

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]	0.661 ± 0.407	11174541	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.087 \pm 118.262) \times 10^{-2}$	11174541	0.263	0.462	9.661×10^{-3}	-130	994
sulfurdioxide total vertical column precision [DU]	0.564 ± 0.841	11174541	0.222	0.381	0.332	2.449×10^{-2}	153
sulfurdioxide slant column density corrected [DU]	$(1.622 \pm 45.086) \times 10^{-2}$	11174541	0.250	0.368	8.630×10^{-3}	-59.3	784
sulfurdioxide slant column density cobra [DU]	$(1.608 \pm 34.841) \times 10^{-2}$	11174541	0.250	0.368	8.630×10^{-3}	-59.3	93.3
sulfurdioxide slant column density cobra precision [DU]	0.290 ± 0.119	11174541	0.213	0.118	0.259	6.812×10^{-2}	25.8
sulfurdioxide slant column density window1 [DU]	0.127 ± 0.665	11174541	0.125	0.743	0.128	-241	55.8
sulfurdioxide slant column density window1 precision [DU]	0.290 ± 0.119	11174541	0.213	0.118	0.259	6.812×10^{-2}	25.8
sulfurdioxide slant column density corrected win1 [DU]	$(-6.109 \pm 659.397) \times 10^{-3}$	11174541	-2.500×10^{-2}	0.733	-1.998×10^{-2}	-241	55.6
background so2 slant column offset window1 [DU]	-0.133 ± 0.121	11174541	-0.140	0.139	-0.141	-1.44	3.77
sulfurdioxide slant column density window2 [DU]	-0.165 ± 9.153	11174541	-0.750	11.6	-0.314	-1.276×10^3	838
sulfurdioxide slant column density window2 precision [DU]	8.32 ± 2.27	11174541	7.43	2.62	7.99	2.29	590
sulfurdioxide slant column density corrected win2 [DU]	-1.40 ± 9.04	11174541	-1.25	11.4	-1.40	-1.276×10^3	839
background so2 slant column offset window2 [DU]	-1.23 ± 2.40	11174541	0.750	3.72	-0.619	-11.0	8.56
sulfurdioxide slant column density window3 [DU]	-0.627 ± 24.529	11174541	-0.560	30.8	-0.341	-905	1.202×10^3
sulfurdioxide slant column density window3 precision [DU]	29.6 ± 13.1	11174541	23.7	9.95	26.1	11.4	932
sulfurdioxide slant column density corrected win3 [DU]	6.61 ± 24.02	11174541	6.16	30.1	6.86	-901	1.205×10^3
background so2 slant column offset window3 [DU]	7.24 ± 6.04	11174541	1.68	9.94	6.76	-17.7	26.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	11174541	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(2.976 \pm 5.250) \times 10^{-2}$	11174541	1.423×10^{-2}	1.906×10^{-2}	1.441×10^{-2}	5.793×10^{-4}	1.54
fitted radiance shift [nm]	$(-4.173 \pm 25.545) \times 10^{-4}$	11174541	-5.000×10^{-4}	1.778×10^{-3}	-4.205×10^{-4}	-7.206×10^{-2}	6.828×10^{-2}
fitted radiance squeeze [1]	$(1.399 \pm 17.742) \times 10^{-5}$	11174541	1.000×10^{-5}	2.072×10^{-4}	1.632×10^{-5}	-2.153×10^{-2}	2.416×10^{-2}
fitted root mean square [1]	$(1.275 \pm 0.483) \times 10^{-3}$	11174541	1.025×10^{-3}	4.774×10^{-4}	1.151×10^{-3}	3.311×10^{-4}	0.123
sulfurdioxide total air mass factor polluted [1]	0.861 ± 0.480	11174541	0.700	0.568	0.774	5.000×10^{-2}	3.25
sulfurdioxide total air mass factor polluted precision [1]	0.112 ± 0.110	11174541	3.500×10^{-2}	0.123	7.293×10^{-2}	2.979×10^{-3}	1.78
sulfurdioxide clear air mass factor polluted [1]	0.723 ± 0.335	11174541	0.620	0.371	0.677	7.710×10^{-2}	3.33
number of spectral points in retrieval [1]	73.4 ± 0.5	11174541	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.110	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.56	-0.952	-0.568	-0.375	-0.217	0.245	0.416	0.629	1.06	2.93
sulfurdioxide total vertical column precision [DU]	8.618×10^{-2}	0.122	0.152	0.182	0.220	0.601	0.824	1.08	1.59	4.29
sulfurdioxide slant column density corrected [DU]	-0.821	-0.487	-0.357	-0.268	-0.174	0.194	0.293	0.389	0.534	0.952
sulfurdioxide slant column density cobra [DU]	-0.821	-0.487	-0.357	-0.268	-0.174	0.194	0.293	0.389	0.534	0.952
sulfurdioxide slant column density cobra precision [DU]	0.145	0.174	0.188	0.199	0.214	0.332	0.381	0.432	0.508	0.726
sulfurdioxide slant column density window1 [DU]	-1.58	-0.891	-0.622	-0.439	-0.244	0.499	0.691	0.872	1.14	1.83
sulfurdioxide slant column density window1 precision [DU]	0.145	0.174	0.188	0.199	0.214	0.332	0.381	0.432	0.508	0.726
sulfurdioxide slant column density corrected win1 [DU]	-1.61	-0.989	-0.740	-0.567	-0.382	0.351	0.548	0.736	1.02	1.78
background so2 slant column offset window1 [DU]	-0.366	-0.296	-0.264	-0.240	-0.210	-7.061×10^{-2}	-3.664×10^{-2}	-1.663×10^{-3}	6.240×10^{-2}	0.255
sulfurdioxide slant column density window2 [DU]	-21.5	-14.7	-11.4	-8.86	-6.05	5.54	8.51	11.2	14.9	22.6
sulfurdioxide slant column density window2 precision [DU]	4.52	5.40	5.91	6.33	6.83	9.45	10.3	11.2	12.3	14.9
sulfurdioxide slant column density corrected win2 [DU]	-23.1	-16.0	-12.5	-9.99	-7.12	4.32	7.18	9.74	13.2	20.4
background so2 slant column offset window2 [DU]	-7.02	-5.57	-4.78	-4.03	-3.02	0.696	1.02	1.24	1.56	2.76
sulfurdioxide slant column density window3 [DU]	-63.3	-41.2	-31.0	-23.7	-15.8	15.0	22.7	29.6	39.0	57.7
sulfurdioxide slant column density window3 precision [DU]	15.7	17.9	19.5	20.8	22.3	32.3	36.7	42.3	54.1	86.1
sulfurdioxide slant column density corrected win3 [DU]	-54.5	-33.1	-23.1	-16.0	-8.23	21.9	29.4	36.2	45.4	64.1
background so2 slant column offset window3 [DU]	-3.82	-0.842	0.112	0.928	2.05	12.0	13.9	15.5	17.4	20.4
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]	2.094×10^{-3}	3.609×10^{-3}	4.895×10^{-3}	6.156×10^{-3}	8.006×10^{-3}	2.706×10^{-2}	4.123×10^{-2}	6.784×10^{-2}	0.113	0.250
fitted radiance shift [nm]	-8.088×10^{-3}	-4.132×10^{-3}	-2.791×10^{-3}	-2.024×10^{-3}	-1.346×10^{-3}	4.320×10^{-4}	1.094×10^{-3}	1.946×10^{-3}	3.459×10^{-3}	7.706×10^{-3}
fitted radiance squeeze [1]	-4.562×10^{-4}	-2.672×10^{-4}	-1.925×10^{-4}	-1.415×10^{-4}	-8.747×10^{-5}	1.197×10^{-4}	1.726×10^{-4}	2.210×10^{-4}	2.892×10^{-4}	4.417×10^{-4}
fitted root mean square [1]	6.276×10^{-4}	7.692×10^{-4}	8.416×10^{-4}	8.981×10^{-4}	9.682×10^{-4}	1.446×10^{-3}	1.661×10^{-3}	1.884×10^{-3}	2.198×10^{-3}	2.946×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.825×10^{-2}	0.225	0.324	0.411	0.528	1.10	1.32	1.54	1.82	2.32
sulfurdioxide total air mass factor polluted precision [1]	1.019×10^{-2}	1.690×10^{-2}	2.282×10^{-2}	2.857×10^{-2}	3.583×10^{-2}	0.158	0.204	0.246	0.314	0.529
sulfurdioxide clear air mass factor polluted [1]	0.199	0.296	0.362	0.427	0.507	0.878	0.974	1.07	1.27	1.98
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]	0.704 ± 0.395	5498525	0.700	1.000	0.0	1.000	0.300	1.000
sulfurdioxide total vertical column [DU]	$(3.850 \pm 140.041) \times 10^{-2}$	5498525	0.533	1.274×10^{-2}	-130	119	-0.249	0.284
sulfurdioxide total vertical column precision [DU]	0.681 ± 1.028	5498525	0.491	0.376	4.860×10^{-2}	44.9	0.244	0.735
sulfurdioxide slant column density corrected [DU]	$(1.857 \pm 35.607) \times 10^{-2}$	5498525	0.373	9.869×10^{-3}	-15.5	46.3	-0.175	0.198
sulfurdioxide slant column density cobra [DU]	$(1.854 \pm 35.399) \times 10^{-2}$	5498525	0.373	9.869×10^{-3}	-15.5	36.9	-0.175	0.198
sulfurdioxide slant column density cobra precision [DU]	0.295 ± 0.119	5498525	0.120	0.264	8.292×10^{-2}	17.8	0.218	0.338
sulfurdioxide slant column density window1 [DU]	0.153 ± 0.663	5498525	0.755	0.153	-9.76	55.8	-0.225	0.530
sulfurdioxide slant column density window1 precision [DU]	0.295 ± 0.119	5498525	0.120	0.264	8.292×10^{-2}	17.8	0.218	0.338
sulfurdioxide slant column density corrected win1 [DU]	$(9.166 \pm 657.865) \times 10^{-3}$	5498525	0.745	-5.350×10^{-3}	-9.43	55.6	-0.373	0.372
background so2 slant column offset window1 [DU]	-0.144 ± 0.110	5498525	0.136	-0.151	-1.44	3.77	-0.216	-7.993×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.294 ± 9.351	5498525	11.9	-0.495	-411	319	-6.35	5.54
sulfurdioxide slant column density window2 precision [DU]	8.62 ± 2.28	5498525	2.80	8.30	2.29	161	7.05	9.86
sulfurdioxide slant column density corrected win2 [DU]	-1.02 ± 9.22	5498525	11.7	-1.01	-413	317	-6.88	4.86
background so2 slant column offset window2 [DU]	-0.722 ± 2.078	5498525	2.66	-0.154	-10.5	8.52	-1.90	0.759
sulfurdioxide slant column density window3 [DU]	-1.20 ± 25.76	5498525	32.2	-0.465	-186	393	-16.8	15.4
sulfurdioxide slant column density window3 precision [DU]	30.8 ± 13.5	5498525	10.8	27.3	11.4	402	23.1	34.0
sulfurdioxide slant column density corrected win3 [DU]	5.82 ± 25.28	5498525	31.8	6.21	-173	391	-9.80	22.0
background so2 slant column offset window3 [DU]	7.01 ± 6.17	5498525	10.0	6.37	-17.7	26.5	1.74	11.8
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	5498525	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.257 \pm 6.443) \times 10^{-2}$	5498525	3.212×10^{-2}	2.016×10^{-2}	5.793×10^{-4}	1.54	1.170×10^{-2}	4.382×10^{-2}
fitted radiance shift [nm]	$(-1.231 \pm 26.339) \times 10^{-4}$	5498525	1.634×10^{-3}	-1.655×10^{-4}	-4.819×10^{-2}	4.316×10^{-2}	-9.573×10^{-4}	6.768×10^{-4}
fitted radiance squeeze [1]	$(1.653 \pm 17.273) \times 10^{-5}$	5498525	2.050×10^{-4}	1.572×10^{-5}	-1.190×10^{-2}	1.350×10^{-2}	-8.616×10^{-5}	1.188×10^{-4}
fitted root mean square [1]	$(1.302 \pm 0.485) \times 10^{-3}$	5498525	5.072×10^{-4}	1.181×10^{-3}	3.591×10^{-4}	5.133×10^{-2}	9.840×10^{-4}	1.491×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.748 ± 0.403	5498525	0.525	0.707	5.000×10^{-2}	2.59	0.449	0.974
sulfurdioxide total air mass factor polluted precision [1]	0.101 ± 0.117	5498525	9.741×10^{-2}	5.394×10^{-2}	2.979×10^{-3}	1.51	3.081×10^{-2}	0.128
sulfurdioxide clear air mass factor polluted [1]	0.661 ± 0.281	5498525	0.423	0.640	7.710×10^{-2}	2.59	0.436	0.860
number of spectral points in retrieval [1]	73.4 ± 0.5	5498525	1.000	73.0	53.0	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]	0.620 ± 0.414	5676016	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(2.348 \pm 92.386) \times 10^{-2}$	5676016	0.404	7.436×10^{-3}	-69.1	994	-0.191	0.213
sulfurdioxide total vertical column precision [DU]	0.451 ± 0.586	5676016	0.313	0.300	2.449×10^{-2}	153	0.197	0.510
sulfurdioxide slant column density corrected [DU]	$(1.394 \pm 52.665) \times 10^{-2}$	5676016	0.363	7.448×10^{-3}	-59.3	784	-0.173	0.191
sulfurdioxide slant column density cobra [DU]	$(1.370 \pm 34.291) \times 10^{-2}$	5676016	0.363	7.448×10^{-3}	-59.3	93.3	-0.173	0.191
sulfurdioxide slant column density cobra precision [DU]	0.286 ± 0.118	5676016	0.115	0.253	6.812×10^{-2}	25.8	0.211	0.326
sulfurdioxide slant column density window1 [DU]	0.101 ± 0.665	5676016	0.730	0.104	-241	52.8	-0.262	0.468
sulfurdioxide slant column density window1 precision [DU]	0.286 ± 0.118	5676016	0.115	0.253	6.812×10^{-2}	25.8	0.211	0.326
sulfurdioxide slant column density corrected win1 [DU]	$(-2.091 \pm 66.054) \times 10^{-2}$	5676016	0.721	-3.385×10^{-2}	-241	52.6	-0.391	0.331
background so2 slant column offset window1 [DU]	-0.122 ± 0.131	5676016	0.141	-0.131	-0.666	3.59	-0.203	-6.211×10^{-2}
sulfurdioxide slant column density window2 [DU]	$(-3.946 \pm 895.617) \times 10^{-2}$	5676016	11.3	-0.148	-1.276×10^3	838	-5.76	5.55
sulfurdioxide slant column density window2 precision [DU]	8.03 ± 2.21	5676016	2.39	7.72	2.42	590	6.65	9.05
sulfurdioxide slant column density corrected win2 [DU]	-1.76 ± 8.84	5676016	11.2	-1.75	-1.276×10^3	839	-7.34	3.81
background so2 slant column offset window2 [DU]	-1.72 ± 2.58	5676016	4.46	-1.48	-11.0	8.56	-3.86	0.605
sulfurdioxide slant column density window3 [DU]	$(-7.451 \pm 2325.605) \times 10^{-2}$	5676016	29.5	-0.231	-905	1.202×10^3	-14.9	14.7
sulfurdioxide slant column density window3 precision [DU]	28.5 ± 12.7	5676016	8.69	25.1	11.8	932	21.7	30.4
sulfurdioxide slant column density corrected win3 [DU]	7.38 ± 22.71	5676016	28.6	7.42	-901	1.205×10^3	-6.82	21.7
background so2 slant column offset window3 [DU]	7.45 ± 5.91	5676016	9.82	7.06	-17.6	24.2	2.39	12.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	5676016	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.735 \pm 3.304) \times 10^{-2}$	5676016	1.125×10^{-2}	1.073×10^{-2}	6.684×10^{-4}	1.16	6.532×10^{-3}	1.778×10^{-2}
fitted radiance shift [nm]	$(-7.023 \pm 24.415) \times 10^{-4}$	5676016	1.785×10^{-3}	-6.941×10^{-4}	-7.206×10^{-2}	6.828×10^{-2}	-1.643×10^{-3}	1.419×10^{-4}
fitted radiance squeeze [1]	$(1.153 \pm 18.182) \times 10^{-5}$	5676016	2.093×10^{-4}	1.691×10^{-5}	-2.153×10^{-2}	2.416×10^{-2}	-8.881×10^{-5}	1.205×10^{-4}
fitted root mean square [1]	$(1.249 \pm 0.479) \times 10^{-3}$	5676016	4.455×10^{-4}	1.123×10^{-3}	3.311×10^{-4}	0.123	9.560×10^{-4}	1.401×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.970 ± 0.522	5676016	0.650	0.844	5.000×10^{-2}	3.25	0.603	1.25
sulfurdioxide total air mass factor polluted precision [1]	0.124 ± 0.101	5676016	0.138	0.101	5.366×10^{-3}	1.78	4.112×10^{-2}	0.179
sulfurdioxide clear air mass factor polluted [1]	0.783 ± 0.371	5676016	0.334	0.702	0.104	3.33	0.564	0.898
number of spectral points in retrieval [1]	73.4 ± 0.5	5676016	1.000	73.0	52.0	74.0	73.0	74.0

Table 5: Parameterlist and basic statistics for the analysis for observations over water

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.645 ± 0.409	7996322	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(2.395 \pm 92.915) \times 10^{-2}$	7996322	0.425	8.672×10^{-3}	-54.2	435	-0.201	0.224
sulfurdioxide total vertical column precision [DU]	0.491 ± 0.686	7996322	0.315	0.304	3.002×10^{-2}	29.0	0.210	0.525
sulfurdioxide slant column density corrected [DU]	$(1.409 \pm 38.803) \times 10^{-2}$	7996322	0.362	8.137×10^{-3}	-15.5	537	-0.171	0.190
sulfurdioxide slant column density cobra [DU]	$(1.401 \pm 33.762) \times 10^{-2}$	7996322	0.362	8.137×10^{-3}	-15.5	93.3	-0.171	0.190
sulfurdioxide slant column density cobra precision [DU]	0.286 ± 0.119	7996322	0.112	0.253	7.316×10^{-2}	25.8	0.211	0.323
sulfurdioxide slant column density window1 [DU]	0.115 ± 0.644	7996322	0.730	0.120	-133	46.6	-0.247	0.483
sulfurdioxide slant column density window1 precision [DU]	0.286 ± 0.119	7996322	0.112	0.253	7.316×10^{-2}	25.8	0.211	0.323
sulfurdioxide slant column density corrected win1 [DU]	$(-1.186 \pm 63.858) \times 10^{-2}$	7996322	0.719	-2.332×10^{-2}	-133	46.4	-0.380	0.339
background so2 slant column offset window1 [DU]	-0.127 ± 0.125	7996322	0.139	-0.136	-0.666	3.59	-0.205	-6.560×10^{-2}
sulfurdioxide slant column density window2 [DU]	$(-8.500 \pm 888.053) \times 10^{-2}$	7996322	11.3	-0.230	-1.043×10^3	838	-5.84	5.49
sulfurdioxide slant column density window2 precision [DU]	8.07 ± 2.07	7996322	2.42	7.76	2.29	459	6.68	9.11
sulfurdioxide slant column density corrected win2 [DU]	-1.49 ± 8.77	7996322	11.2	-1.49	-1.043×10^3	839	-7.09	4.10
background so2 slant column offset window2 [DU]	-1.41 ± 2.47	7996322	4.00	-0.841	-11.0	8.56	-3.35	0.651
sulfurdioxide slant column density window3 [DU]	1.60 ± 23.46	7996322	29.8	1.48	-384	1.202×10^3	-13.3	16.5
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 11.9	7996322	8.72	25.1	11.4	340	21.7	30.5
sulfurdioxide slant column density corrected win3 [DU]	8.94 ± 22.72	7996322	28.8	8.81	-372	1.205×10^3	-5.45	23.3
background so2 slant column offset window3 [DU]	7.33 ± 5.97	7996322	9.87	7.00	-17.7	25.9	2.18	12.0
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	7996322	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.853 \pm 2.850) \times 10^{-2}$	7996322	1.248×10^{-2}	1.244×10^{-2}	6.684×10^{-4}	0.880	7.433×10^{-3}	1.991×10^{-2}
fitted radiance shift [nm]	$(-4.931 \pm 23.502) \times 10^{-4}$	7996322	1.810×10^{-3}	-4.848×10^{-4}	-4.819×10^{-2}	6.828×10^{-2}	-1.436×10^{-3}	3.740×10^{-4}
fitted radiance squeeze [1]	$(1.320 \pm 17.500) \times 10^{-5}$	7996322	2.038×10^{-4}	1.726×10^{-5}	-2.153×10^{-2}	1.460×10^{-2}	-8.532×10^{-5}	1.185×10^{-4}
fitted root mean square [1]	$(1.253 \pm 0.478) \times 10^{-3}$	7996322	4.487×10^{-4}	1.125×10^{-3}	3.611×10^{-4}	5.462×10^{-2}	9.543×10^{-4}	1.403×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.912 ± 0.480	7996322	0.553	0.825	5.000×10^{-2}	2.92	0.590	1.14
sulfurdioxide total air mass factor polluted precision [1]	0.116 ± 0.104	7996322	0.124	8.105×10^{-2}	4.118×10^{-3}	1.25	4.039×10^{-2}	0.164
sulfurdioxide clear air mass factor polluted [1]	0.749 ± 0.307	7996322	0.344	0.708	9.599×10^{-2}	2.92	0.549	0.893
number of spectral points in retrieval [1]	73.4 ± 0.5	7996322	1.000	73.0	71.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.743 ± 0.385	2378327	0.620	1.000	0.0	1.000	0.380	1.000
sulfurdioxide total vertical column [DU]	$(3.679 \pm 144.586) \times 10^{-2}$	2378327	0.532	1.057×10^{-2}	-130	994	-0.249	0.283
sulfurdioxide total vertical column precision [DU]	0.635 ± 0.912	2378327	0.469	0.398	2.449×10^{-2}	46.8	0.248	0.717
sulfurdioxide slant column density corrected [DU]	$(1.993 \pm 62.336) \times 10^{-2}$	2378327	0.368	8.508×10^{-3}	-14.6	784	-0.174	0.194
sulfurdioxide slant column density cobra [DU]	$(1.954 \pm 35.616) \times 10^{-2}$	2378327	0.368	8.508×10^{-3}	-14.6	37.7	-0.174	0.194
sulfurdioxide slant column density cobra precision [DU]	0.284 ± 0.104	2378327	0.107	0.260	6.812×10^{-2}	23.5	0.219	0.327
sulfurdioxide slant column density window1 [DU]	0.164 ± 0.658	2378327	0.745	0.155	-56.3	55.8	-0.214	0.531
sulfurdioxide slant column density window1 precision [DU]	0.284 ± 0.104	2378327	0.107	0.260	6.812×10^{-2}	23.5	0.219	0.327
sulfurdioxide slant column density corrected win1 [DU]	$(8.802 \pm 6523.920) \times 10^{-4}$	2378327	0.736	-1.675×10^{-2}	-56.3	55.6	-0.378	0.358
background so2 slant column offset window1 [DU]	-0.163 ± 0.100	2378327	0.128	-0.167	-1.44	3.77	-0.230	-0.102
sulfurdioxide slant column density window2 [DU]	-0.808 ± 9.592	2378327	12.0	-0.938	-1.276×10^3	785	-6.87	5.12
sulfurdioxide slant column density window2 precision [DU]	8.80 ± 2.59	2378327	2.79	8.48	2.43	590	7.22	10.0
sulfurdioxide slant column density corrected win2 [DU]	-1.16 ± 9.54	2378327	11.9	-1.14	-1.276×10^3	784	-7.11	4.81
background so2 slant column offset window2 [DU]	-0.357 ± 1.908	2378327	2.16	0.140	-10.5	8.56	-1.26	0.909
sulfurdioxide slant column density window3 [DU]	-6.00 ± 25.89	2378327	32.5	-5.17	-905	228	-21.8	10.7
sulfurdioxide slant column density window3 precision [DU]	32.7 ± 15.5	2378327	10.6	28.5	11.8	228	24.5	35.1
sulfurdioxide slant column density corrected win3 [DU]	-0.135 ± 25.779	2378327	32.4	0.342	-901	228	-16.1	16.3
background so2 slant column offset window3 [DU]	5.86 ± 5.87	2378327	8.96	4.23	-17.7	26.5	1.33	10.3
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	2378327	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.124 \pm 8.314) \times 10^{-2}$	2378327	6.410×10^{-2}	3.257×10^{-2}	6.096×10^{-4}	1.54	1.370×10^{-2}	7.780×10^{-2}
fitted radiance shift [nm]	$(-2.284 \pm 30.503) \times 10^{-4}$	2378327	1.563×10^{-3}	-2.826×10^{-4}	-4.166×10^{-2}	3.963×10^{-2}	-1.050×10^{-3}	5.139×10^{-4}
fitted radiance squeeze [1]	$(1.214 \pm 17.433) \times 10^{-5}$	2378327	2.080×10^{-4}	1.014×10^{-5}	-1.637×10^{-2}	1.326×10^{-2}	-9.280×10^{-5}	1.152×10^{-4}
fitted root mean square [1]	$(1.262 \pm 0.435) \times 10^{-3}$	2378327	4.439×10^{-4}	1.171×10^{-3}	3.311×10^{-4}	6.241×10^{-2}	9.886×10^{-4}	1.433×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.759 ± 0.454	2378327	0.536	0.656	5.000×10^{-2}	3.25	0.441	0.977
sulfurdioxide total air mass factor polluted precision [1]	0.103 ± 0.123	2378327	0.115	4.919×10^{-2}	2.979×10^{-3}	1.75	2.723×10^{-2}	0.142
sulfurdioxide clear air mass factor polluted [1]	0.682 ± 0.401	2378327	0.402	0.614	7.710×10^{-2}	3.33	0.427	0.829
number of spectral points in retrieval [1]	73.4 ± 0.5	2378327	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

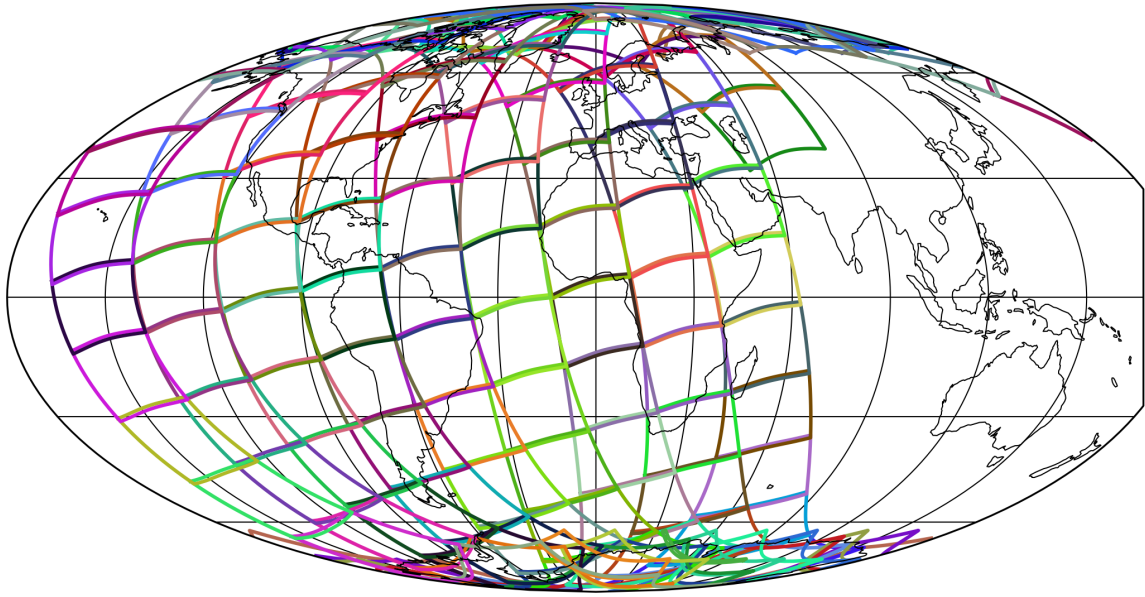


Figure 1: Outline of the granules.

