

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]	0.676 ± 0.405	18134039	0.995	0.760	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.251 \pm 110.210) \times 10^{-2}$	18134039	0.294	0.472	1.043×10^{-2}	-82.7	312
sulfurdioxide total vertical column precision [DU]	0.557 ± 0.799	18134039	0.222	0.360	0.343	3.205×10^{-2}	48.2
sulfurdioxide slant column density corrected [DU]	$(1.848 \pm 38.344) \times 10^{-2}$	18134039	0.267	0.378	9.112×10^{-3}	-25.7	260
sulfurdioxide slant column density cobra [DU]	$(1.833 \pm 37.118) \times 10^{-2}$	18134039	0.267	0.378	9.112×10^{-3}	-25.7	36.1
sulfurdioxide slant column density cobra precision [DU]	0.305 ± 0.137	18134039	0.213	0.146	0.263	8.122×10^{-2}	16.5
sulfurdioxide slant column density window1 [DU]	0.167 ± 0.704	18134039	0.175	0.758	0.178	-285	59.4
sulfurdioxide slant column density window1 precision [DU]	0.305 ± 0.137	18134039	0.213	0.146	0.263	8.122×10^{-2}	16.5
sulfurdioxide slant column density corrected win1 [DU]	$(2.996 \pm 69.911) \times 10^{-2}$	18134039	-2.500×10^{-2}	0.746	9.508×10^{-3}	-285	59.3
background so2 slant column offset window1 [DU]	-0.137 ± 0.163	18134039	-0.180	0.152	-0.164	-1.00	4.80
sulfurdioxide slant column density window2 [DU]	2.54 ± 9.33	18134039	1.75	11.8	2.29	-1.098×10^3	1.072×10^3
sulfurdioxide slant column density window2 precision [DU]	8.36 ± 2.26	18134039	7.43	2.67	8.03	2.31	617
sulfurdioxide slant column density corrected win2 [DU]	0.765 ± 9.079	18134039	0.750	11.5	0.733	-1.098×10^3	1.073×10^3
background so2 slant column offset window2 [DU]	-1.78 ± 2.39	18134039	0.250	3.66	-1.13	-16.2	8.24
sulfurdioxide slant column density window3 [DU]	-11.0 ± 25.0	18134039	-10.6	31.5	-10.9	-5.354×10^3	230
sulfurdioxide slant column density window3 precision [DU]	28.8 ± 13.2	18134039	23.7	10.1	25.3	9.48	1.502×10^3
sulfurdioxide slant column density corrected win3 [DU]	-0.903 ± 24.284	18134039	-0.560	30.6	-0.850	-5.349×10^3	244
background so2 slant column offset window3 [DU]	10.1 ± 6.2	18134039	3.92	10.2	9.62	-22.2	39.4
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	18134039	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.139 \pm 6.728) \times 10^{-2}$	18134039	1.217×10^{-2}	2.085×10^{-2}	1.252×10^{-2}	1.644×10^{-4}	2.51
fitted radiance shift [nm]	$(-4.694 \pm 26.281) \times 10^{-4}$	18134039	-5.000×10^{-4}	1.911×10^{-3}	-4.559×10^{-4}	-5.658×10^{-2}	4.032×10^{-2}
fitted radiance squeeze [1]	$(-1.362 \pm 19.364) \times 10^{-5}$	18134039	1.000×10^{-5}	2.127×10^{-4}	-2.729×10^{-6}	-1.449×10^{-2}	1.746×10^{-2}
fitted root mean square [1]	$(1.331 \pm 0.565) \times 10^{-3}$	18134039	1.025×10^{-3}	5.836×10^{-4}	1.166×10^{-3}	3.389×10^{-4}	7.955×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.858 ± 0.440	18134039	0.620	0.541	0.792	5.000×10^{-2}	3.24
sulfurdioxide total air mass factor polluted precision [1]	0.104 ± 0.105	18134039	3.500×10^{-2}	0.103	6.712×10^{-2}	2.999×10^{-3}	1.86
sulfurdioxide clear air mass factor polluted [1]	0.733 ± 0.301	18134039	0.620	0.375	0.700	5.796×10^{-2}	3.40
number of spectral points in retrieval [1]	73.4 ± 0.5	18134039	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}	0.120	0.240	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.50	-0.934	-0.566	-0.379	-0.222	0.250	0.419	0.626	1.05	2.91
sulfurdioxide total vertical column precision [DU]	9.616×10^{-2}	0.134	0.164	0.191	0.226	0.585	0.803	1.05	1.56	3.92
sulfurdioxide slant column density corrected [DU]	-0.889	-0.513	-0.371	-0.276	-0.178	0.200	0.304	0.407	0.569	1.06
sulfurdioxide slant column density cobra [DU]	-0.889	-0.513	-0.371	-0.276	-0.178	0.200	0.304	0.407	0.569	1.06
sulfurdioxide slant column density cobra precision [DU]	0.143	0.172	0.186	0.198	0.214	0.360	0.417	0.472	0.555	0.799
sulfurdioxide slant column density window1 [DU]	-1.77	-0.926	-0.615	-0.413	-0.206	0.552	0.749	0.936	1.22	2.00
sulfurdioxide slant column density window1 precision [DU]	0.143	0.172	0.186	0.198	0.214	0.360	0.417	0.472	0.555	0.799
sulfurdioxide slant column density corrected win1 [DU]	-1.71	-1.000	-0.730	-0.549	-0.358	0.388	0.595	0.801	1.13	2.04
background so2 slant column offset window1 [DU]	-0.408	-0.327	-0.290	-0.263	-0.233	-8.176×10^{-2}	-2.811×10^{-2}	4.290×10^{-2}	0.158	0.408
sulfurdioxide slant column density window2 [DU]	-18.9	-12.2	-8.83	-6.34	-3.51	8.32	11.4	14.2	18.1	26.3
sulfurdioxide slant column density window2 precision [DU]	4.43	5.36	5.91	6.34	6.85	9.52	10.4	11.3	12.4	15.0
sulfurdioxide slant column density corrected win2 [DU]	-21.1	-13.9	-10.4	-7.88	-5.02	6.50	9.40	12.0	15.5	23.0
background so2 slant column offset window2 [DU]	-7.49	-6.05	-5.26	-4.53	-3.57	9.675×10^{-2}	0.387	0.616	0.957	2.61
sulfurdioxide slant column density window3 [DU]	-74.0	-52.1	-41.9	-34.6	-26.6	4.94	13.0	20.1	29.7	48.7
sulfurdioxide slant column density window3 precision [DU]	13.9	16.5	18.3	19.8	21.4	31.6	36.0	41.6	53.4	84.9
sulfurdioxide slant column density corrected win3 [DU]	-61.7	-40.7	-30.9	-23.8	-16.1	14.5	22.3	29.2	38.6	57.6
background so2 slant column offset window3 [DU]	-1.57	1.62	2.77	3.63	4.79	15.0	16.9	18.4	20.5	23.8
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]	9.386×10^{-4}	2.271×10^{-3}	3.272×10^{-3}	4.255×10^{-3}	6.096×10^{-3}	2.695×10^{-2}	4.615×10^{-2}	7.252×10^{-2}	0.121	0.307
fitted radiance shift [nm]	-8.287×10^{-3}	-4.340×10^{-3}	-2.980×10^{-3}	-2.184×10^{-3}	-1.464×10^{-3}	4.479×10^{-4}	1.125×10^{-3}	1.996×10^{-3}	3.532×10^{-3}	7.770×10^{-3}
fitted radiance squeeze [1]	-6.041×10^{-4}	-3.336×10^{-4}	-2.343×10^{-4}	-1.728×10^{-4}	-1.118×10^{-4}	1.009×10^{-4}	1.535×10^{-4}	2.018×10^{-4}	2.697×10^{-4}	4.234×10^{-4}
fitted root mean square [1]	6.037×10^{-4}	7.500×10^{-4}	8.292×10^{-4}	8.900×10^{-4}	9.648×10^{-4}	1.548×10^{-3}	1.808×10^{-3}	2.053×10^{-3}	2.411×10^{-3}	3.333×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.532×10^{-2}	0.239	0.345	0.443	0.553	1.09	1.29	1.46	1.70	2.15
sulfurdioxide total air mass factor polluted precision [1]	9.911×10^{-3}	1.804×10^{-2}	2.473×10^{-2}	2.962×10^{-2}	3.697×10^{-2}	0.140	0.179	0.218	0.284	0.527
sulfurdioxide clear air mass factor polluted [1]	0.203	0.305	0.382	0.449	0.531	0.907	1.00	1.09	1.22	1.75
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]	0.697 ± 0.403	9134926	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(2.991 \pm 125.776) \times 10^{-2}$	9134926	0.491	1.025×10^{-2}	-82.7	113	-0.232	0.259
sulfurdioxide total vertical column precision [DU]	0.616 ± 0.936	9134926	0.416	0.352	4.757×10^{-2}	31.7	0.228	0.643
sulfurdioxide slant column density corrected [DU]	$(1.507 \pm 34.222) \times 10^{-2}$	9134926	0.365	8.345×10^{-3}	-7.60	50.8	-0.173	0.192
sulfurdioxide slant column density cobra [DU]	$(1.503 \pm 33.949) \times 10^{-2}$	9134926	0.365	8.345×10^{-3}	-7.60	30.3	-0.173	0.192
sulfurdioxide slant column density cobra precision [DU]	0.290 ± 0.117	9134926	0.133	0.256	8.780×10^{-2}	14.5	0.210	0.344
sulfurdioxide slant column density window1 [DU]	0.191 ± 0.649	9134926	0.736	0.196	-8.29	23.9	-0.174	0.561
sulfurdioxide slant column density window1 precision [DU]	0.290 ± 0.117	9134926	0.133	0.256	8.780×10^{-2}	14.5	0.210	0.344
sulfurdioxide slant column density corrected win1 [DU]	$(2.719 \pm 64.372) \times 10^{-2}$	9134926	0.724	1.159×10^{-2}	-7.85	23.6	-0.345	0.379
background so2 slant column offset window1 [DU]	-0.164 ± 0.123	9134926	0.140	-0.176	-0.936	2.20	-0.242	-0.103
sulfurdioxide slant column density window2 [DU]	2.09 ± 9.28	9134926	11.8	1.87	-305	284	-3.92	7.86
sulfurdioxide slant column density window2 precision [DU]	8.45 ± 2.29	9134926	2.81	8.11	2.31	158	6.88	9.69
sulfurdioxide slant column density corrected win2 [DU]	0.727 ± 9.096	9134926	11.6	0.724	-306	285	-5.06	6.51
background so2 slant column offset window2 [DU]	-1.37 ± 2.18	9134926	2.74	-0.732	-13.4	8.19	-2.61	0.134
sulfurdioxide slant column density window3 [DU]	-10.8 ± 26.0	9134926	32.5	-10.5	-5.354×10^3	164	-26.8	5.73
sulfurdioxide slant column density window3 precision [DU]	29.6 ± 13.9	9134926	11.1	26.0	9.62	1.502×10^3	21.8	32.9
sulfurdioxide slant column density corrected win3 [DU]	-1.13 ± 25.19	9134926	31.6	-1.00	-5.349×10^3	179	-16.8	14.8
background so2 slant column offset window3 [DU]	9.70 ± 6.37	9134926	10.5	8.82	-13.8	29.4	4.37	14.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	9134926	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.746 \pm 8.572) \times 10^{-2}$	9134926	4.000×10^{-2}	2.020×10^{-2}	3.458×10^{-4}	2.51	1.086×10^{-2}	5.086×10^{-2}
fitted radiance shift [nm]	$(-1.254 \pm 27.579) \times 10^{-4}$	9134926	1.777×10^{-3}	-1.599×10^{-4}	-4.513×10^{-2}	4.032×10^{-2}	-1.037×10^{-3}	7.401×10^{-4}
fitted radiance squeeze [1]	$(-5.044 \pm 1694.977) \times 10^{-7}$	9134926	2.010×10^{-4}	1.407×10^{-6}	-9.692×10^{-3}	1.085×10^{-2}	-9.984×10^{-5}	1.012×10^{-4}
fitted root mean square [1]	$(1.281 \pm 0.487) \times 10^{-3}$	9134926	5.542×10^{-4}	1.149×10^{-3}	3.550×10^{-4}	2.967×10^{-2}	9.513×10^{-4}	1.506×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.794 ± 0.419	9134926	0.532	0.756	5.000×10^{-2}	2.85	0.493	1.02
sulfurdioxide total air mass factor polluted precision [1]	0.105 ± 0.123	9134926	9.888×10^{-2}	5.704×10^{-2}	2.999×10^{-3}	1.86	3.330×10^{-2}	0.132
sulfurdioxide clear air mass factor polluted [1]	0.705 ± 0.290	9134926	0.435	0.693	6.149×10^{-2}	2.76	0.480	0.915
number of spectral points in retrieval [1]	73.4 ± 0.5	9134926	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.655 ± 0.406	8999113	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(3.515 \pm 91.745) \times 10^{-2}$	8999113	0.454	1.060×10^{-2}	-50.0	312	-0.212	0.242
sulfurdioxide total vertical column precision [DU]	0.498 ± 0.625	8999113	0.314	0.337	3.205×10^{-2}	48.2	0.223	0.537
sulfurdioxide slant column density corrected [DU]	$(2.194 \pm 42.114) \times 10^{-2}$	8999113	0.392	9.956×10^{-3}	-25.7	260	-0.184	0.208
sulfurdioxide slant column density cobra [DU]	$(2.169 \pm 40.077) \times 10^{-2}$	8999113	0.392	9.956×10^{-3}	-25.7	36.1	-0.184	0.208
sulfurdioxide slant column density cobra precision [DU]	0.319 ± 0.153	8999113	0.161	0.271	8.122×10^{-2}	16.5	0.218	0.379
sulfurdioxide slant column density window1 [DU]	0.142 ± 0.755	8999113	0.781	0.159	-285	59.4	-0.239	0.543
sulfurdioxide slant column density window1 precision [DU]	0.319 ± 0.153	8999113	0.161	0.271	8.122×10^{-2}	16.5	0.218	0.379
sulfurdioxide slant column density corrected win1 [DU]	$(3.276 \pm 75.117) \times 10^{-2}$	8999113	0.768	7.279×10^{-3}	-285	59.3	-0.371	0.397
background so2 slant column offset window1 [DU]	-0.110 ± 0.191	8999113	0.168	-0.149	-1.00	4.80	-0.223	-5.473×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.00 ± 9.36	8999113	11.9	2.72	-1.098×10^3	1.072×10^3	-3.09	8.77
sulfurdioxide slant column density window2 precision [DU]	8.26 ± 2.22	8999113	2.53	7.95	2.40	617	6.82	9.35
sulfurdioxide slant column density corrected win2 [DU]	0.805 ± 9.062	8999113	11.5	0.742	-1.098×10^3	1.073×10^3	-4.98	6.50
background so2 slant column offset window2 [DU]	-2.19 ± 2.52	8999113	4.24	-1.96	-16.2	8.24	-4.20	4.534×10^{-2}
sulfurdioxide slant column density window3 [DU]	-11.1 ± 24.0	8999113	30.5	-11.2	-417	230	-26.4	4.17
sulfurdioxide slant column density window3 precision [DU]	27.9 ± 12.4	8999113	9.02	24.7	9.48	214	21.1	30.2
sulfurdioxide slant column density corrected win3 [DU]	-0.677 ± 23.326	8999113	29.5	-0.706	-411	244	-15.4	14.1
background so2 slant column offset window3 [DU]	10.5 ± 6.0	8999113	9.82	10.3	-22.2	39.4	5.23	15.1
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	8999113	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.508 \pm 3.369) \times 10^{-2}$	8999113	1.005×10^{-2}	8.153×10^{-3}	1.644×10^{-4}	1.34	4.177×10^{-3}	1.423×10^{-2}
fitted radiance shift [nm]	$(-8.185 \pm 24.403) \times 10^{-4}$	8999113	1.902×10^{-3}	-7.742×10^{-4}	-5.658×10^{-2}	3.791×10^{-2}	-1.815×10^{-3}	8.716×10^{-5}
fitted radiance squeeze [1]	$(-2.693 \pm 21.457) \times 10^{-5}$	8999113	2.265×10^{-4}	-7.391×10^{-6}	-1.449×10^{-2}	1.746×10^{-2}	-1.259×10^{-4}	1.006×10^{-4}
fitted root mean square [1]	$(1.382 \pm 0.631) \times 10^{-3}$	8999113	6.227×10^{-4}	1.184×10^{-3}	3.389×10^{-4}	7.955×10^{-2}	9.792×10^{-4}	1.602×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.922 ± 0.451	8999113	0.576	0.828	5.000×10^{-2}	3.24	0.606	1.18
sulfurdioxide total air mass factor polluted precision [1]	0.103 ± 0.082	8999113	0.105	8.099×10^{-2}	3.216×10^{-3}	1.37	3.989×10^{-2}	0.144
sulfurdioxide clear air mass factor polluted [1]	0.761 ± 0.309	8999113	0.323	0.704	5.796×10^{-2}	3.40	0.572	0.895
number of spectral points in retrieval [1]	73.4 ± 0.5	8999113	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]	0.689 ± 0.398	13086125	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(2.900 \pm 93.865) \times 10^{-2}$	13086125	0.444	9.955×10^{-3}	-53.2	70.6	-0.209	0.235
sulfurdioxide total vertical column precision [DU]	0.504 ± 0.679	13086125	0.319	0.318	3.294×10^{-2}	41.8	0.218	0.537
sulfurdioxide slant column density corrected [DU]	$(1.798 \pm 37.000) \times 10^{-2}$	13086125	0.373	9.002×10^{-3}	-25.7	45.8	-0.176	0.197
sulfurdioxide slant column density cobra [DU]	$(1.790 \pm 36.574) \times 10^{-2}$	13086125	0.373	9.002×10^{-3}	-25.7	36.1	-0.176	0.197
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.139	13086125	0.147	0.257	8.122×10^{-2}	16.5	0.211	0.358
sulfurdioxide slant column density window1 [DU]	0.163 ± 0.703	13086125	0.750	0.176	-285	59.4	-0.204	0.546
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.139	13086125	0.147	0.257	8.122×10^{-2}	16.5	0.211	0.358
sulfurdioxide slant column density corrected win1 [DU]	$(2.981 \pm 69.720) \times 10^{-2}$	13086125	0.736	9.765×10^{-3}	-285	59.3	-0.353	0.383
background so2 slant column offset window1 [DU]	-0.133 ± 0.170	13086125	0.154	-0.163	-1.00	4.80	-0.232	-7.864×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.56 ± 9.15	13086125	11.6	2.30	-772	1.072×10^3	-3.41	8.24
sulfurdioxide slant column density window2 precision [DU]	8.17 ± 2.12	13086125	2.51	7.86	2.31	477	6.75	9.26
sulfurdioxide slant column density corrected win2 [DU]	0.747 ± 8.890	13086125	11.3	0.707	-772	1.073×10^3	-4.95	6.39
background so2 slant column offset window2 [DU]	-1.82 ± 2.43	13086125	3.82	-1.15	-16.2	8.24	-3.71	0.115
sulfurdioxide slant column density window3 [DU]	-8.54 ± 24.33	13086125	31.1	-8.73	-264	230	-24.1	6.99
sulfurdioxide slant column density window3 precision [DU]	27.7 ± 12.1	13086125	9.10	24.5	9.48	211	21.1	30.2
sulfurdioxide slant column density corrected win3 [DU]	1.34 ± 23.37	13086125	29.8	1.10	-255	244	-13.6	16.2
background so2 slant column offset window3 [DU]	9.89 ± 6.11	13086125	10.0	9.36	-22.2	39.4	4.70	14.7
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	13086125	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.848 \pm 3.561) \times 10^{-2}$	13086125	1.330×10^{-2}	1.066×10^{-2}	1.644×10^{-4}	2.40	5.341×10^{-3}	1.864×10^{-2}
fitted radiance shift [nm]	$(-5.232 \pm 24.302) \times 10^{-4}$	13086125	1.917×10^{-3}	-4.783×10^{-4}	-4.734×10^{-2}	4.019×10^{-2}	-1.524×10^{-3}	3.924×10^{-4}
fitted radiance squeeze [1]	$(-1.725 \pm 19.654) \times 10^{-5}$	13086125	2.120×10^{-4}	-3.116×10^{-6}	-1.449×10^{-2}	1.746×10^{-2}	-1.127×10^{-4}	9.927×10^{-5}
fitted root mean square [1]	$(1.319 \pm 0.576) \times 10^{-3}$	13086125	5.684×10^{-4}	1.140×10^{-3}	3.389×10^{-4}	7.955×10^{-2}	9.524×10^{-4}	1.521×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.889 ± 0.425	13086125	0.520	0.838	5.000×10^{-2}	2.90	0.595	1.11
sulfurdioxide total air mass factor polluted precision [1]	$(9.966 \pm 9.114) \times 10^{-2}$	13086125	9.391×10^{-2}	6.885×10^{-2}	3.216×10^{-3}	1.44	3.996×10^{-2}	0.134
sulfurdioxide clear air mass factor polluted [1]	0.759 ± 0.287	13086125	0.360	0.732	5.796×10^{-2}	2.93	0.567	0.927
number of spectral points in retrieval [1]	73.4 ± 0.5	13086125	1.000	73.0	53.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.669 ± 0.418	3771366	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(3.371 \pm 109.168) \times 10^{-2}$	3771366	0.526	1.082×10^{-2}	-73.2	312	-0.247	0.278
sulfurdioxide total vertical column precision [DU]	0.608 ± 0.784	3771366	0.394	0.394	3.205×10^{-2}	48.2	0.255	0.649
sulfurdioxide slant column density corrected [DU]	$(1.882 \pm 41.124) \times 10^{-2}$	3771366	0.375	8.697×10^{-3}	-17.5	260	-0.177	0.198
sulfurdioxide slant column density cobra [DU]	$(1.844 \pm 37.210) \times 10^{-2}$	3771366	0.375	8.697×10^{-3}	-17.5	30.7	-0.177	0.198
sulfurdioxide slant column density cobra precision [DU]	0.298 ± 0.128	3771366	0.125	0.265	8.352×10^{-2}	14.5	0.219	0.344
sulfurdioxide slant column density window1 [DU]	0.185 ± 0.684	3771366	0.753	0.186	-113	34.9	-0.191	0.562
sulfurdioxide slant column density window1 precision [DU]	0.298 ± 0.128	3771366	0.125	0.265	8.352×10^{-2}	14.5	0.219	0.344
sulfurdioxide slant column density corrected win1 [DU]	$(2.478 \pm 68.054) \times 10^{-2}$	3771366	0.743	4.084×10^{-3}	-113	34.7	-0.361	0.382
background so2 slant column offset window1 [DU]	-0.160 ± 0.142	3771366	0.140	-0.176	-0.795	3.44	-0.243	-0.103
sulfurdioxide slant column density window2 [DU]	2.15 ± 9.62	3771366	12.1	1.93	-1.098×10^3	908	-4.02	8.09
sulfurdioxide slant column density window2 precision [DU]	8.73 ± 2.51	3771366	2.84	8.41	2.40	617	7.13	9.96
sulfurdioxide slant column density corrected win2 [DU]	0.815 ± 9.432	3771366	11.9	0.802	-1.098×10^3	907	-5.12	6.74
background so2 slant column offset window2 [DU]	-1.33 ± 2.15	3771366	2.61	-0.764	-13.4	8.24	-2.47	0.141
sulfurdioxide slant column density window3 [DU]	-17.1 ± 25.5	3771366	31.6	-16.3	-5.354×10^3	218	-32.6	-0.921
sulfurdioxide slant column density window3 precision [DU]	31.6 ± 15.9	3771366	11.6	27.4	9.62	1.502×10^3	22.9	34.5
sulfurdioxide slant column density corrected win3 [DU]	-7.42 ± 25.42	3771366	31.6	-6.96	-5.349×10^3	223	-23.0	8.62
background so2 slant column offset window3 [DU]	9.68 ± 6.19	3771366	9.83	8.75	-13.8	35.1	4.61	14.4
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	3771366	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.515 \pm 10.540) \times 10^{-2}$	3771366	6.554×10^{-2}	2.879×10^{-2}	3.458×10^{-4}	2.31	1.050×10^{-2}	7.604×10^{-2}
fitted radiance shift [nm]	$(-3.503 \pm 31.784) \times 10^{-4}$	3771366	1.887×10^{-3}	-4.318×10^{-4}	-5.658×10^{-2}	4.032×10^{-2}	-1.310×10^{-3}	5.768×10^{-4}
fitted radiance squeeze [1]	$(-5.904 \pm 181.179) \times 10^{-6}$	3771366	2.089×10^{-4}	-2.903×10^{-6}	-1.361×10^{-2}	1.510×10^{-2}	-1.079×10^{-4}	1.010×10^{-4}
fitted root mean square [1]	$(1.316 \pm 0.520) \times 10^{-3}$	3771366	5.308×10^{-4}	1.193×10^{-3}	3.433×10^{-4}	5.432×10^{-2}	9.871×10^{-4}	1.518×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.791 ± 0.460	3771366	0.520	0.682	5.000×10^{-2}	3.24	0.485	1.00
sulfurdioxide total air mass factor polluted precision [1]	0.116 ± 0.133	3771366	0.129	5.890×10^{-2}	3.058×10^{-3}	1.86	3.067×10^{-2}	0.159
sulfurdioxide clear air mass factor polluted [1]	0.674 ± 0.320	3771366	0.361	0.626	6.149×10^{-2}	3.40	0.465	0.825
number of spectral points in retrieval [1]	73.4 ± 0.5	3771366	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

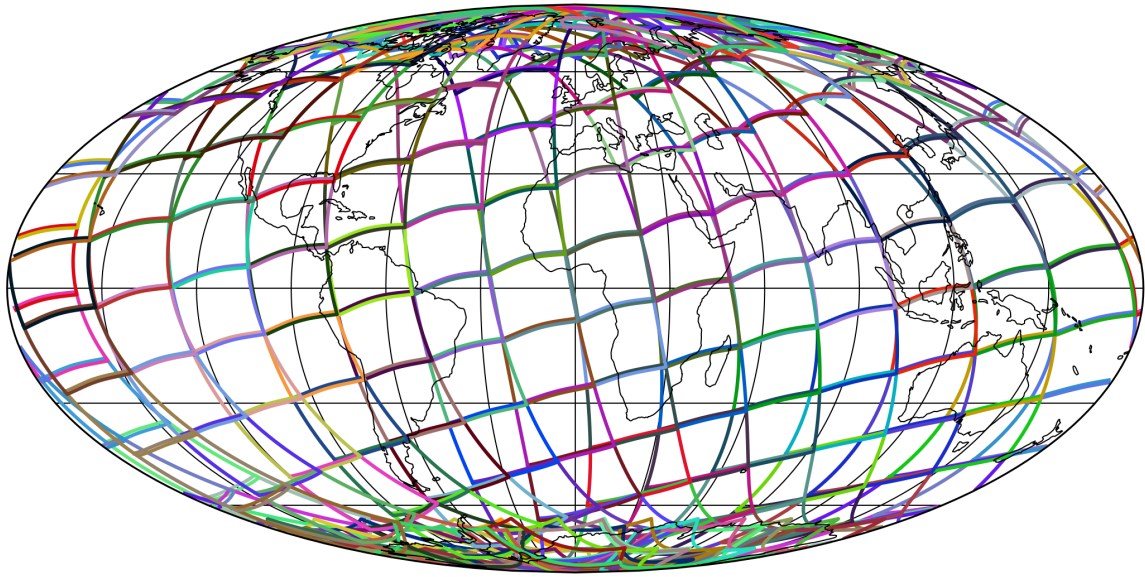


Figure 1: Outline of the granules.

