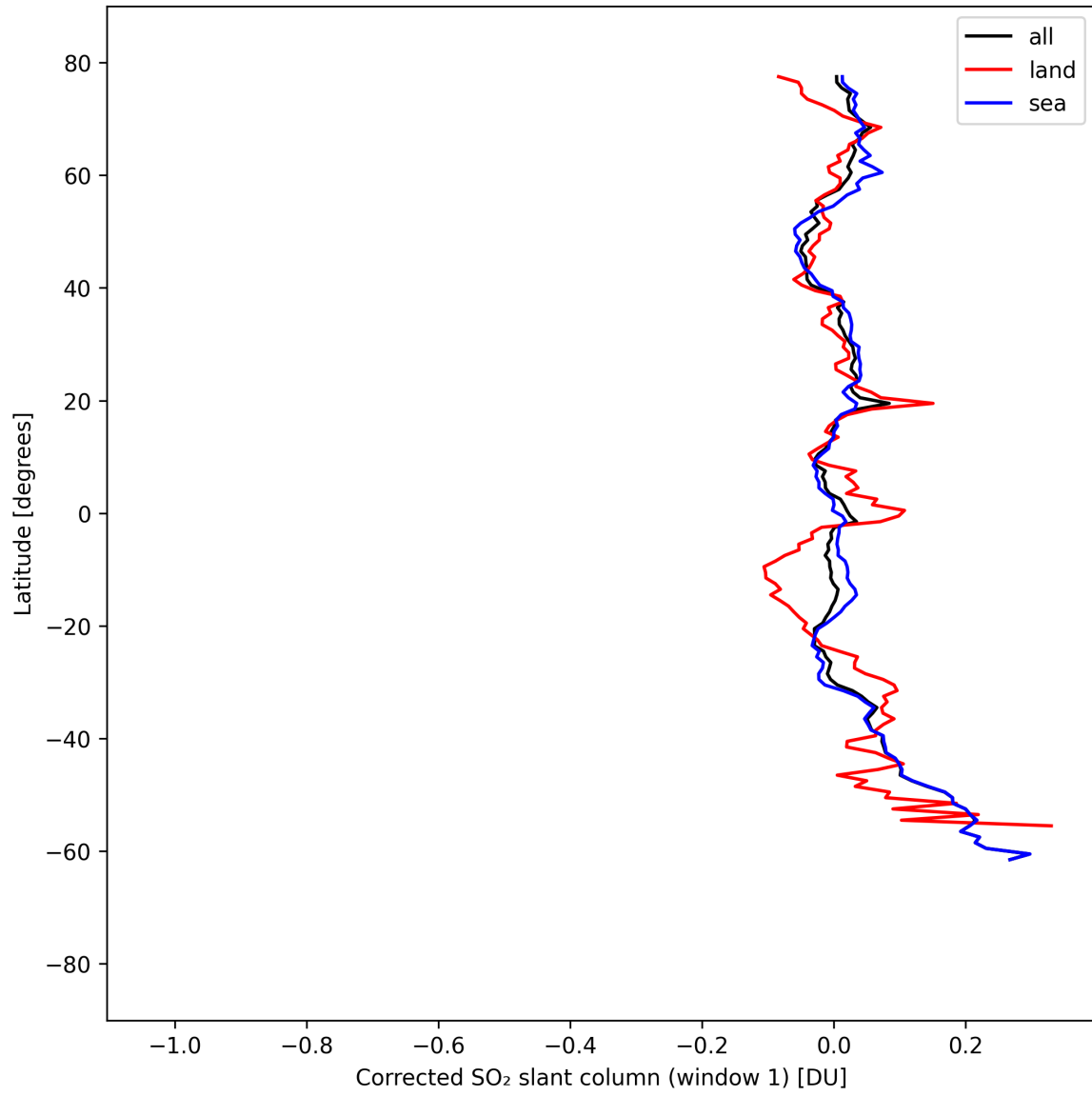


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-09-02 to 2025-09-02.

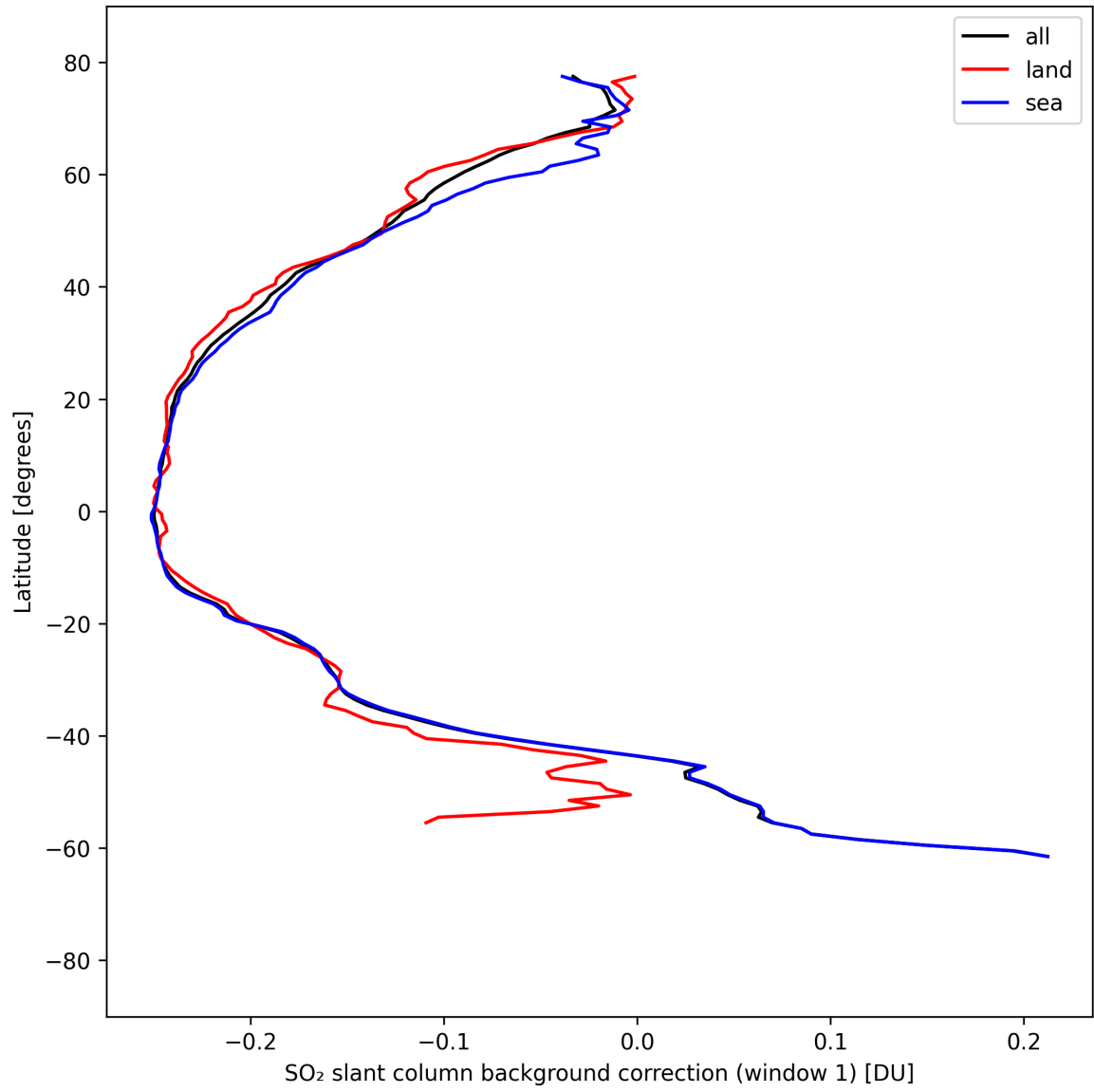


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-09-02 to 2025-09-02.

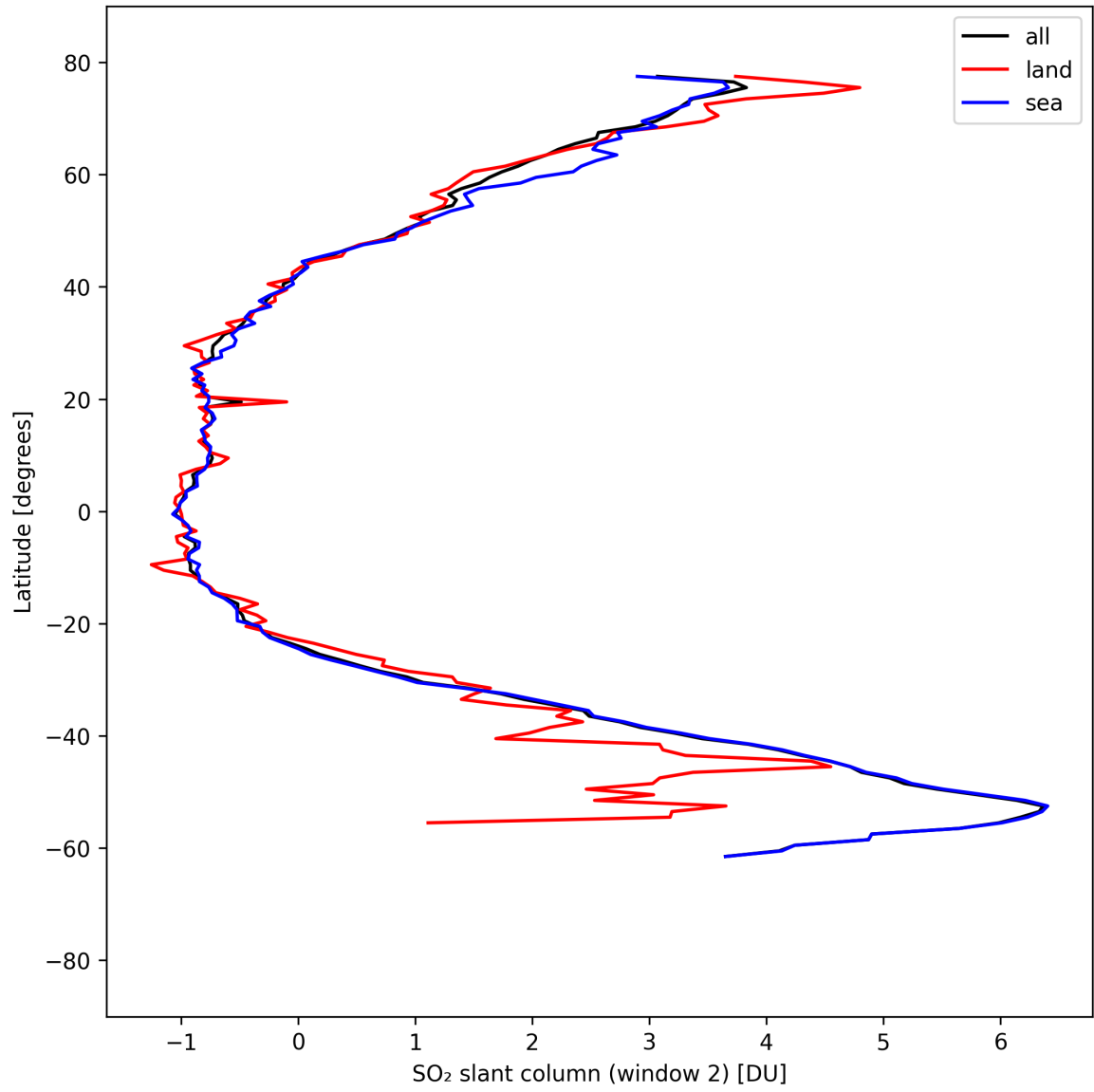


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-09-02 to 2025-09-02.

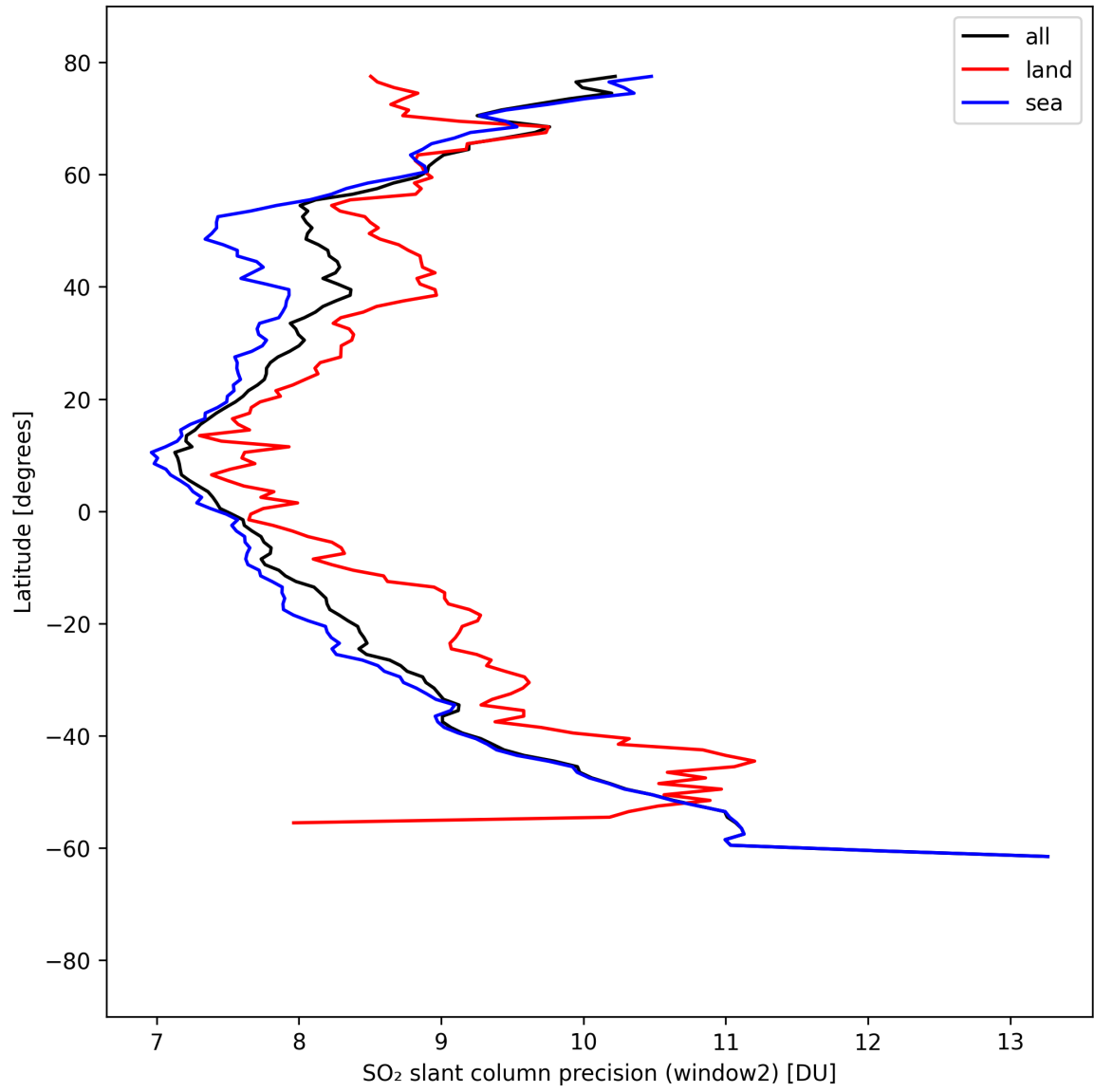


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-09-02 to 2025-09-02.

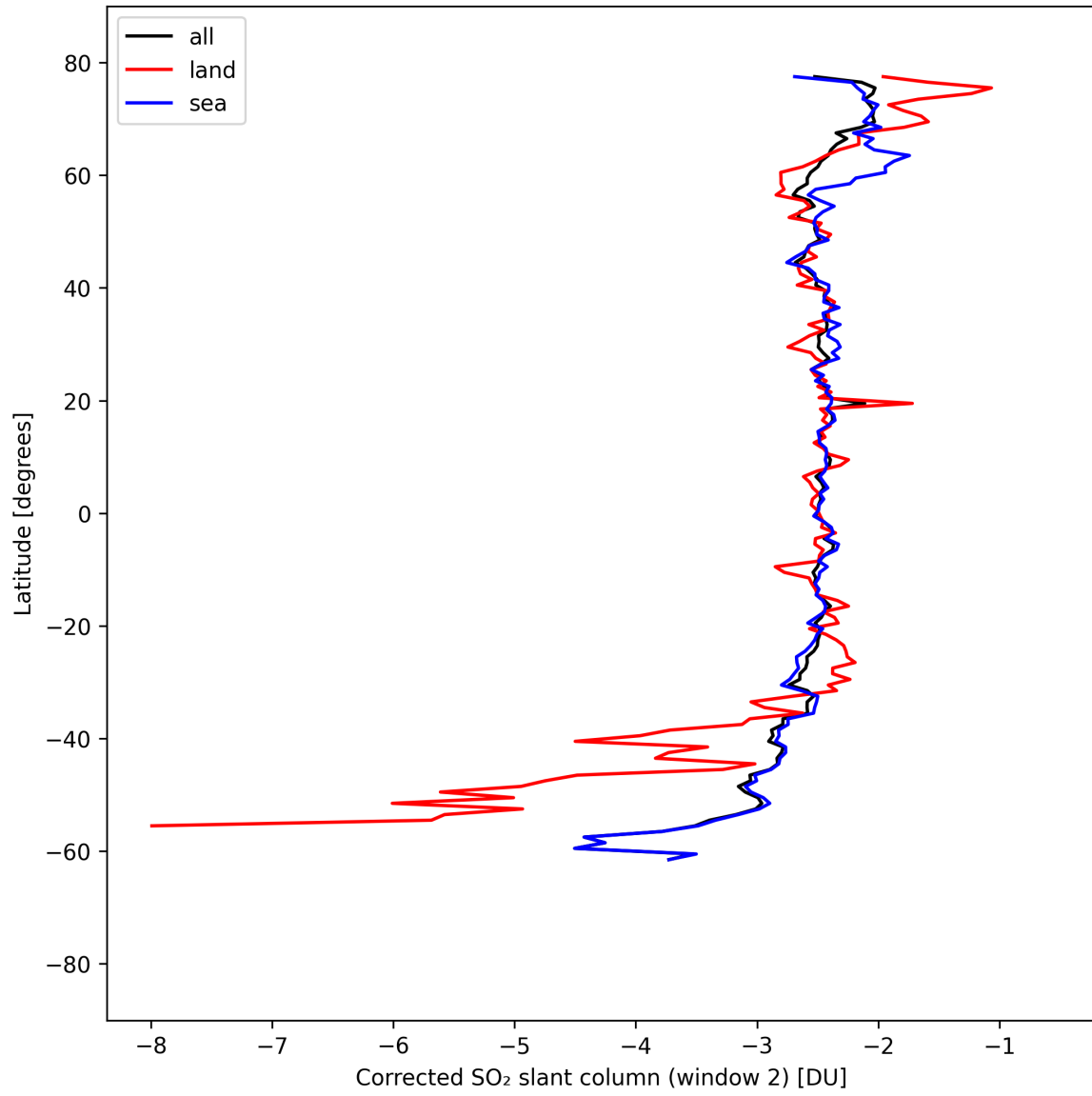


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-09-02 to 2025-09-02.

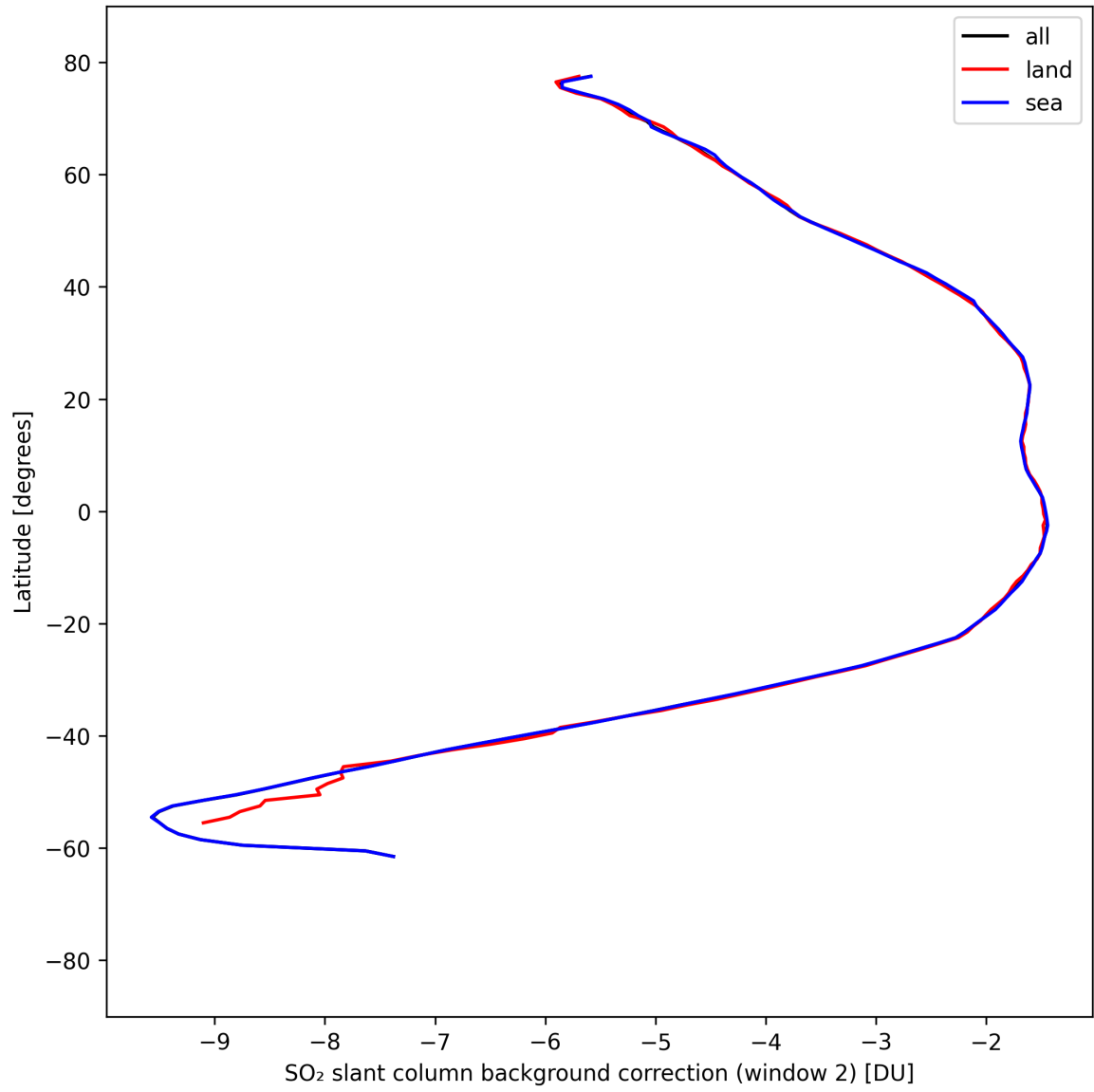


Figure 43: Zonal average of "SO₂ slant column background correction (window 2)" for 2025-09-02 to 2025-09-02.

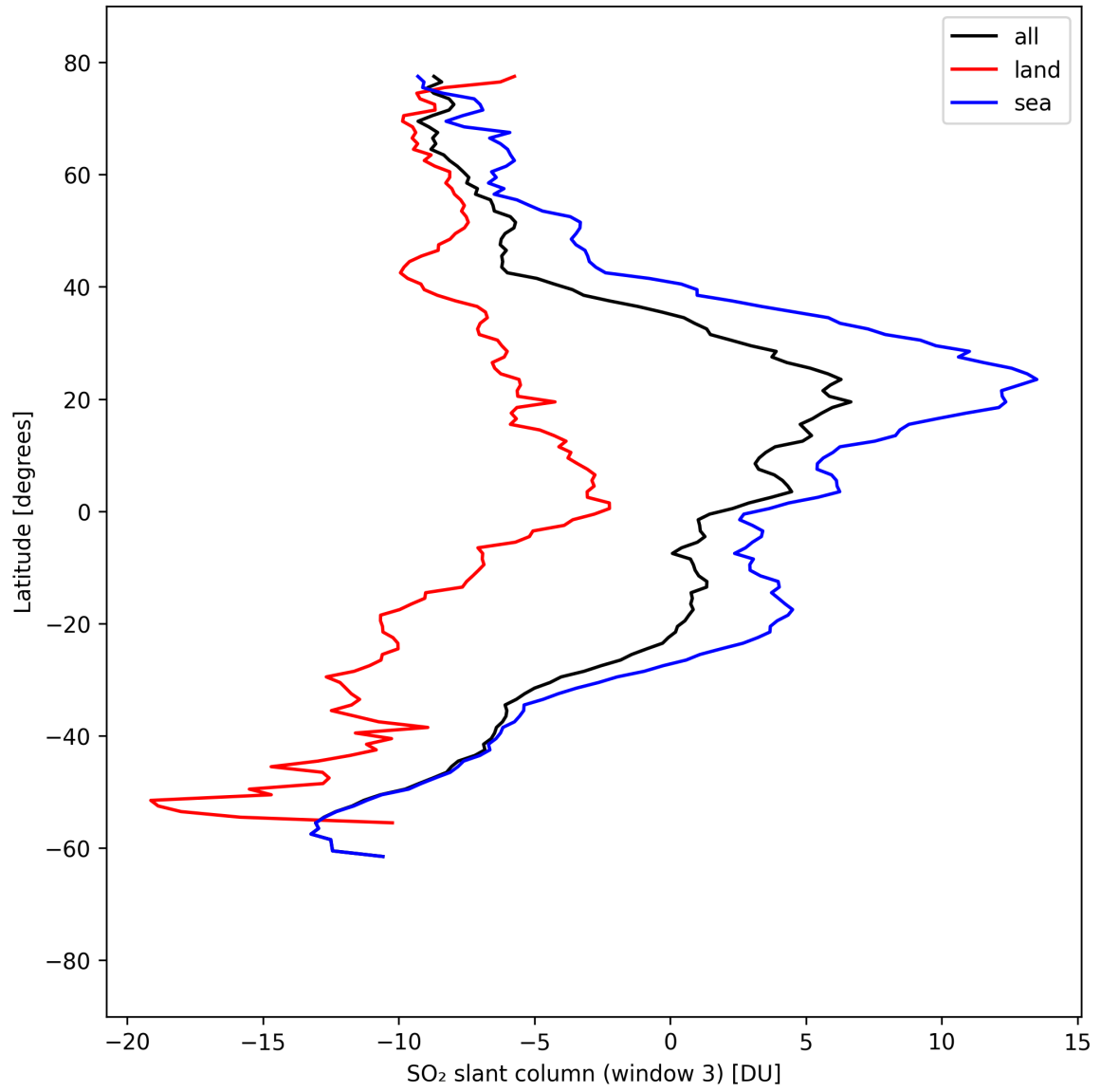


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-09-02 to 2025-09-02.

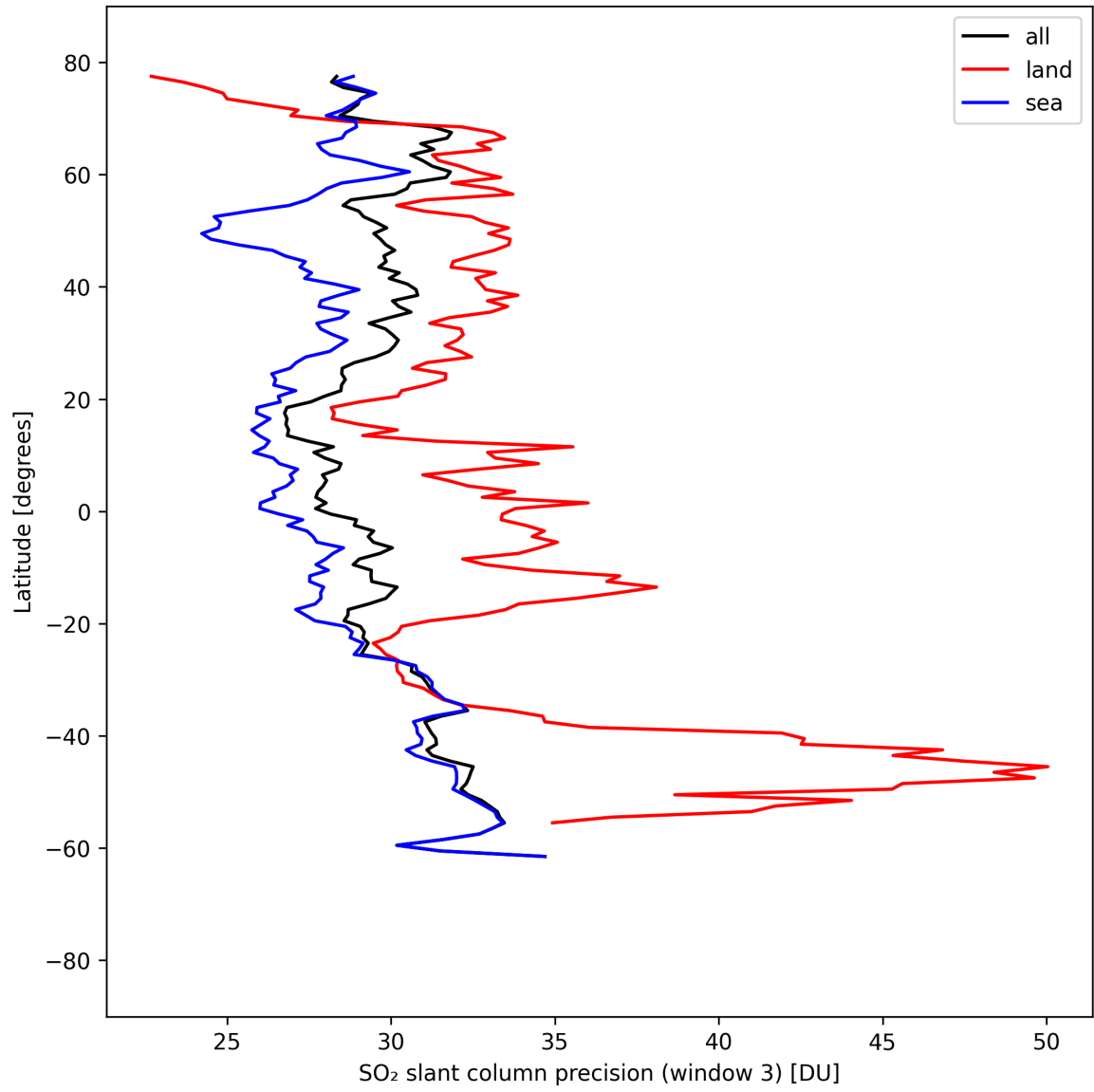


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-09-02 to 2025-09-02.

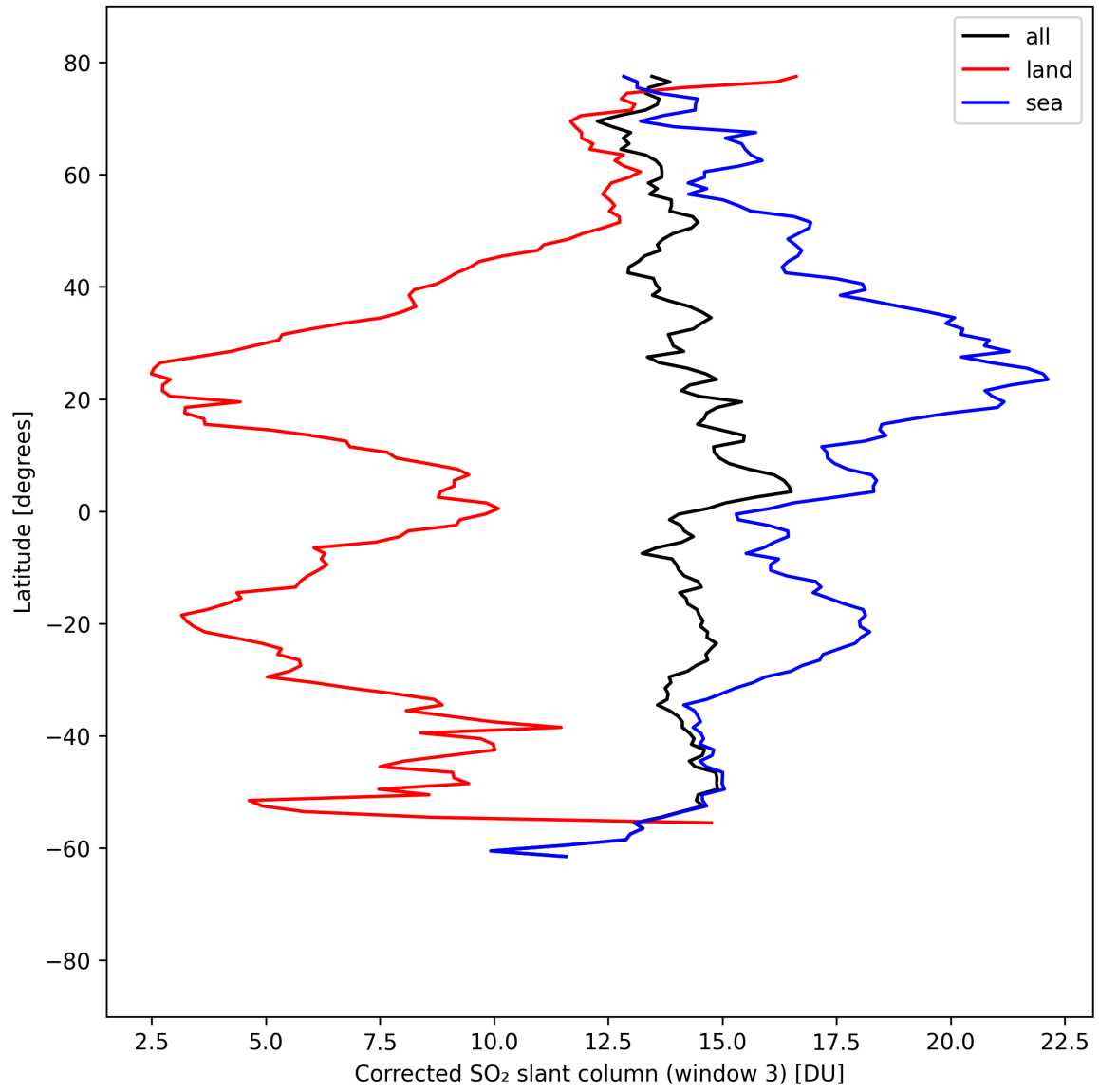


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-09-02 to 2025-09-02.

