

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]	0.648 ± 0.419	1575890	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(8.228 \pm 158.229) \times 10^{-2}$	1575890	0.310	0.562	1.647×10^{-2}	-59.2	101
sulfurdioxide total vertical column precision [DU]	0.607 ± 0.822	1575890	0.271	0.363	0.411	7.374×10^{-2}	28.2
sulfurdioxide slant column density corrected [DU]	$(5.111 \pm 87.146) \times 10^{-2}$	1575890	0.294	0.394	1.234×10^{-2}	-10.1	115
sulfurdioxide slant column density cobra [DU]	$(4.555 \pm 64.790) \times 10^{-2}$	1575890	0.294	0.394	1.234×10^{-2}	-10.1	44.1
sulfurdioxide slant column density cobra precision [DU]	0.317 ± 0.148	1575890	0.262	0.153	0.275	8.977×10^{-2}	2.84
sulfurdioxide slant column density window1 [DU]	0.170 ± 0.925	1575890	0.125	0.786	0.160	-20.4	47.2
sulfurdioxide slant column density window1 precision [DU]	0.317 ± 0.148	1575890	0.262	0.153	0.275	8.977×10^{-2}	2.84
sulfurdioxide slant column density corrected win1 [DU]	$(5.944 \pm 91.678) \times 10^{-2}$	1575890	-2.500×10^{-2}	0.775	1.280×10^{-2}	-20.4	46.8
background so2 slant column offset window1 [DU]	-0.110 ± 0.174	1575890	-0.180	0.163	-0.144	-1.37	5.25
sulfurdioxide slant column density window2 [DU]	1.79 ± 9.27	1575890	0.250	11.8	1.56	-586	229
sulfurdioxide slant column density window2 precision [DU]	8.30 ± 2.13	1575890	7.43	2.57	8.01	2.38	281
sulfurdioxide slant column density corrected win2 [DU]	-0.417 ± 8.959	1575890	0.250	11.4	-0.426	-586	226
background so2 slant column offset window2 [DU]	-2.20 ± 2.34	1575890	-0.250	3.66	-1.68	-15.6	4.16
sulfurdioxide slant column density window3 [DU]	-4.97 ± 24.33	1575890	-6.16	30.8	-5.19	-177	161
sulfurdioxide slant column density window3 precision [DU]	28.0 ± 11.7	1575890	22.5	9.08	25.0	10.6	191
sulfurdioxide slant column density corrected win3 [DU]	6.07 ± 23.29	1575890	5.04	29.6	5.83	-165	171
background so2 slant column offset window3 [DU]	11.0 ± 6.3	1575890	5.04	10.1	11.1	-14.2	33.8
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.28	1575890	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(1.589 \pm 1.498) \times 10^{-2}$	1575890	1.423×10^{-2}	1.096×10^{-2}	1.279×10^{-2}	5.702×10^{-4}	0.204
fitted radiance shift [nm]	$(-4.871 \pm 23.488) \times 10^{-4}$	1575890	-5.000×10^{-4}	1.884×10^{-3}	-4.343×10^{-4}	-3.123×10^{-2}	3.357×10^{-2}
fitted radiance squeeze [1]	$(-2.279 \pm 19.271) \times 10^{-5}$	1575890	1.000×10^{-5}	2.166×10^{-4}	-8.111×10^{-6}	-6.536×10^{-3}	1.565×10^{-3}
fitted root mean square [1]	$(1.368 \pm 0.588) \times 10^{-3}$	1575890	1.025×10^{-3}	6.248×10^{-4}	1.200×10^{-3}	3.016×10^{-4}	1.708×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.756 ± 0.361	1575890	0.620	0.491	0.704	5.000×10^{-2}	2.47
sulfurdioxide total air mass factor polluted precision [1]	0.109 ± 0.125	1575890	3.500×10^{-2}	0.106	6.269×10^{-2}	3.837×10^{-3}	1.39
sulfurdioxide clear air mass factor polluted [1]	0.656 ± 0.238	1575890	0.580	0.312	0.619	9.436×10^{-2}	2.37
number of spectral points in retrieval [1]	73.4 ± 0.7	1575890	73.0	1.000	73.0	52.0	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	2.000×10^{-2}	8.000×10^{-2}	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.54	-1.00	-0.634	-0.435	-0.259	0.303	0.499	0.731	1.19	3.49
sulfurdioxide total vertical column precision [DU]	0.128	0.171	0.204	0.232	0.273	0.637	0.820	1.08	1.56	4.09
sulfurdioxide slant column density corrected [DU]	-0.937	-0.533	-0.383	-0.284	-0.181	0.212	0.324	0.439	0.629	1.37
sulfurdioxide slant column density cobra [DU]	-0.937	-0.533	-0.383	-0.284	-0.181	0.212	0.324	0.439	0.629	1.37
sulfurdioxide slant column density cobra precision [DU]	0.135	0.170	0.187	0.201	0.222	0.375	0.436	0.490	0.582	0.852
sulfurdioxide slant column density window1 [DU]	-1.86	-1.00	-0.672	-0.458	-0.238	0.548	0.754	0.956	1.28	2.26
sulfurdioxide slant column density window1 precision [DU]	0.135	0.170	0.187	0.201	0.222	0.375	0.436	0.490	0.582	0.852
sulfurdioxide slant column density corrected win1 [DU]	-1.76	-1.04	-0.754	-0.565	-0.366	0.409	0.632	0.857	1.22	2.35
background so2 slant column offset window1 [DU]	-0.379	-0.310	-0.278	-0.250	-0.218	-5.490×10^{-2}	2.116×10^{-2}	0.108	0.218	0.469
sulfurdioxide slant column density window2 [DU]	-19.8	-13.0	-9.60	-7.08	-4.24	7.58	10.7	13.5	17.3	25.3
sulfurdioxide slant column density window2 precision [DU]	4.28	5.32	5.91	6.35	6.86	9.43	10.3	11.1	12.2	14.5
sulfurdioxide slant column density corrected win2 [DU]	-22.1	-15.0	-11.5	-8.99	-6.14	5.28	8.14	10.7	14.2	21.4
background so2 slant column offset window2 [DU]	-7.79	-6.41	-5.58	-4.88	-3.95	-0.294	7.159×10^{-2}	0.319	0.641	1.88
sulfurdioxide slant column density window3 [DU]	-65.2	-44.5	-34.8	-27.9	-20.3	10.5	18.5	25.6	35.1	53.9
sulfurdioxide slant column density window3 precision [DU]	14.2	17.0	18.7	20.0	21.5	30.5	34.7	39.2	49.1	77.6
sulfurdioxide slant column density corrected win3 [DU]	-51.3	-31.6	-22.5	-15.9	-8.73	20.9	28.5	35.3	44.4	62.7
background so2 slant column offset window3 [DU]	-0.894	1.73	3.02	4.14	5.73	15.9	17.7	19.4	21.5	24.6
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]	1.204×10^{-3}	1.917×10^{-3}	3.005×10^{-3}	4.983×10^{-3}	7.902×10^{-3}	1.886×10^{-2}	2.385×10^{-2}	2.849×10^{-2}	4.295×10^{-2}	8.022×10^{-2}
fitted radiance shift [nm]	-7.364×10^{-3}	-4.041×10^{-3}	-2.898×10^{-3}	-2.178×10^{-3}	-1.457×10^{-3}	4.270×10^{-4}	1.060×10^{-3}	1.815×10^{-3}	3.092×10^{-3}	6.606×10^{-3}
fitted radiance squeeze [1]	-5.974×10^{-4}	-3.530×10^{-4}	-2.526×10^{-4}	-1.873×10^{-4}	-1.220×10^{-4}	9.462×10^{-5}	1.453×10^{-4}	1.916×10^{-4}	2.564×10^{-4}	4.032×10^{-4}
fitted root mean square [1]	5.738×10^{-4}	7.476×10^{-4}	8.413×10^{-4}	9.056×10^{-4}	9.841×10^{-4}	1.609×10^{-3}	1.887×10^{-3}	2.120×10^{-3}	2.445×10^{-3}	3.529×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.294×10^{-2}	0.224	0.336	0.418	0.497	0.988	1.12	1.24	1.42	1.75
sulfurdioxide total air mass factor polluted precision [1]	9.902×10^{-3}	1.711×10^{-2}	2.307×10^{-2}	2.746×10^{-2}	3.316×10^{-2}	0.139	0.181	0.228	0.340	0.679
sulfurdioxide clear air mass factor polluted [1]	0.235	0.325	0.385	0.426	0.479	0.791	0.888	1.01	1.12	1.29
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]	0.661 ± 0.417	965420	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	0.101 ± 1.760	965420	0.554	1.693×10^{-2}	-59.2	100	-0.254	0.300
sulfurdioxide total vertical column precision [DU]	0.608 ± 0.798	965420	0.353	0.397	7.463×10^{-2}	27.3	0.266	0.620
sulfurdioxide slant column density corrected [DU]	$(6.635 \pm 104.728) \times 10^{-2}$	965420	0.391	1.280×10^{-2}	-5.21	115	-0.179	0.212
sulfurdioxide slant column density cobra [DU]	$(5.769 \pm 74.755) \times 10^{-2}$	965420	0.391	1.280×10^{-2}	-5.21	44.1	-0.179	0.212
sulfurdioxide slant column density cobra precision [DU]	0.304 ± 0.122	965420	0.112	0.269	8.977×10^{-2}	1.82	0.230	0.342
sulfurdioxide slant column density window1 [DU]	0.202 ± 1.002	965420	0.781	0.167	-20.4	47.2	-0.224	0.557
sulfurdioxide slant column density window1 precision [DU]	0.304 ± 0.122	965420	0.112	0.269	8.977×10^{-2}	1.82	0.230	0.342
sulfurdioxide slant column density corrected win1 [DU]	$(6.633 \pm 99.197) \times 10^{-2}$	965420	0.771	9.751×10^{-3}	-20.4	46.8	-0.368	0.403
background so2 slant column offset window1 [DU]	-0.135 ± 0.132	965420	0.140	-0.150	-1.37	5.25	-0.219	-7.874×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.37 ± 9.26	965420	11.8	1.19	-59.9	229	-4.63	7.17
sulfurdioxide slant column density window2 precision [DU]	8.38 ± 2.09	965420	2.57	8.06	2.38	85.4	6.93	9.51
sulfurdioxide slant column density corrected win2 [DU]	-0.637 ± 9.061	965420	11.6	-0.638	-63.2	226	-6.44	5.14
background so2 slant column offset window2 [DU]	-2.01 ± 2.19	965420	3.09	-1.47	-13.5	4.12	-3.43	-0.341
sulfurdioxide slant column density window3 [DU]	-5.36 ± 25.08	965420	31.7	-5.37	-177	161	-21.1	10.6
sulfurdioxide slant column density window3 precision [DU]	28.5 ± 11.3	965420	9.69	25.7	11.1	189	21.9	31.6
sulfurdioxide slant column density corrected win3 [DU]	5.89 ± 23.97	965420	30.4	5.88	-165	171	-9.21	21.2
background so2 slant column offset window3 [DU]	11.3 ± 6.4	965420	10.3	11.5	-14.2	31.3	5.82	16.1
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.26	965420	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.027 \pm 1.738) \times 10^{-2}$	965420	1.353×10^{-2}	1.629×10^{-2}	5.702×10^{-4}	0.204	1.069×10^{-2}	2.421×10^{-2}
fitted radiance shift [nm]	$(-1.315 \pm 22.282) \times 10^{-4}$	965420	1.655×10^{-3}	-1.610×10^{-4}	-3.092×10^{-2}	3.357×10^{-2}	-9.603×10^{-4}	6.950×10^{-4}
fitted radiance squeeze [1]	$(-3.549 \pm 175.281) \times 10^{-6}$	965420	2.076×10^{-4}	1.581×10^{-6}	-3.506×10^{-3}	1.565×10^{-3}	-1.042×10^{-4}	1.035×10^{-4}
fitted root mean square [1]	$(1.328 \pm 0.506) \times 10^{-3}$	965420	5.142×10^{-4}	1.183×10^{-3}	3.016×10^{-4}	1.708×10^{-2}	9.996×10^{-4}	1.514×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.752 ± 0.363	965420	0.480	0.707	5.000×10^{-2}	2.47	0.496	0.976
sulfurdioxide total air mass factor polluted precision [1]	0.117 ± 0.148	965420	0.107	5.603×10^{-2}	5.087×10^{-3}	1.39	3.155×10^{-2}	0.139
sulfurdioxide clear air mass factor polluted [1]	0.656 ± 0.241	965420	0.331	0.618	9.436×10^{-2}	2.37	0.466	0.797
number of spectral points in retrieval [1]	73.4 ± 0.7	965420	1.000	73.0	52.0	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]	0.626 ± 0.420	610470	0.810	1.000	0.0	1.000	0.190	1.000
sulfurdioxide total vertical column [DU]	$(5.203 \pm 125.097) \times 10^{-2}$	610470	0.575	1.571×10^{-2}	-46.7	101	-0.267	0.309
sulfurdioxide total vertical column precision [DU]	0.607 ± 0.859	610470	0.373	0.437	7.374×10^{-2}	28.2	0.285	0.658
sulfurdioxide slant column density corrected [DU]	$(2.701 \pm 47.434) \times 10^{-2}$	610470	0.399	1.164×10^{-2}	-10.1	42.6	-0.185	0.214
sulfurdioxide slant column density cobra [DU]	$(2.635 \pm 44.638) \times 10^{-2}$	610470	0.399	1.164×10^{-2}	-10.1	9.36	-0.185	0.214
sulfurdioxide slant column density cobra precision [DU]	0.338 ± 0.181	610470	0.214	0.296	9.191×10^{-2}	2.84	0.206	0.420
sulfurdioxide slant column density window1 [DU]	0.119 ± 0.787	610470	0.795	0.149	-11.0	8.49	-0.262	0.533
sulfurdioxide slant column density window1 precision [DU]	0.338 ± 0.181	610470	0.214	0.296	9.191×10^{-2}	2.84	0.206	0.420
sulfurdioxide slant column density corrected win1 [DU]	$(4.855 \pm 78.316) \times 10^{-2}$	610470	0.781	1.760×10^{-2}	-10.1	9.45	-0.364	0.418
background so2 slant column offset window1 [DU]	$(-7.065 \pm 21.988) \times 10^{-2}$	610470	0.240	-0.127	-0.562	2.37	-0.217	2.275×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.44 ± 9.25	610470	11.8	2.15	-586	68.3	-3.61	8.23
sulfurdioxide slant column density window2 precision [DU]	8.17 ± 2.19	610470	2.56	7.93	2.53	281	6.75	9.31
sulfurdioxide slant column density corrected win2 [DU]	$(-6.868 \pm 878.478) \times 10^{-2}$	610470	11.2	-0.103	-586	62.5	-5.67	5.49
background so2 slant column offset window2 [DU]	-2.51 ± 2.54	610470	4.36	-2.24	-15.6	4.16	-4.56	-0.199
sulfurdioxide slant column density window3 [DU]	-4.35 ± 23.06	610470	29.5	-4.94	-146	135	-19.2	10.2
sulfurdioxide slant column density window3 precision [DU]	27.1 ± 12.3	610470	7.80	24.1	10.6	191	20.9	28.7
sulfurdioxide slant column density corrected win3 [DU]	6.35 ± 22.16	610470	28.5	5.75	-136	148	-8.05	20.4
background so2 slant column offset window3 [DU]	10.7 ± 6.1	610470	9.81	10.4	-13.1	33.8	5.61	15.4
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.31	610470	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(8.965 \pm 4.771) \times 10^{-3}$	610470	7.792×10^{-3}	9.330×10^{-3}	6.659×10^{-4}	2.151×10^{-2}	4.797×10^{-3}	1.259×10^{-2}
fitted radiance shift [nm]	$(-1.049 \pm 2.424) \times 10^{-3}$	610470	1.991×10^{-3}	-9.565×10^{-4}	-3.123×10^{-2}	2.494×10^{-2}	-2.103×10^{-3}	-1.113×10^{-4}
fitted radiance squeeze [1]	$(-5.322 \pm 21.394) \times 10^{-5}$	610470	2.359×10^{-4}	-2.504×10^{-5}	-6.536×10^{-3}	1.500×10^{-3}	-1.561×10^{-4}	7.983×10^{-5}
fitted root mean square [1]	$(1.432 \pm 0.694) \times 10^{-3}$	610470	7.897×10^{-4}	1.251×10^{-3}	3.732×10^{-4}	1.448×10^{-2}	9.535×10^{-4}	1.743×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.761 ± 0.358	610470	0.509	0.697	5.000×10^{-2}	2.23	0.499	1.01
sulfurdioxide total air mass factor polluted precision [1]	$(9.593 \pm 7.377) \times 10^{-2}$	610470	0.103	7.488×10^{-2}	3.837×10^{-3}	0.663	3.615×10^{-2}	0.139
sulfurdioxide clear air mass factor polluted [1]	0.654 ± 0.233	610470	0.283	0.621	9.848×10^{-2}	2.27	0.499	0.782
number of spectral points in retrieval [1]	73.4 ± 0.5	610470	1.000	73.0	72.0	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]	0.675 ± 0.409	1485764	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(7.663 \pm 152.578) \times 10^{-2}$	1485764	0.550	1.566×10^{-2}	-46.7	101	-0.254	0.296
sulfurdioxide total vertical column precision [DU]	0.585 ± 0.795	1485764	0.351	0.404	7.374×10^{-2}	28.2	0.270	0.621
sulfurdioxide slant column density corrected [DU]	$(4.683 \pm 81.013) \times 10^{-2}$	1485764	0.385	1.167×10^{-2}	-10.1	115	-0.178	0.207
sulfurdioxide slant column density cobra [DU]	$(4.169 \pm 59.579) \times 10^{-2}$	1485764	0.385	1.167×10^{-2}	-10.1	30.6	-0.178	0.207
sulfurdioxide slant column density cobra precision [DU]	0.308 ± 0.141	1485764	0.140	0.269	8.977×10^{-2}	2.84	0.219	0.359
sulfurdioxide slant column density window1 [DU]	0.172 ± 0.872	1485764	0.765	0.163	-20.4	35.0	-0.223	0.541
sulfurdioxide slant column density window1 precision [DU]	0.308 ± 0.141	1485764	0.140	0.269	8.977×10^{-2}	2.84	0.219	0.359
sulfurdioxide slant column density corrected win1 [DU]	$(5.239 \pm 86.366) \times 10^{-2}$	1485764	0.754	9.848×10^{-3}	-20.4	34.6	-0.360	0.394
background so2 slant column offset window1 [DU]	-0.120 ± 0.170	1485764	0.156	-0.151	-0.562	2.37	-0.222	-6.677×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.55 ± 9.12	1485764	11.6	1.36	-586	68.3	-4.37	7.27
sulfurdioxide slant column density window2 precision [DU]	8.20 ± 2.08	1485764	2.50	7.93	2.38	281	6.81	9.30
sulfurdioxide slant column density corrected win2 [DU]	-0.470 ± 8.846	1485764	11.3	-0.468	-586	62.5	-6.12	5.17
background so2 slant column offset window2 [DU]	-2.02 ± 2.24	1485764	3.38	-1.48	-15.6	4.16	-3.62	-0.236
sulfurdioxide slant column density window3 [DU]	-4.35 ± 24.14	1485764	30.6	-4.65	-163	161	-19.7	11.0
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 11.7	1485764	8.89	24.9	10.6	191	21.4	30.3
sulfurdioxide slant column density corrected win3 [DU]	6.29 ± 23.17	1485764	29.5	6.00	-149	171	-8.48	21.1
background so2 slant column offset window3 [DU]	10.6 ± 6.2	1485764	9.90	10.6	-14.2	33.8	5.51	15.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	1485764	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.621 \pm 1.481) \times 10^{-2}$	1485764	1.072×10^{-2}	1.306×10^{-2}	6.659×10^{-4}	0.203	8.392×10^{-3}	1.911×10^{-2}
fitted radiance shift [nm]	$(-4.933 \pm 23.513) \times 10^{-4}$	1485764	1.858×10^{-3}	-4.379×10^{-4}	-3.123×10^{-2}	3.357×10^{-2}	-1.452×10^{-3}	4.059×10^{-4}
fitted radiance squeeze [1]	$(-1.988 \pm 18.823) \times 10^{-5}$	1485764	2.115×10^{-4}	-5.876×10^{-6}	-6.536×10^{-3}	1.565×10^{-3}	-1.167×10^{-4}	9.483×10^{-5}
fitted root mean square [1]	$(1.329 \pm 0.565) \times 10^{-3}$	1485764	5.536×10^{-4}	1.174×10^{-3}	3.016×10^{-4}	1.708×10^{-2}	9.731×10^{-4}	1.527×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.751 ± 0.353	1485764	0.476	0.702	5.000×10^{-2}	2.25	0.500	0.976
sulfurdioxide total air mass factor polluted precision [1]	0.108 ± 0.126	1485764	0.103	6.024×10^{-2}	3.837×10^{-3}	1.39	3.295×10^{-2}	0.136
sulfurdioxide clear air mass factor polluted [1]	0.652 ± 0.228	1485764	0.301	0.619	9.436×10^{-2}	2.27	0.482	0.784
number of spectral points in retrieval [1]	73.4 ± 0.6	1485764	1.000	73.0	52.0	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]	0.107 ± 0.205	43365	0.1000	3.000×10^{-2}	0.0	1.000	0.0	0.1000
sulfurdioxide total vertical column [DU]	0.169 ± 2.125	43365	0.840	4.084×10^{-2}	-59.2	58.0	-0.353	0.487
sulfurdioxide total vertical column precision [DU]	0.949 ± 1.102	43365	0.827	0.526	9.020×10^{-2}	27.3	0.338	1.17
sulfurdioxide slant column density corrected [DU]	0.134 ± 1.648	43365	0.671	3.650×10^{-2}	-5.21	70.4	-0.288	0.383
sulfurdioxide slant column density cobra [DU]	0.122 ± 1.348	43365	0.671	3.650×10^{-2}	-5.21	44.1	-0.288	0.383
sulfurdioxide slant column density cobra precision [DU]	0.494 ± 0.183	43365	0.245	0.447	0.127	1.66	0.370	0.615
sulfurdioxide slant column density window1 [DU]	$(9.662 \pm 168.506) \times 10^{-2}$	43365	1.34	3.281×10^{-2}	-7.49	47.2	-0.641	0.699
sulfurdioxide slant column density window1 precision [DU]	0.494 ± 0.183	43365	0.245	0.447	0.127	1.66	0.370	0.615
sulfurdioxide slant column density corrected win1 [DU]	0.183 ± 1.668	43365	1.33	9.633×10^{-2}	-7.14	46.8	-0.562	0.769
background so2 slant column offset window1 [DU]	$(8.647 \pm 18.140) \times 10^{-2}$	43365	0.229	7.129×10^{-2}	-1.37	5.25	-3.690×10^{-2}	0.192
sulfurdioxide slant column density window2 [DU]	6.40 ± 10.54	43365	13.7	6.39	-45.7	69.8	-0.506	13.2
sulfurdioxide slant column density window2 precision [DU]	9.78 ± 2.14	43365	2.67	9.44	3.27	23.4	8.27	10.9
sulfurdioxide slant column density corrected win2 [DU]	0.867 ± 10.450	43365	13.5	0.836	-52.0	70.4	-5.89	7.58
background so2 slant column offset window2 [DU]	-5.53 ± 1.64	43365	1.95	-5.58	-13.5	1.79	-6.55	-4.60
sulfurdioxide slant column density window3 [DU]	-15.2 ± 23.8	43365	30.4	-14.9	-177	107	-30.4	5.613×10^{-2}
sulfurdioxide slant column density window3 precision [DU]	29.8 ± 11.1	43365	10.1	26.7	13.2	154	22.9	33.0
sulfurdioxide slant column density corrected win3 [DU]	2.88 ± 23.56	43365	30.2	3.22	-165	122	-12.1	18.1
background so2 slant column offset window3 [DU]	18.1 ± 4.7	43365	6.71	18.0	-3.93	31.3	14.9	21.6
sulfurdioxide slant column cobra flag [1]	1.54 ± 0.83	43365	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.393 \pm 11.414) \times 10^{-3}$	43365	7.108×10^{-3}	3.903×10^{-3}	5.702×10^{-4}	0.173	1.645×10^{-3}	8.753×10^{-3}
fitted radiance shift [nm]	$(-3.602 \pm 22.901) \times 10^{-4}$	43365	2.403×10^{-3}	-3.288×10^{-4}	-2.340×10^{-2}	1.752×10^{-2}	-1.544×10^{-3}	8.589×10^{-4}
fitted radiance squeeze [1]	$(-9.074 \pm 25.417) \times 10^{-5}$	43365	3.181×10^{-4}	-8.312×10^{-5}	-1.883×10^{-3}	1.548×10^{-3}	-2.460×10^{-4}	7.203×10^{-5}
fitted root mean square [1]	$(2.072 \pm 0.616) \times 10^{-3}$	43365	6.100×10^{-4}	1.953×10^{-3}	3.096×10^{-4}	6.234×10^{-3}	1.680×10^{-3}	2.290×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.888 ± 0.492	43365	0.853	0.879	5.000×10^{-2}	2.41	0.443	1.30
sulfurdioxide total air mass factor polluted precision [1]	0.146 ± 0.114	43365	0.118	0.130	5.087×10^{-3}	1.22	6.801×10^{-2}	0.186
sulfurdioxide clear air mass factor polluted [1]	0.751 ± 0.377	43365	0.677	0.660	0.106	2.30	0.412	1.09
number of spectral points in retrieval [1]	73.4 ± 0.9	43365	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

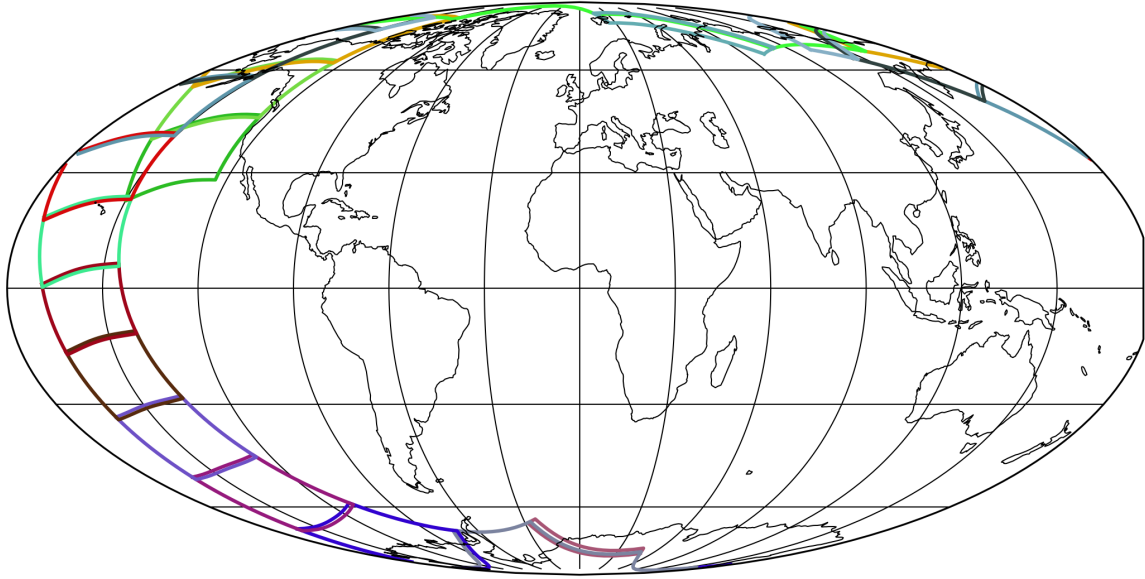


Figure 1: Outline of the granules.

