

PyCAMA report generated by tropl2-proc

tropl2-proc

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1 Short Introduction

1.1 The list of parameters

You may want to keep the list given in table 1 at hand when viewing the results.

2 Definitions

The averages shown here are *unweighed* averages:

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N x_i \quad (1)$$

with N the number of observations in the dataset.

The spread of the measurements is indicated with the variance $V(x)$, or rather the standard deviation $\sigma(x) = \sqrt{V(x)}$.

$$V(x) = \frac{1}{N-1} \sum_{i=1}^N (x_i - \bar{x})^2 \quad (2)$$

We also report the more robust statistics median, minimum, maximum, various percentiles and inter quartile range.

The median m is the value of parameter x for which half of the observations of x is smaller than m :

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^m f(x) dx = \frac{1}{2} \quad (3)$$

with $f(x)$ the probability density function.

The median is a special case of a percentile. Instead of 1/2 in equation 3, other threshold values can be used. We report results for 1 %, 5 %, 10 %, 15.9 %, 25 %, 75 %, 84.1 %, 90 %, 95 % and 99 %. The inter quartile range is the difference between the 75 % and 25 % percentiles. Similarly the minimum and maximum values correspond to the 0 % and 100 % percentiles respectively.

For normally distributed parameters the mean and median are the same, while the $\mu \pm \sigma$ values and the 15.9 % and 84.1 % percentiles coincide.

To get a measure for the relation of one variable $x_{(k)}$ with another $x_{(l)}$, we calculate the covariance matrix C_{kl} .

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1} \sum_{i=1}^N (x_{(k),i} - \bar{x}_{(k)})(x_{(l),i} - \bar{x}_{(l)}) \quad (4)$$

Rather than a dimensionally dependent covariance, it is often easier to interpret a correlation matrix R_{kl} , a matrix of Pearson's r coefficients:

$$R_{kl} = R(x_{(k)}, x_{(l)}) = \frac{C_{kl}}{\sqrt{C_{kk}C_{ll}}} = \frac{C_{kl}}{\sqrt{V(x_{(k)})V(x_{(l)})}} \quad (5)$$

The diagonal elements of the covariance matrix are the variances of the elements, $V(x_{(k)}) = C_{kk}$ and obviously $R_{kk} = 1$.

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm \sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.660 ± 0.404	17408302	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.672 \pm 75.614) \times 10^{-2}$	17408302	0.278	0.434	1.023×10^{-2}	-301	190
sulfurdioxide total vertical column precision [DU]	0.449 ± 0.496	17408302	0.222	0.286	0.319	4.266×10^{-2}	73.5
sulfurdioxide slant column density corrected [DU]	$(1.817 \pm 37.433) \times 10^{-2}$	17408302	0.258	0.365	9.257×10^{-3}	-119	148
sulfurdioxide slant column density cobra [DU]	$(1.803 \pm 36.197) \times 10^{-2}$	17408302	0.258	0.365	9.257×10^{-3}	-119	35.8
sulfurdioxide slant column density cobra precision [DU]	0.293 ± 0.134	17408302	0.213	0.133	0.253	8.704×10^{-2}	34.0
sulfurdioxide slant column density window1 [DU]	0.108 ± 0.678	17408302	0.125	0.737	0.112	-75.5	87.9
sulfurdioxide slant column density window1 precision [DU]	0.293 ± 0.134	17408302	0.213	0.133	0.253	8.704×10^{-2}	34.0
sulfurdioxide slant column density corrected win1 [DU]	$(1.581 \pm 67.067) \times 10^{-2}$	17408302	-2.500×10^{-2}	0.724	-3.499×10^{-3}	-75.5	88.2
background so2 slant column offset window1 [DU]	$(-9.221 \pm 14.931) \times 10^{-2}$	17408302	-0.180	0.173	-0.121	-1.45	5.14
sulfurdioxide slant column density window2 [DU]	0.844 ± 9.141	17408302	0.750	11.4	0.690	-1.107×10^3	1.829×10^3
sulfurdioxide slant column density window2 precision [DU]	8.33 ± 2.40	17408302	7.43	2.70	7.98	2.16	695
sulfurdioxide slant column density corrected win2 [DU]	-0.551 ± 8.998	17408302	-0.250	11.3	-0.528	-1.109×10^3	1.828×10^3
background so2 slant column offset window2 [DU]	-1.40 ± 2.02	17408302	-0.250	2.05	-0.884	-25.8	7.81
sulfurdioxide slant column density window3 [DU]	-4.43 ± 24.36	17408302	-5.04	30.4	-4.17	-753	830
sulfurdioxide slant column density window3 precision [DU]	29.3 ± 14.3	17408302	22.5	10.7	25.5	9.00	784
sulfurdioxide slant column density corrected win3 [DU]	2.82 ± 24.02	17408302	2.80	30.1	3.02	-737	843
background so2 slant column offset window3 [DU]	7.25 ± 4.56	17408302	9.52	6.73	7.30	-12.9	30.8
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17408302	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.029 \pm 5.430) \times 10^{-2}$	17408302	1.664×10^{-2}	2.338×10^{-2}	1.622×10^{-2}	1.213×10^{-4}	1.86
fitted radiance shift [nm]	$(-2.828 \pm 27.841) \times 10^{-4}$	17408302	-5.000×10^{-4}	1.870×10^{-3}	-2.897×10^{-4}	-5.426×10^{-2}	7.416×10^{-2}
fitted radiance squeeze [1]	$(-5.176 \pm 18.557) \times 10^{-5}$	17408302	-3.000×10^{-5}	2.167×10^{-4}	-4.557×10^{-5}	-1.931×10^{-2}	2.034×10^{-2}
fitted root mean square [1]	$(1.288 \pm 0.538) \times 10^{-3}$	17408302	9.750×10^{-4}	5.326×10^{-4}	1.138×10^{-3}	3.411×10^{-4}	5.910×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.898 ± 0.435	17408302	0.660	0.521	0.816	5.000×10^{-2}	2.93
sulfurdioxide total air mass factor polluted precision [1]	0.116 ± 0.114	17408302	3.500×10^{-2}	0.116	7.906×10^{-2}	4.063×10^{-3}	2.09
sulfurdioxide clear air mass factor polluted [1]	0.746 ± 0.286	17408302	0.700	0.310	0.712	7.250×10^{-2}	2.81
number of spectral points in retrieval [1]	73.4 ± 0.5	17408302	73.0	1.000	73.0	52.0	155

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	6.000×10^{-2}	0.120	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-1.79	-0.768	-0.494	-0.341	-0.204	0.230	0.377	0.544	0.855	2.09
sulfurdioxide total vertical column precision [DU]	9.104×10^{-2}	0.126	0.156	0.184	0.220	0.506	0.644	0.813	1.16	2.38
sulfurdioxide slant column density corrected [DU]	-0.859	-0.492	-0.356	-0.266	-0.171	0.193	0.293	0.391	0.546	1.02
sulfurdioxide slant column density cobra [DU]	-0.859	-0.492	-0.356	-0.266	-0.171	0.193	0.293	0.391	0.546	1.02
sulfurdioxide slant column density cobra precision [DU]	0.141	0.167	0.182	0.193	0.208	0.341	0.398	0.454	0.543	0.782
sulfurdioxide slant column density window1 [DU]	-1.69	-0.935	-0.648	-0.458	-0.259	0.478	0.671	0.855	1.14	1.90
sulfurdioxide slant column density window1 precision [DU]	0.141	0.167	0.182	0.193	0.208	0.341	0.398	0.454	0.543	0.782
sulfurdioxide slant column density corrected win1 [DU]	-1.64	-0.973	-0.717	-0.544	-0.360	0.364	0.564	0.761	1.07	1.92
background so2 slant column offset window1 [DU]	-0.400	-0.272	-0.229	-0.210	-0.189	-1.547×10^{-2}	4.323×10^{-2}	9.472×10^{-2}	0.163	0.323
sulfurdioxide slant column density window2 [DU]	-20.5	-13.6	-10.3	-7.77	-4.97	6.47	9.42	12.1	15.8	23.8
sulfurdioxide slant column density window2 precision [DU]	4.33	5.24	5.80	6.25	6.78	9.48	10.4	11.3	12.5	15.5
sulfurdioxide slant column density corrected win2 [DU]	-22.4	-15.1	-11.6	-9.04	-6.19	5.10	7.92	10.5	13.9	21.2
background so2 slant column offset window2 [DU]	-8.17	-5.75	-4.01	-2.99	-2.15	-9.663×10^{-2}	0.156	0.368	0.666	1.82
sulfurdioxide slant column density window3 [DU]	-66.3	-44.8	-34.7	-27.4	-19.4	11.0	18.7	25.6	35.0	53.9
sulfurdioxide slant column density window3 precision [DU]	13.3	16.0	18.0	19.6	21.4	32.1	37.0	43.5	56.2	90.3
sulfurdioxide slant column density corrected win3 [DU]	-57.8	-36.9	-27.0	-19.8	-12.1	18.0	25.6	32.5	41.8	60.6
background so2 slant column offset window3 [DU]	-2.64	0.186	1.48	2.51	3.79	10.5	11.8	13.0	14.7	17.9
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	2.788×10^{-4}	6.120×10^{-4}	1.471×10^{-3}	3.521×10^{-3}	7.591×10^{-3}	3.098×10^{-2}	4.618×10^{-2}	6.632×10^{-2}	0.105	0.247
fitted radiance shift [nm]	-8.663×10^{-3}	-4.350×10^{-3}	-2.866×10^{-3}	-1.999×10^{-3}	-1.248×10^{-3}	6.216×10^{-4}	1.380×10^{-3}	2.305×10^{-3}	3.909×10^{-3}	8.452×10^{-3}
fitted radiance squeeze [1]	-5.440×10^{-4}	-3.558×10^{-4}	-2.740×10^{-4}	-2.173×10^{-4}	-1.571×10^{-4}	5.956×10^{-5}	1.122×10^{-4}	1.608×10^{-4}	2.302×10^{-4}	3.991×10^{-4}
fitted root mean square [1]	5.901×10^{-4}	7.310×10^{-4}	8.127×10^{-4}	8.738×10^{-4}	9.464×10^{-4}	1.479×10^{-3}	1.717×10^{-3}	1.954×10^{-3}	2.314×10^{-3}	3.229×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.149	0.318	0.421	0.503	0.600	1.12	1.31	1.49	1.74	2.25
sulfurdioxide total air mass factor polluted precision [1]	1.246×10^{-2}	2.163×10^{-2}	2.801×10^{-2}	3.285×10^{-2}	4.002×10^{-2}	0.156	0.199	0.243	0.319	0.545
sulfurdioxide clear air mass factor polluted [1]	0.261	0.369	0.434	0.494	0.565	0.875	0.970	1.06	1.22	1.76
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]	0.630 ± 0.412	11478578	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(1.828 \pm 66.150) \times 10^{-2}$	11478578	0.396	8.375×10^{-3}	-36.4	60.3	-0.188	0.208
sulfurdioxide total vertical column precision [DU]	0.409 ± 0.470	11478578	0.250	0.290	4.266×10^{-2}	18.8	0.203	0.453
sulfurdioxide slant column density corrected [DU]	$(1.353 \pm 31.095) \times 10^{-2}$	11478578	0.340	7.740×10^{-3}	-6.99	43.0	-0.161	0.179
sulfurdioxide slant column density cobra [DU]	$(1.352 \pm 31.036) \times 10^{-2}$	11478578	0.340	7.740×10^{-3}	-6.99	18.7	-0.161	0.179
sulfurdioxide slant column density cobra precision [DU]	0.267 ± 0.106	11478578	0.108	0.236	8.704×10^{-2}	8.86	0.199	0.307
sulfurdioxide slant column density window1 [DU]	0.101 ± 0.605	11478578	0.694	0.106	-16.9	22.9	-0.245	0.449
sulfurdioxide slant column density window1 precision [DU]	0.267 ± 0.106	11478578	0.108	0.236	8.704×10^{-2}	8.86	0.199	0.307
sulfurdioxide slant column density corrected win1 [DU]	$(4.413 \pm 592.566) \times 10^{-3}$	11478578	0.678	-7.935×10^{-3}	-16.9	22.7	-0.343	0.335
background so2 slant column offset window1 [DU]	$(-9.675 \pm 13.500) \times 10^{-2}$	11478578	0.182	-0.120	-1.45	1.57	-0.193	-1.073×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.377 ± 8.494	11478578	10.9	0.344	-306	215	-5.07	5.78
sulfurdioxide slant column density window2 precision [DU]	7.98 ± 2.22	11478578	2.51	7.65	2.16	363	6.53	9.03
sulfurdioxide slant column density corrected win2 [DU]	-0.531 ± 8.464	11478578	10.8	-0.496	-307	215	-5.92	4.89
background so2 slant column offset window2 [DU]	-0.908 ± 1.389	11478578	1.78	-0.683	-7.92	7.81	-1.76	1.944×10^{-2}
sulfurdioxide slant column density window3 [DU]	-3.53 ± 23.40	11478578	29.2	-3.45	-220	656	-18.0	11.2
sulfurdioxide slant column density window3 precision [DU]	28.4 ± 14.9	11478578	10.3	24.2	9.00	784	20.5	30.8
sulfurdioxide slant column density corrected win3 [DU]	2.89 ± 23.04	11478578	28.9	3.04	-217	666	-11.4	17.5
background so2 slant column offset window3 [DU]	6.42 ± 4.34	11478578	7.04	6.72	-12.9	20.0	2.91	9.94
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11478578	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.234 \pm 6.197) \times 10^{-2}$	11478578	2.958×10^{-2}	1.460×10^{-2}	1.213×10^{-4}	1.86	3.928×10^{-3}	3.351×10^{-2}
fitted radiance shift [nm]	$(-1.051 \pm 29.134) \times 10^{-4}$	11478578	1.810×10^{-3}	-1.508×10^{-4}	-4.385×10^{-2}	5.359×10^{-2}	-1.026×10^{-3}	7.835×10^{-4}
fitted radiance squeeze [1]	$(-7.769 \pm 17.226) \times 10^{-5}$	11478578	2.097×10^{-4}	-6.635×10^{-5}	-1.588×10^{-2}	1.106×10^{-2}	-1.766×10^{-4}	3.311×10^{-5}
fitted root mean square [1]	$(1.196 \pm 0.444) \times 10^{-3}$	11478578	4.615×10^{-4}	1.081×10^{-3}	3.411×10^{-4}	3.518×10^{-2}	9.099×10^{-4}	1.371×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.927 ± 0.471	11478578	0.572	0.844	5.000×10^{-2}	2.93	0.598	1.17
sulfurdioxide total air mass factor polluted precision [1]	0.126 ± 0.126	11478578	0.128	8.727×10^{-2}	4.063×10^{-3}	2.09	4.213×10^{-2}	0.170
sulfurdioxide clear air mass factor polluted [1]	0.770 ± 0.321	11478578	0.362	0.732	7.538×10^{-2}	2.81	0.557	0.918
number of spectral points in retrieval [1]	73.5 ± 0.5	11478578	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]	0.717 ± 0.380	5929724	0.650	1.000	0.0	1.000	0.350	1.000
sulfurdioxide total vertical column [DU]	$(4.306 \pm 91.164) \times 10^{-2}$	5929724	0.524	1.498×10^{-2}	-301	190	-0.242	0.282
sulfurdioxide total vertical column precision [DU]	0.528 ± 0.533	5929724	0.336	0.384	5.312×10^{-2}	73.5	0.265	0.601
sulfurdioxide slant column density corrected [DU]	$(2.715 \pm 47.337) \times 10^{-2}$	5929724	0.424	1.288×10^{-2}	-119	148	-0.196	0.227
sulfurdioxide slant column density cobra [DU]	$(2.677 \pm 44.506) \times 10^{-2}$	5929724	0.424	1.288×10^{-2}	-119	35.8	-0.196	0.227
sulfurdioxide slant column density cobra precision [DU]	0.344 ± 0.164	5929724	0.180	0.296	8.950×10^{-2}	34.0	0.234	0.414
sulfurdioxide slant column density window1 [DU]	0.121 ± 0.799	5929724	0.834	0.126	-75.5	87.9	-0.293	0.541
sulfurdioxide slant column density window1 precision [DU]	0.344 ± 0.164	5929724	0.180	0.296	8.950×10^{-2}	34.0	0.234	0.414
sulfurdioxide slant column density corrected win1 [DU]	$(3.787 \pm 80.004) \times 10^{-2}$	5929724	0.829	6.938×10^{-3}	-75.5	88.2	-0.398	0.431
background so2 slant column offset window1 [DU]	$(-8.341 \pm 17.335) \times 10^{-2}$	5929724	0.152	-0.122	-1.35	5.14	-0.180	-2.753×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.75 ± 10.22	5929724	12.7	1.47	-1.107×10^3	1.829×10^3	-4.74	7.93
sulfurdioxide slant column density window2 precision [DU]	9.01 ± 2.58	5929724	2.83	8.65	2.36	695	7.40	10.2
sulfurdioxide slant column density corrected win2 [DU]	-0.590 ± 9.950	5929724	12.3	-0.599	-1.109×10^3	1.828×10^3	-6.77	5.57
background so2 slant column offset window2 [DU]	-2.34 ± 2.63	5929724	3.65	-1.37	-25.8	7.12	-4.01	-0.356
sulfurdioxide slant column density window3 [DU]	-6.18 ± 26.04	5929724	33.0	-5.75	-753	830	-22.4	10.6
sulfurdioxide slant column density window3 precision [DU]	31.0 ± 13.0	5929724	10.3	27.8	9.97	469	23.7	34.0
sulfurdioxide slant column density corrected win3 [DU]	2.69 ± 25.82	5929724	32.7	2.97	-737	843	-13.5	19.2
background so2 slant column offset window3 [DU]	8.86 ± 4.55	5929724	6.73	7.95	-7.78	30.8	5.54	12.3
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.28	5929724	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.633 \pm 3.463) \times 10^{-2}$	5929724	1.630×10^{-2}	1.790×10^{-2}	1.205×10^{-3}	0.963	1.158×10^{-2}	2.788×10^{-2}
fitted radiance shift [nm]	$(-6.267 \pm 24.789) \times 10^{-4}$	5929724	1.905×10^{-3}	-5.808×10^{-4}	-5.426×10^{-2}	7.416×10^{-2}	-1.623×10^{-3}	2.817×10^{-4}
fitted radiance squeeze [1]	$(-1.567 \pm 199.586) \times 10^{-6}$	5929724	2.245×10^{-4}	-1.689×10^{-6}	-1.931×10^{-2}	2.034×10^{-2}	-1.136×10^{-4}	1.108×10^{-4}
fitted root mean square [1]	$(1.465 \pm 0.649) \times 10^{-3}$	5929724	6.892×10^{-4}	1.265×10^{-3}	3.630×10^{-4}	5.910×10^{-2}	1.038×10^{-3}	1.727×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.841 ± 0.347	5929724	0.438	0.773	5.000×10^{-2}	2.74	0.604	1.04
sulfurdioxide total air mass factor polluted precision [1]	$(9.606 \pm 8.165) \times 10^{-2}$	5929724	9.259×10^{-2}	6.761×10^{-2}	4.427×10^{-3}	1.61	3.745×10^{-2}	0.130
sulfurdioxide clear air mass factor polluted [1]	0.699 ± 0.195	5929724	0.223	0.688	7.250×10^{-2}	1.91	0.576	0.799
number of spectral points in retrieval [1]	73.4 ± 0.5	5929724	1.000	73.0	52.0	155	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]	0.655 ± 0.400	11364703	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.941 \pm 77.995) \times 10^{-2}$	11364703	0.444	1.141×10^{-2}	-92.8	104	-0.208	0.236
sulfurdioxide total vertical column precision [DU]	0.457 ± 0.517	11364703	0.273	0.318	4.402×10^{-2}	35.4	0.227	0.501
sulfurdioxide slant column density corrected [DU]	$(1.989 \pm 37.491) \times 10^{-2}$	11364703	0.367	1.003×10^{-2}	-8.50	44.9	-0.172	0.196
sulfurdioxide slant column density cobra [DU]	$(1.982 \pm 37.131) \times 10^{-2}$	11364703	0.367	1.003×10^{-2}	-8.50	29.1	-0.172	0.196
sulfurdioxide slant column density cobra precision [DU]	0.299 ± 0.142	11364703	0.150	0.251	8.889×10^{-2}	21.4	0.205	0.355
sulfurdioxide slant column density window1 [DU]	0.110 ± 0.696	11364703	0.747	0.118	-43.4	60.4	-0.259	0.487
sulfurdioxide slant column density window1 precision [DU]	0.299 ± 0.142	11364703	0.150	0.251	8.889×10^{-2}	21.4	0.205	0.355
sulfurdioxide slant column density corrected win1 [DU]	$(2.283 \pm 68.925) \times 10^{-2}$	11364703	0.733	2.052×10^{-3}	-43.4	60.1	-0.358	0.374
background so2 slant column offset window1 [DU]	$(-8.685 \pm 15.990) \times 10^{-2}$	11364703	0.187	-0.123	-1.35	5.14	-0.190	-2.375×10^{-3}
sulfurdioxide slant column density window2 [DU]	1.03 ± 9.08	11364703	11.4	0.812	-1.107×10^3	692	-4.80	6.59
sulfurdioxide slant column density window2 precision [DU]	8.20 ± 2.23	11364703	2.64	7.88	2.16	610	6.71	9.35
sulfurdioxide slant column density corrected win2 [DU]	-0.552 ± 8.883	11364703	11.2	-0.530	-1.109×10^3	692	-6.15	5.06
background so2 slant column offset window2 [DU]	-1.58 ± 2.25	11364703	2.41	-0.881	-25.8	7.81	-2.50	-8.900×10^{-2}
sulfurdioxide slant column density window3 [DU]	-2.05 ± 24.00	11364703	30.2	-1.97	-753	739	-17.0	13.2
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 11.4	11364703	9.37	24.6	9.00	356	21.0	30.4
sulfurdioxide slant column density corrected win3 [DU]	5.22 ± 23.42	11364703	29.6	5.19	-737	752	-9.52	20.1
background so2 slant column offset window3 [DU]	7.27 ± 4.70	11364703	6.78	7.07	-12.9	30.8	3.73	10.5
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.26	11364703	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.124 \pm 3.074) \times 10^{-2}$	11364703	1.612×10^{-2}	1.487×10^{-2}	1.644×10^{-4}	1.86	8.387×10^{-3}	2.451×10^{-2}
fitted radiance shift [nm]	$(-3.066 \pm 22.809) \times 10^{-4}$	11364703	1.778×10^{-3}	-2.790×10^{-4}	-5.176×10^{-2}	4.245×10^{-2}	-1.218×10^{-3}	5.600×10^{-4}
fitted radiance squeeze [1]	$(-4.139 \pm 18.667) \times 10^{-5}$	11364703	2.140×10^{-4}	-3.496×10^{-5}	-1.594×10^{-2}	1.504×10^{-2}	-1.451×10^{-4}	6.886×10^{-5}
fitted root mean square [1]	$(1.307 \pm 0.573) \times 10^{-3}$	11364703	6.007×10^{-4}	1.129×10^{-3}	3.411×10^{-4}	5.910×10^{-2}	9.356×10^{-4}	1.536×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.876 ± 0.383	11364703	0.467	0.822	5.000×10^{-2}	2.50	0.621	1.09
sulfurdioxide total air mass factor polluted precision [1]	0.110 ± 0.112	11364703	0.101	7.251×10^{-2}	4.063×10^{-3}	2.09	4.150×10^{-2}	0.142
sulfurdioxide clear air mass factor polluted [1]	0.741 ± 0.237	11364703	0.283	0.729	9.922×10^{-2}	2.48	0.590	0.873
number of spectral points in retrieval [1]	73.4 ± 0.5	11364703	1.000	73.0	52.0	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]	0.678 ± 0.410	4212561	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(1.995 \pm 67.767) \times 10^{-2}$	4212561	0.398	7.478×10^{-3}	-301	190	-0.189	0.210
sulfurdioxide total vertical column precision [DU]	0.415 ± 0.422	4212561	0.305	0.309	4.266×10^{-2}	73.5	0.190	0.495
sulfurdioxide slant column density corrected [DU]	$(1.460 \pm 36.830) \times 10^{-2}$	4212561	0.351	7.322×10^{-3}	-119	148	-0.166	0.184
sulfurdioxide slant column density cobra [DU]	$(1.434 \pm 33.765) \times 10^{-2}$	4212561	0.351	7.322×10^{-3}	-119	35.8	-0.166	0.184
sulfurdioxide slant column density cobra precision [DU]	0.275 ± 0.113	4212561	9.832×10^{-2}	0.245	8.704×10^{-2}	34.0	0.208	0.306
sulfurdioxide slant column density window1 [DU]	0.123 ± 0.624	4212561	0.699	0.118	-75.5	87.9	-0.232	0.468
sulfurdioxide slant column density window1 precision [DU]	0.275 ± 0.113	4212561	9.832×10^{-2}	0.245	8.704×10^{-2}	34.0	0.208	0.306
sulfurdioxide slant column density corrected win1 [DU]	$(2.280 \pm 615.584) \times 10^{-3}$	4212561	0.687	-1.272×10^{-2}	-75.5	88.2	-0.351	0.336
background so2 slant column offset window1 [DU]	-0.121 ± 0.125	4212561	0.137	-0.143	-1.45	2.33	-0.196	-5.908×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.379 ± 9.241	4212561	11.4	0.338	-857	1.829×10^3	-5.37	6.06
sulfurdioxide slant column density window2 precision [DU]	8.53 ± 2.74	4212561	2.80	8.12	2.26	695	6.87	9.67
sulfurdioxide slant column density corrected win2 [DU]	-0.515 ± 9.192	4212561	11.4	-0.492	-861	1.828×10^3	-6.18	5.17
background so2 slant column offset window2 [DU]	-0.894 ± 1.427	4212561	1.61	-0.650	-20.8	7.81	-1.62	-9.361×10^{-3}
sulfurdioxide slant column density window3 [DU]	-8.99 ± 24.36	4212561	30.1	-8.34	-352	830	-23.7	6.37
sulfurdioxide slant column density window3 precision [DU]	33.0 ± 18.9	4212561	13.8	27.7	9.12	784	22.3	36.2
sulfurdioxide slant column density corrected win3 [DU]	-2.46 ± 24.45	4212561	30.3	-1.88	-343	843	-17.3	13.0
background so2 slant column offset window3 [DU]	6.53 ± 4.29	4212561	6.60	6.66	-12.9	26.5	3.24	9.84
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.11	4212561	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.122 \pm 8.006) \times 10^{-2}$	4212561	5.177×10^{-2}	2.541×10^{-2}	1.213×10^{-4}	1.81	8.043×10^{-3}	5.982×10^{-2}
fitted radiance shift [nm]	$(-2.493 \pm 36.820) \times 10^{-4}$	4212561	2.053×10^{-3}	-3.318×10^{-4}	-4.385×10^{-2}	7.416×10^{-2}	-1.308×10^{-3}	7.445×10^{-4}
fitted radiance squeeze [1]	$(-5.874 \pm 17.788) \times 10^{-5}$	4212561	2.124×10^{-4}	-5.415×10^{-5}	-1.588×10^{-2}	1.606×10^{-2}	-1.627×10^{-4}	4.968×10^{-5}
fitted root mean square [1]	$(1.216 \pm 0.443) \times 10^{-3}$	4212561	4.106×10^{-4}	1.121×10^{-3}	3.482×10^{-4}	5.900×10^{-2}	9.485×10^{-4}	1.359×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.957 ± 0.535	4212561	0.642	0.807	5.000×10^{-2}	2.93	0.575	1.22
sulfurdioxide total air mass factor polluted precision [1]	0.127 ± 0.117	4212561	0.150	9.623×10^{-2}	4.266×10^{-3}	1.84	3.509×10^{-2}	0.185
sulfurdioxide clear air mass factor polluted [1]	0.781 ± 0.383	4212561	0.371	0.683	7.250×10^{-2}	2.81	0.544	0.915
number of spectral points in retrieval [1]	73.4 ± 0.5	4212561	1.000	73.0	52.0	155	73.0	74.0

3 Granule outlines

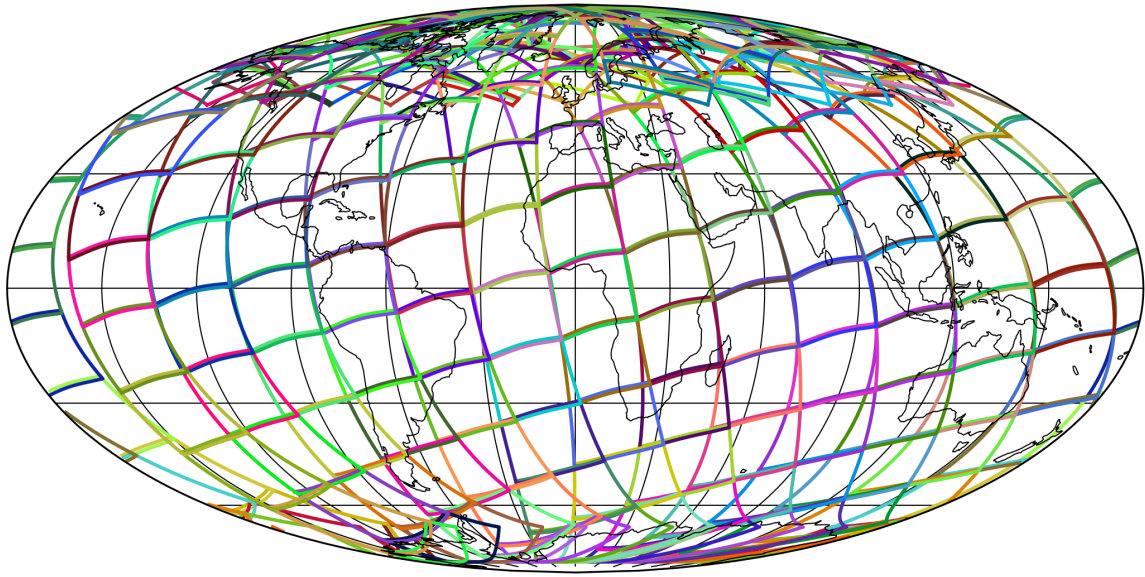


Figure 1: Outline of the granules.