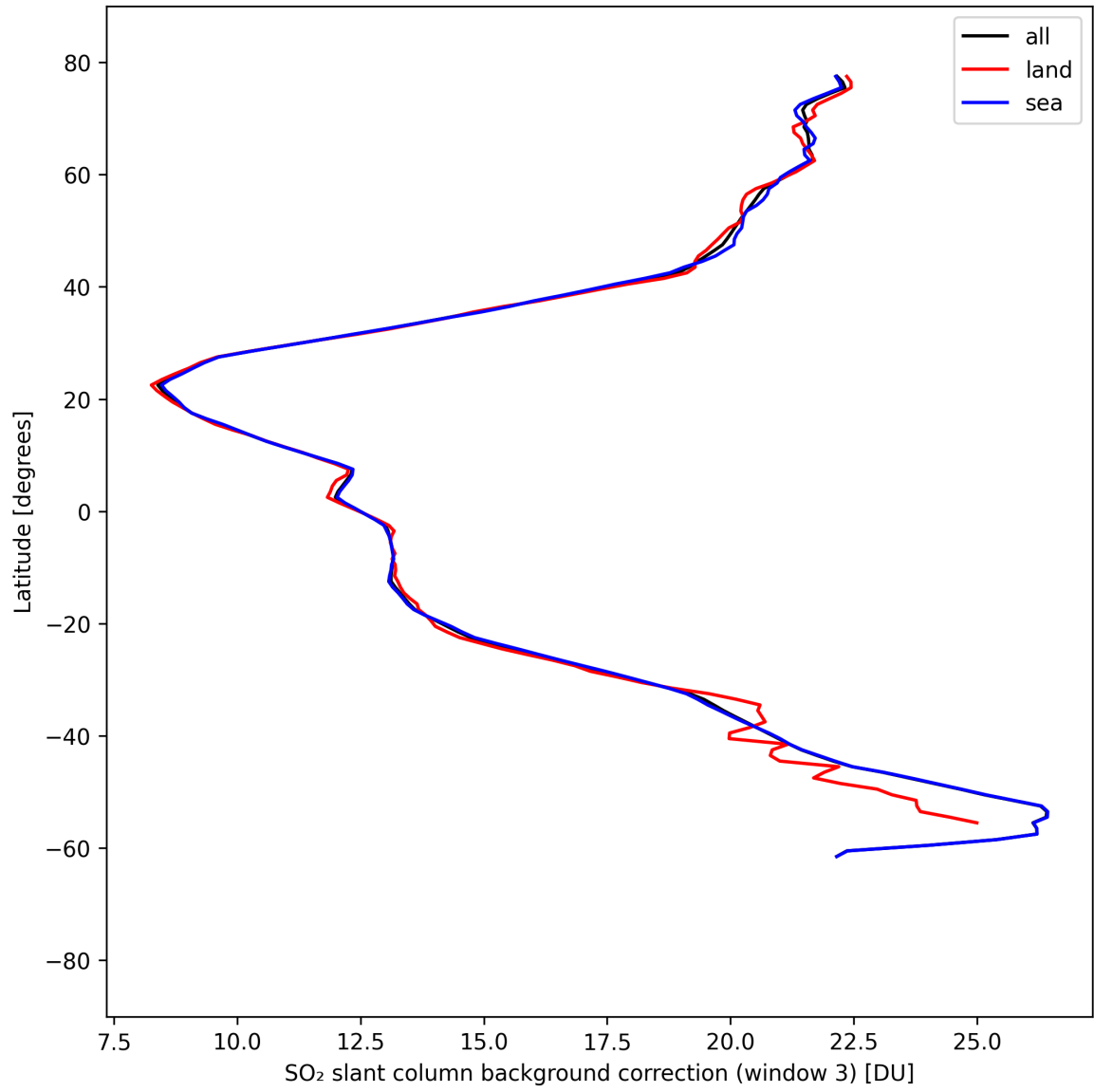


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-09-02 to 2025-09-02.

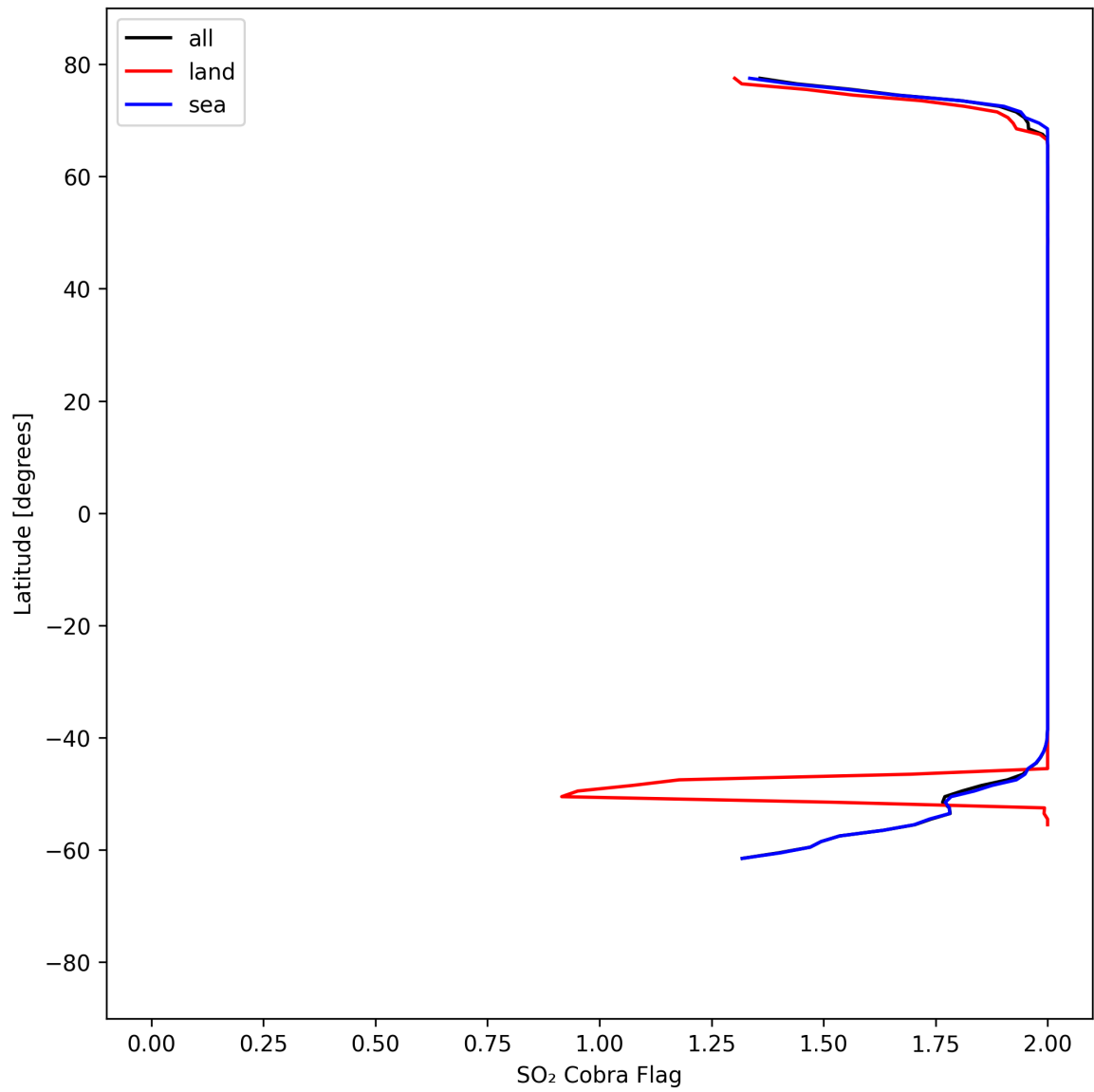


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-09-02 to 2025-09-02.

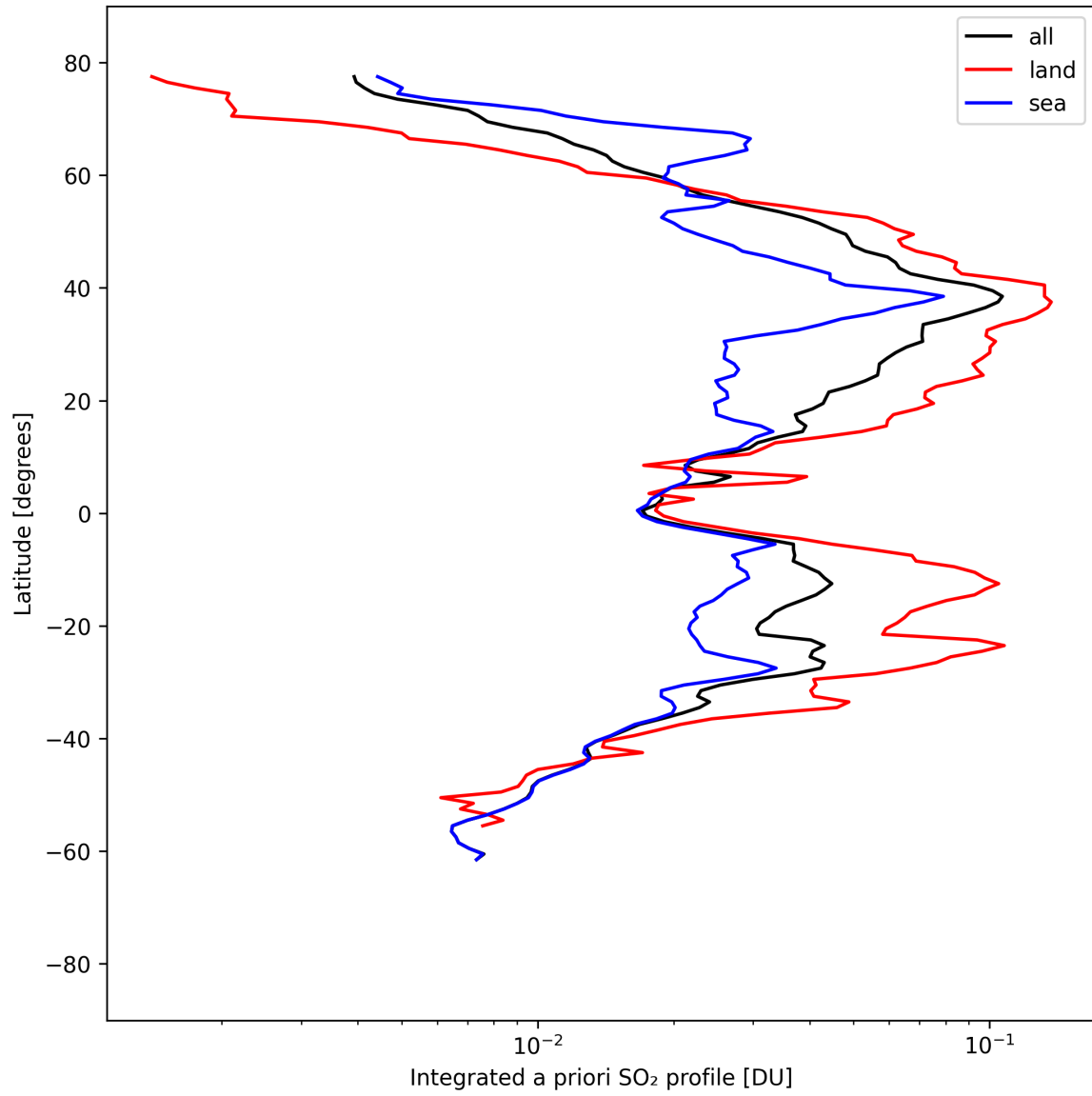


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-09-02 to 2025-09-02.

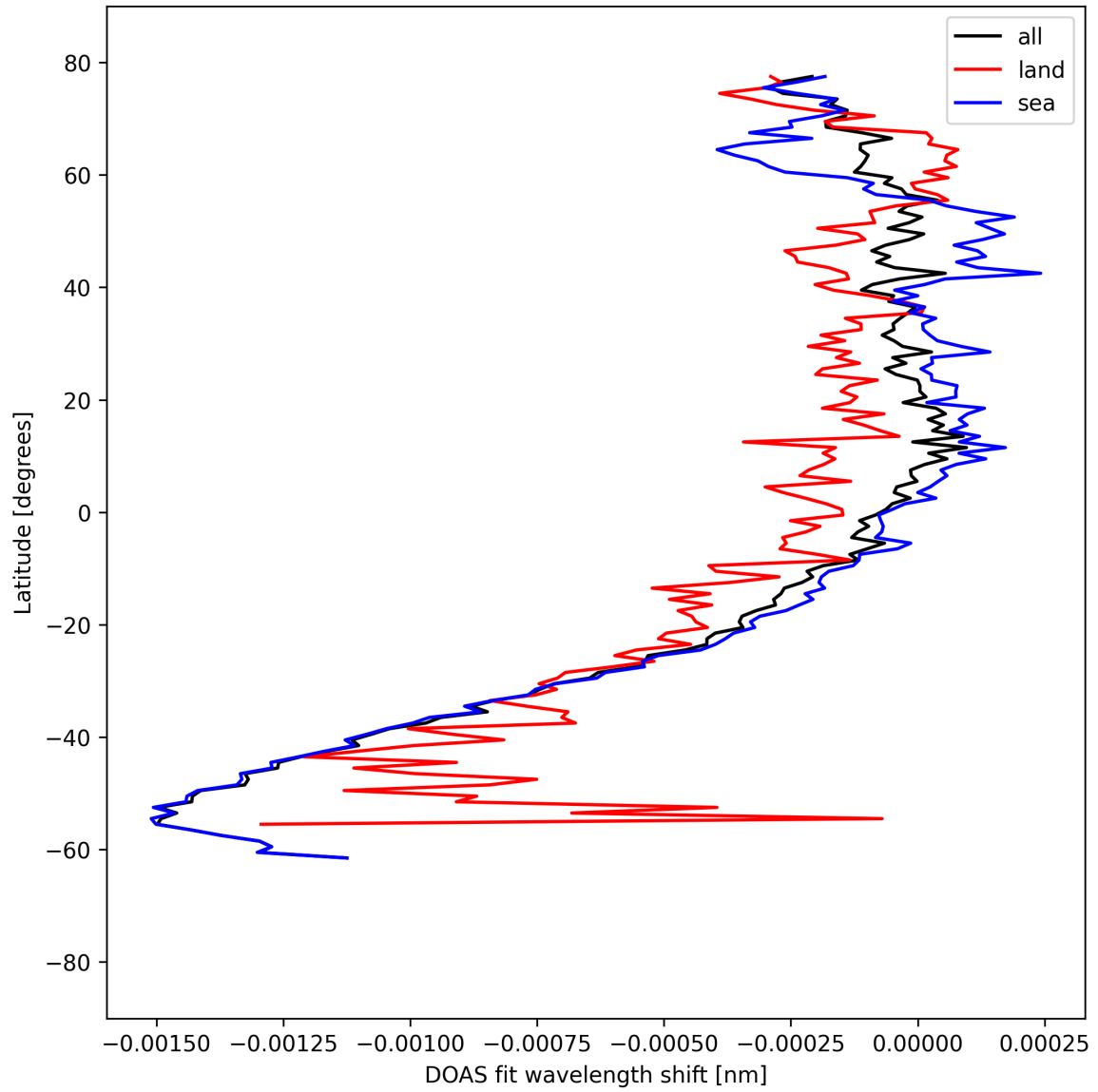


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-09-02 to 2025-09-02.

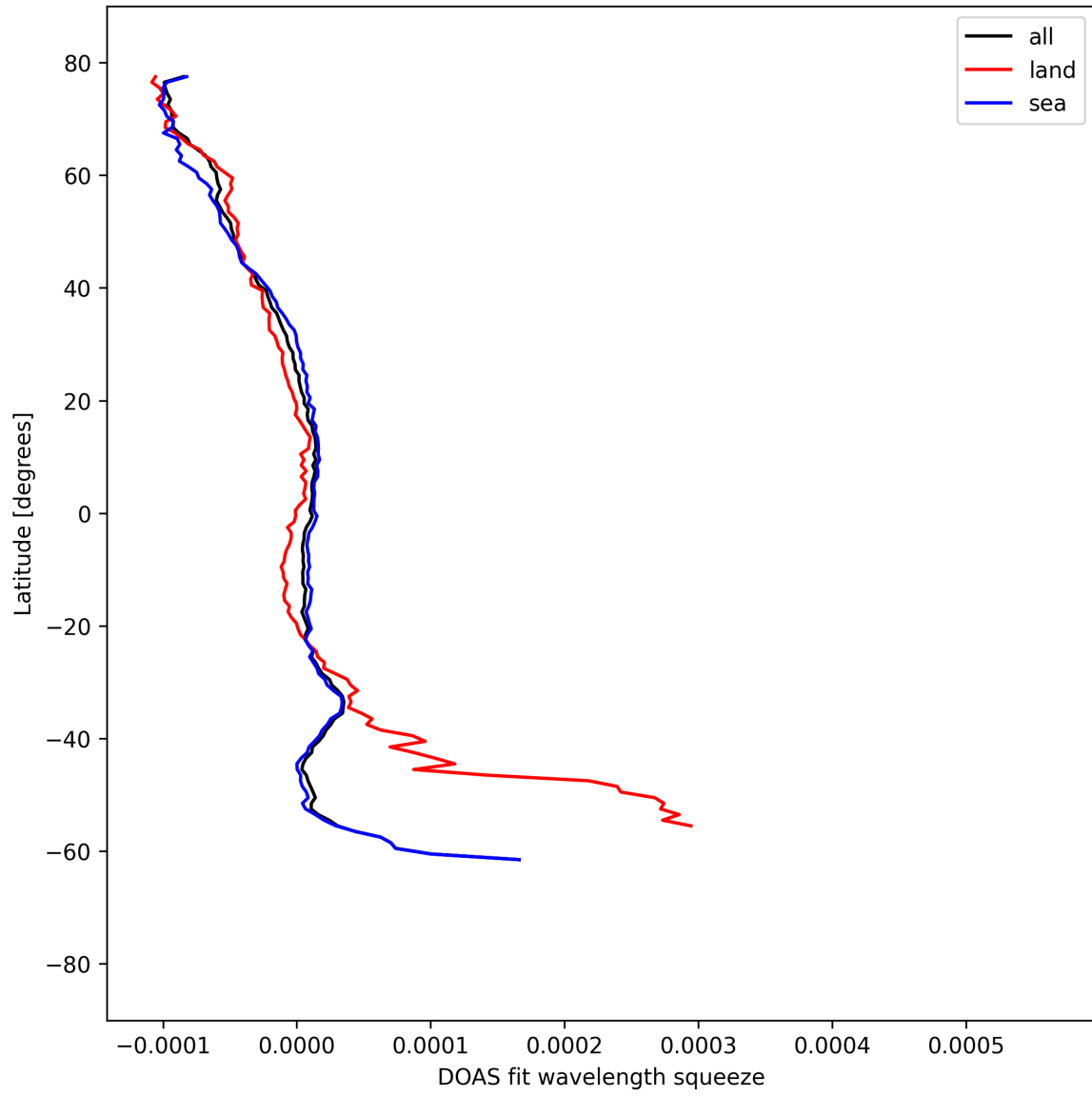


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-09-02 to 2025-09-02.

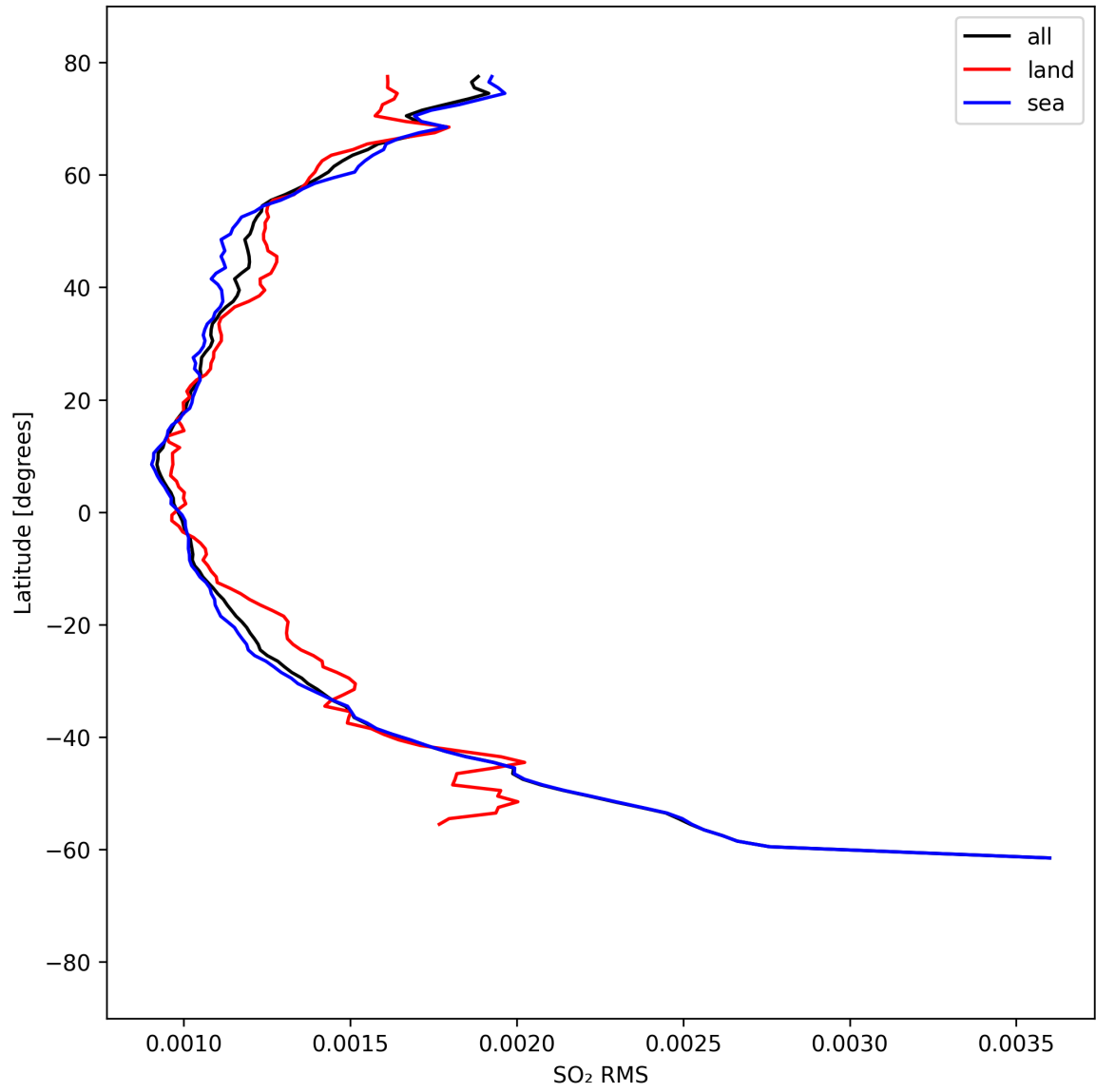


Figure 52: Zonal average of “SO₂ RMS” for 2025-09-02 to 2025-09-02.

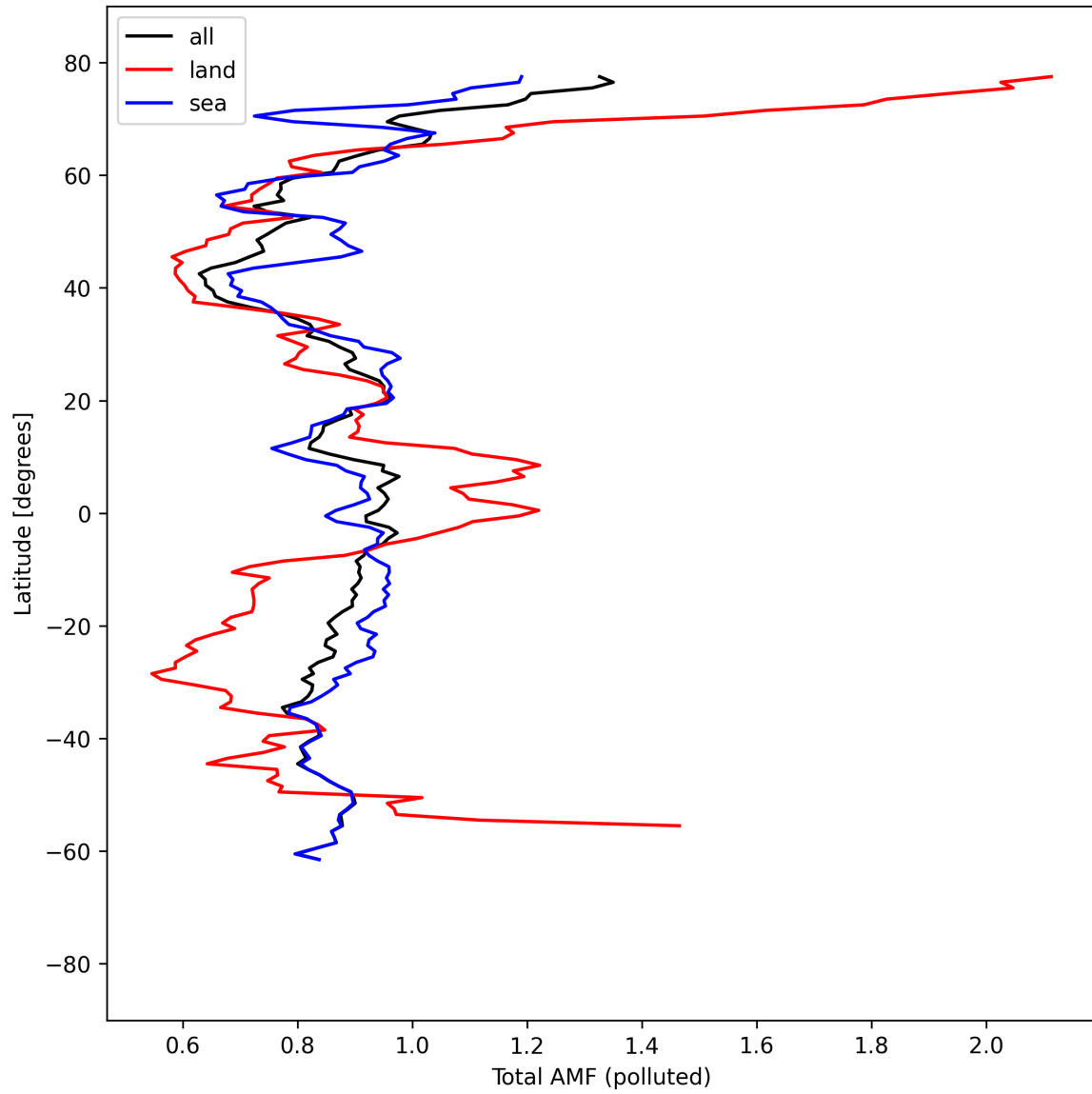


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-09-02 to 2025-09-02.

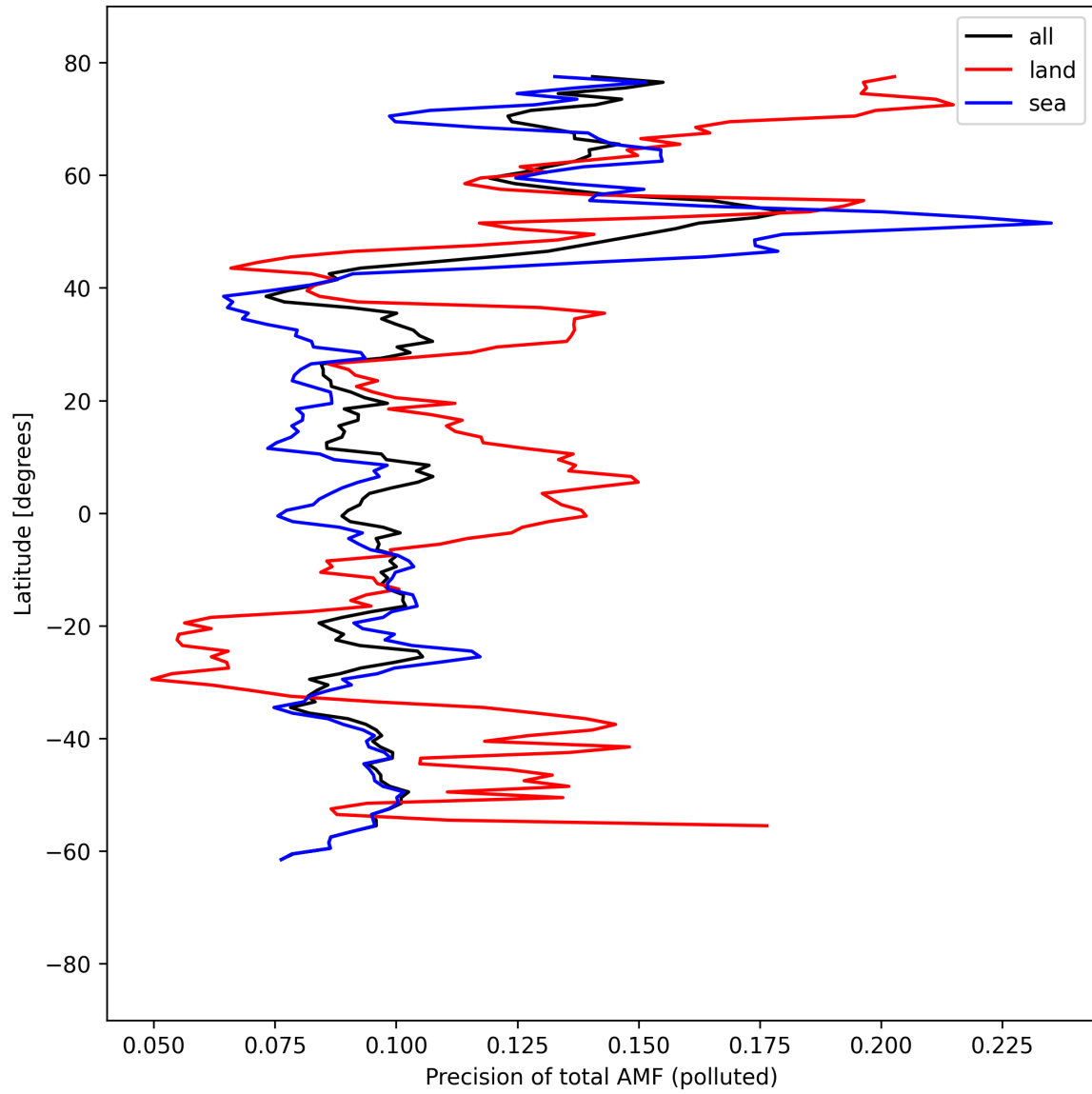


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-09-02 to 2025-09-02.

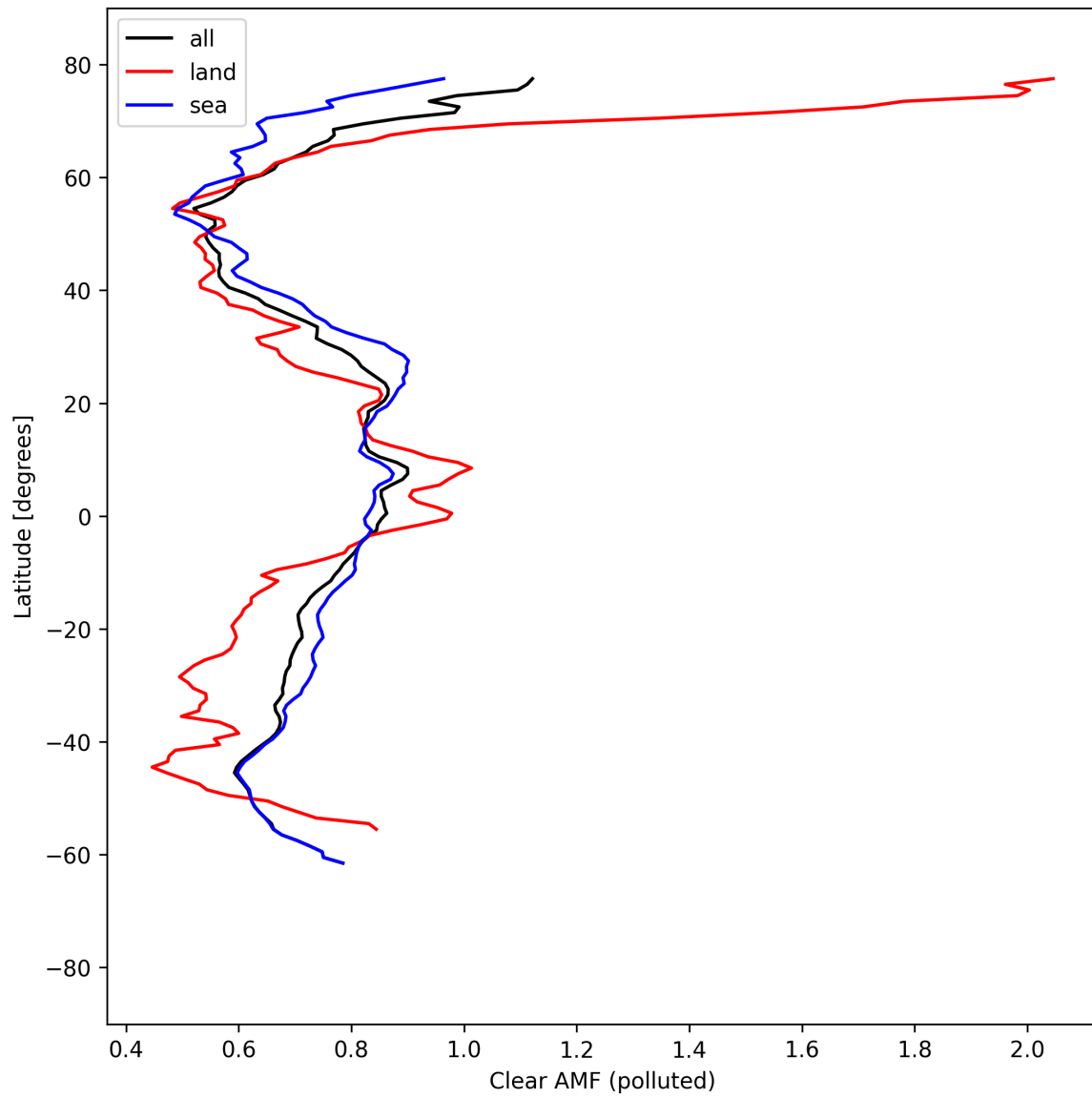


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-09-02 to 2025-09-02.