4 Input data monitoring

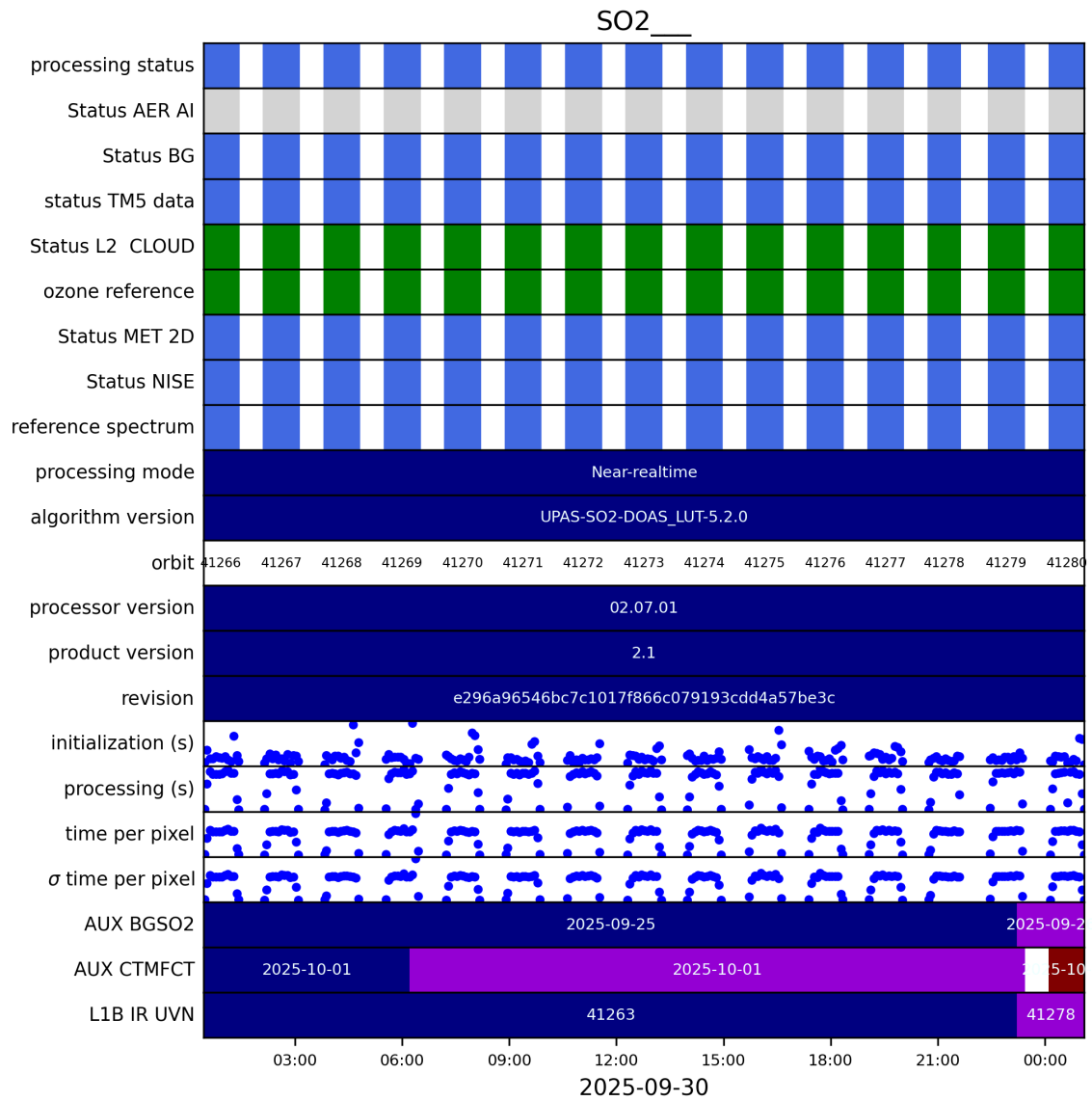


Figure 2: Input data per granule

5 Warnings and errors

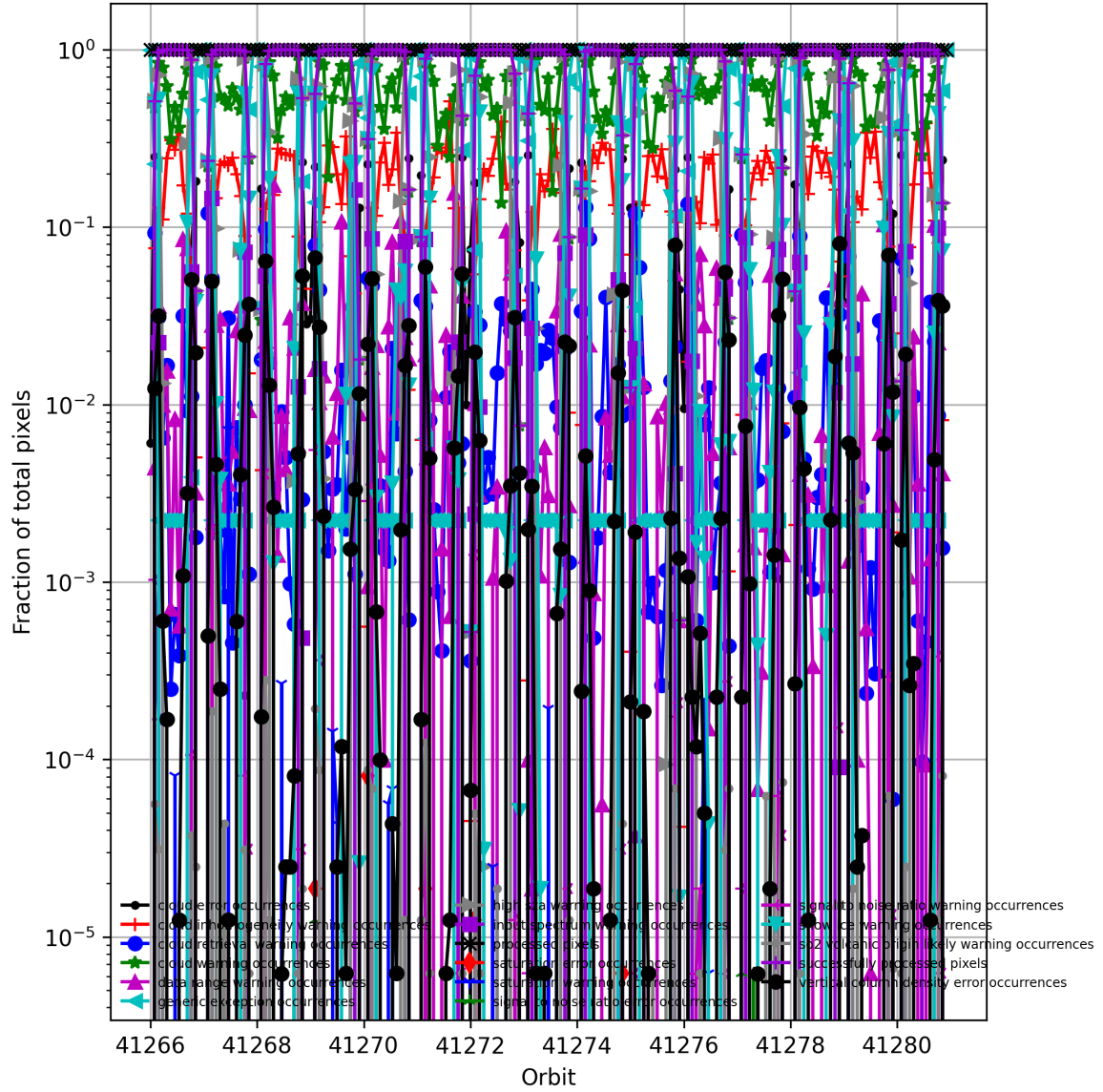


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

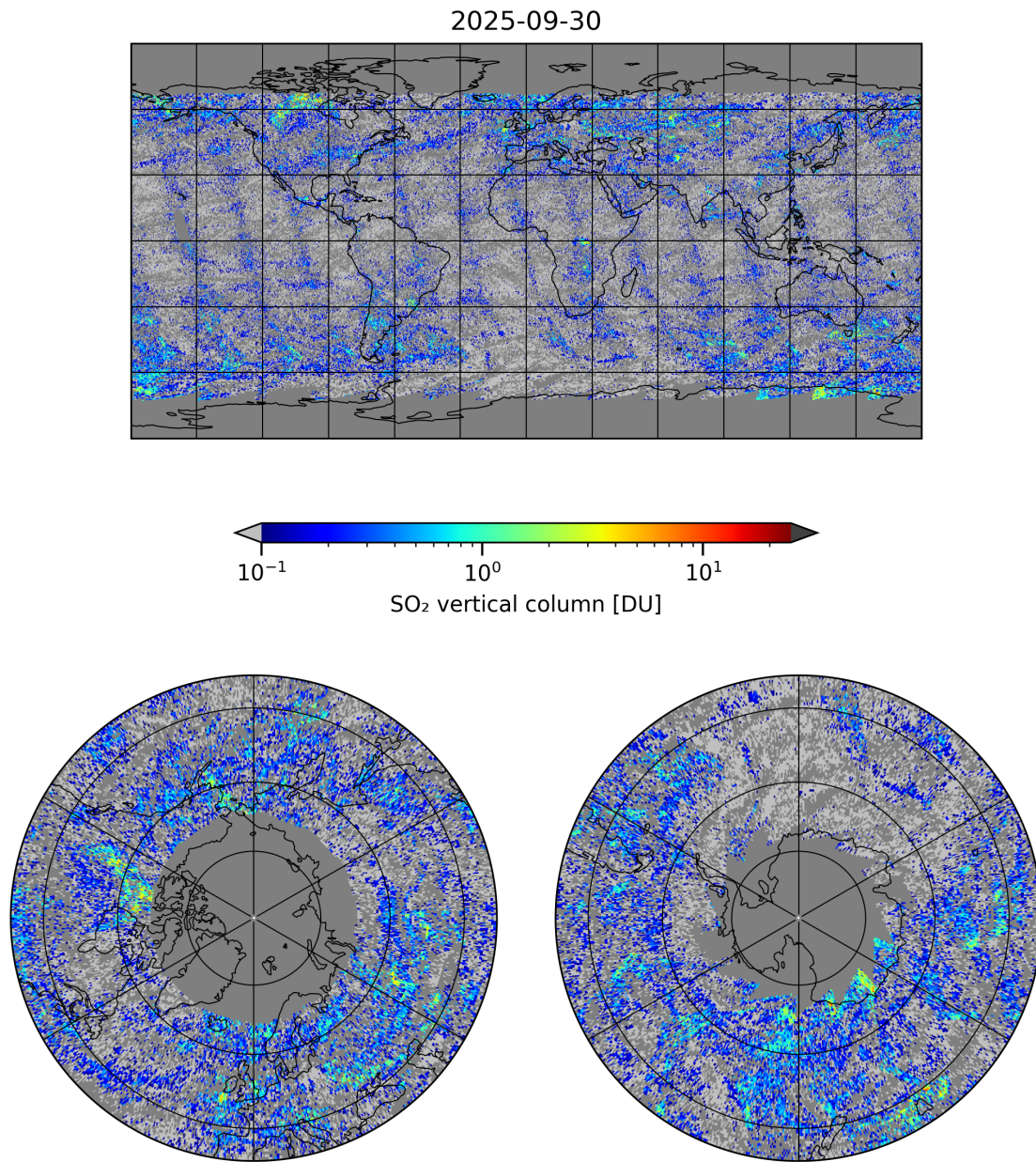


Figure 4: Map of “SO₂ vertical column” for 2025-09-30 to 2025-10-01

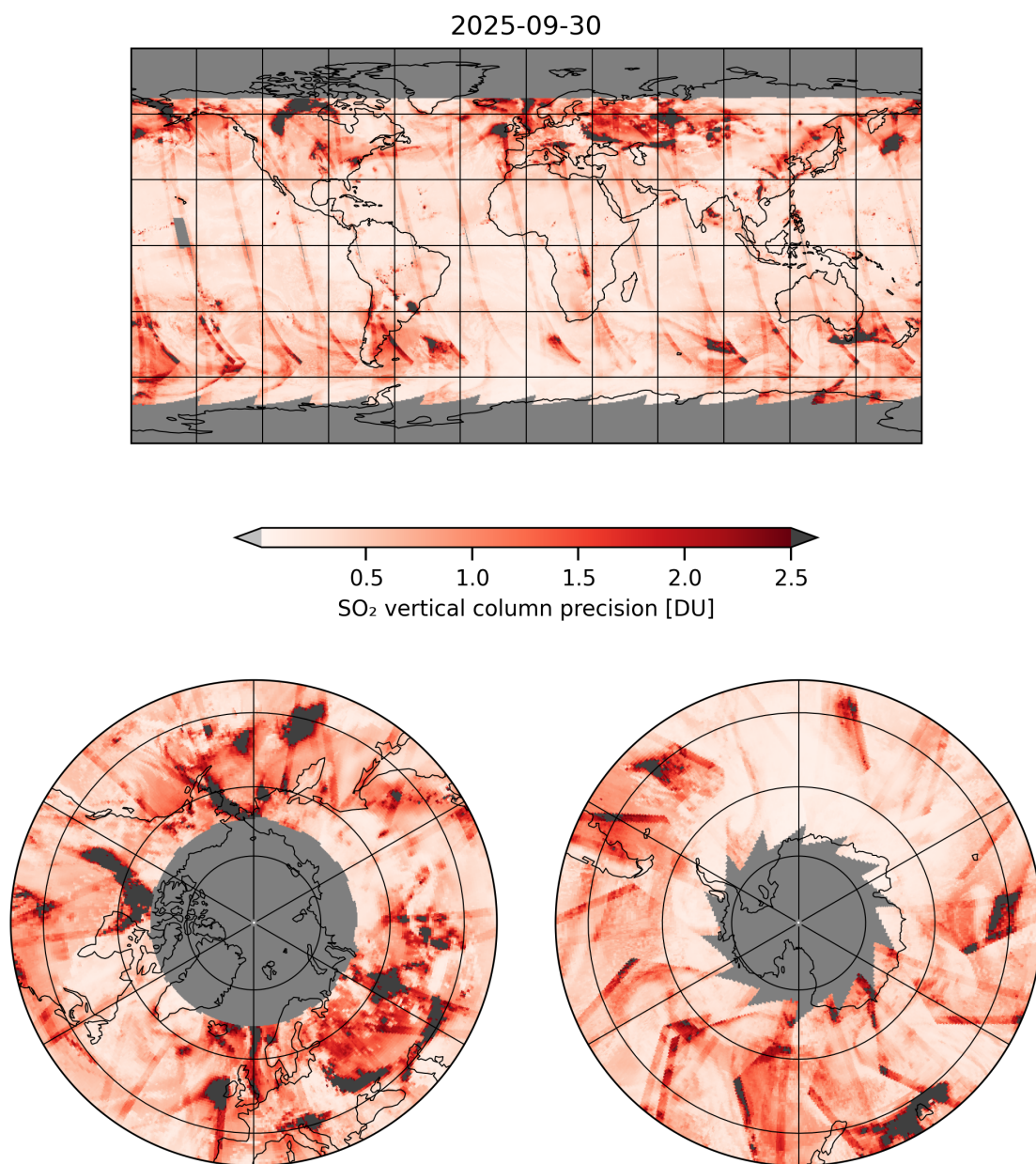


Figure 5: Map of “SO₂ vertical column precision” for 2025-09-30 to 2025-10-01

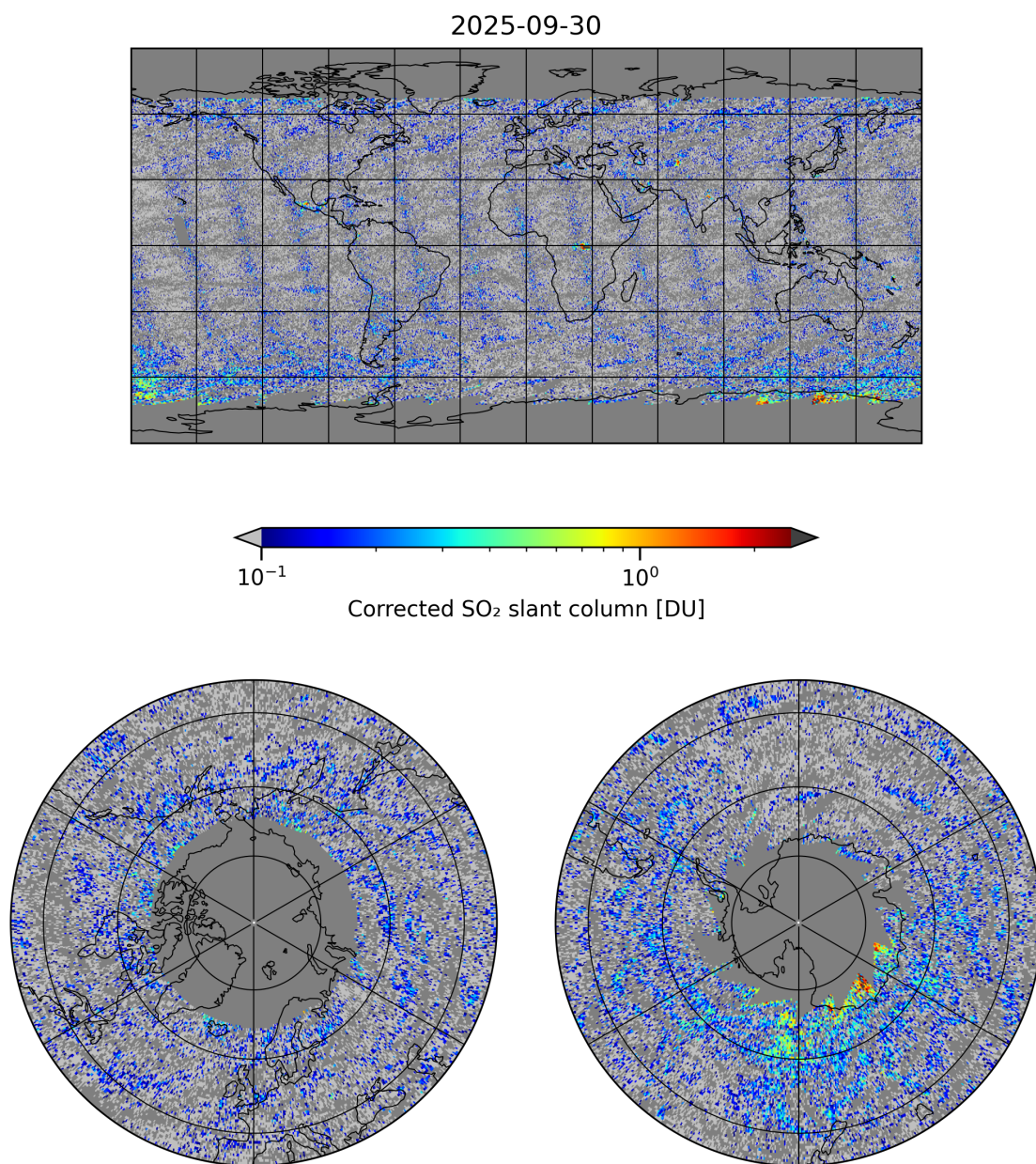


Figure 6: Map of “Corrected SO₂ slant column” for 2025-09-30 to 2025-10-01

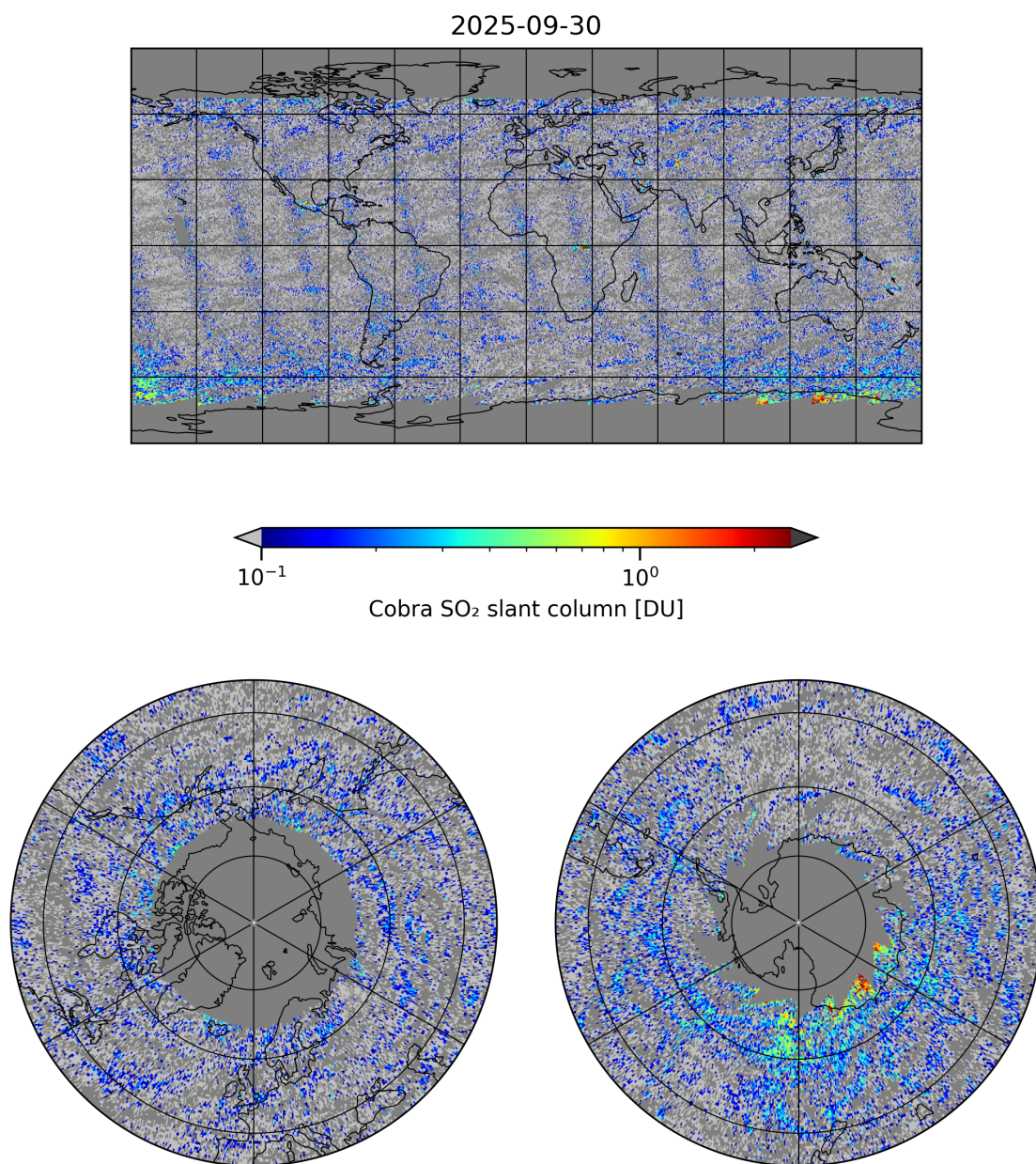


Figure 7: Map of “Cobra SO₂ slant column” for 2025-09-30 to 2025-10-01

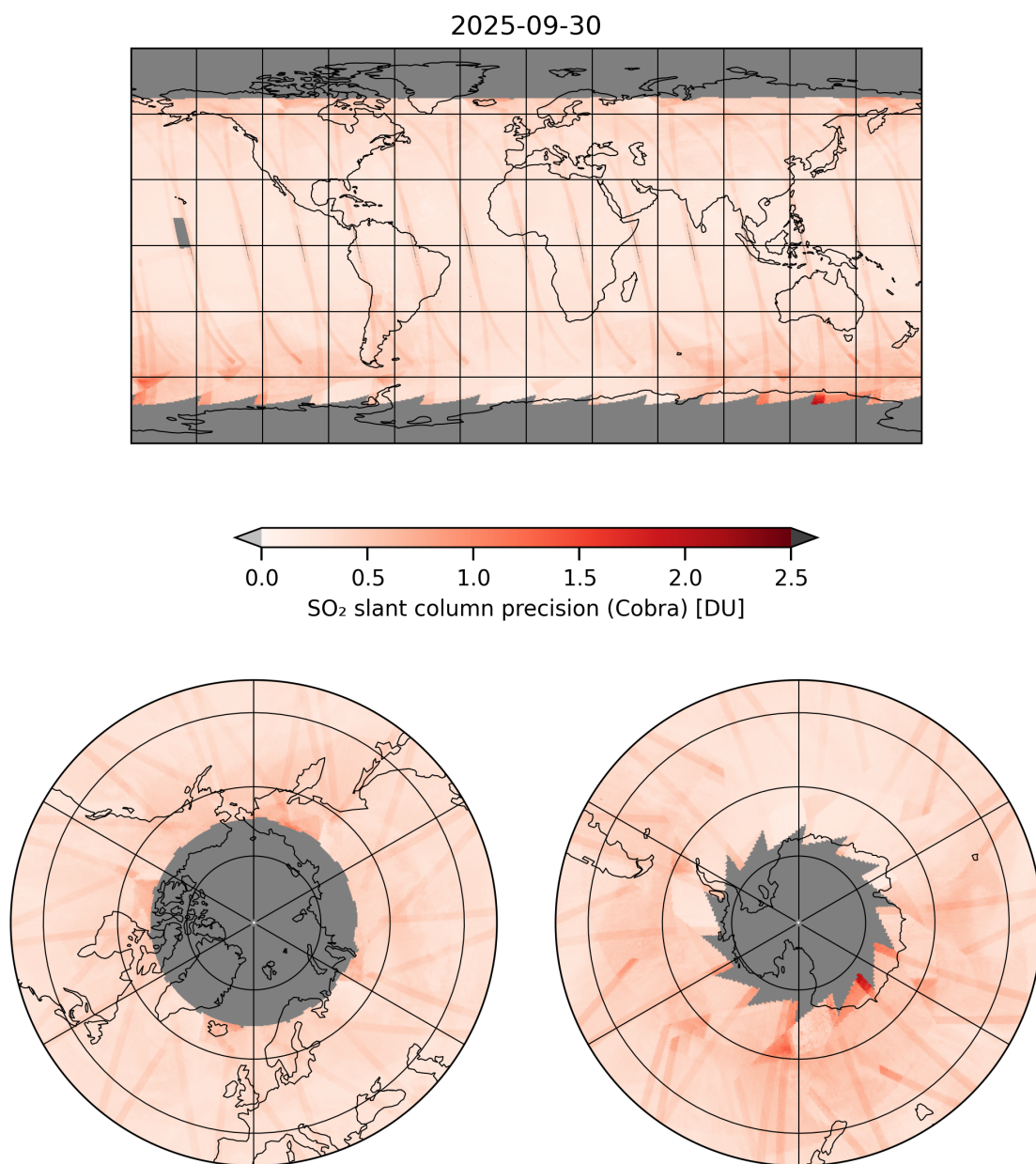


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-09-30 to 2025-10-01

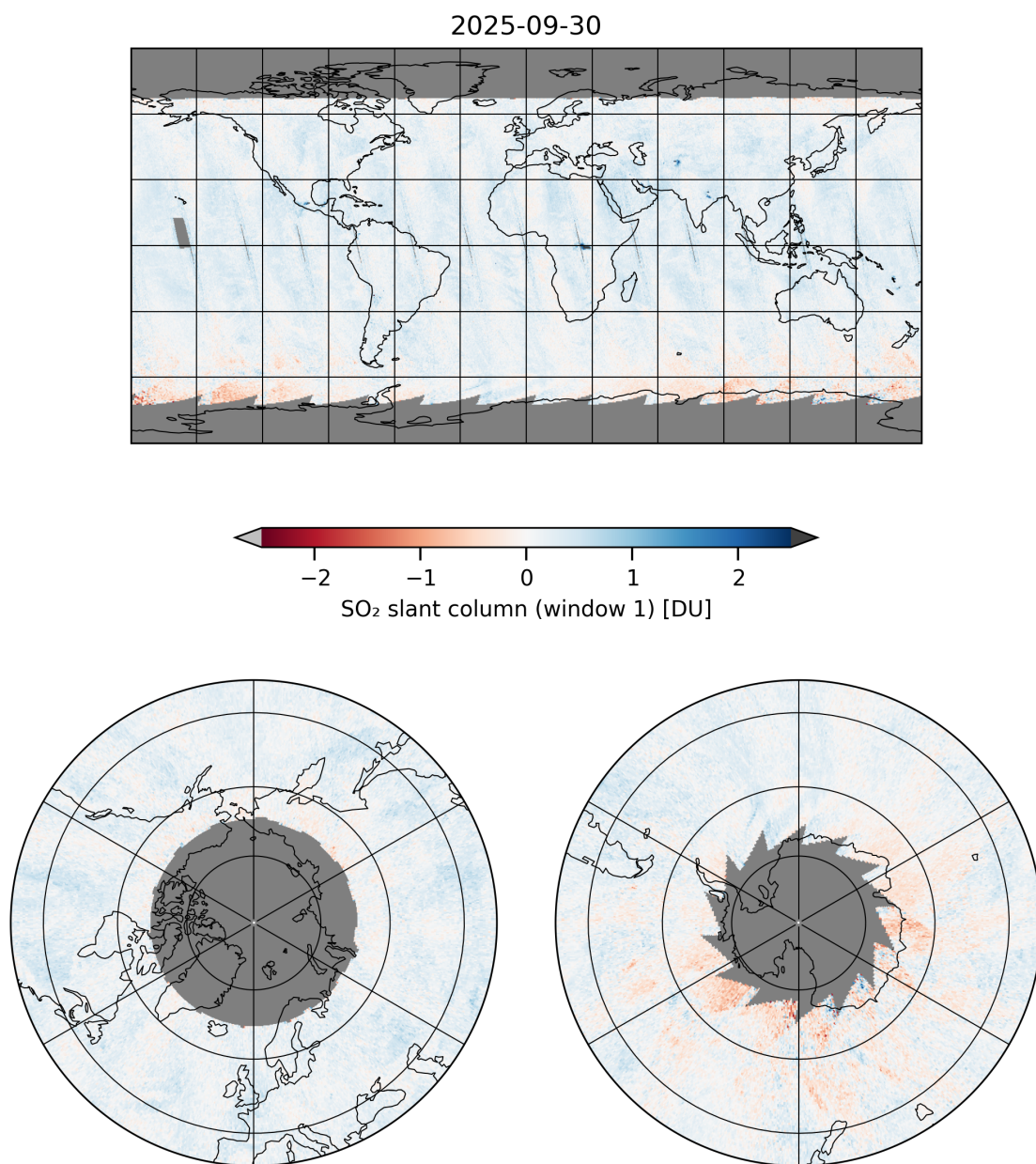


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-09-30 to 2025-10-01

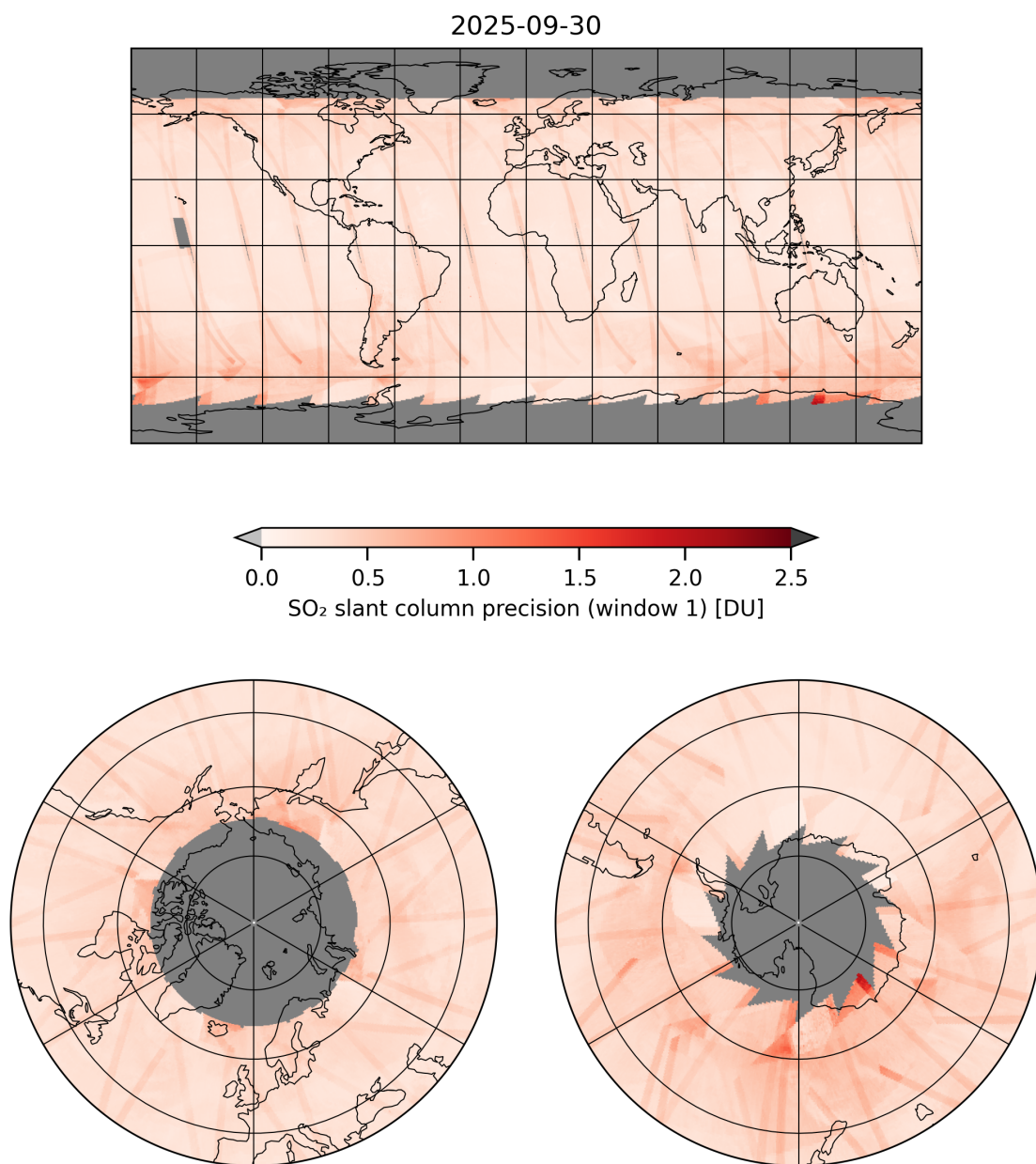


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-09-30 to 2025-10-01

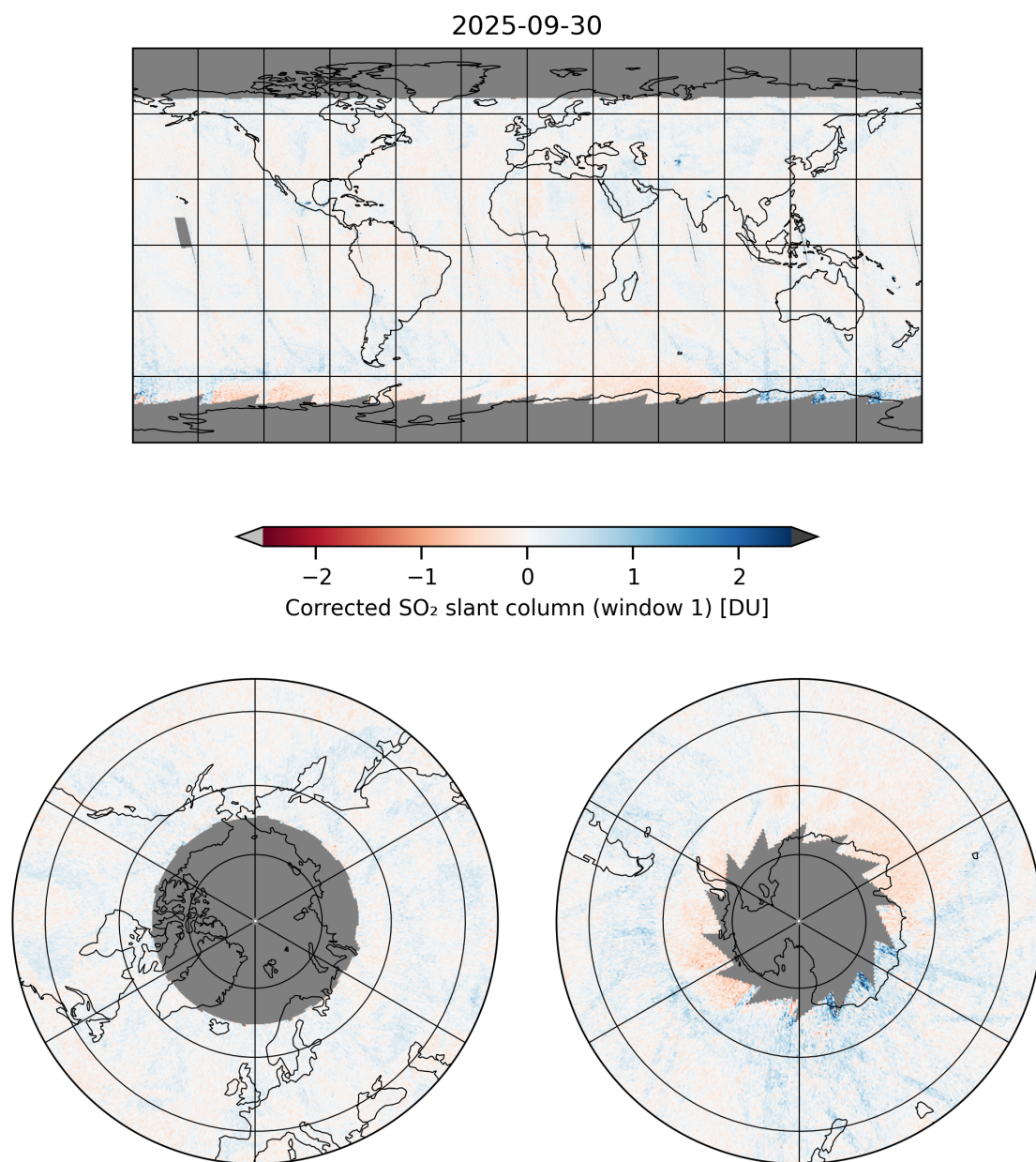


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-09-30 to 2025-10-01

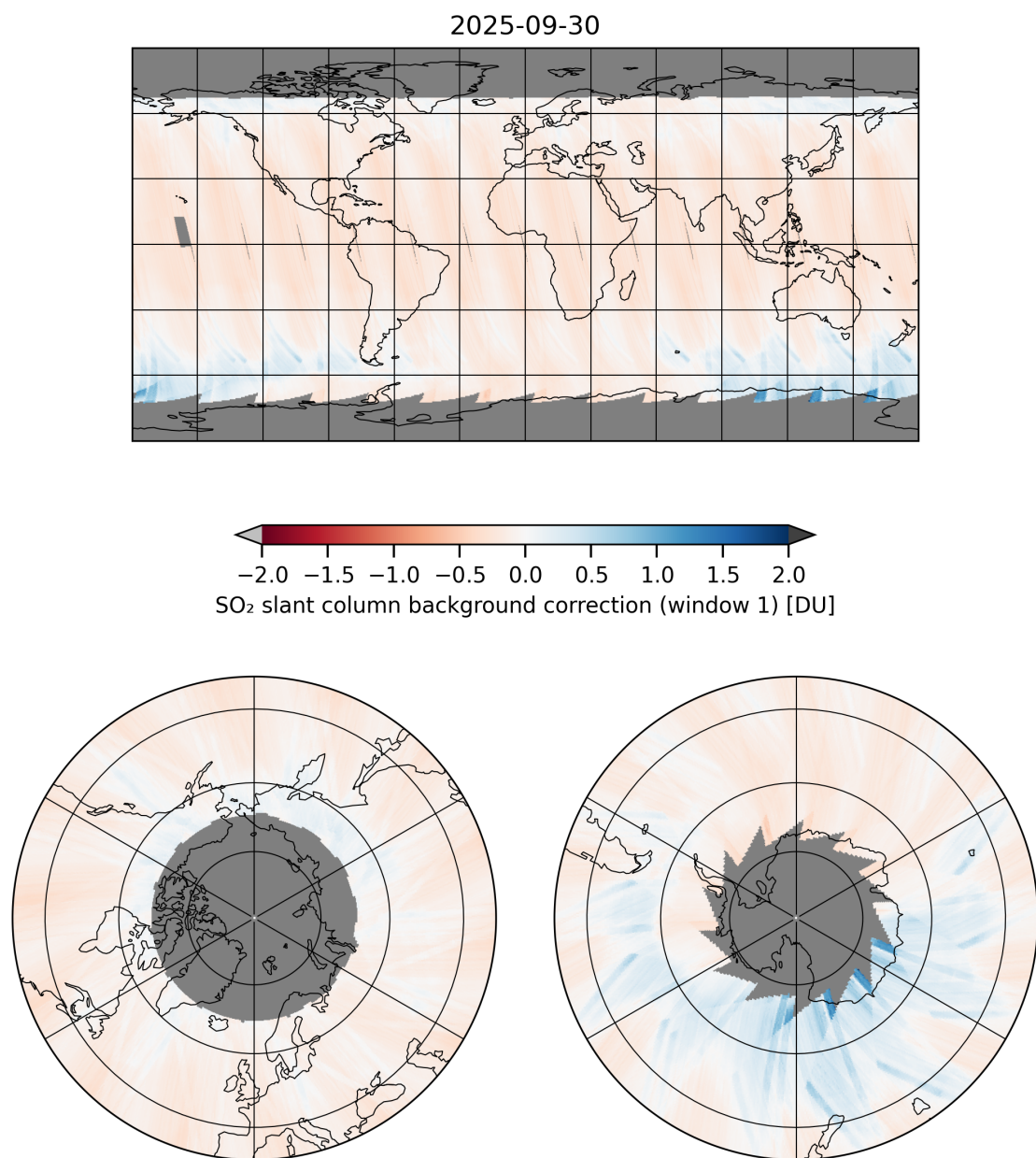


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-09-30 to 2025-10-01

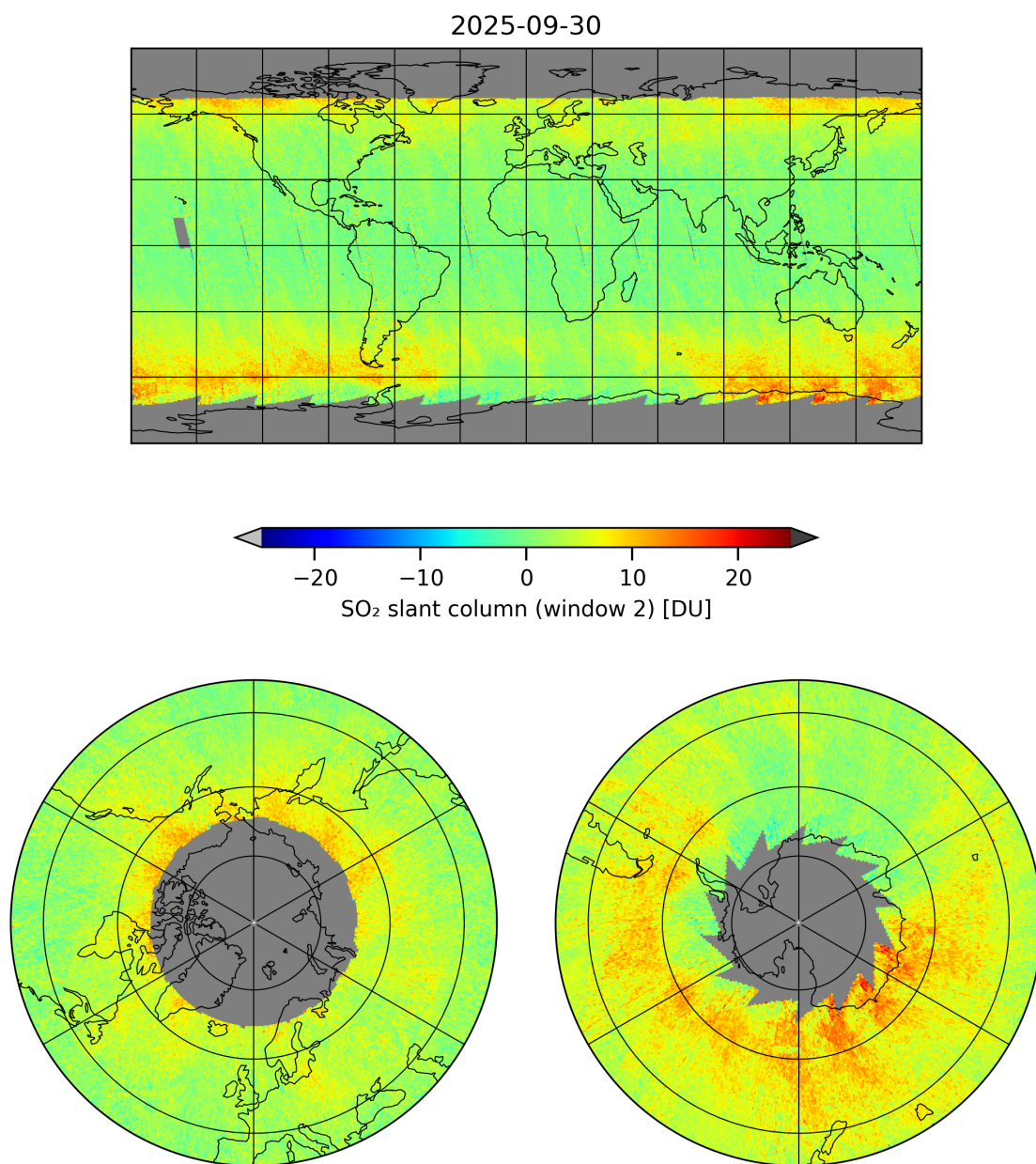


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-09-30 to 2025-10-01

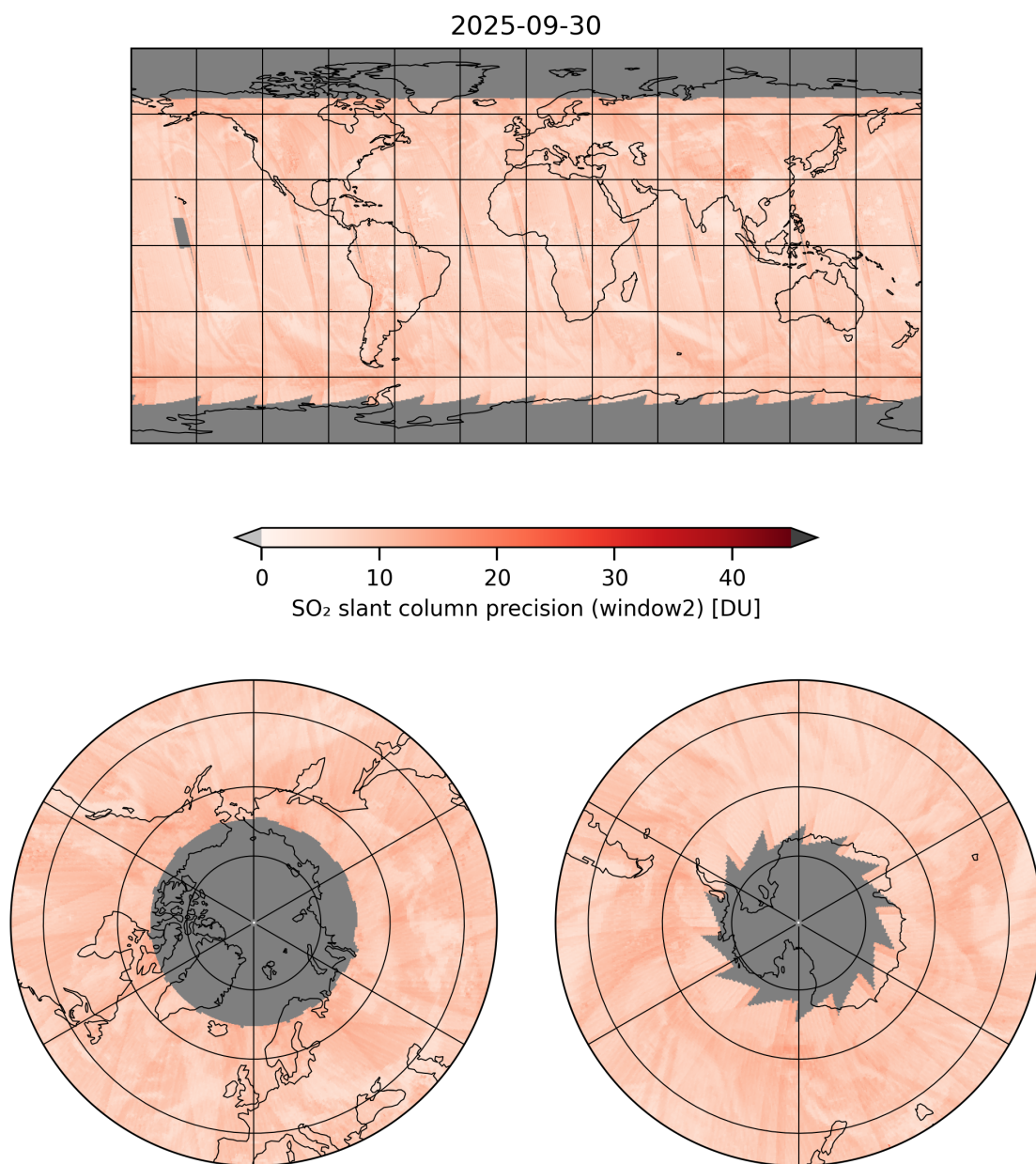


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-09-30 to 2025-10-01

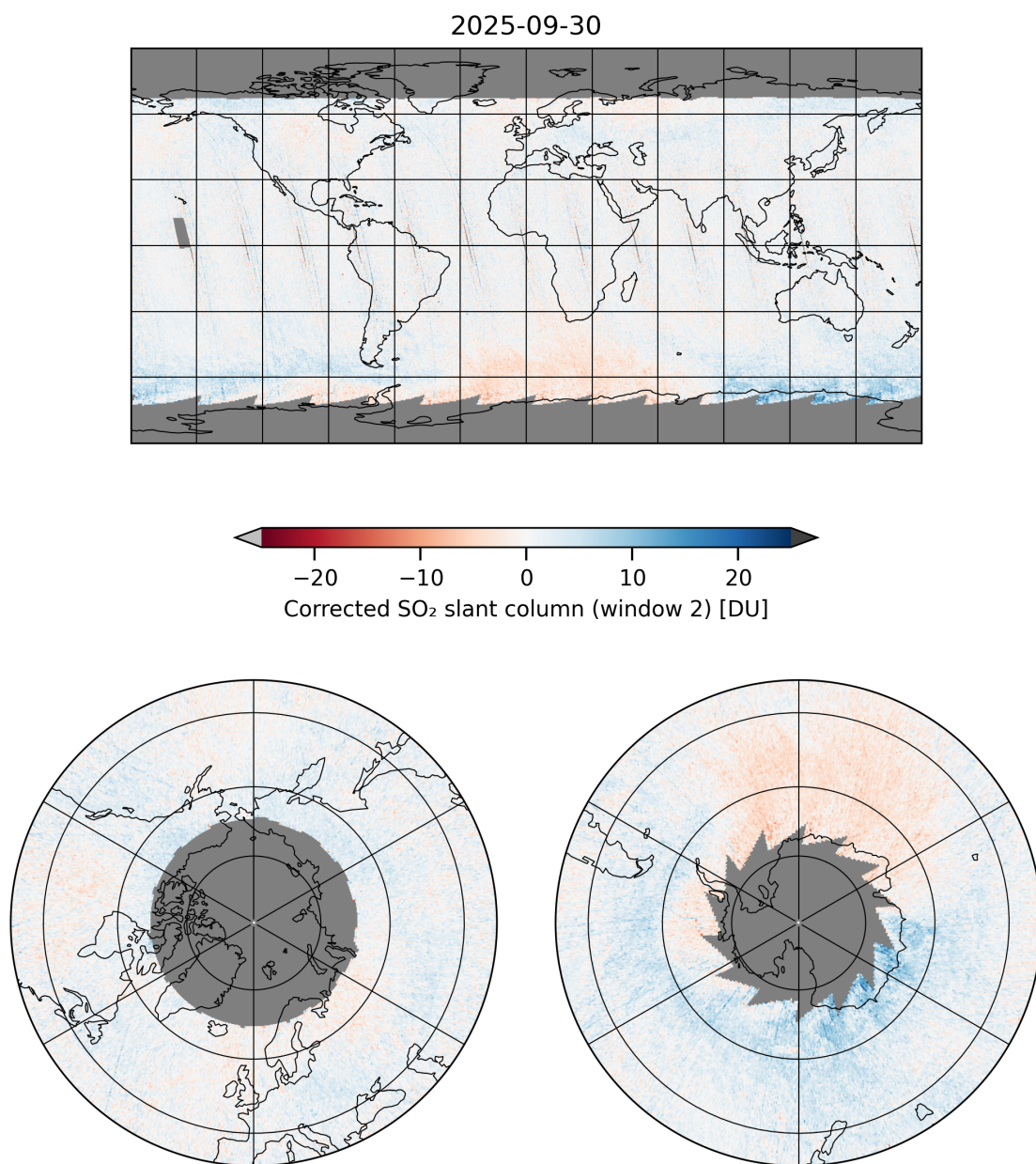


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-09-30 to 2025-10-01

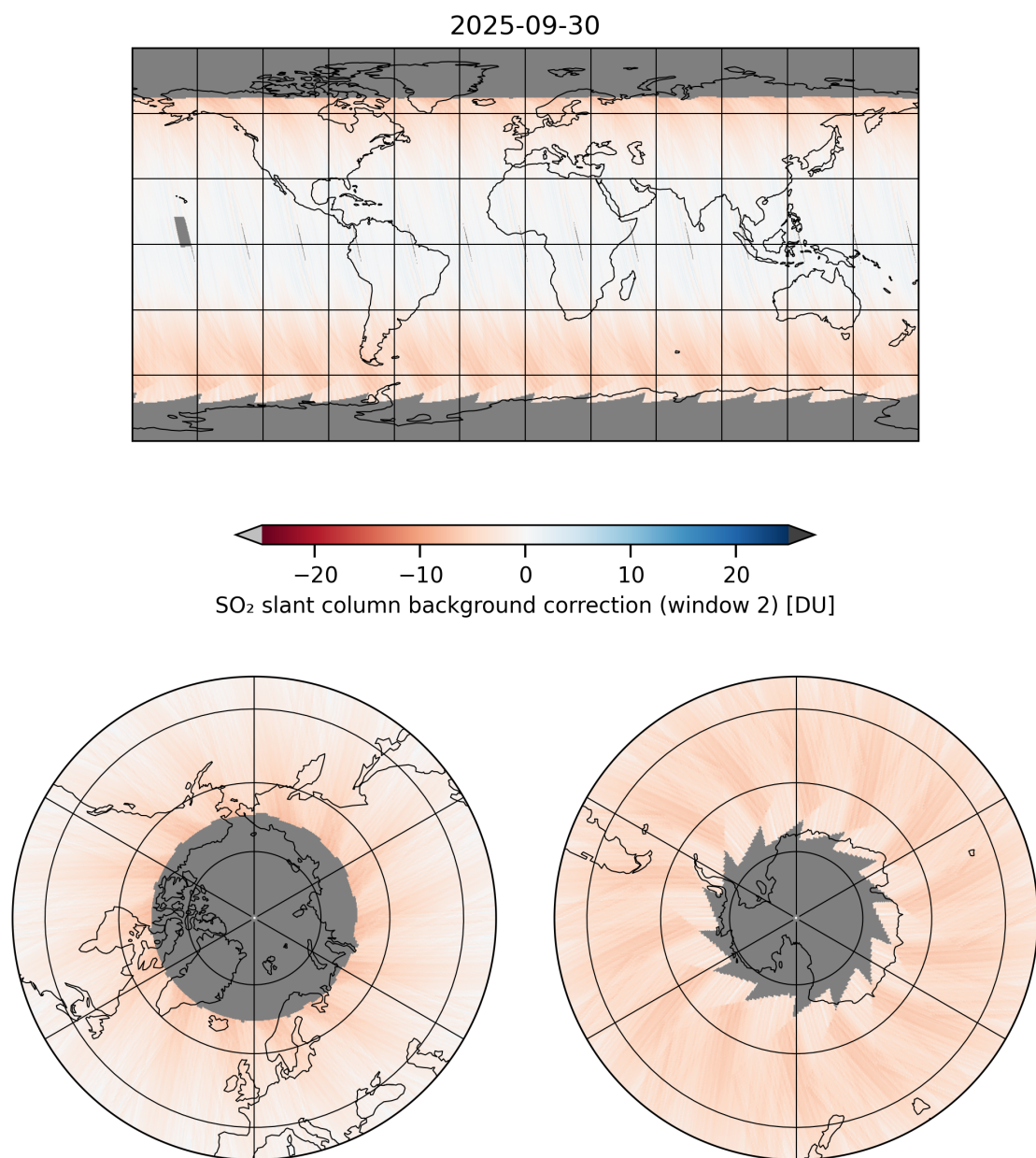


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-09-30 to 2025-10-01

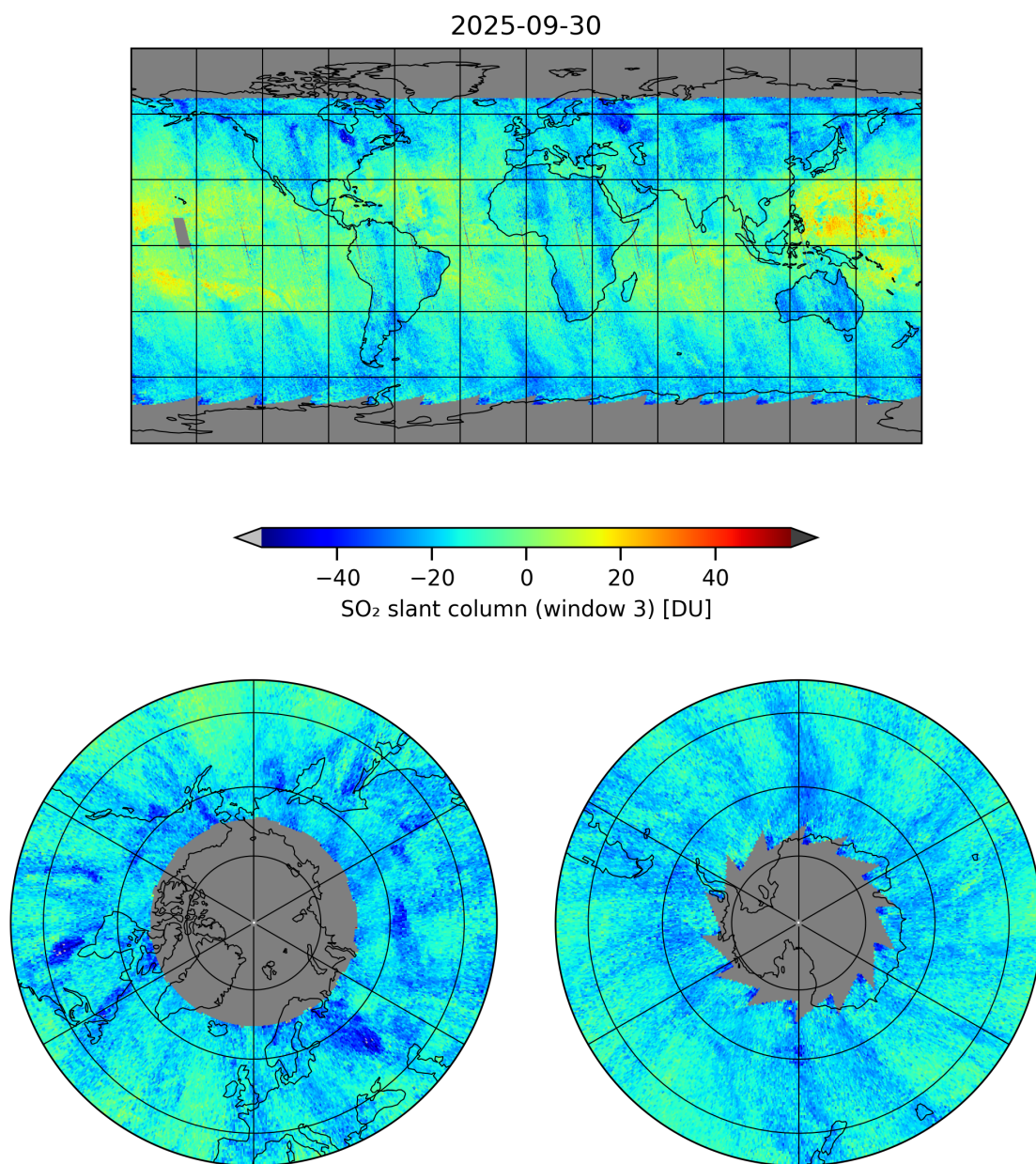


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-09-30 to 2025-10-01

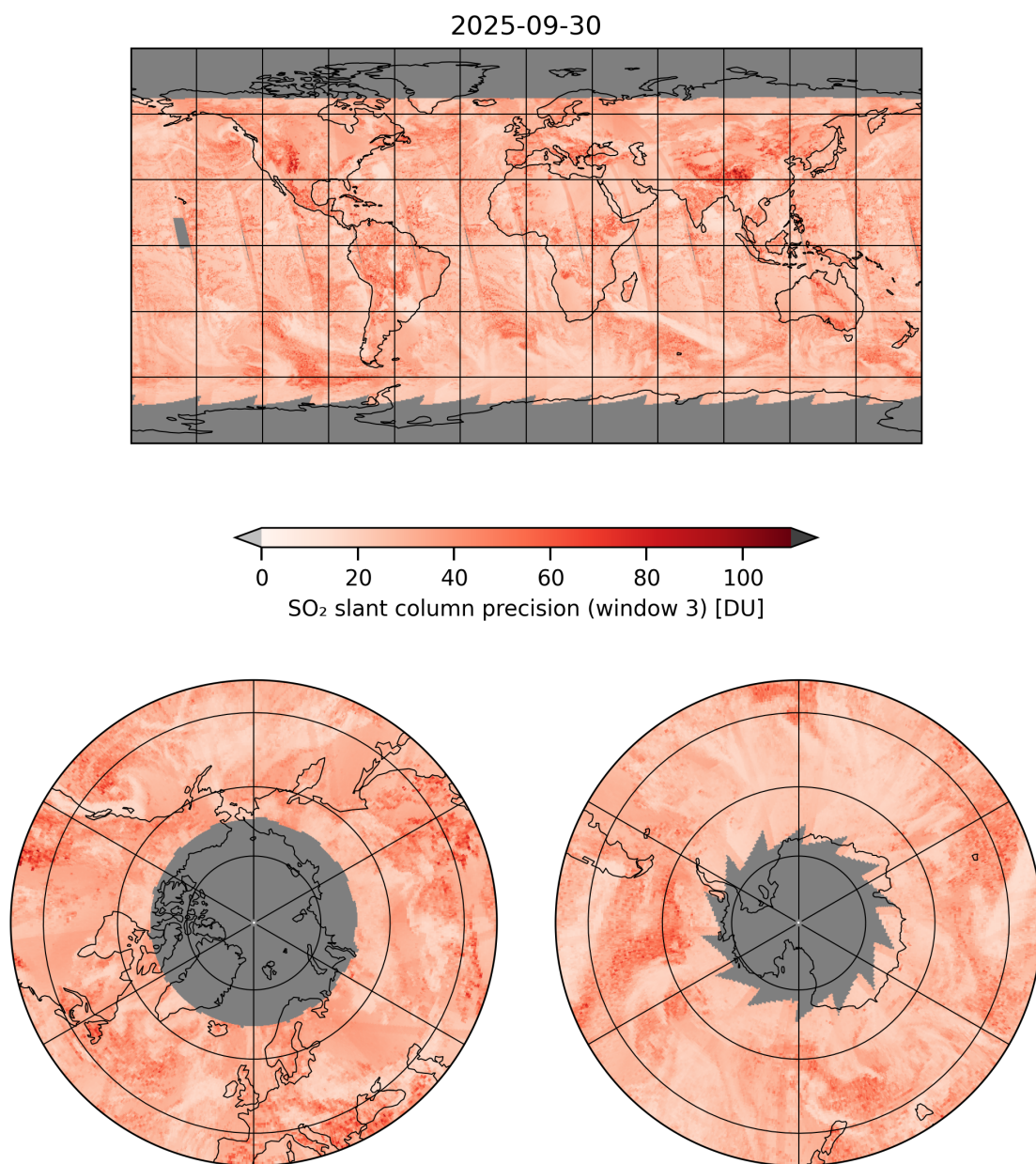


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-09-30 to 2025-10-01

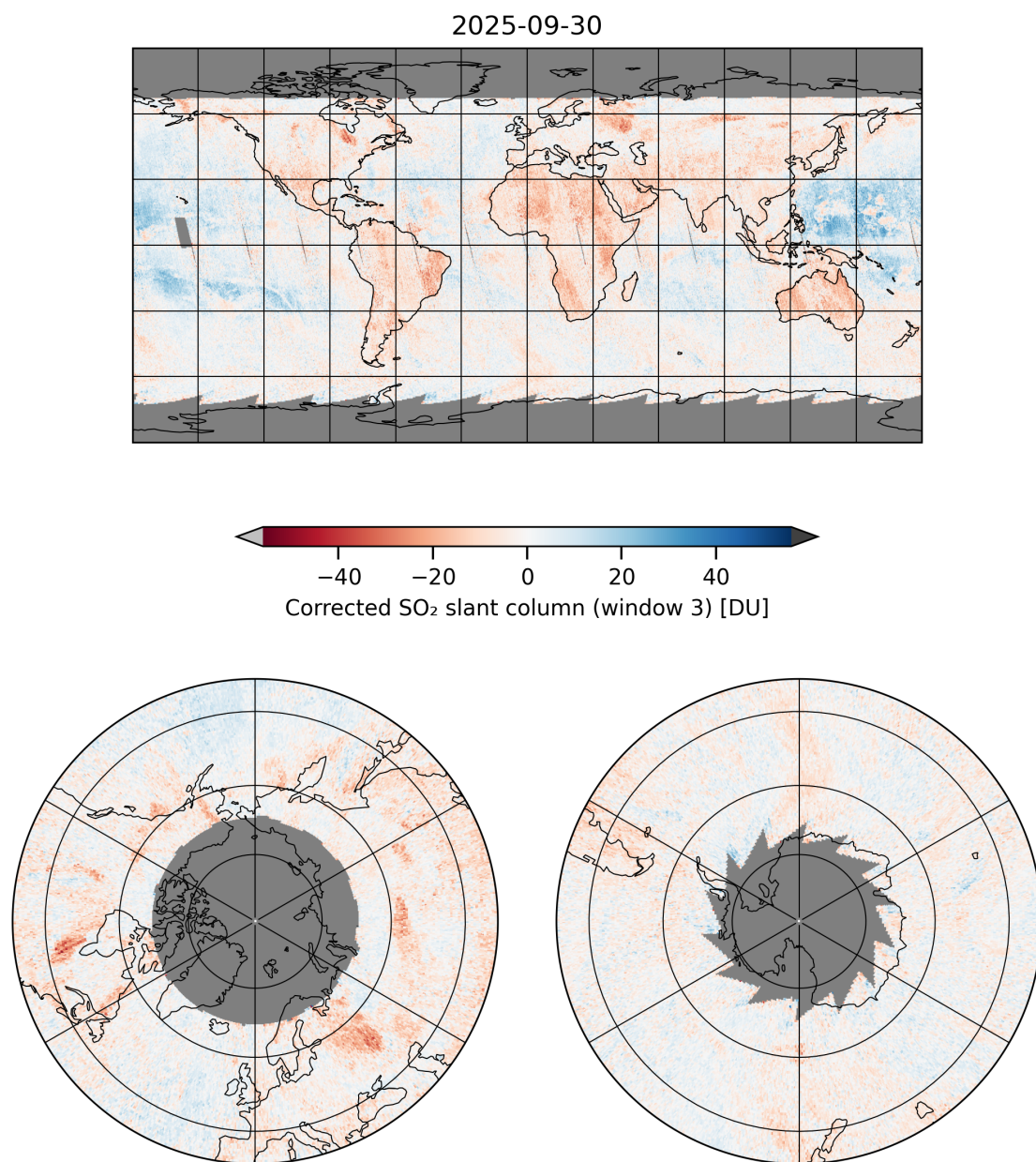


