

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]	0.653 ± 0.410	16964449	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.952 \pm 107.114) \times 10^{-2}$	16964449	0.263	0.459	9.935×10^{-3}	-67.0	480
sulfurdioxide total vertical column precision [DU]	0.546 ± 0.775	16964449	0.222	0.351	0.331	2.318×10^{-2}	110
sulfurdioxide slant column density corrected [DU]	$(1.664 \pm 39.101) \times 10^{-2}$	16964449	0.250	0.374	8.894×10^{-3}	-16.4	391
sulfurdioxide slant column density cobra [DU]	$(1.648 \pm 35.635) \times 10^{-2}$	16964449	0.250	0.374	8.894×10^{-3}	-16.4	160
sulfurdioxide slant column density cobra precision [DU]	0.298 ± 0.127	16964449	0.213	0.136	0.261	5.238×10^{-2}	52.5
sulfurdioxide slant column density window1 [DU]	0.129 ± 0.678	16964449	0.125	0.751	0.137	-60.9	191
sulfurdioxide slant column density window1 precision [DU]	0.298 ± 0.127	16964449	0.213	0.136	0.261	5.238×10^{-2}	52.5
sulfurdioxide slant column density corrected win1 [DU]	$(3.930 \pm 67.067) \times 10^{-2}$	16964449	2.500×10^{-2}	0.738	2.311×10^{-2}	-60.9	191
background so2 slant column offset window1 [DU]	$(-8.921 \pm 14.924) \times 10^{-2}$	16964449	-1.000×10^{-1}	0.153	-0.103	-1.42	4.02
sulfurdioxide slant column density window2 [DU]	1.60 ± 9.24	16964449	1.25	11.8	1.40	-1.151×10^3	1.114×10^3
sulfurdioxide slant column density window2 precision [DU]	8.28 ± 2.26	16964449	7.43	2.58	7.96	2.20	788
sulfurdioxide slant column density corrected win2 [DU]	1.01 ± 8.98	16964449	0.750	11.4	0.986	-1.149×10^3	1.115×10^3
background so2 slant column offset window2 [DU]	-0.585 ± 2.294	16964449	1.25	3.55	-1.103×10^{-2}	-10.1	8.07
sulfurdioxide slant column density window3 [DU]	-6.83 ± 24.54	16964449	-7.28	30.7	-6.74	-1.081×10^3	1.325×10^4
sulfurdioxide slant column density window3 precision [DU]	29.0 ± 13.7	16964449	23.7	9.98	25.3	9.62	3.397×10^3
sulfurdioxide slant column density corrected win3 [DU]	-4.52 ± 23.87	16964449	-5.04	29.7	-4.43	-1.079×10^3	1.325×10^4
background so2 slant column offset window3 [DU]	2.31 ± 5.98	16964449	-2.80	9.62	1.63	-19.3	25.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	16964449	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.254 \pm 7.143) \times 10^{-2}$	16964449	1.423×10^{-2}	1.779×10^{-2}	1.426×10^{-2}	3.589×10^{-4}	2.17
fitted radiance shift [nm]	$(-4.385 \pm 27.171) \times 10^{-4}$	16964449	-5.000×10^{-4}	1.955×10^{-3}	-4.439×10^{-4}	-5.778×10^{-2}	4.713×10^{-2}
fitted radiance squeeze [1]	$(-7.074 \pm 185.329) \times 10^{-6}$	16964449	1.000×10^{-5}	2.100×10^{-4}	1.950×10^{-6}	-1.386×10^{-2}	2.494×10^{-2}
fitted root mean square [1]	$(1.302 \pm 0.521) \times 10^{-3}$	16964449	1.025×10^{-3}	5.406×10^{-4}	1.159×10^{-3}	3.385×10^{-4}	0.149
sulfurdioxide total air mass factor polluted [1]	0.876 ± 0.464	16964449	0.700	0.570	0.804	5.000×10^{-2}	3.45
sulfurdioxide total air mass factor polluted precision [1]	0.112 ± 0.111	16964449	3.500×10^{-2}	0.114	7.482×10^{-2}	3.378×10^{-3}	1.69
sulfurdioxide clear air mass factor polluted [1]	0.736 ± 0.343	16964449	0.620	0.374	0.692	8.185×10^{-2}	3.47
number of spectral points in retrieval [1]	73.4 ± 0.5	16964449	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.110	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.50	-0.912	-0.551	-0.369	-0.216	0.243	0.407	0.608	1.01	2.84
sulfurdioxide total vertical column precision [DU]	8.827×10^{-2}	0.128	0.159	0.186	0.221	0.572	0.777	1.03	1.57	3.89
sulfurdioxide slant column density corrected [DU]	-0.856	-0.502	-0.365	-0.273	-0.177	0.197	0.299	0.398	0.552	0.995
sulfurdioxide slant column density cobra [DU]	-0.856	-0.502	-0.365	-0.273	-0.177	0.197	0.299	0.398	0.552	0.995
sulfurdioxide slant column density cobra precision [DU]	0.145	0.172	0.187	0.199	0.214	0.351	0.405	0.453	0.528	0.764
sulfurdioxide slant column density window1 [DU]	-1.70	-0.934	-0.639	-0.444	-0.242	0.509	0.702	0.885	1.16	1.88
sulfurdioxide slant column density window1 precision [DU]	0.145	0.172	0.187	0.199	0.214	0.351	0.405	0.453	0.528	0.764
sulfurdioxide slant column density corrected win1 [DU]	-1.63	-0.967	-0.707	-0.530	-0.341	0.397	0.599	0.795	1.10	1.92
background so2 slant column offset window1 [DU]	-0.341	-0.281	-0.248	-0.221	-0.182	-2.948×10^{-2}	1.849×10^{-2}	7.350×10^{-2}	0.173	0.423
sulfurdioxide slant column density window2 [DU]	-19.8	-13.0	-9.71	-7.21	-4.39	7.38	10.4	13.2	16.9	24.6
sulfurdioxide slant column density window2 precision [DU]	4.47	5.37	5.89	6.31	6.81	9.39	10.2	11.1	12.3	14.9
sulfurdioxide slant column density corrected win2 [DU]	-20.5	-13.5	-10.1	-7.55	-4.71	6.70	9.56	12.1	15.6	22.8
background so2 slant column offset window2 [DU]	-6.15	-4.76	-3.93	-3.24	-2.30	1.25	1.58	1.82	2.16	3.36
sulfurdioxide slant column density window3 [DU]	-67.9	-46.8	-36.9	-29.8	-22.0	8.61	16.4	23.4	32.8	51.5
sulfurdioxide slant column density window3 precision [DU]	14.5	16.9	18.5	19.8	21.4	31.4	36.3	42.4	54.8	87.5
sulfurdioxide slant column density corrected win3 [DU]	-64.0	-43.4	-33.7	-26.8	-19.2	10.5	18.0	24.8	34.0	52.5
background so2 slant column offset window3 [DU]	-8.45	-5.86	-4.74	-3.84	-2.62	7.00	8.92	10.5	12.5	15.8
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	2.033×10^{-3}	3.755×10^{-3}	5.110×10^{-3}	6.606×10^{-3}	8.514×10^{-3}	2.631×10^{-2}	3.954×10^{-2}	6.418×10^{-2}	0.121	0.332
fitted radiance shift [nm]	-8.527×10^{-3}	-4.378×10^{-3}	-2.973×10^{-3}	-2.180×10^{-3}	-1.470×10^{-3}	4.855×10^{-4}	1.204×10^{-3}	2.117×10^{-3}	3.718×10^{-3}	8.165×10^{-3}
fitted radiance squeeze [1]	-5.482×10^{-4}	-3.150×10^{-4}	-2.236×10^{-4}	-1.650×10^{-4}	-1.056×10^{-4}	1.044×10^{-4}	1.560×10^{-4}	2.032×10^{-4}	2.691×10^{-4}	4.187×10^{-4}
fitted root mean square [1]	6.118×10^{-4}	7.545×10^{-4}	8.303×10^{-4}	8.898×10^{-4}	9.635×10^{-4}	1.504×10^{-3}	1.745×10^{-3}	1.970×10^{-3}	2.284×10^{-3}	3.139×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.750×10^{-2}	0.232	0.345	0.442	0.553	1.12	1.32	1.51	1.75	2.27
sulfurdioxide total air mass factor polluted precision [1]	9.727×10^{-3}	1.830×10^{-2}	2.476×10^{-2}	3.035×10^{-2}	3.829×10^{-2}	0.152	0.195	0.237	0.308	0.534
sulfurdioxide clear air mass factor polluted [1]	0.198	0.294	0.373	0.440	0.518	0.892	0.994	1.10	1.26	2.06
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]	0.676 $\pm$ 0.410	7993708	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(3.471 \pm 124.671) \times 10^{-2}$	7993708	0.509	1.142×10^{-2}	-67.0	130	-0.239	0.270
sulfurdioxide total vertical column precision [DU]	0.640 $\pm$ 0.922	7993708	0.435	0.363	5.022×10^{-2}	37.7	0.234	0.669
sulfurdioxide slant column density corrected [DU]	$(1.730 \pm 35.987) \times 10^{-2}$	7993708	0.369	9.117×10^{-3}	-8.21	108	-0.174	0.195
sulfurdioxide slant column density cobra [DU]	$(1.715 \pm 34.619) \times 10^{-2}$	7993708	0.369	9.117×10^{-3}	-8.21	34.4	-0.174	0.195
sulfurdioxide slant column density cobra precision [DU]	0.292 $\pm$ 0.117	7993708	0.124	0.259	8.566×10^{-2}	10.6	0.214	0.339
sulfurdioxide slant column density window1 [DU]	0.163 $\pm$ 0.653	7993708	0.741	0.166	-8.33	28.2	-0.206	0.534
sulfurdioxide slant column density window1 precision [DU]	0.292 $\pm$ 0.117	7993708	0.124	0.259	8.566×10^{-2}	10.6	0.214	0.339
sulfurdioxide slant column density corrected win1 [DU]	$(4.608 \pm 64.824) \times 10^{-2}$	7993708	0.729	3.014×10^{-2}	-8.02	28.5	-0.329	0.400
background so2 slant column offset window1 [DU]	-0.117 $\pm$ 0.123	7993708	0.145	-0.119	-0.967	3.18	-0.200	-5.464×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.20 $\pm$ 9.31	7993708	11.9	0.978	-379	495	-4.85	7.01
sulfurdioxide slant column density window2 precision [DU]	8.51 $\pm$ 2.30	7993708	2.75	8.18	2.20	277	6.96	9.71
sulfurdioxide slant column density corrected win2 [DU]	1.03 $\pm$ 9.11	7993708	11.6	1.00	-383	496	-4.79	6.83
background so2 slant column offset window2 [DU]	-0.163 $\pm$ 2.069	7993708	2.58	0.403	-9.53	7.75	-1.28	1.30
sulfurdioxide slant column density window3 [DU]	-6.83 $\pm$ 25.63	7993708	32.1	-6.44	-244	186	-22.6	9.50
sulfurdioxide slant column density window3 precision [DU]	30.2 $\pm$ 14.5	7993708	11.0	26.3	9.62	260	22.2	33.2
sulfurdioxide slant column density corrected win3 [DU]	-4.72 $\pm$ 24.92	7993708	31.3	-4.54	-226	190	-20.2	11.1
background so2 slant column offset window3 [DU]	2.11 $\pm$ 5.98	7993708	9.44	1.18	-19.3	23.4	-2.73	6.72
sulfurdioxide slant column cobra flag [1]	1.97 $\pm$ 0.22	7993708	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.940 \pm 9.581) \times 10^{-2}$	7993708	3.333×10^{-2}	1.891×10^{-2}	3.589×10^{-4}	2.17	1.057×10^{-2}	4.391×10^{-2}
fitted radiance shift [nm]	$(-8.801 \pm 287.581) \times 10^{-5}$	7993708	1.857×10^{-3}	-1.312×10^{-4}	-4.748×10^{-2}	4.713×10^{-2}	-1.043×10^{-3}	8.140×10^{-4}
fitted radiance squeeze [1]	$(1.110 \pm 17.155) \times 10^{-5}$	7993708	2.033×10^{-4}	1.181×10^{-5}	-1.077×10^{-2}	1.292×10^{-2}	-8.992×10^{-5}	1.134×10^{-4}
fitted root mean square [1]	$(1.287 \pm 0.488) \times 10^{-3}$	7993708	5.298×10^{-4}	1.160×10^{-3}	3.430×10^{-4}	4.895×10^{-2}	9.630×10^{-4}	1.493×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.773 $\pm$ 0.407	7993708	0.548	0.739	5.000×10^{-2}	3.00	0.470	1.02
sulfurdioxide total air mass factor polluted precision [1]	0.108 $\pm$ 0.131	7993708	9.934×10^{-2}	5.923×10^{-2}	3.378×10^{-3}	1.69	3.318×10^{-2}	0.133
sulfurdioxide clear air mass factor polluted [1]	0.687 $\pm$ 0.295	7993708	0.441	0.671	8.185×10^{-2}	2.57	0.451	0.892
number of spectral points in retrieval [1]	73.5 $\pm$ 0.5	7993708	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.632 ± 0.409	8970741	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(2.489 \pm 88.582) \times 10^{-2}$	8970741	0.421	8.823×10^{-3}	-57.2	480	-0.199	0.222
sulfurdioxide total vertical column precision [DU]	0.462 ± 0.604	8970741	0.297	0.309	2.318×10^{-2}	110	0.209	0.506
sulfurdioxide slant column density corrected [DU]	$(1.605 \pm 41.681) \times 10^{-2}$	8970741	0.378	8.687×10^{-3}	-16.4	391	-0.179	0.199
sulfurdioxide slant column density cobra [DU]	$(1.588 \pm 36.517) \times 10^{-2}$	8970741	0.378	8.687×10^{-3}	-16.4	160	-0.179	0.199
sulfurdioxide slant column density cobra precision [DU]	0.304 ± 0.134	8970741	0.149	0.264	5.238×10^{-2}	52.5	0.214	0.363
sulfurdioxide slant column density window1 [DU]	$(9.813 \pm 69.736) \times 10^{-2}$	8970741	0.759	0.111	-60.9	191	-0.274	0.486
sulfurdioxide slant column density window1 precision [DU]	0.304 ± 0.134	8970741	0.149	0.264	5.238×10^{-2}	52.5	0.214	0.363
sulfurdioxide slant column density corrected win1 [DU]	$(3.325 \pm 68.998) \times 10^{-2}$	8970741	0.746	1.666×10^{-2}	-60.9	191	-0.352	0.394
background so2 slant column offset window1 [DU]	$(-6.488 \pm 16.518) \times 10^{-2}$	8970741	0.163	-8.708×10^{-2}	-1.42	4.02	-0.167	-4.452×10^{-3}
sulfurdioxide slant column density window2 [DU]	1.96 ± 9.16	8970741	11.7	1.77	-1.151×10^3	1.114×10^3	-3.97	7.69
sulfurdioxide slant column density window2 precision [DU]	8.08 ± 2.19	8970741	2.41	7.78	2.35	788	6.70	9.11
sulfurdioxide slant column density corrected win2 [DU]	0.995 ± 8.861	8970741	11.2	0.970	-1.149×10^3	1.115×10^3	-4.64	6.59
background so2 slant column offset window2 [DU]	-0.962 ± 2.415	8970741	4.10	-0.723	-10.1	8.07	-2.91	1.19
sulfurdioxide slant column density window3 [DU]	-6.83 ± 23.52	8970741	29.4	-6.99	-1.081×10^3	1.325×10^4	-21.6	7.86
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 12.9	8970741	8.79	24.4	10.4	3.397×10^3	20.9	29.7
sulfurdioxide slant column density corrected win3 [DU]	-4.34 ± 22.89	8970741	28.4	-4.35	-1.079×10^3	1.325×10^4	-18.5	9.89
background so2 slant column offset window3 [DU]	2.49 ± 5.98	8970741	9.79	2.02	-19.1	25.6	-2.53	7.26
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	8970741	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.751 \pm 3.146) \times 10^{-2}$	8970741	1.160×10^{-2}	1.180×10^{-2}	8.815×10^{-4}	1.62	7.285×10^{-3}	1.888×10^{-2}
fitted radiance shift [nm]	$(-7.508 \pm 25.269) \times 10^{-4}$	8970741	1.905×10^{-3}	-7.327×10^{-4}	-5.778×10^{-2}	4.404×10^{-2}	-1.764×10^{-3}	1.411×10^{-4}
fitted radiance squeeze [1]	$(-2.327 \pm 19.538) \times 10^{-5}$	8970741	2.171×10^{-4}	-7.285×10^{-6}	-1.386×10^{-2}	2.494×10^{-2}	-1.208×10^{-4}	9.623×10^{-5}
fitted root mean square [1]	$(1.315 \pm 0.548) \times 10^{-3}$	8970741	5.513×10^{-4}	1.157×10^{-3}	3.385×10^{-4}	0.149	9.638×10^{-4}	1.515×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.967 ± 0.491	8970741	0.620	0.862	5.000×10^{-2}	3.45	0.621	1.24
sulfurdioxide total air mass factor polluted precision [1]	0.115 ± 0.088	8970741	0.122	9.278×10^{-2}	4.629×10^{-3}	1.29	4.277×10^{-2}	0.165
sulfurdioxide clear air mass factor polluted [1]	0.779 ± 0.375	8970741	0.330	0.704	9.056×10^{-2}	3.47	0.562	0.892
number of spectral points in retrieval [1]	73.4 ± 0.5	8970741	1.000	73.0	70.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.659 ± 0.406	12262853	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.564 \pm 95.358) \times 10^{-2}$	12262853	0.429	8.979×10^{-3}	-62.5	480	-0.203	0.226
sulfurdioxide total vertical column precision [DU]	0.489 ± 0.693	12262853	0.299	0.305	2.318×10^{-2}	110	0.214	0.513
sulfurdioxide slant column density corrected [DU]	$(1.504 \pm 36.900) \times 10^{-2}$	12262853	0.367	8.299×10^{-3}	-8.91	391	-0.174	0.193
sulfurdioxide slant column density cobra [DU]	$(1.497 \pm 34.669) \times 10^{-2}$	12262853	0.367	8.299×10^{-3}	-8.91	160	-0.174	0.193
sulfurdioxide slant column density cobra precision [DU]	0.294 ± 0.126	12262853	0.136	0.256	5.238×10^{-2}	52.5	0.211	0.347
sulfurdioxide slant column density window1 [DU]	0.123 ± 0.667	12262853	0.739	0.135	-60.9	191	-0.239	0.499
sulfurdioxide slant column density window1 precision [DU]	0.294 ± 0.126	12262853	0.136	0.256	5.238×10^{-2}	52.5	0.211	0.347
sulfurdioxide slant column density corrected win1 [DU]	$(3.865 \pm 66.020) \times 10^{-2}$	12262853	0.725	2.343×10^{-2}	-60.9	191	-0.335	0.390
background so2 slant column offset window1 [DU]	$(-8.476 \pm 15.243) \times 10^{-2}$	12262853	0.156	-0.100	-1.42	4.02	-0.180	-2.330×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.69 ± 8.99	12262853	11.5	1.49	-1.151×10^3	929	-4.19	7.35
sulfurdioxide slant column density window2 precision [DU]	8.04 ± 2.05	12262853	2.41	7.76	2.20	605	6.68	9.09
sulfurdioxide slant column density corrected win2 [DU]	1.04 ± 8.71	12262853	11.2	1.01	-1.149×10^3	929	-4.56	6.60
background so2 slant column offset window2 [DU]	-0.650 ± 2.339	12262853	3.76	-7.115×10^{-2}	-10.1	8.07	-2.49	1.27
sulfurdioxide slant column density window3 [DU]	-4.71 ± 23.53	12262853	30.0	-4.95	-489	2.025×10^3	-19.8	10.2
sulfurdioxide slant column density window3 precision [DU]	27.6 ± 12.2	12262853	8.76	24.4	9.62	635	20.9	29.7
sulfurdioxide slant column density corrected win3 [DU]	-2.56 ± 22.66	12262853	28.8	-2.83	-487	2.019×10^3	-17.0	11.8
background so2 slant column offset window3 [DU]	2.15 ± 5.90	12262853	9.50	1.45	-19.3	25.6	-2.70	6.79
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	12262853	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.885 \pm 3.294) \times 10^{-2}$	12262853	1.166×10^{-2}	1.265×10^{-2}	4.856×10^{-4}	2.17	8.171×10^{-3}	1.983×10^{-2}
fitted radiance shift [nm]	$(-5.037 \pm 24.828) \times 10^{-4}$	12262853	1.940×10^{-3}	-4.875×10^{-4}	-5.778×10^{-2}	4.713×10^{-2}	-1.531×10^{-3}	4.093×10^{-4}
fitted radiance squeeze [1]	$(-1.059 \pm 18.373) \times 10^{-5}$	12262853	2.067×10^{-4}	9.637×10^{-7}	-1.275×10^{-2}	2.494×10^{-2}	-1.057×10^{-4}	1.010×10^{-4}
fitted root mean square [1]	$(1.279 \pm 0.517) \times 10^{-3}$	12262853	5.217×10^{-4}	1.133×10^{-3}	3.385×10^{-4}	0.149	9.476×10^{-4}	1.469×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.907 ± 0.437	12262853	0.539	0.845	5.000×10^{-2}	2.87	0.606	1.14
sulfurdioxide total air mass factor polluted precision [1]	0.108 ± 0.090	12262853	0.108	7.729×10^{-2}	3.479×10^{-3}	1.55	4.194×10^{-2}	0.150
sulfurdioxide clear air mass factor polluted [1]	0.756 ± 0.295	12262853	0.349	0.724	9.056×10^{-2}	2.88	0.561	0.910
number of spectral points in retrieval [1]	73.4 ± 0.5	12262853	1.000	73.0	70.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.656 ± 0.417	3658786	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(3.395 \pm 120.334) \times 10^{-2}$	3658786	0.535	1.180×10^{-2}	-47.9	385	-0.248	0.286
sulfurdioxide total vertical column precision [DU]	0.644 ± 0.845	3658786	0.452	0.403	3.757×10^{-2}	37.7	0.250	0.702
sulfurdioxide slant column density corrected [DU]	$(1.937 \pm 43.671) \times 10^{-2}$	3658786	0.383	9.802×10^{-3}	-16.4	339	-0.180	0.203
sulfurdioxide slant column density cobra [DU]	$(1.903 \pm 36.980) \times 10^{-2}$	3658786	0.383	9.802×10^{-3}	-16.4	47.7	-0.180	0.203
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.126	3658786	0.122	0.267	8.890×10^{-2}	12.7	0.223	0.345
sulfurdioxide slant column density window1 [DU]	0.142 ± 0.687	3658786	0.768	0.145	-39.9	33.0	-0.240	0.528
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.126	3658786	0.122	0.267	8.890×10^{-2}	12.7	0.223	0.345
sulfurdioxide slant column density corrected win1 [DU]	$(3.526 \pm 68.055) \times 10^{-2}$	3658786	0.755	1.805×10^{-2}	-39.9	32.9	-0.354	0.401
background so2 slant column offset window1 [DU]	-0.106 ± 0.142	3658786	0.145	-0.114	-0.880	2.01	-0.196	-5.130×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.15 ± 9.76	3658786	12.3	0.970	-652	1.114×10^3	-5.09	7.19
sulfurdioxide slant column density window2 precision [DU]	8.83 ± 2.63	3658786	2.79	8.46	2.51	788	7.22	10.0
sulfurdioxide slant column density corrected win2 [DU]	0.982 ± 9.552	3658786	12.0	0.945	-653	1.115×10^3	-5.04	6.97
background so2 slant column offset window2 [DU]	-0.163 ± 2.037	3658786	2.56	0.337	-10.0	8.07	-1.27	1.29
sulfurdioxide slant column density window3 [DU]	-12.2 ± 26.1	3658786	31.6	-11.6	-477	1.325×10^4	-27.7	3.90
sulfurdioxide slant column density window3 precision [DU]	32.6 ± 16.9	3658786	11.8	27.8	10.5	3.397×10^3	23.4	35.1
sulfurdioxide slant column density corrected win3 [DU]	-10.1 ± 26.1	3658786	31.6	-9.49	-481	1.325×10^4	-25.6	6.00
background so2 slant column offset window3 [DU]	2.15 ± 6.03	3658786	9.43	1.08	-19.3	23.5	-2.68	6.75
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.26	3658786	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.674 \pm 11.067) \times 10^{-2}$	3658786	6.062×10^{-2}	2.814×10^{-2}	3.589×10^{-4}	2.07	1.133×10^{-2}	7.195×10^{-2}
fitted radiance shift [nm]	$(-2.985 \pm 33.258) \times 10^{-4}$	3658786	1.971×10^{-3}	-3.640×10^{-4}	-4.232×10^{-2}	4.404×10^{-2}	-1.321×10^{-3}	6.494×10^{-4}
fitted radiance squeeze [1]	$(-3.711 \pm 186.383) \times 10^{-6}$	3658786	2.159×10^{-4}	5.022×10^{-7}	-1.386×10^{-2}	1.303×10^{-2}	-1.084×10^{-4}	1.075×10^{-4}
fitted root mean square [1]	$(1.332 \pm 0.516) \times 10^{-3}$	3658786	5.178×10^{-4}	1.199×10^{-3}	3.627×10^{-4}	3.327×10^{-2}	1.004×10^{-3}	1.522×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.815 ± 0.530	3658786	0.594	0.685	5.000×10^{-2}	3.45	0.460	1.05
sulfurdioxide total air mass factor polluted precision [1]	0.121 ± 0.147	3658786	0.127	6.419×10^{-2}	3.378×10^{-3}	1.69	2.999×10^{-2}	0.157
sulfurdioxide clear air mass factor polluted [1]	0.704 ± 0.460	3658786	0.389	0.608	8.185×10^{-2}	3.47	0.434	0.824
number of spectral points in retrieval [1]	73.4 ± 0.5	3658786	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

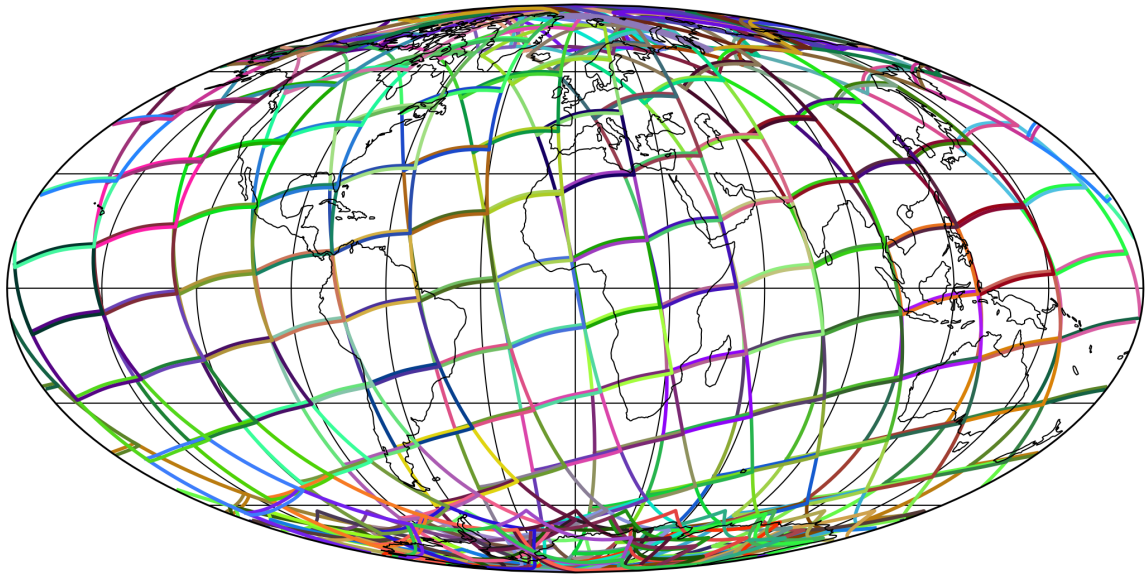


Figure 1: Outline of the granules.

