

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]	0.704 ± 0.394	17273851	0.995	0.700	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.067 \pm 90.693) \times 10^{-2}$	17273851	0.278	0.475	1.147×10^{-2}	-104	485
sulfurdioxide total vertical column precision [DU]	0.508 ± 0.608	17273851	0.222	0.335	0.350	4.662×10^{-2}	69.1
sulfurdioxide slant column density corrected [DU]	$(2.059 \pm 40.944) \times 10^{-2}$	17273851	0.258	0.377	9.867×10^{-3}	-27.1	395
sulfurdioxide slant column density cobra [DU]	$(2.039 \pm 37.622) \times 10^{-2}$	17273851	0.258	0.377	9.867×10^{-3}	-27.1	47.8
sulfurdioxide slant column density cobra precision [DU]	0.305 ± 0.143	17273851	0.213	0.144	0.262	7.903×10^{-2}	25.6
sulfurdioxide slant column density window1 [DU]	0.190 ± 0.705	17273851	0.225	0.754	0.195	-264	60.1
sulfurdioxide slant column density window1 precision [DU]	0.305 ± 0.143	17273851	0.213	0.144	0.262	7.903×10^{-2}	25.6
sulfurdioxide slant column density corrected win1 [DU]	$(5.331 \pm 70.254) \times 10^{-2}$	17273851	2.500×10^{-2}	0.746	3.325×10^{-2}	-264	59.9
background so2 slant column offset window1 [DU]	-0.137 ± 0.135	17273851	-0.220	0.132	-0.162	-1.37	3.97
sulfurdioxide slant column density window2 [DU]	3.07 ± 9.47	17273851	2.25	11.9	2.84	-1.235×10^3	1.314×10^3
sulfurdioxide slant column density window2 precision [DU]	8.51 ± 2.42	17273851	7.43	2.82	8.15	2.12	531
sulfurdioxide slant column density corrected win2 [DU]	-0.760 ± 9.252	17273851	-0.750	11.6	-0.747	-1.238×10^3	1.308×10^3
background so2 slant column offset window2 [DU]	-3.83 ± 2.43	17273851	-2.25	2.97	-3.21	-18.8	9.59
sulfurdioxide slant column density window3 [DU]	-16.2 ± 25.5	17273851	-16.2	32.0	-15.9	-893	238
sulfurdioxide slant column density window3 precision [DU]	29.9 ± 13.9	17273851	23.7	10.5	26.3	9.79	262
sulfurdioxide slant column density corrected win3 [DU]	0.605 ± 25.011	17273851	0.560	31.5	0.776	-879	254
background so2 slant column offset window3 [DU]	16.8 ± 5.7	17273851	12.9	8.96	16.6	-10.7	46.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	17273851	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.482 \pm 6.609) \times 10^{-2}$	17273851	1.316×10^{-2}	2.114×10^{-2}	1.611×10^{-2}	1.236×10^{-4}	1.67
fitted radiance shift [nm]	$(-3.313 \pm 27.064) \times 10^{-4}$	17273851	-5.000×10^{-4}	1.838×10^{-3}	-3.211×10^{-4}	-6.739×10^{-2}	5.976×10^{-2}
fitted radiance squeeze [1]	$(-1.981 \pm 18.727) \times 10^{-5}$	17273851	-1.000×10^{-5}	2.125×10^{-4}	-1.530×10^{-5}	-1.638×10^{-2}	1.445×10^{-2}
fitted root mean square [1]	$(1.333 \pm 0.584) \times 10^{-3}$	17273851	9.750×10^{-4}	5.758×10^{-4}	1.169×10^{-3}	3.408×10^{-4}	0.244
sulfurdioxide total air mass factor polluted [1]	0.849 ± 0.416	17273851	0.620	0.491	0.773	5.000×10^{-2}	2.91
sulfurdioxide total air mass factor polluted precision [1]	0.102 ± 0.101	17273851	3.500×10^{-2}	0.102	6.409×10^{-2}	3.894×10^{-3}	1.70
sulfurdioxide clear air mass factor polluted [1]	0.722 ± 0.276	17273851	0.620	0.331	0.683	4.830×10^{-2}	2.98
number of spectral points in retrieval [1]	73.4 ± 0.5	17273851	73.0	1.000	73.0	70.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	7.000×10^{-2}	0.150	0.300	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.09	-0.864	-0.547	-0.374	-0.222	0.253	0.417	0.610	0.973	2.45
sulfurdioxide total vertical column precision [DU]	9.796×10^{-2}	0.137	0.168	0.197	0.233	0.568	0.728	0.932	1.32	2.94
sulfurdioxide slant column density corrected [DU]	-0.891	-0.511	-0.368	-0.275	-0.177	0.200	0.304	0.408	0.573	1.09
sulfurdioxide slant column density cobra [DU]	-0.891	-0.511	-0.368	-0.275	-0.177	0.200	0.304	0.408	0.573	1.09
sulfurdioxide slant column density cobra precision [DU]	0.143	0.171	0.186	0.197	0.213	0.357	0.417	0.474	0.568	0.821
sulfurdioxide slant column density window1 [DU]	-1.70	-0.887	-0.586	-0.388	-0.185	0.569	0.768	0.960	1.25	2.07
sulfurdioxide slant column density window1 precision [DU]	0.143	0.171	0.186	0.197	0.213	0.357	0.417	0.474	0.568	0.821
sulfurdioxide slant column density corrected win1 [DU]	-1.70	-0.977	-0.706	-0.525	-0.334	0.412	0.620	0.825	1.15	2.06
background so2 slant column offset window1 [DU]	-0.360	-0.279	-0.255	-0.239	-0.219	-8.705×10^{-2}	-3.714×10^{-2}	1.539×10^{-2}	9.278×10^{-2}	0.290
sulfurdioxide slant column density window2 [DU]	-18.8	-11.8	-8.41	-5.87	-3.00	8.87	12.0	14.8	18.8	27.3
sulfurdioxide slant column density window2 precision [DU]	4.39	5.37	5.94	6.39	6.92	9.74	10.7	11.6	12.8	15.5
sulfurdioxide slant column density corrected win2 [DU]	-23.3	-15.7	-12.2	-9.51	-6.58	5.07	7.98	10.6	14.2	21.7
background so2 slant column offset window2 [DU]	-10.9	-8.77	-7.22	-6.10	-5.09	-2.12	-1.86	-1.63	-1.23	0.672
sulfurdioxide slant column density window3 [DU]	-80.9	-58.6	-47.9	-40.3	-32.0	5.096×10^{-2}	8.14	15.4	25.2	44.4
sulfurdioxide slant column density window3 precision [DU]	14.0	16.8	18.9	20.5	22.2	32.8	37.4	43.4	55.9	88.8
sulfurdioxide slant column density corrected win3 [DU]	-62.2	-40.8	-30.5	-23.1	-15.0	16.5	24.5	31.6	41.2	60.5
background so2 slant column offset window3 [DU]	5.40	8.44	9.71	10.8	12.3	21.2	22.8	24.1	25.7	29.1
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]	1.091×10^{-3}	2.796×10^{-3}	4.910×10^{-3}	7.057×10^{-3}	9.641×10^{-3}	3.078×10^{-2}	4.870×10^{-2}	7.559×10^{-2}	0.129	0.322
fitted radiance shift [nm]	-8.496×10^{-3}	-4.362×10^{-3}	-2.891×10^{-3}	-2.023×10^{-3}	-1.279×10^{-3}	5.596×10^{-4}	1.280×10^{-3}	2.192×10^{-3}	3.779×10^{-3}	8.159×10^{-3}
fitted radiance squeeze [1]	-5.283×10^{-4}	-3.196×10^{-4}	-2.369×10^{-4}	-1.813×10^{-4}	-1.233×10^{-4}	8.921×10^{-5}	1.430×10^{-4}	1.931×10^{-4}	2.658×10^{-4}	4.435×10^{-4}
fitted root mean square [1]	5.983×10^{-4}	7.455×10^{-4}	8.280×10^{-4}	8.896×10^{-4}	9.639×10^{-4}	1.540×10^{-3}	1.792×10^{-3}	2.044×10^{-3}	2.438×10^{-3}	3.445×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.106	0.299	0.403	0.476	0.565	1.06	1.25	1.42	1.67	2.11
sulfurdioxide total air mass factor polluted precision [1]	1.205×10^{-2}	2.115×10^{-2}	2.607×10^{-2}	3.000×10^{-2}	3.591×10^{-2}	0.138	0.179	0.219	0.288	0.493
sulfurdioxide clear air mass factor polluted [1]	0.264	0.364	0.421	0.472	0.538	0.869	0.956	1.04	1.17	1.64
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]	0.670 ± 0.409	10274988	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(1.830 \pm 81.330) \times 10^{-2}$	10274988	0.427	9.220×10^{-3}	-41.6	55.7	-0.202	0.225
sulfurdioxide total vertical column precision [DU]	0.469 ± 0.608	10274988	0.297	0.306	4.662×10^{-2}	25.8	0.213	0.509
sulfurdioxide slant column density corrected [DU]	$(1.428 \pm 31.801) \times 10^{-2}$	10274988	0.349	8.106×10^{-3}	-6.77	32.4	-0.165	0.184
sulfurdioxide slant column density cobra [DU]	$(1.428 \pm 31.774) \times 10^{-2}$	10274988	0.349	8.106×10^{-3}	-6.77	12.6	-0.165	0.184
sulfurdioxide slant column density cobra precision [DU]	0.276 ± 0.109	10274988	0.114	0.244	7.903×10^{-2}	17.2	0.204	0.317
sulfurdioxide slant column density window1 [DU]	0.188 ± 0.616	10274988	0.705	0.191	-18.3	17.9	-0.164	0.541
sulfurdioxide slant column density window1 precision [DU]	0.276 ± 0.109	10274988	0.114	0.244	7.903×10^{-2}	17.2	0.204	0.317
sulfurdioxide slant column density corrected win1 [DU]	$(3.598 \pm 60.951) \times 10^{-2}$	10274988	0.695	2.381×10^{-2}	-18.3	17.7	-0.320	0.376
background so2 slant column offset window1 [DU]	-0.152 ± 0.105	10274988	0.131	-0.170	-0.755	1.16	-0.224	-9.302×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.54 ± 8.86	10274988	11.3	2.44	-155	154	-3.15	8.13
sulfurdioxide slant column density window2 precision [DU]	8.21 ± 2.29	10274988	2.71	7.85	2.12	319	6.67	9.38
sulfurdioxide slant column density corrected win2 [DU]	-0.741 ± 8.795	10274988	11.2	-0.712	-158	152	-6.32	4.87
background so2 slant column offset window2 [DU]	-3.28 ± 1.77	10274988	2.47	-2.93	-12.5	9.53	-4.52	-2.06
sulfurdioxide slant column density window3 [DU]	-15.5 ± 25.0	10274988	31.1	-15.3	-229	163	-30.8	0.296
sulfurdioxide slant column density window3 precision [DU]	29.5 ± 14.5	10274988	11.0	25.5	9.79	262	21.5	32.5
sulfurdioxide slant column density corrected win3 [DU]	0.506 ± 24.410	10274988	30.6	0.691	-211	175	-14.6	16.0
background so2 slant column offset window3 [DU]	16.0 ± 5.8	10274988	9.88	15.7	-10.7	37.1	11.0	20.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	10274988	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.875 \pm 7.215) \times 10^{-2}$	10274988	3.025×10^{-2}	1.739×10^{-2}	1.236×10^{-4}	1.67	8.178×10^{-3}	3.843×10^{-2}
fitted radiance shift [nm]	$(-6.093 \pm 284.967) \times 10^{-5}$	10274988	1.796×10^{-3}	-9.523×10^{-5}	-4.231×10^{-2}	4.575×10^{-2}	-9.716×10^{-4}	8.241×10^{-4}
fitted radiance squeeze [1]	$(-3.540 \pm 16.735) \times 10^{-5}$	10274988	2.009×10^{-4}	-2.851×10^{-5}	-1.069×10^{-2}	9.710×10^{-3}	-1.321×10^{-4}	6.883×10^{-5}
fitted root mean square [1]	$(1.225 \pm 0.457) \times 10^{-3}$	10274988	4.928×10^{-4}	1.106×10^{-3}	3.431×10^{-4}	5.372×10^{-2}	9.243×10^{-4}	1.417×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.884 ± 0.450	10274988	0.567	0.831	5.000×10^{-2}	2.91	0.554	1.12
sulfurdioxide total air mass factor polluted precision [1]	0.114 ± 0.115	10274988	0.113	7.369×10^{-2}	4.227×10^{-3}	1.70	3.972×10^{-2}	0.153
sulfurdioxide clear air mass factor polluted [1]	0.752 ± 0.313	10274988	0.406	0.729	0.120	2.98	0.519	0.925
number of spectral points in retrieval [1]	73.5 ± 0.5	10274988	1.000	73.0	71.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.754 ± 0.366	6998863	0.580	1.000	0.0	1.000	0.420	1.000
sulfurdioxide total vertical column [DU]	$(4.882 \pm 102.879) \times 10^{-2}$	6998863	0.557	1.573×10^{-2}	-104	485	-0.257	0.300
sulfurdioxide total vertical column precision [DU]	0.566 ± 0.603	6998863	0.366	0.412	4.933×10^{-2}	69.1	0.282	0.648
sulfurdioxide slant column density corrected [DU]	$(2.984 \pm 51.492) \times 10^{-2}$	6998863	0.424	1.297×10^{-2}	-27.1	395	-0.196	0.228
sulfurdioxide slant column density cobra [DU]	$(2.936 \pm 44.832) \times 10^{-2}$	6998863	0.424	1.297×10^{-2}	-27.1	47.8	-0.196	0.228
sulfurdioxide slant column density cobra precision [DU]	0.348 ± 0.173	6998863	0.183	0.299	8.950×10^{-2}	25.6	0.232	0.415
sulfurdioxide slant column density window1 [DU]	0.194 ± 0.819	6998863	0.837	0.201	-264	60.1	-0.220	0.618
sulfurdioxide slant column density window1 precision [DU]	0.348 ± 0.173	6998863	0.183	0.299	8.950×10^{-2}	25.6	0.232	0.415
sulfurdioxide slant column density corrected win1 [DU]	$(7.875 \pm 81.956) \times 10^{-2}$	6998863	0.832	4.962×10^{-2}	-264	59.9	-0.357	0.474
background so2 slant column offset window1 [DU]	-0.116 ± 0.167	6998863	0.135	-0.153	-1.37	3.97	-0.211	-7.523×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.85 ± 10.24	6998863	12.8	3.48	-1.235×10^3	1.314×10^3	-2.75	10.0
sulfurdioxide slant column density window2 precision [DU]	8.96 ± 2.54	6998863	2.88	8.58	2.38	531	7.33	10.2
sulfurdioxide slant column density corrected win2 [DU]	-0.789 ± 9.885	6998863	12.4	-0.804	-1.238×10^3	1.308×10^3	-6.98	5.38
background so2 slant column offset window2 [DU]	-4.64 ± 2.98	6998863	4.58	-3.77	-18.8	9.59	-6.84	-2.26
sulfurdioxide slant column density window3 [DU]	-17.3 ± 26.2	6998863	33.4	-16.9	-893	238	-33.7	-0.333
sulfurdioxide slant column density window3 precision [DU]	30.4 ± 12.8	6998863	9.61	27.4	10.2	221	23.4	33.0
sulfurdioxide slant column density corrected win3 [DU]	0.750 ± 25.867	6998863	32.9	0.911	-879	254	-15.6	17.4
background so2 slant column offset window3 [DU]	18.0 ± 5.3	6998863	7.85	17.4	-10.3	46.1	14.0	21.8
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	6998863	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.906 \pm 5.551) \times 10^{-2}$	6998863	1.304×10^{-2}	1.517×10^{-2}	9.541×10^{-4}	1.54	1.081×10^{-2}	2.385×10^{-2}
fitted radiance shift [nm]	$(-7.283 \pm 24.270) \times 10^{-4}$	6998863	1.764×10^{-3}	-6.536×10^{-4}	-6.739×10^{-2}	5.976×10^{-2}	-1.632×10^{-3}	1.321×10^{-4}
fitted radiance squeeze [1]	$(3.086 \pm 211.106) \times 10^{-6}$	6998863	2.296×10^{-4}	6.920×10^{-6}	-1.638×10^{-2}	1.445×10^{-2}	-1.082×10^{-4}	1.213×10^{-4}
fitted root mean square [1]	$(1.493 \pm 0.701) \times 10^{-3}$	6998863	7.122×10^{-4}	1.279×10^{-3}	3.408×10^{-4}	0.244	1.036×10^{-3}	1.748×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.798 ± 0.354	6998863	0.380	0.710	5.000×10^{-2}	2.67	0.572	0.952
sulfurdioxide total air mass factor polluted precision [1]	$(8.477 \pm 7.412) \times 10^{-2}$	6998863	8.280×10^{-2}	5.307×10^{-2}	3.894×10^{-3}	1.35	3.322×10^{-2}	0.116
sulfurdioxide clear air mass factor polluted [1]	0.678 ± 0.201	6998863	0.222	0.647	4.830×10^{-2}	2.66	0.555	0.777
number of spectral points in retrieval [1]	73.4 ± 0.5	6998863	1.000	73.0	70.0	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]	0.710 ± 0.388	11539486	0.680	1.000	0.0	1.000	0.320	1.000
sulfurdioxide total vertical column [DU]	$(3.424 \pm 91.950) \times 10^{-2}$	11539486	0.473	1.208×10^{-2}	-104	291	-0.221	0.252
sulfurdioxide total vertical column precision [DU]	0.506 ± 0.609	11539486	0.331	0.340	4.954×10^{-2}	36.3	0.232	0.564
sulfurdioxide slant column density corrected [DU]	$(2.277 \pm 41.847) \times 10^{-2}$	11539486	0.376	1.028×10^{-2}	-22.7	395	-0.176	0.201
sulfurdioxide slant column density cobra [DU]	$(2.254 \pm 39.288) \times 10^{-2}$	11539486	0.376	1.028×10^{-2}	-22.7	19.6	-0.176	0.201
sulfurdioxide slant column density cobra precision [DU]	0.310 ± 0.155	11539486	0.162	0.257	7.903×10^{-2}	24.8	0.209	0.372
sulfurdioxide slant column density window1 [DU]	0.196 ± 0.726	11539486	0.756	0.204	-137	50.3	-0.177	0.578
sulfurdioxide slant column density window1 precision [DU]	0.310 ± 0.155	11539486	0.162	0.257	7.903×10^{-2}	24.8	0.209	0.372
sulfurdioxide slant column density corrected win1 [DU]	$(6.441 \pm 72.402) \times 10^{-2}$	11539486	0.748	4.186×10^{-2}	-137	50.6	-0.325	0.422
background so2 slant column offset window1 [DU]	-0.132 ± 0.148	11539486	0.138	-0.163	-1.37	3.97	-0.220	-8.209×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.25 ± 9.46	11539486	11.8	2.93	-658	1.314×10^3	-2.85	8.98
sulfurdioxide slant column density window2 precision [DU]	8.40 ± 2.34	11539486	2.77	8.02	2.12	531	6.83	9.61
sulfurdioxide slant column density corrected win2 [DU]	-0.752 ± 9.167	11539486	11.5	-0.752	-660	1.308×10^3	-6.52	5.01
background so2 slant column offset window2 [DU]	-4.01 ± 2.67	11539486	3.42	-3.14	-18.8	9.59	-5.52	-2.09
sulfurdioxide slant column density window3 [DU]	-13.5 ± 25.1	11539486	31.8	-13.4	-893	166	-29.2	2.55
sulfurdioxide slant column density window3 precision [DU]	28.7 ± 12.2	11539486	9.65	25.6	9.79	225	21.9	31.6
sulfurdioxide slant column density corrected win3 [DU]	3.25 ± 24.35	11539486	31.0	3.19	-879	185	-12.2	18.8
background so2 slant column offset window3 [DU]	16.8 ± 5.8	11539486	9.09	16.3	-10.7	46.1	12.2	21.3
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	11539486	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.282 \pm 3.094) \times 10^{-2}$	11539486	1.391×10^{-2}	1.512×10^{-2}	3.228×10^{-4}	1.37	1.020×10^{-2}	2.412×10^{-2}
fitted radiance shift [nm]	$(-4.001 \pm 24.386) \times 10^{-4}$	11539486	1.846×10^{-3}	-3.520×10^{-4}	-4.243×10^{-2}	5.976×10^{-2}	-1.349×10^{-3}	4.970×10^{-4}
fitted radiance squeeze [1]	$(-1.189 \pm 19.041) \times 10^{-5}$	11539486	2.107×10^{-4}	-7.076×10^{-6}	-1.638×10^{-2}	1.350×10^{-2}	-1.140×10^{-4}	9.674×10^{-5}
fitted root mean square [1]	$(1.351 \pm 0.633) \times 10^{-3}$	11539486	6.408×10^{-4}	1.145×10^{-3}	3.408×10^{-4}	0.244	9.485×10^{-4}	1.589×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.839 ± 0.377	11539486	0.447	0.781	5.000×10^{-2}	2.67	0.586	1.03
sulfurdioxide total air mass factor polluted precision [1]	$(9.767 \pm 9.687) \times 10^{-2}$	11539486	8.945×10^{-2}	6.230×10^{-2}	4.842×10^{-3}	1.70	3.773×10^{-2}	0.127
sulfurdioxide clear air mass factor polluted [1]	0.719 ± 0.231	11539486	0.307	0.696	0.120	2.66	0.556	0.864
number of spectral points in retrieval [1]	73.4 ± 0.5	11539486	1.000	73.0	70.0	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]	0.715 $\pm$ 0.400	4028917	0.710	1.000	0.0	1.000	0.290	1.000
sulfurdioxide total vertical column [DU]	(1.984 $\pm$ 84.266) $\times 10^{-2}$	4028917	0.455	8.324 $\times 10^{-3}$	-46.9	485	-0.216	0.239
sulfurdioxide total vertical column precision [DU]	0.485 $\pm$ 0.566	4028917	0.321	0.359	4.662 $\times 10^{-2}$	69.1	0.225	0.546
sulfurdioxide slant column density corrected [DU]	(1.412 $\pm$ 39.620) $\times 10^{-2}$	4028917	0.364	7.463 $\times 10^{-3}$	-27.1	324	-0.173	0.191
sulfurdioxide slant column density cobra [DU]	(1.395 $\pm$ 32.617) $\times 10^{-2}$	4028917	0.364	7.463 $\times 10^{-3}$	-27.1	47.8	-0.173	0.191
sulfurdioxide slant column density cobra precision [DU]	0.284 $\pm$ 0.111	4028917	0.104	0.258	9.427 $\times 10^{-2}$	25.6	0.216	0.320
sulfurdioxide slant column density window1 [DU]	0.192 $\pm$ 0.641	4028917	0.724	0.187	-264	40.1	-0.174	0.550
sulfurdioxide slant column density window1 precision [DU]	0.284 $\pm$ 0.111	4028917	0.104	0.258	9.427 $\times 10^{-2}$	25.6	0.216	0.320
sulfurdioxide slant column density corrected win1 [DU]	(2.961 $\pm$ 63.591) $\times 10^{-2}$	4028917	0.717	1.529 $\times 10^{-2}$	-264	39.8	-0.338	0.379
background so2 slant column offset window1 [DU]	-0.163 $\pm$ 0.098	4028917	0.112	-0.176	-0.652	2.39	-0.225	-0.113
sulfurdioxide slant column density window2 [DU]	2.45 $\pm$ 9.35	4028917	11.8	2.40	-806	863	-3.47	8.32
sulfurdioxide slant column density window2 precision [DU]	8.64 $\pm$ 2.57	4028917	2.77	8.30	2.35	529	7.04	9.81
sulfurdioxide slant column density corrected win2 [DU]	-0.730 $\pm$ 9.301	4028917	11.7	-0.700	-809	860	-6.57	5.13
background so2 slant column offset window2 [DU]	-3.18 $\pm$ 1.73	4028917	2.22	-2.88	-13.3	9.59	-4.27	-2.05
sulfurdioxide slant column density window3 [DU]	-21.5 $\pm$ 25.2	4028917	31.3	-20.9	-378	238	-36.9	-5.54
sulfurdioxide slant column density window3 precision [DU]	32.3 $\pm$ 17.0	4028917	12.0	27.8	10.2	262	22.9	34.9
sulfurdioxide slant column density corrected win3 [DU]	-5.59 $\pm$ 25.25	4028917	31.6	-5.09	-360	254	-21.2	10.4
background so2 slant column offset window3 [DU]	15.9 $\pm$ 5.3	4028917	8.54	15.7	-10.7	37.1	11.7	20.2
sulfurdioxide slant column cobra flag [1]	1.99 $\pm$ 0.13	4028917	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	(6.401 $\pm$ 10.307) $\times 10^{-2}$	4028917	6.628 $\times 10^{-2}$	2.696 $\times 10^{-2}$	1.236 $\times 10^{-4}$	1.64	9.162 $\times 10^{-3}$	7.544 $\times 10^{-2}$
fitted radiance shift [nm]	(-2.182 $\pm$ 32.884) $\times 10^{-4}$	4028917	1.773 $\times 10^{-3}$	-2.996 $\times 10^{-4}$	-5.052 $\times 10^{-2}$	4.575 $\times 10^{-2}$	-1.139 $\times 10^{-3}$	6.337 $\times 10^{-4}$
fitted radiance squeeze [1]	(-2.874 $\pm$ 17.473) $\times 10^{-5}$	4028917	2.077 $\times 10^{-4}$	-2.607 $\times 10^{-5}$	-1.590 $\times 10^{-2}$	1.445 $\times 10^{-2}$	-1.311 $\times 10^{-4}$	7.660 $\times 10^{-5}$
fitted root mean square [1]	(1.251 $\pm$ 0.443) $\times 10^{-3}$	4028917	4.317 $\times 10^{-4}$	1.165 $\times 10^{-3}$	3.497 $\times 10^{-4}$	7.778 $\times 10^{-2}$	9.786 $\times 10^{-4}$	1.410 $\times 10^{-3}$
sulfurdioxide total air mass factor polluted [1]	0.879 $\pm$ 0.492	4028917	0.583	0.749	5.000 $\times 10^{-2}$	2.91	0.541	1.12
sulfurdioxide total air mass factor polluted precision [1]	0.112 $\pm$ 0.112	4028917	0.132	6.461 $\times 10^{-2}$	3.894 $\times 10^{-3}$	1.55	3.094 $\times 10^{-2}$	0.162
sulfurdioxide clear air mass factor polluted [1]	0.740 $\pm$ 0.358	4028917	0.369	0.652	4.830 $\times 10^{-2}$	2.98	0.518	0.886
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	4028917	1.000	73.0	70.0	74.0	73.0	74.0

3 Granule outlines

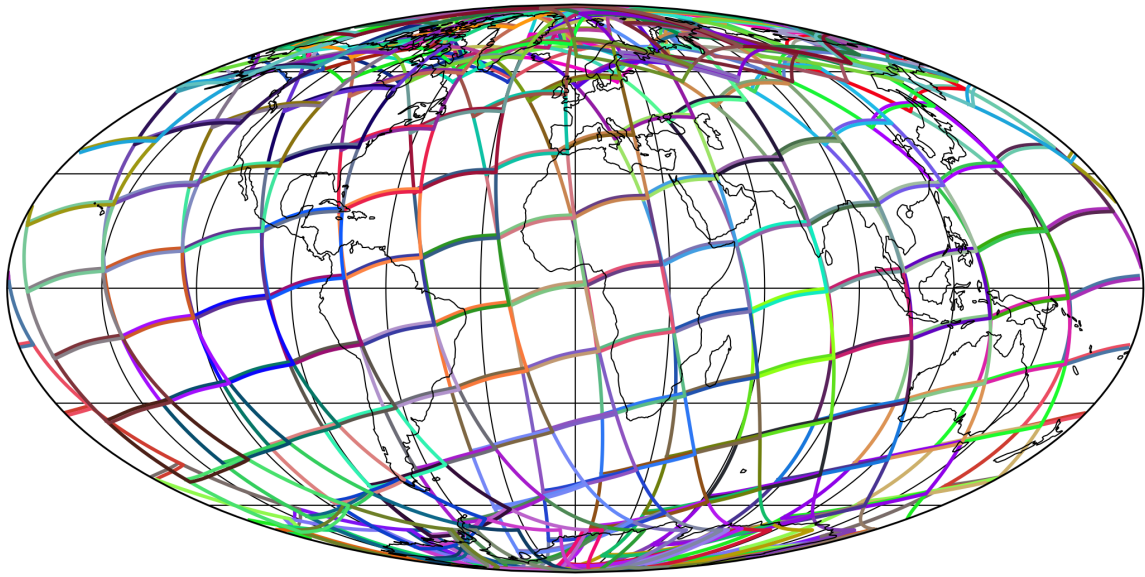


Figure 1: Outline of the granules.