4 Input data monitoring

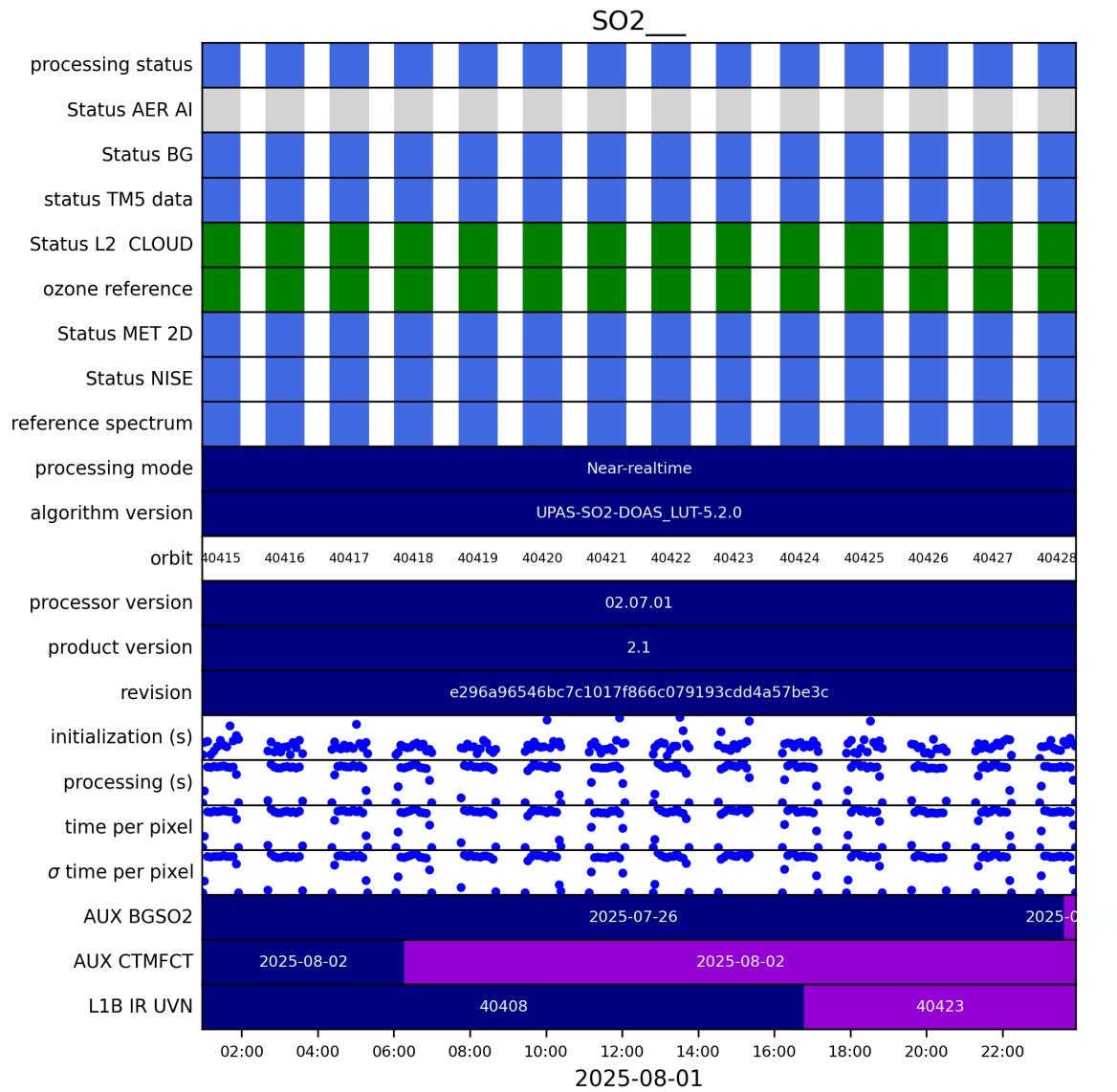


Figure 2: Input data per granule

5 Warnings and errors

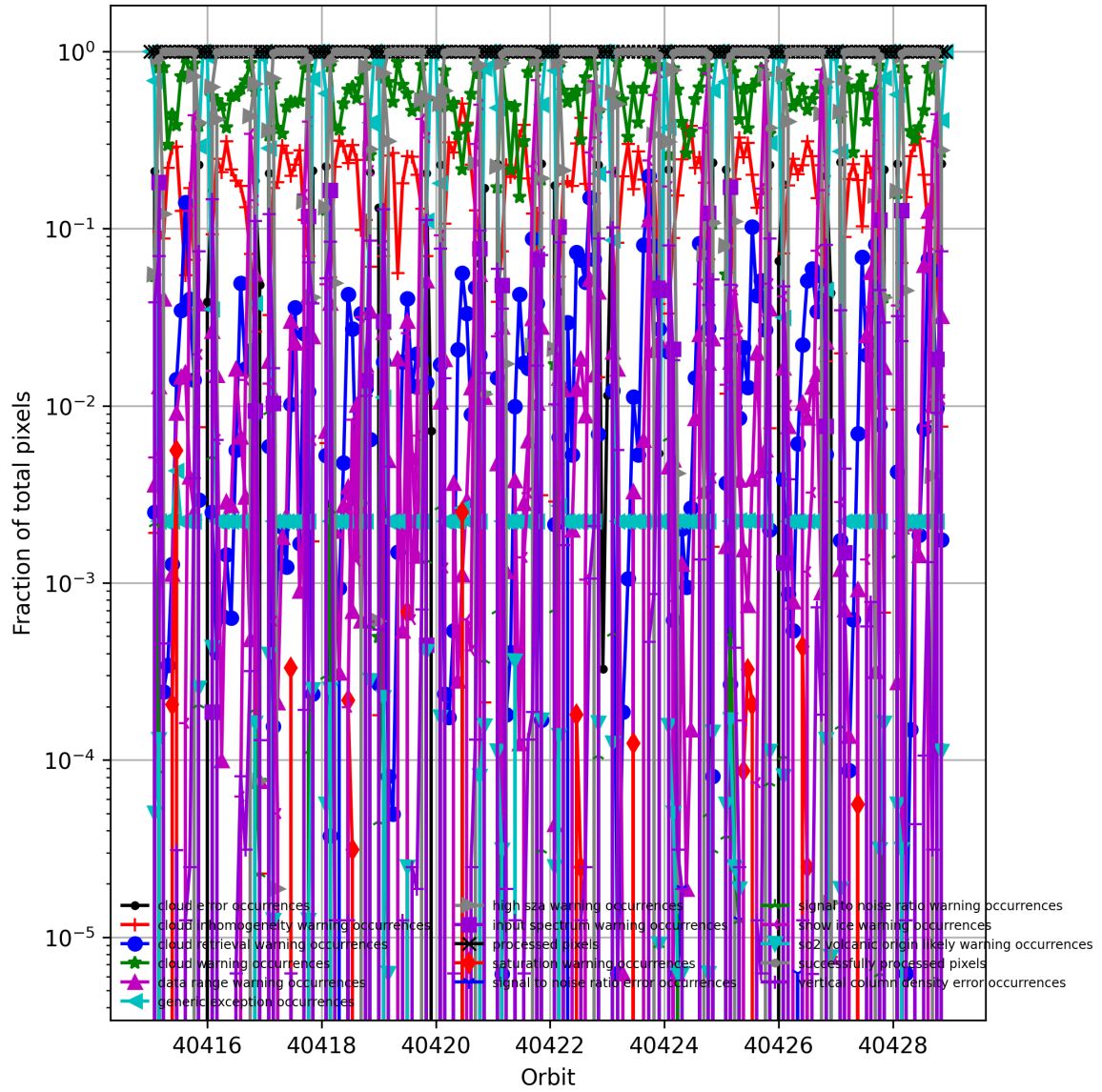


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

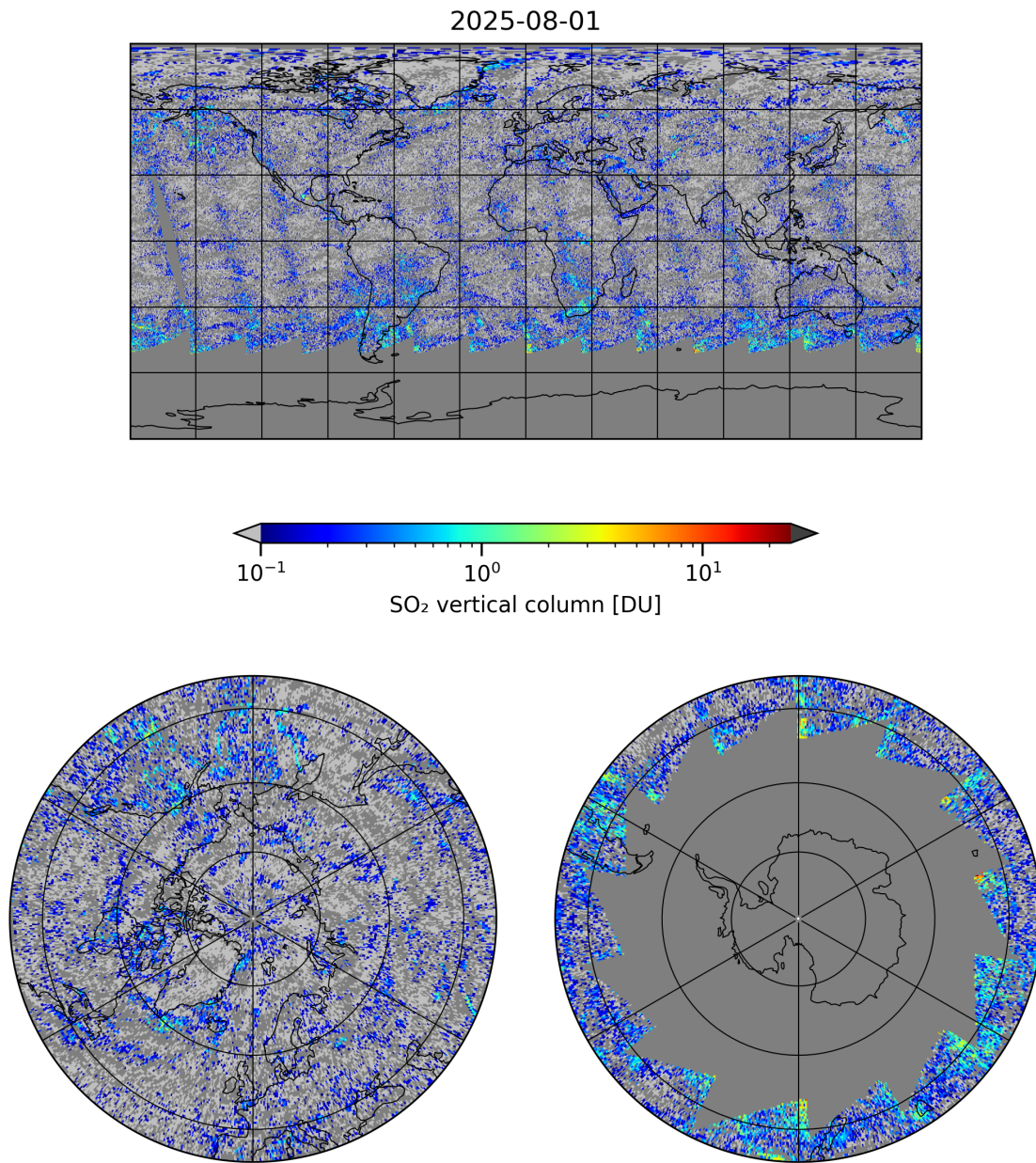


Figure 4: Map of “SO₂ vertical column” for 2025-08-01 to 2025-08-01

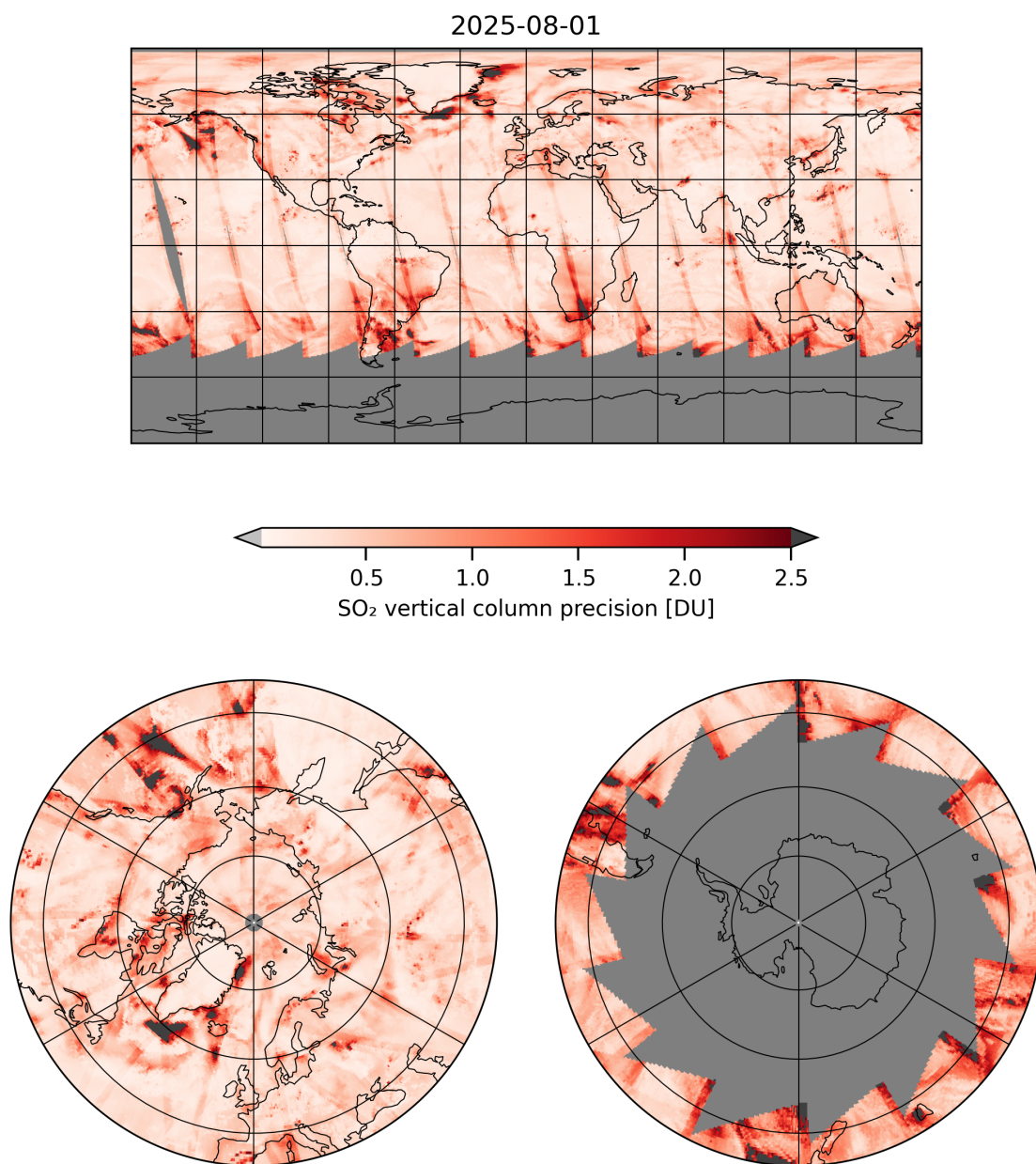


Figure 5: Map of “SO₂ vertical column precision” for 2025-08-01 to 2025-08-01

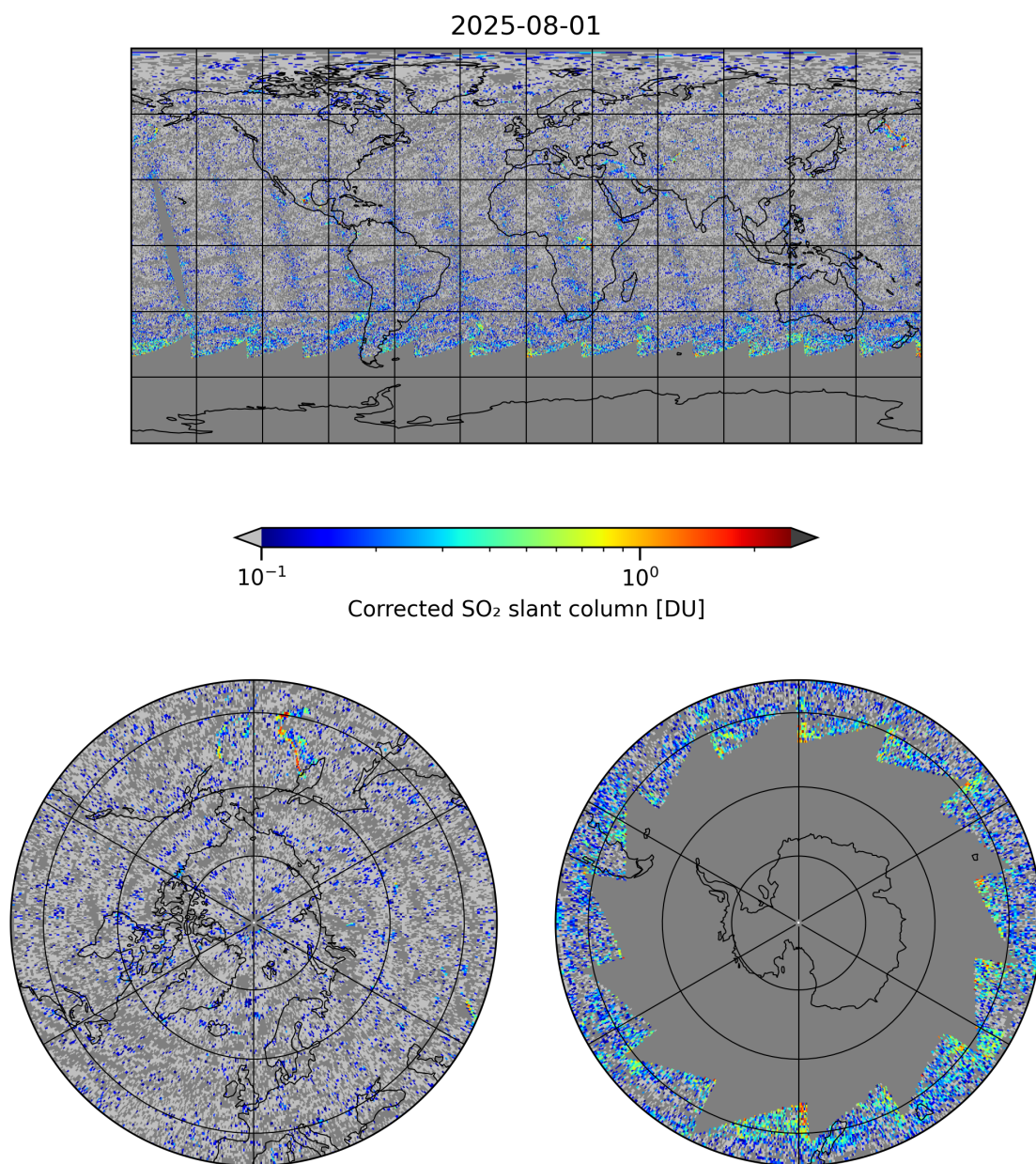


Figure 6: Map of “Corrected SO₂ slant column” for 2025-08-01 to 2025-08-01

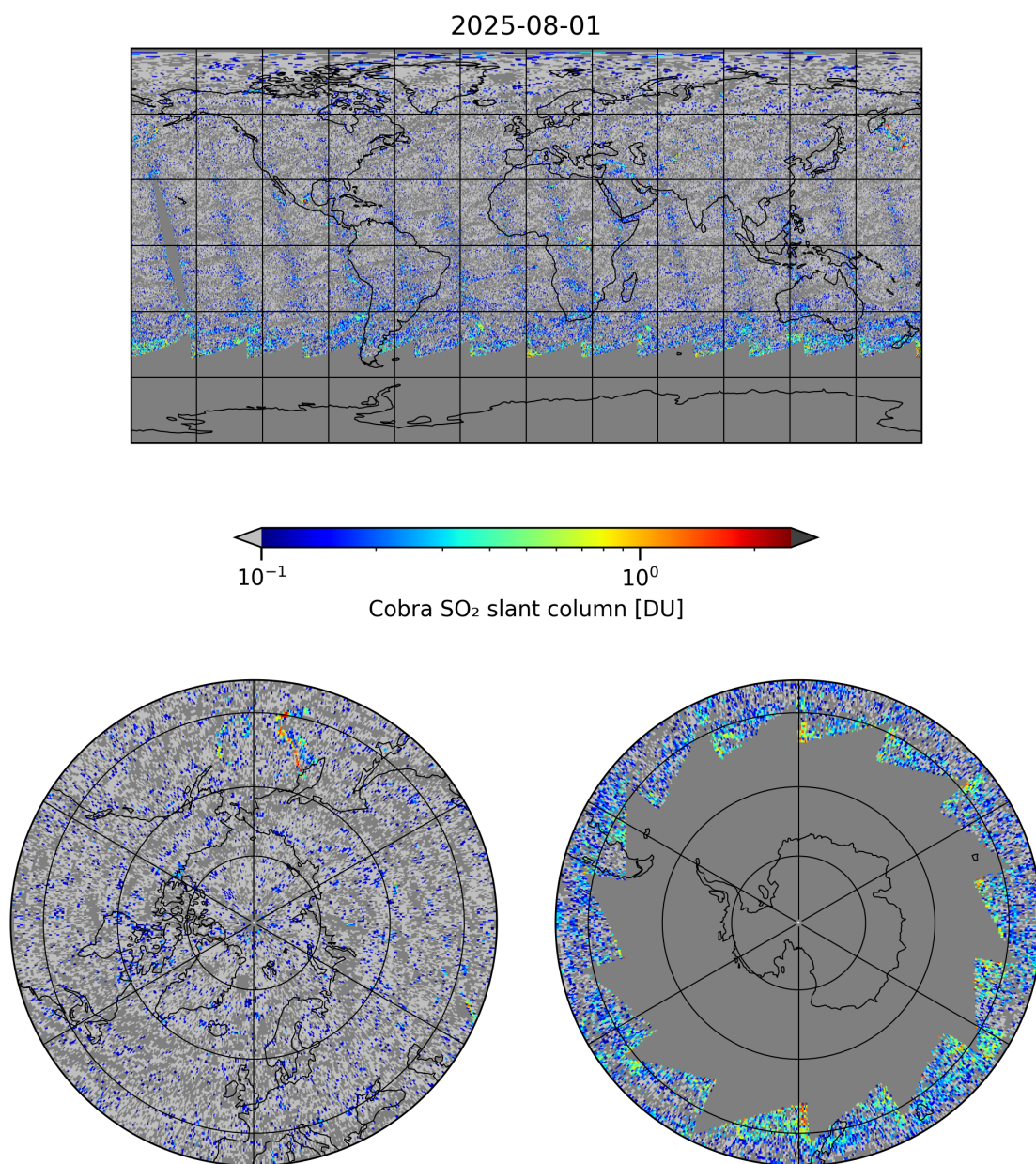


Figure 7: Map of “Cobra SO₂ slant column” for 2025-08-01 to 2025-08-01

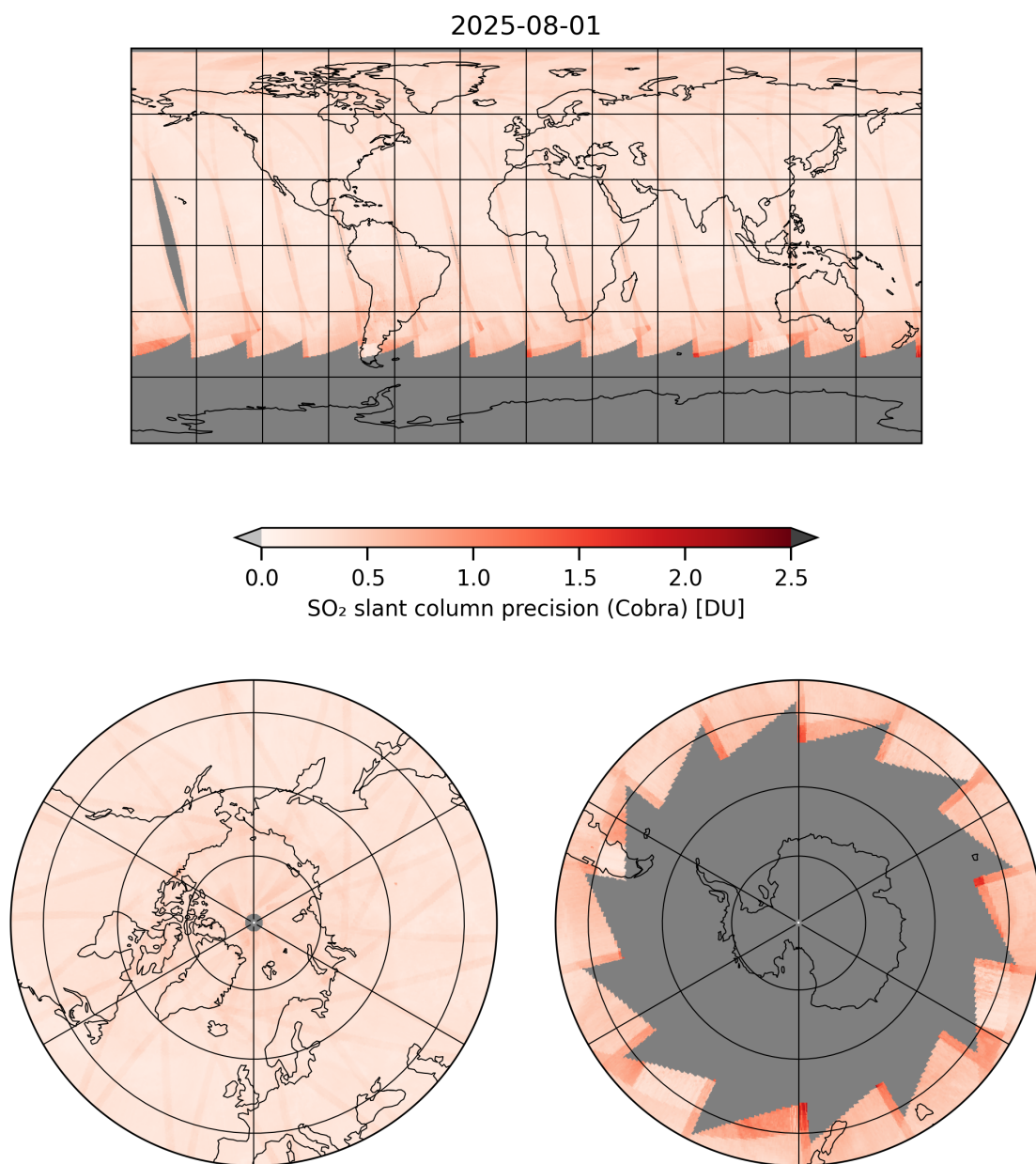


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-08-01 to 2025-08-01

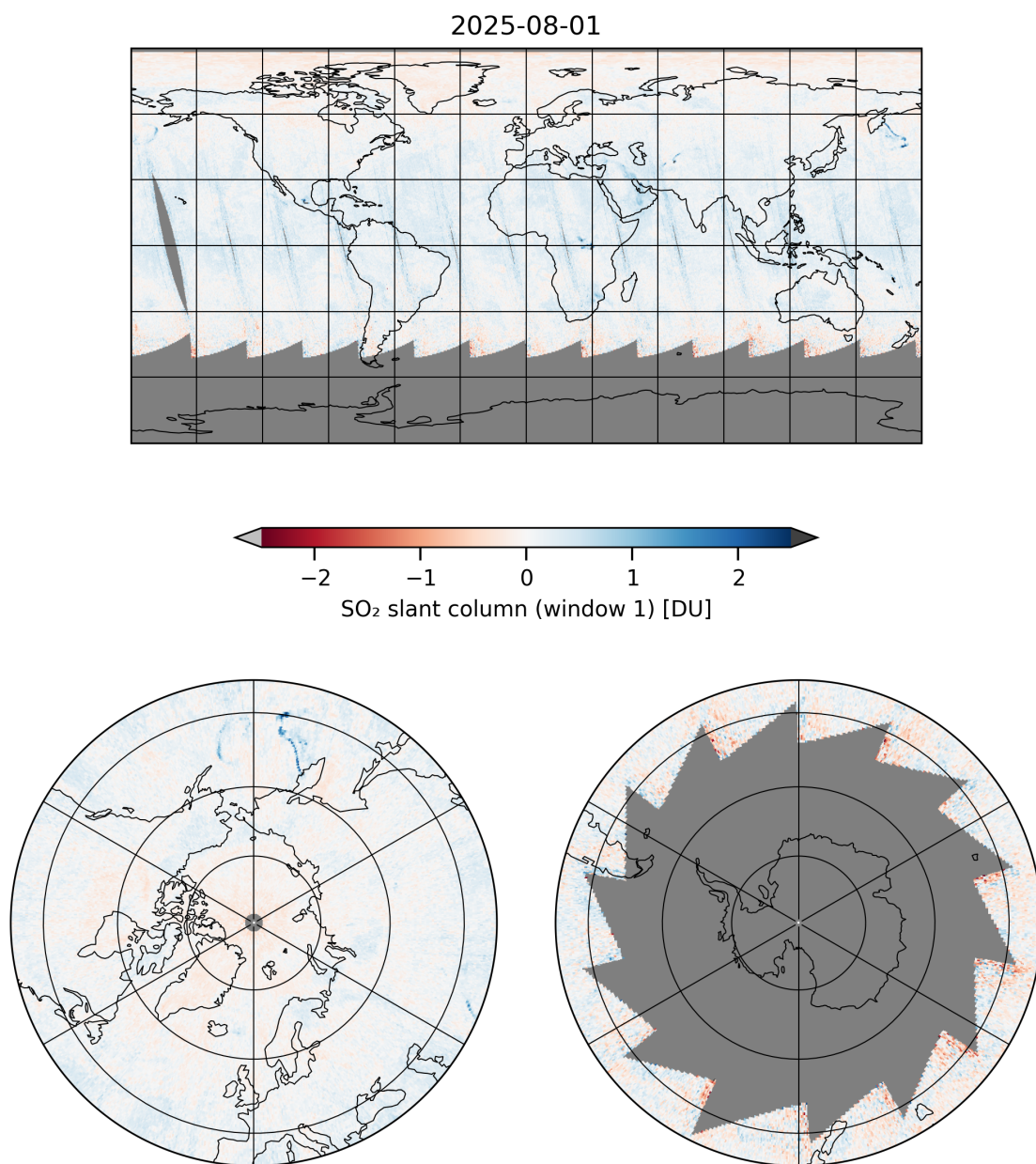


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-08-01 to 2025-08-01

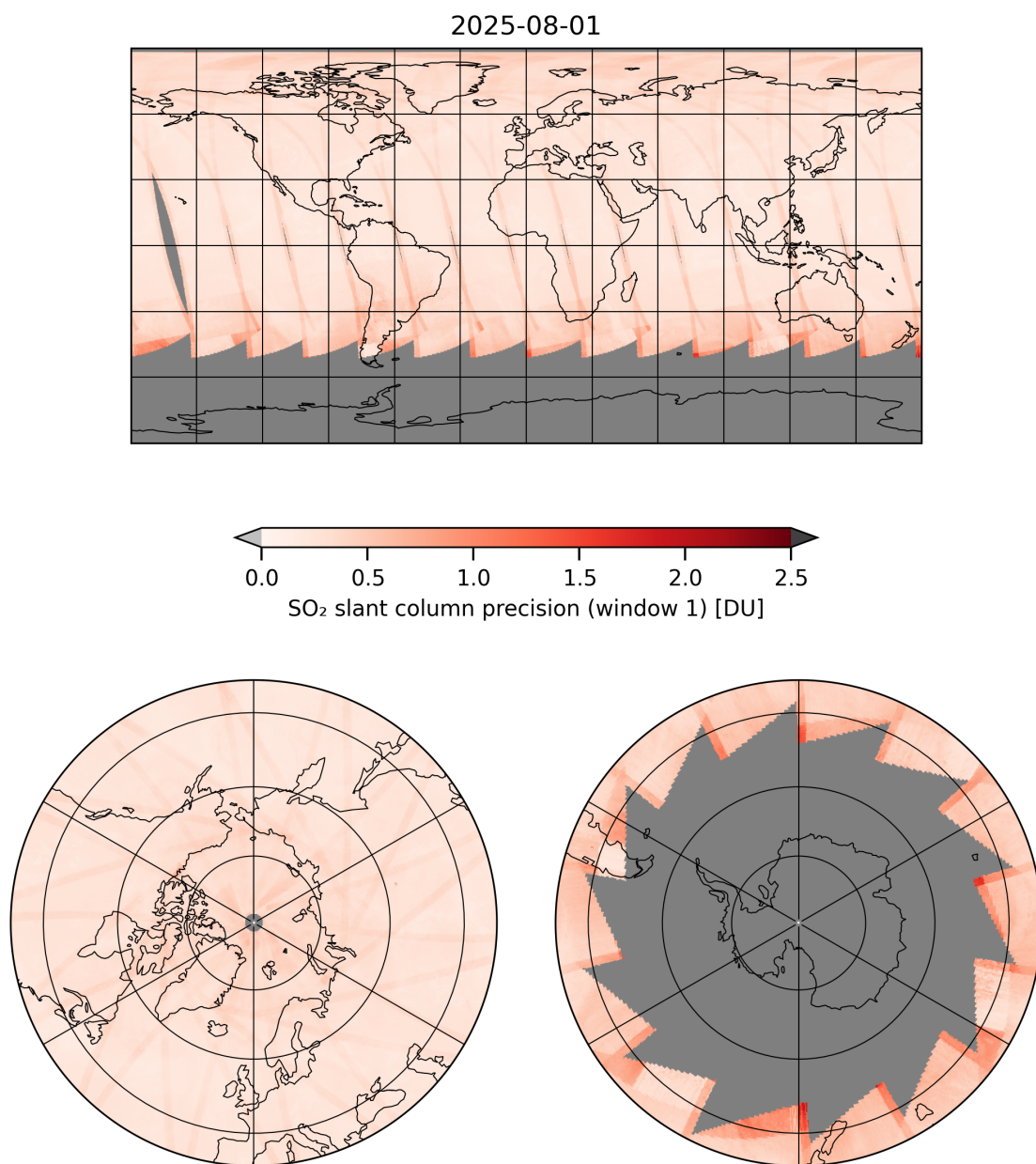


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-08-01 to 2025-08-01

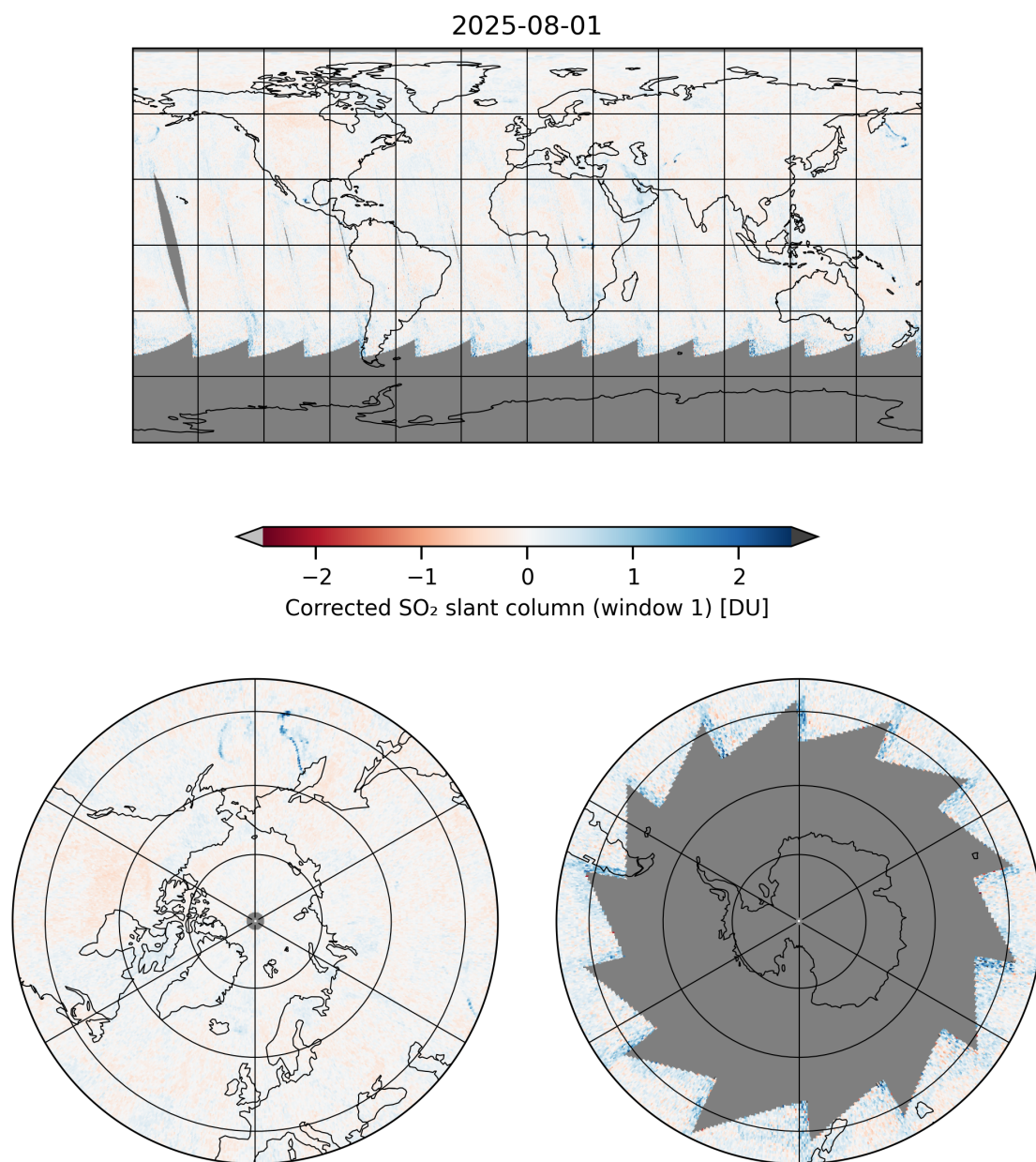


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-08-01 to 2025-08-01

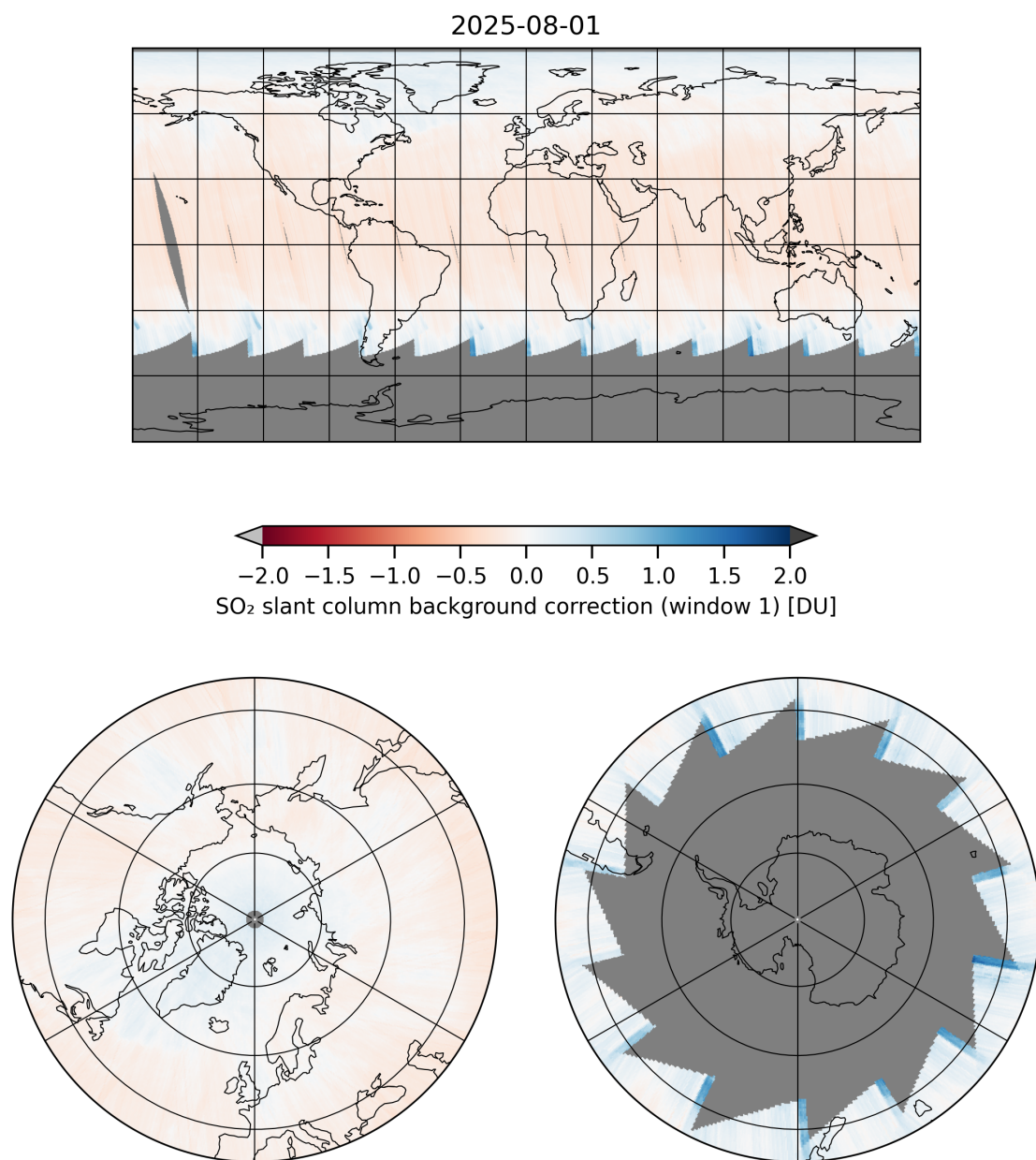


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-08-01 to 2025-08-01

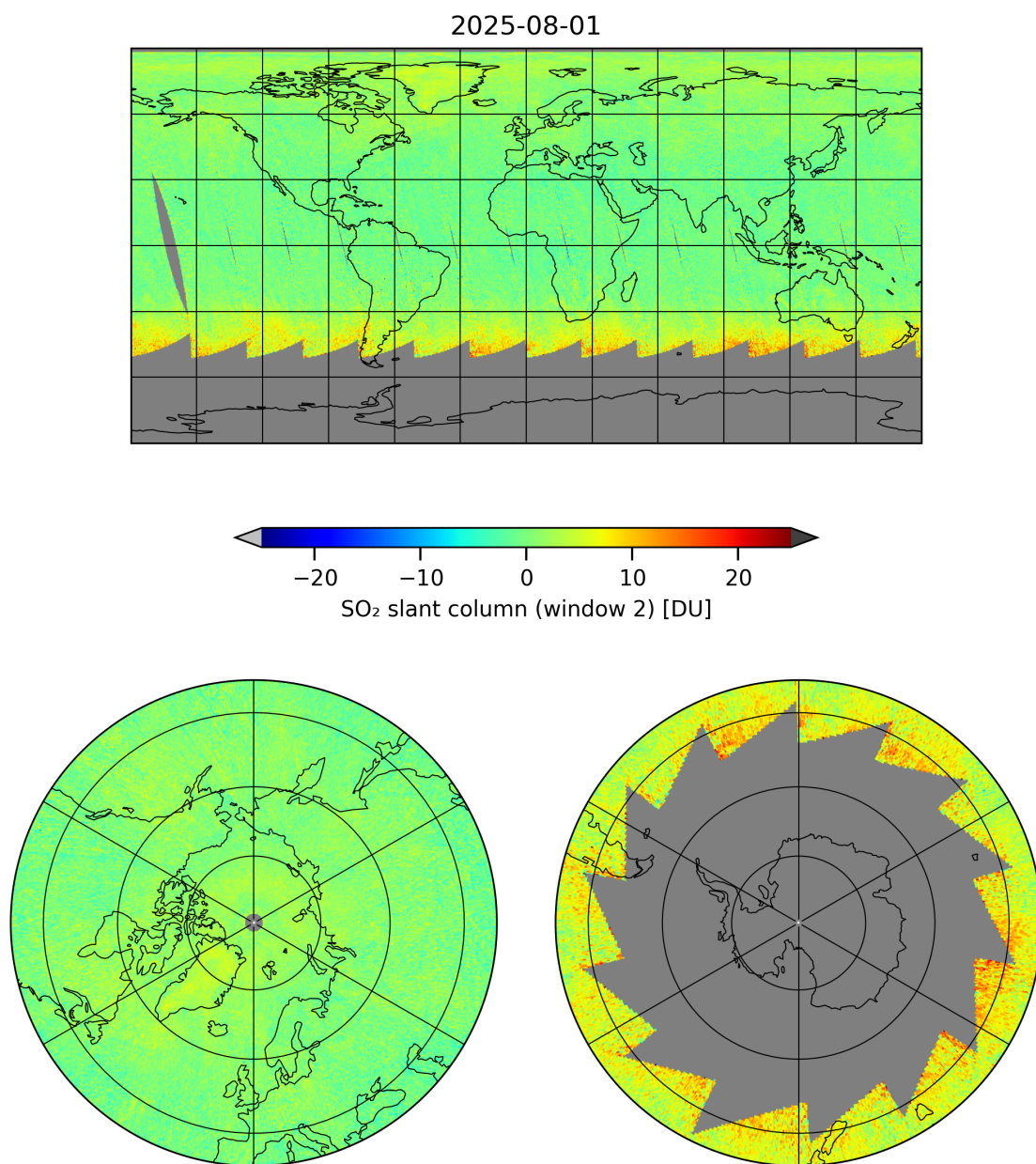


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-08-01 to 2025-08-01

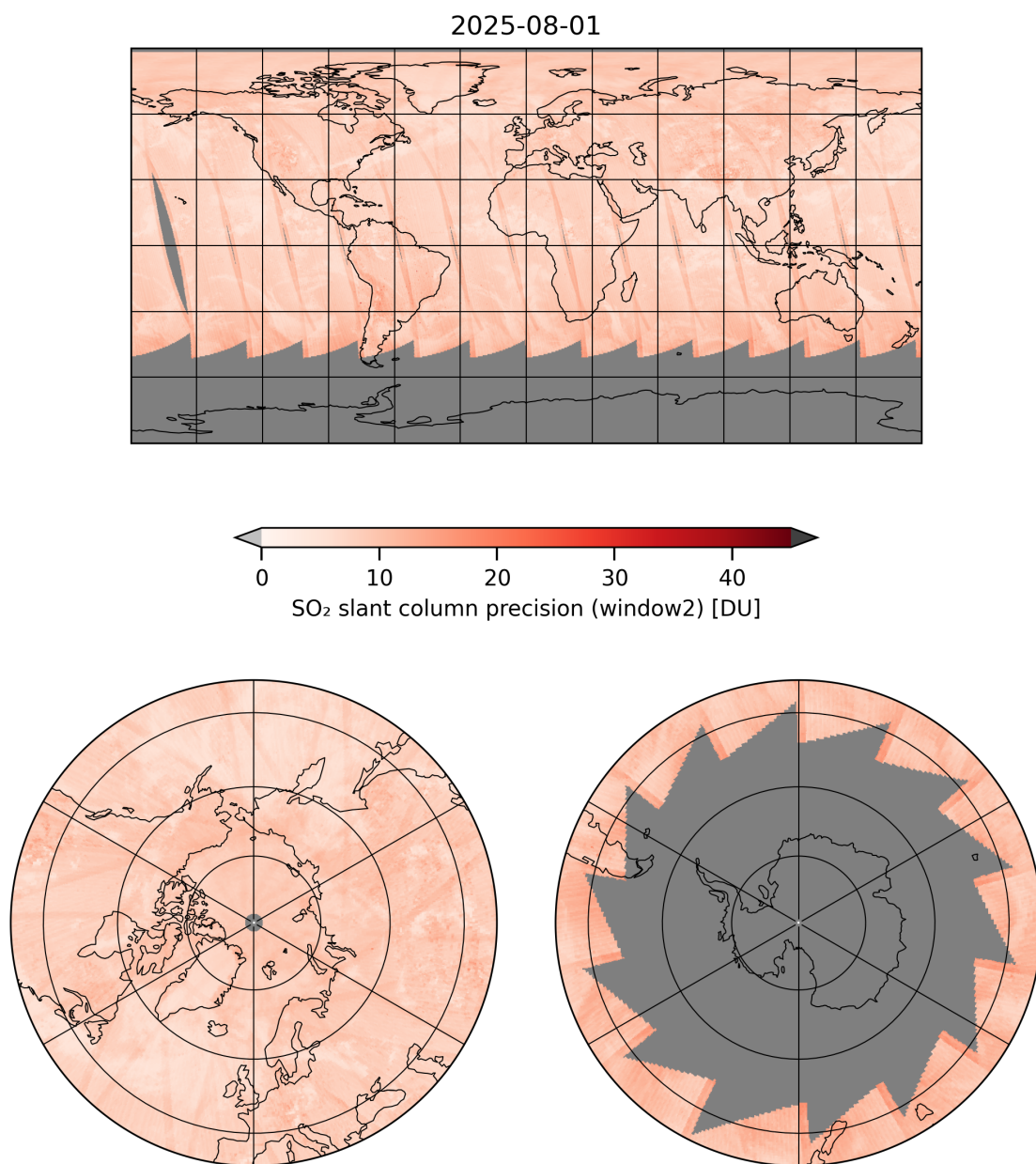


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-08-01 to 2025-08-01

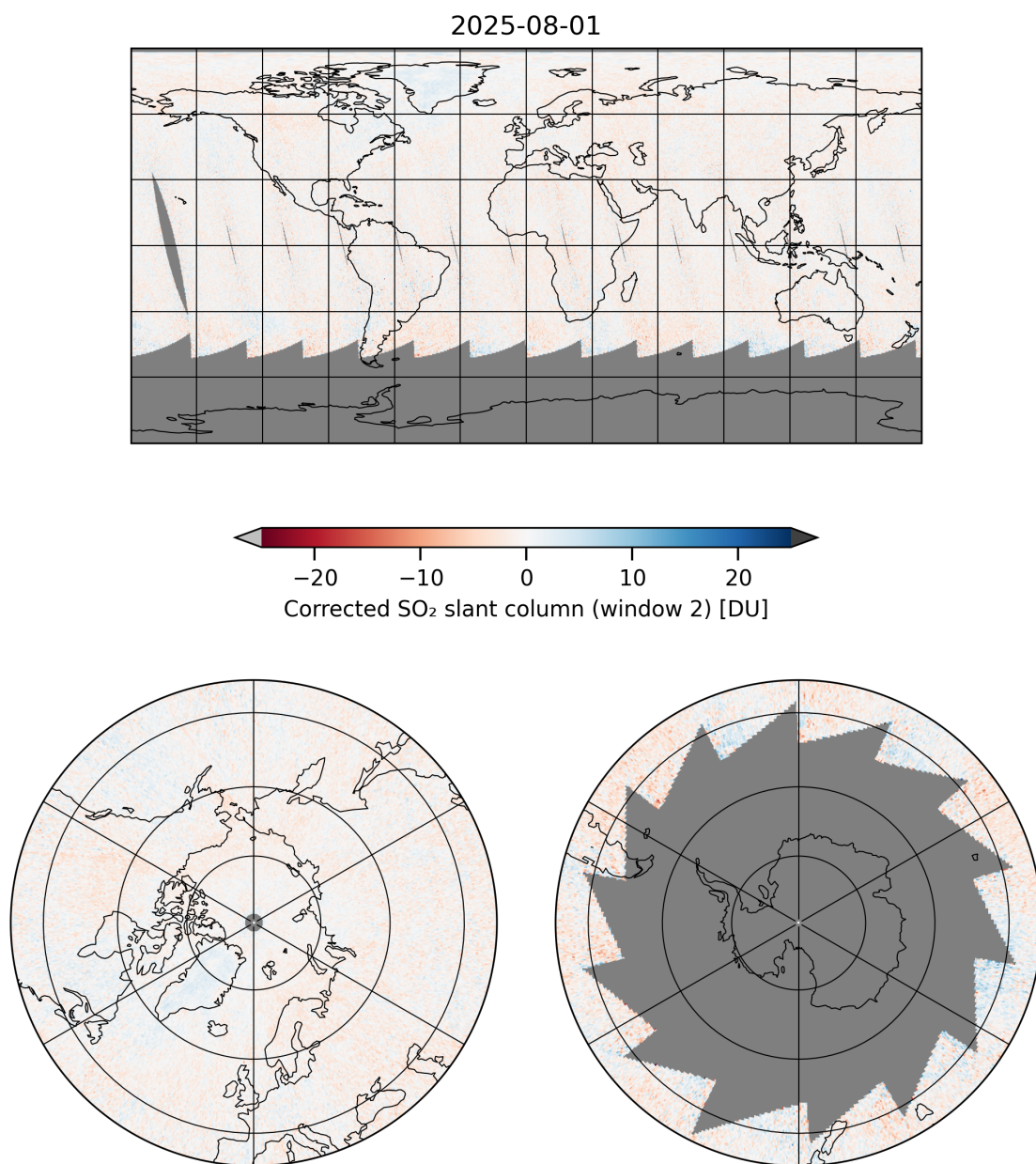


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-08-01 to 2025-08-01

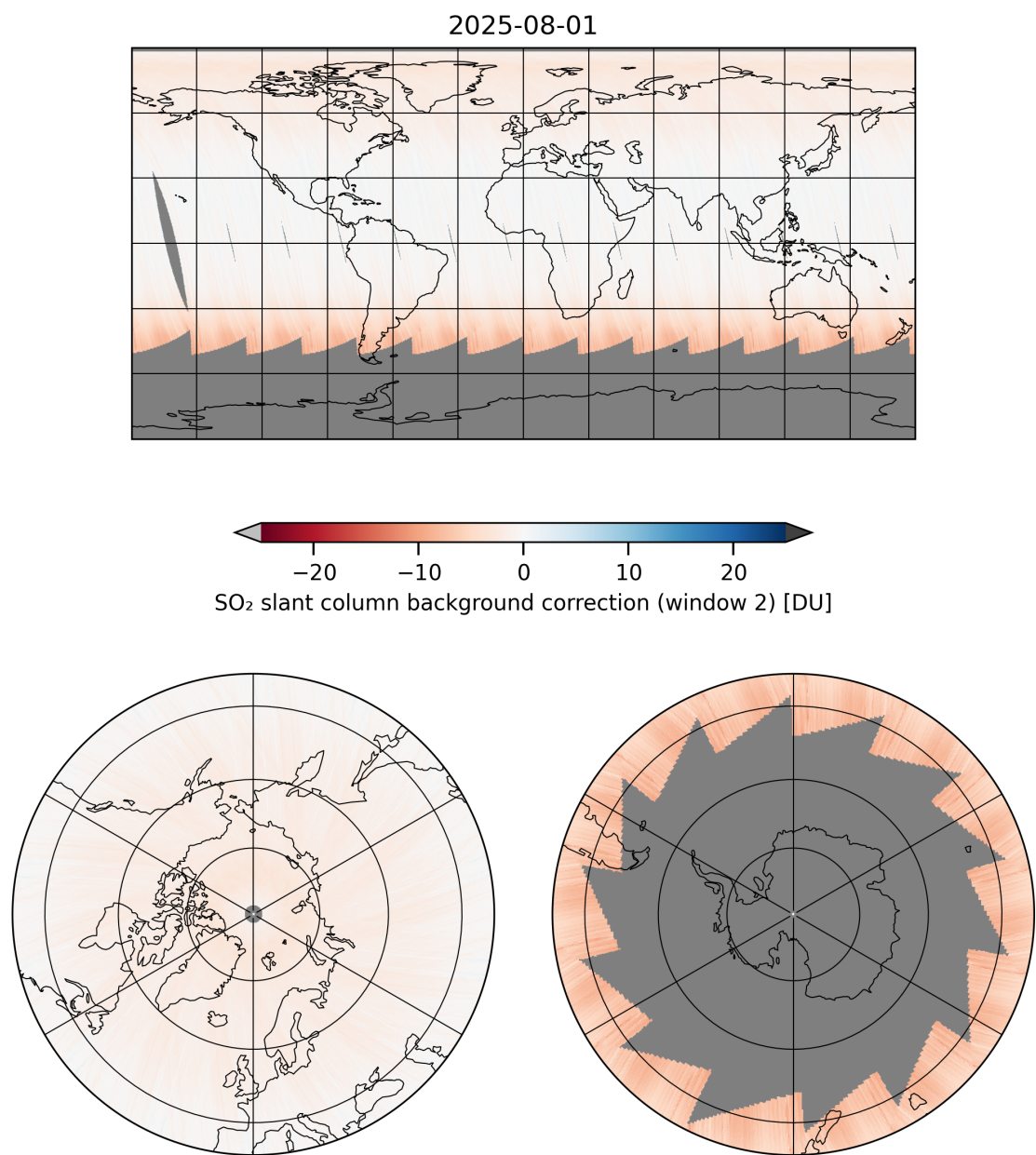


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-08-01 to 2025-08-01

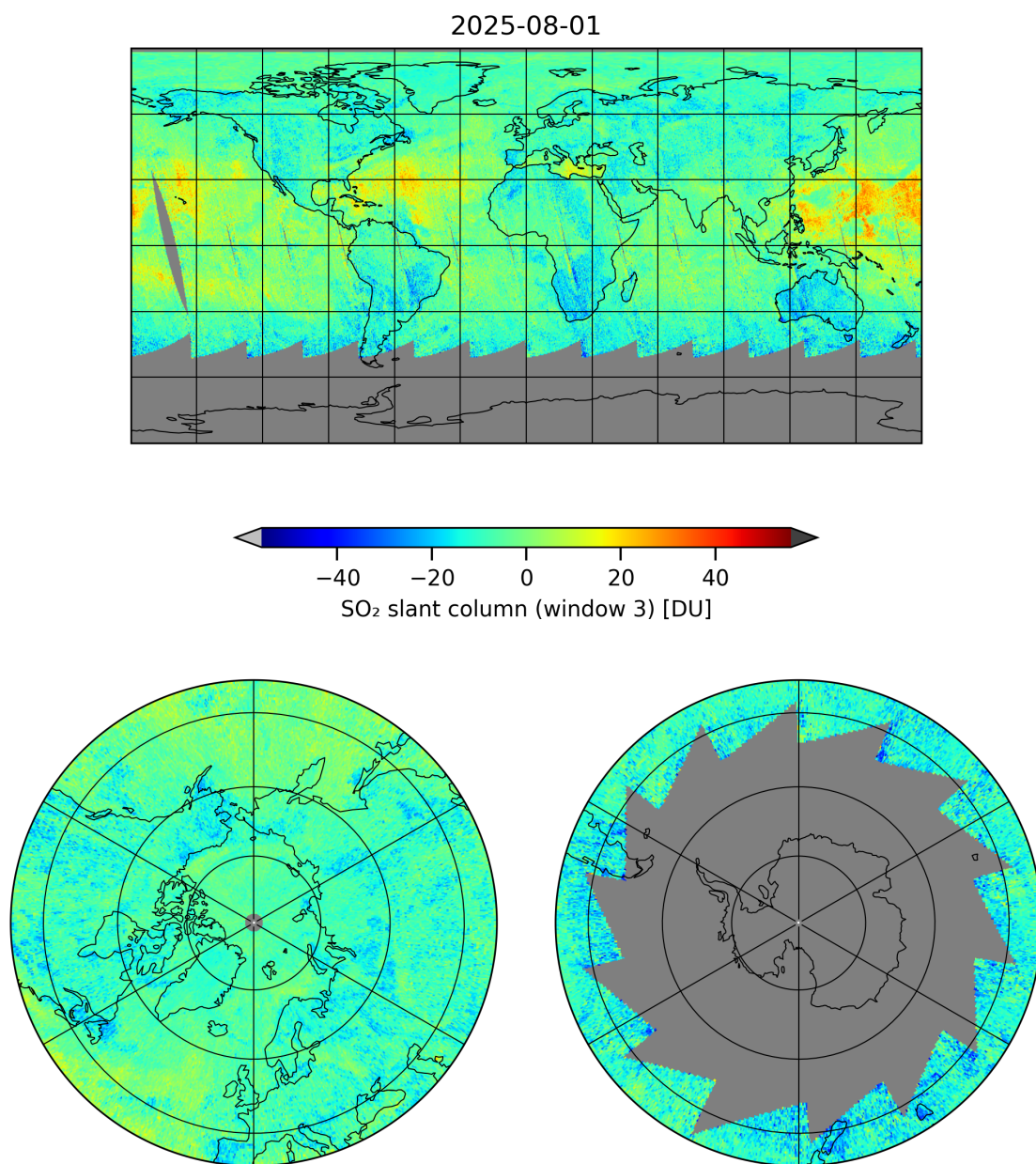


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-08-01 to 2025-08-01

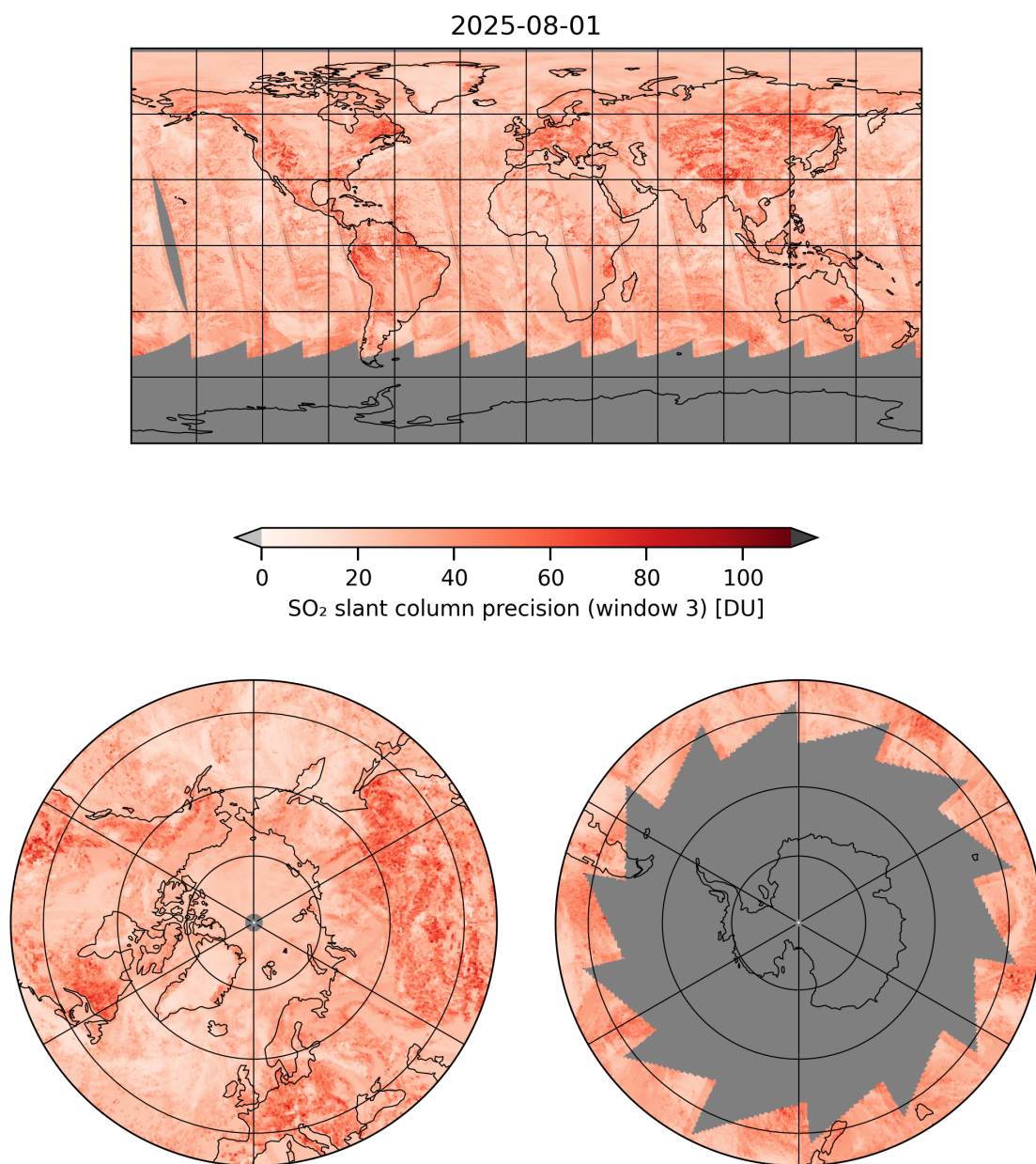


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-08-01 to 2025-08-01

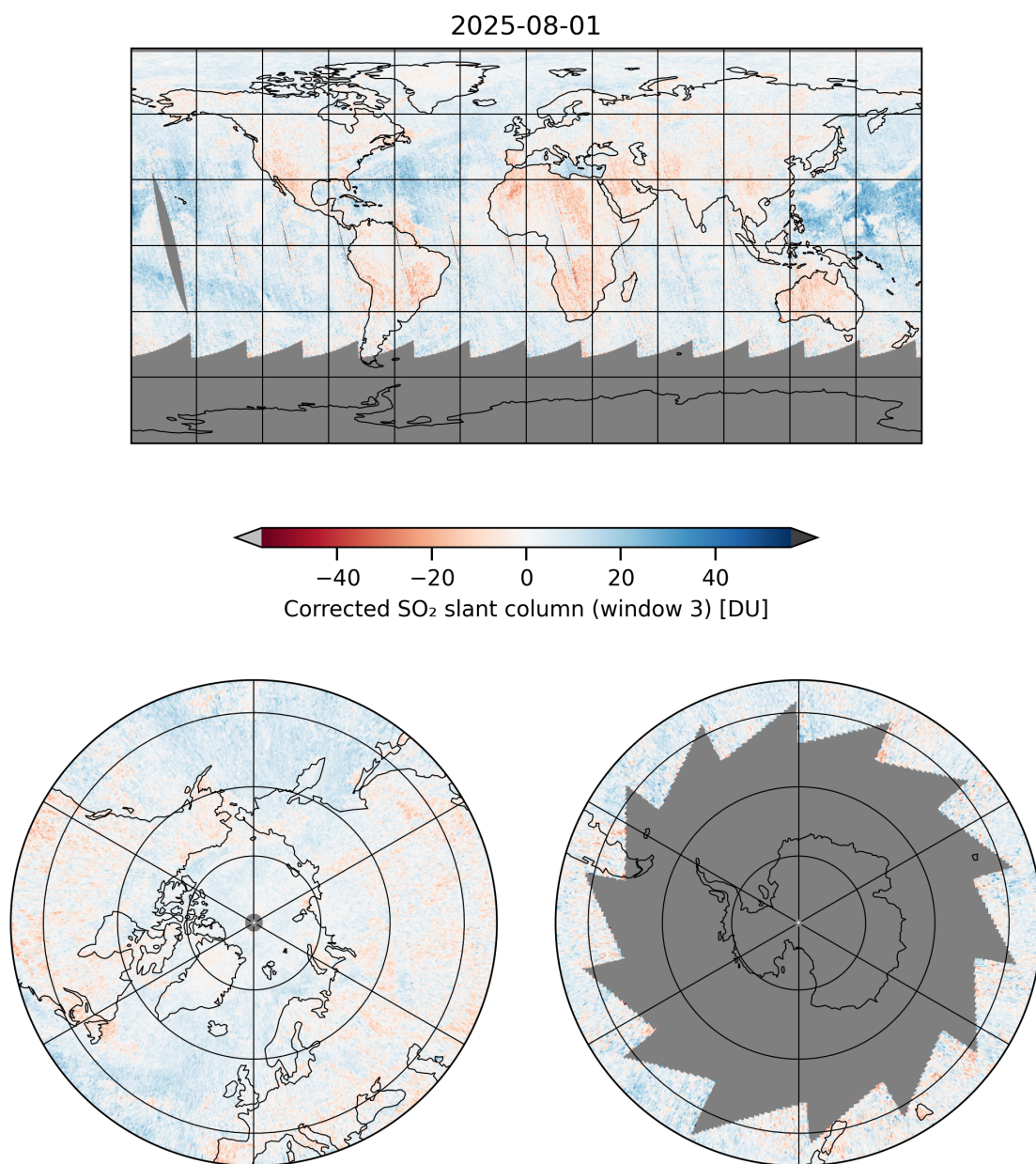


Figure 19: Map of "Corrected SO₂ slant column (window 3)" for 2025-08-01 to 2025-08-01