4 Input data monitoring

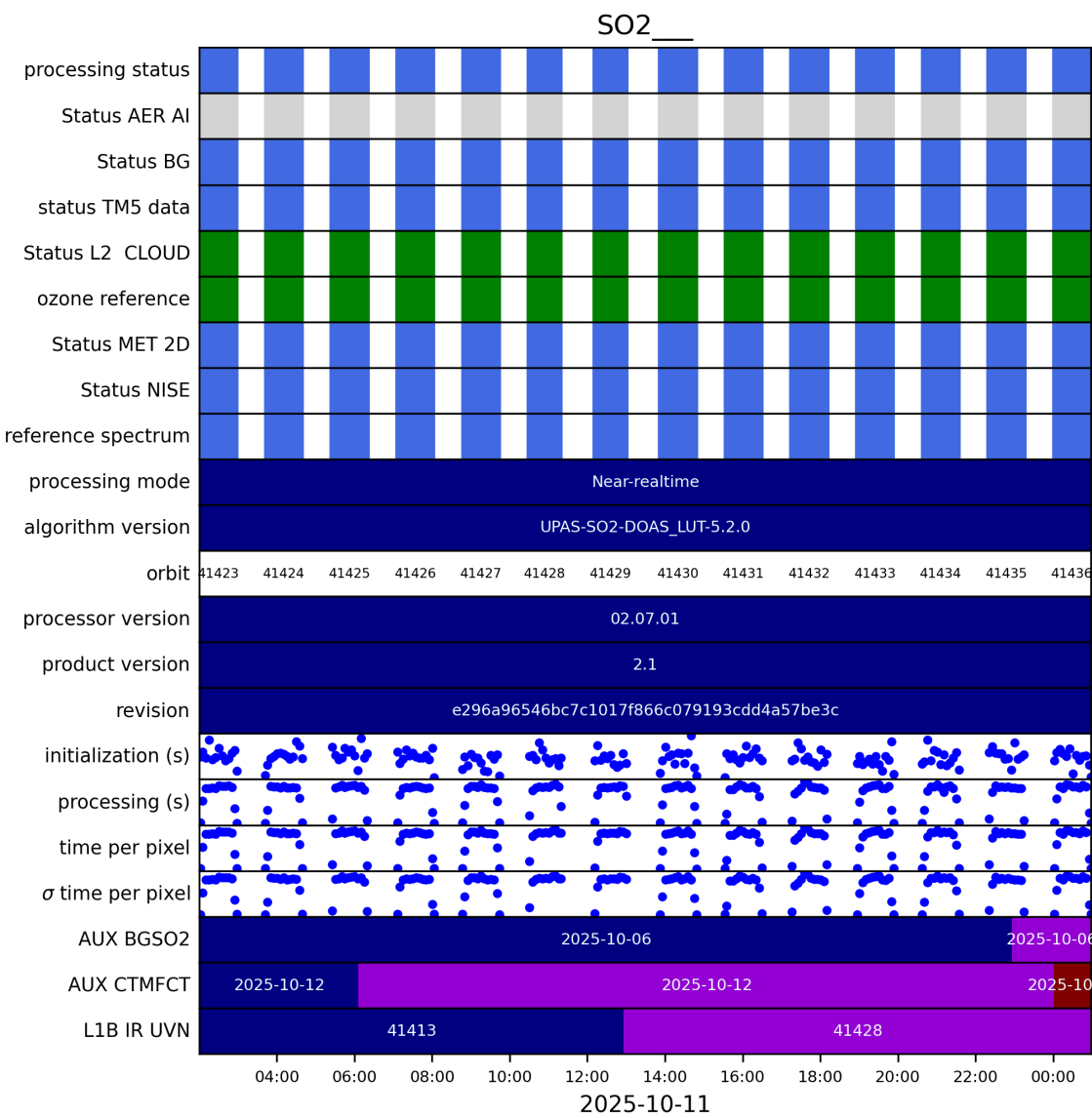


Figure 2: Input data per granule

5 Warnings and errors

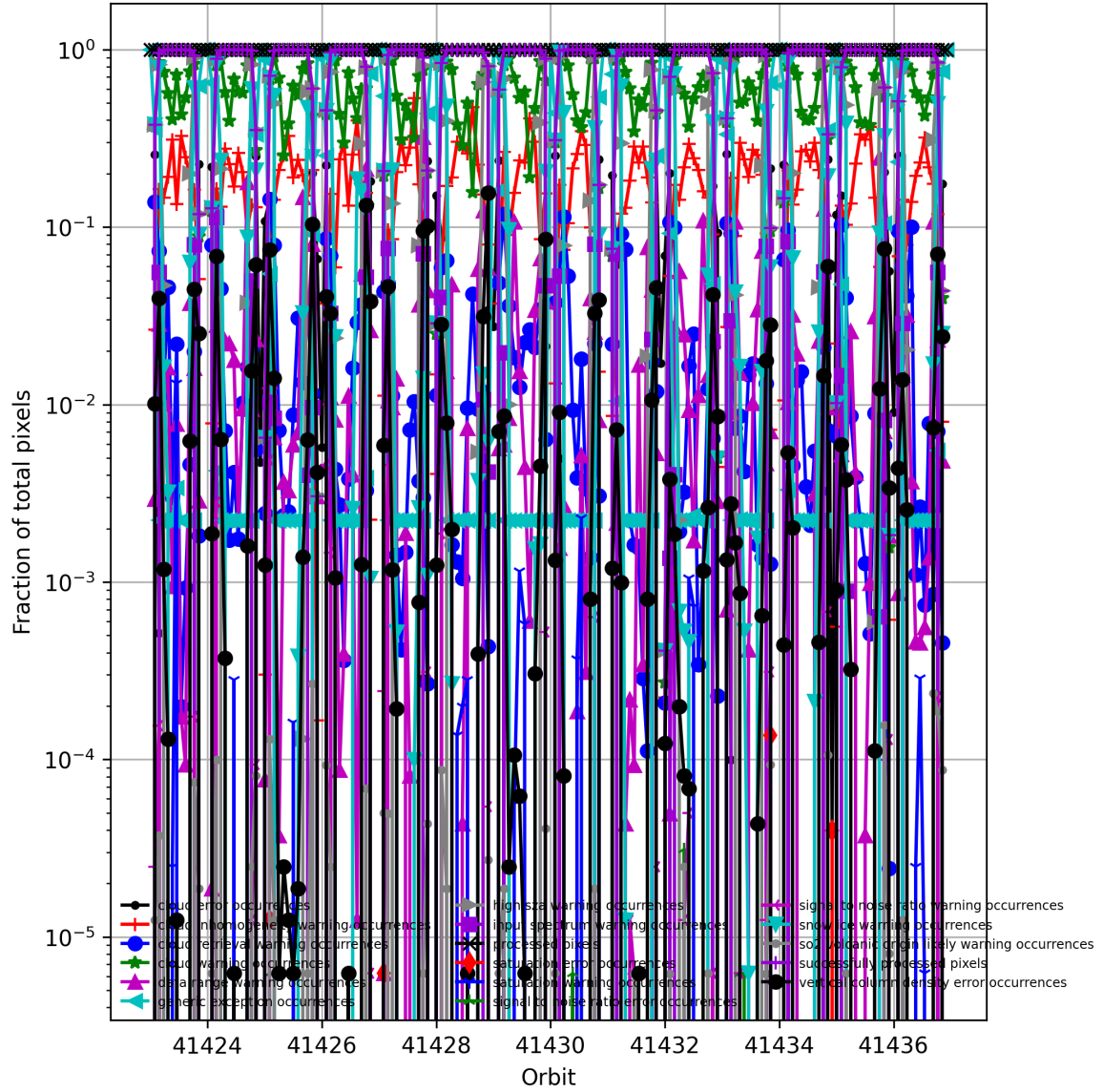


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

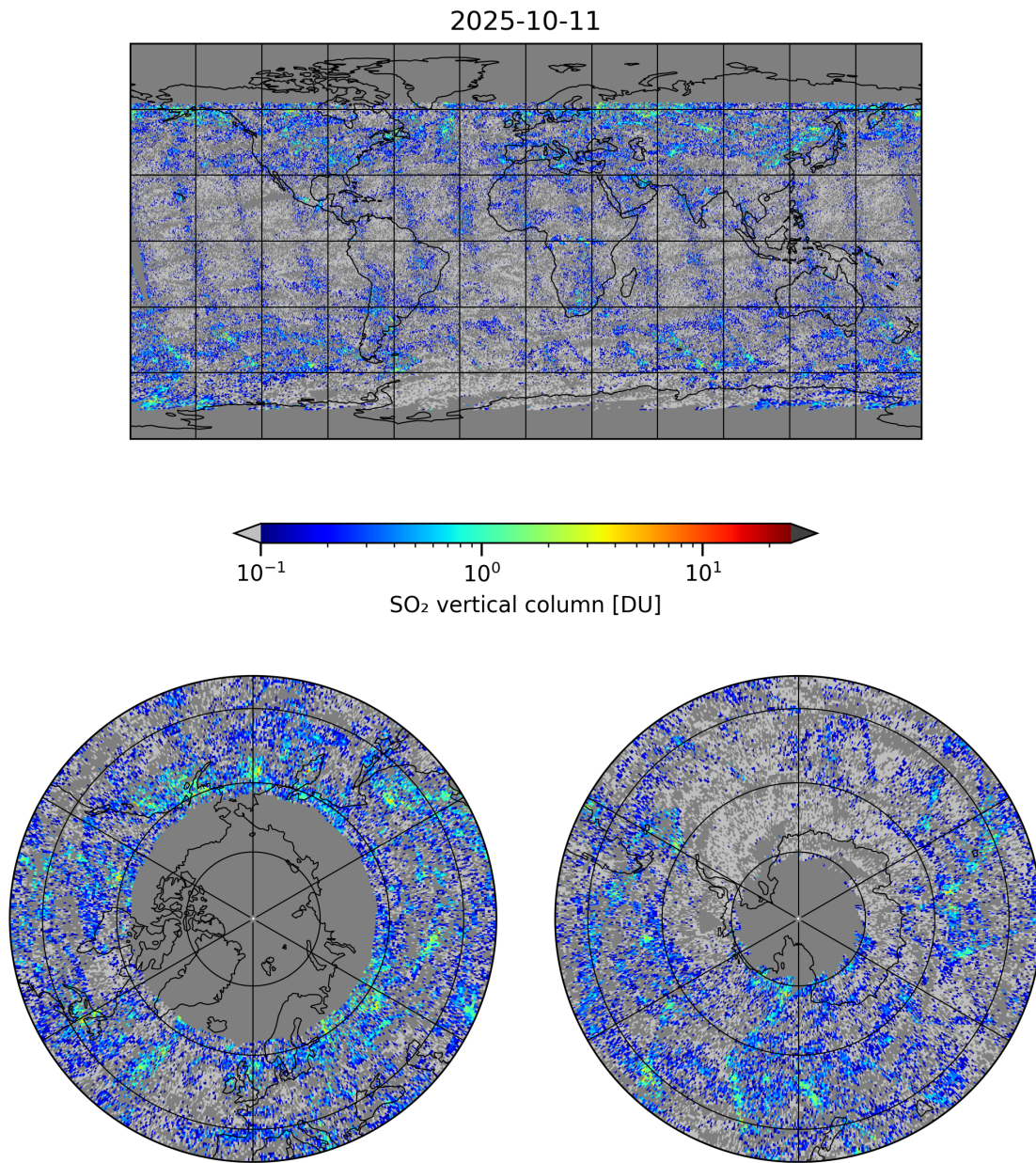


Figure 4: Map of “SO₂ vertical column” for 2025-10-11 to 2025-10-12

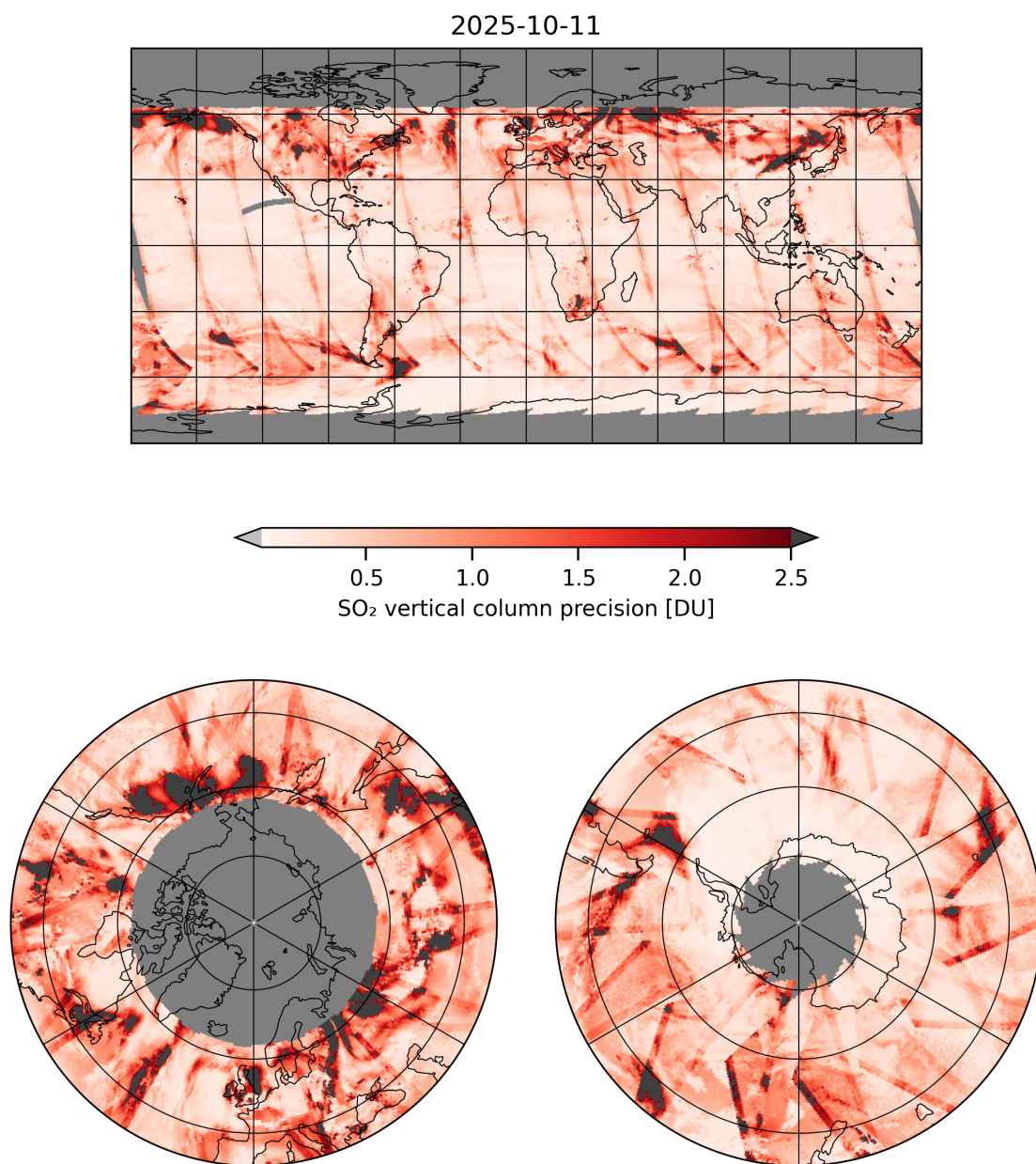


Figure 5: Map of “SO₂ vertical column precision” for 2025-10-11 to 2025-10-12

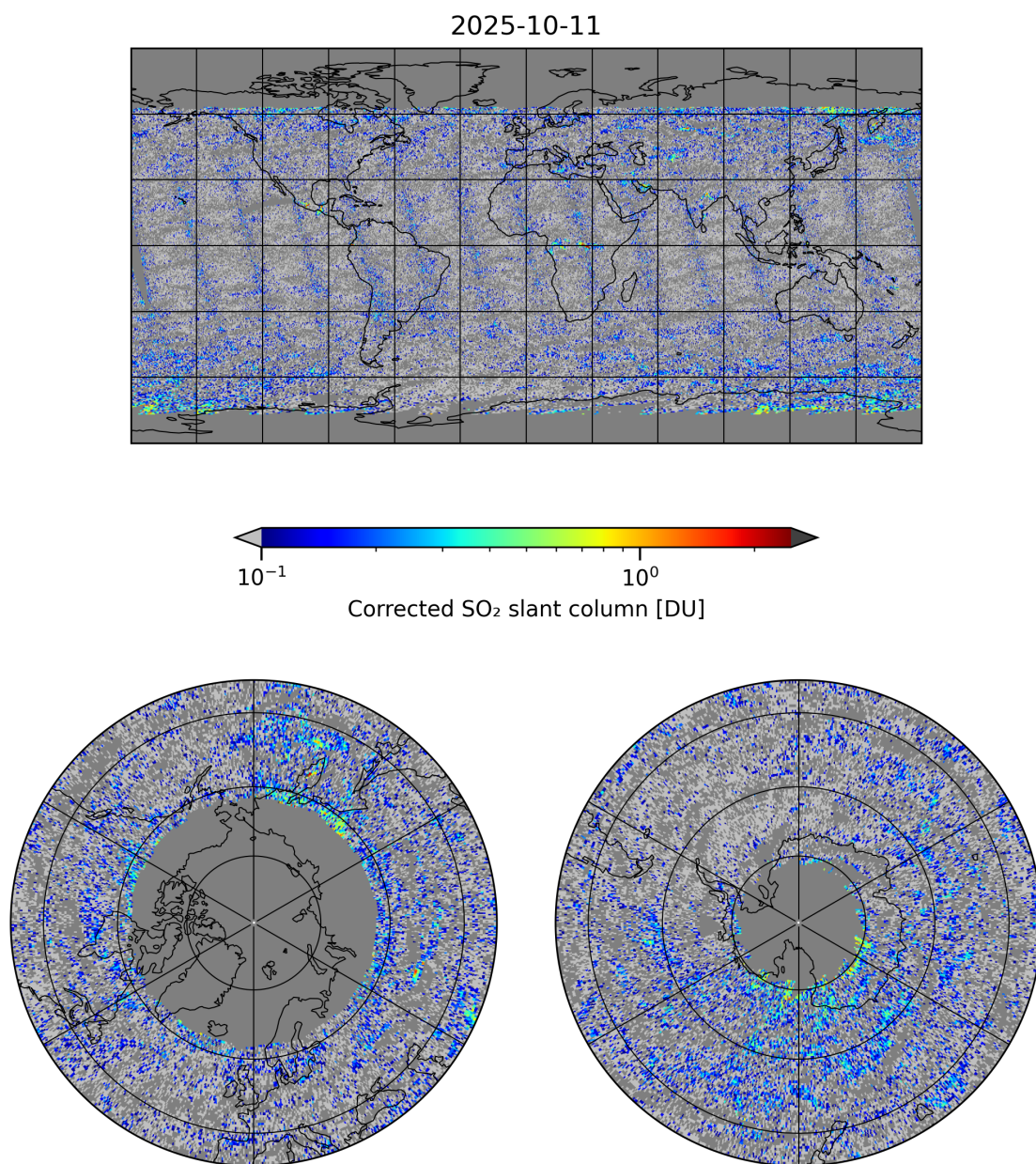


Figure 6: Map of “Corrected SO₂ slant column” for 2025-10-11 to 2025-10-12

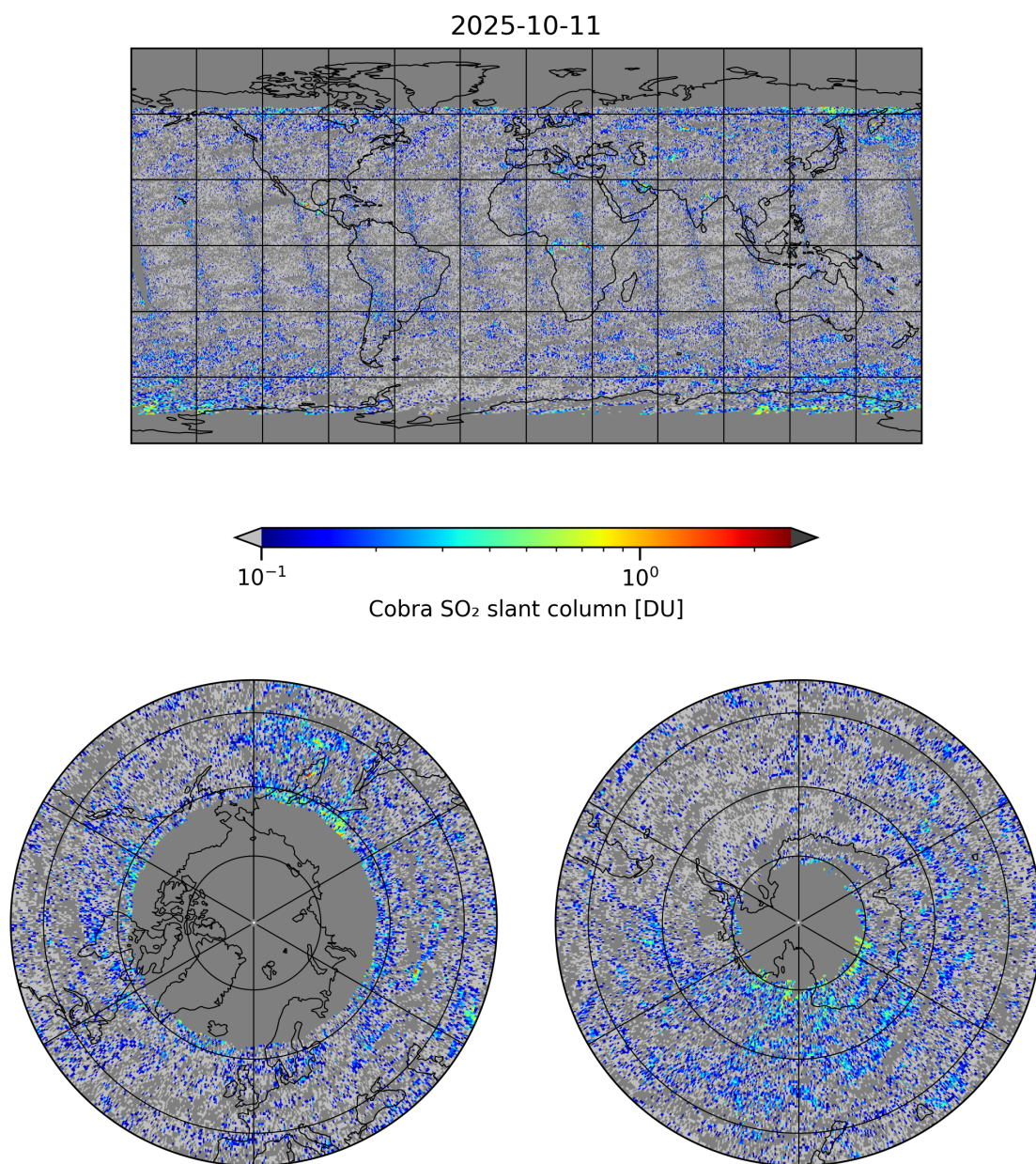


Figure 7: Map of “Cobra SO₂ slant column” for 2025-10-11 to 2025-10-12

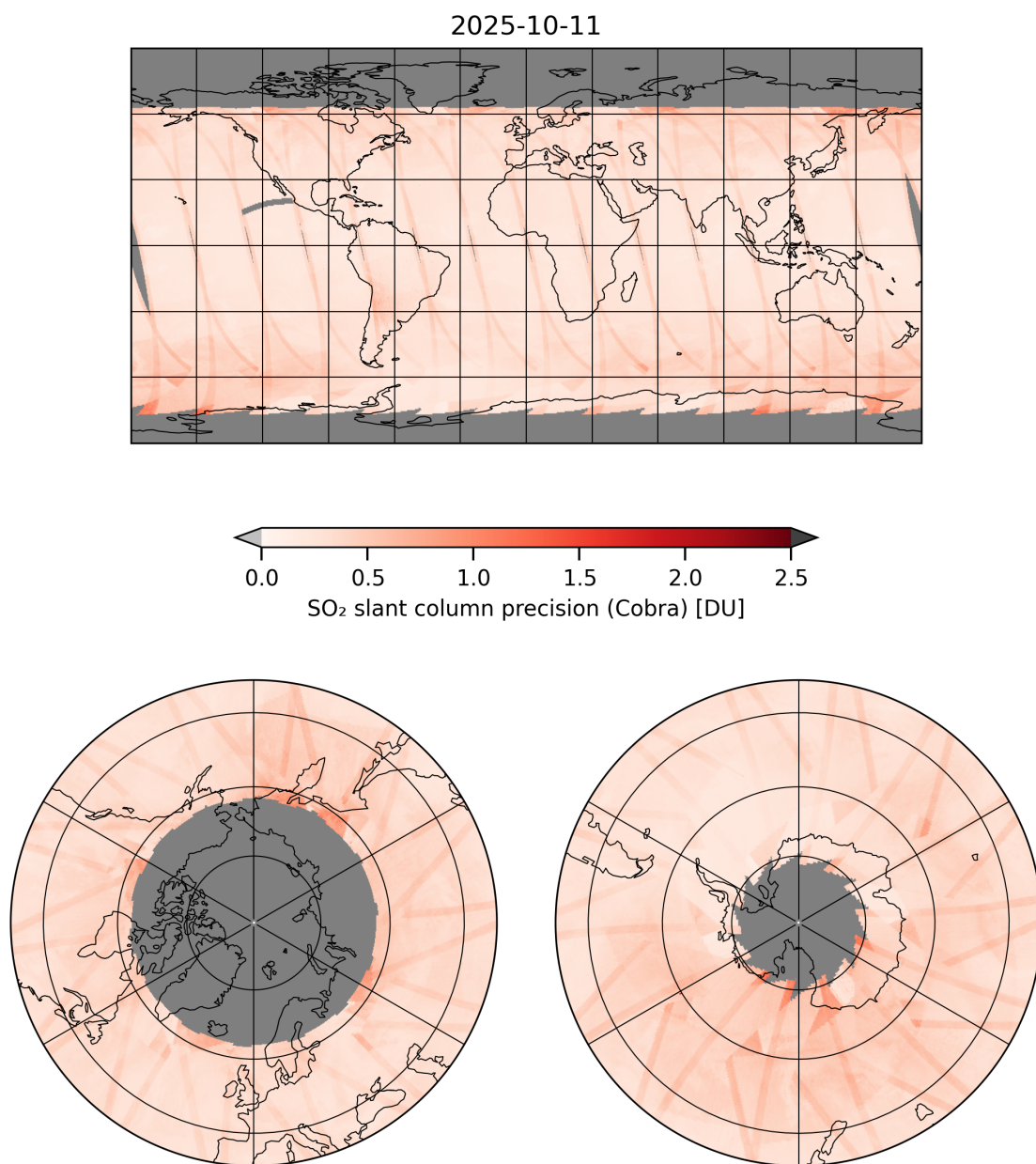


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-10-11 to 2025-10-12

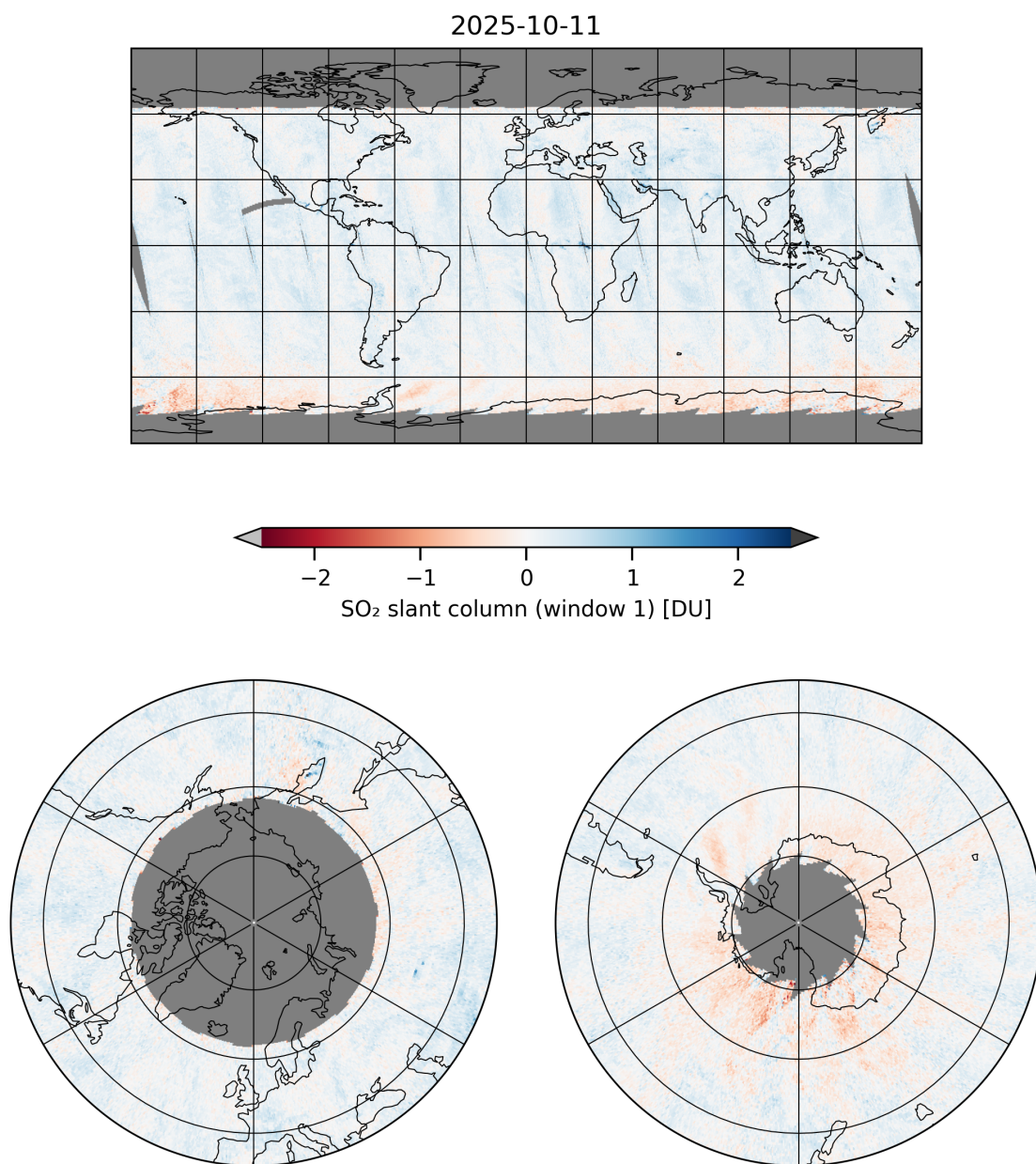


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-10-11 to 2025-10-12

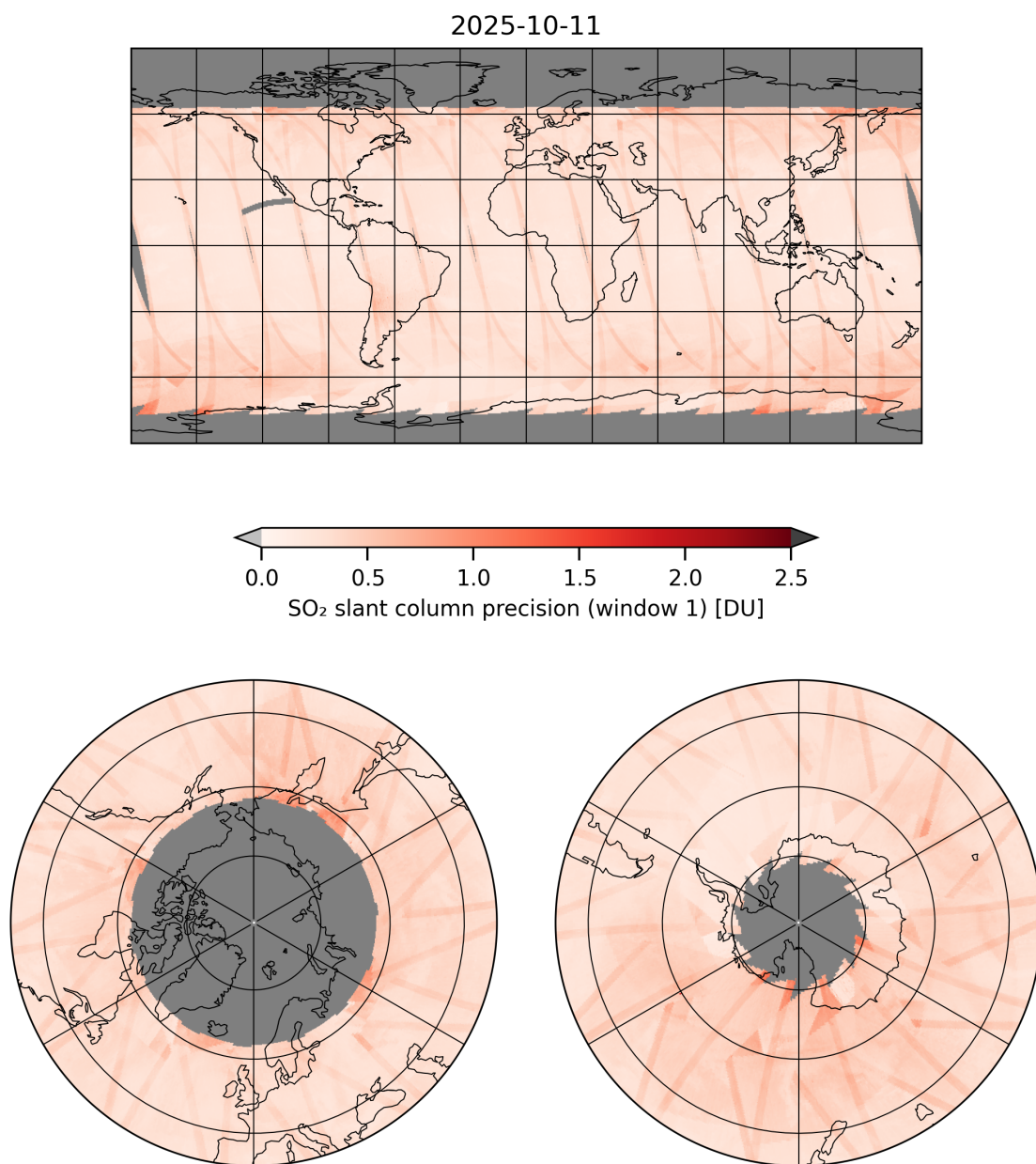


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-10-11 to 2025-10-12

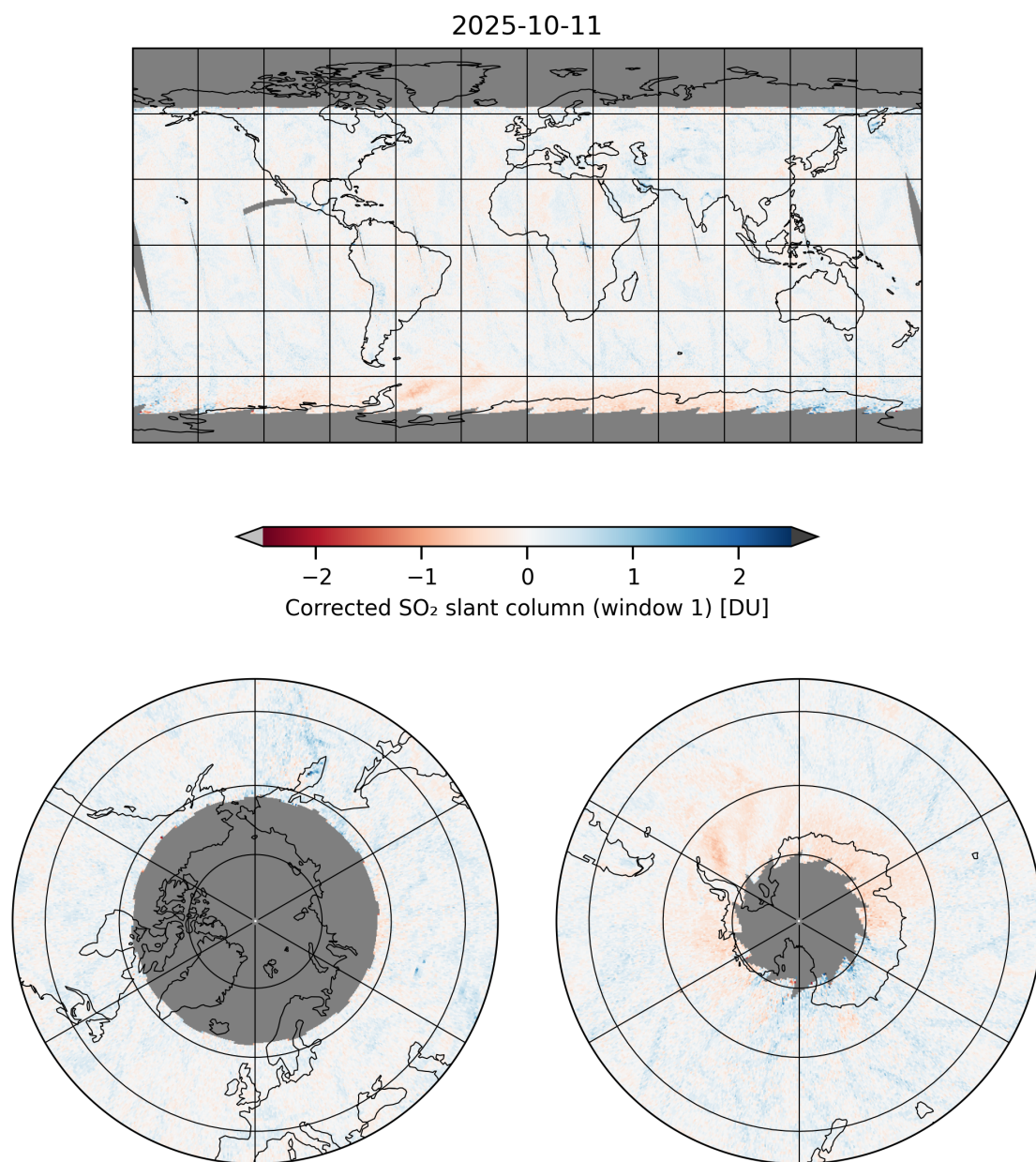


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-10-11 to 2025-10-12

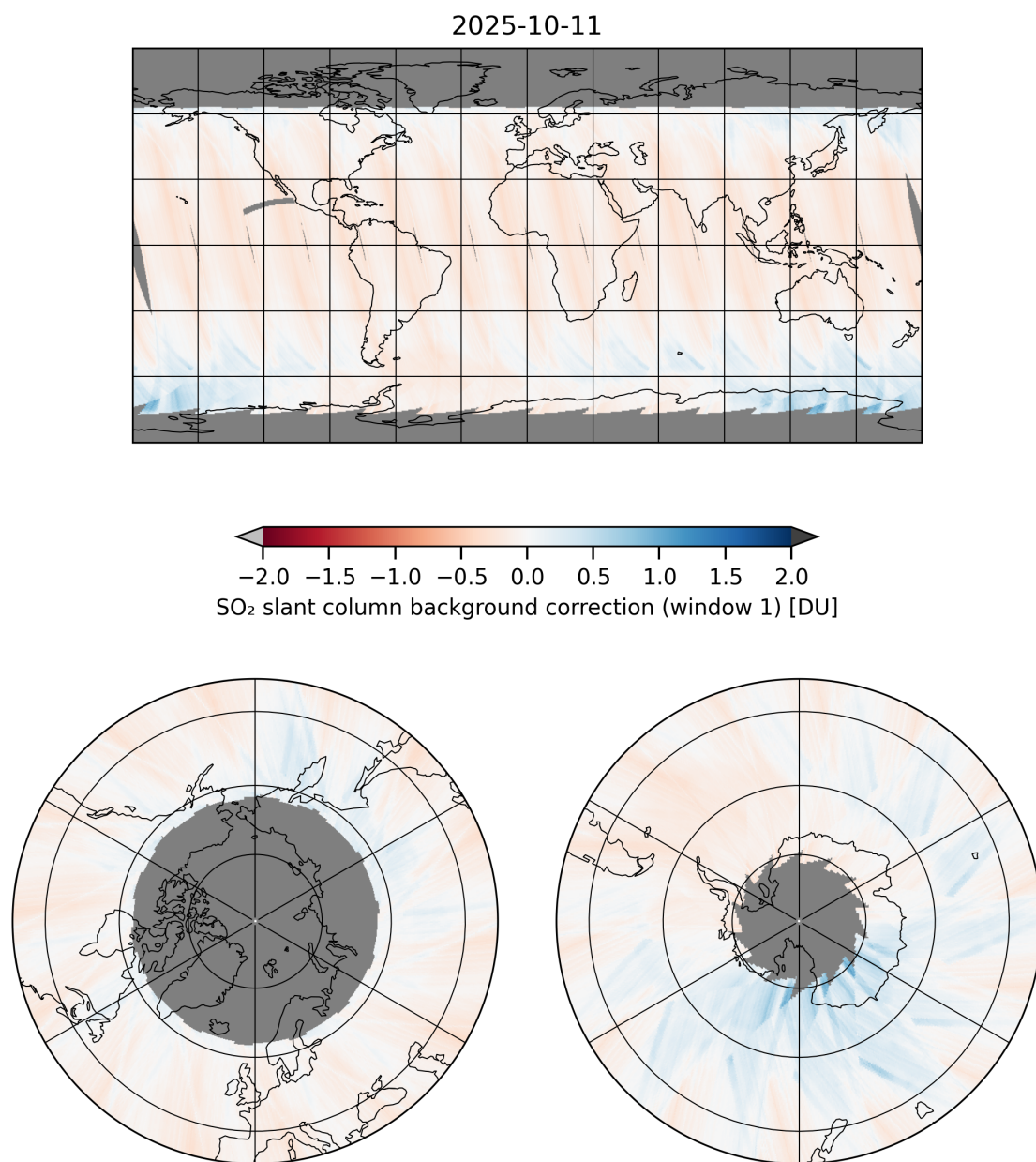


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-10-11 to 2025-10-12

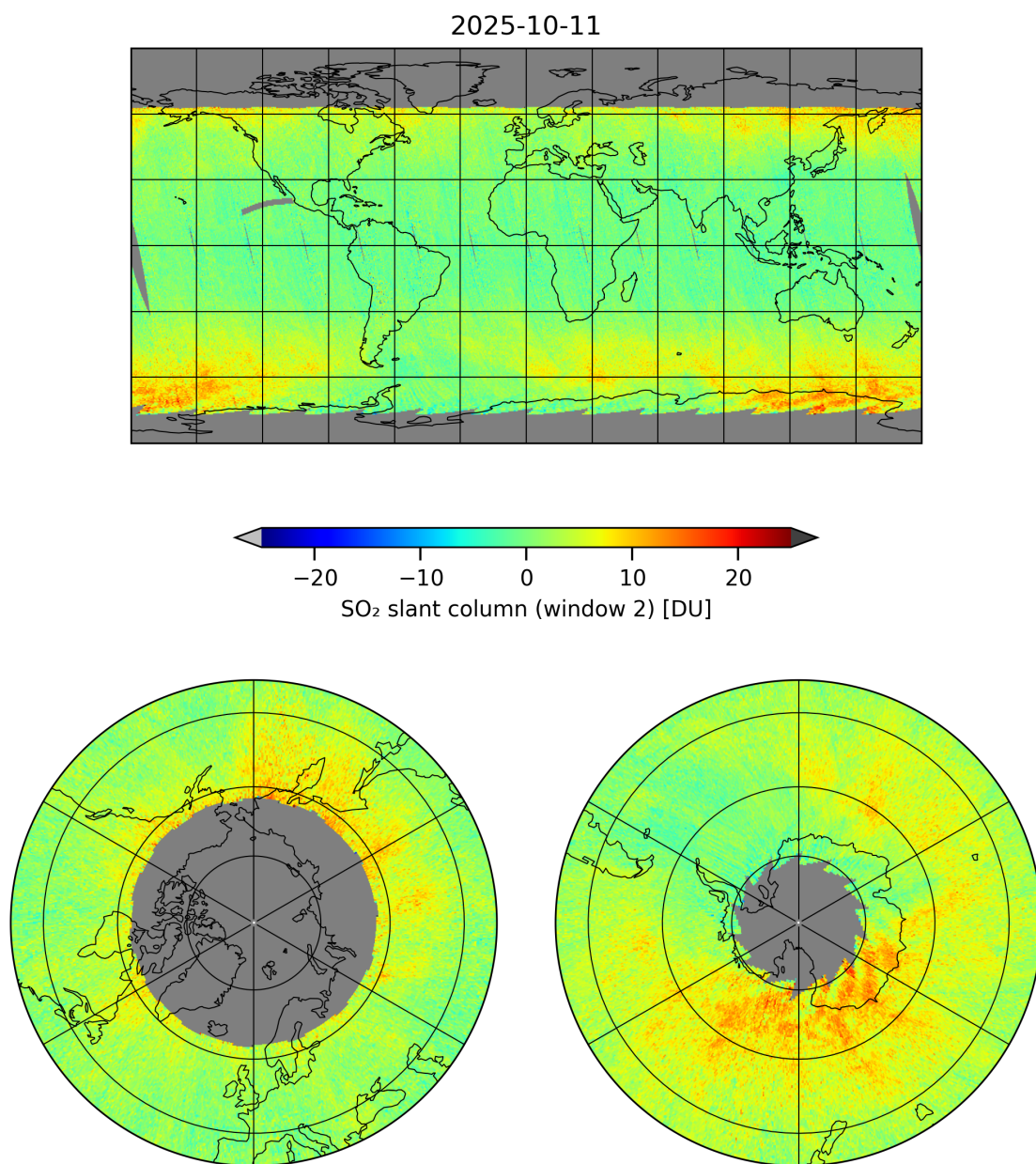


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-10-11 to 2025-10-12

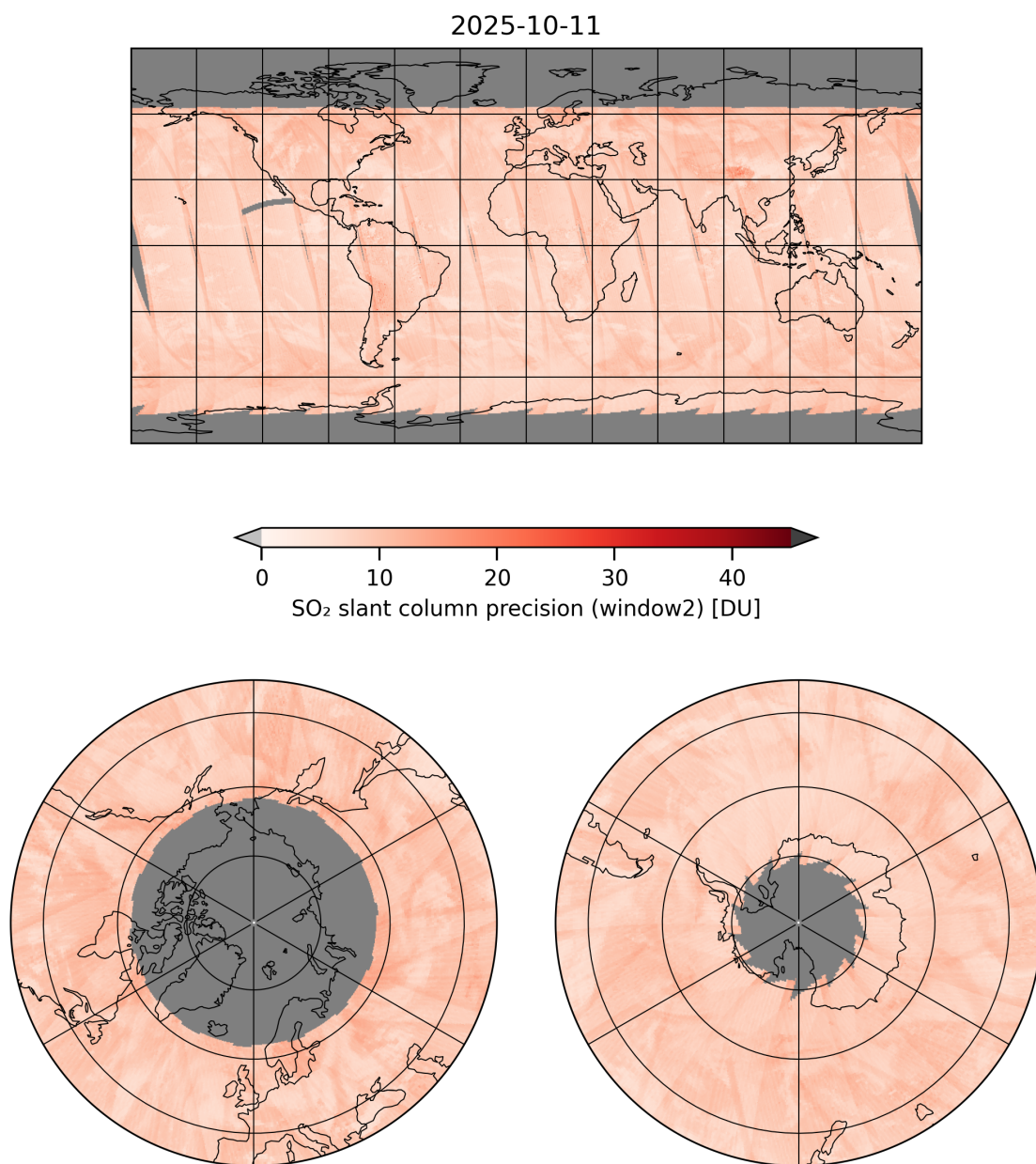


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-10-11 to 2025-10-12

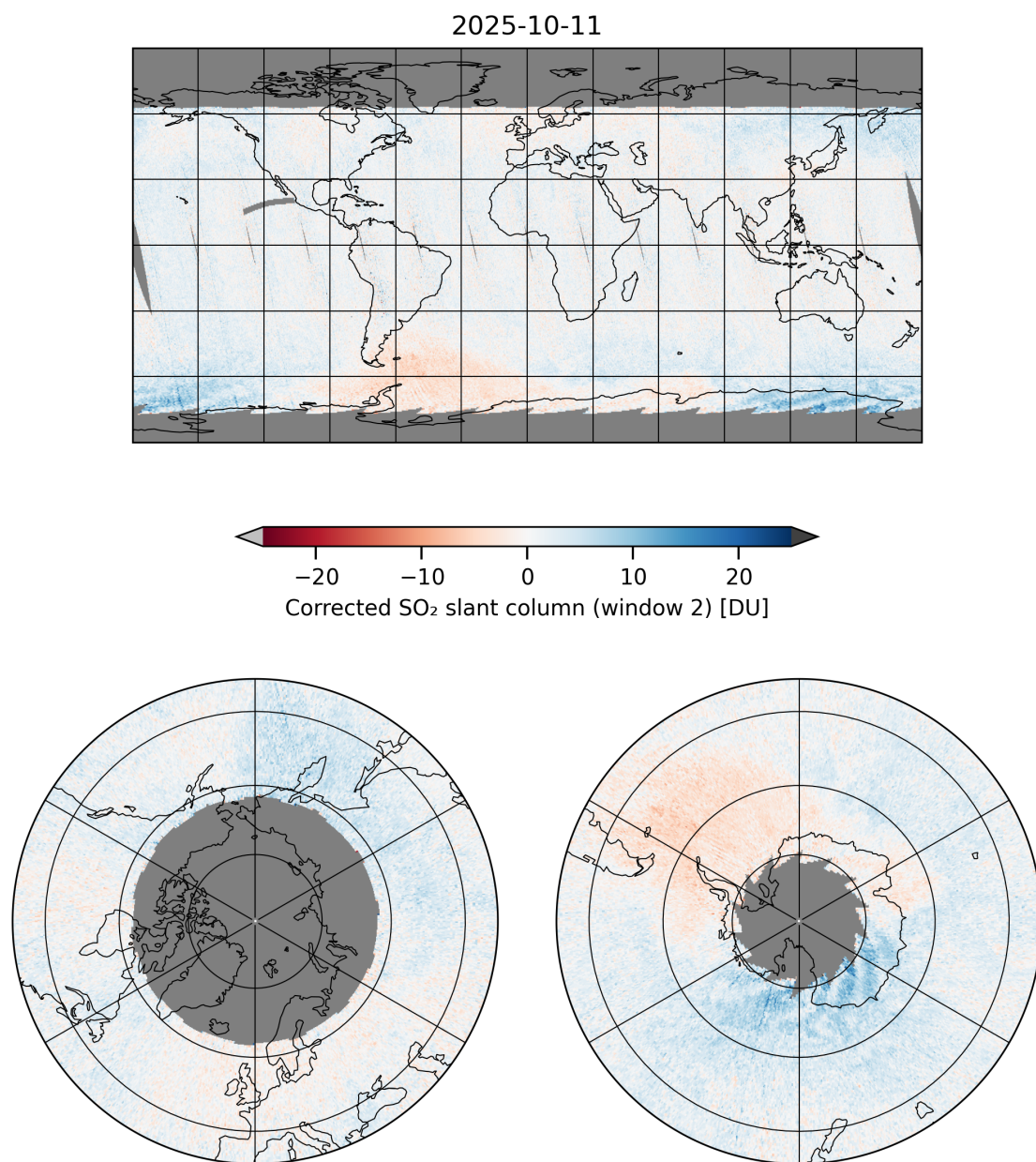


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-10-11 to 2025-10-12

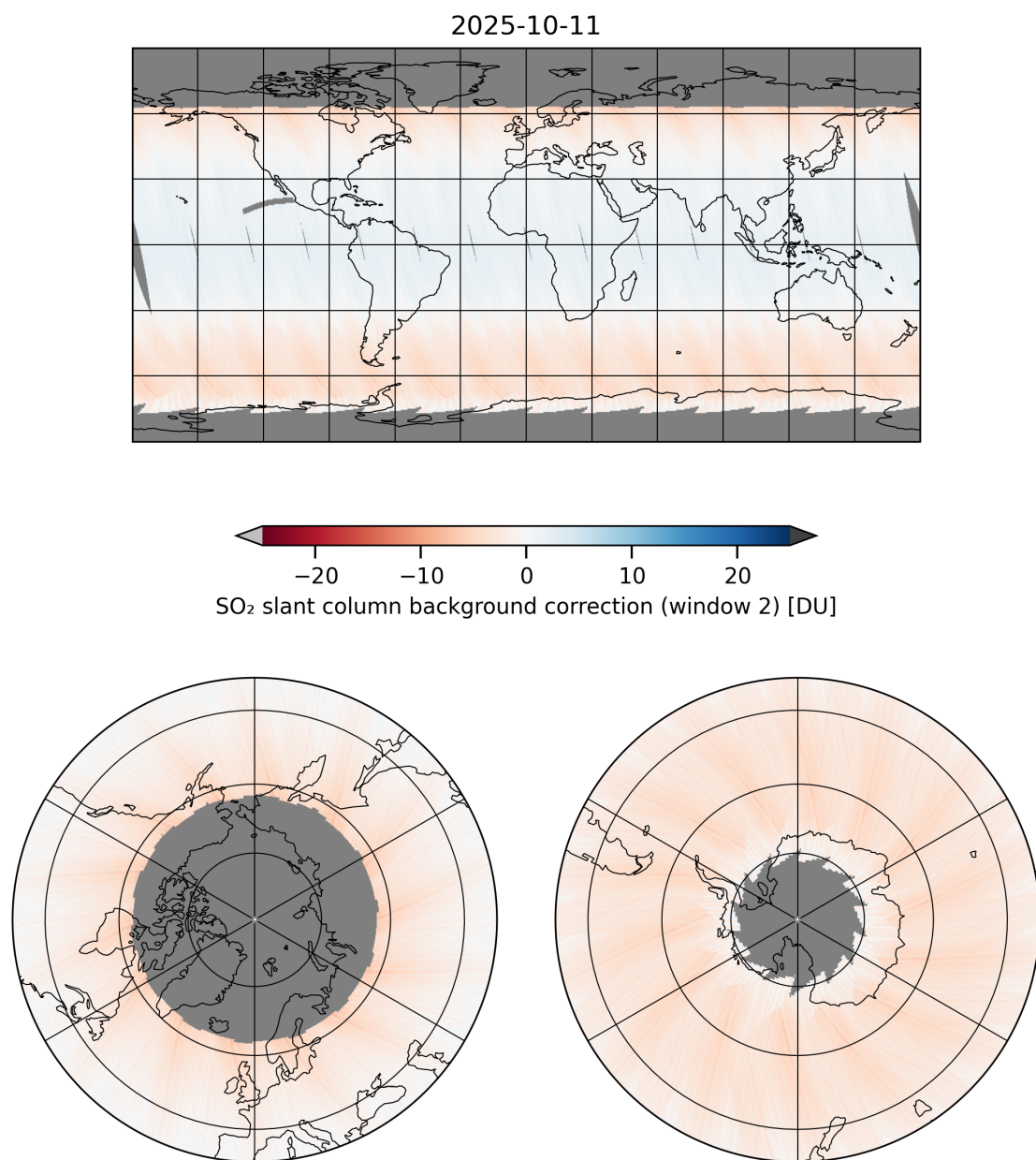


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-10-11 to 2025-10-12

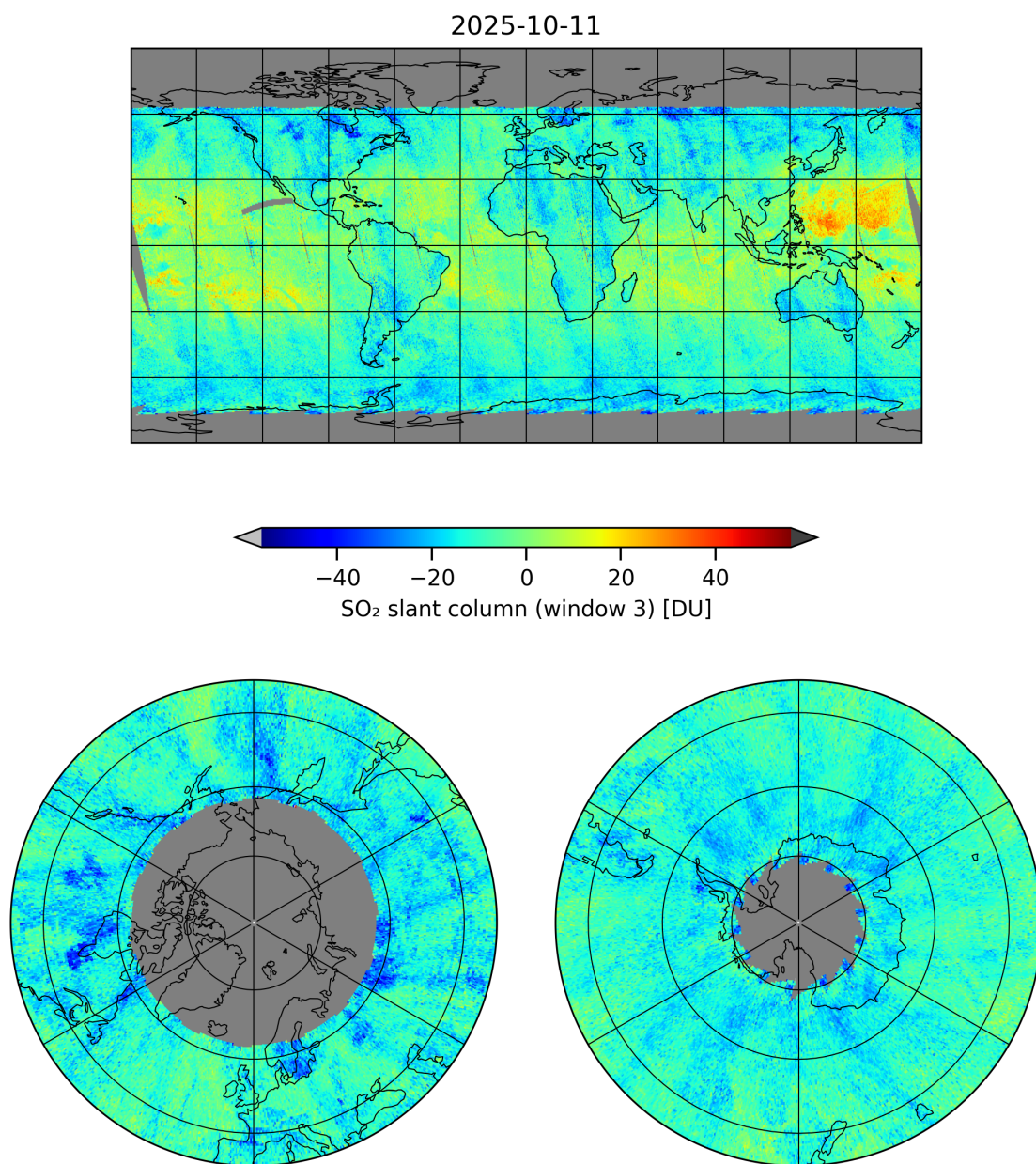


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-10-11 to 2025-10-12

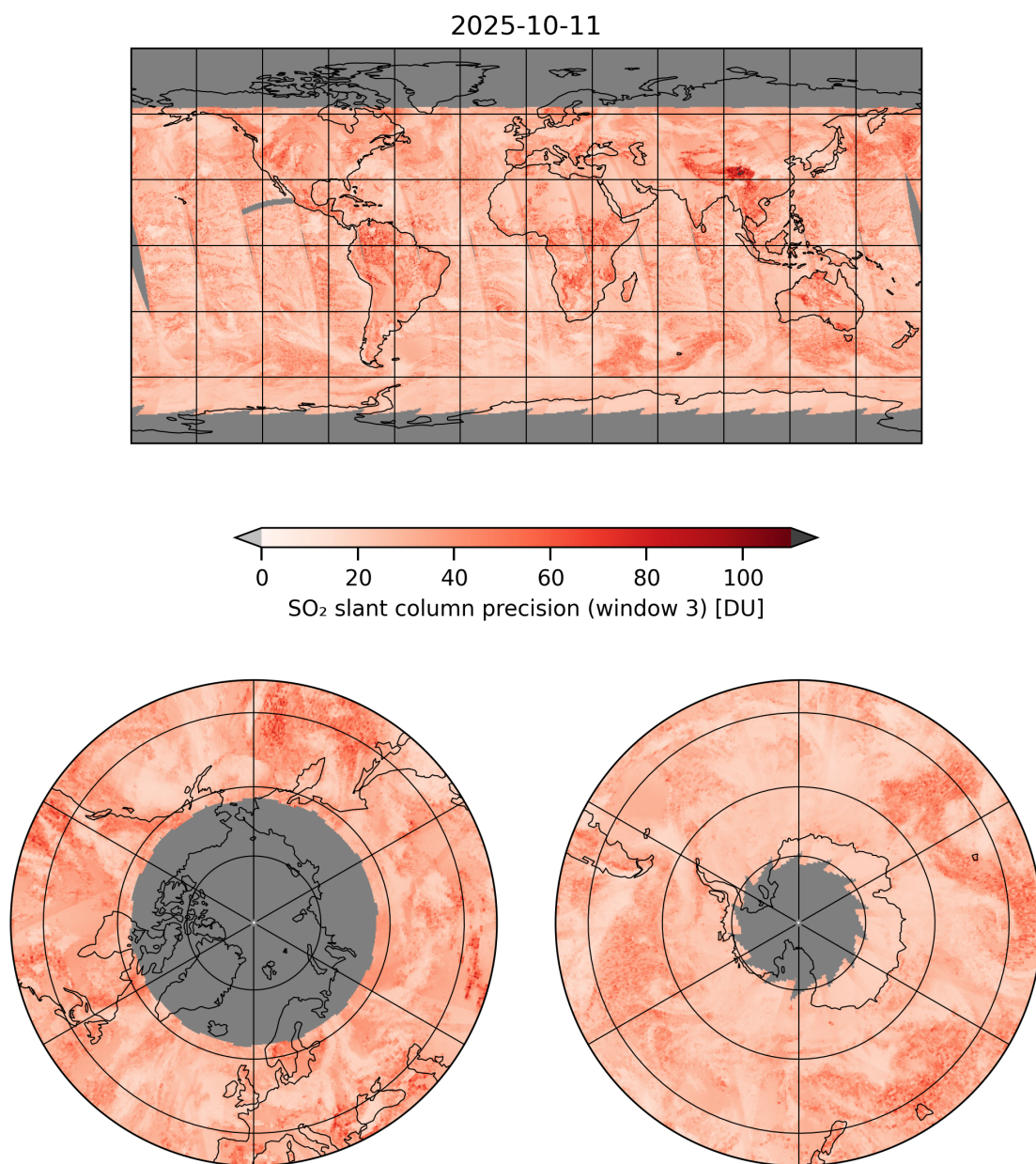


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-10-11 to 2025-10-12

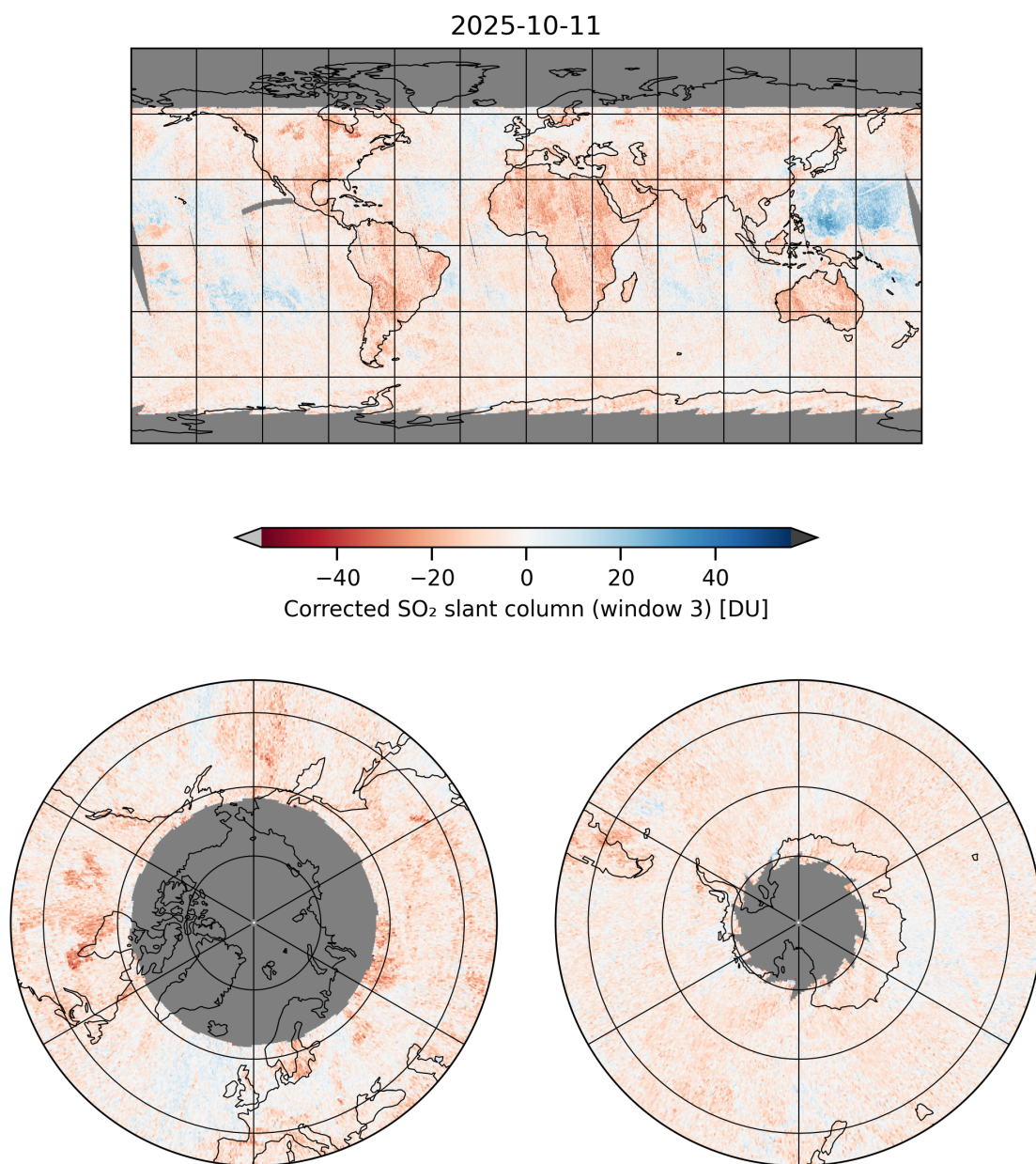


