

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]	0.667 ± 0.406	16994038	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.143 \pm 107.797) \times 10^{-2}$	16994038	0.278	0.478	1.066×10^{-2}	-90.4	120
sulfurdioxide total vertical column precision [DU]	0.568 ± 0.772	16994038	0.222	0.393	0.347	2.963×10^{-2}	128
sulfurdioxide slant column density corrected [DU]	$(1.748 \pm 36.473) \times 10^{-2}$	16994038	0.276	0.375	9.256×10^{-3}	-20.4	104
sulfurdioxide slant column density cobra [DU]	$(1.743 \pm 36.052) \times 10^{-2}$	16994038	0.276	0.375	9.256×10^{-3}	-20.4	49.6
sulfurdioxide slant column density cobra precision [DU]	0.301 ± 0.132	16994038	0.213	0.137	0.260	7.320×10^{-2}	24.9
sulfurdioxide slant column density window1 [DU]	0.122 ± 0.692	16994038	0.125	0.755	0.130	-88.2	111
sulfurdioxide slant column density window1 precision [DU]	0.301 ± 0.132	16994038	0.213	0.137	0.260	7.320×10^{-2}	24.9
sulfurdioxide slant column density corrected win1 [DU]	$(1.521 \pm 68.520) \times 10^{-2}$	16994038	-2.500×10^{-2}	0.744	-3.966×10^{-4}	-88.2	111
background so2 slant column offset window1 [DU]	-0.107 ± 0.145	16994038	-0.140	0.147	-0.123	-1.30	2.83
sulfurdioxide slant column density window2 [DU]	0.380 ± 9.264	16994038	-0.250	11.8	0.165	-1.638×10^3	740
sulfurdioxide slant column density window2 precision [DU]	8.35 ± 2.29	16994038	7.43	2.67	8.02	2.41	674
sulfurdioxide slant column density corrected win2 [DU]	-0.775 ± 9.007	16994038	-0.750	11.4	-0.793	-1.636×10^3	741
background so2 slant column offset window2 [DU]	-1.15 ± 2.38	16994038	0.750	3.72	-0.477	-12.1	8.64
sulfurdioxide slant column density window3 [DU]	-1.20 ± 24.65	16994038	-0.560	31.0	-1.02	-911	515
sulfurdioxide slant column density window3 precision [DU]	29.6 ± 13.2	16994038	23.7	9.96	26.0	11.1	436
sulfurdioxide slant column density corrected win3 [DU]	4.19 ± 24.00	16994038	3.92	30.1	4.31	-911	518
background so2 slant column offset window3 [DU]	5.39 ± 6.13	16994038	-0.560	9.92	4.78	-22.9	31.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	16994038	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.274 \pm 6.393) \times 10^{-2}$	16994038	1.423×10^{-2}	1.973×10^{-2}	1.515×10^{-2}	5.517×10^{-4}	1.70
fitted radiance shift [nm]	$(-4.109 \pm 26.510) \times 10^{-4}$	16994038	-5.000×10^{-4}	1.879×10^{-3}	-4.056×10^{-4}	-4.834×10^{-2}	6.852×10^{-2}
fitted radiance squeeze [1]	$(-5.843 \pm 192.006) \times 10^{-6}$	16994038	1.000×10^{-5}	2.123×10^{-4}	5.003×10^{-6}	-1.401×10^{-2}	2.462×10^{-2}
fitted root mean square [1]	$(1.317 \pm 0.544) \times 10^{-3}$	16994038	1.025×10^{-3}	5.572×10^{-4}	1.160×10^{-3}	3.603×10^{-4}	5.243×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.845 ± 0.452	16994038	0.620	0.557	0.775	5.000×10^{-2}	3.29
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.106	16994038	3.500×10^{-2}	0.110	6.797×10^{-2}	3.133×10^{-3}	1.66
sulfurdioxide clear air mass factor polluted [1]	0.718 ± 0.319	16994038	0.620	0.371	0.678	5.785×10^{-2}	3.31
number of spectral points in retrieval [1]	73.4 ± 0.5	16994038	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.120	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.59	-0.974	-0.583	-0.386	-0.224	0.254	0.429	0.648	1.09	2.95
sulfurdioxide total vertical column precision [DU]	9.331×10^{-2}	0.132	0.162	0.189	0.225	0.618	0.836	1.10	1.62	3.88
sulfurdioxide slant column density corrected [DU]	-0.878	-0.507	-0.367	-0.274	-0.177	0.198	0.301	0.401	0.560	1.03
sulfurdioxide slant column density cobra [DU]	-0.878	-0.507	-0.367	-0.274	-0.177	0.198	0.301	0.401	0.560	1.03
sulfurdioxide slant column density cobra precision [DU]	0.146	0.173	0.187	0.198	0.213	0.350	0.415	0.471	0.548	0.780
sulfurdioxide slant column density window1 [DU]	-1.77	-0.955	-0.652	-0.454	-0.250	0.505	0.701	0.888	1.17	1.93
sulfurdioxide slant column density window1 precision [DU]	0.146	0.173	0.187	0.198	0.213	0.350	0.415	0.471	0.548	0.780
sulfurdioxide slant column density corrected win1 [DU]	-1.72	-1.01	-0.740	-0.559	-0.368	0.376	0.581	0.781	1.09	1.95
background so2 slant column offset window1 [DU]	-0.355	-0.287	-0.257	-0.230	-0.195	-4.868×10^{-2}	-3.499×10^{-3}	4.929×10^{-2}	0.150	0.398
sulfurdioxide slant column density window2 [DU]	-21.1	-14.3	-10.9	-8.44	-5.62	6.15	9.20	12.0	15.8	23.7
sulfurdioxide slant column density window2 precision [DU]	4.47	5.37	5.90	6.32	6.83	9.51	10.4	11.2	12.4	15.0
sulfurdioxide slant column density corrected win2 [DU]	-22.4	-15.3	-11.9	-9.35	-6.50	4.93	7.79	10.4	13.8	21.1
background so2 slant column offset window2 [DU]	-6.97	-5.60	-4.73	-3.96	-2.93	0.784	1.10	1.33	1.68	2.59
sulfurdioxide slant column density window3 [DU]	-63.7	-41.8	-31.7	-24.4	-16.5	14.5	22.3	29.4	38.8	57.6
sulfurdioxide slant column density window3 precision [DU]	15.5	17.8	19.4	20.7	22.3	32.2	36.7	42.4	54.3	86.2
sulfurdioxide slant column density corrected win3 [DU]	-56.5	-35.3	-25.4	-18.4	-10.7	19.4	27.0	33.9	43.2	62.0
background so2 slant column offset window3 [DU]	-5.64	-2.89	-1.78	-0.882	0.298	10.2	12.2	13.7	15.7	18.8
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]	1.865×10^{-3}	3.544×10^{-3}	5.035×10^{-3}	6.475×10^{-3}	8.622×10^{-3}	2.835×10^{-2}	4.327×10^{-2}	6.896×10^{-2}	0.122	0.313
fitted radiance shift [nm]	-8.332×10^{-3}	-4.256×10^{-3}	-2.888×10^{-3}	-2.103×10^{-3}	-1.395×10^{-3}	4.837×10^{-4}	1.164×10^{-3}	2.045×10^{-3}	3.611×10^{-3}	7.968×10^{-3}
fitted radiance squeeze [1]	-5.881×10^{-4}	-3.264×10^{-4}	-2.263×10^{-4}	-1.647×10^{-4}	-1.038×10^{-4}	1.084×10^{-4}	1.607×10^{-4}	2.086×10^{-4}	2.755×10^{-4}	4.269×10^{-4}
fitted root mean square [1]	6.178×10^{-4}	7.568×10^{-4}	8.317×10^{-4}	8.905×10^{-4}	9.637×10^{-4}	1.521×10^{-3}	1.778×10^{-3}	2.025×10^{-3}	2.368×10^{-3}	3.228×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.551×10^{-2}	0.224	0.323	0.415	0.528	1.09	1.27	1.46	1.71	2.22
sulfurdioxide total air mass factor polluted precision [1]	9.857×10^{-3}	1.686×10^{-2}	2.298×10^{-2}	2.839×10^{-2}	3.560×10^{-2}	0.146	0.189	0.232	0.301	0.515
sulfurdioxide clear air mass factor polluted [1]	0.197	0.290	0.365	0.432	0.510	0.881	0.987	1.08	1.21	1.88
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]	0.694 ± 0.402	8124576	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	$(3.595 \pm 127.489) \times 10^{-2}$	8124576	0.510	1.207×10^{-2}	-90.4	116	-0.239	0.271
sulfurdioxide total vertical column precision [DU]	0.645 ± 0.917	8124576	0.463	0.361	4.785×10^{-2}	128	0.231	0.694
sulfurdioxide slant column density corrected [DU]	$(1.744 \pm 35.160) \times 10^{-2}$	8124576	0.369	9.632×10^{-3}	-13.7	85.5	-0.173	0.196
sulfurdioxide slant column density cobra [DU]	$(1.741 \pm 34.914) \times 10^{-2}$	8124576	0.369	9.632×10^{-3}	-13.7	15.0	-0.173	0.196
sulfurdioxide slant column density cobra precision [DU]	0.294 ± 0.122	8124576	0.130	0.258	8.308×10^{-2}	14.4	0.212	0.342
sulfurdioxide slant column density window1 [DU]	0.153 ± 0.661	8124576	0.744	0.155	-13.7	18.5	-0.218	0.526
sulfurdioxide slant column density window1 precision [DU]	0.294 ± 0.122	8124576	0.130	0.258	8.308×10^{-2}	14.4	0.212	0.342
sulfurdioxide slant column density corrected win1 [DU]	$(2.213 \pm 65.669) \times 10^{-2}$	8124576	0.734	6.818×10^{-3}	-13.7	18.4	-0.356	0.379
background so2 slant column offset window1 [DU]	-0.131 ± 0.118	8124576	0.135	-0.138	-1.30	2.26	-0.206	-7.108×10^{-2}
sulfurdioxide slant column density window2 [DU]	$(-1.732 \pm 933.723) \times 10^{-2}$	8124576	11.9	-0.244	-239	216	-6.08	5.78
sulfurdioxide slant column density window2 precision [DU]	8.56 ± 2.33	8124576	2.85	8.22	2.41	335	6.96	9.81
sulfurdioxide slant column density corrected win2 [DU]	-0.655 ± 9.127	8124576	11.6	-0.666	-237	217	-6.47	5.15
background so2 slant column offset window2 [DU]	-0.637 ± 2.063	8124576	2.63	-1.430×10^{-2}	-9.75	5.84	-1.79	0.847
sulfurdioxide slant column density window3 [DU]	-1.24 ± 26.02	8124576	32.5	-0.707	-204	204	-17.1	15.4
sulfurdioxide slant column density window3 precision [DU]	30.7 ± 14.0	8124576	11.1	27.0	11.1	265	22.8	33.9
sulfurdioxide slant column density corrected win3 [DU]	3.85 ± 25.28	8124576	31.7	4.12	-183	209	-11.8	20.0
background so2 slant column offset window3 [DU]	5.09 ± 6.22	8124576	9.93	4.13	-21.8	26.5	-2.410×10^{-2}	9.91
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	8124576	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.800 \pm 8.301) \times 10^{-2}$	8124576	3.558×10^{-2}	1.978×10^{-2}	5.517×10^{-4}	1.70	1.154×10^{-2}	4.712×10^{-2}
fitted radiance shift [nm]	$(-6.138 \pm 279.513) \times 10^{-5}$	8124576	1.715×10^{-3}	-1.022×10^{-4}	-4.834×10^{-2}	4.559×10^{-2}	-9.370×10^{-4}	7.785×10^{-4}
fitted radiance squeeze [1]	$(1.119 \pm 17.363) \times 10^{-5}$	8124576	2.036×10^{-4}	1.235×10^{-5}	-2.740×10^{-3}	2.462×10^{-2}	-8.958×10^{-5}	1.140×10^{-4}
fitted root mean square [1]	$(1.297 \pm 0.501) \times 10^{-3}$	8124576	5.507×10^{-4}	1.163×10^{-3}	3.603×10^{-4}	1.738×10^{-2}	9.599×10^{-4}	1.511×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.773 ± 0.412	8124576	0.558	0.741	5.000×10^{-2}	2.91	0.461	1.02
sulfurdioxide total air mass factor polluted precision [1]	0.102 ± 0.121	8124576	9.338×10^{-2}	5.663×10^{-2}	3.133×10^{-3}	1.66	3.215×10^{-2}	0.126
sulfurdioxide clear air mass factor polluted [1]	0.688 ± 0.290	8124576	0.443	0.676	5.785×10^{-2}	2.52	0.457	0.900
number of spectral points in retrieval [1]	73.4 ± 0.5	8124576	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]	0.643 ± 0.407	8869462	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(2.729 \pm 85.882) \times 10^{-2}$	8869462	0.451	9.528×10^{-3}	-52.8	120	-0.212	0.239
sulfurdioxide total vertical column precision [DU]	0.498 ± 0.600	8869462	0.351	0.337	2.963×10^{-2}	55.1	0.217	0.568
sulfurdioxide slant column density corrected [DU]	$(1.752 \pm 37.635) \times 10^{-2}$	8869462	0.380	8.902×10^{-3}	-20.4	104	-0.180	0.201
sulfurdioxide slant column density cobra [DU]	$(1.745 \pm 37.063) \times 10^{-2}$	8869462	0.380	8.902×10^{-3}	-20.4	49.6	-0.180	0.201
sulfurdioxide slant column density cobra precision [DU]	0.307 ± 0.140	8869462	0.145	0.262	7.320×10^{-2}	24.9	0.215	0.360
sulfurdioxide slant column density window1 [DU]	$(9.365 \pm 71.837) \times 10^{-2}$	8869462	0.764	0.107	-88.2	111	-0.280	0.485
sulfurdioxide slant column density window1 precision [DU]	0.307 ± 0.140	8869462	0.145	0.262	7.320×10^{-2}	24.9	0.215	0.360
sulfurdioxide slant column density corrected win1 [DU]	$(8.879 \pm 710.256) \times 10^{-3}$	8869462	0.753	-7.161×10^{-3}	-88.2	111	-0.379	0.374
background so2 slant column offset window1 [DU]	$(-8.477 \pm 16.233) \times 10^{-2}$	8869462	0.156	-0.107	-1.08	2.83	-0.184	-2.825×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.744 ± 9.182	8869462	11.7	0.534	-1.638×10^3	740	-5.19	6.46
sulfurdioxide slant column density window2 precision [DU]	8.16 ± 2.23	8869462	2.50	7.85	2.43	674	6.73	9.24
sulfurdioxide slant column density corrected win2 [DU]	-0.885 ± 8.894	8869462	11.3	-0.907	-1.636×10^3	741	-6.53	4.73
background so2 slant column offset window2 [DU]	-1.63 ± 2.55	8869462	4.37	-1.33	-12.1	8.64	-3.70	0.676
sulfurdioxide slant column density window3 [DU]	-1.16 ± 23.32	8869462	29.7	-1.29	-911	515	-16.0	13.7
sulfurdioxide slant column density window3 precision [DU]	28.6 ± 12.4	8869462	8.67	25.2	11.7	436	21.9	30.6
sulfurdioxide slant column density corrected win3 [DU]	4.50 ± 22.76	8869462	28.7	4.48	-911	518	-9.79	18.9
background so2 slant column offset window3 [DU]	5.66 ± 6.03	8869462	9.88	5.30	-22.9	31.1	0.617	10.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	8869462	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.876 \pm 3.332) \times 10^{-2}$	8869462	1.306×10^{-2}	1.218×10^{-2}	7.629×10^{-4}	1.37	7.096×10^{-3}	2.016×10^{-2}
fitted radiance shift [nm]	$(-7.310 \pm 24.688) \times 10^{-4}$	8869462	1.869×10^{-3}	-7.095×10^{-4}	-4.468×10^{-2}	6.852×10^{-2}	-1.719×10^{-3}	1.504×10^{-4}
fitted radiance squeeze [1]	$(-2.145 \pm 20.618) \times 10^{-5}$	8869462	2.217×10^{-4}	-2.212×10^{-6}	-1.401×10^{-2}	2.103×10^{-2}	-1.185×10^{-4}	1.032×10^{-4}
fitted root mean square [1]	$(1.336 \pm 0.579) \times 10^{-3}$	8869462	5.655×10^{-4}	1.157×10^{-3}	3.689×10^{-4}	5.243×10^{-2}	9.669×10^{-4}	1.532×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.911 ± 0.477	8869462	0.594	0.805	5.000×10^{-2}	3.29	0.577	1.17
sulfurdioxide total air mass factor polluted precision [1]	0.111 ± 0.090	8869462	0.121	8.489×10^{-2}	3.616×10^{-3}	1.58	3.861×10^{-2}	0.159
sulfurdioxide clear air mass factor polluted [1]	0.747 ± 0.341	8869462	0.323	0.680	9.278×10^{-2}	3.31	0.539	0.862
number of spectral points in retrieval [1]	73.4 ± 0.5	8869462	1.000	73.0	53.0	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]	0.667 ± 0.404	12229165	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(2.599 \pm 92.928) \times 10^{-2}$	12229165	0.447	9.368×10^{-3}	-75.5	116	-0.211	0.236
sulfurdioxide total vertical column precision [DU]	0.509 ± 0.659	12229165	0.337	0.321	4.517×10^{-2}	128	0.217	0.554
sulfurdioxide slant column density corrected [DU]	$(1.535 \pm 35.179) \times 10^{-2}$	12229165	0.367	8.376×10^{-3}	-9.11	104	-0.174	0.193
sulfurdioxide slant column density cobra [DU]	$(1.531 \pm 34.771) \times 10^{-2}$	12229165	0.367	8.376×10^{-3}	-9.11	44.9	-0.174	0.193
sulfurdioxide slant column density cobra precision [DU]	0.295 ± 0.129	12229165	0.129	0.253	8.308×10^{-2}	23.9	0.210	0.340
sulfurdioxide slant column density window1 [DU]	0.116 ± 0.677	12229165	0.741	0.127	-71.0	43.7	-0.248	0.493
sulfurdioxide slant column density window1 precision [DU]	0.295 ± 0.129	12229165	0.129	0.253	8.308×10^{-2}	23.9	0.210	0.340
sulfurdioxide slant column density corrected win1 [DU]	$(1.243 \pm 67.005) \times 10^{-2}$	12229165	0.729	-1.263×10^{-3}	-71.0	43.7	-0.362	0.367
background so2 slant column offset window1 [DU]	-0.103 ± 0.146	12229165	0.150	-0.121	-1.08	2.83	-0.194	-4.412×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.440 ± 9.000	12229165	11.5	0.230	-1.638×10^3	644	-5.43	6.08
sulfurdioxide slant column density window2 precision [DU]	8.10 ± 2.09	12229165	2.48	7.80	2.43	525	6.69	9.17
sulfurdioxide slant column density corrected win2 [DU]	-0.806 ± 8.732	12229165	11.2	-0.822	-1.636×10^3	645	-6.40	4.77
background so2 slant column offset window2 [DU]	-1.25 ± 2.45	12229165	3.96	-0.566	-12.1	8.64	-3.17	0.796
sulfurdioxide slant column density window3 [DU]	1.18 ± 23.68	12229165	30.2	0.956	-618	290	-13.9	16.3
sulfurdioxide slant column density window3 precision [DU]	28.2 ± 11.8	12229165	8.67	25.0	11.3	436	21.7	30.4
sulfurdioxide slant column density corrected win3 [DU]	6.43 ± 22.85	12229165	29.0	6.19	-612	301	-8.11	20.9
background so2 slant column offset window3 [DU]	5.25 ± 6.04	12229165	9.88	4.61	-22.9	31.1	0.229	10.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	12229165	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.992 \pm 3.073) \times 10^{-2}$	12229165	1.296×10^{-2}	1.344×10^{-2}	5.517×10^{-4}	1.66	8.140×10^{-3}	2.110×10^{-2}
fitted radiance shift [nm]	$(-4.736 \pm 24.369) \times 10^{-4}$	12229165	1.889×10^{-3}	-4.540×10^{-4}	-4.834×10^{-2}	4.559×10^{-2}	-1.460×10^{-3}	4.286×10^{-4}
fitted radiance squeeze [1]	$(-8.034 \pm 189.878) \times 10^{-6}$	12229165	2.084×10^{-4}	5.077×10^{-6}	-1.401×10^{-2}	2.462×10^{-2}	-1.025×10^{-4}	1.060×10^{-4}
fitted root mean square [1]	$(1.291 \pm 0.538) \times 10^{-3}$	12229165	5.201×10^{-4}	1.130×10^{-3}	3.603×10^{-4}	5.243×10^{-2}	9.493×10^{-4}	1.469×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.875 ± 0.436	12229165	0.529	0.817	5.000×10^{-2}	2.92	0.576	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.103 ± 0.090	12229165	0.104	7.023×10^{-2}	3.528×10^{-3}	1.64	3.931×10^{-2}	0.144
sulfurdioxide clear air mass factor polluted [1]	0.742 ± 0.287	12229165	0.358	0.709	8.190×10^{-2}	2.92	0.545	0.903
number of spectral points in retrieval [1]	73.4 ± 0.5	12229165	1.000	73.0	52.0	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]	0.686 ± 0.406	3679684	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(4.048 \pm 116.961) \times 10^{-2}$	3679684	0.549	1.330×10^{-2}	-72.2	120	-0.254	0.295
sulfurdioxide total vertical column precision [DU]	0.654 ± 0.848	3679684	0.472	0.411	2.963×10^{-2}	55.1	0.256	0.727
sulfurdioxide slant column density corrected [DU]	$(2.169 \pm 38.589) \times 10^{-2}$	3679684	0.386	1.082×10^{-2}	-20.4	86.6	-0.181	0.206
sulfurdioxide slant column density cobra [DU]	$(2.164 \pm 38.059) \times 10^{-2}$	3679684	0.386	1.082×10^{-2}	-20.4	49.6	-0.181	0.206
sulfurdioxide slant column density cobra precision [DU]	0.307 ± 0.133	3679684	0.137	0.270	7.320×10^{-2}	24.9	0.221	0.358
sulfurdioxide slant column density window1 [DU]	0.138 ± 0.715	3679684	0.777	0.141	-88.2	111	-0.247	0.530
sulfurdioxide slant column density window1 precision [DU]	0.307 ± 0.133	3679684	0.137	0.270	7.320×10^{-2}	24.9	0.221	0.358
sulfurdioxide slant column density corrected win1 [DU]	$(1.720 \pm 70.836) \times 10^{-2}$	3679684	0.767	-1.998×10^{-3}	-88.2	111	-0.379	0.389
background so2 slant column offset window1 [DU]	-0.121 ± 0.144	3679684	0.134	-0.135	-1.30	2.41	-0.204	-6.979×10^{-2}
sulfurdioxide slant column density window2 [DU]	$(1.093 \pm 979.248) \times 10^{-2}$	3679684	12.3	-0.203	-861	740	-6.26	6.06
sulfurdioxide slant column density window2 precision [DU]	8.91 ± 2.60	3679684	2.89	8.58	2.41	674	7.27	10.2
sulfurdioxide slant column density corrected win2 [DU]	-0.641 ± 9.572	3679684	12.0	-0.659	-863	741	-6.68	5.37
background so2 slant column offset window2 [DU]	-0.652 ± 2.045	3679684	2.59	-8.100×10^{-2}	-9.74	7.17	-1.76	0.828
sulfurdioxide slant column density window3 [DU]	-7.14 ± 25.71	3679684	32.2	-6.40	-911	515	-22.9	9.33
sulfurdioxide slant column density window3 precision [DU]	33.2 ± 16.1	3679684	11.3	28.7	11.1	265	24.4	35.8
sulfurdioxide slant column density corrected win3 [DU]	-2.03 ± 25.57	3679684	32.0	-1.52	-911	518	-17.8	14.2
background so2 slant column offset window3 [DU]	5.11 ± 6.18	3679684	9.62	4.04	-22.9	30.9	0.153	9.78
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	3679684	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.569 \pm 10.053) \times 10^{-2}$	3679684	6.438×10^{-2}	3.087×10^{-2}	6.087×10^{-4}	1.70	1.250×10^{-2}	7.688×10^{-2}
fitted radiance shift [nm]	$(-2.697 \pm 31.931) \times 10^{-4}$	3679684	1.808×10^{-3}	-3.157×10^{-4}	-4.344×10^{-2}	6.852×10^{-2}	-1.213×10^{-3}	5.949×10^{-4}
fitted radiance squeeze [1]	$(-5.939 \pm 195.686) \times 10^{-6}$	3679684	2.191×10^{-4}	9.219×10^{-7}	-1.311×10^{-2}	1.478×10^{-2}	-1.099×10^{-4}	1.091×10^{-4}
fitted root mean square [1]	$(1.351 \pm 0.543) \times 10^{-3}$	3679684	5.579×10^{-4}	1.213×10^{-3}	3.689×10^{-4}	4.966×10^{-2}	1.001×10^{-3}	1.559×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.789 ± 0.485	3679684	0.574	0.669	5.000×10^{-2}	3.29	0.453	1.03
sulfurdioxide total air mass factor polluted precision [1]	0.115 ± 0.139	3679684	0.124	5.845×10^{-2}	3.133×10^{-3}	1.66	2.892×10^{-2}	0.153
sulfurdioxide clear air mass factor polluted [1]	0.674 ± 0.390	3679684	0.378	0.611	5.785×10^{-2}	3.31	0.429	0.807
number of spectral points in retrieval [1]	73.4 ± 0.5	3679684	1.000	73.0	53.0	74.0	73.0	74.0

