

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 $\frac{1}{2}$ 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]	0.657 ± 0.408	16952730	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.910 \pm 129.888) \times 10^{-2}$	16952730	0.263	0.468	9.764×10^{-3}	-89.6	398
sulfurdioxide total vertical column precision [DU]	0.591 ± 0.917	16952730	0.222	0.376	0.338	1.813×10^{-2}	89.1
sulfurdioxide slant column density corrected [DU]	$(2.049 \pm 50.901) \times 10^{-2}$	16952730	0.267	0.373	8.667×10^{-3}	-25.1	498
sulfurdioxide slant column density cobra [DU]	$(1.941 \pm 41.538) \times 10^{-2}$	16952730	0.267	0.373	8.667×10^{-3}	-25.1	48.9
sulfurdioxide slant column density cobra precision [DU]	0.295 ± 0.122	16952730	0.213	0.128	0.262	6.070×10^{-2}	28.4
sulfurdioxide slant column density window1 [DU]	0.173 ± 0.710	16952730	0.175	0.746	0.174	-81.8	70.9
sulfurdioxide slant column density window1 precision [DU]	0.295 ± 0.122	16952730	0.213	0.128	0.262	6.070×10^{-2}	28.4
sulfurdioxide slant column density corrected win1 [DU]	$(4.851 \pm 70.508) \times 10^{-2}$	16952730	2.500×10^{-2}	0.736	2.800×10^{-2}	-81.8	71.6
background so2 slant column offset window1 [DU]	-0.125 ± 0.133	16952730	-0.140	0.143	-0.140	-0.597	3.19
sulfurdioxide slant column density window2 [DU]	2.48 ± 9.17	16952730	2.25	11.7	2.32	-626	947
sulfurdioxide slant column density window2 precision [DU]	8.26 ± 2.23	16952730	7.43	2.60	7.93	2.25	371
sulfurdioxide slant column density corrected win2 [DU]	-0.686 ± 8.889	16952730	-0.250	11.3	-0.697	-628	940
background so2 slant column offset window2 [DU]	-3.16 ± 2.40	16952730	-0.750	3.86	-2.52	-12.6	3.35
sulfurdioxide slant column density window3 [DU]	-9.26 ± 24.36	16952730	-10.6	30.7	-9.32	-511	2.080×10^3
sulfurdioxide slant column density window3 precision [DU]	28.4 ± 13.3	16952730	22.5	9.91	25.1	8.73	526
sulfurdioxide slant column density corrected win3 [DU]	5.41 ± 23.67	16952730	5.04	29.7	5.43	-502	2.091×10^3
background so2 slant column offset window3 [DU]	14.7 ± 6.1	16952730	8.40	9.98	14.0	-9.36	40.7
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	16952730	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.400 \pm 7.029) \times 10^{-2}$	16952730	1.664×10^{-2}	1.937×10^{-2}	1.423×10^{-2}	4.897×10^{-4}	1.61
fitted radiance shift [nm]	$(-5.716 \pm 26.194) \times 10^{-4}$	16952730	-5.000×10^{-4}	1.910×10^{-3}	-5.855×10^{-4}	-4.276×10^{-2}	0.110
fitted radiance squeeze [1]	$(-6.265 \pm 175.938) \times 10^{-6}$	16952730	1.000×10^{-5}	2.058×10^{-4}	-2.262×10^{-6}	-1.606×10^{-2}	6.022×10^{-2}
fitted root mean square [1]	$(1.292 \pm 0.495) \times 10^{-3}$	16952730	1.025×10^{-3}	5.149×10^{-4}	1.165×10^{-3}	2.792×10^{-4}	6.044×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.870 ± 0.506	16952730	0.620	0.593	0.782	5.000×10^{-2}	3.59
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.107	16952730	3.500×10^{-2}	0.110	7.068×10^{-2}	2.500×10^{-3}	1.82
sulfurdioxide clear air mass factor polluted [1]	0.748 ± 0.411	16952730	0.620	0.383	0.686	4.878×10^{-2}	3.63
number of spectral points in retrieval [1]	73.4 ± 0.5	16952730	73.0	1.000	73.0	51.0	156

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	4.000×10^{-2}	0.110	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.88	-0.972	-0.573	-0.380	-0.221	0.248	0.420	0.636	1.09	3.39
sulfurdioxide total vertical column precision [DU]	8.601×10^{-2}	0.128	0.158	0.186	0.222	0.597	0.821	1.12	1.80	4.58
sulfurdioxide slant column density corrected [DU]	-0.840	-0.497	-0.363	-0.272	-0.176	0.196	0.297	0.395	0.545	0.984
sulfurdioxide slant column density cobra [DU]	-0.840	-0.497	-0.363	-0.272	-0.176	0.196	0.297	0.395	0.545	0.984
sulfurdioxide slant column density cobra precision [DU]	0.144	0.173	0.188	0.200	0.215	0.343	0.393	0.442	0.519	0.732
sulfurdioxide slant column density window1 [DU]	-1.58	-0.870	-0.590	-0.401	-0.202	0.544	0.737	0.920	1.19	1.92
sulfurdioxide slant column density window1 precision [DU]	0.144	0.173	0.188	0.200	0.215	0.343	0.393	0.442	0.519	0.732
sulfurdioxide slant column density corrected win1 [DU]	-1.58	-0.948	-0.696	-0.522	-0.335	0.401	0.602	0.796	1.09	1.90
background so2 slant column offset window1 [DU]	-0.368	-0.302	-0.268	-0.243	-0.210	-6.679×10^{-2}	-2.153×10^{-2}	3.470×10^{-2}	0.121	0.295
sulfurdioxide slant column density window2 [DU]	-19.0	-12.2	-8.82	-6.31	-3.47	8.26	11.3	14.0	17.6	25.3
sulfurdioxide slant column density window2 precision [DU]	4.40	5.32	5.85	6.27	6.77	9.37	10.2	11.1	12.3	14.9
sulfurdioxide slant column density corrected win2 [DU]	-22.1	-15.1	-11.7	-9.18	-6.36	4.96	7.79	10.3	13.8	20.9
background so2 slant column offset window2 [DU]	-8.83	-7.47	-6.71	-6.01	-5.05	-1.18	-0.844	-0.615	-0.325	0.820
sulfurdioxide slant column density window3 [DU]	-70.2	-49.0	-39.2	-32.2	-24.5	6.14	14.0	21.2	30.7	49.7
sulfurdioxide slant column density window3 precision [DU]	13.5	16.2	18.0	19.4	21.1	31.0	35.7	41.4	53.2	85.3
sulfurdioxide slant column density corrected win3 [DU]	-54.1	-33.4	-23.7	-16.8	-9.32	20.4	27.9	34.8	44.1	62.7
background so2 slant column offset window3 [DU]	2.72	6.57	7.68	8.46	9.52	19.5	21.5	23.1	24.9	27.9
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	1.765×10^{-3}	3.663×10^{-3}	4.944×10^{-3}	6.179×10^{-3}	8.018×10^{-3}	2.739×10^{-2}	4.334×10^{-2}	6.995×10^{-2}	0.138	0.359
fitted radiance shift [nm]	-8.315×10^{-3}	-4.347×10^{-3}	-3.007×10^{-3}	-2.242×10^{-3}	-1.569×10^{-3}	3.410×10^{-4}	1.016×10^{-3}	1.871×10^{-3}	3.390×10^{-3}	7.701×10^{-3}
fitted radiance squeeze [1]	-4.777×10^{-4}	-2.912×10^{-4}	-2.144×10^{-4}	-1.618×10^{-4}	-1.065×10^{-4}	9.931×10^{-5}	1.510×10^{-4}	1.986×10^{-4}	2.655×10^{-4}	4.194×10^{-4}
fitted root mean square [1]	6.001×10^{-4}	7.529×10^{-4}	8.333×10^{-4}	8.949×10^{-4}	9.702×10^{-4}	1.485×10^{-3}	1.702×10^{-3}	1.916×10^{-3}	2.238×10^{-3}	3.054×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.063×10^{-2}	0.201	0.310	0.407	0.524	1.12	1.32	1.53	1.82	2.59
sulfurdioxide total air mass factor polluted precision [1]	8.941×10^{-3}	1.652×10^{-2}	2.308×10^{-2}	2.877×10^{-2}	3.650×10^{-2}	0.147	0.188	0.228	0.296	0.510
sulfurdioxide clear air mass factor polluted [1]	0.184	0.282	0.356	0.424	0.505	0.889	0.997	1.11	1.31	2.74
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]	0.703 ± 0.399	7636600	0.700	1.000	0.0	1.000	0.300	1.000
sulfurdioxide total vertical column [DU]	$(6.041 \pm 168.353) \times 10^{-2}$	7636600	0.544	1.349×10^{-2}	-89.6	146	-0.253	0.291
sulfurdioxide total vertical column precision [DU]	0.747 ± 1.176	7636600	0.500	0.386	4.950×10^{-2}	55.8	0.244	0.744
sulfurdioxide slant column density corrected [DU]	$(2.901 \pm 62.005) \times 10^{-2}$	7636600	0.377	1.035×10^{-2}	-25.1	140	-0.176	0.201
sulfurdioxide slant column density cobra [DU]	$(2.679 \pm 48.942) \times 10^{-2}$	7636600	0.377	1.035×10^{-2}	-25.1	48.9	-0.176	0.201
sulfurdioxide slant column density cobra precision [DU]	0.299 ± 0.126	7636600	0.130	0.263	8.414×10^{-2}	28.4	0.218	0.348
sulfurdioxide slant column density window1 [DU]	0.213 ± 0.769	7636600	0.755	0.206	-7.76	57.3	-0.172	0.582
sulfurdioxide slant column density window1 precision [DU]	0.299 ± 0.126	7636600	0.130	0.263	8.414×10^{-2}	28.4	0.218	0.348
sulfurdioxide slant column density corrected win1 [DU]	$(6.195 \pm 76.575) \times 10^{-2}$	7636600	0.747	3.609×10^{-2}	-7.49	57.0	-0.332	0.415
background so2 slant column offset window1 [DU]	-0.151 ± 0.115	7636600	0.130	-0.157	-0.550	1.48	-0.225	-9.446×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.10 ± 9.51	7636600	12.1	1.89	-127	947	-4.06	8.02
sulfurdioxide slant column density window2 precision [DU]	8.67 ± 2.34	7636600	2.83	8.33	2.33	351	7.08	9.91
sulfurdioxide slant column density corrected win2 [DU]	-0.567 ± 9.263	7636600	11.8	-0.588	-129	940	-6.49	5.32
background so2 slant column offset window2 [DU]	-2.67 ± 2.13	7636600	2.73	-2.03	-12.6	3.17	-3.88	-1.15
sulfurdioxide slant column density window3 [DU]	-9.34 ± 26.01	7636600	32.7	-8.95	-208	197	-25.4	7.31
sulfurdioxide slant column density window3 precision [DU]	30.3 ± 14.2	7636600	10.9	26.8	9.42	251	22.5	33.4
sulfurdioxide slant column density corrected win3 [DU]	5.10 ± 25.36	7636600	32.0	5.31	-198	207	-10.7	21.3
background so2 slant column offset window3 [DU]	14.4 ± 5.9	7636600	9.52	13.4	-8.87	34.0	9.60	19.1
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	7636600	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.555 \pm 9.607) \times 10^{-2}$	7636600	3.948×10^{-2}	2.141×10^{-2}	4.897×10^{-4}	1.61	1.288×10^{-2}	5.236×10^{-2}
fitted radiance shift [nm]	$(-2.114 \pm 27.977) \times 10^{-4}$	7636600	1.815×10^{-3}	-2.563×10^{-4}	-4.276×10^{-2}	3.939×10^{-2}	-1.133×10^{-3}	6.816×10^{-4}
fitted radiance squeeze [1]	$(1.029 \pm 17.385) \times 10^{-5}$	7636600	2.068×10^{-4}	9.288×10^{-6}	-9.061×10^{-3}	3.079×10^{-3}	-9.351×10^{-5}	1.133×10^{-4}
fitted root mean square [1]	$(1.320 \pm 0.510) \times 10^{-3}$	7636600	5.505×10^{-4}	1.183×10^{-3}	2.792×10^{-4}	3.031×10^{-2}	9.820×10^{-4}	1.532×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.737 ± 0.392	7636600	0.544	0.713	5.000×10^{-2}	2.96	0.441	0.985
sulfurdioxide total air mass factor polluted precision [1]	$(9.823 \pm 12.152) \times 10^{-2}$	7636600	8.767×10^{-2}	5.539×10^{-2}	2.500×10^{-3}	1.82	3.158×10^{-2}	0.119
sulfurdioxide clear air mass factor polluted [1]	0.665 ± 0.287	7636600	0.443	0.656	4.878×10^{-2}	2.37	0.434	0.876
number of spectral points in retrieval [1]	73.4 ± 0.6	7636600	1.000	73.0	51.0	156	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.620 ± 0.411	9316130	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(2.163 \pm 86.374) \times 10^{-2}$	9316130	0.416	7.413×10^{-3}	-88.8	398	-0.198	0.218
sulfurdioxide total vertical column precision [DU]	0.462 ± 0.599	9316130	0.314	0.309	1.813×10^{-2}	89.1	0.203	0.517
sulfurdioxide slant column density corrected [DU]	$(1.351 \pm 39.524) \times 10^{-2}$	9316130	0.369	7.311×10^{-3}	-10.3	498	-0.176	0.193
sulfurdioxide slant column density cobra [DU]	$(1.335 \pm 34.286) \times 10^{-2}$	9316130	0.369	7.311×10^{-3}	-10.3	27.1	-0.176	0.193
sulfurdioxide slant column density cobra precision [DU]	0.292 ± 0.119	9316130	0.126	0.261	6.070×10^{-2}	21.4	0.213	0.340
sulfurdioxide slant column density window1 [DU]	0.141 ± 0.656	9316130	0.739	0.149	-81.8	70.9	-0.225	0.513
sulfurdioxide slant column density window1 precision [DU]	0.292 ± 0.119	9316130	0.126	0.261	6.070×10^{-2}	21.4	0.213	0.340
sulfurdioxide slant column density corrected win1 [DU]	$(3.749 \pm 65.094) \times 10^{-2}$	9316130	0.728	2.153×10^{-2}	-81.8	71.6	-0.338	0.390
background so2 slant column offset window1 [DU]	-0.103 ± 0.142	9316130	0.152	-0.122	-0.597	3.19	-0.195	-4.285×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.78 ± 8.88	9316130	11.4	2.66	-626	867	-2.98	8.43
sulfurdioxide slant column density window2 precision [DU]	7.92 ± 2.08	9316130	2.34	7.63	2.25	371	6.58	8.92
sulfurdioxide slant column density corrected win2 [DU]	-0.784 ± 8.569	9316130	11.0	-0.780	-628	864	-6.26	4.69
background so2 slant column offset window2 [DU]	-3.57 ± 2.53	9316130	4.43	-3.34	-11.8	3.35	-5.67	-1.24
sulfurdioxide slant column density window3 [DU]	-9.19 ± 22.93	9316130	29.1	-9.58	-511	2.080×10^3	-23.9	5.21
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 12.4	9316130	8.58	23.8	8.73	526	20.2	28.8
sulfurdioxide slant column density corrected win3 [DU]	5.67 ± 22.19	9316130	27.9	5.52	-502	2.091×10^3	-8.31	19.6
background so2 slant column offset window3 [DU]	14.9 ± 6.2	9316130	10.4	14.6	-9.36	40.7	9.43	19.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	9316130	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.633 \pm 2.706) \times 10^{-2}$	9316130	1.085×10^{-2}	1.012×10^{-2}	5.905×10^{-4}	1.51	6.402×10^{-3}	1.725×10^{-2}
fitted radiance shift [nm]	$(-8.668 \pm 24.240) \times 10^{-4}$	9316130	1.841×10^{-3}	-8.659×10^{-4}	-4.149×10^{-2}	0.110	-1.831×10^{-3}	9.888×10^{-6}
fitted radiance squeeze [1]	$(-1.983 \pm 17.648) \times 10^{-5}$	9316130	2.051×10^{-4}	-1.165×10^{-5}	-1.606×10^{-2}	6.022×10^{-2}	-1.171×10^{-4}	8.799×10^{-5}
fitted root mean square [1]	$(1.269 \pm 0.481) \times 10^{-3}$	9316130	4.899×10^{-4}	1.151×10^{-3}	3.099×10^{-4}	6.044×10^{-2}	9.613×10^{-4}	1.451×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.979 ± 0.560	9316130	0.678	0.847	5.000×10^{-2}	3.59	0.588	1.27
sulfurdioxide total air mass factor polluted precision [1]	0.115 ± 0.093	9316130	0.123	9.078×10^{-2}	3.042×10^{-3}	1.49	4.078×10^{-2}	0.164
sulfurdioxide clear air mass factor polluted [1]	0.815 ± 0.480	9316130	0.348	0.705	8.189×10^{-2}	3.63	0.553	0.900
number of spectral points in retrieval [1]	73.4 ± 0.5	9316130	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]	0.665 ± 0.404	12341745	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(3.571 \pm 112.560) \times 10^{-2}$	12341745	0.442	9.311×10^{-3}	-88.8	278	-0.209	0.233
sulfurdioxide total vertical column precision [DU]	0.521 ± 0.767	12341745	0.320	0.315	2.817×10^{-2}	89.1	0.217	0.537
sulfurdioxide slant column density corrected [DU]	$(2.096 \pm 53.112) \times 10^{-2}$	12341745	0.366	8.372×10^{-3}	-25.1	291	-0.173	0.193
sulfurdioxide slant column density cobra [DU]	$(1.954 \pm 42.950) \times 10^{-2}$	12341745	0.366	8.372×10^{-3}	-25.1	48.9	-0.173	0.193
sulfurdioxide slant column density cobra precision [DU]	0.291 ± 0.121	12341745	0.125	0.257	7.489×10^{-2}	28.4	0.212	0.337
sulfurdioxide slant column density window1 [DU]	0.169 ± 0.717	12341745	0.733	0.171	-81.8	70.9	-0.199	0.534
sulfurdioxide slant column density window1 precision [DU]	0.291 ± 0.121	12341745	0.125	0.257	7.489×10^{-2}	28.4	0.212	0.337
sulfurdioxide slant column density corrected win1 [DU]	$(5.053 \pm 71.208) \times 10^{-2}$	12341745	0.723	2.919×10^{-2}	-81.8	71.6	-0.328	0.395
background so2 slant column offset window1 [DU]	-0.119 ± 0.138	12341745	0.146	-0.137	-0.597	3.19	-0.206	-6.032×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.57 ± 8.96	12341745	11.5	2.41	-626	947	-3.27	8.24
sulfurdioxide slant column density window2 precision [DU]	8.04 ± 2.09	12341745	2.43	7.75	2.29	371	6.66	9.08
sulfurdioxide slant column density corrected win2 [DU]	-0.681 ± 8.664	12341745	11.1	-0.693	-628	940	-6.24	4.85
background so2 slant column offset window2 [DU]	-3.25 ± 2.45	12341745	4.07	-2.62	-12.6	3.35	-5.24	-1.18
sulfurdioxide slant column density window3 [DU]	-6.89 ± 23.62	12341745	30.0	-7.29	-511	2.080×10^3	-22.0	8.02
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 12.1	12341745	8.95	24.4	8.73	526	20.7	29.7
sulfurdioxide slant column density corrected win3 [DU]	7.57 ± 22.72	12341745	28.8	7.23	-502	2.091×10^3	-6.92	21.9
background so2 slant column offset window3 [DU]	14.5 ± 5.9	12341745	9.68	13.9	-9.36	40.7	9.44	19.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	12341745	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.969 \pm 3.233) \times 10^{-2}$	12341745	1.263×10^{-2}	1.245×10^{-2}	5.097×10^{-4}	1.61	7.658×10^{-3}	2.029×10^{-2}
fitted radiance shift [nm]	$(-5.962 \pm 24.402) \times 10^{-4}$	12341745	1.942×10^{-3}	-5.885×10^{-4}	-4.149×10^{-2}	0.110	-1.616×10^{-3}	3.261×10^{-4}
fitted radiance squeeze [1]	$(-1.103 \pm 17.404) \times 10^{-5}$	12341745	2.021×10^{-4}	-4.815×10^{-6}	-1.606×10^{-2}	6.022×10^{-2}	-1.080×10^{-4}	9.411×10^{-5}
fitted root mean square [1]	$(1.270 \pm 0.493) \times 10^{-3}$	12341745	4.921×10^{-4}	1.141×10^{-3}	2.792×10^{-4}	6.044×10^{-2}	9.558×10^{-4}	1.448×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.886 ± 0.454	12341745	0.559	0.825	5.000×10^{-2}	3.00	0.572	1.13
sulfurdioxide total air mass factor polluted precision [1]	0.103 ± 0.090	12341745	0.102	7.163×10^{-2}	3.042×10^{-3}	1.16	3.963×10^{-2}	0.142
sulfurdioxide clear air mass factor polluted [1]	0.749 ± 0.312	12341745	0.352	0.713	6.571×10^{-2}	3.00	0.547	0.900
number of spectral points in retrieval [1]	73.4 ± 0.5	12341745	1.000	73.0	51.0	156	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.662 ± 0.410	3671700	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(4.071 \pm 144.271) \times 10^{-2}$	3671700	0.526	9.591×10^{-3}	-89.6	128	-0.246	0.280
sulfurdioxide total vertical column precision [DU]	0.696 ± 1.063	3671700	0.496	0.401	1.813×10^{-2}	30.8	0.236	0.732
sulfurdioxide slant column density corrected [DU]	$(1.731 \pm 36.813) \times 10^{-2}$	3671700	0.384	8.565×10^{-3}	-9.34	48.1	-0.182	0.202
sulfurdioxide slant column density cobra [DU]	$(1.725 \pm 36.462) \times 10^{-2}$	3671700	0.384	8.565×10^{-3}	-9.34	22.8	-0.182	0.202
sulfurdioxide slant column density cobra precision [DU]	0.301 ± 0.116	3671700	0.125	0.271	6.070×10^{-2}	10.4	0.223	0.348
sulfurdioxide slant column density window1 [DU]	0.185 ± 0.677	3671700	0.773	0.183	-27.5	28.6	-0.204	0.570
sulfurdioxide slant column density window1 precision [DU]	0.301 ± 0.116	3671700	0.125	0.271	6.070×10^{-2}	10.4	0.223	0.348
sulfurdioxide slant column density corrected win1 [DU]	$(3.771 \pm 67.037) \times 10^{-2}$	3671700	0.761	2.076×10^{-2}	-27.5	28.4	-0.354	0.407
background so2 slant column offset window1 [DU]	-0.148 ± 0.114	3671700	0.135	-0.152	-0.576	0.860	-0.223	-8.768×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.04 ± 9.65	3671700	12.3	1.90	-478	867	-4.17	8.10
sulfurdioxide slant column density window2 precision [DU]	8.79 ± 2.46	3671700	2.88	8.44	2.25	325	7.16	10.0
sulfurdioxide slant column density corrected win2 [DU]	-0.674 ± 9.414	3671700	11.9	-0.685	-483	864	-6.65	5.29
background so2 slant column offset window2 [DU]	-2.71 ± 2.13	3671700	2.82	-2.14	-12.6	3.35	-3.96	-1.14
sulfurdioxide slant column density window3 [DU]	-15.7 ± 25.1	3671700	31.5	-15.2	-484	172	-31.2	0.269
sulfurdioxide slant column density window3 precision [DU]	31.4 ± 16.1	3671700	11.7	27.2	10.0	251	22.4	34.1
sulfurdioxide slant column density corrected win3 [DU]	-0.945 ± 25.059	3671700	31.4	-0.463	-475	186	-16.4	15.0
background so2 slant column offset window3 [DU]	14.8 ± 6.4	3671700	10.5	13.6	-9.36	40.4	9.48	20.0
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.26	3671700	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.020 \pm 11.272) \times 10^{-2}$	3671700	6.507×10^{-2}	2.801×10^{-2}	4.897×10^{-4}	1.54	1.065×10^{-2}	7.571×10^{-2}
fitted radiance shift [nm]	$(-5.350 \pm 30.998) \times 10^{-4}$	3671700	1.770×10^{-3}	-6.105×10^{-4}	-4.276×10^{-2}	3.939×10^{-2}	-1.455×10^{-3}	3.147×10^{-4}
fitted radiance squeeze [1]	$(2.648 \pm 177.157) \times 10^{-6}$	3671700	2.145×10^{-4}	1.945×10^{-6}	-1.386×10^{-2}	9.416×10^{-3}	-1.049×10^{-4}	1.096×10^{-4}
fitted root mean square [1]	$(1.326 \pm 0.476) \times 10^{-3}$	3671700	5.136×10^{-4}	1.214×10^{-3}	3.099×10^{-4}	4.016×10^{-2}	1.013×10^{-3}	1.526×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.865 ± 0.648	3671700	0.644	0.681	5.000×10^{-2}	3.59	0.437	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.121 ± 0.144	3671700	0.135	6.781×10^{-2}	2.500×10^{-3}	1.82	2.987×10^{-2}	0.165
sulfurdioxide clear air mass factor polluted [1]	0.781 ± 0.643	3671700	0.440	0.613	4.878×10^{-2}	3.63	0.409	0.849
number of spectral points in retrieval [1]	73.4 ± 0.5	3671700	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

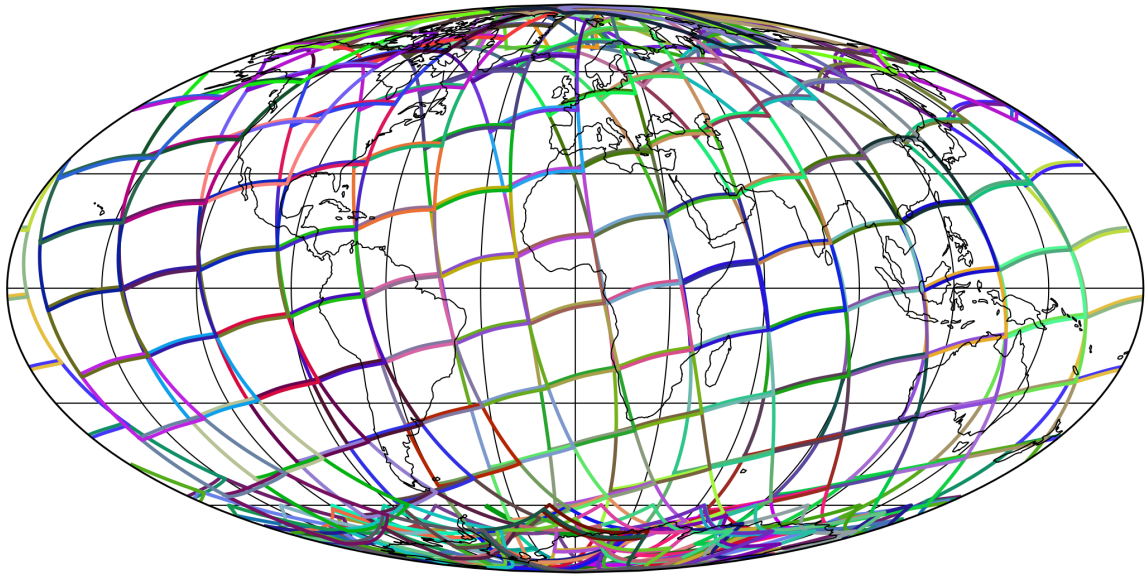


Figure 1: Outline of the granules.