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-10-11 to 2025-10-12

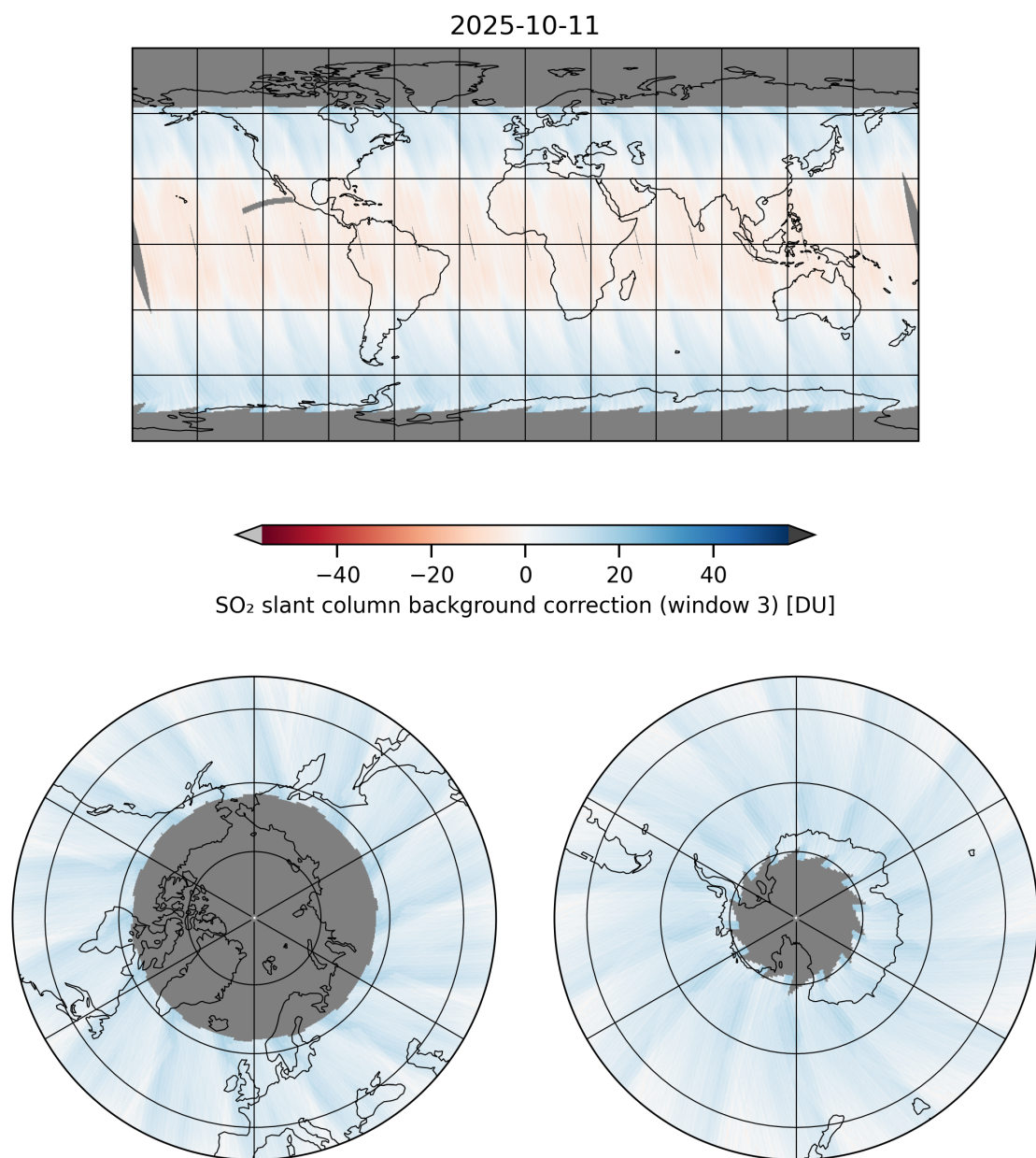


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-10-11 to 2025-10-12

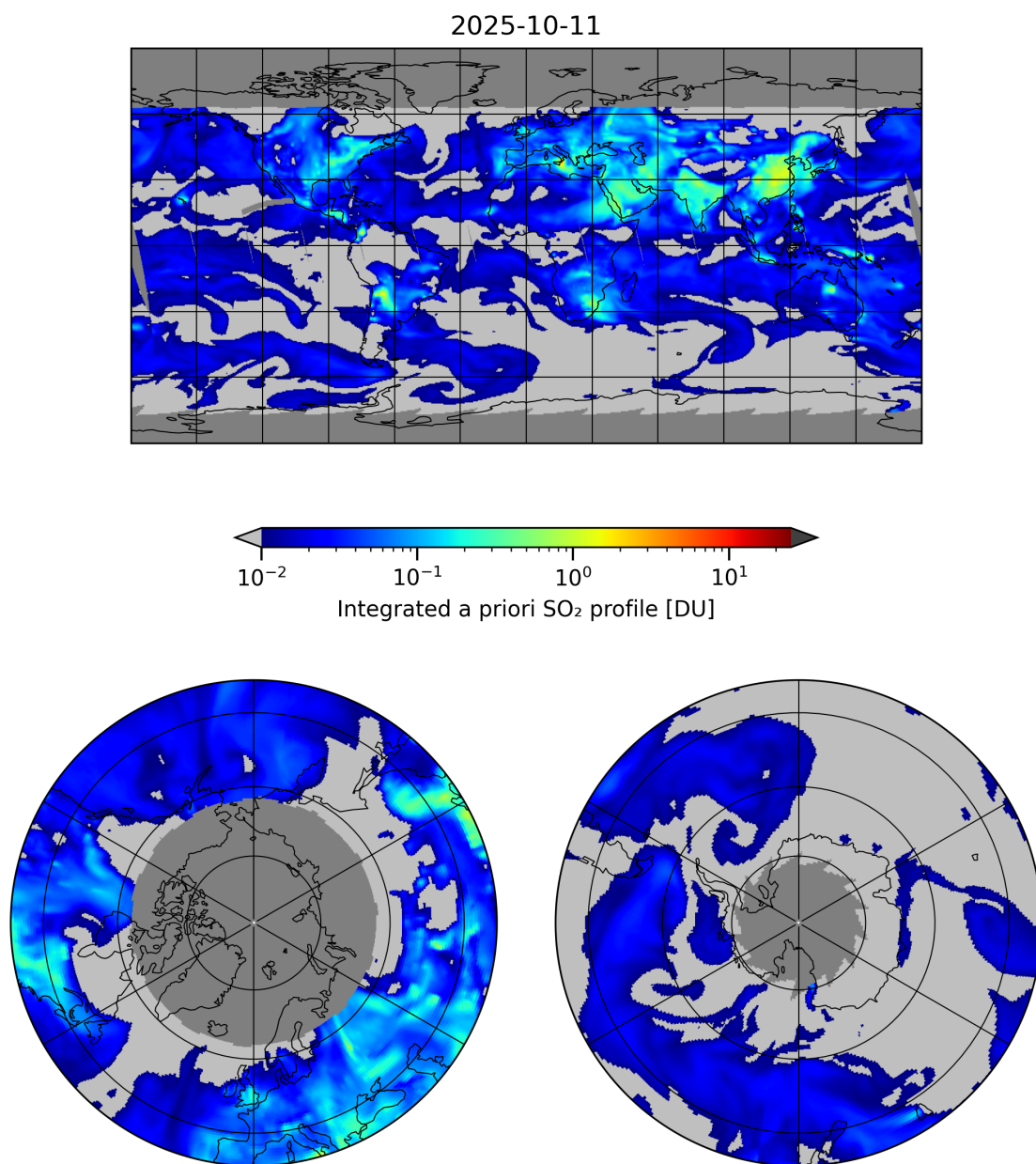


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-10-11 to 2025-10-12

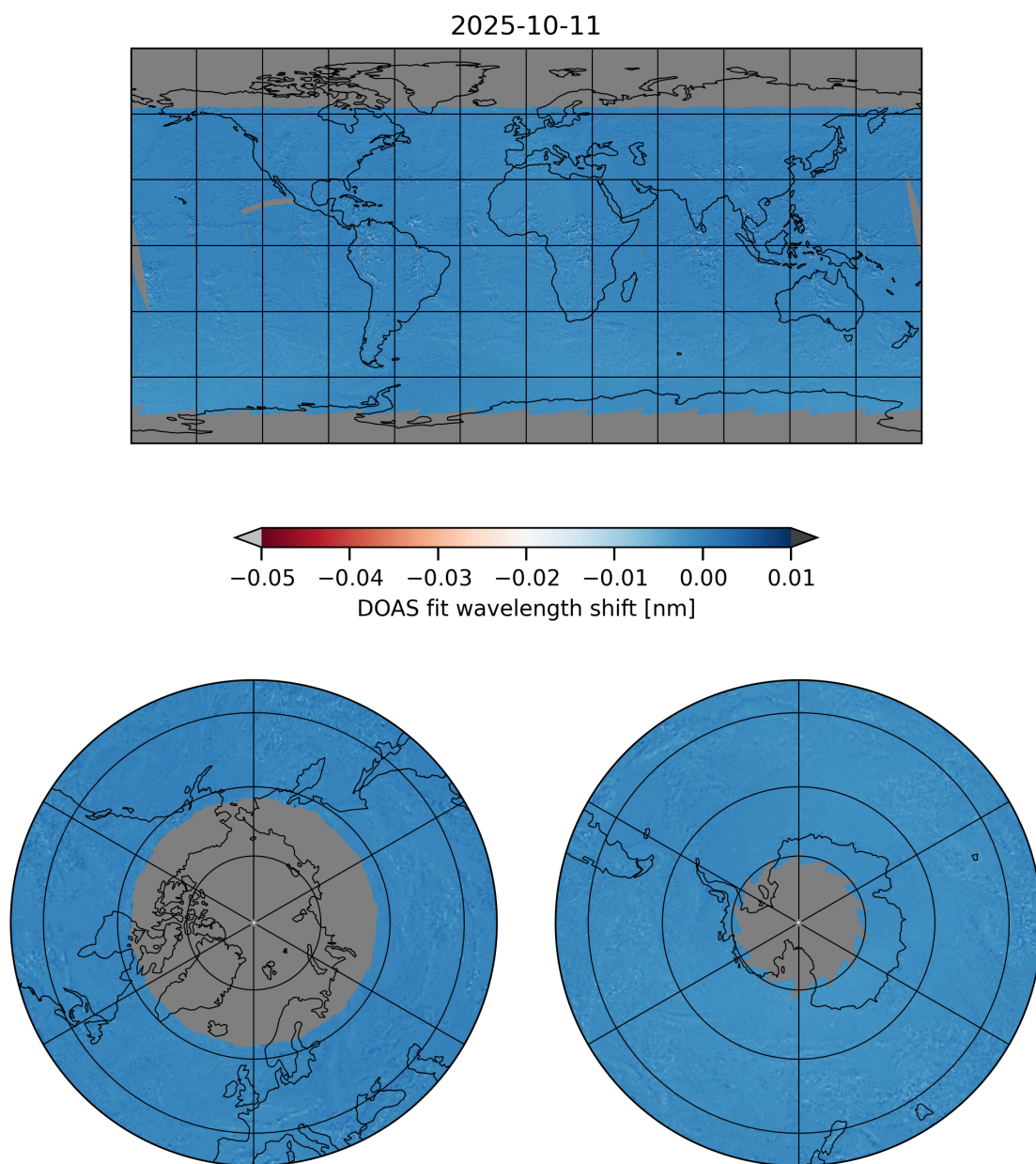


Figure 22: Map of “DOAS fit wavelength shift” for 2025-10-11 to 2025-10-12

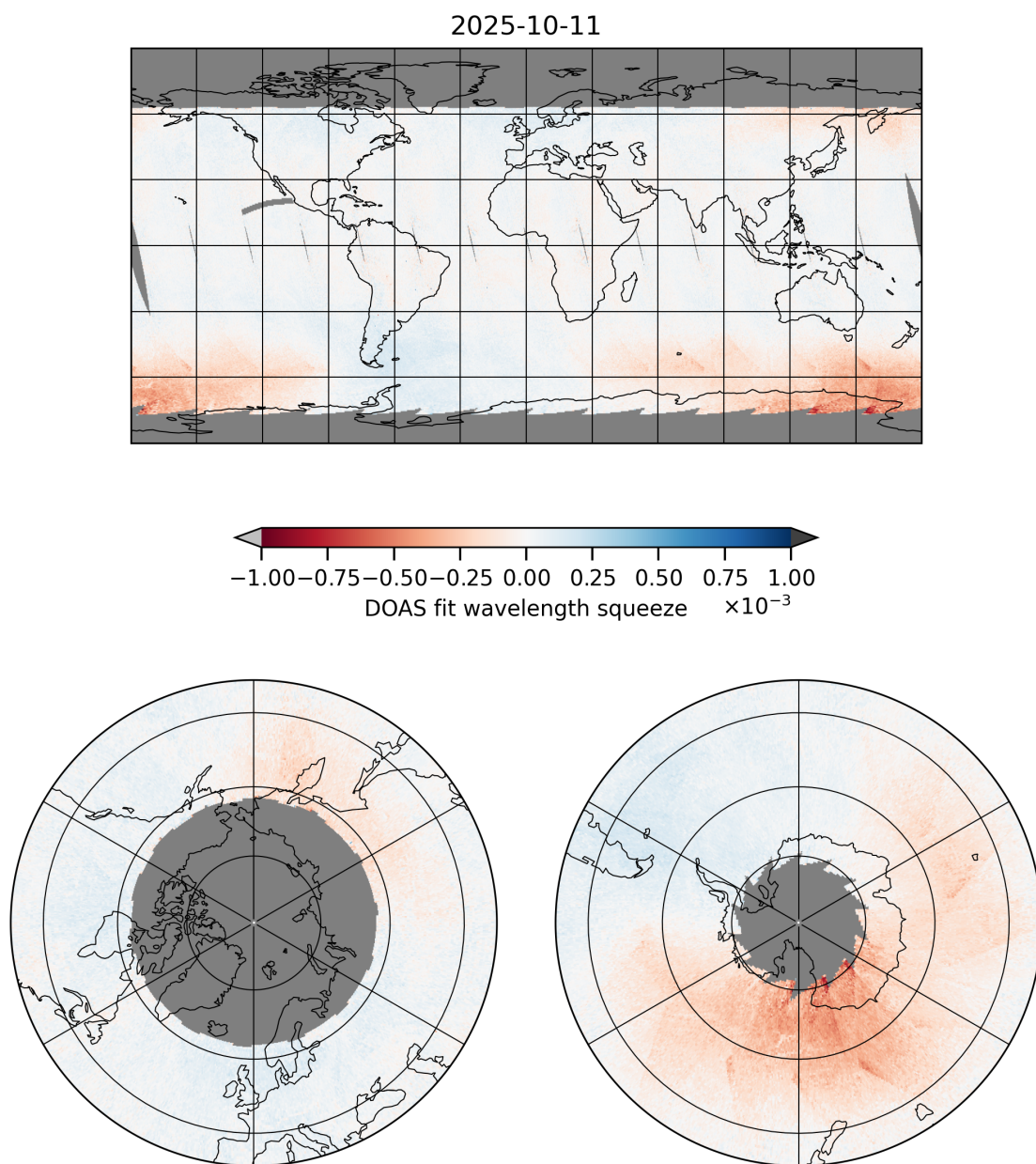


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-10-11 to 2025-10-12

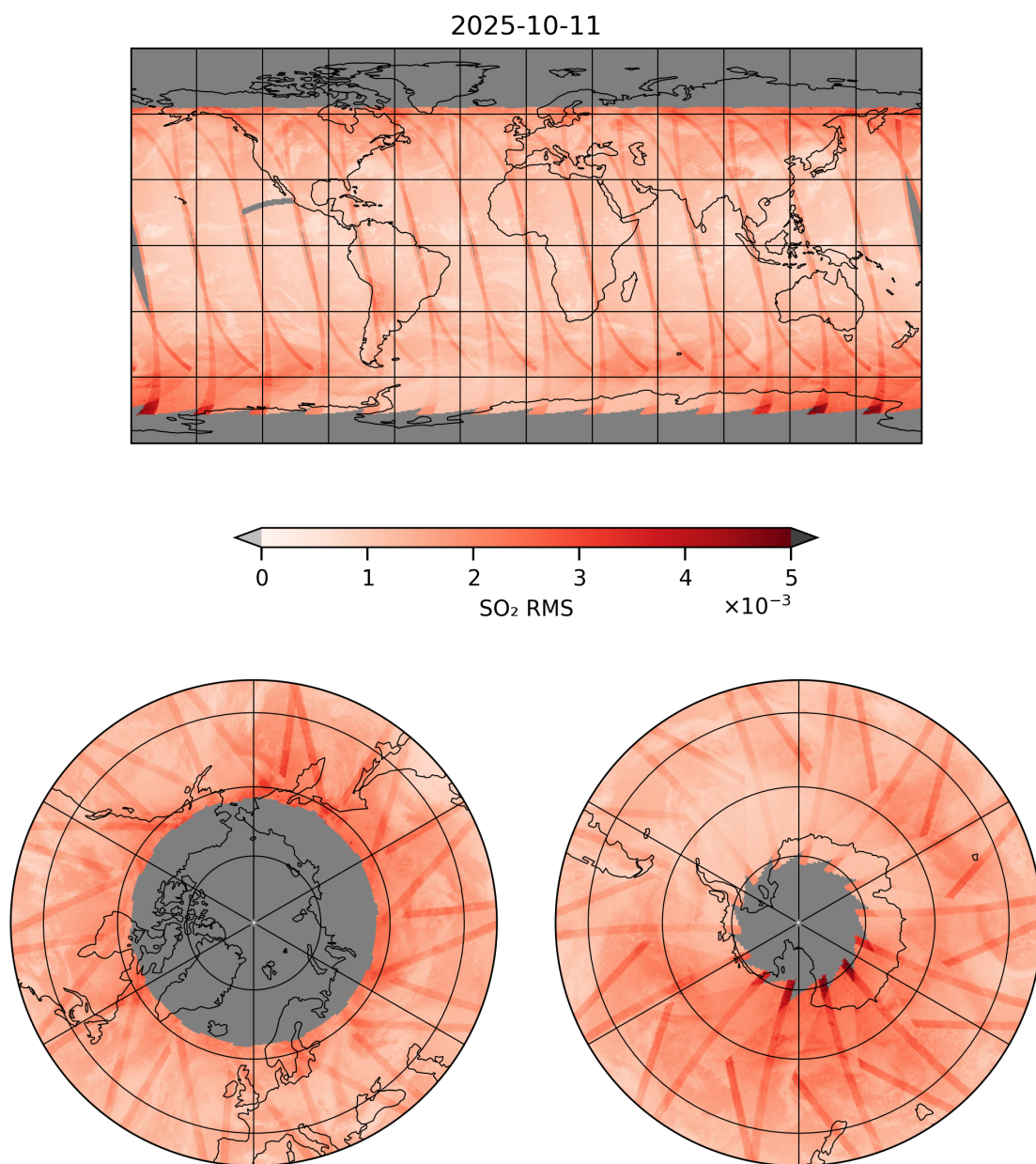


Figure 24: Map of “SO₂ RMS” for 2025-10-11 to 2025-10-12

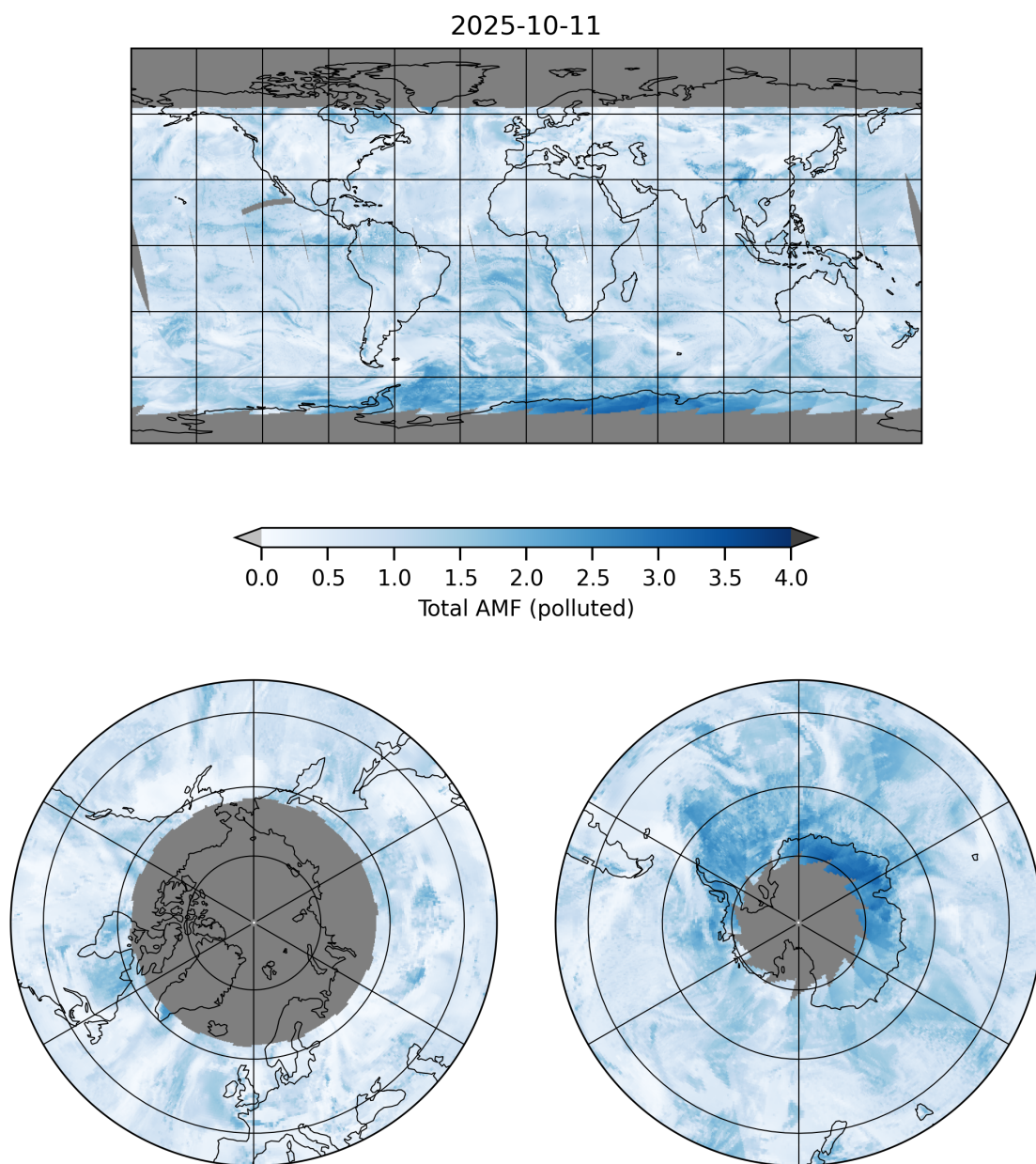


Figure 25: Map of “Total AMF (polluted)” for 2025-10-11 to 2025-10-12

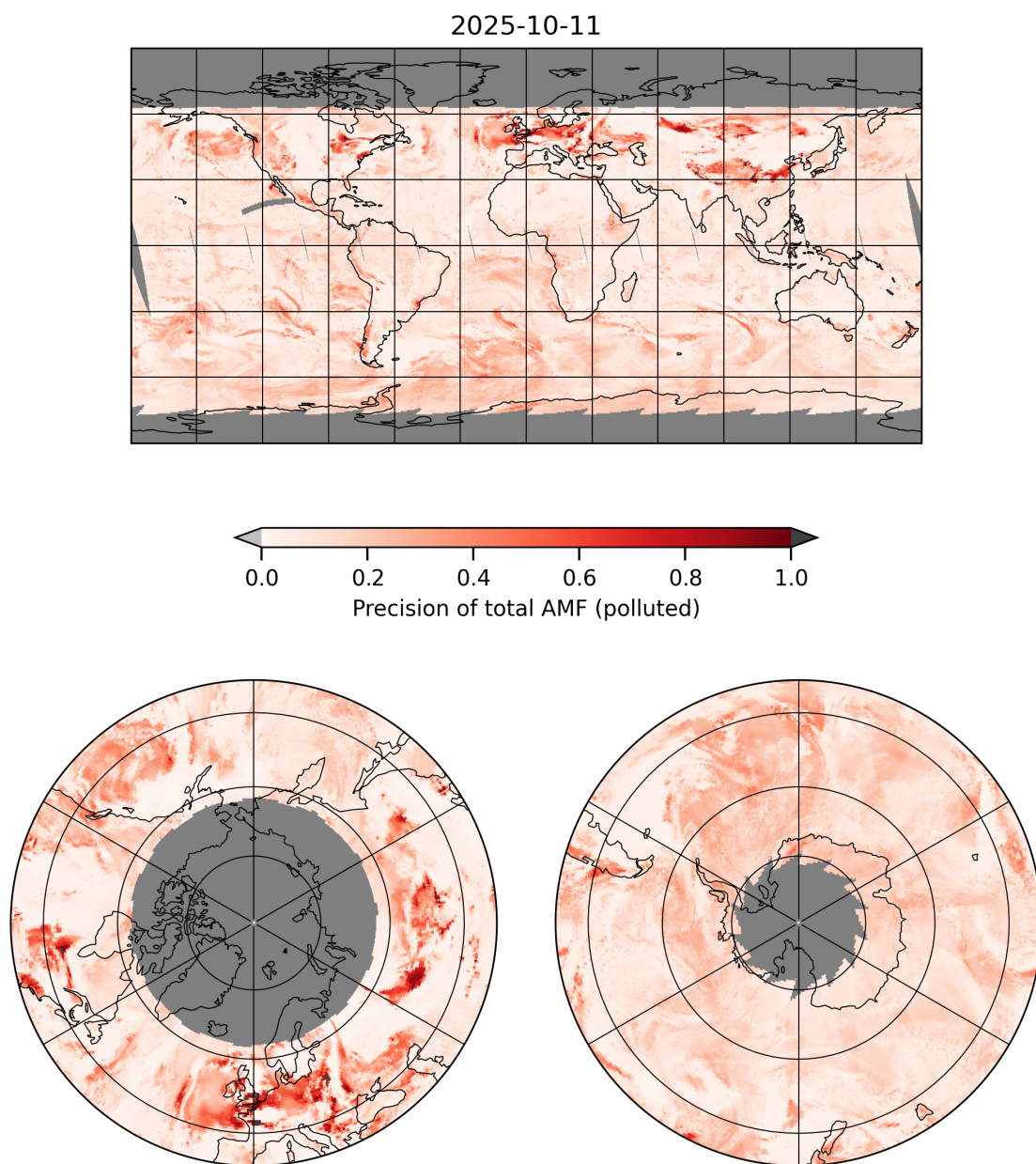


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-10-11 to 2025-10-12

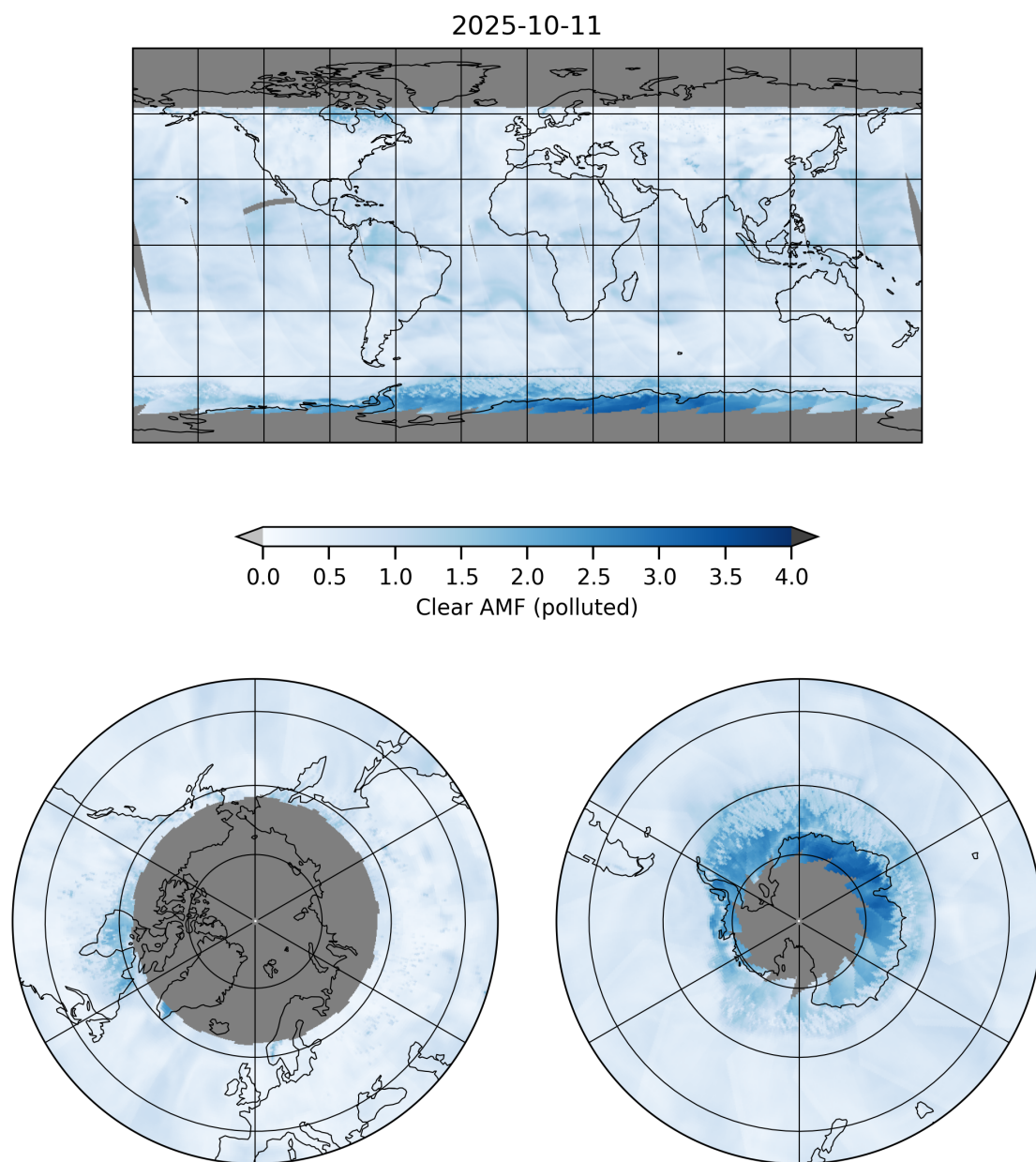


Figure 27: Map of “Clear AMF (polluted)” for 2025-10-11 to 2025-10-12

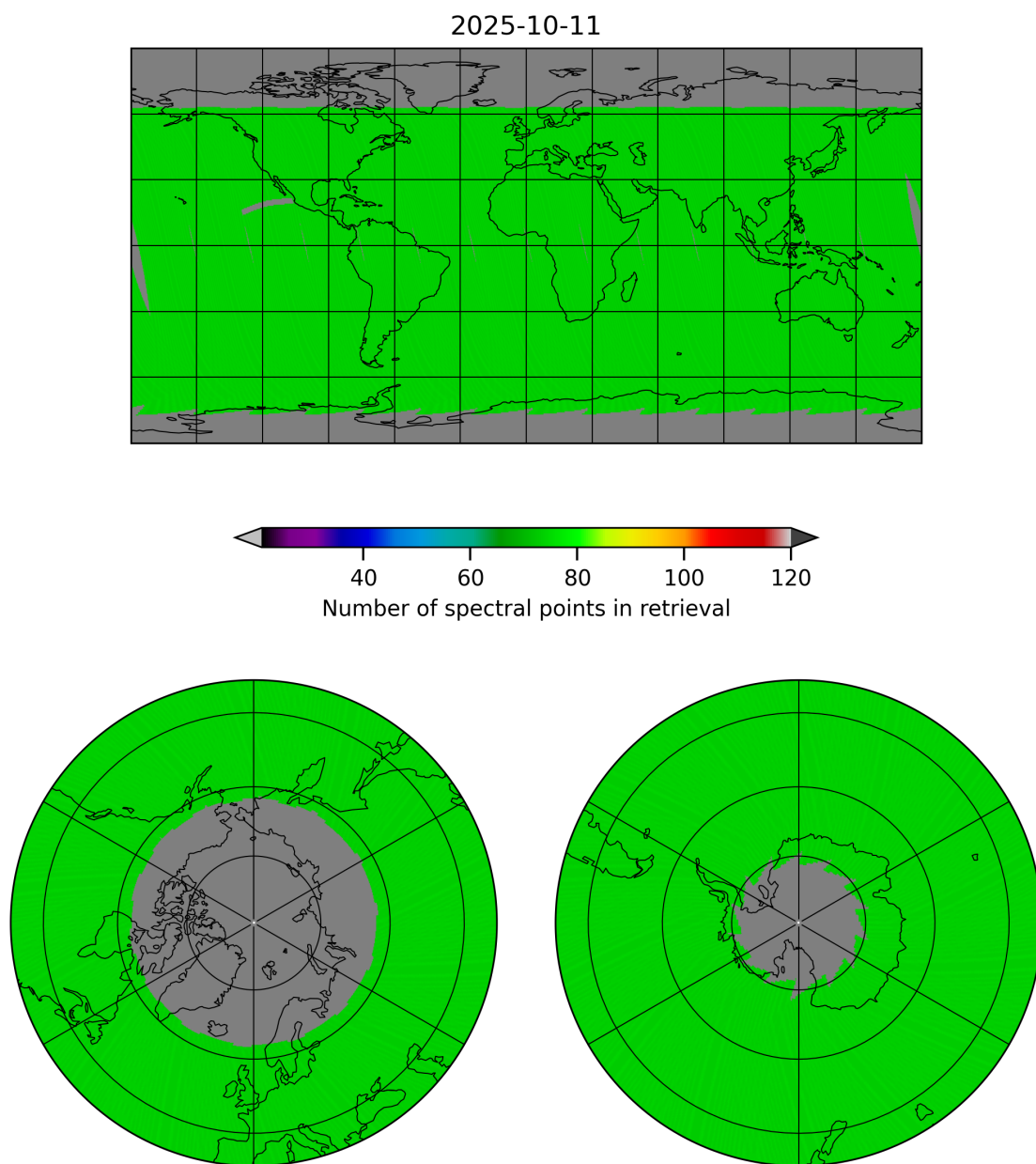


Figure 28: Map of “Number of spectral points in retrieval” for 2025-10-11 to 2025-10-12

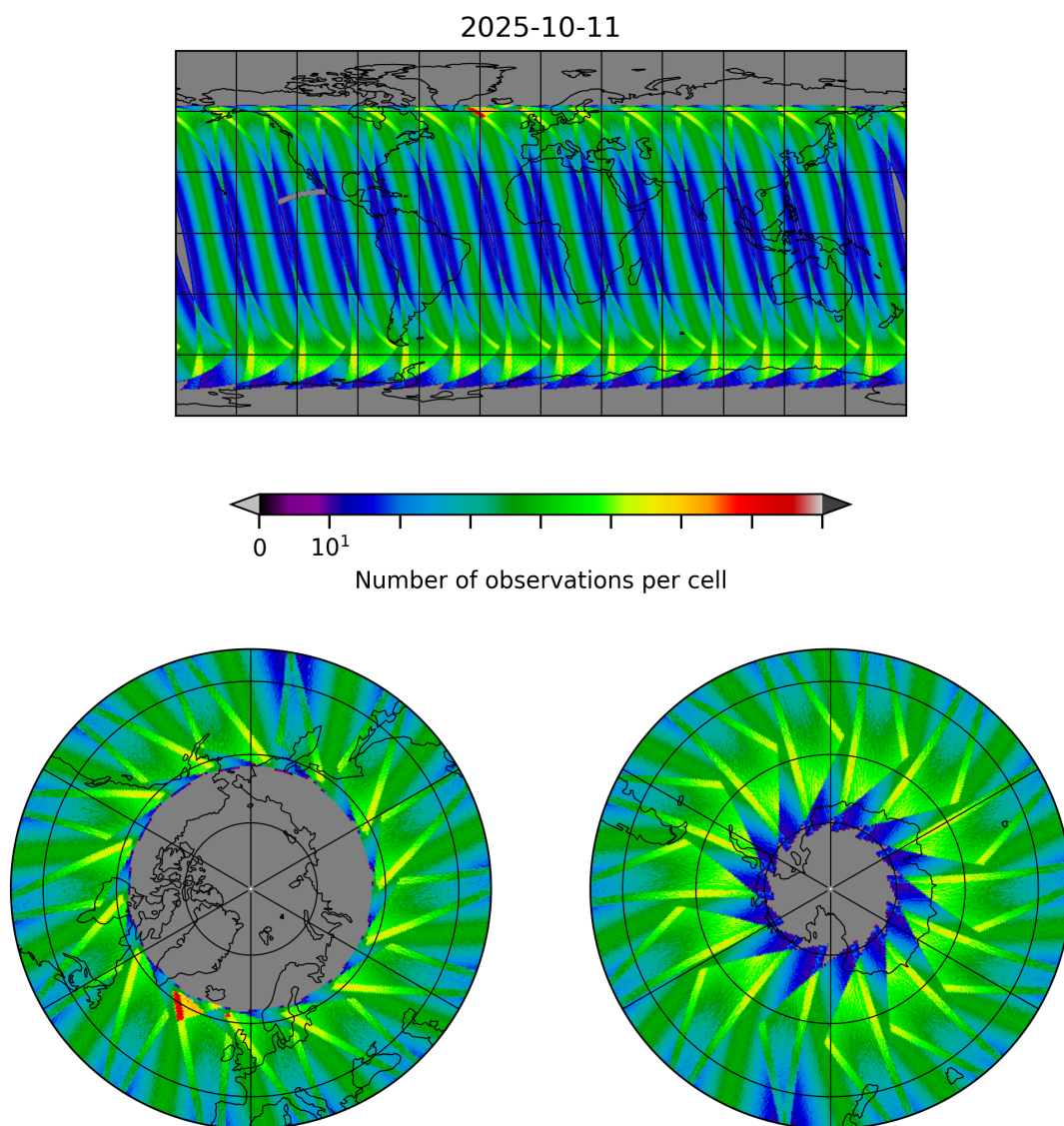


Figure 29: Map of the number of observations for 2025-10-11 to 2025-10-12

7 Zonal average

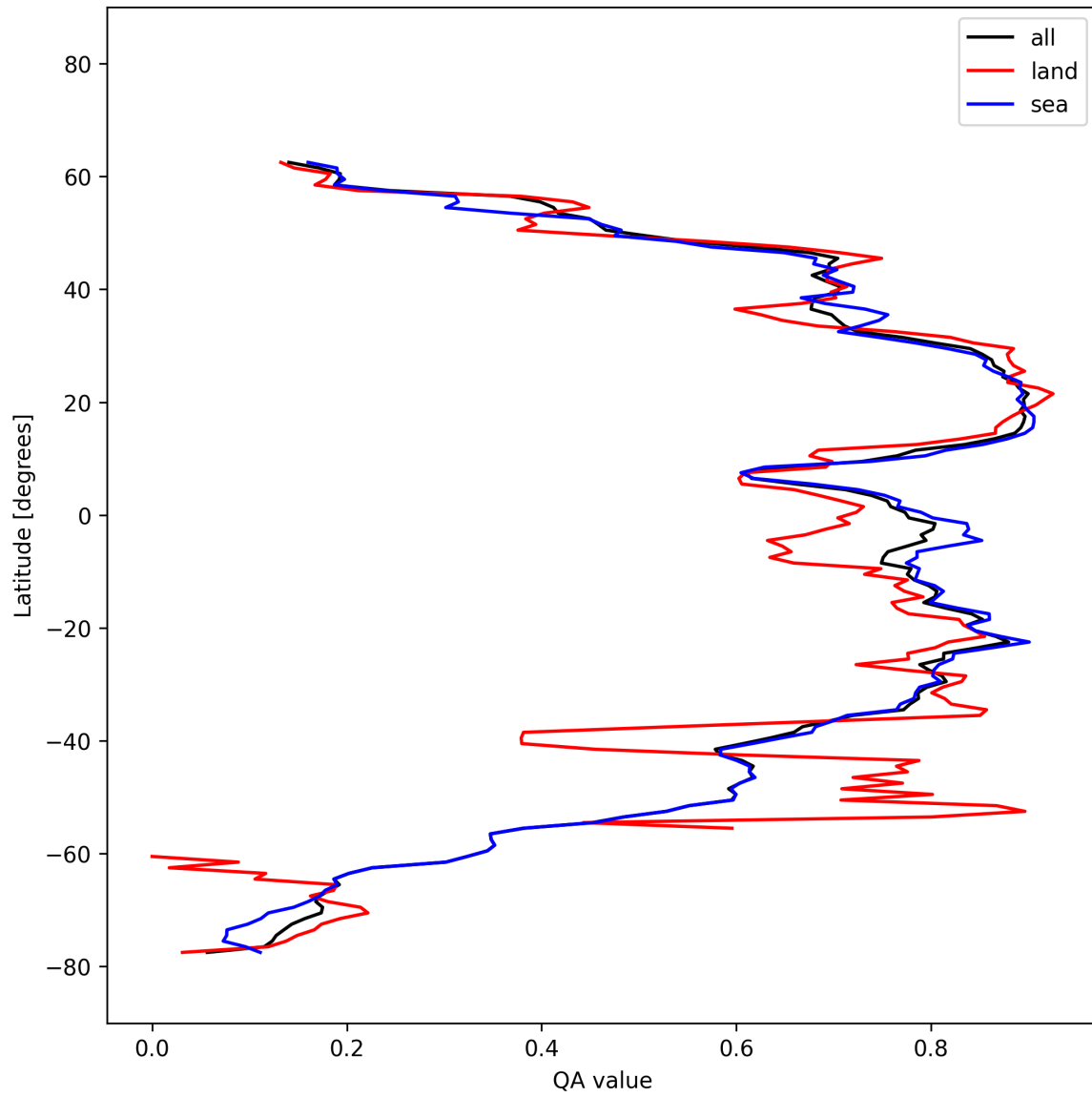


Figure 30: Zonal average of “QA value” for 2025-10-11 to 2025-10-12.

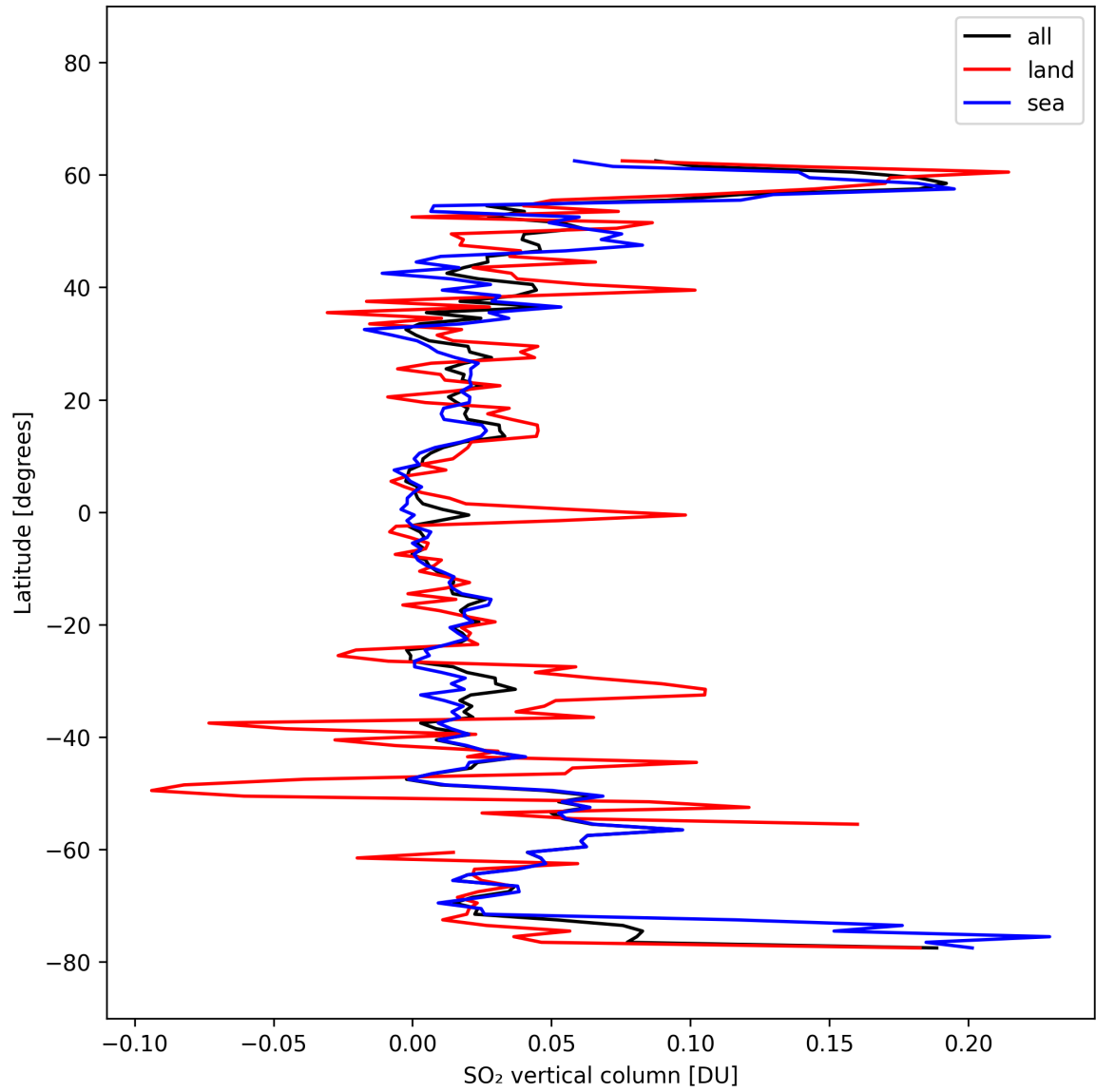


Figure 31: Zonal average of “SO₂ vertical column” for 2025-10-11 to 2025-10-12.

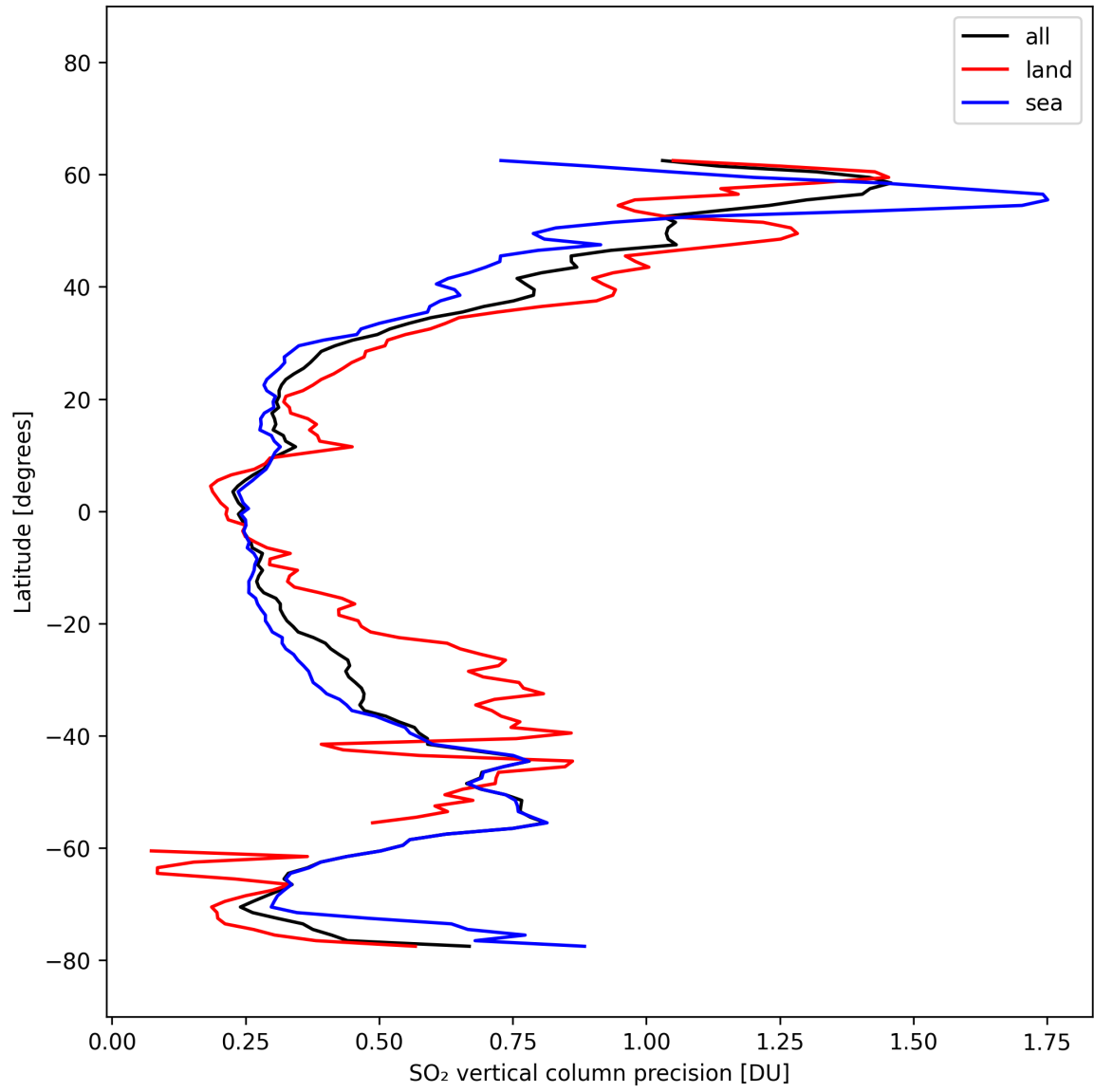


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-10-11 to 2025-10-12.

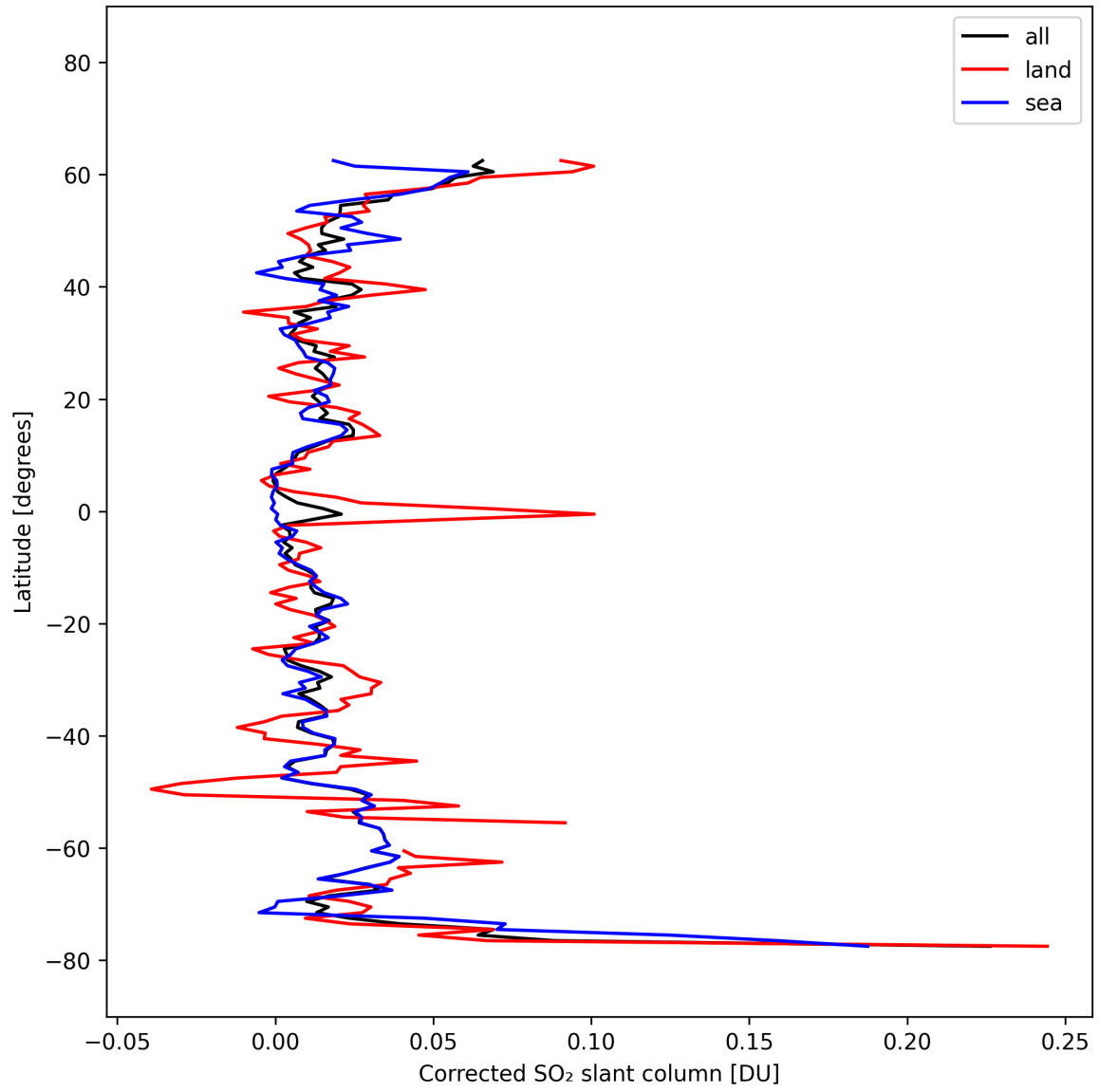


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-10-11 to 2025-10-12.

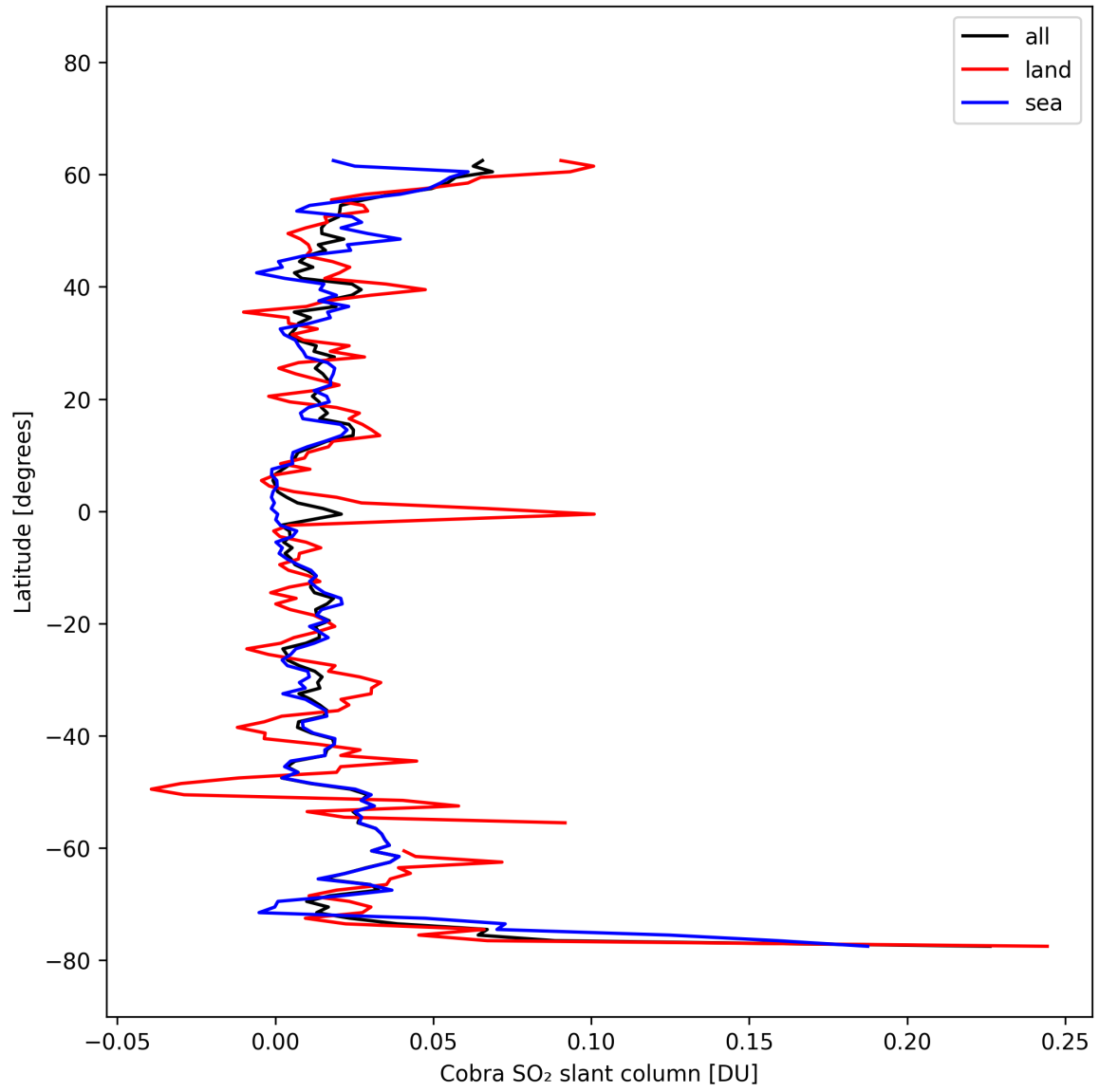


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-10-11 to 2025-10-12.

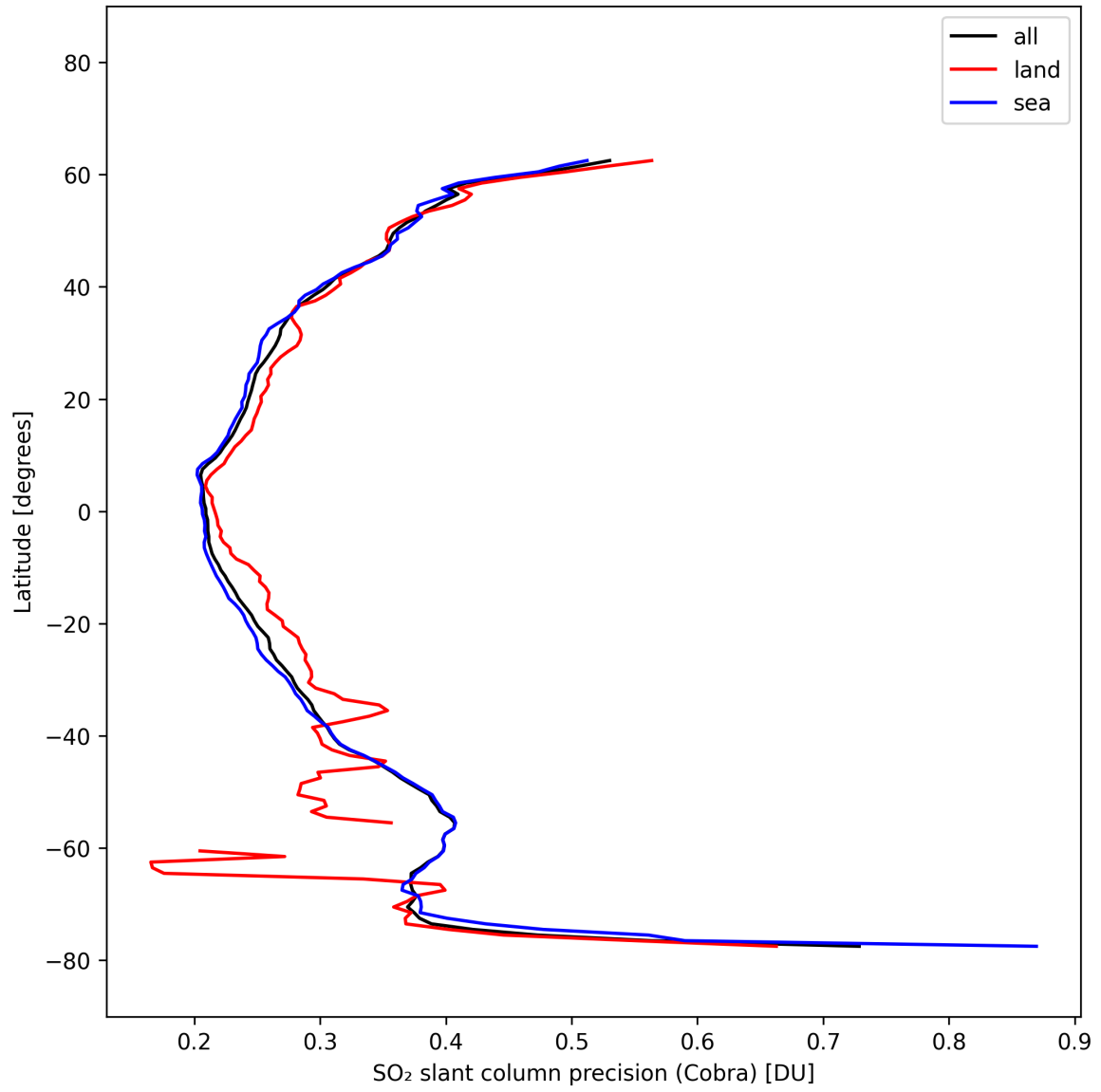


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-10-11 to 2025-10-12.

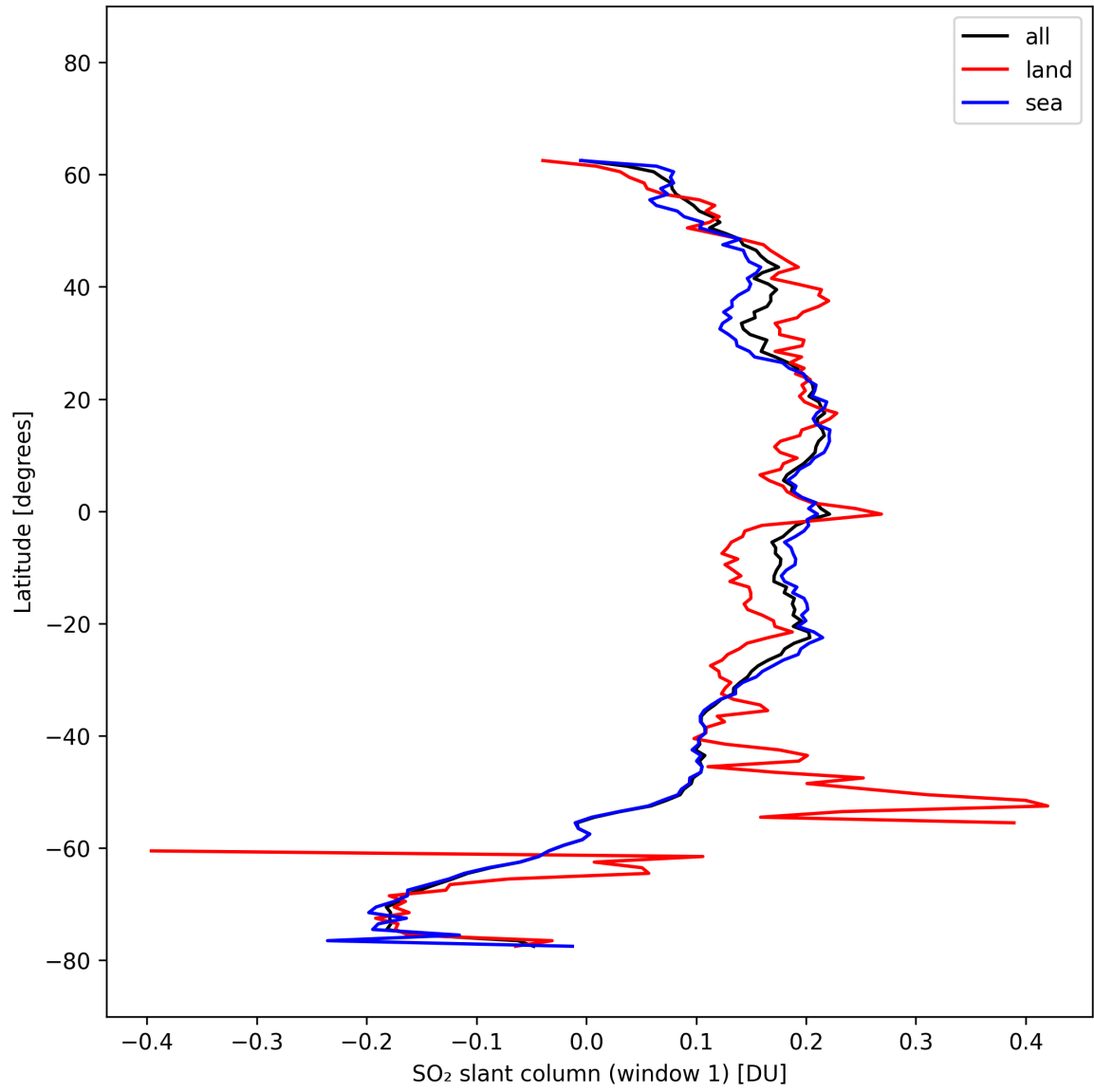


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-10-11 to 2025-10-12.