4 Input data monitoring

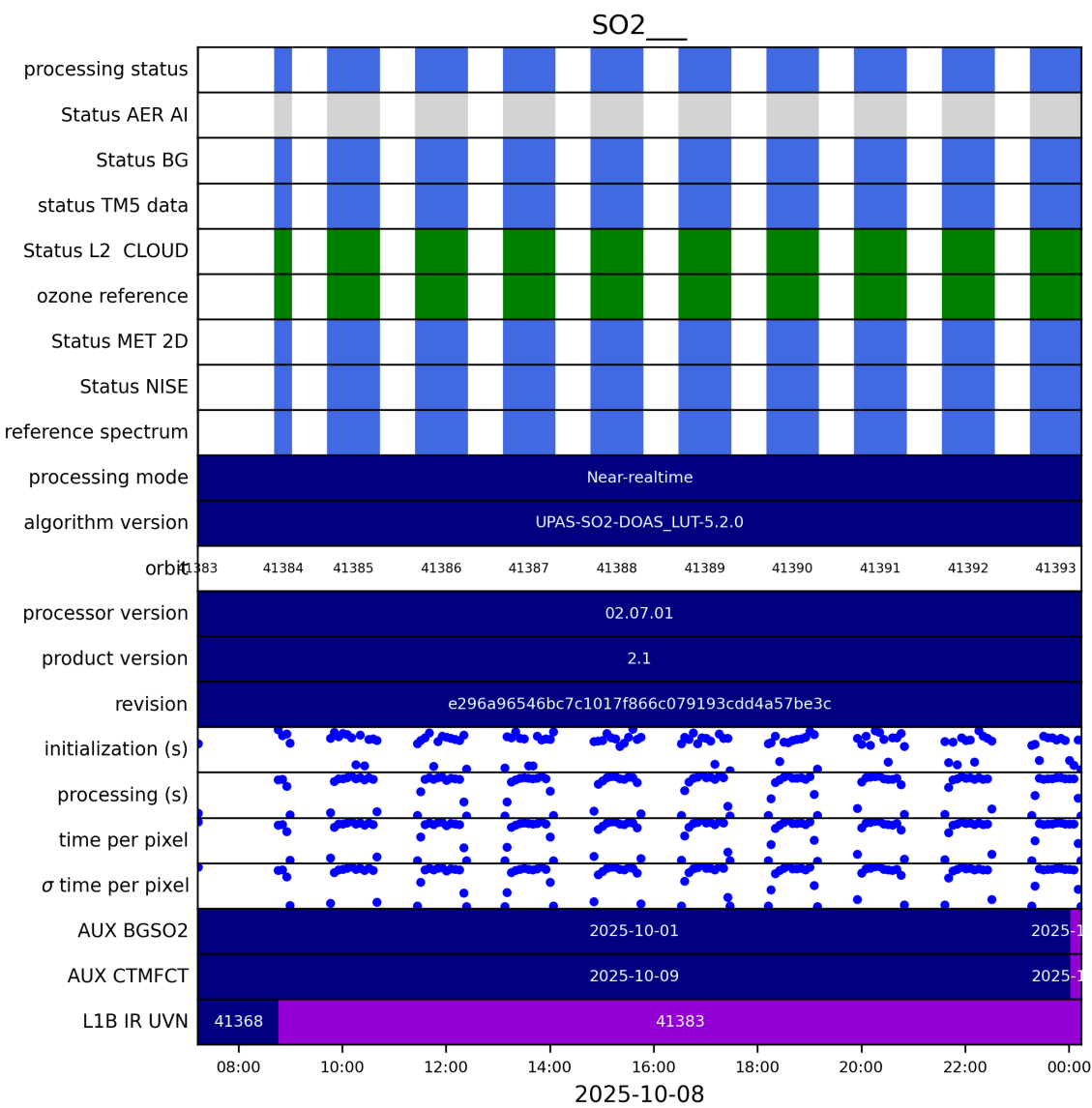


Figure 2: Input data per granule

5 Warnings and errors

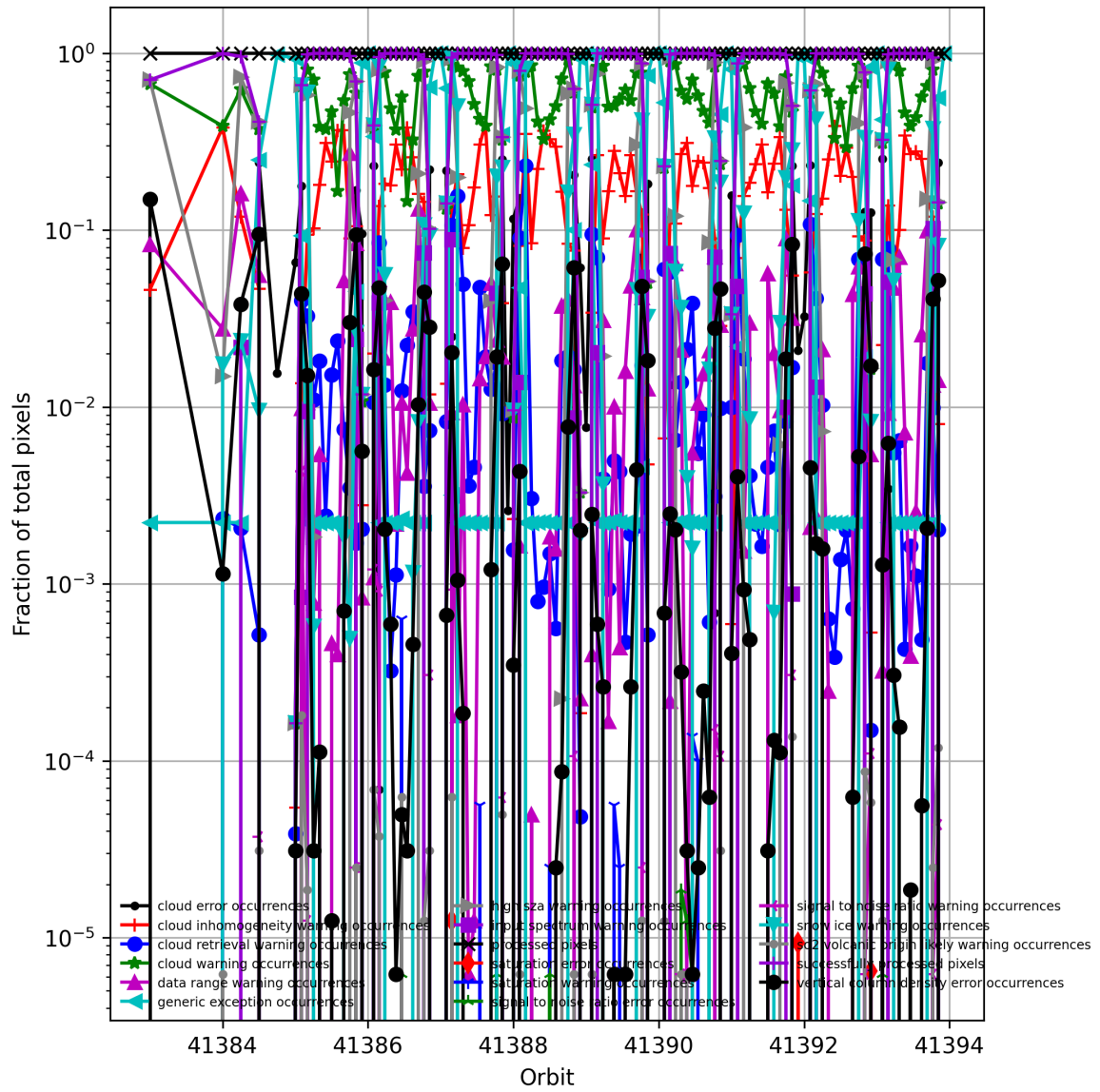


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

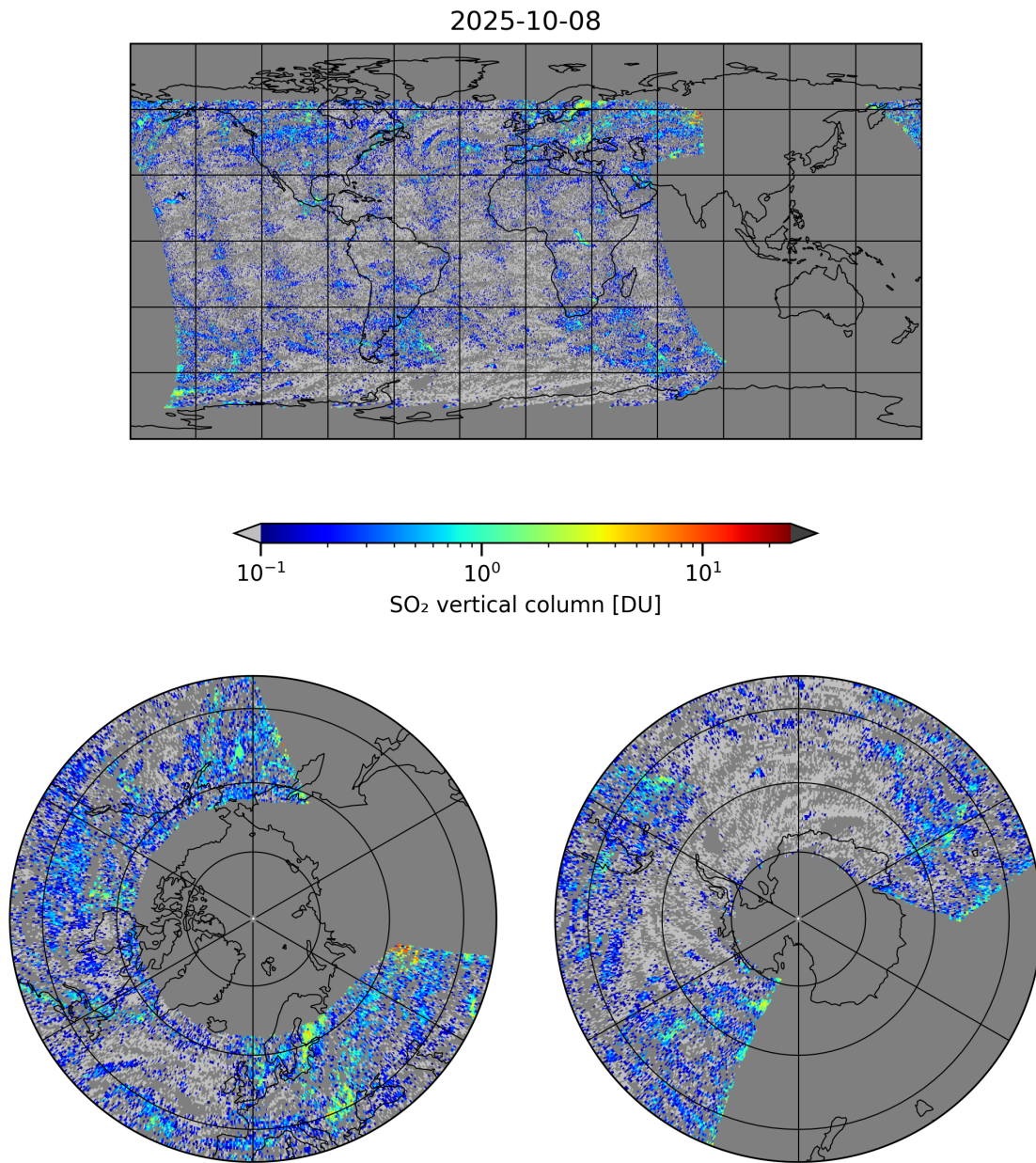


Figure 4: Map of “SO₂ vertical column” for 2025-10-08 to 2025-10-09

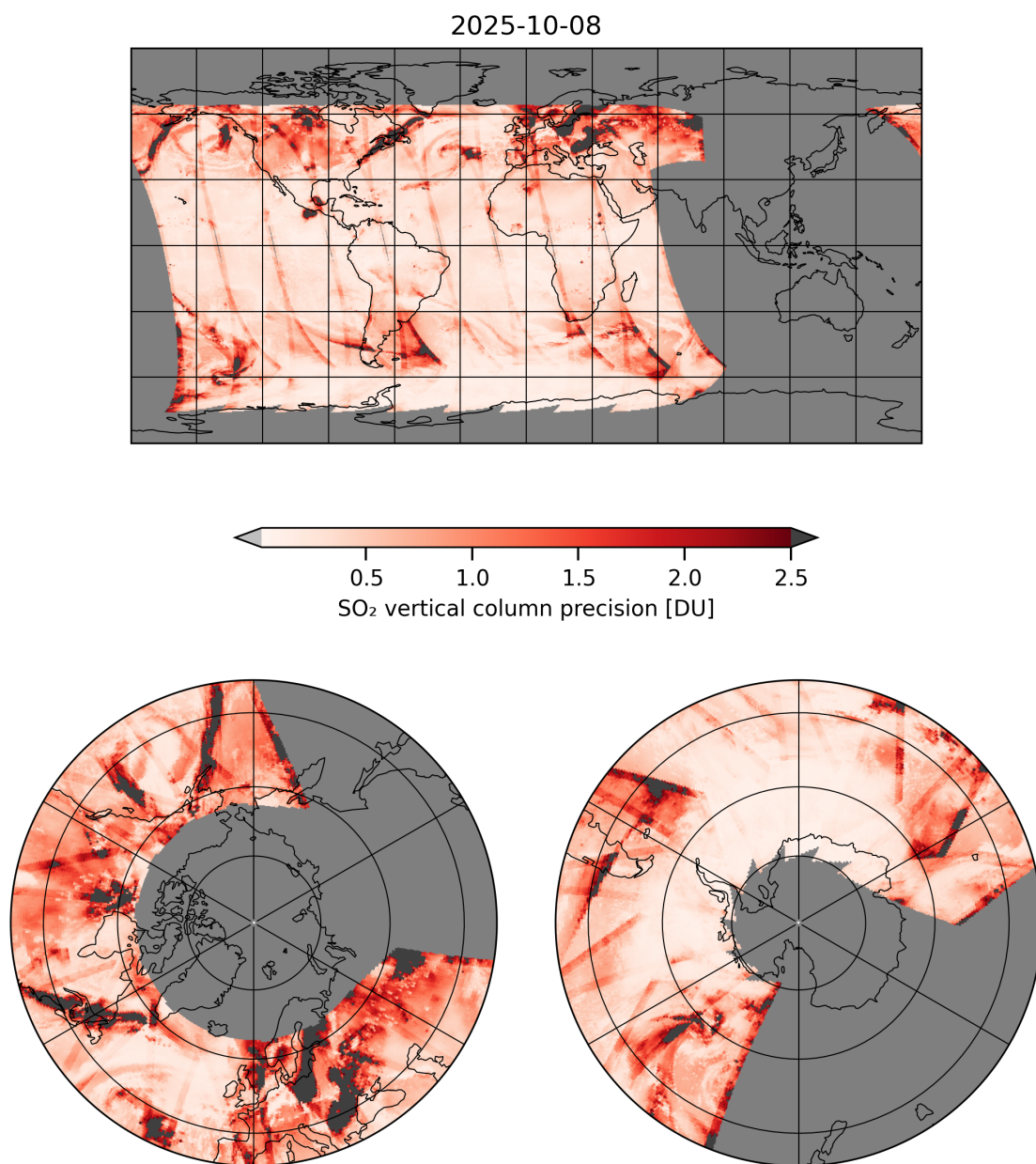


Figure 5: Map of “SO₂ vertical column precision” for 2025-10-08 to 2025-10-09

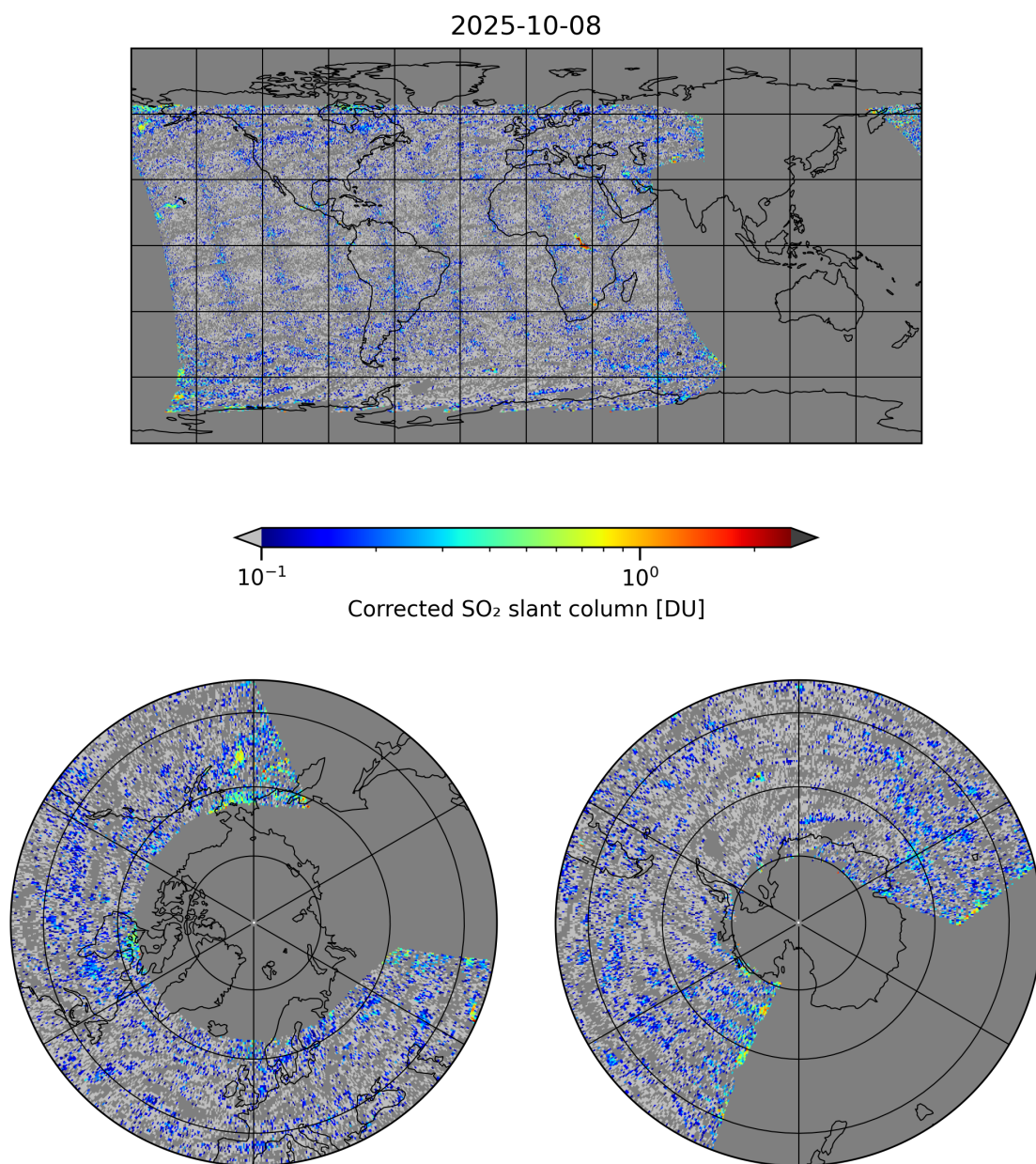


Figure 6: Map of “Corrected SO₂ slant column” for 2025-10-08 to 2025-10-09

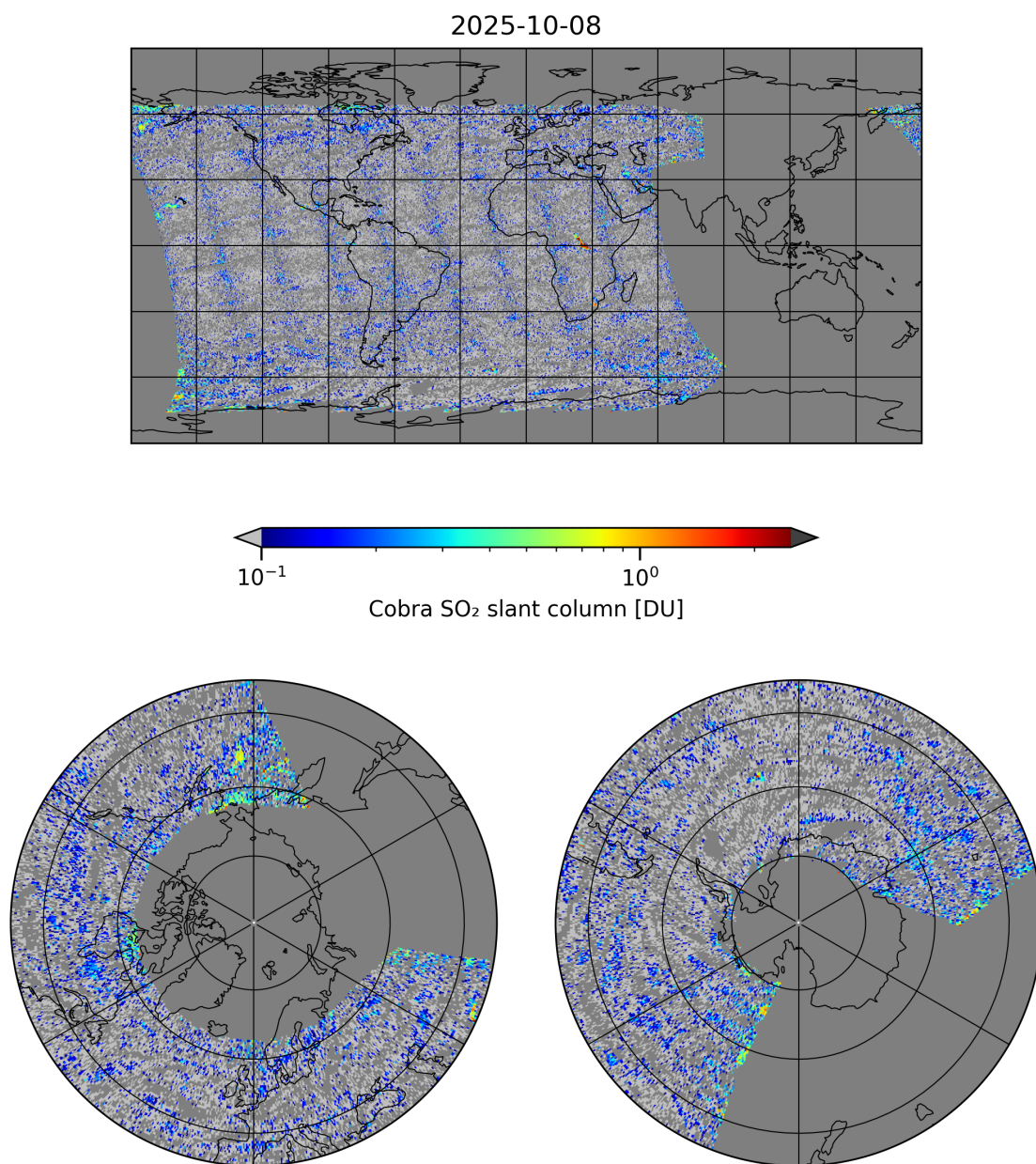


Figure 7: Map of “Cobra SO₂ slant column” for 2025-10-08 to 2025-10-09

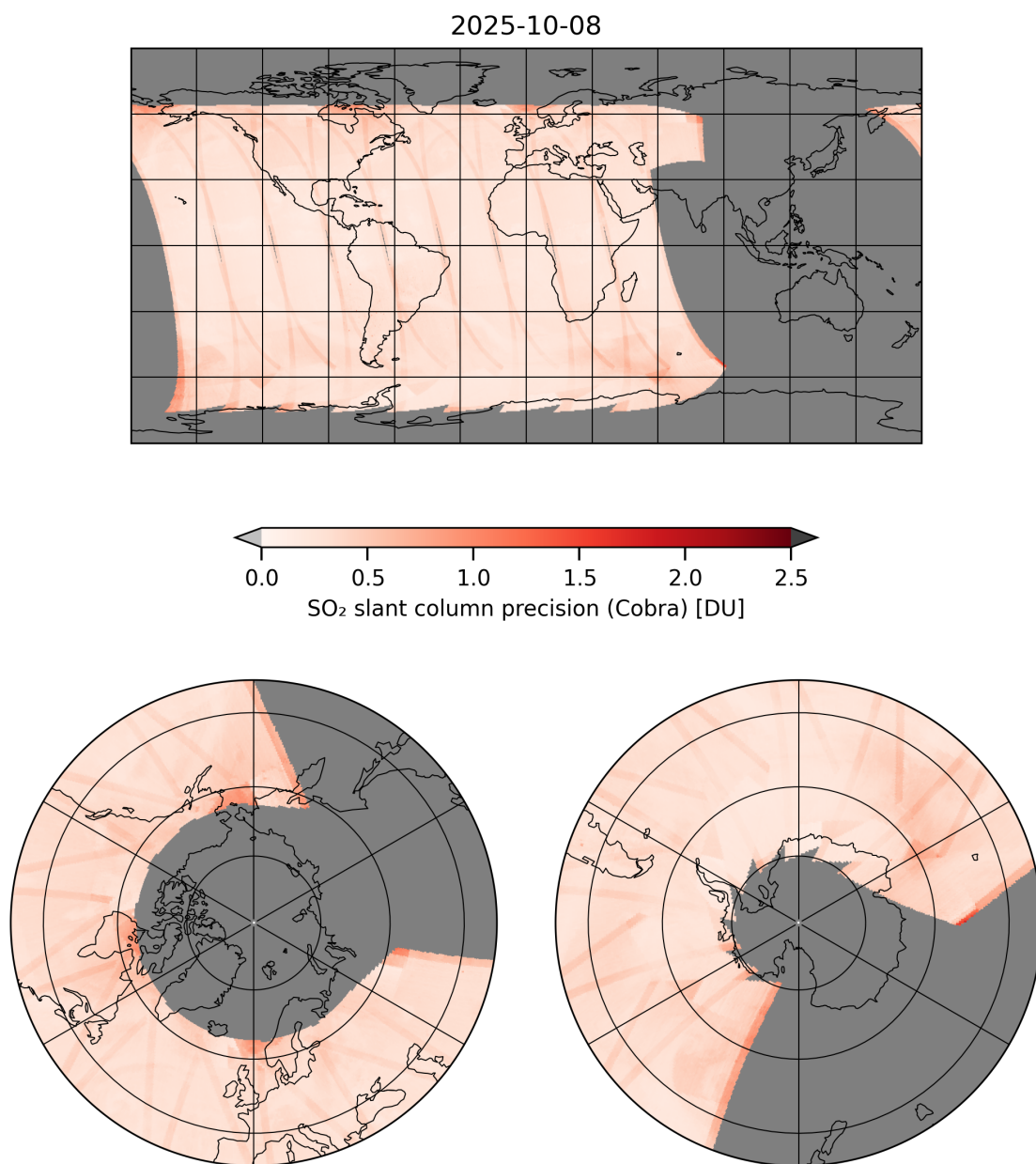


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-10-08 to 2025-10-09

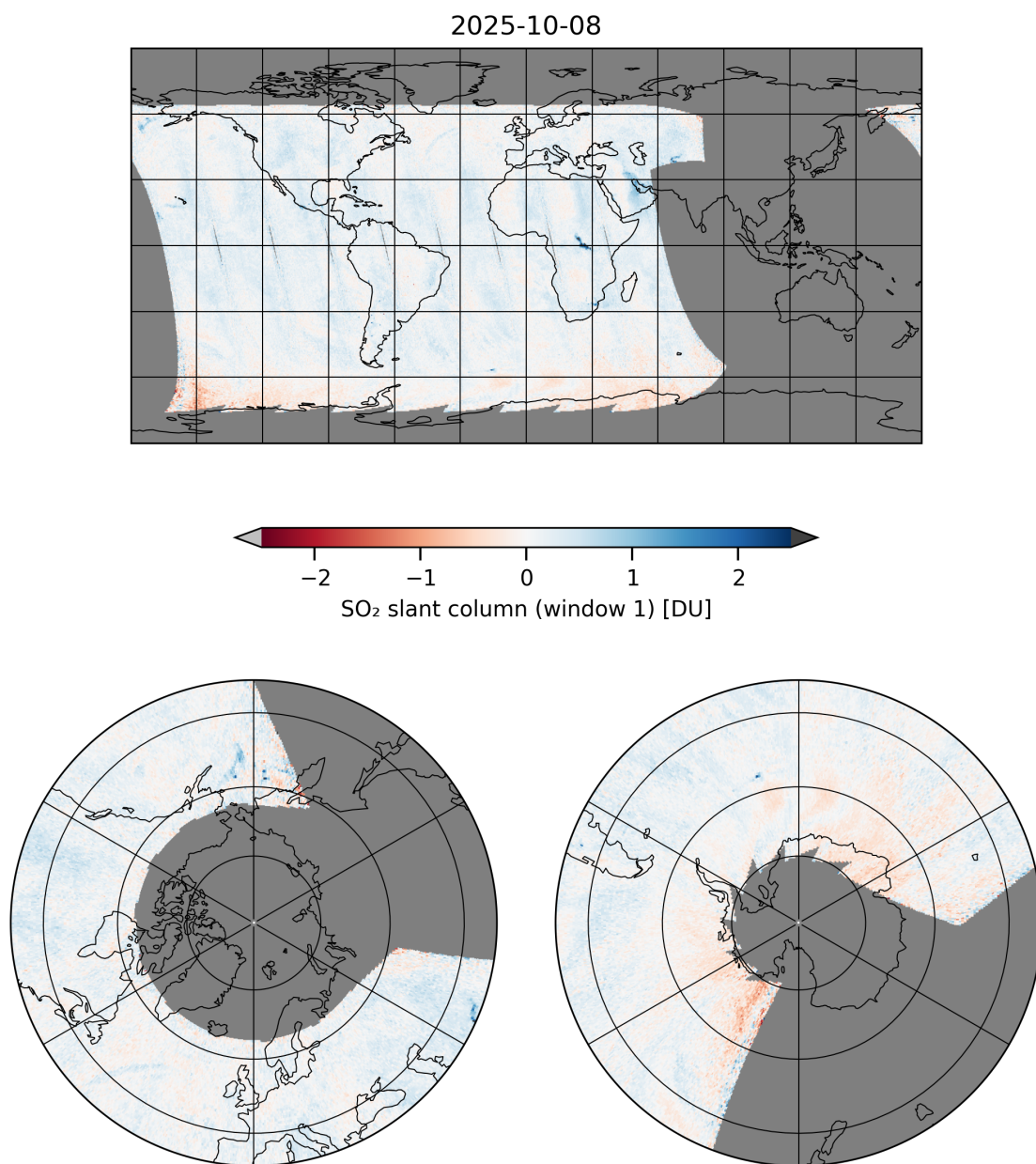


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-10-08 to 2025-10-09

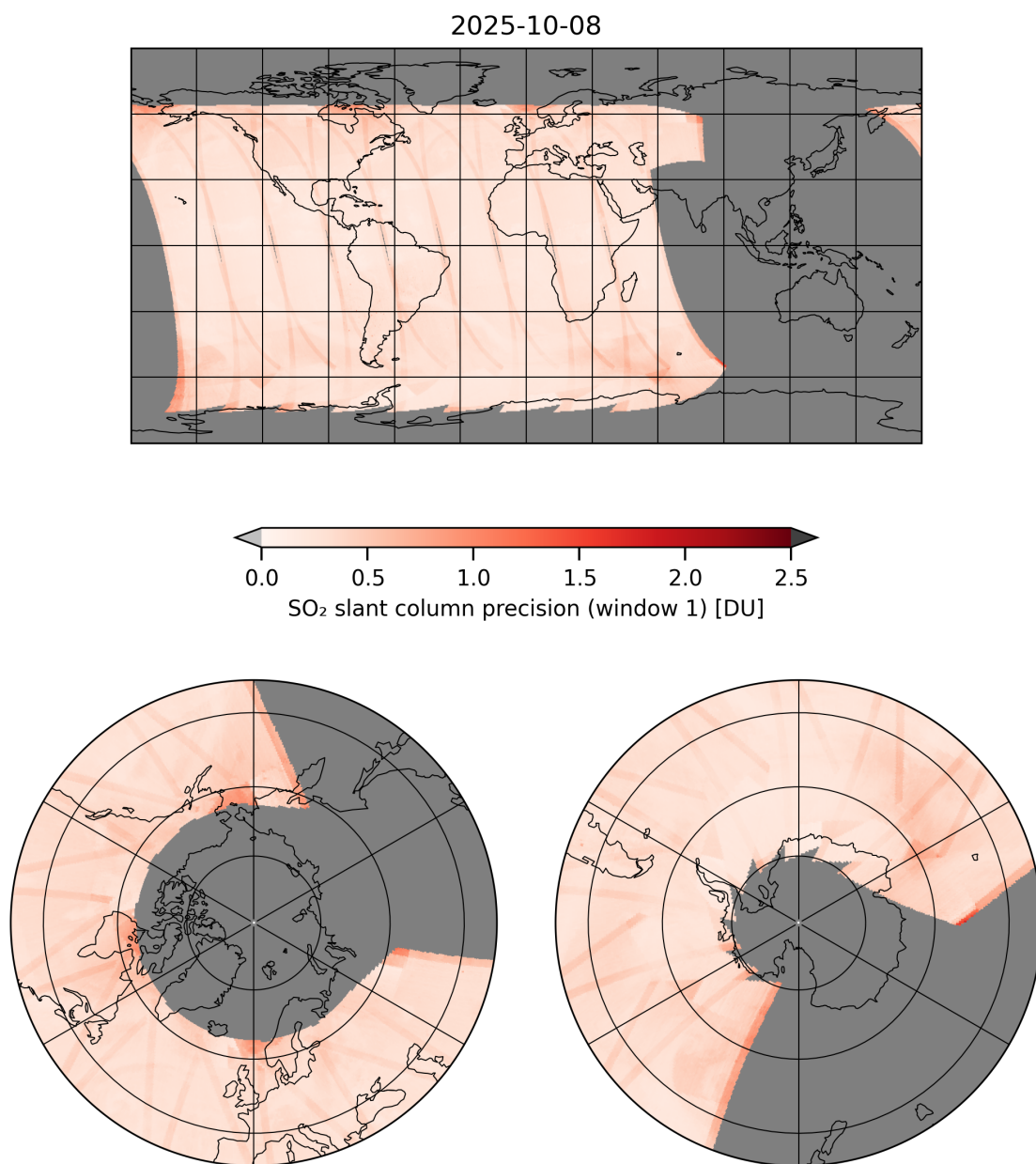


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-10-08 to 2025-10-09

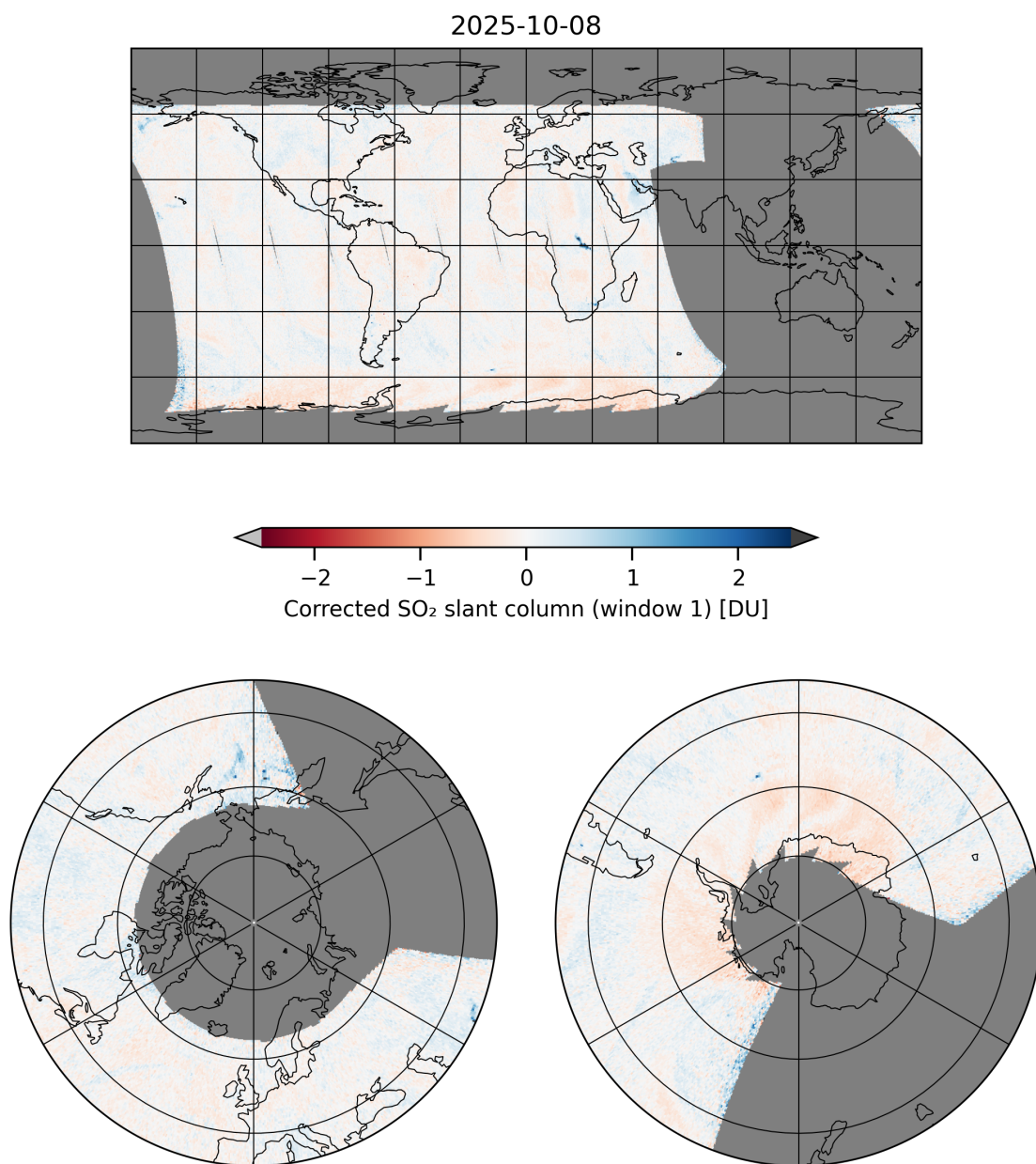


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-10-08 to 2025-10-09

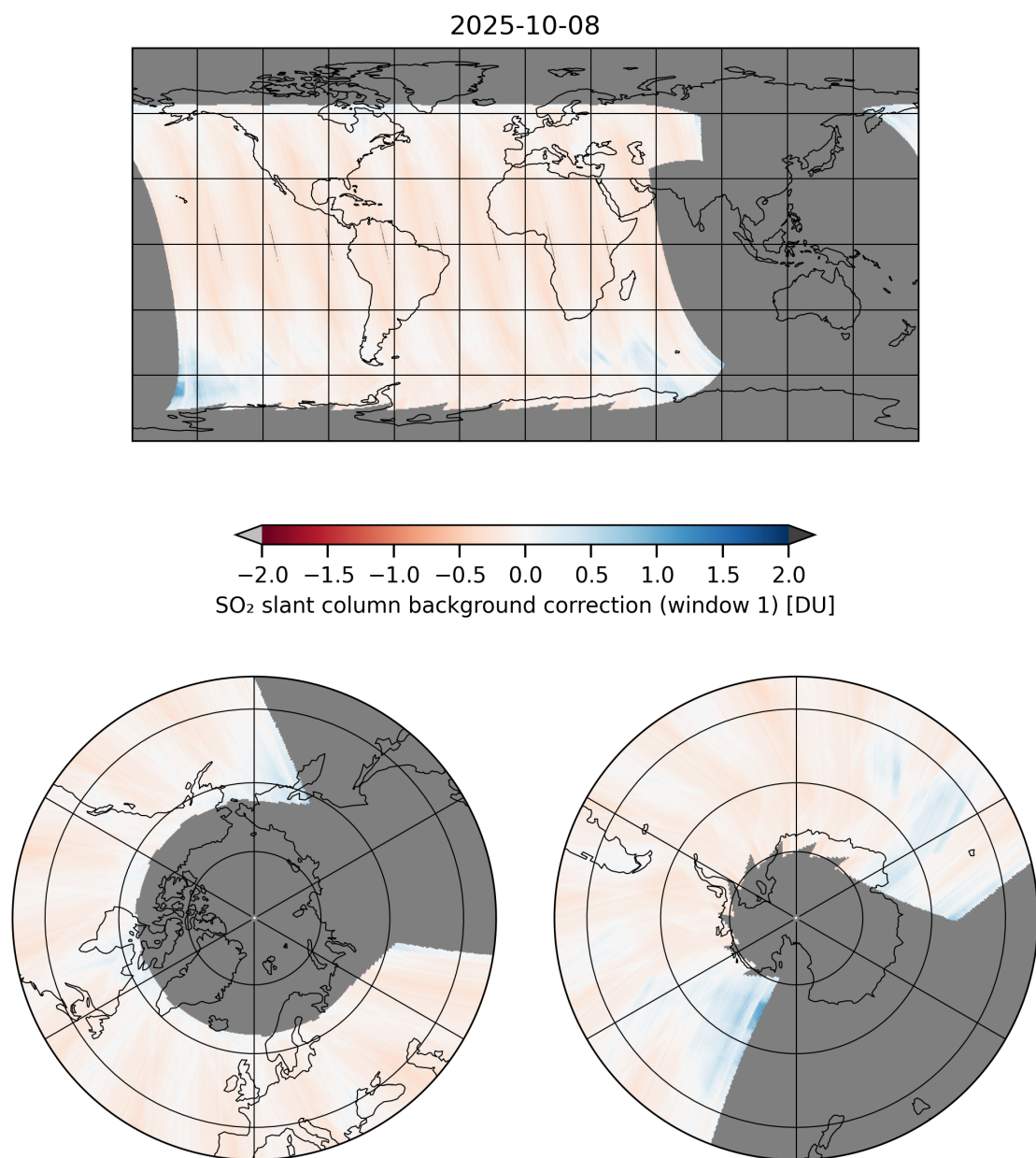


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-10-08 to 2025-10-09

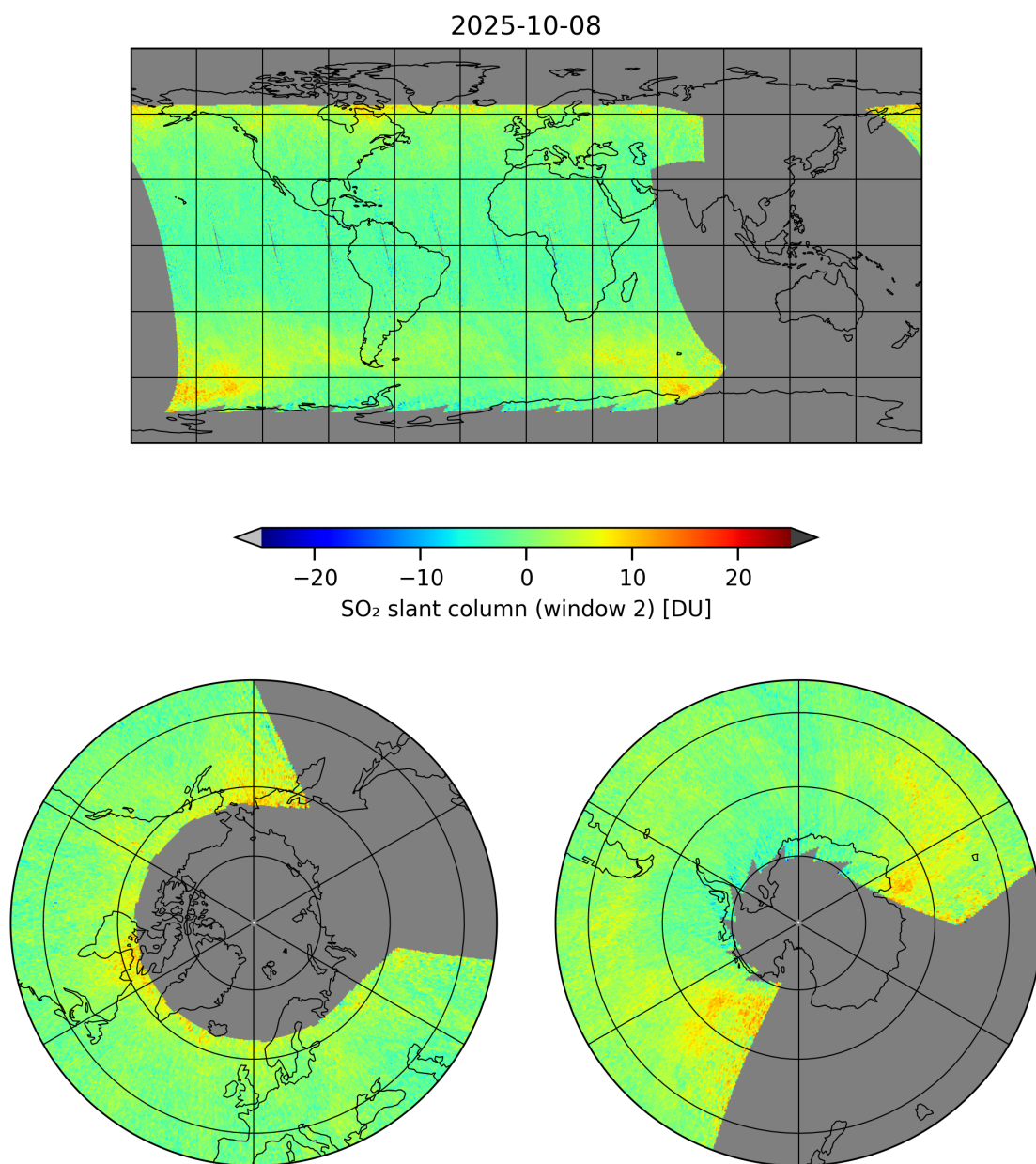


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-10-08 to 2025-10-09

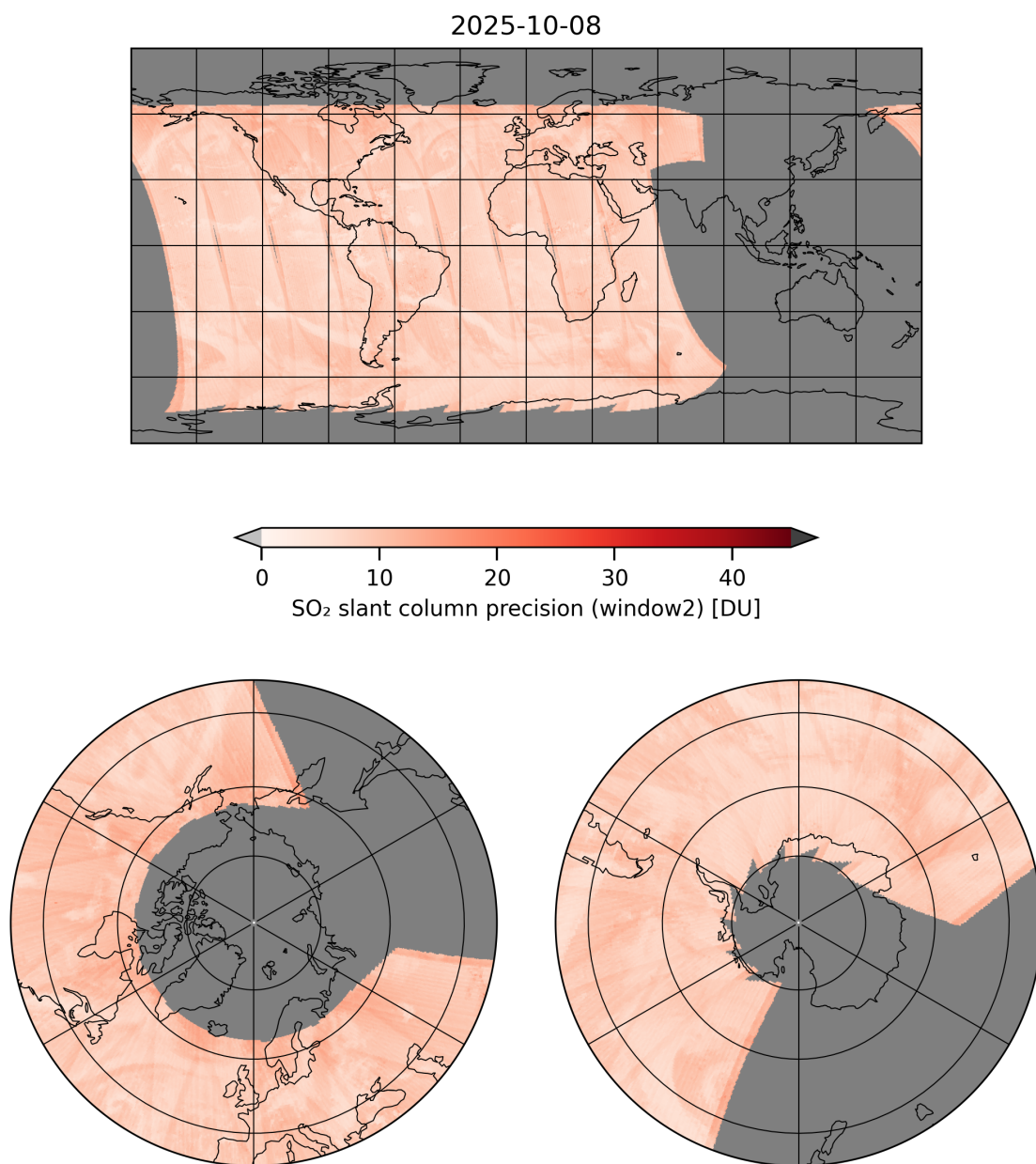


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-10-08 to 2025-10-09

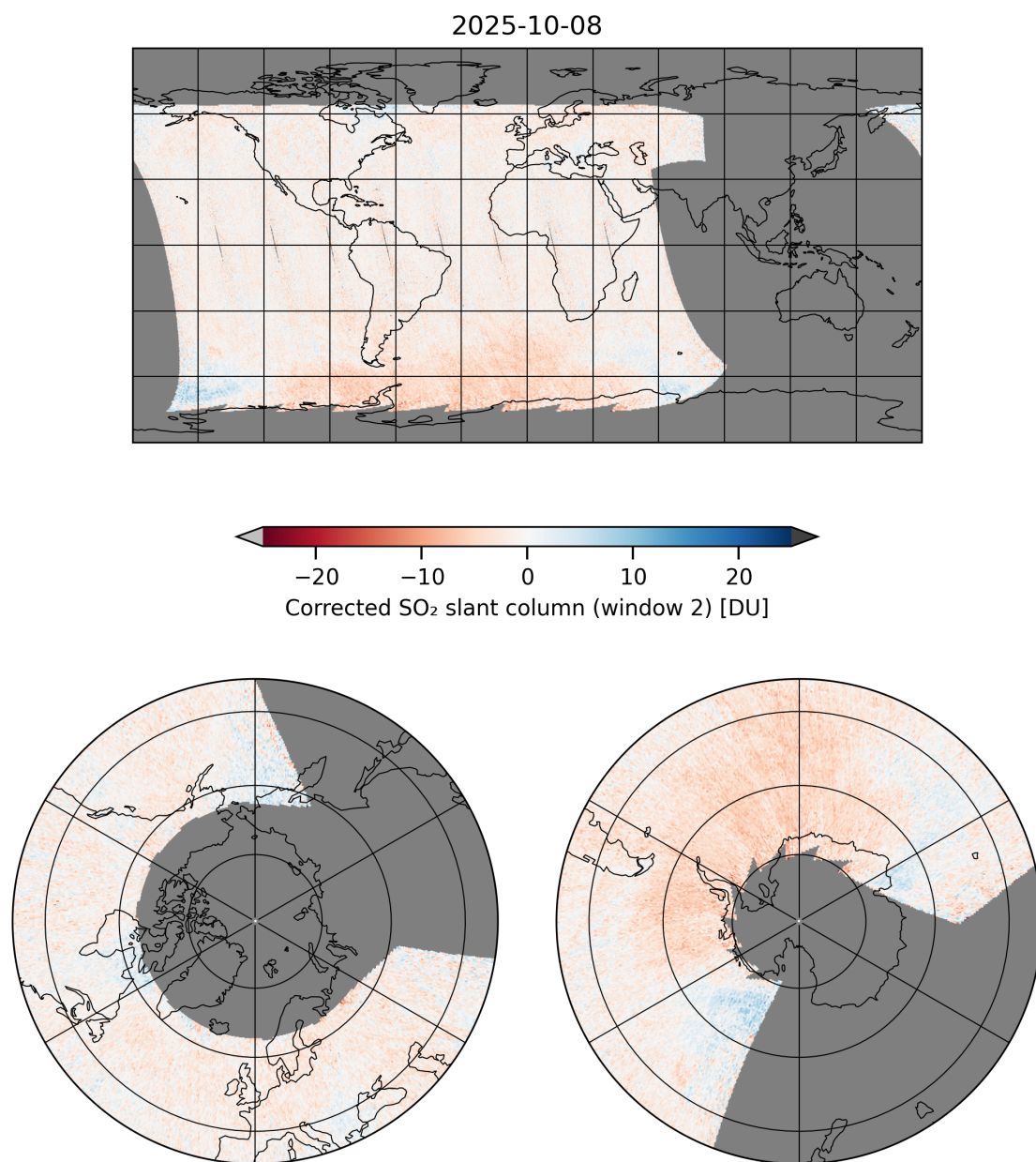


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-10-08 to 2025-10-09

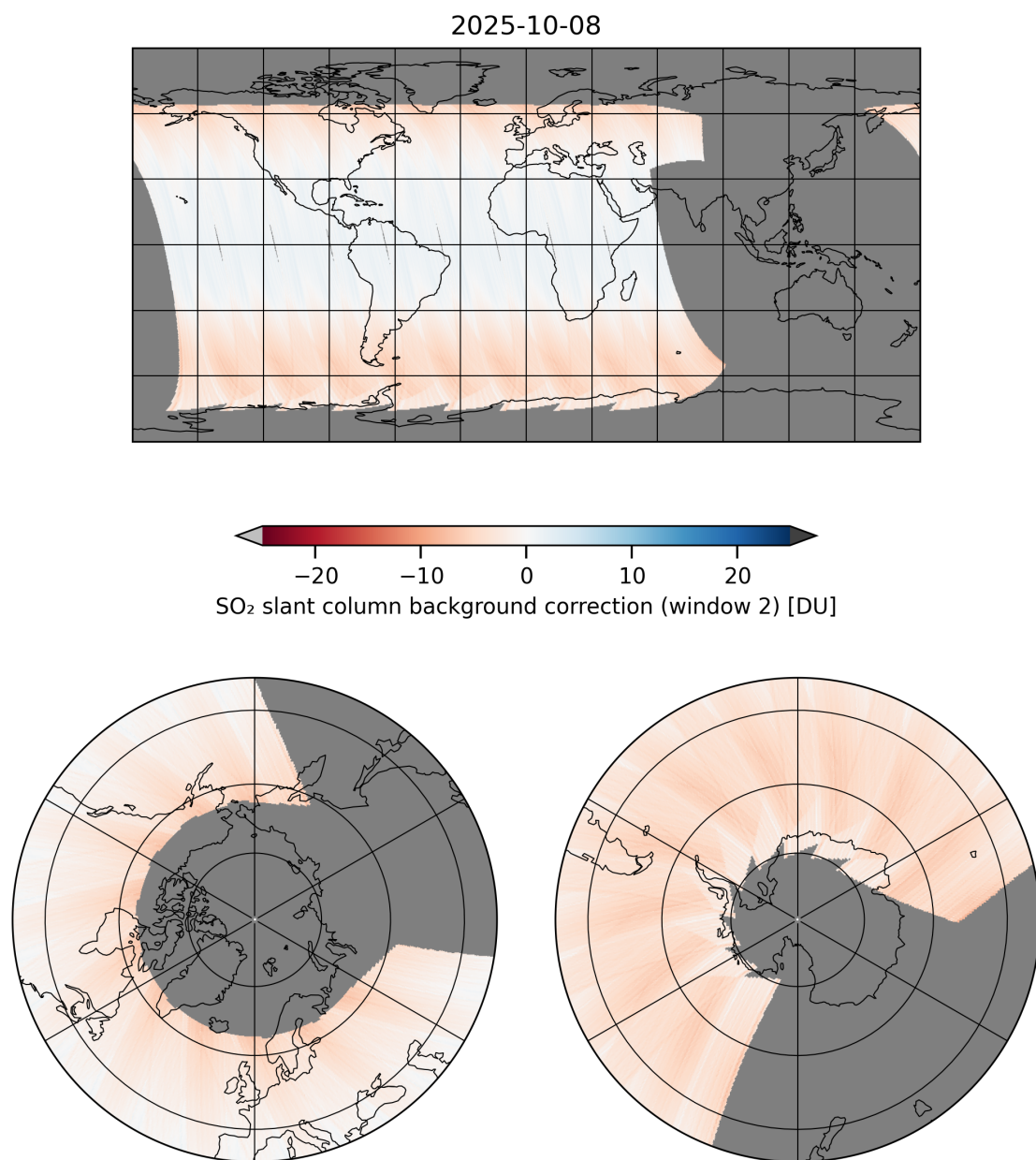


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-10-08 to 2025-10-09

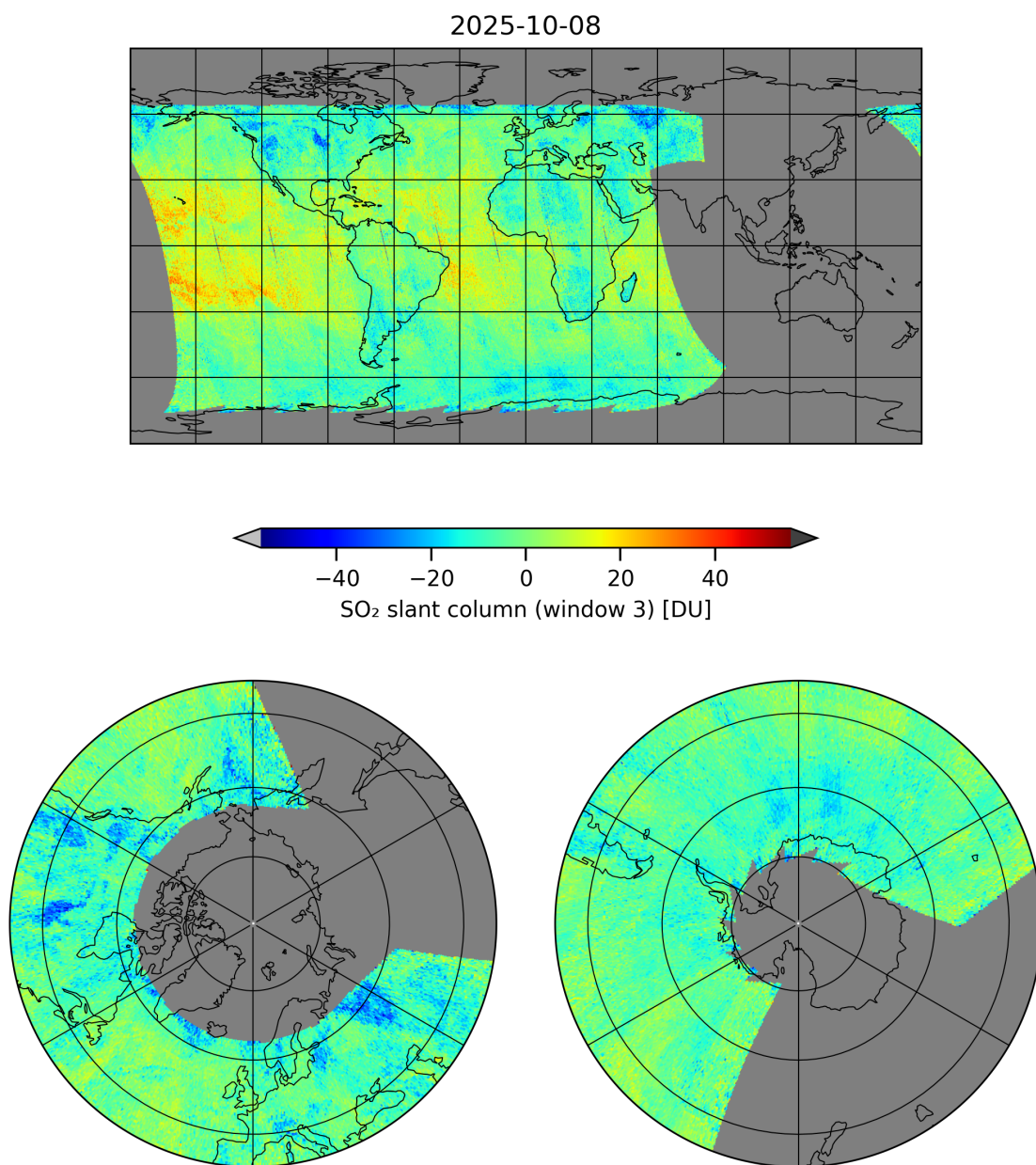


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-10-08 to 2025-10-09

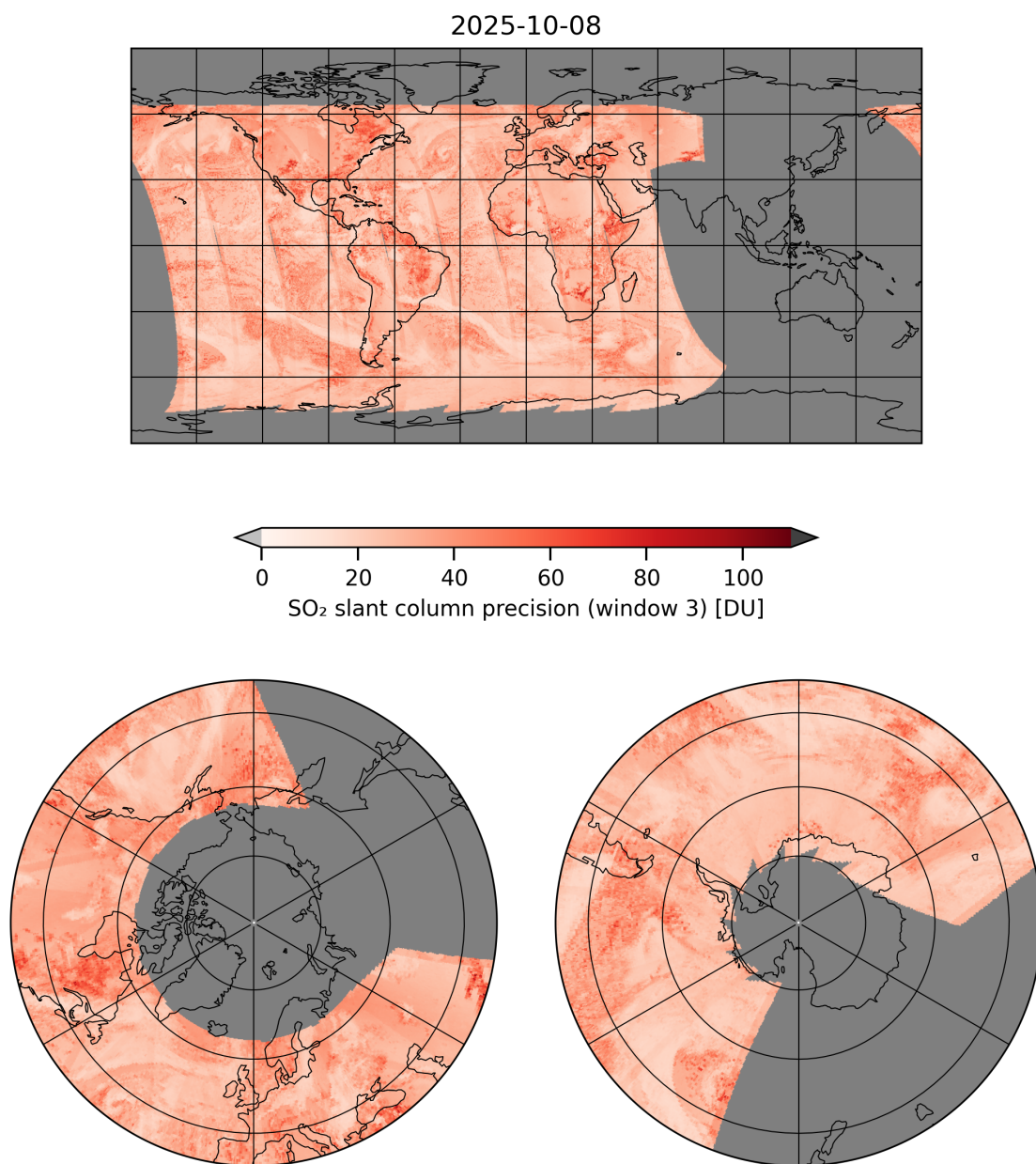


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-10-08 to 2025-10-09

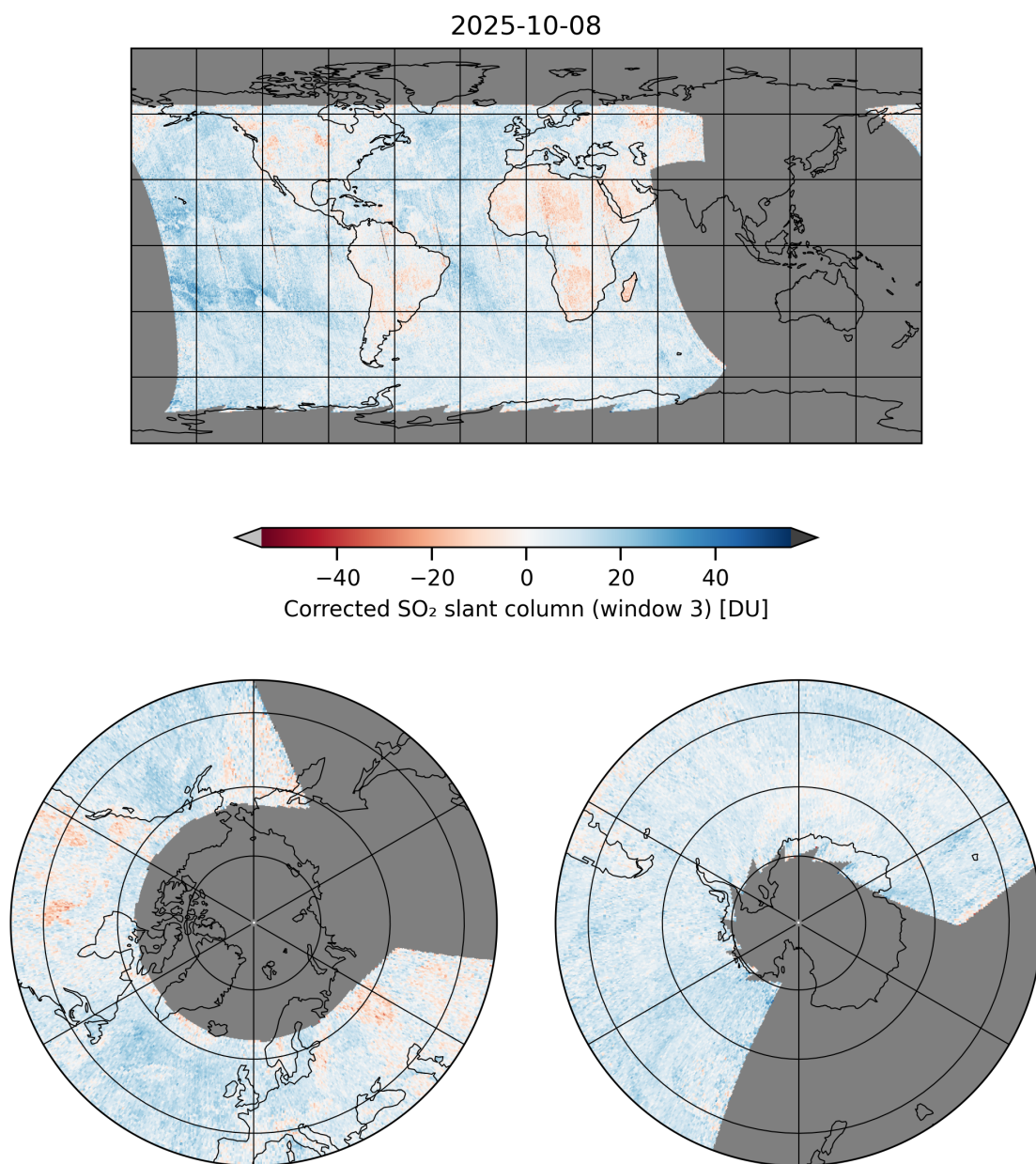