4 Input data monitoring

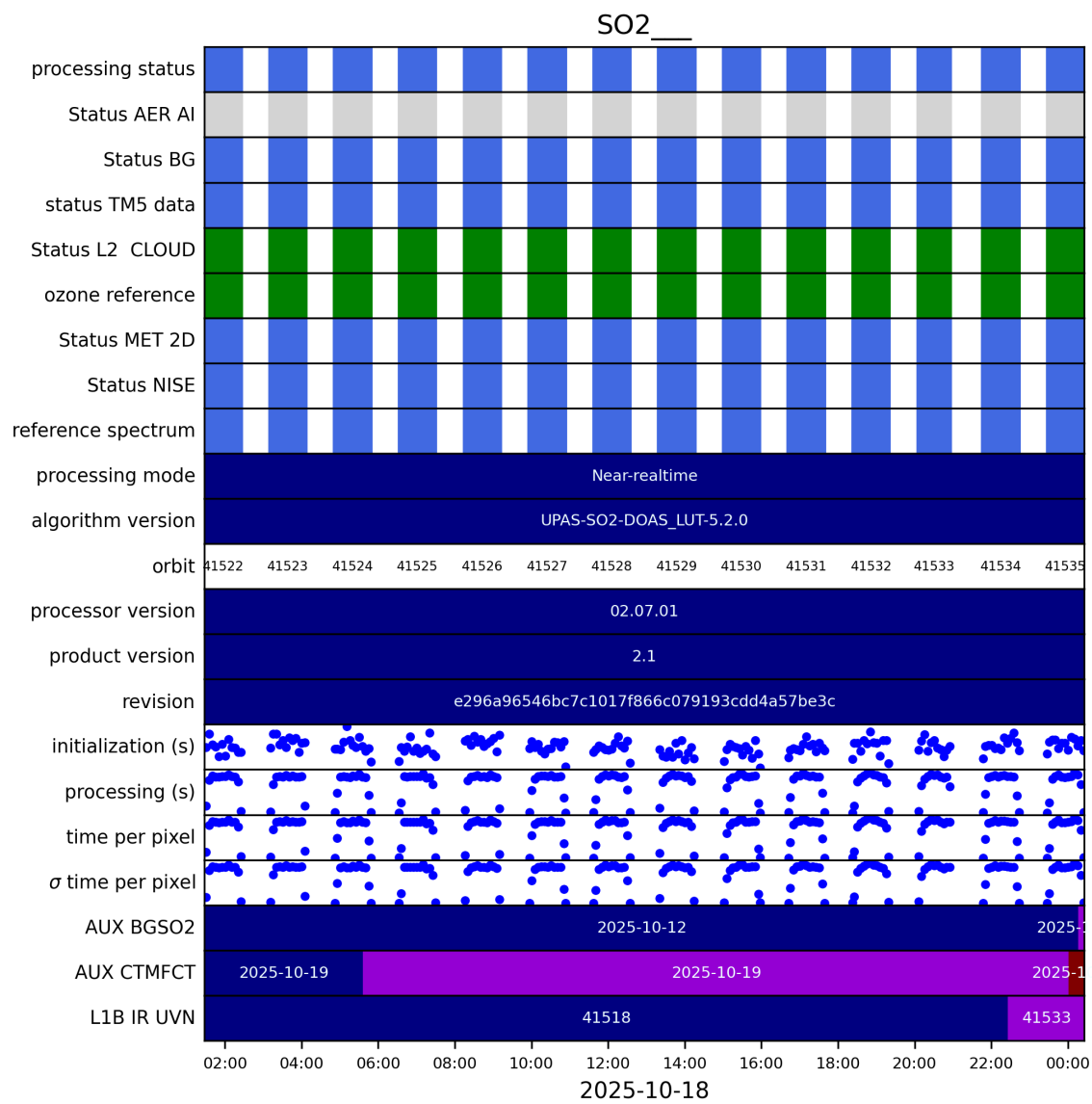


Figure 2: Input data per granule

5 Warnings and errors

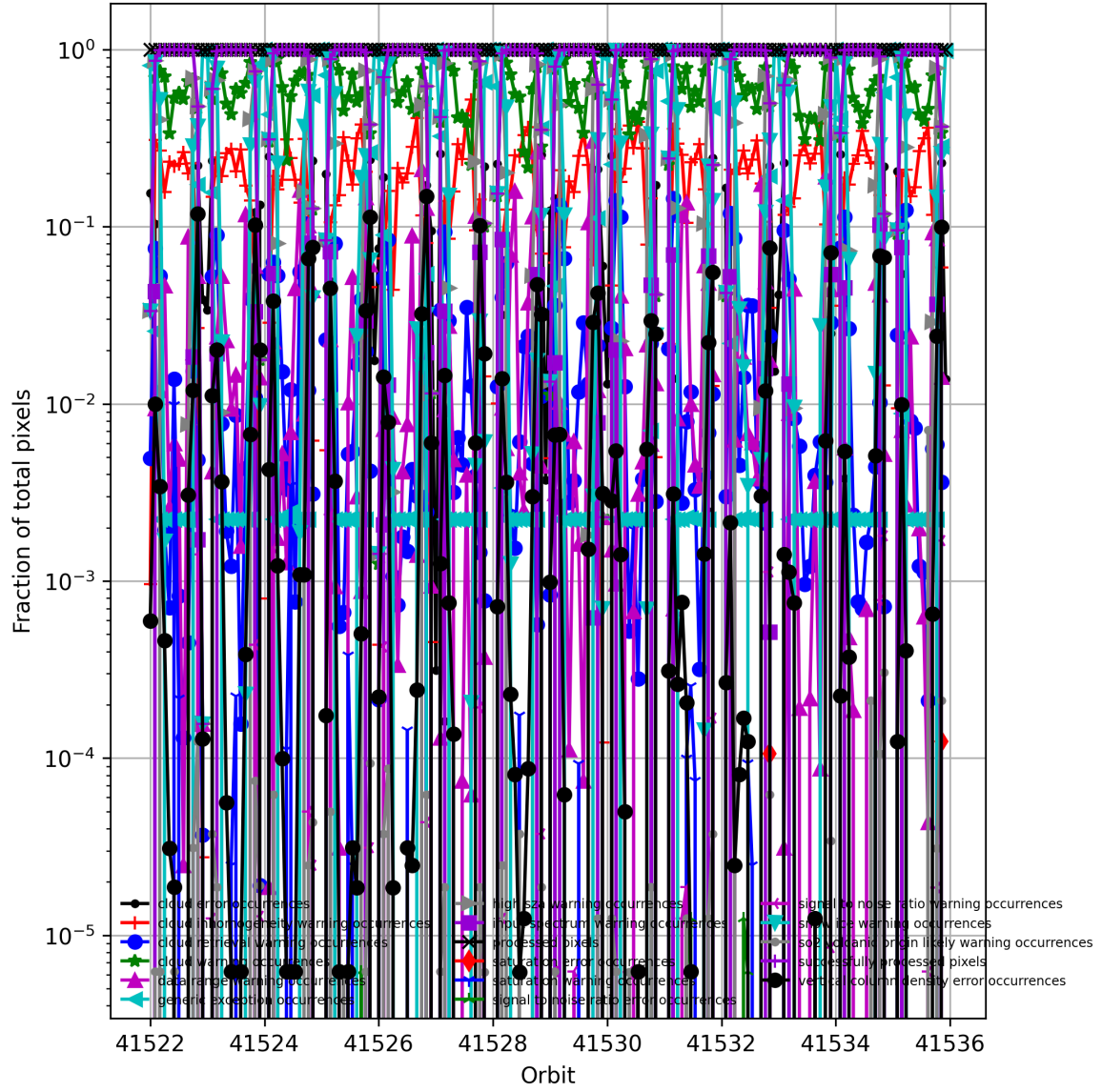


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

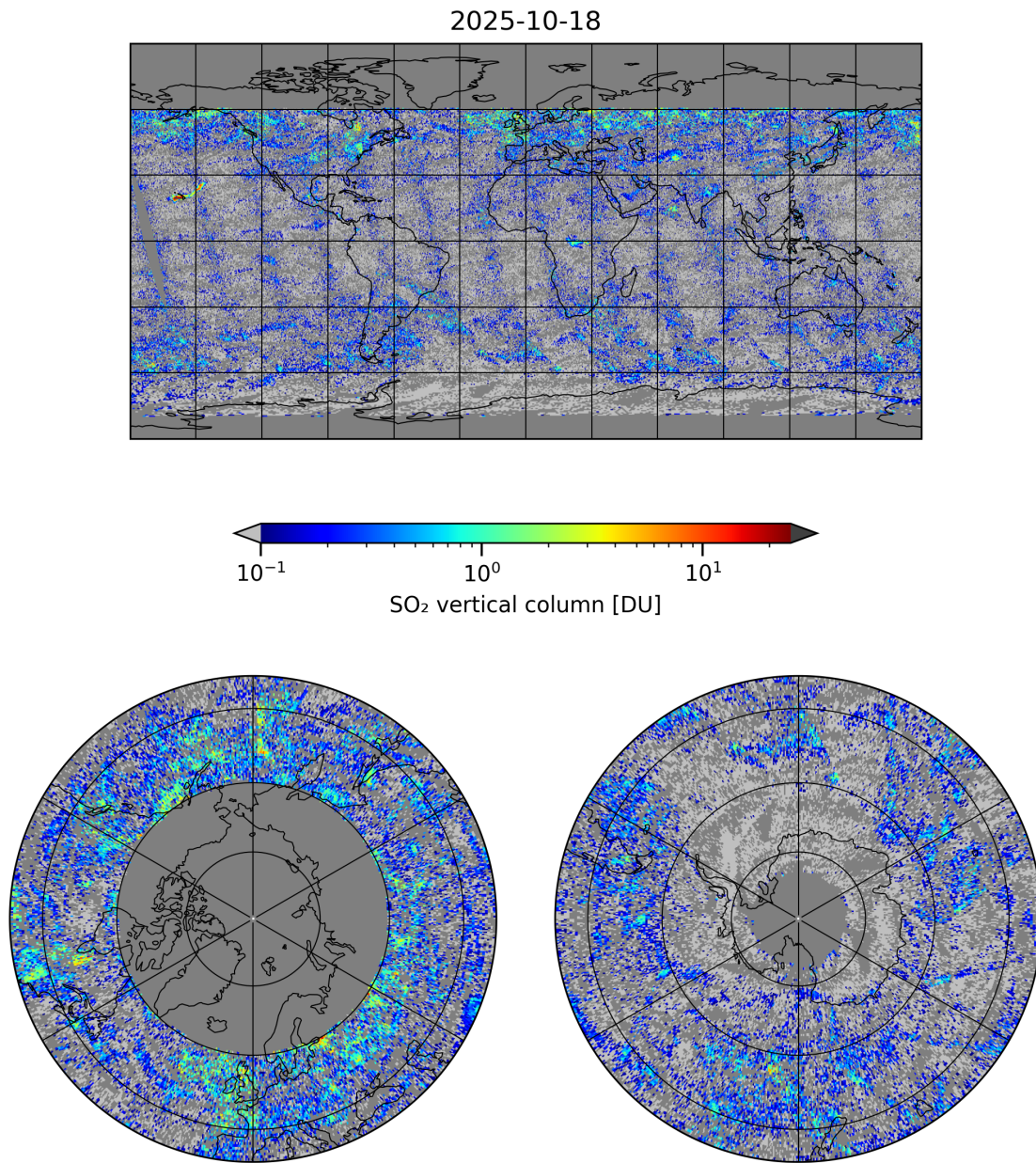


Figure 4: Map of “SO₂ vertical column” for 2025-10-18 to 2025-10-19

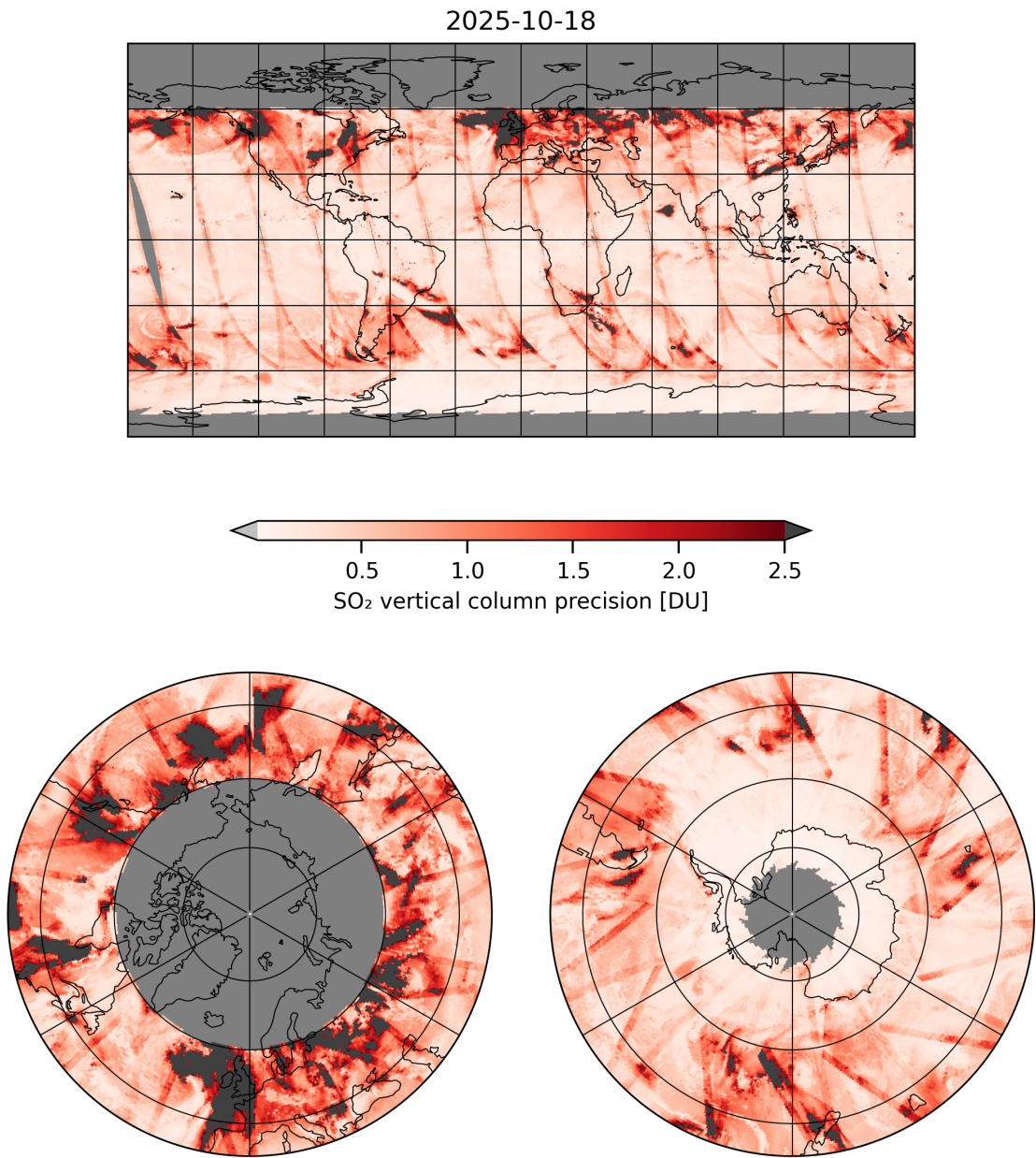


Figure 5: Map of “SO₂ vertical column precision” for 2025-10-18 to 2025-10-19

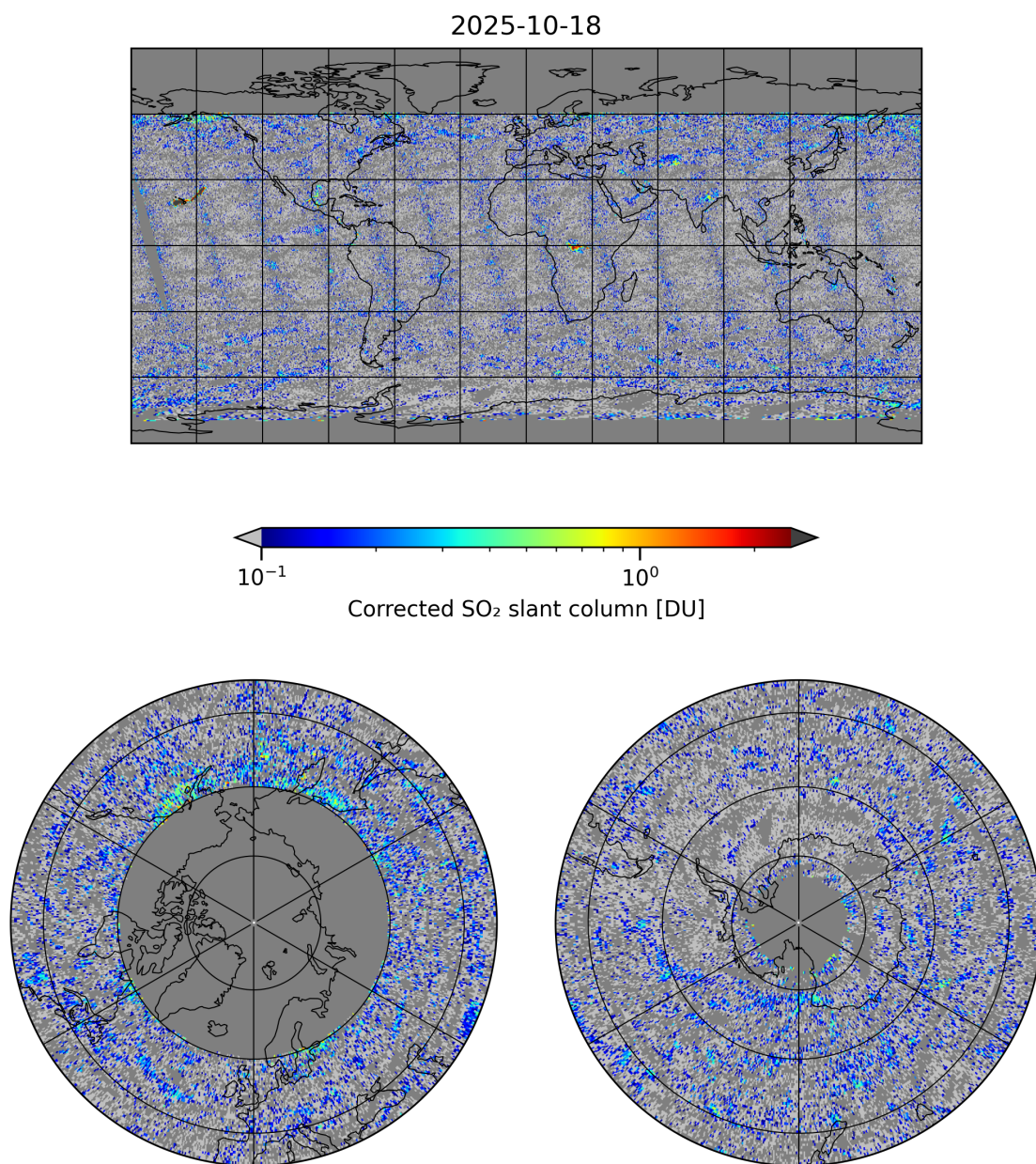


Figure 6: Map of “Corrected SO₂ slant column” for 2025-10-18 to 2025-10-19

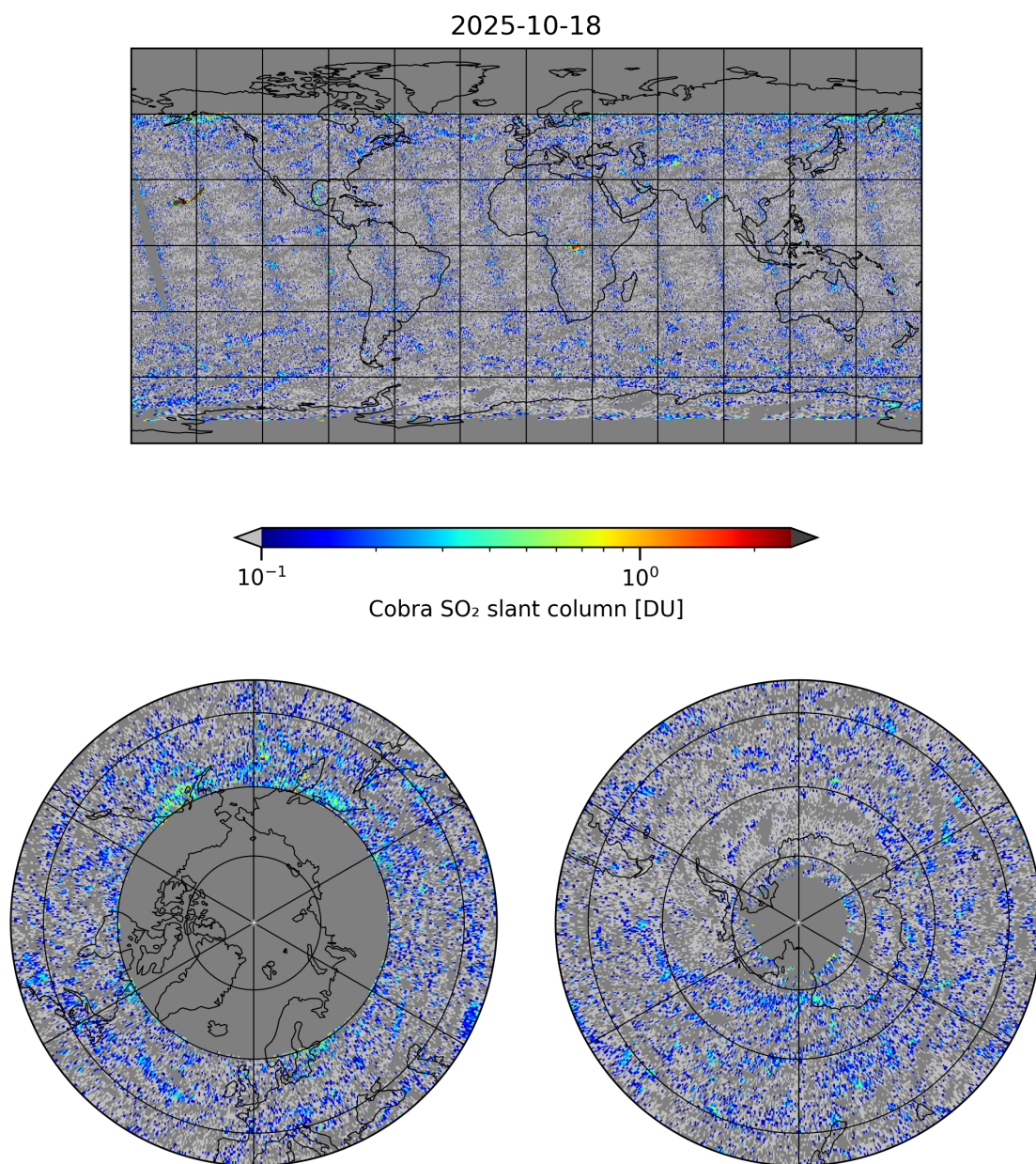


Figure 7: Map of “Cobra SO₂ slant column” for 2025-10-18 to 2025-10-19

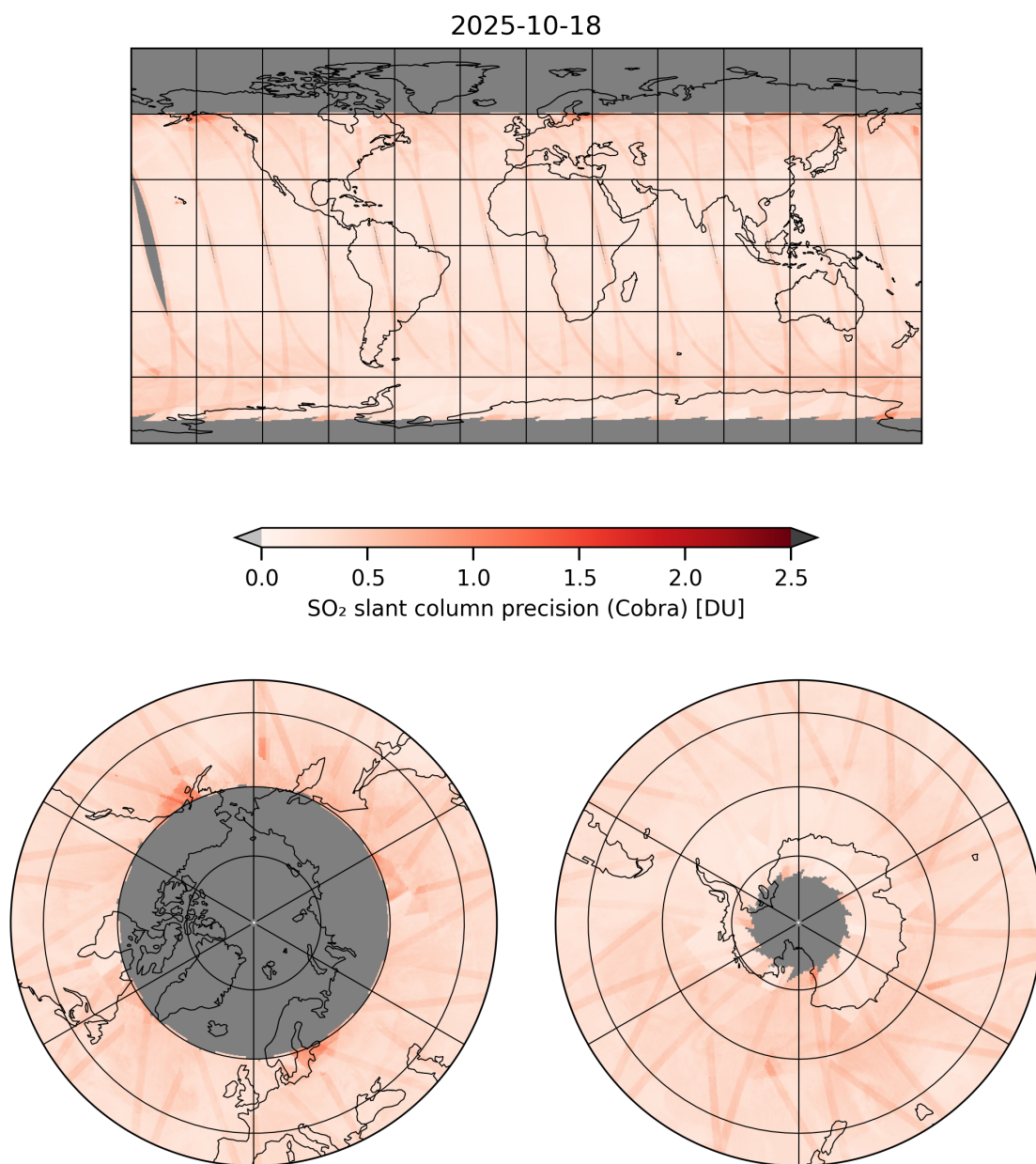


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-10-18 to 2025-10-19

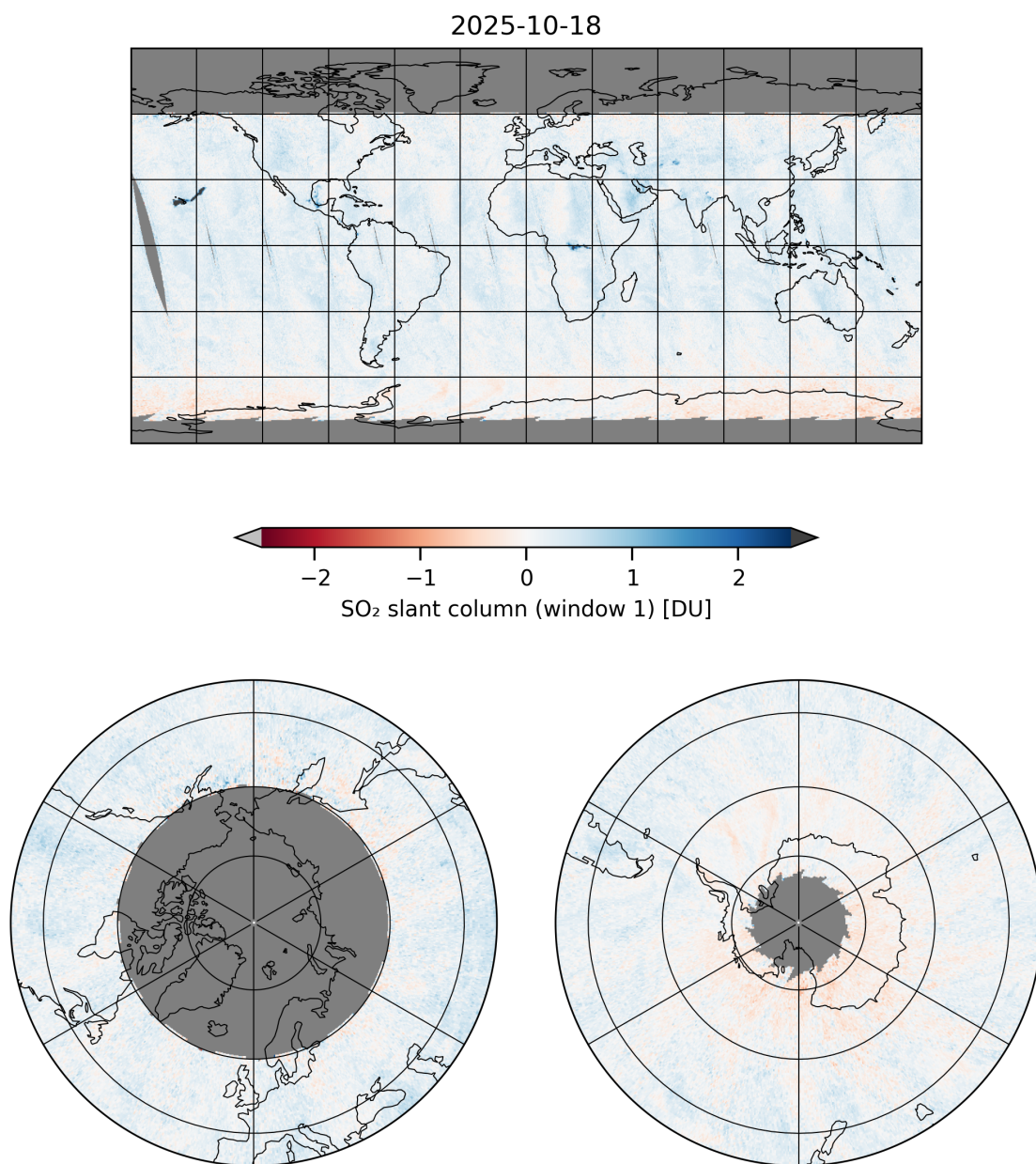


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-10-18 to 2025-10-19

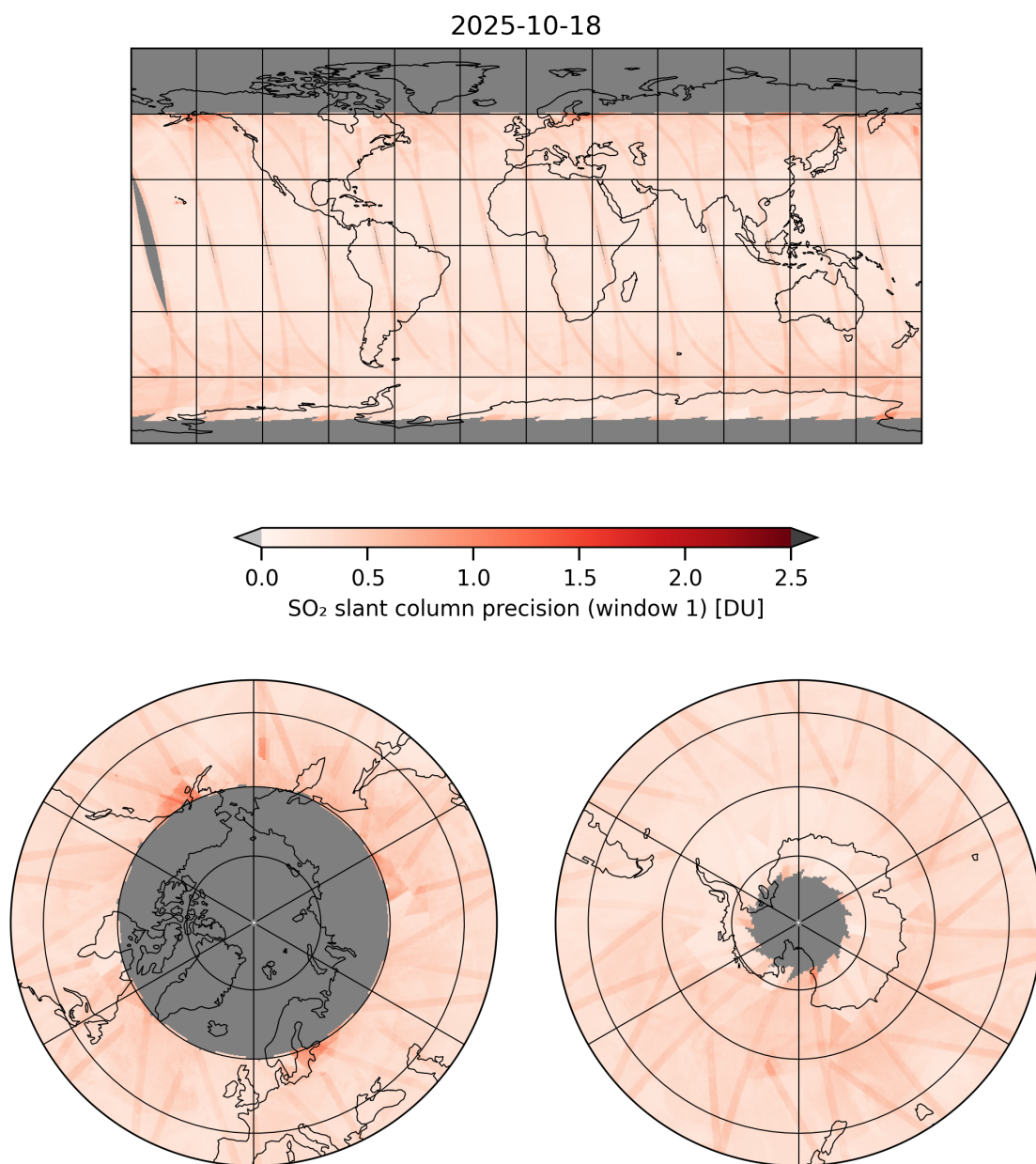


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-10-18 to 2025-10-19

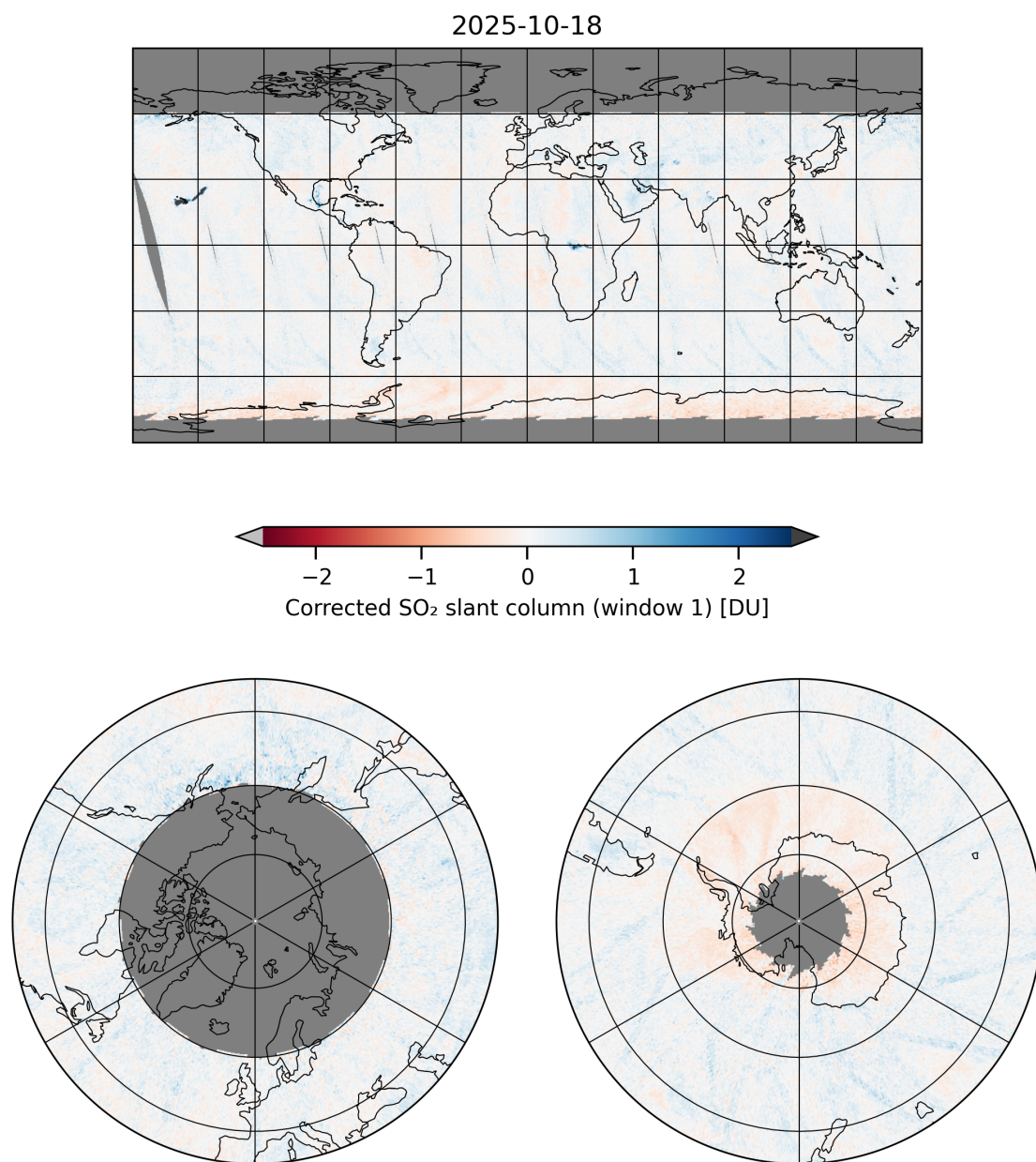


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-10-18 to 2025-10-19

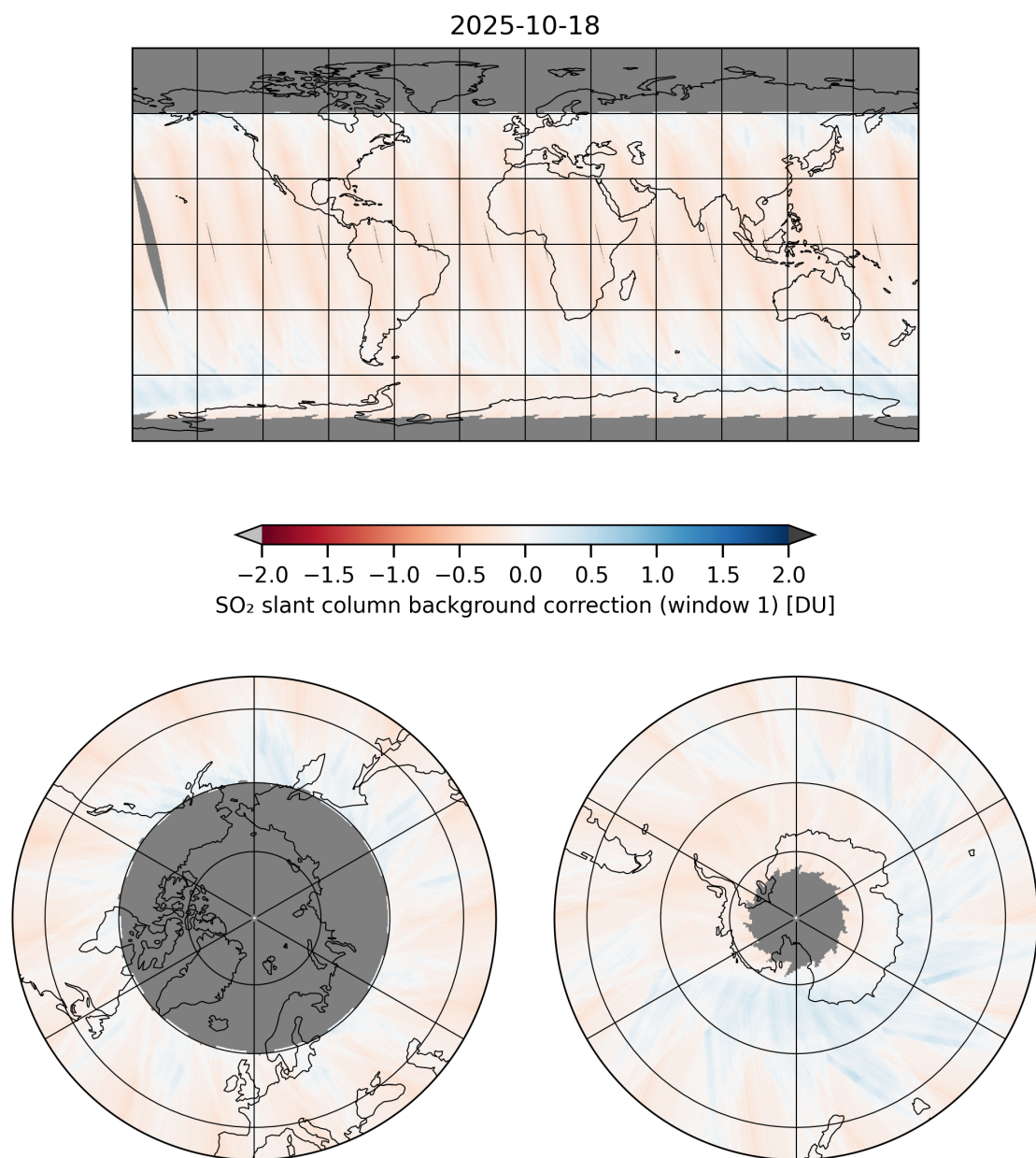


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-10-18 to 2025-10-19

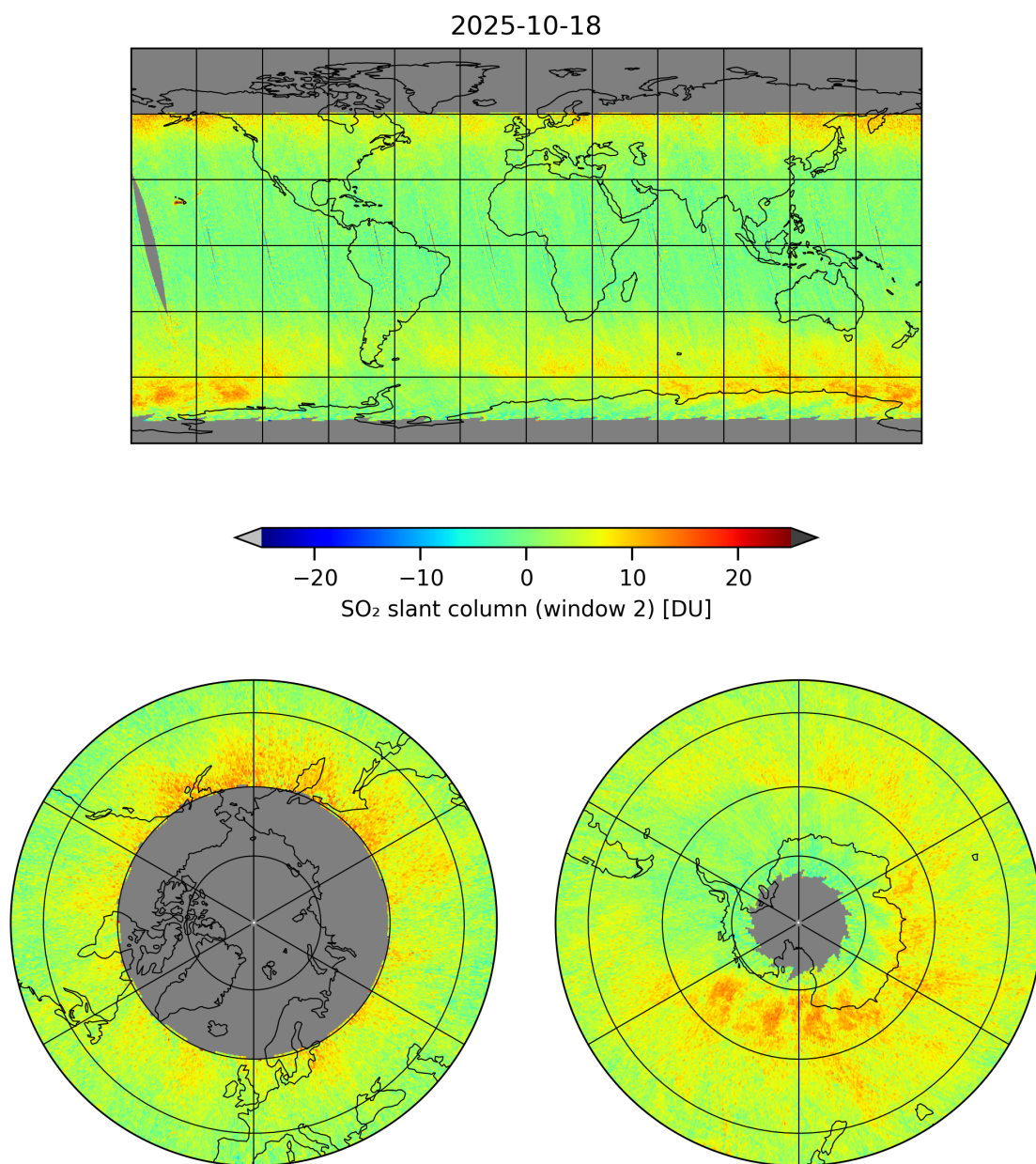


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-10-18 to 2025-10-19

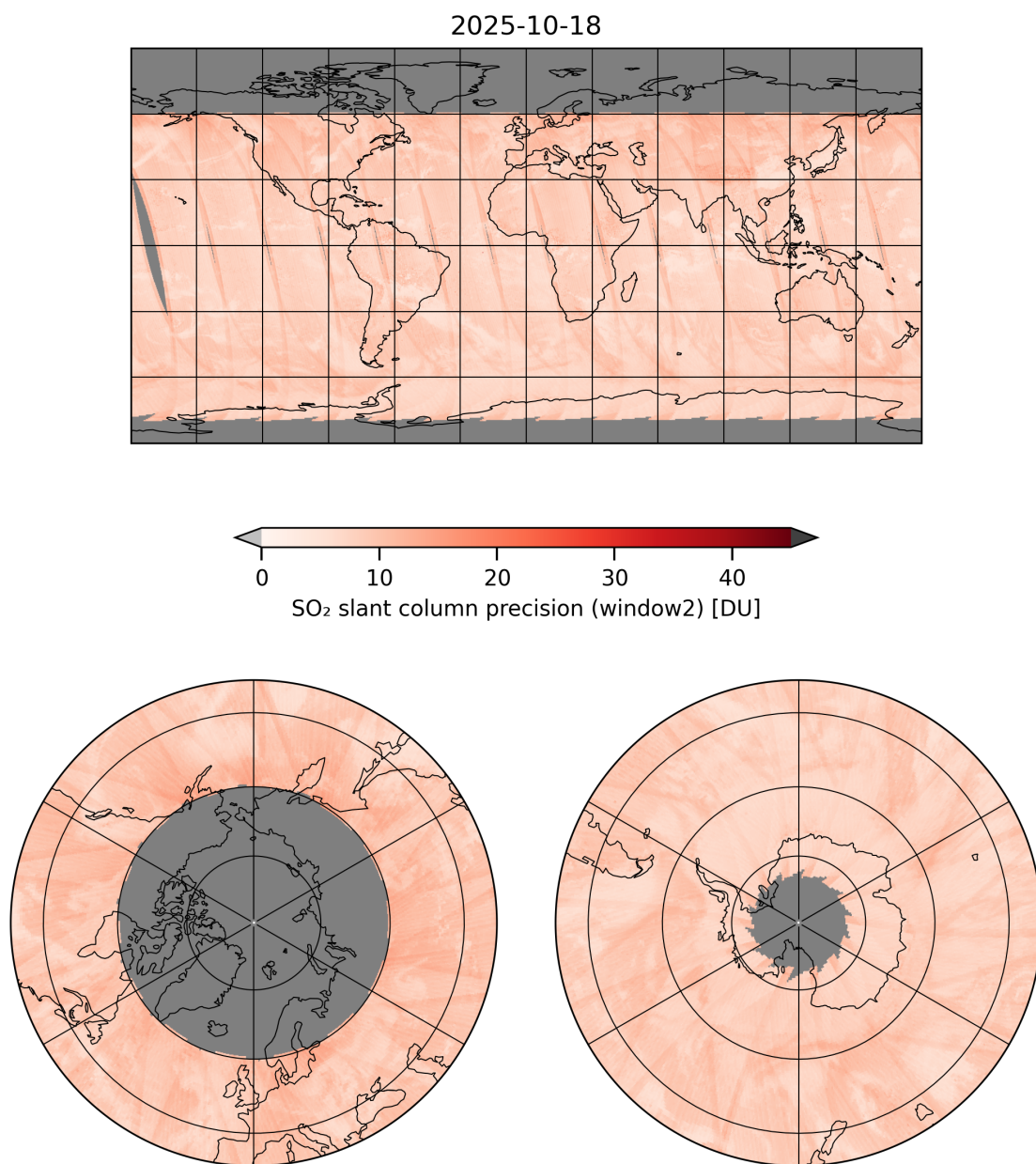


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-10-18 to 2025-10-19

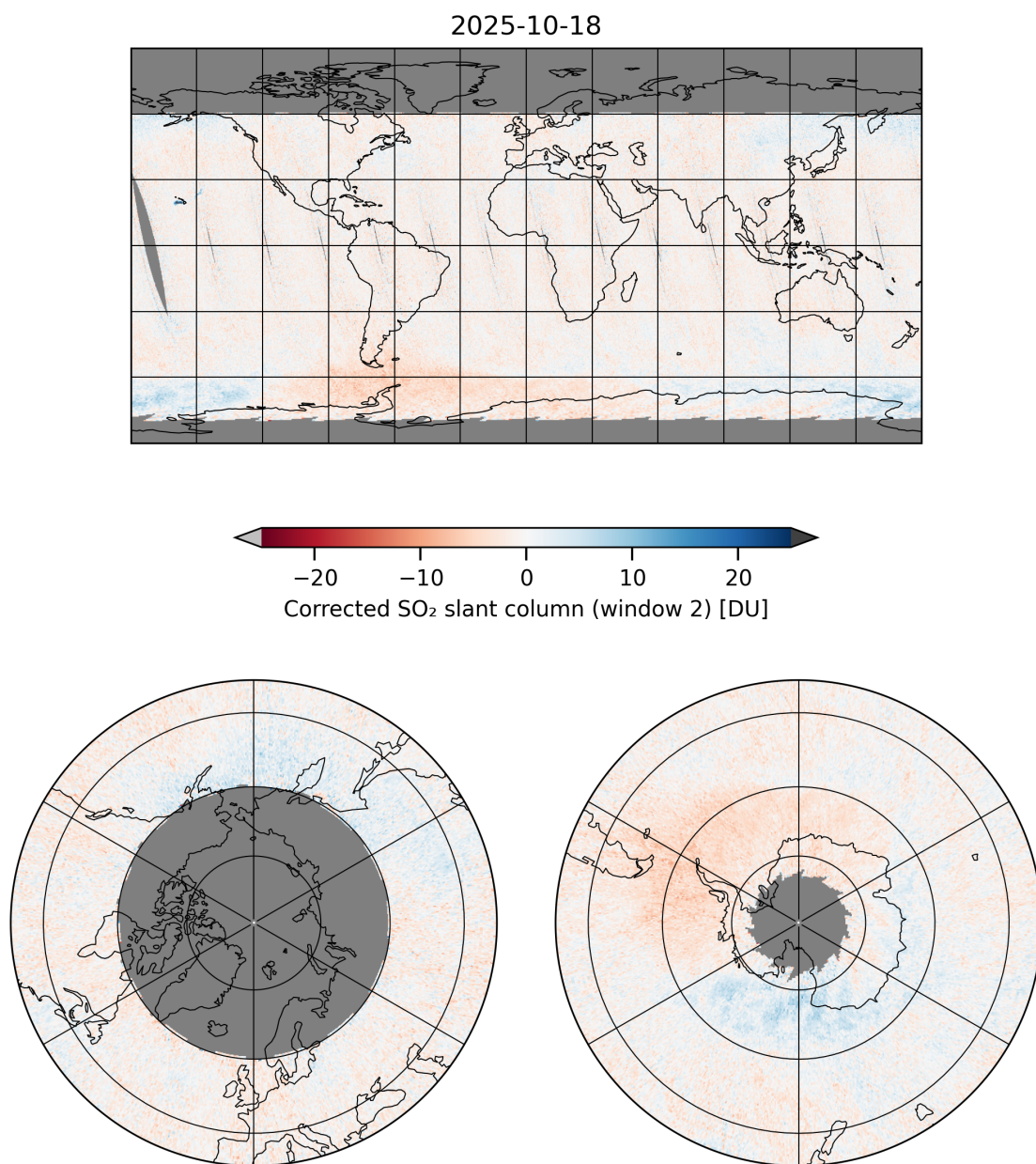


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-10-18 to 2025-10-19

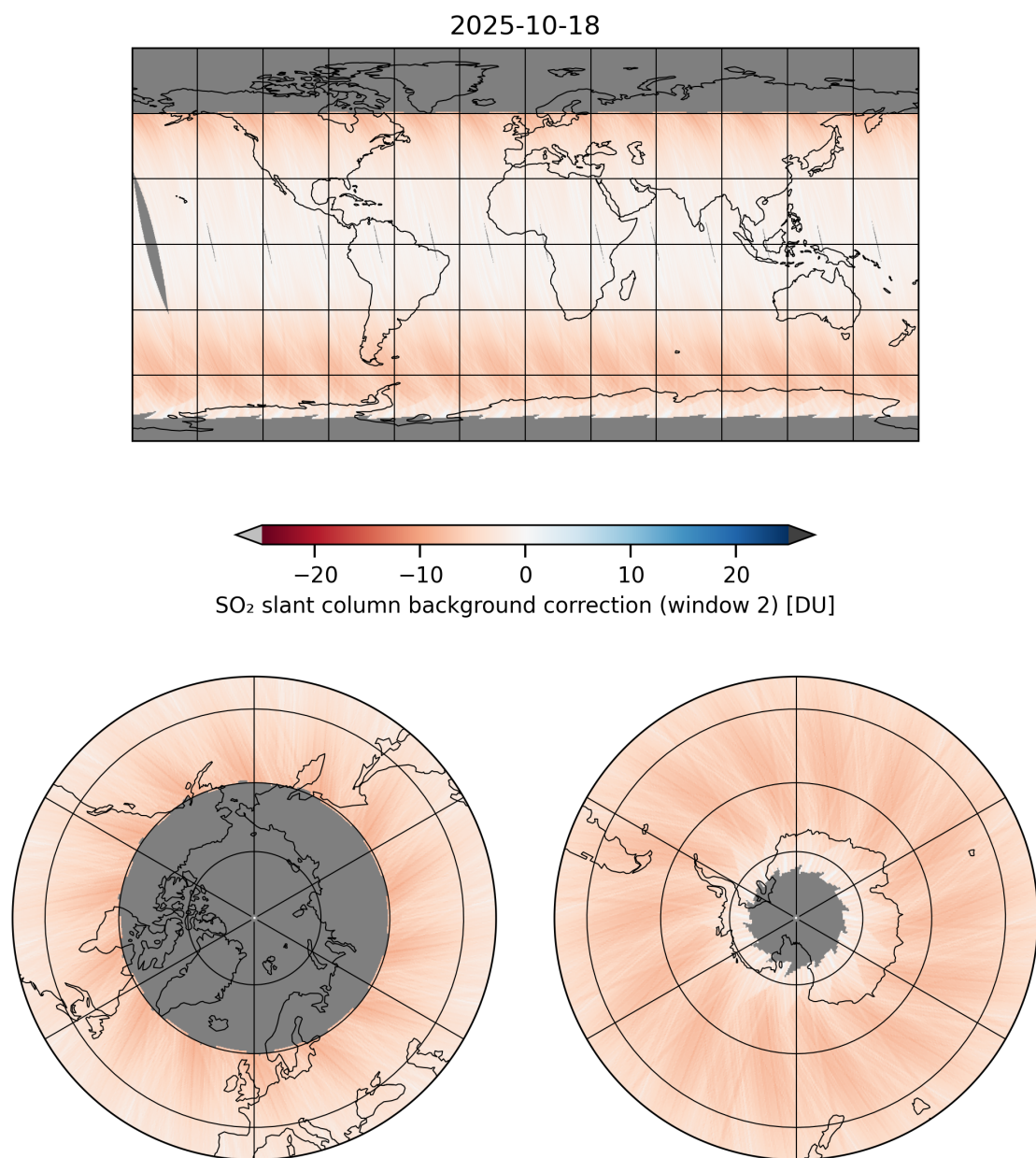


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-10-18 to 2025-10-19

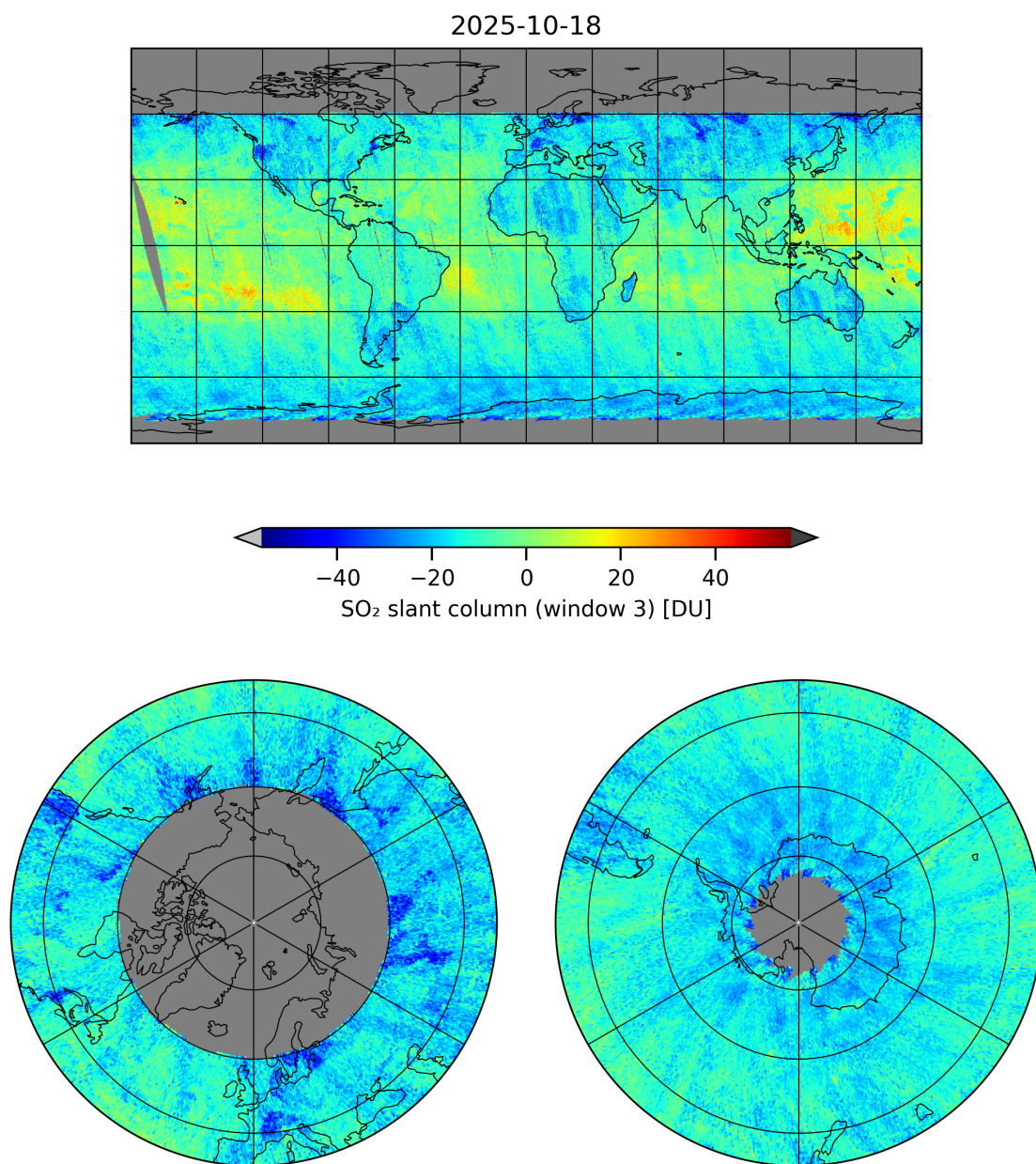


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-10-18 to 2025-10-19

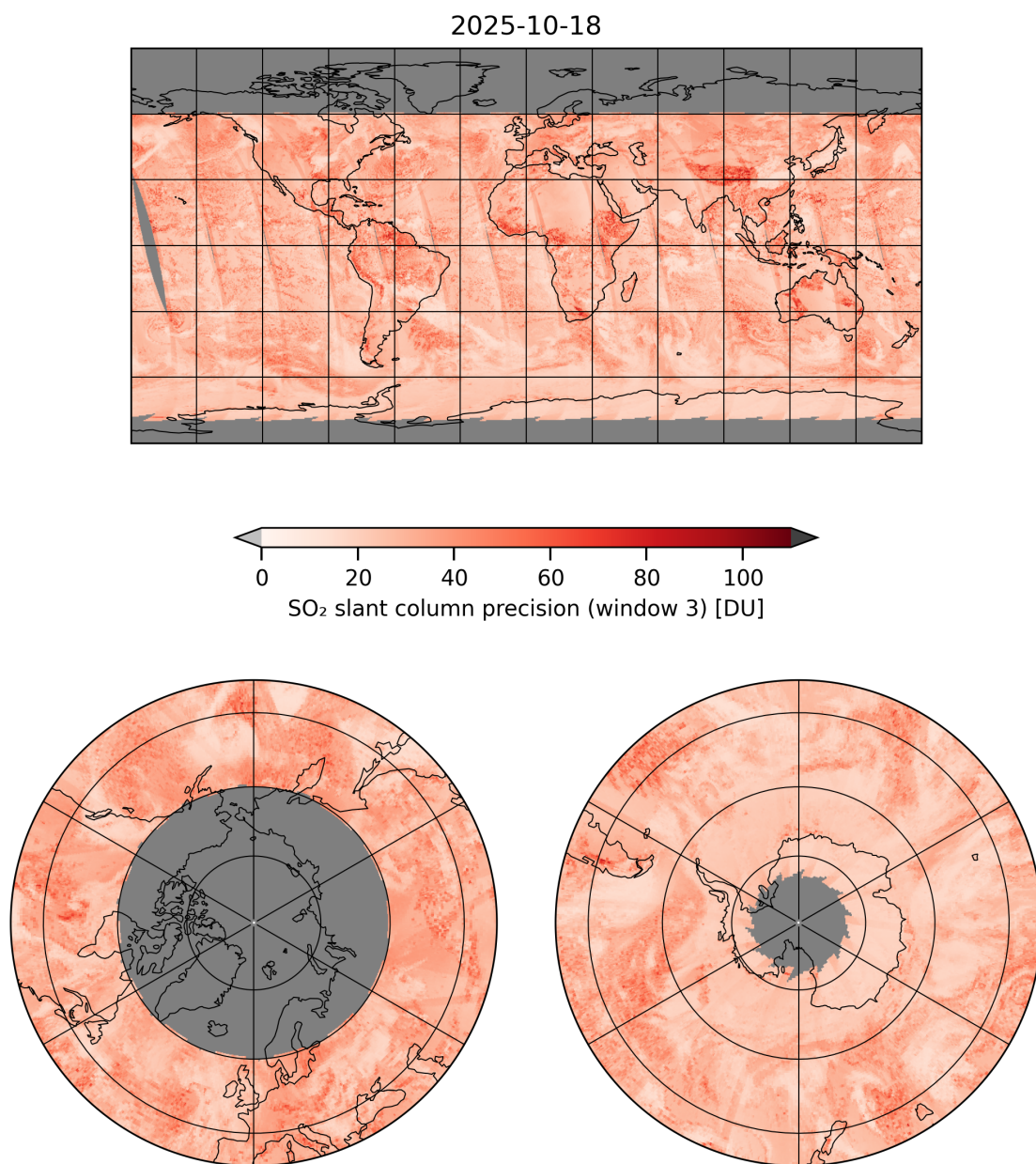


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-10-18 to 2025-10-19

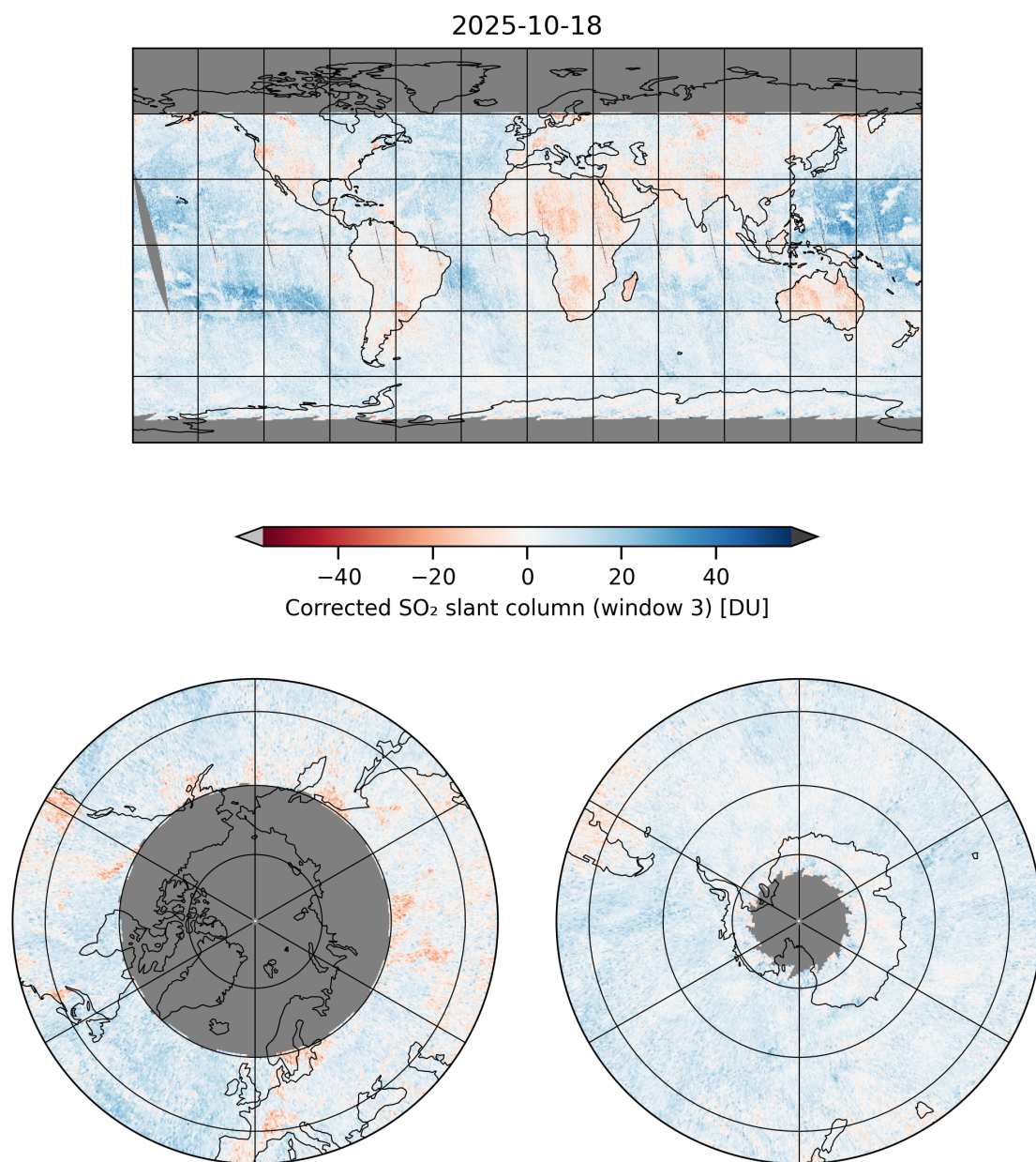


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-10-18 to 2025-10-19