4 Input data monitoring

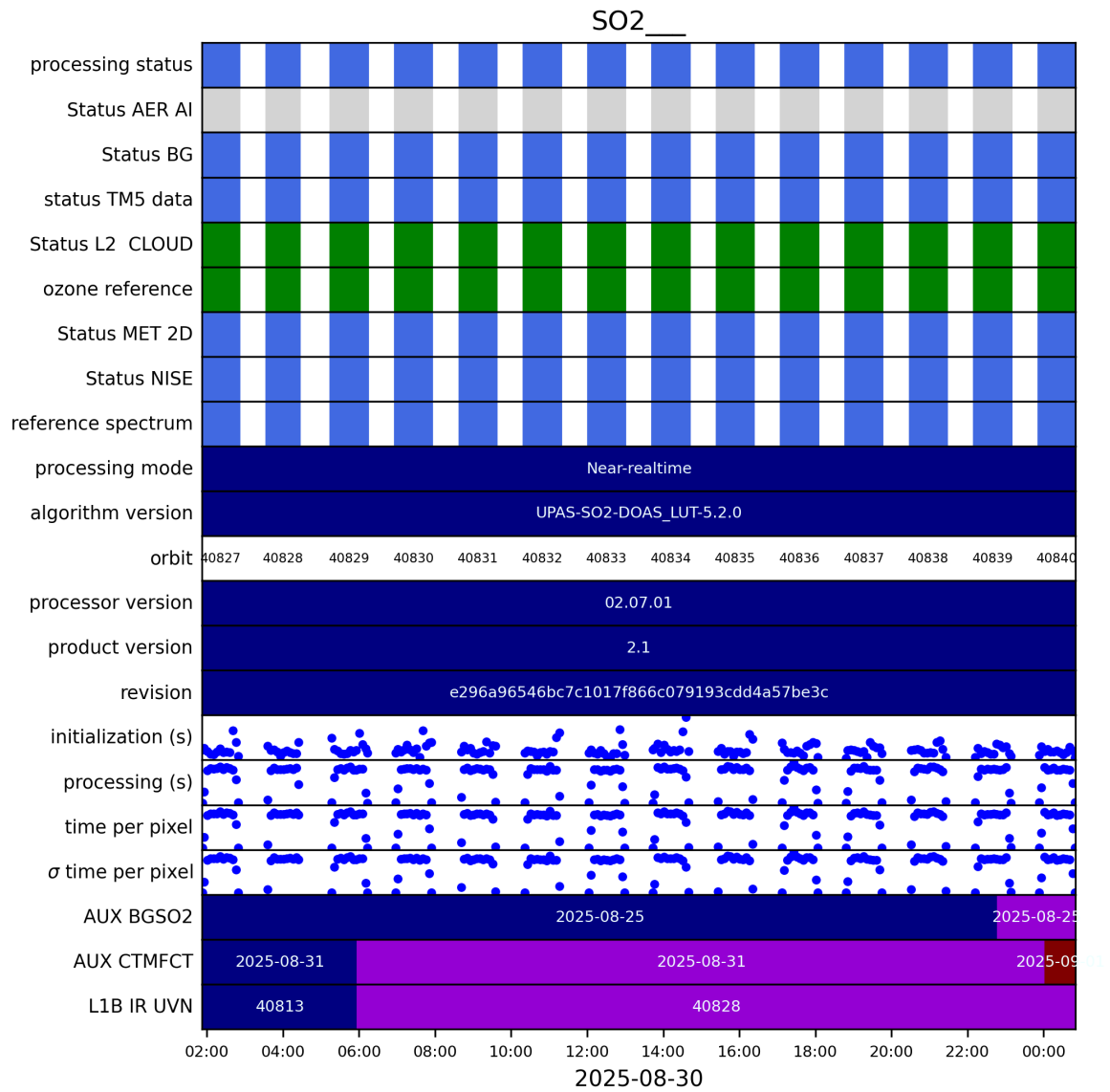


Figure 2: Input data per granule

5 Warnings and errors

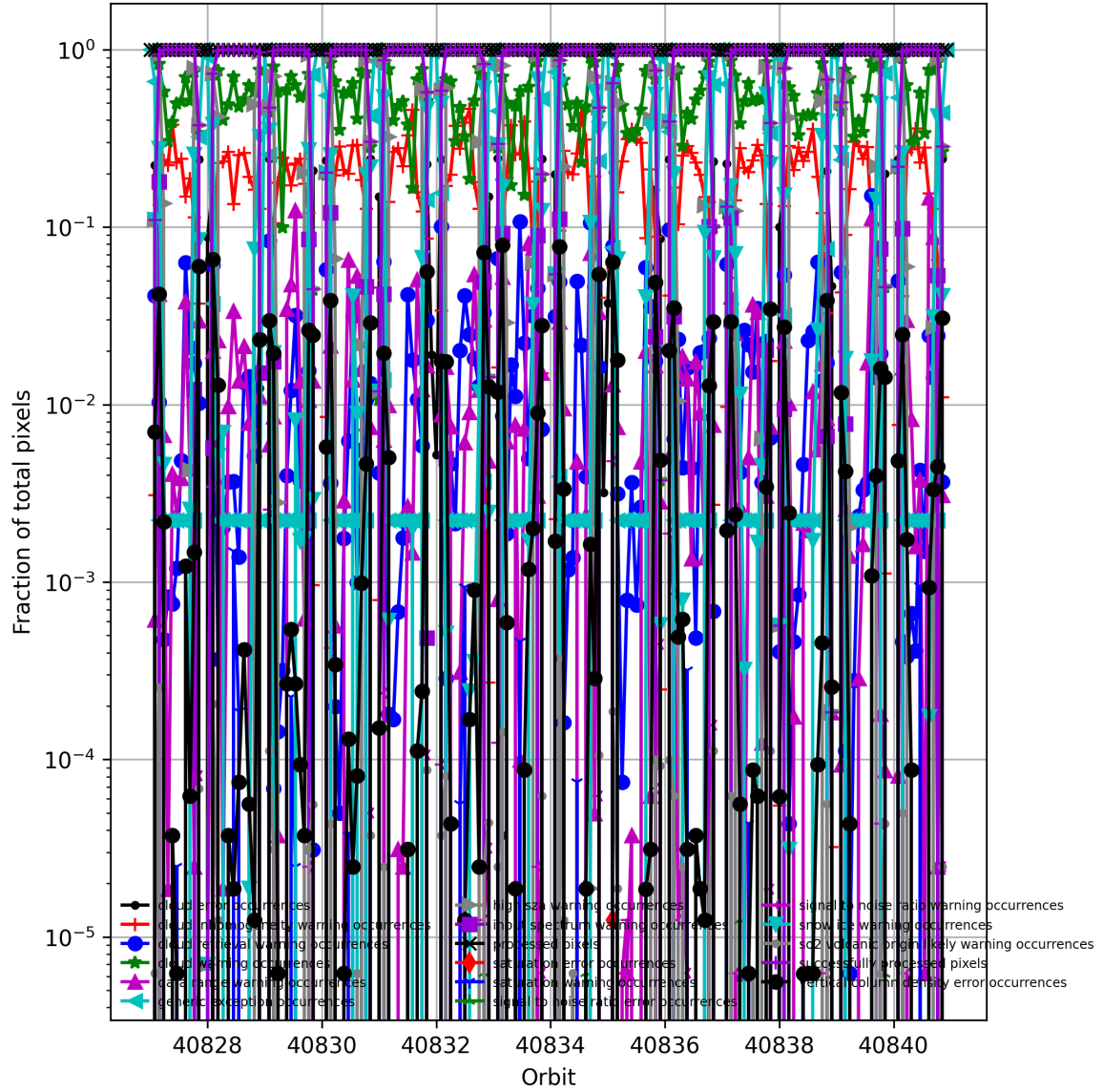


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

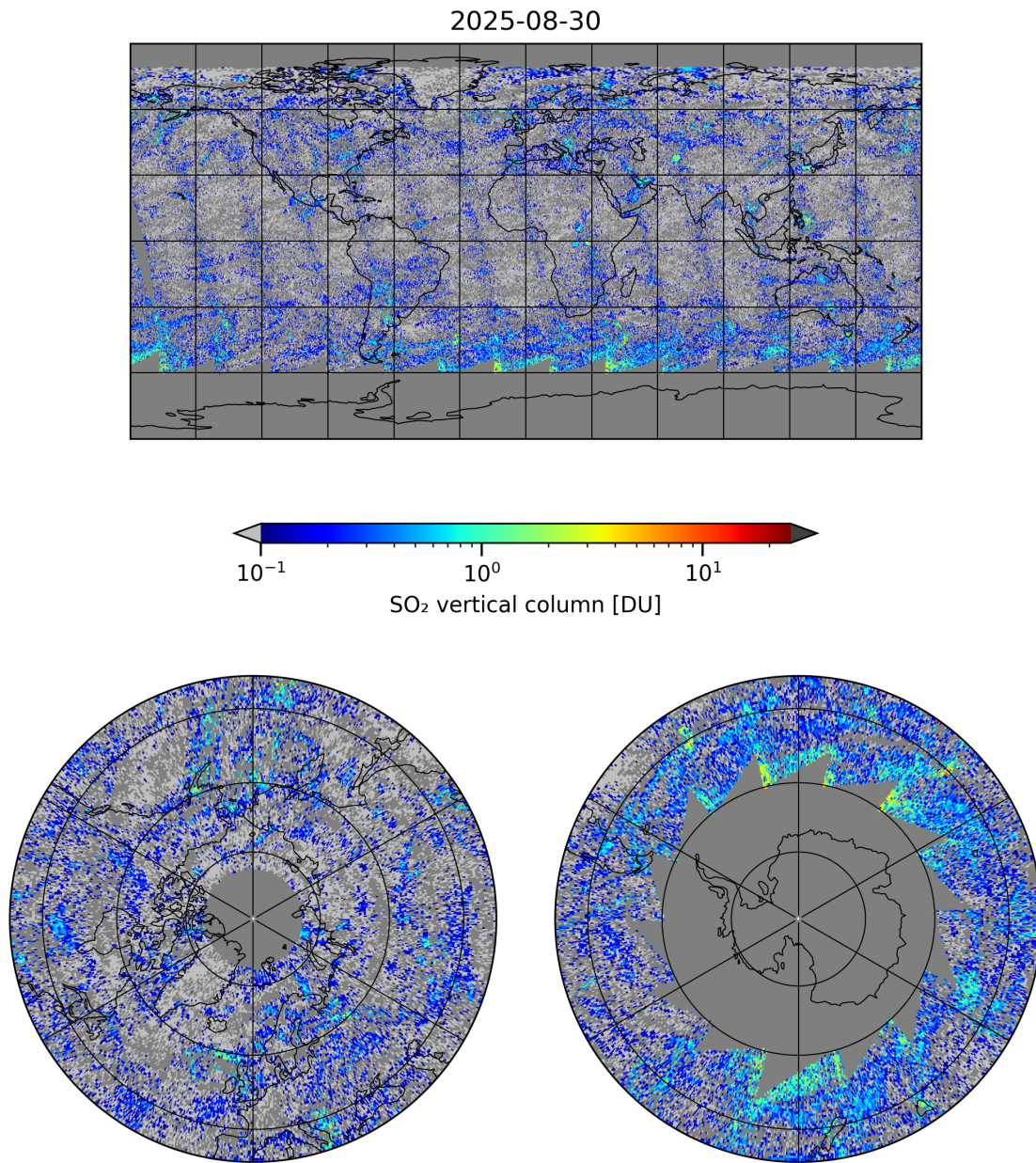


Figure 4: Map of “SO₂ vertical column” for 2025-08-30 to 2025-08-31

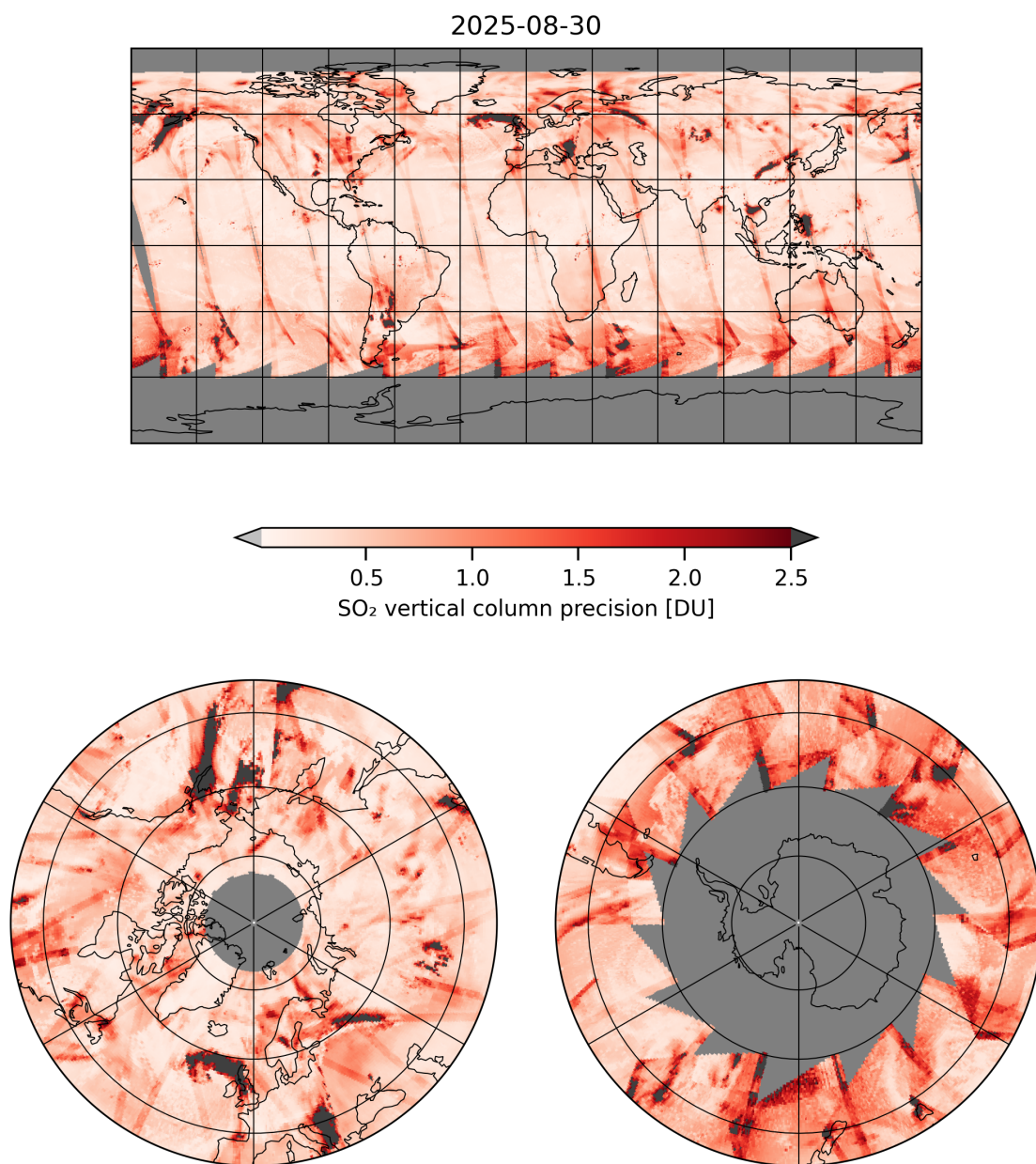


Figure 5: Map of “SO₂ vertical column precision” for 2025-08-30 to 2025-08-31

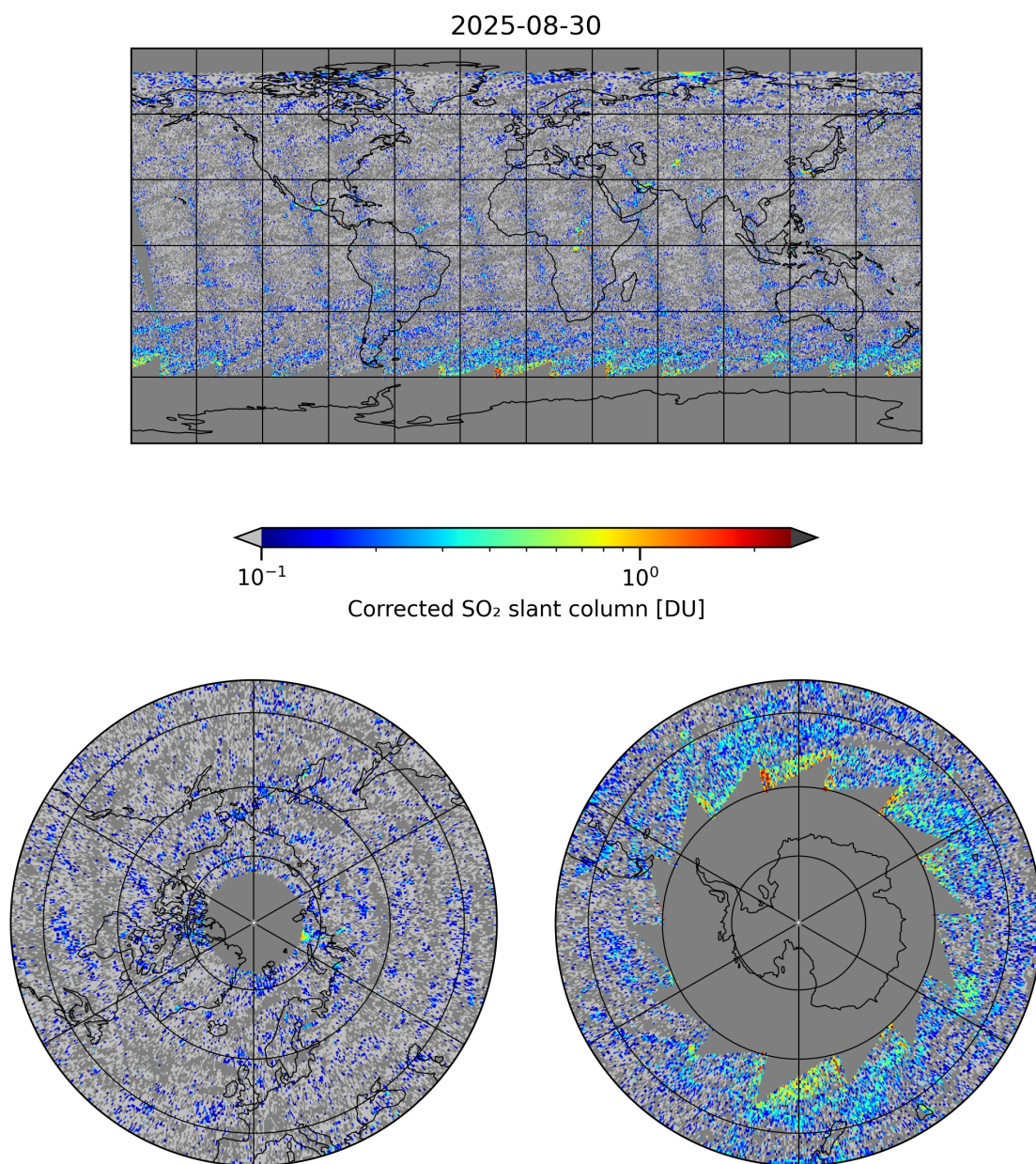


Figure 6: Map of “Corrected SO₂ slant column” for 2025-08-30 to 2025-08-31

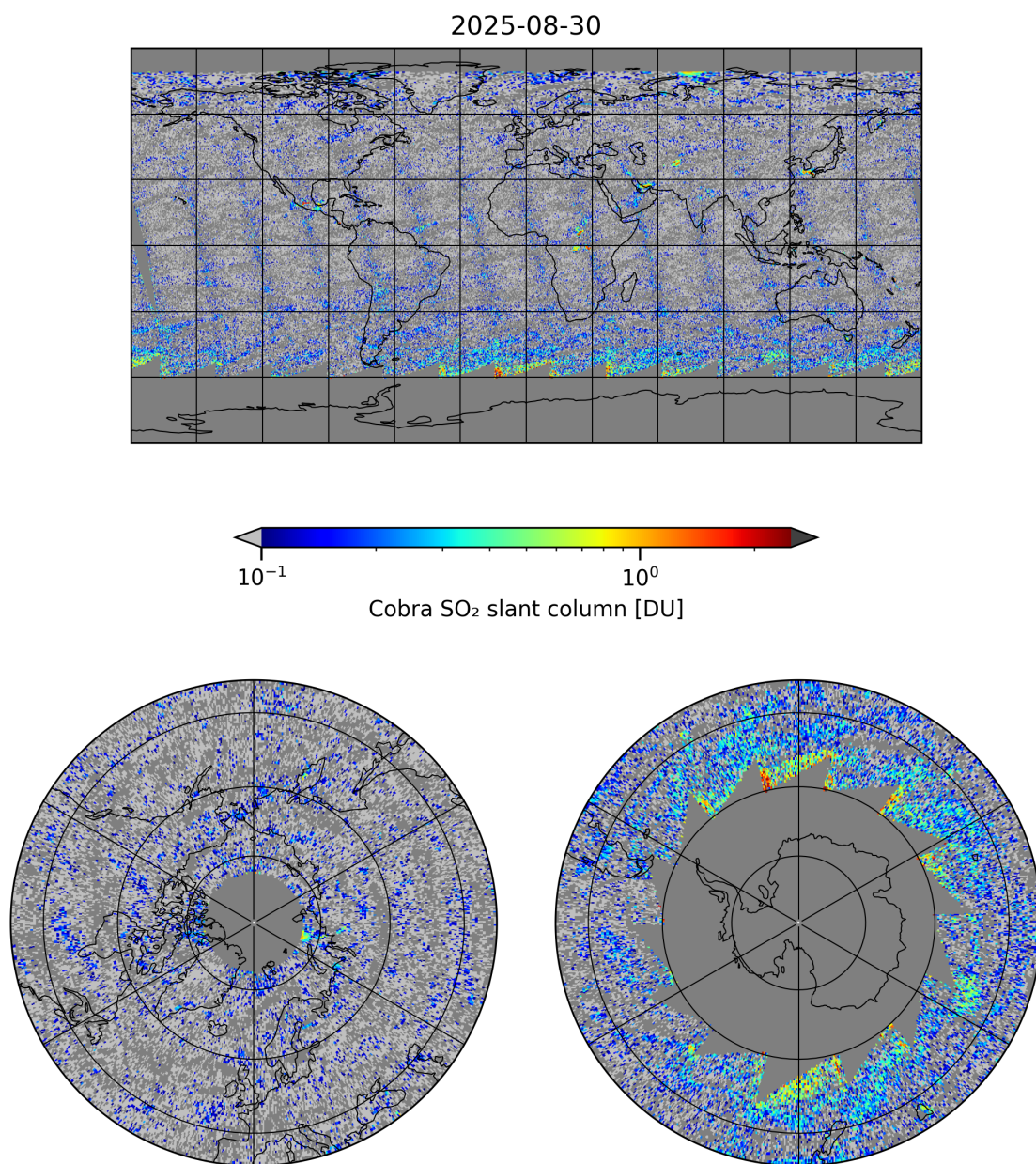


Figure 7: Map of “Cobra SO₂ slant column” for 2025-08-30 to 2025-08-31

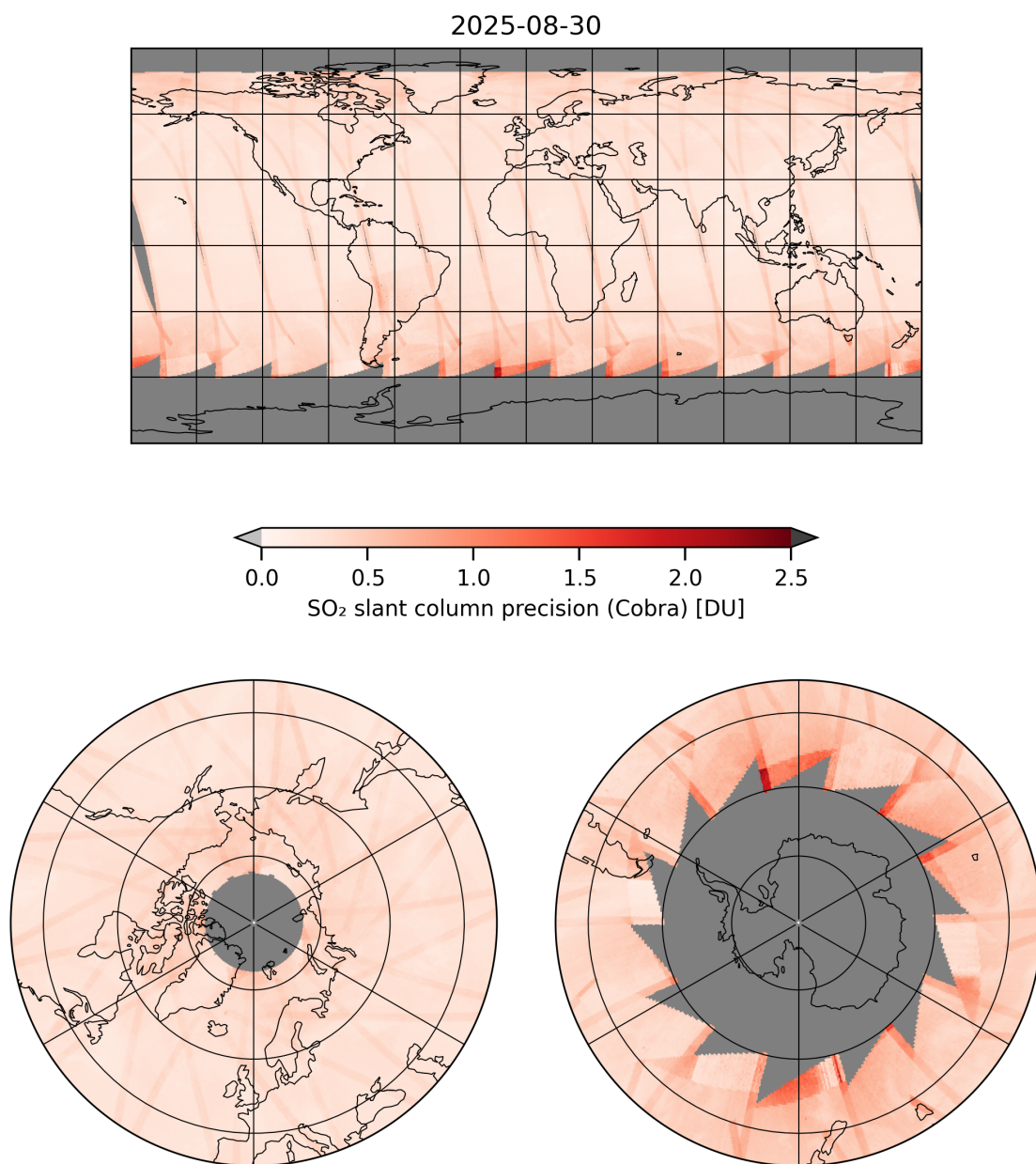


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-08-30 to 2025-08-31

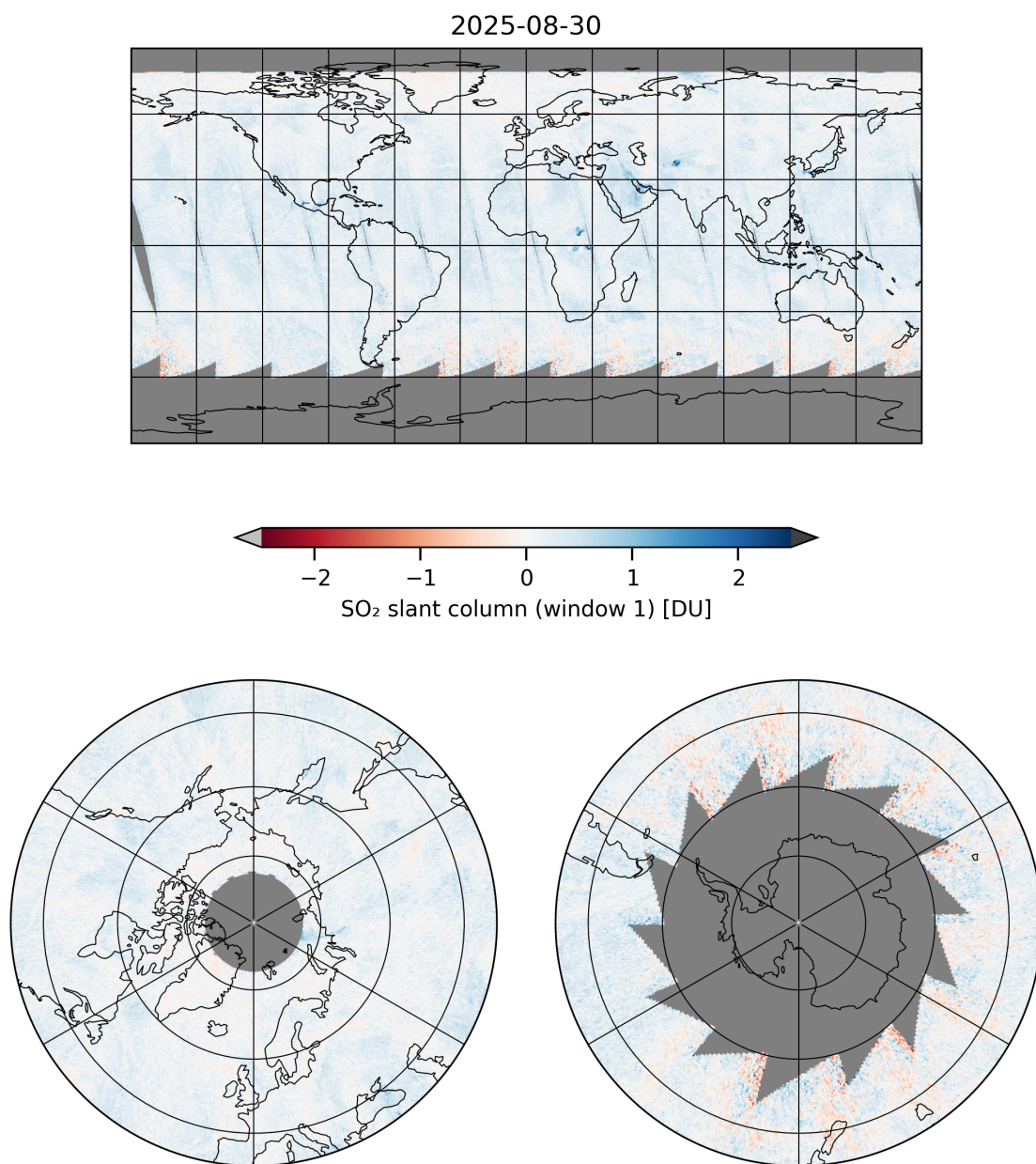


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-08-30 to 2025-08-31

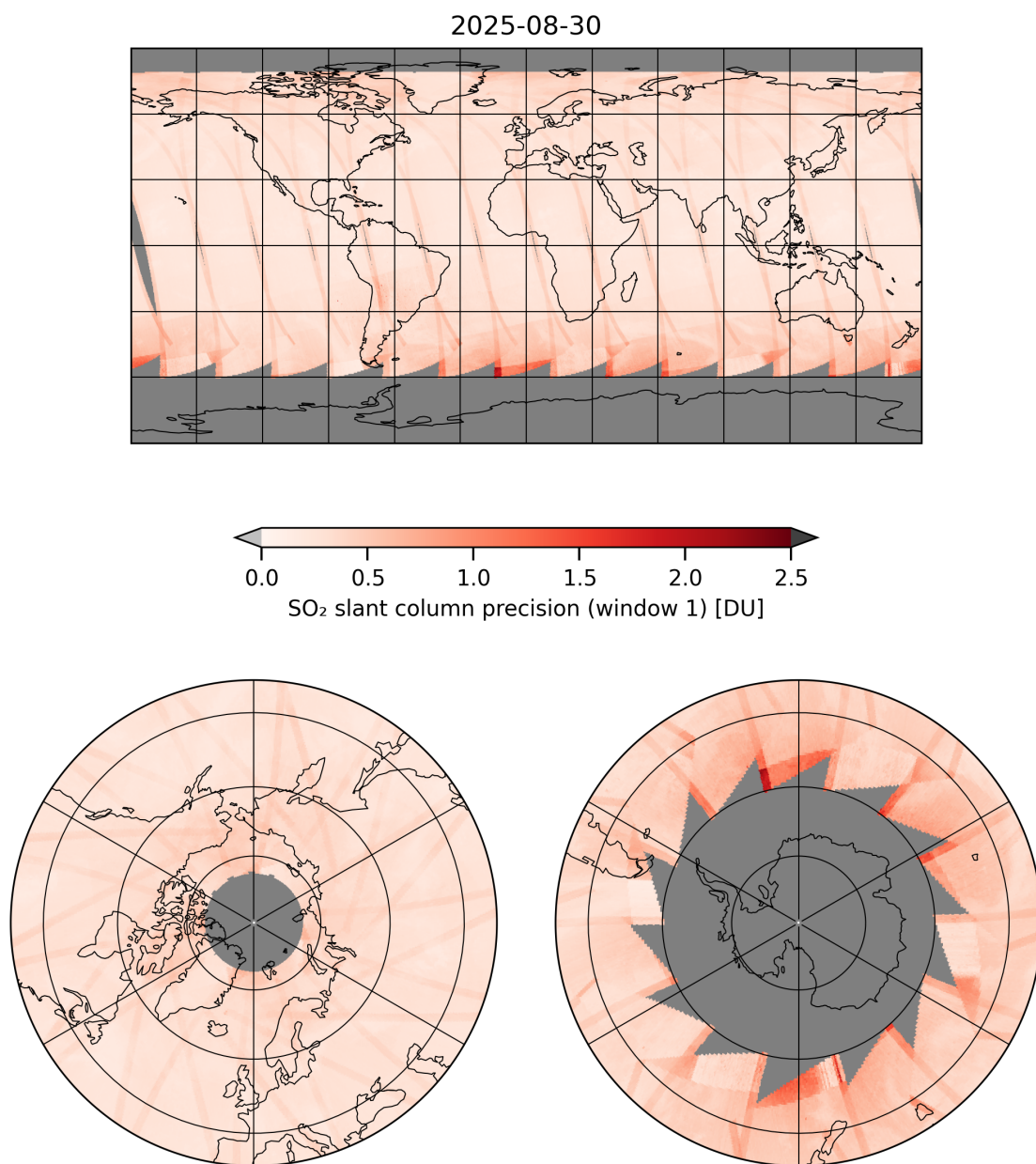


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-08-30 to 2025-08-31

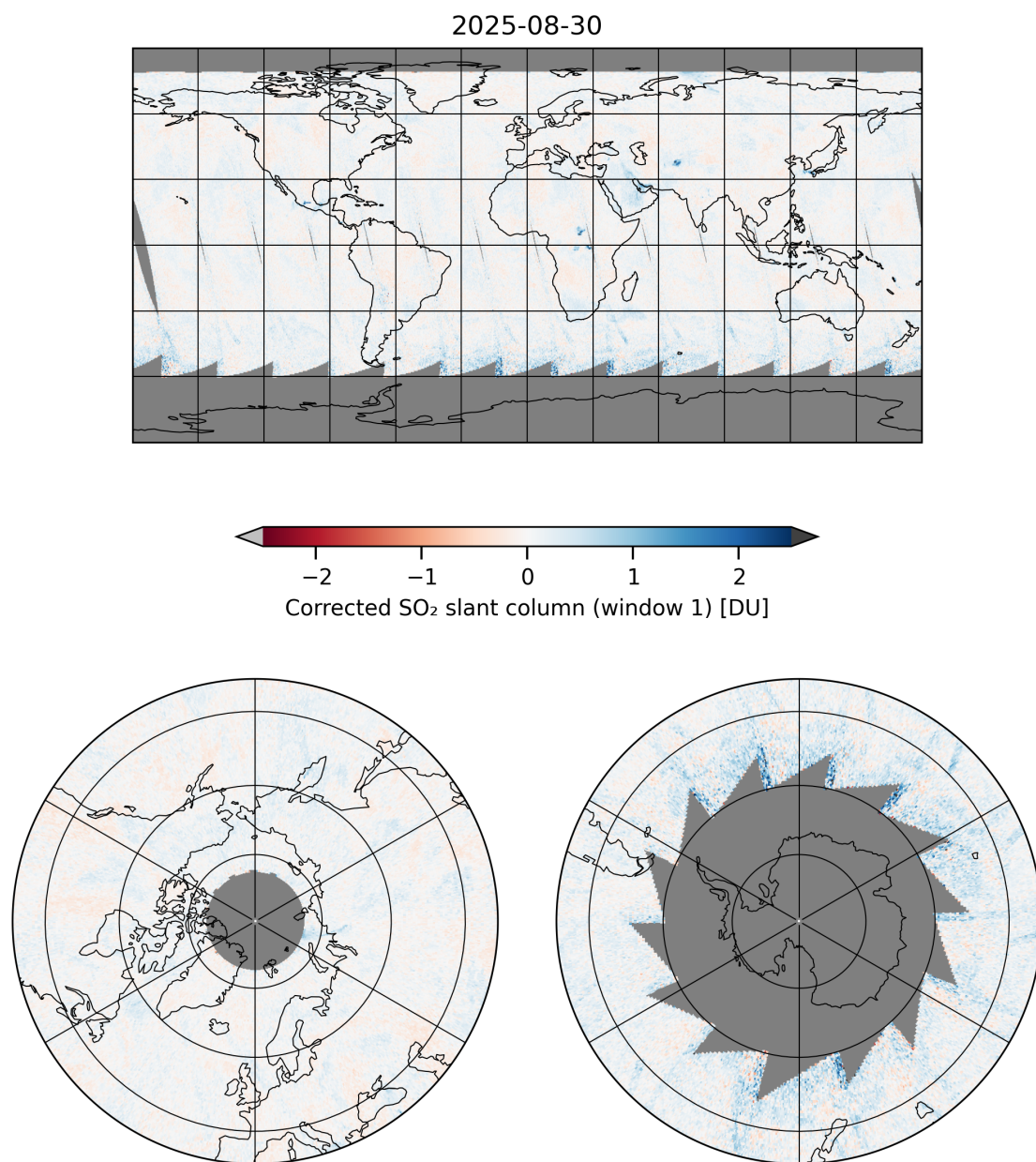


Figure 11: Map of "Corrected SO₂ slant column (window 1)" for 2025-08-30 to 2025-08-31

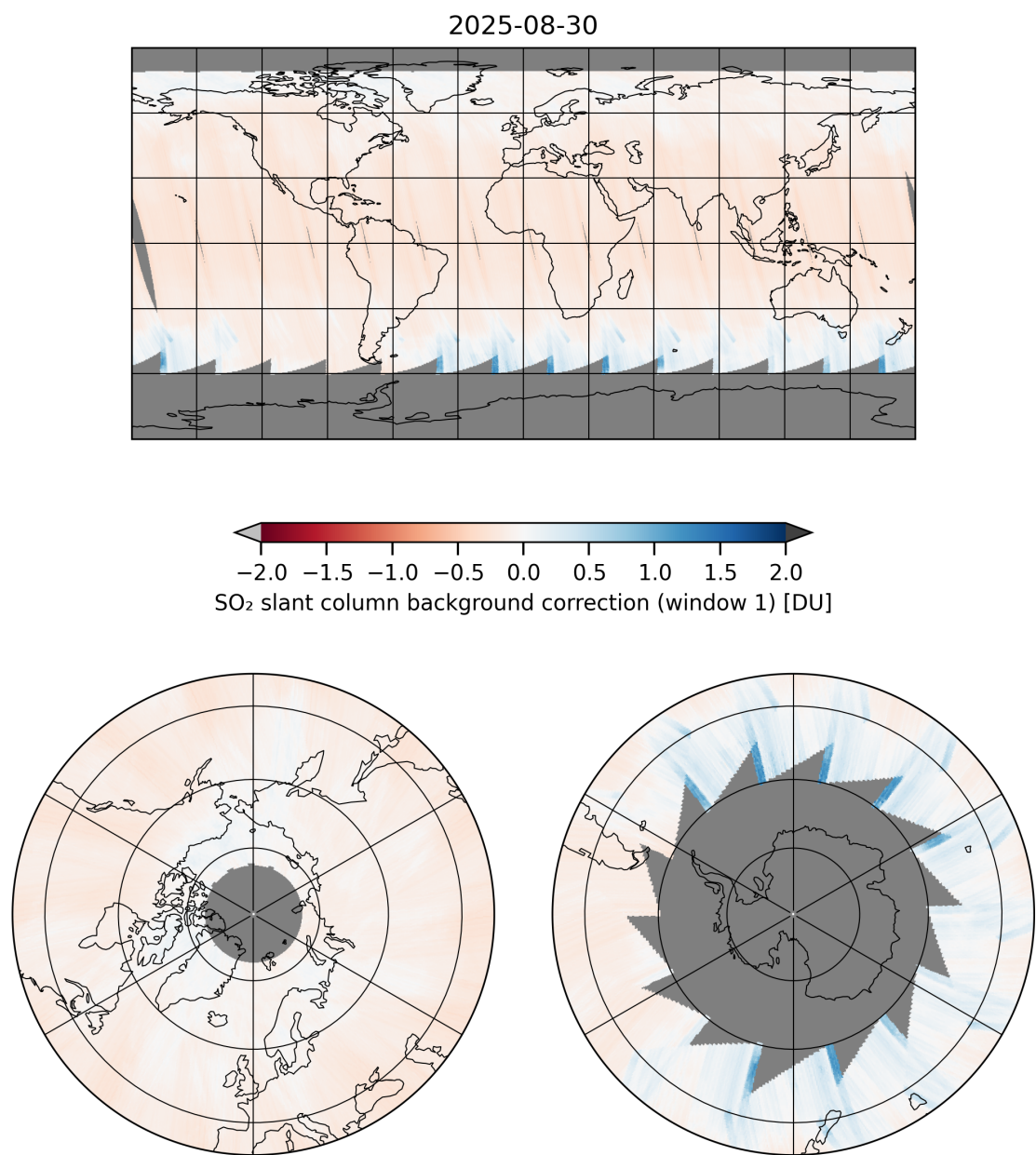


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-08-30 to 2025-08-31

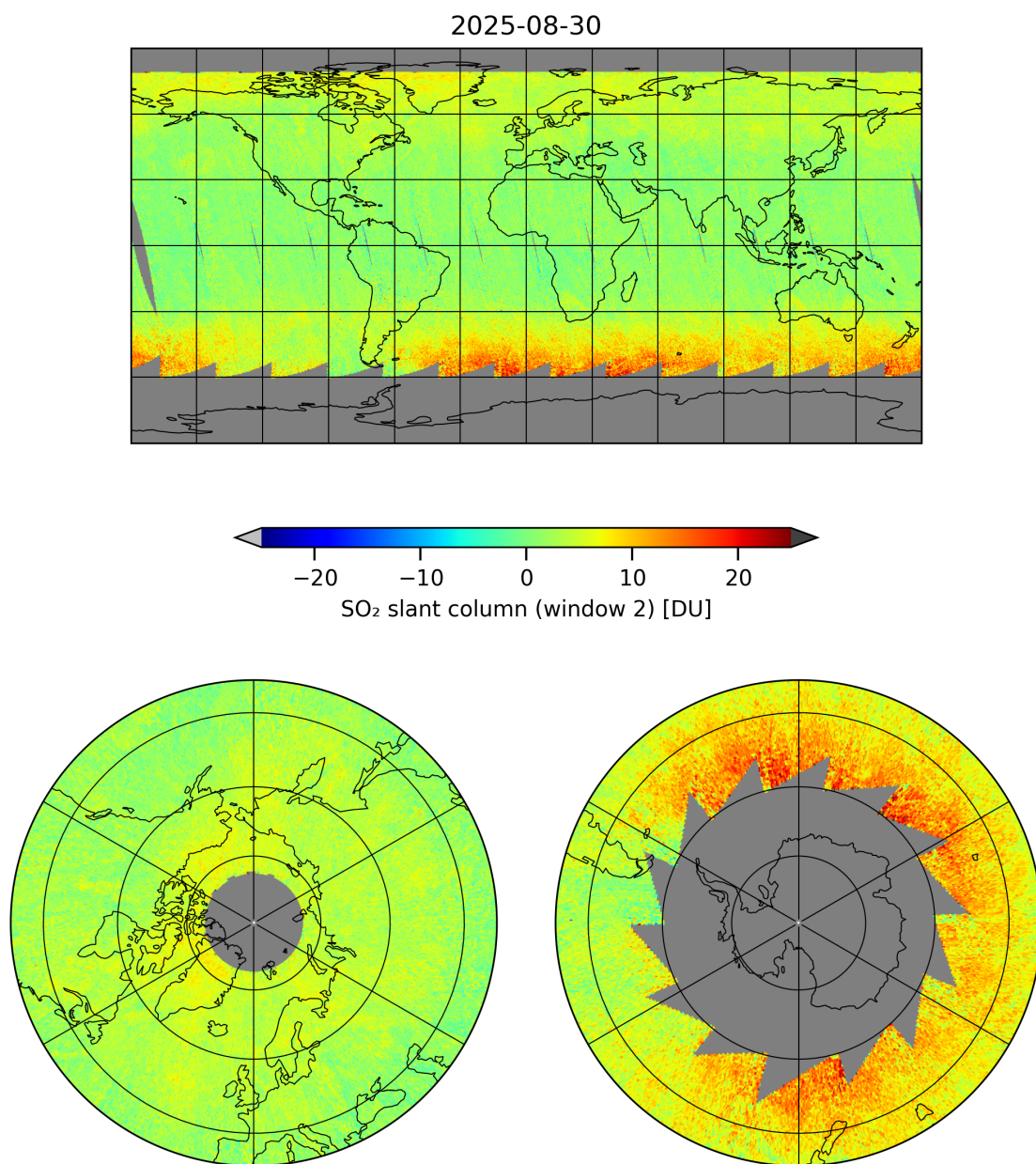


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-08-30 to 2025-08-31

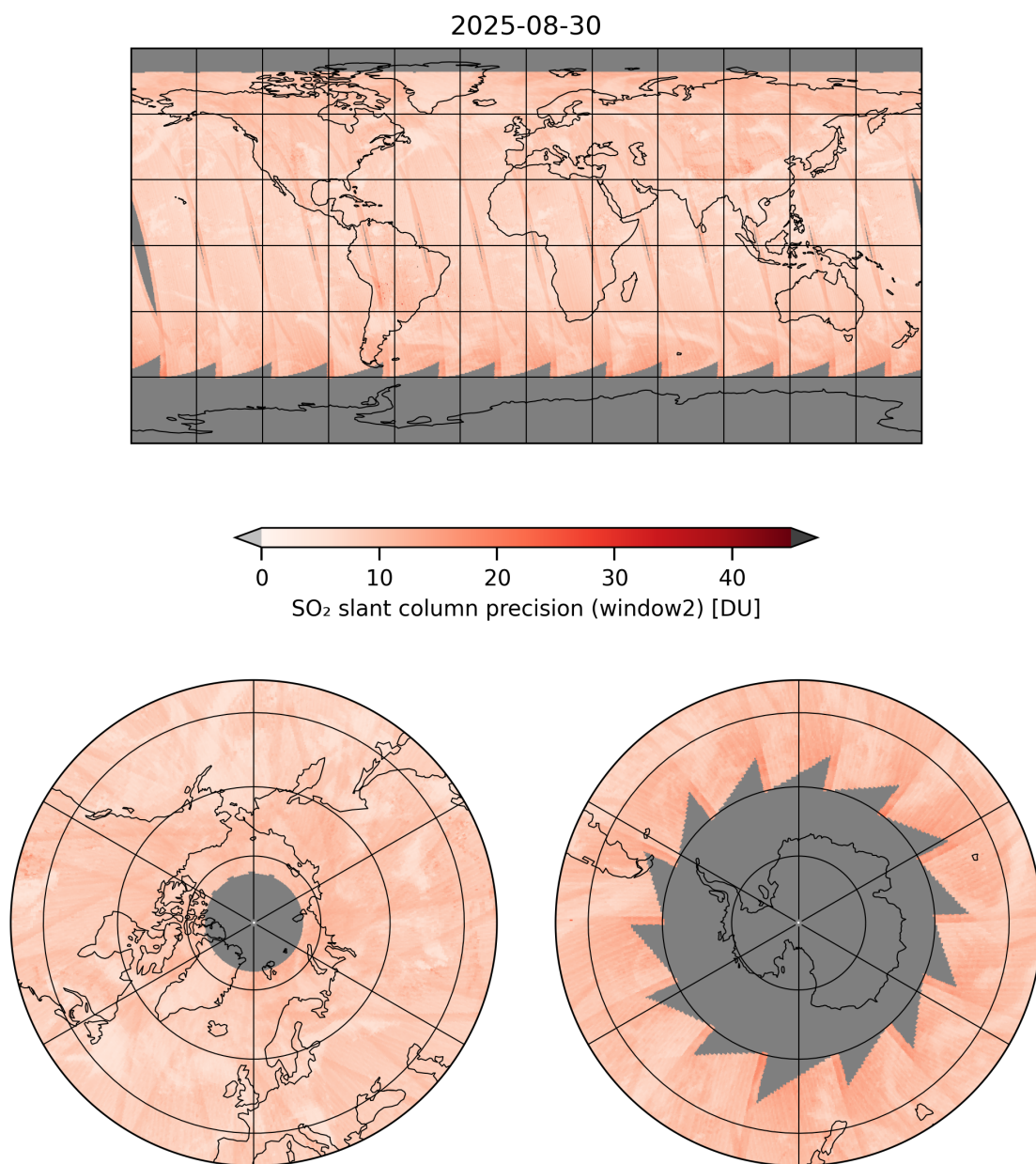


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-08-30 to 2025-08-31

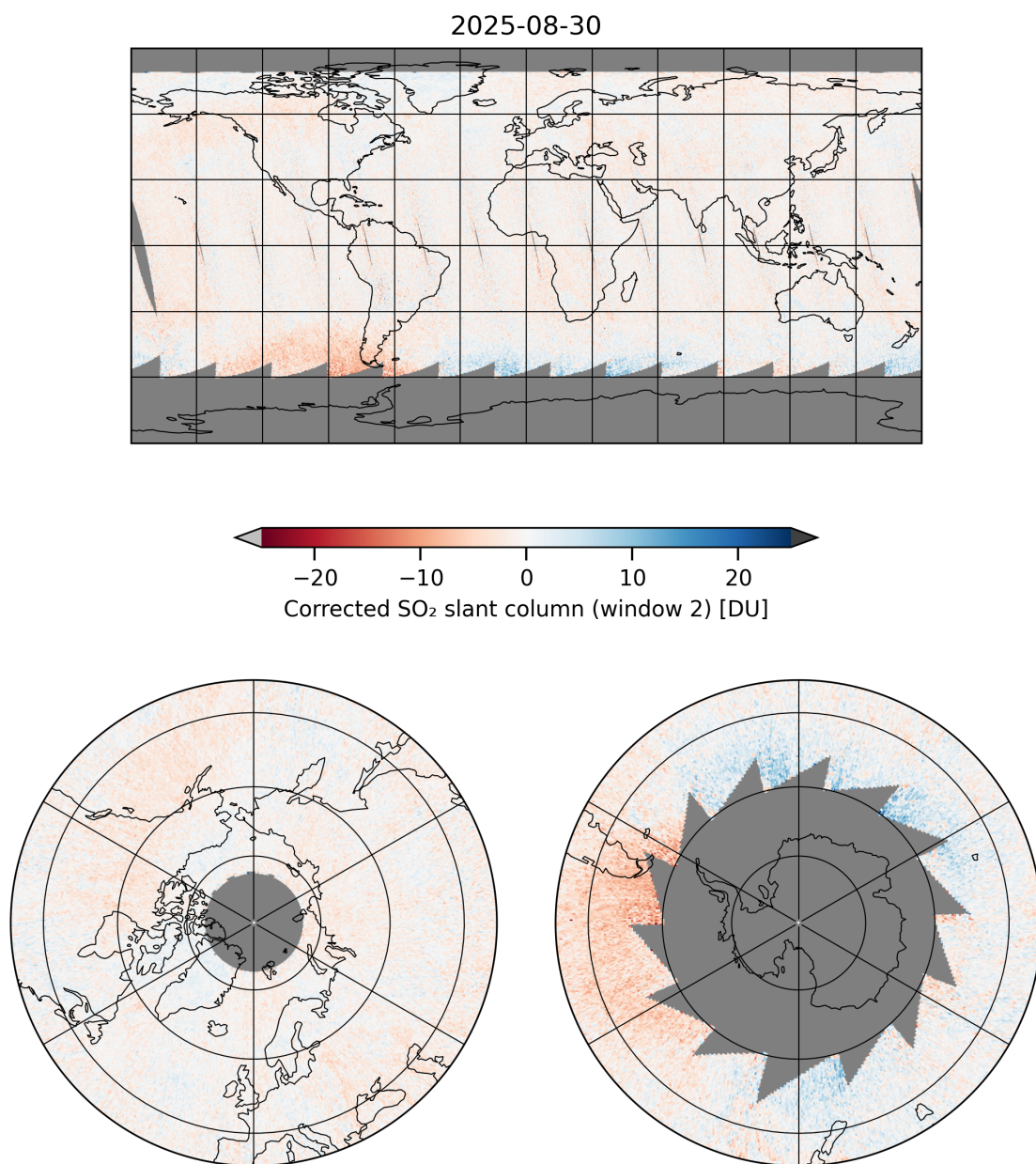


Figure 15: Map of "Corrected SO₂ slant column (window 2)" for 2025-08-30 to 2025-08-31