3 Granule outlines

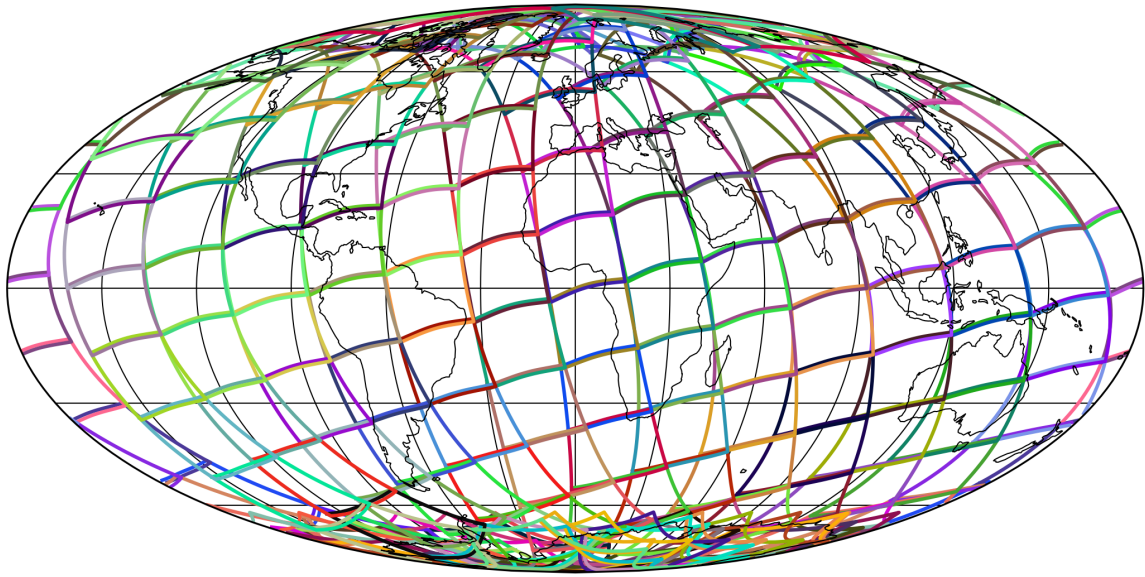


Figure 1: Outline of the granules.