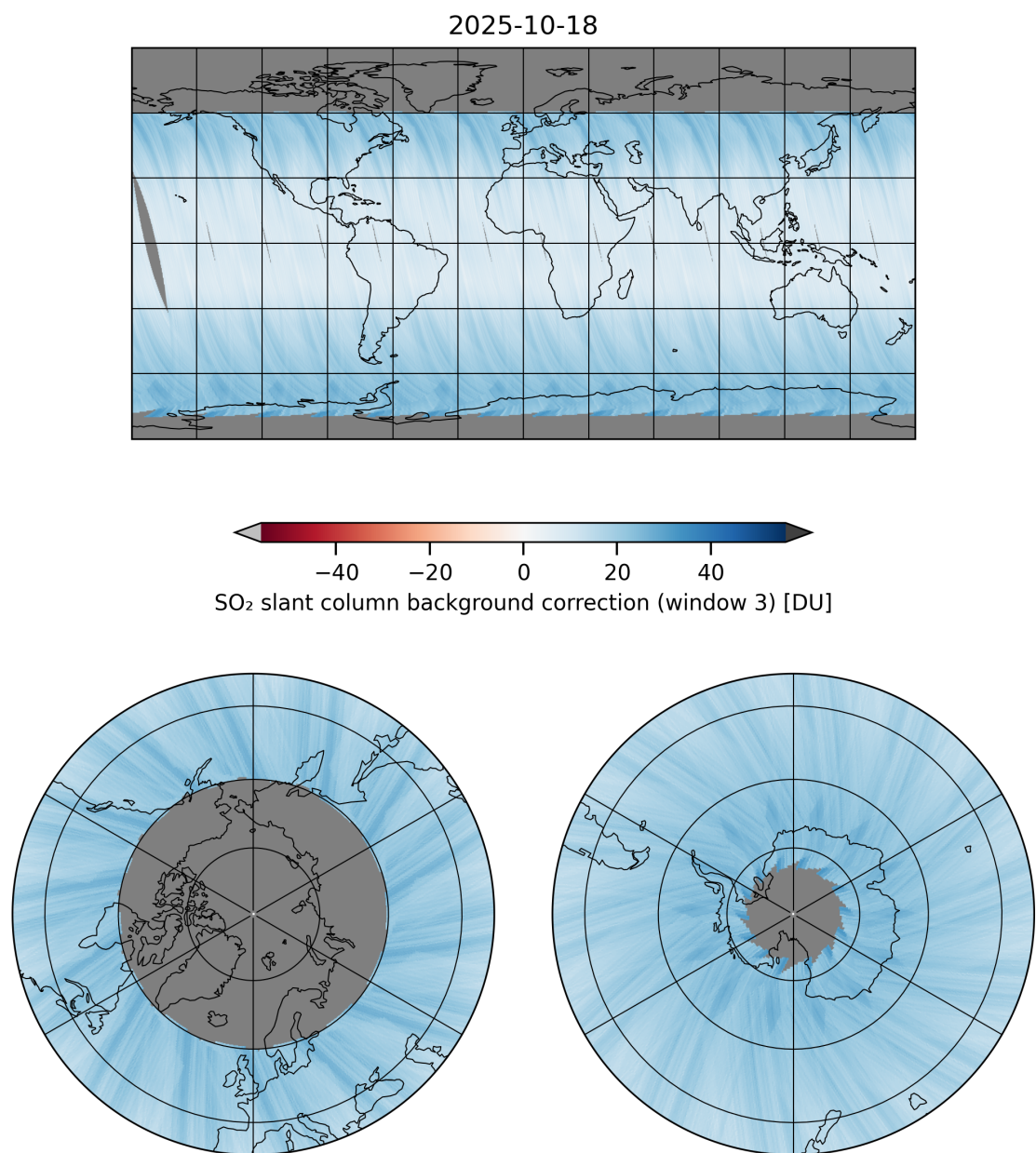


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-10-18 to 2025-10-19

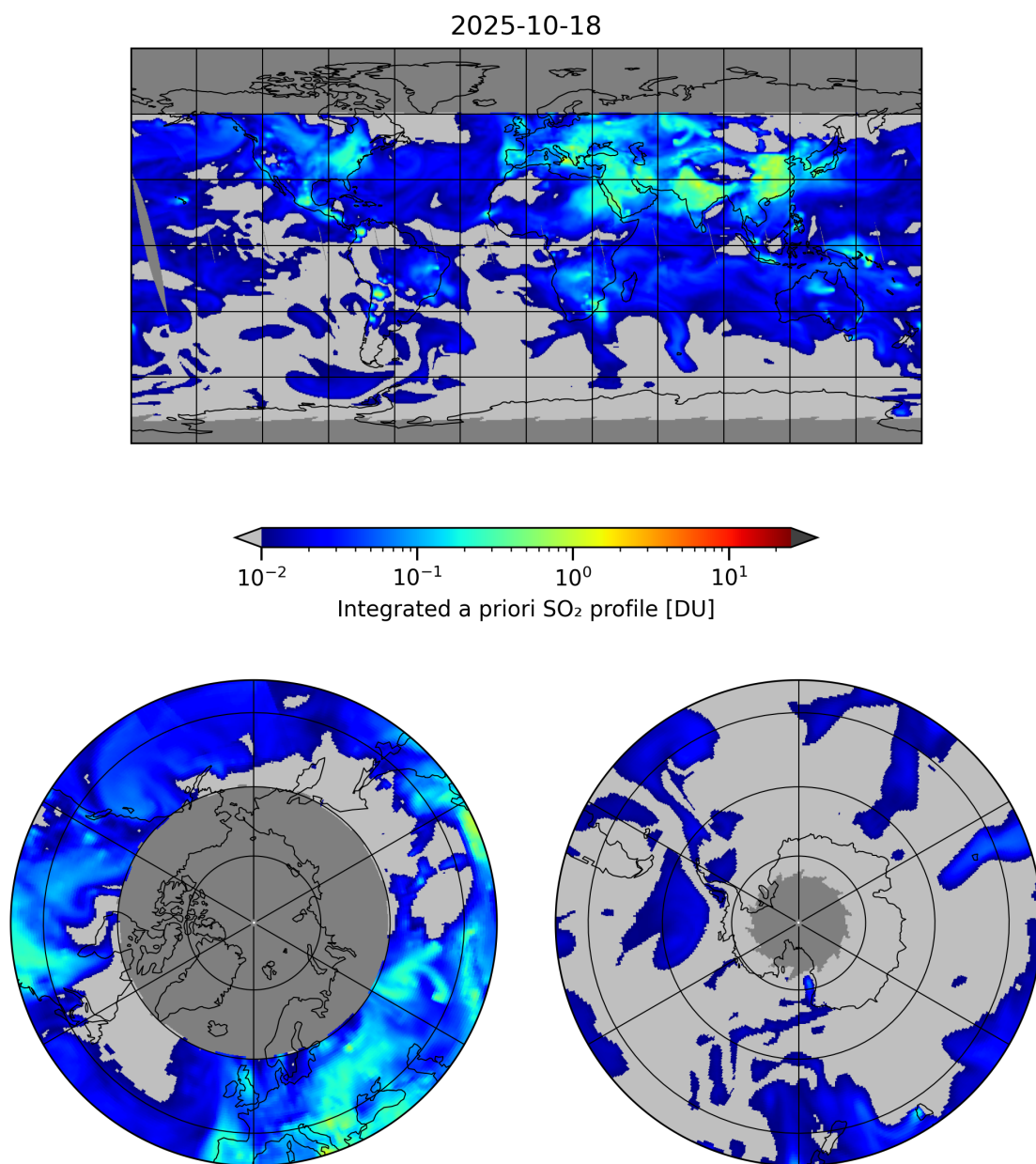


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-10-18 to 2025-10-19

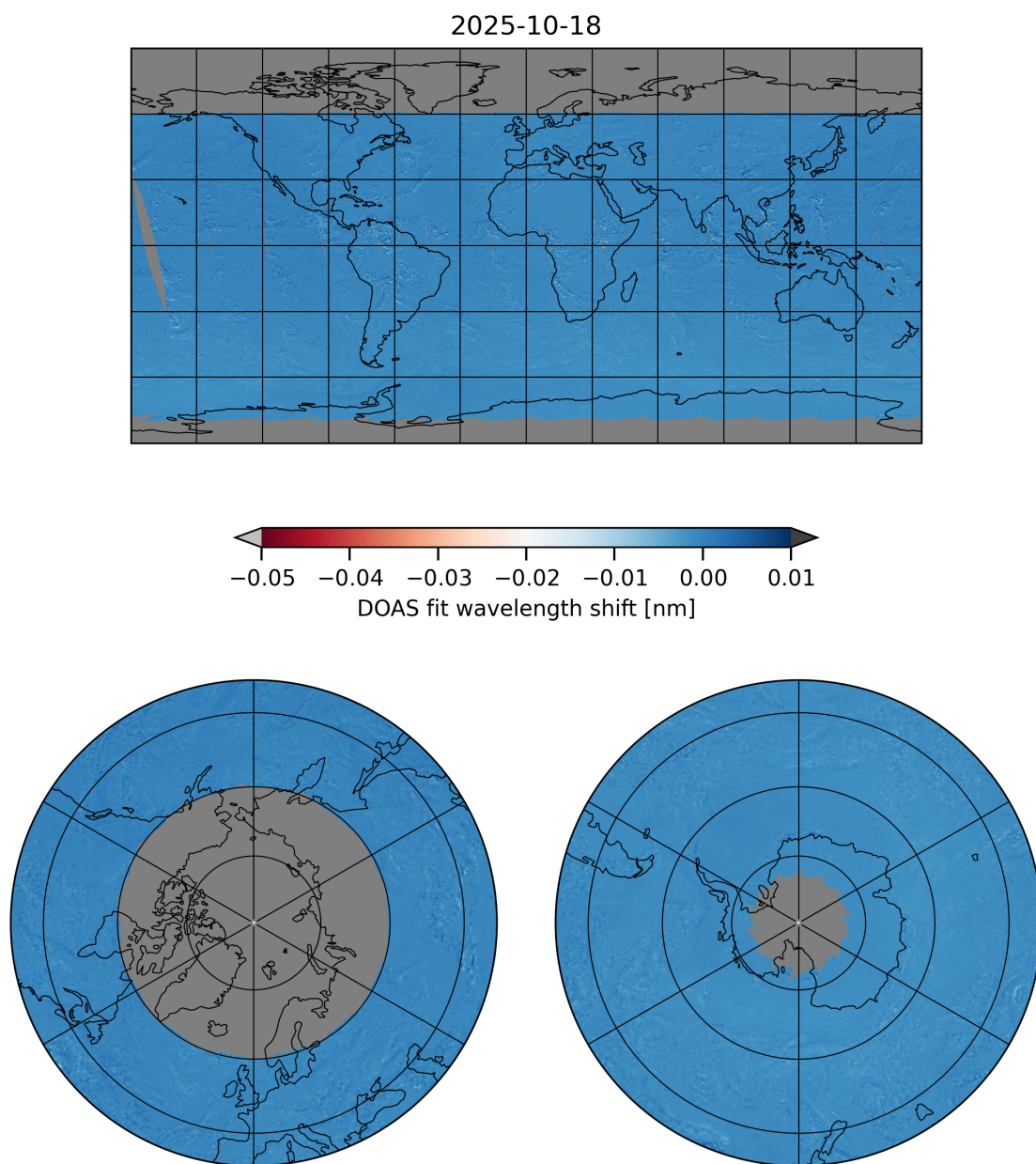


Figure 22: Map of “DOAS fit wavelength shift” for 2025-10-18 to 2025-10-19

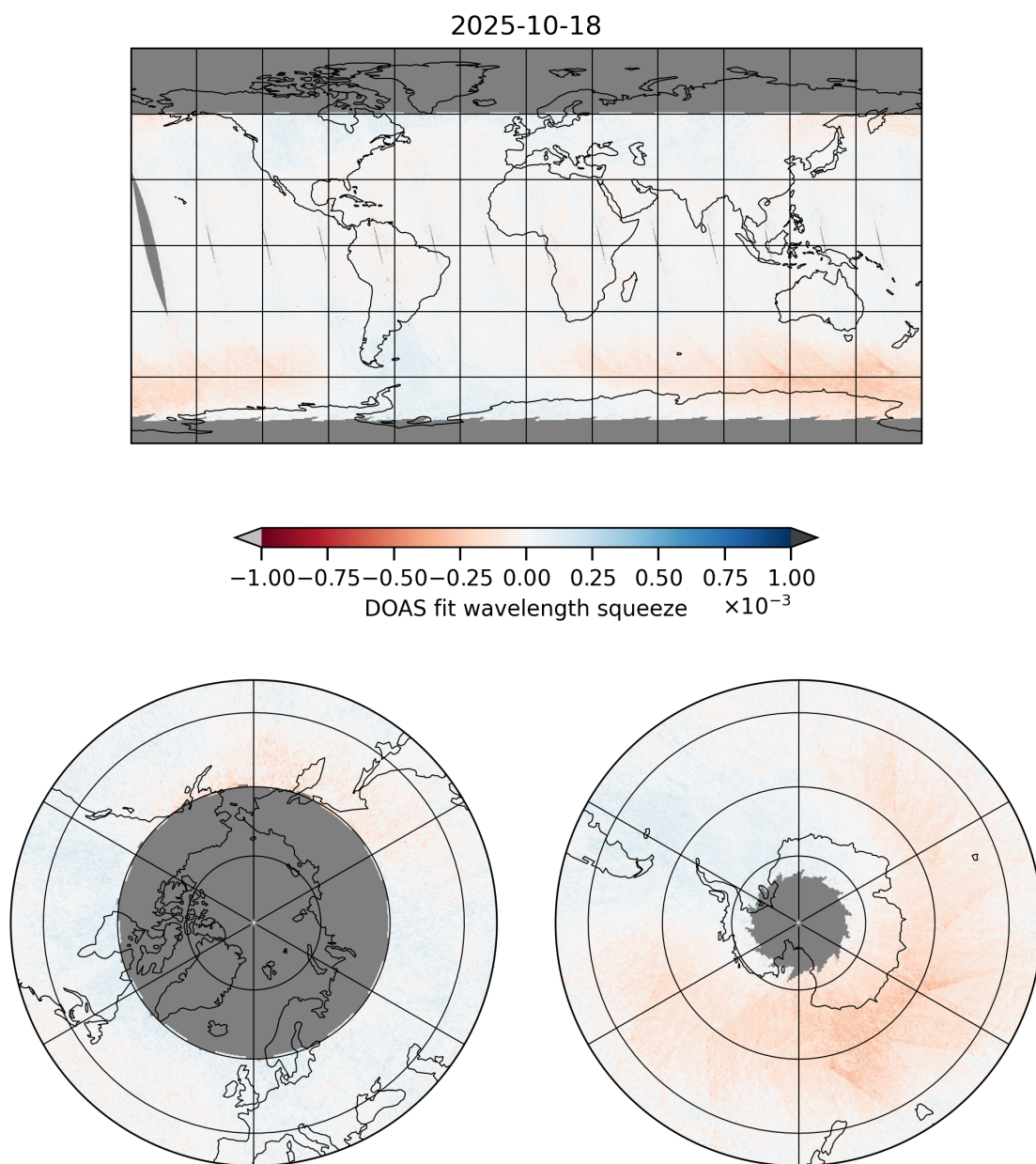


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-10-18 to 2025-10-19

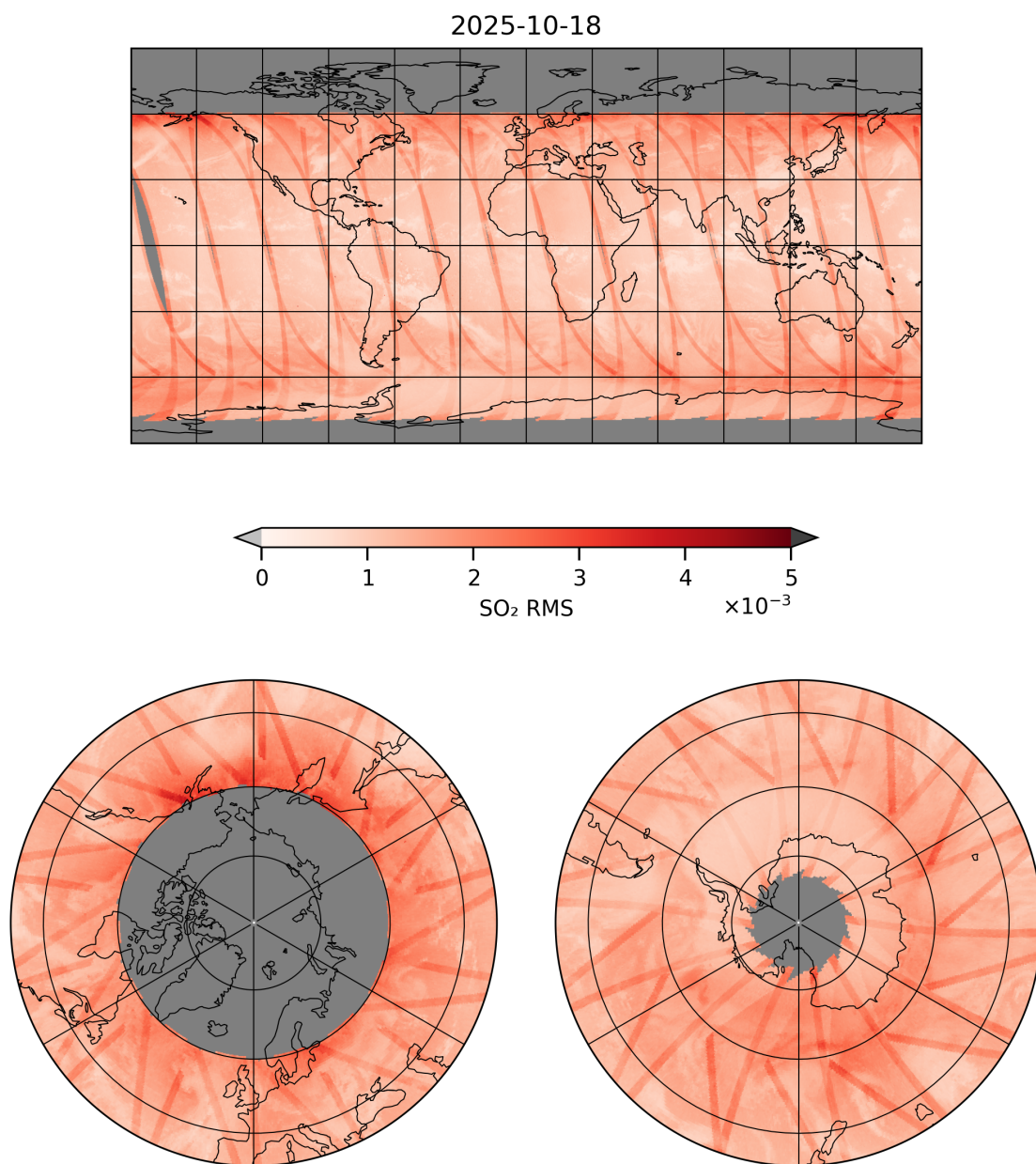


Figure 24: Map of “SO₂ RMS” for 2025-10-18 to 2025-10-19

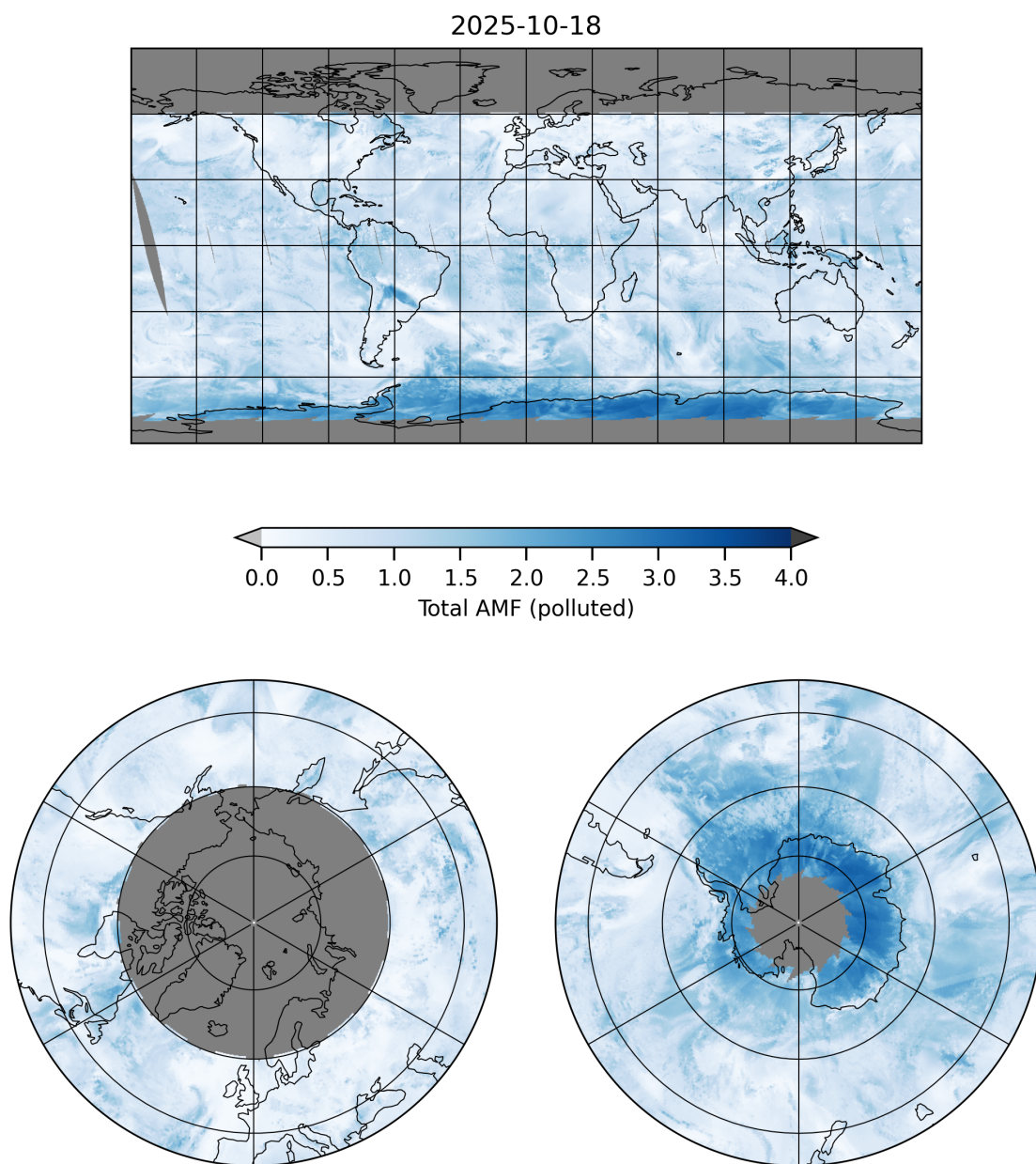


Figure 25: Map of “Total AMF (polluted)” for 2025-10-18 to 2025-10-19

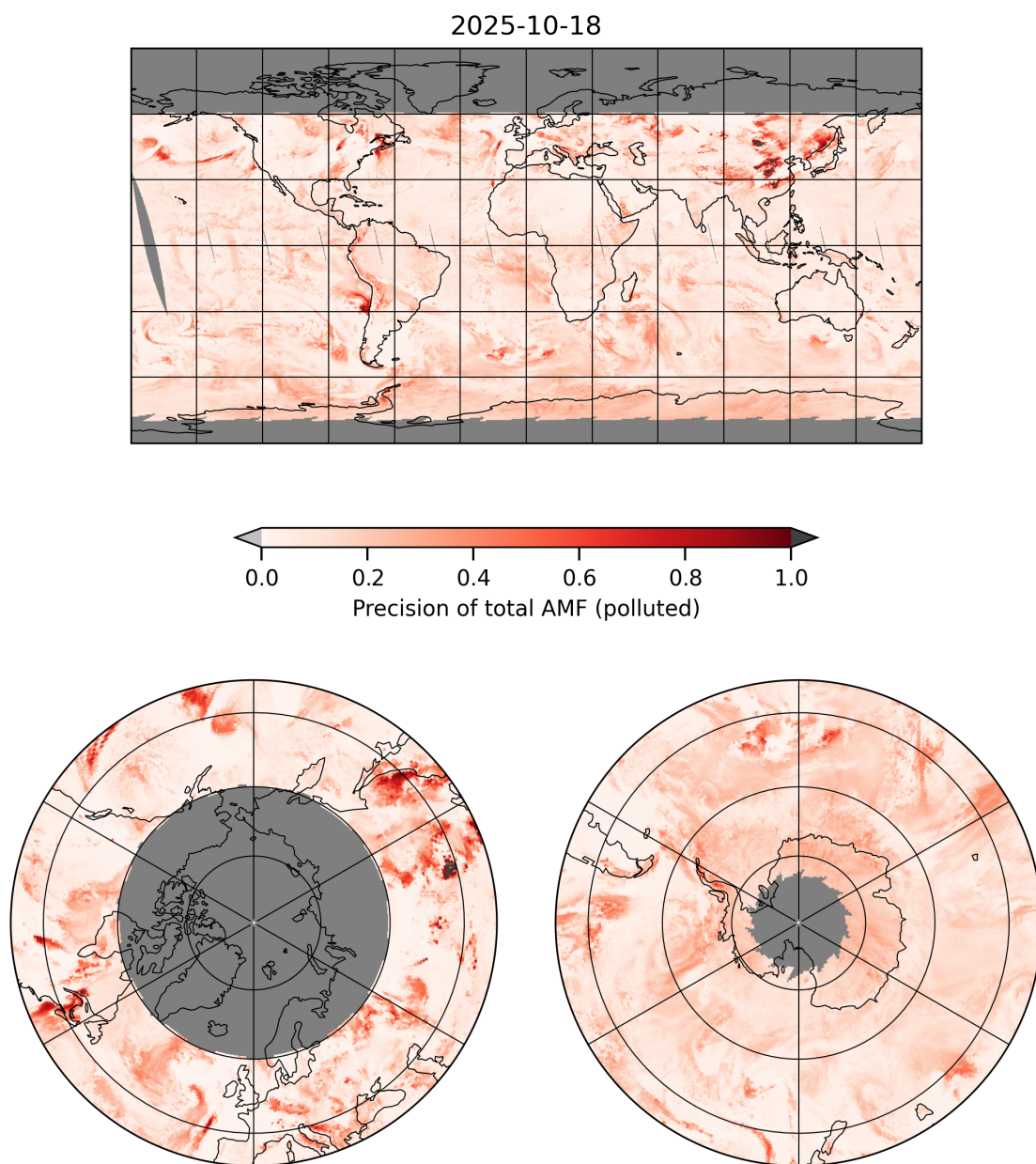


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-10-18 to 2025-10-19

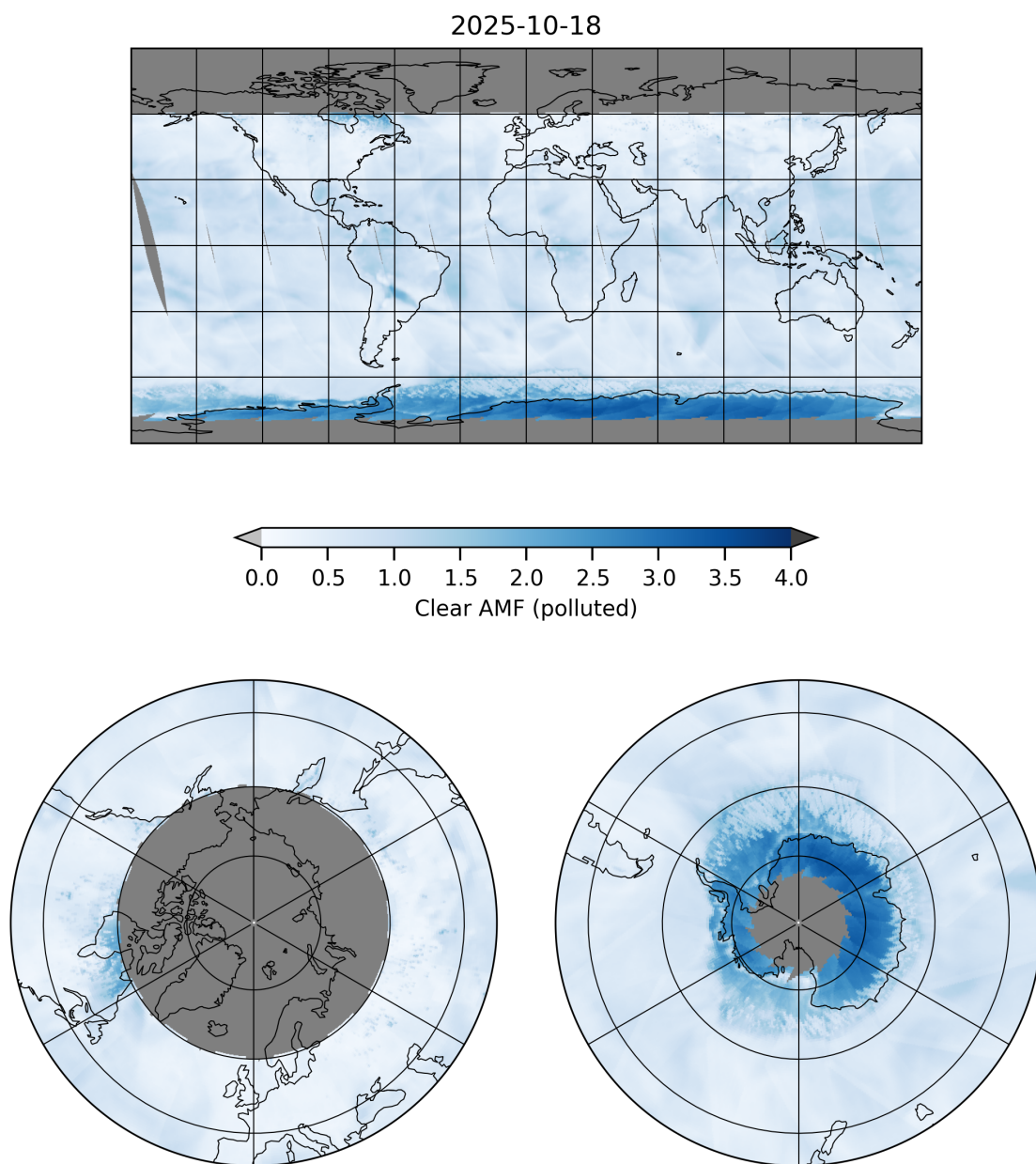


Figure 27: Map of “Clear AMF (polluted)” for 2025-10-18 to 2025-10-19

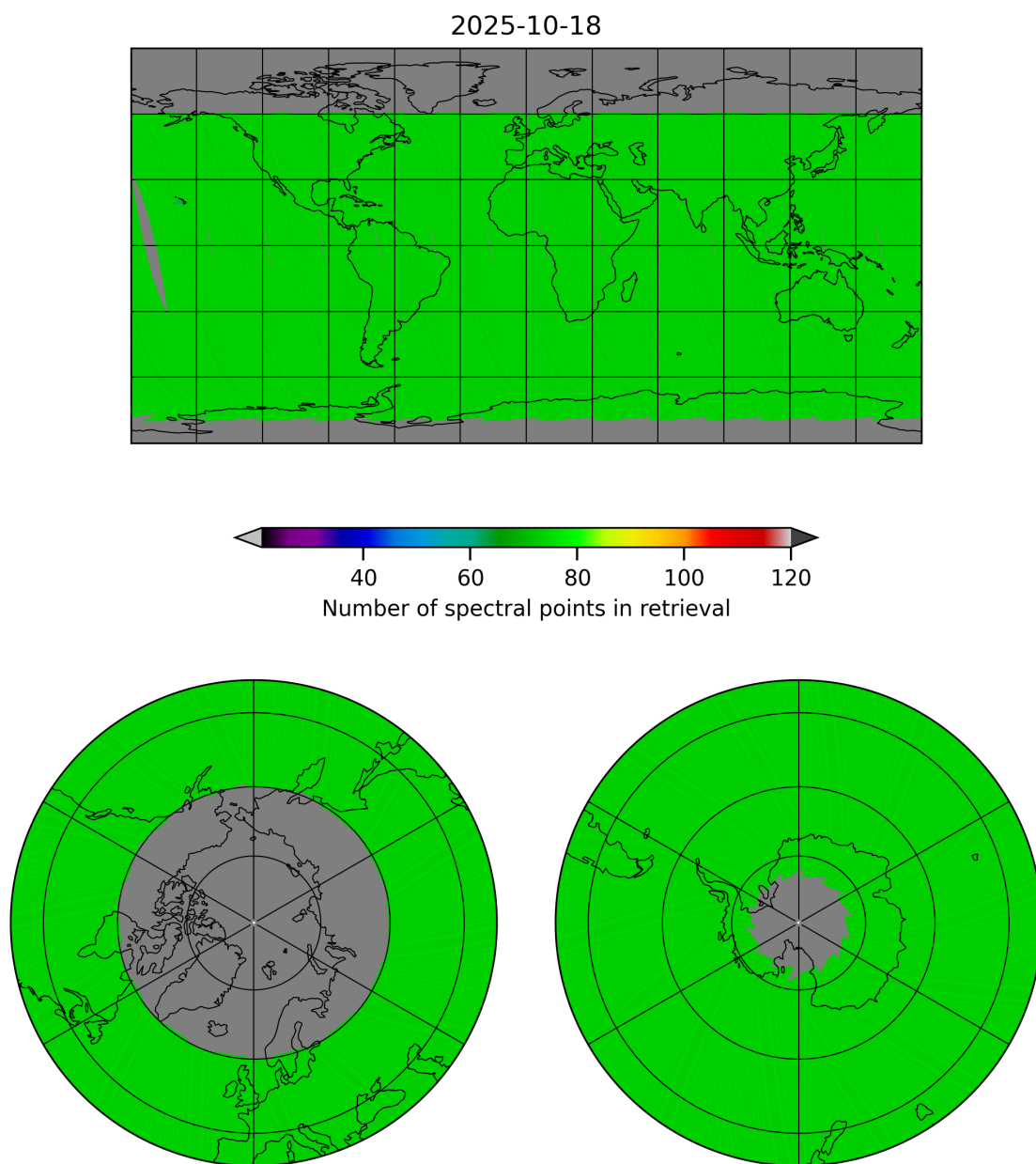


Figure 28: Map of “Number of spectral points in retrieval” for 2025-10-18 to 2025-10-19

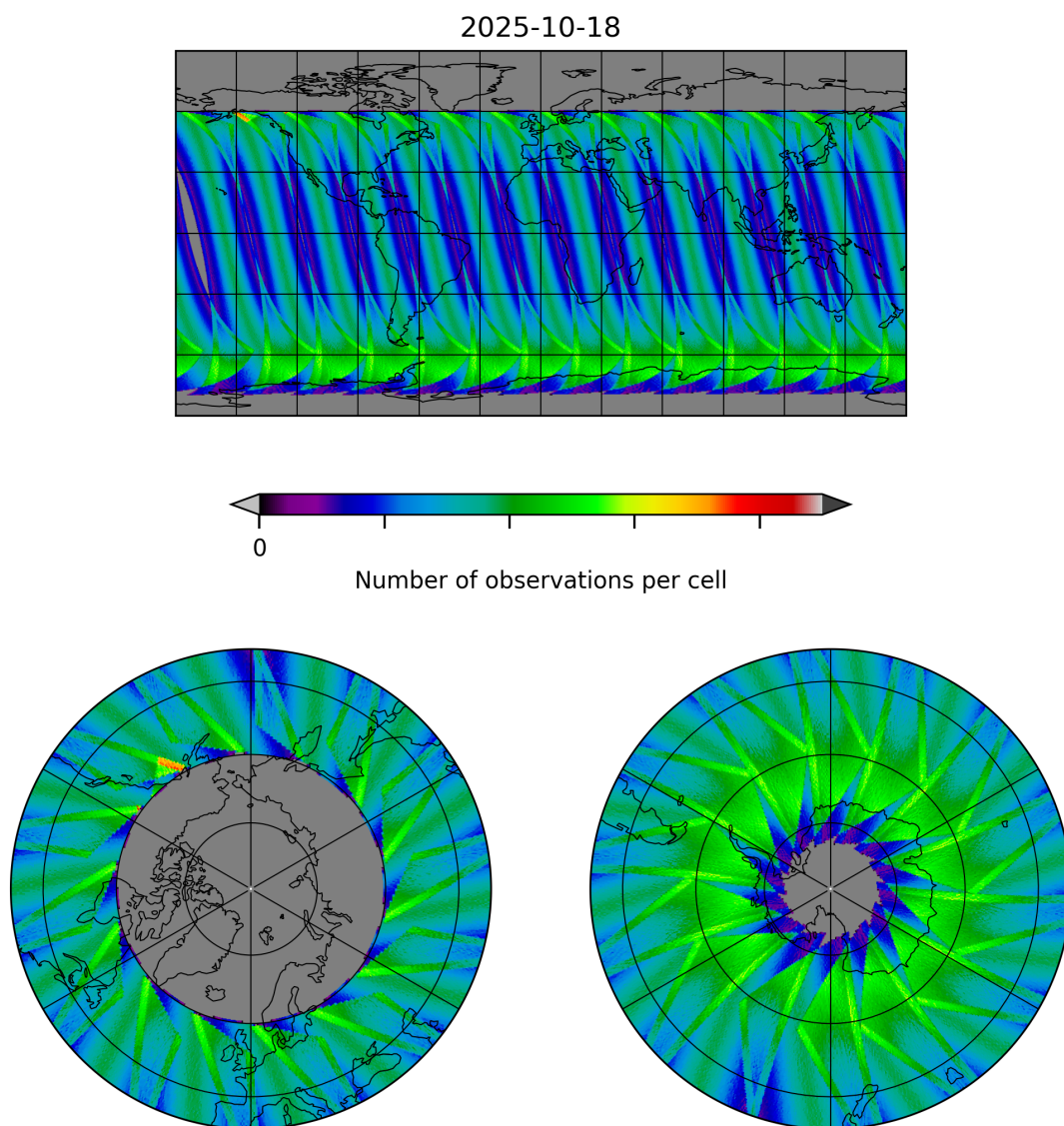


Figure 29: Map of the number of observations for 2025-10-18 to 2025-10-19

7 Zonal average

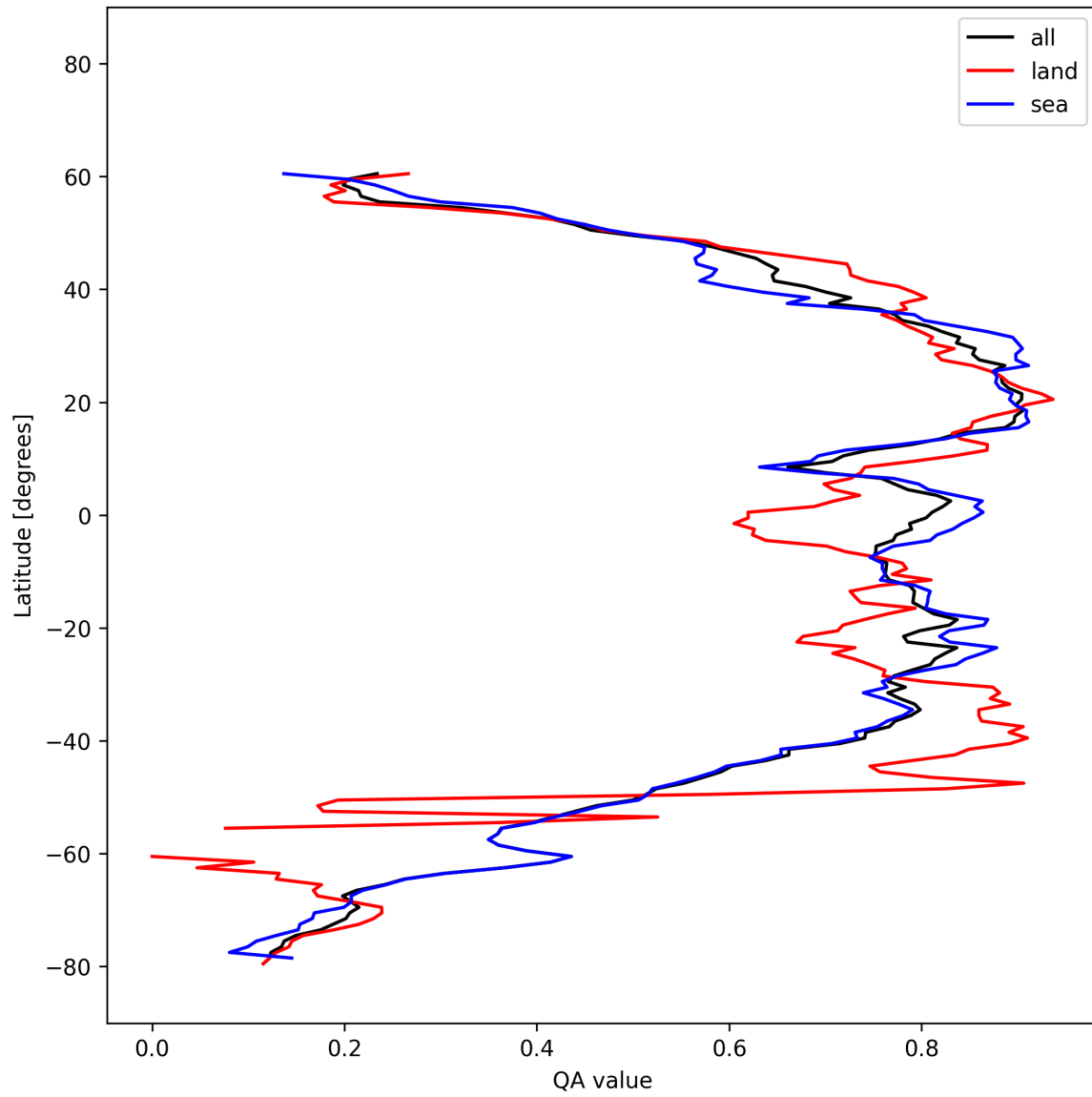


Figure 30: Zonal average of “QA value” for 2025-10-18 to 2025-10-19.

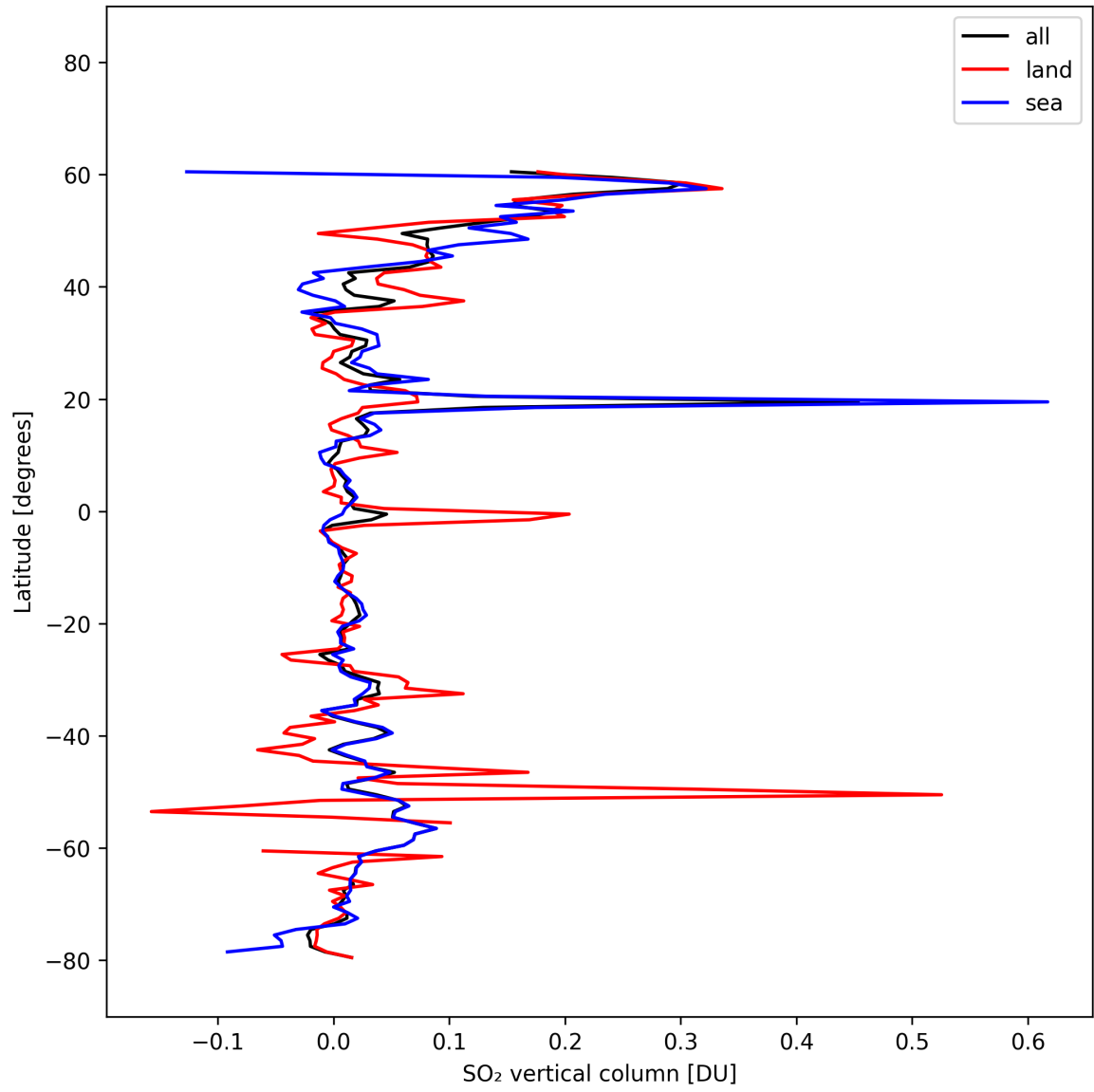


Figure 31: Zonal average of “SO₂ vertical column” for 2025-10-18 to 2025-10-19.

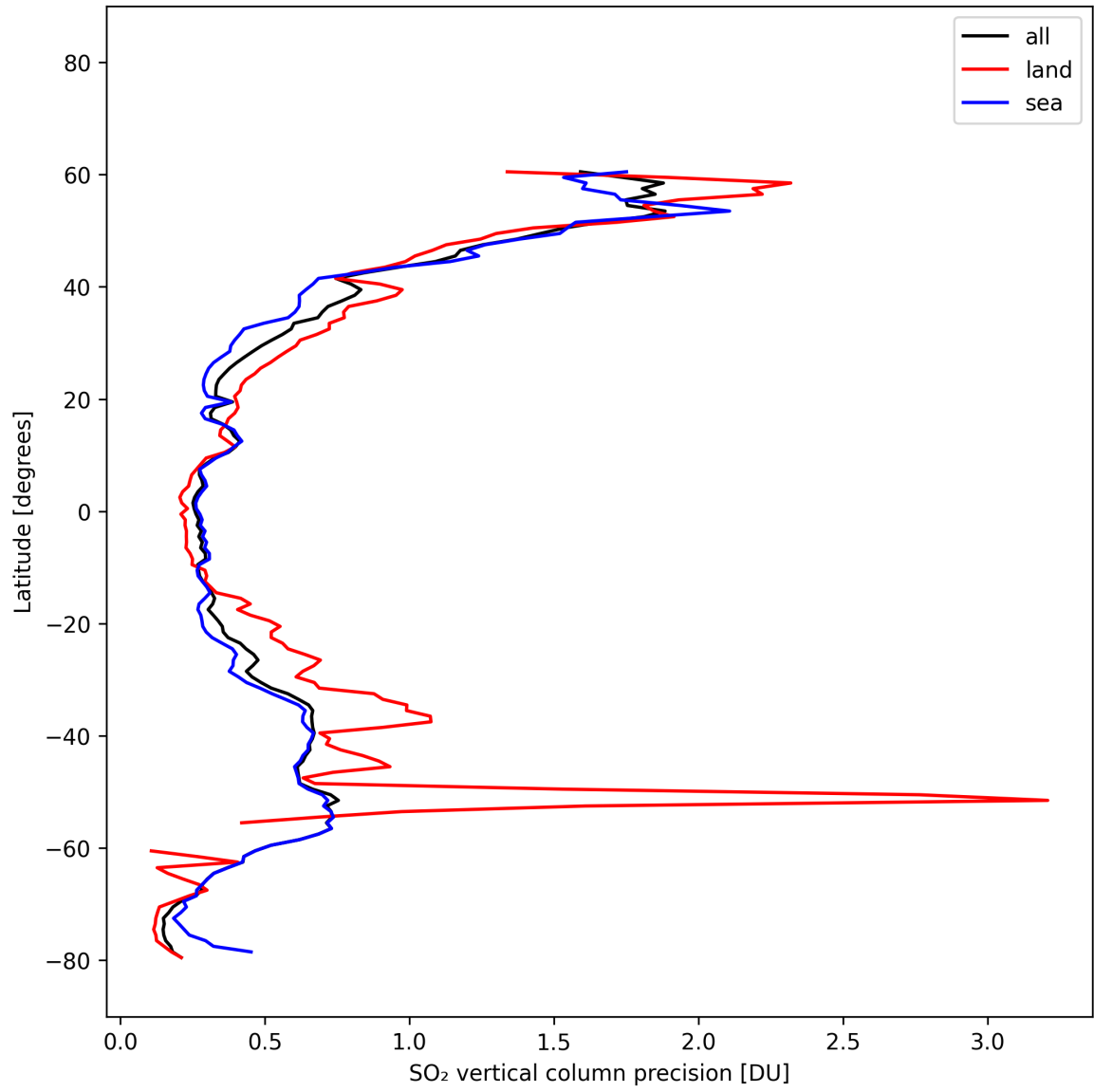


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-10-18 to 2025-10-19.

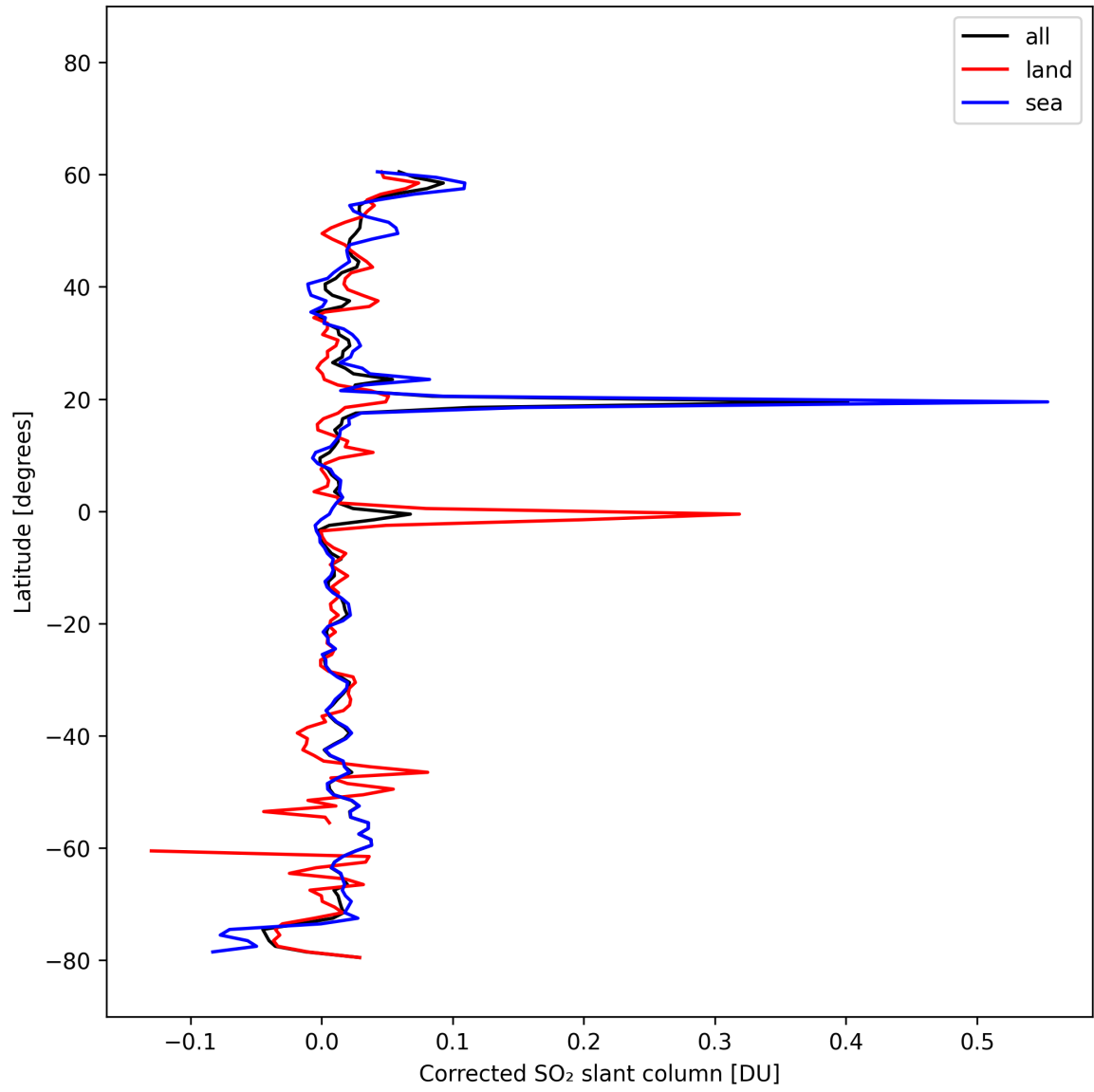


Figure 33: Zonal average of "Corrected SO₂ slant column" for 2025-10-18 to 2025-10-19.

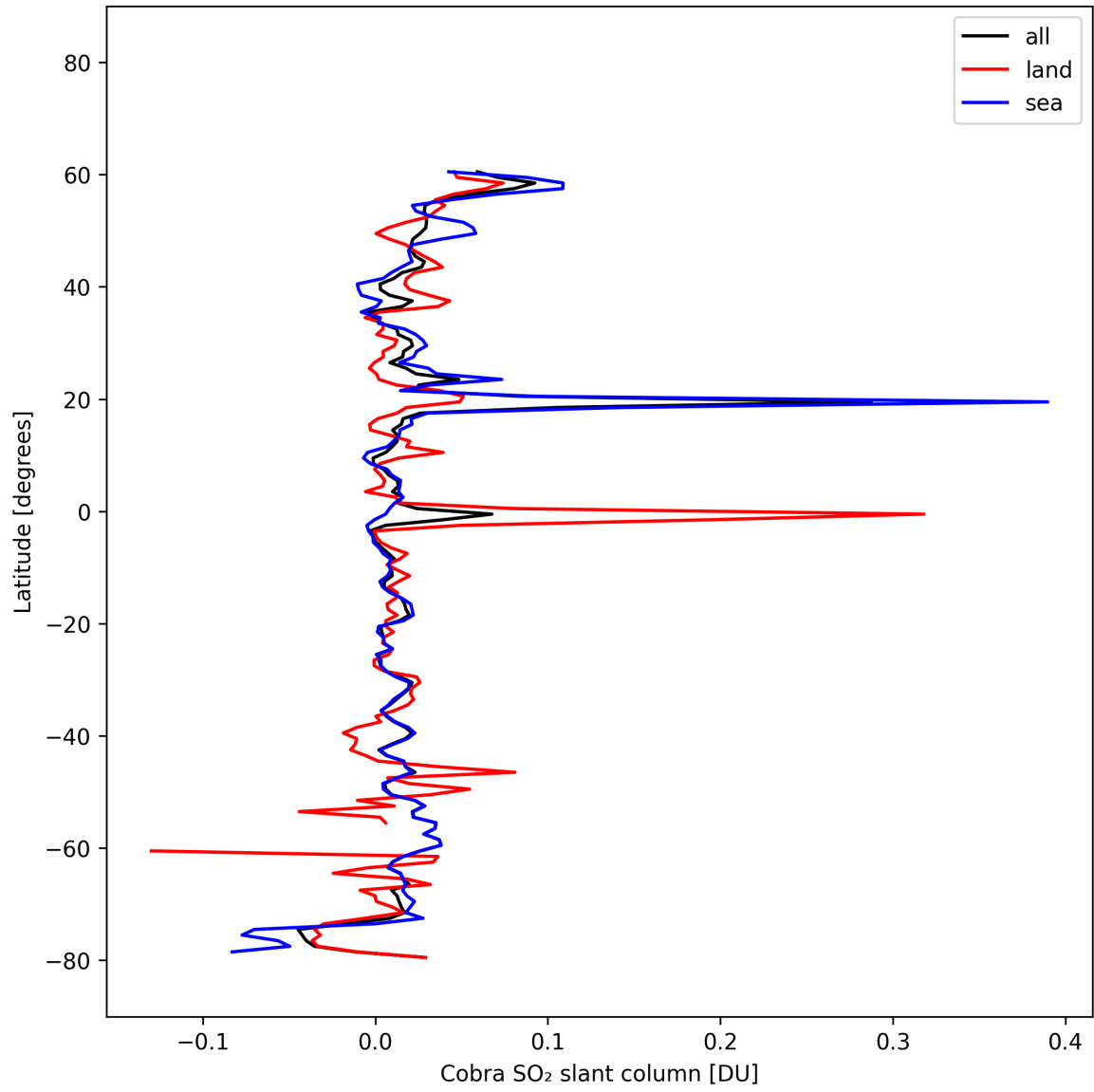


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-10-18 to 2025-10-19.

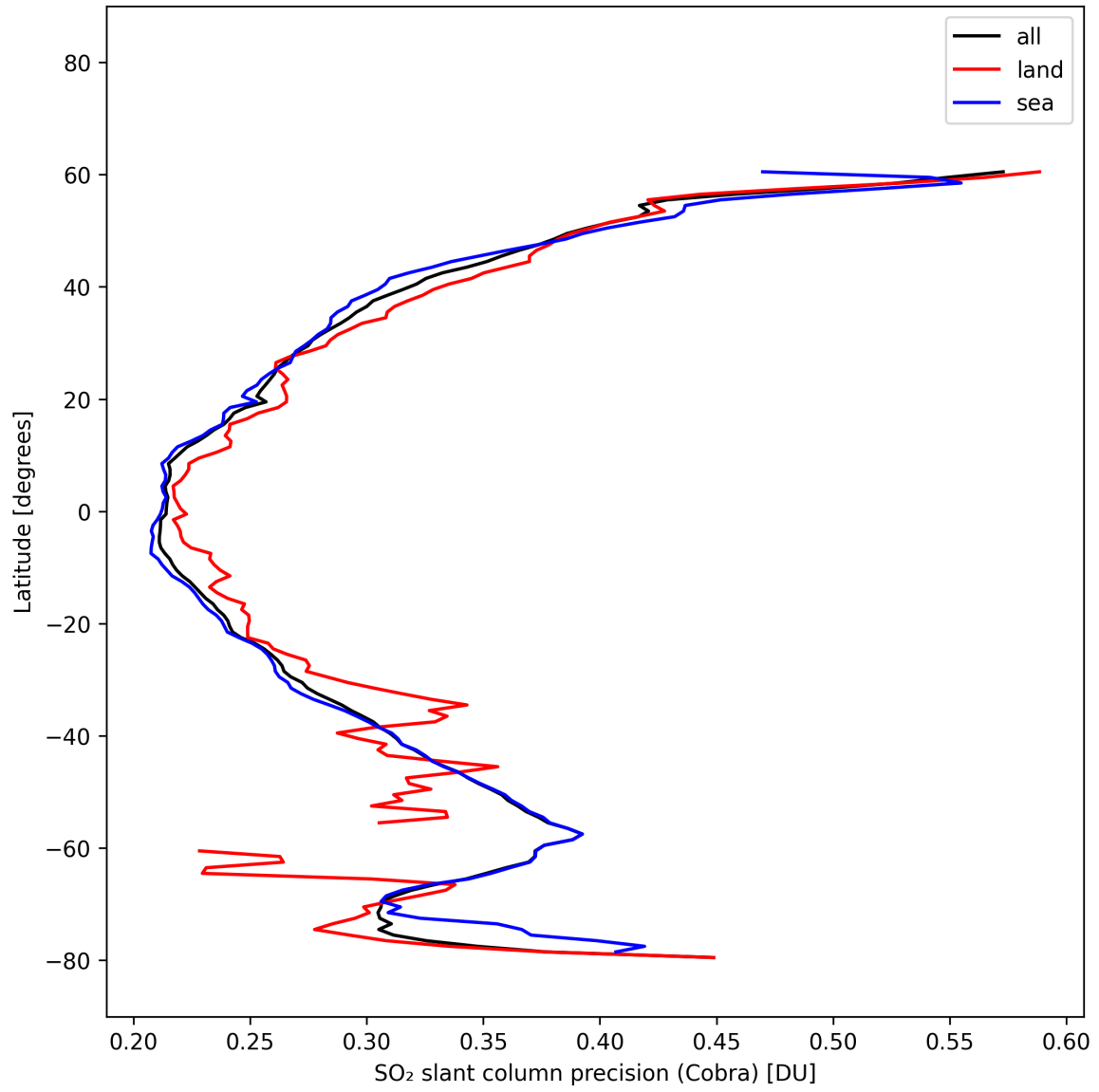


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-10-18 to 2025-10-19.

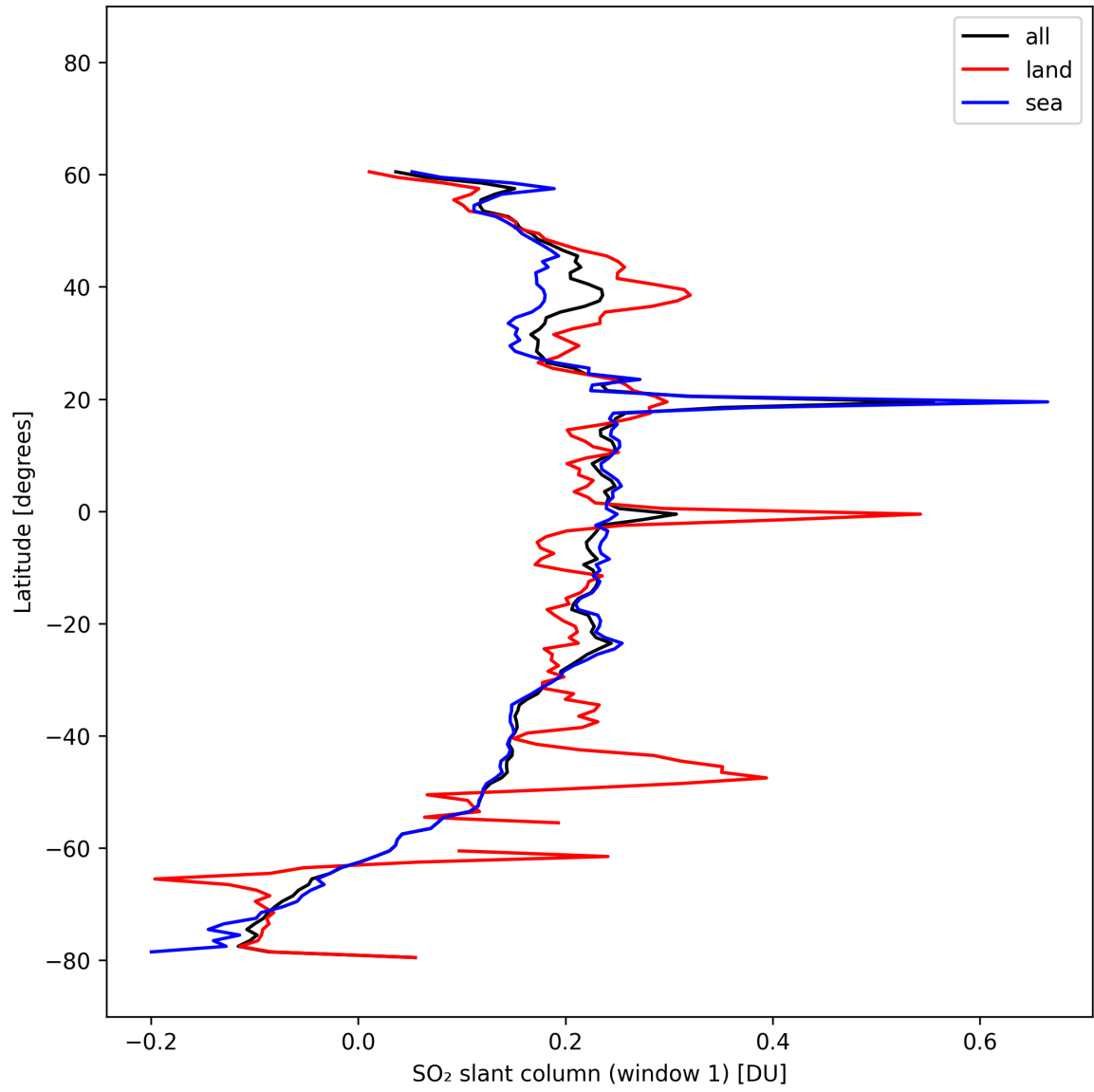


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-10-18 to 2025-10-19.

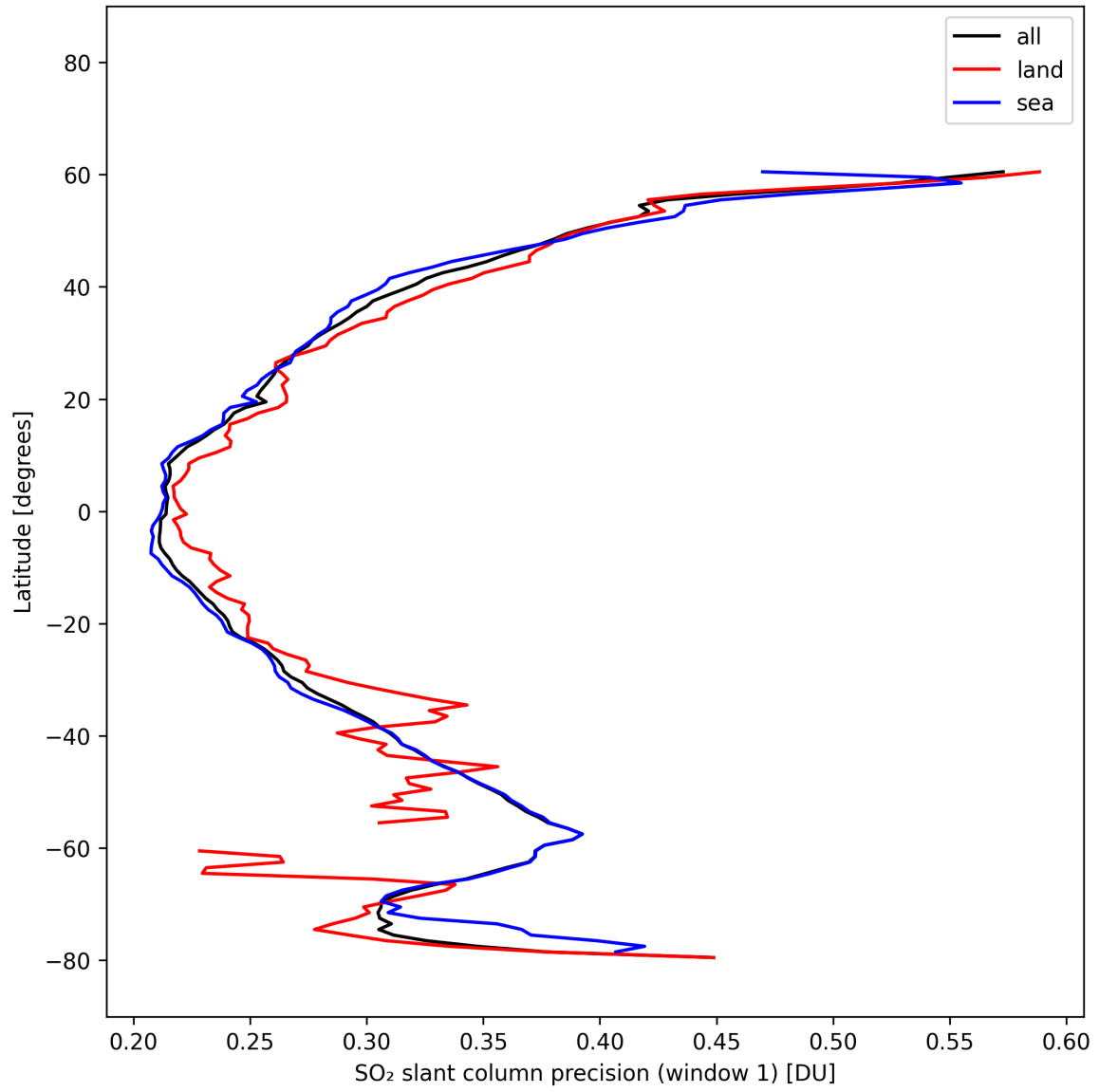


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-10-18 to 2025-10-19.