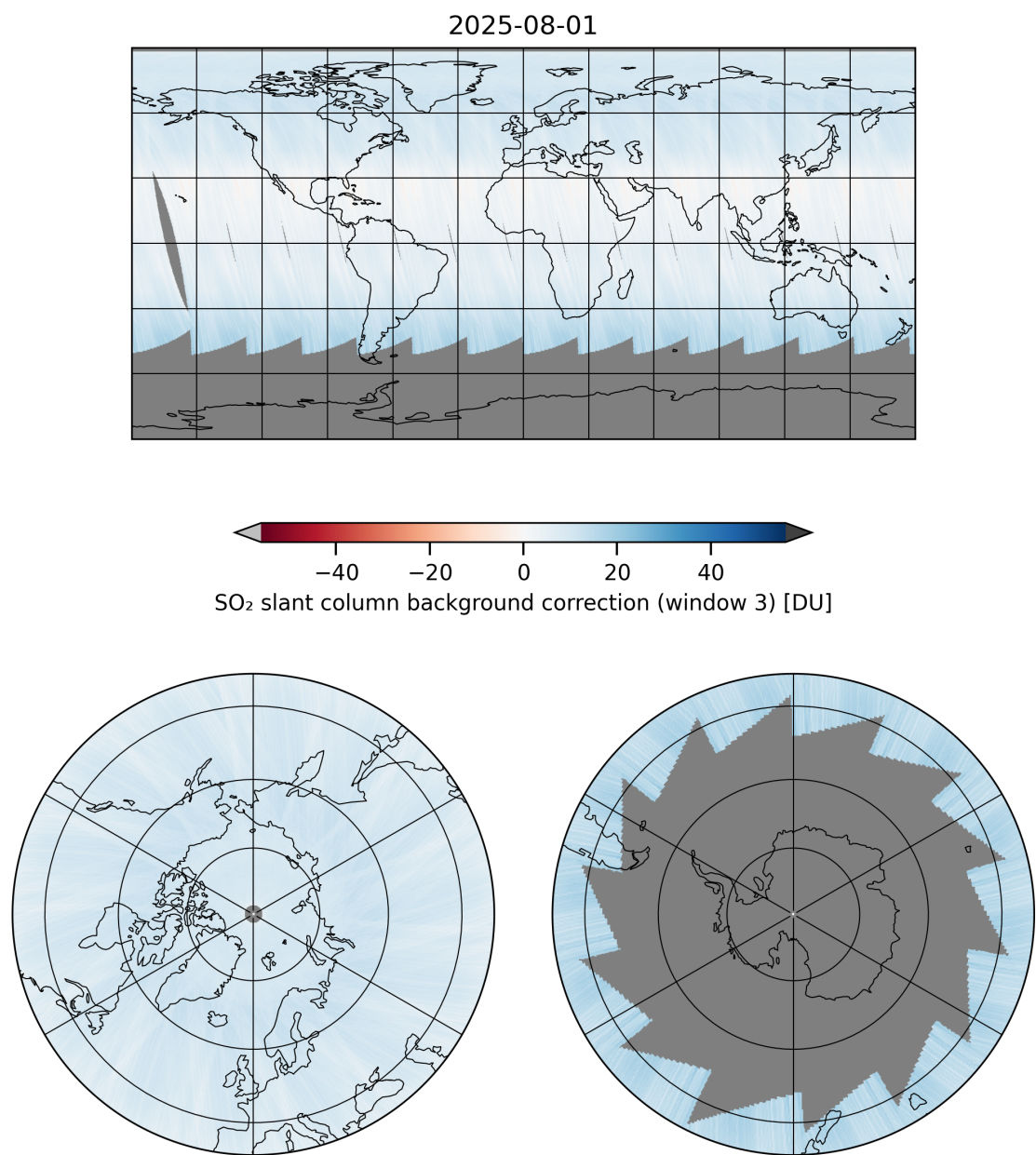


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-08-01 to 2025-08-01

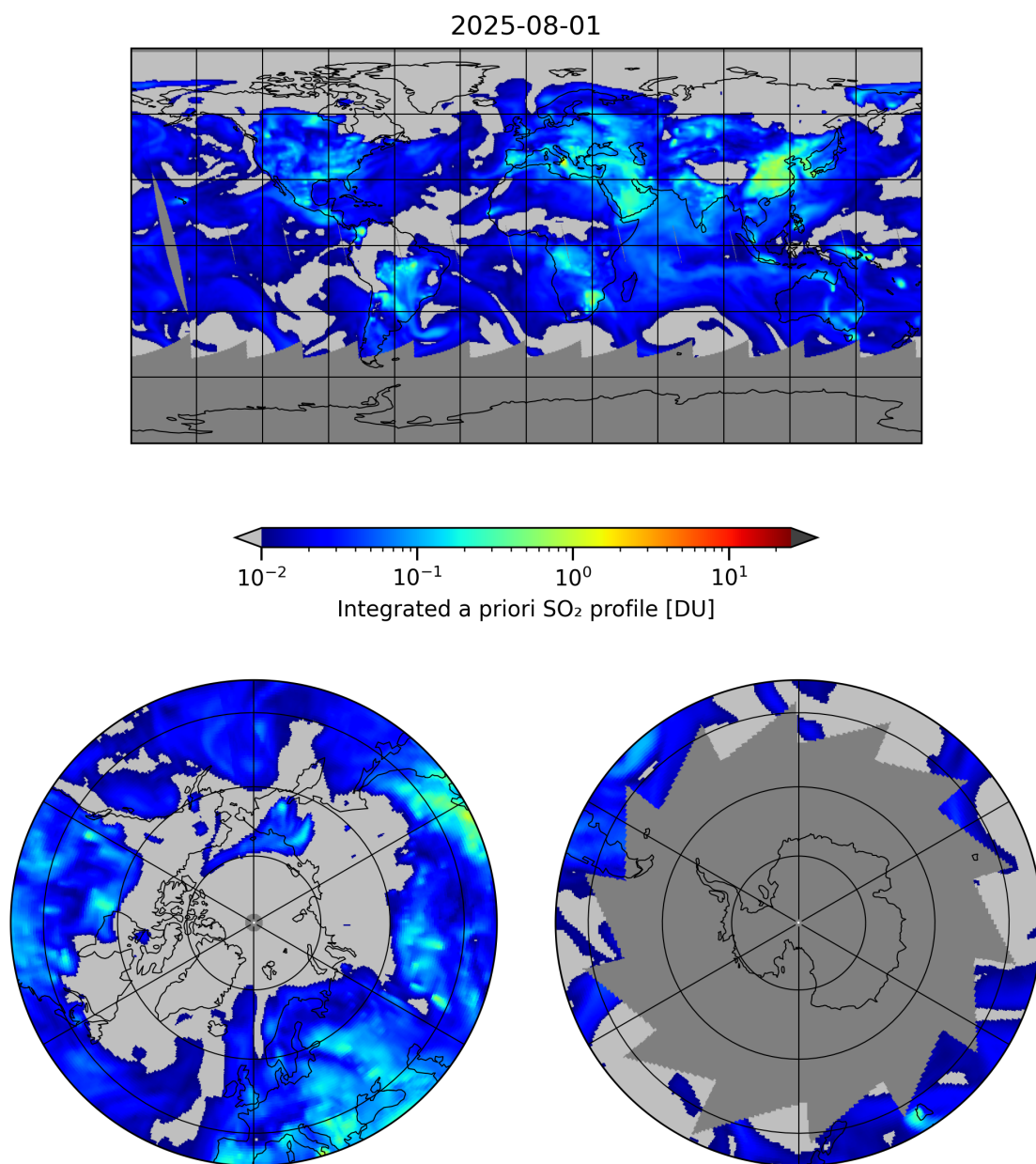


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-08-01 to 2025-08-01

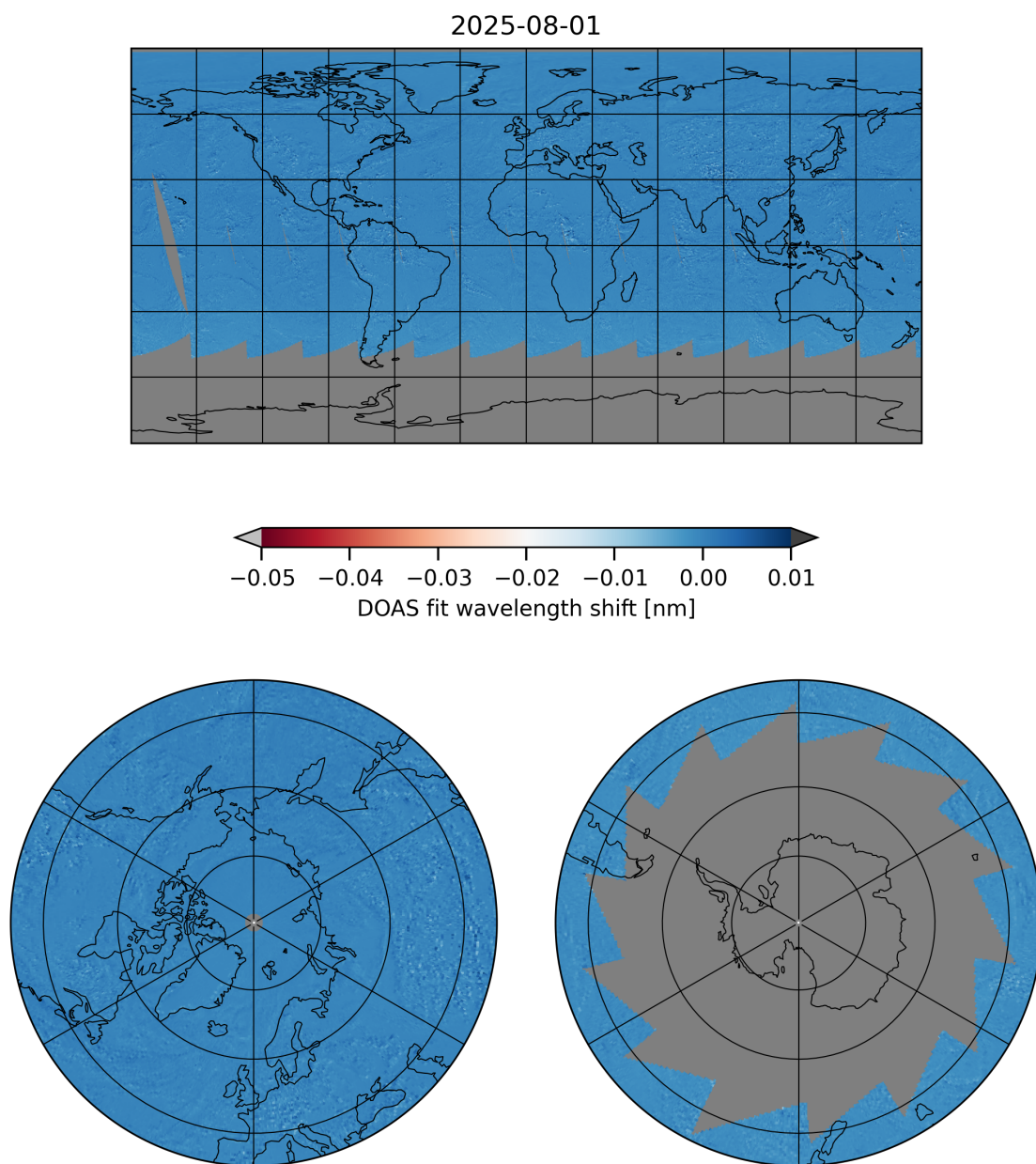


Figure 22: Map of “DOAS fit wavelength shift” for 2025-08-01 to 2025-08-01

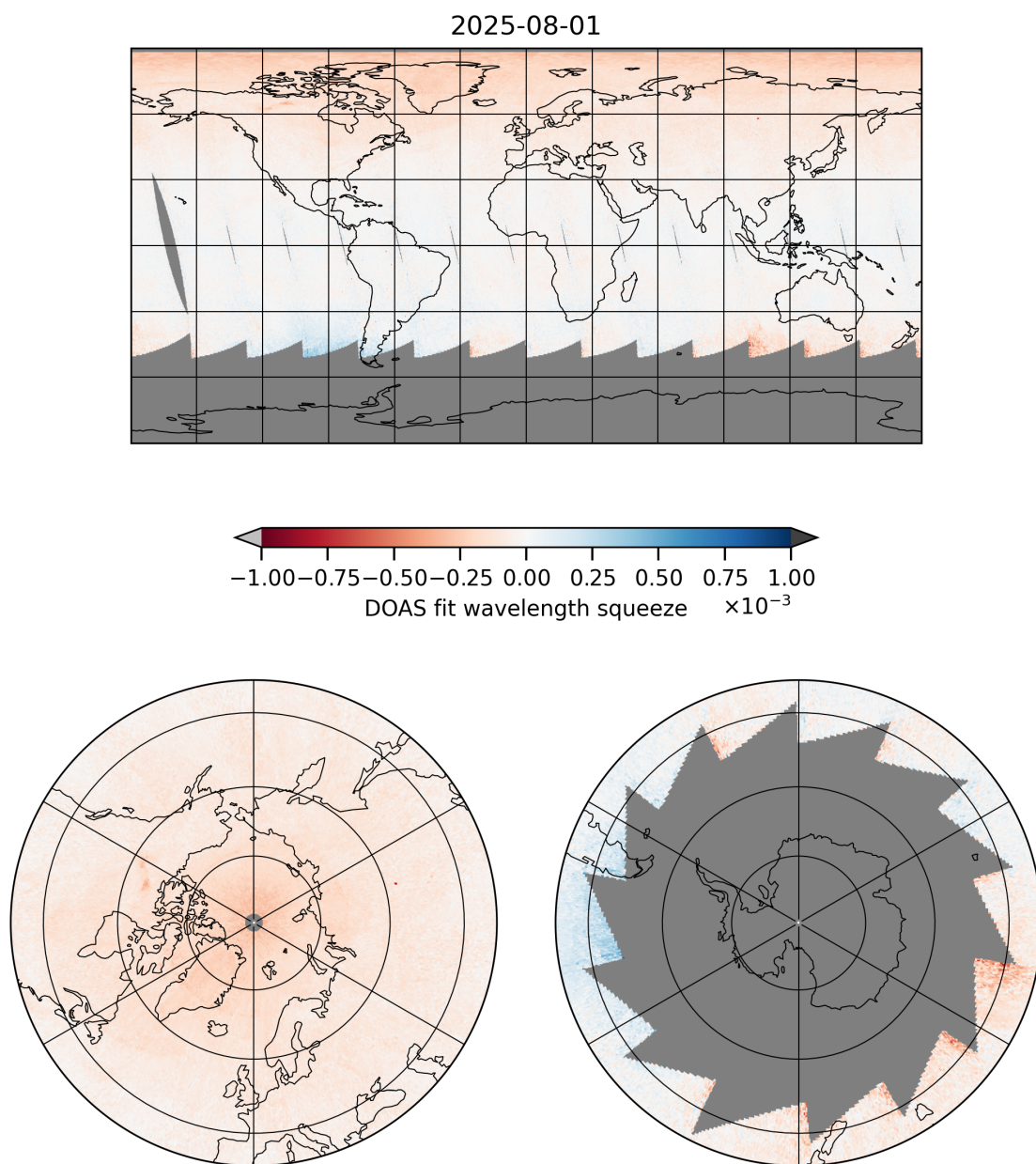


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-08-01 to 2025-08-01

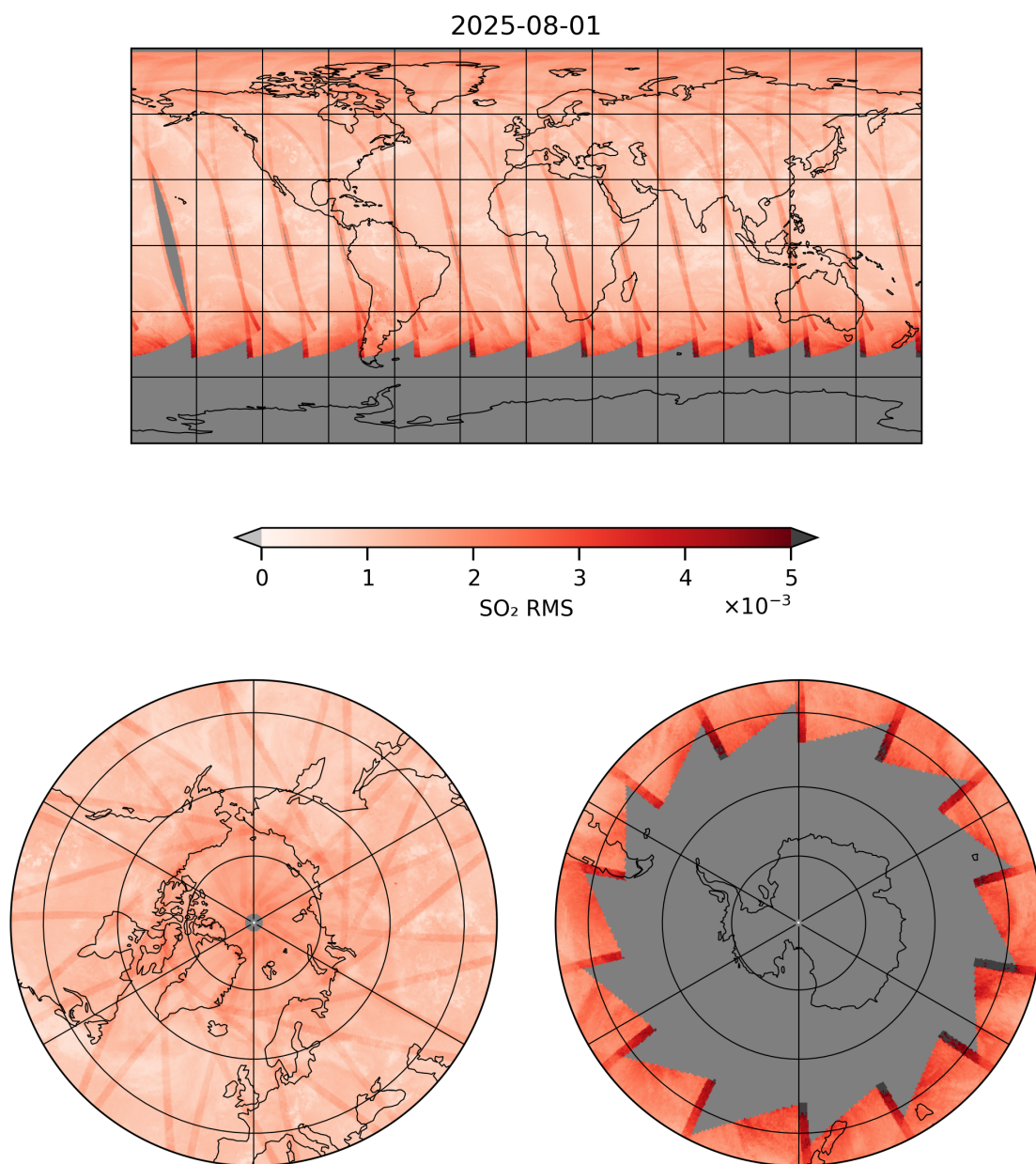


Figure 24: Map of “SO₂ RMS” for 2025-08-01 to 2025-08-01

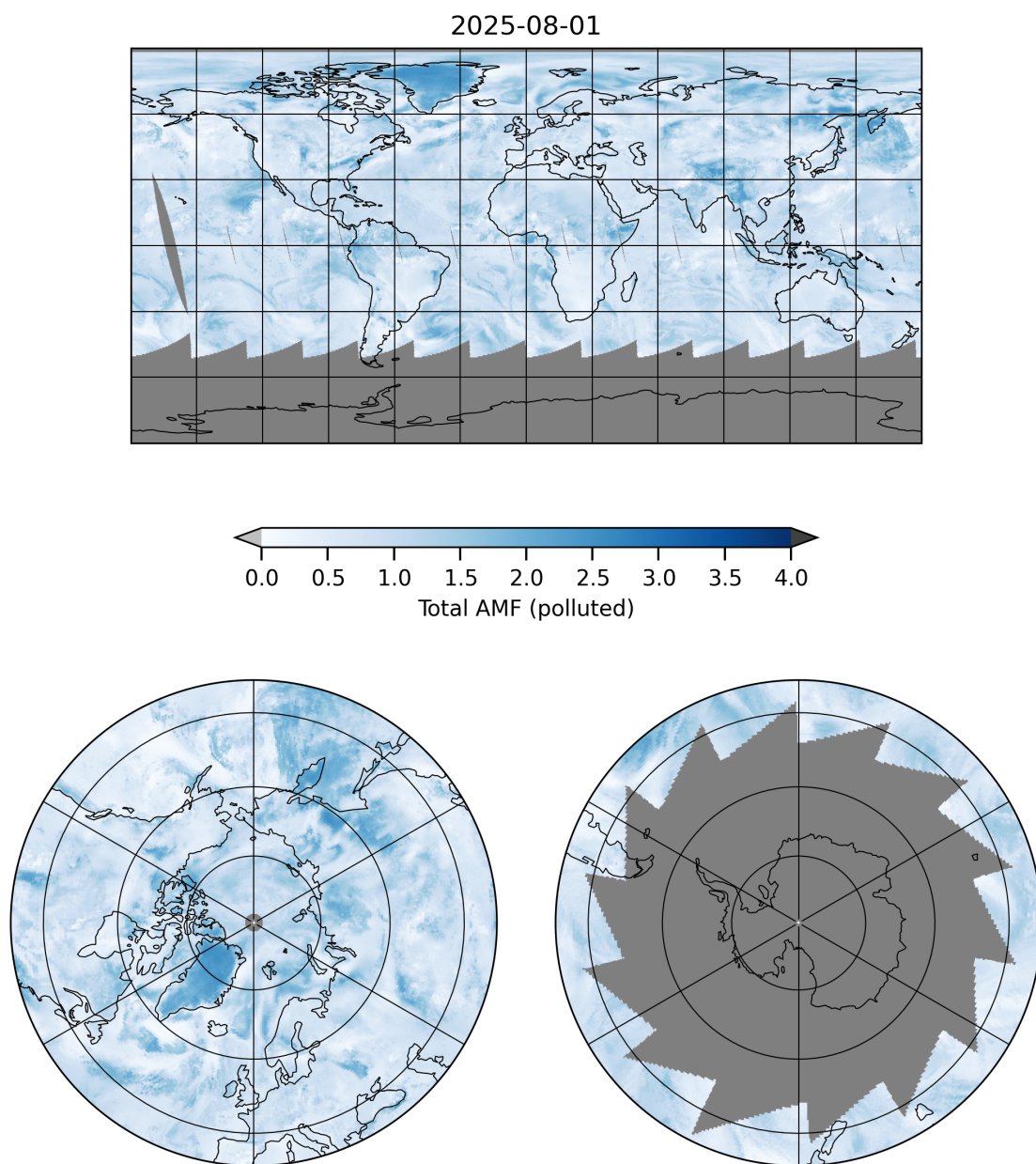


Figure 25: Map of “Total AMF (polluted)” for 2025-08-01 to 2025-08-01

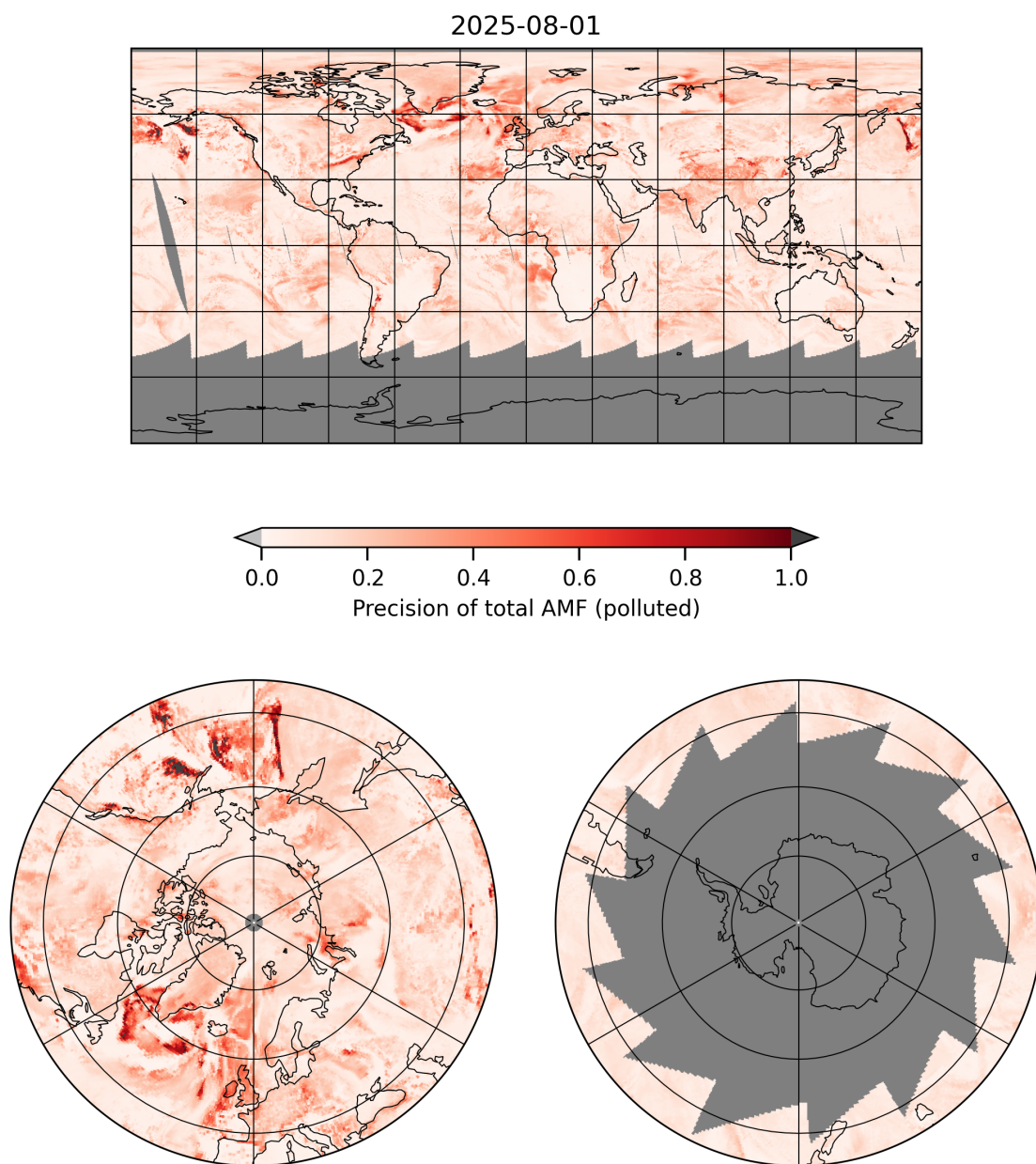


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-08-01 to 2025-08-01

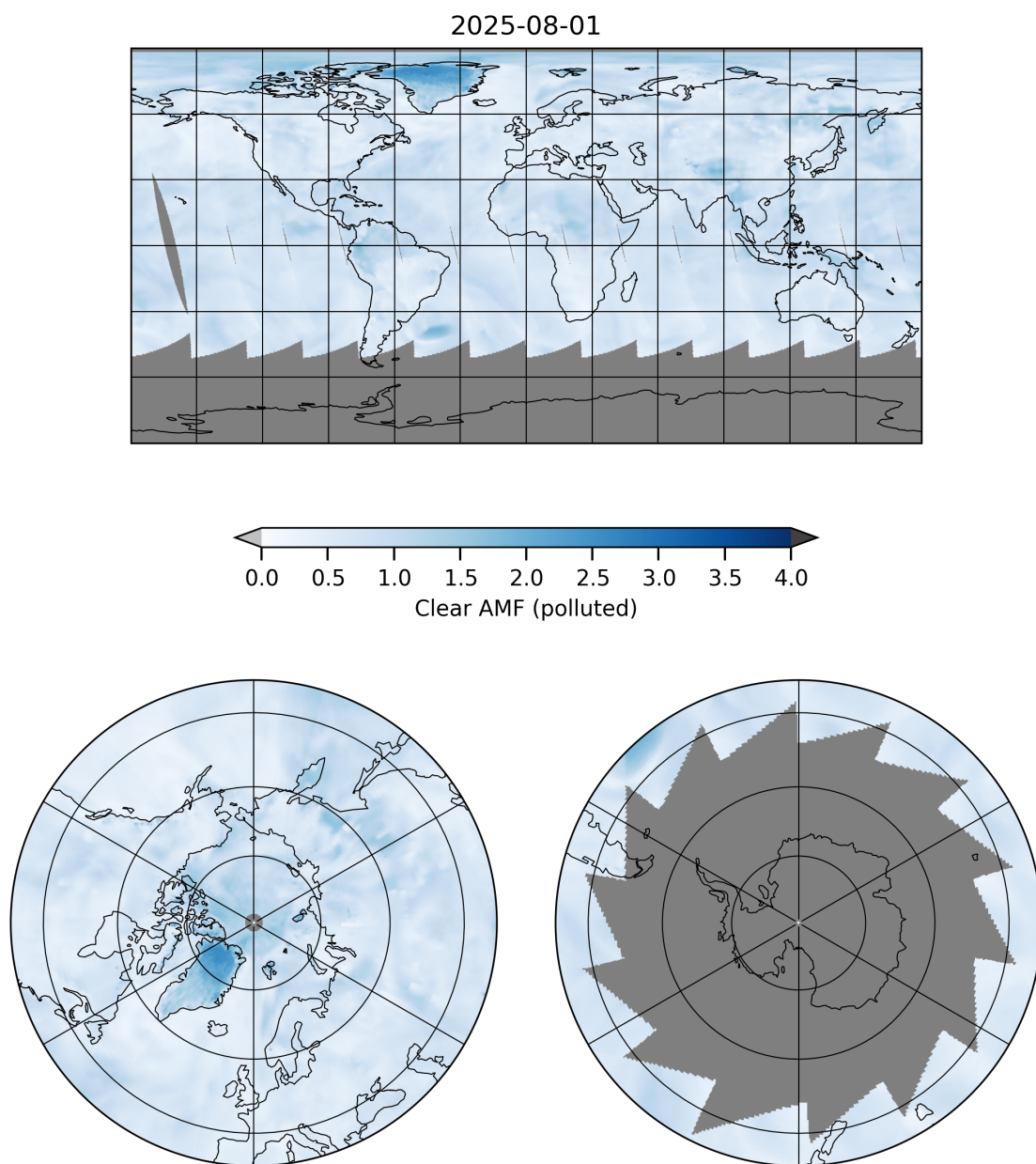


Figure 27: Map of “Clear AMF (polluted)” for 2025-08-01 to 2025-08-01

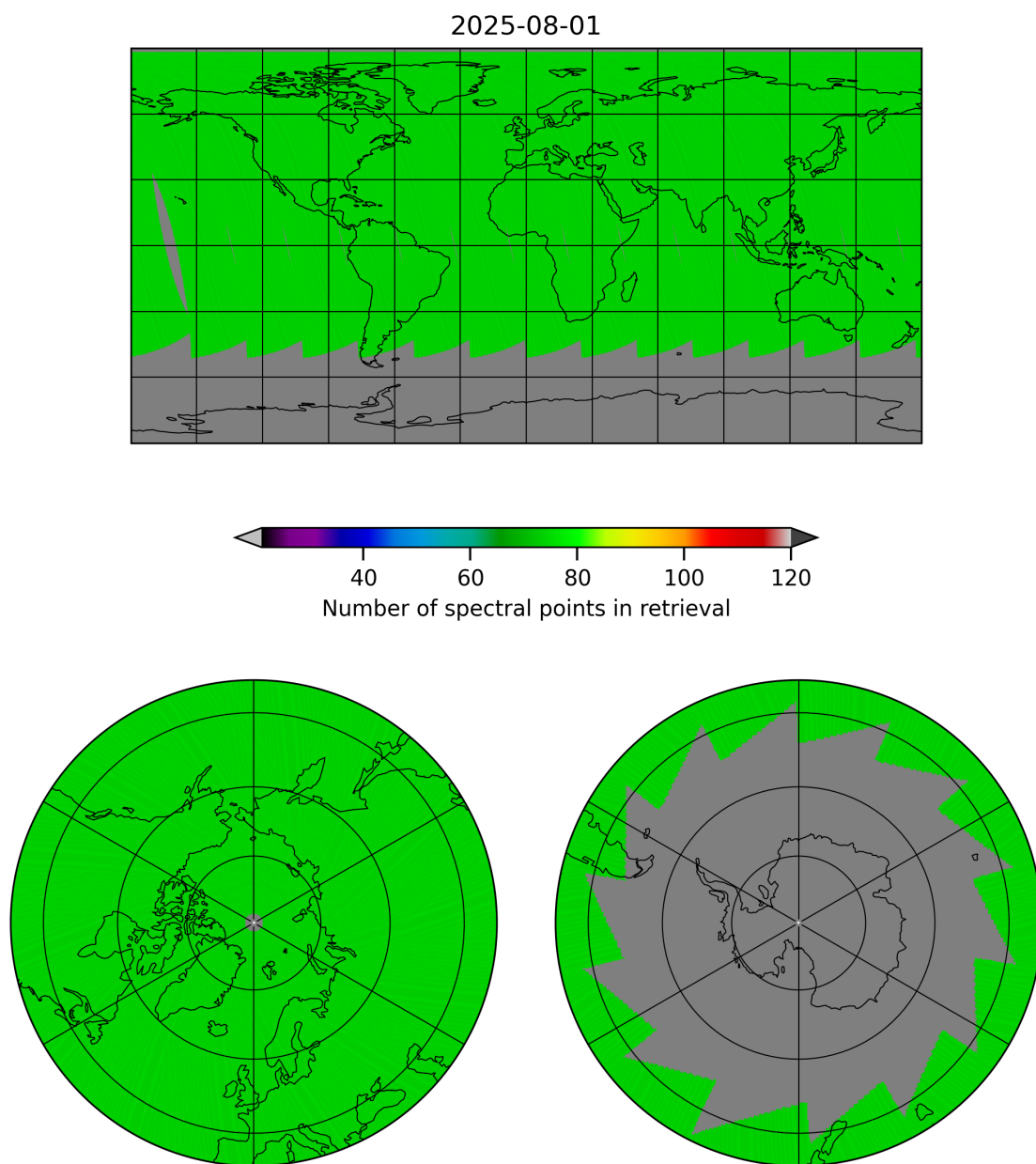


Figure 28: Map of “Number of spectral points in retrieval” for 2025-08-01 to 2025-08-01

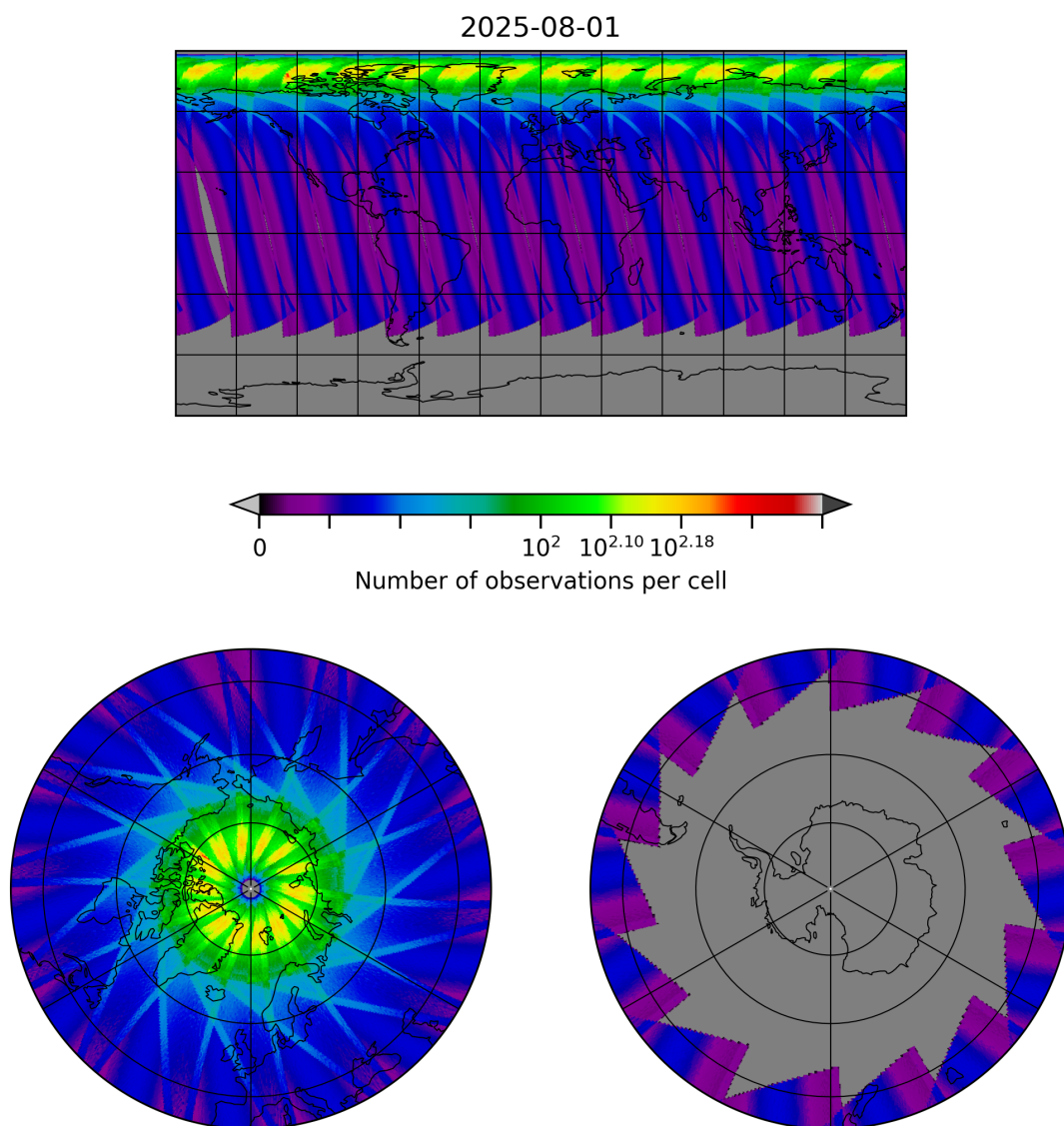


Figure 29: Map of the number of observations for 2025-08-01 to 2025-08-01

7 Zonal average

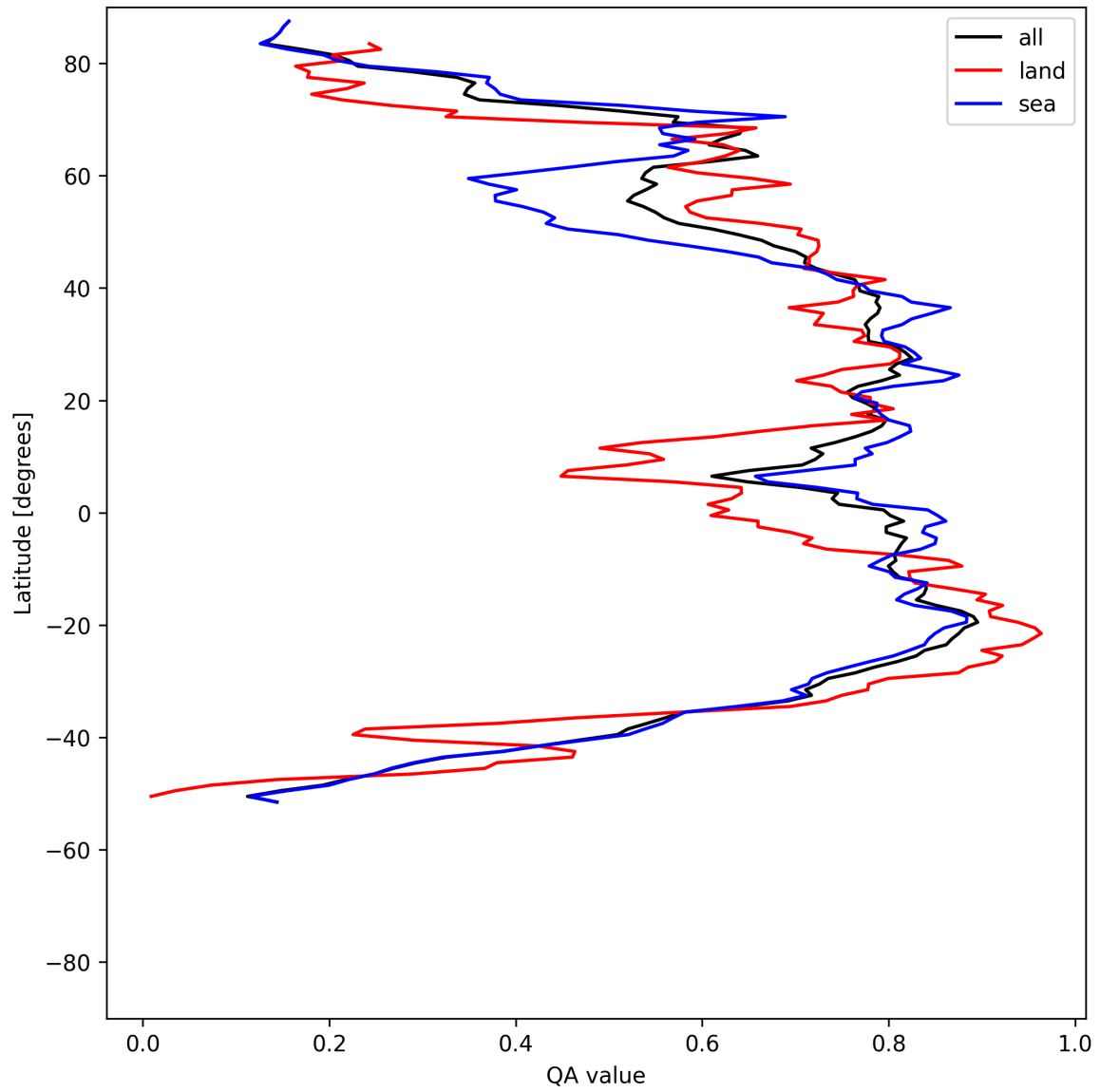


Figure 30: Zonal average of “QA value” for 2025-08-01 to 2025-08-01.

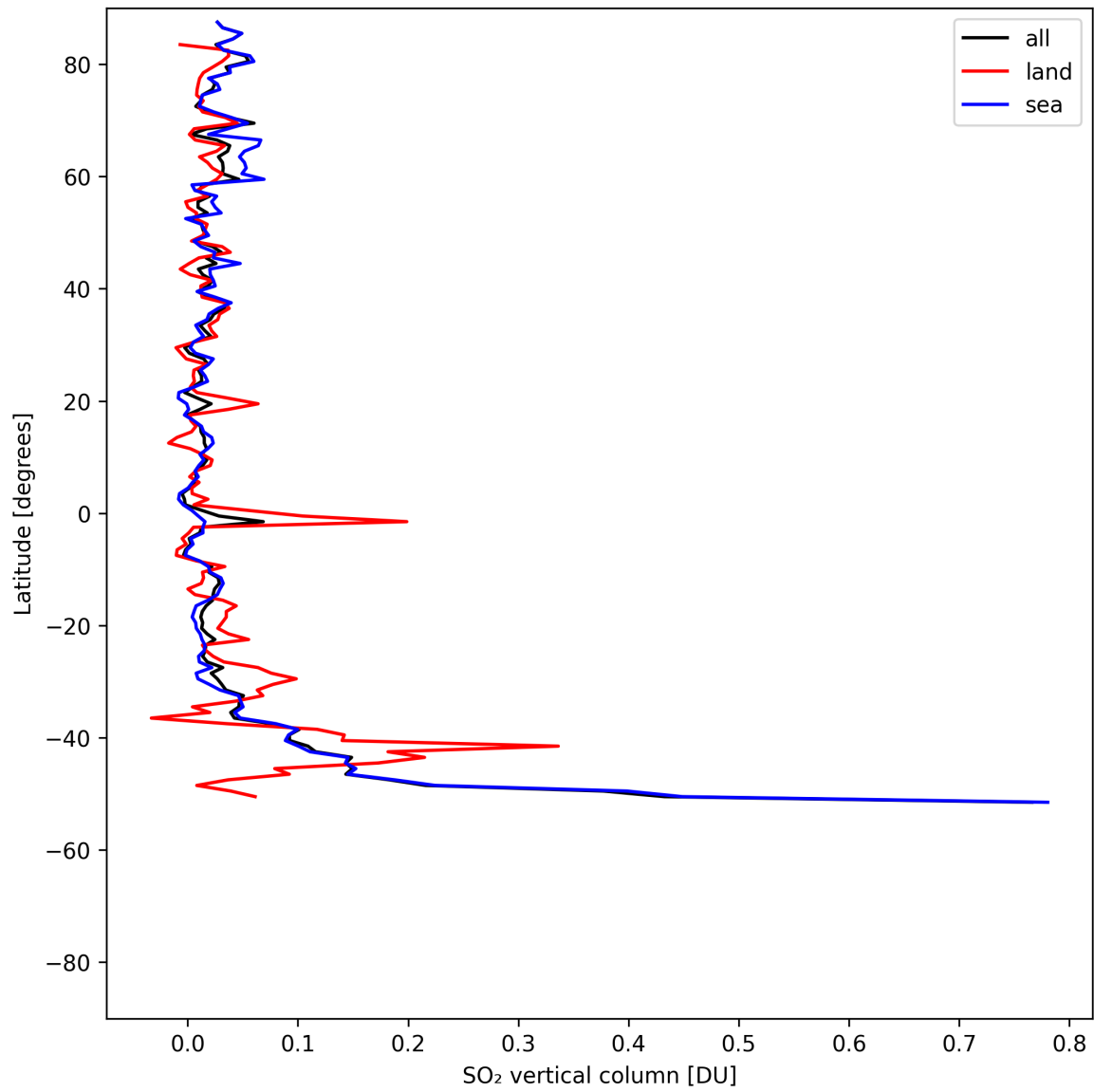


Figure 31: Zonal average of “SO₂ vertical column” for 2025-08-01 to 2025-08-01.

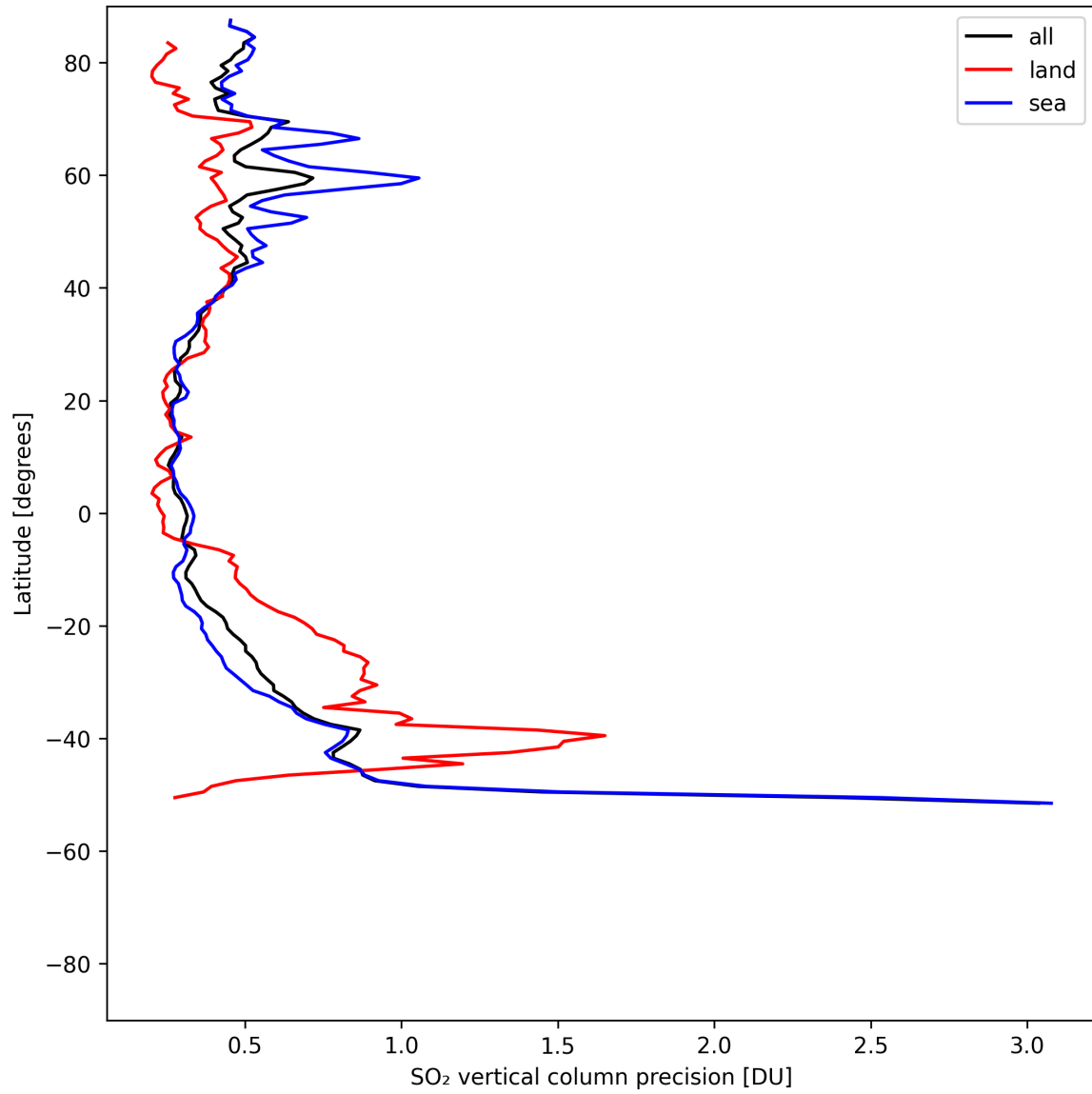


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-08-01 to 2025-08-01.

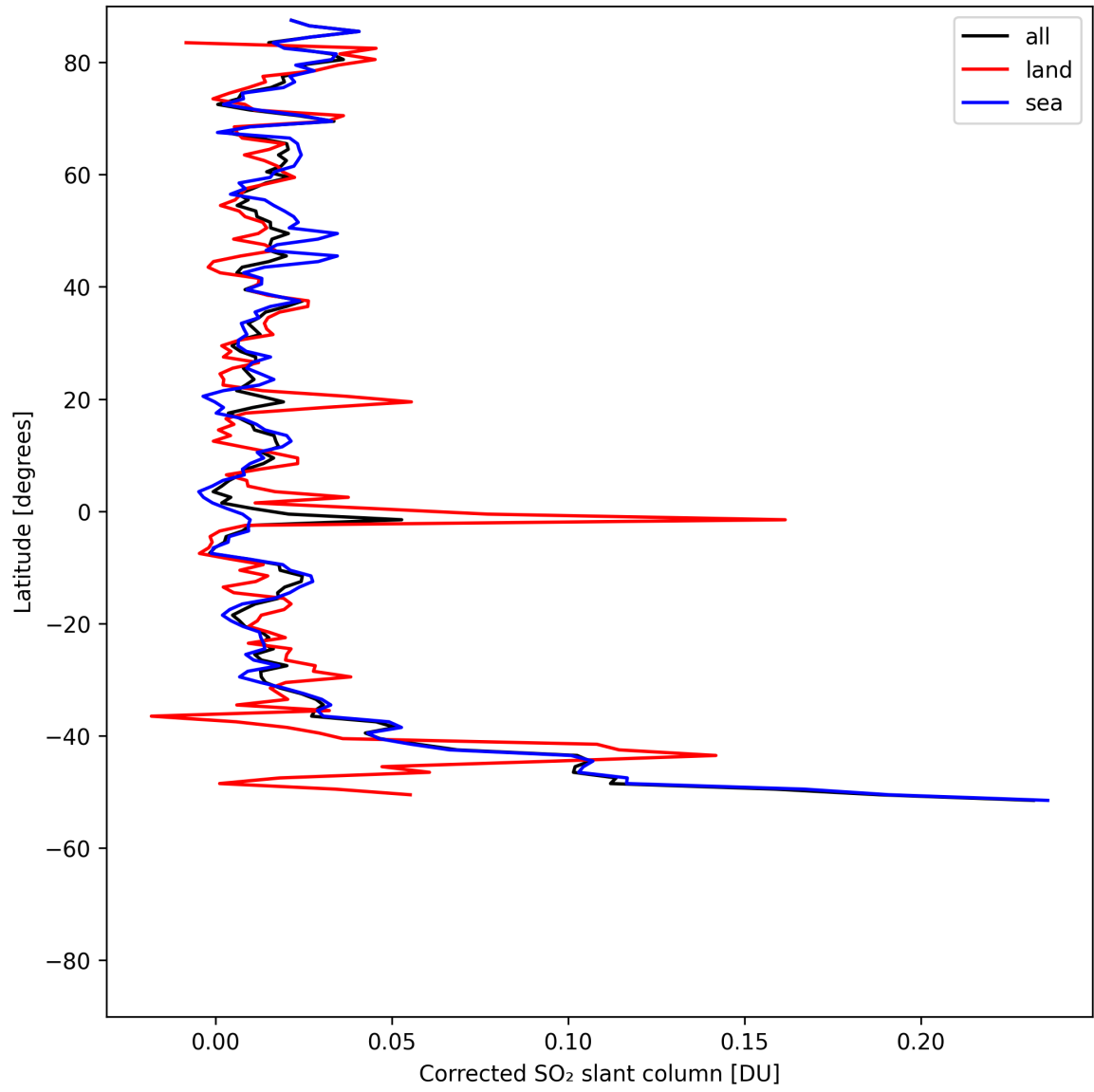


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-08-01 to 2025-08-01.

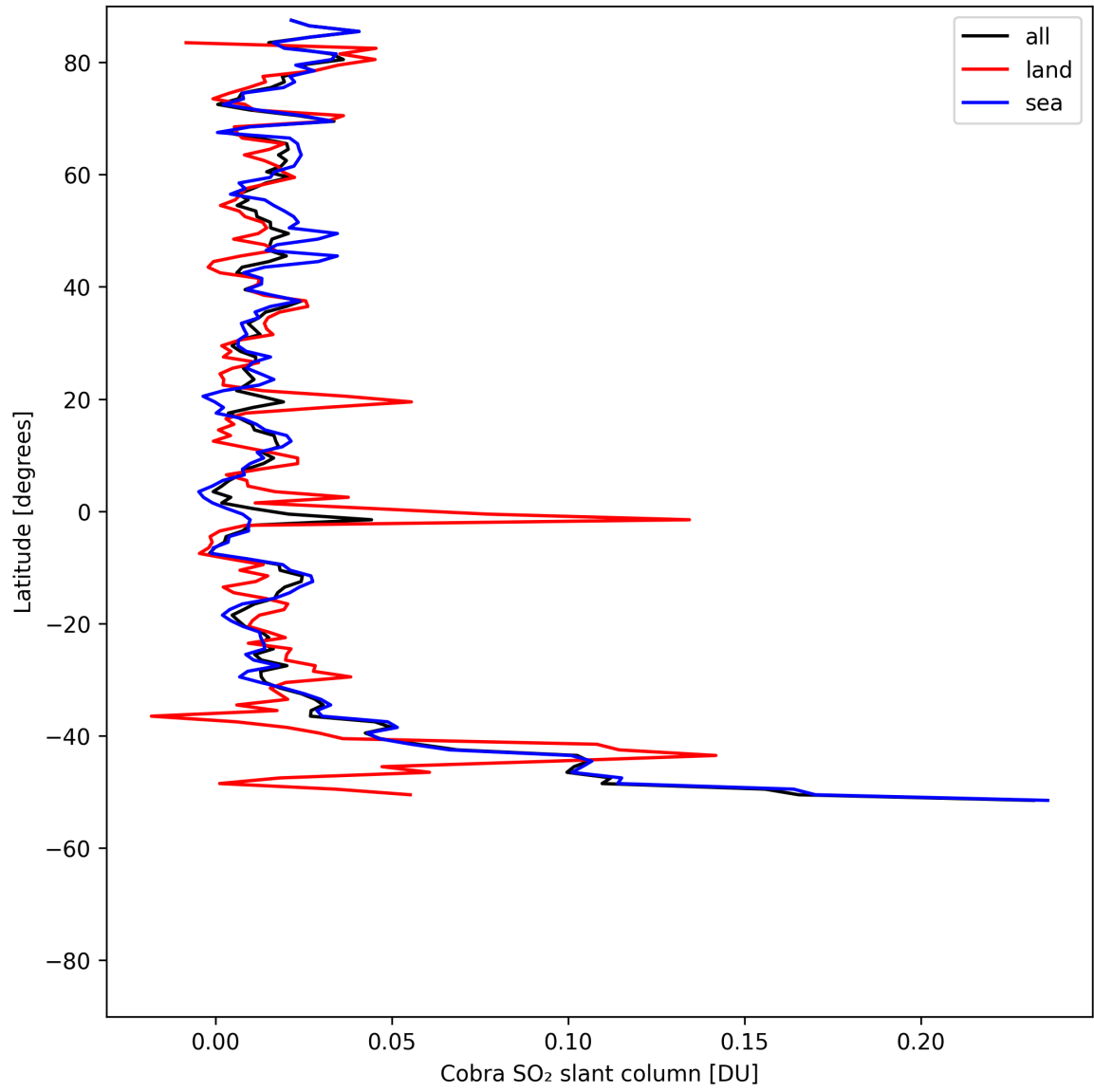


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-08-01 to 2025-08-01.

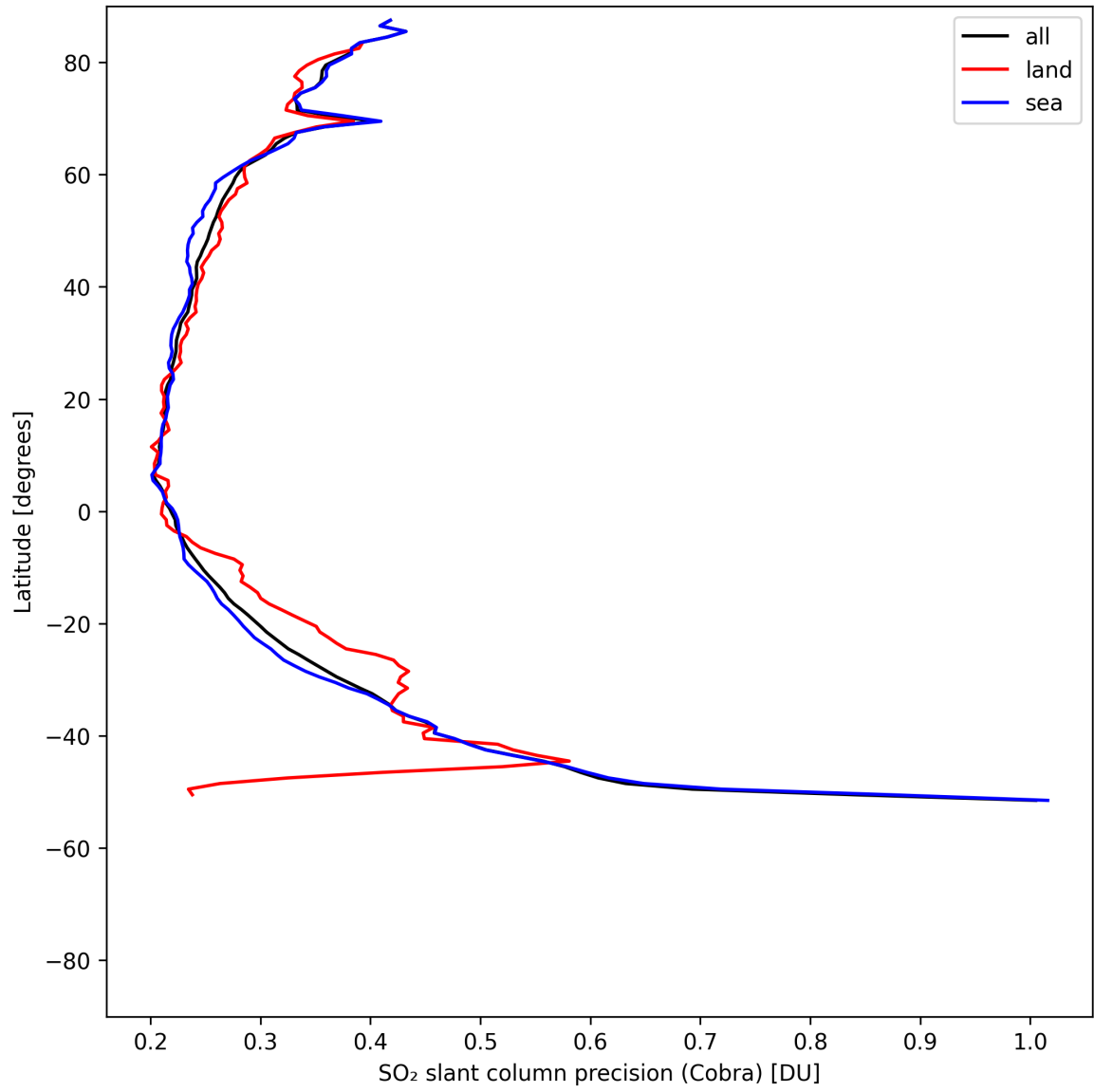


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-08-01 to 2025-08-01.

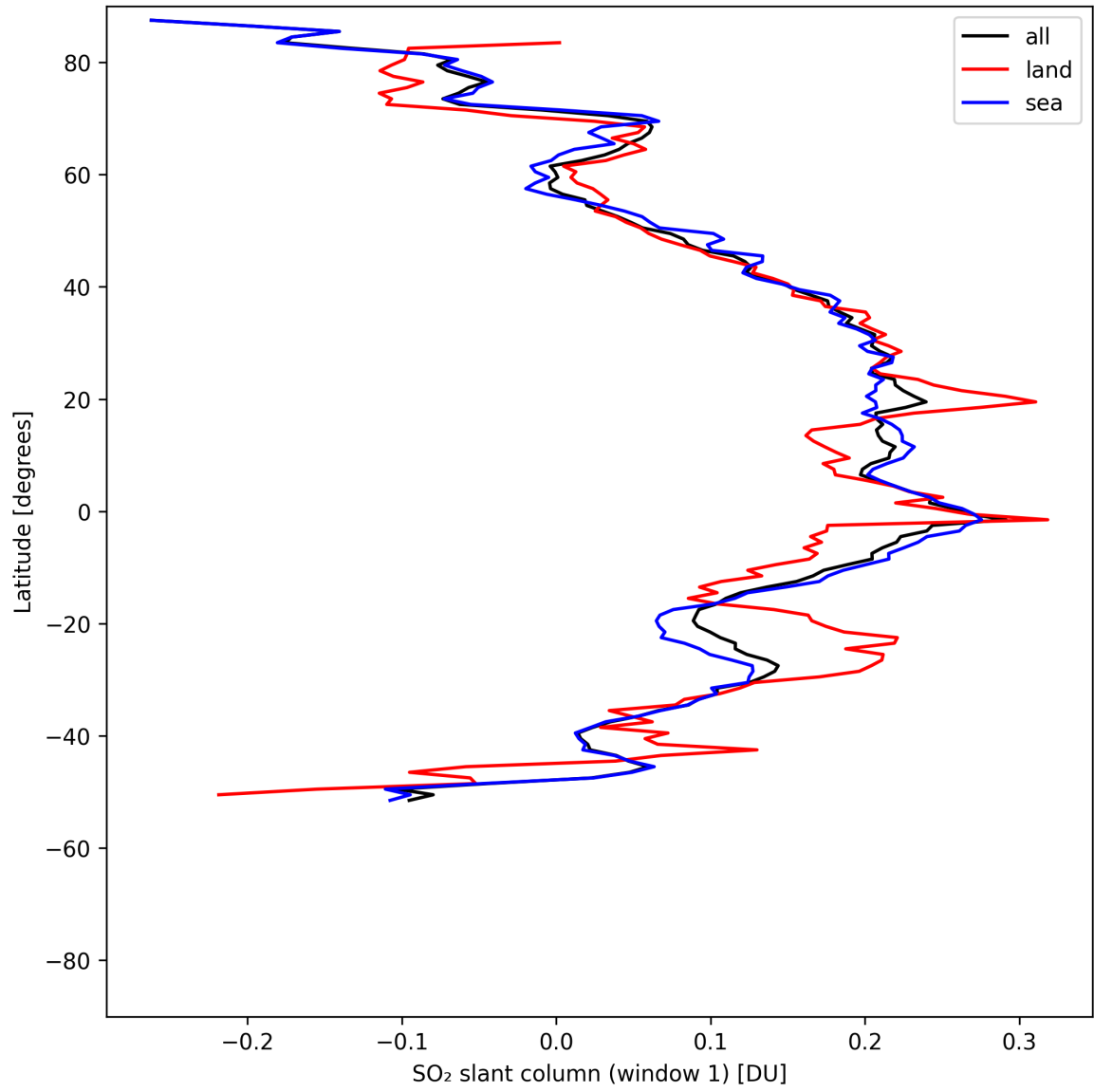


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-08-01 to 2025-08-01.