4 Input data monitoring

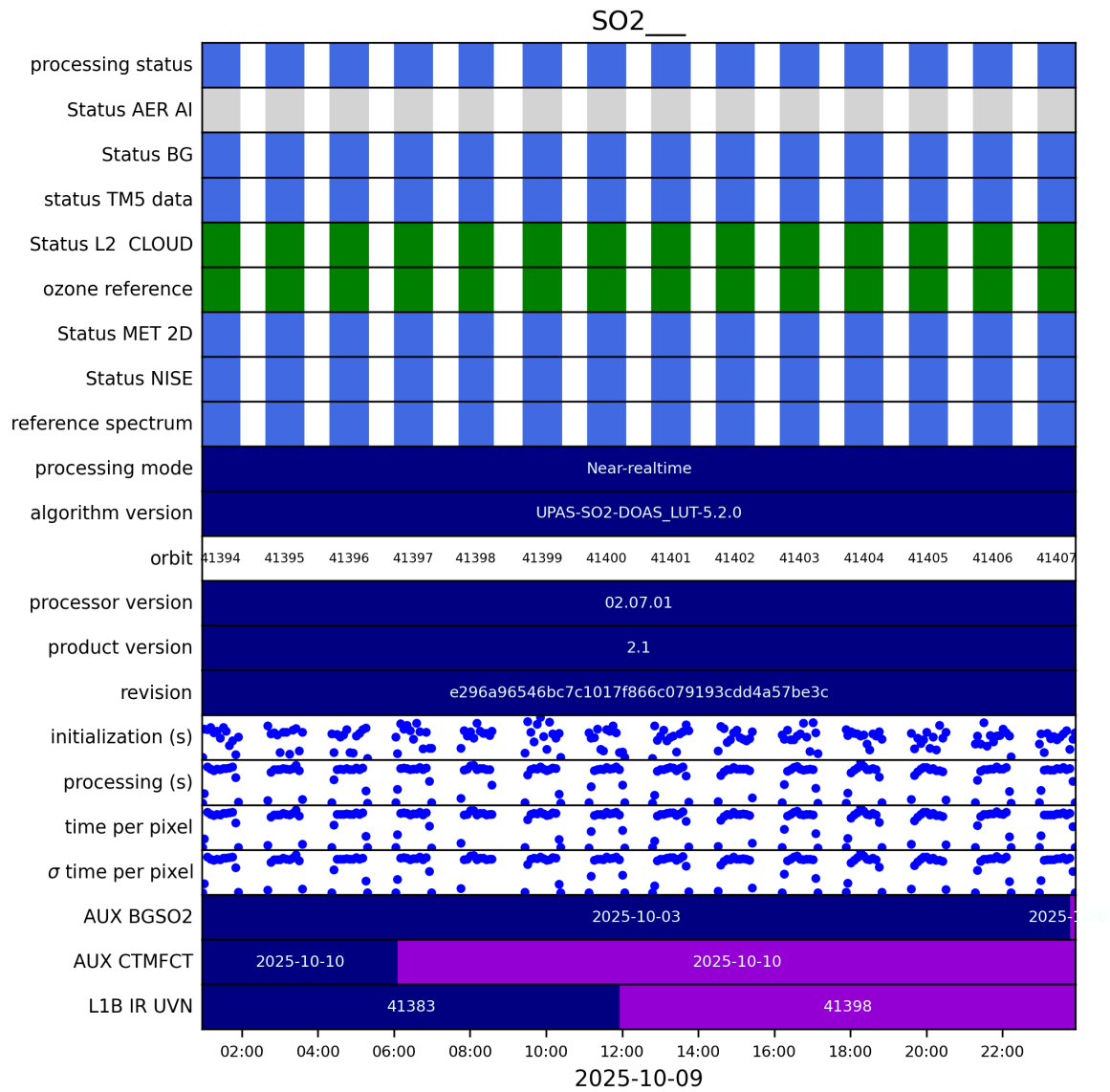


Figure 2: Input data per granule

5 Warnings and errors

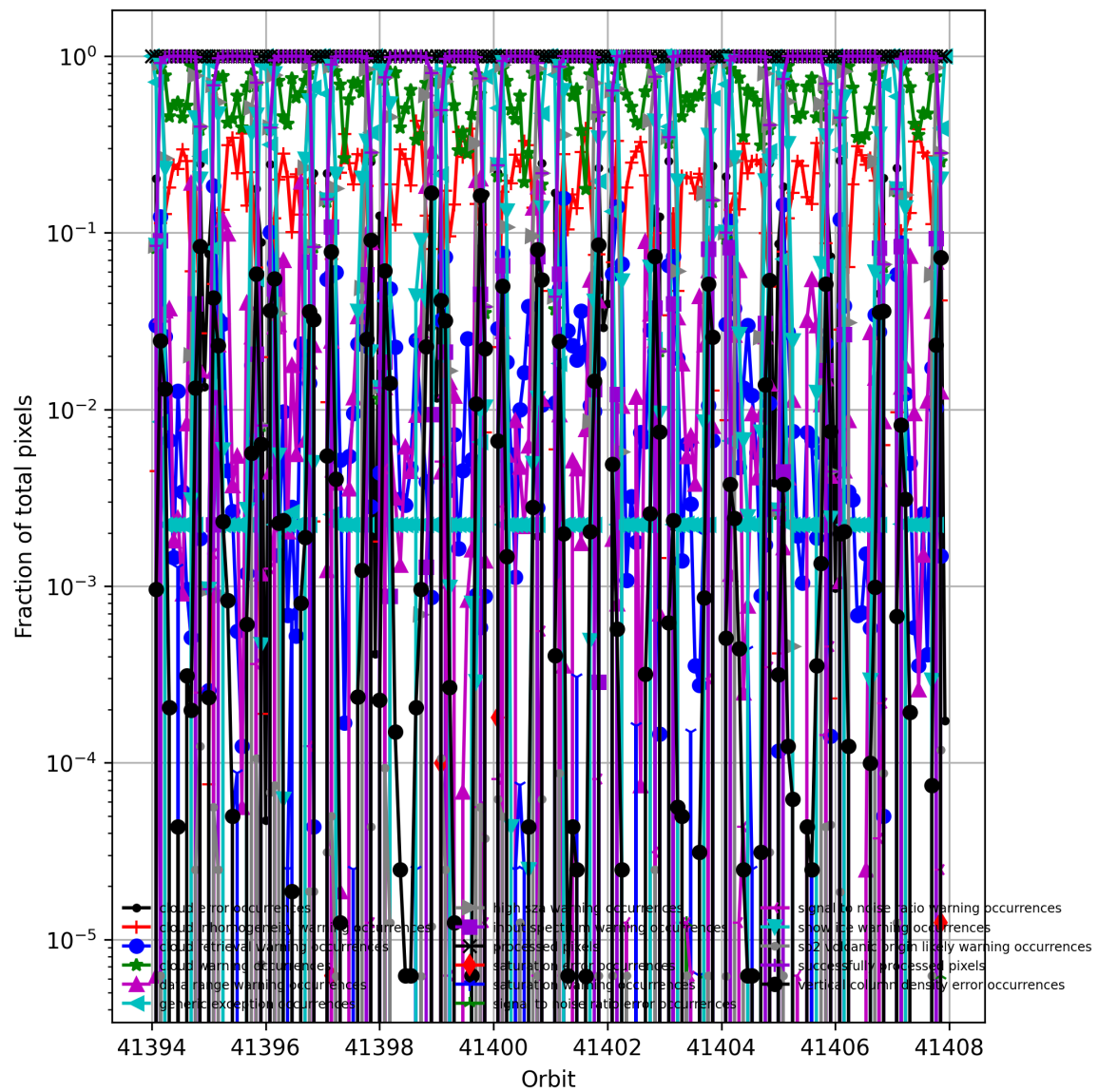


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

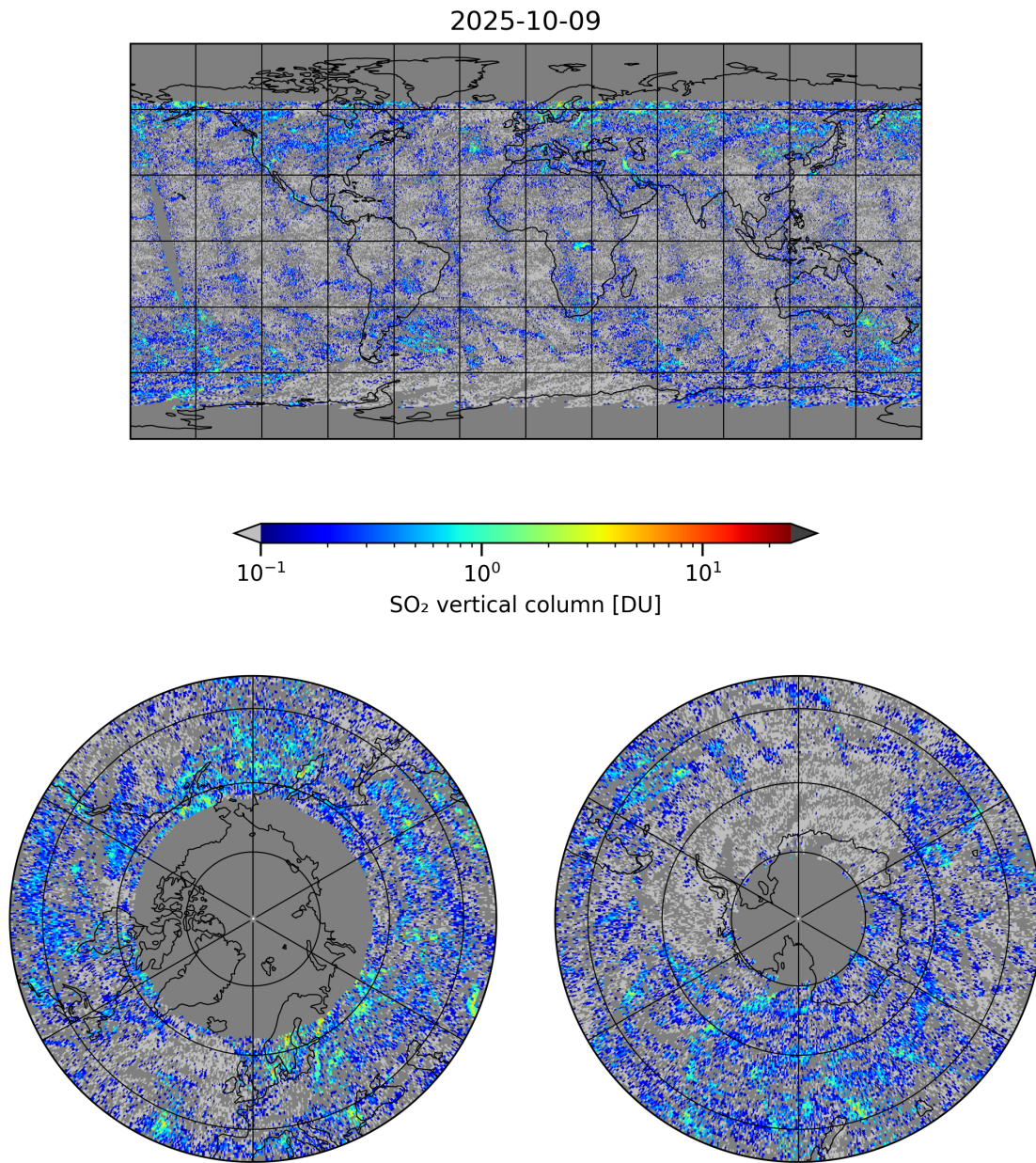


Figure 4: Map of “SO₂ vertical column” for 2025-10-09 to 2025-10-09

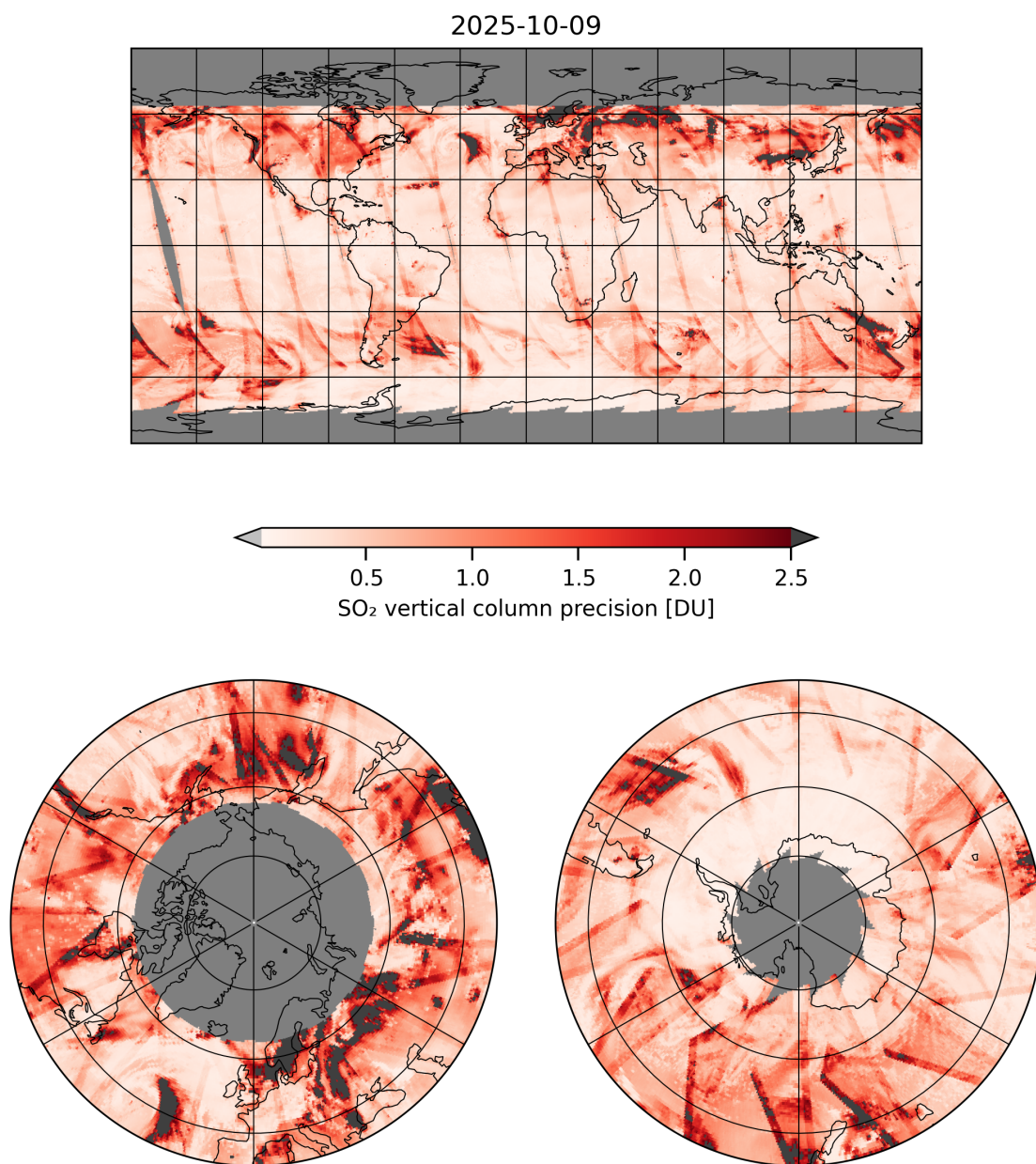


Figure 5: Map of “SO₂ vertical column precision” for 2025-10-09 to 2025-10-09

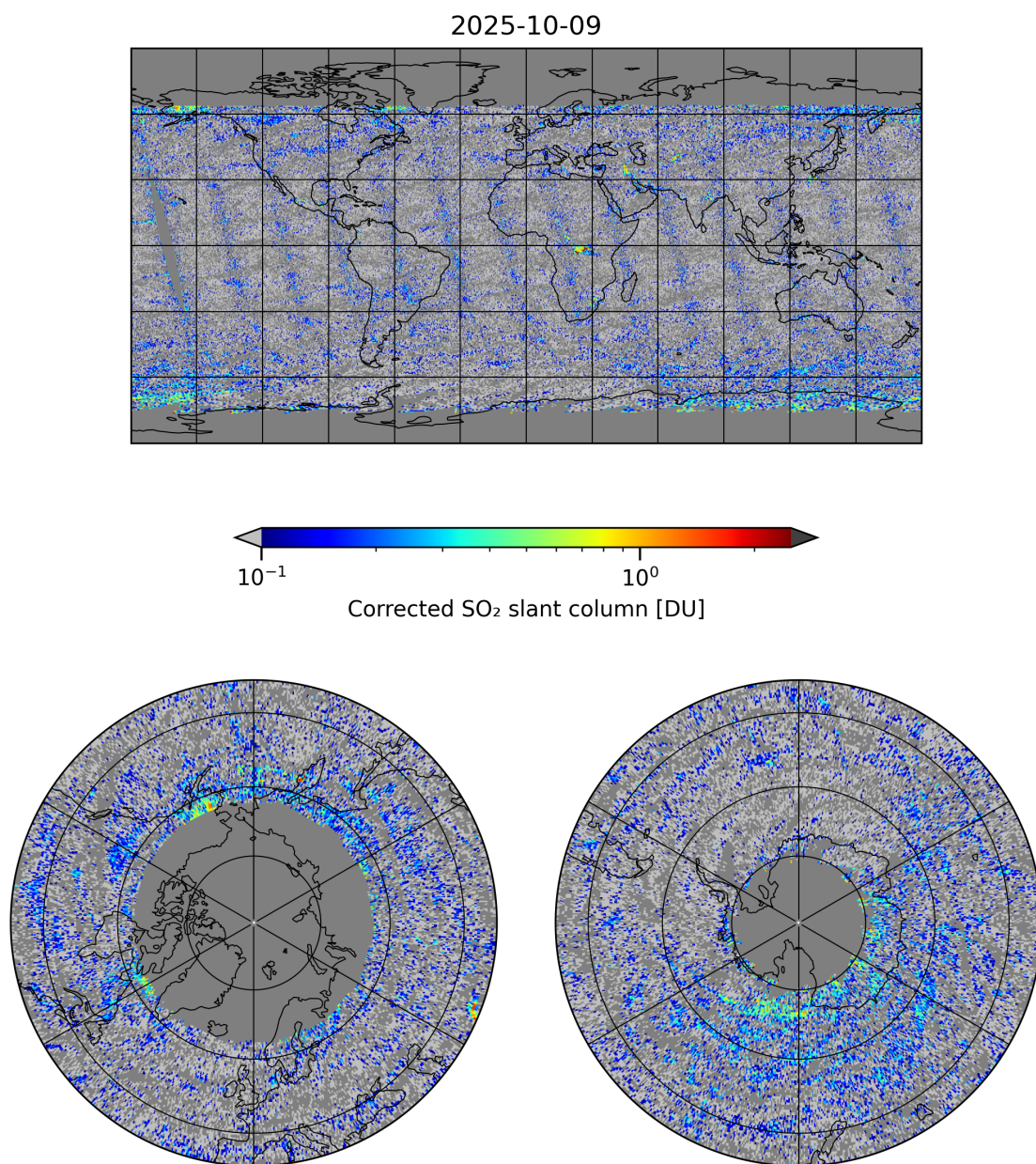


Figure 6: Map of “Corrected SO₂ slant column” for 2025-10-09 to 2025-10-09

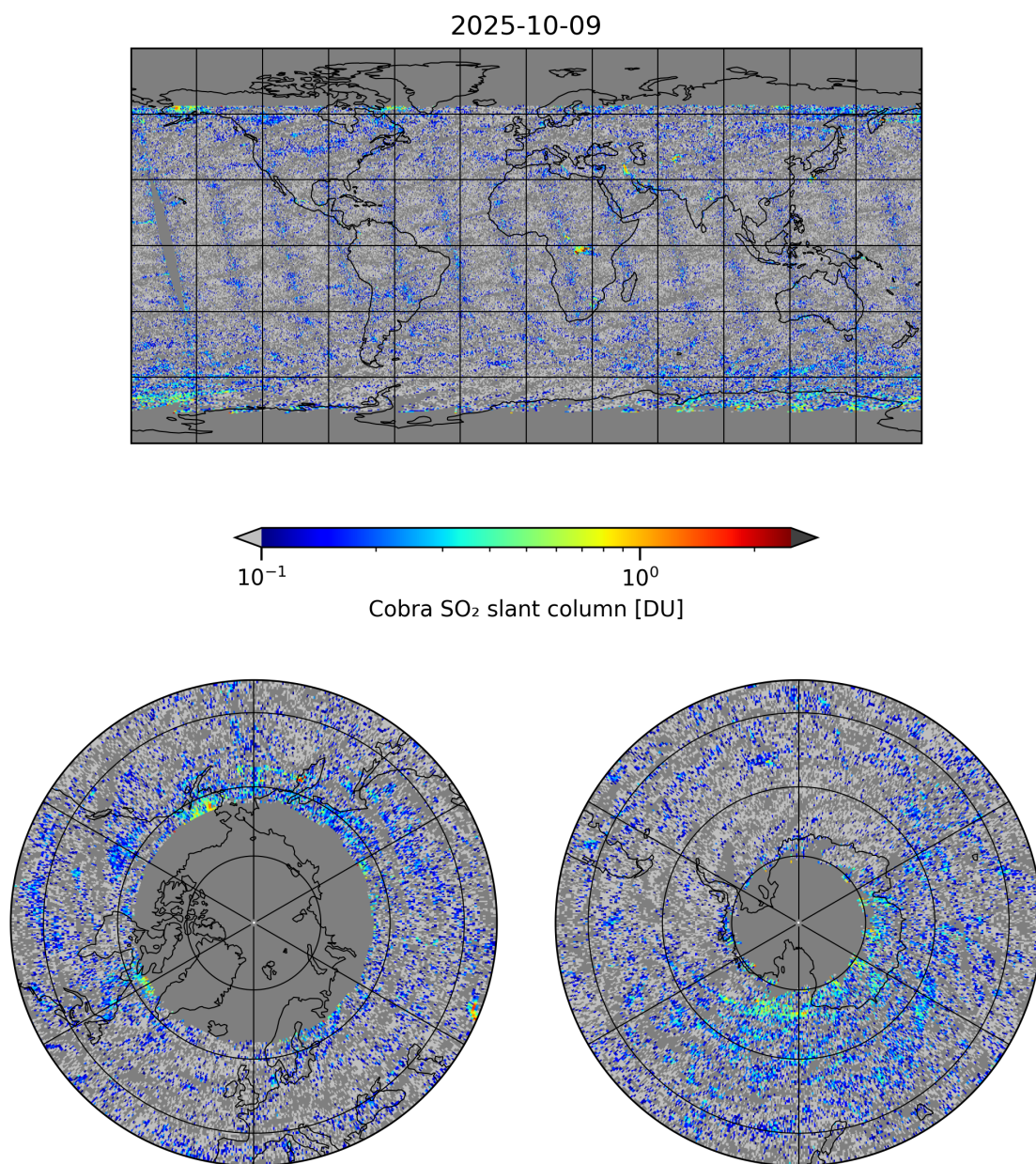


Figure 7: Map of “Cobra SO₂ slant column” for 2025-10-09 to 2025-10-09

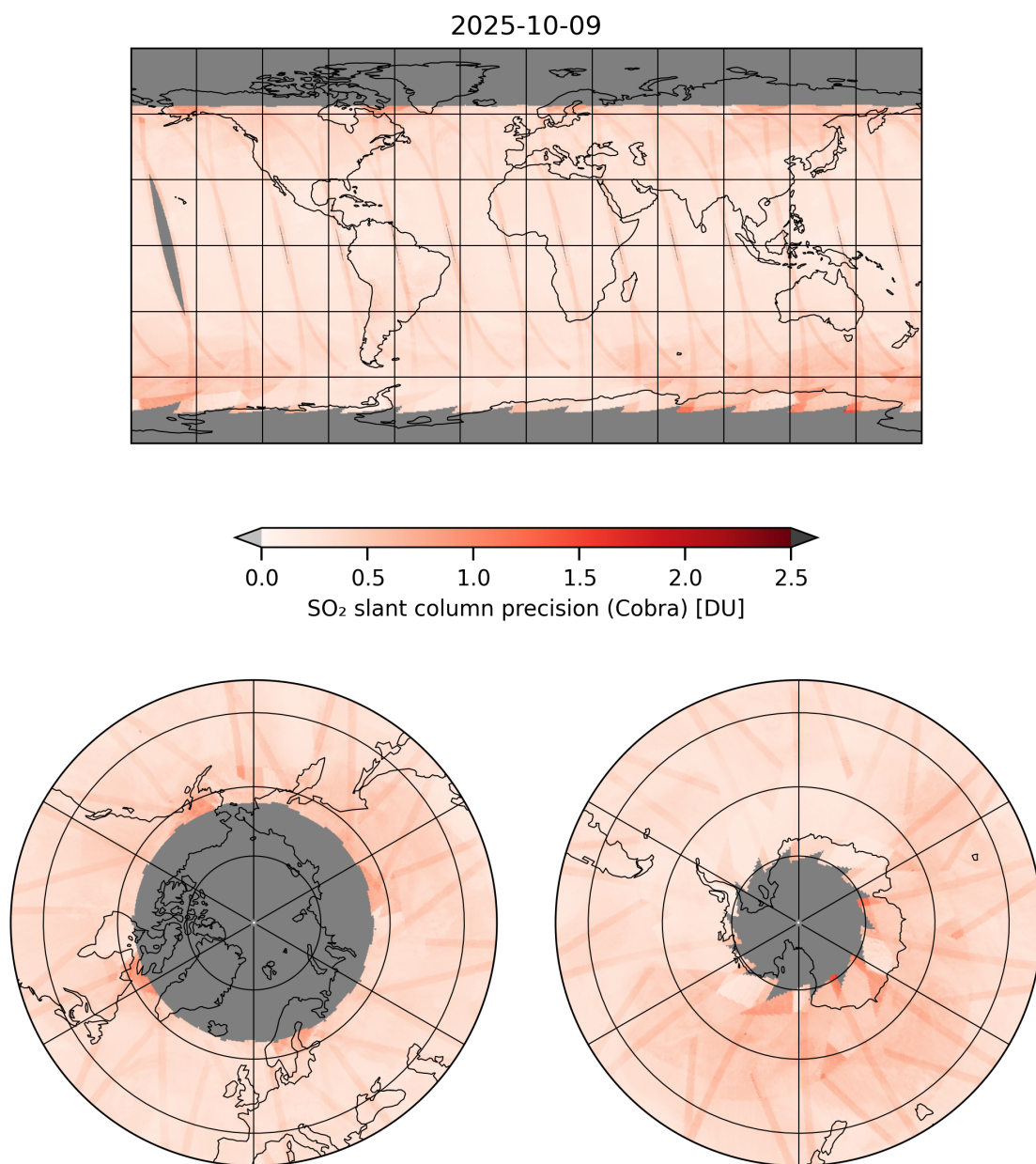


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-10-09 to 2025-10-09