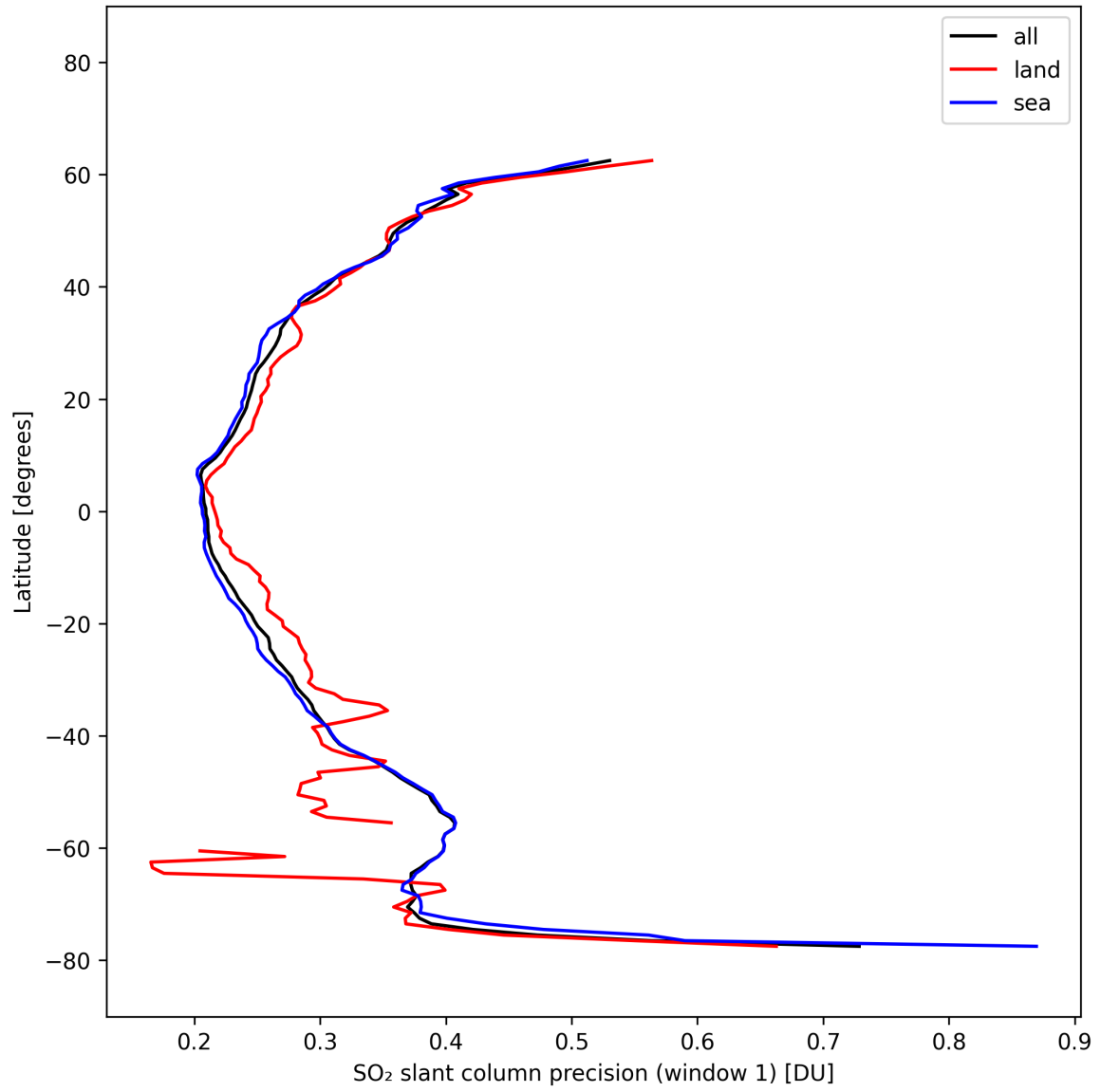


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-10-11 to 2025-10-12.

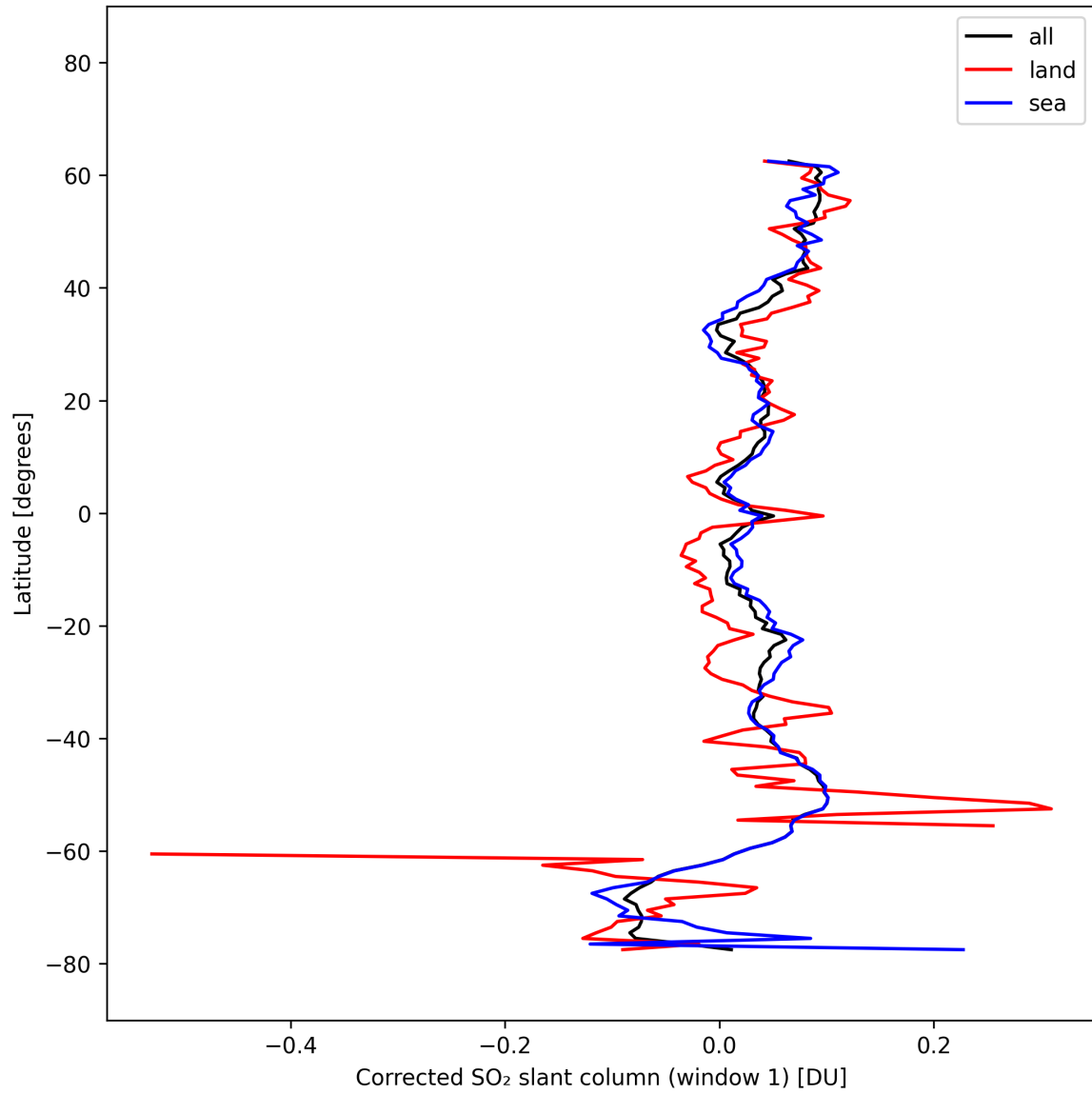


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-10-11 to 2025-10-12.

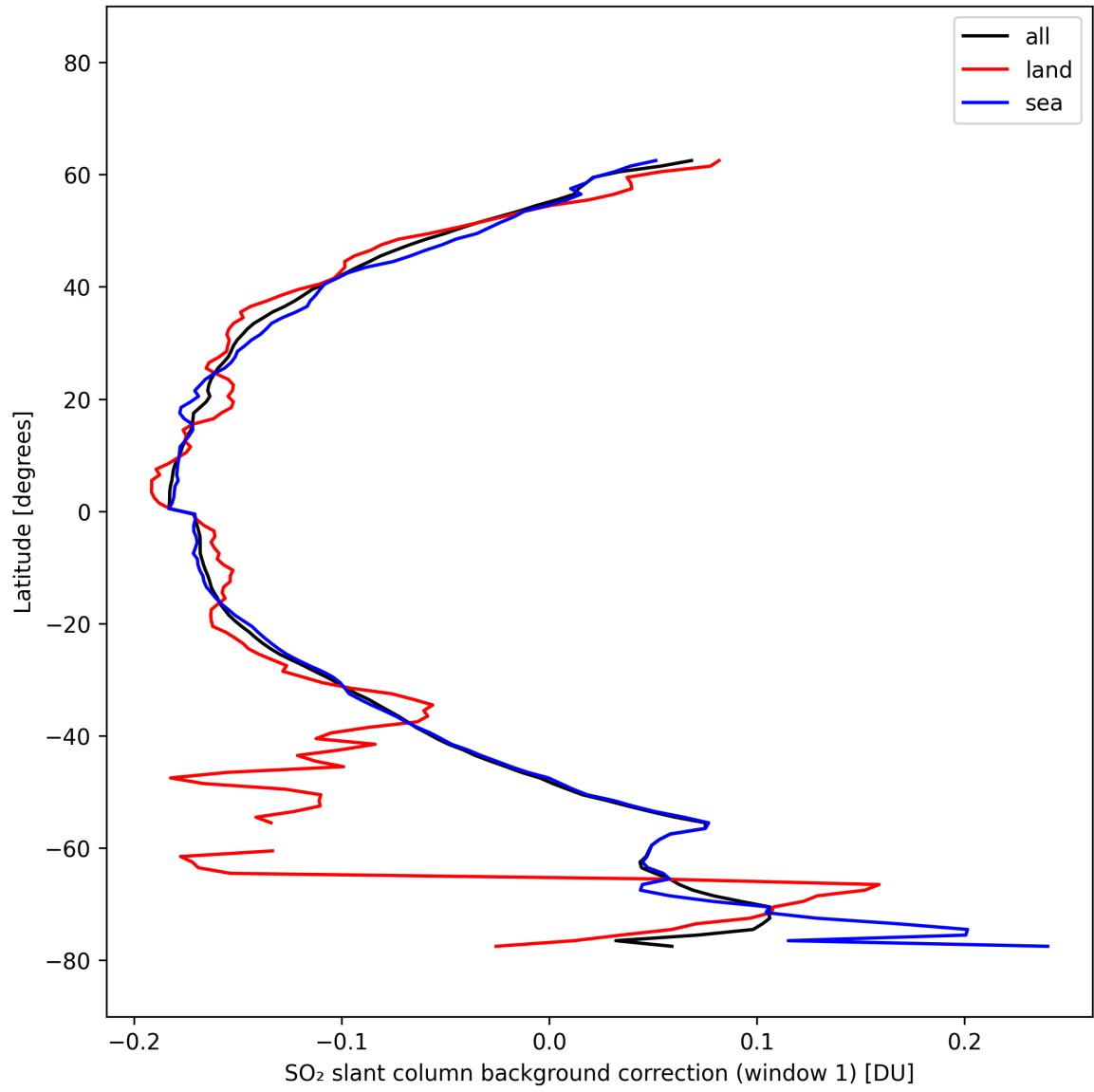


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-10-11 to 2025-10-12.

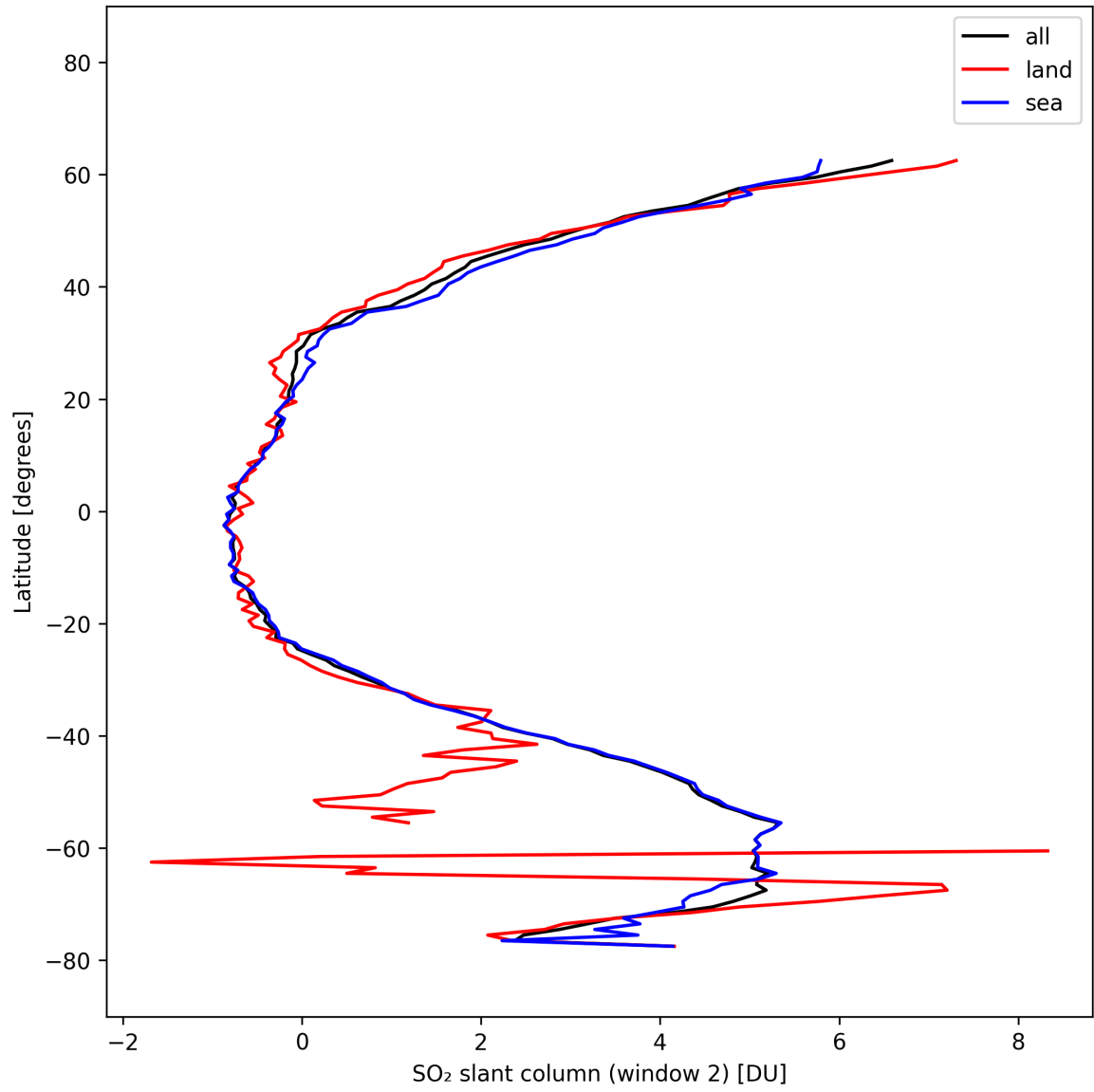


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-10-11 to 2025-10-12.

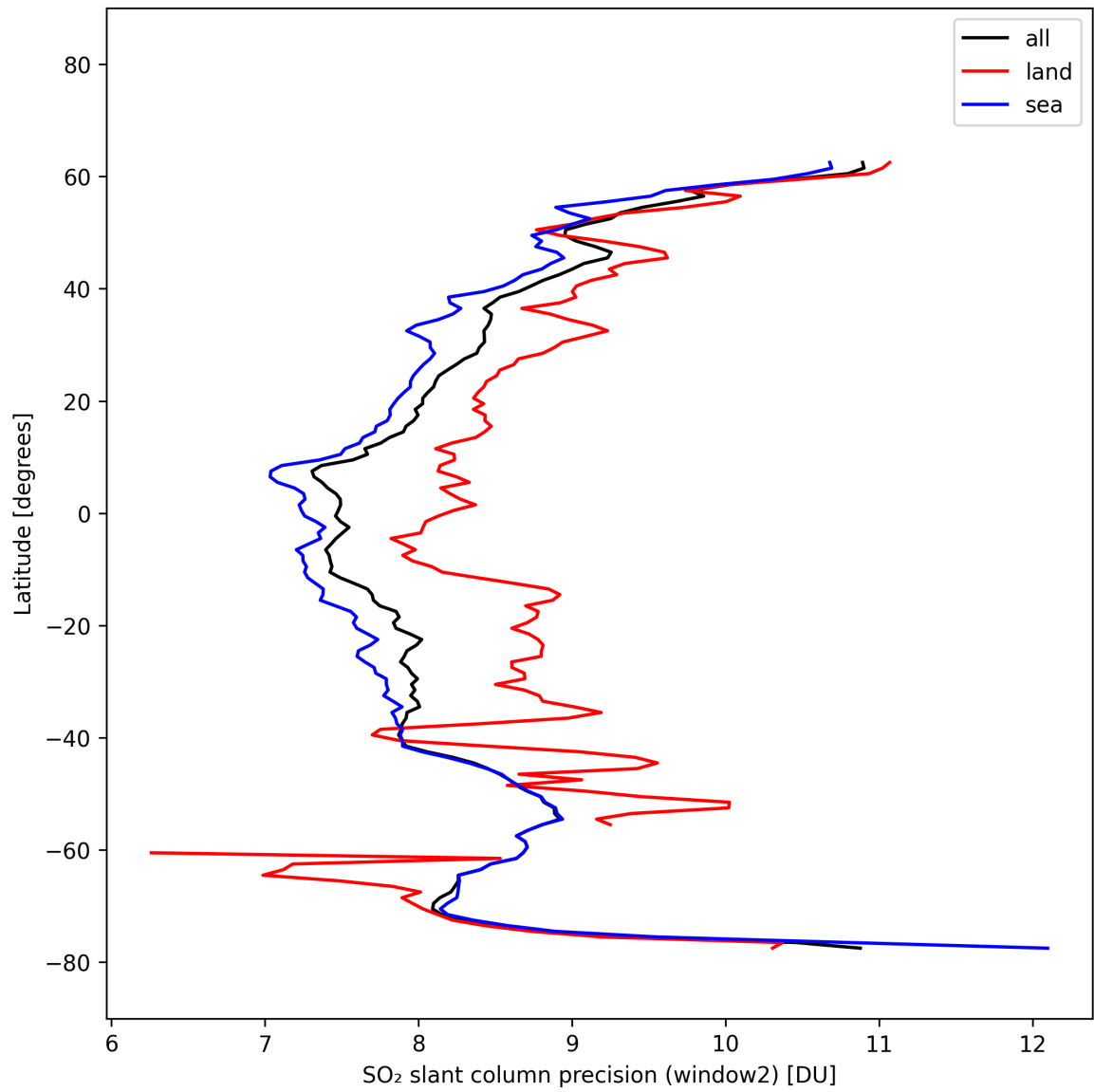


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-10-11 to 2025-10-12.

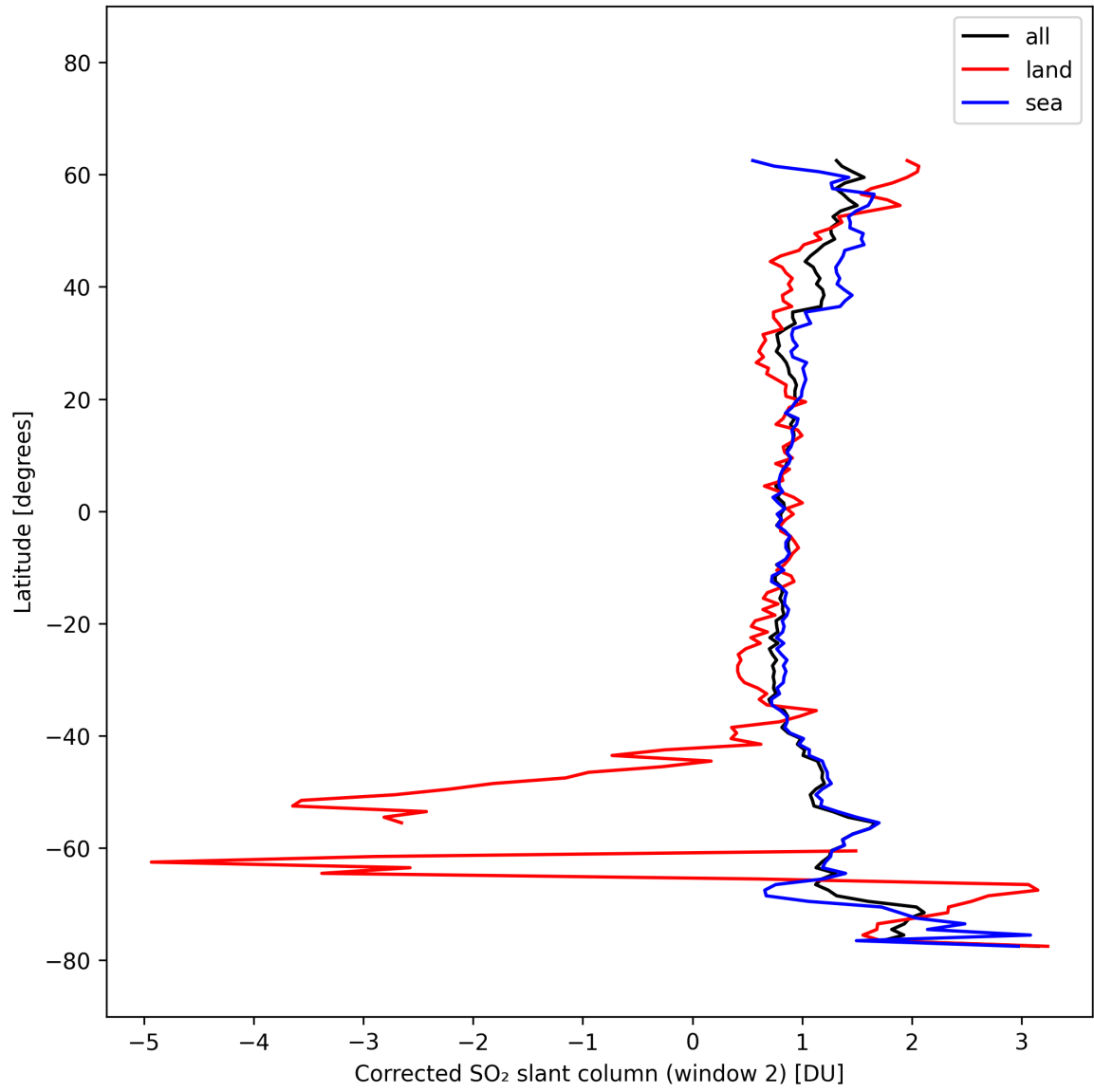


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-10-11 to 2025-10-12.

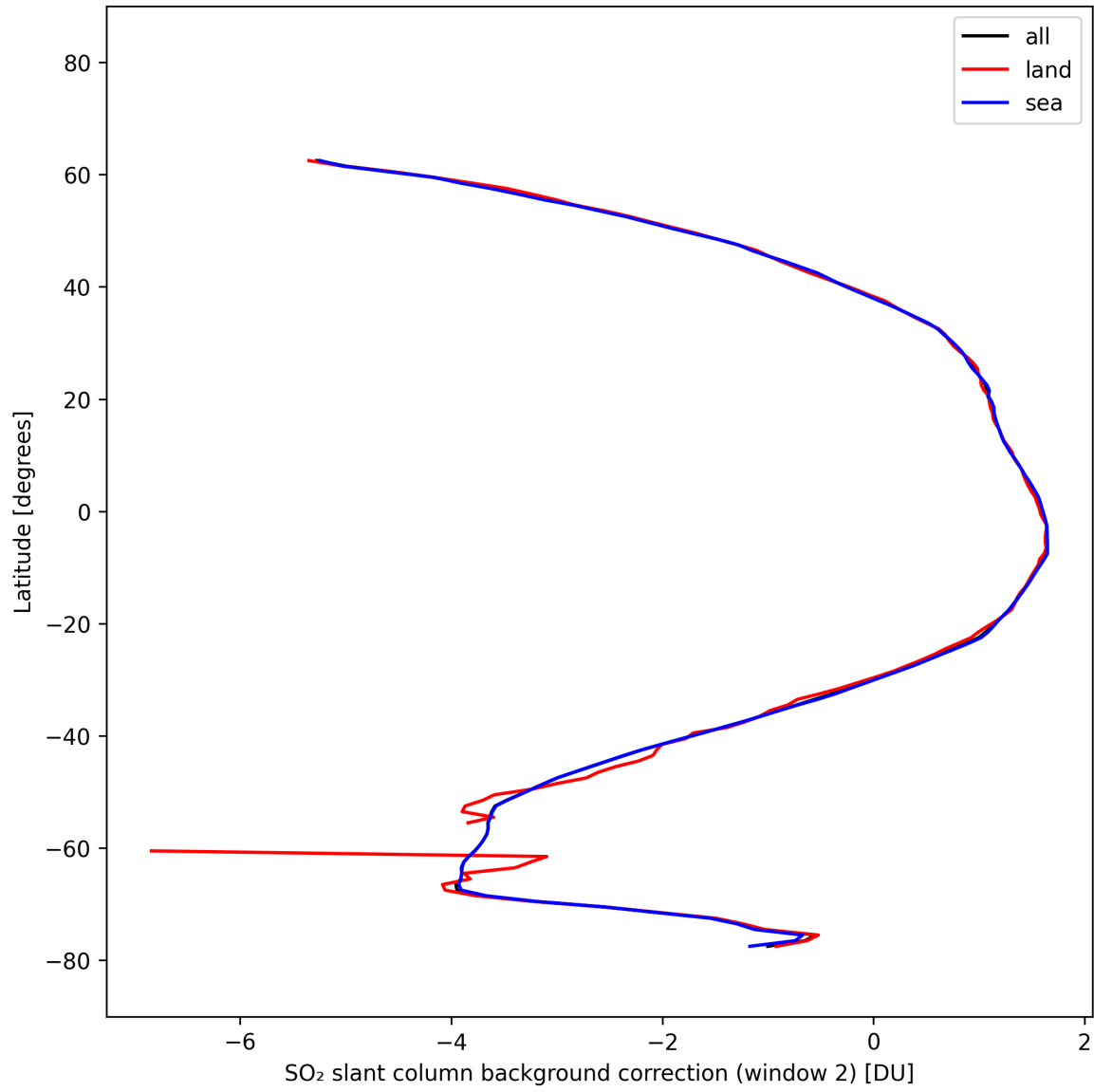


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-10-11 to 2025-10-12.

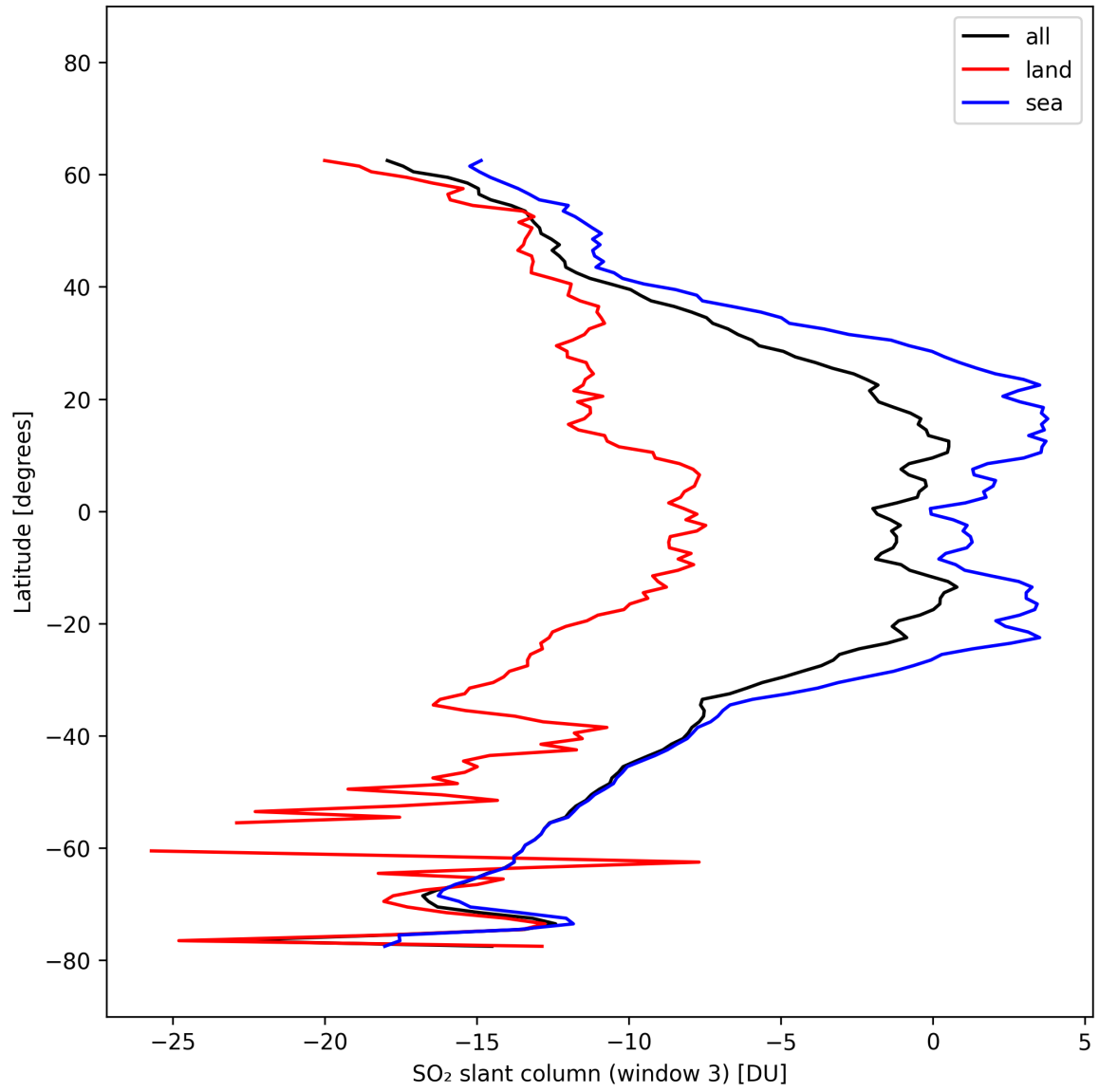


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-10-11 to 2025-10-12.

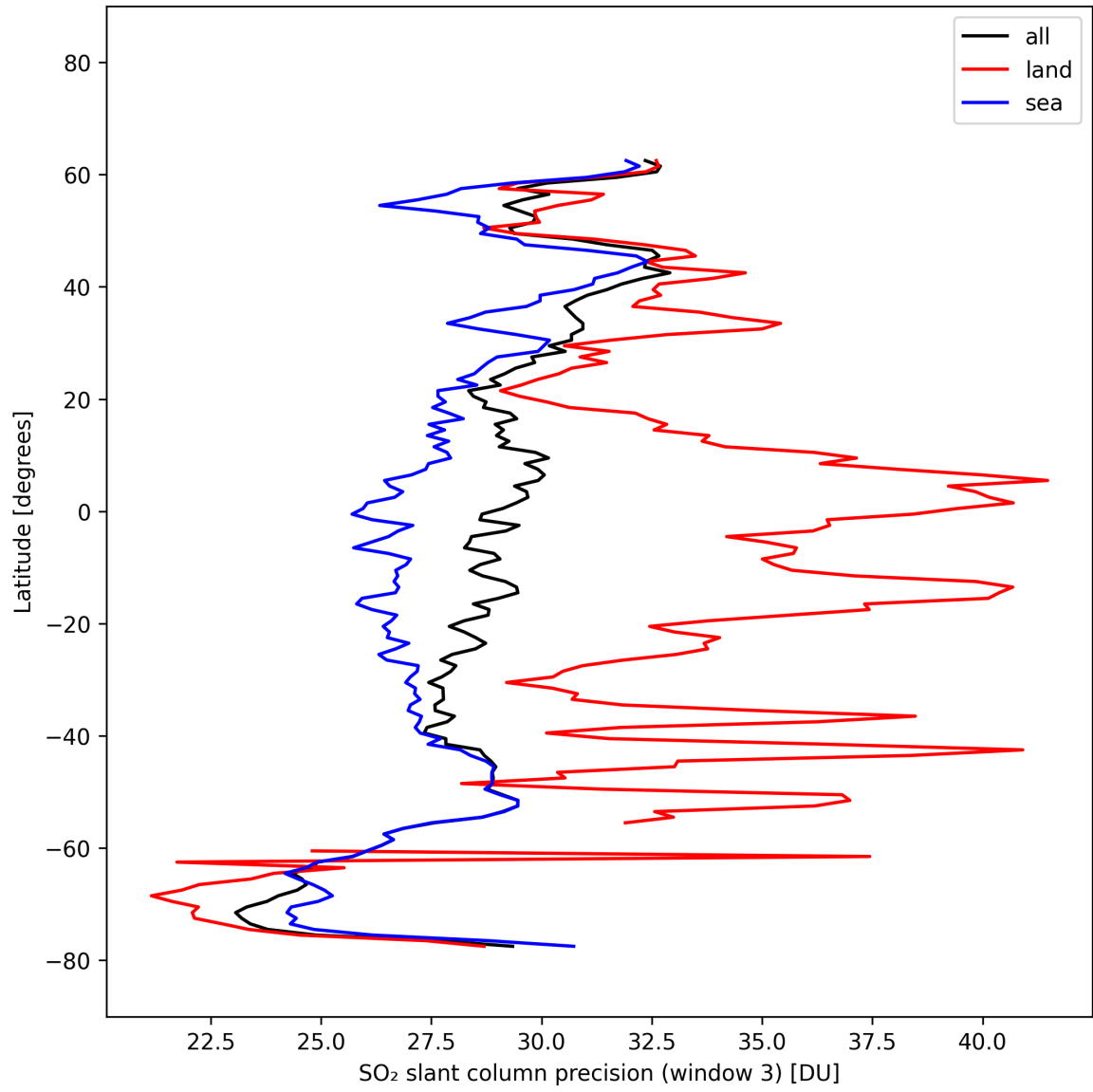


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-10-11 to 2025-10-12.

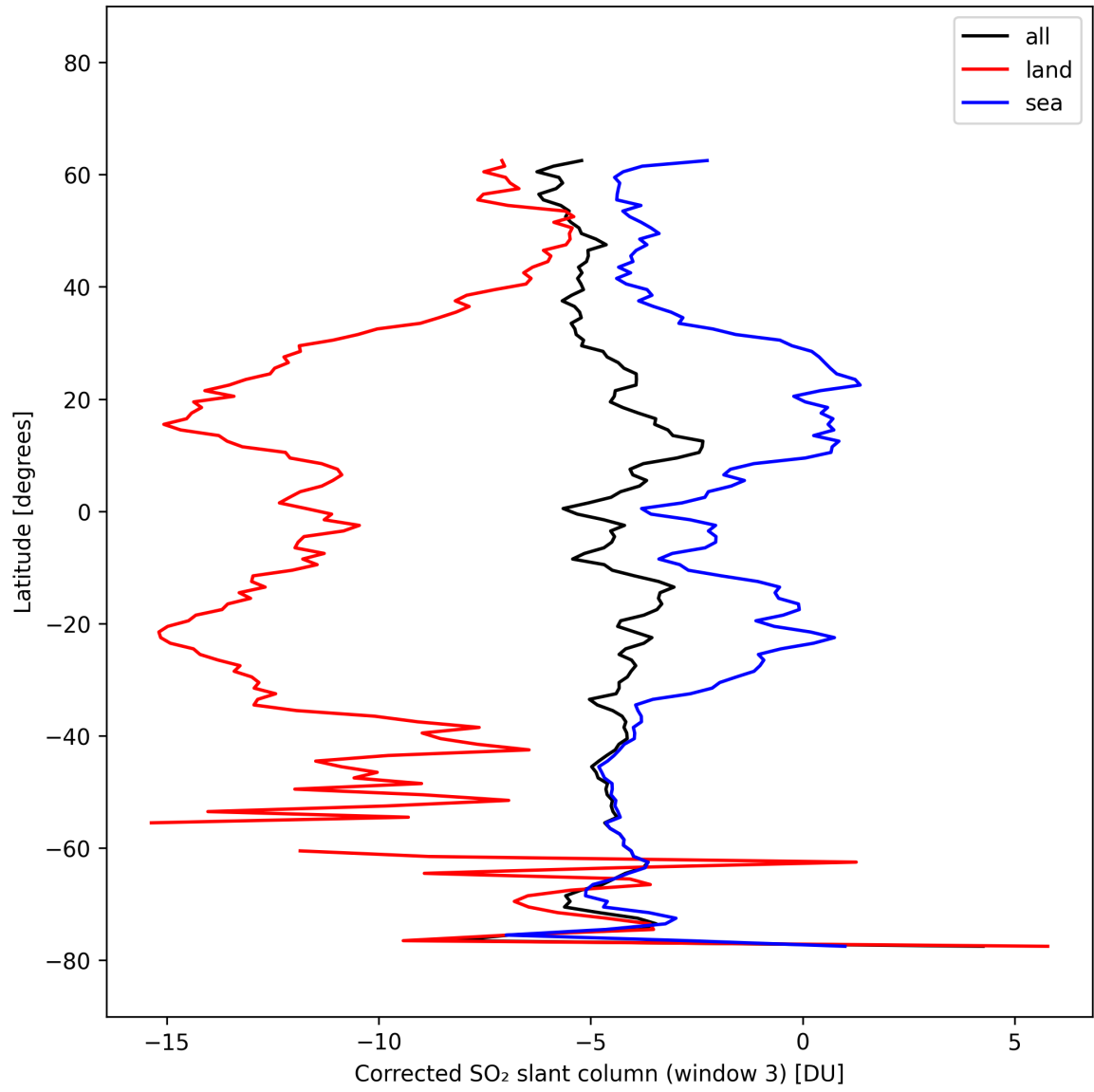


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-10-11 to 2025-10-12.

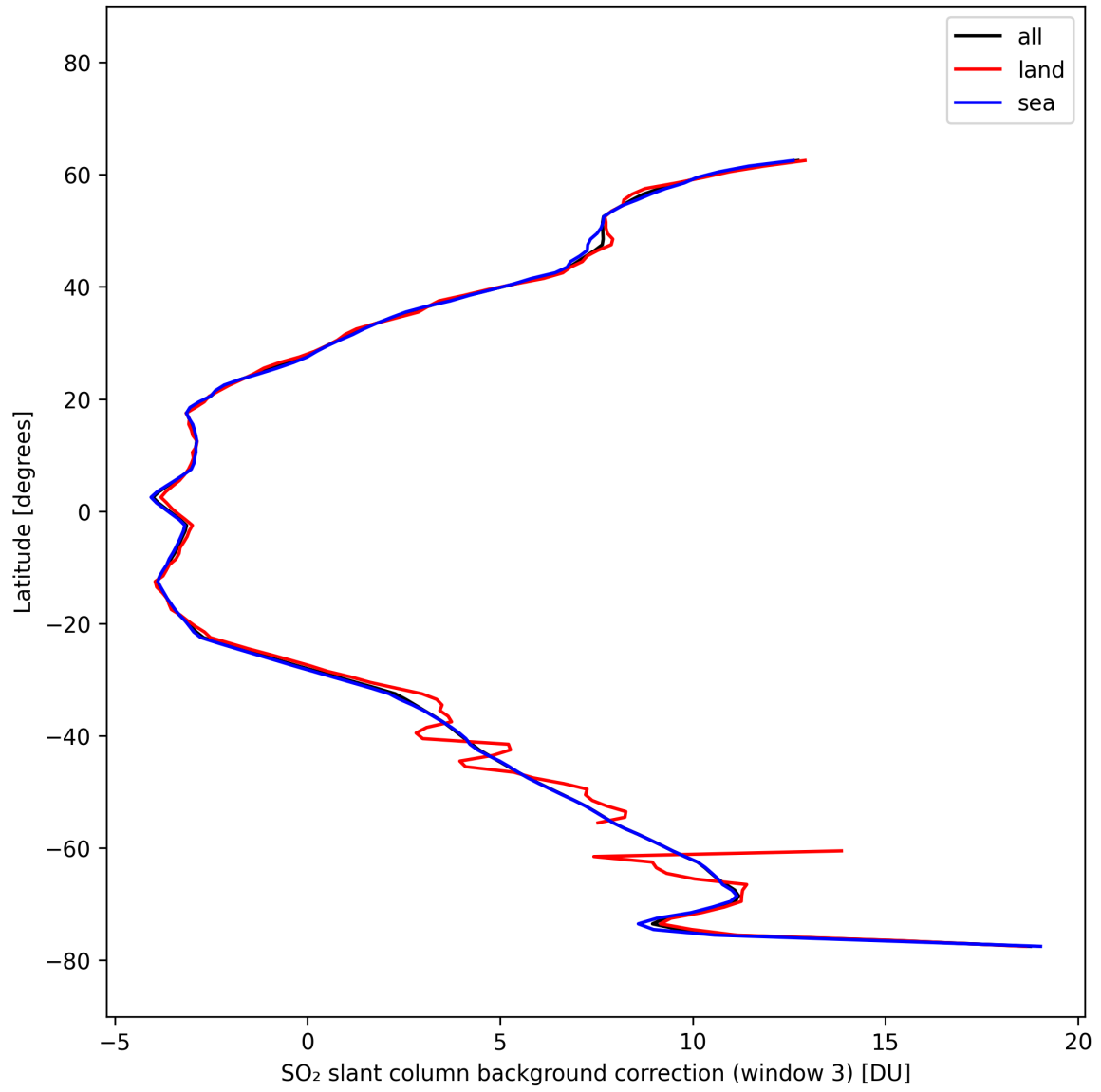


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-10-11 to 2025-10-12.

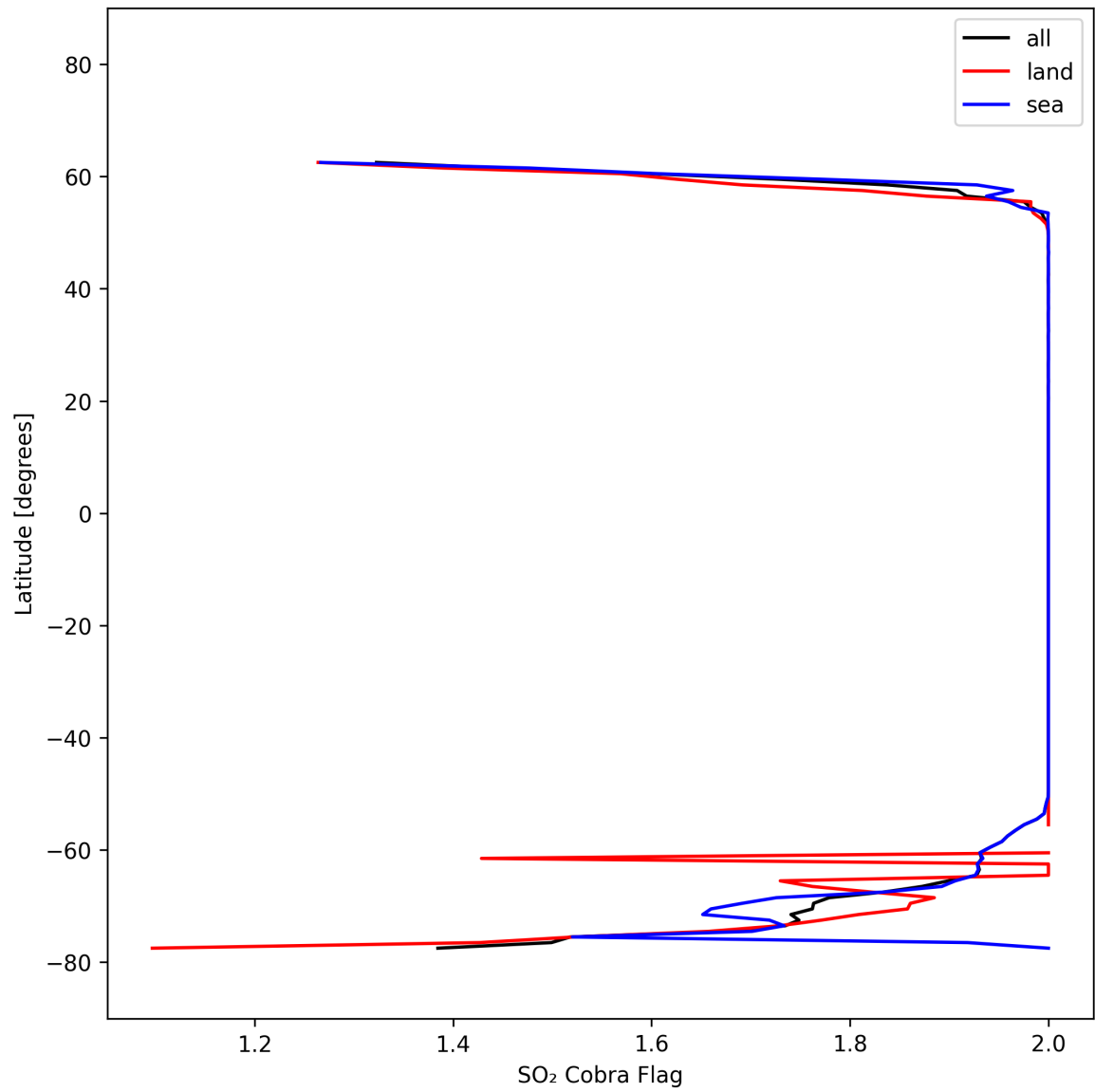


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-10-11 to 2025-10-12.

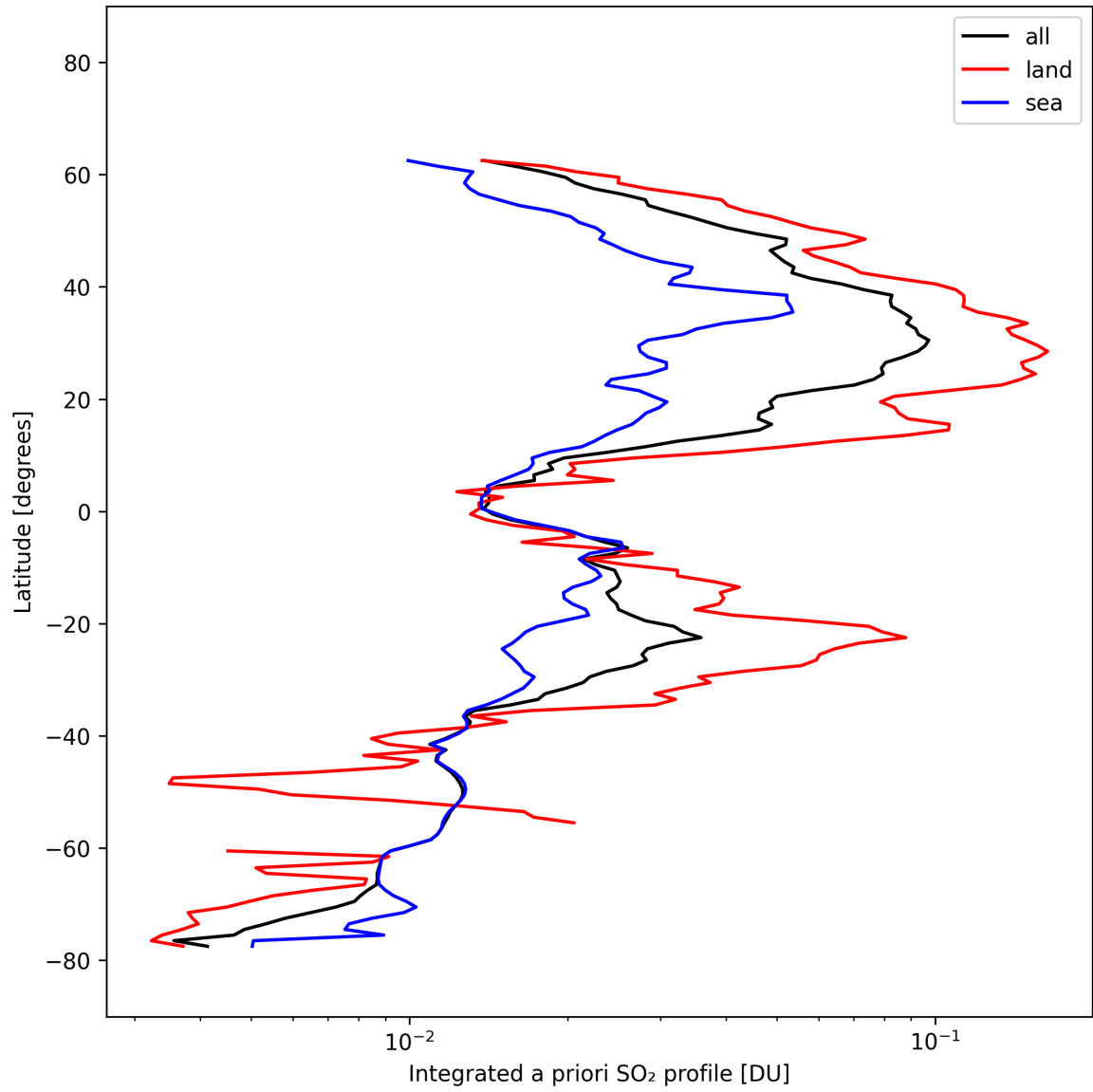


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-10-11 to 2025-10-12.

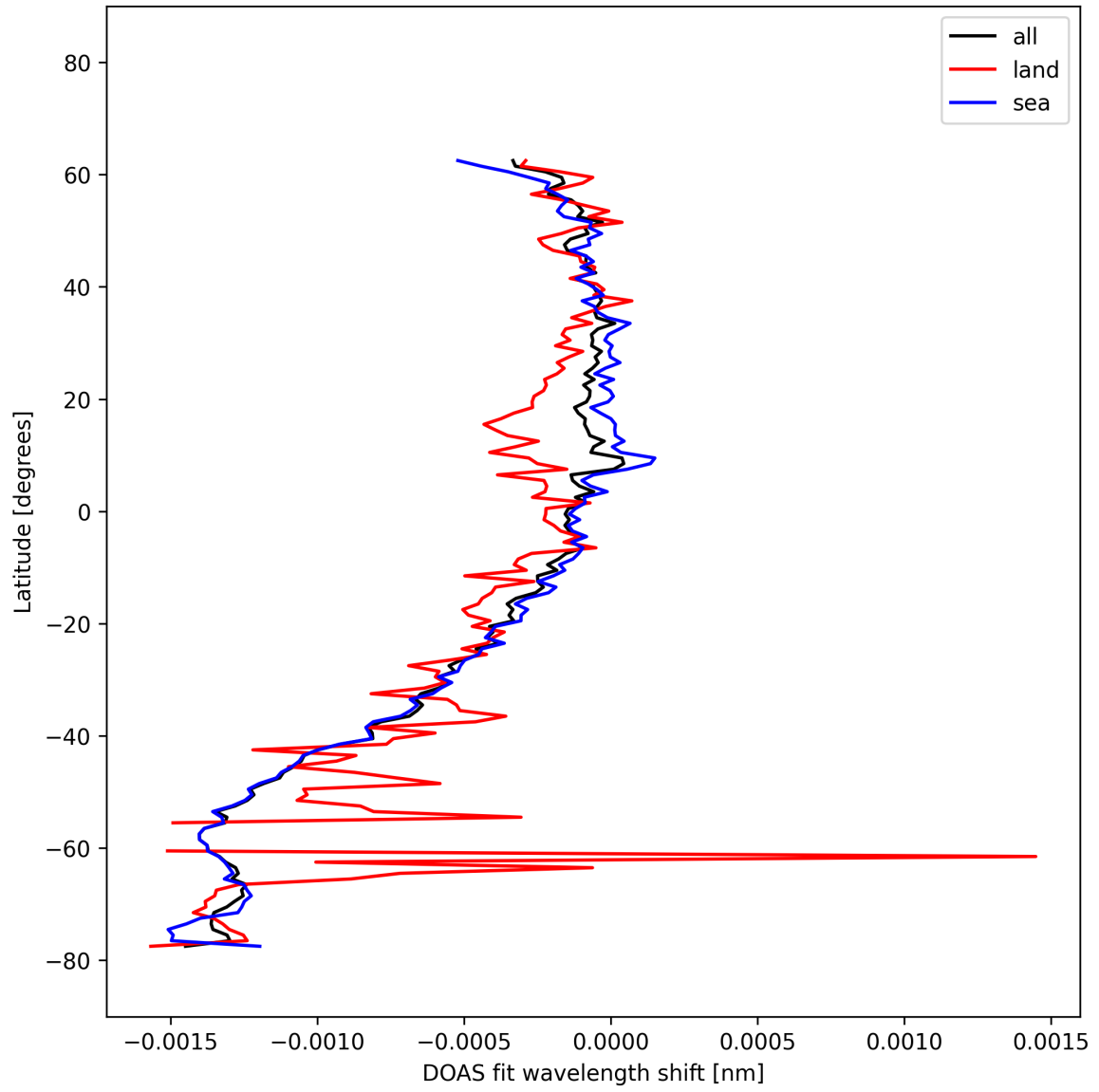


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-10-11 to 2025-10-12.

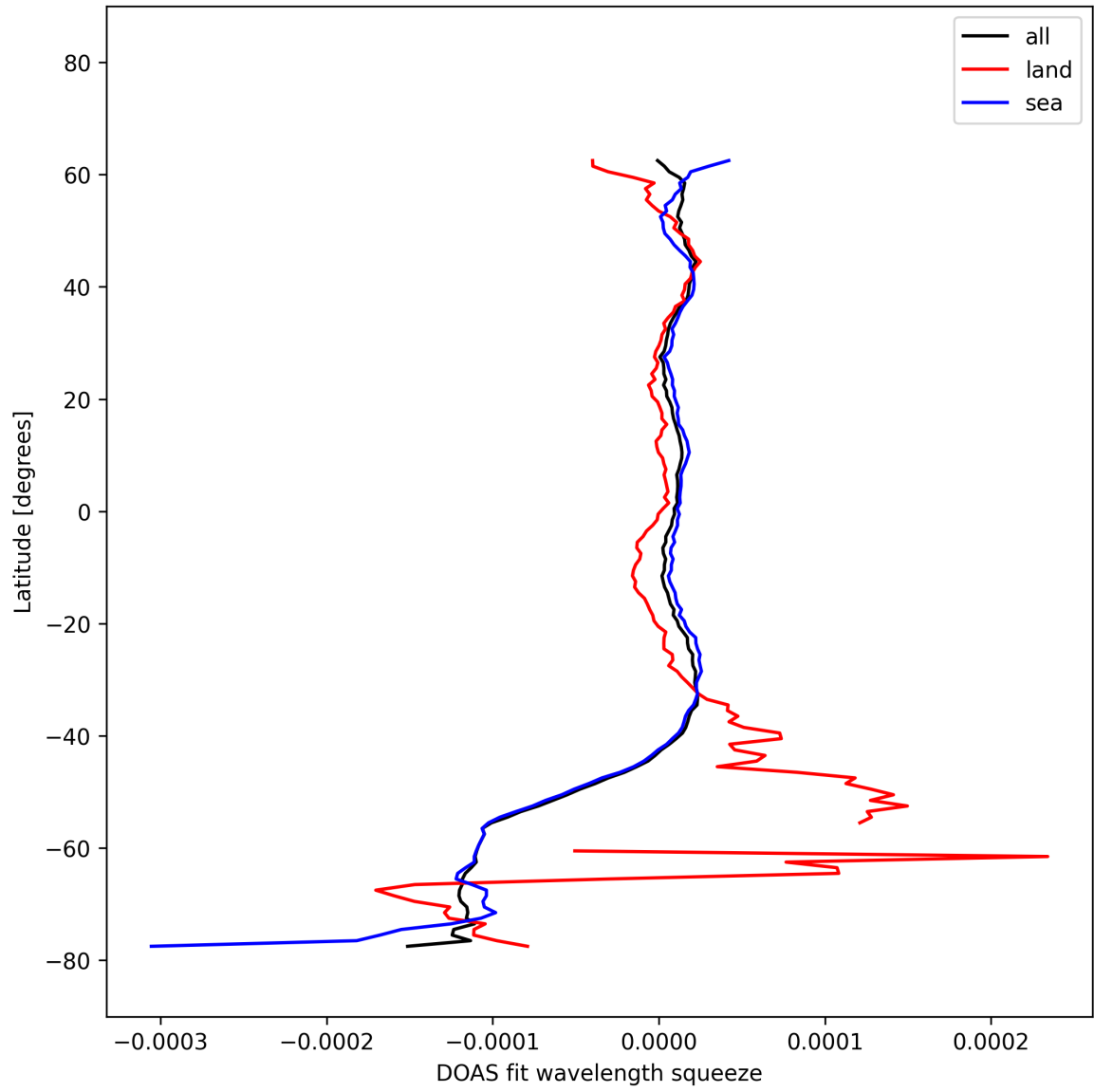


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-10-11 to 2025-10-12.