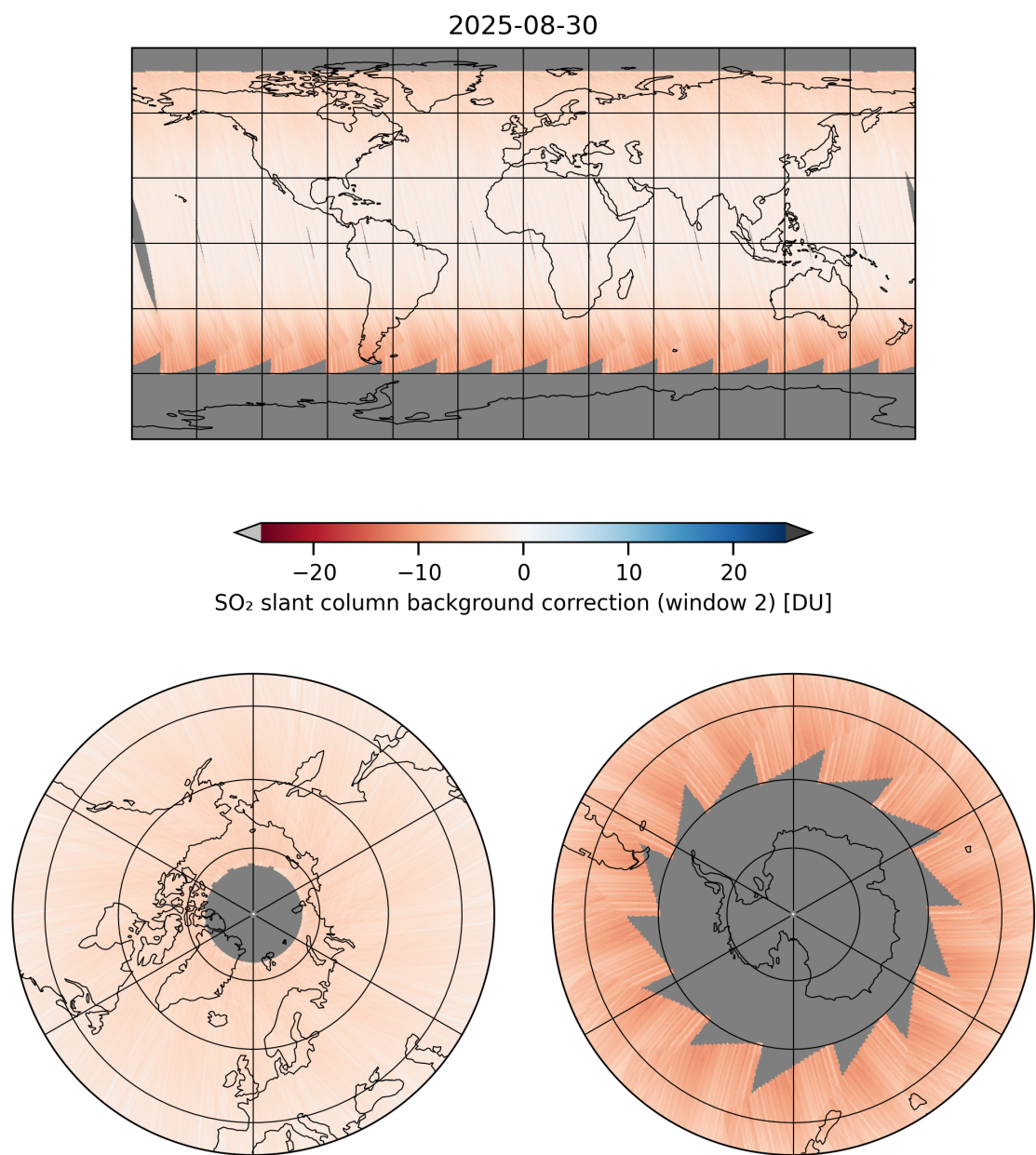


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-08-30 to 2025-08-31

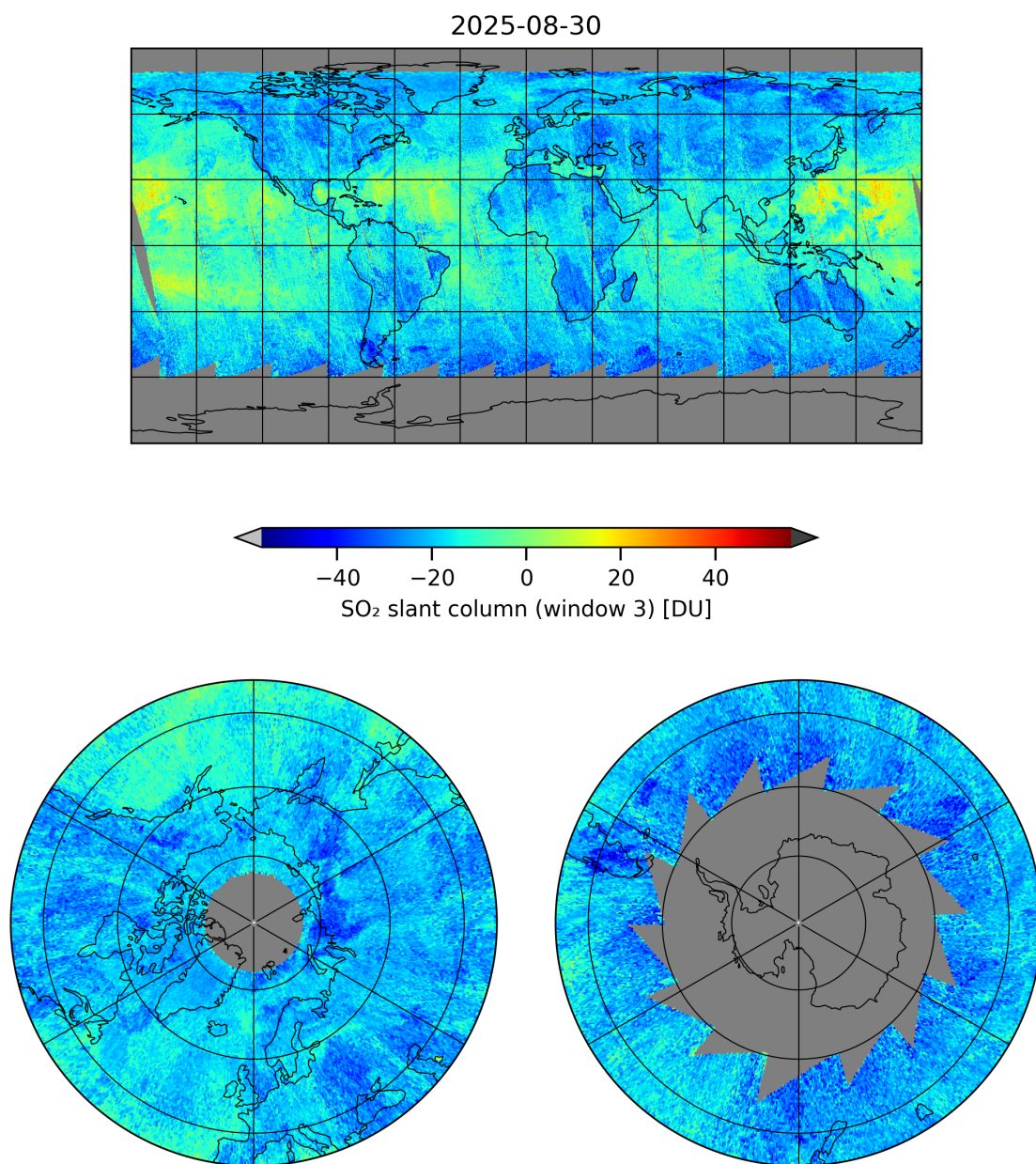


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-08-30 to 2025-08-31

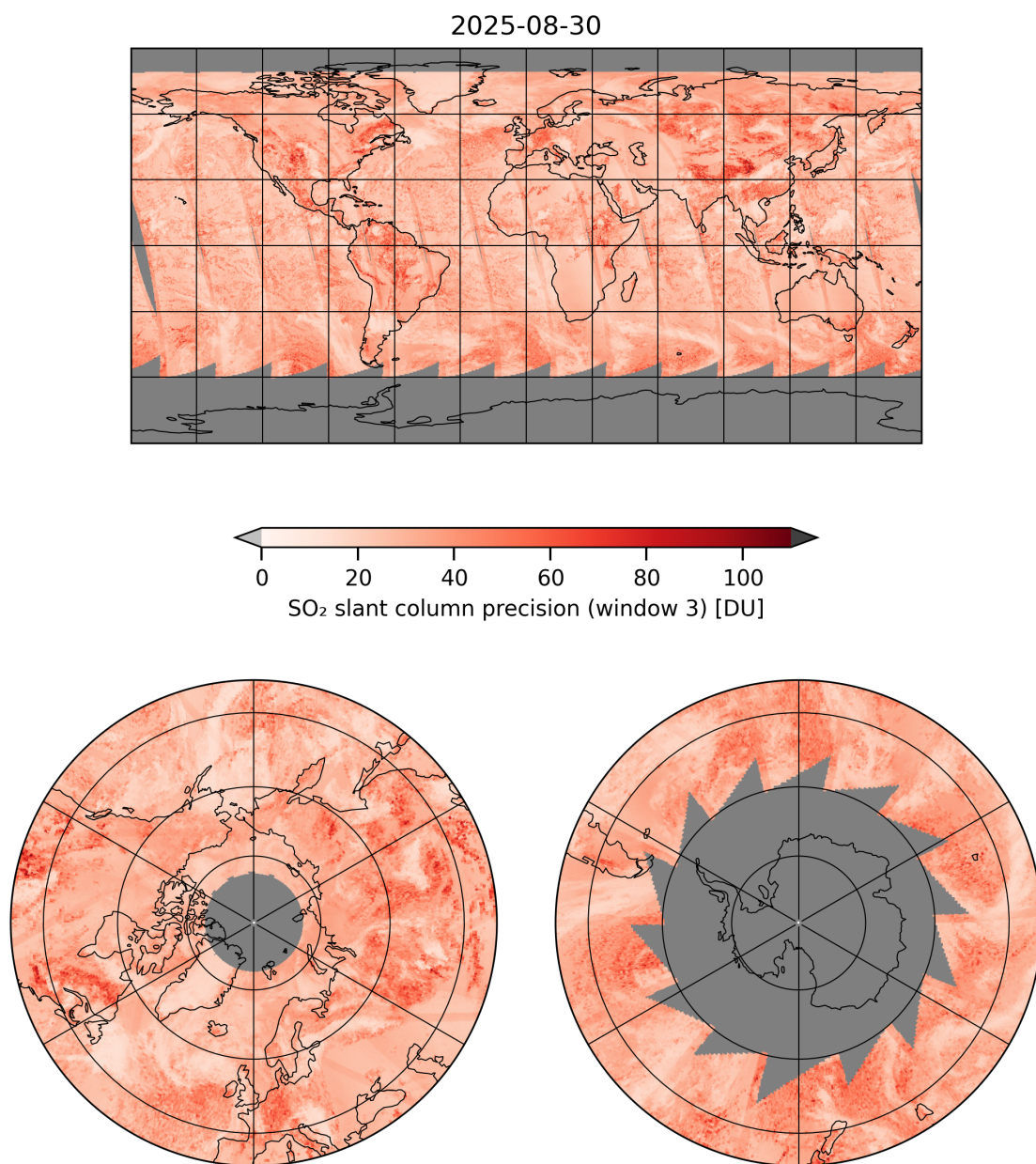


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-08-30 to 2025-08-31

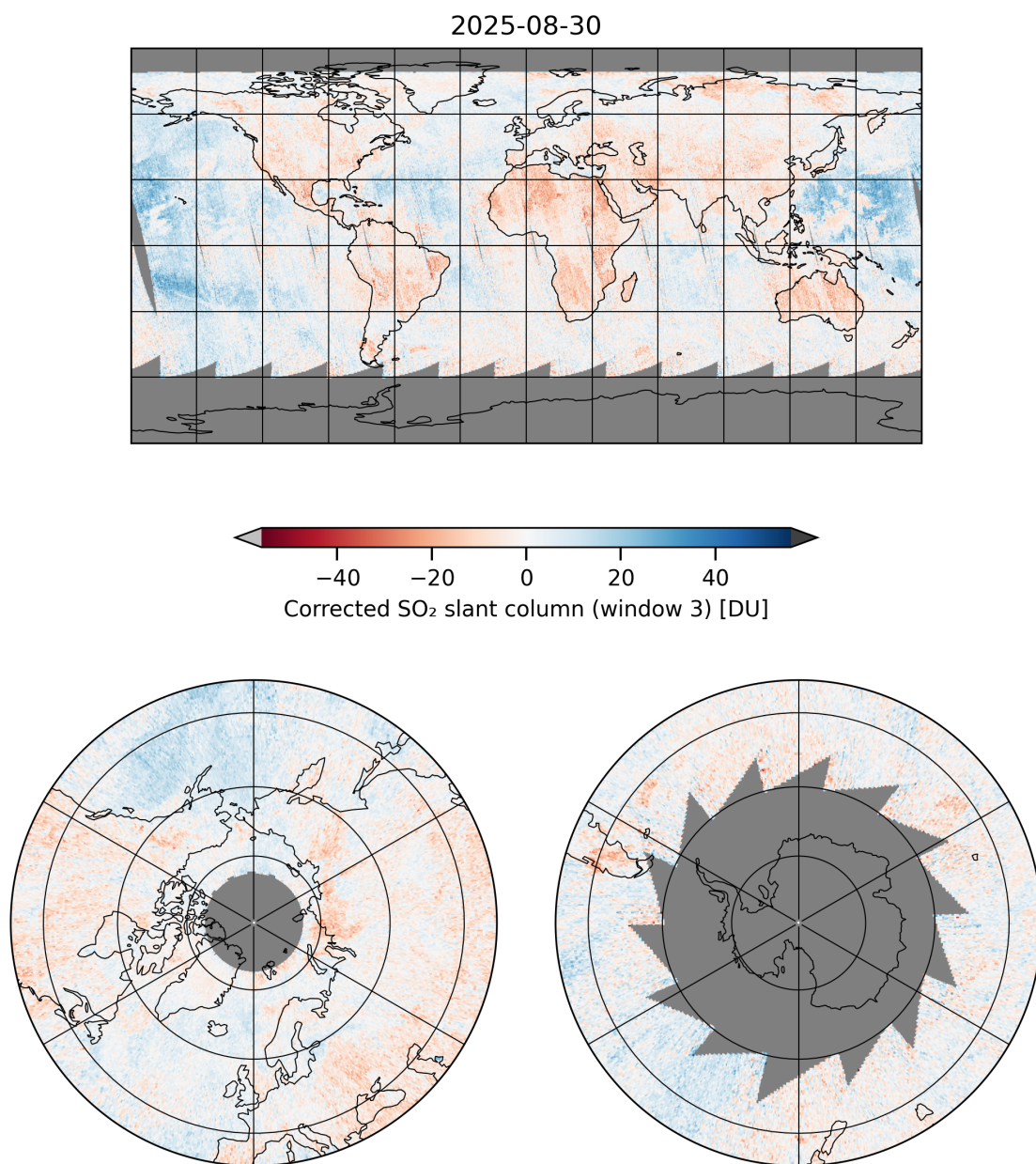


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-08-30 to 2025-08-31

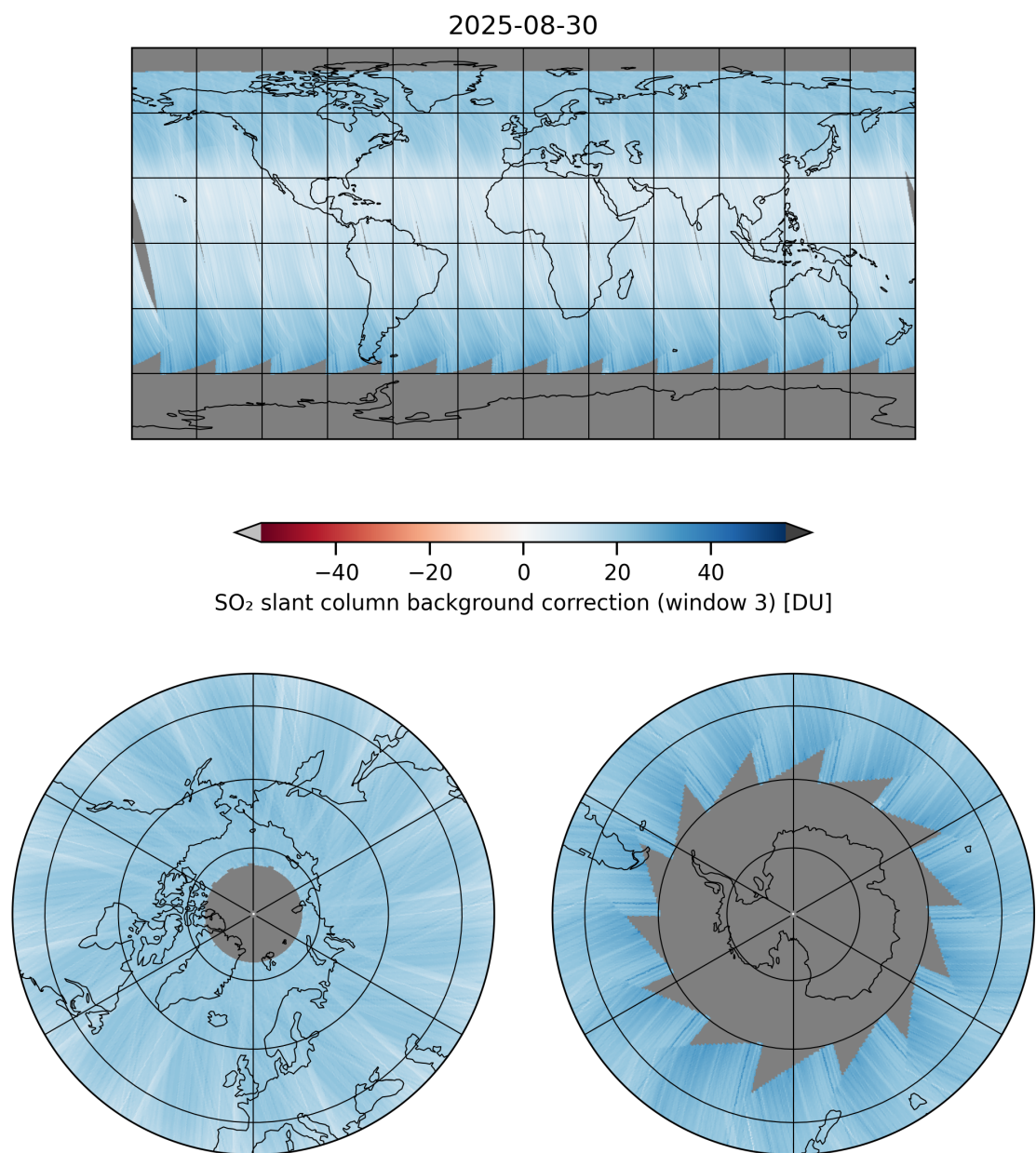


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-08-30 to 2025-08-31

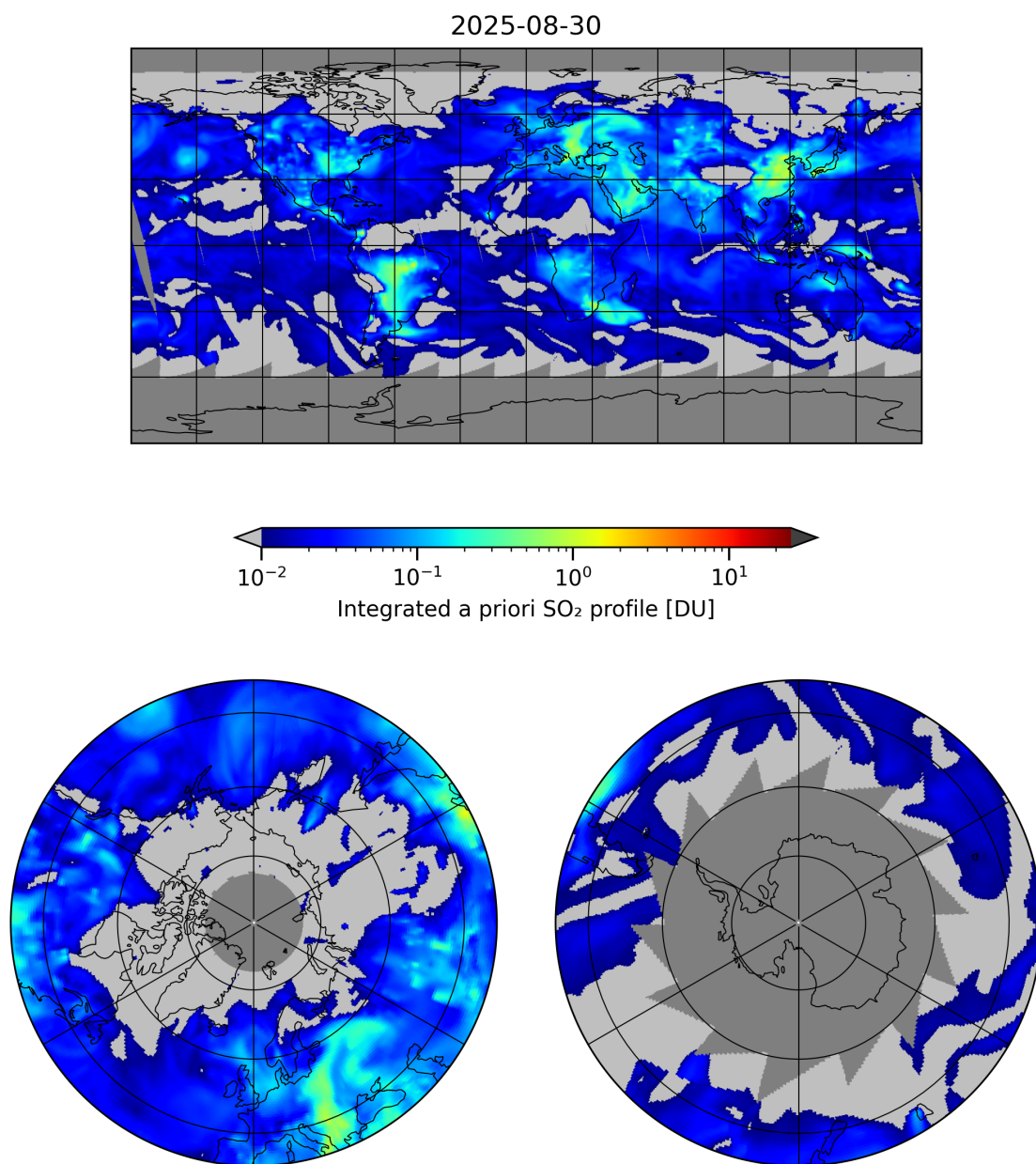


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-08-30 to 2025-08-31

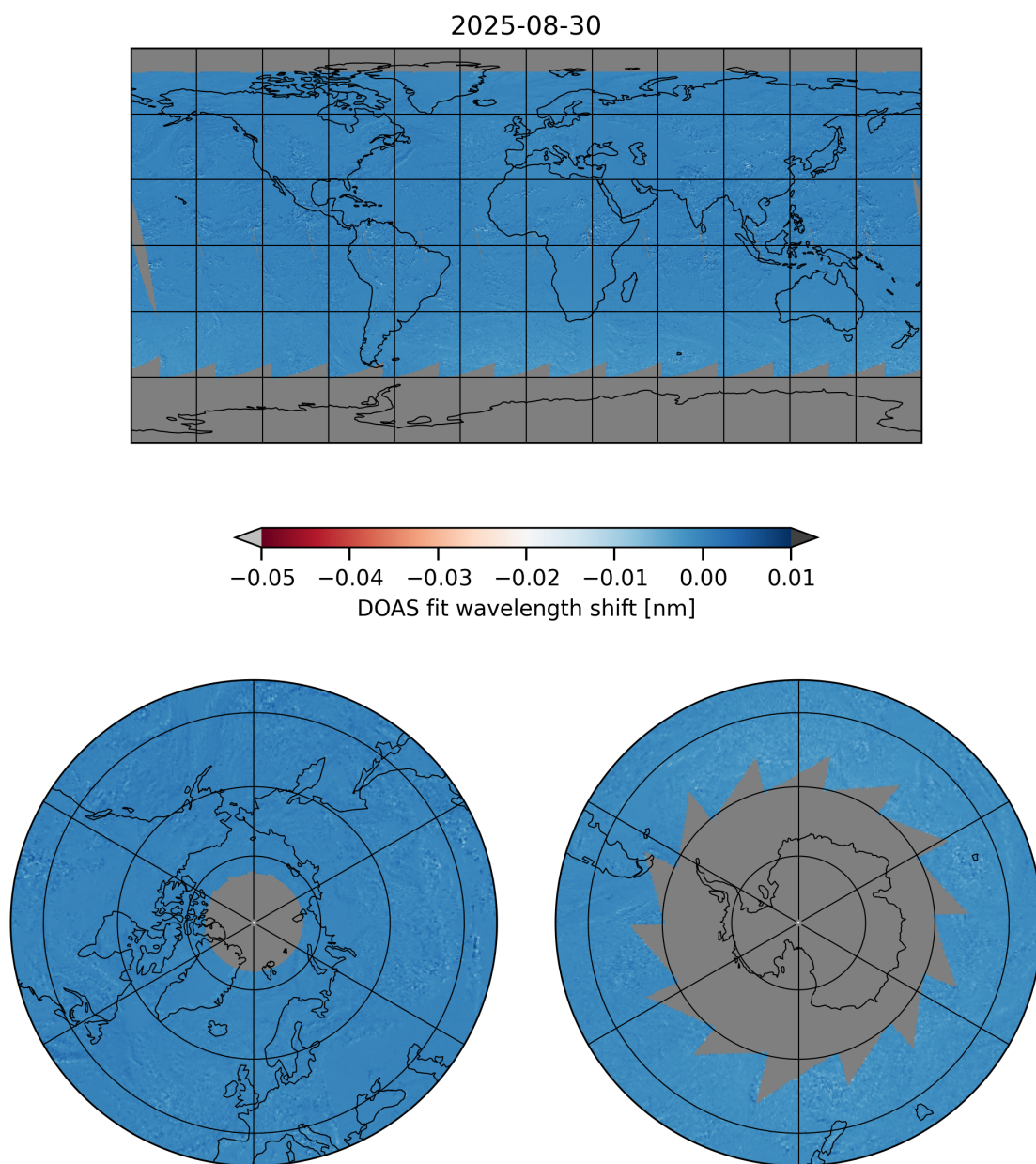


Figure 22: Map of “DOAS fit wavelength shift” for 2025-08-30 to 2025-08-31

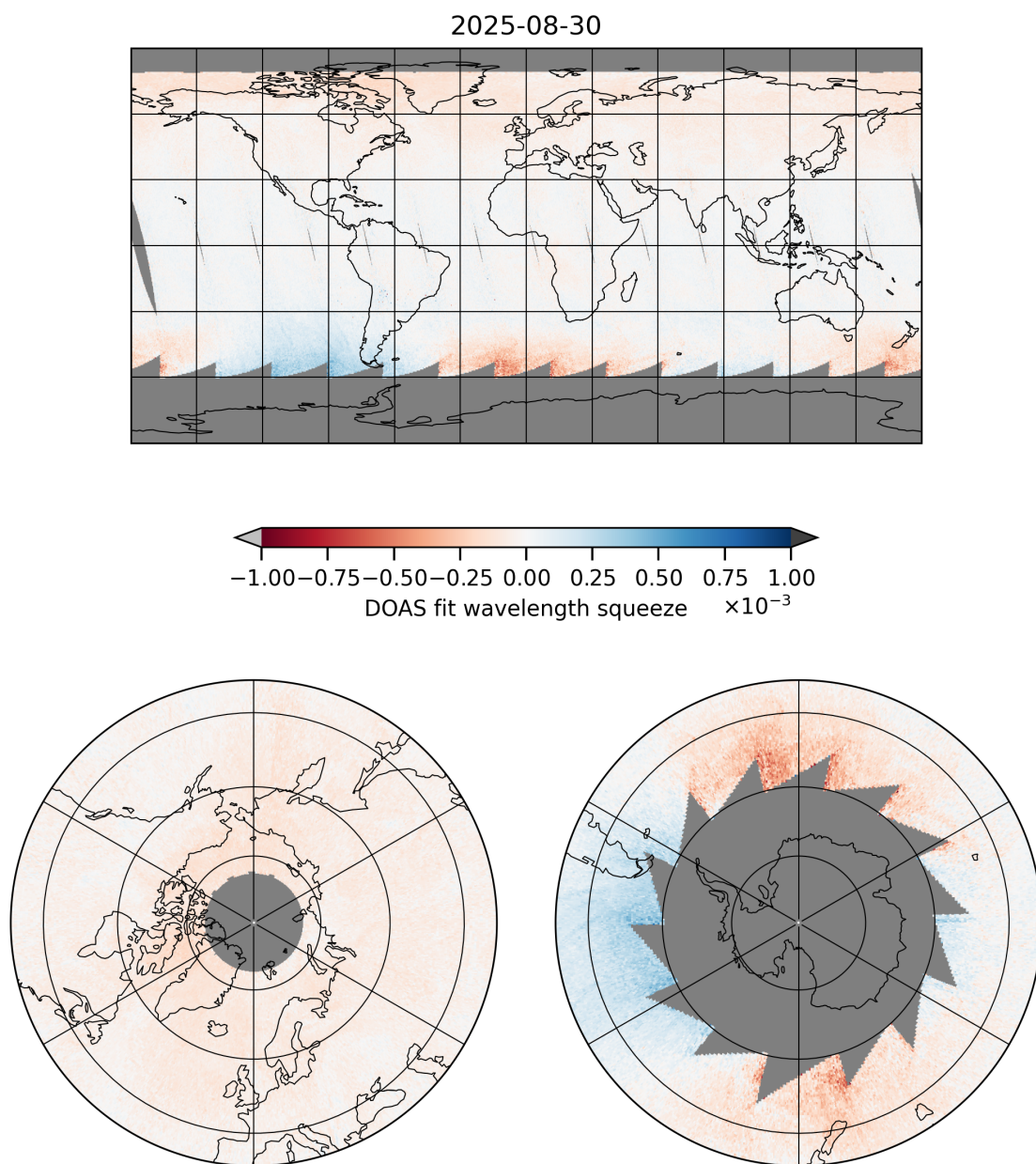


Figure 23: Map of "DOAS fit wavelength squeeze" for 2025-08-30 to 2025-08-31

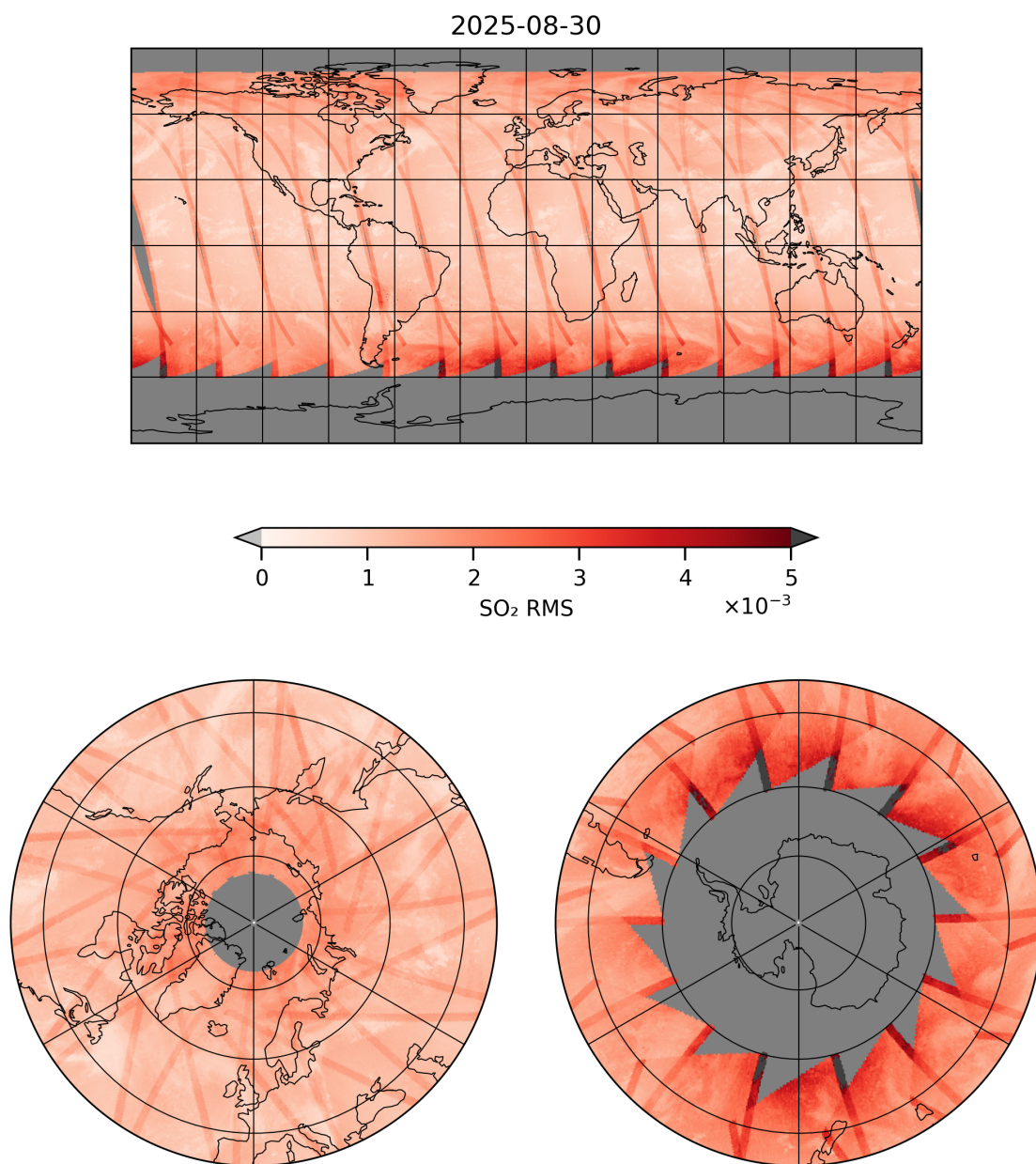


Figure 24: Map of “SO₂ RMS” for 2025-08-30 to 2025-08-31

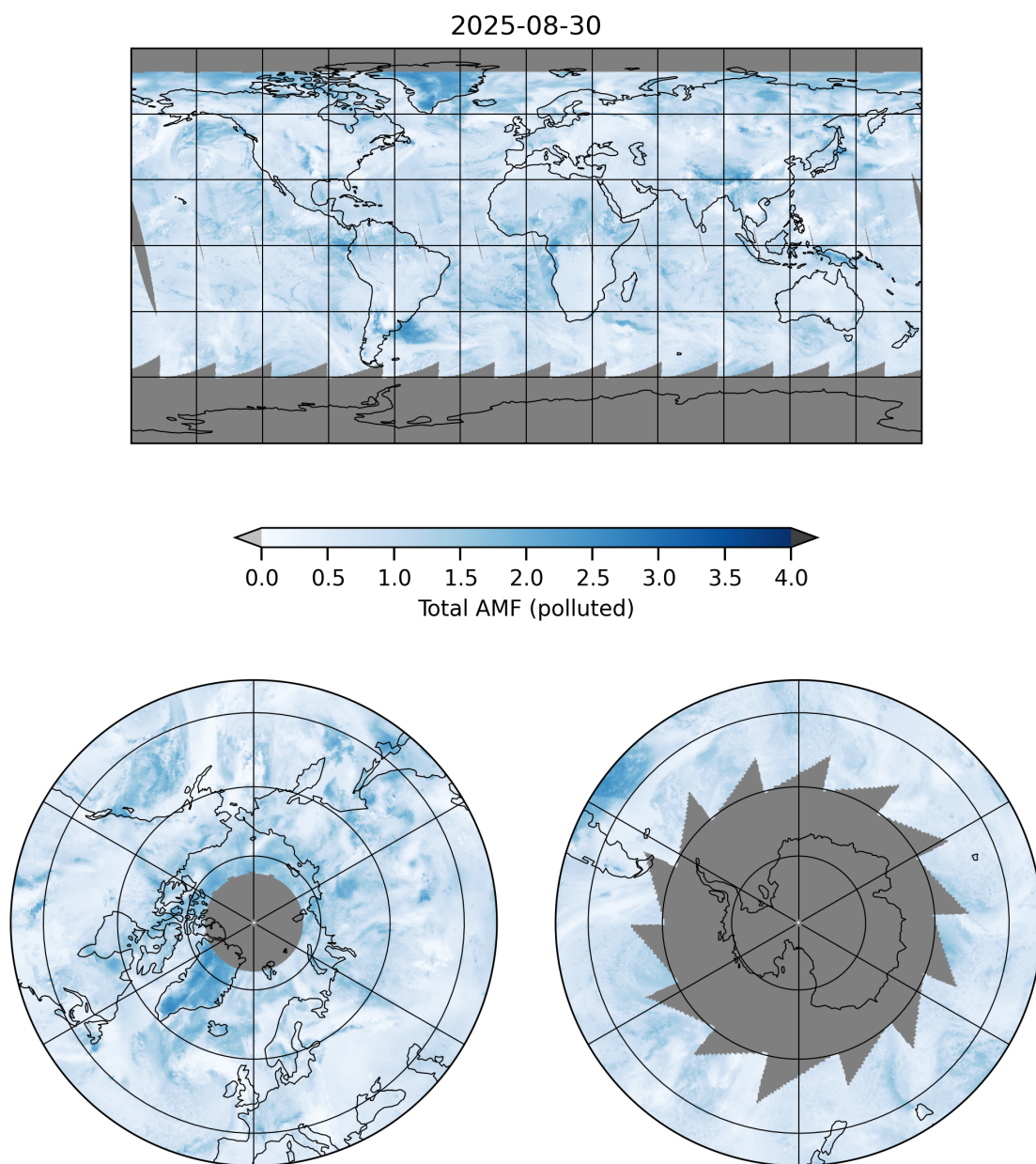


Figure 25: Map of “Total AMF (polluted)” for 2025-08-30 to 2025-08-31

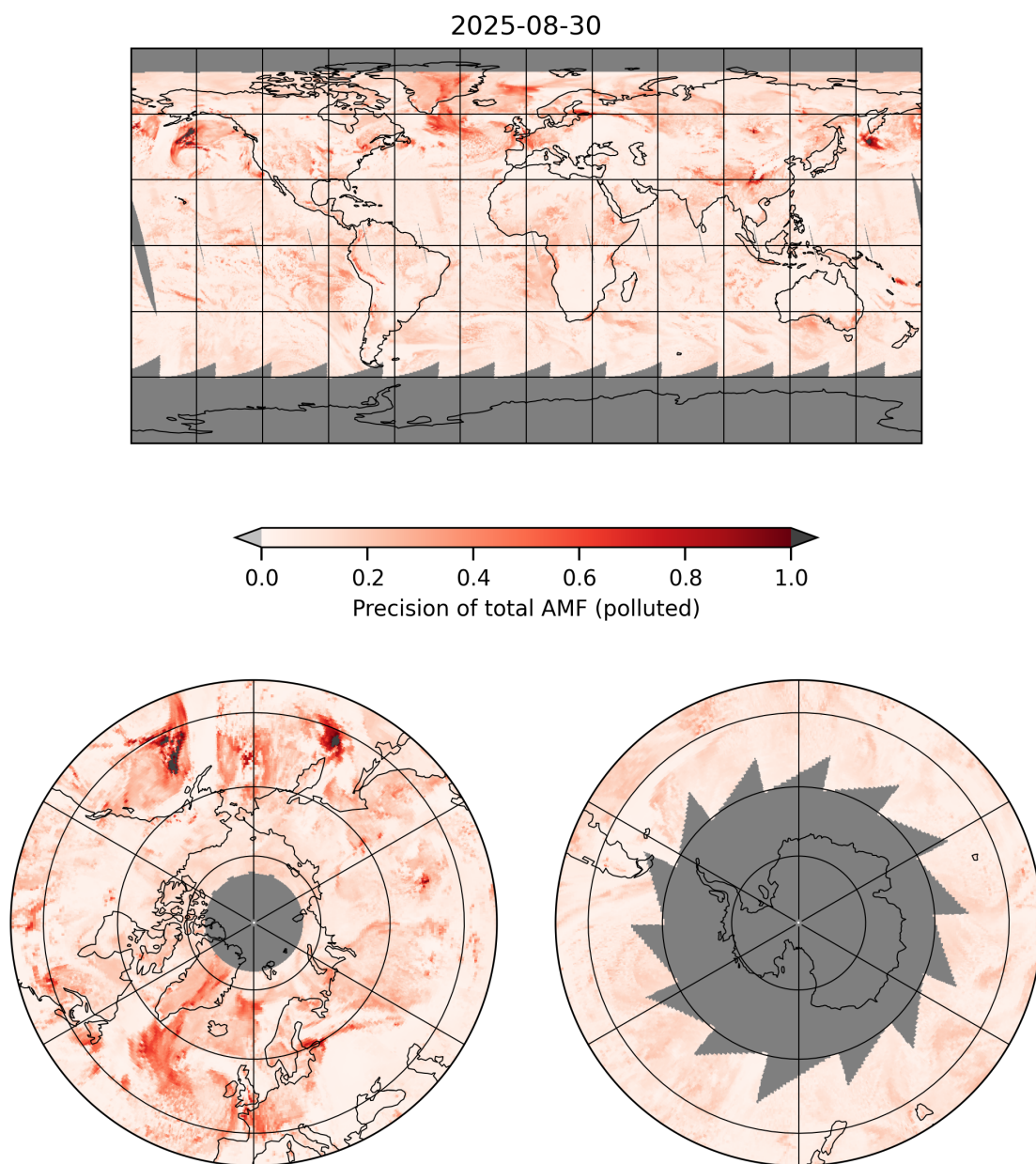


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-08-30 to 2025-08-31

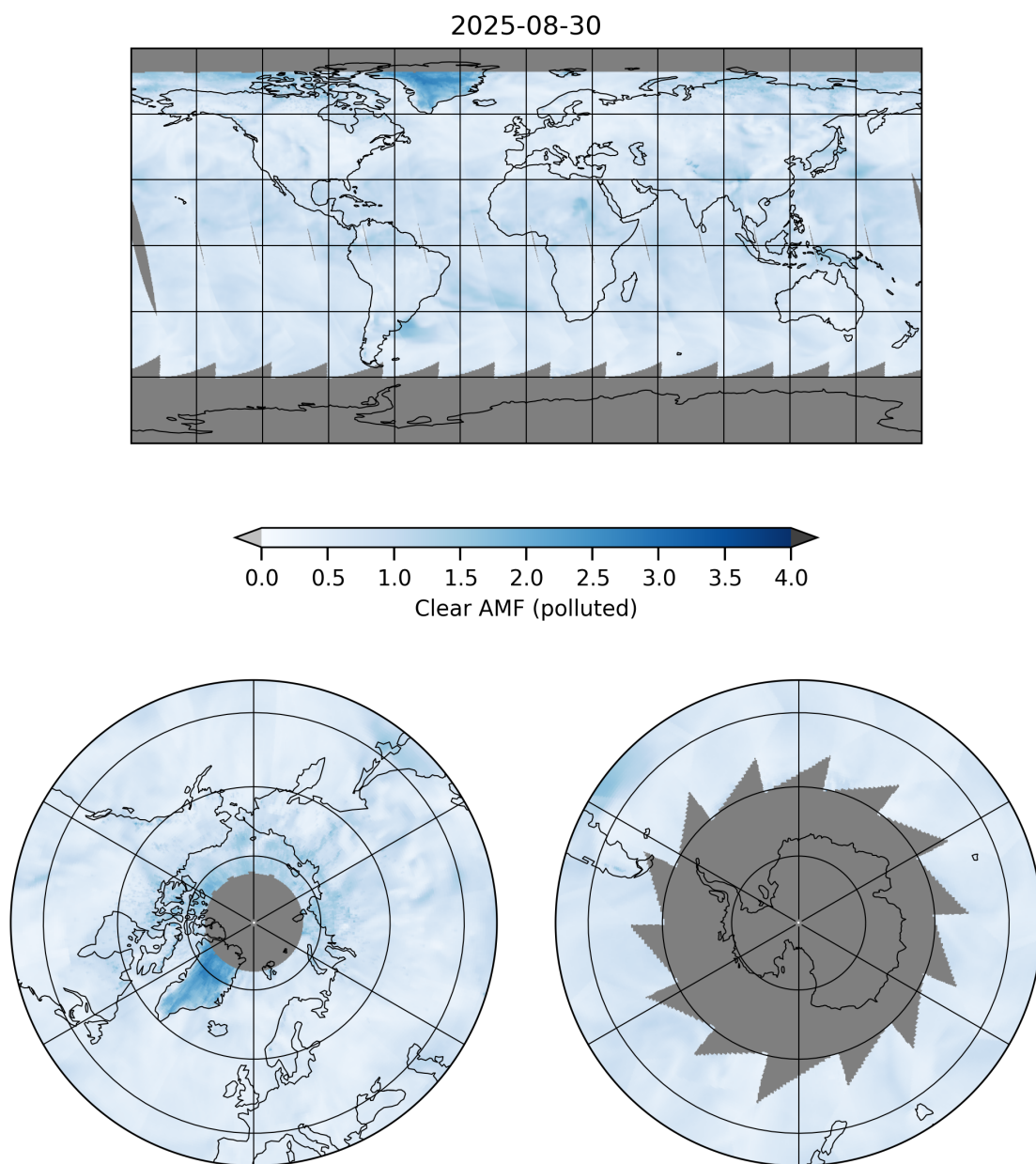


Figure 27: Map of “Clear AMF (polluted)” for 2025-08-30 to 2025-08-31

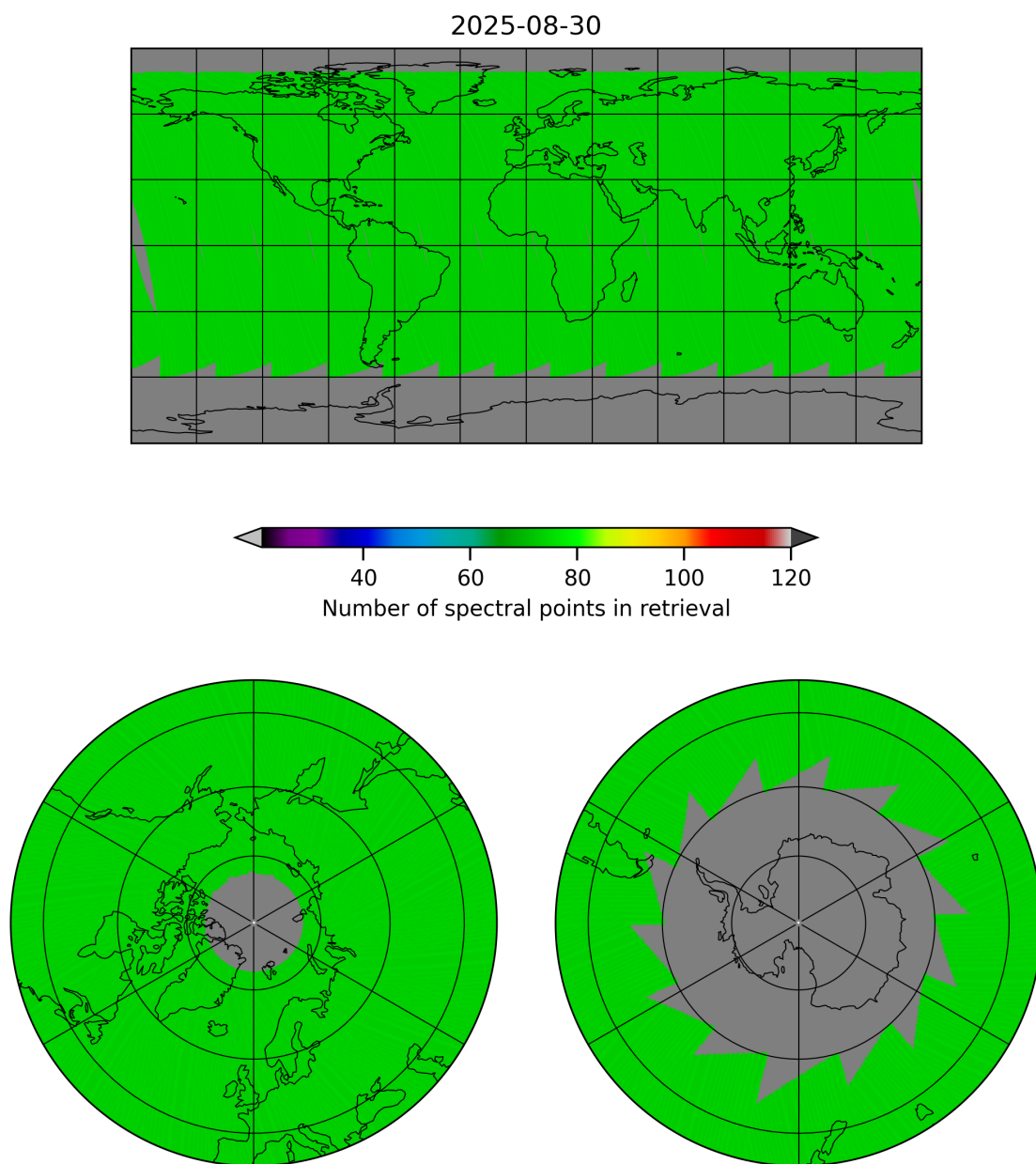


Figure 28: Map of “Number of spectral points in retrieval” for 2025-08-30 to 2025-08-31

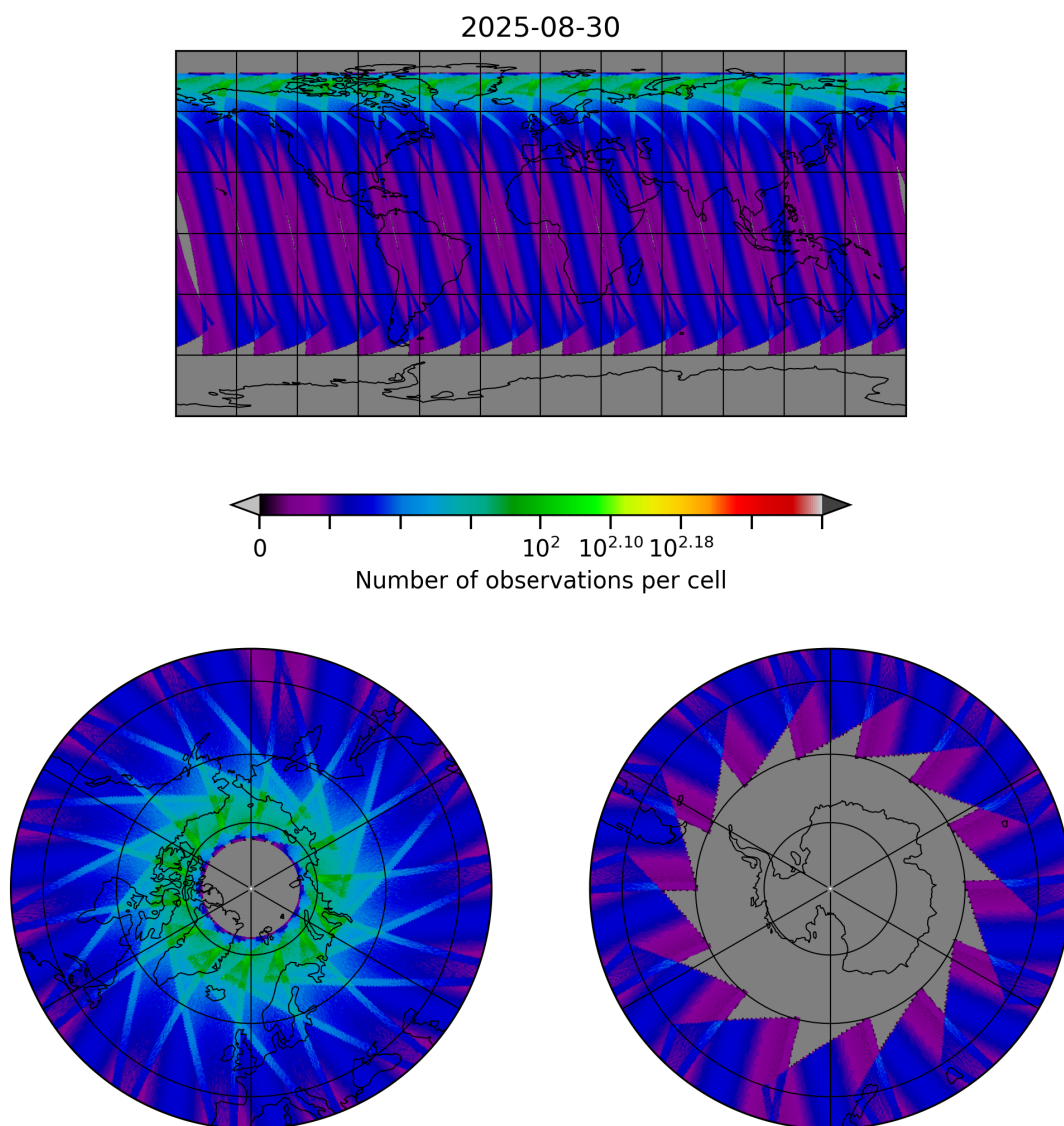


Figure 29: Map of the number of observations for 2025-08-30 to 2025-08-31

7 Zonal average

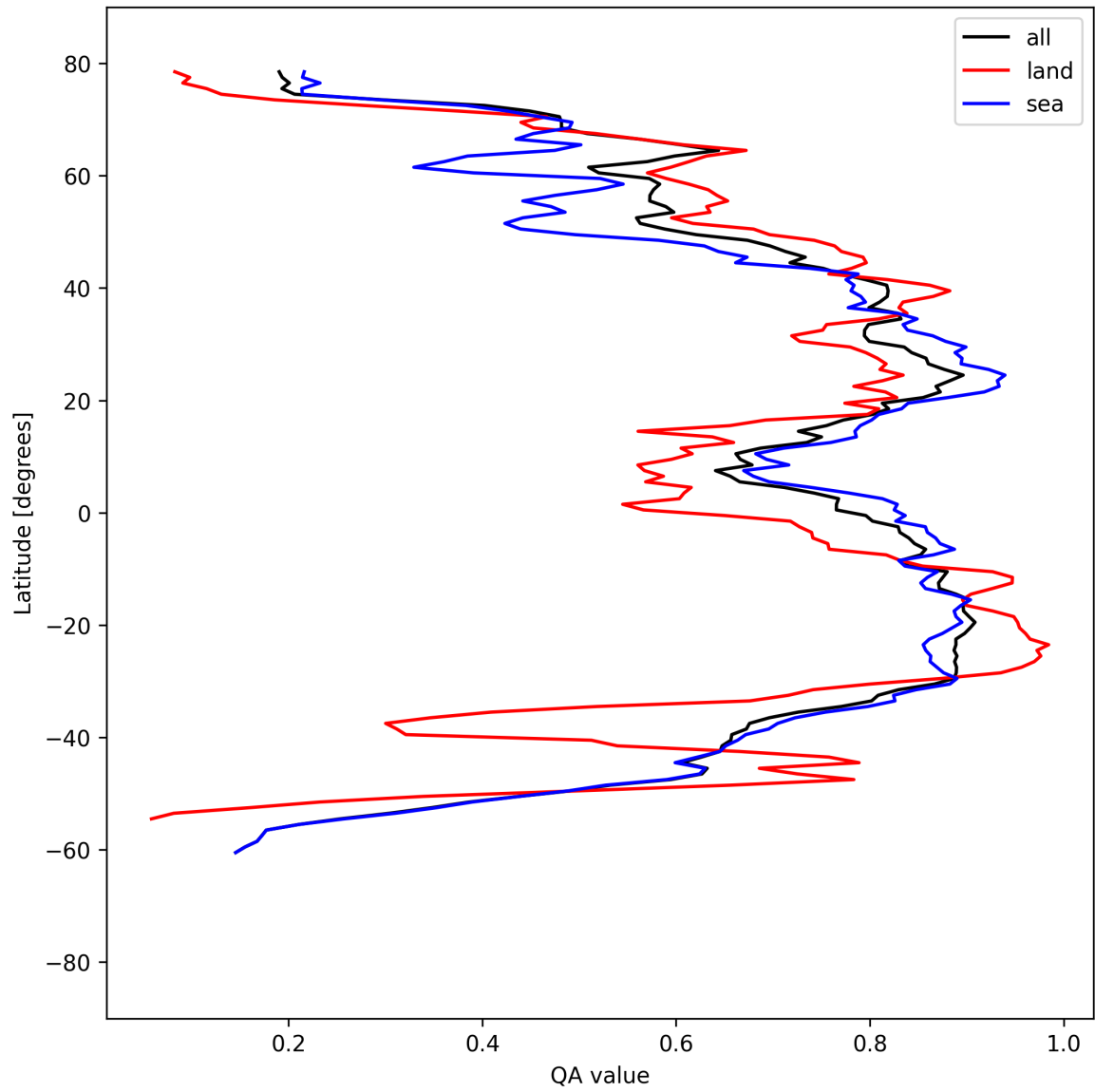


Figure 30: Zonal average of “QA value” for 2025-08-30 to 2025-08-31.

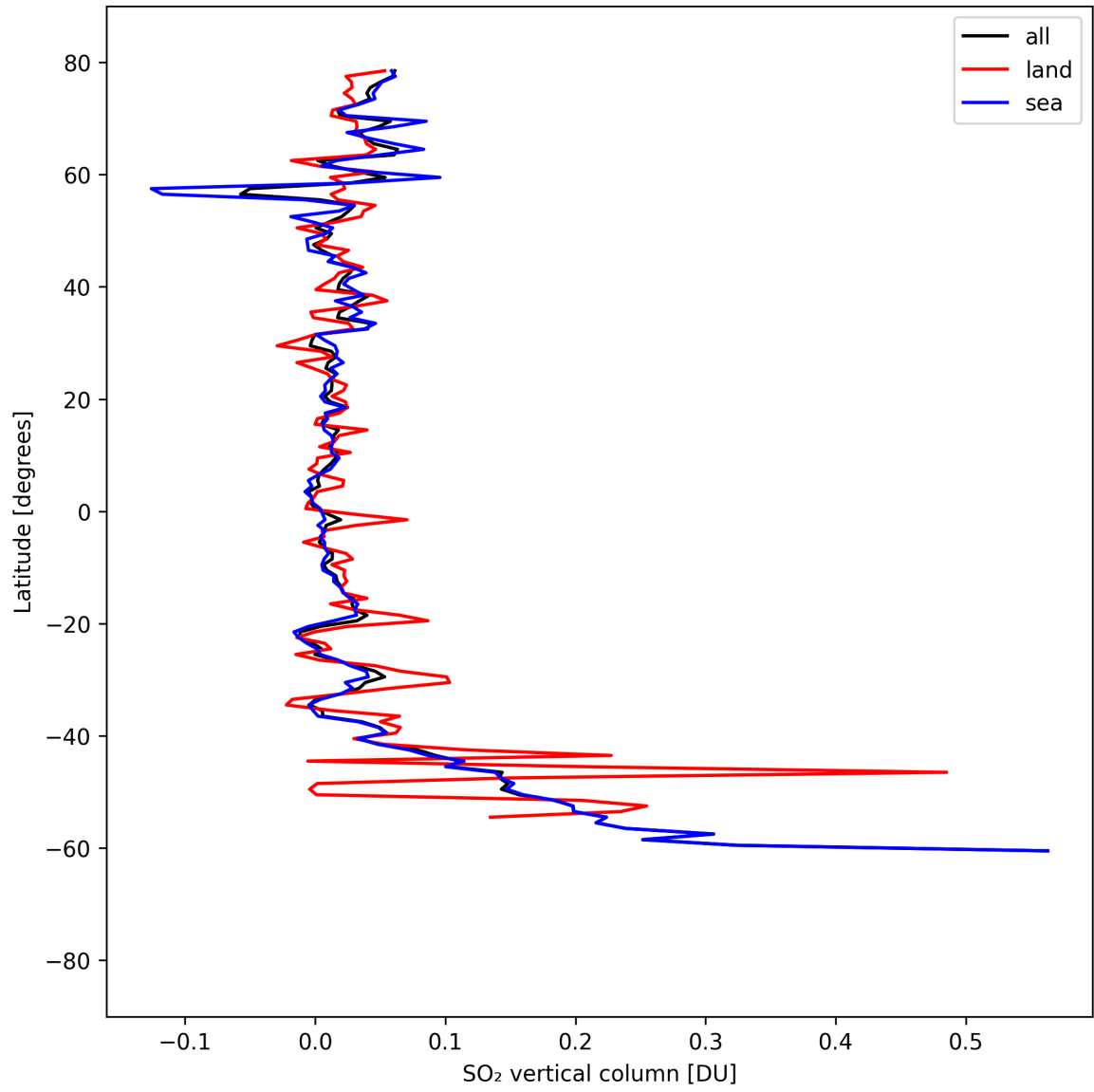


Figure 31: Zonal average of “SO₂ vertical column” for 2025-08-30 to 2025-08-31.

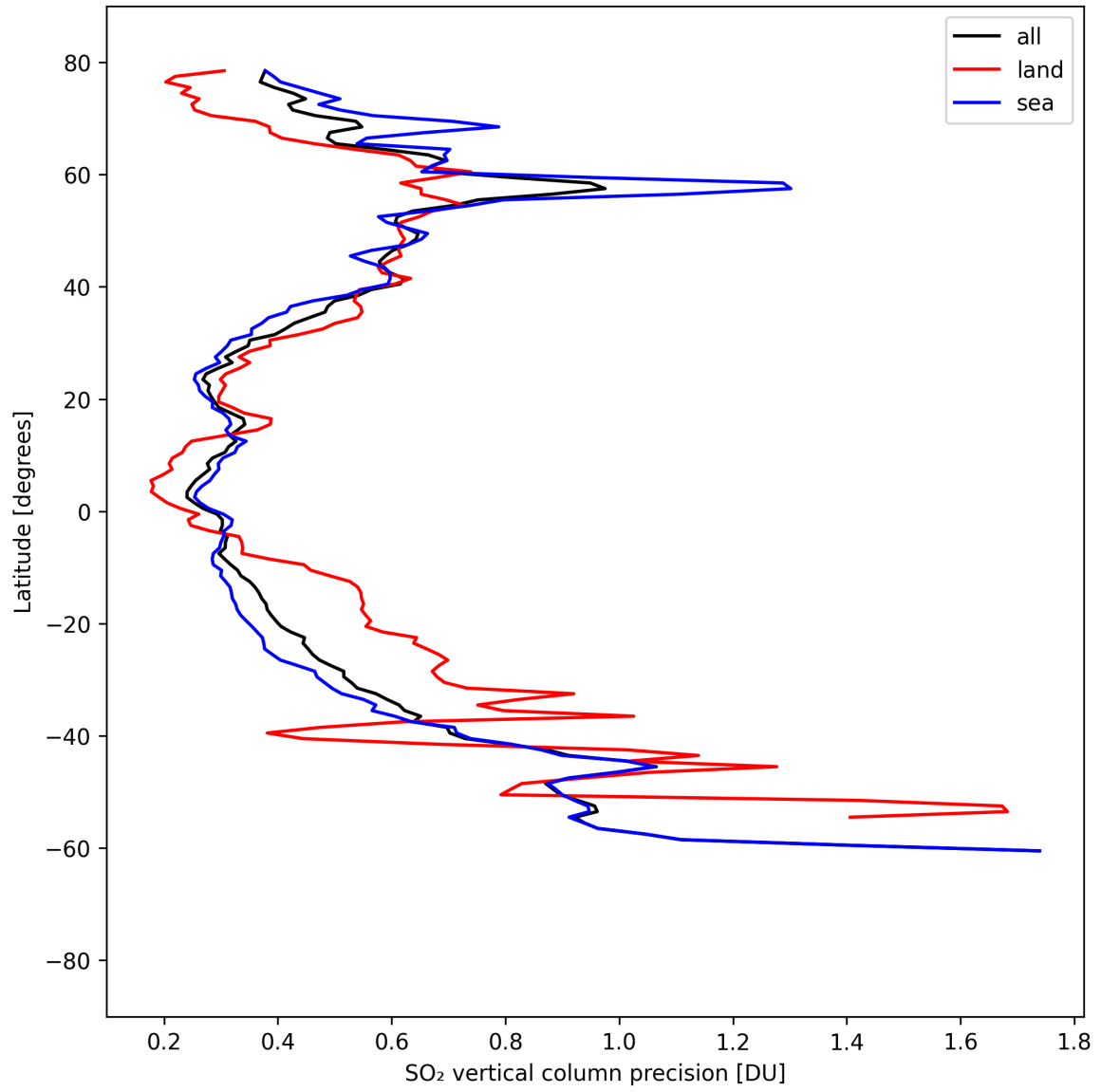


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-08-30 to 2025-08-31.

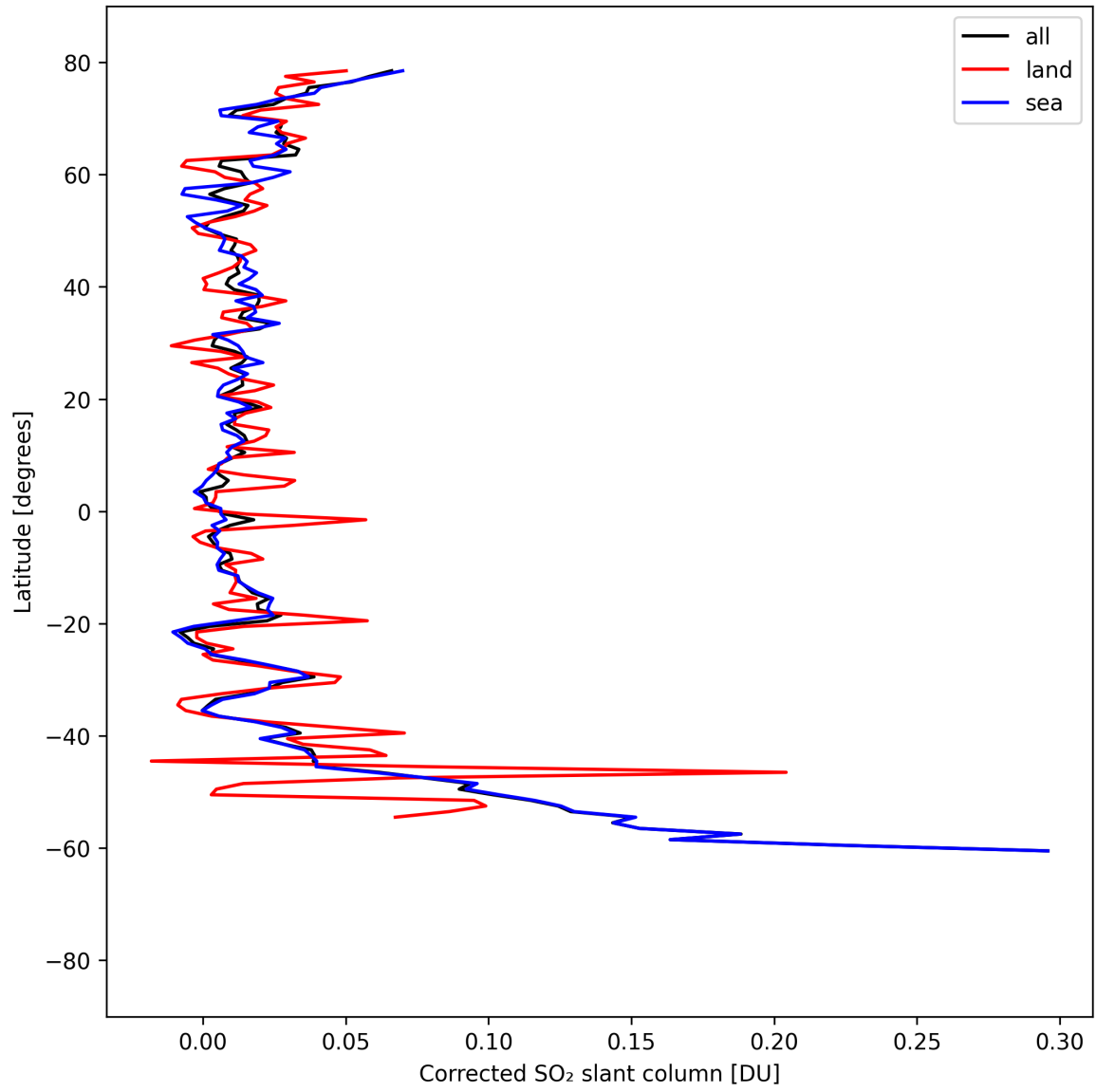


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-08-30 to 2025-08-31.

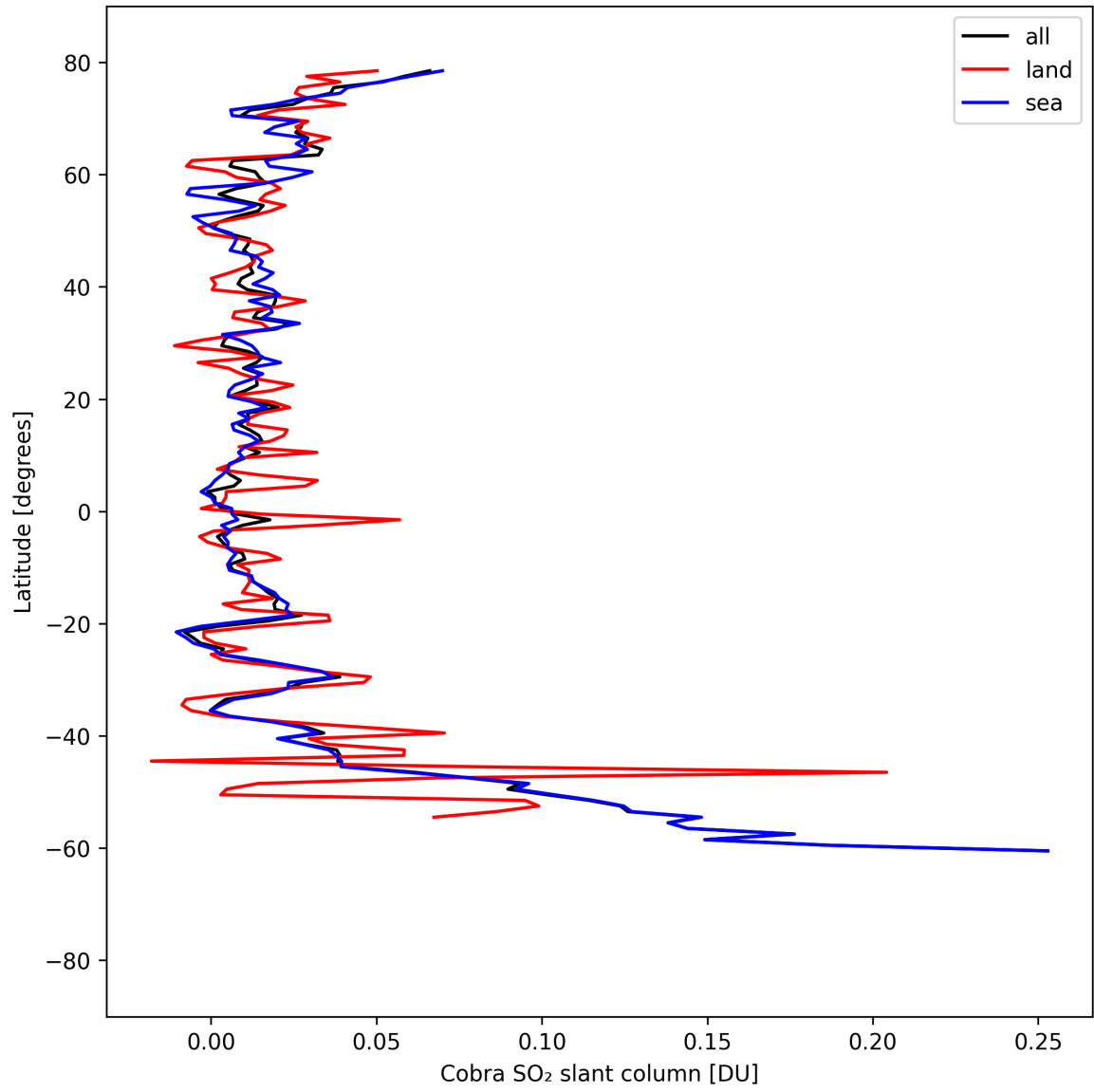


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-08-30 to 2025-08-31.

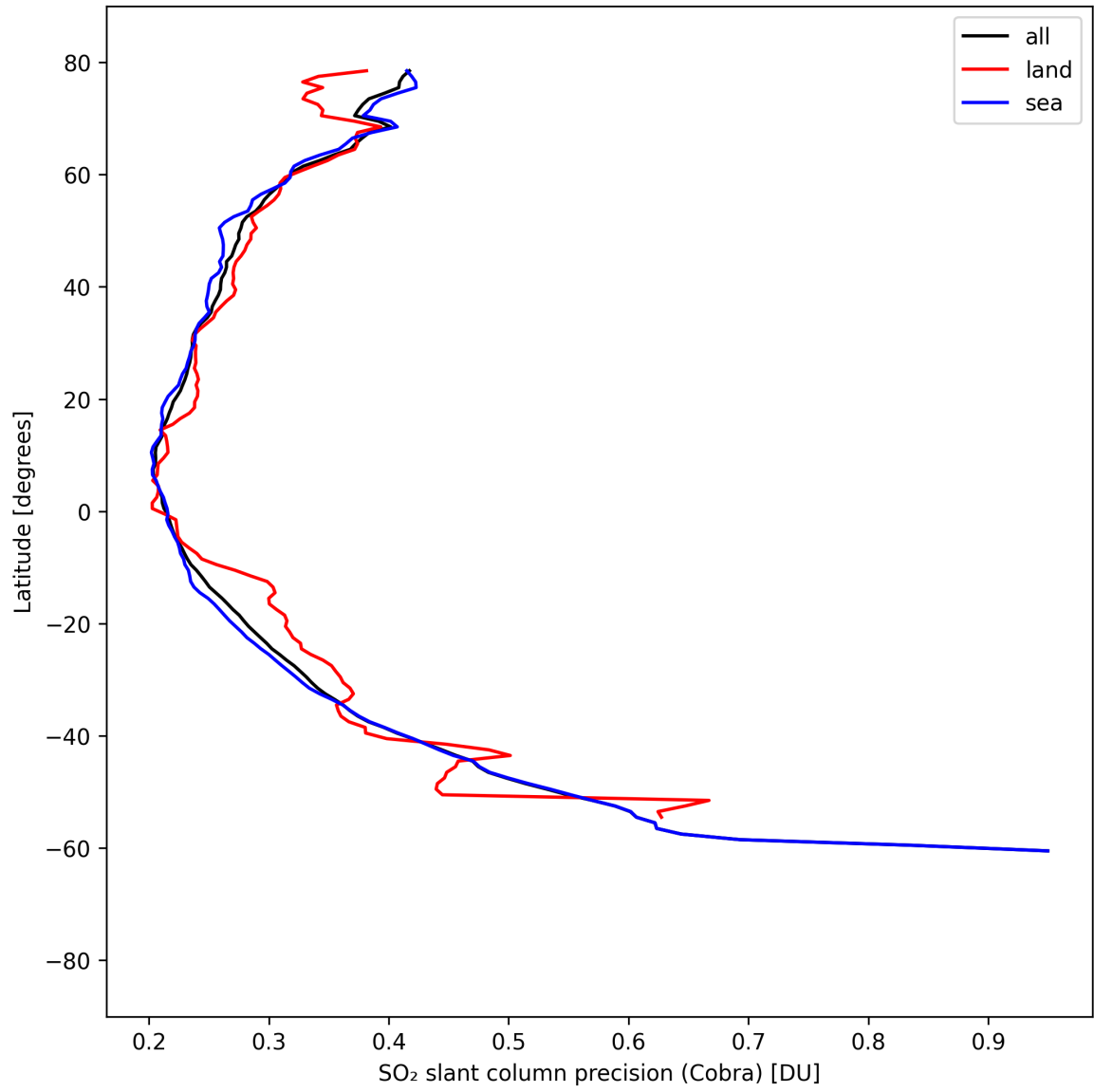


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-08-30 to 2025-08-31.

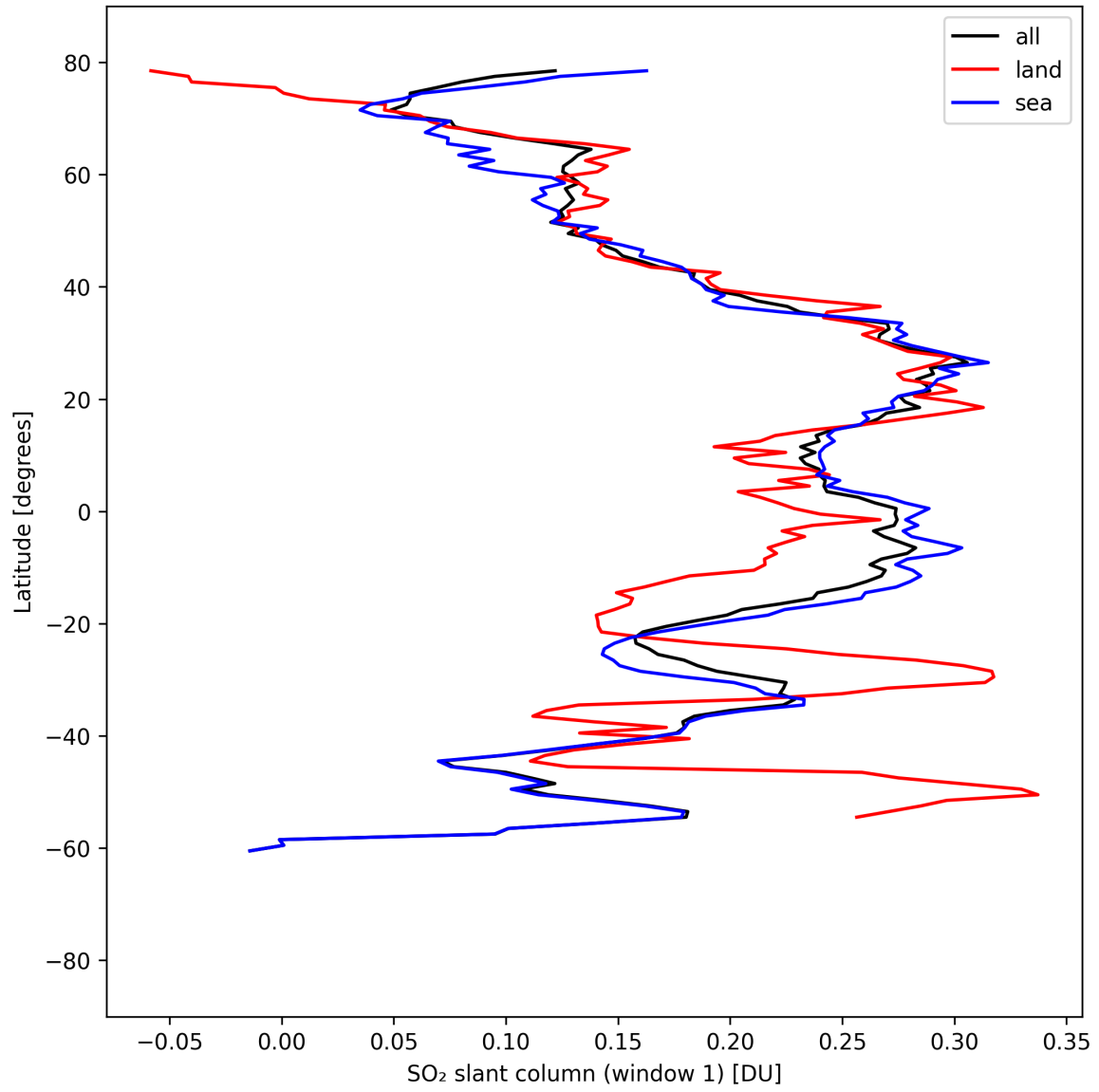


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-08-30 to 2025-08-31.