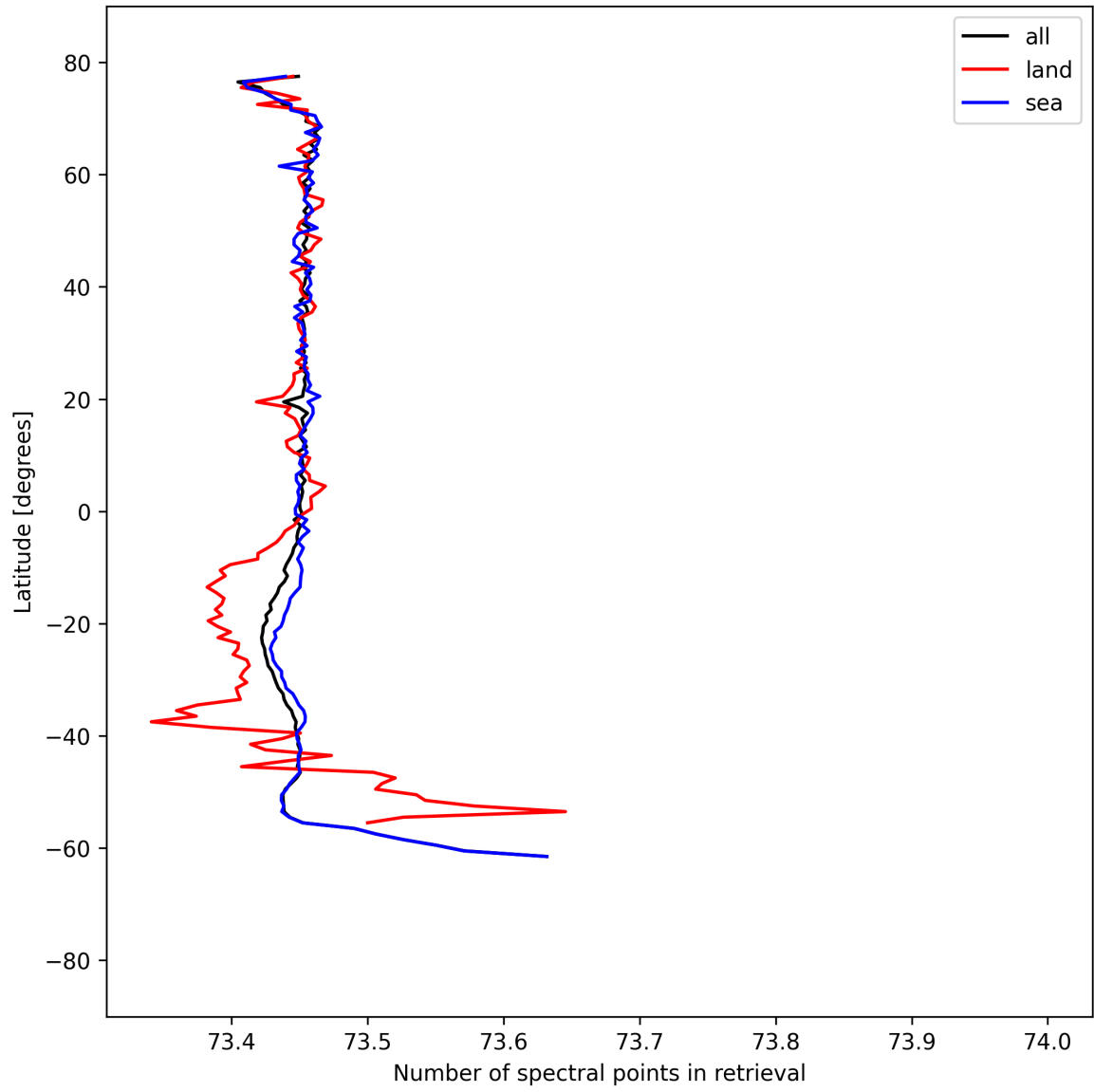


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-09-02 to 2025-09-02.