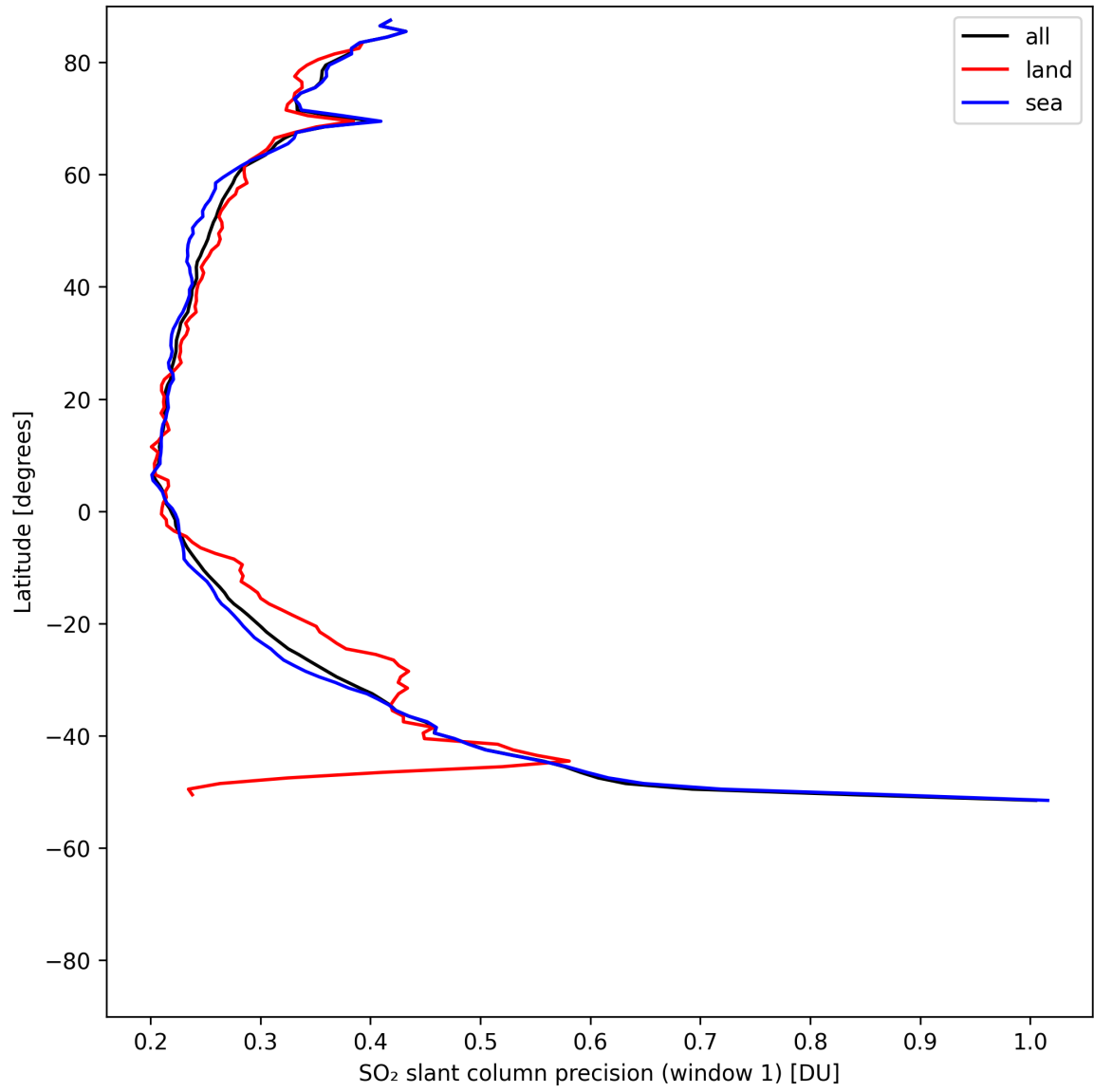


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-08-01 to 2025-08-01.

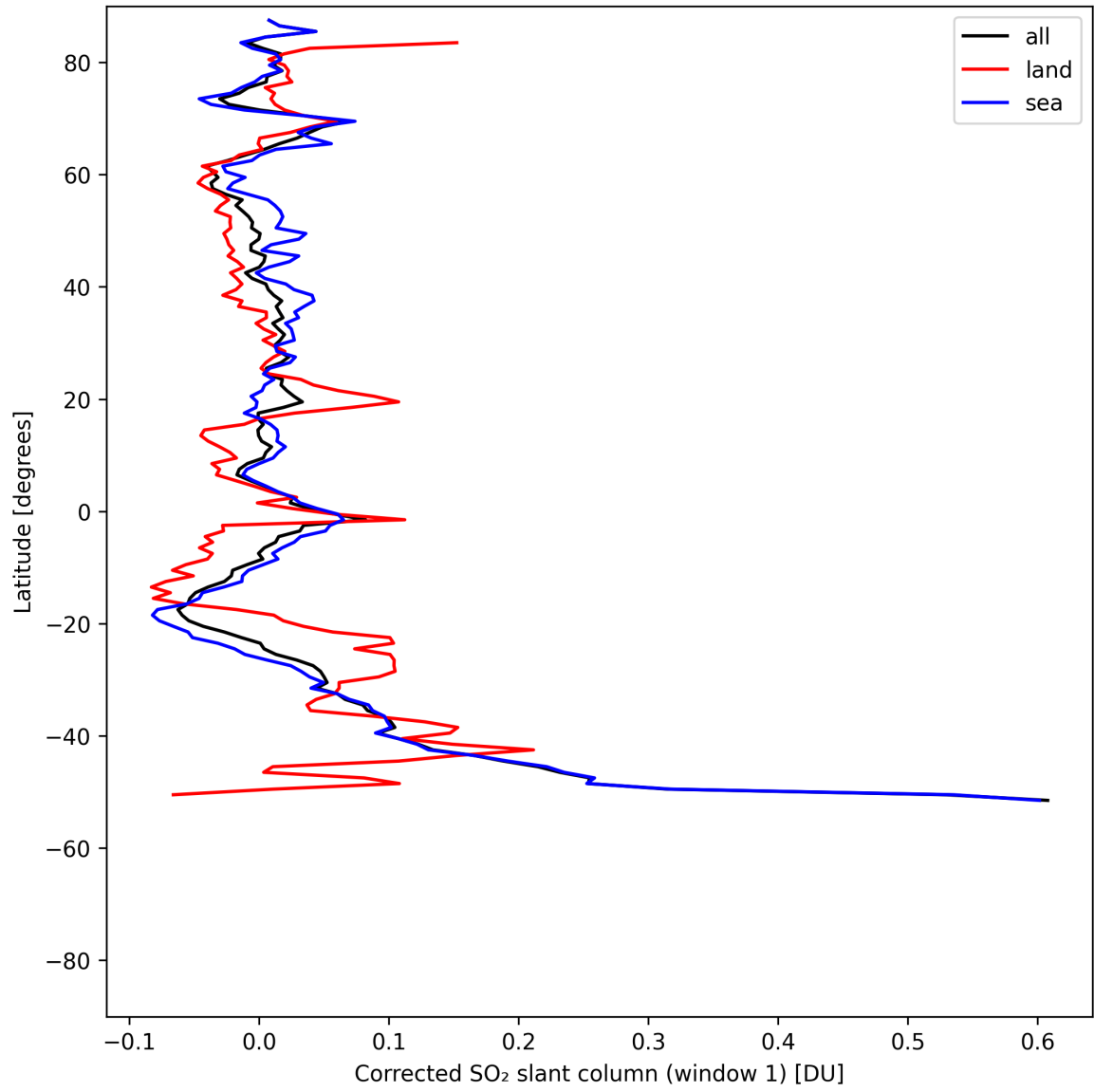


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-08-01 to 2025-08-01.

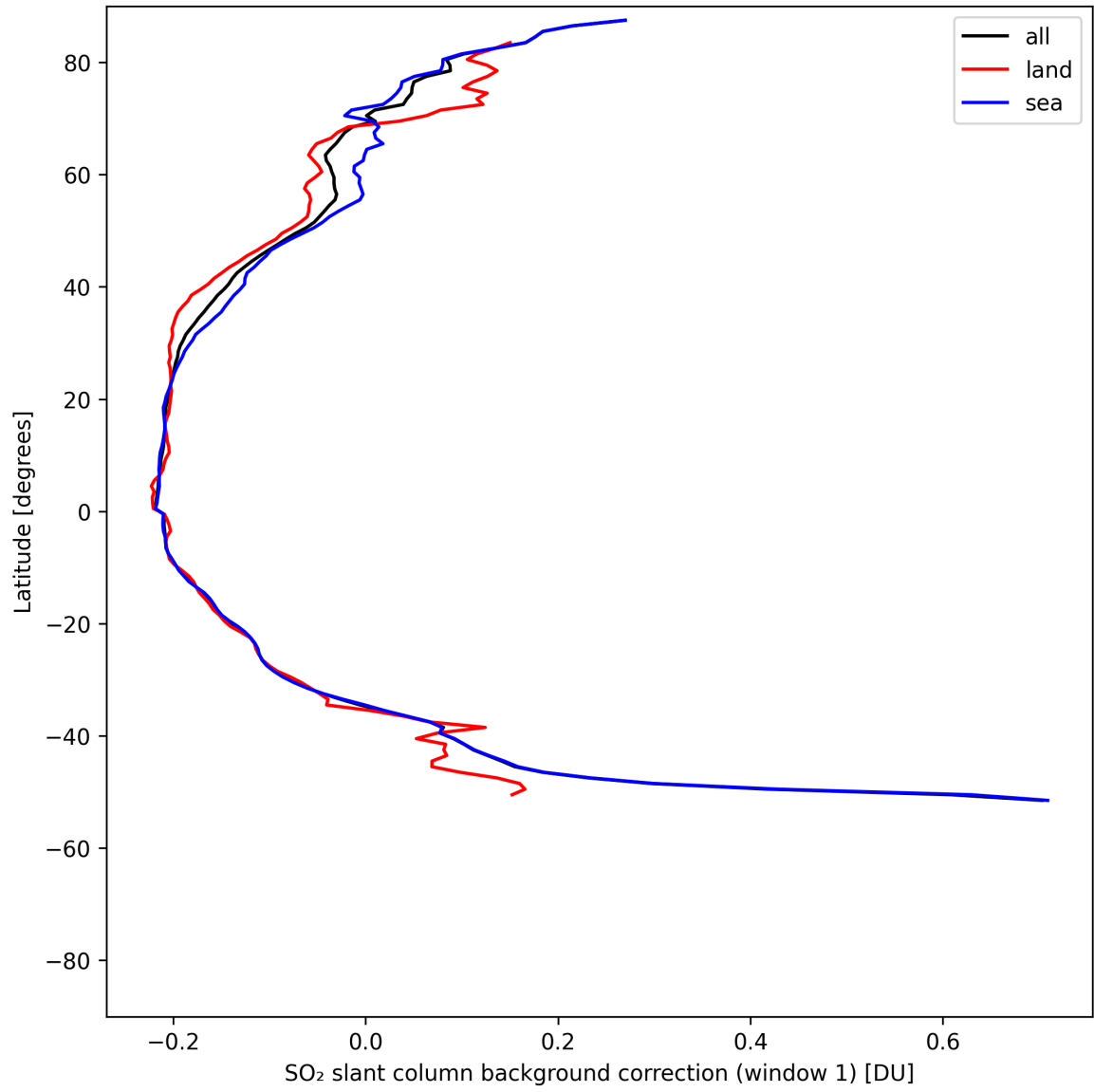


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-08-01 to 2025-08-01.

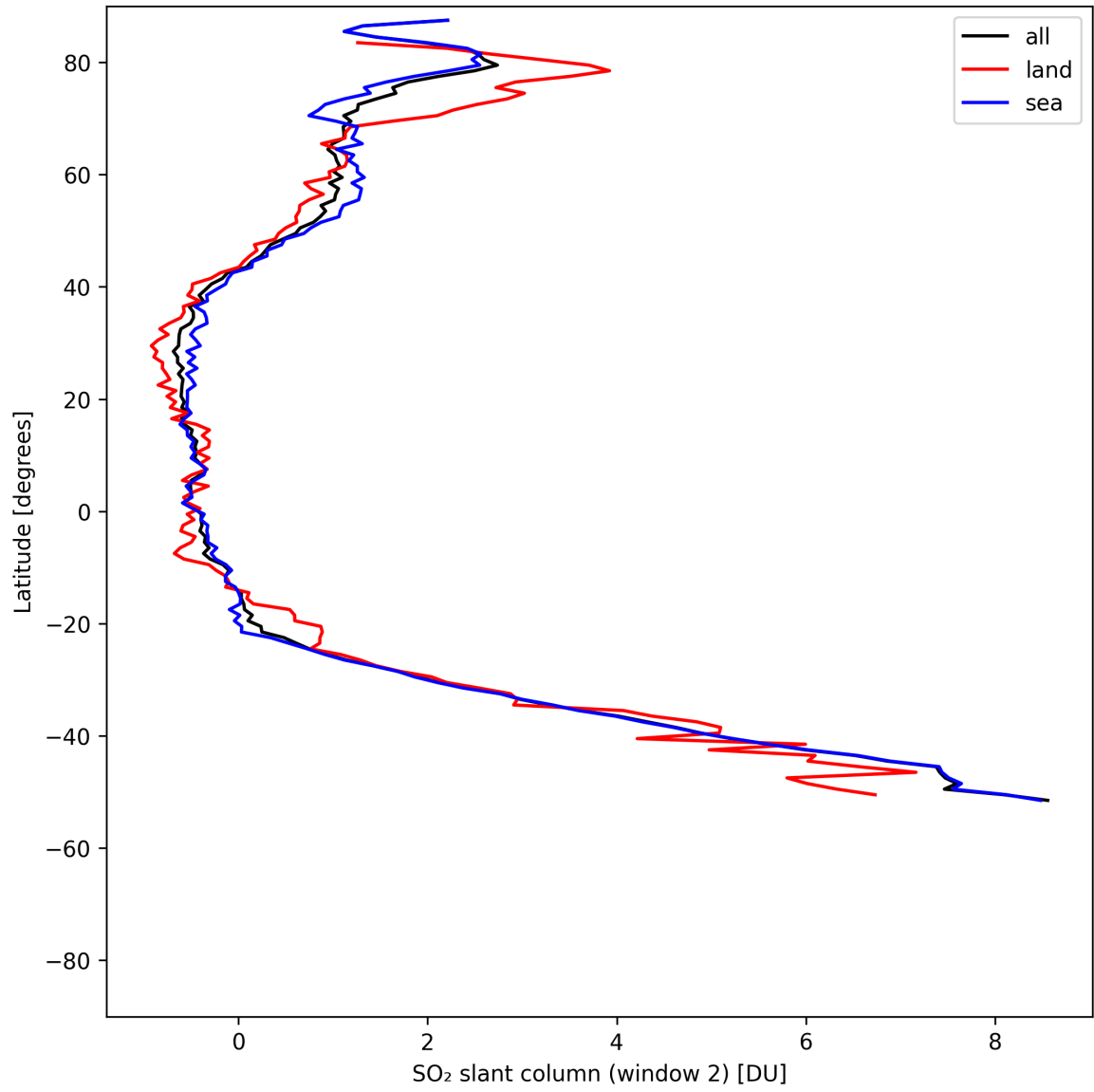


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-08-01 to 2025-08-01.

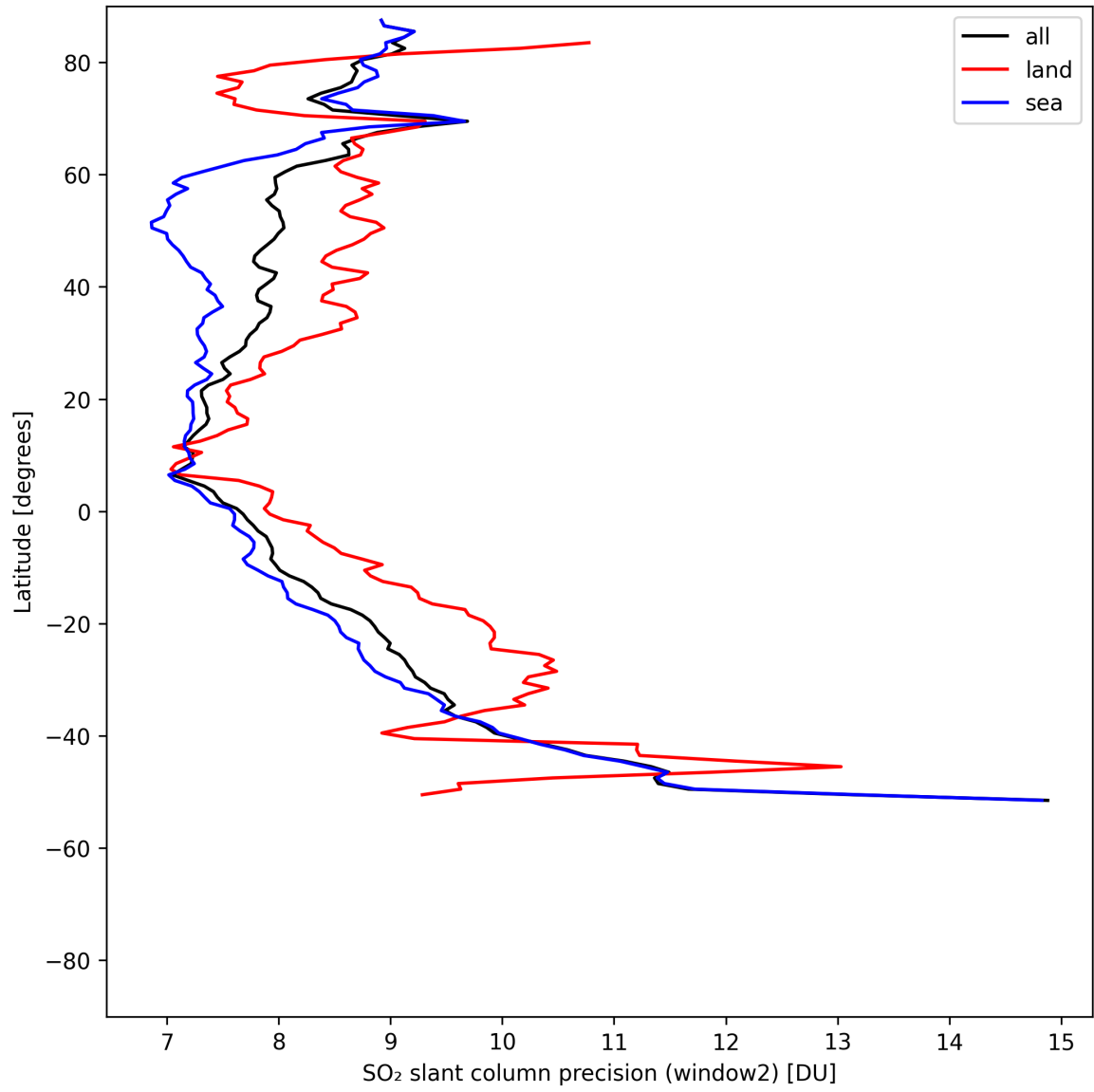


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-08-01 to 2025-08-01.

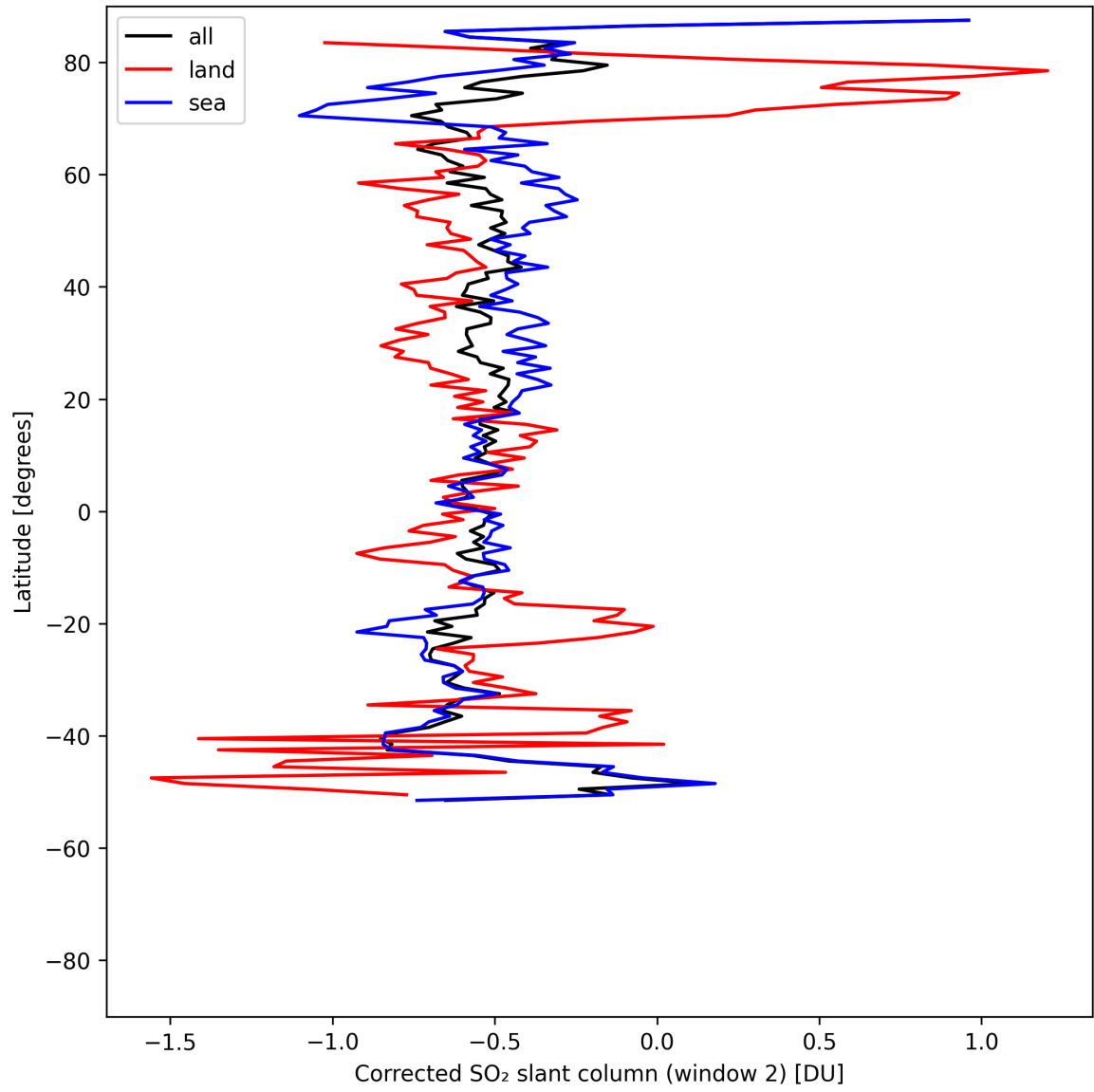


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-08-01 to 2025-08-01.

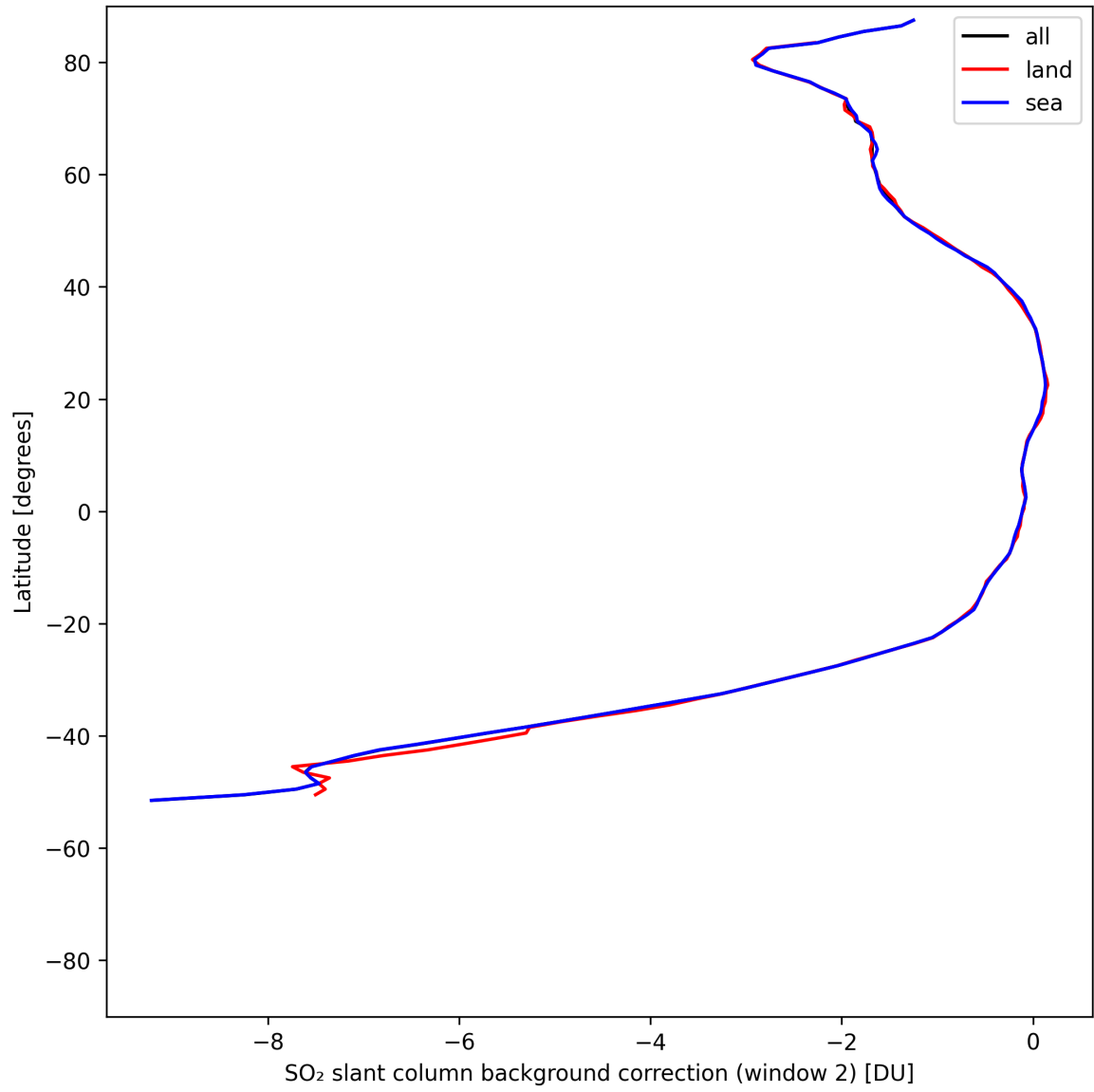


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-08-01 to 2025-08-01.

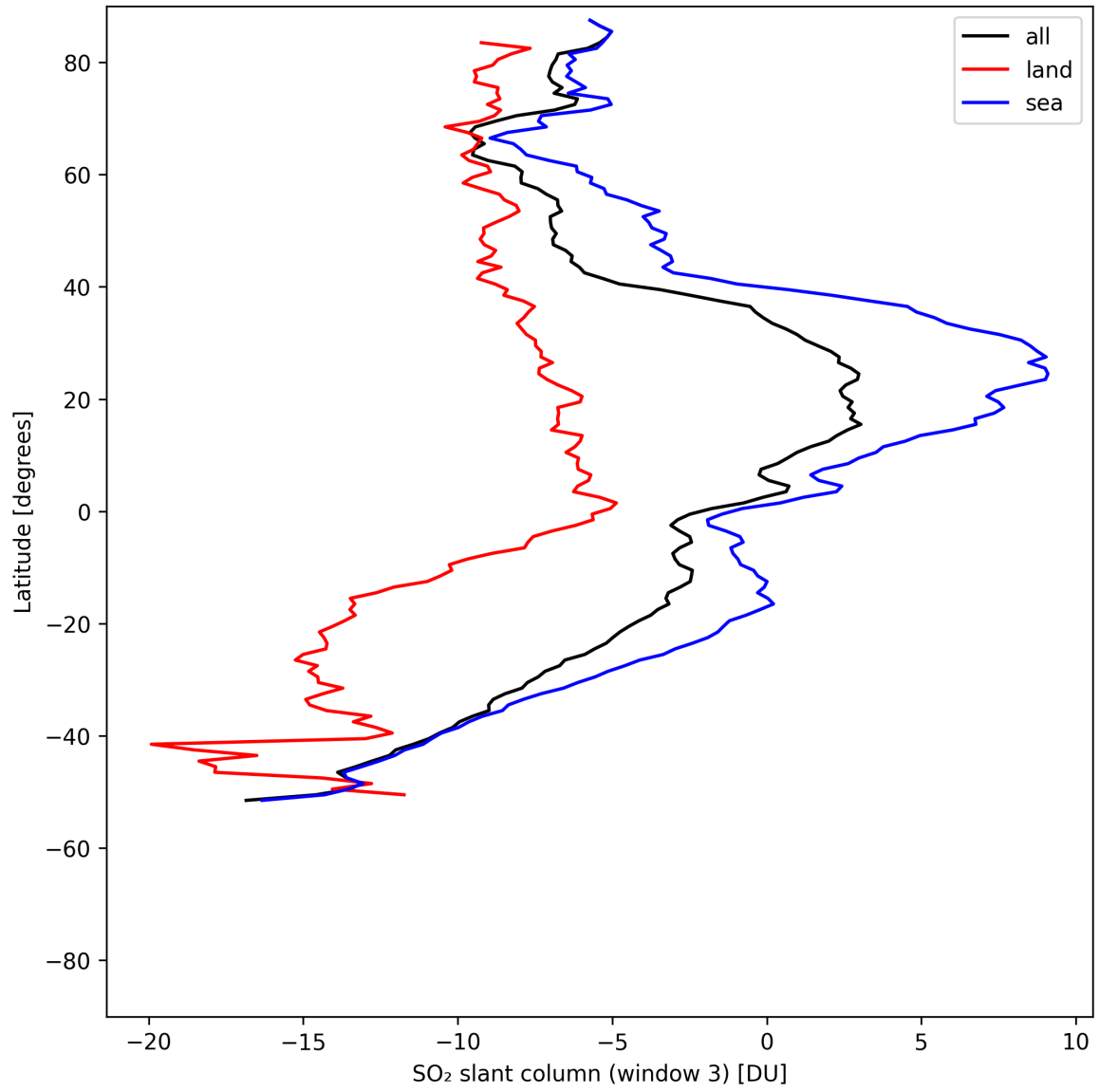


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-08-01 to 2025-08-01.

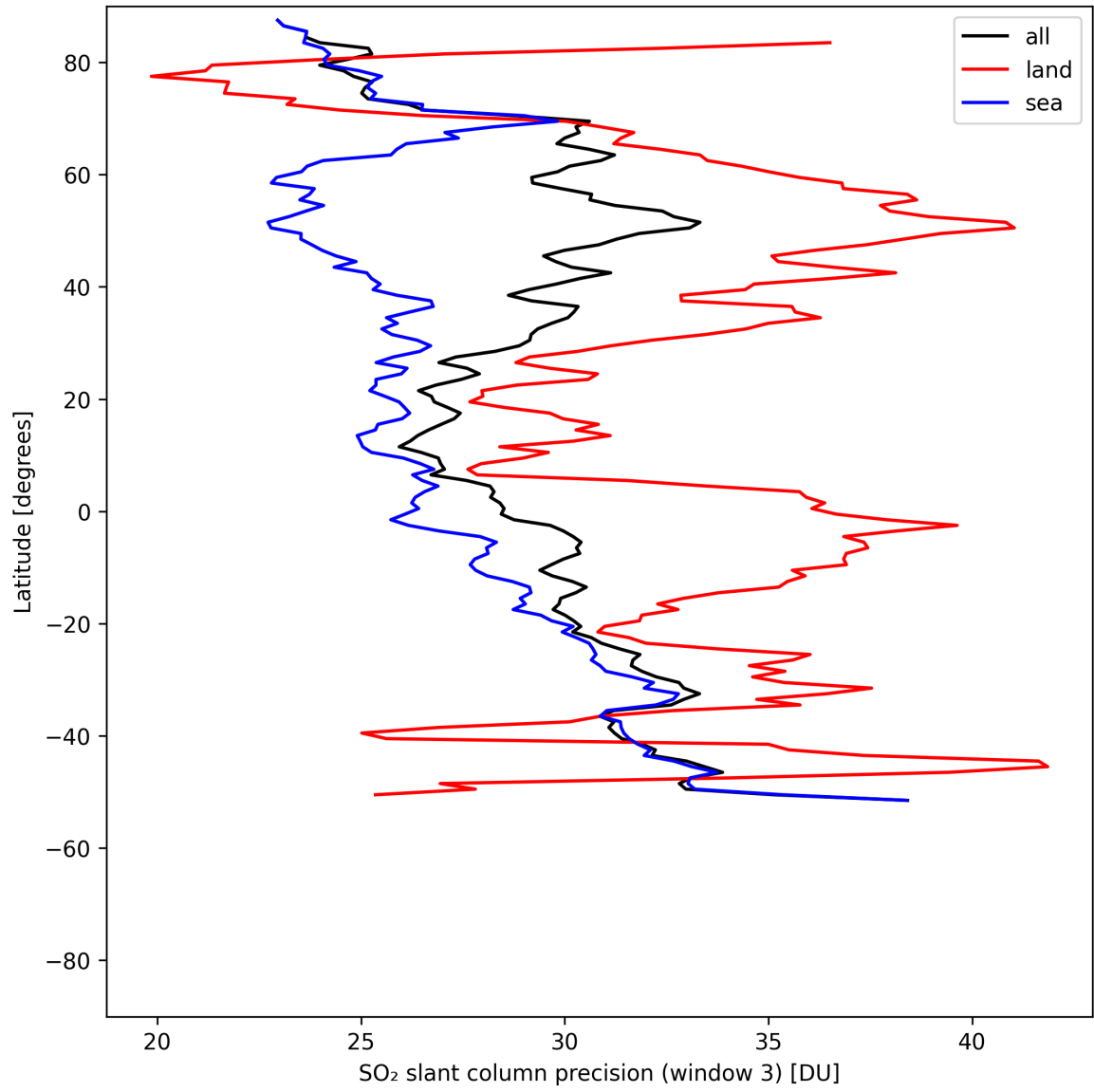


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-08-01 to 2025-08-01.

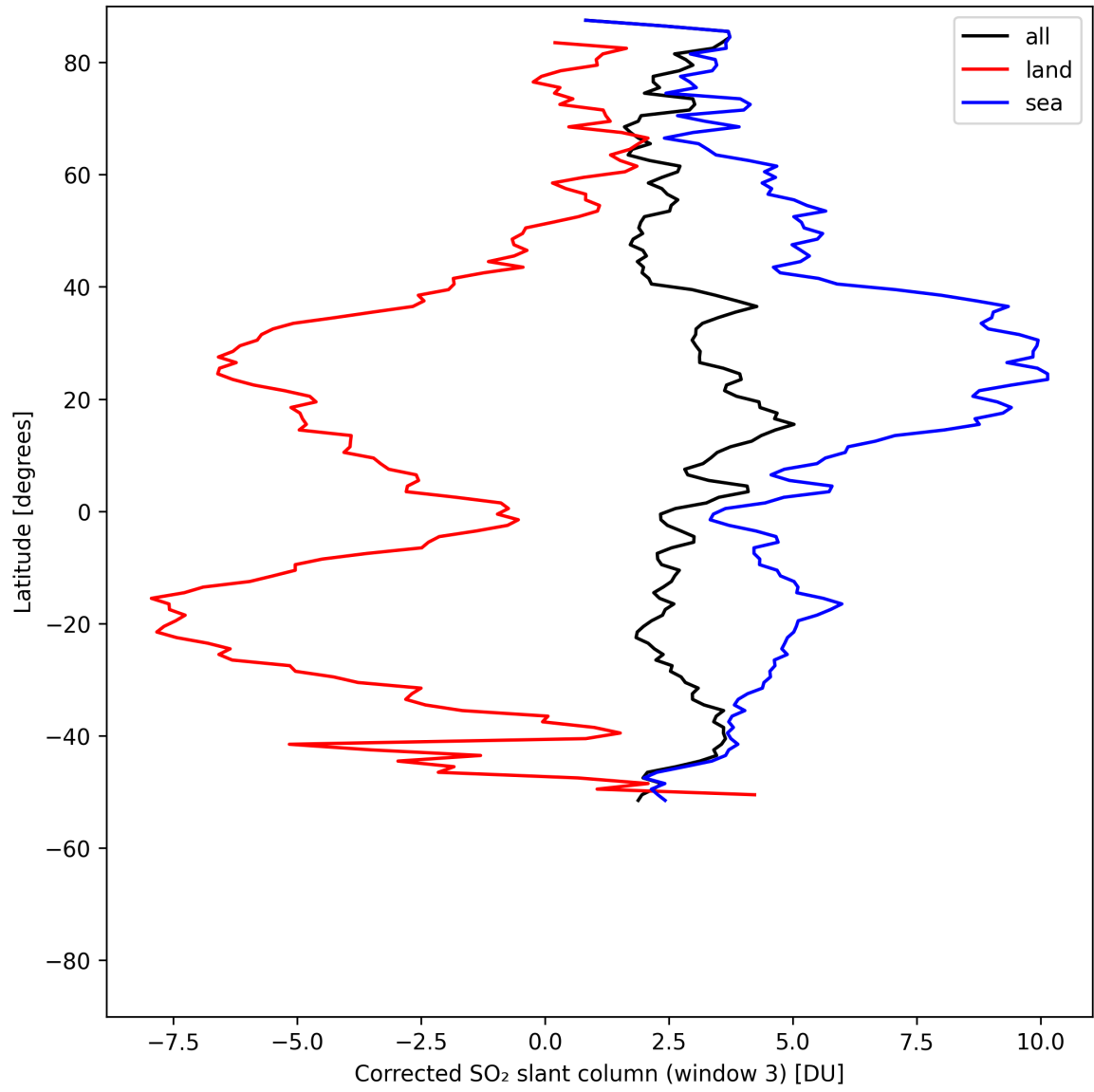


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-08-01 to 2025-08-01.

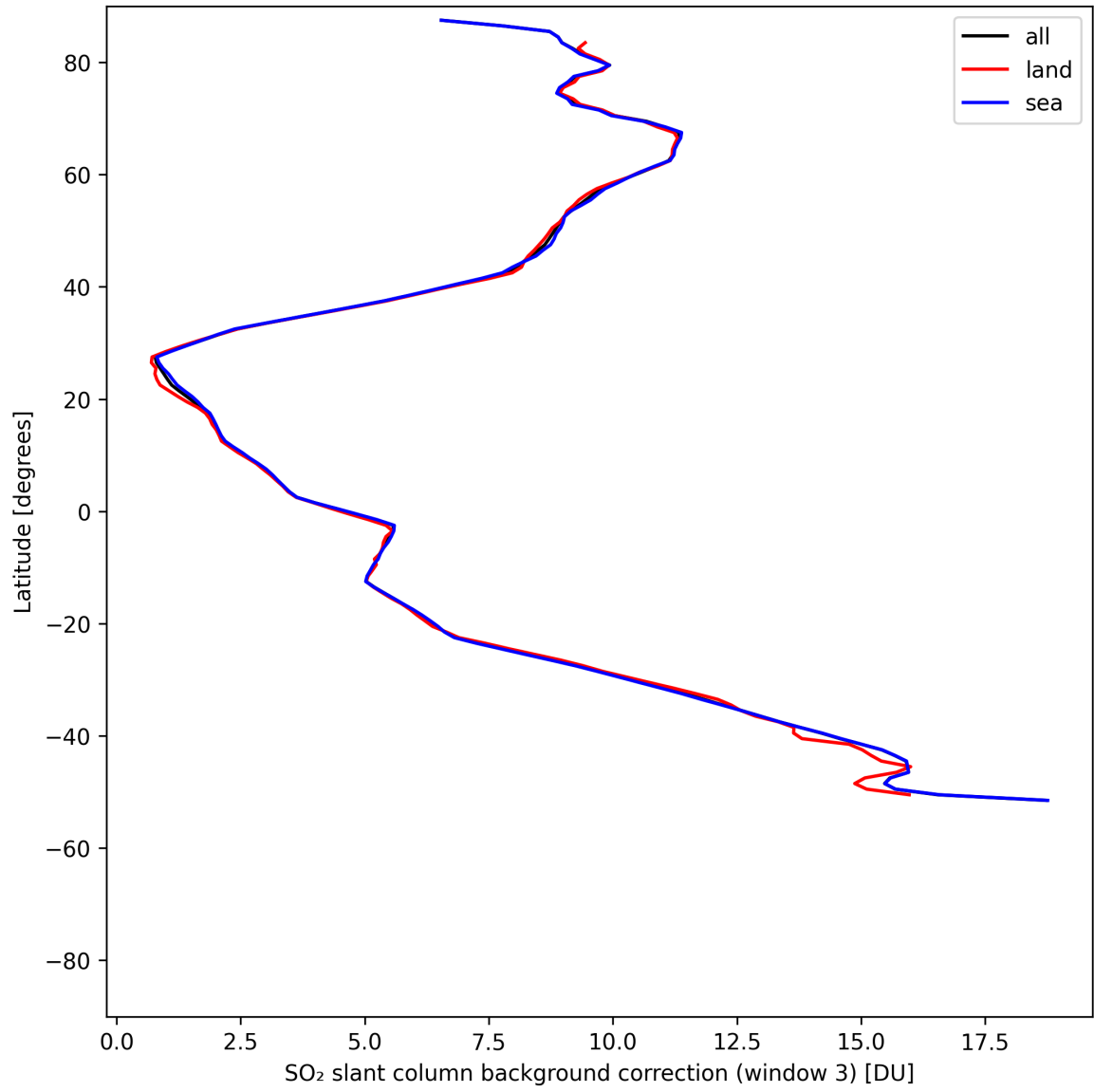


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-08-01 to 2025-08-01.

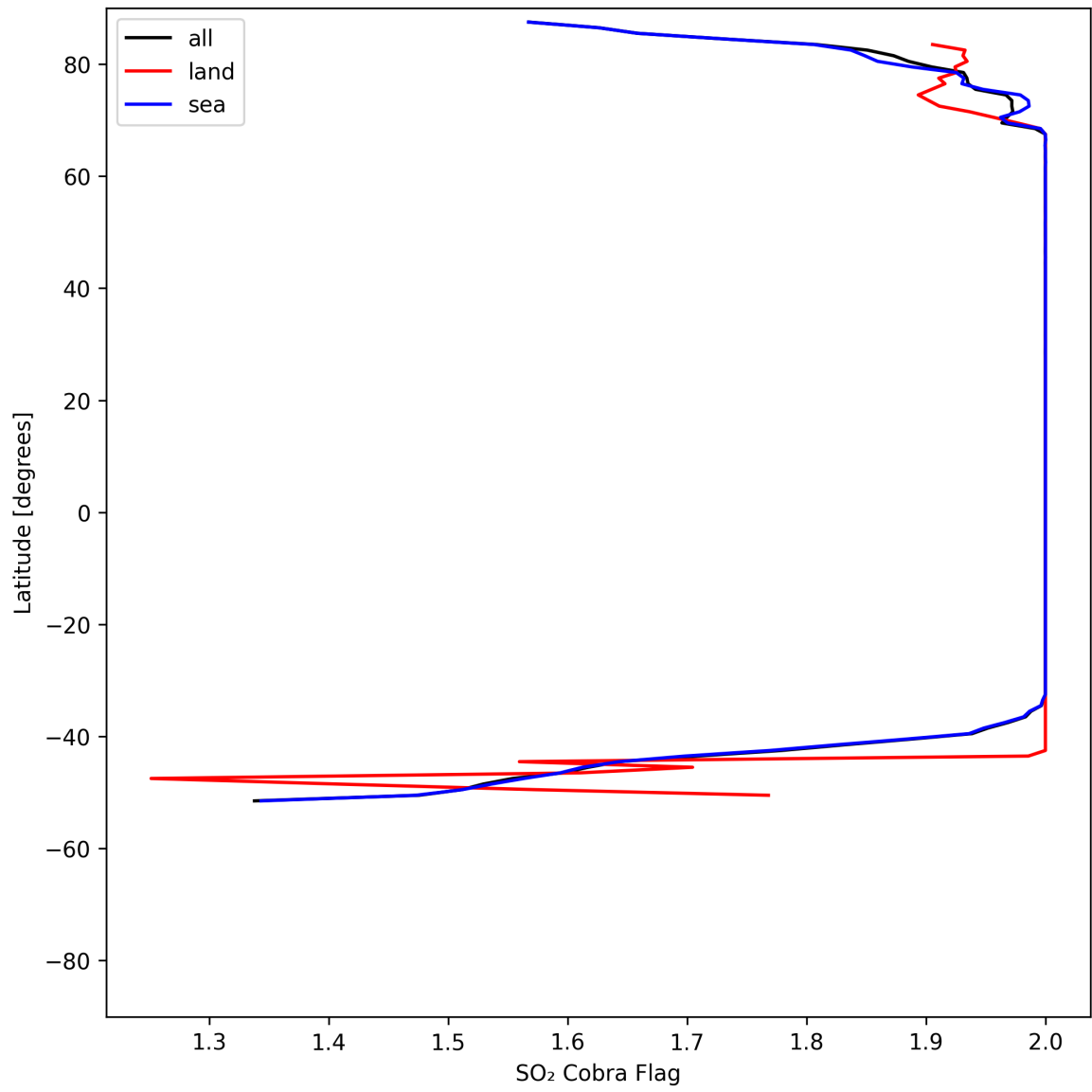


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-08-01 to 2025-08-01.

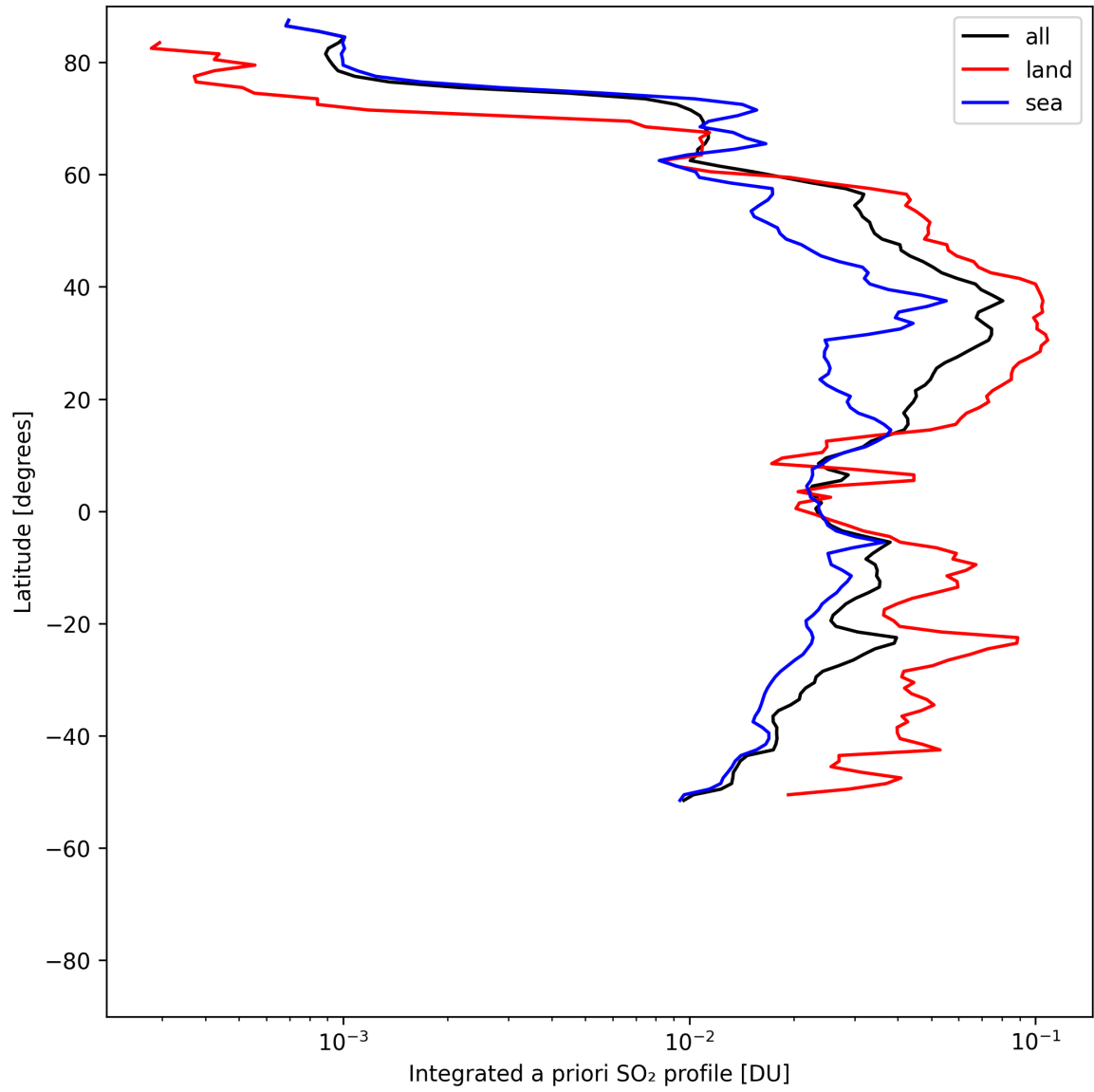


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-08-01 to 2025-08-01.

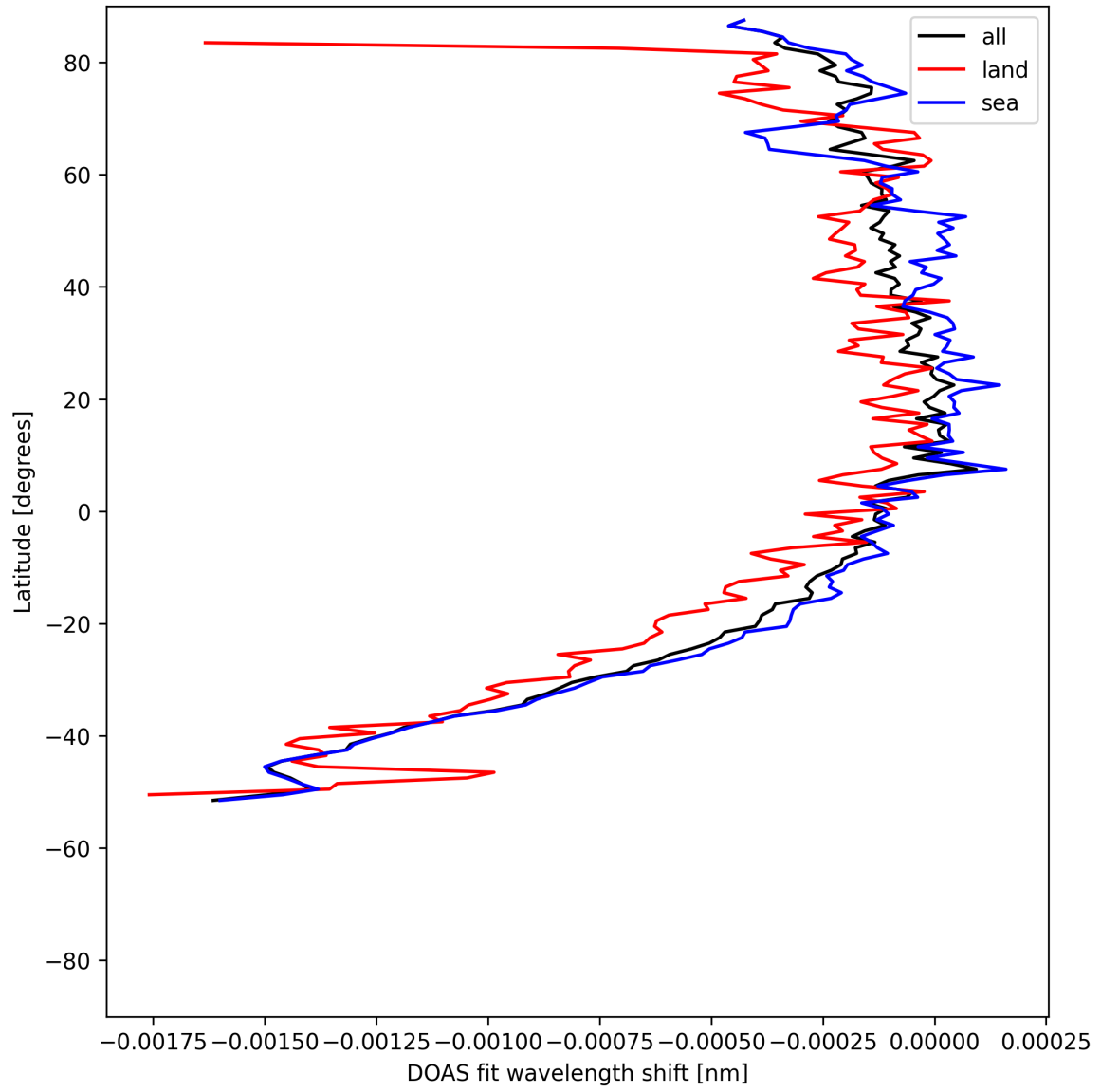


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-08-01 to 2025-08-01.