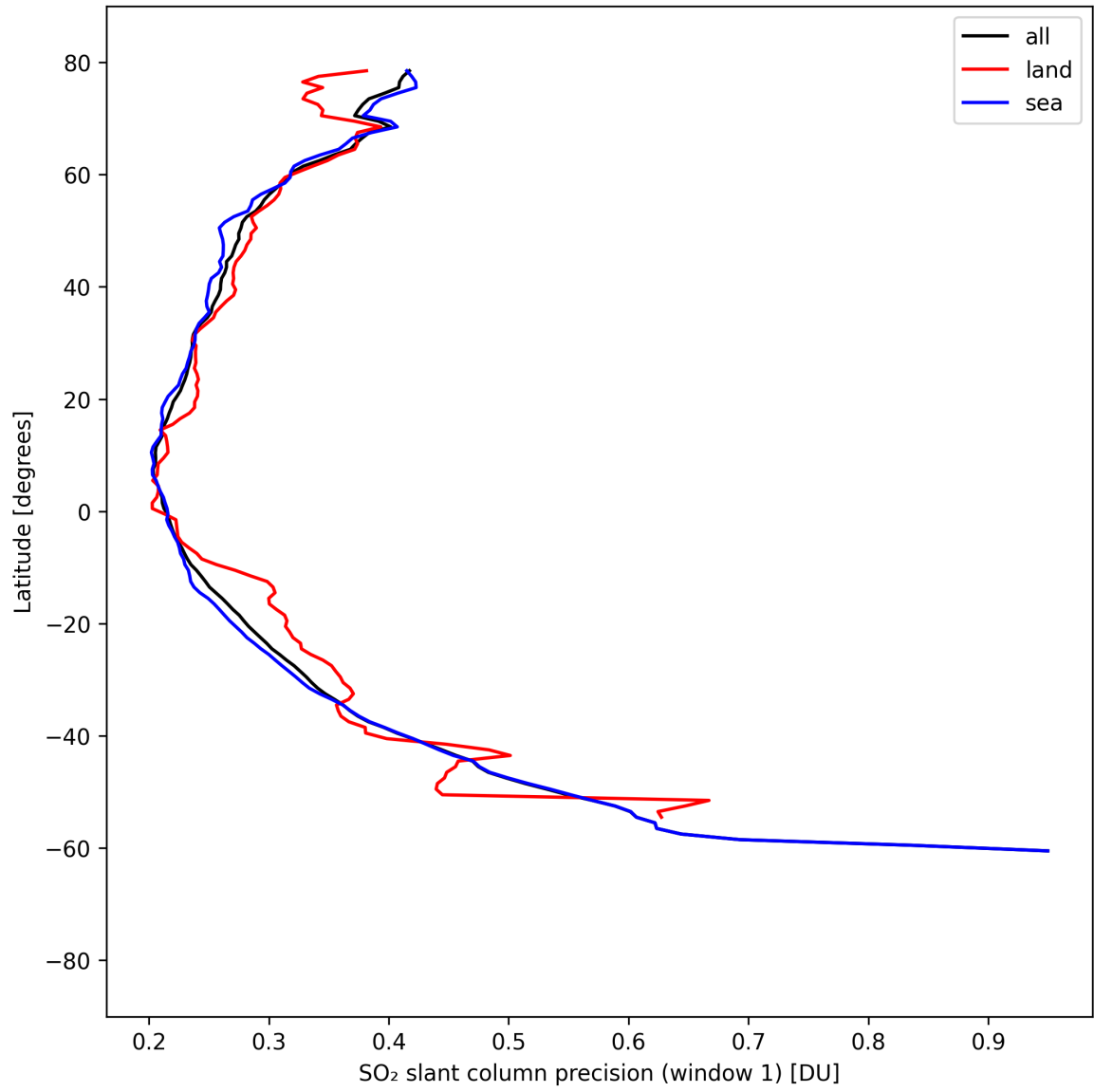


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-08-30 to 2025-08-31.

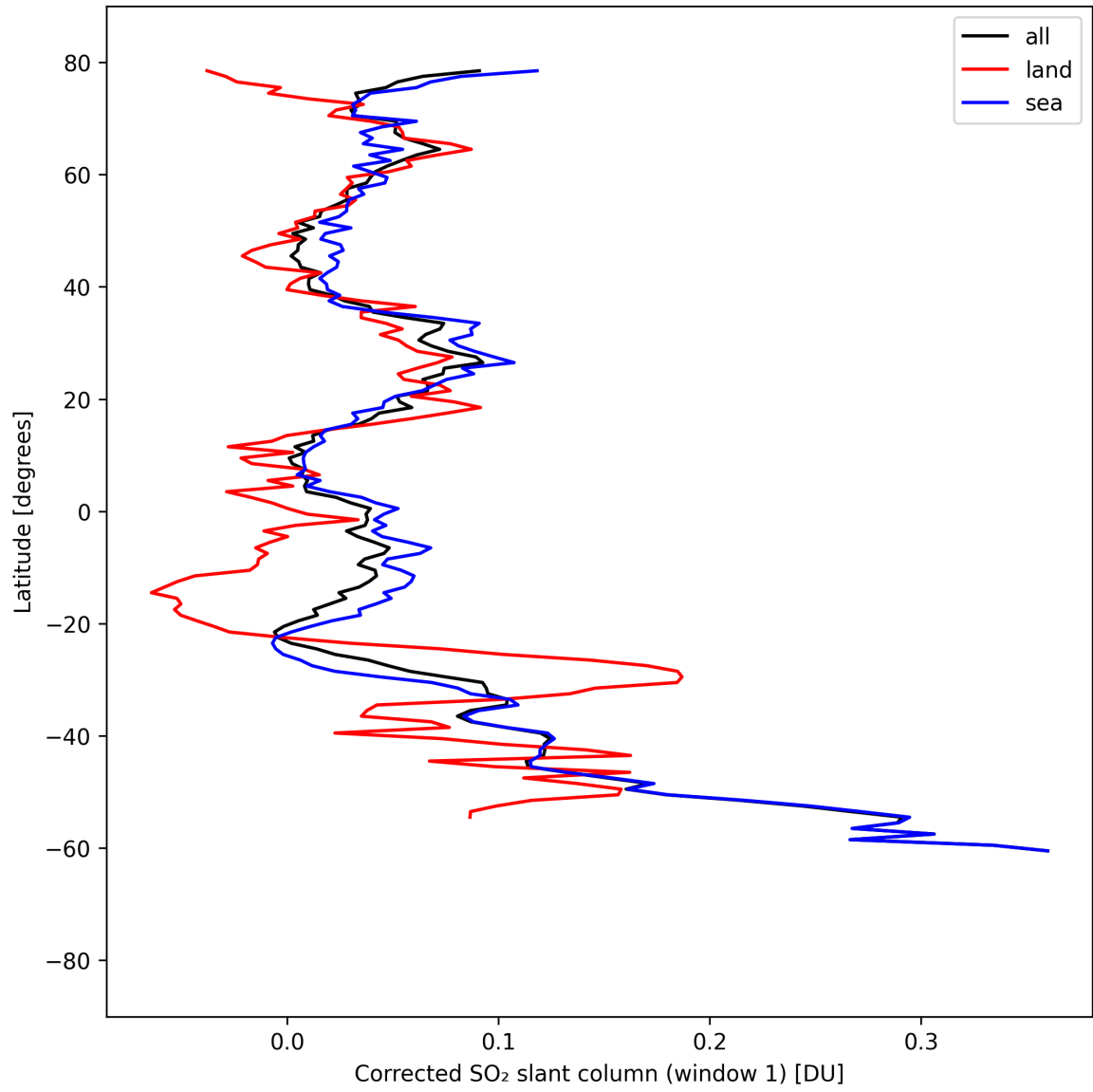


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-08-30 to 2025-08-31.

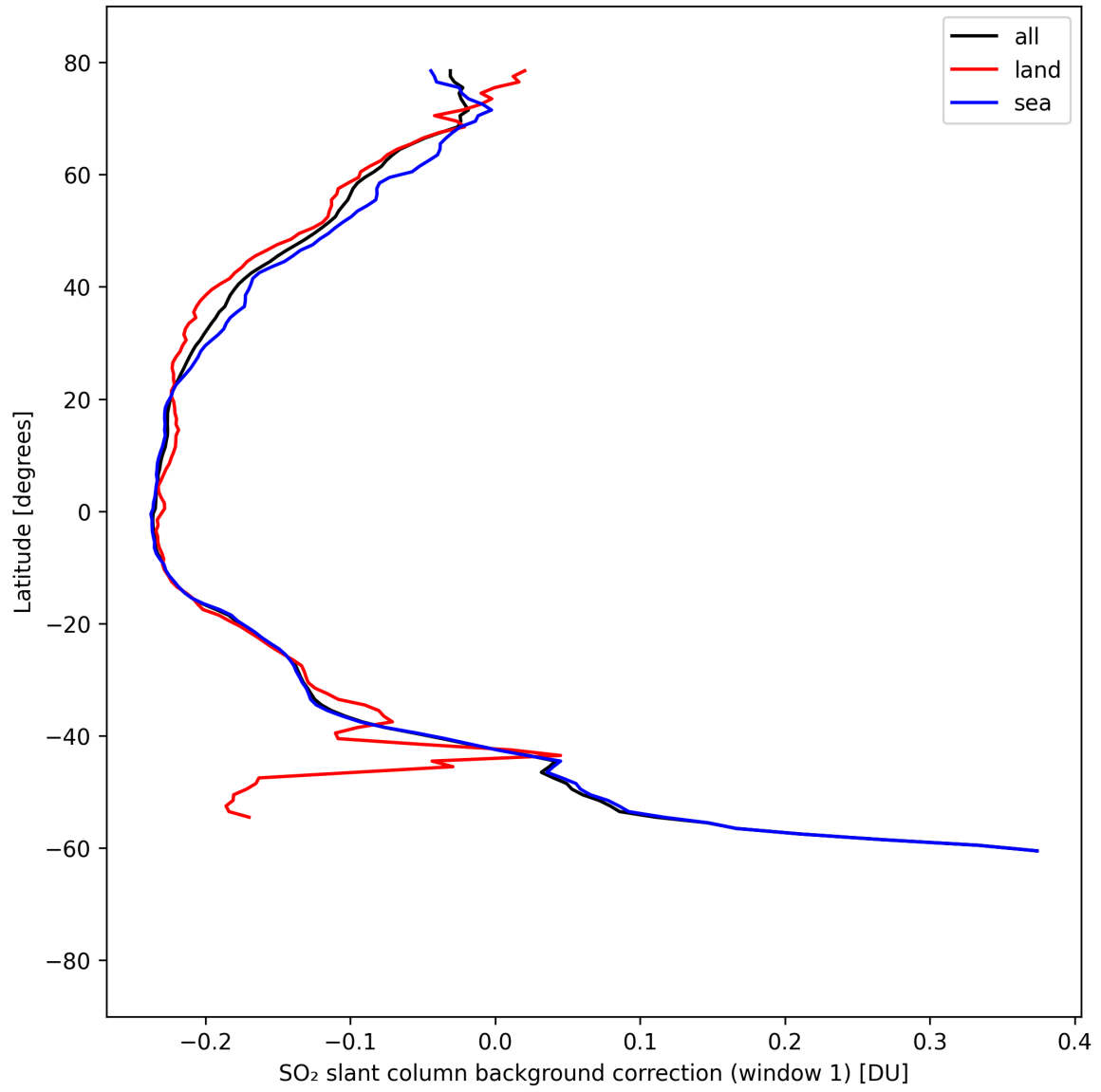


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-08-30 to 2025-08-31.

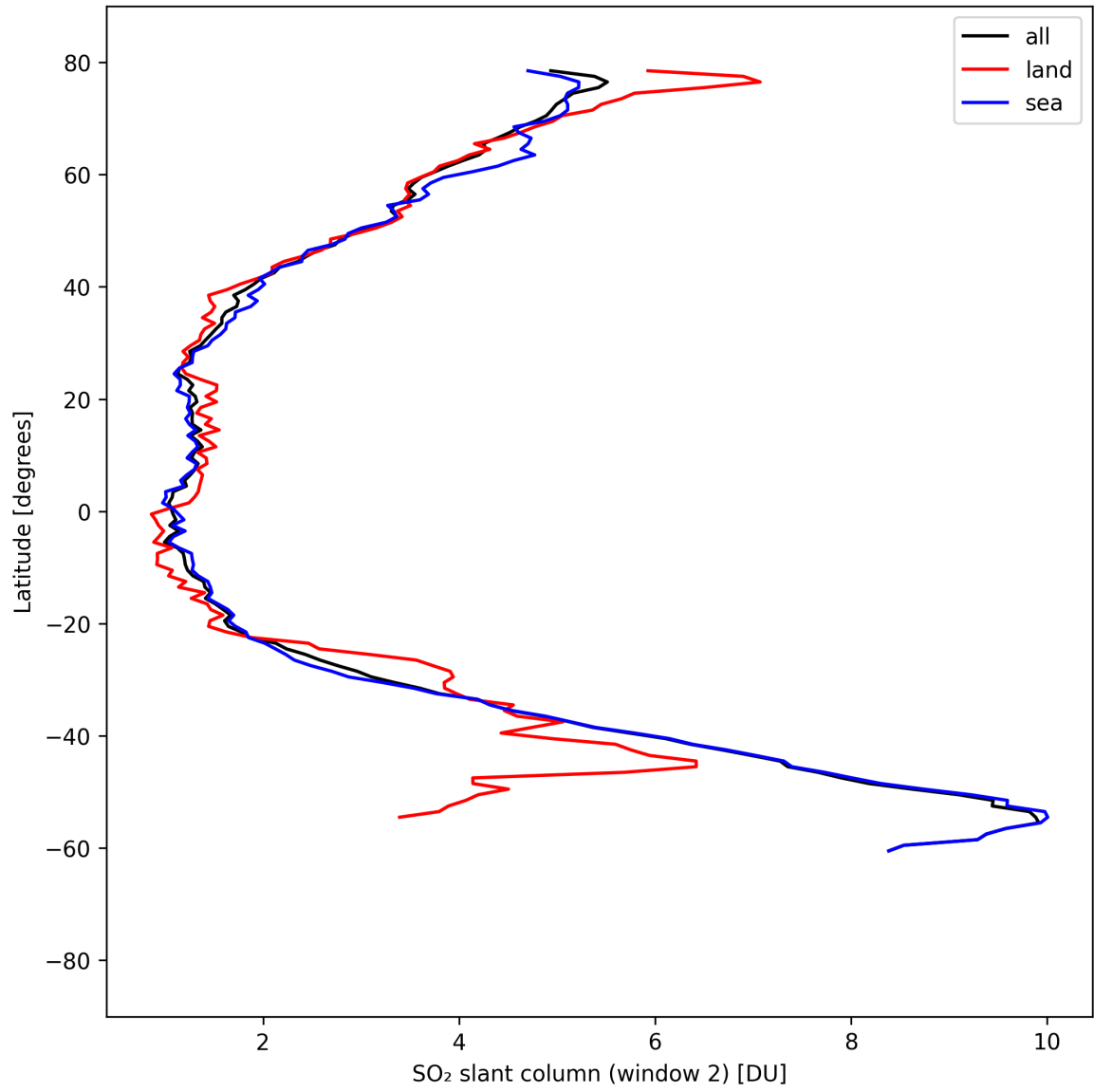


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-08-30 to 2025-08-31.



Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-08-30 to 2025-08-31.

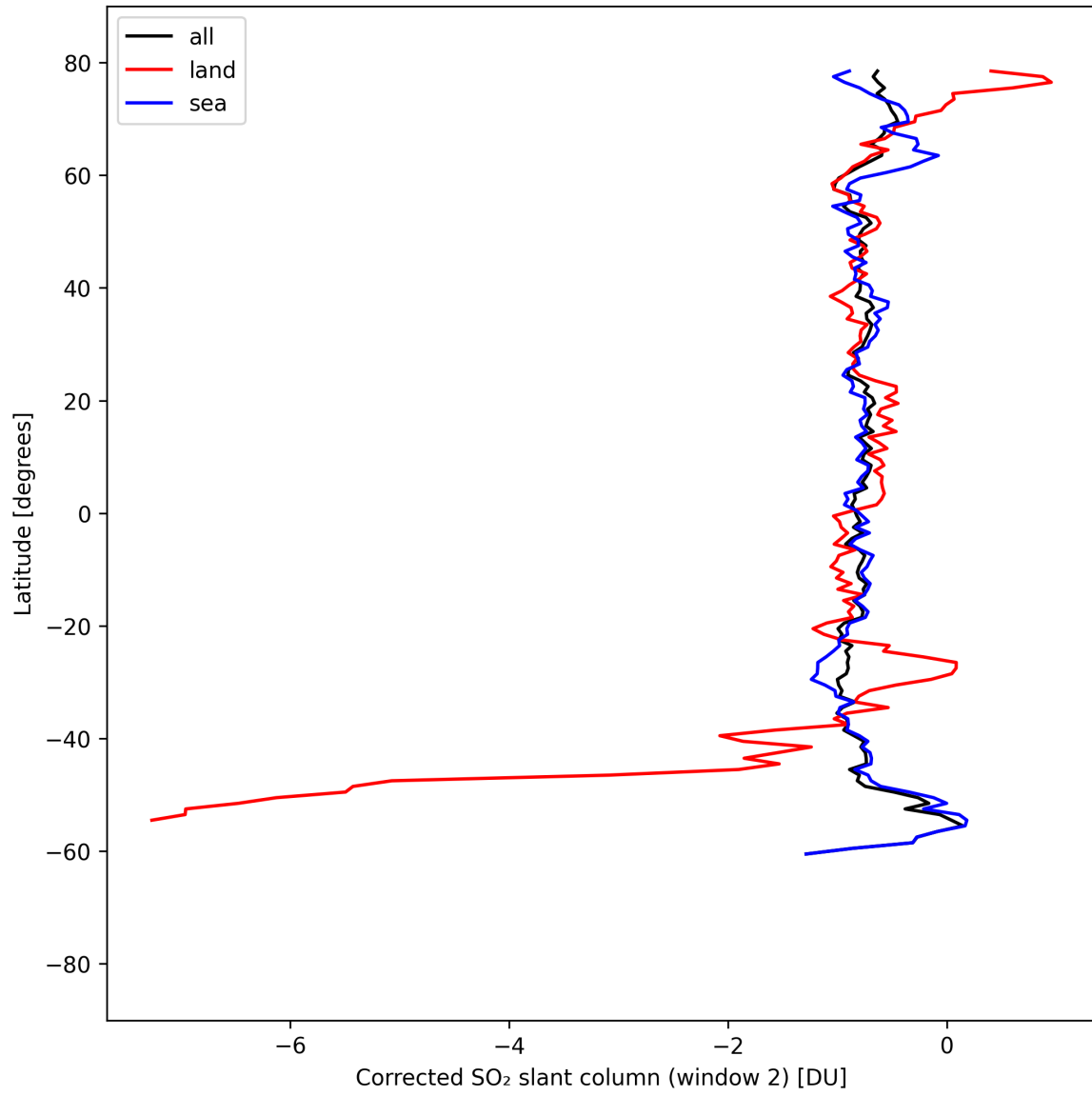


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-08-30 to 2025-08-31.

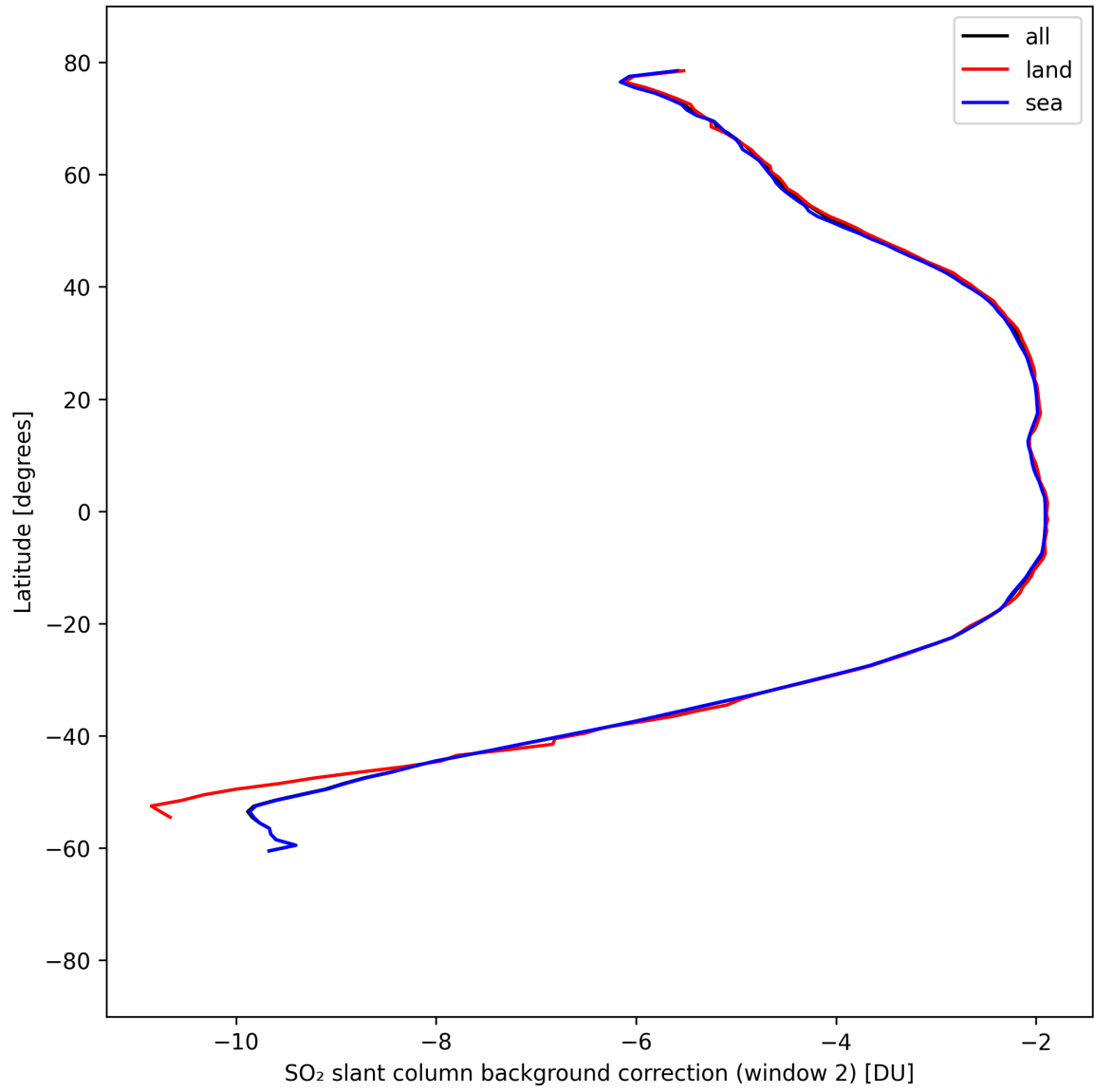


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-08-30 to 2025-08-31.

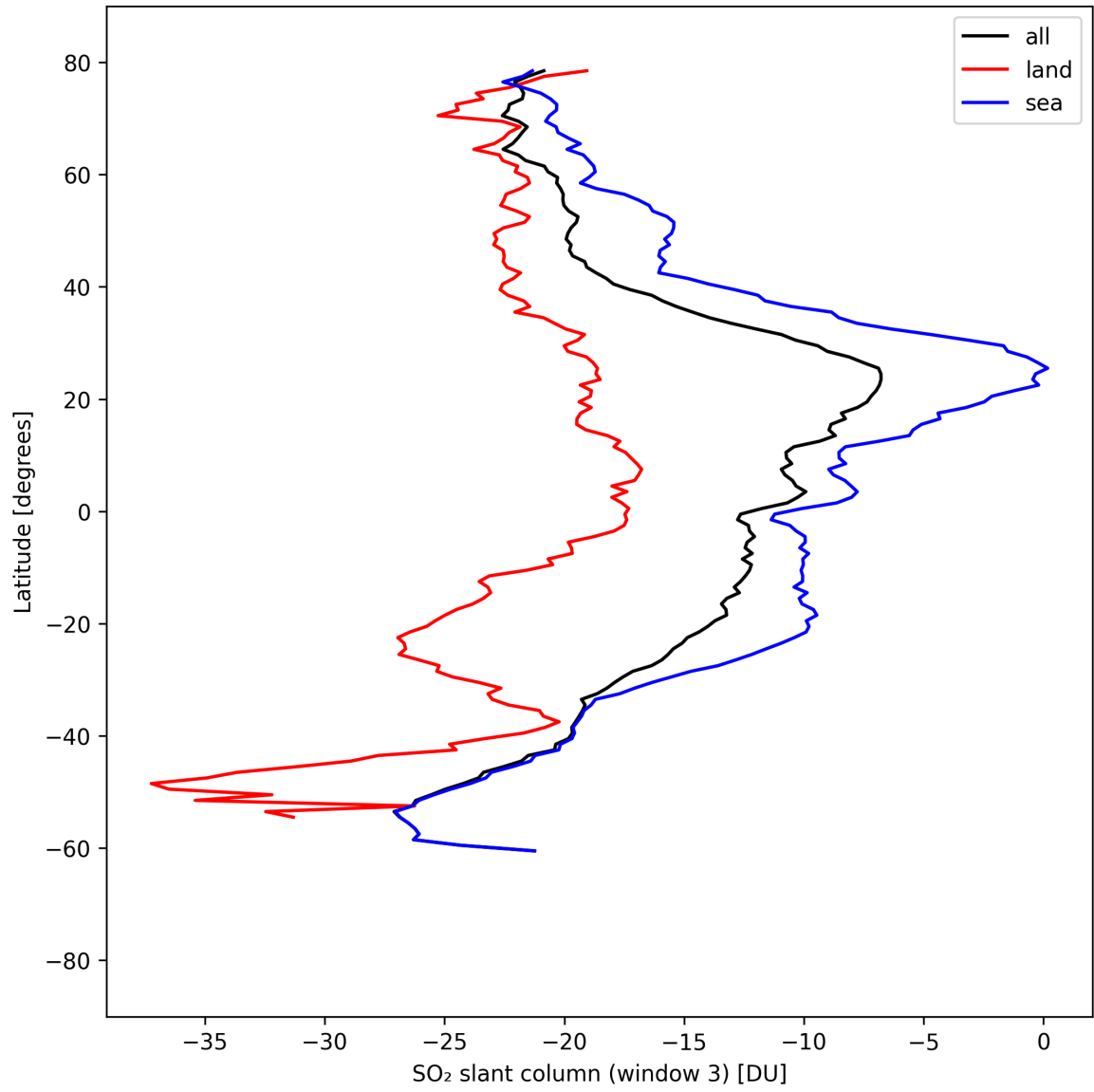


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-08-30 to 2025-08-31.

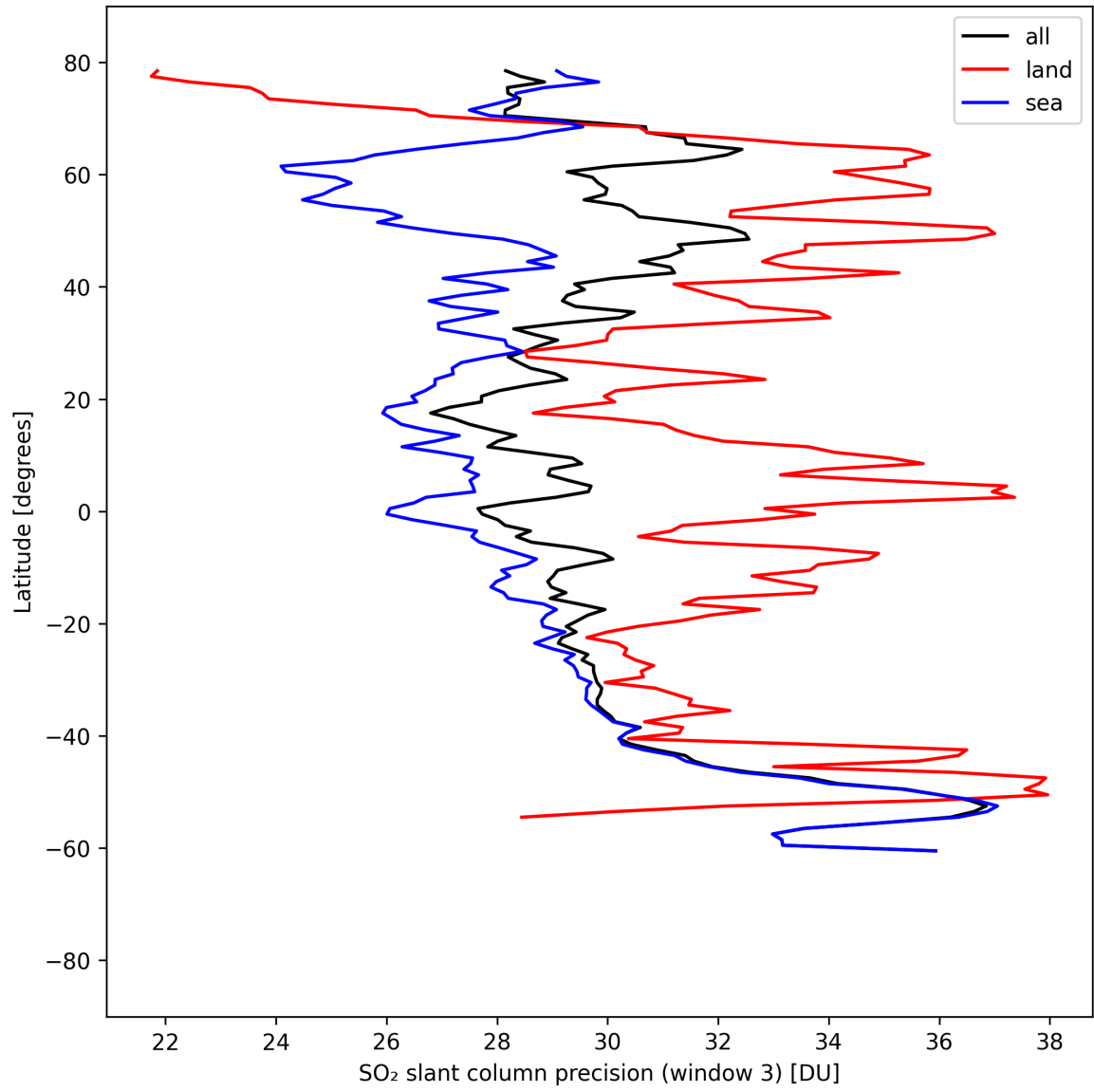


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-08-30 to 2025-08-31.

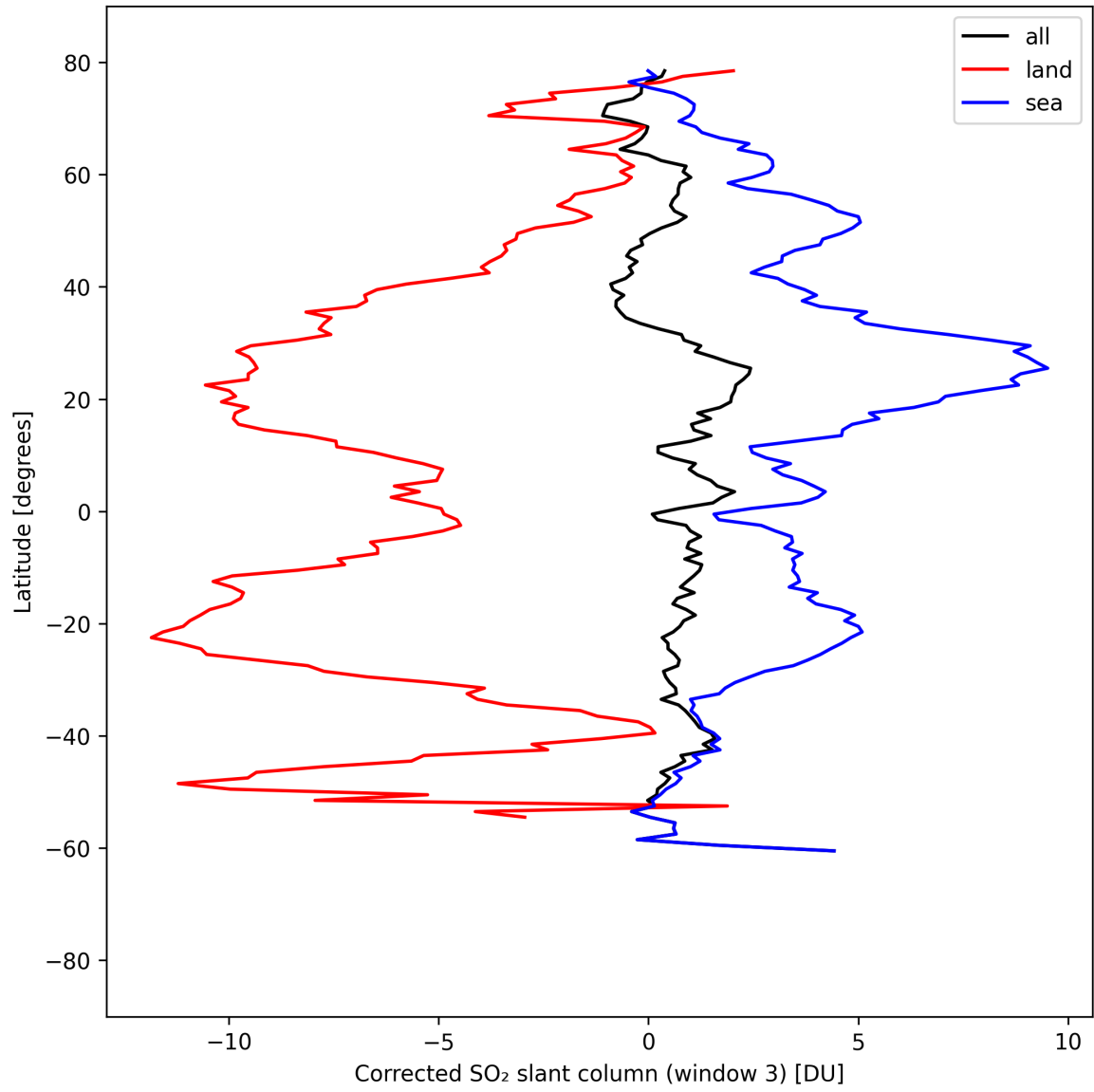


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-08-30 to 2025-08-31.

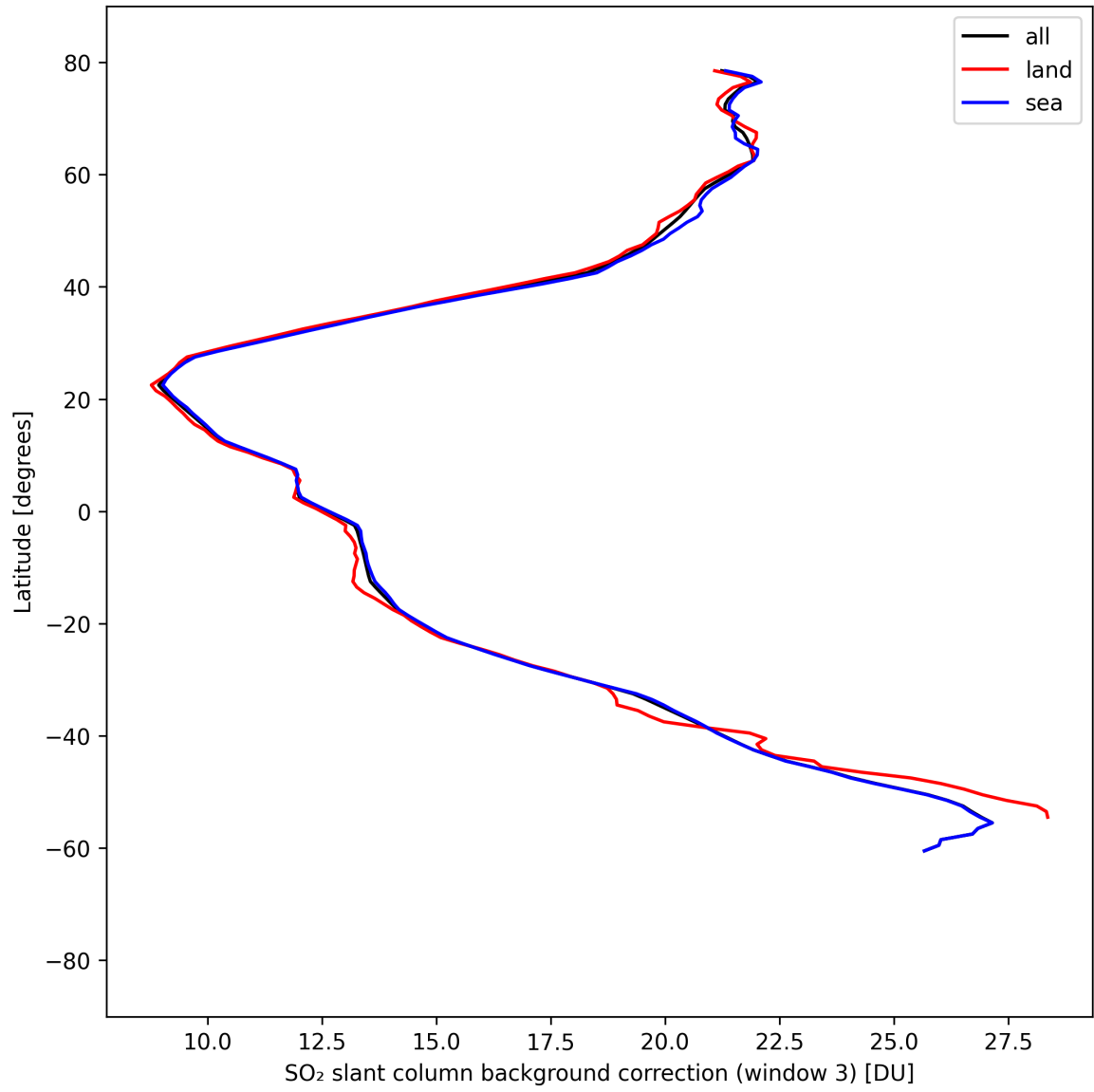


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-08-30 to 2025-08-31.

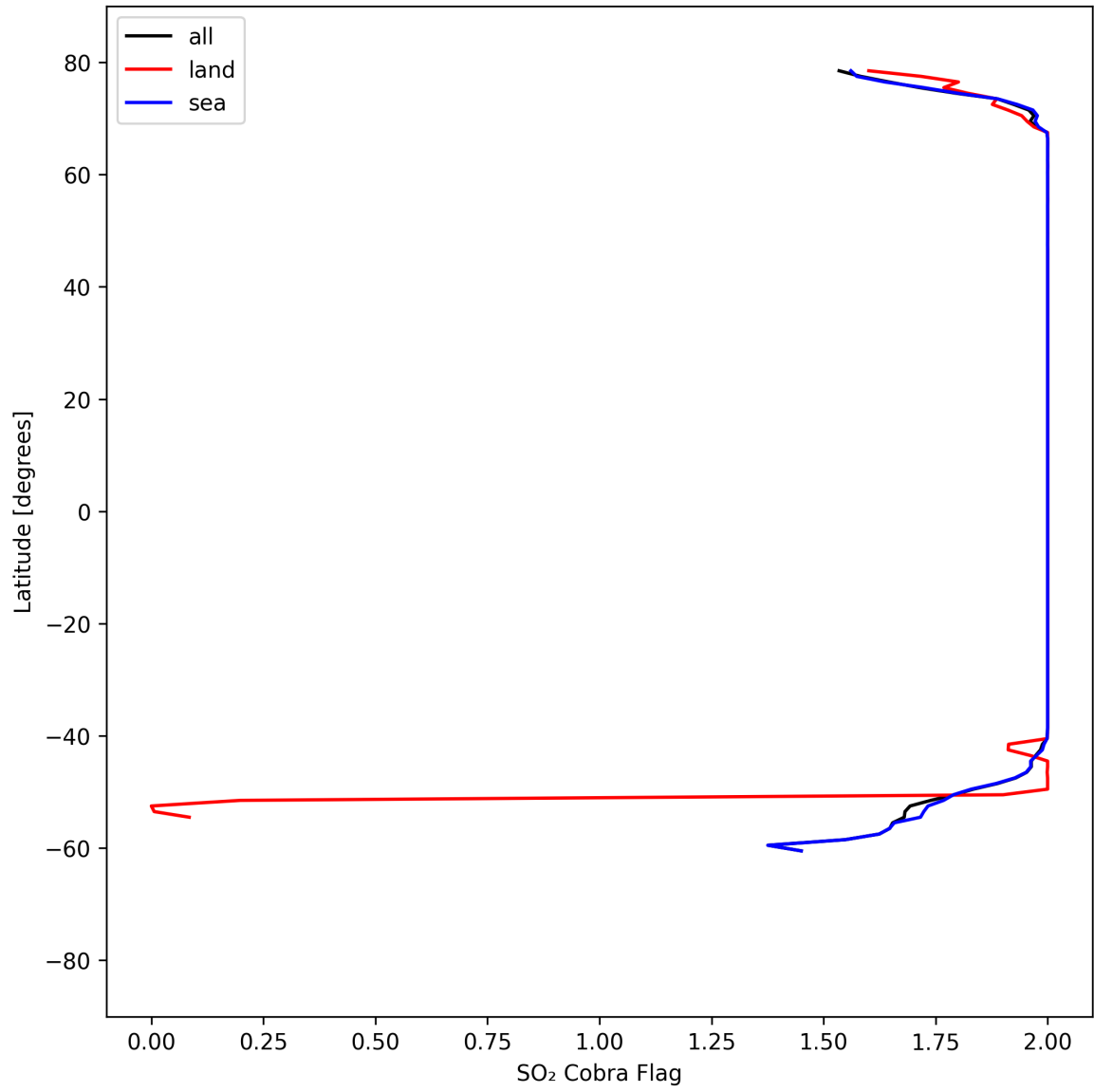


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-08-30 to 2025-08-31.

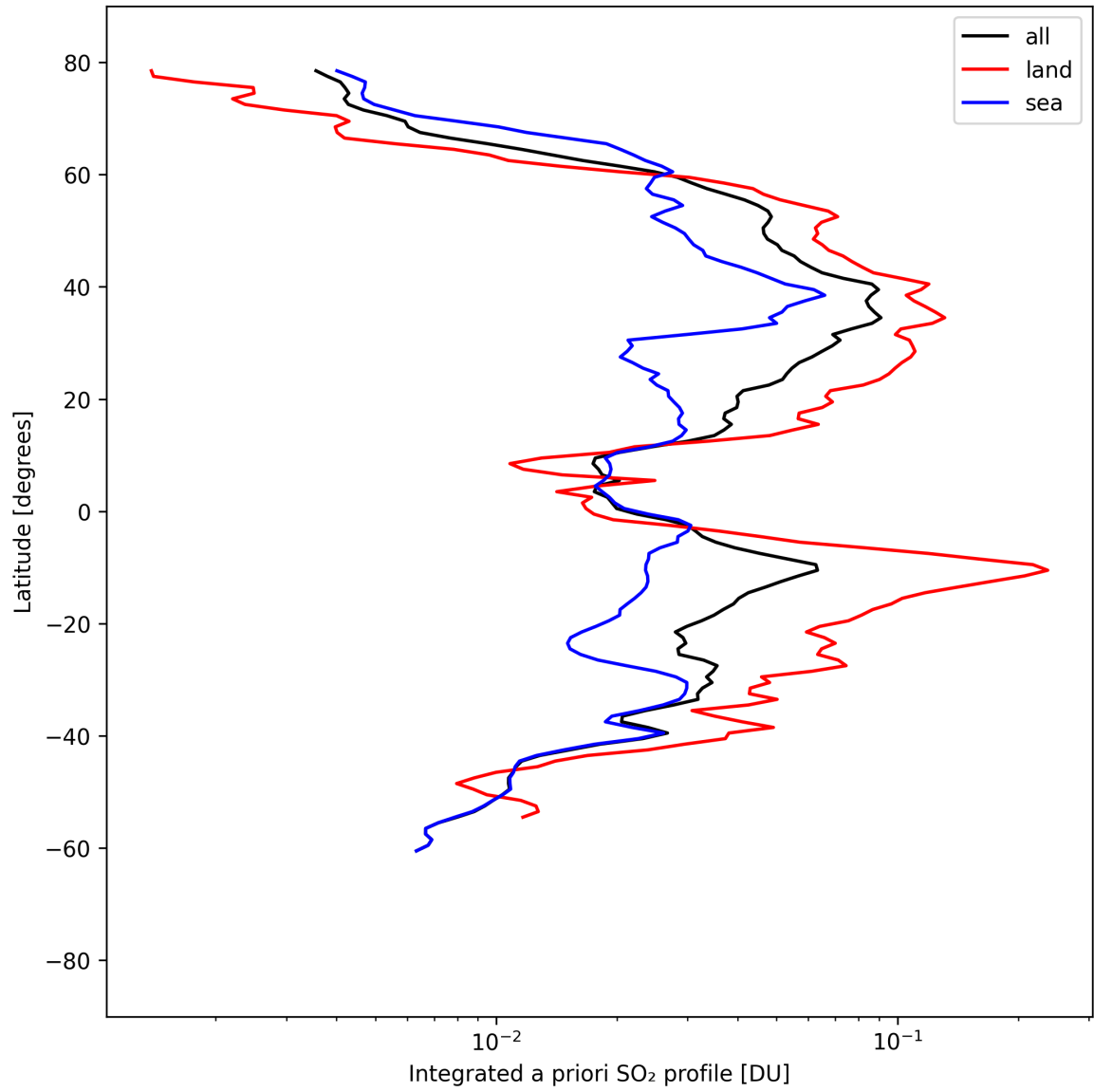


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-08-30 to 2025-08-31.

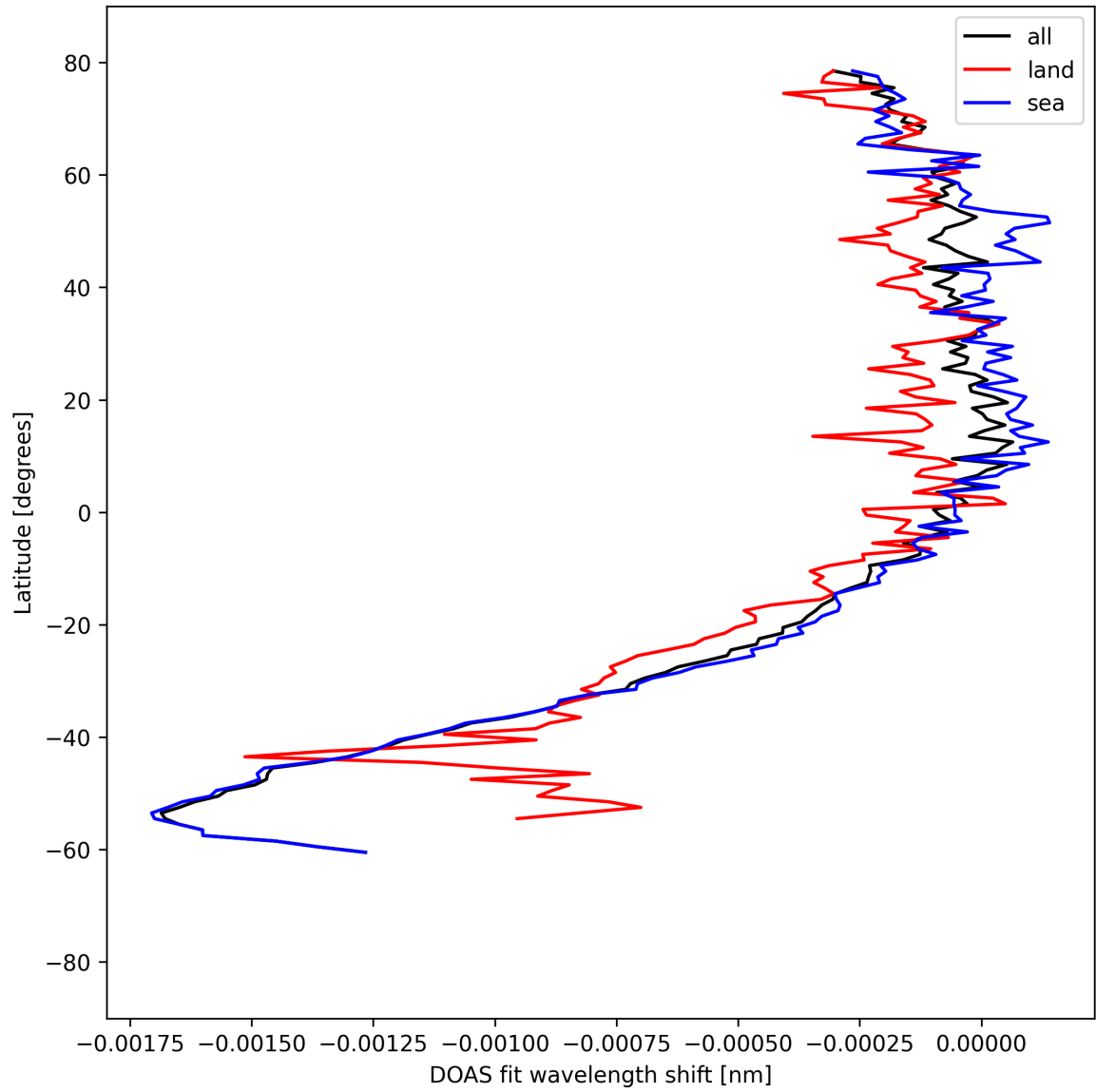


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-08-30 to 2025-08-31.

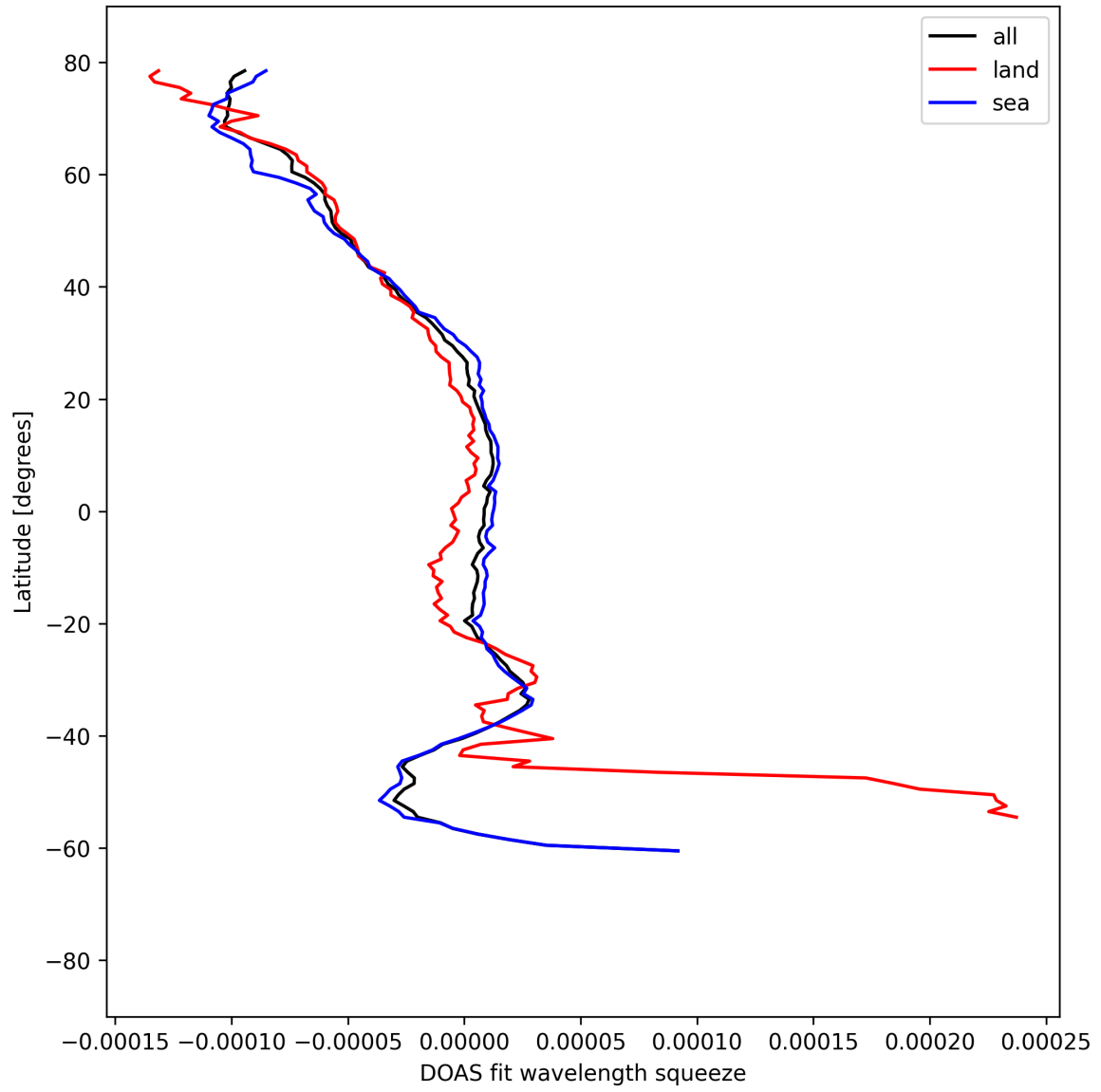


Figure 51: Zonal average of "DOAS fit wavelength squeeze" for 2025-08-30 to 2025-08-31.