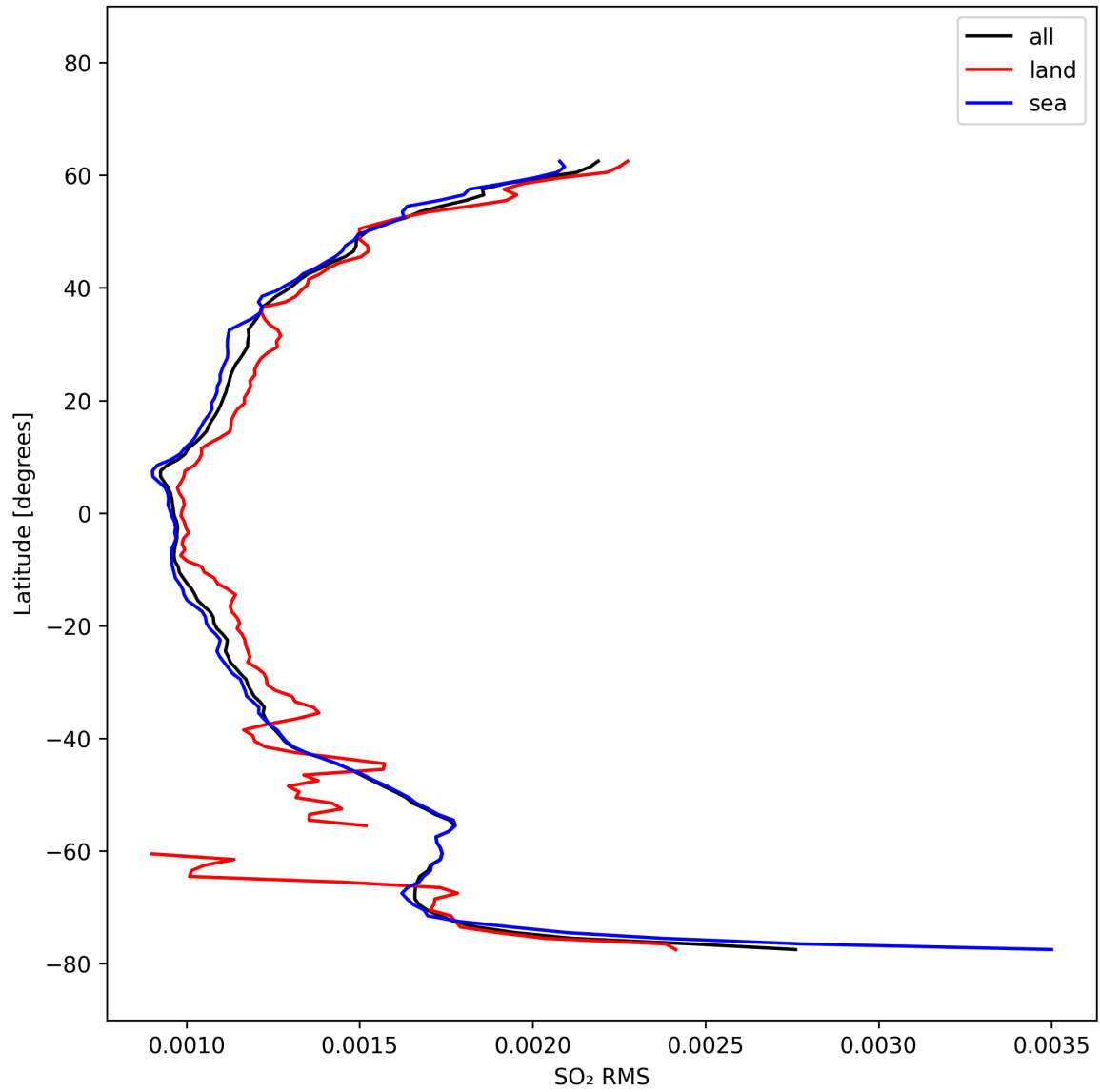


Figure 52: Zonal average of “SO₂ RMS” for 2025-10-11 to 2025-10-12.

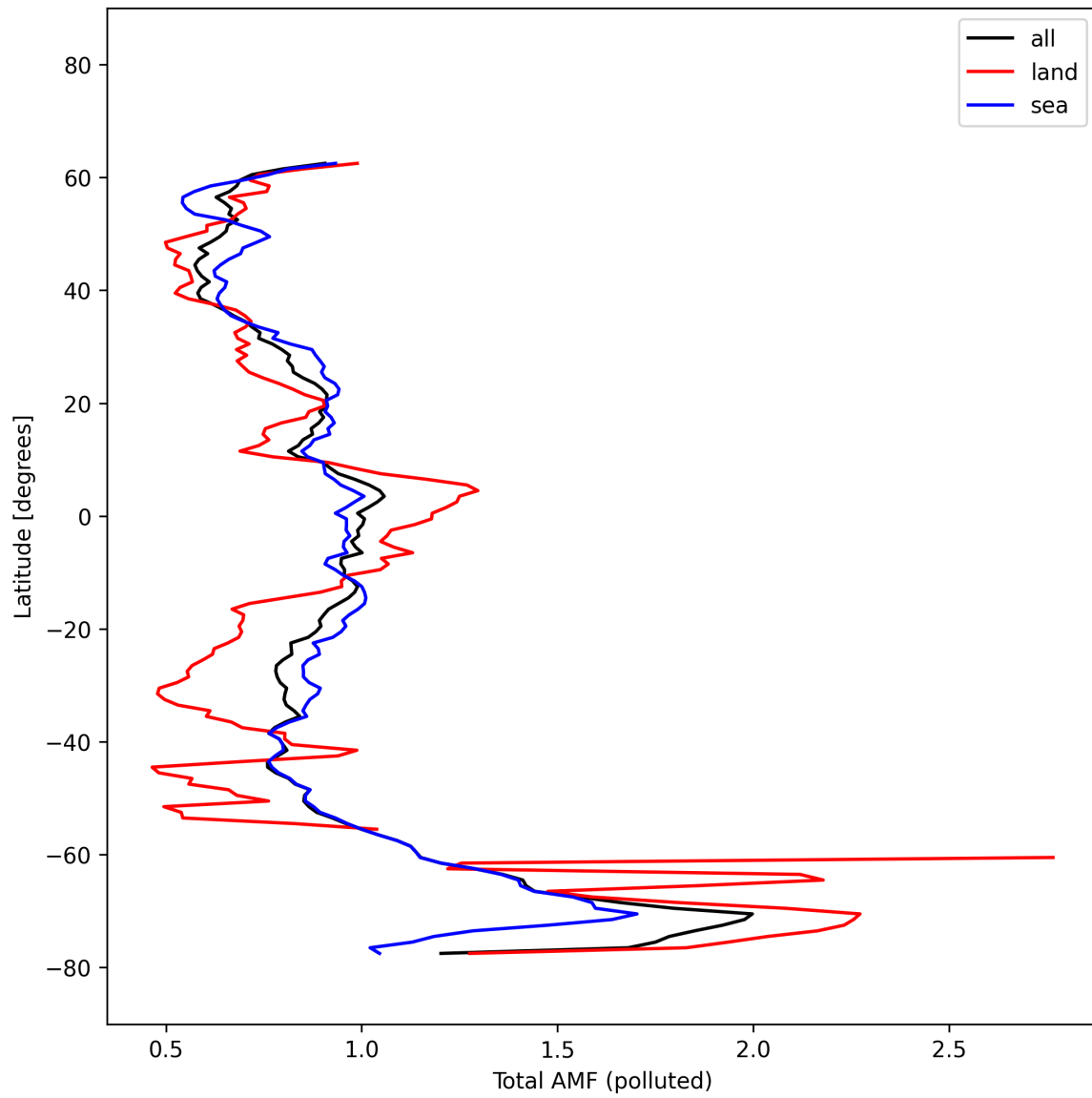


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-10-11 to 2025-10-12.

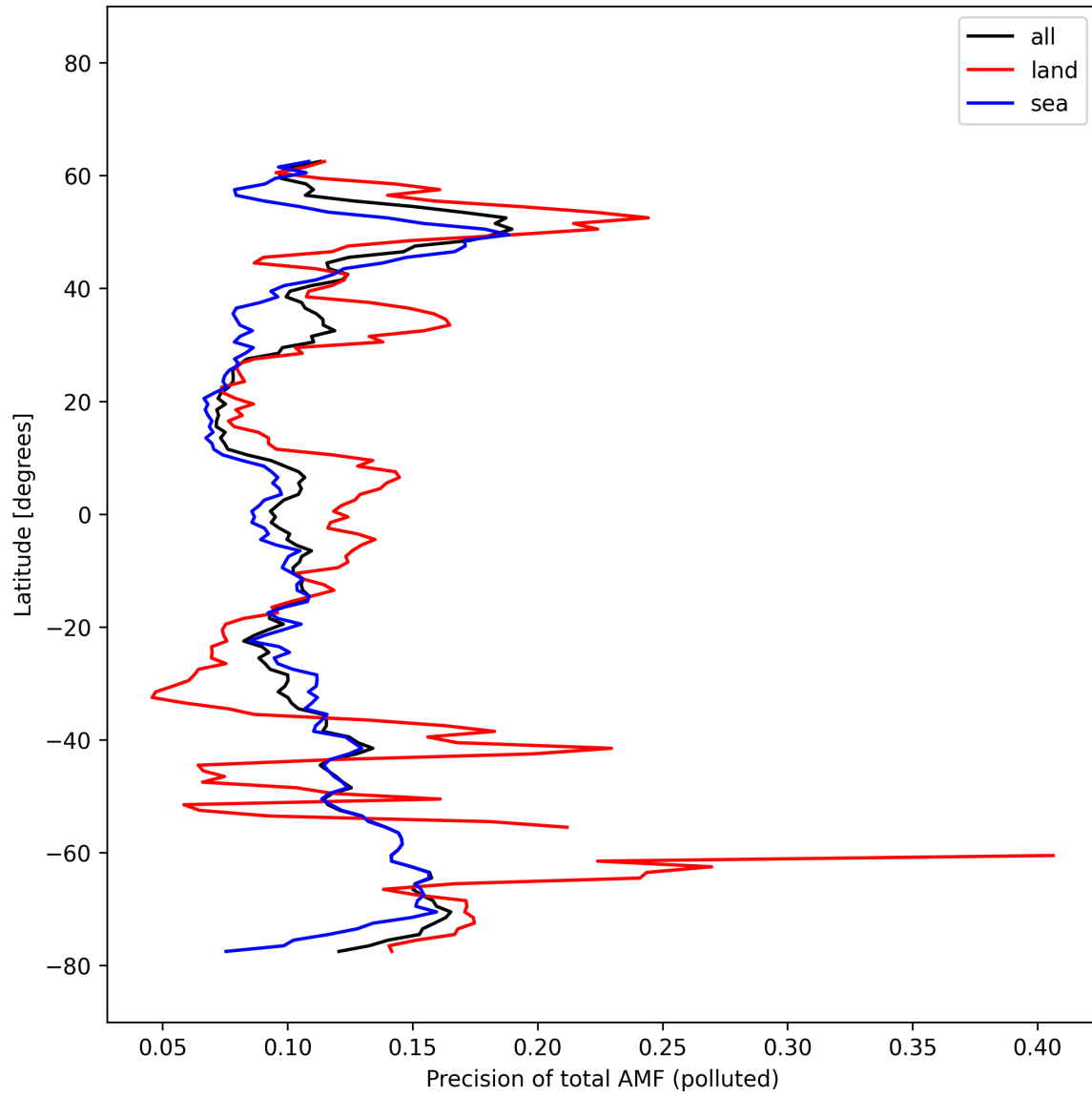


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-10-11 to 2025-10-12.

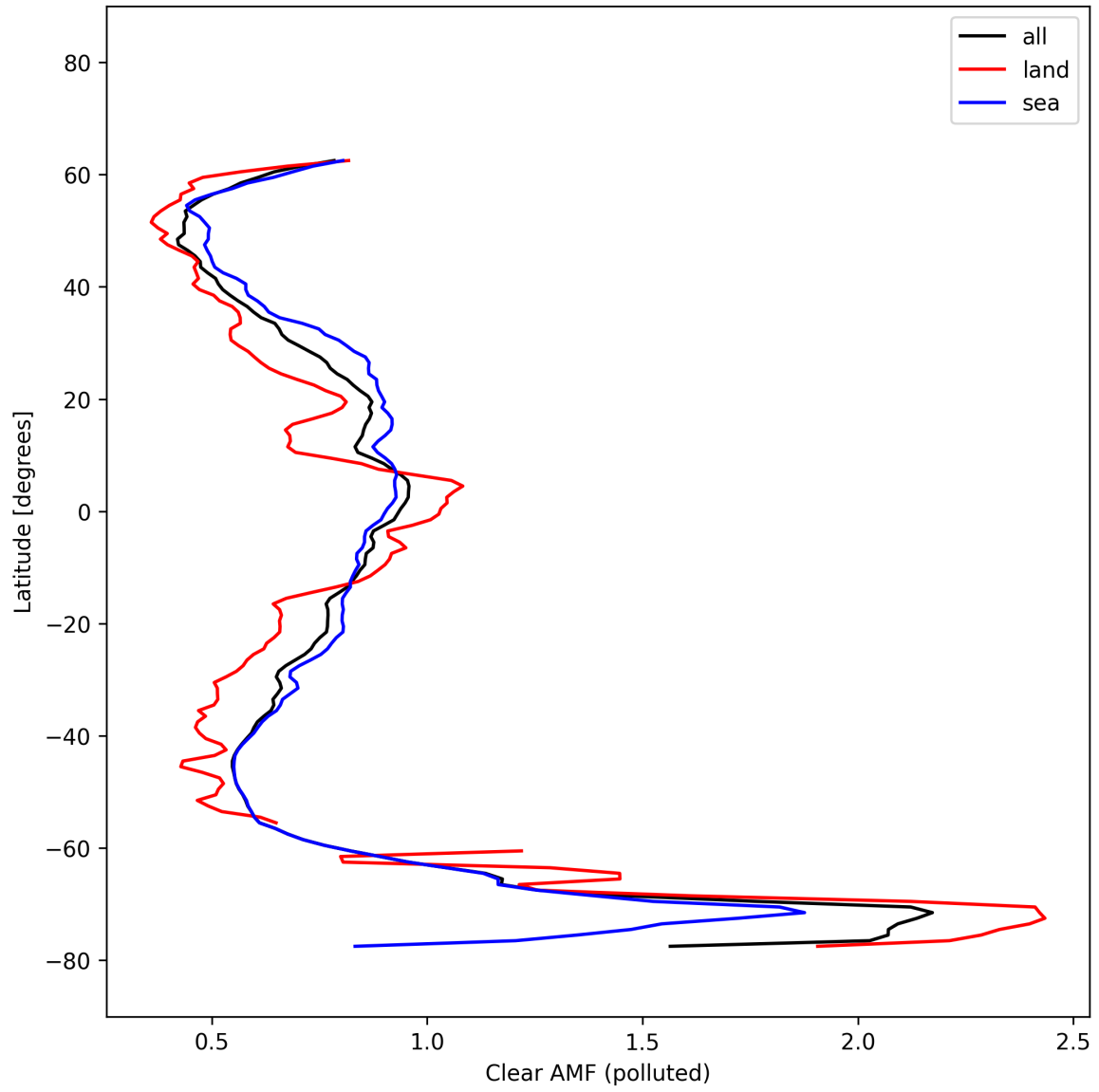


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-10-11 to 2025-10-12.

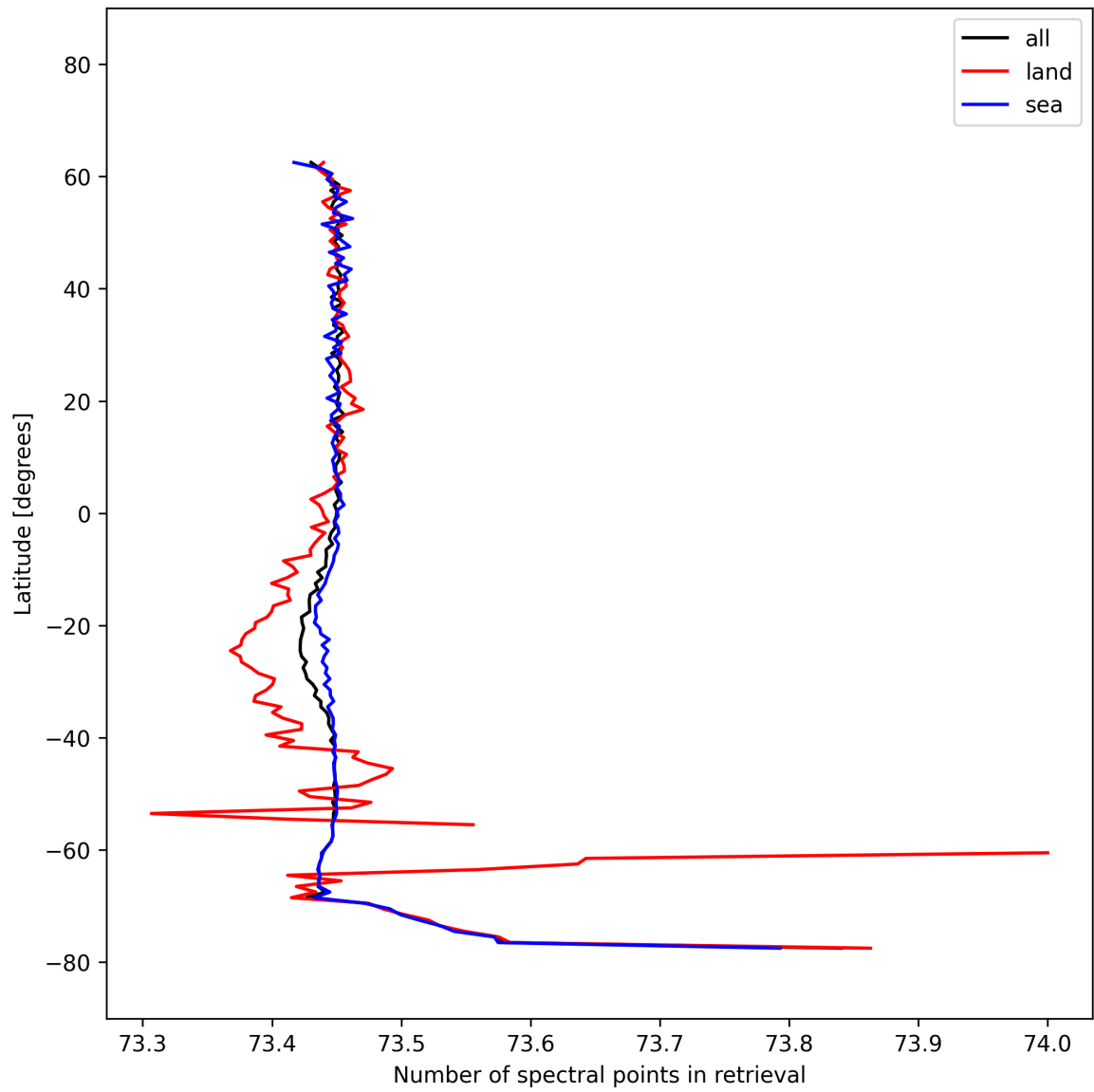


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-10-11 to 2025-10-12.