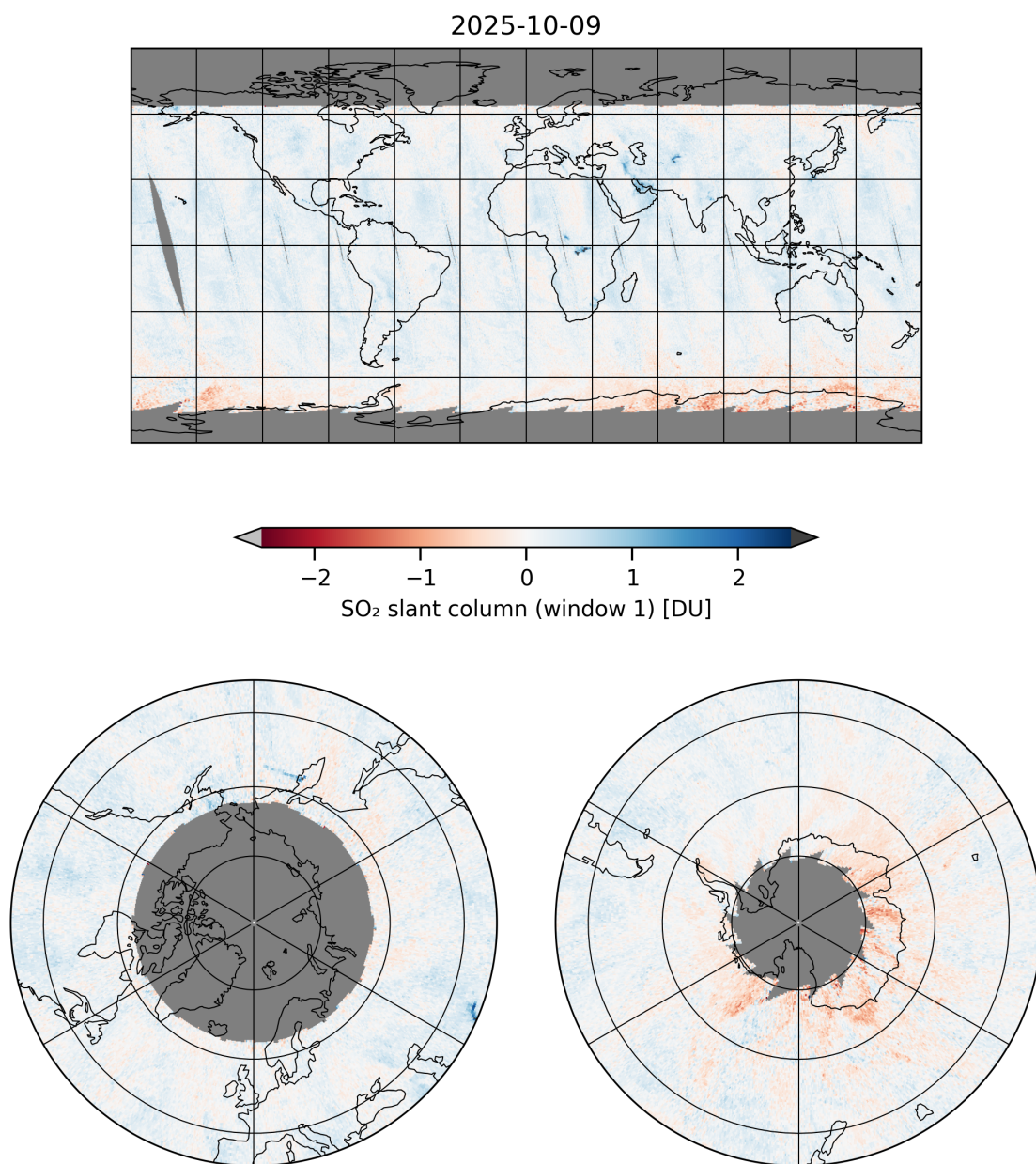


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-10-09 to 2025-10-09

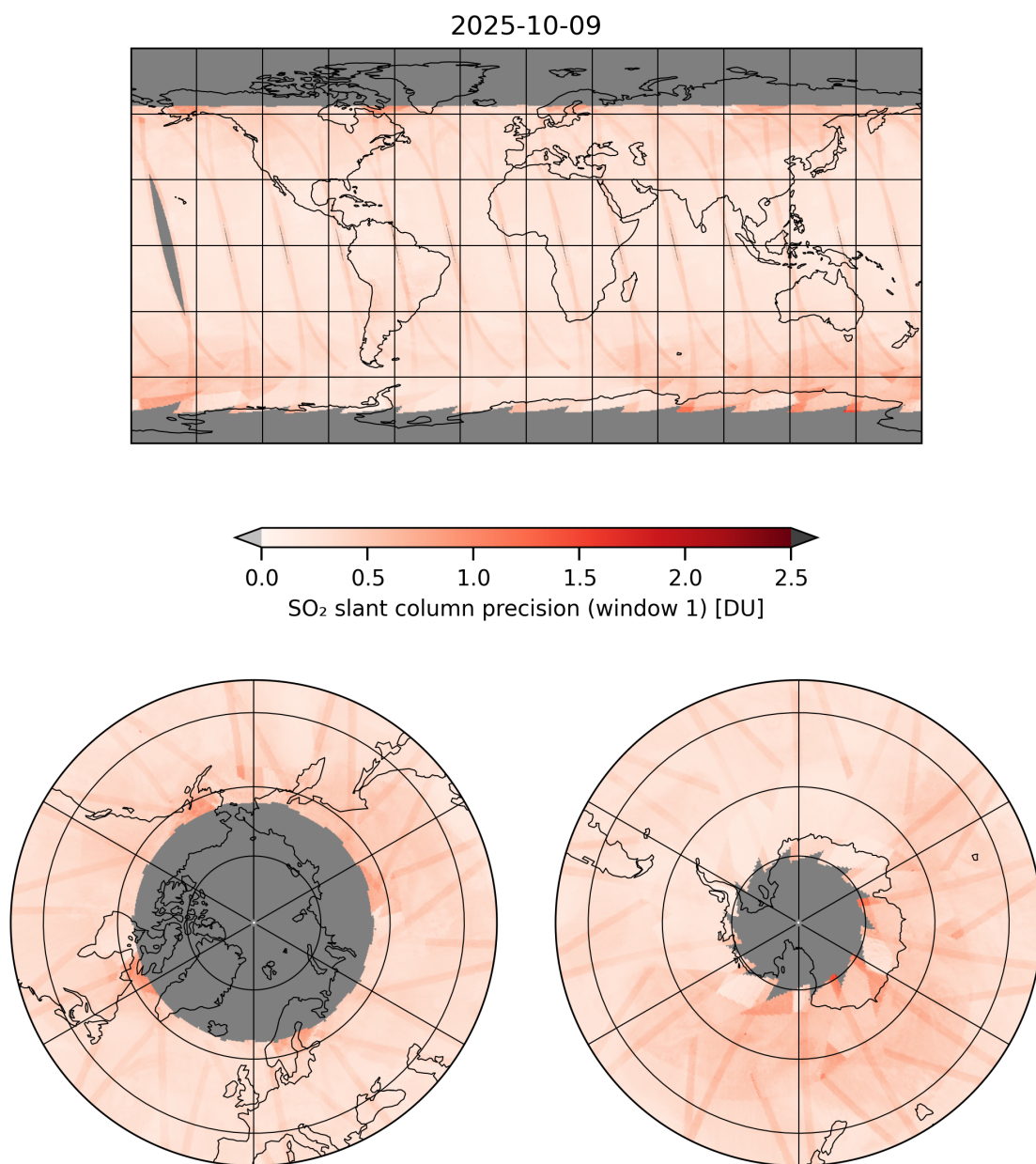


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-10-09 to 2025-10-09

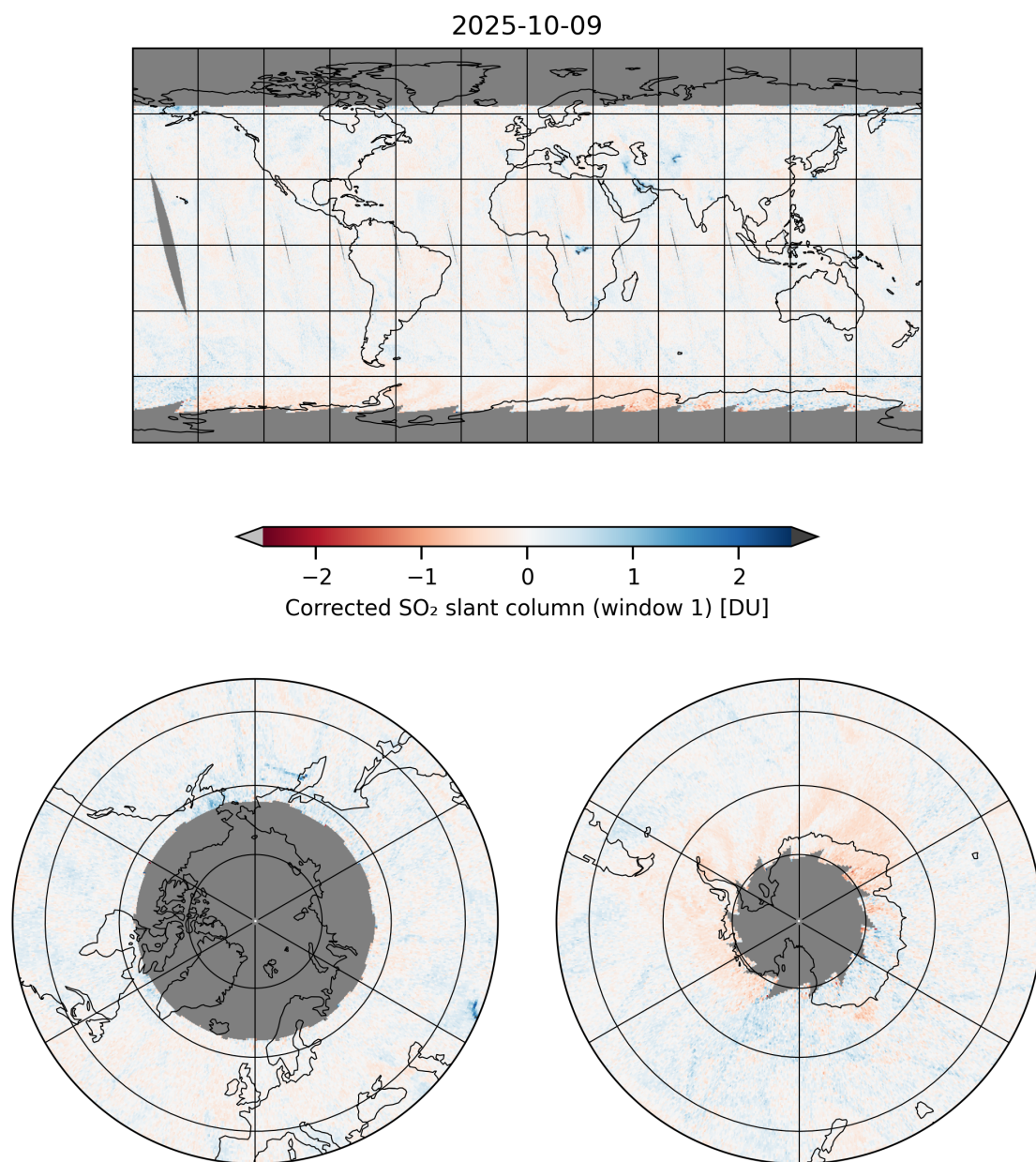


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-10-09 to 2025-10-09

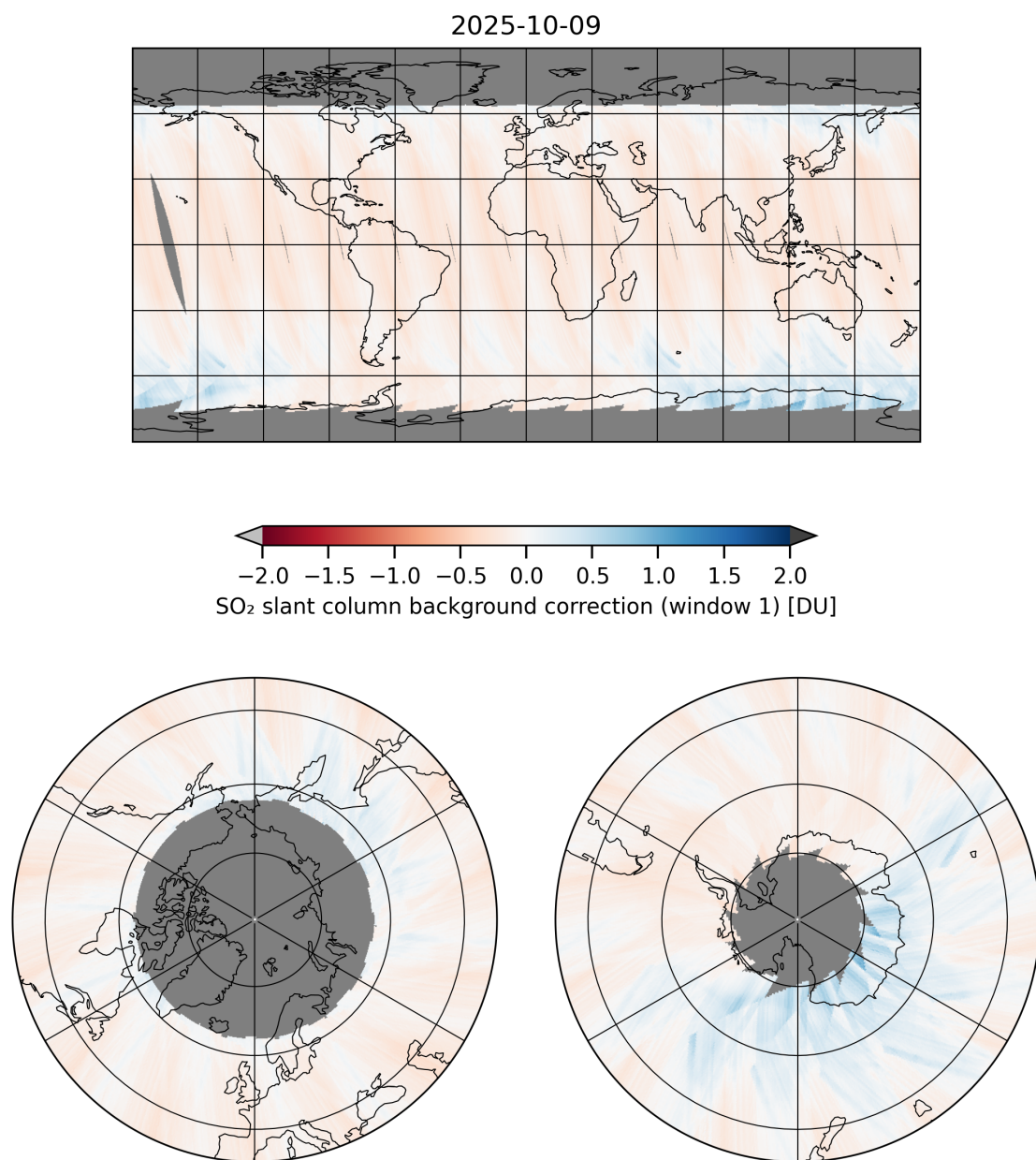


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-10-09 to 2025-10-09

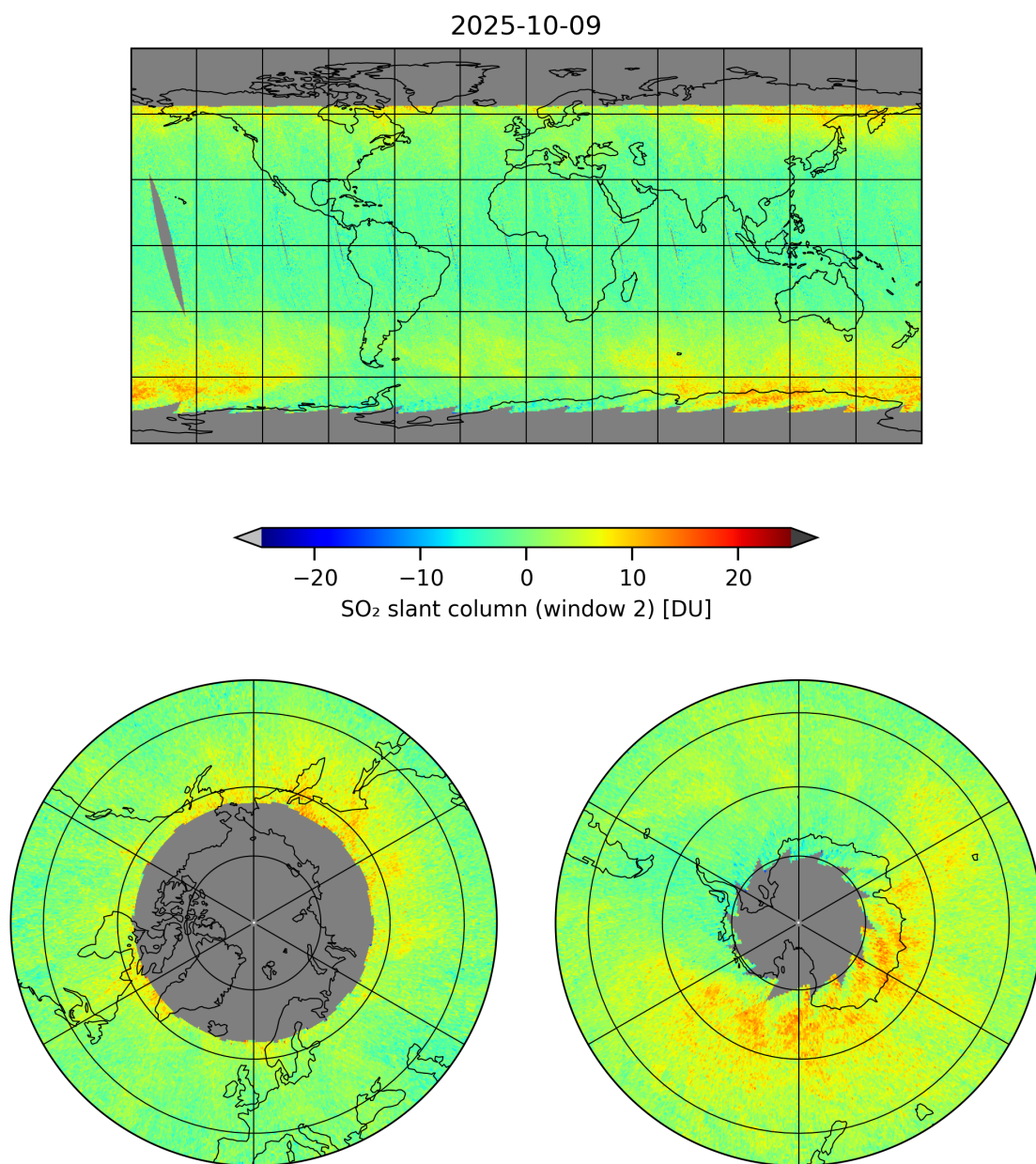


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-10-09 to 2025-10-09

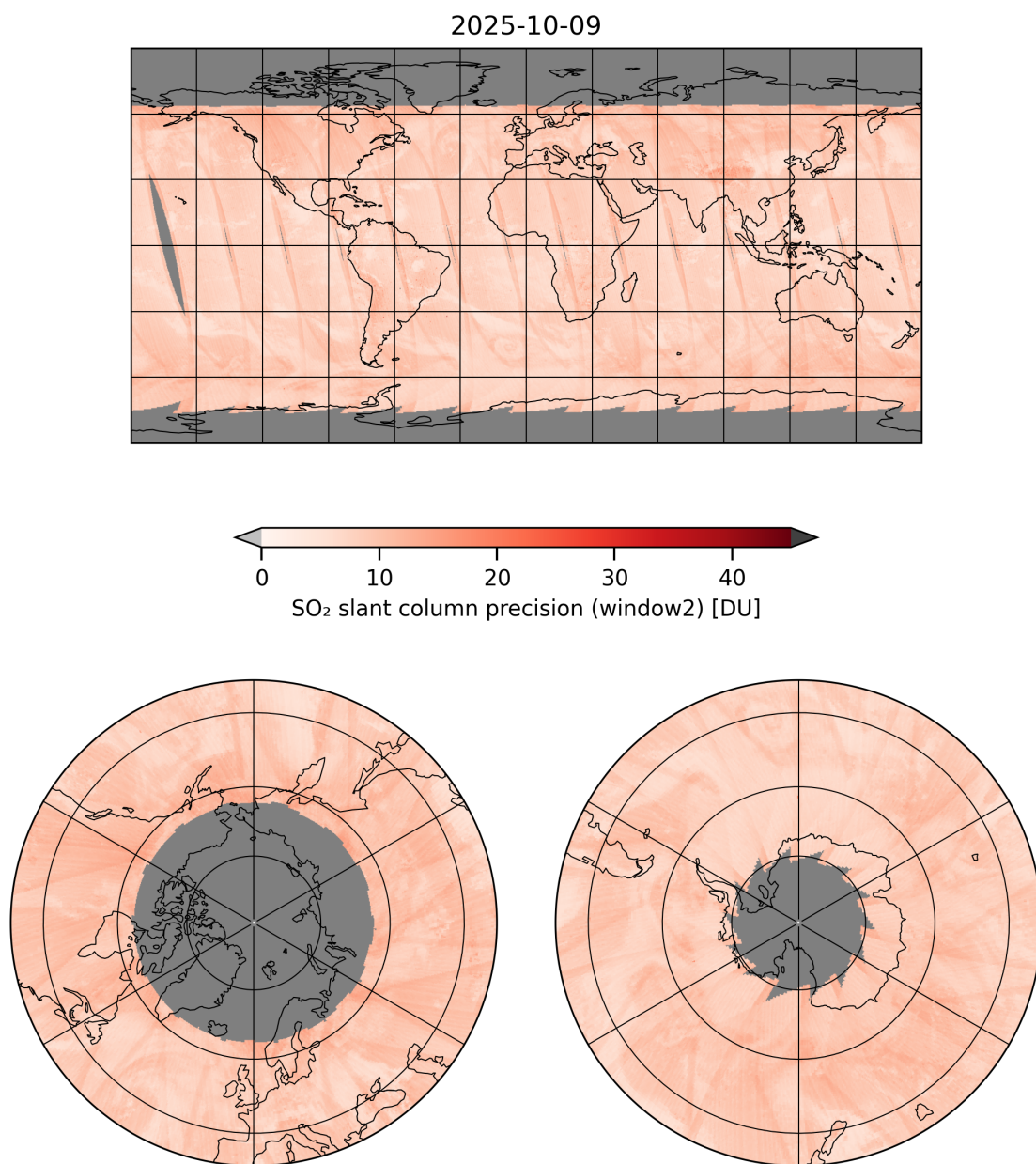


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-10-09 to 2025-10-09

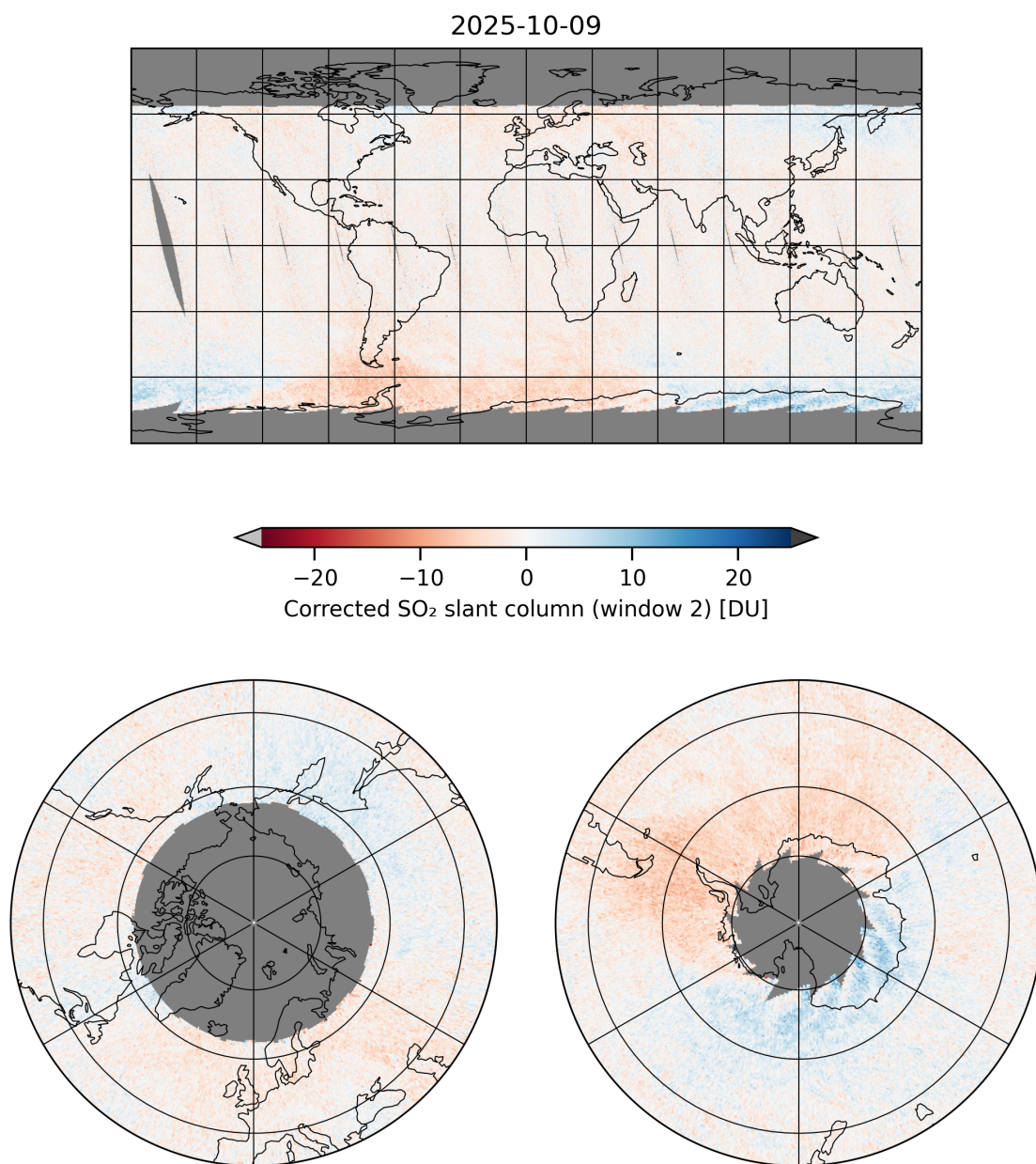


Figure 15: Map of "Corrected SO₂ slant column (window 2)" for 2025-10-09 to 2025-10-09