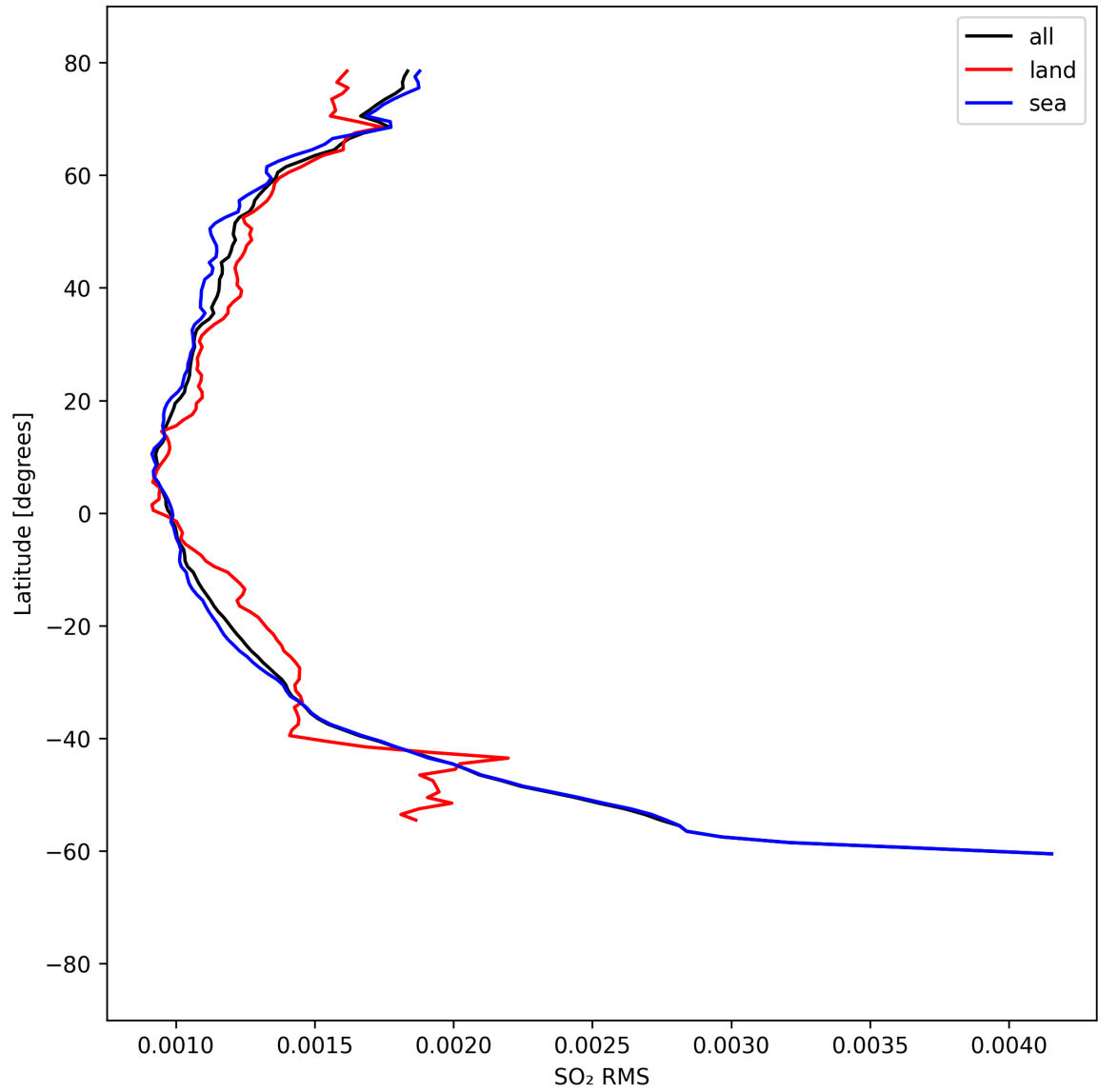


Figure 52: Zonal average of “SO₂ RMS” for 2025-08-30 to 2025-08-31.

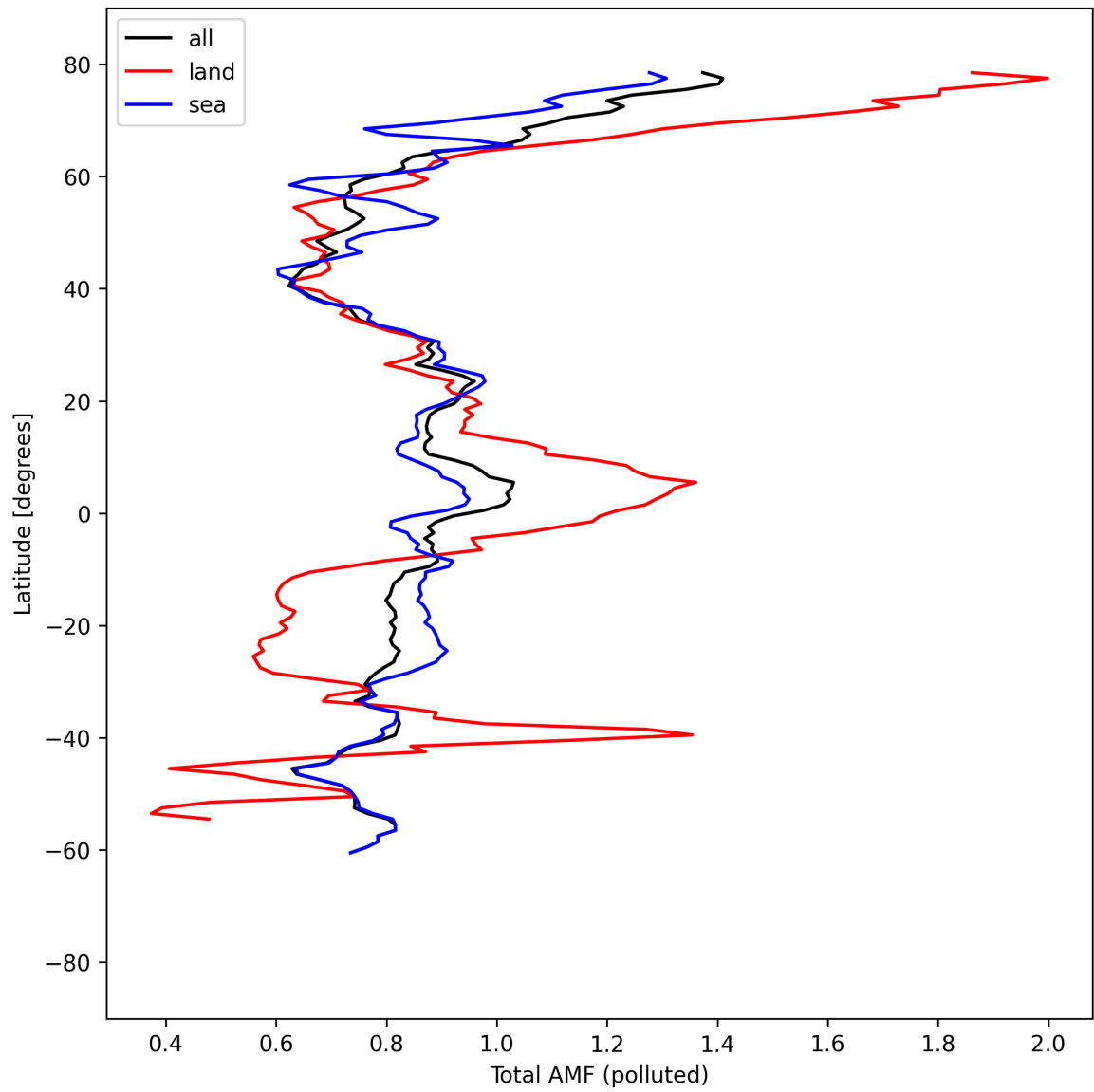


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-08-30 to 2025-08-31.

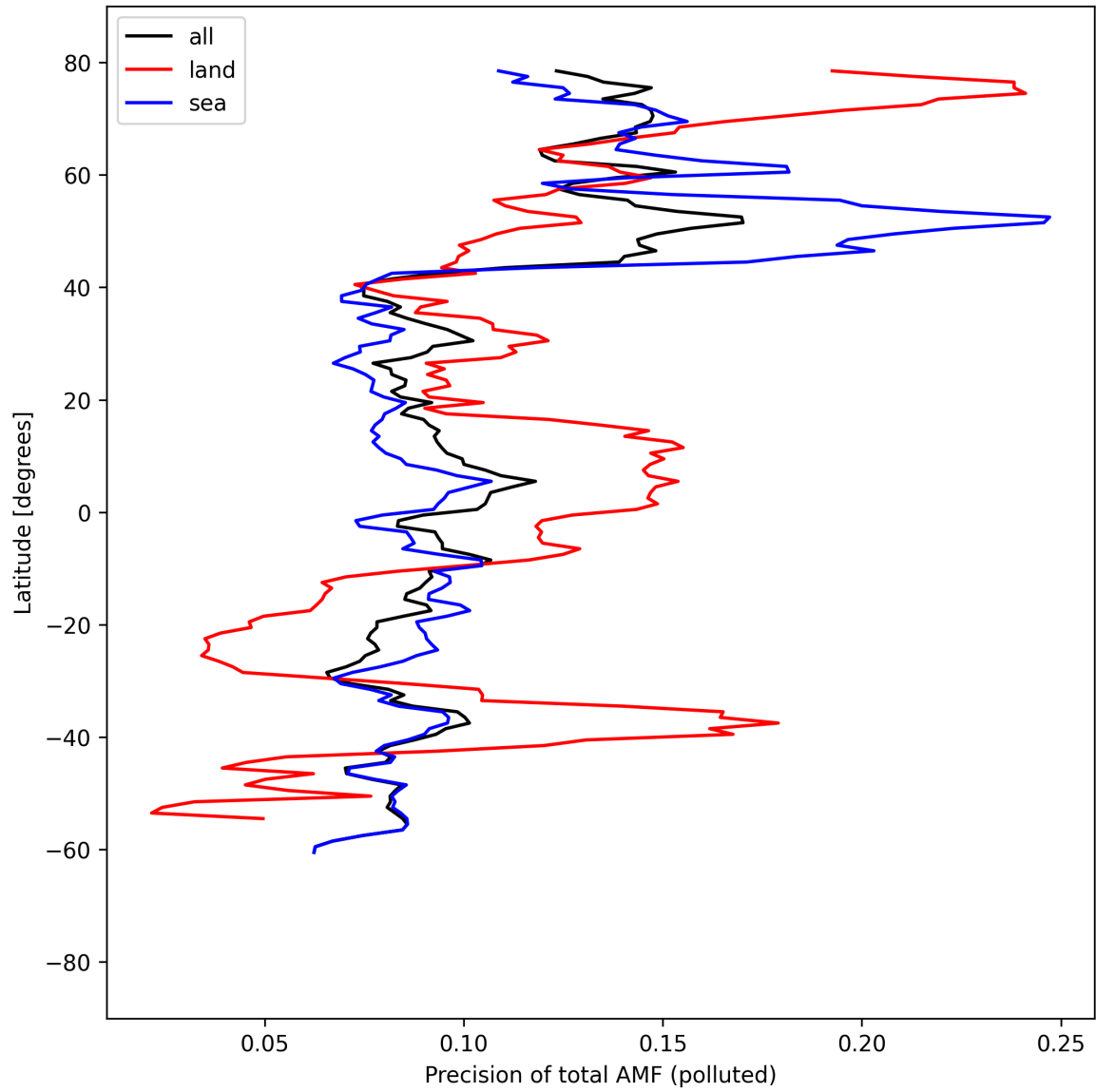


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-08-30 to 2025-08-31.

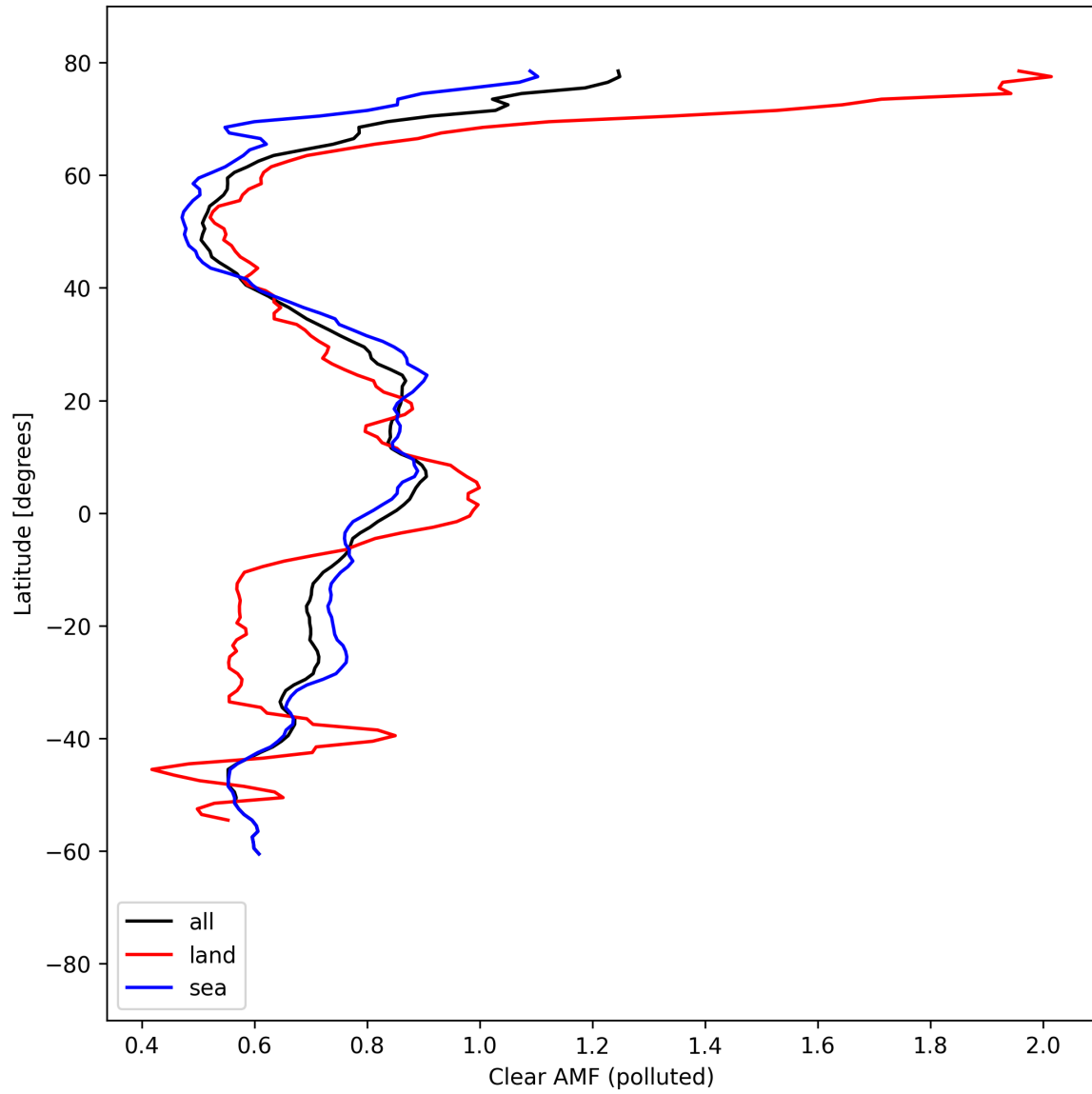


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-08-30 to 2025-08-31.

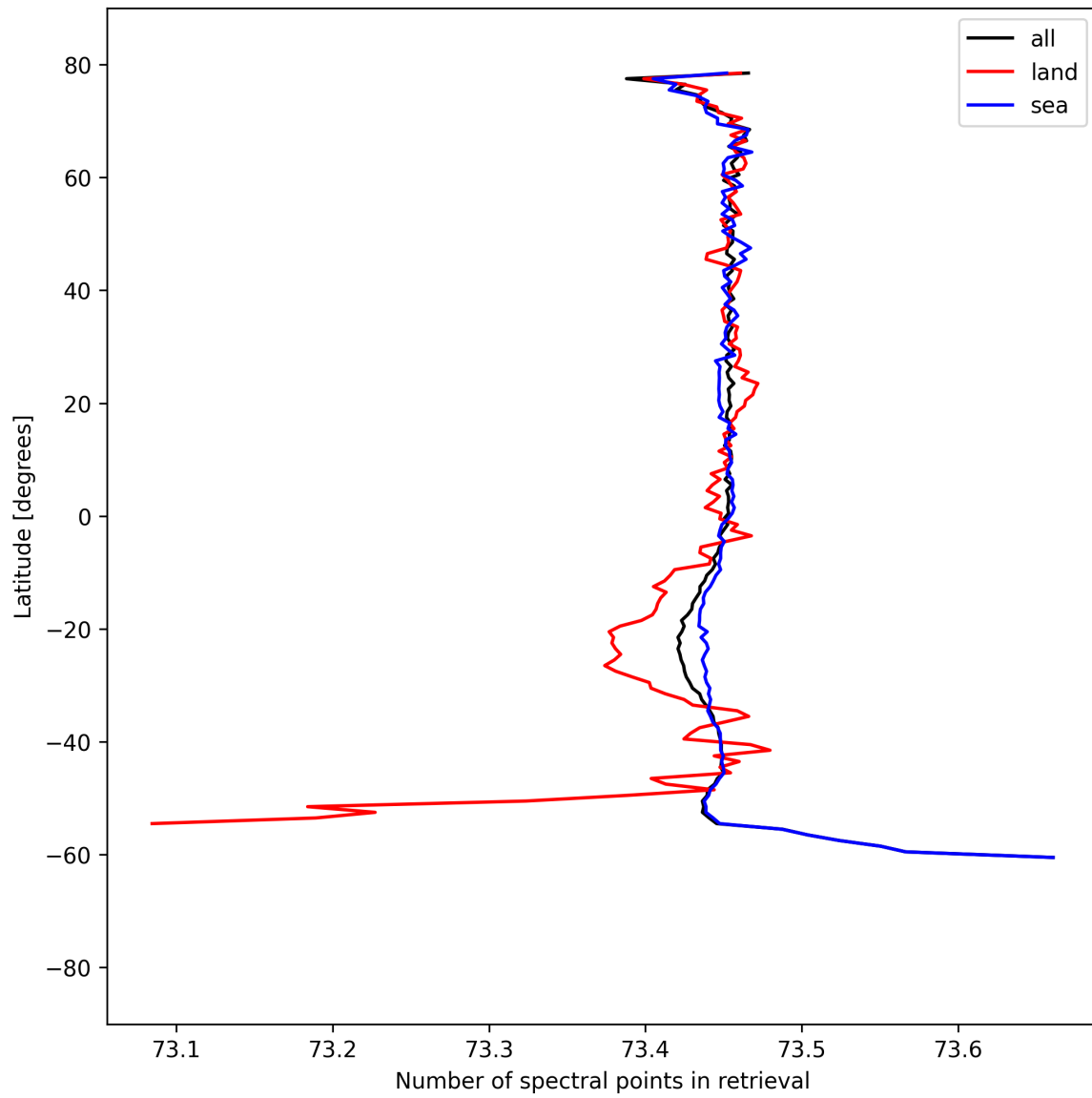


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-08-30 to 2025-08-31.