8 Histograms

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

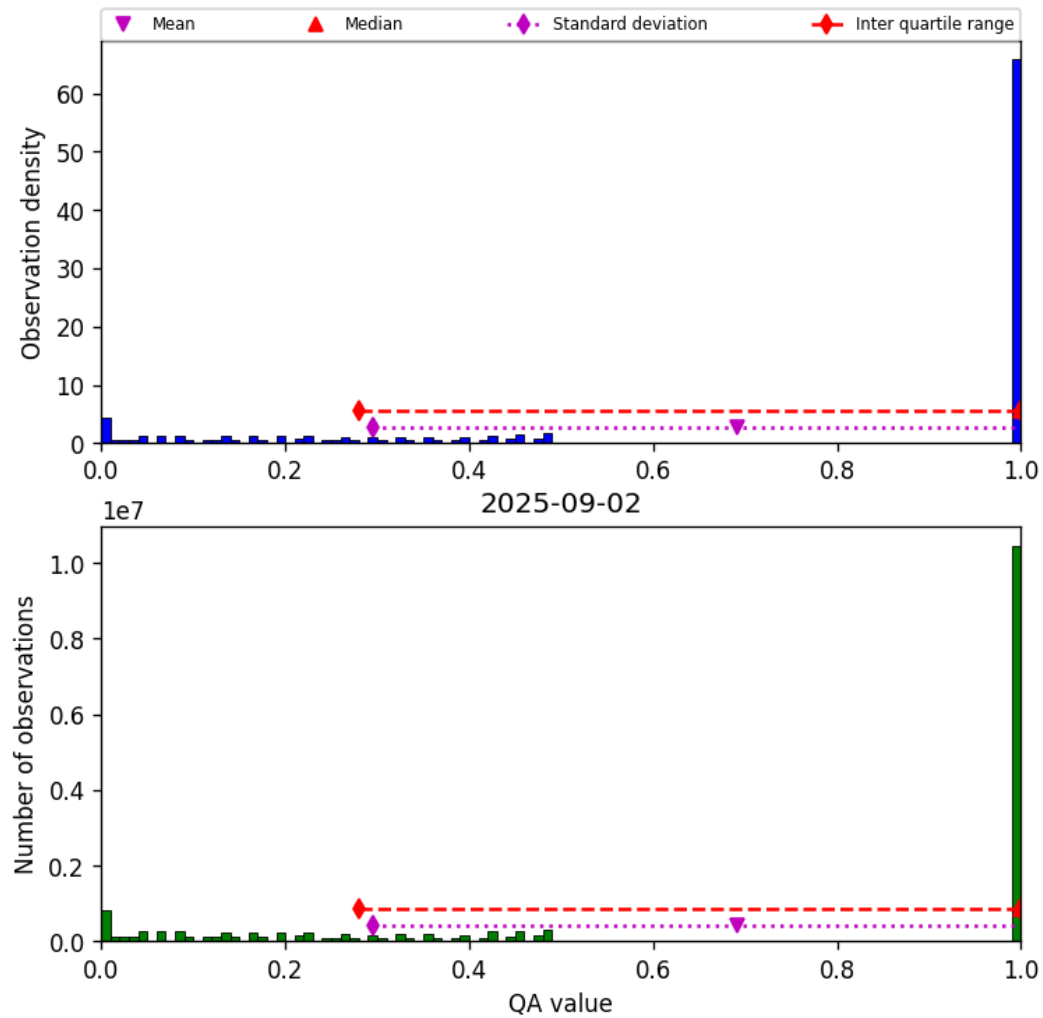


Figure 57: Histogram of “QA value” for 2025-09-02 to 2025-09-02

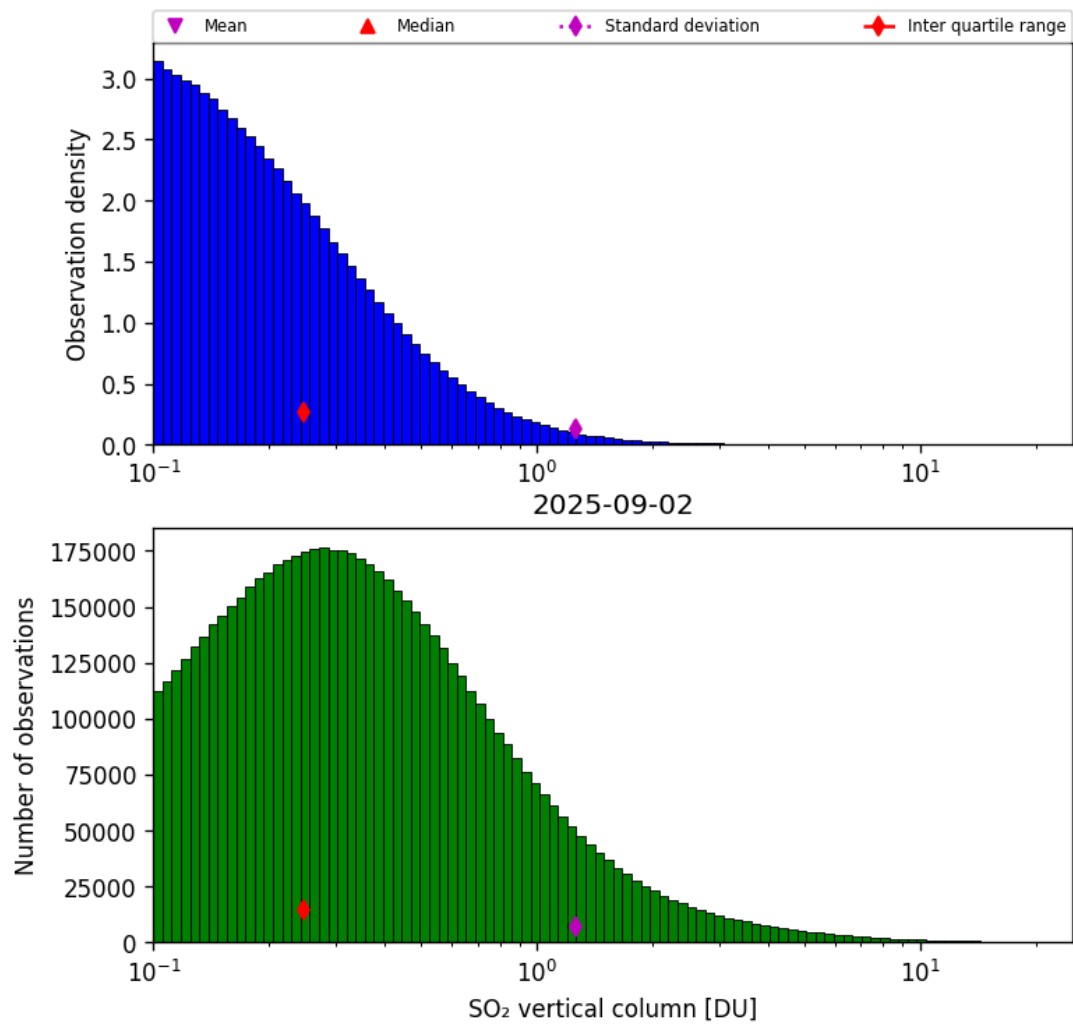


Figure 58: Histogram of “SO₂ vertical column” for 2025-09-02 to 2025-09-02

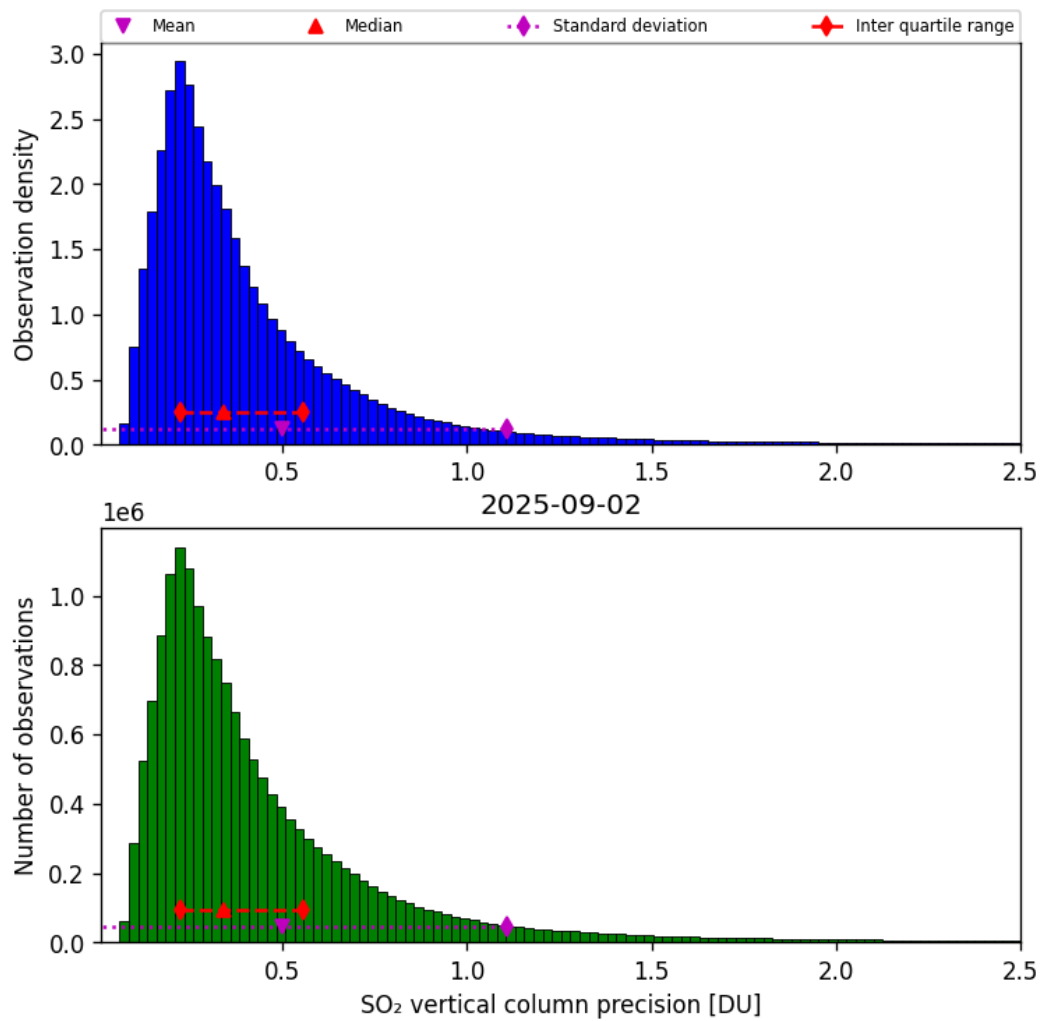


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-09-02 to 2025-09-02

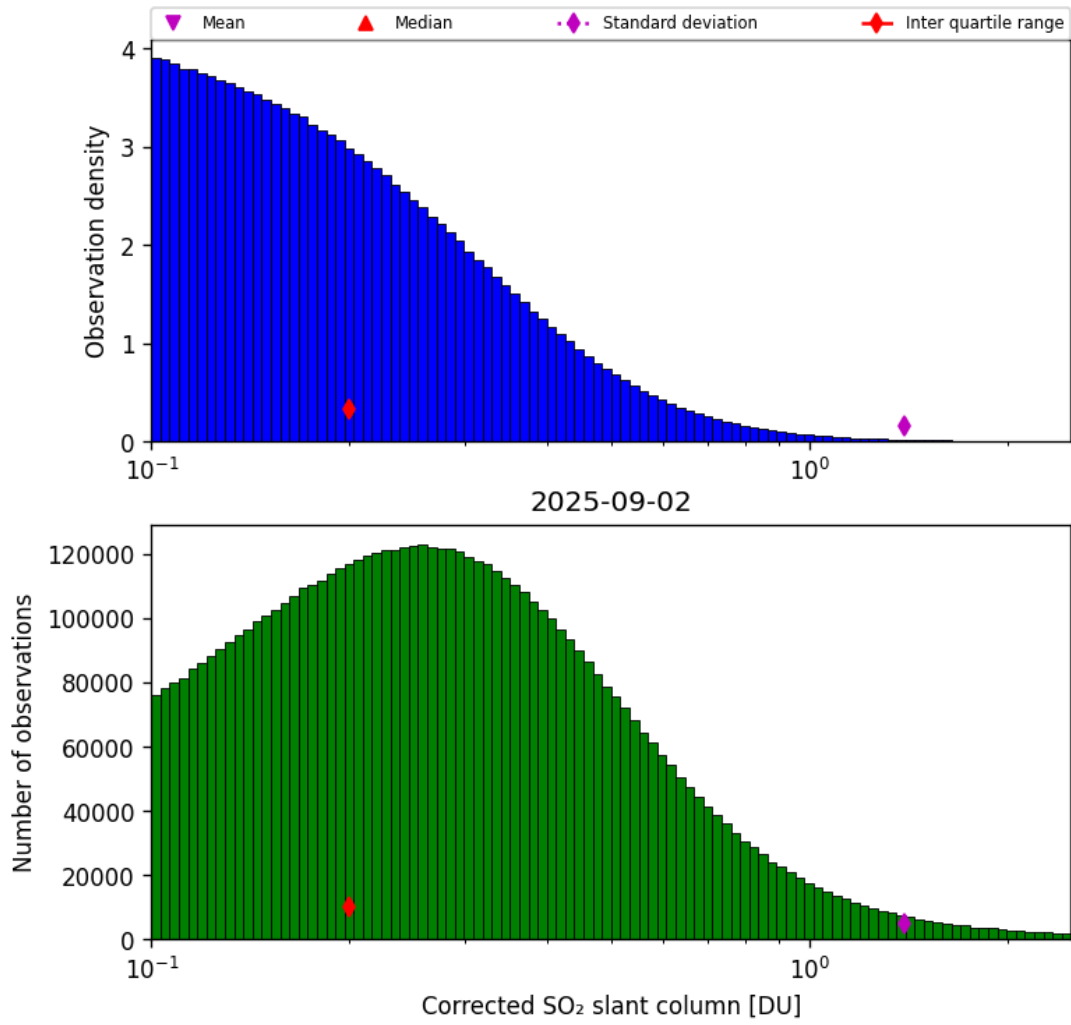


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-09-02 to 2025-09-02

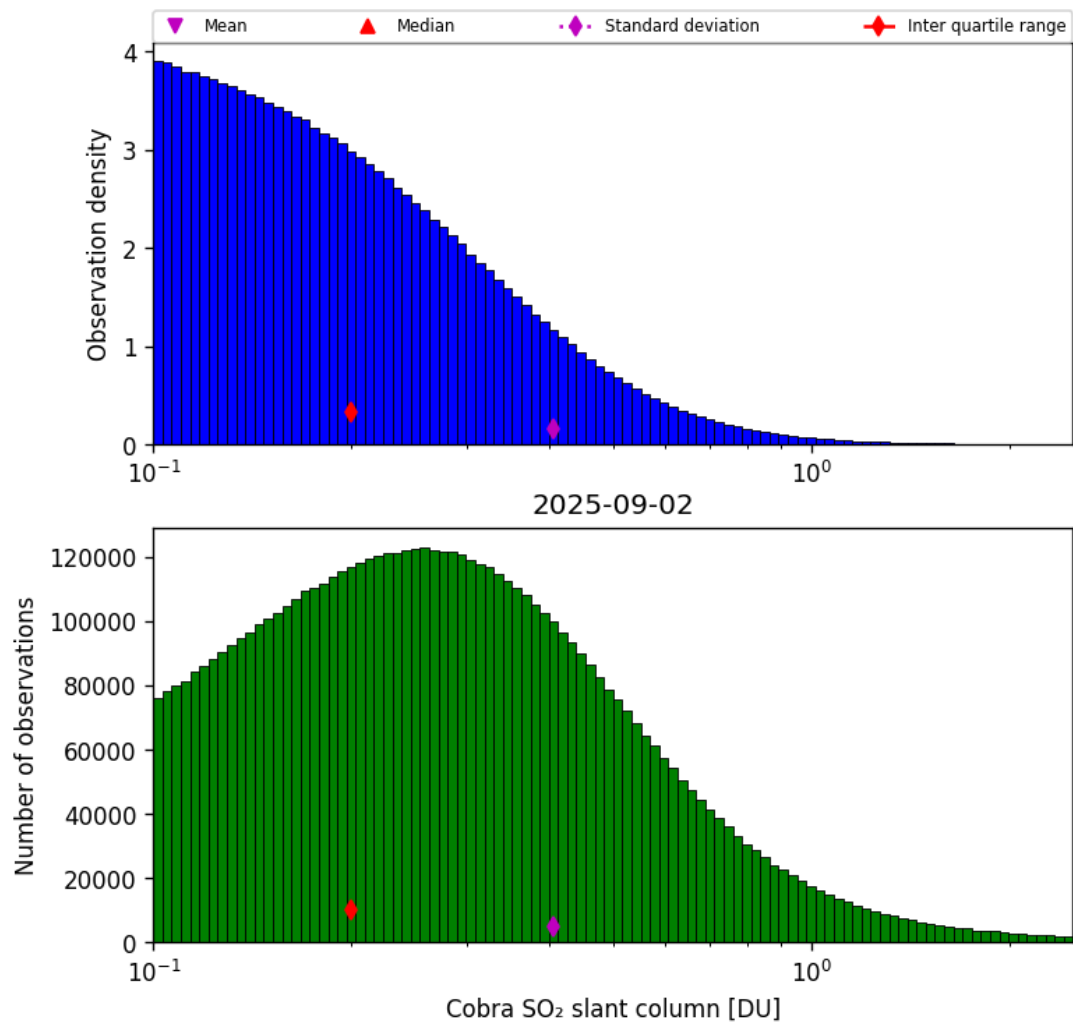


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-09-02 to 2025-09-02

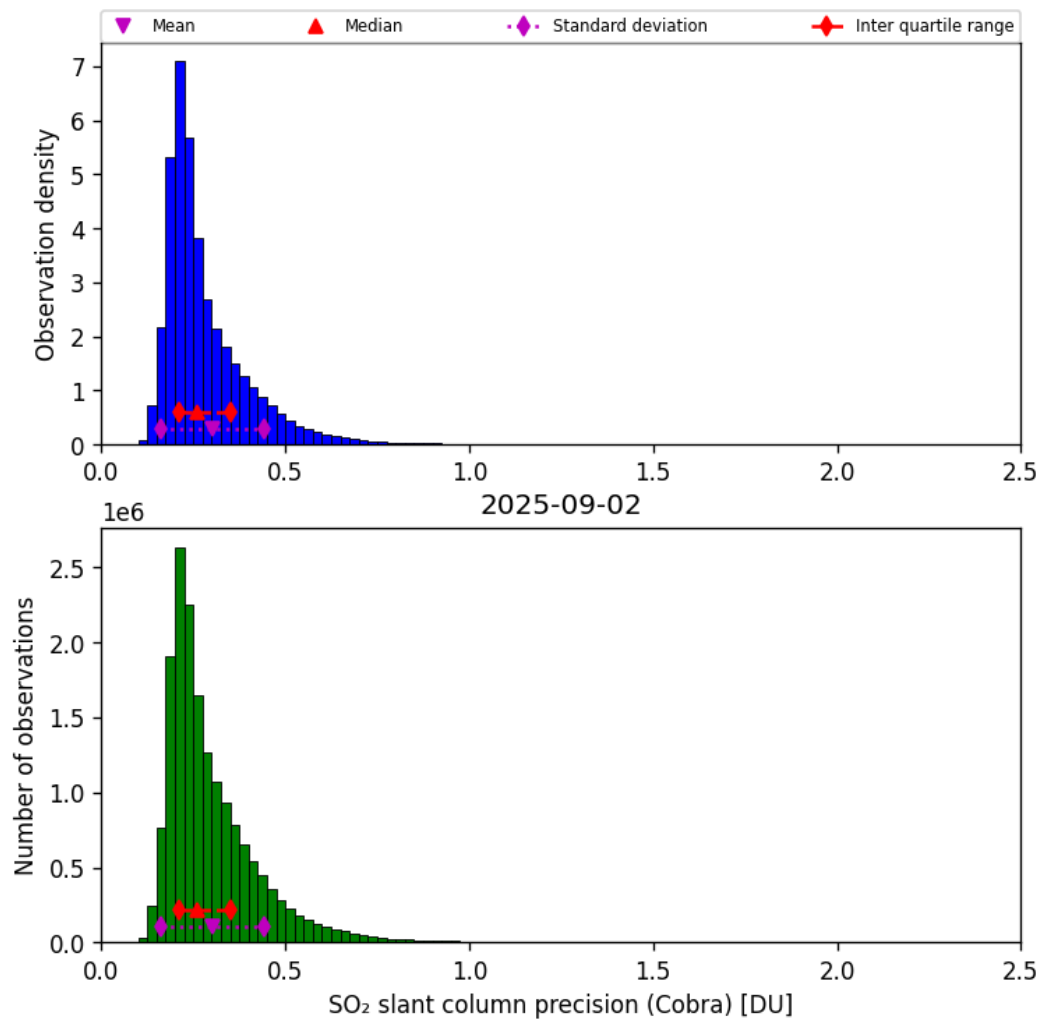


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-09-02 to 2025-09-02

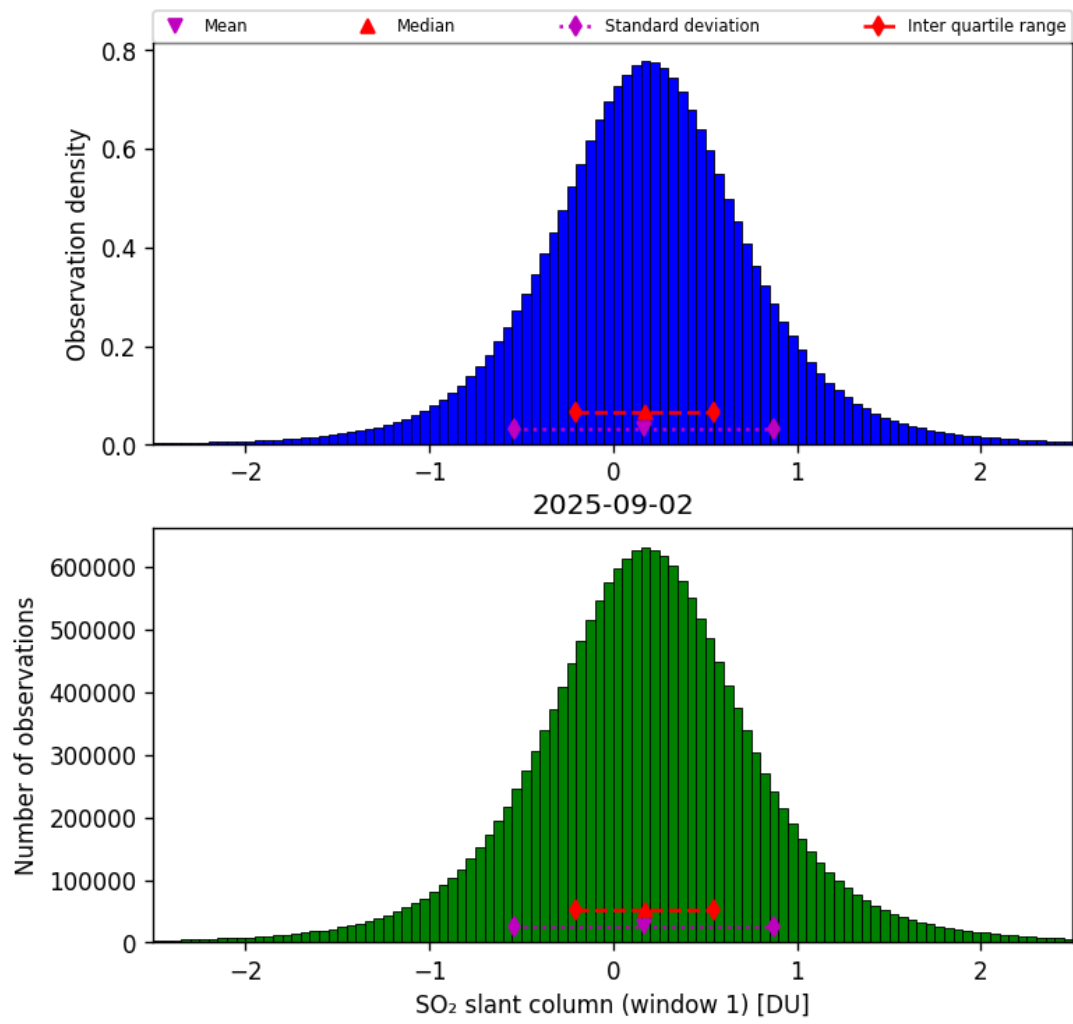


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-09-02 to 2025-09-02

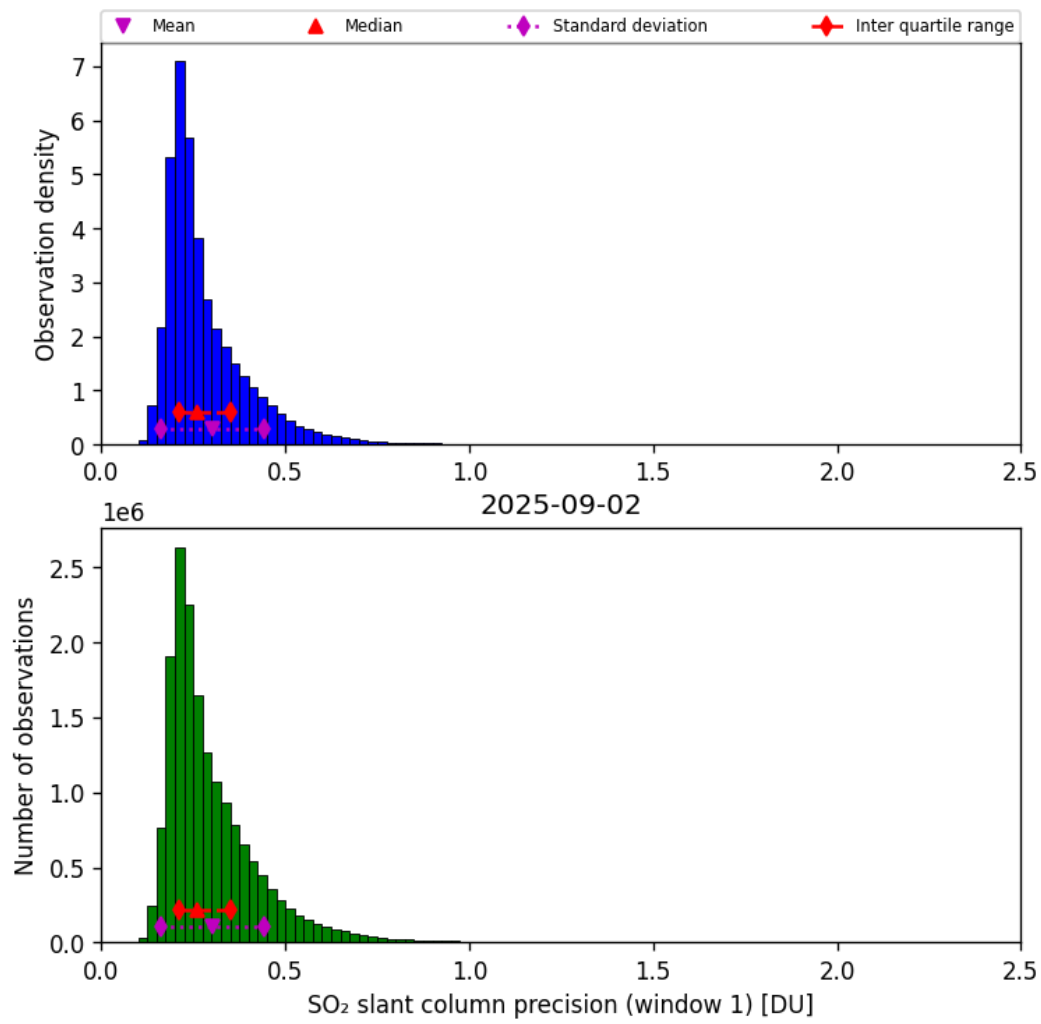


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-09-02 to 2025-09-02

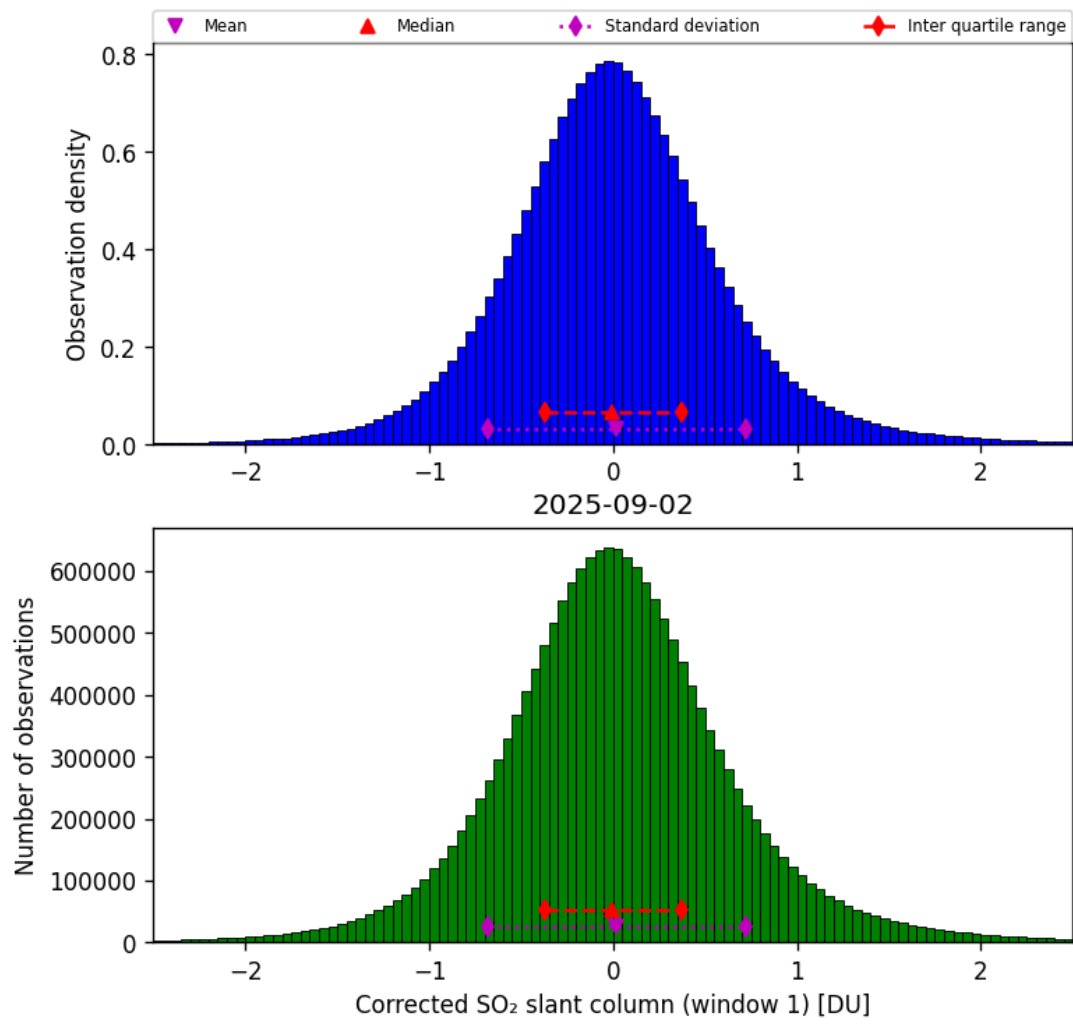


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-09-02 to 2025-09-02

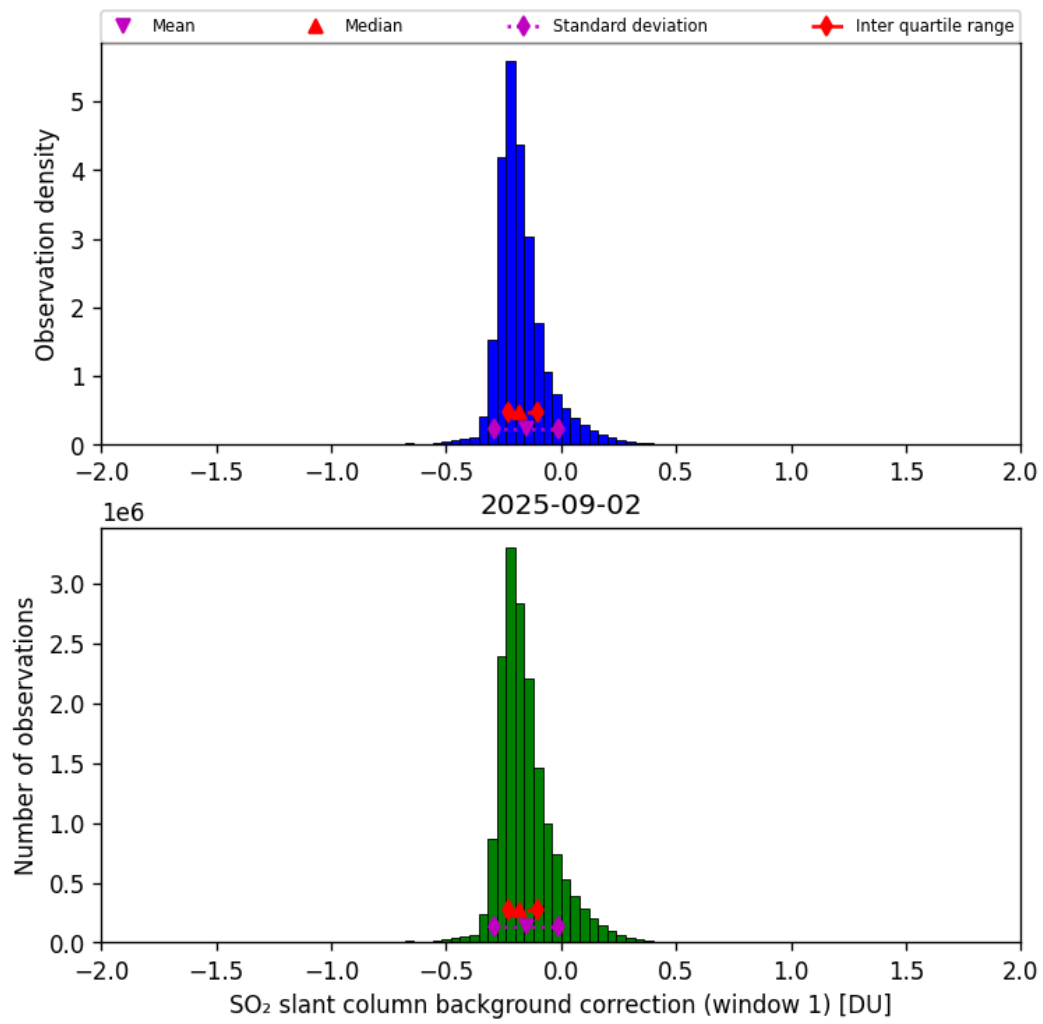


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-09-02 to 2025-09-02

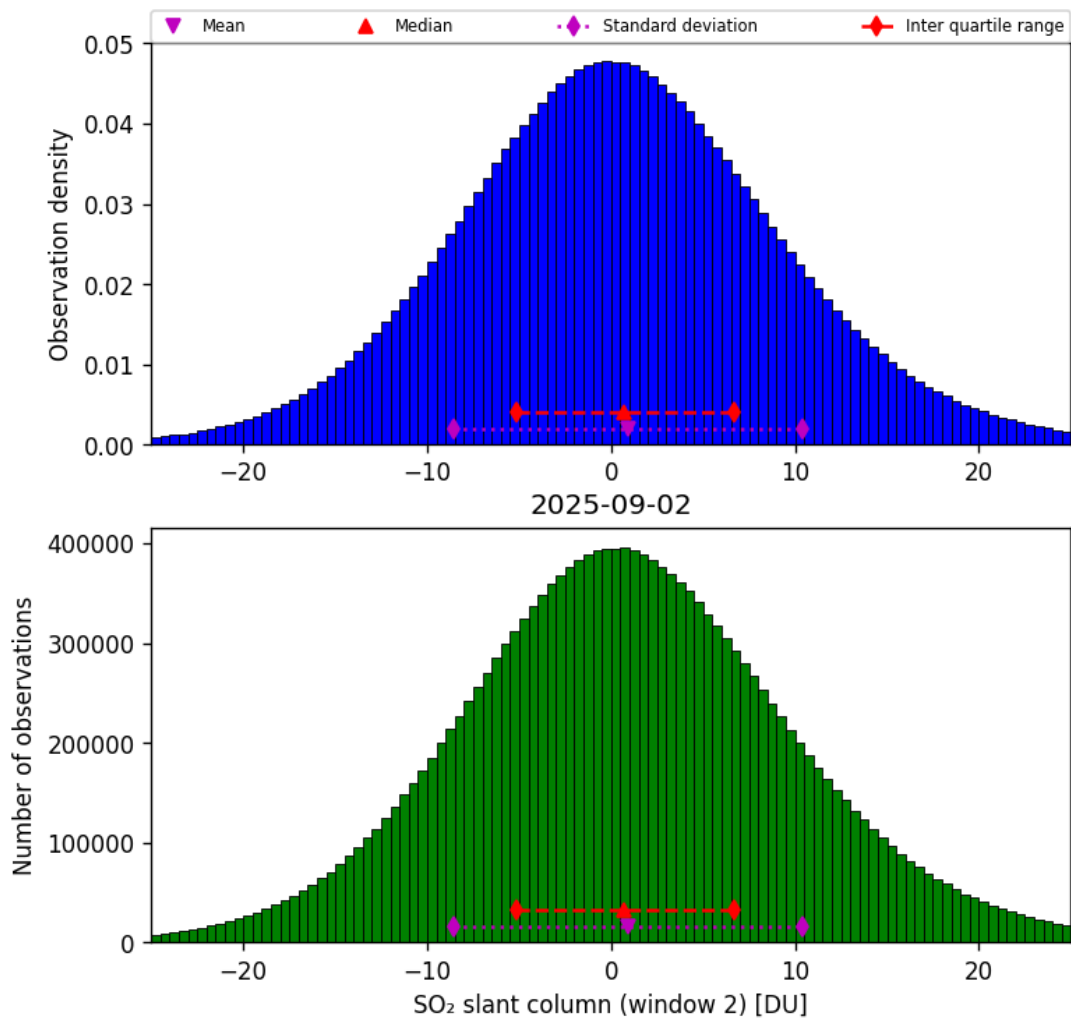


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-09-02 to 2025-09-02

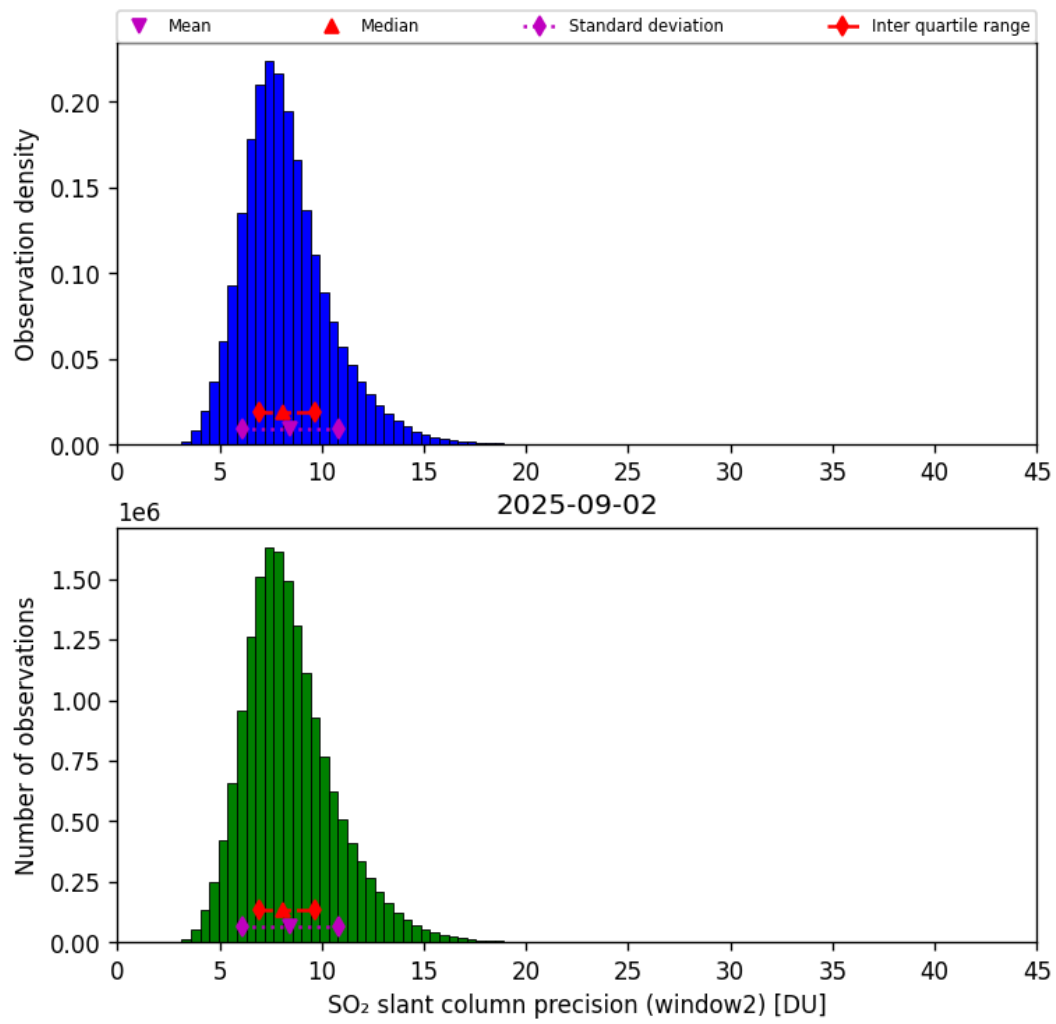


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-09-02 to 2025-09-02

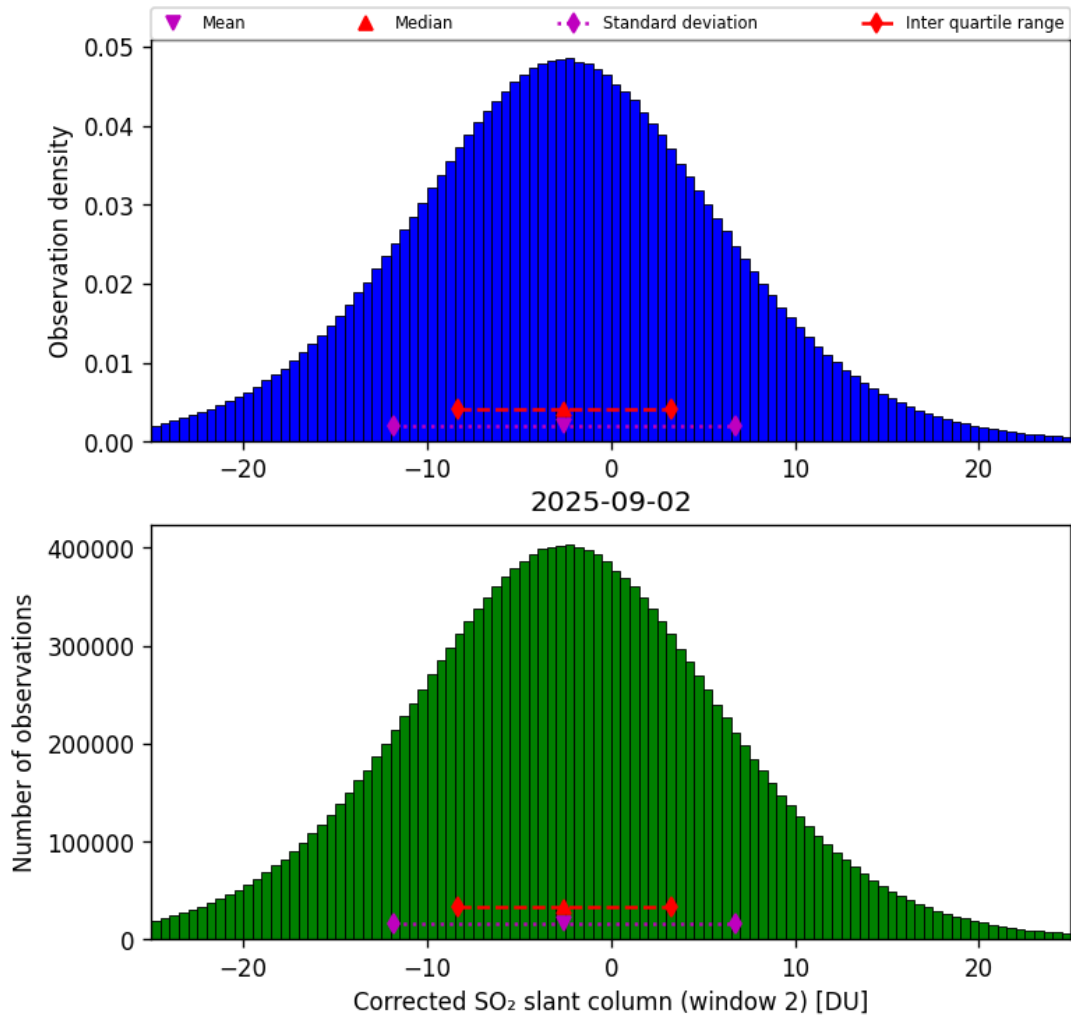


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-09-02 to 2025-09-02

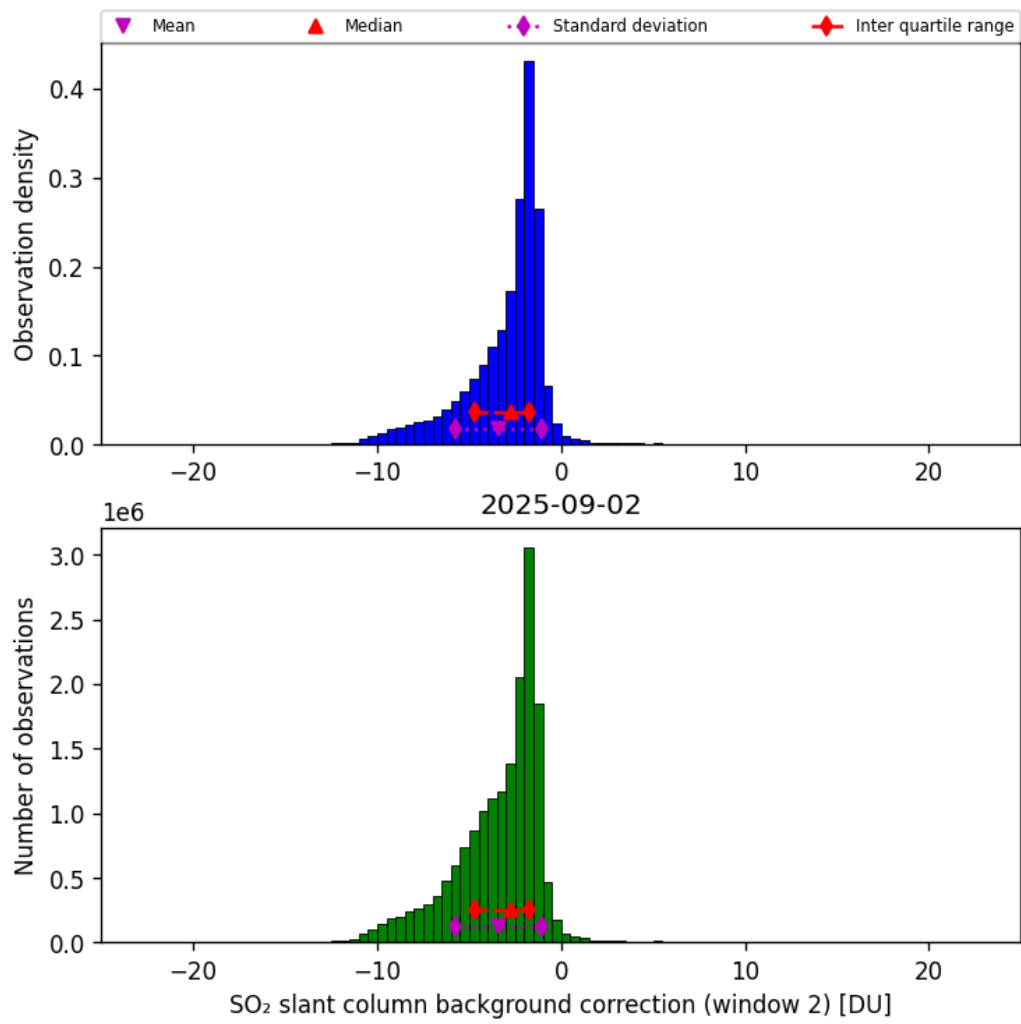