4 Input data monitoring

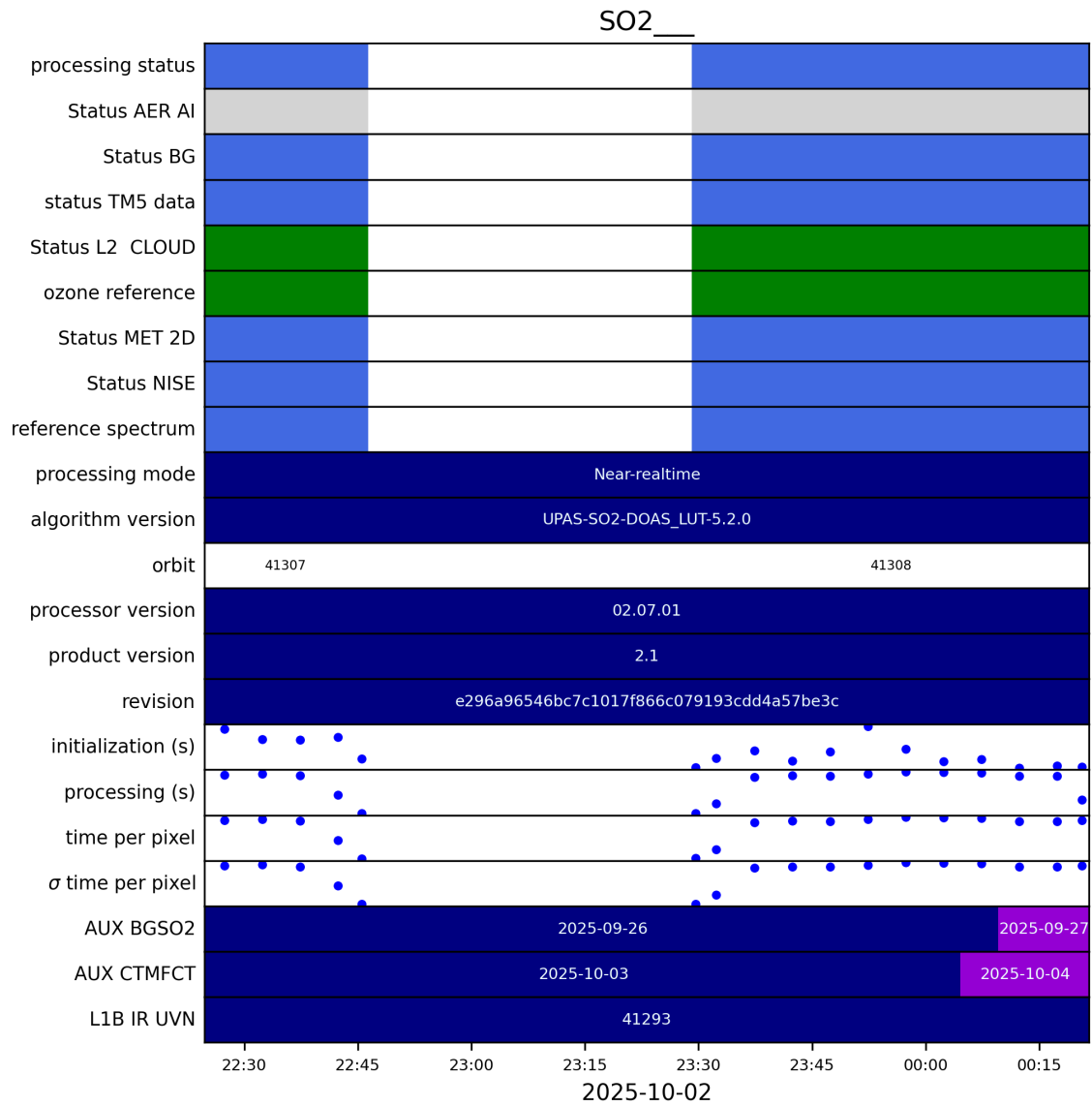


Figure 2: Input data per granule

5 Warnings and errors

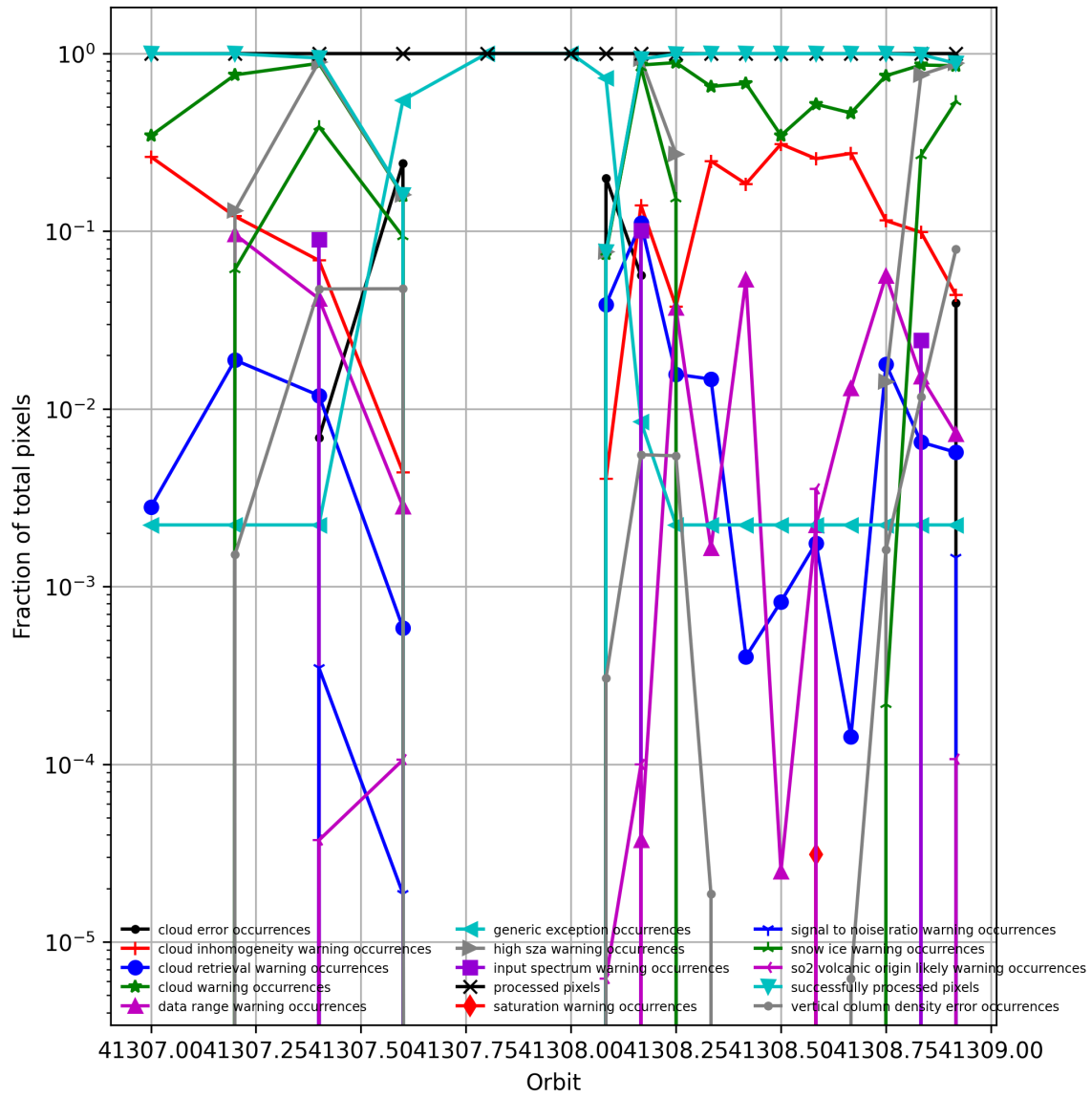


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

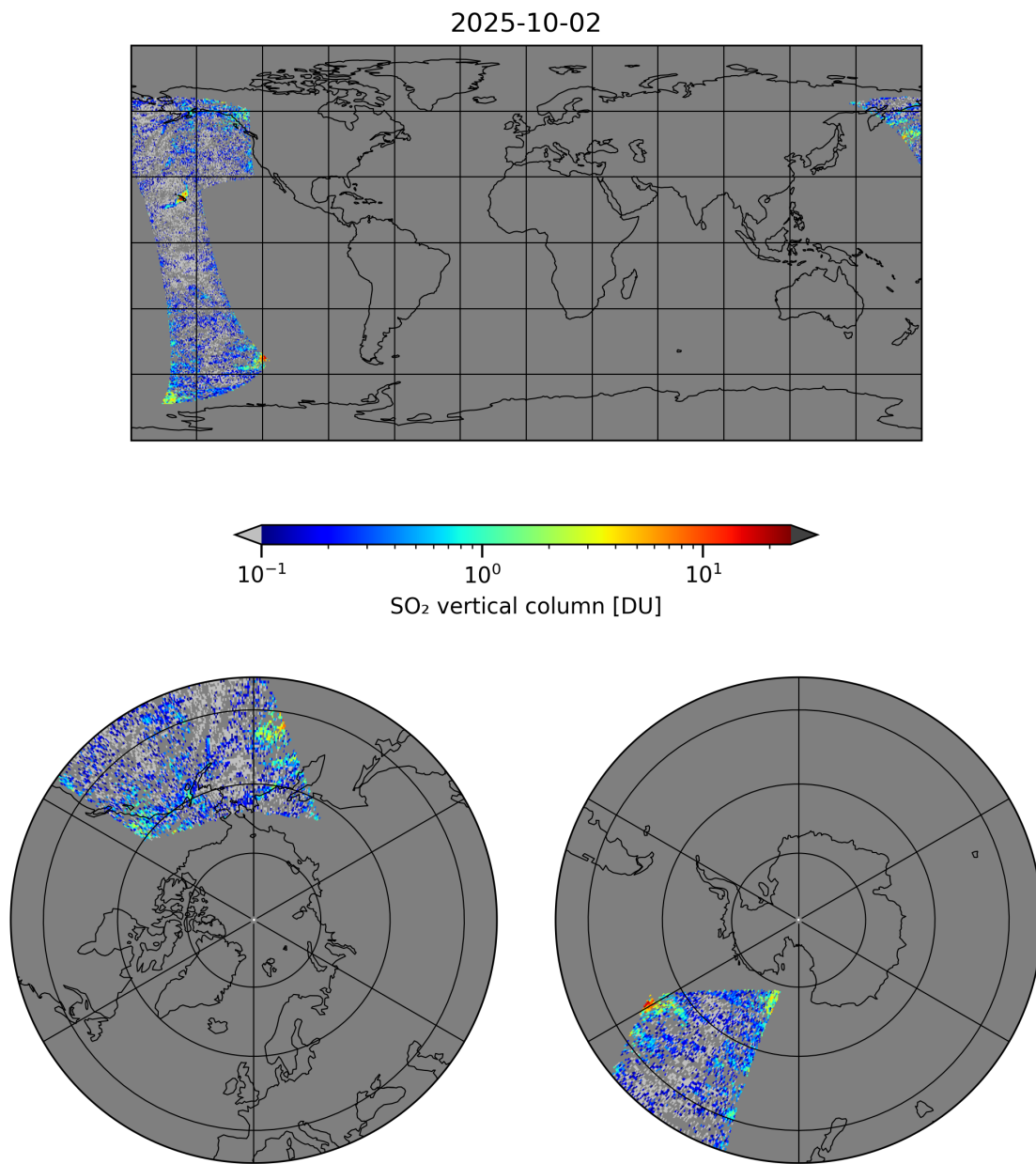


Figure 4: Map of “SO₂ vertical column” for 2025-10-02 to 2025-10-03

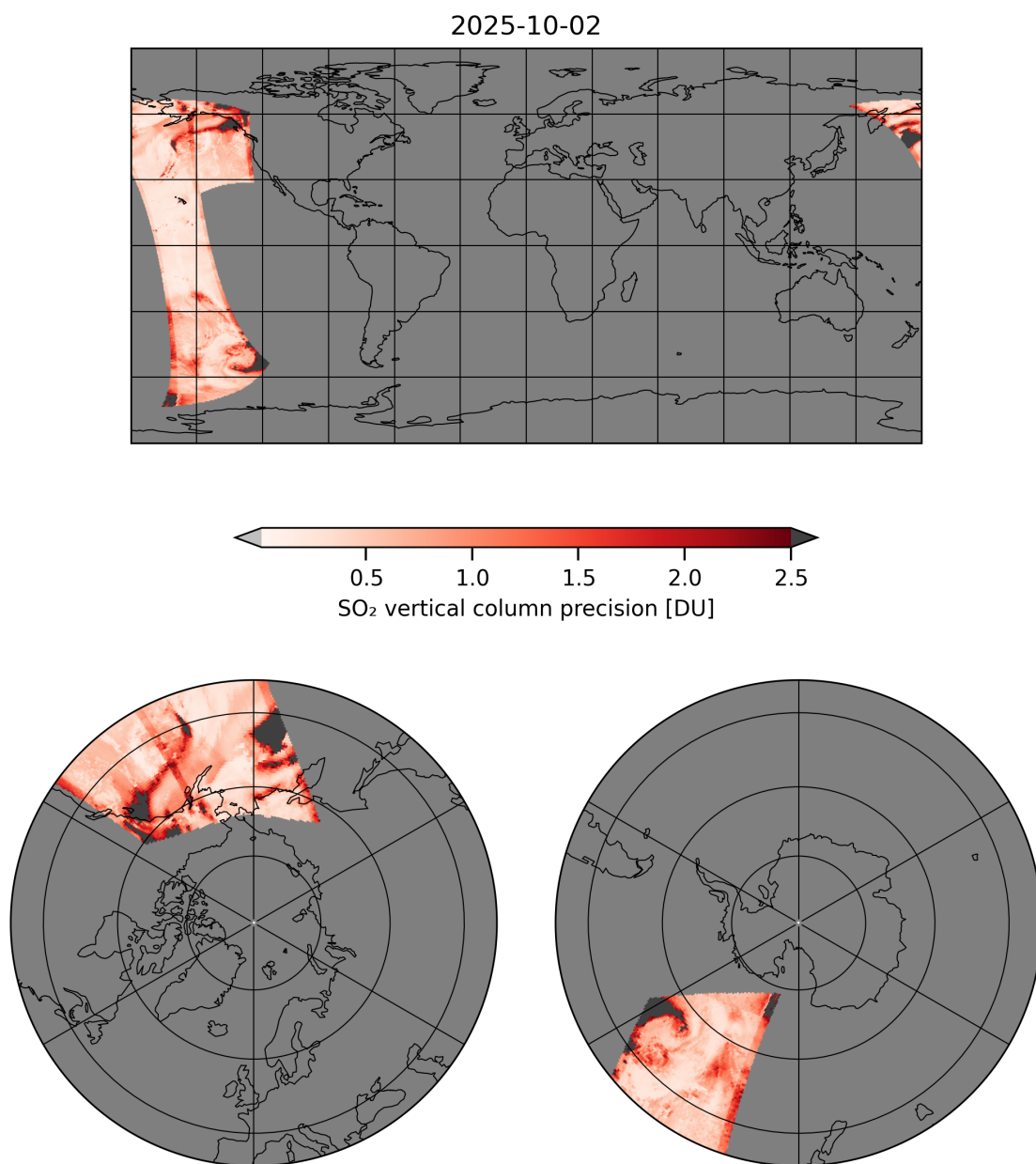


Figure 5: Map of “SO₂ vertical column precision” for 2025-10-02 to 2025-10-03

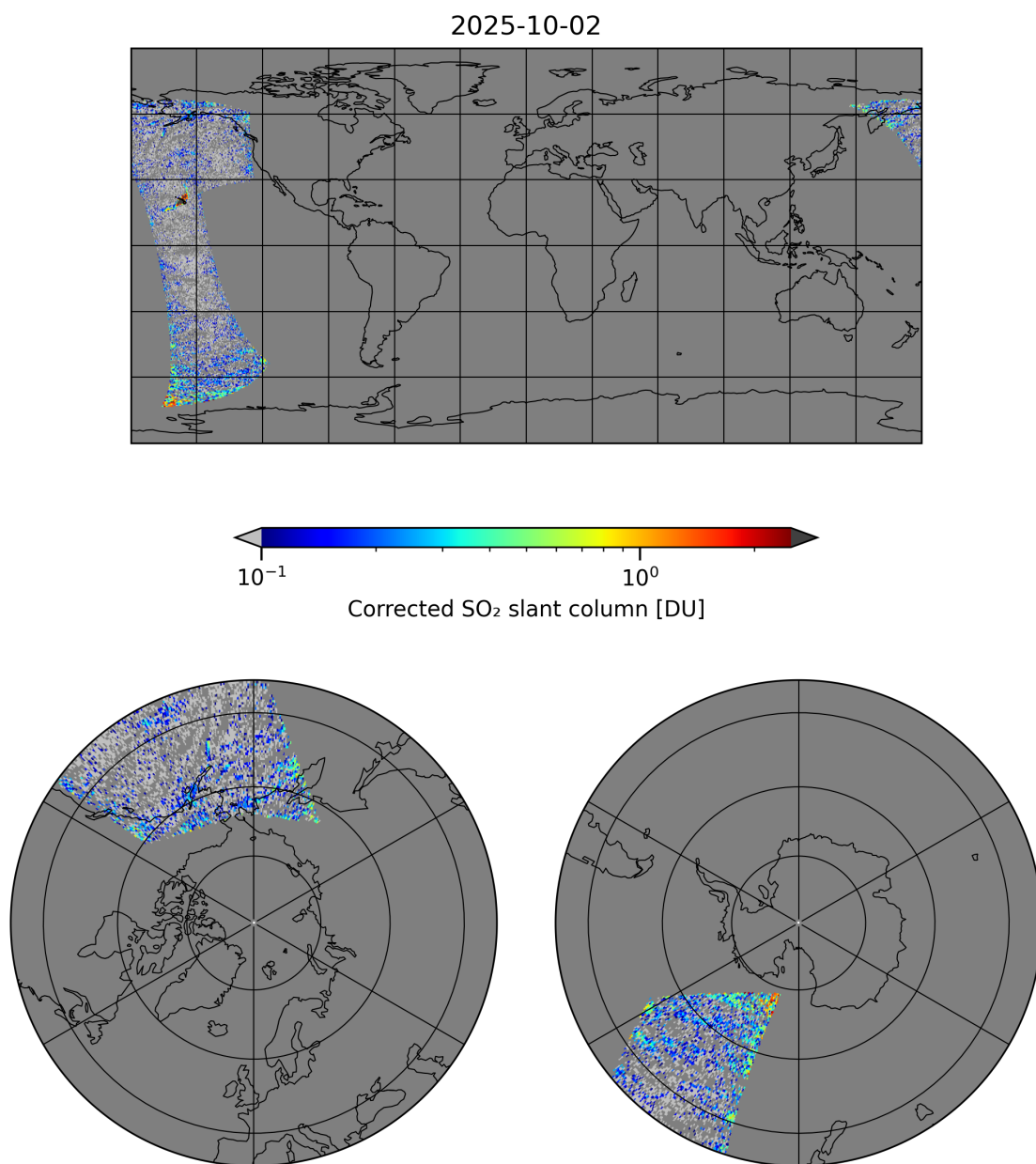


Figure 6: Map of “Corrected SO₂ slant column” for 2025-10-02 to 2025-10-03

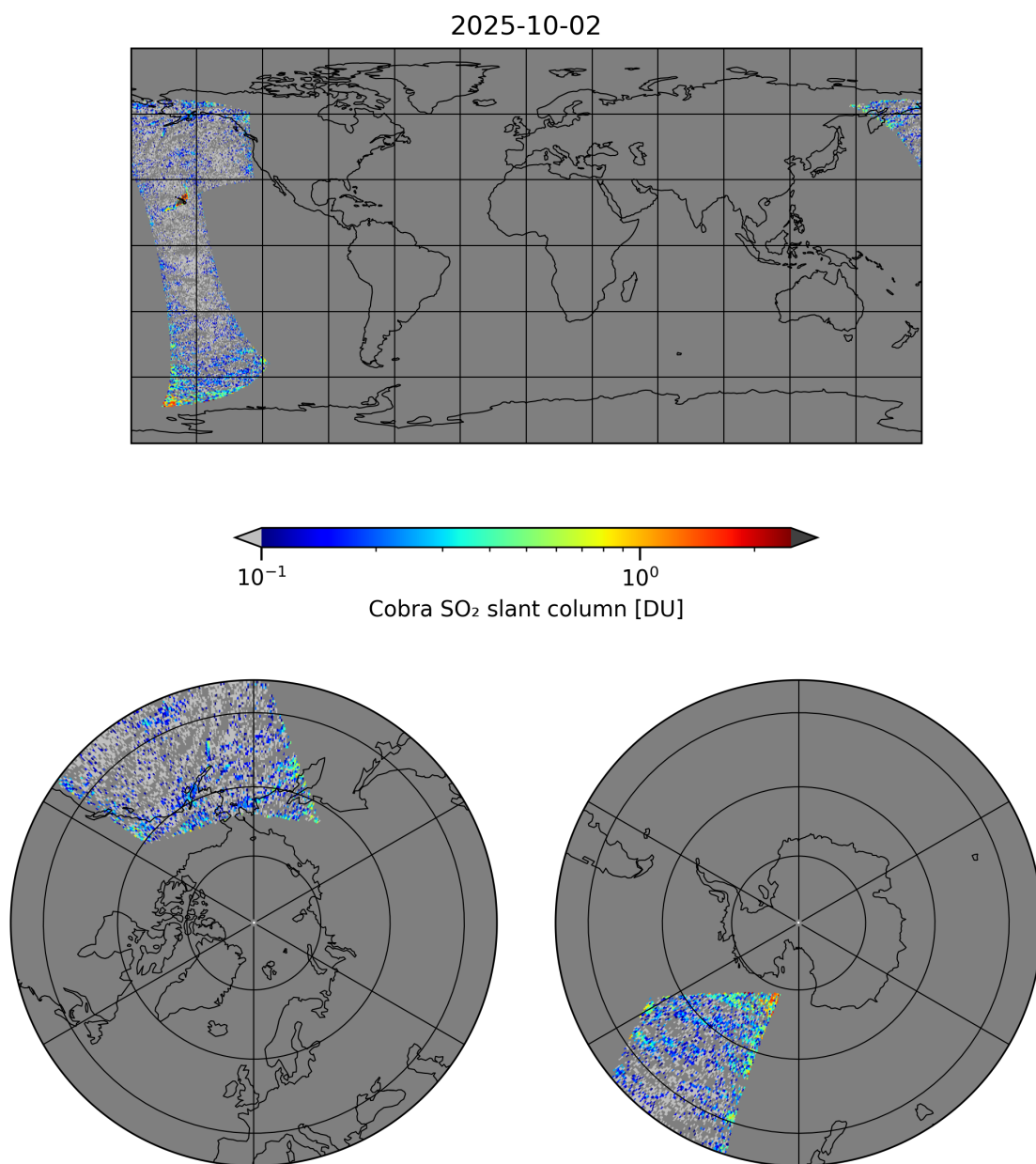


Figure 7: Map of “Cobra SO₂ slant column” for 2025-10-02 to 2025-10-03

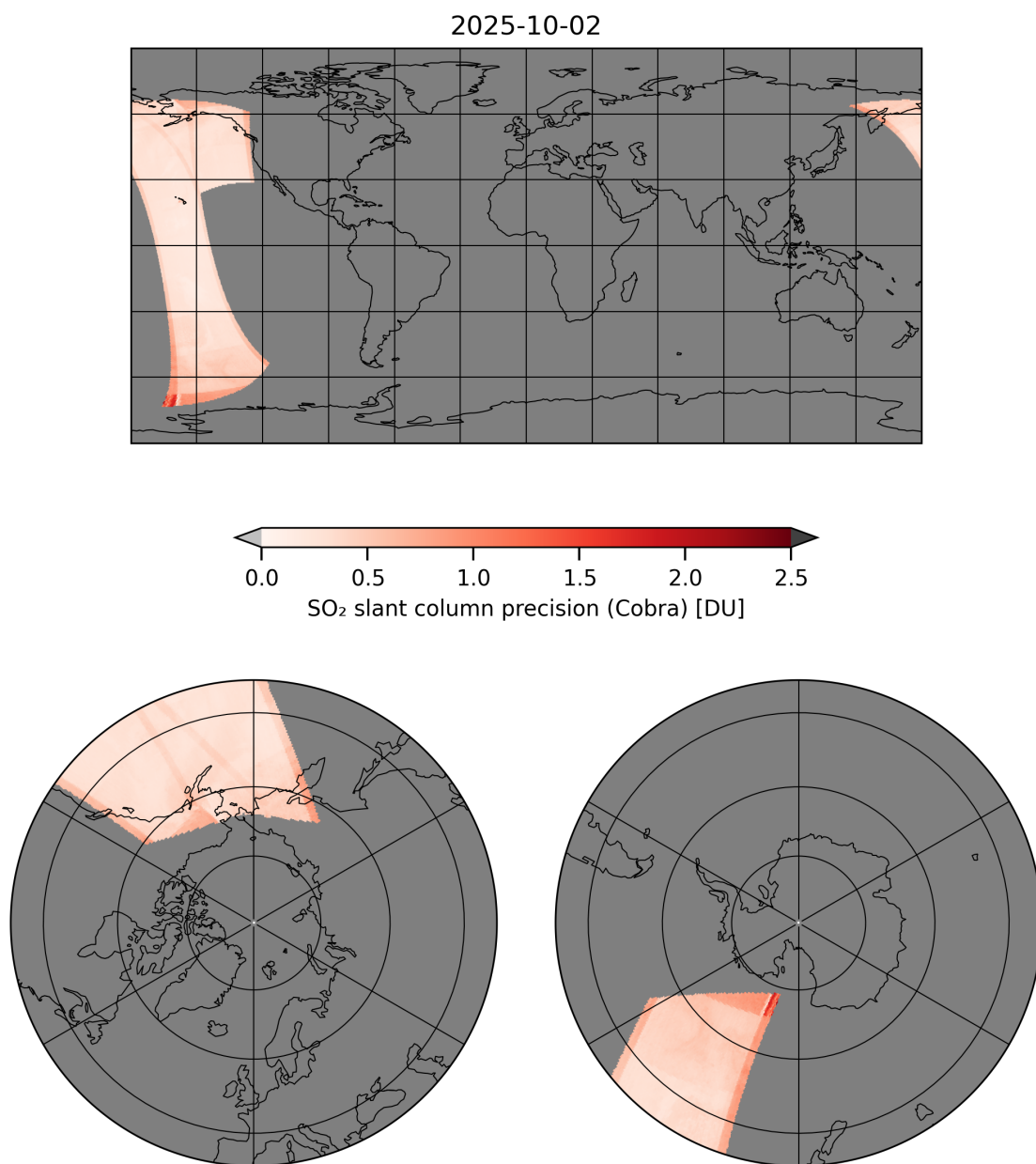


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-10-02 to 2025-10-03

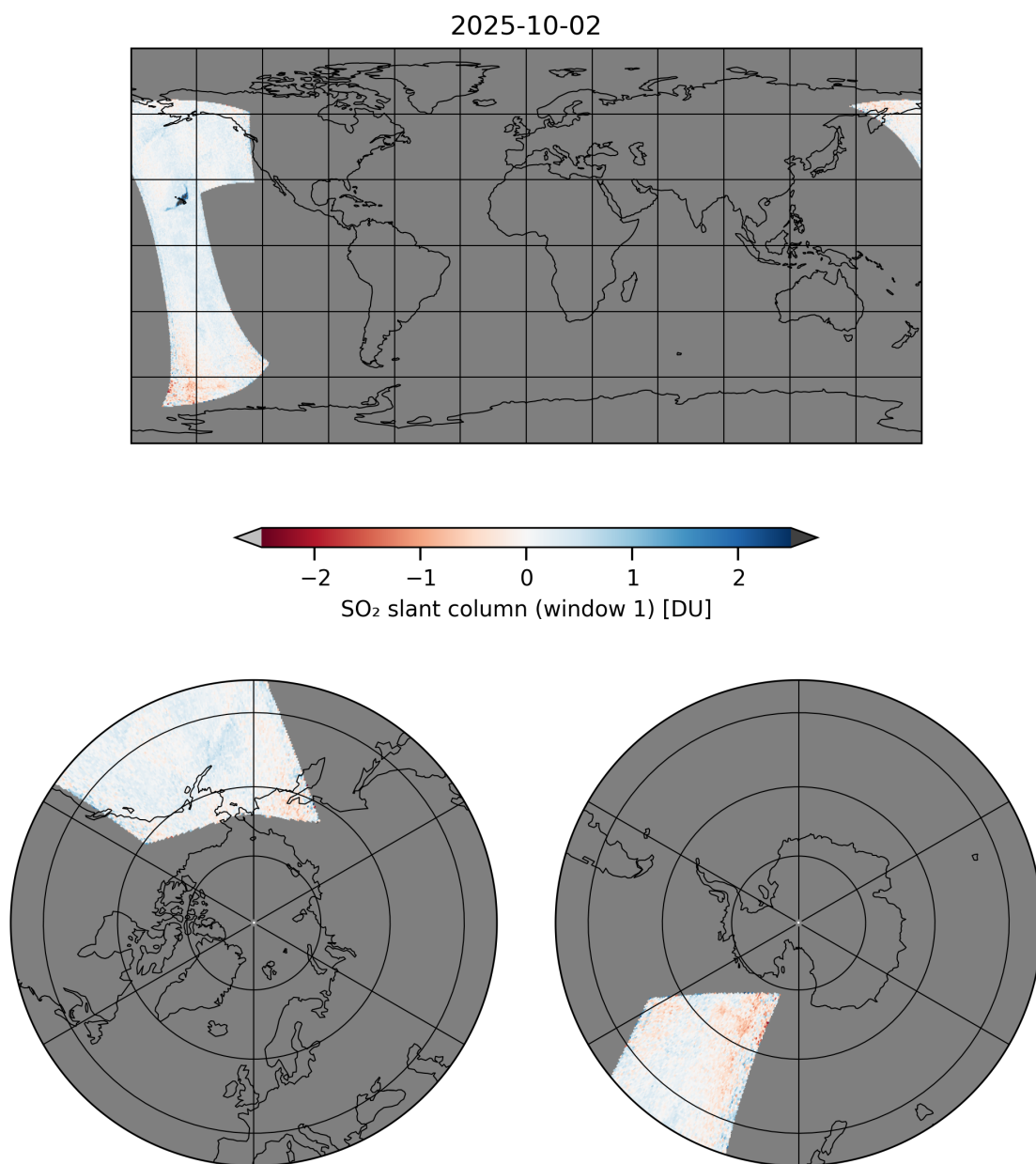


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-10-02 to 2025-10-03

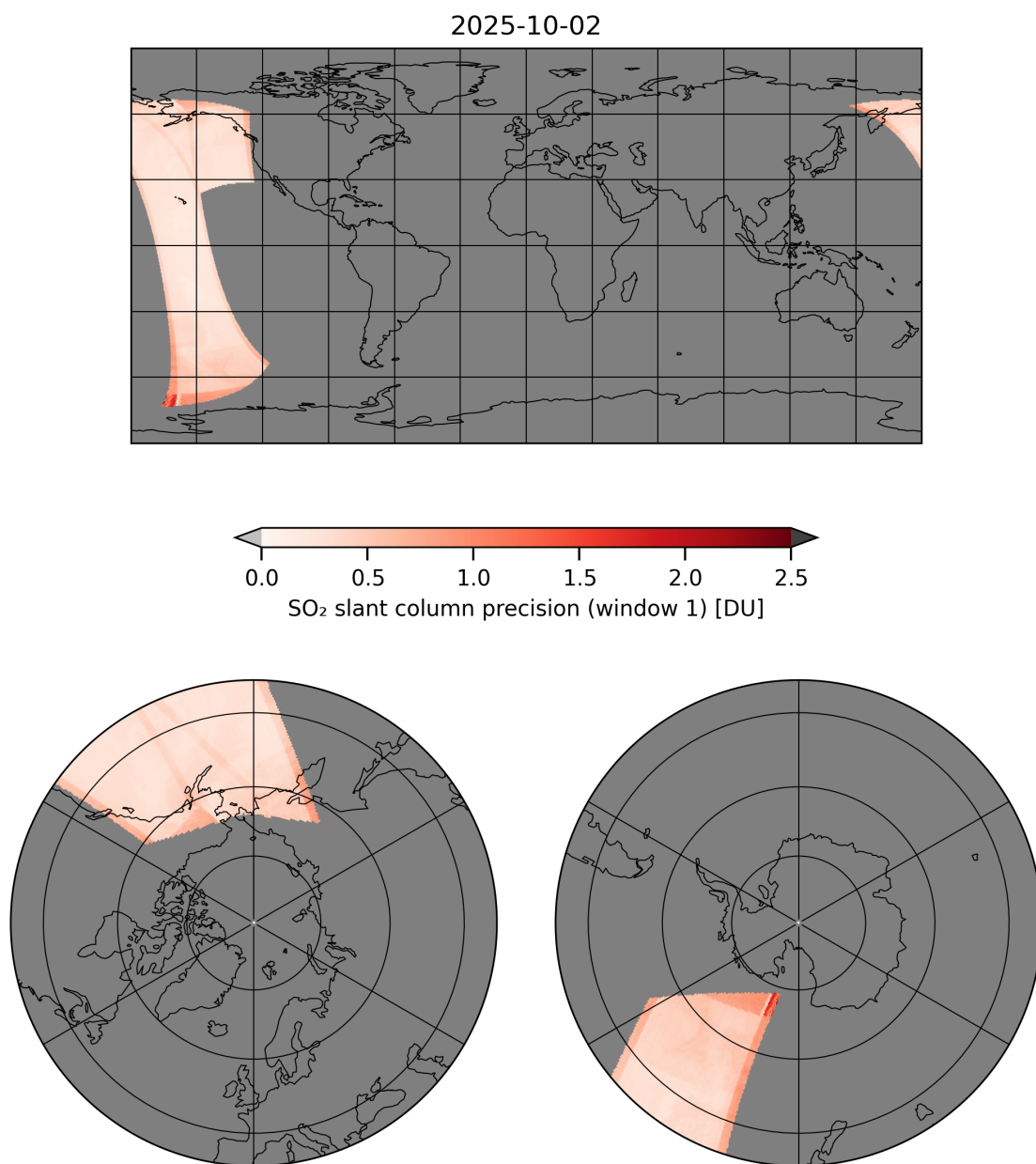


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-10-02 to 2025-10-03

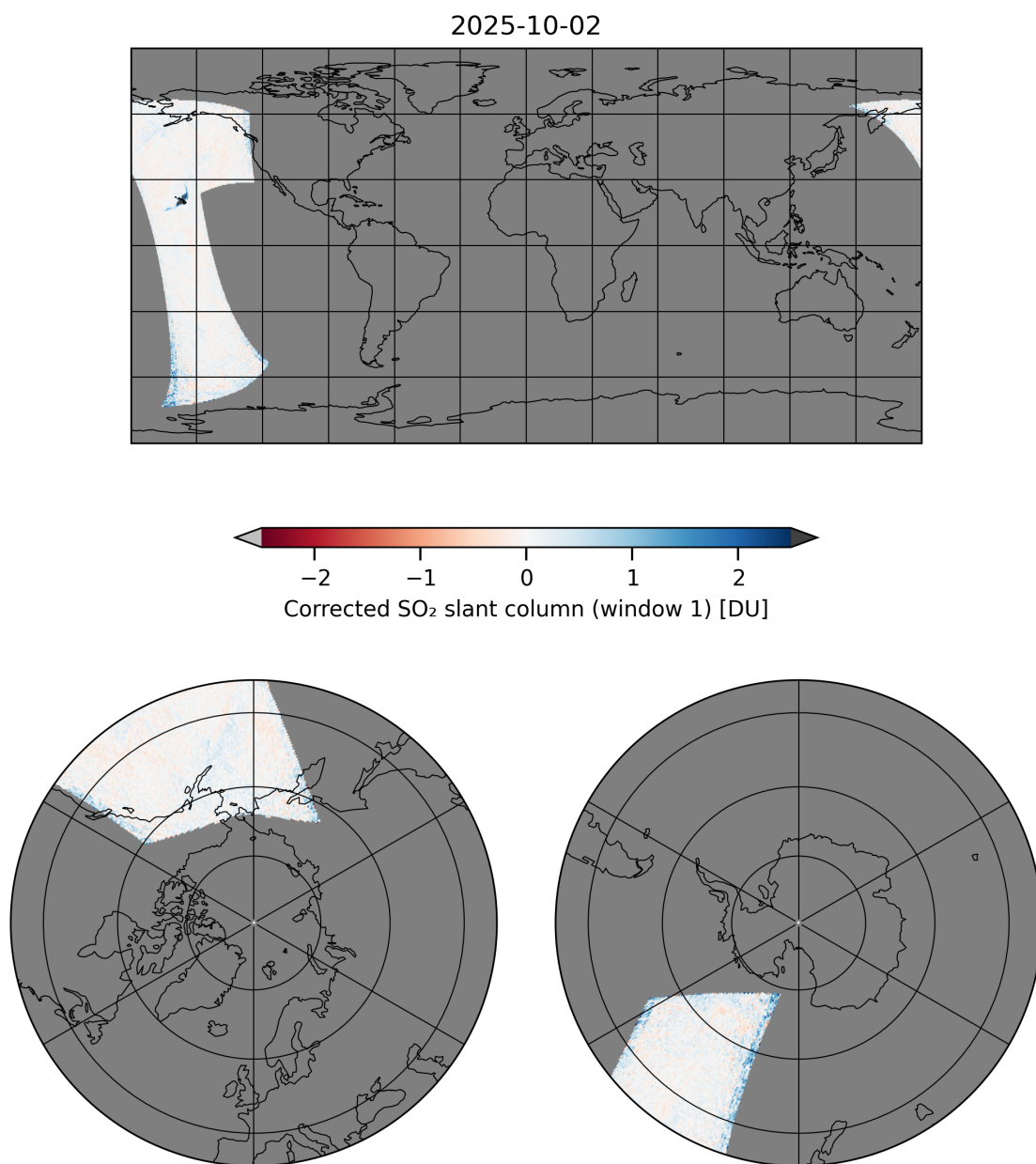


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-10-02 to 2025-10-03

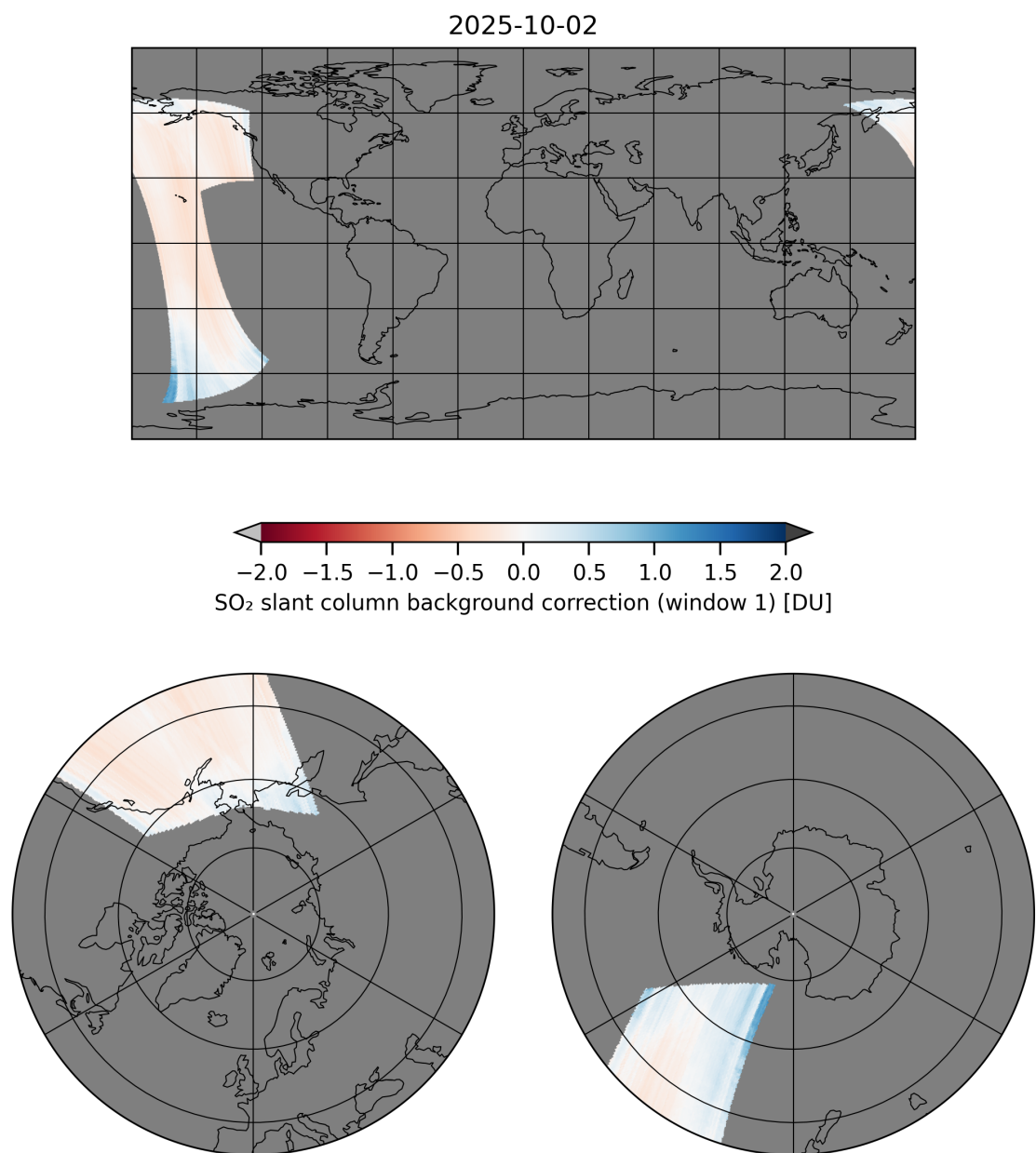


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-10-02 to 2025-10-03

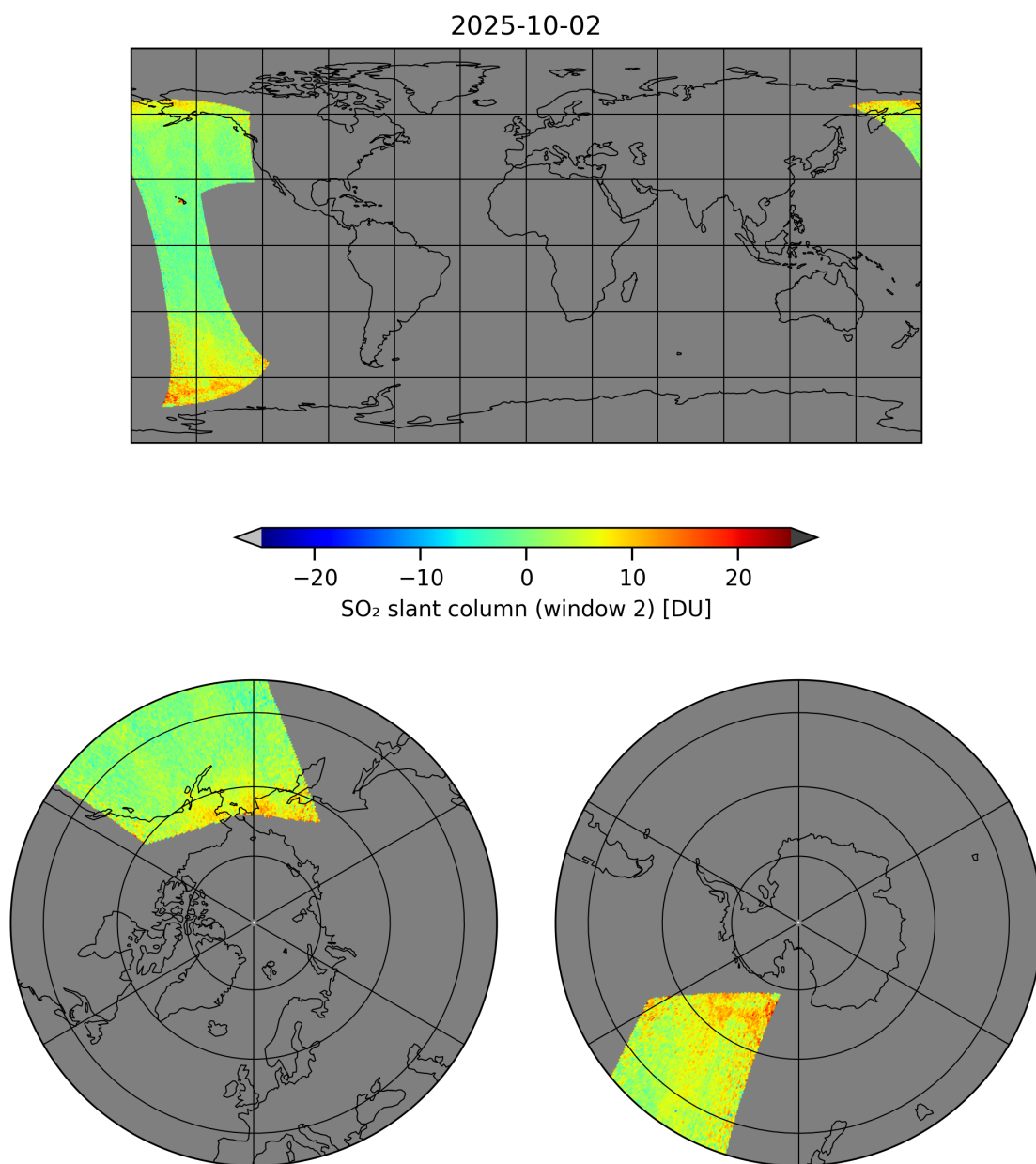


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-10-02 to 2025-10-03

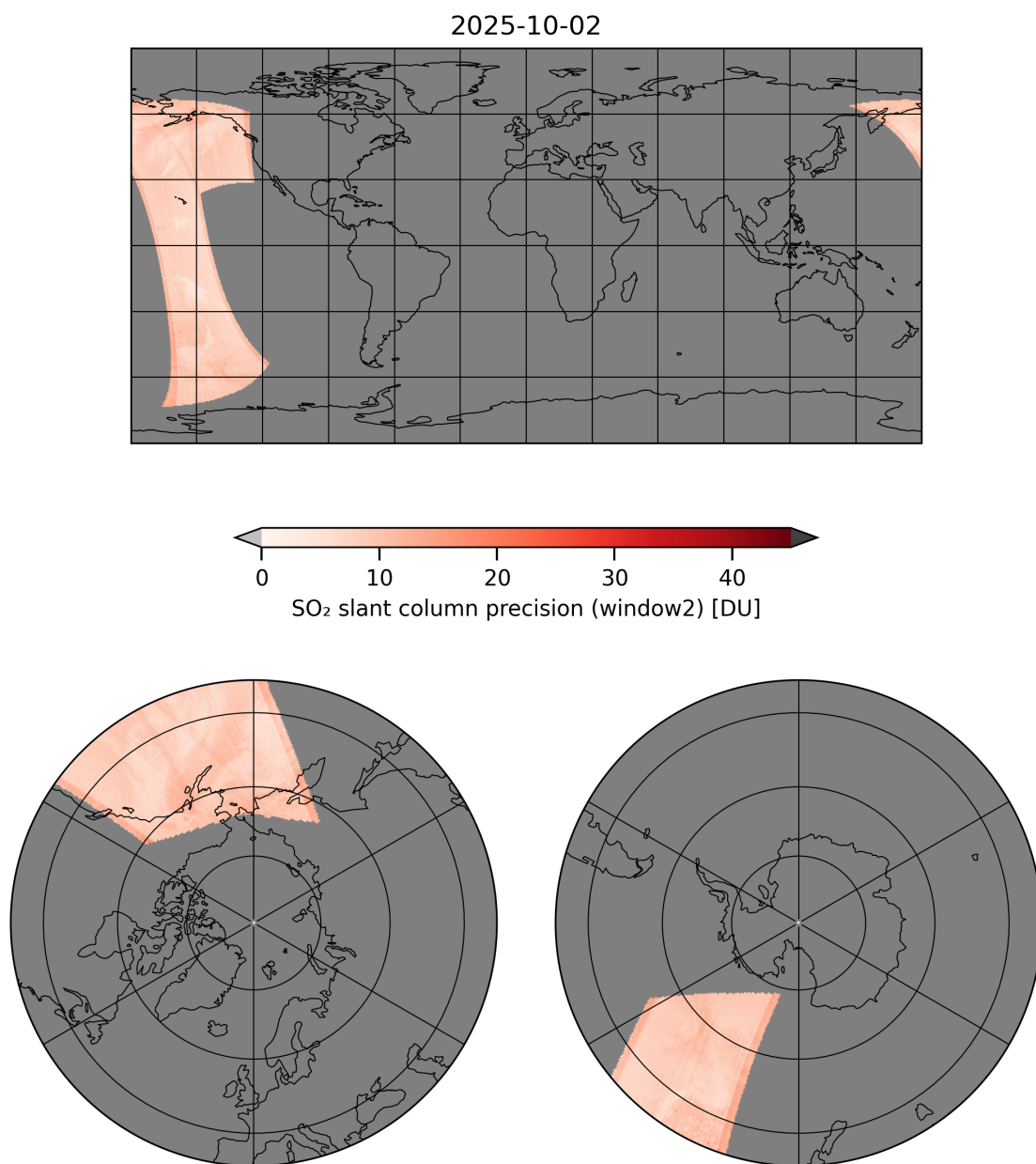


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-10-02 to 2025-10-03

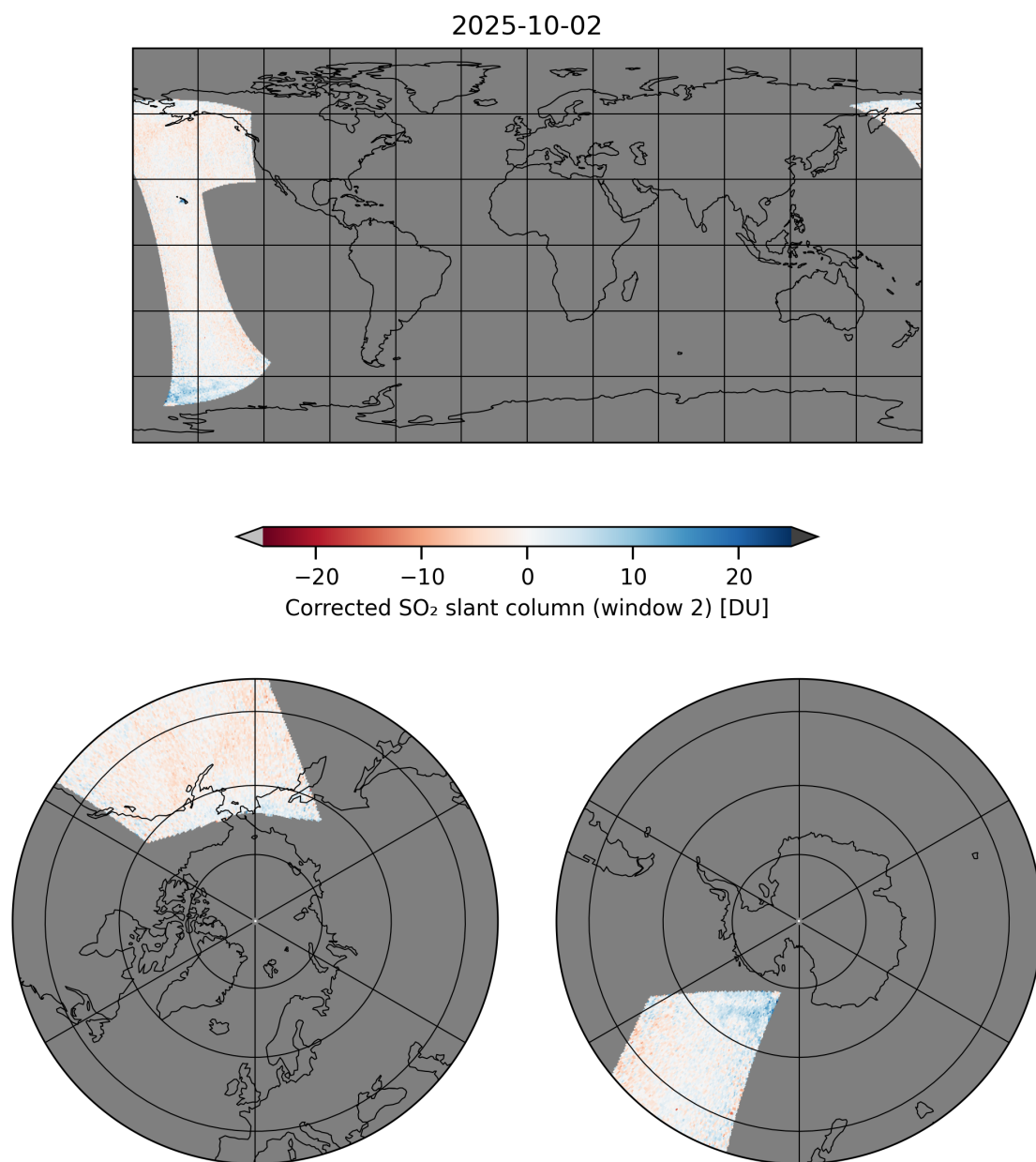


Figure 15: Map of "Corrected SO₂ slant column (window 2)" for 2025-10-02 to 2025-10-03