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-10-08 to 2025-10-09

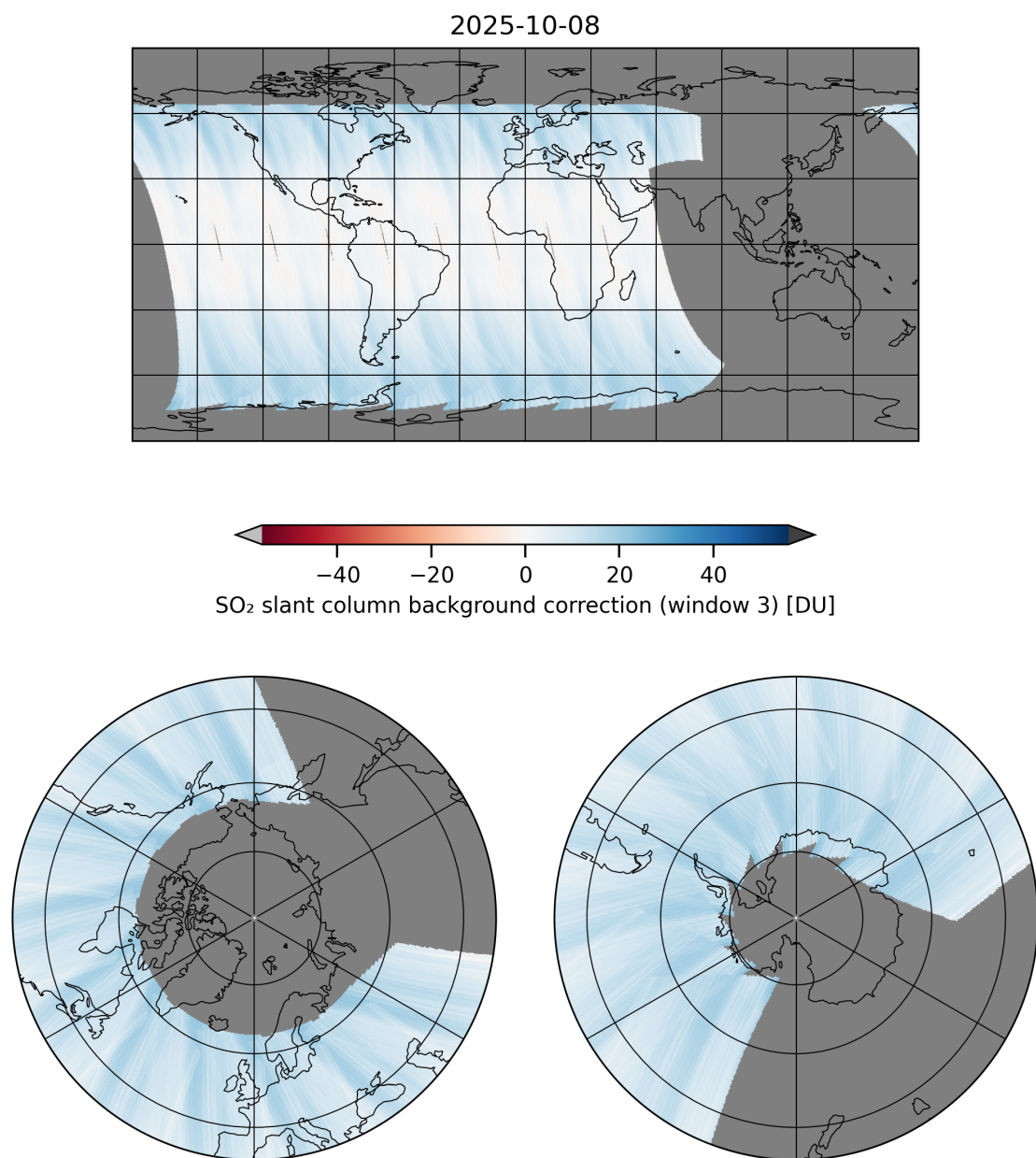


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-10-08 to 2025-10-09

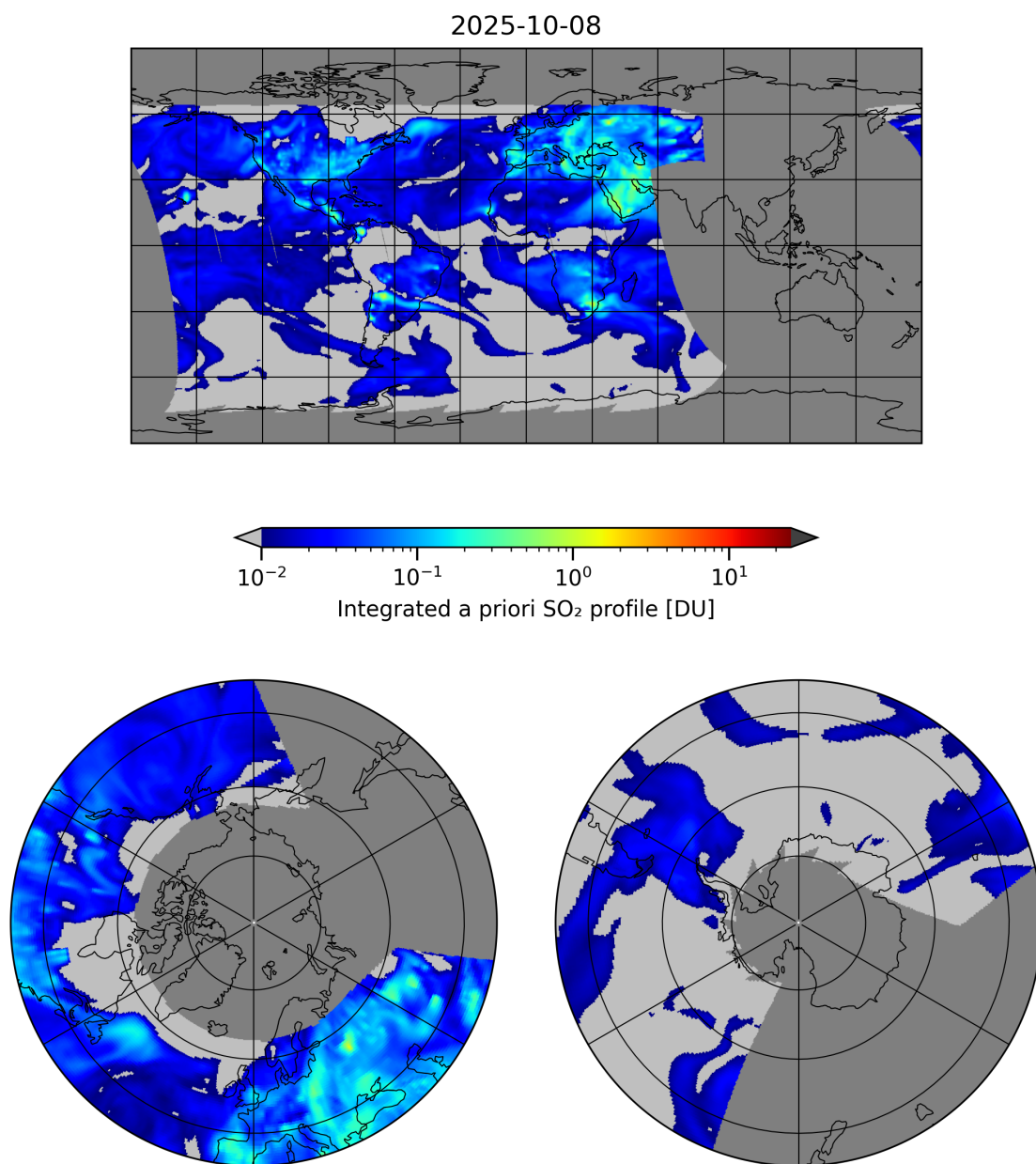


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-10-08 to 2025-10-09

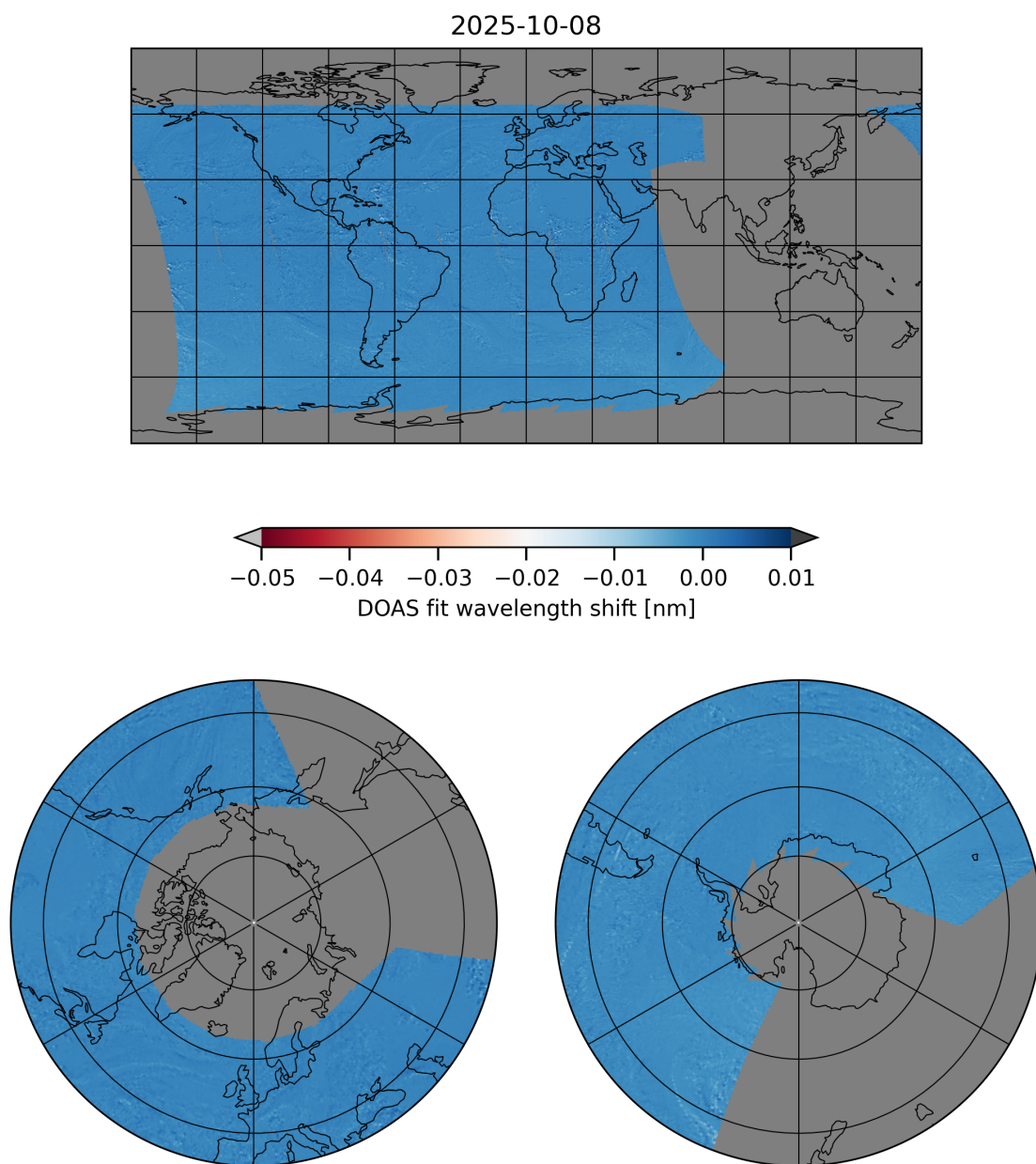


Figure 22: Map of “DOAS fit wavelength shift” for 2025-10-08 to 2025-10-09

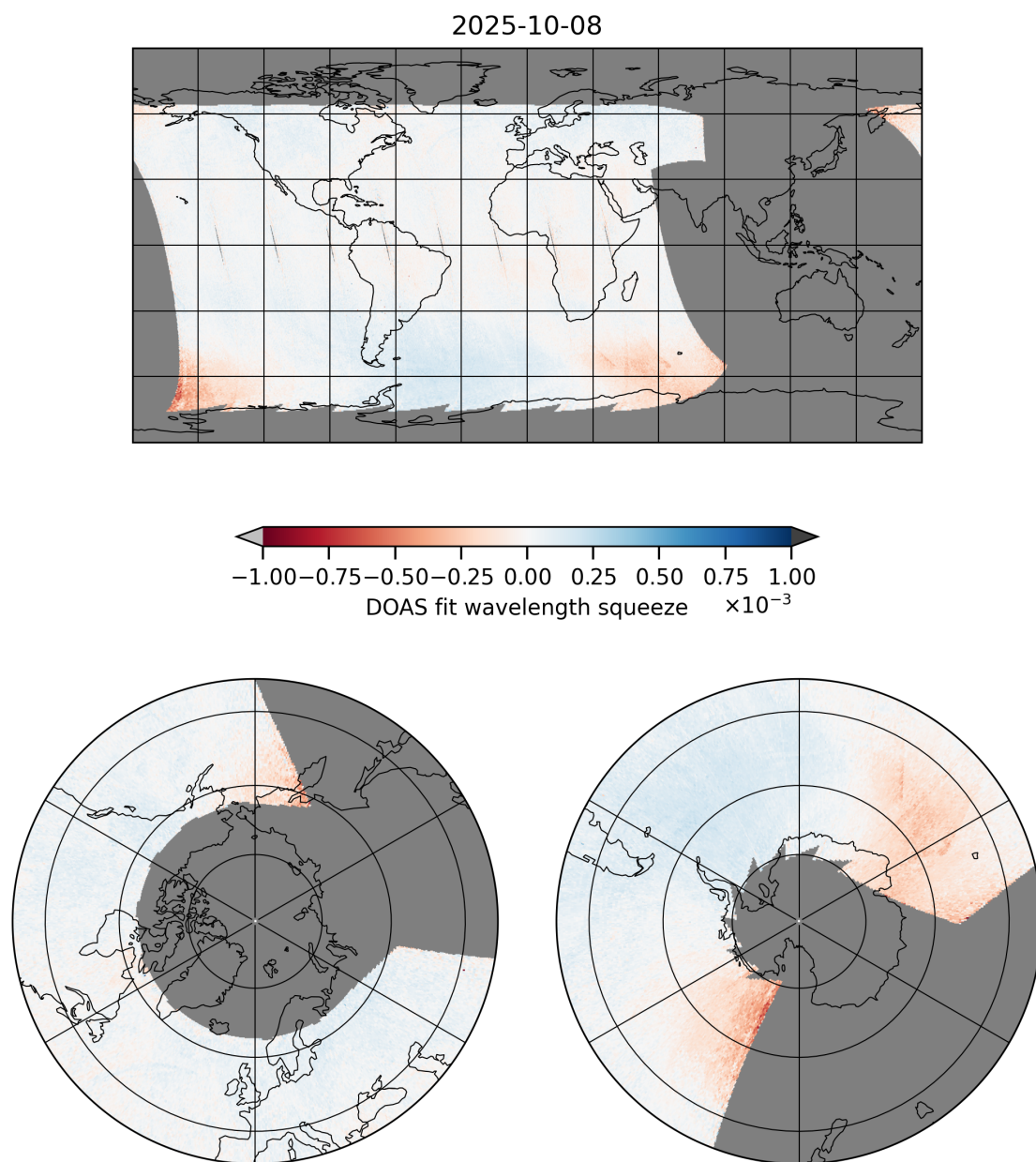


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-10-08 to 2025-10-09

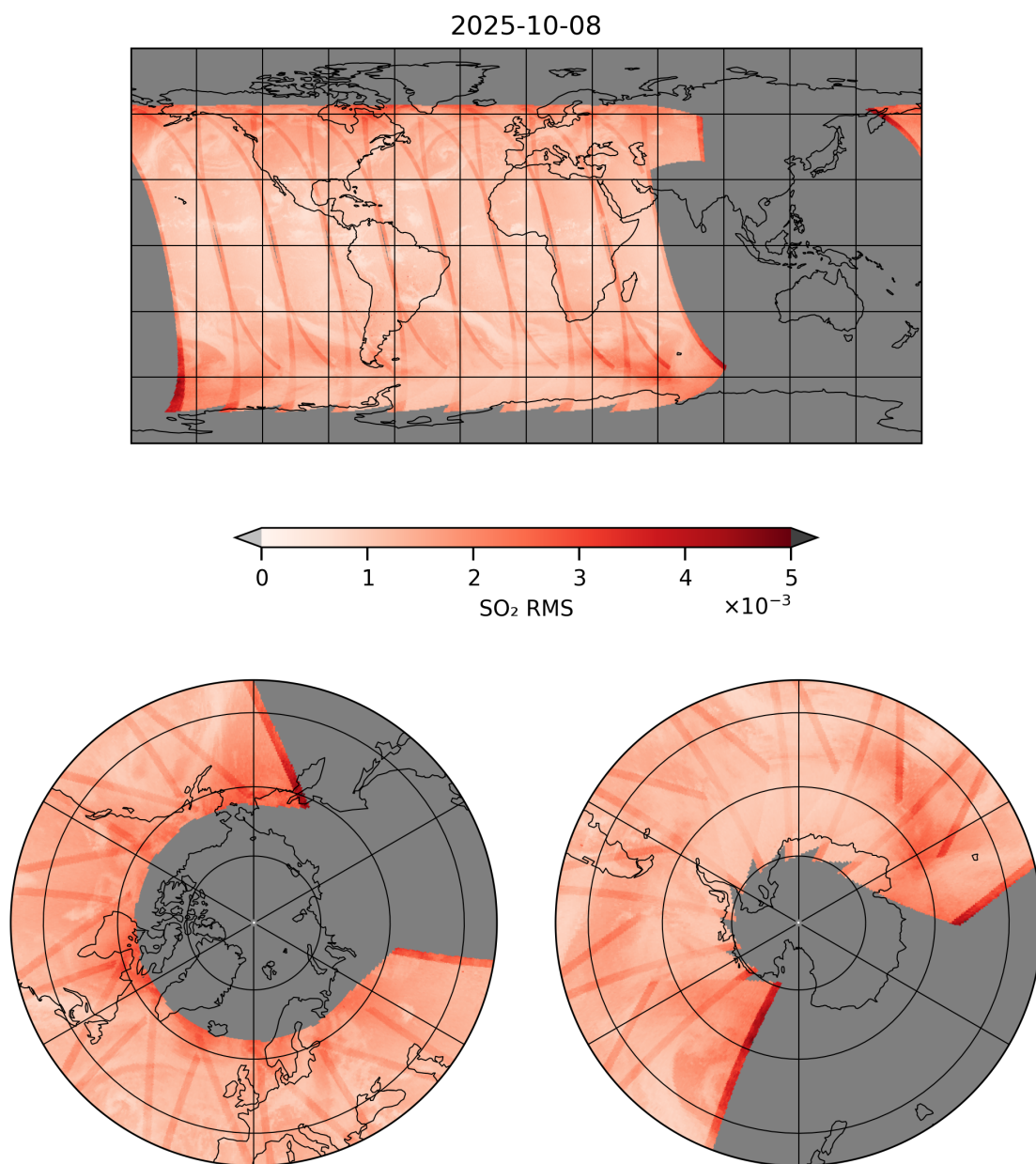


Figure 24: Map of “SO₂ RMS” for 2025-10-08 to 2025-10-09

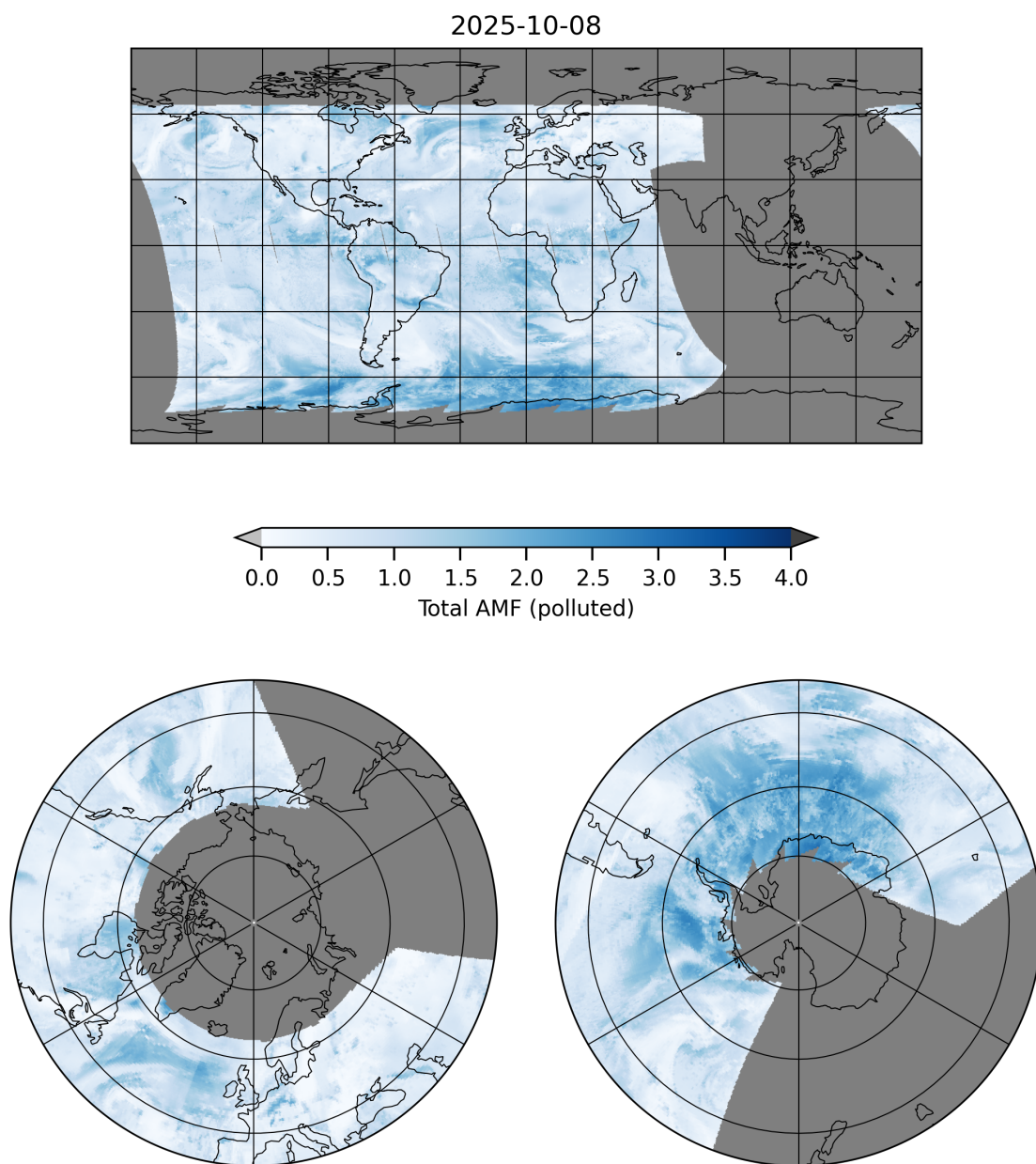


Figure 25: Map of “Total AMF (polluted)” for 2025-10-08 to 2025-10-09

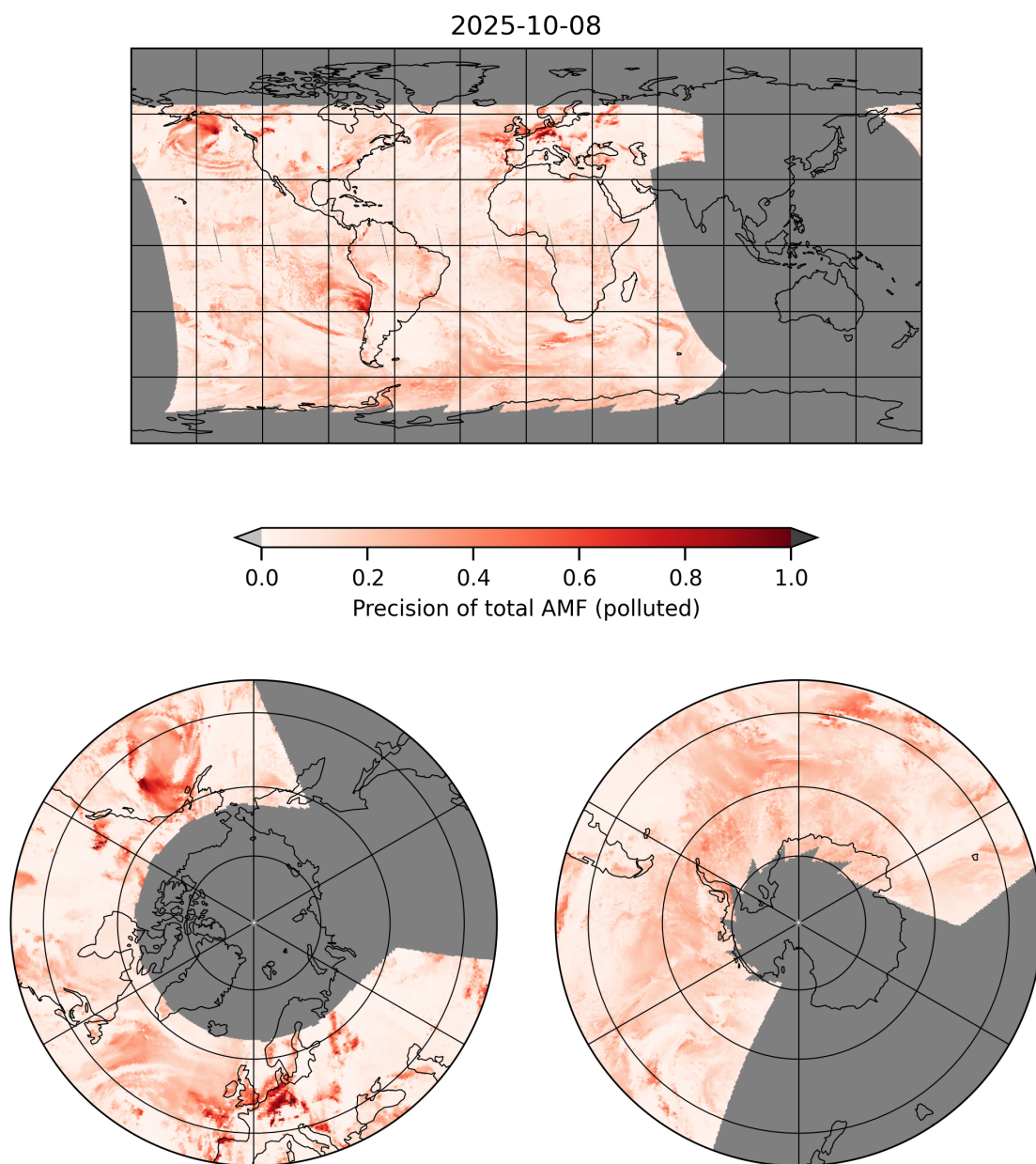


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-10-08 to 2025-10-09

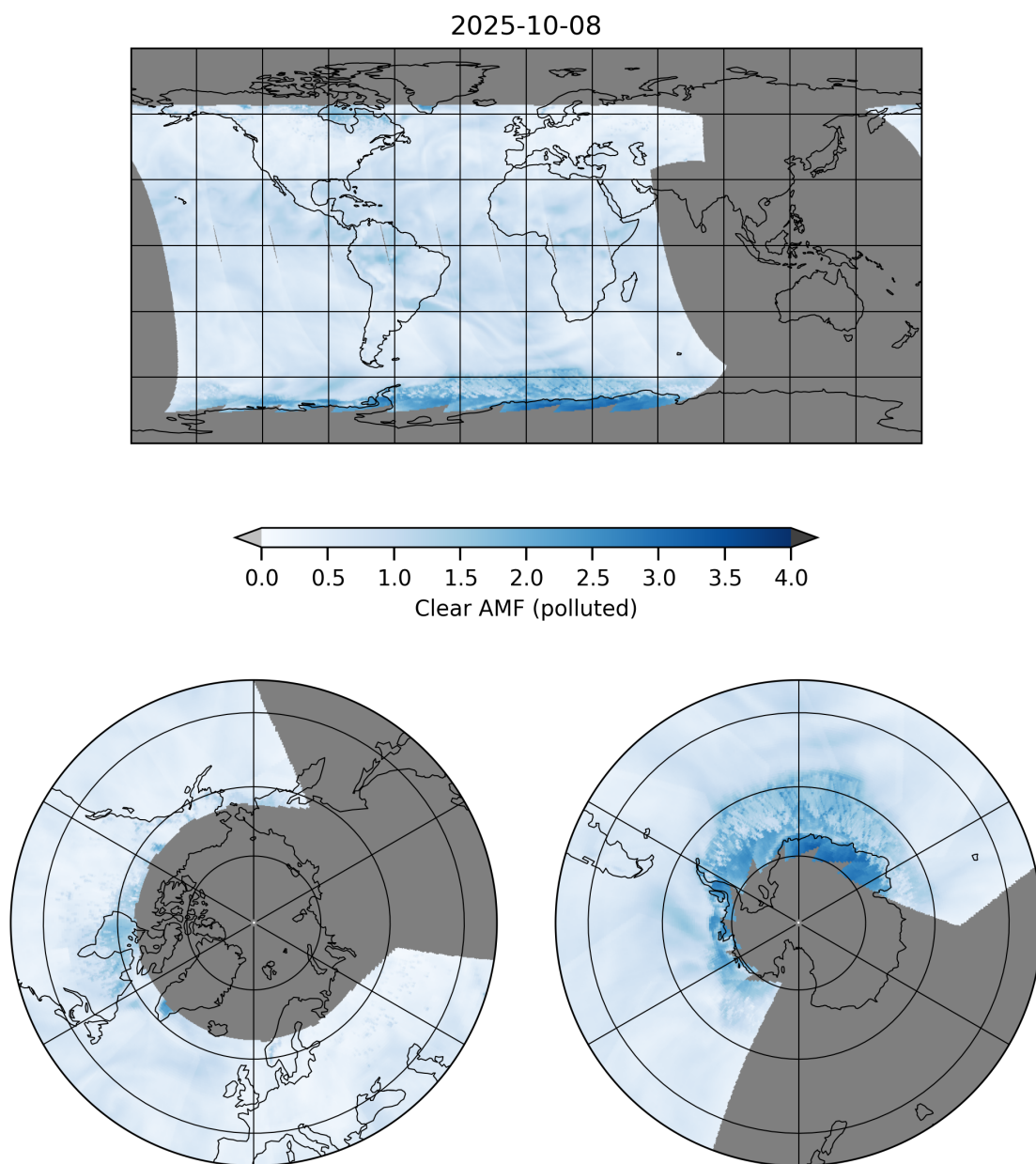


Figure 27: Map of “Clear AMF (polluted)” for 2025-10-08 to 2025-10-09

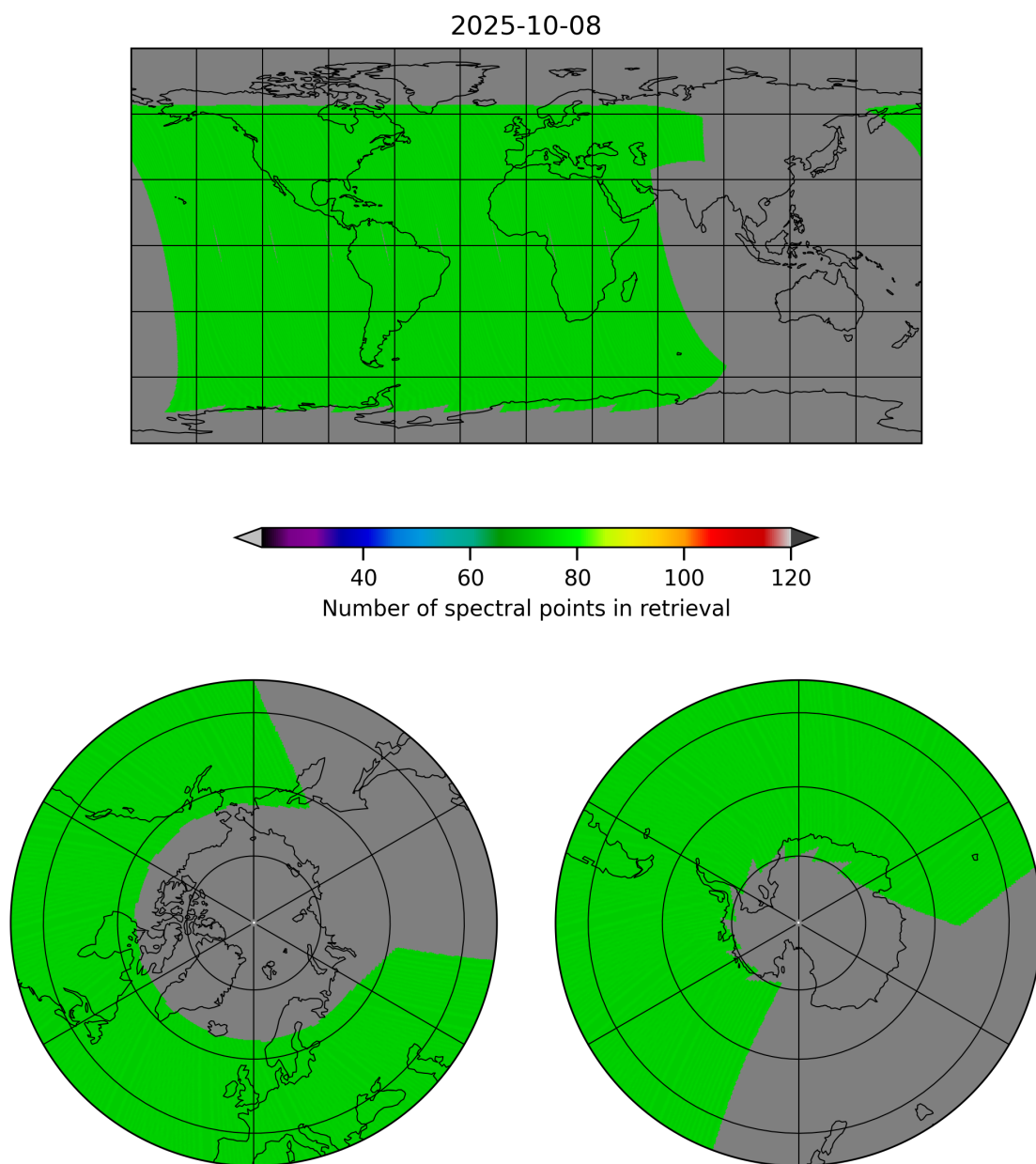


Figure 28: Map of “Number of spectral points in retrieval” for 2025-10-08 to 2025-10-09

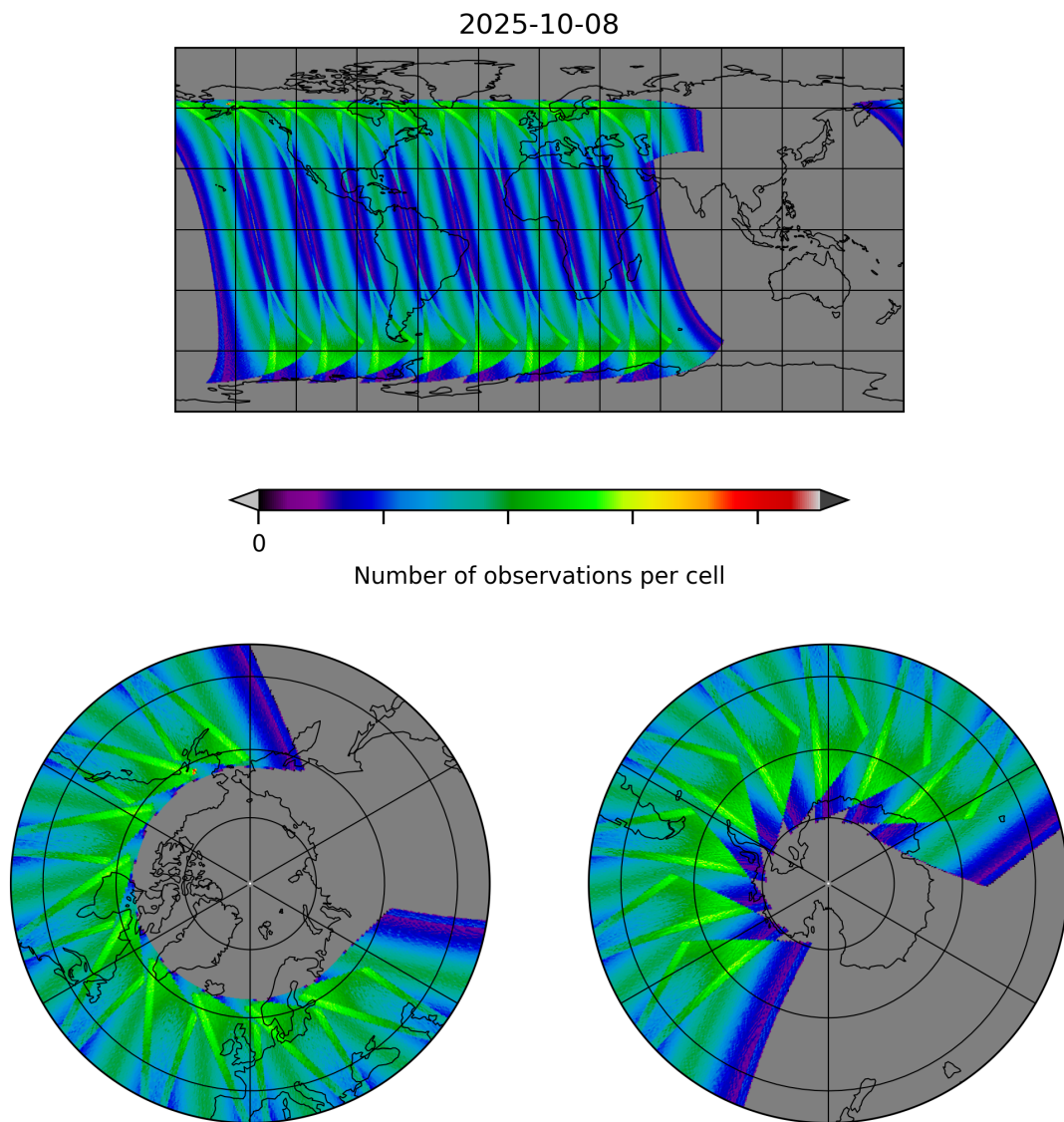


Figure 29: Map of the number of observations for 2025-10-08 to 2025-10-09

7 Zonal average

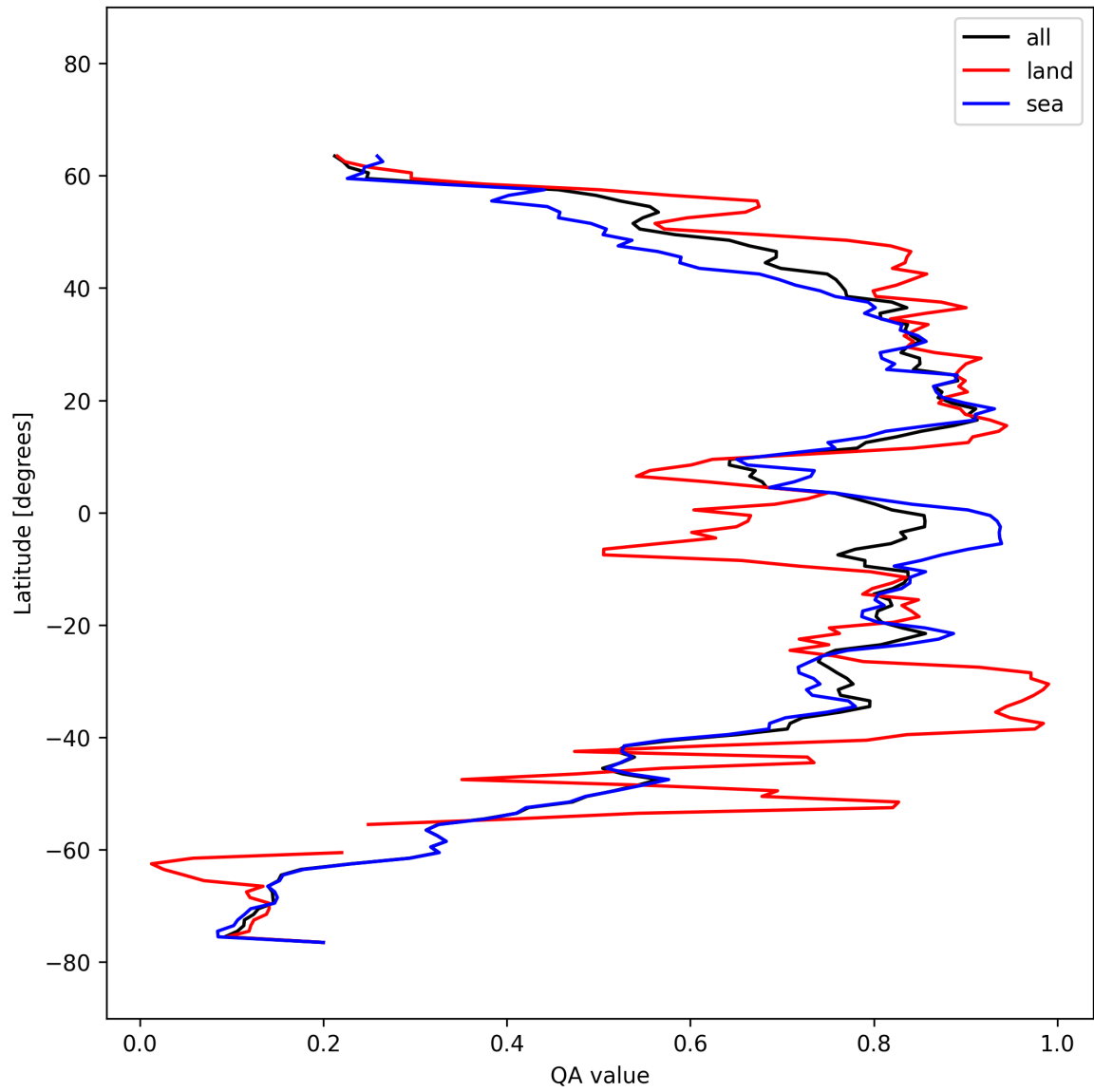


Figure 30: Zonal average of “QA value” for 2025-10-08 to 2025-10-09.

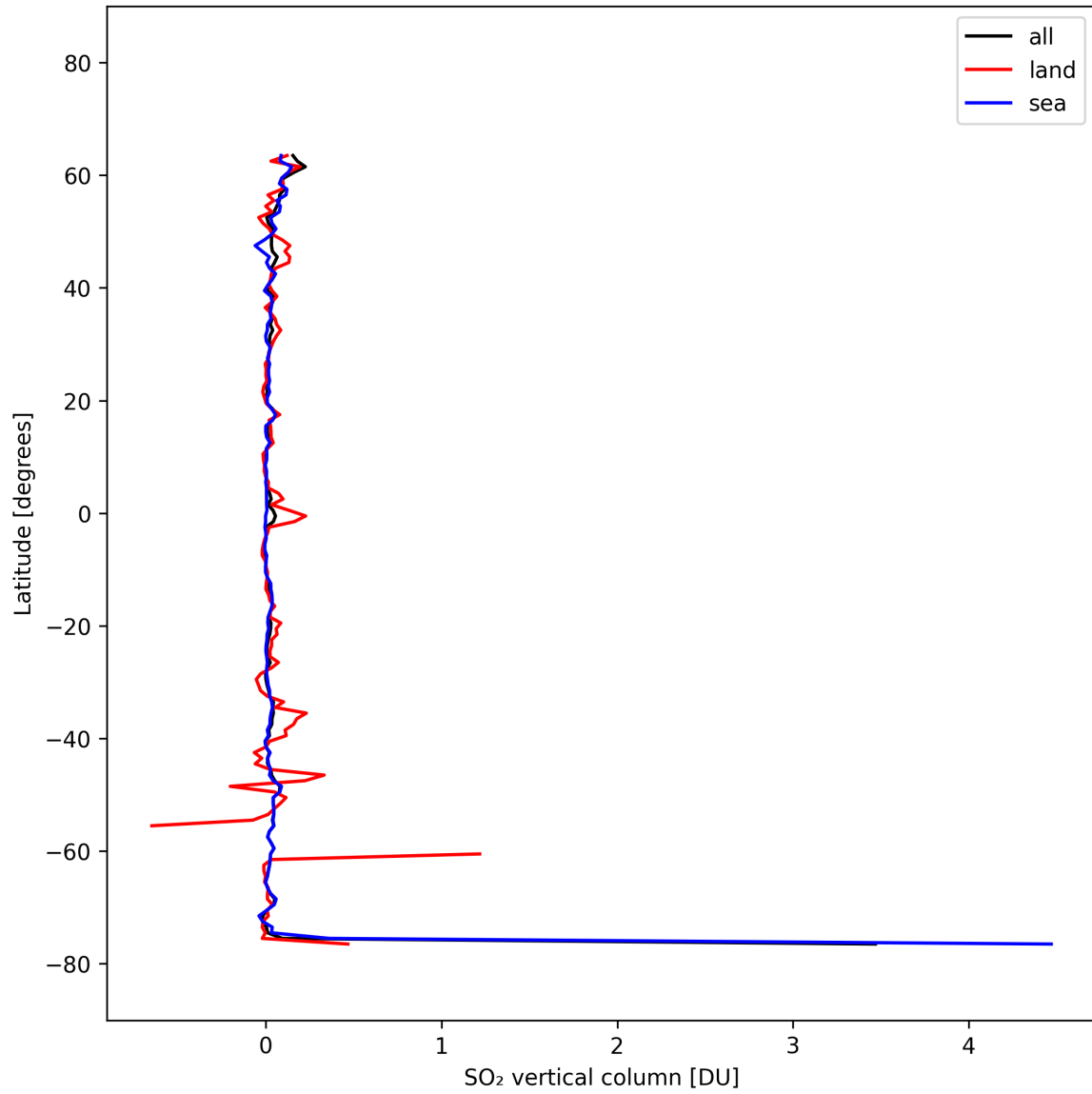


Figure 31: Zonal average of “SO₂ vertical column” for 2025-10-08 to 2025-10-09.

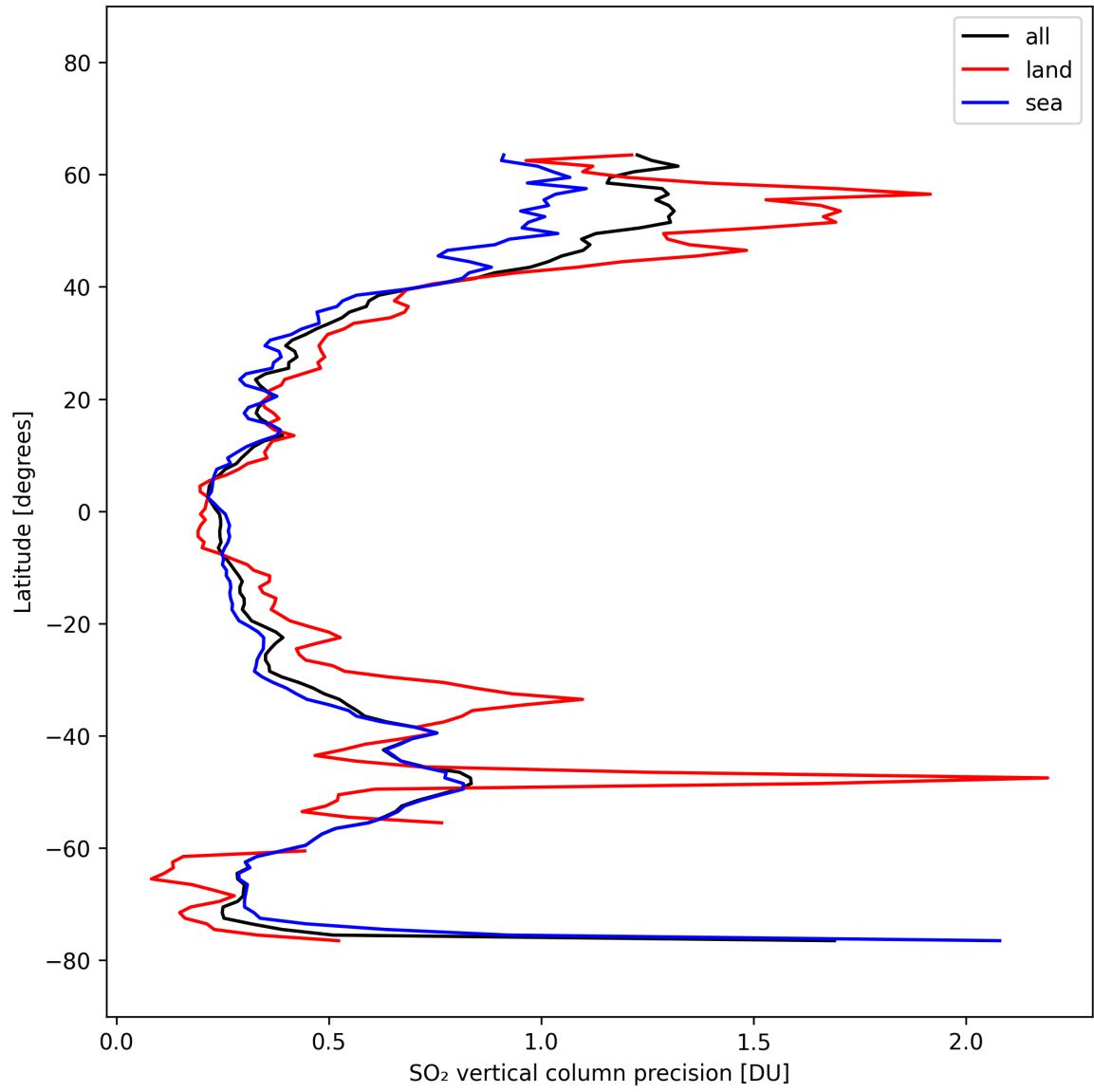


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-10-08 to 2025-10-09.

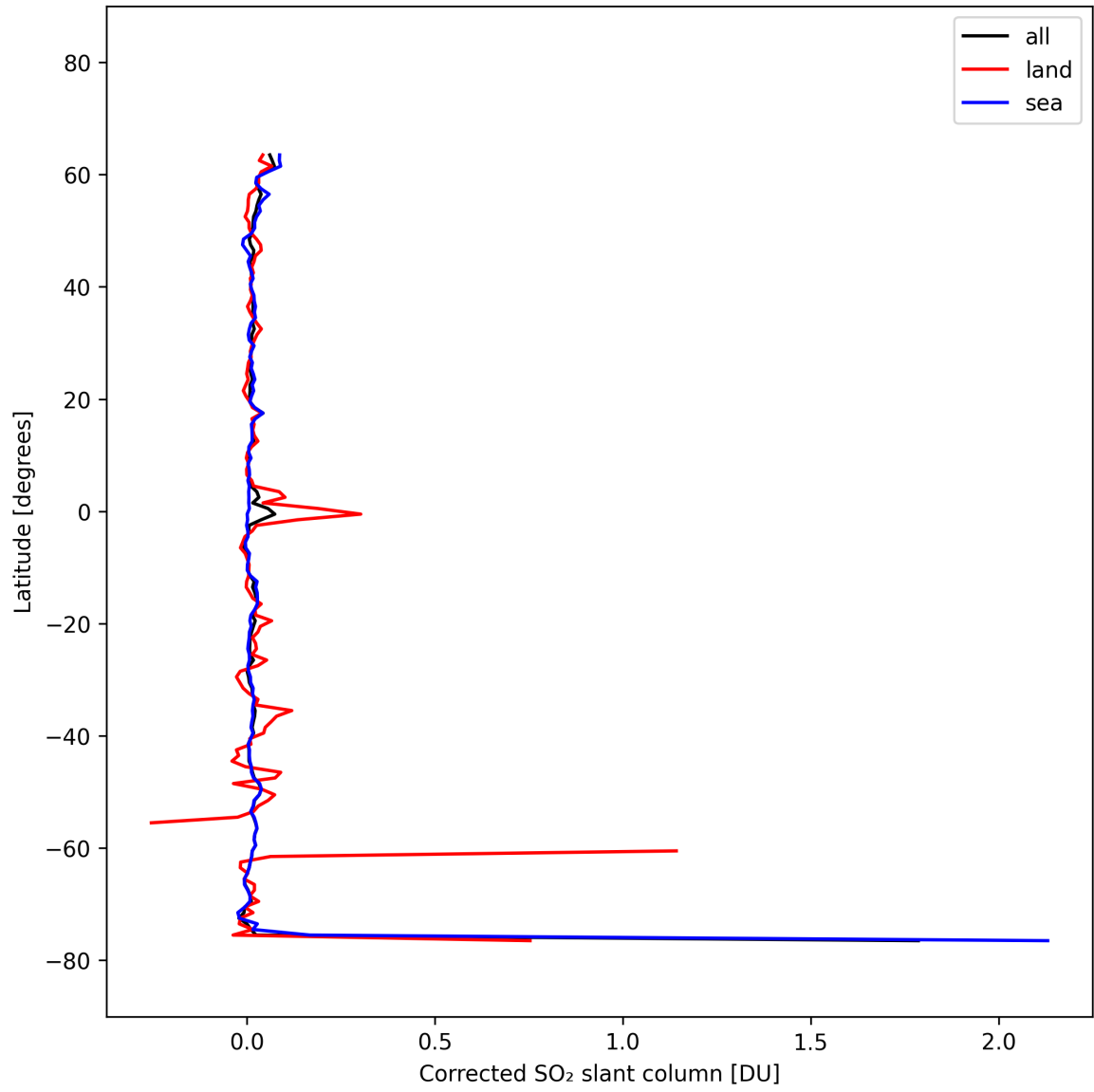


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-10-08 to 2025-10-09.

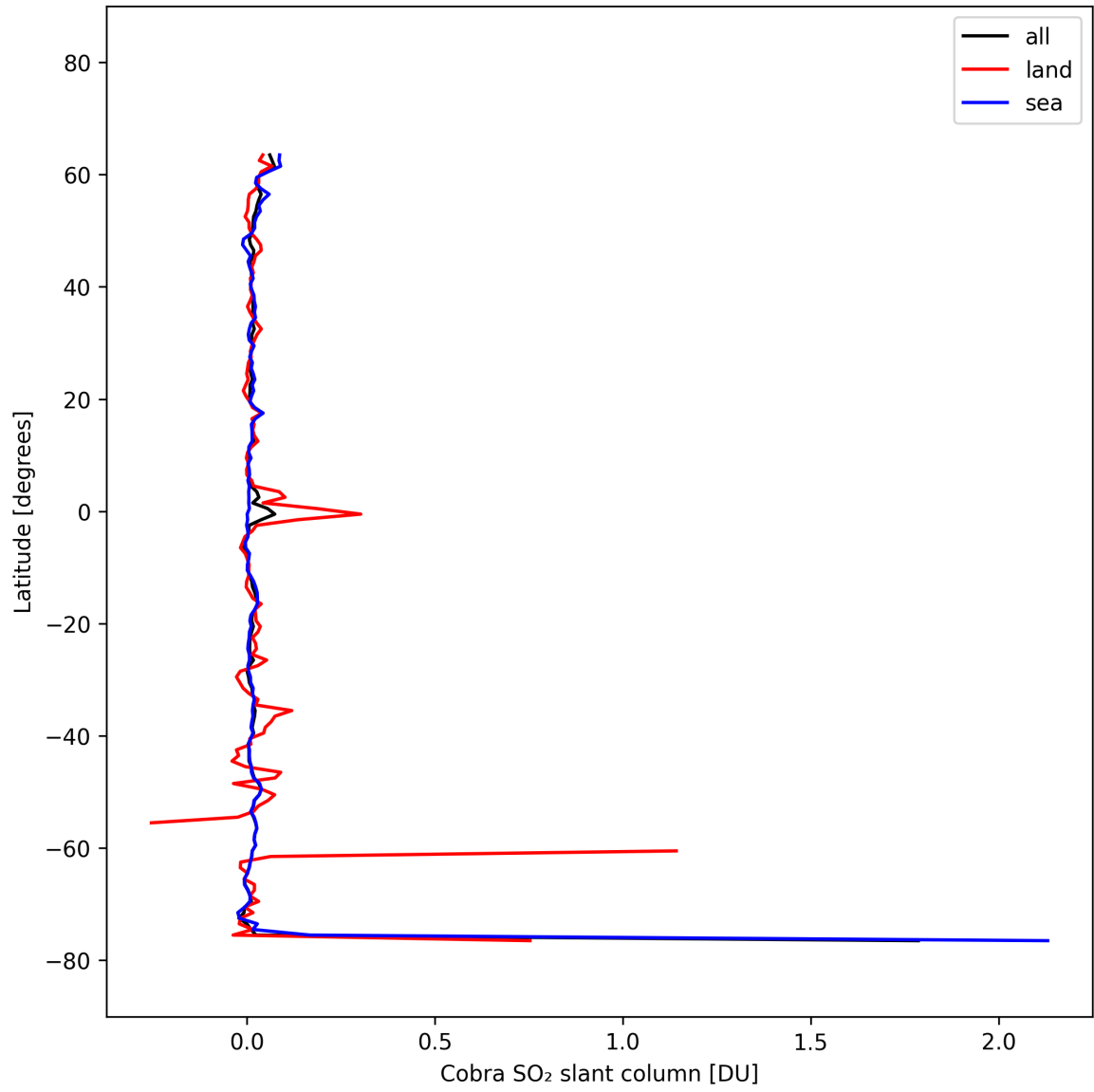


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-10-08 to 2025-10-09.

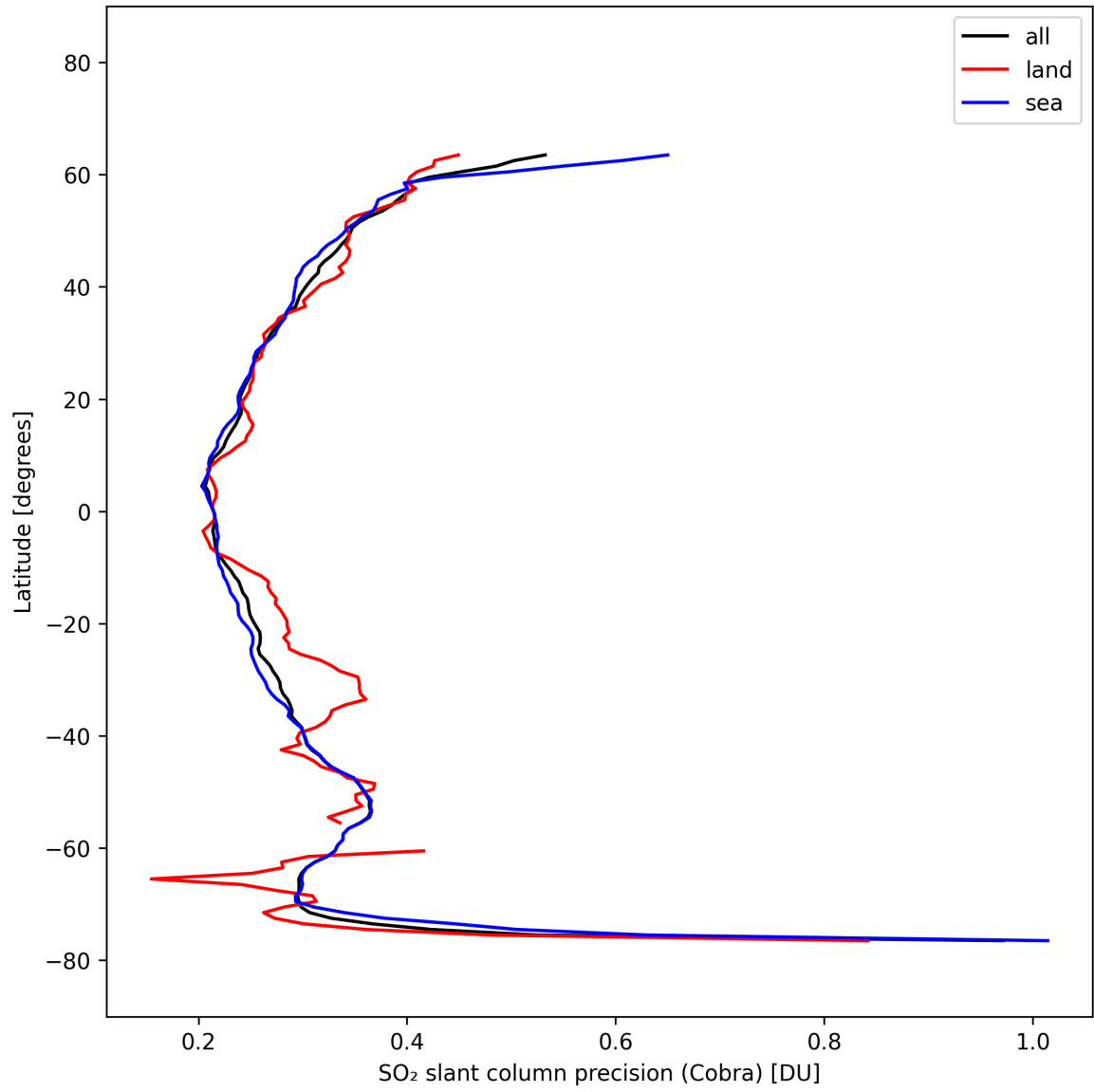


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-10-08 to 2025-10-09.

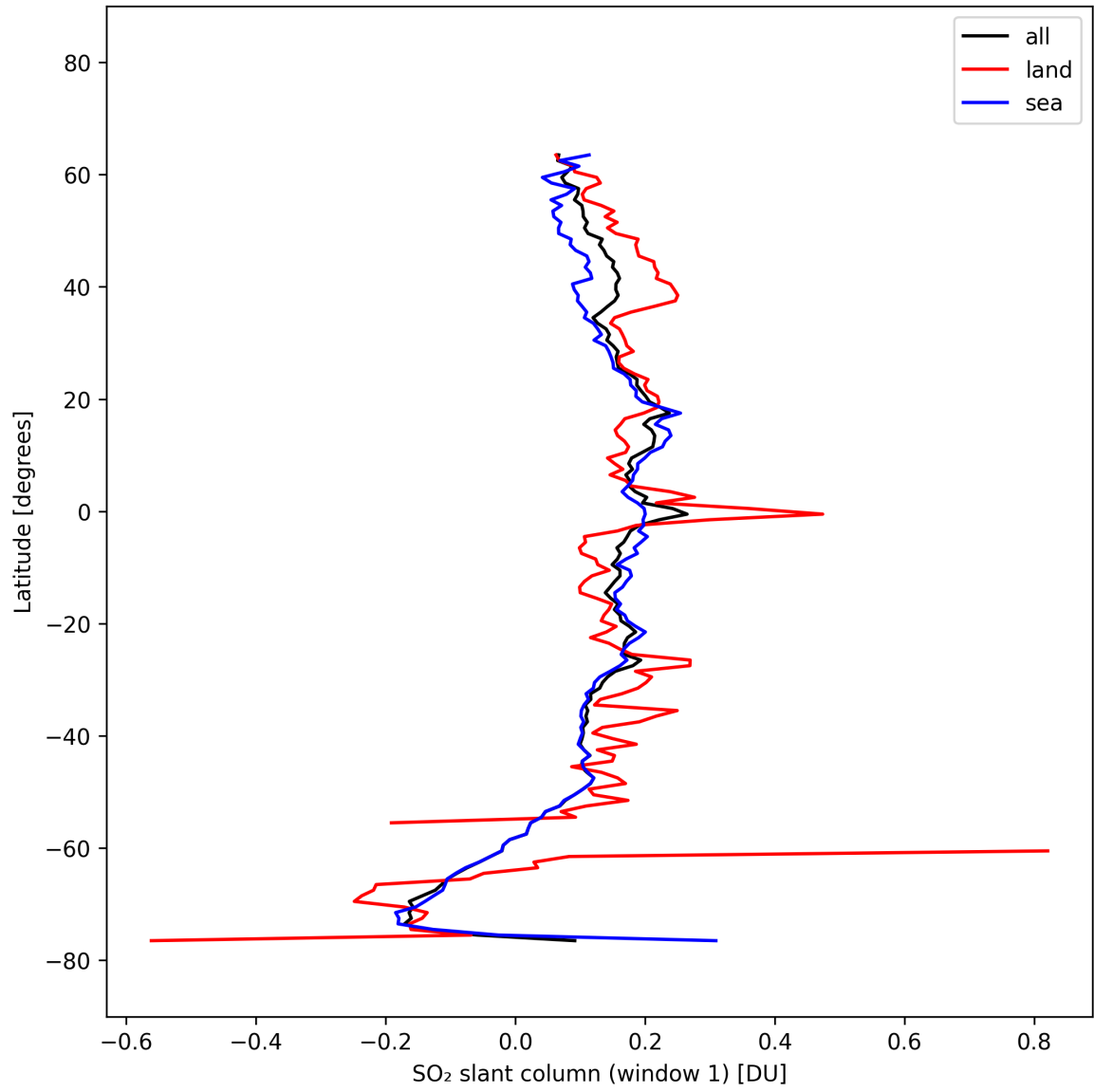


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-10-08 to 2025-10-09.