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-09-02 to 2025-09-02

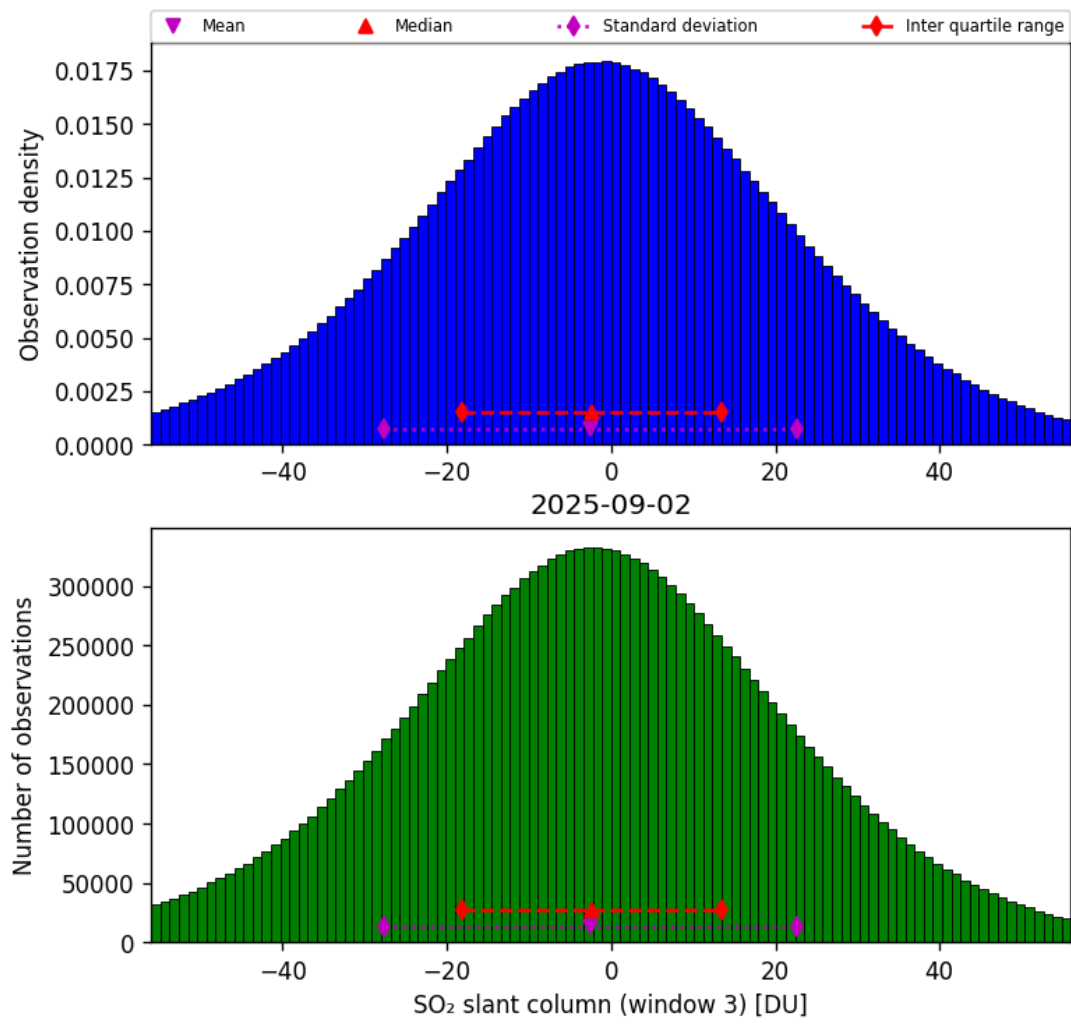


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-09-02 to 2025-09-02

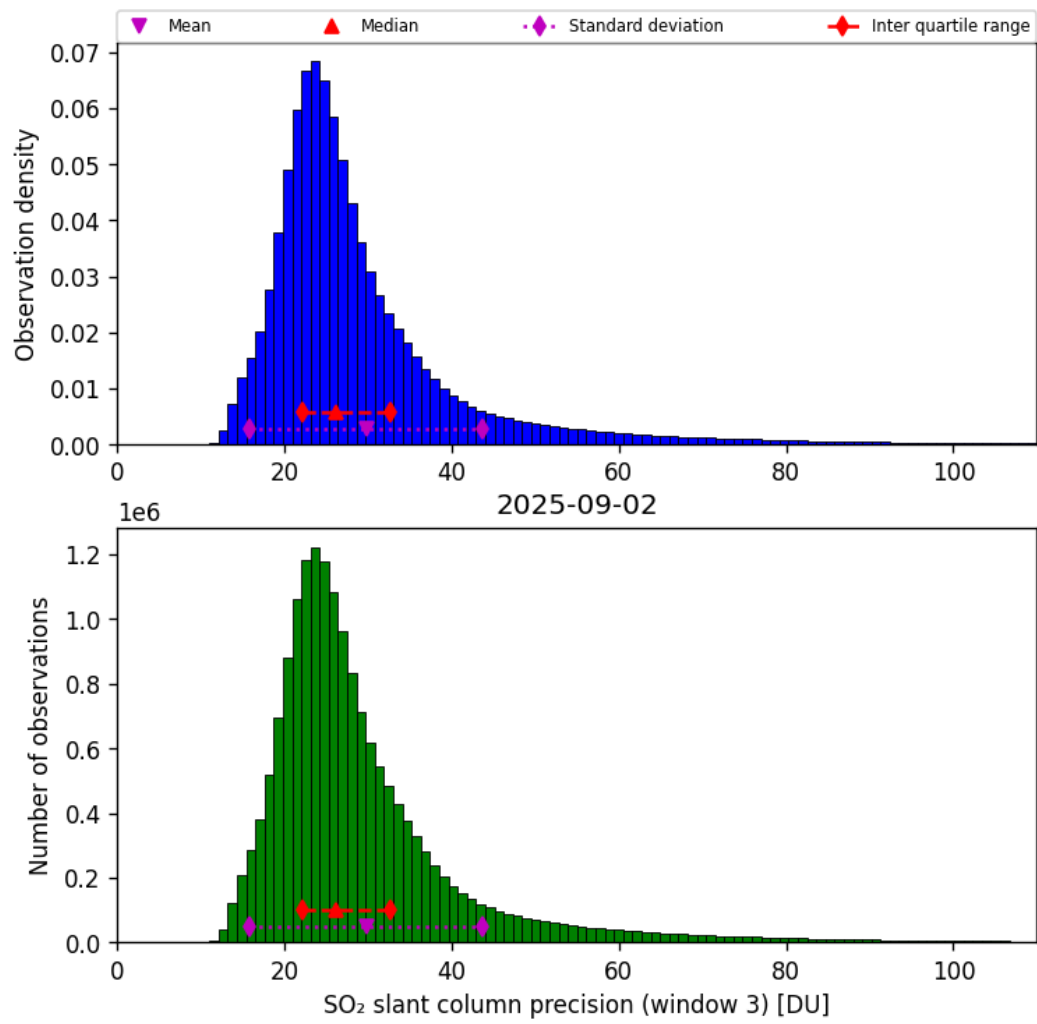


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-09-02 to 2025-09-02

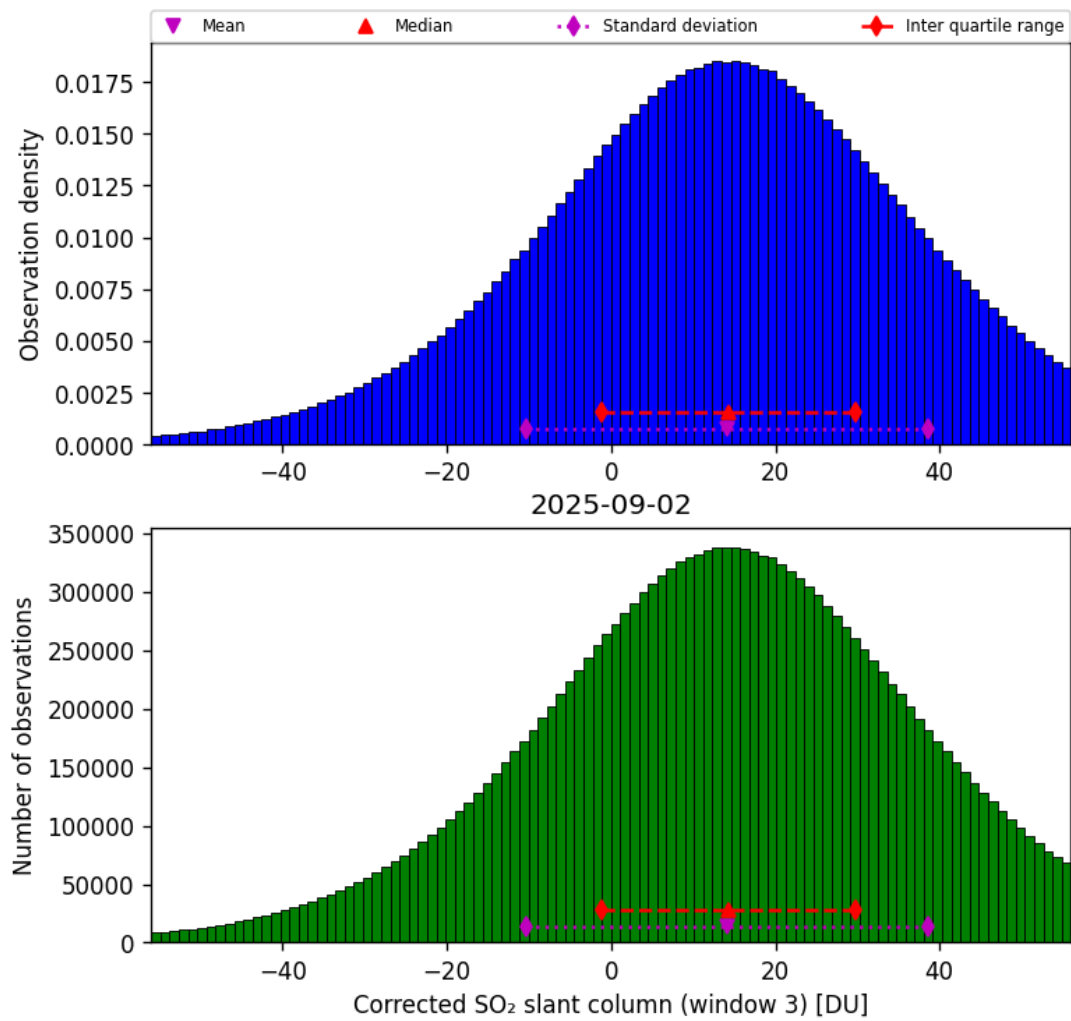


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-09-02 to 2025-09-02

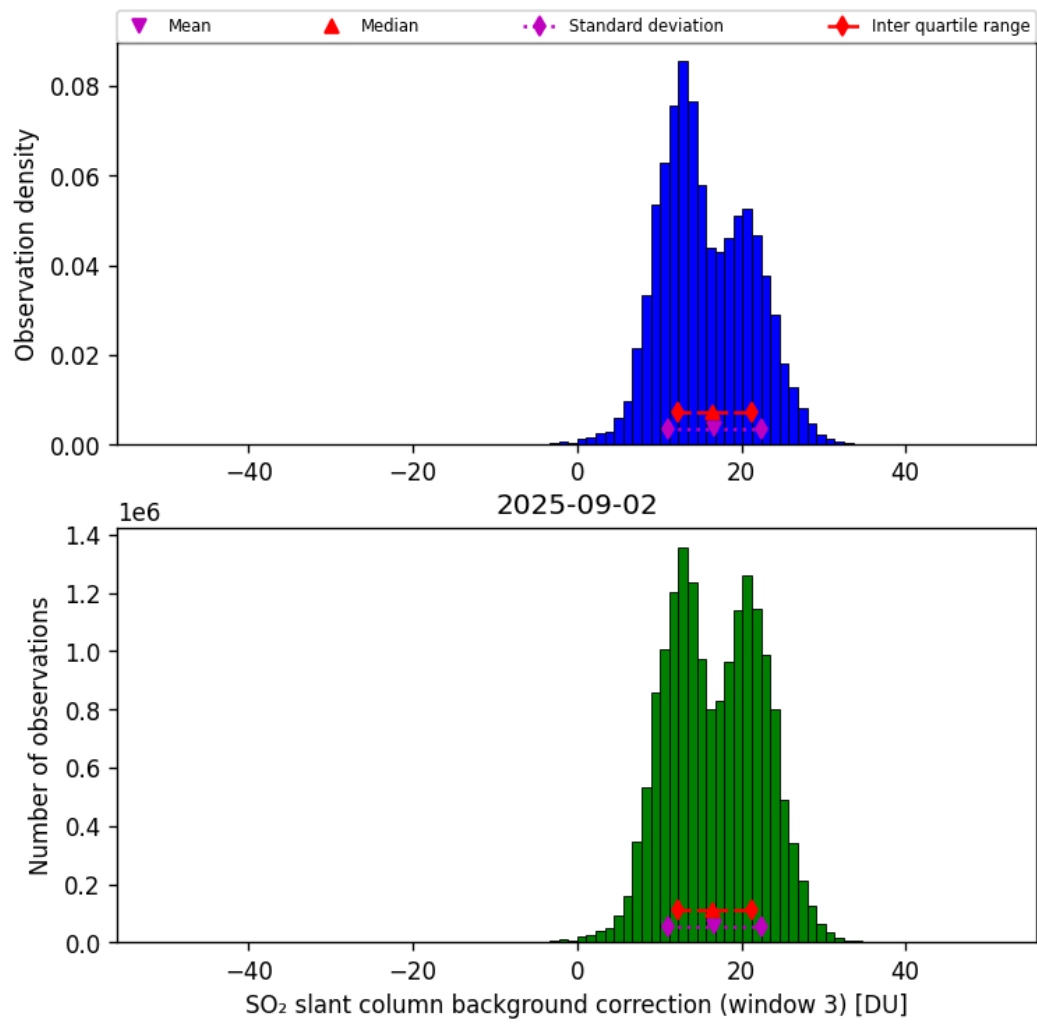


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-09-02 to 2025-09-02

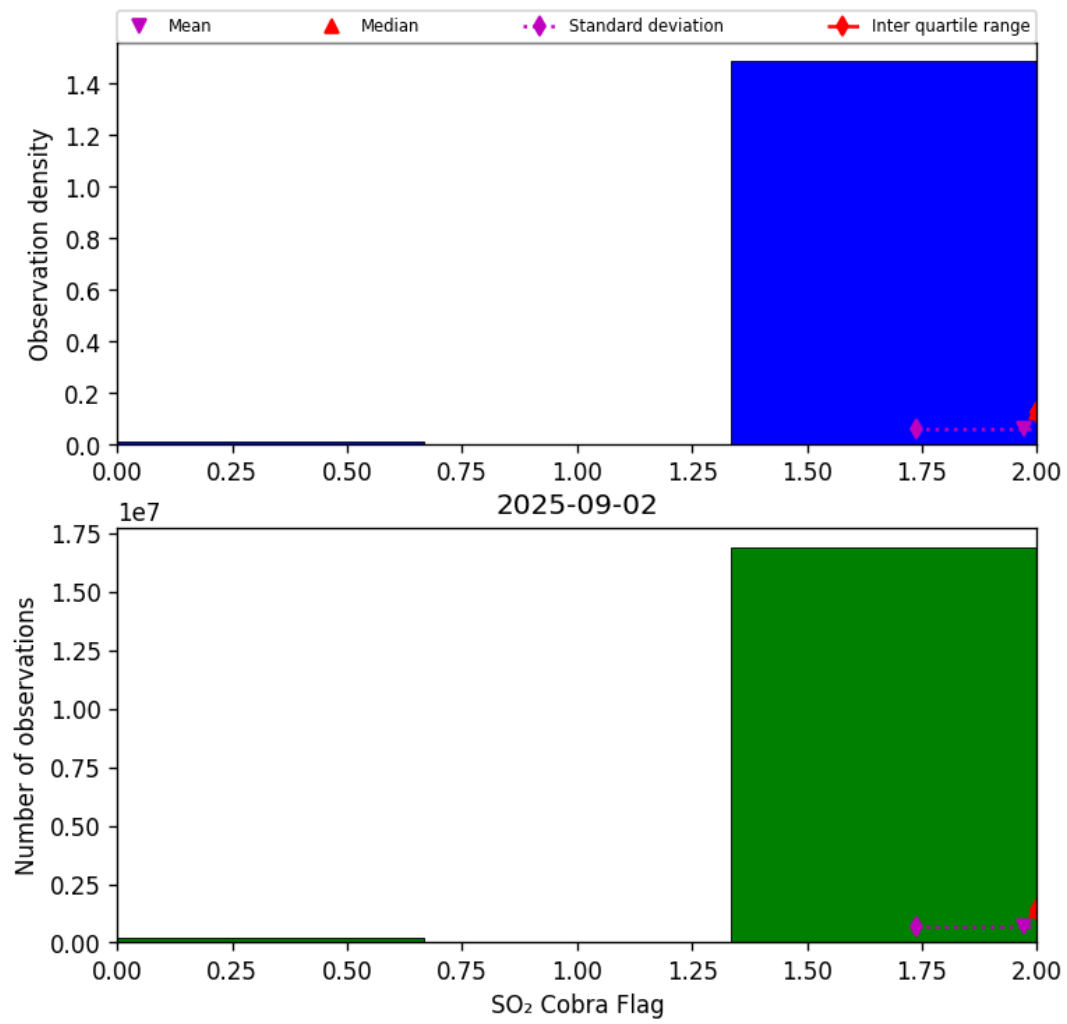


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-09-02 to 2025-09-02

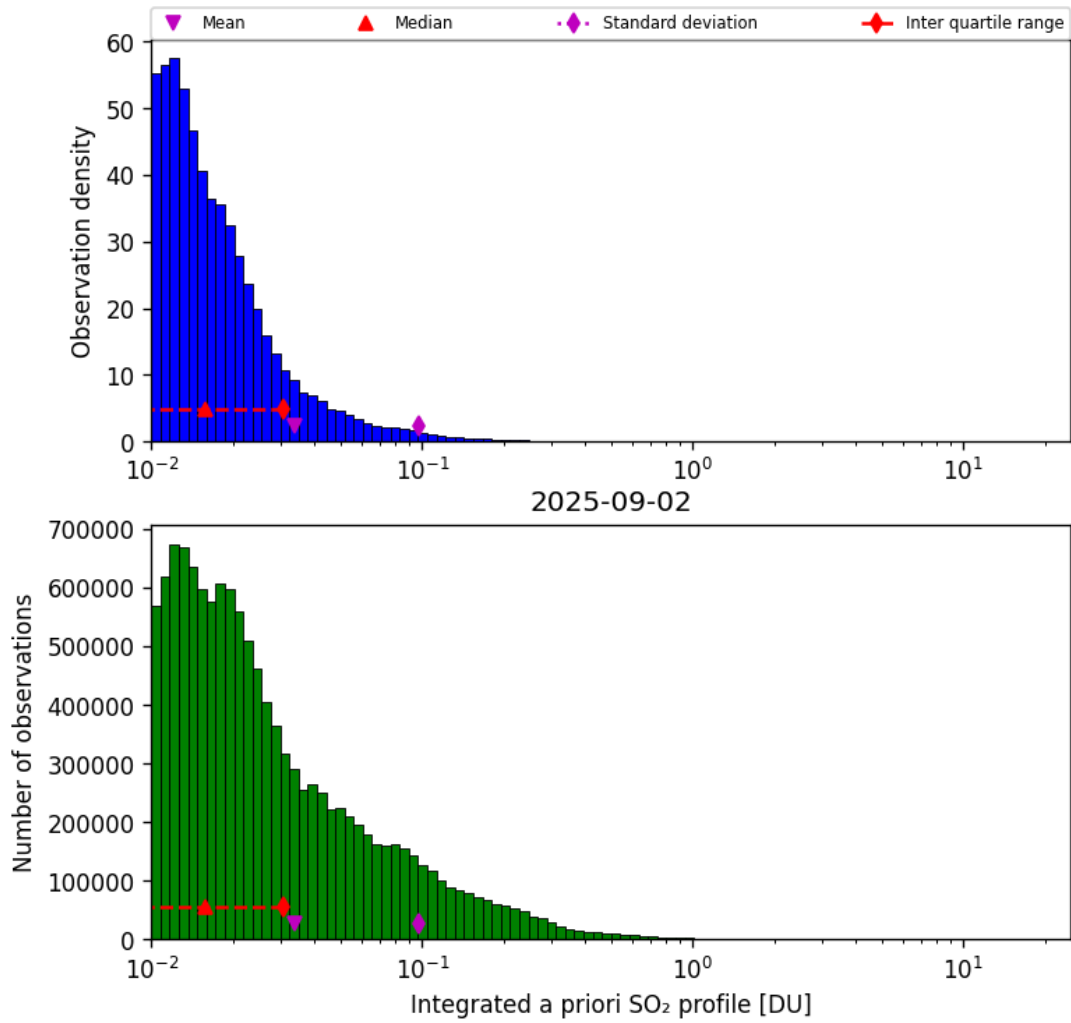


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-09-02 to 2025-09-02

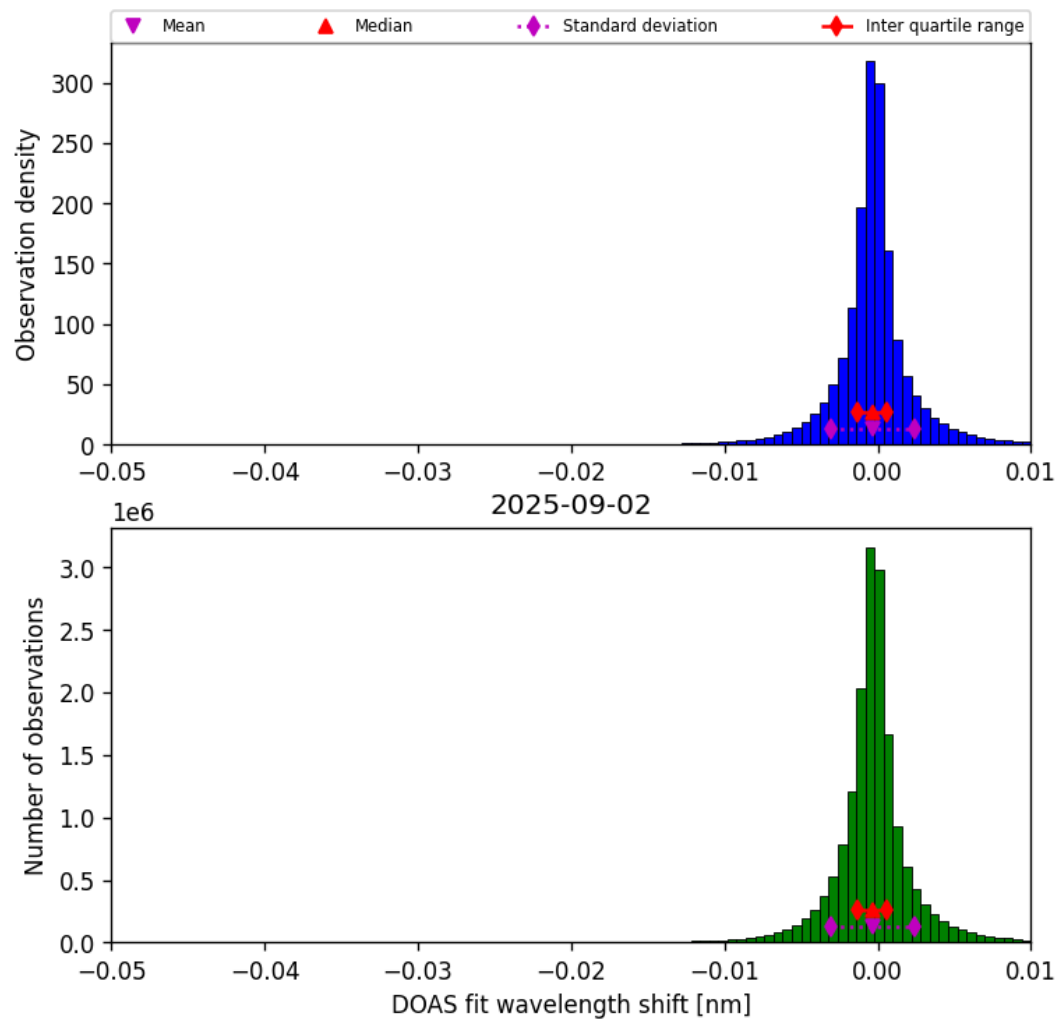


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-09-02 to 2025-09-02

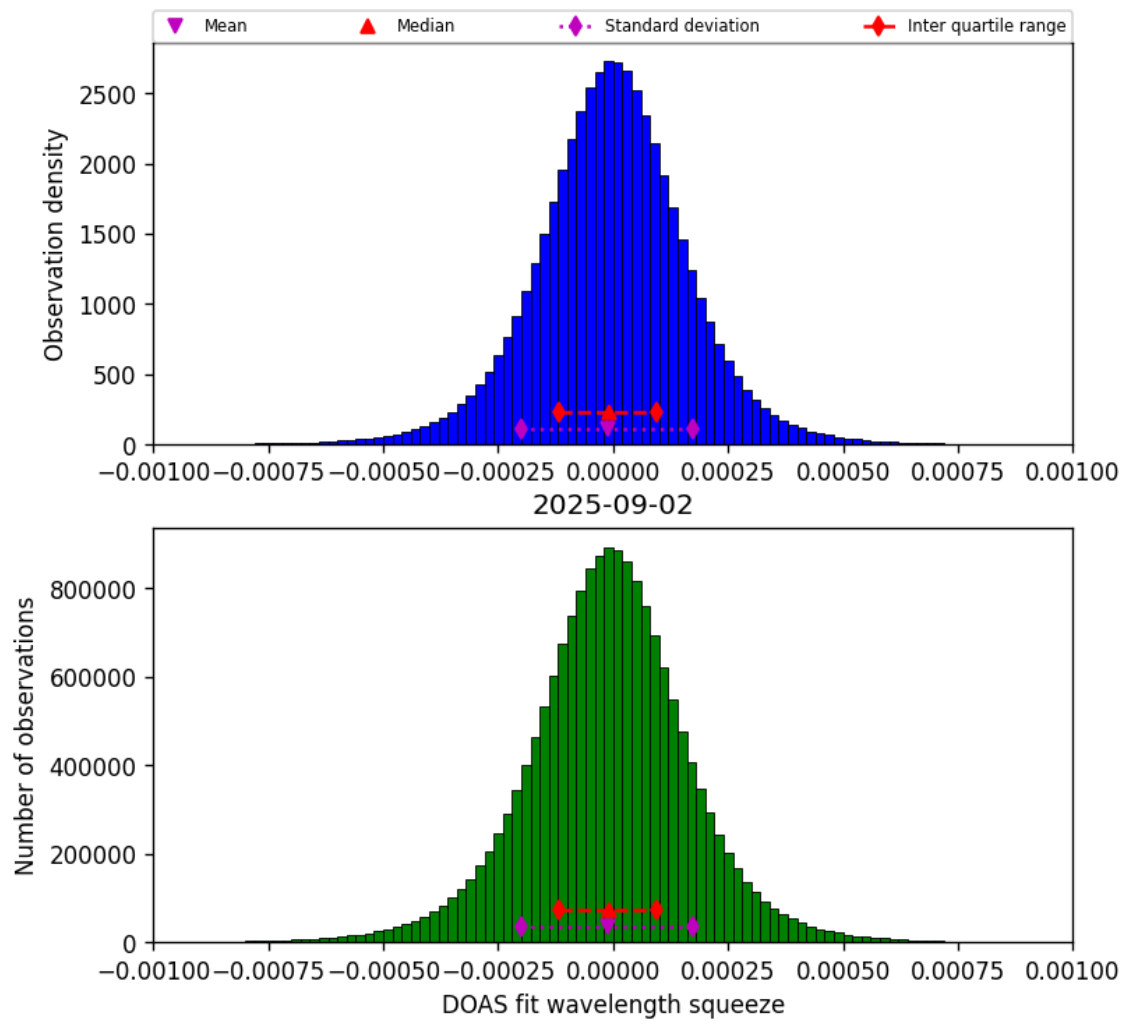


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-09-02 to 2025-09-02

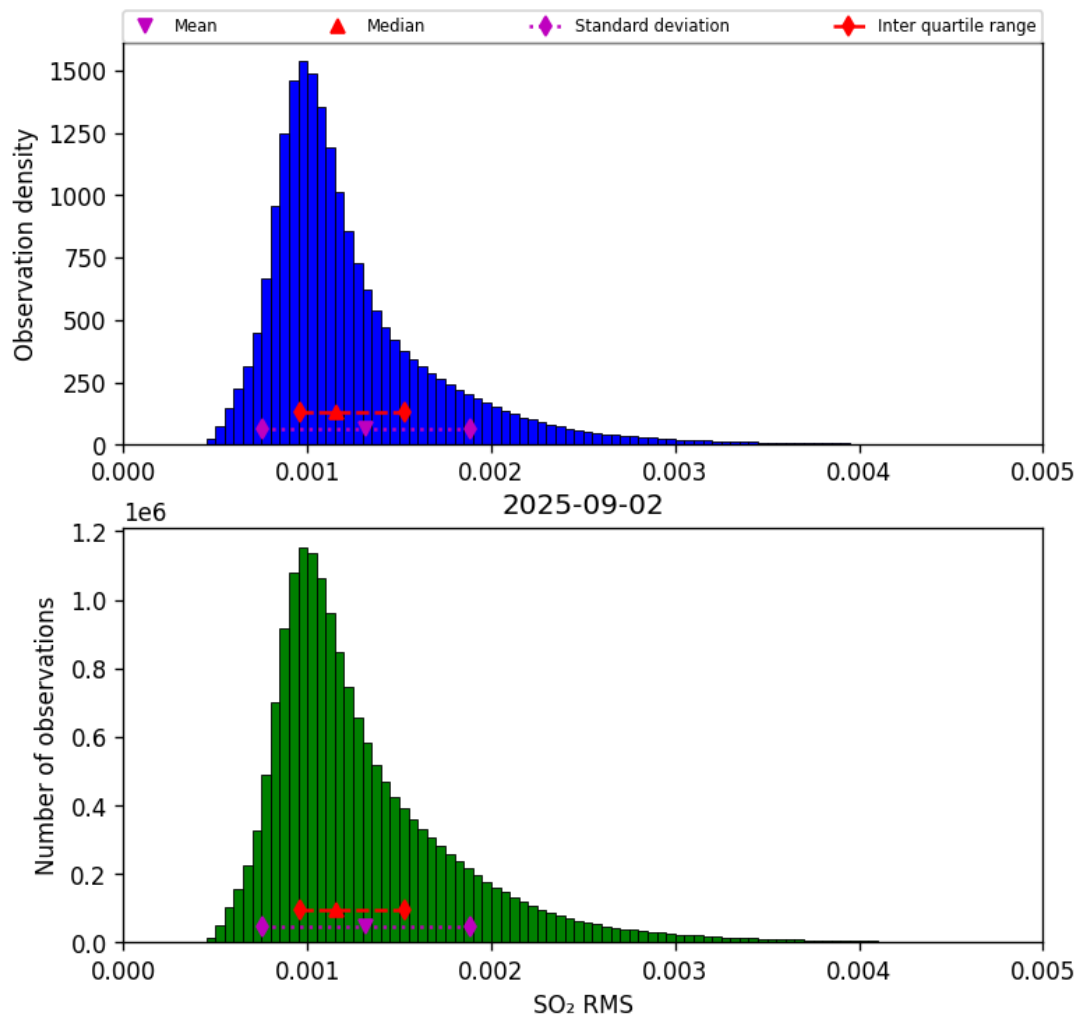


Figure 79: Histogram of “SO₂ RMS” for 2025-09-02 to 2025-09-02

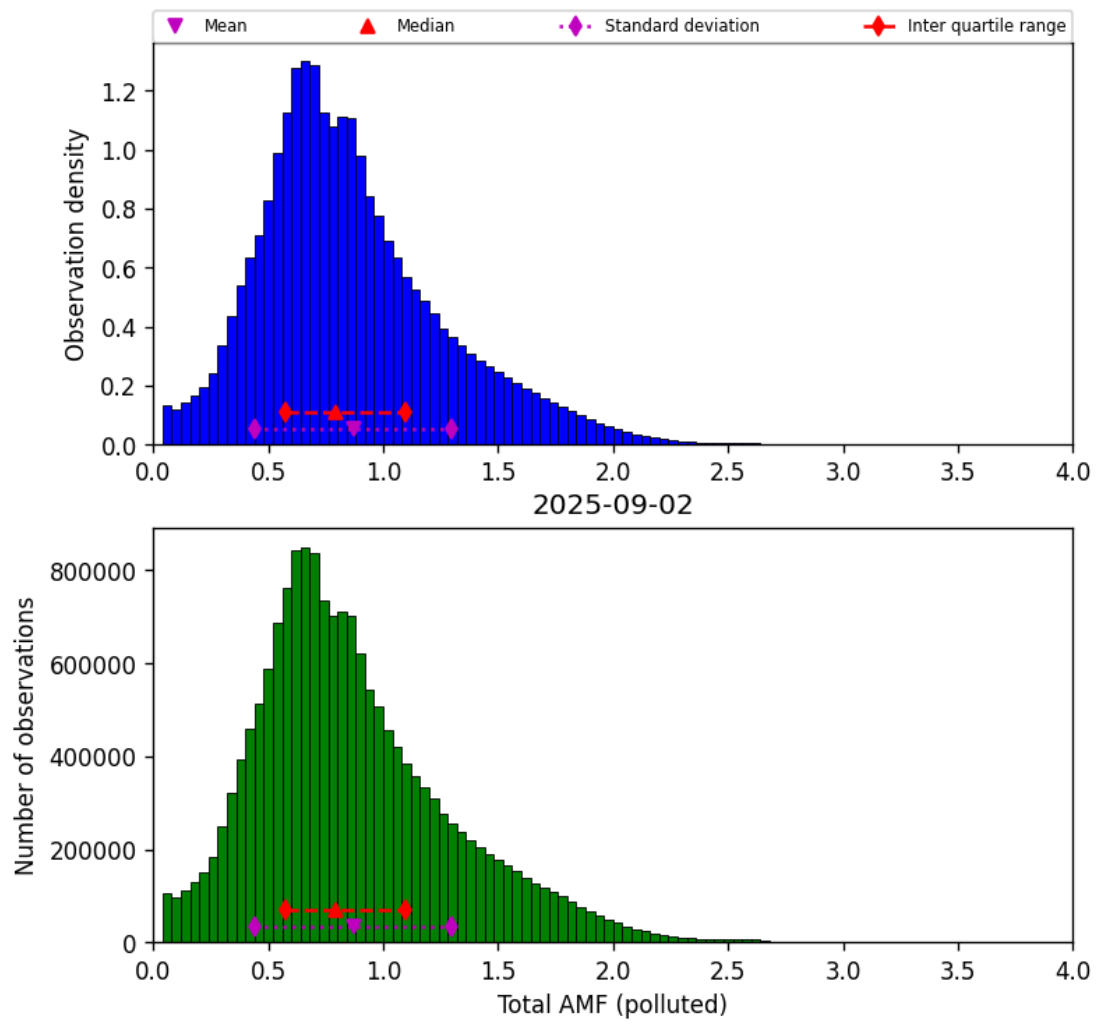


Figure 80: Histogram of “Total AMF (polluted)” for 2025-09-02 to 2025-09-02

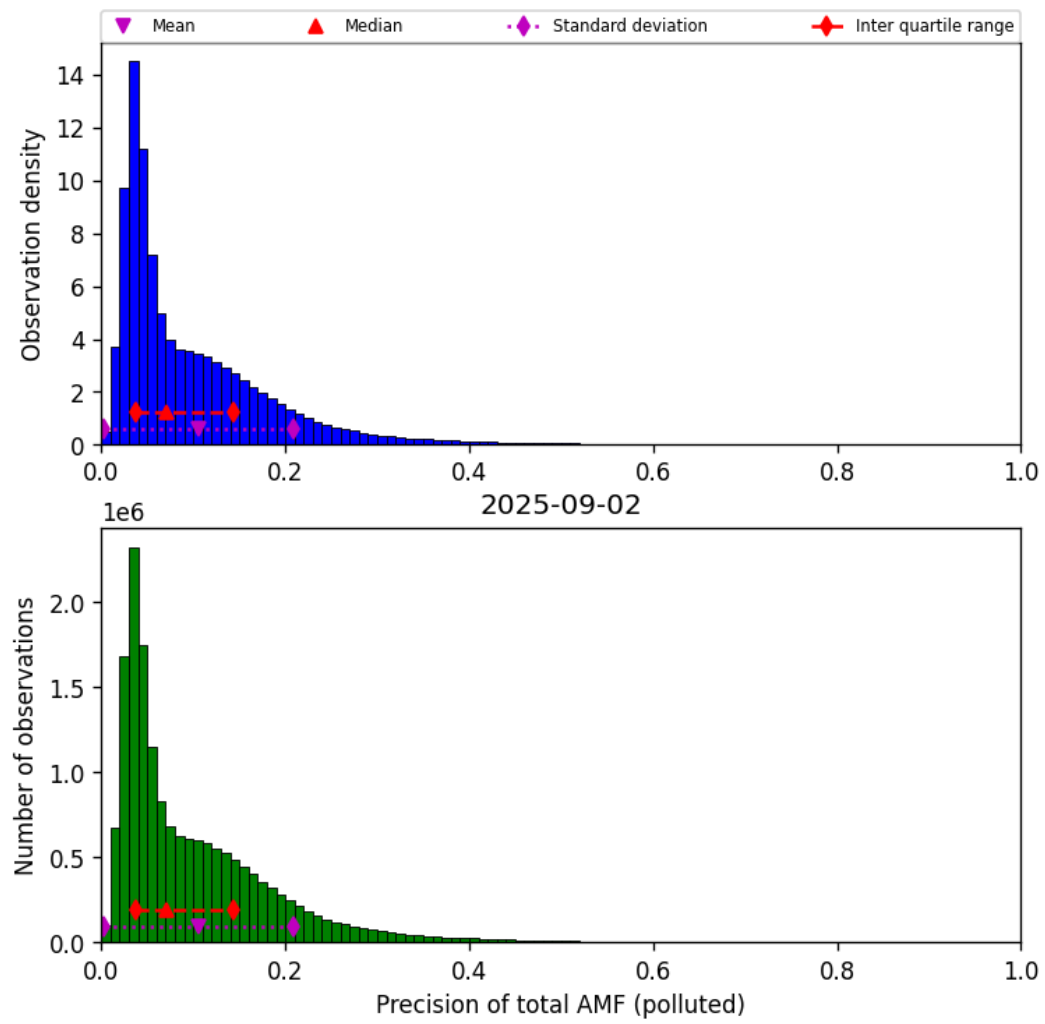


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-09-02 to 2025-09-02

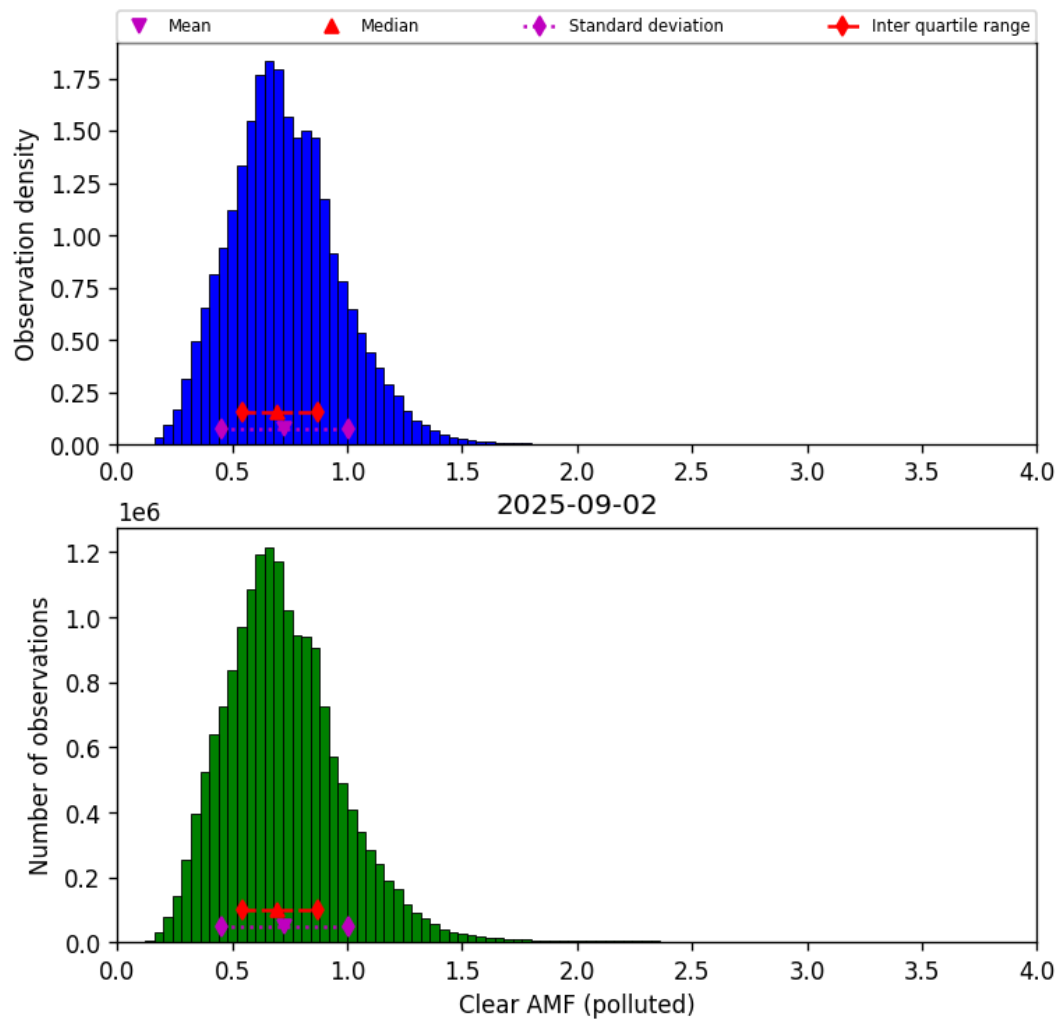


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-09-02 to 2025-09-02

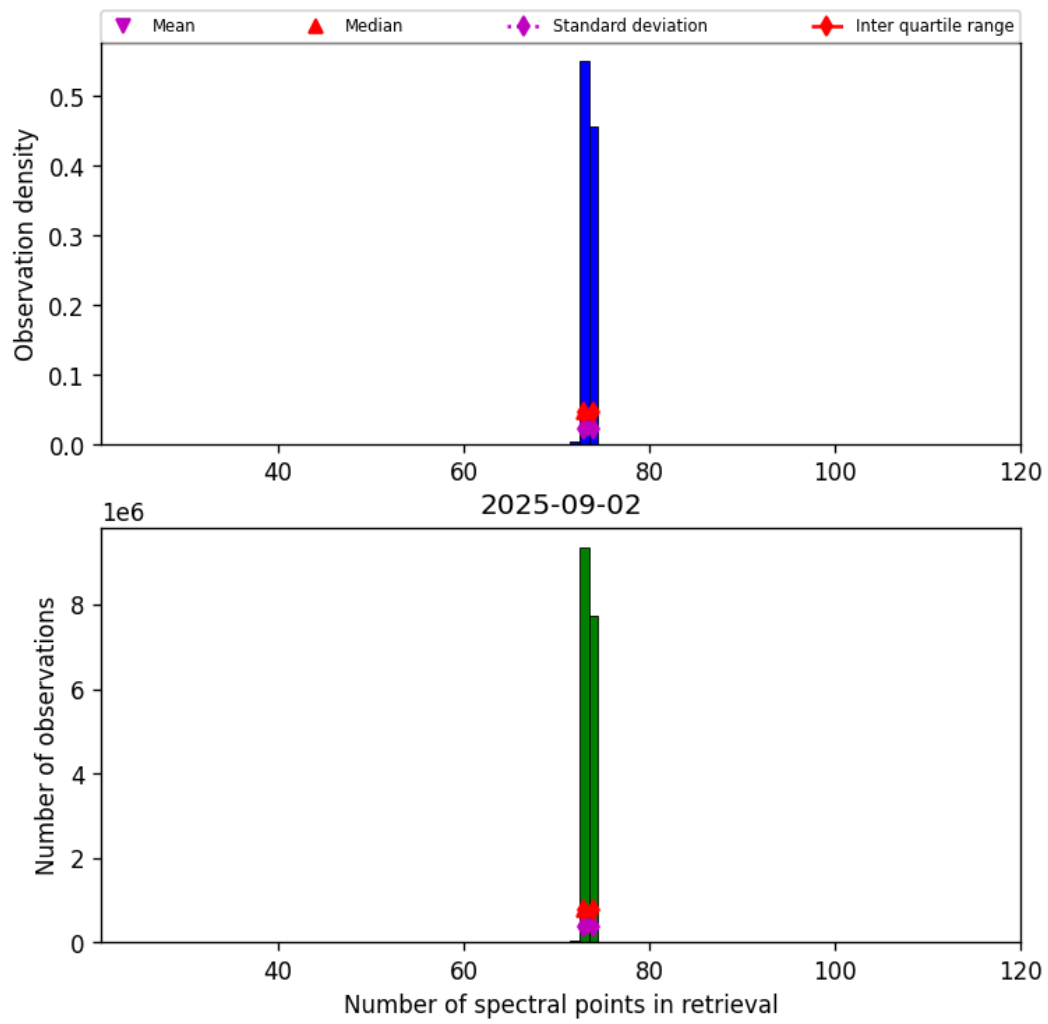


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-09-02 to 2025-09-02

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.