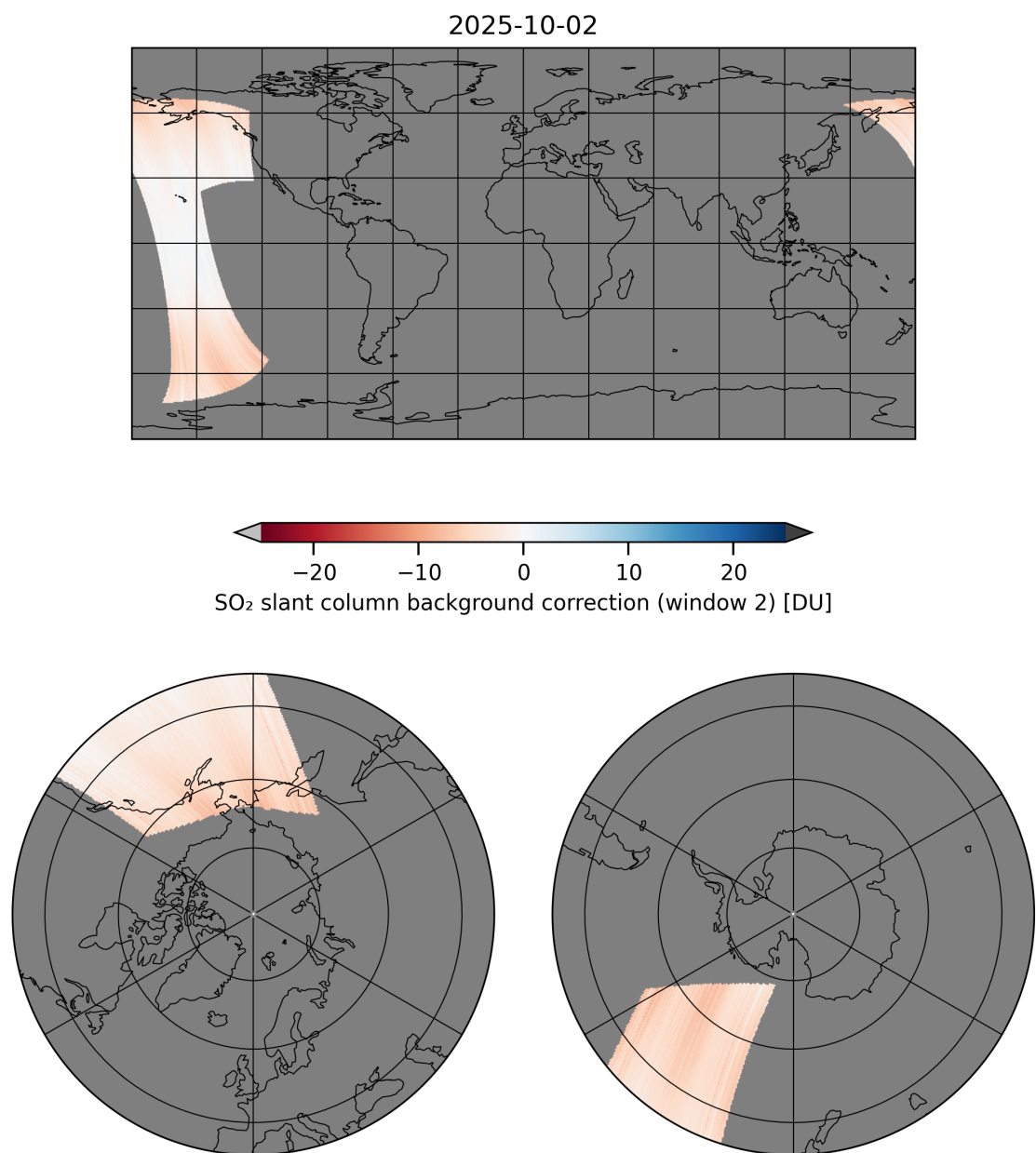


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-10-02 to 2025-10-03

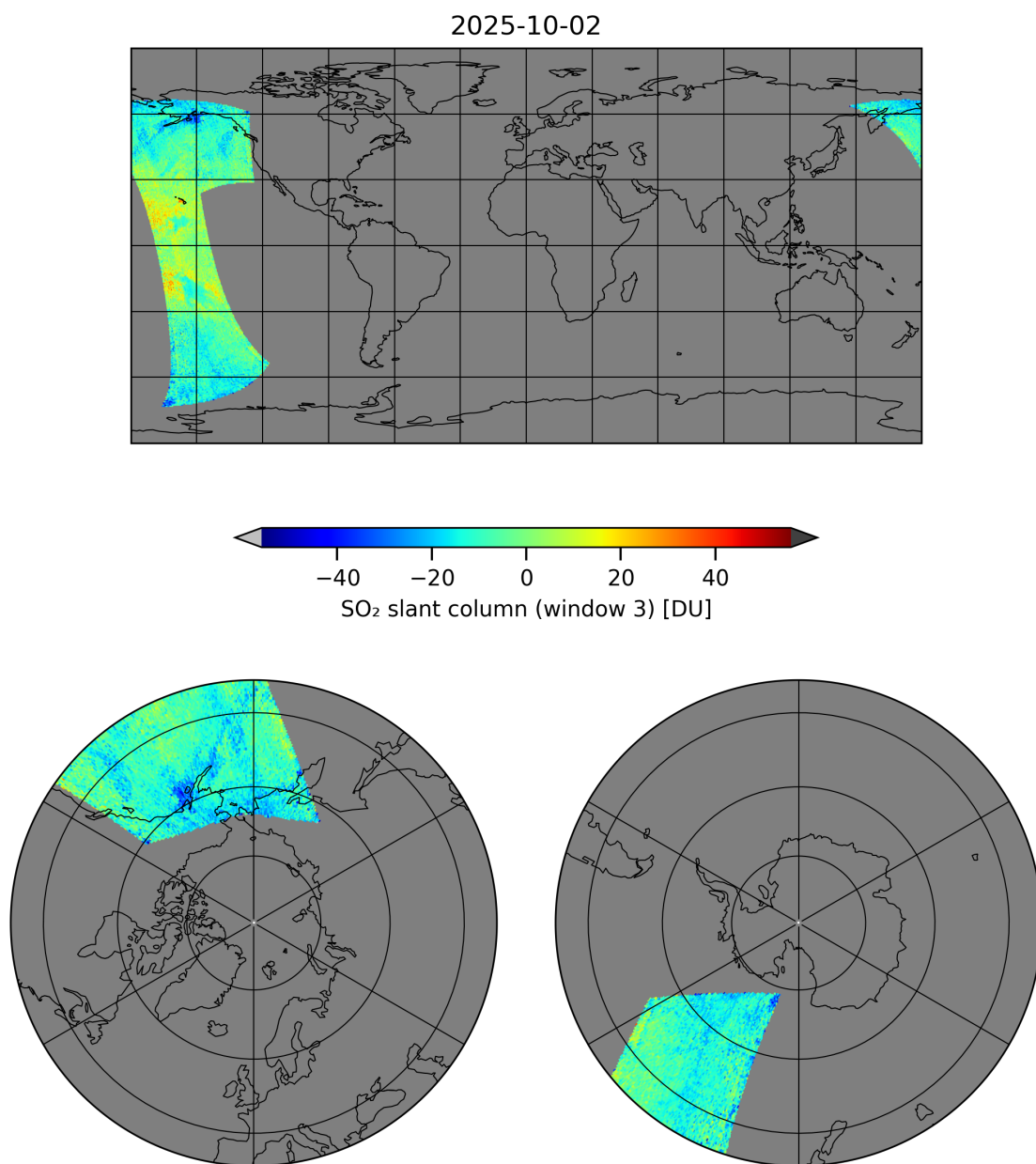


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-10-02 to 2025-10-03

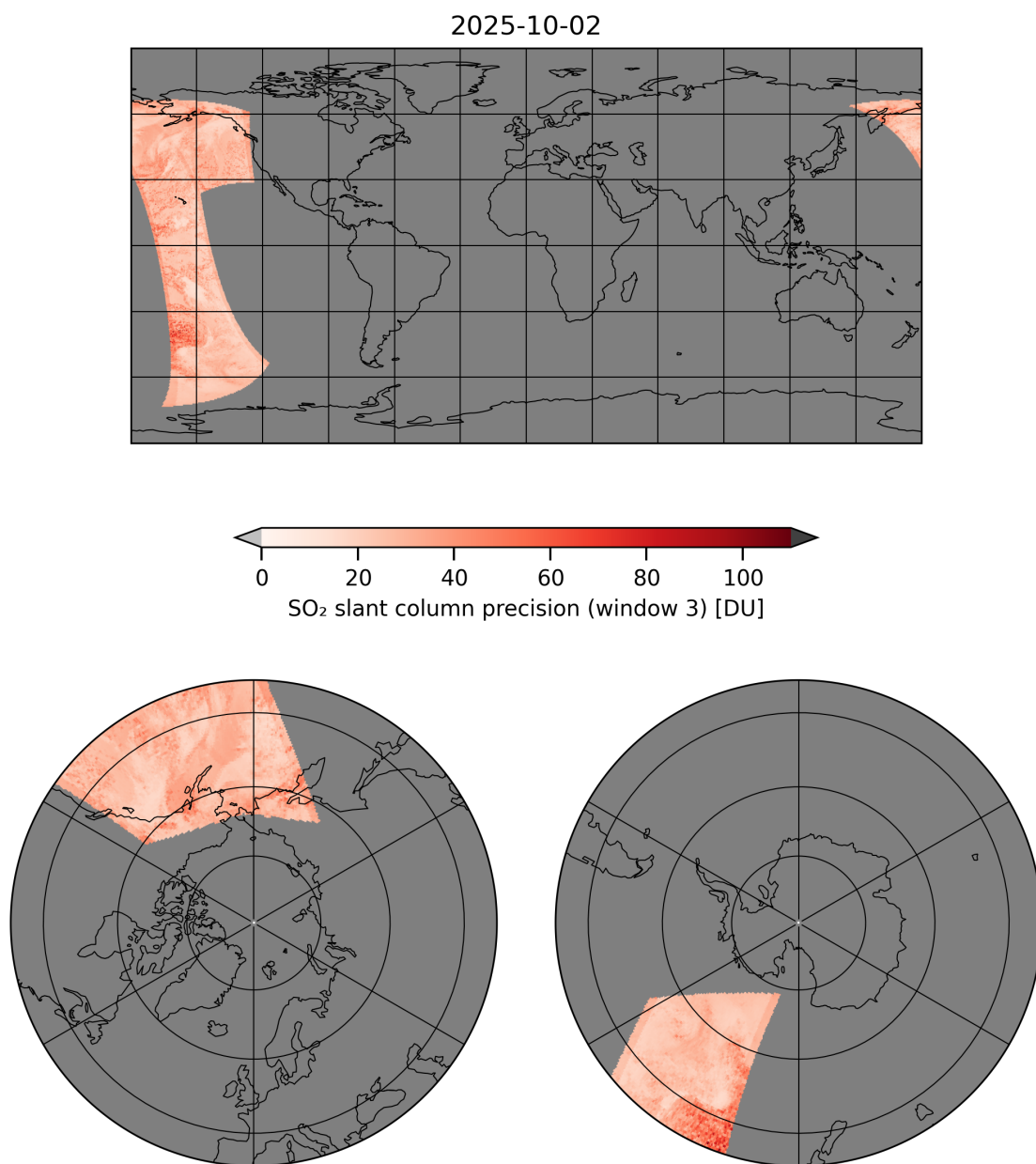


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-10-02 to 2025-10-03

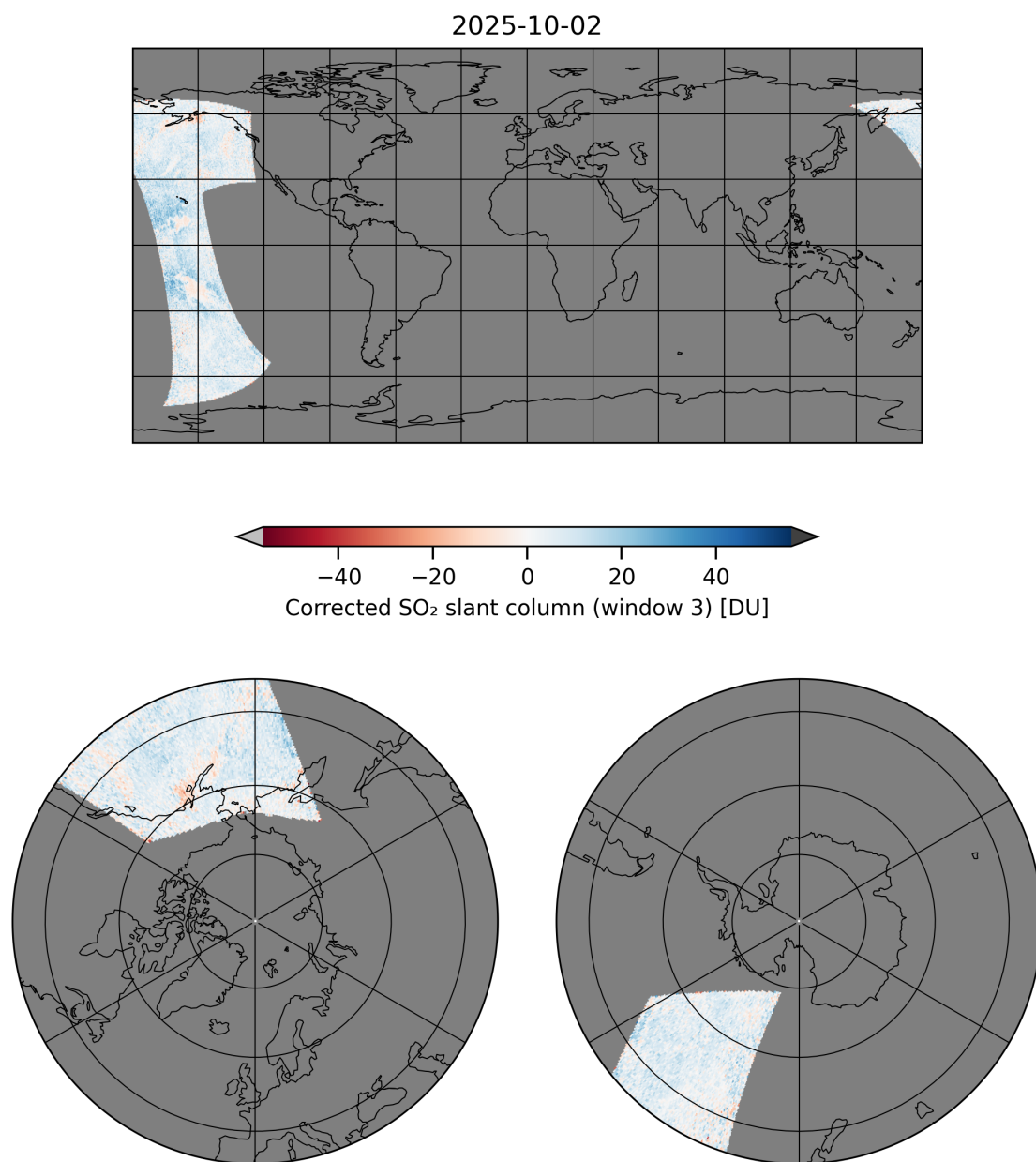


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-10-02 to 2025-10-03

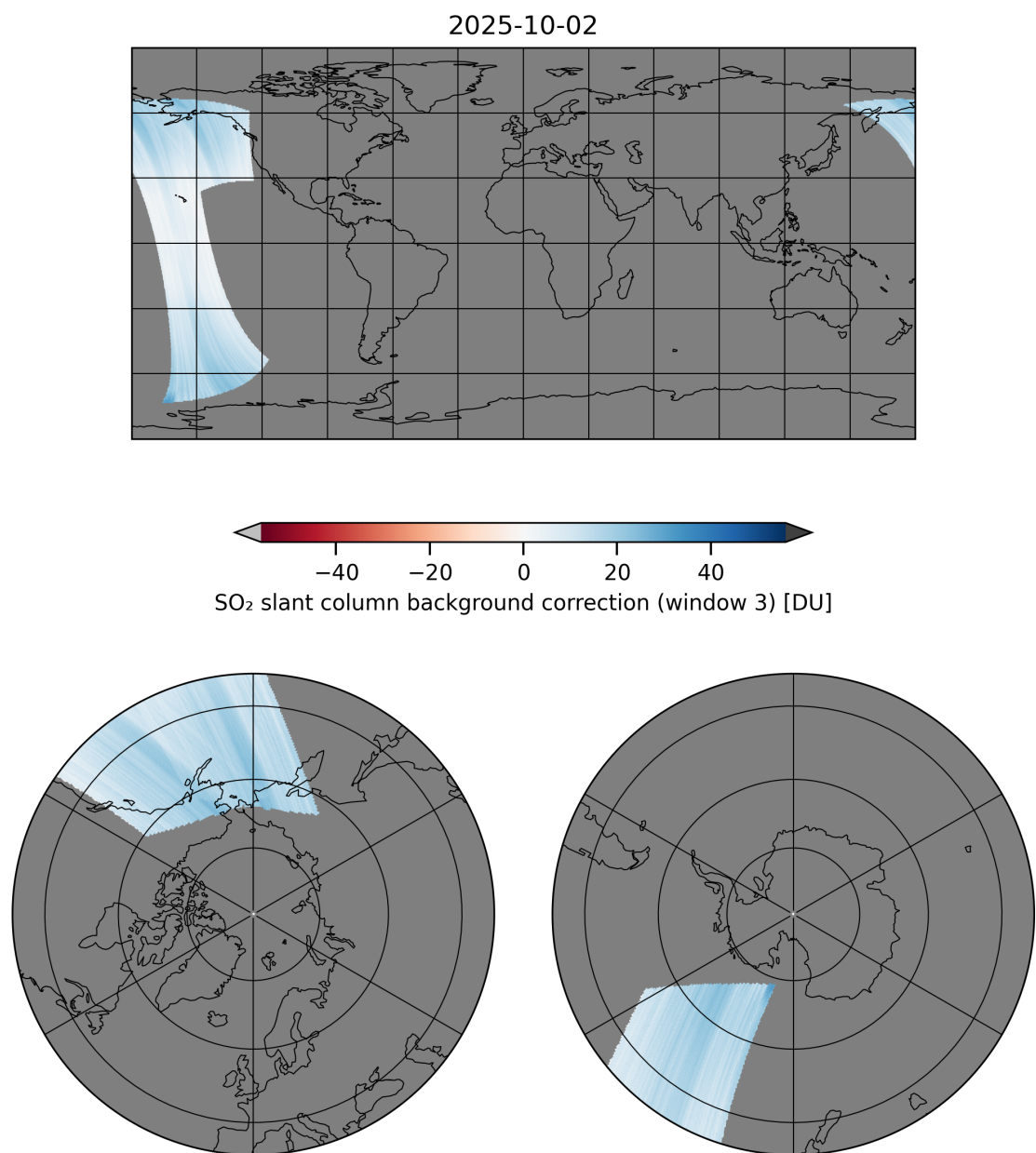


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-10-02 to 2025-10-03

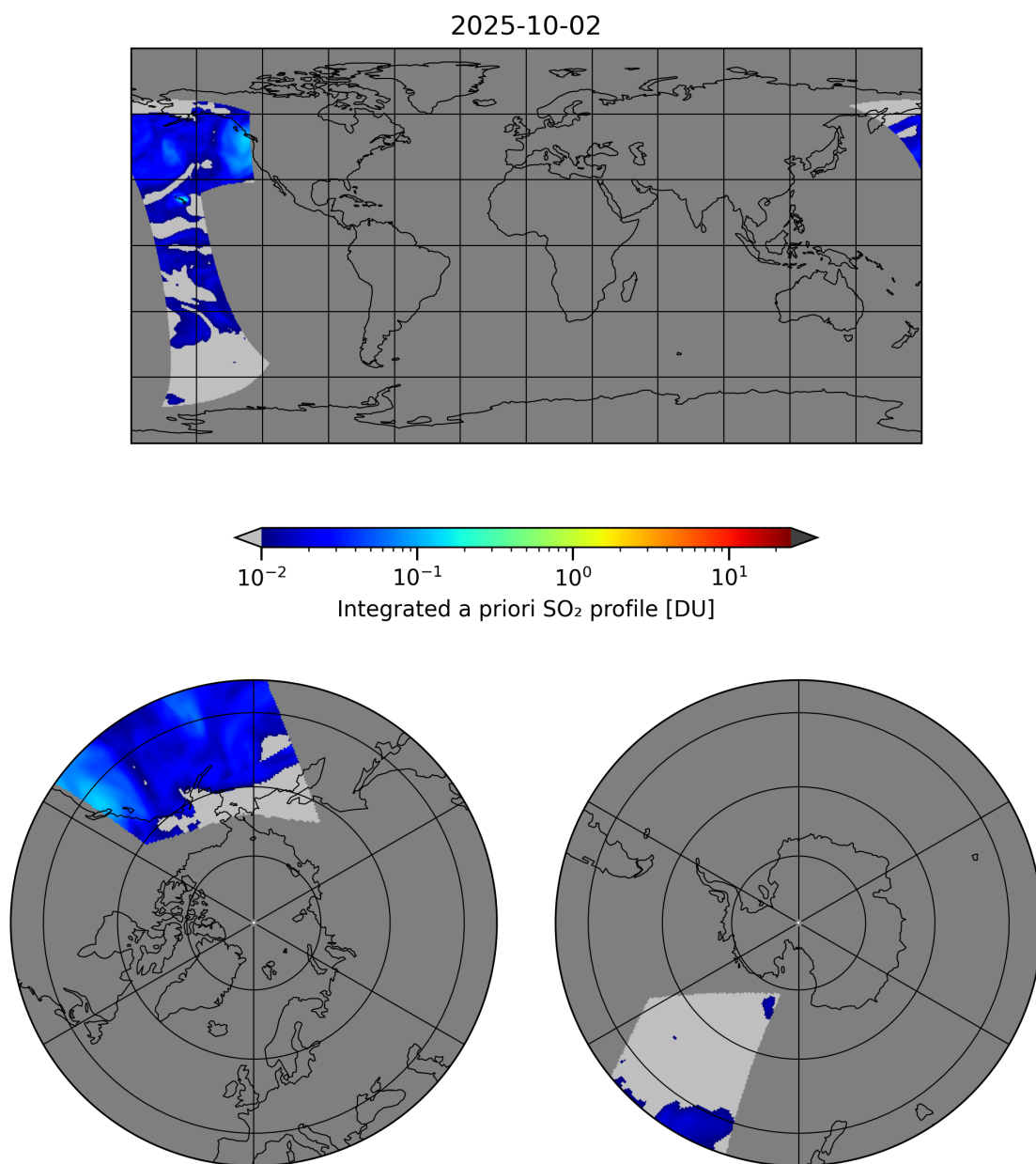


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-10-02 to 2025-10-03

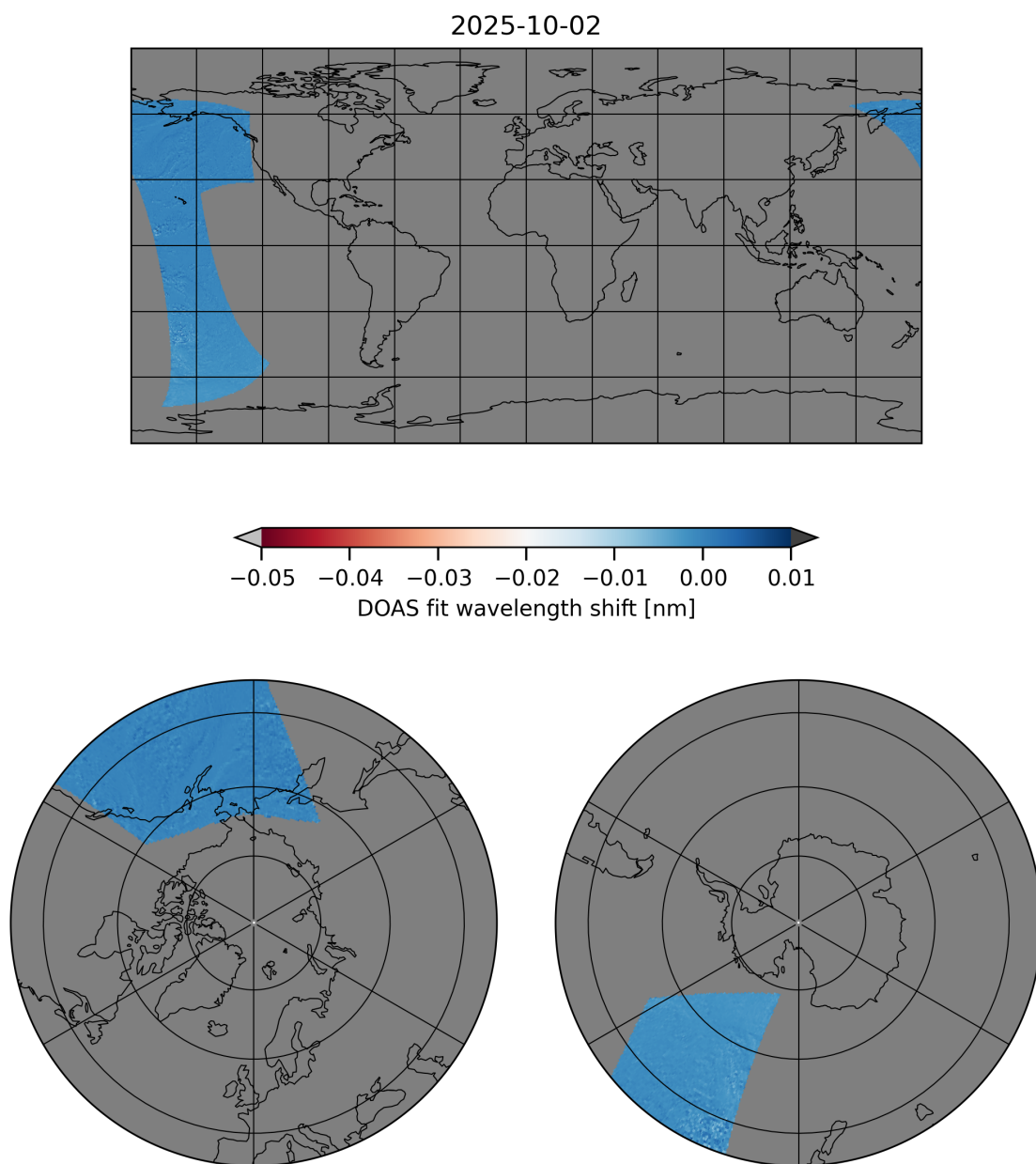


Figure 22: Map of “DOAS fit wavelength shift” for 2025-10-02 to 2025-10-03

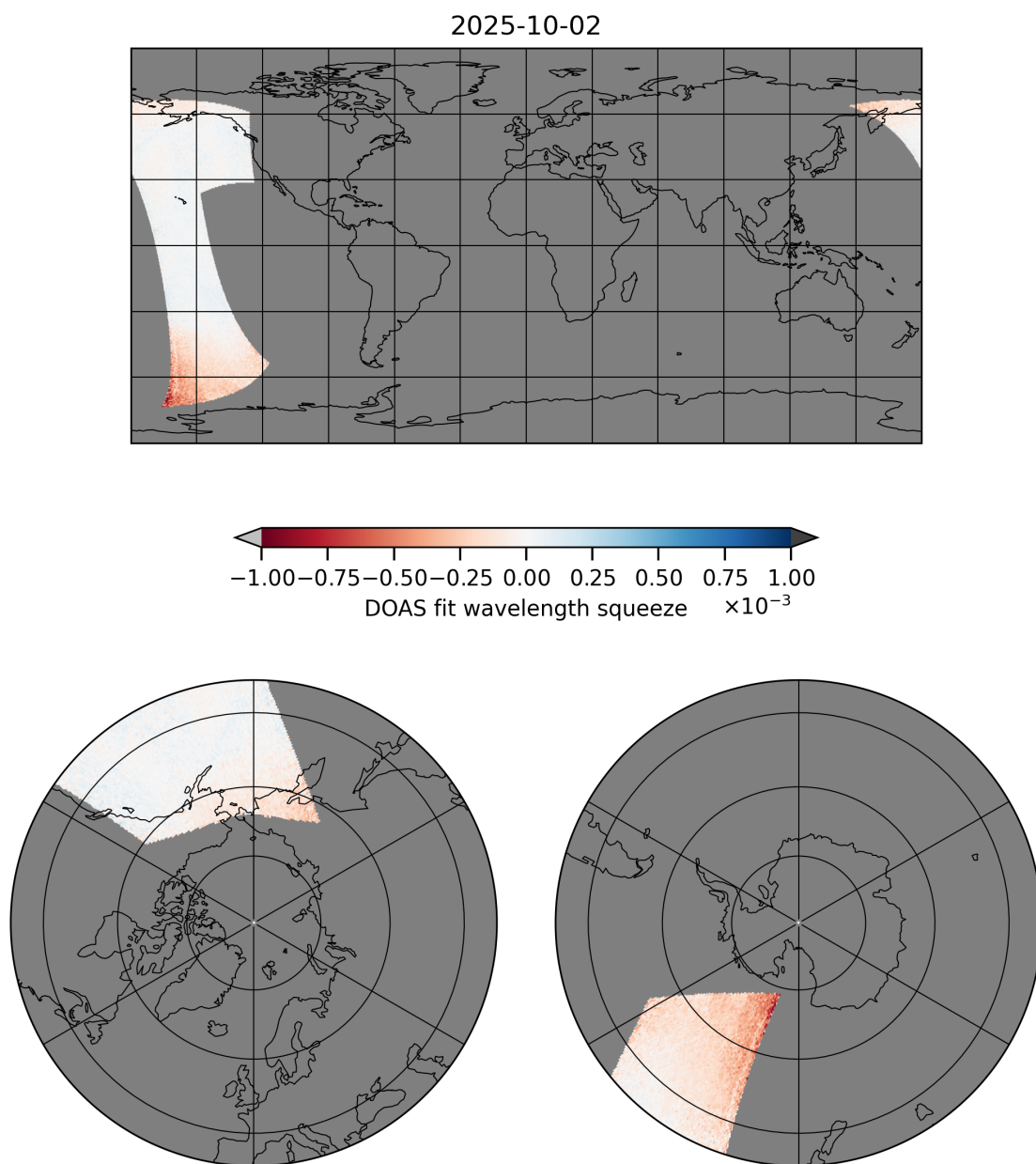


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-10-02 to 2025-10-03

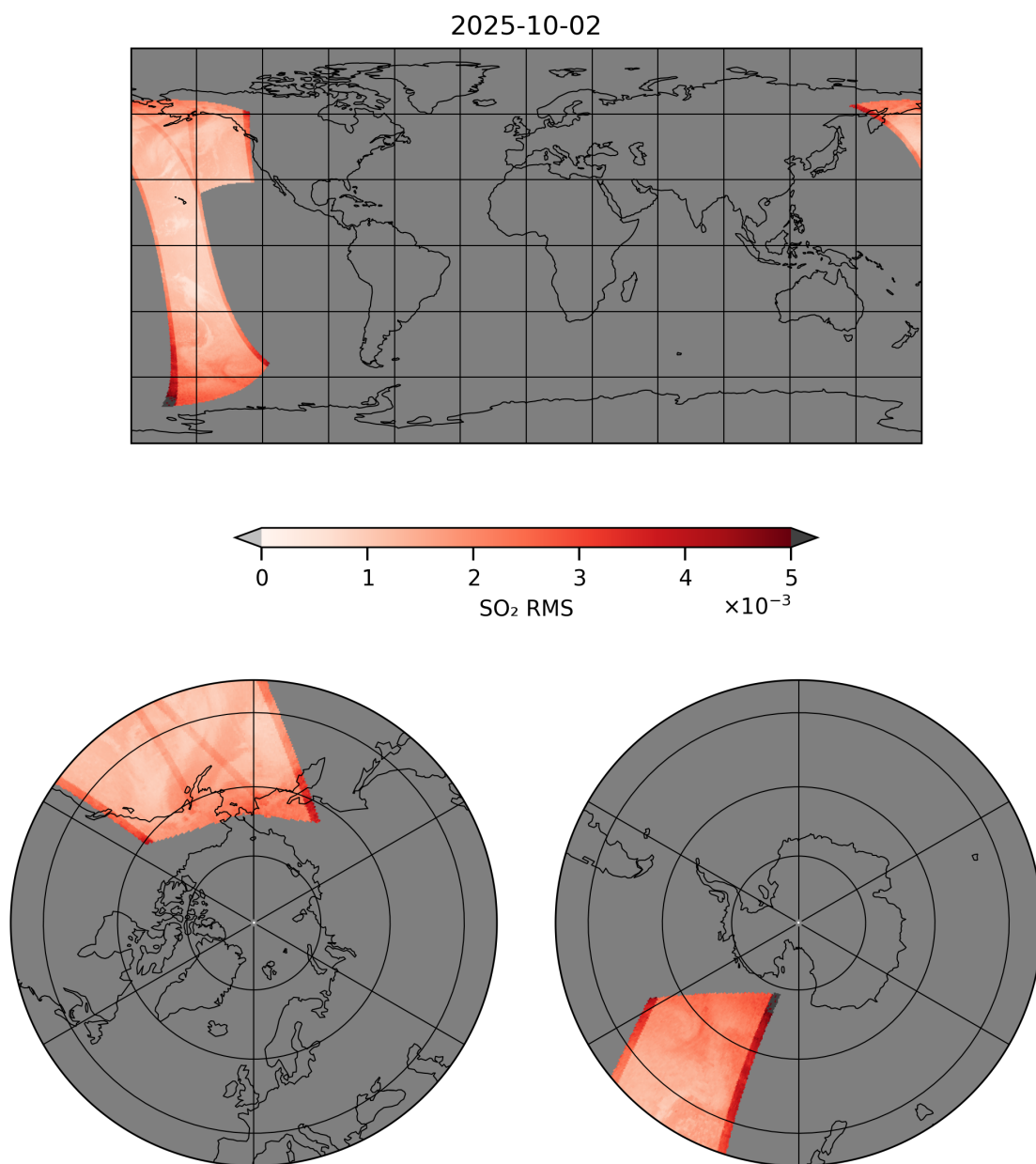


Figure 24: Map of “SO₂ RMS” for 2025-10-02 to 2025-10-03

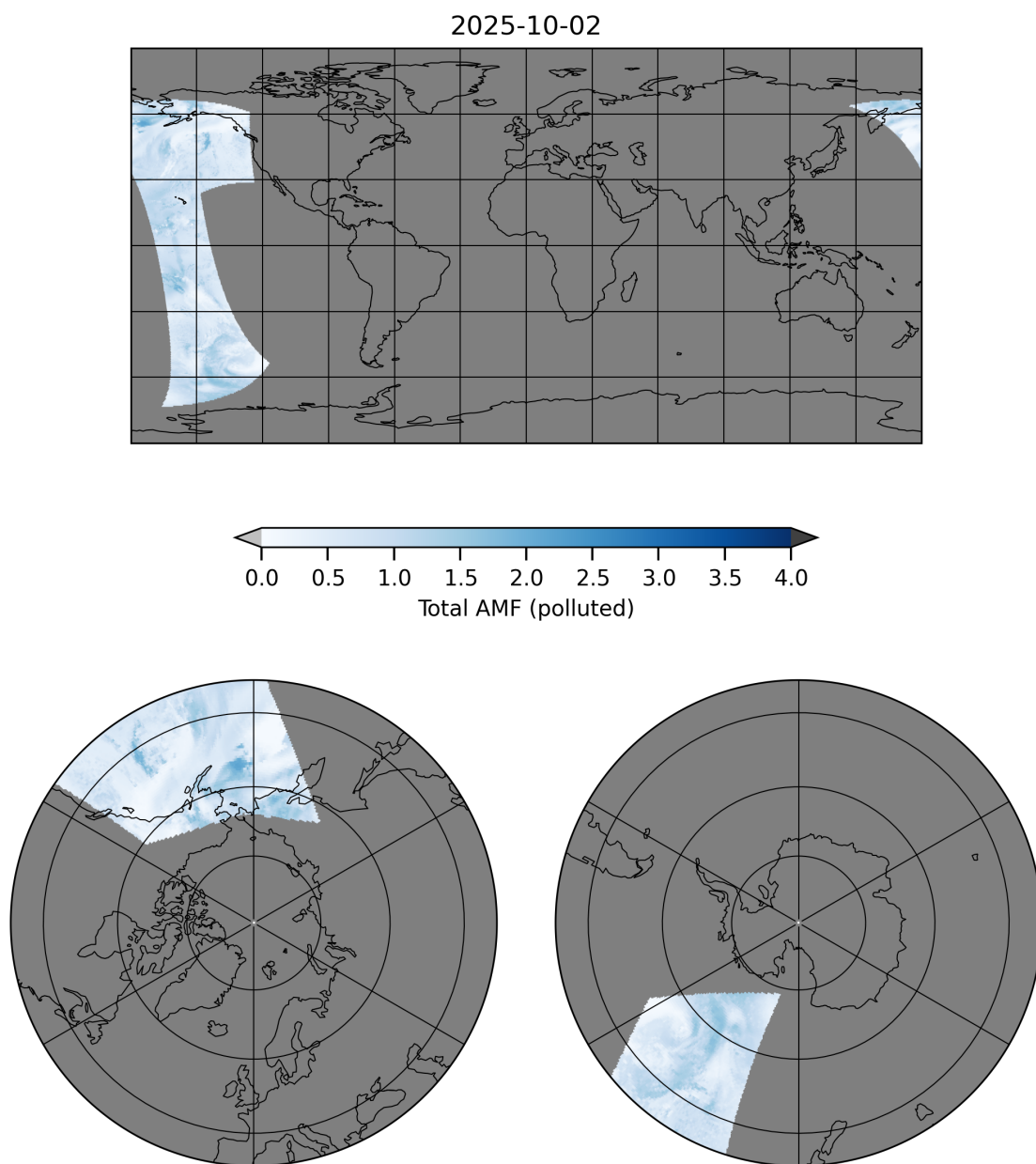


Figure 25: Map of “Total AMF (polluted)” for 2025-10-02 to 2025-10-03

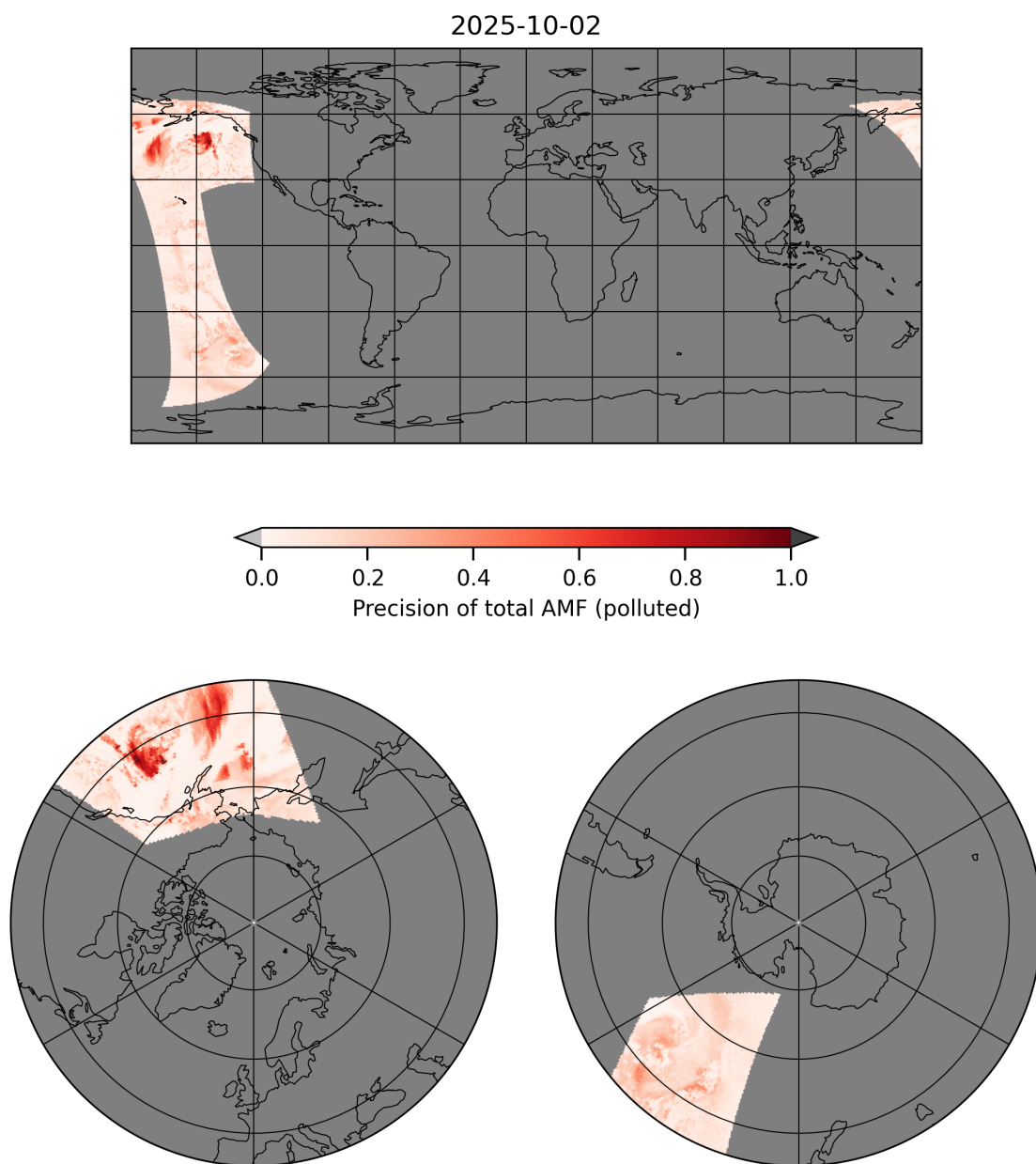


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-10-02 to 2025-10-03

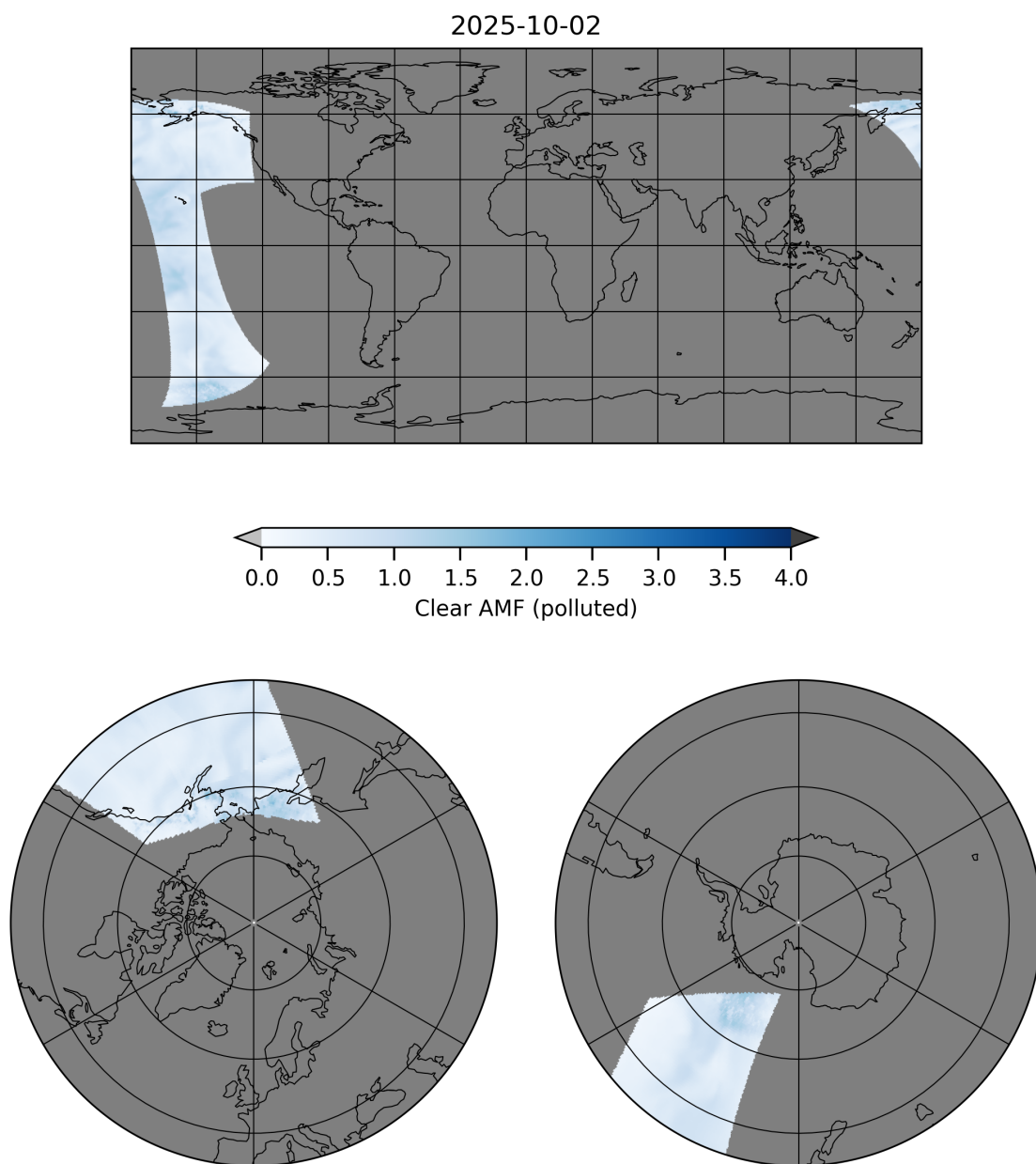


Figure 27: Map of “Clear AMF (polluted)” for 2025-10-02 to 2025-10-03

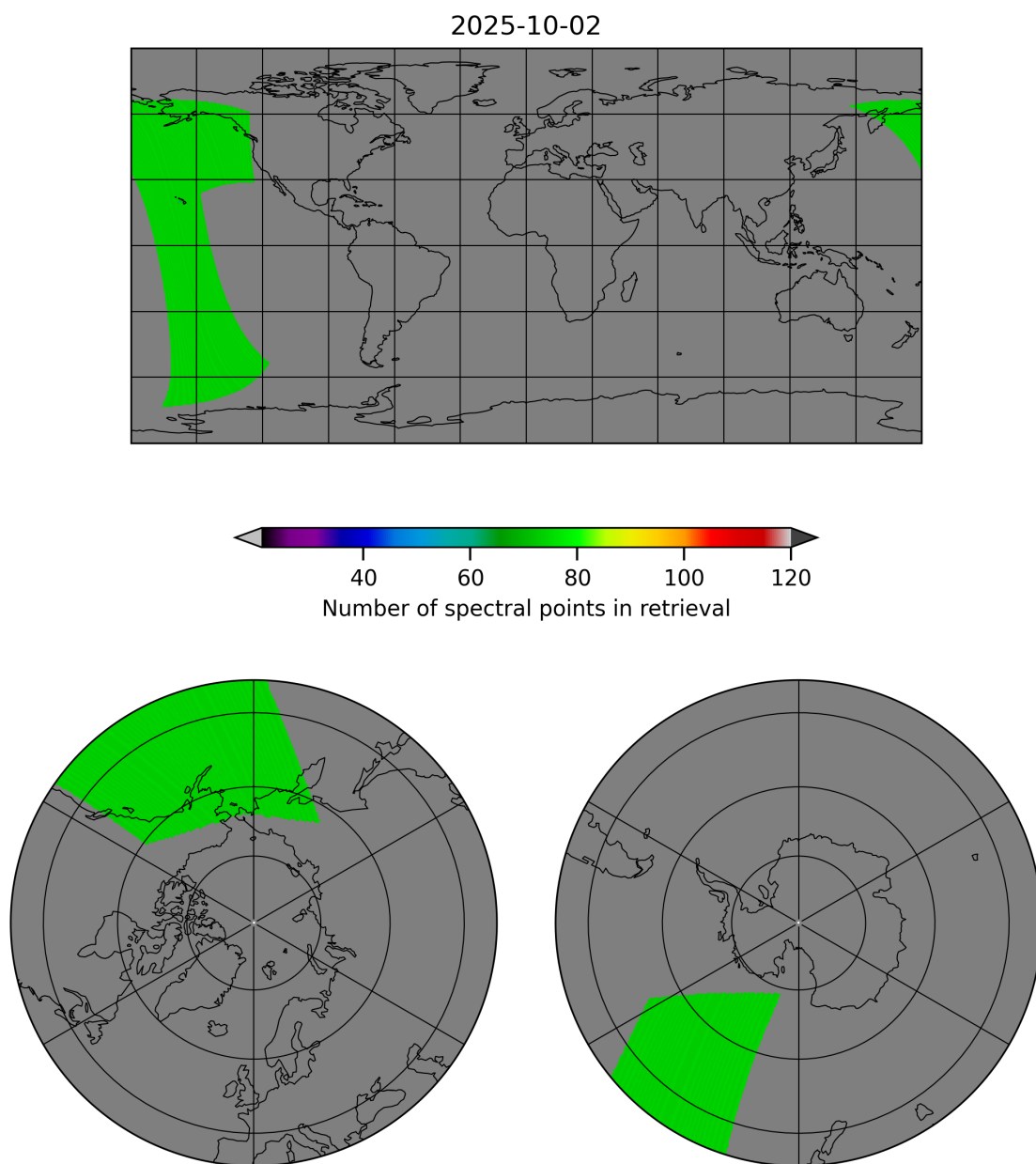


Figure 28: Map of “Number of spectral points in retrieval” for 2025-10-02 to 2025-10-03

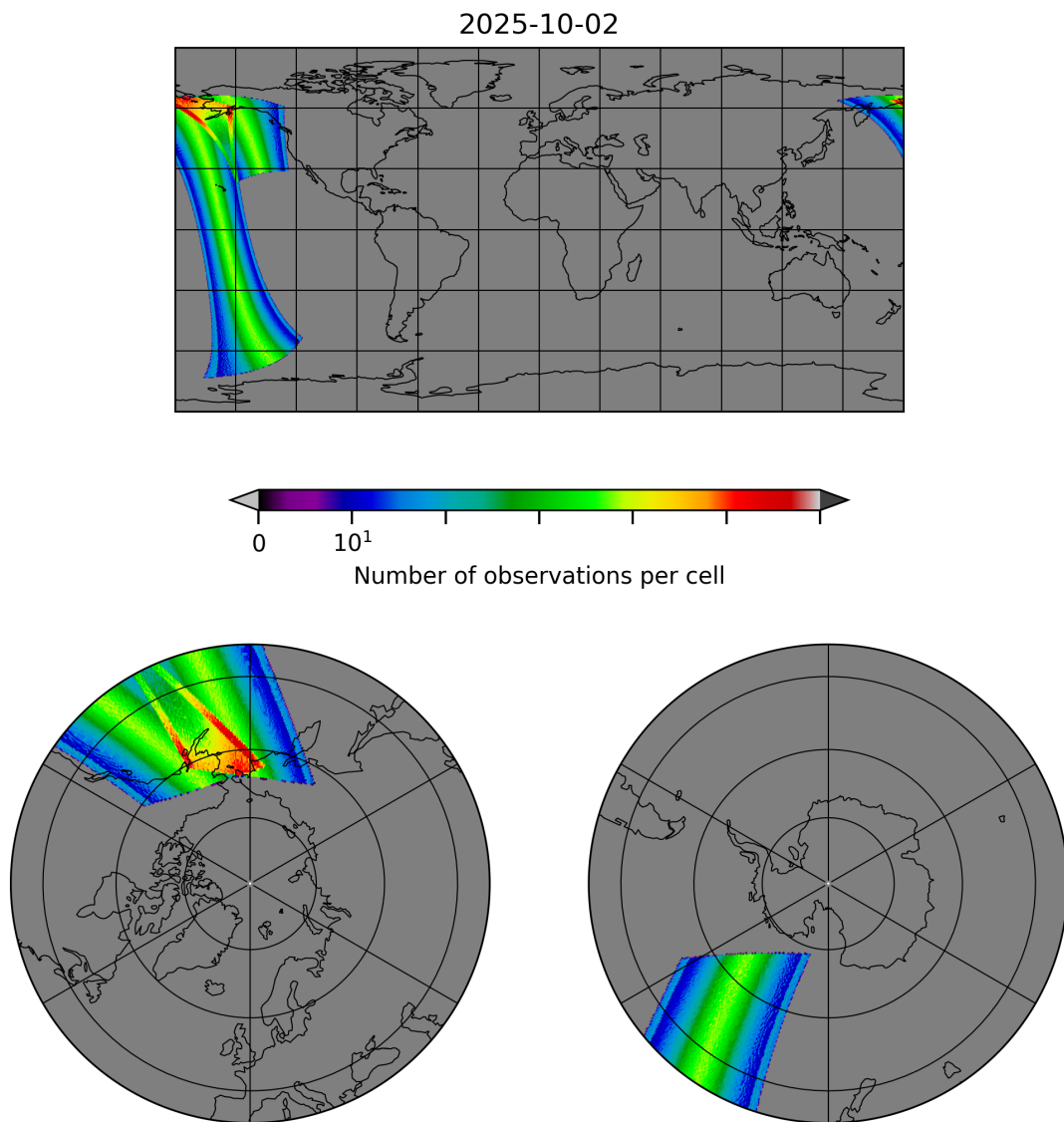


Figure 29: Map of the number of observations for 2025-10-02 to 2025-10-03

7 Zonal average

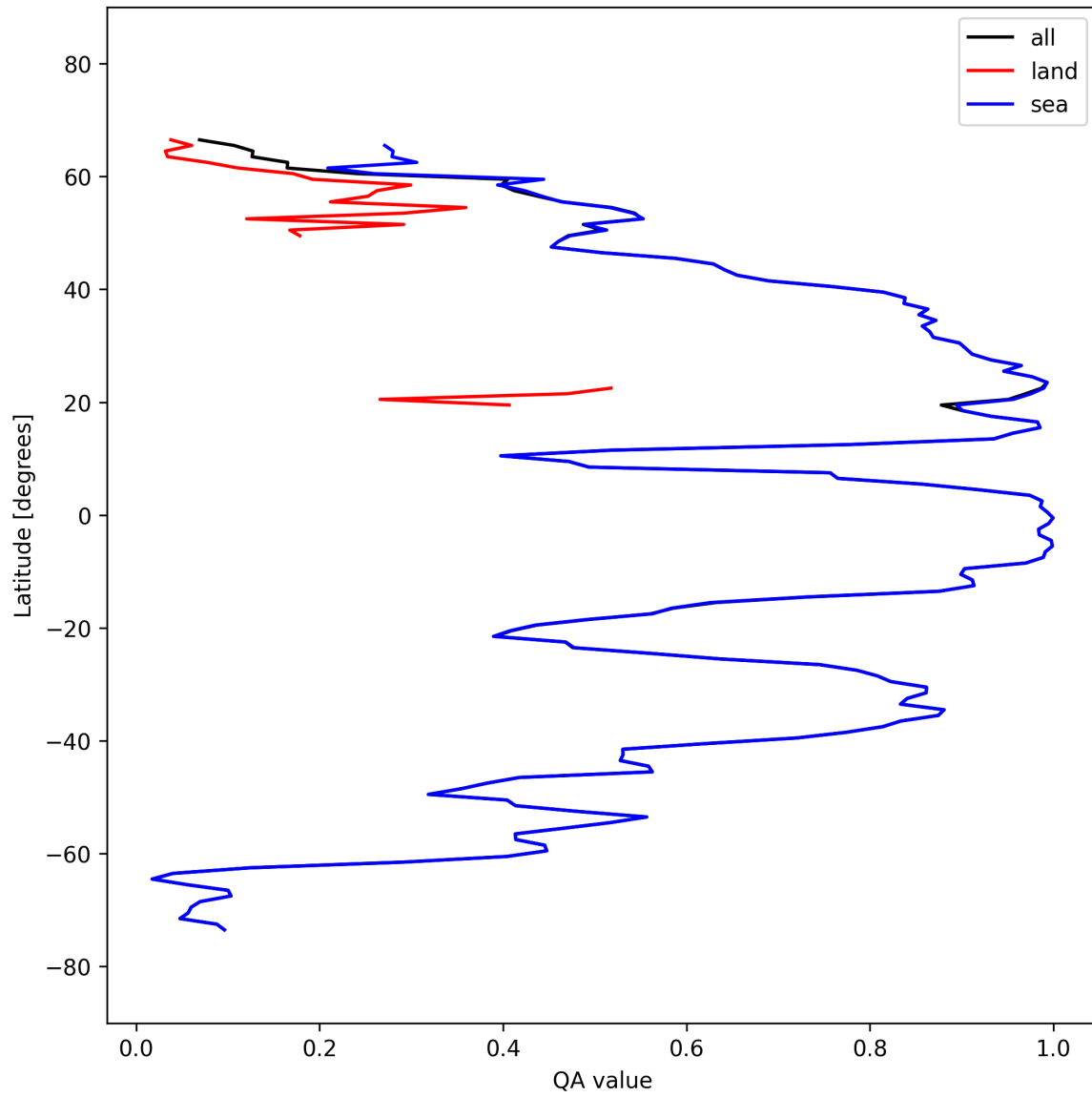


Figure 30: Zonal average of “QA value” for 2025-10-02 to 2025-10-03.

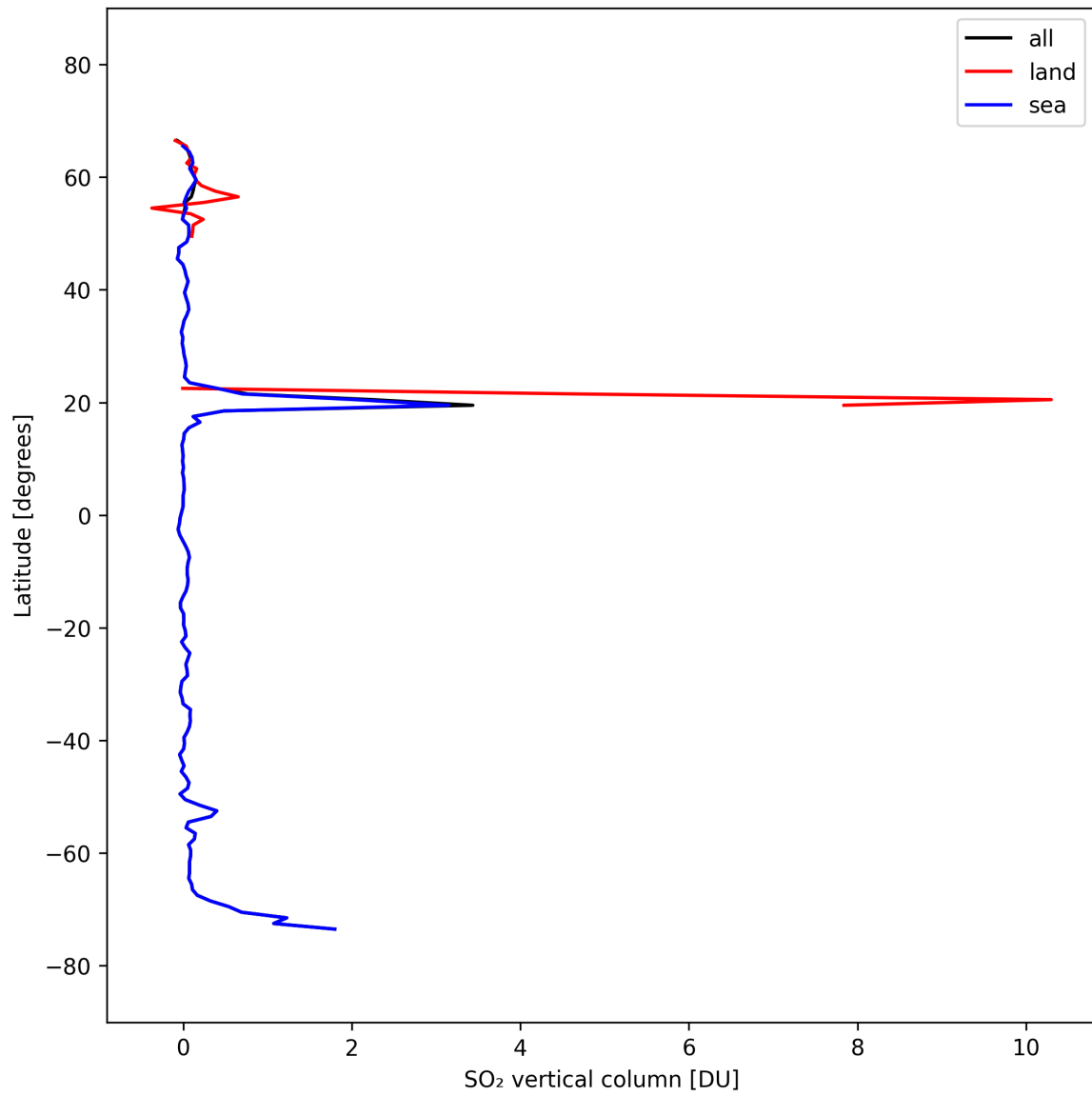


Figure 31: Zonal average of “SO₂ vertical column” for 2025-10-02 to 2025-10-03.

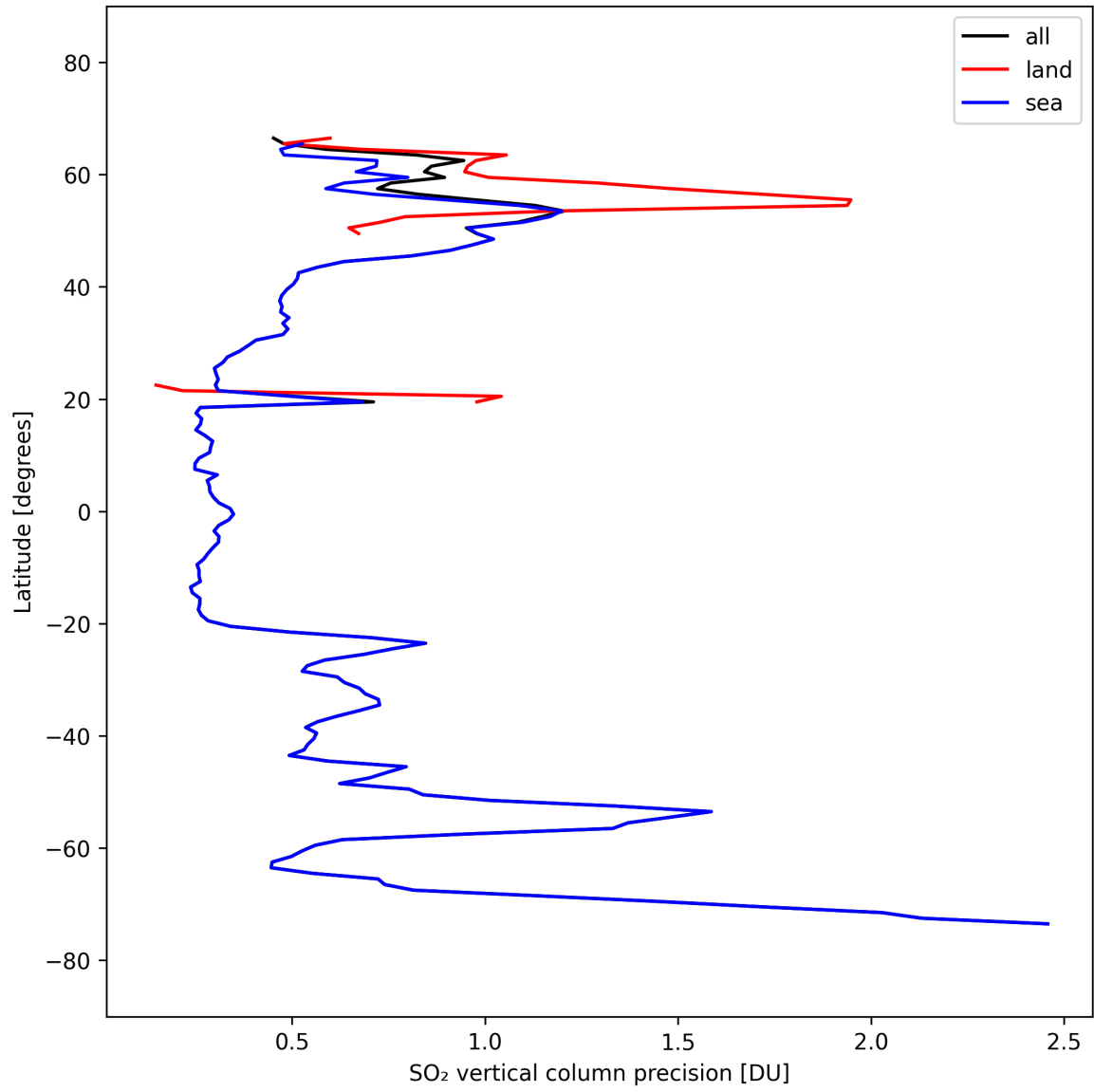


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-10-02 to 2025-10-03.

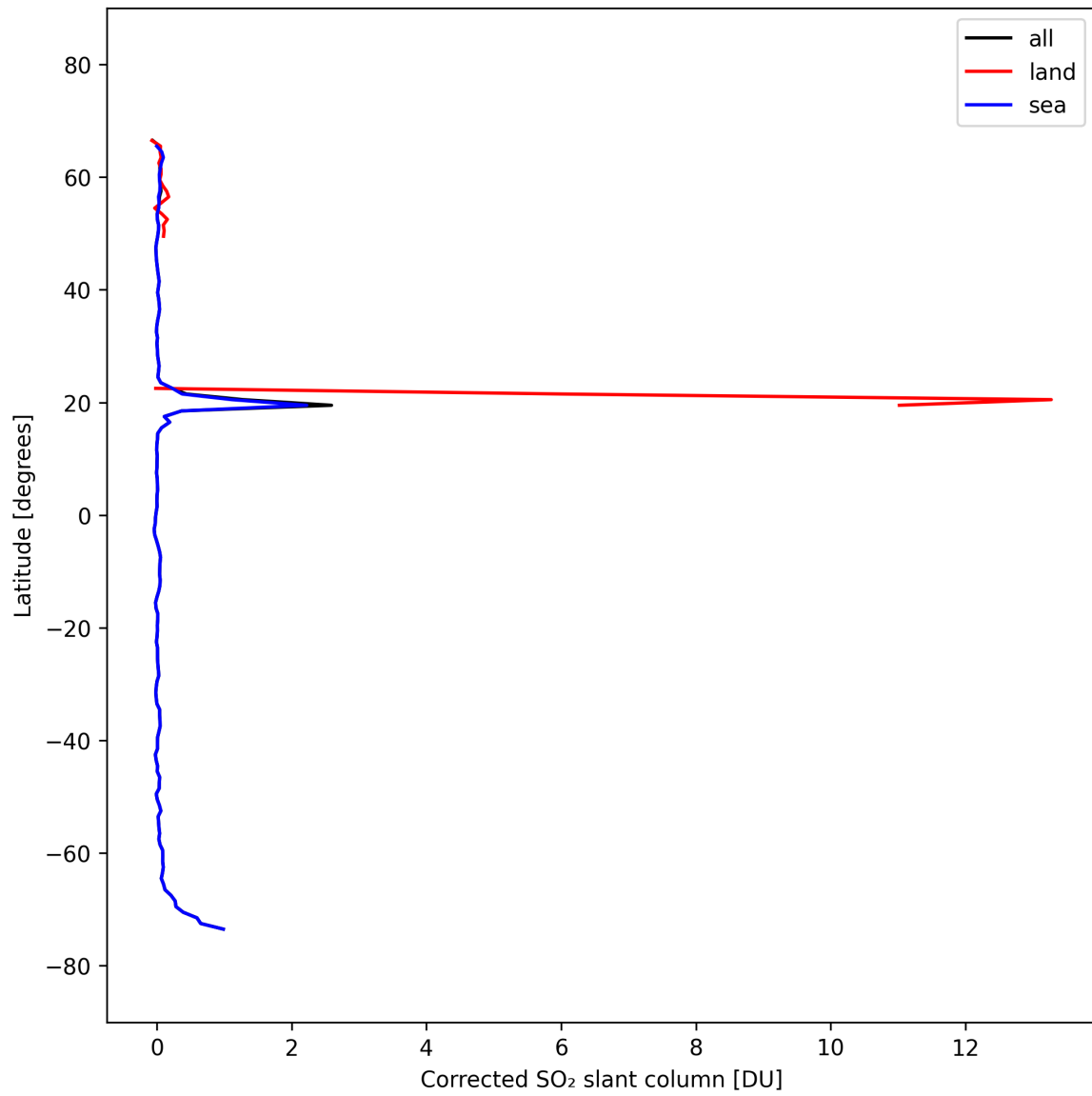


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-10-02 to 2025-10-03.

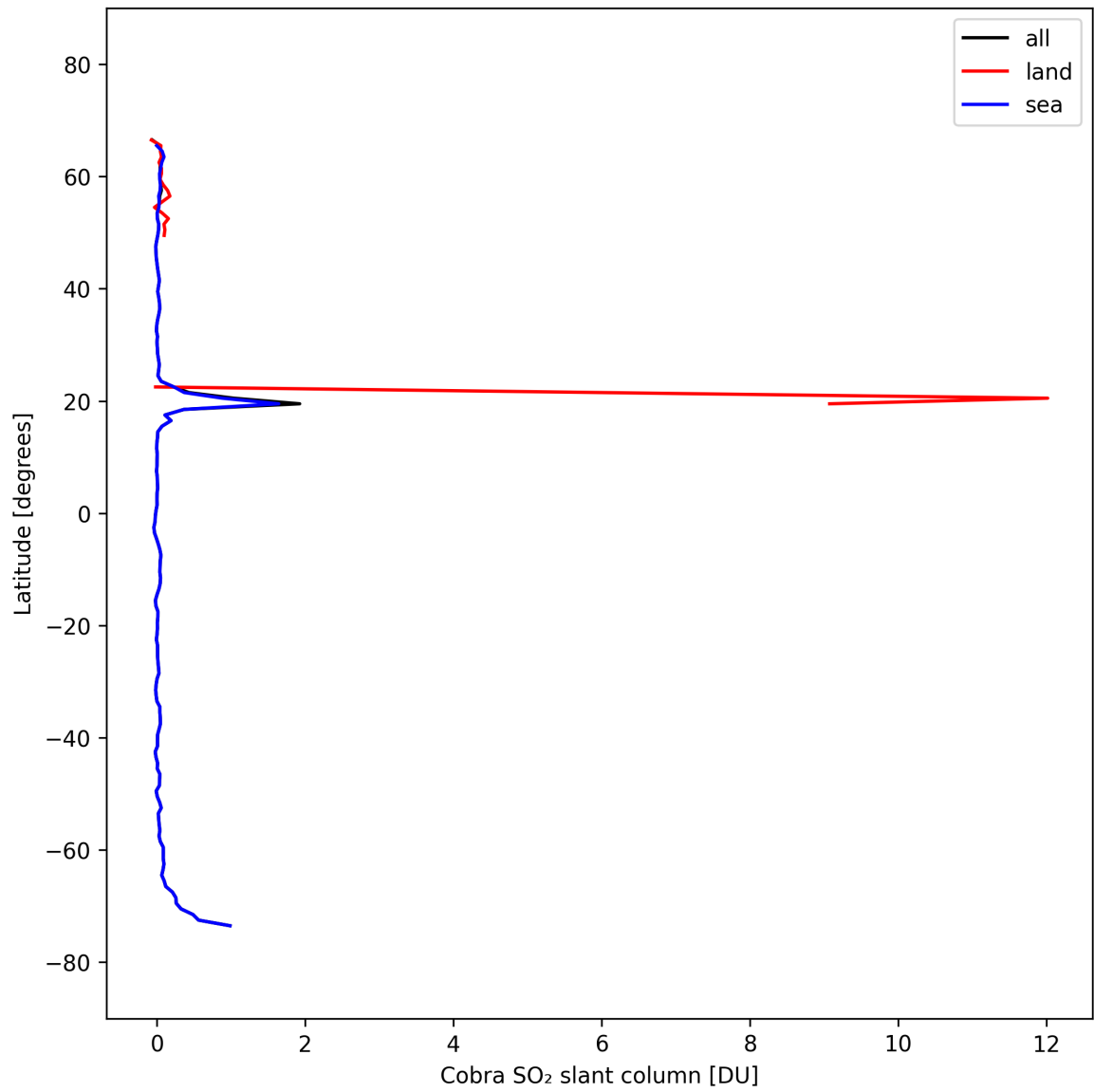


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-10-02 to 2025-10-03.

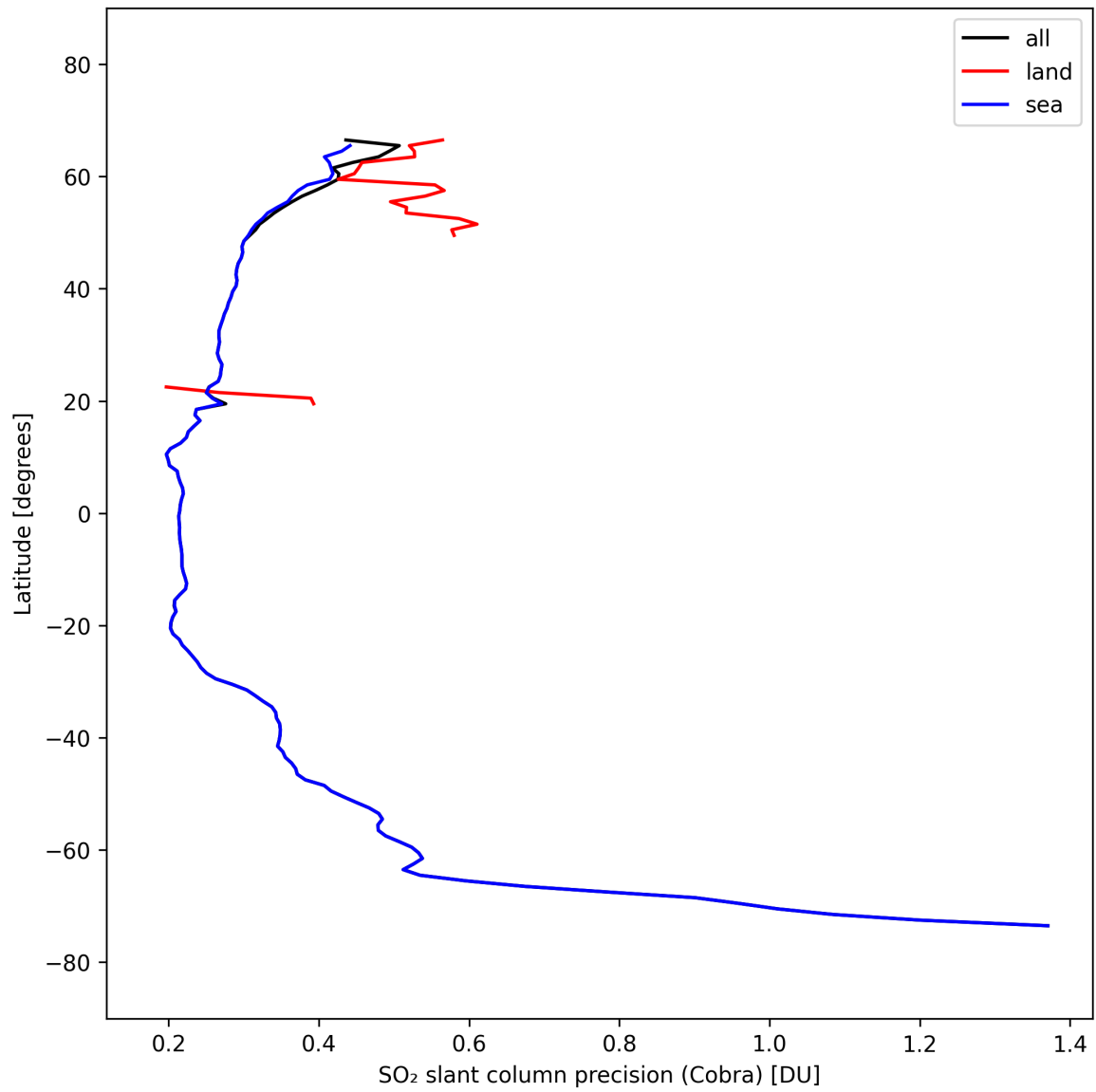


Figure 35: Zonal average of "SO₂ slant column precision (Cobra)" for 2025-10-02 to 2025-10-03.

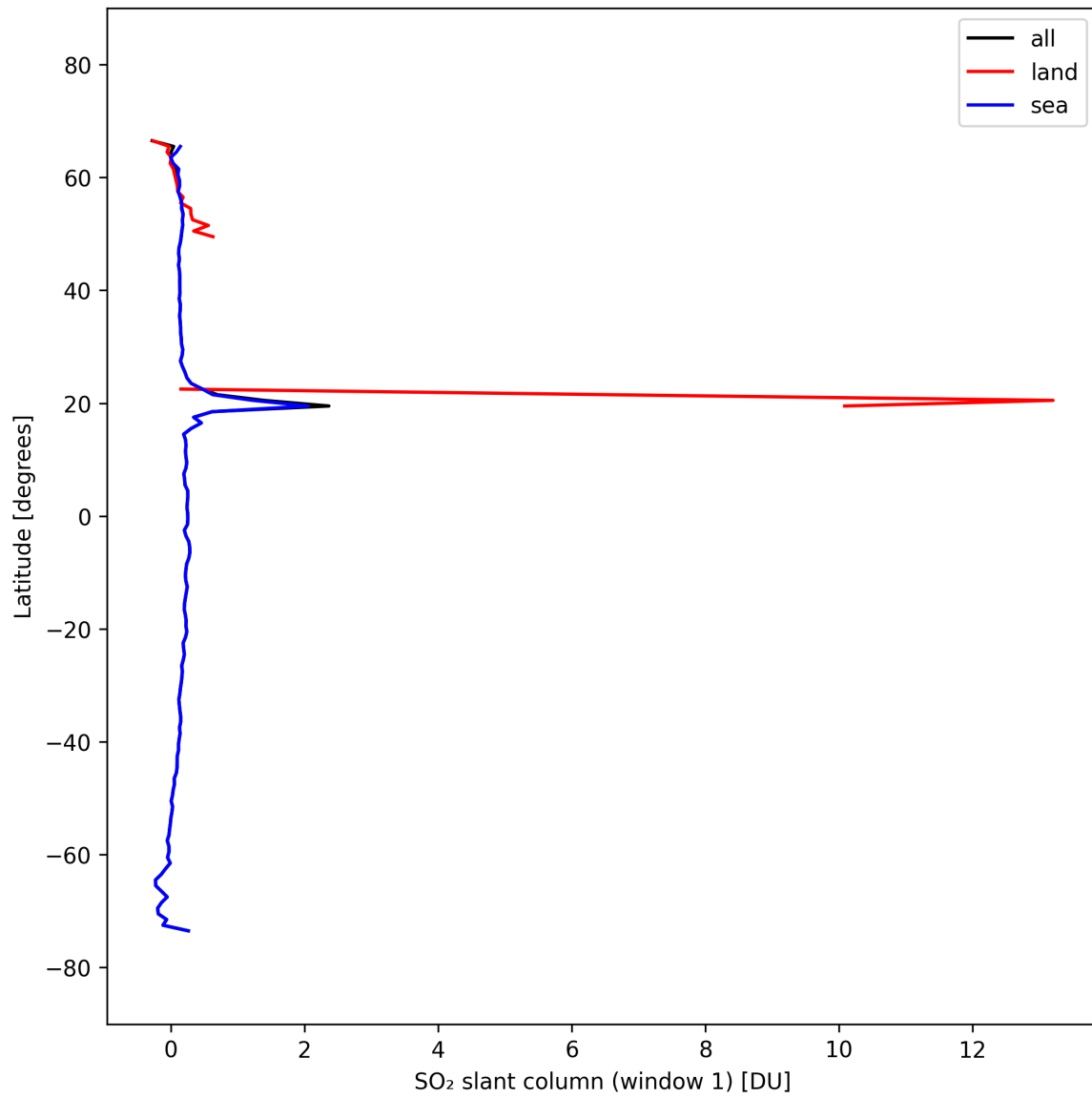


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-10-02 to 2025-10-03.

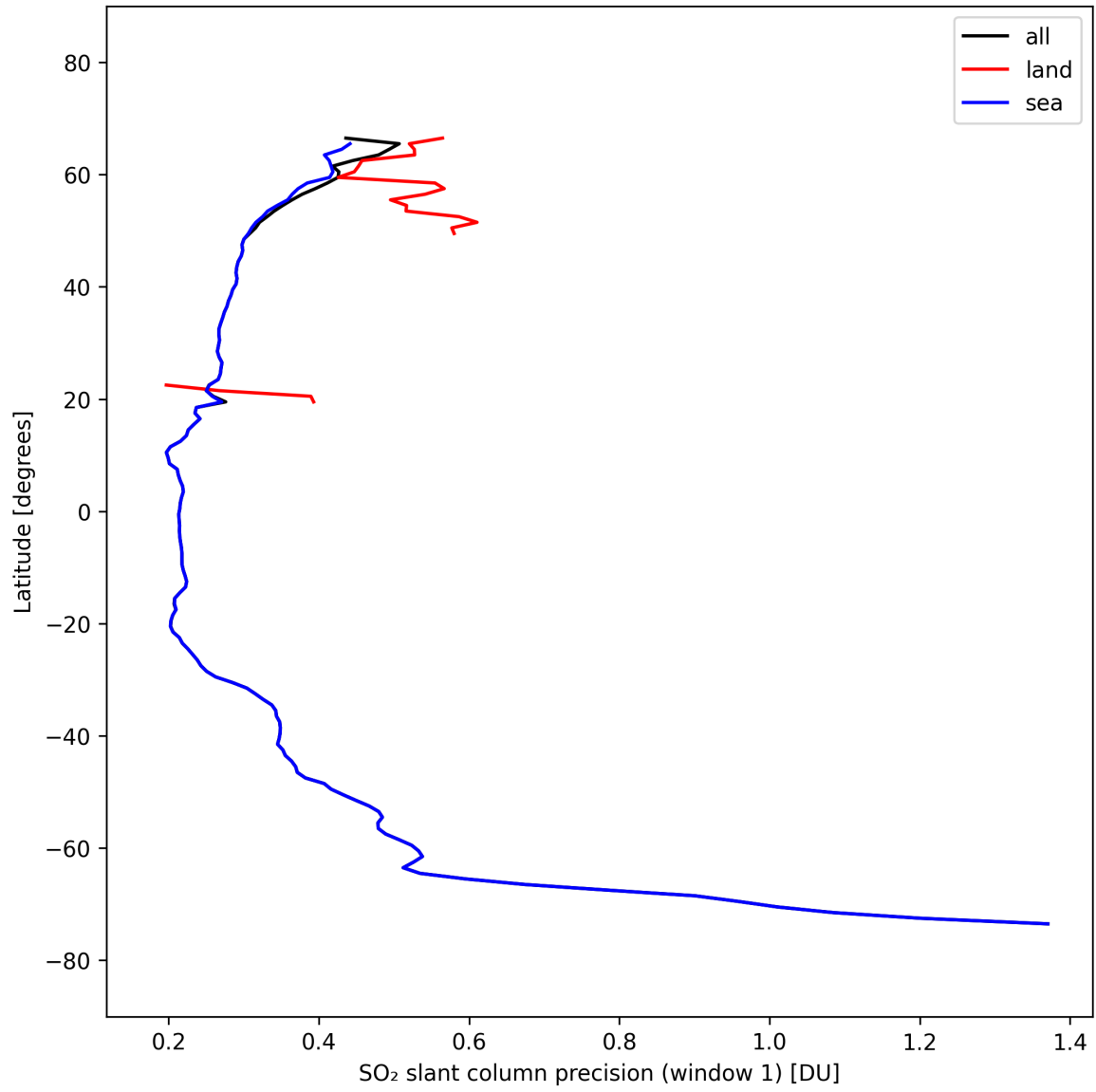


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-10-02 to 2025-10-03.