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-09-30 to 2025-10-01

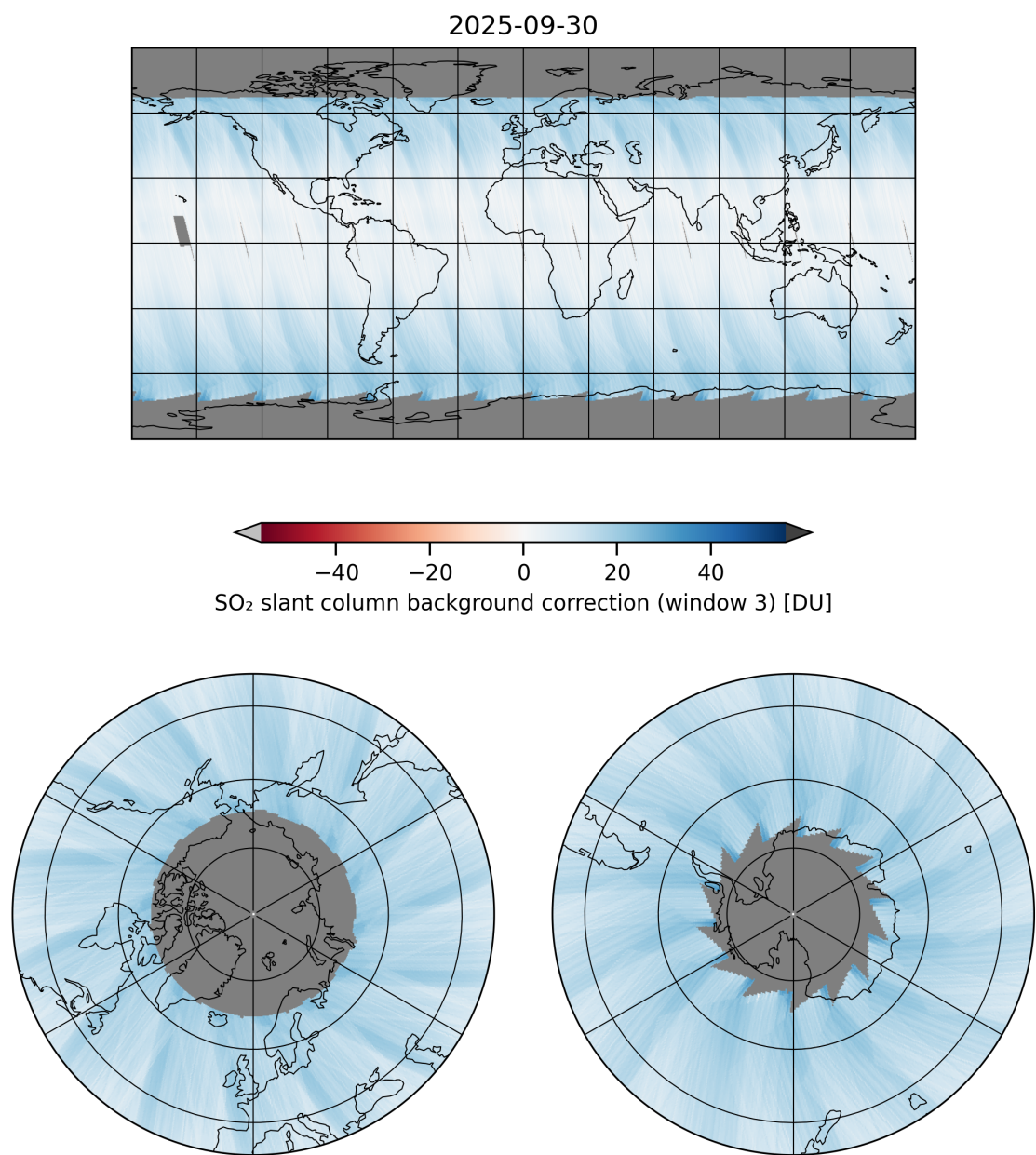


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-09-30 to 2025-10-01

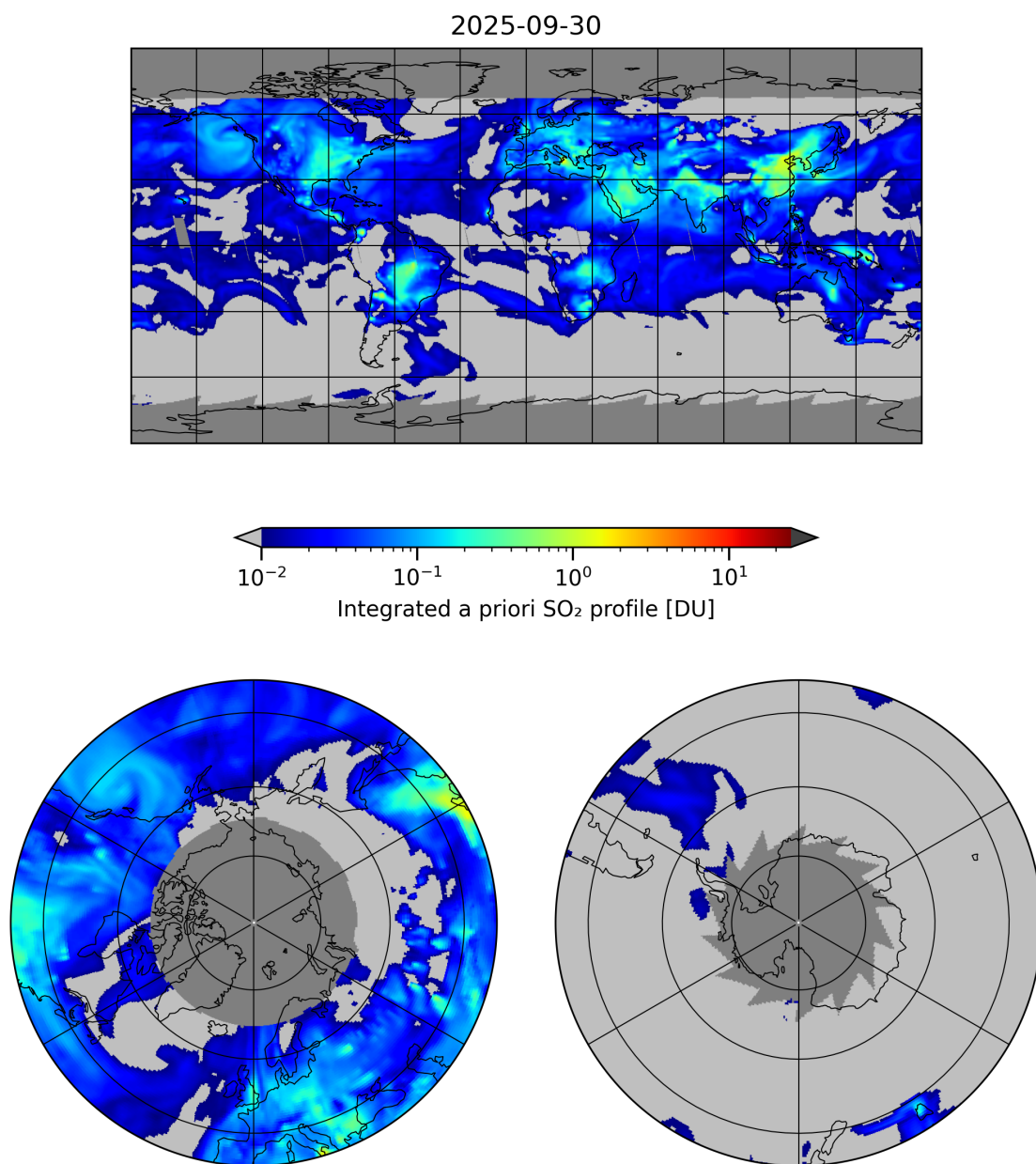


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-09-30 to 2025-10-01

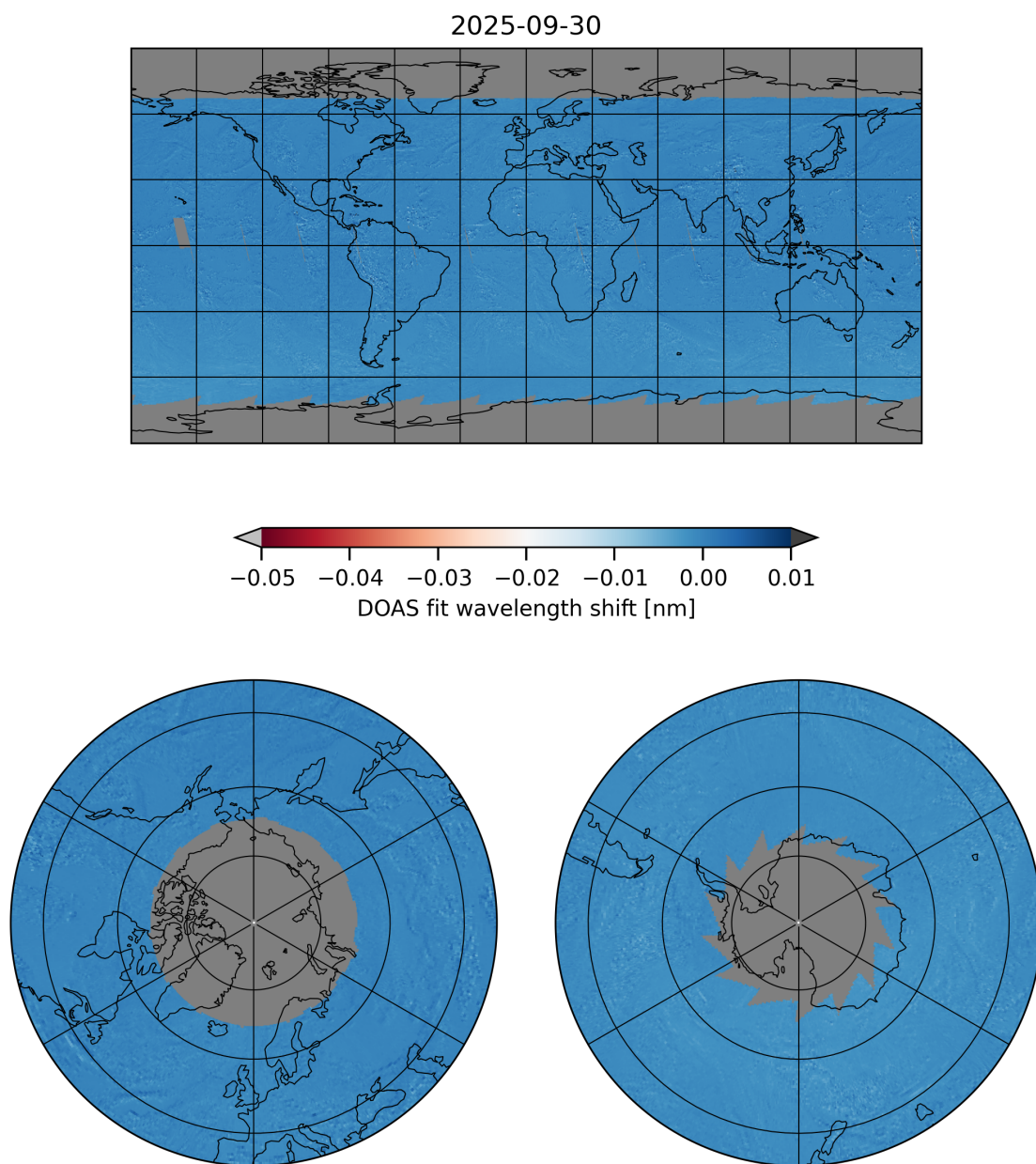


Figure 22: Map of “DOAS fit wavelength shift” for 2025-09-30 to 2025-10-01

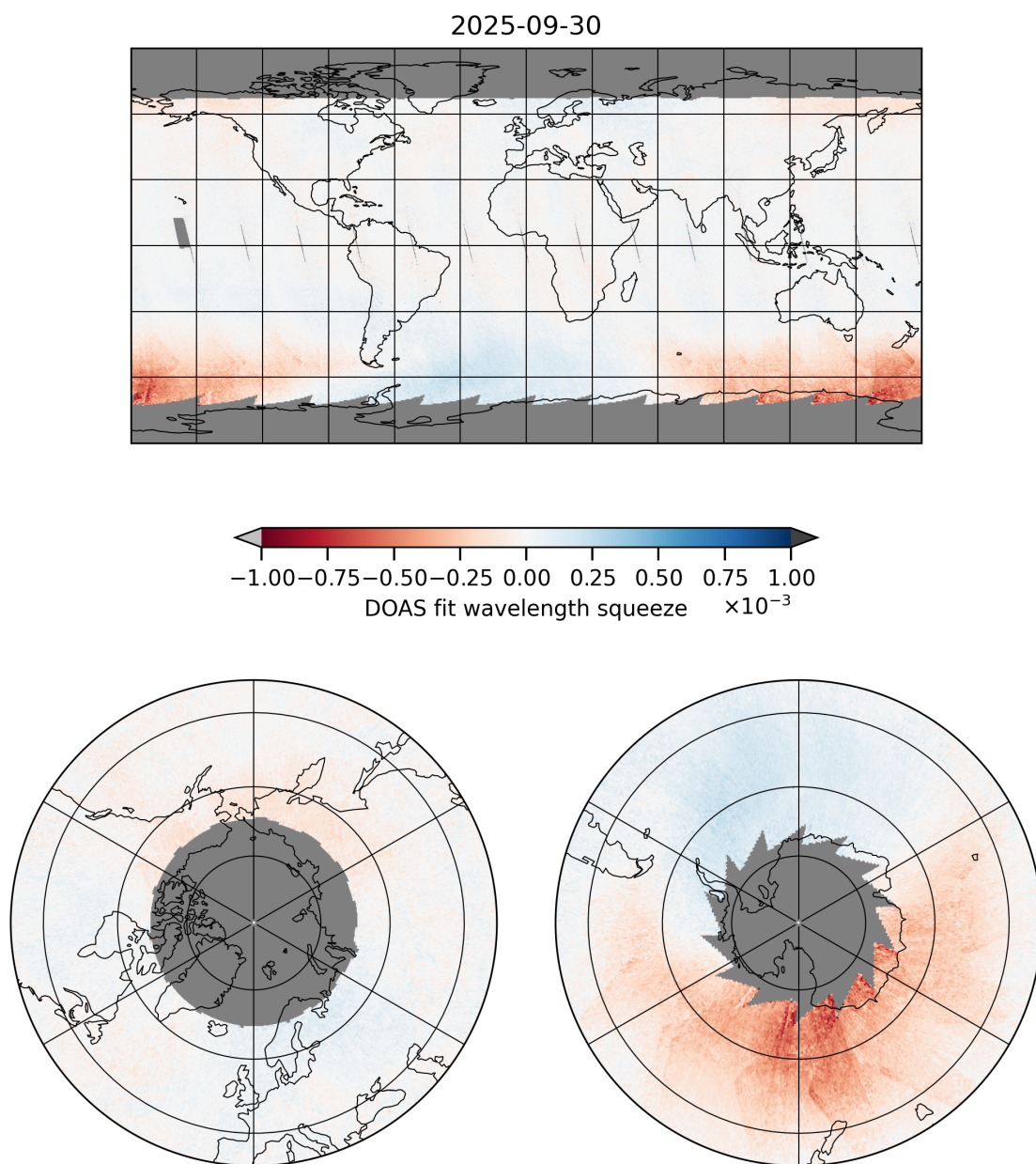


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-09-30 to 2025-10-01

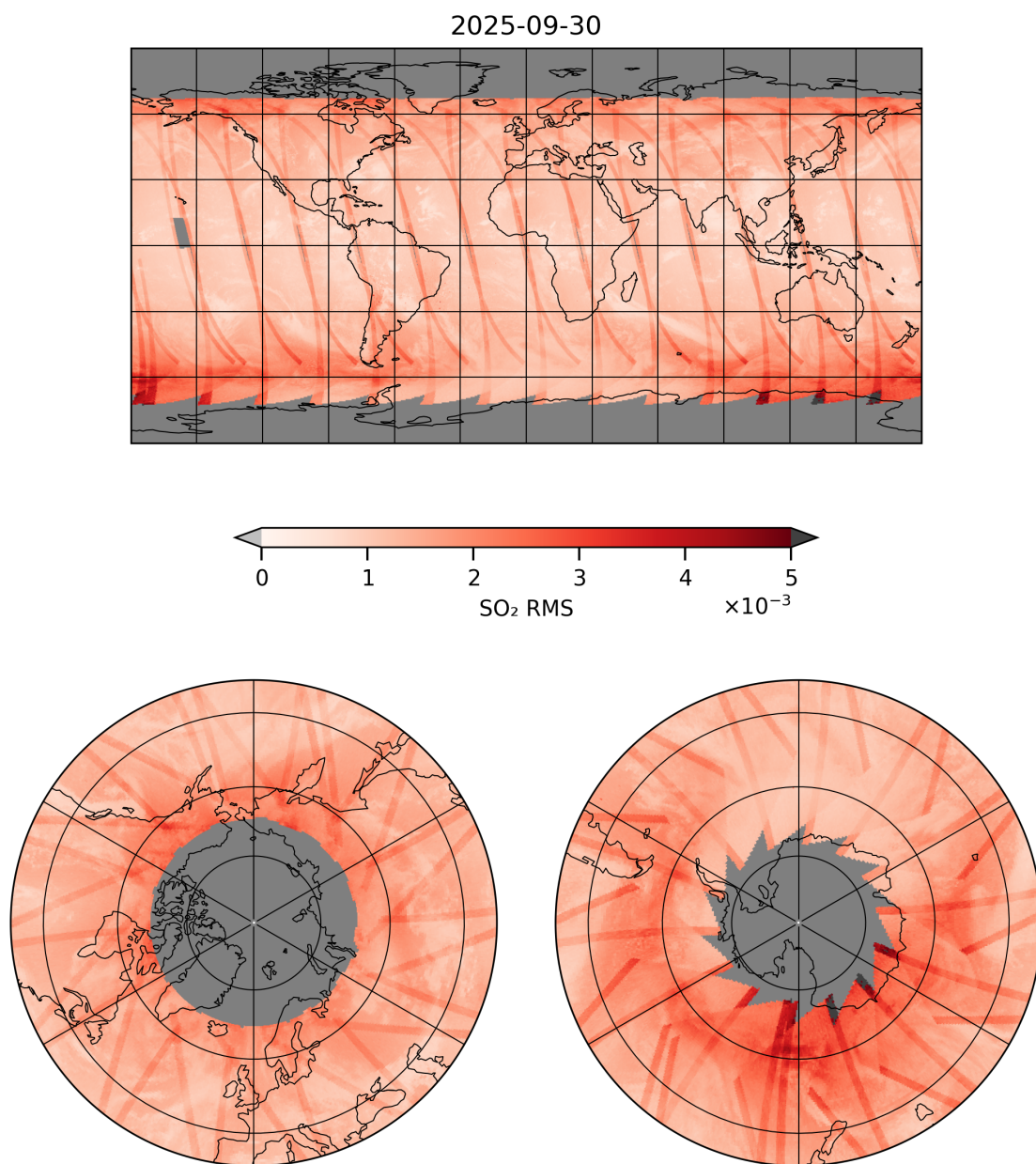


Figure 24: Map of “SO₂ RMS” for 2025-09-30 to 2025-10-01

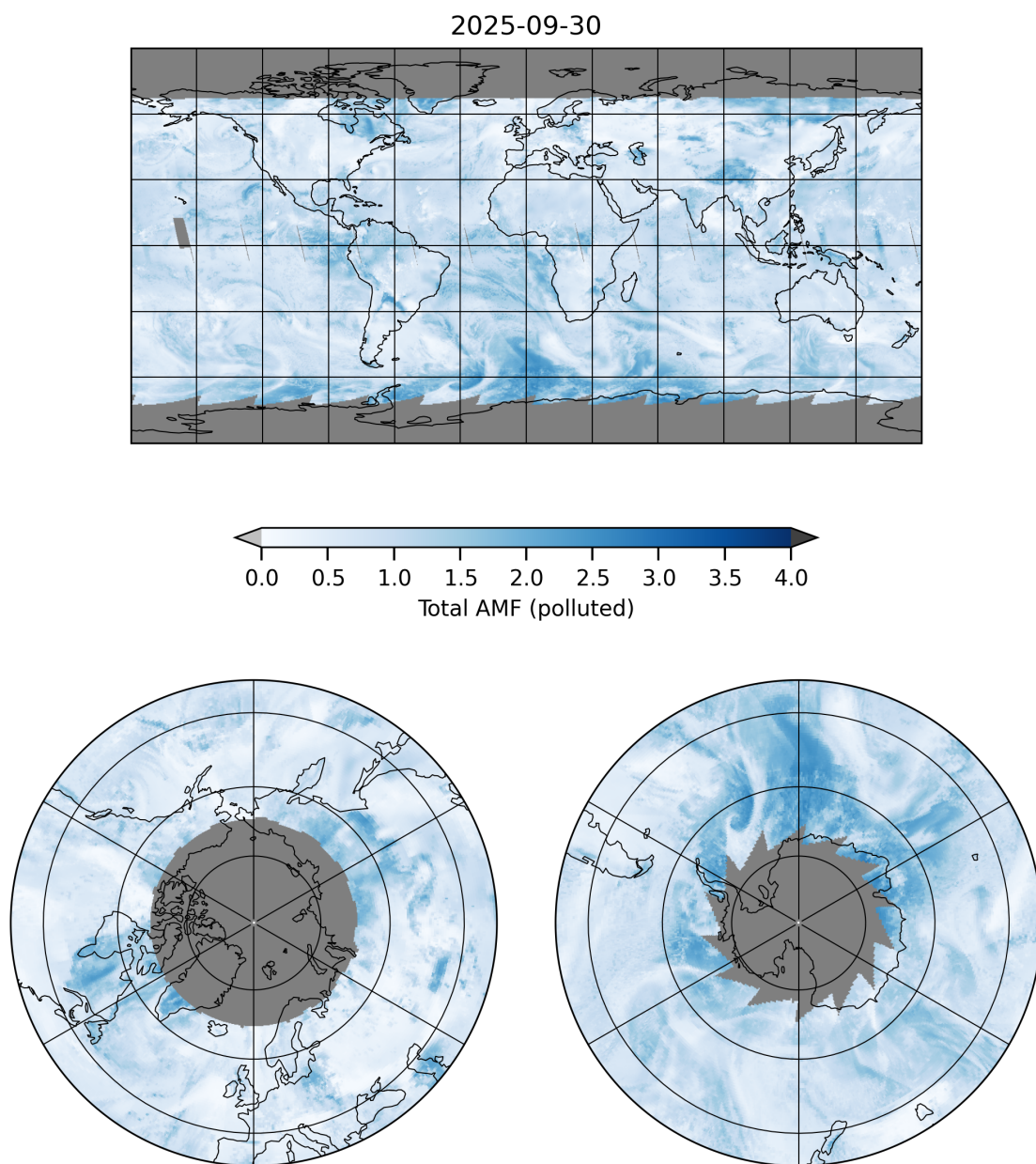


Figure 25: Map of “Total AMF (polluted)” for 2025-09-30 to 2025-10-01

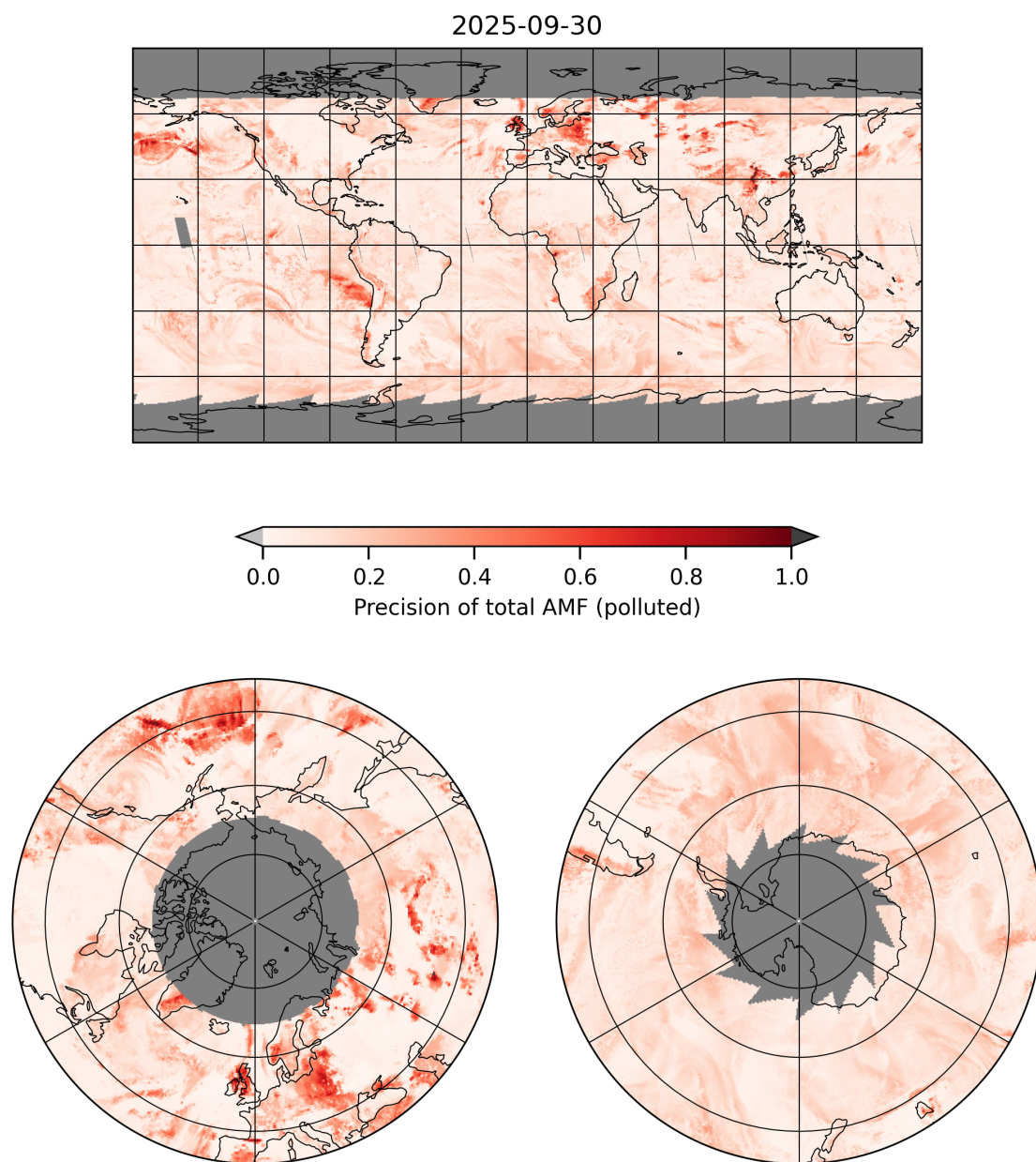


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-09-30 to 2025-10-01

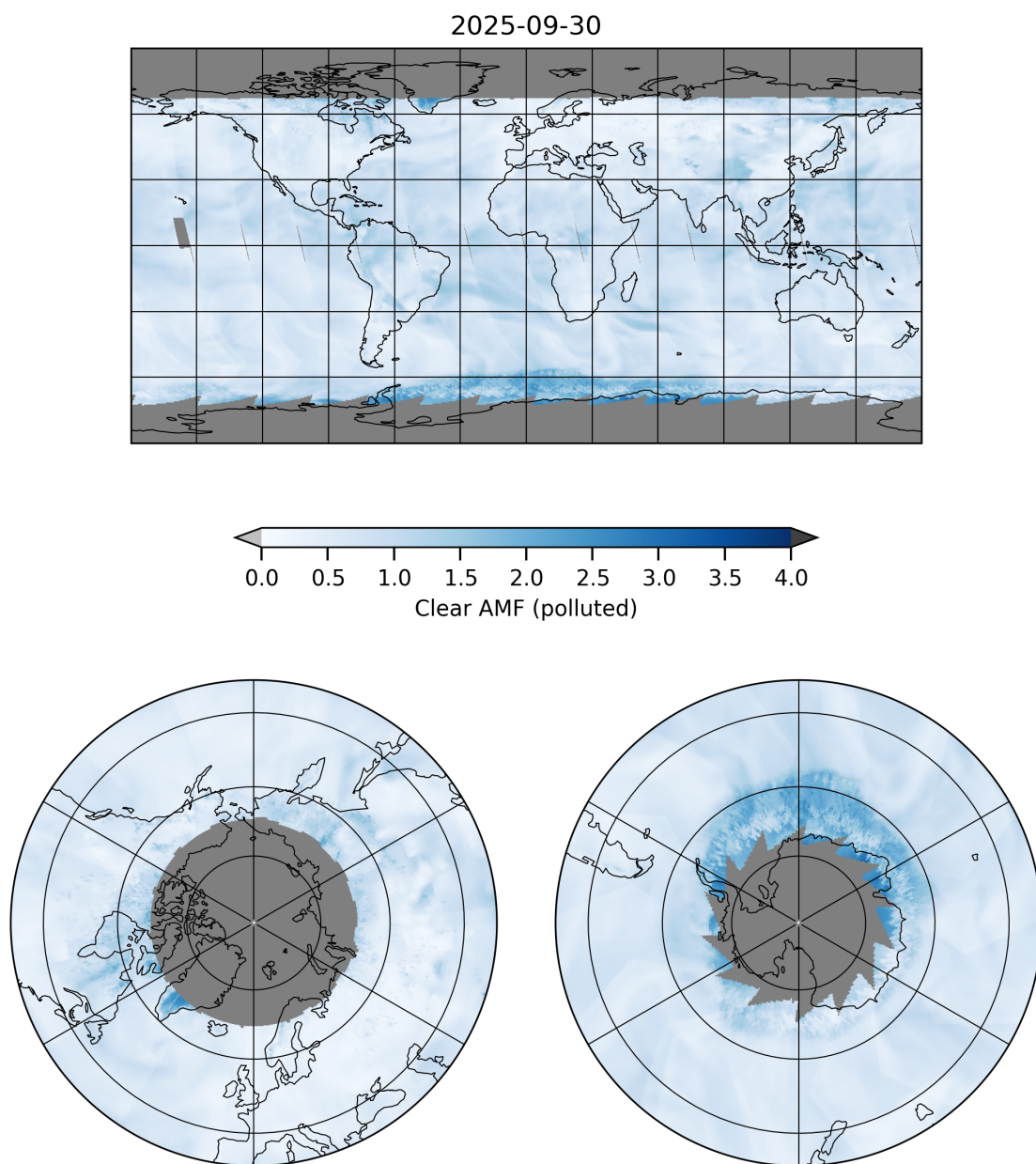


Figure 27: Map of "Clear AMF (polluted)" for 2025-09-30 to 2025-10-01

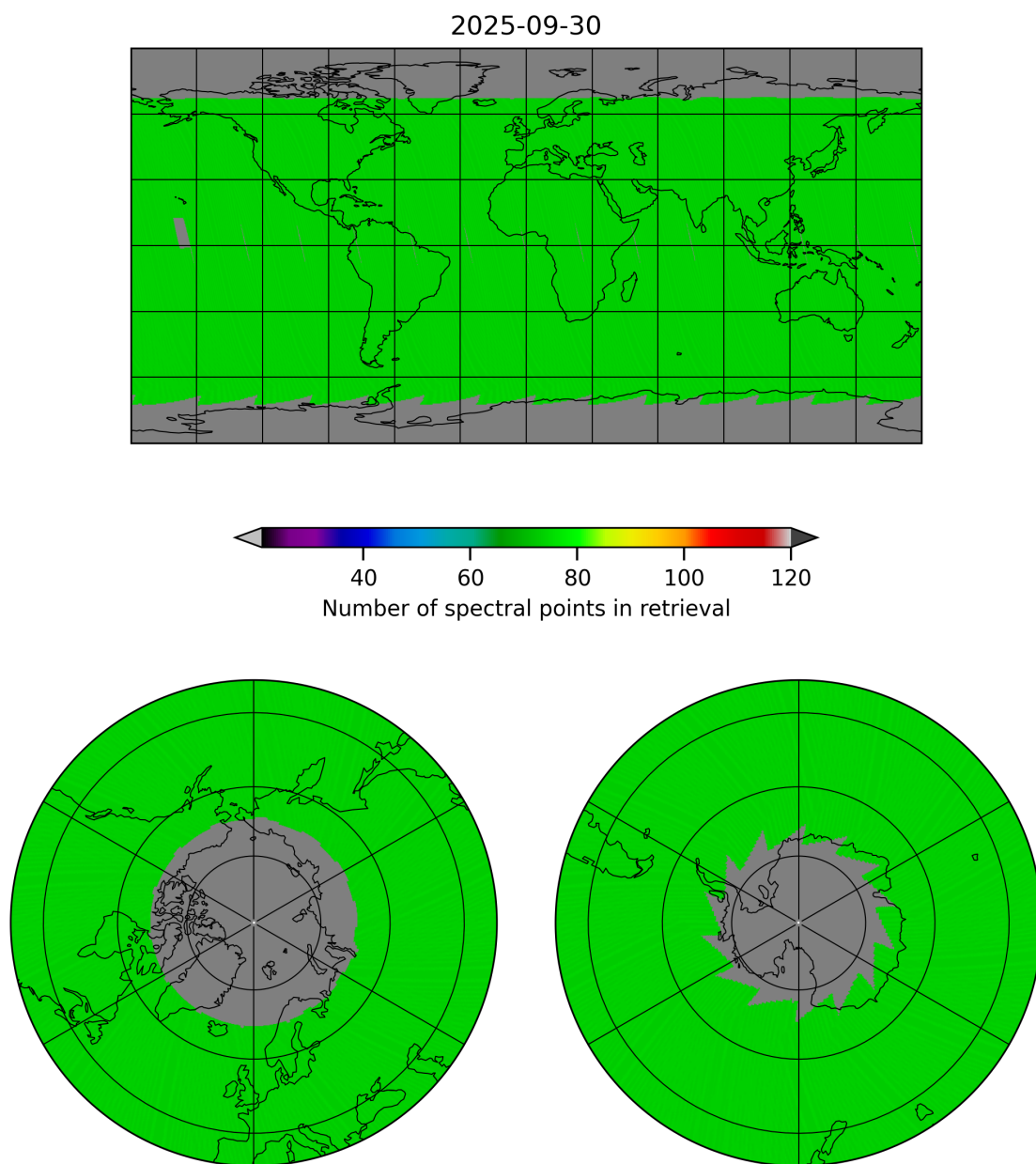


Figure 28: Map of “Number of spectral points in retrieval” for 2025-09-30 to 2025-10-01

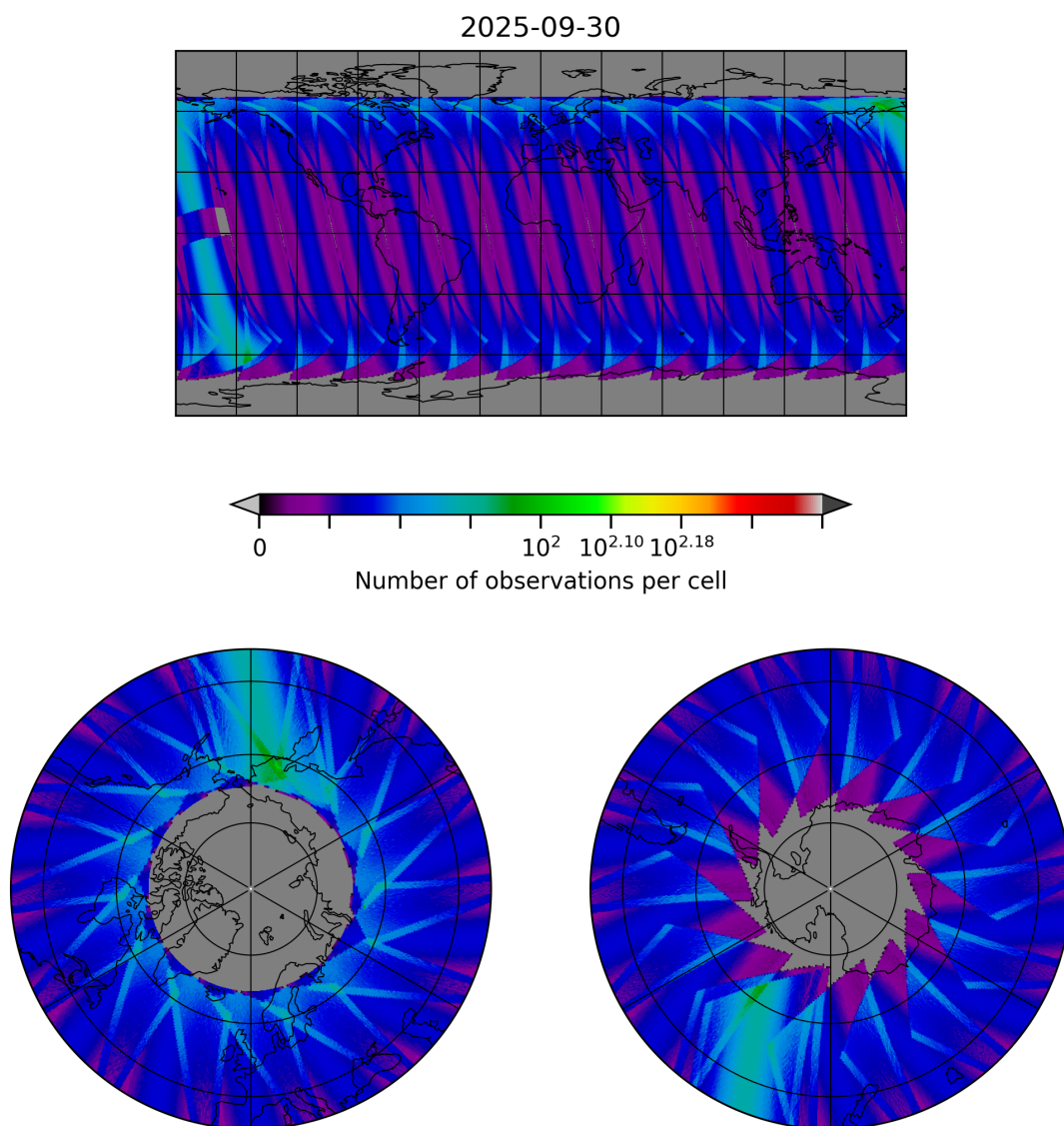


Figure 29: Map of the number of observations for 2025-09-30 to 2025-10-01

7 Zonal average

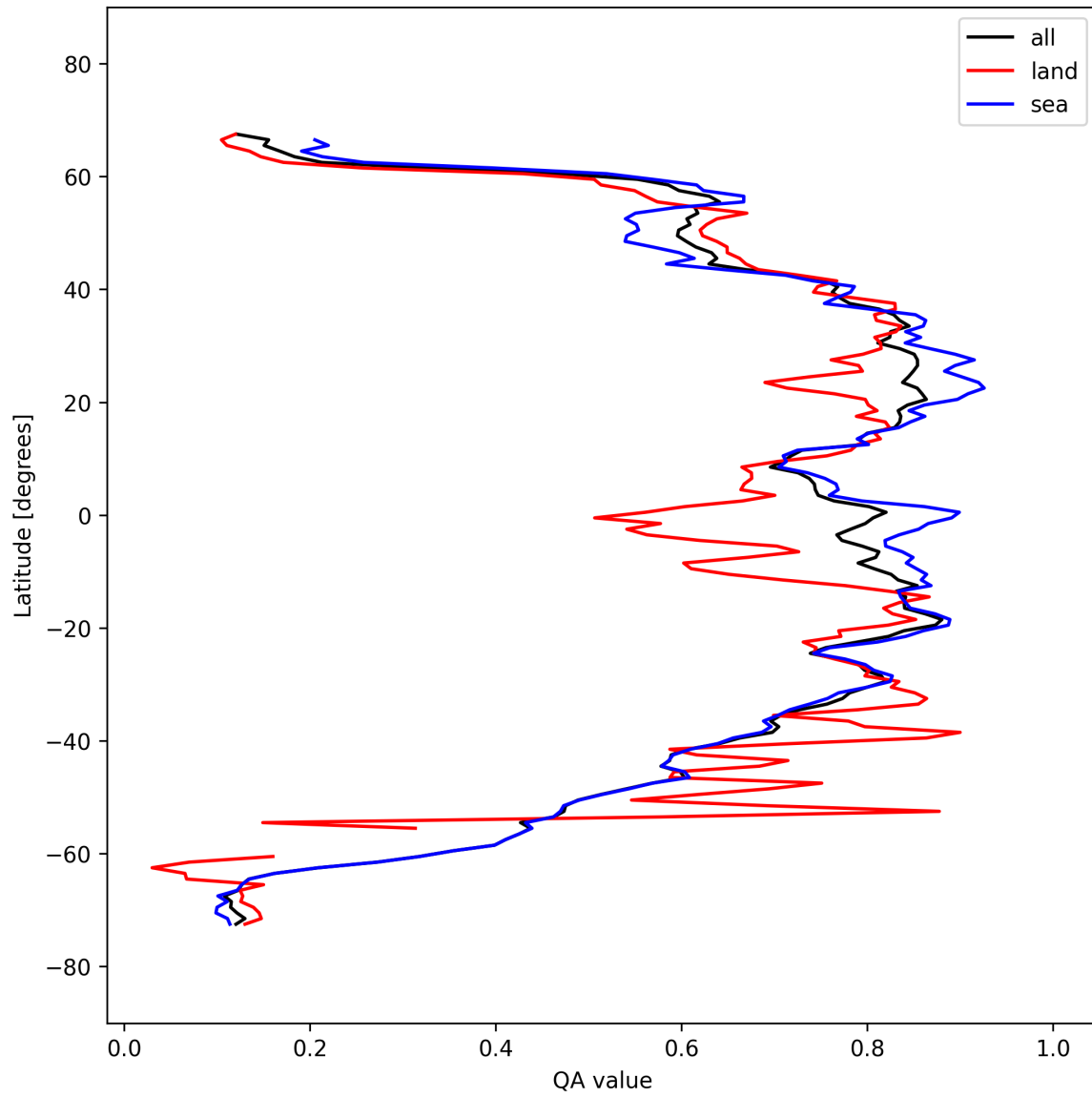


Figure 30: Zonal average of “QA value” for 2025-09-30 to 2025-10-01.

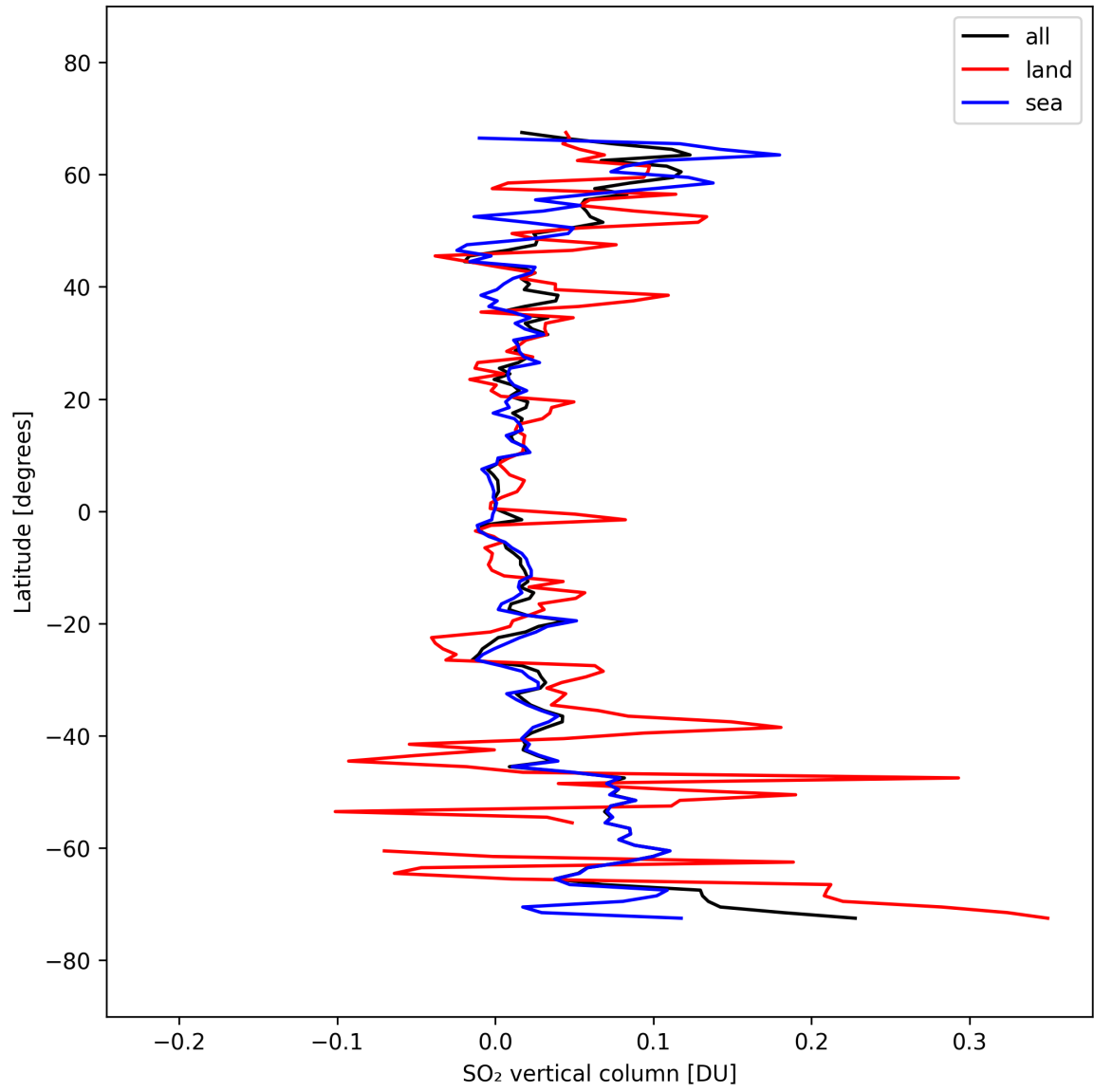


Figure 31: Zonal average of “SO₂ vertical column” for 2025-09-30 to 2025-10-01.

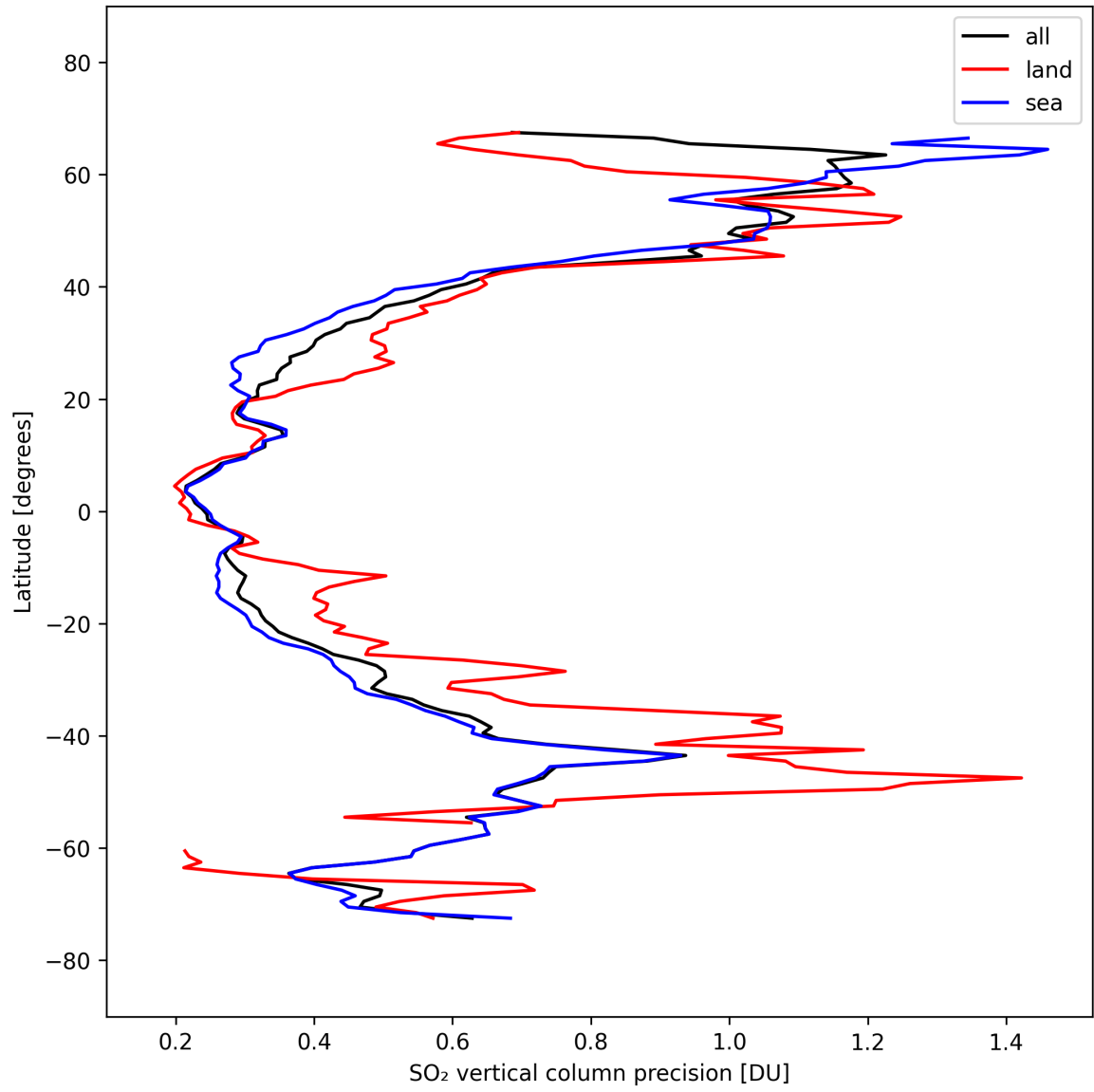


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-09-30 to 2025-10-01.

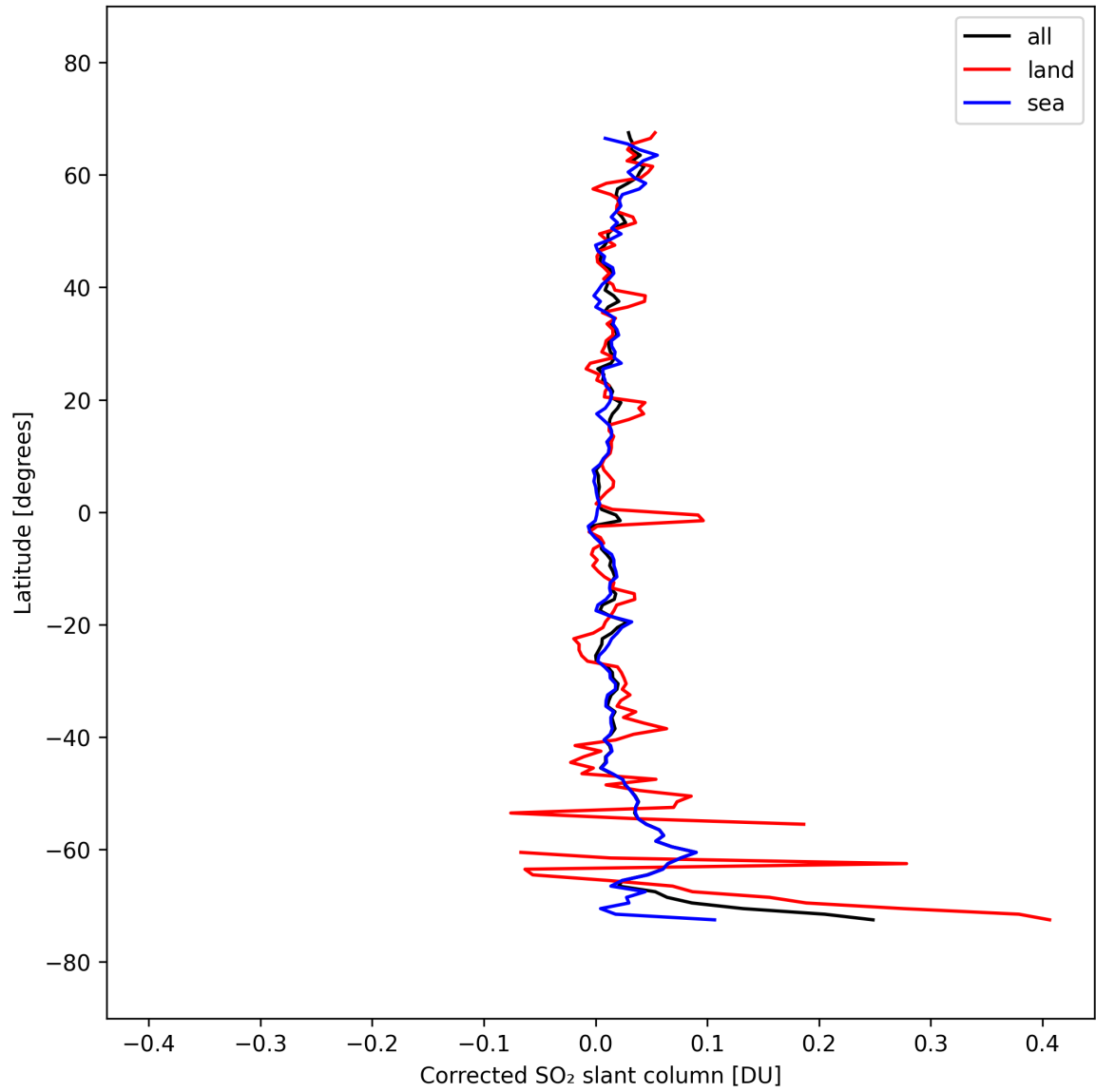


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-09-30 to 2025-10-01.

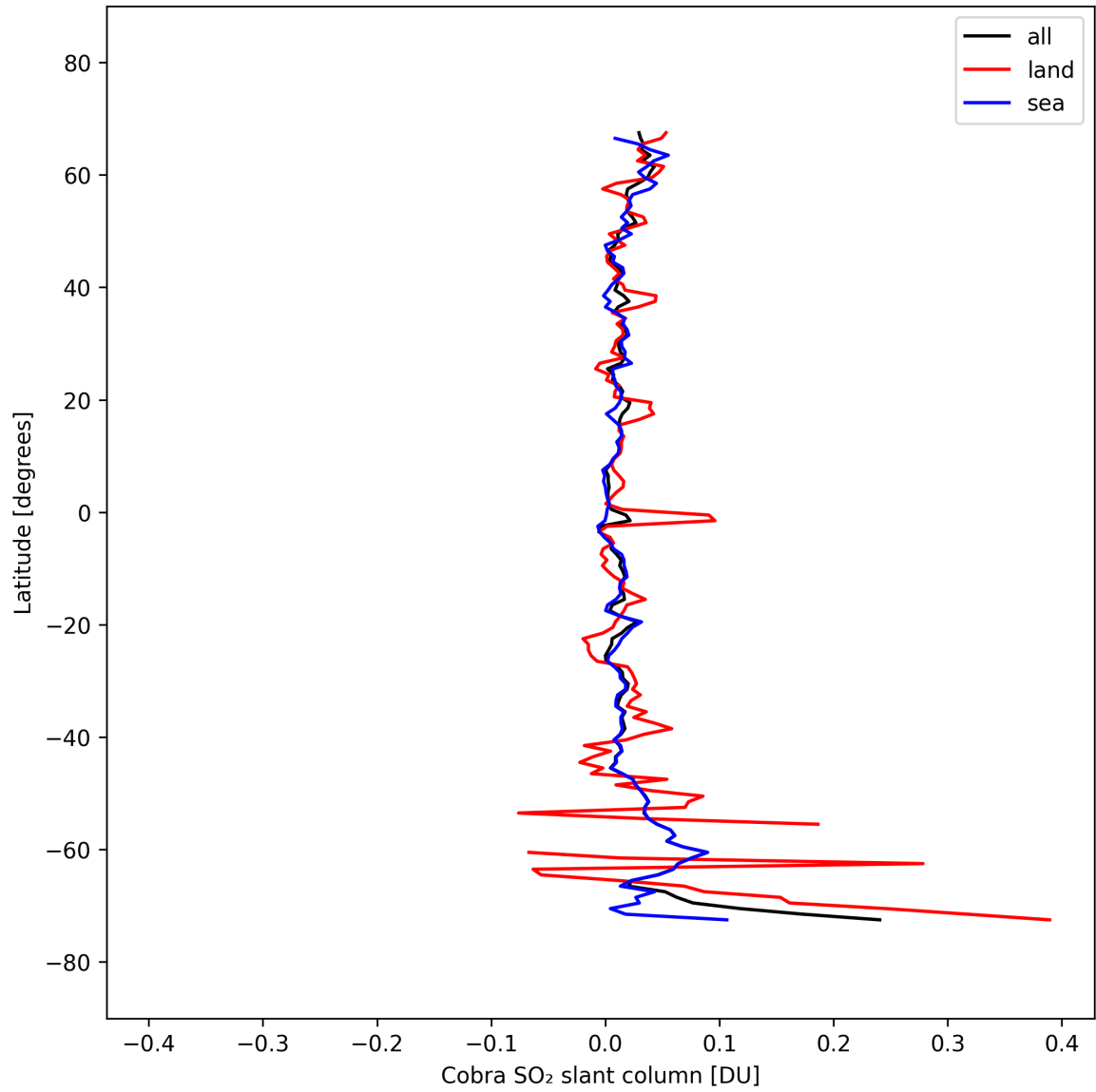


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-09-30 to 2025-10-01.

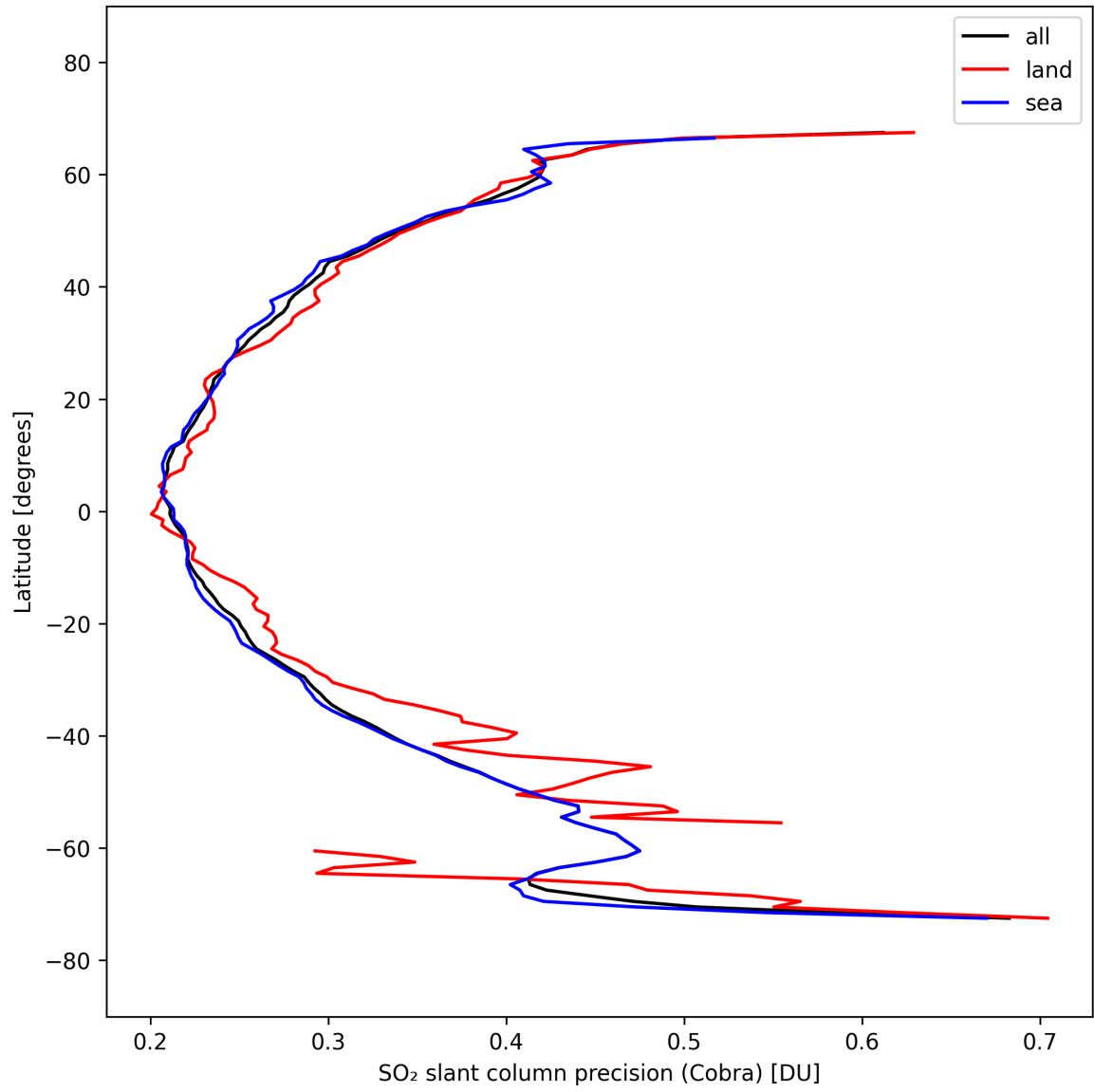


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-09-30 to 2025-10-01.

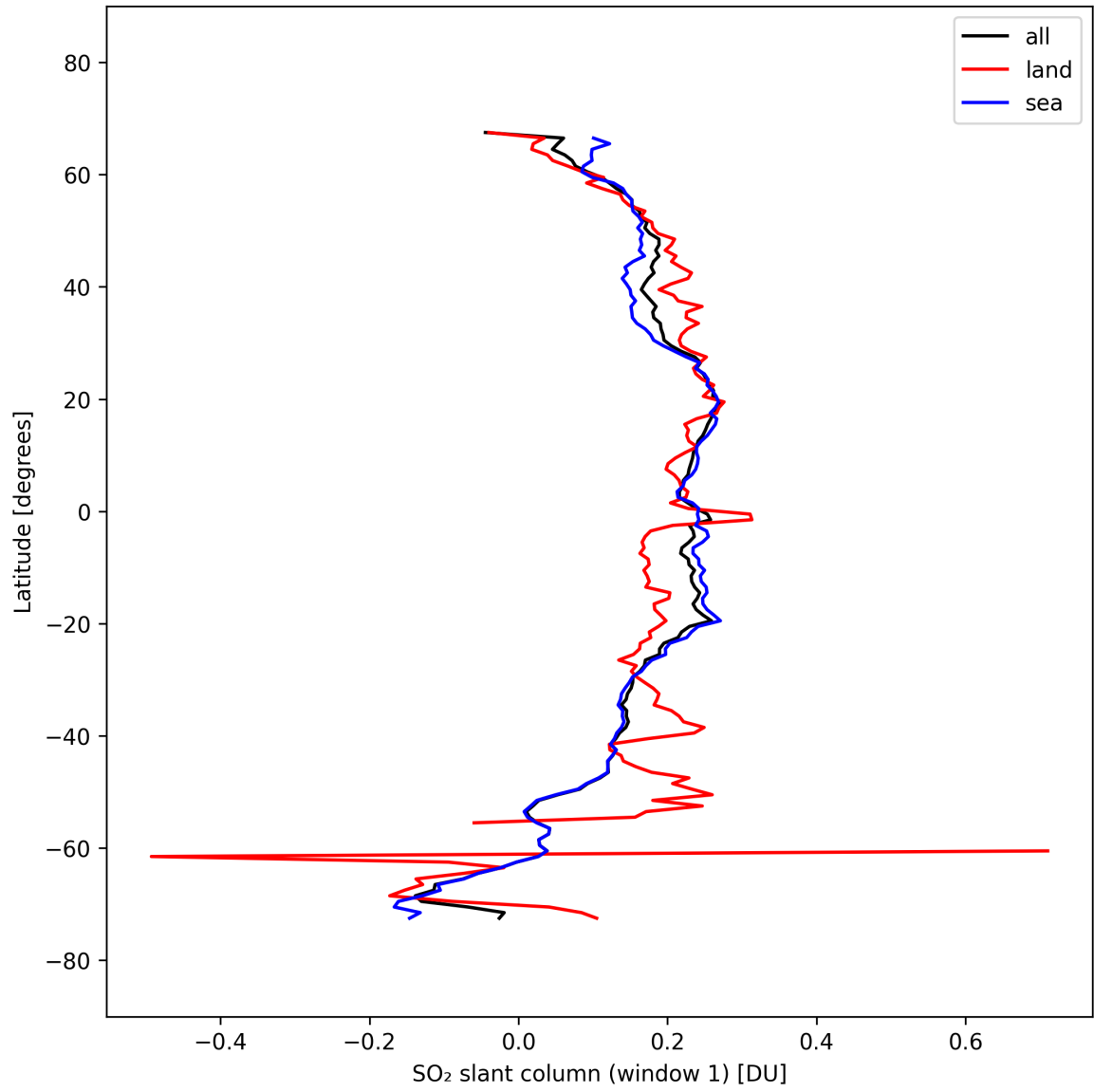


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-09-30 to 2025-10-01.