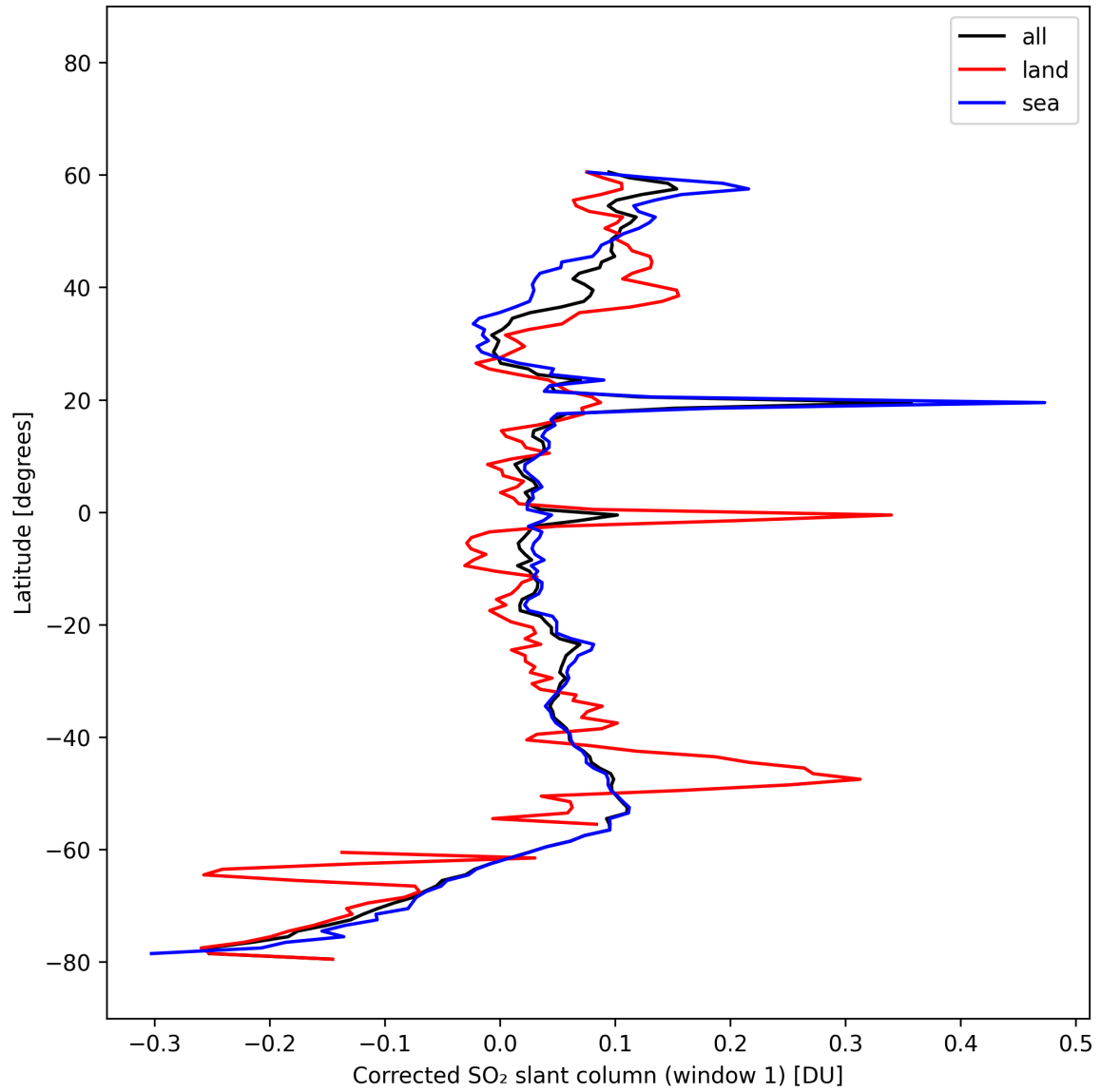


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-10-18 to 2025-10-19.

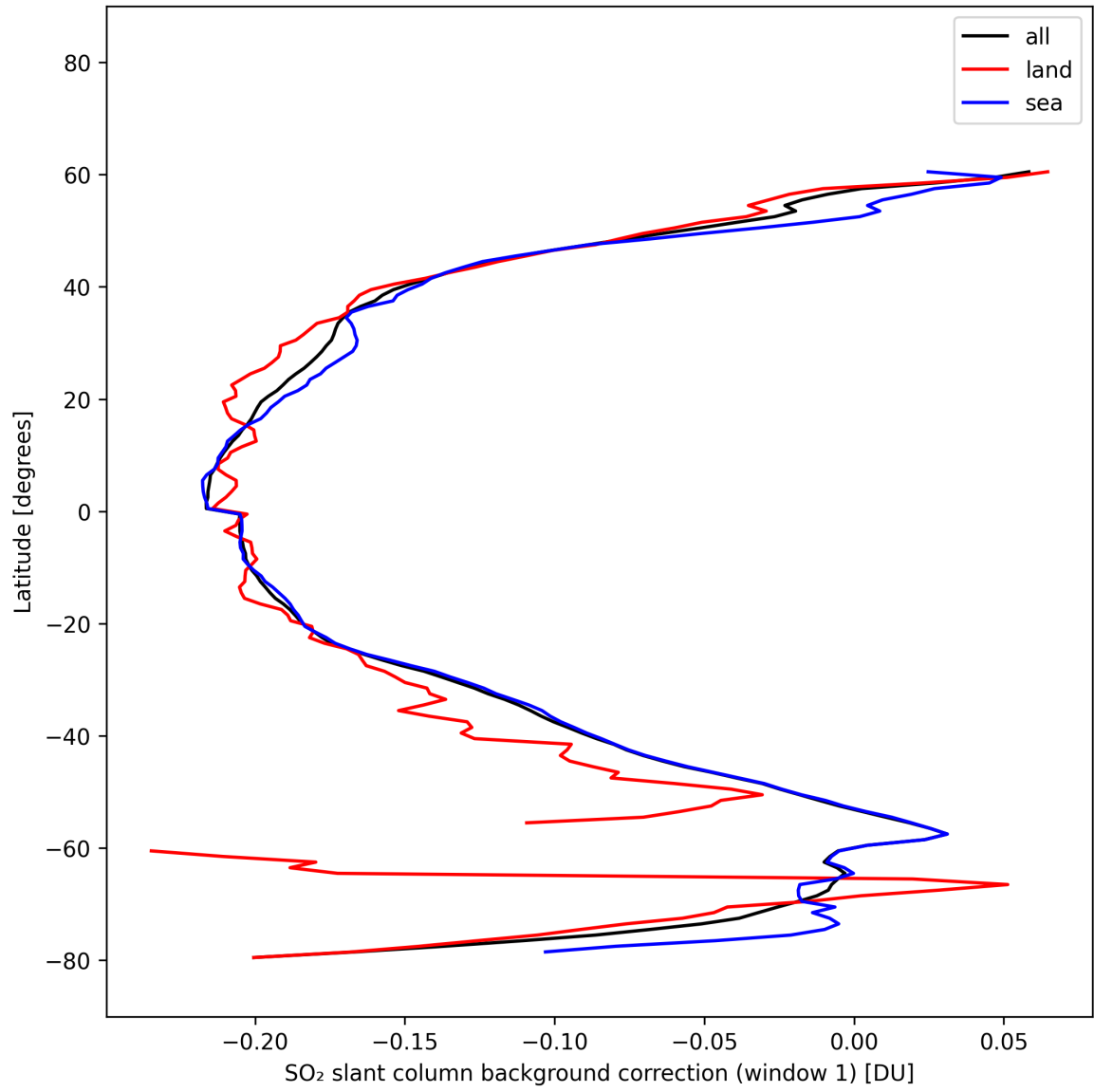


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-10-18 to 2025-10-19.

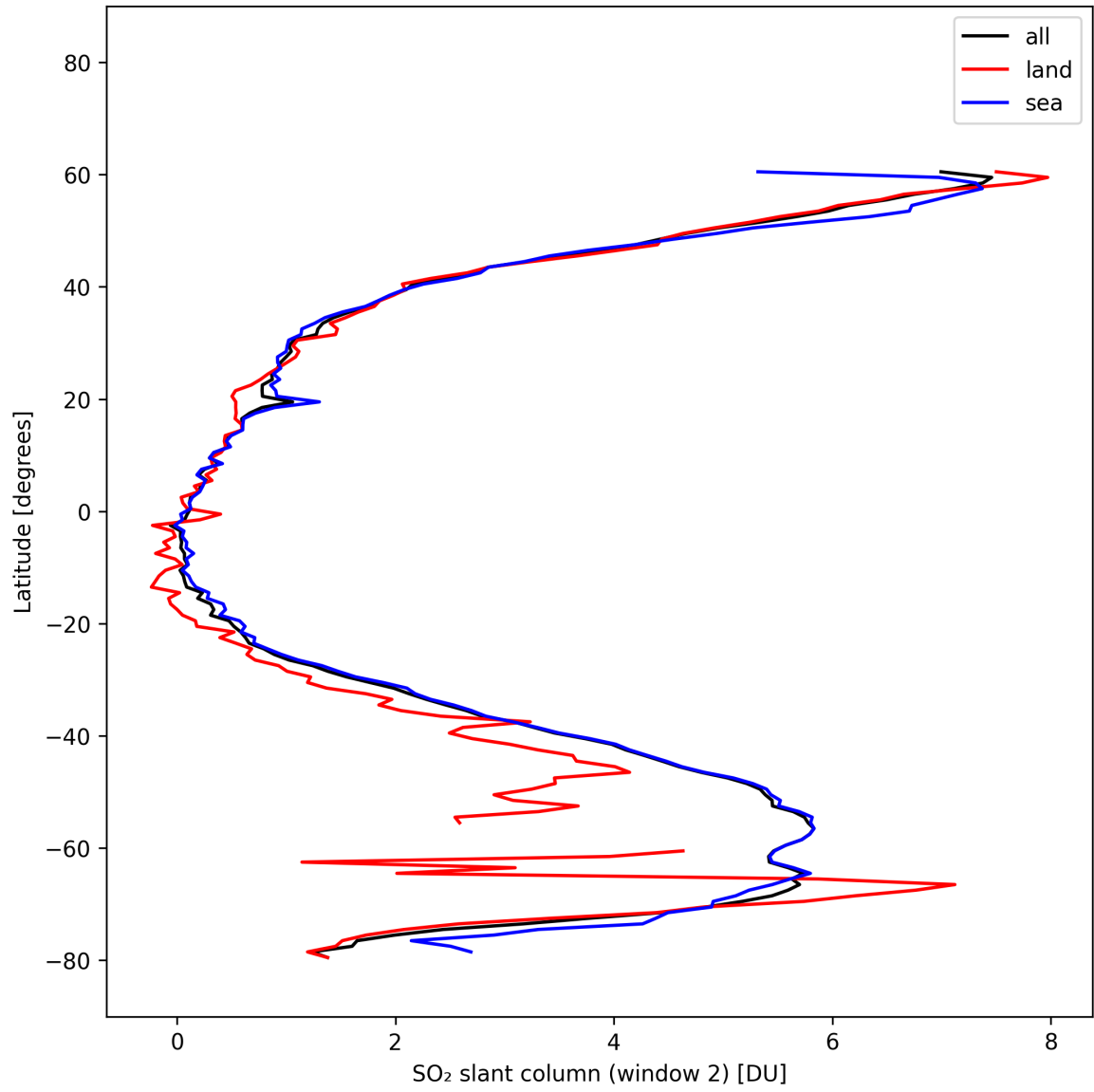


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-10-18 to 2025-10-19.

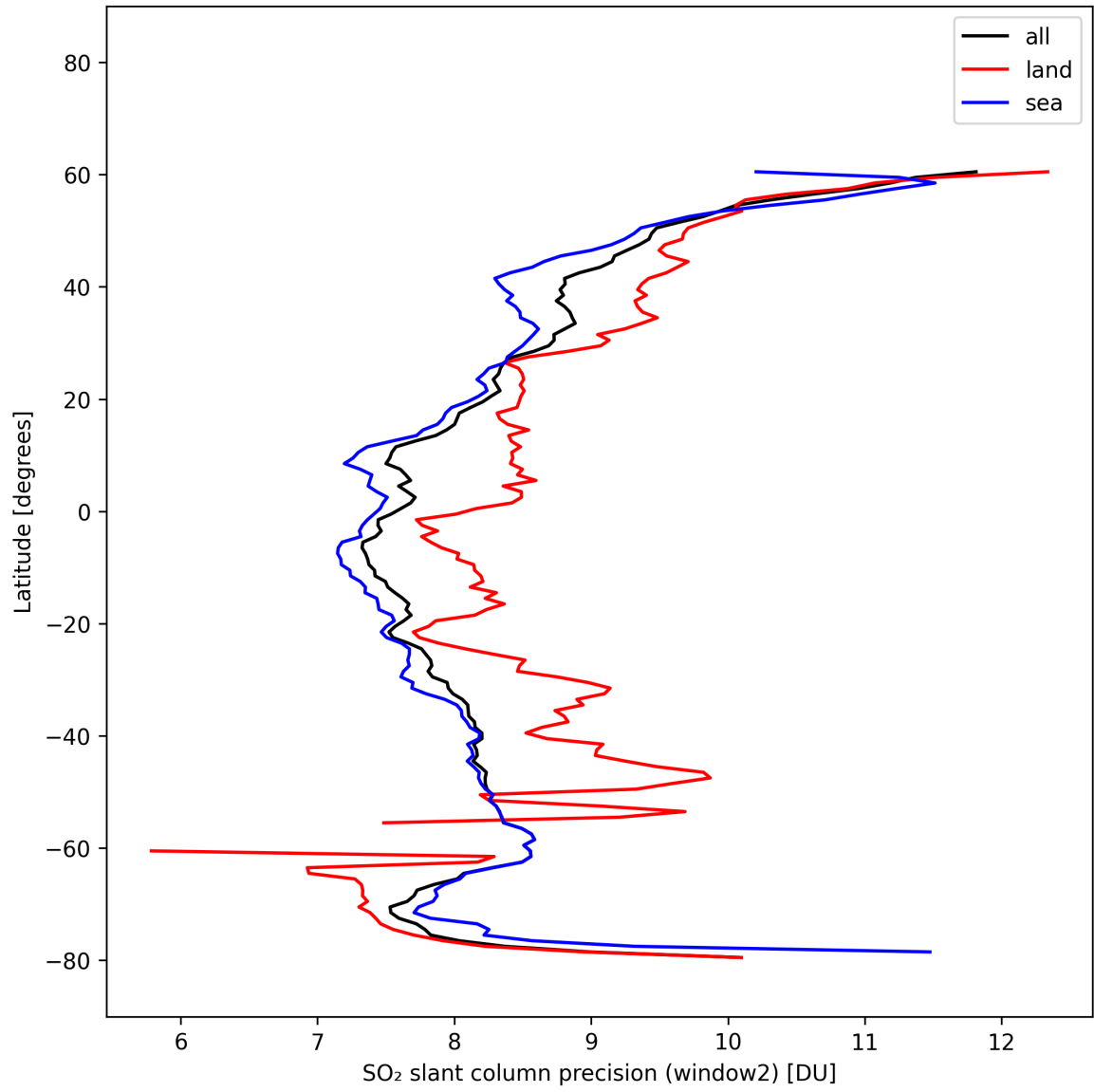


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-10-18 to 2025-10-19.

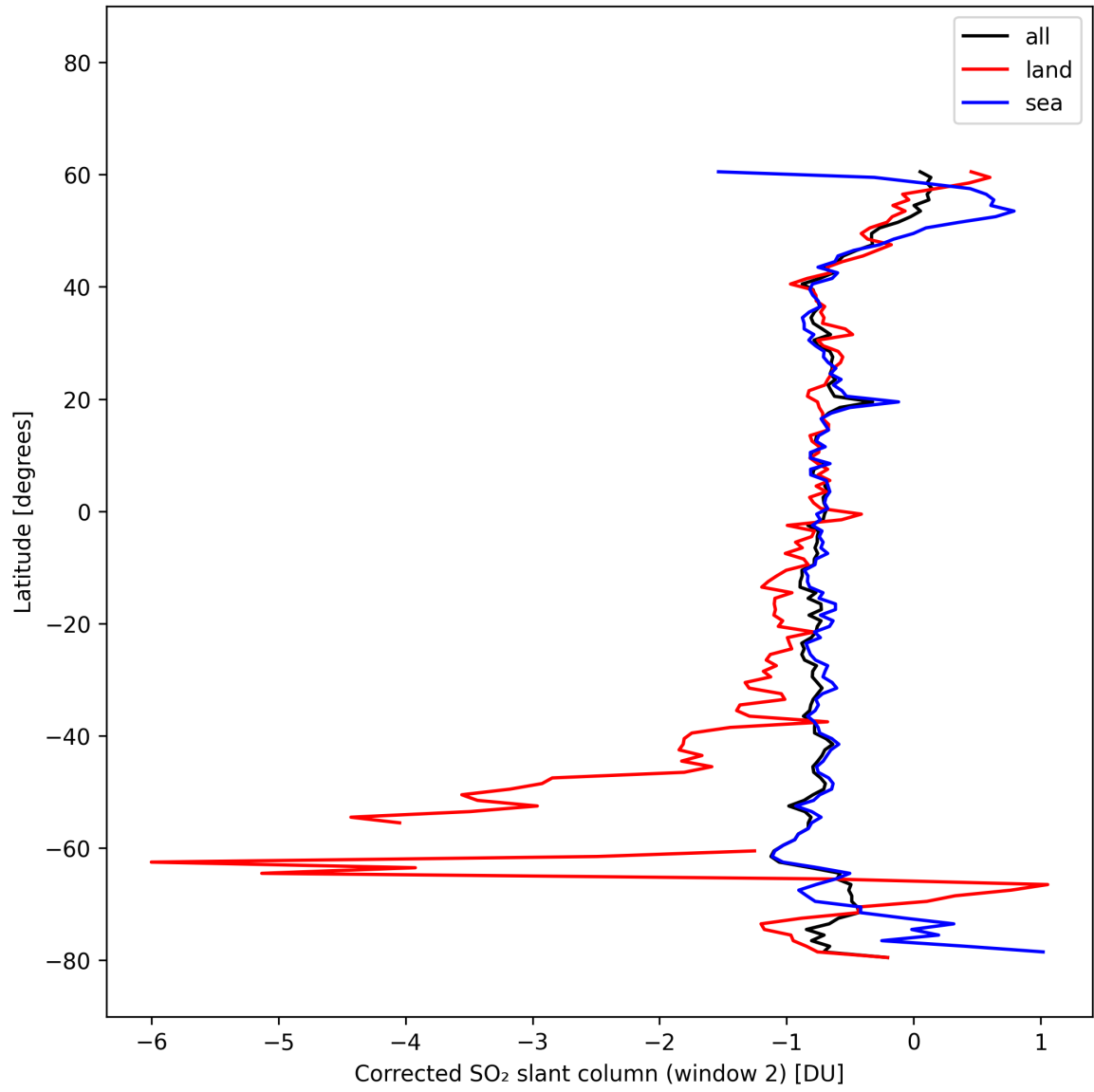


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-10-18 to 2025-10-19.

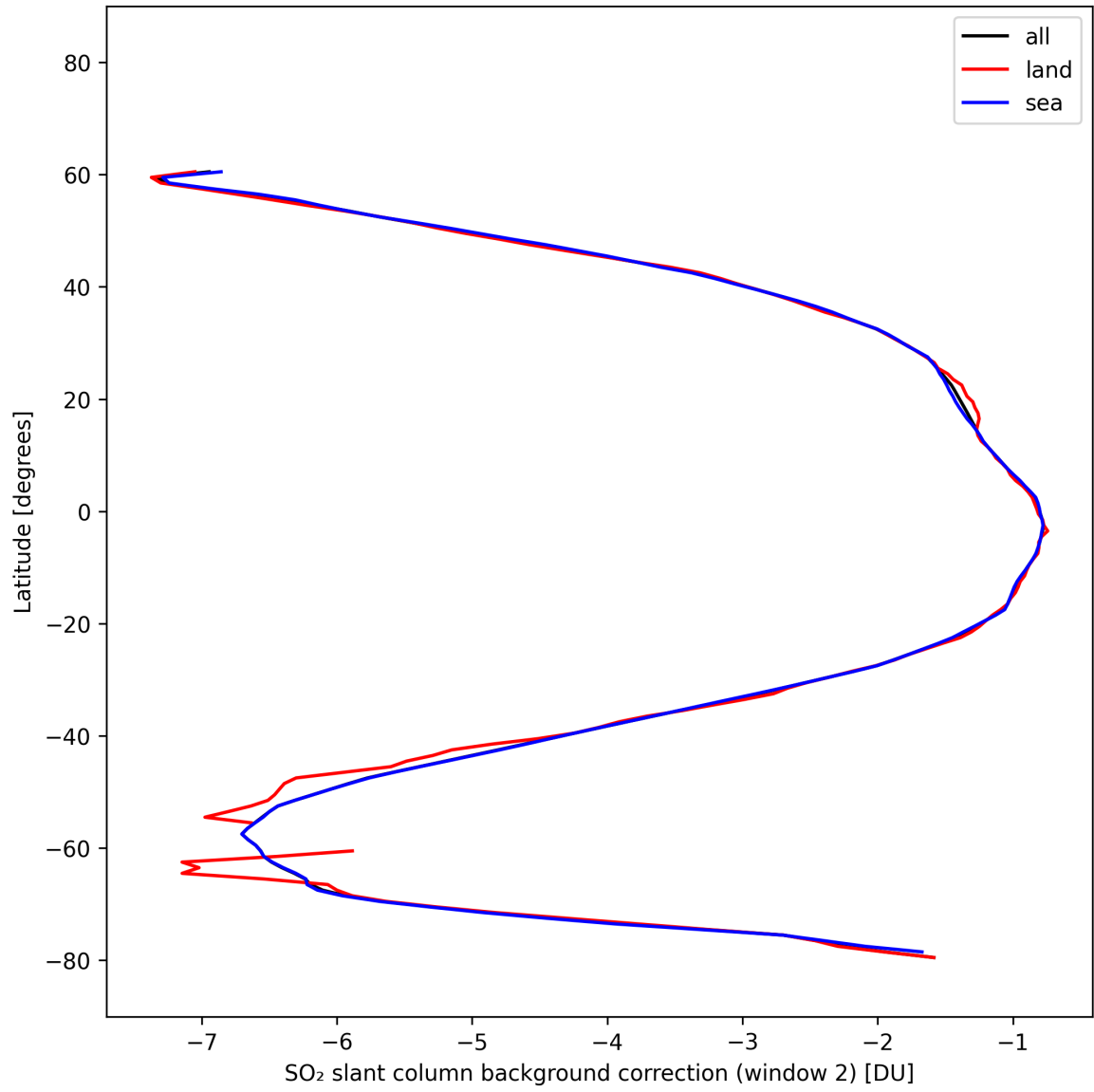


Figure 43: Zonal average of "SO₂ slant column background correction (window 2)" for 2025-10-18 to 2025-10-19.

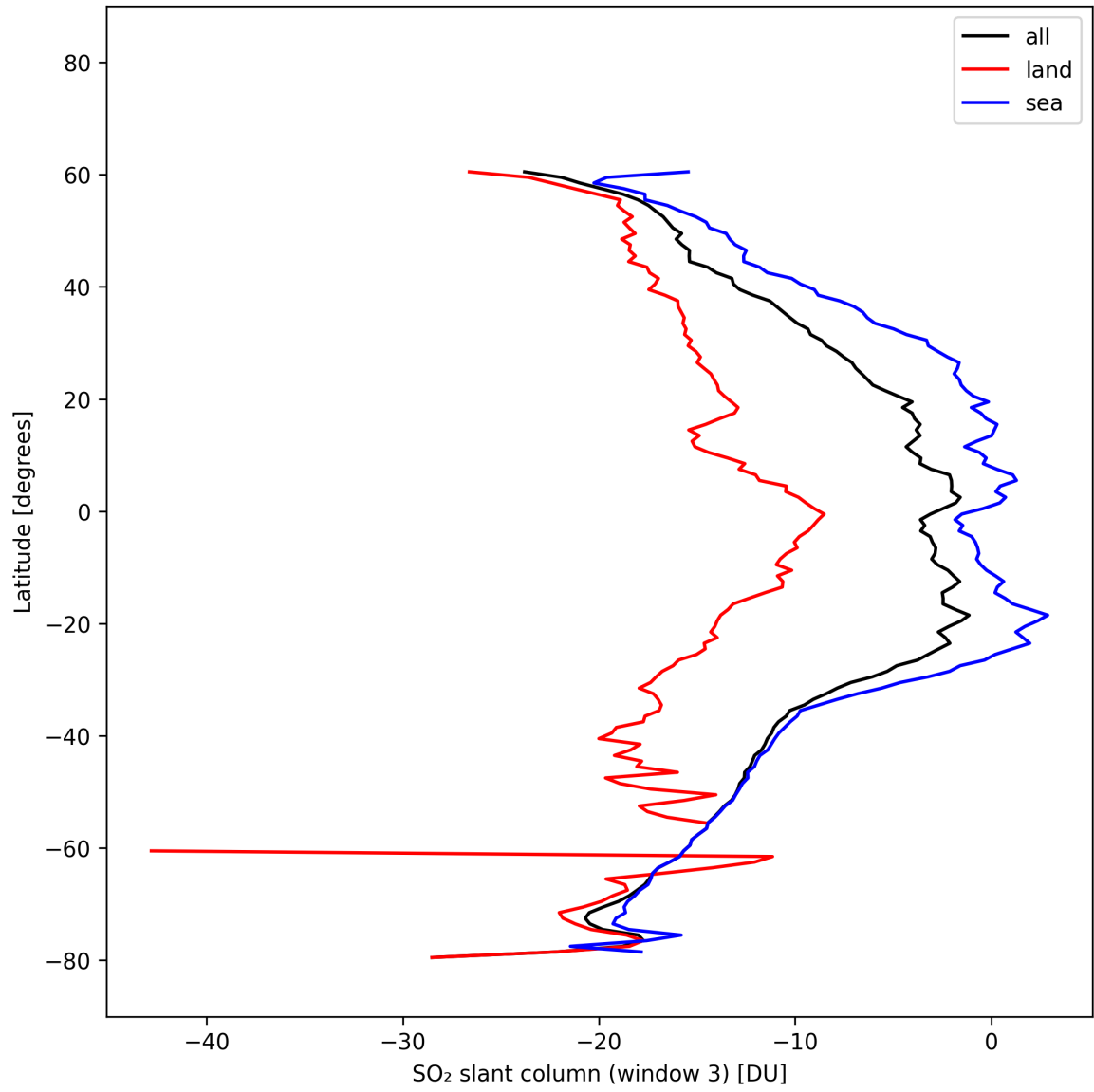


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-10-18 to 2025-10-19.

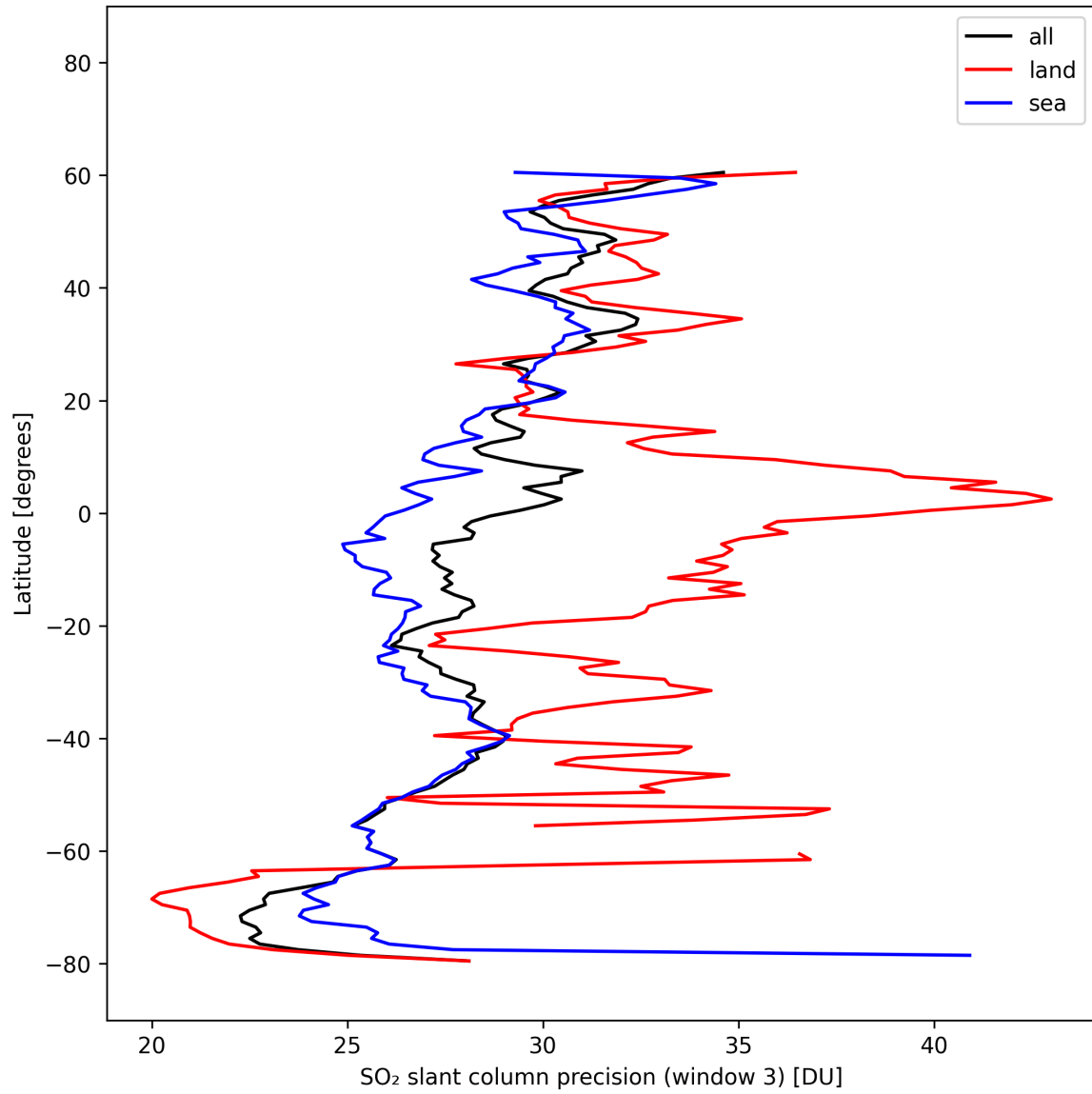


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-10-18 to 2025-10-19.

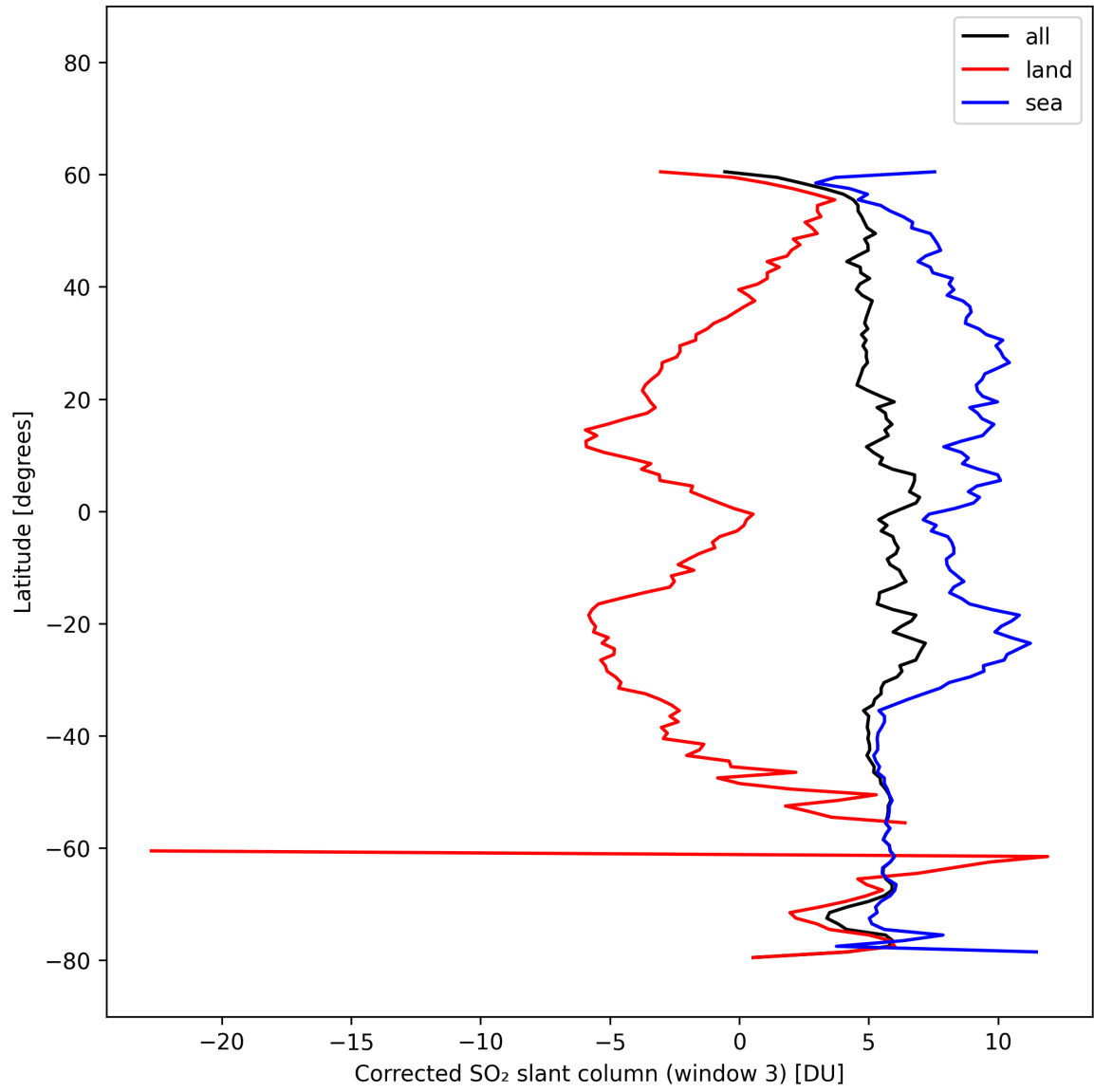


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-10-18 to 2025-10-19.

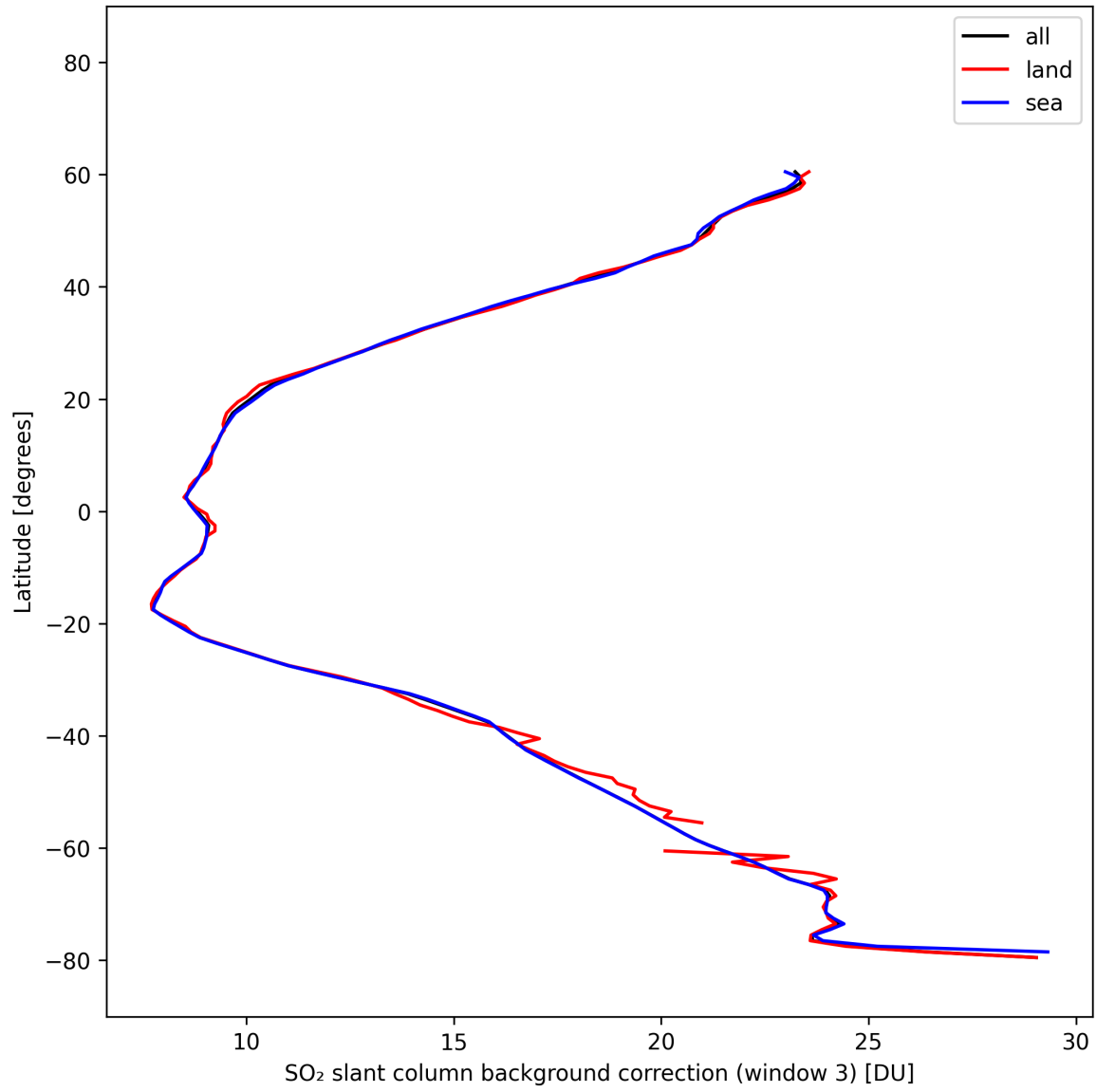


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-10-18 to 2025-10-19.

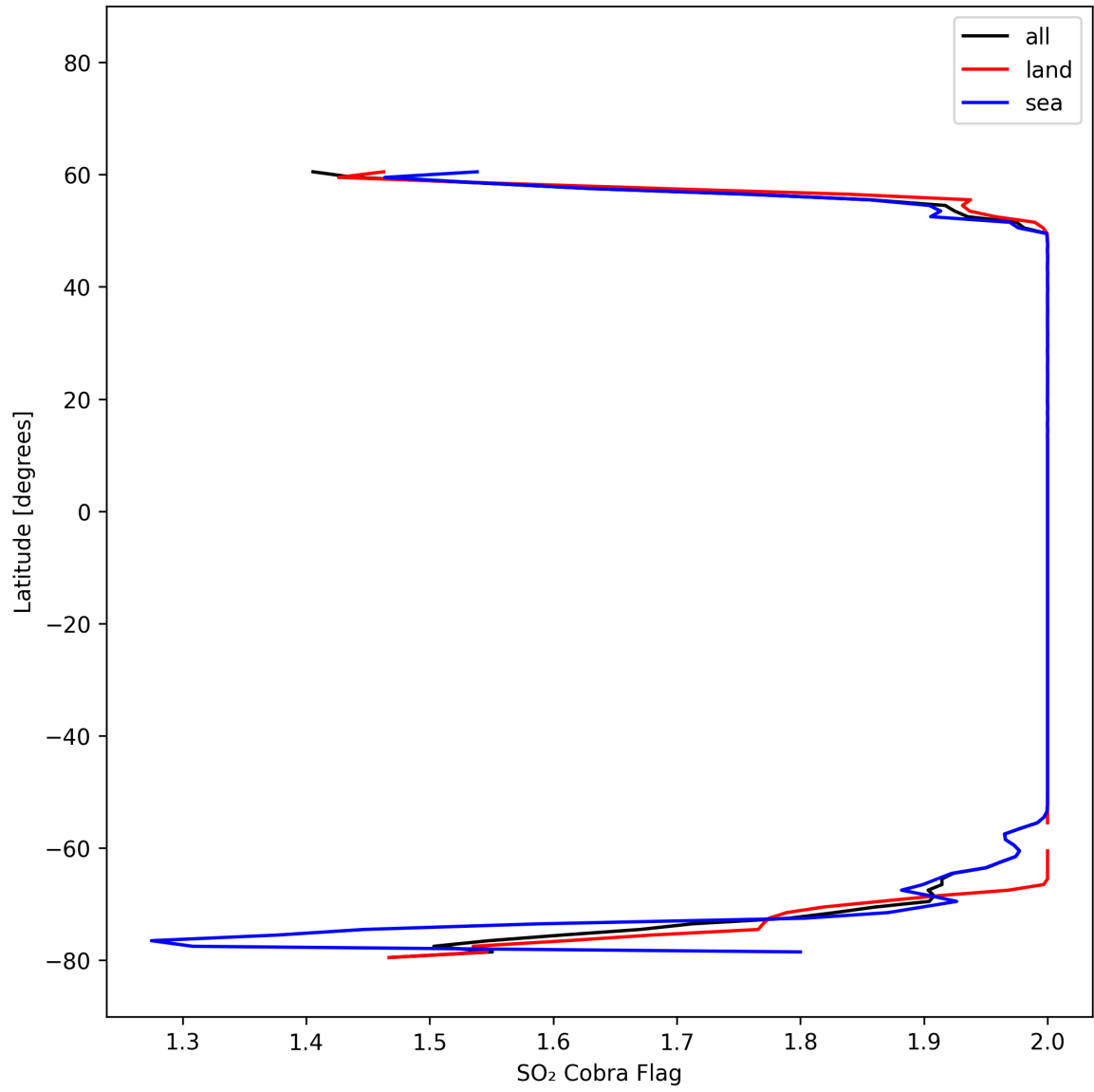


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-10-18 to 2025-10-19.

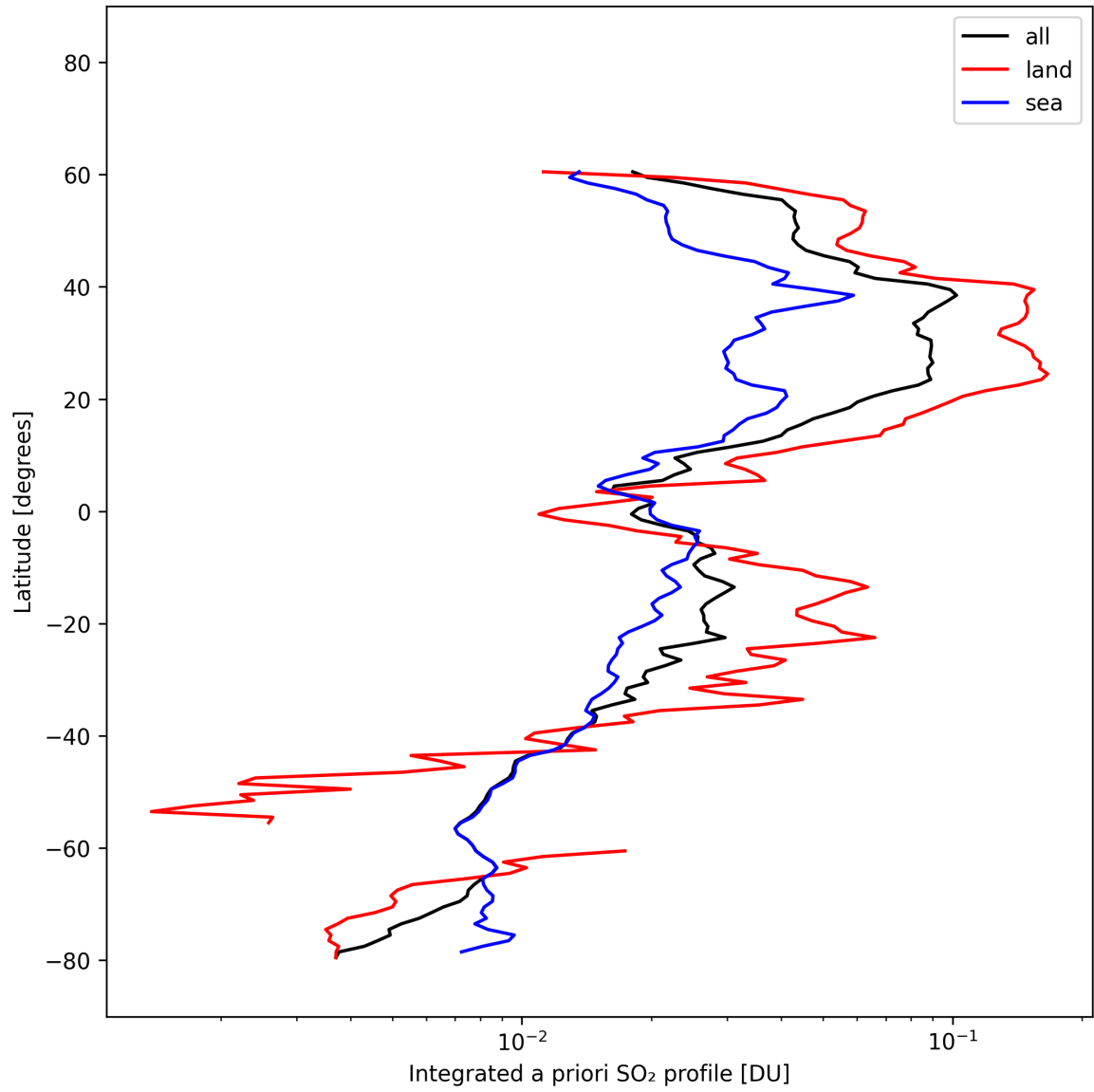


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-10-18 to 2025-10-19.

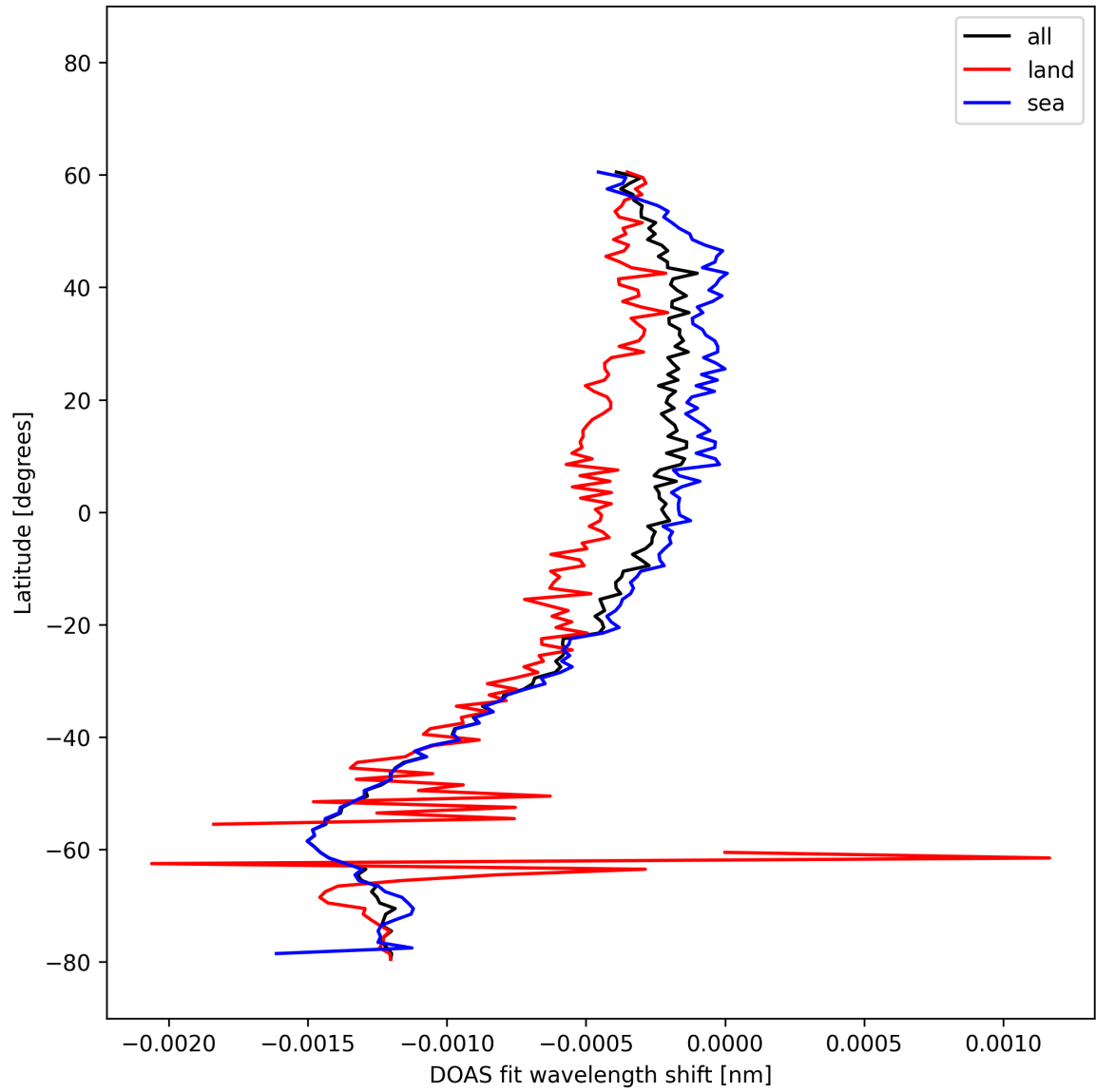


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-10-18 to 2025-10-19.

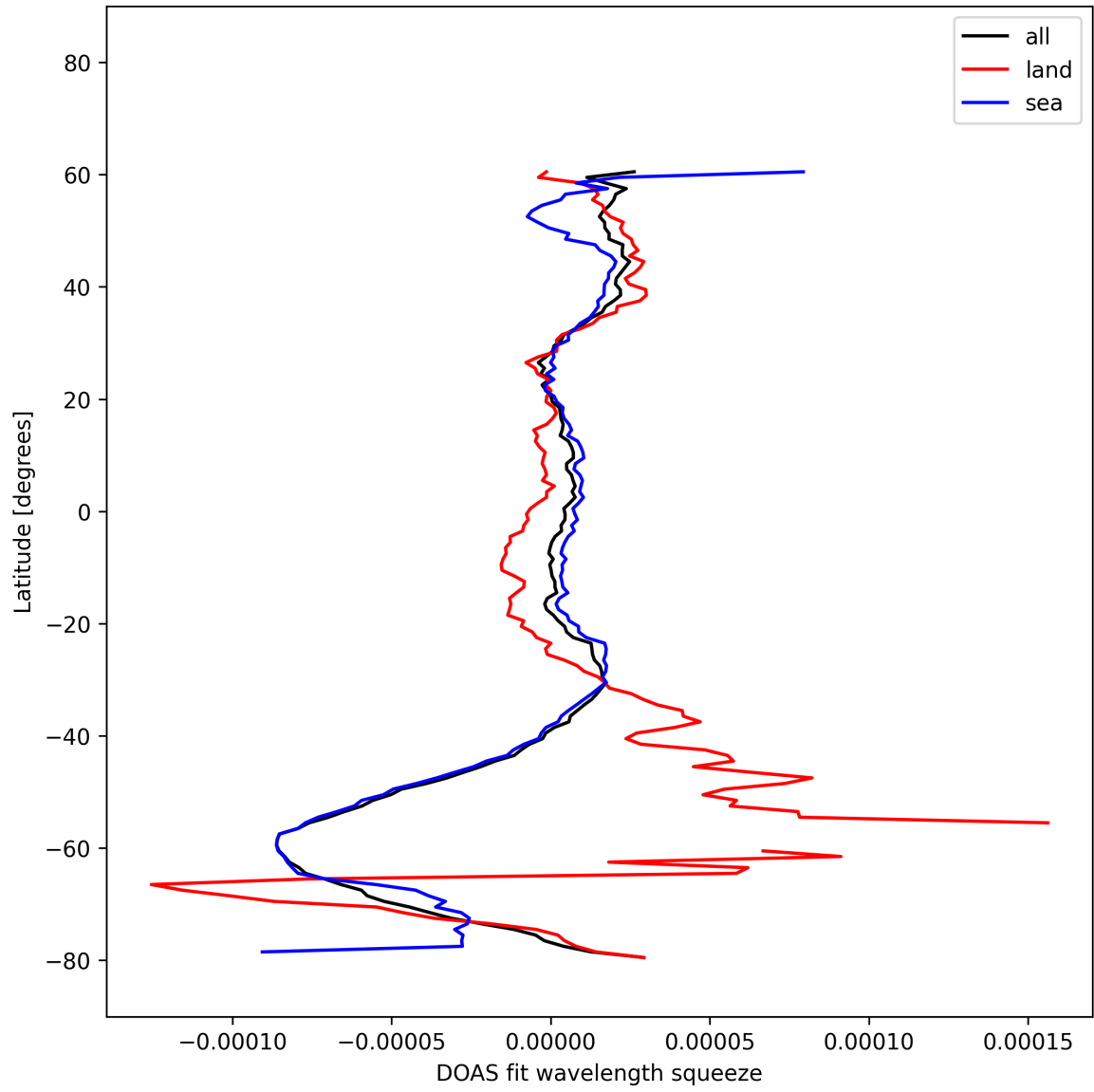


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-10-18 to 2025-10-19.