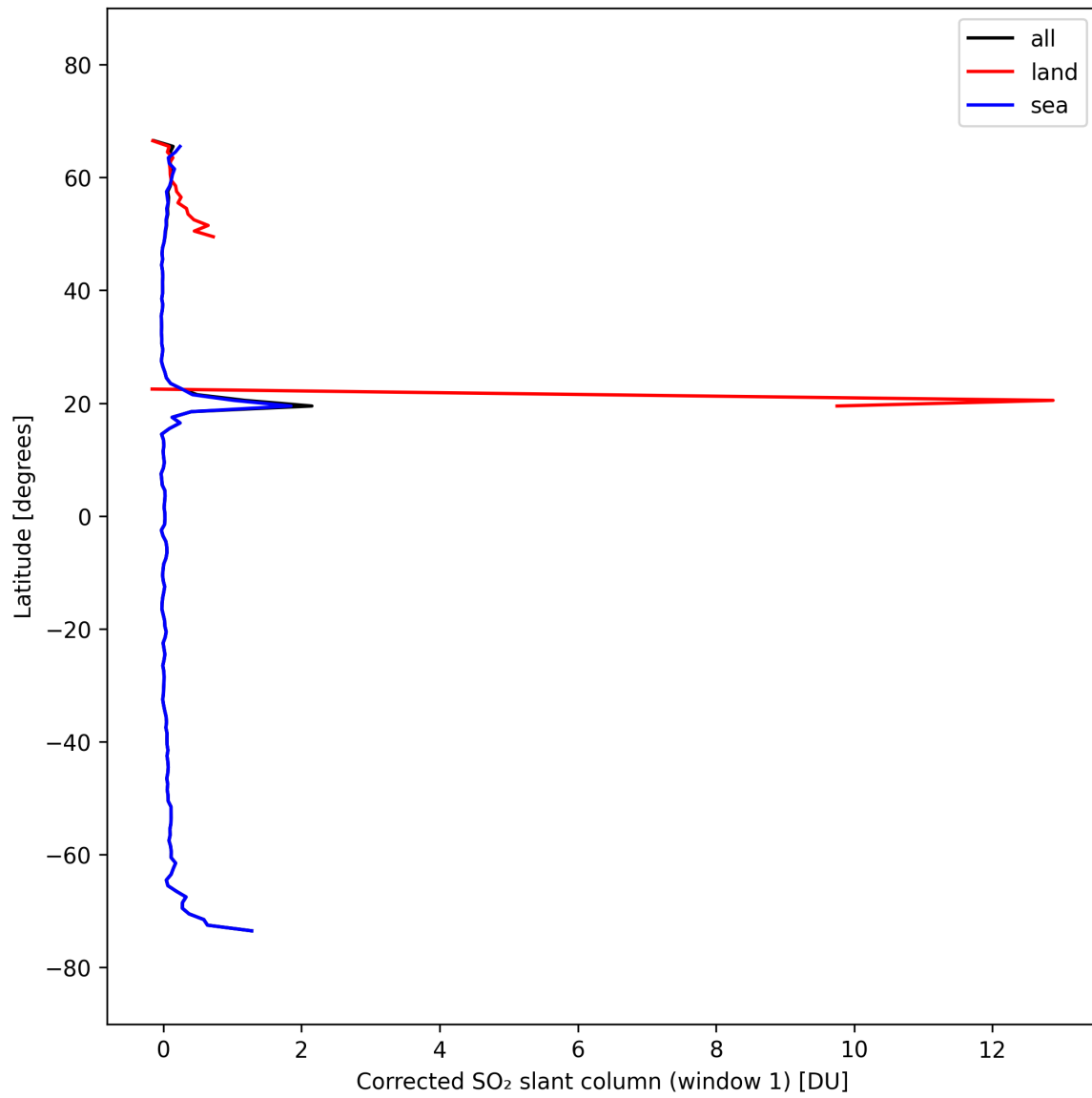


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-10-02 to 2025-10-03.

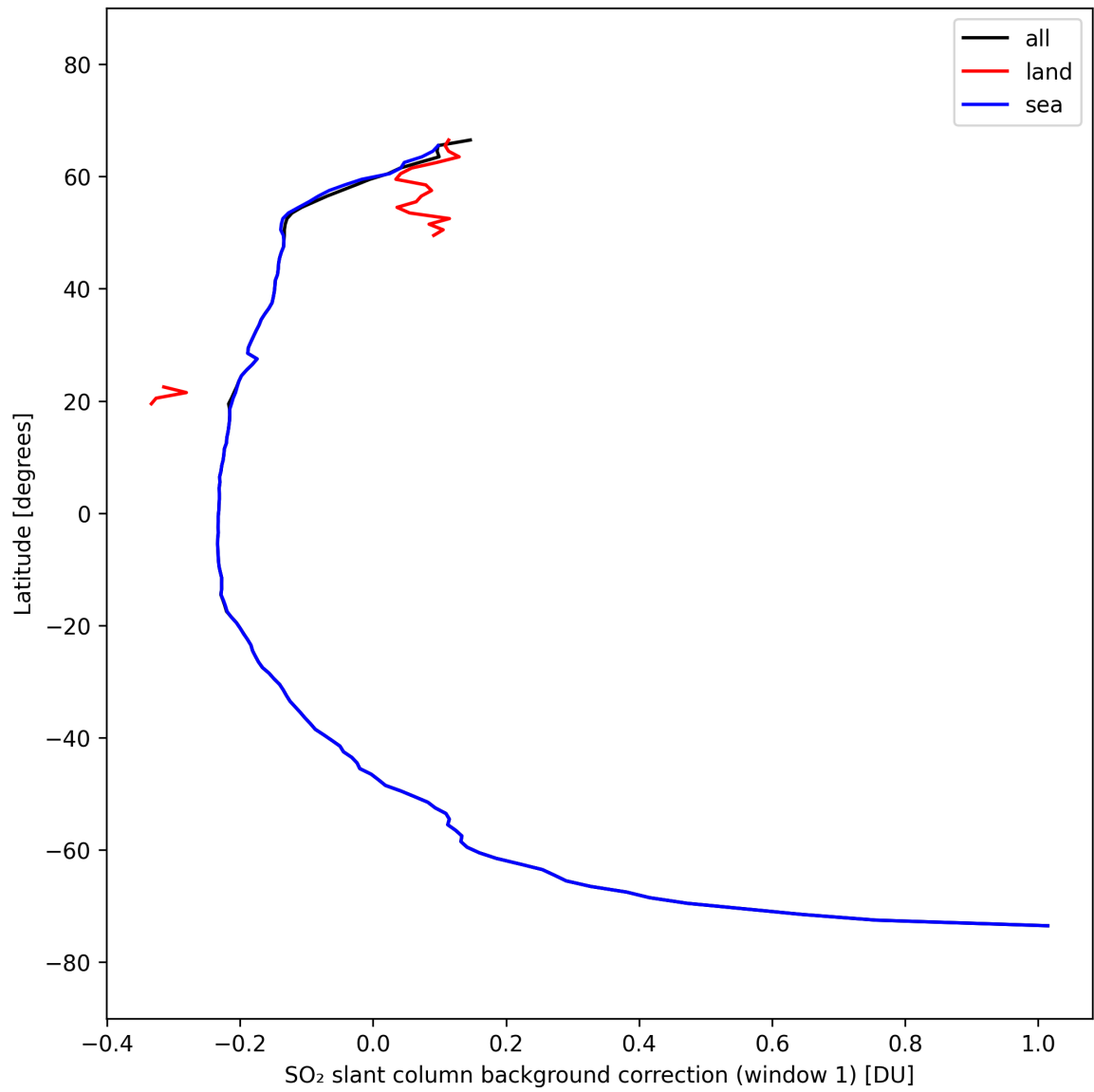


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-10-02 to 2025-10-03.

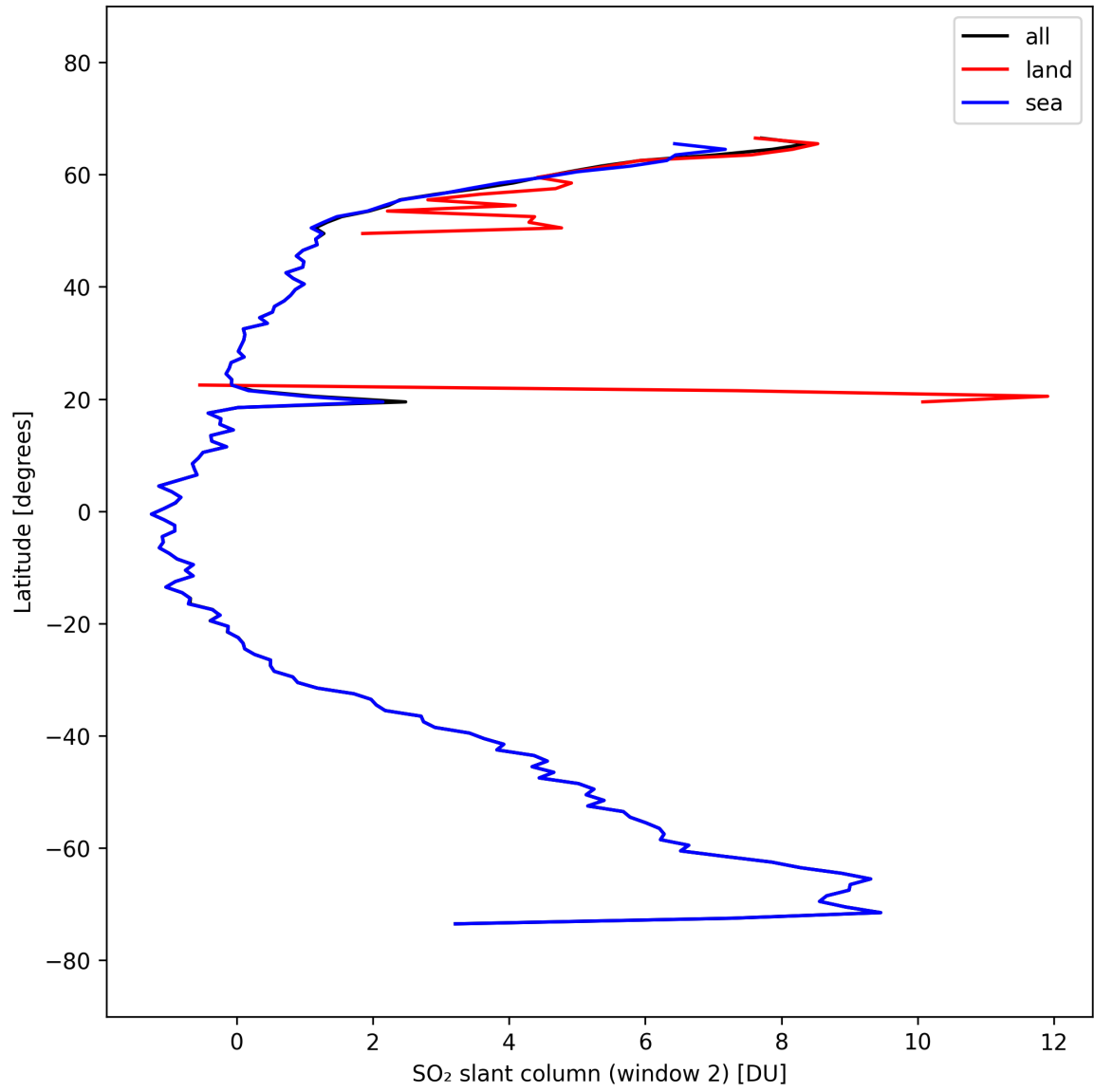


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-10-02 to 2025-10-03.

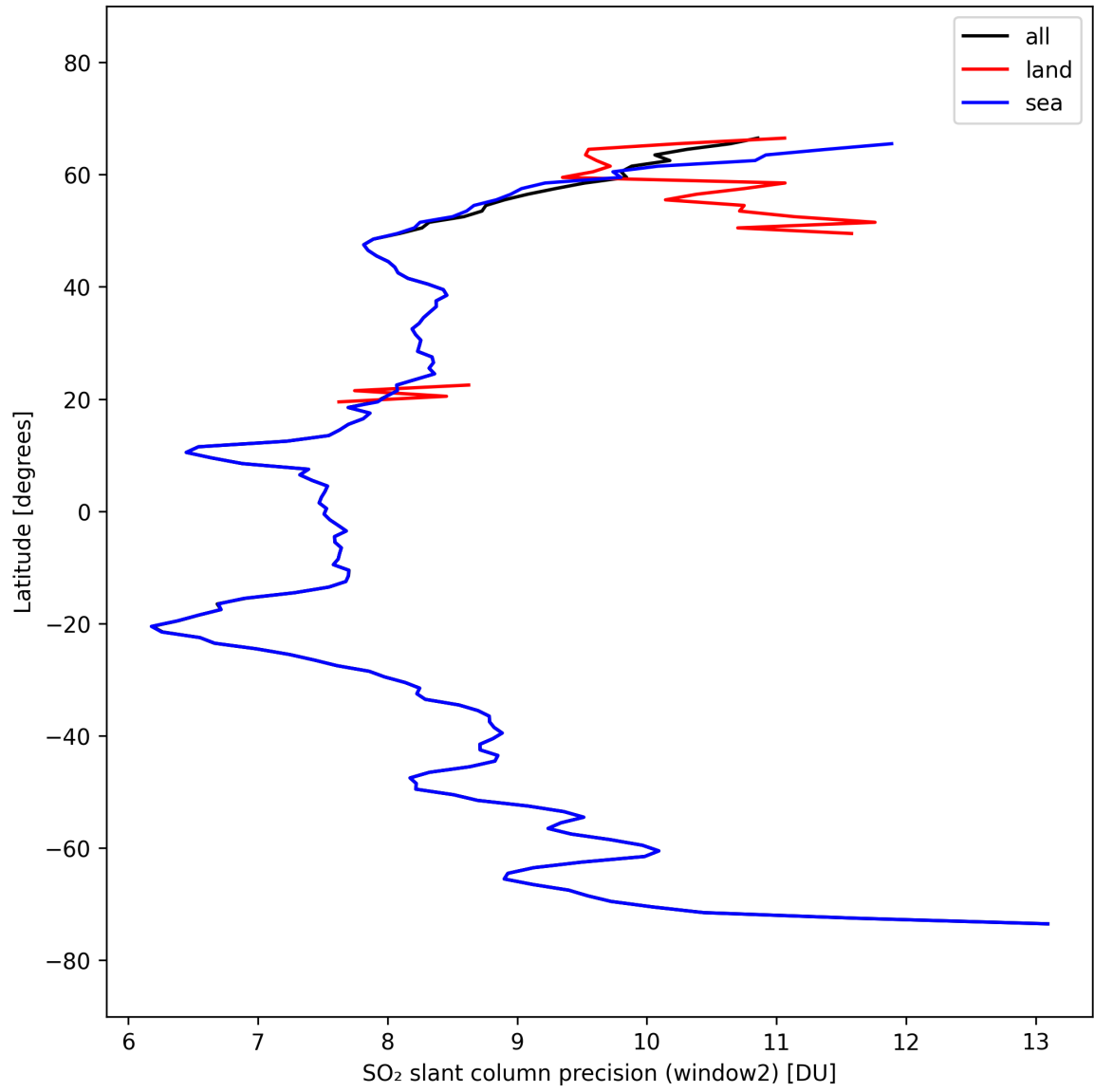


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-10-02 to 2025-10-03.

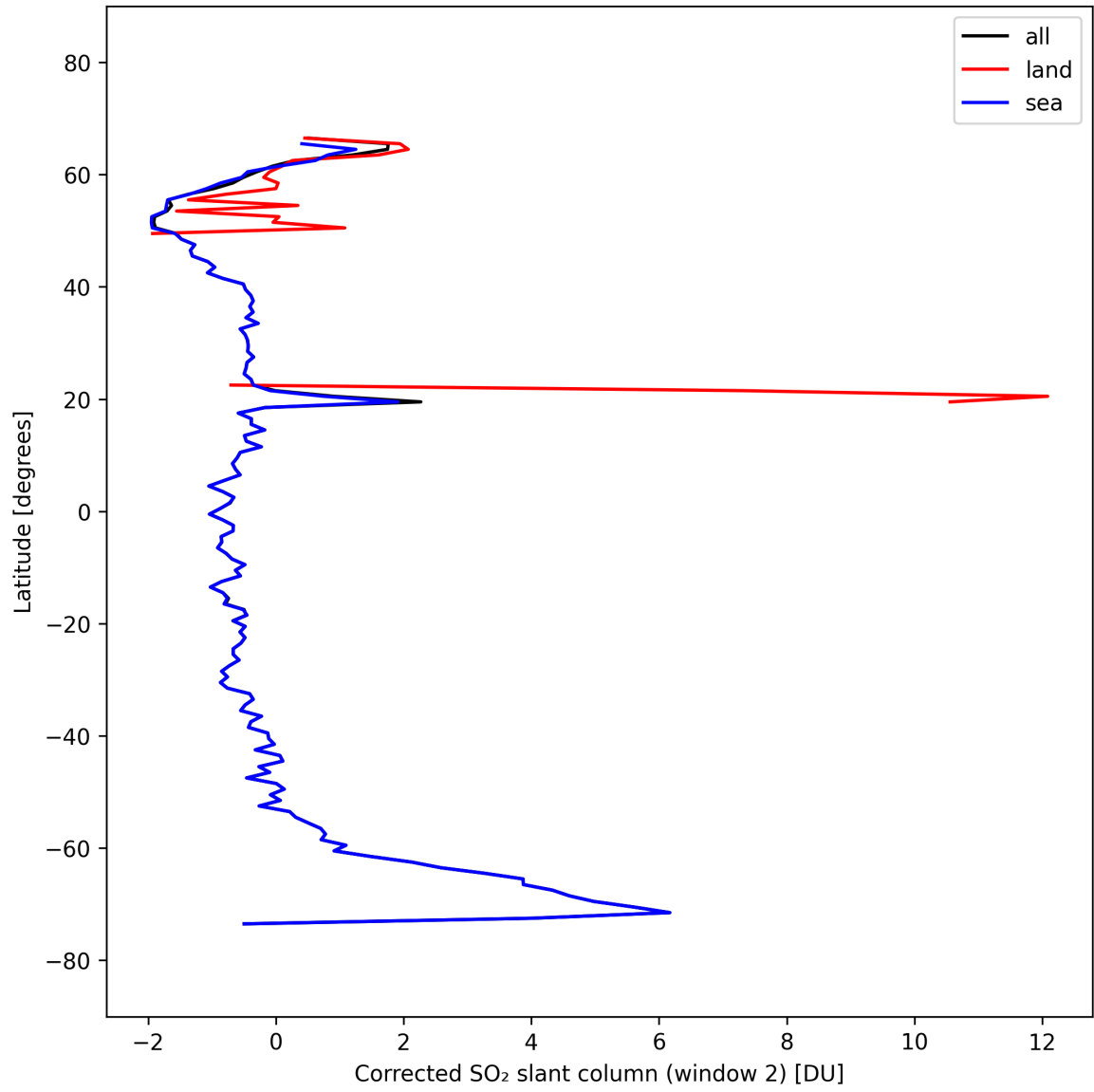


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-10-02 to 2025-10-03.

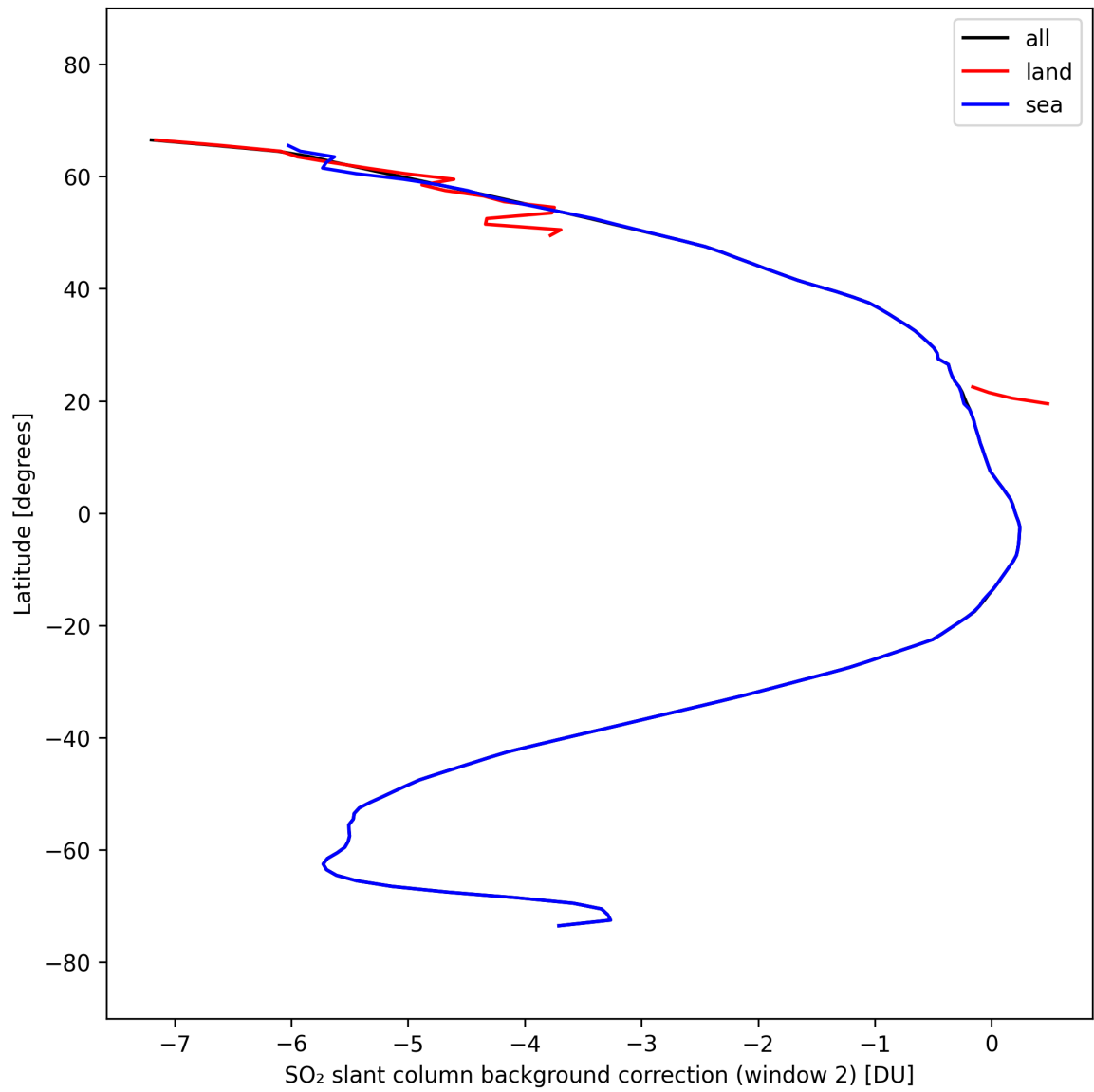


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-10-02 to 2025-10-03.

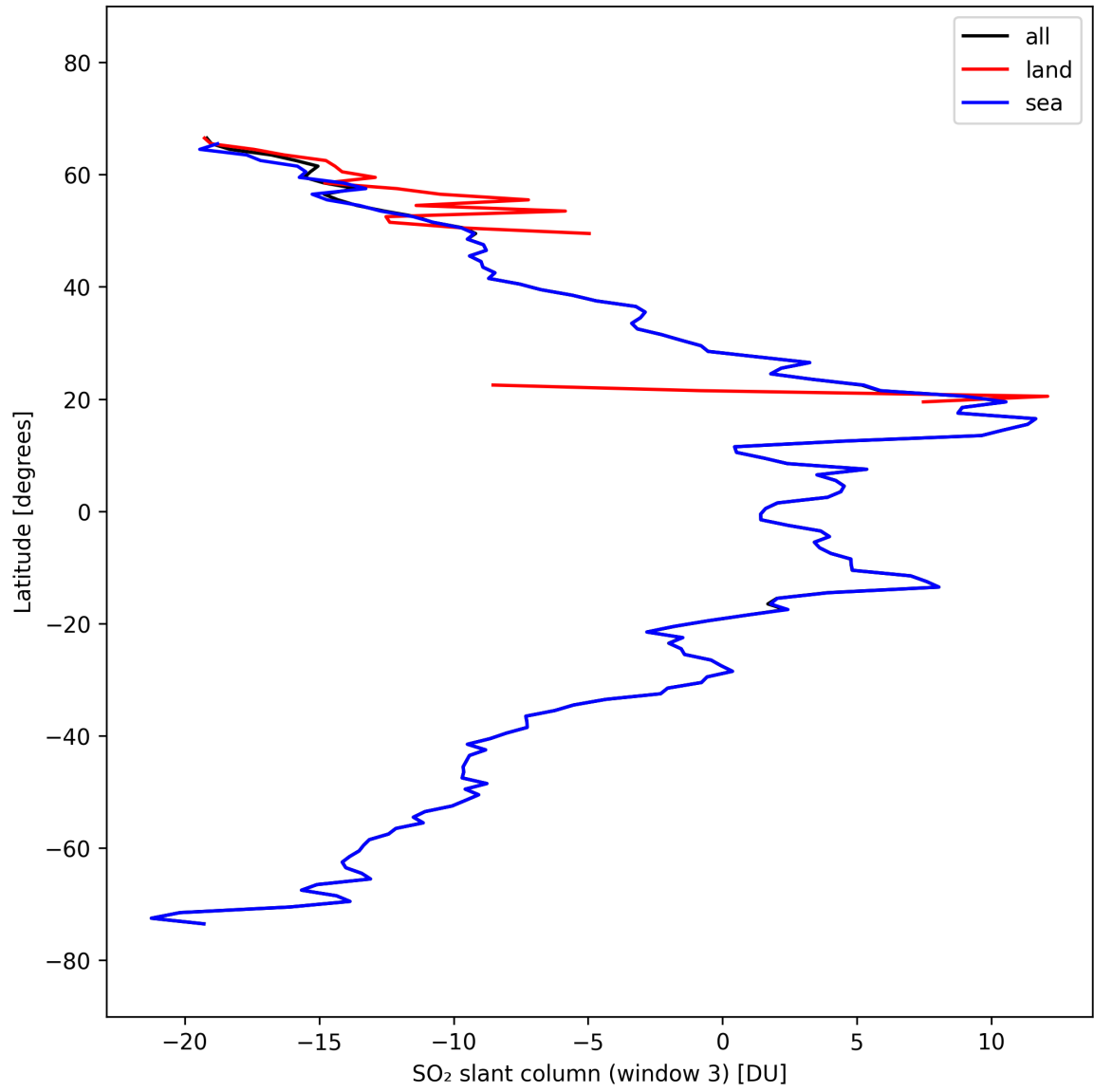


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-10-02 to 2025-10-03.

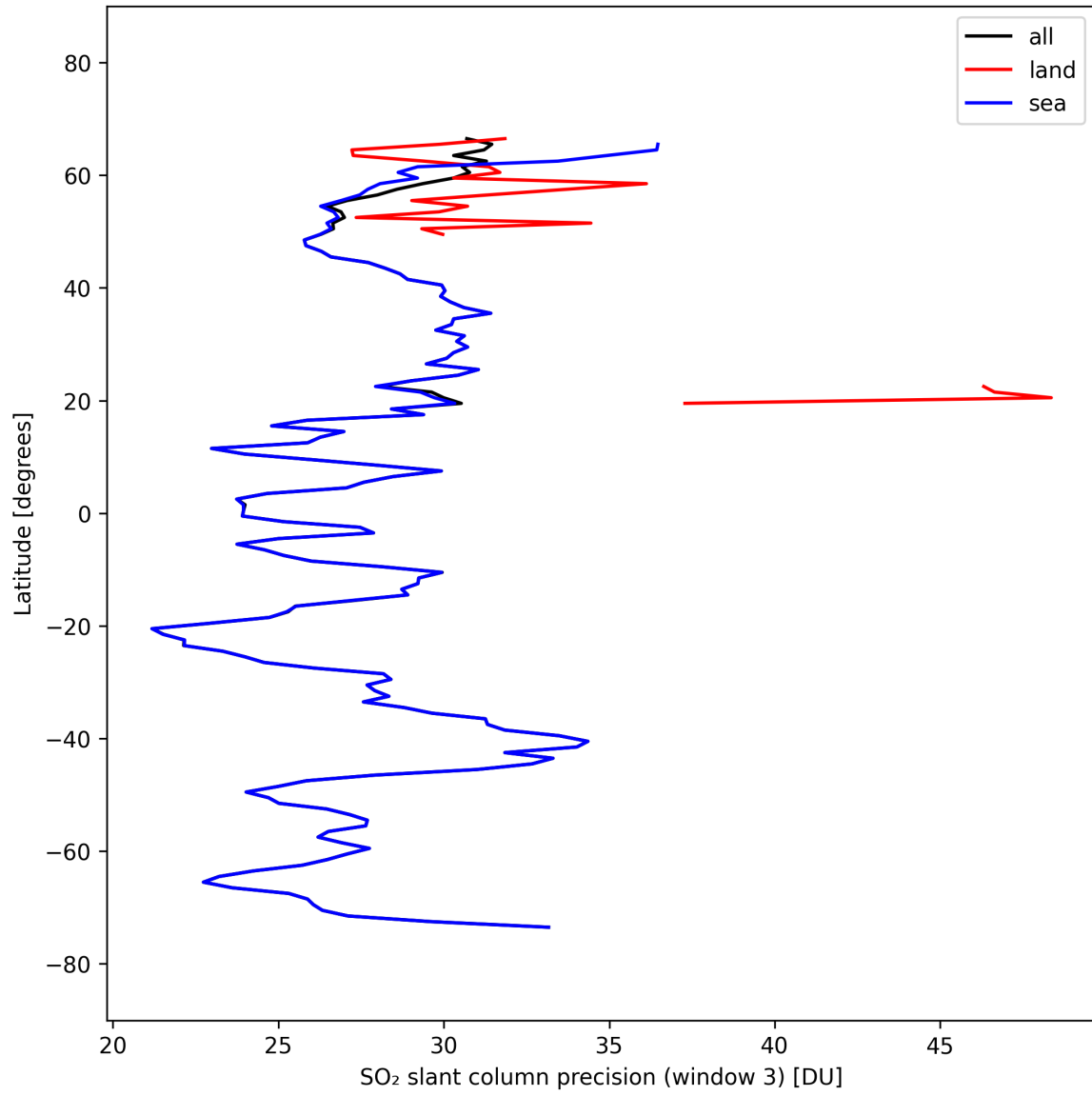


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-10-02 to 2025-10-03.

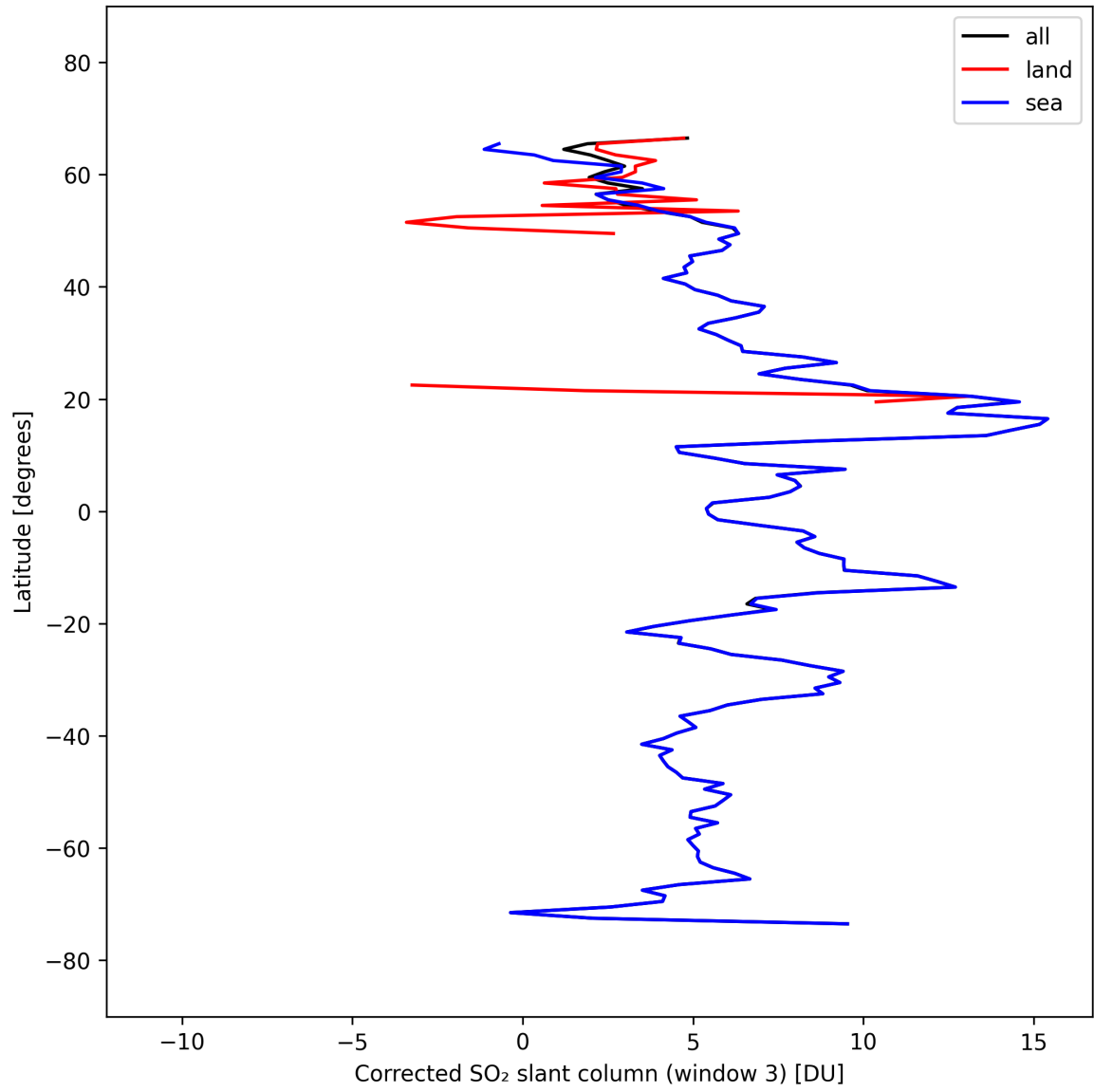


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-10-02 to 2025-10-03.

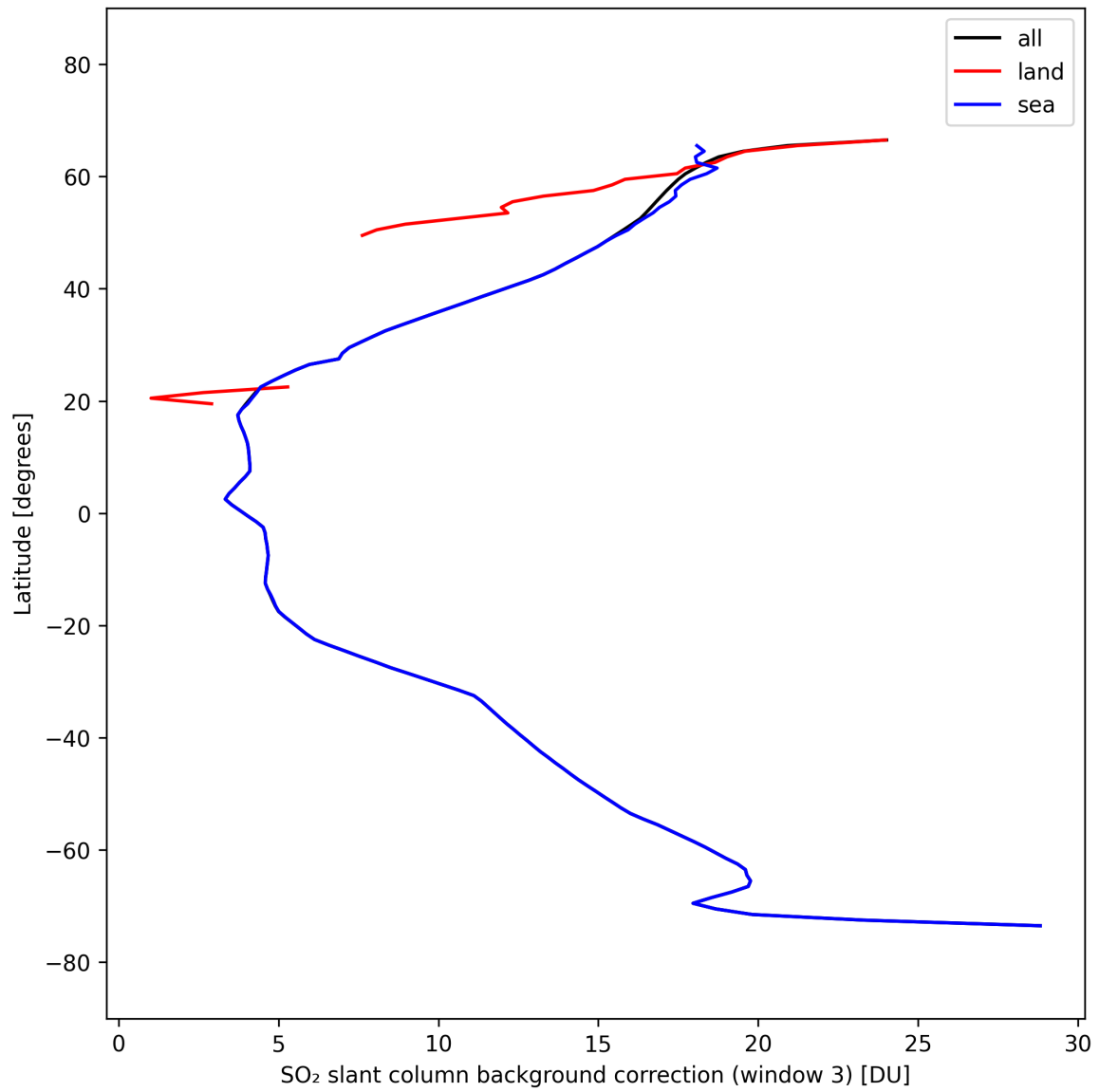


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-10-02 to 2025-10-03.

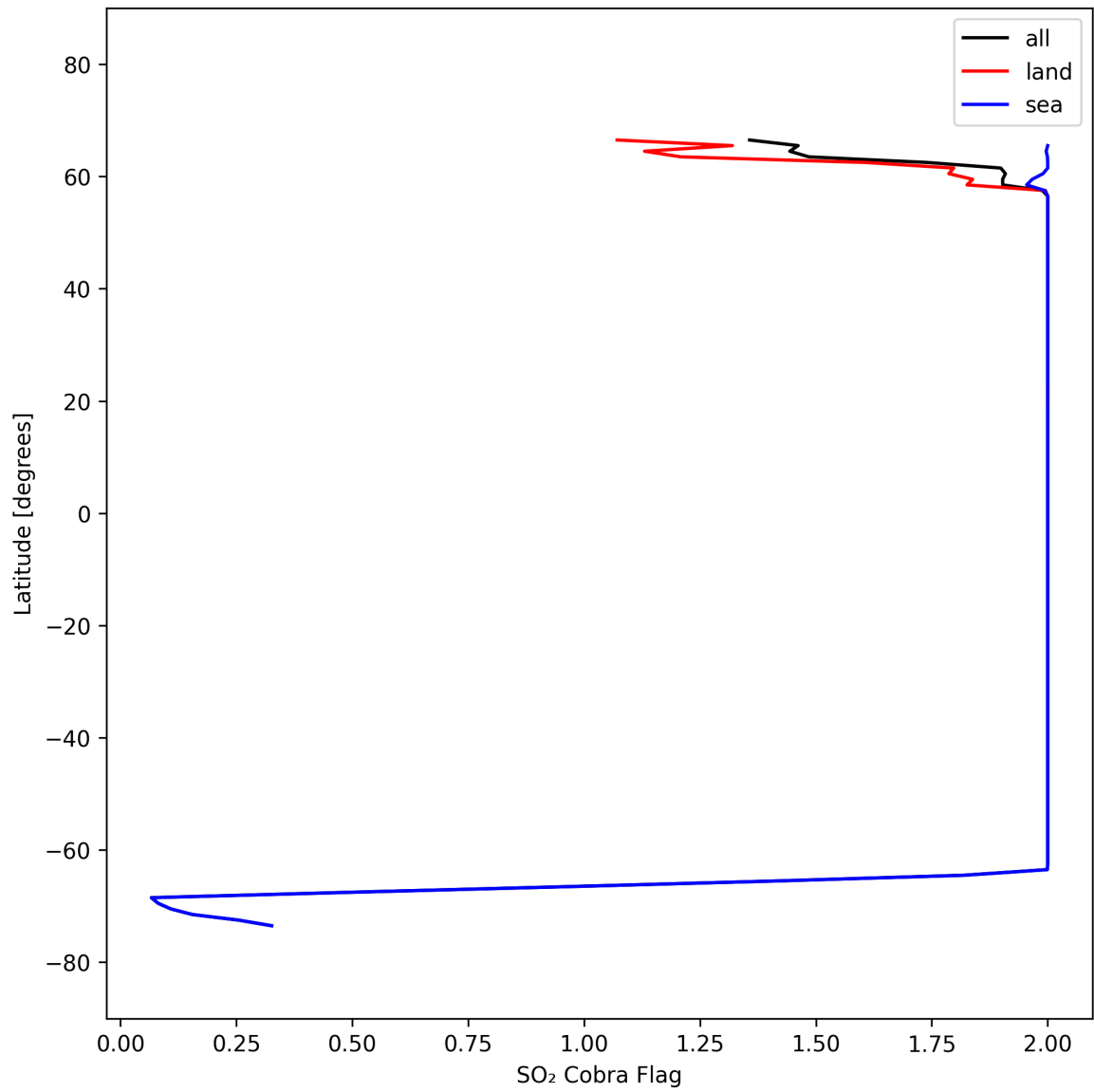


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-10-02 to 2025-10-03.

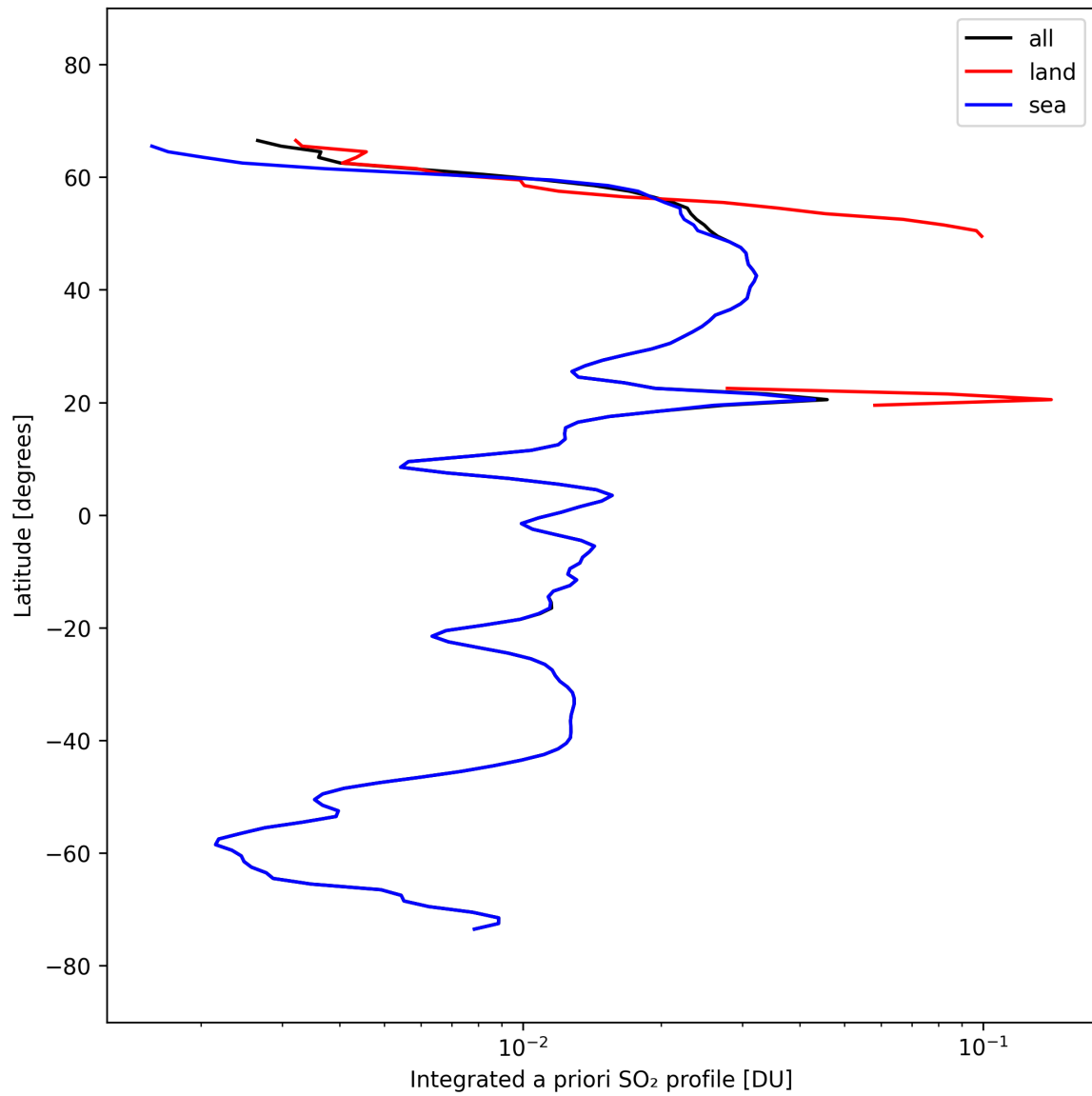


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-10-02 to 2025-10-03.

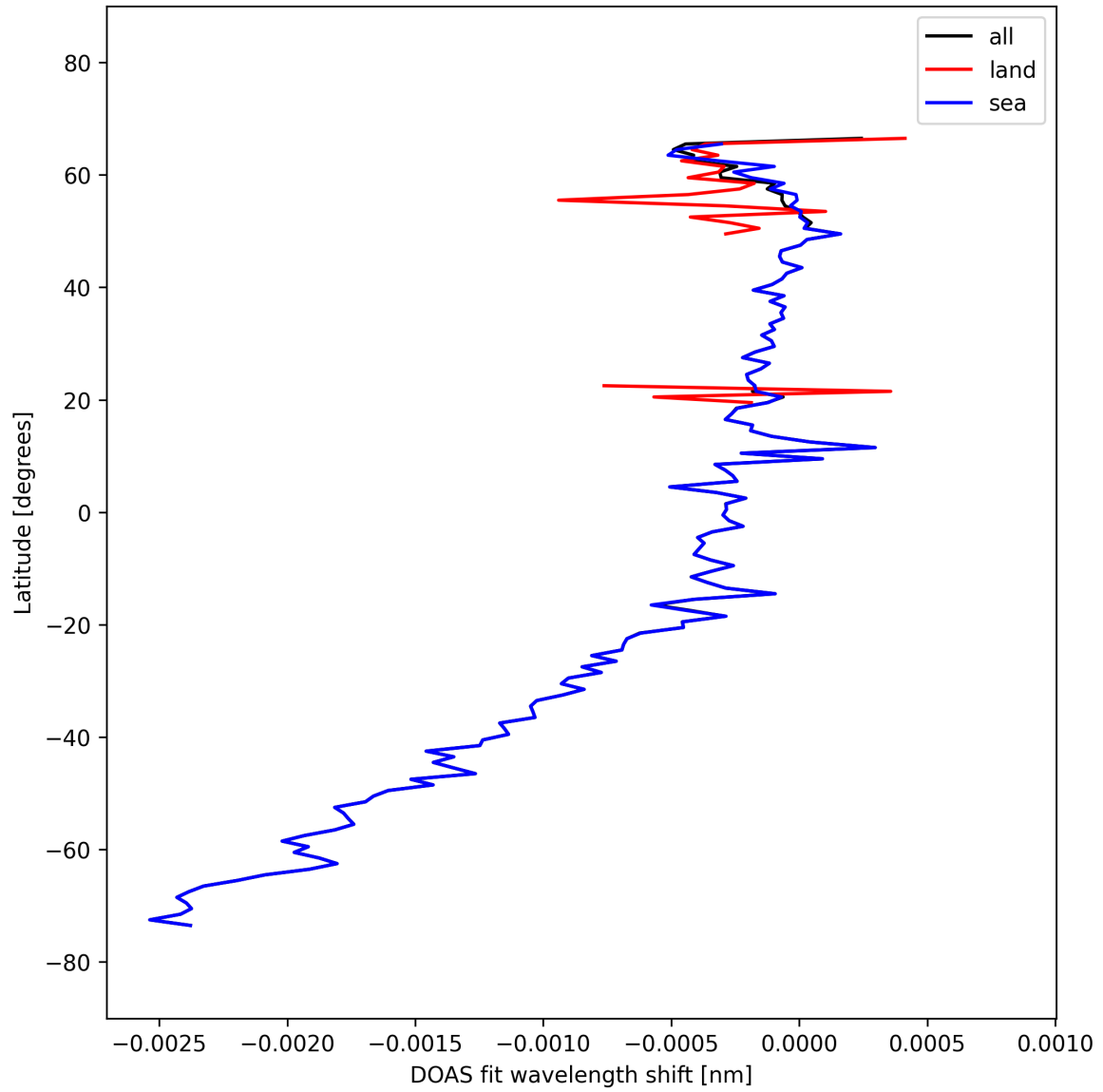


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-10-02 to 2025-10-03.

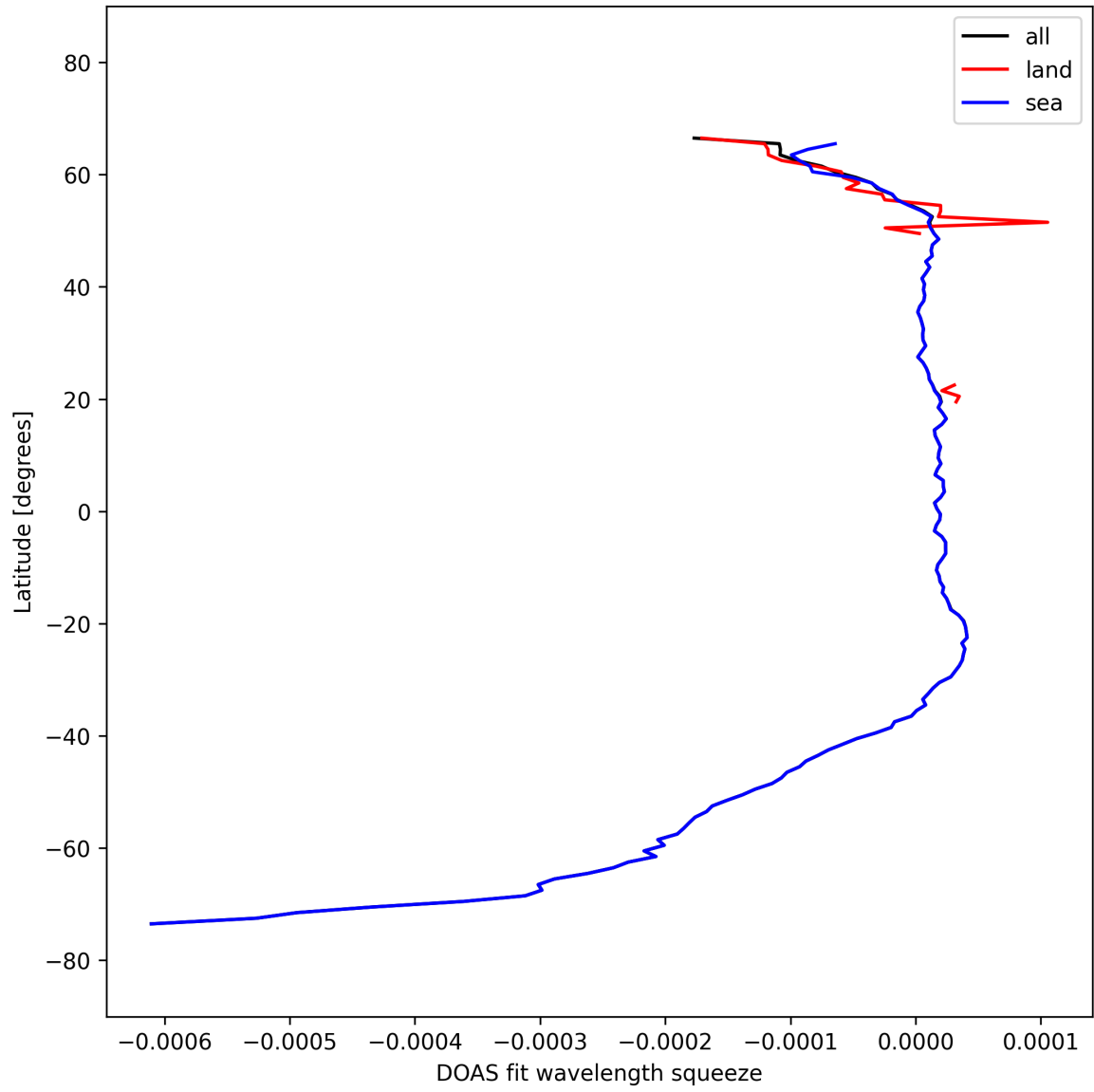


Figure 51: Zonal average of "DOAS fit wavelength squeeze" for 2025-10-02 to 2025-10-03.