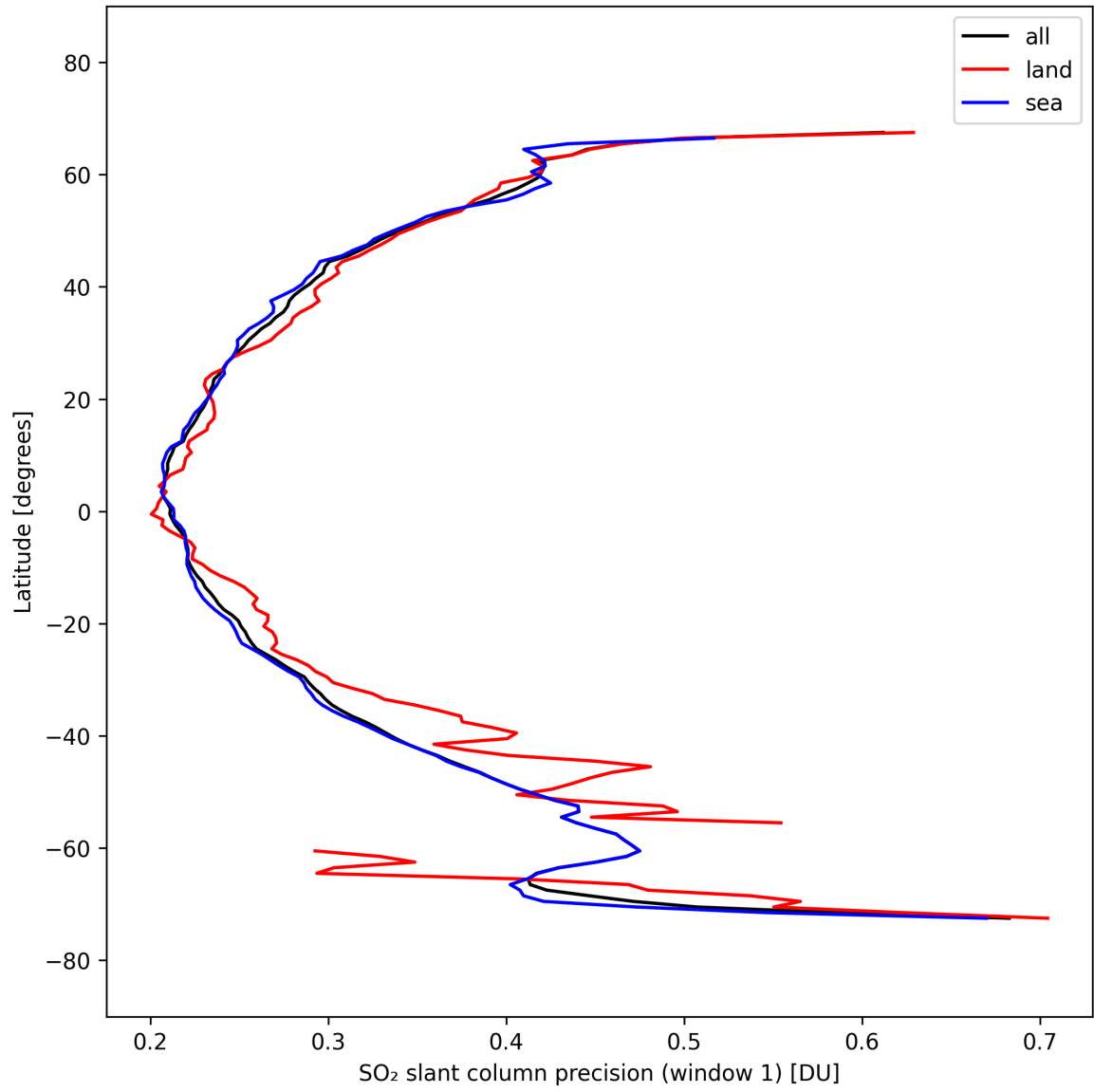


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-09-30 to 2025-10-01.

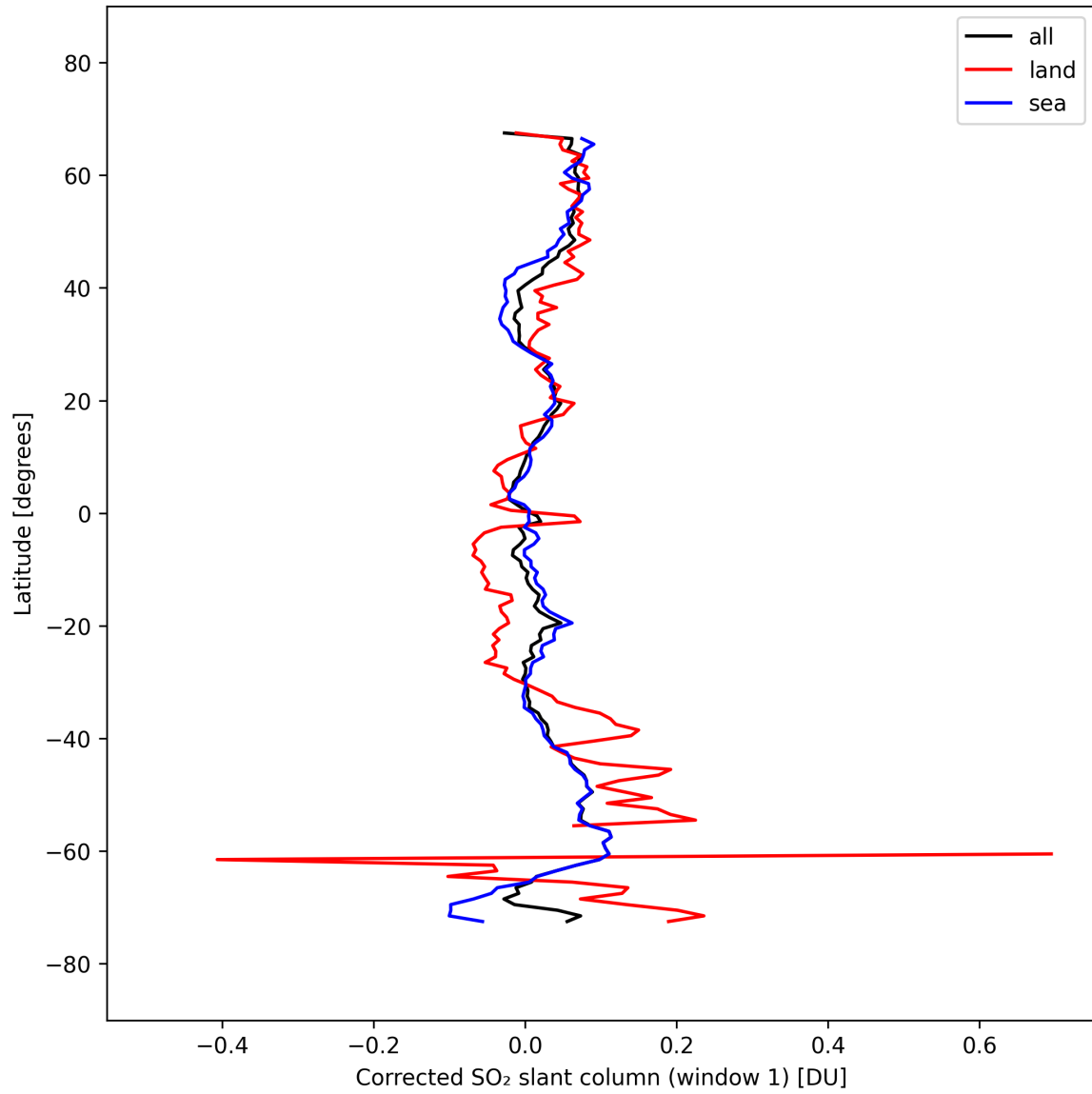


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-09-30 to 2025-10-01.

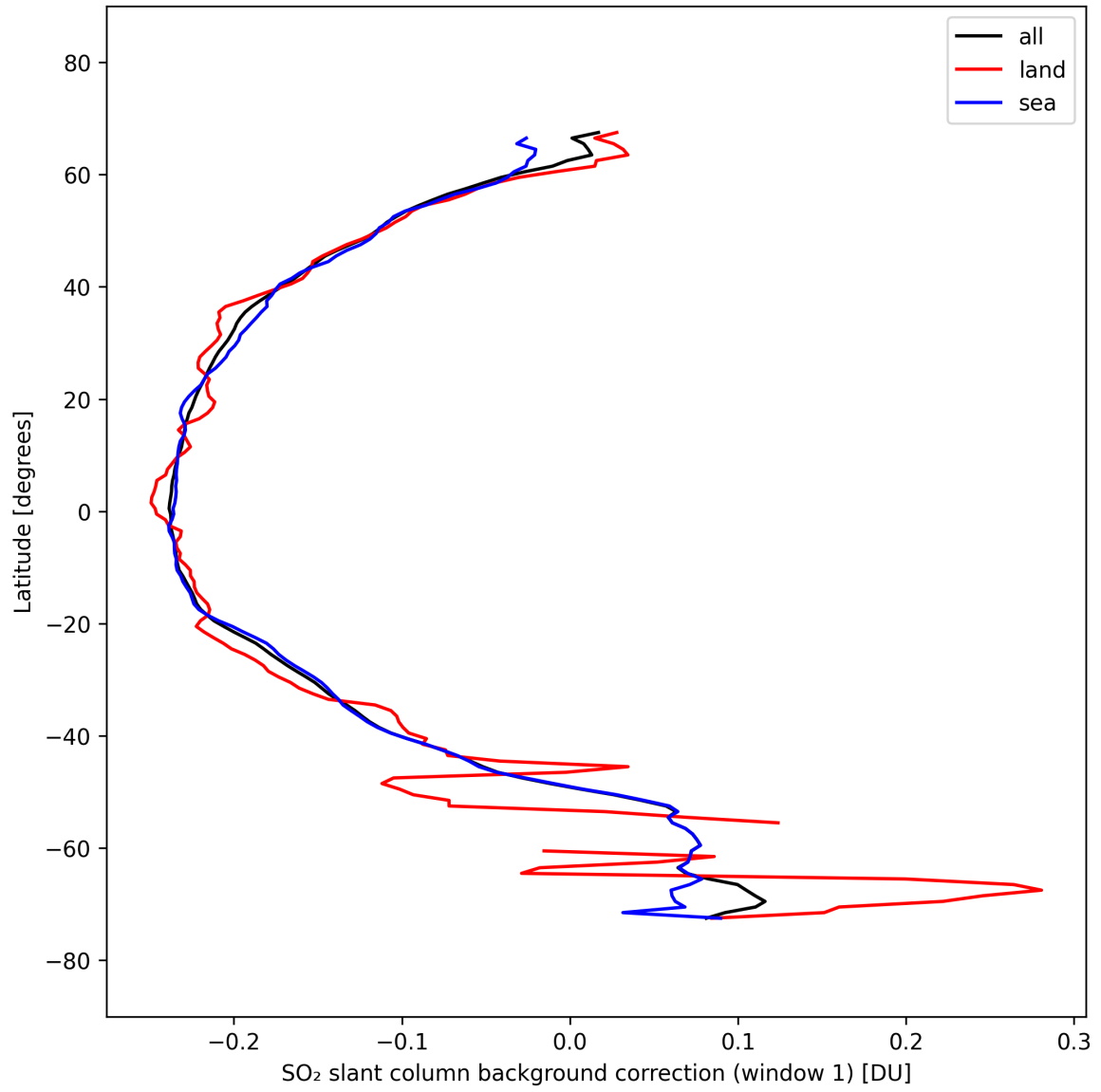


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-09-30 to 2025-10-01.

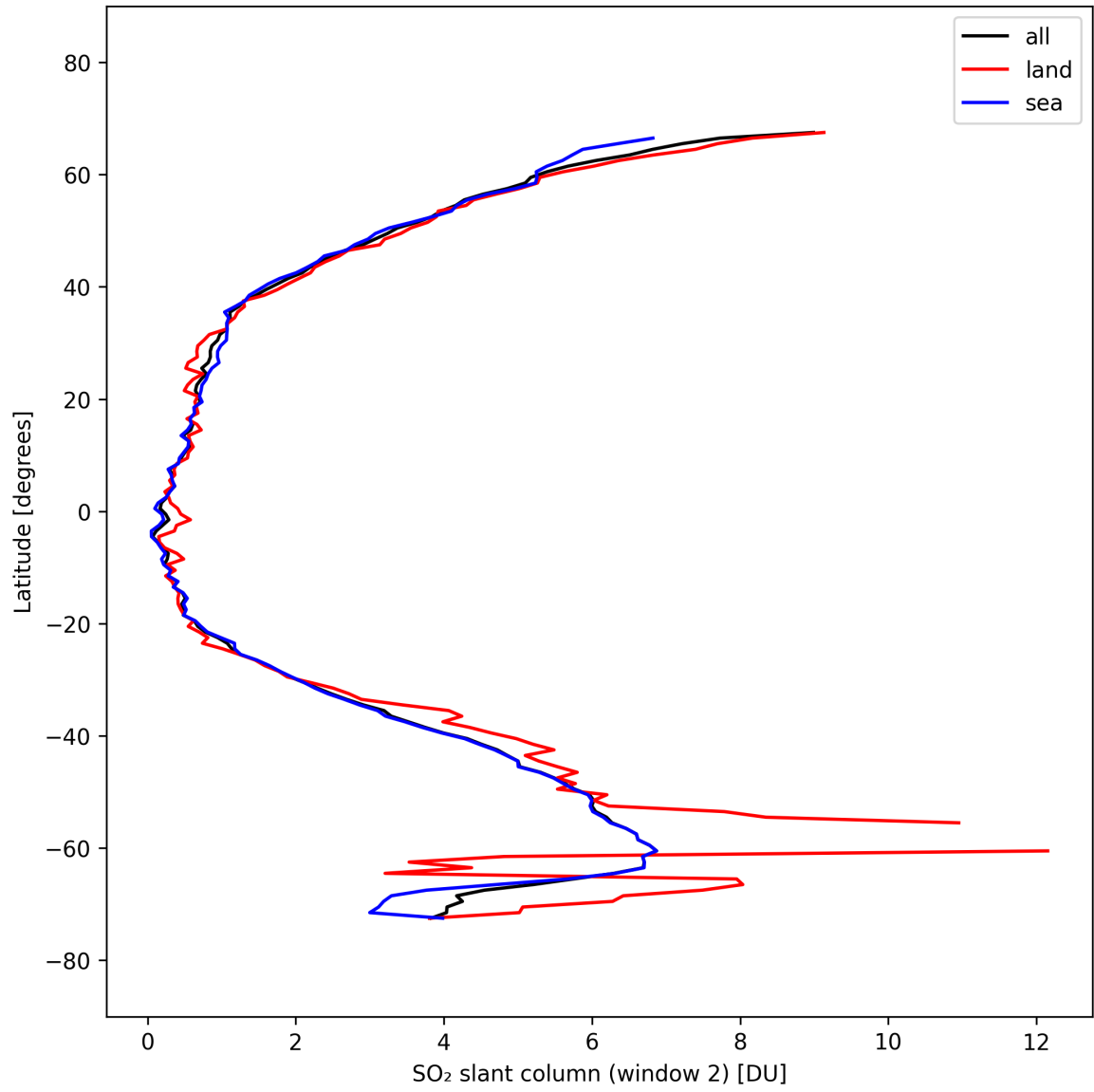


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-09-30 to 2025-10-01.

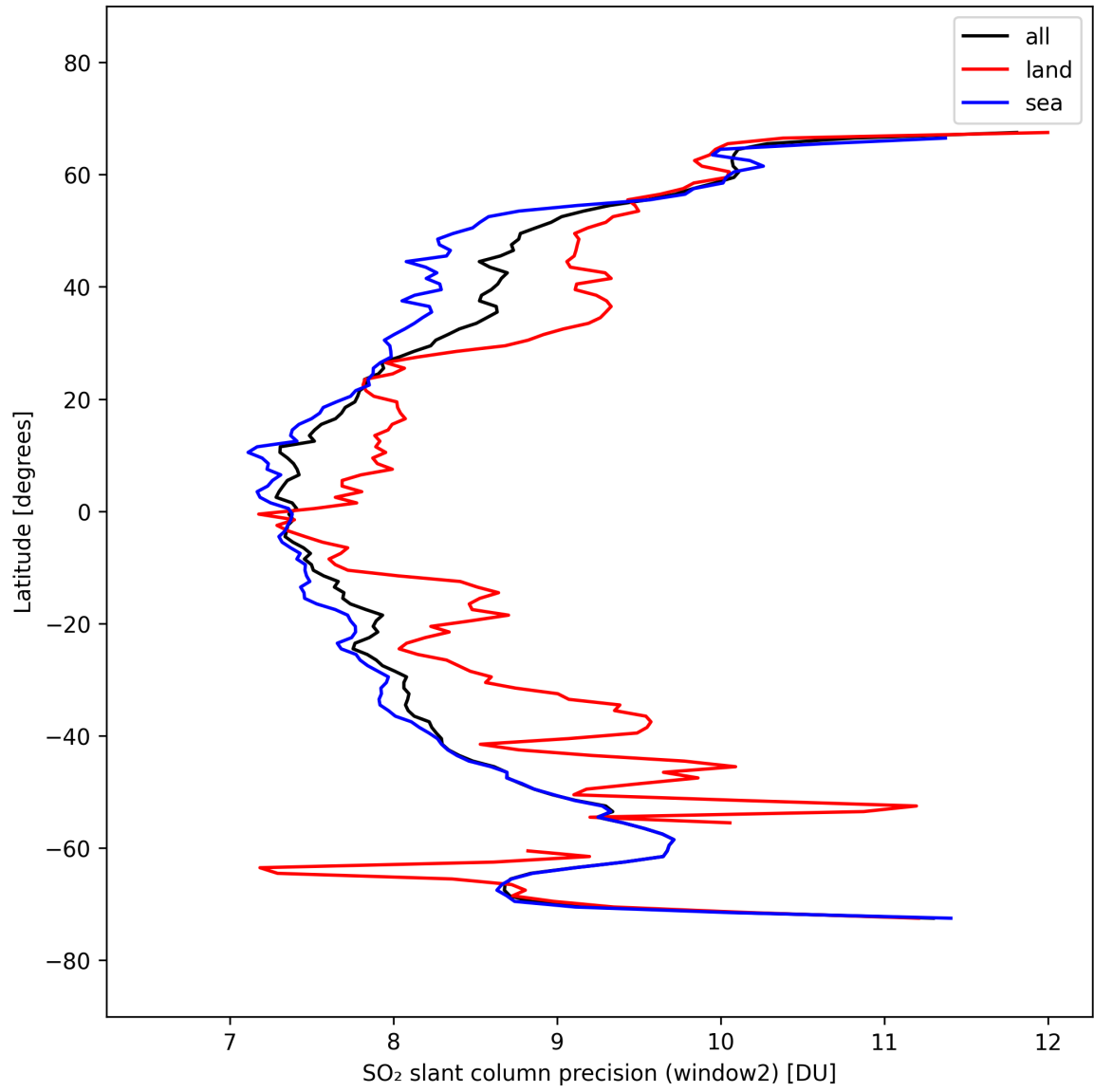


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-09-30 to 2025-10-01.

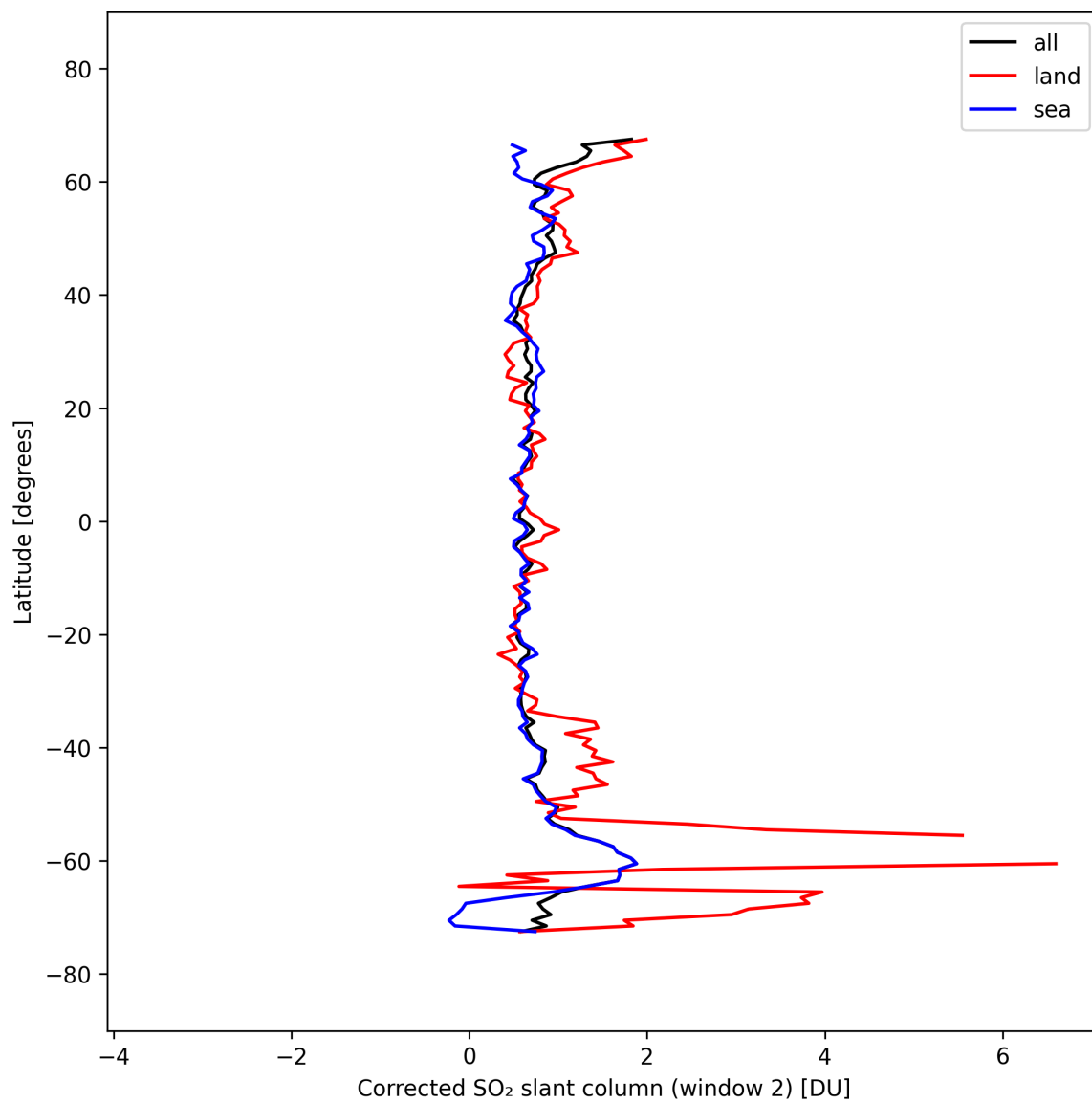


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-09-30 to 2025-10-01.

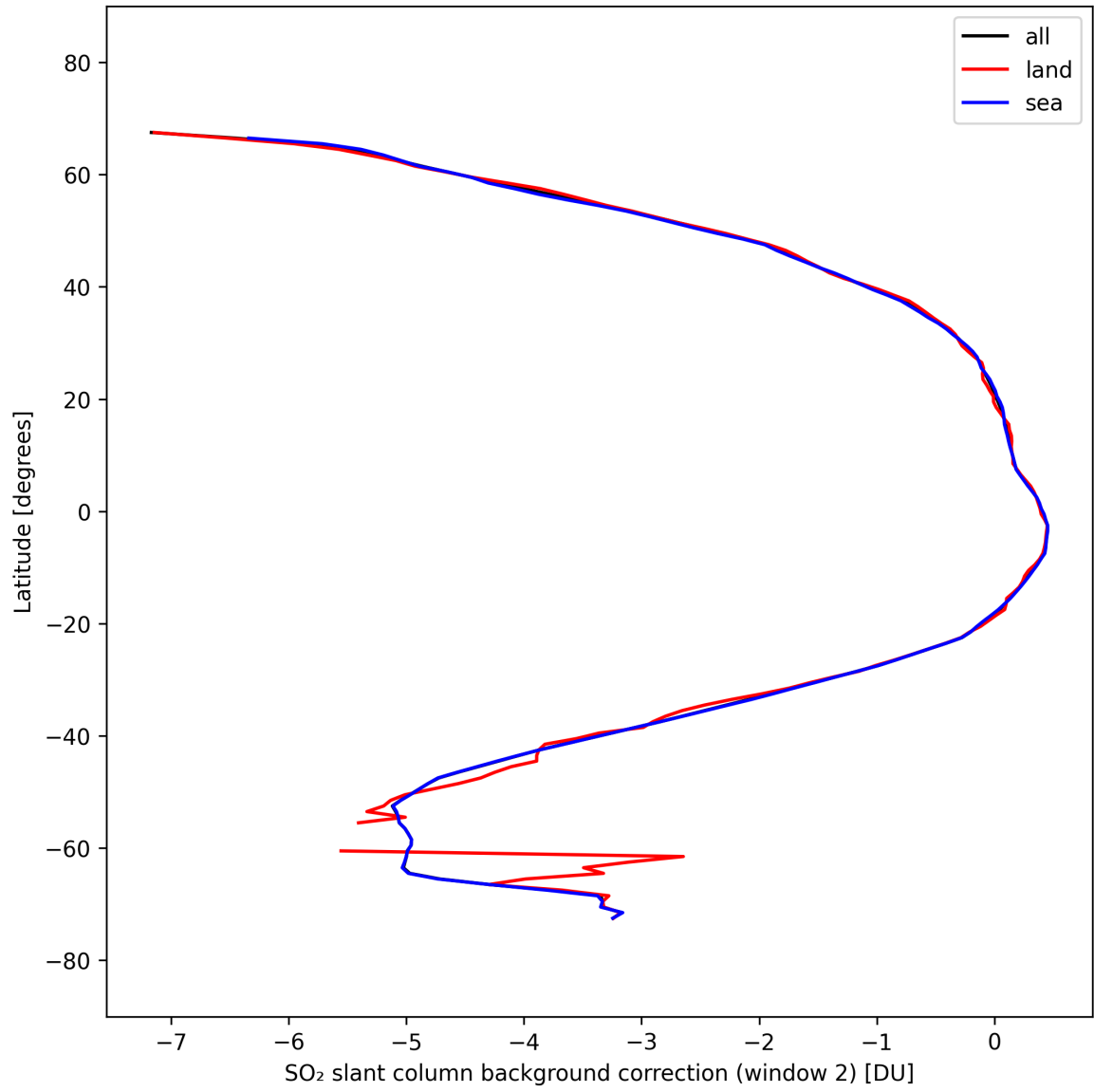


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-09-30 to 2025-10-01.

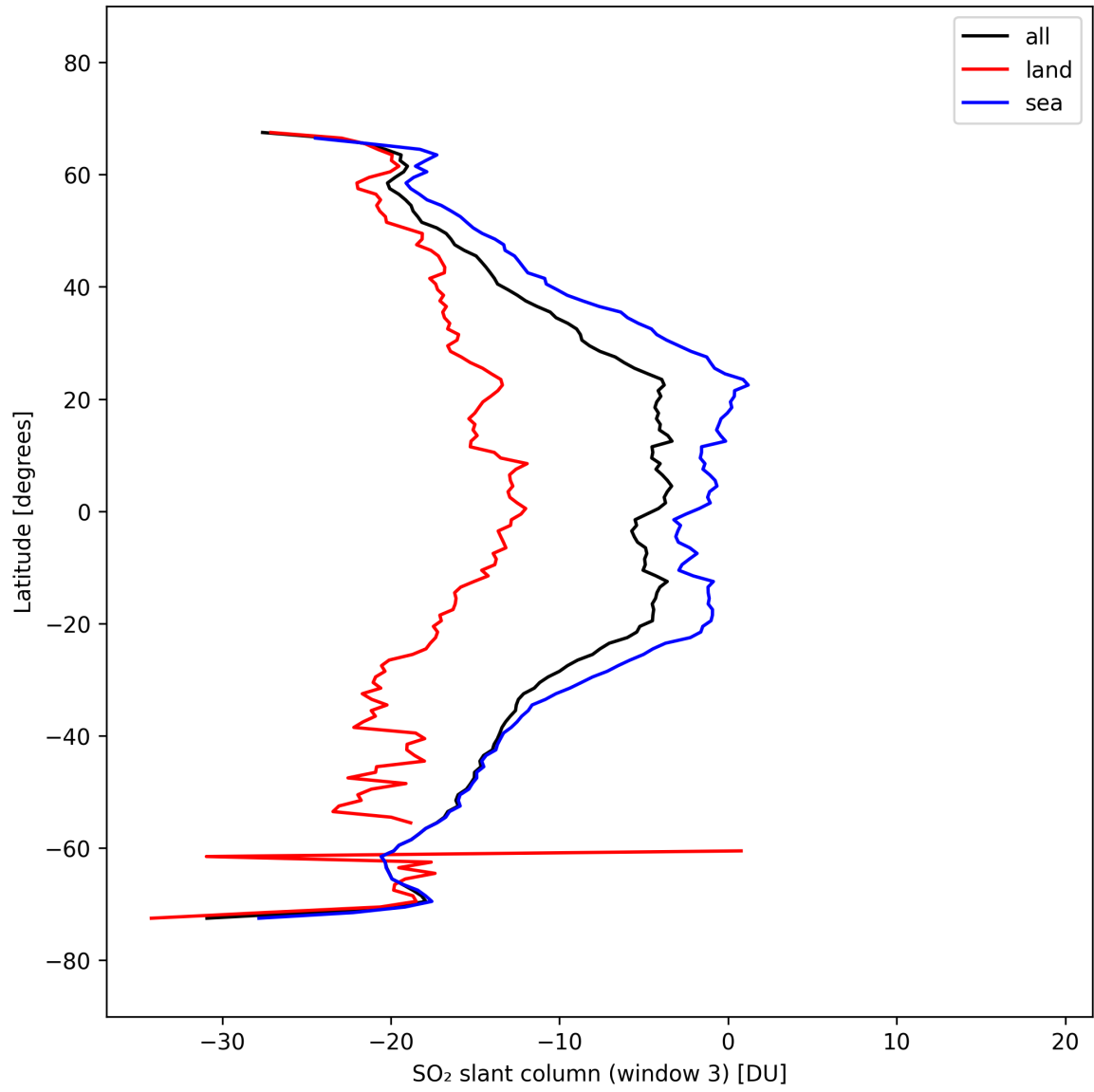


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-09-30 to 2025-10-01.

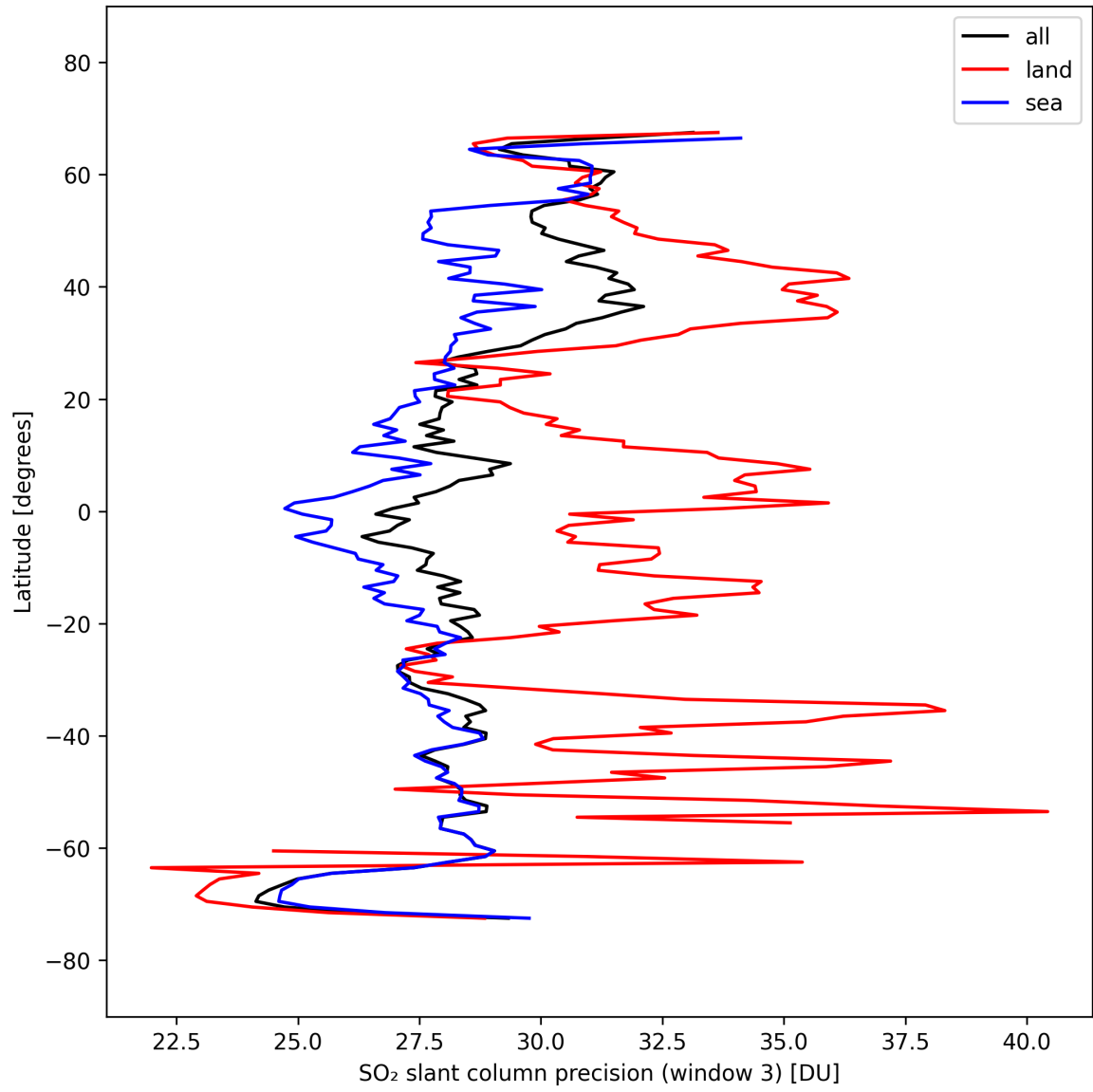


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-09-30 to 2025-10-01.

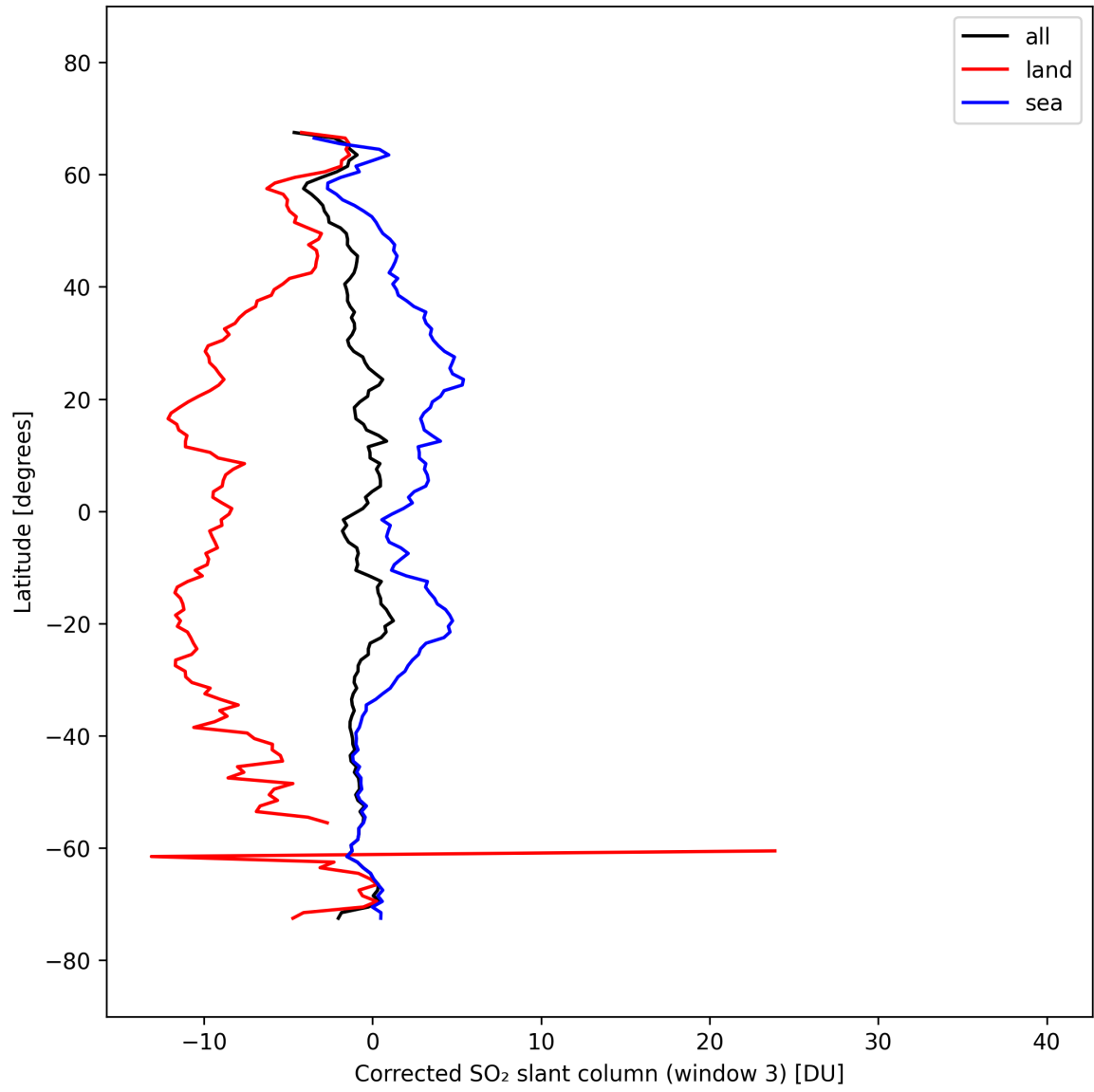


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-09-30 to 2025-10-01.

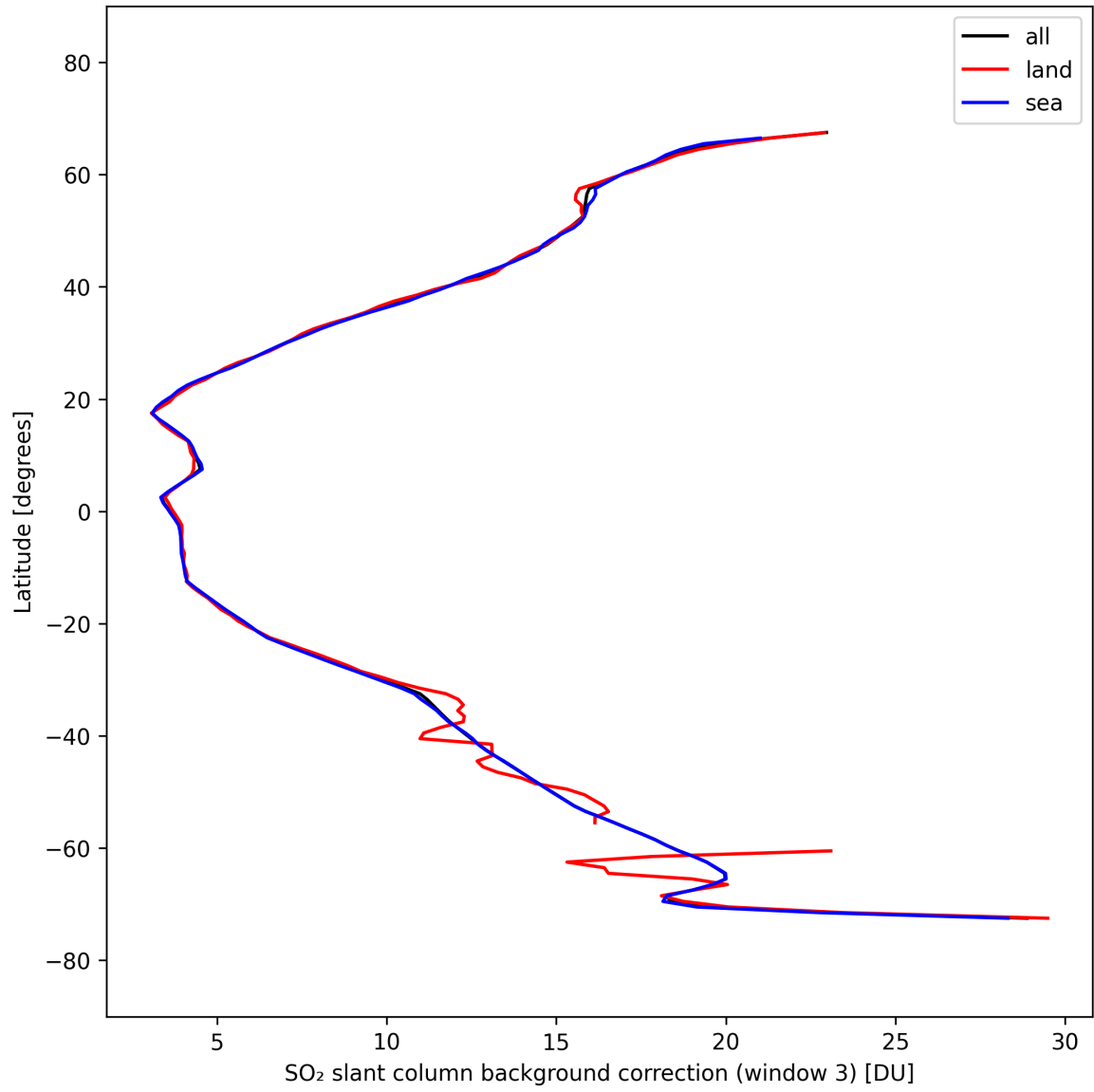


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-09-30 to 2025-10-01.

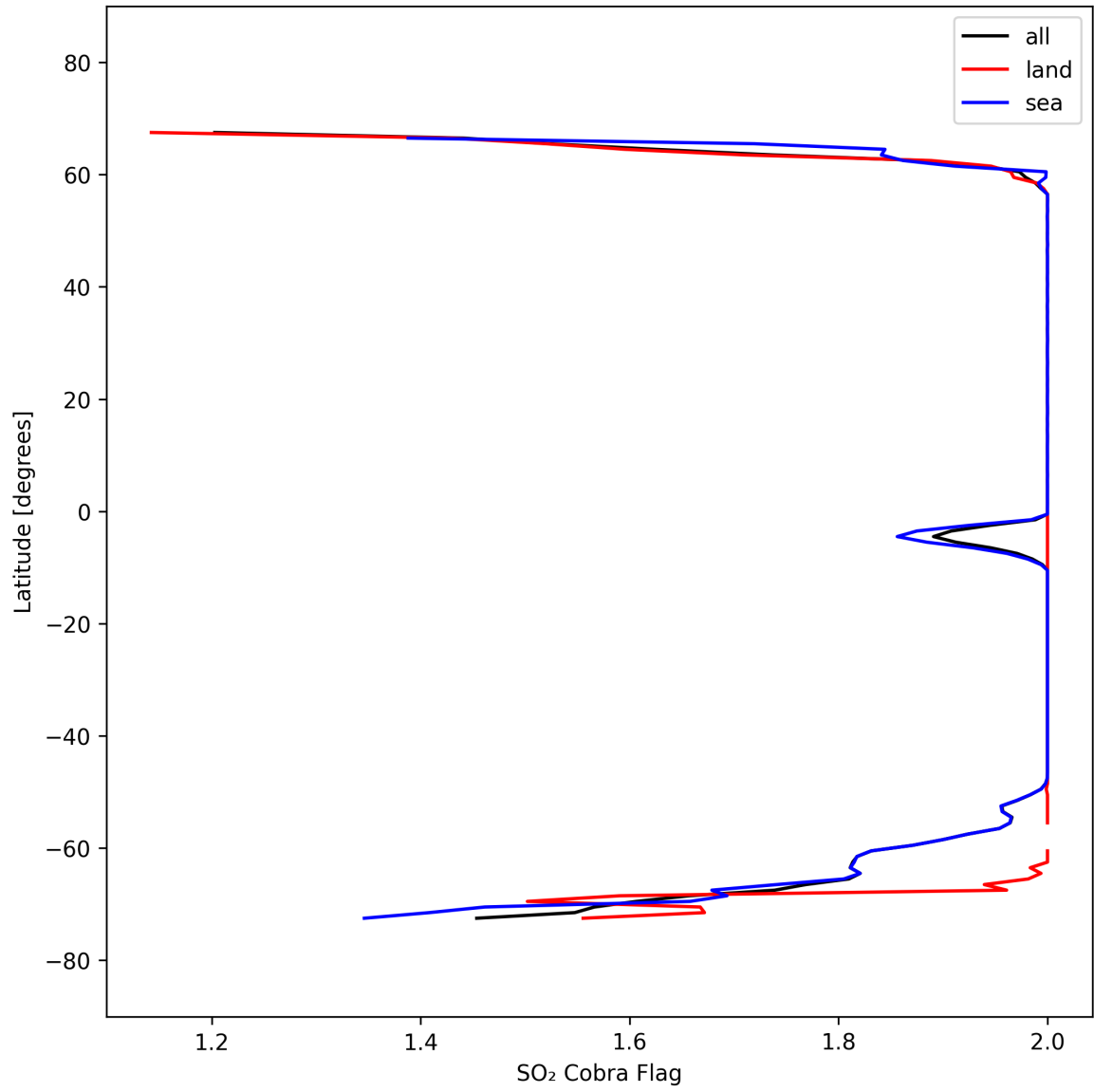


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-09-30 to 2025-10-01.

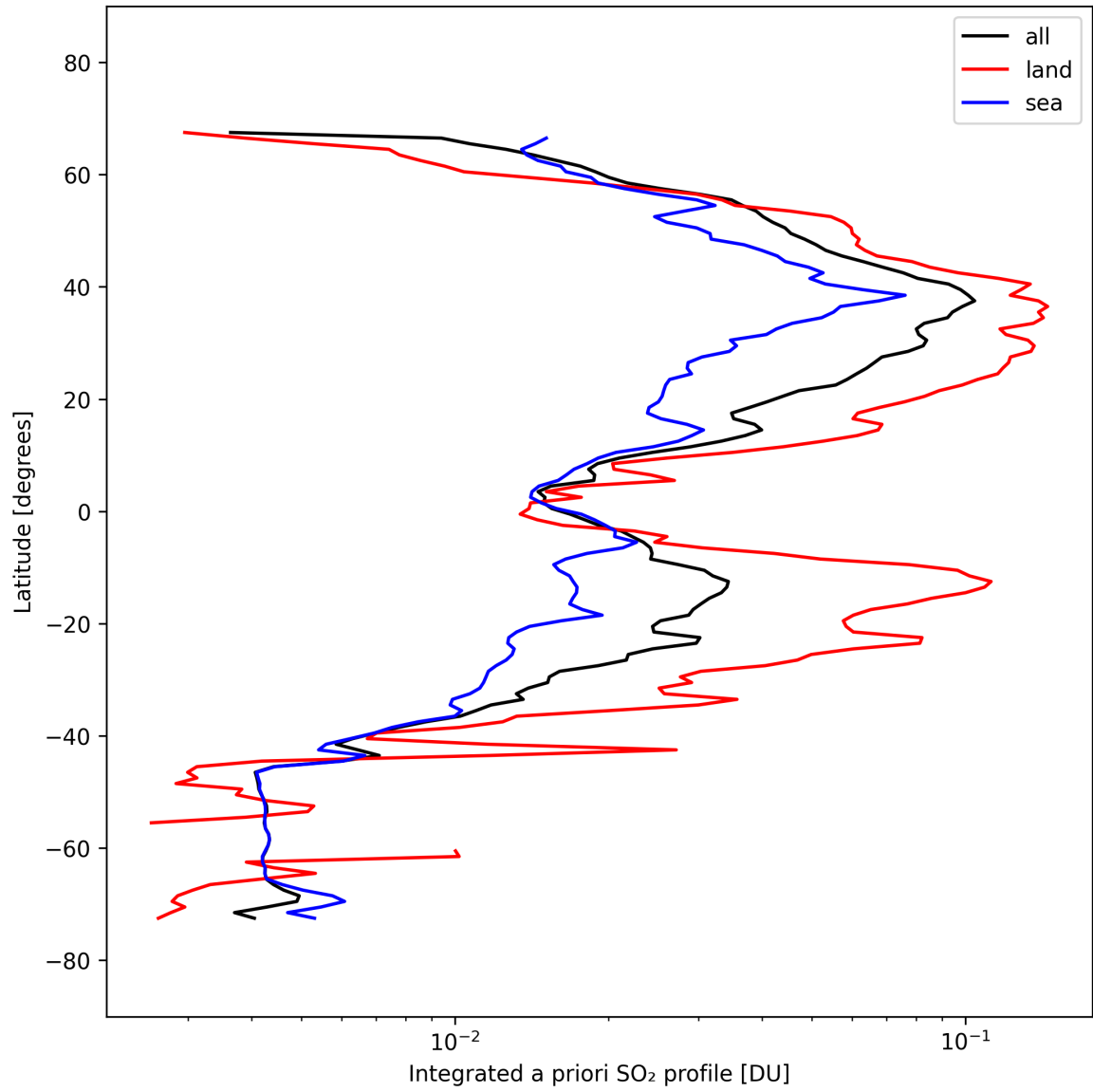


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-09-30 to 2025-10-01.

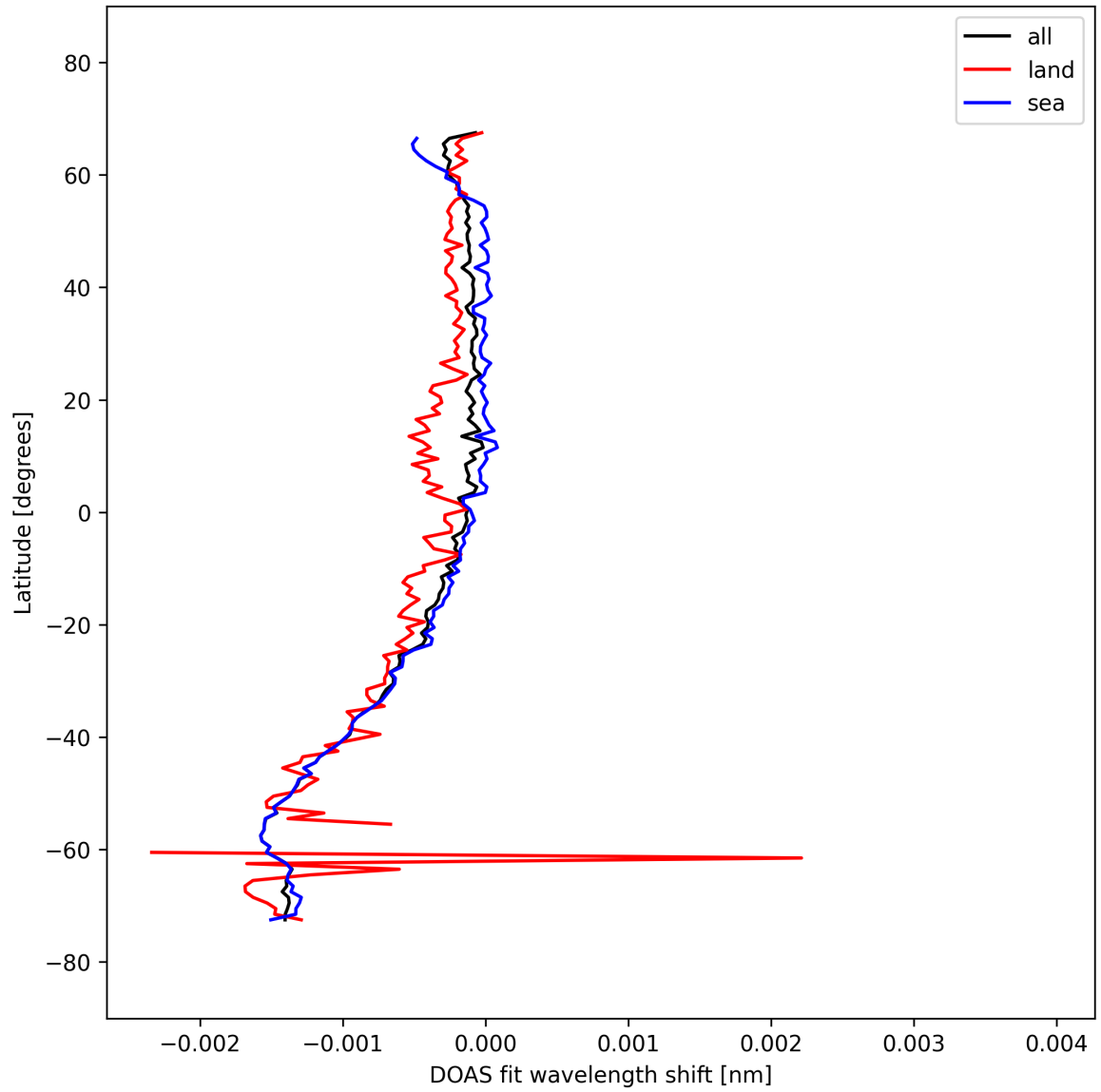


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-09-30 to 2025-10-01.