8 Histograms

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

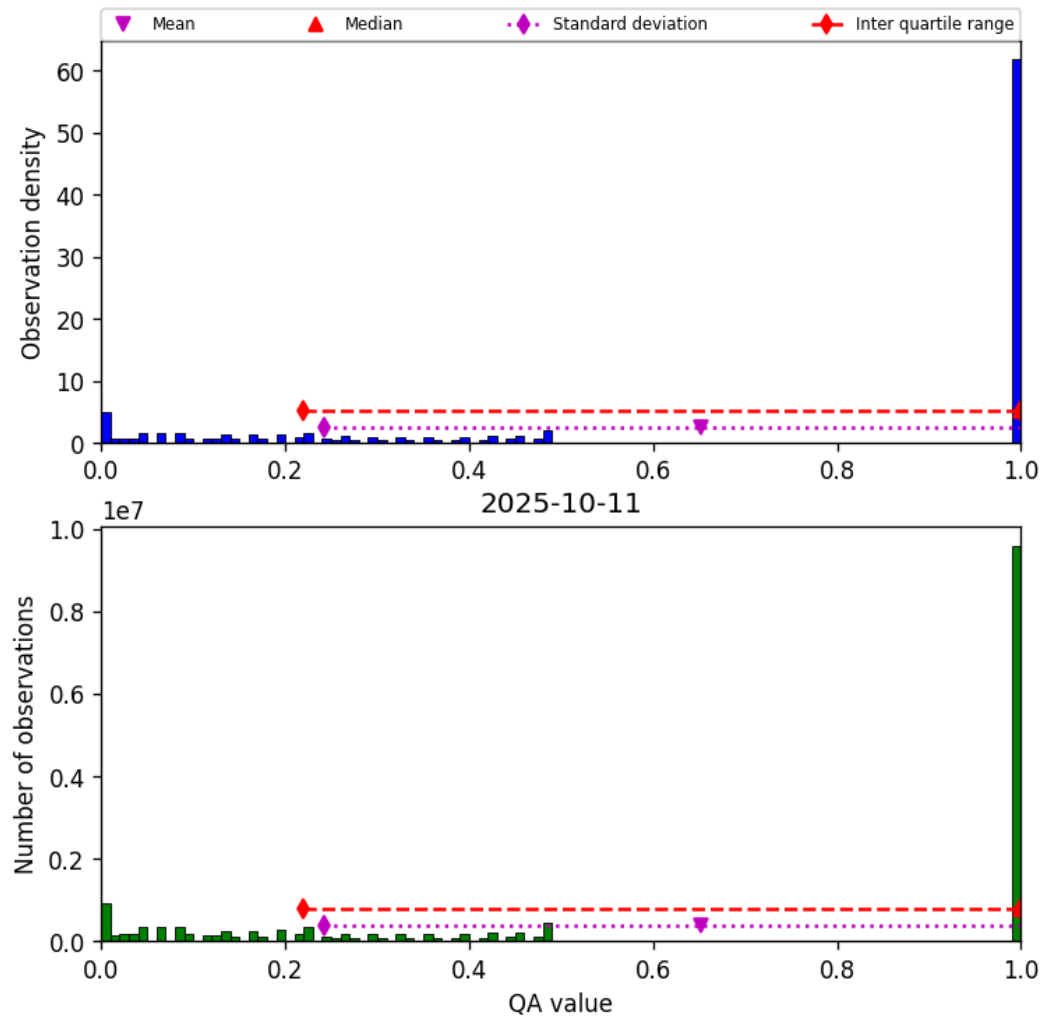


Figure 57: Histogram of “QA value” for 2025-10-11 to 2025-10-12

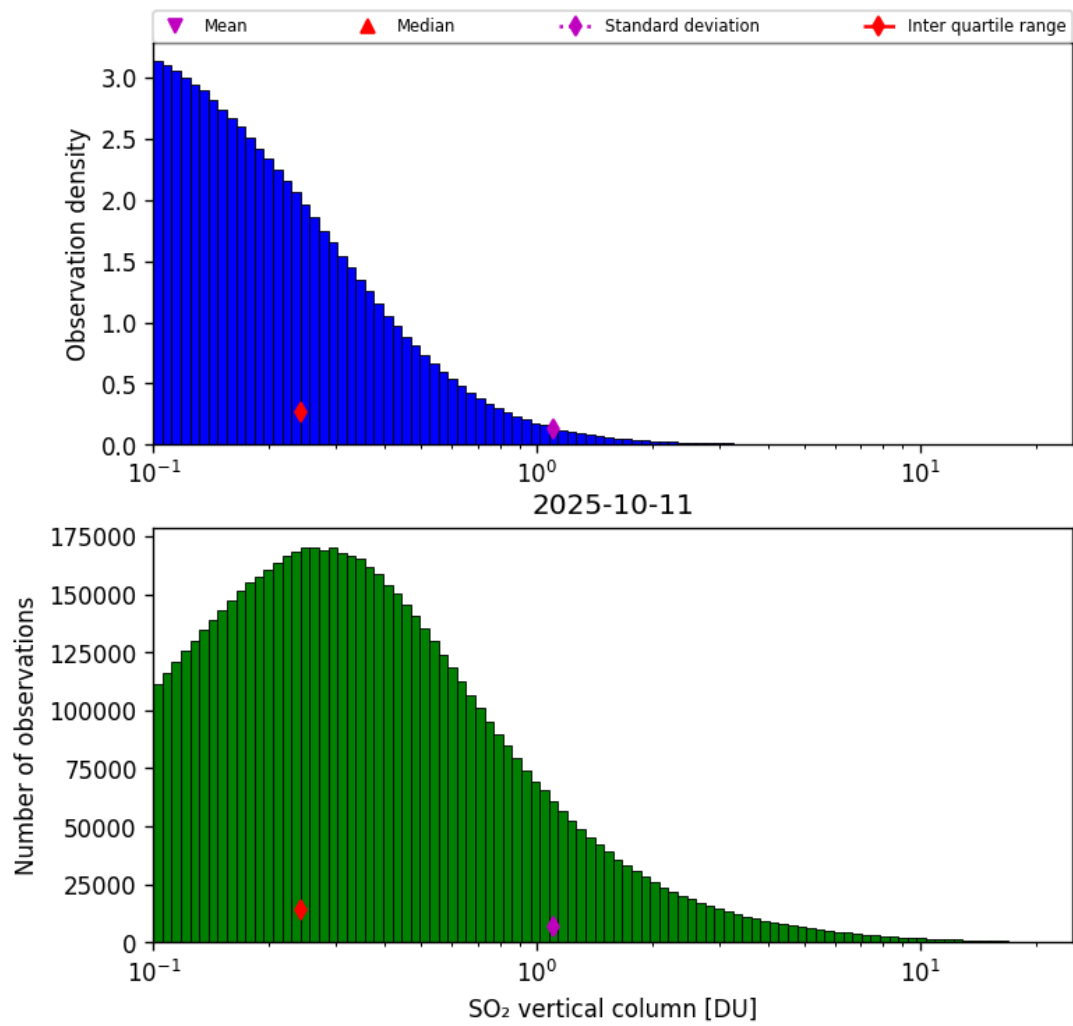


Figure 58: Histogram of “SO₂ vertical column” for 2025-10-11 to 2025-10-12

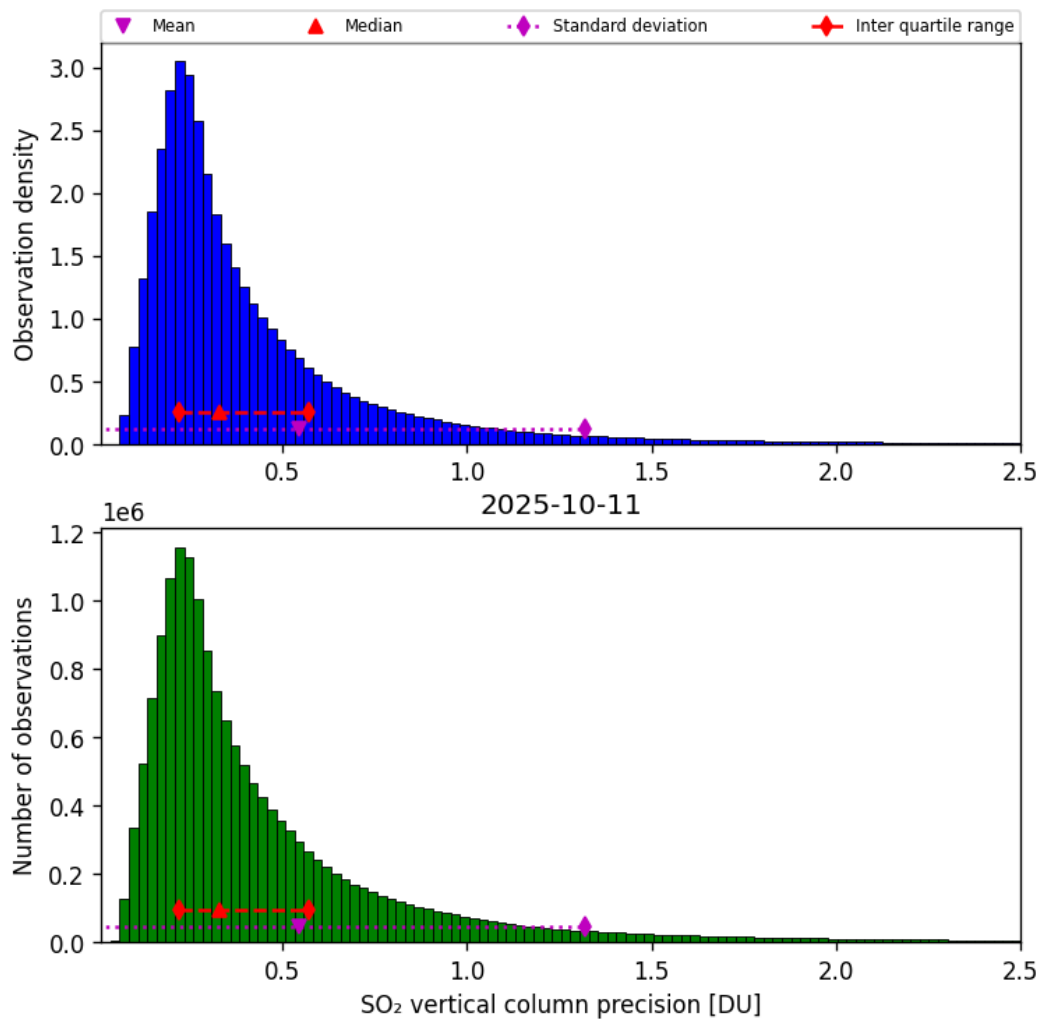


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-10-11 to 2025-10-12

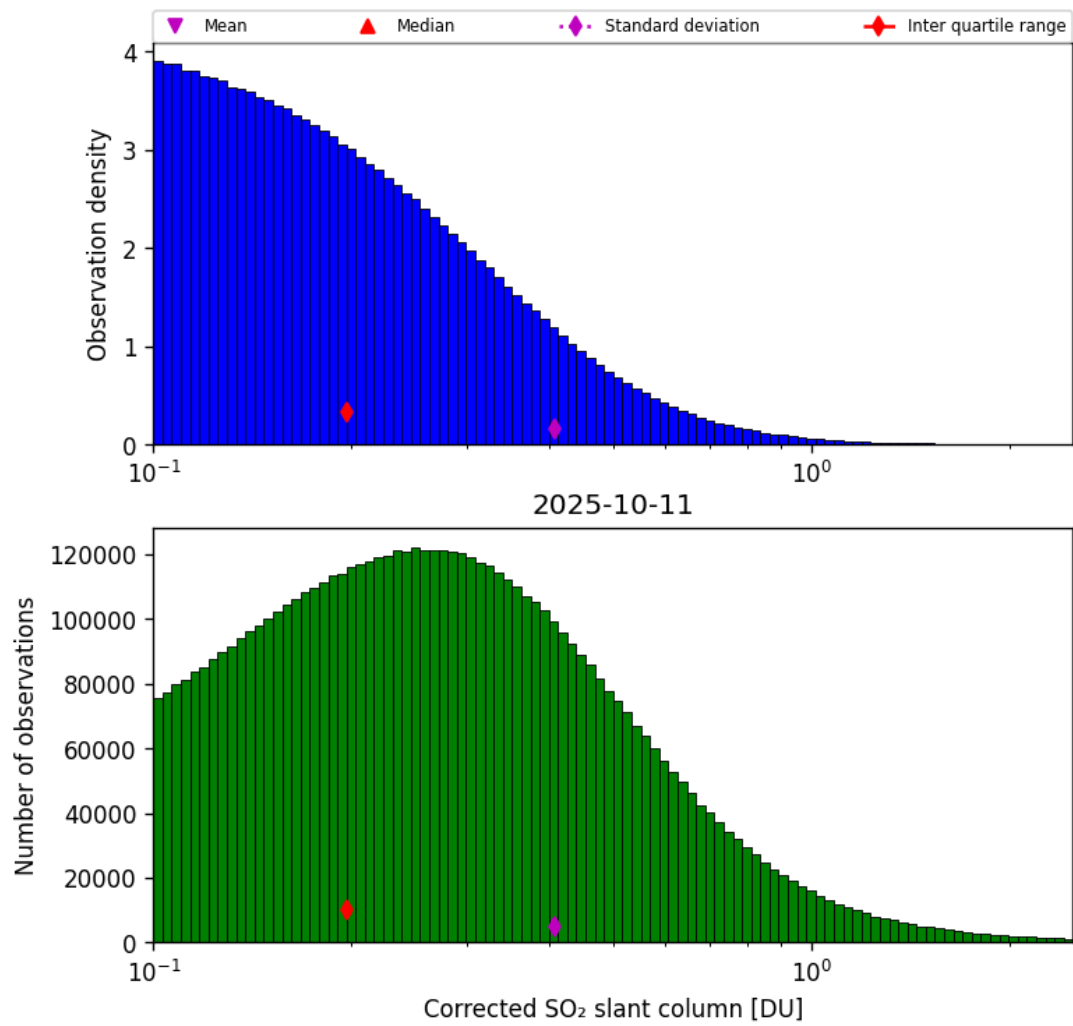


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-10-11 to 2025-10-12

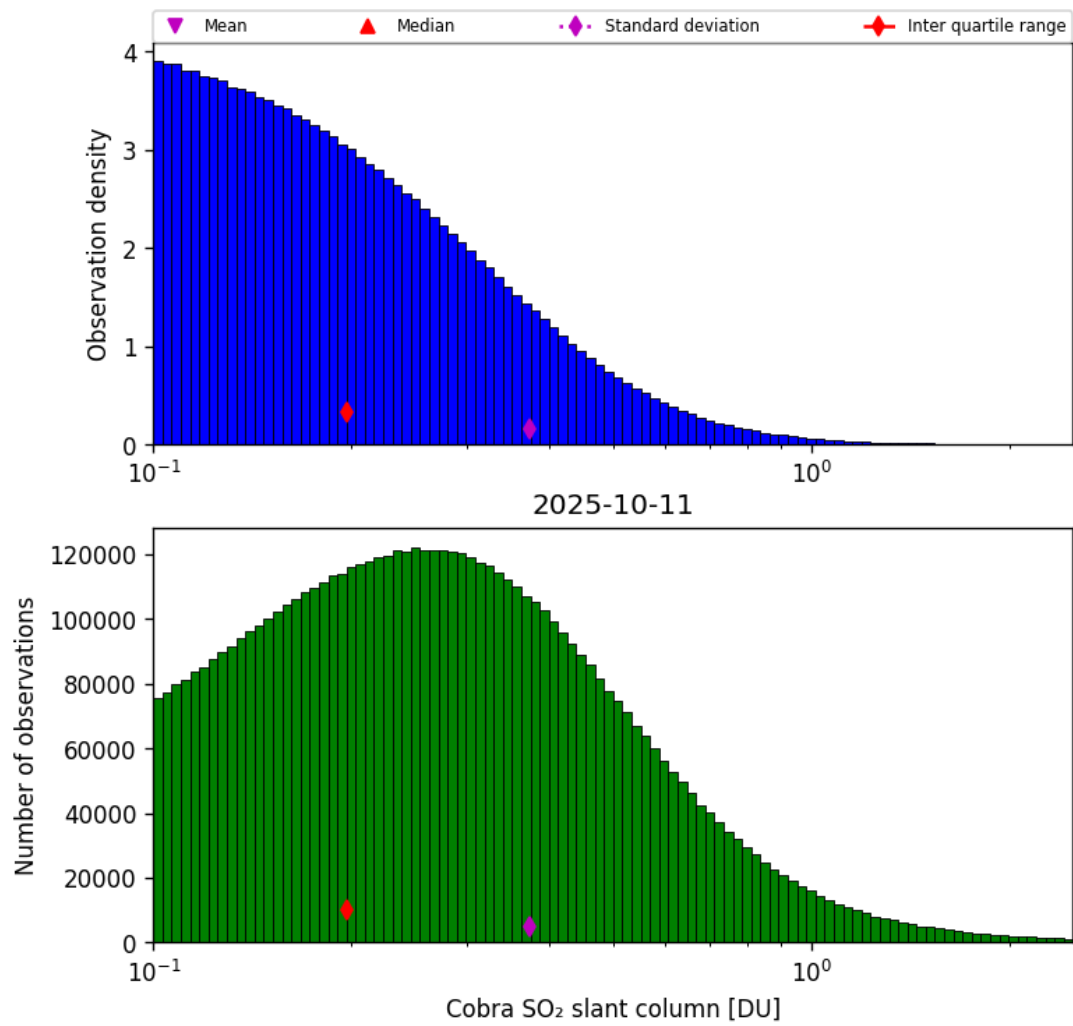


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-10-11 to 2025-10-12

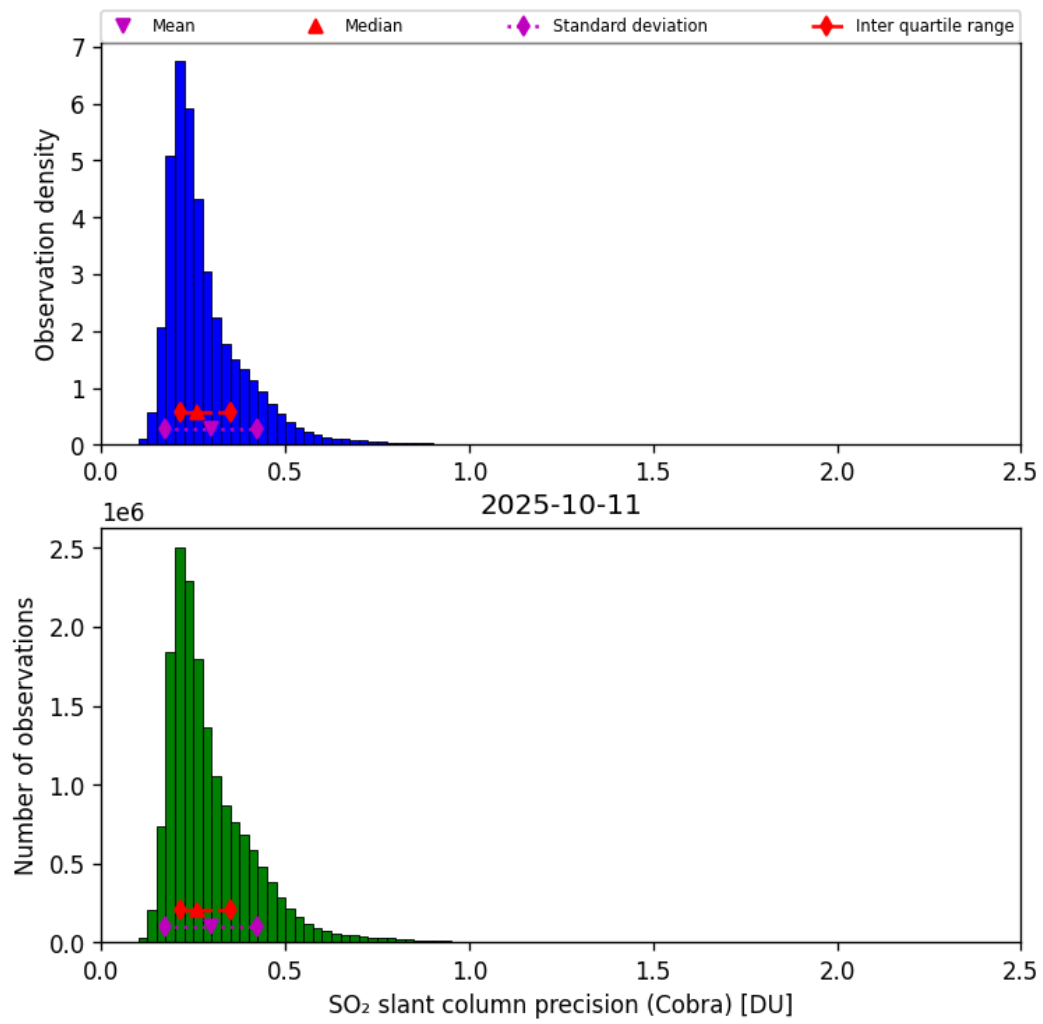


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-10-11 to 2025-10-12

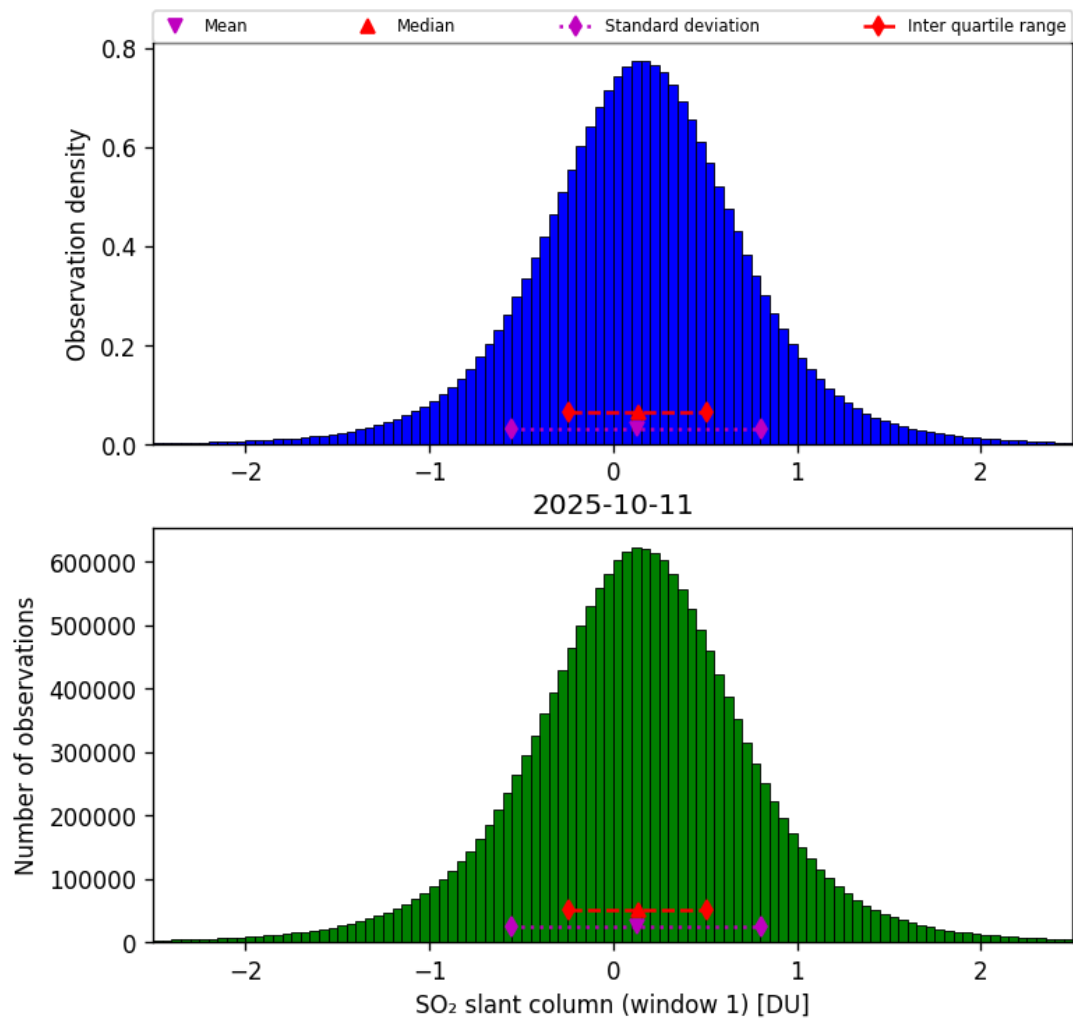


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-10-11 to 2025-10-12

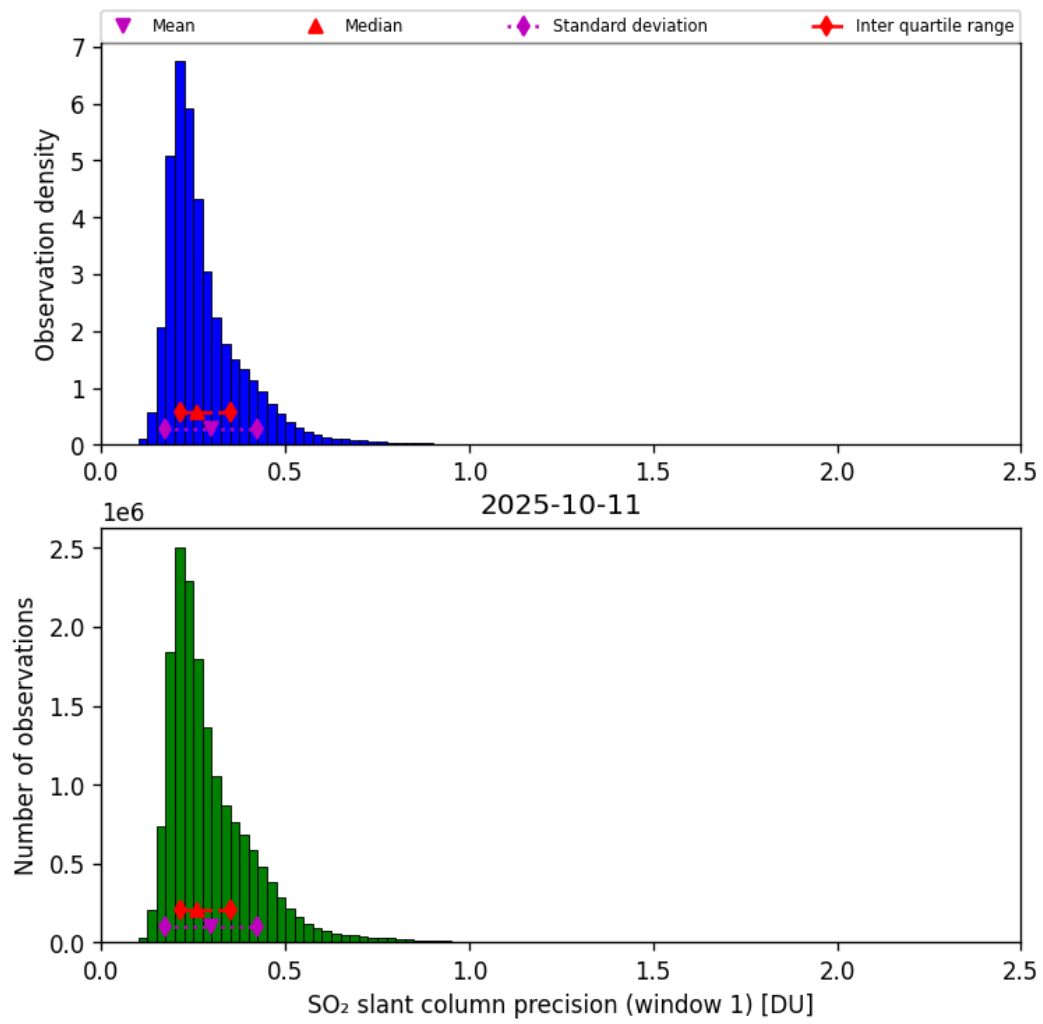


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-10-11 to 2025-10-12

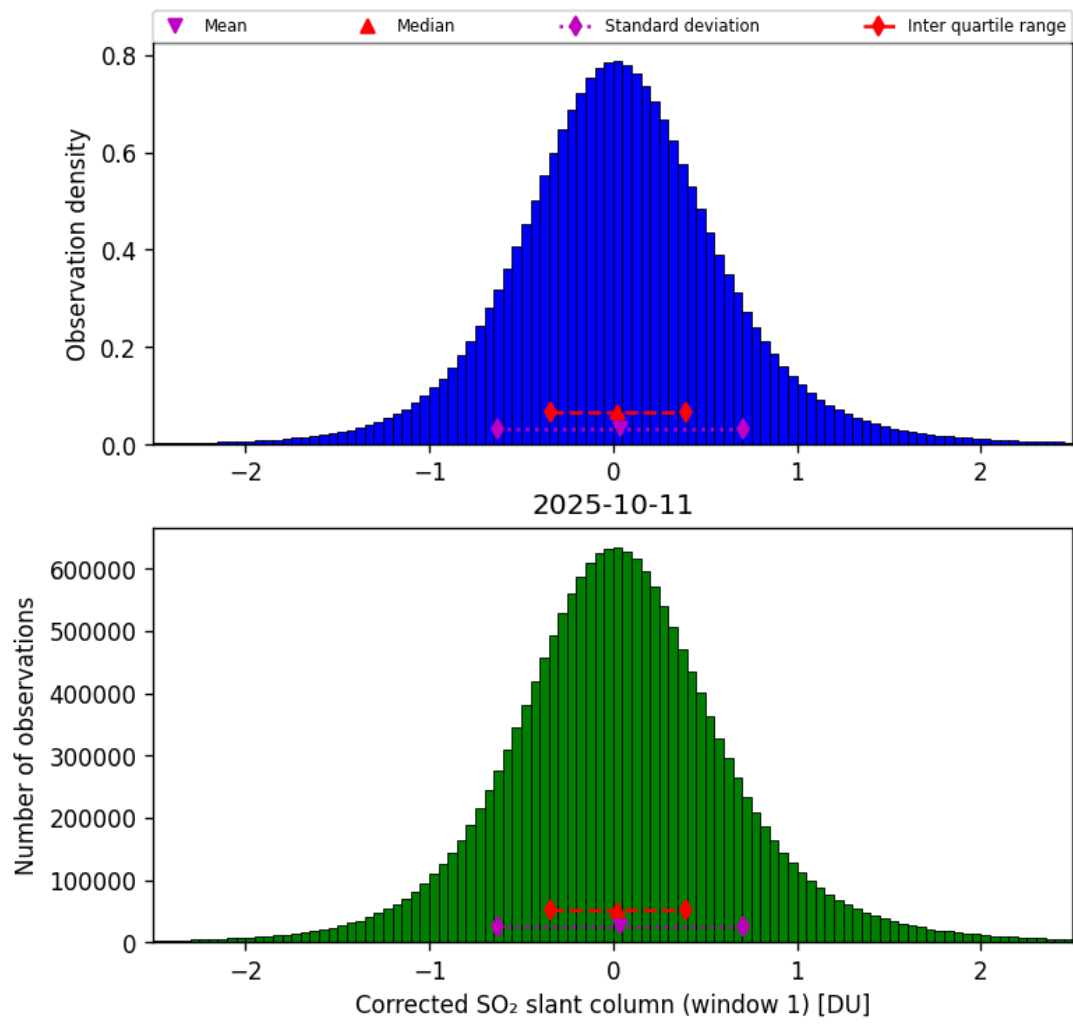


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-10-11 to 2025-10-12

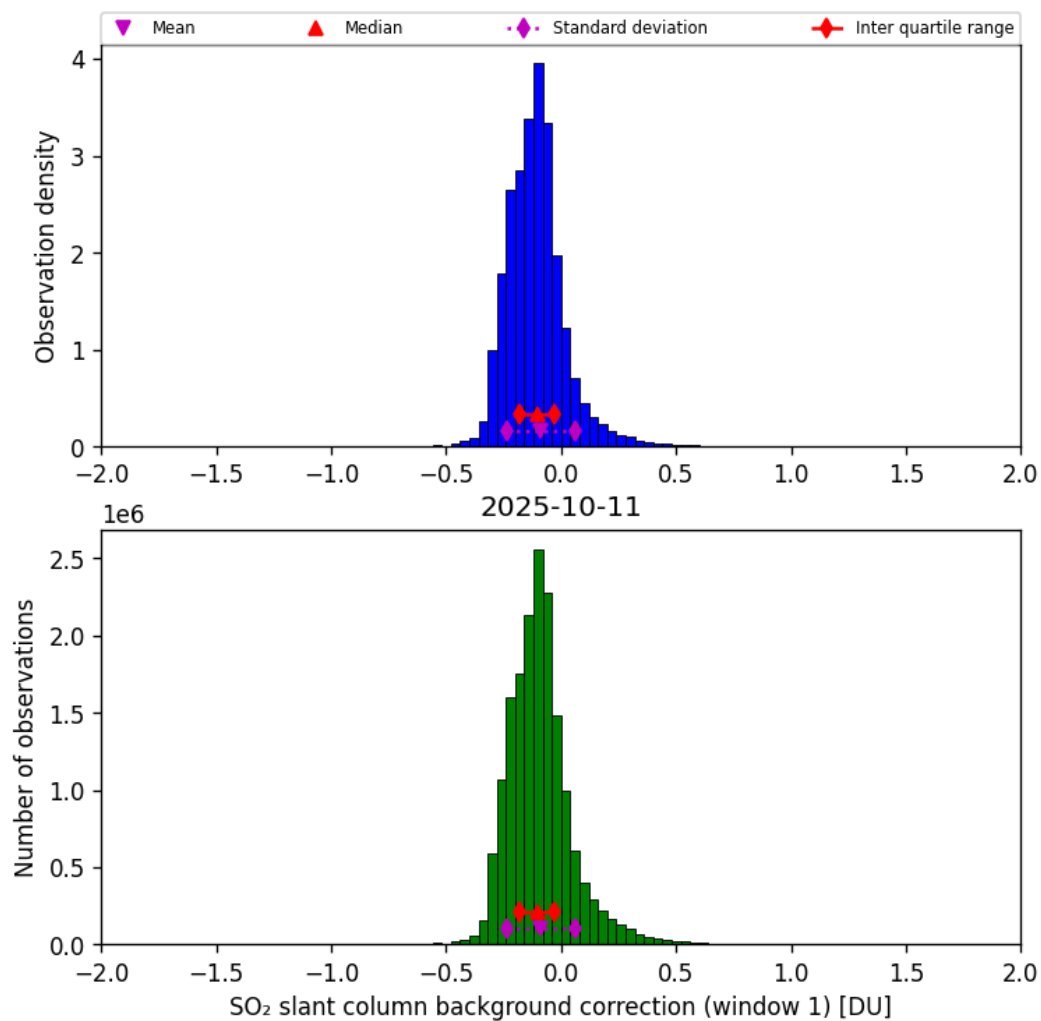


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-10-11 to 2025-10-12

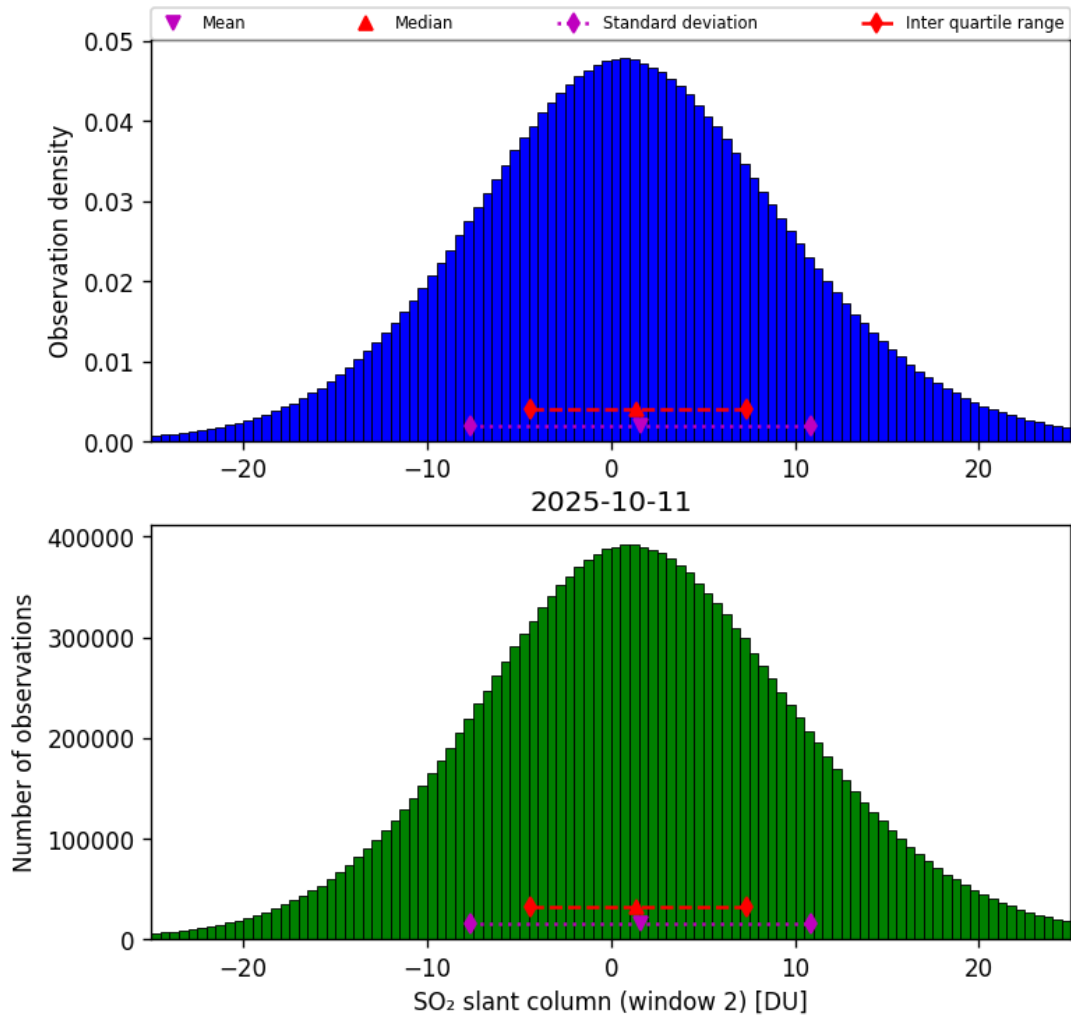


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-10-11 to 2025-10-12

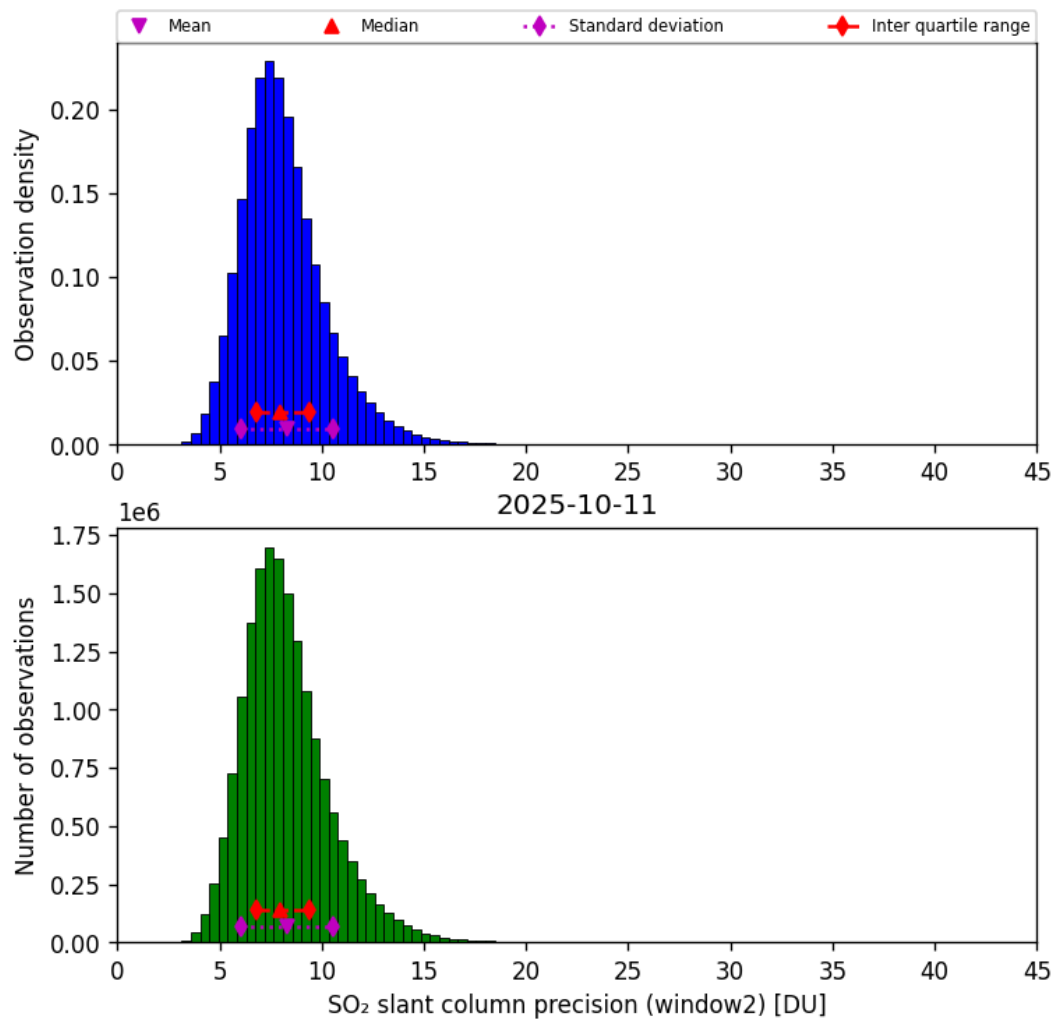


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-10-11 to 2025-10-12

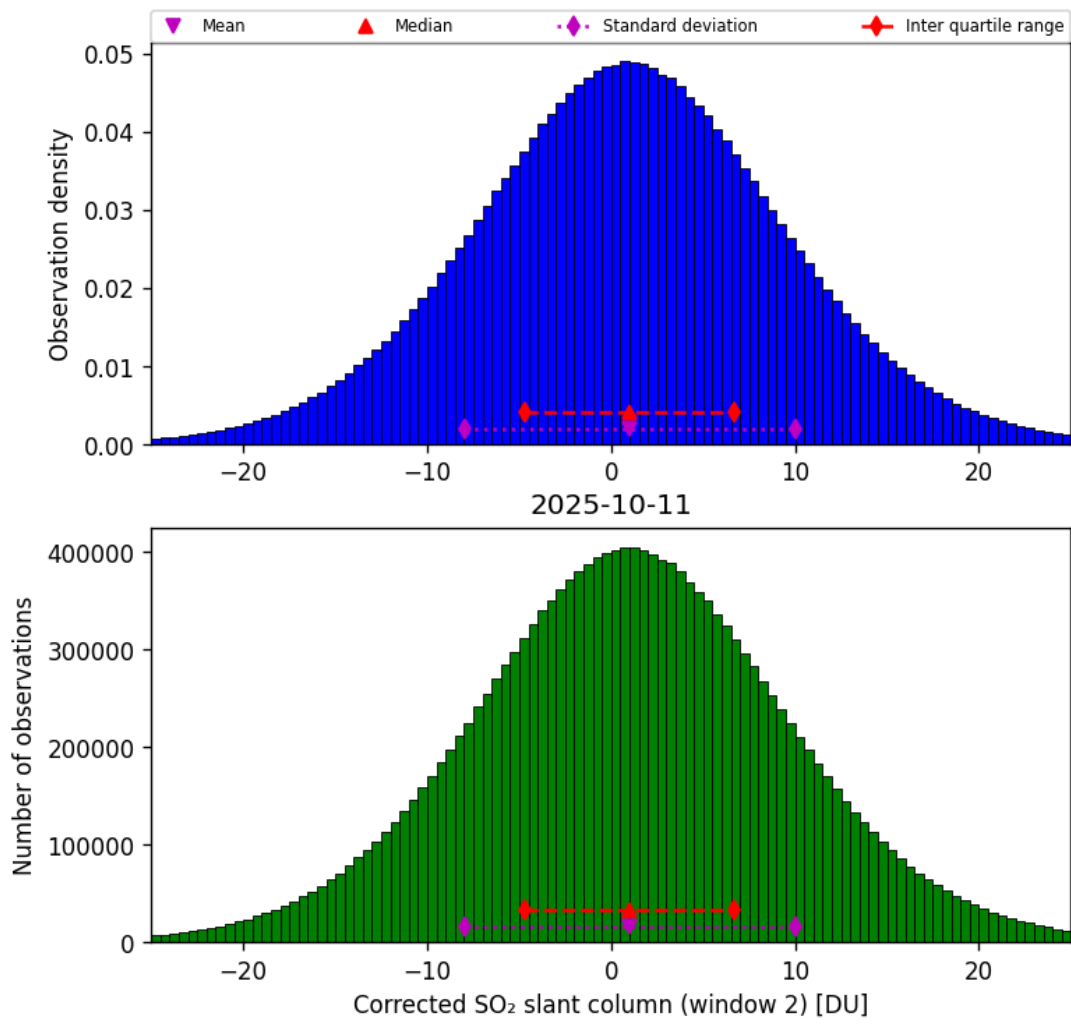


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-10-11 to 2025-10-12

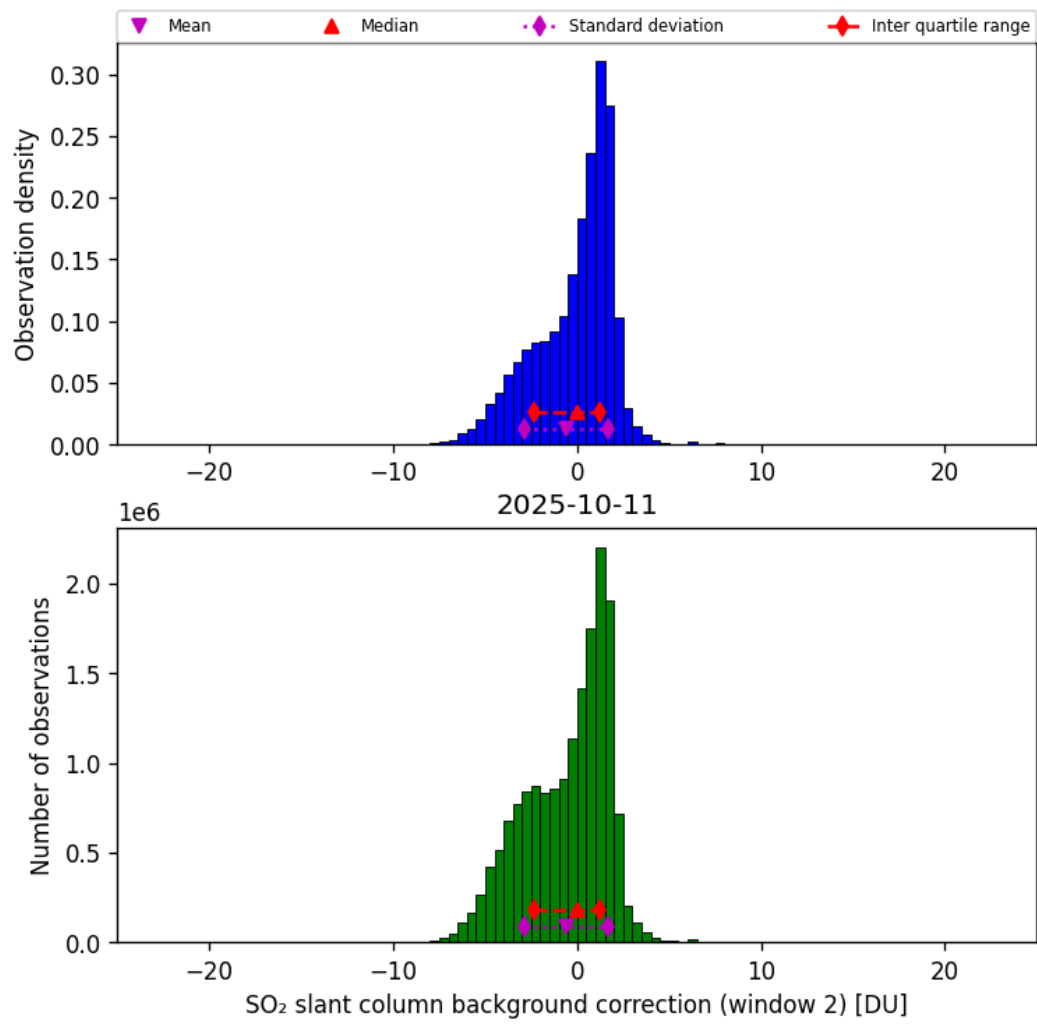


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-10-11 to 2025-10-12

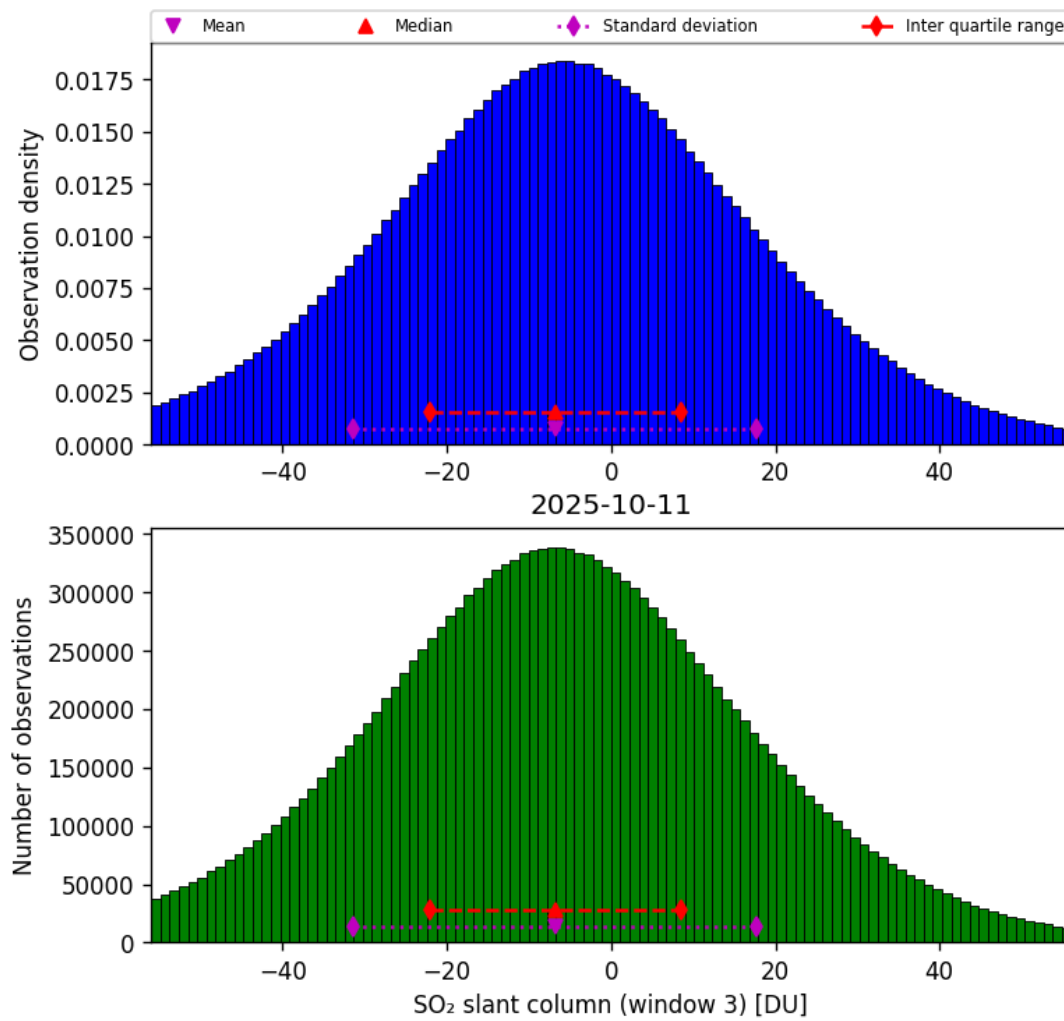


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-10-11 to 2025-10-12

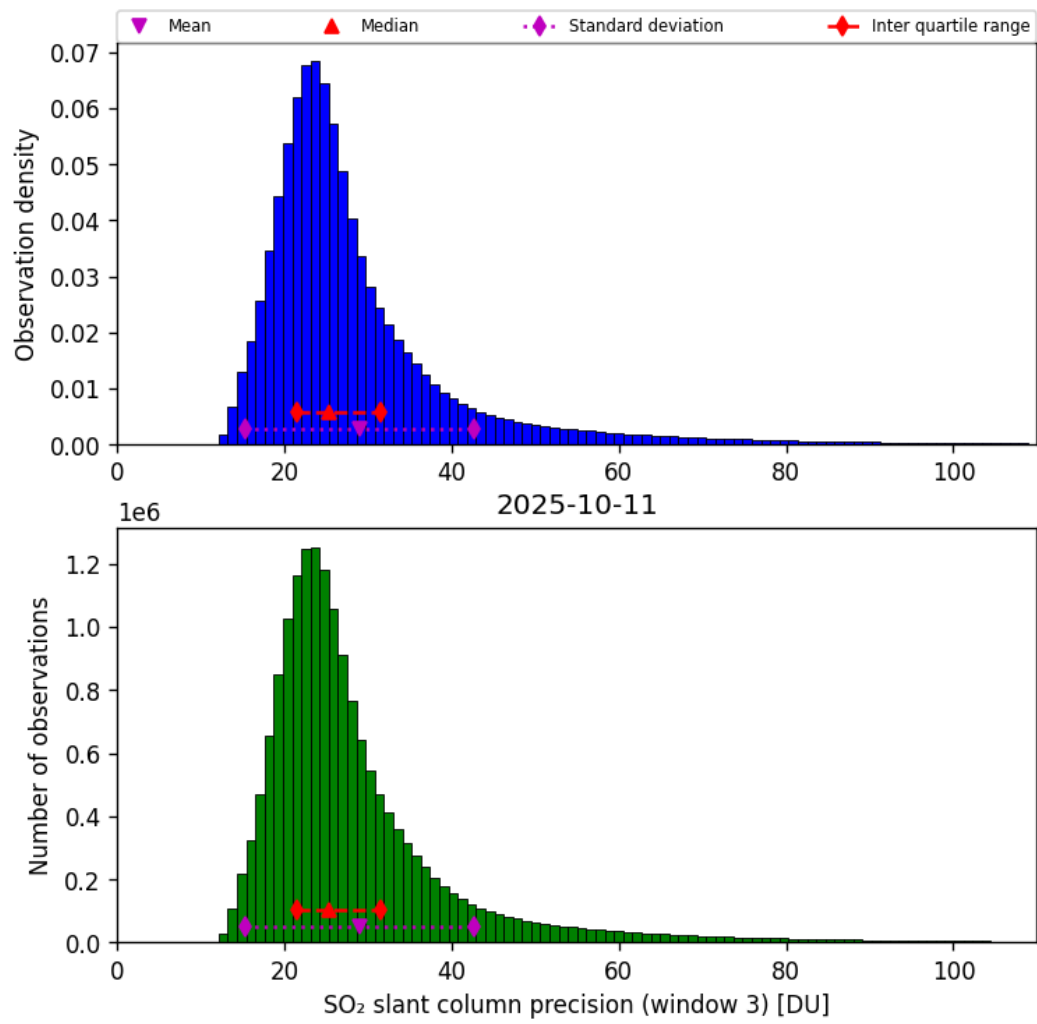


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-10-11 to 2025-10-12

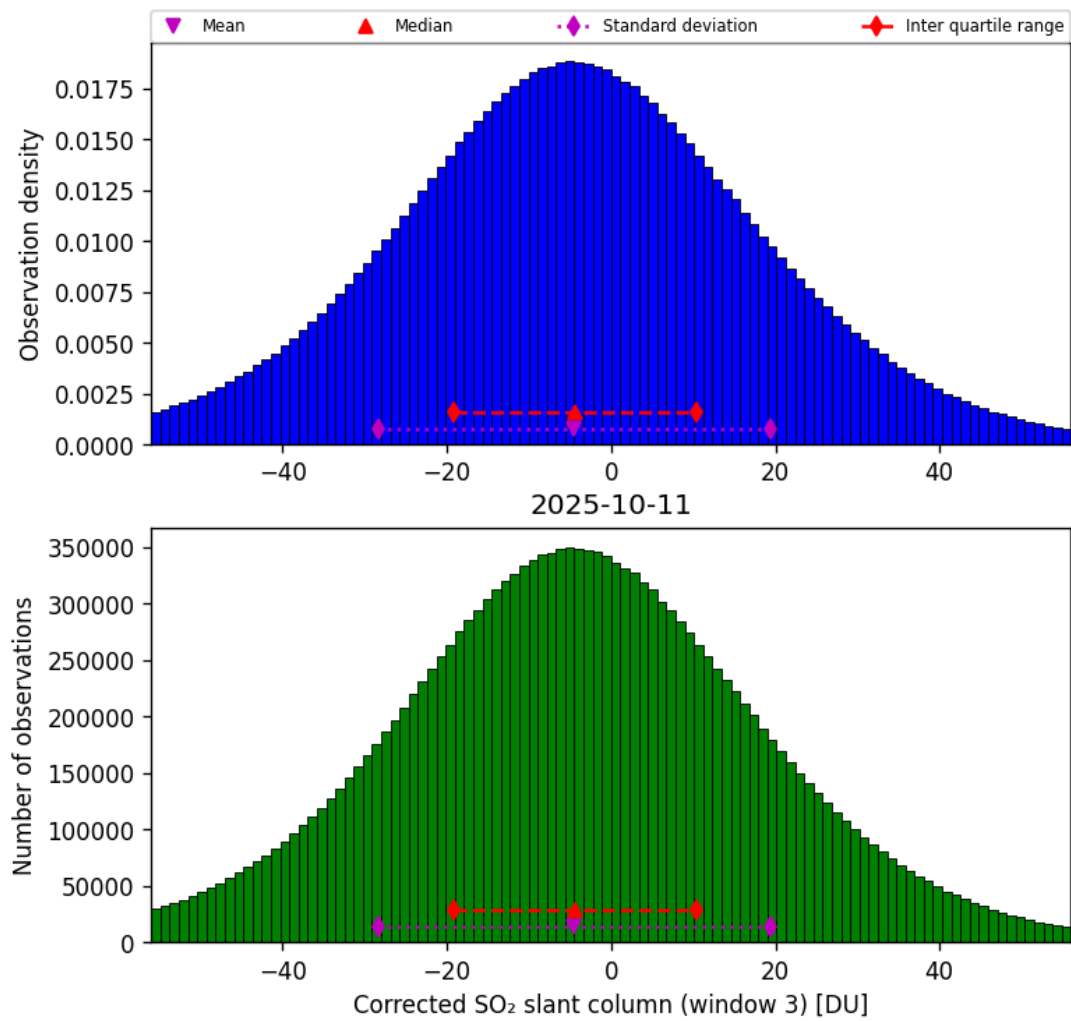


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-10-11 to 2025-10-12

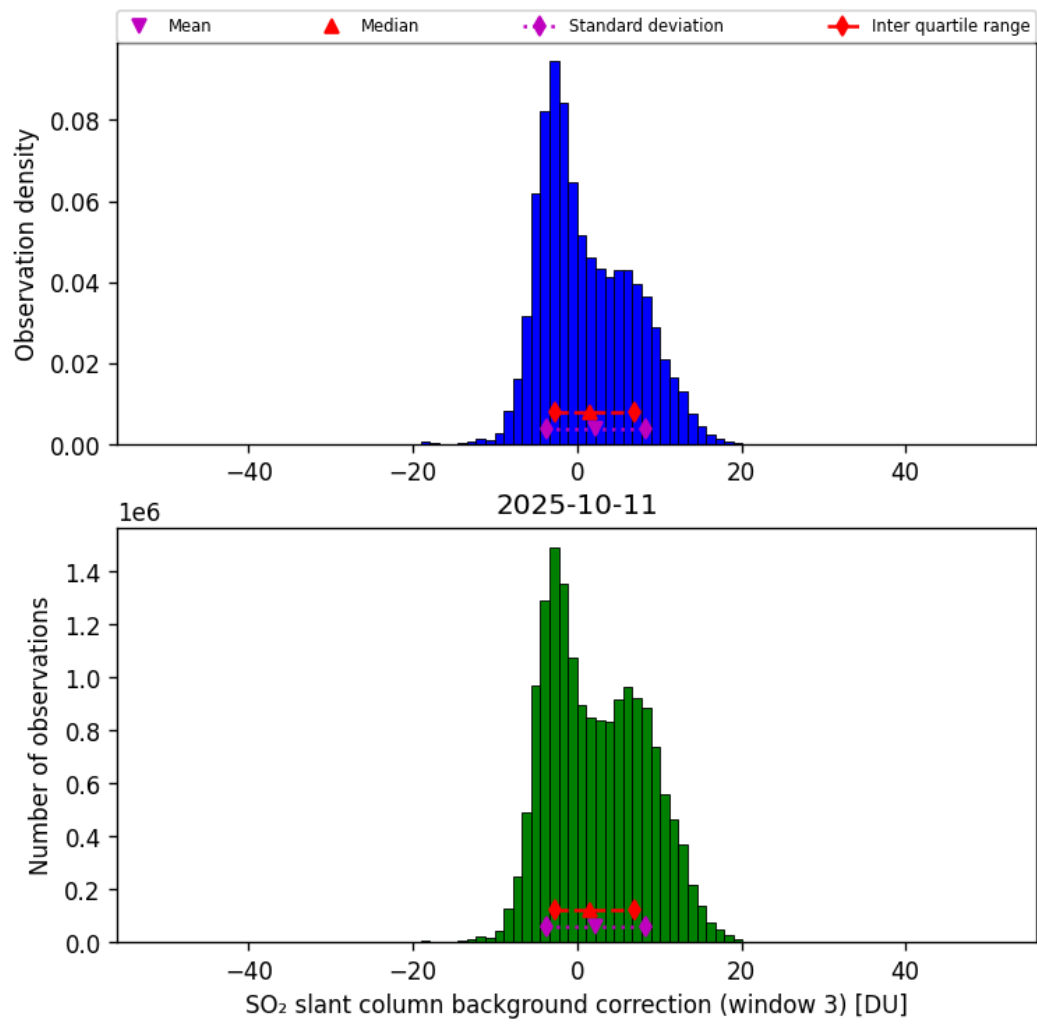


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-10-11 to 2025-10-12

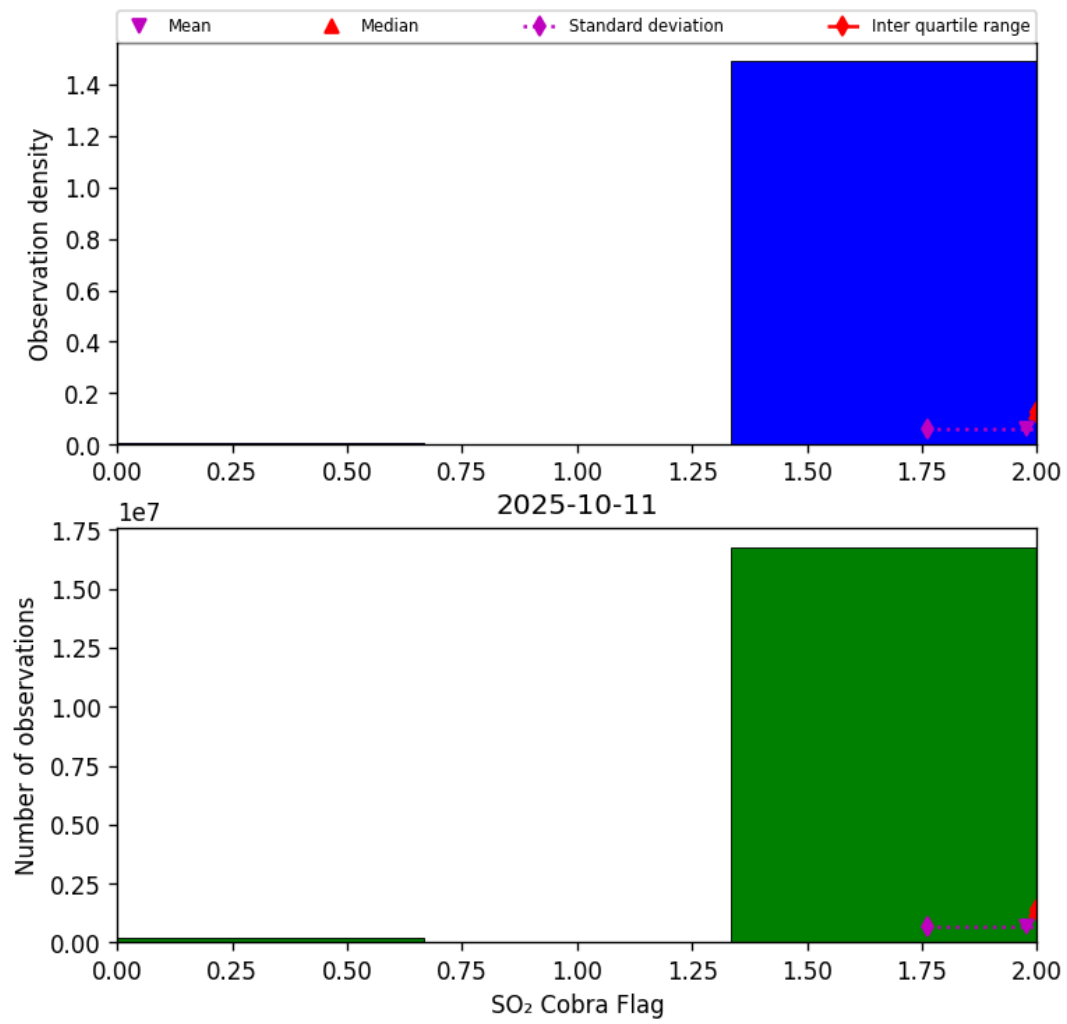


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-10-11 to 2025-10-12

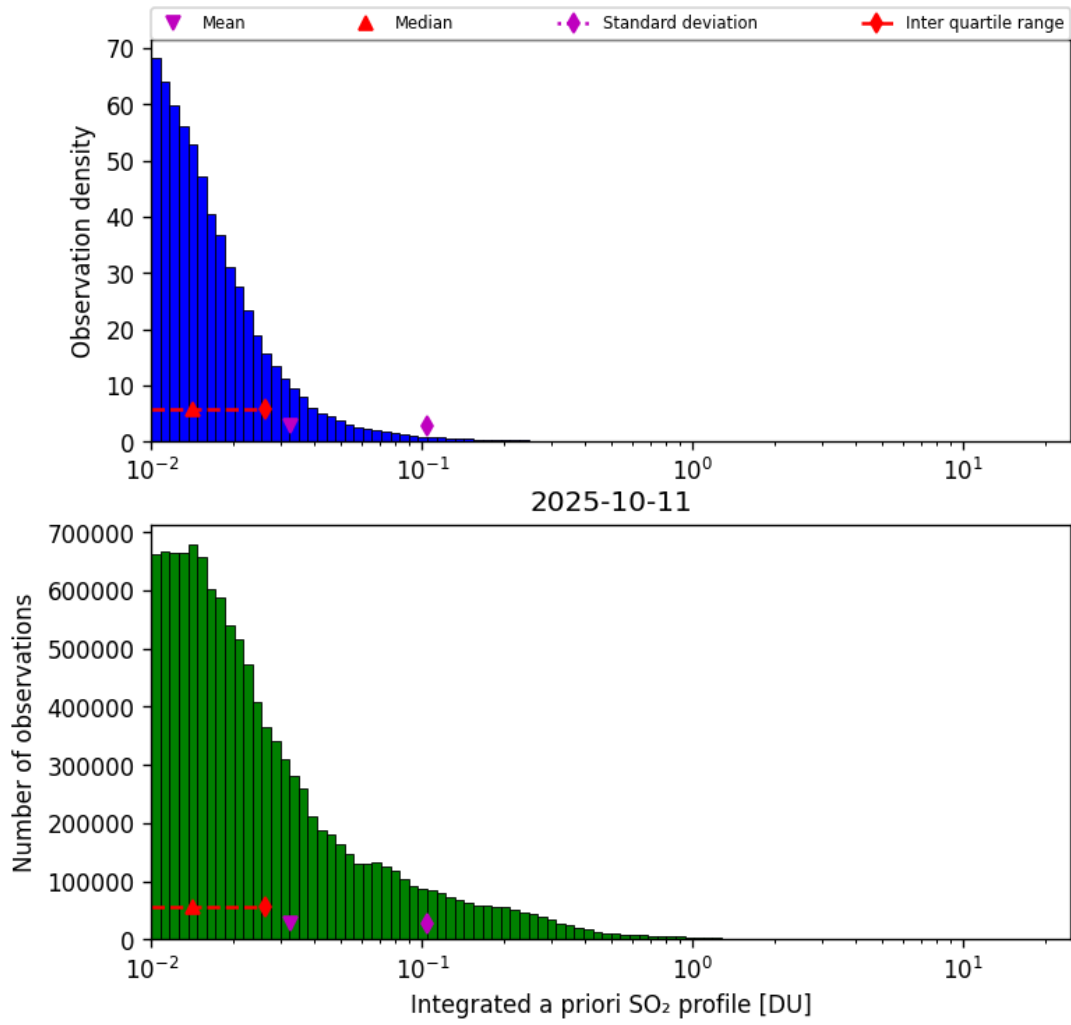


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-10-11 to 2025-10-12

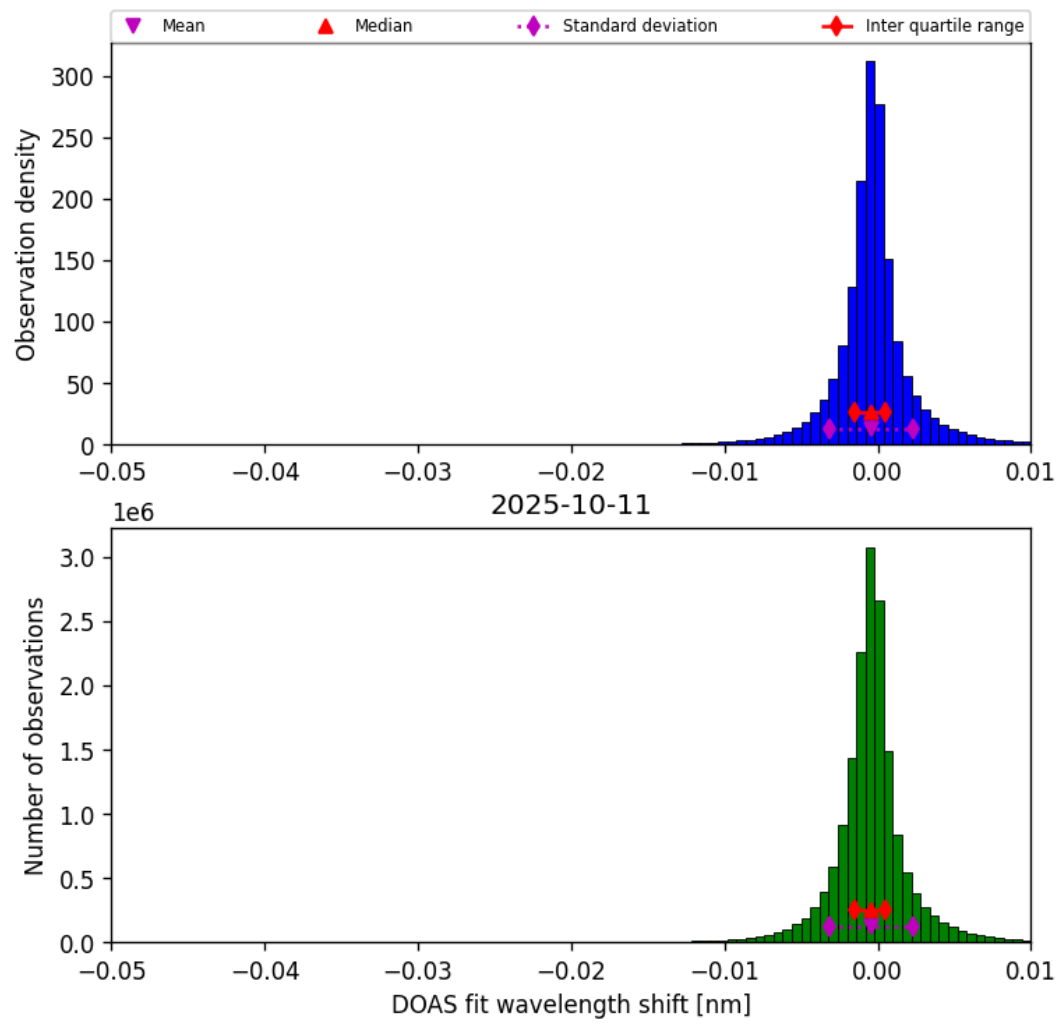


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-10-11 to 2025-10-12

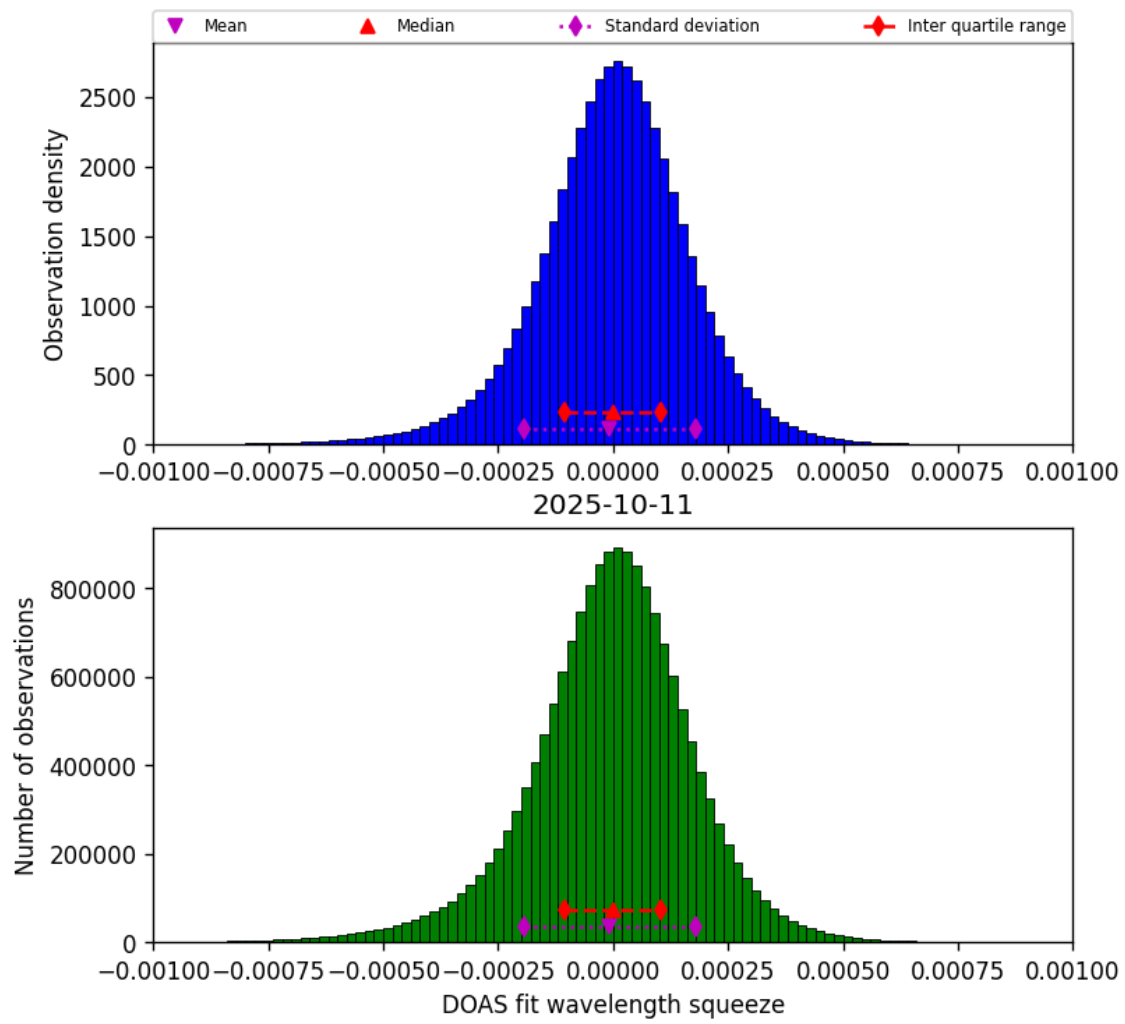


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-10-11 to 2025-10-12

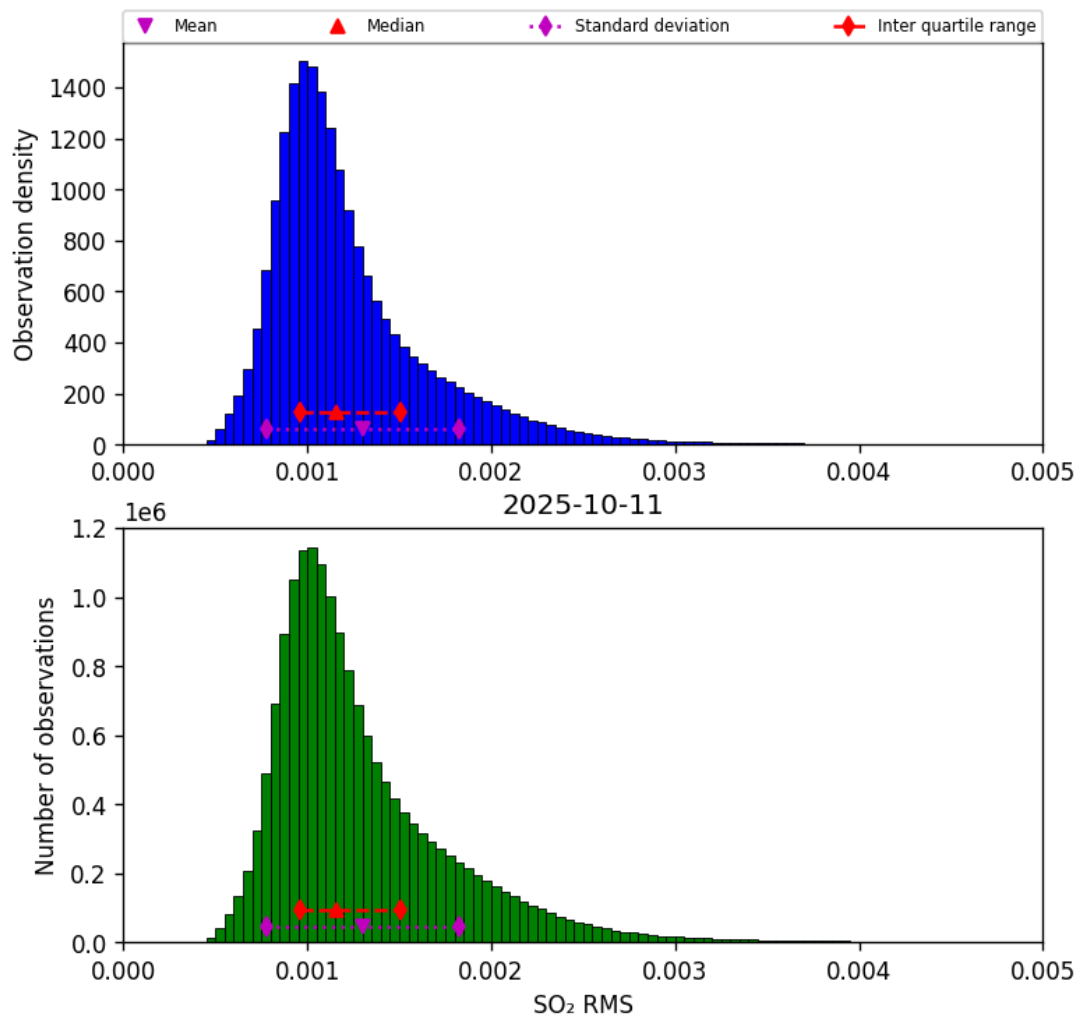


Figure 79: Histogram of “SO₂ RMS” for 2025-10-11 to 2025-10-12

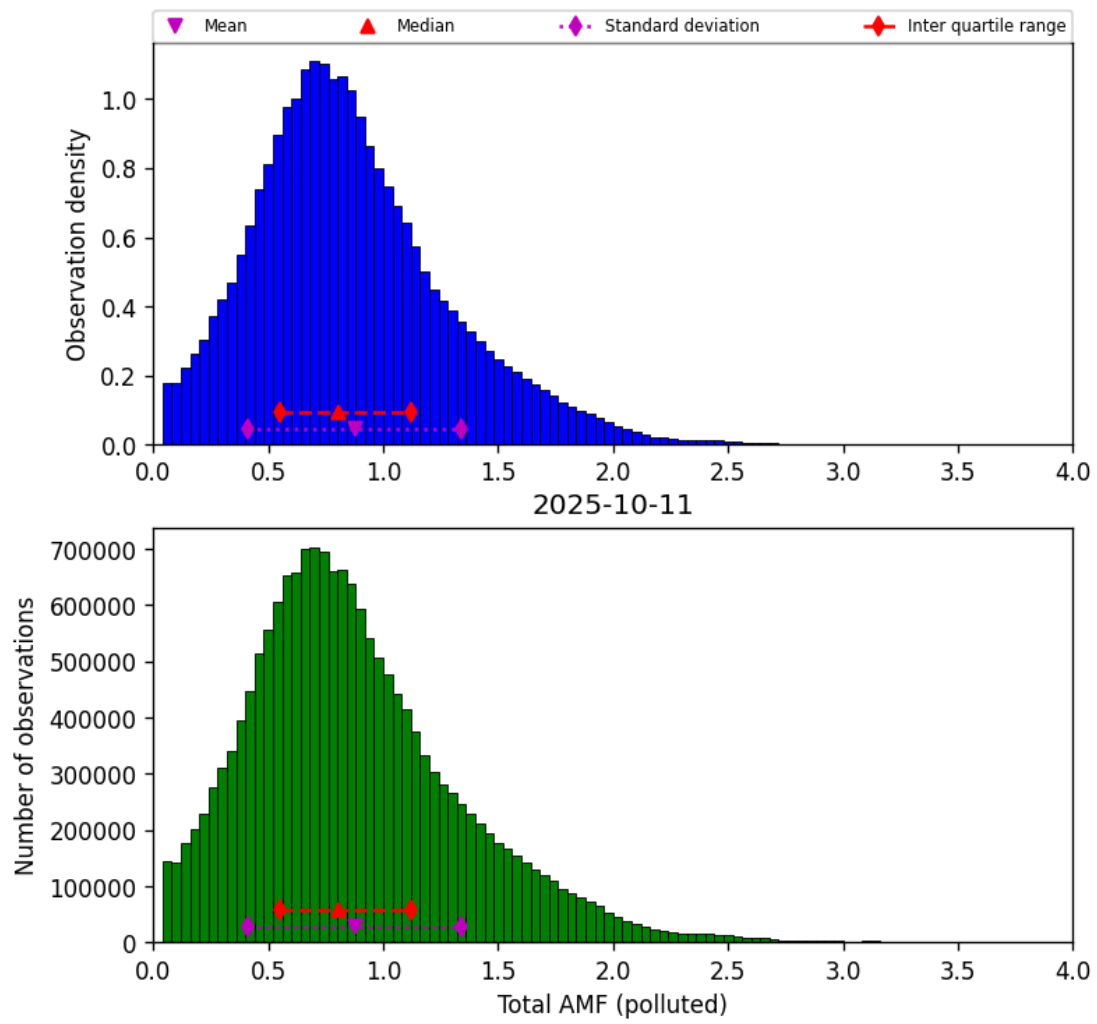


Figure 80: Histogram of “Total AMF (polluted)” for 2025-10-11 to 2025-10-12

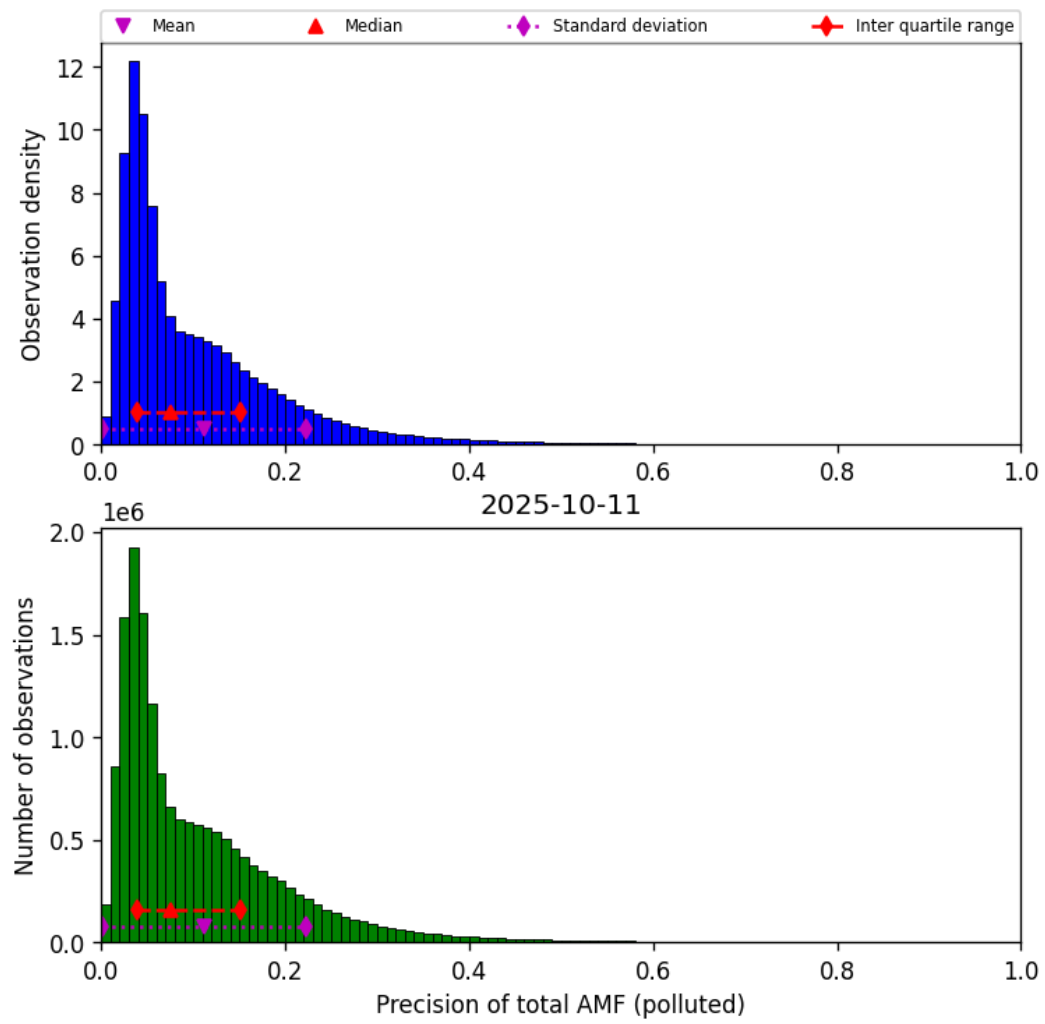


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-10-11 to 2025-10-12

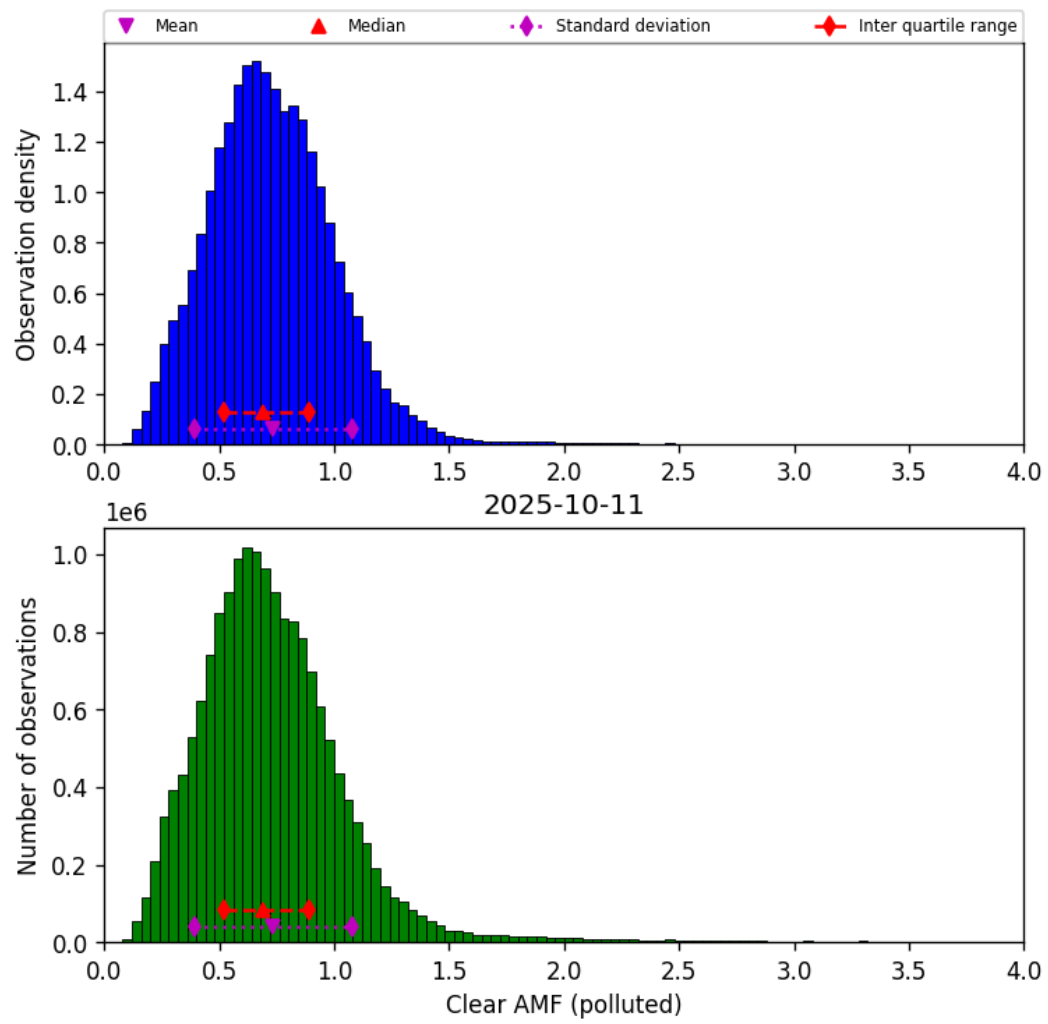


Figure 82: Histogram of "Clear AMF (polluted)" for 2025-10-11 to 2025-10-12

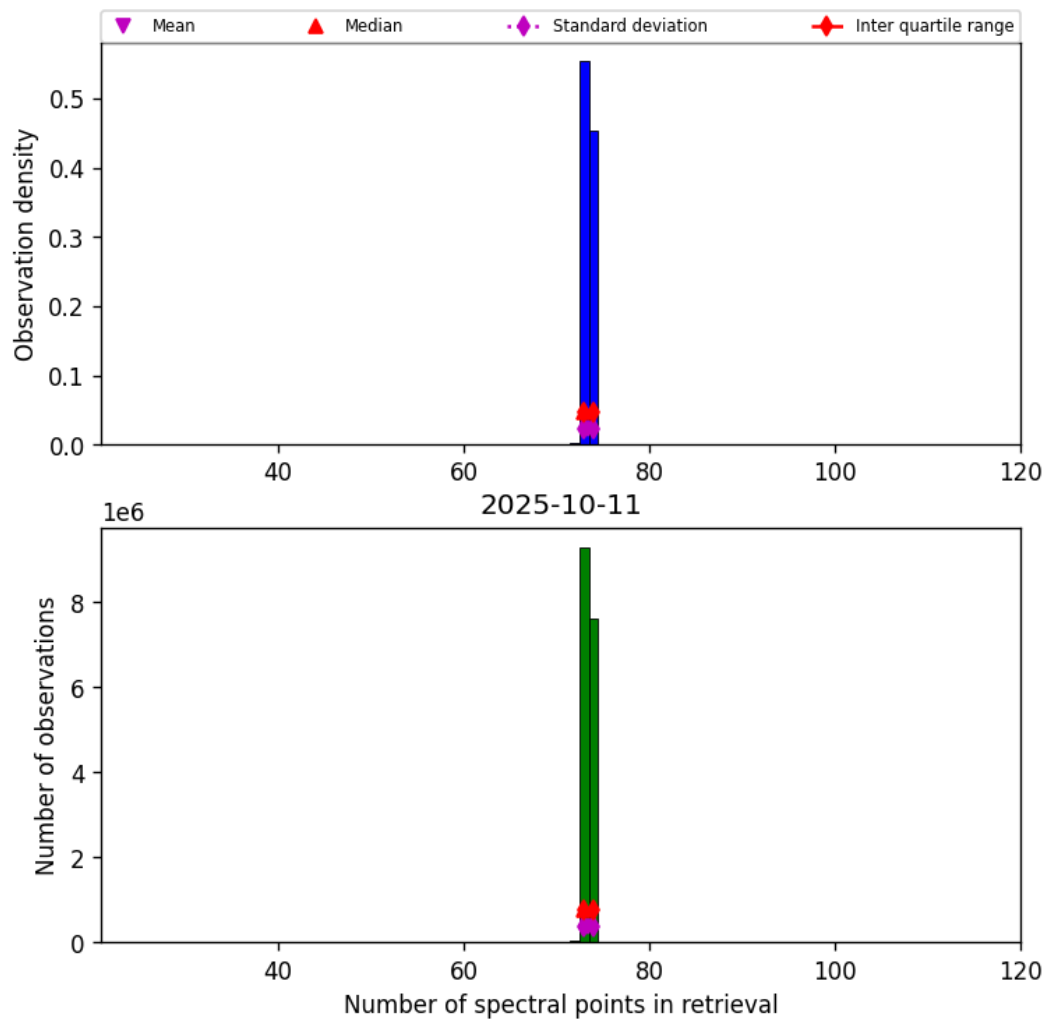


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-10-11 to 2025-10-12

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.