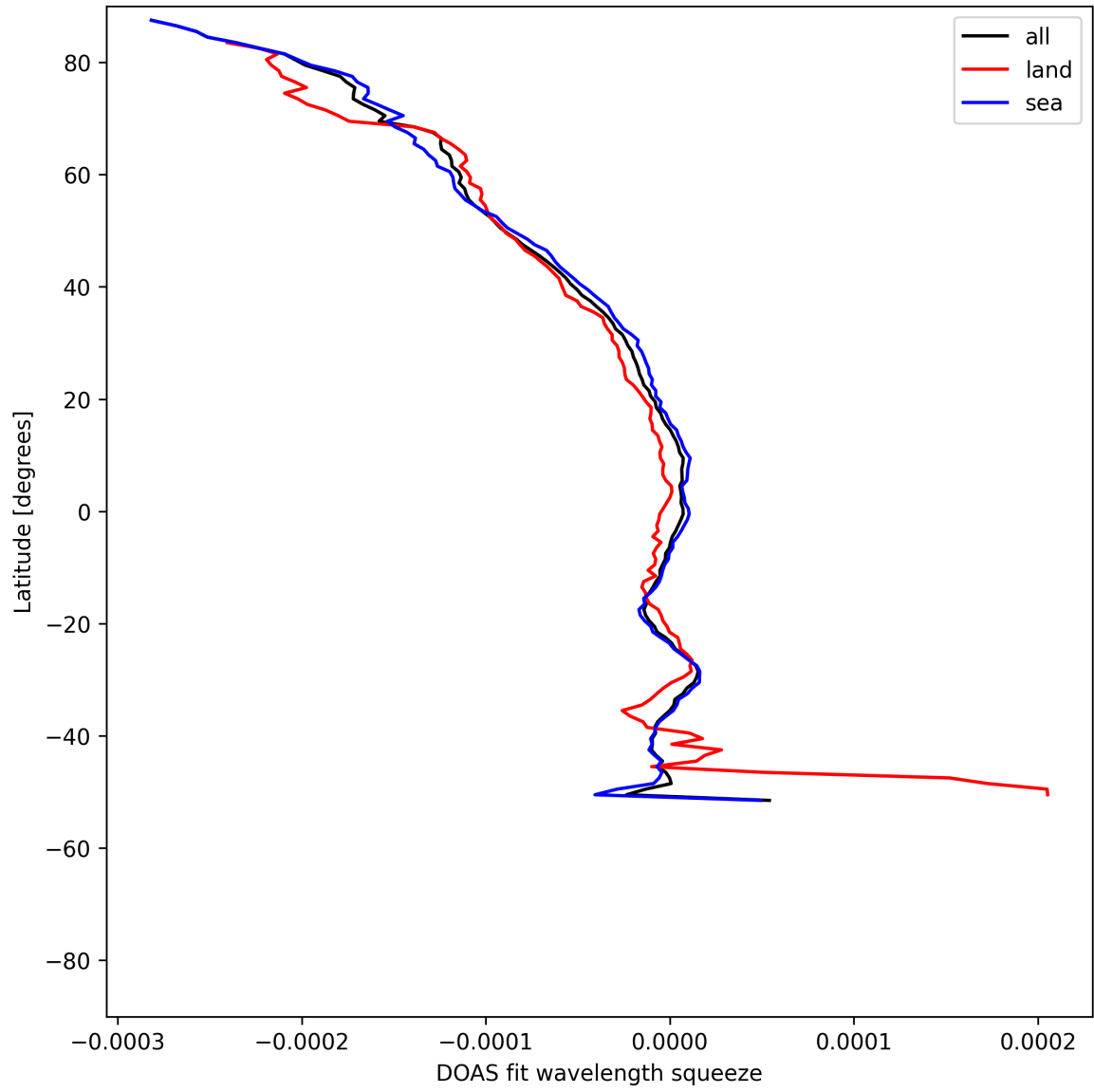


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-08-01 to 2025-08-01.

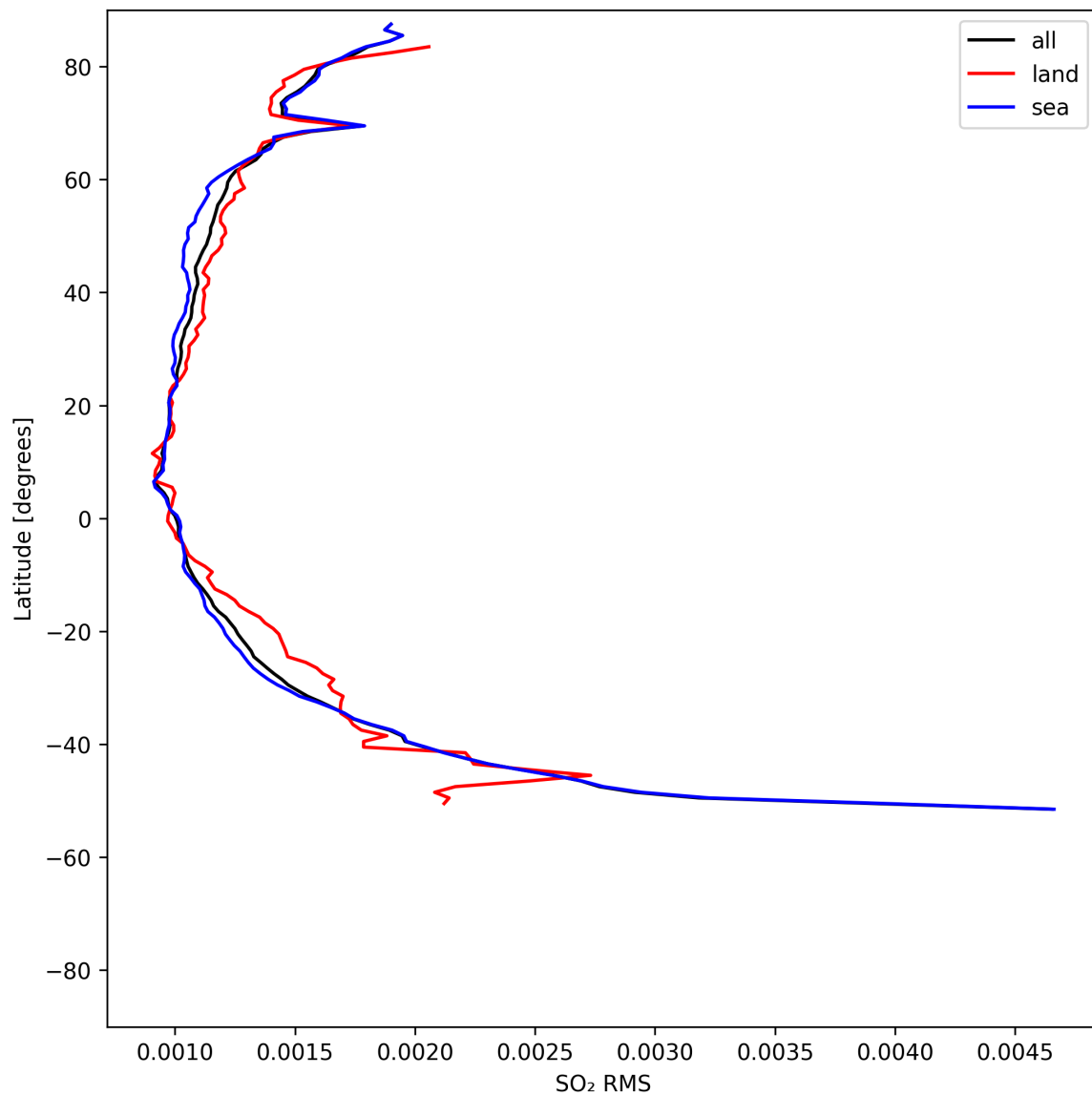


Figure 52: Zonal average of “SO₂ RMS” for 2025-08-01 to 2025-08-01.

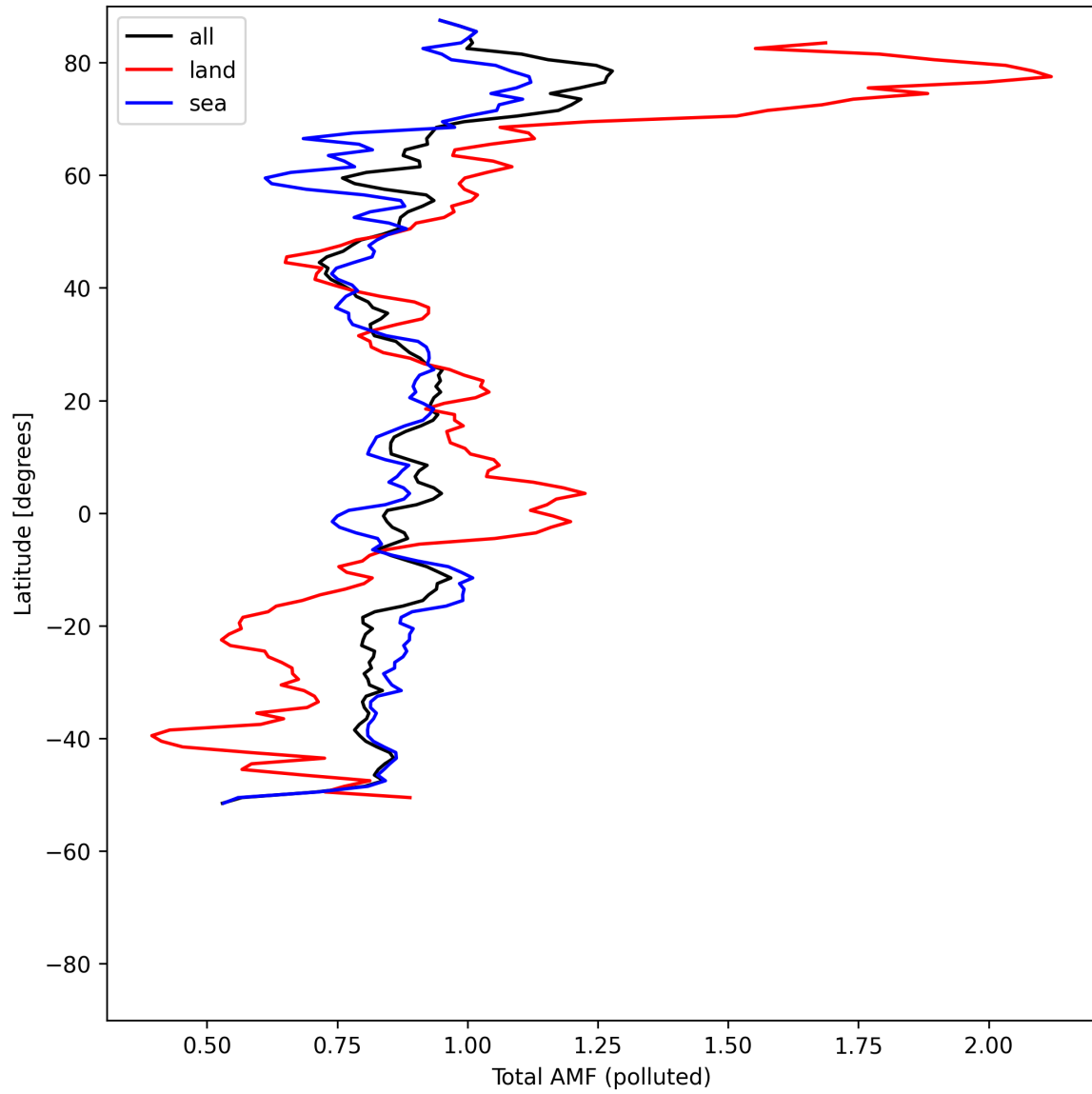


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-08-01 to 2025-08-01.

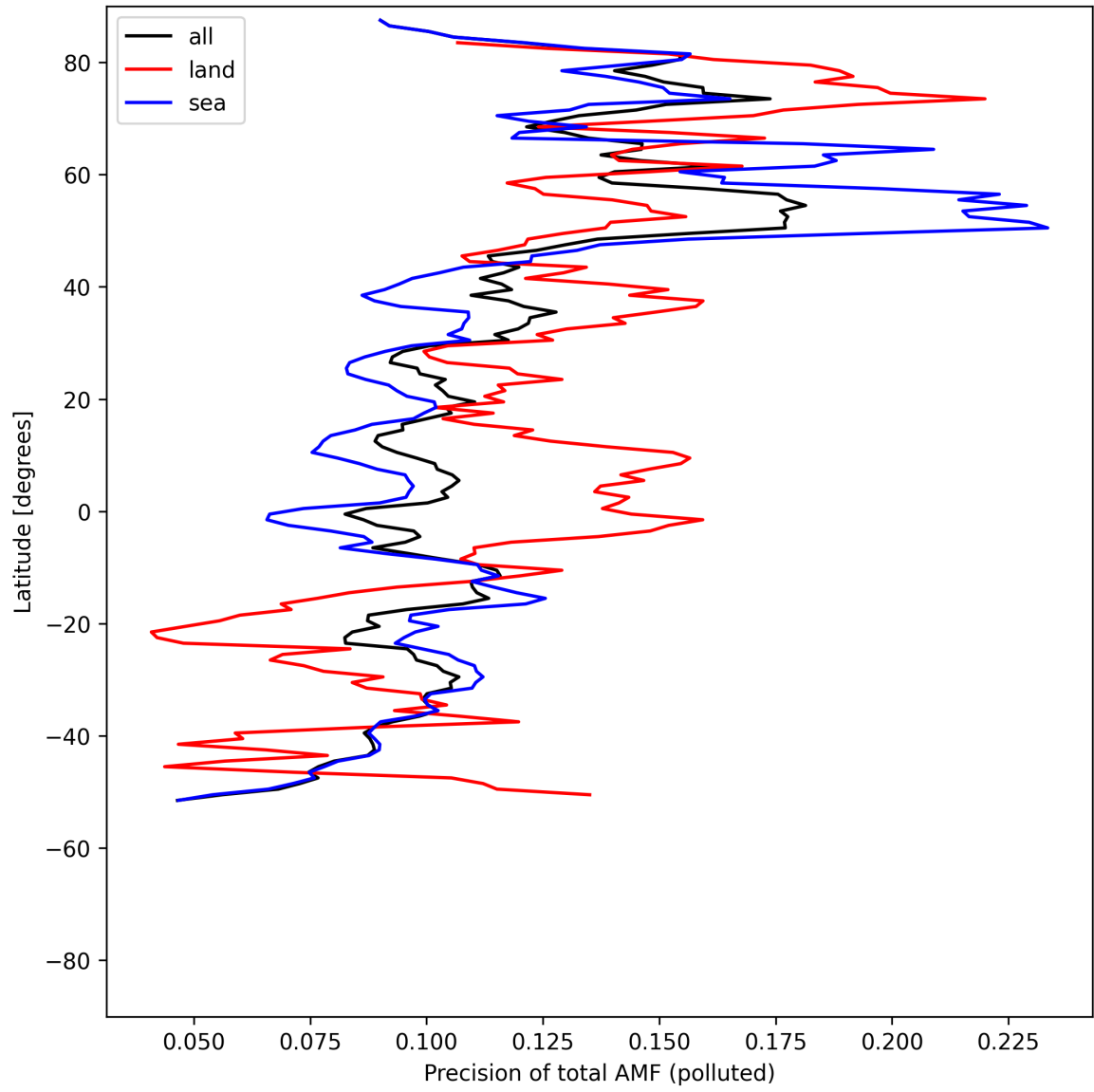


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-08-01 to 2025-08-01.

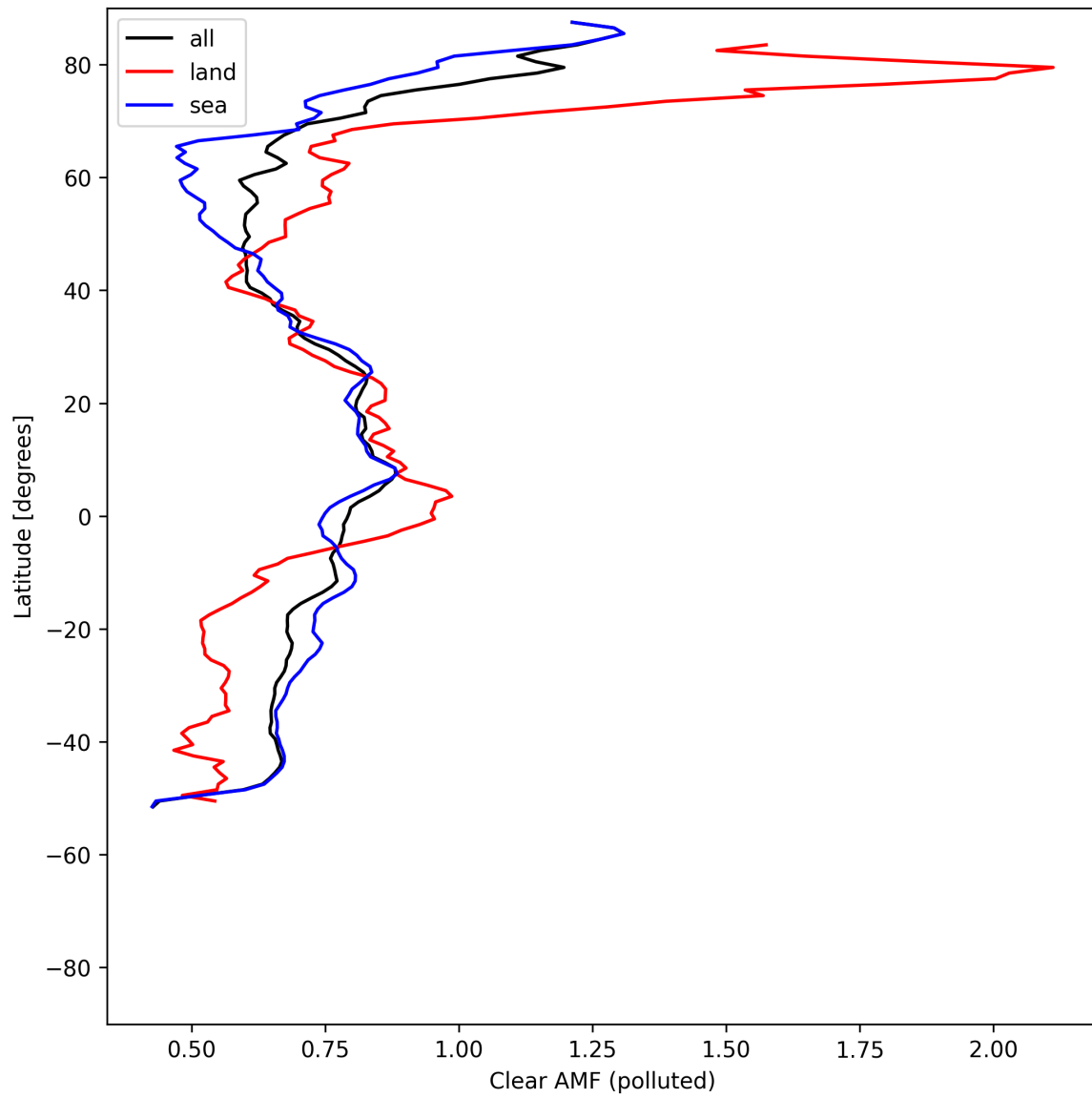


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-08-01 to 2025-08-01.

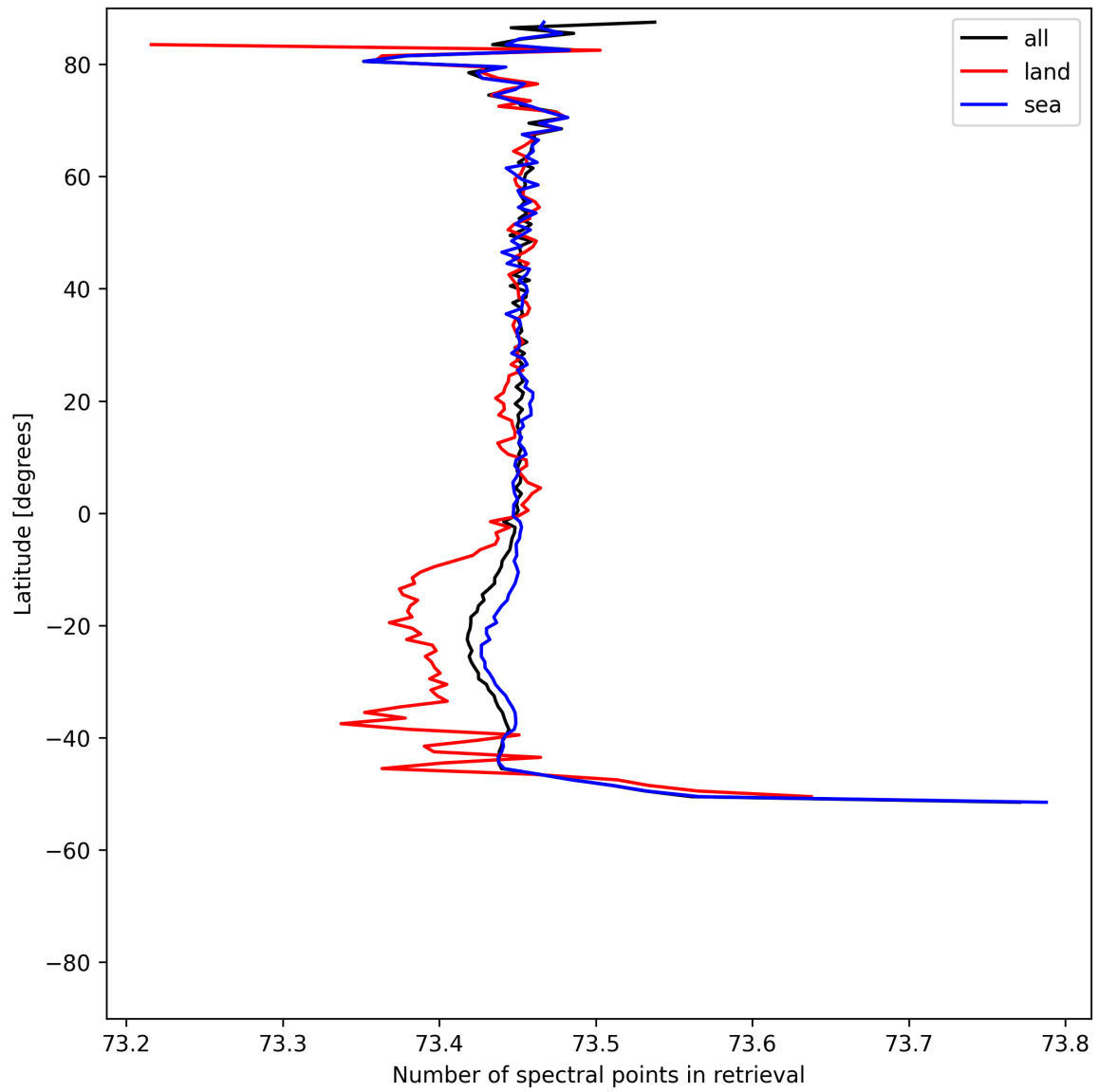


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-08-01 to 2025-08-01.