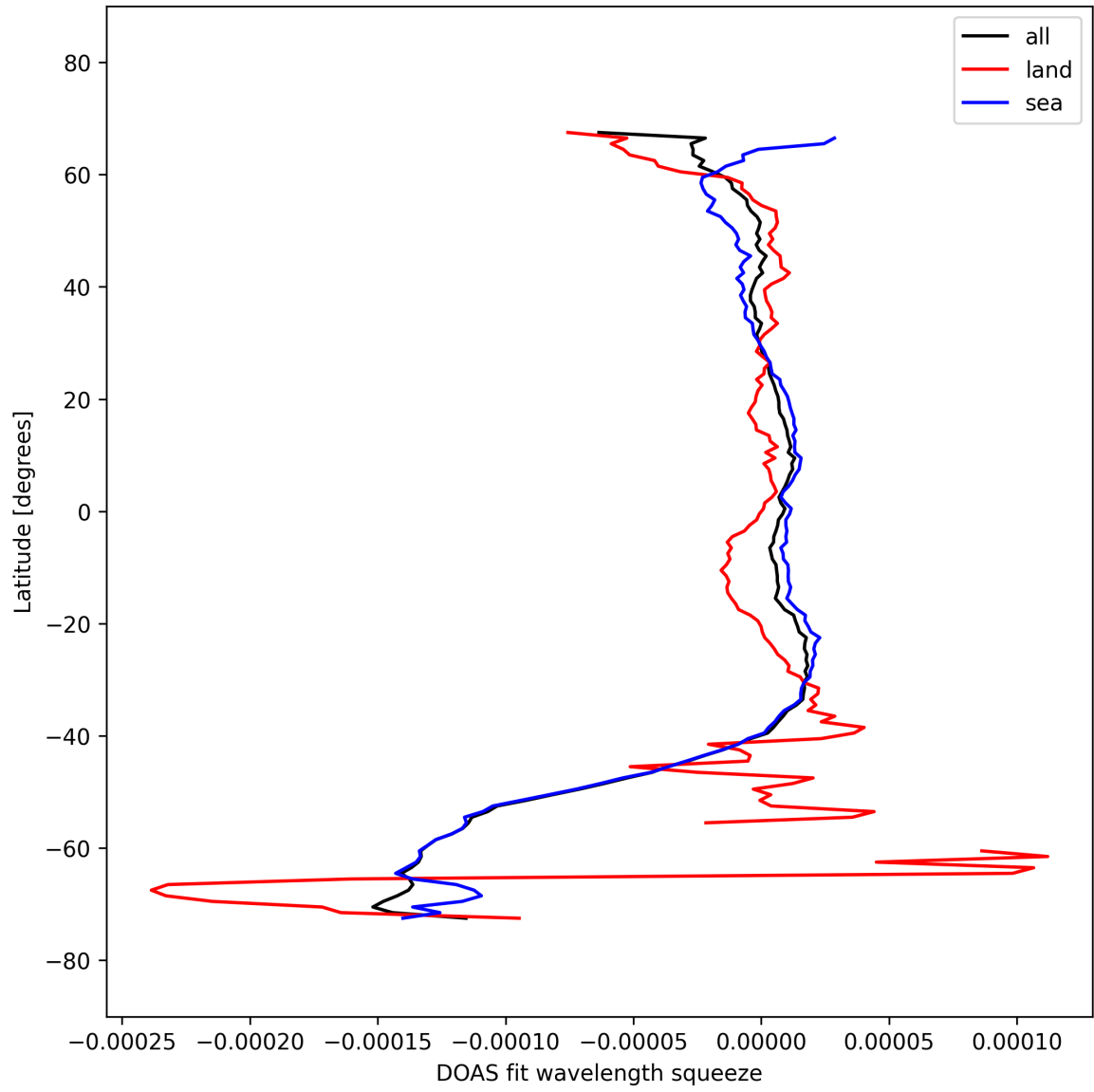


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-09-30 to 2025-10-01.

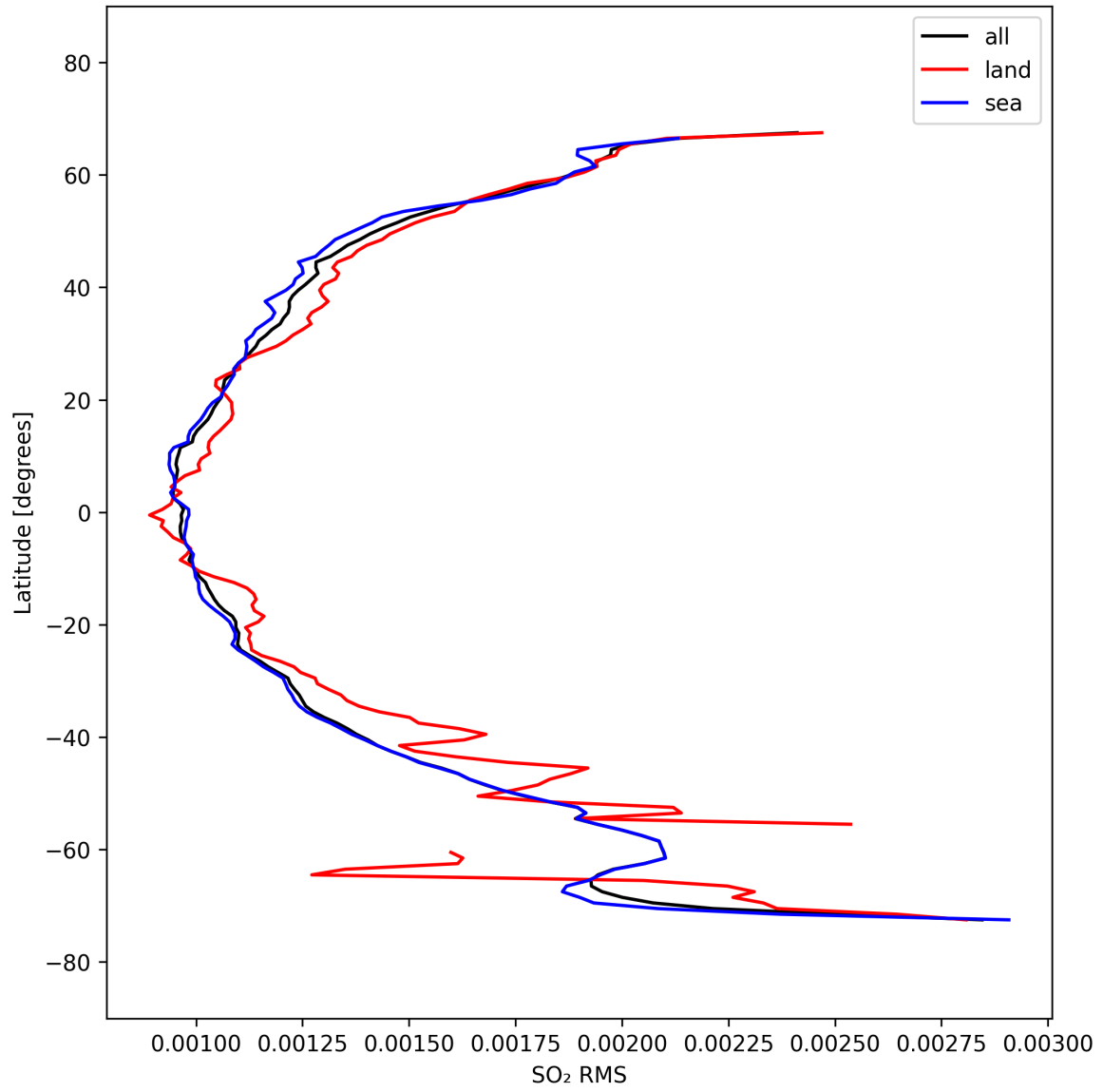


Figure 52: Zonal average of “SO₂ RMS” for 2025-09-30 to 2025-10-01.

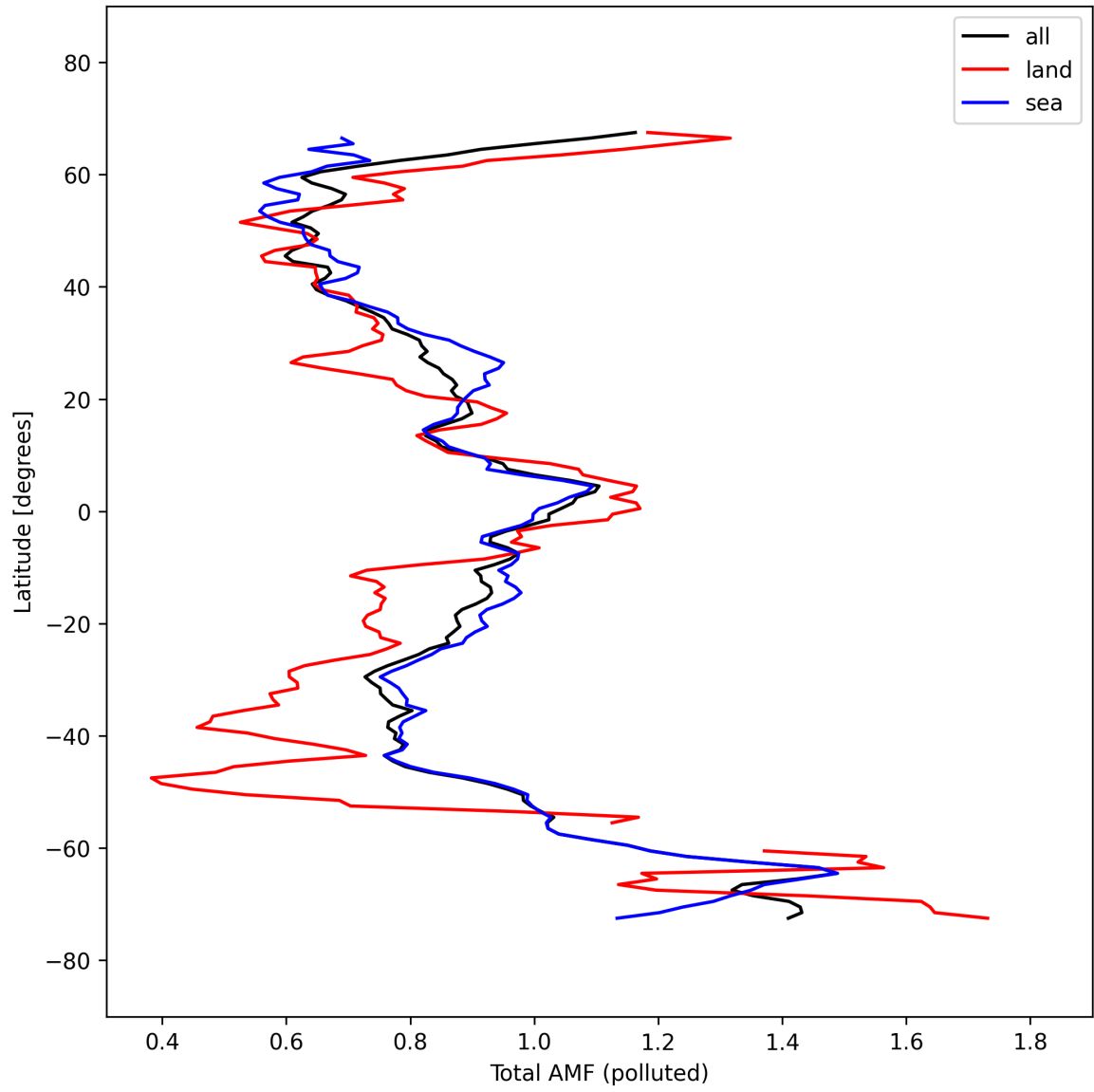


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-09-30 to 2025-10-01.

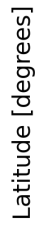


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-09-30 to 2025-10-01.

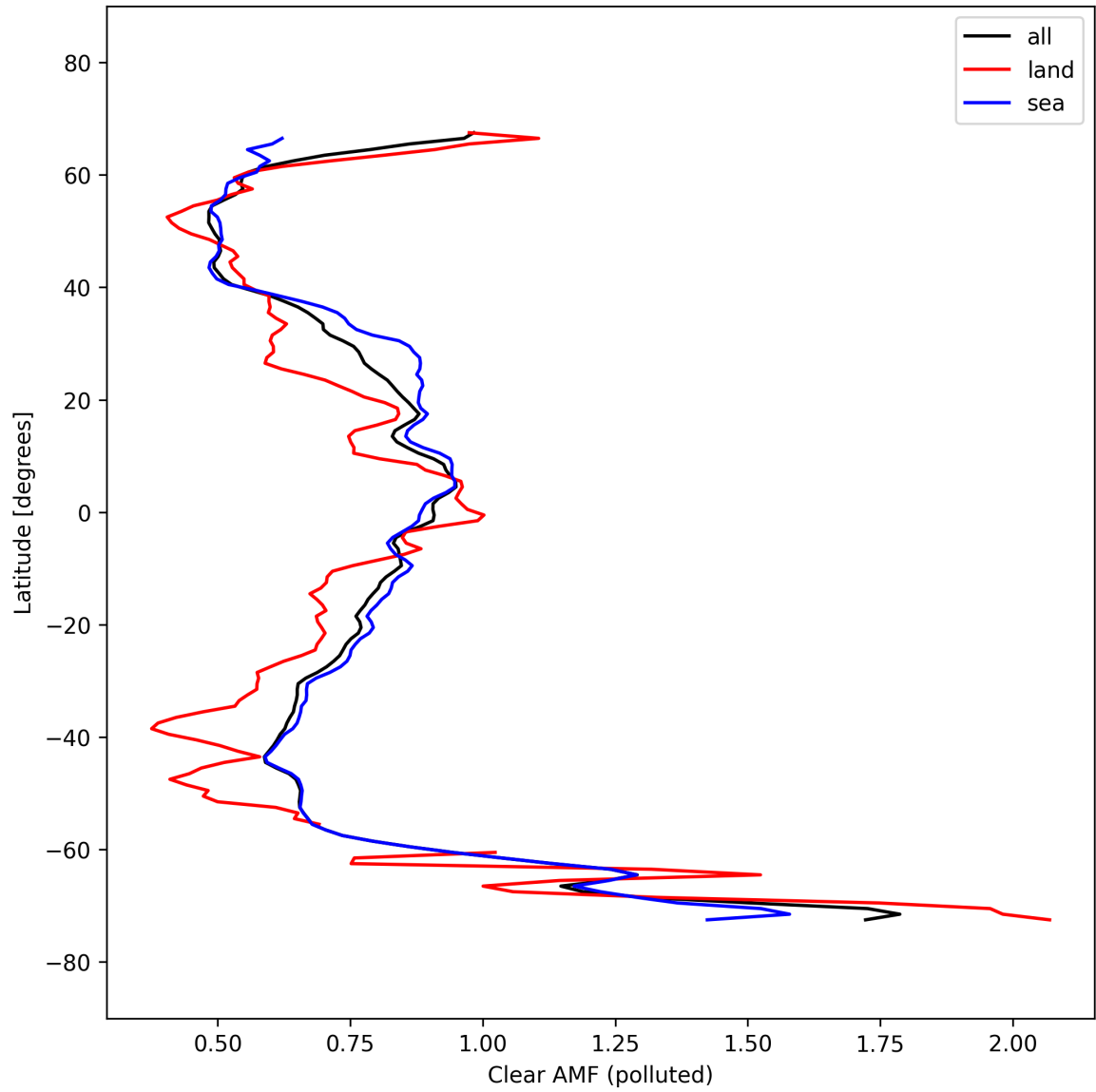


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-09-30 to 2025-10-01.

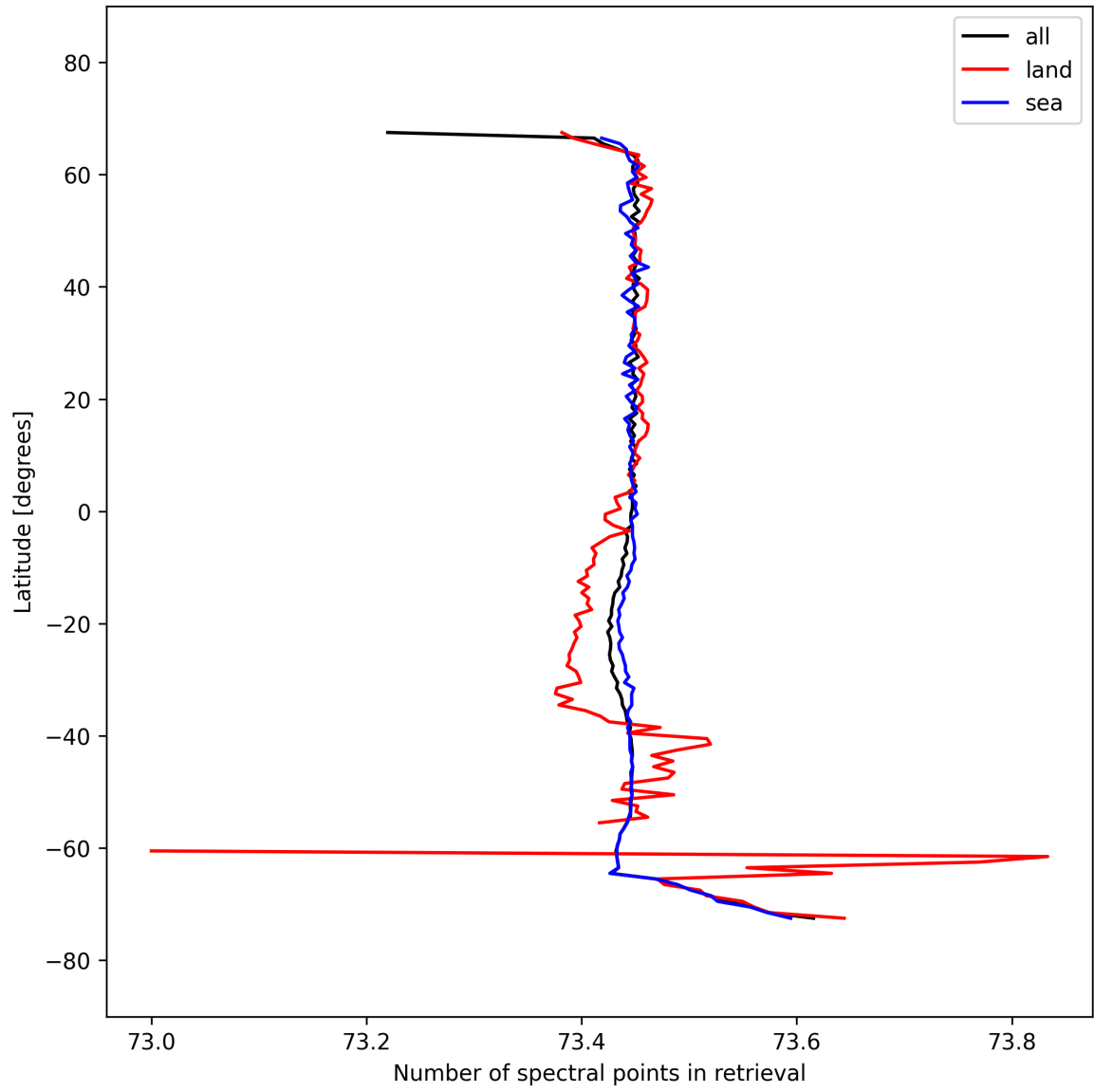


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-09-30 to 2025-10-01.