8 Histograms

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

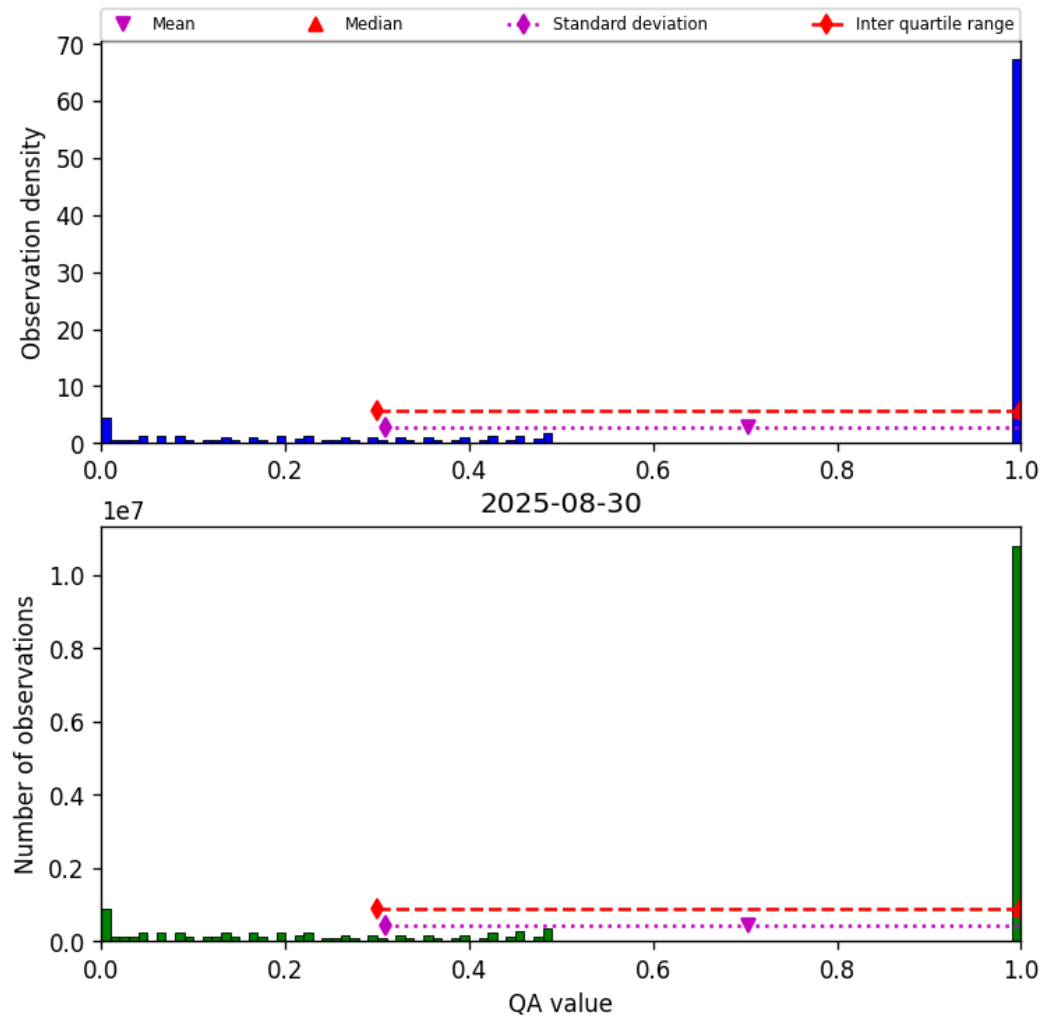


Figure 57: Histogram of “QA value” for 2025-08-30 to 2025-08-31

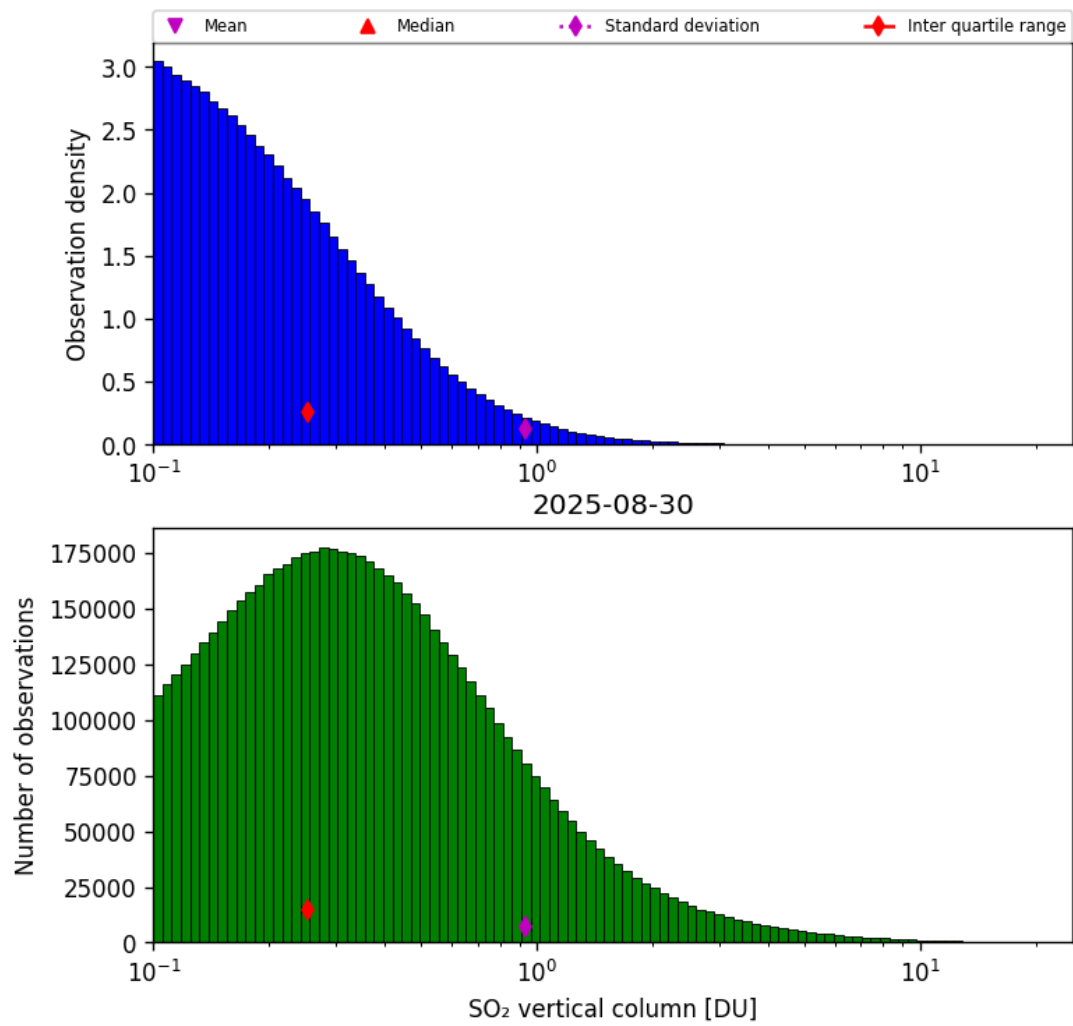


Figure 58: Histogram of “SO₂ vertical column” for 2025-08-30 to 2025-08-31

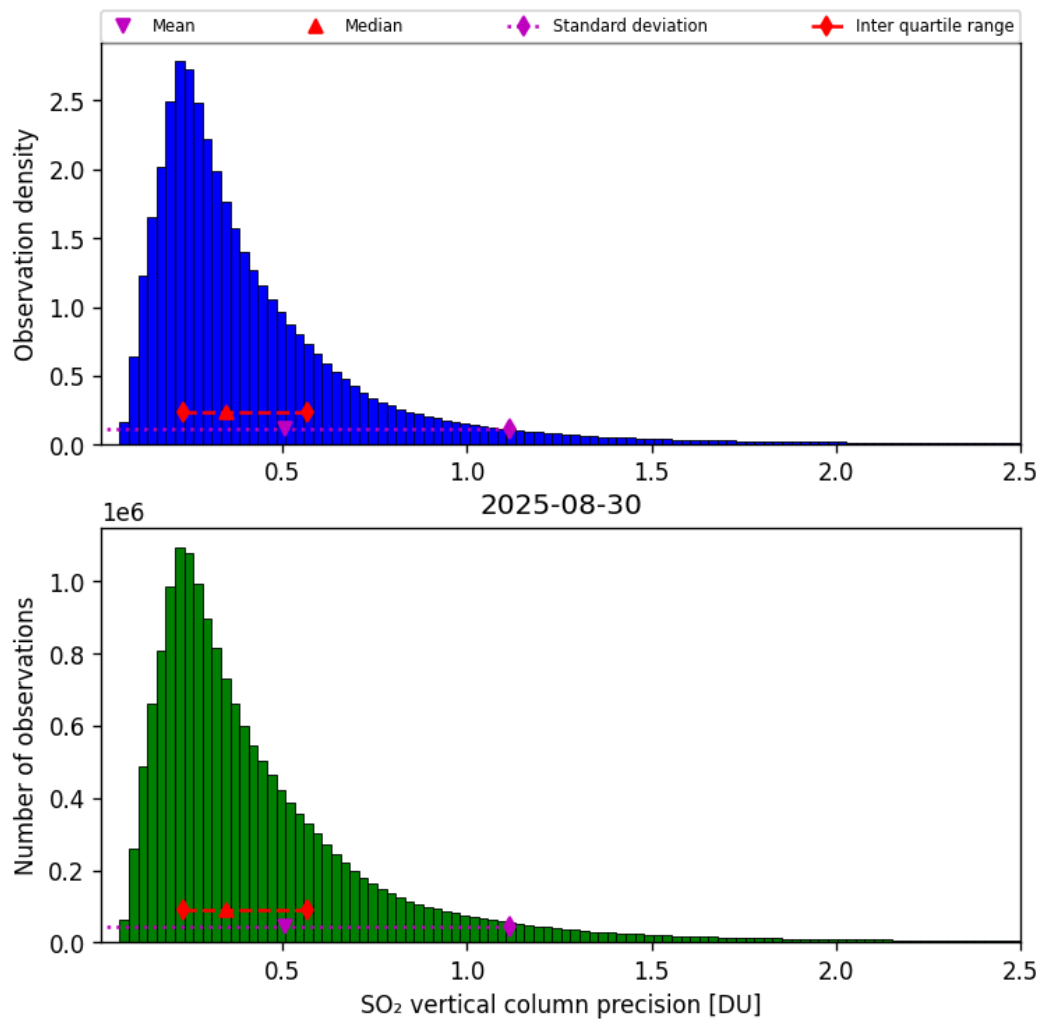


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-08-30 to 2025-08-31

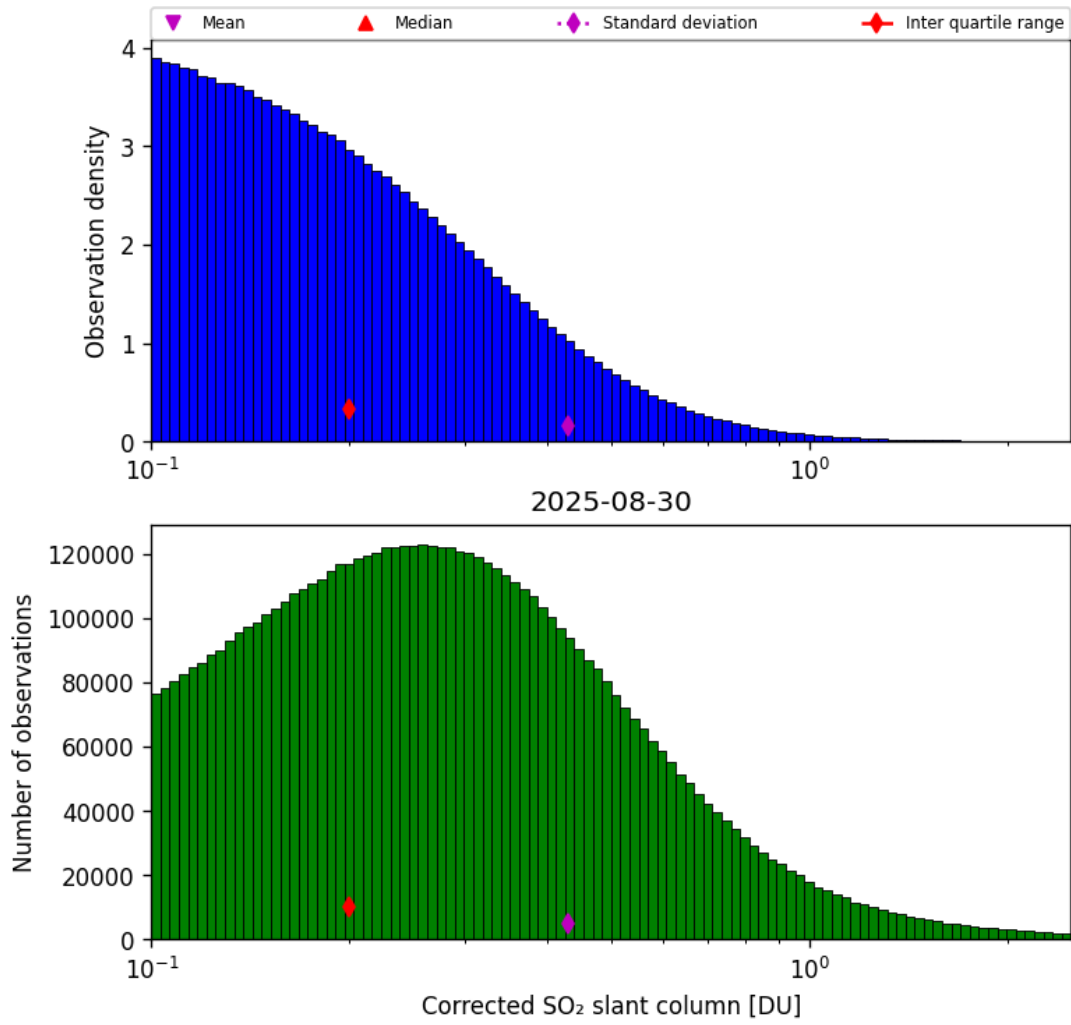


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-08-30 to 2025-08-31

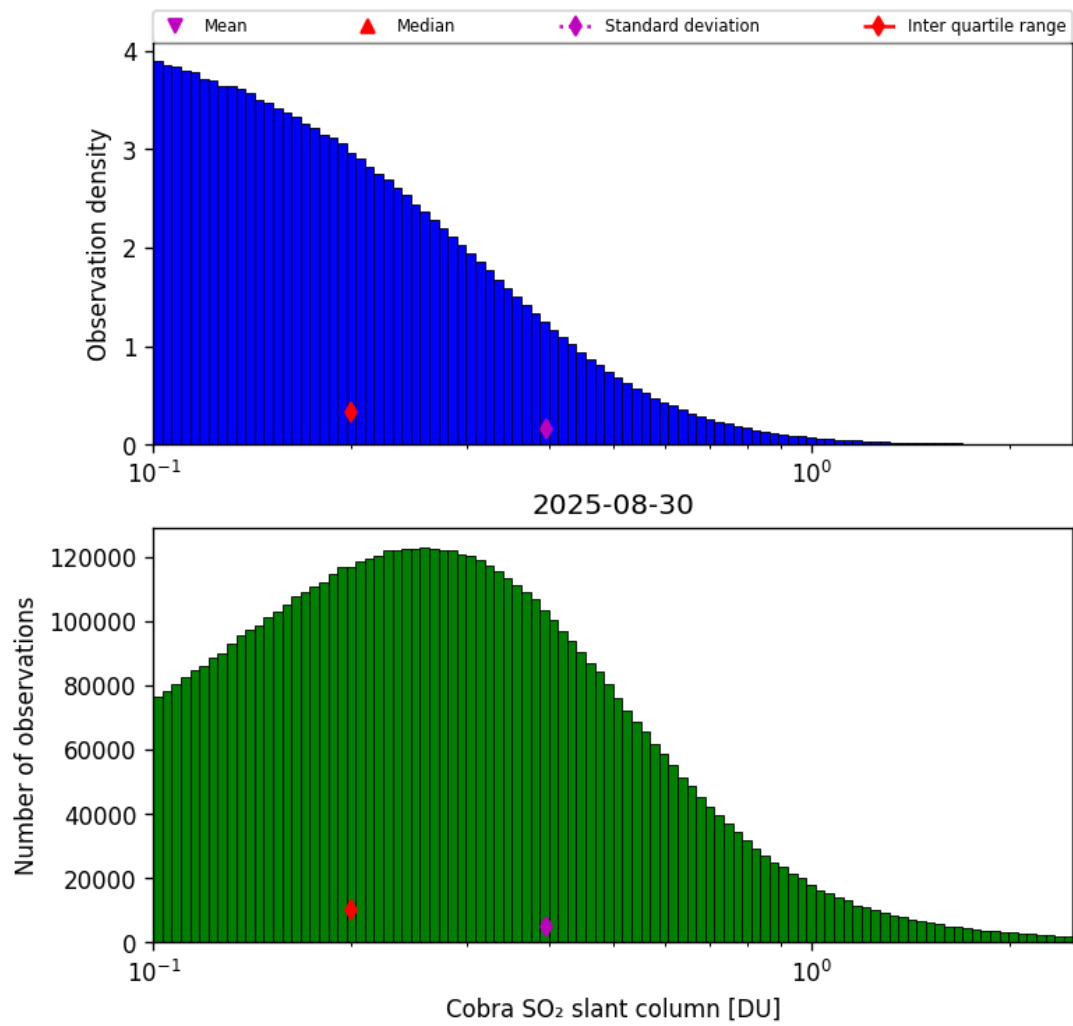


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-08-30 to 2025-08-31

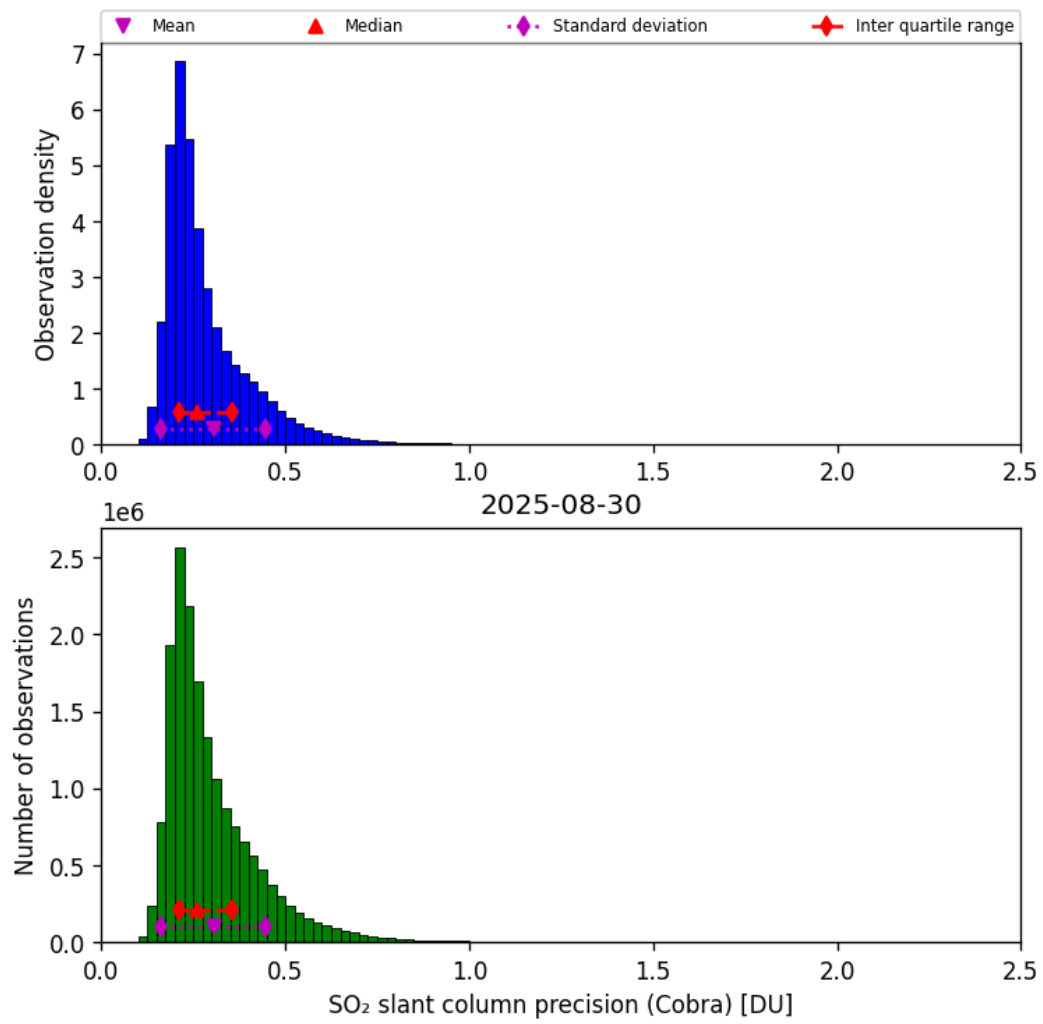


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-08-30 to 2025-08-31

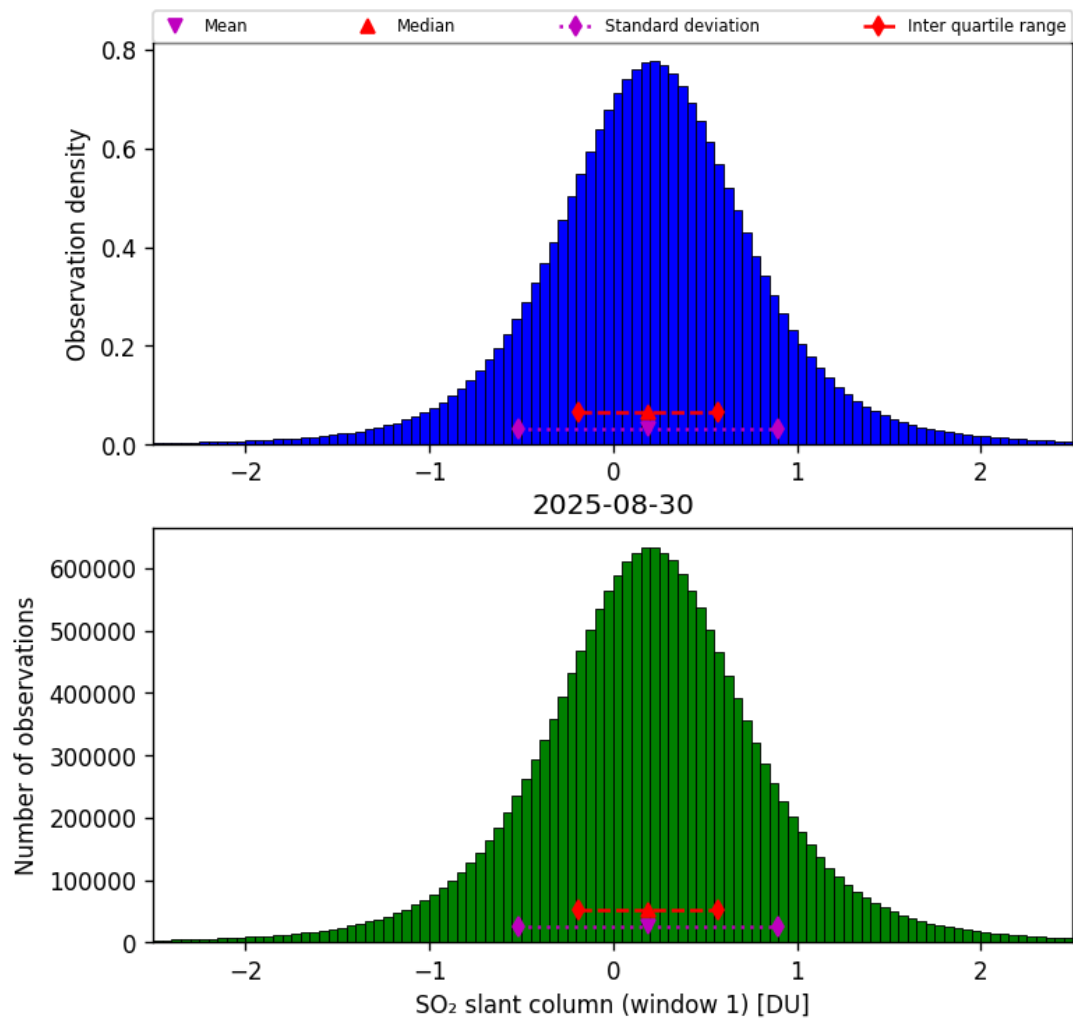


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-08-30 to 2025-08-31

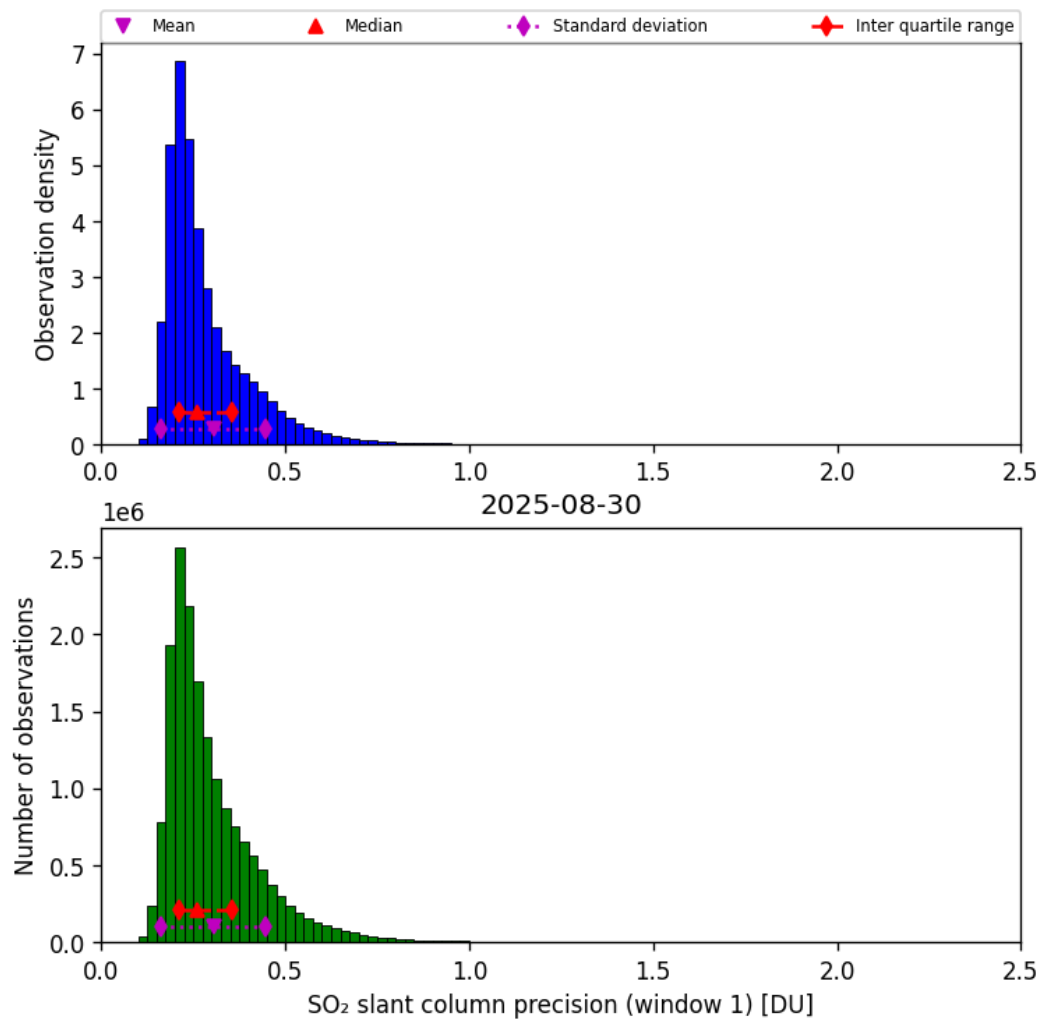


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-08-30 to 2025-08-31

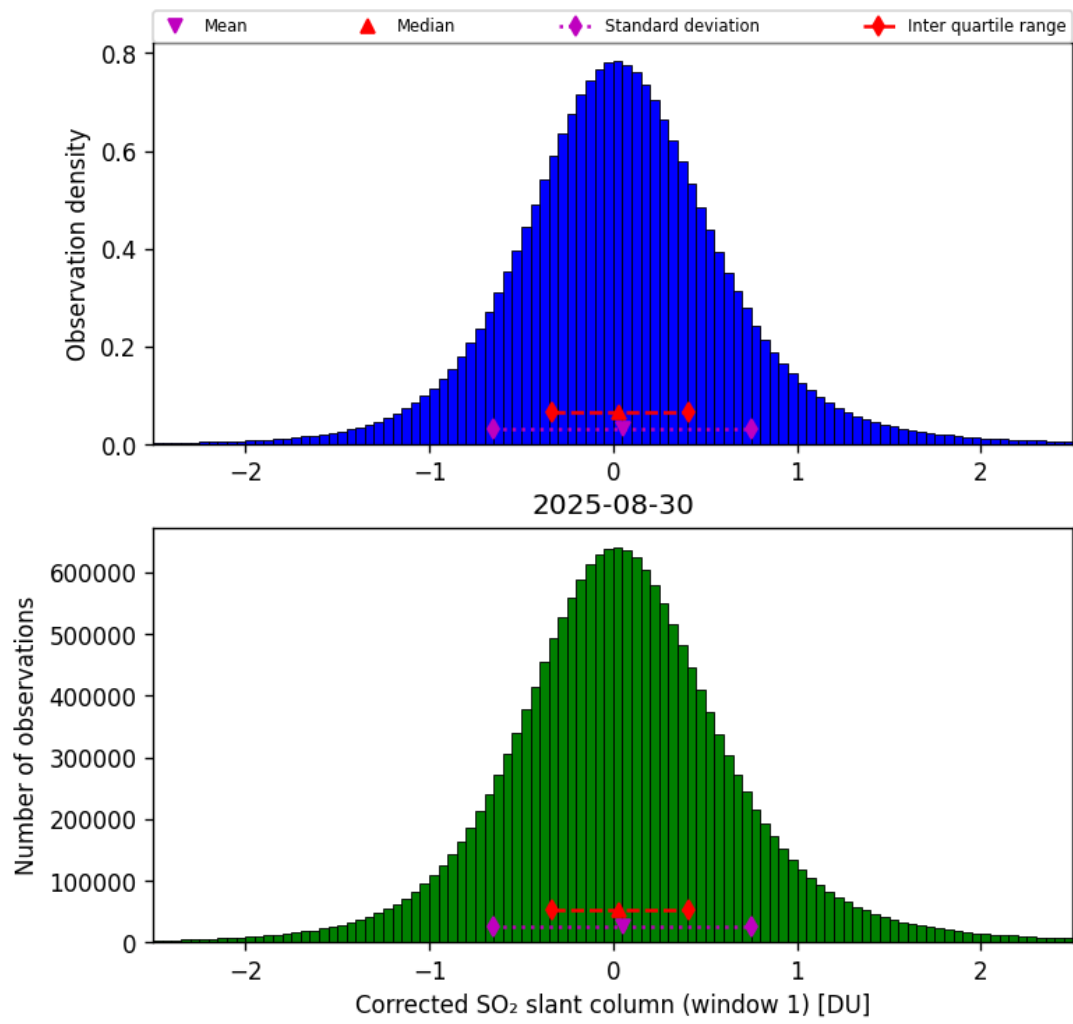


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-08-30 to 2025-08-31

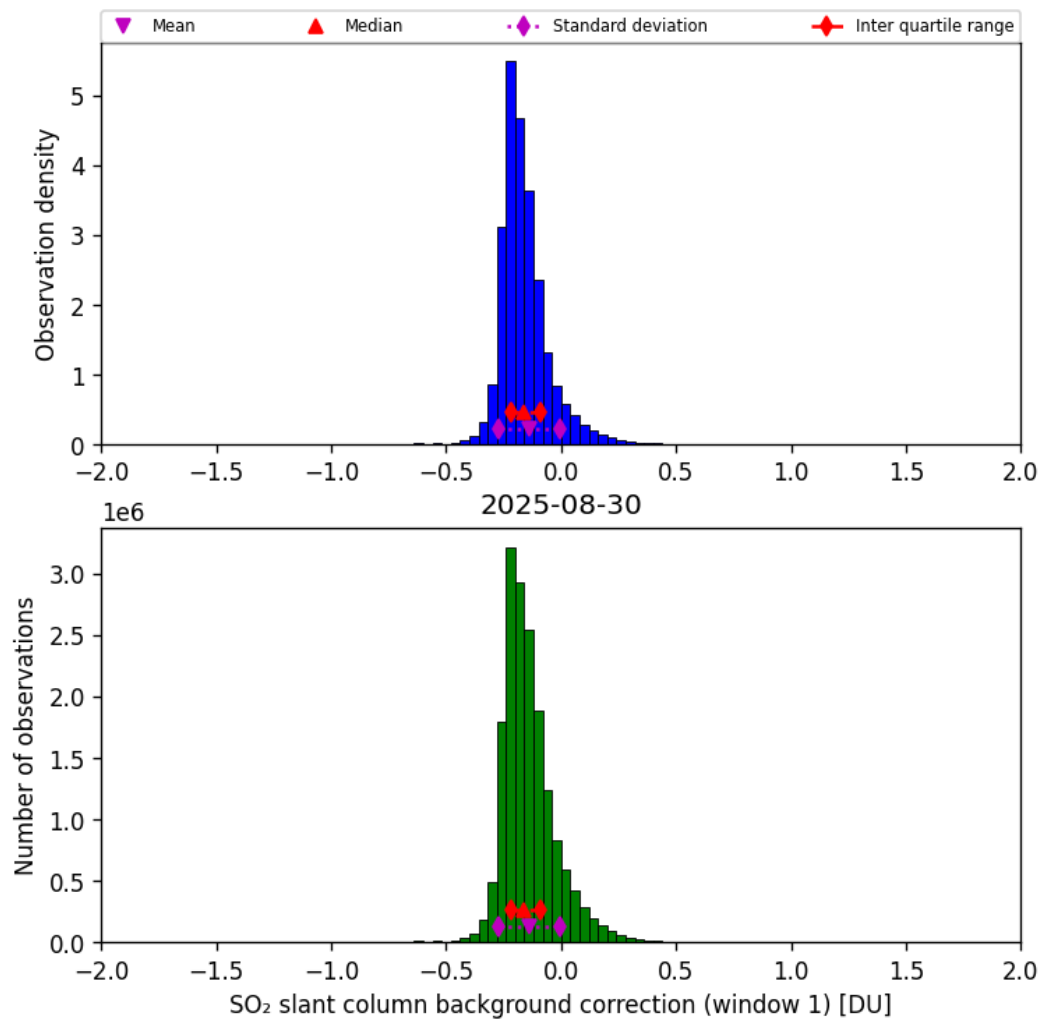


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-08-30 to 2025-08-31

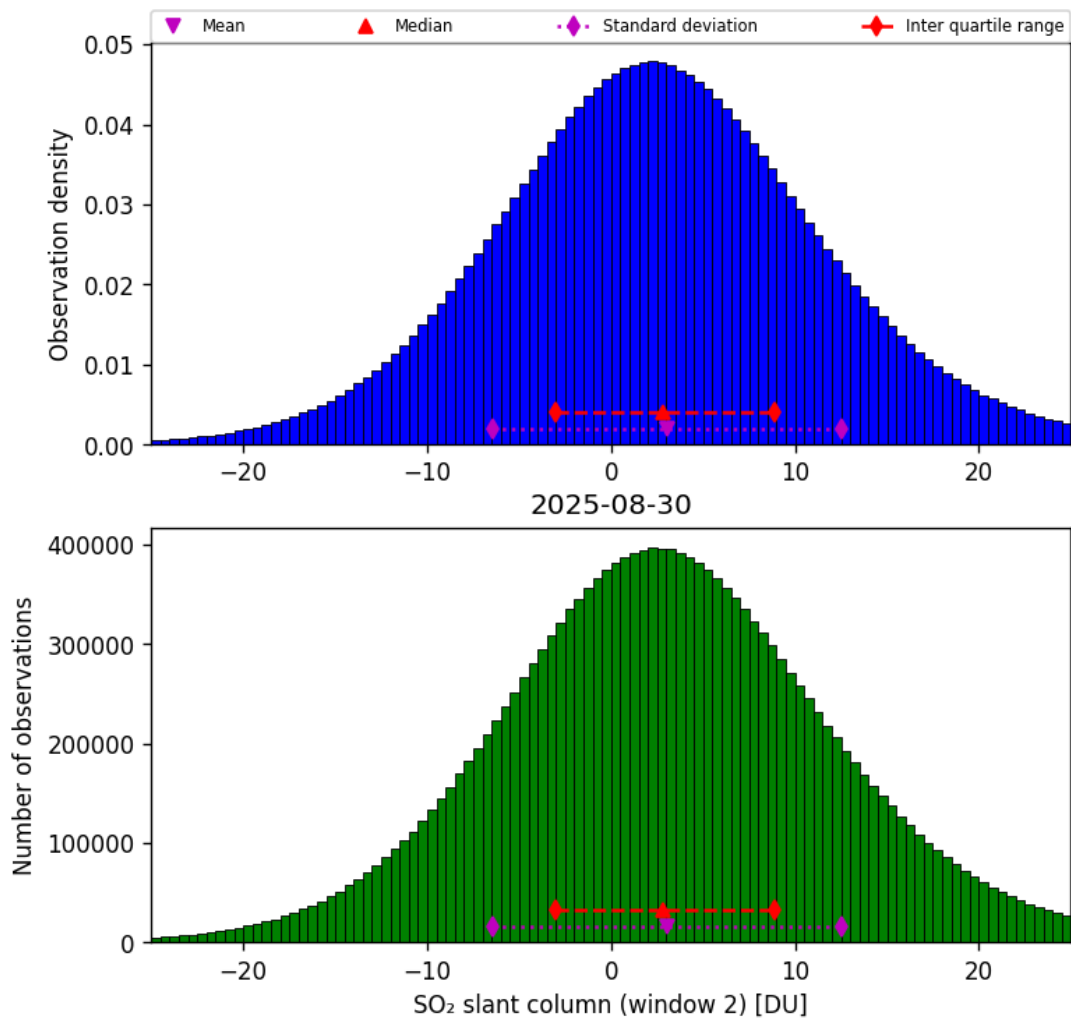


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-08-30 to 2025-08-31

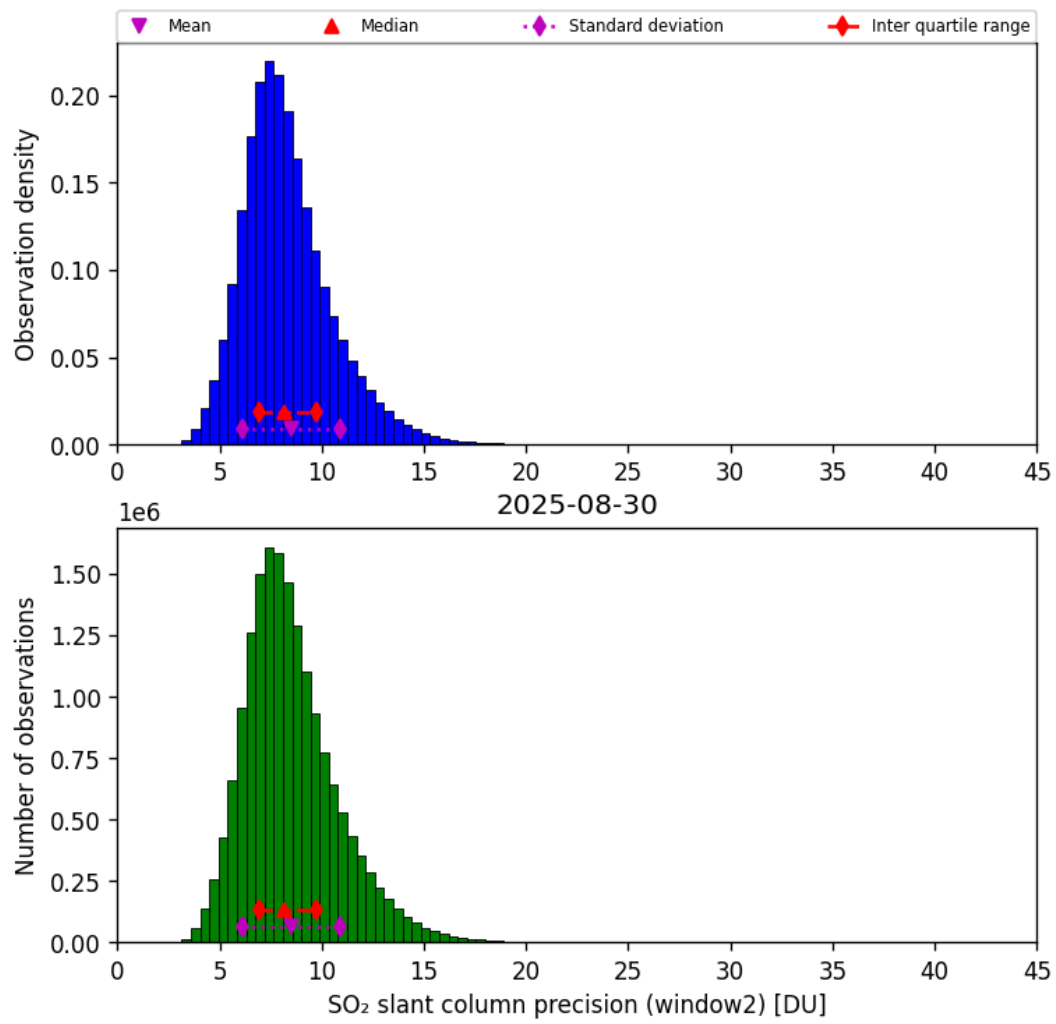


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-08-30 to 2025-08-31

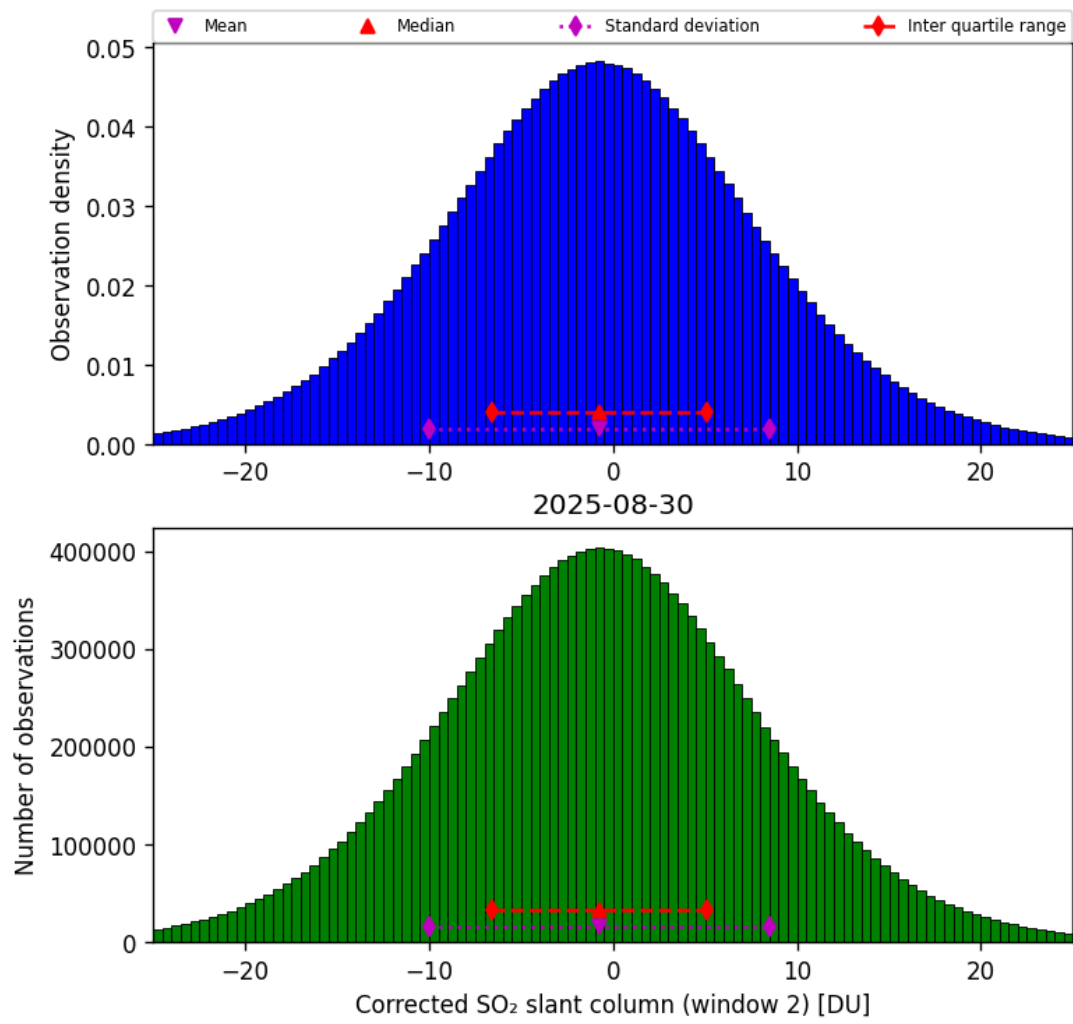


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-08-30 to 2025-08-31

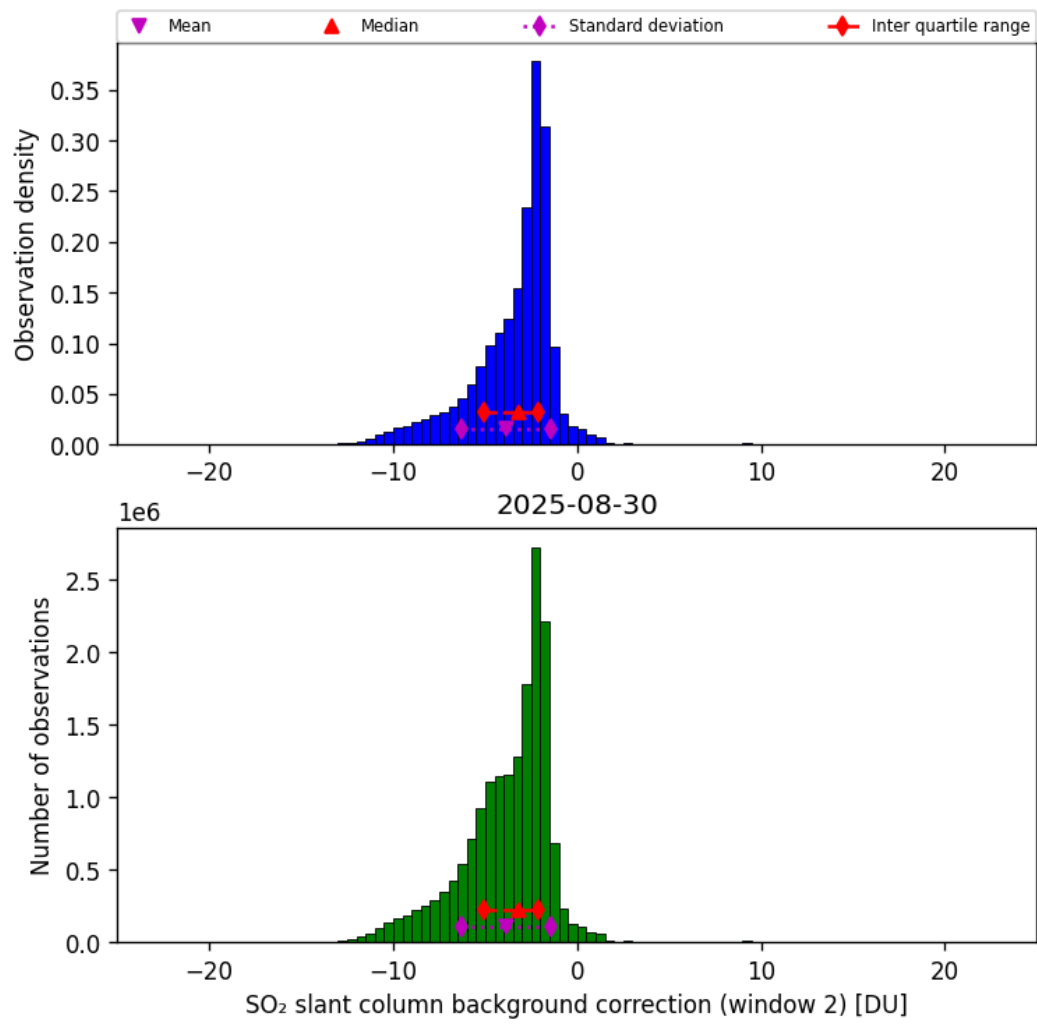


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-08-30 to 2025-08-31

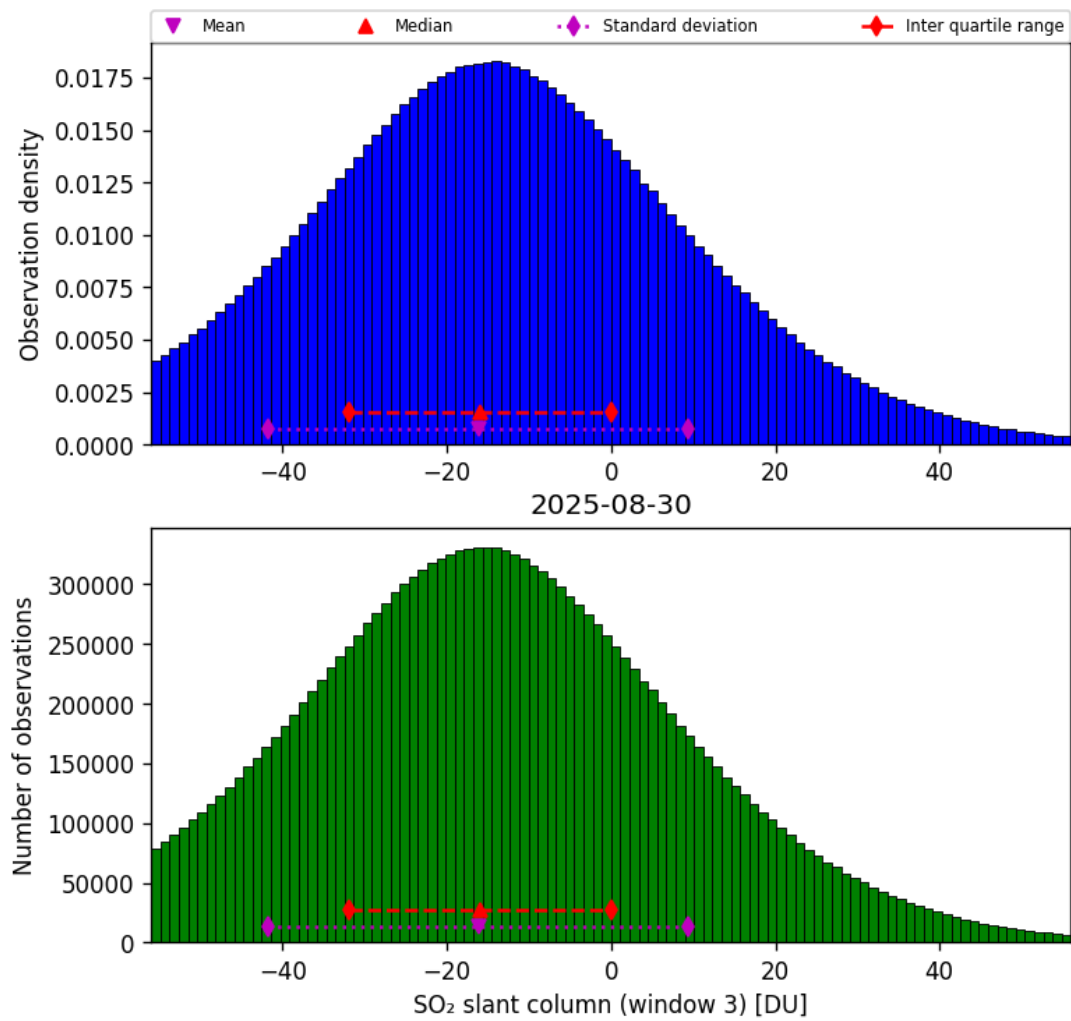


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-08-30 to 2025-08-31

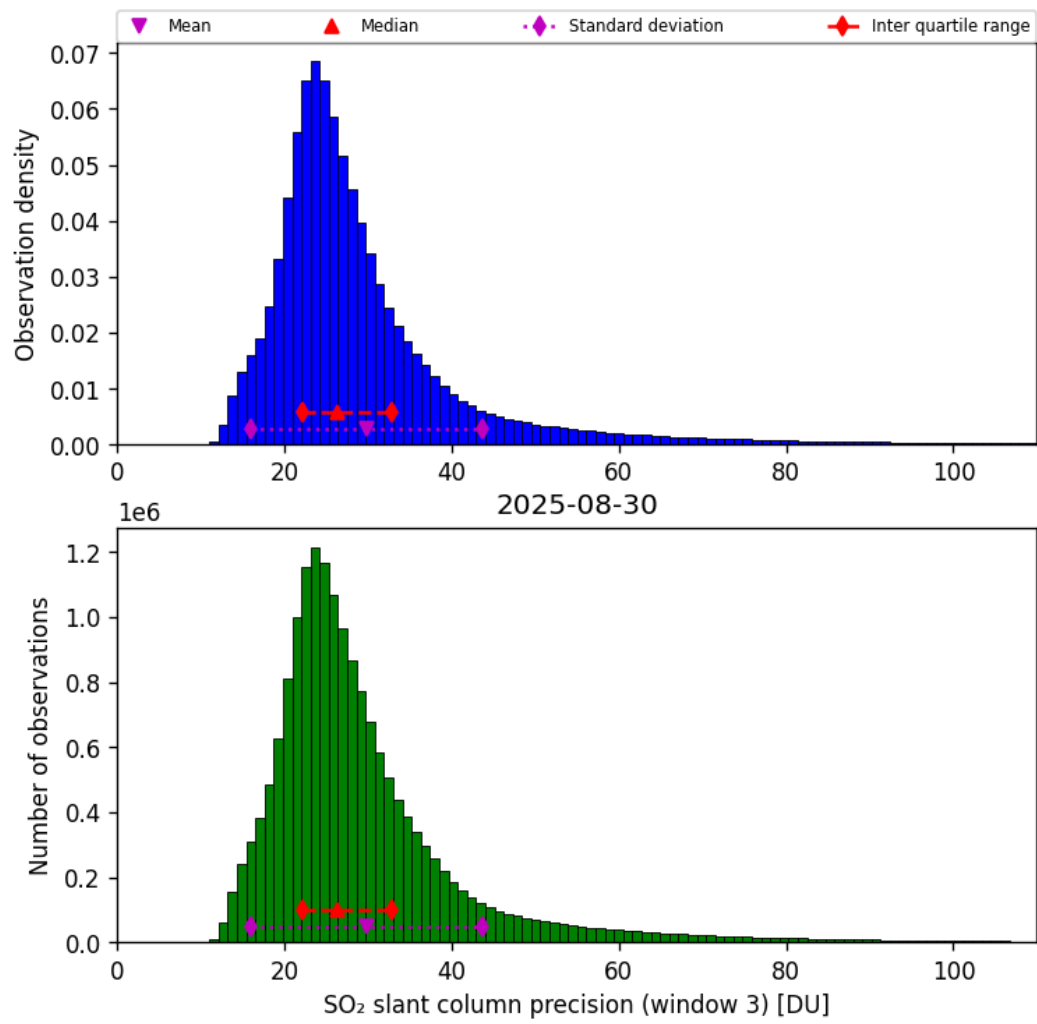


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-08-30 to 2025-08-31

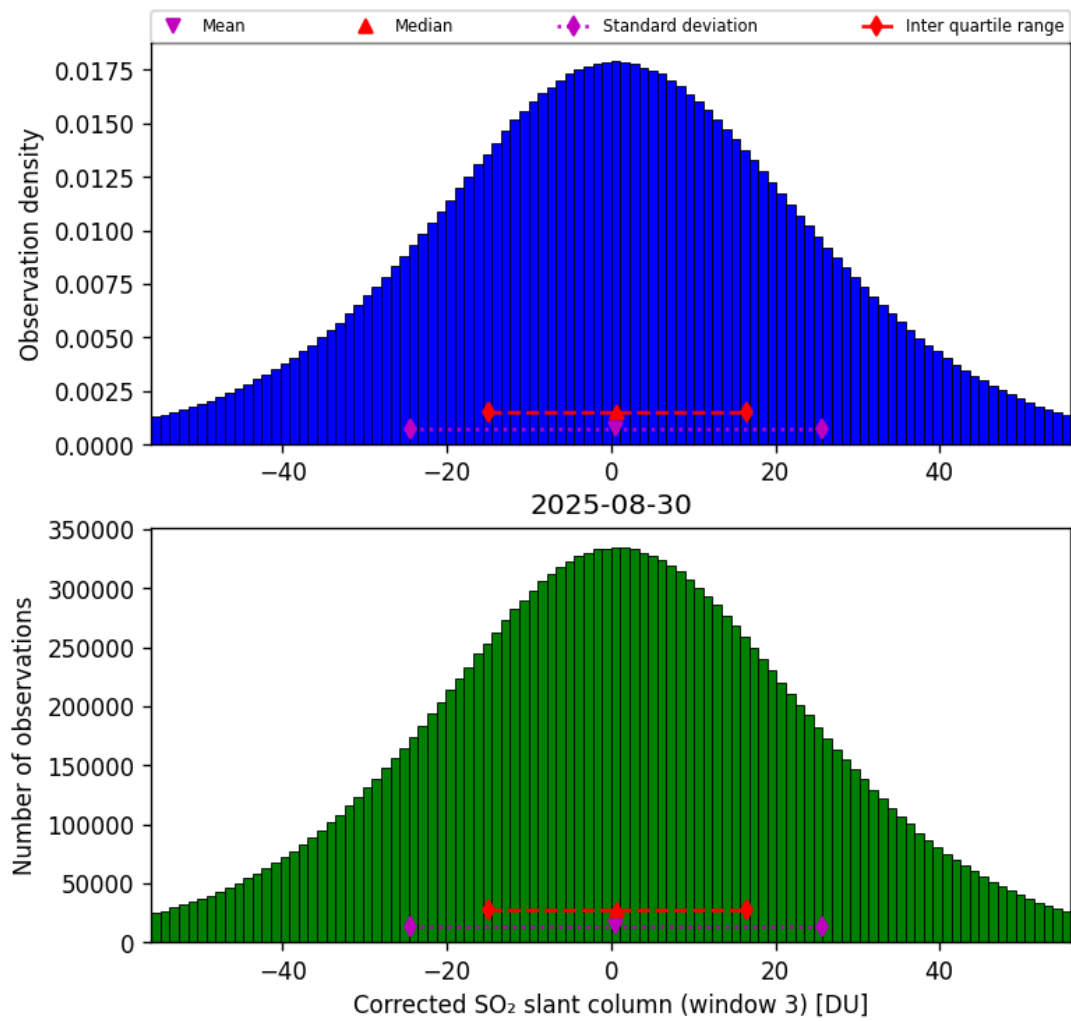


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-08-30 to 2025-08-31

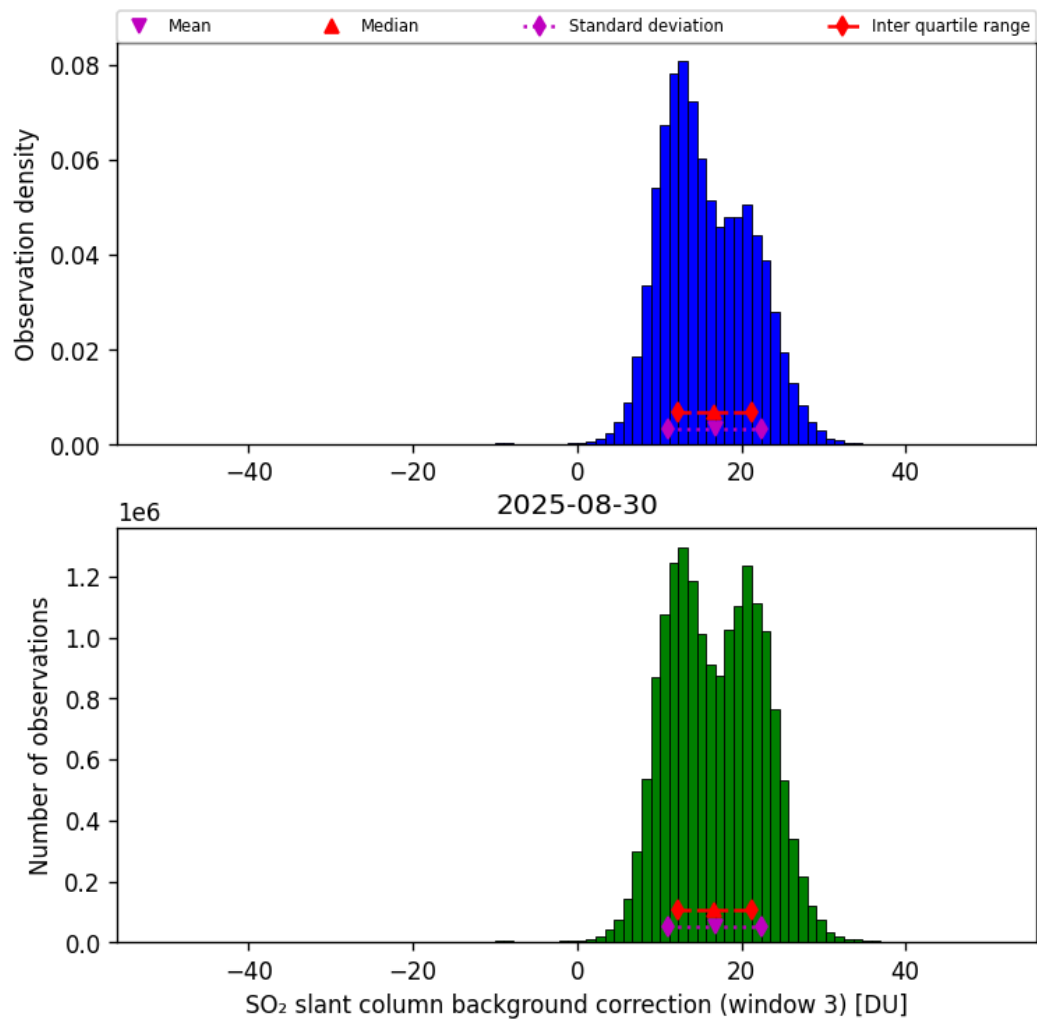


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-08-30 to 2025-08-31

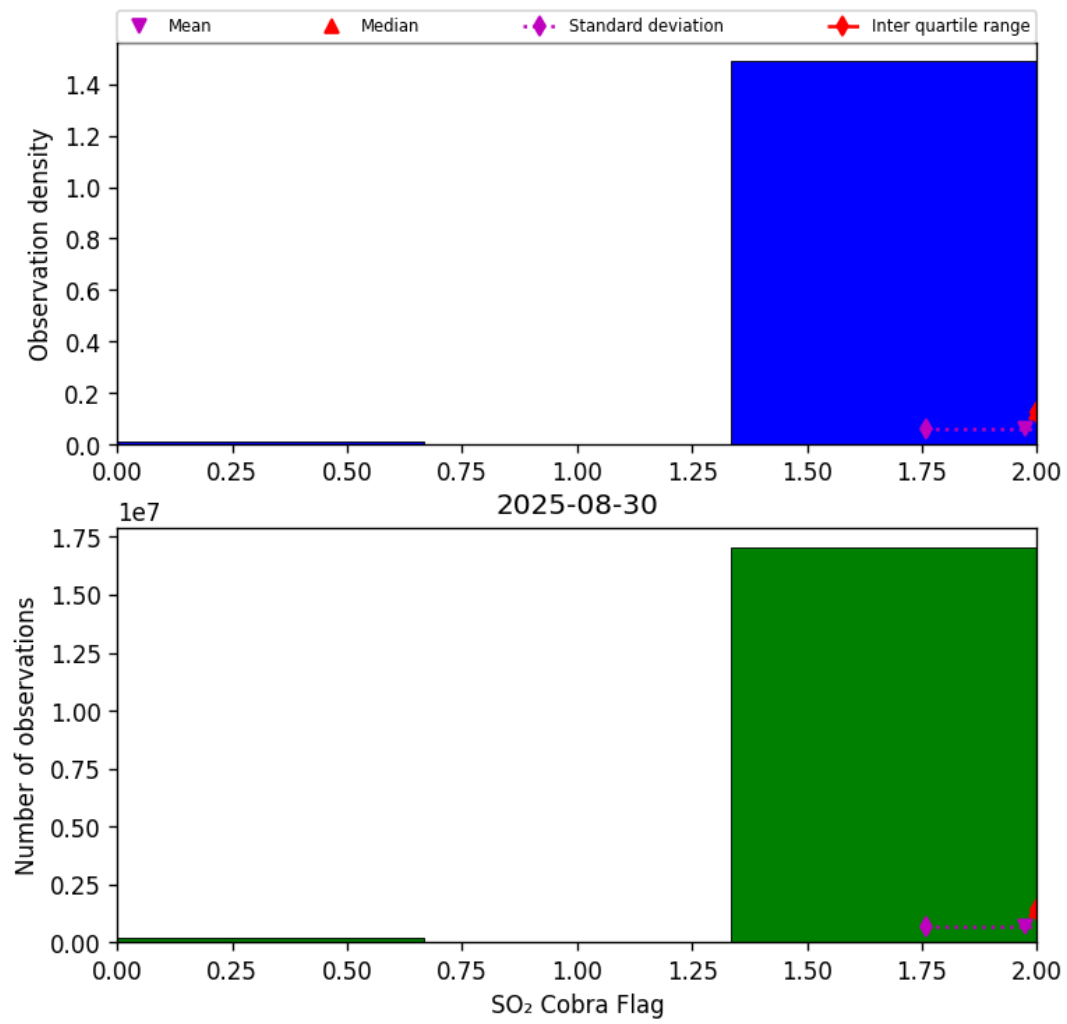


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-08-30 to 2025-08-31

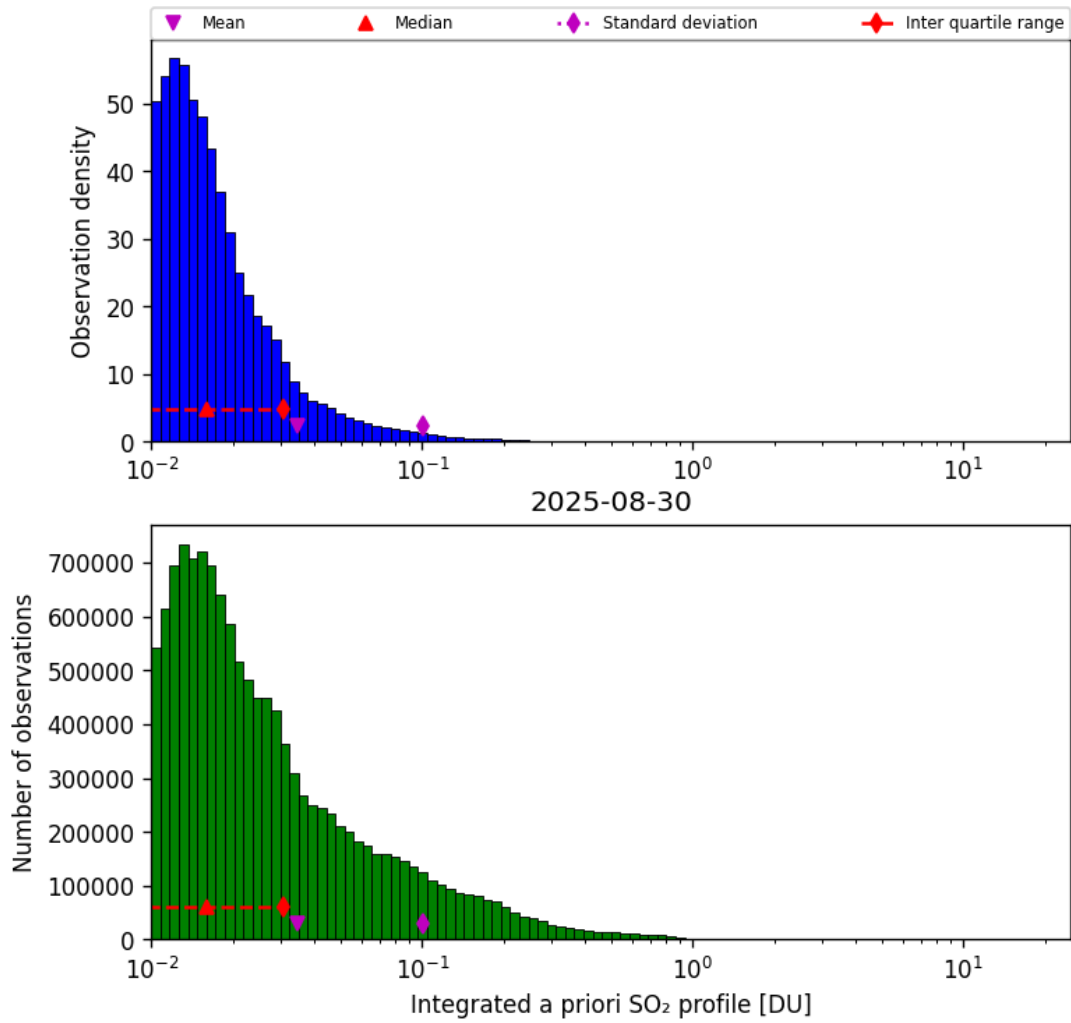


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-08-30 to 2025-08-31

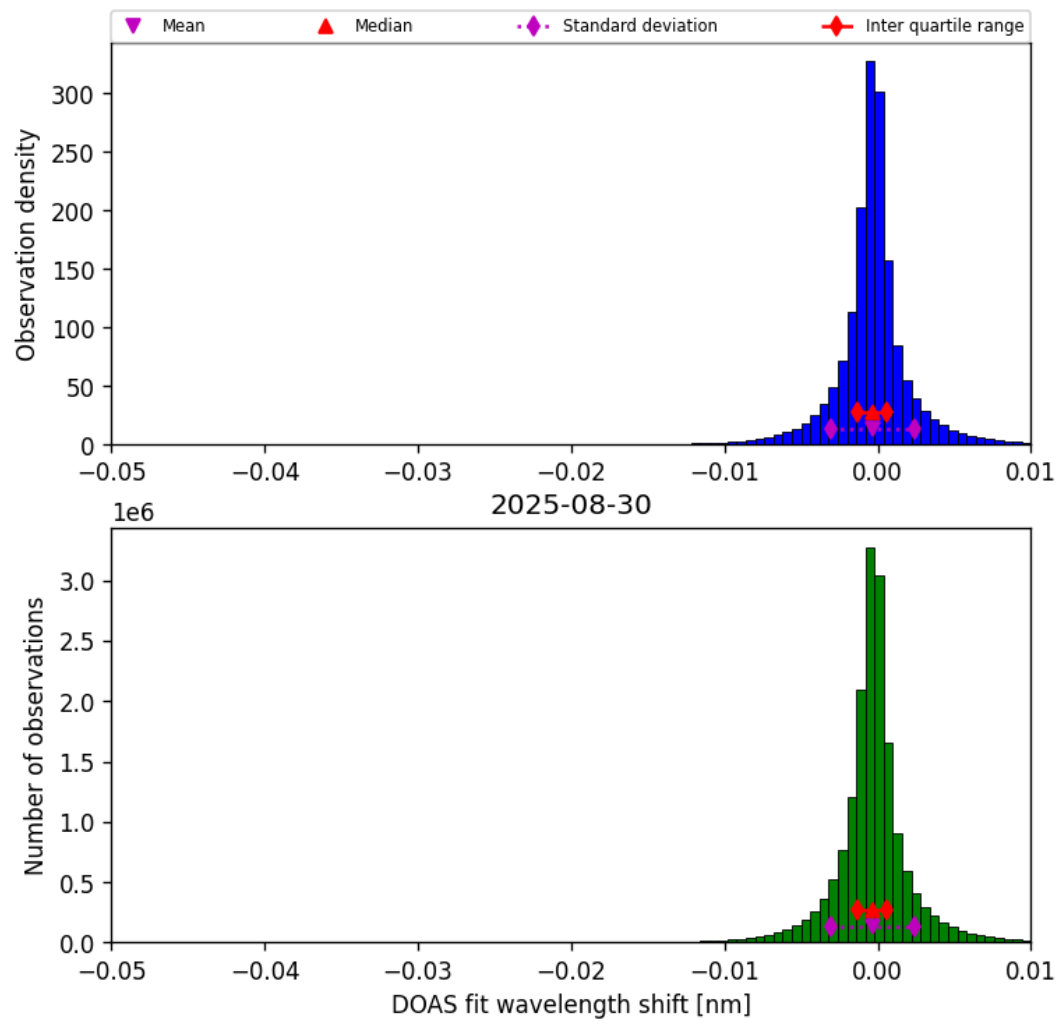


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-08-30 to 2025-08-31

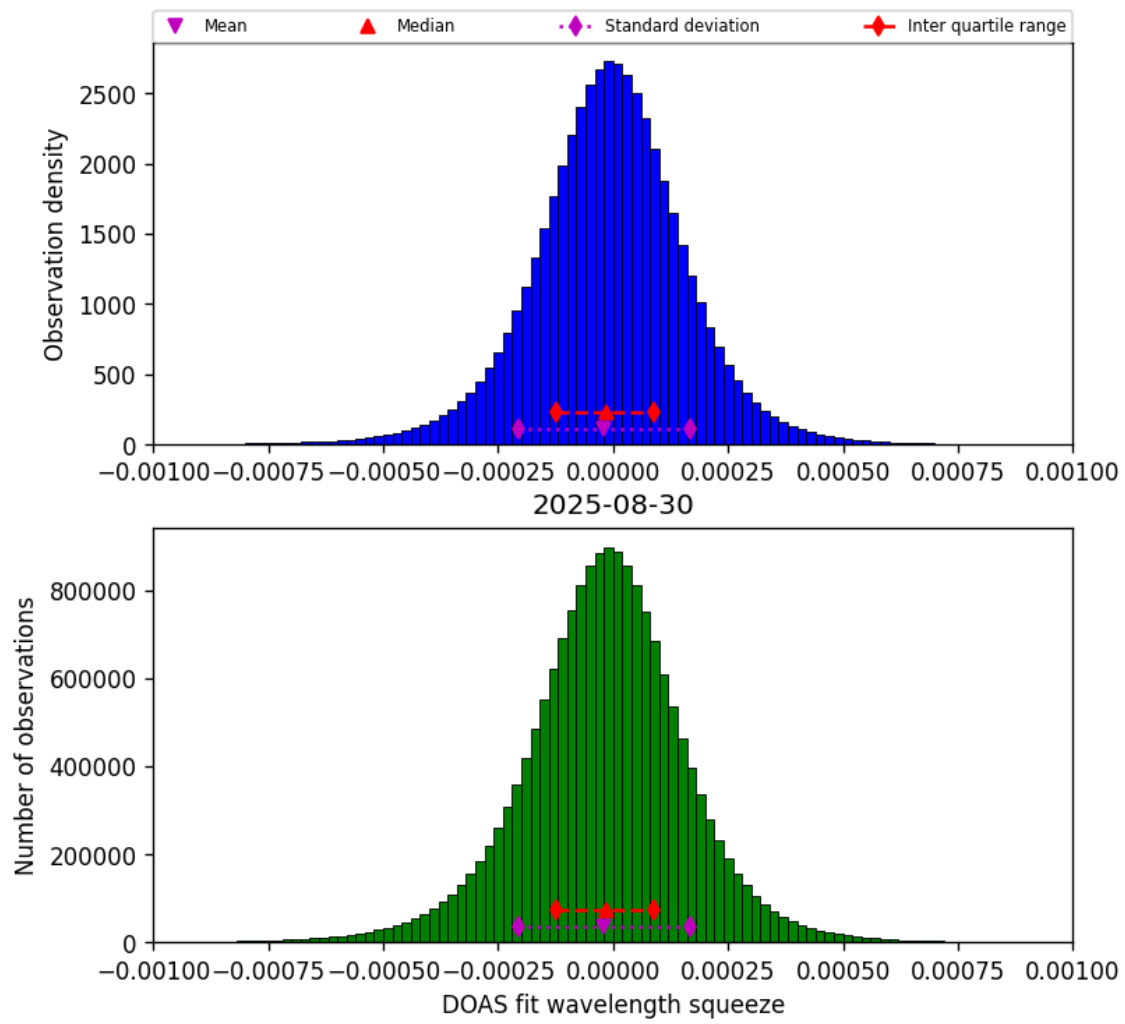


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-08-30 to 2025-08-31

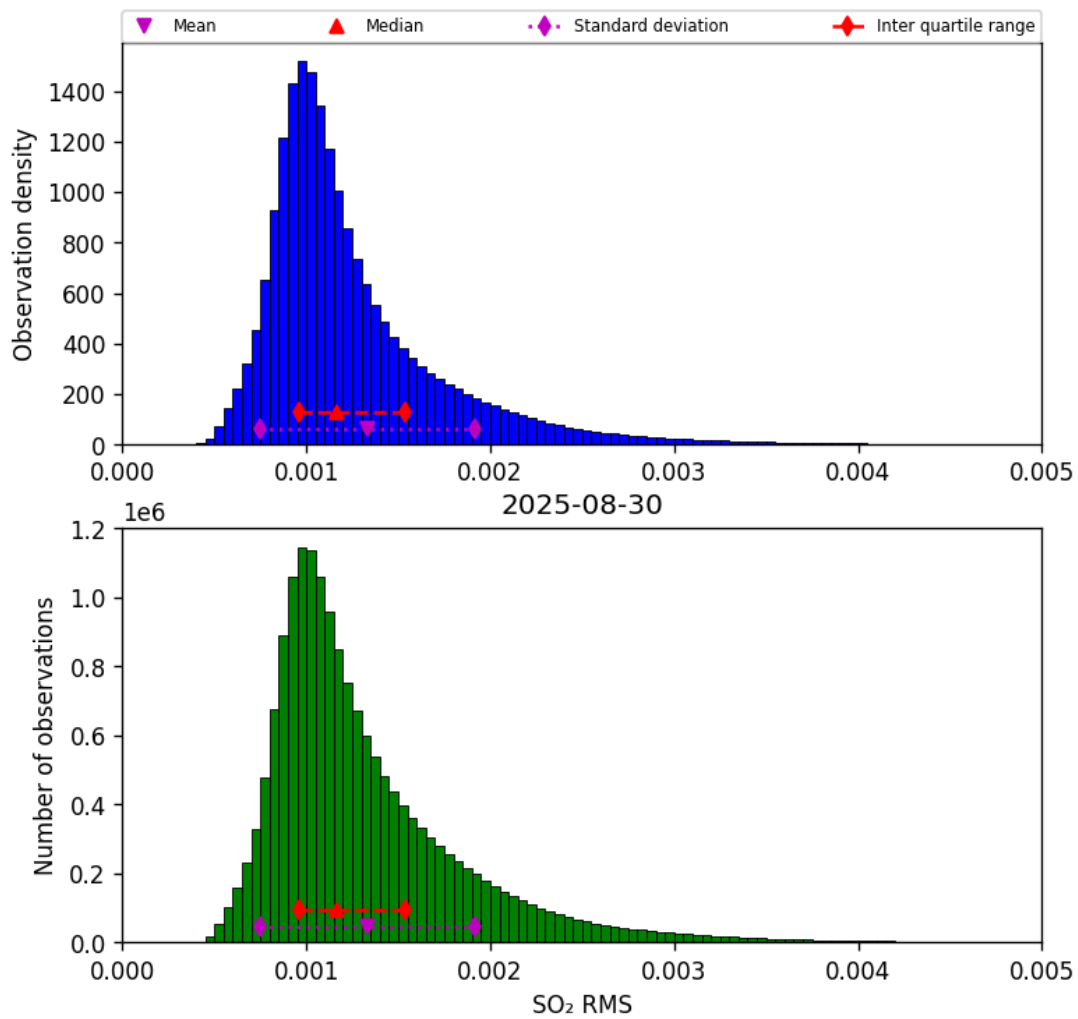


Figure 79: Histogram of “SO₂ RMS” for 2025-08-30 to 2025-08-31

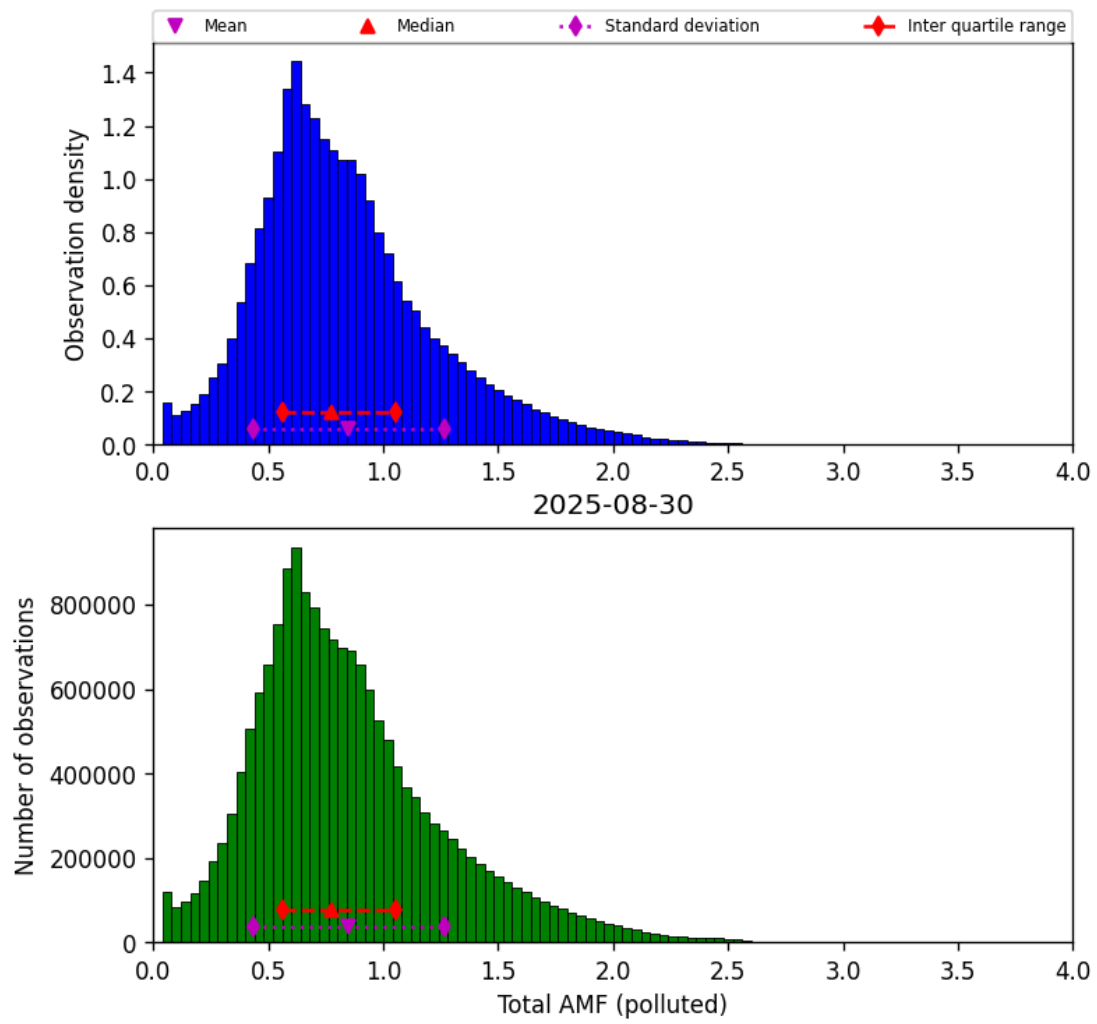


Figure 80: Histogram of “Total AMF (polluted)” for 2025-08-30 to 2025-08-31

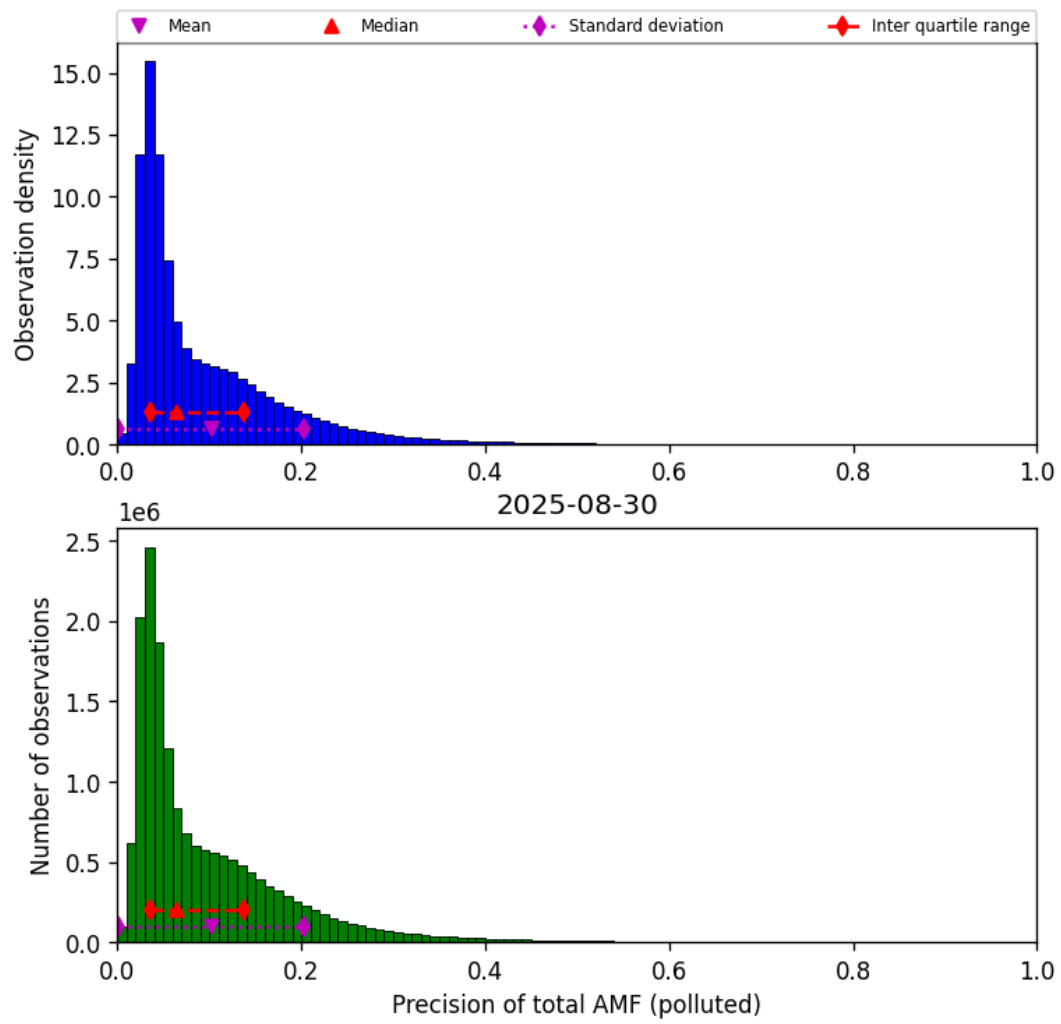


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-08-30 to 2025-08-31

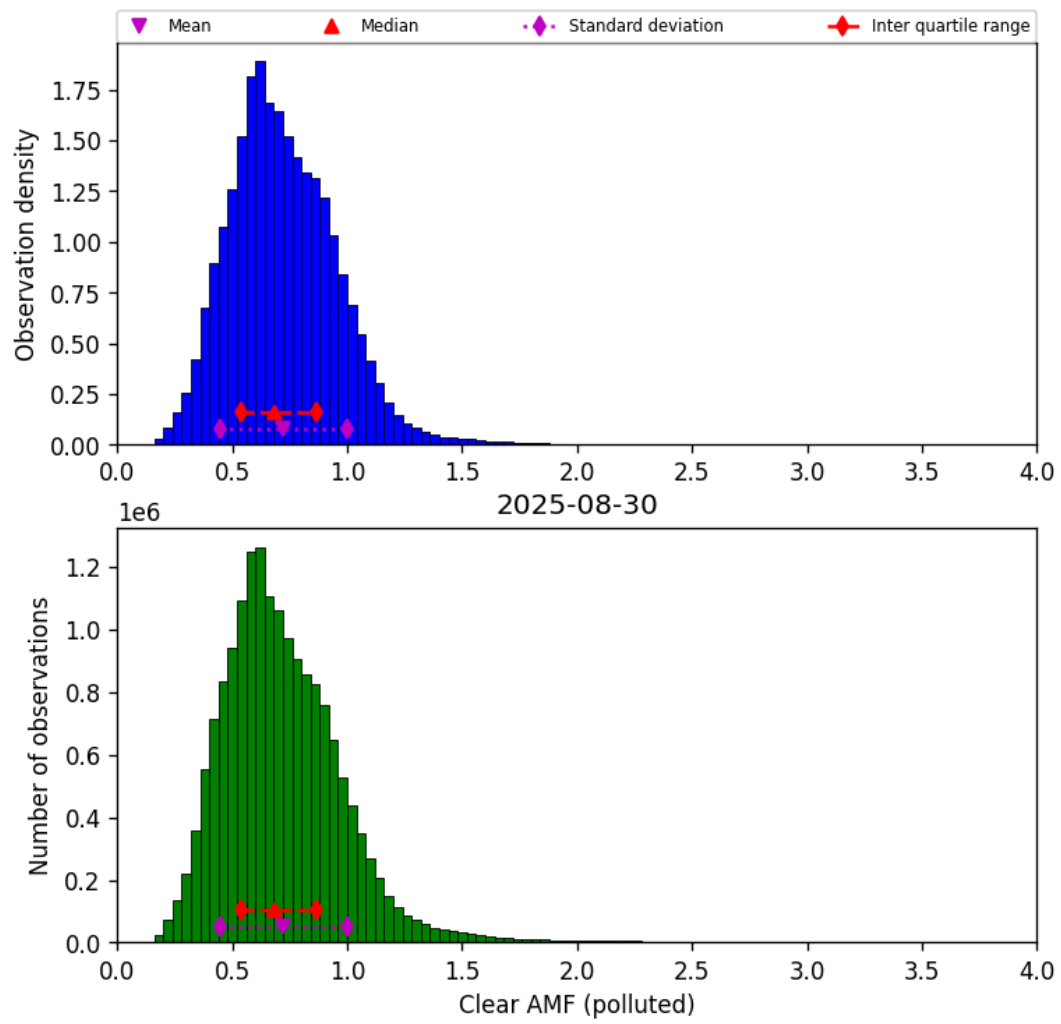


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-08-30 to 2025-08-31

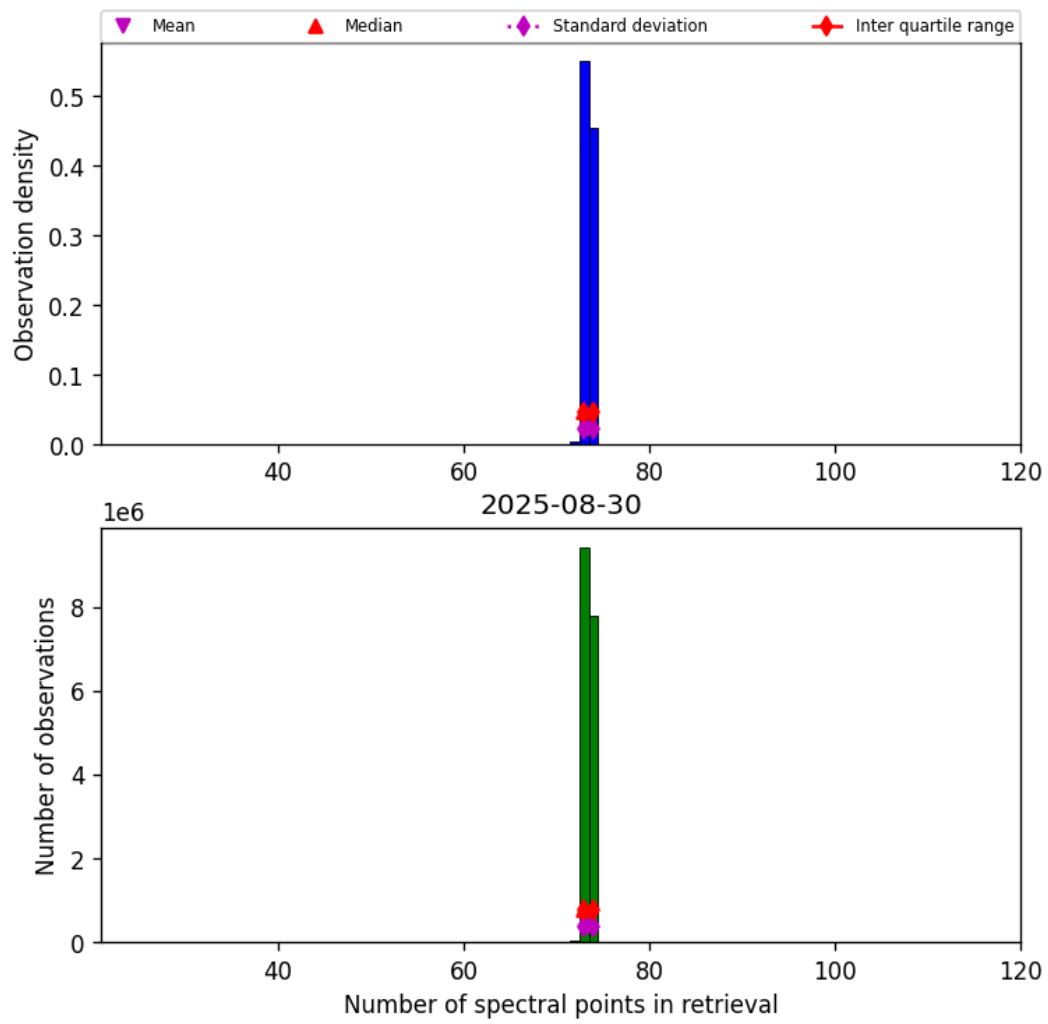


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-08-30 to 2025-08-31

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.