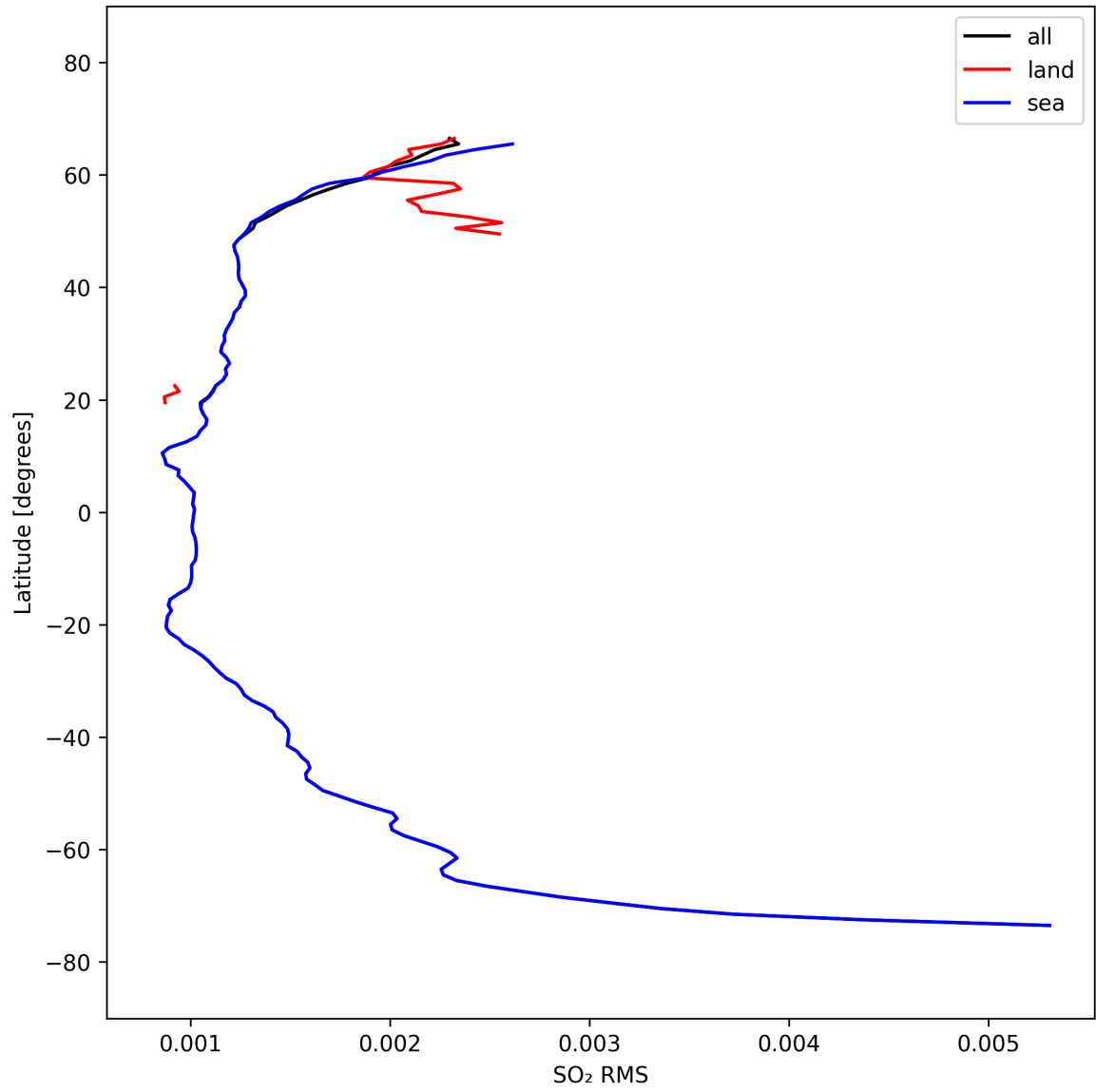


Figure 52: Zonal average of “SO₂ RMS” for 2025-10-02 to 2025-10-03.

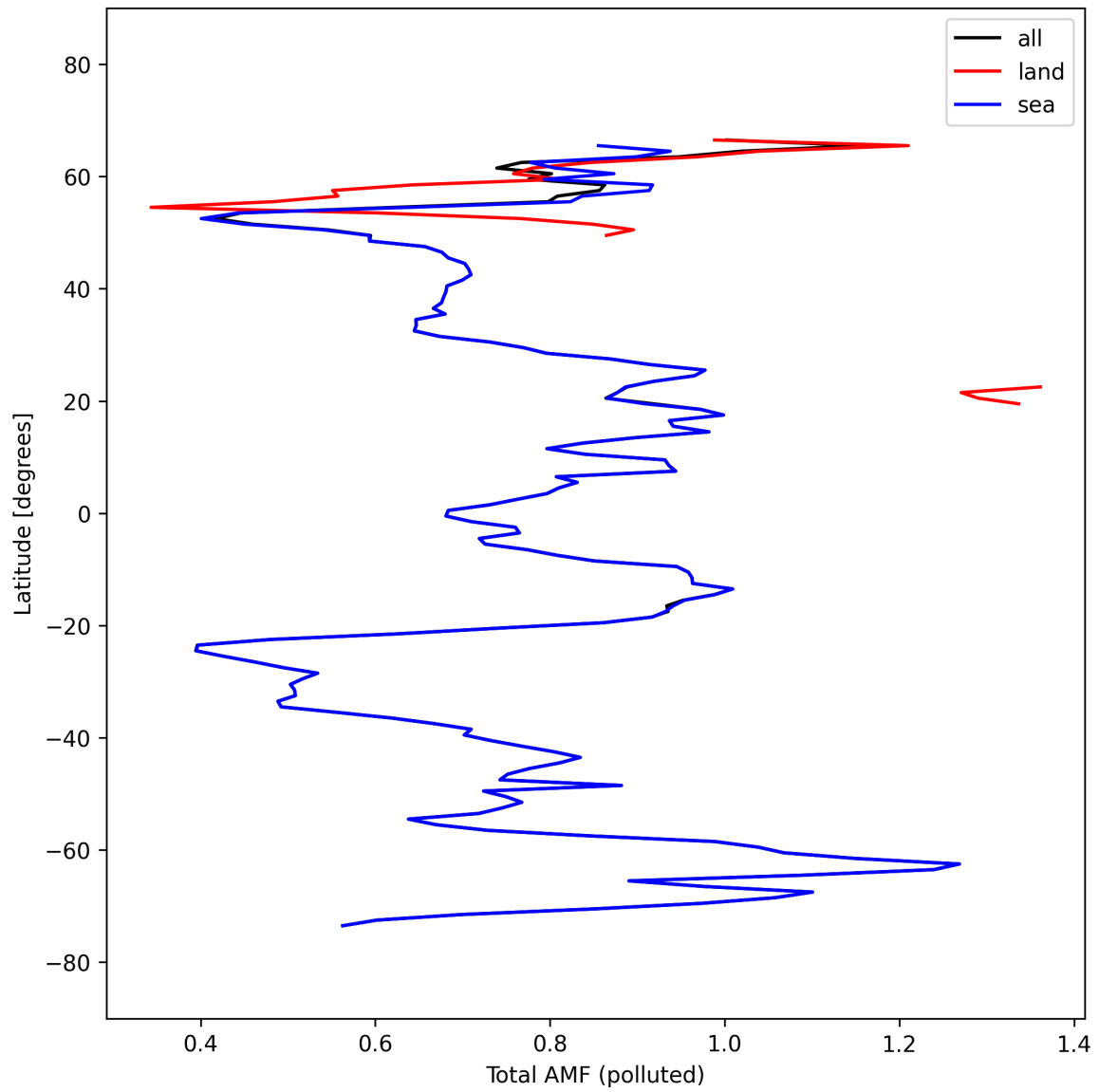


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-10-02 to 2025-10-03.

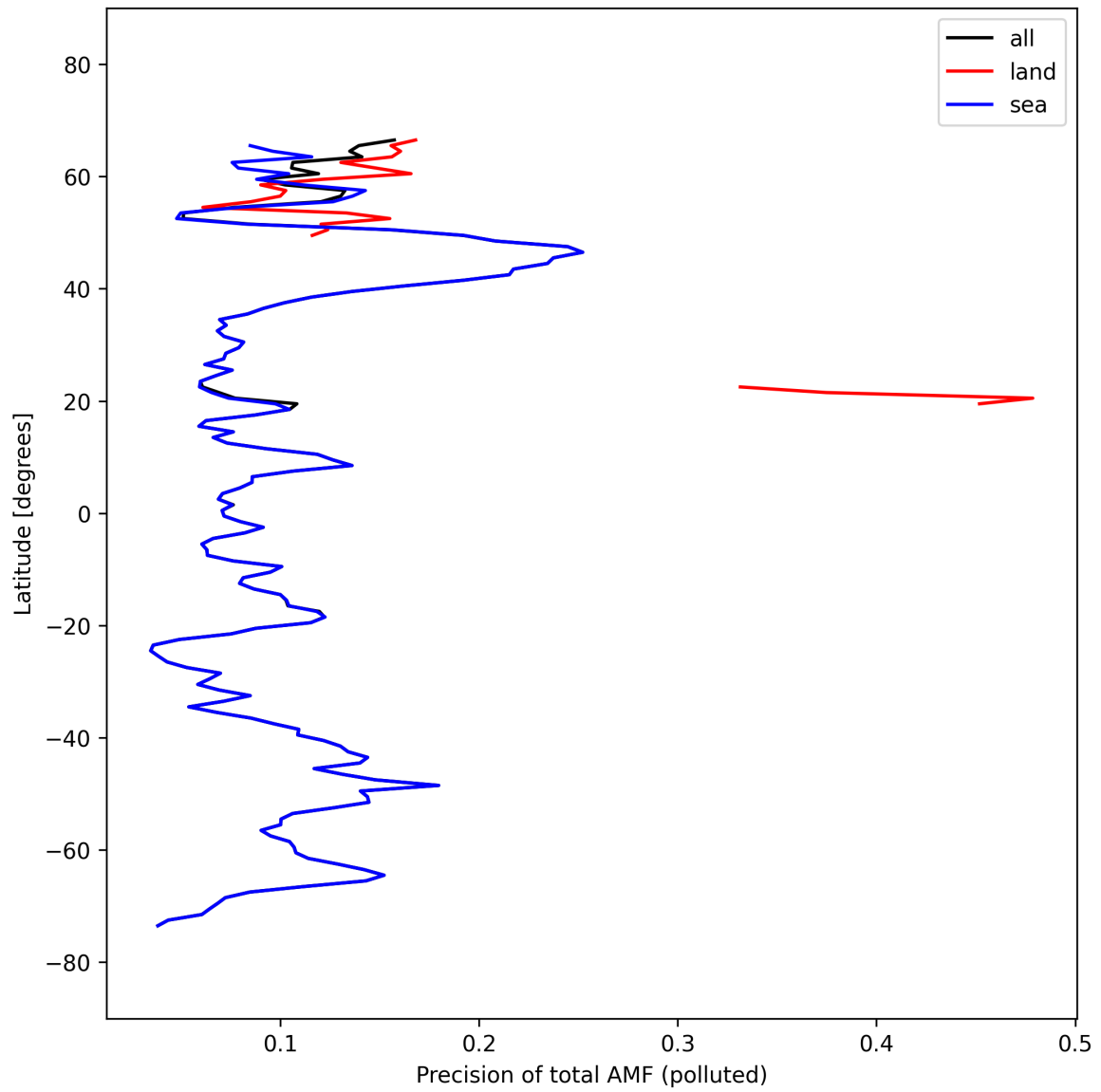


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-10-02 to 2025-10-03.

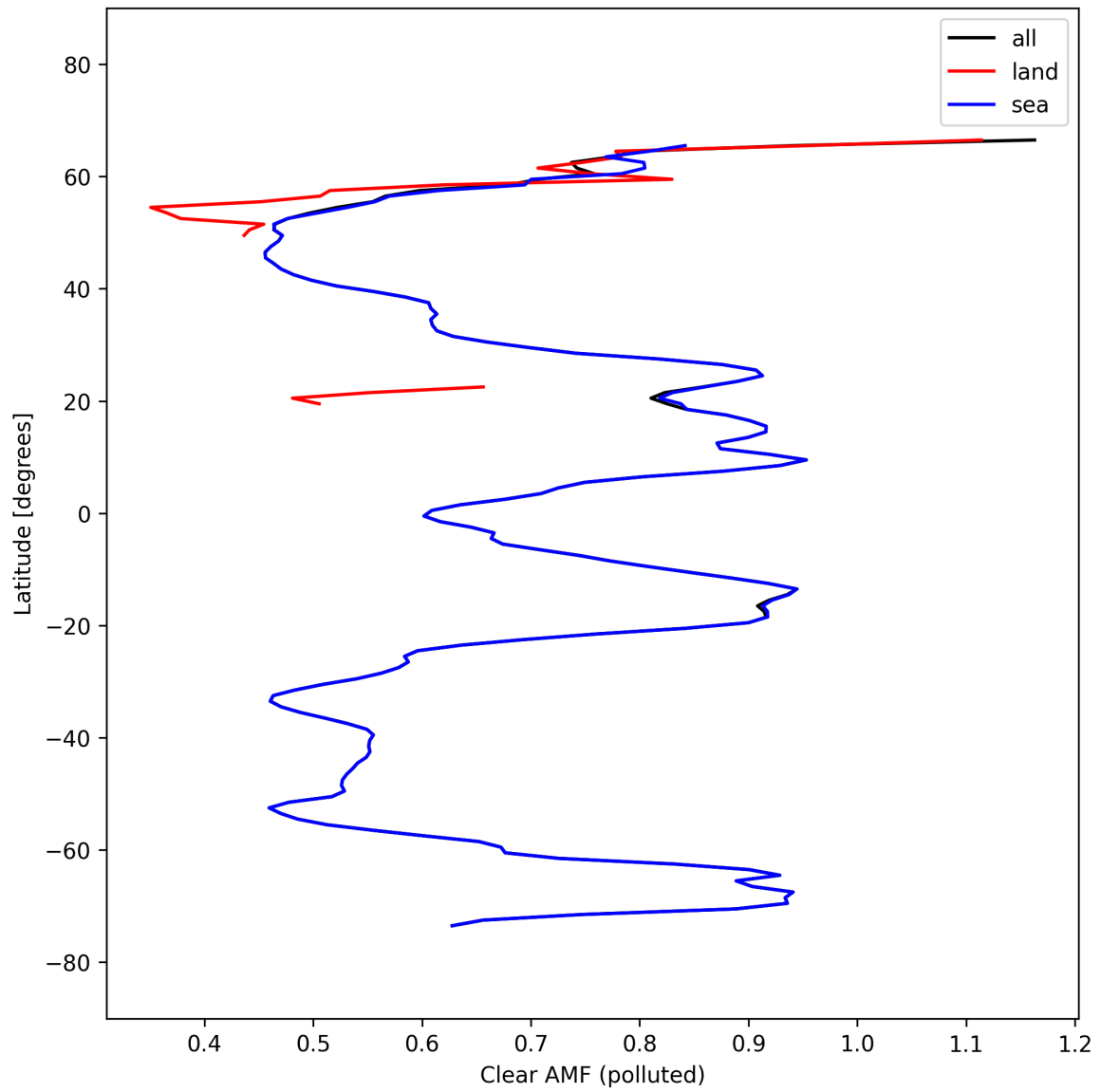


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-10-02 to 2025-10-03.

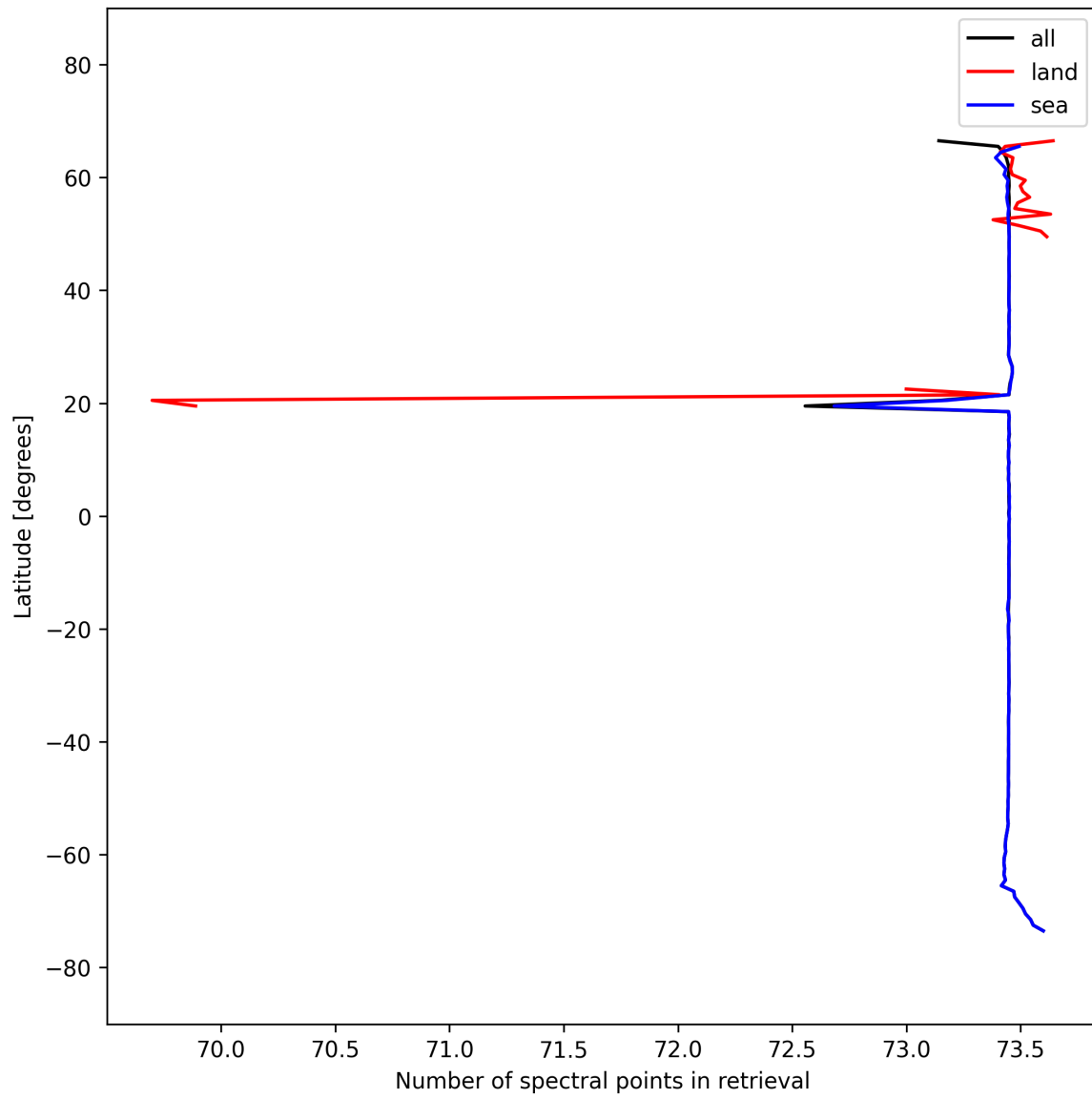


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-10-02 to 2025-10-03.