8 Histograms

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

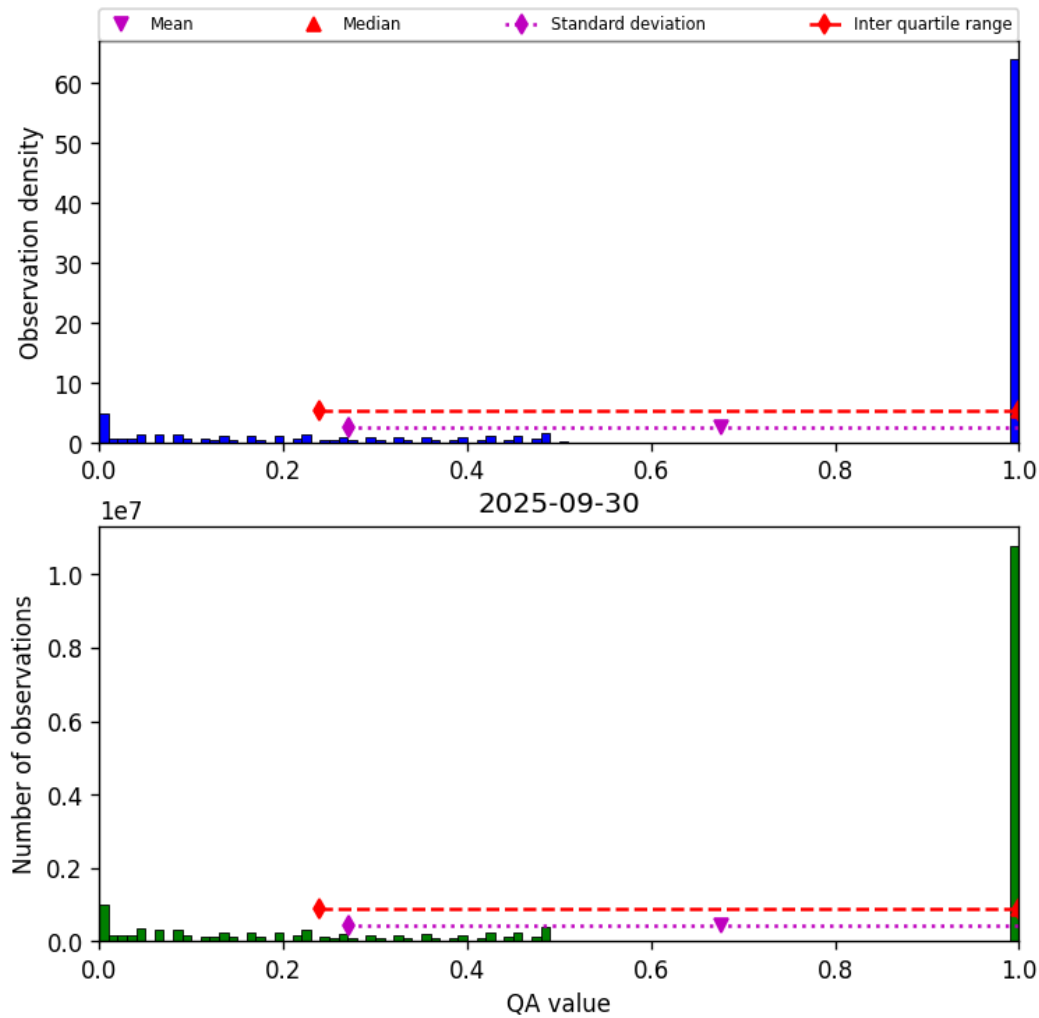


Figure 57: Histogram of “QA value” for 2025-09-30 to 2025-10-01

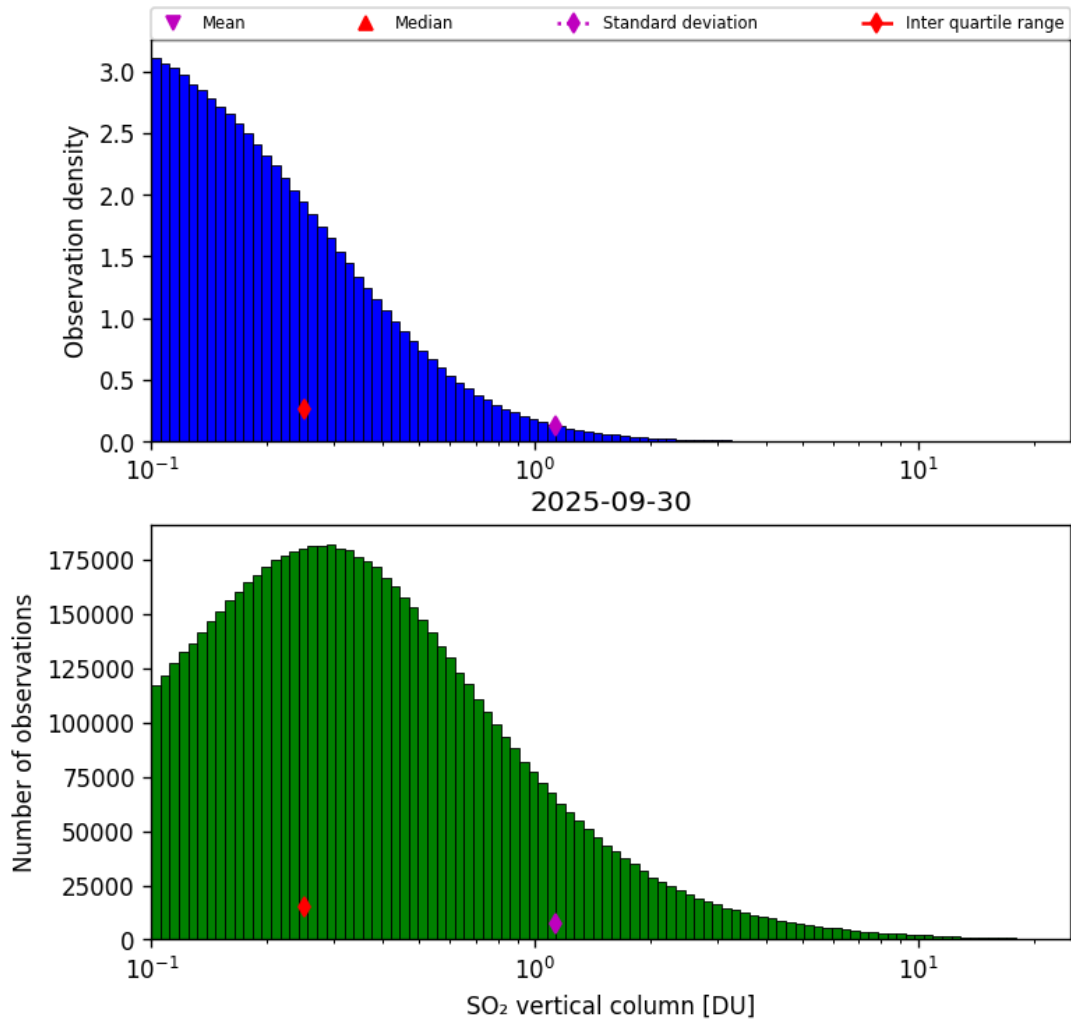


Figure 58: Histogram of “SO₂ vertical column” for 2025-09-30 to 2025-10-01

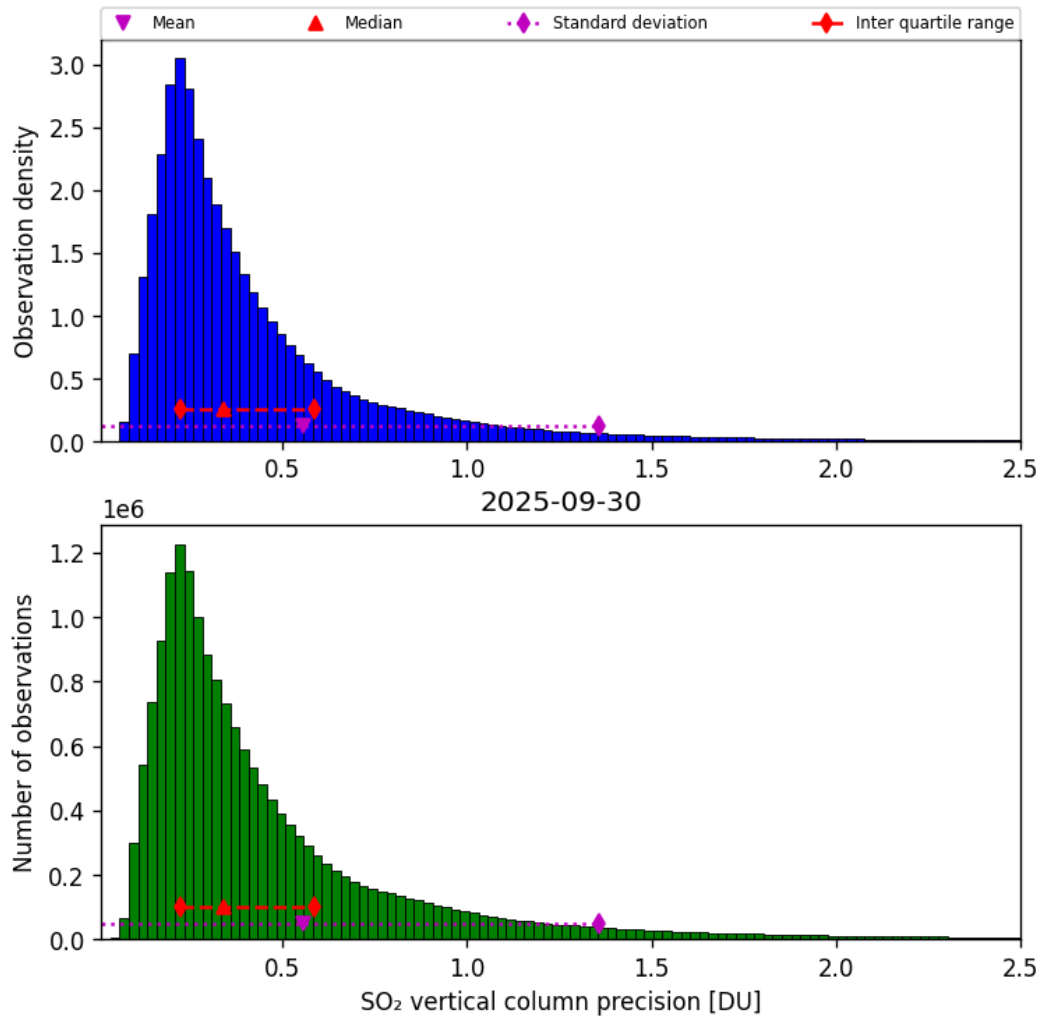


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-09-30 to 2025-10-01

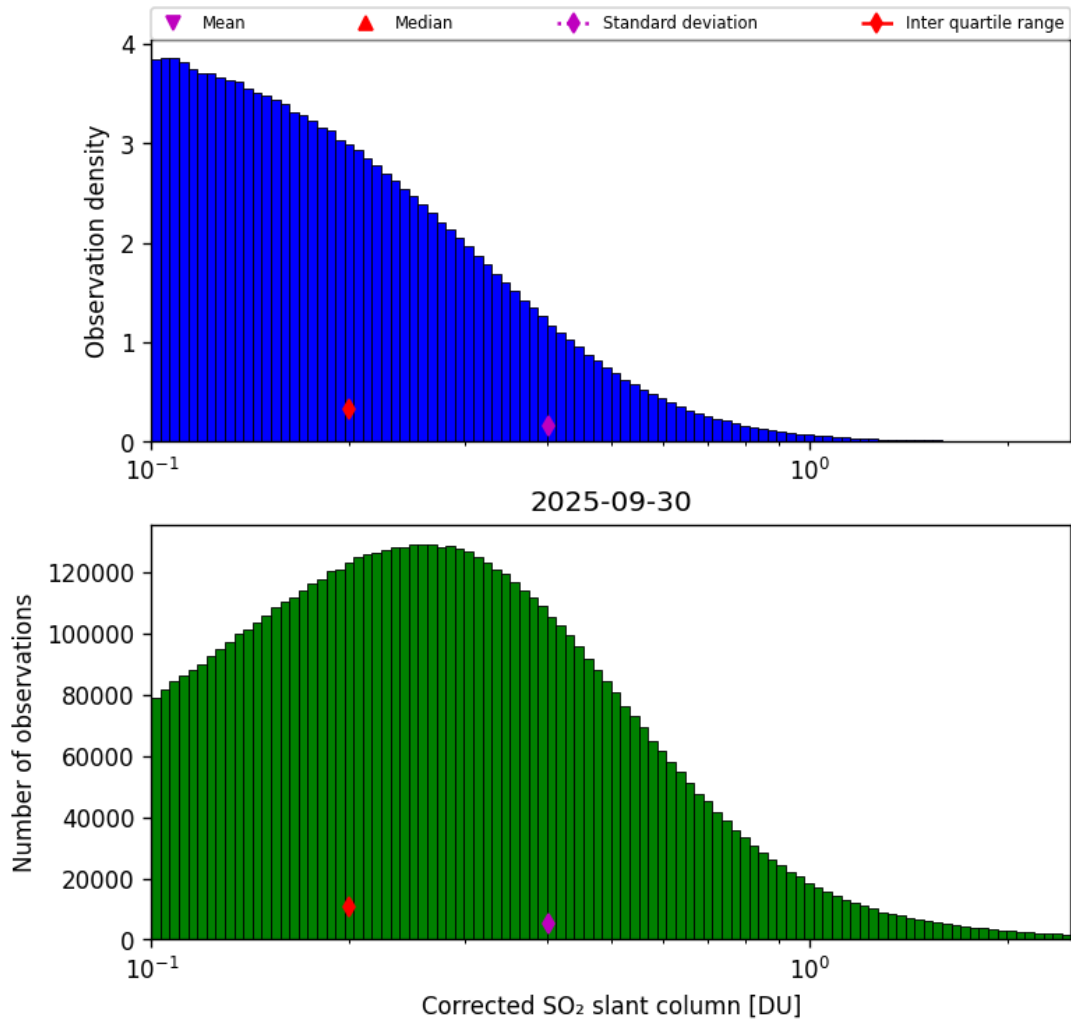


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-09-30 to 2025-10-01

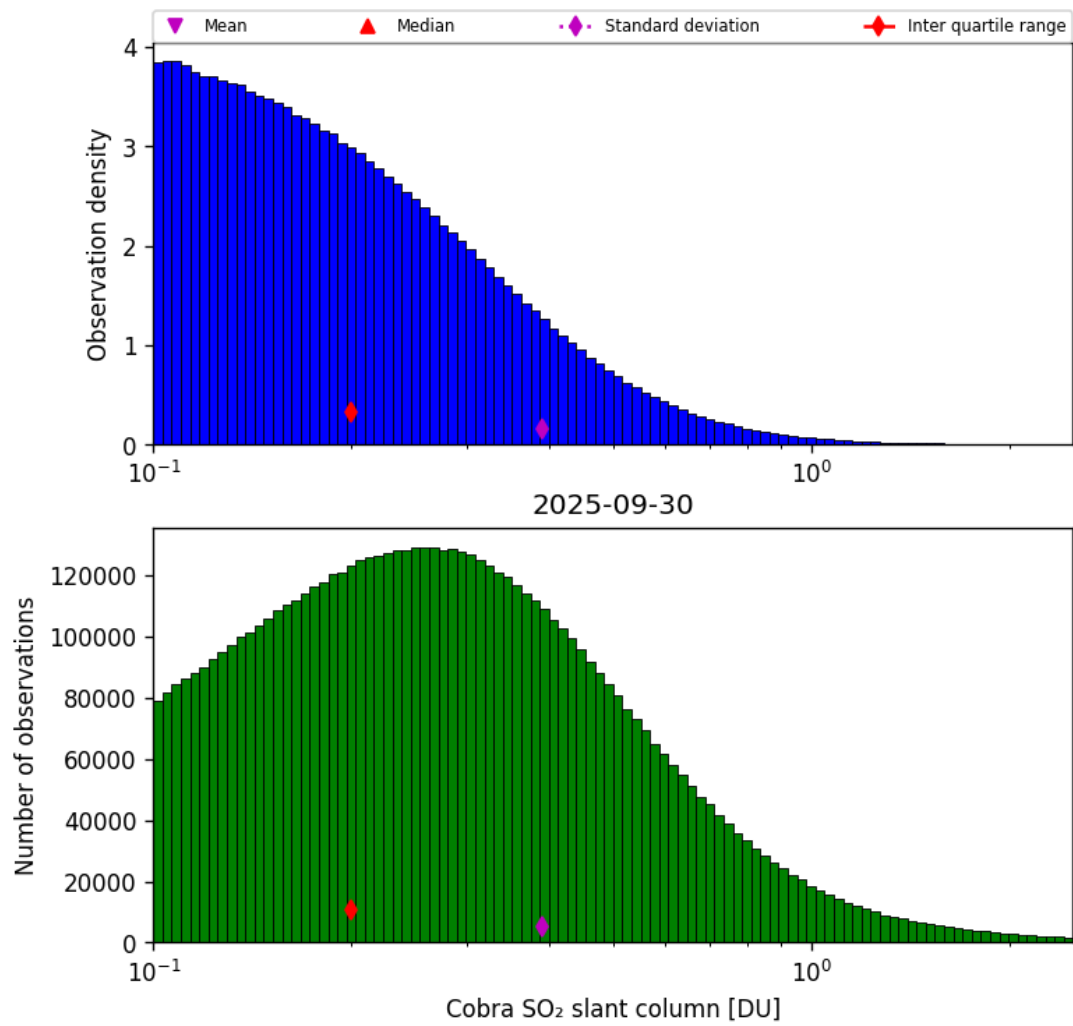


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-09-30 to 2025-10-01

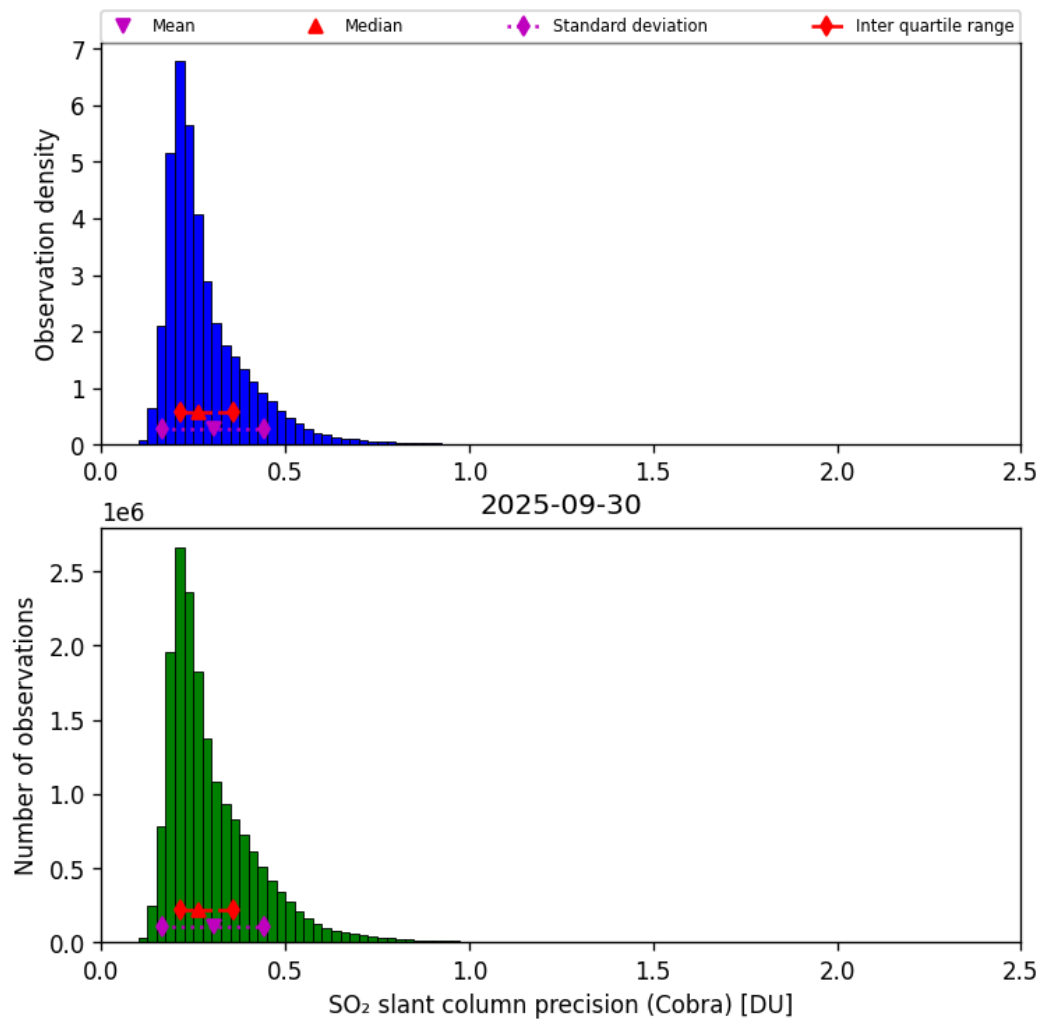


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-09-30 to 2025-10-01

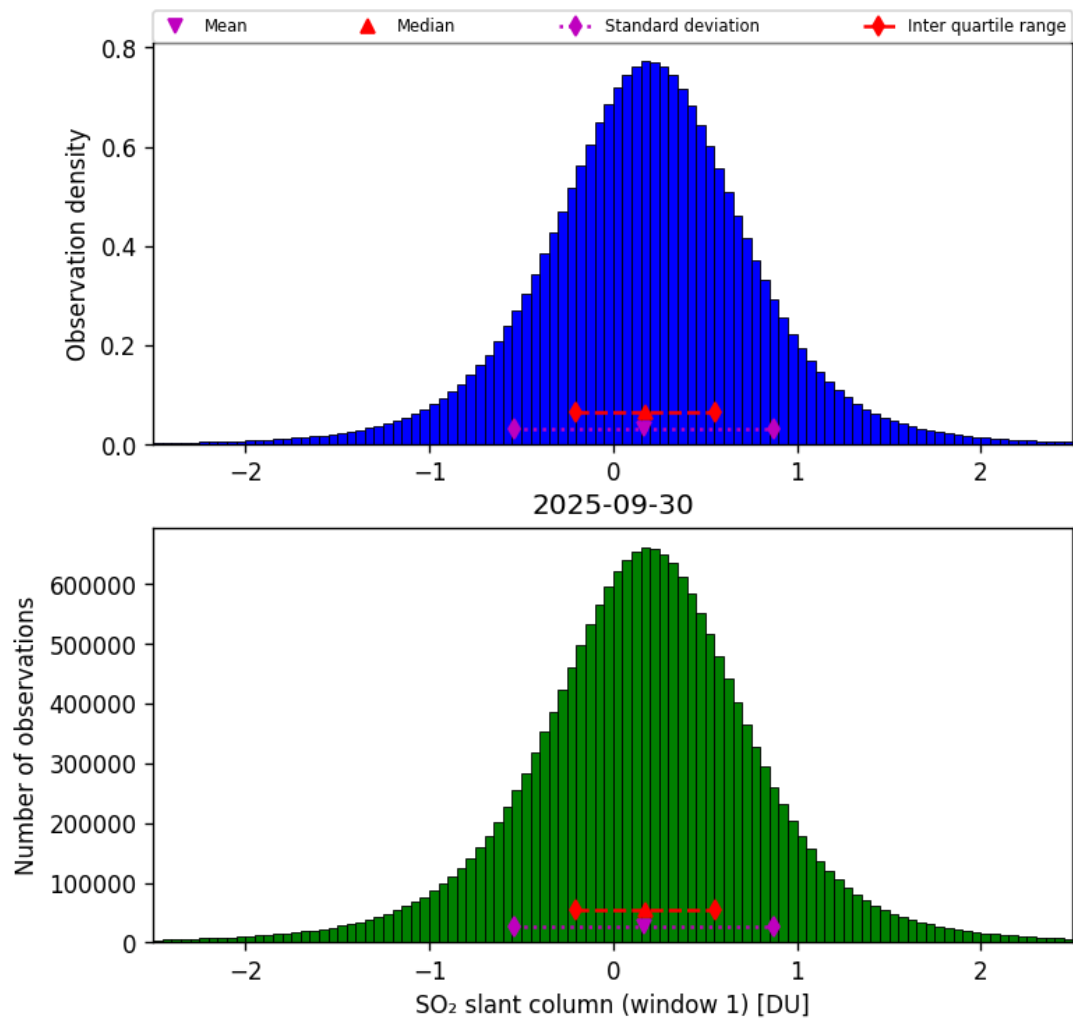


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-09-30 to 2025-10-01

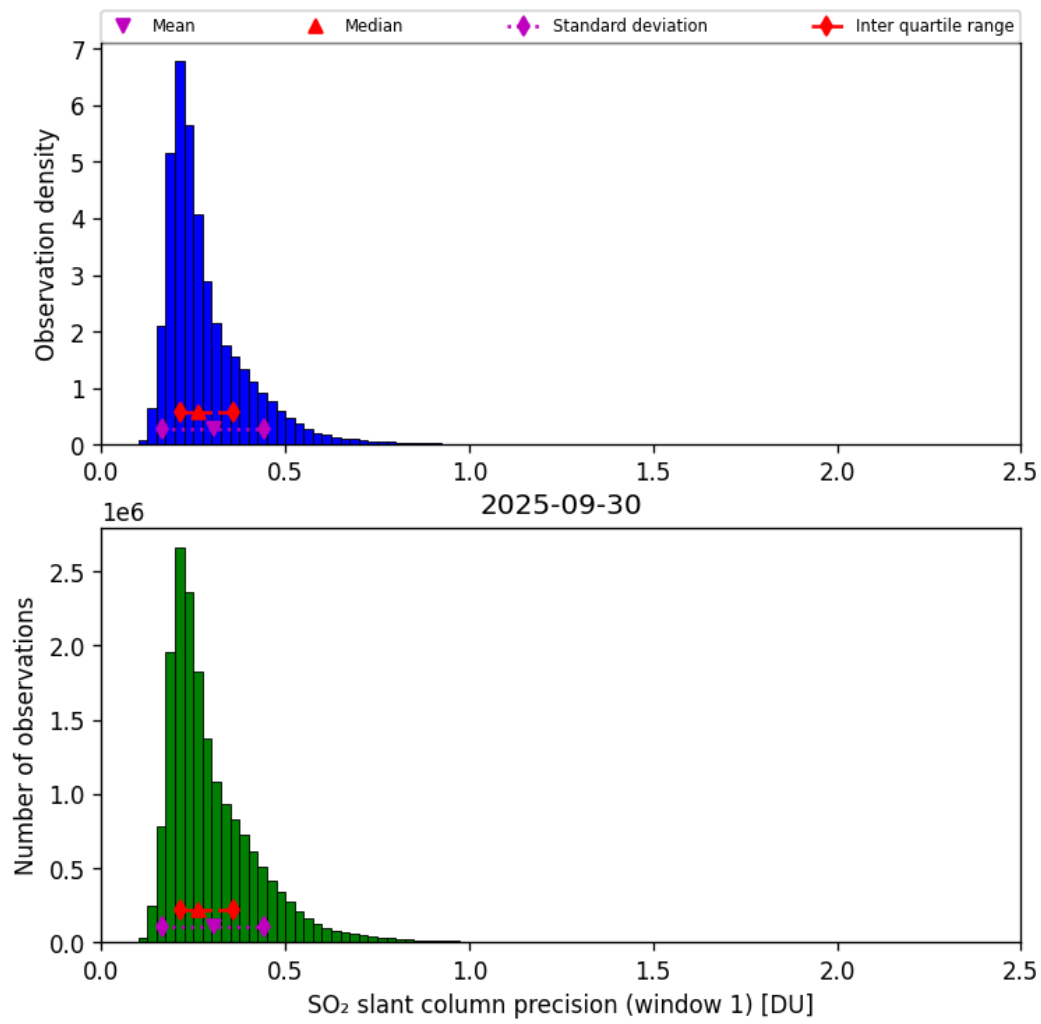


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-09-30 to 2025-10-01

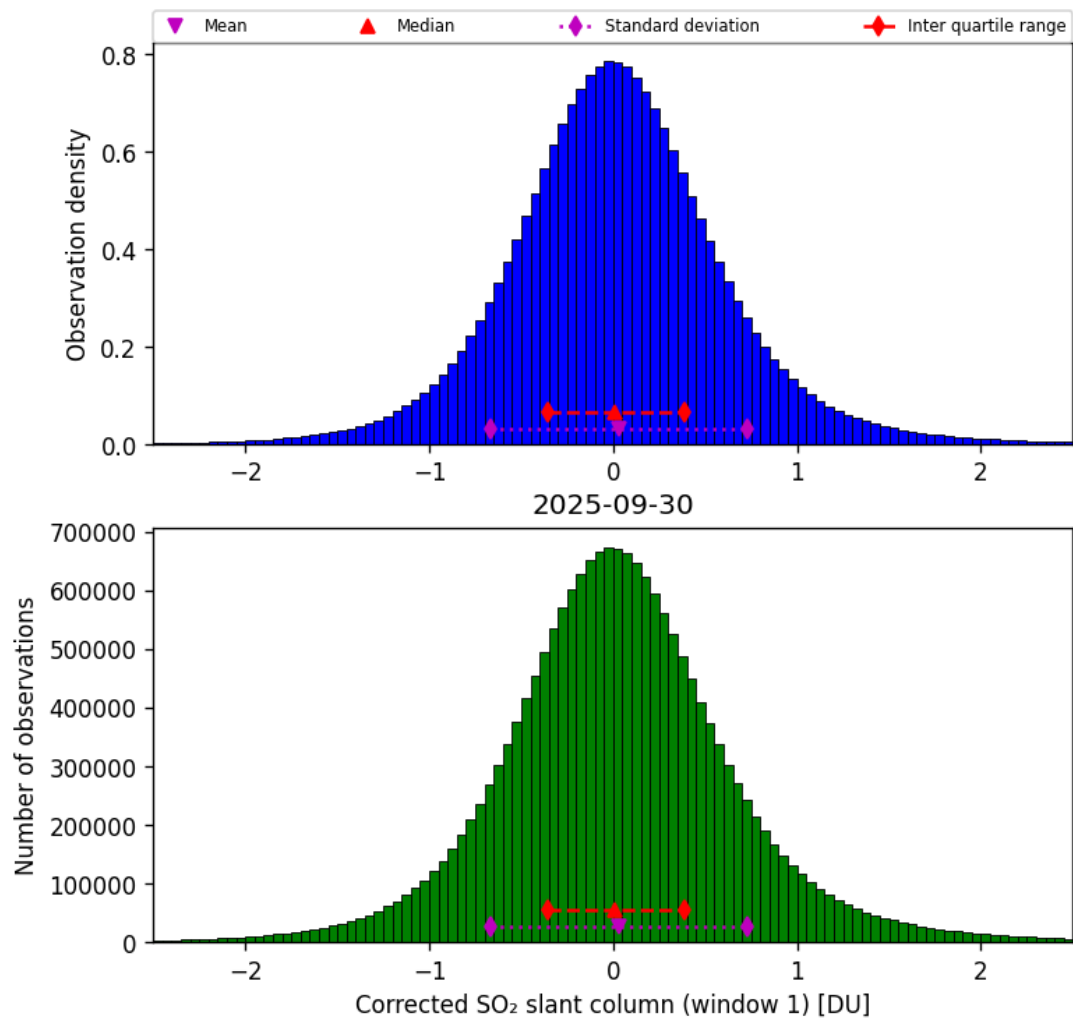


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-09-30 to 2025-10-01

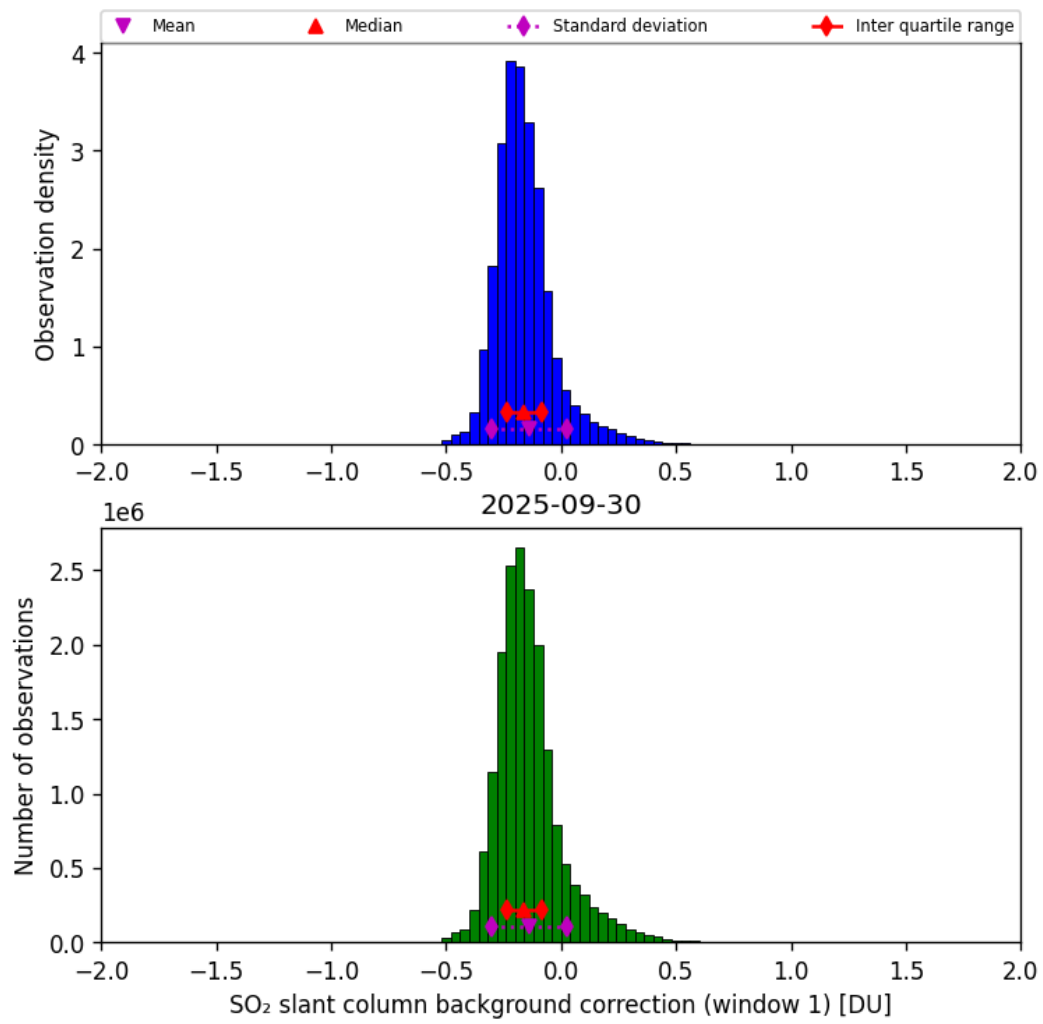


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-09-30 to 2025-10-01

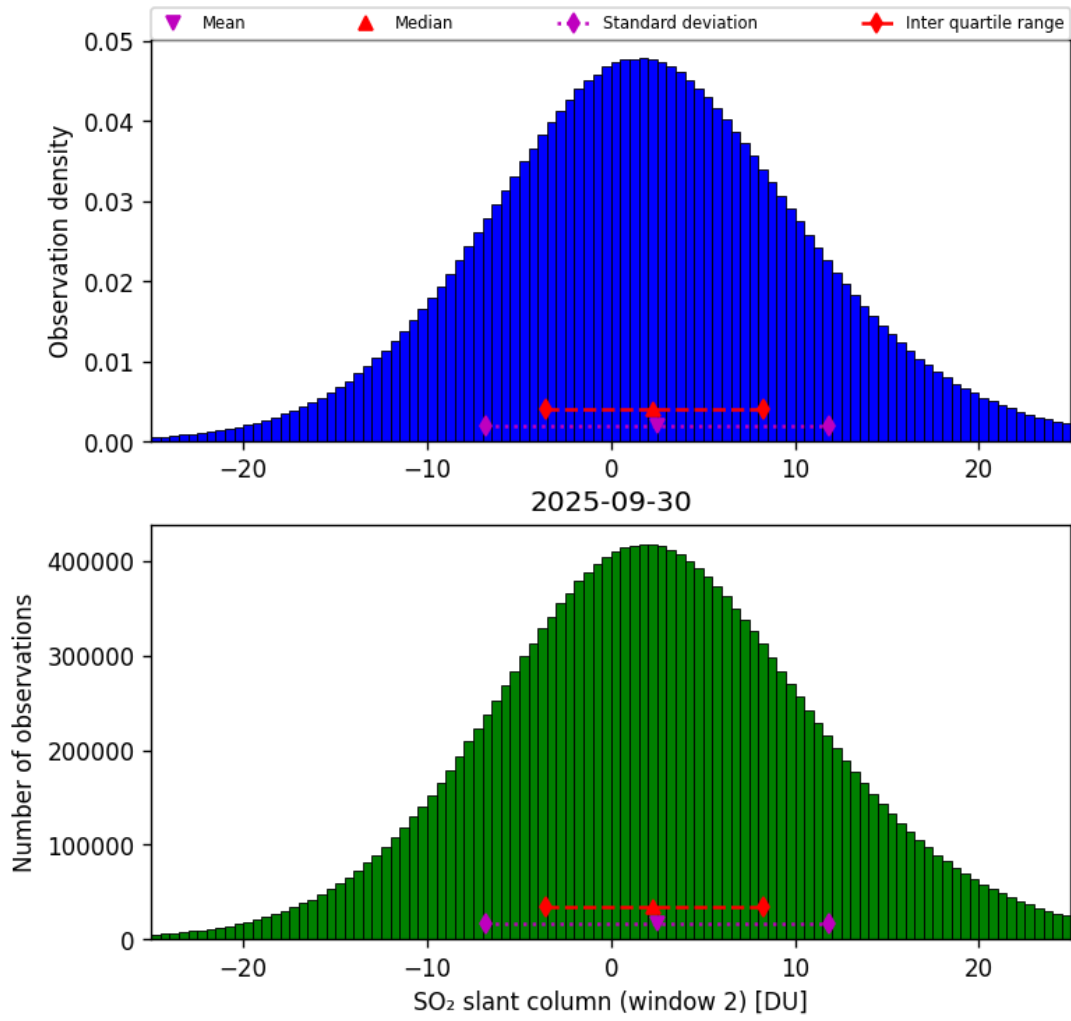


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-09-30 to 2025-10-01

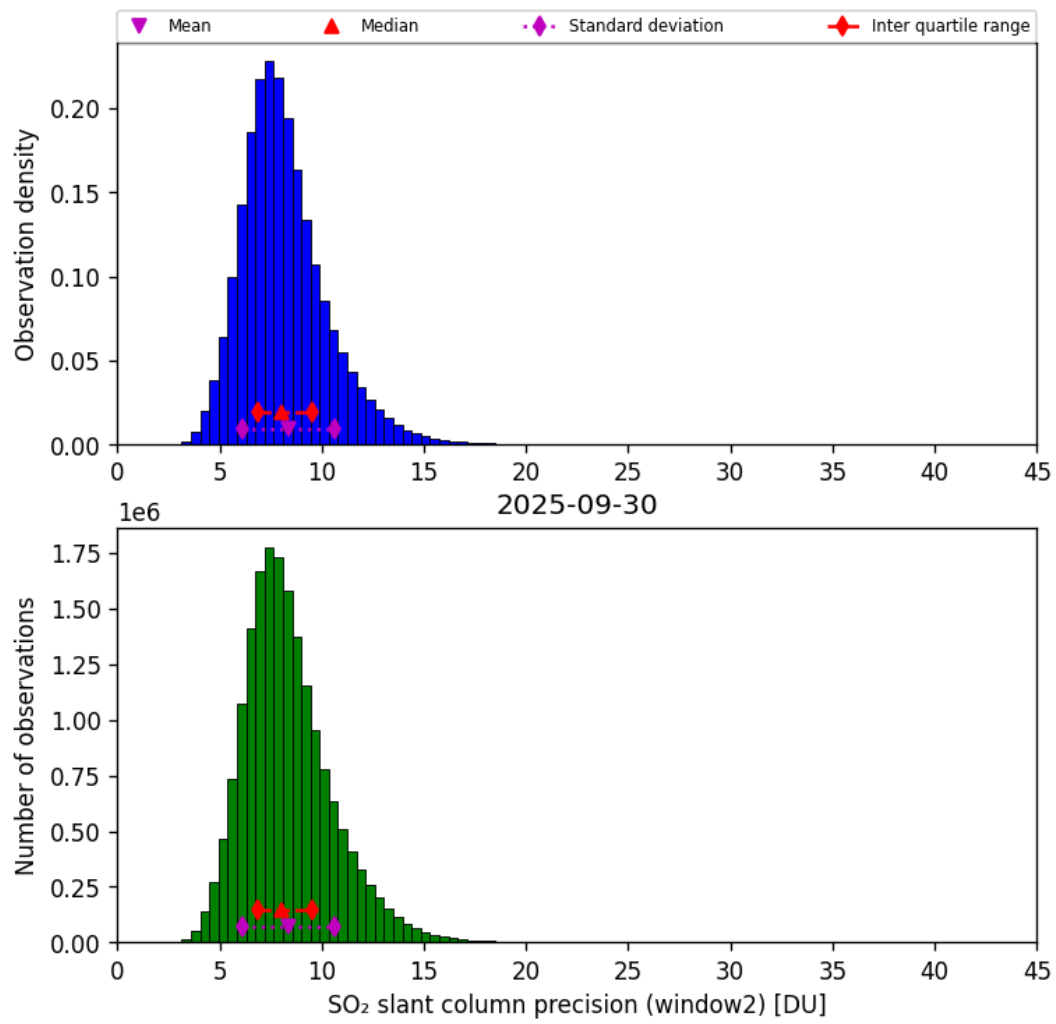


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-09-30 to 2025-10-01

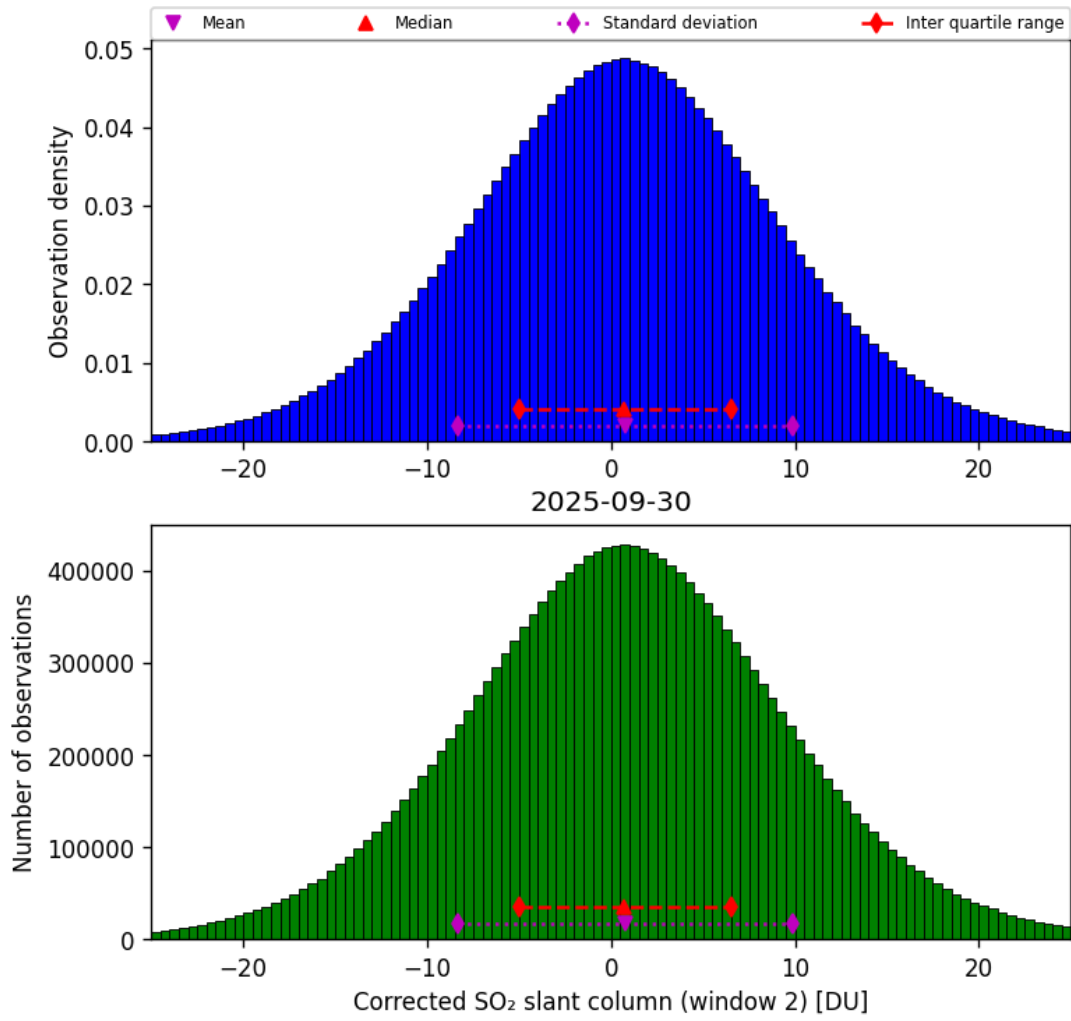


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-09-30 to 2025-10-01

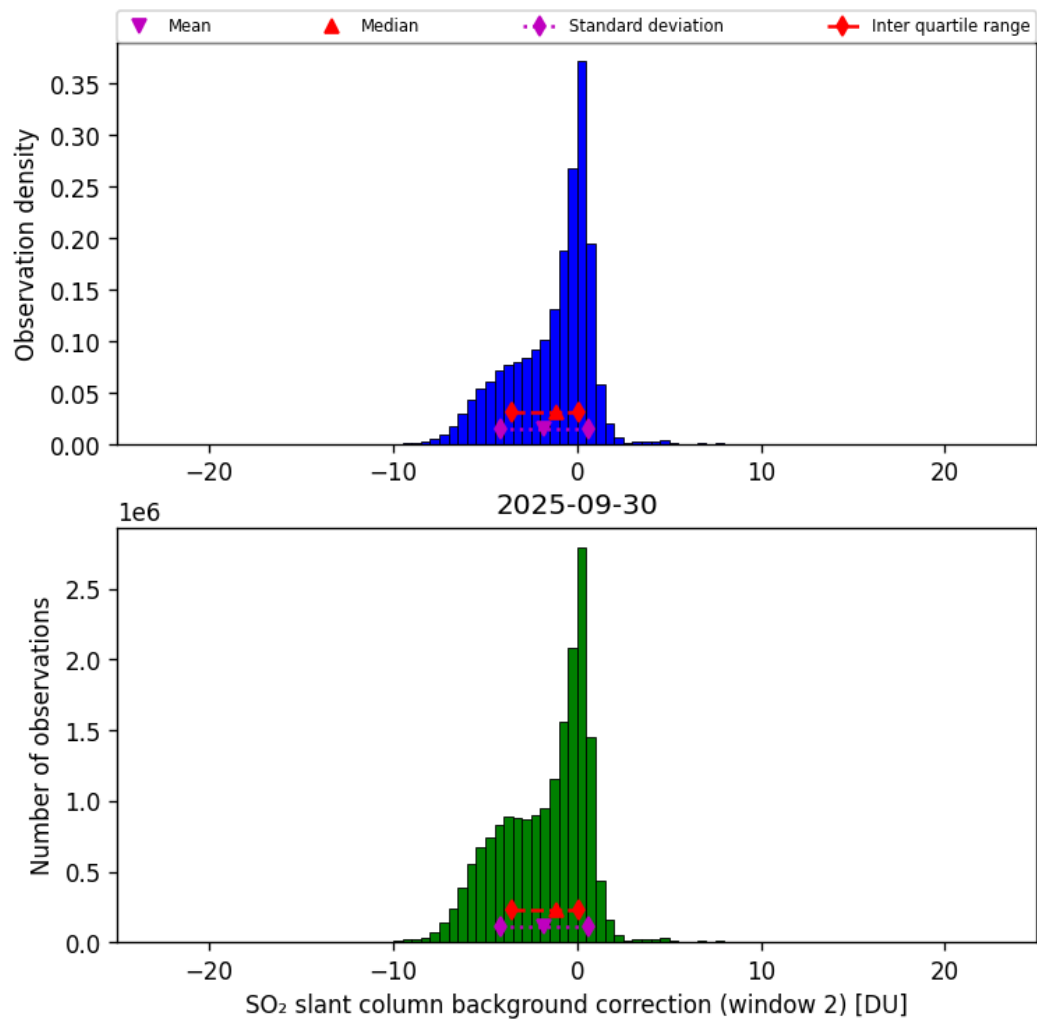


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-09-30 to 2025-10-01

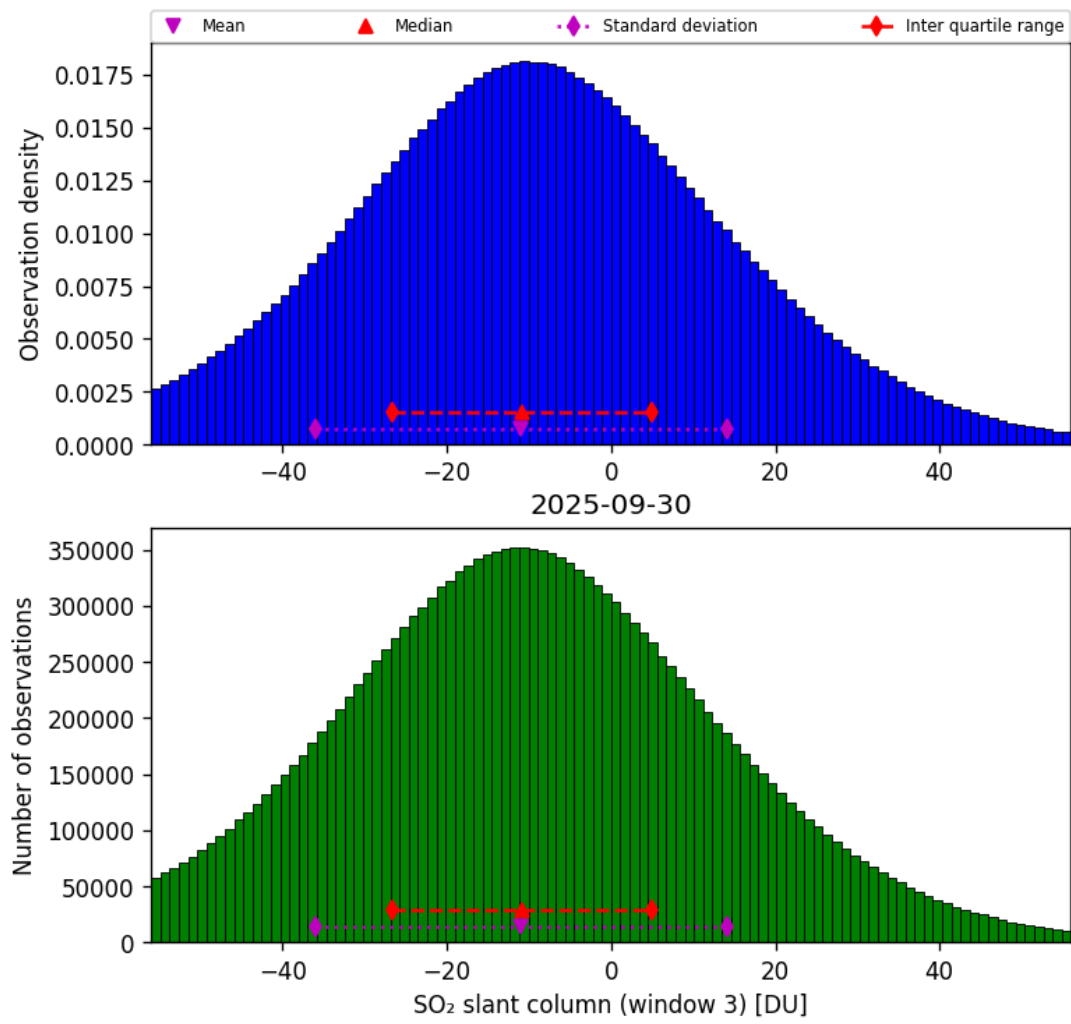


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-09-30 to 2025-10-01

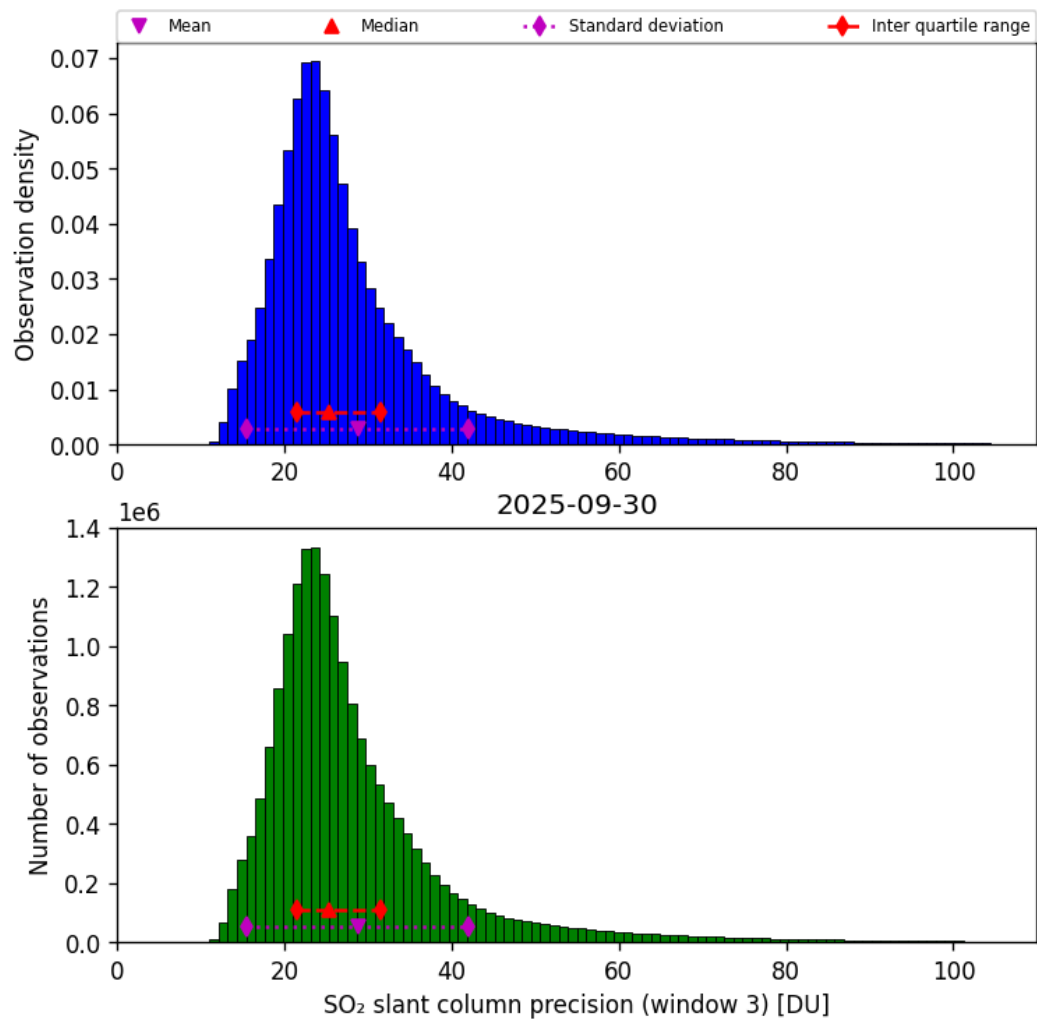


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-09-30 to 2025-10-01

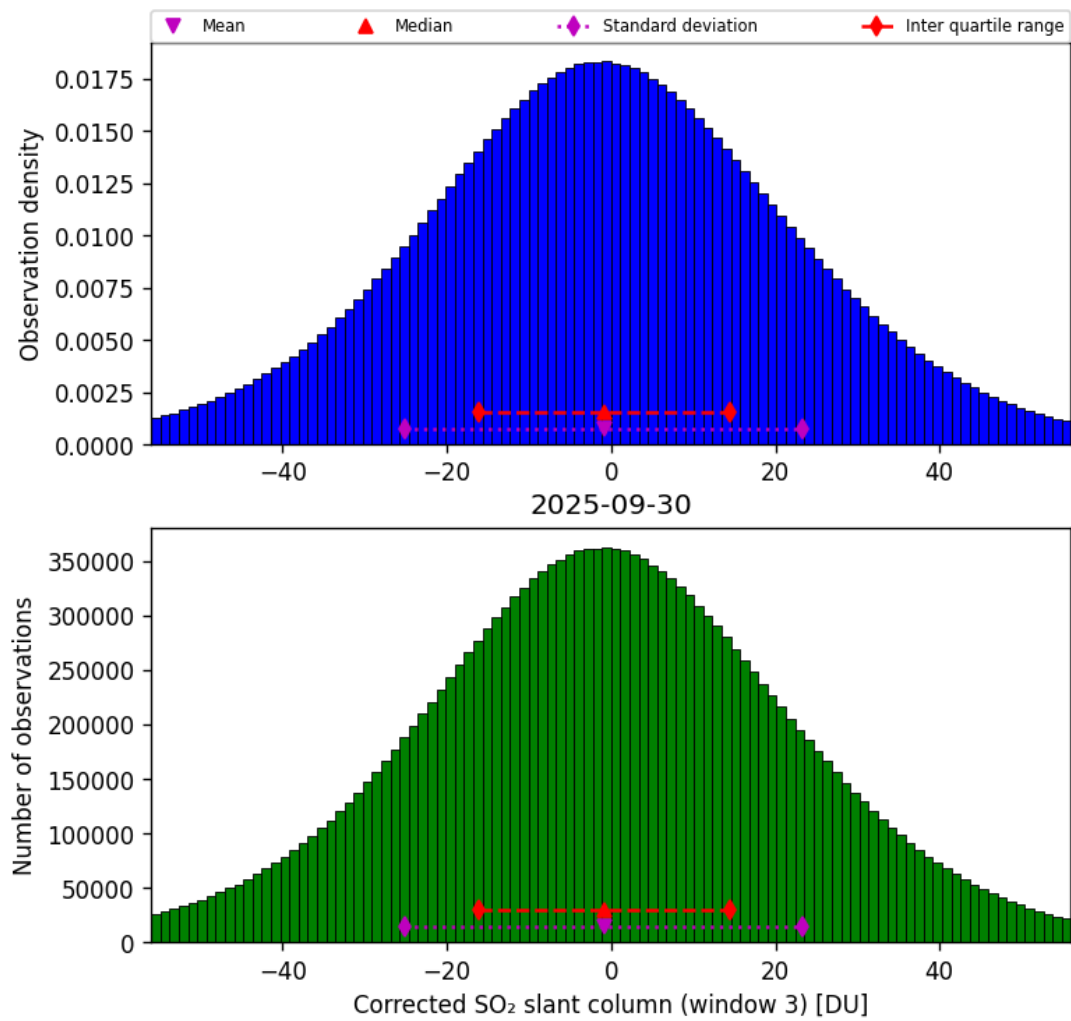


Figure 73: Histogram of "Corrected SO₂ slant column (window 3)" for 2025-09-30 to 2025-10-01