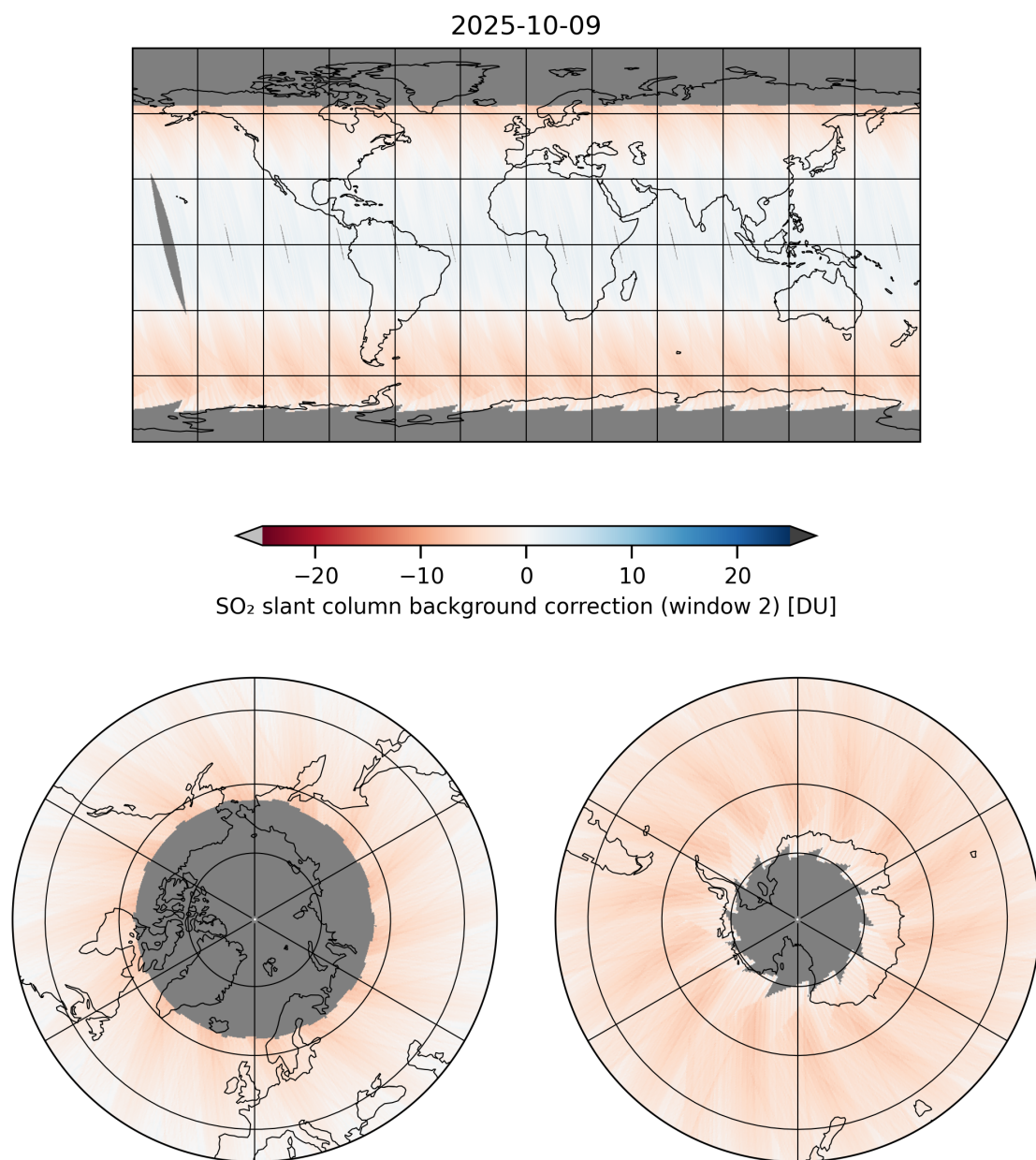


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-10-09 to 2025-10-09

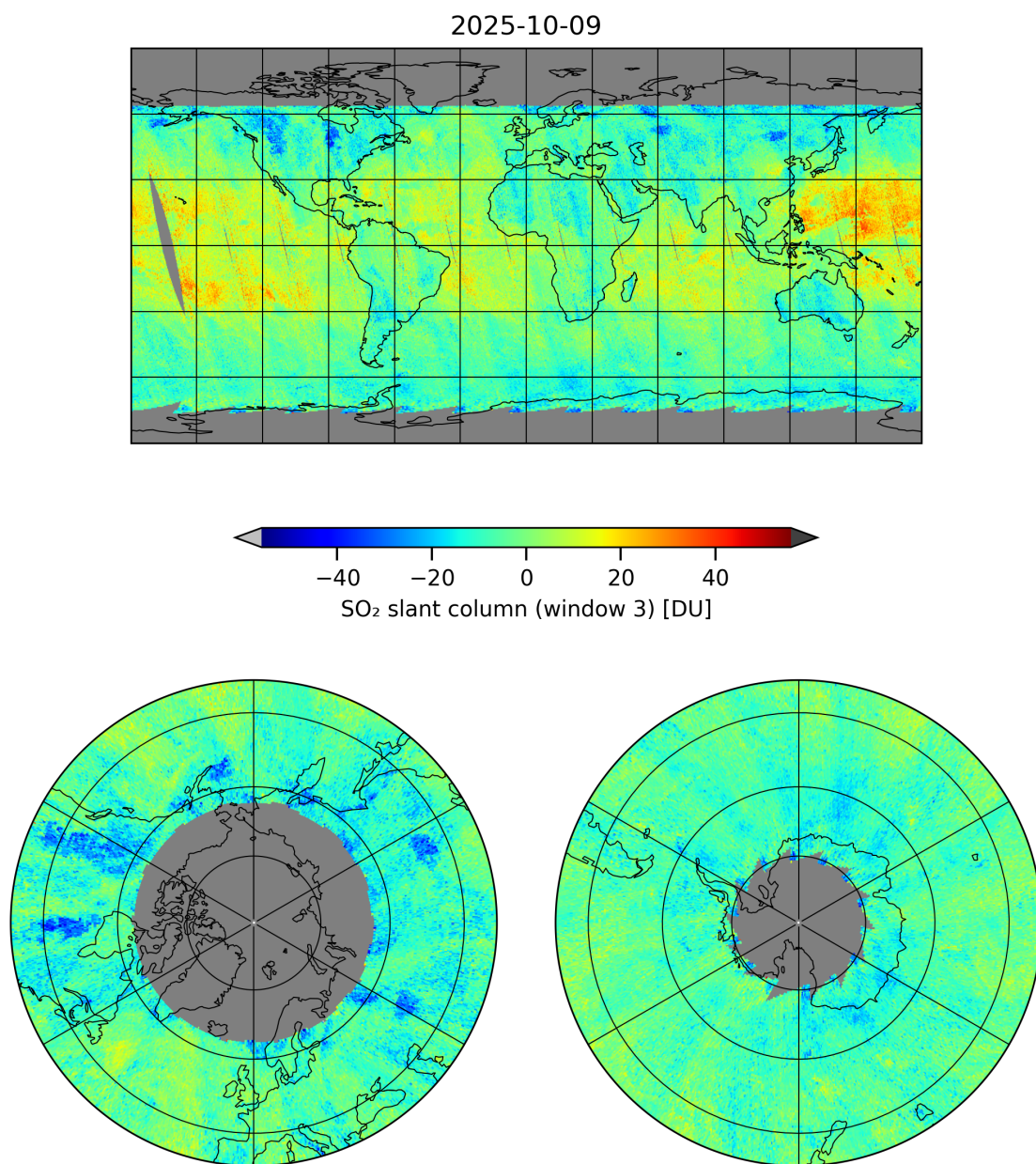


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-10-09 to 2025-10-09

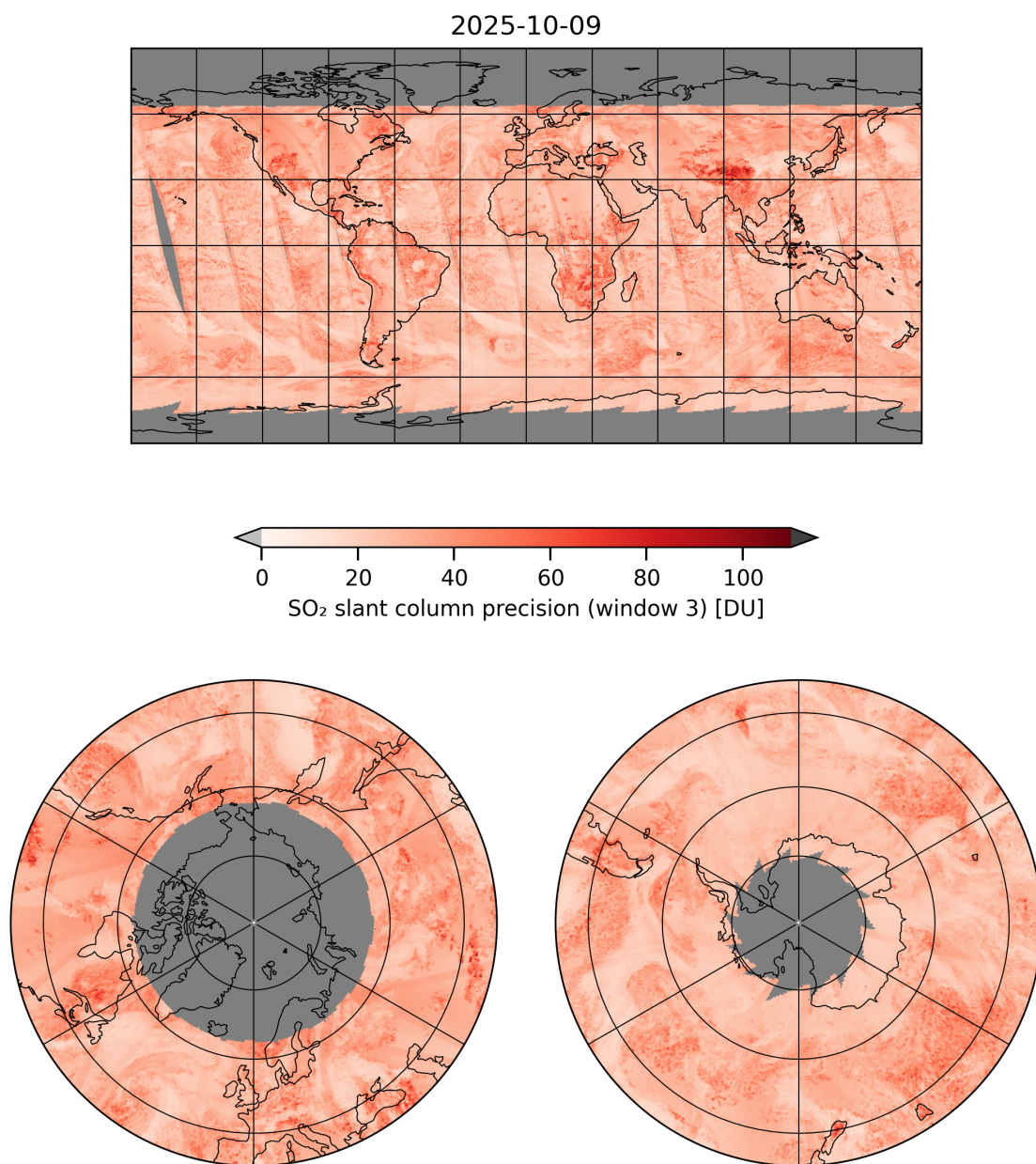


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-10-09 to 2025-10-09

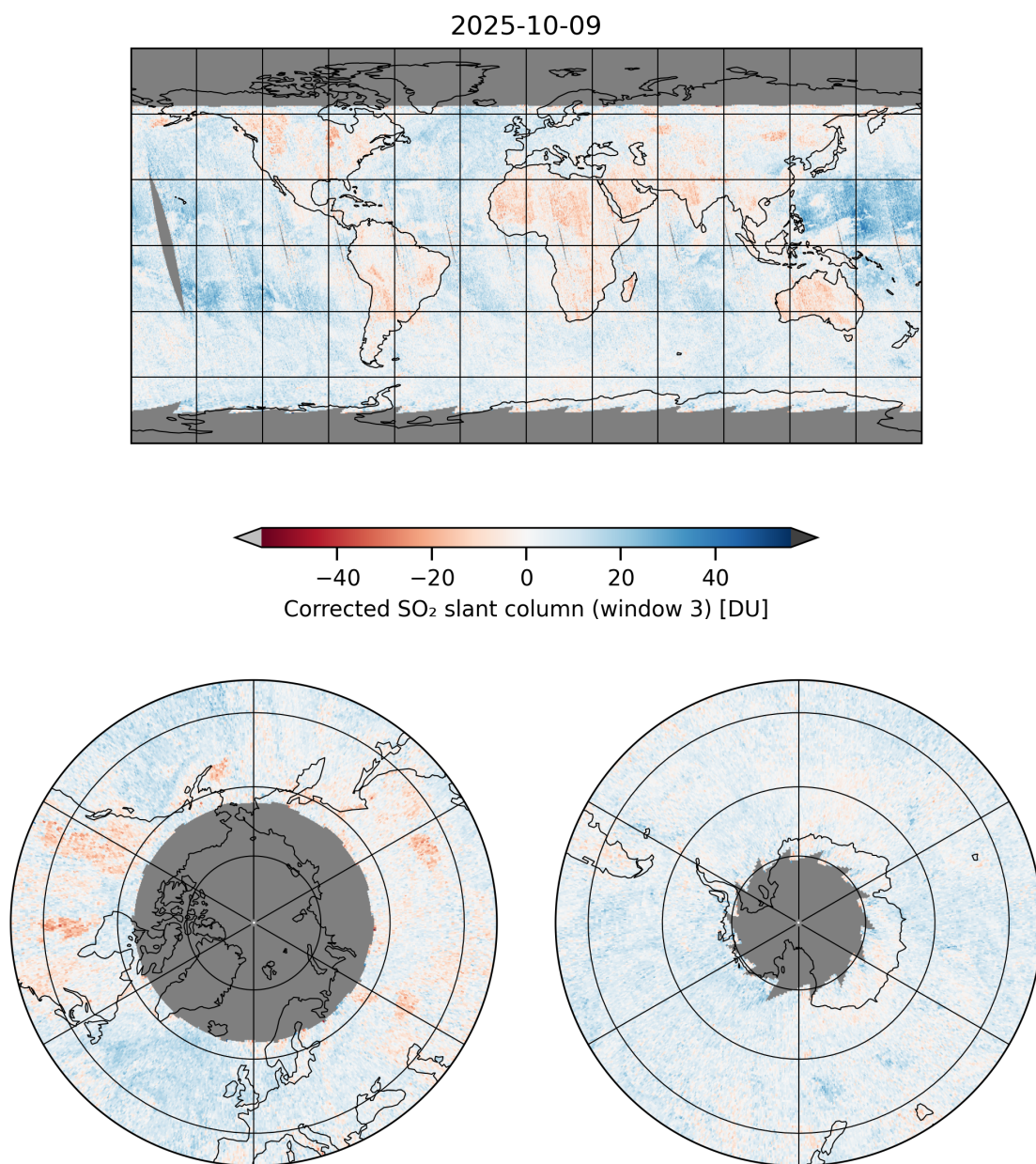


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-10-09 to 2025-10-09

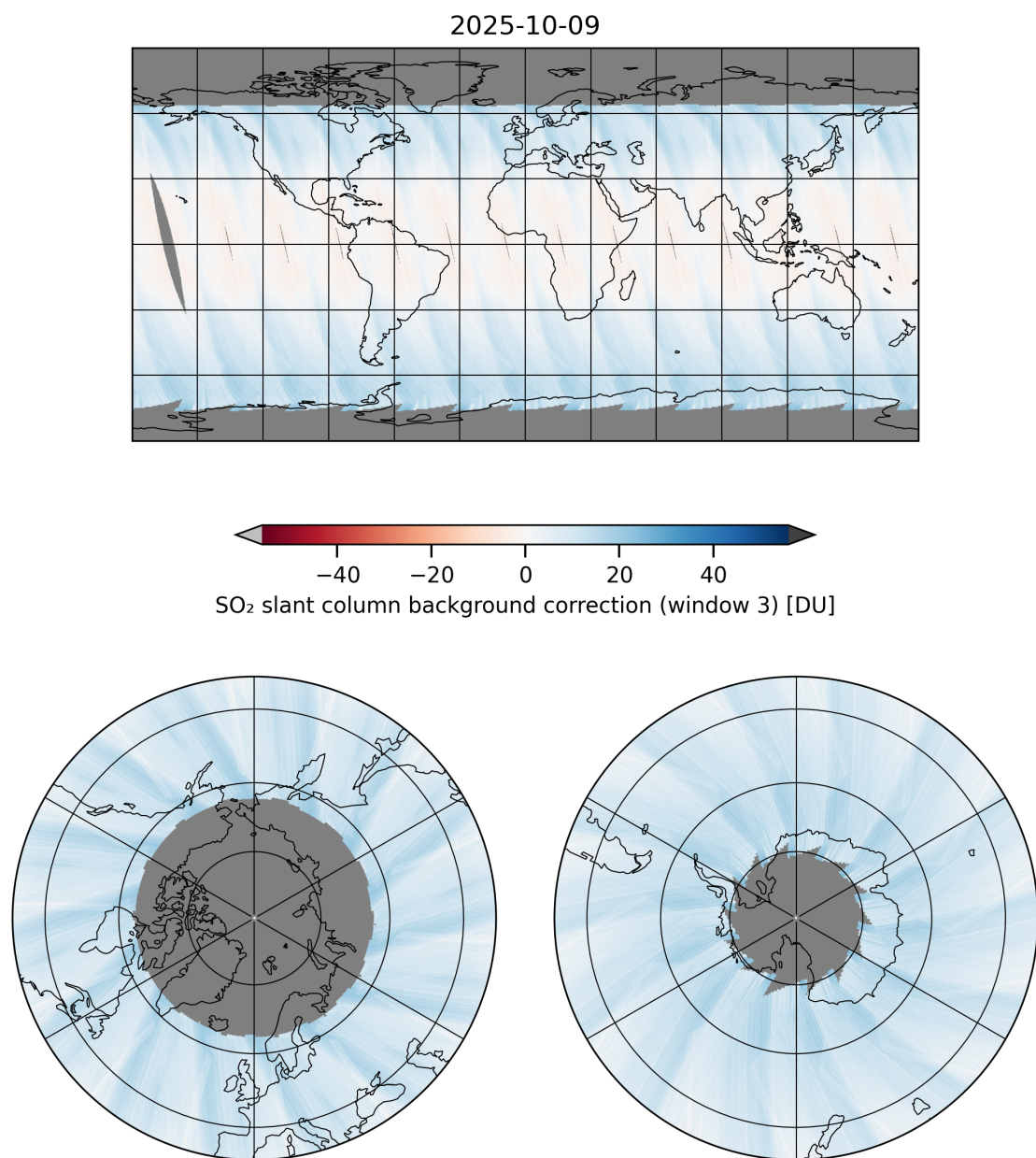


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-10-09 to 2025-10-09

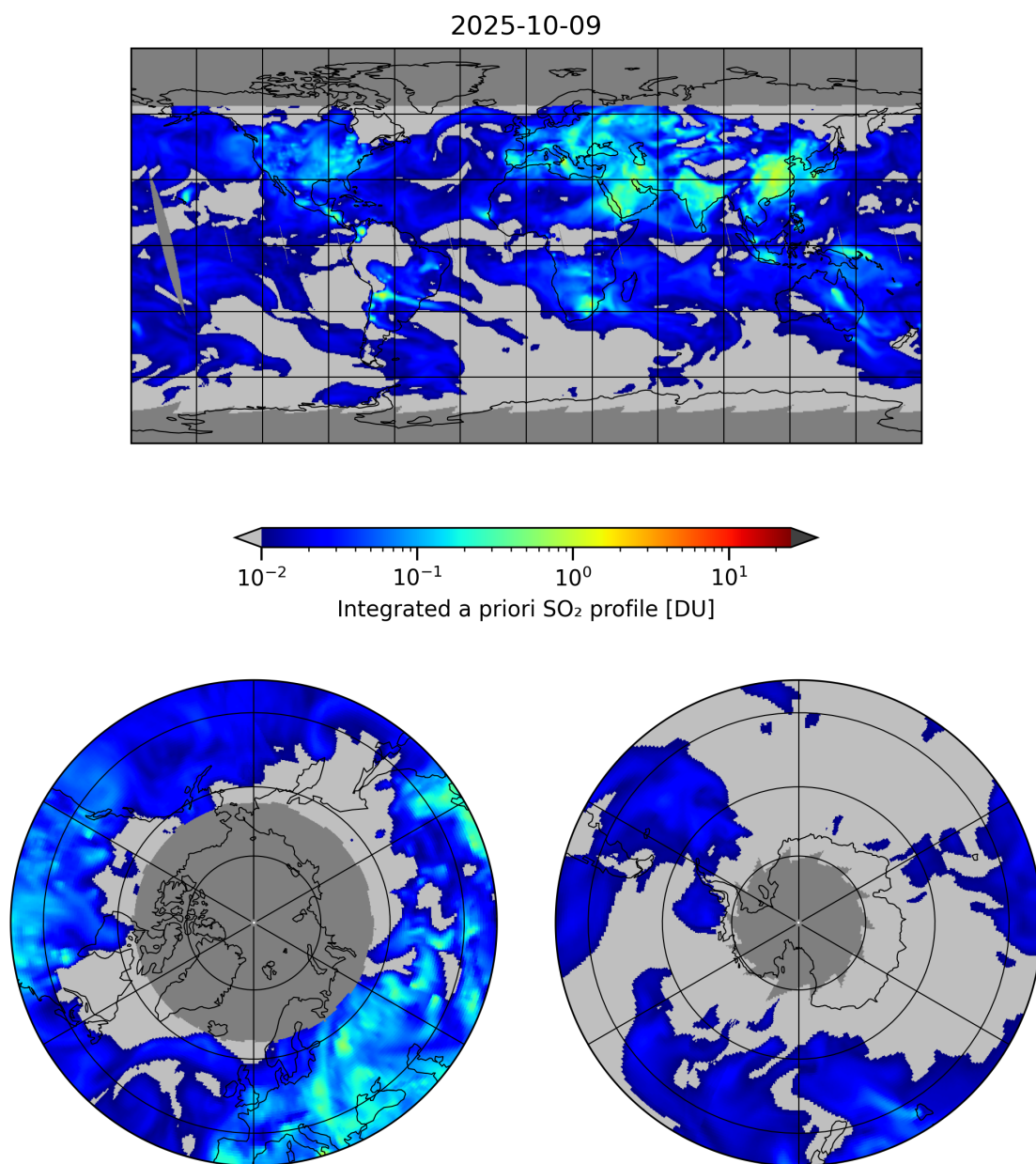


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-10-09 to 2025-10-09