8 Histograms

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

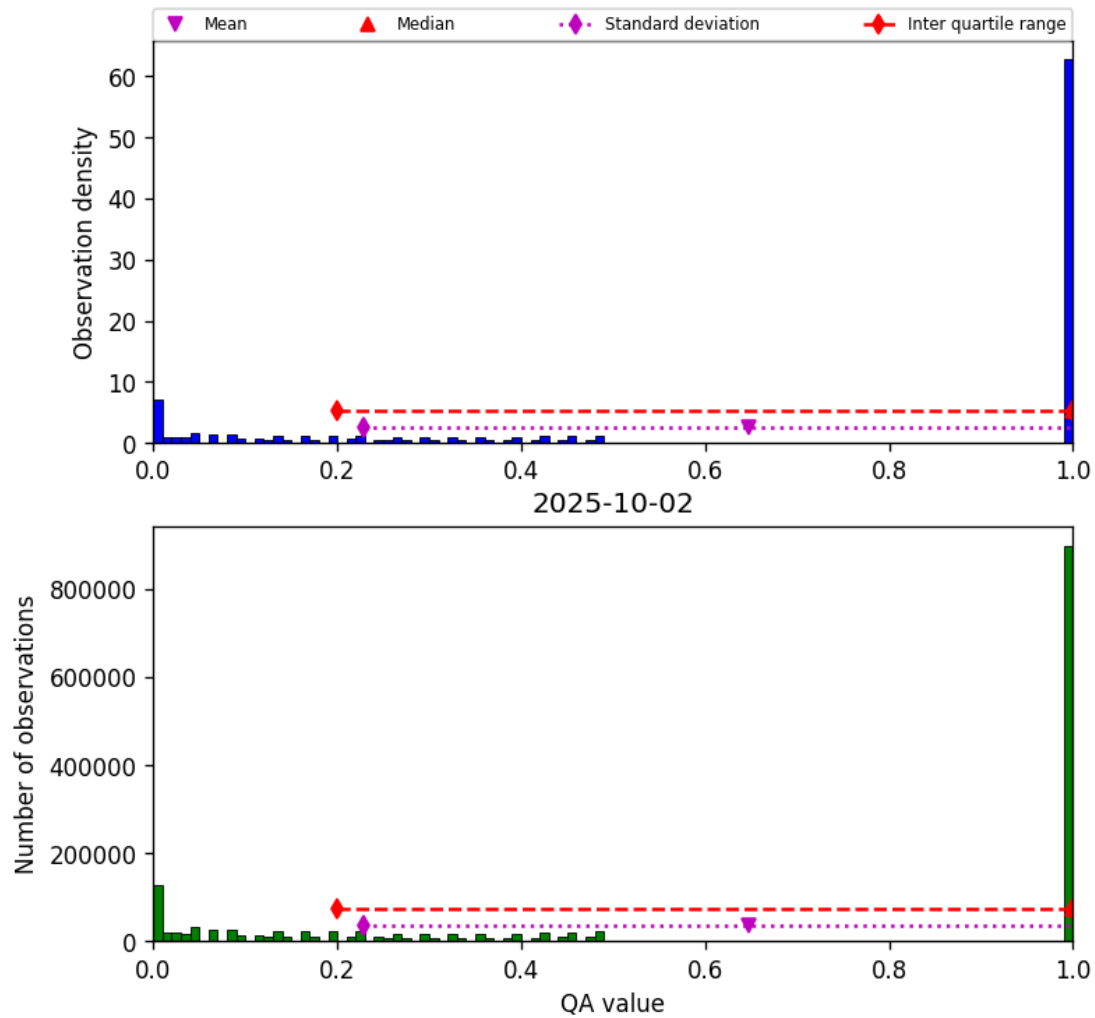


Figure 57: Histogram of “QA value” for 2025-10-02 to 2025-10-03

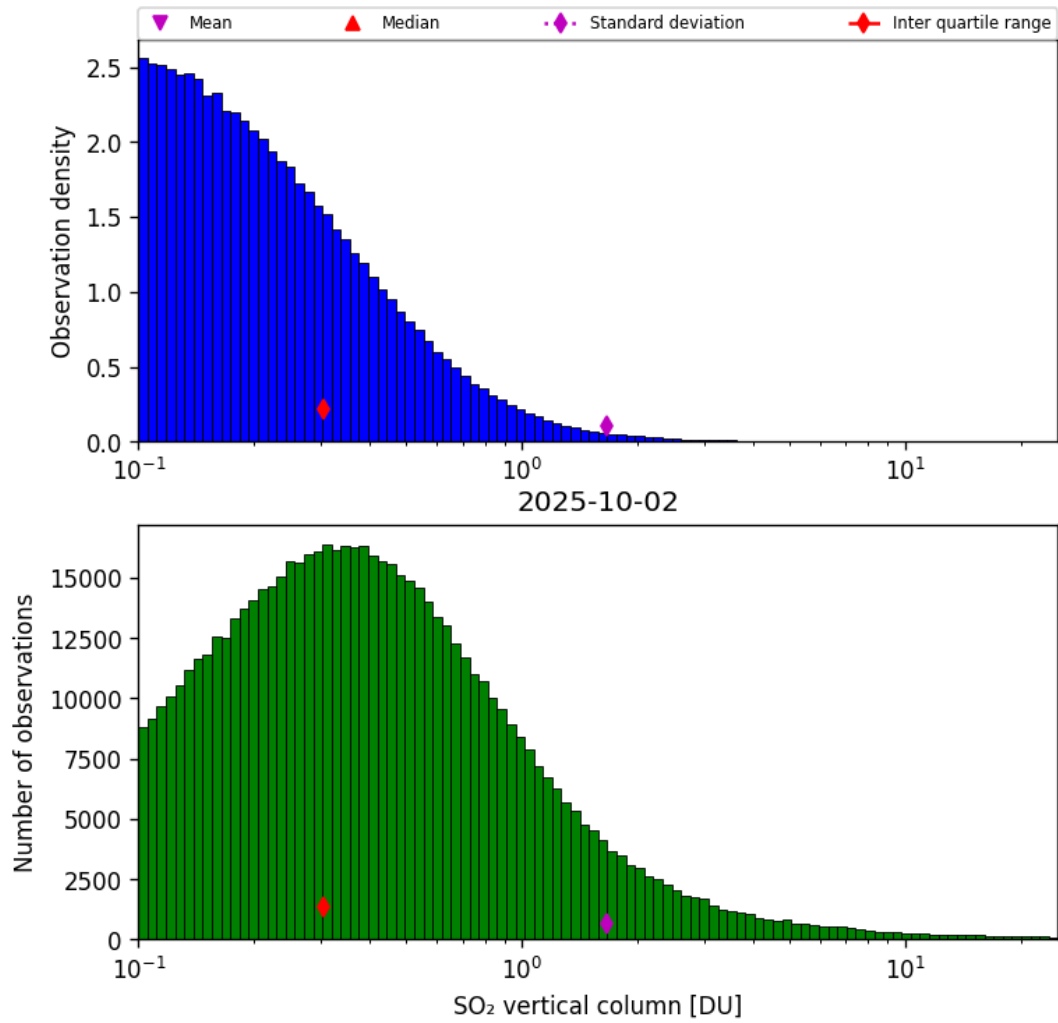


Figure 58: Histogram of “SO₂ vertical column” for 2025-10-02 to 2025-10-03

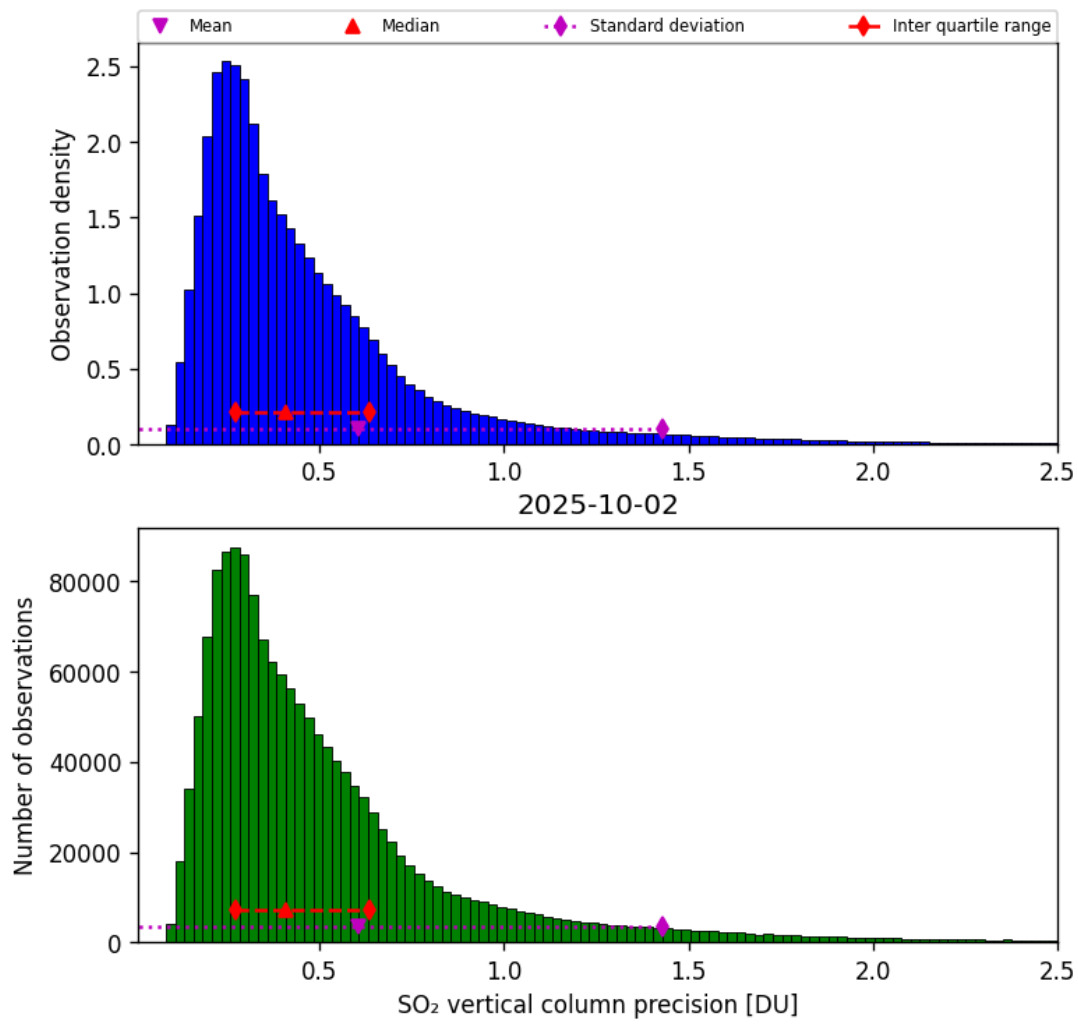


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-10-02 to 2025-10-03

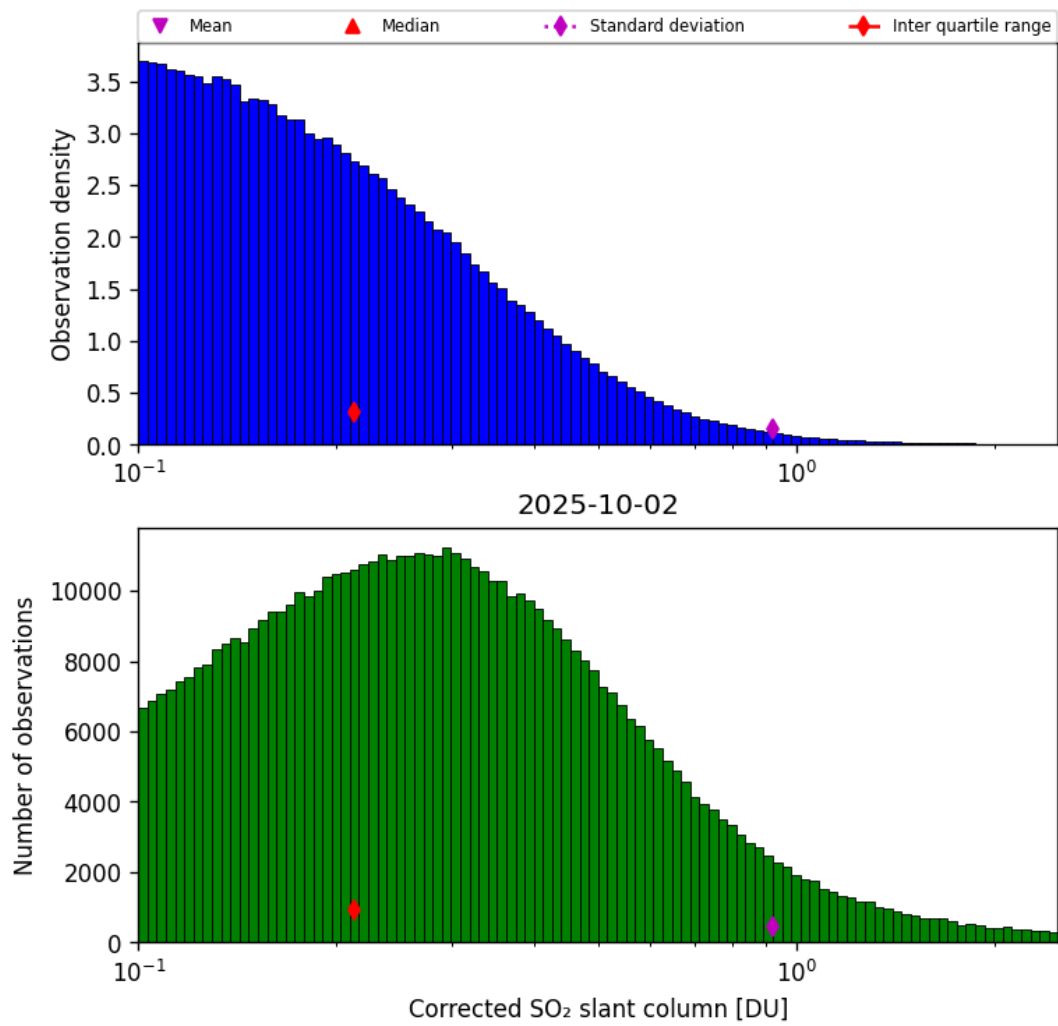


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-10-02 to 2025-10-03

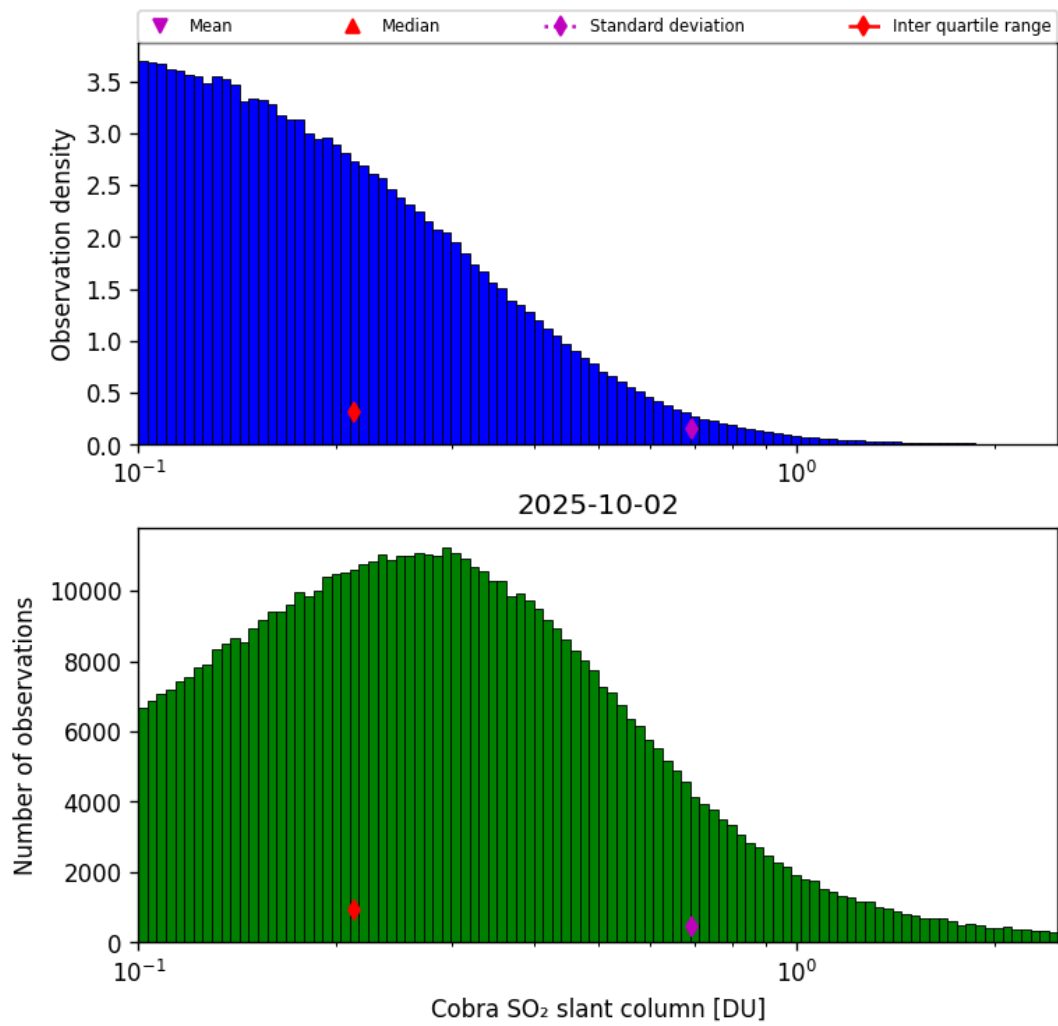


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-10-02 to 2025-10-03

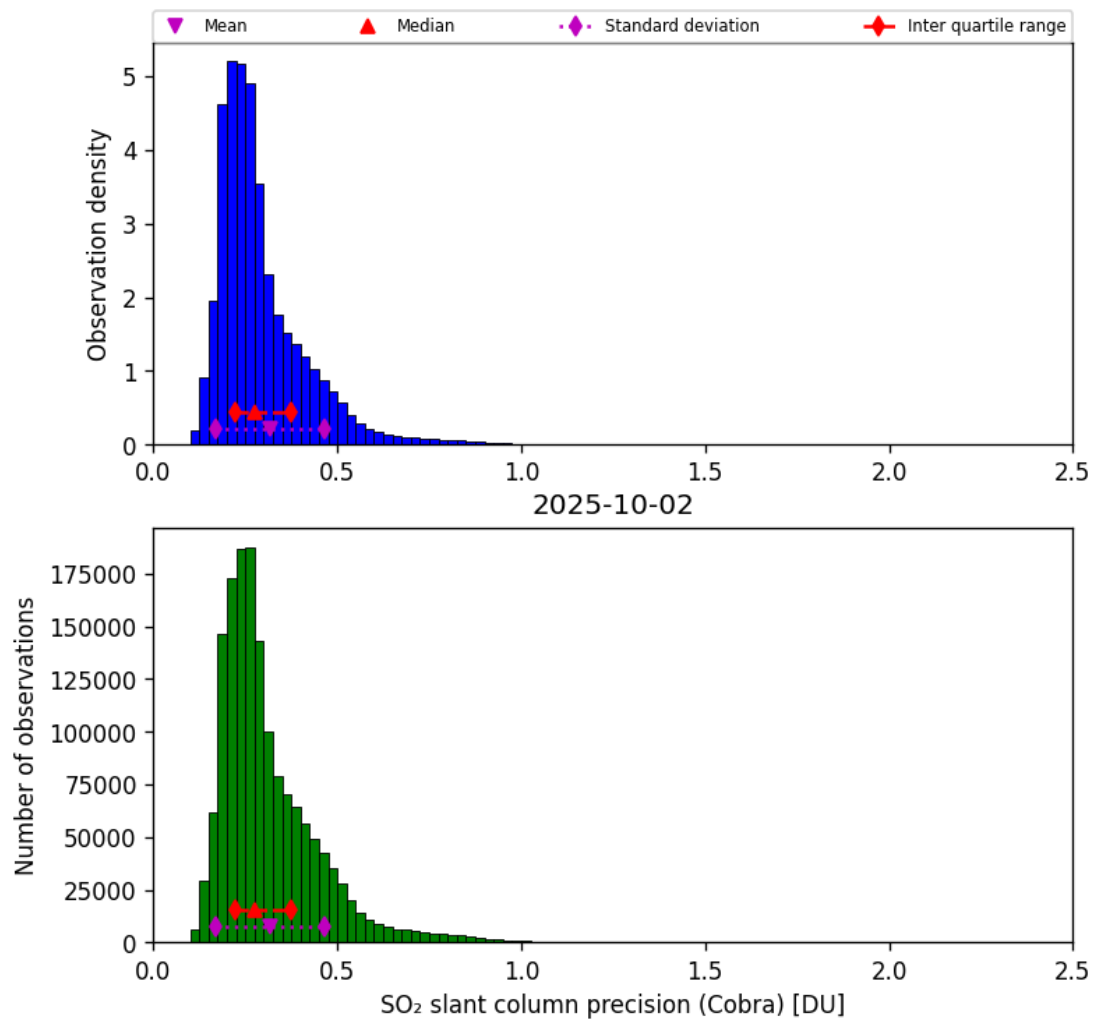


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-10-02 to 2025-10-03

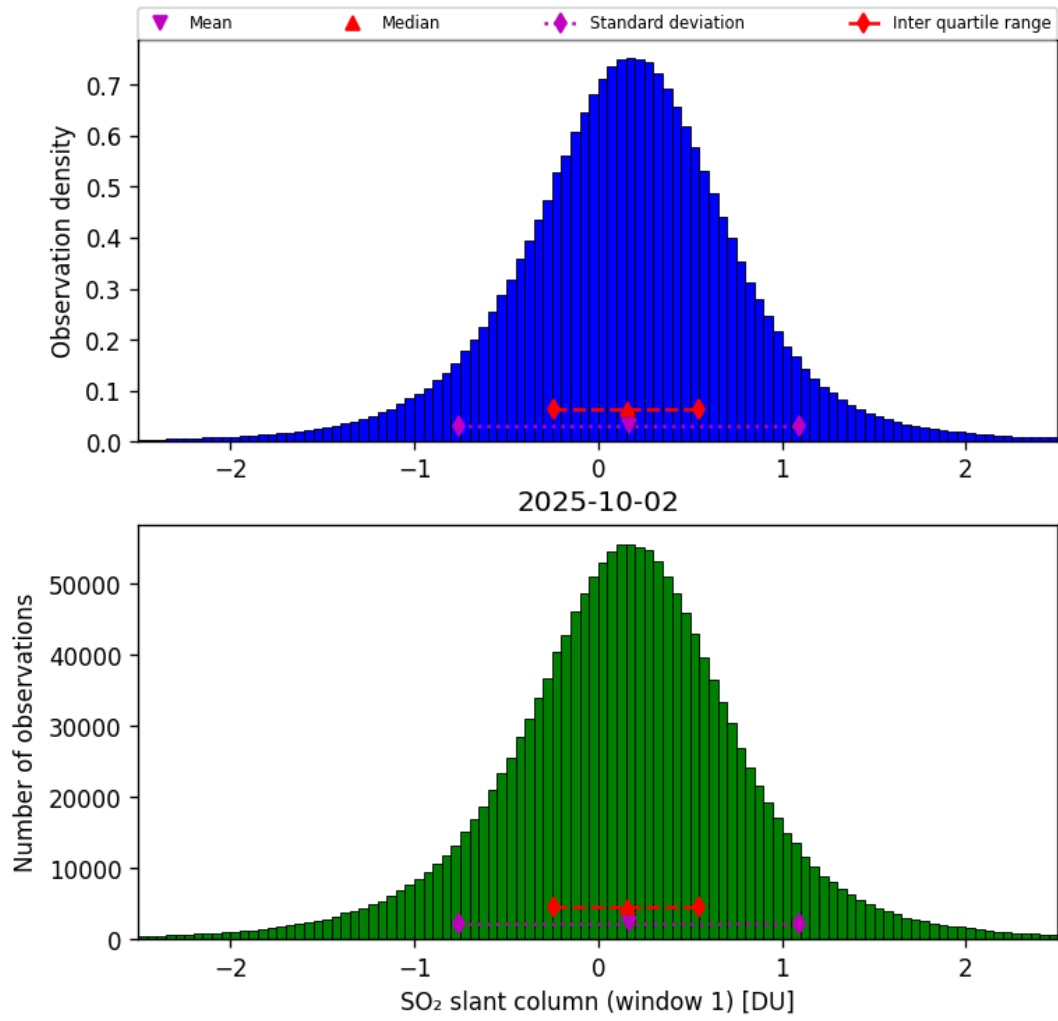


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-10-02 to 2025-10-03

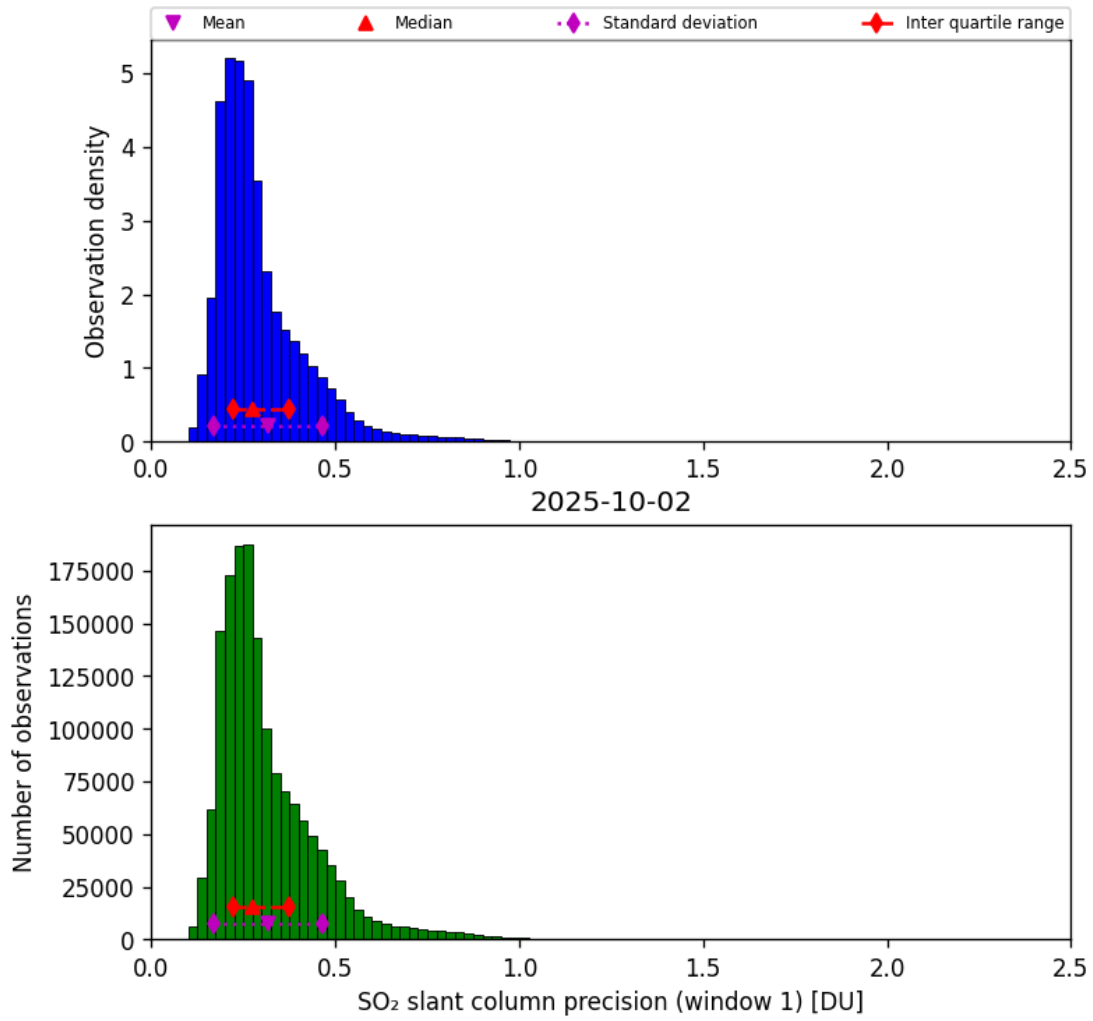


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-10-02 to 2025-10-03

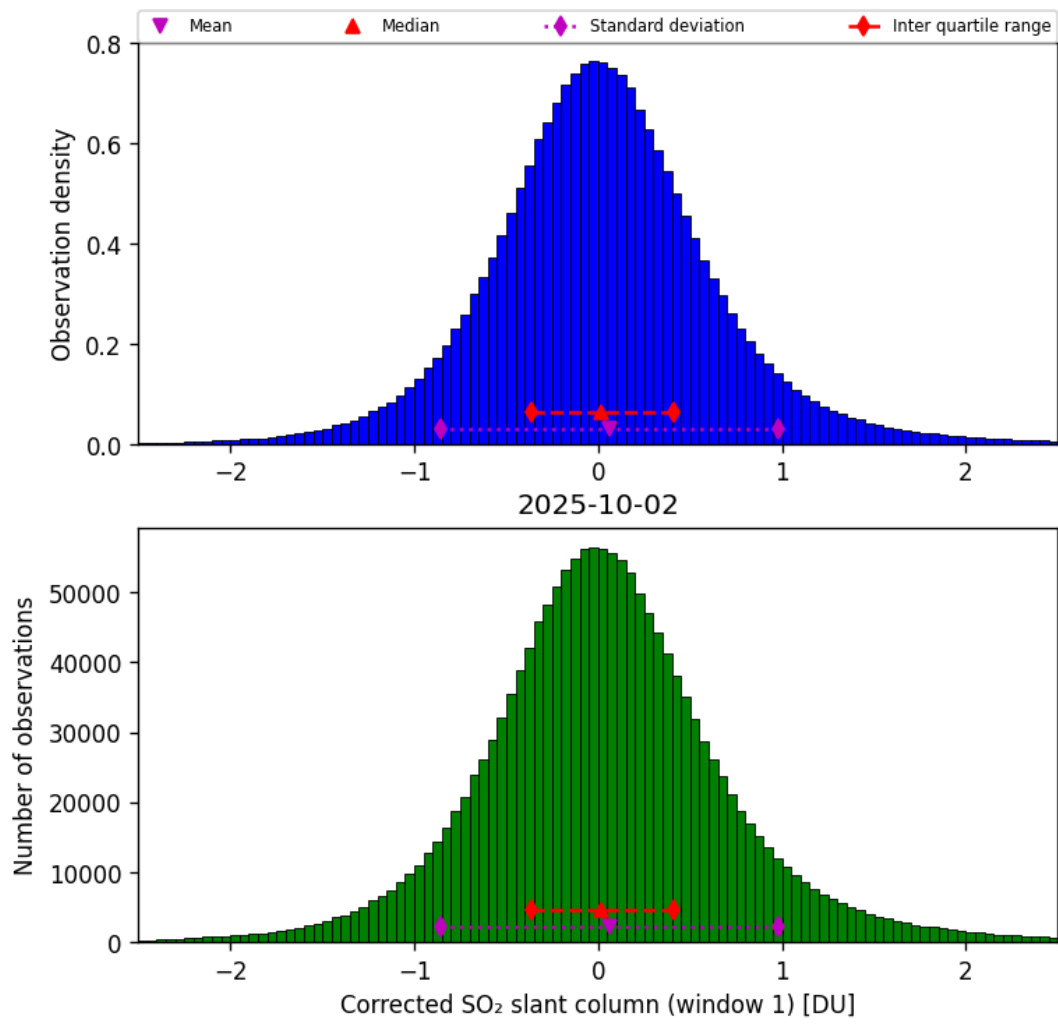


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-10-02 to 2025-10-03

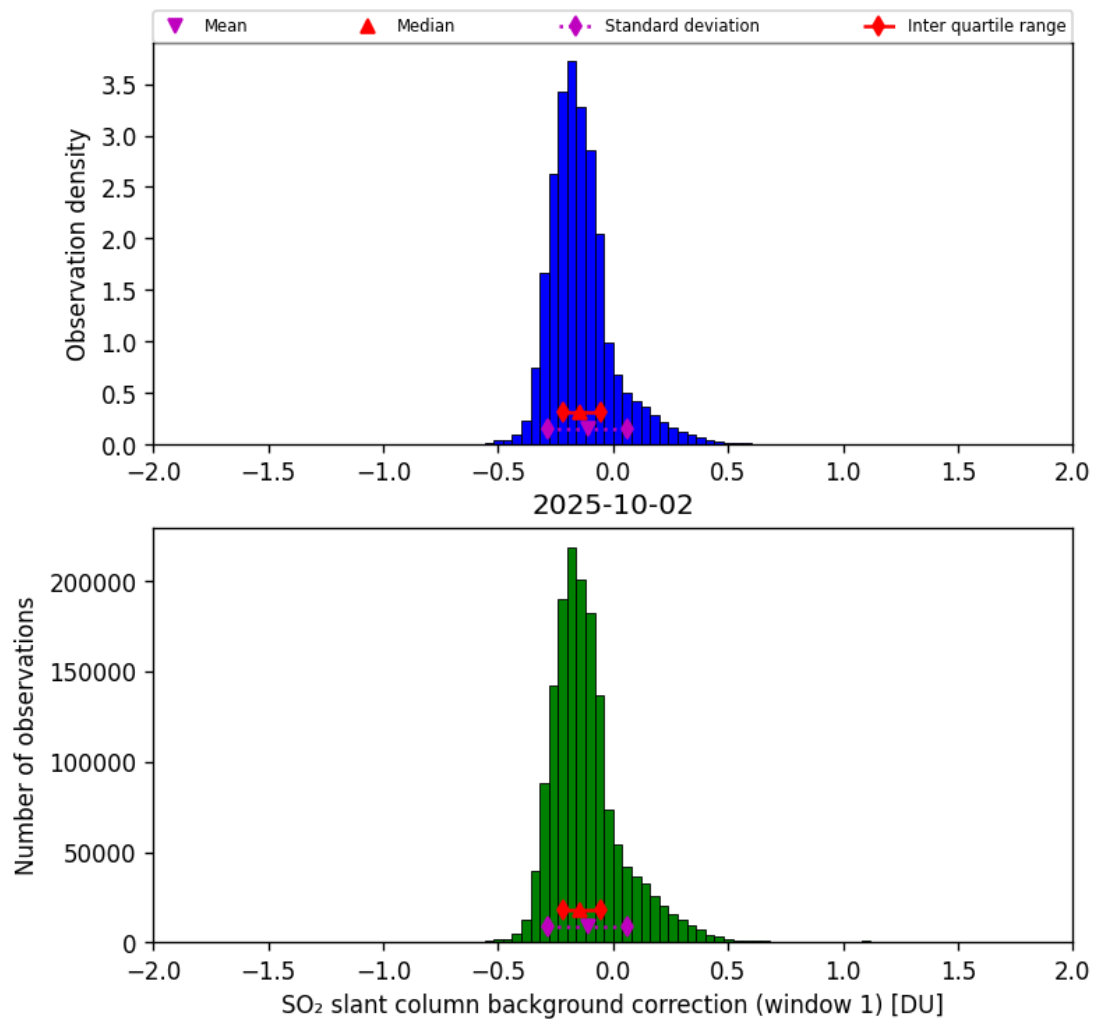


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-10-02 to 2025-10-03

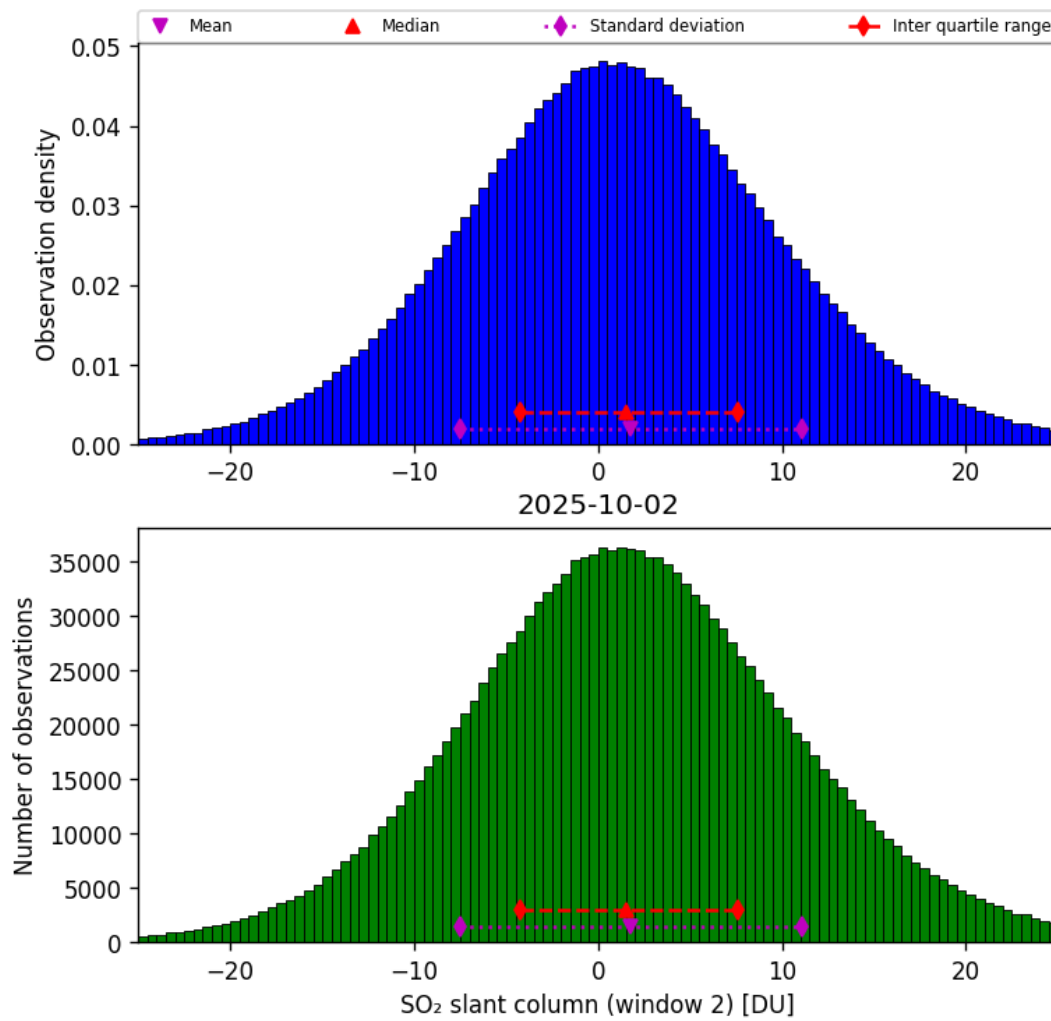


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-10-02 to 2025-10-03

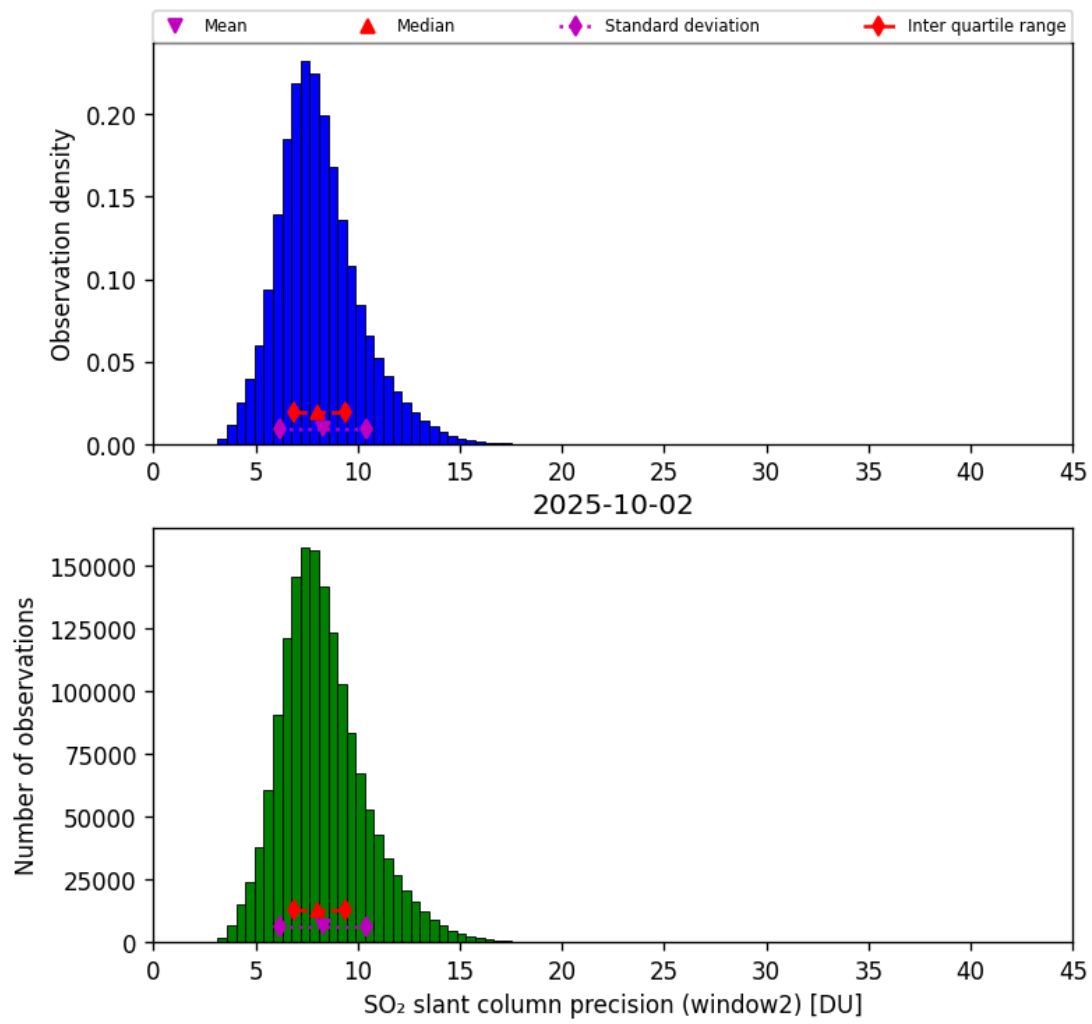


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-10-02 to 2025-10-03

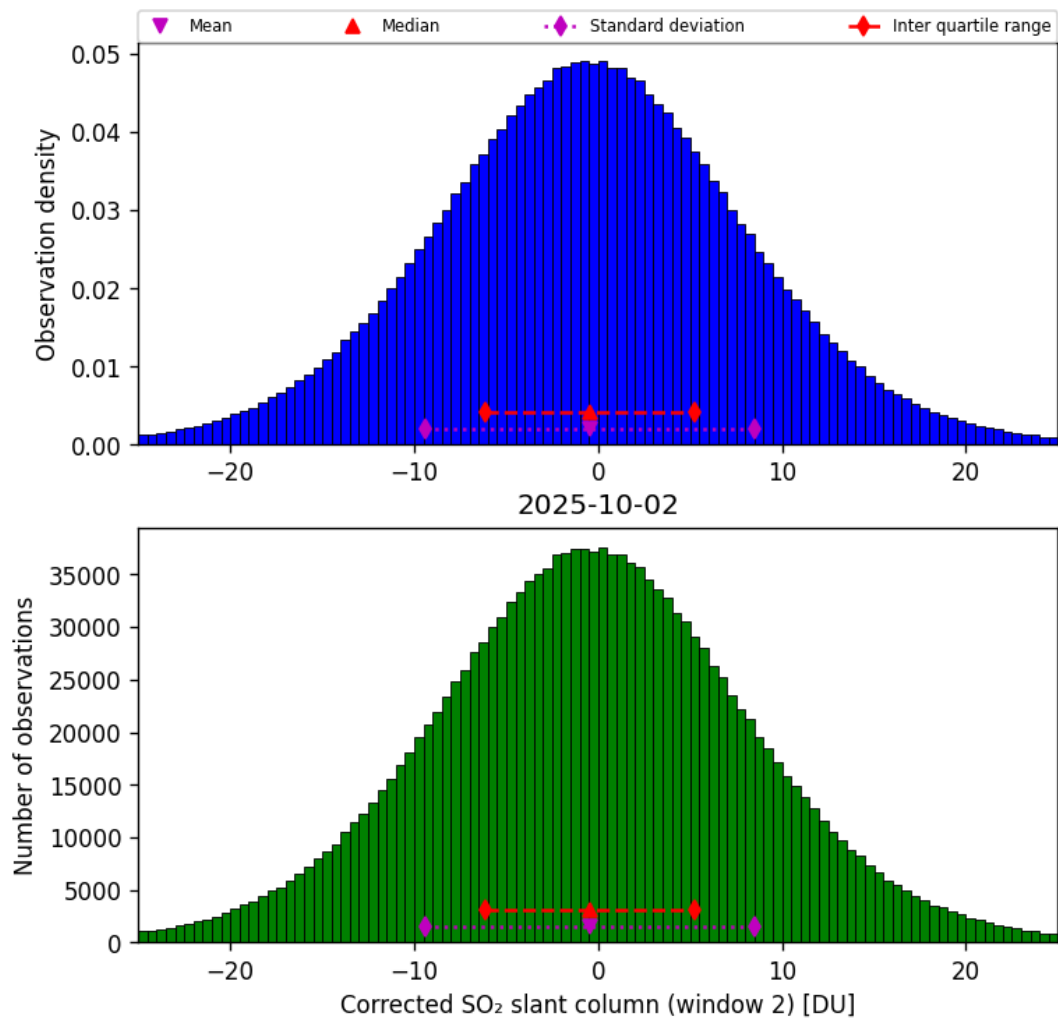


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-10-02 to 2025-10-03

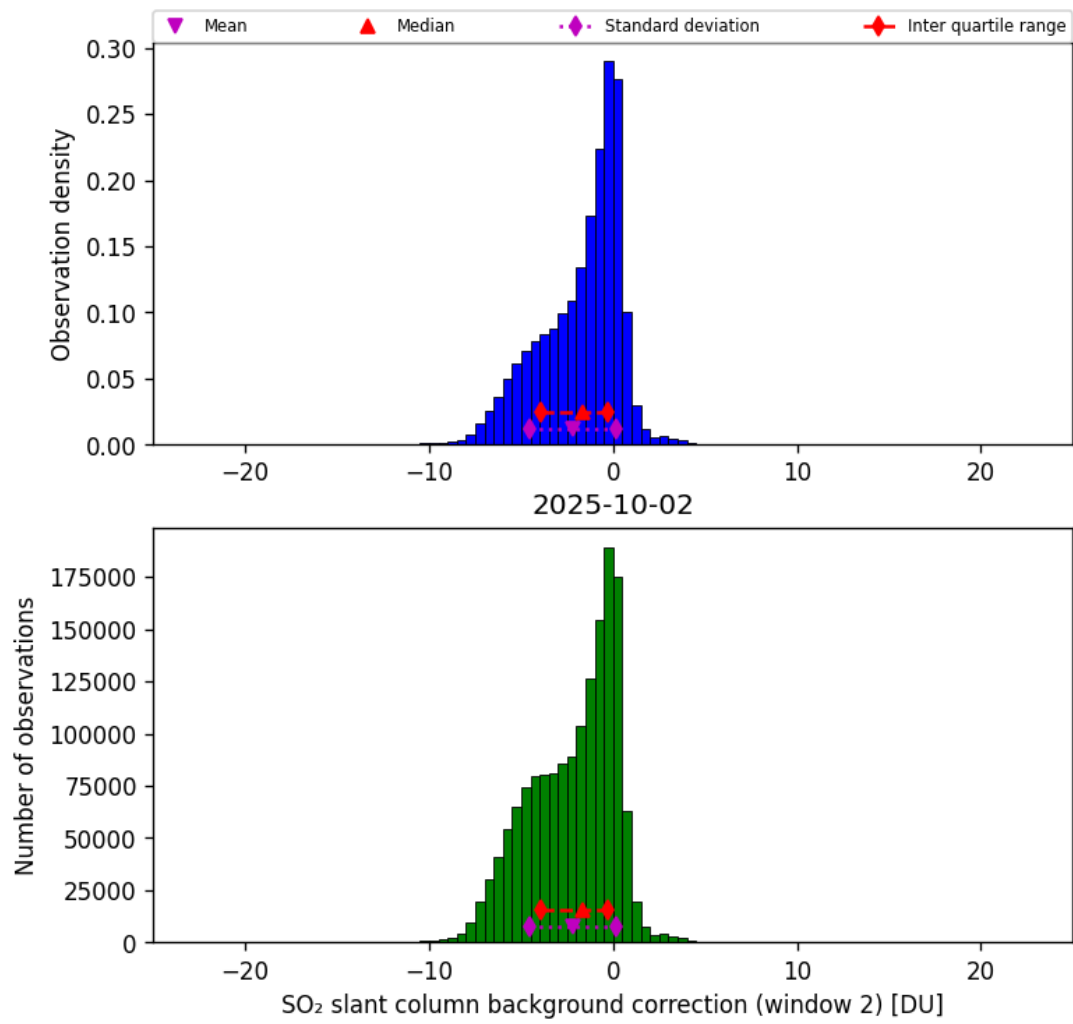


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-10-02 to 2025-10-03

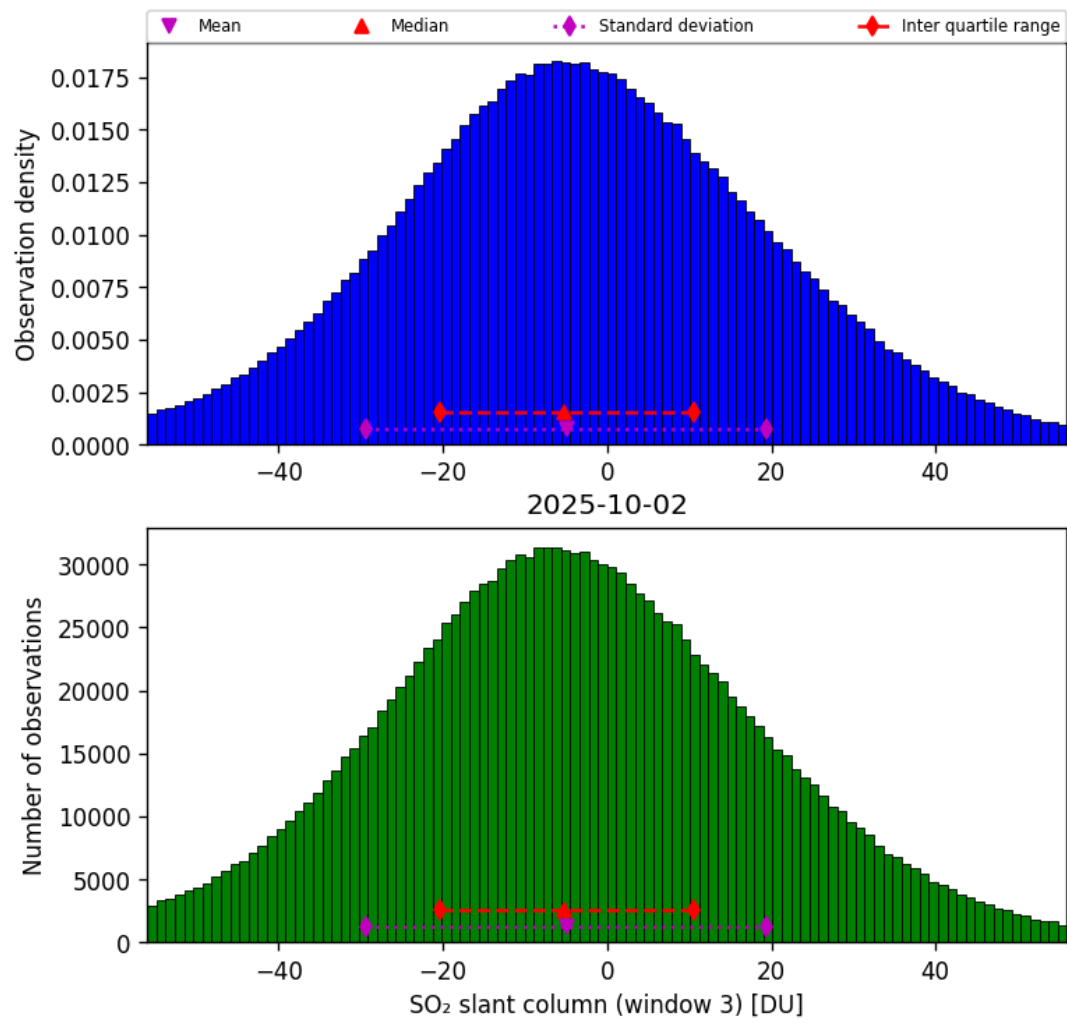


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-10-02 to 2025-10-03

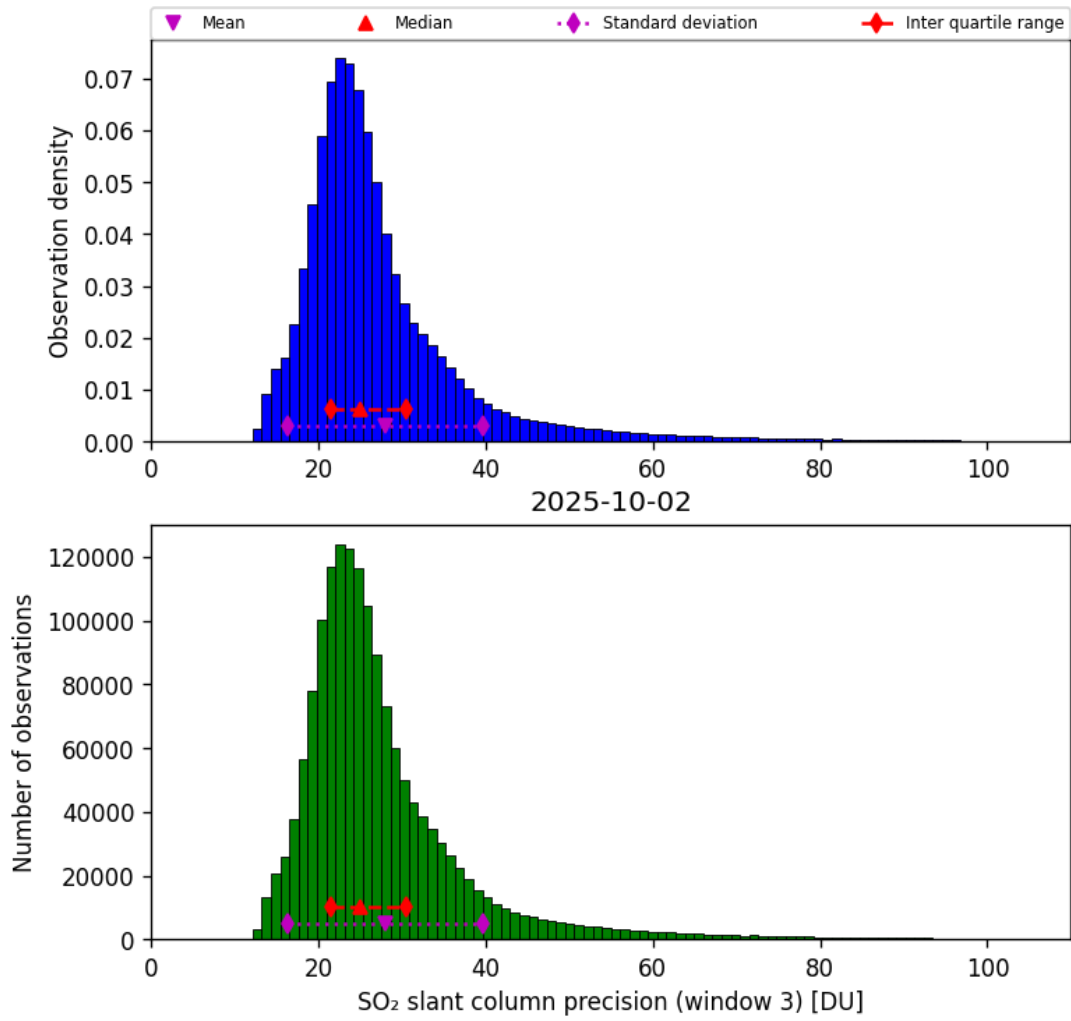


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-10-02 to 2025-10-03

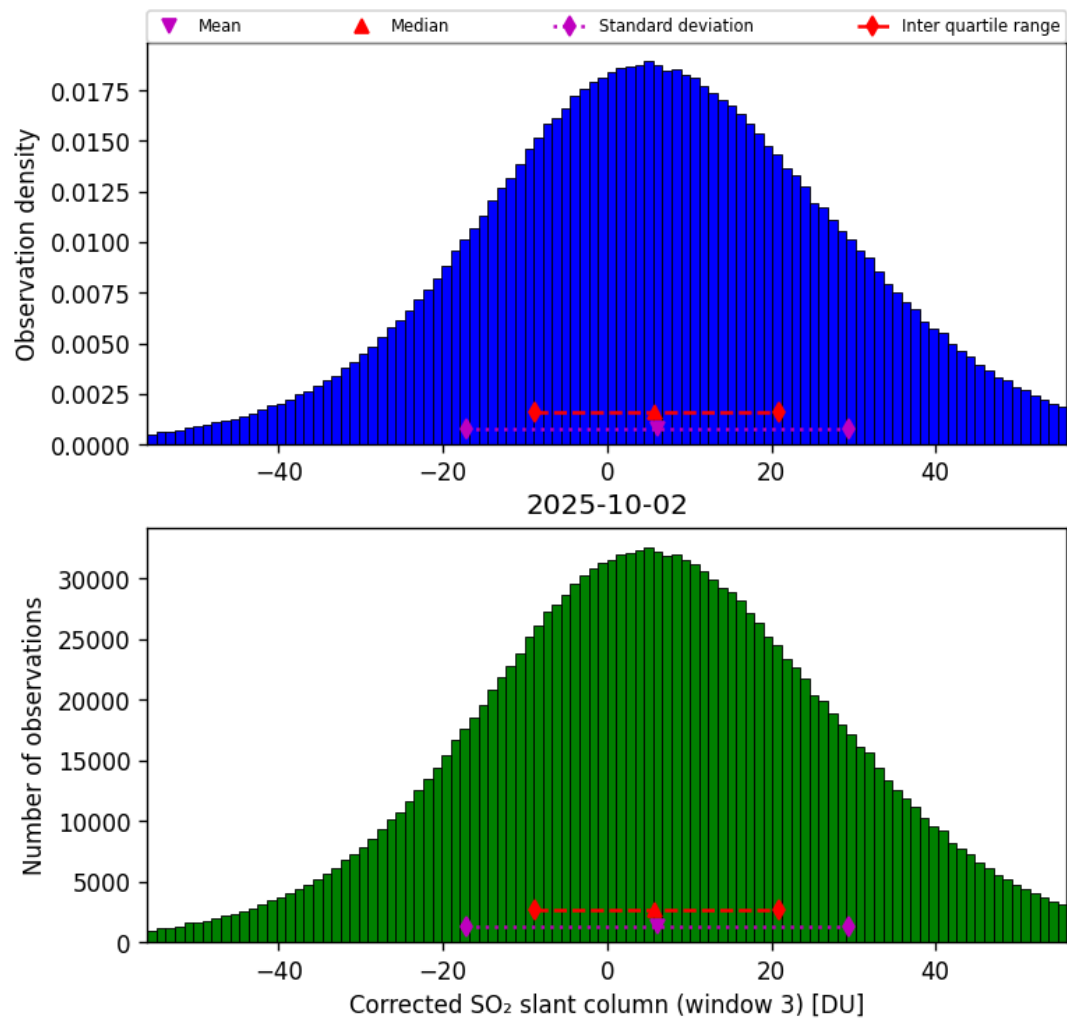


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-10-02 to 2025-10-03

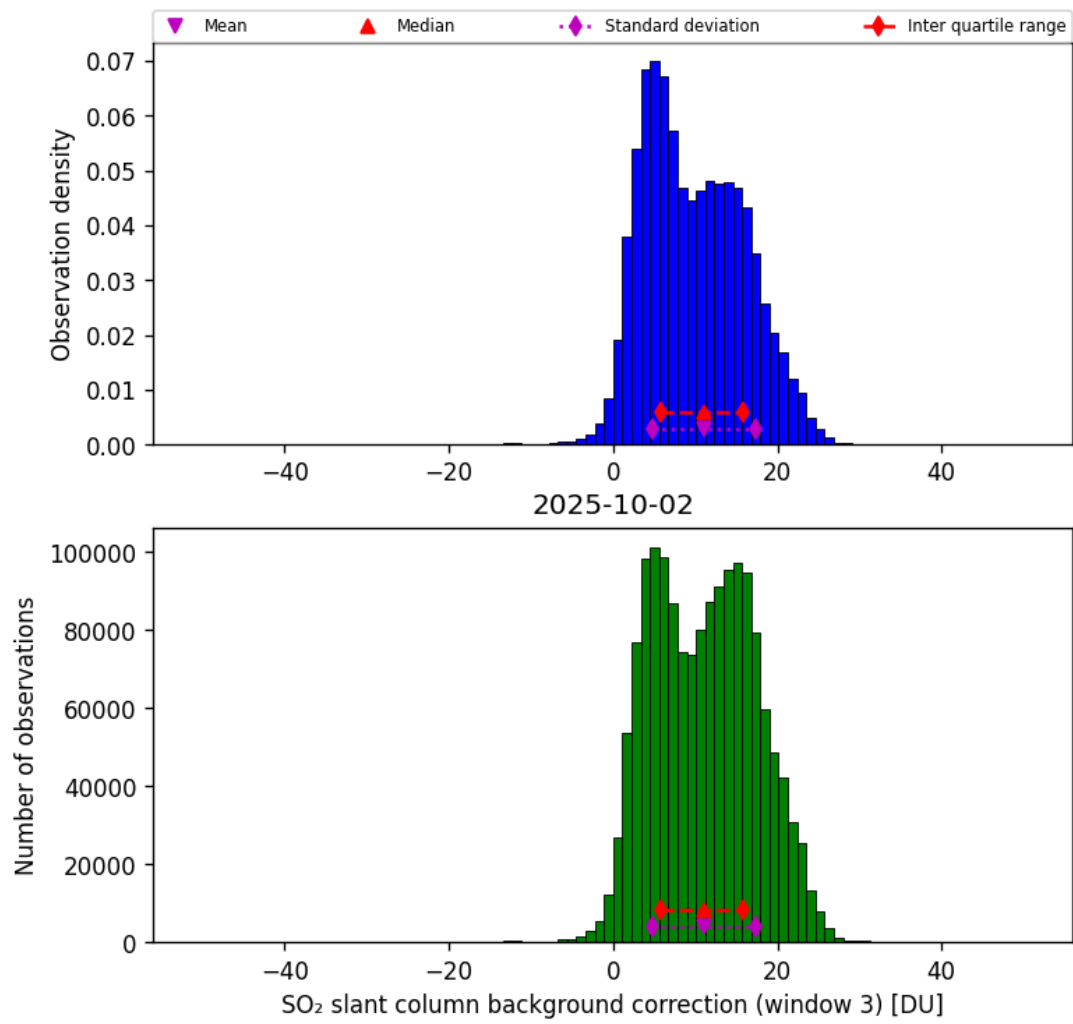


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-10-02 to 2025-10-03

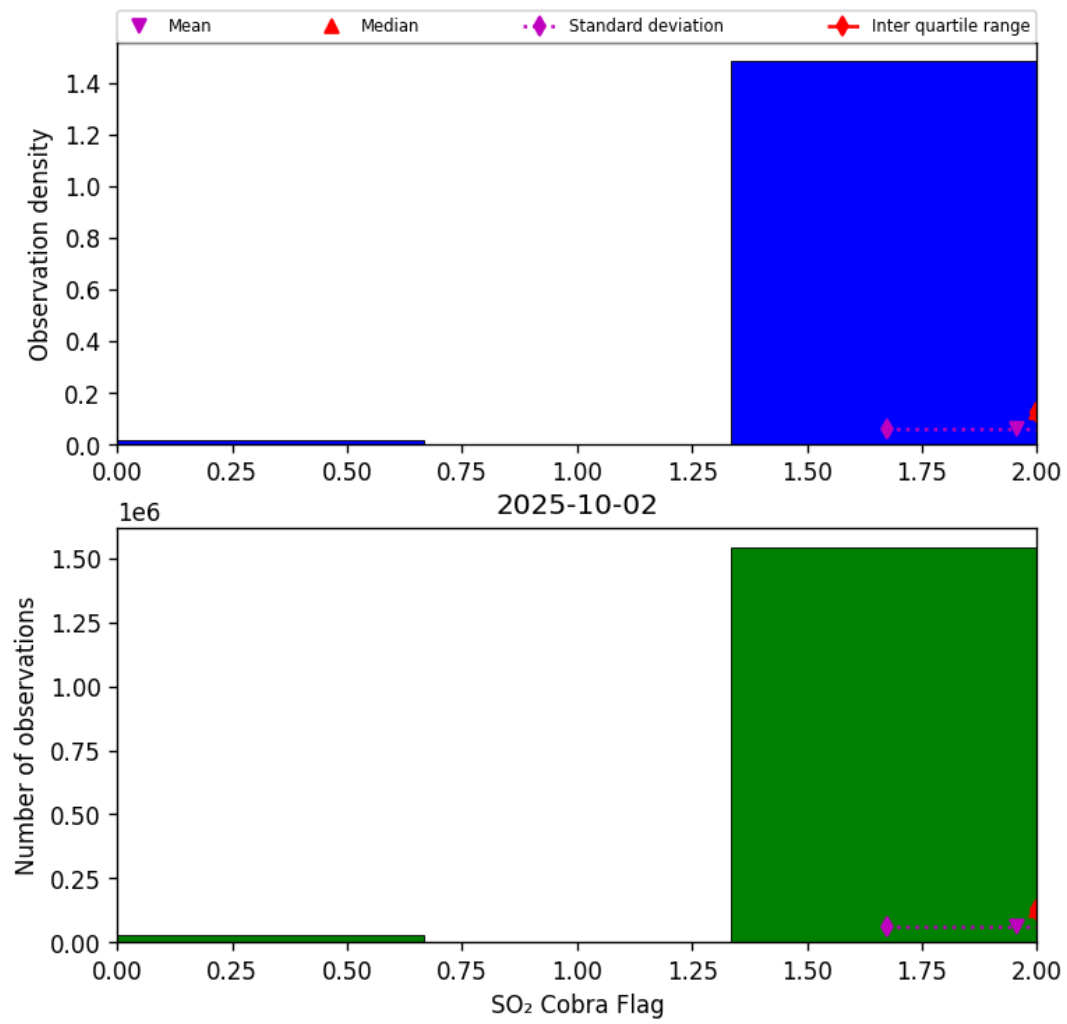


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-10-02 to 2025-10-03

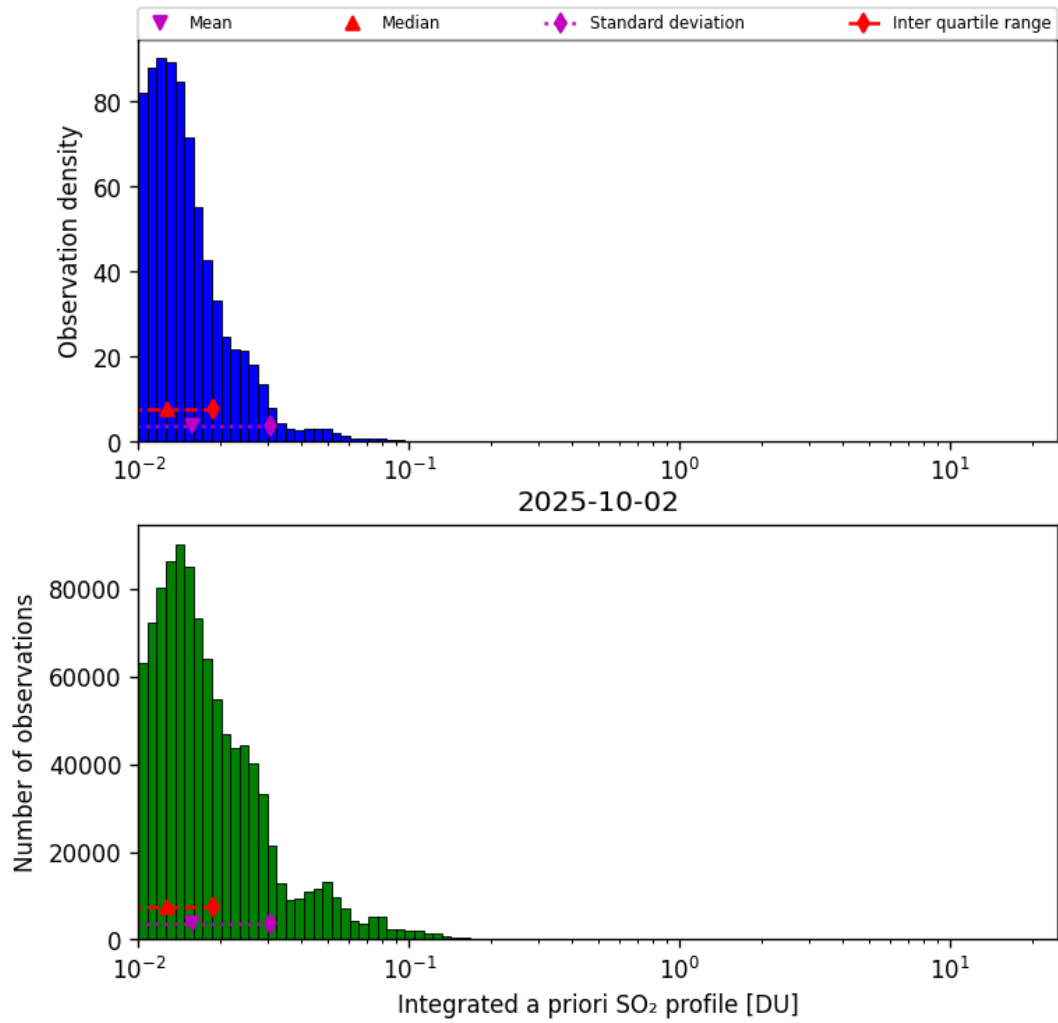


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-10-02 to 2025-10-03

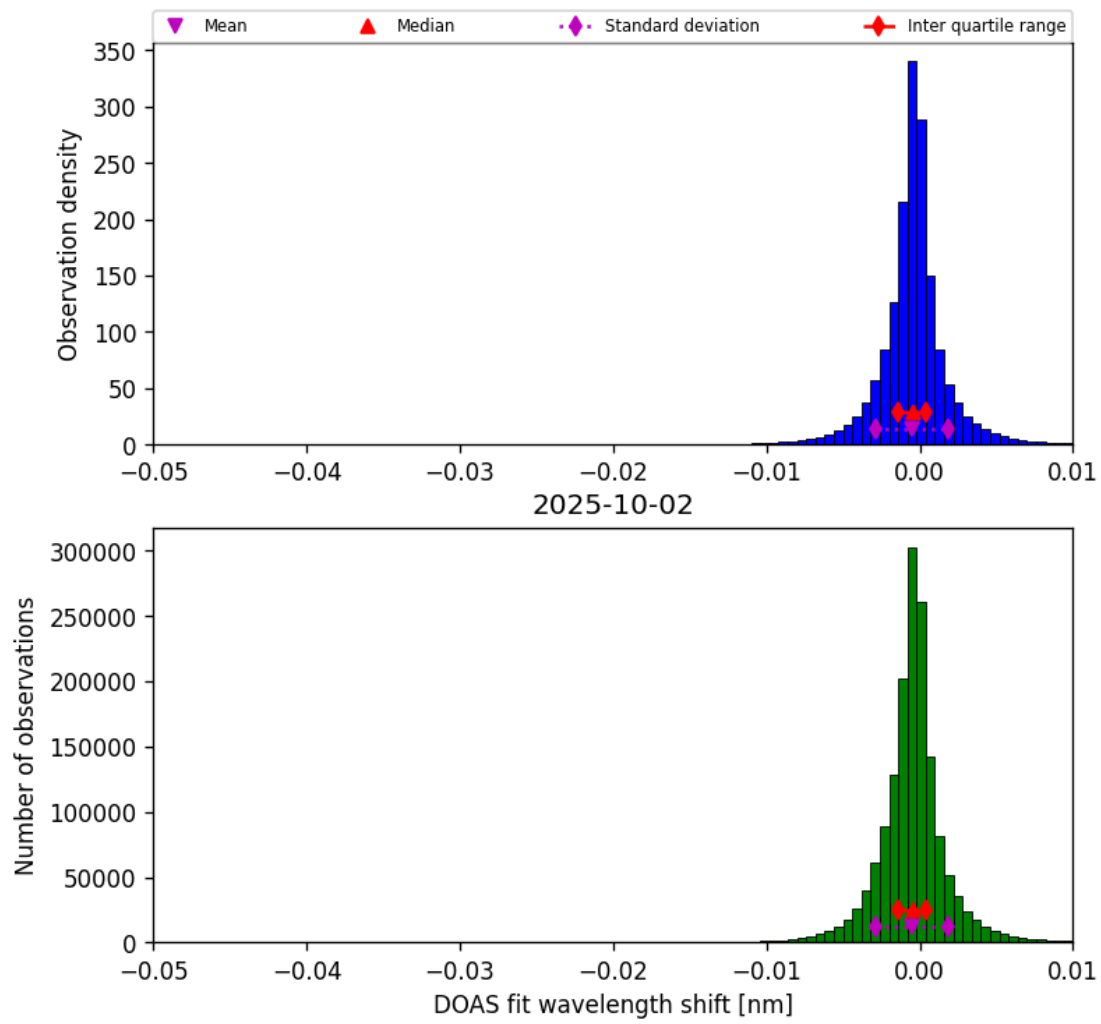


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-10-02 to 2025-10-03

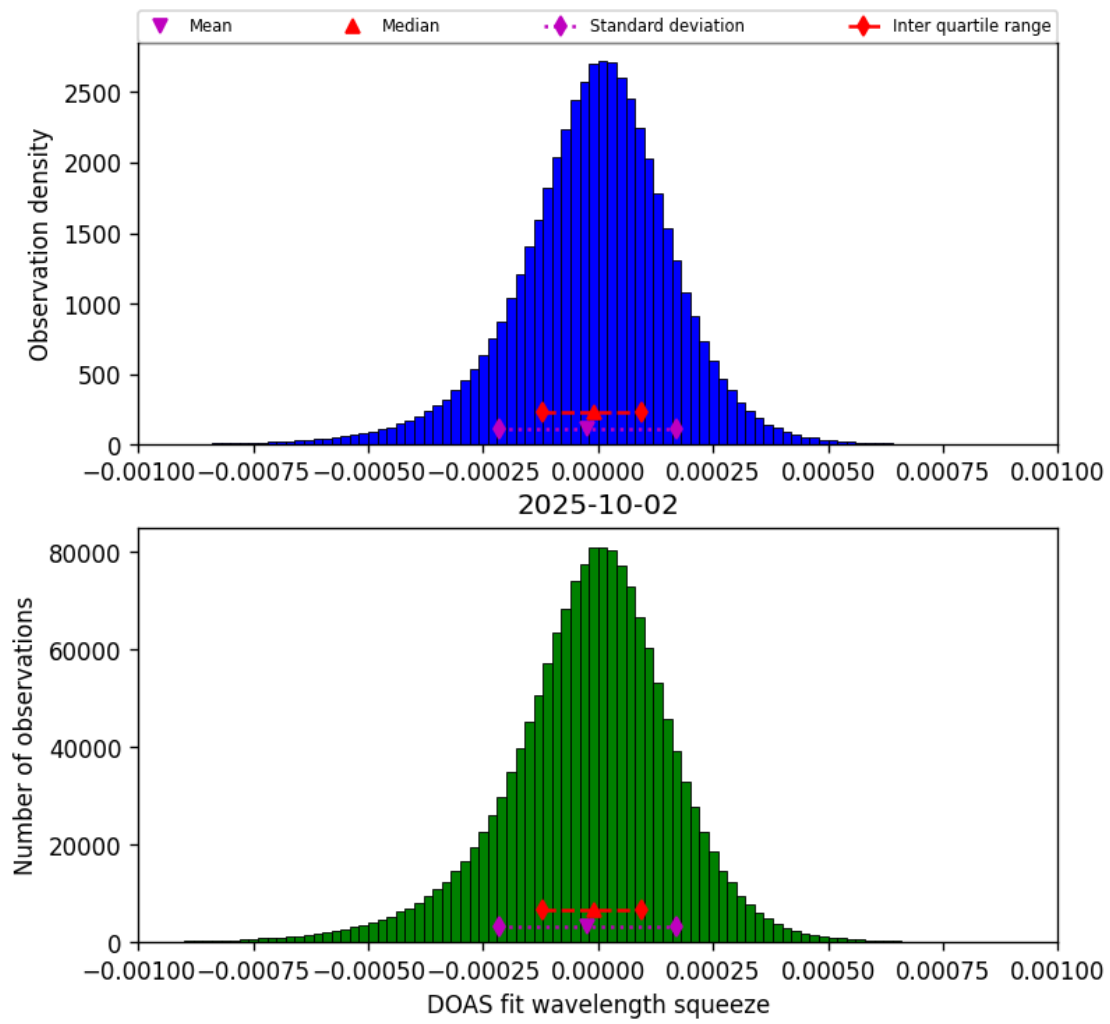


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-10-02 to 2025-10-03

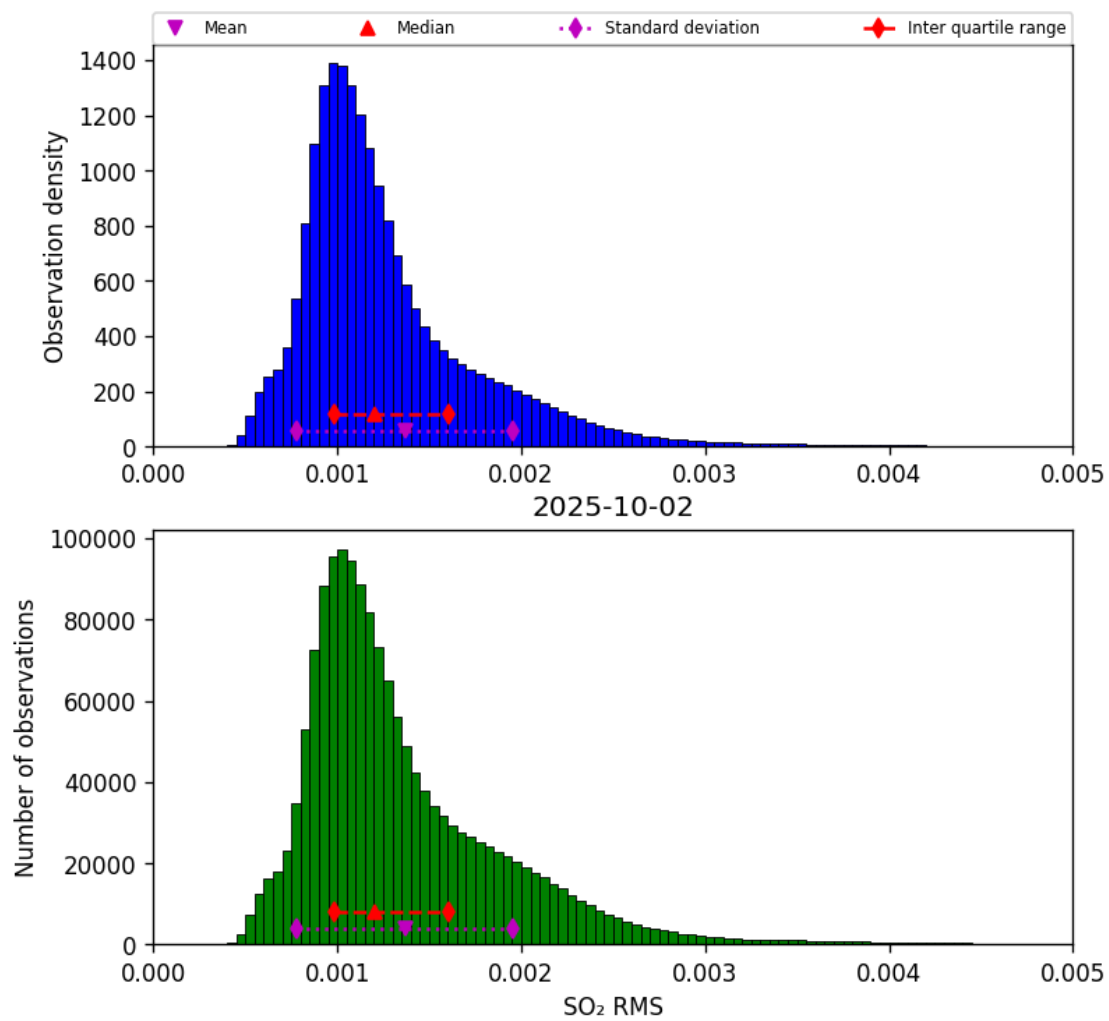


Figure 79: Histogram of “SO₂ RMS” for 2025-10-02 to 2025-10-03

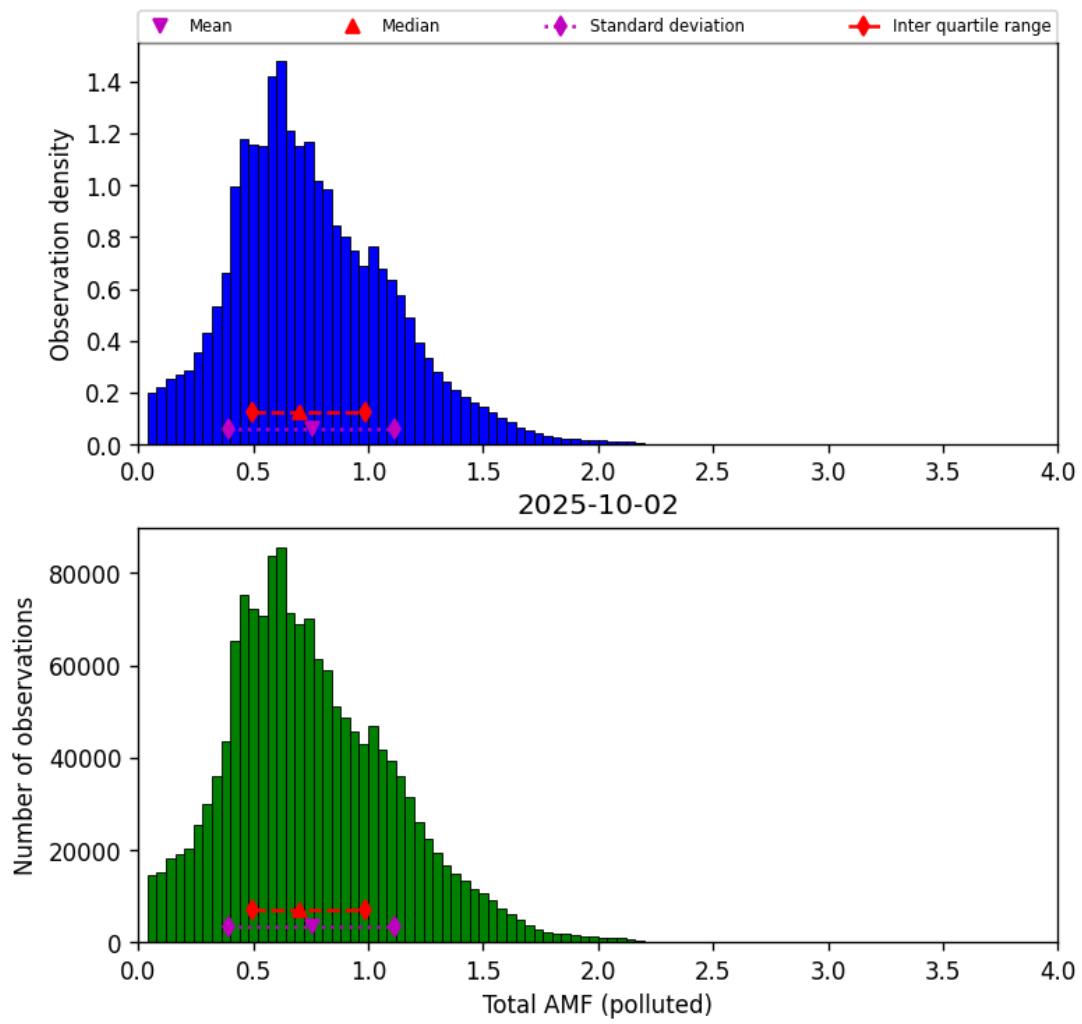


Figure 80: Histogram of “Total AMF (polluted)” for 2025-10-02 to 2025-10-03

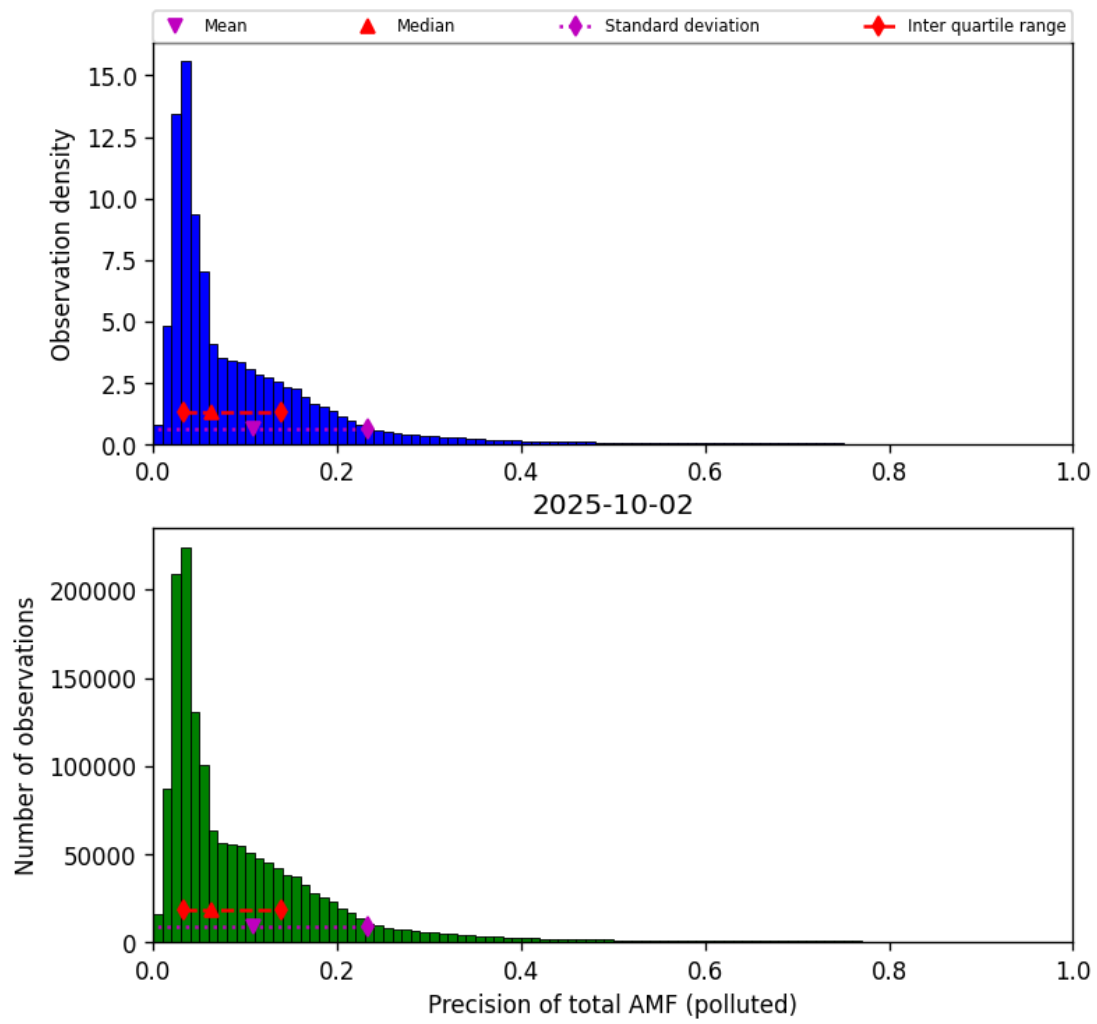


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-10-02 to 2025-10-03

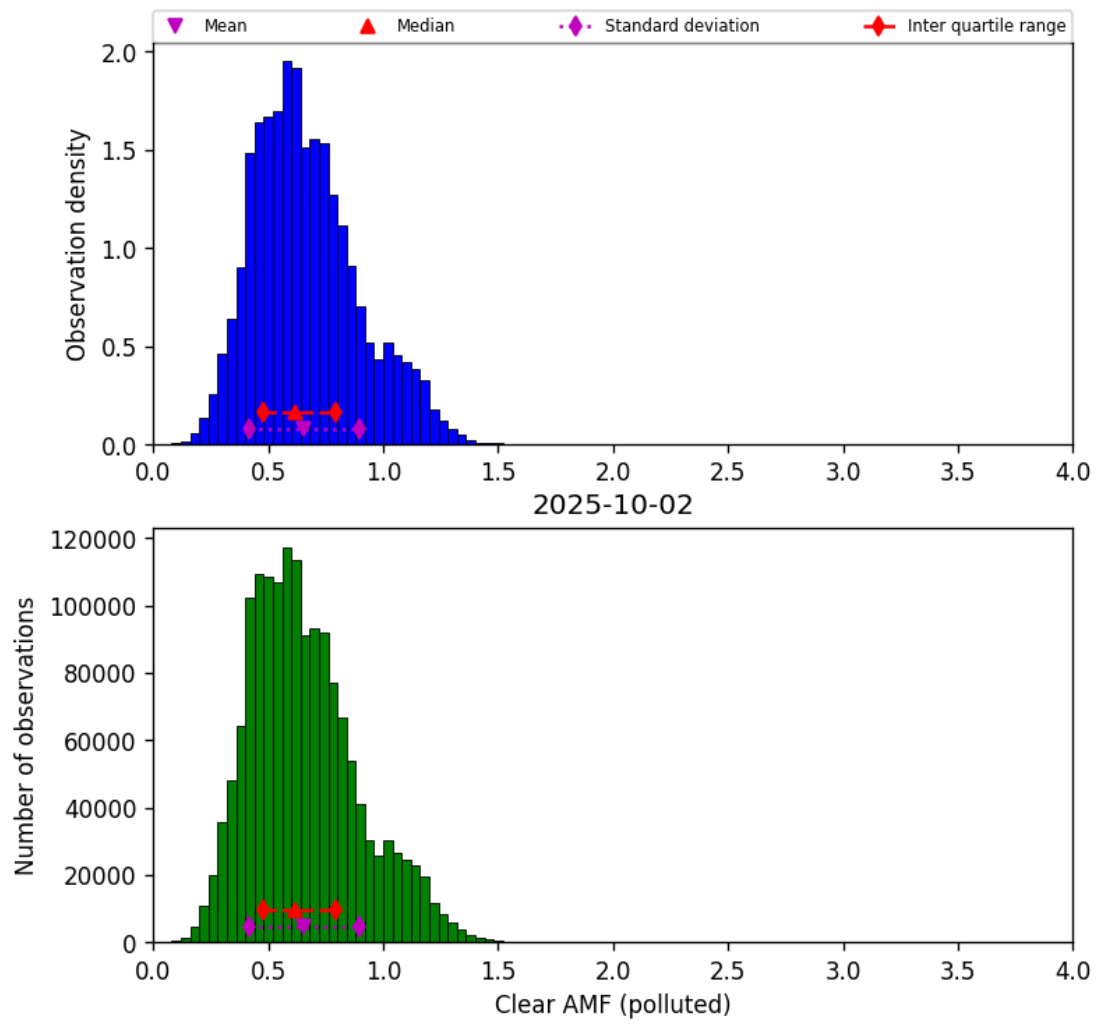


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-10-02 to 2025-10-03

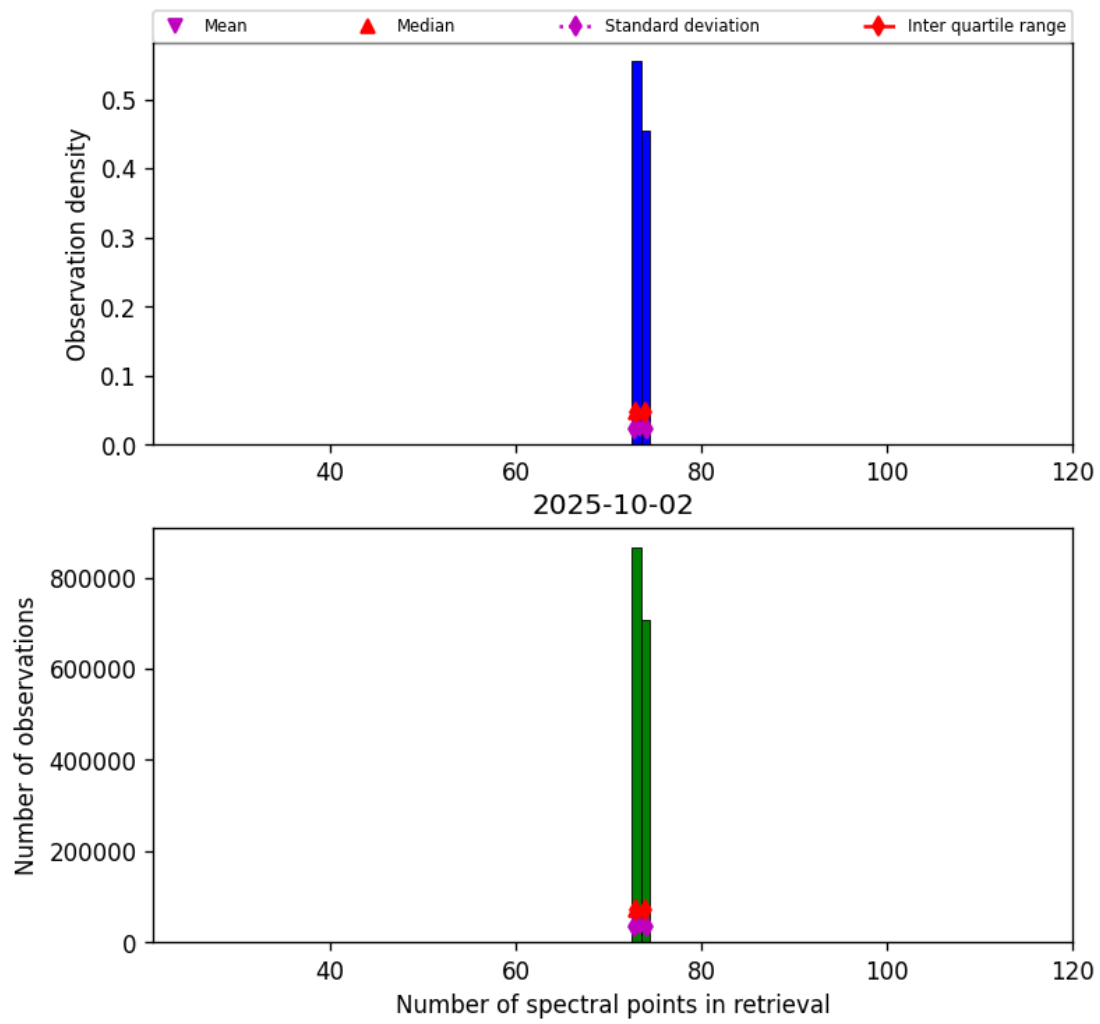


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-10-02 to 2025-10-03

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.