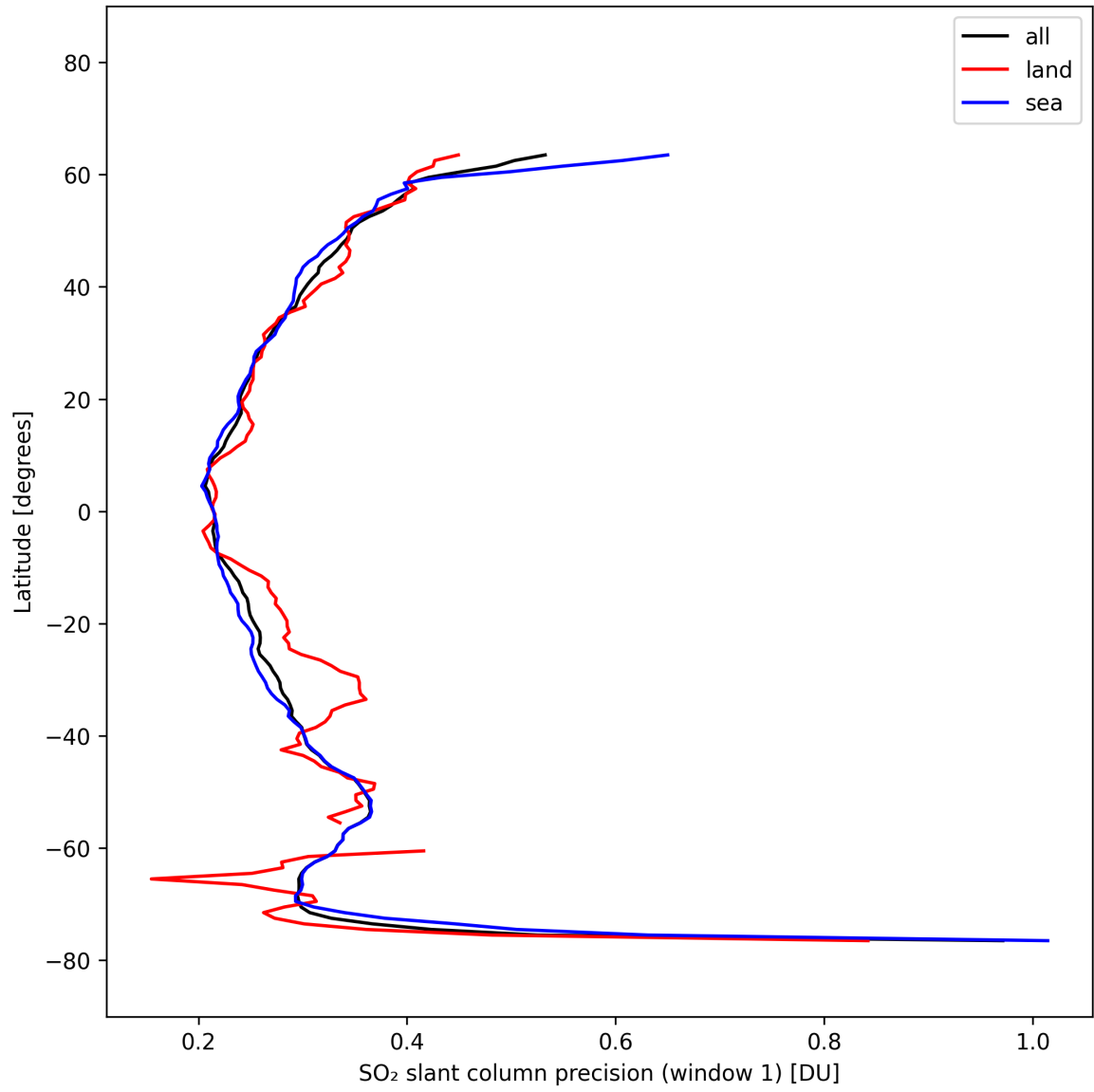


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-10-08 to 2025-10-09.

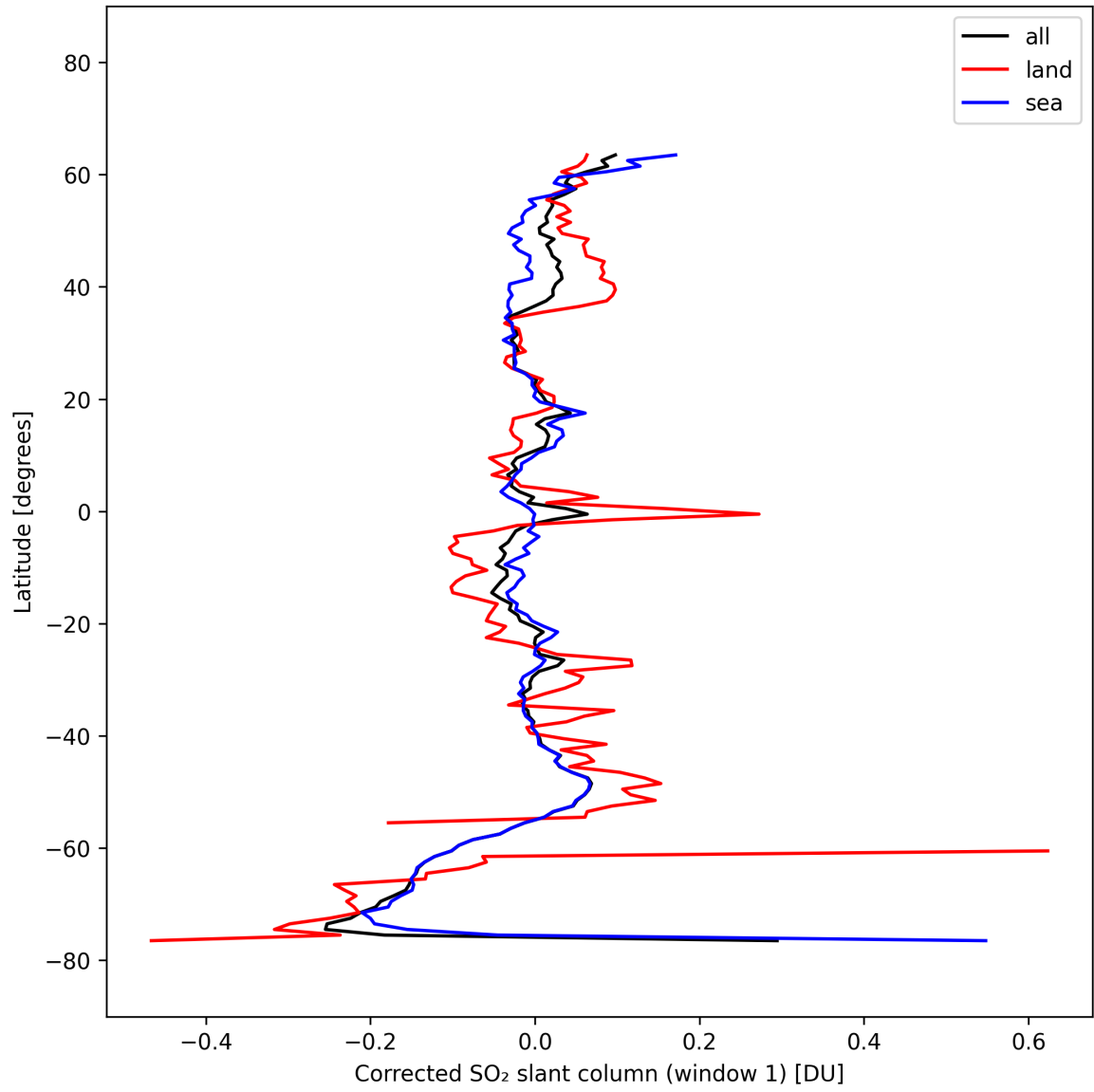


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-10-08 to 2025-10-09.

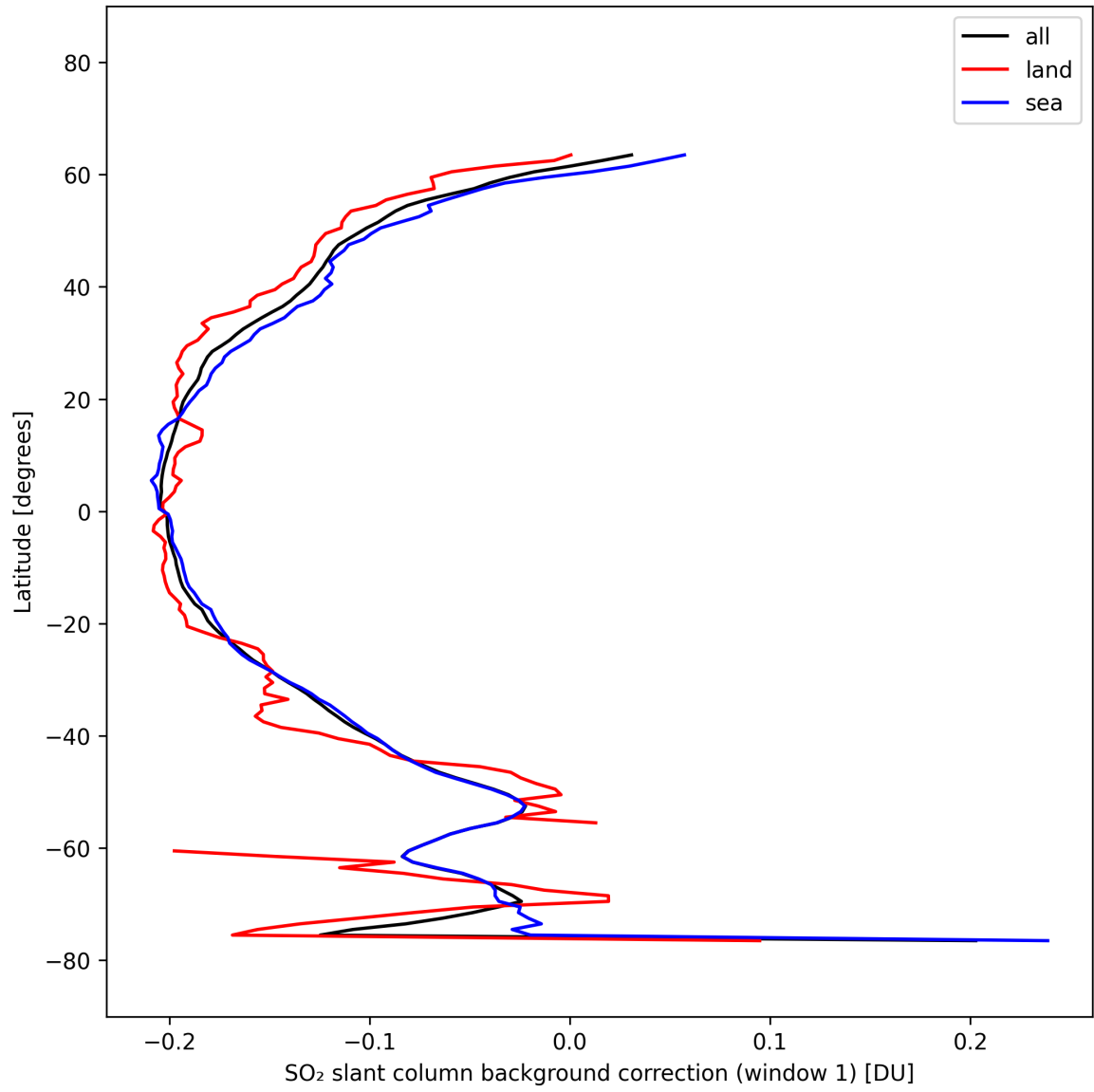


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-10-08 to 2025-10-09.

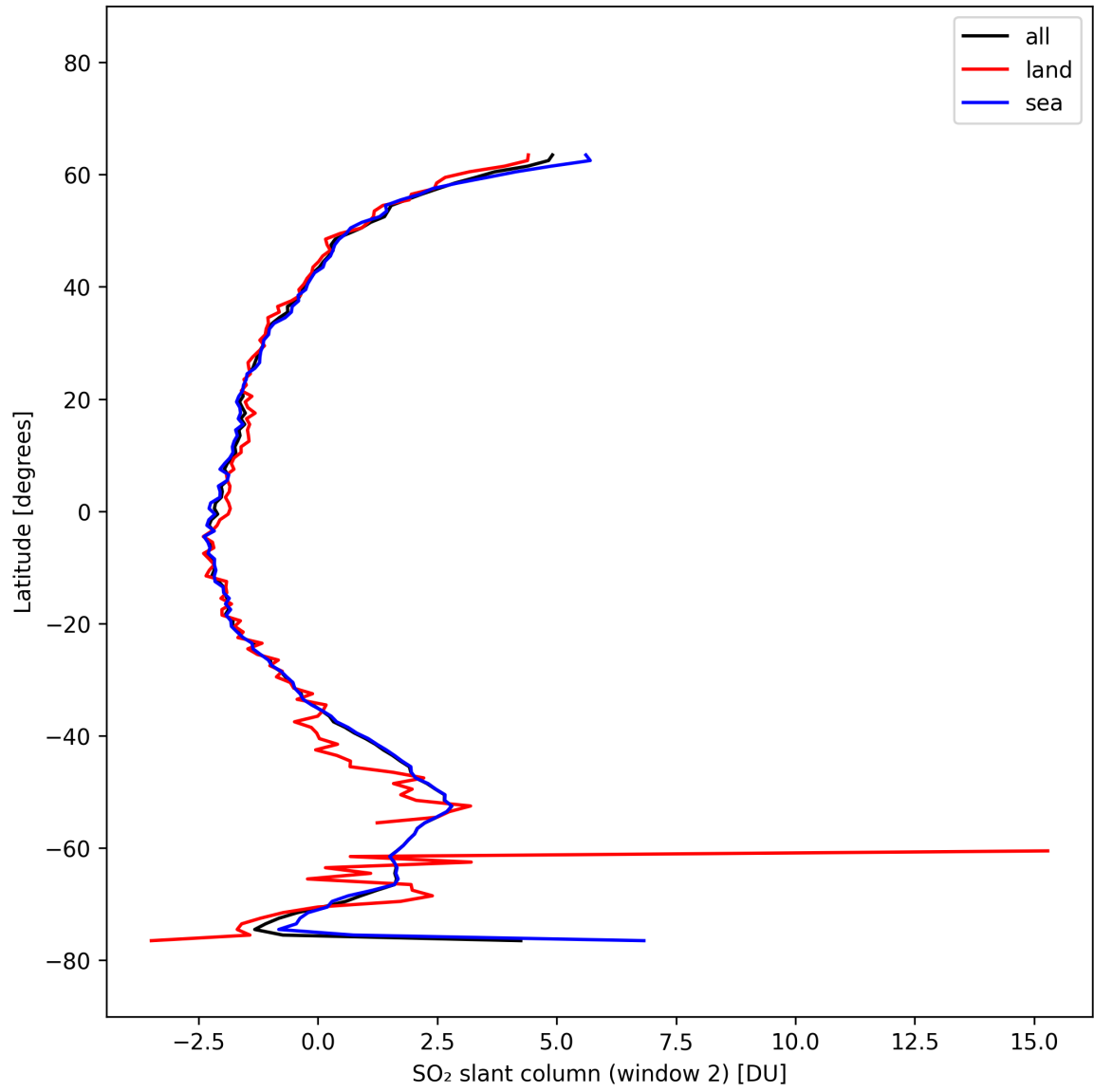


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-10-08 to 2025-10-09.

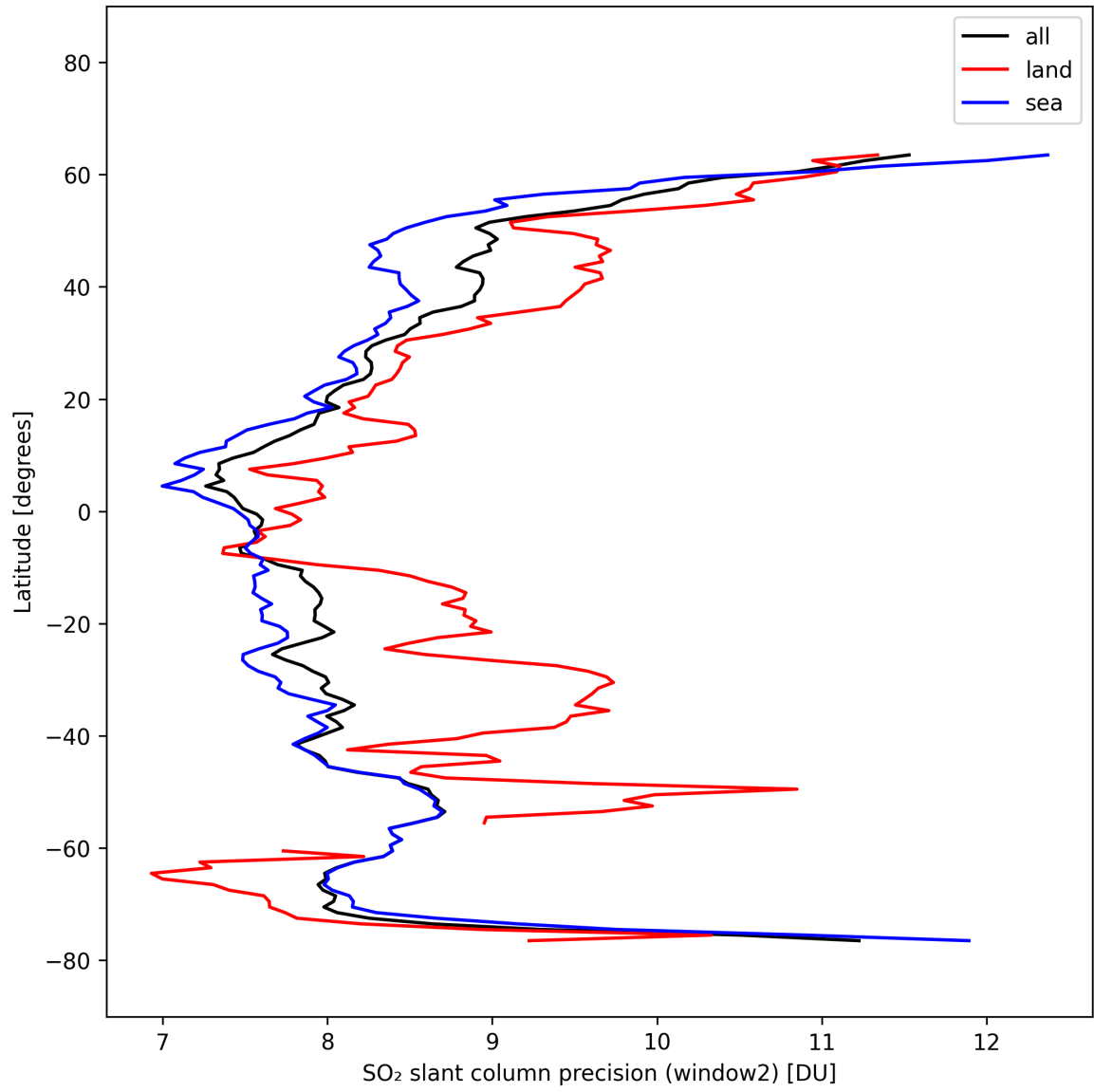


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-10-08 to 2025-10-09.

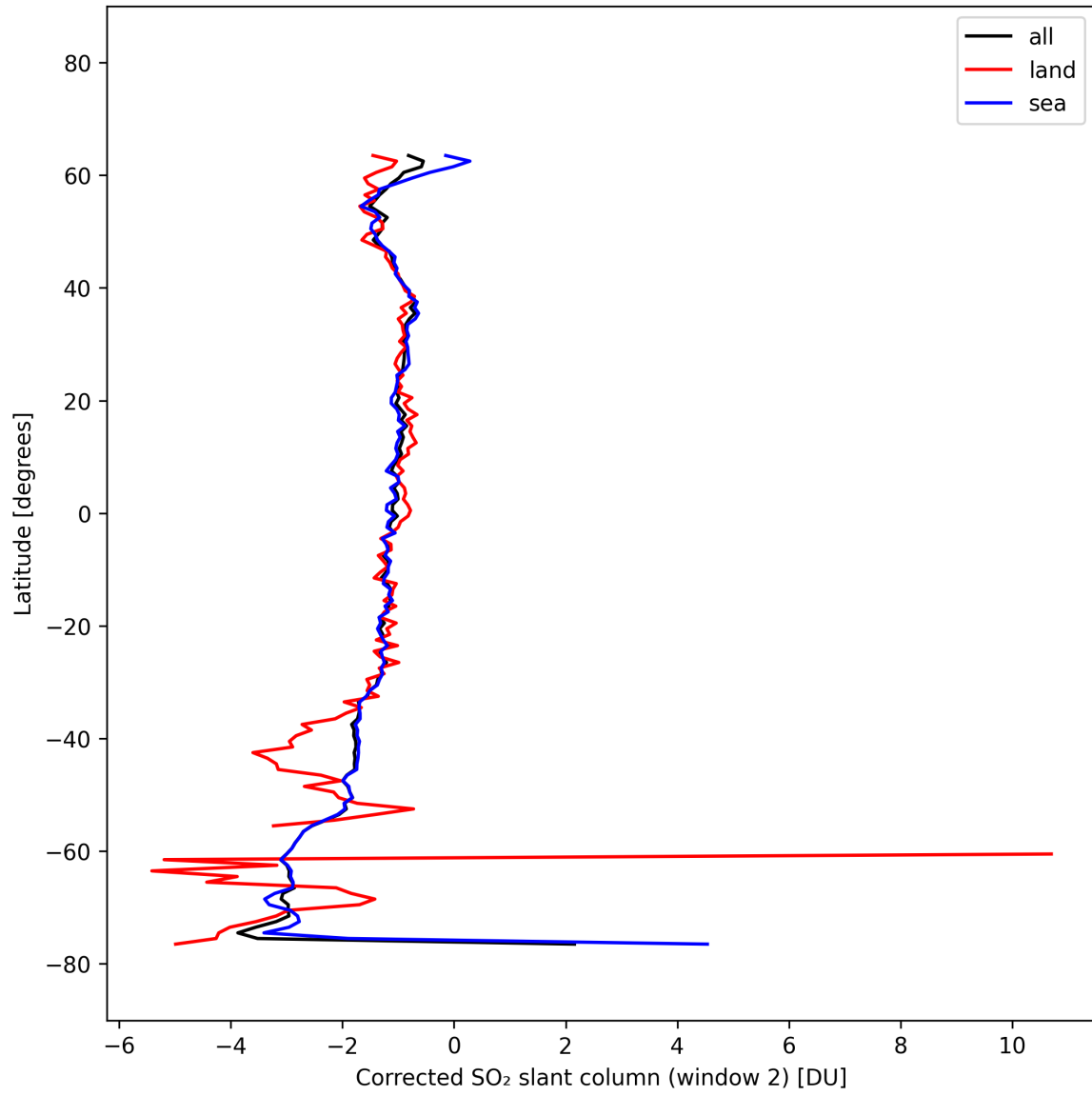


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-10-08 to 2025-10-09.

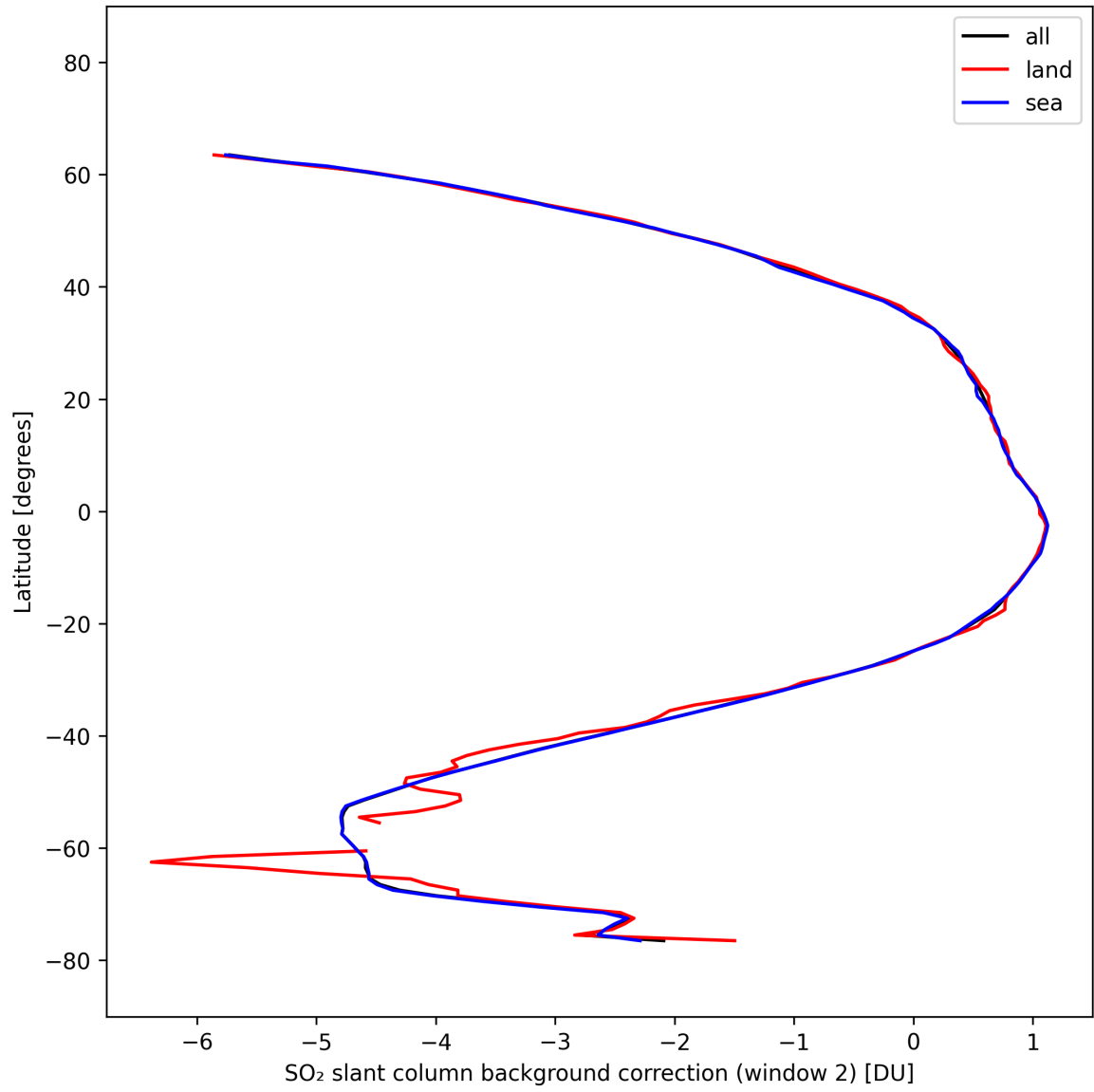


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-10-08 to 2025-10-09.

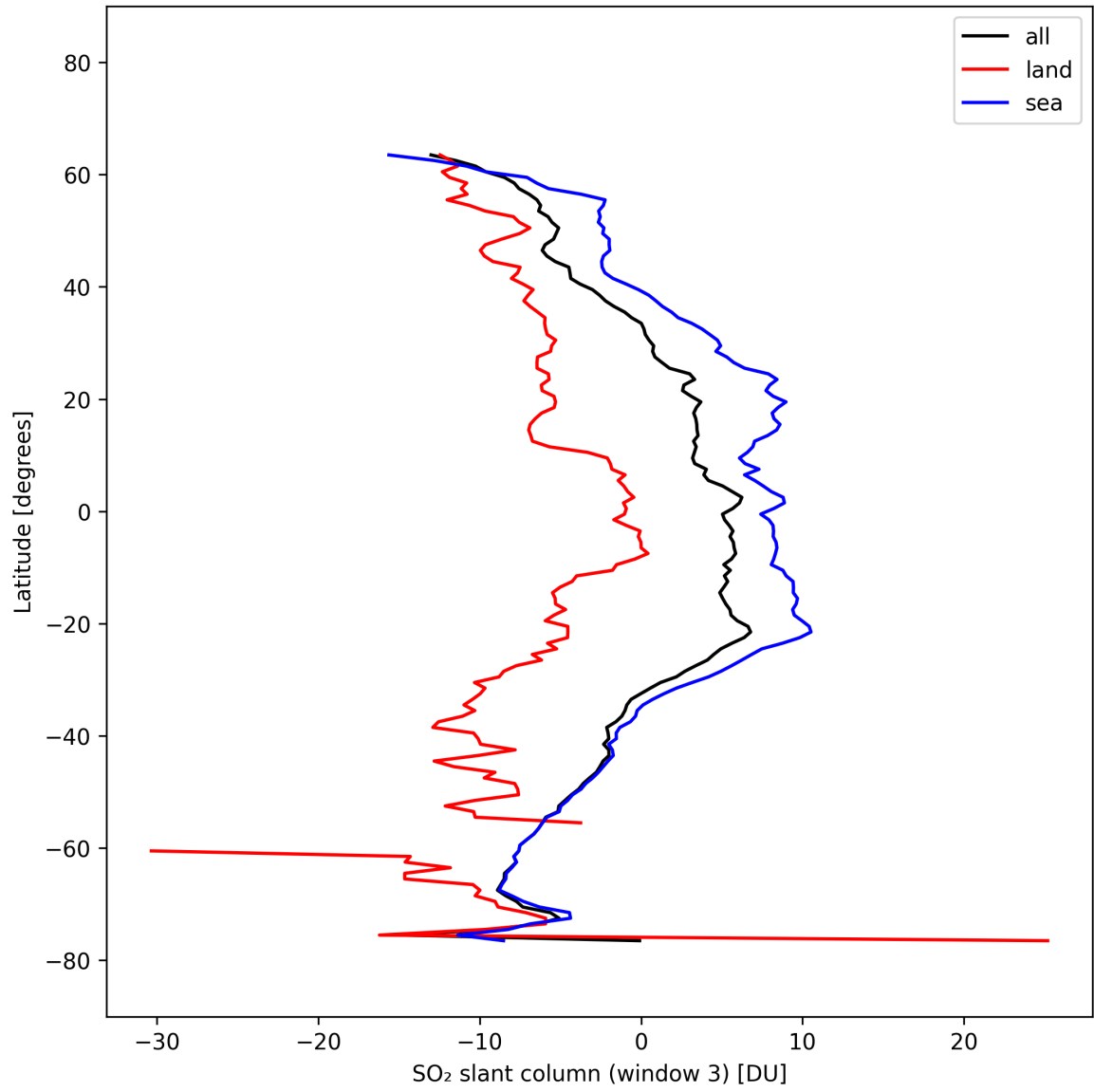


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-10-08 to 2025-10-09.

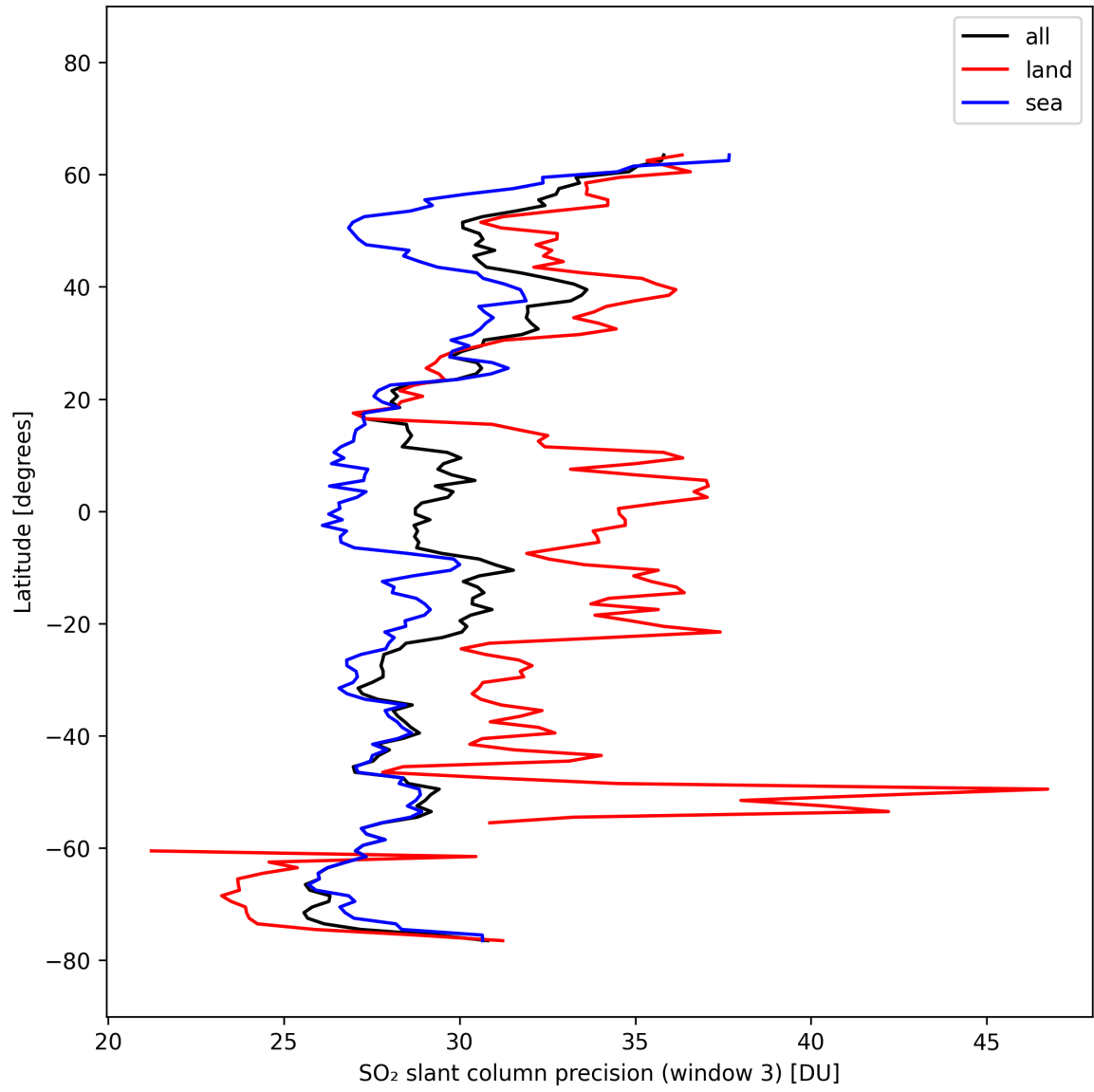


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-10-08 to 2025-10-09.

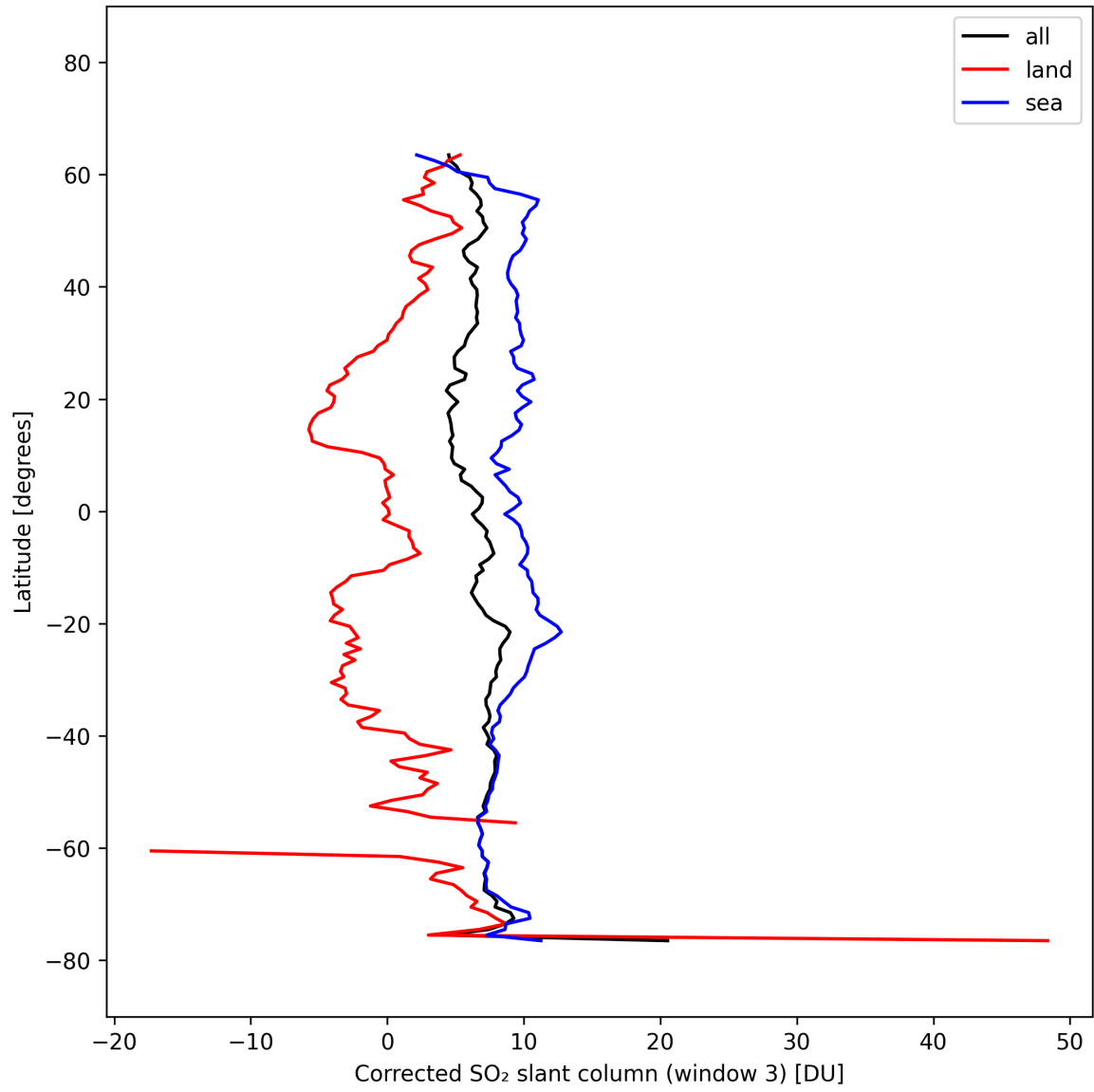


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-10-08 to 2025-10-09.

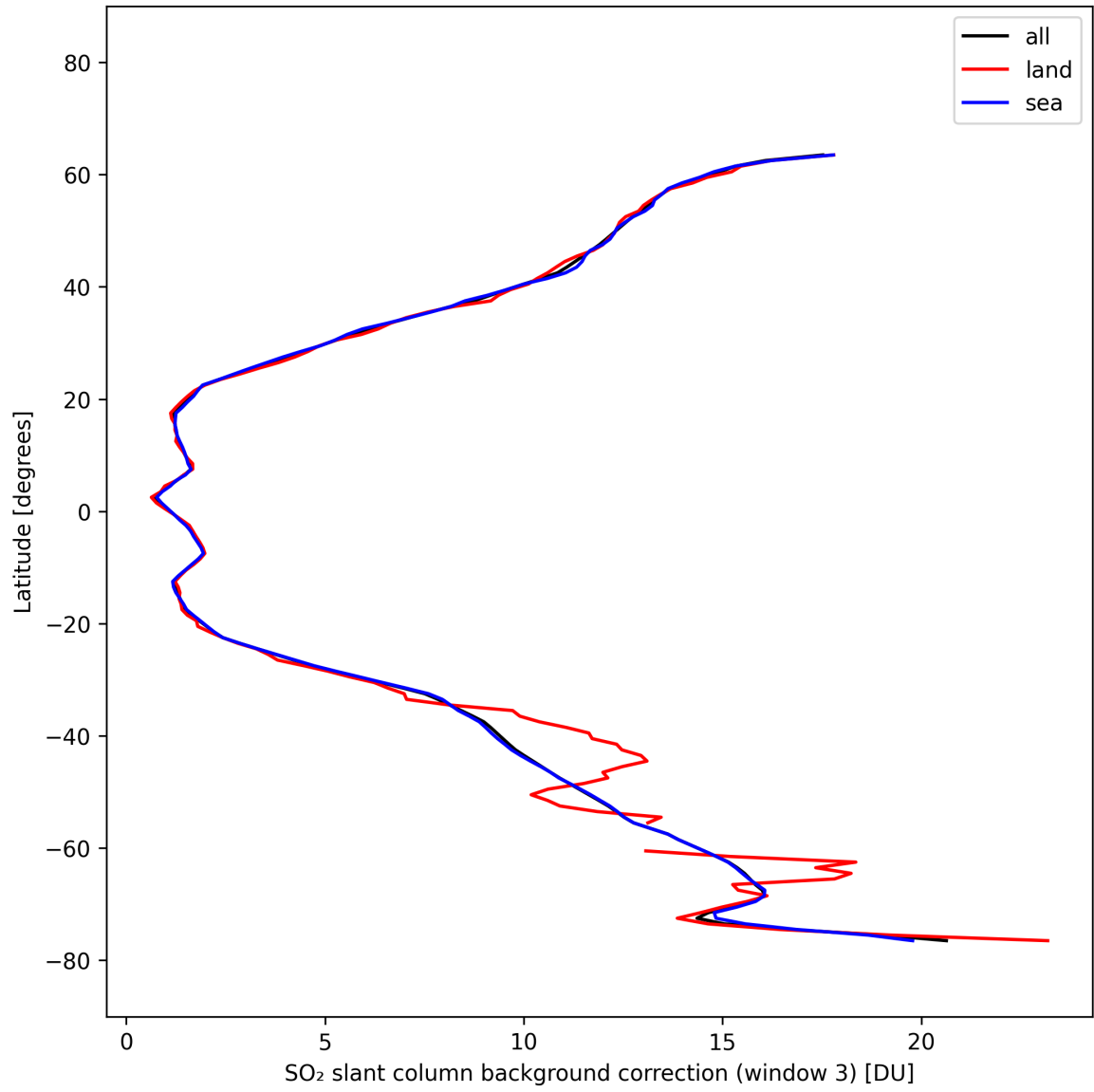


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-10-08 to 2025-10-09.

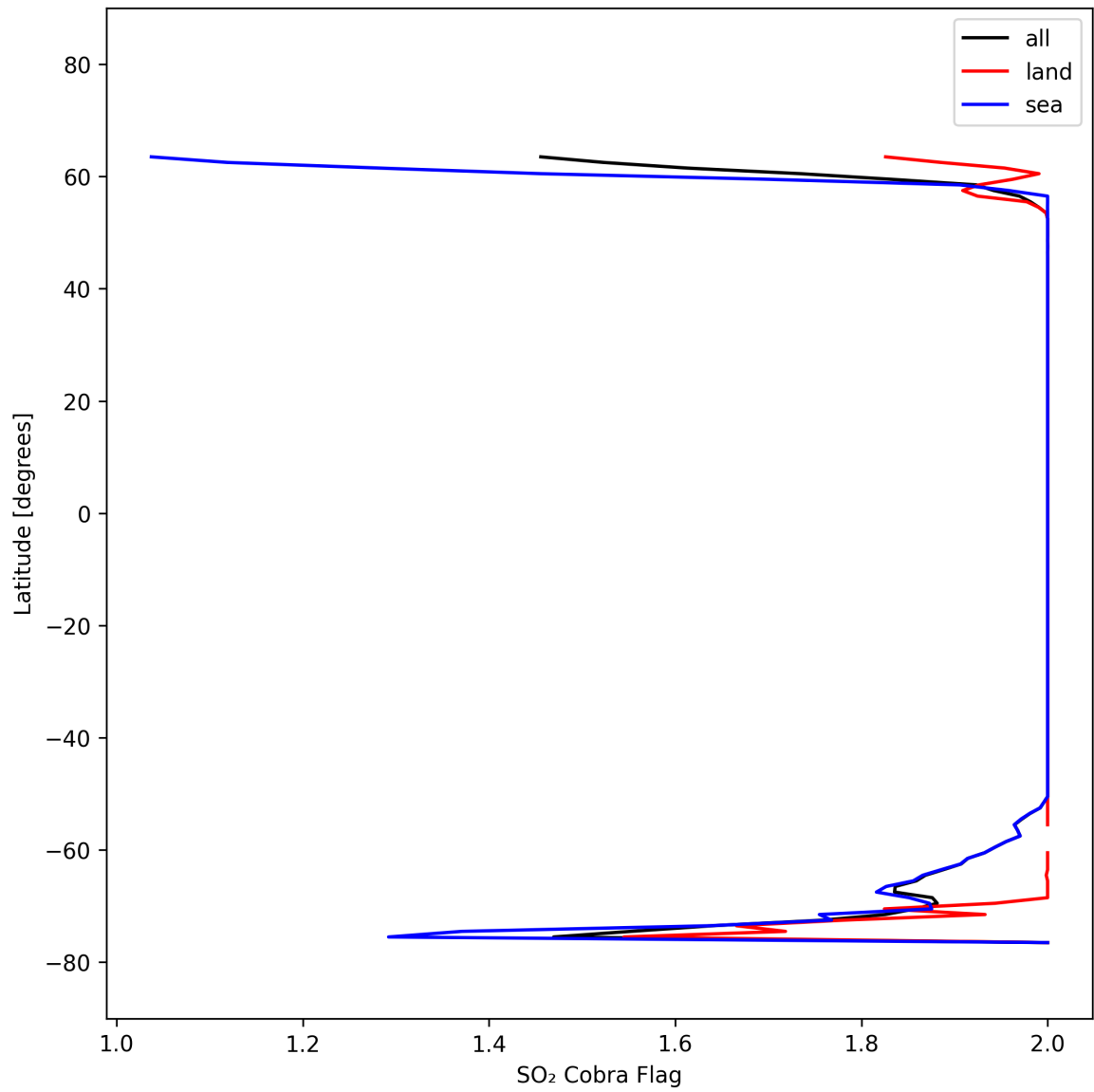


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-10-08 to 2025-10-09.

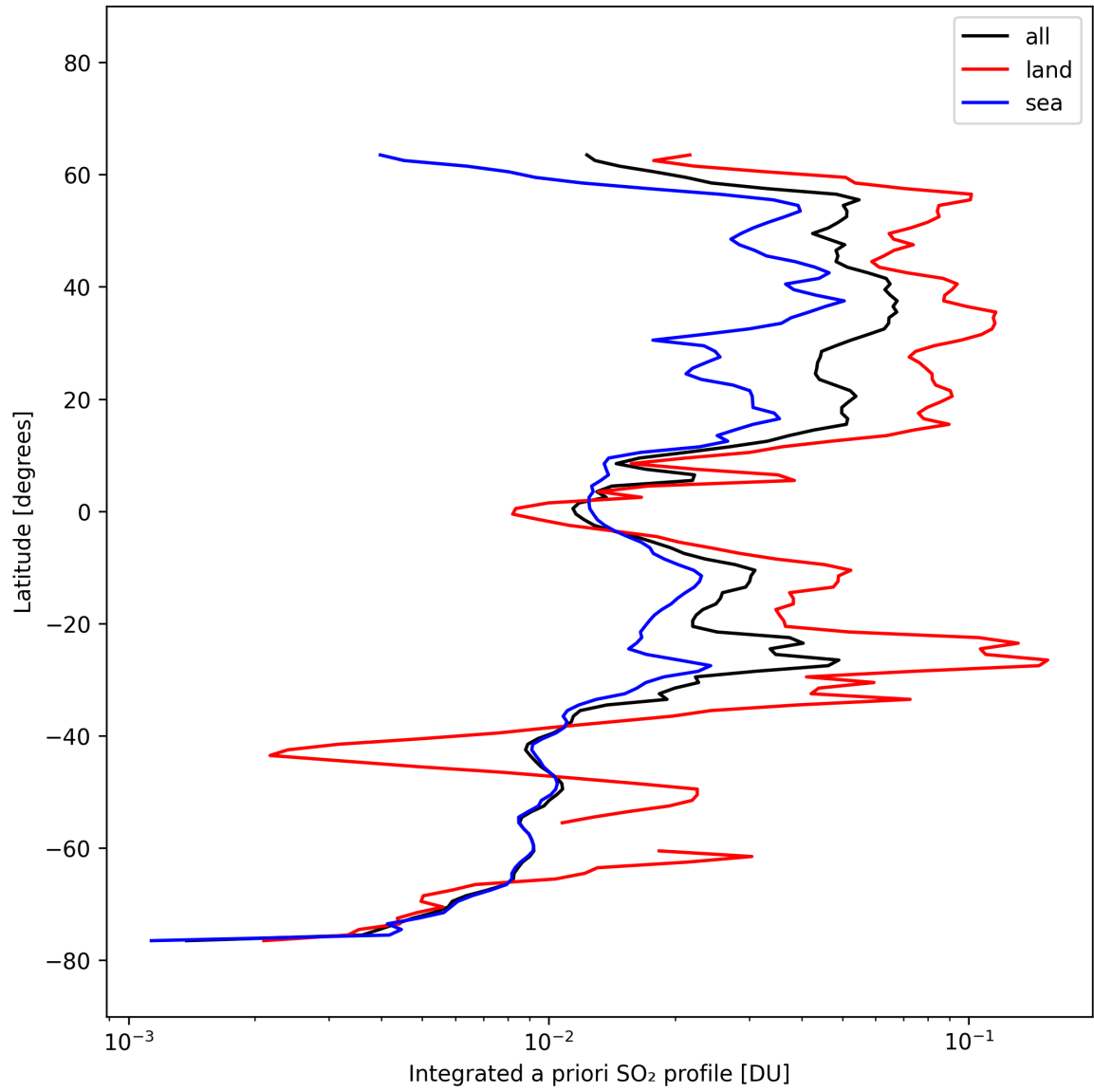


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-10-08 to 2025-10-09.

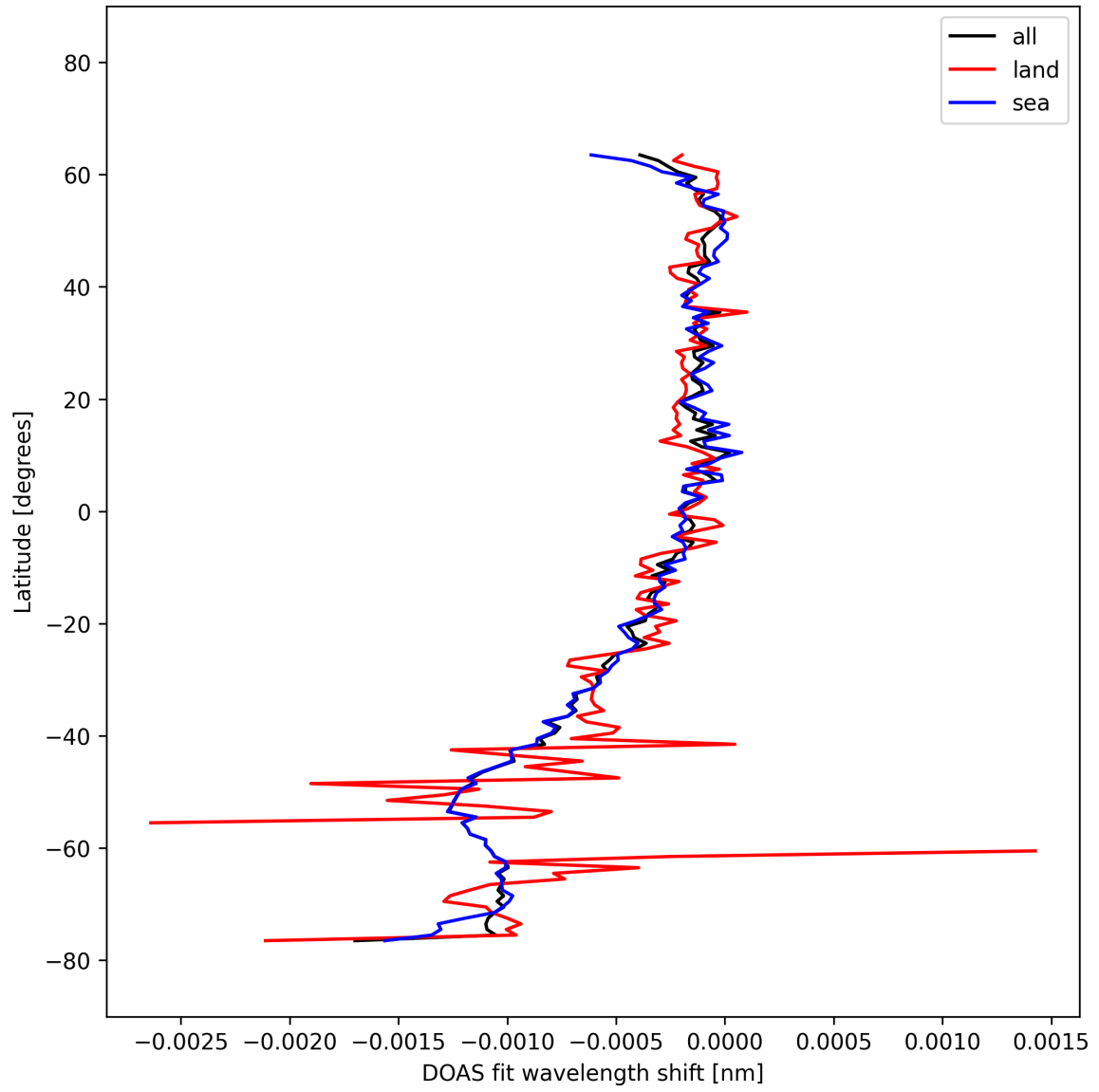


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-10-08 to 2025-10-09.

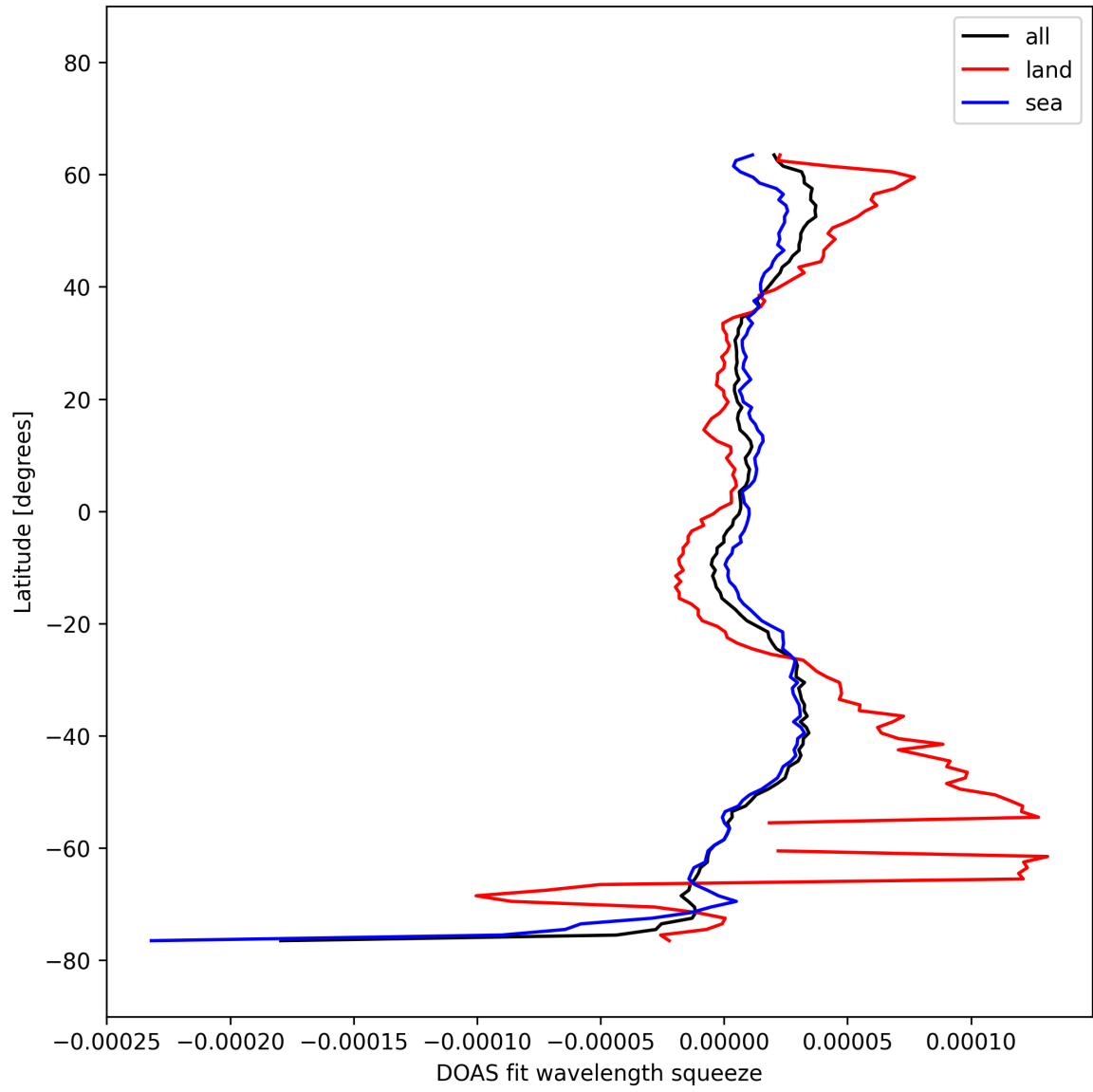


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-10-08 to 2025-10-09.