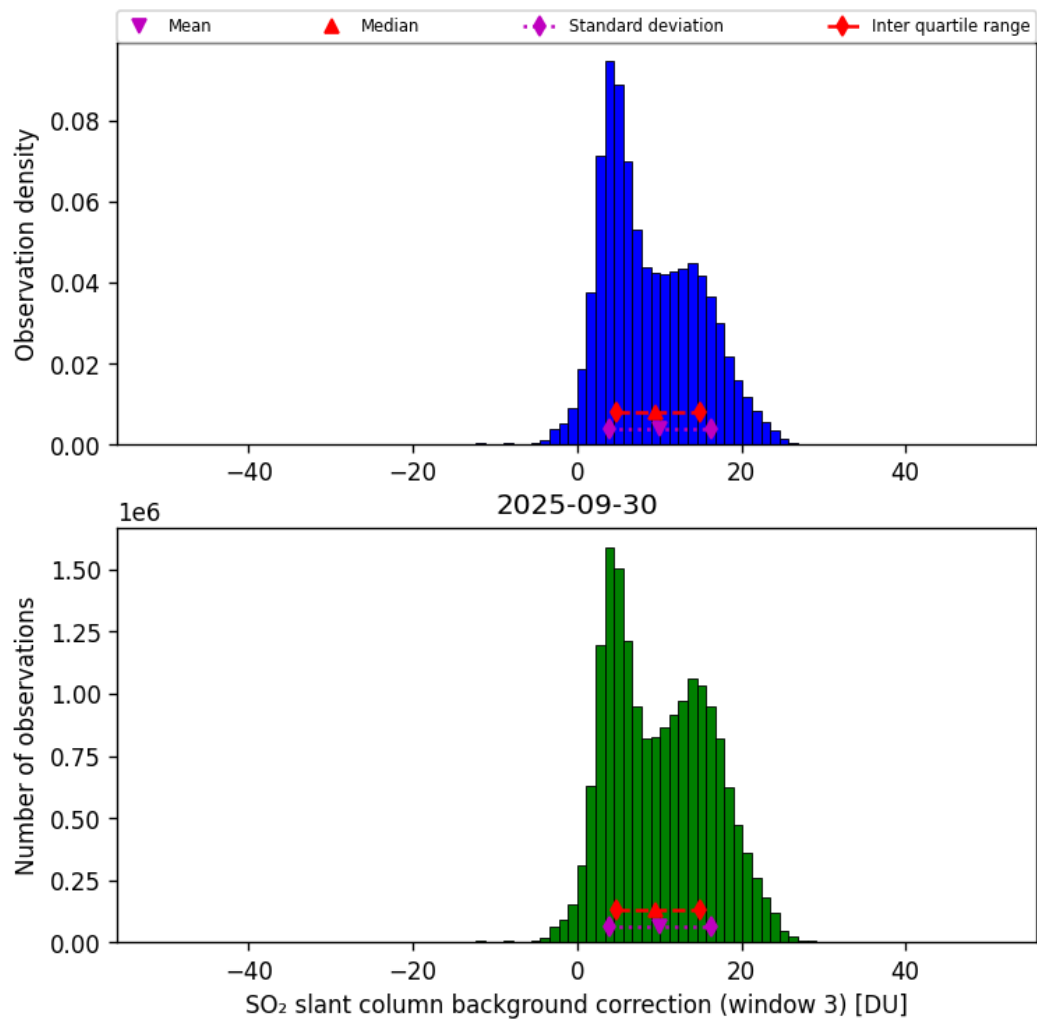


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-09-30 to 2025-10-01

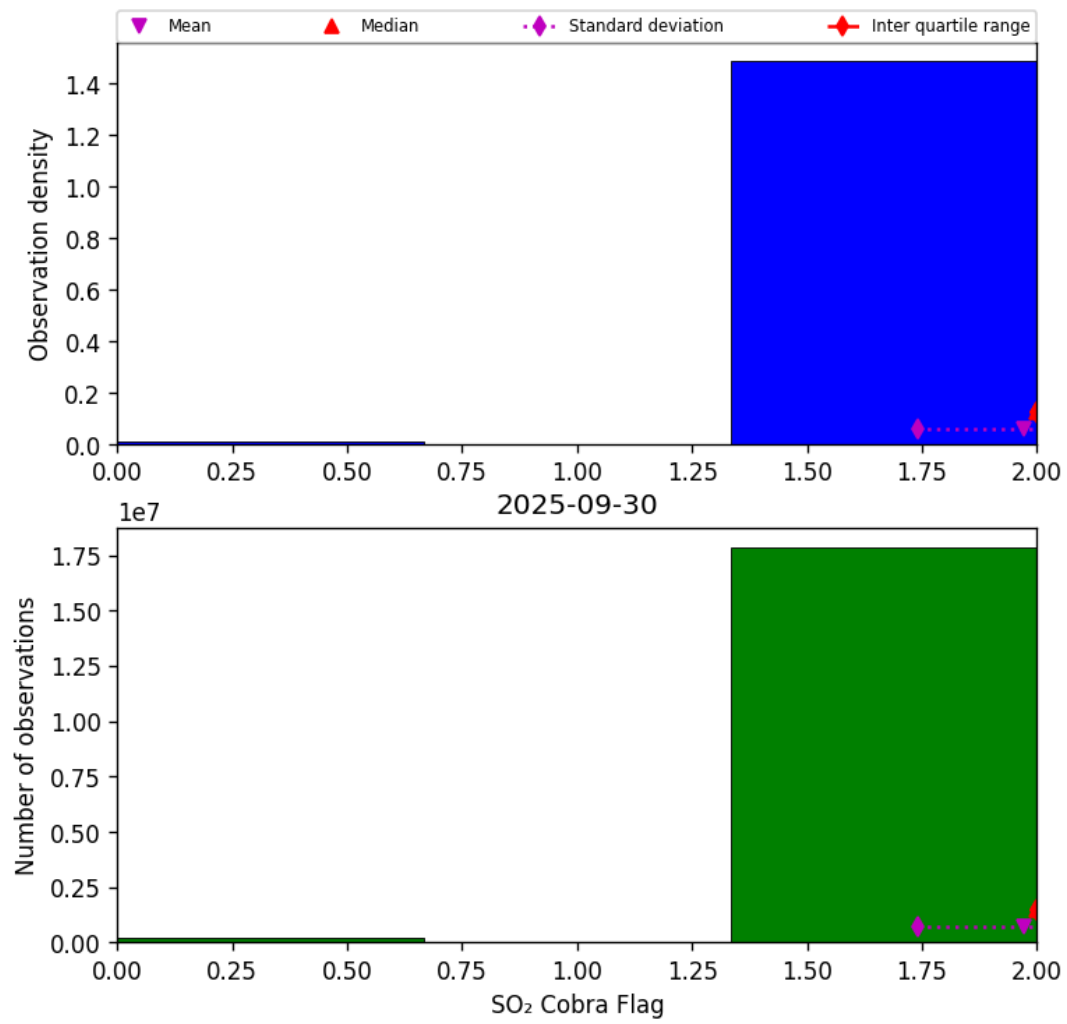


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-09-30 to 2025-10-01

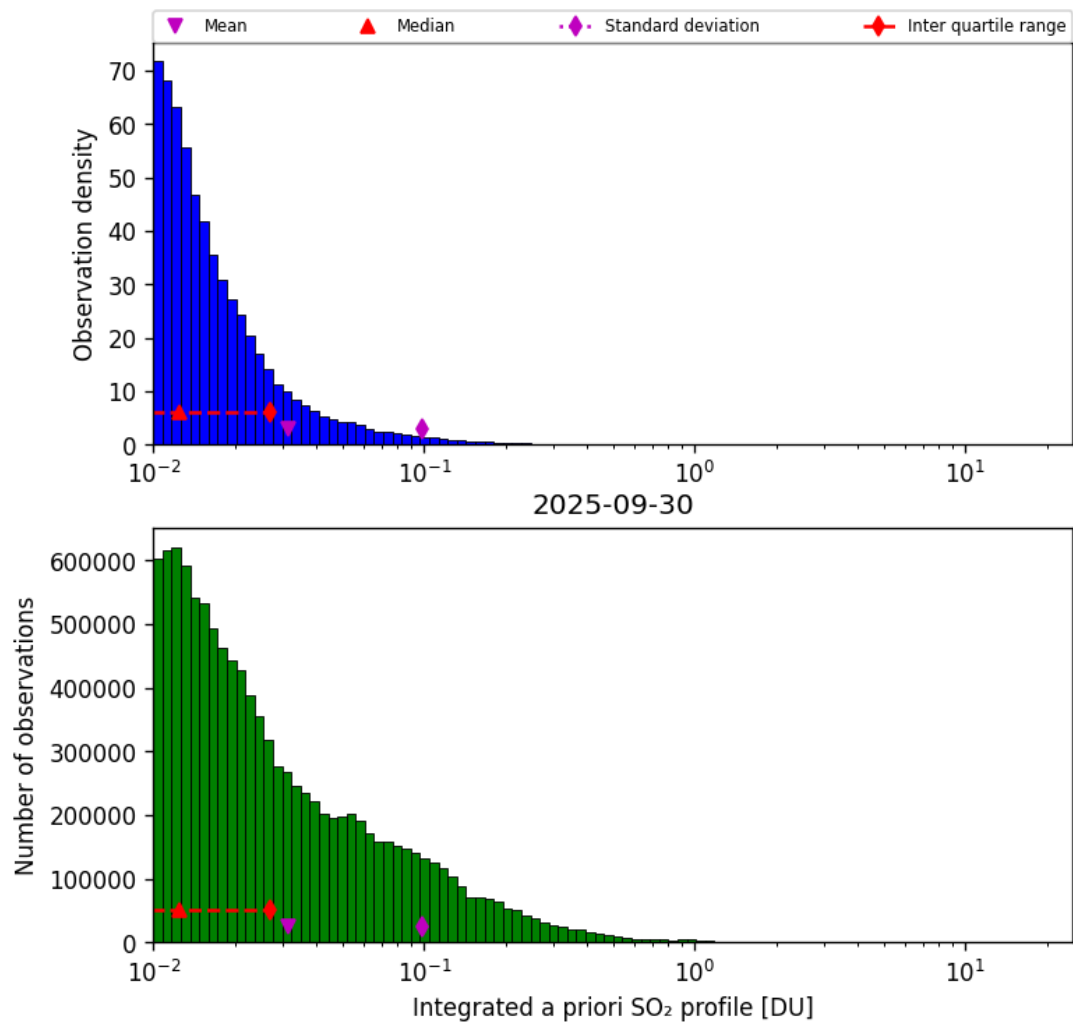


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-09-30 to 2025-10-01

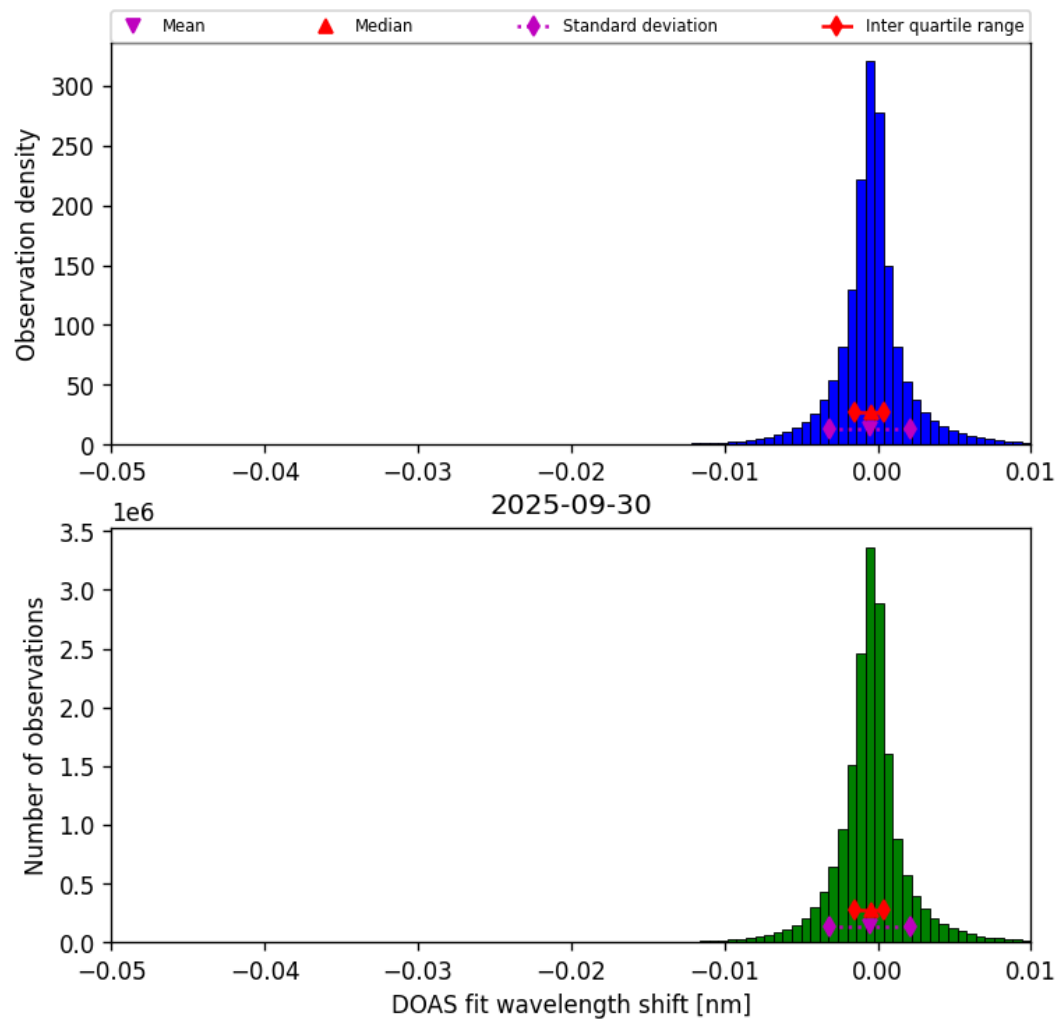


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-09-30 to 2025-10-01

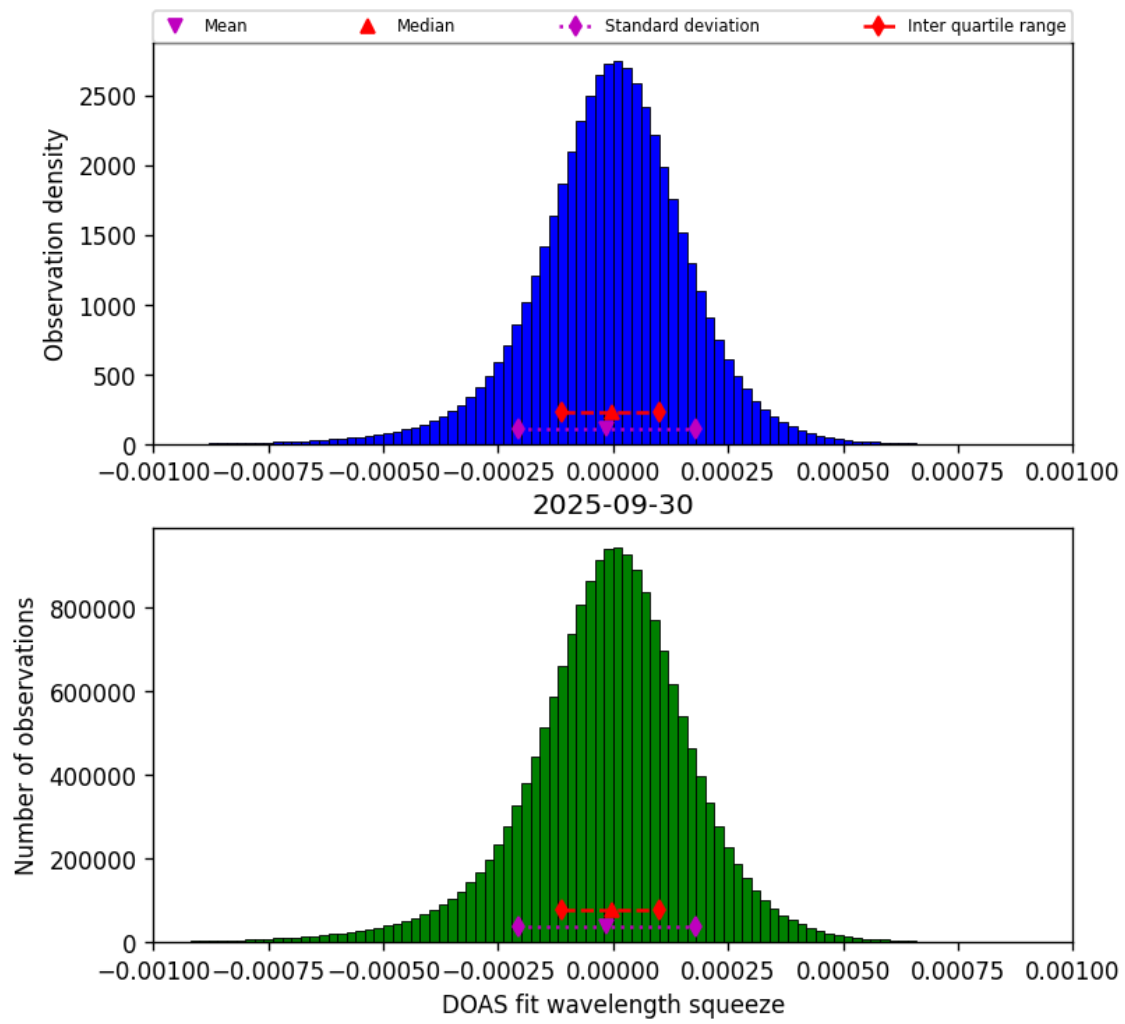


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-09-30 to 2025-10-01

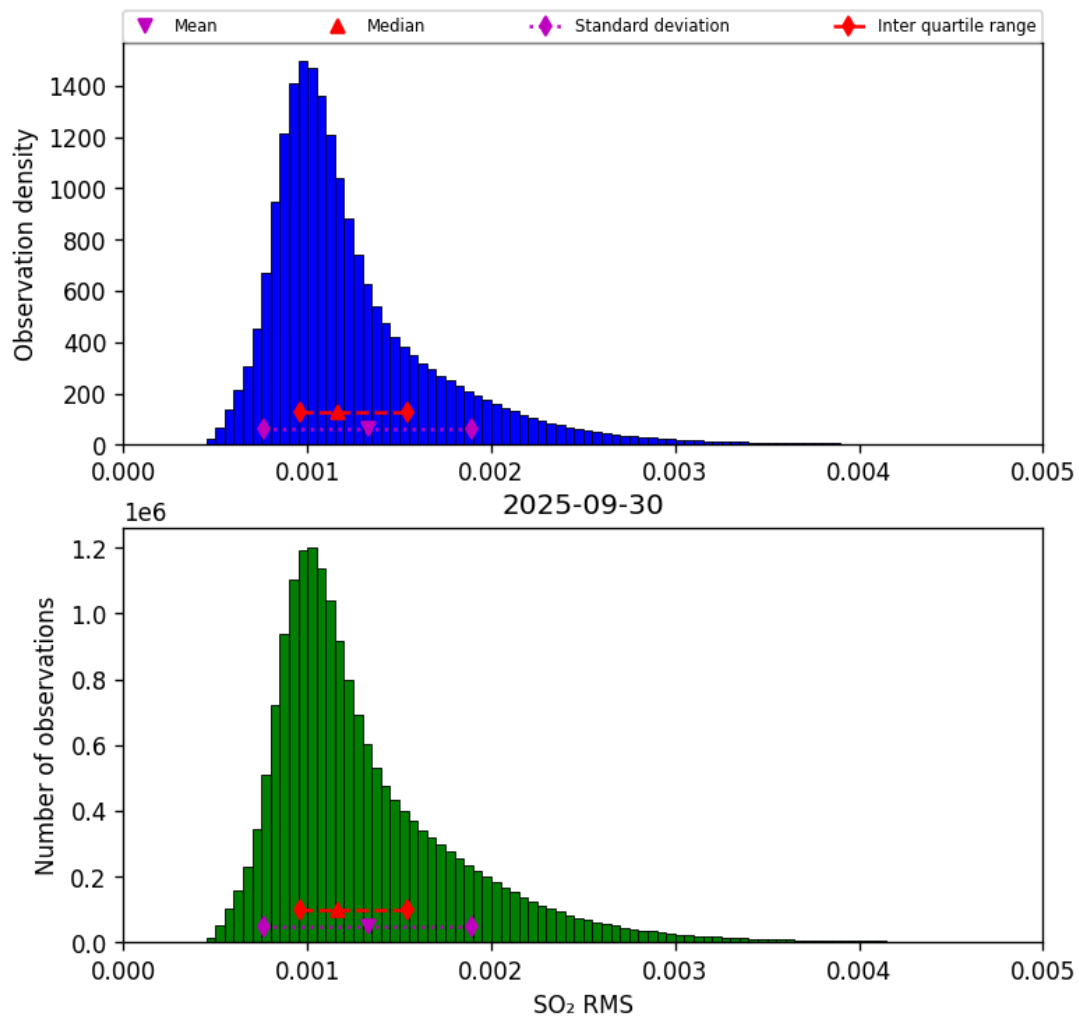


Figure 79: Histogram of “SO₂ RMS” for 2025-09-30 to 2025-10-01

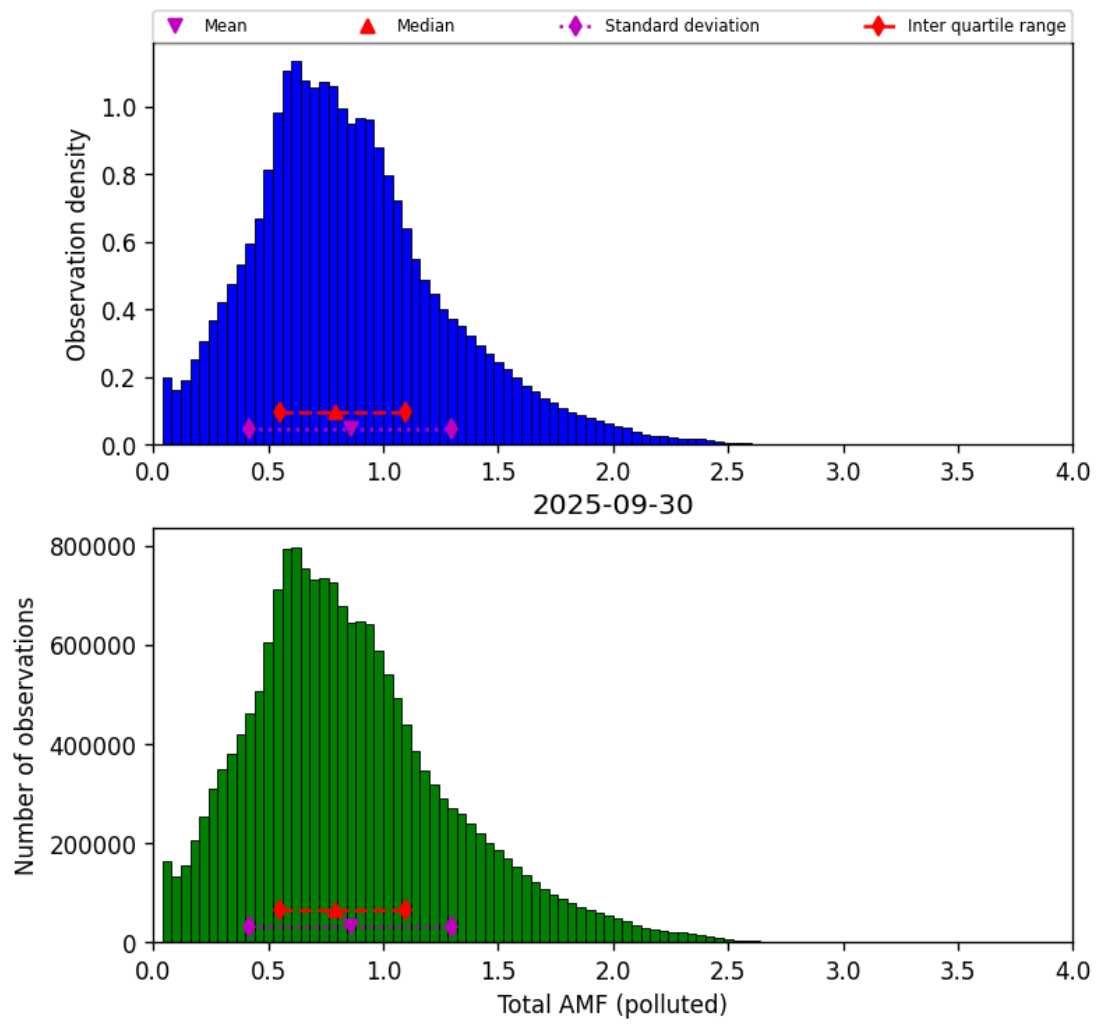


Figure 80: Histogram of “Total AMF (polluted)” for 2025-09-30 to 2025-10-01

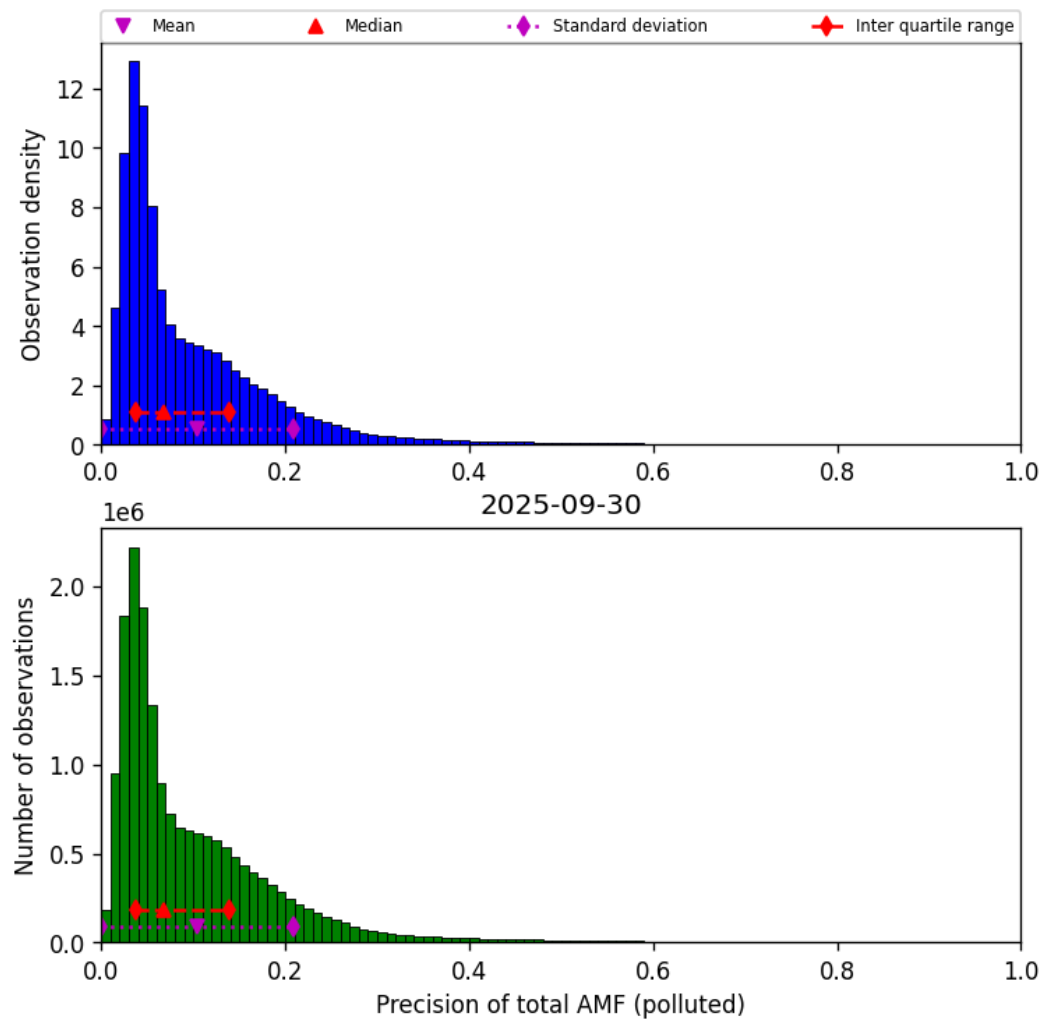


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-09-30 to 2025-10-01

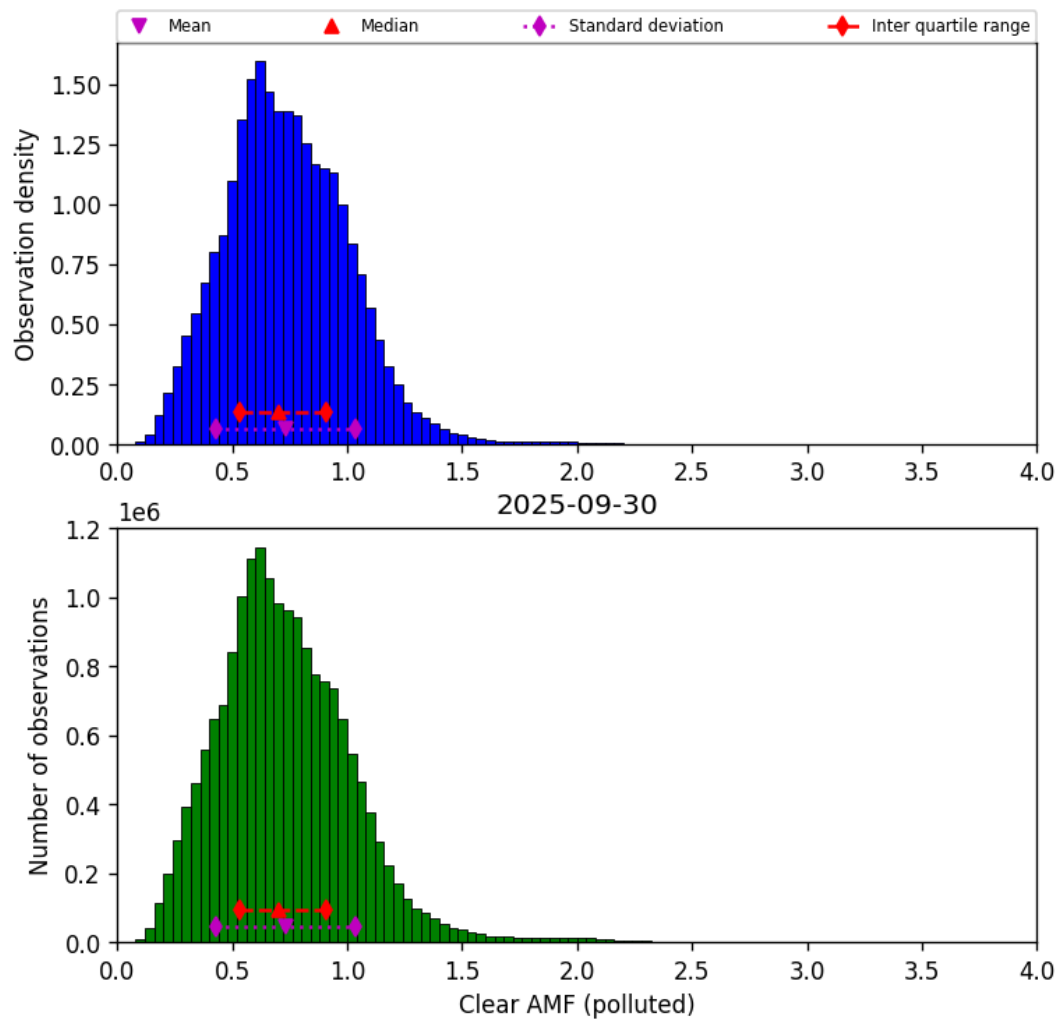


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-09-30 to 2025-10-01

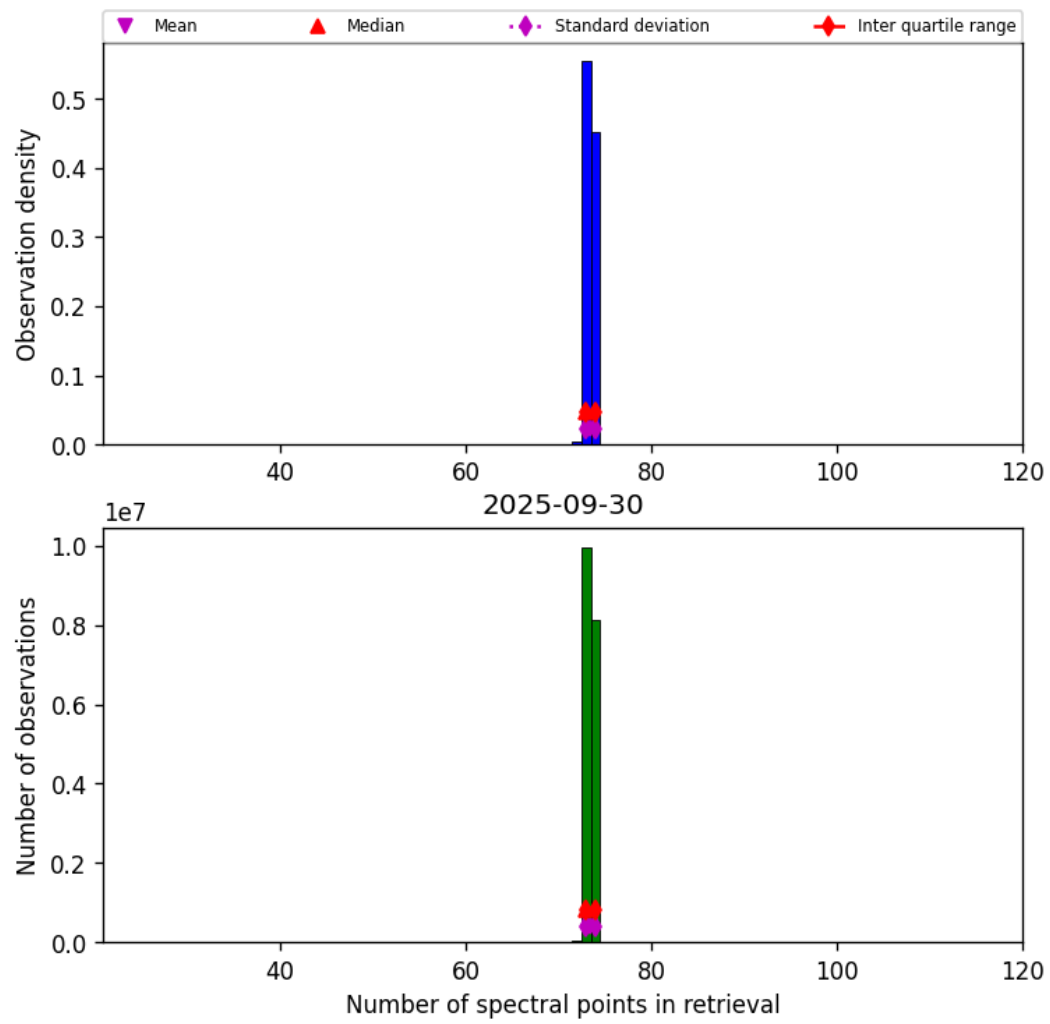


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-09-30 to 2025-10-01

9 Along track statistics

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

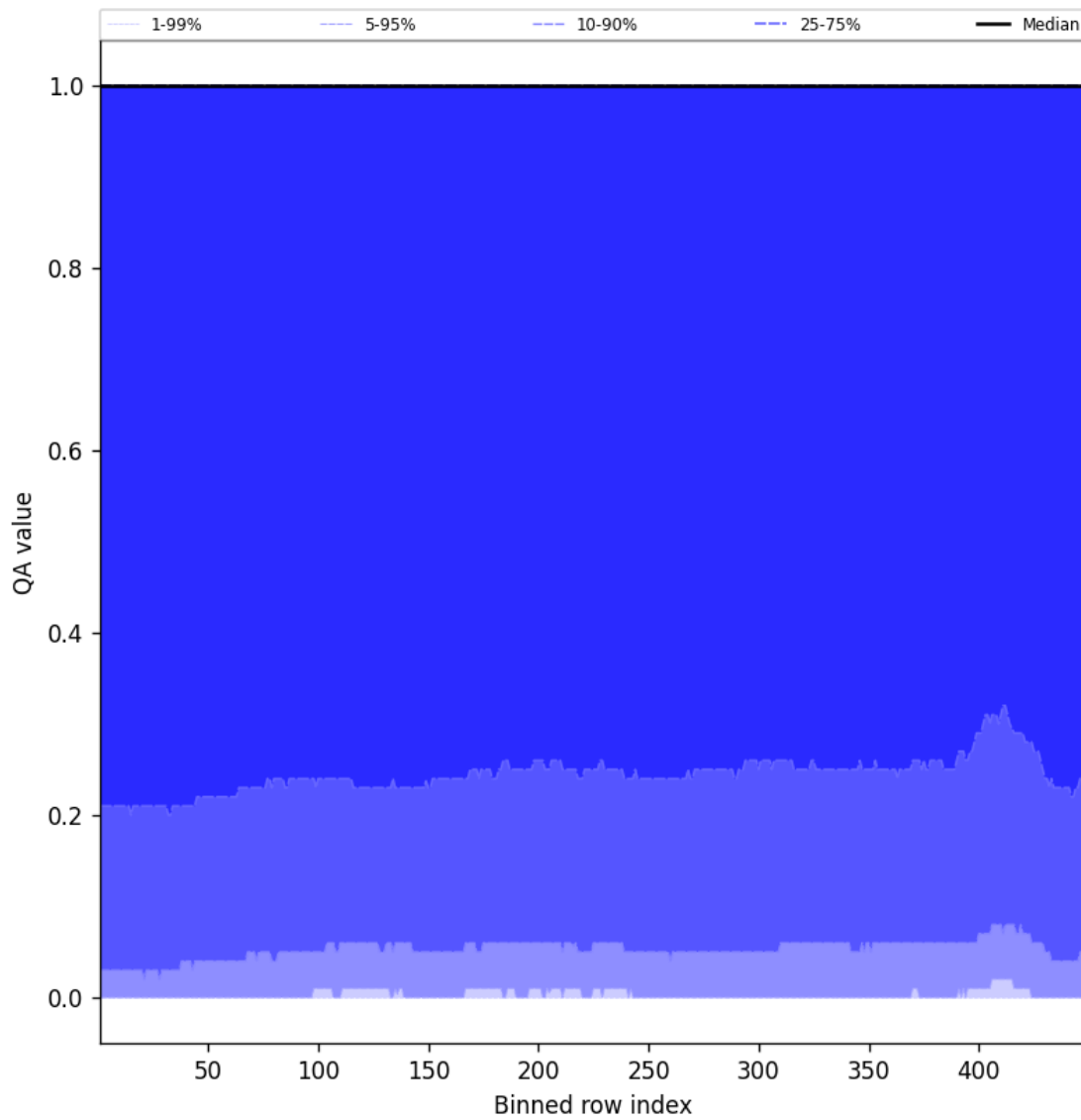


Figure 84: Along track statistics of “QA value” for 2025-09-30 to 2025-10-01

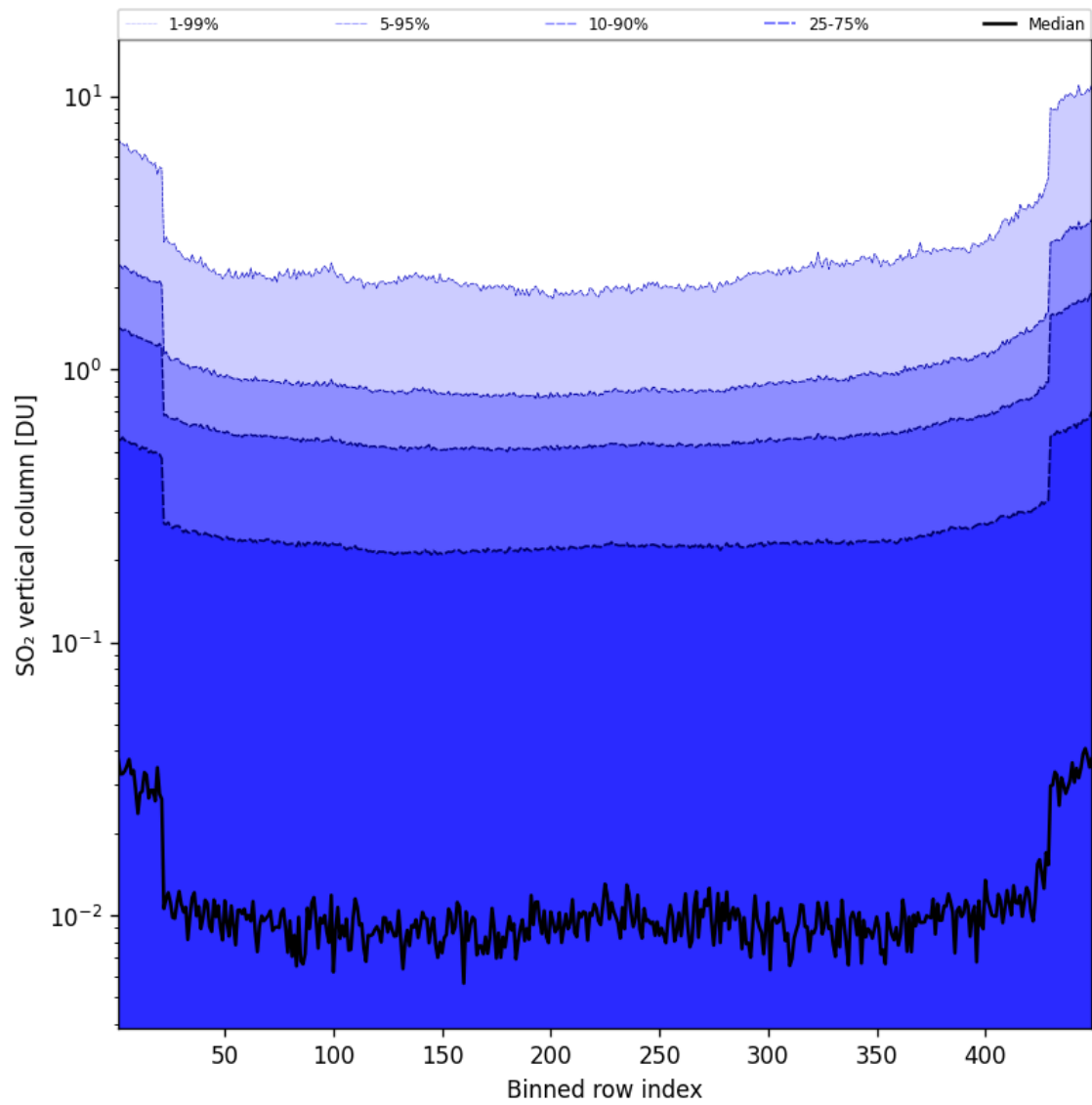


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-09-30 to 2025-10-01

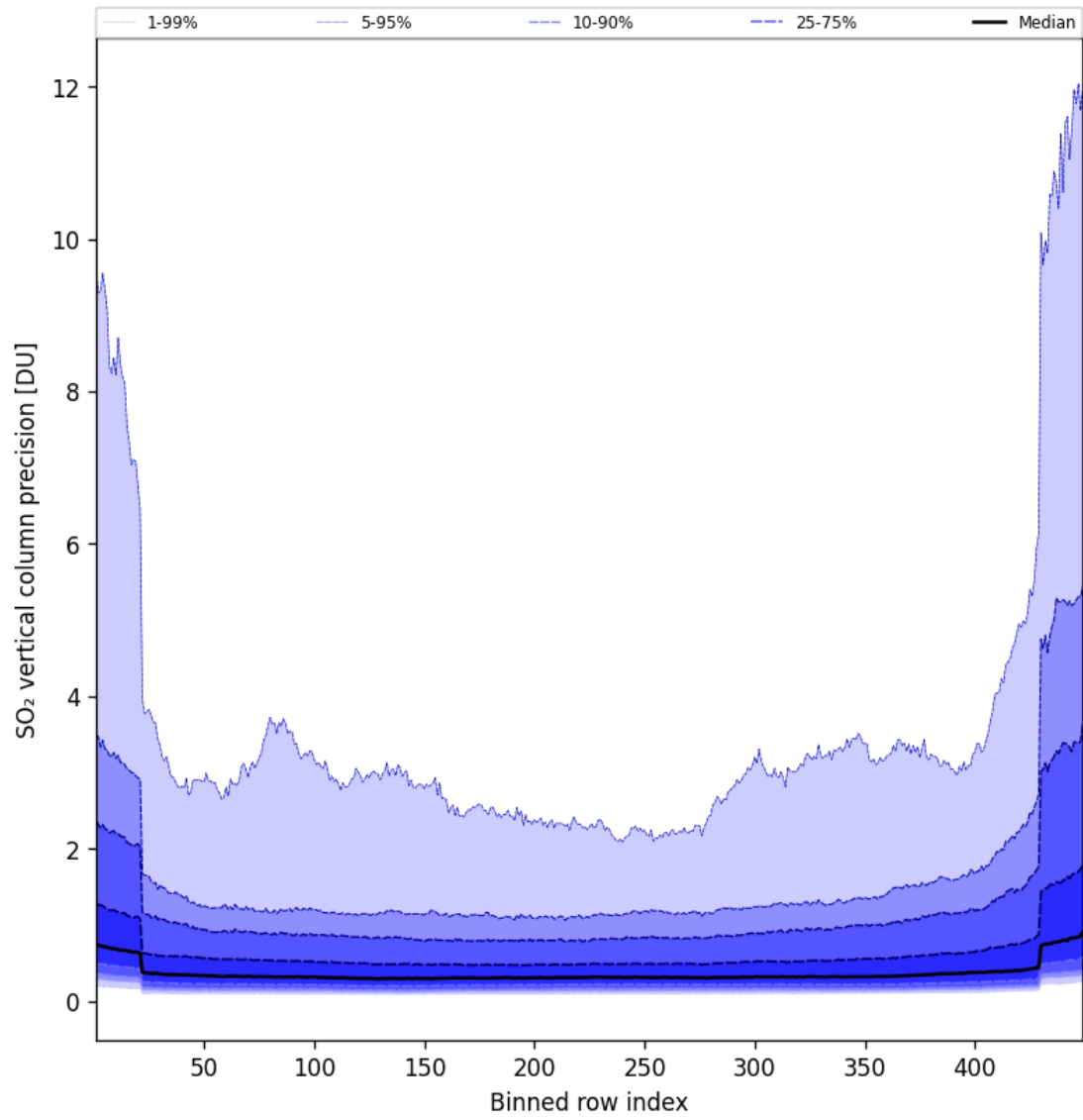


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-09-30 to 2025-10-01

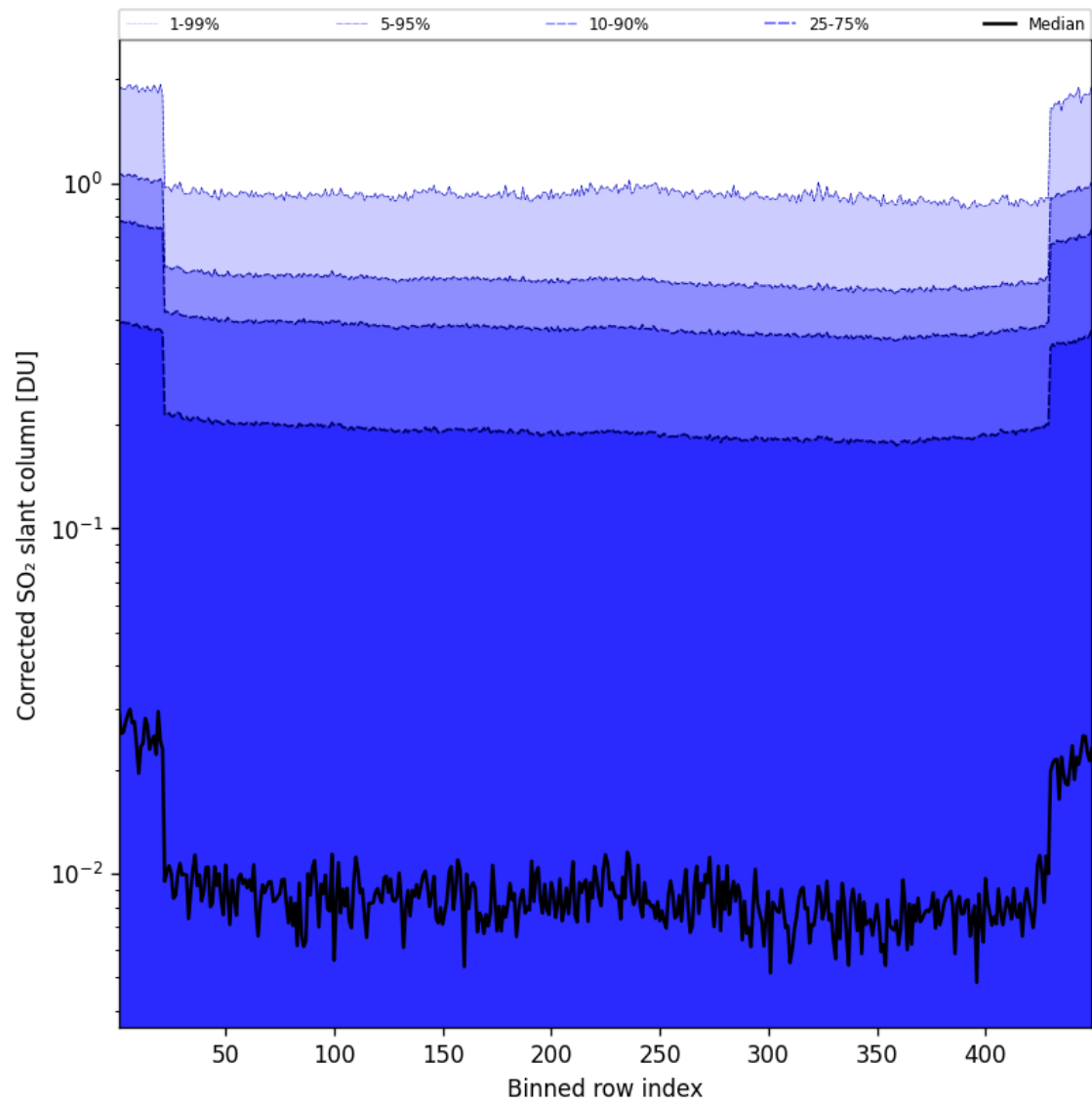


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-09-30 to 2025-10-01

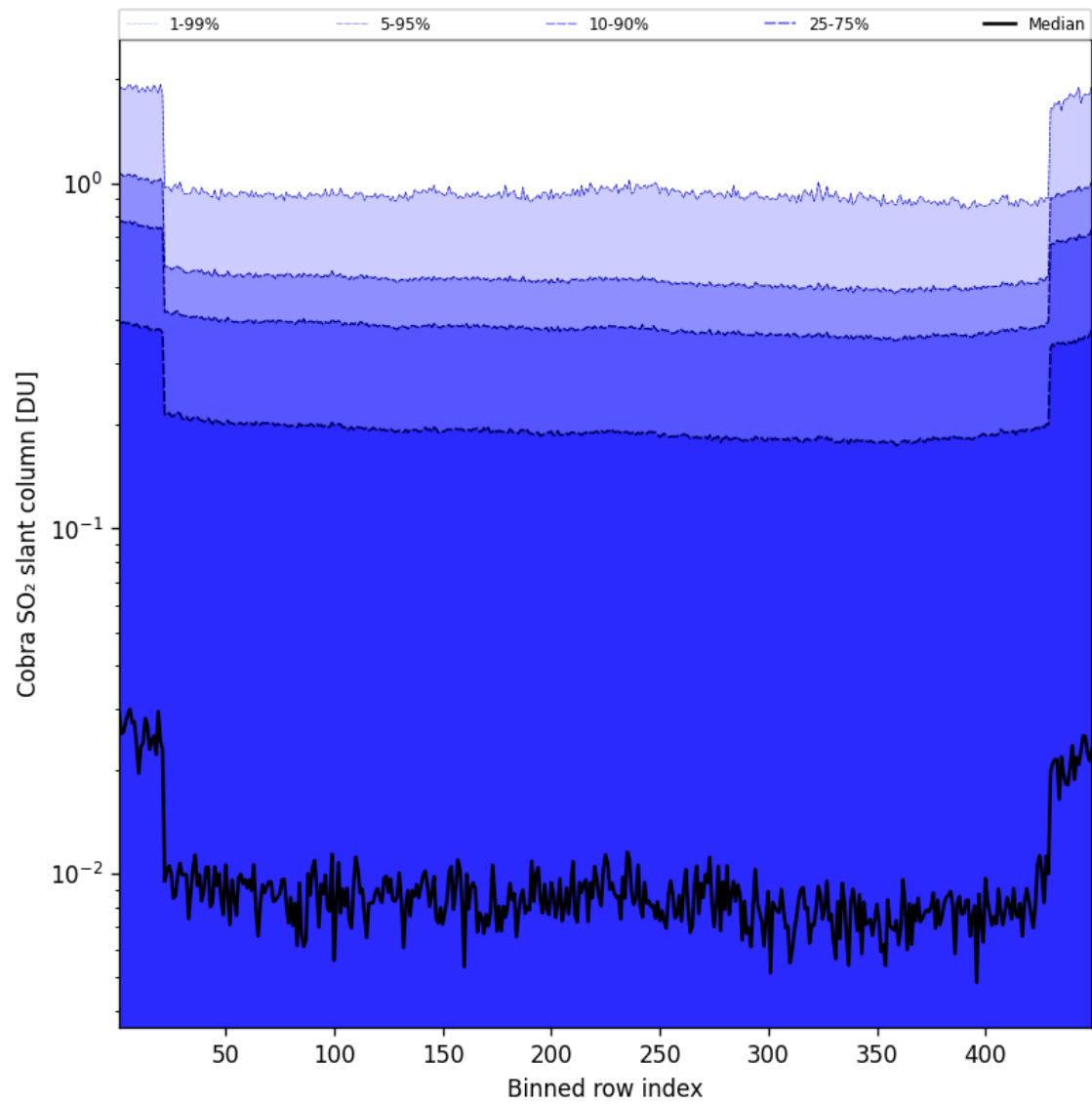


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-09-30 to 2025-10-01

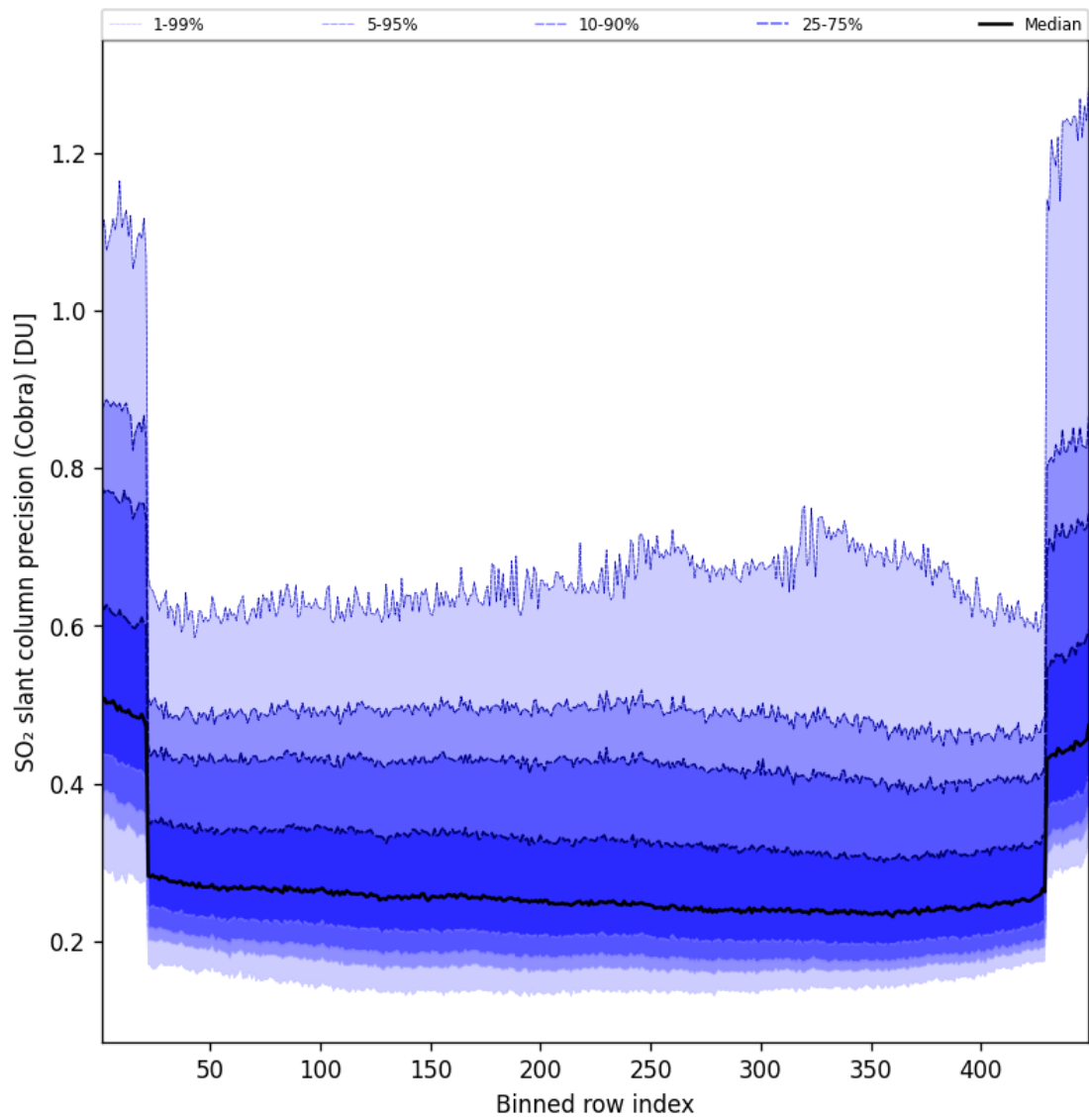


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-09-30 to 2025-10-01

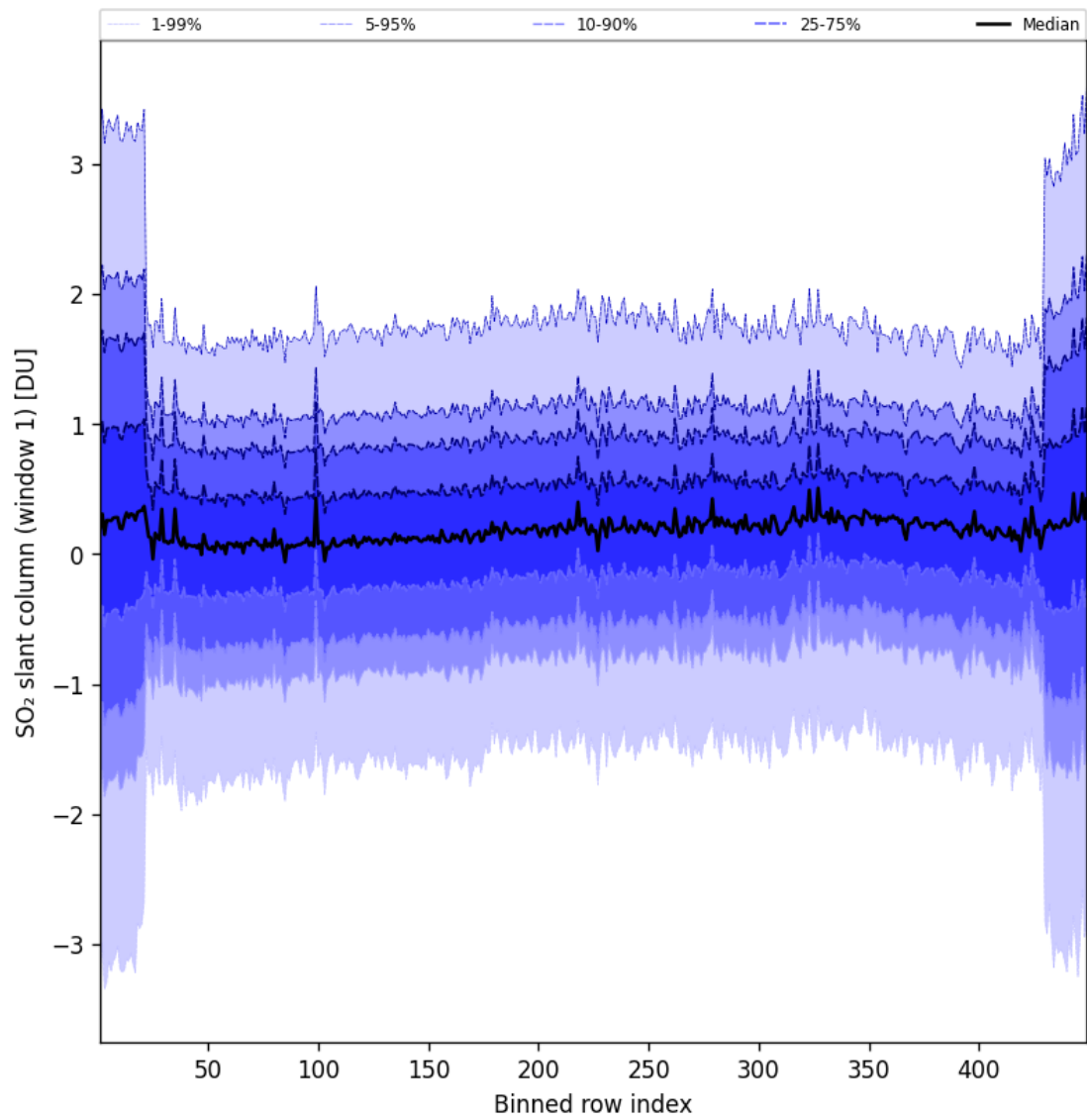


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-09-30 to 2025-10-01

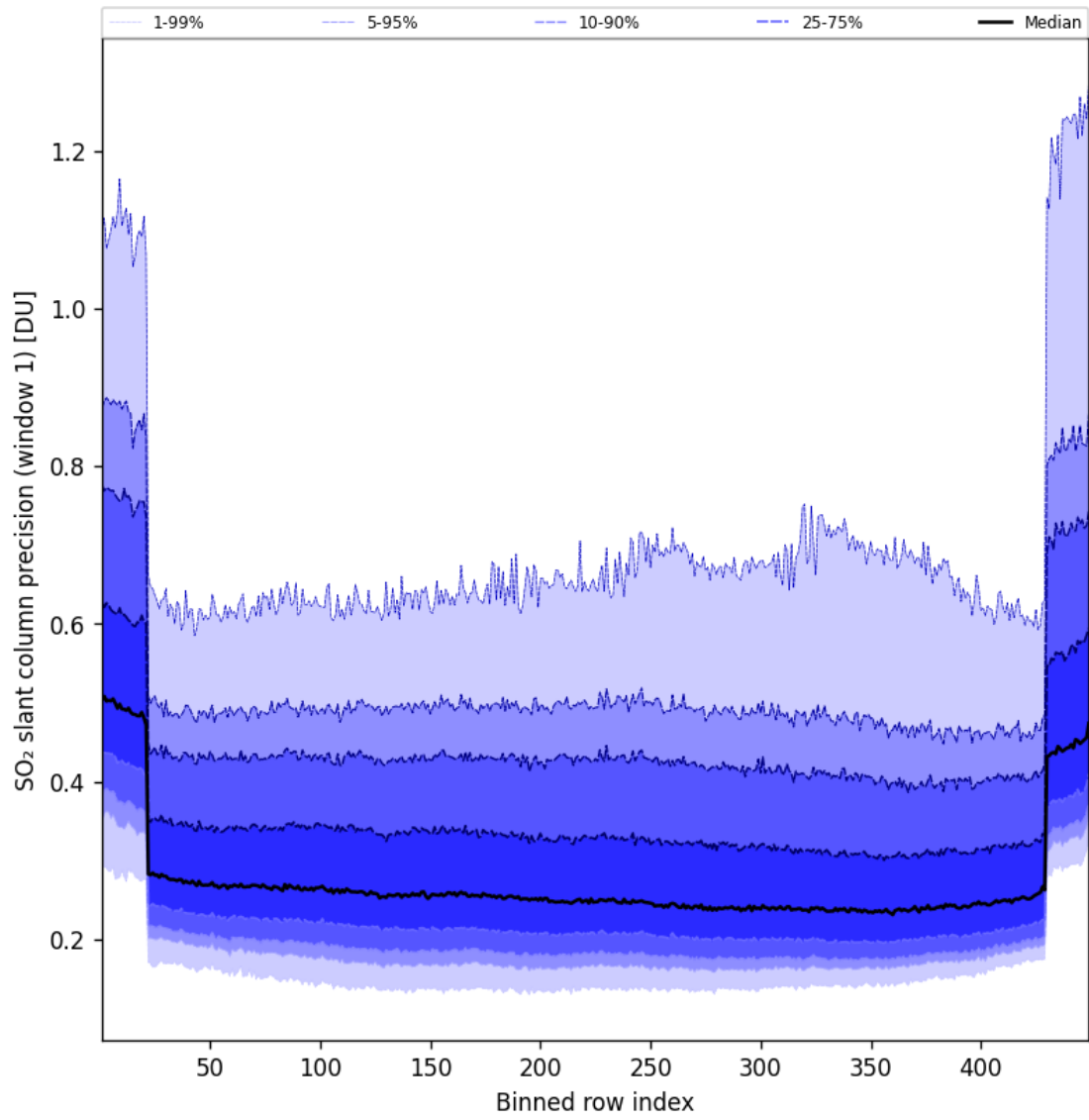


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-09-30 to 2025-10-01

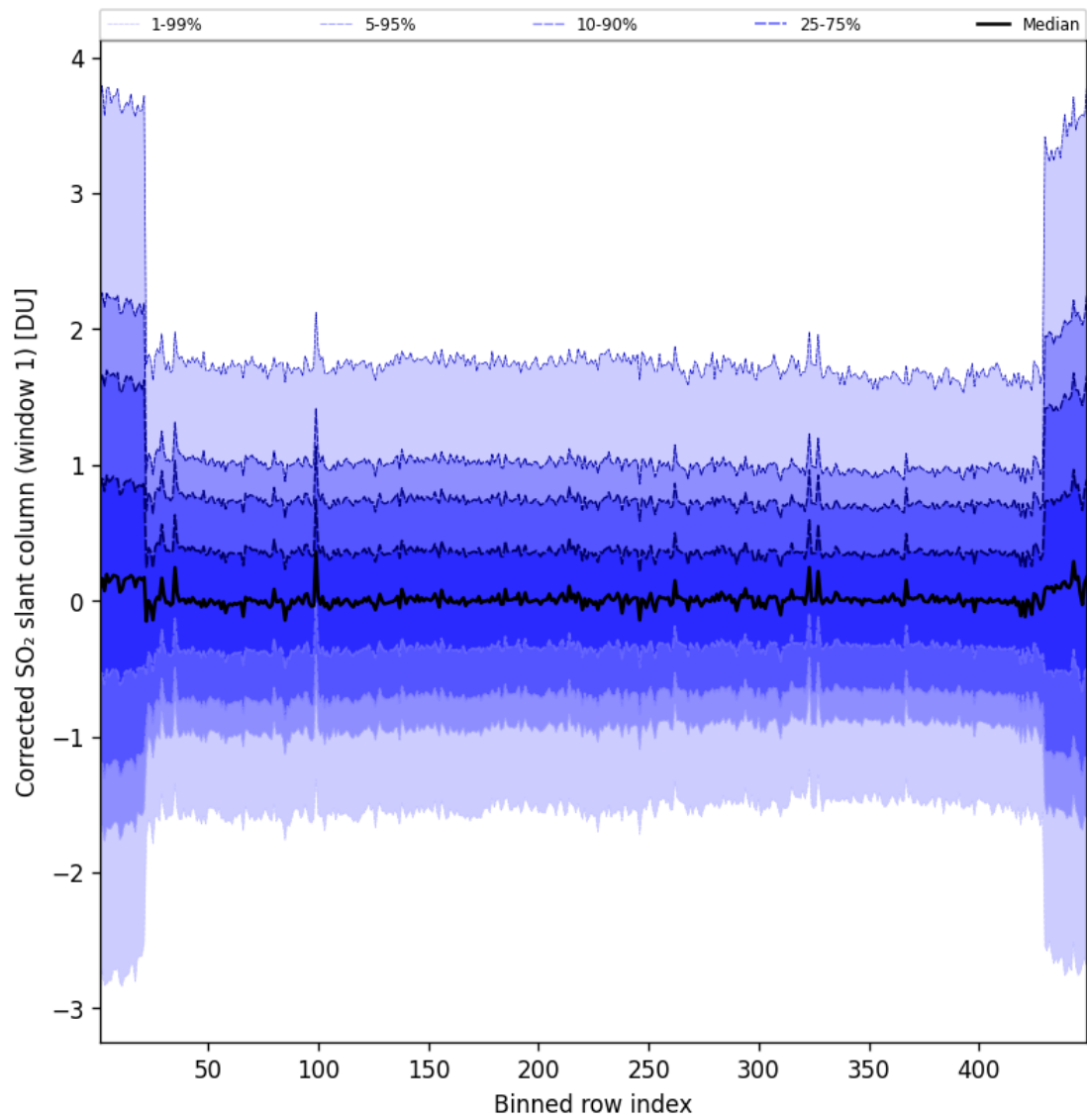


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-09-30 to 2025-10-01