8 Histograms

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

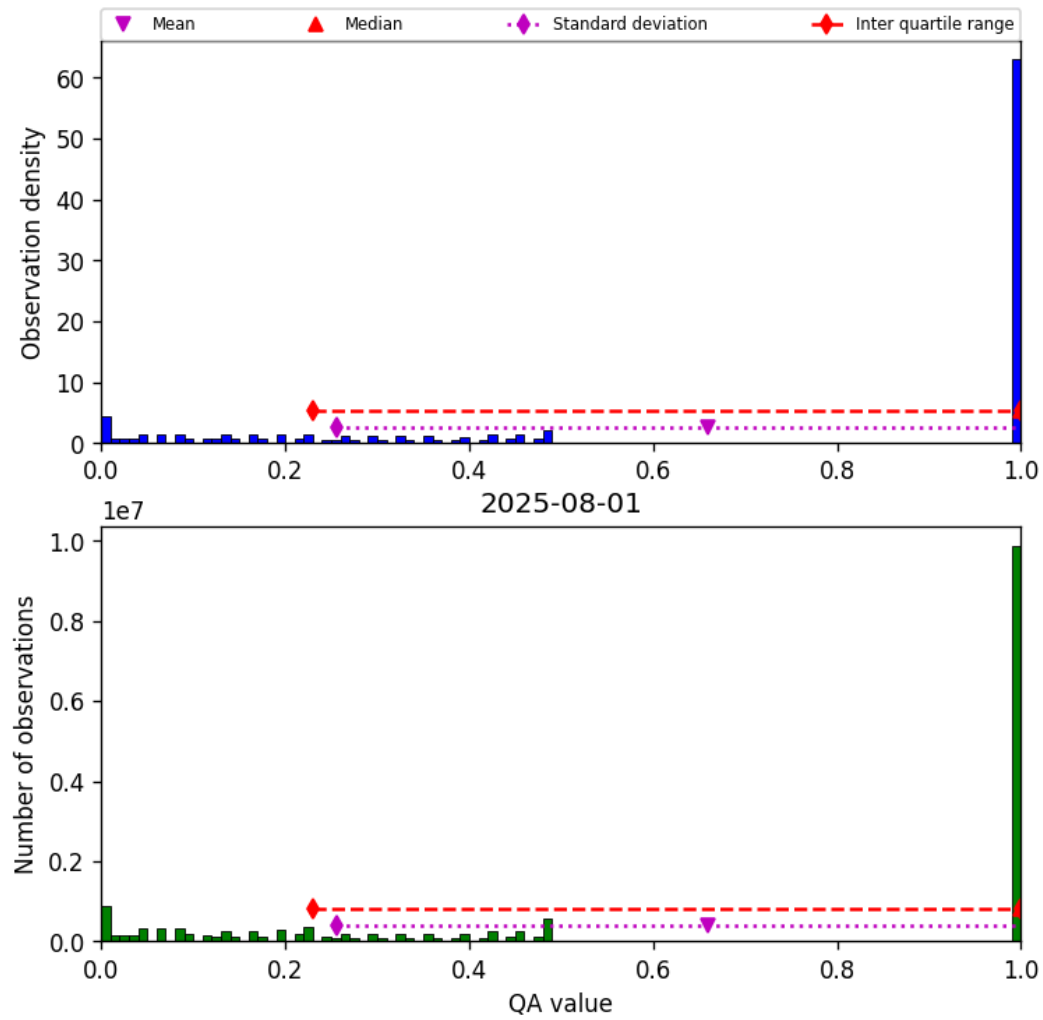


Figure 57: Histogram of “QA value” for 2025-08-01 to 2025-08-01

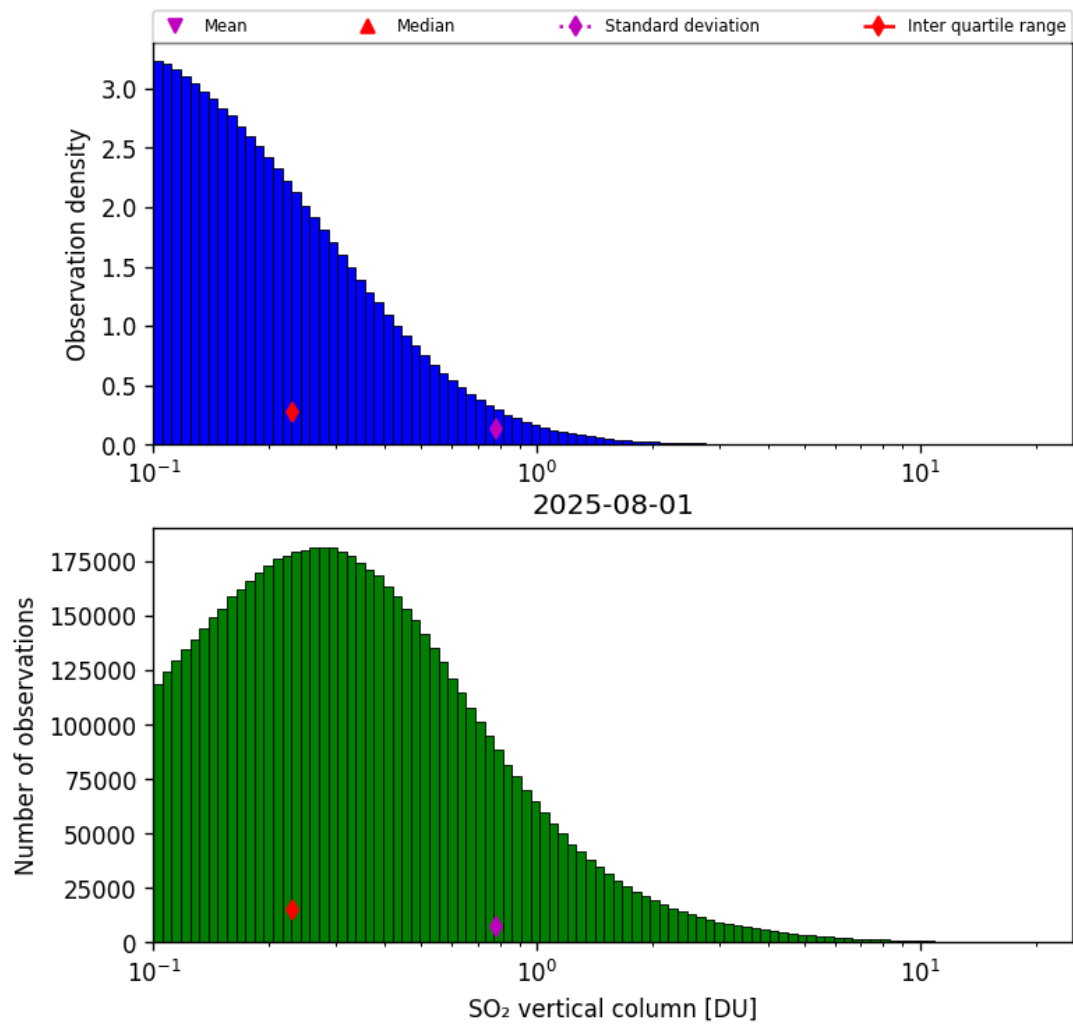


Figure 58: Histogram of “SO₂ vertical column” for 2025-08-01 to 2025-08-01

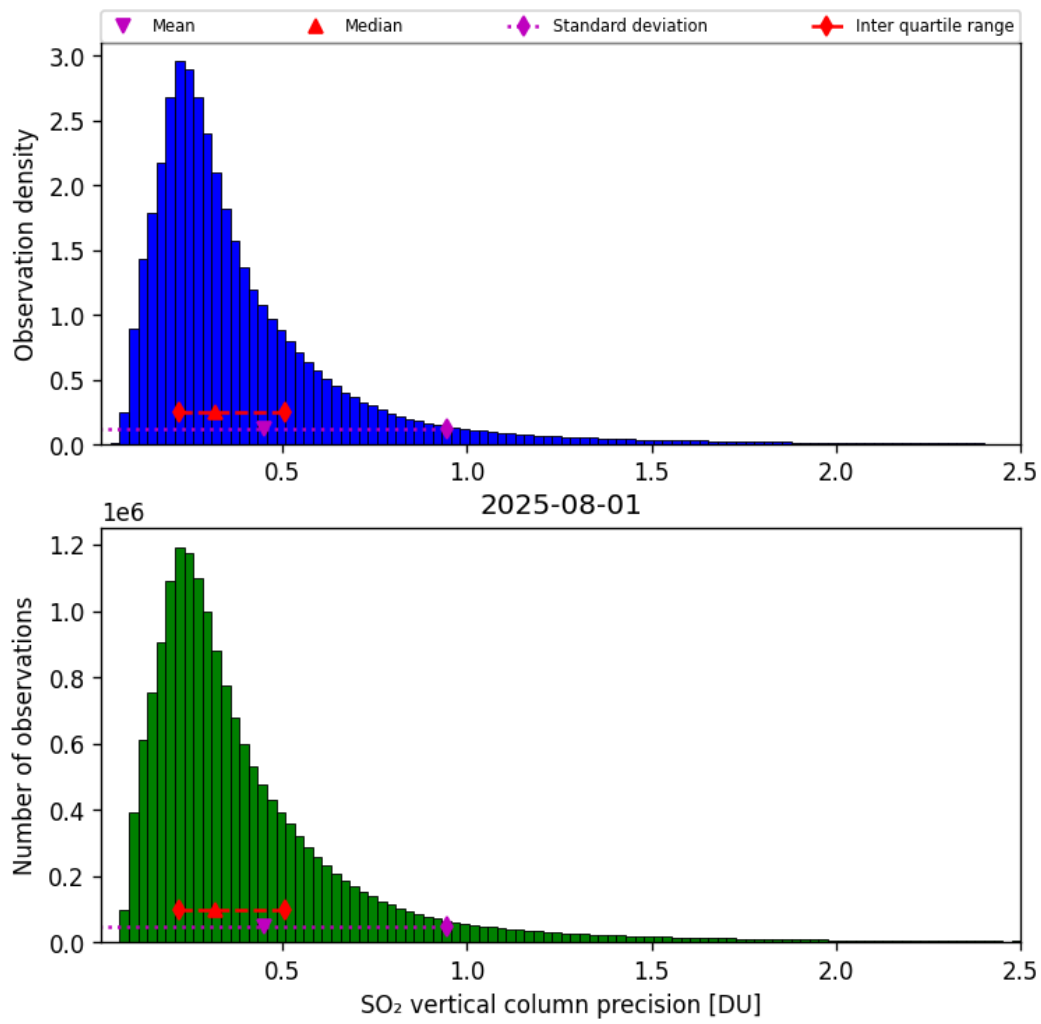


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-08-01 to 2025-08-01

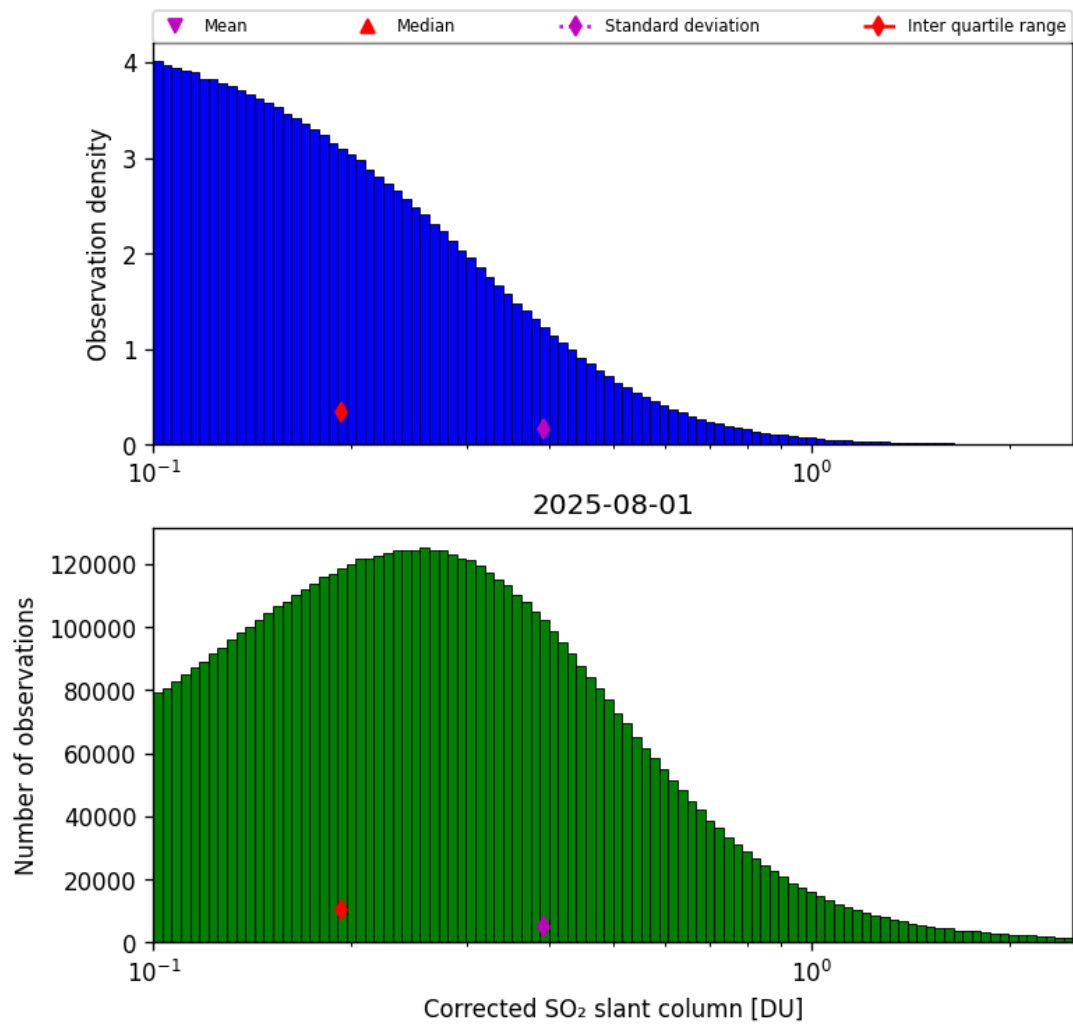


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-08-01 to 2025-08-01

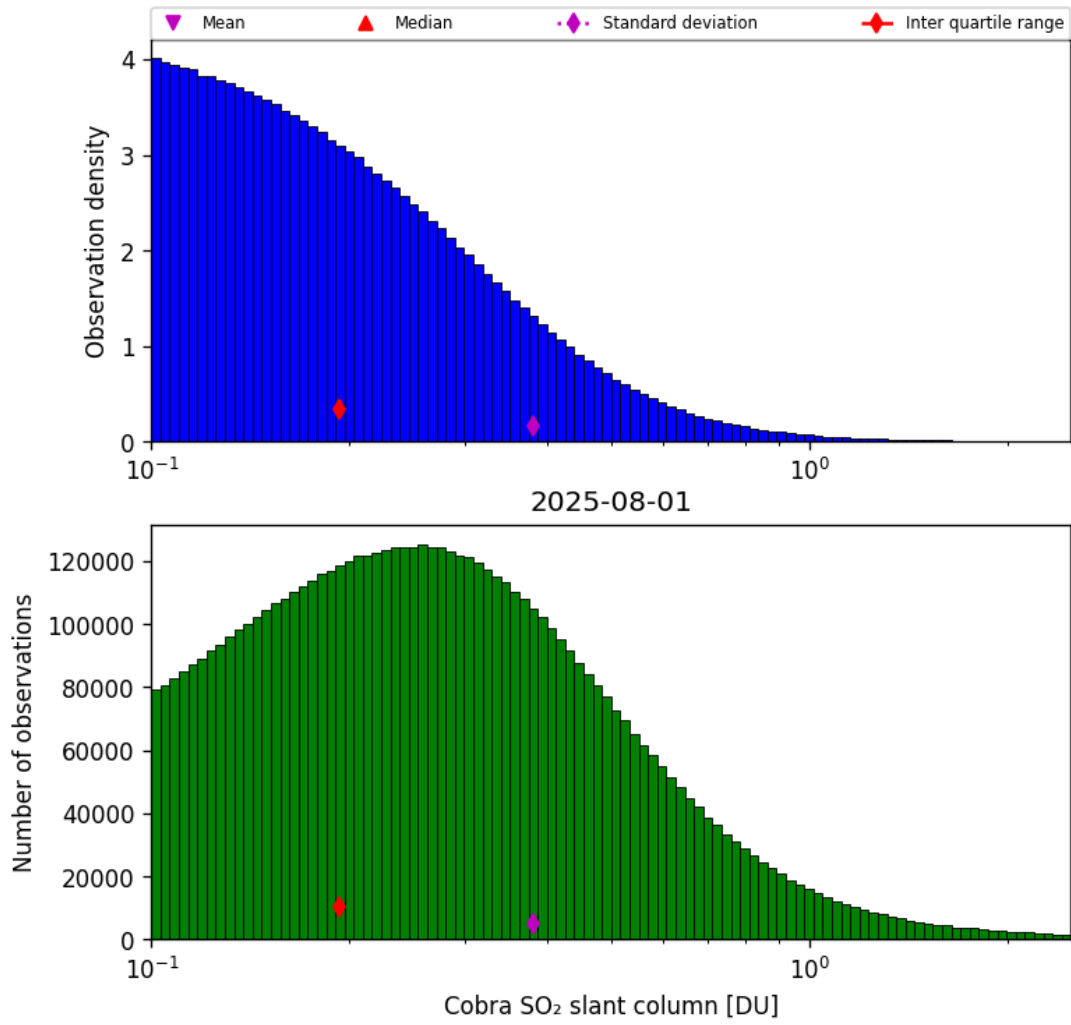


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-08-01 to 2025-08-01

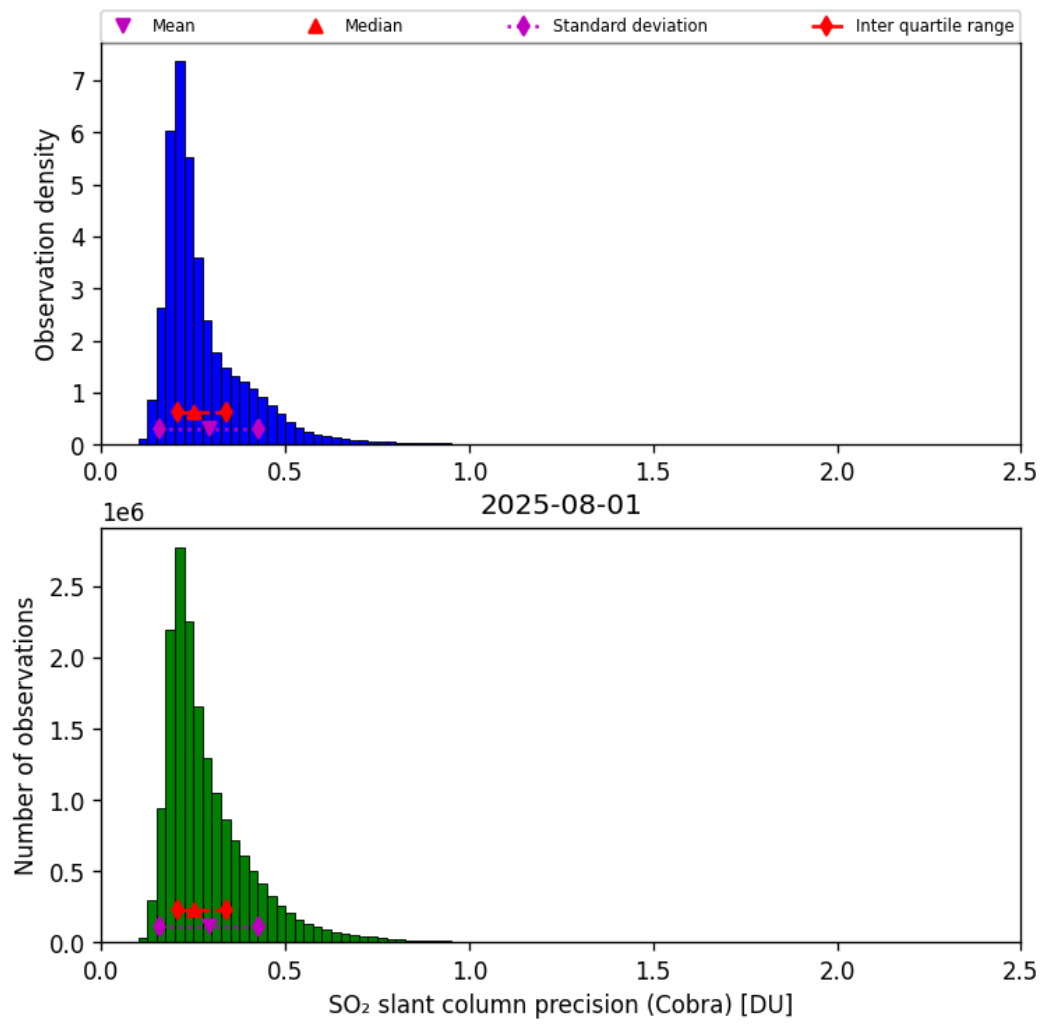


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-08-01 to 2025-08-01

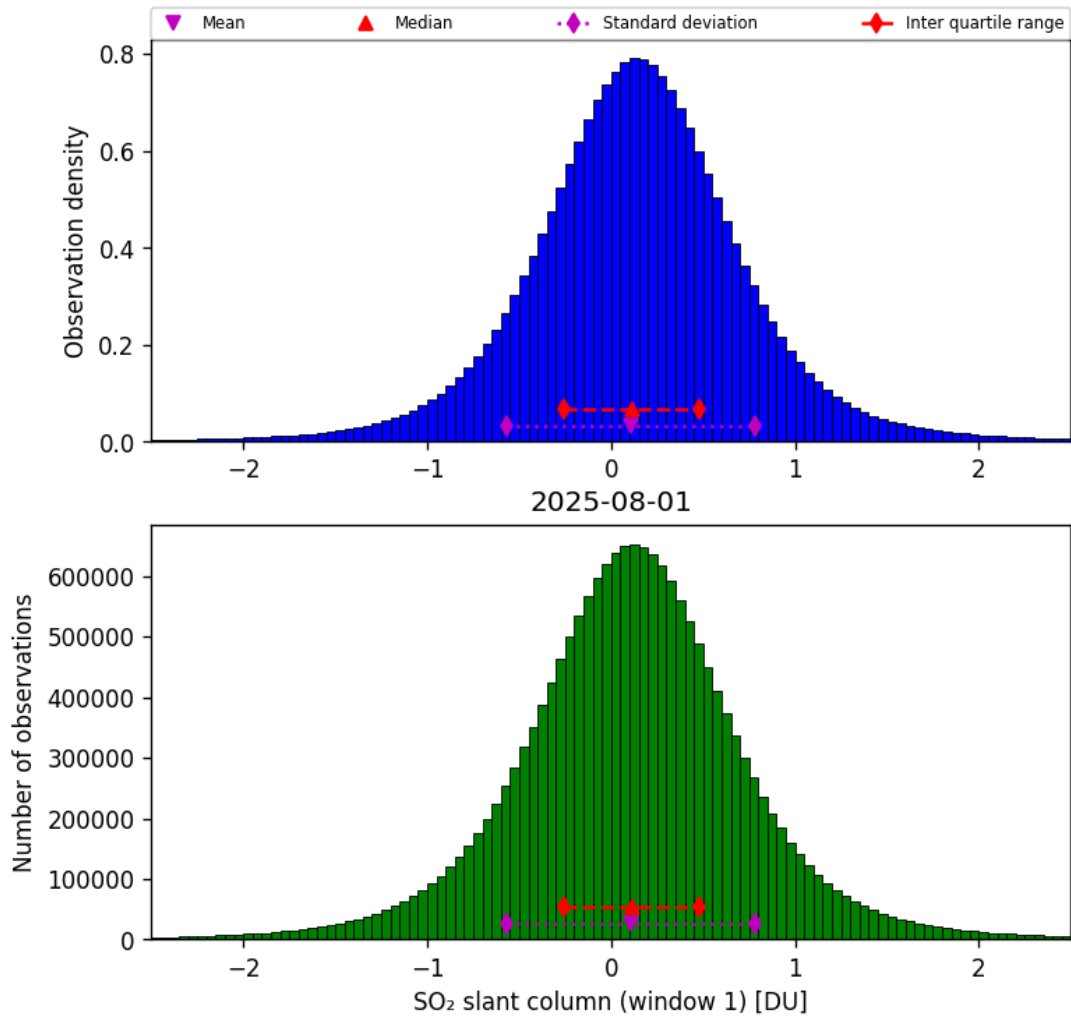


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-08-01 to 2025-08-01

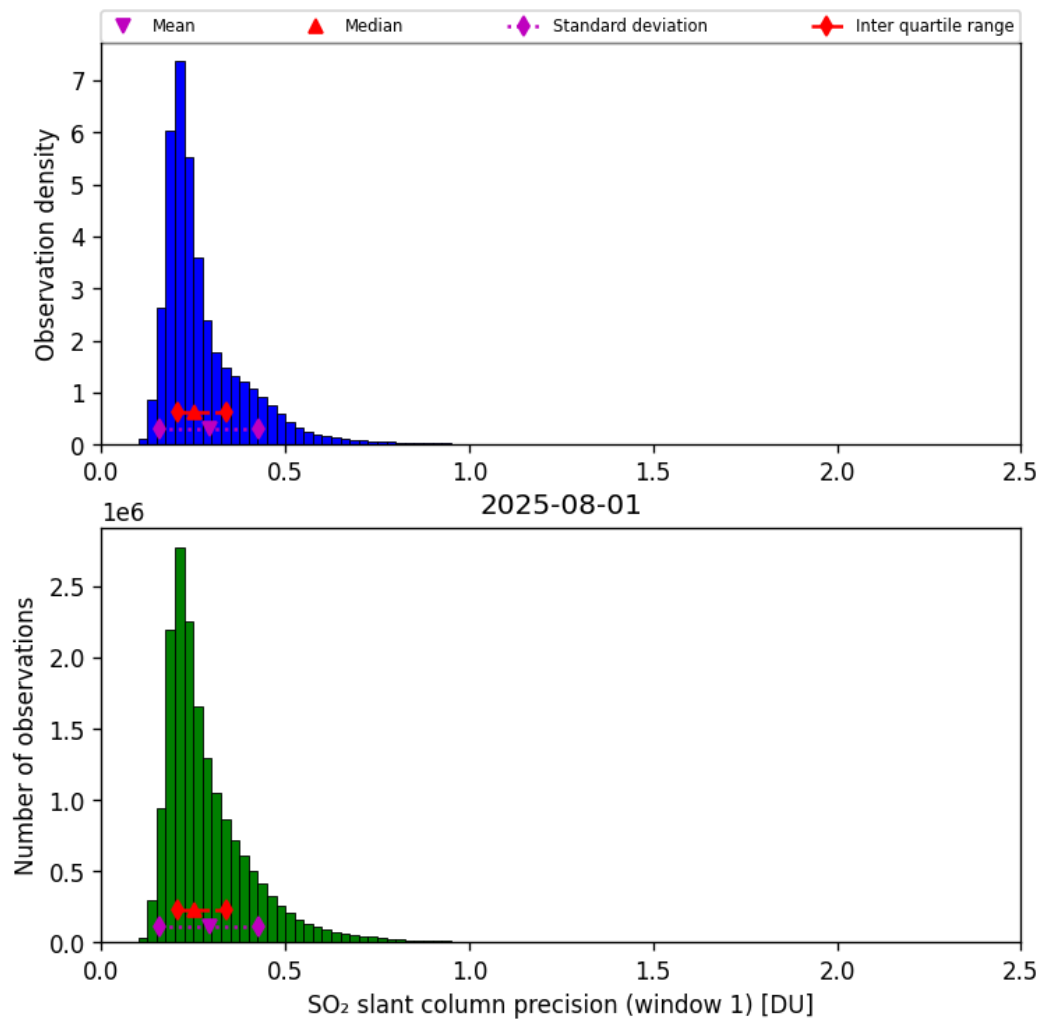


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-08-01 to 2025-08-01

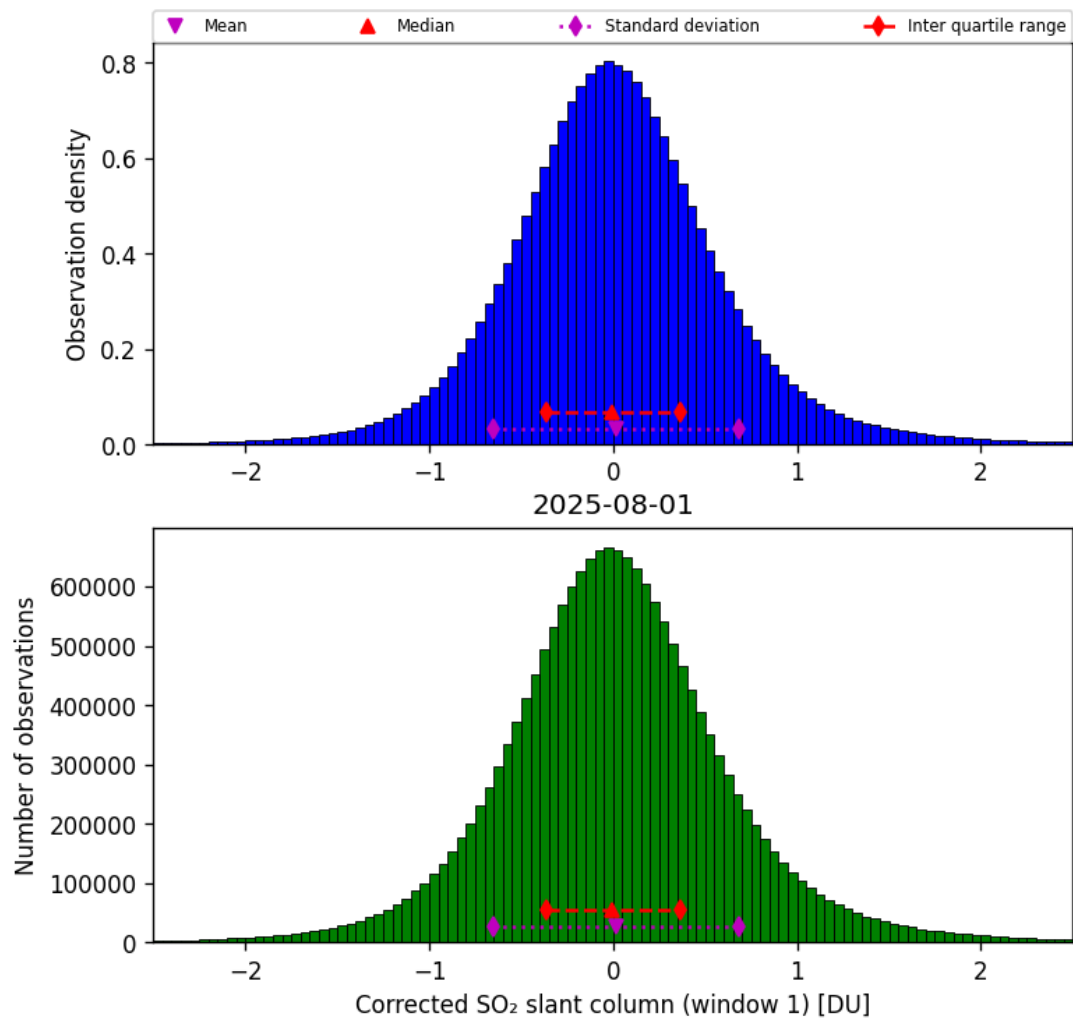


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-08-01 to 2025-08-01

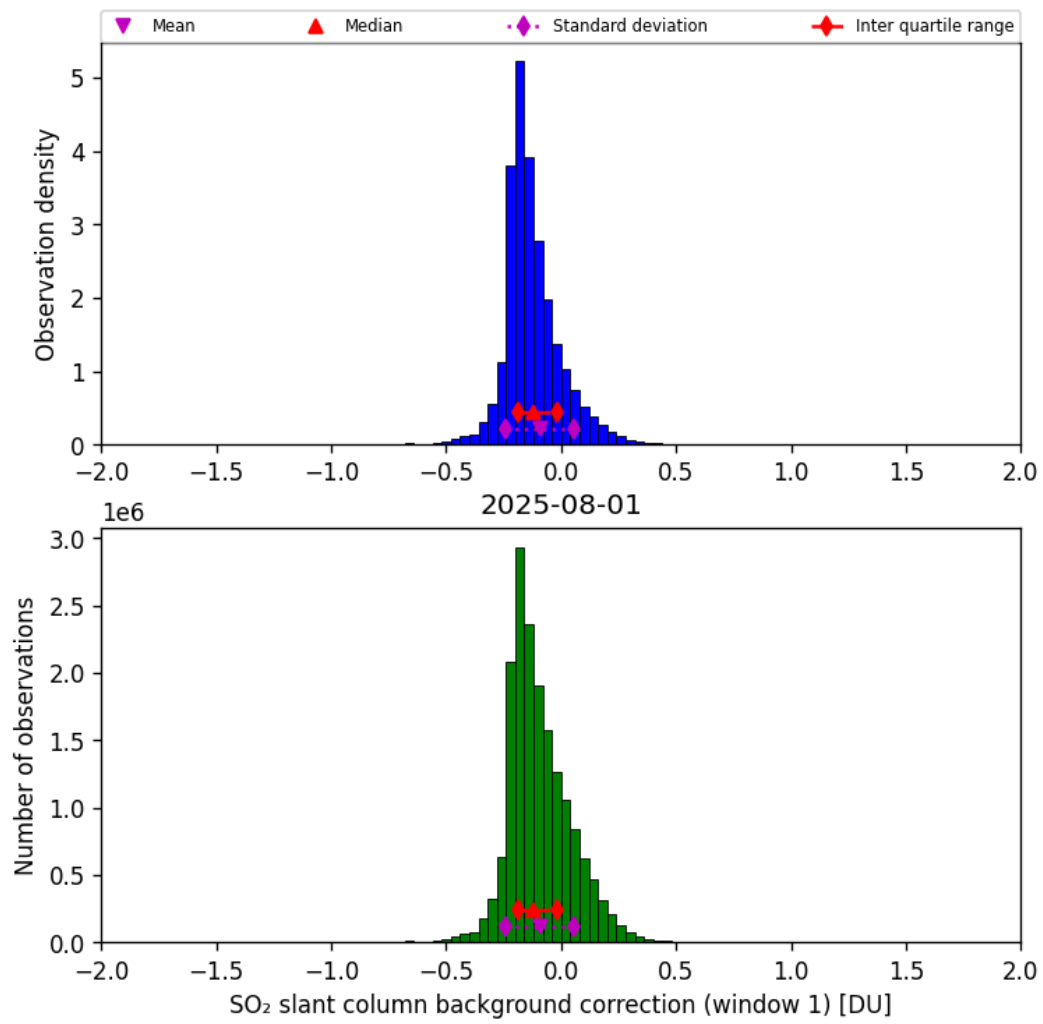


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-08-01 to 2025-08-01

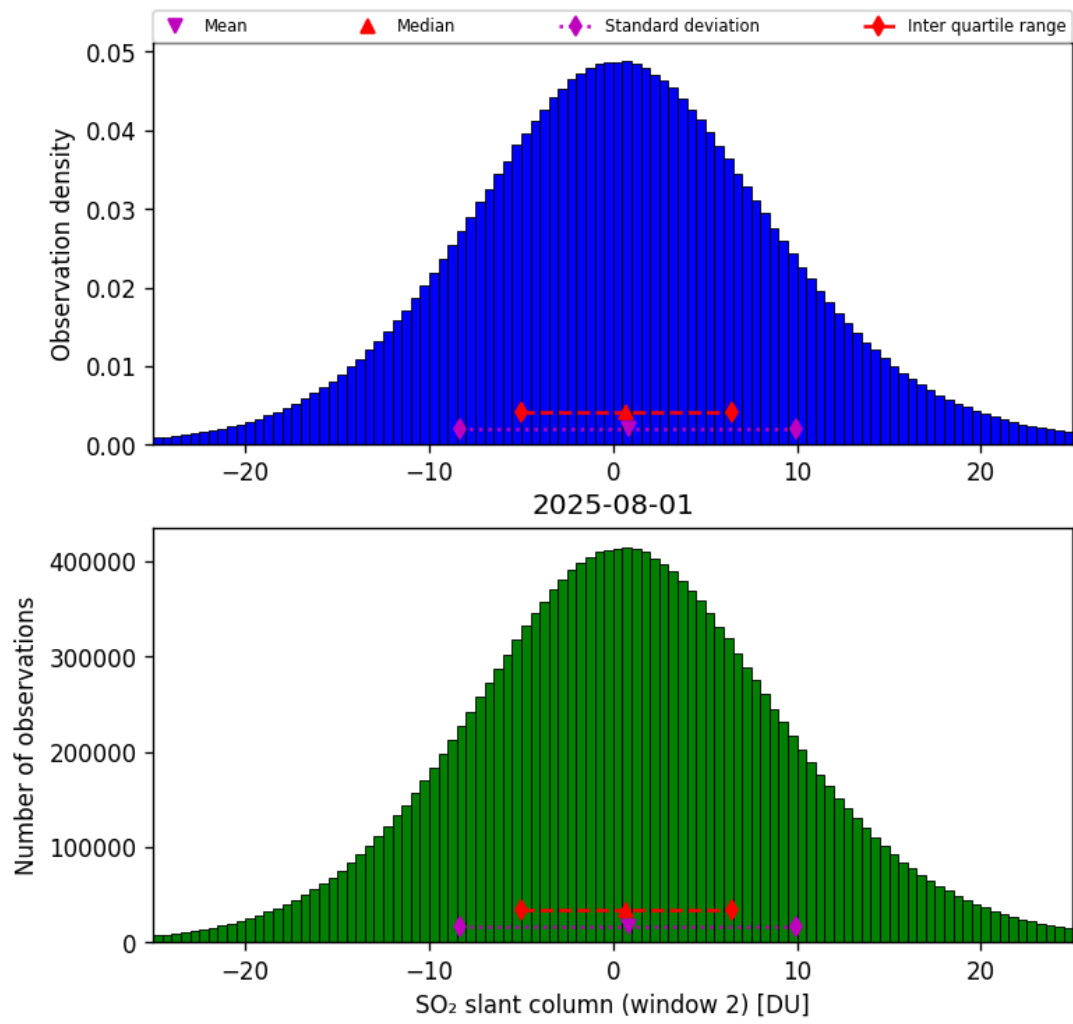


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-08-01 to 2025-08-01

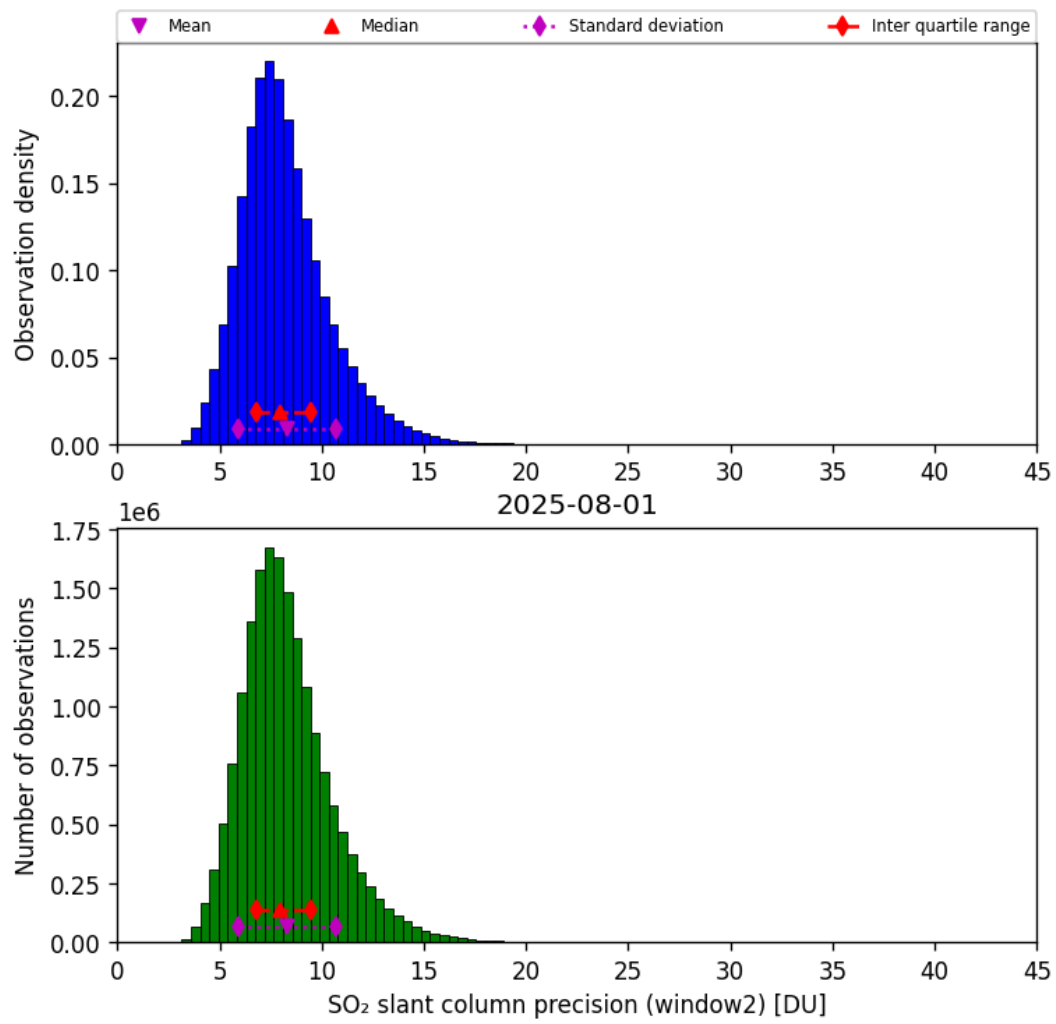


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-08-01 to 2025-08-01

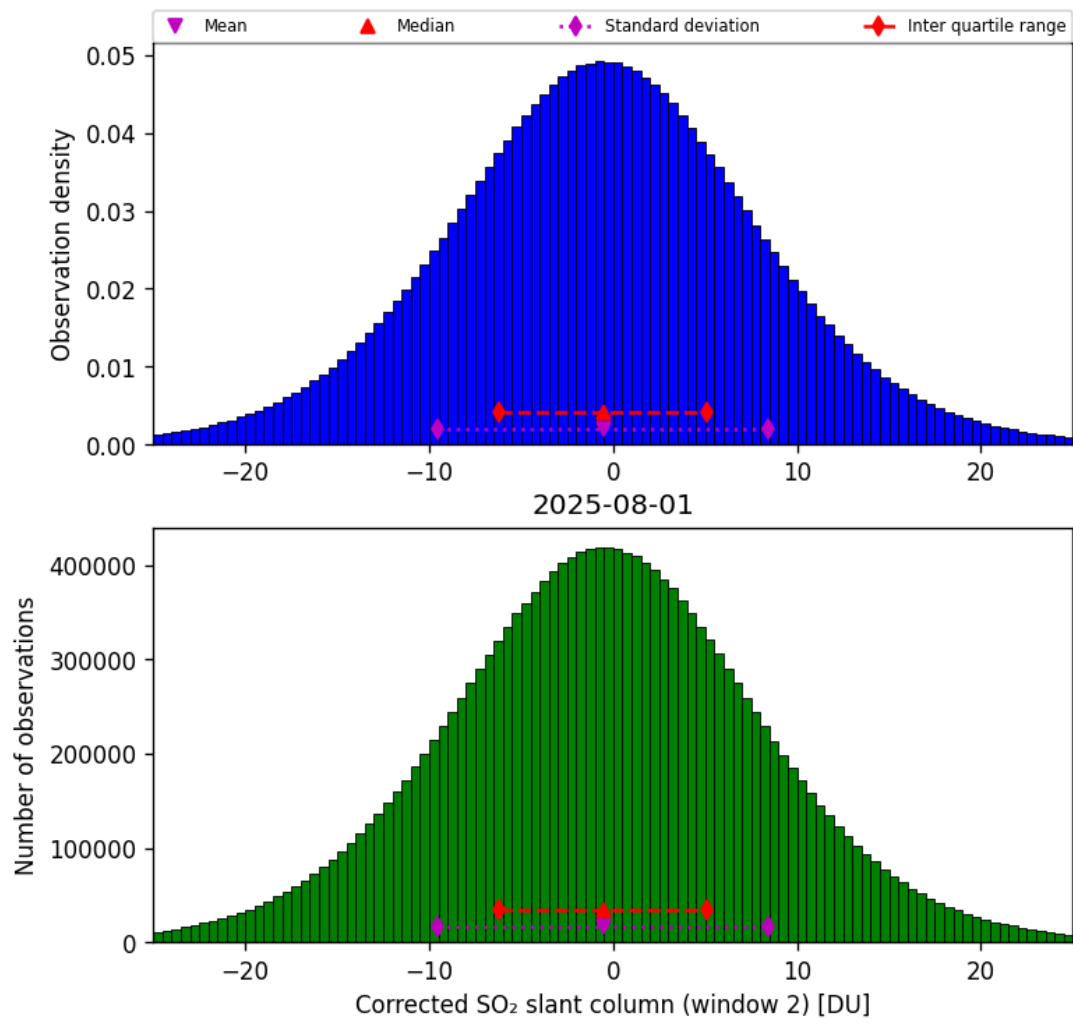


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-08-01 to 2025-08-01

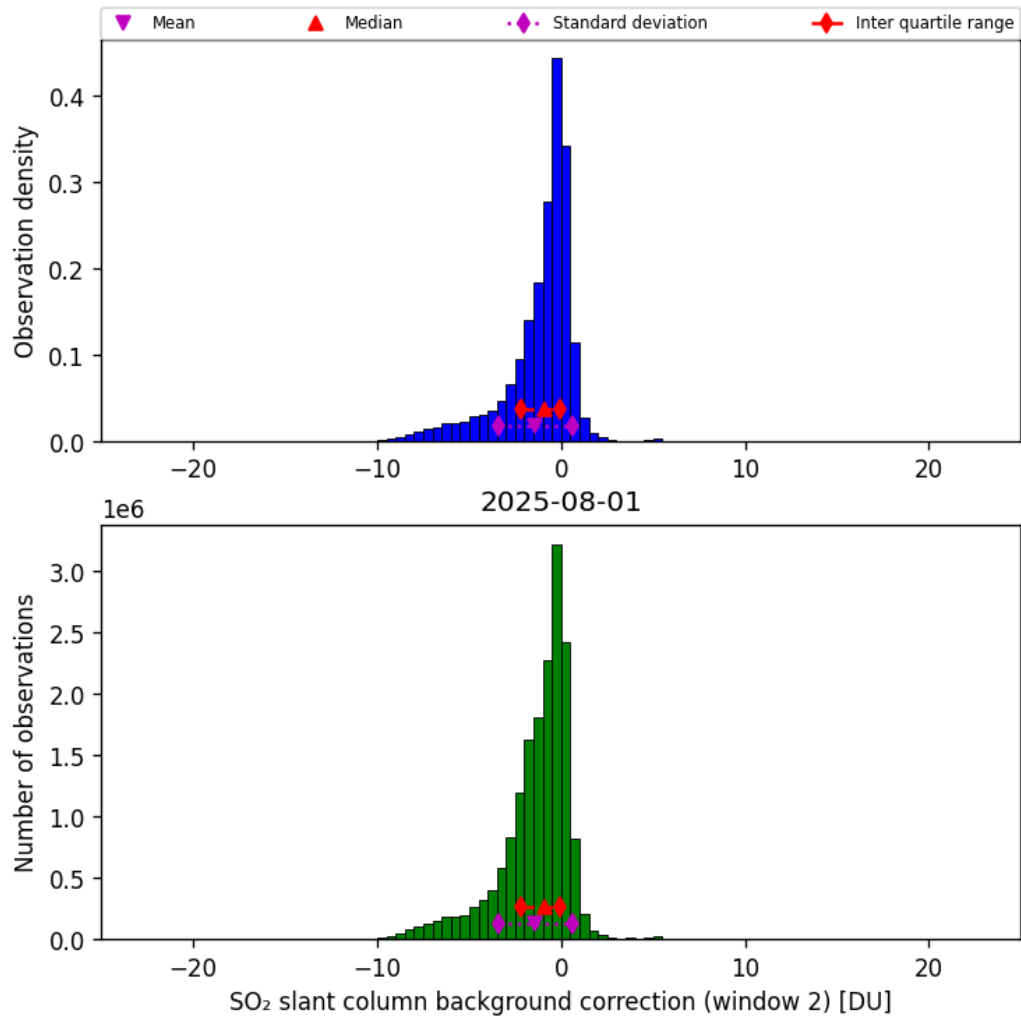


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-08-01 to 2025-08-01

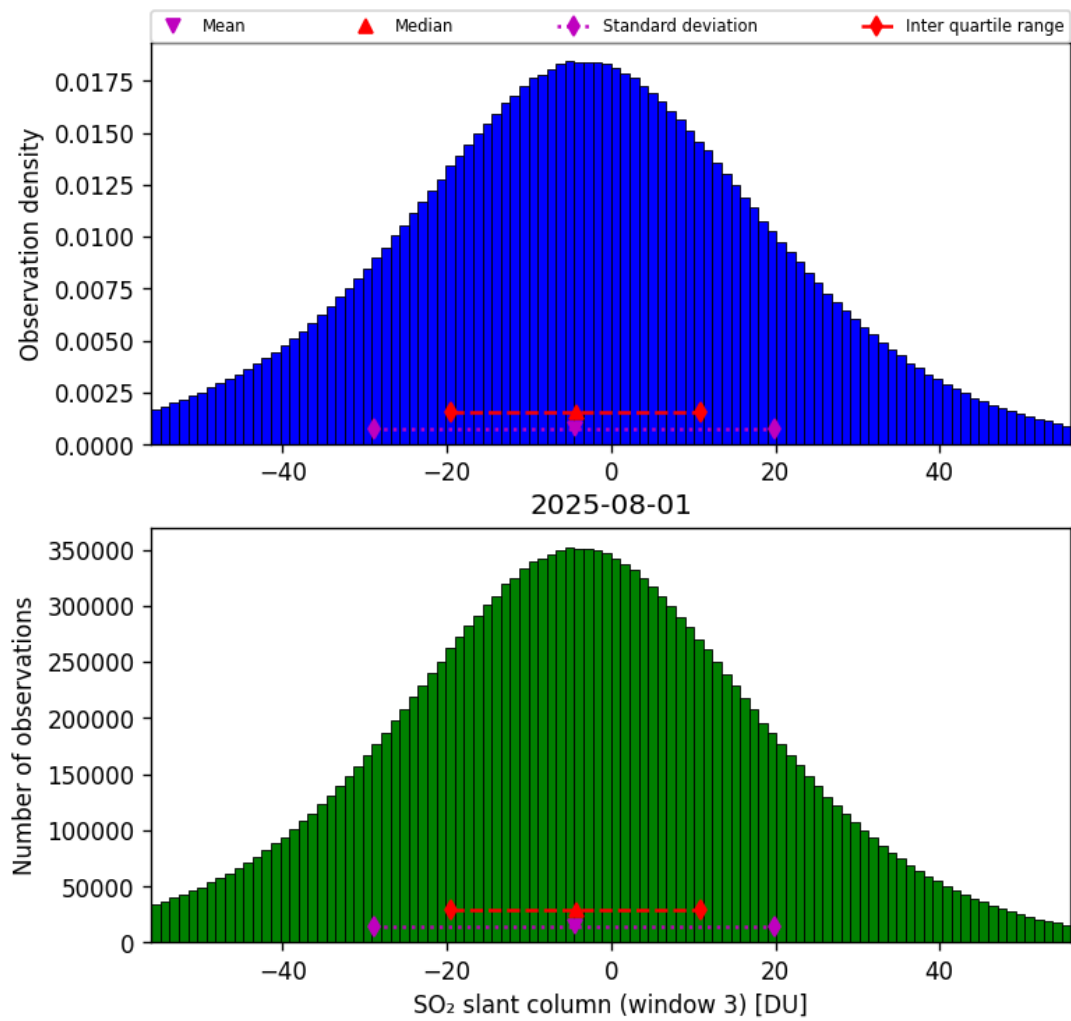


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-08-01 to 2025-08-01

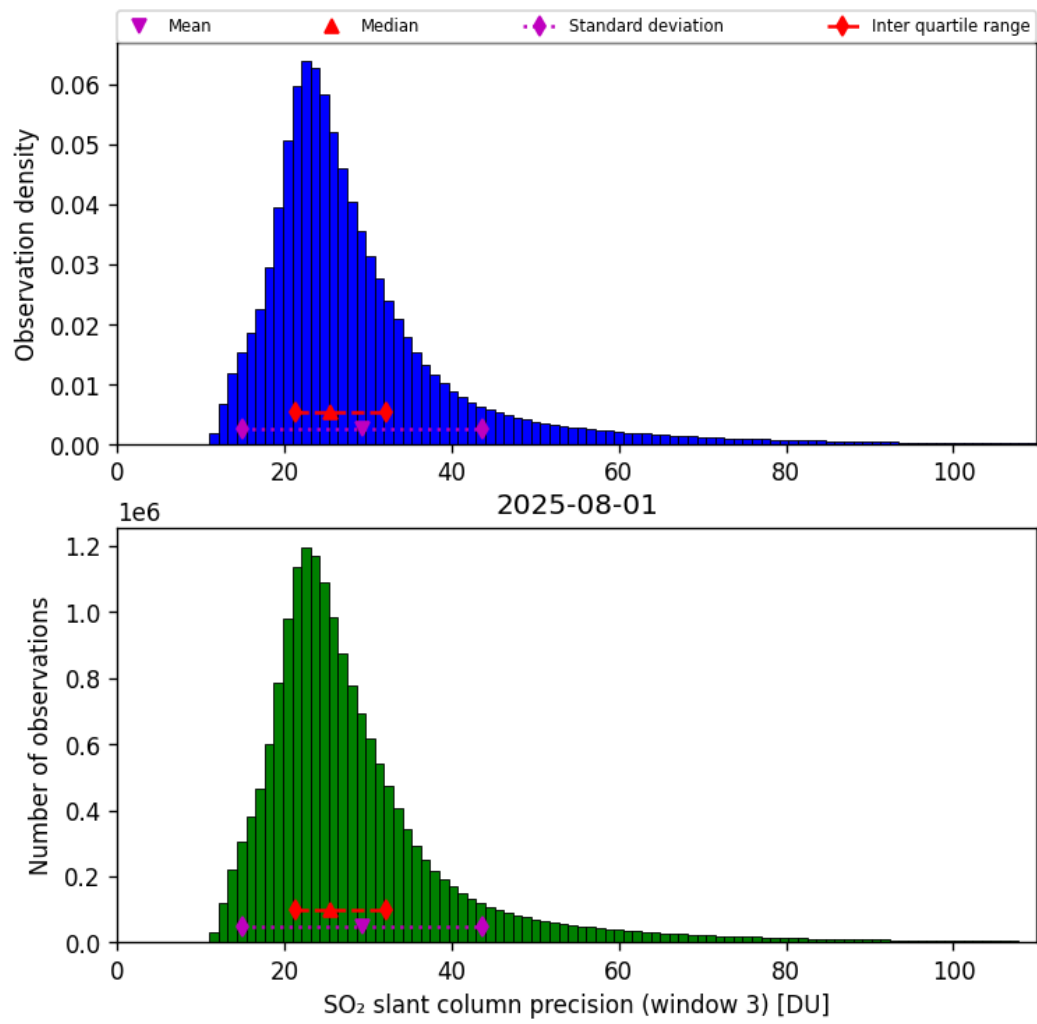


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-08-01 to 2025-08-01

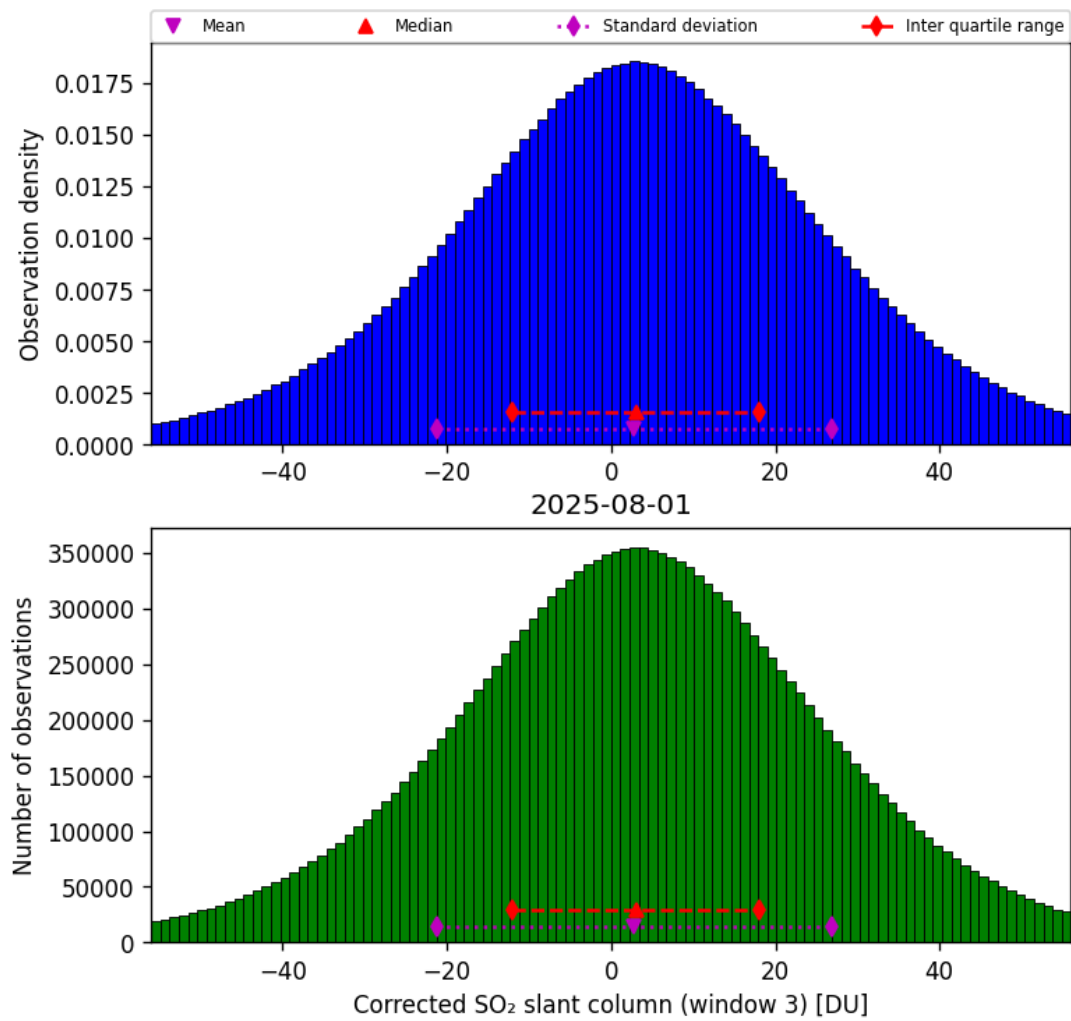


Figure 73: Histogram of "Corrected SO₂ slant column (window 3)" for 2025-08-01 to 2025-08-01

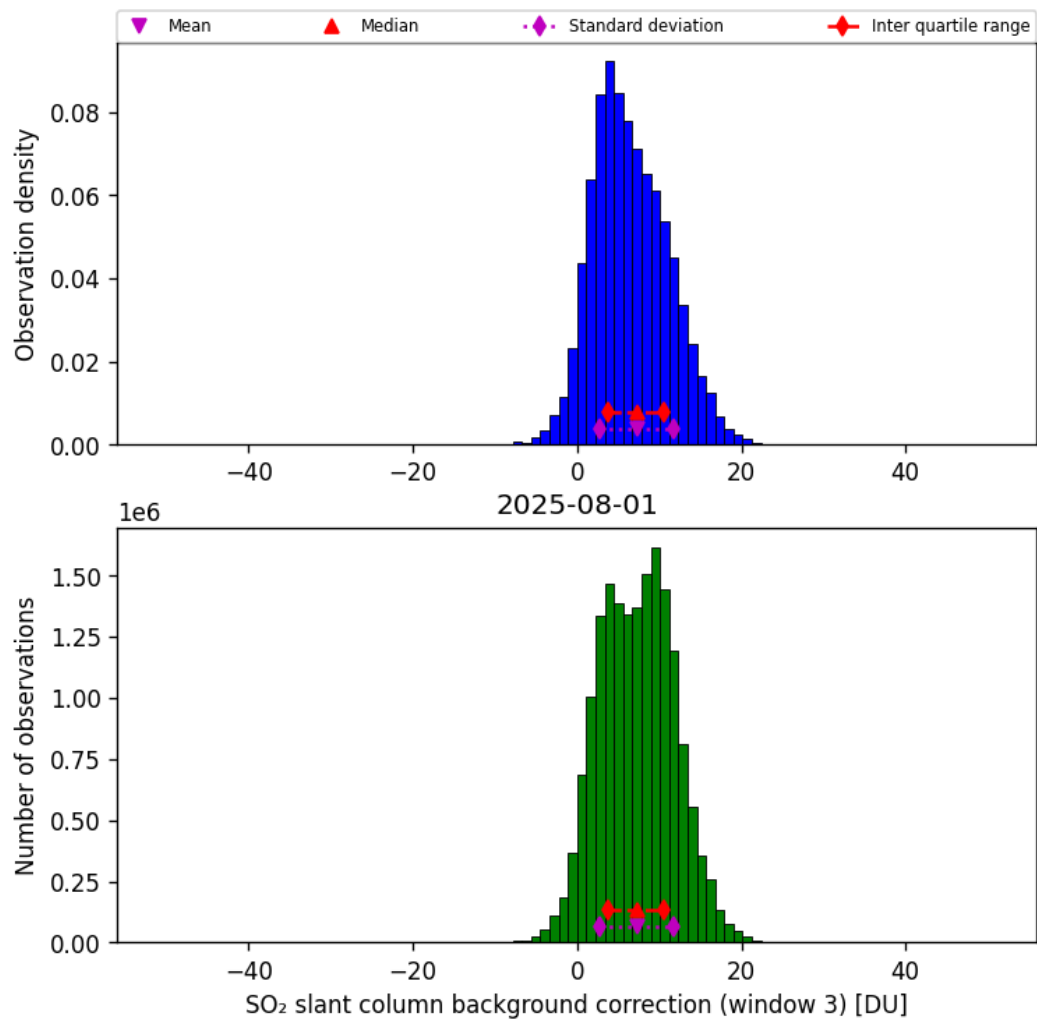


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-08-01 to 2025-08-01

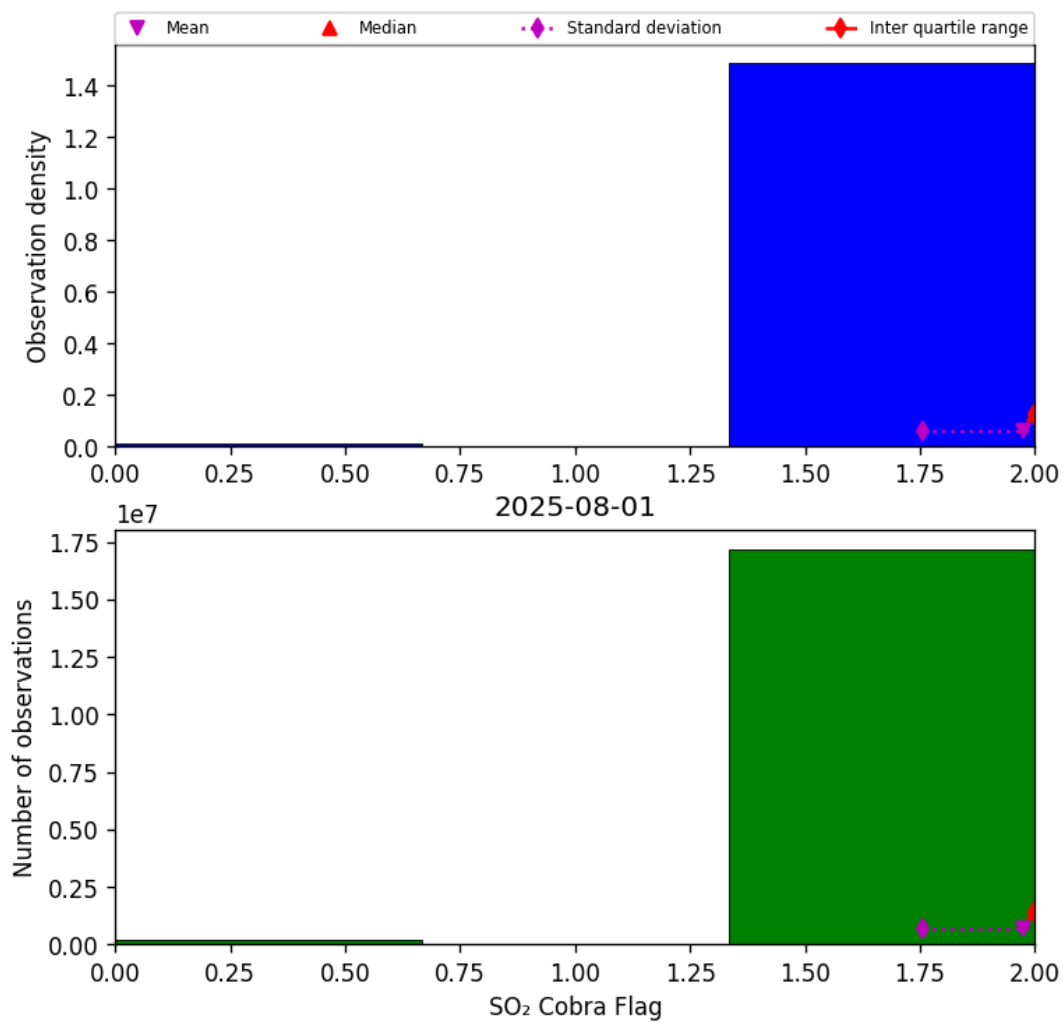


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-08-01 to 2025-08-01

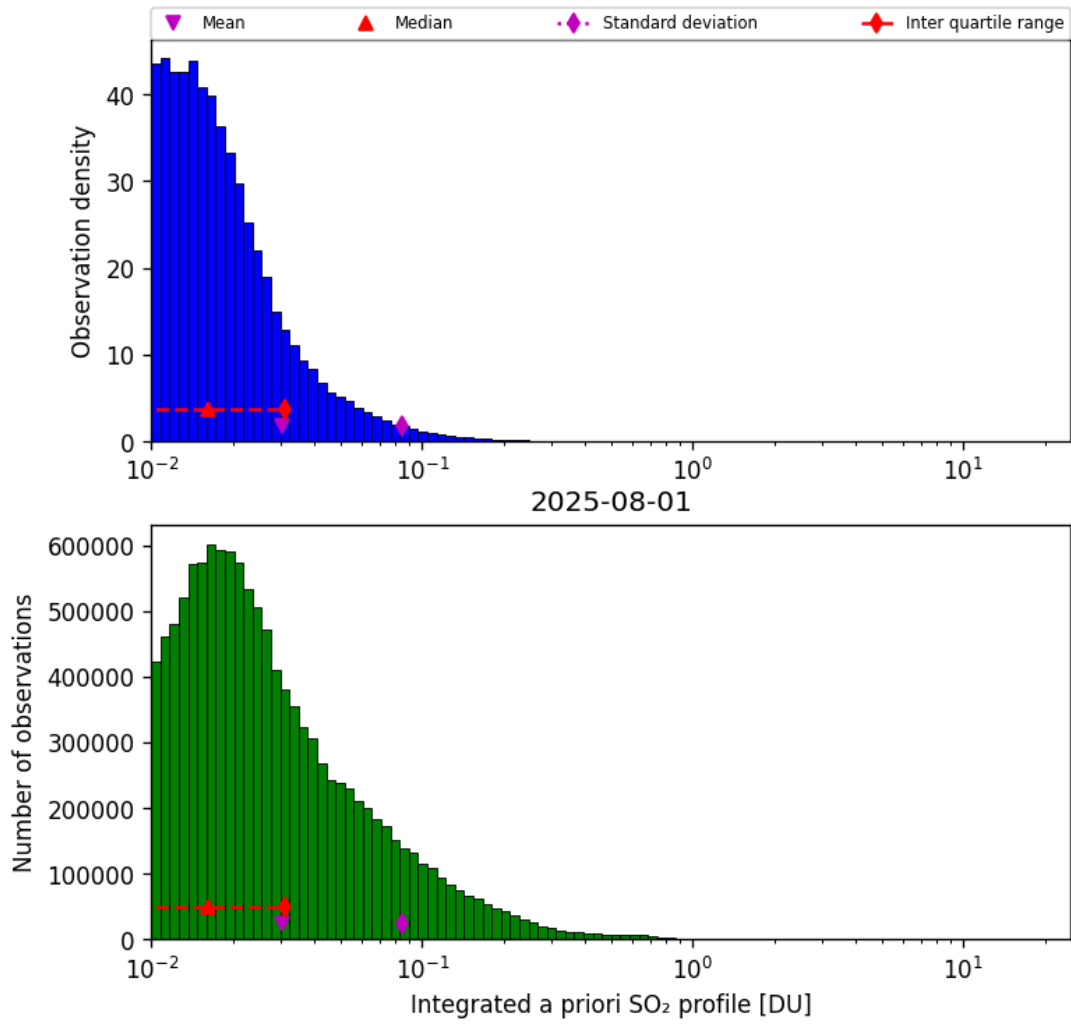


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-08-01 to 2025-08-01

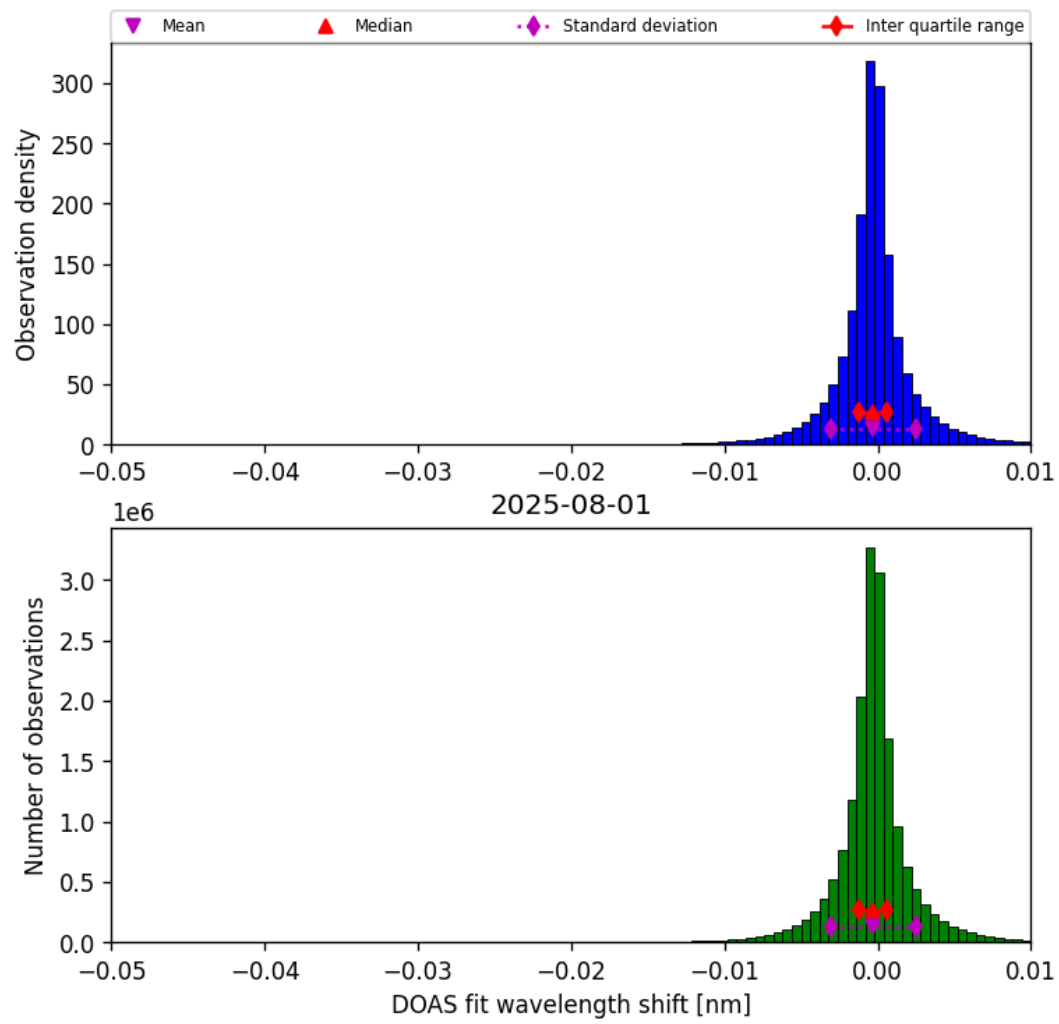


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-08-01 to 2025-08-01

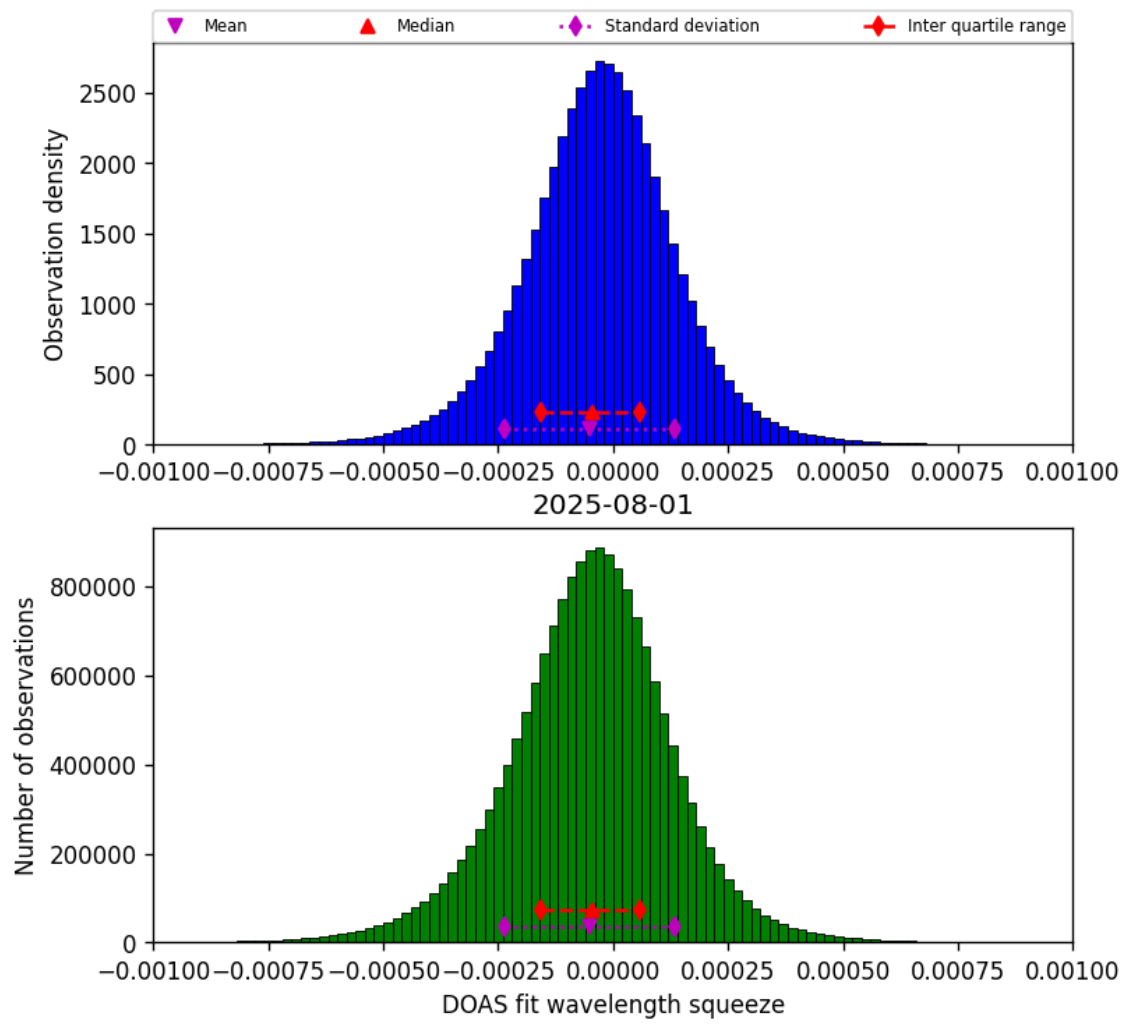


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-08-01 to 2025-08-01

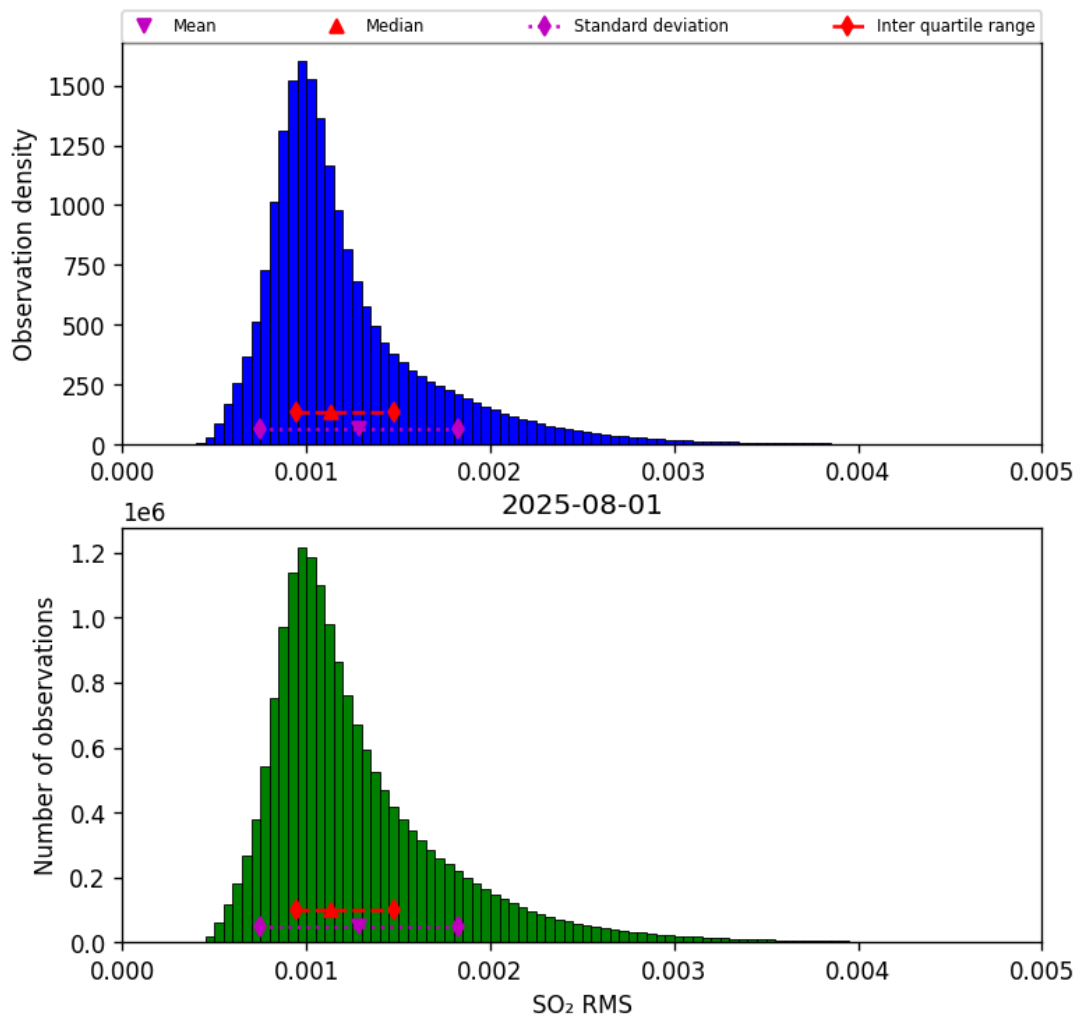


Figure 79: Histogram of “SO₂ RMS” for 2025-08-01 to 2025-08-01

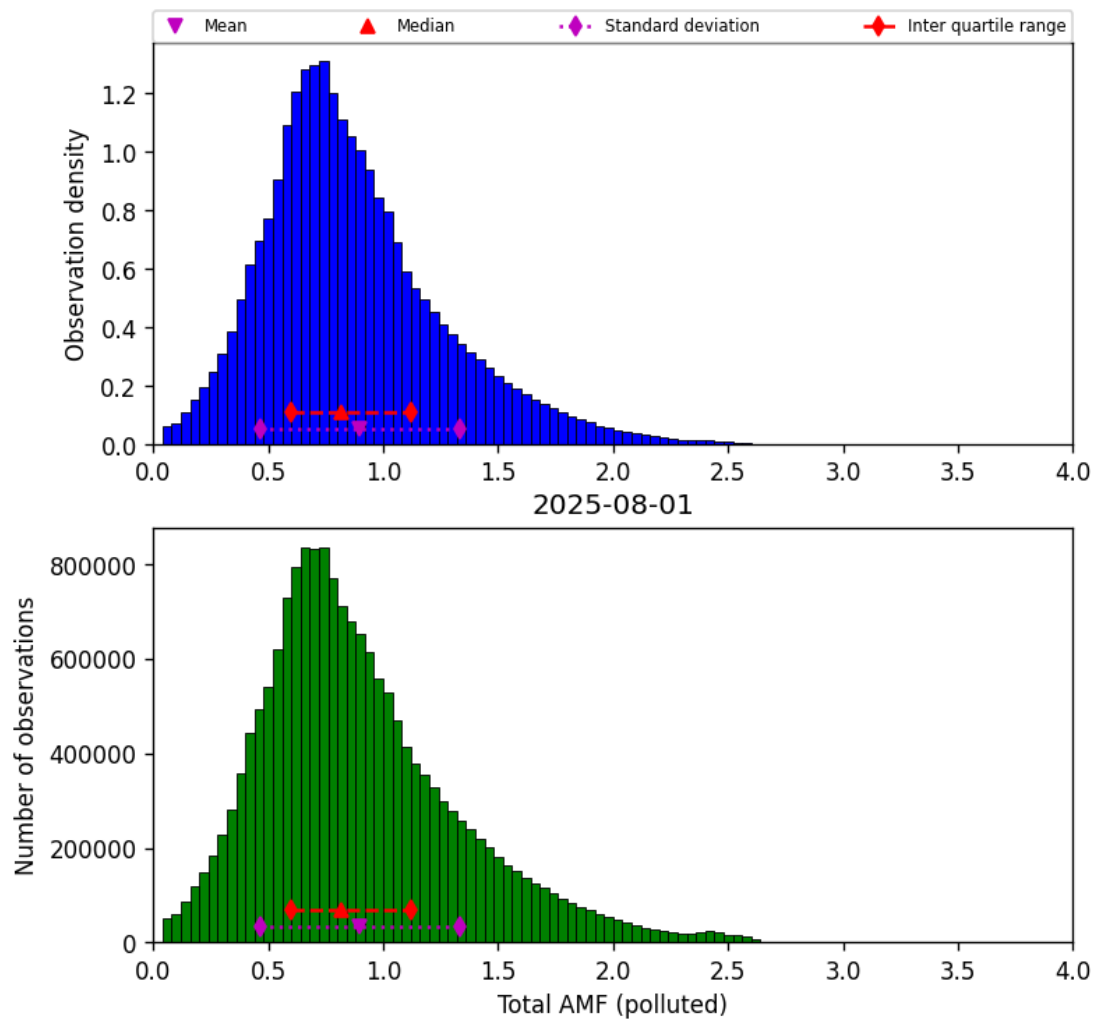


Figure 80: Histogram of “Total AMF (polluted)” for 2025-08-01 to 2025-08-01

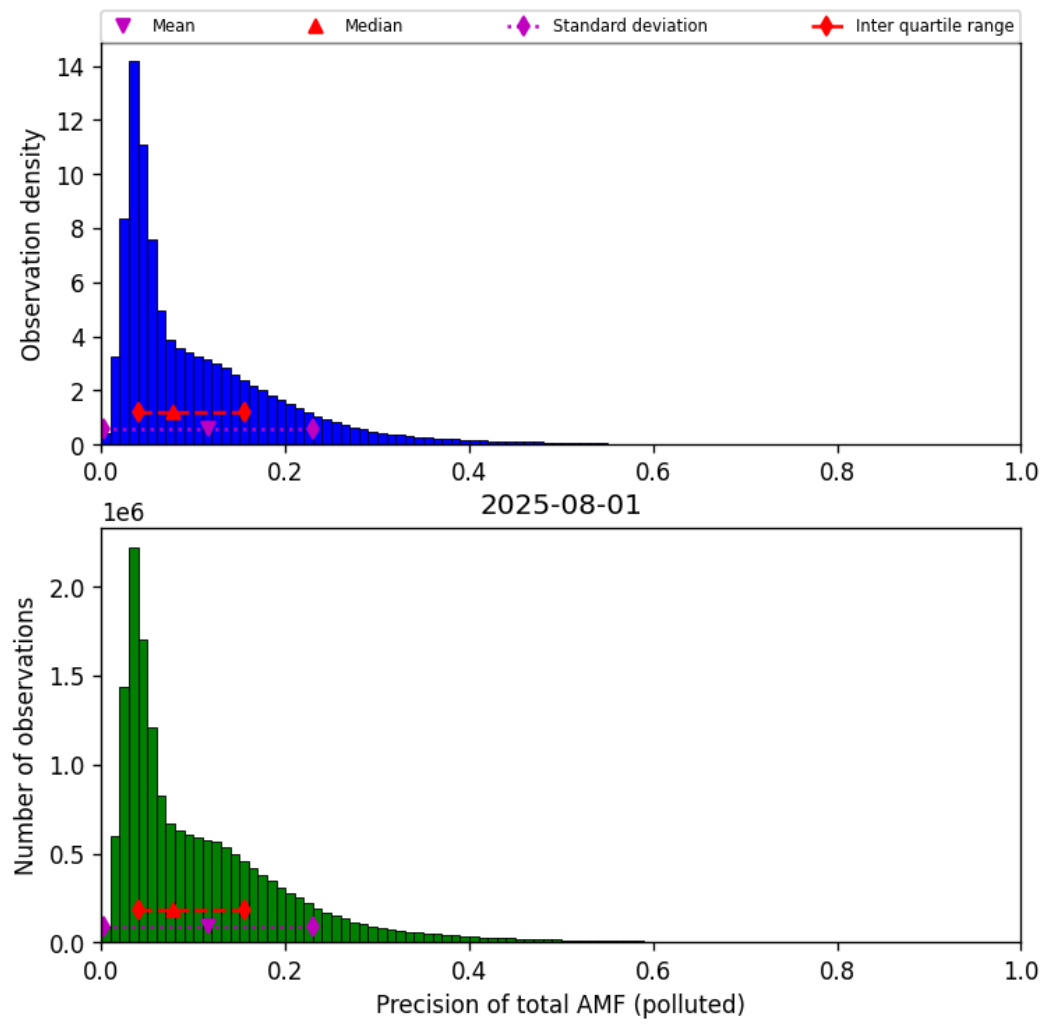


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-08-01 to 2025-08-01

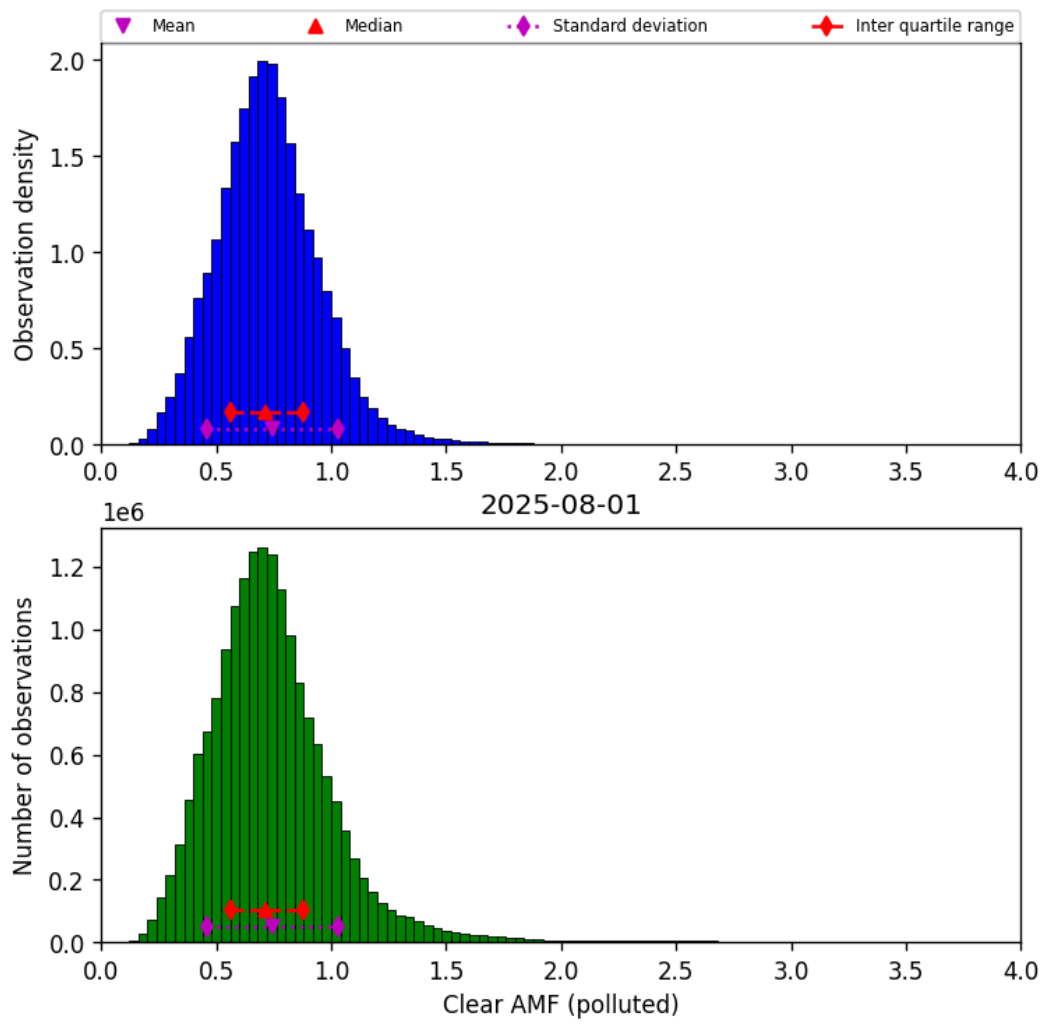


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-08-01 to 2025-08-01

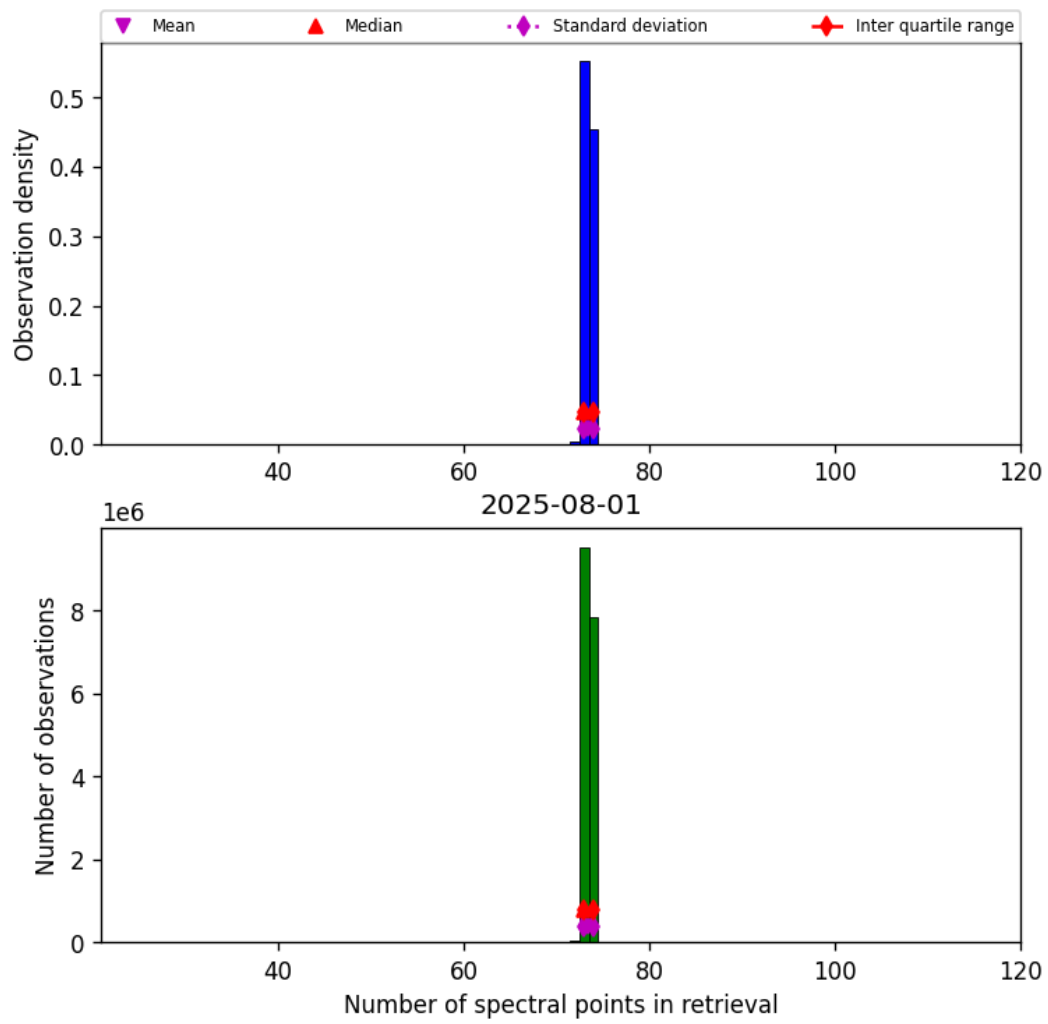


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-08-01 to 2025-08-01

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.