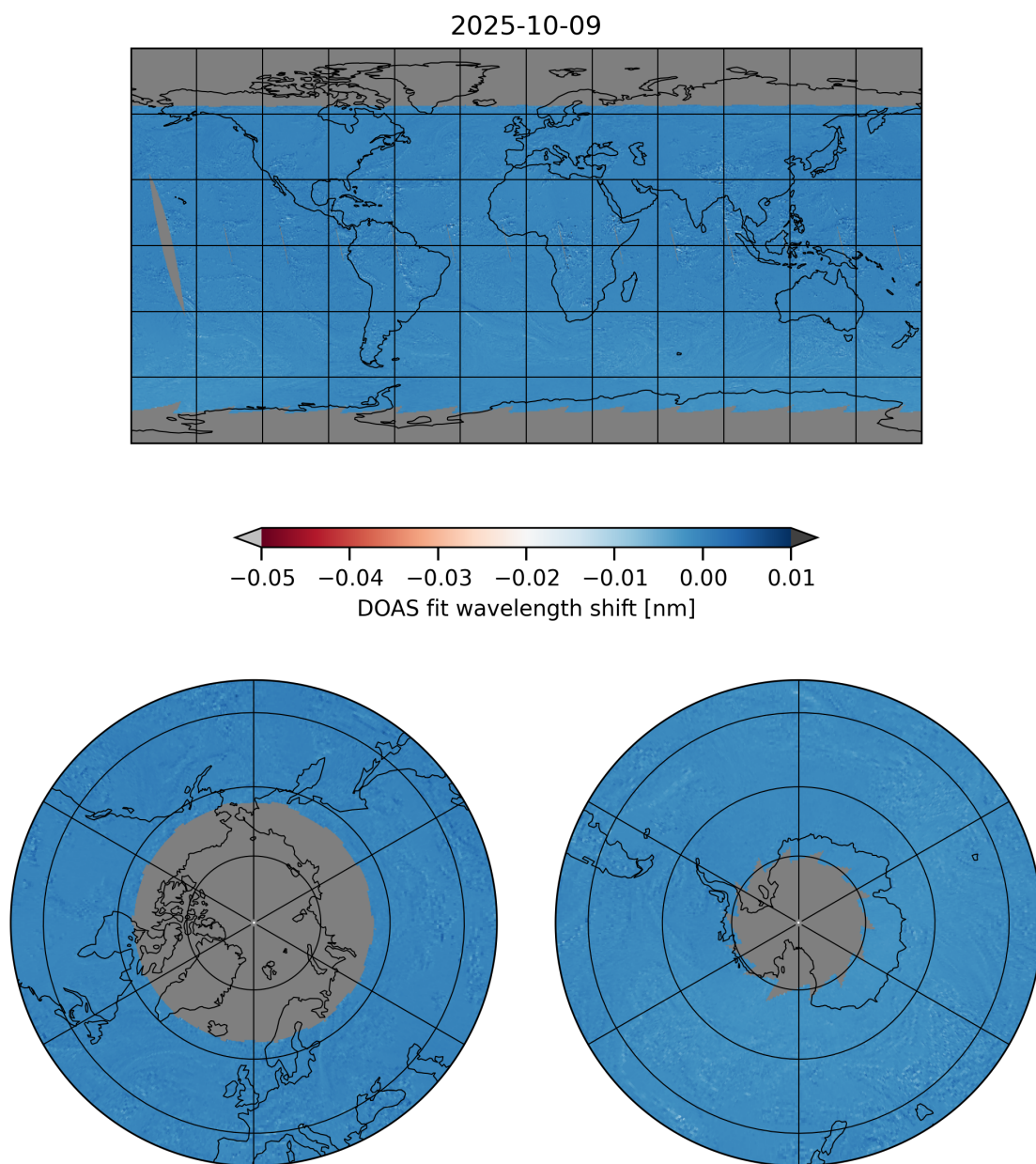


Figure 22: Map of “DOAS fit wavelength shift” for 2025-10-09 to 2025-10-09

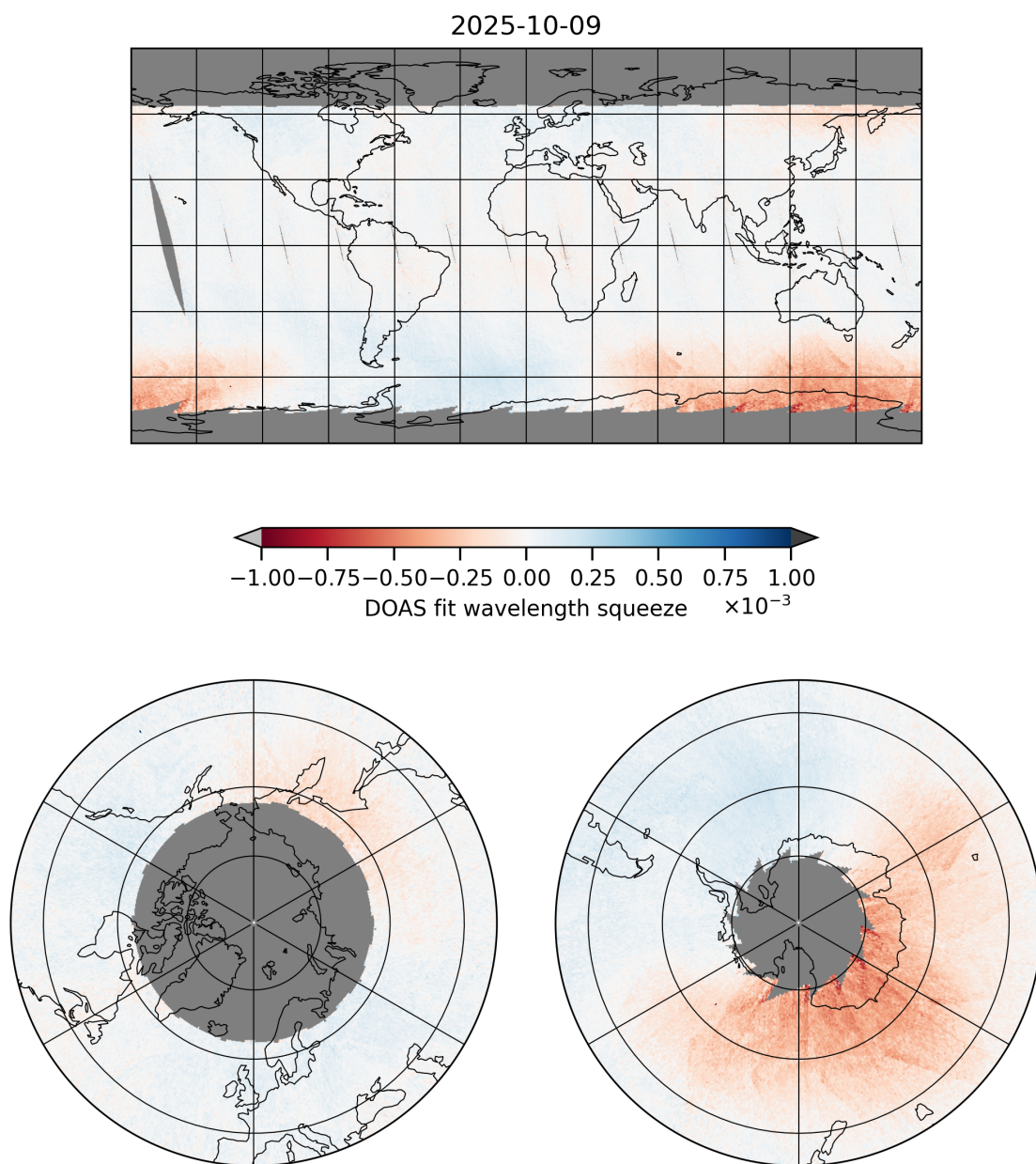


Figure 23: Map of "DOAS fit wavelength squeeze" for 2025-10-09 to 2025-10-09

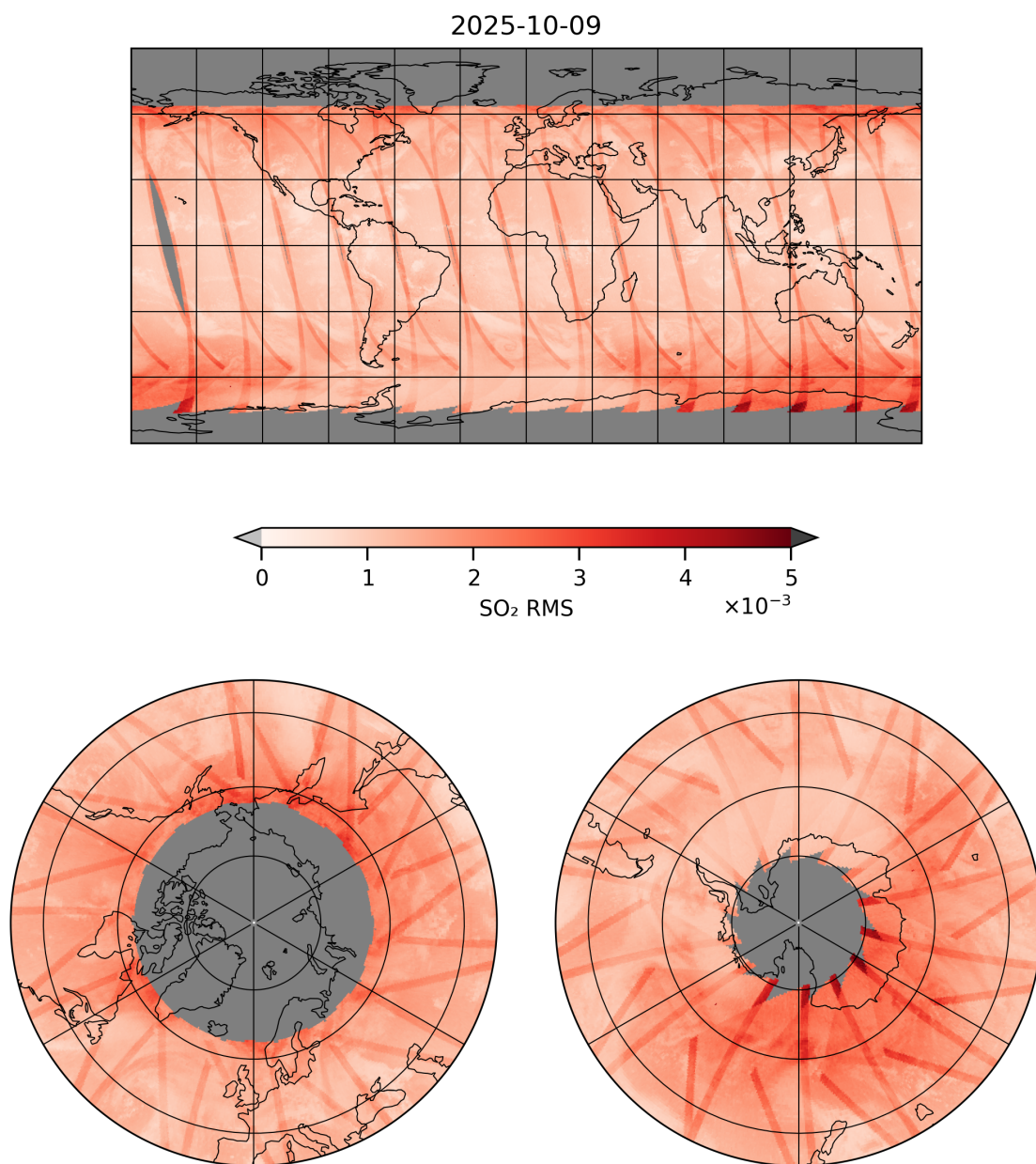


Figure 24: Map of “SO₂ RMS” for 2025-10-09 to 2025-10-09

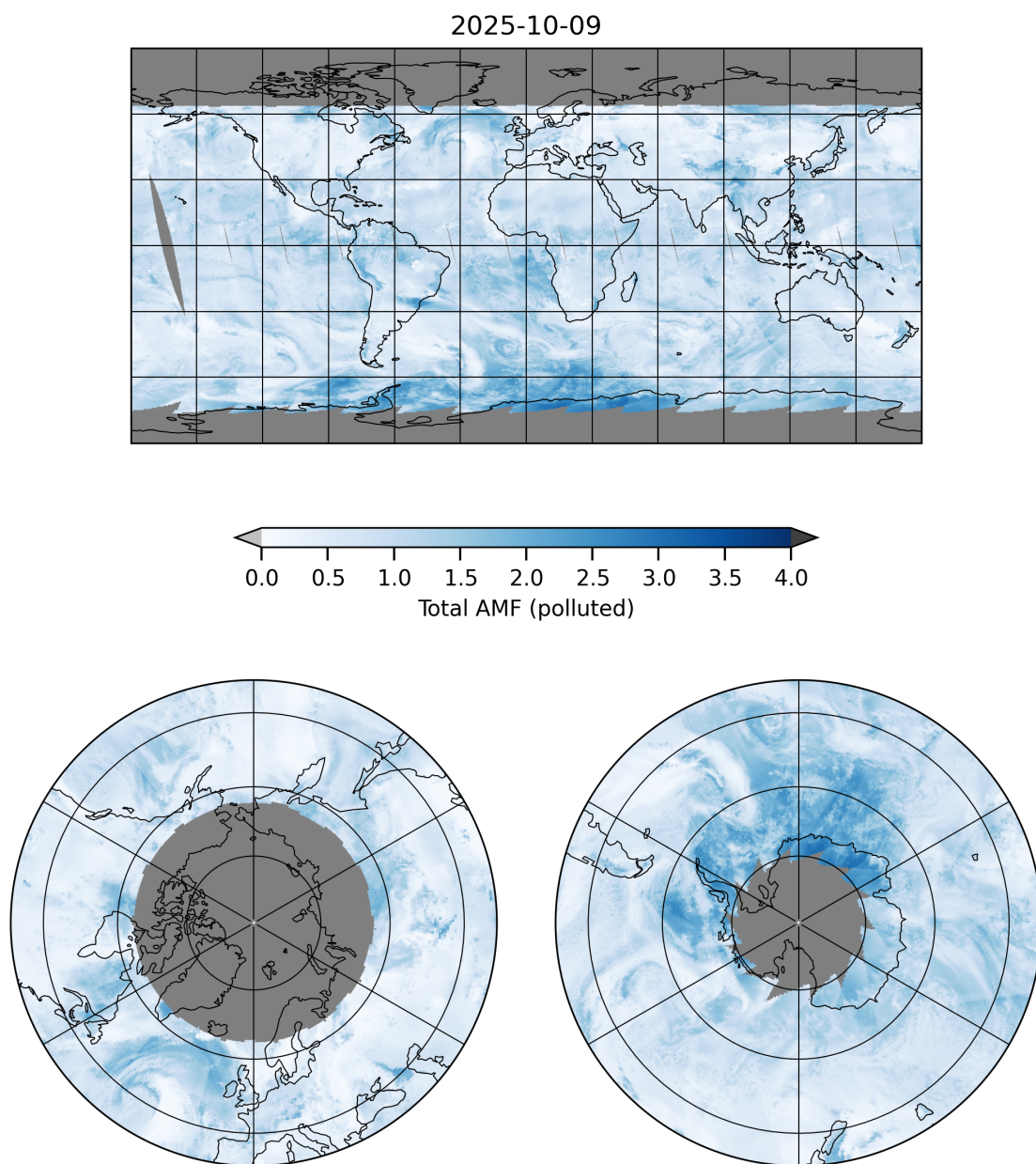


Figure 25: Map of “Total AMF (polluted)” for 2025-10-09 to 2025-10-09

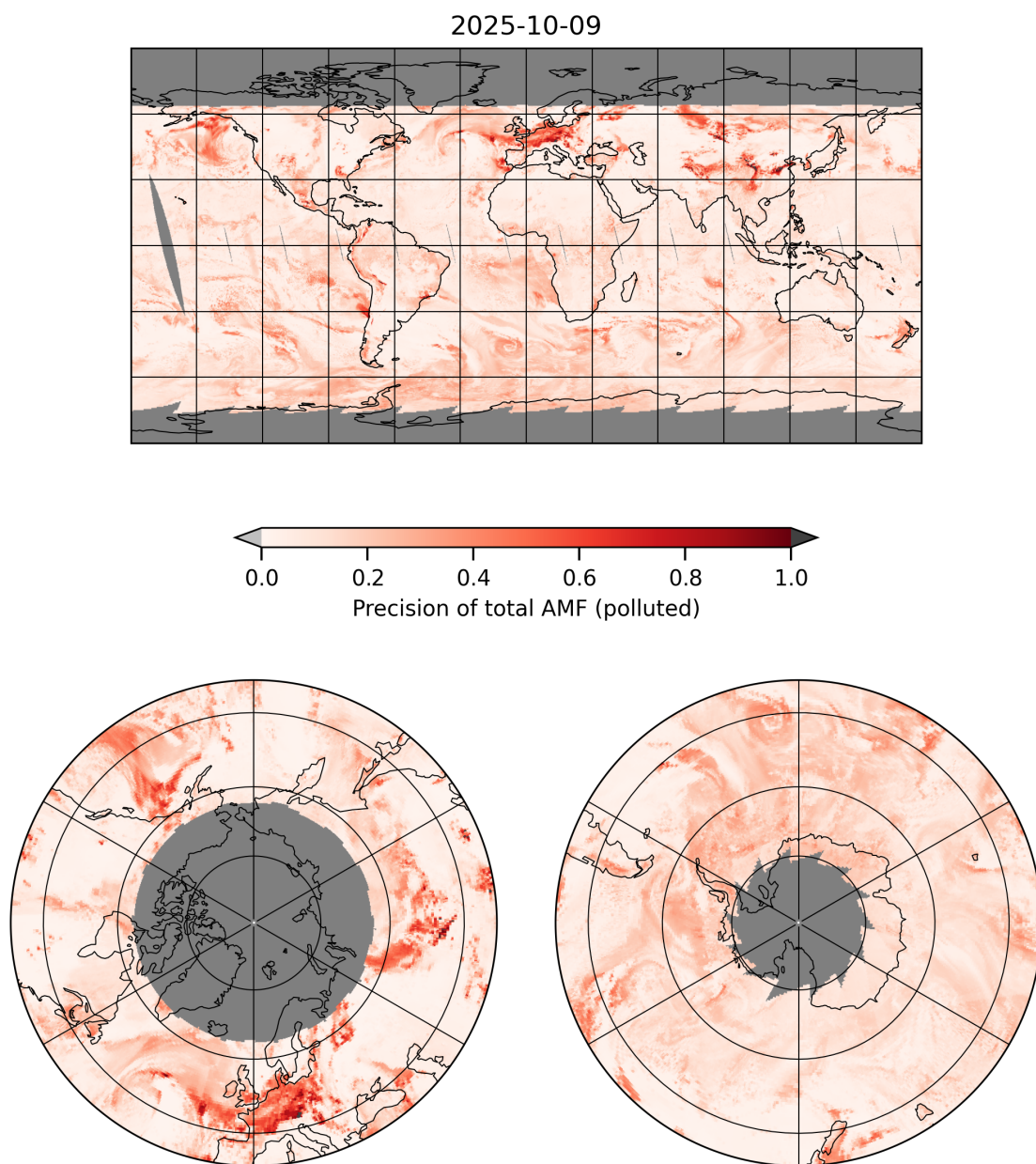


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-10-09 to 2025-10-09

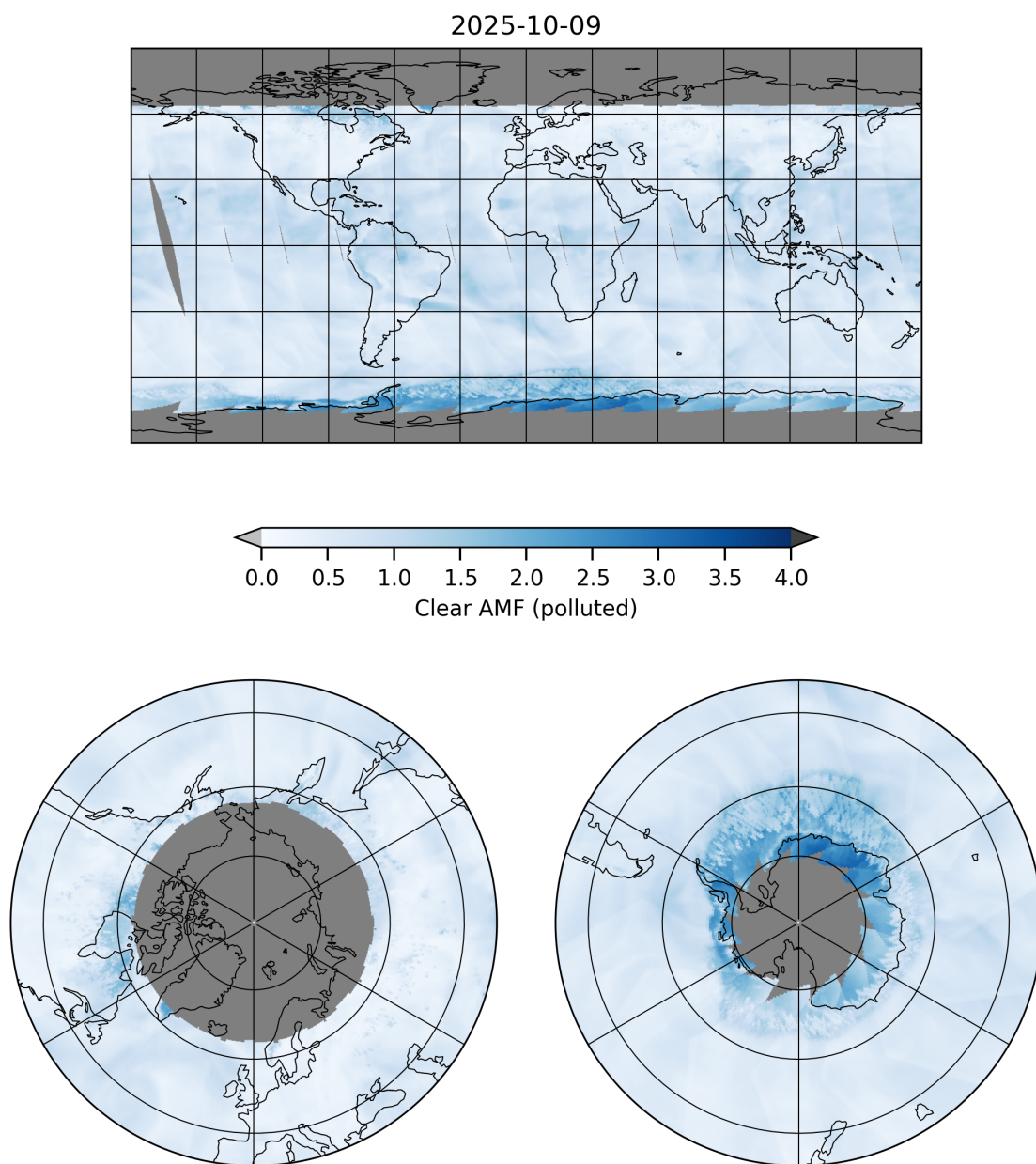