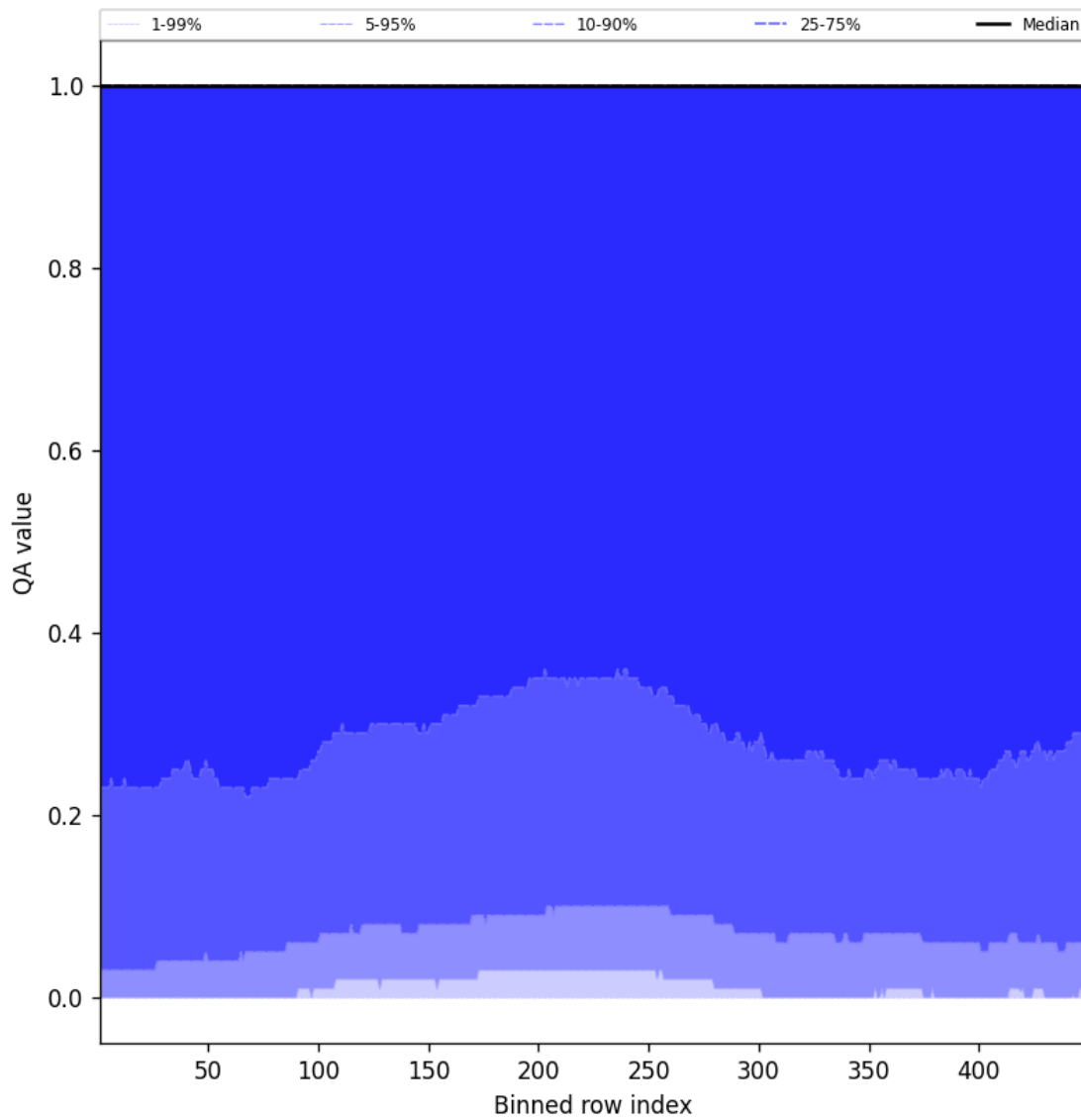


Figure 84: Along track statistics of “QA value” for 2025-09-02 to 2025-09-02

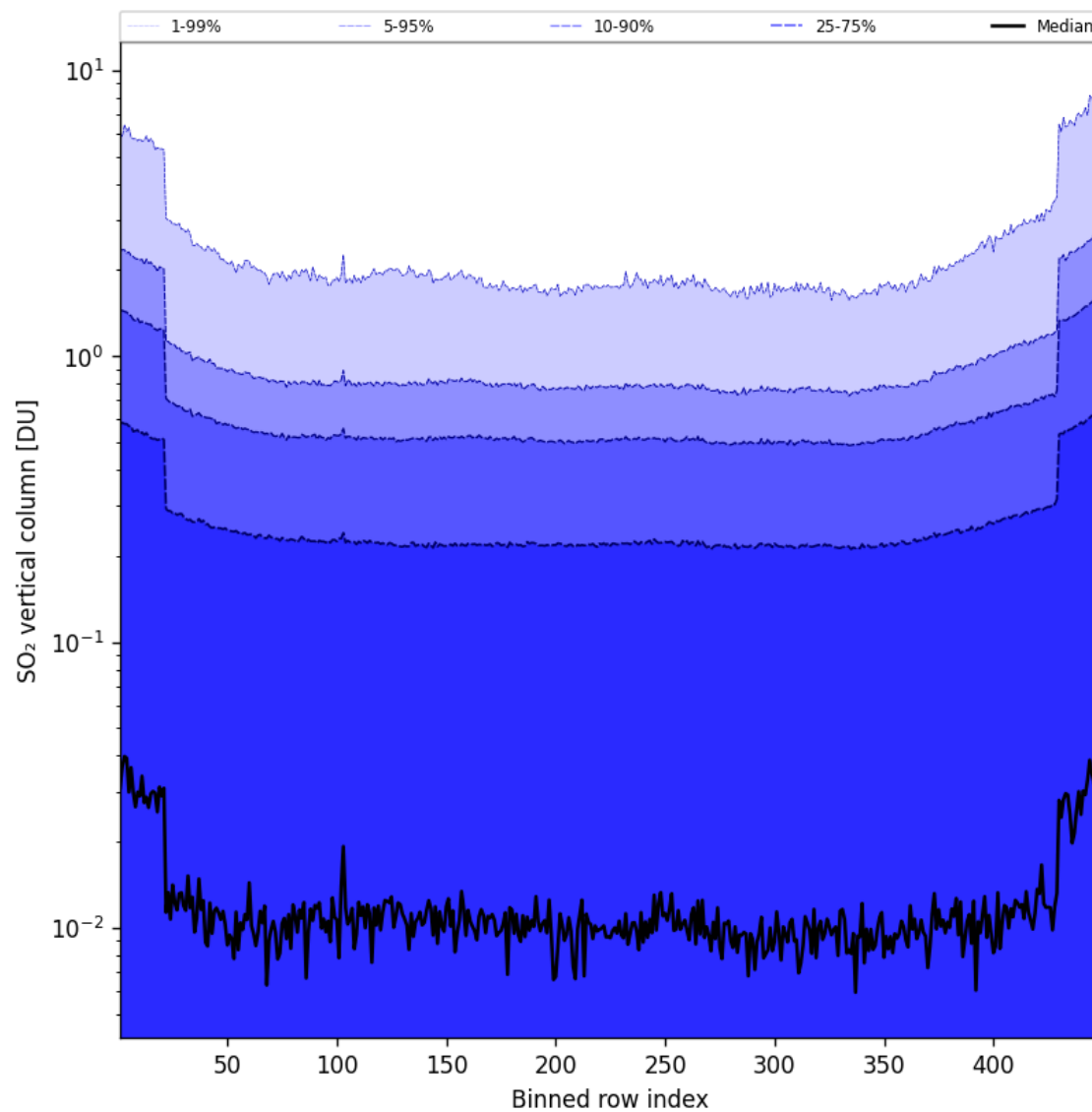


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-09-02 to 2025-09-02

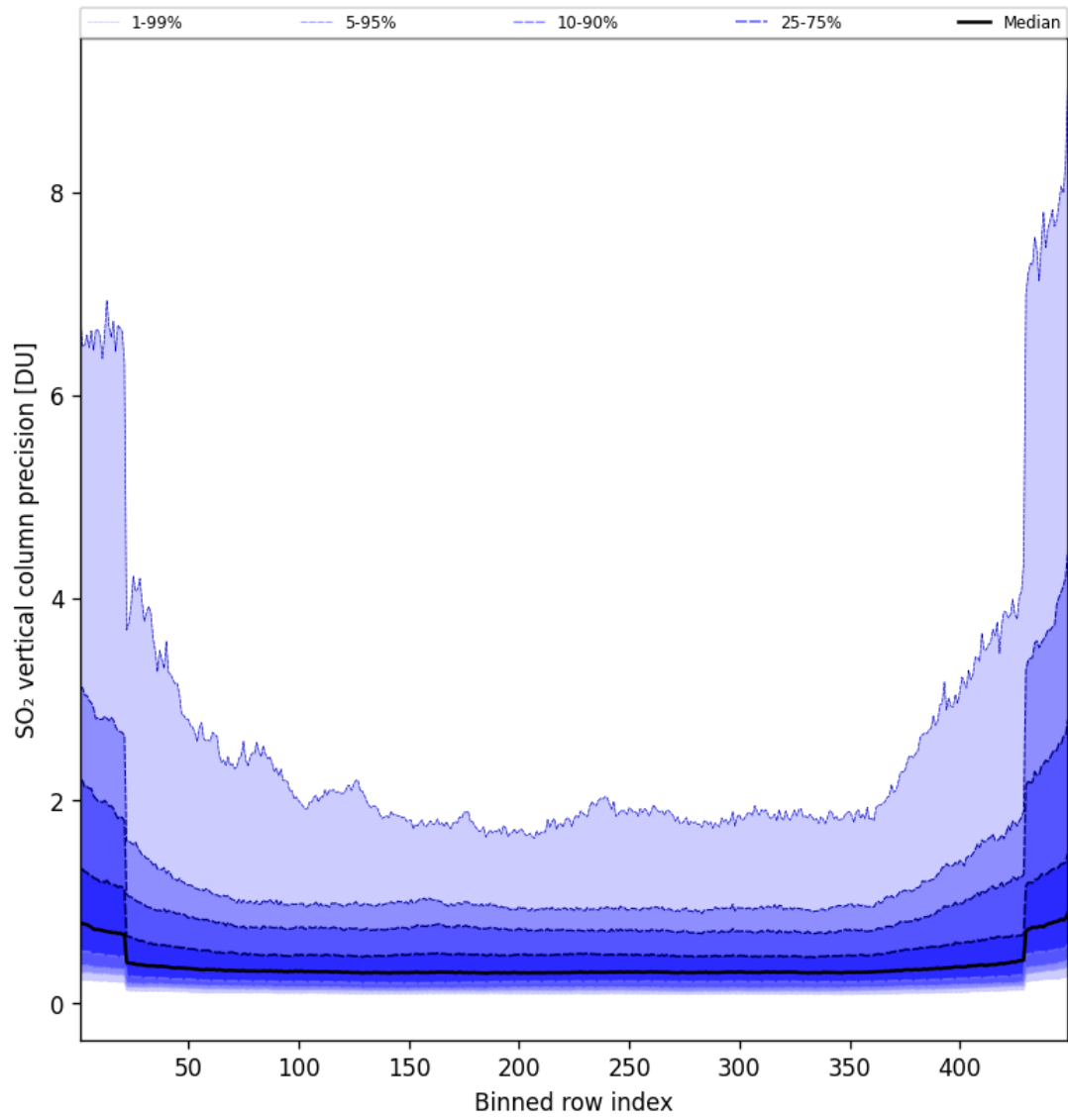


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-09-02 to 2025-09-02

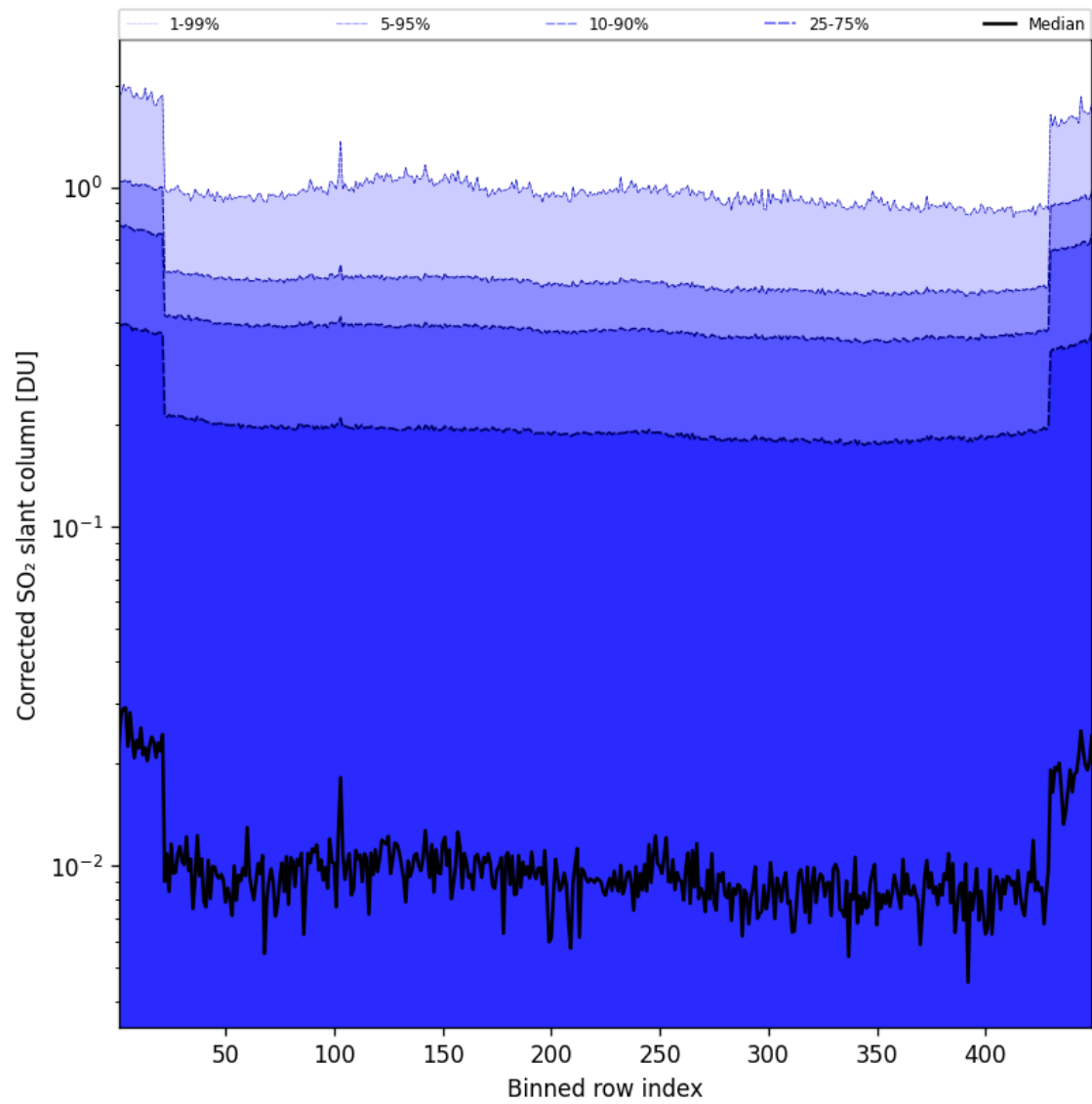


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-09-02 to 2025-09-02

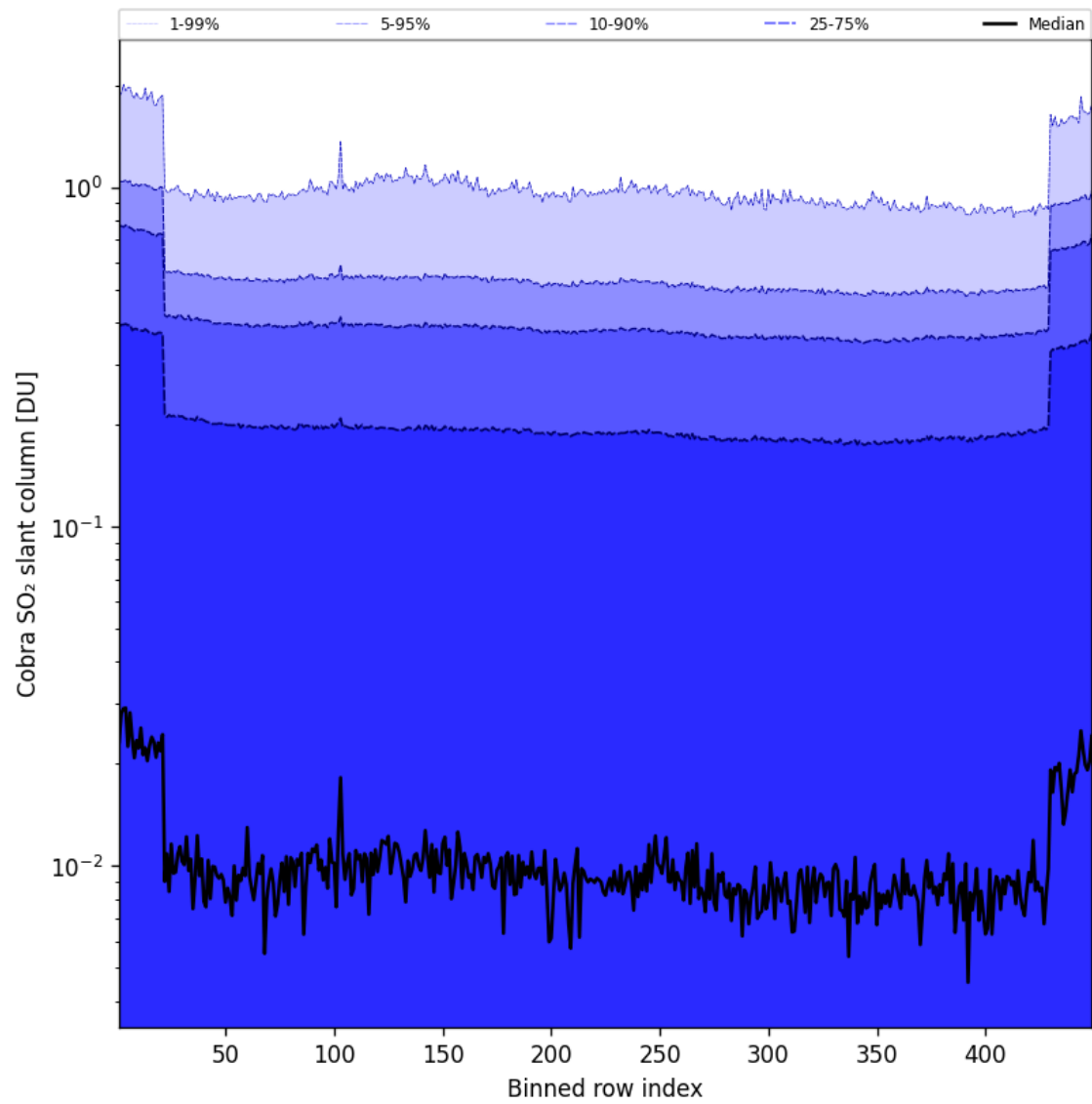


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-09-02 to 2025-09-02

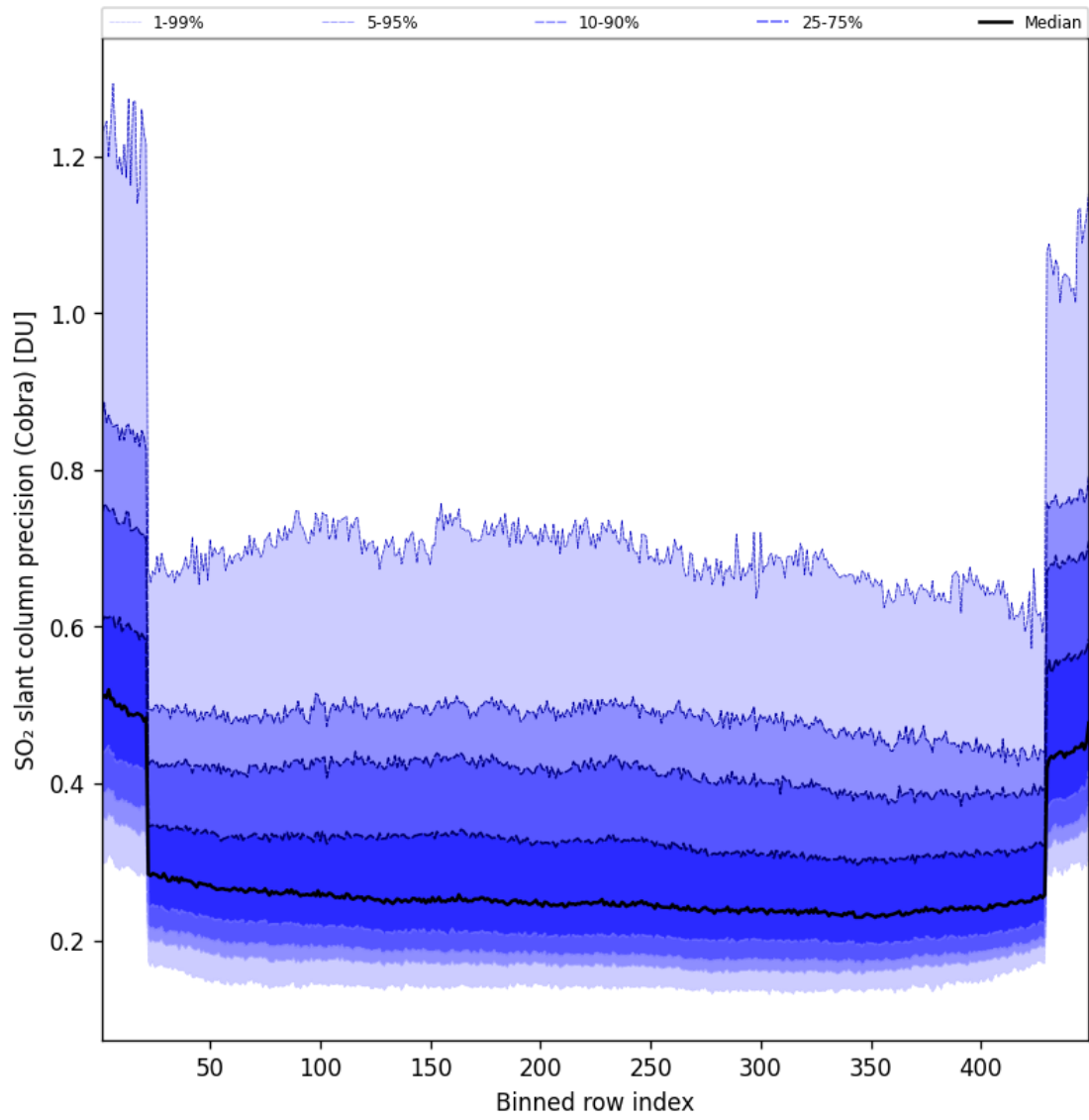


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-09-02 to 2025-09-02

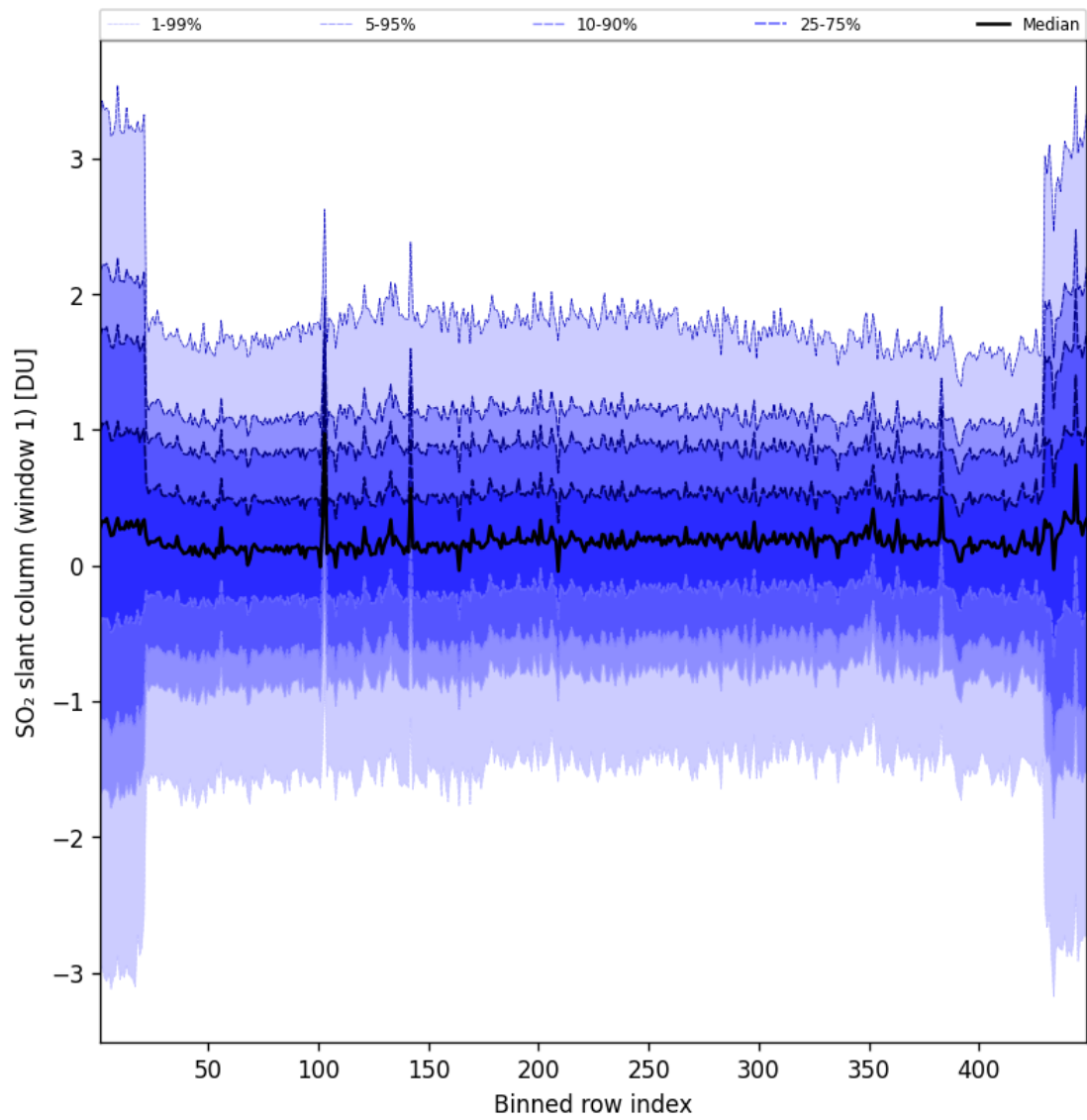


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-09-02 to 2025-09-02

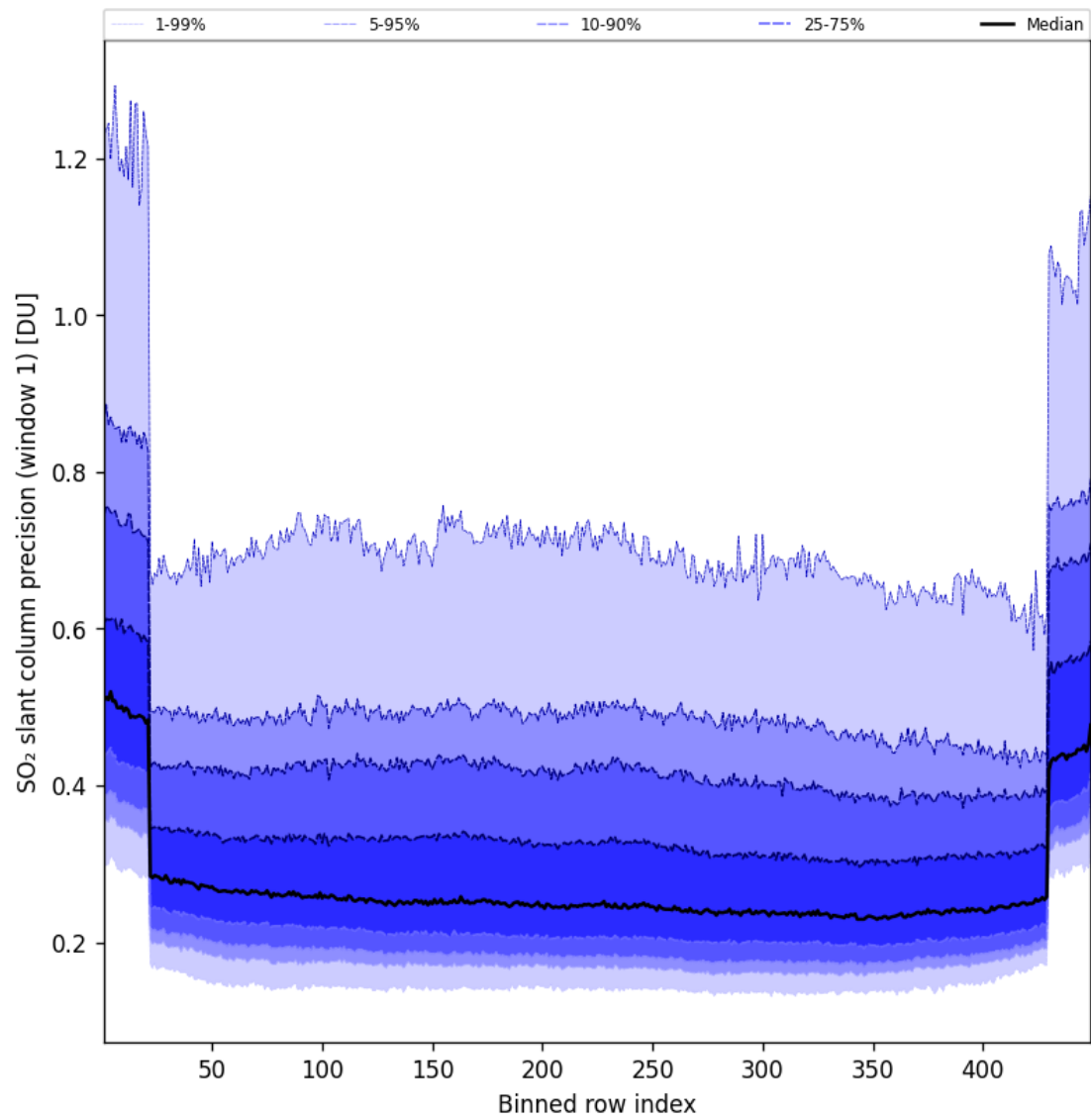


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-09-02 to 2025-09-02

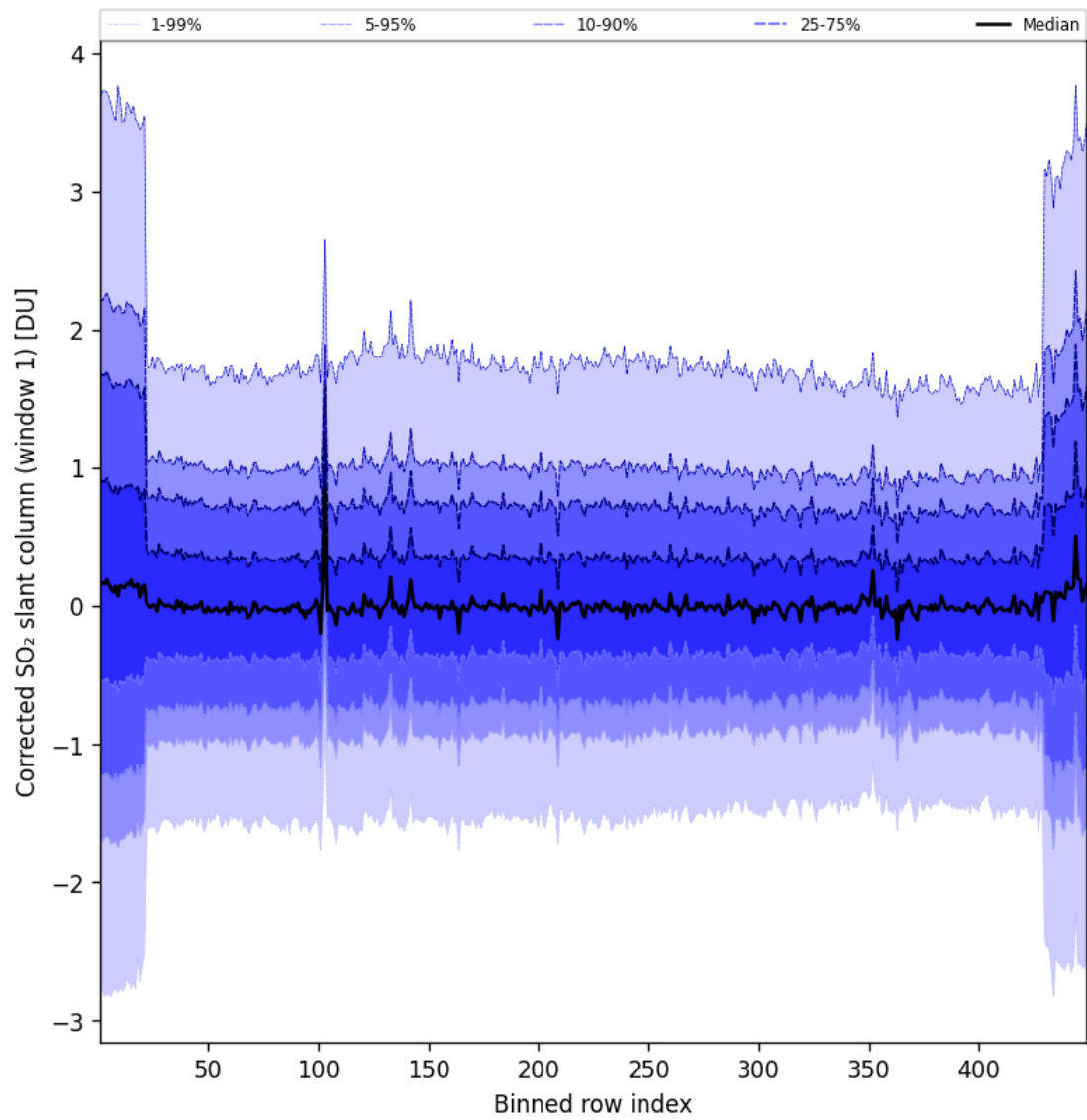


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-09-02 to 2025-09-02

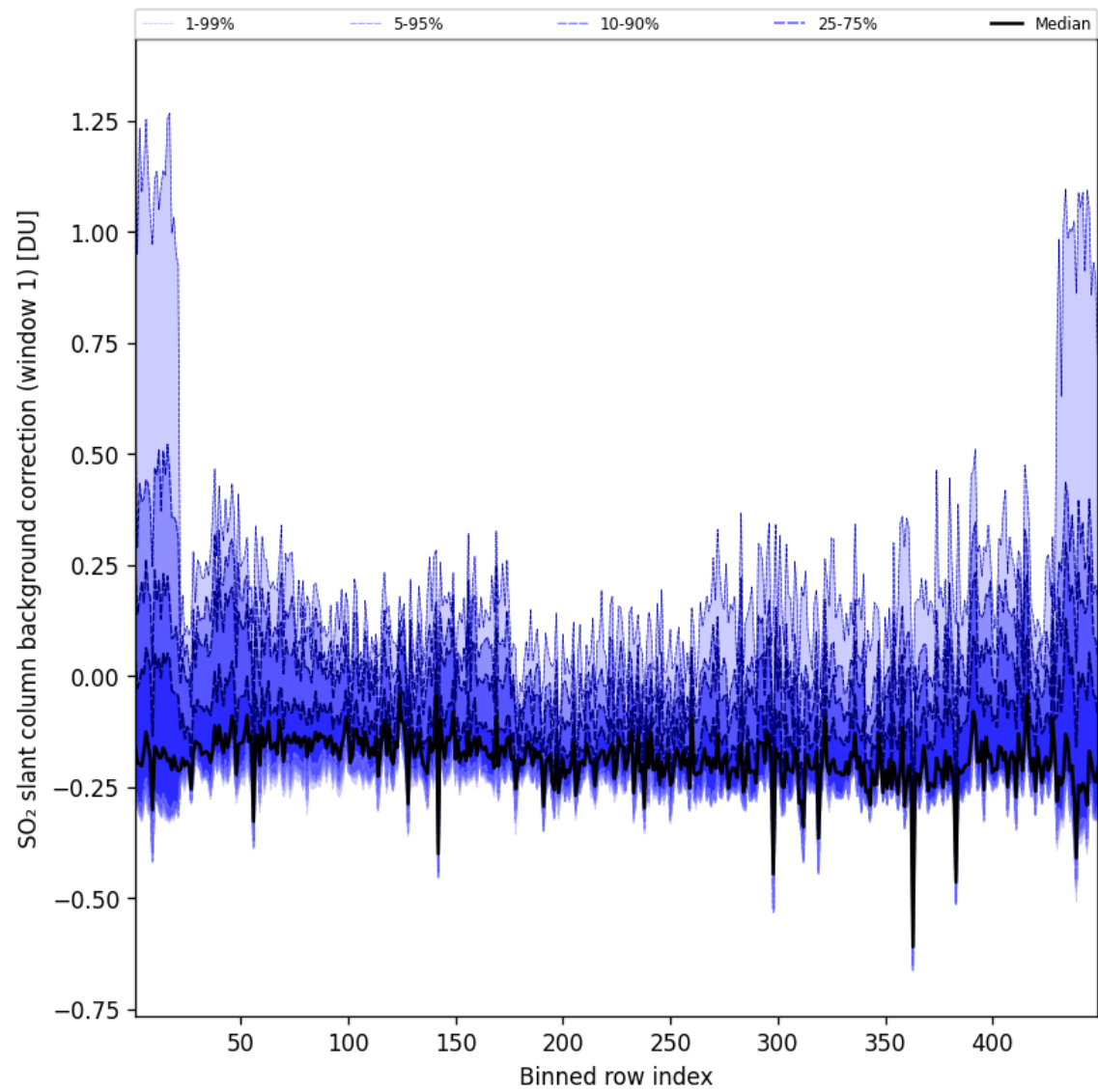