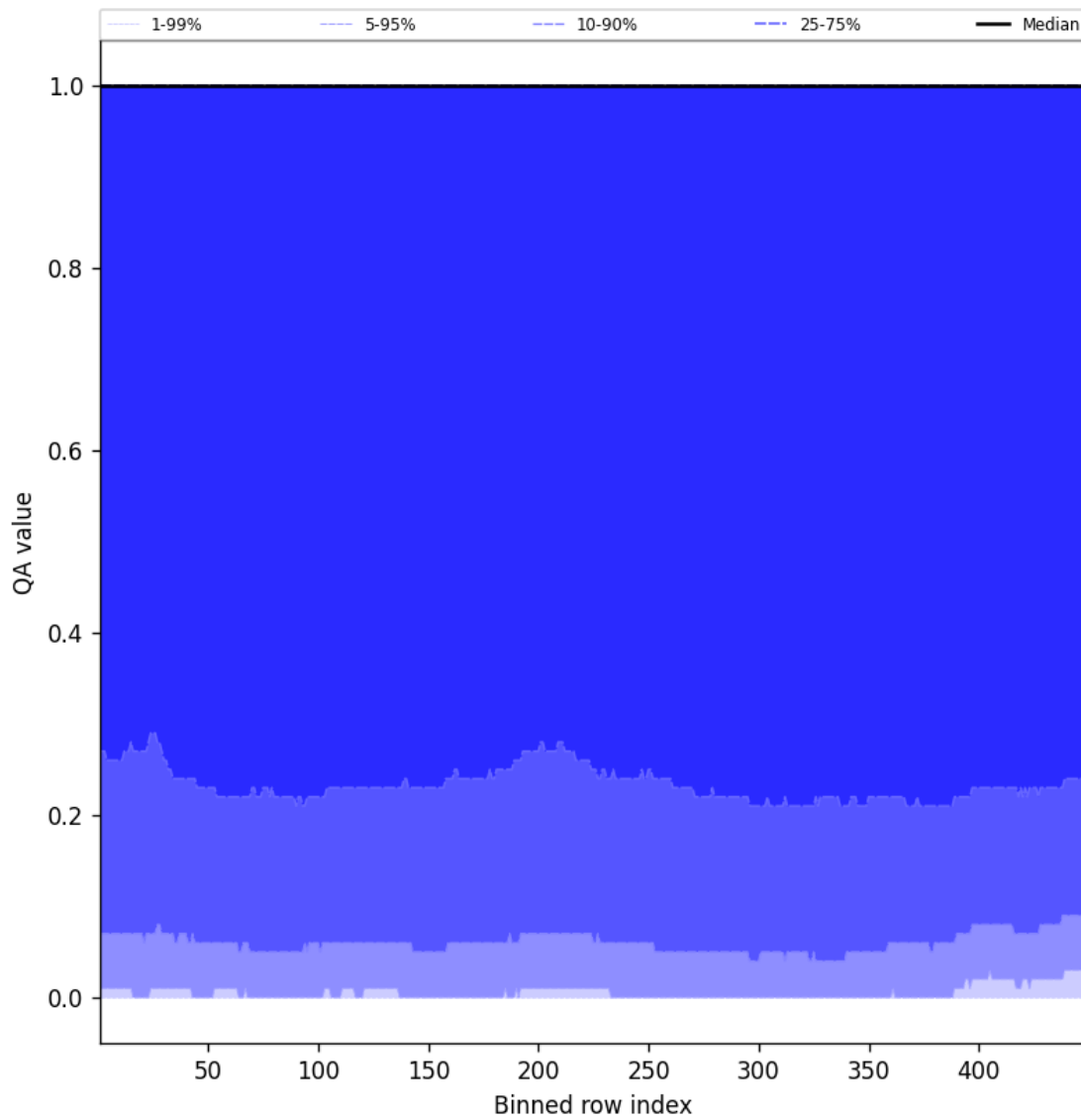


Figure 84: Along track statistics of “QA value” for 2025-08-01 to 2025-08-01

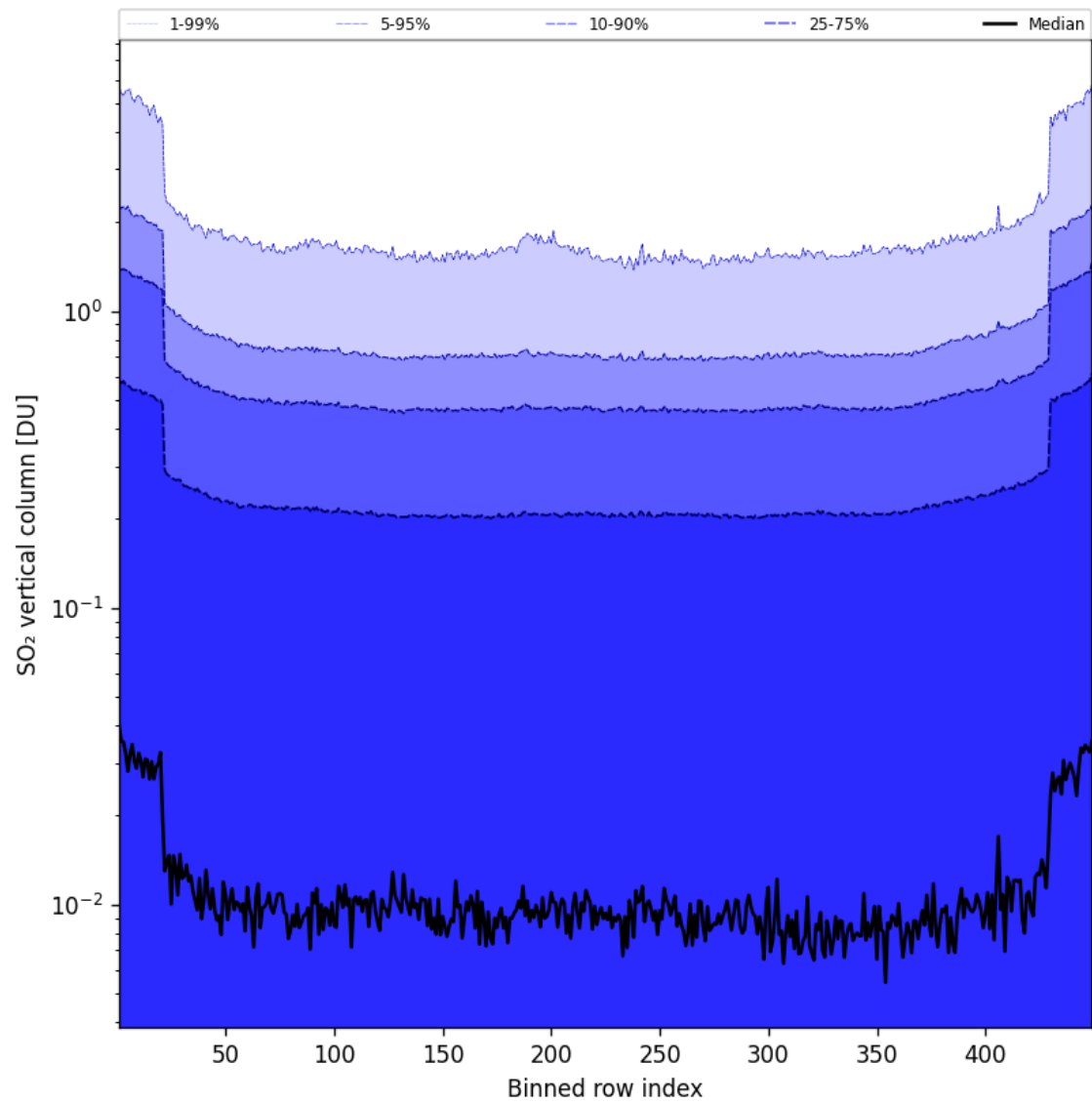


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-08-01 to 2025-08-01

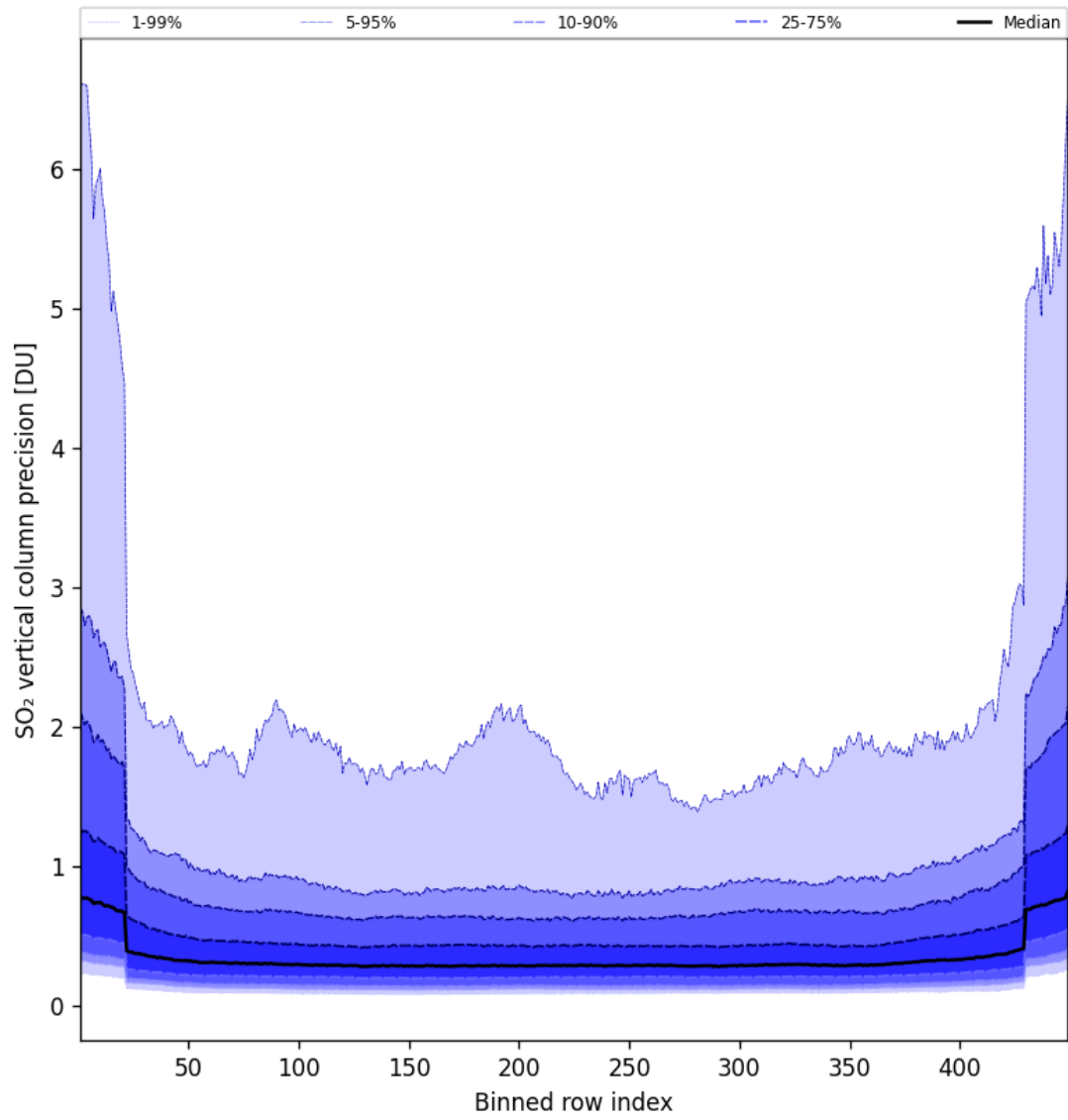


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-08-01 to 2025-08-01

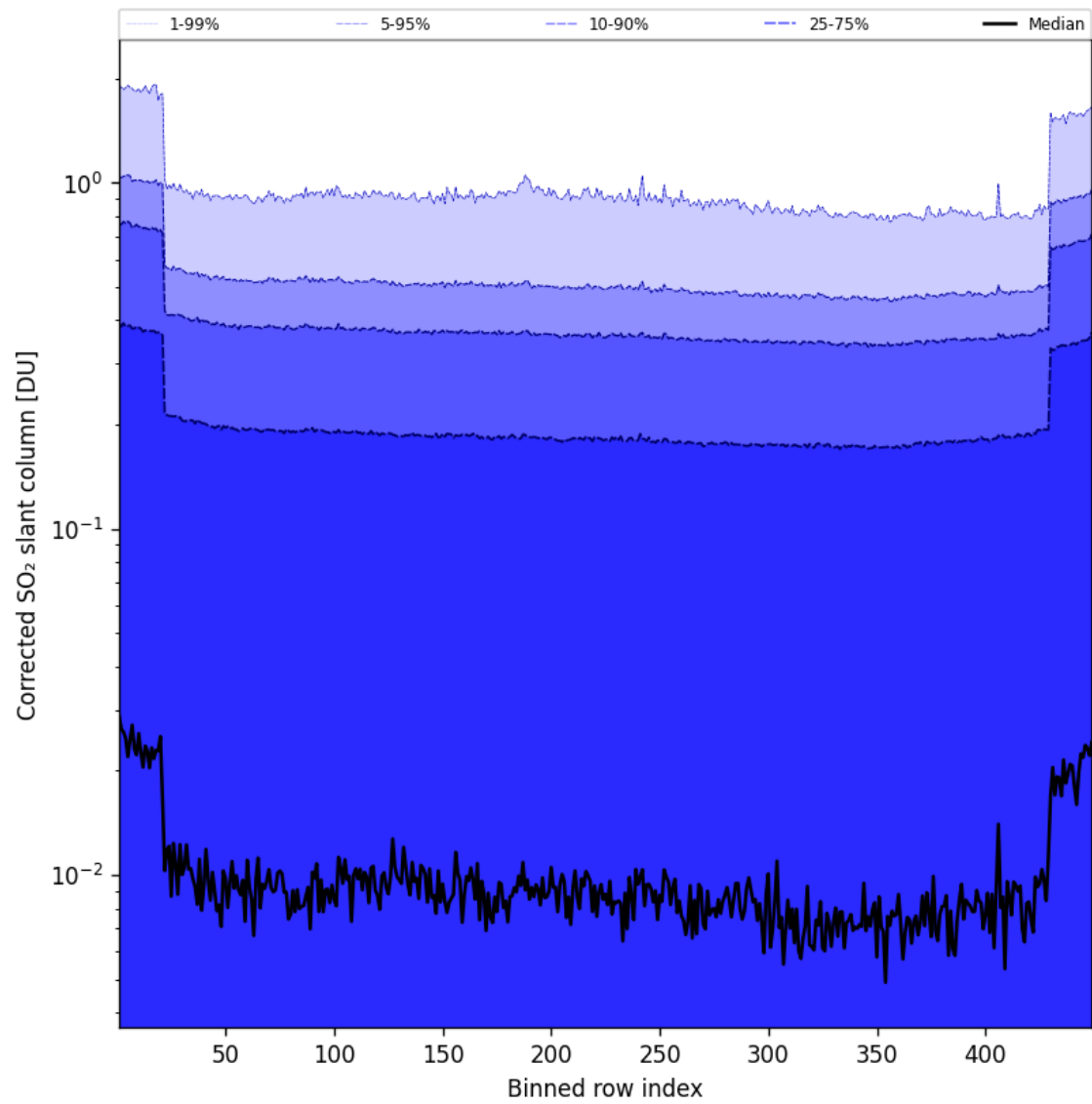


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-08-01 to 2025-08-01

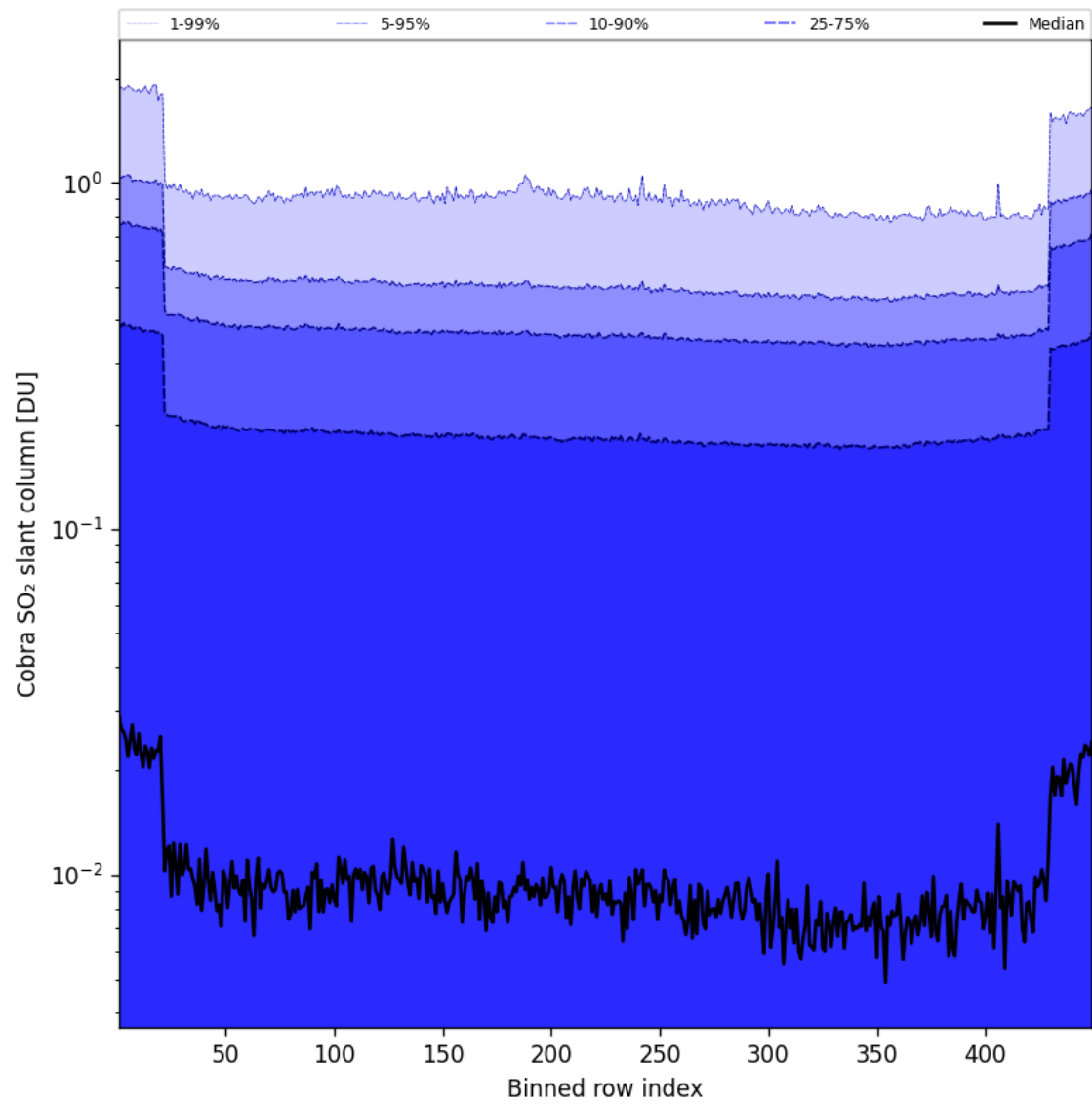


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-08-01 to 2025-08-01

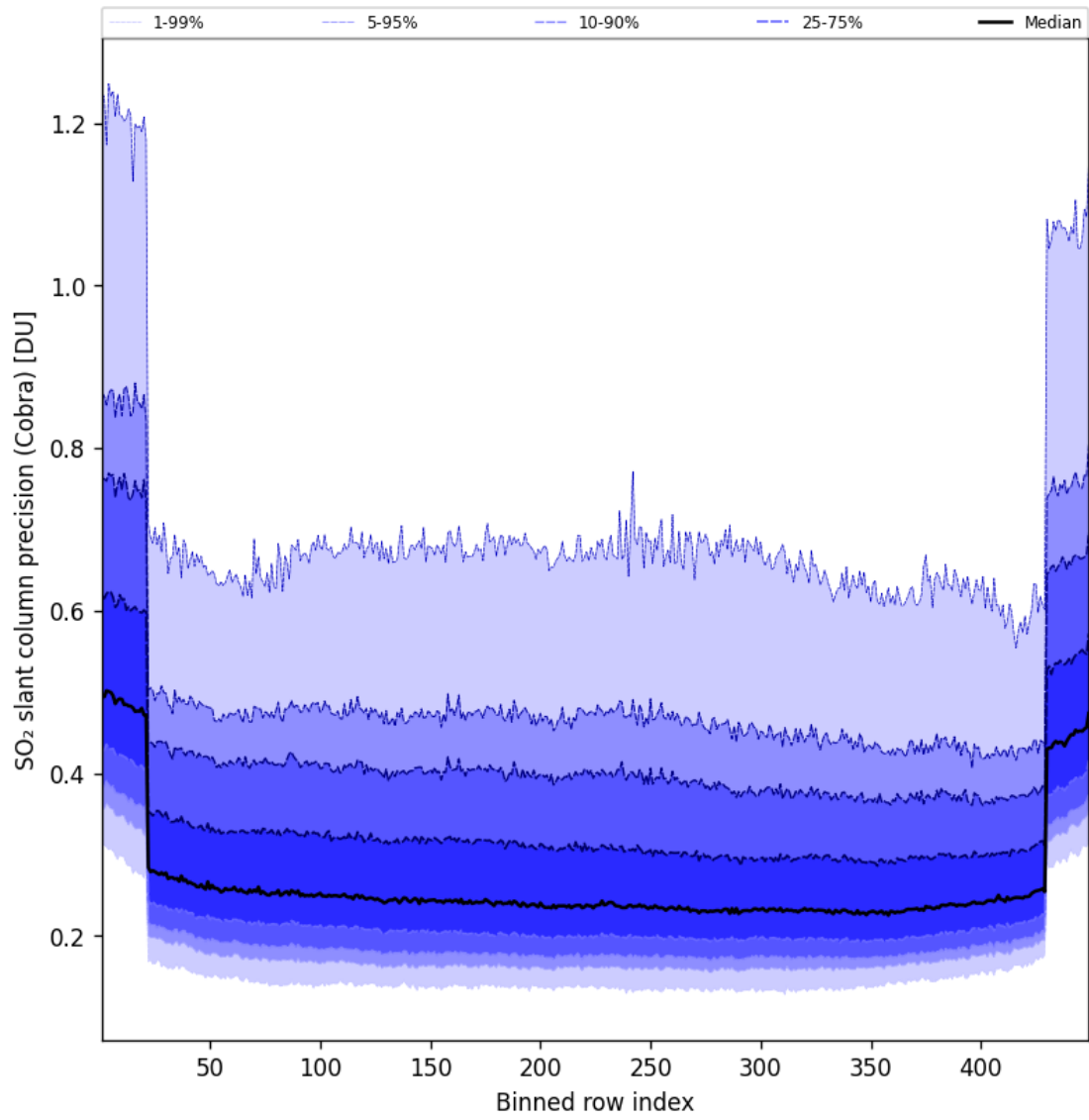


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-08-01 to 2025-08-01

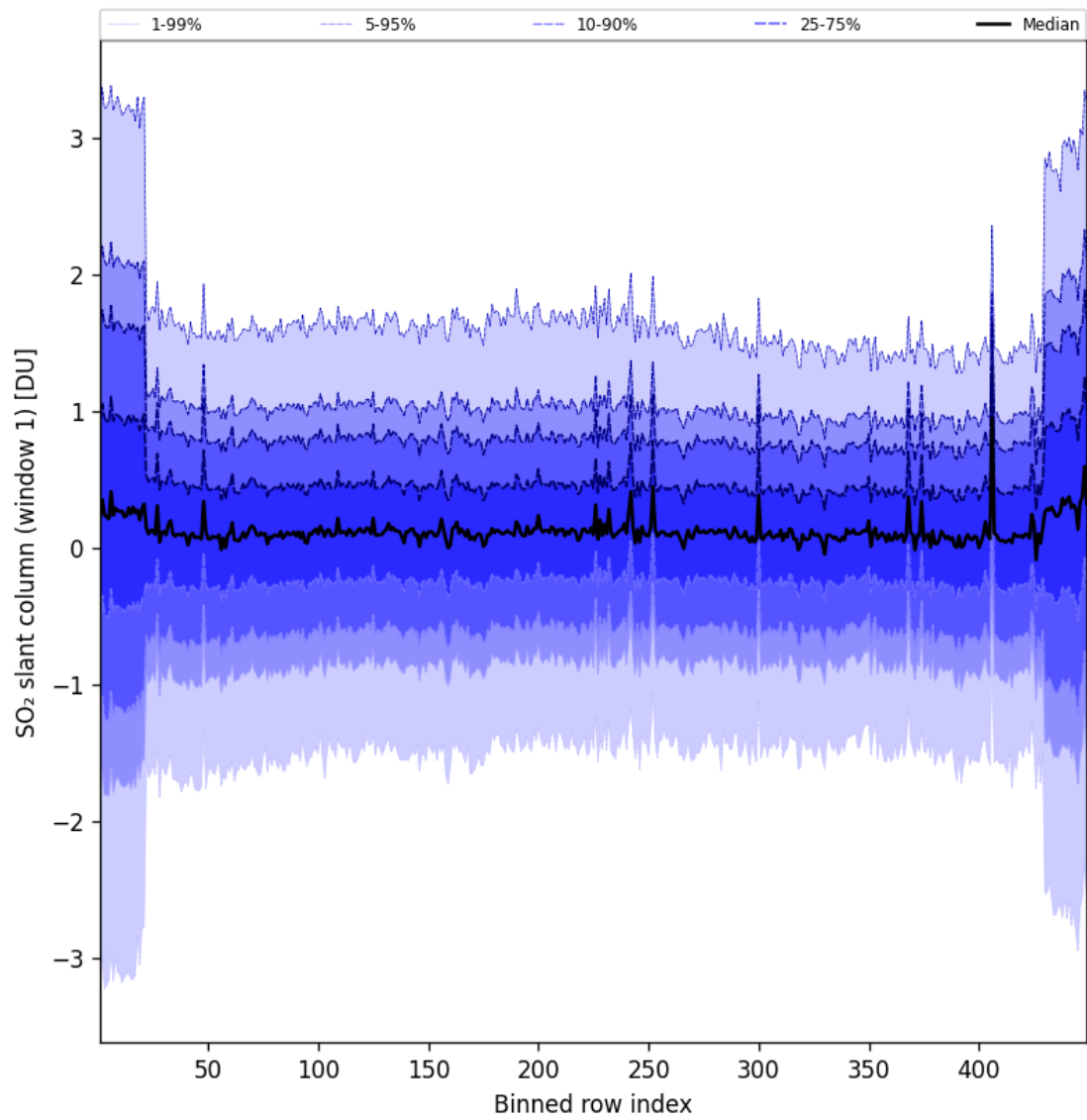


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-08-01 to 2025-08-01

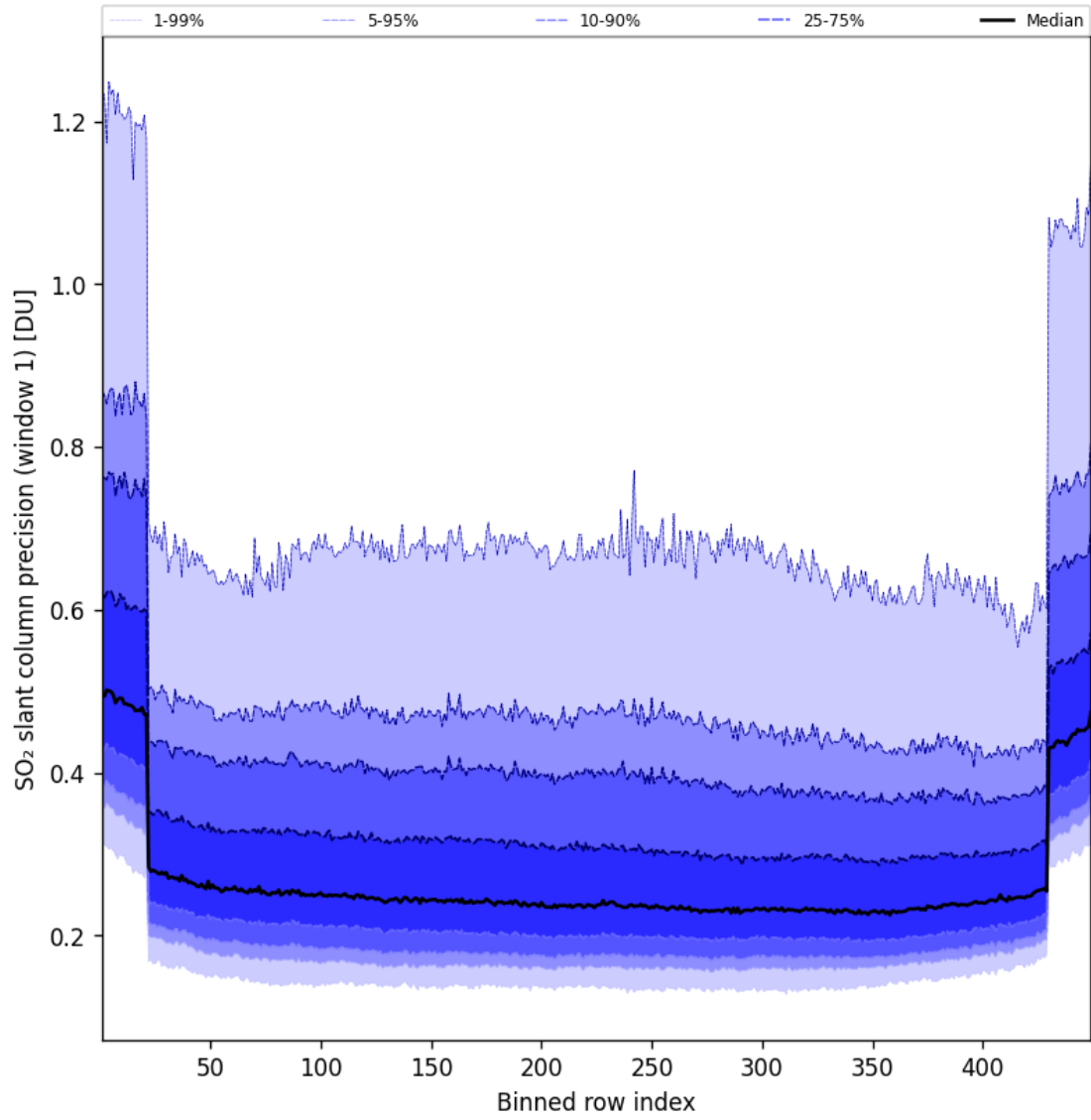


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-08-01 to 2025-08-01

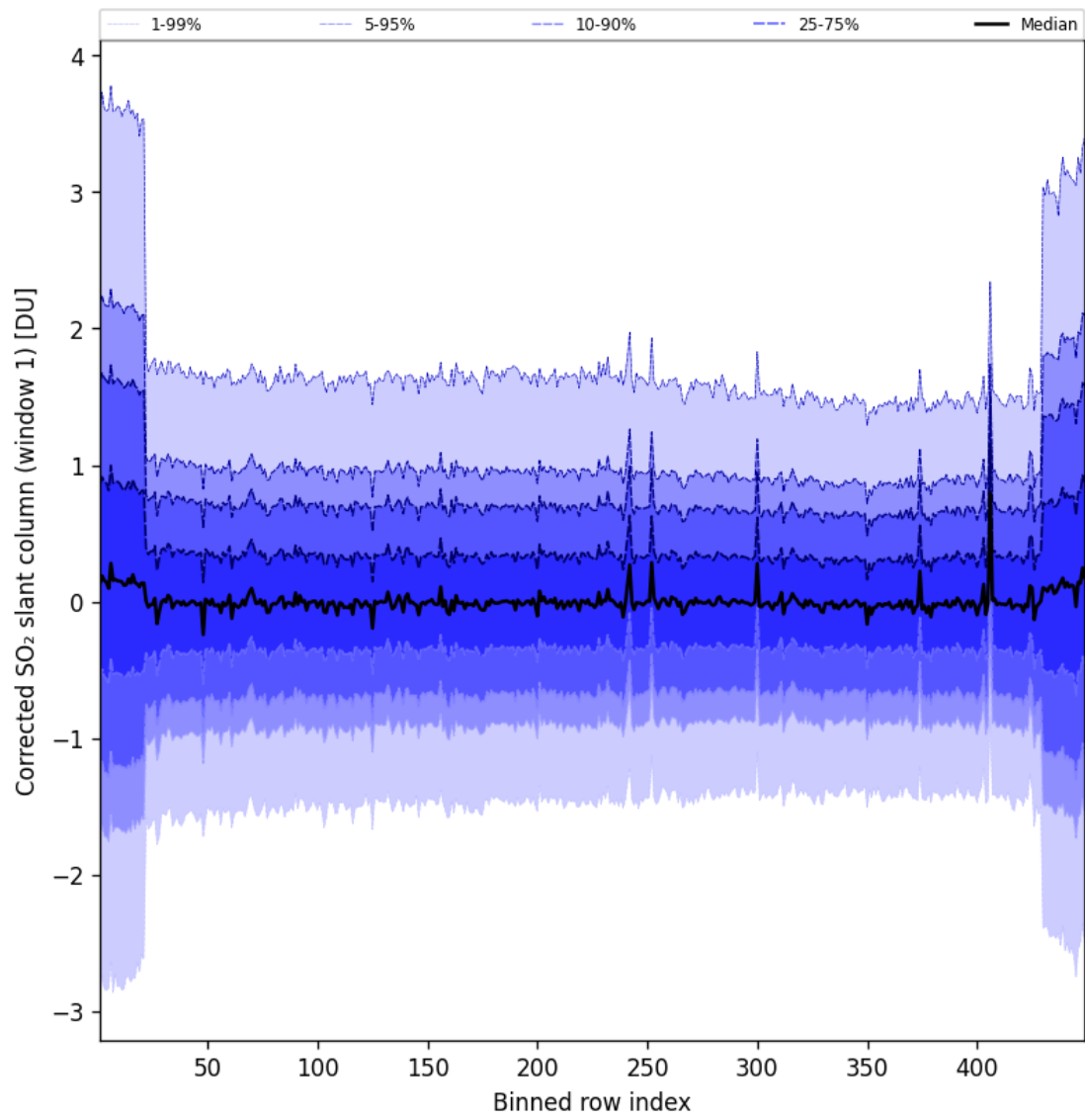


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-08-01 to 2025-08-01

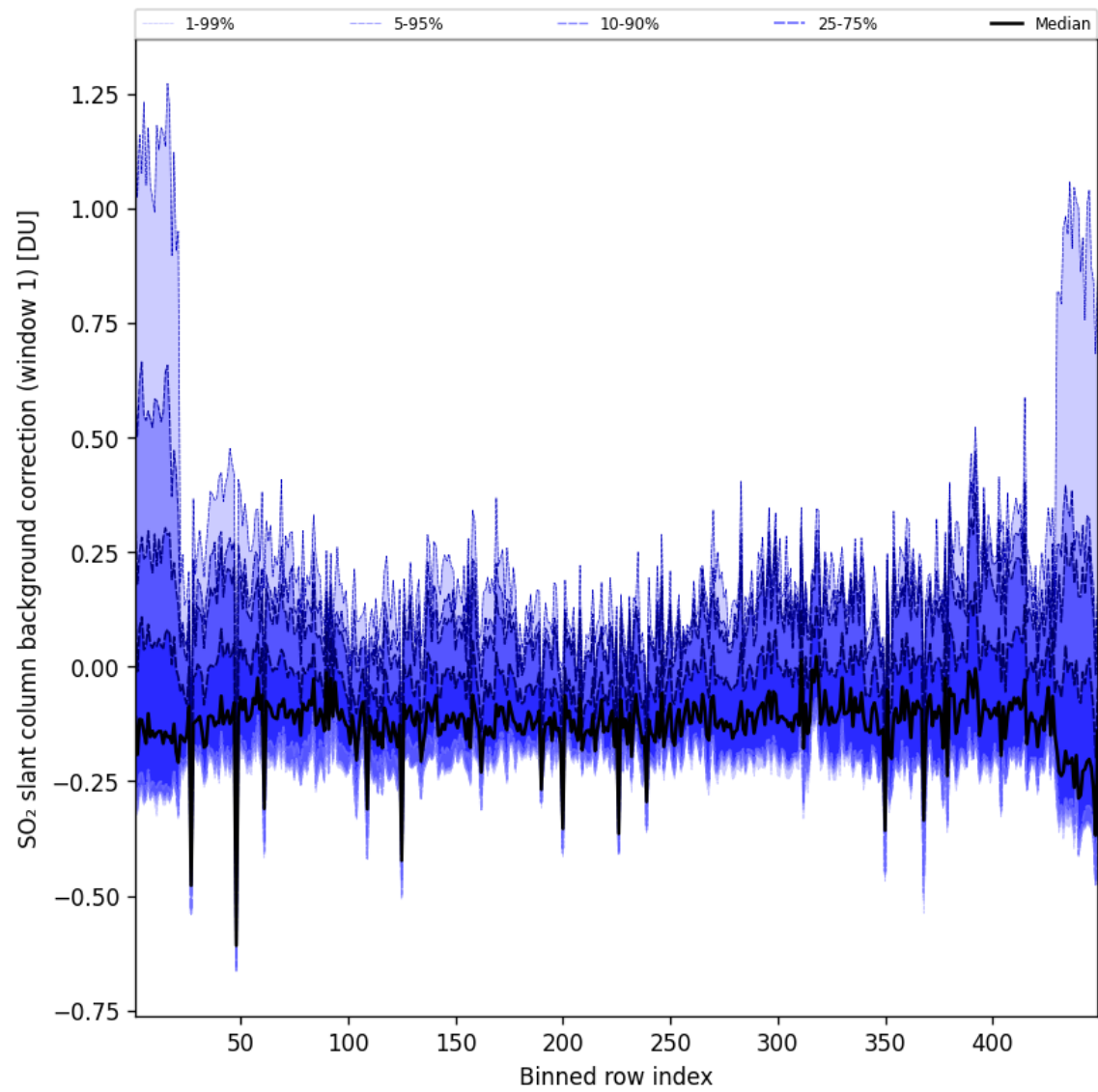


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-08-01 to 2025-08-01

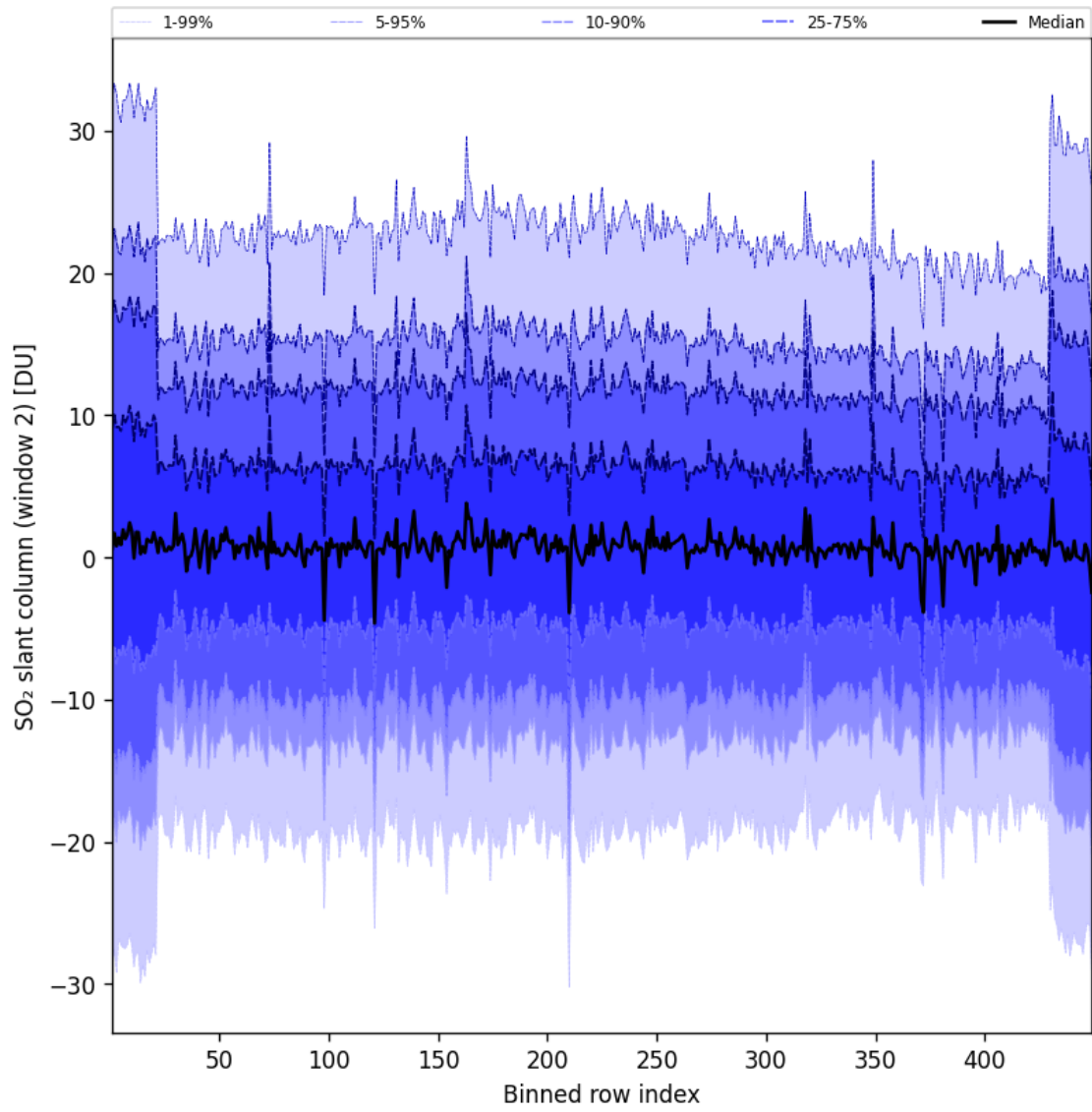


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-08-01 to 2025-08-01

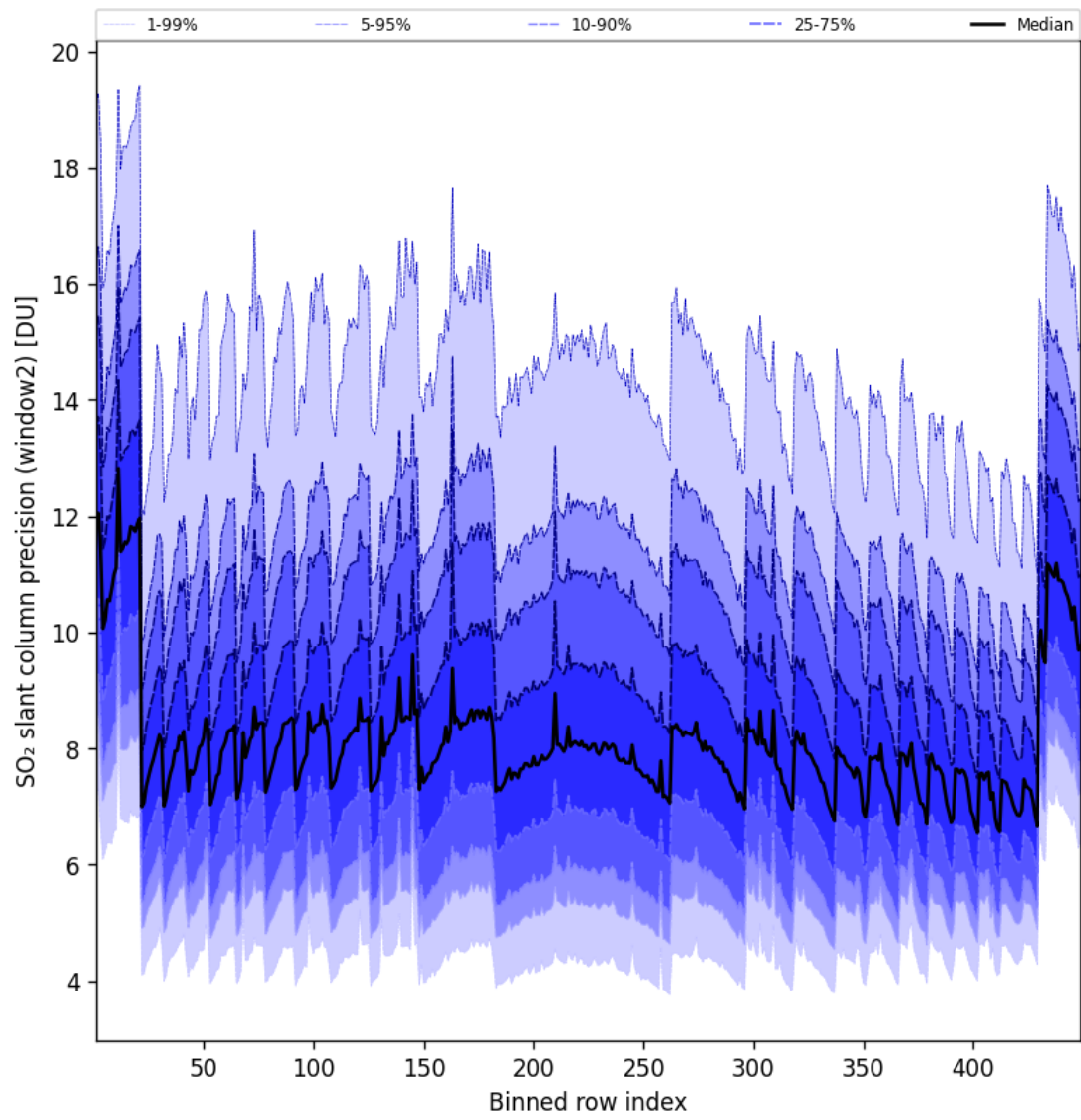


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-08-01 to 2025-08-01

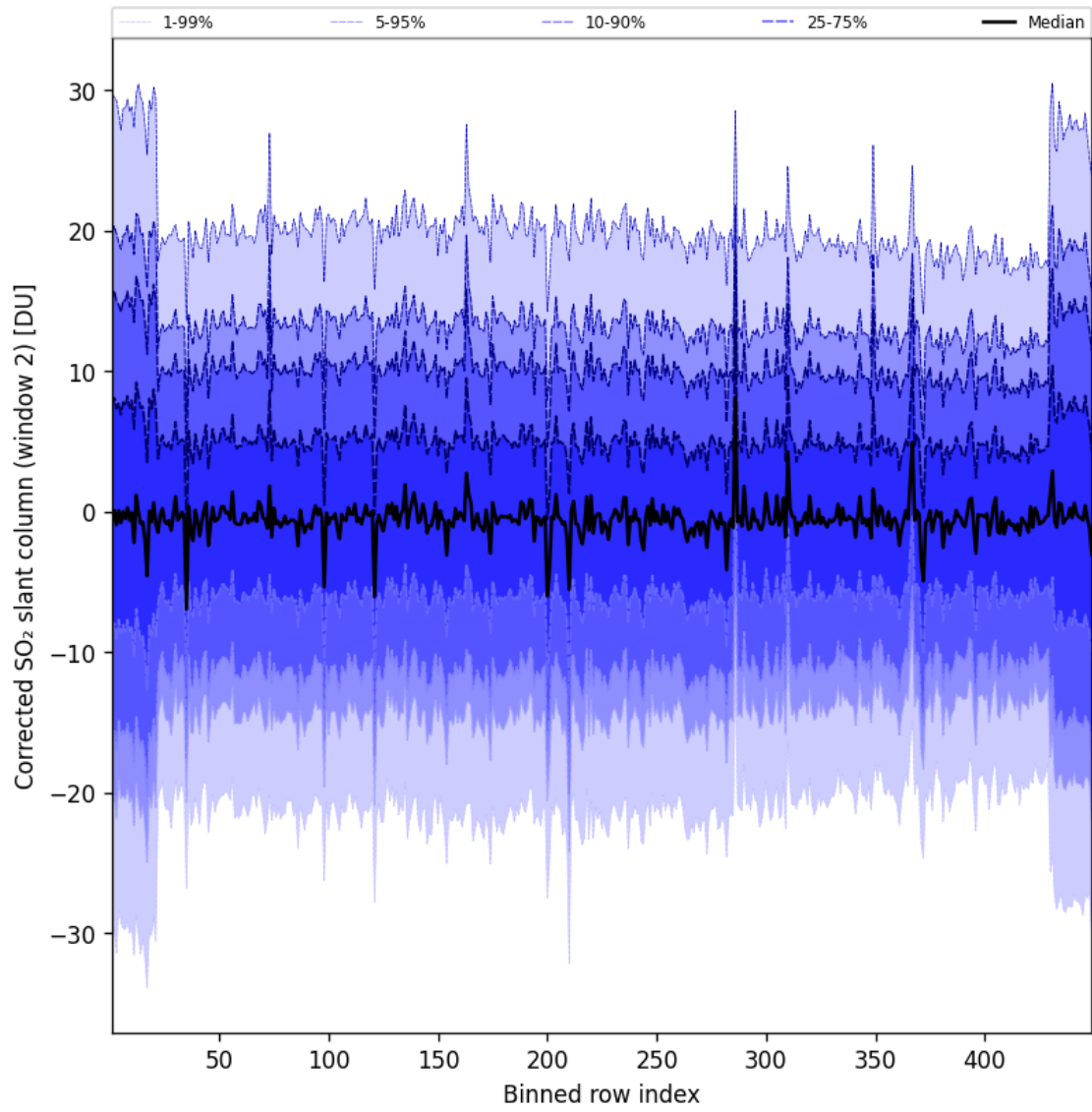


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-08-01 to 2025-08-01

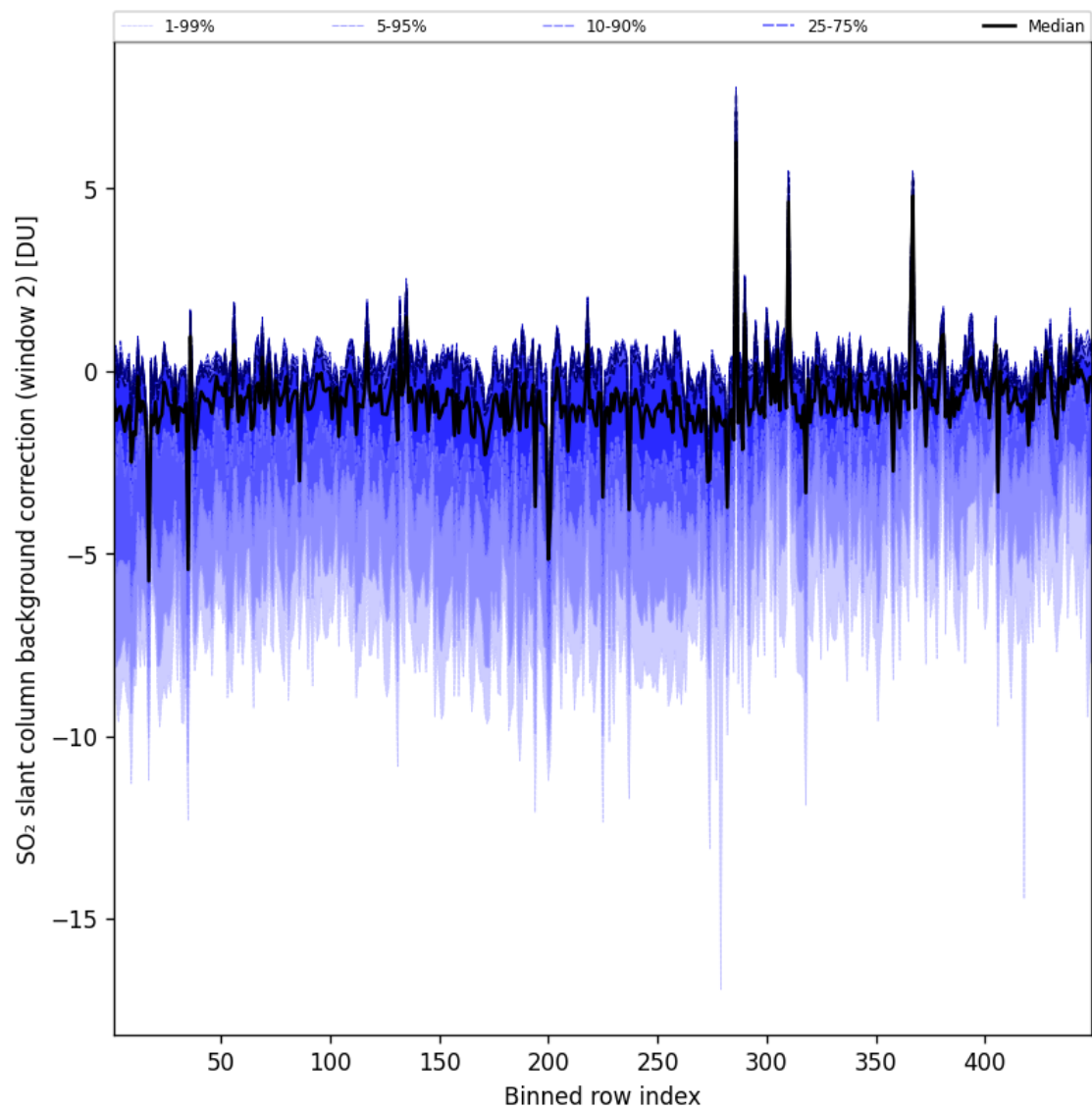


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-08-01 to 2025-08-01