Figure 27: Map of “Clear AMF (polluted)” for 2025-10-09 to 2025-10-09

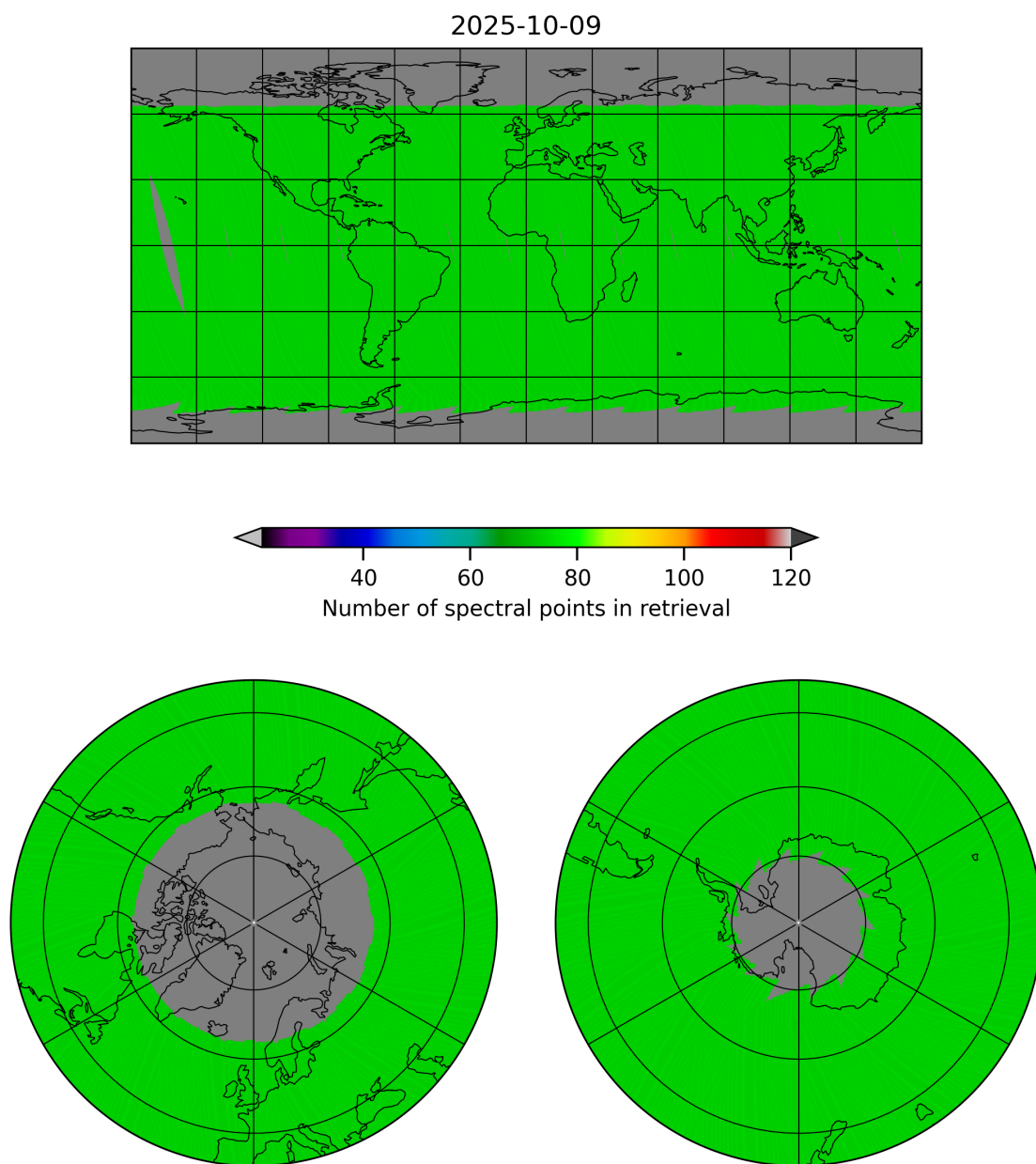


Figure 28: Map of “Number of spectral points in retrieval” for 2025-10-09 to 2025-10-09

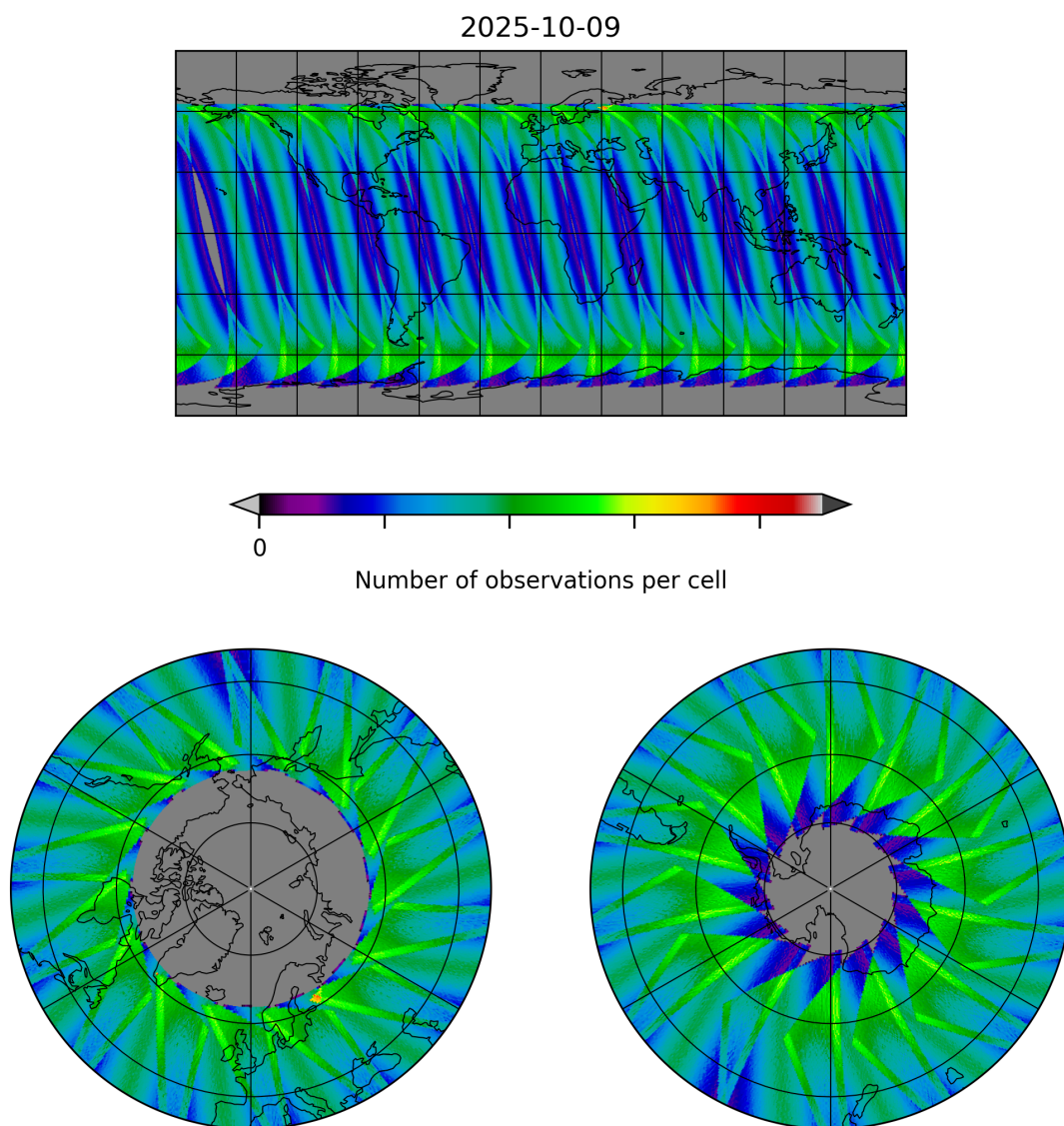


Figure 29: Map of the number of observations for 2025-10-09 to 2025-10-09

7 Zonal average

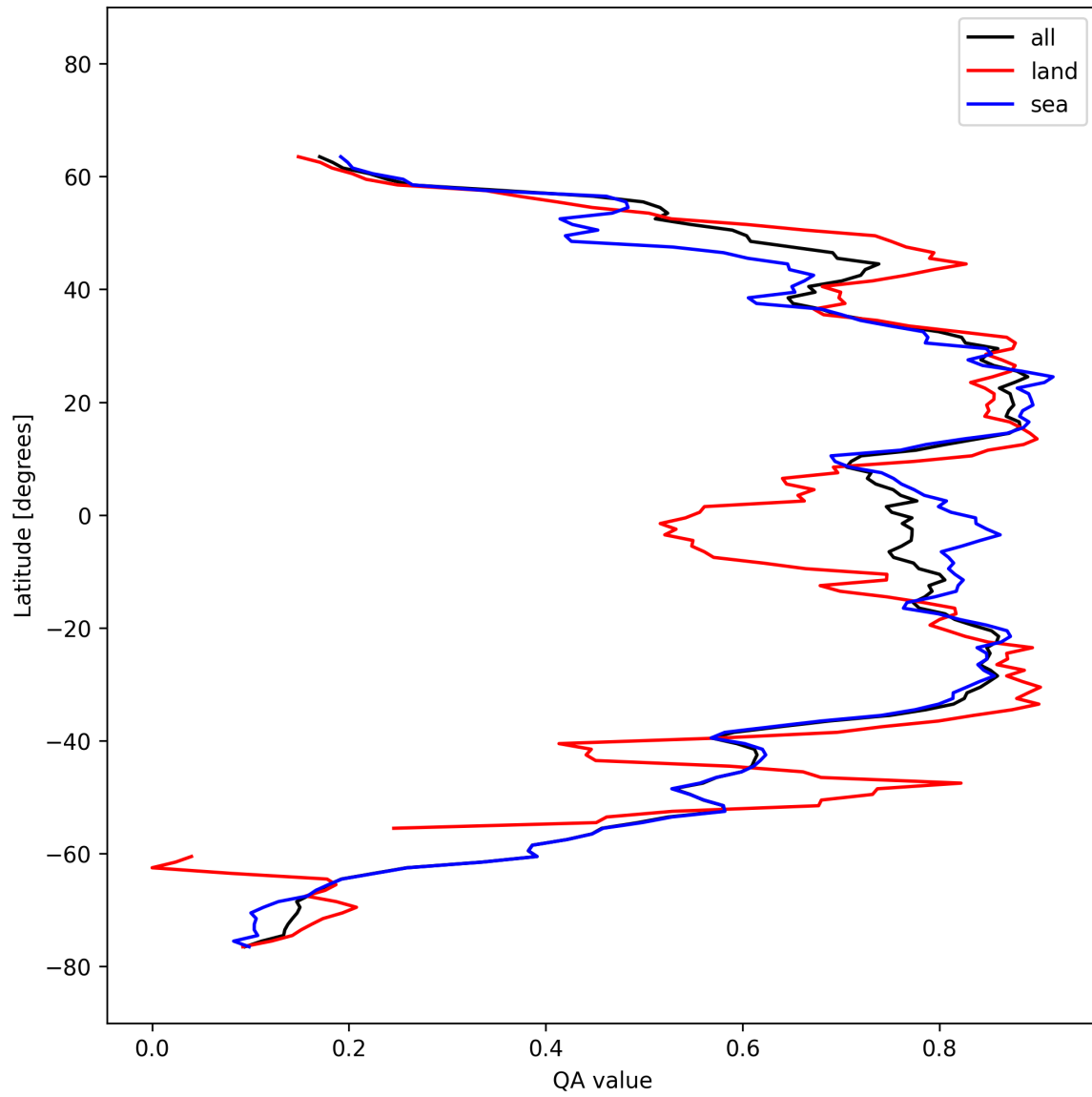


Figure 30: Zonal average of “QA value” for 2025-10-09 to 2025-10-09.

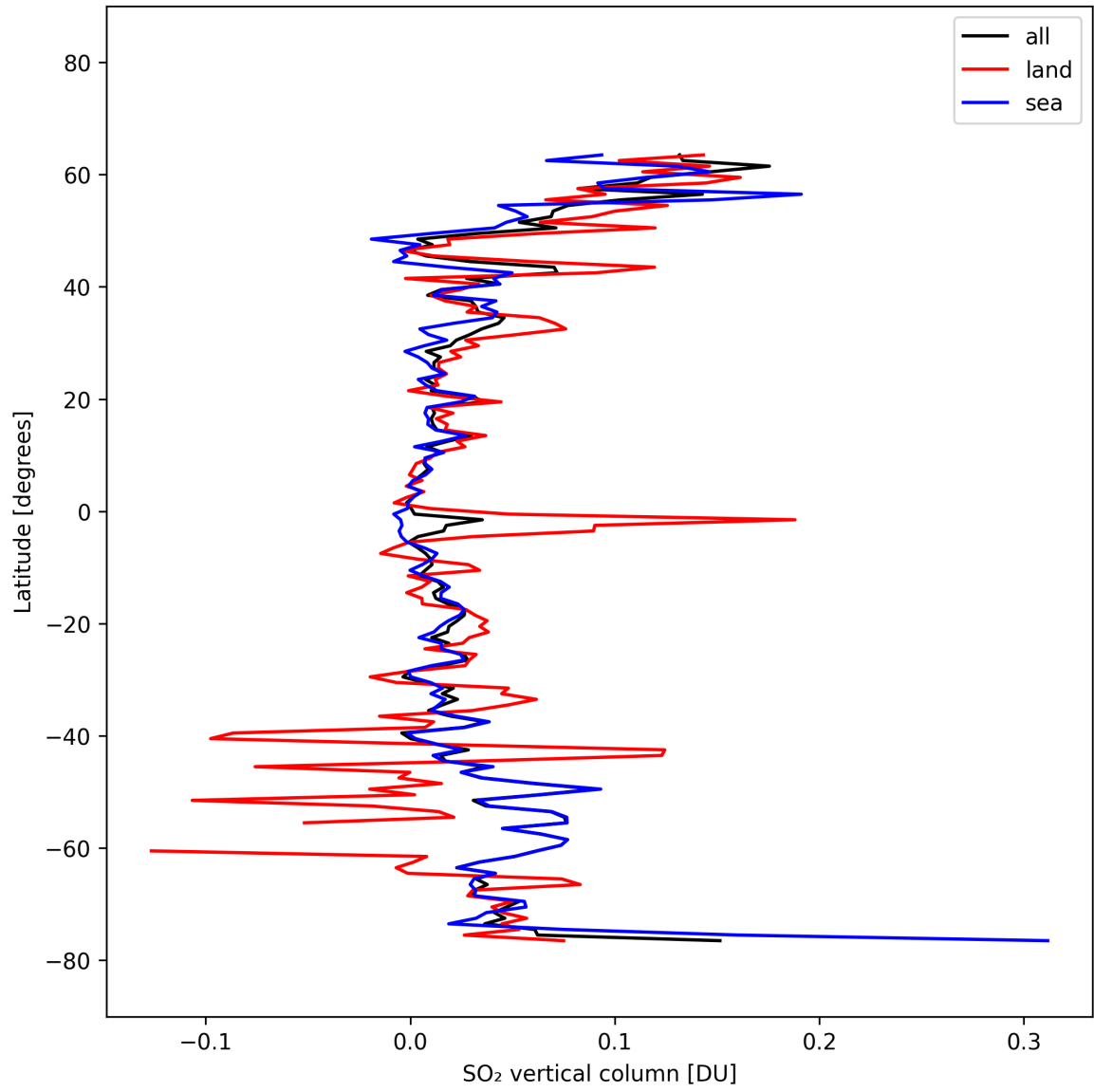


Figure 31: Zonal average of “SO₂ vertical column” for 2025-10-09 to 2025-10-09.

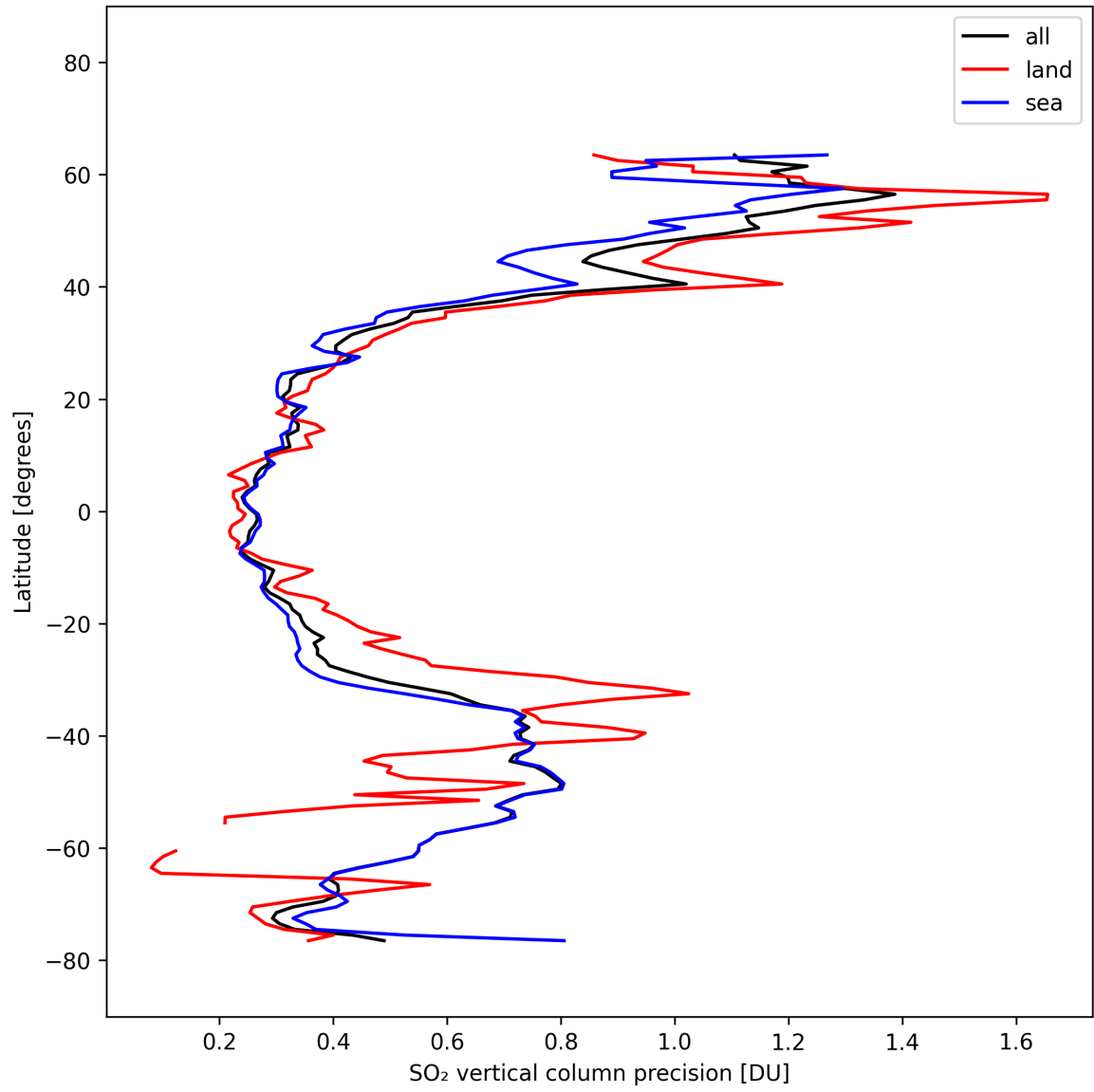


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-10-09 to 2025-10-09.