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-09-02 to 2025-09-02

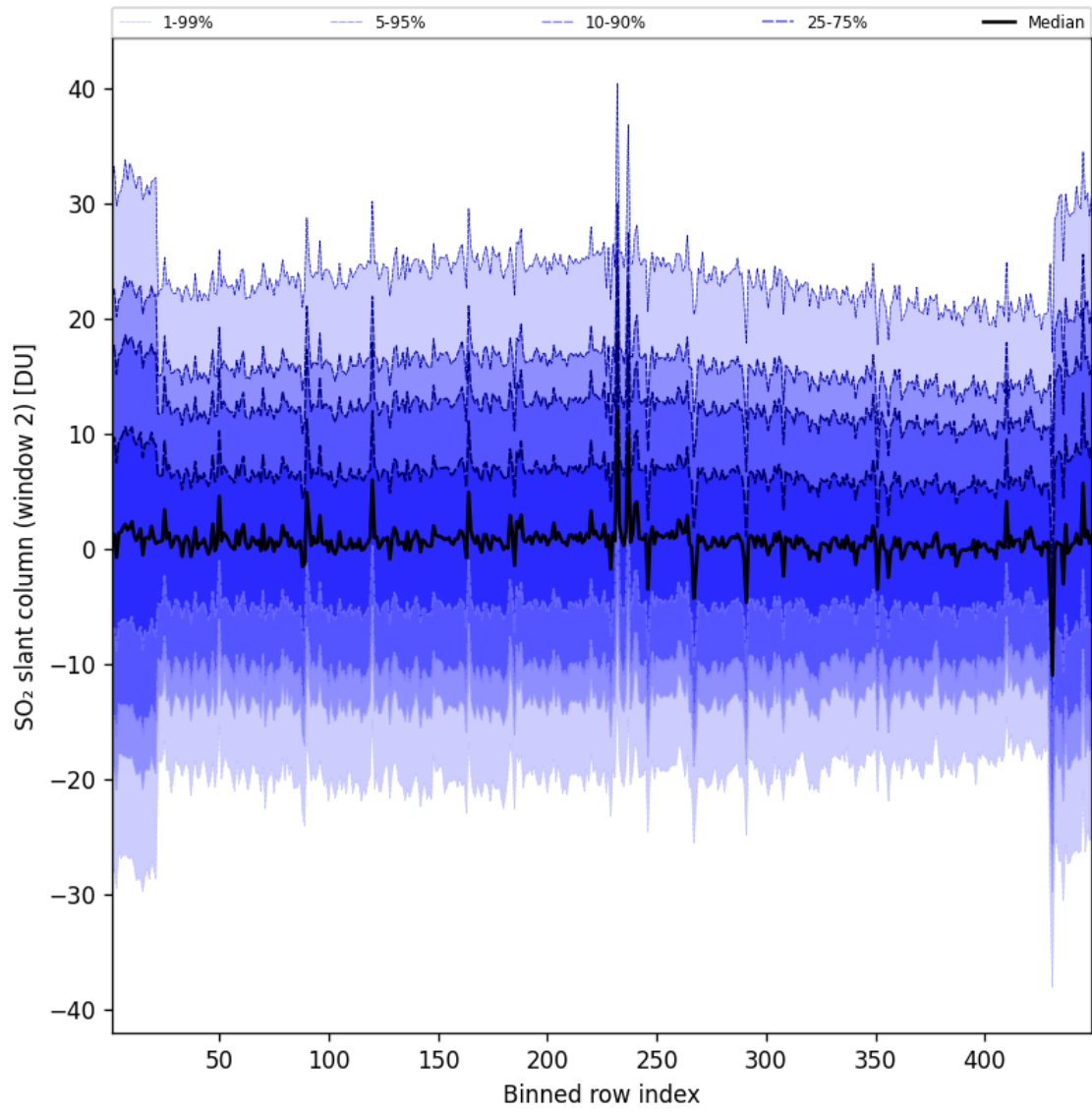


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-09-02 to 2025-09-02

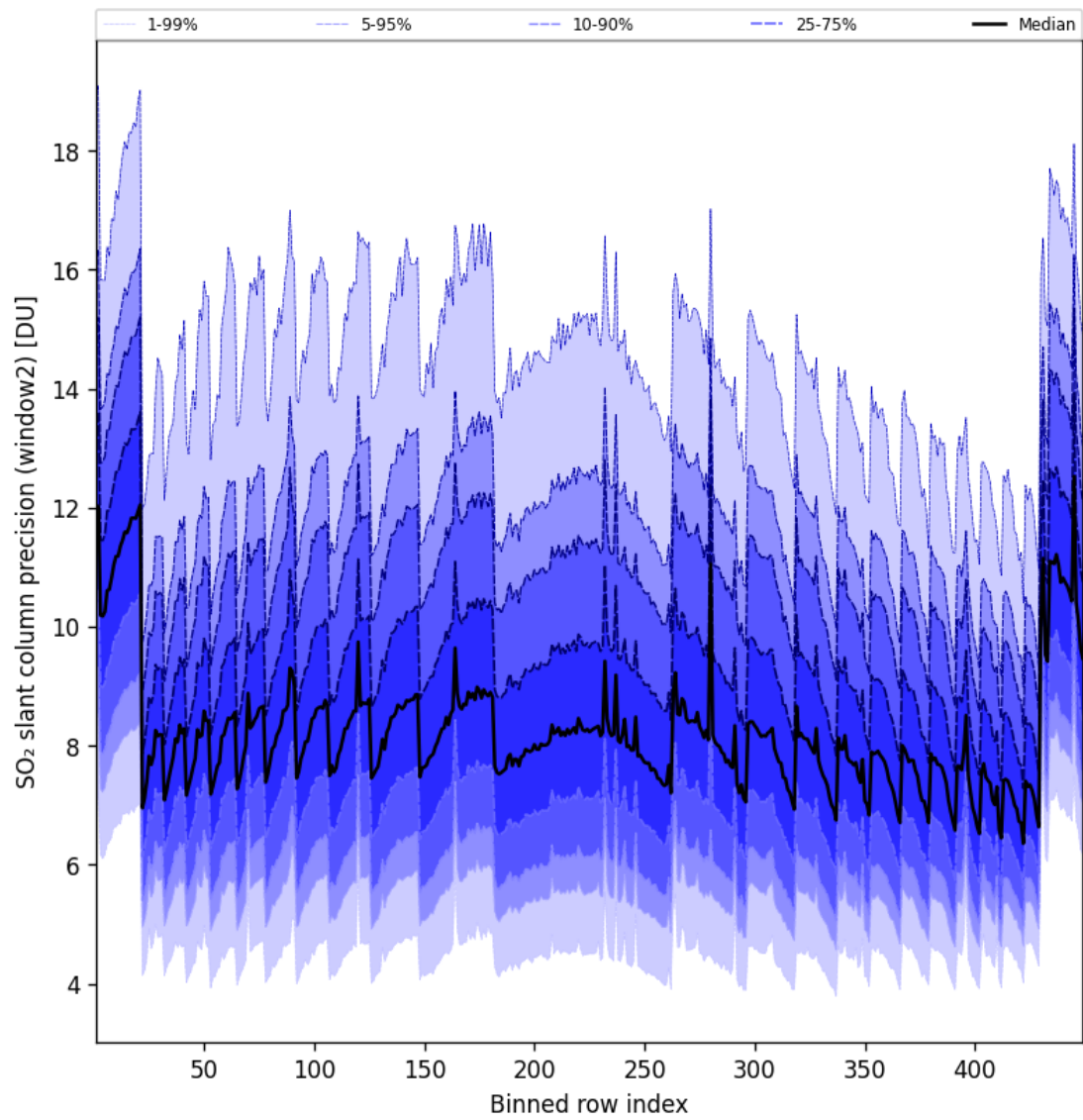


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-09-02 to 2025-09-02

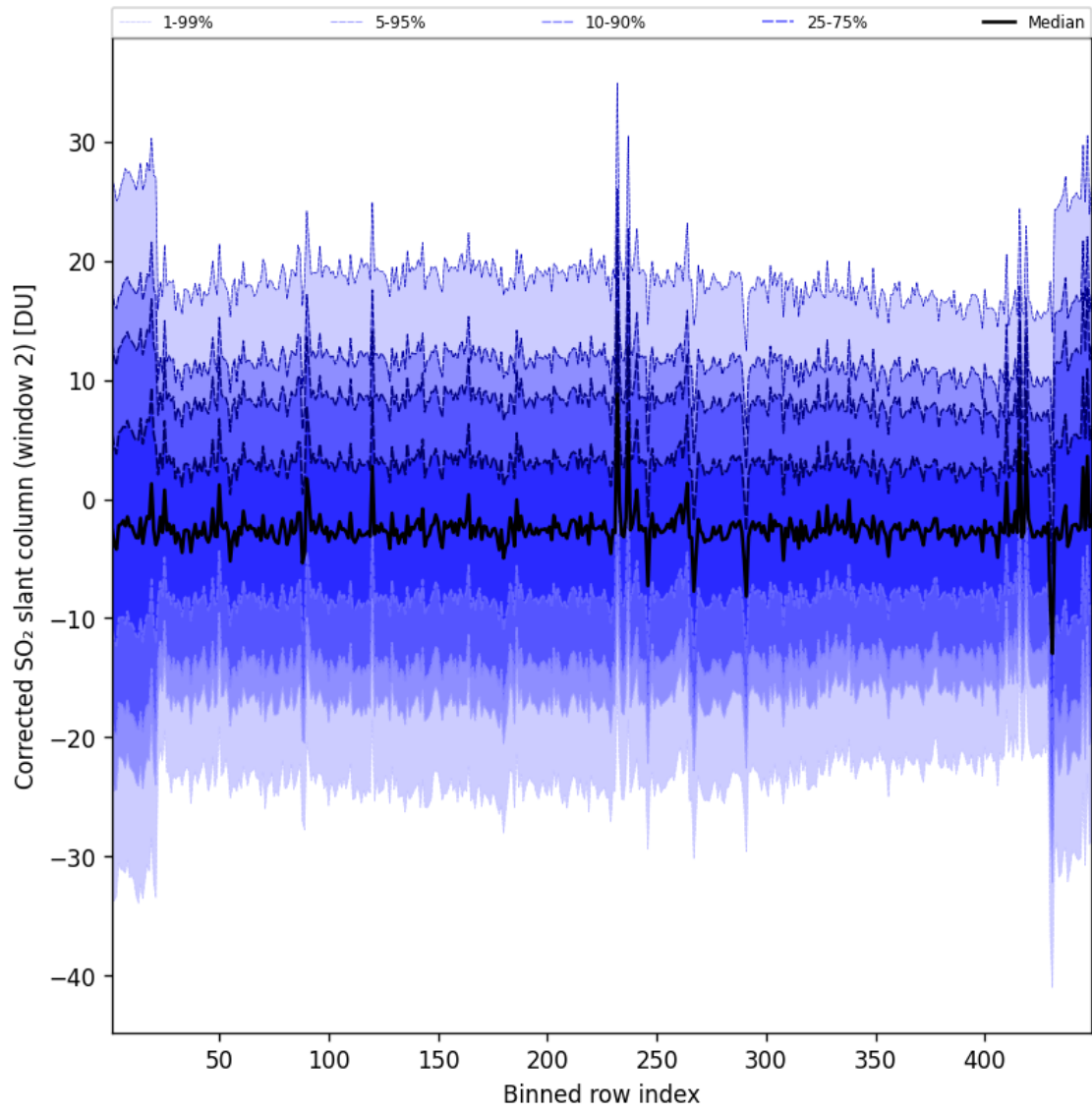


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-09-02 to 2025-09-02

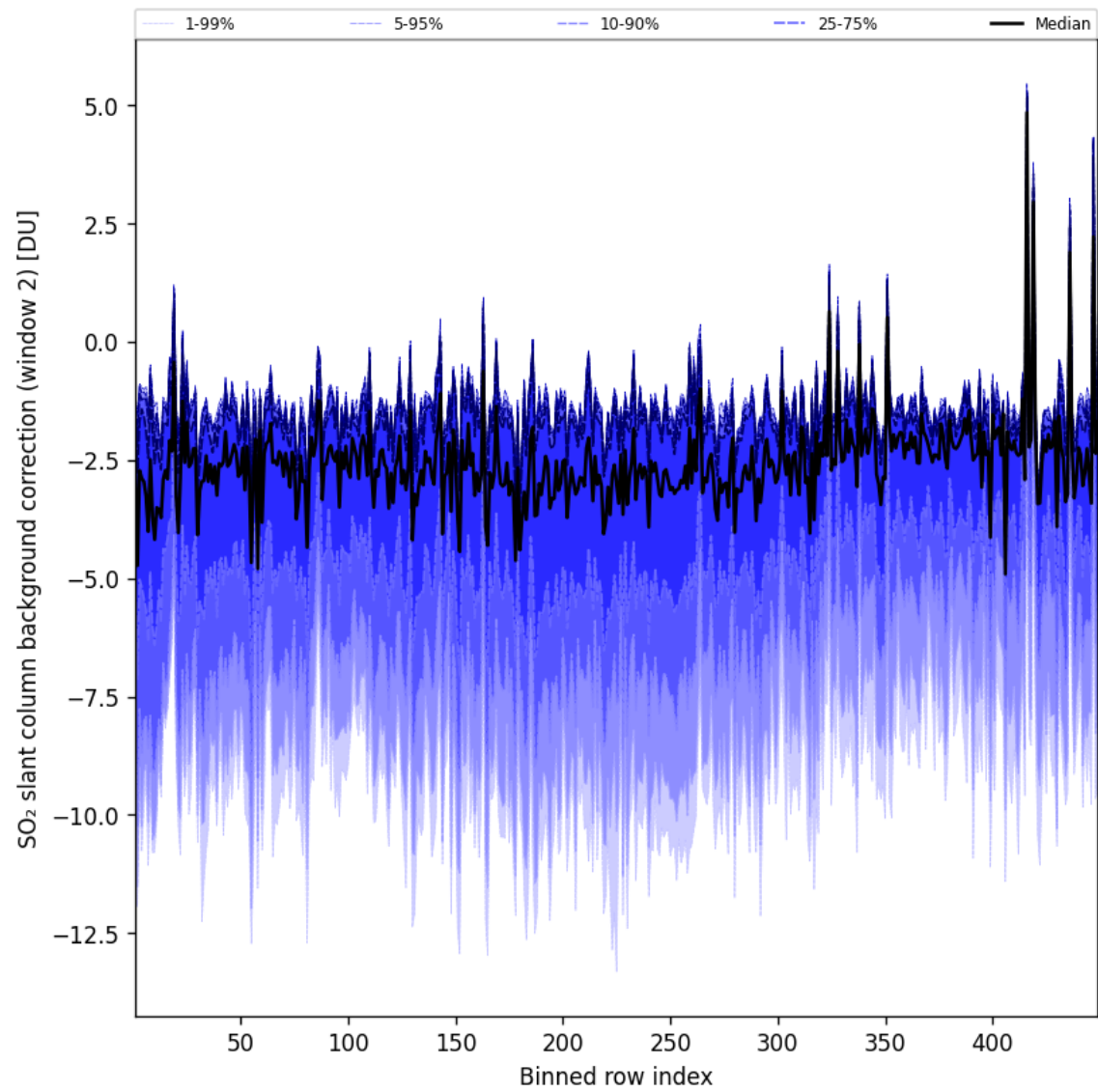


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-09-02 to 2025-09-02

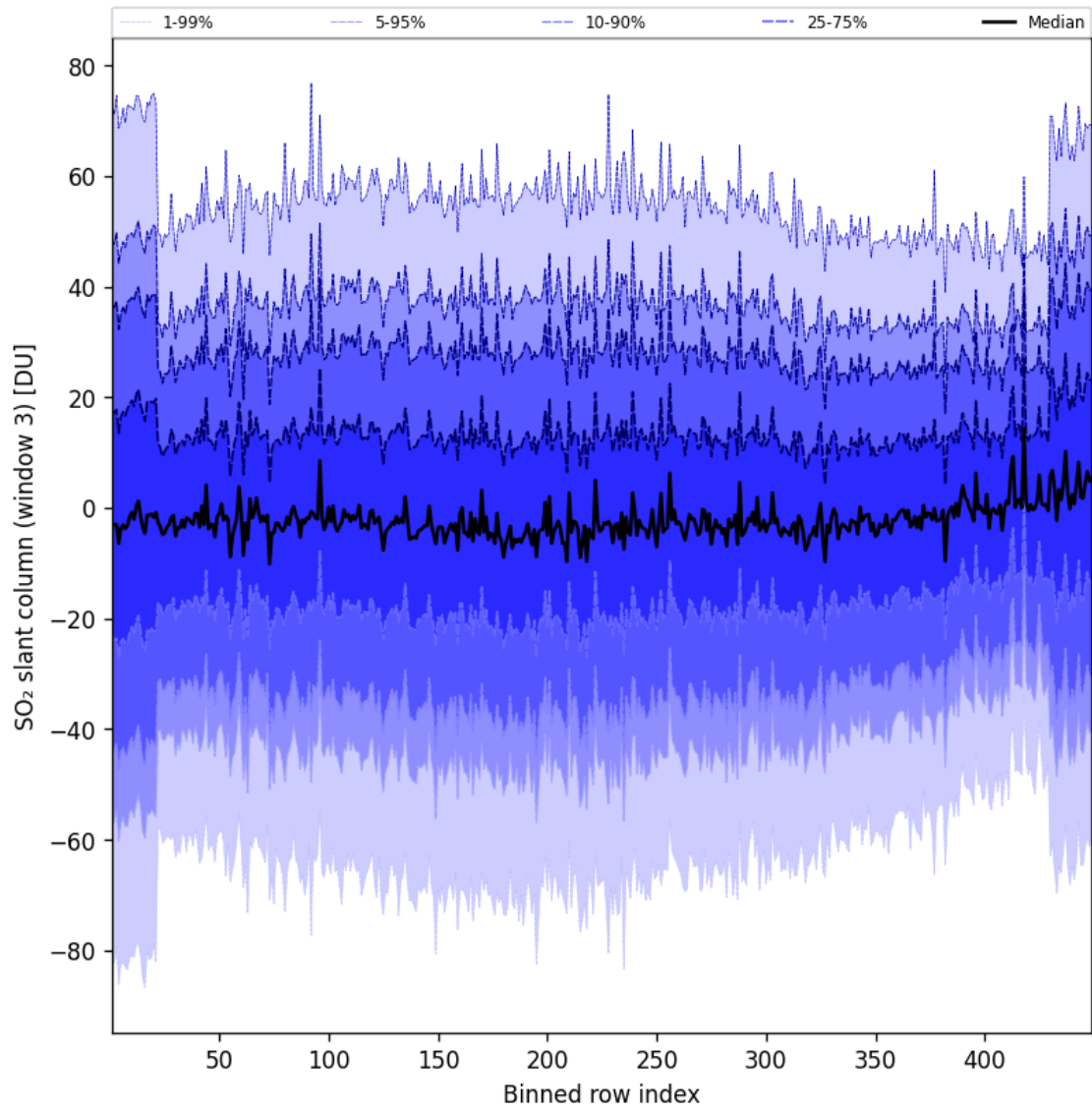


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-09-02 to 2025-09-02

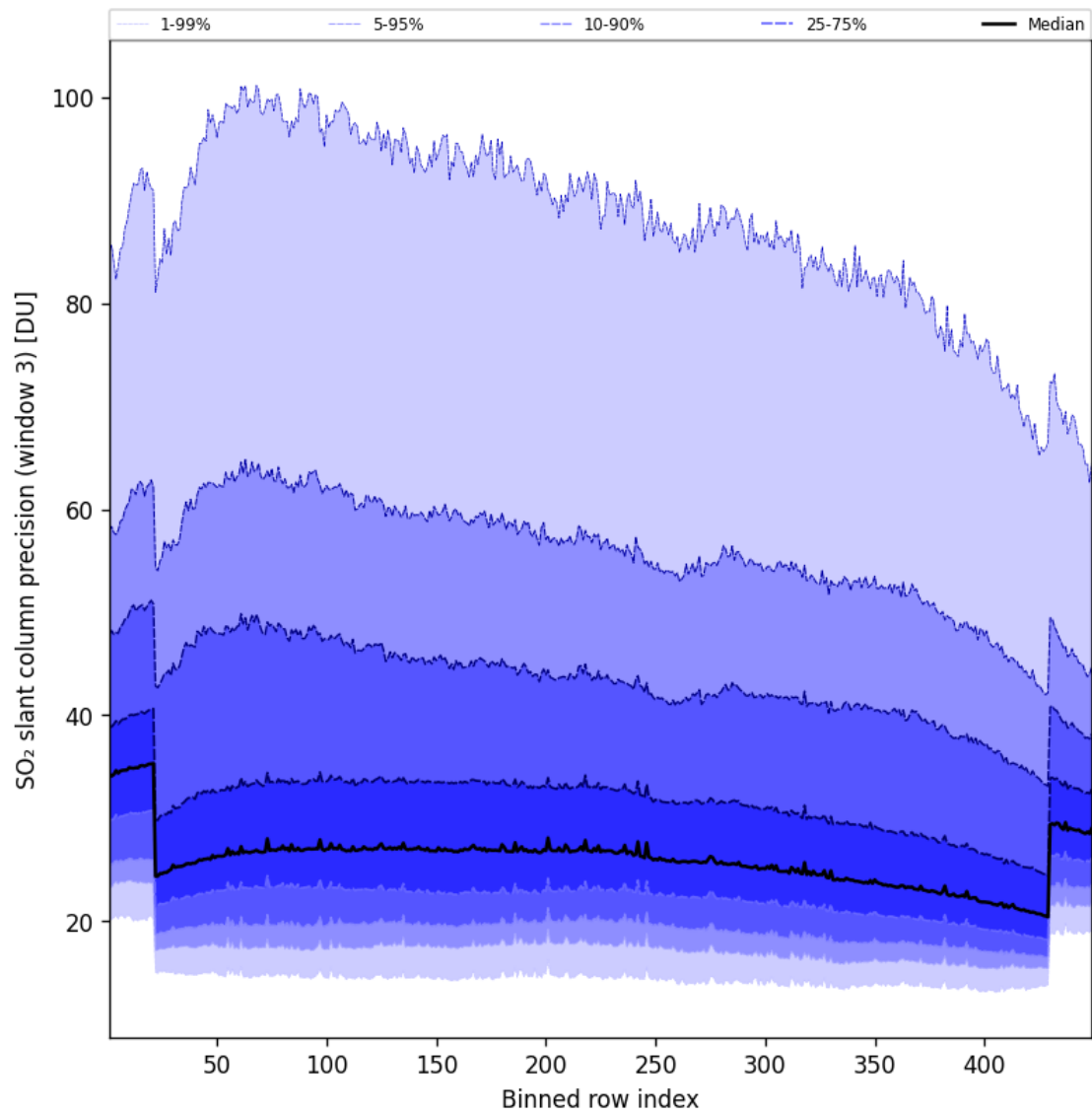


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-09-02 to 2025-09-02

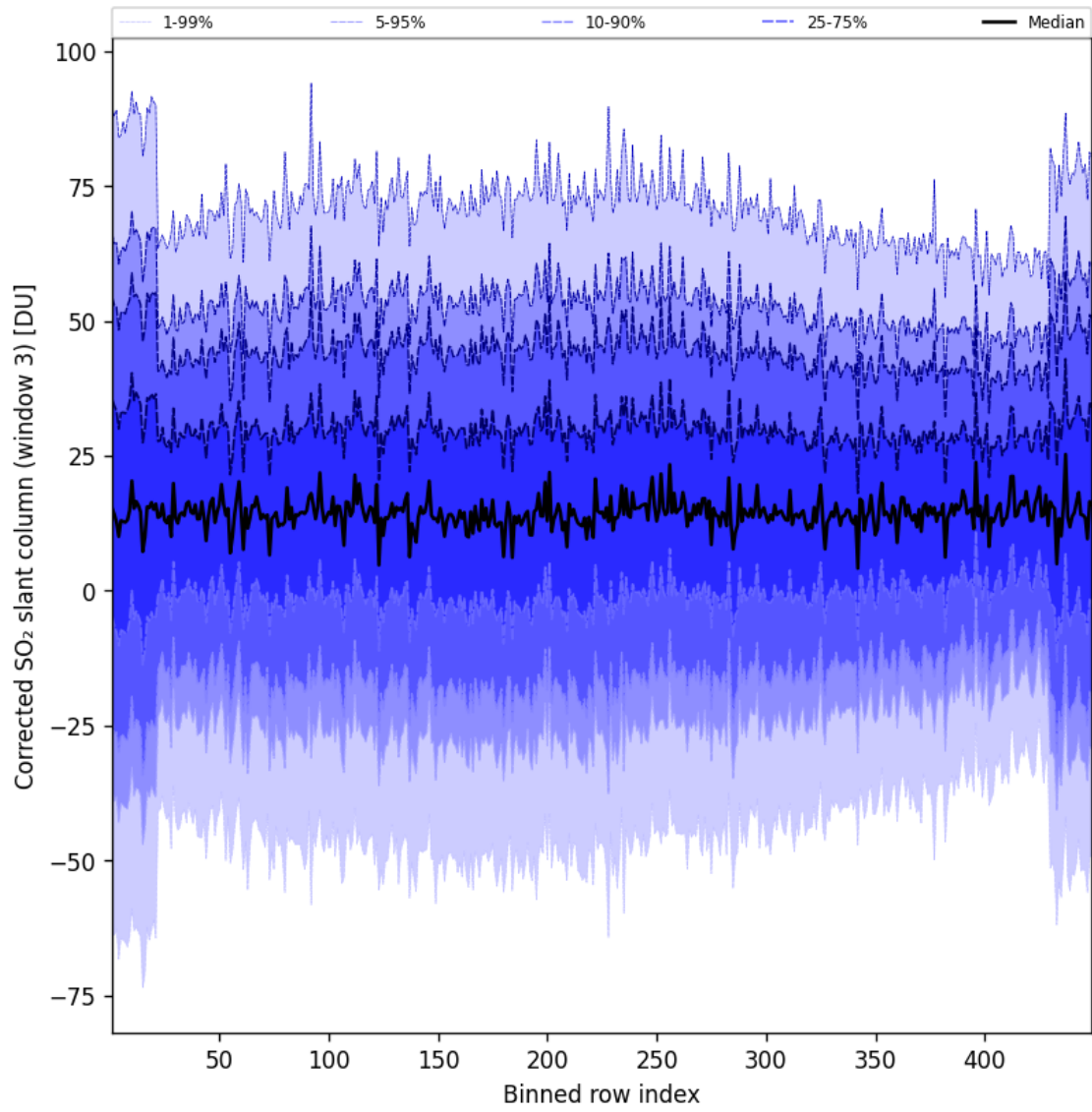


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-09-02 to 2025-09-02

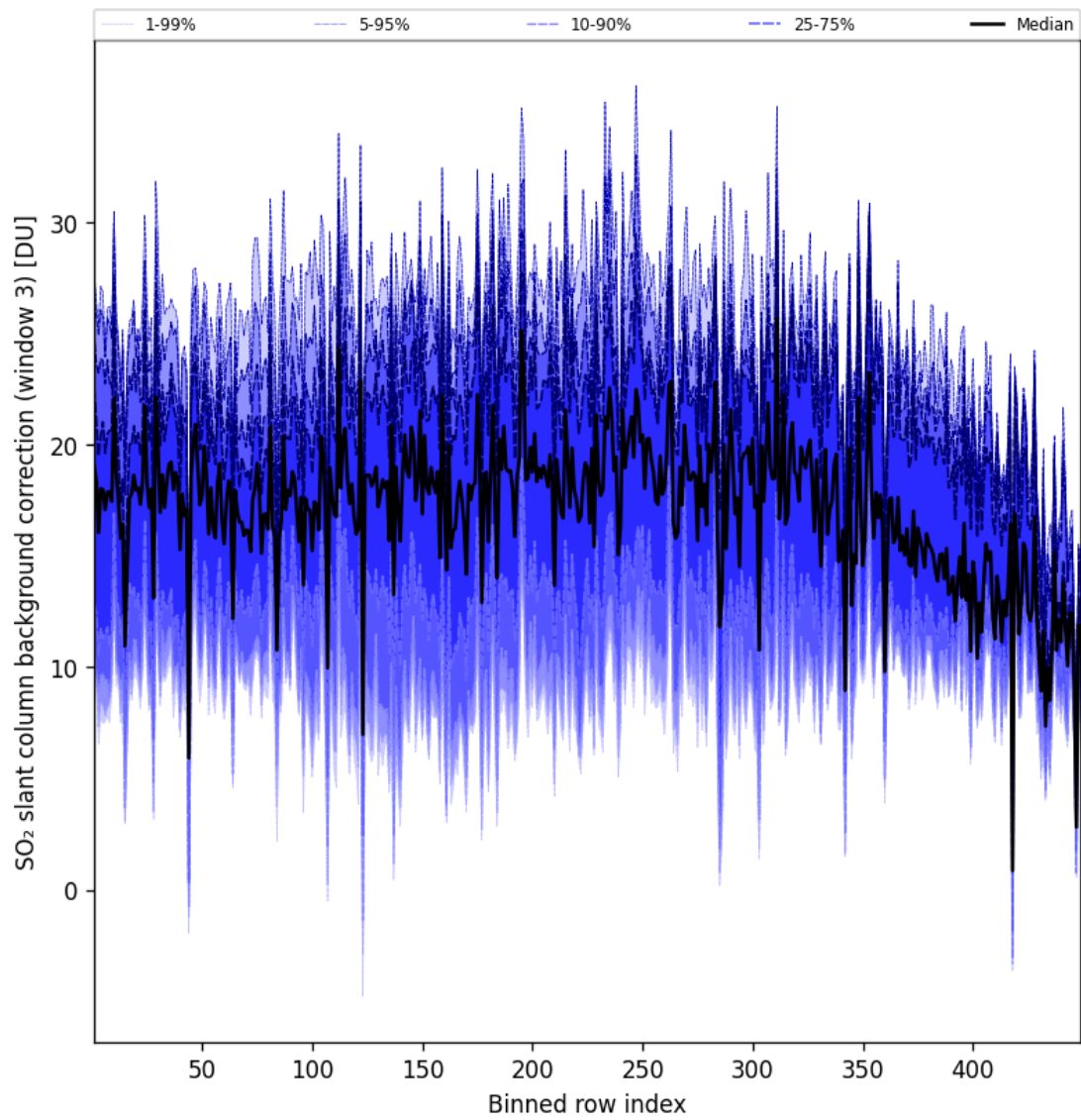


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-09-02 to 2025-09-02

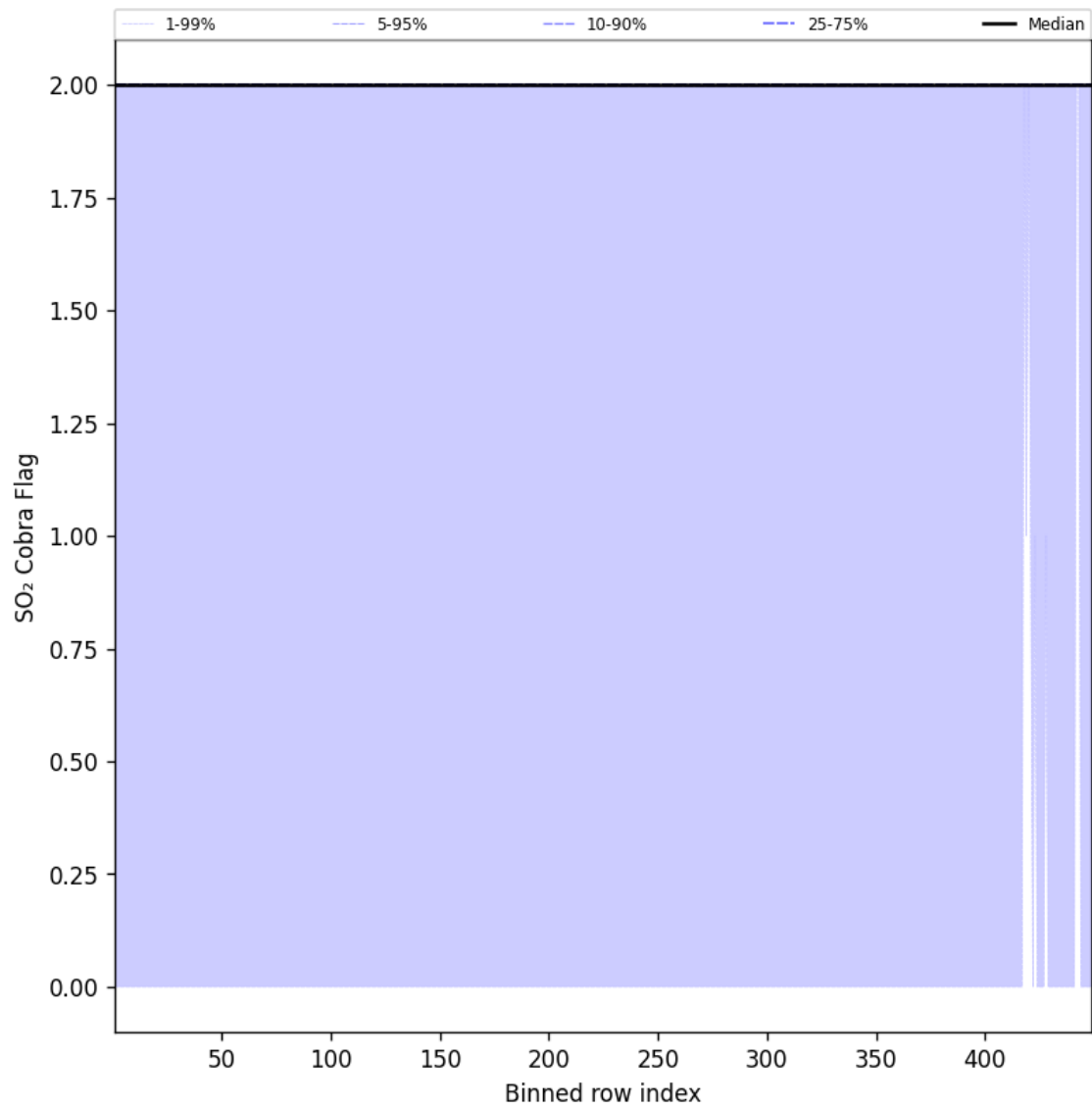