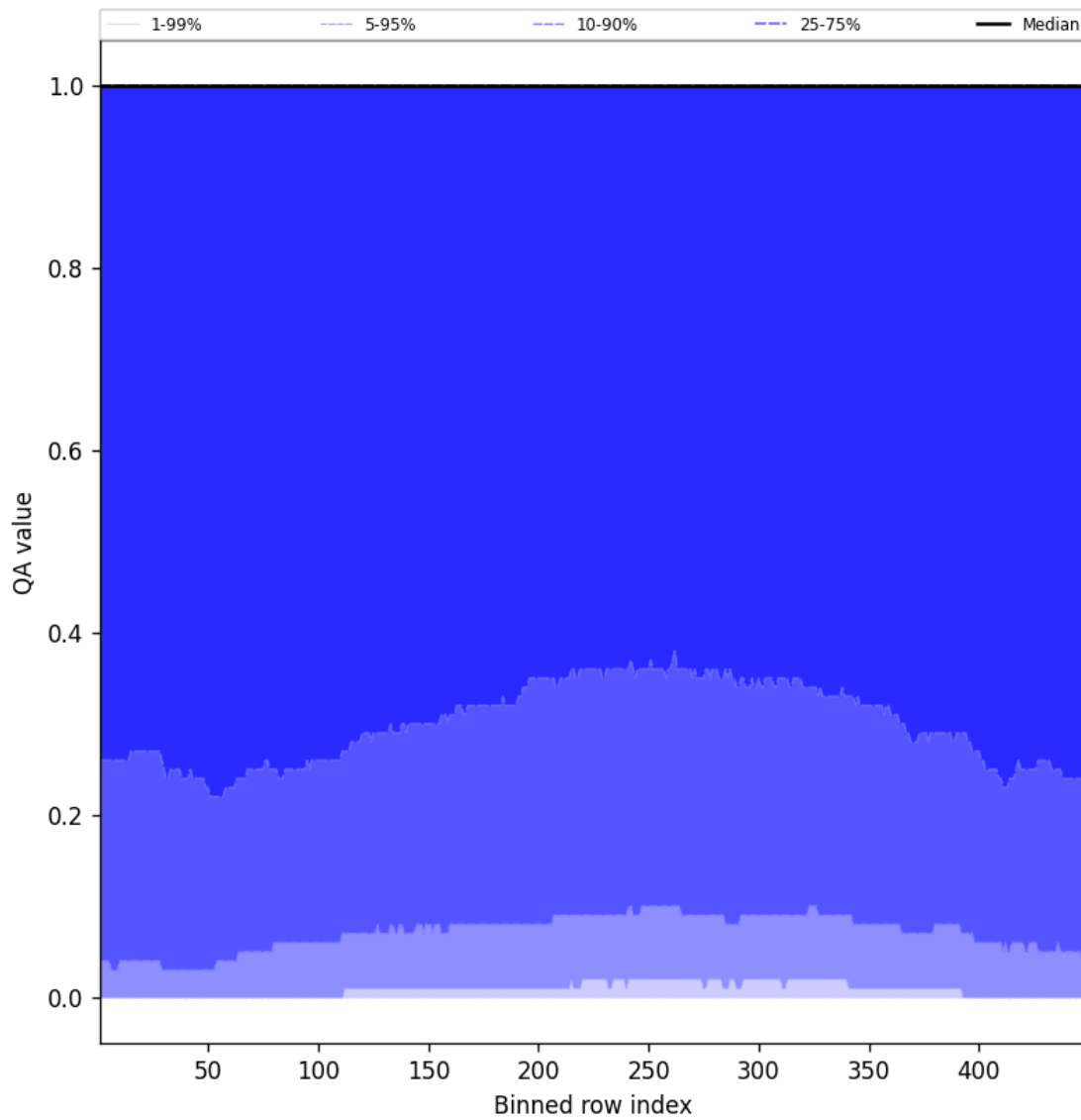


Figure 84: Along track statistics of “QA value” for 2025-08-30 to 2025-08-31

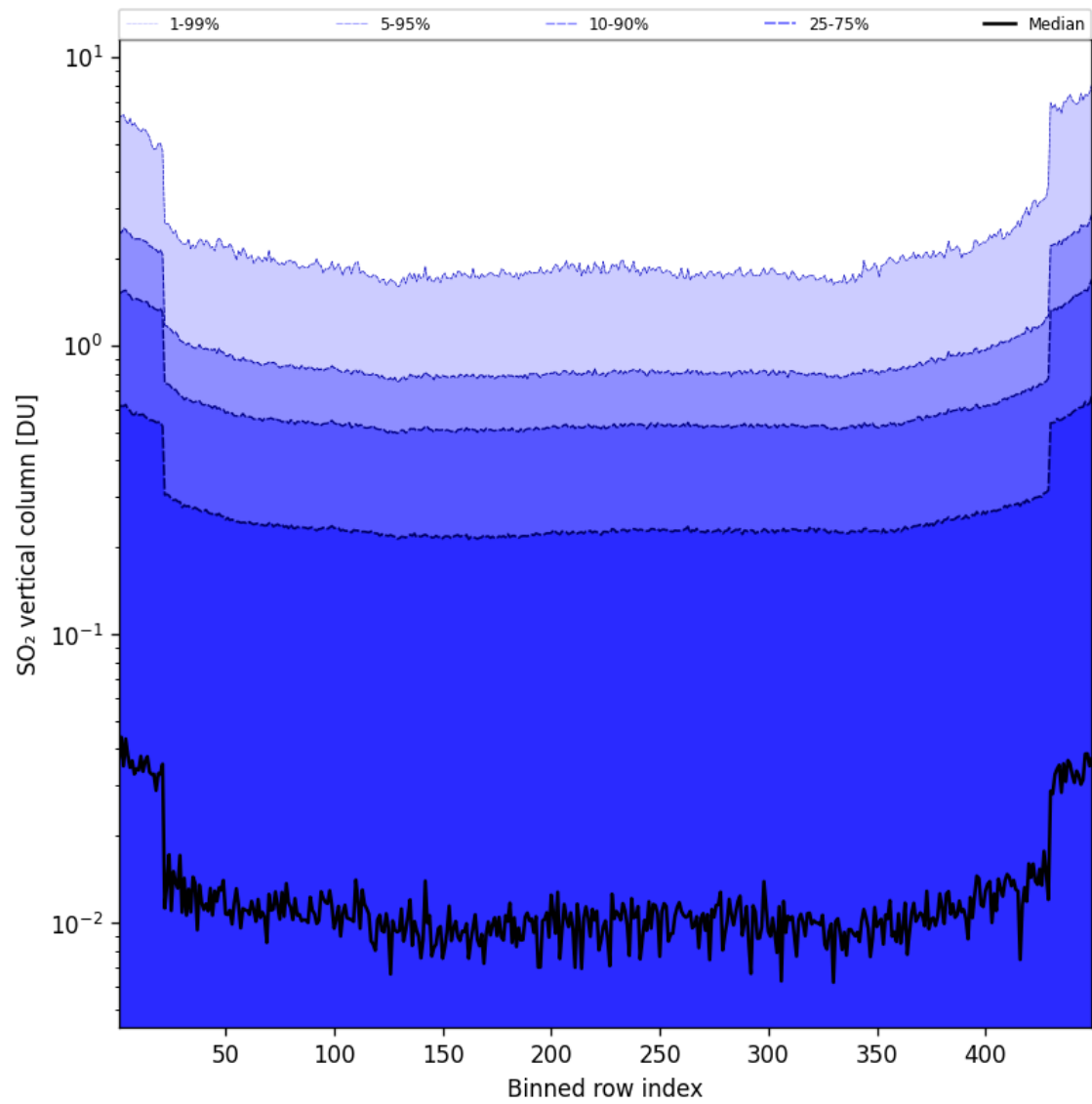


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-08-30 to 2025-08-31

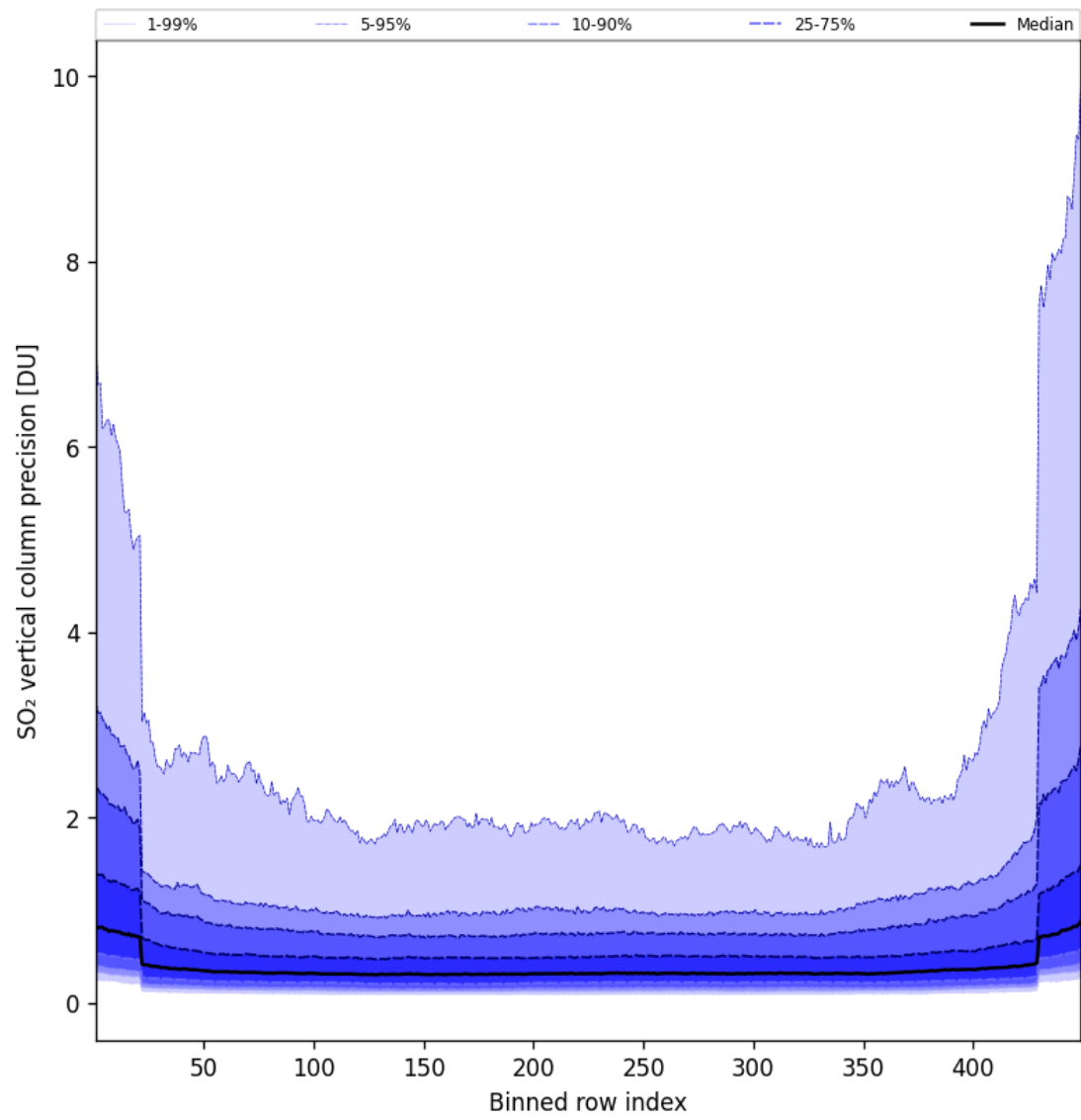


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-08-30 to 2025-08-31

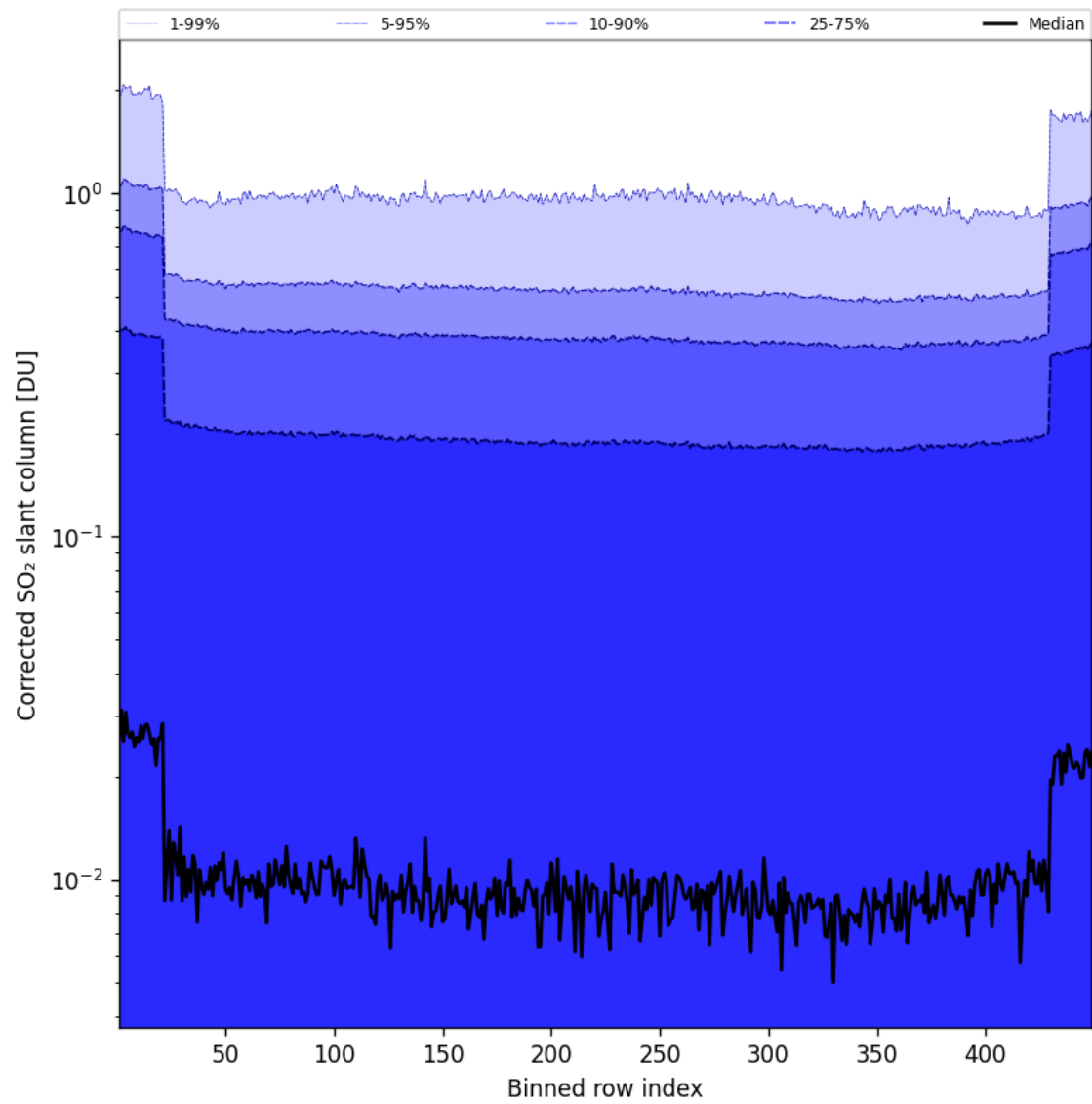


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-08-30 to 2025-08-31

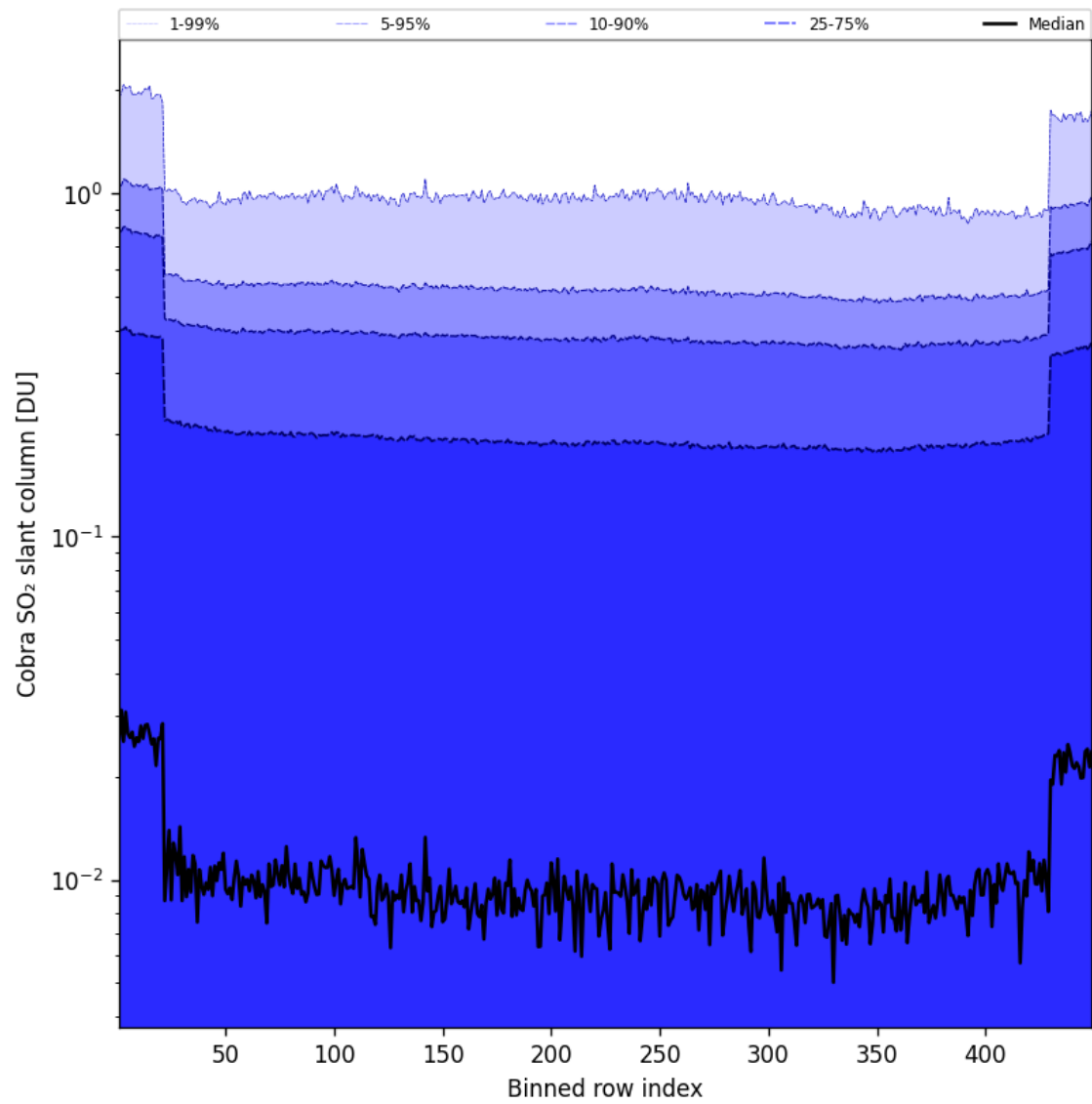


Figure 88: Along track statistics of "Cobra SO₂ slant column" for 2025-08-30 to 2025-08-31

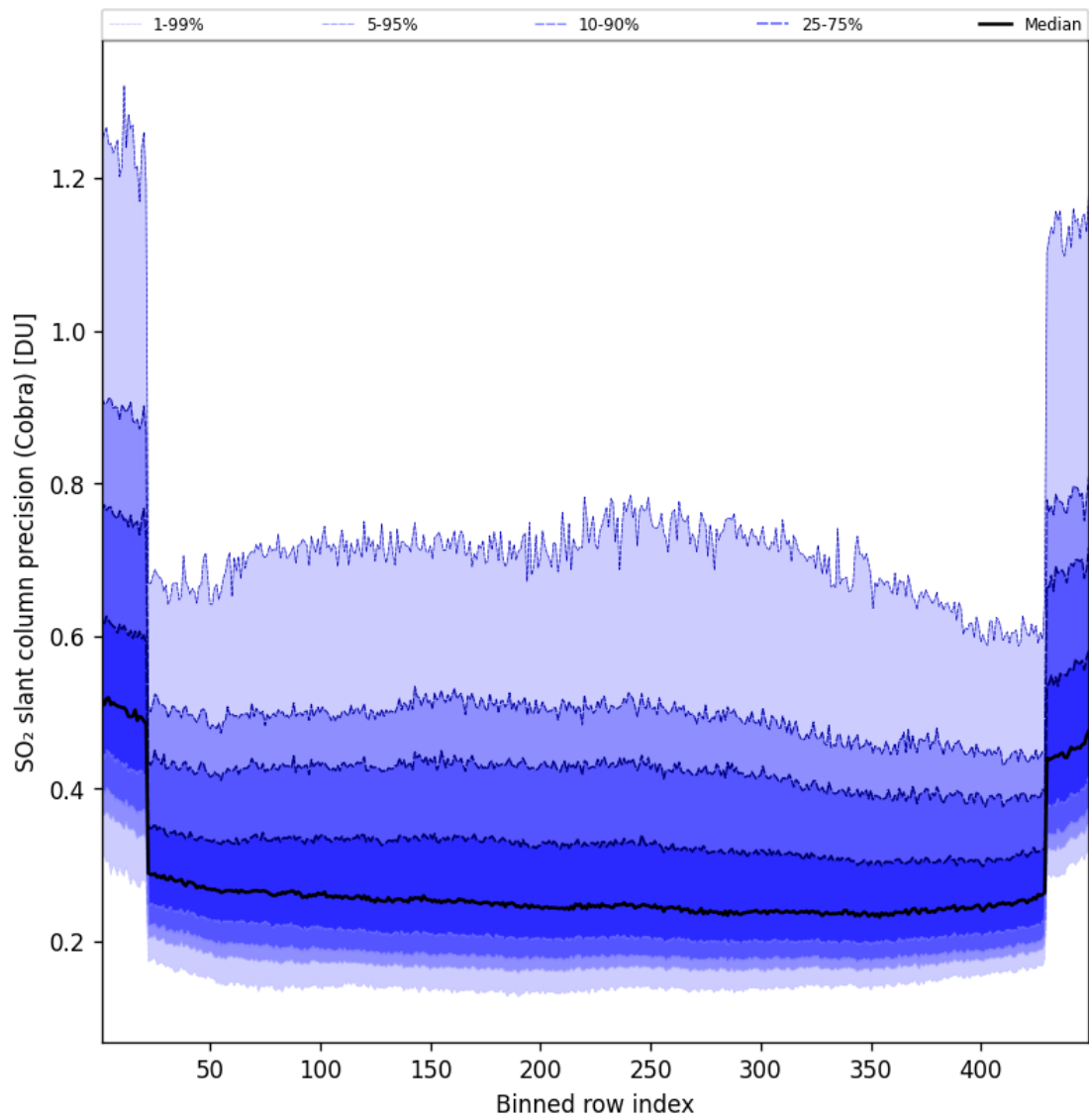


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-08-30 to 2025-08-31

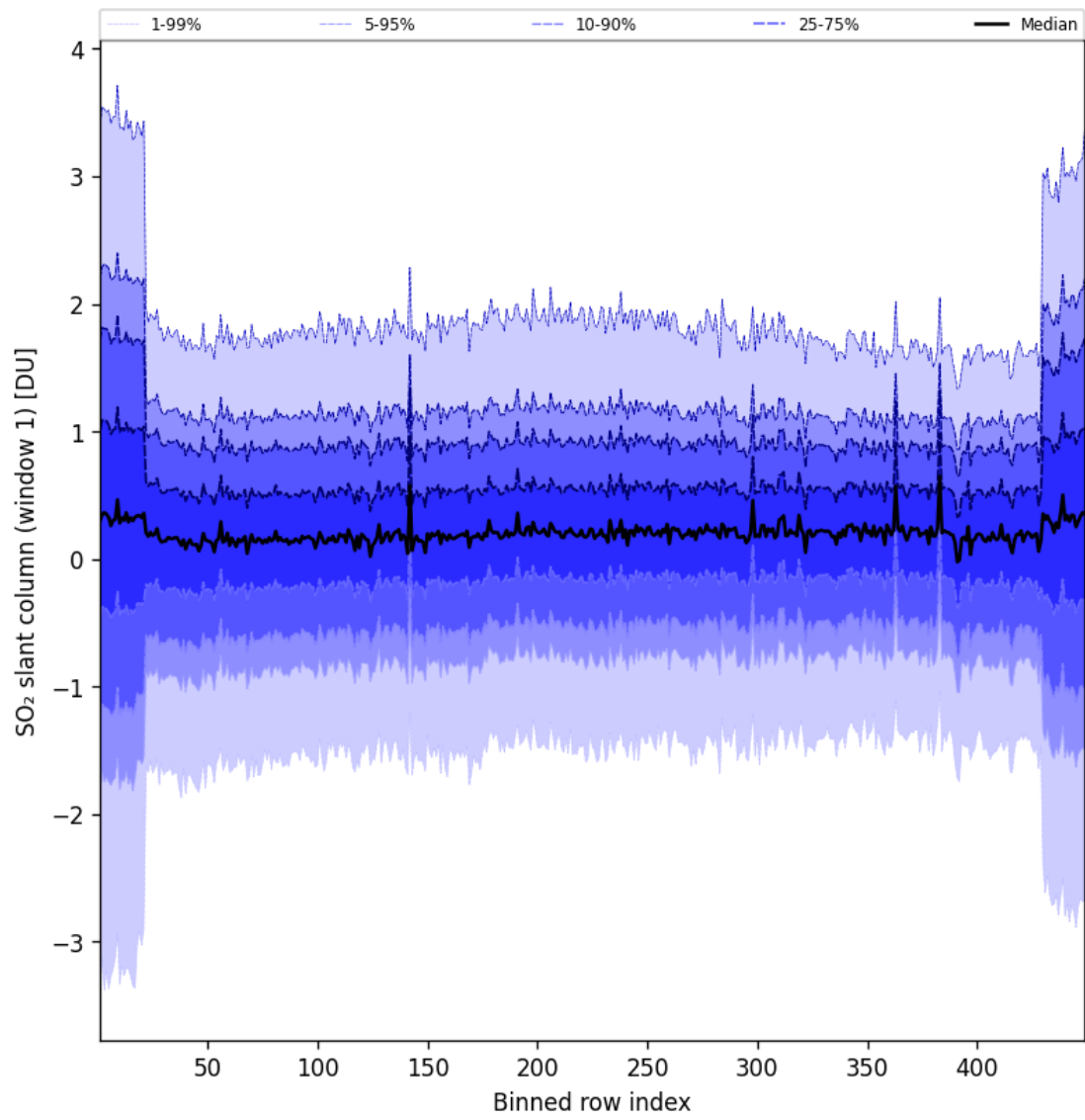


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-08-30 to 2025-08-31

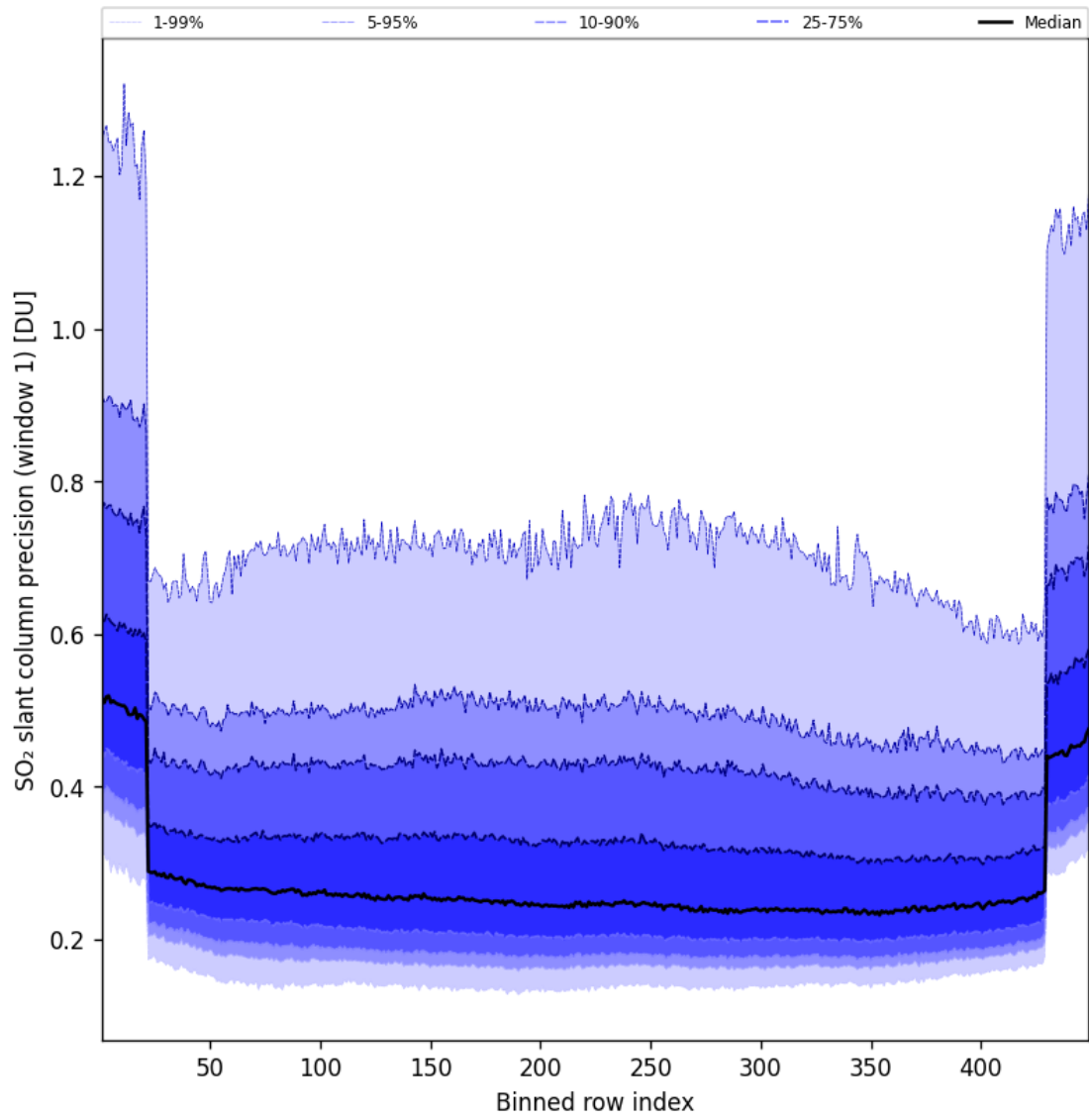


Figure 91: Along track statistics of "SO₂ slant column precision (window 1)" for 2025-08-30 to 2025-08-31