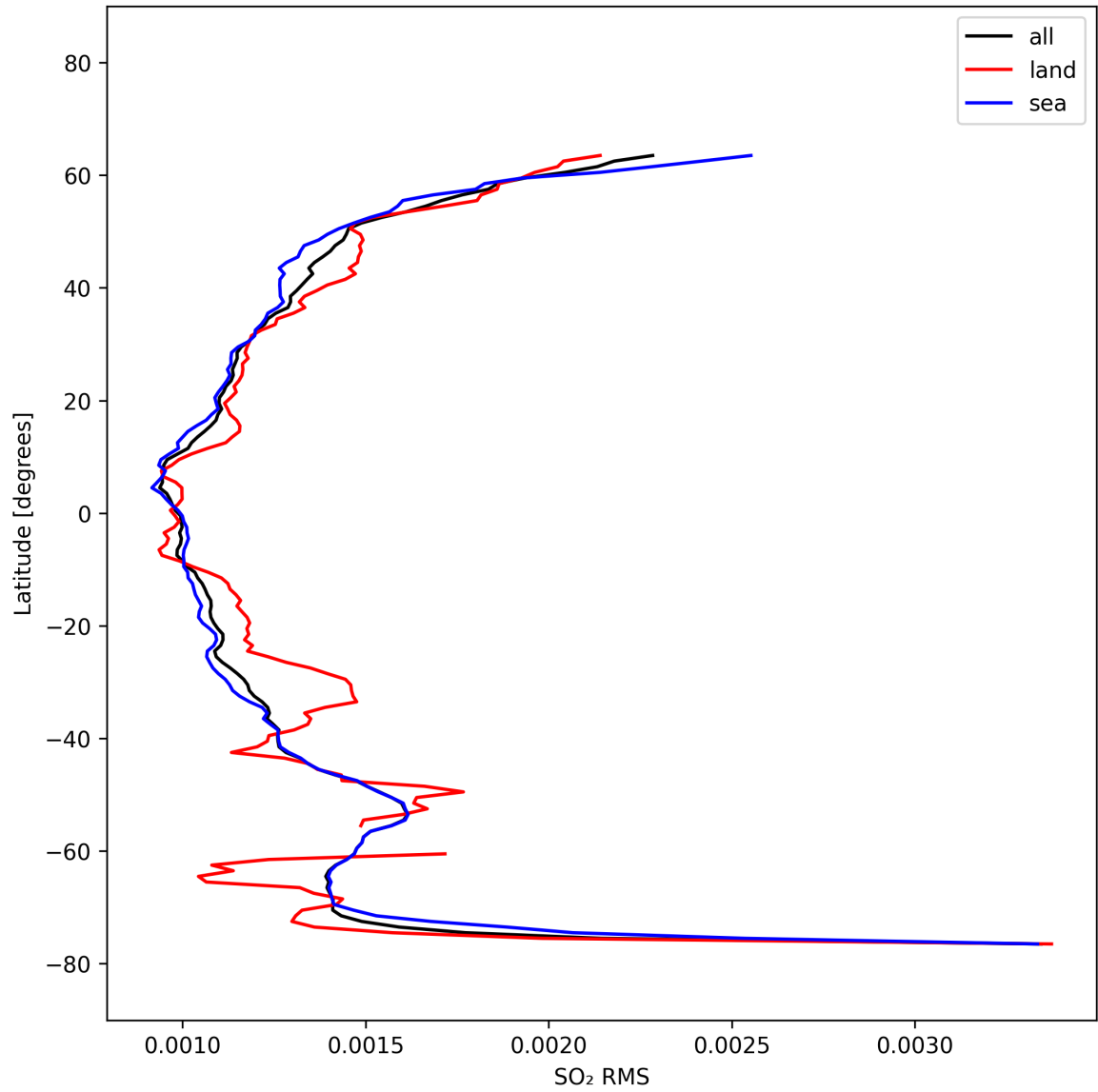


Figure 52: Zonal average of “SO₂ RMS” for 2025-10-08 to 2025-10-09.

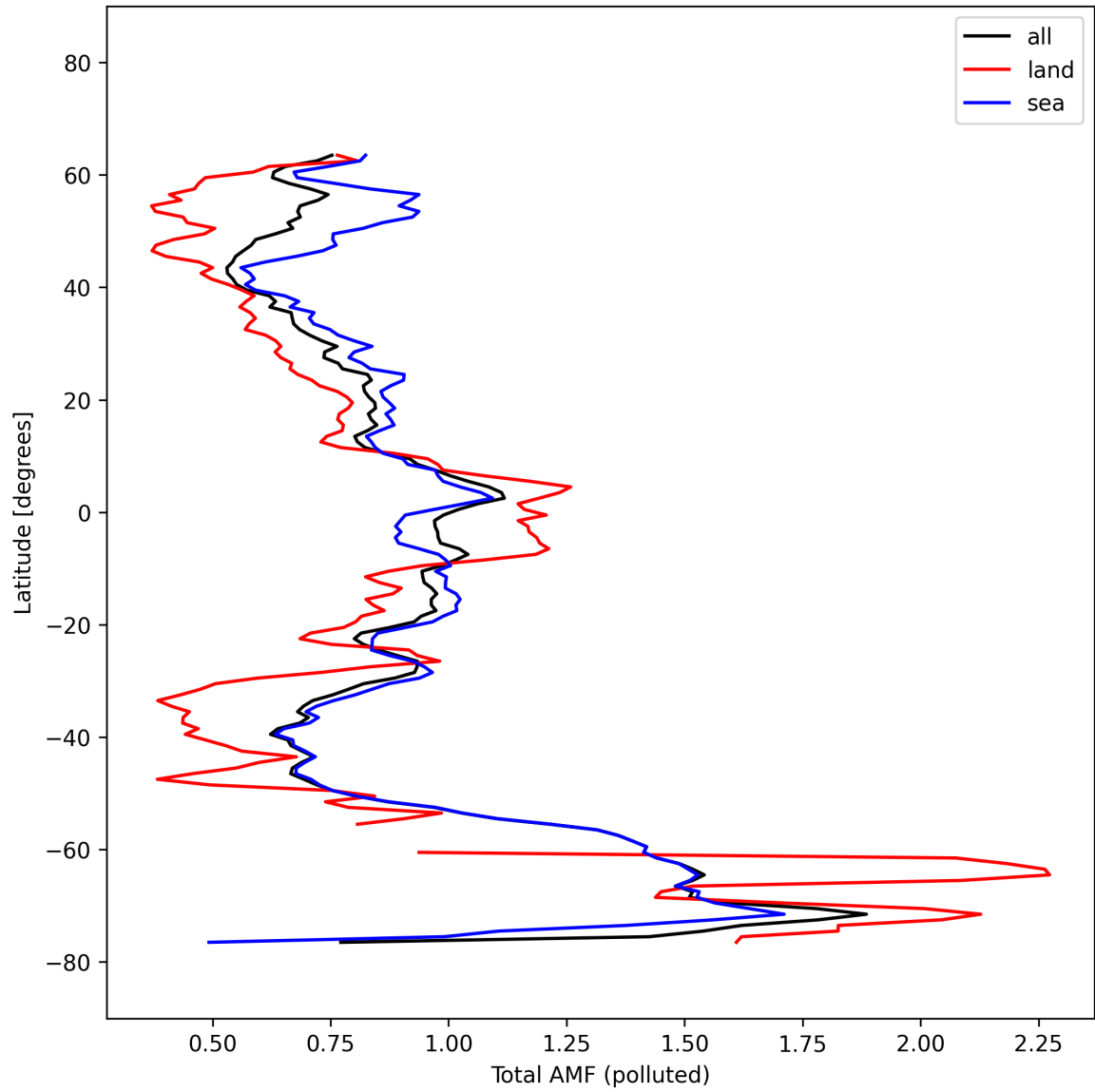


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-10-08 to 2025-10-09.

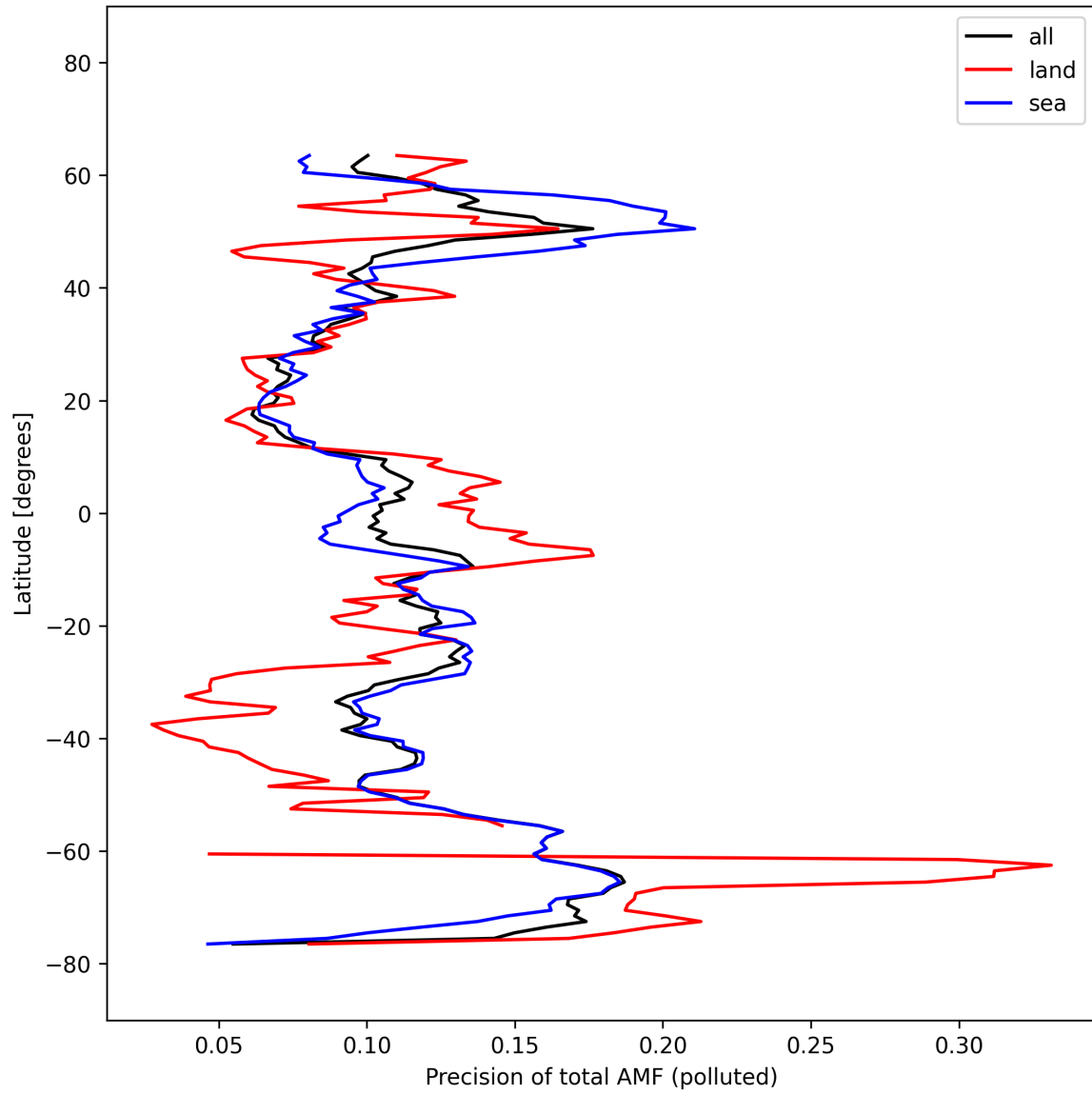


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-10-08 to 2025-10-09.

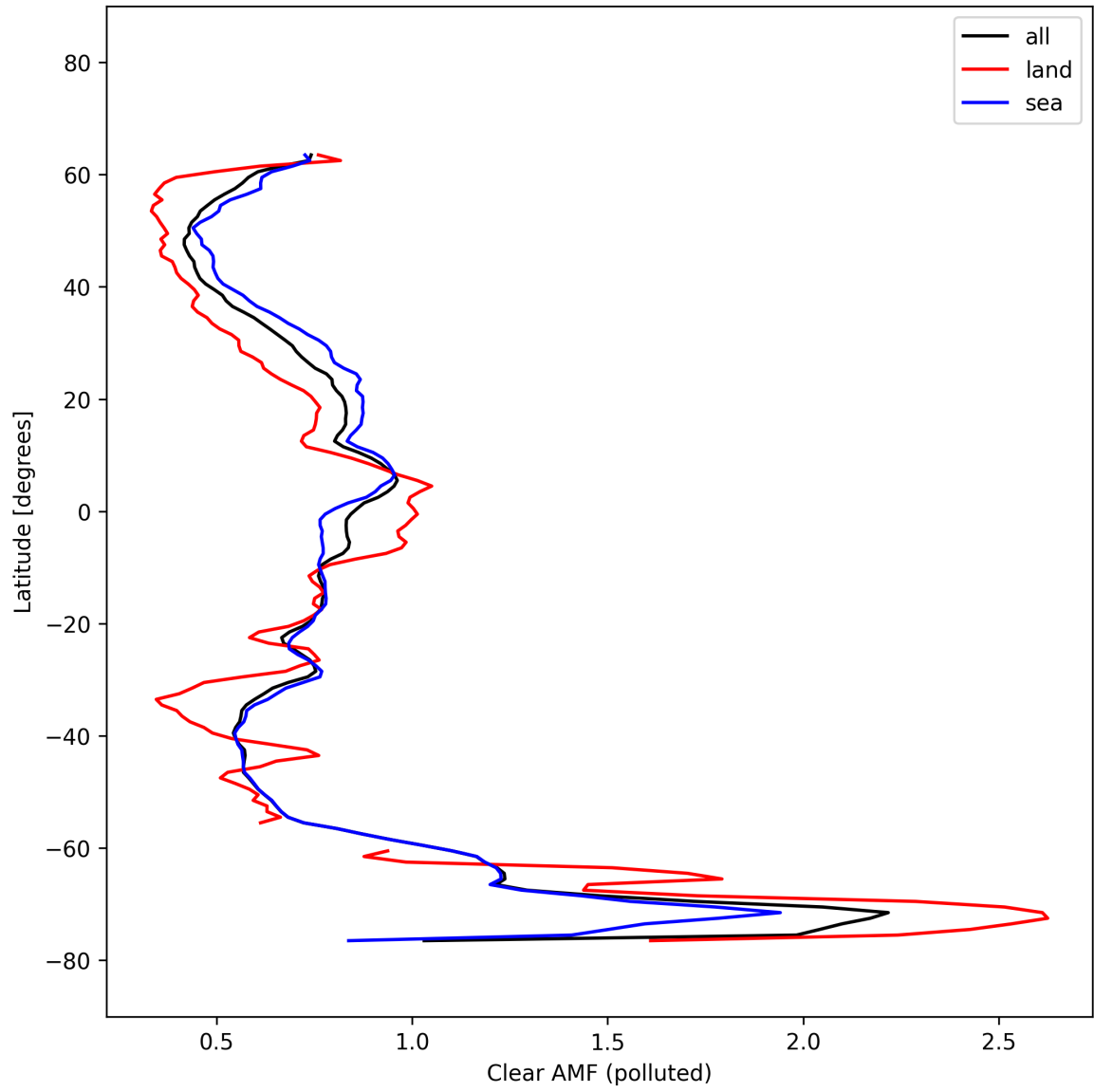


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-10-08 to 2025-10-09.

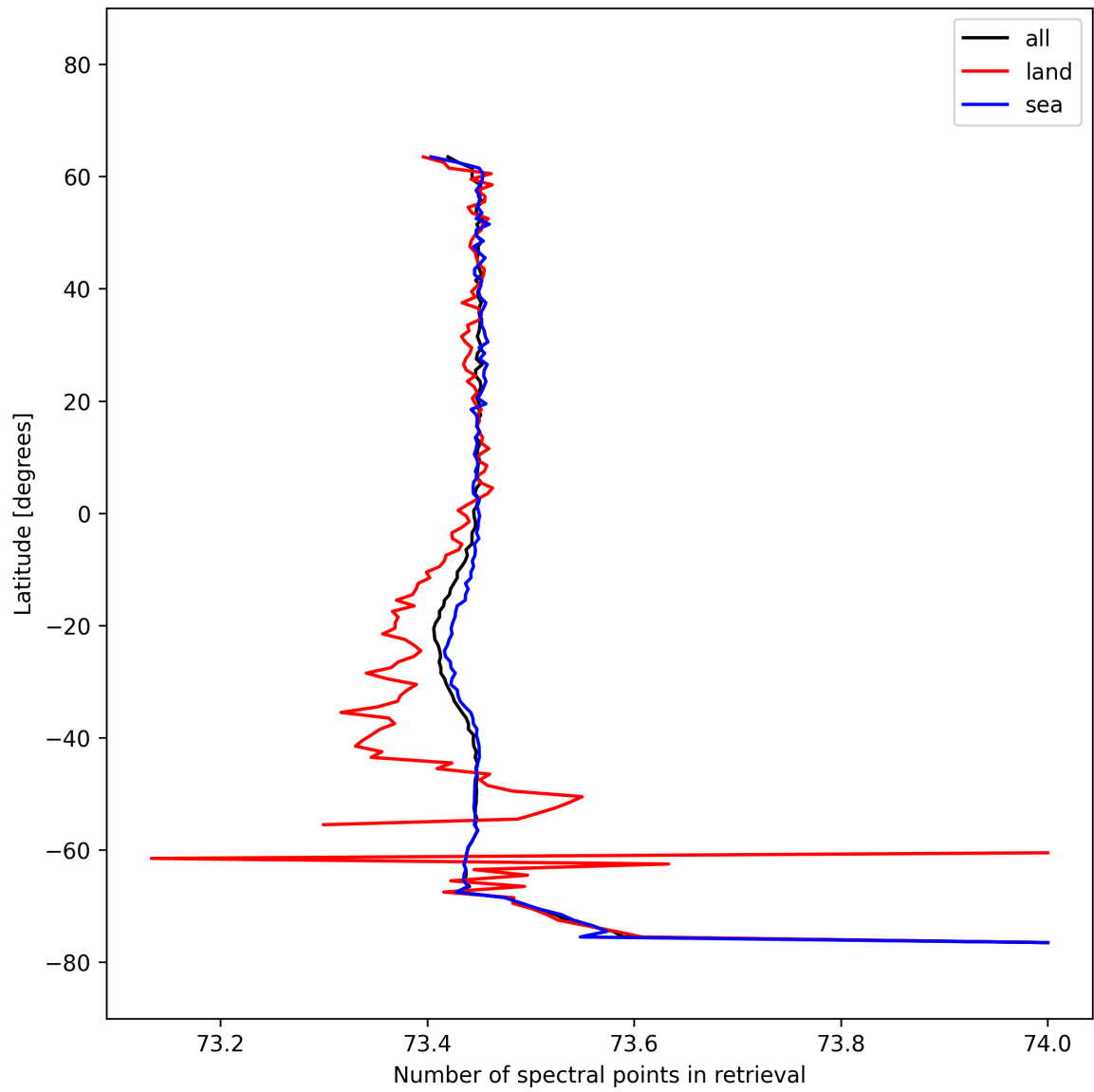


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-10-08 to 2025-10-09.

8 Histograms

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

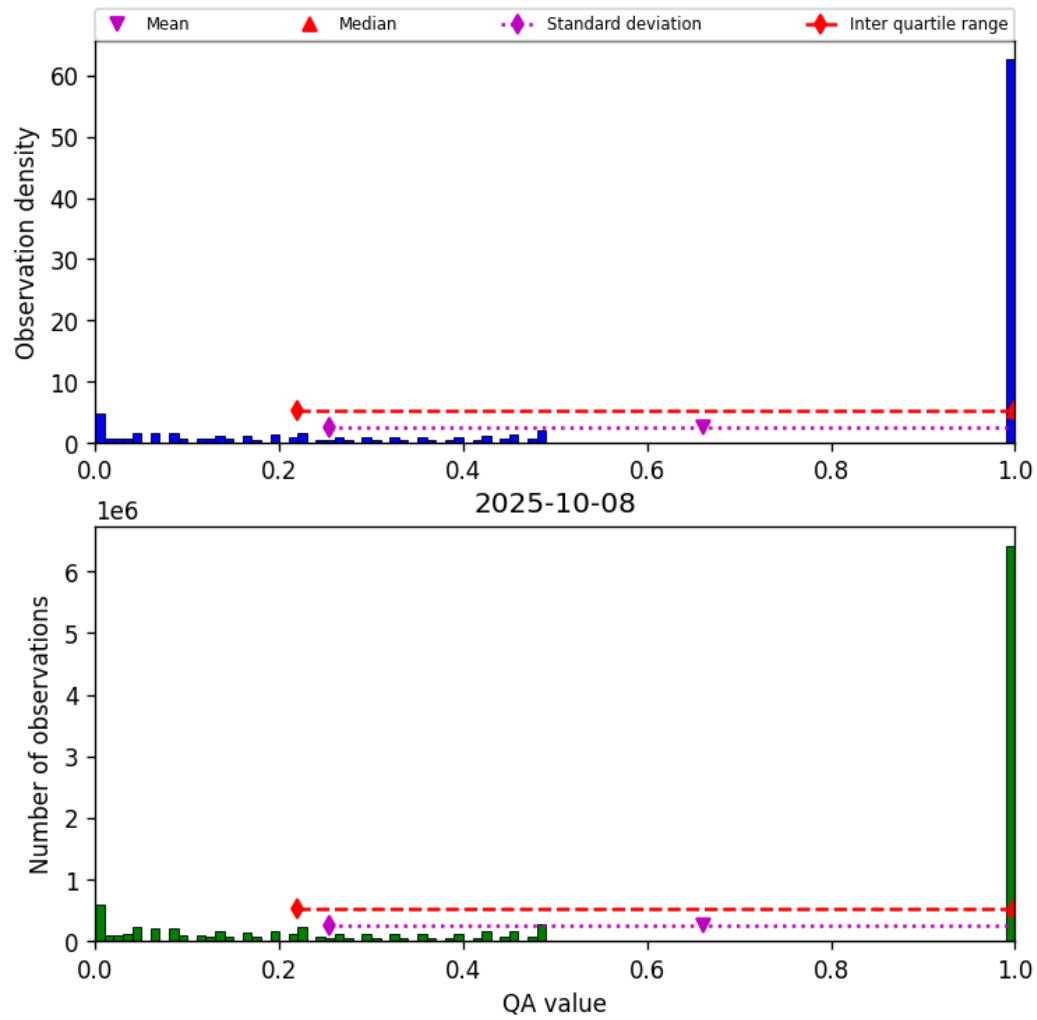


Figure 57: Histogram of “QA value” for 2025-10-08 to 2025-10-09

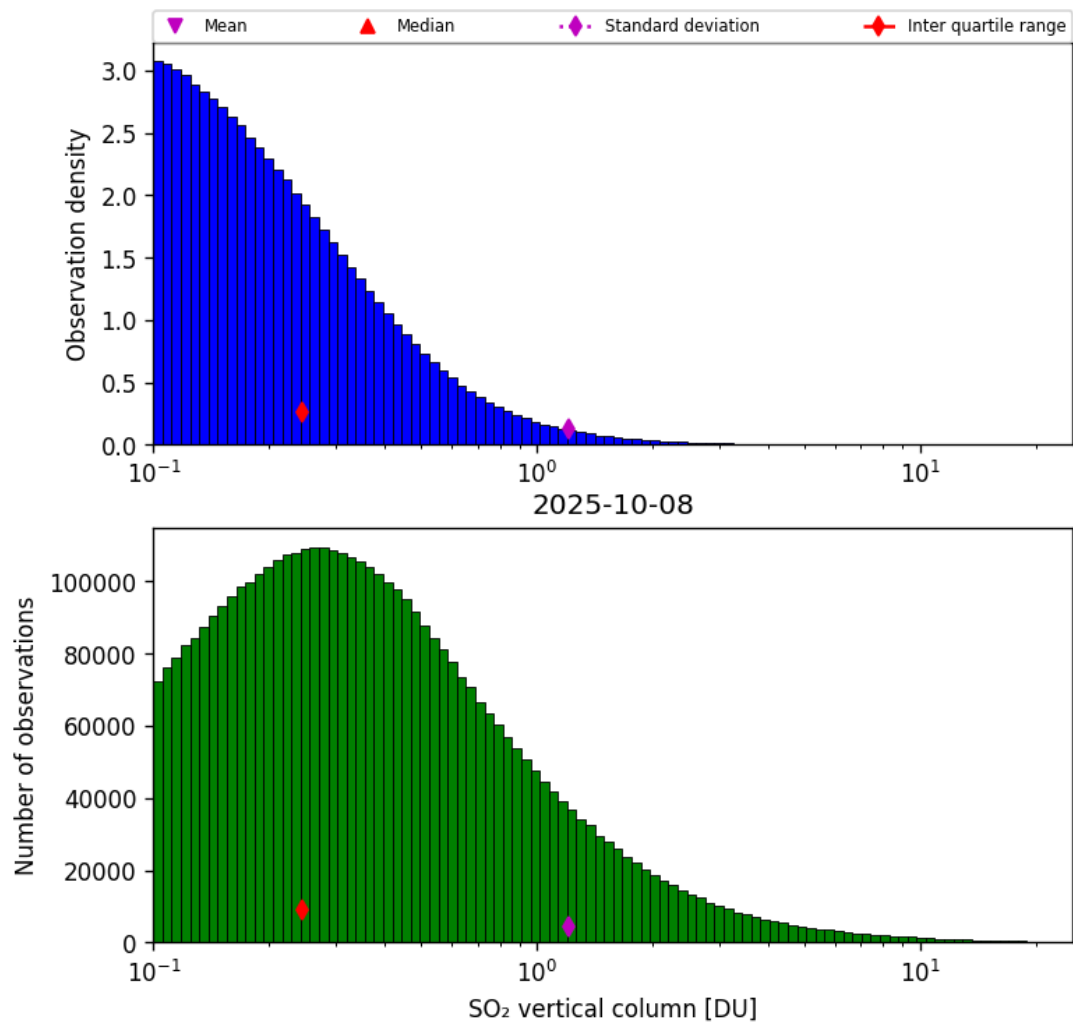


Figure 58: Histogram of “SO₂ vertical column” for 2025-10-08 to 2025-10-09

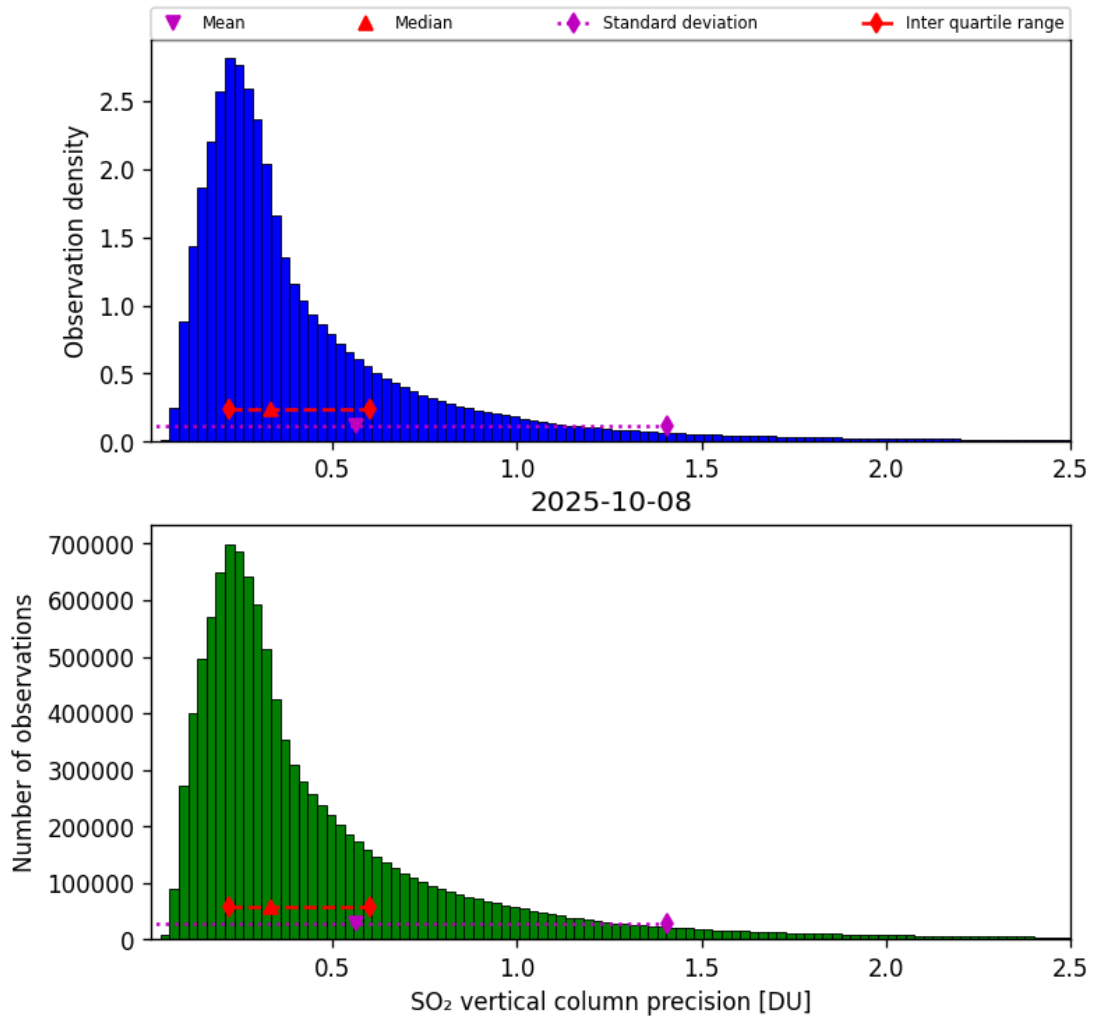


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-10-08 to 2025-10-09

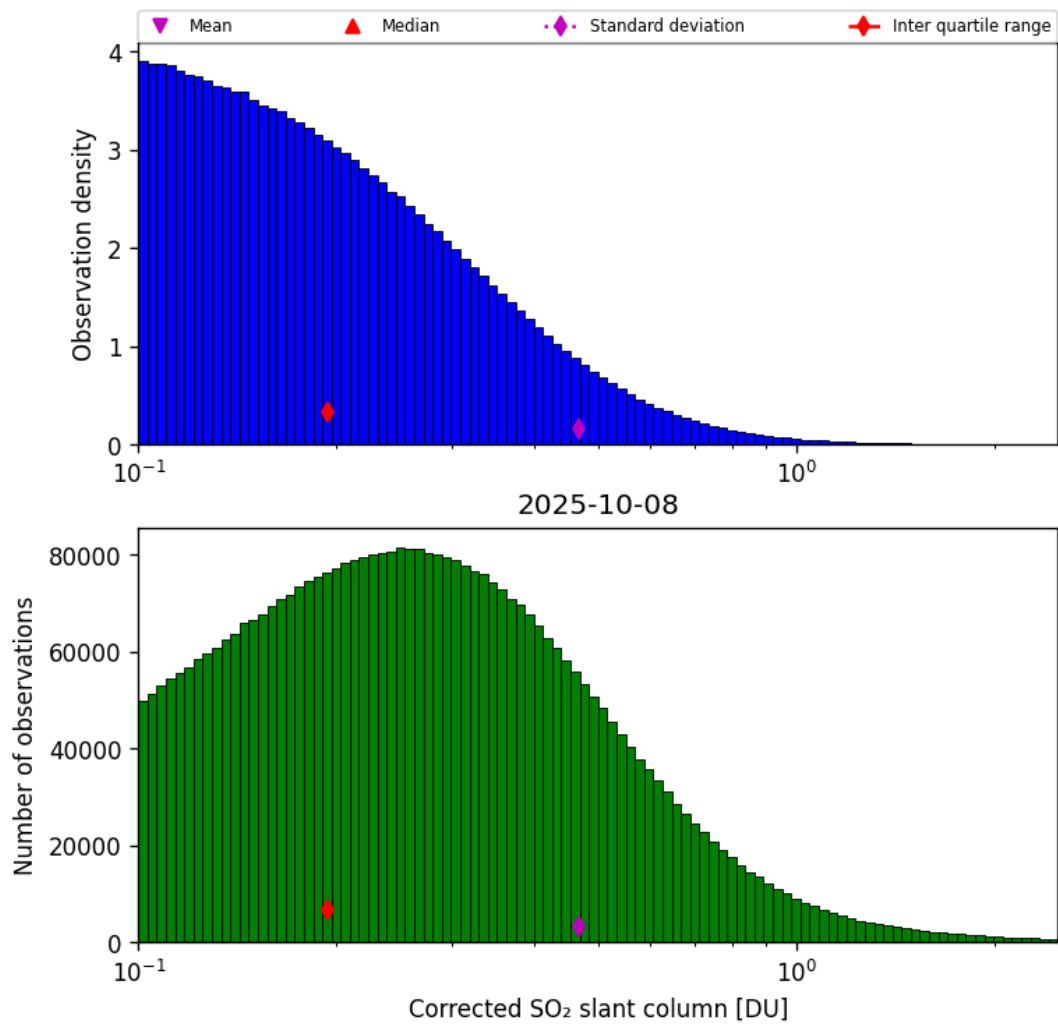


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-10-08 to 2025-10-09

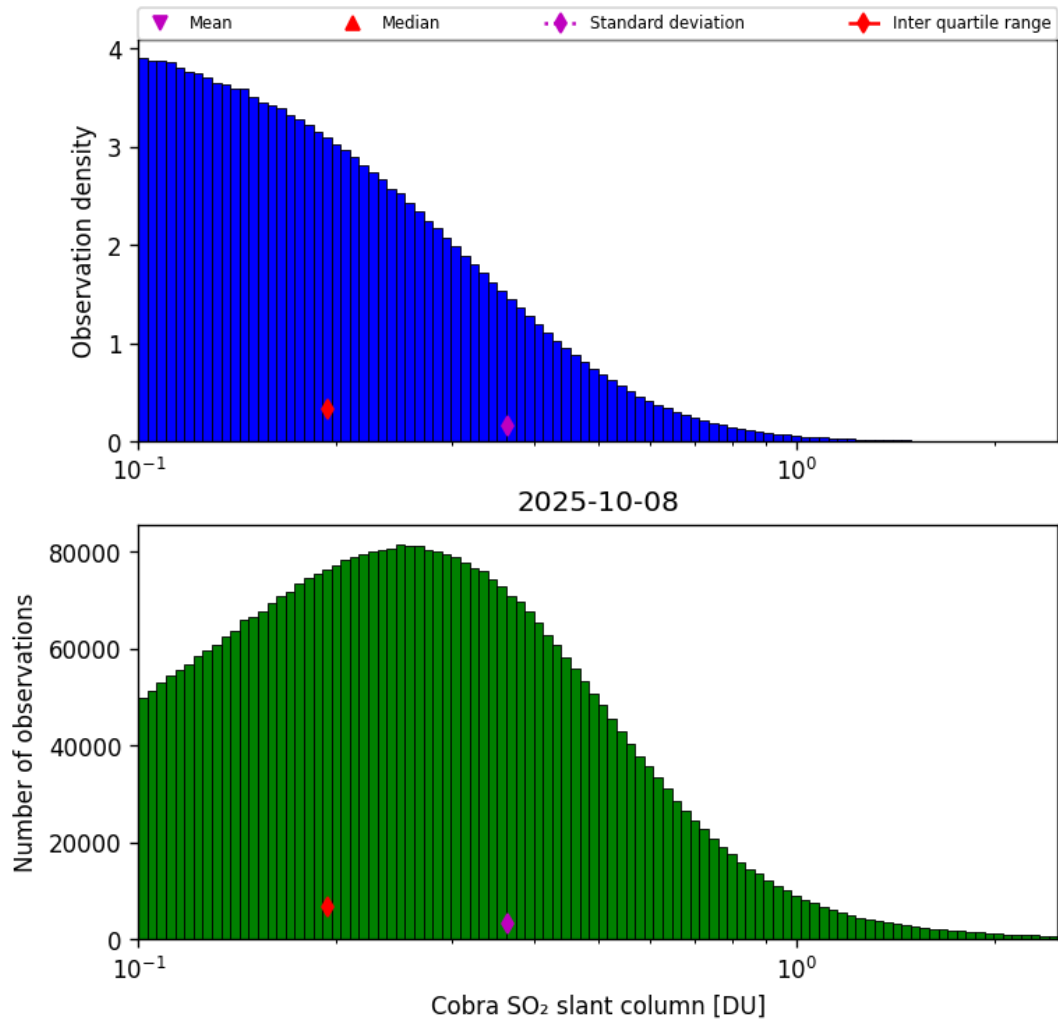


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-10-08 to 2025-10-09

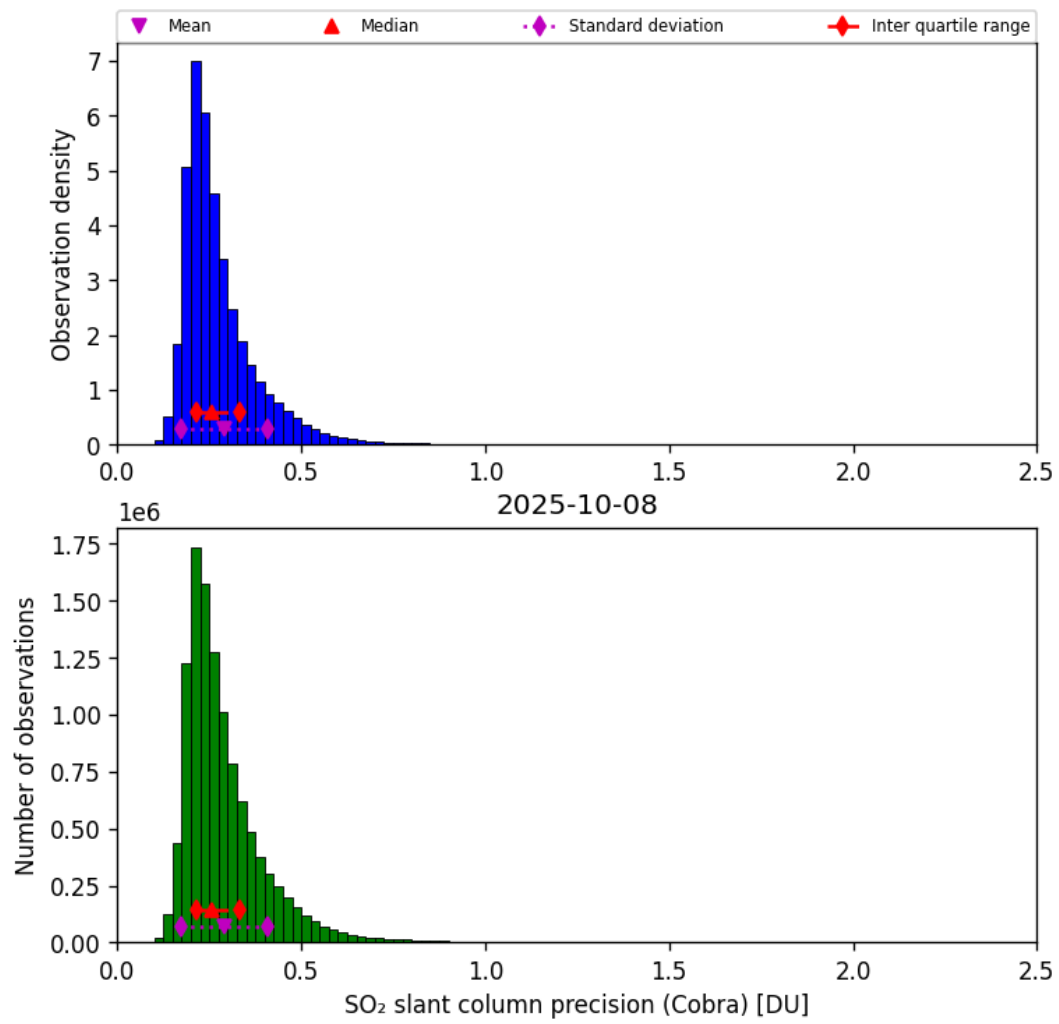


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-10-08 to 2025-10-09

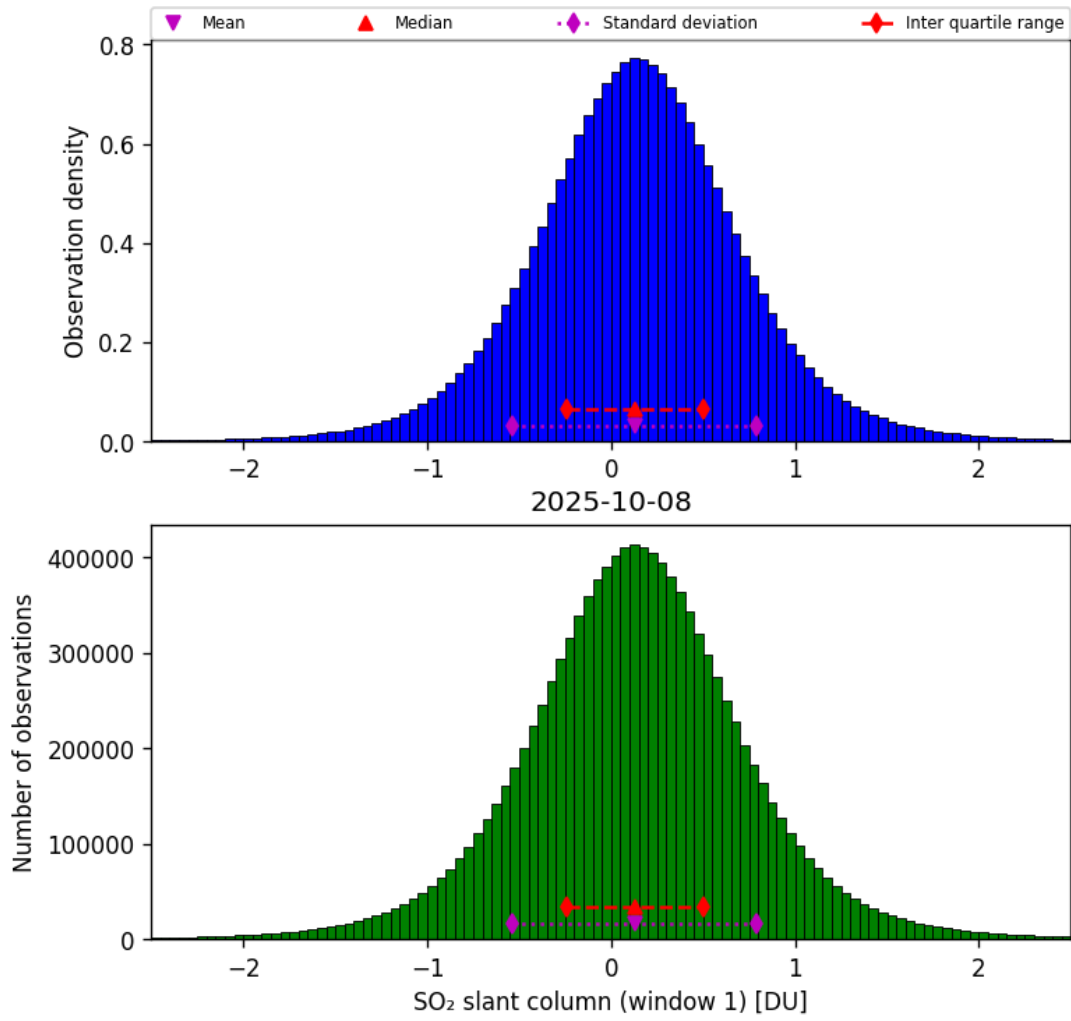


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-10-08 to 2025-10-09

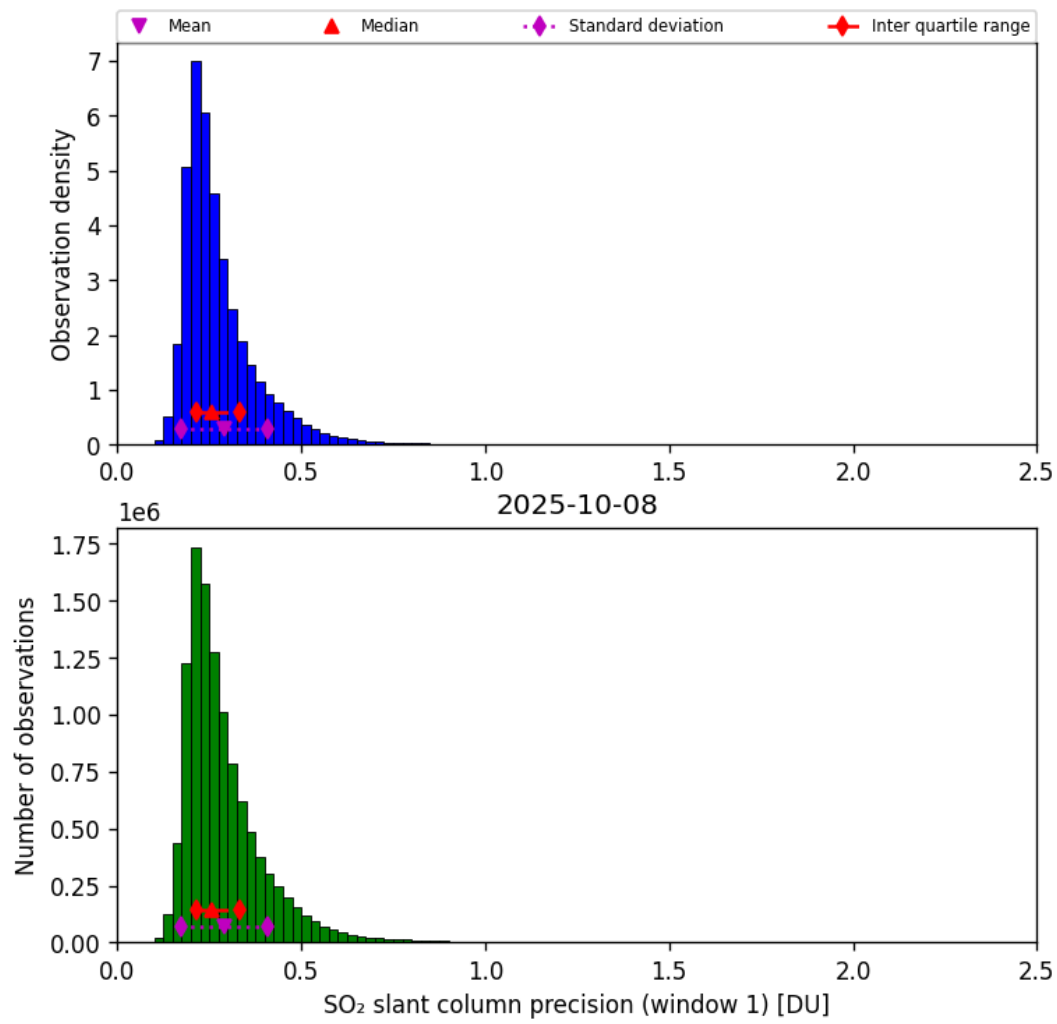


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-10-08 to 2025-10-09

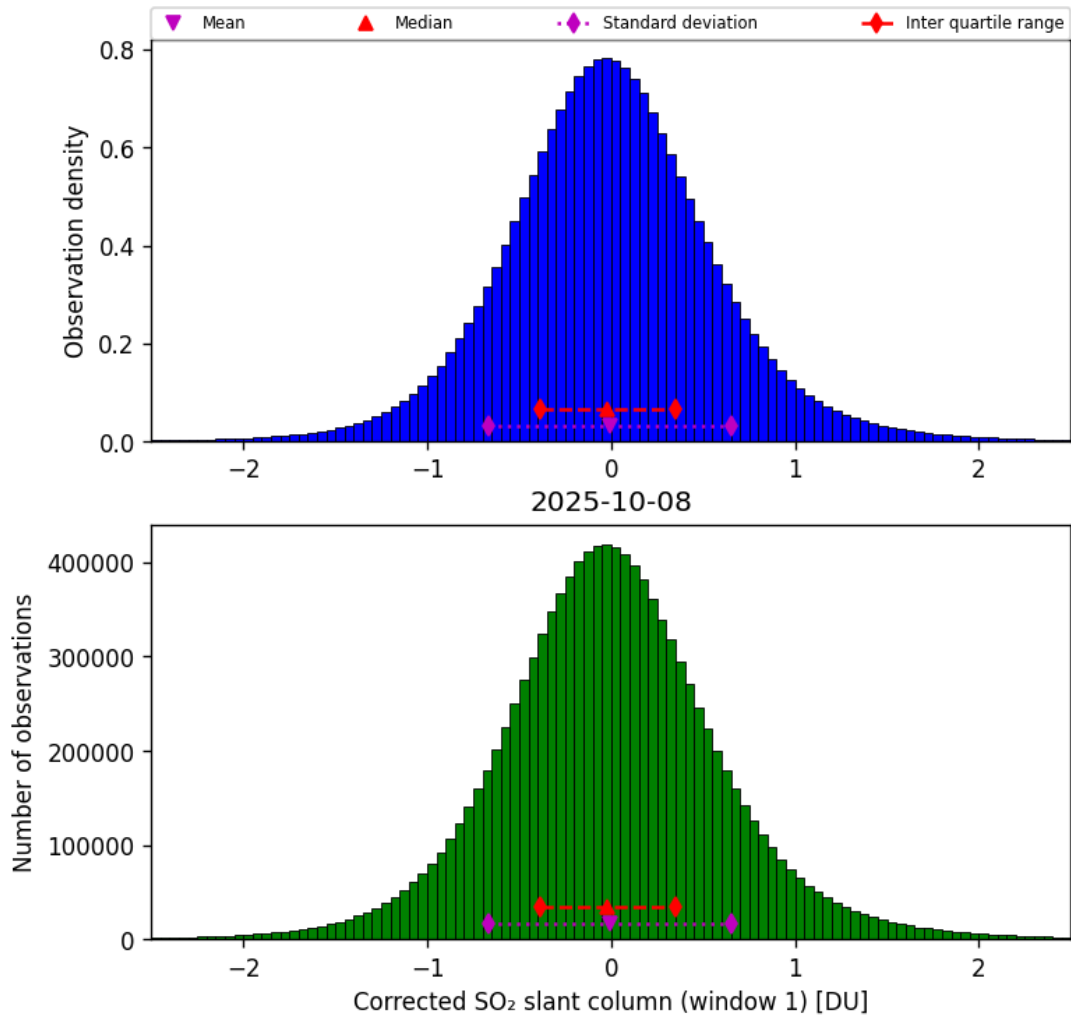


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-10-08 to 2025-10-09

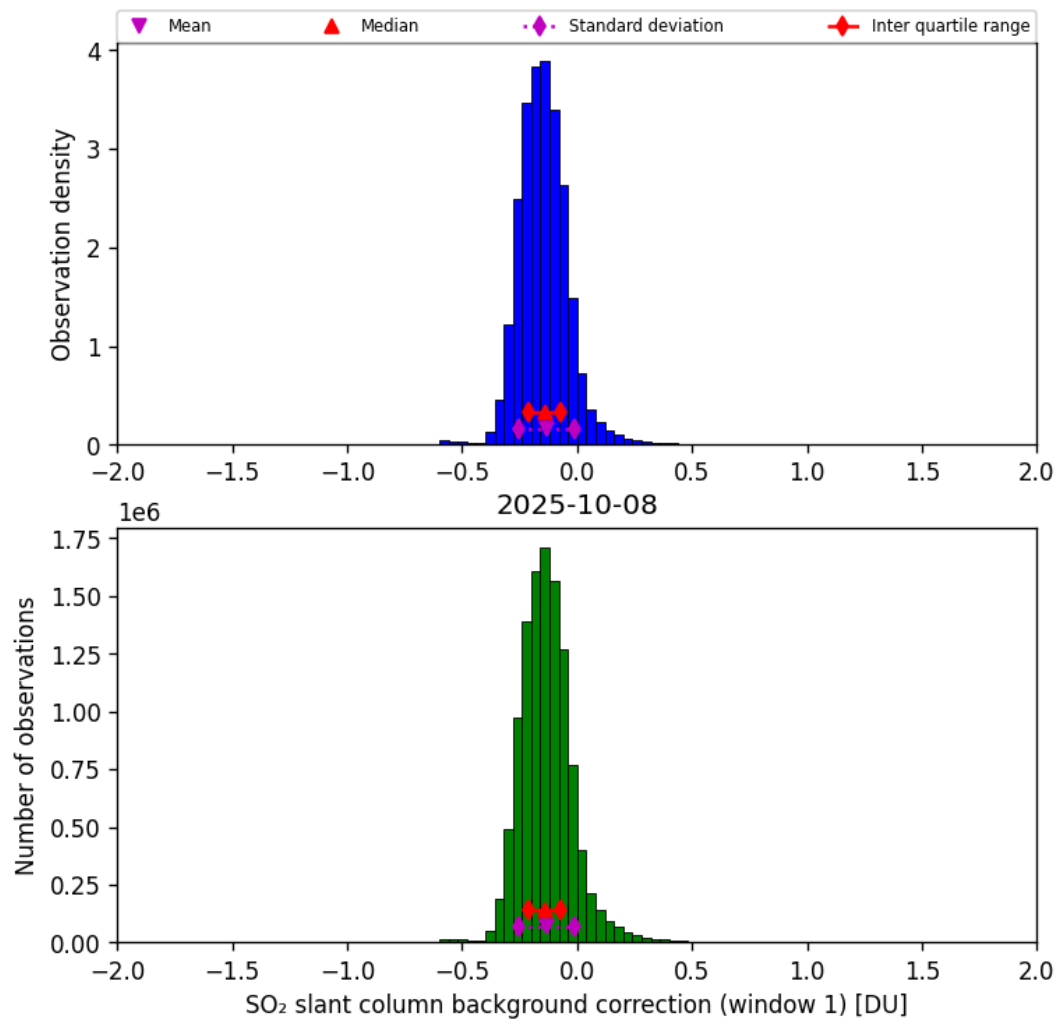


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-10-08 to 2025-10-09

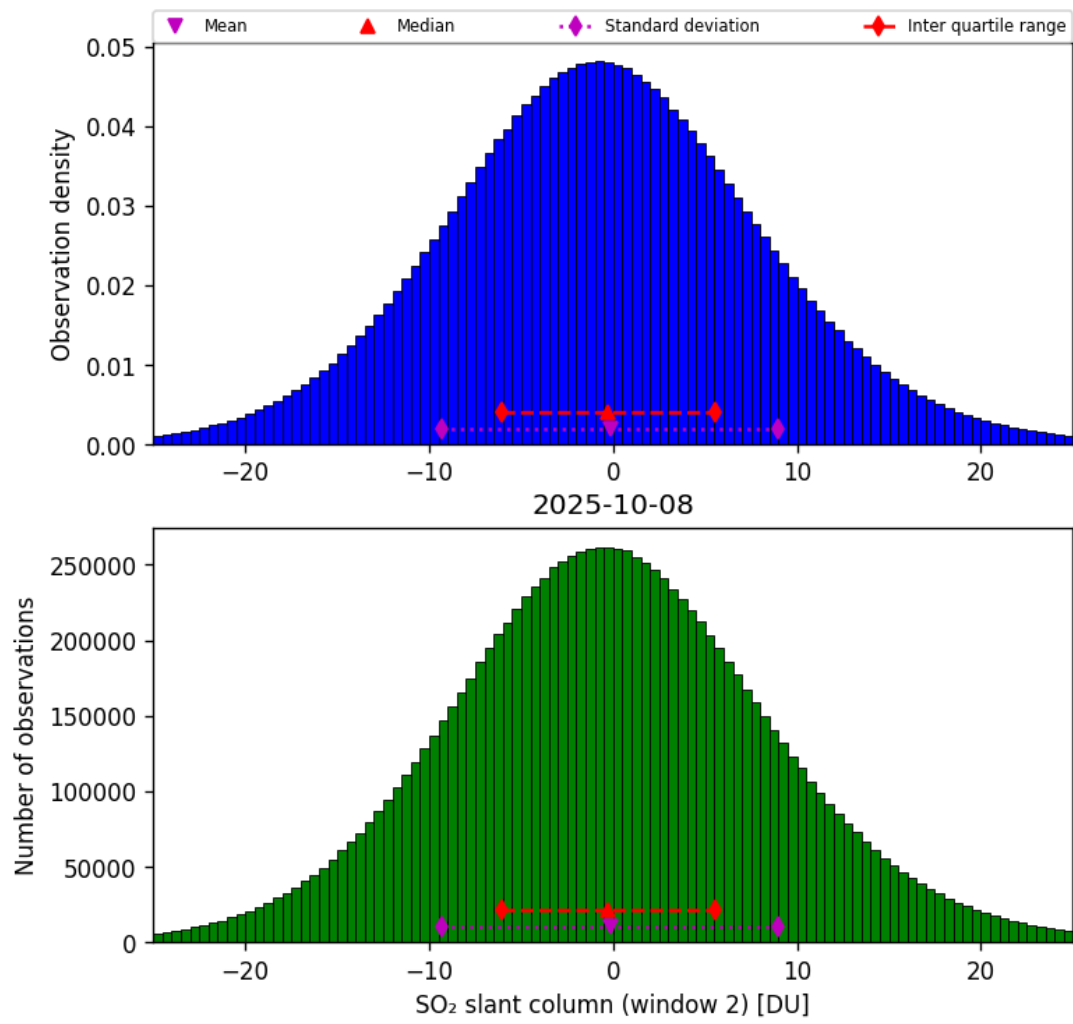


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-10-08 to 2025-10-09

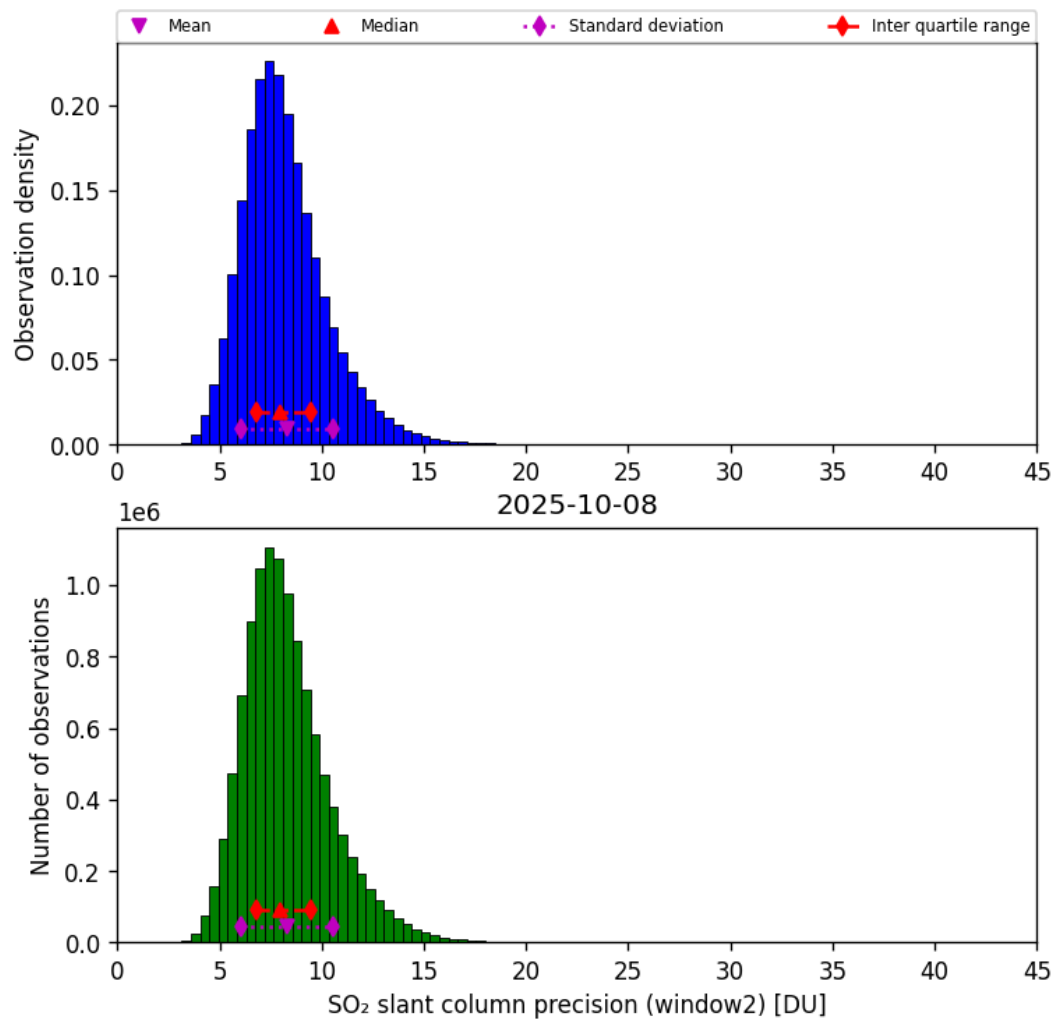


Figure 68: Histogram of "SO₂ slant column precision (window2)" for 2025-10-08 to 2025-10-09