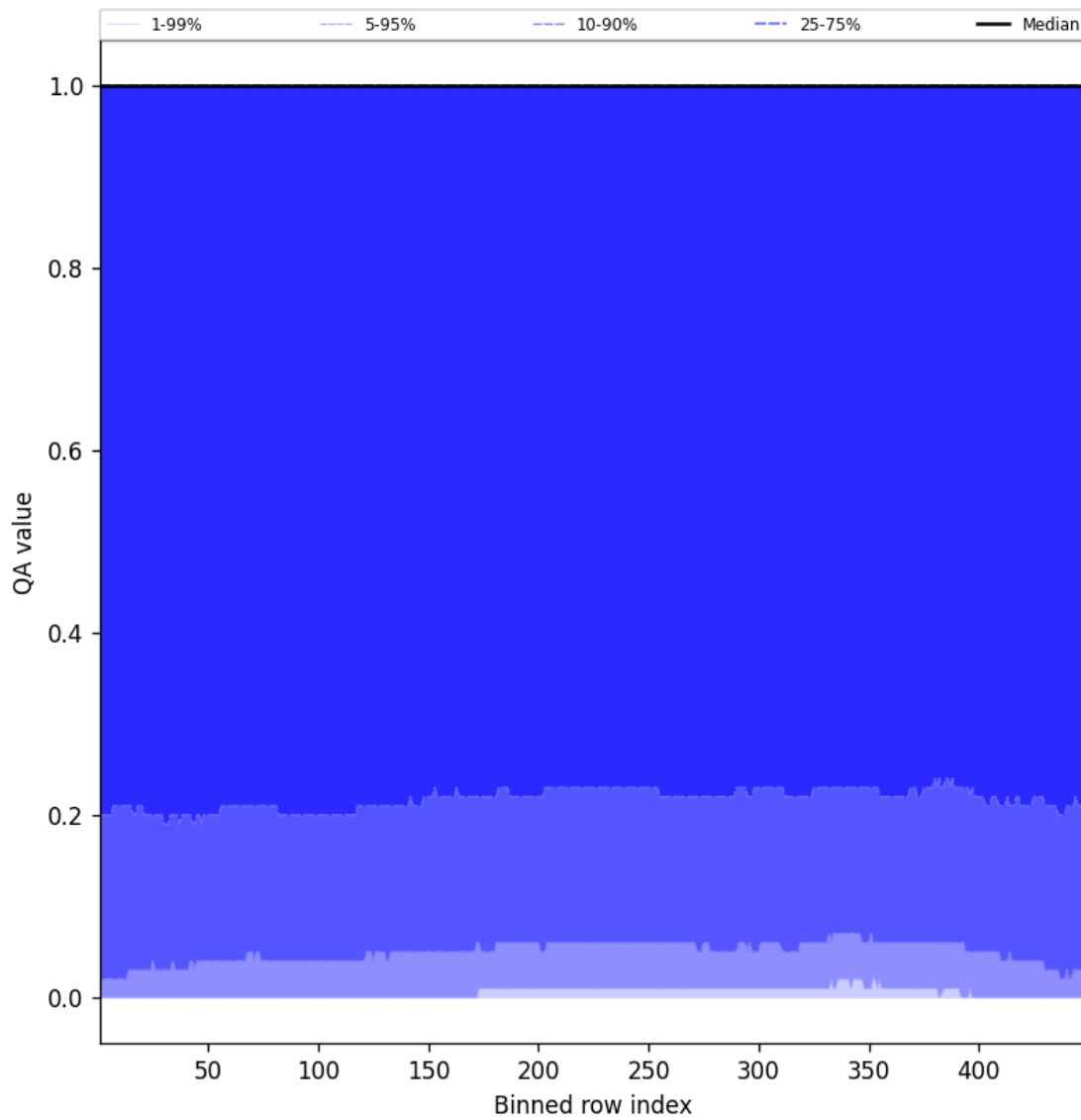


Figure 84: Along track statistics of “QA value” for 2025-10-11 to 2025-10-12

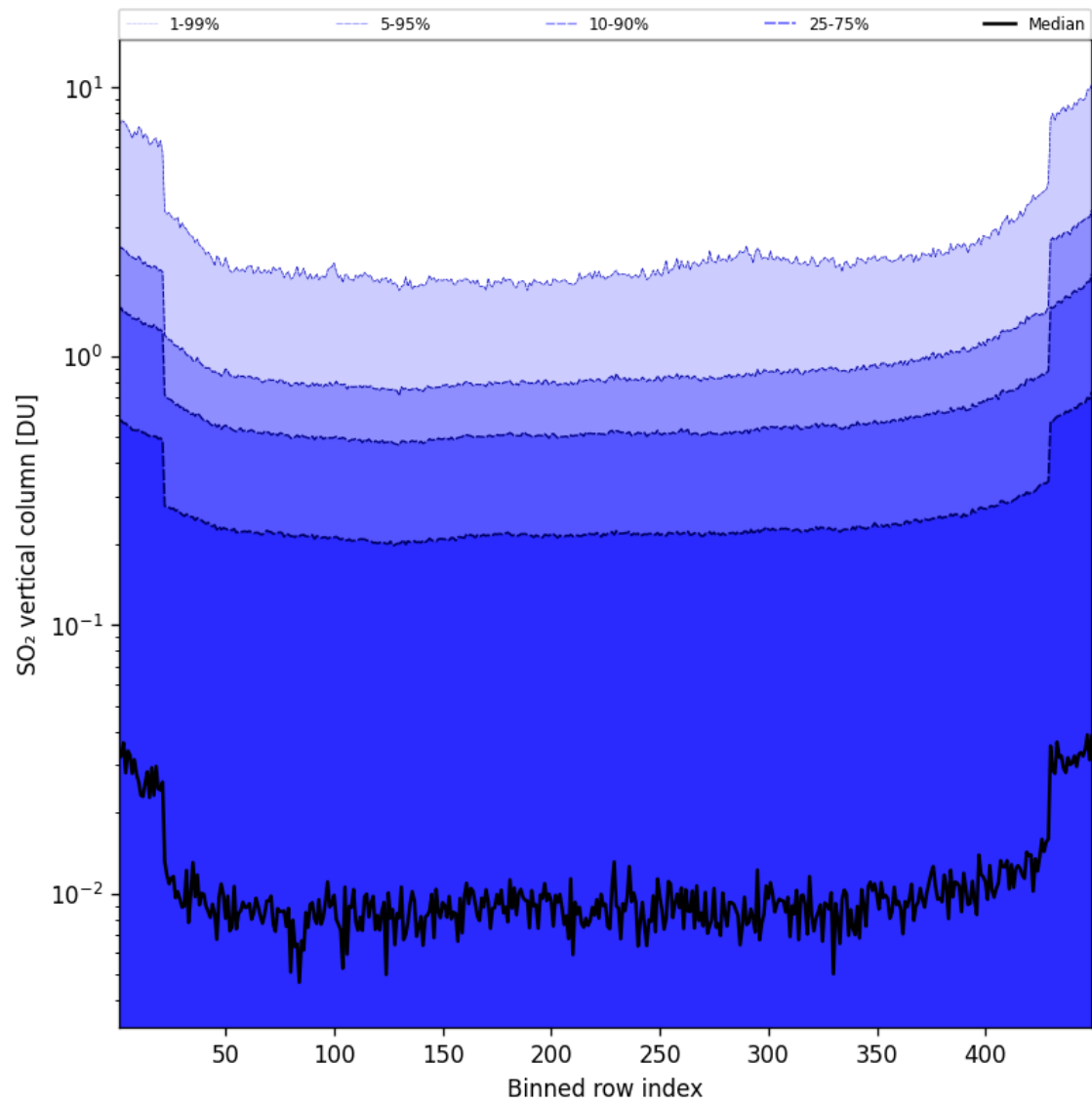


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-10-11 to 2025-10-12

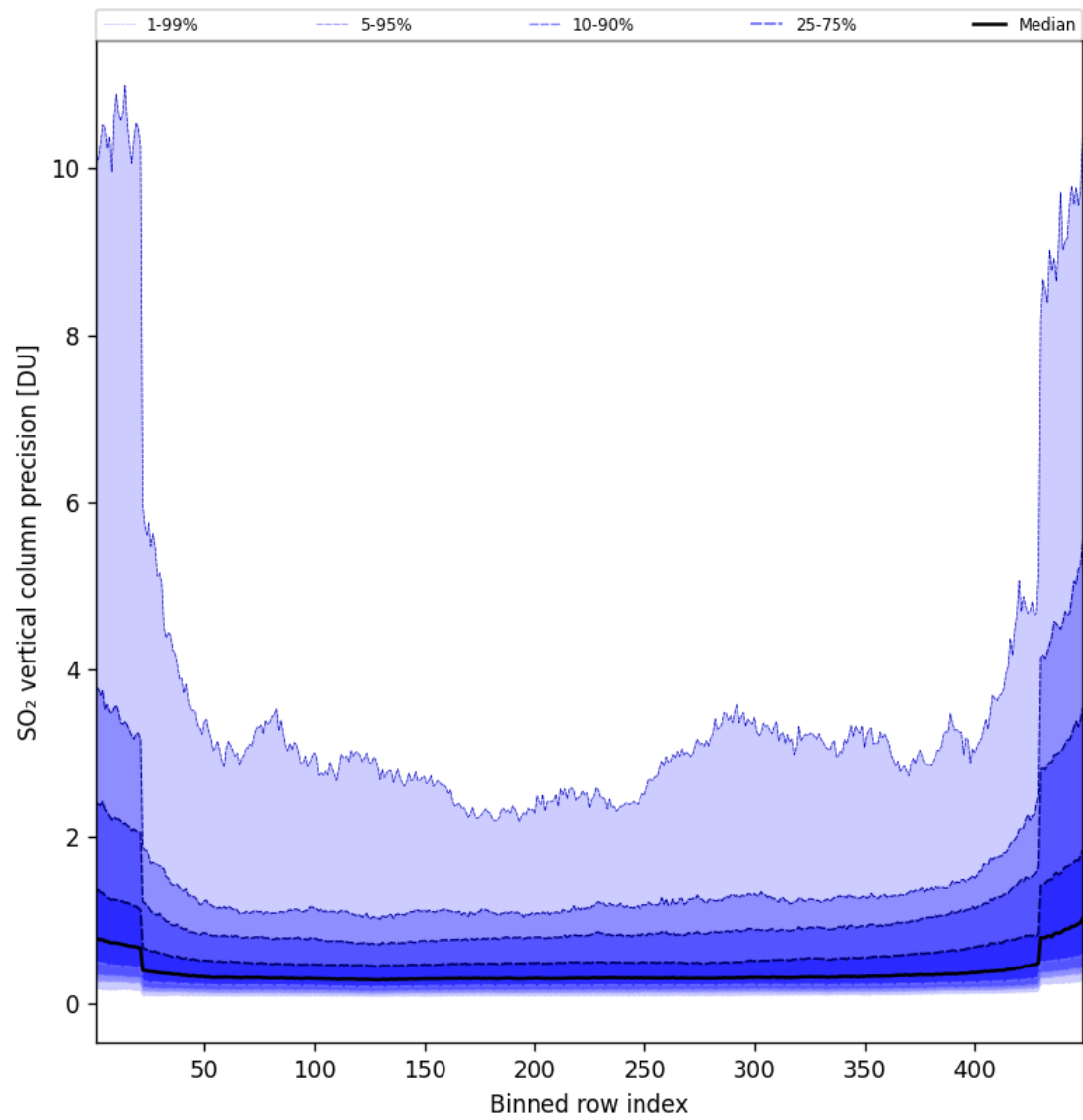


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-10-11 to 2025-10-12

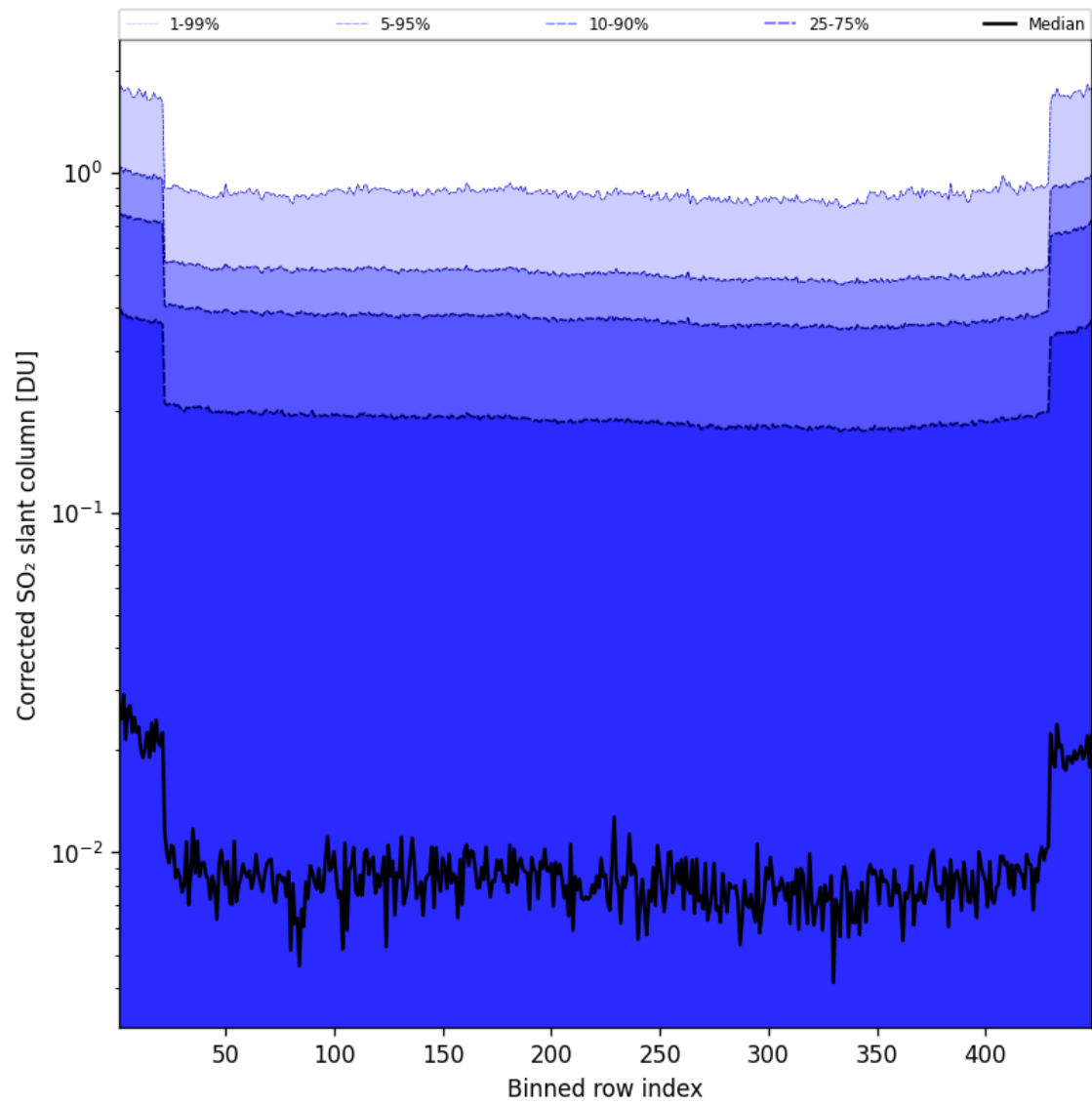


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-10-11 to 2025-10-12

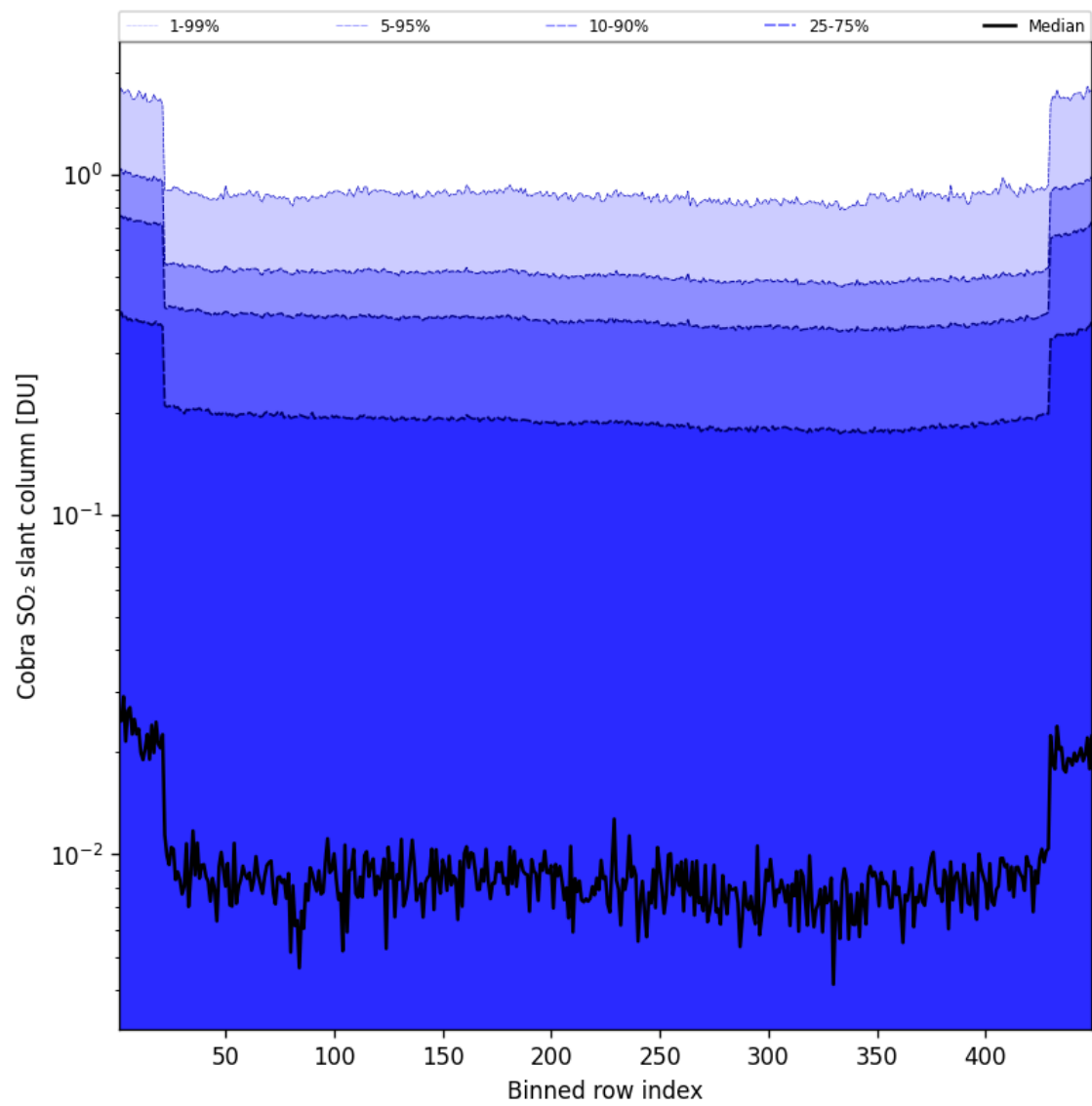


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-10-11 to 2025-10-12

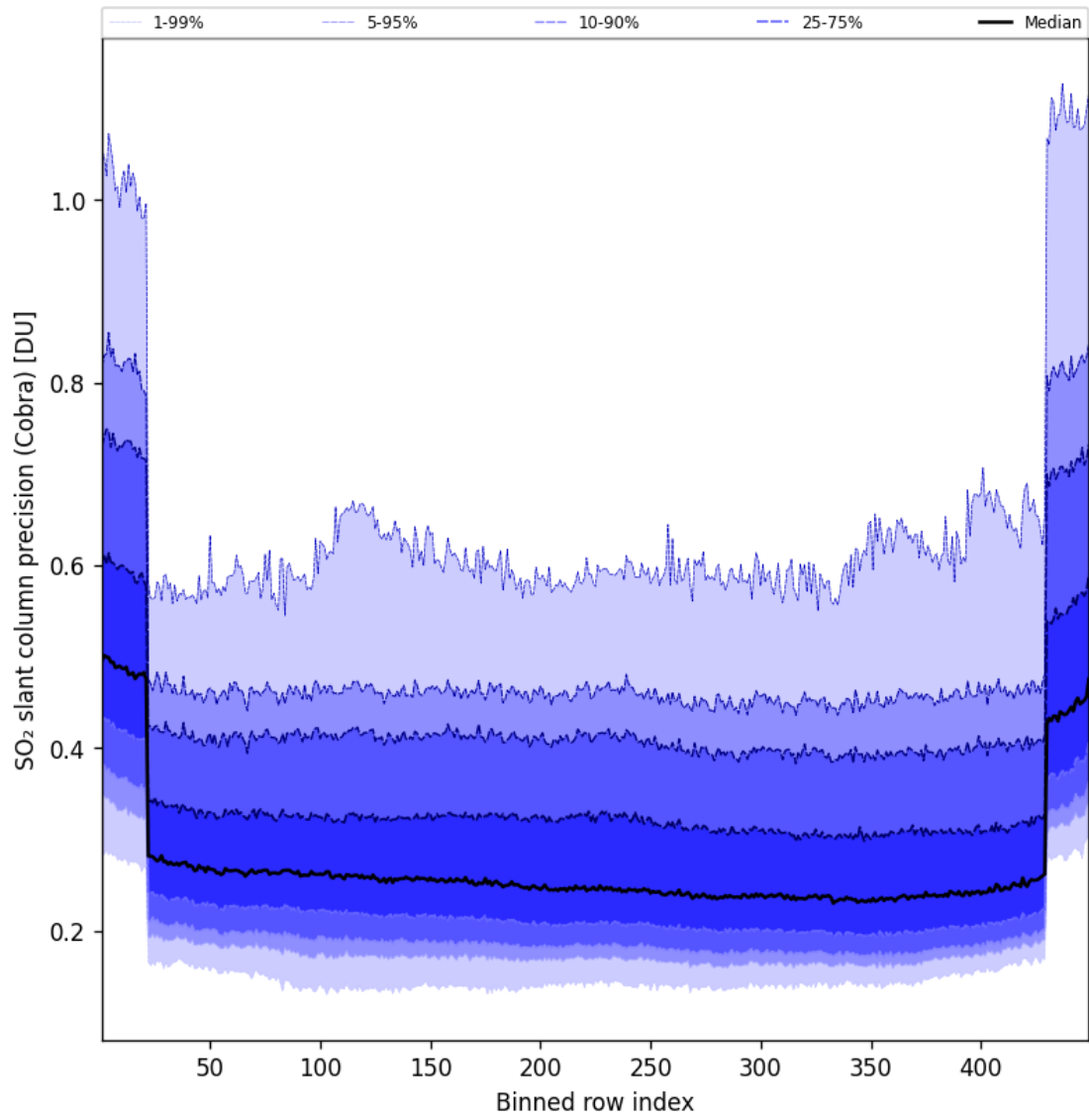


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-10-11 to 2025-10-12

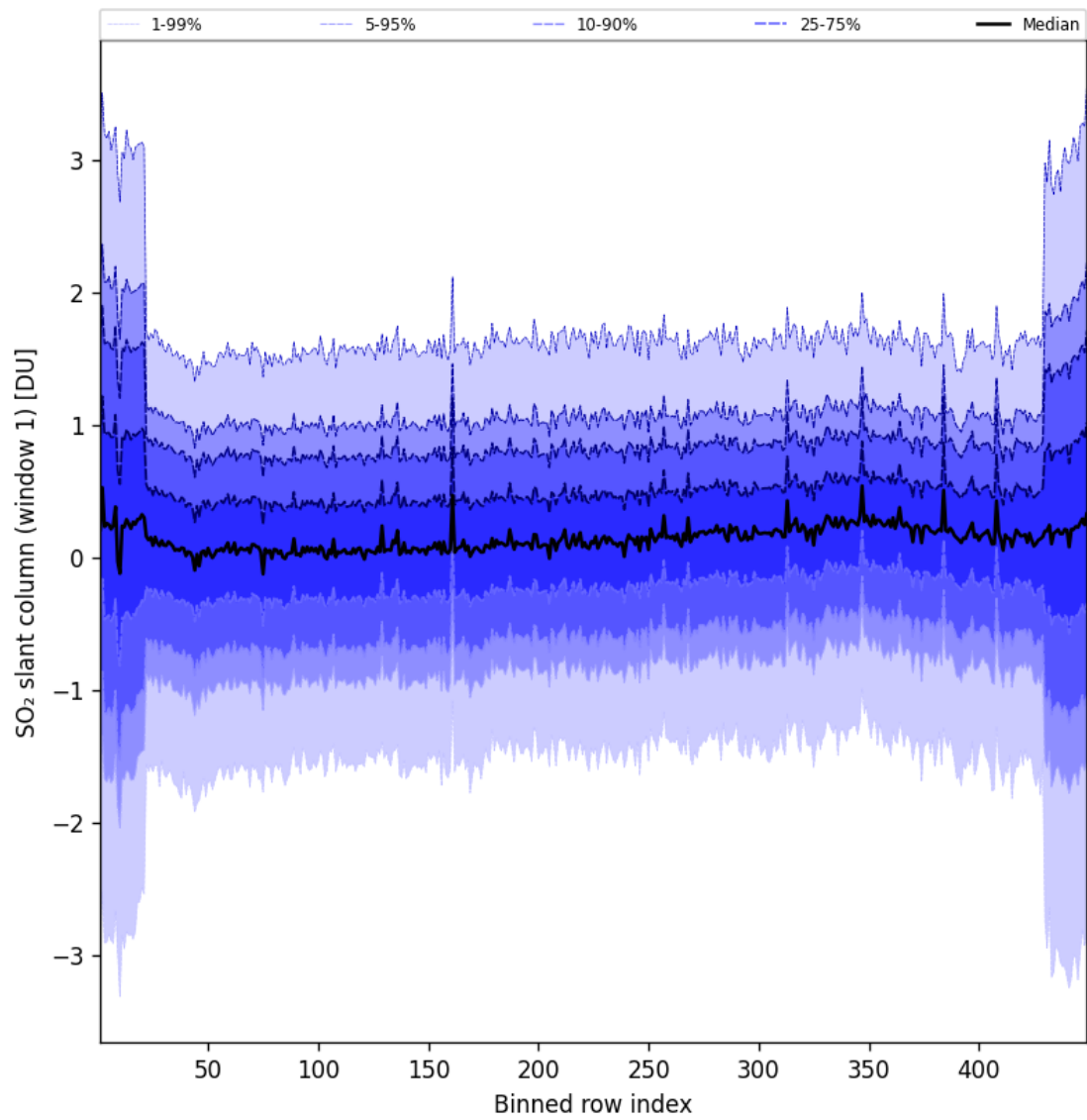


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-10-11 to 2025-10-12

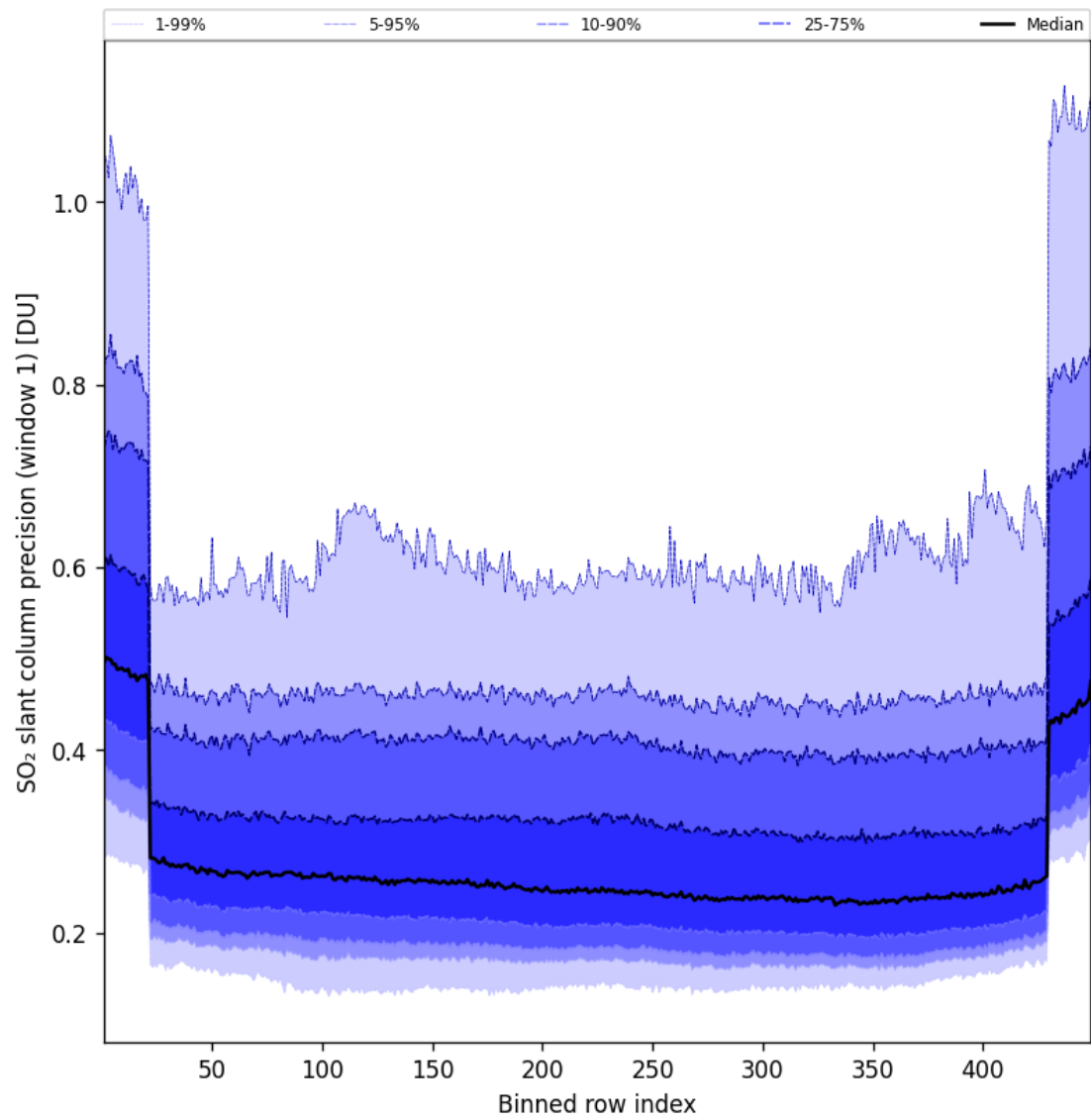


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-10-11 to 2025-10-12

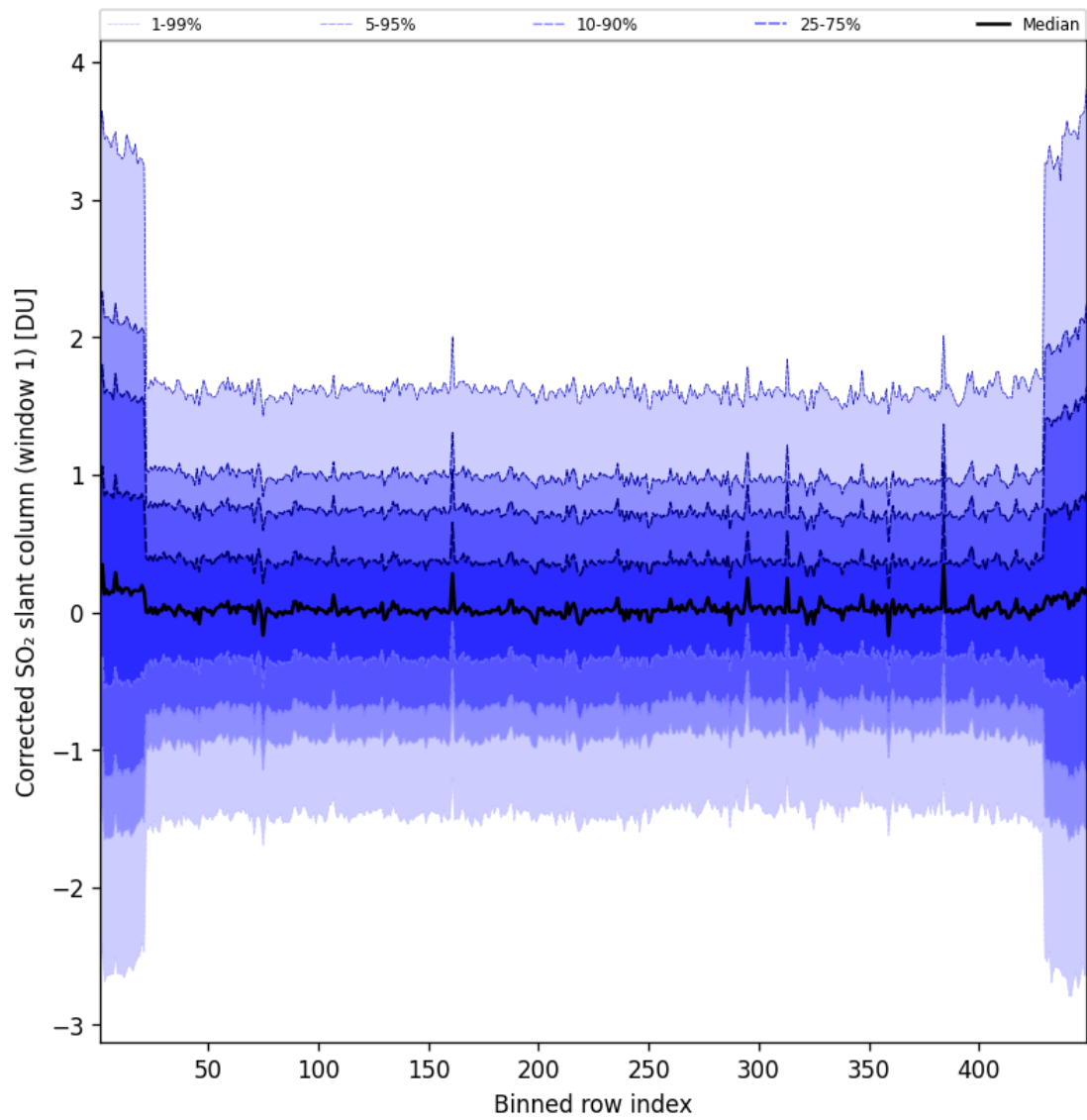


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-10-11 to 2025-10-12

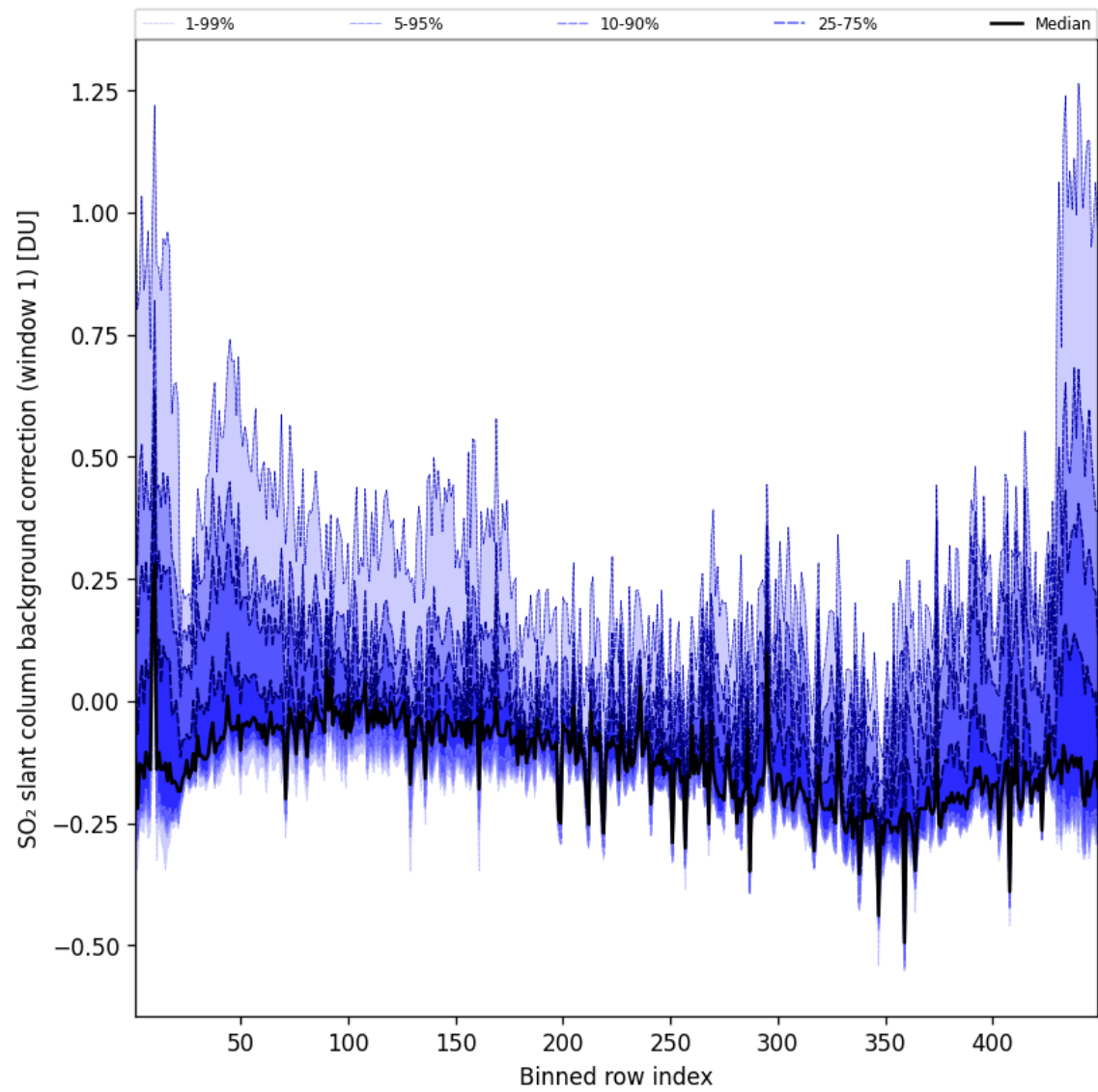


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-10-11 to 2025-10-12

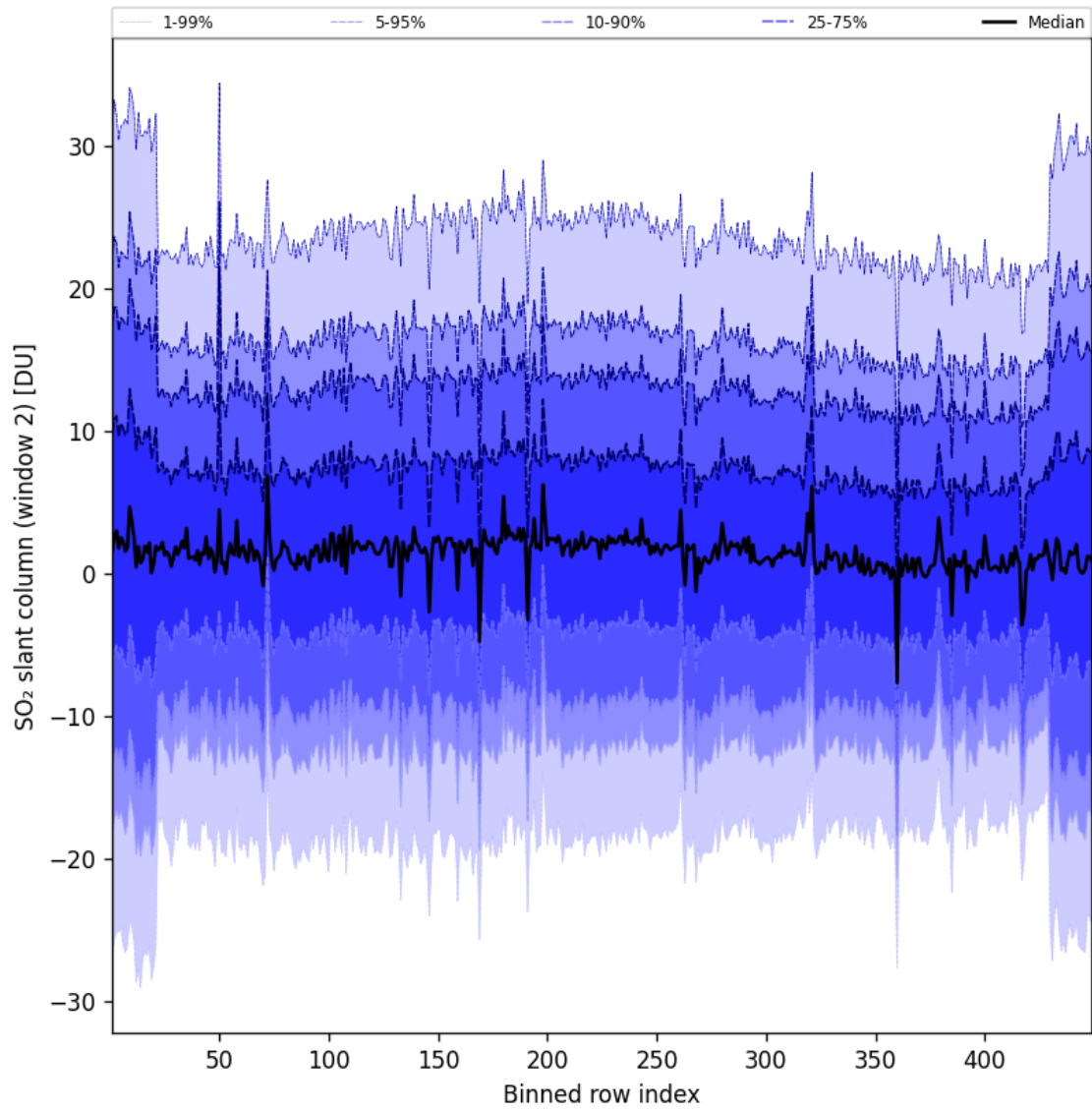


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-10-11 to 2025-10-12

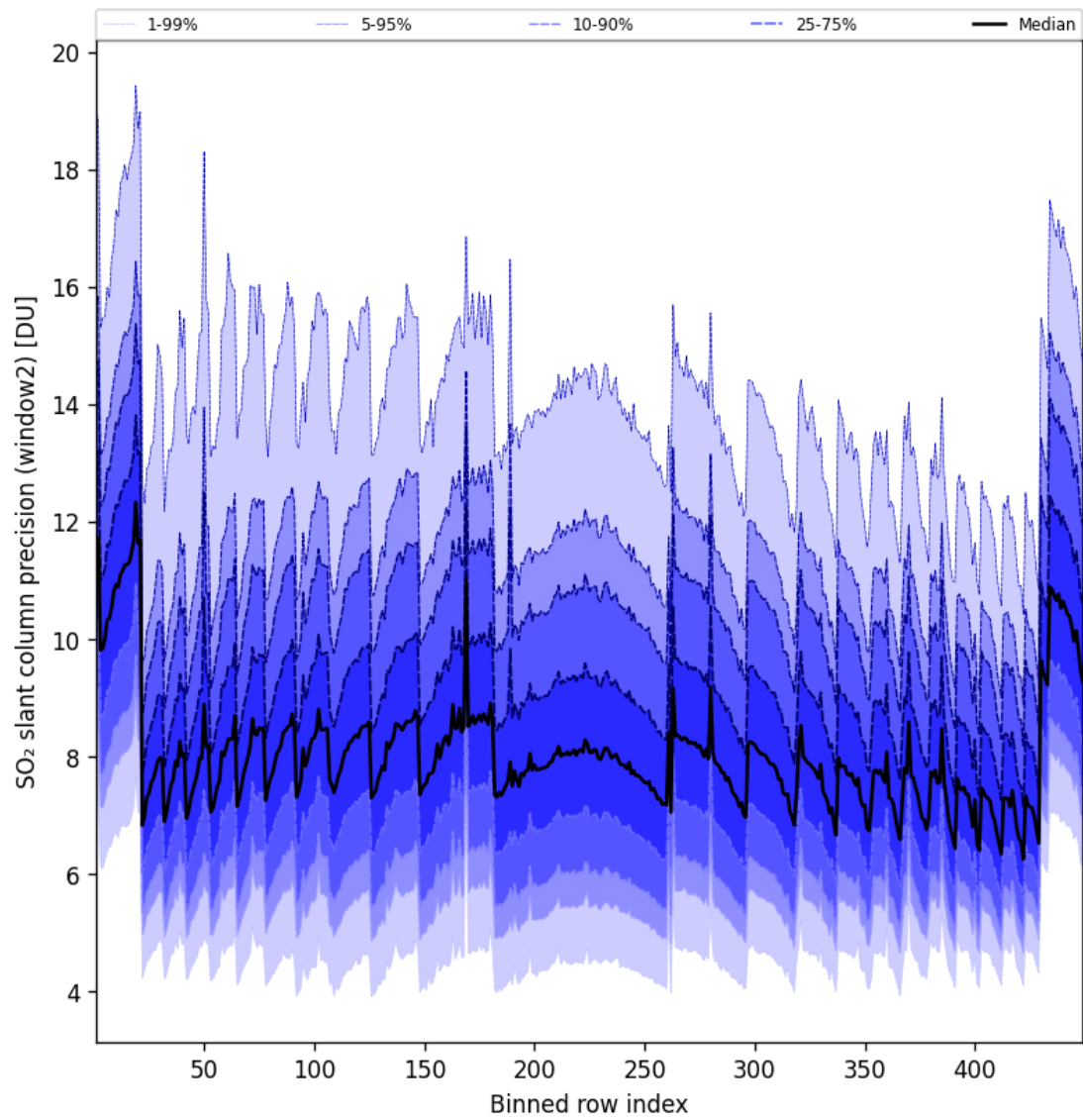


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-10-11 to 2025-10-12

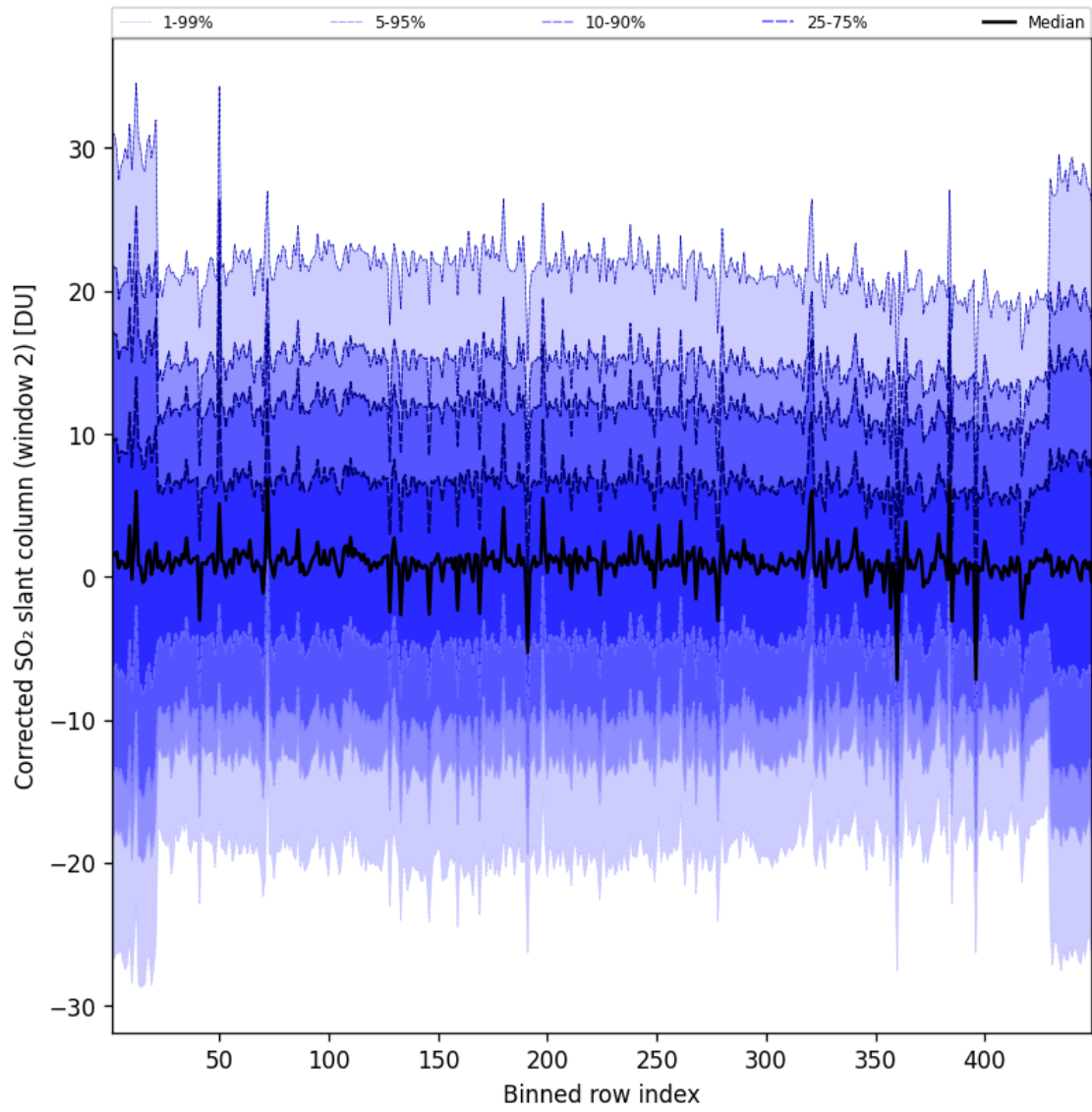


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-10-11 to 2025-10-12

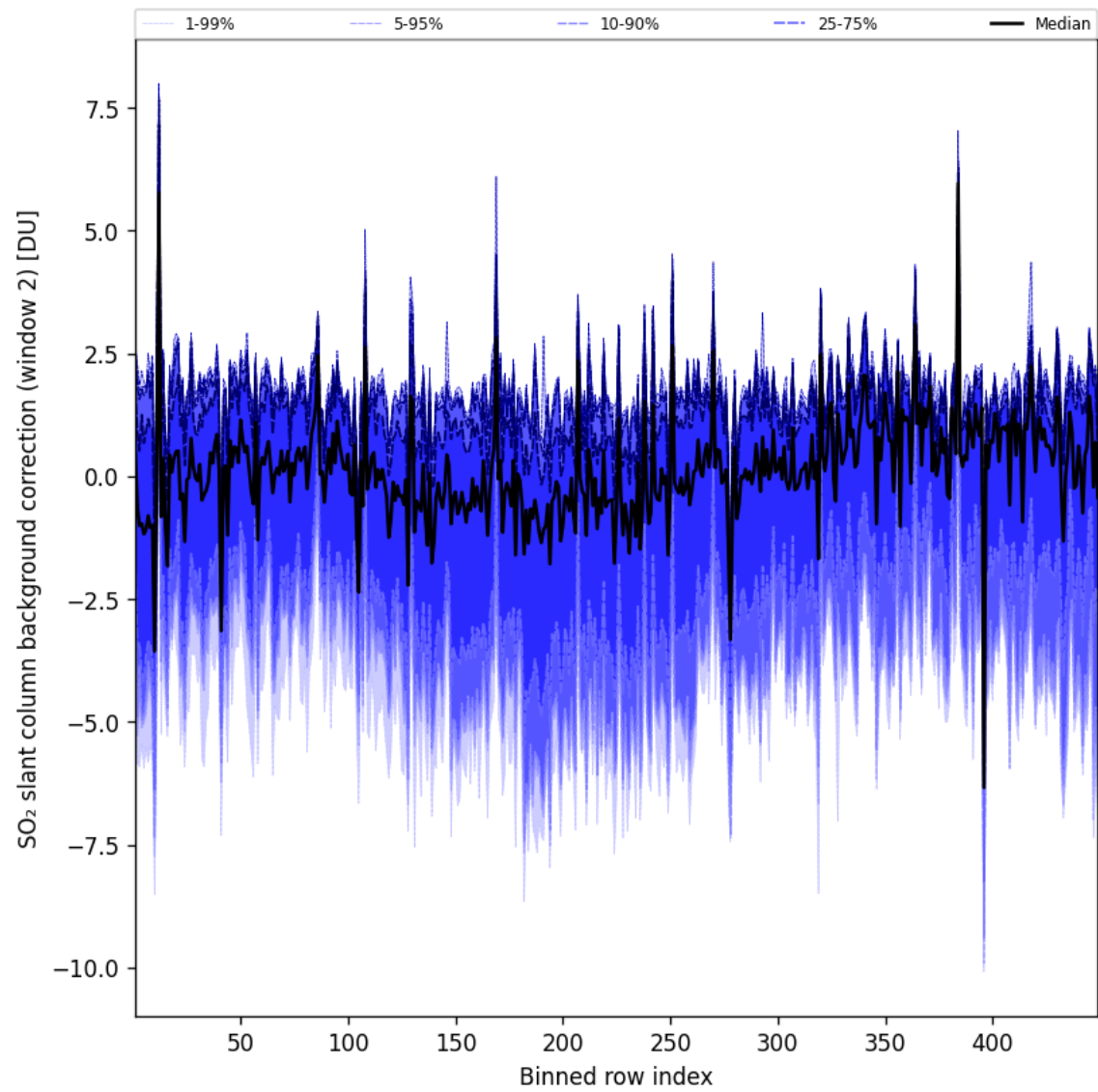


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-10-11 to 2025-10-12

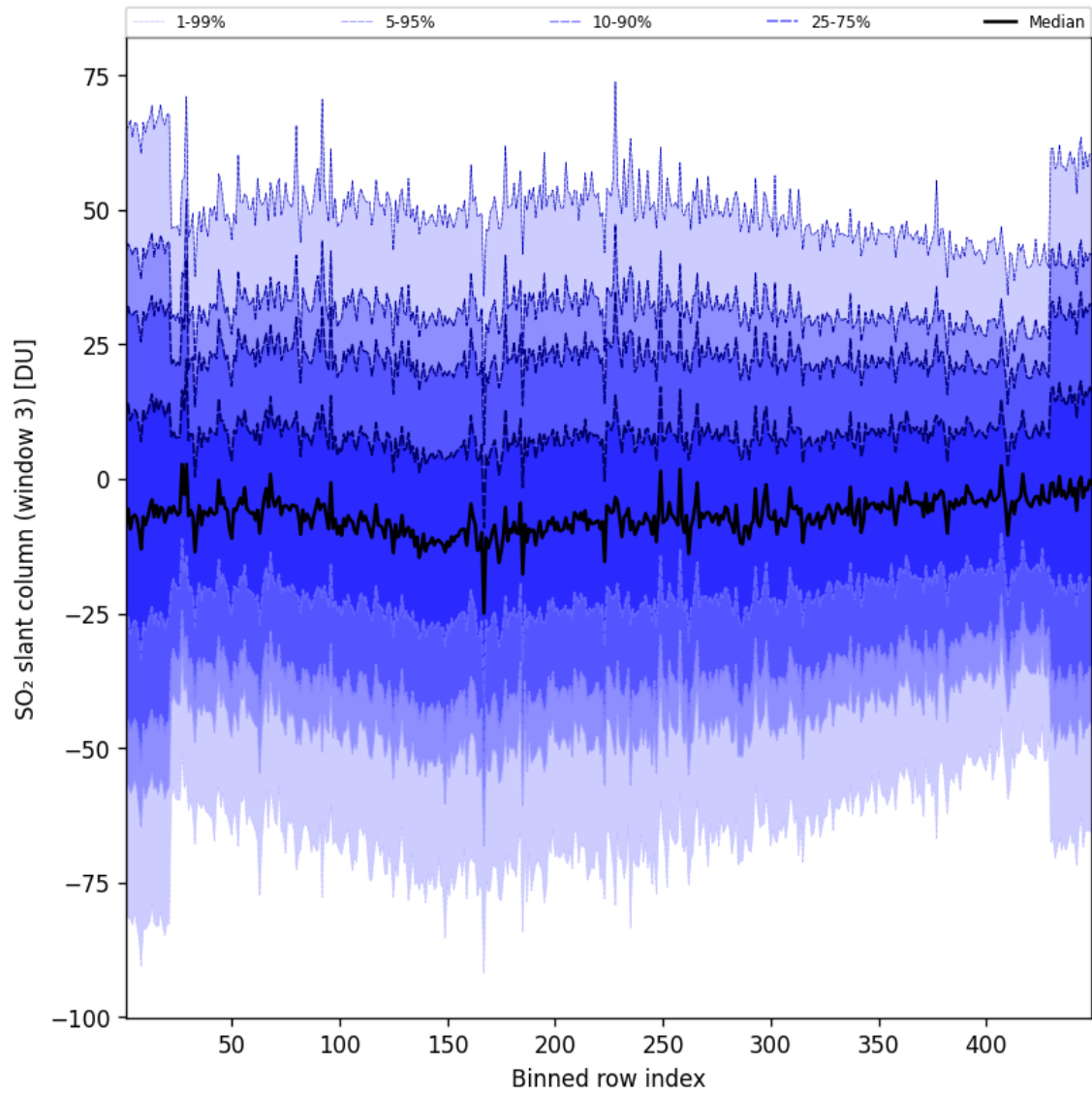