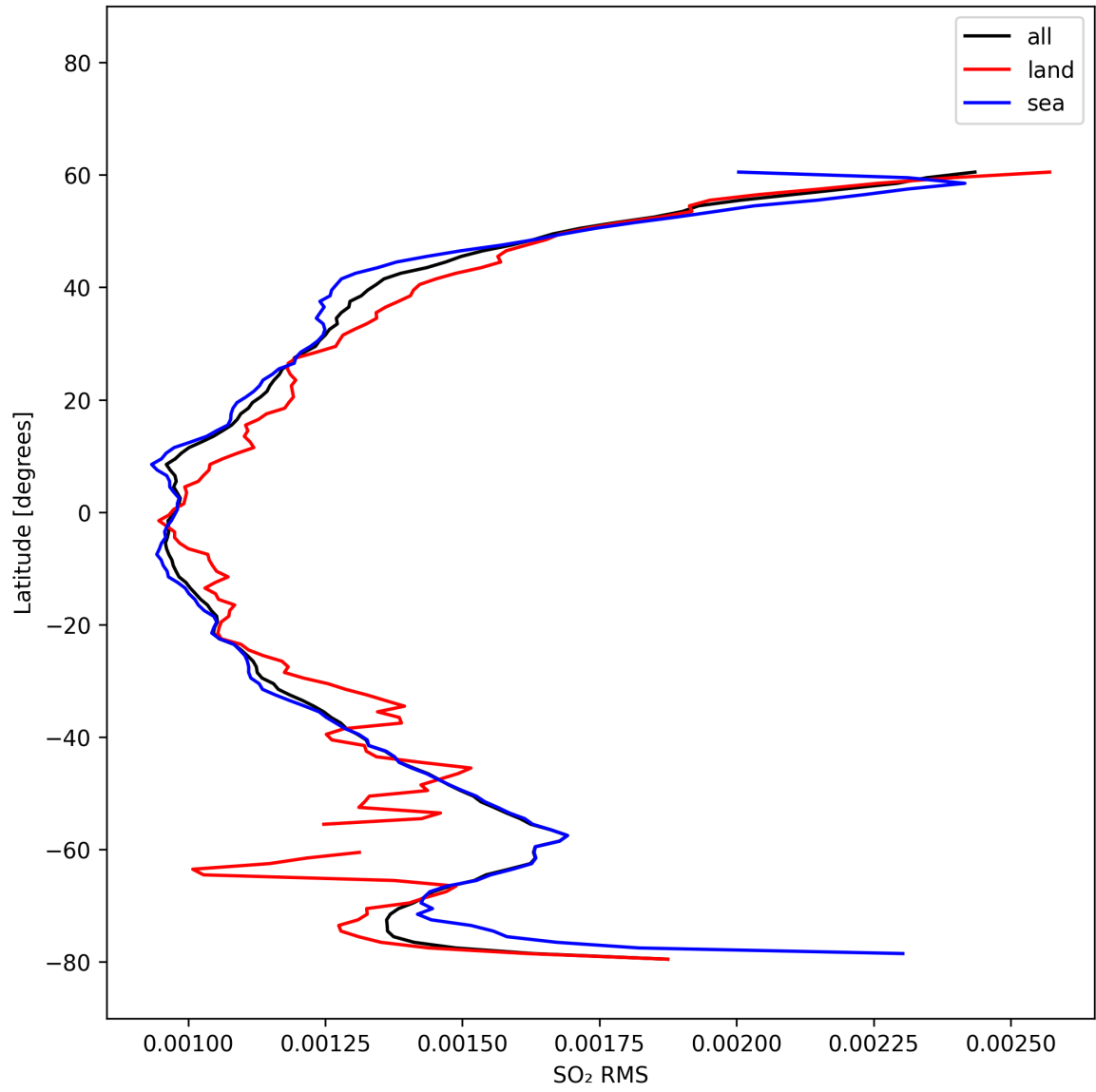


Figure 52: Zonal average of “SO₂ RMS” for 2025-10-18 to 2025-10-19.

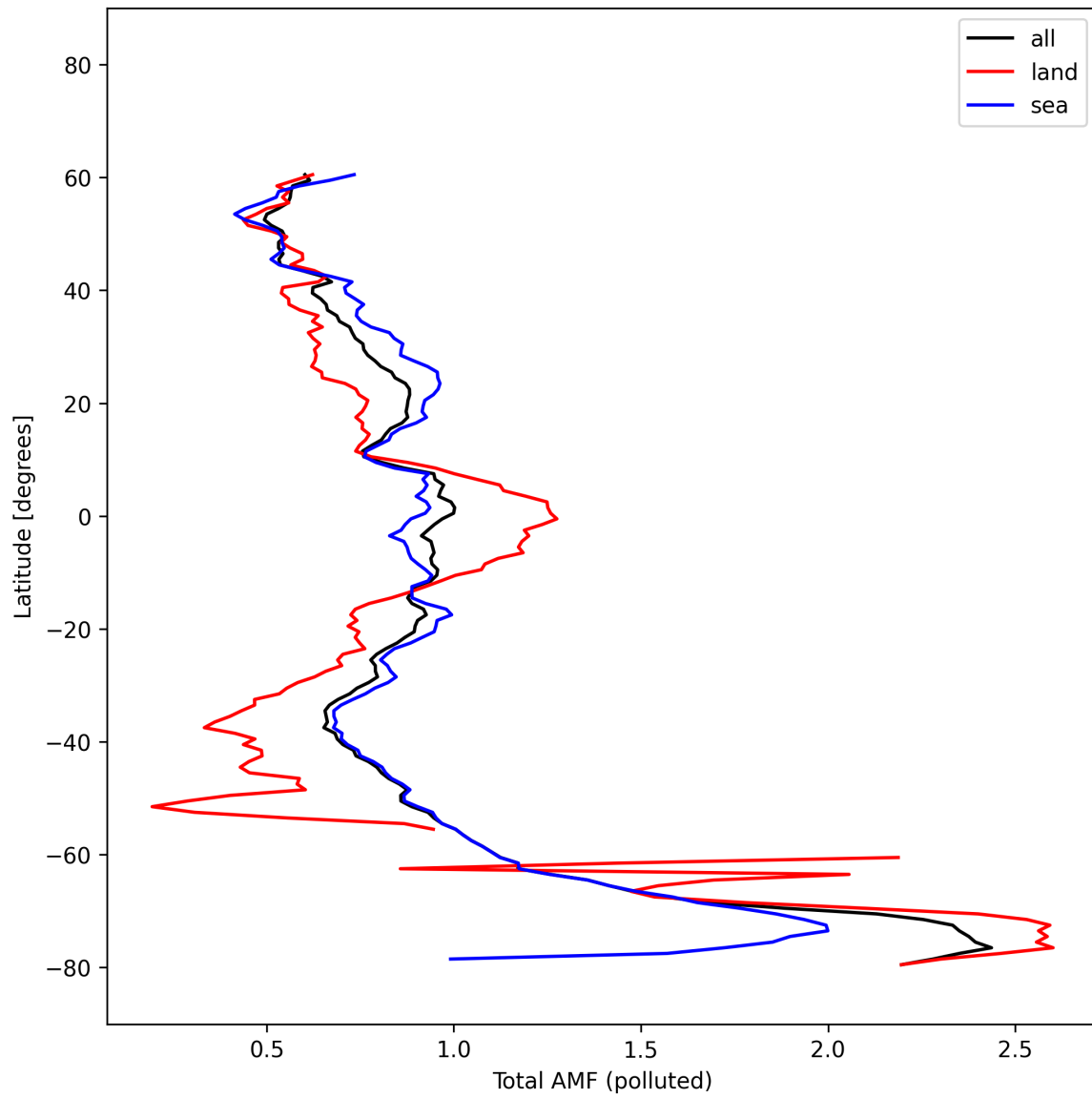


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-10-18 to 2025-10-19.

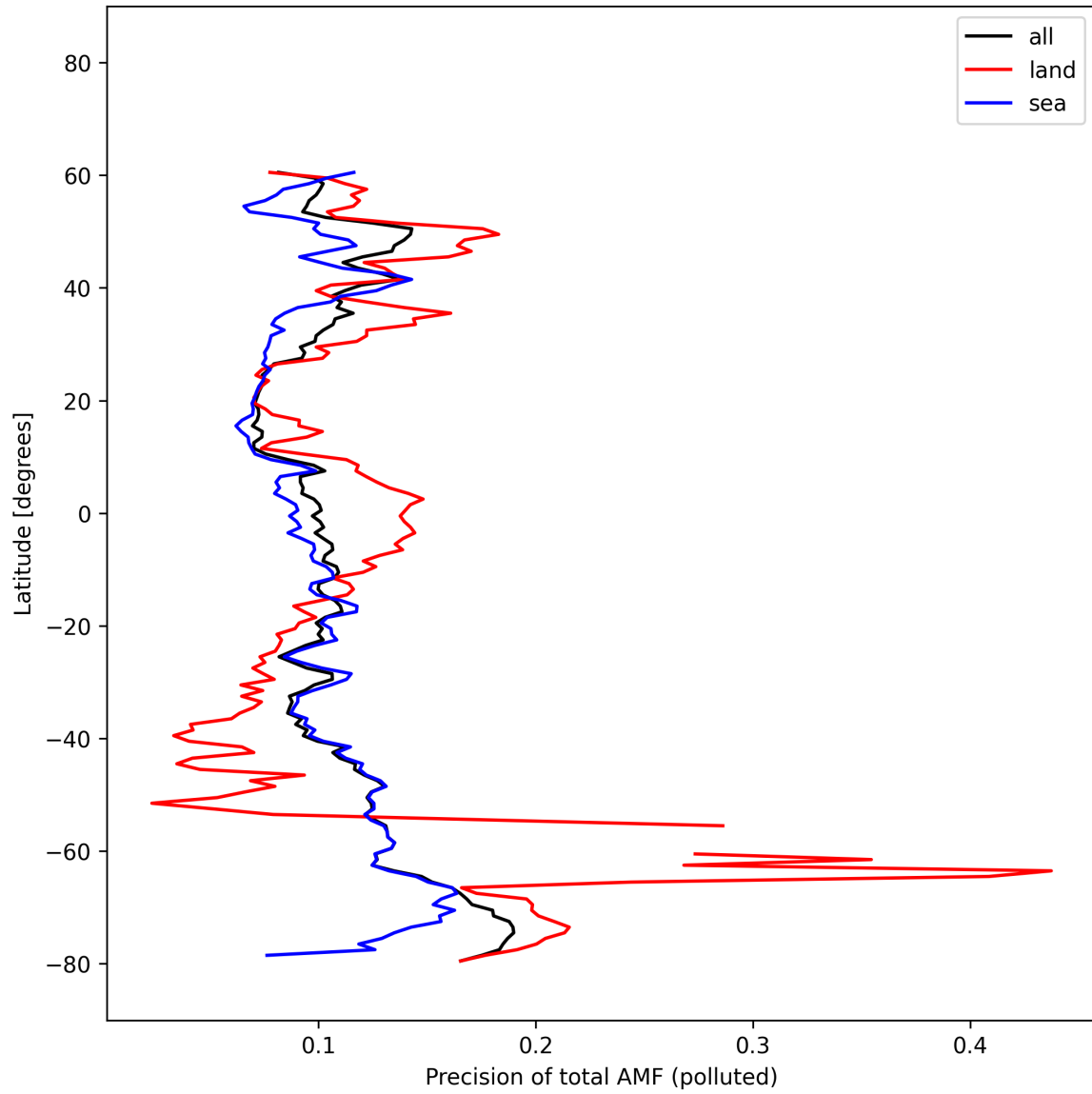


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-10-18 to 2025-10-19.

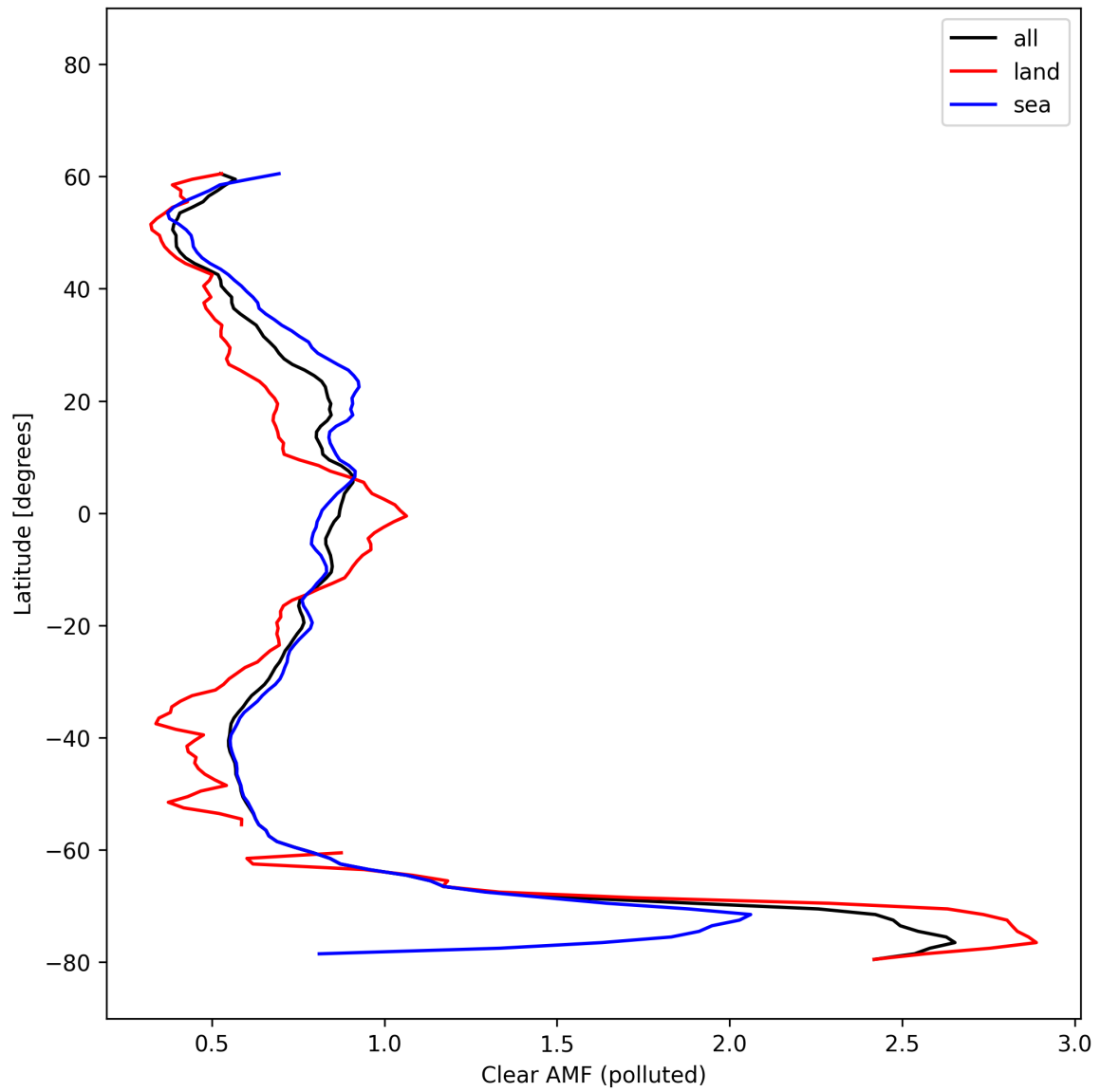


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-10-18 to 2025-10-19.

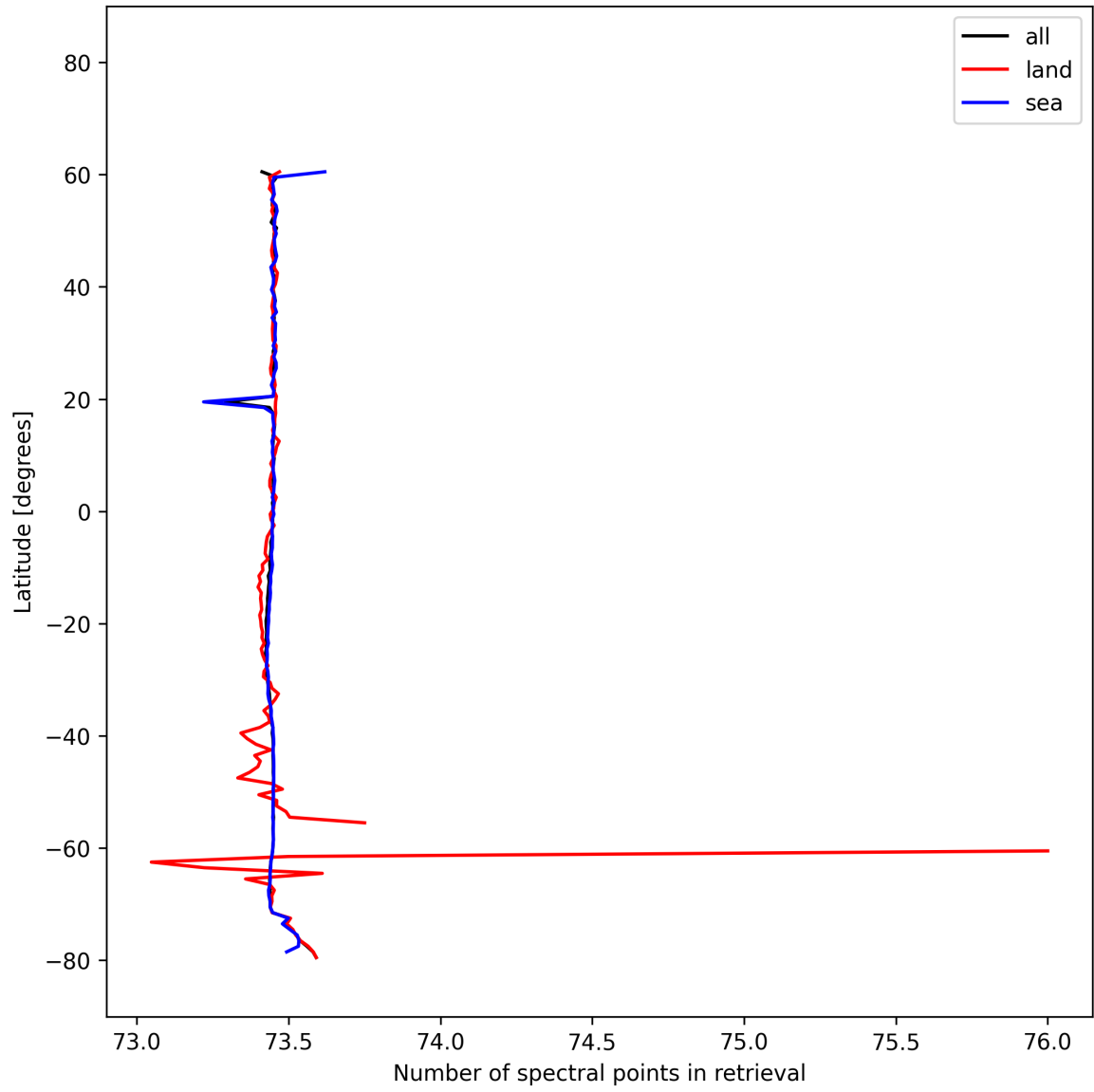


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-10-18 to 2025-10-19.