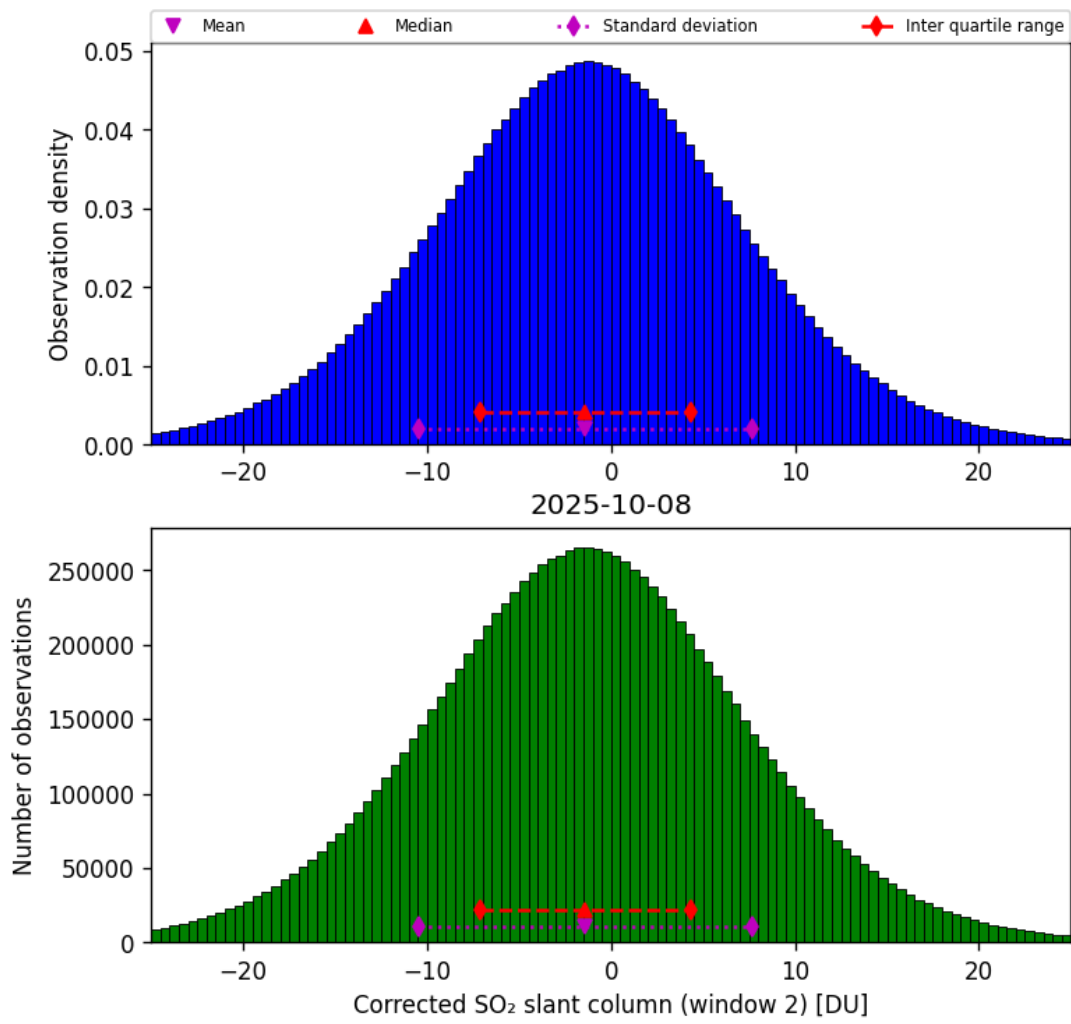


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-10-08 to 2025-10-09

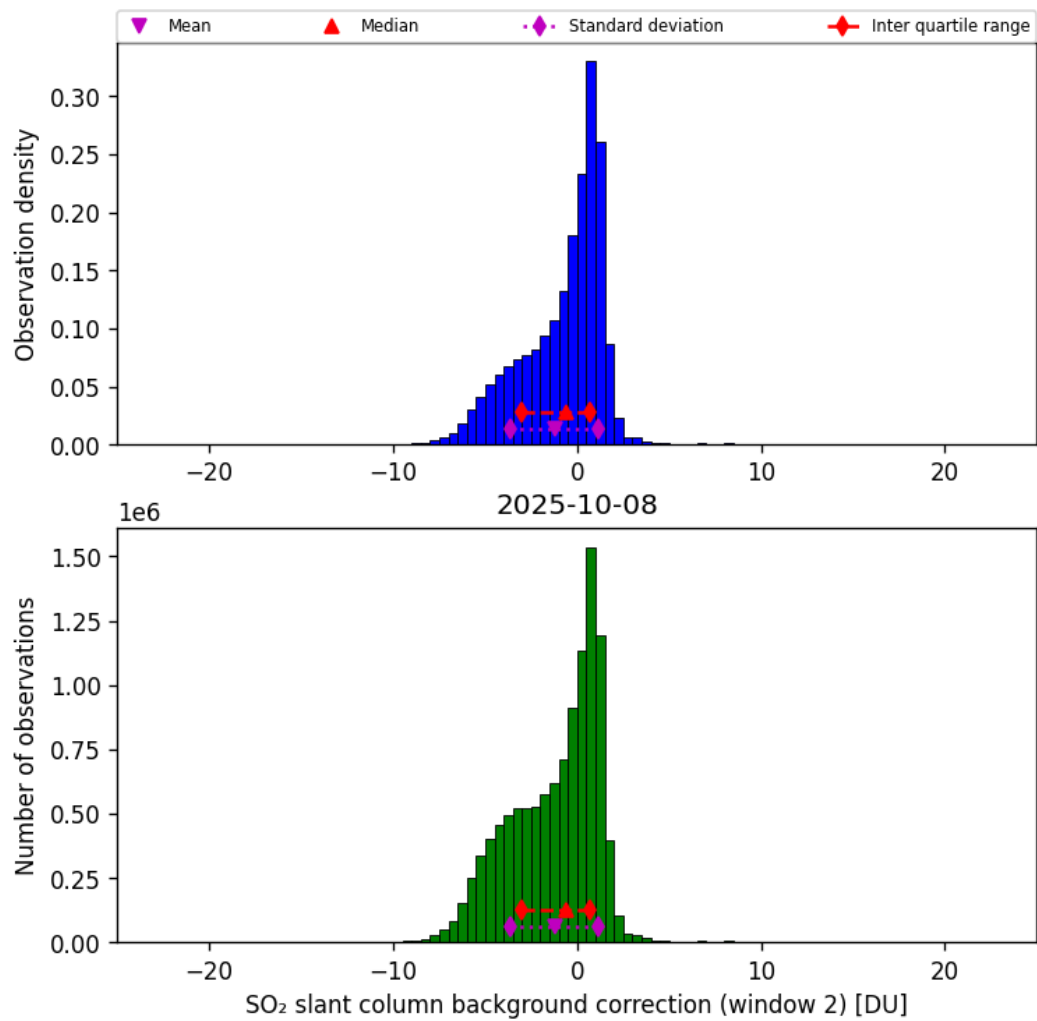


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-10-08 to 2025-10-09

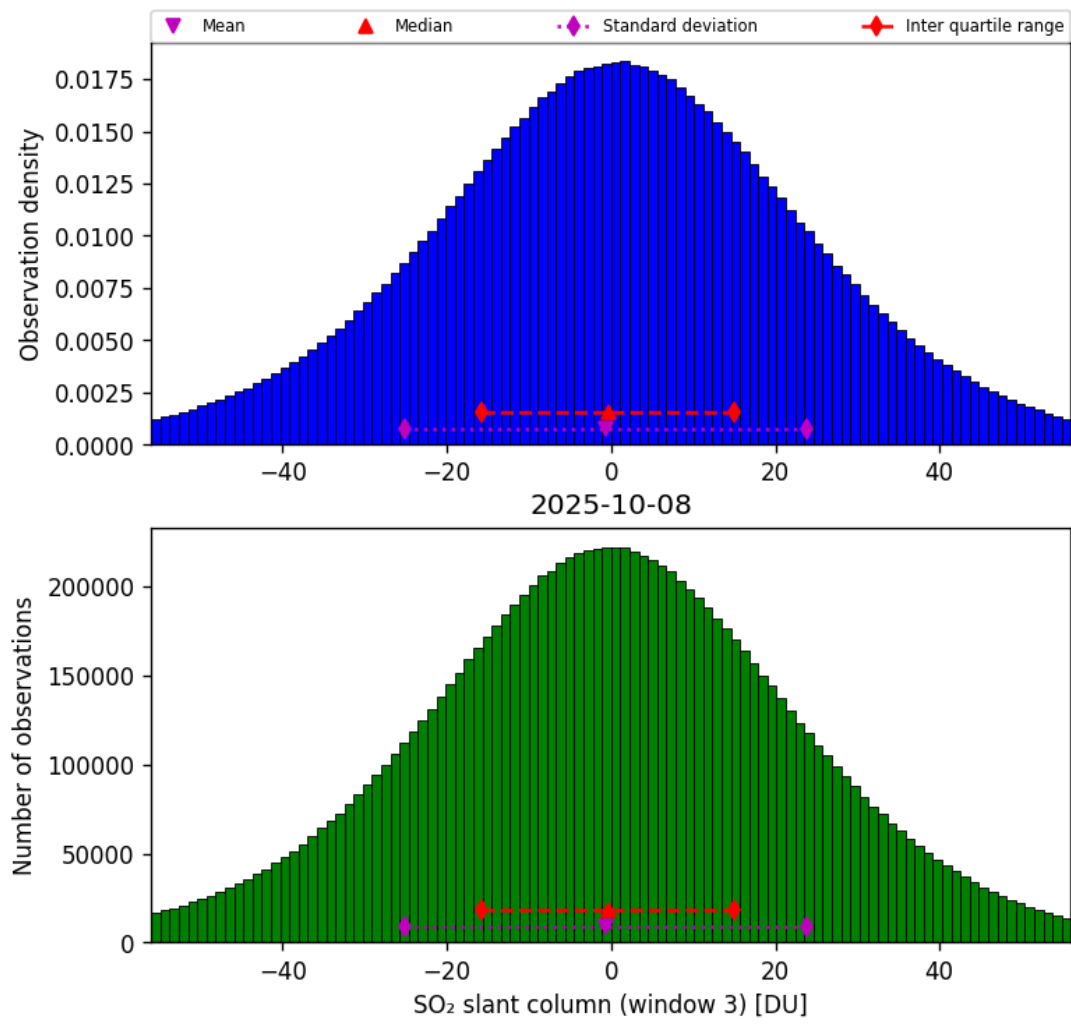


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-10-08 to 2025-10-09

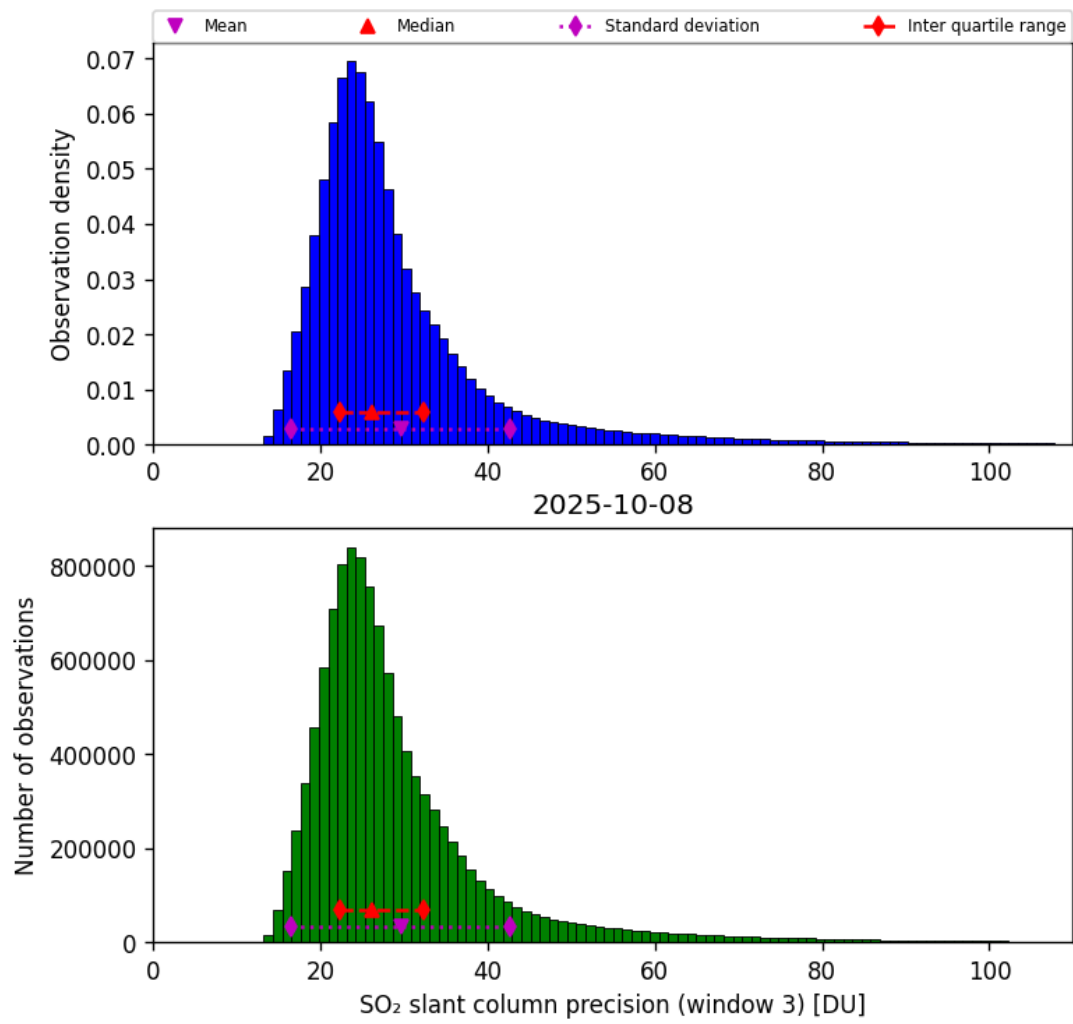


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-10-08 to 2025-10-09

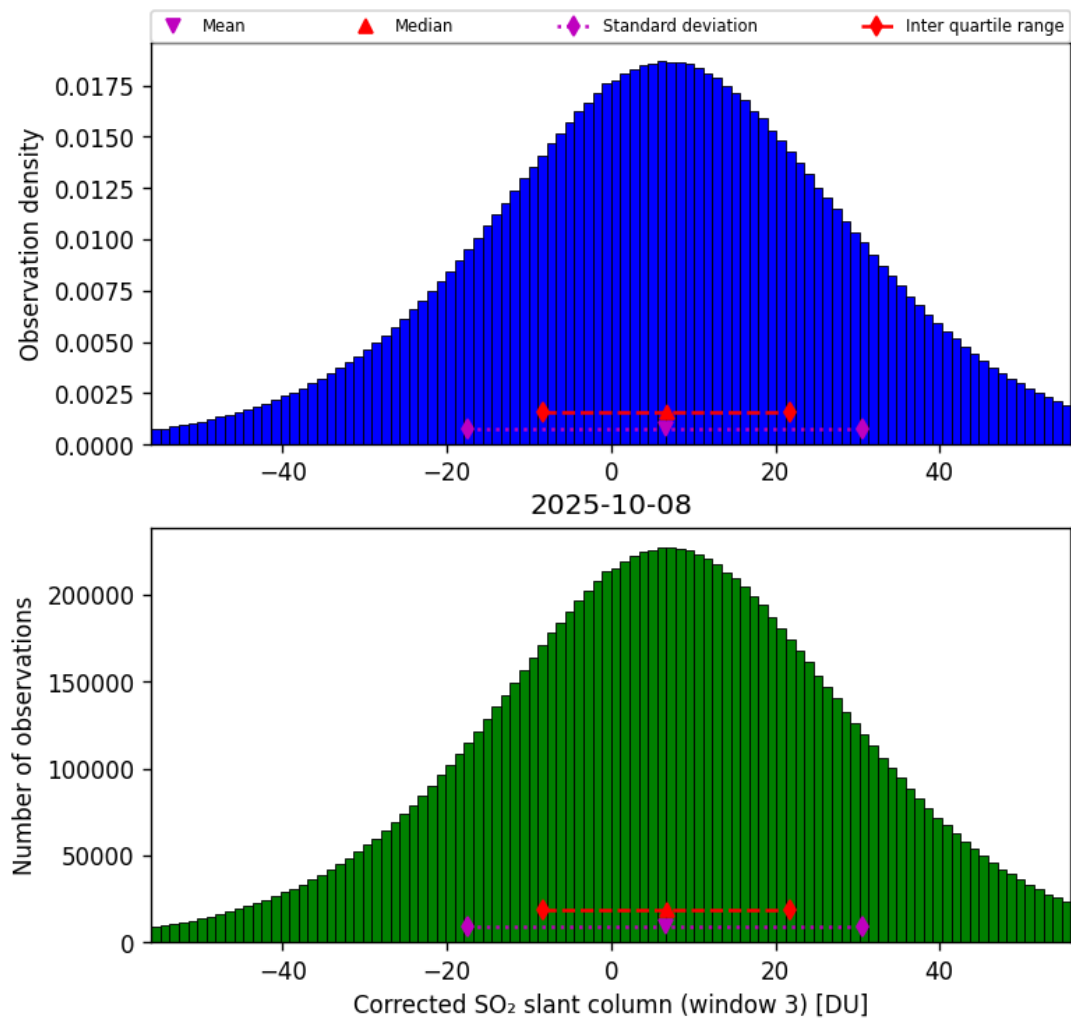


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-10-08 to 2025-10-09

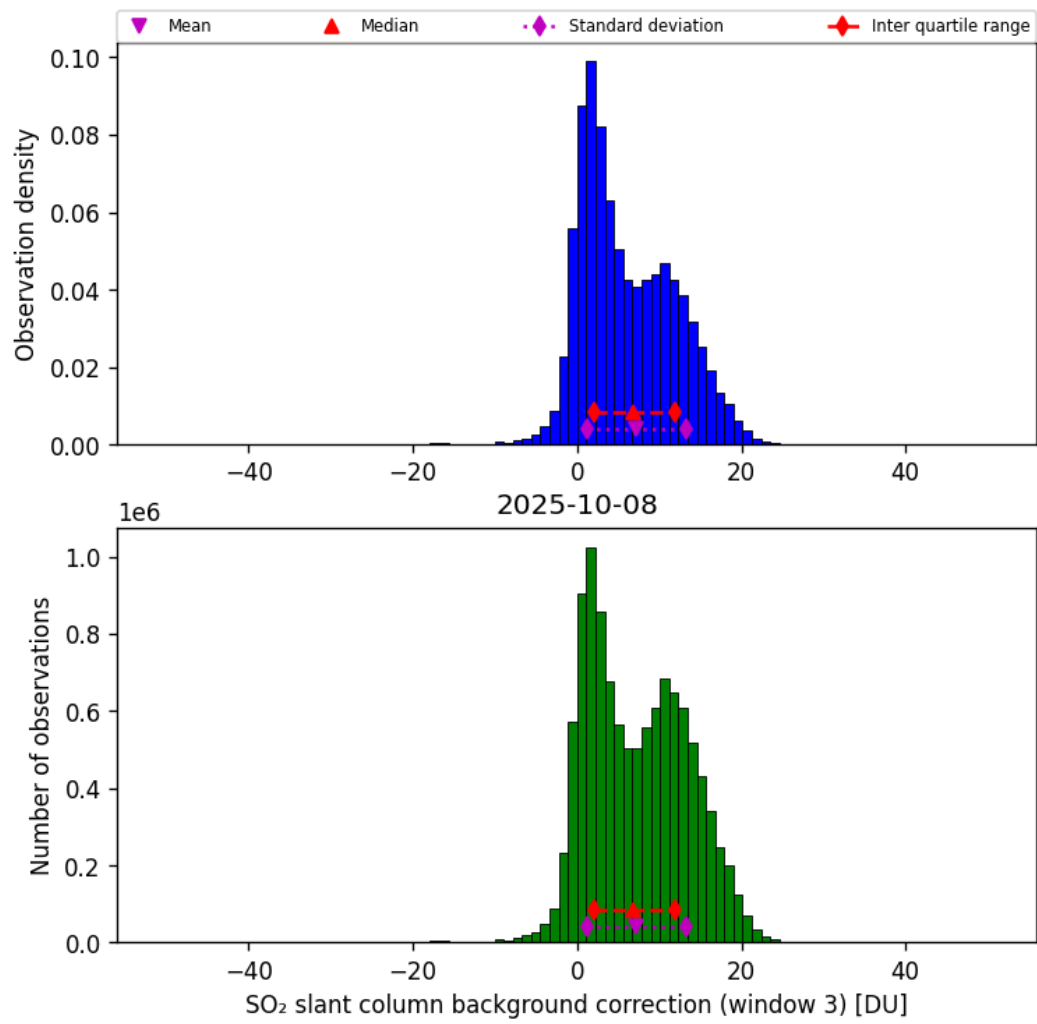


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-10-08 to 2025-10-09

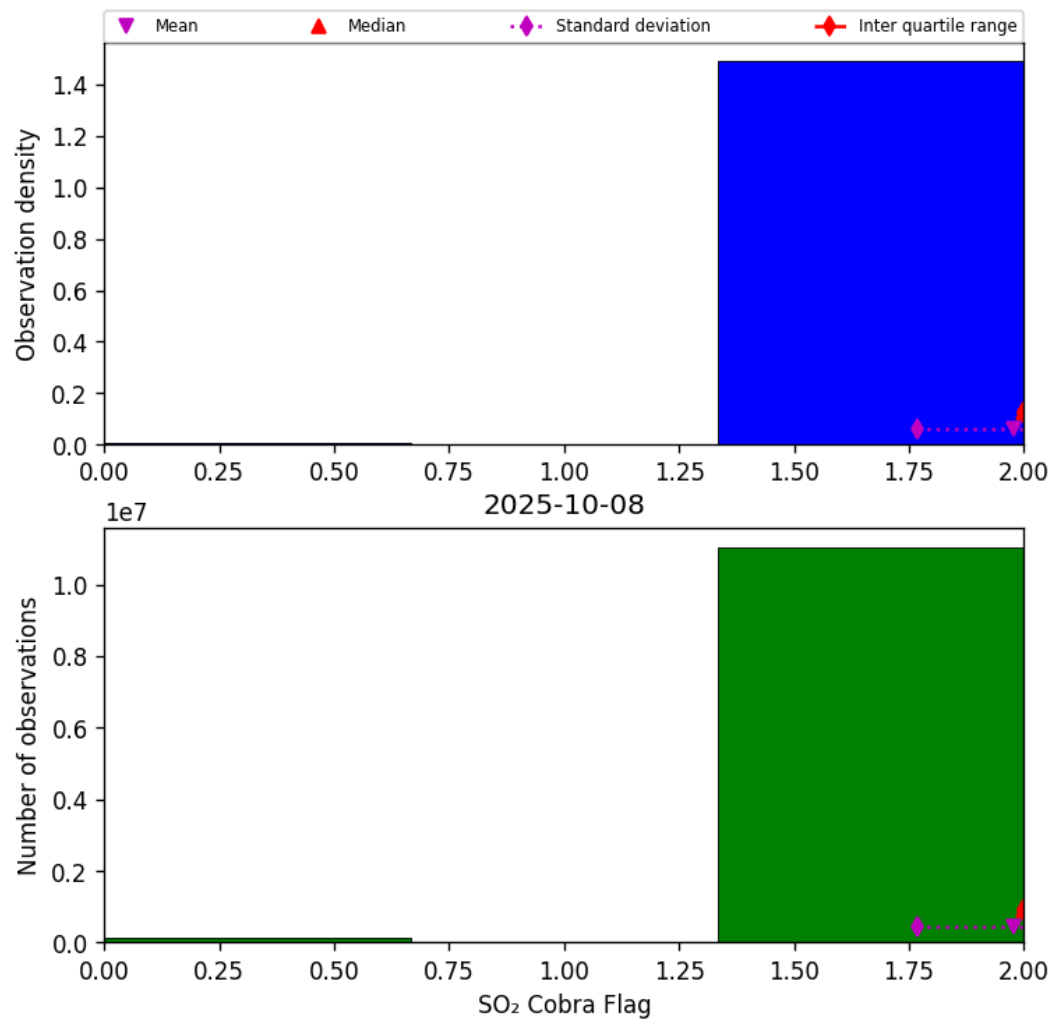


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-10-08 to 2025-10-09

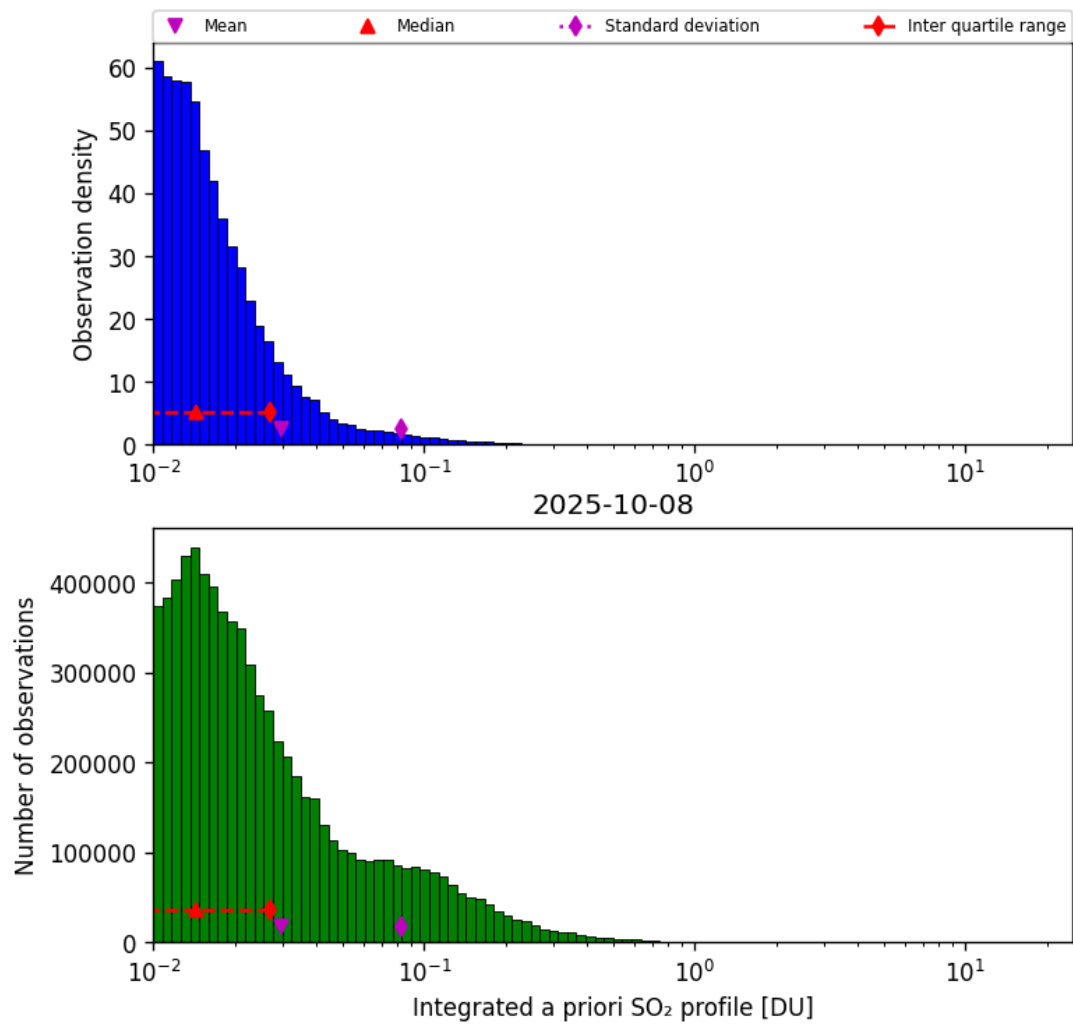


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-10-08 to 2025-10-09

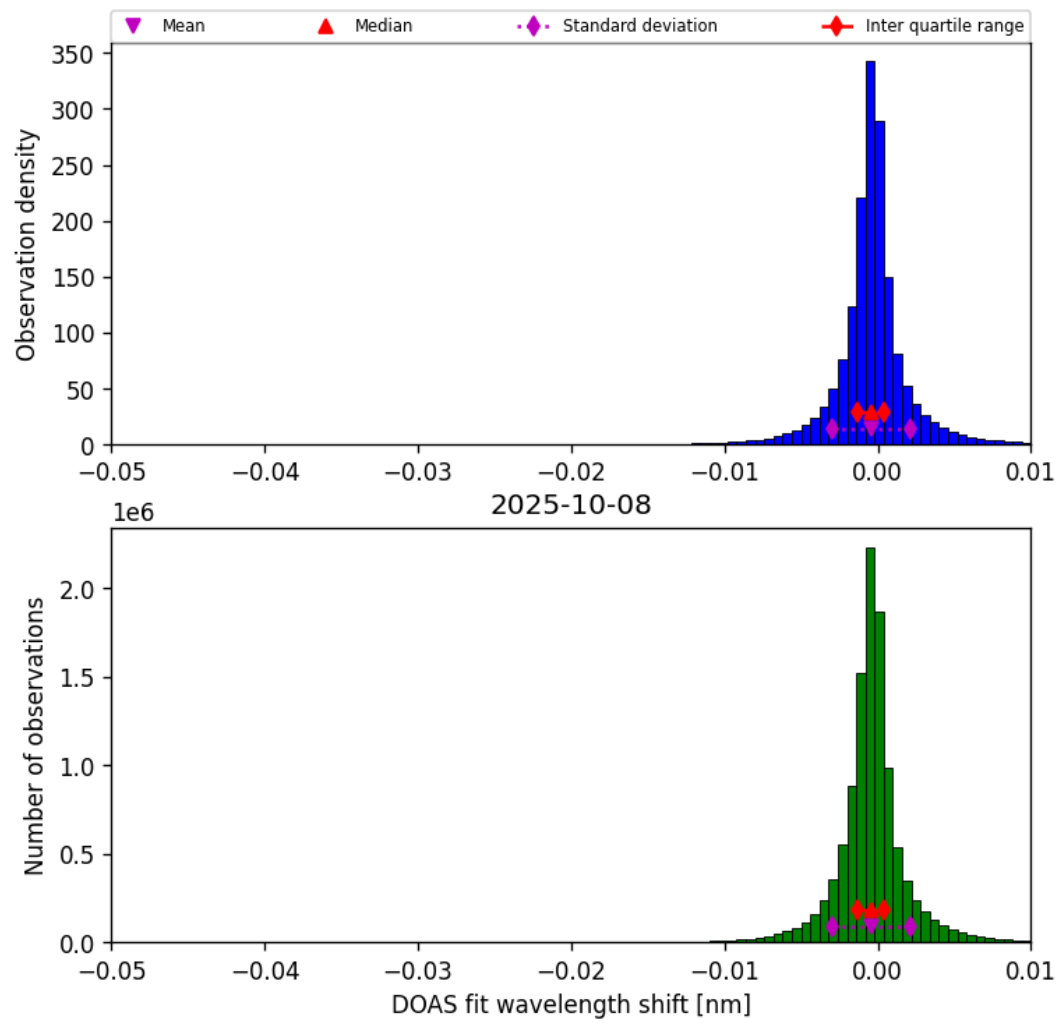


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-10-08 to 2025-10-09

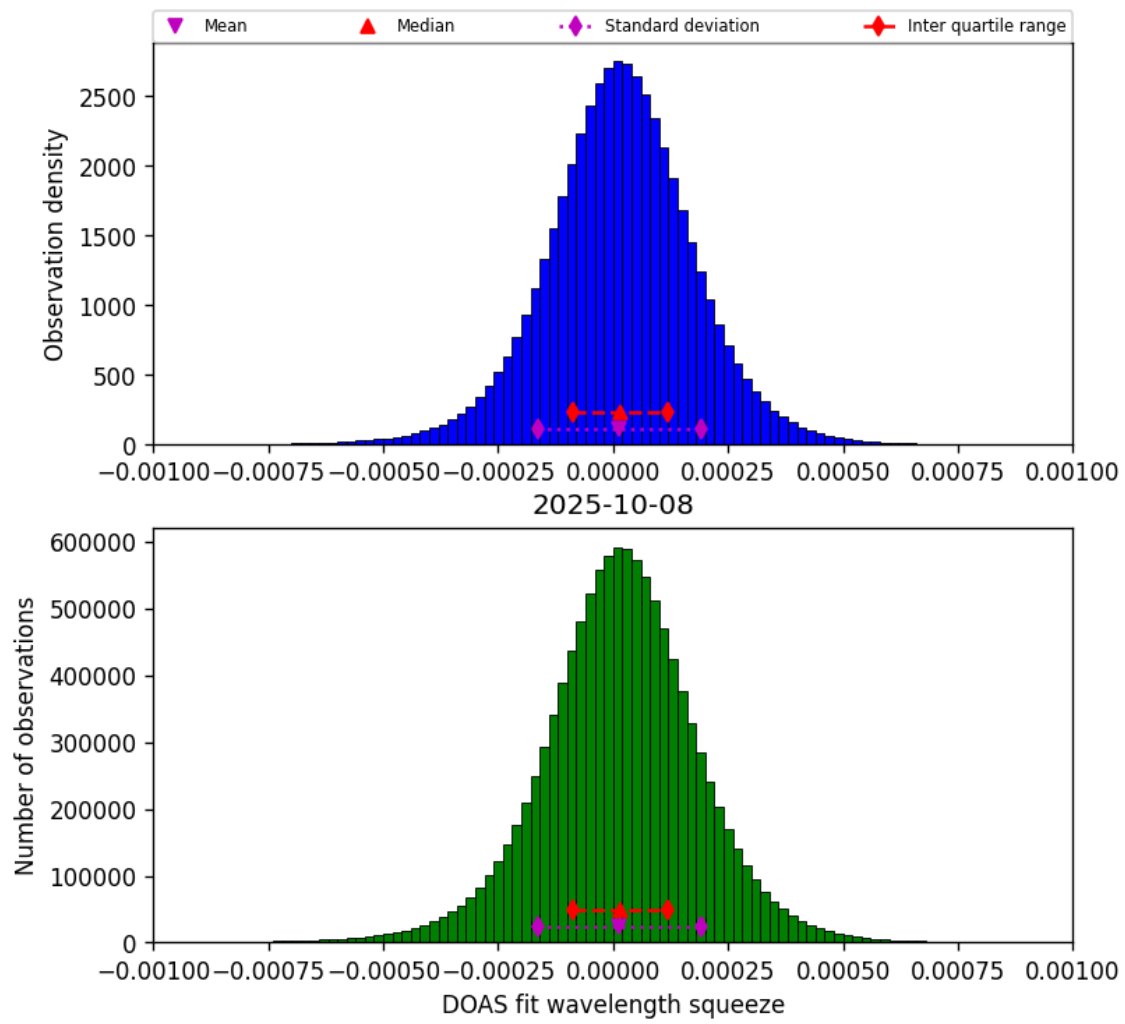


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-10-08 to 2025-10-09

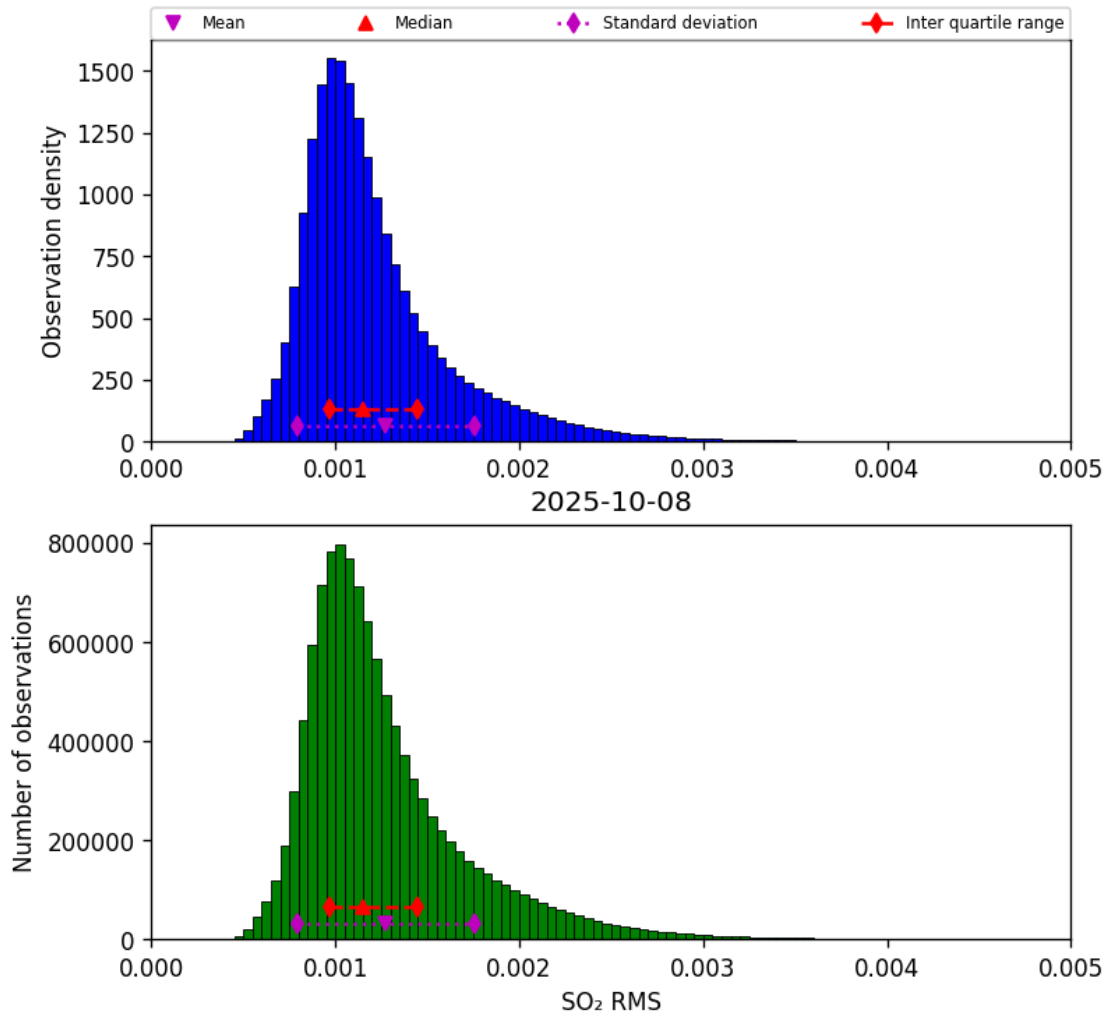


Figure 79: Histogram of “SO₂ RMS” for 2025-10-08 to 2025-10-09

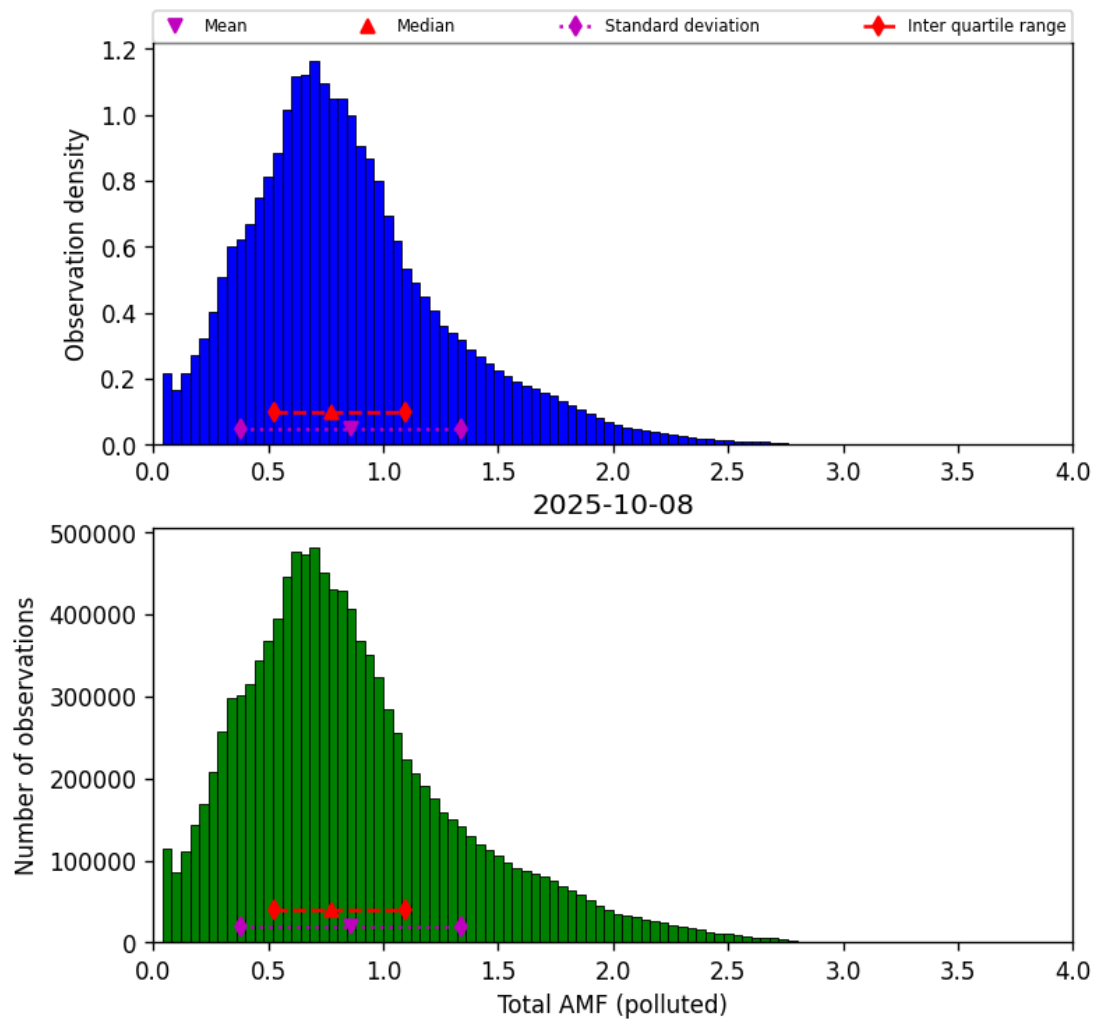


Figure 80: Histogram of “Total AMF (polluted)” for 2025-10-08 to 2025-10-09

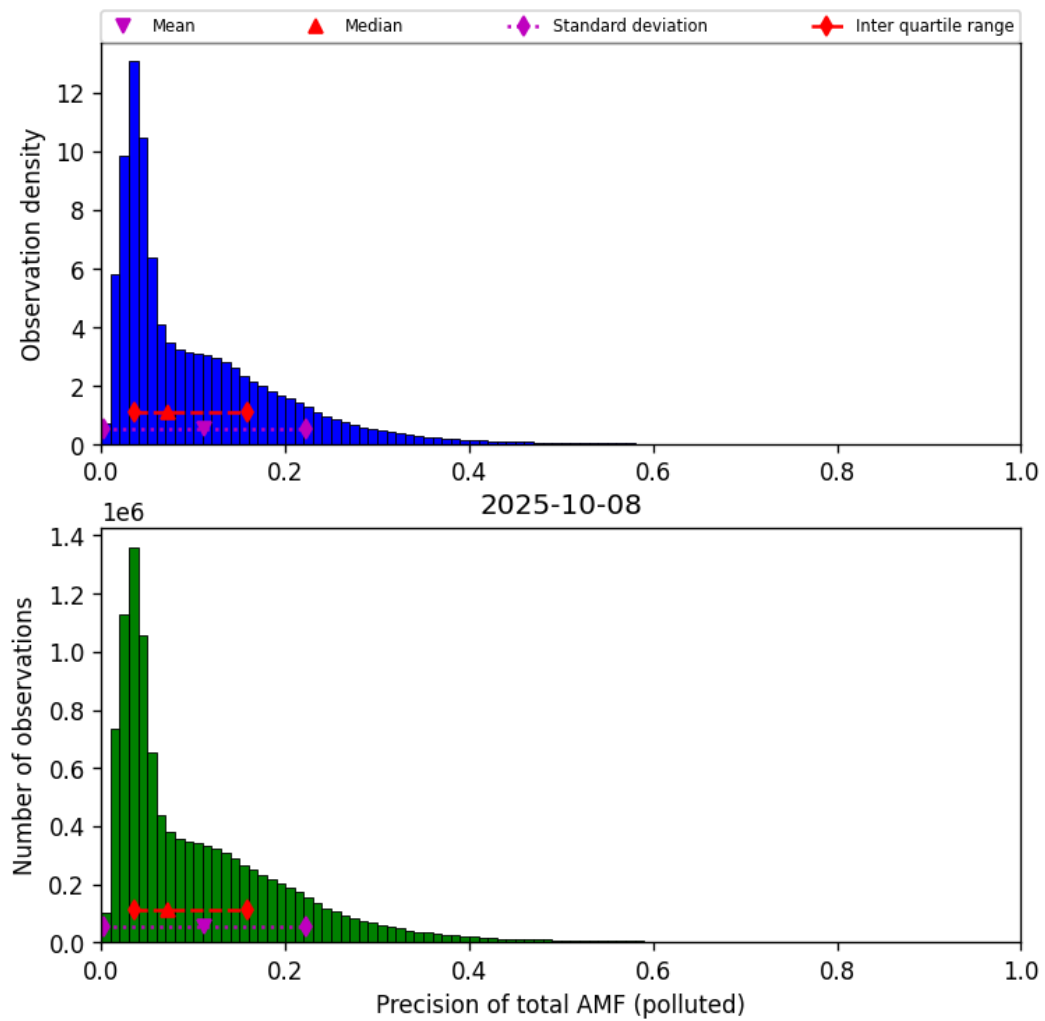


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-10-08 to 2025-10-09

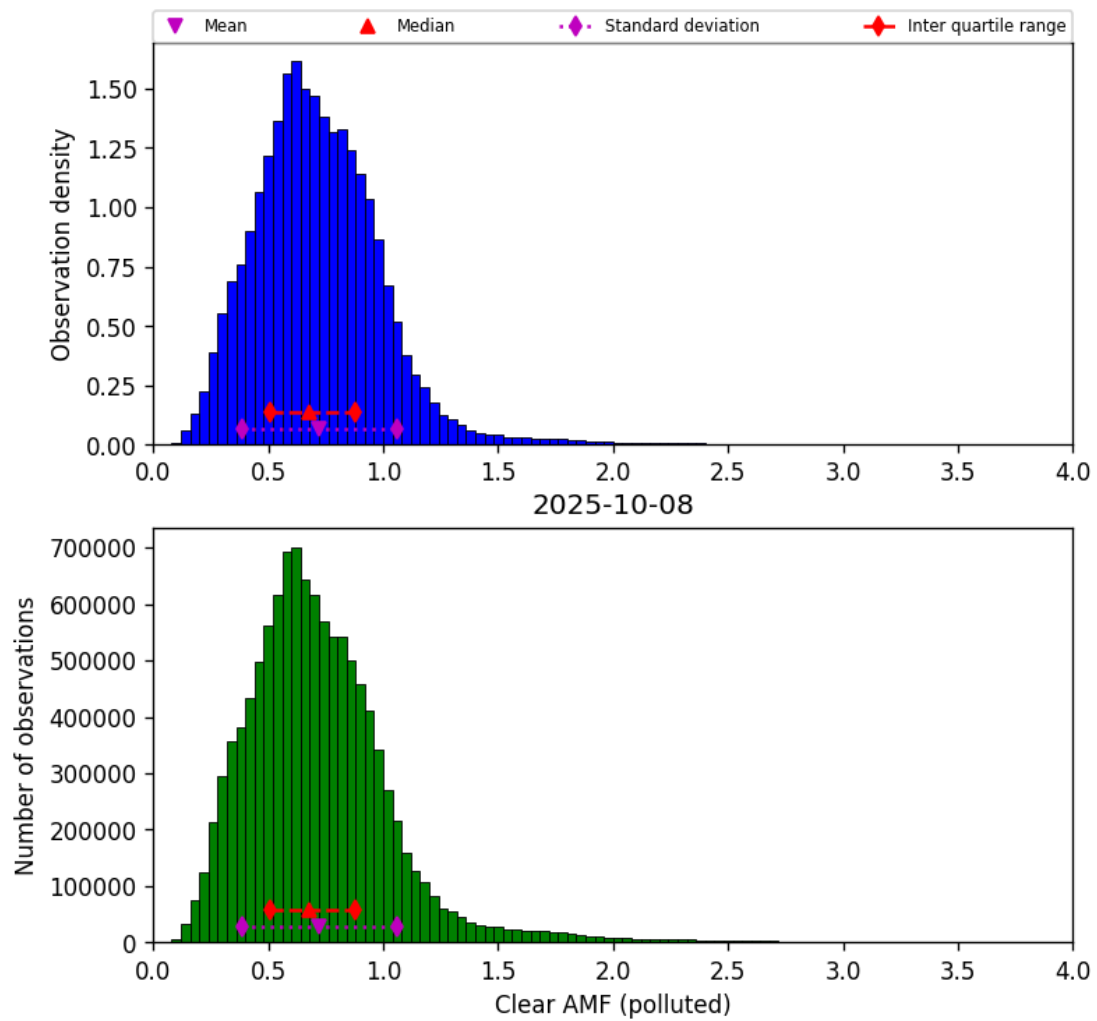


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-10-08 to 2025-10-09

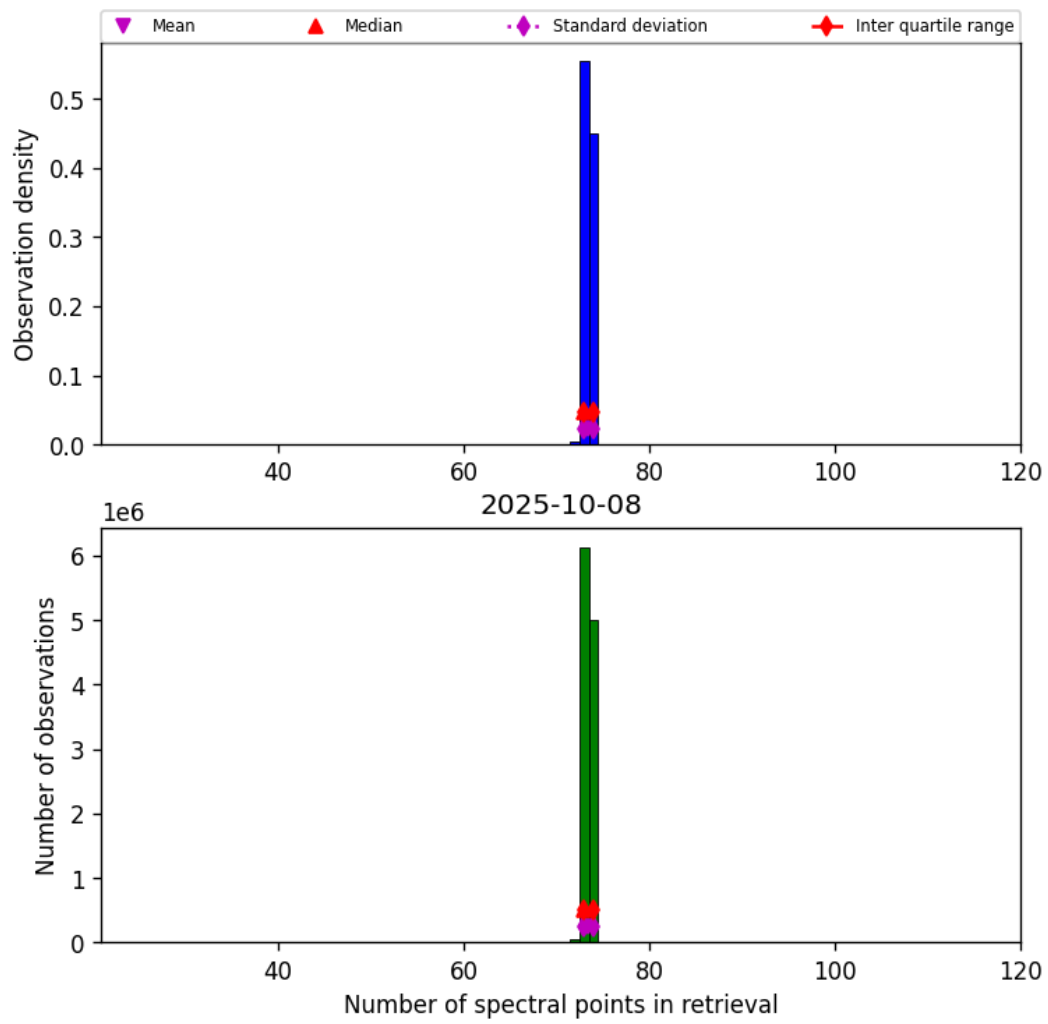


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-10-08 to 2025-10-09

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.