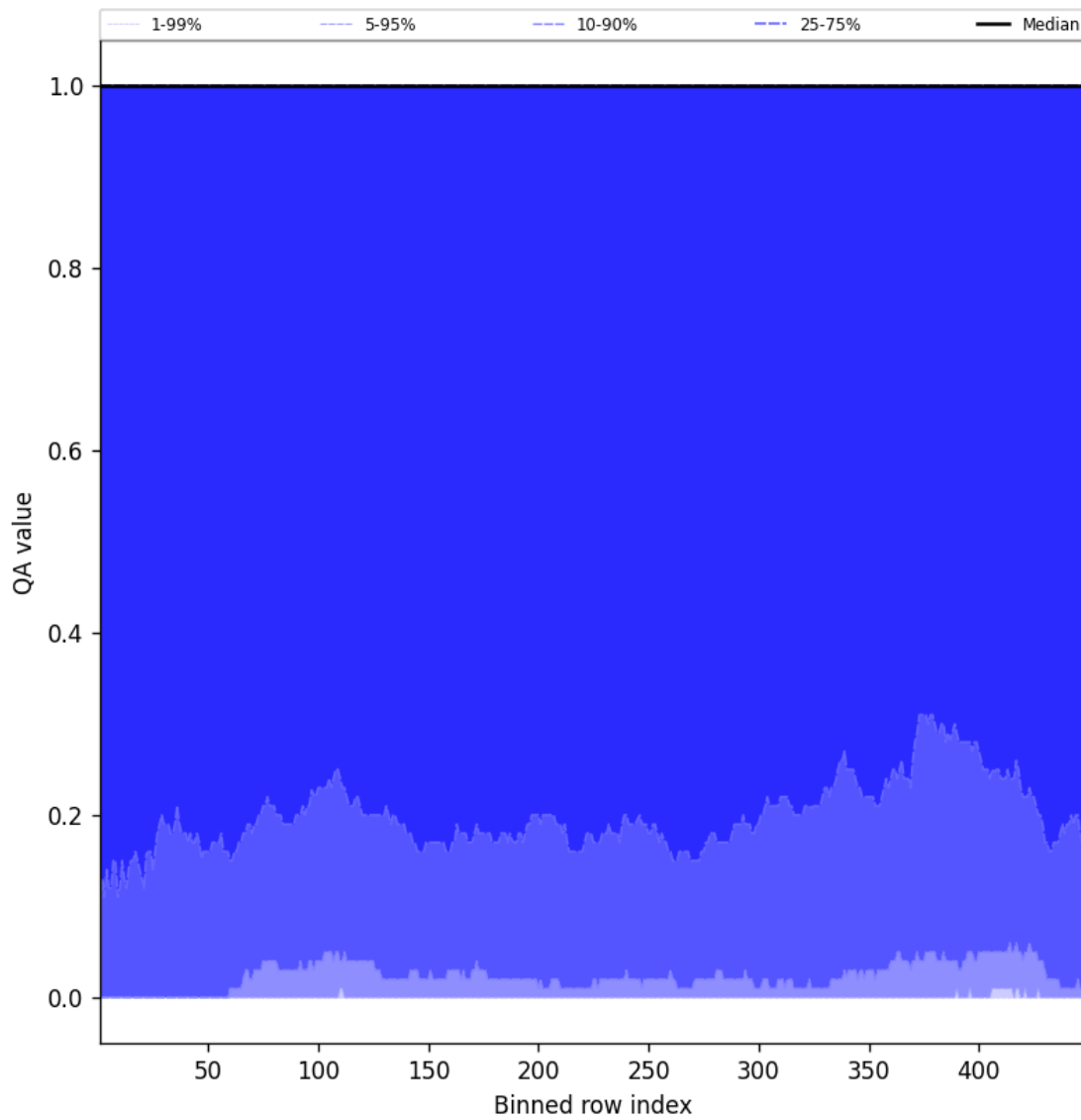


Figure 84: Along track statistics of “QA value” for 2025-10-02 to 2025-10-03

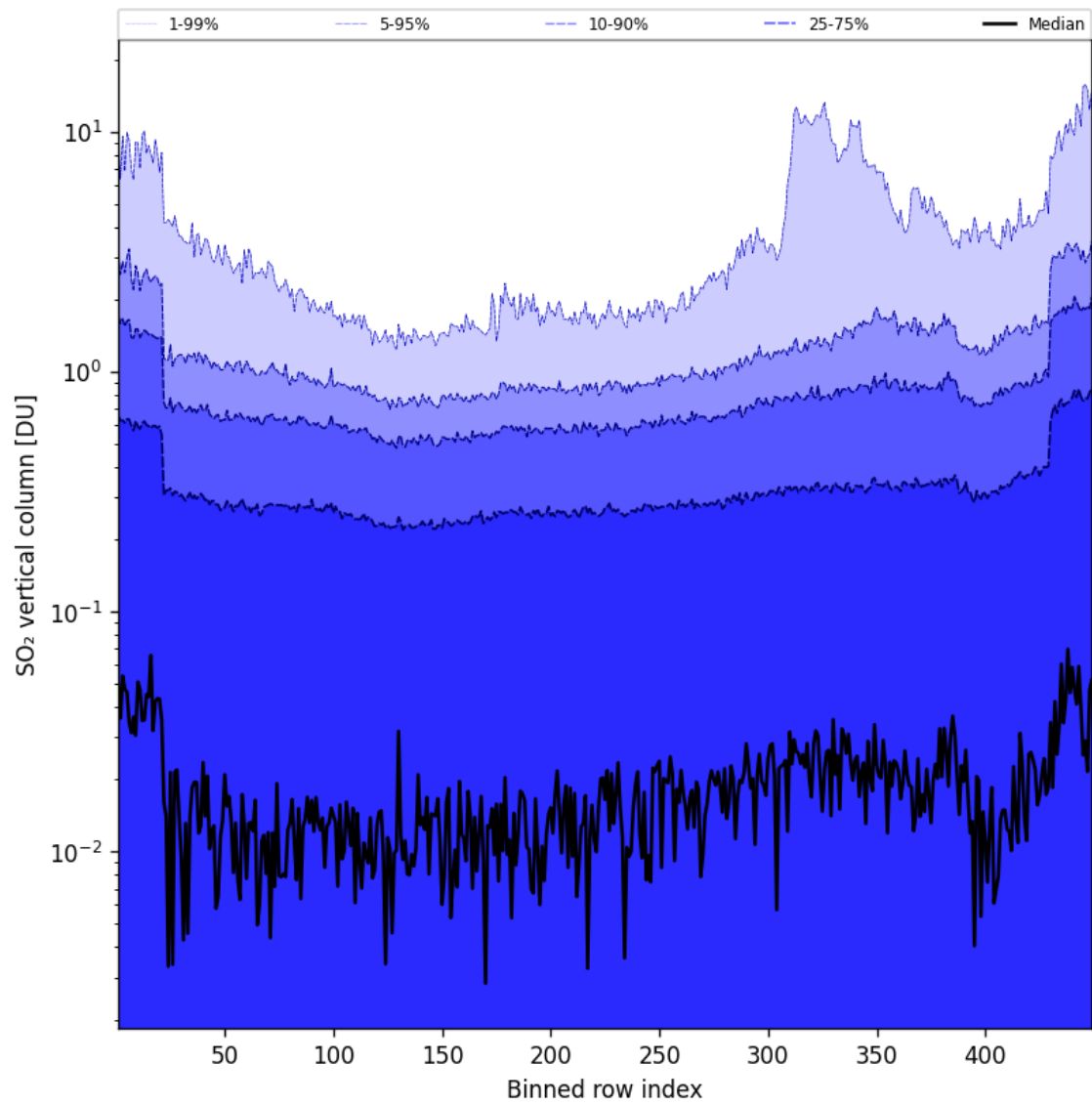


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-10-02 to 2025-10-03

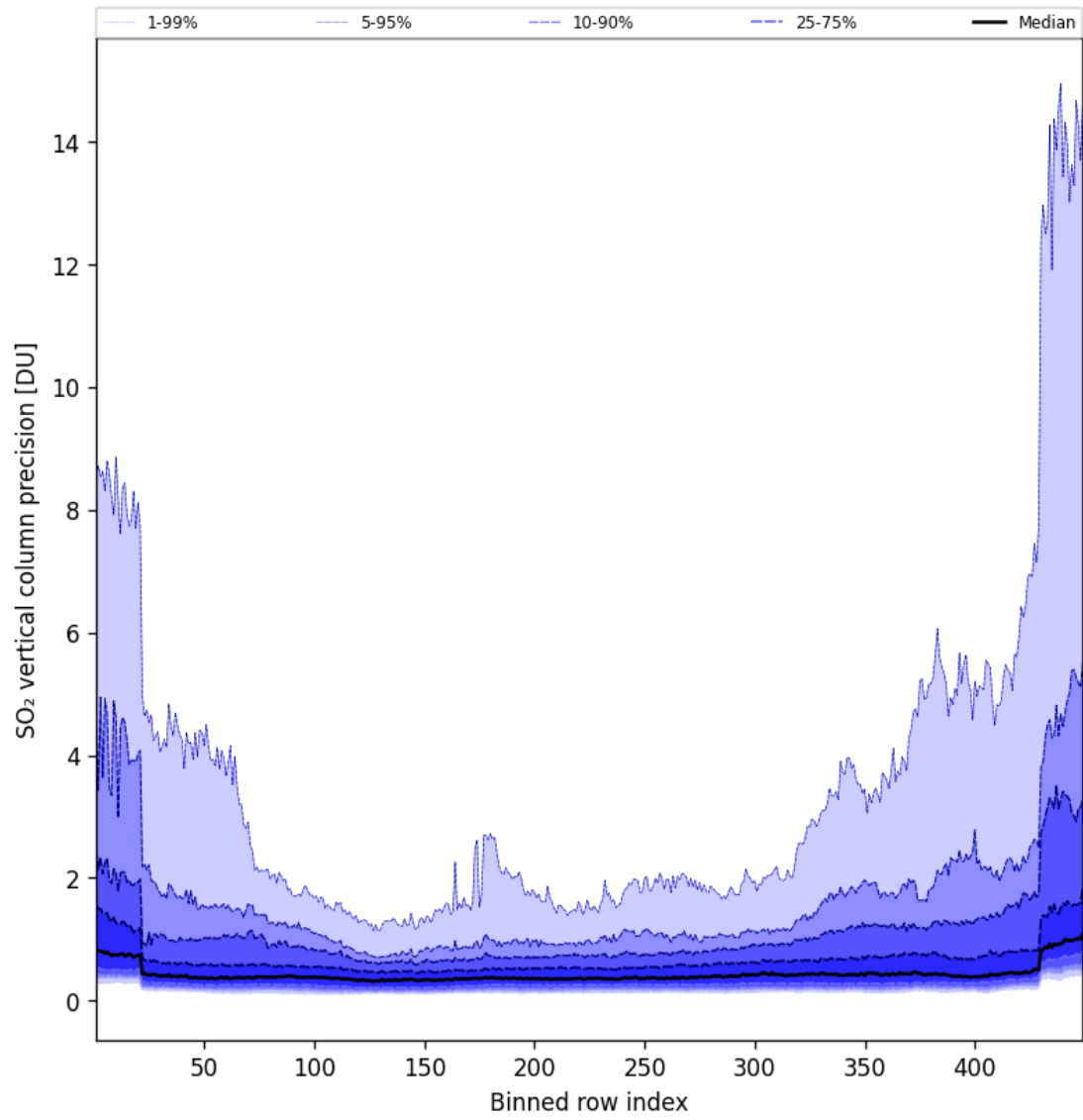


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-10-02 to 2025-10-03

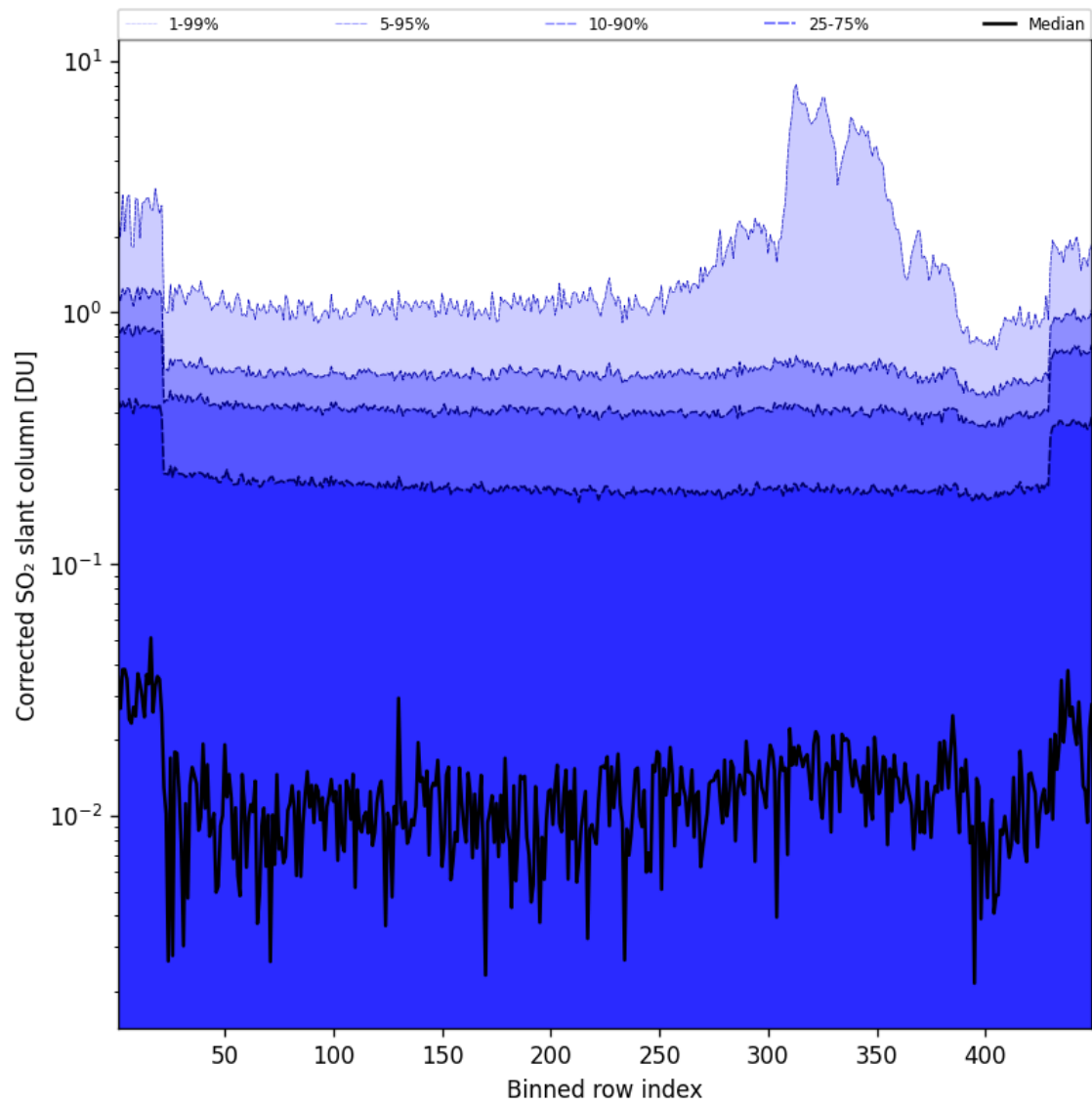


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-10-02 to 2025-10-03

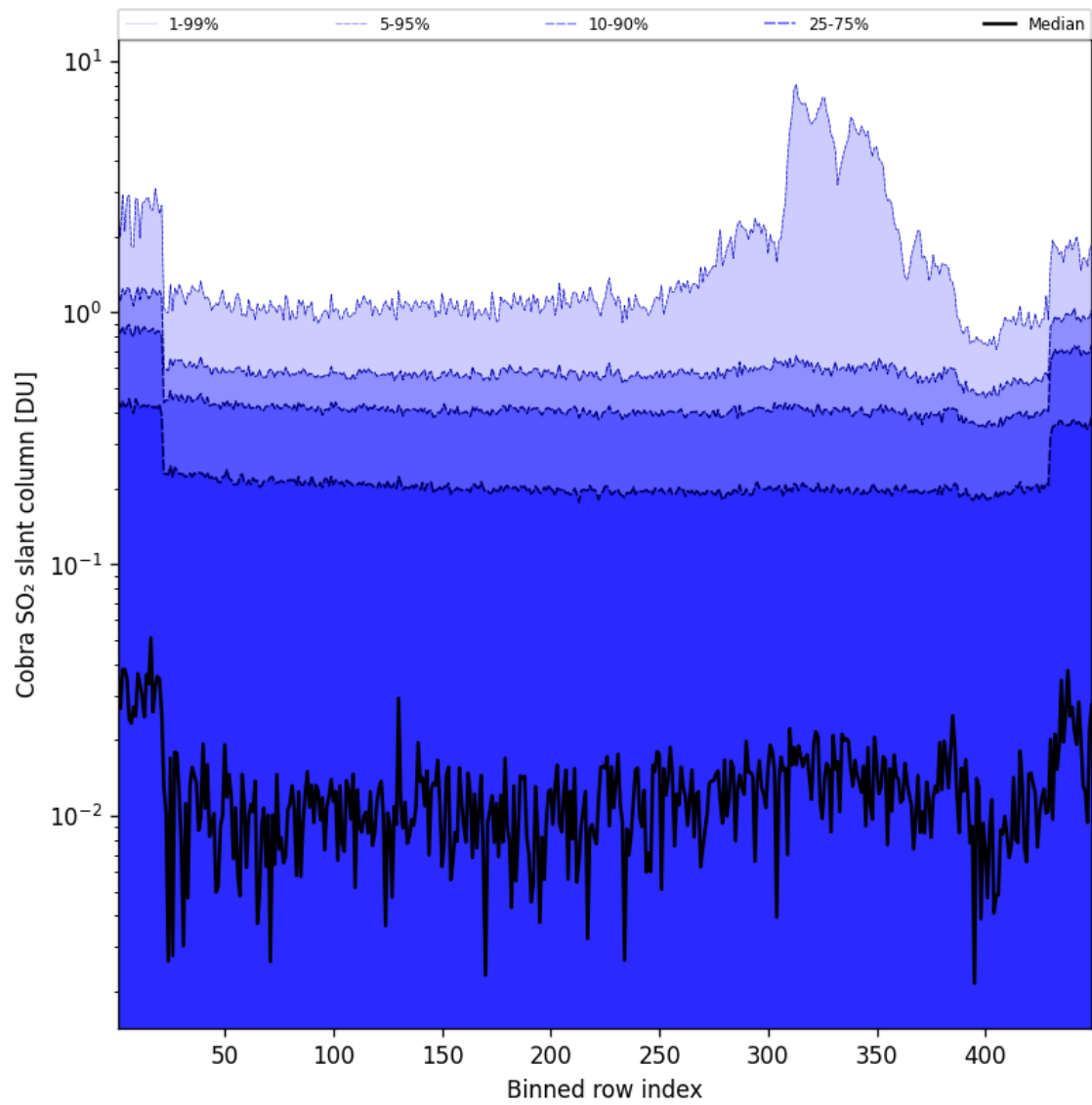


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-10-02 to 2025-10-03

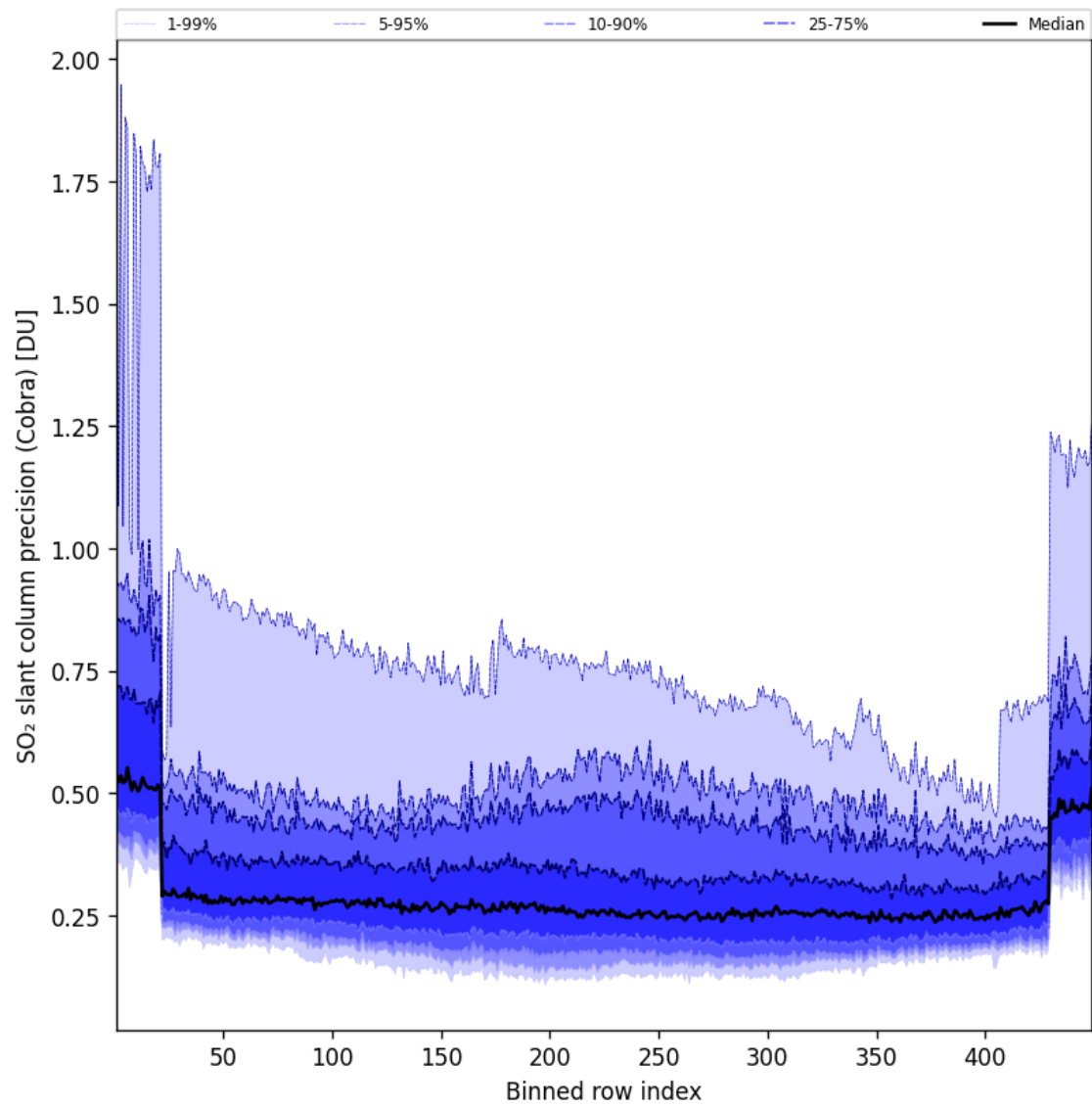


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-10-02 to 2025-10-03

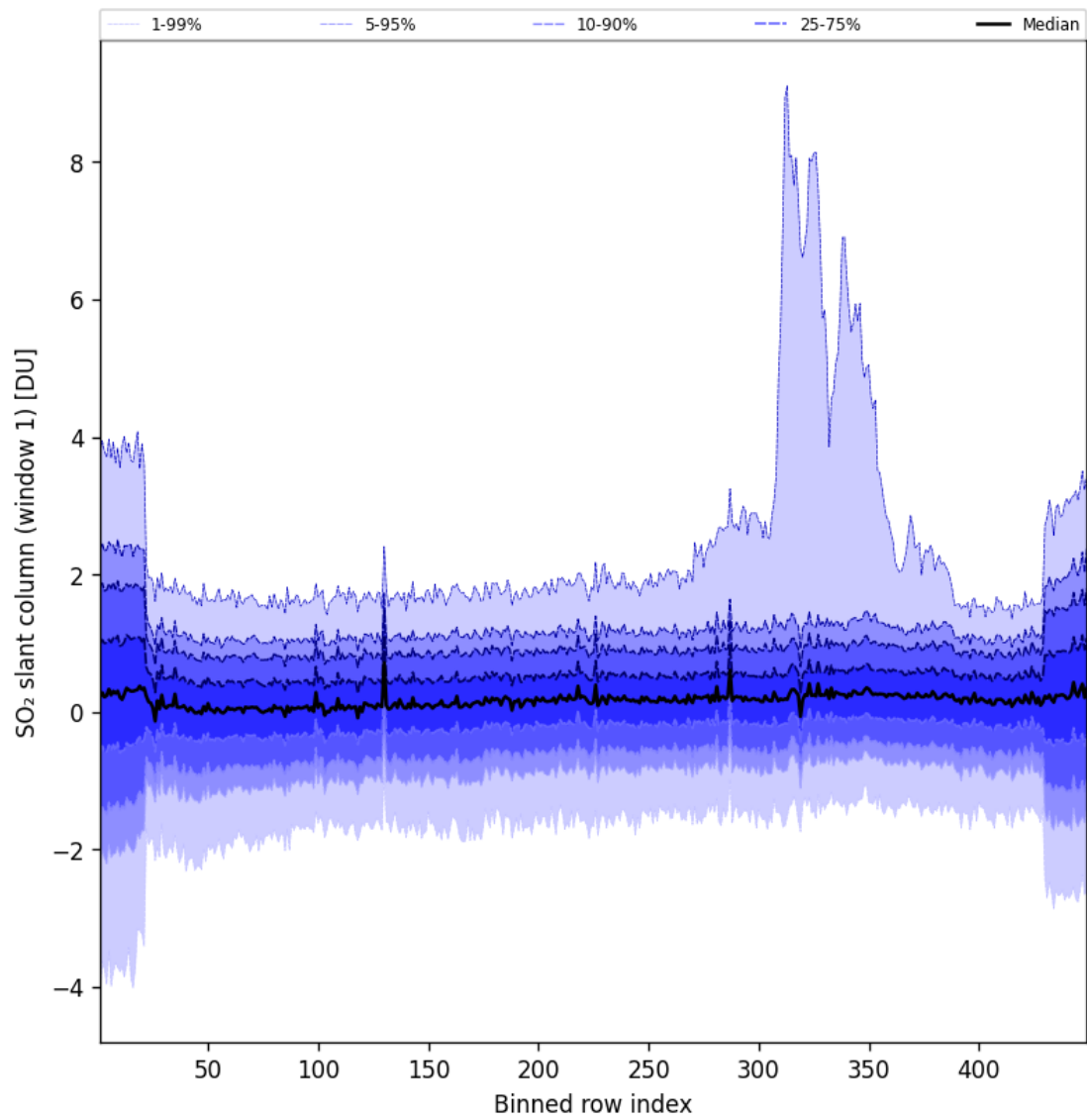


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-10-02 to 2025-10-03

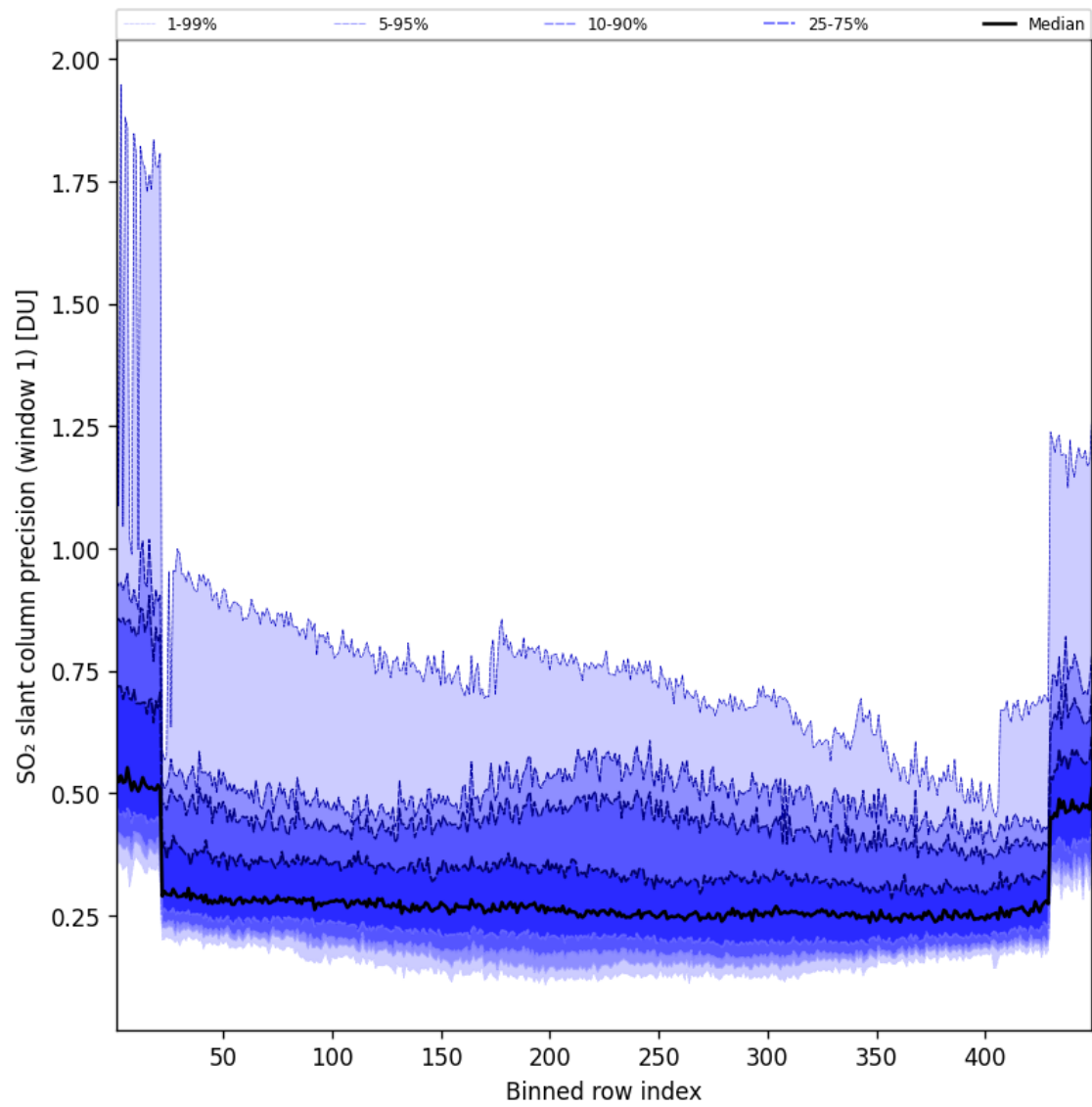


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-10-02 to 2025-10-03

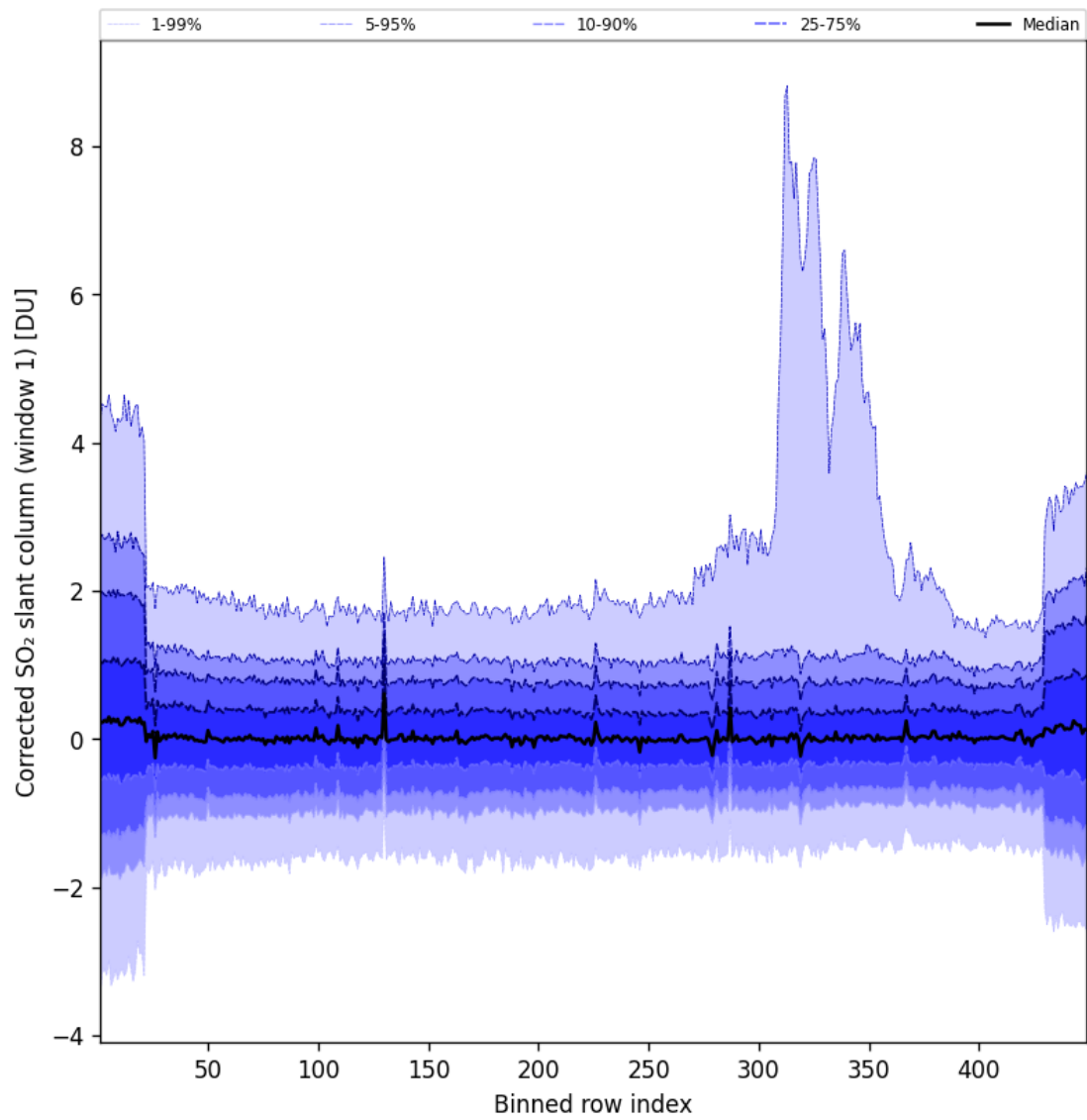


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-10-02 to 2025-10-03

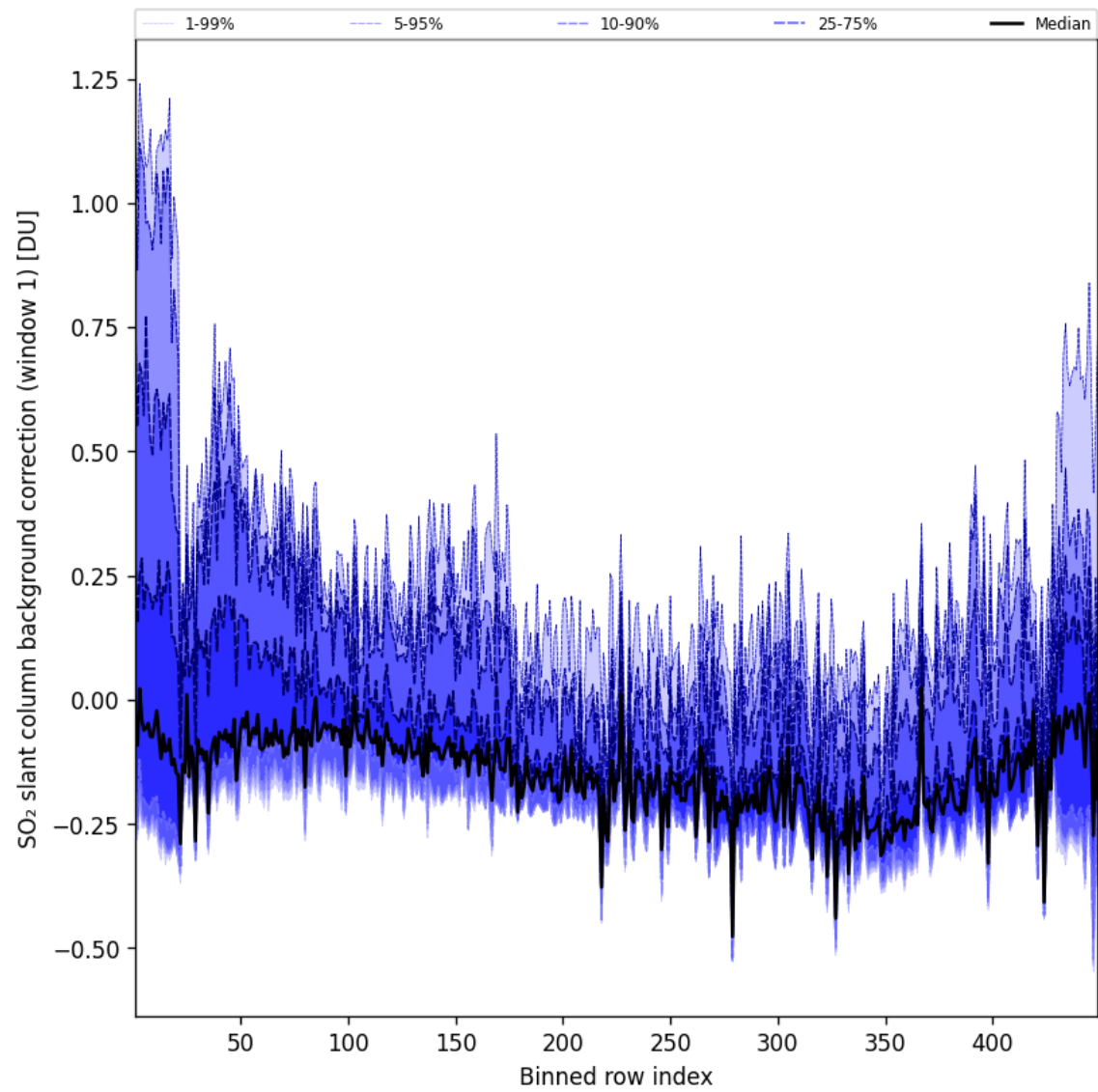


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-10-02 to 2025-10-03

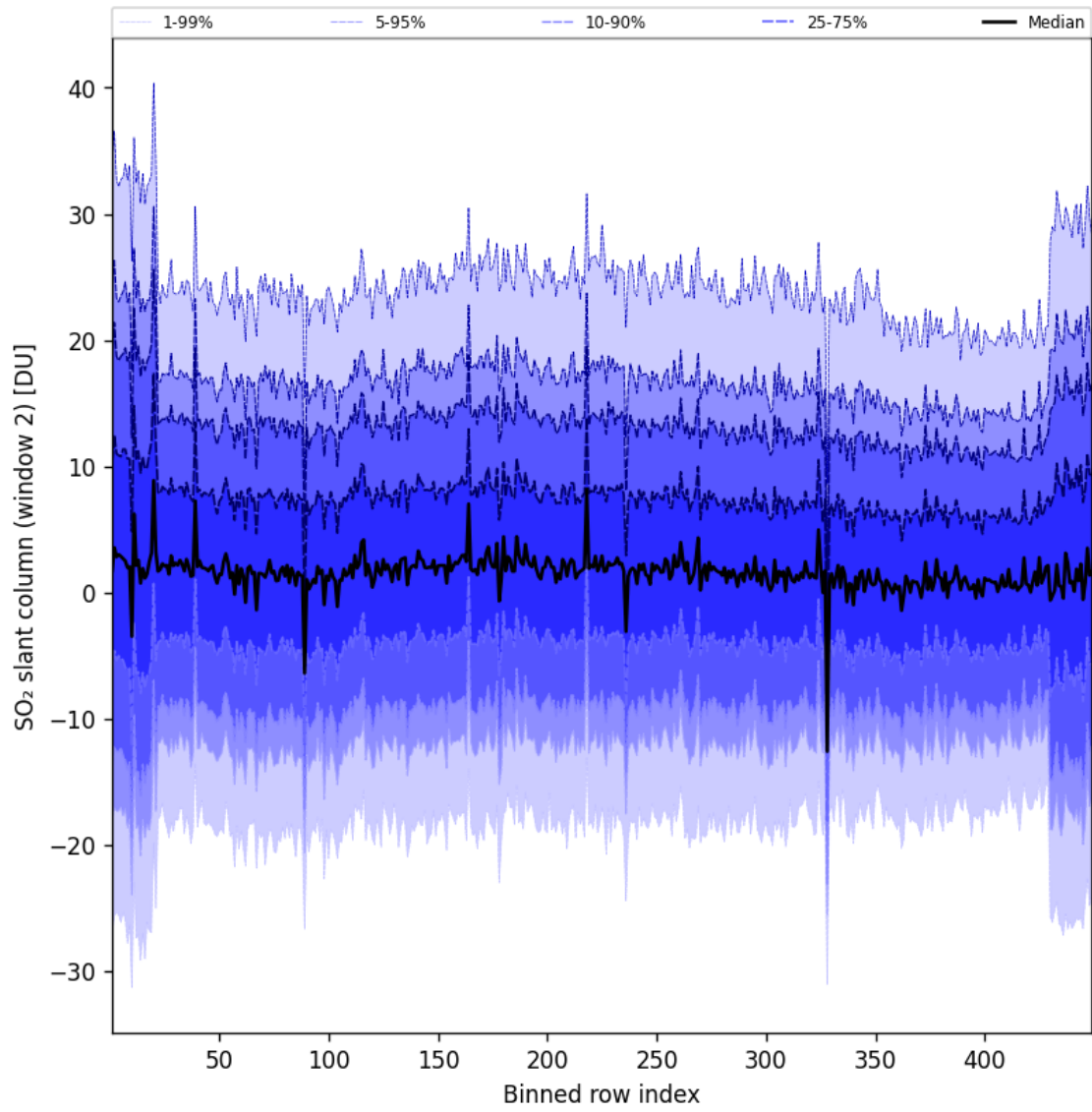


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-10-02 to 2025-10-03

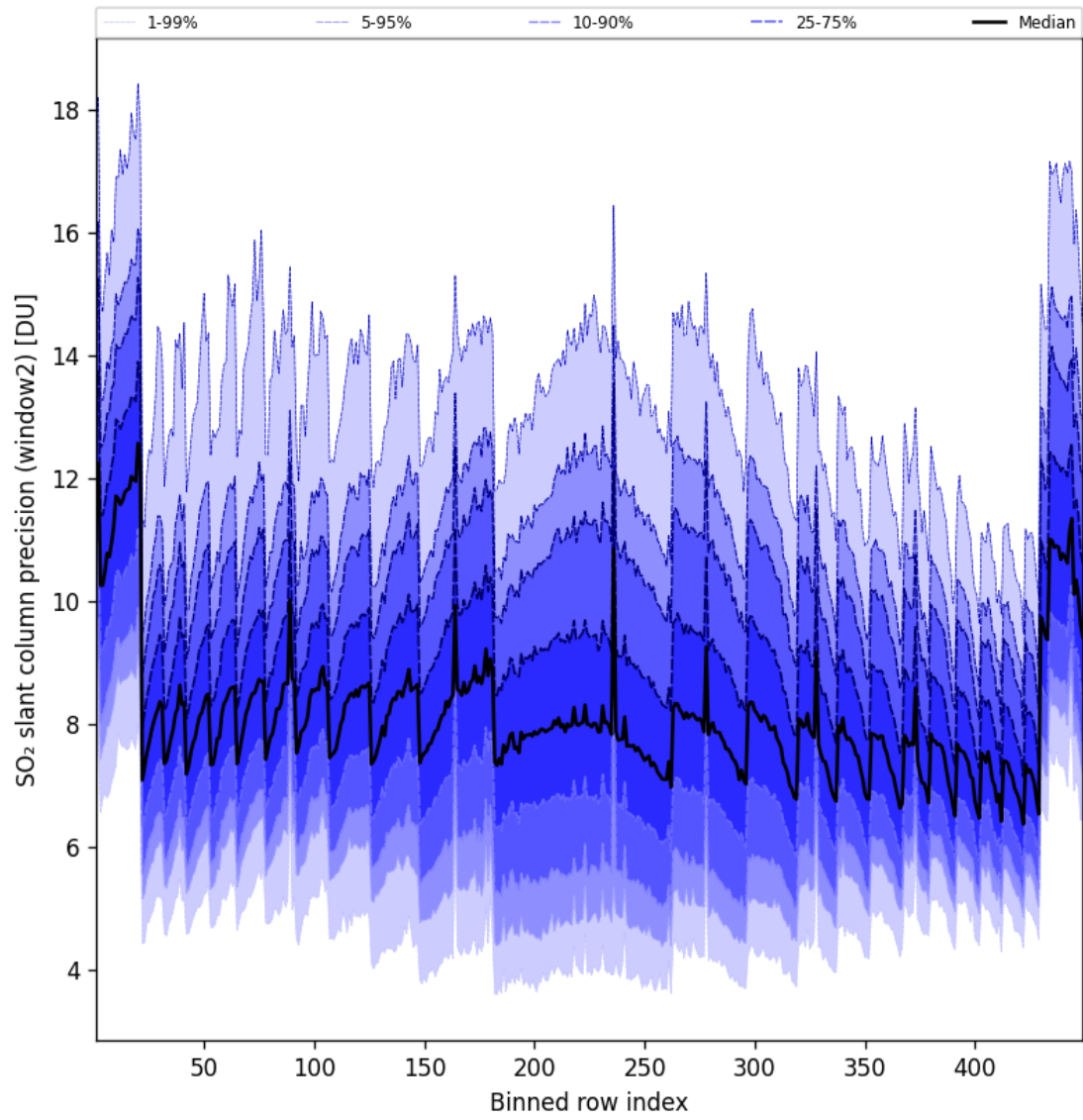


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-10-02 to 2025-10-03

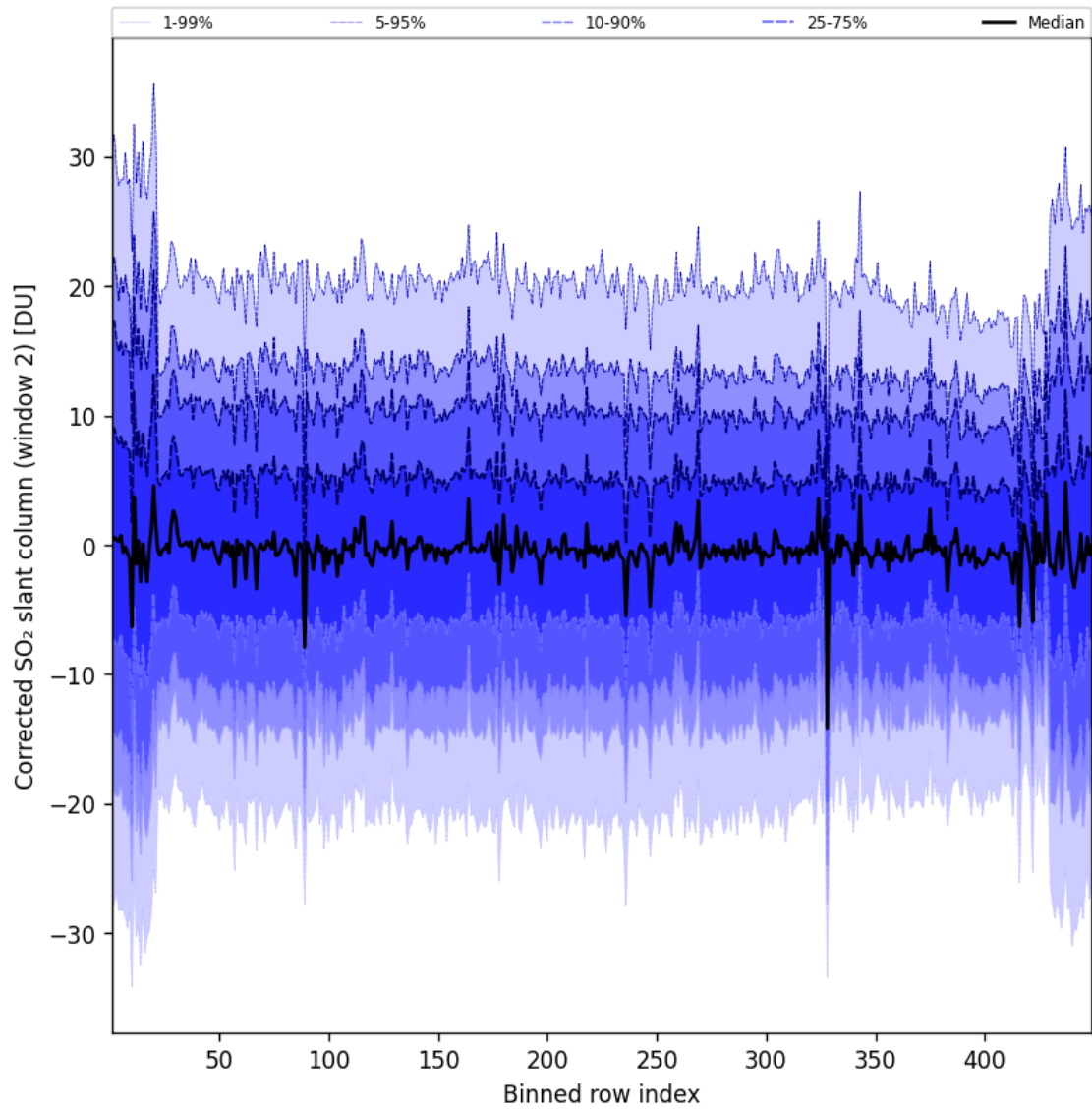


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-10-02 to 2025-10-03

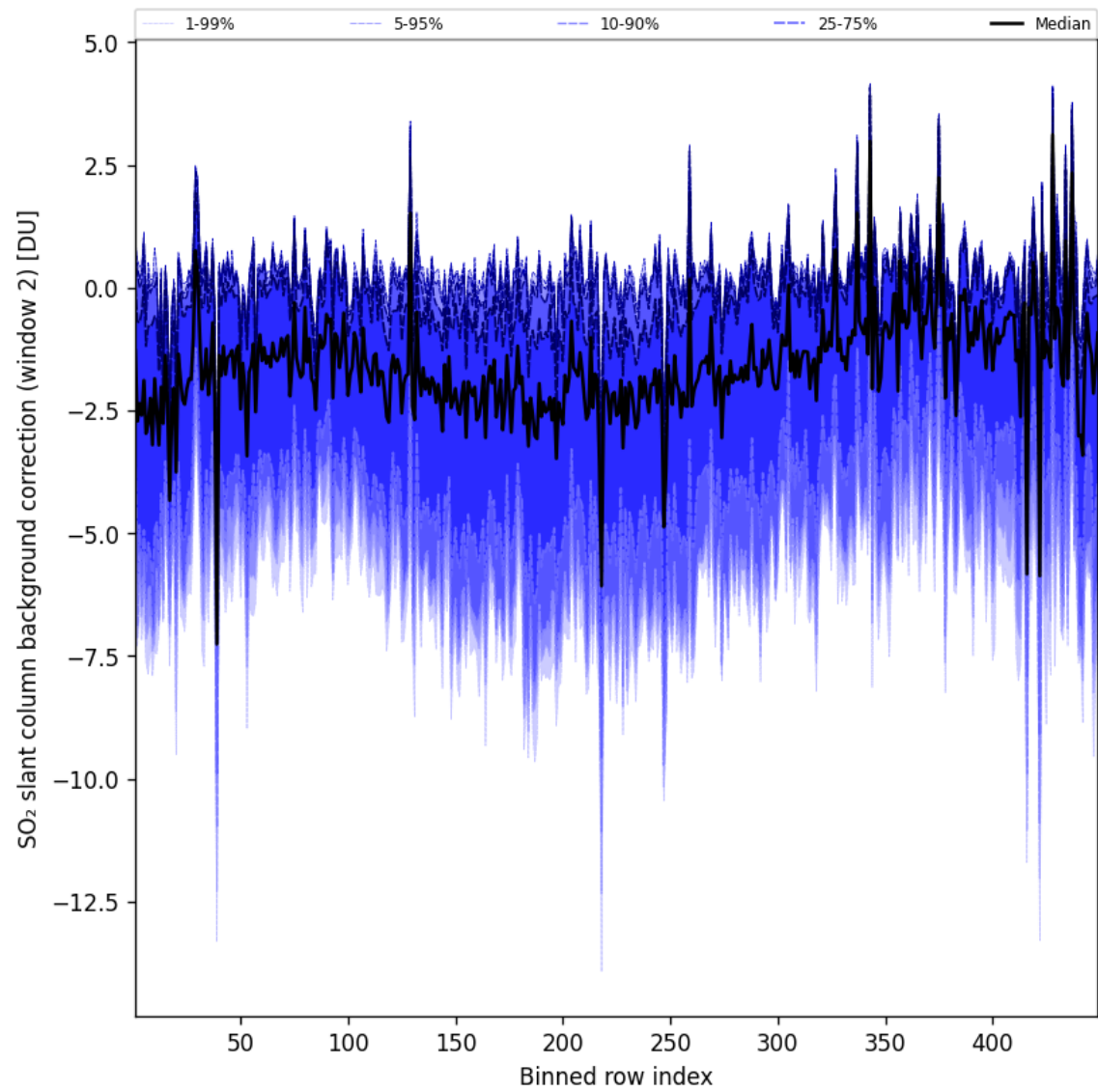


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-10-02 to 2025-10-03

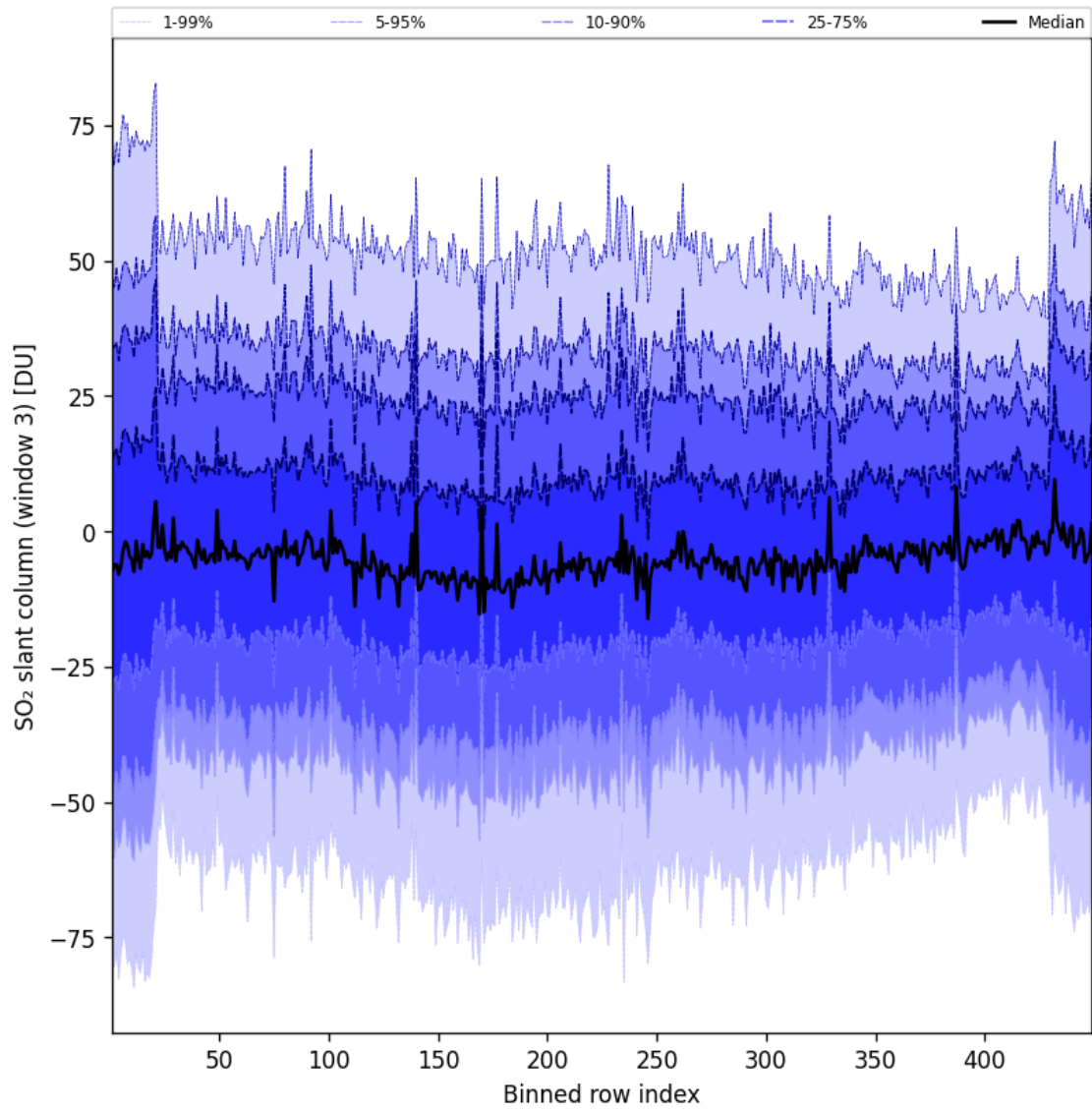