8 Histograms

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

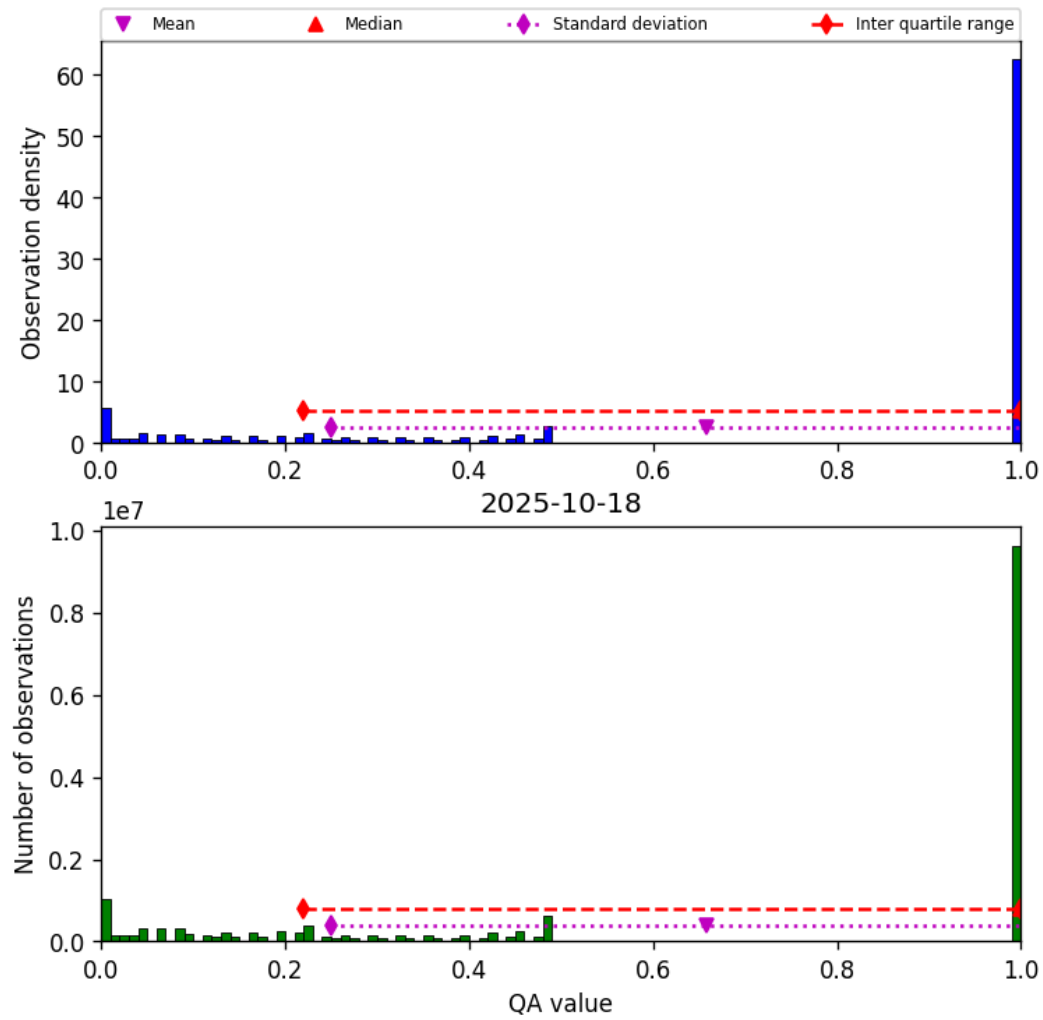


Figure 57: Histogram of “QA value” for 2025-10-18 to 2025-10-19

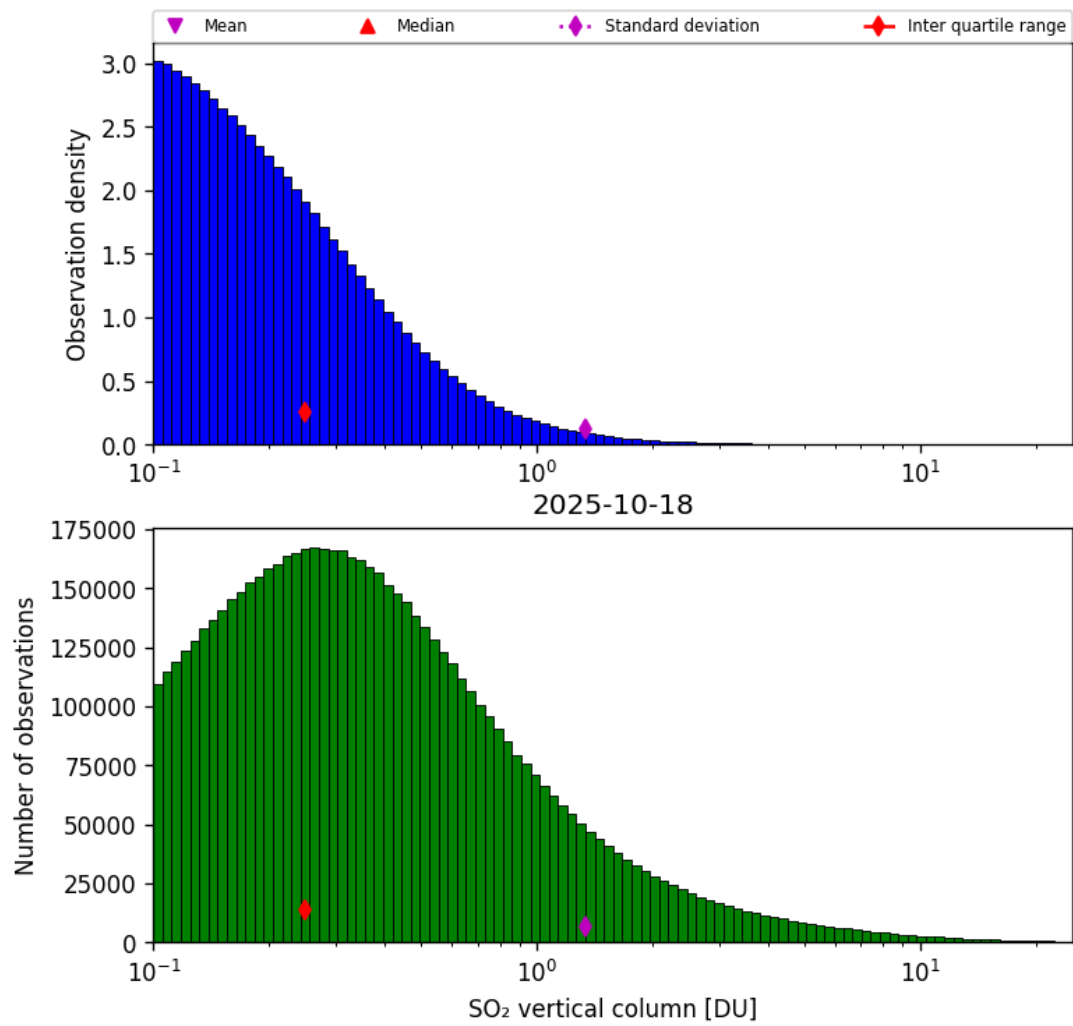


Figure 58: Histogram of “SO₂ vertical column” for 2025-10-18 to 2025-10-19

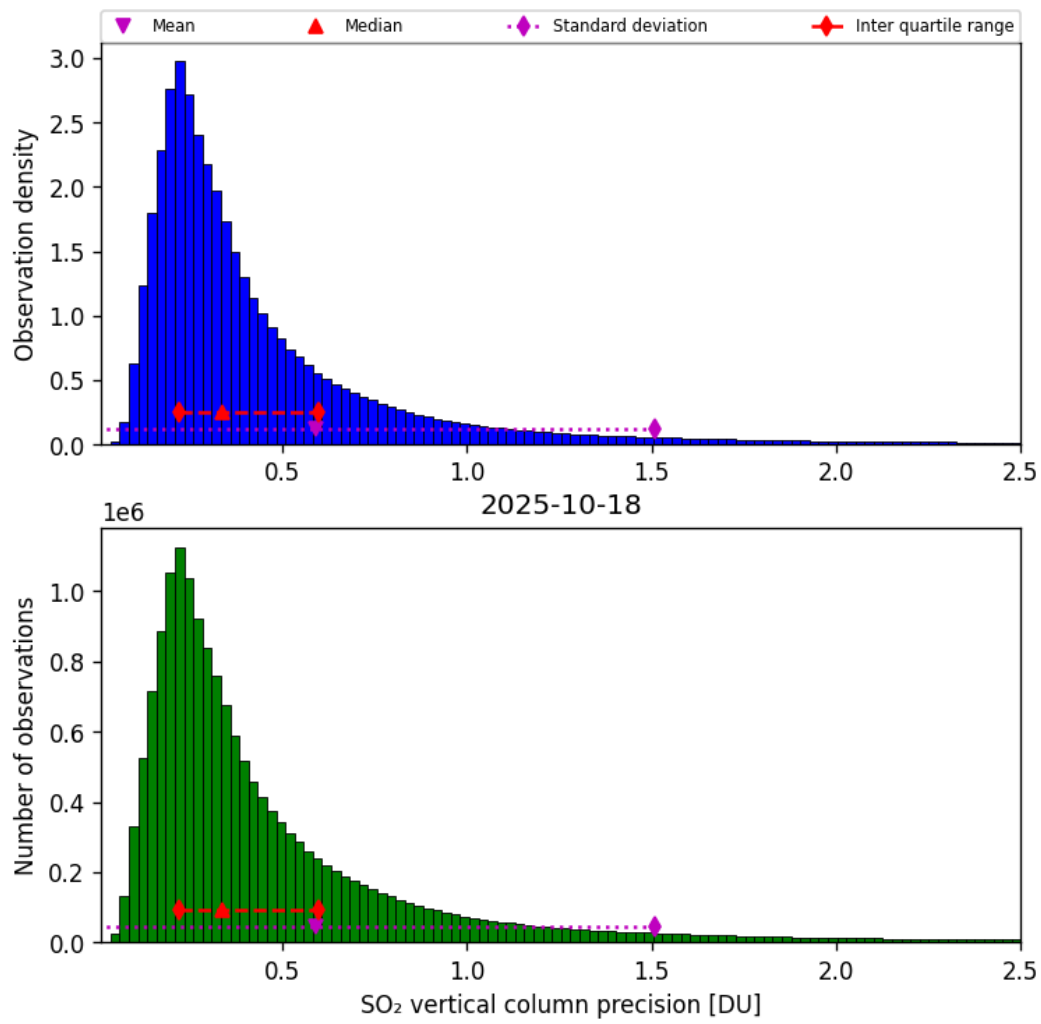


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-10-18 to 2025-10-19

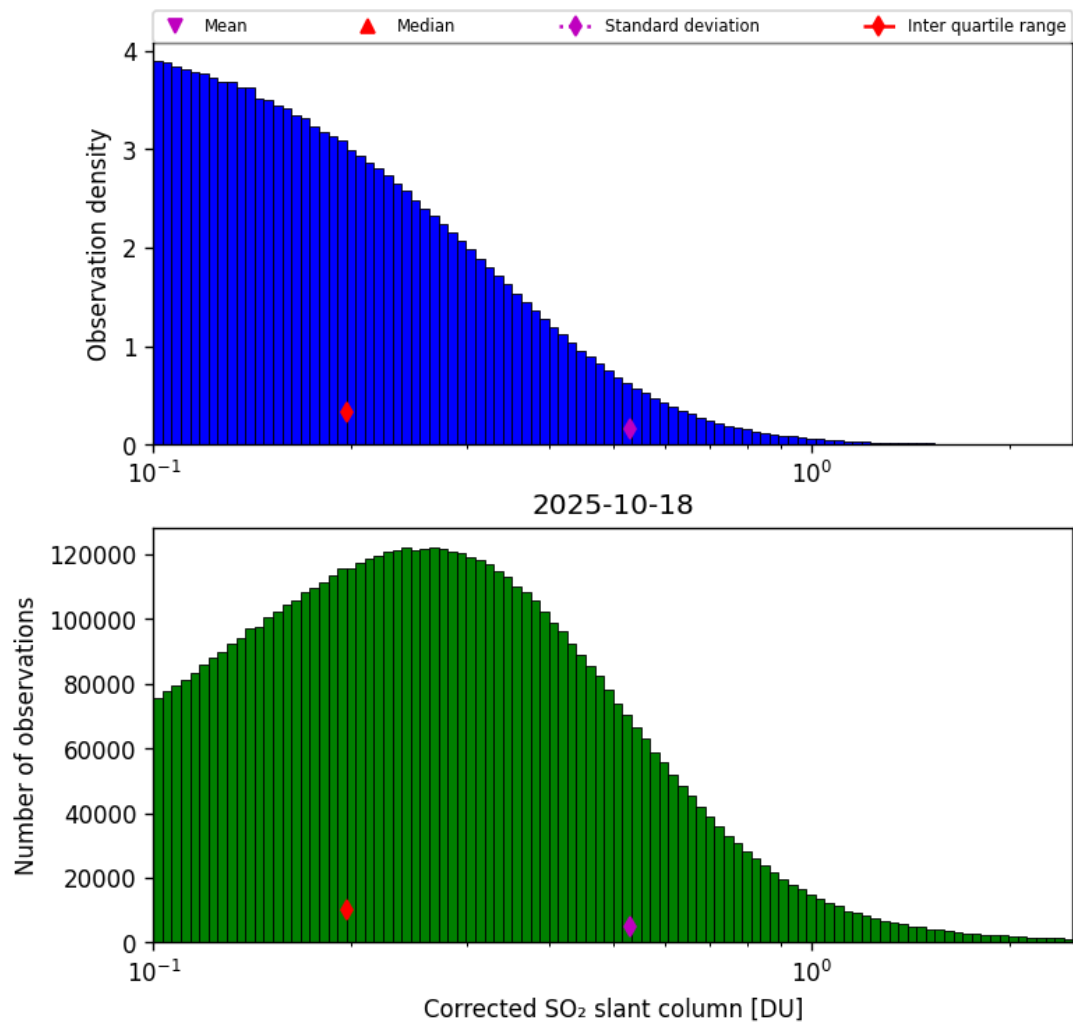


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-10-18 to 2025-10-19

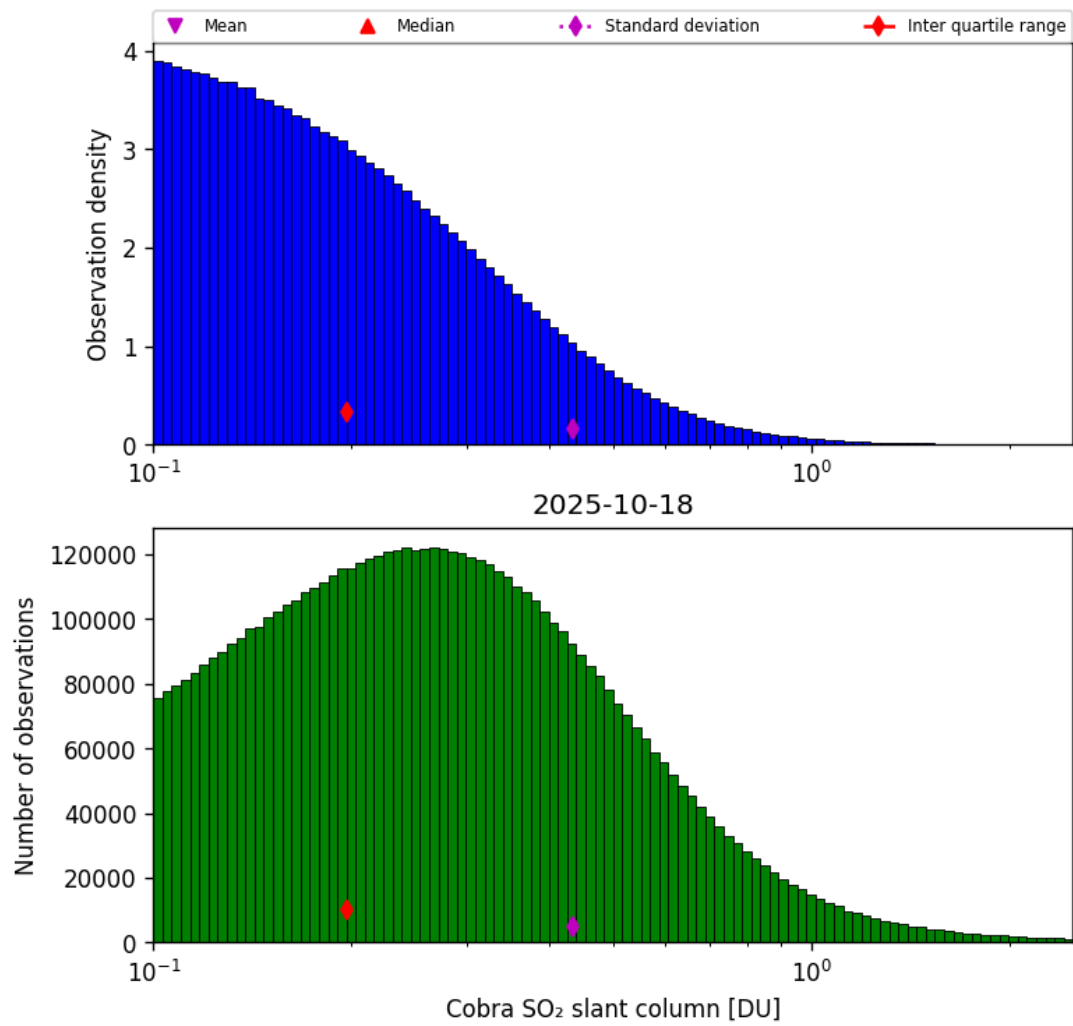


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-10-18 to 2025-10-19

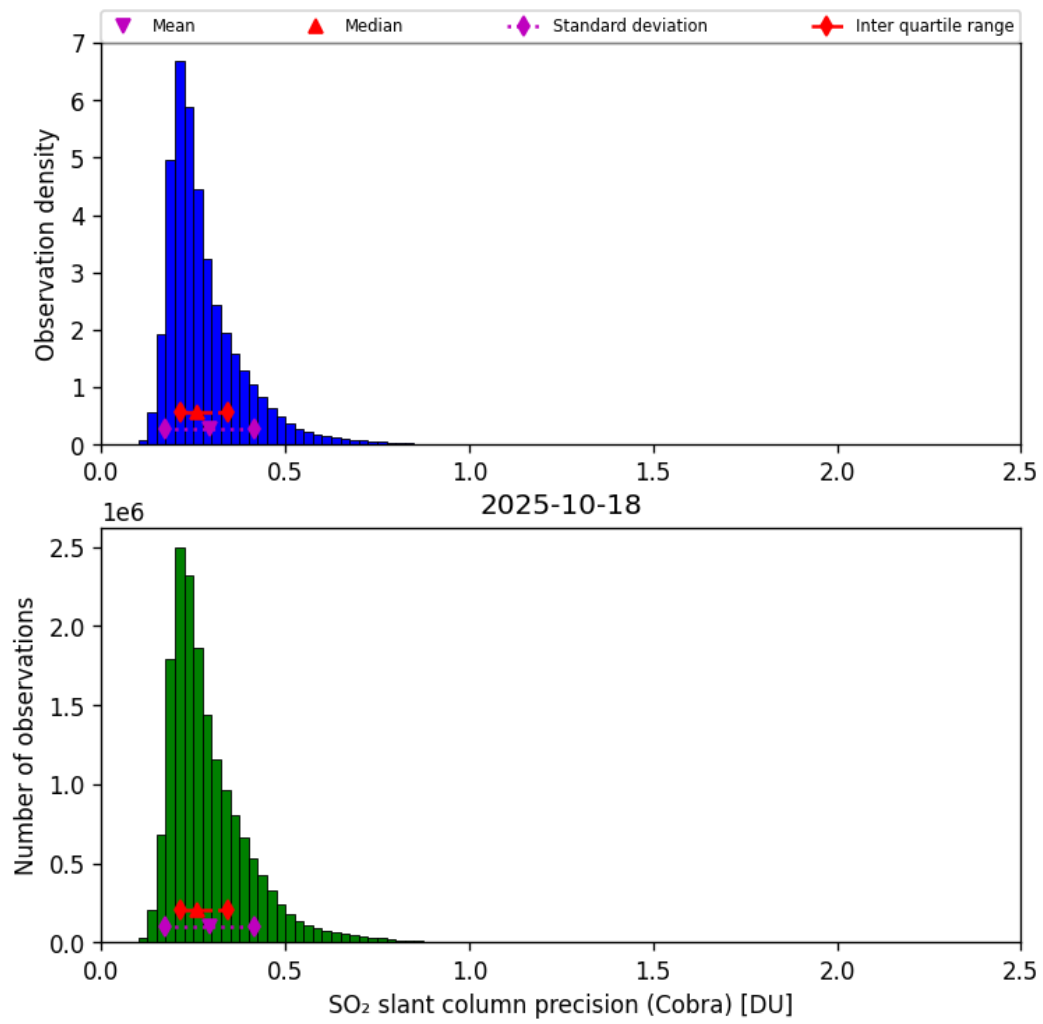


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-10-18 to 2025-10-19

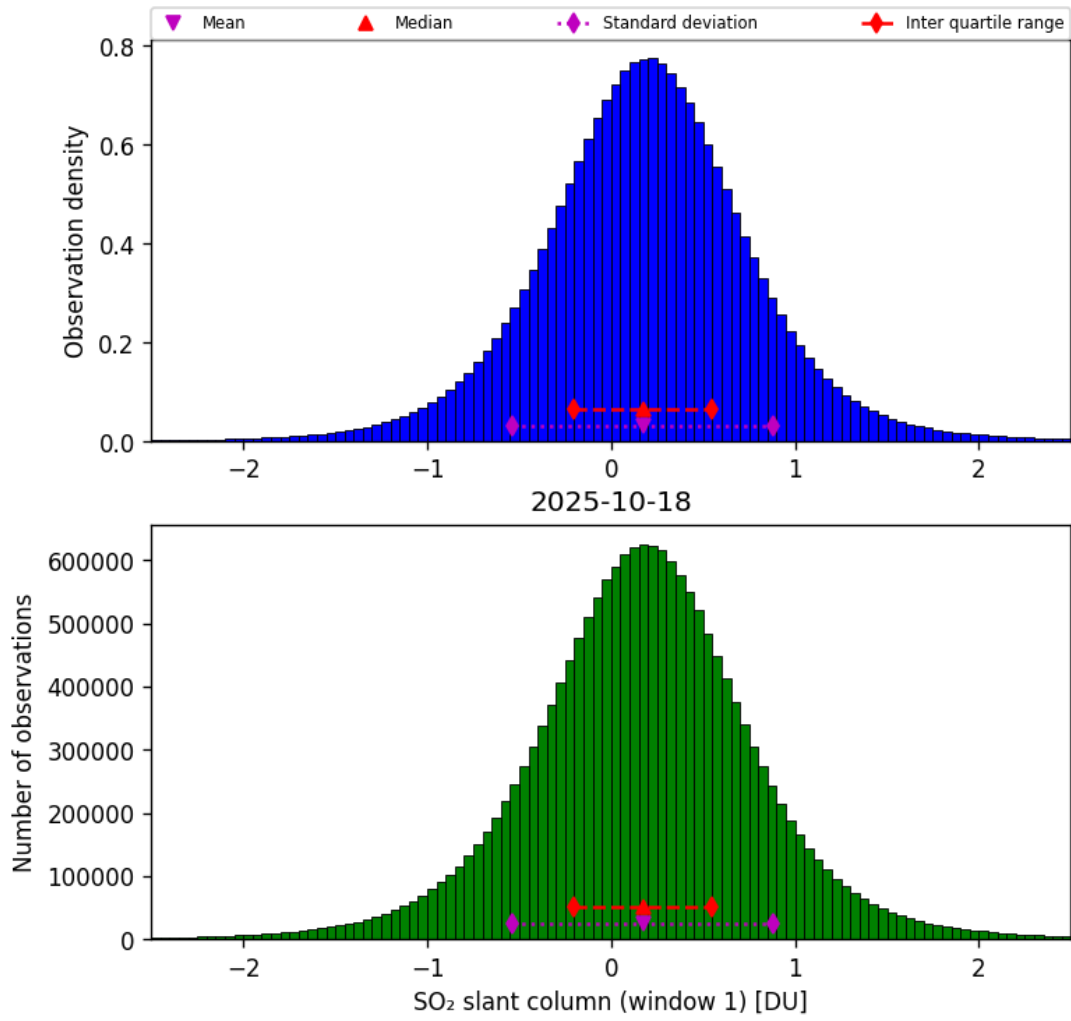


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-10-18 to 2025-10-19

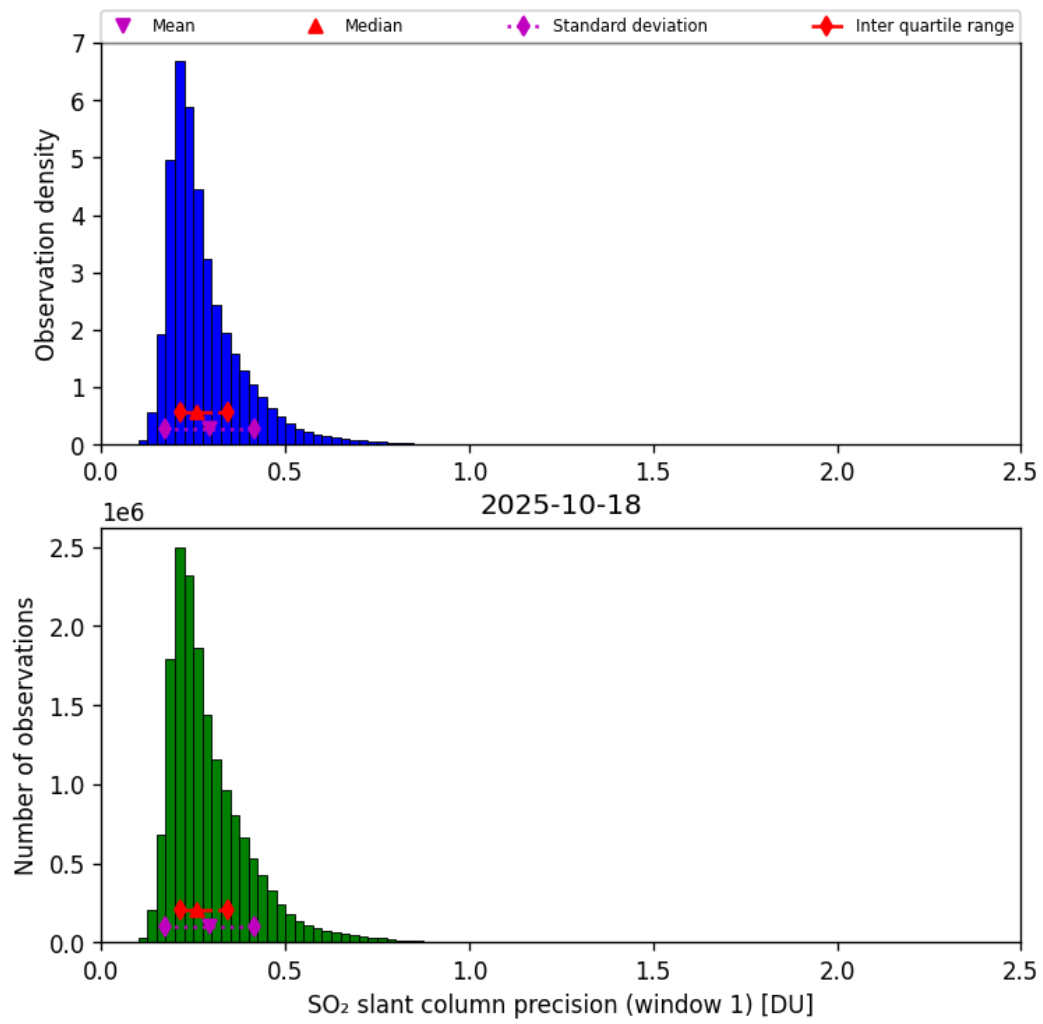


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-10-18 to 2025-10-19

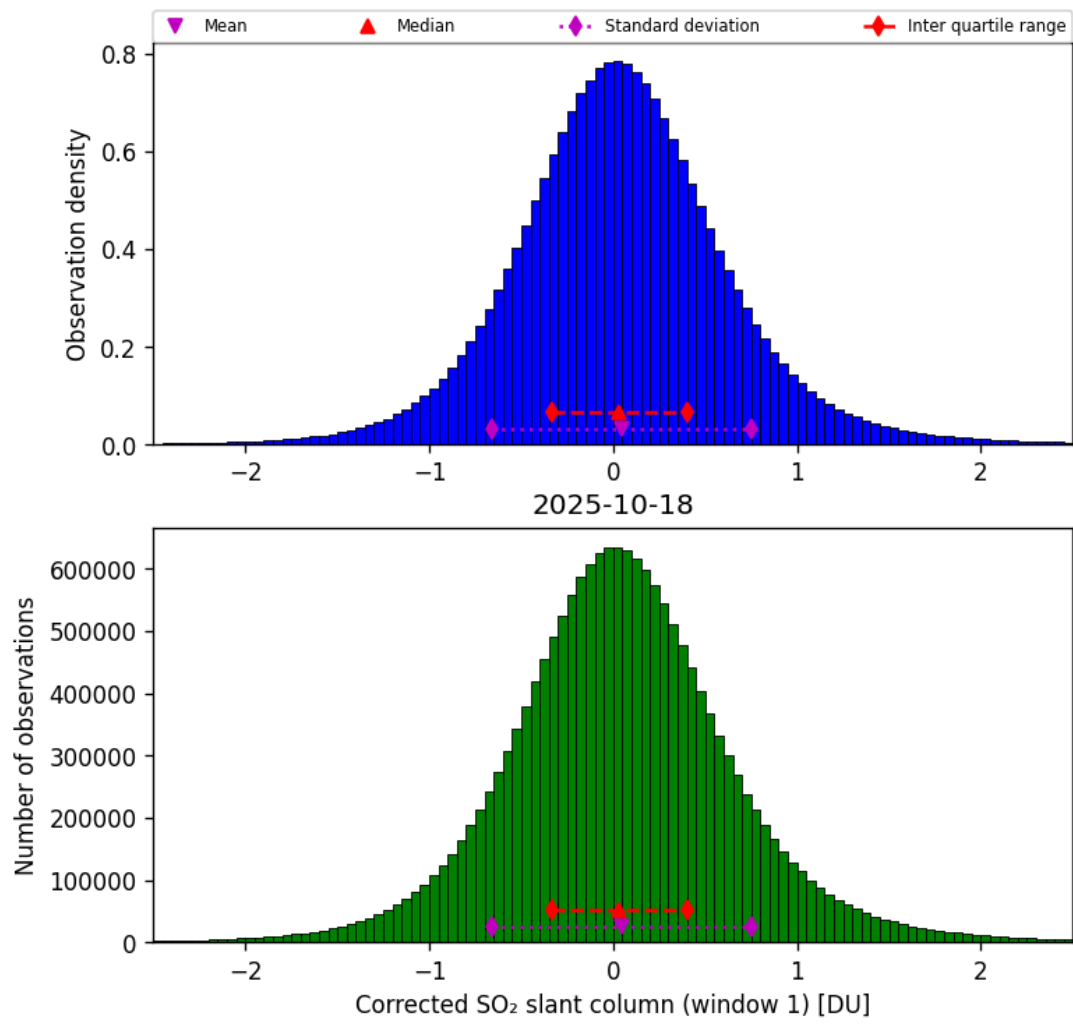


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-10-18 to 2025-10-19

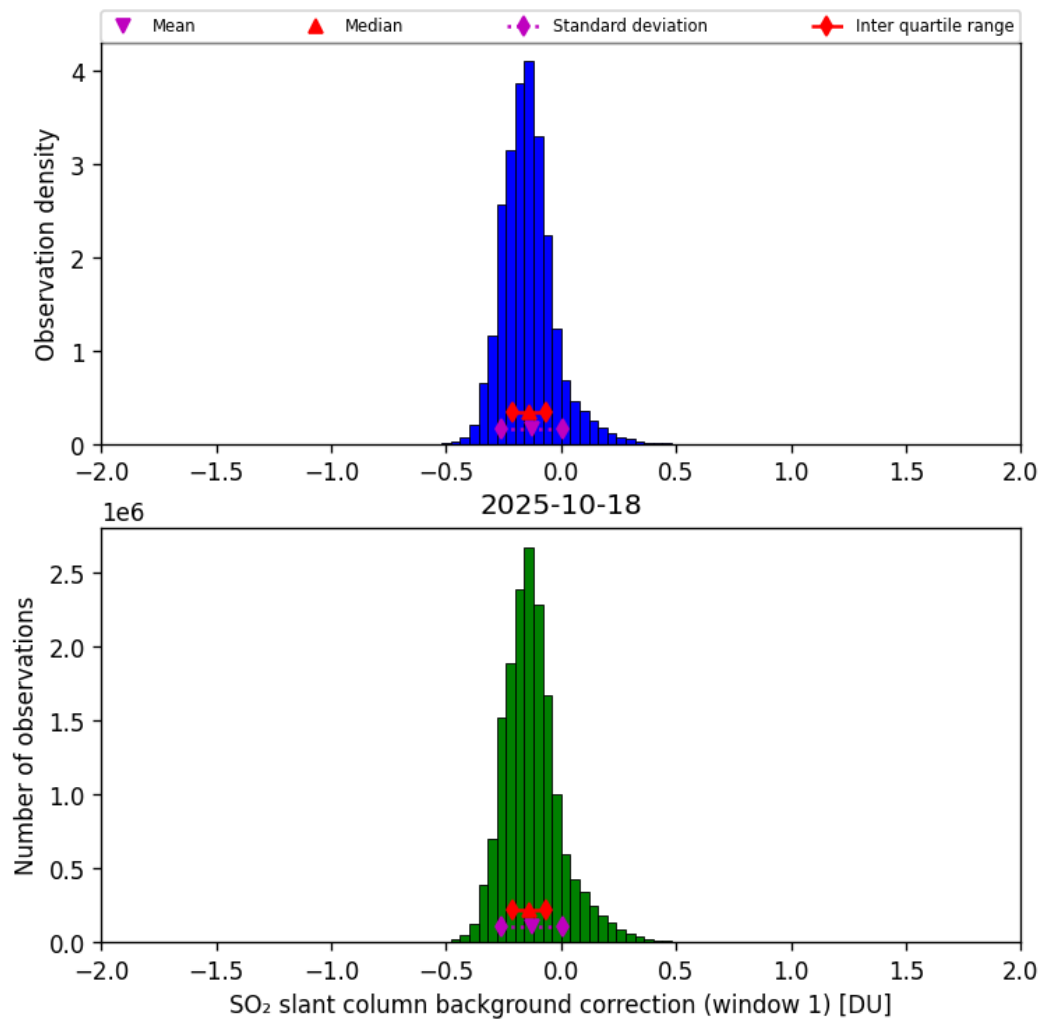


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-10-18 to 2025-10-19

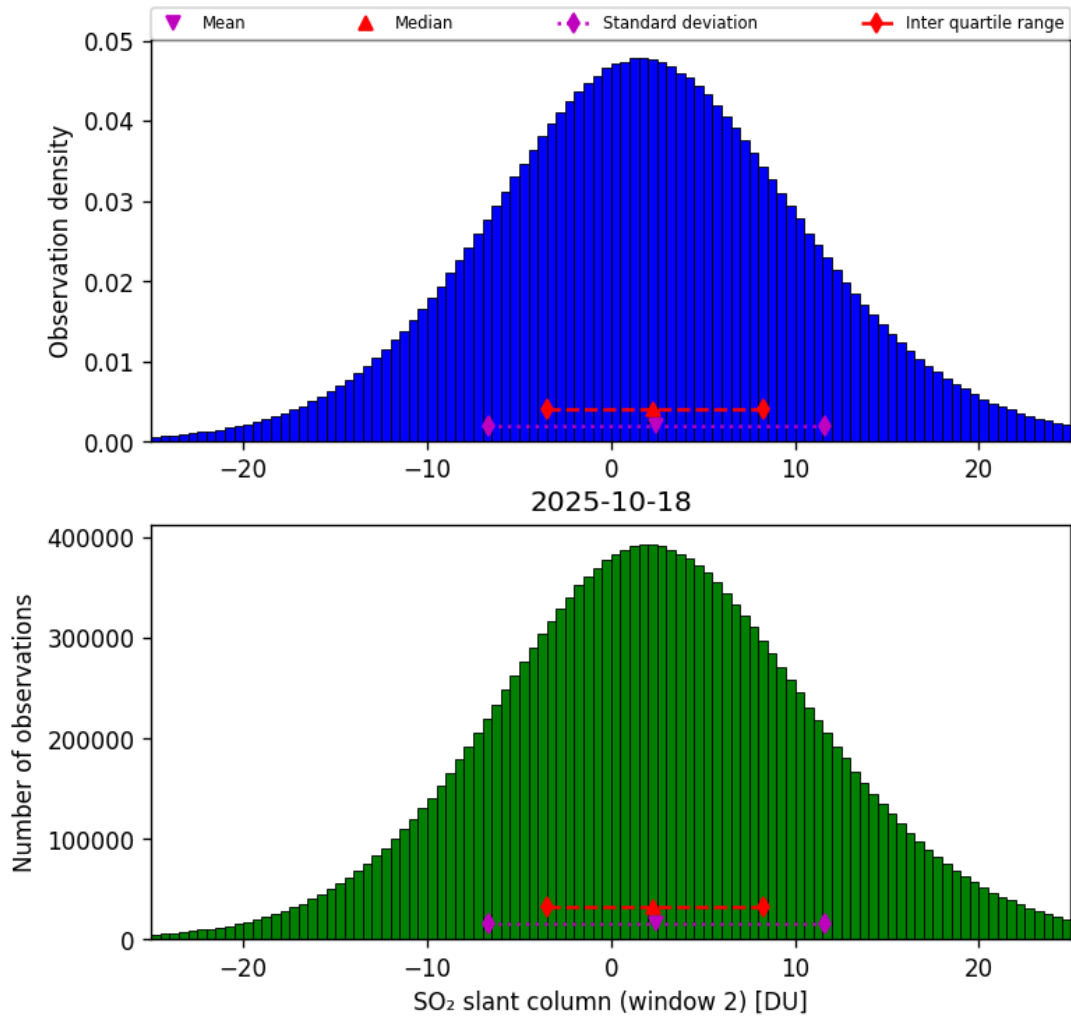


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-10-18 to 2025-10-19

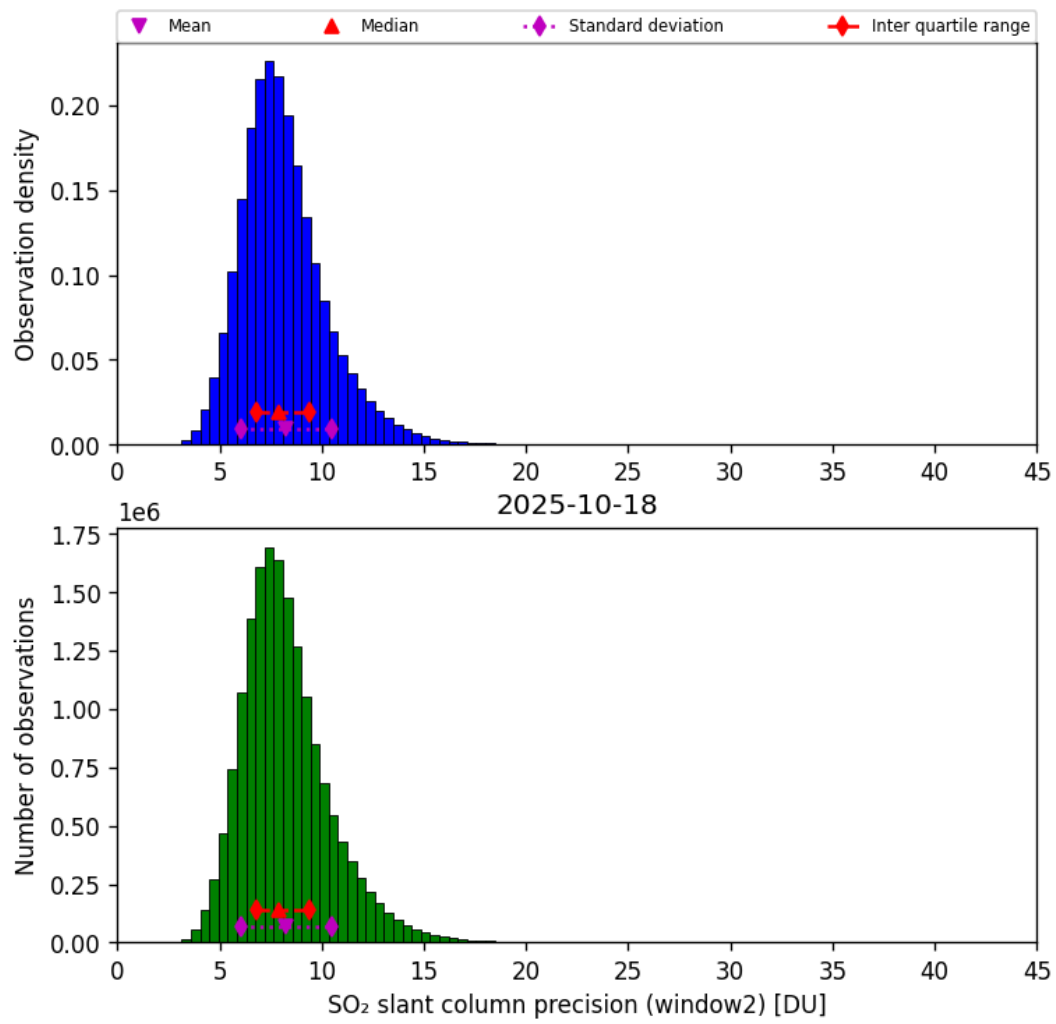


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-10-18 to 2025-10-19

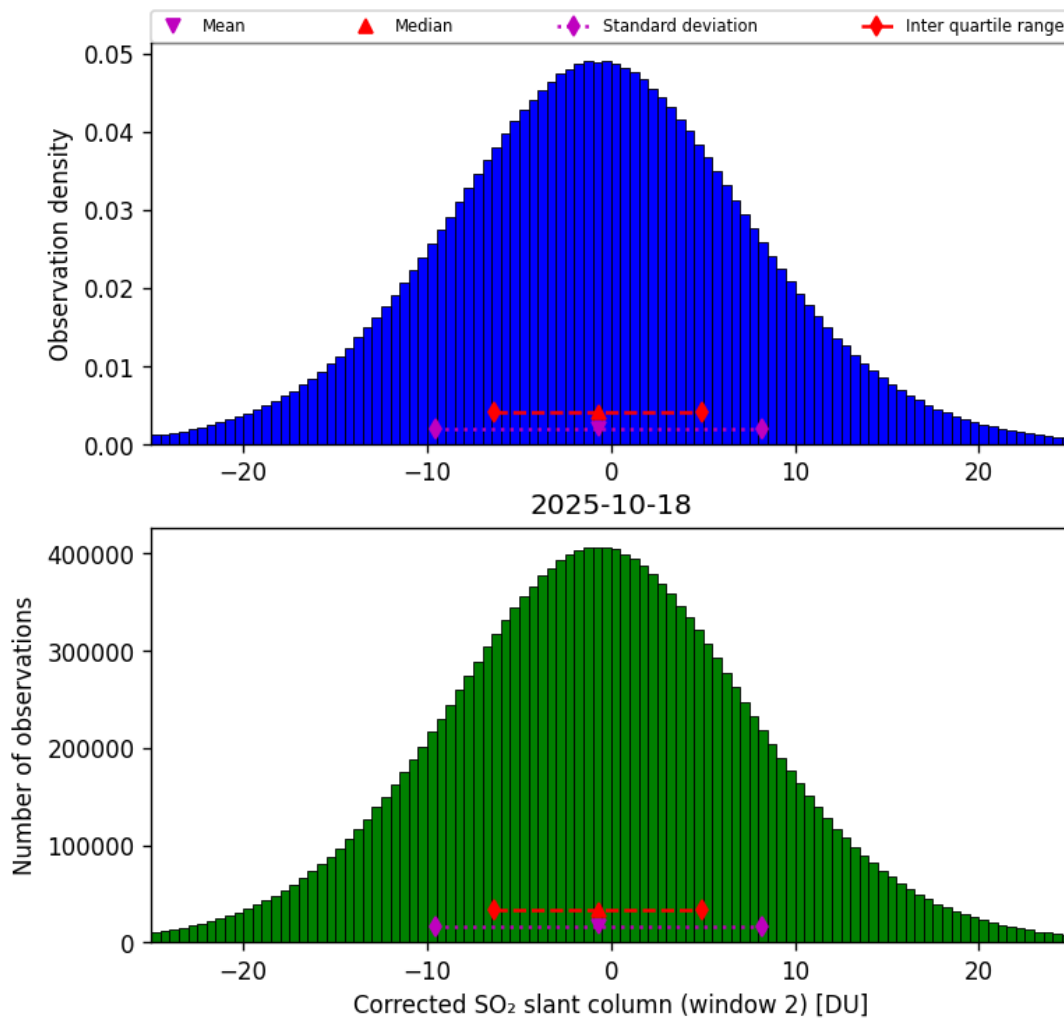


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-10-18 to 2025-10-19

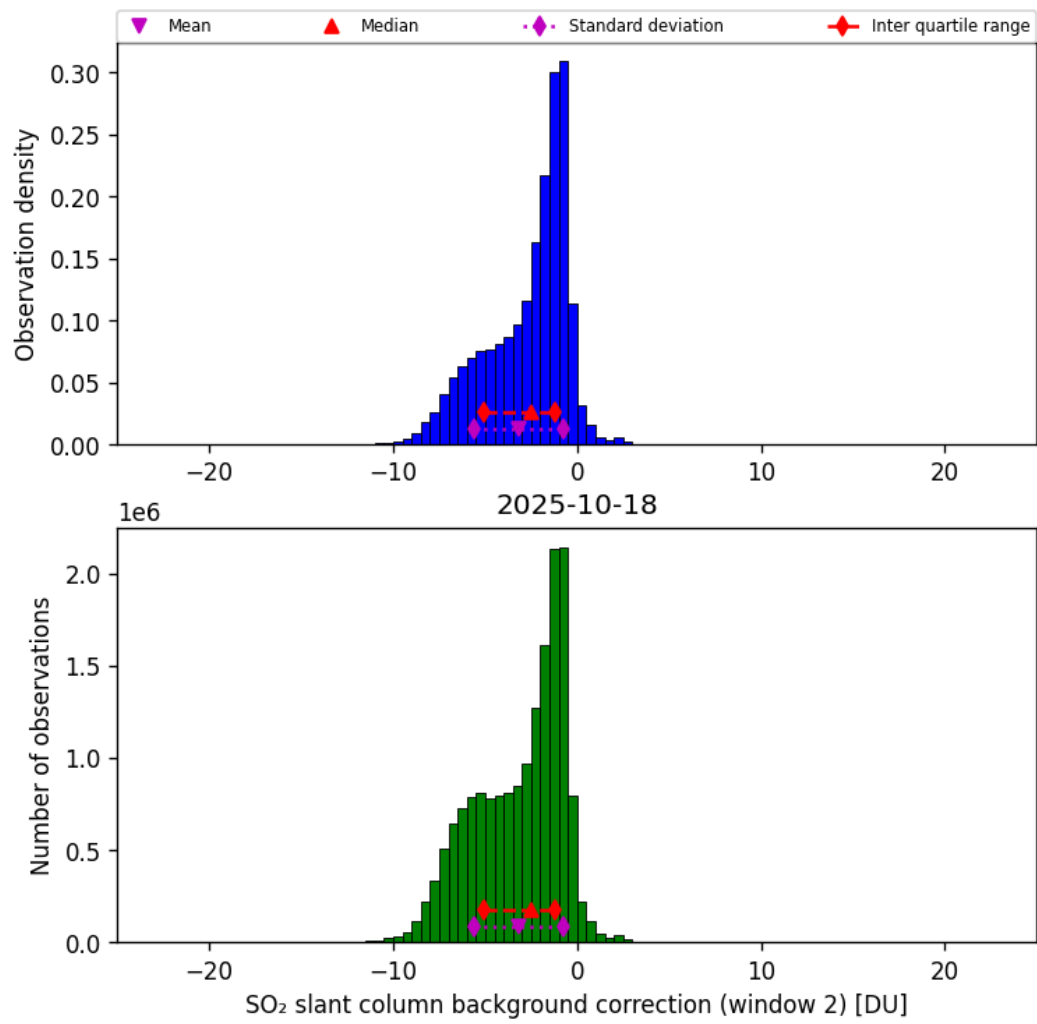


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-10-18 to 2025-10-19

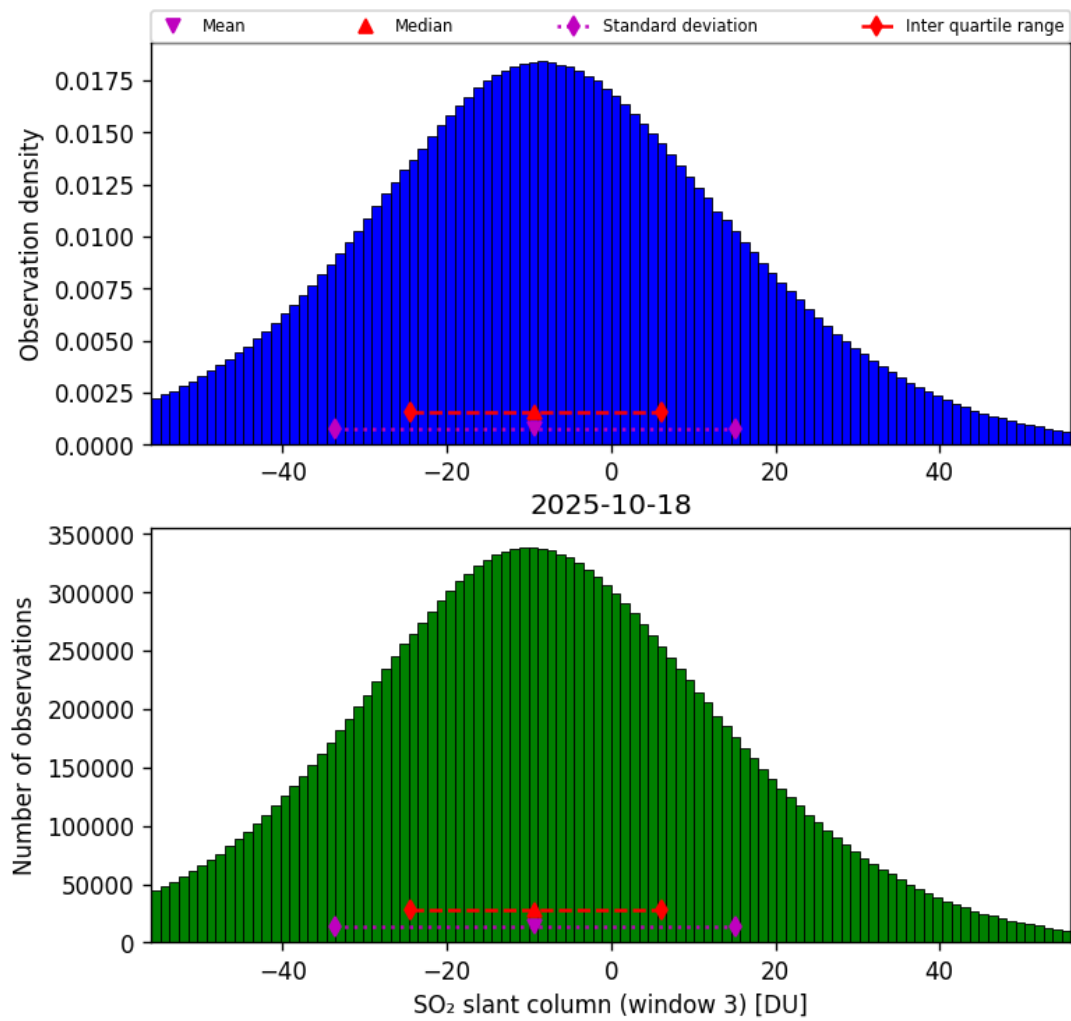


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-10-18 to 2025-10-19

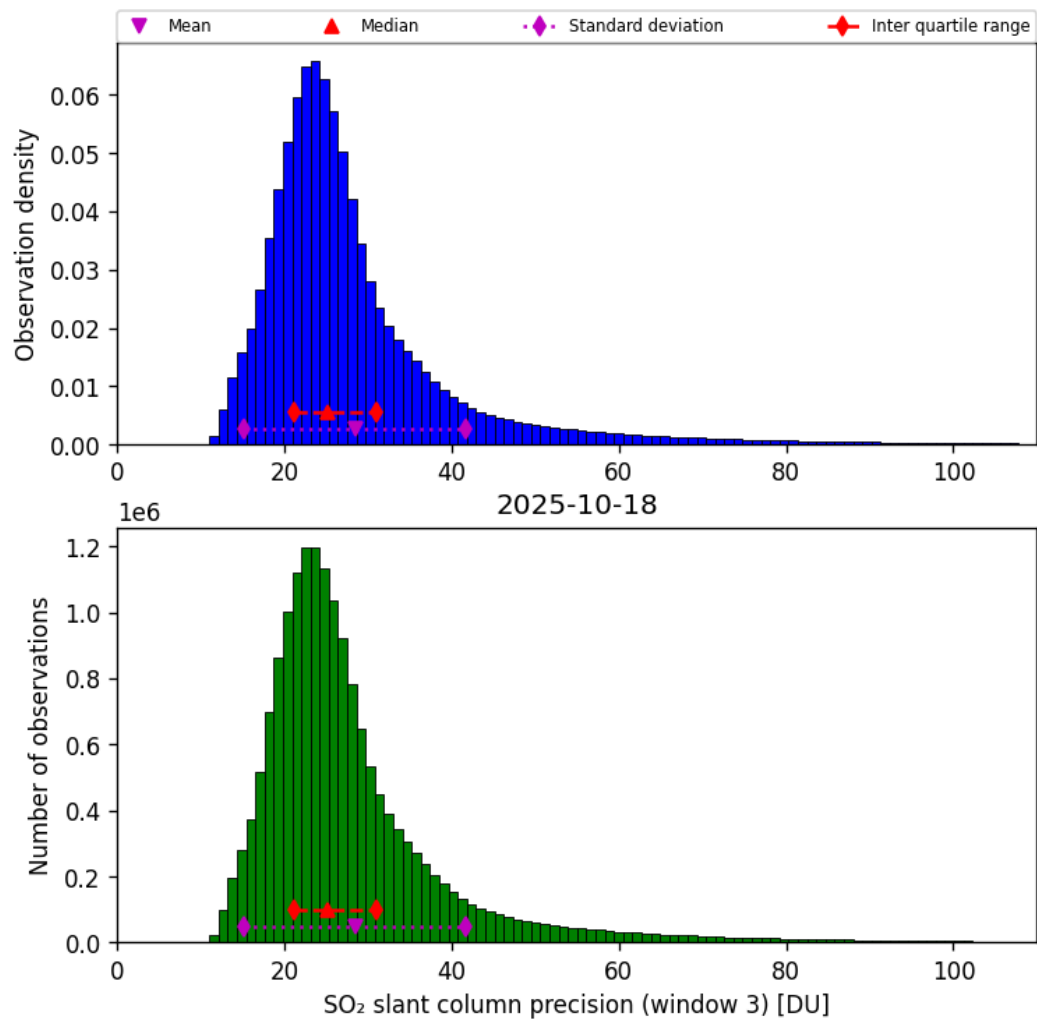


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-10-18 to 2025-10-19

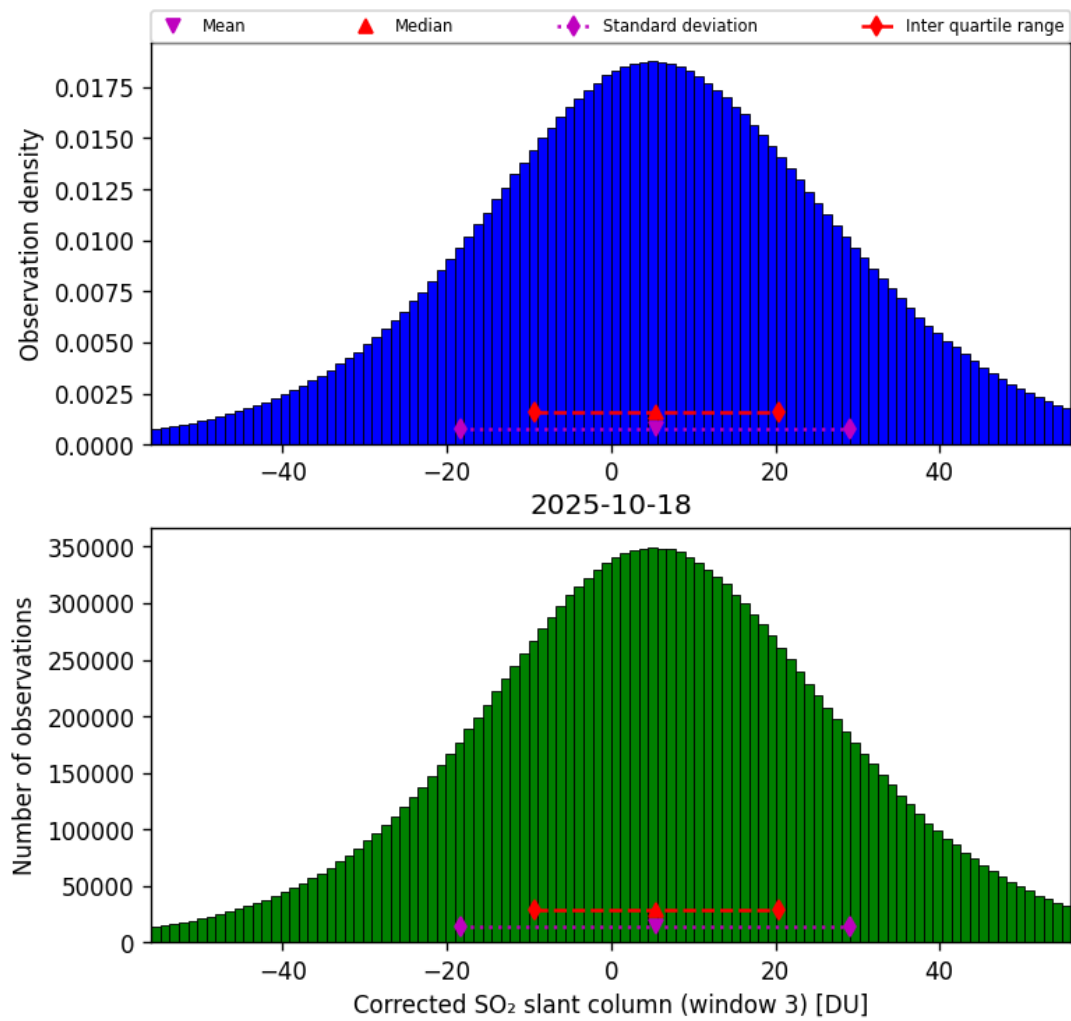


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-10-18 to 2025-10-19

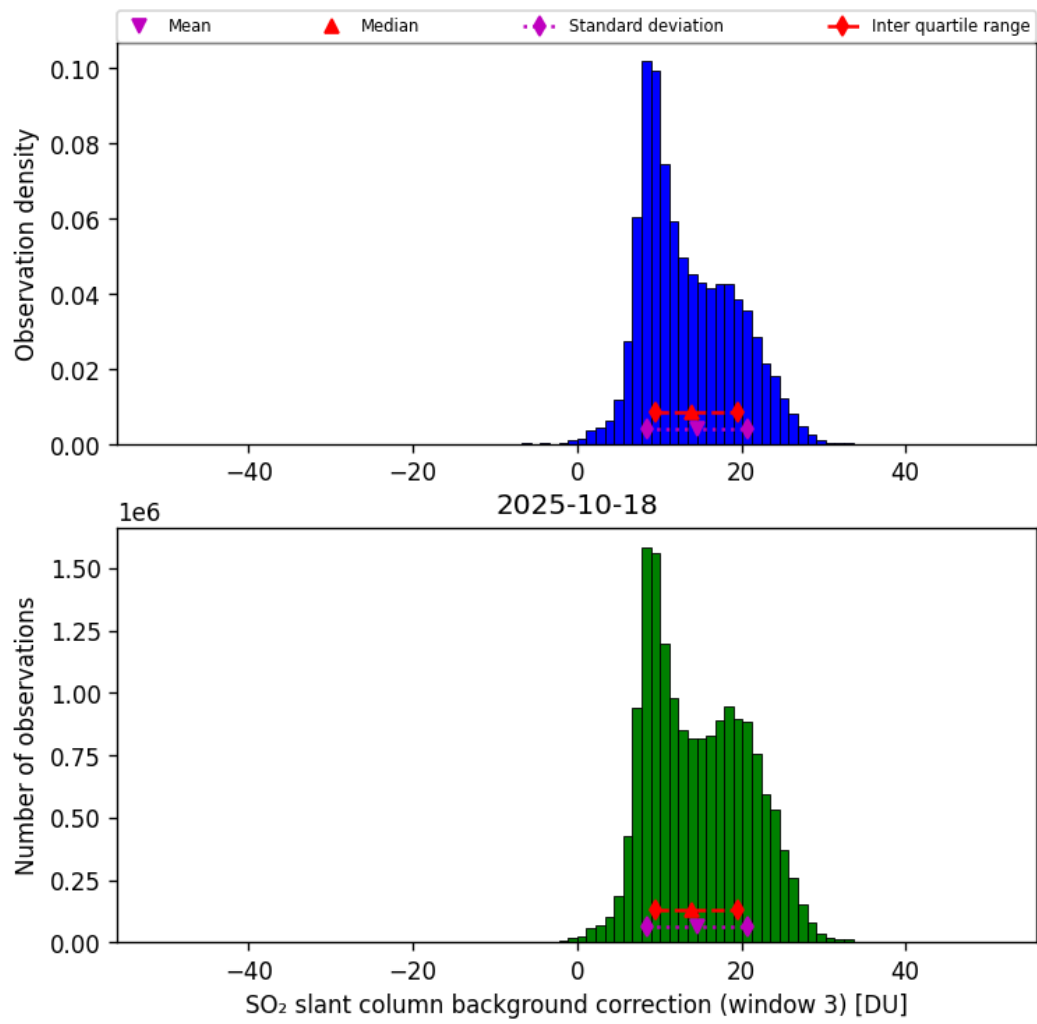


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-10-18 to 2025-10-19

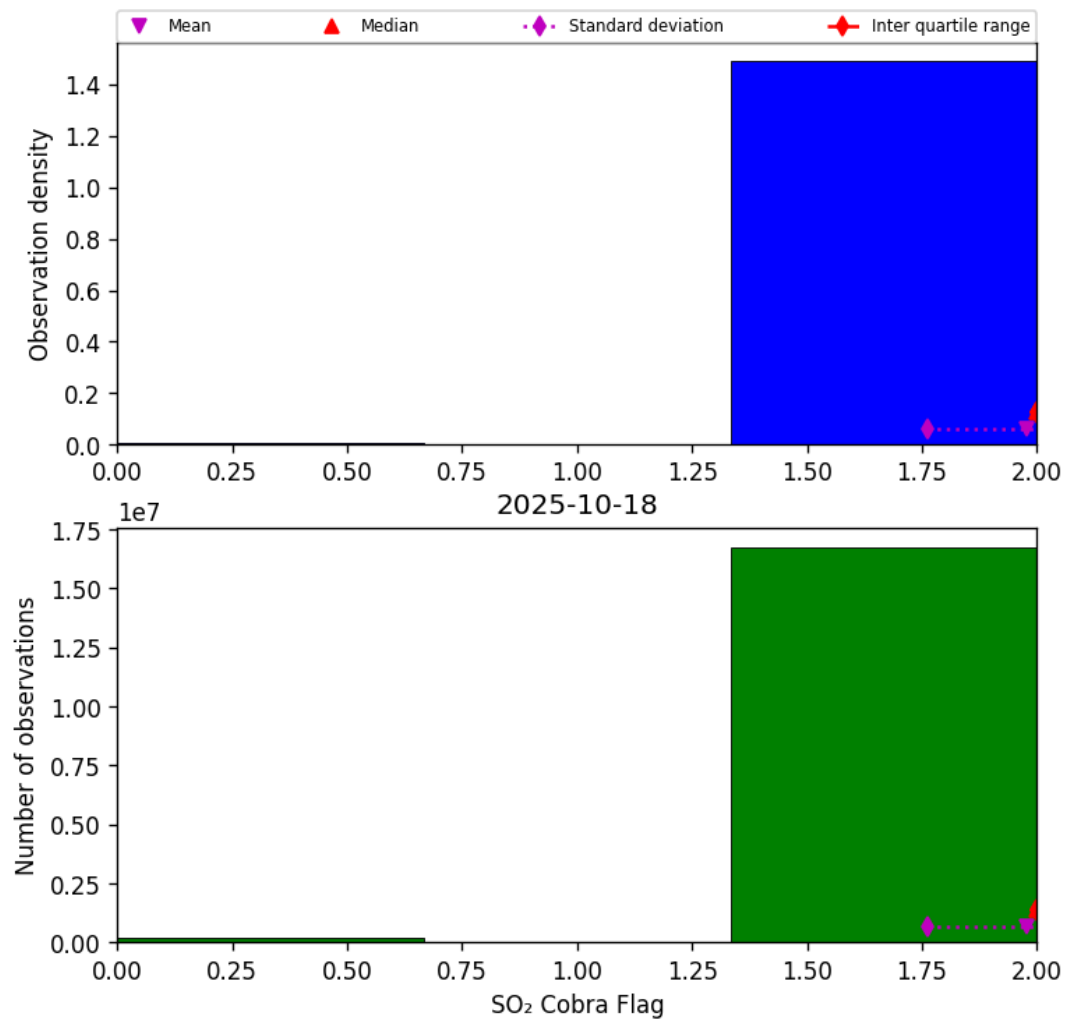


Figure 75: Histogram of "SO₂ Cobra Flag" for 2025-10-18 to 2025-10-19

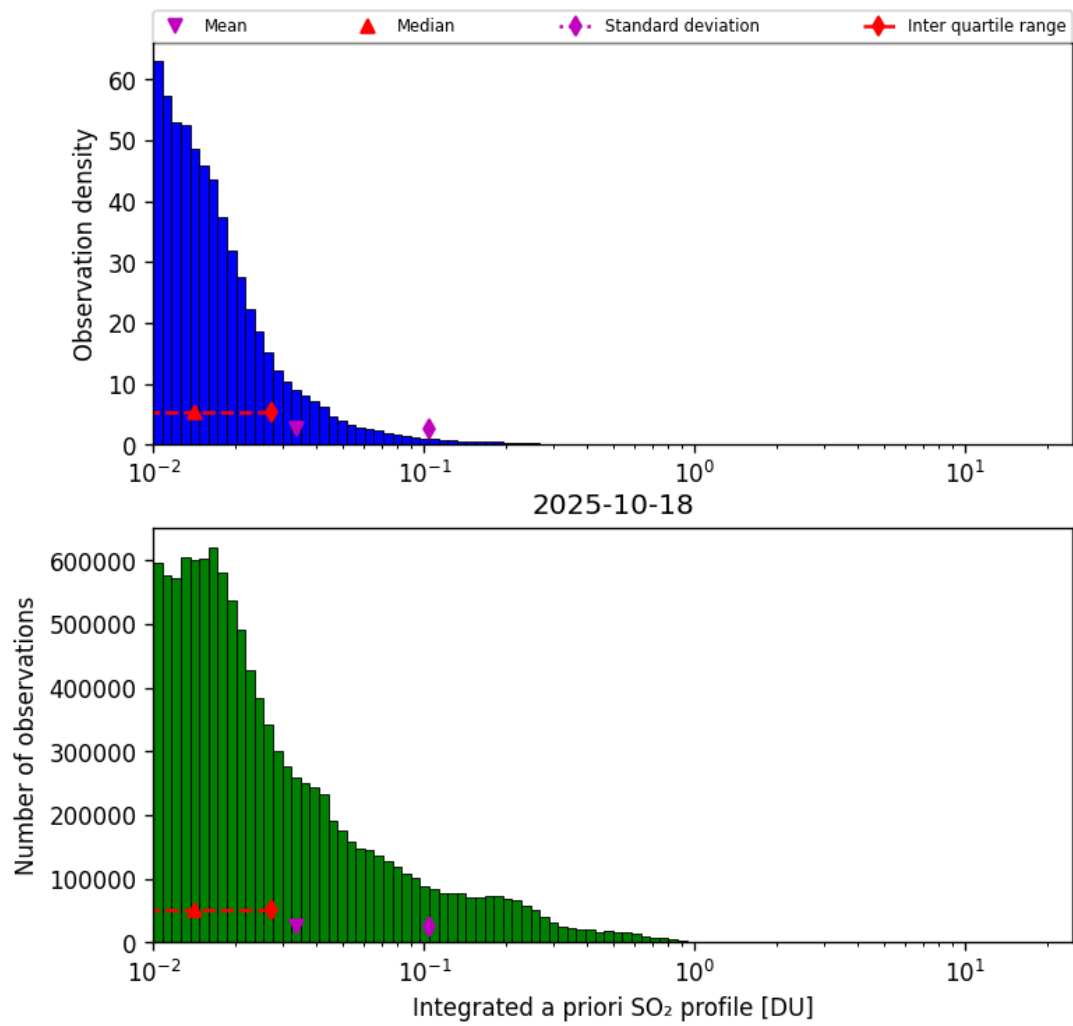


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-10-18 to 2025-10-19

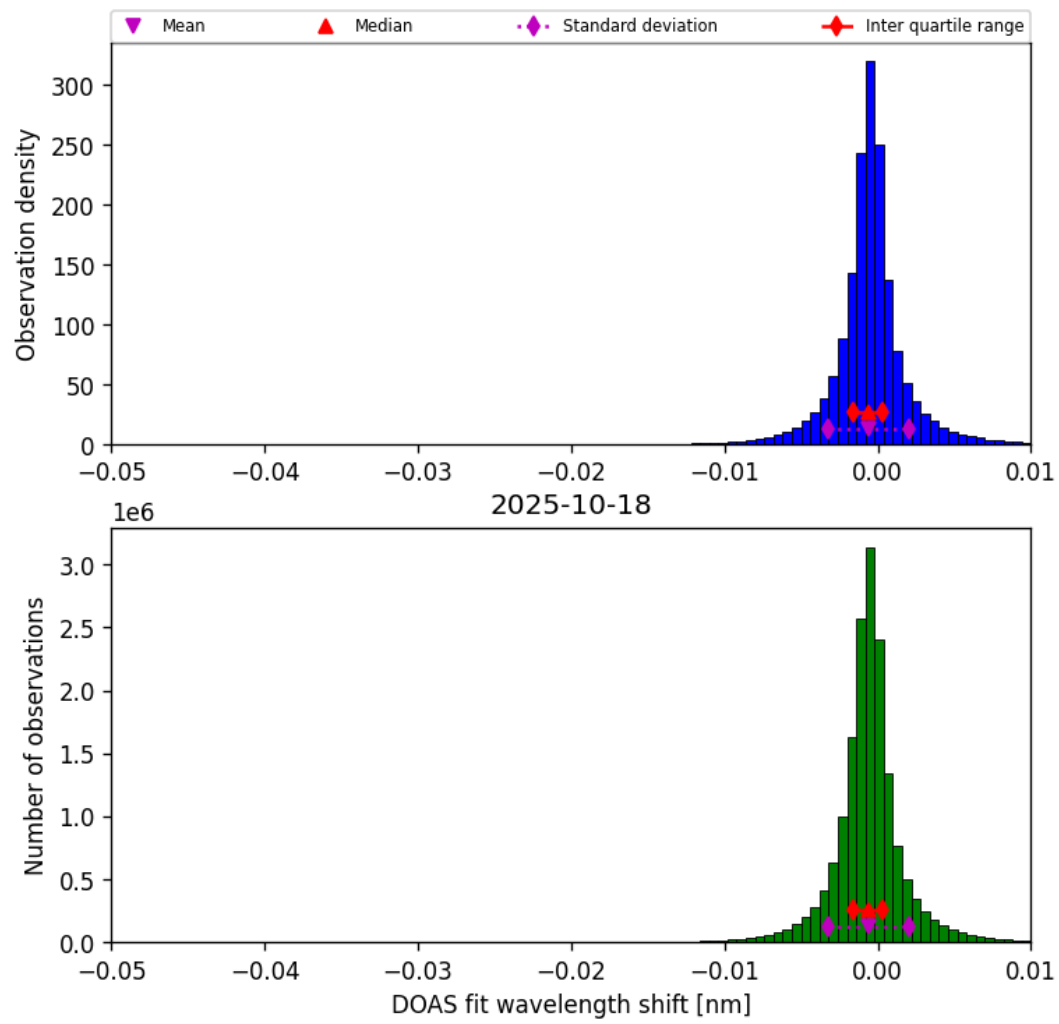


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-10-18 to 2025-10-19

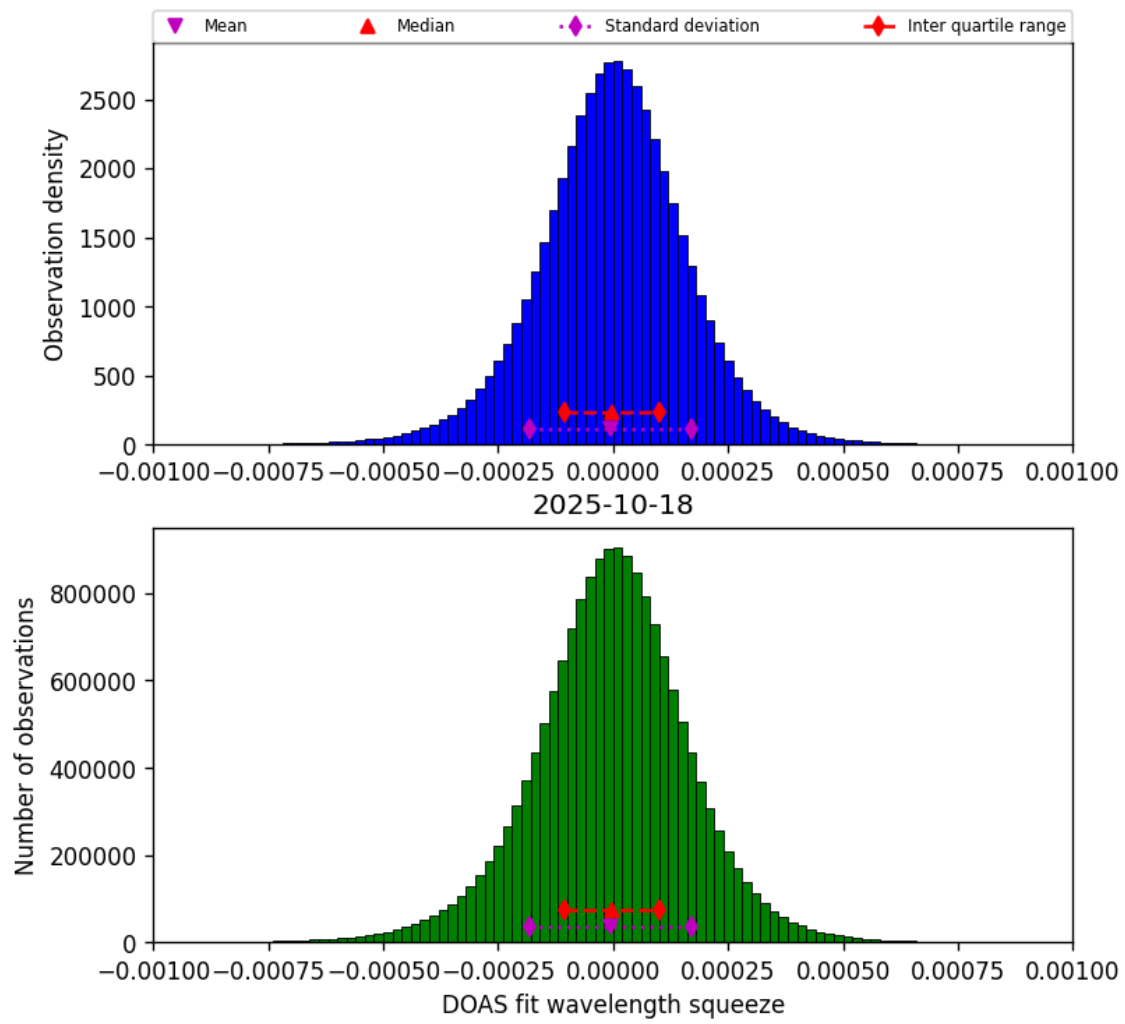


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-10-18 to 2025-10-19

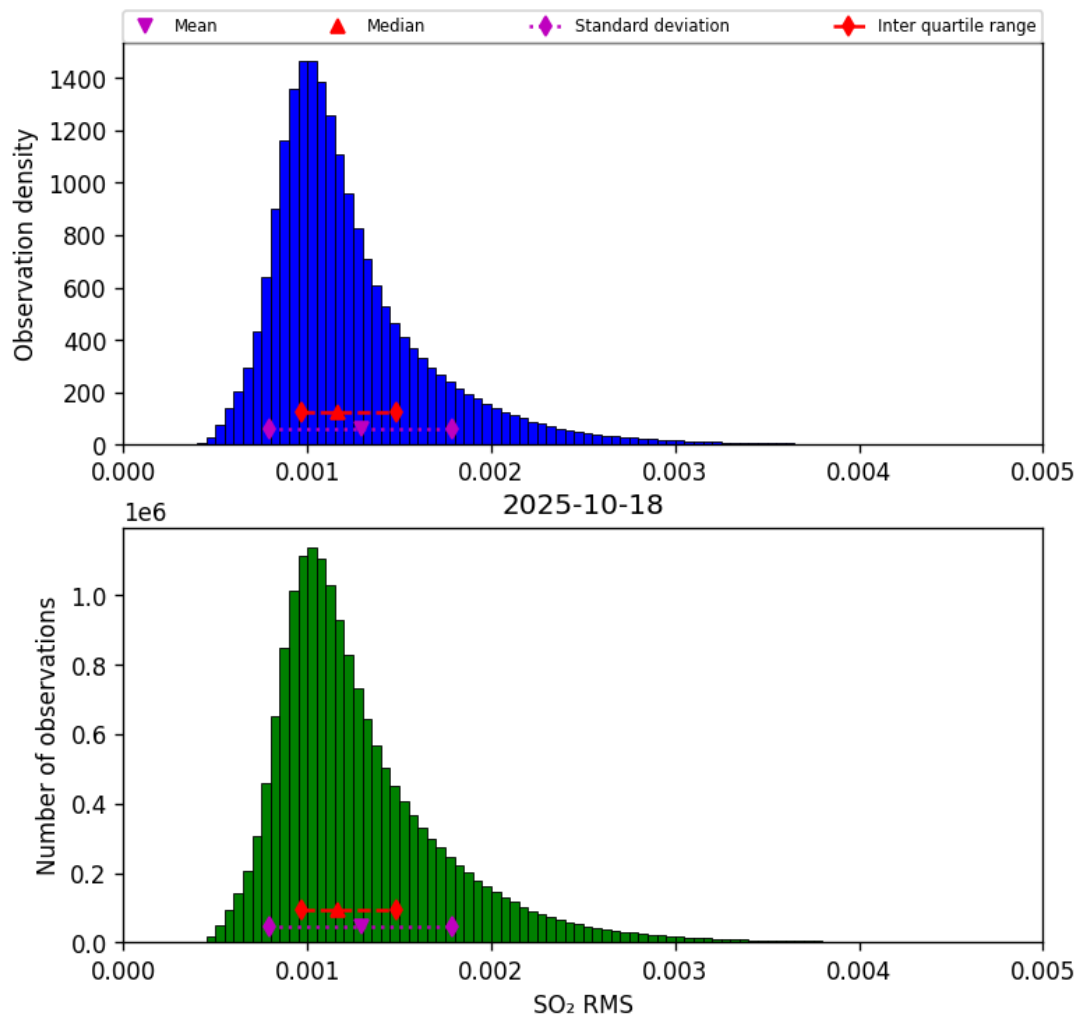


Figure 79: Histogram of “SO₂ RMS” for 2025-10-18 to 2025-10-19

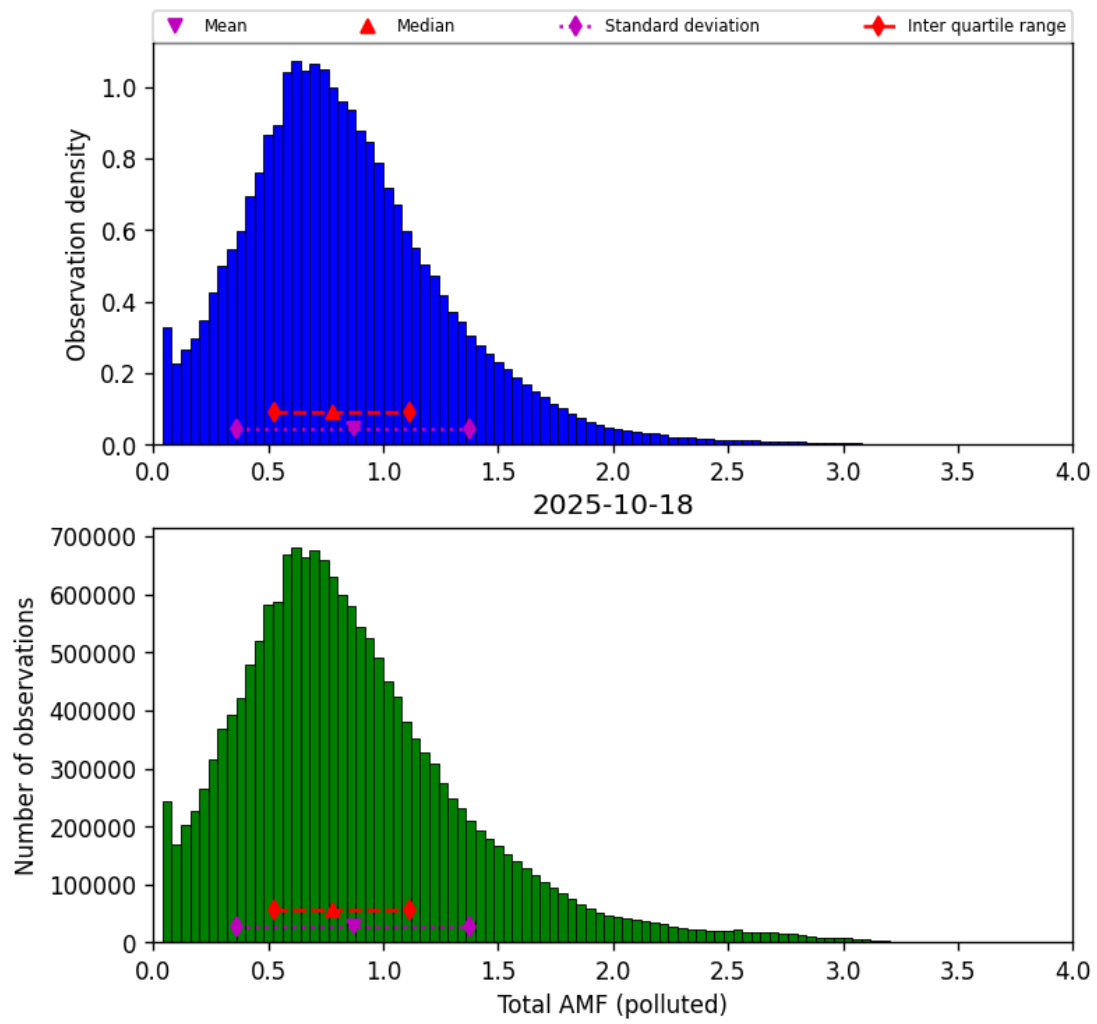


Figure 80: Histogram of “Total AMF (polluted)” for 2025-10-18 to 2025-10-19

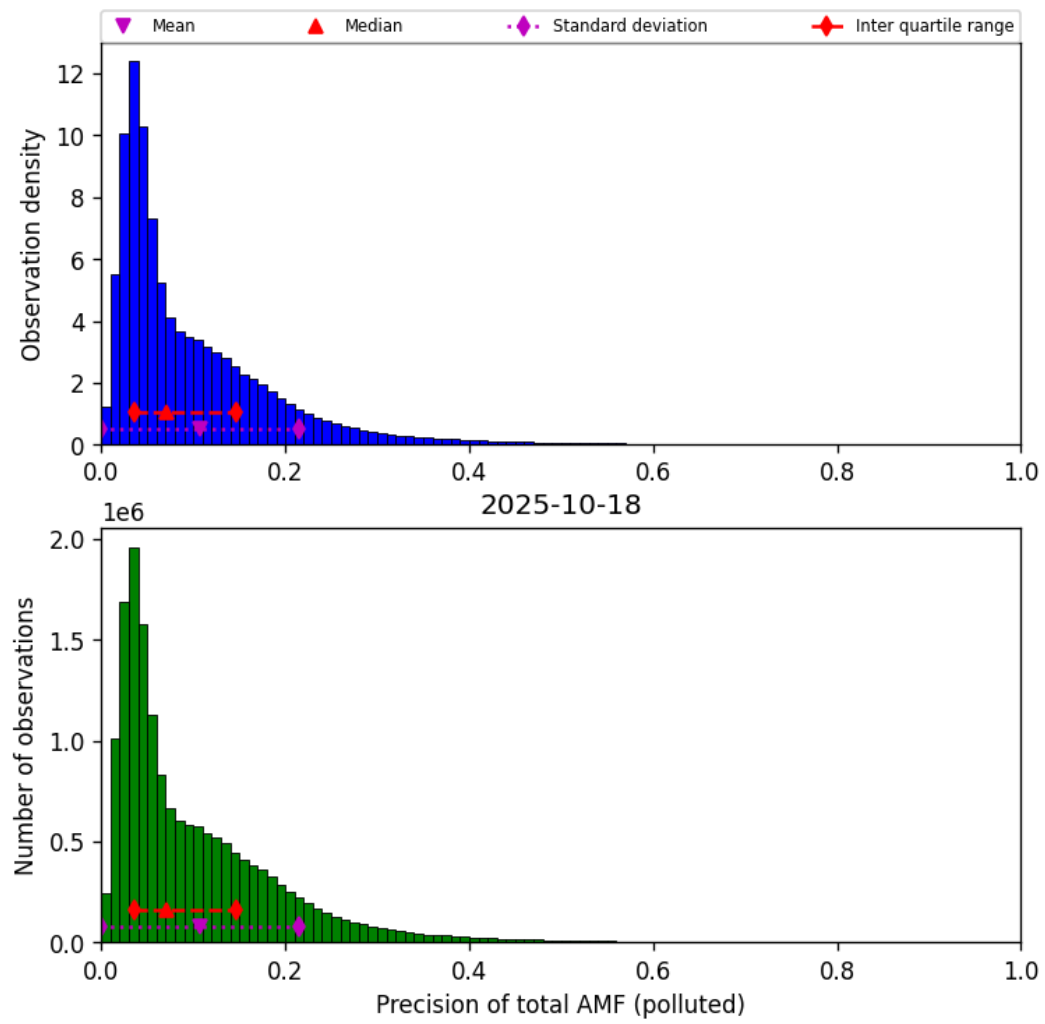


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-10-18 to 2025-10-19

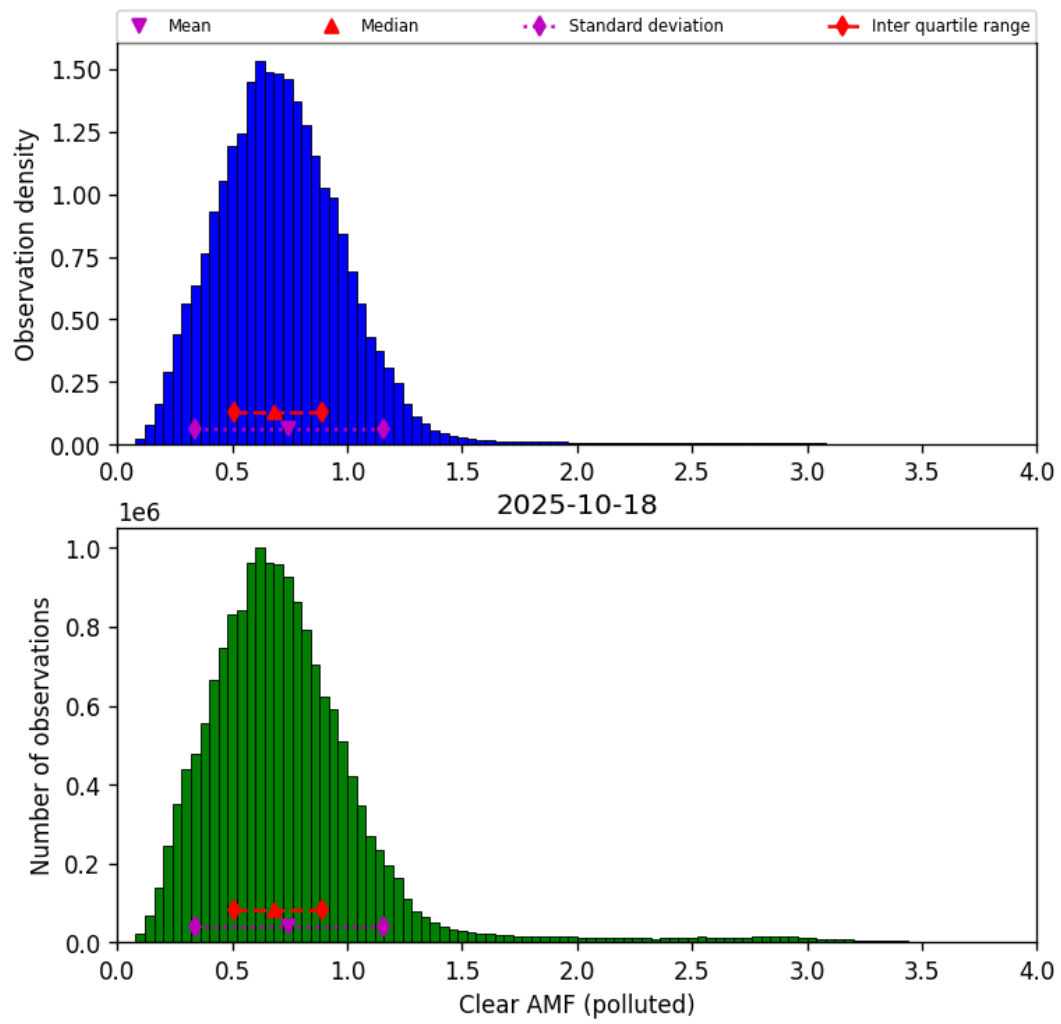


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-10-18 to 2025-10-19

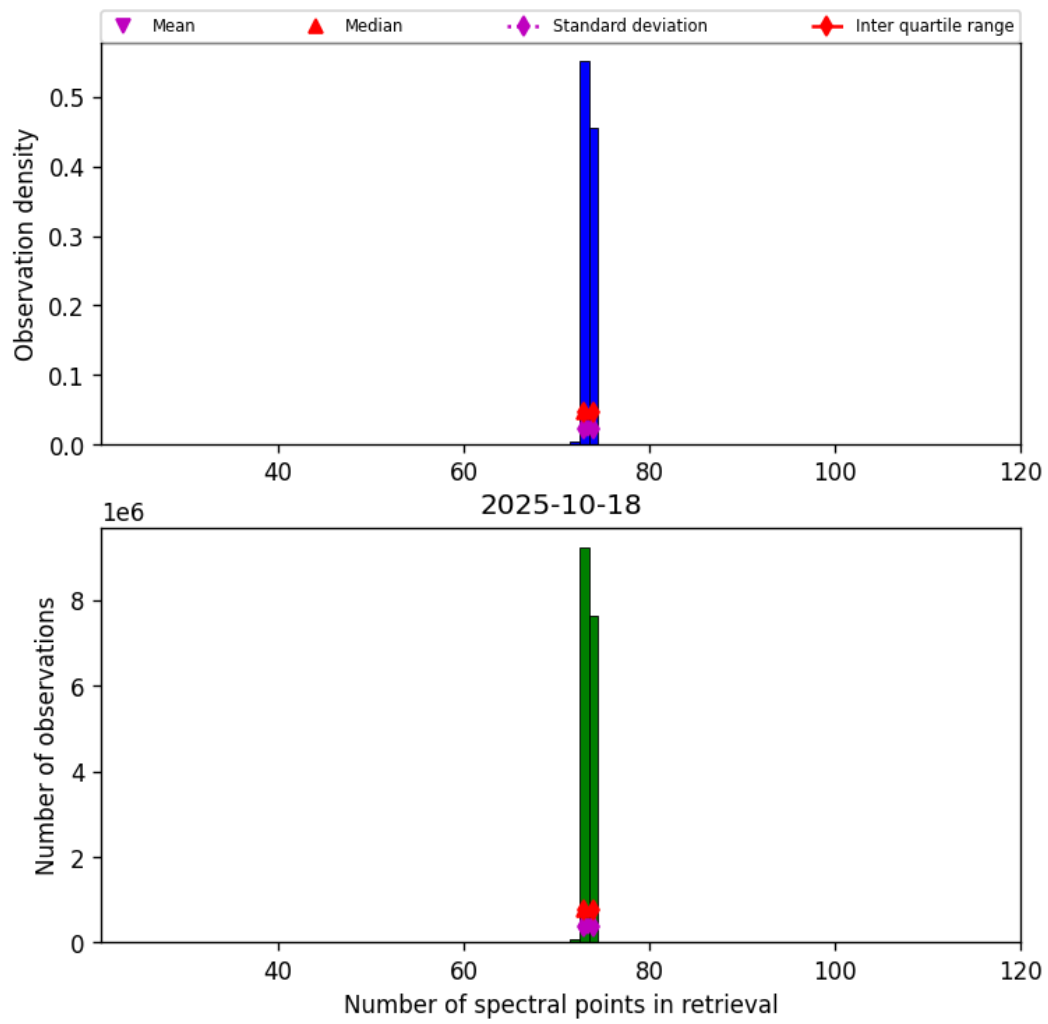


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-10-18 to 2025-10-19

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.