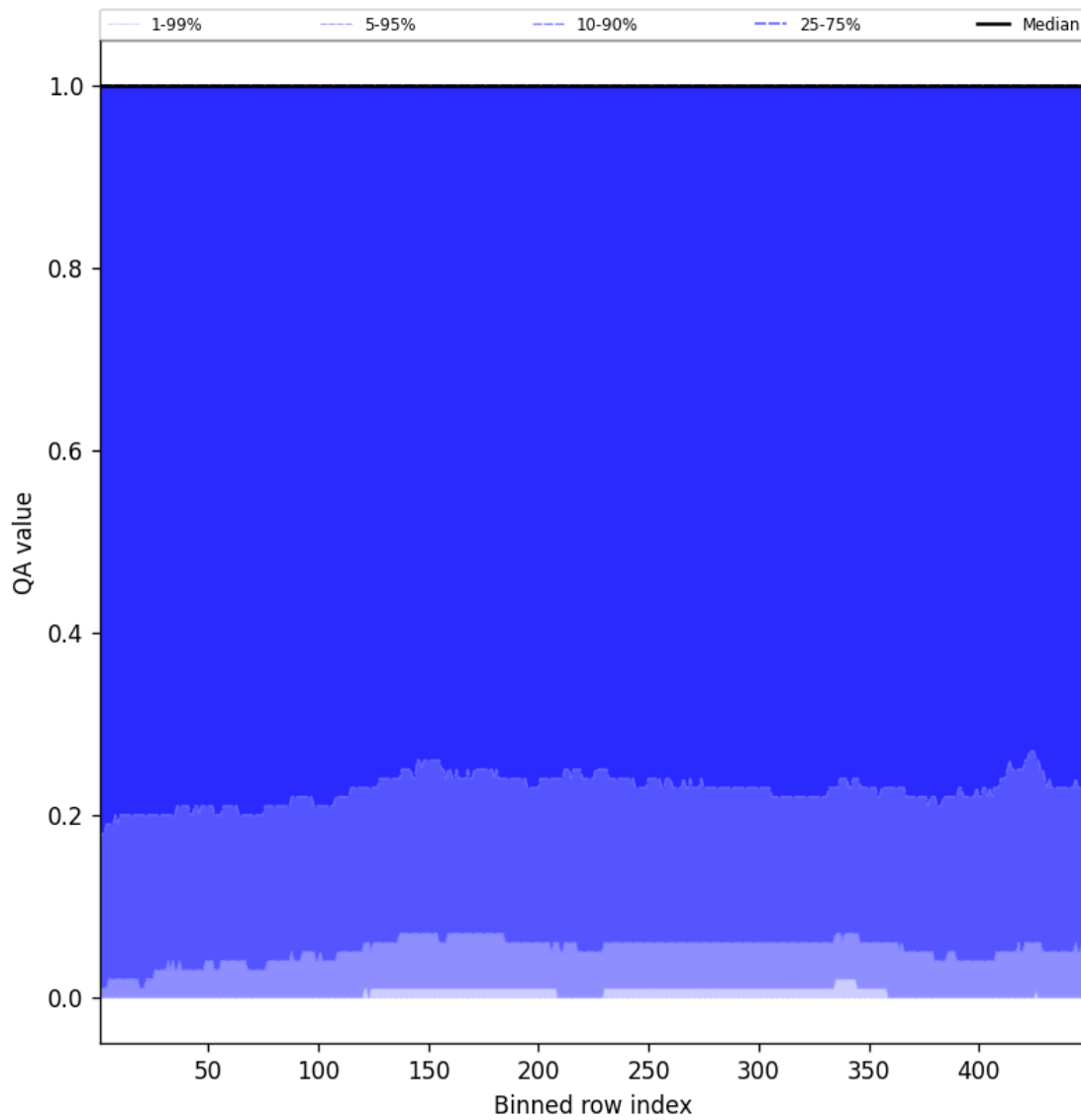


Figure 84: Along track statistics of “QA value” for 2025-10-08 to 2025-10-09

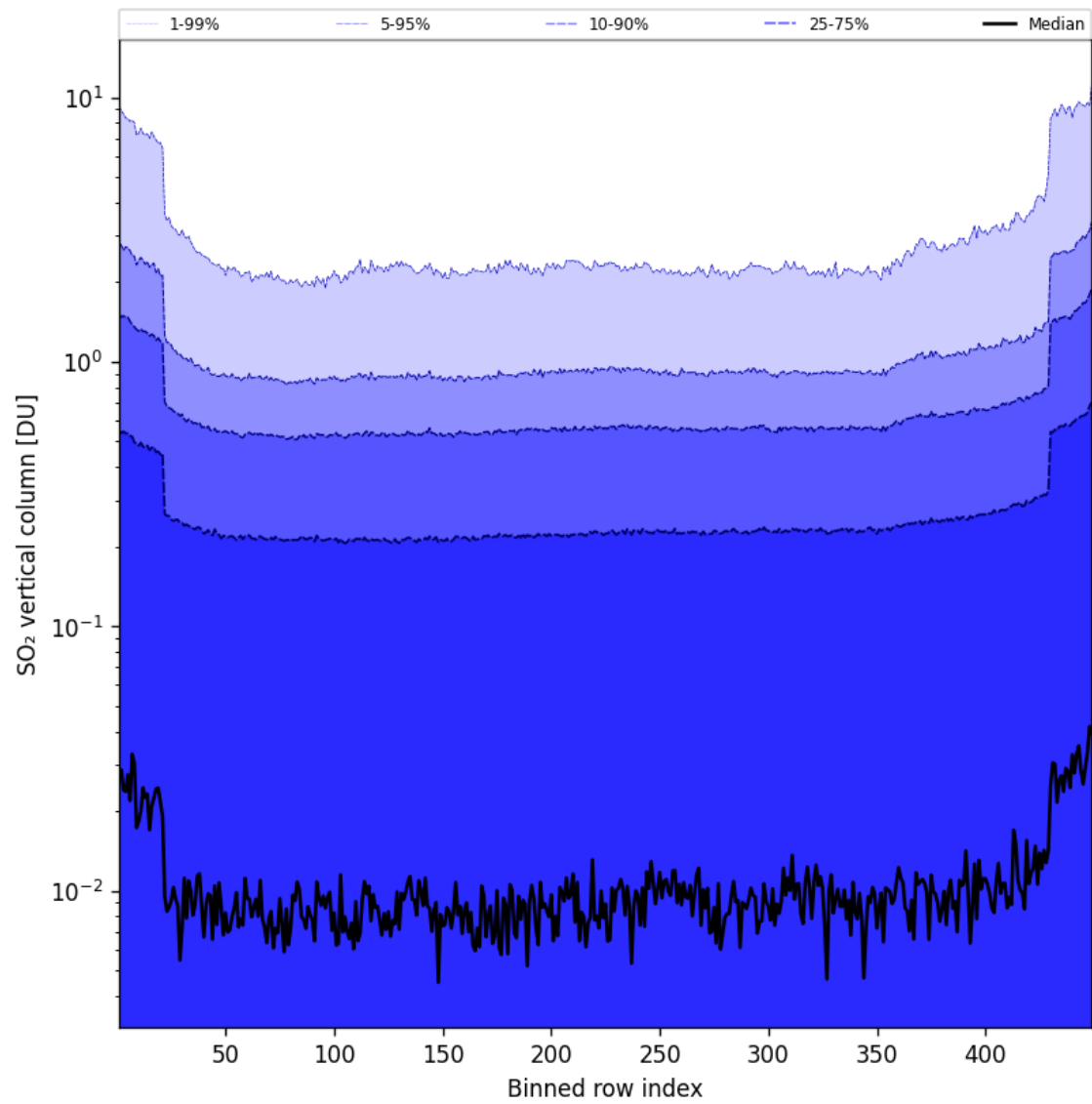


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-10-08 to 2025-10-09

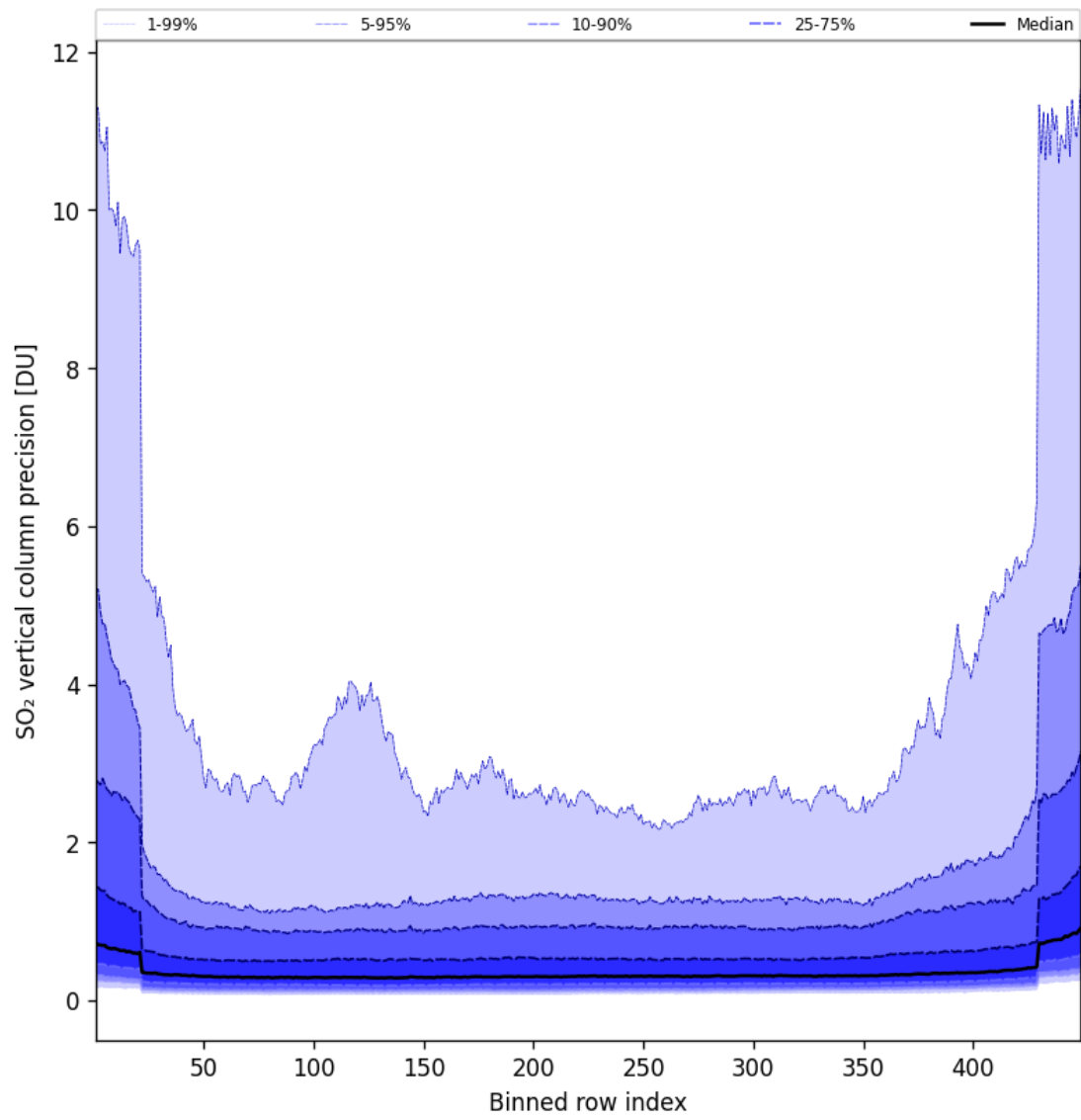


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-10-08 to 2025-10-09

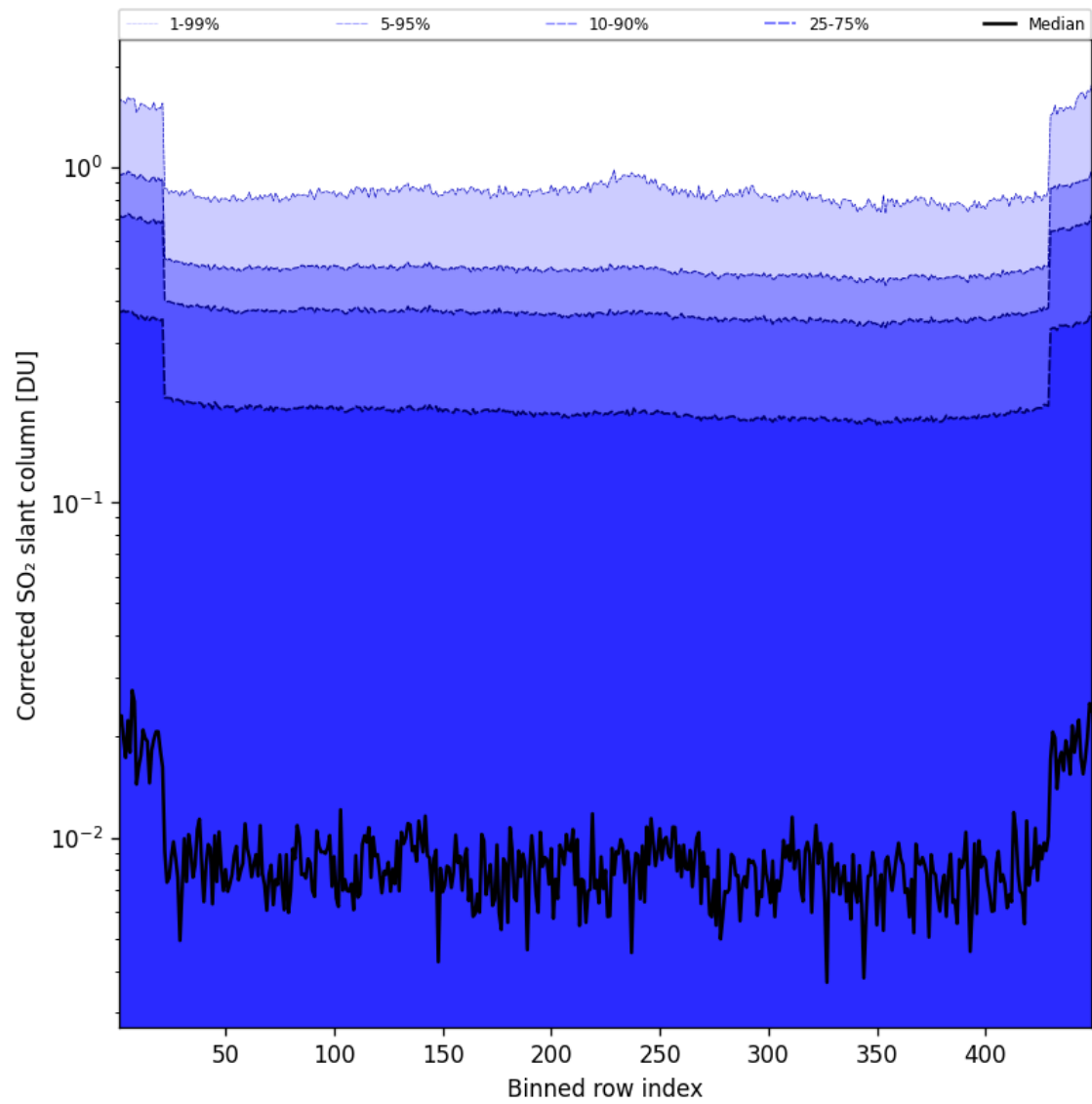


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-10-08 to 2025-10-09

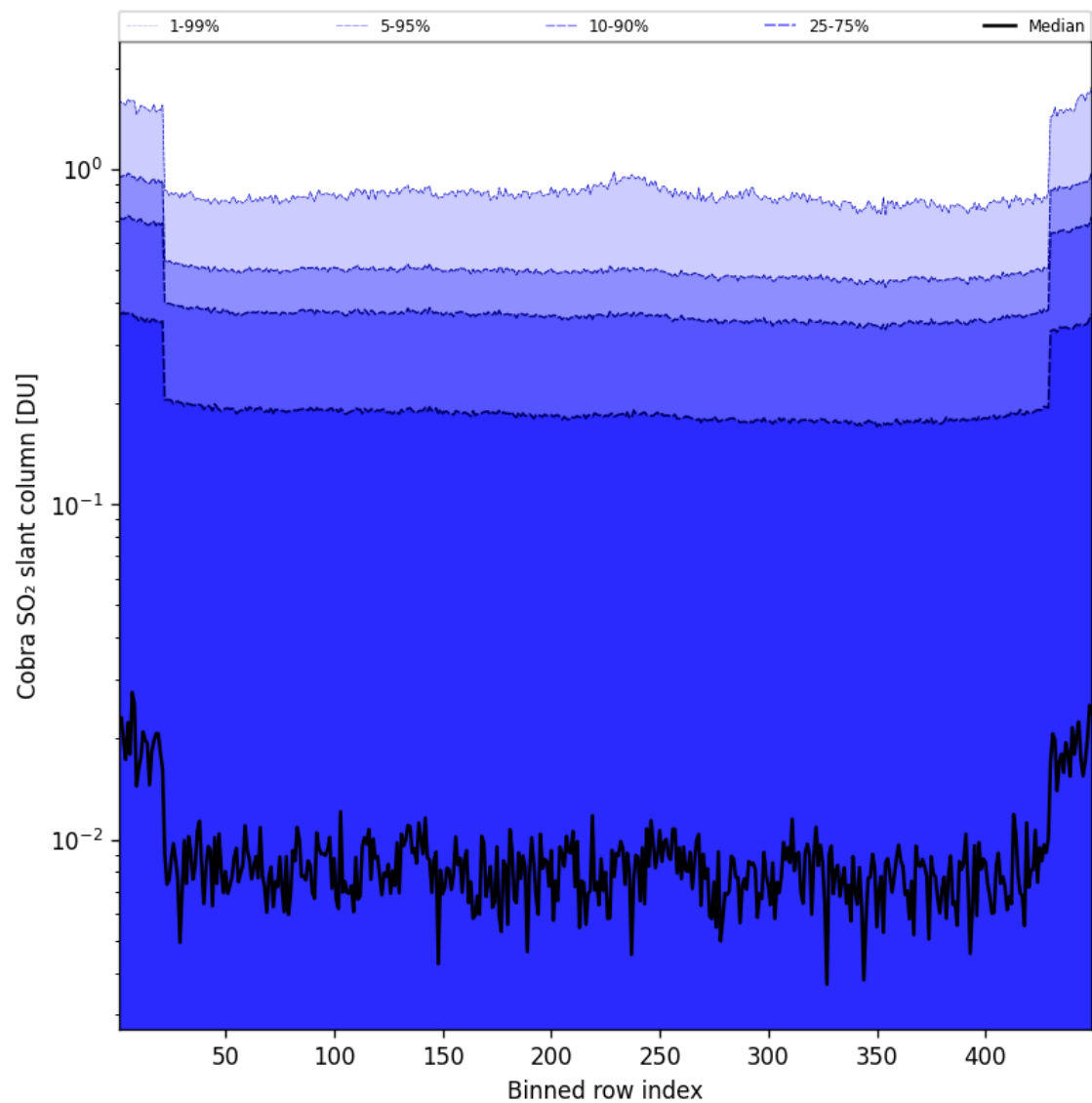


Figure 88: Along track statistics of "Cobra SO₂ slant column" for 2025-10-08 to 2025-10-09