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-10-02 to 2025-10-03

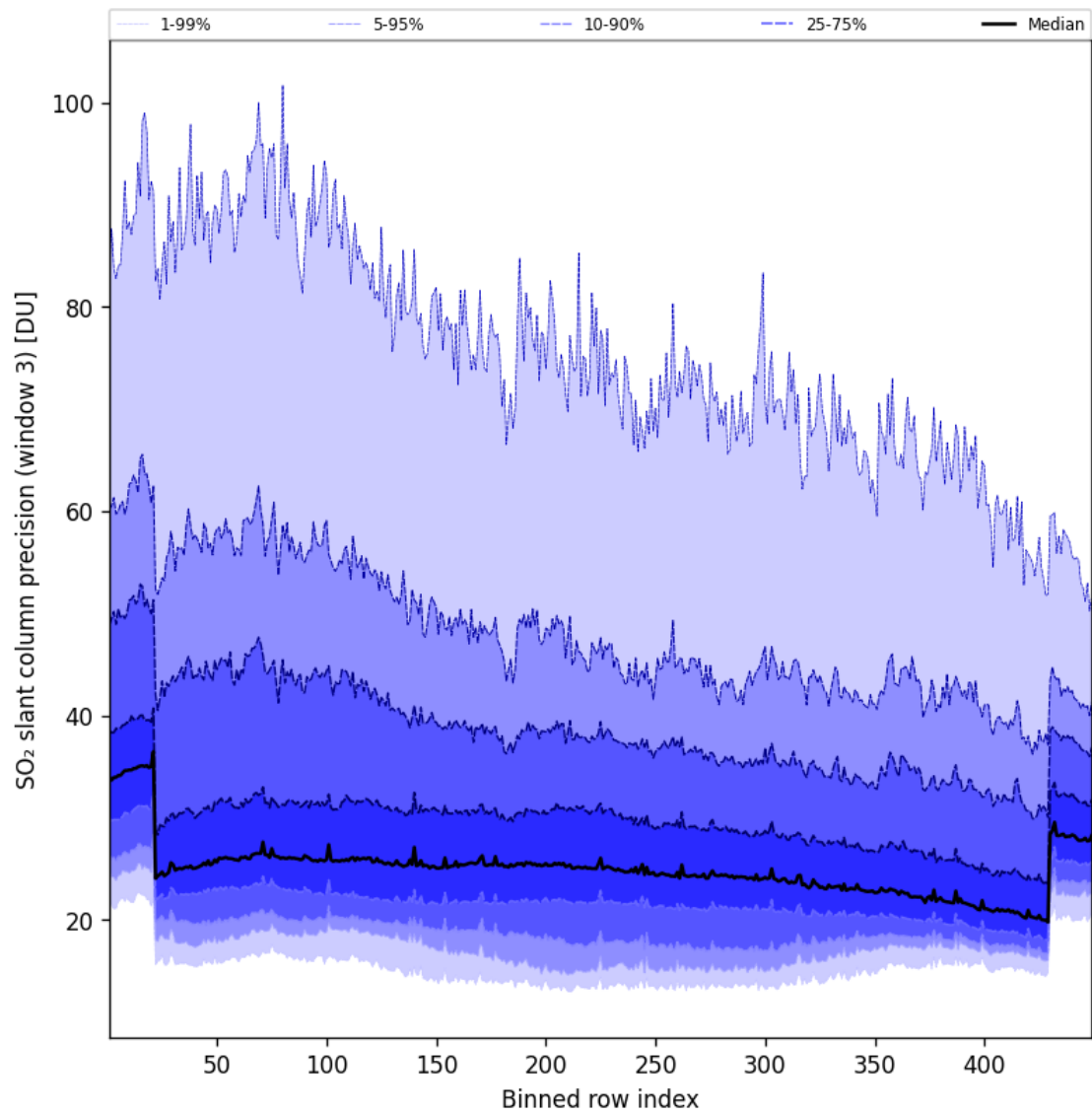


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-10-02 to 2025-10-03

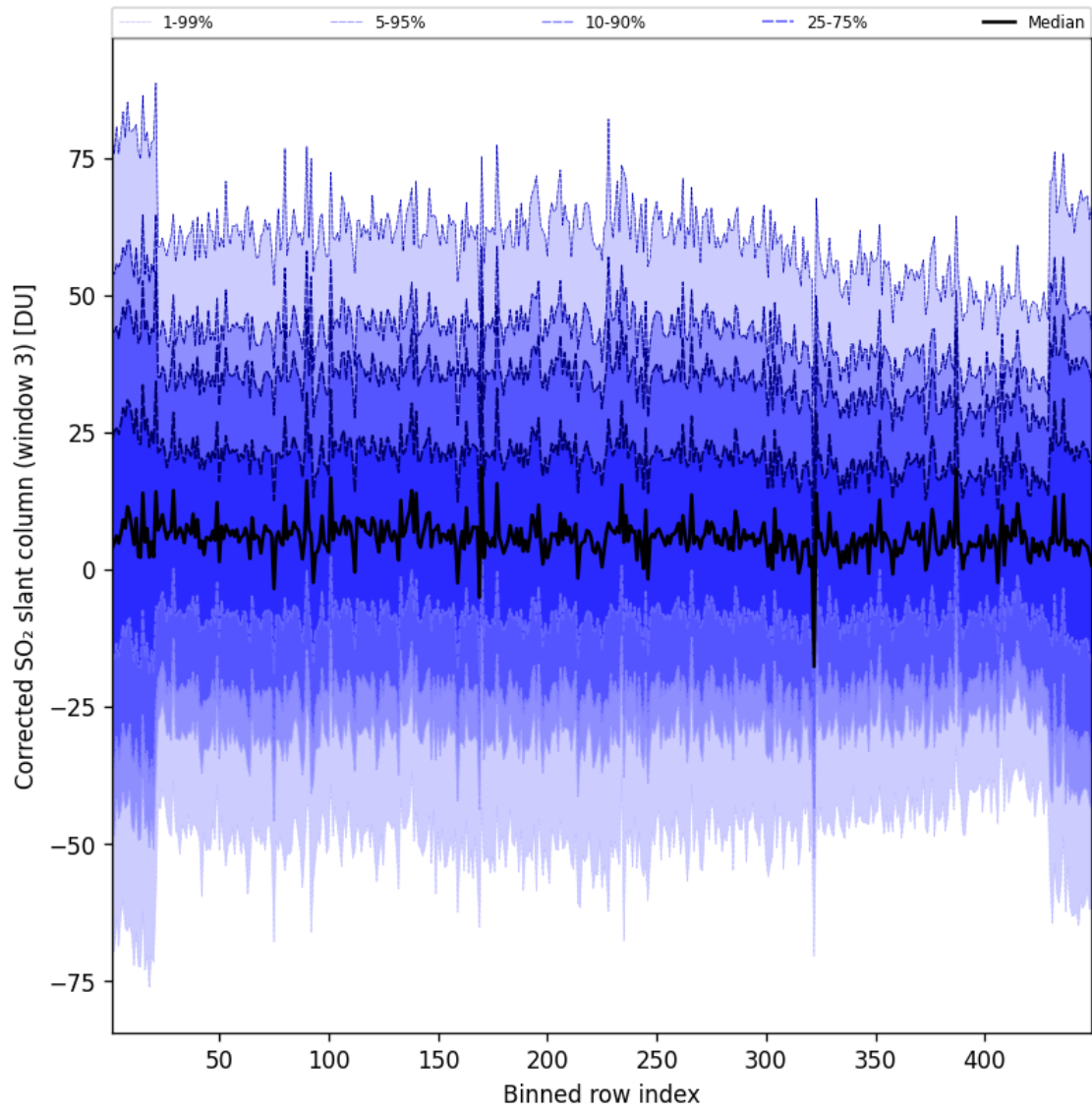


Figure 100: Along track statistics of "Corrected SO₂ slant column (window 3)" for 2025-10-02 to 2025-10-03

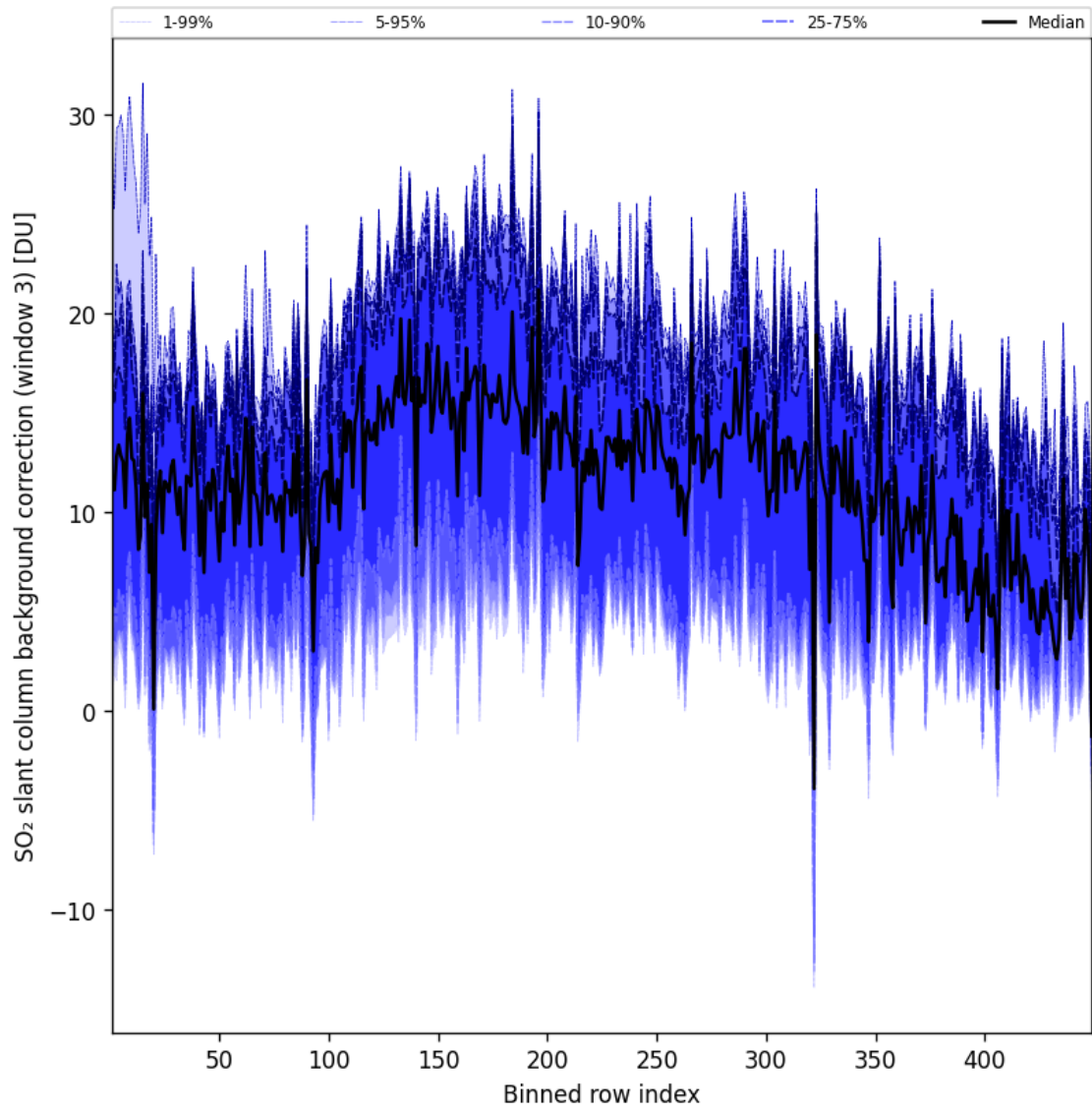


Figure 101: Along track statistics of "SO₂ slant column background correction (window 3)" for 2025-10-02 to 2025-10-03

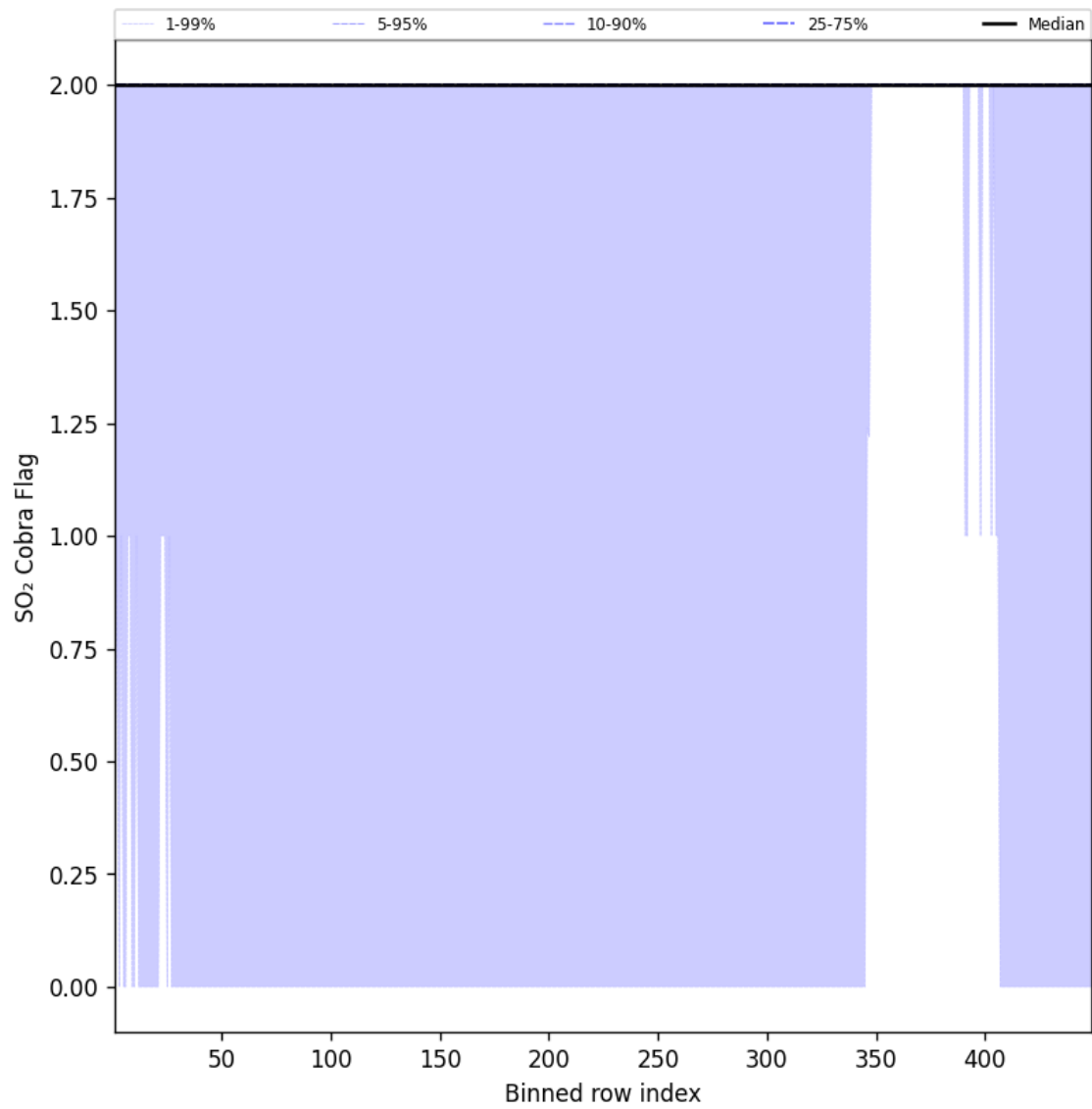


Figure 102: Along track statistics of "SO₂ Cobra Flag" for 2025-10-02 to 2025-10-03

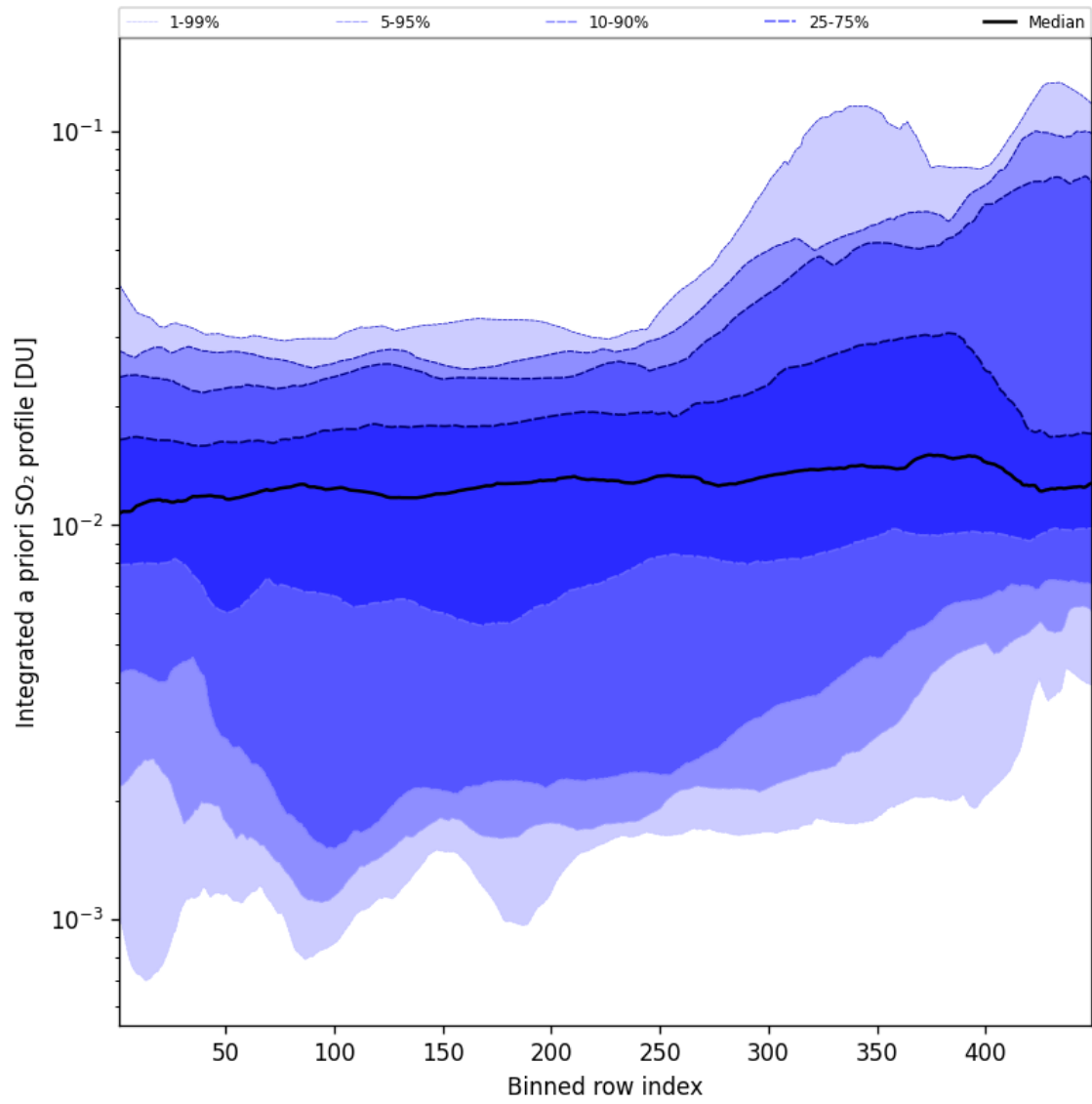


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-10-02 to 2025-10-03

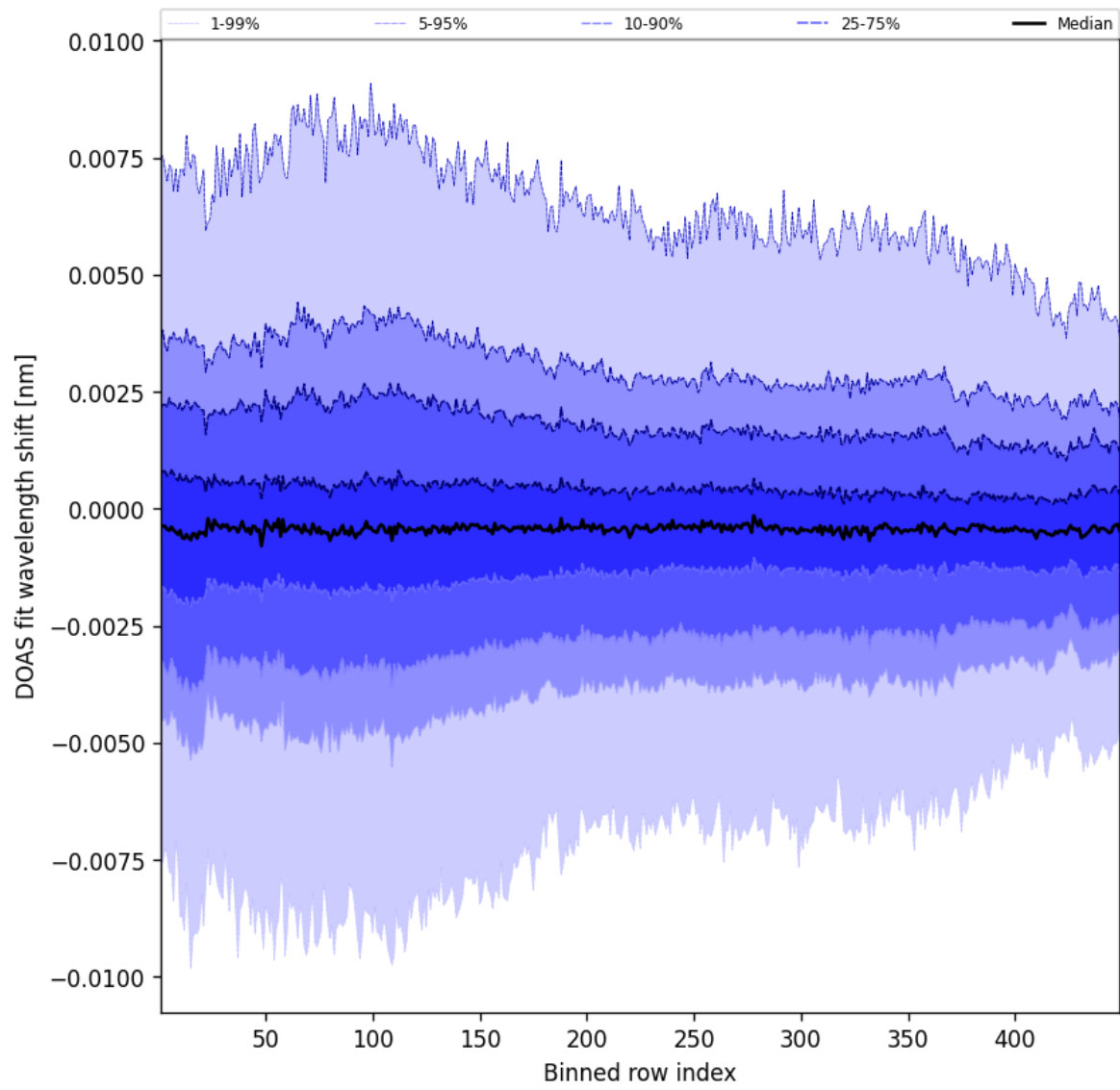


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-10-02 to 2025-10-03

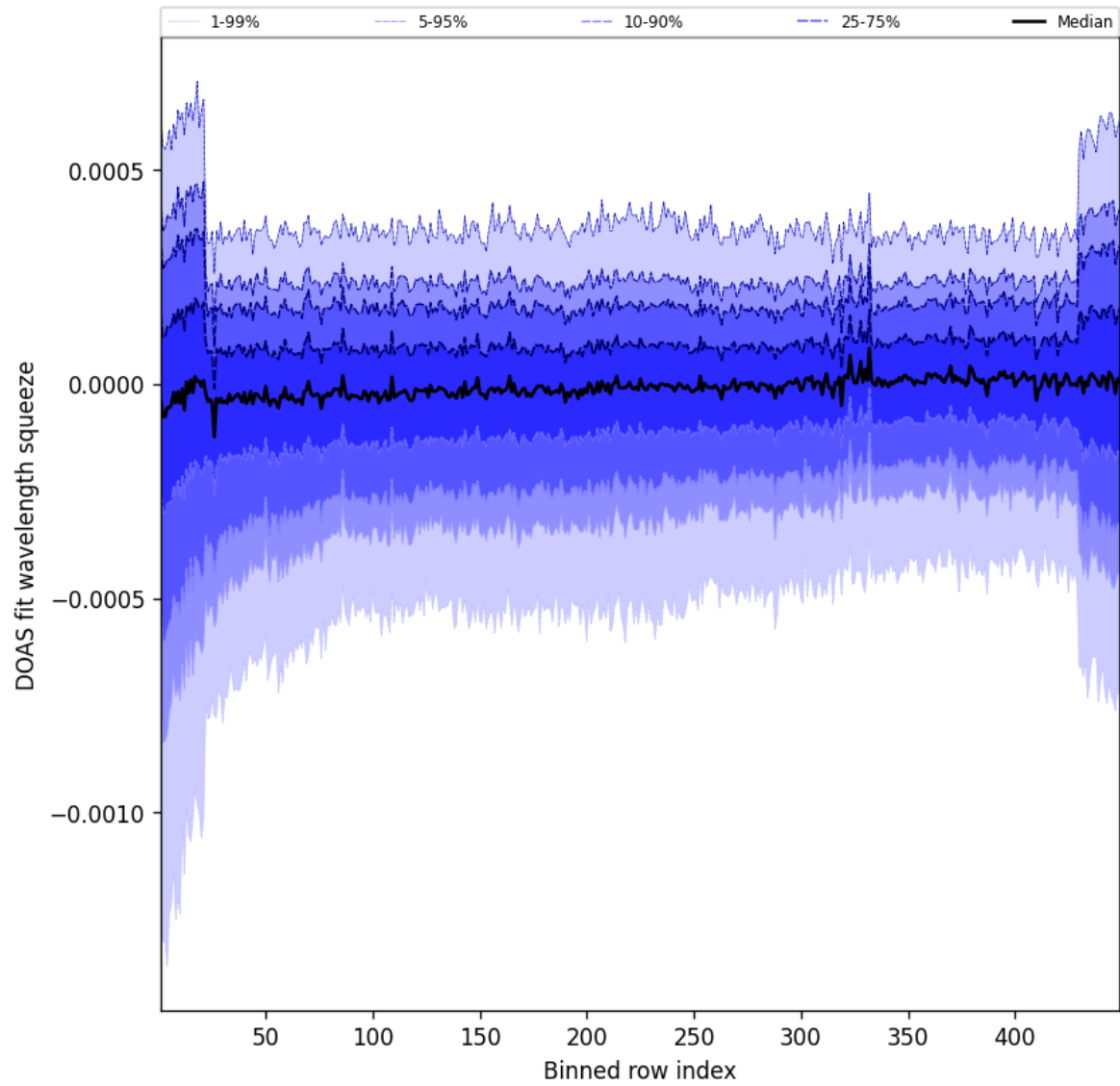


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-10-02 to 2025-10-03

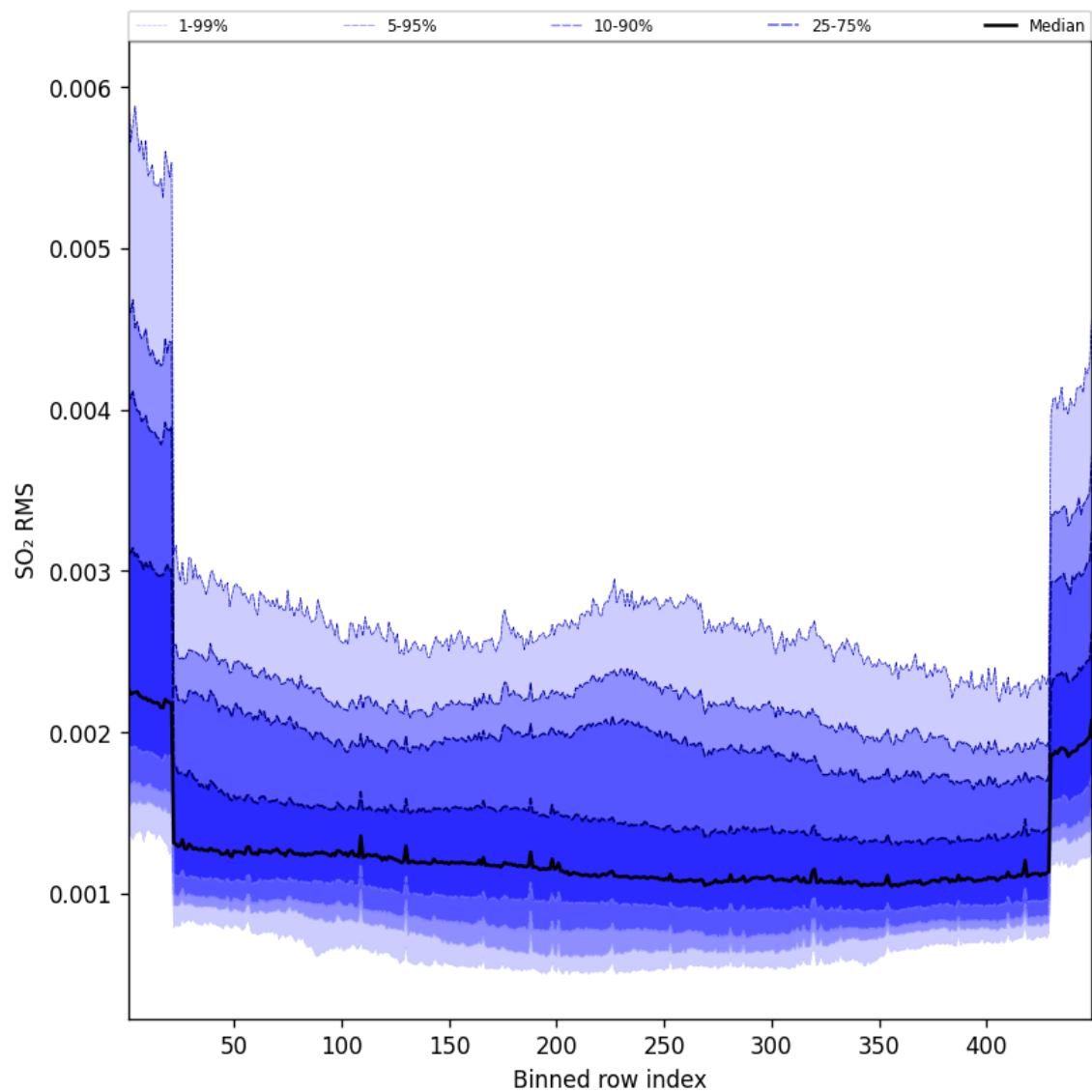


Figure 106: Along track statistics of “SO₂ RMS” for 2025-10-02 to 2025-10-03

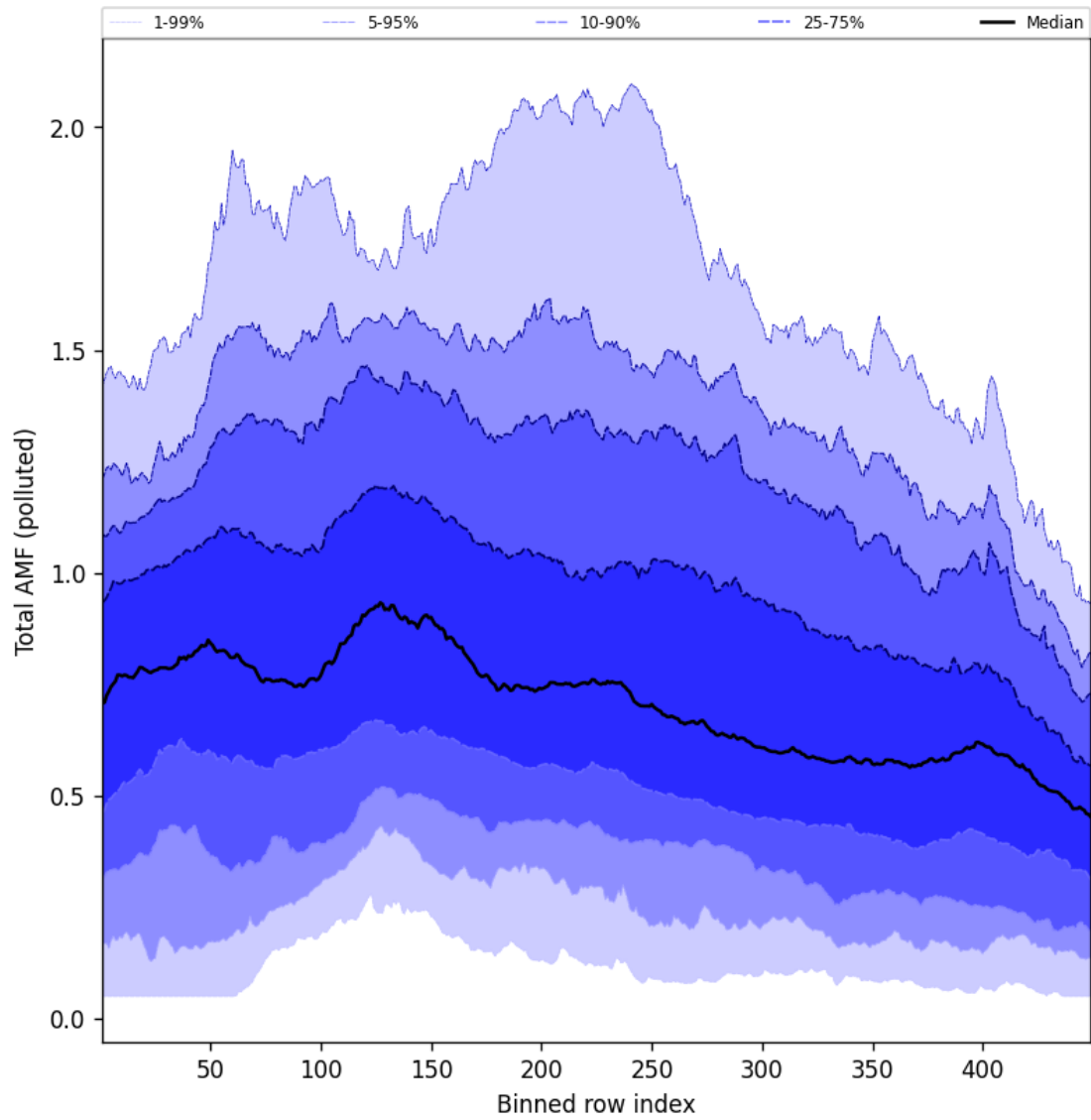


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-10-02 to 2025-10-03

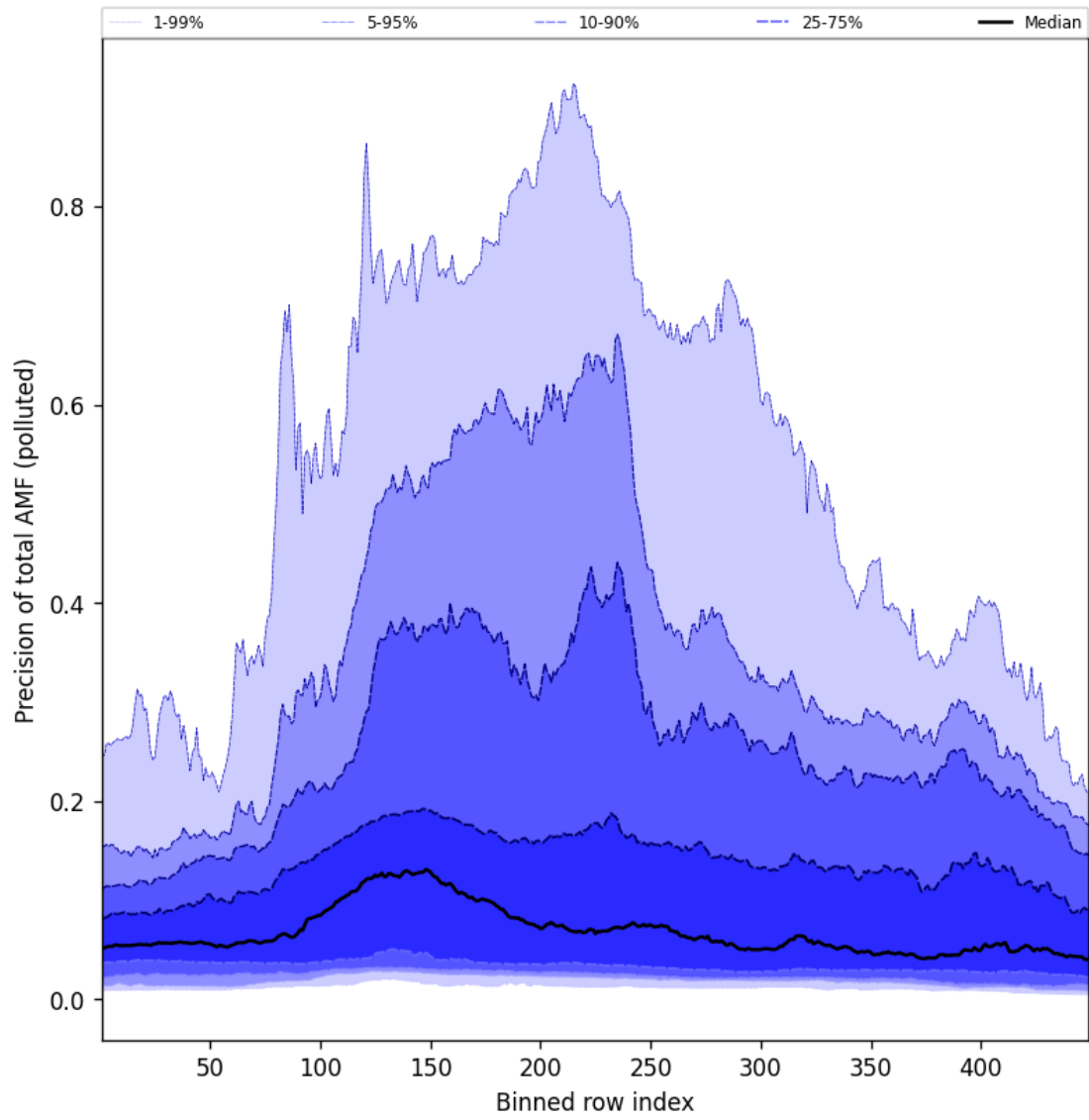


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-10-02 to 2025-10-03

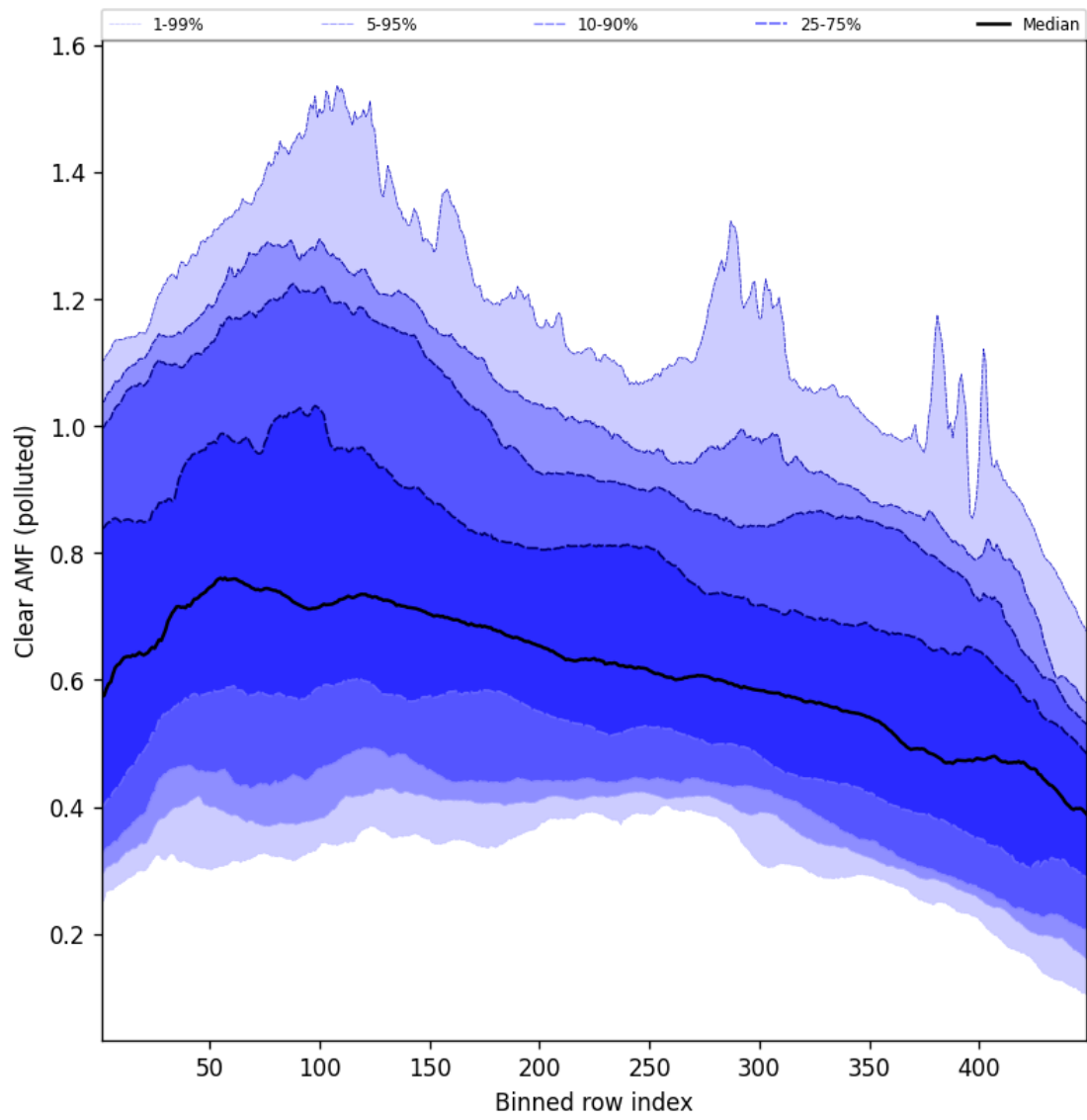


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-10-02 to 2025-10-03

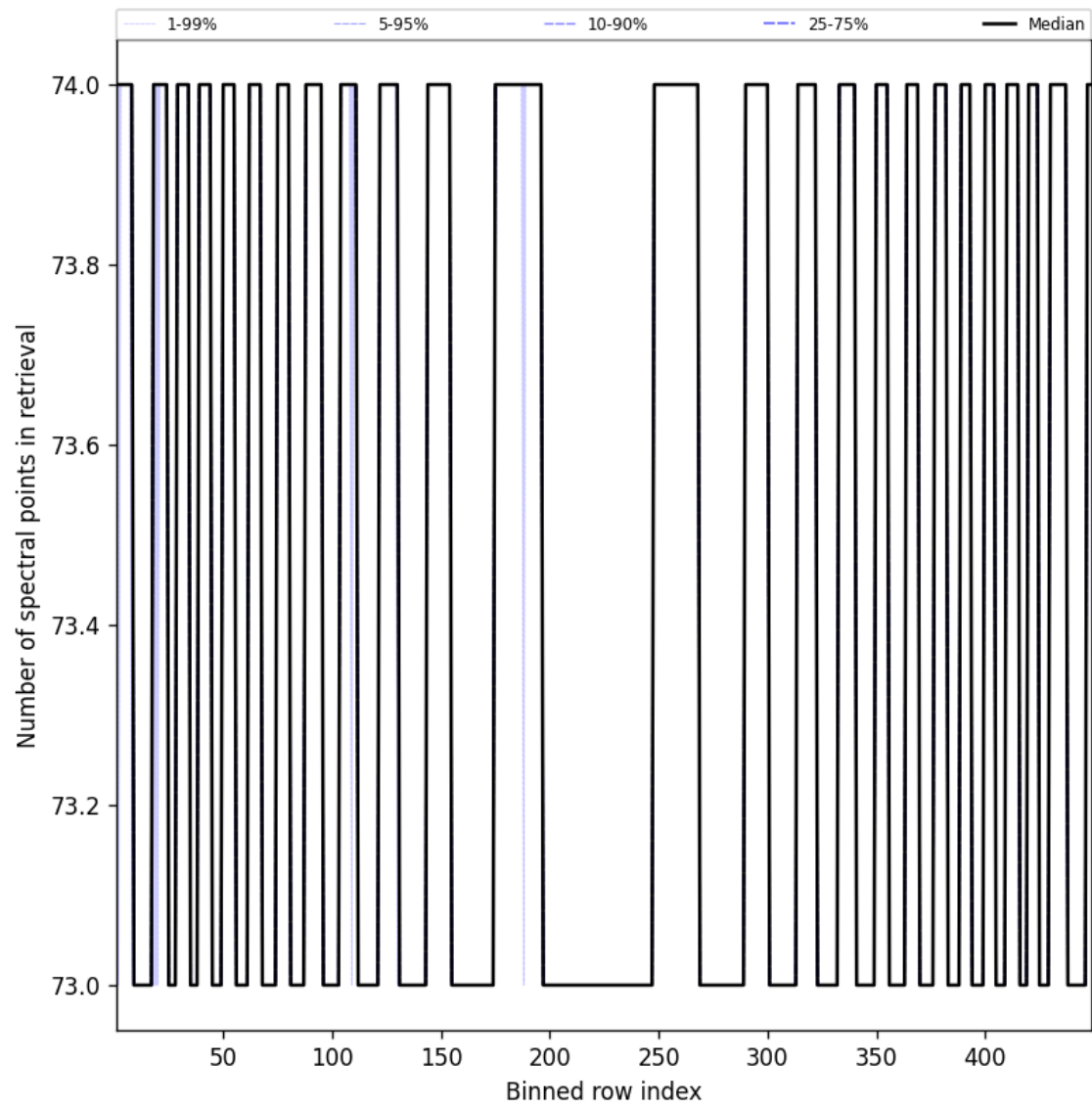


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-10-02 to 2025-10-03

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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