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-10-11 to 2025-10-12

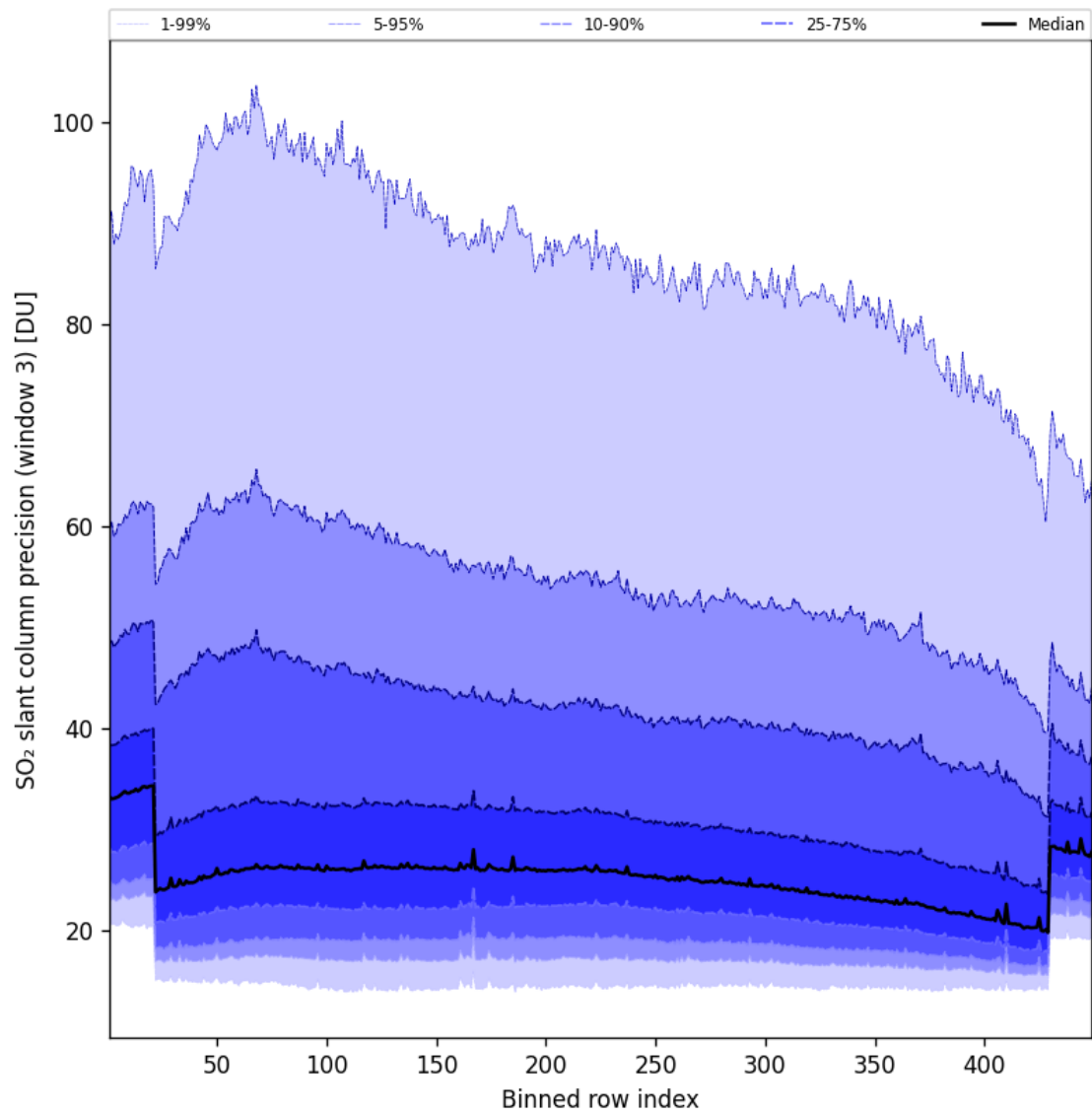


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-10-11 to 2025-10-12

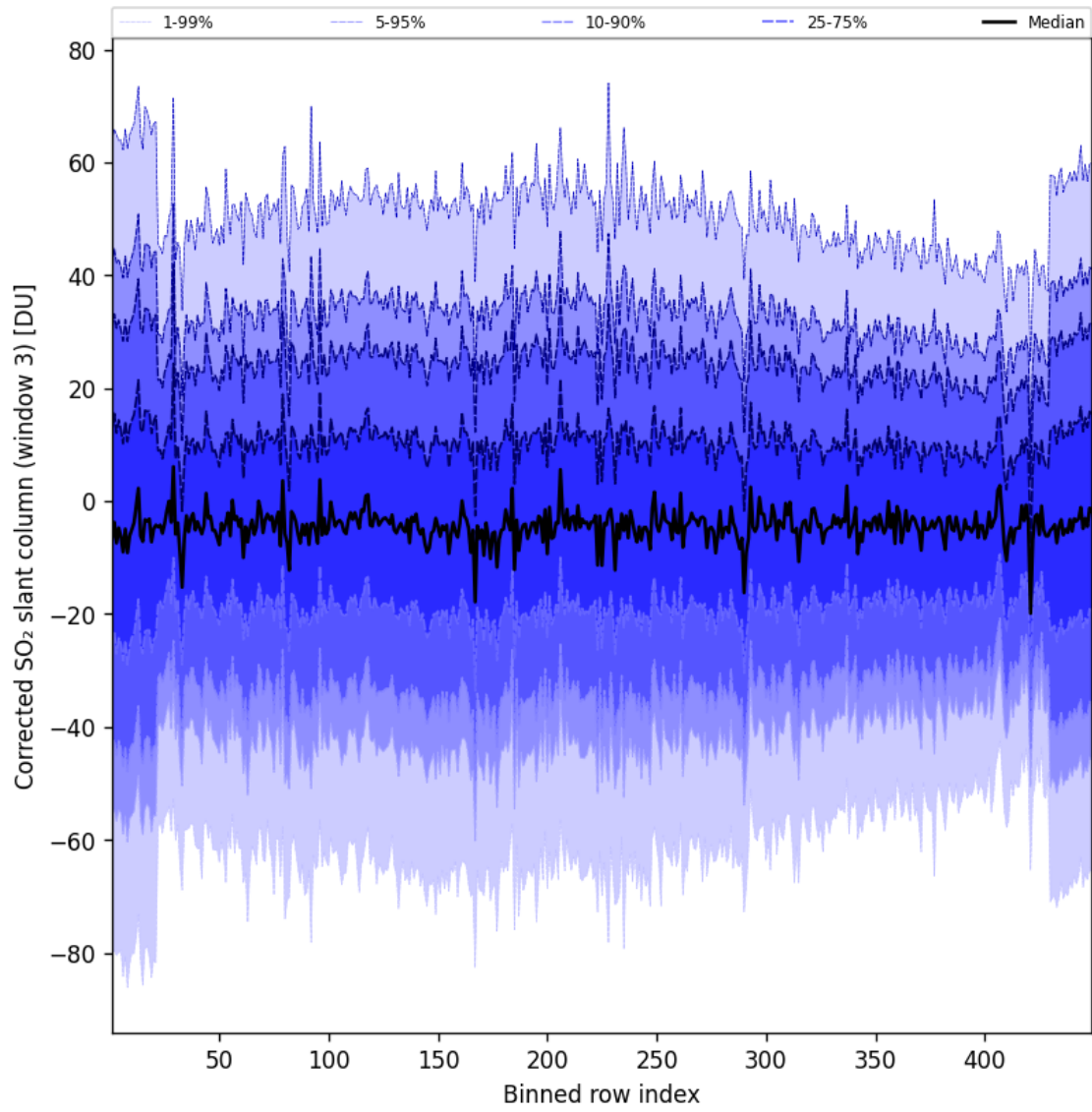


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-10-11 to 2025-10-12

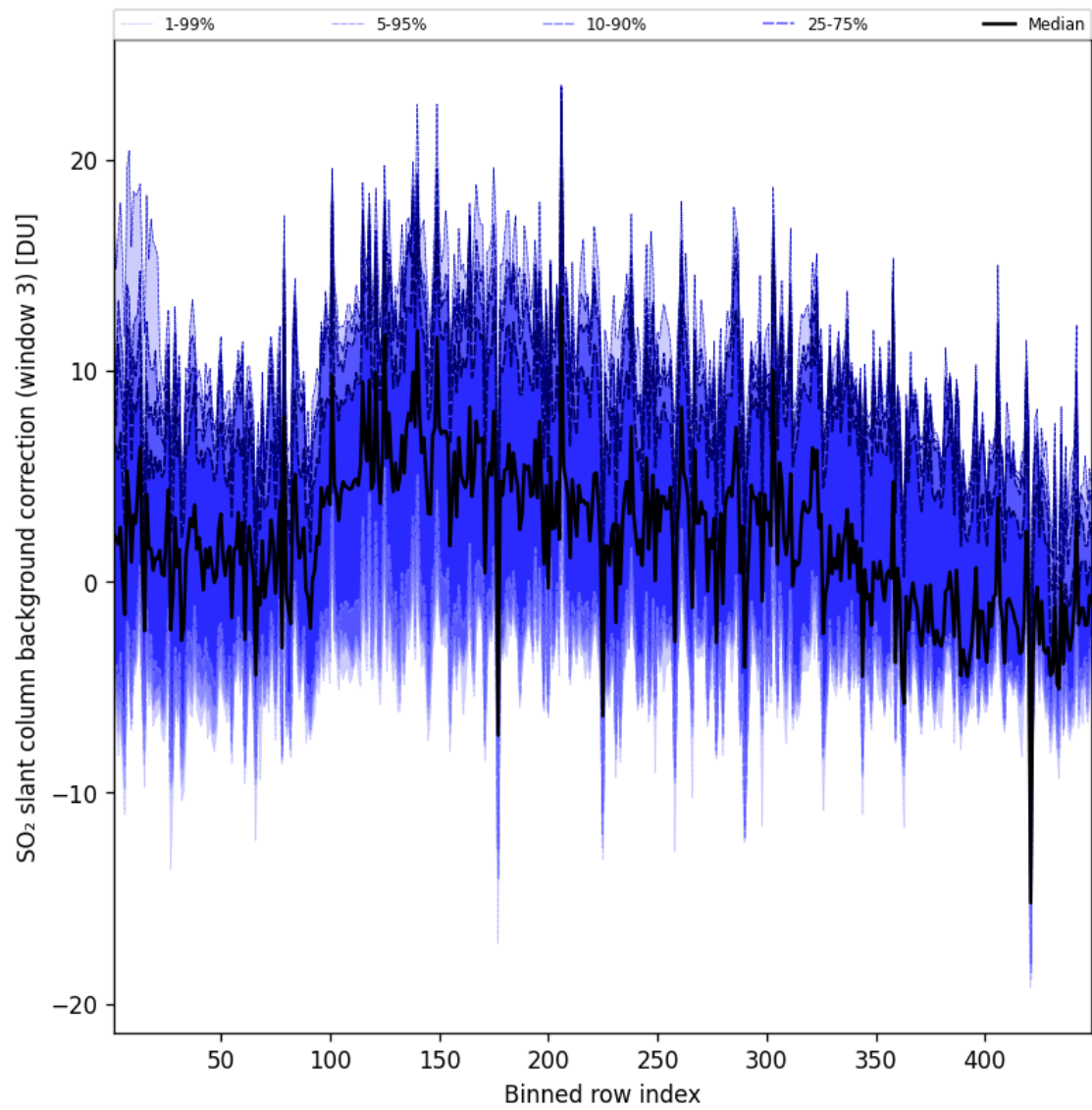


Figure 101: Along track statistics of "SO₂ slant column background correction (window 3)" for 2025-10-11 to 2025-10-12

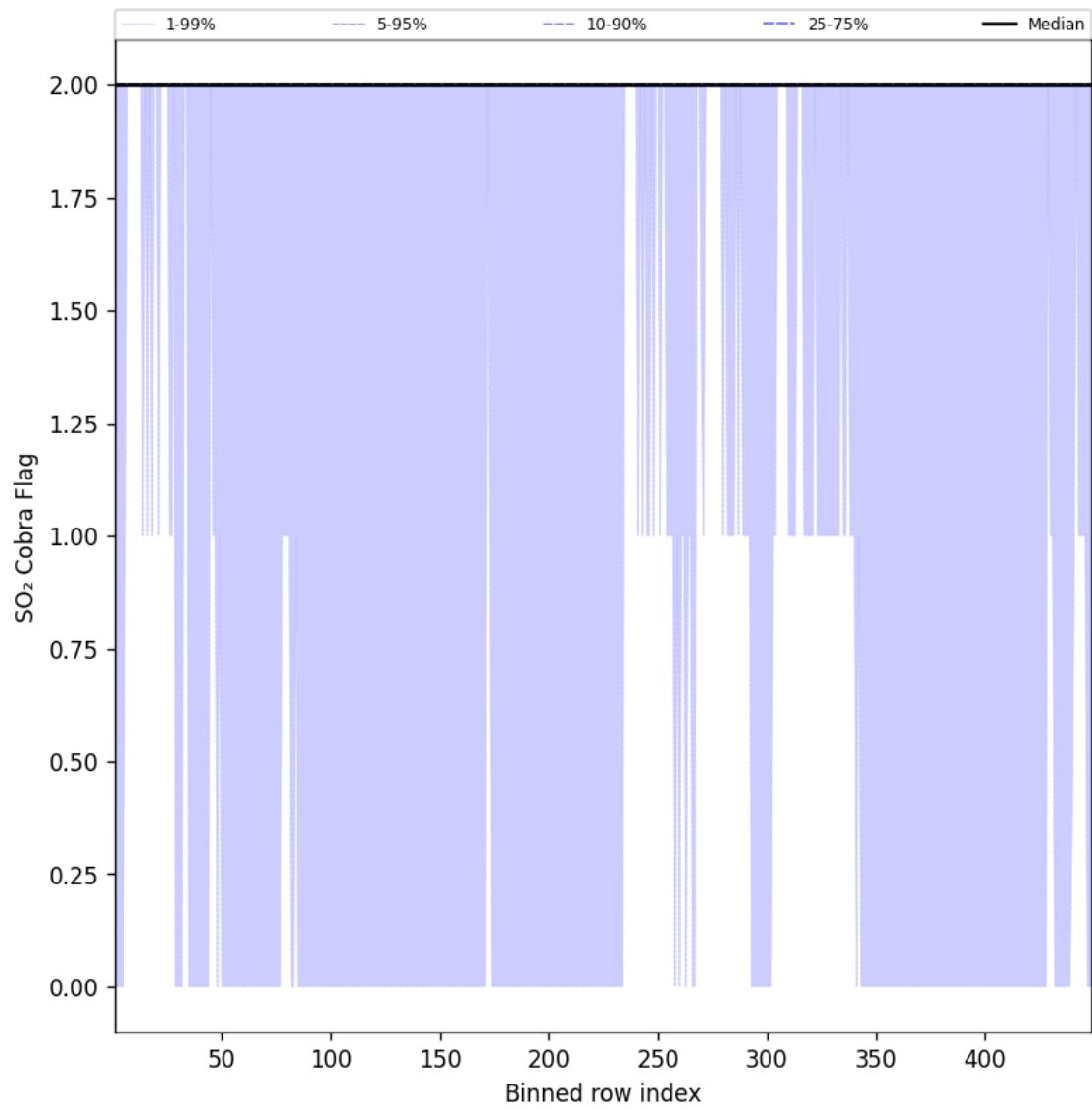


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-10-11 to 2025-10-12

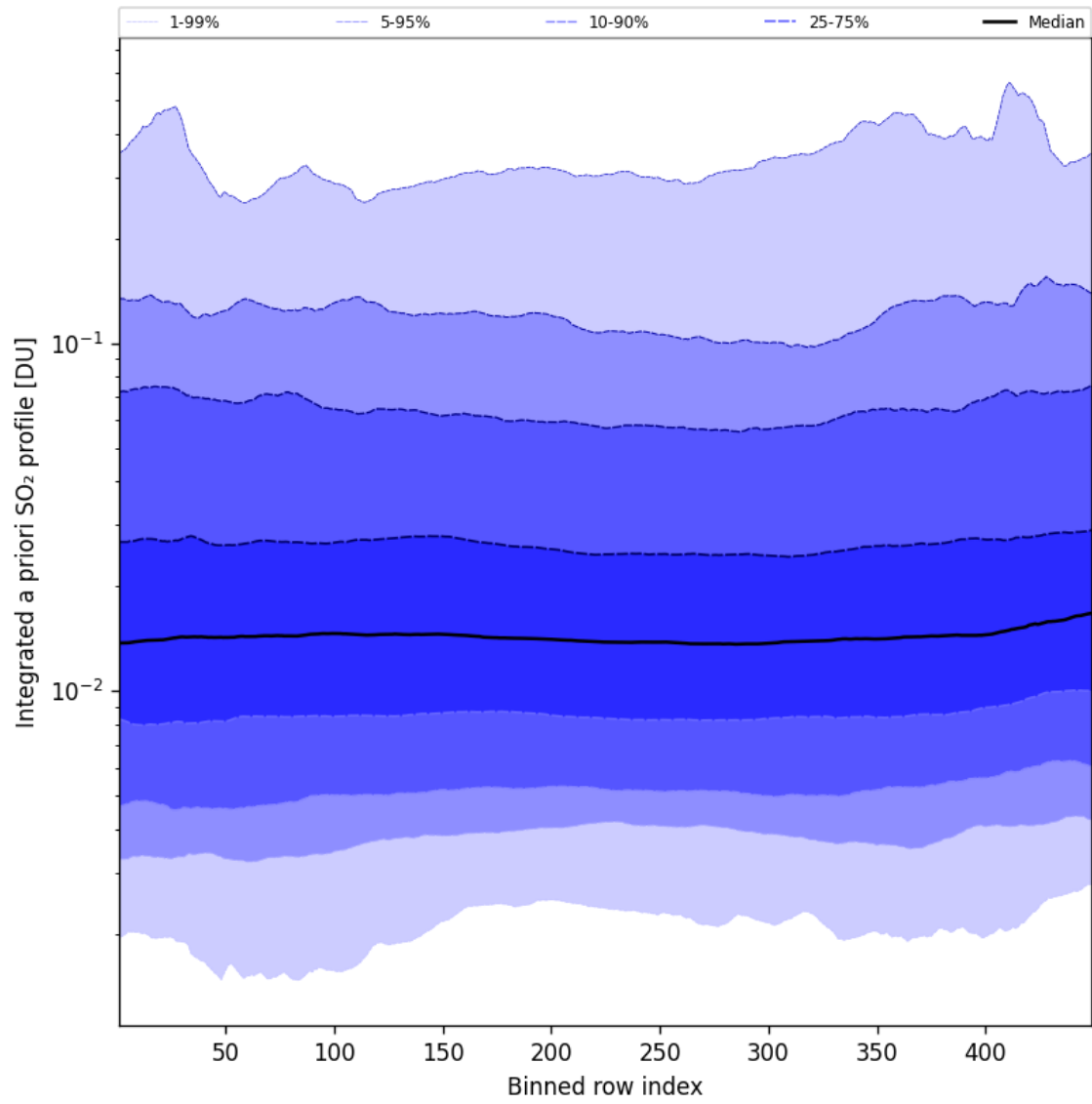


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-10-11 to 2025-10-12

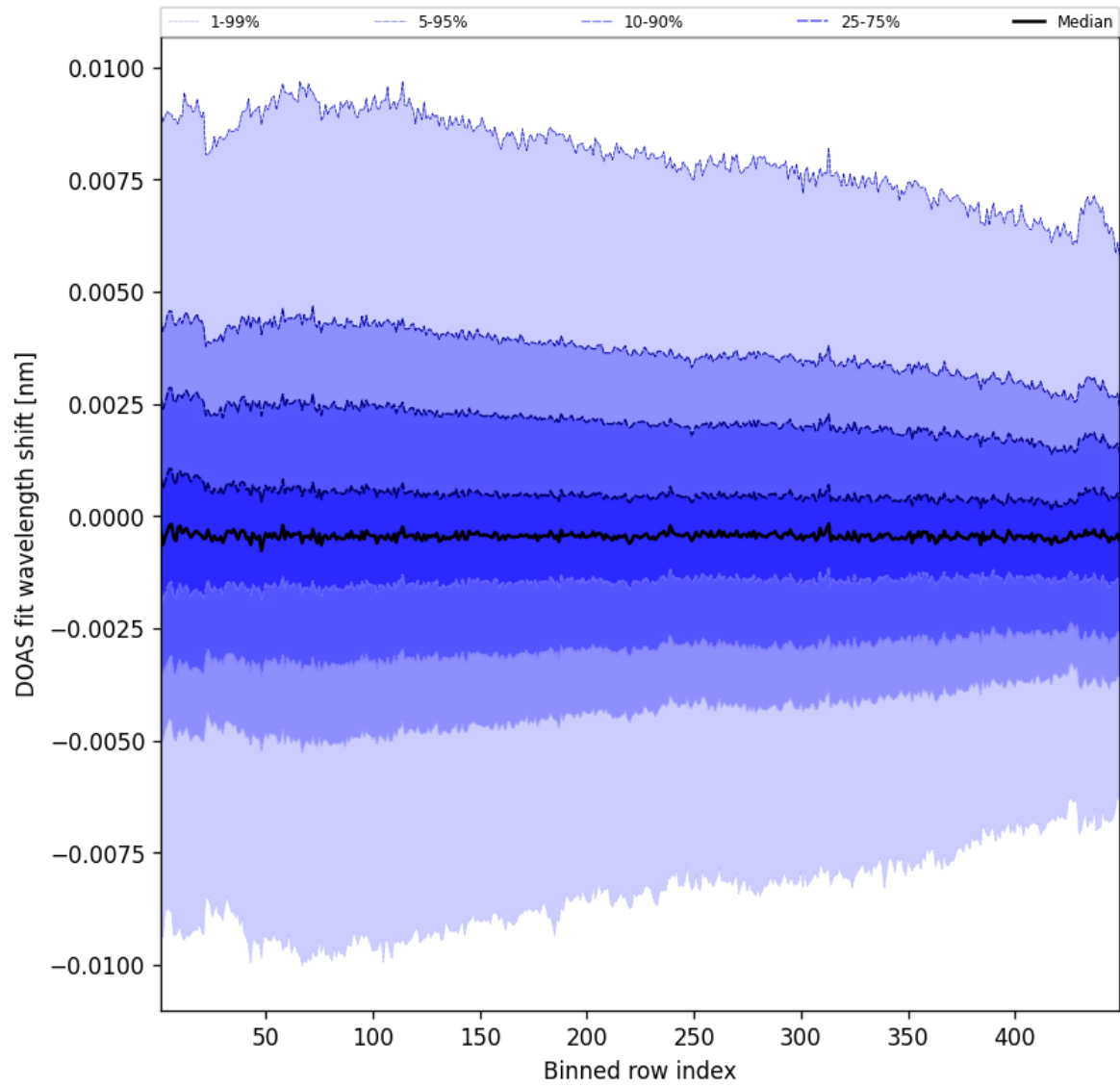


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-10-11 to 2025-10-12

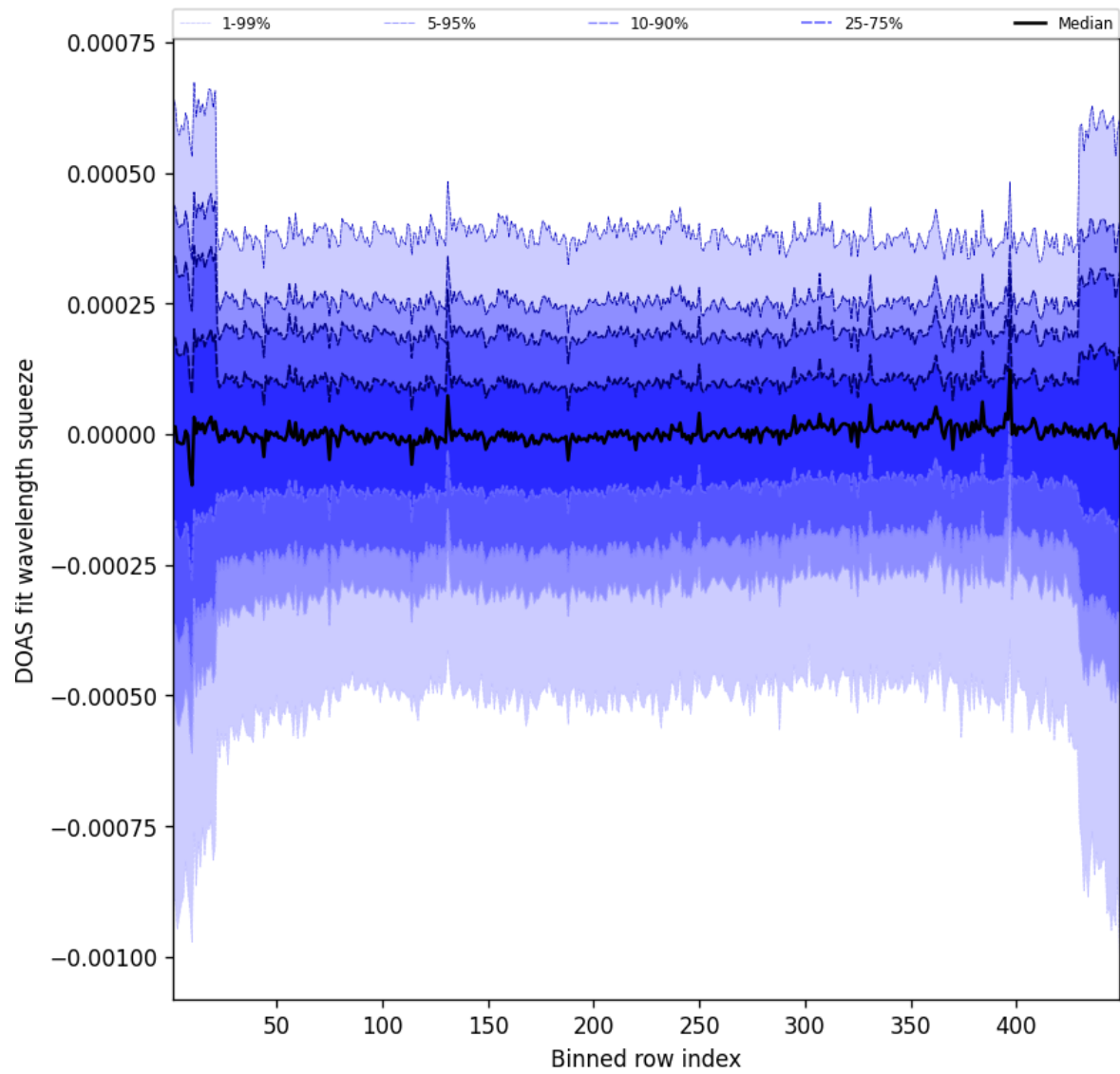


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-10-11 to 2025-10-12

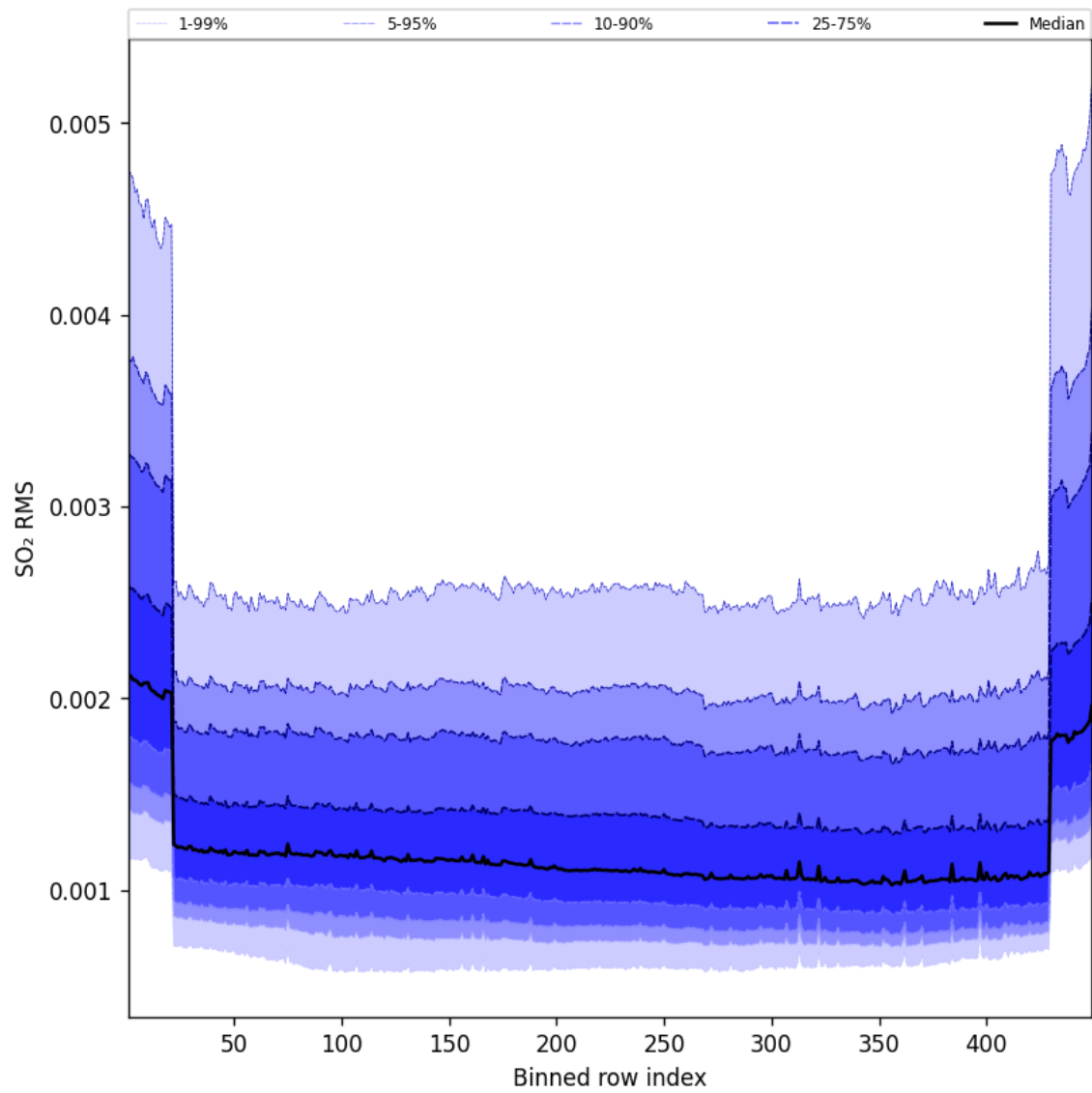


Figure 106: Along track statistics of “SO₂ RMS” for 2025-10-11 to 2025-10-12

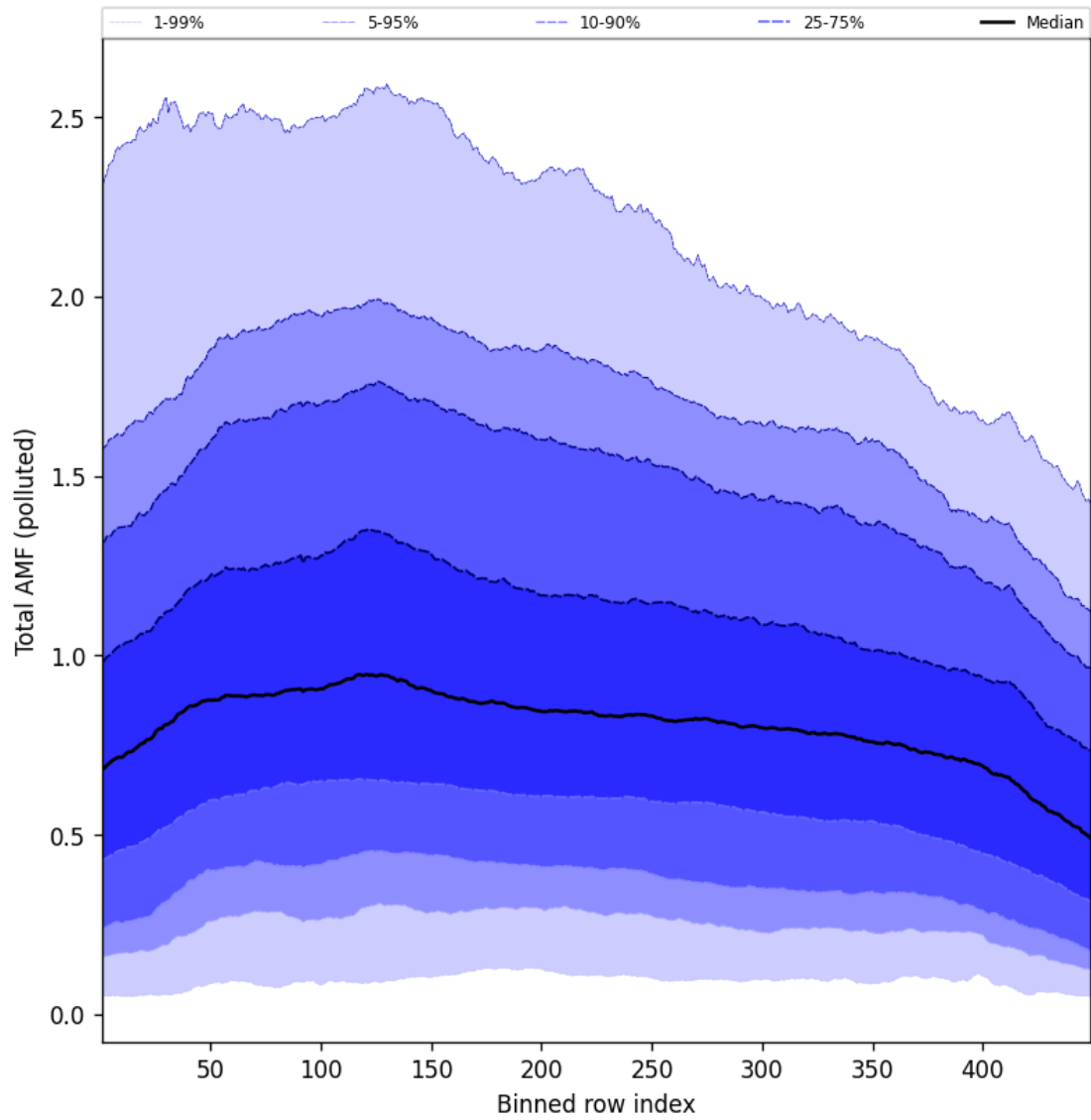


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-10-11 to 2025-10-12

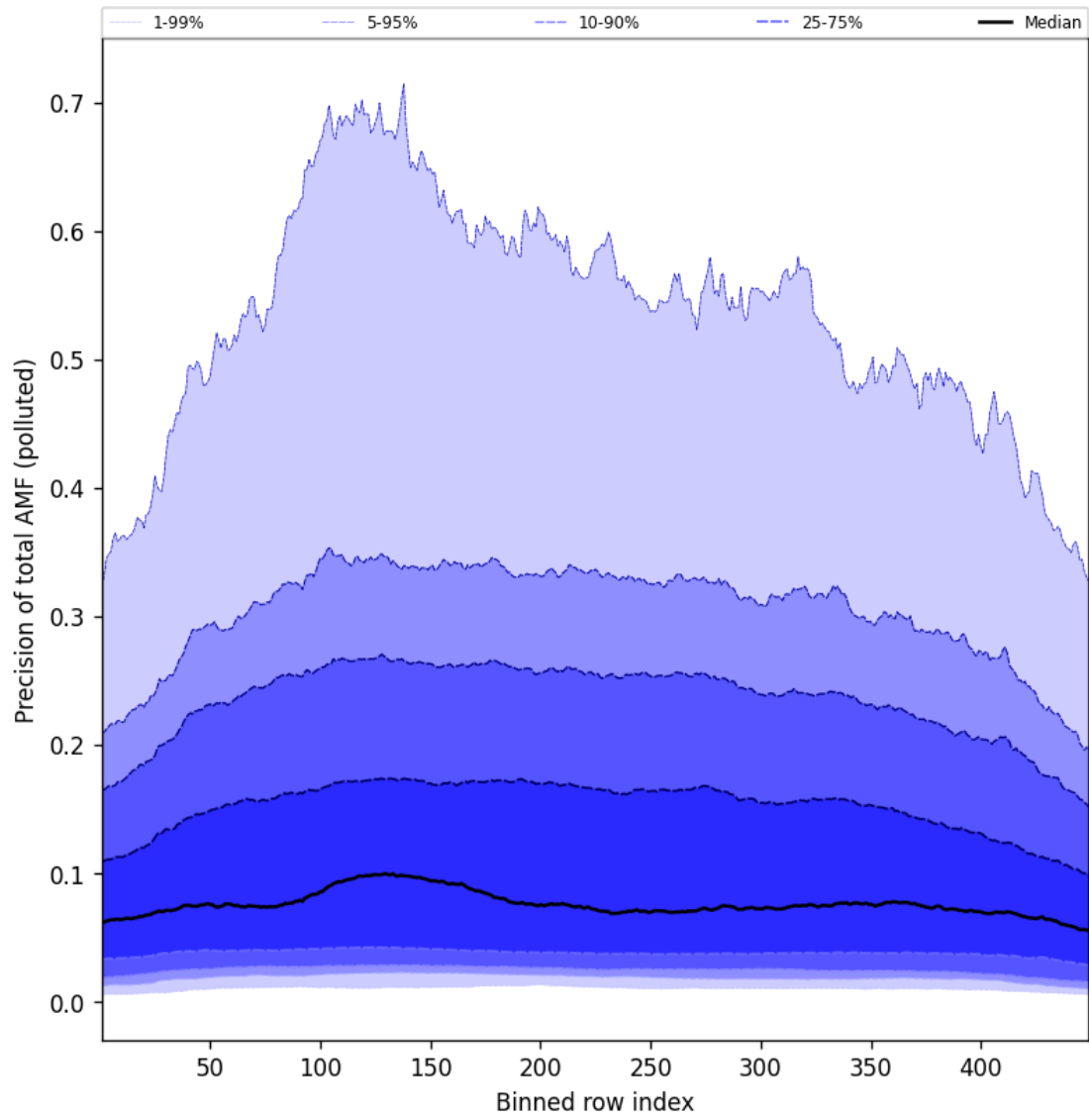


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-10-11 to 2025-10-12

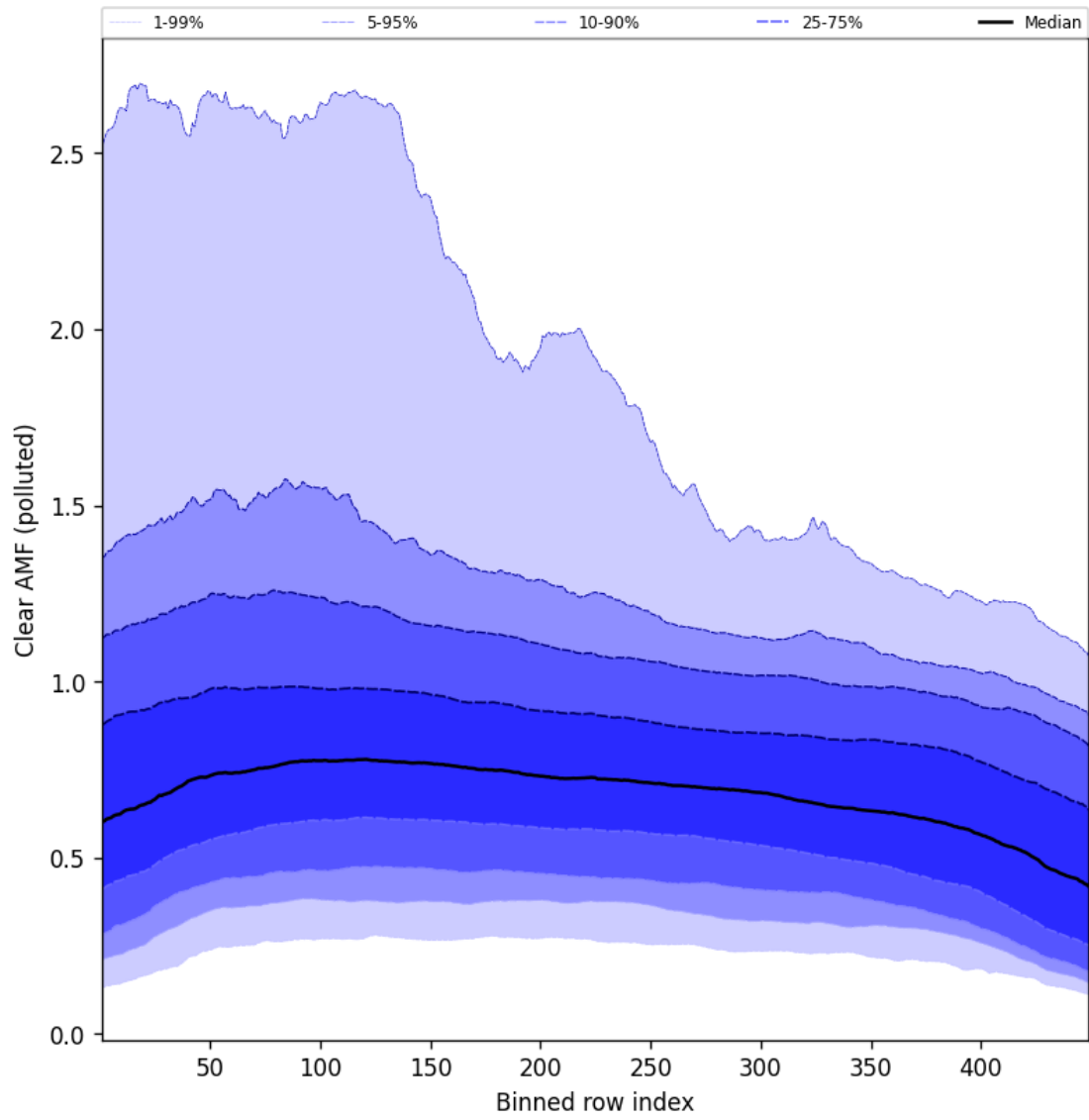


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-10-11 to 2025-10-12

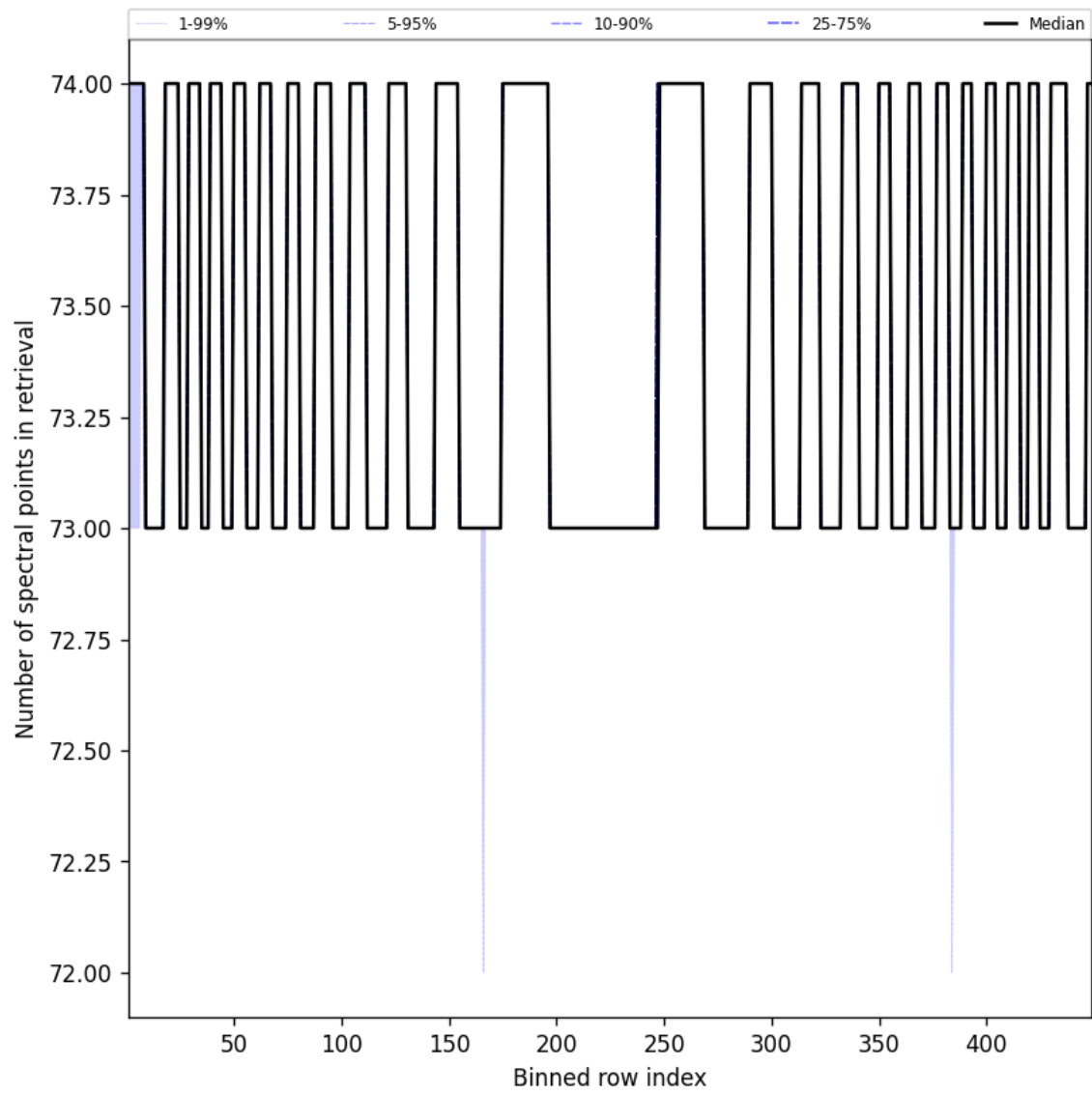


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-10-11 to 2025-10-12

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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Maarten Sneep (maarten.sneep@knmi.nl).