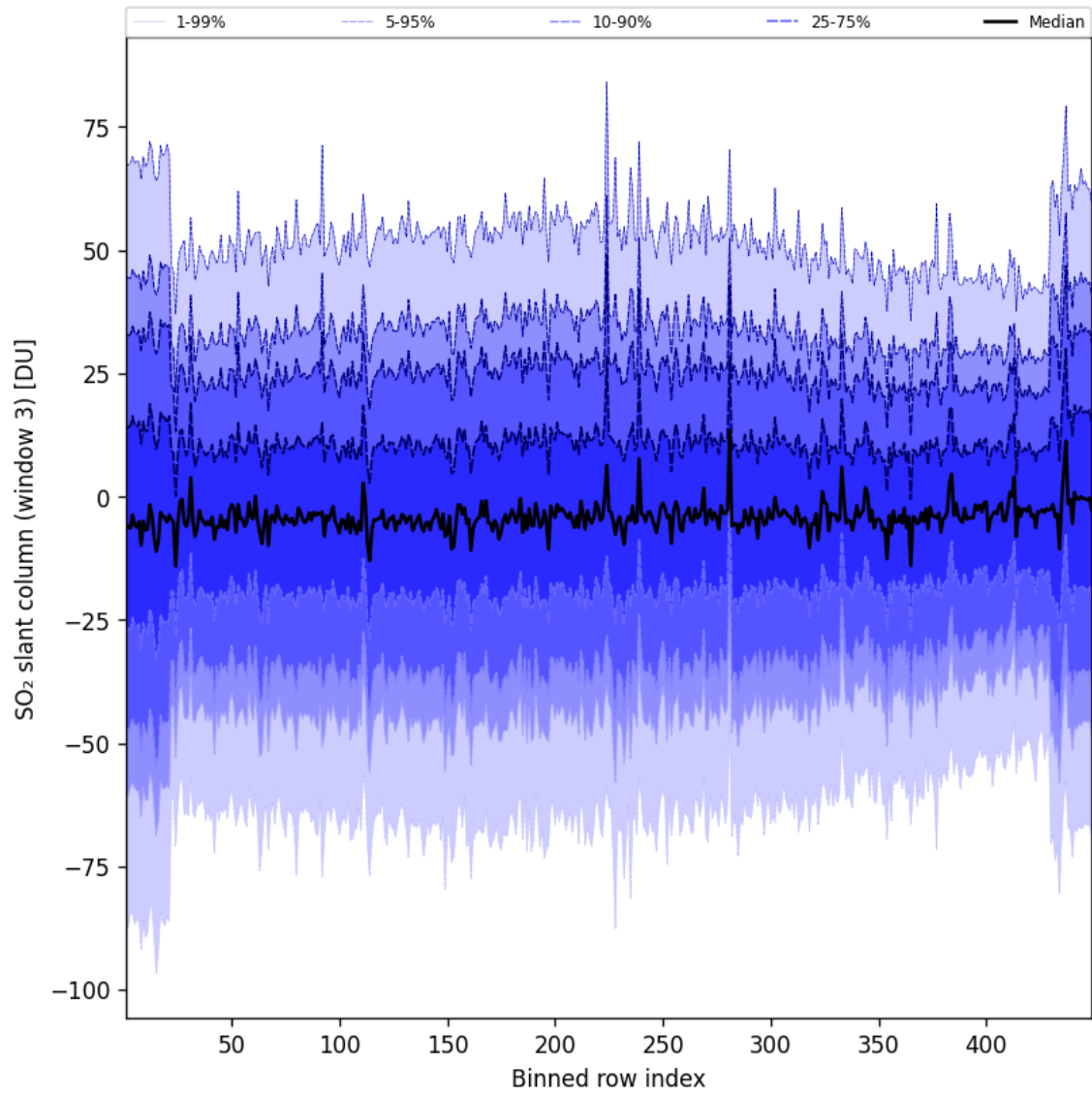


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-08-01 to 2025-08-01

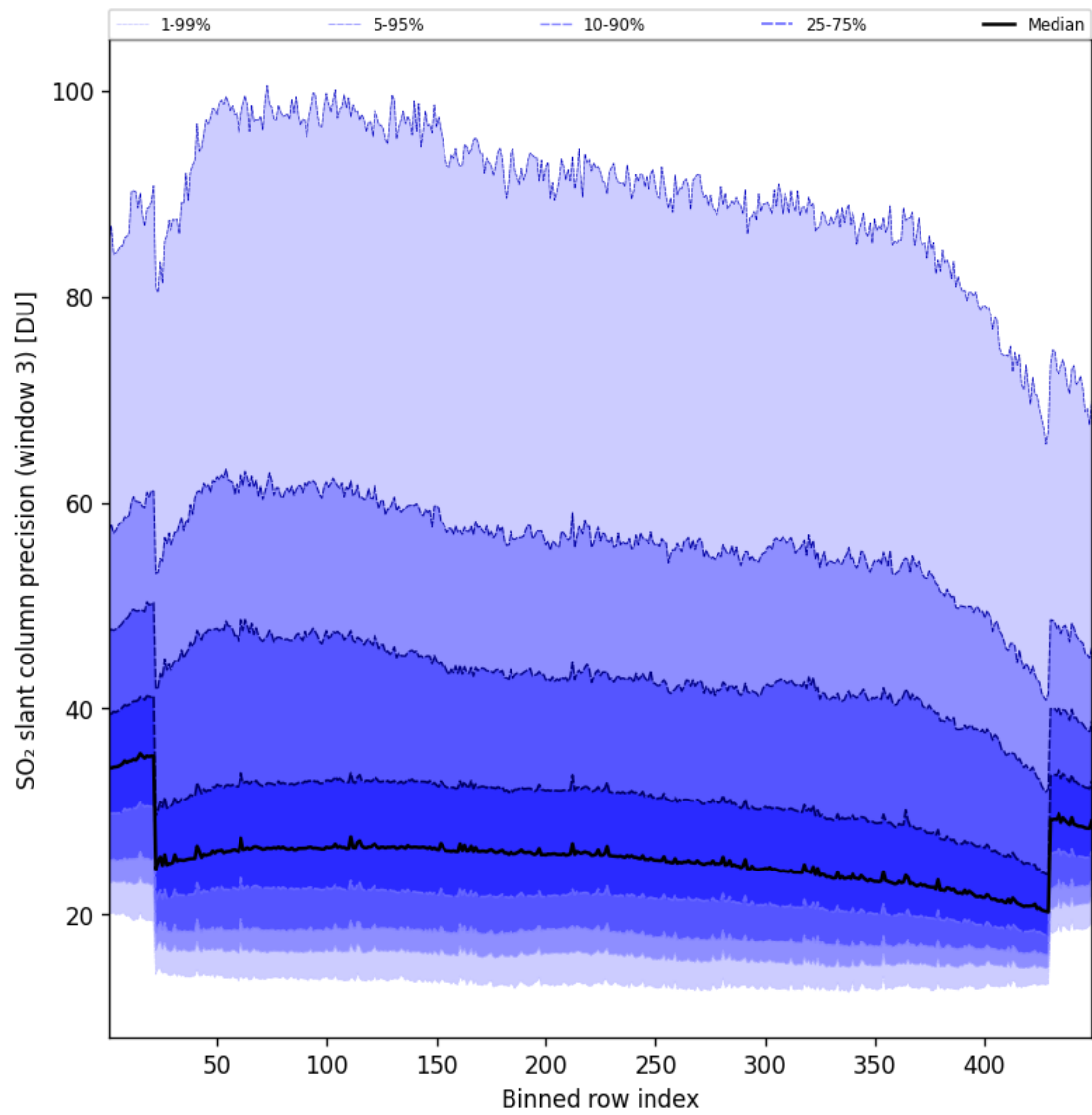


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-08-01 to 2025-08-01

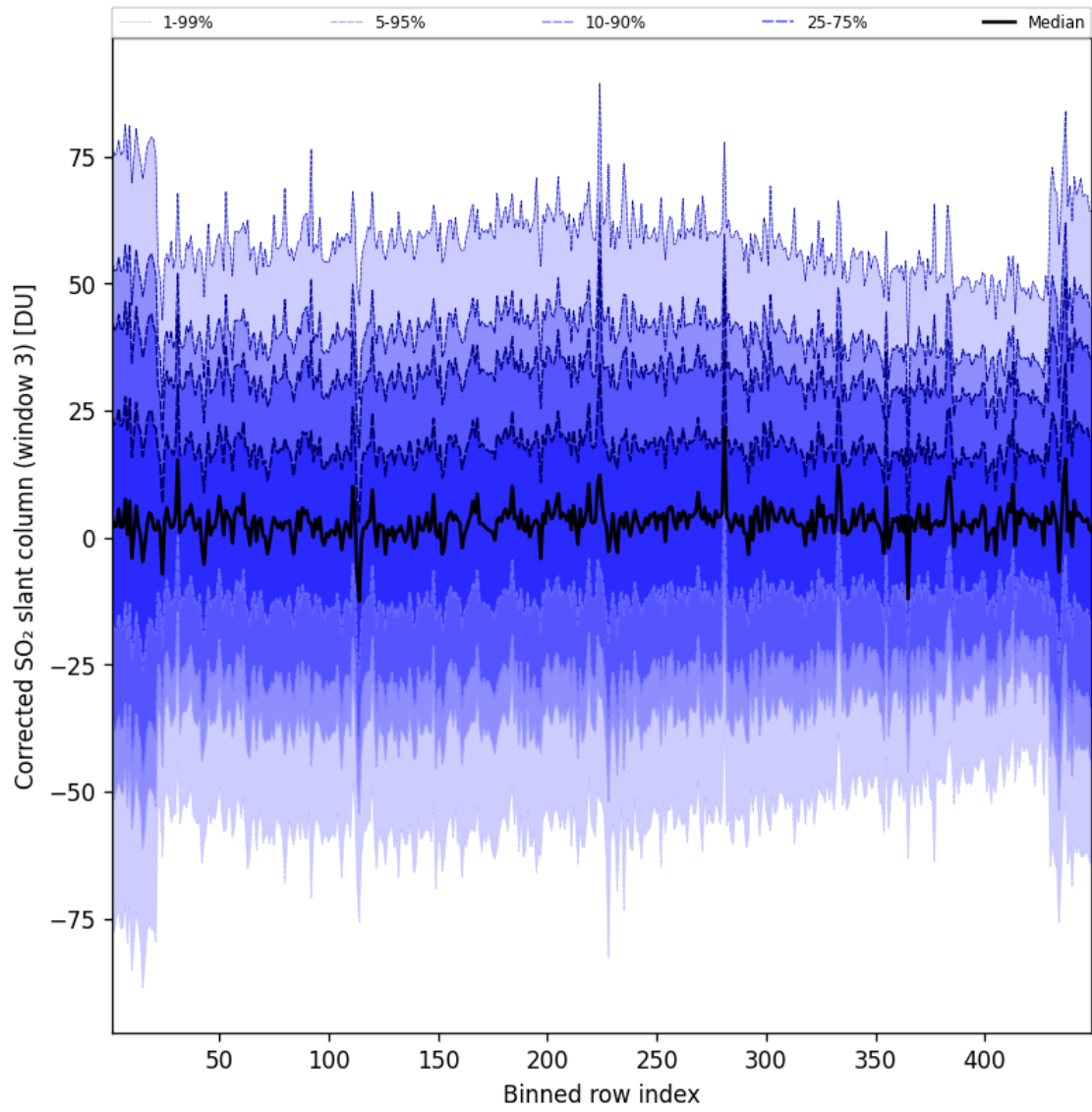


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-08-01 to 2025-08-01

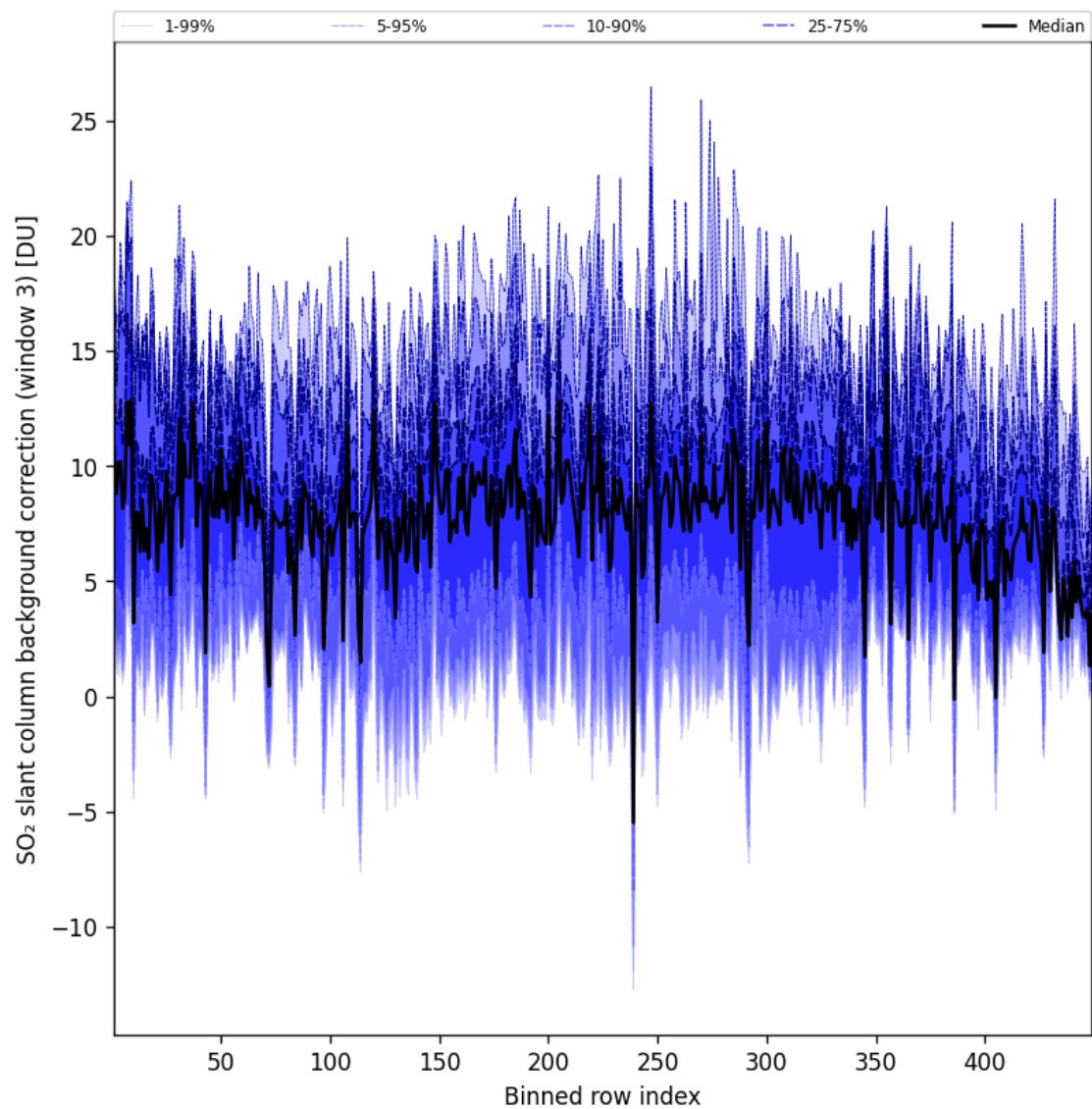


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-08-01 to 2025-08-01

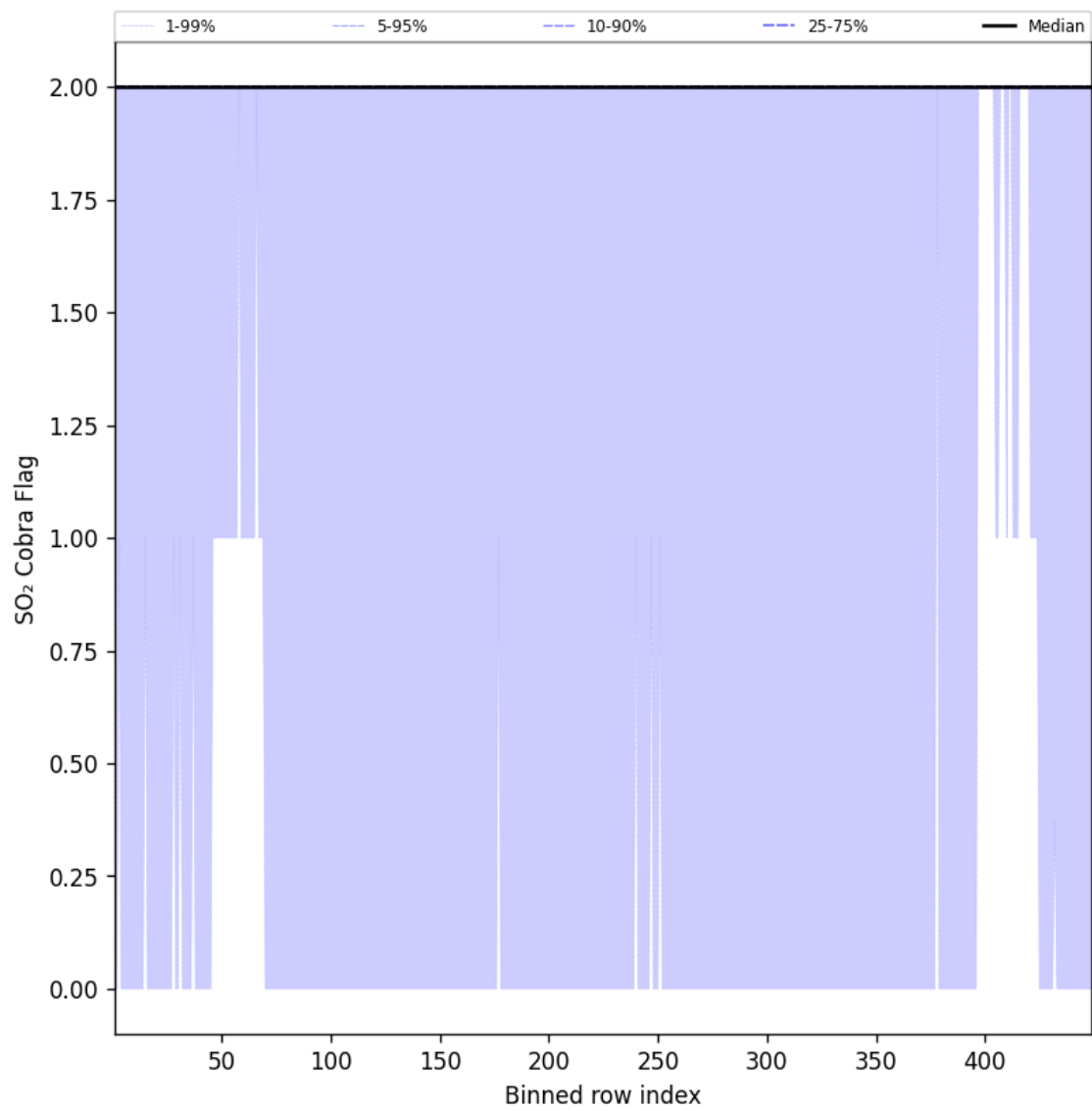


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-08-01 to 2025-08-01

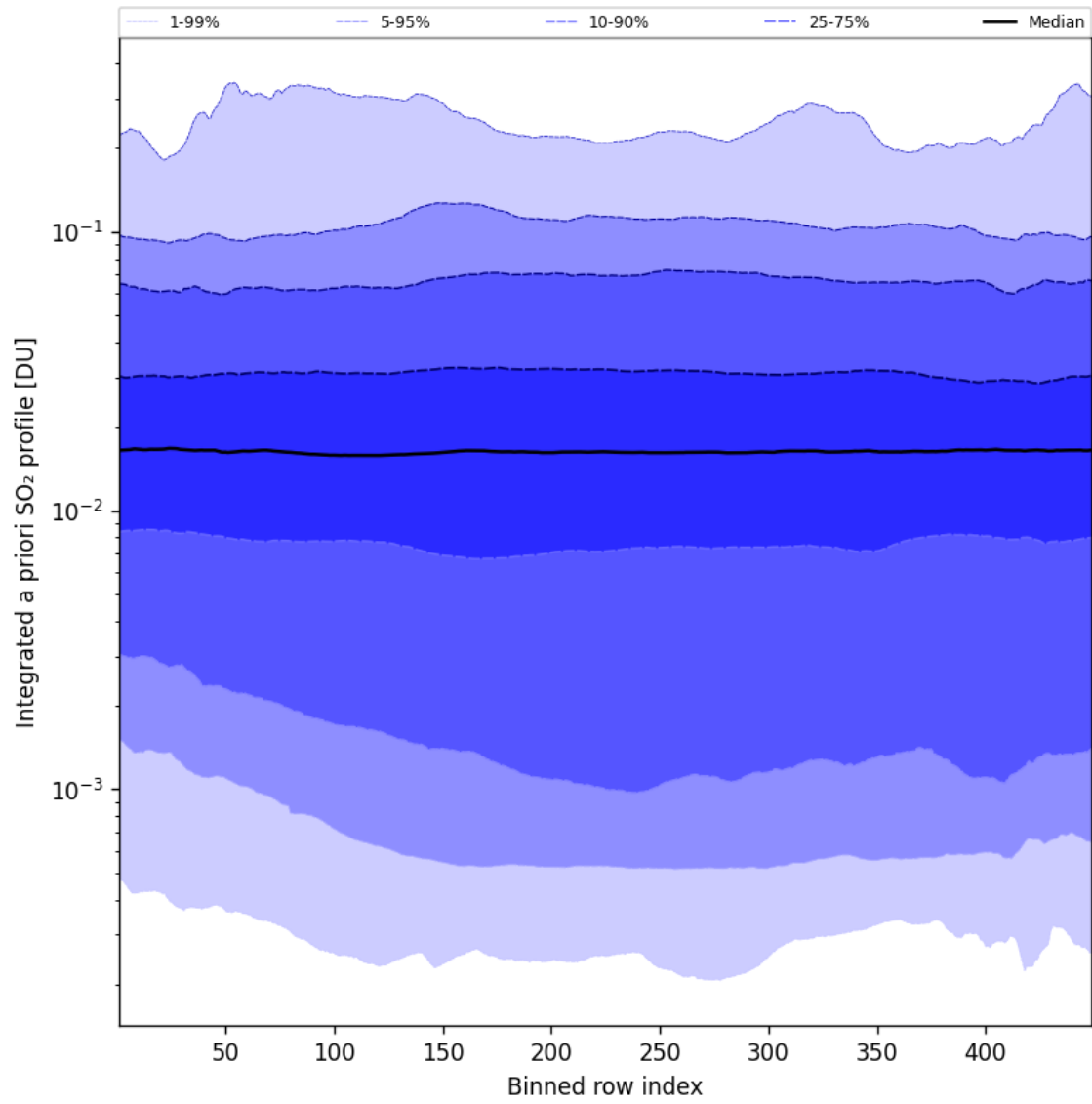


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-08-01 to 2025-08-01

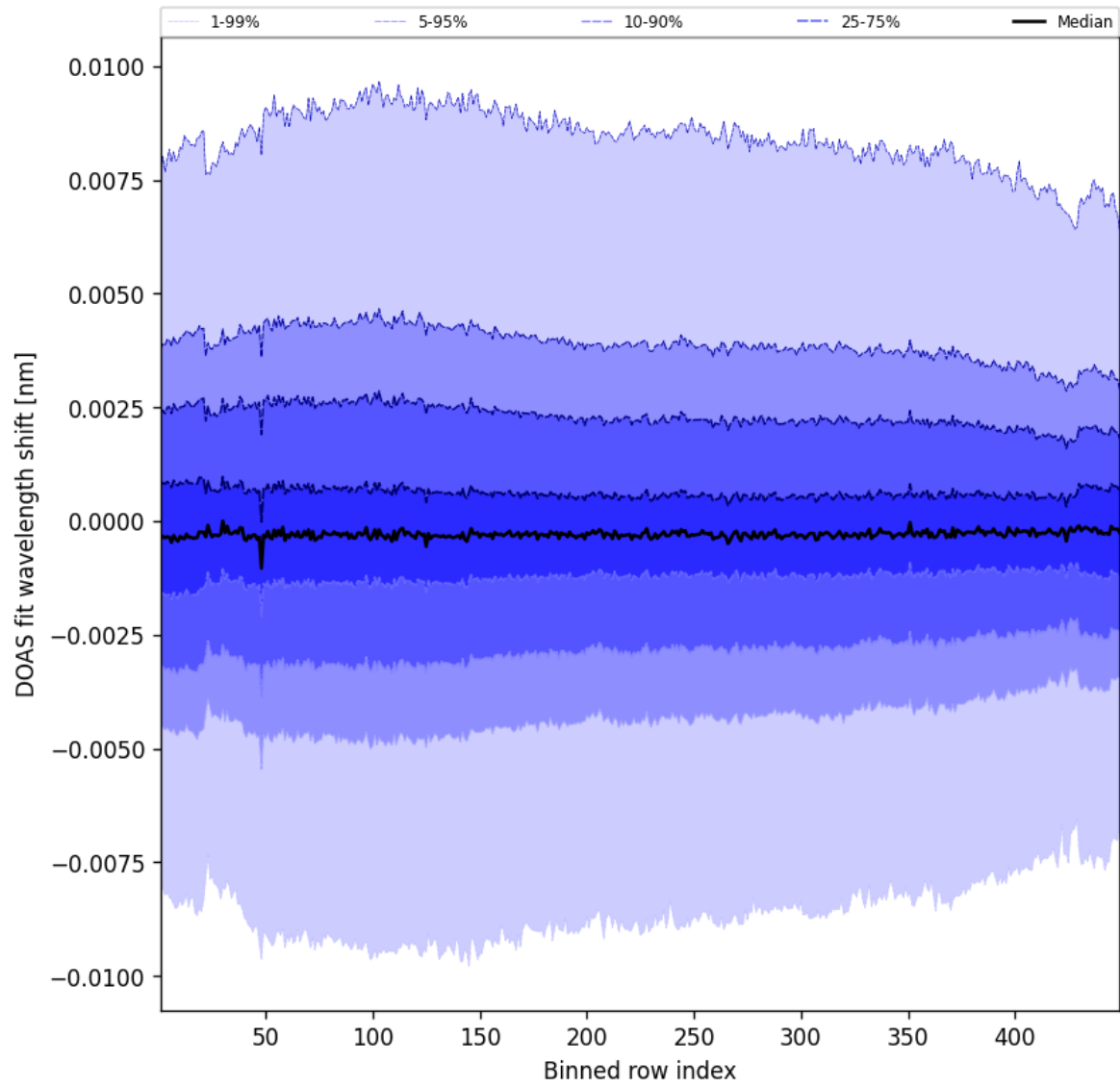


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-08-01 to 2025-08-01

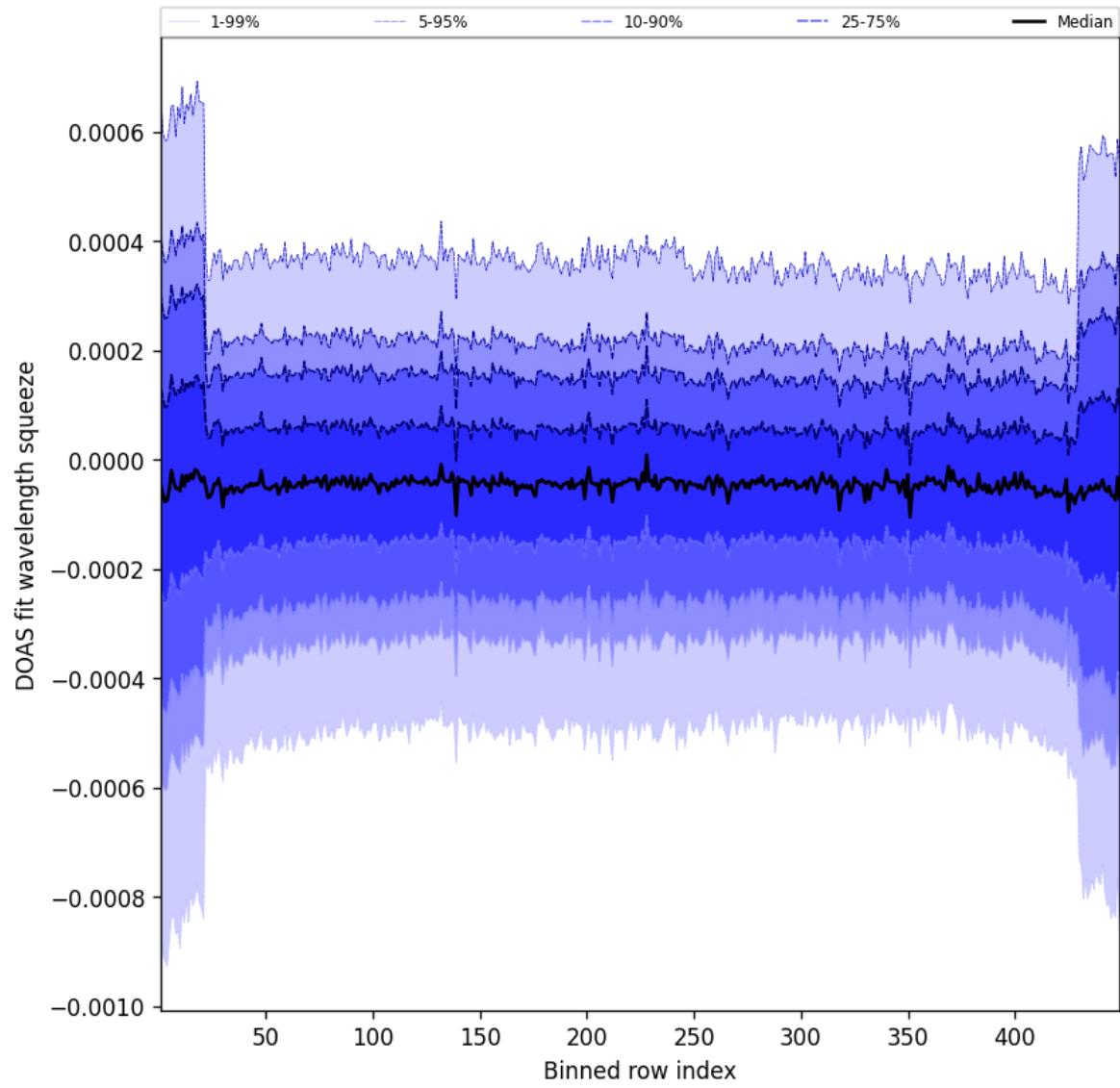


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-08-01 to 2025-08-01

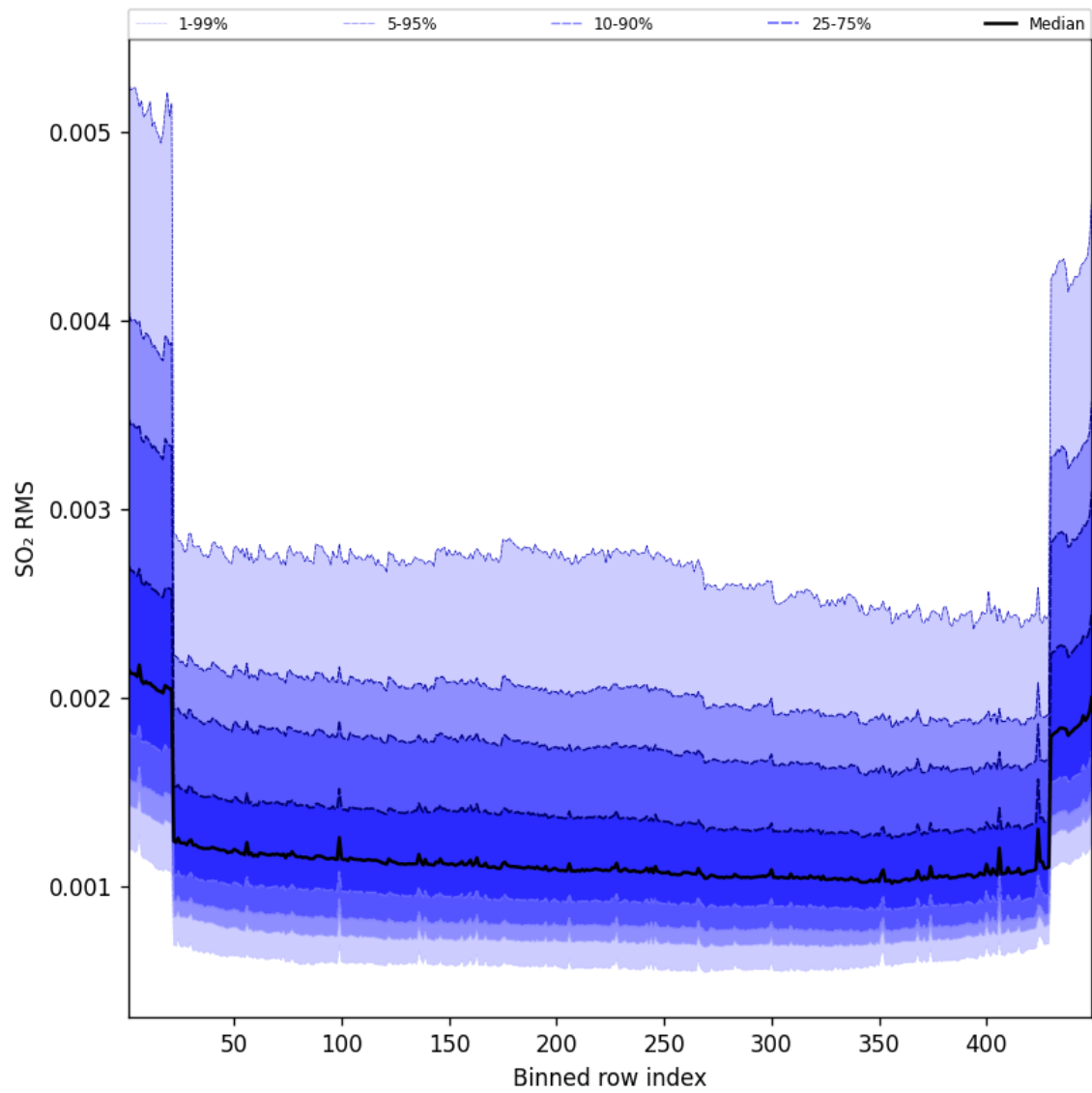


Figure 106: Along track statistics of “SO₂ RMS” for 2025-08-01 to 2025-08-01

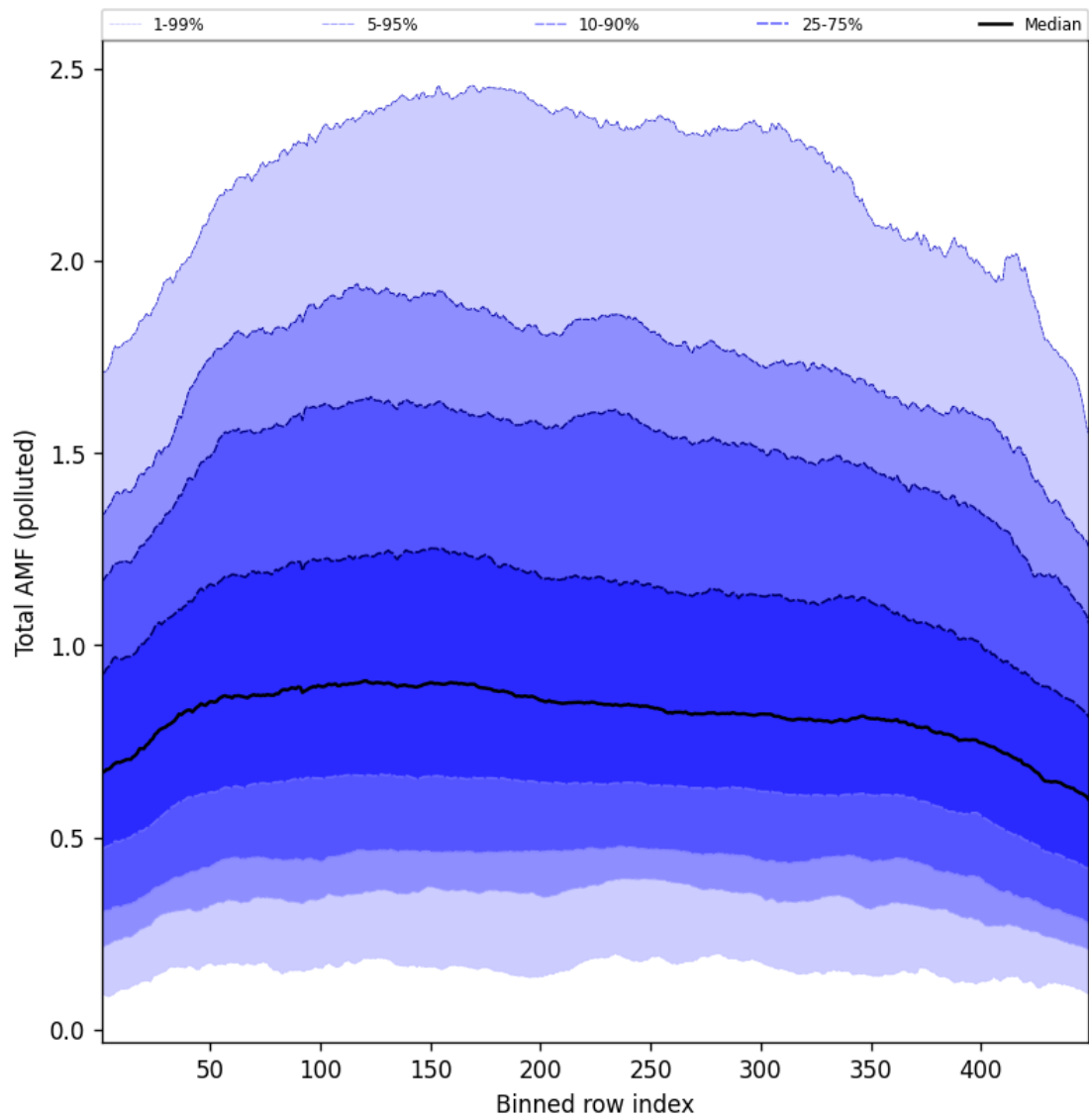


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-08-01 to 2025-08-01

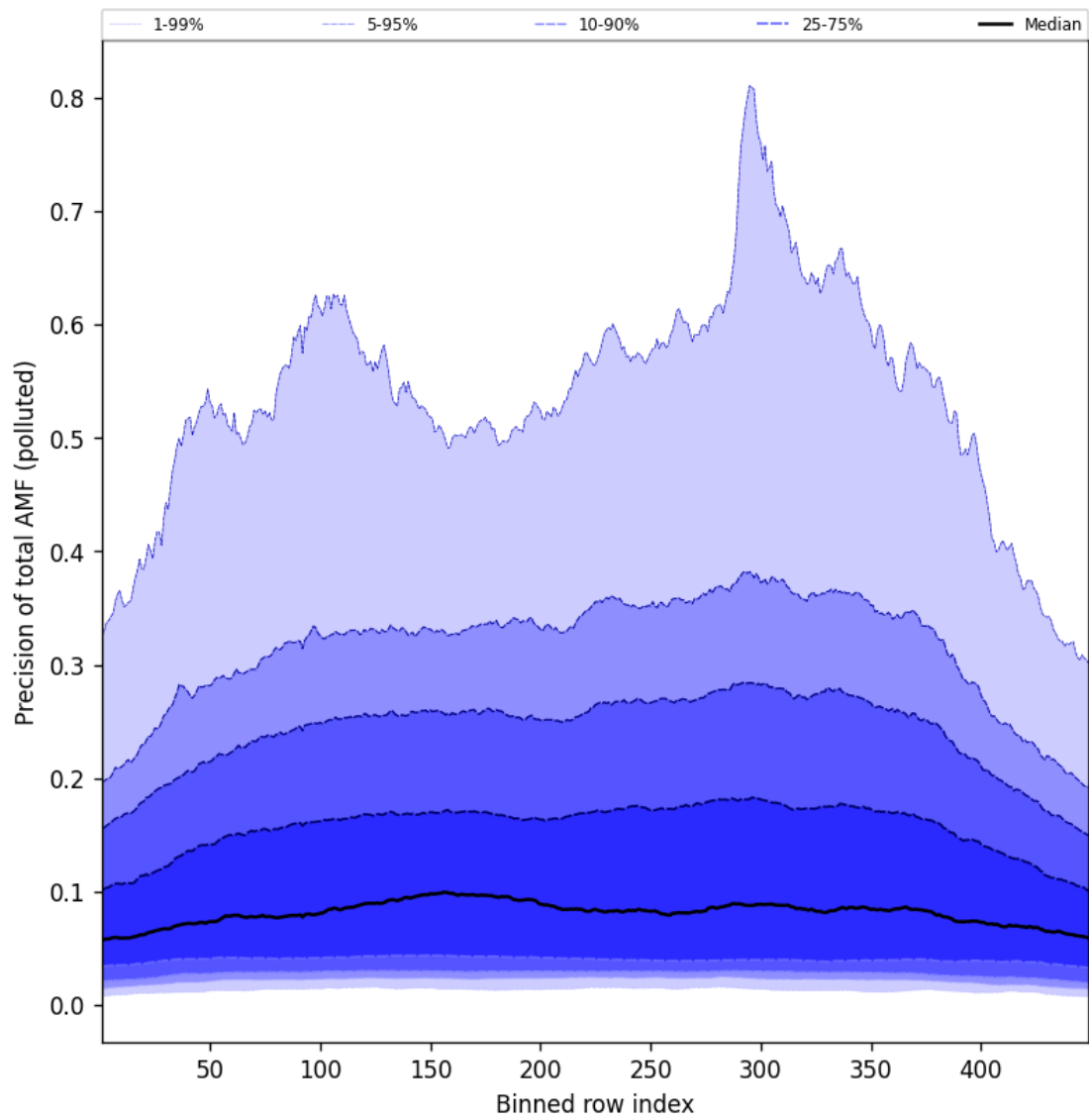


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-08-01 to 2025-08-01

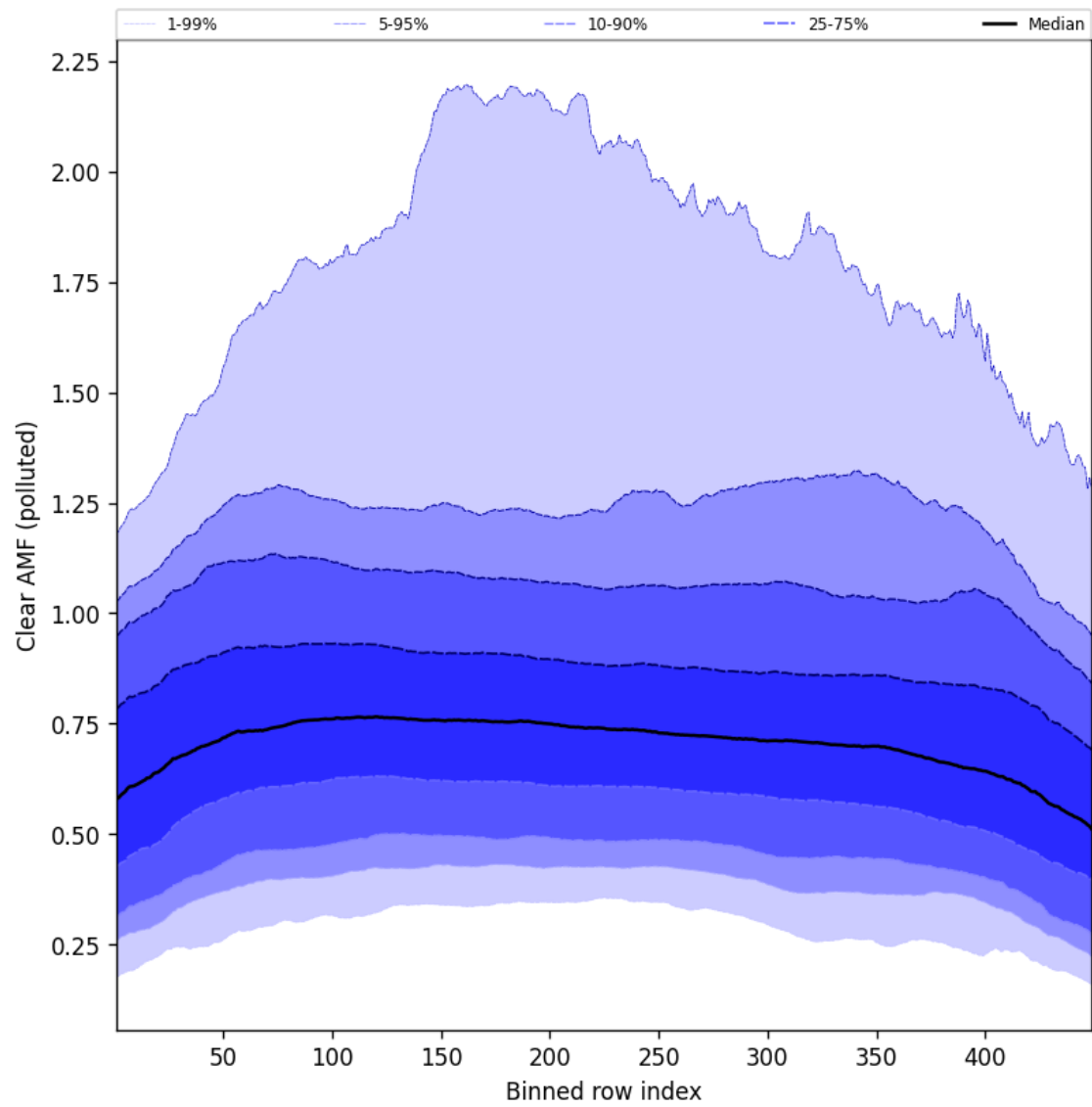


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-08-01 to 2025-08-01

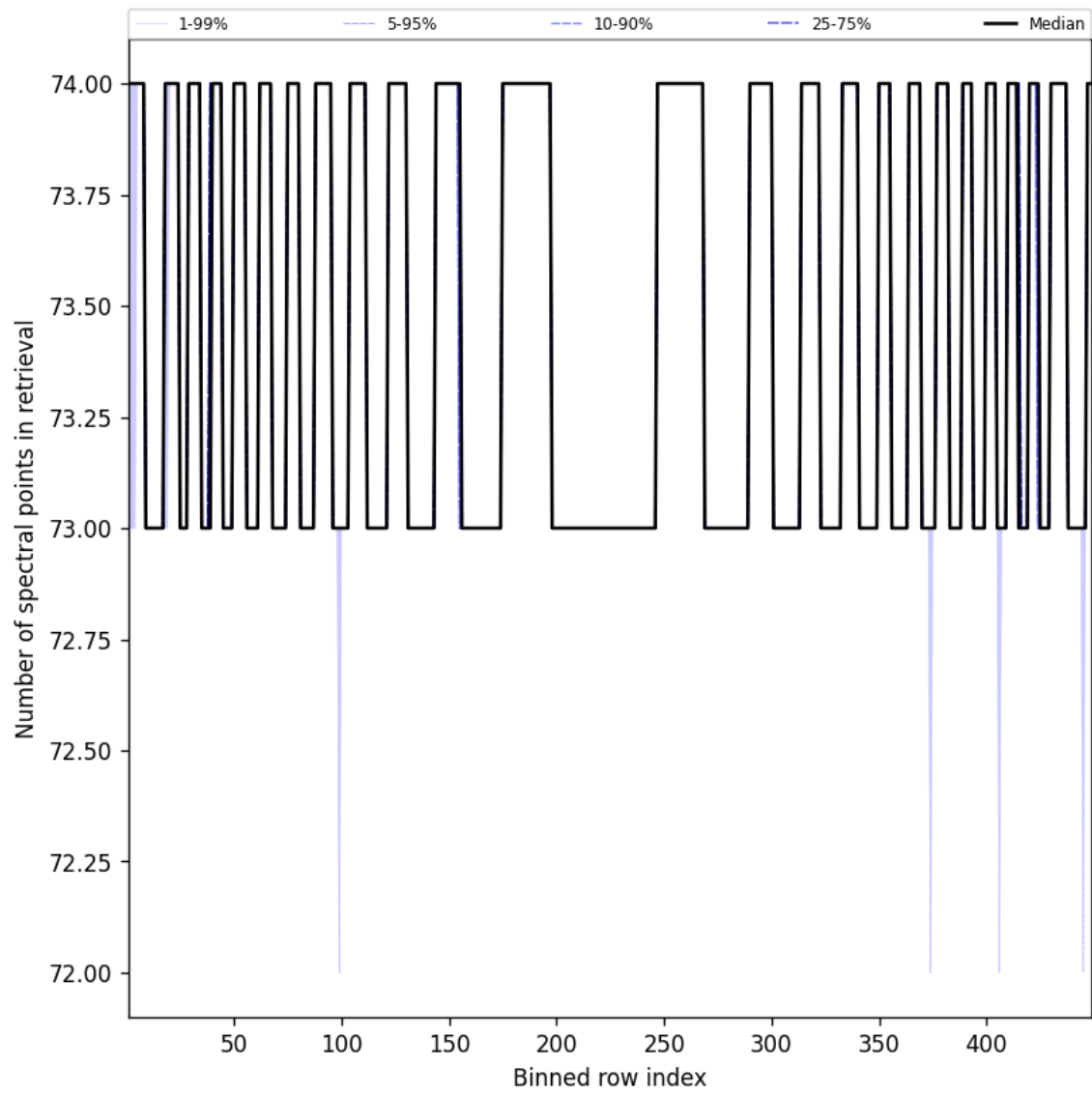


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-08-01 to 2025-08-01

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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