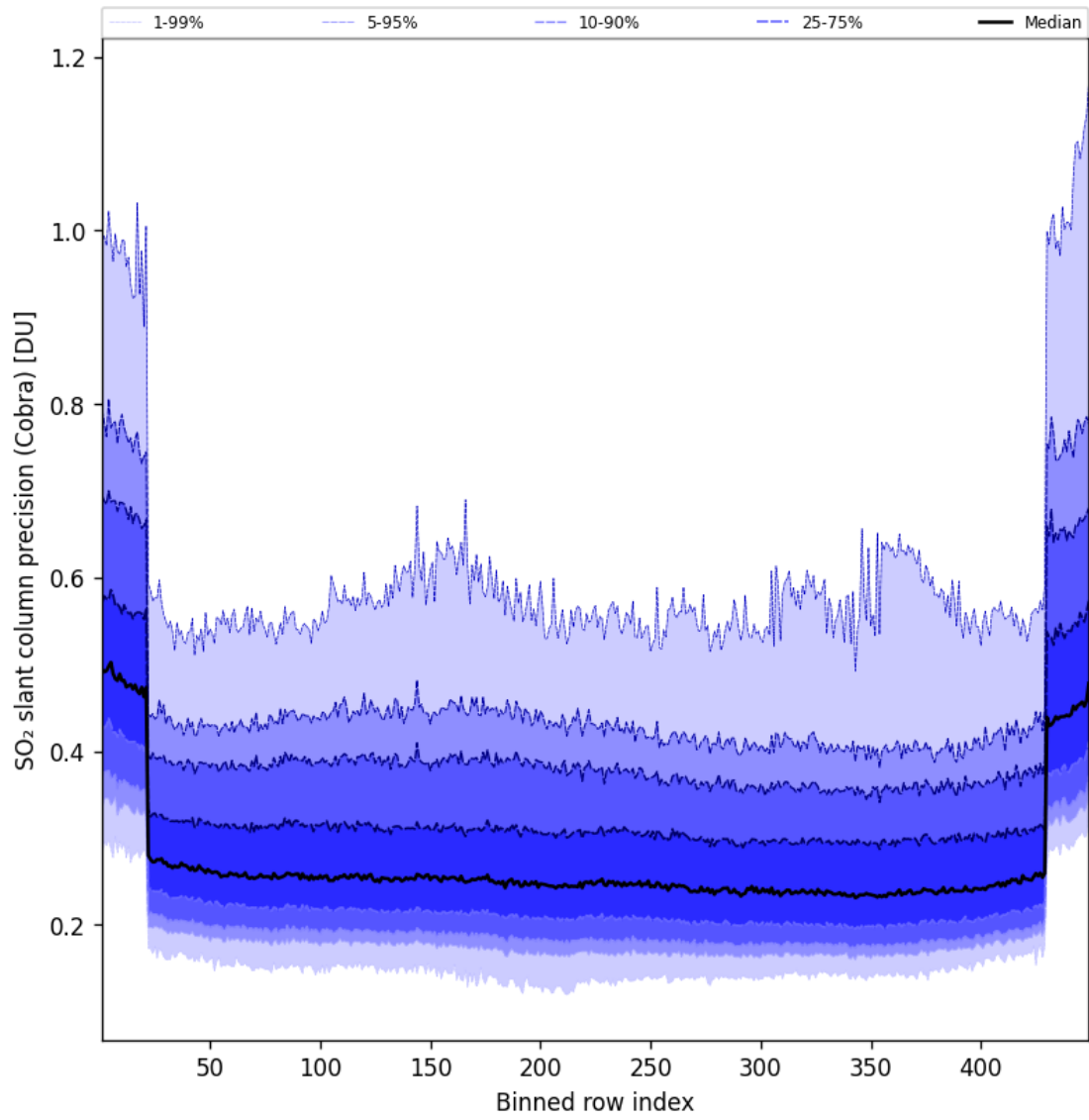


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-10-08 to 2025-10-09

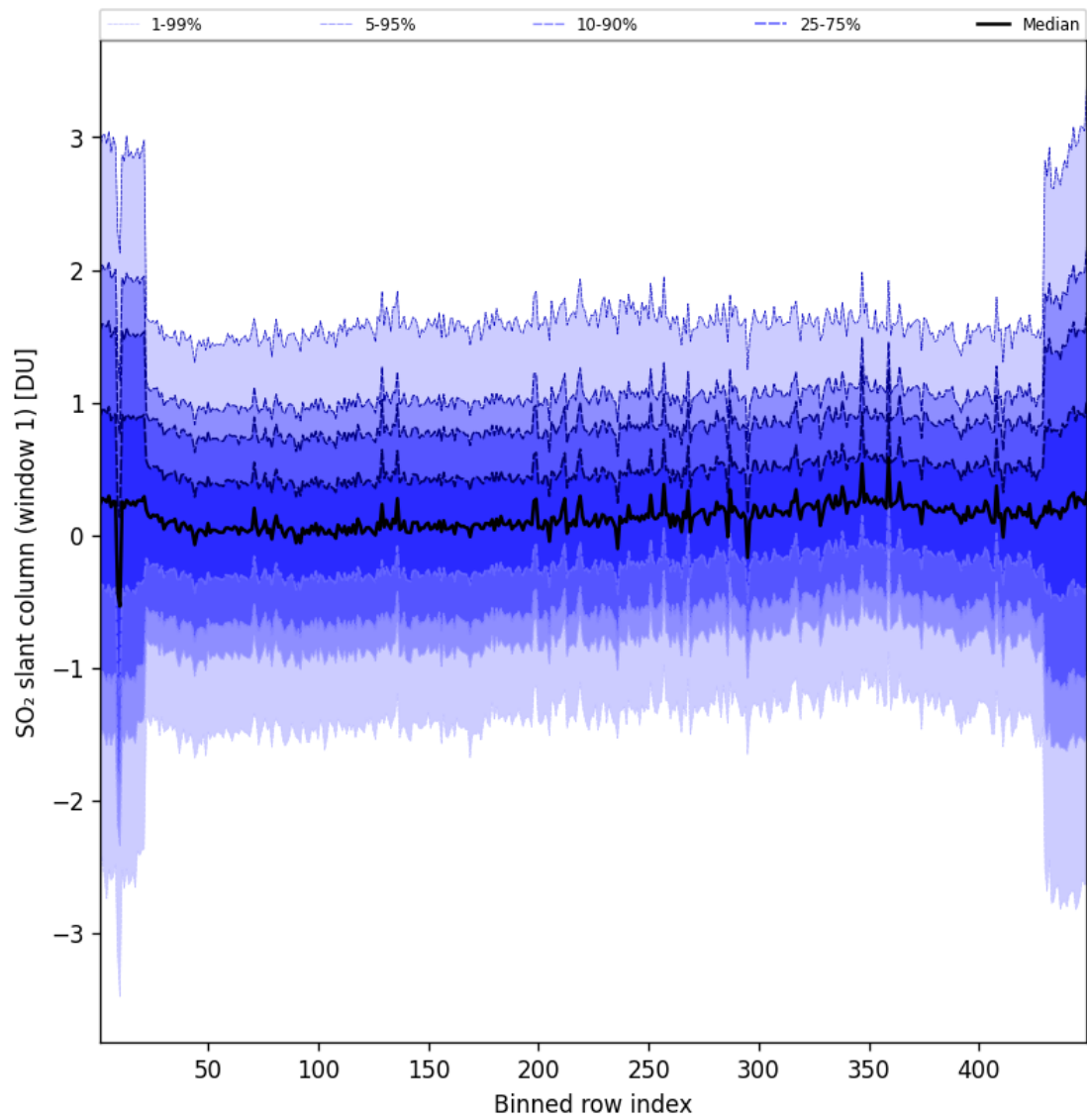


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-10-08 to 2025-10-09

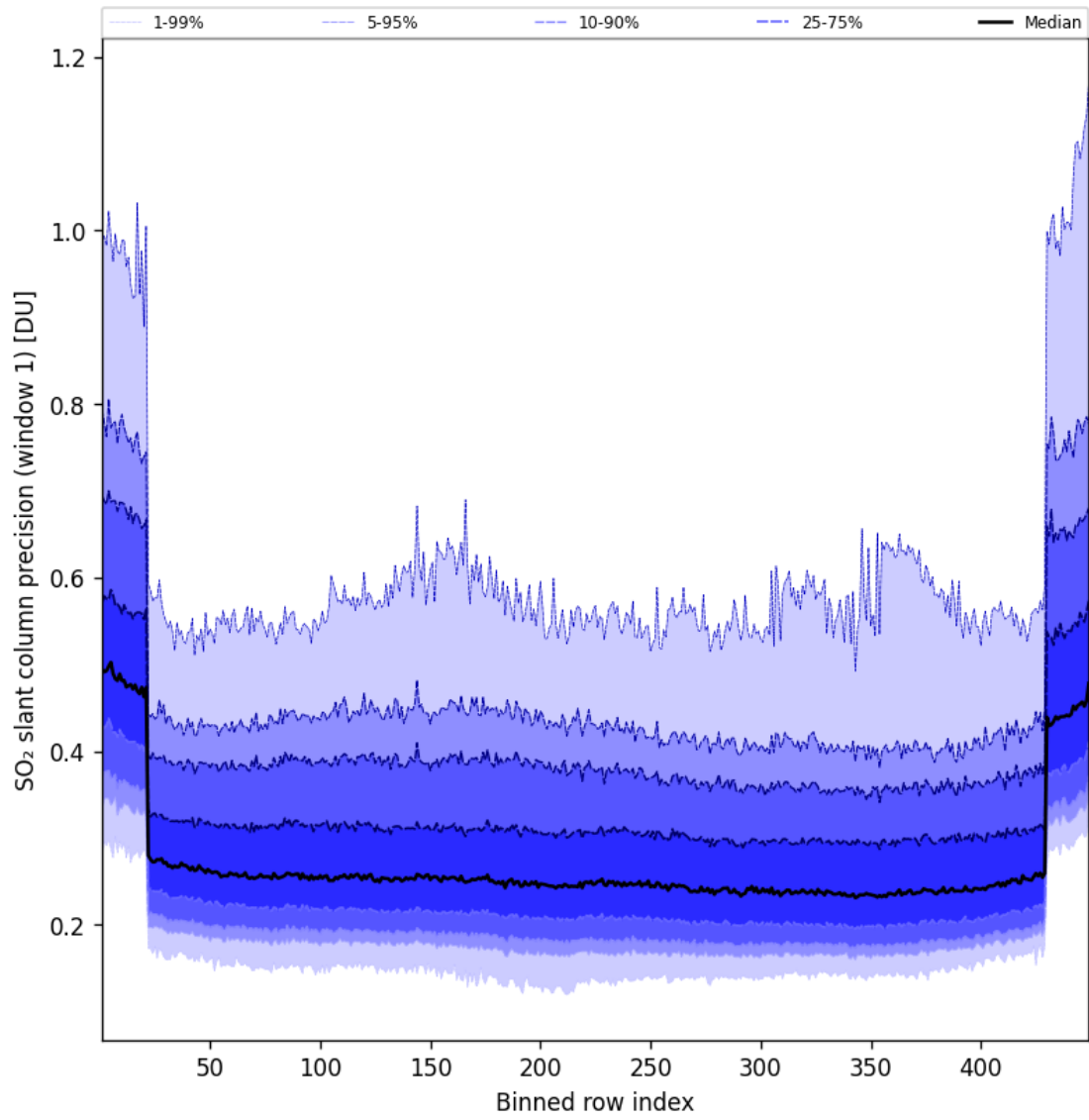


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-10-08 to 2025-10-09

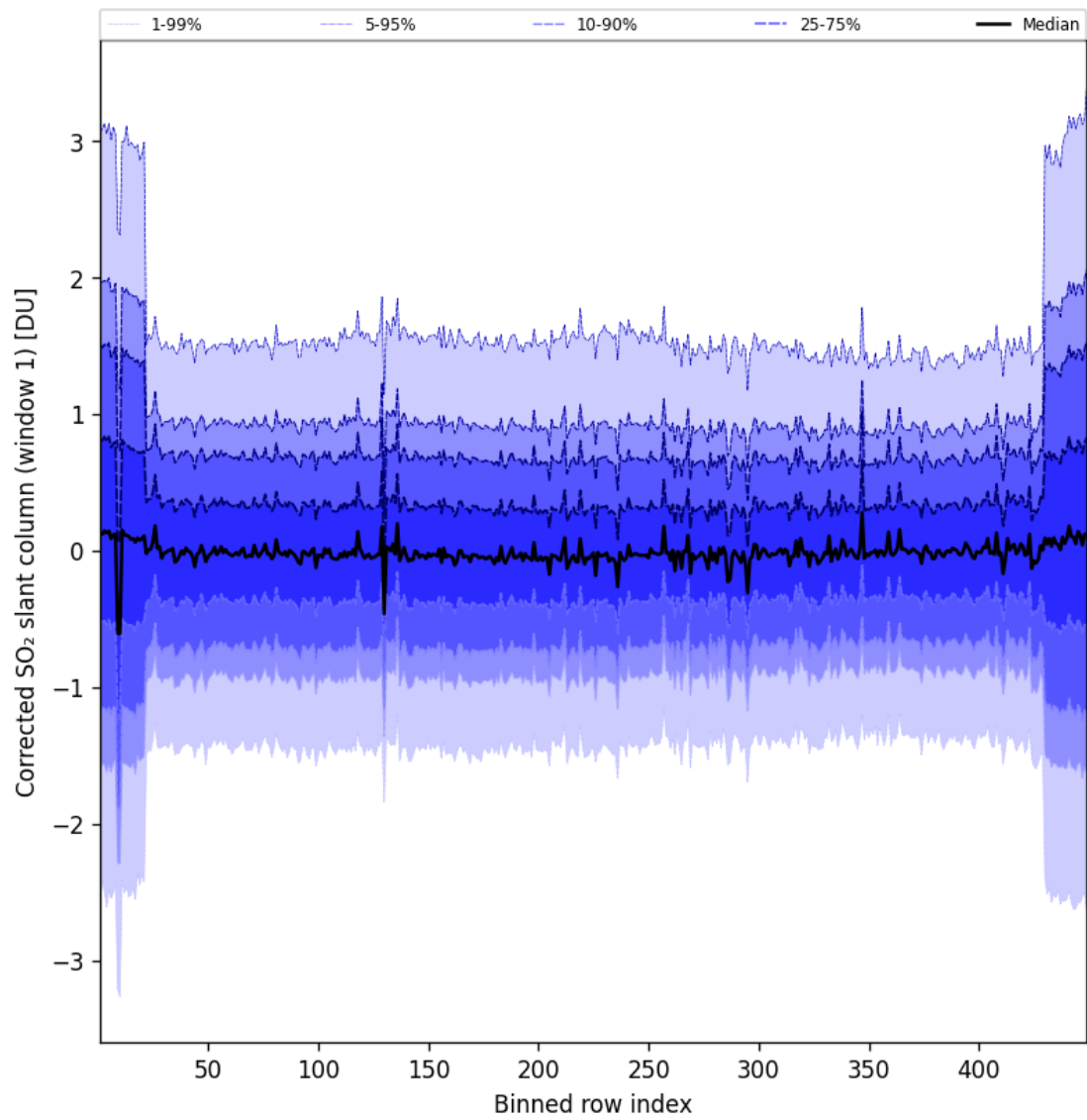


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-10-08 to 2025-10-09

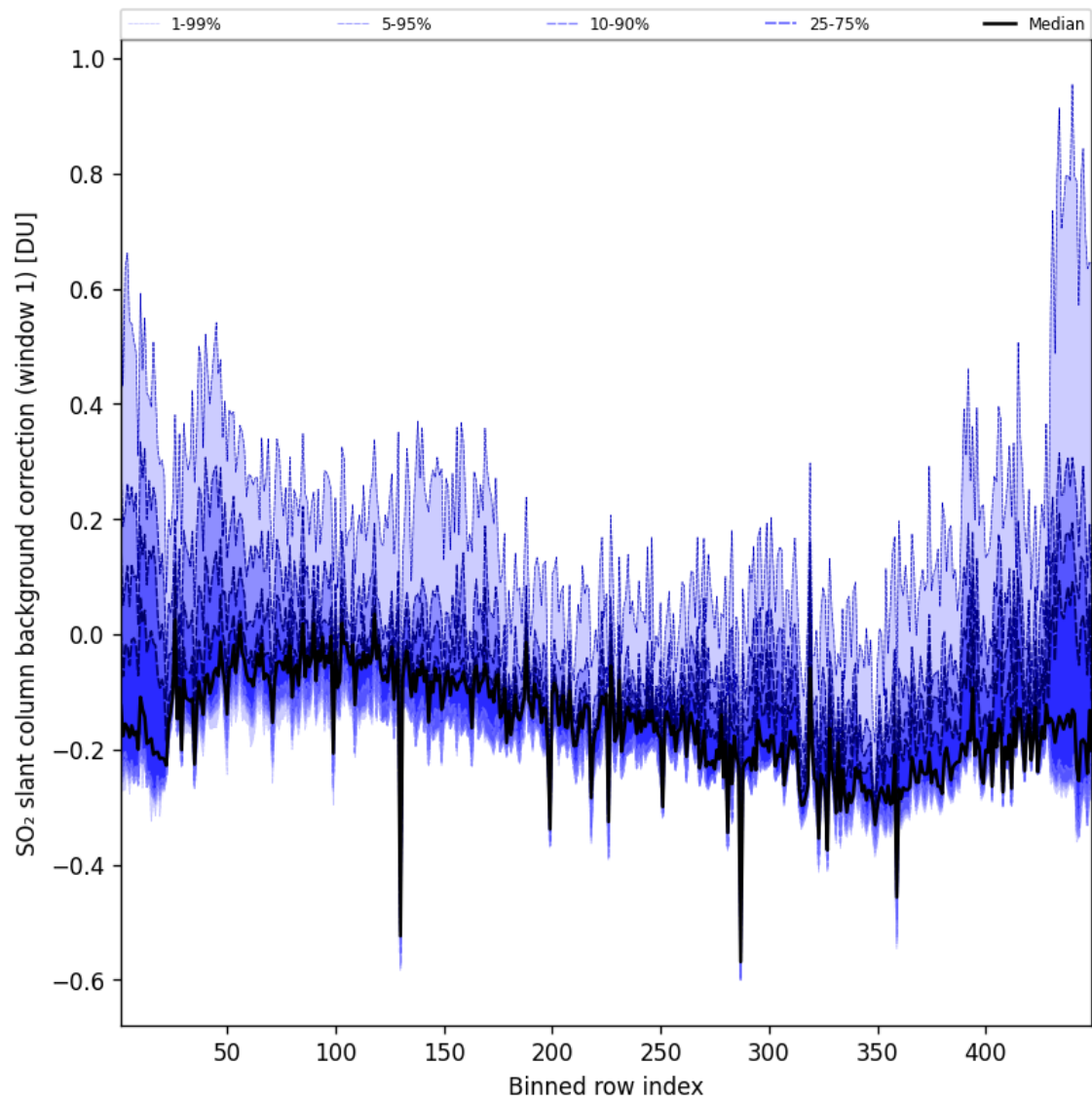


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-10-08 to 2025-10-09

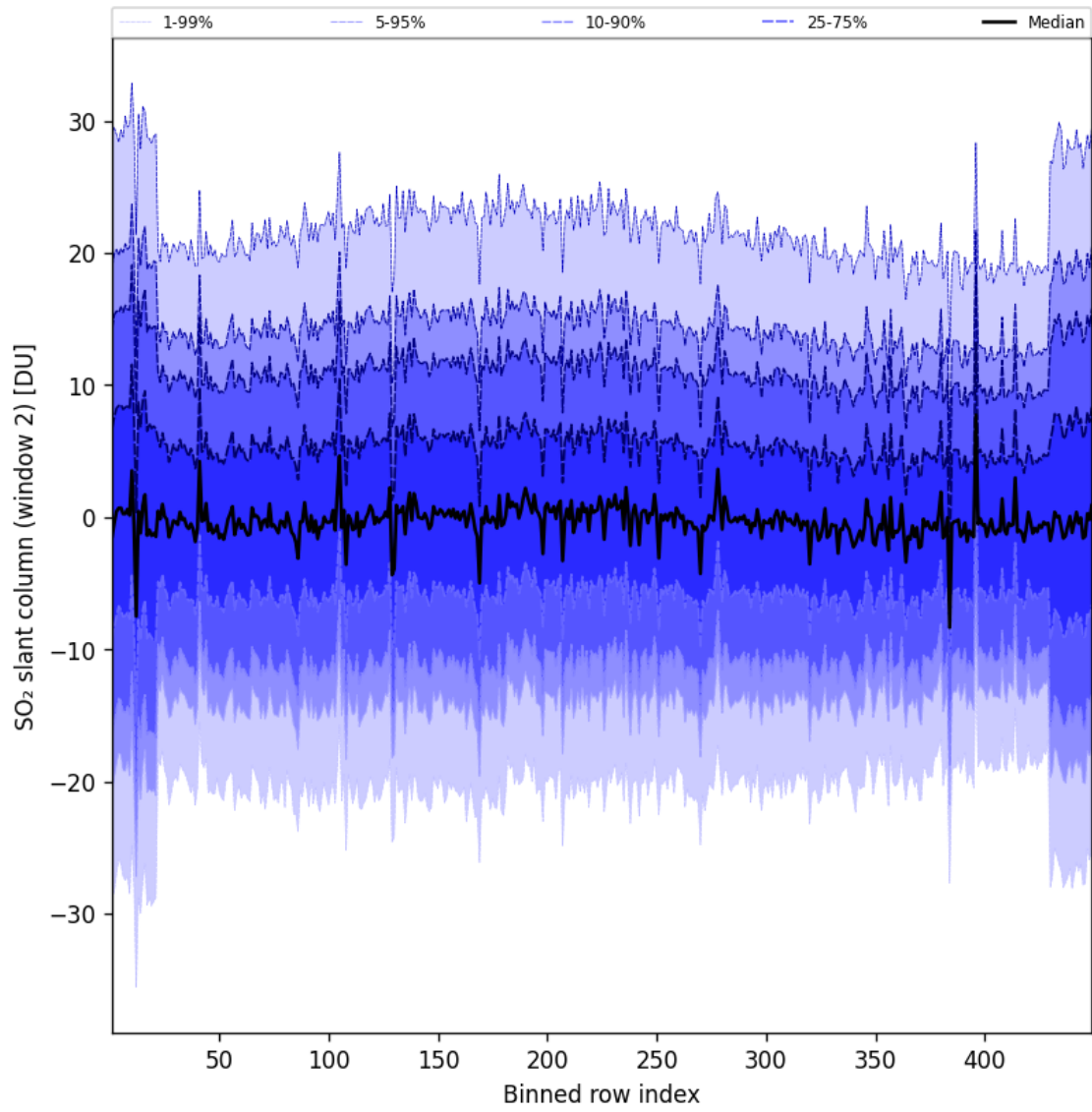


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-10-08 to 2025-10-09

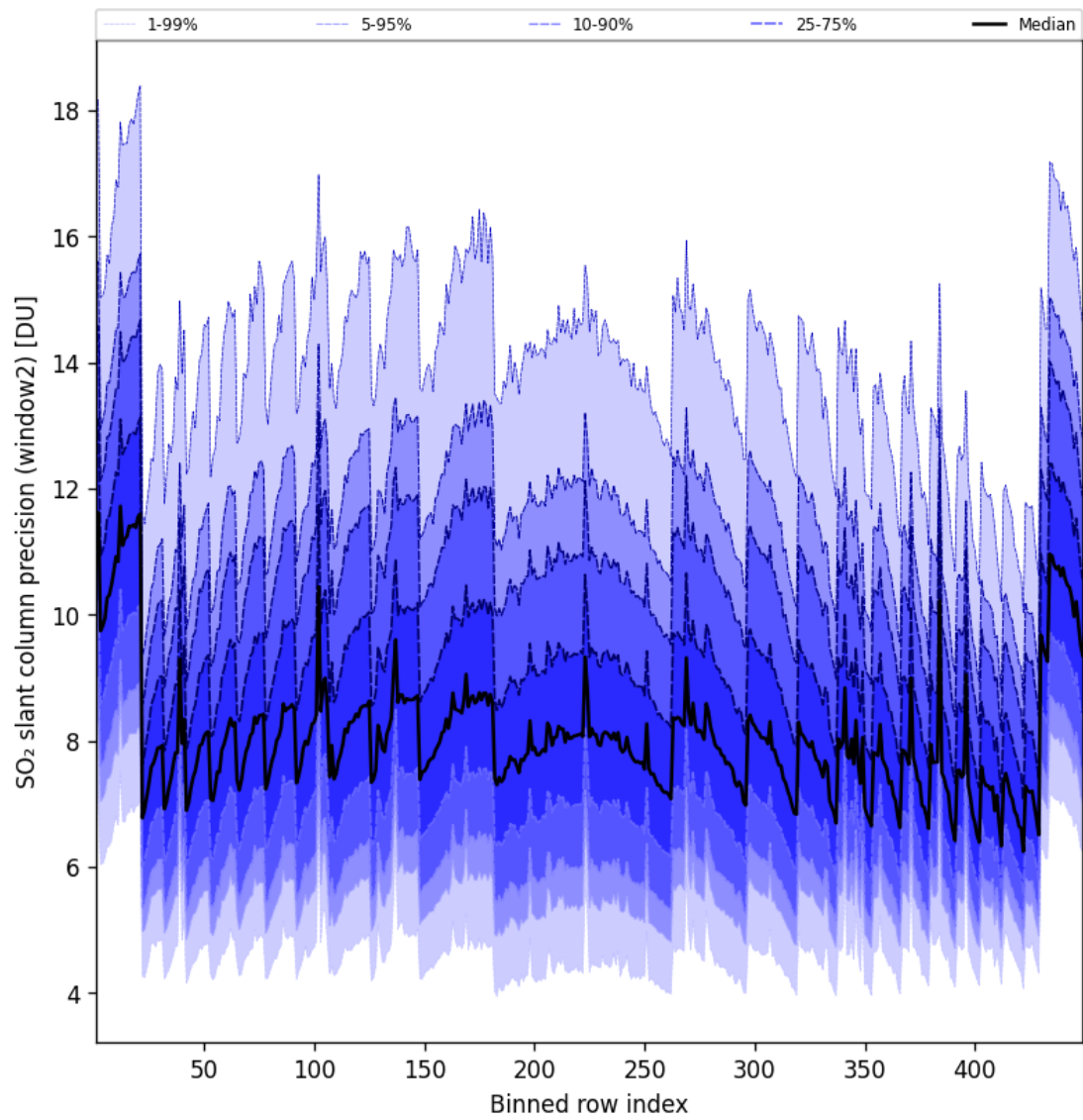


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-10-08 to 2025-10-09

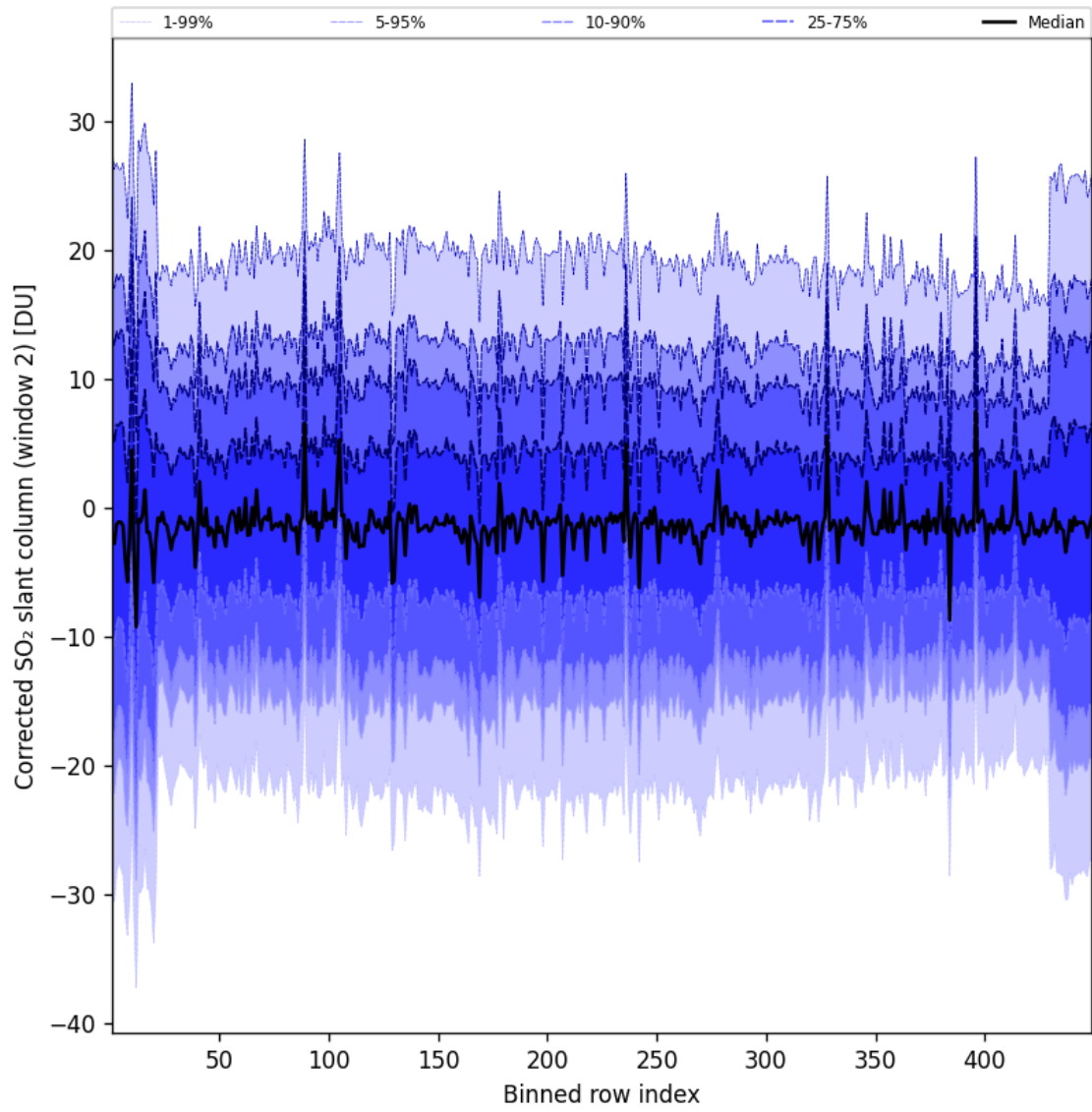


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-10-08 to 2025-10-09

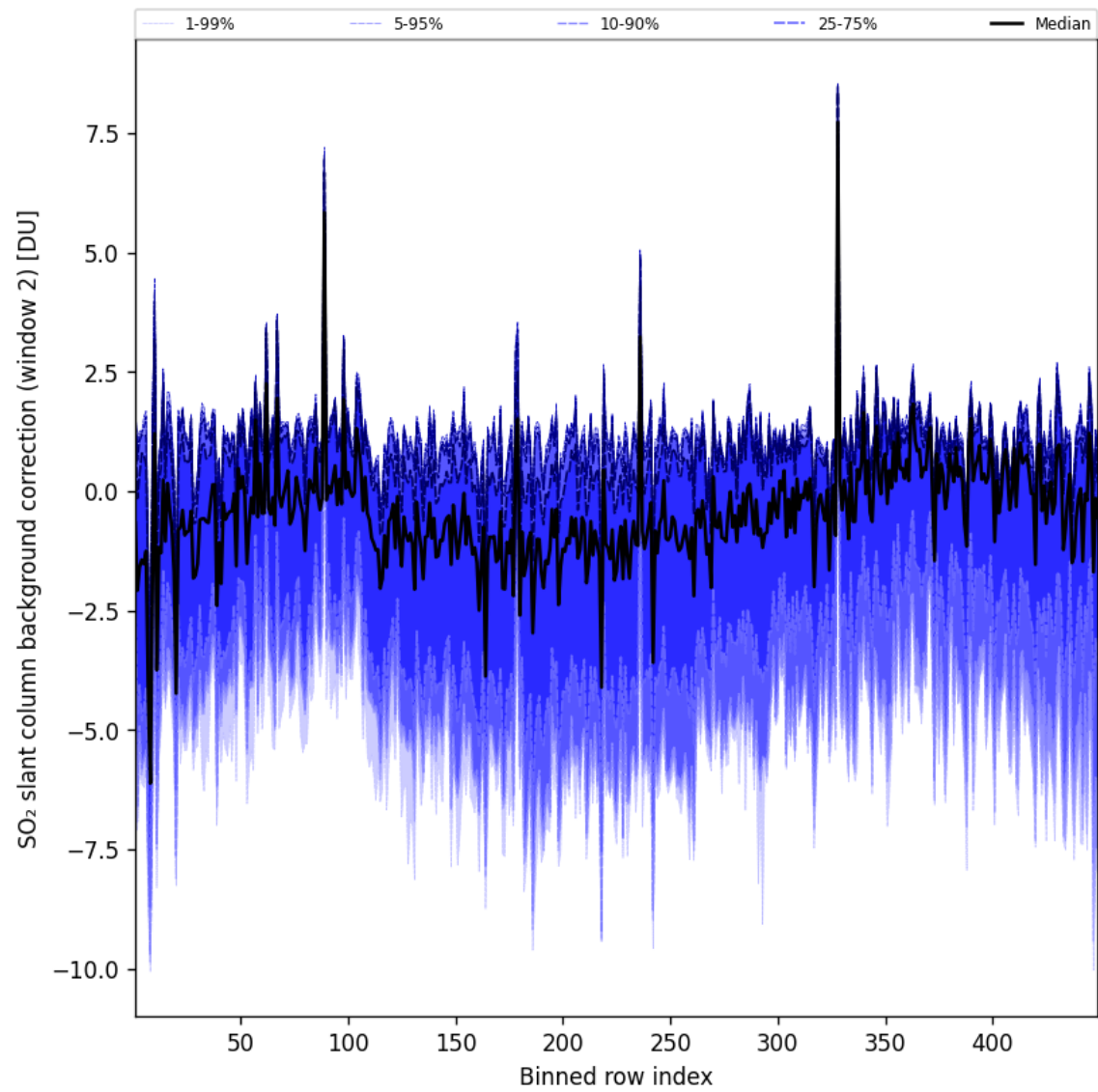


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-10-08 to 2025-10-09

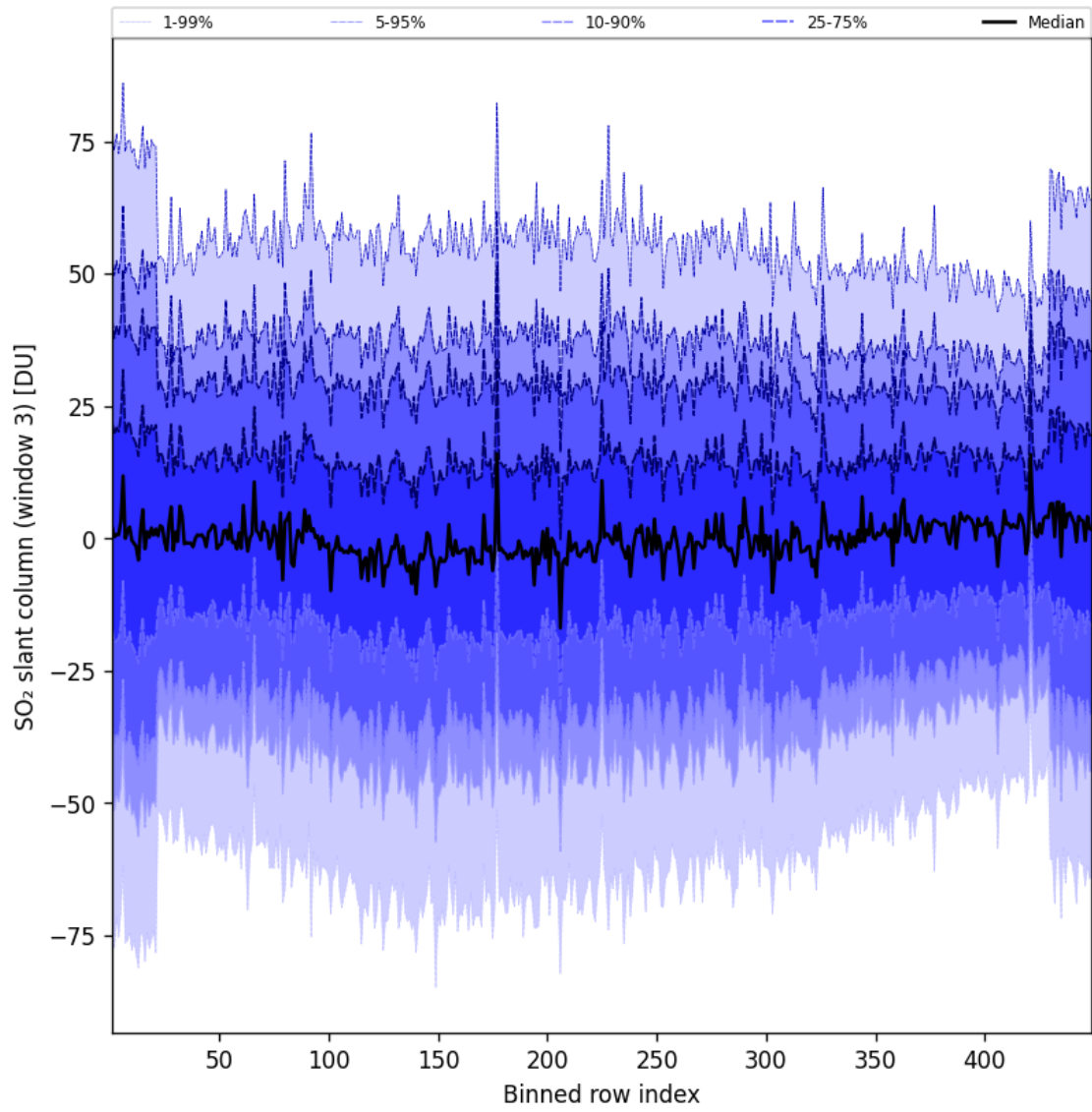


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-10-08 to 2025-10-09

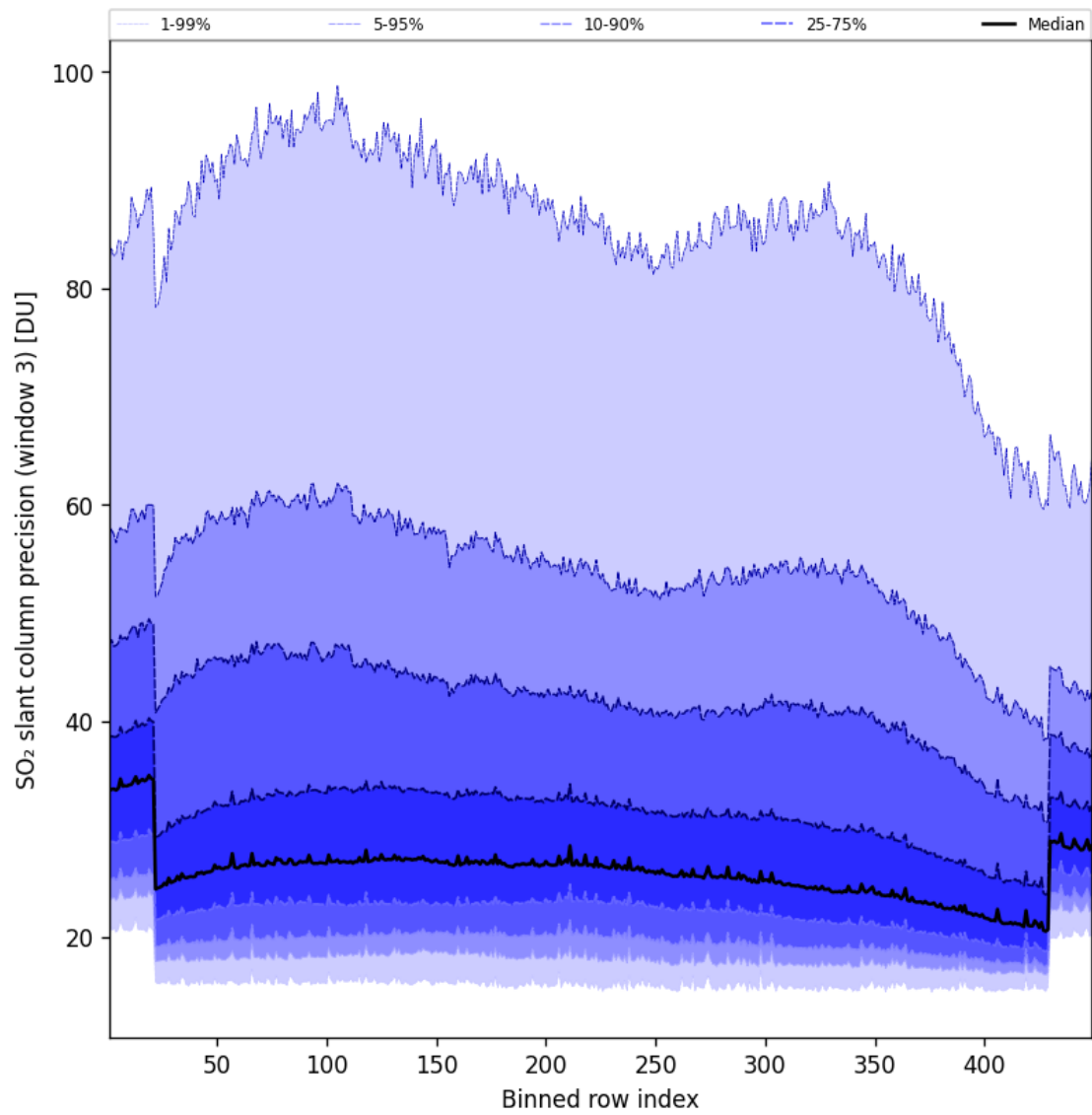


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-10-08 to 2025-10-09

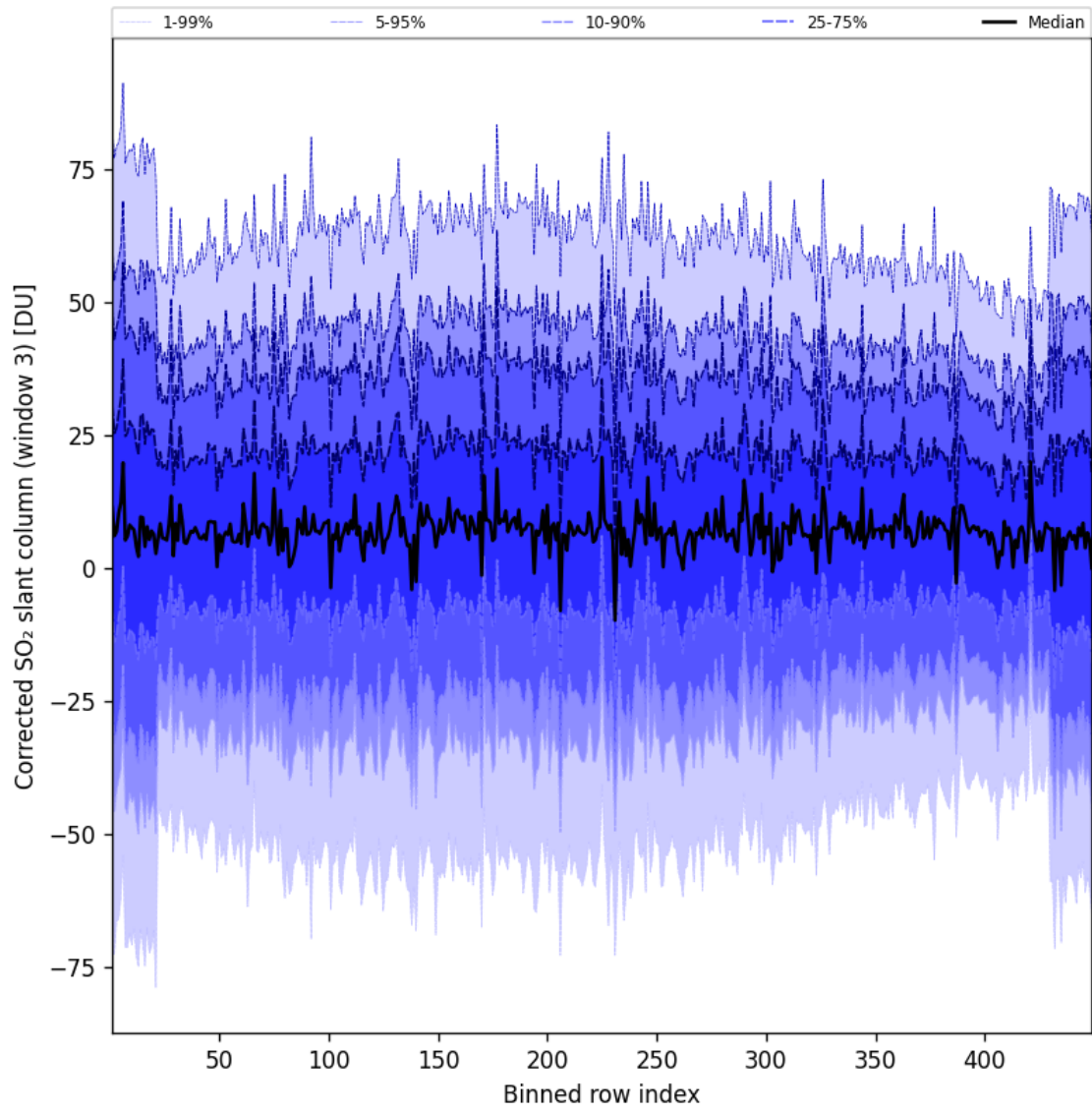


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-10-08 to 2025-10-09

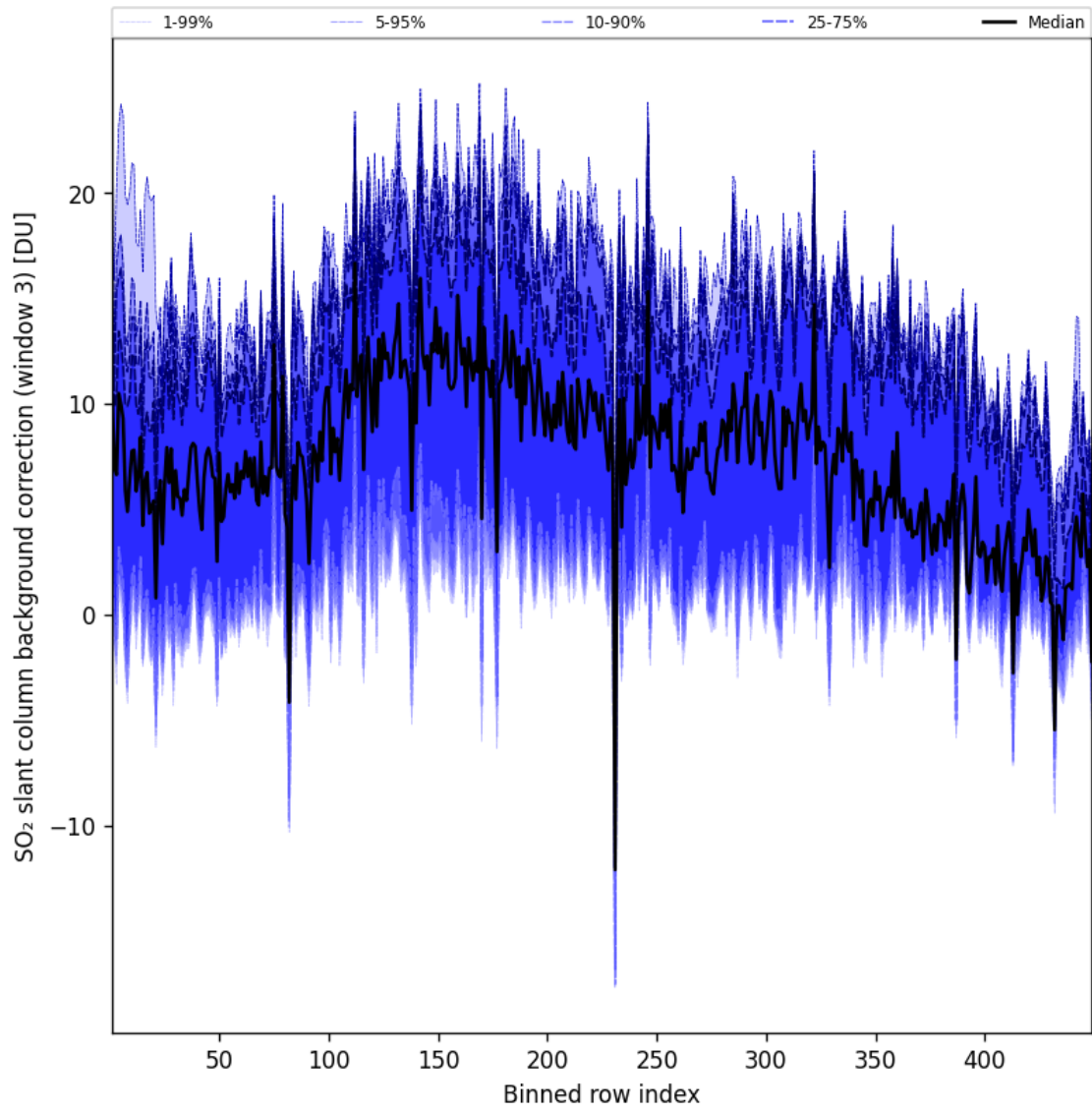


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-10-08 to 2025-10-09

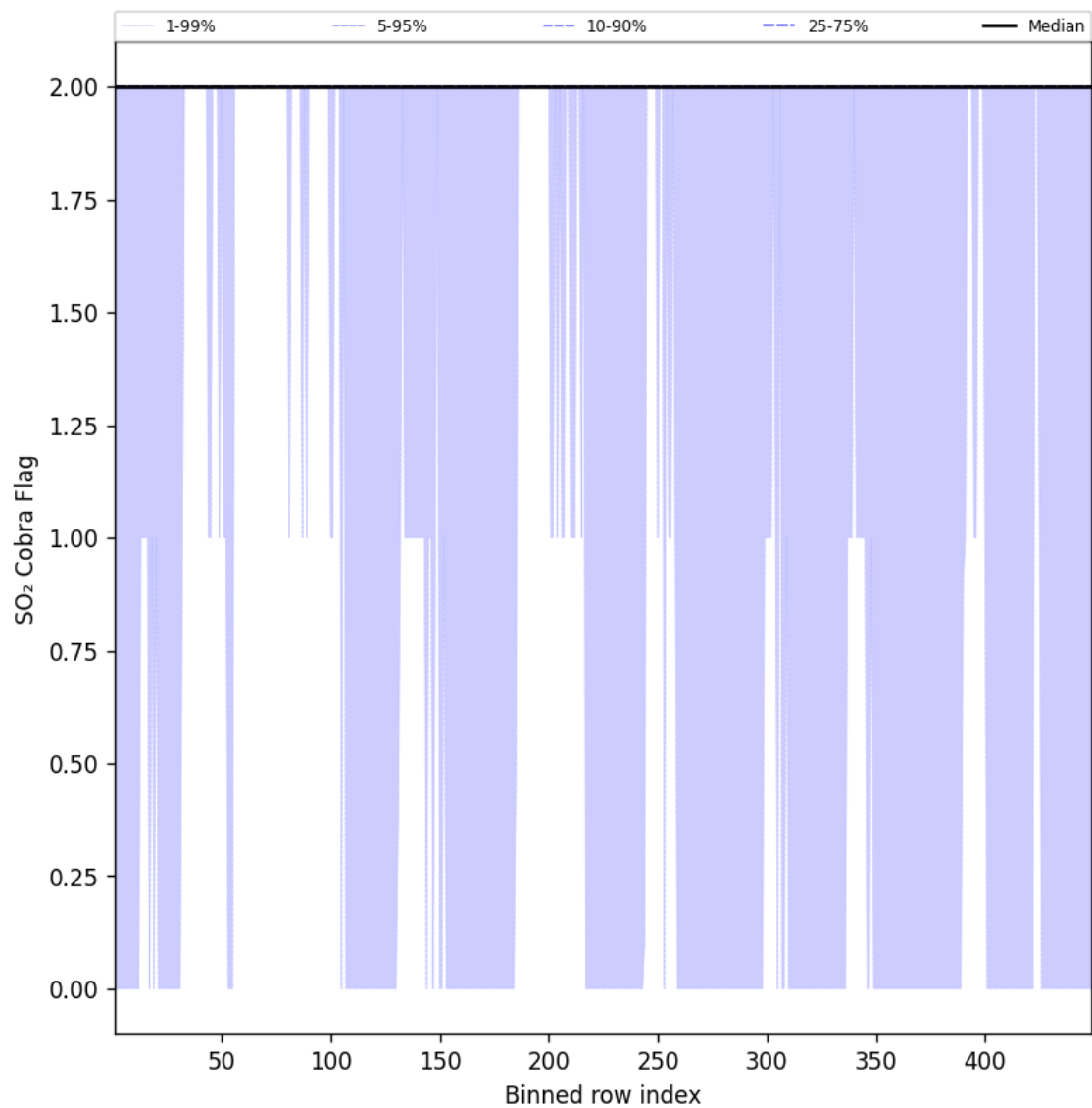


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-10-08 to 2025-10-09

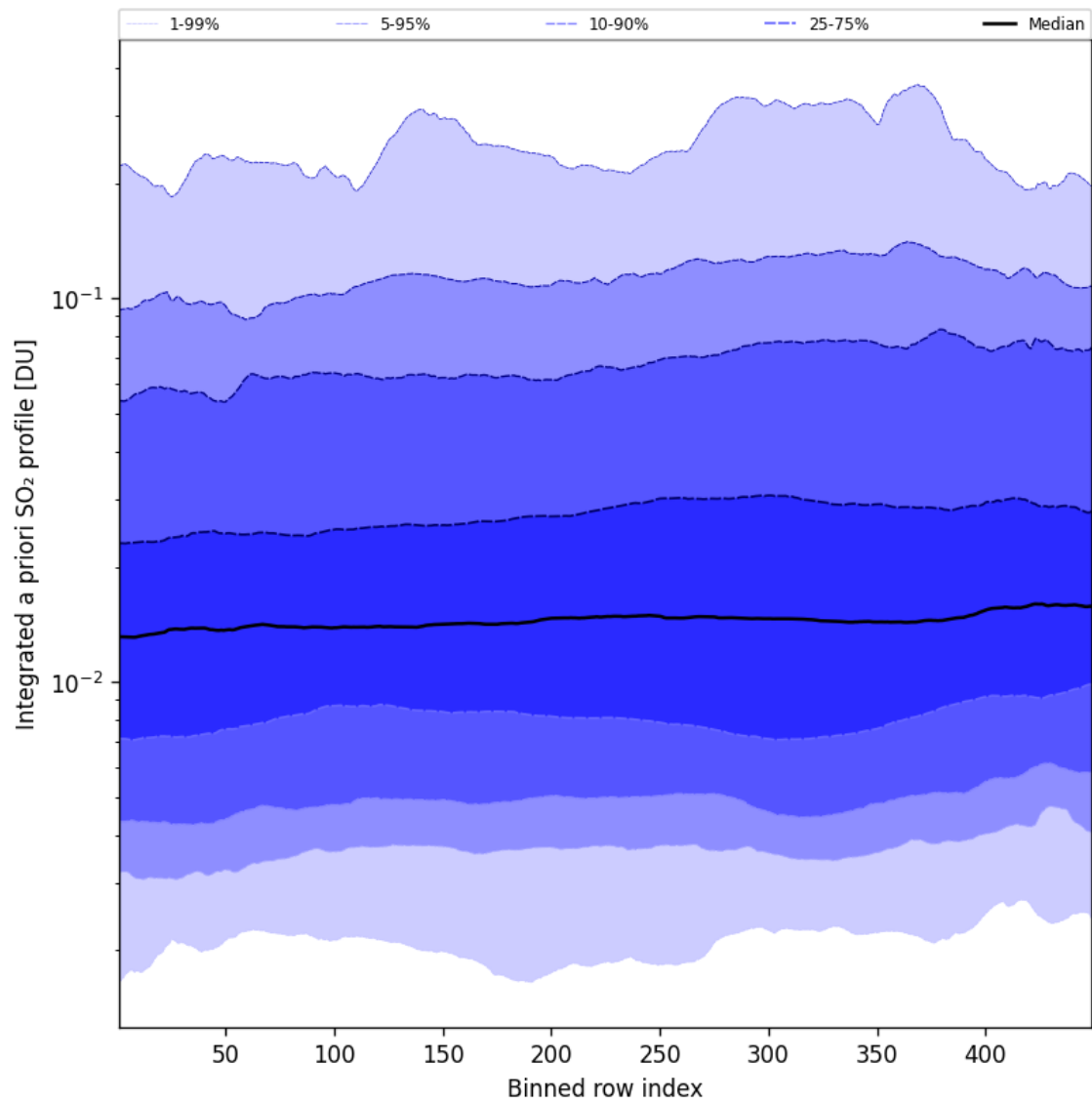


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-10-08 to 2025-10-09

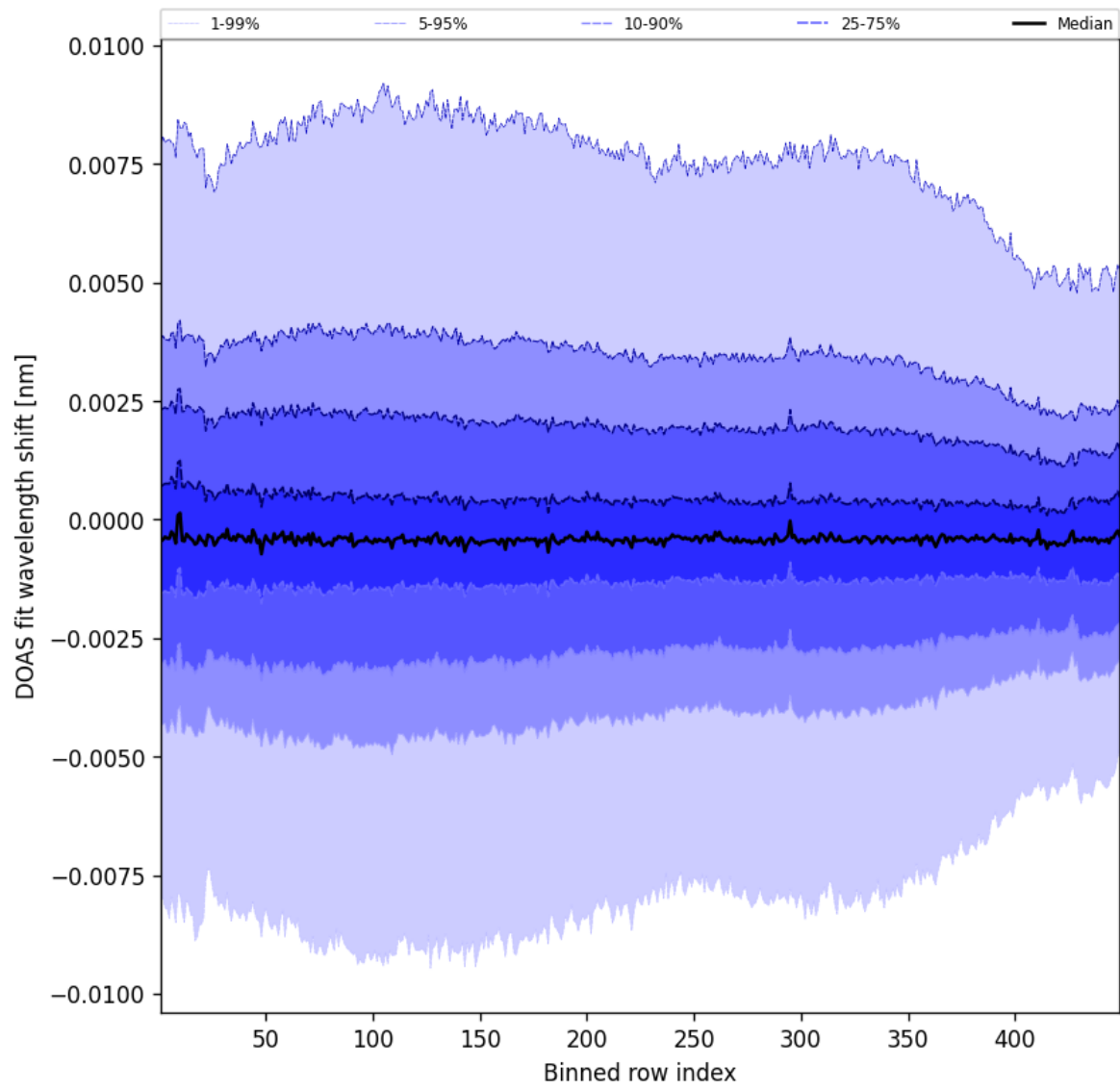


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-10-08 to 2025-10-09

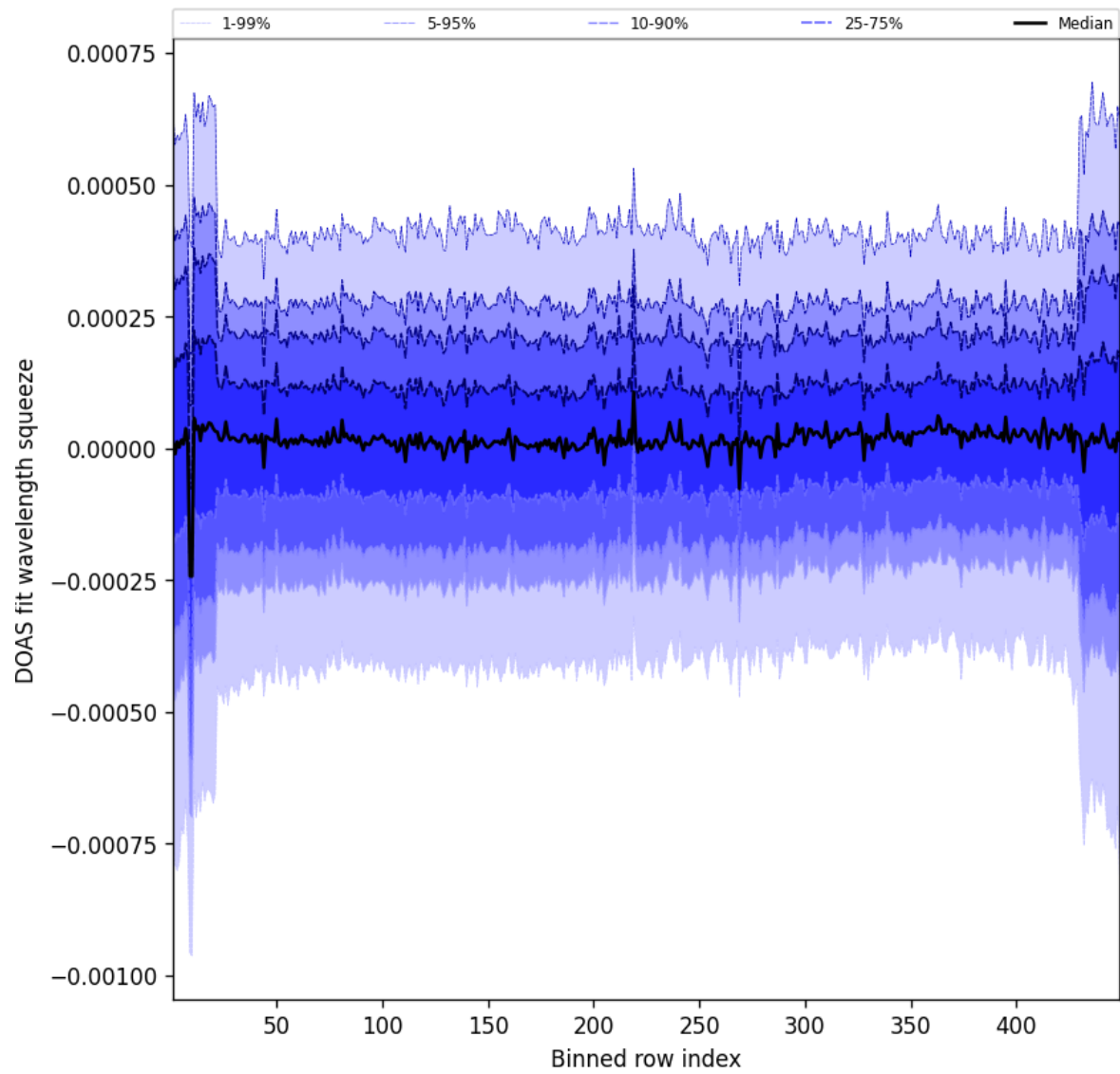


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-10-08 to 2025-10-09

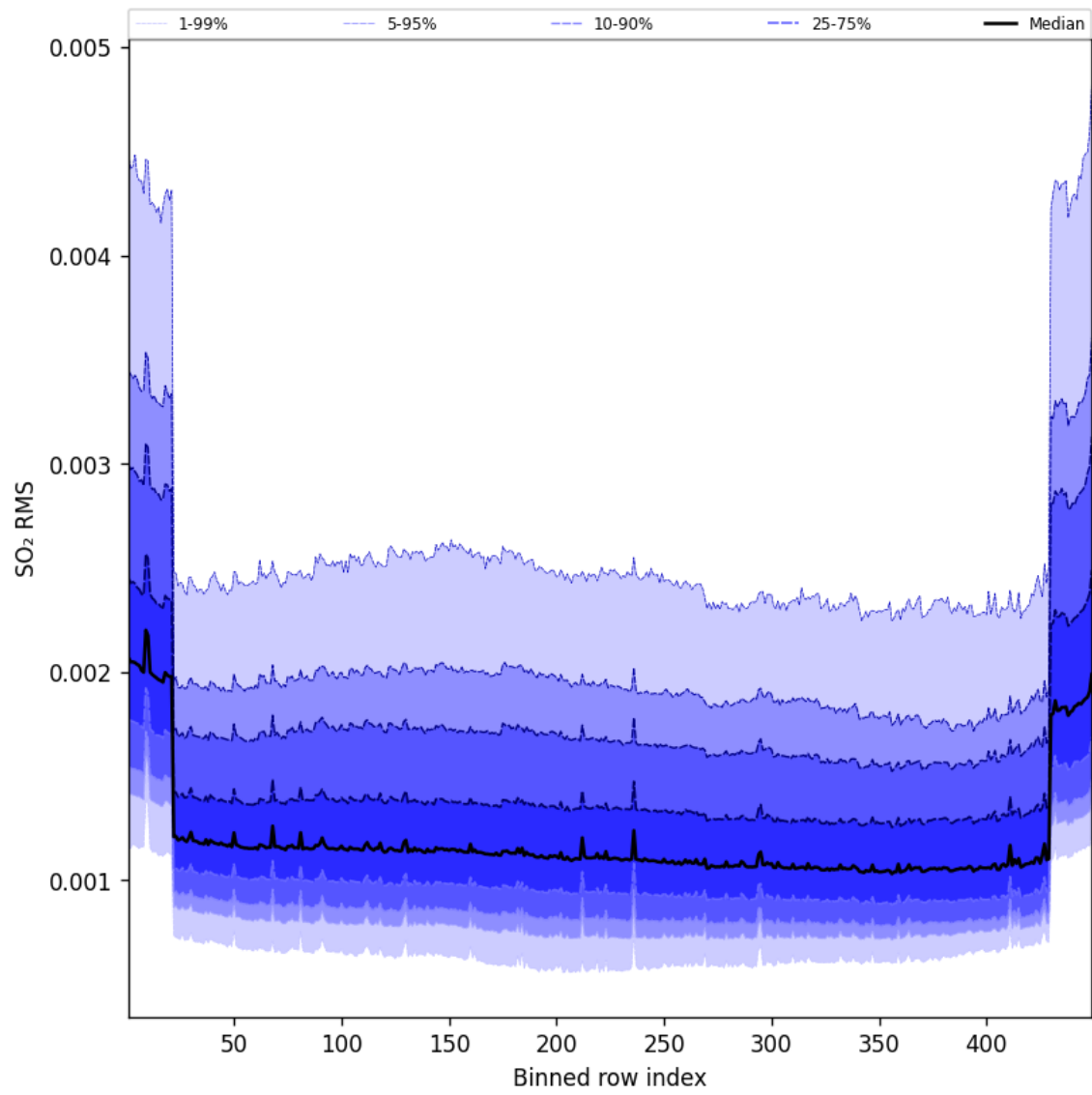


Figure 106: Along track statistics of “SO₂ RMS” for 2025-10-08 to 2025-10-09

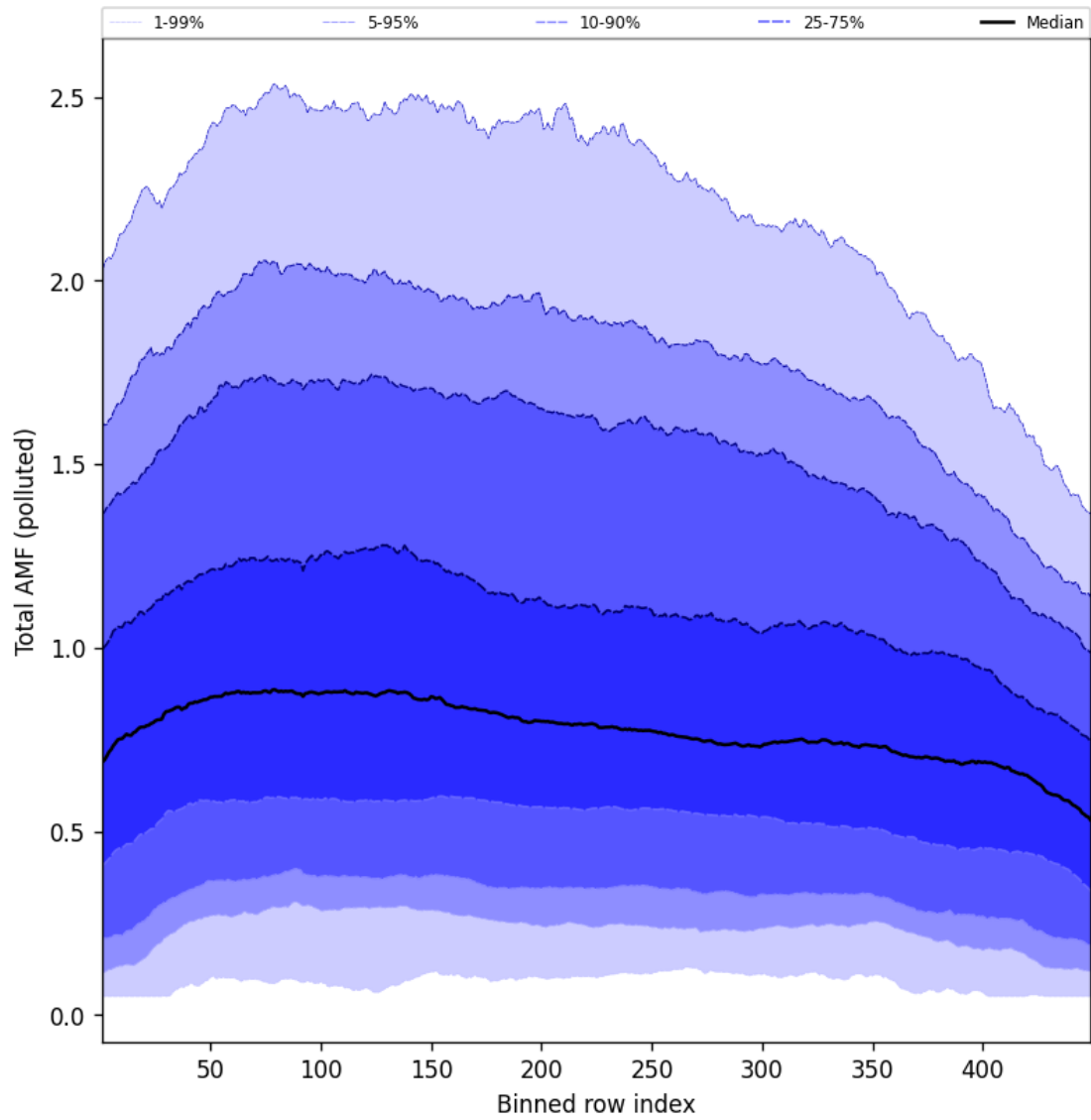


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-10-08 to 2025-10-09

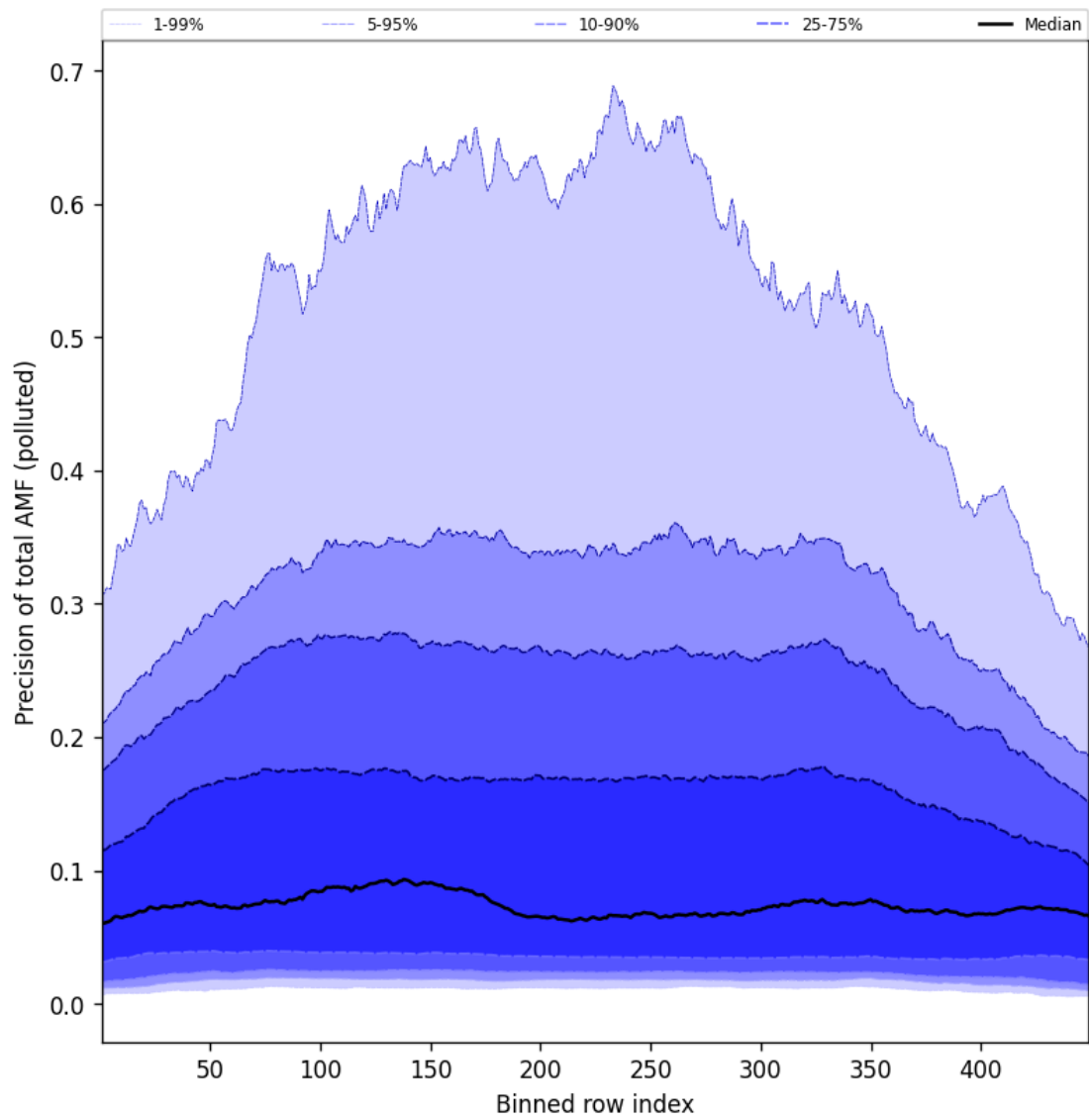


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-10-08 to 2025-10-09

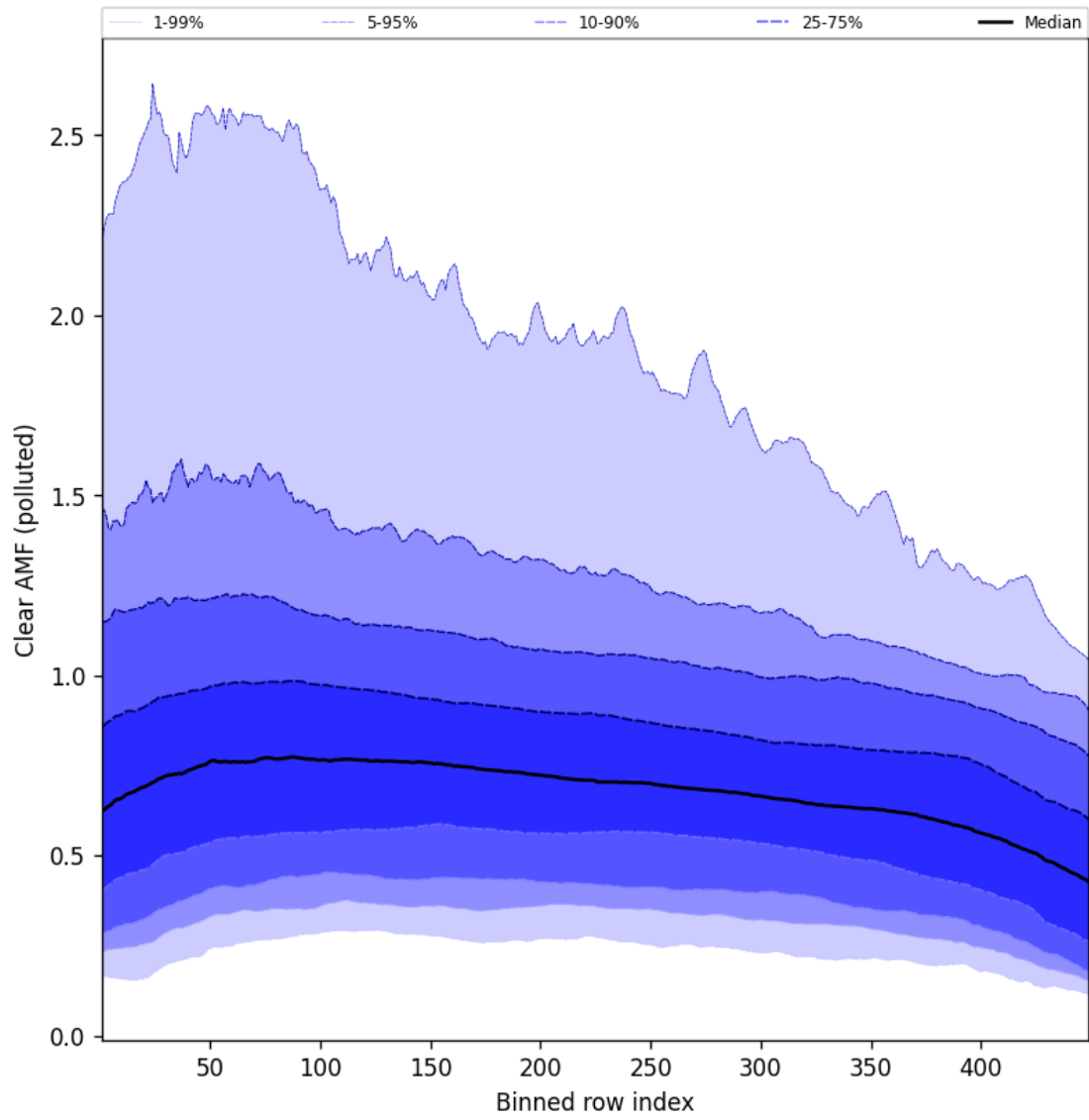


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-10-08 to 2025-10-09

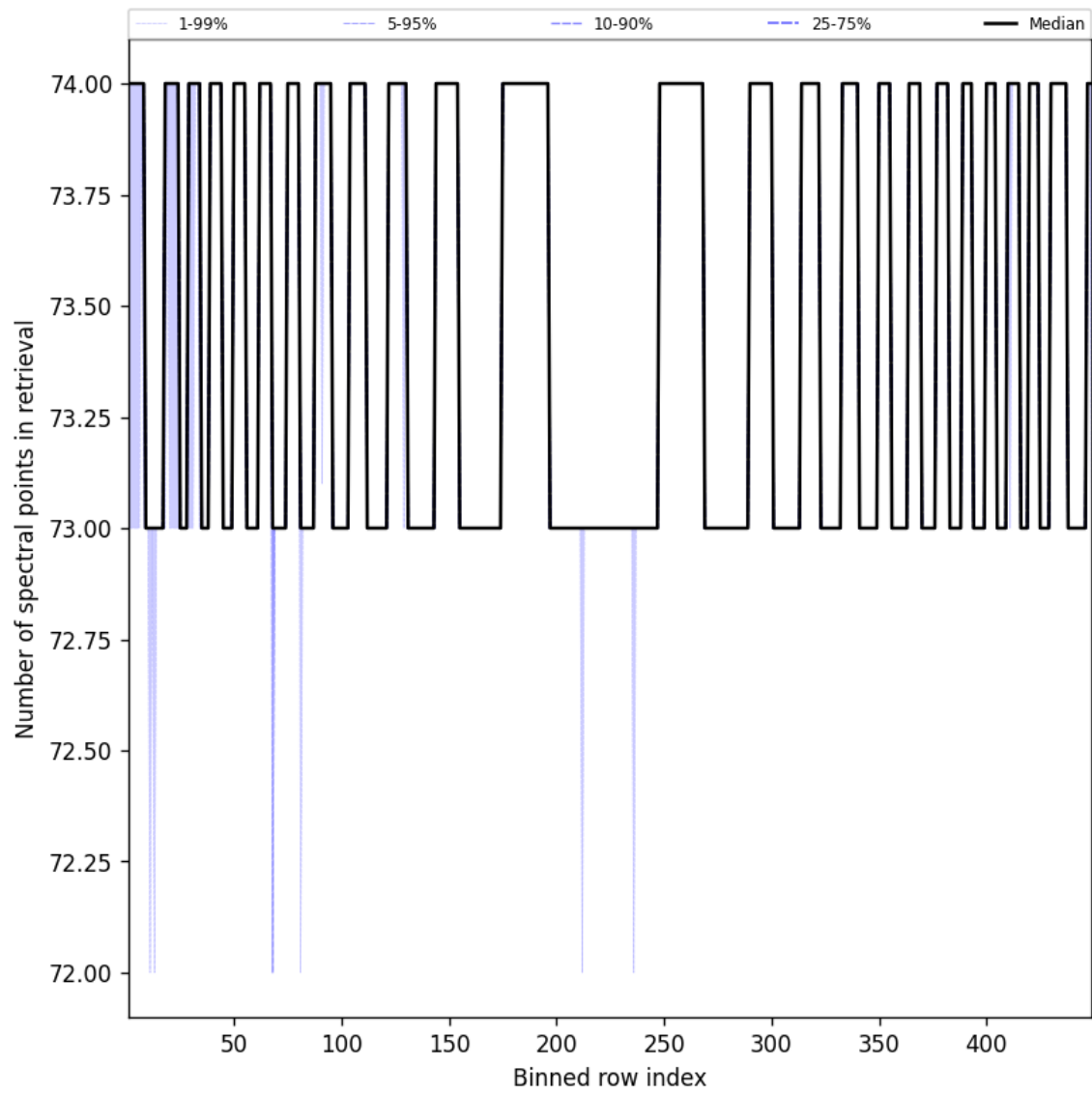


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-10-08 to 2025-10-09

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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