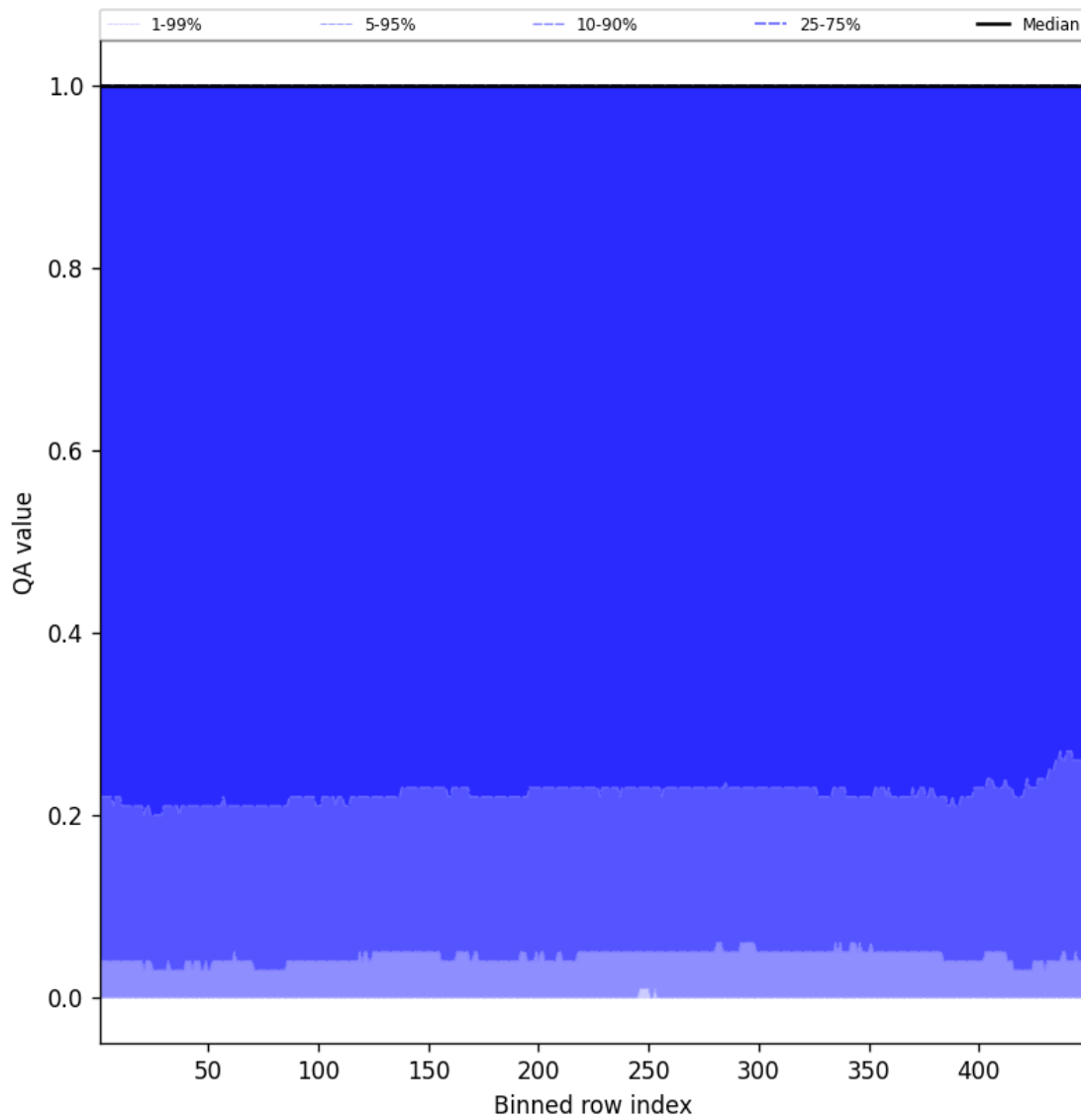


Figure 84: Along track statistics of “QA value” for 2025-10-18 to 2025-10-19

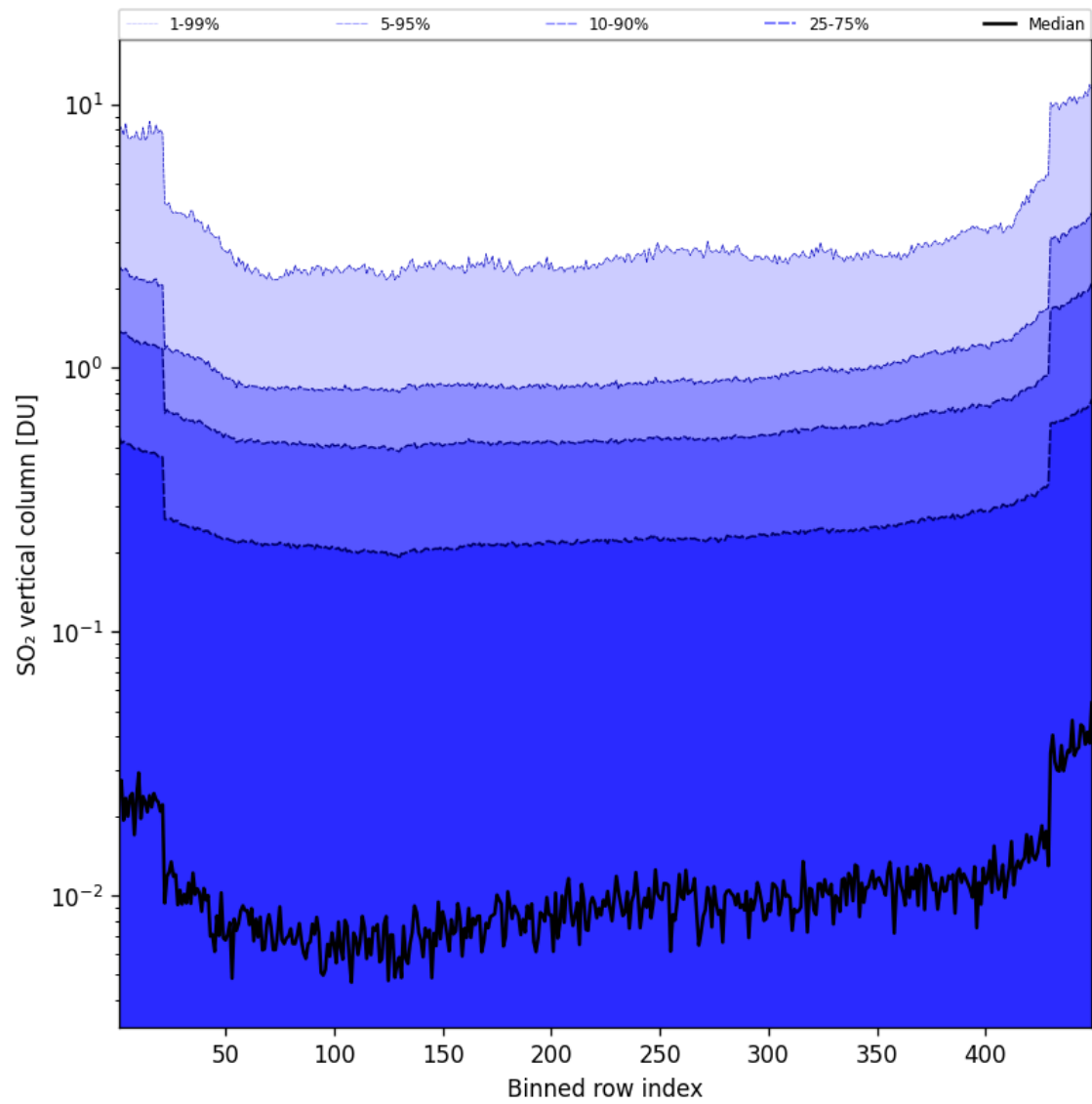


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-10-18 to 2025-10-19

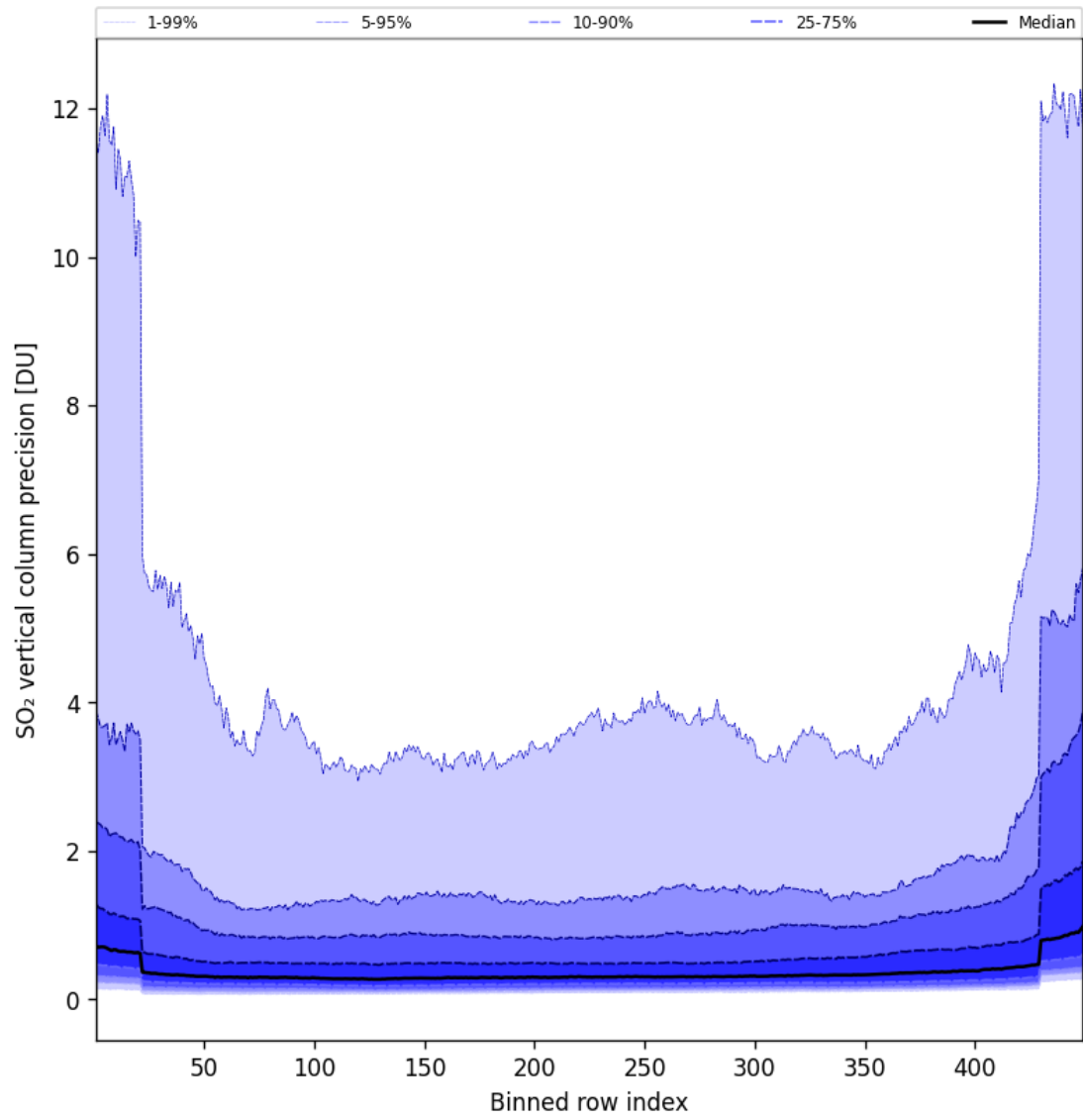


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-10-18 to 2025-10-19

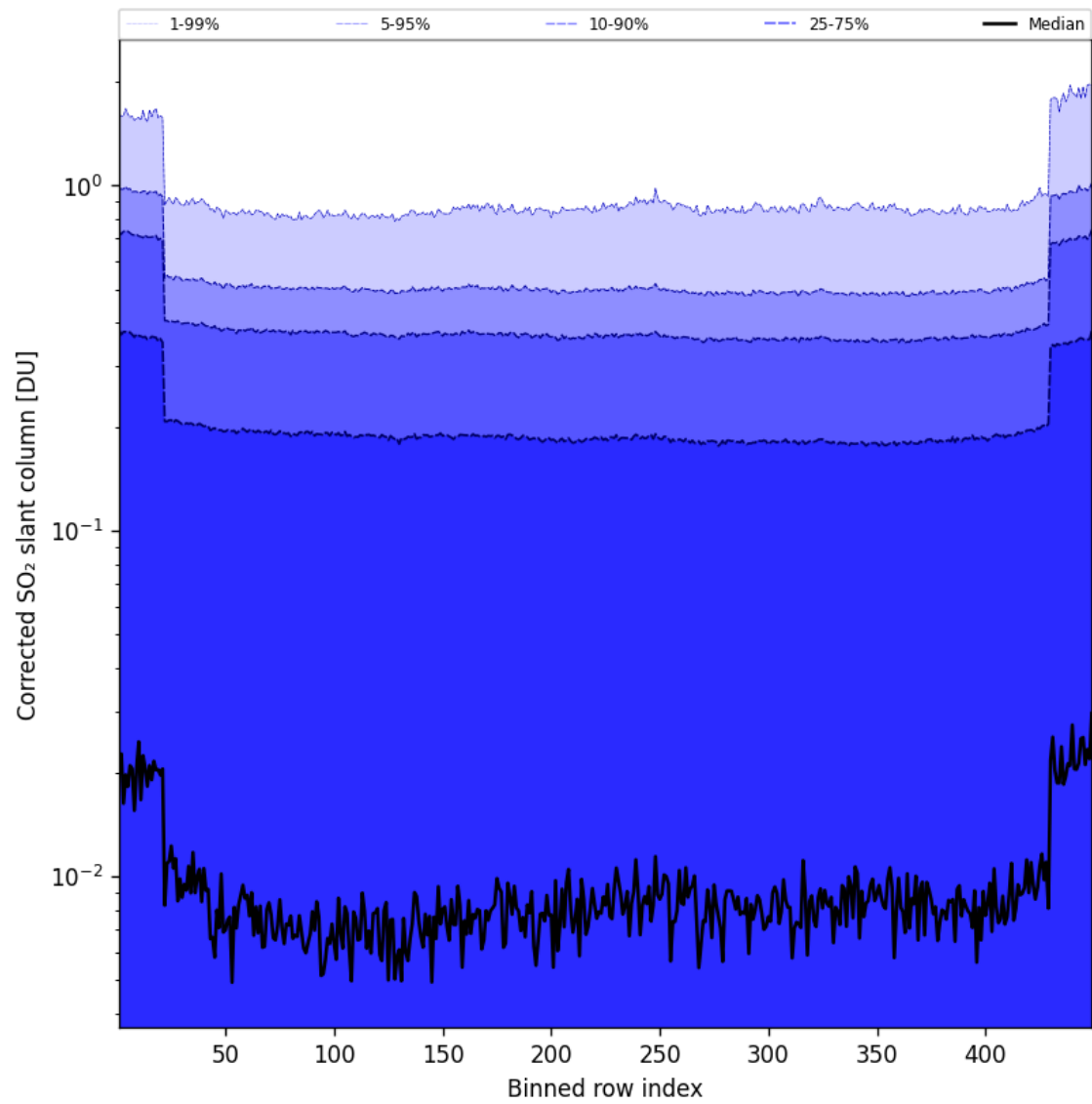


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-10-18 to 2025-10-19

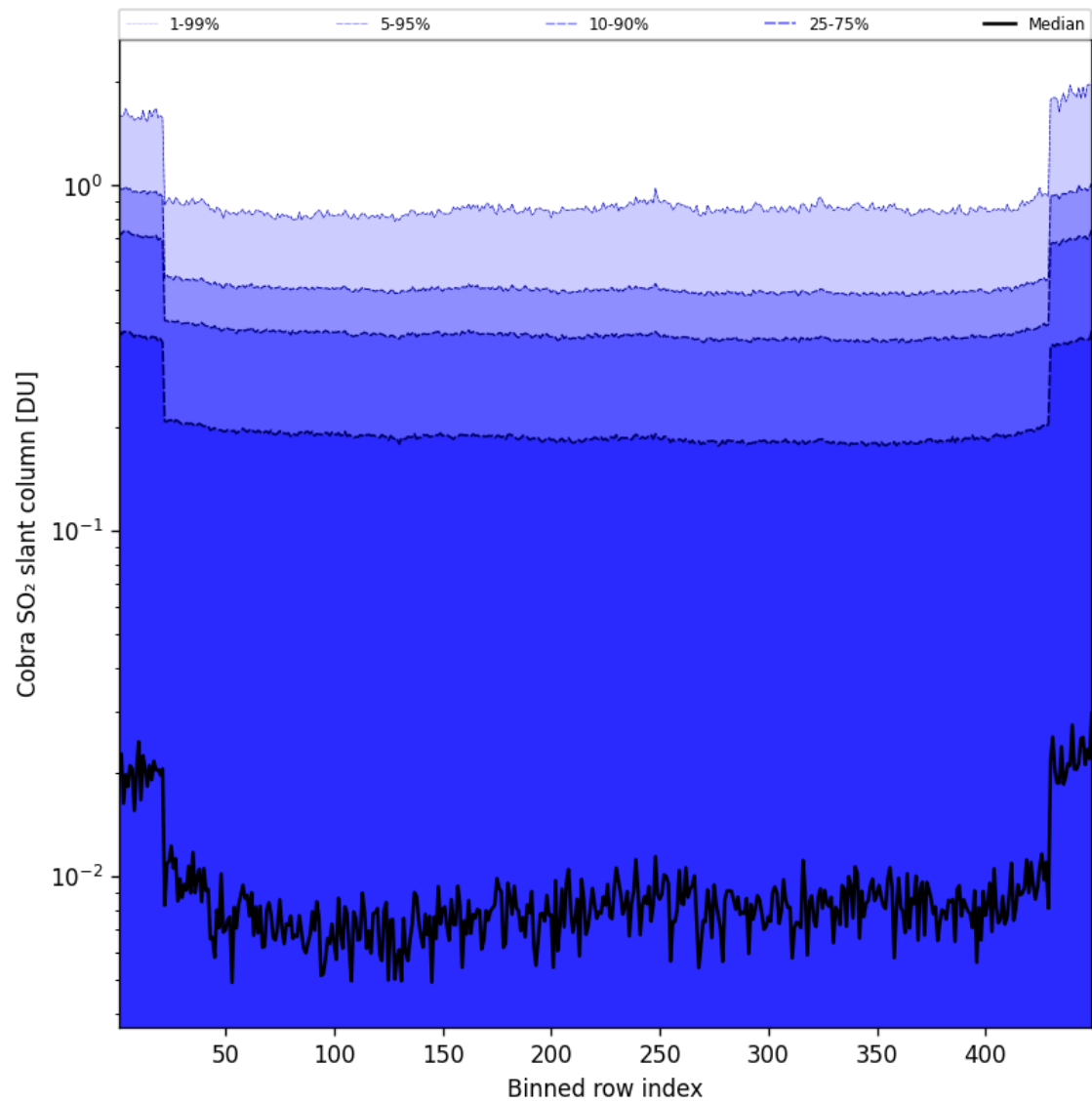


Figure 88: Along track statistics of "Cobra SO₂ slant column" for 2025-10-18 to 2025-10-19