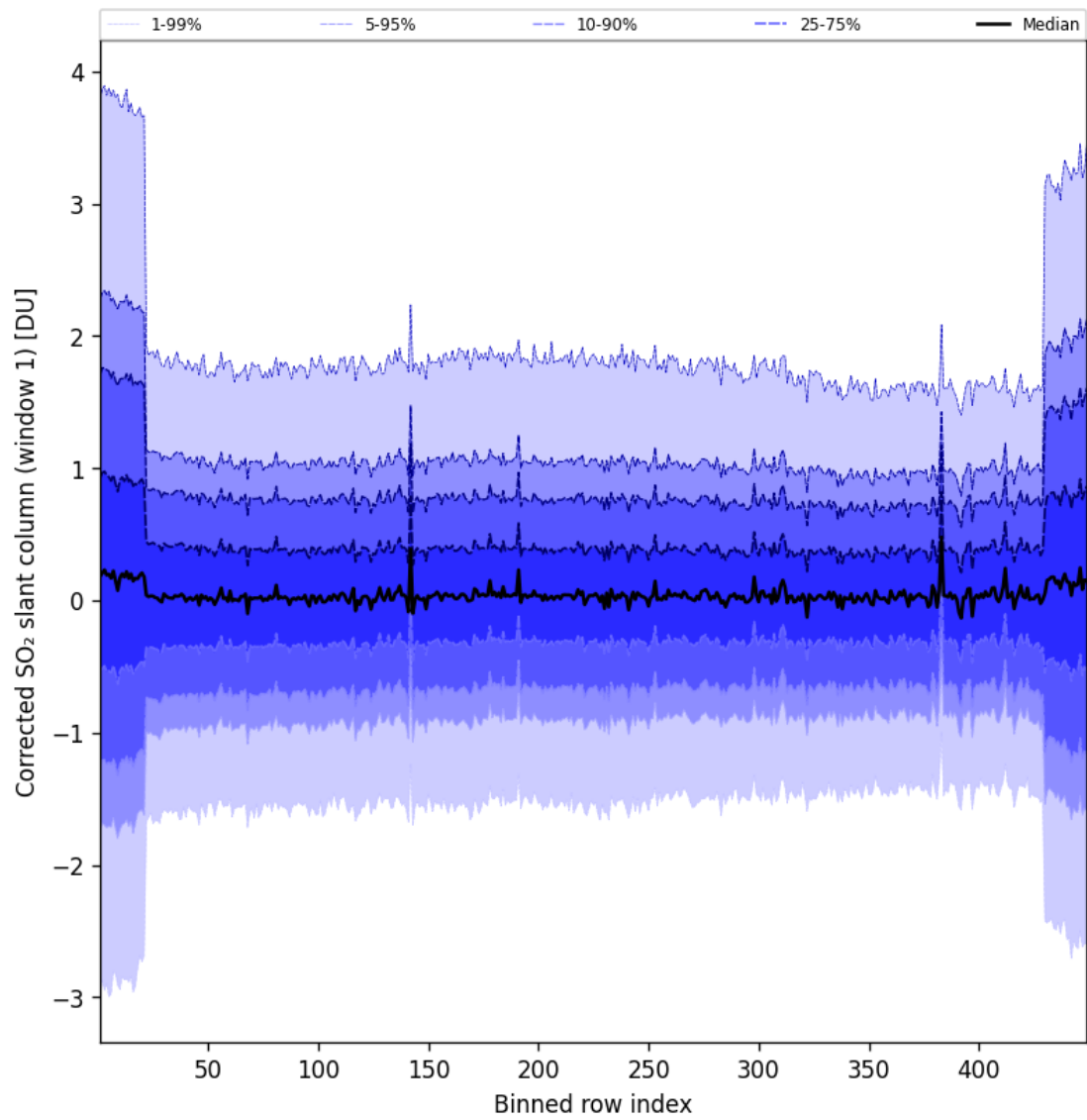


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-08-30 to 2025-08-31

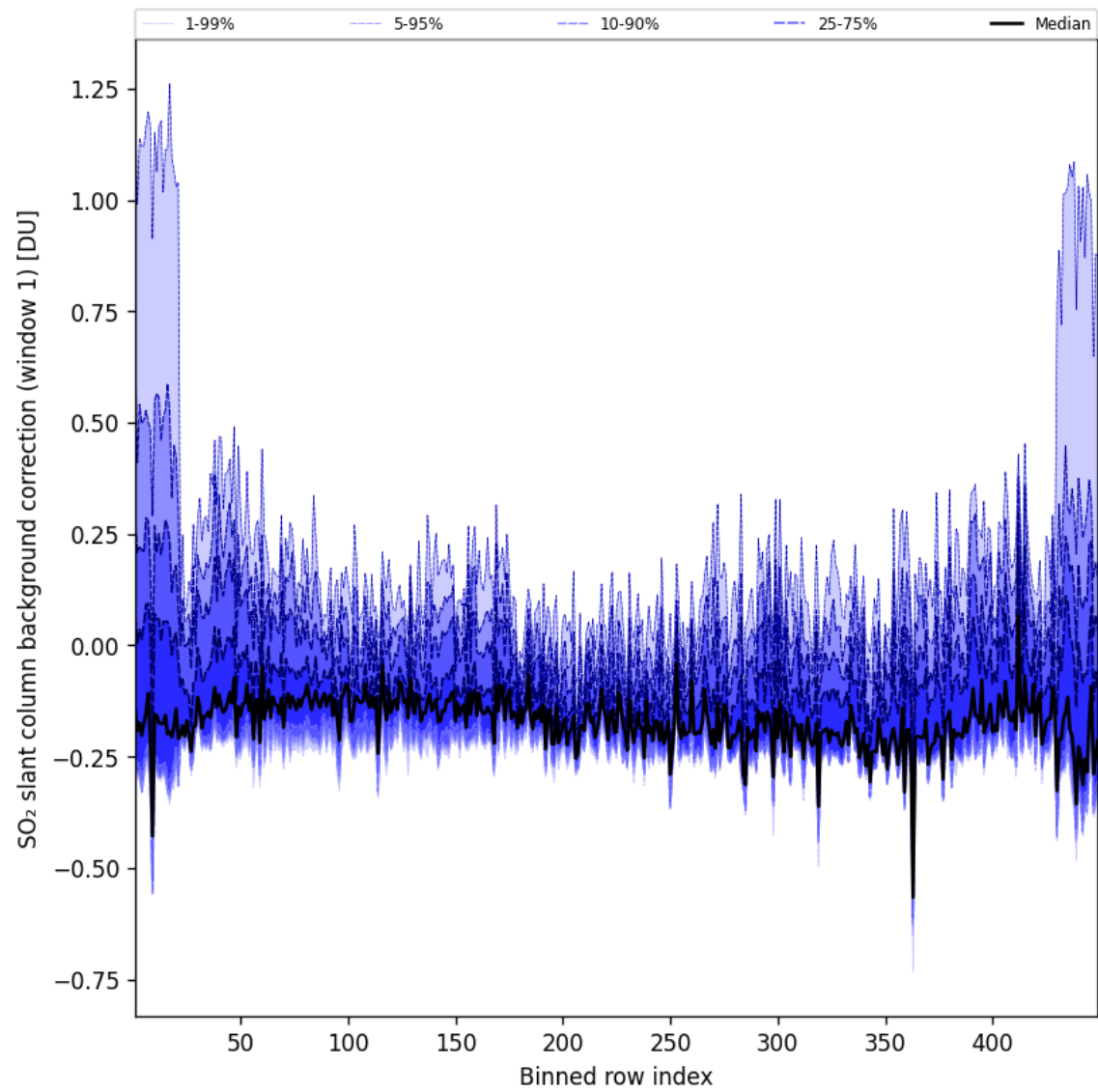


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-08-30 to 2025-08-31

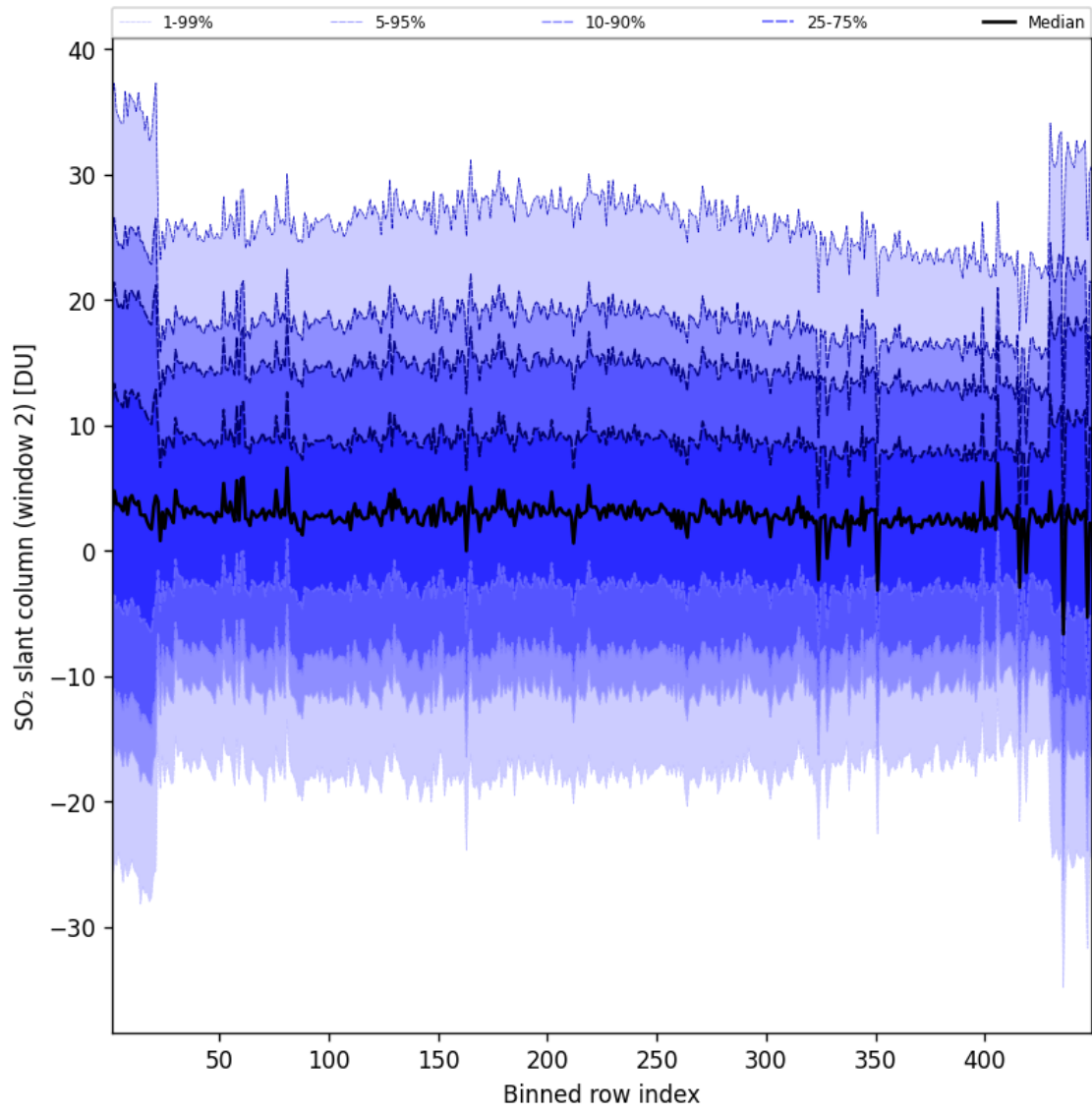


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-08-30 to 2025-08-31

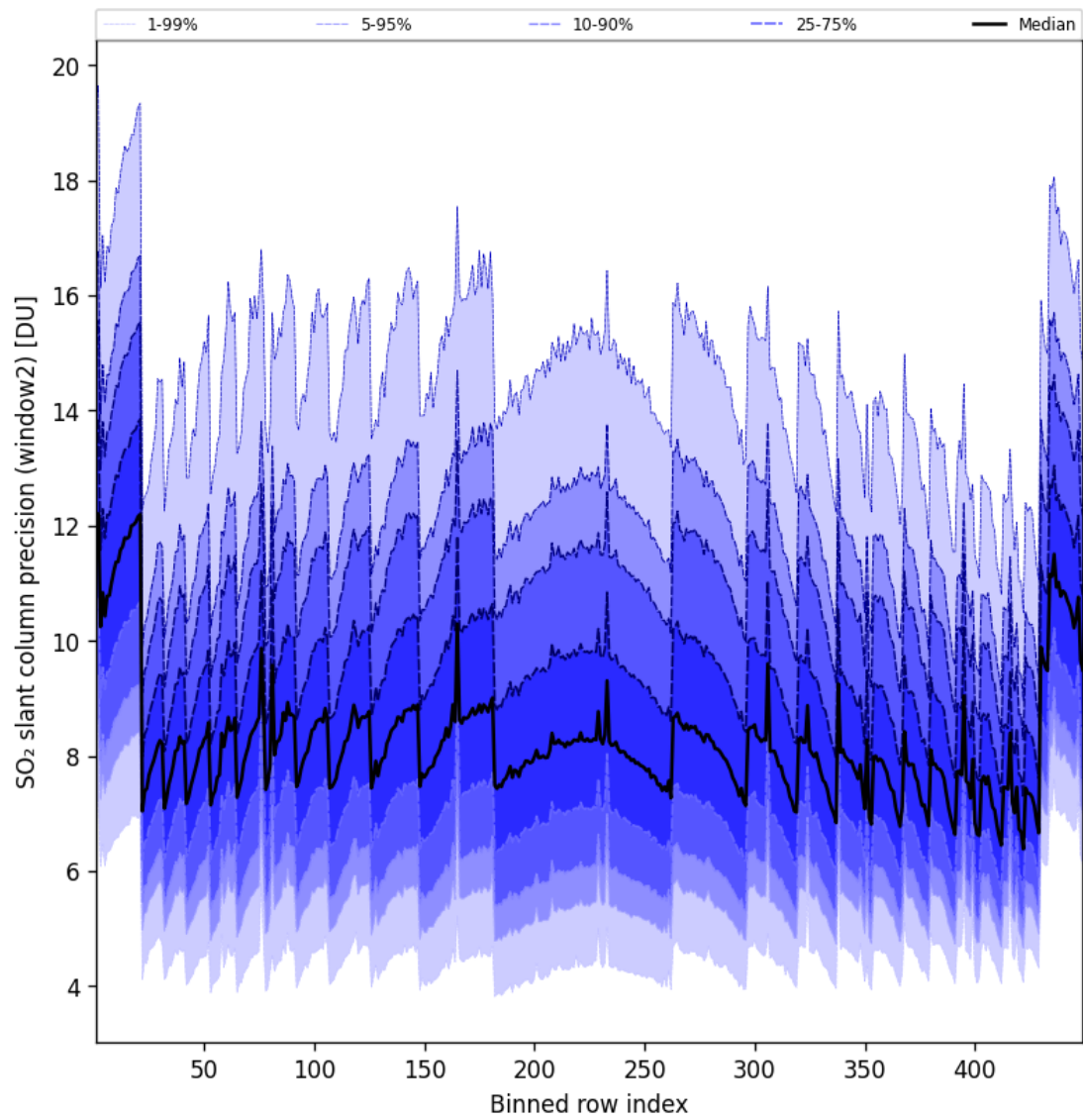


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-08-30 to 2025-08-31

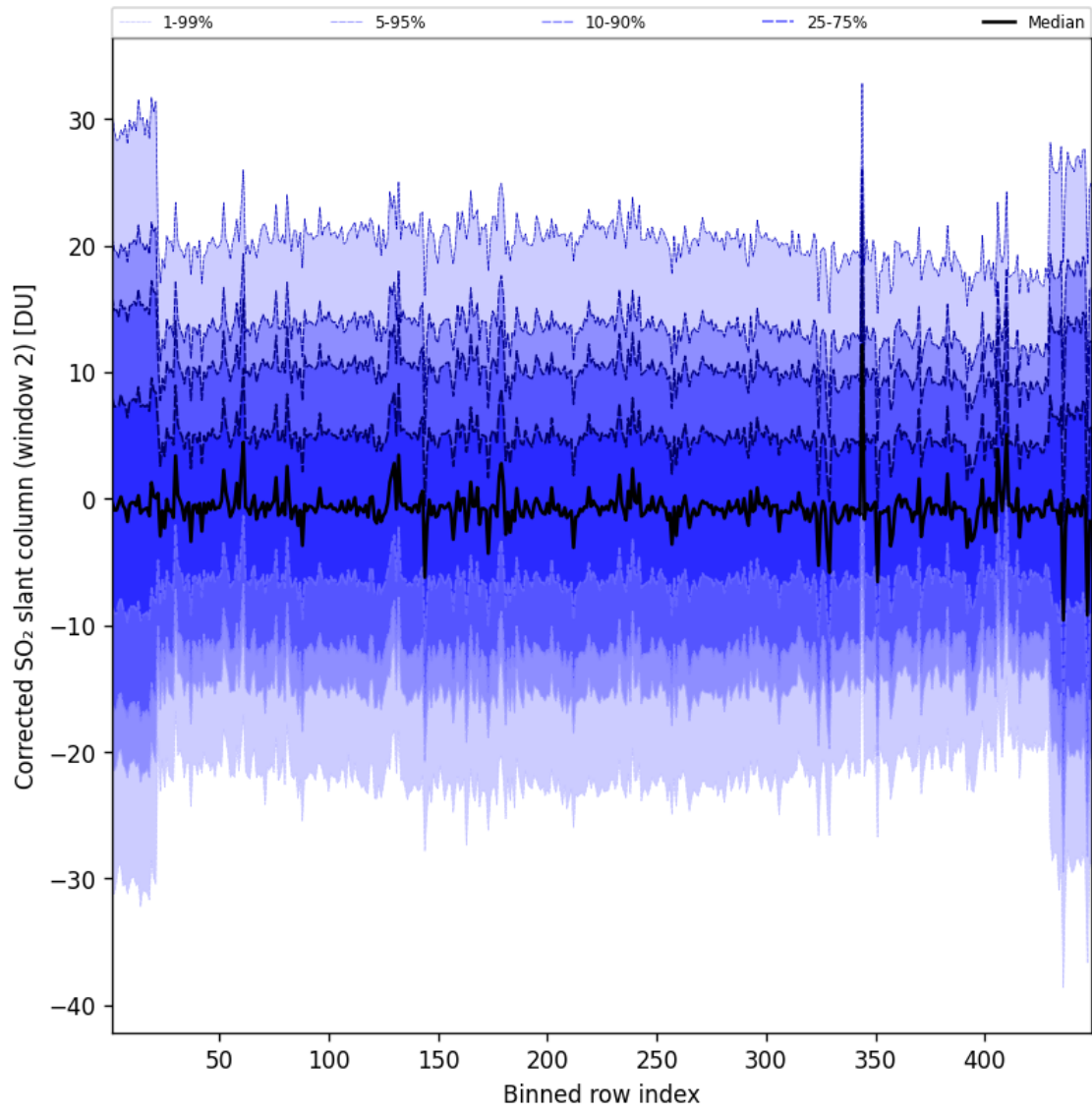


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-08-30 to 2025-08-31

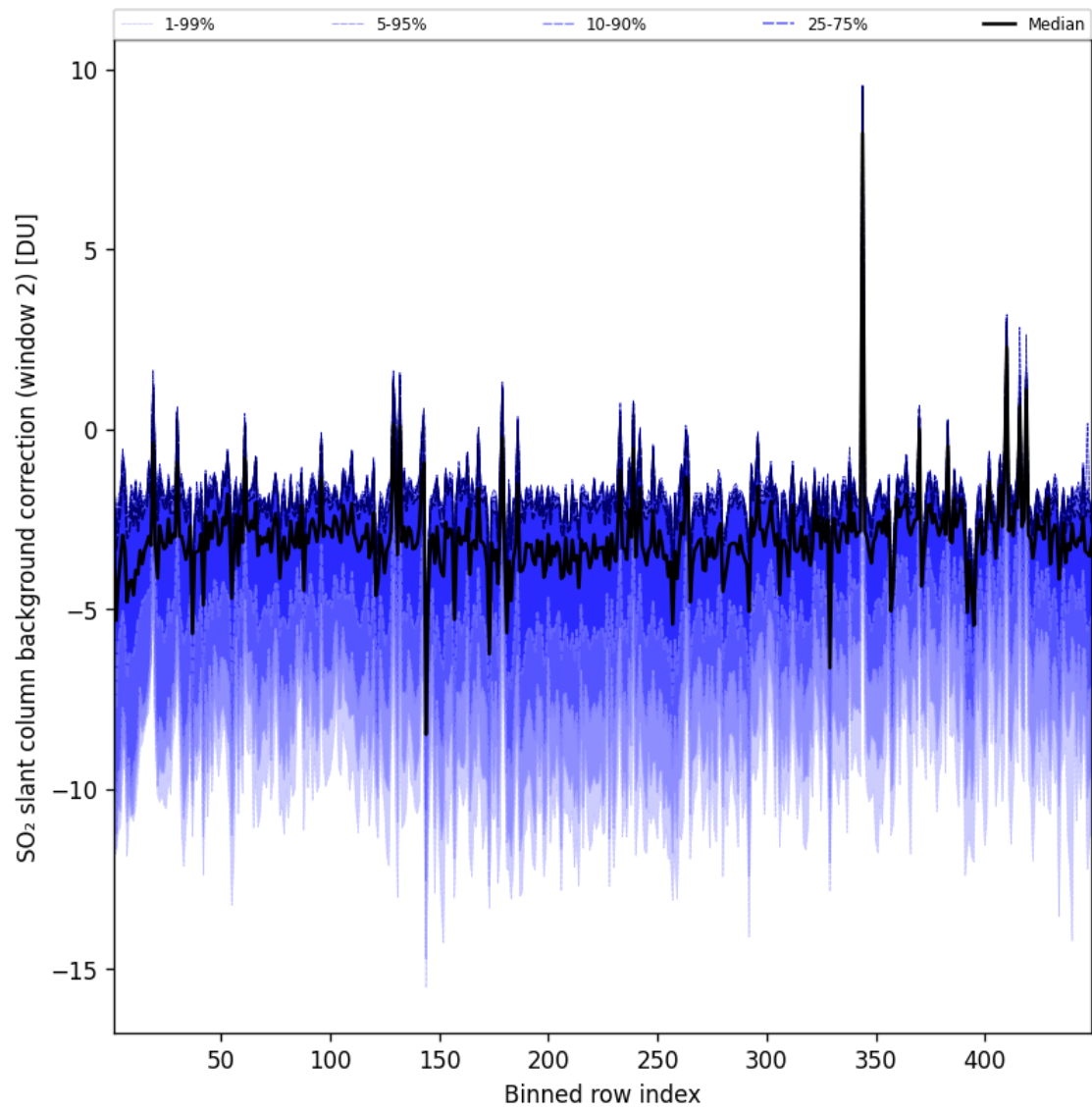


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-08-30 to 2025-08-31

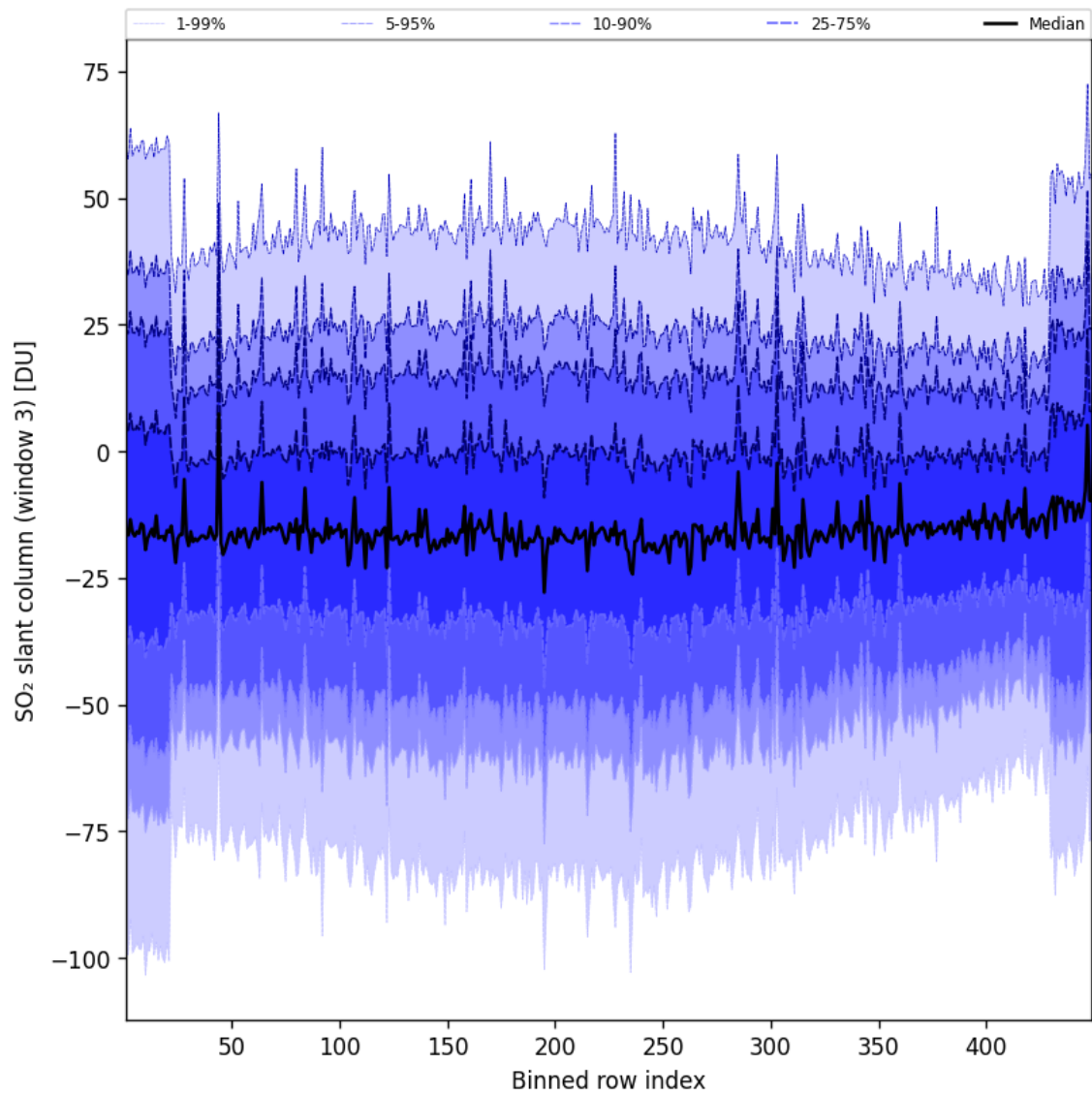


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-08-30 to 2025-08-31

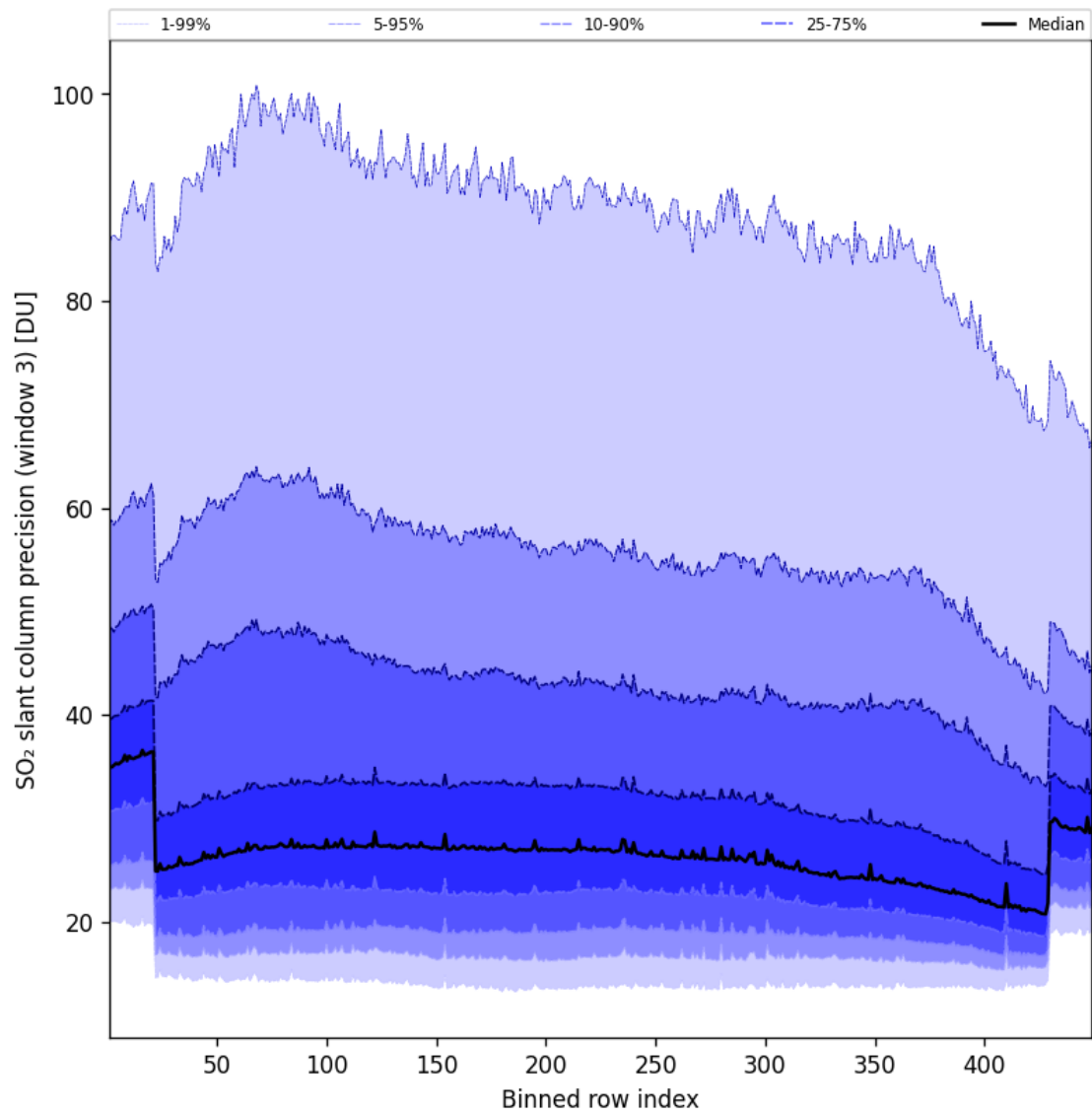


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-08-30 to 2025-08-31

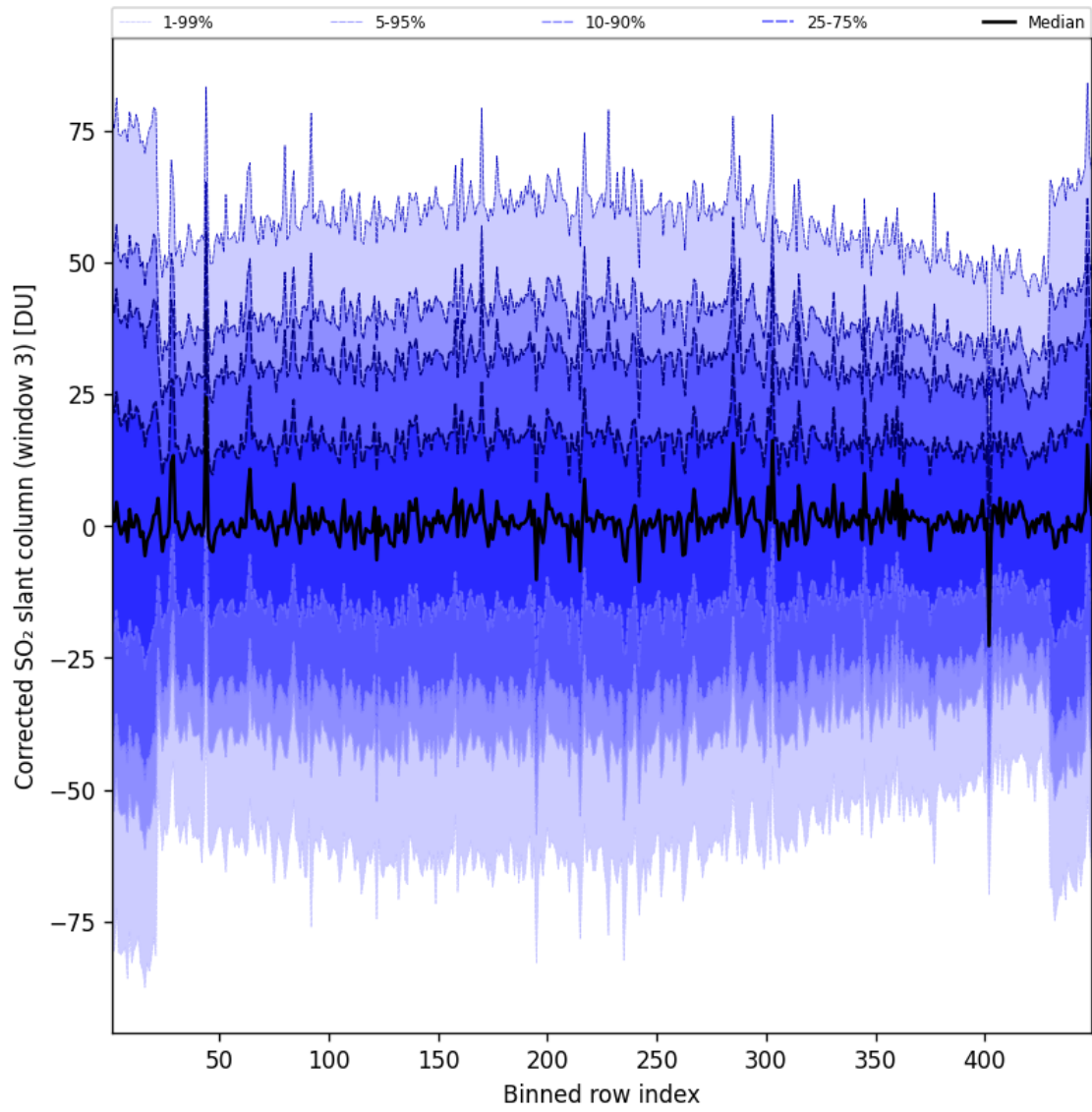


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-08-30 to 2025-08-31

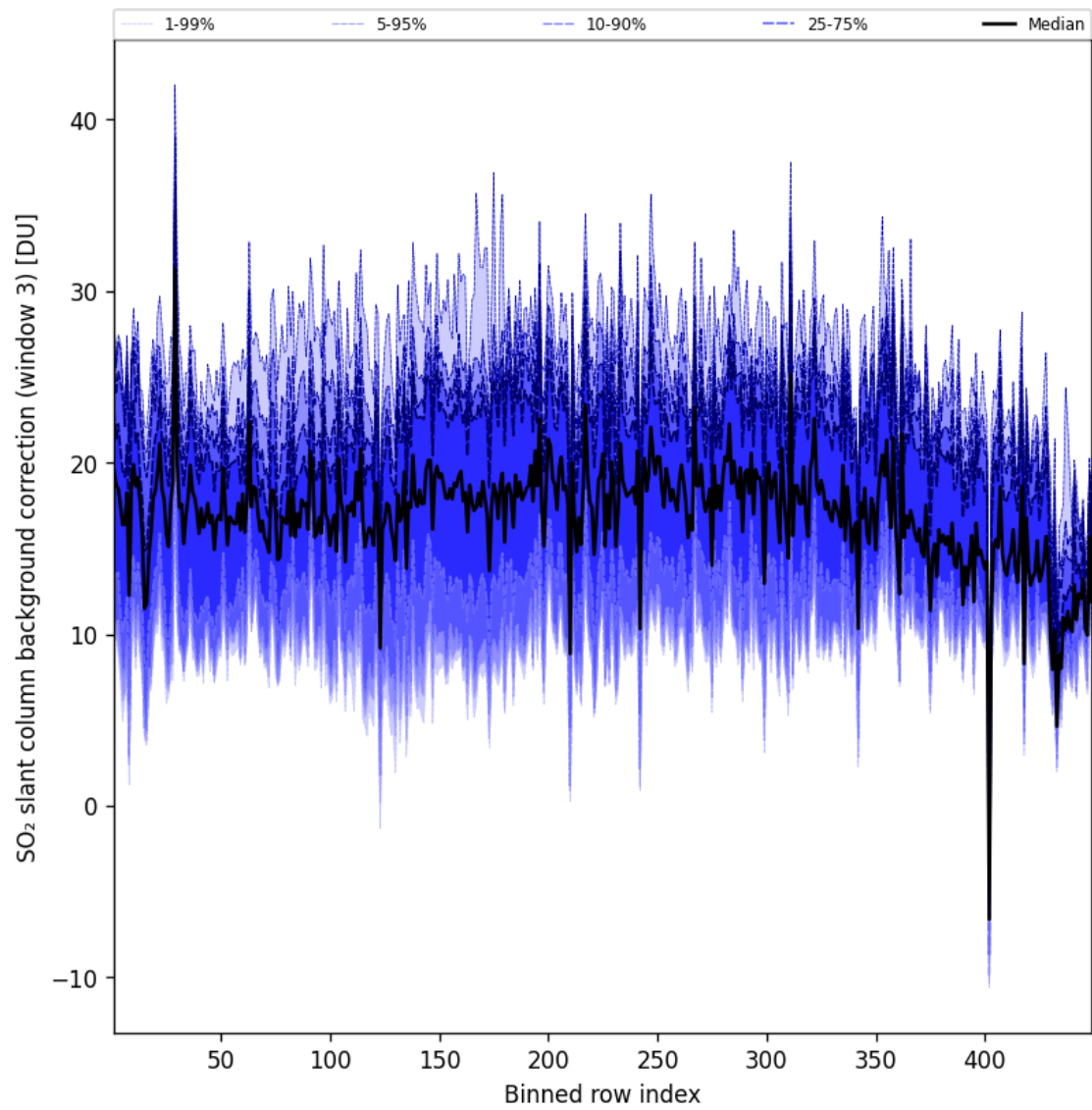


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-08-30 to 2025-08-31

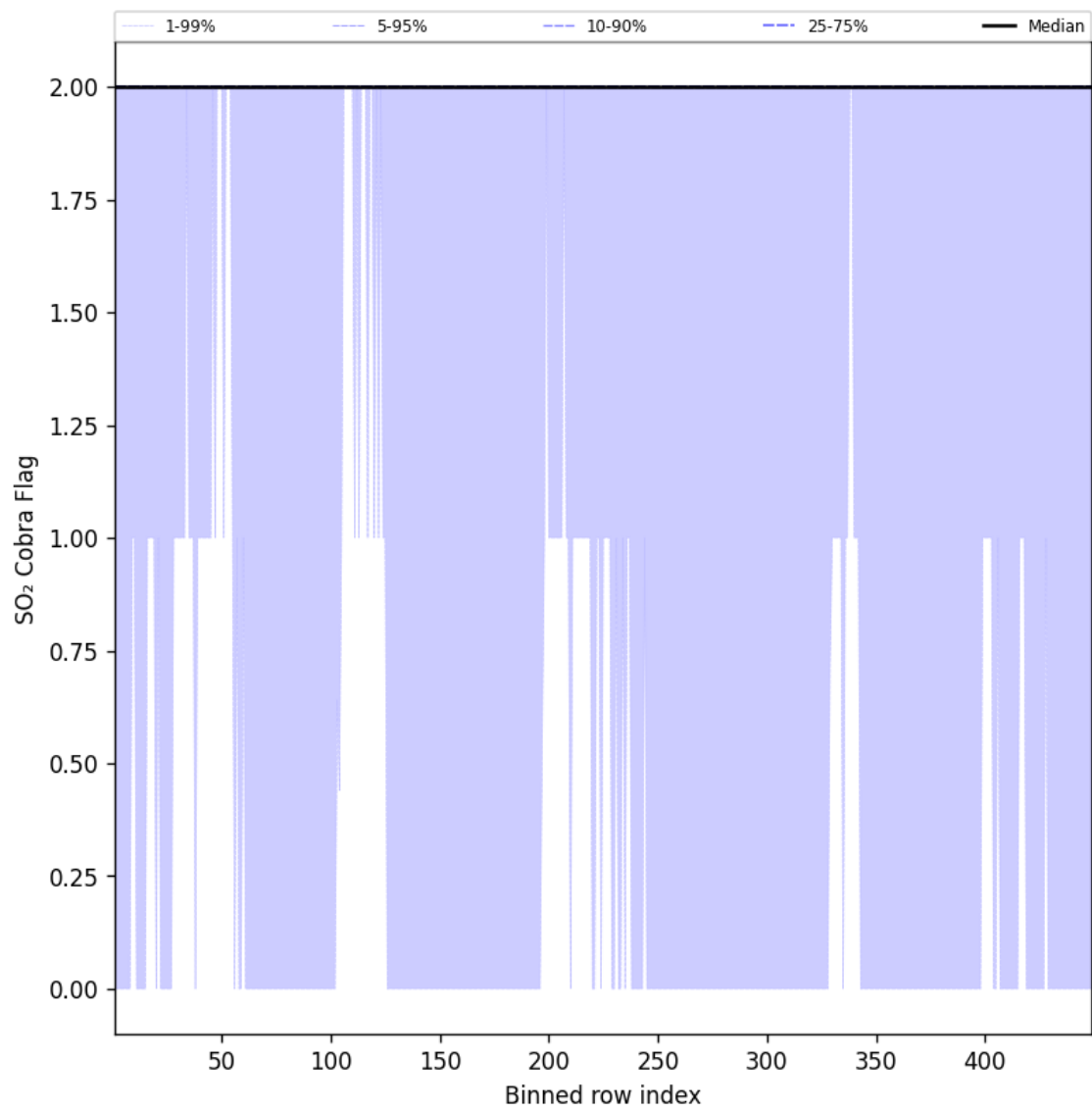


Figure 102: Along track statistics of "SO₂ Cobra Flag" for 2025-08-30 to 2025-08-31

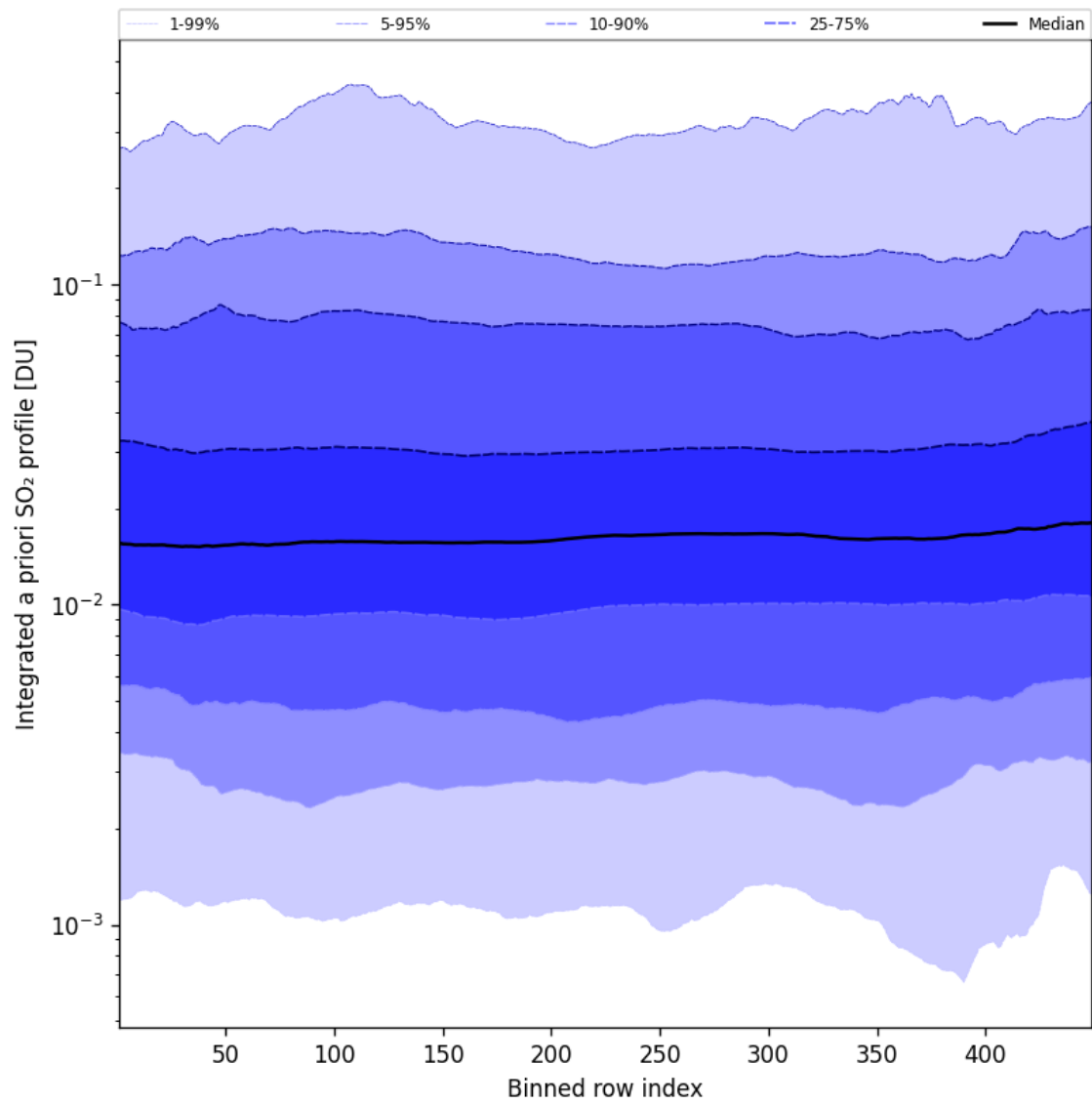


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-08-30 to 2025-08-31

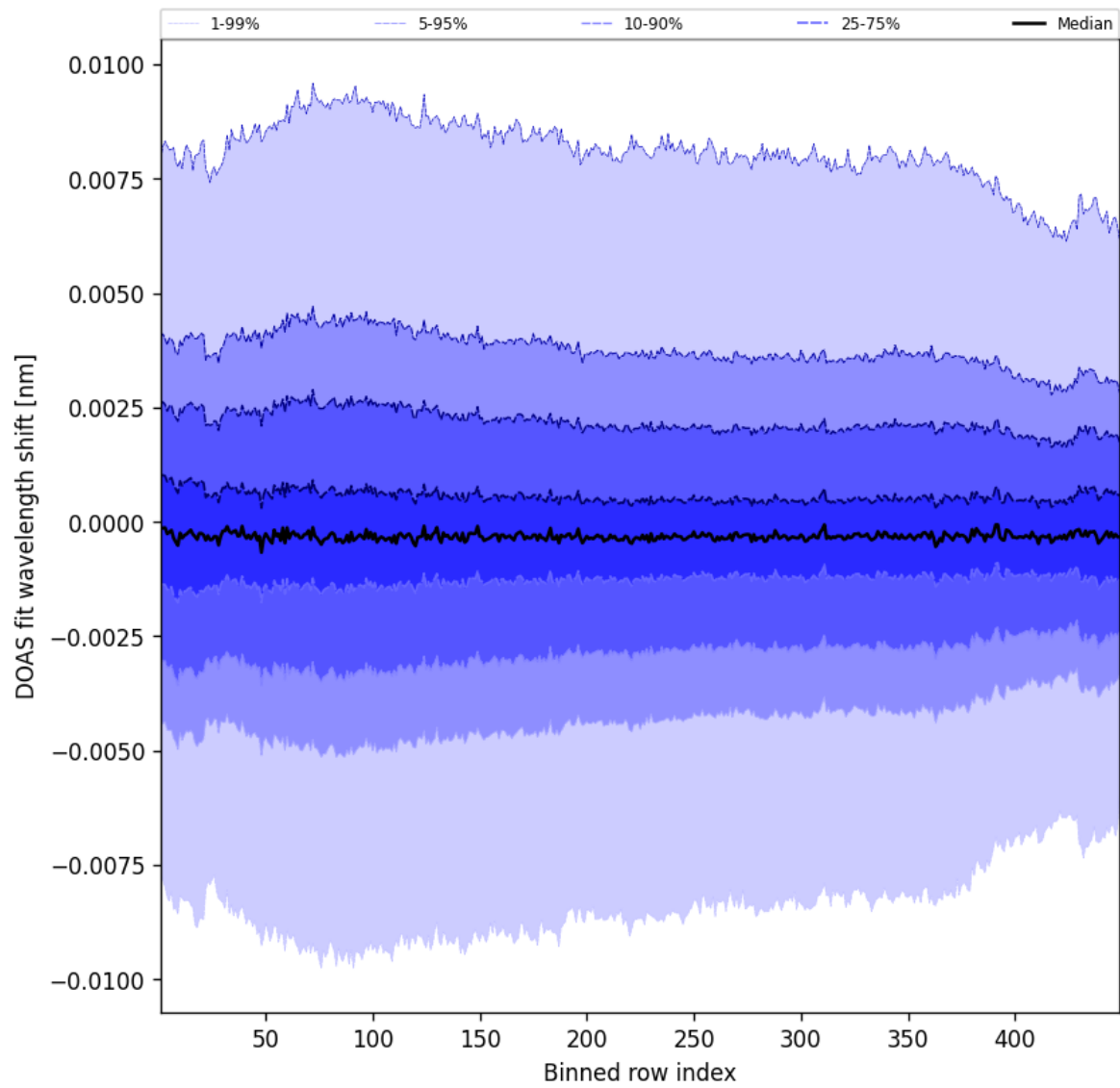


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-08-30 to 2025-08-31

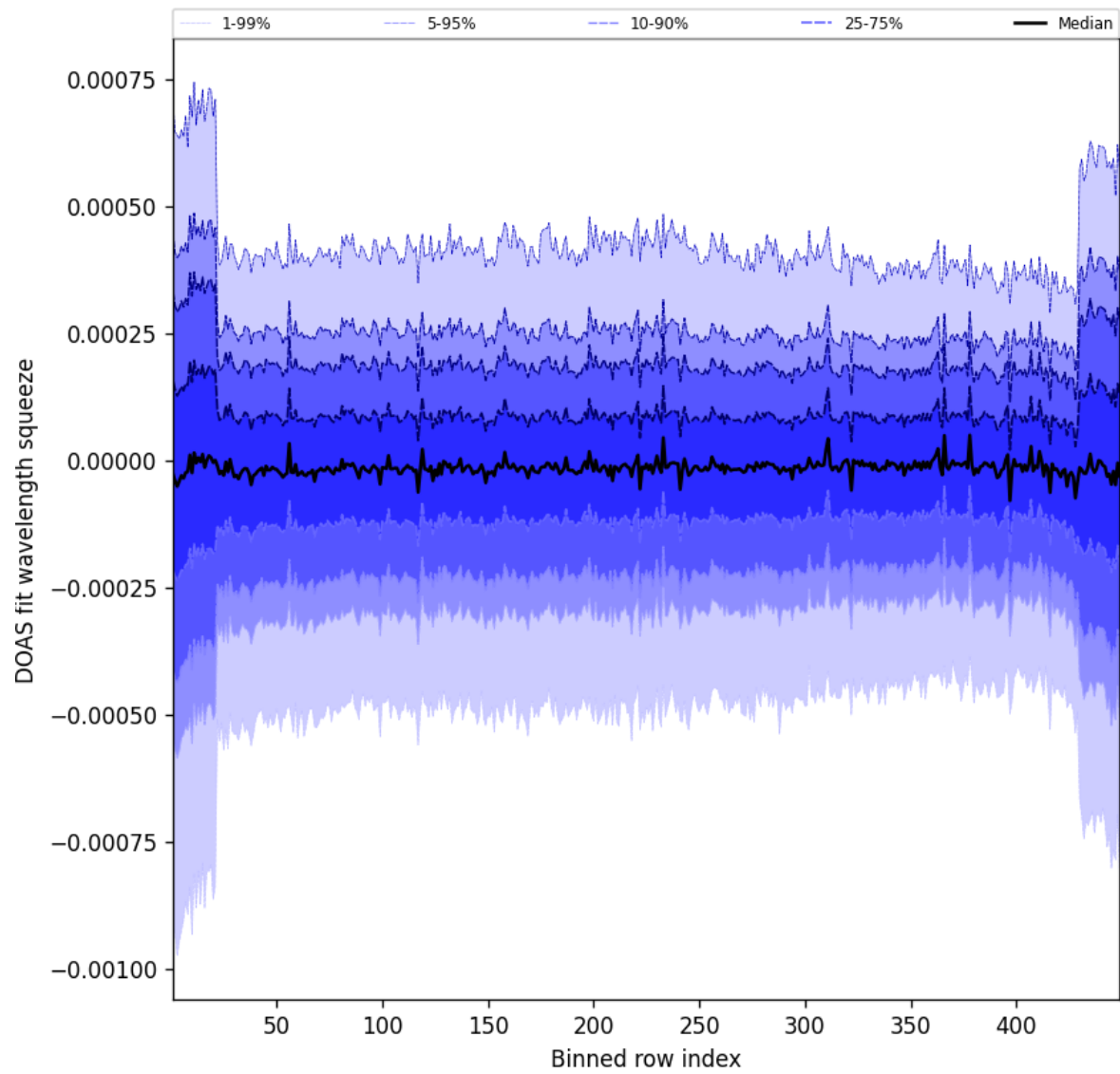


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-08-30 to 2025-08-31

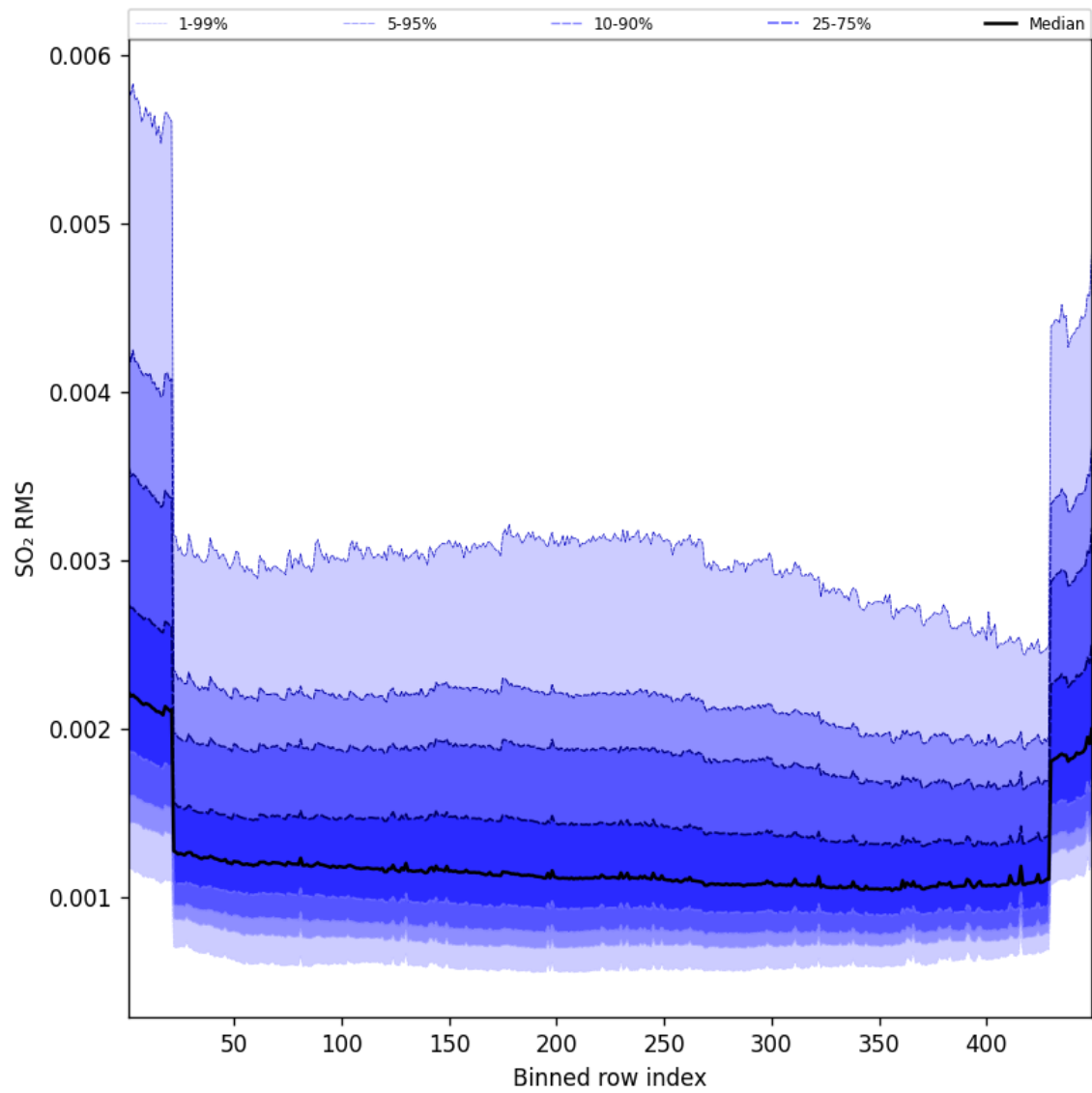


Figure 106: Along track statistics of “SO₂ RMS” for 2025-08-30 to 2025-08-31

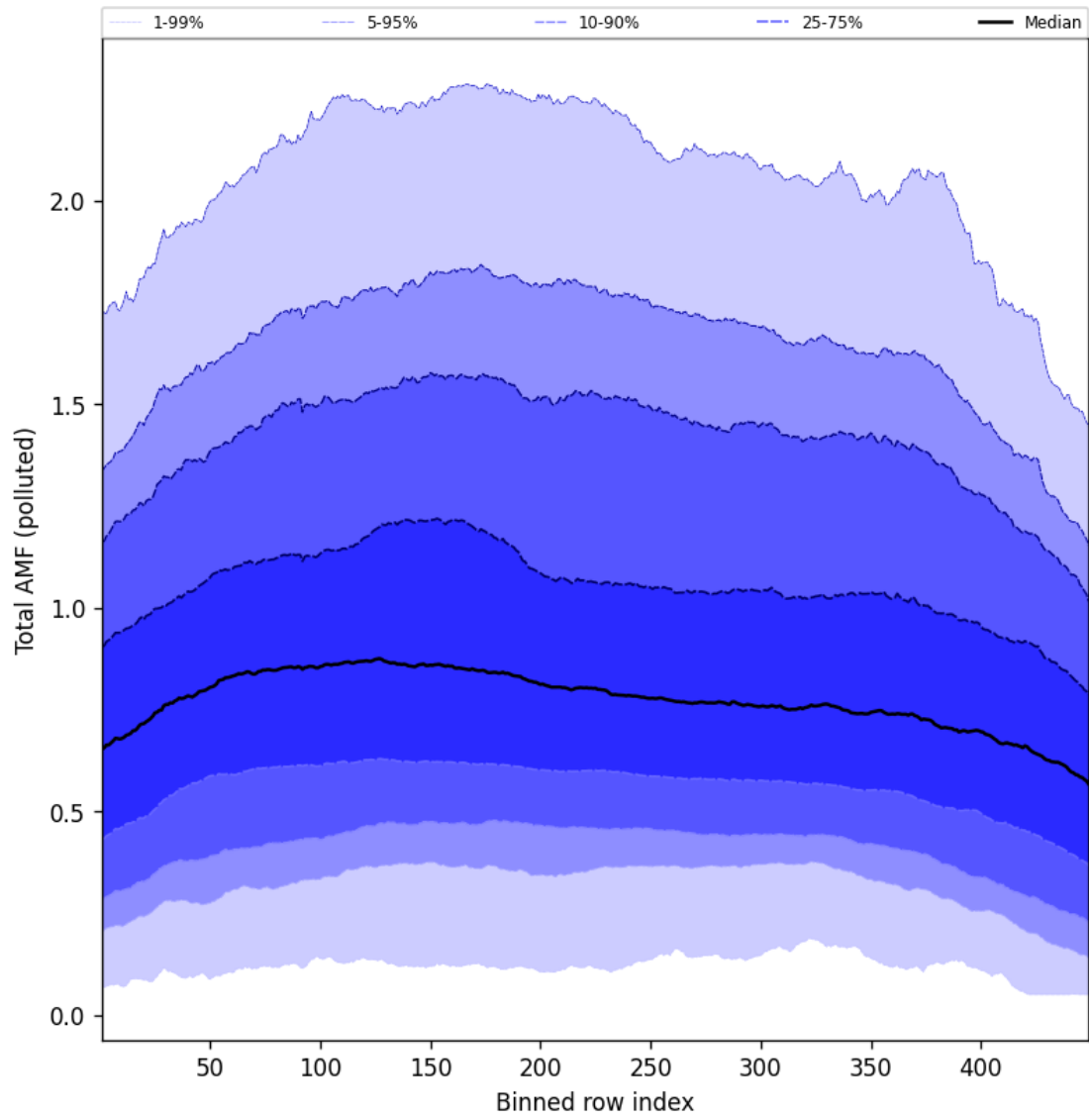


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-08-30 to 2025-08-31

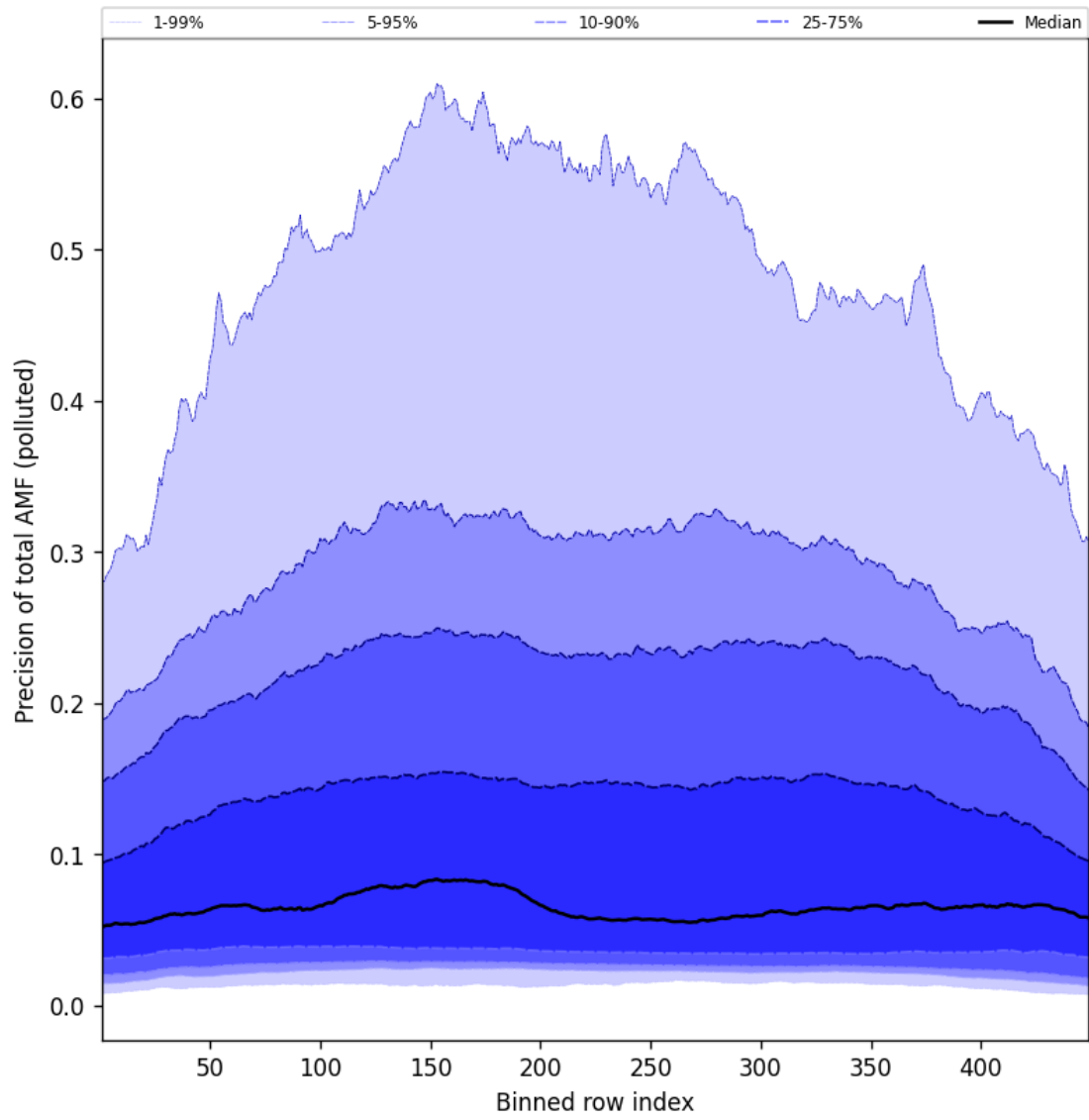


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-08-30 to 2025-08-31

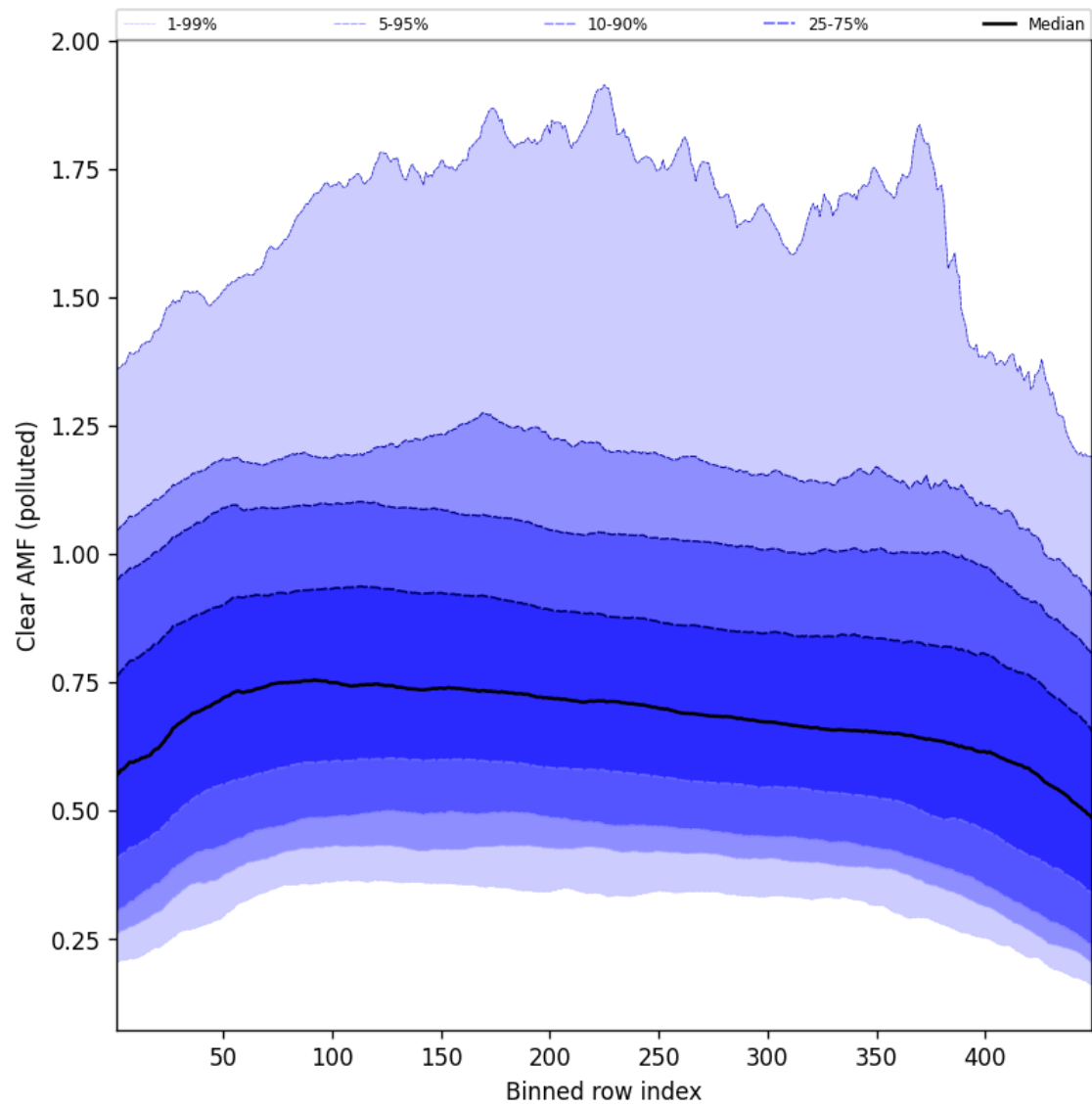


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-08-30 to 2025-08-31

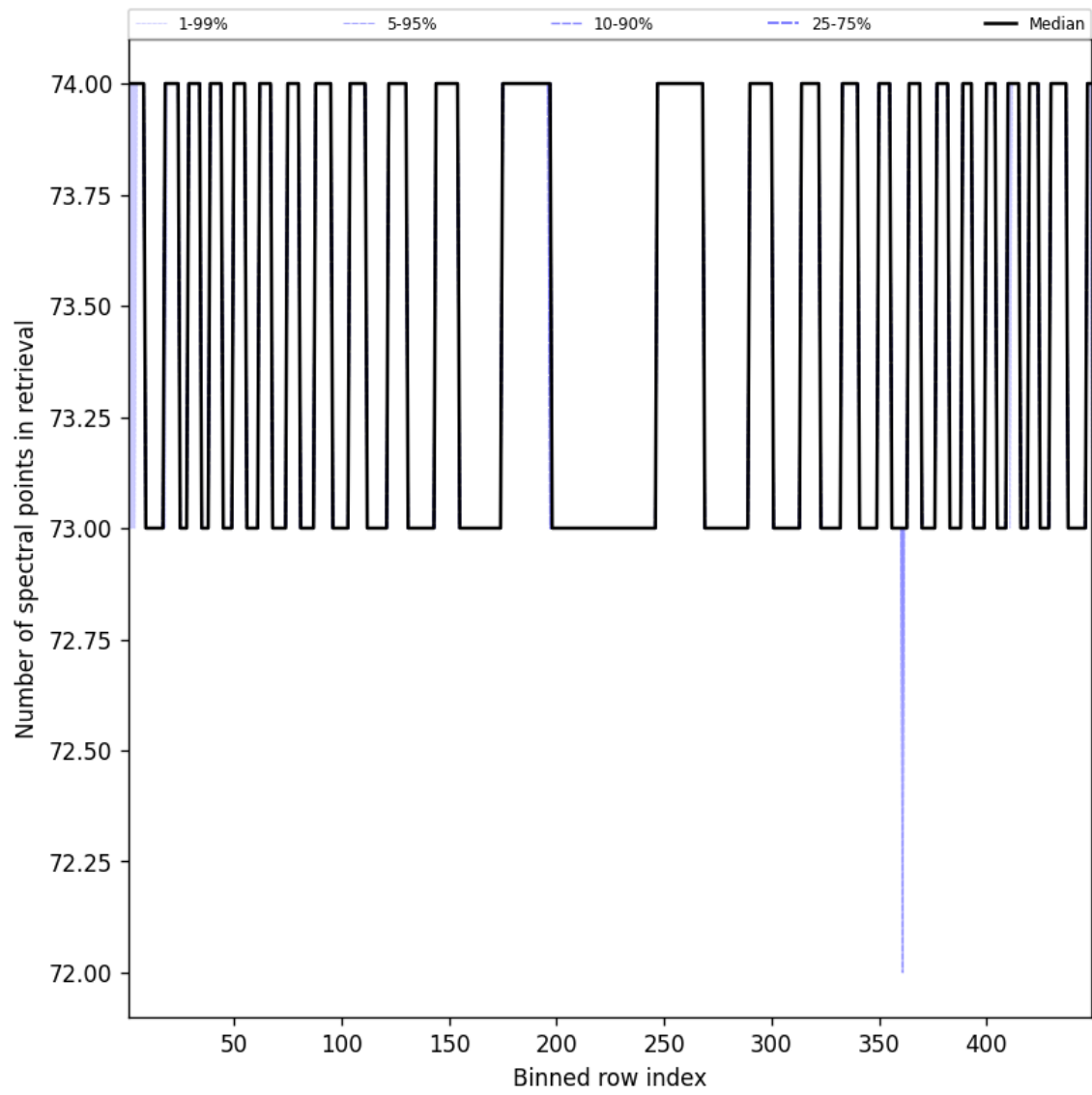


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-08-30 to 2025-08-31

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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