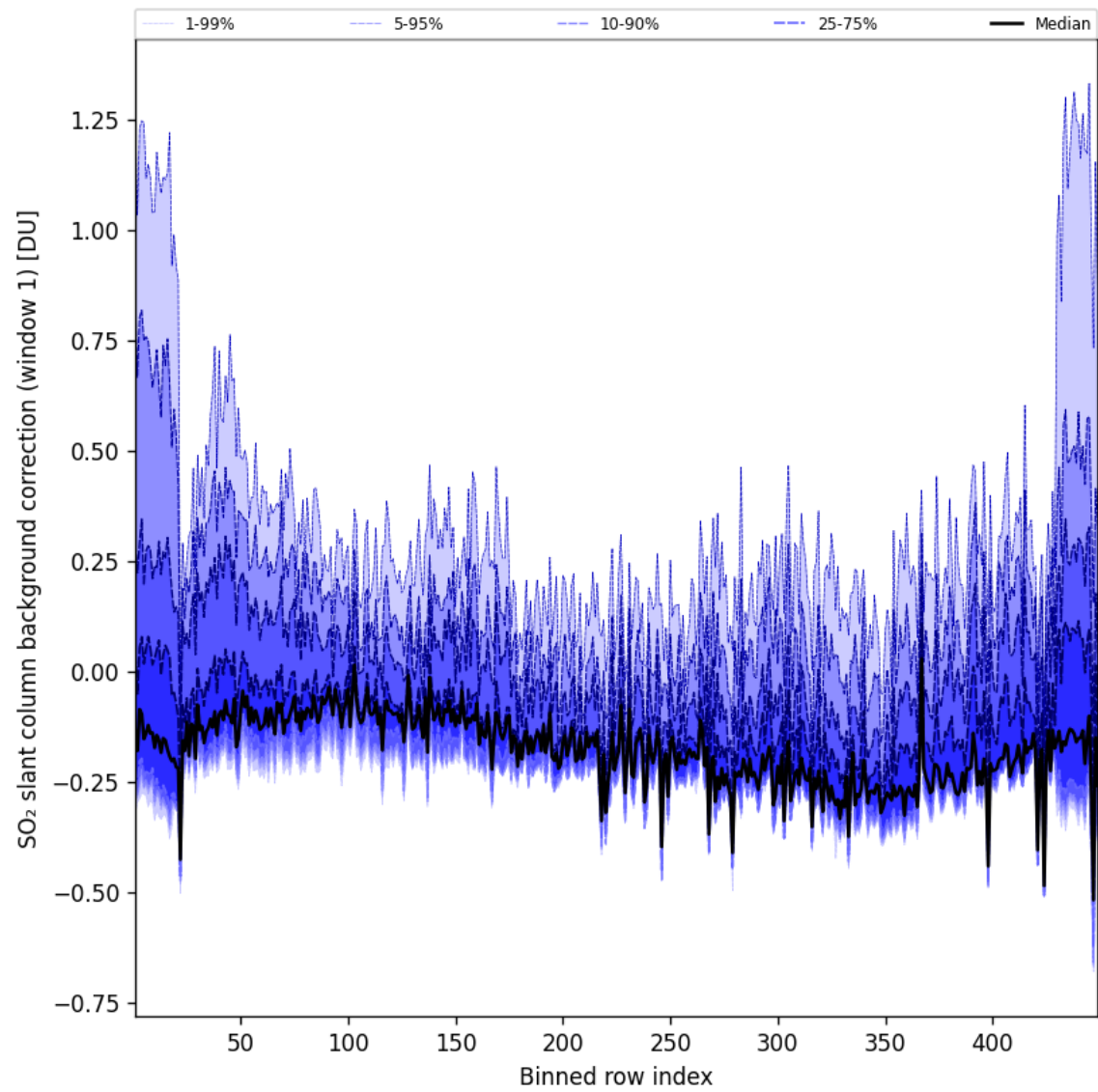


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-09-30 to 2025-10-01

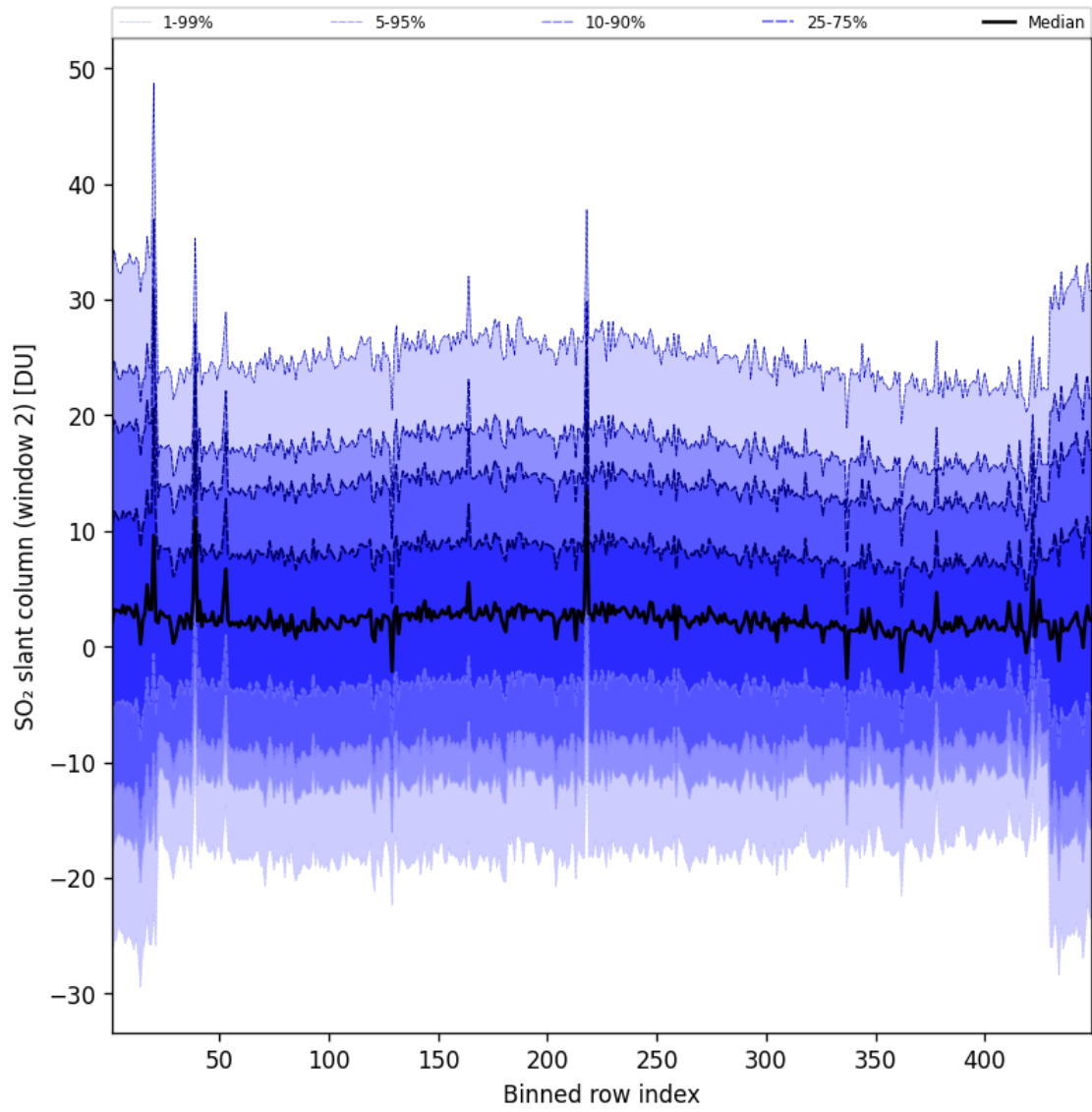


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-09-30 to 2025-10-01

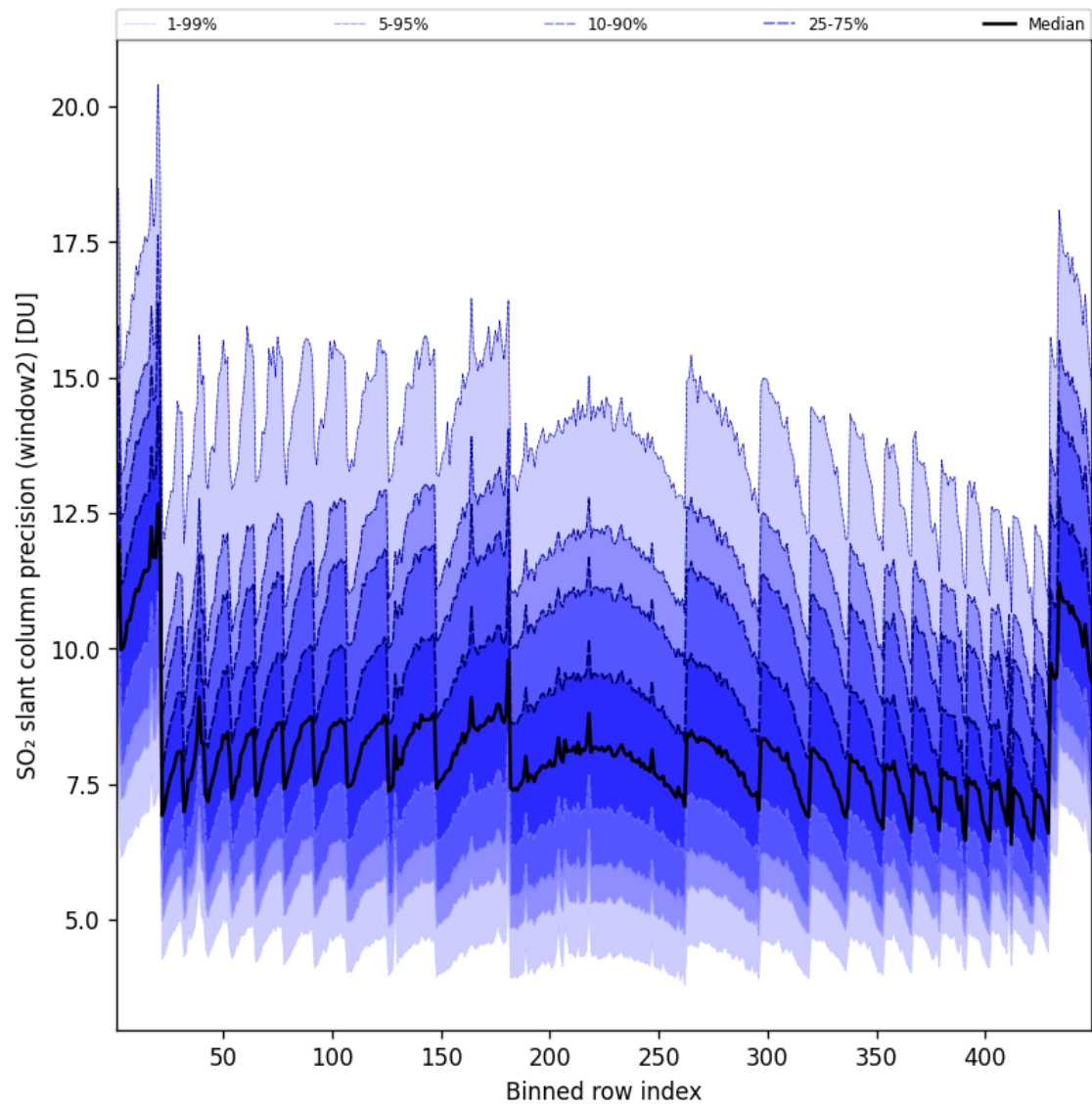


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-09-30 to 2025-10-01

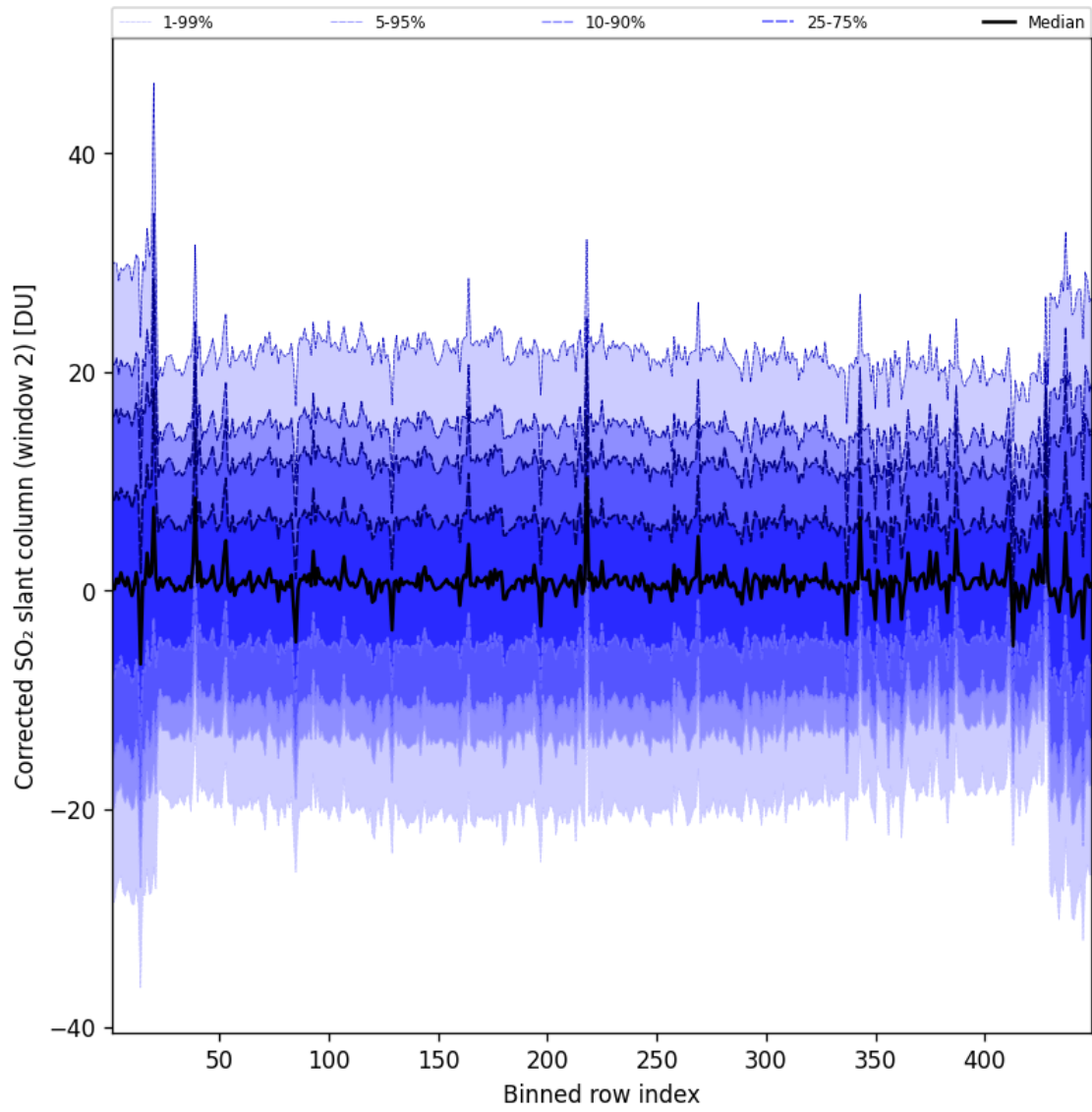


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-09-30 to 2025-10-01

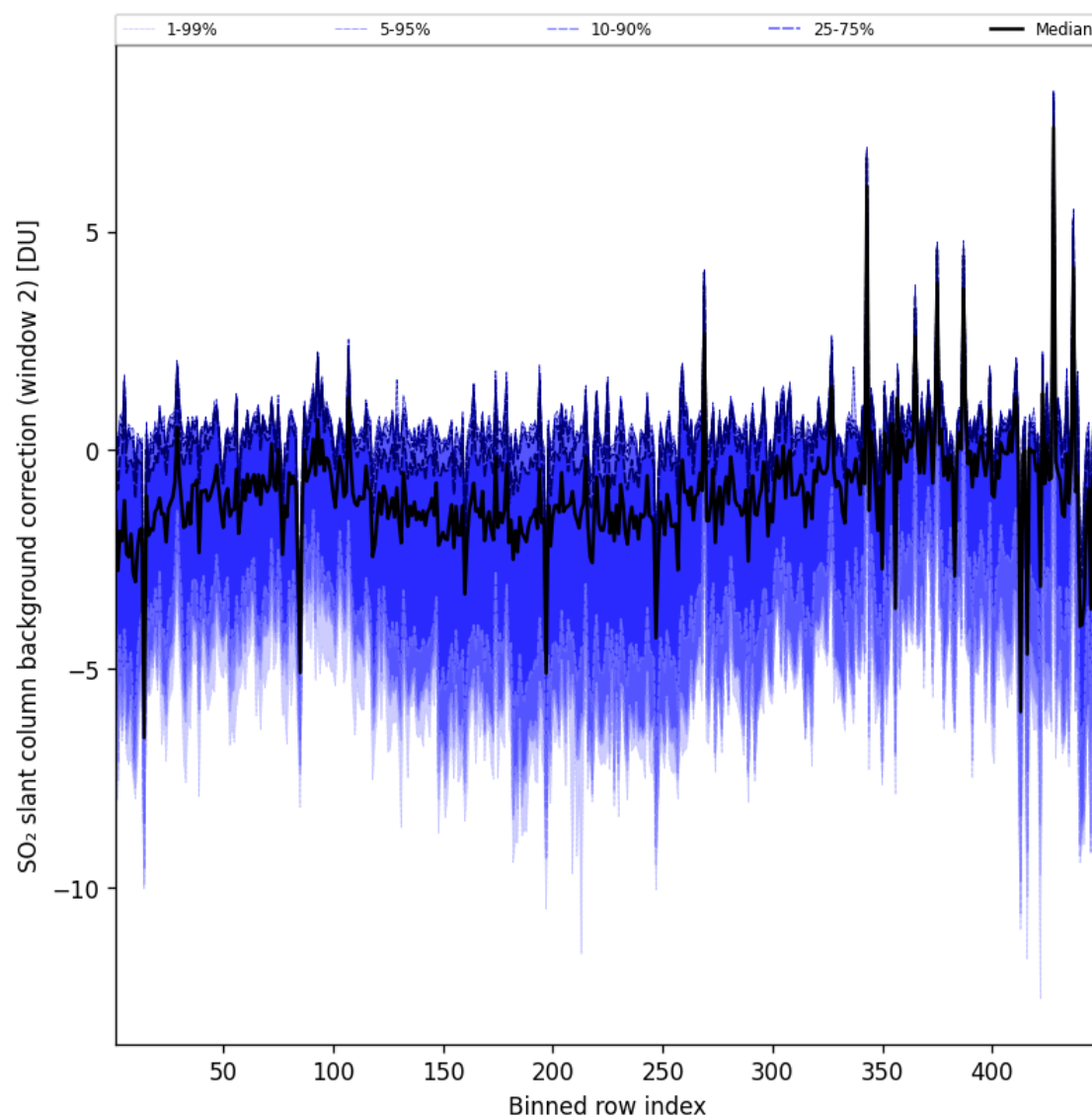


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-09-30 to 2025-10-01

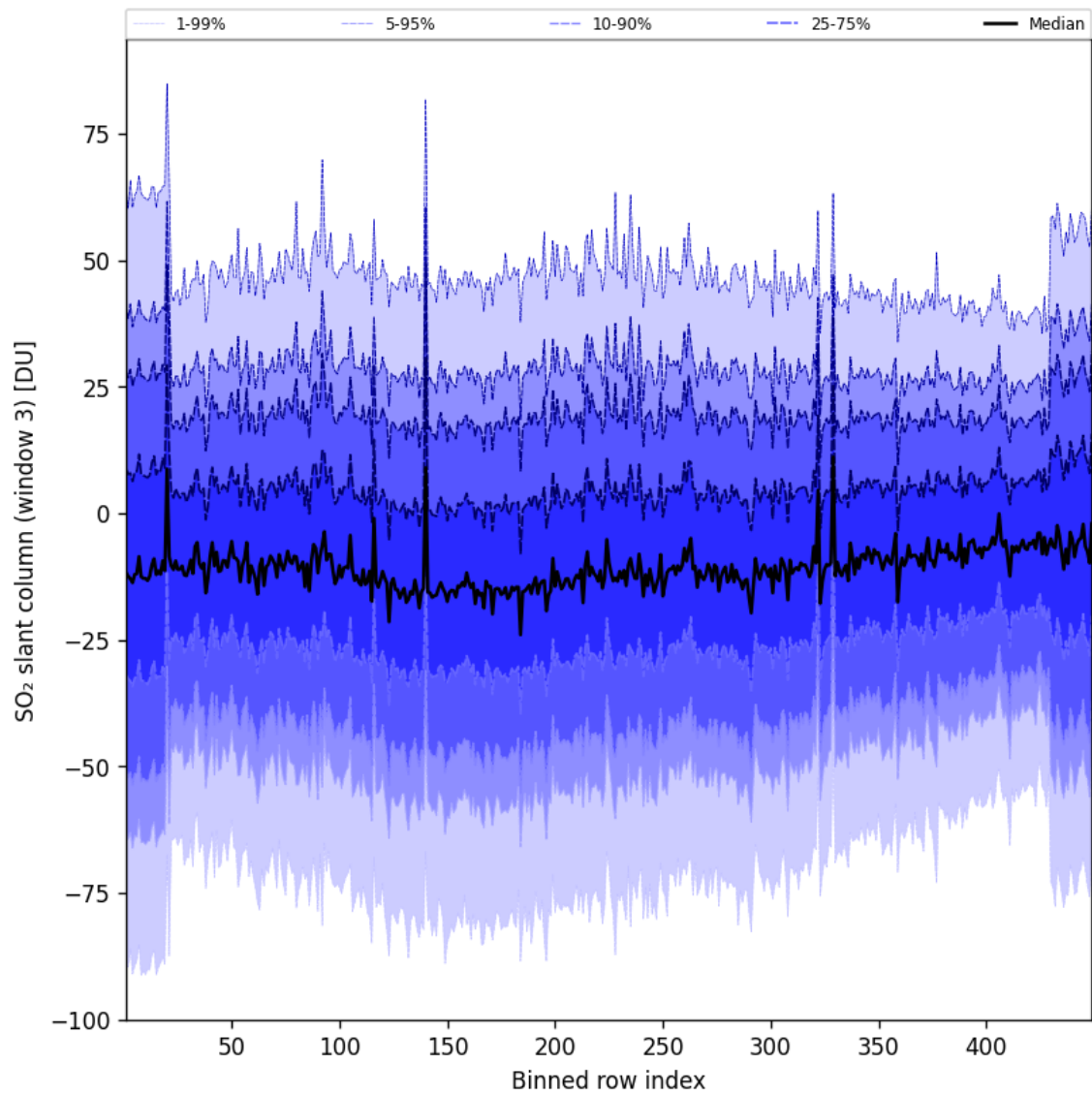


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-09-30 to 2025-10-01

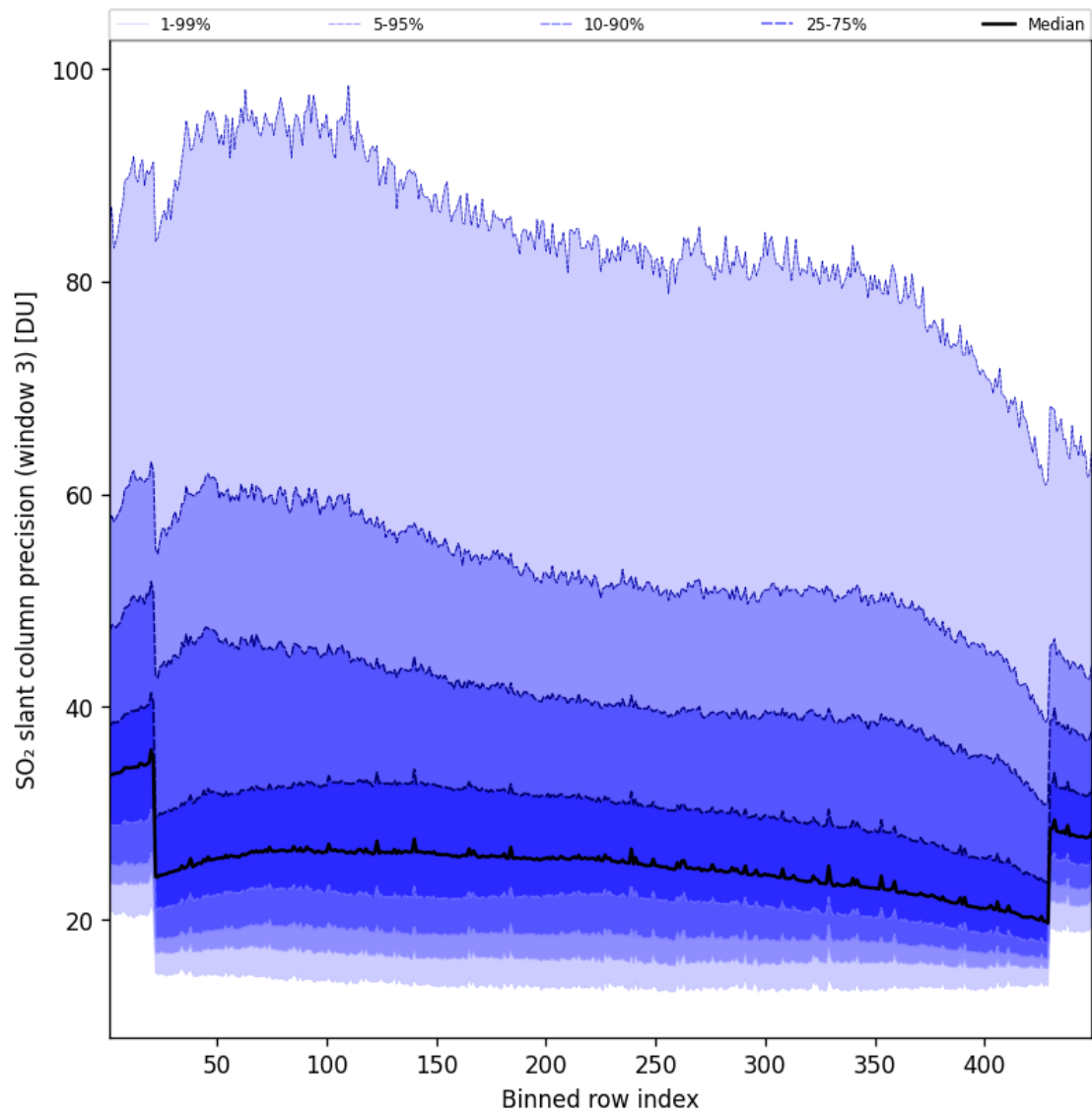


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-09-30 to 2025-10-01

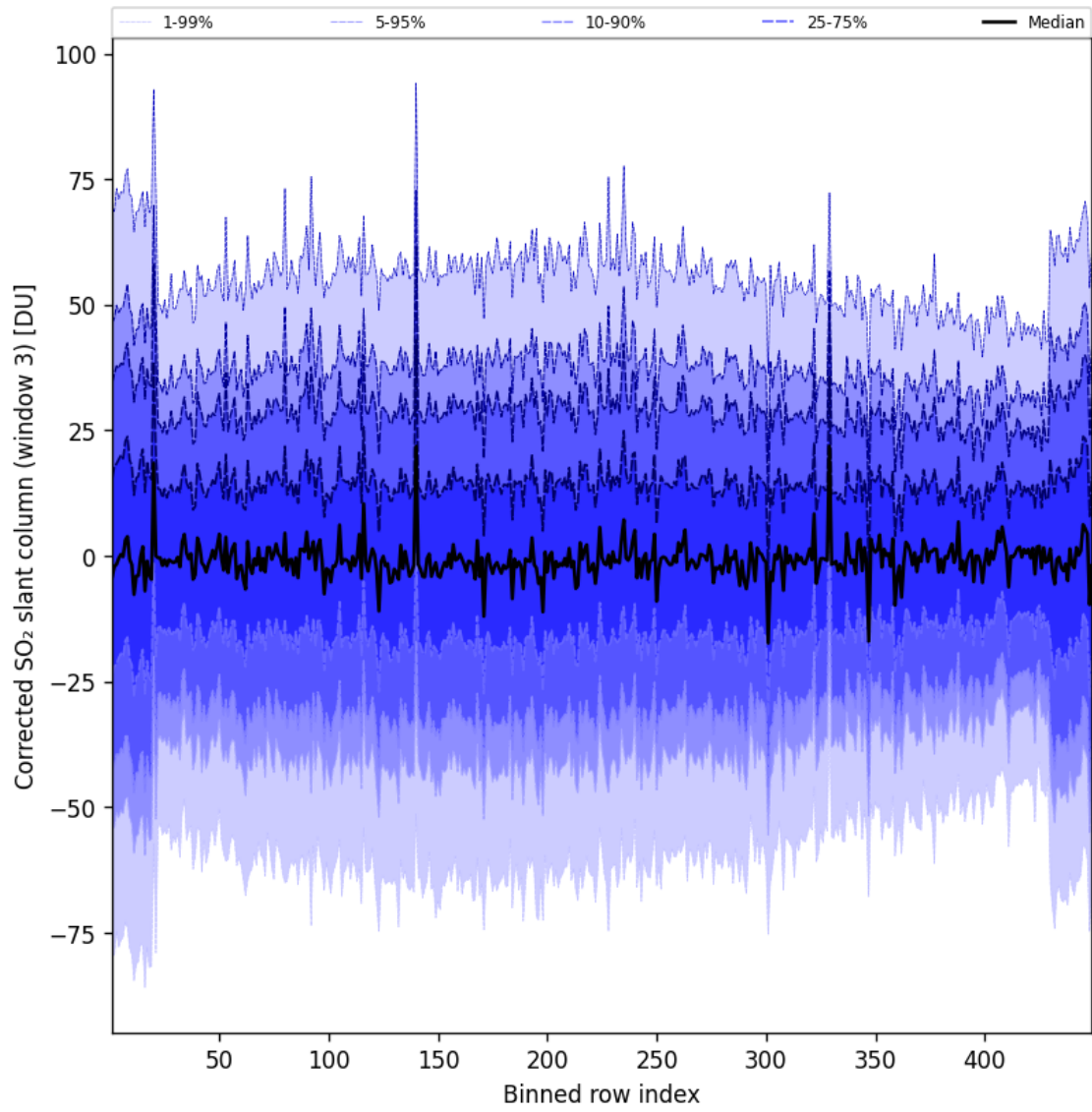


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-09-30 to 2025-10-01

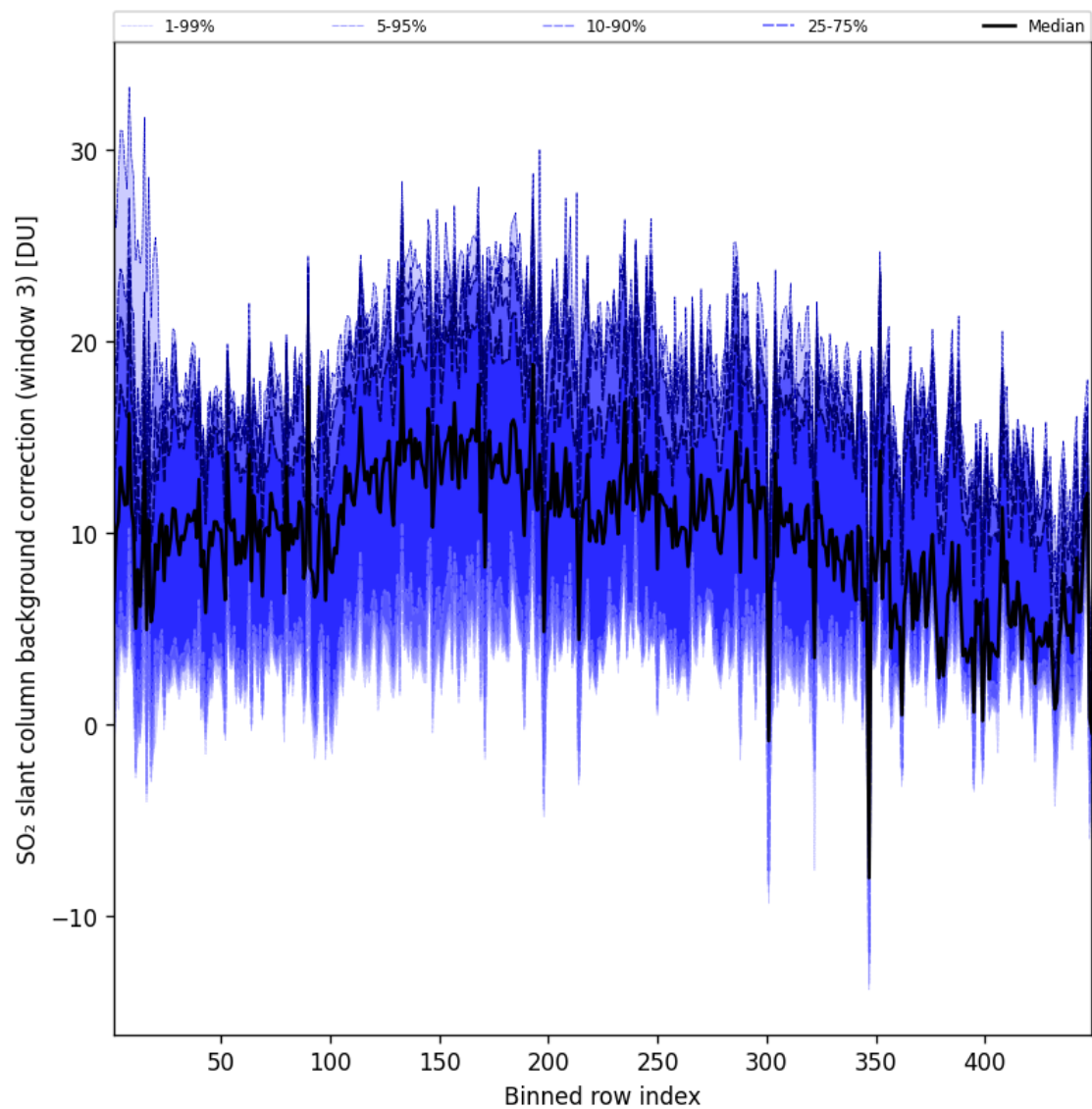


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-09-30 to 2025-10-01

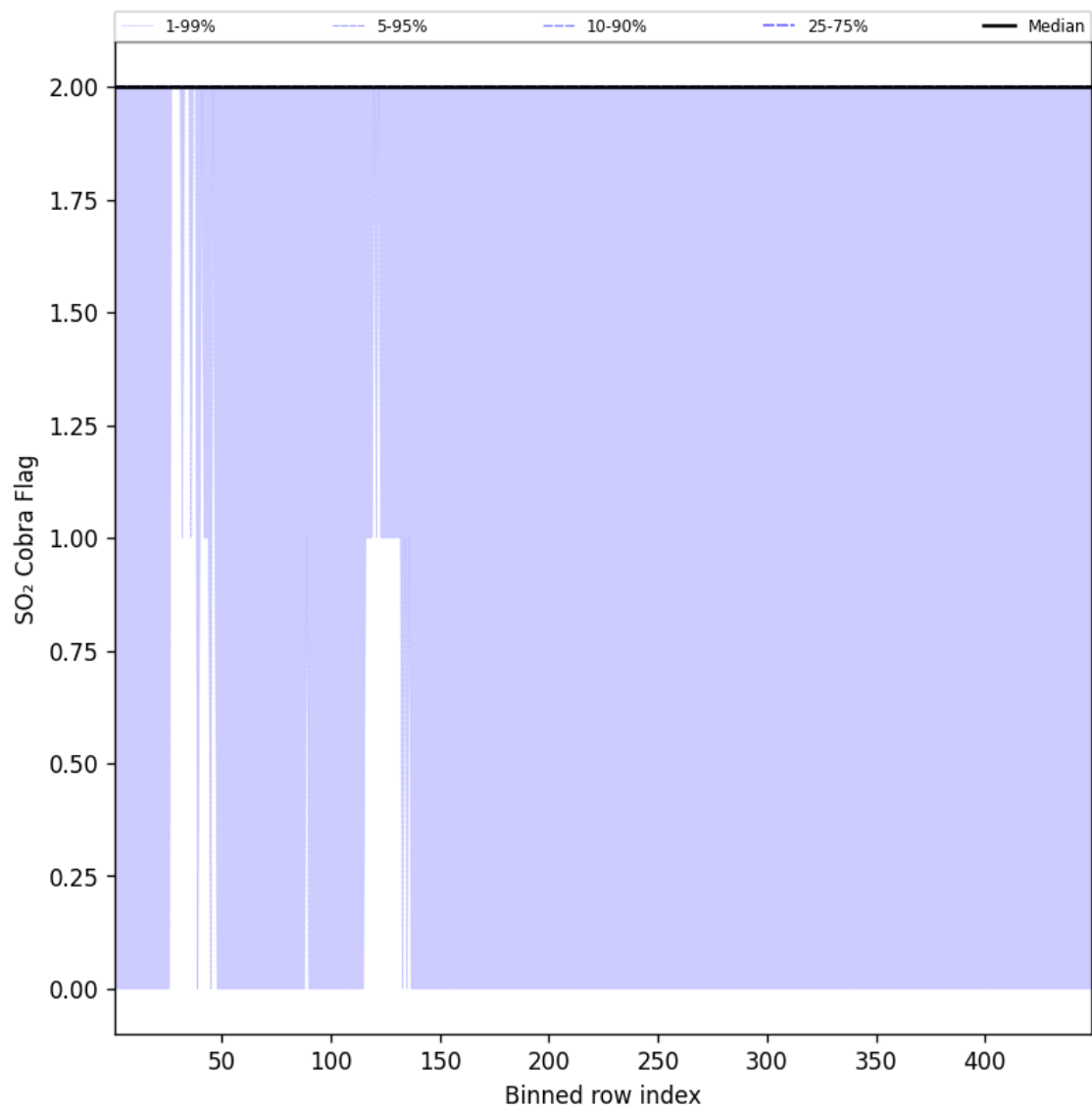


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-09-30 to 2025-10-01

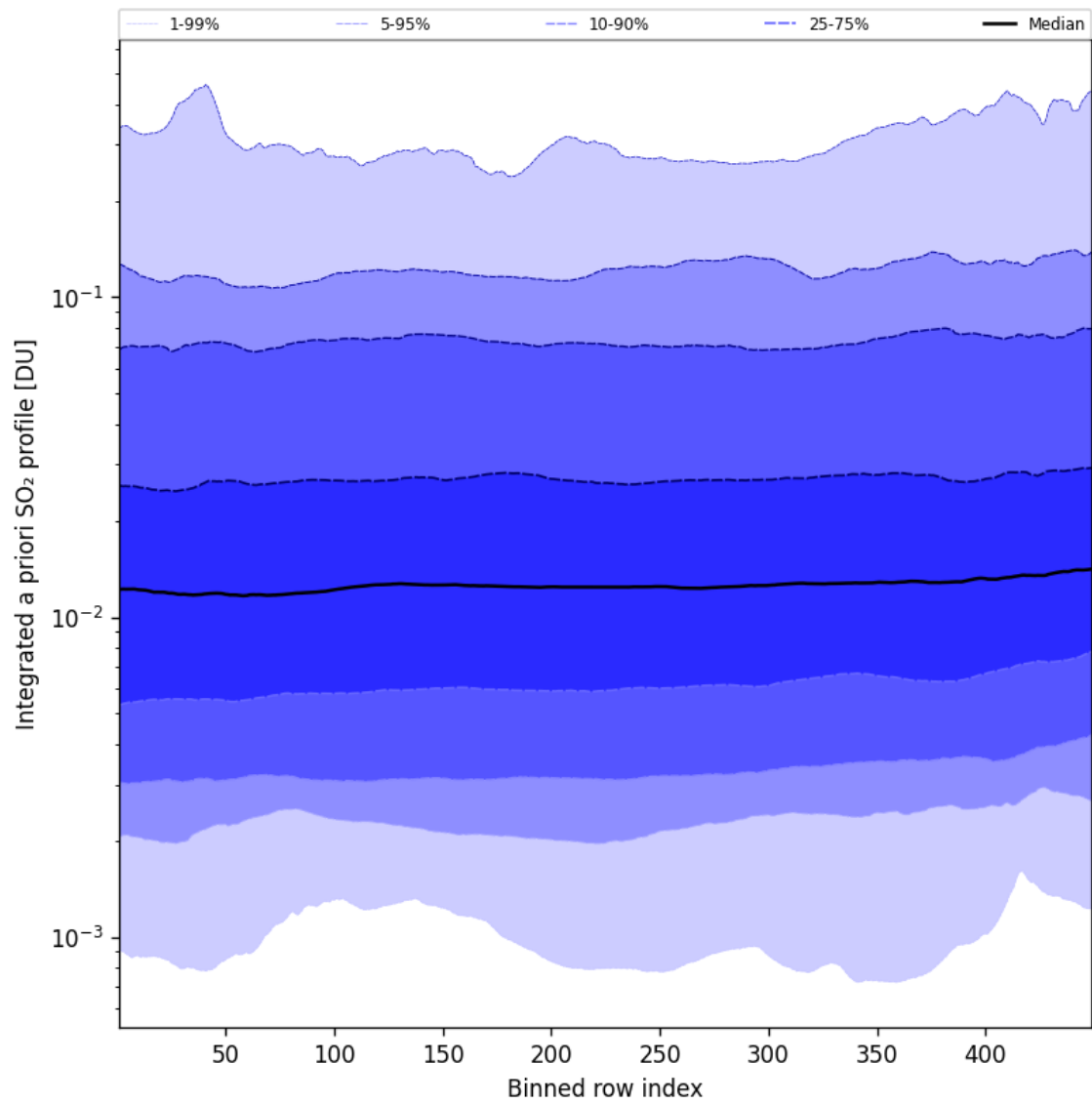


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-09-30 to 2025-10-01

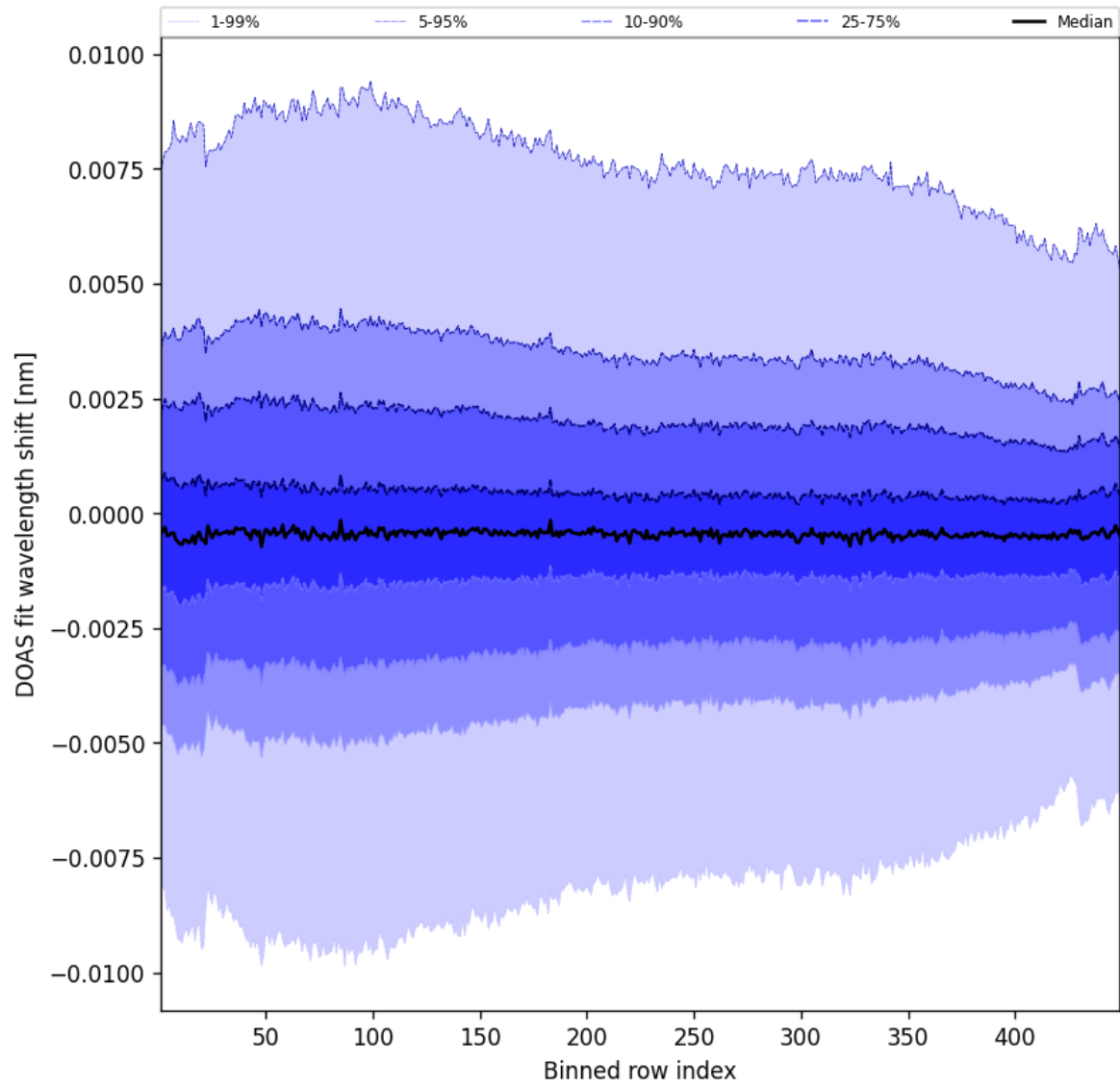


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-09-30 to 2025-10-01

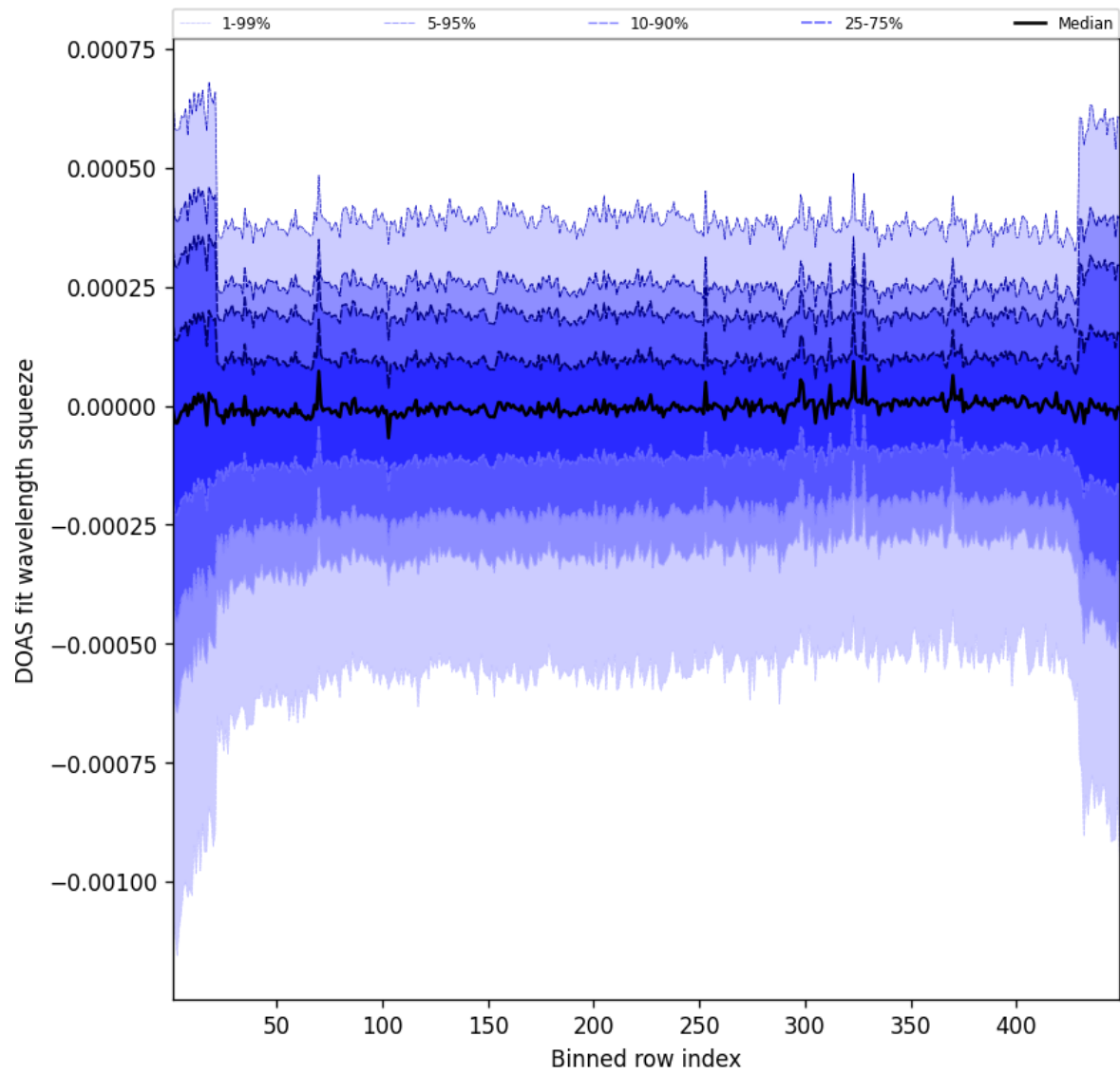


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-09-30 to 2025-10-01

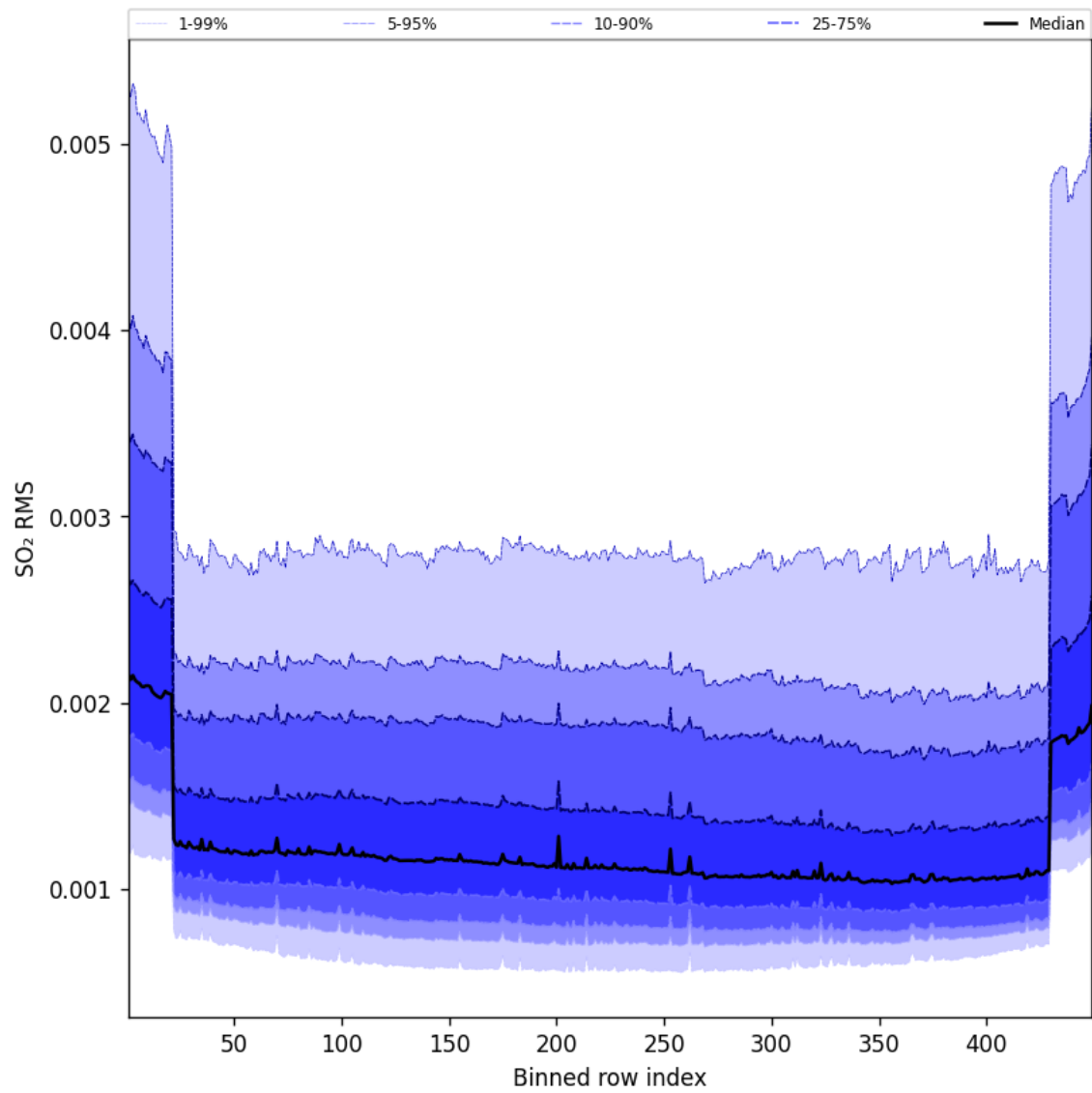


Figure 106: Along track statistics of “SO₂ RMS” for 2025-09-30 to 2025-10-01

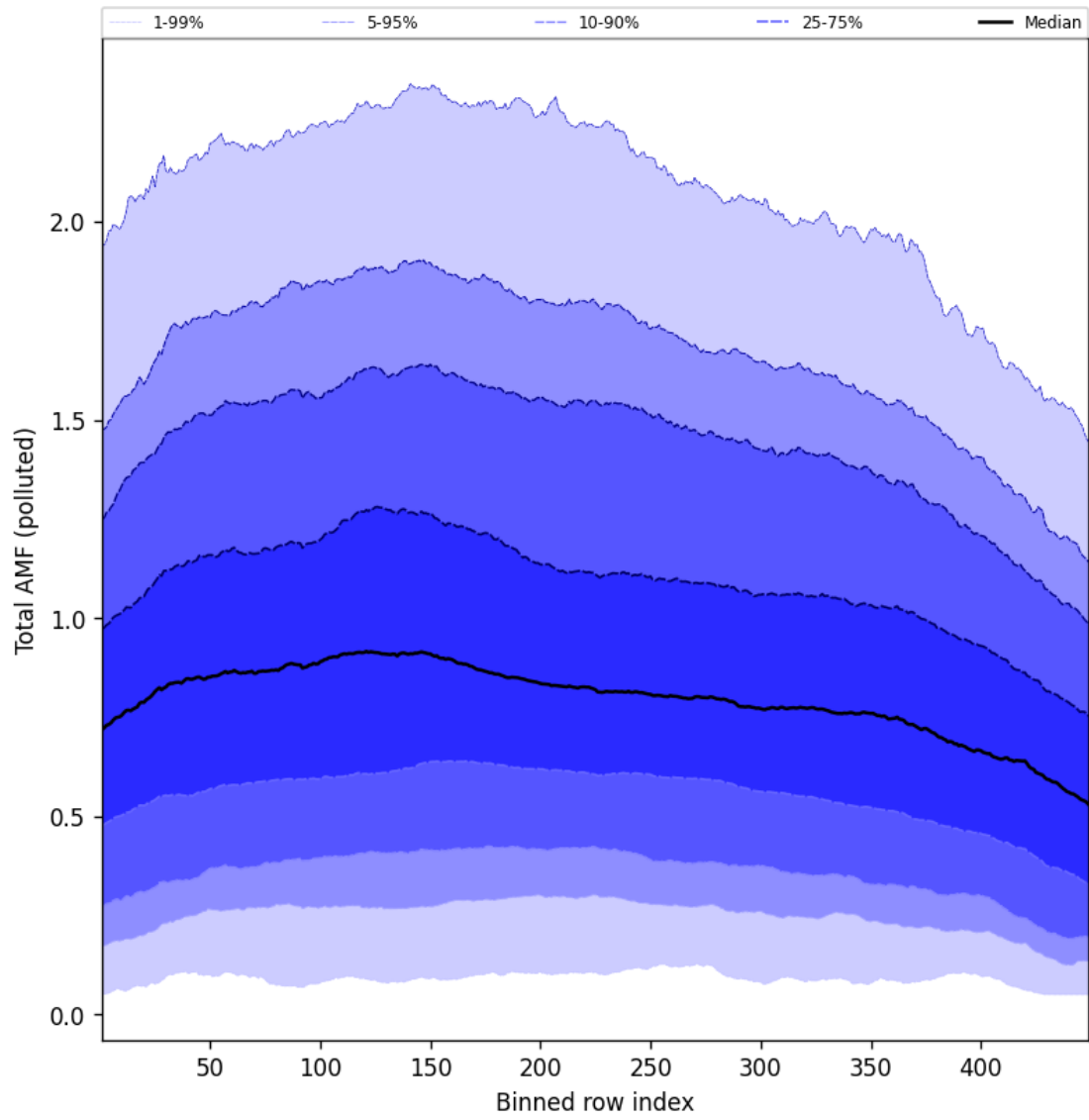


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-09-30 to 2025-10-01

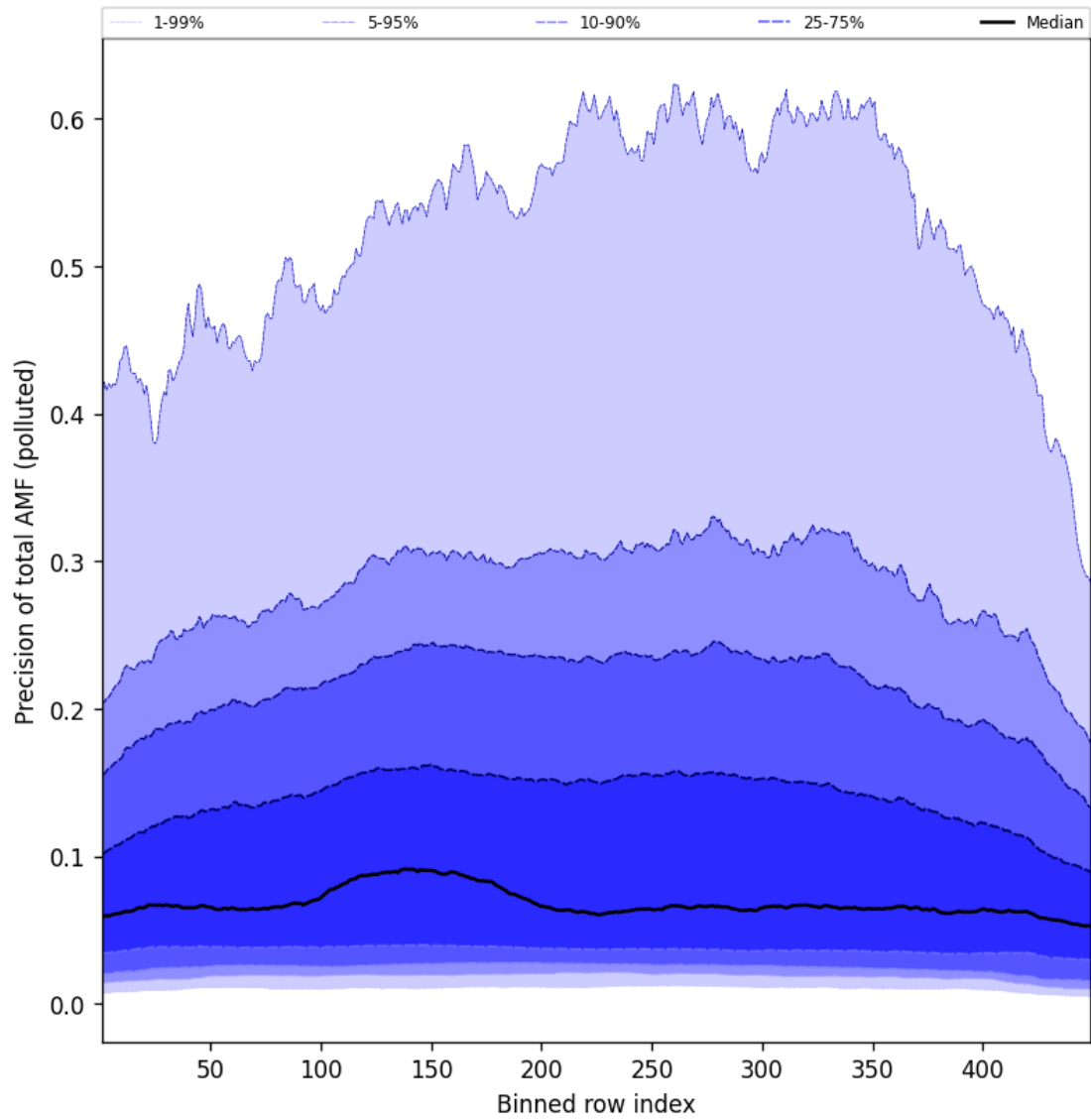


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-09-30 to 2025-10-01

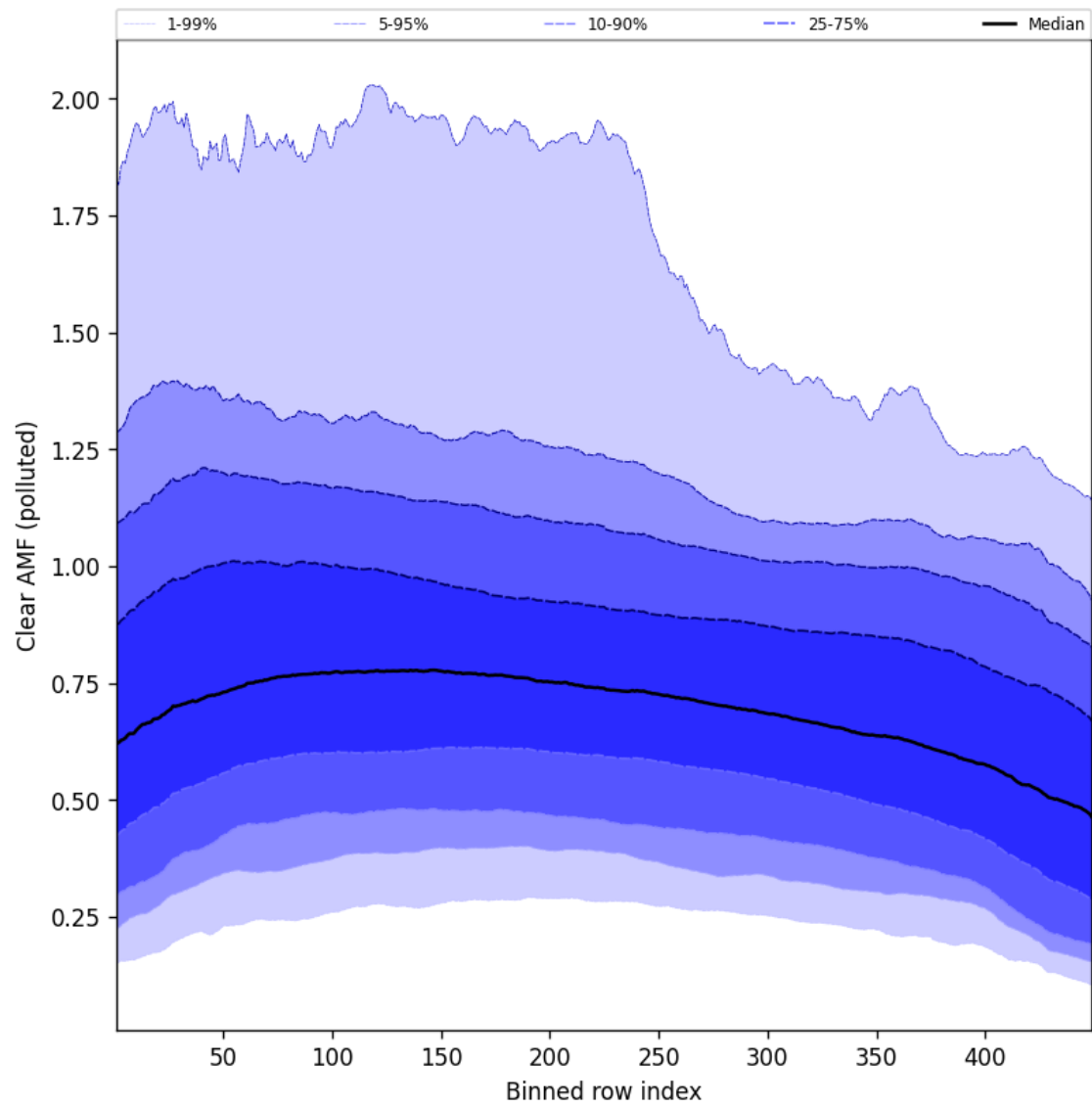


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-09-30 to 2025-10-01

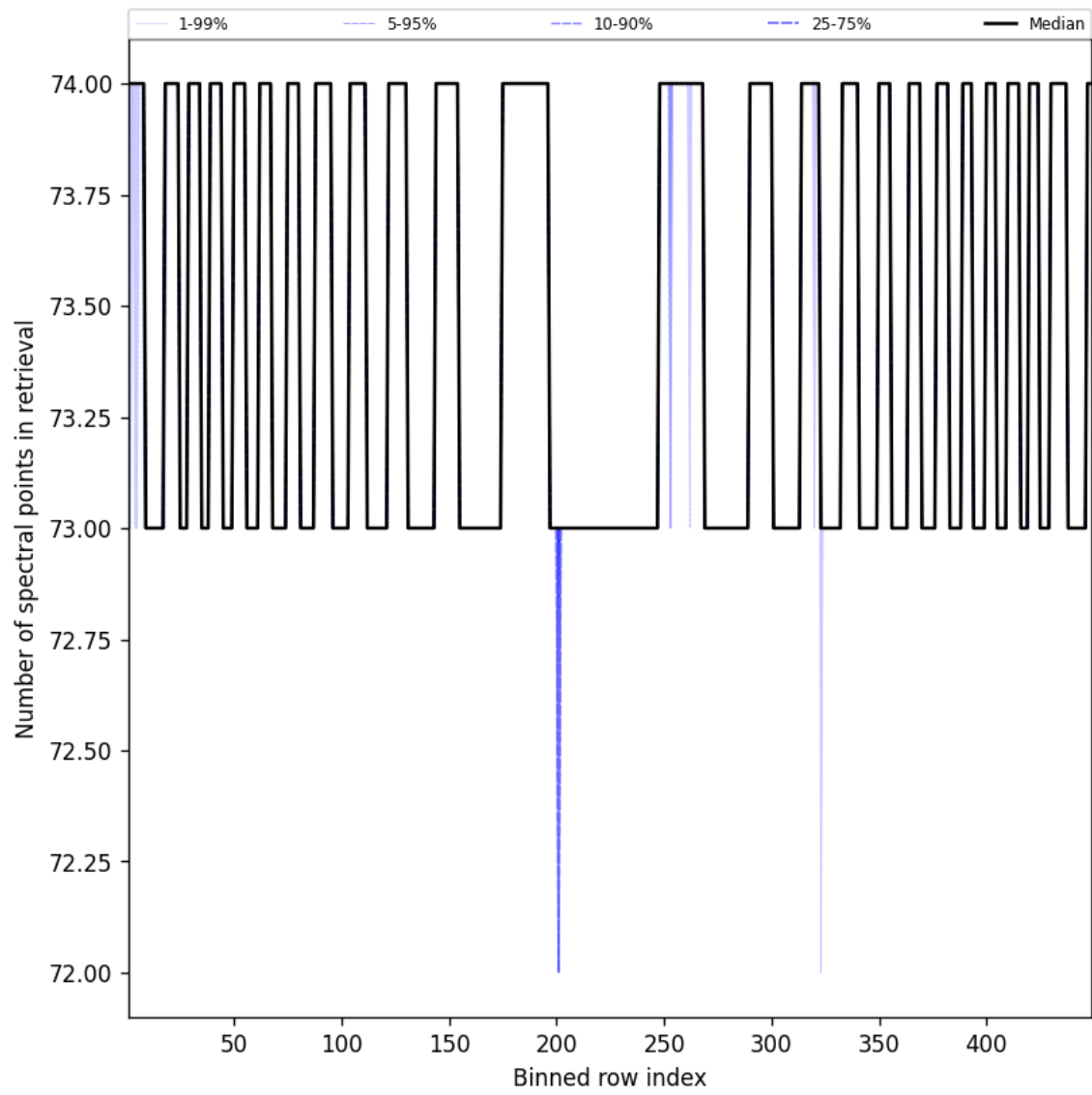


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-09-30 to 2025-10-01

10 Coincidence density

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

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