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-09-02 to 2025-09-02

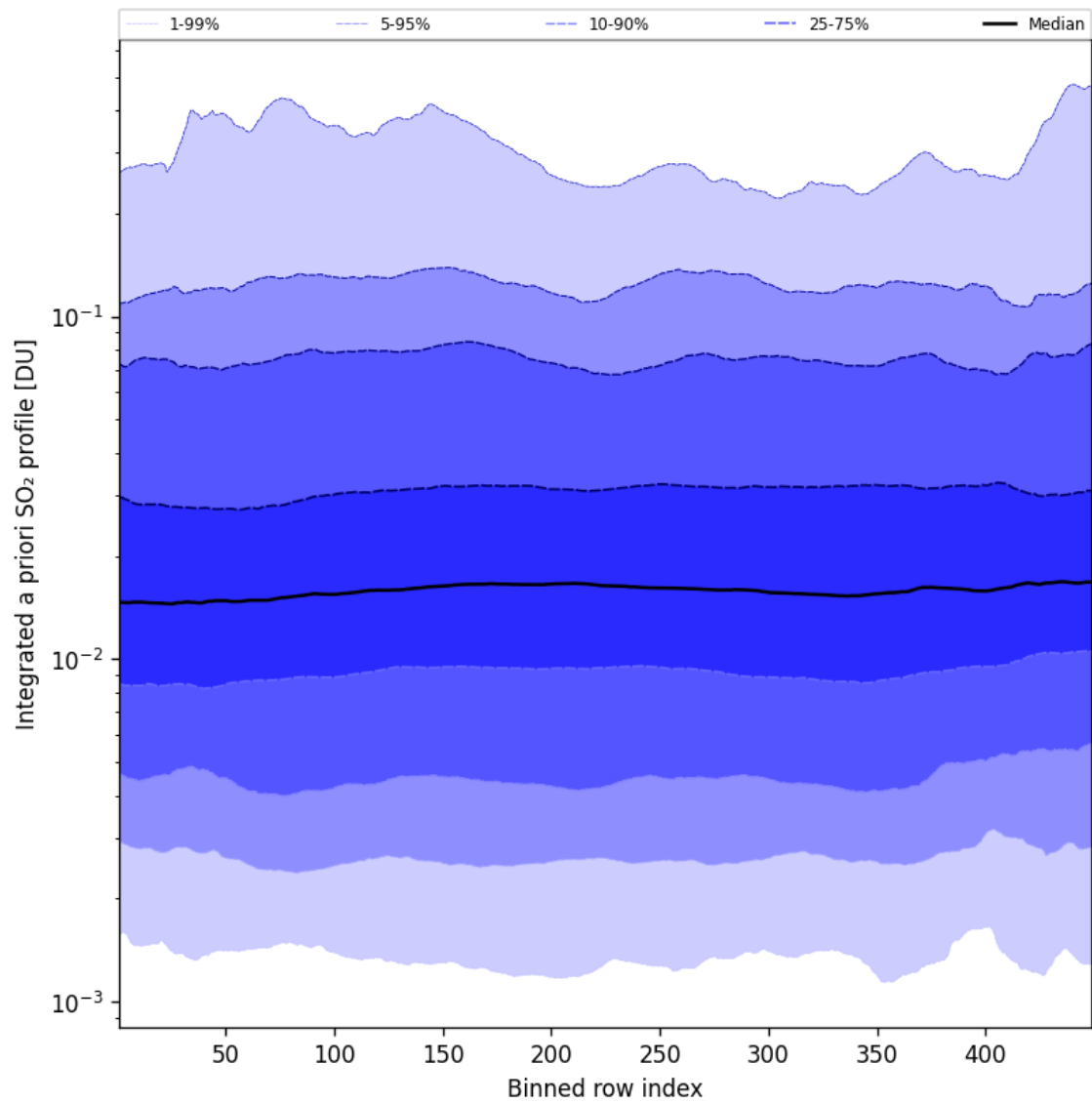


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-09-02 to 2025-09-02

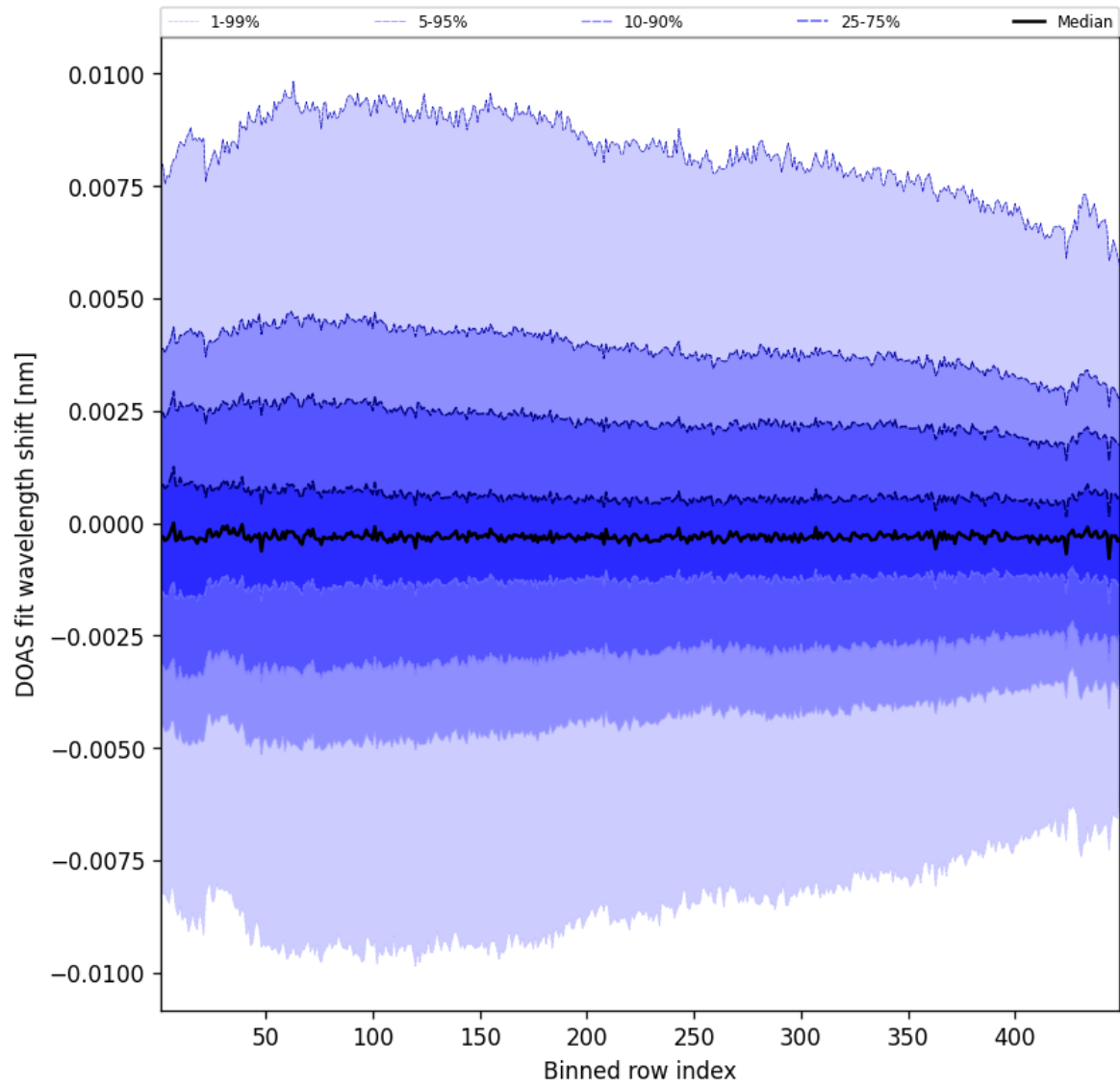


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-09-02 to 2025-09-02

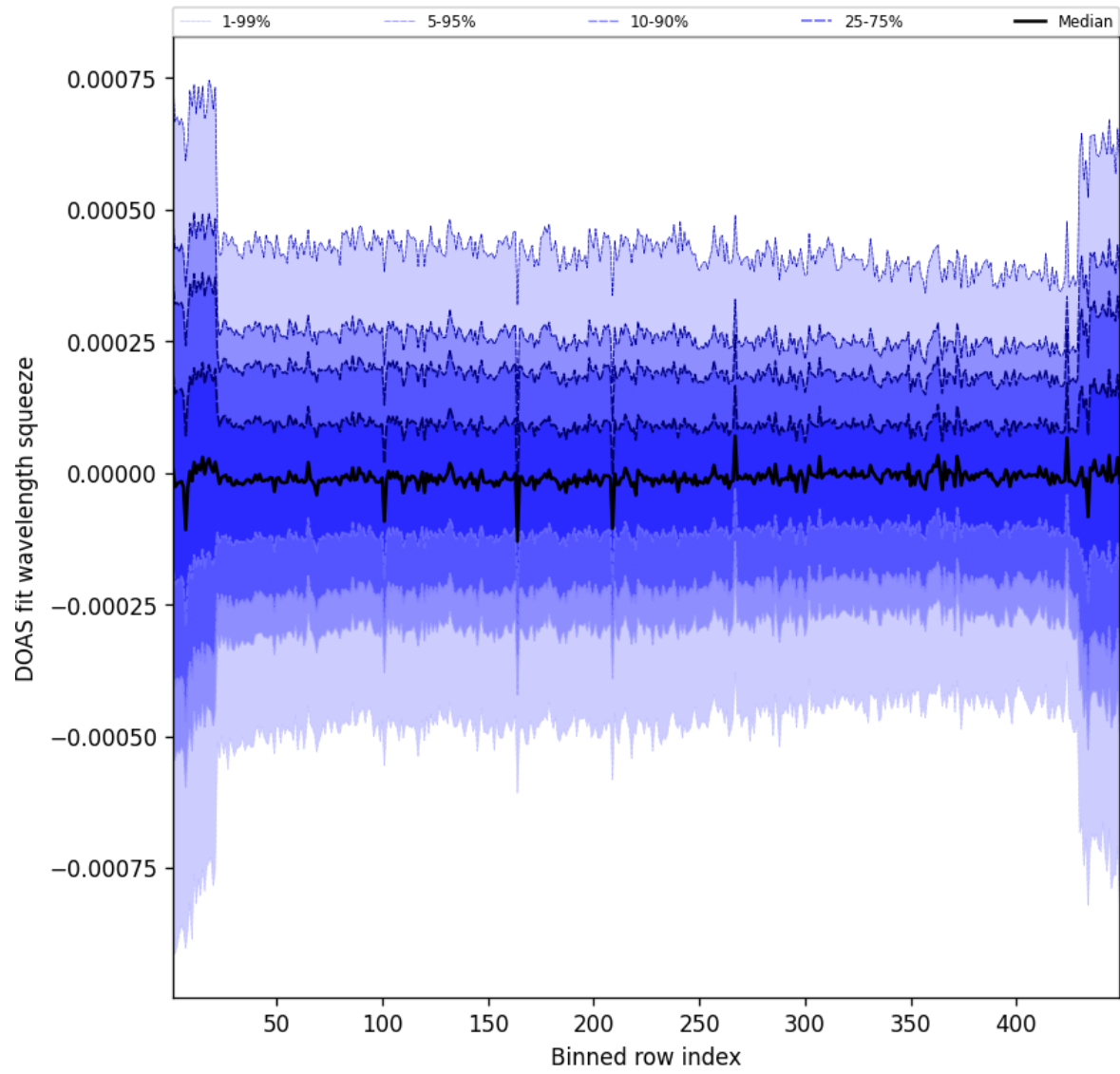


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-09-02 to 2025-09-02

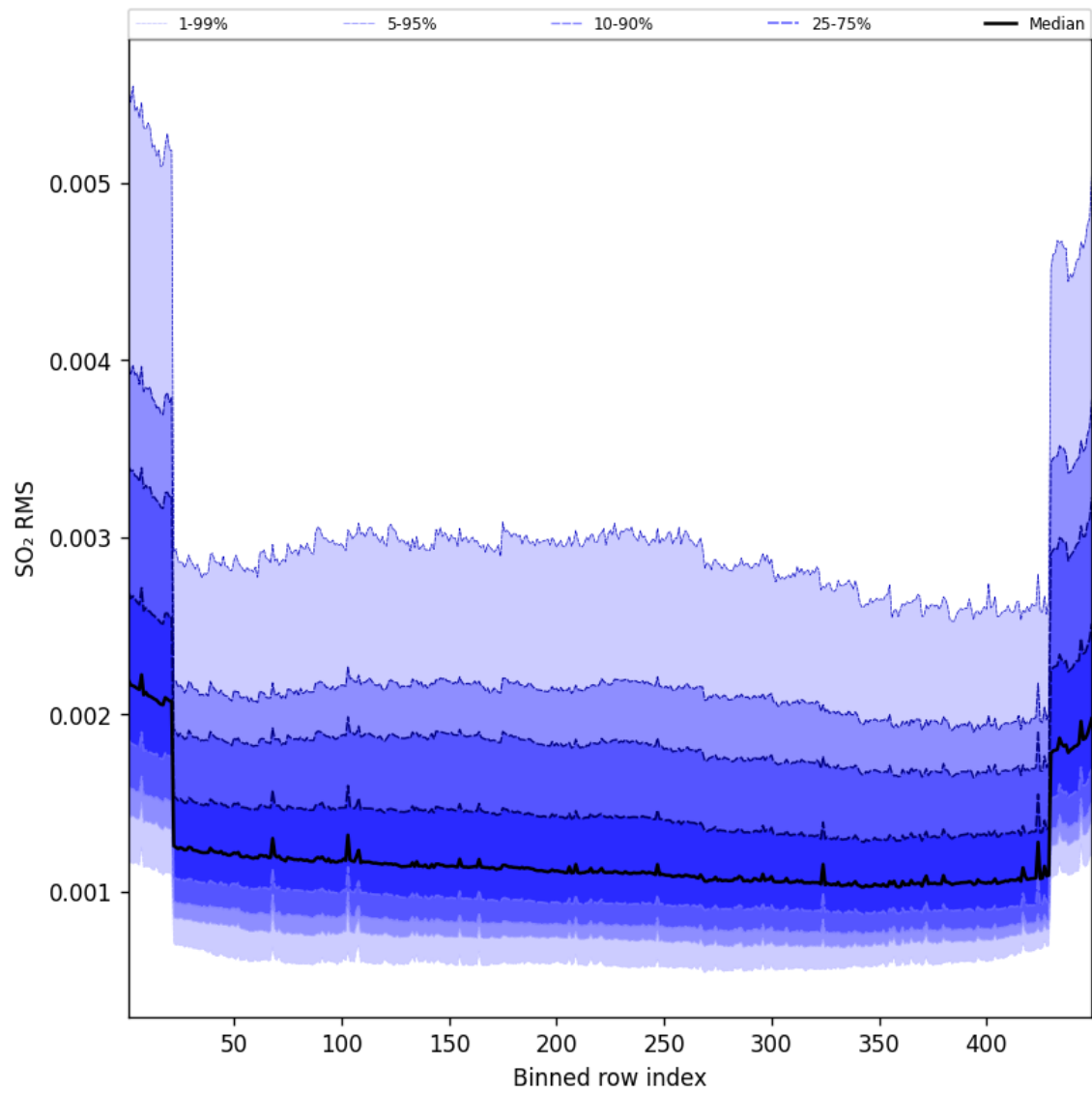


Figure 106: Along track statistics of “SO₂ RMS” for 2025-09-02 to 2025-09-02

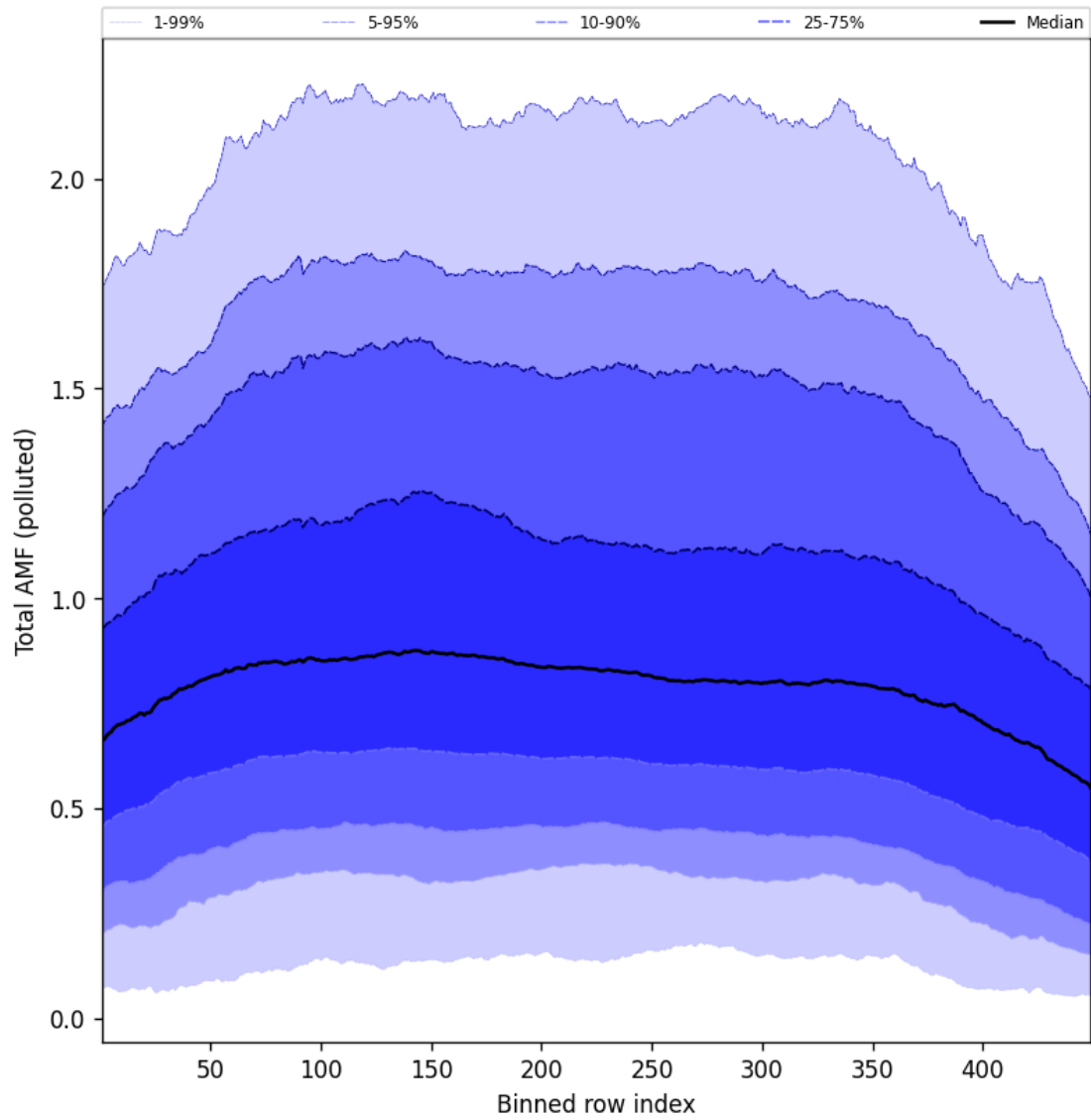


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-09-02 to 2025-09-02

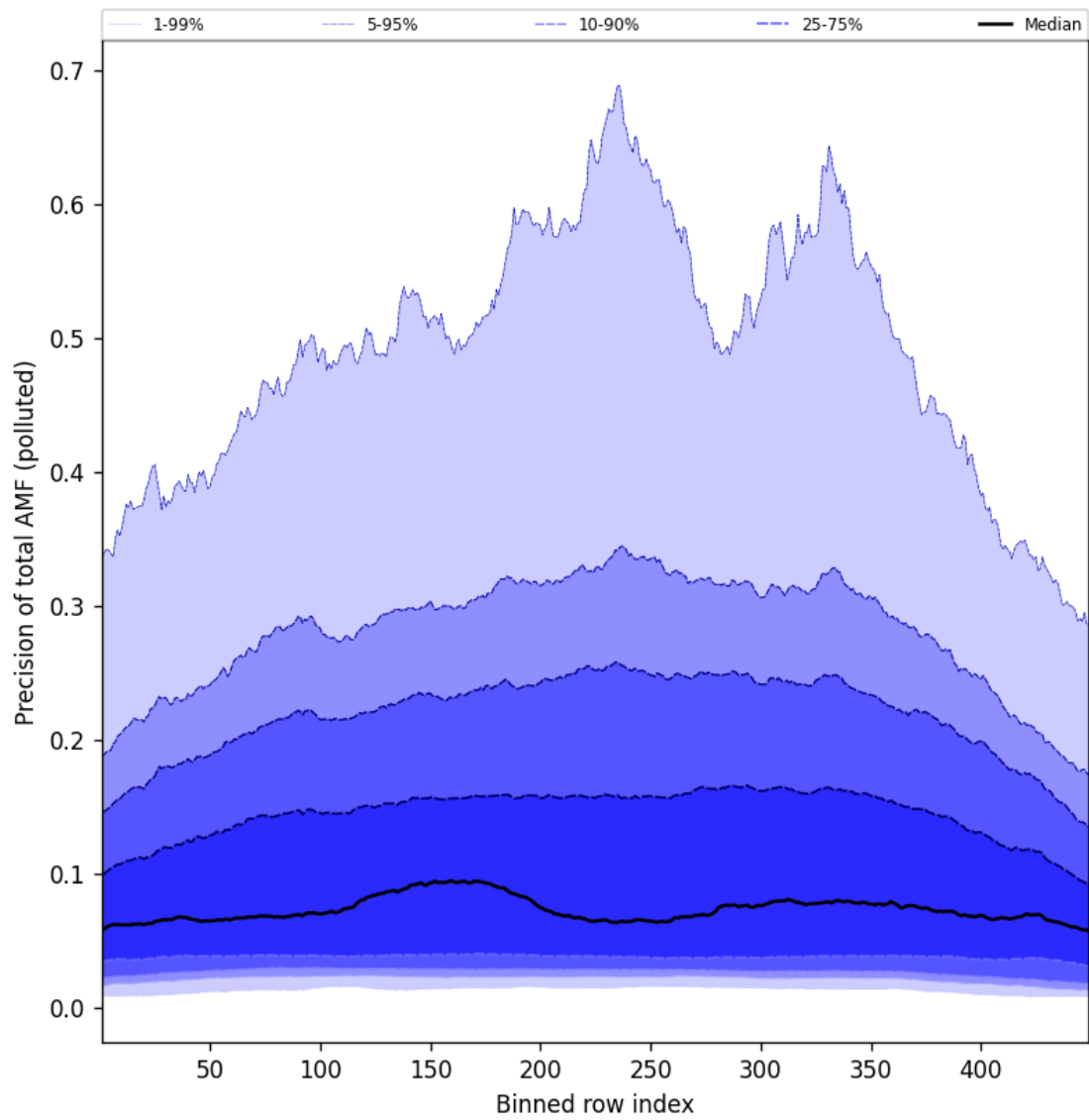


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-09-02 to 2025-09-02

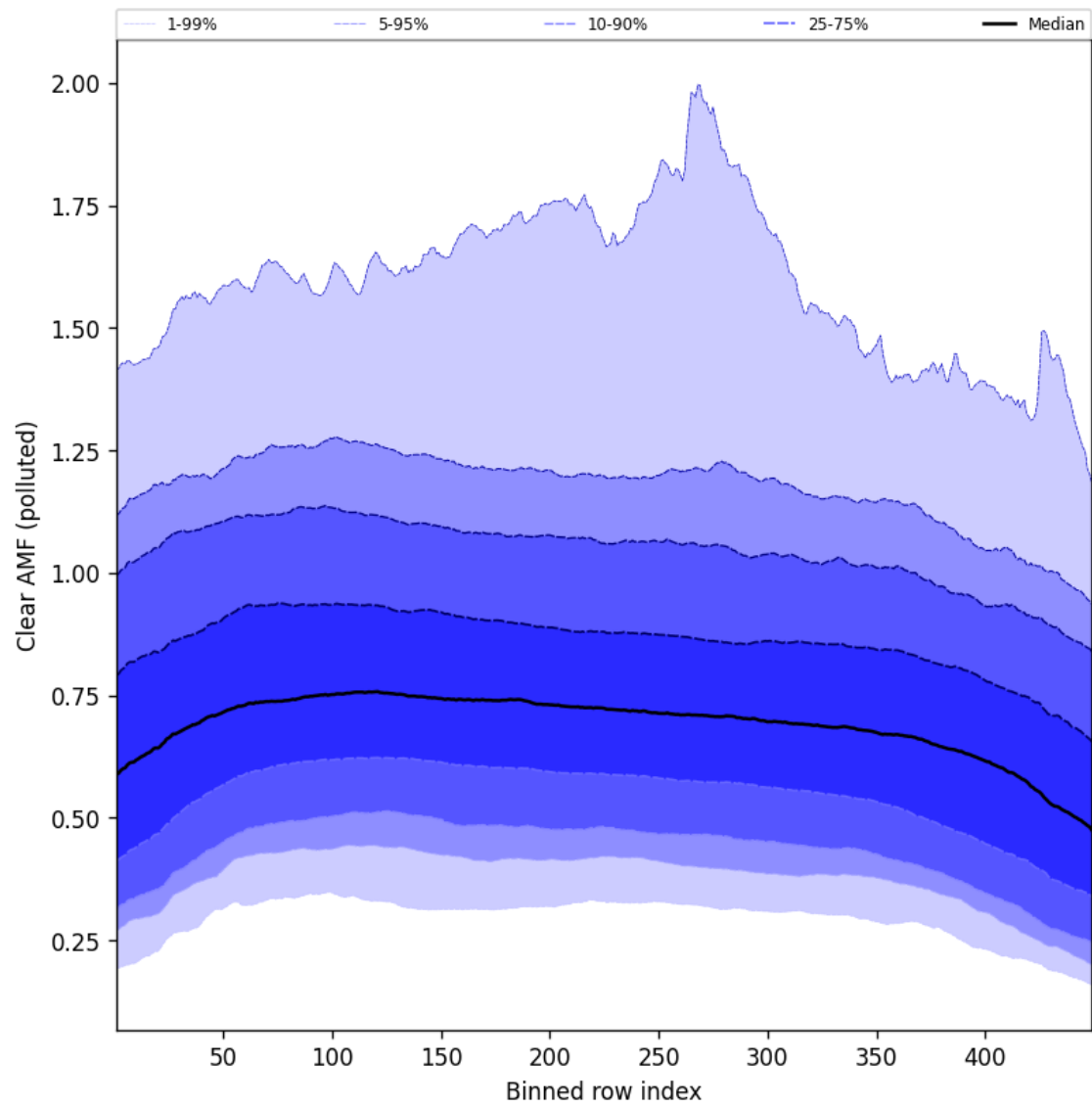


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-09-02 to 2025-09-02

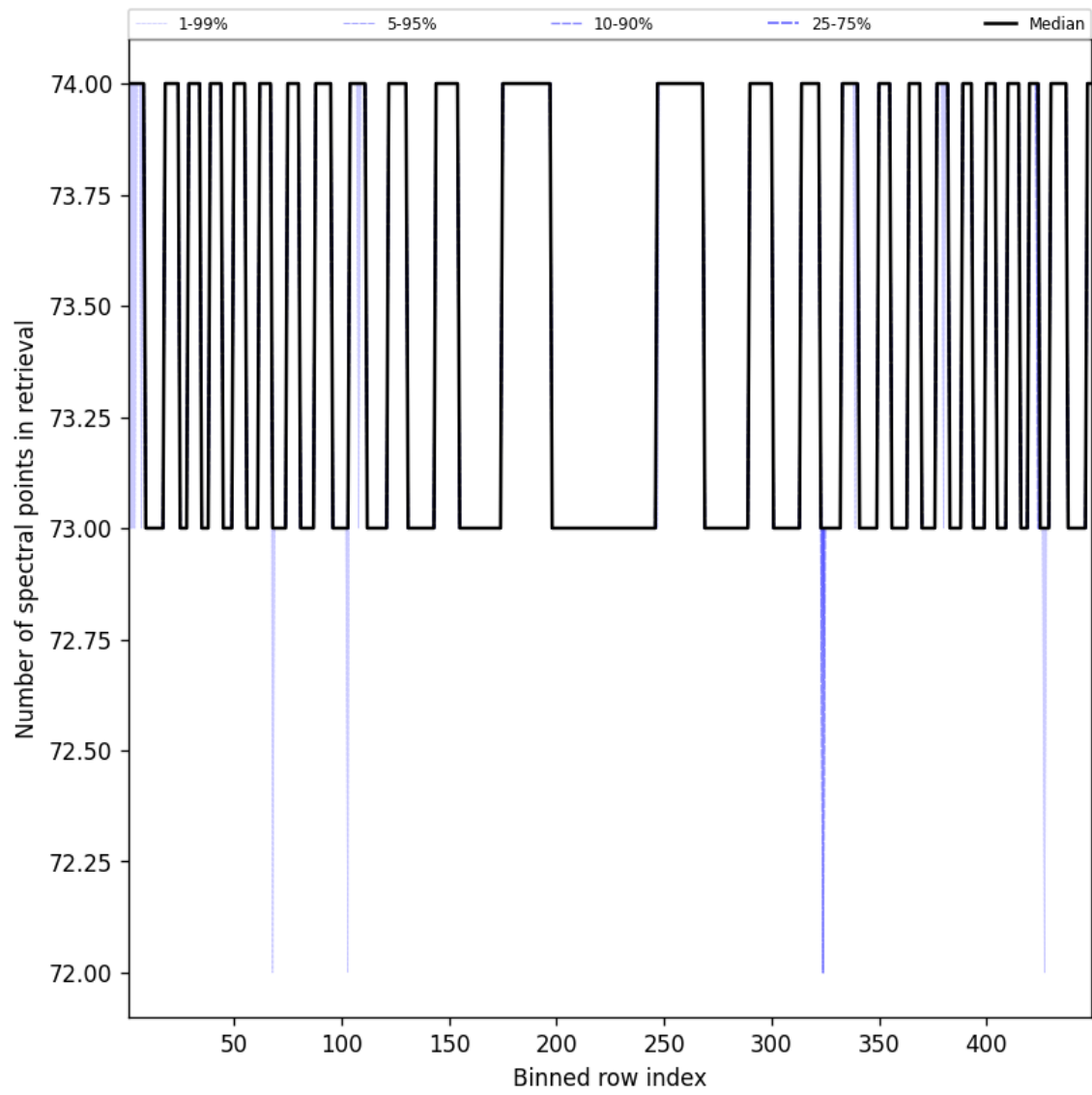


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-09-02 to 2025-09-02

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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