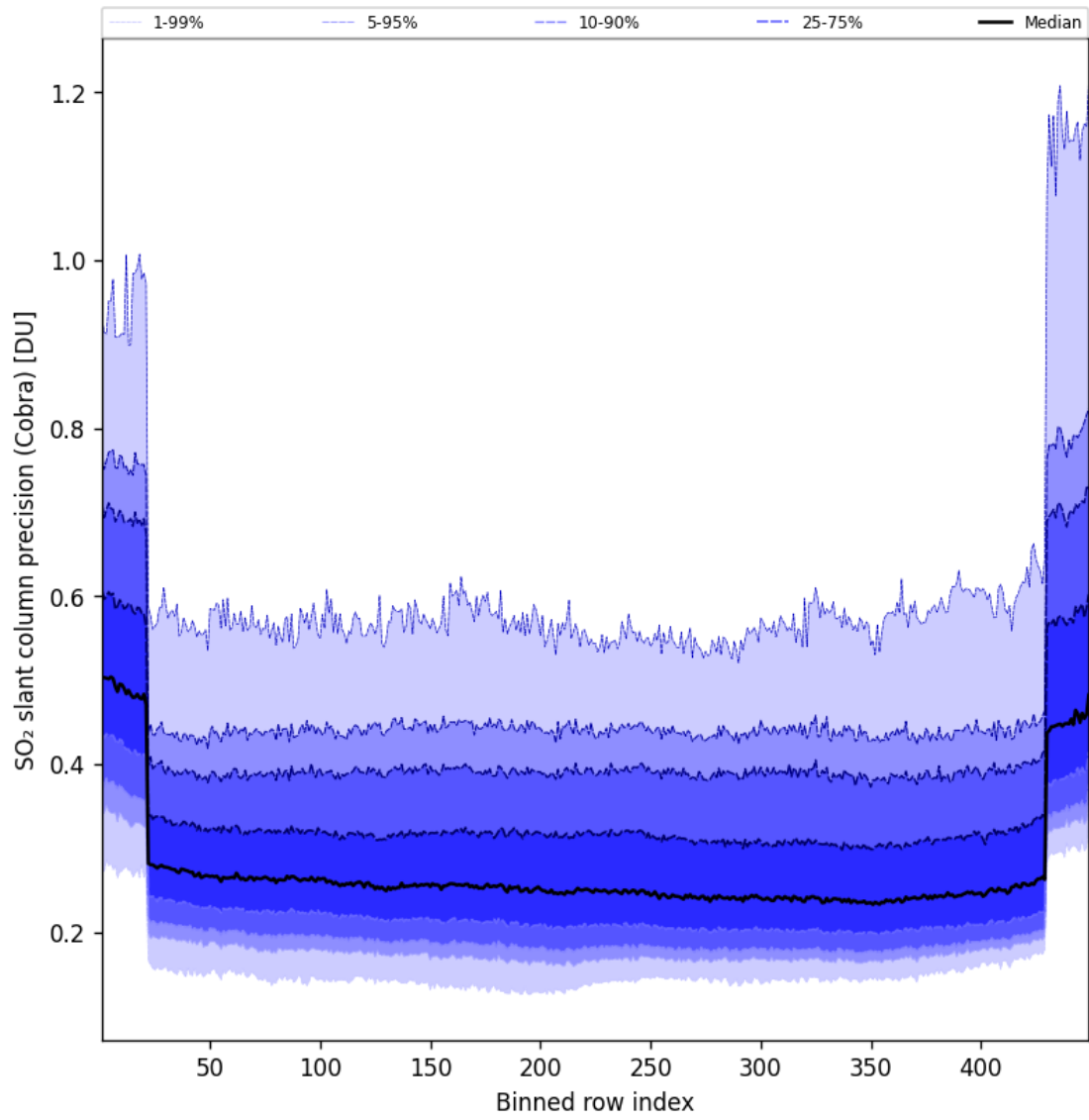


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-10-18 to 2025-10-19

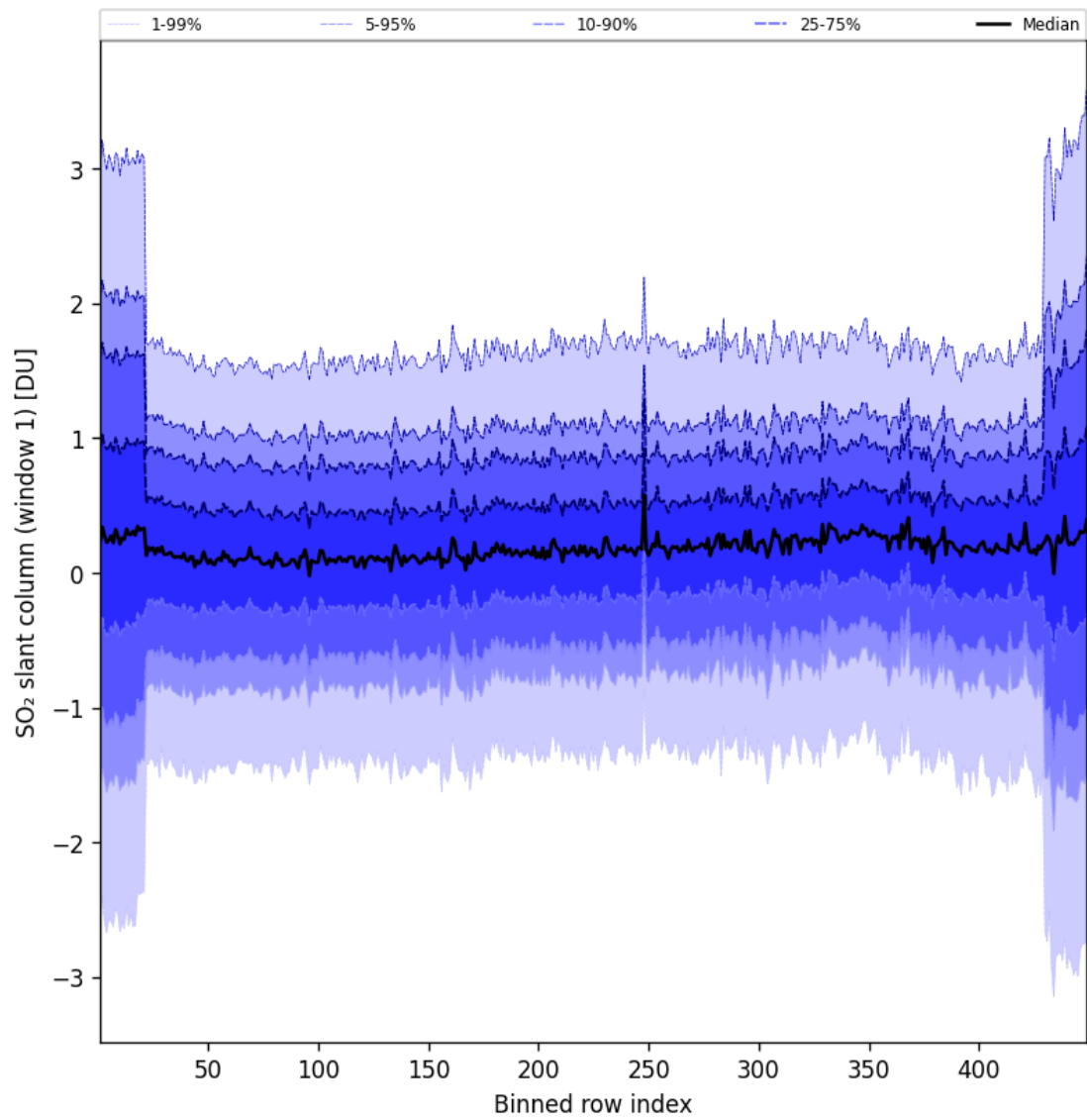


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-10-18 to 2025-10-19

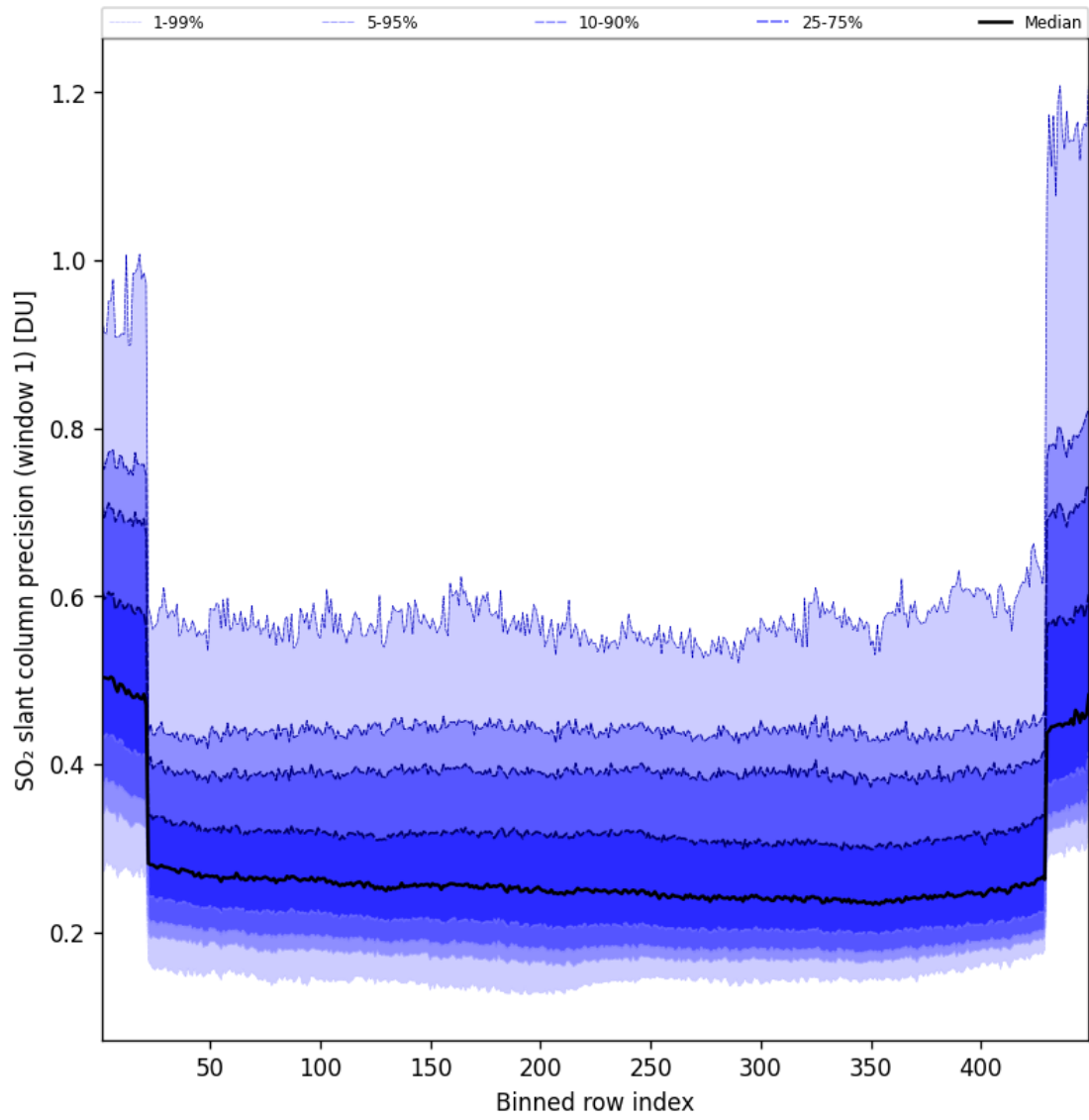


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-10-18 to 2025-10-19

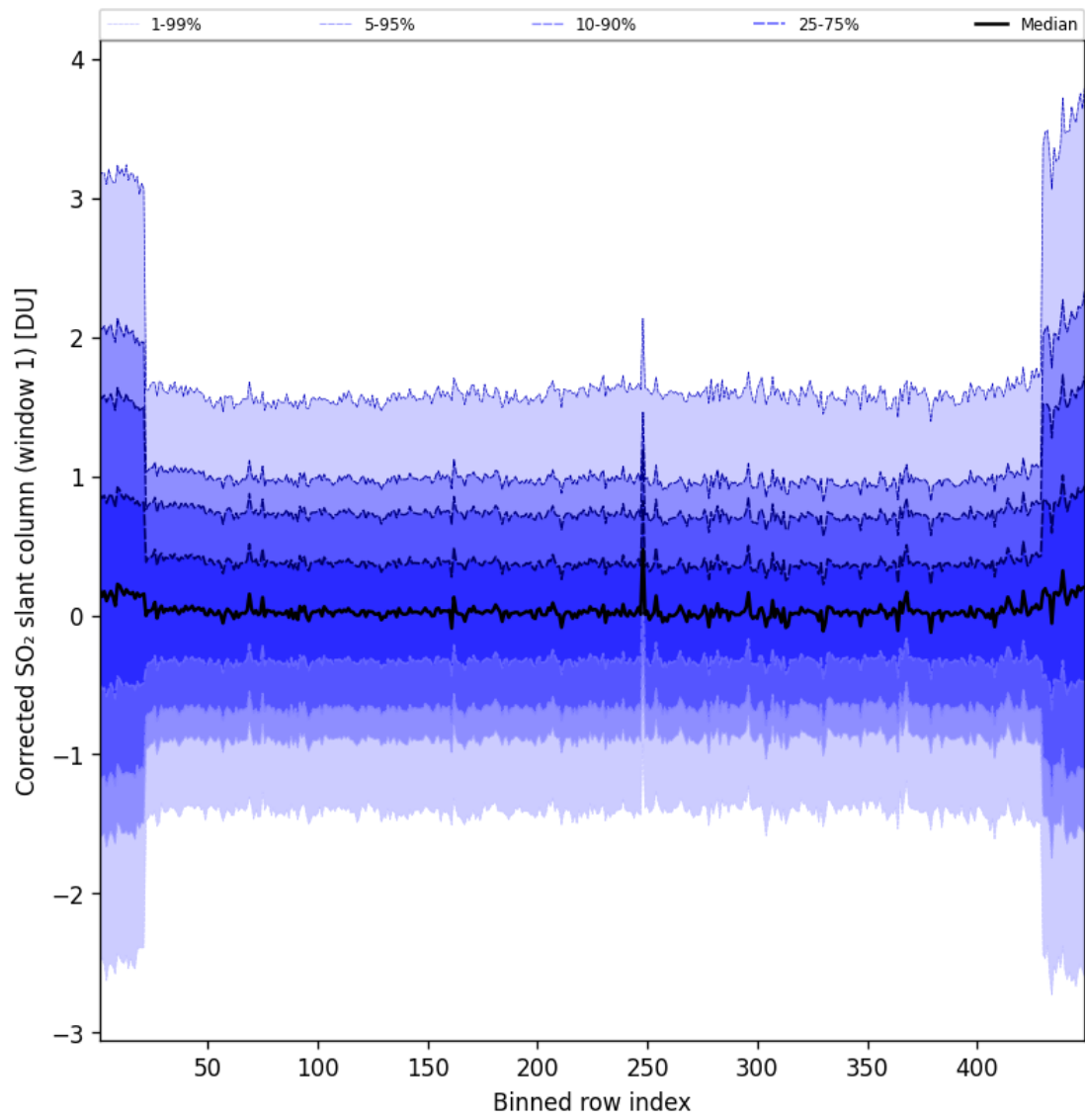


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-10-18 to 2025-10-19

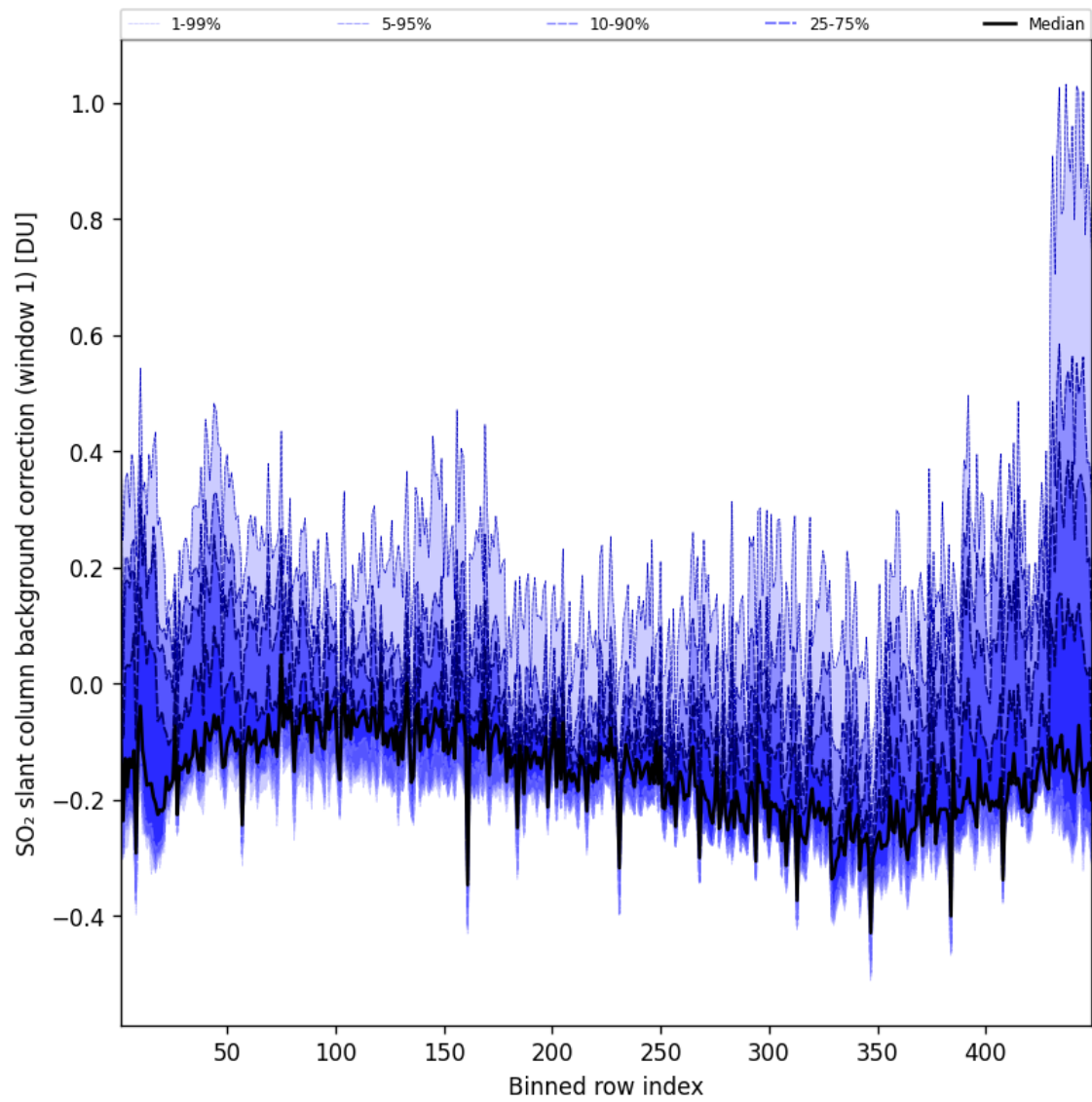


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-10-18 to 2025-10-19

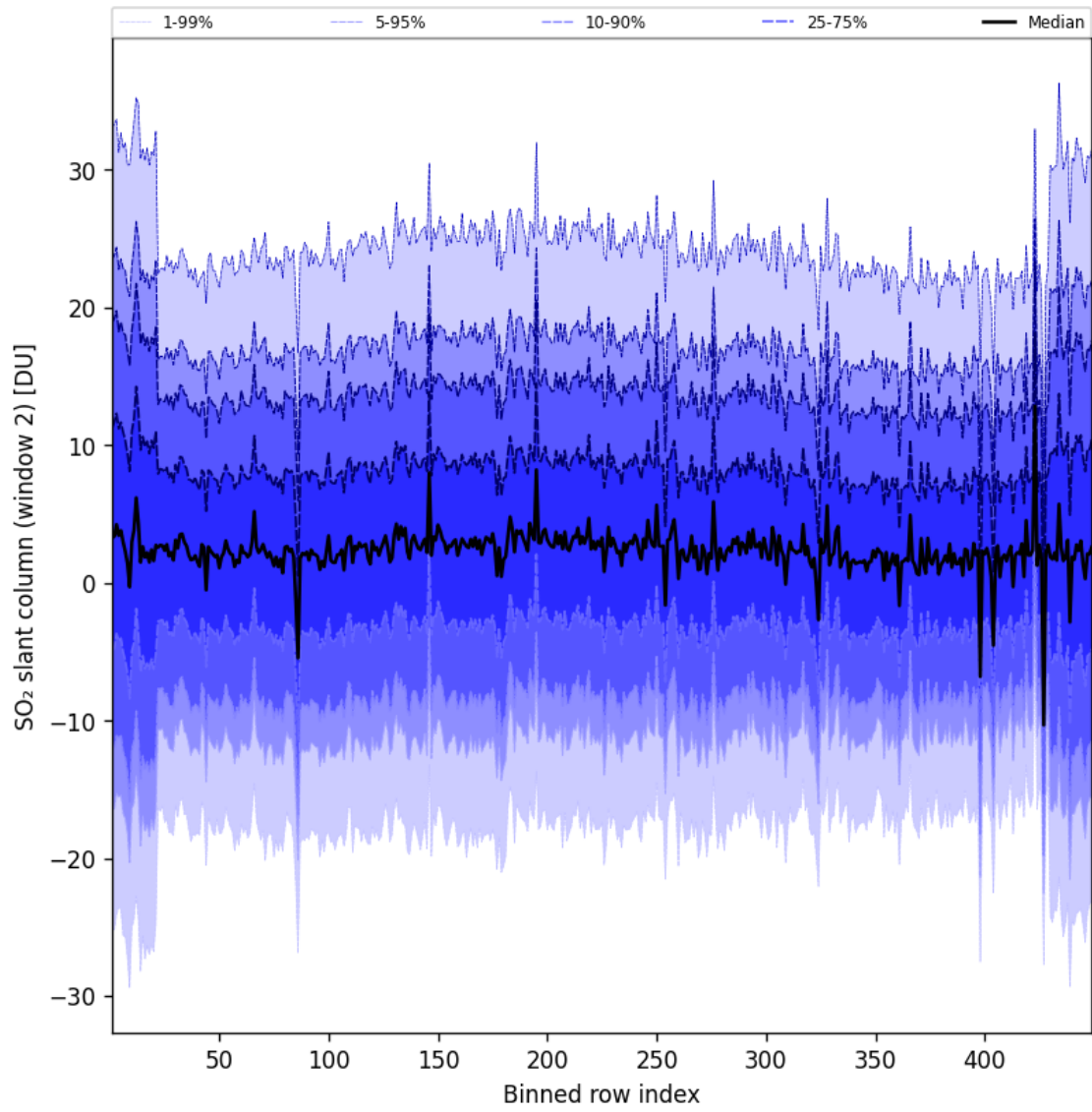


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-10-18 to 2025-10-19

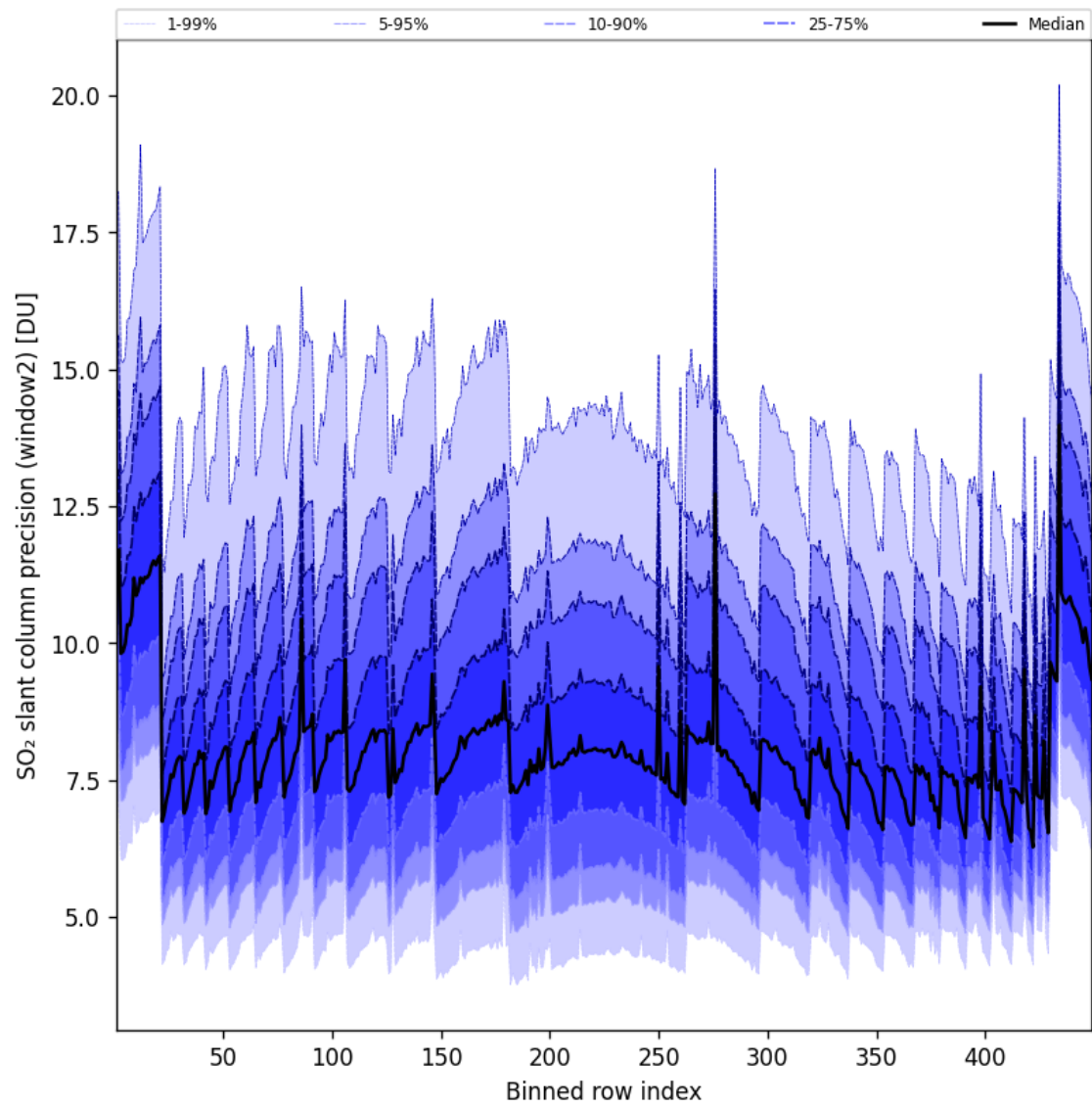


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-10-18 to 2025-10-19

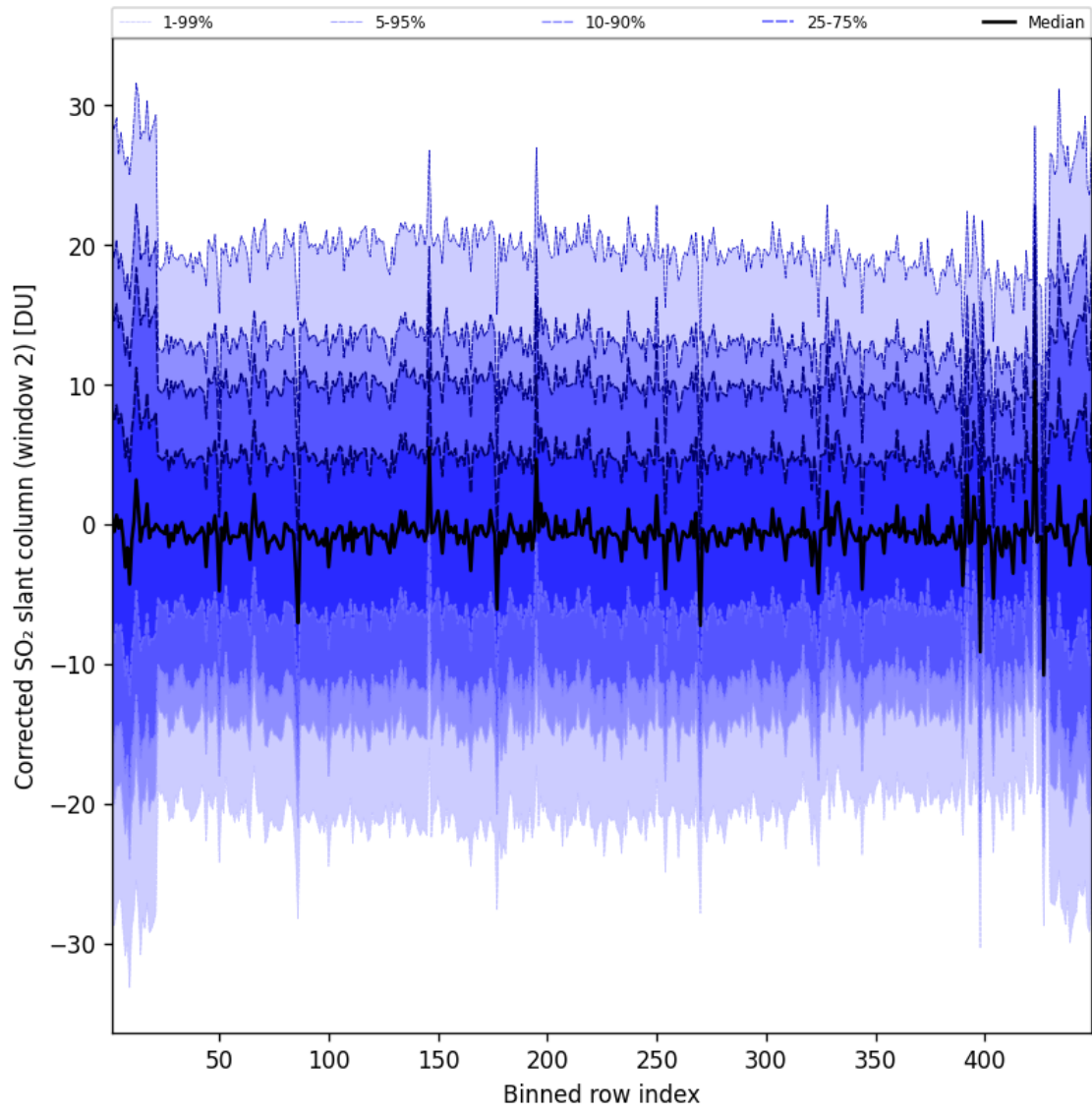


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-10-18 to 2025-10-19

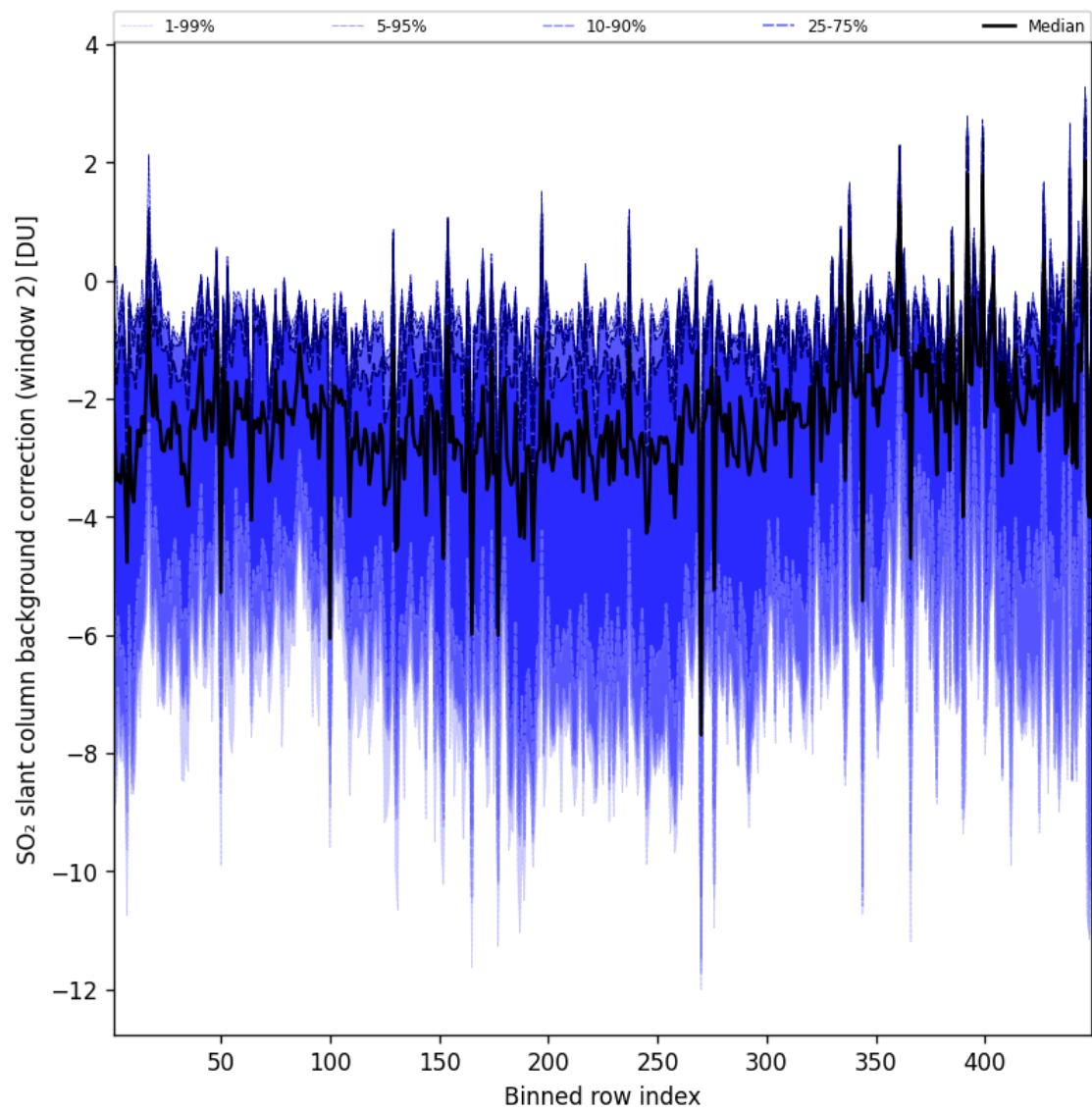


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-10-18 to 2025-10-19

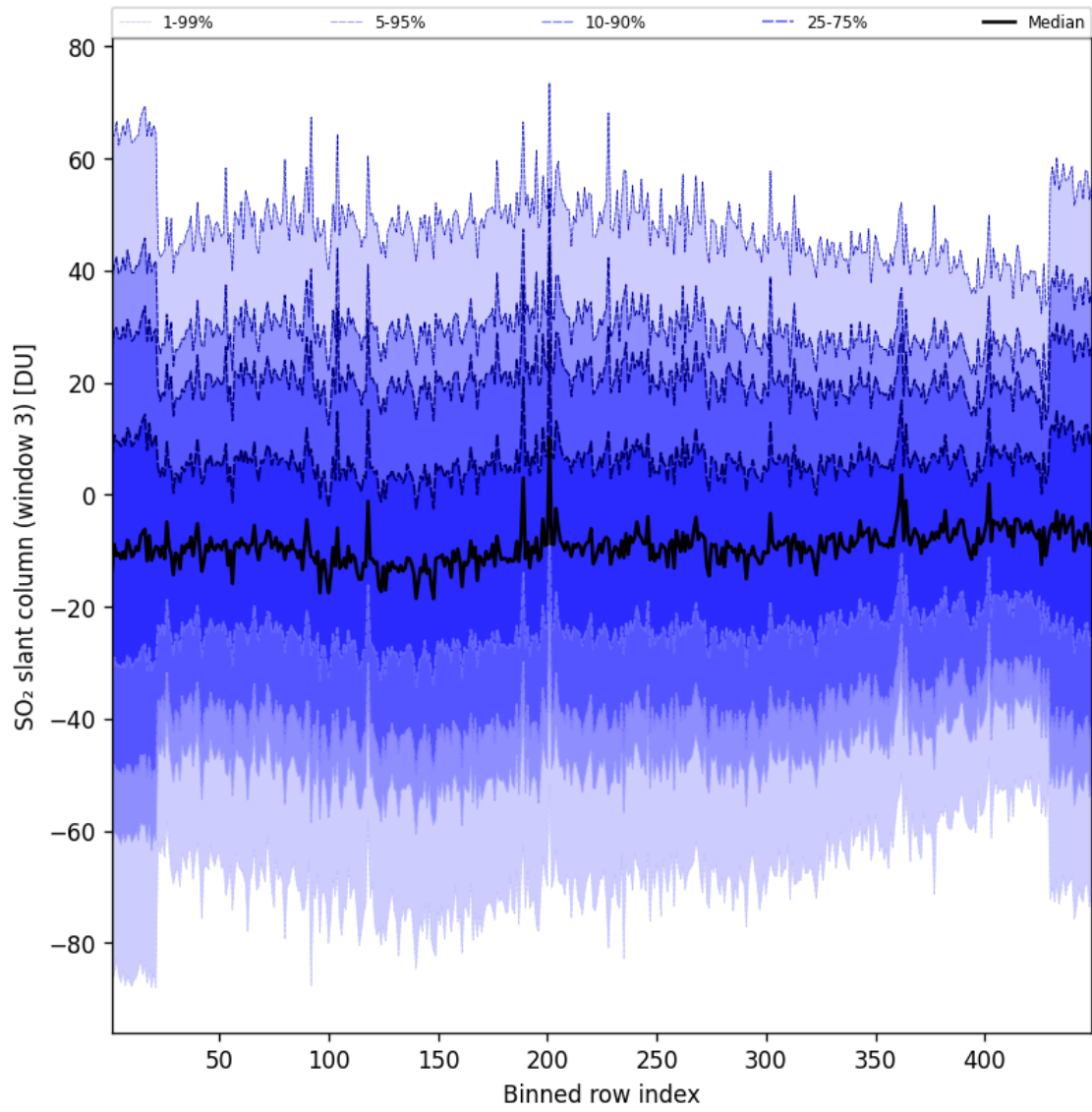


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-10-18 to 2025-10-19

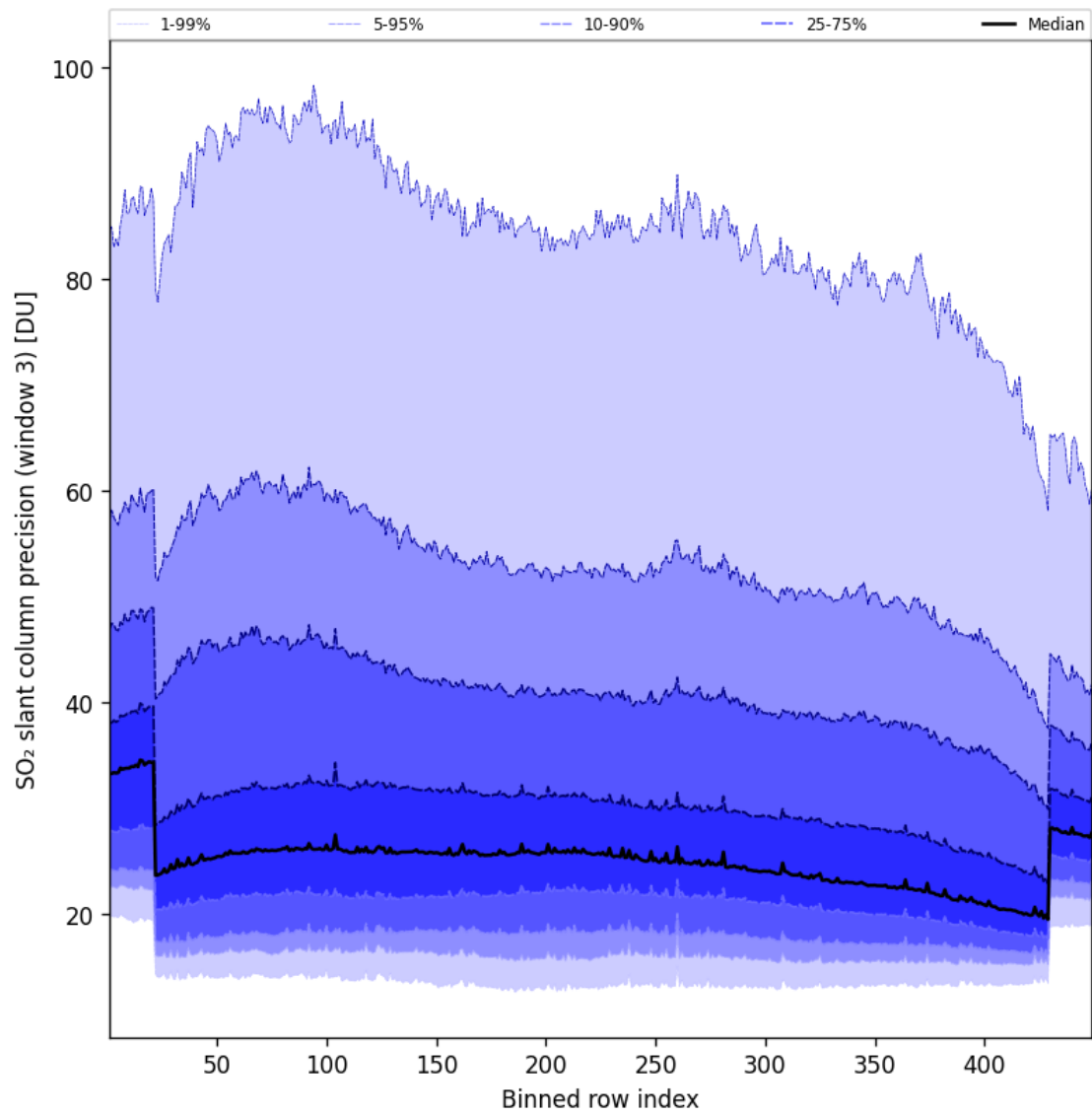


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-10-18 to 2025-10-19

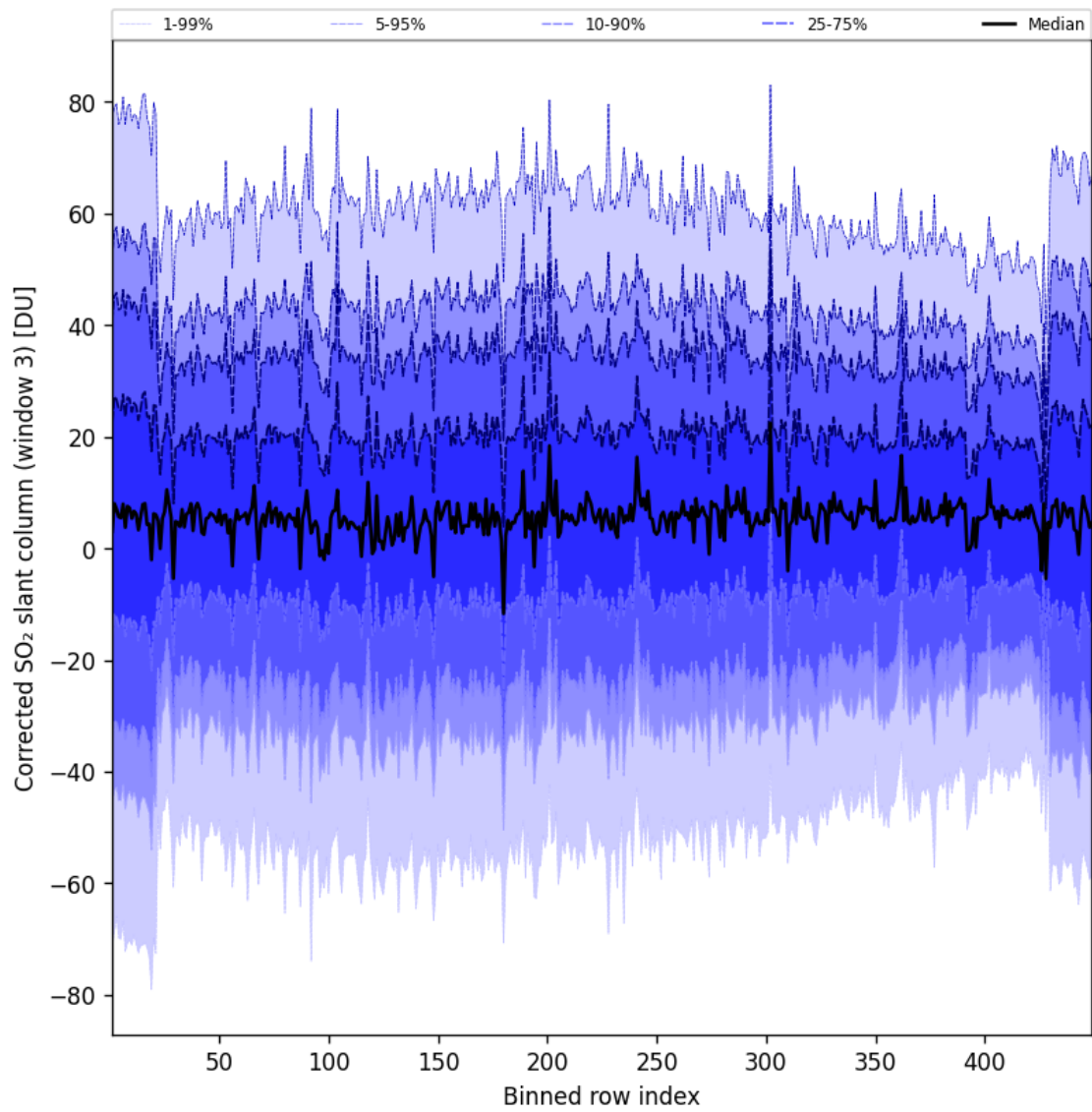


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-10-18 to 2025-10-19

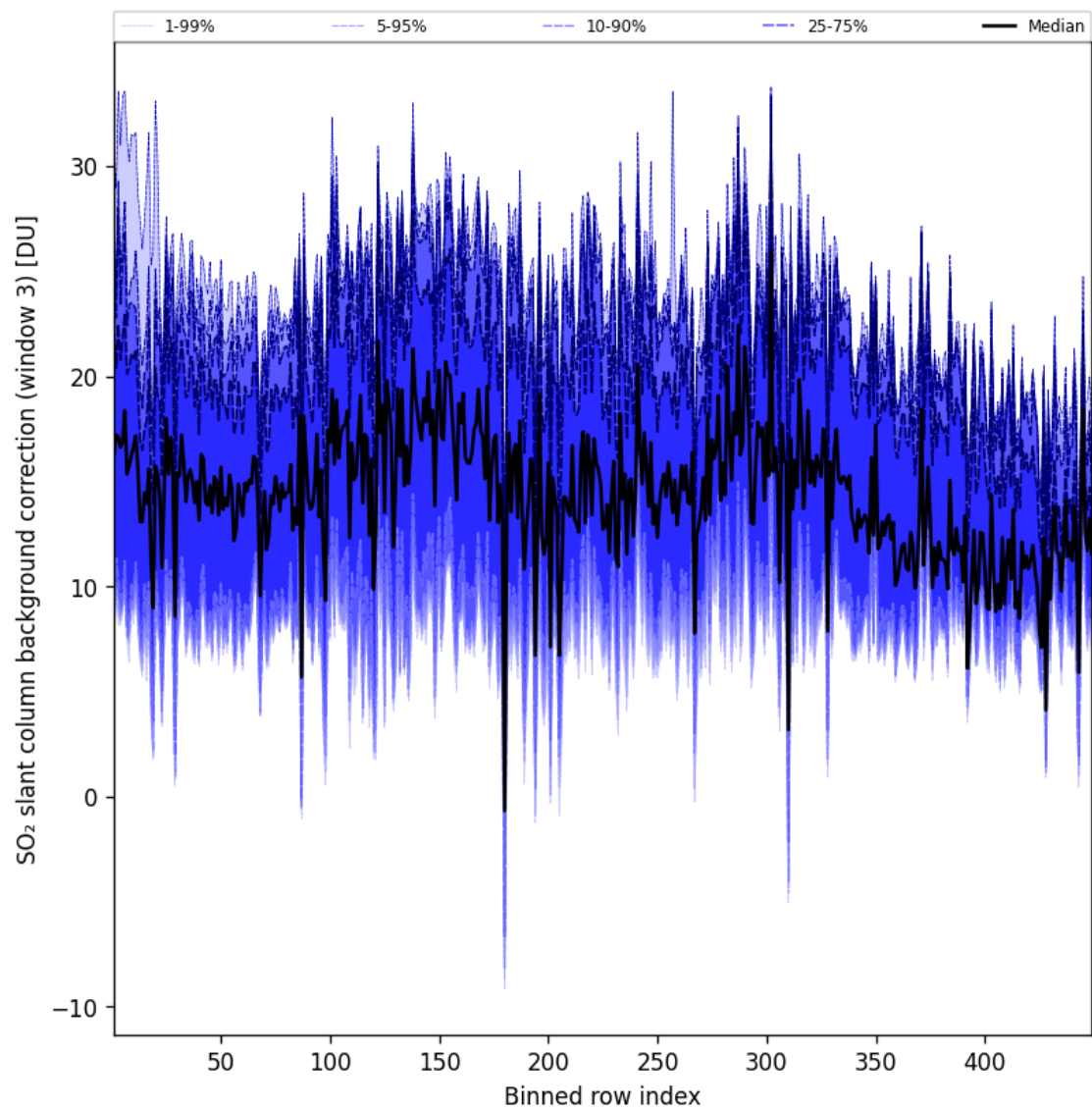


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-10-18 to 2025-10-19

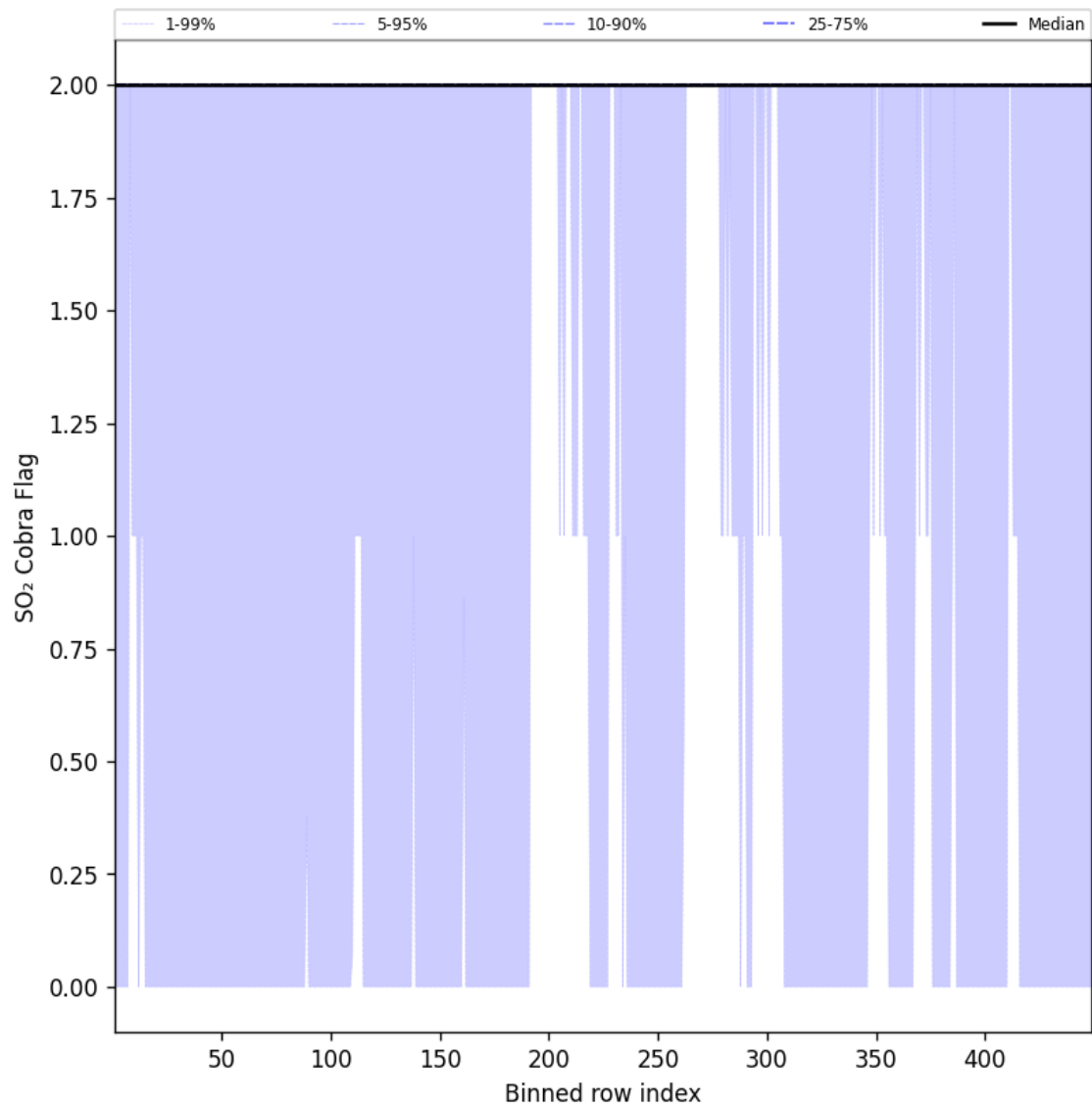


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-10-18 to 2025-10-19

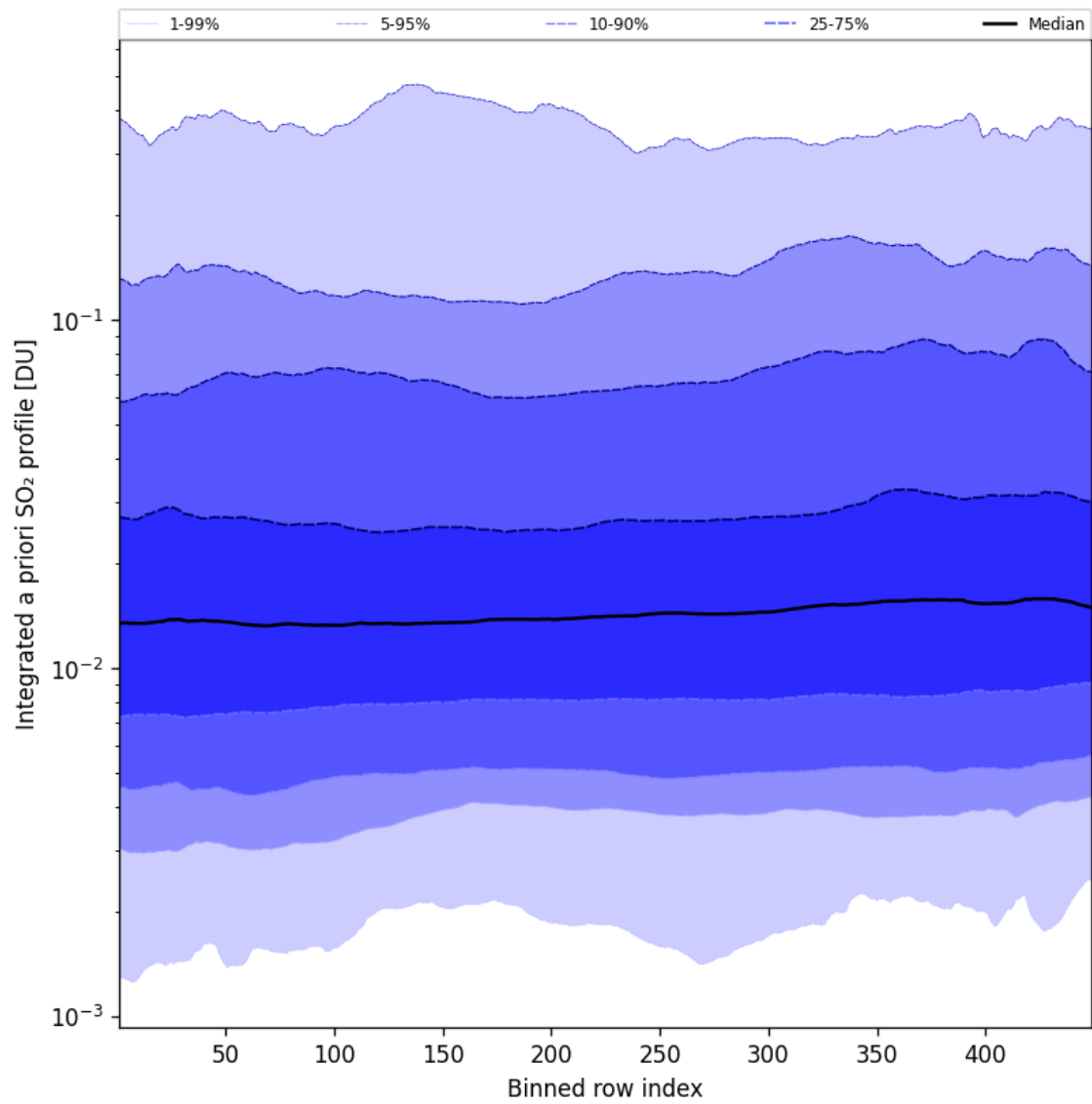


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-10-18 to 2025-10-19

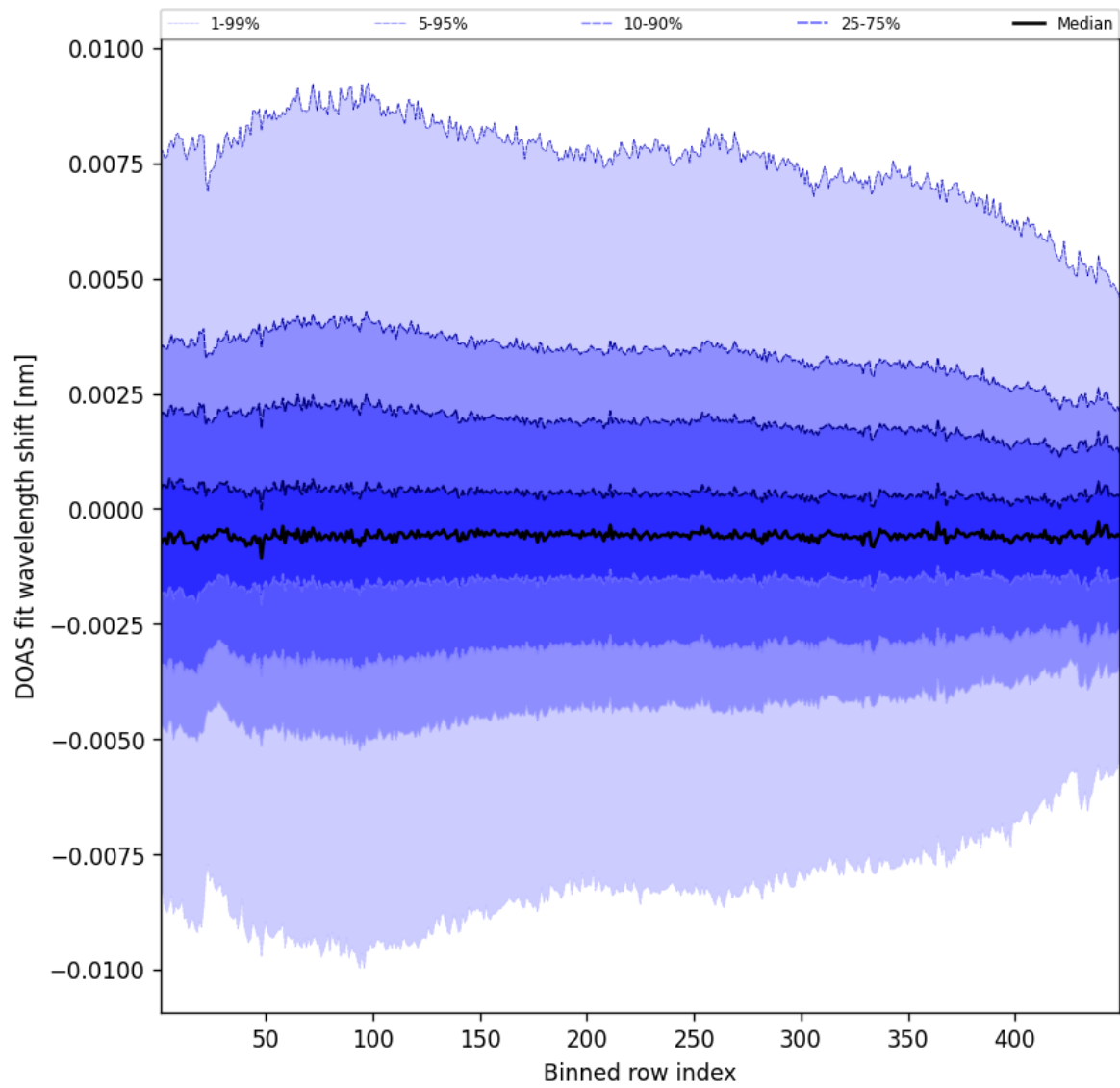


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-10-18 to 2025-10-19

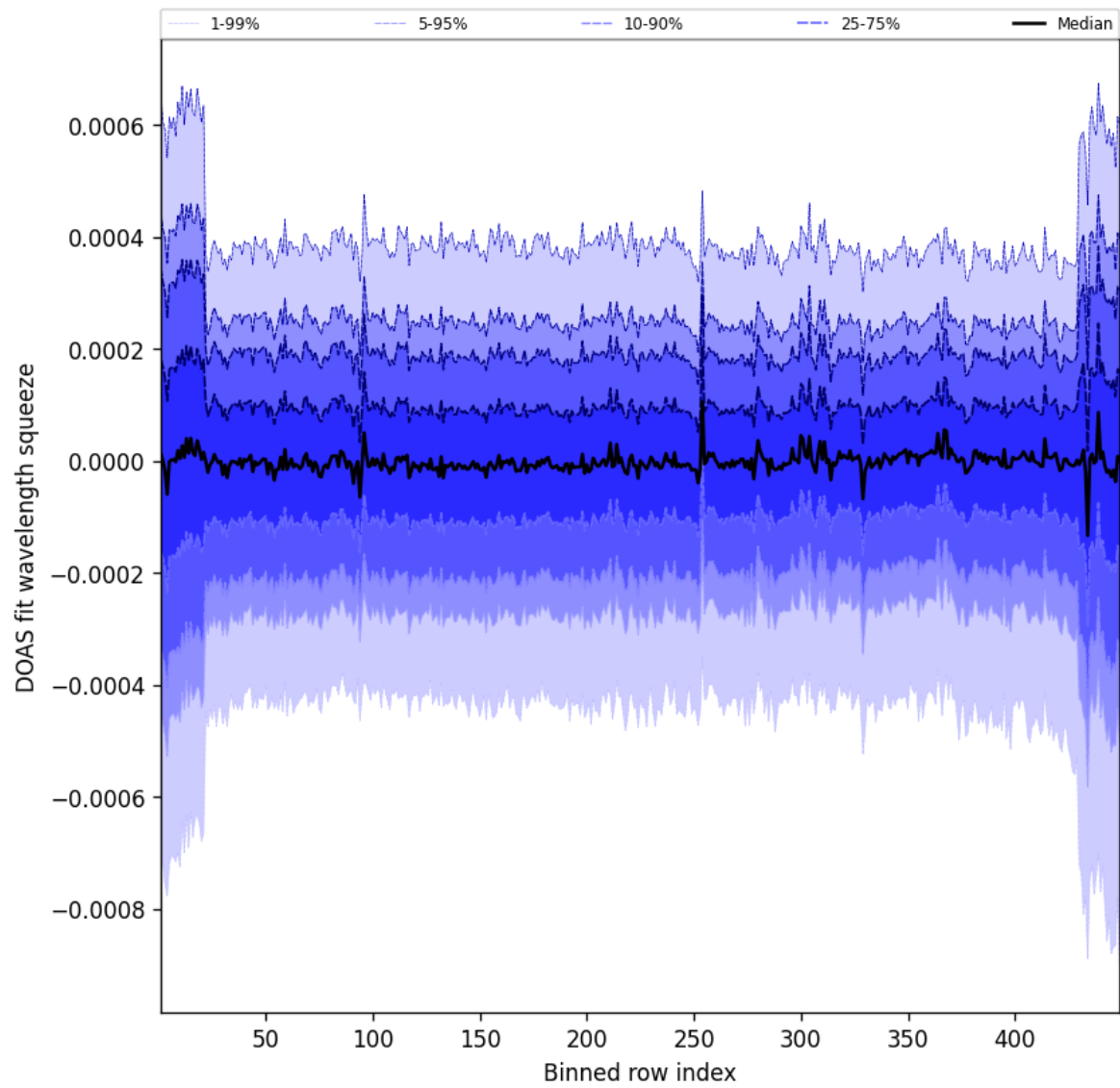


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-10-18 to 2025-10-19

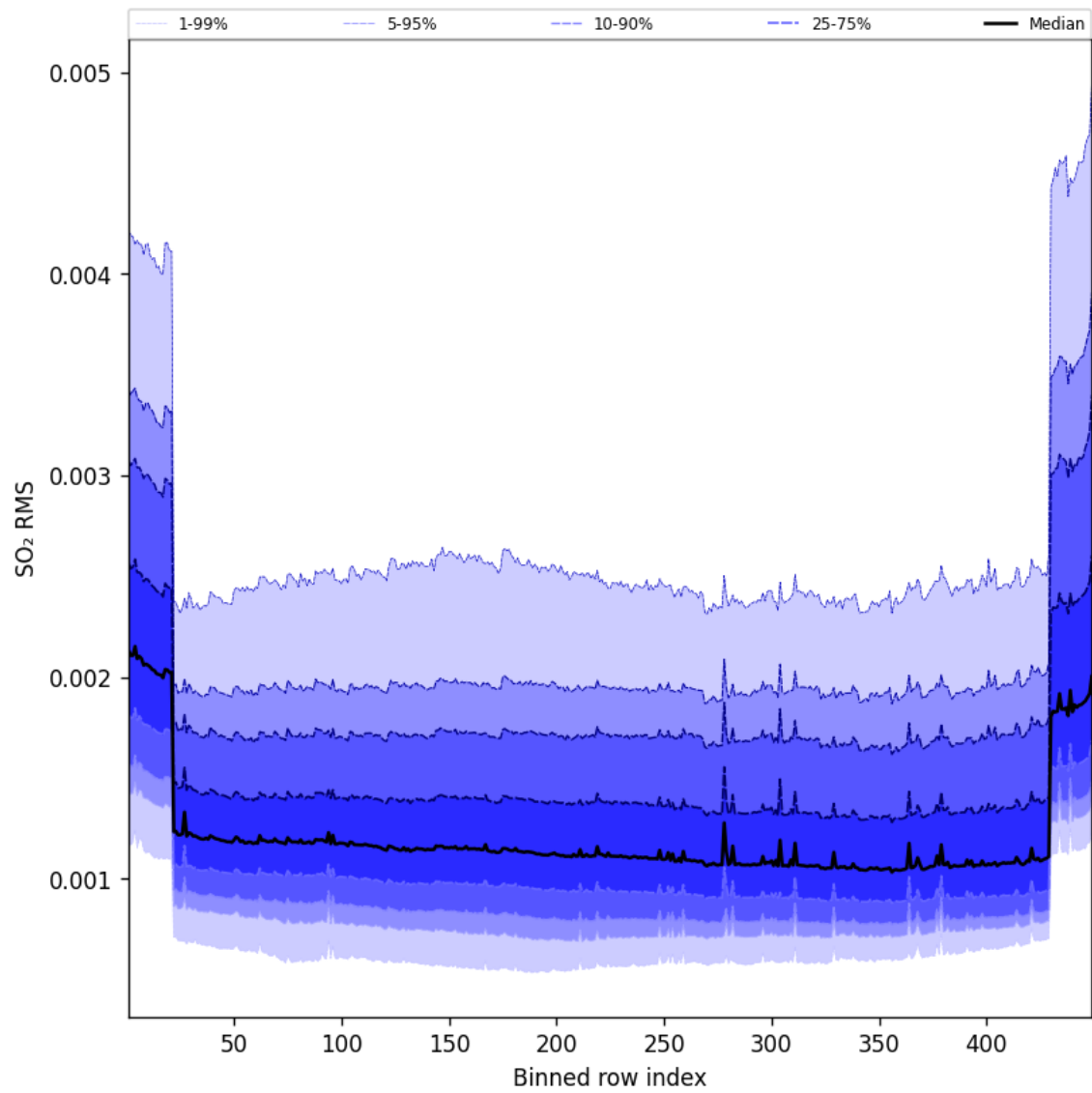


Figure 106: Along track statistics of “SO₂ RMS” for 2025-10-18 to 2025-10-19

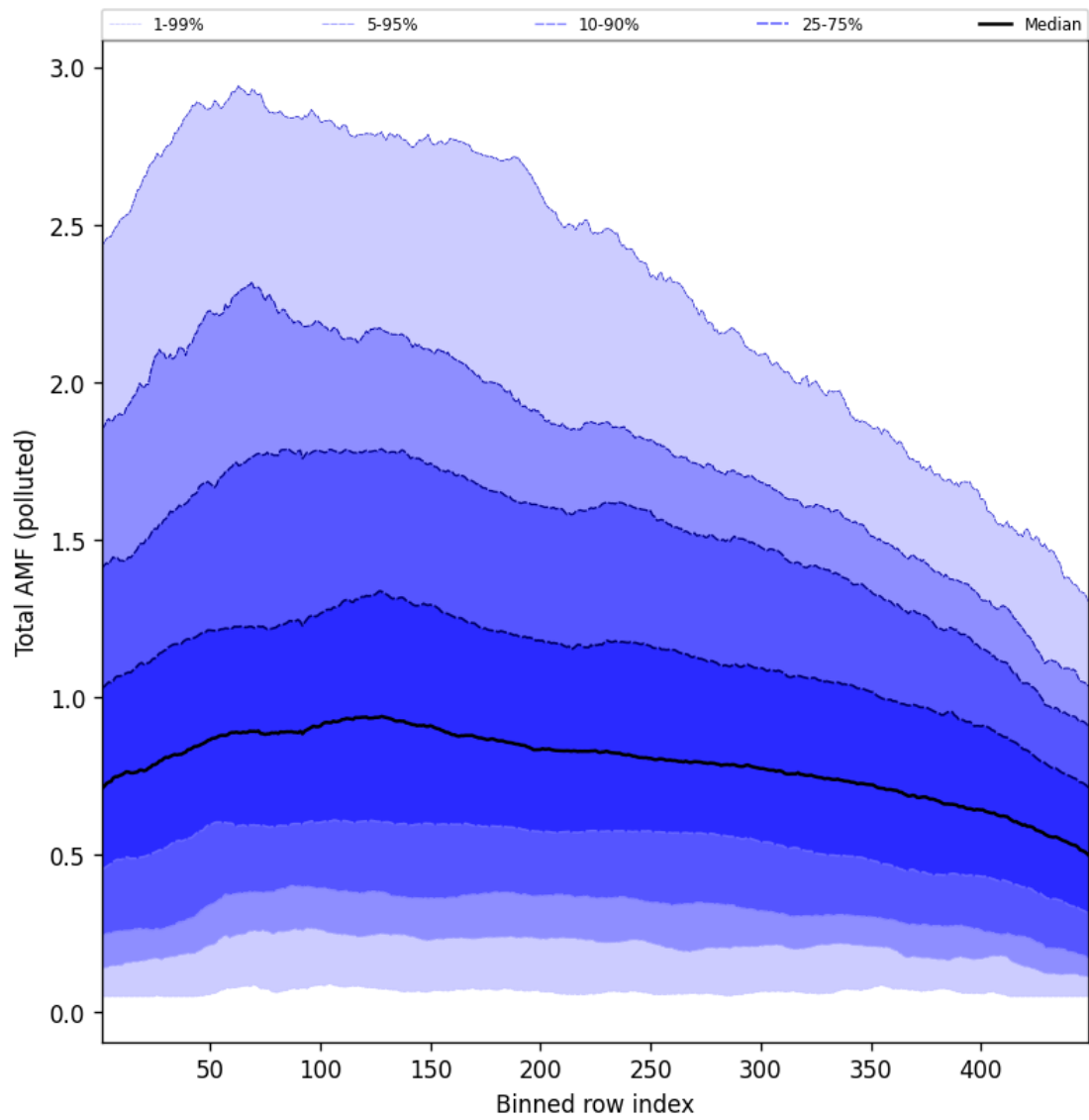


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-10-18 to 2025-10-19

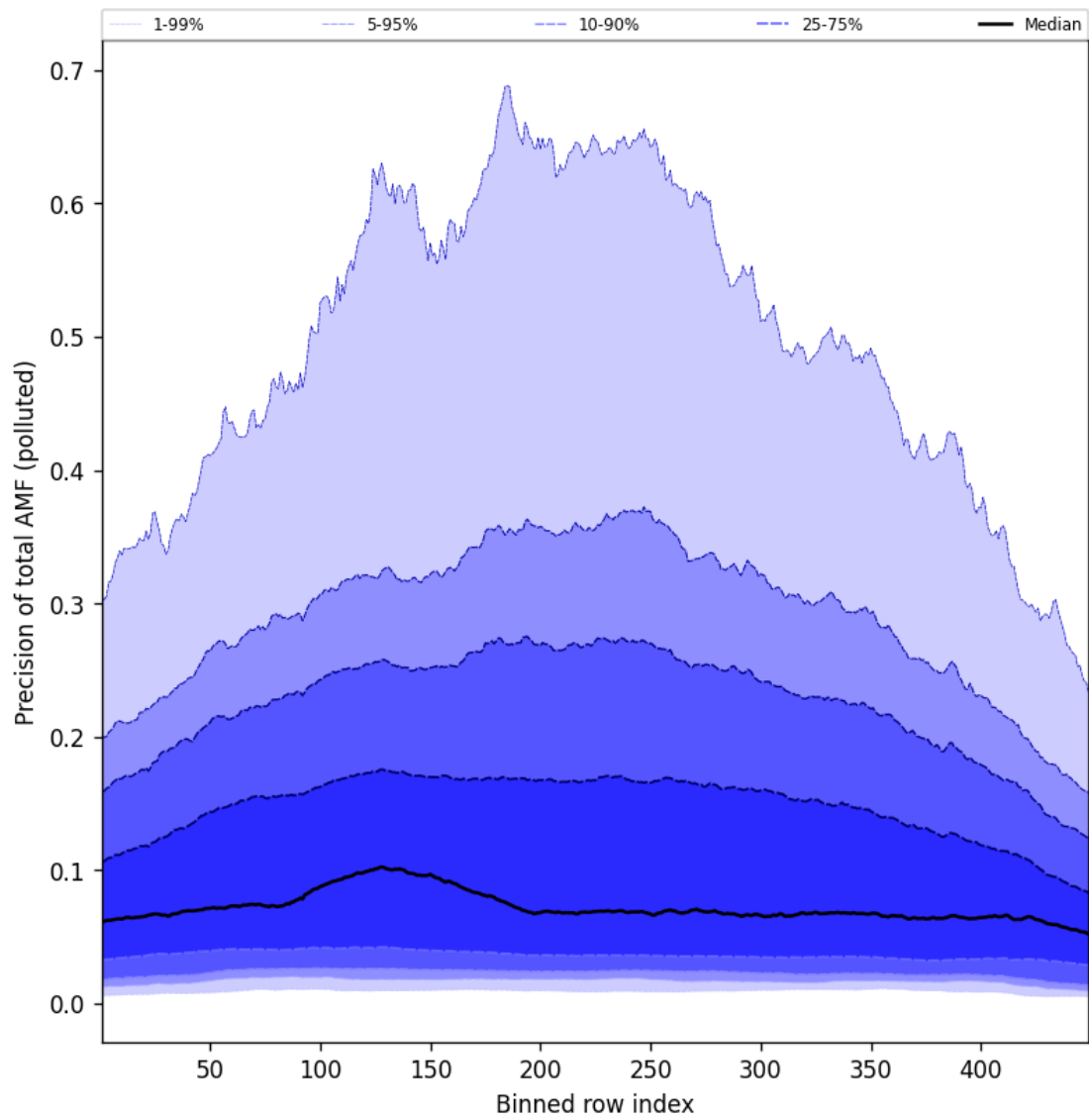


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-10-18 to 2025-10-19

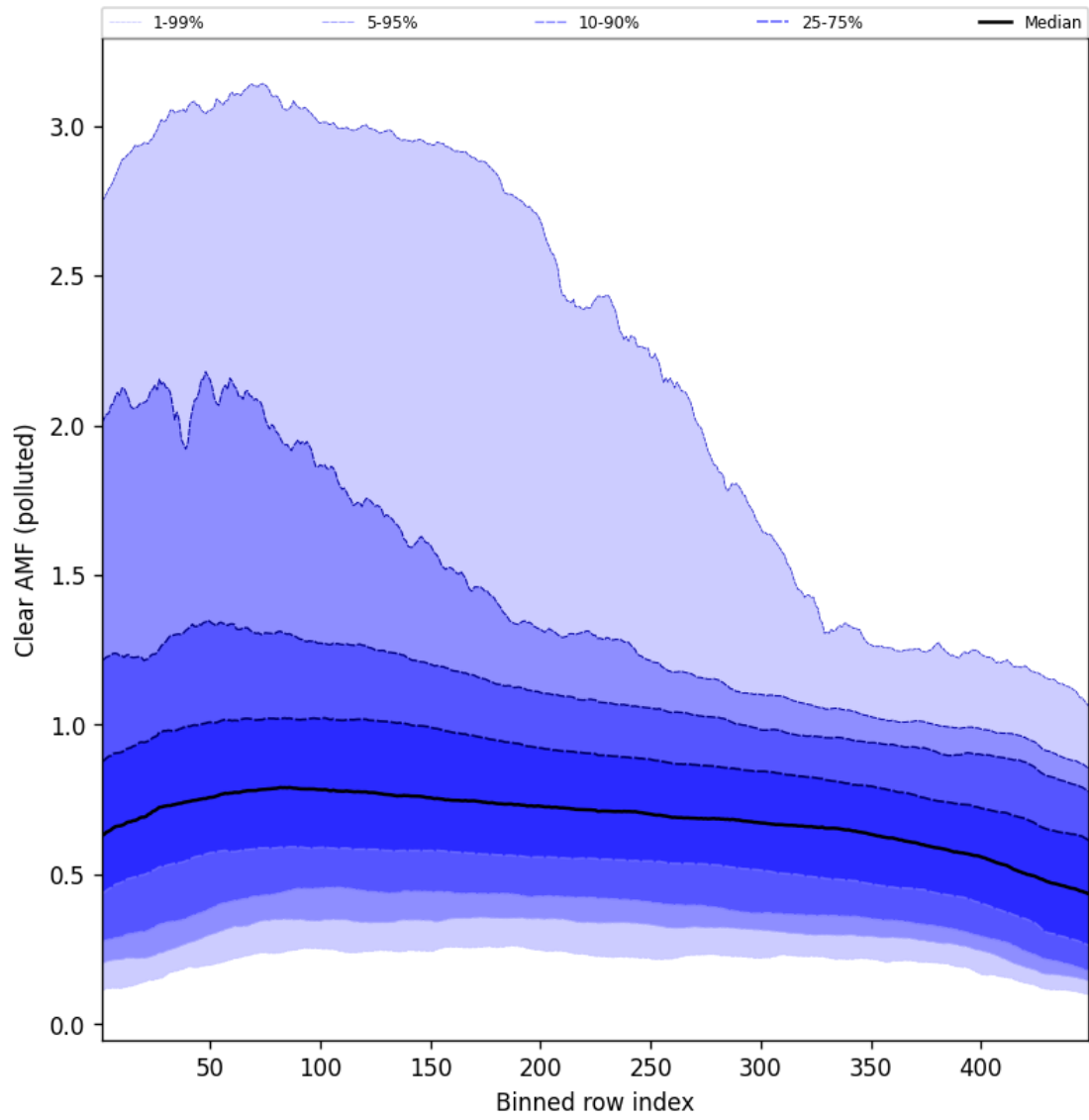


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-10-18 to 2025-10-19

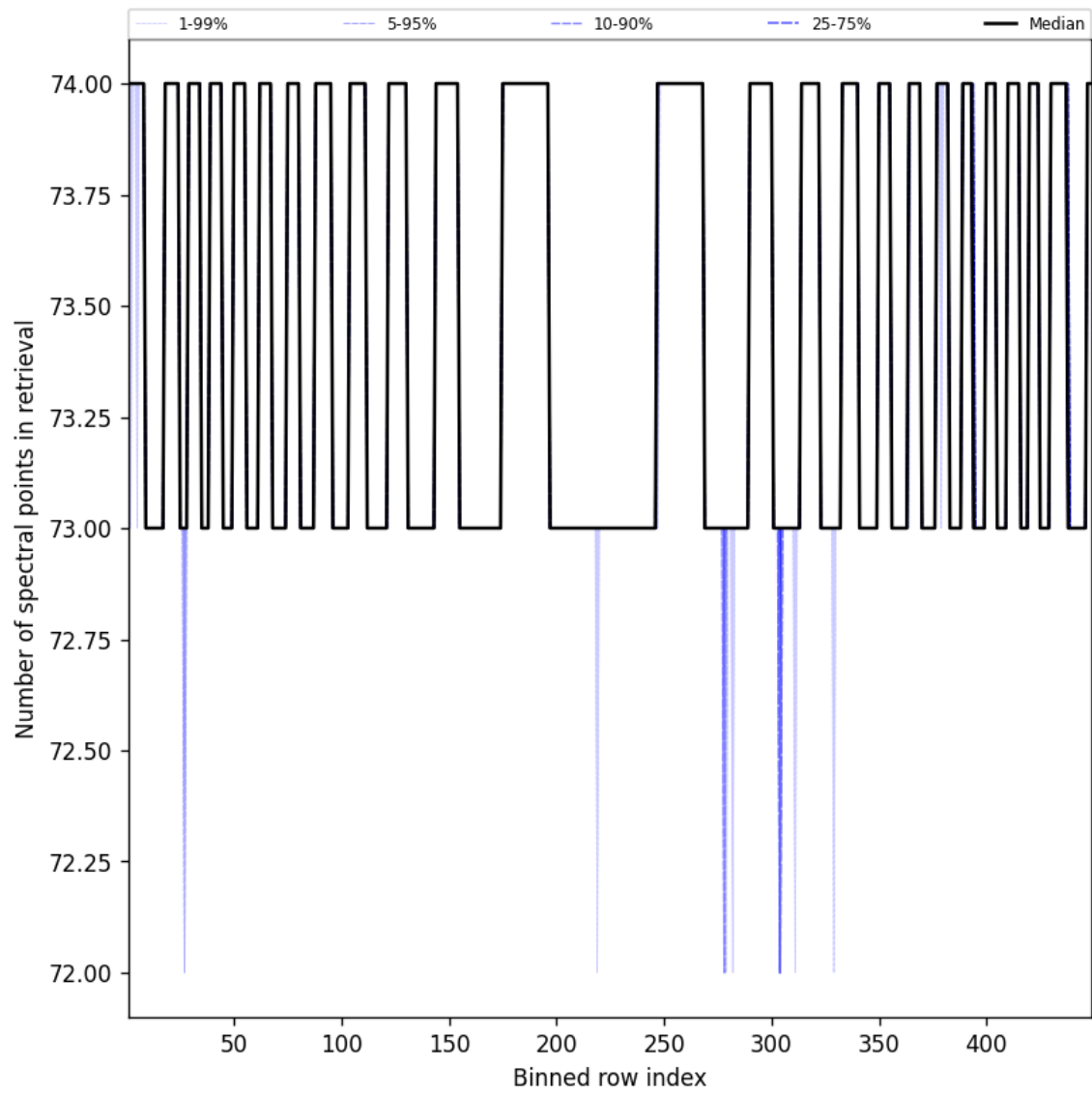


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-10-18 to 2025-10-19

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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