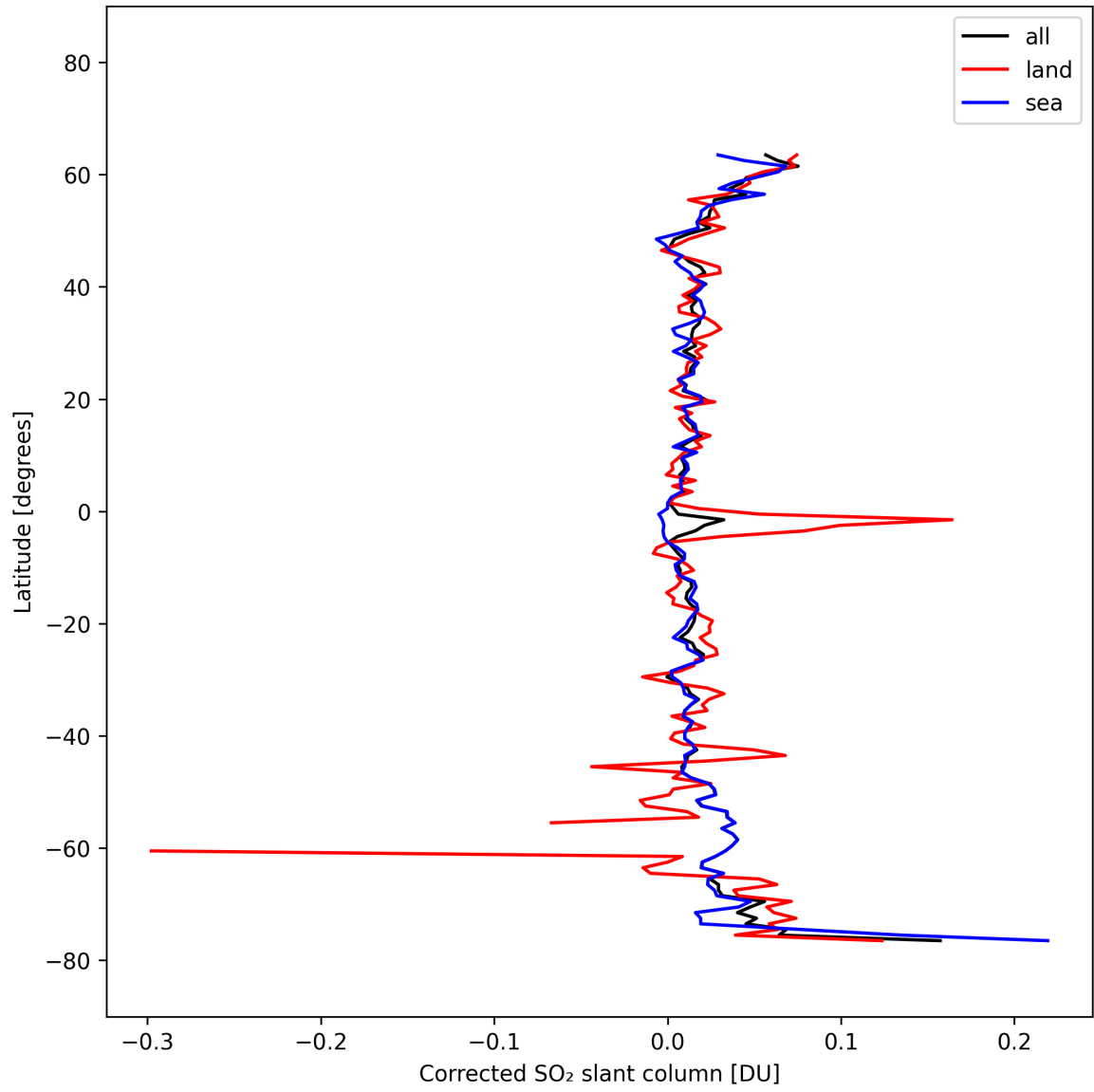


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-10-09 to 2025-10-09.

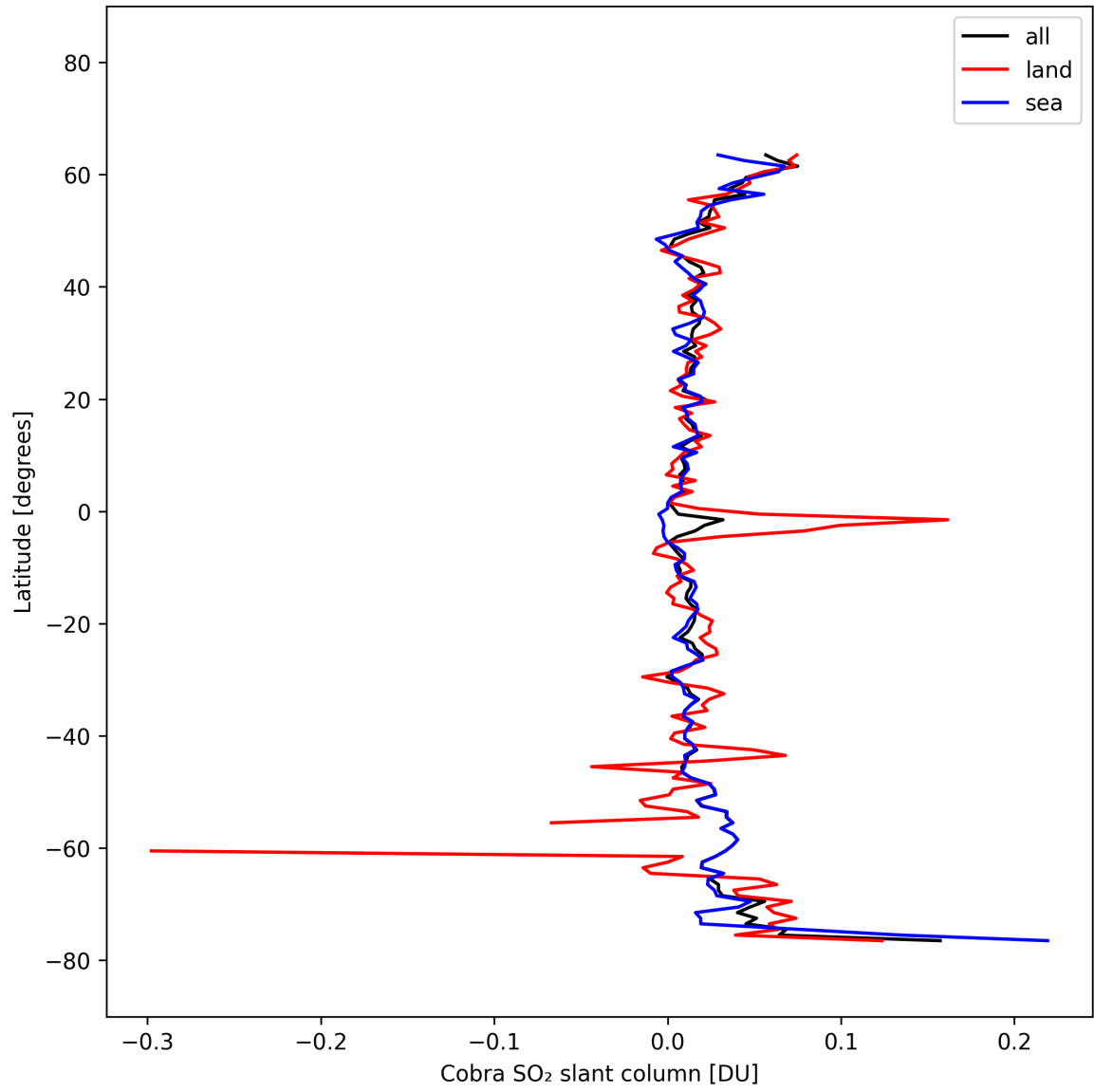


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-10-09 to 2025-10-09.

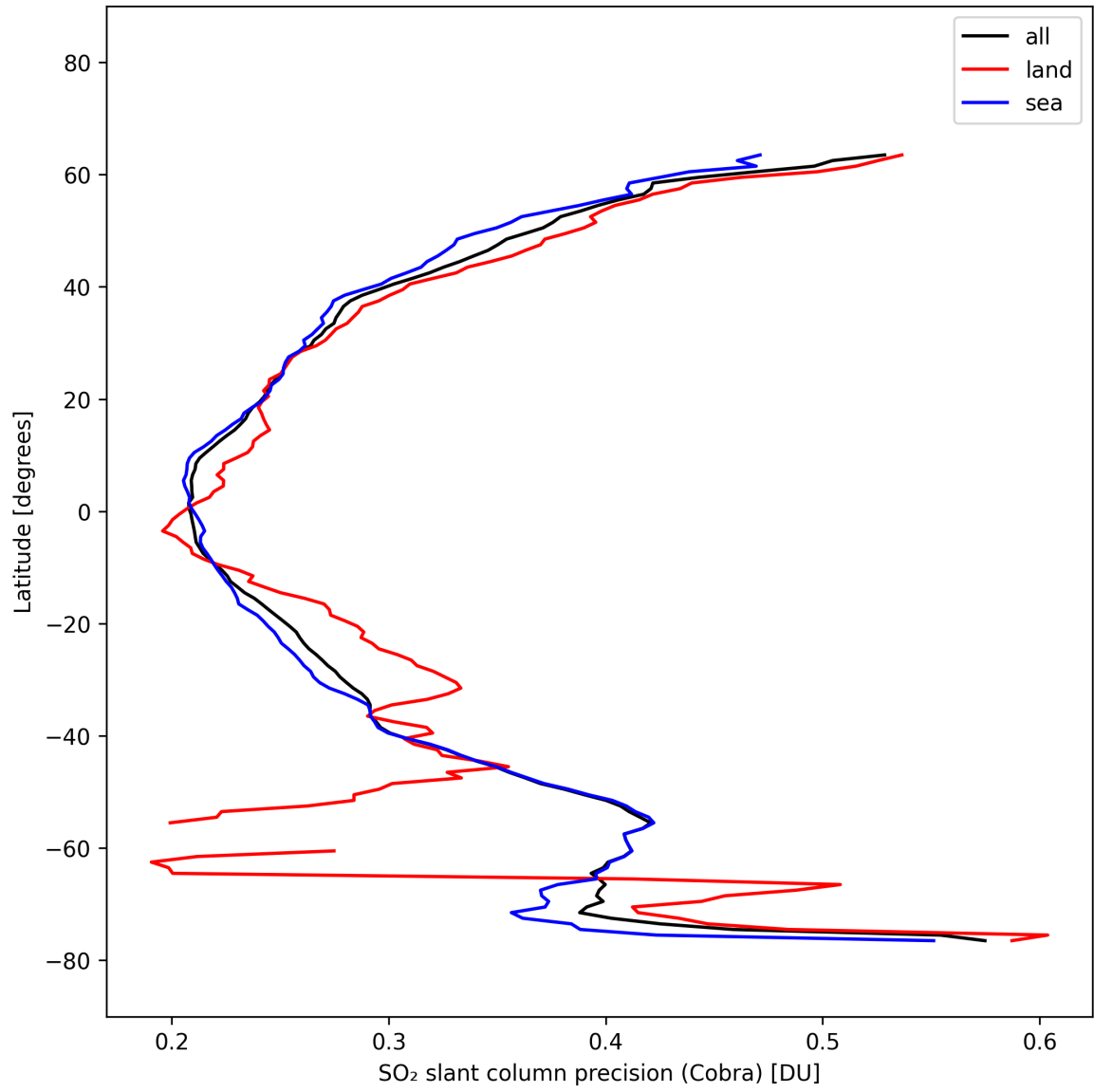


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-10-09 to 2025-10-09.

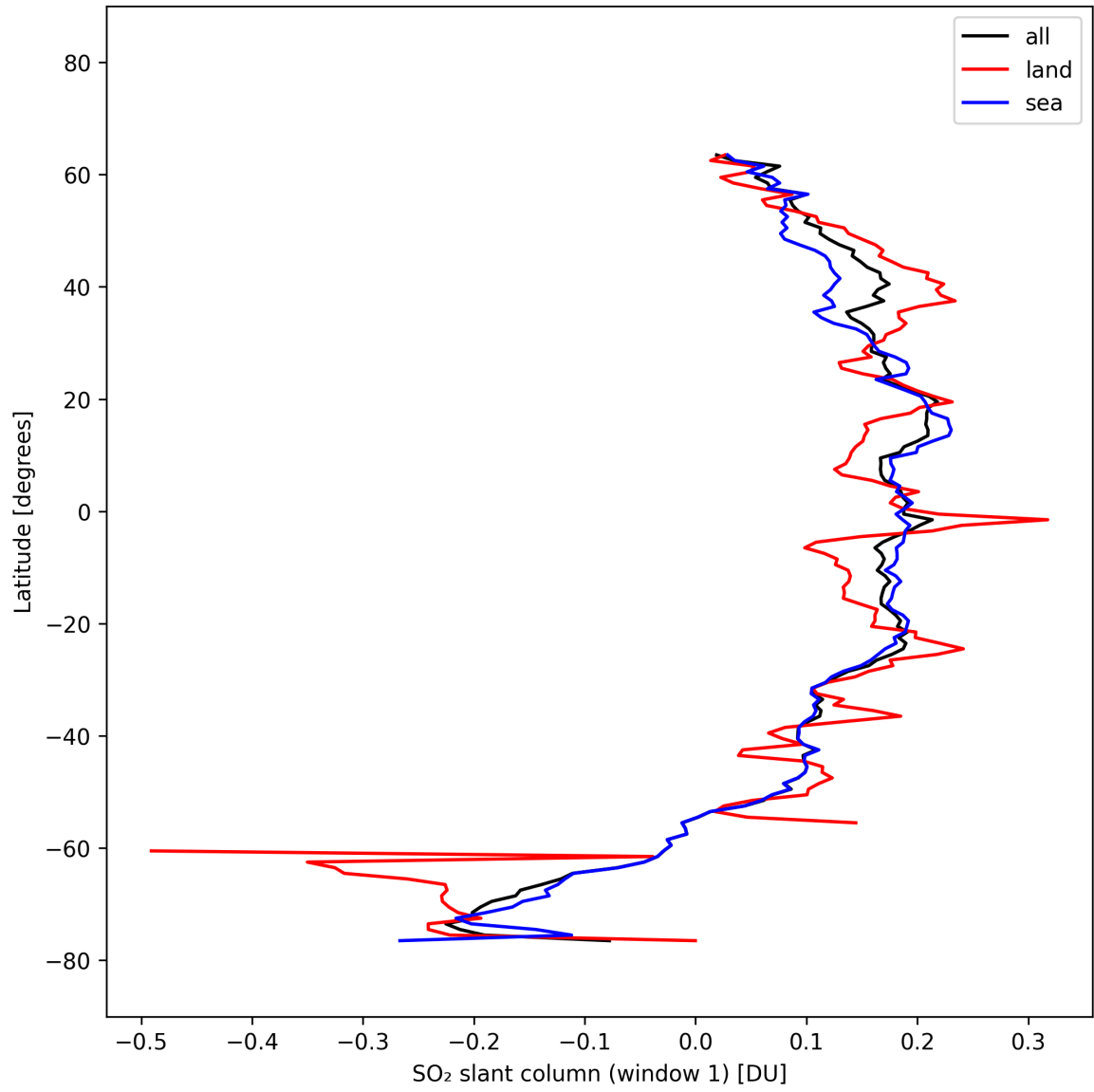


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-10-09 to 2025-10-09.

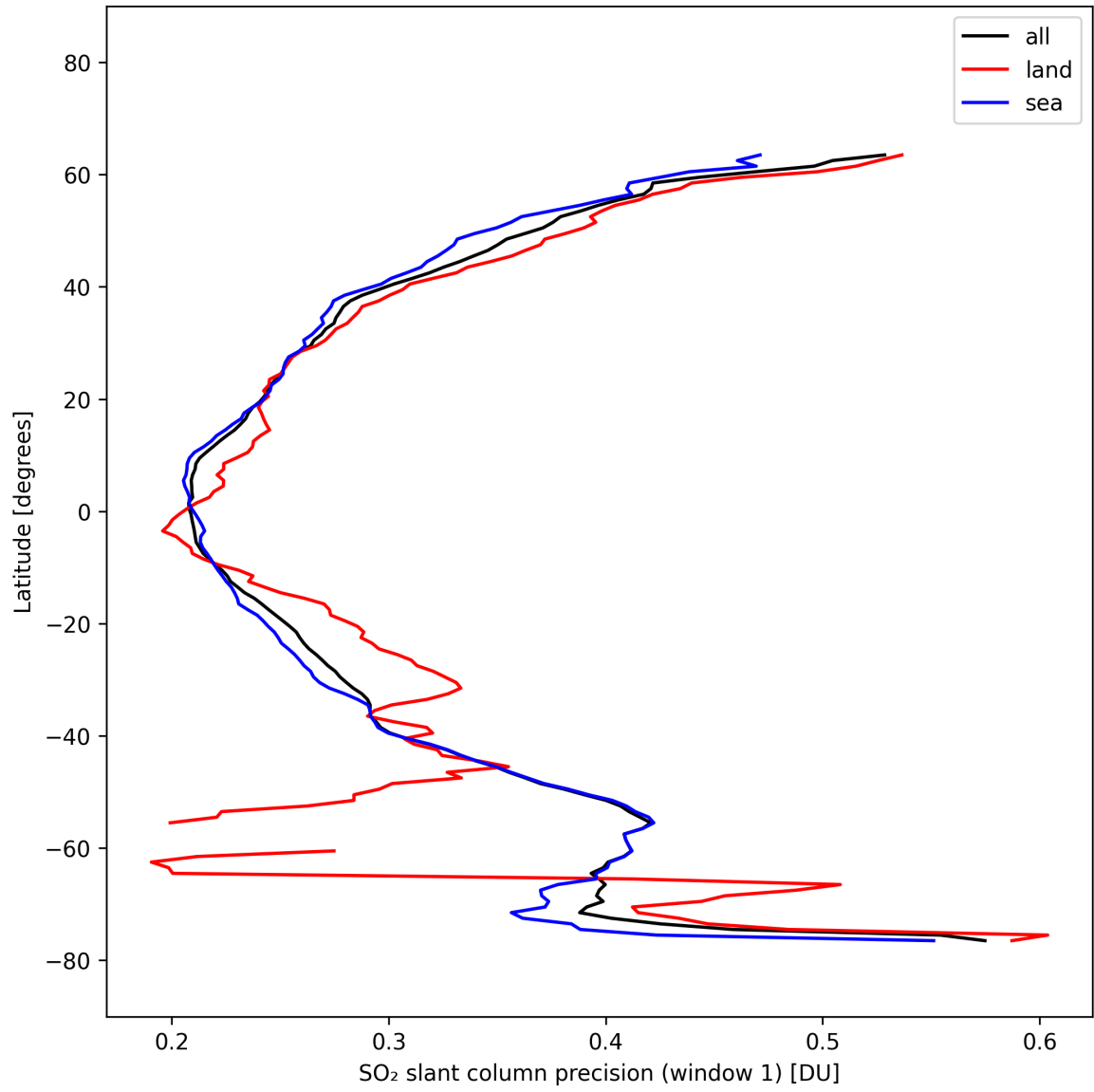


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-10-09 to 2025-10-09.

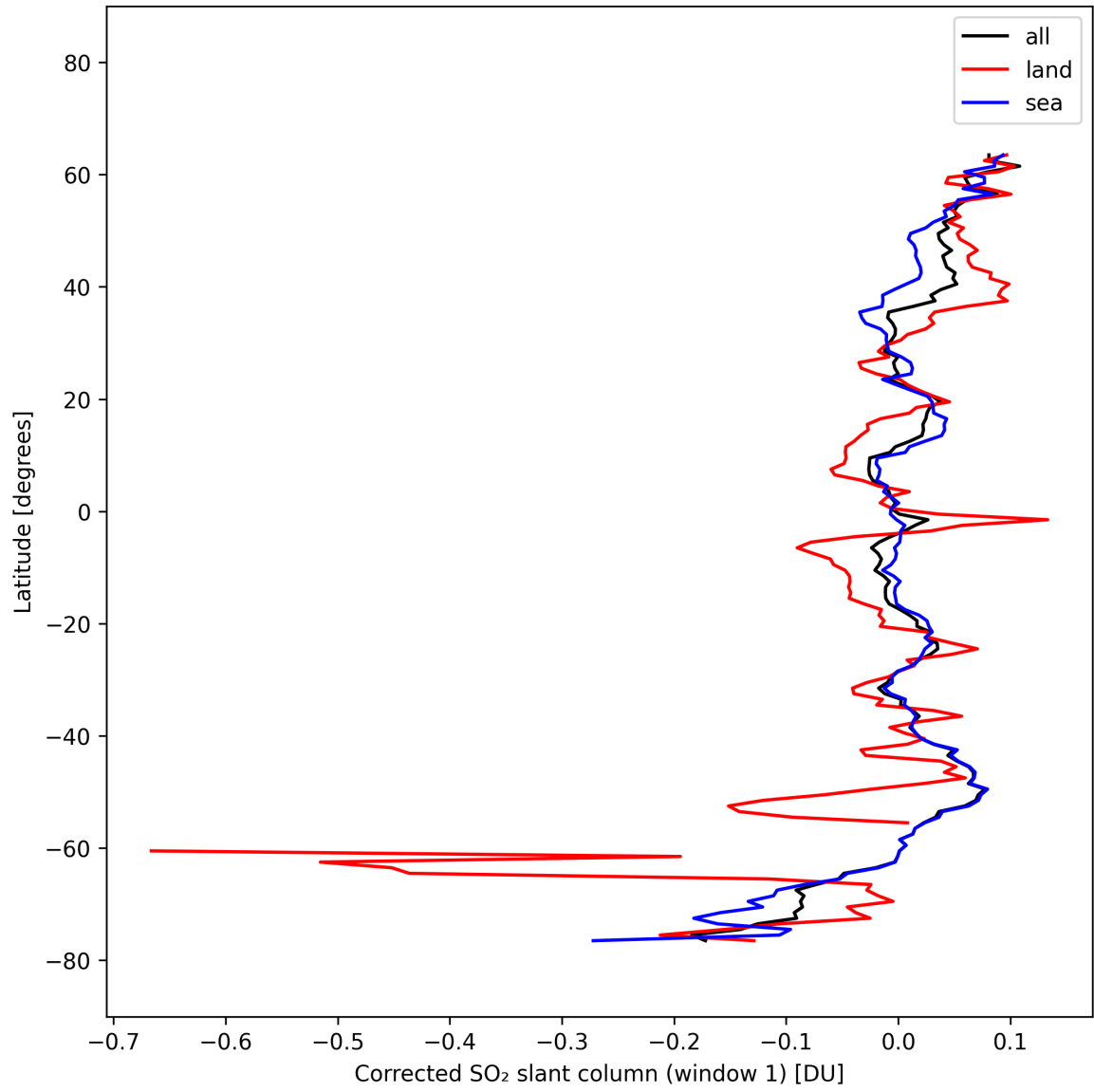


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-10-09 to 2025-10-09.

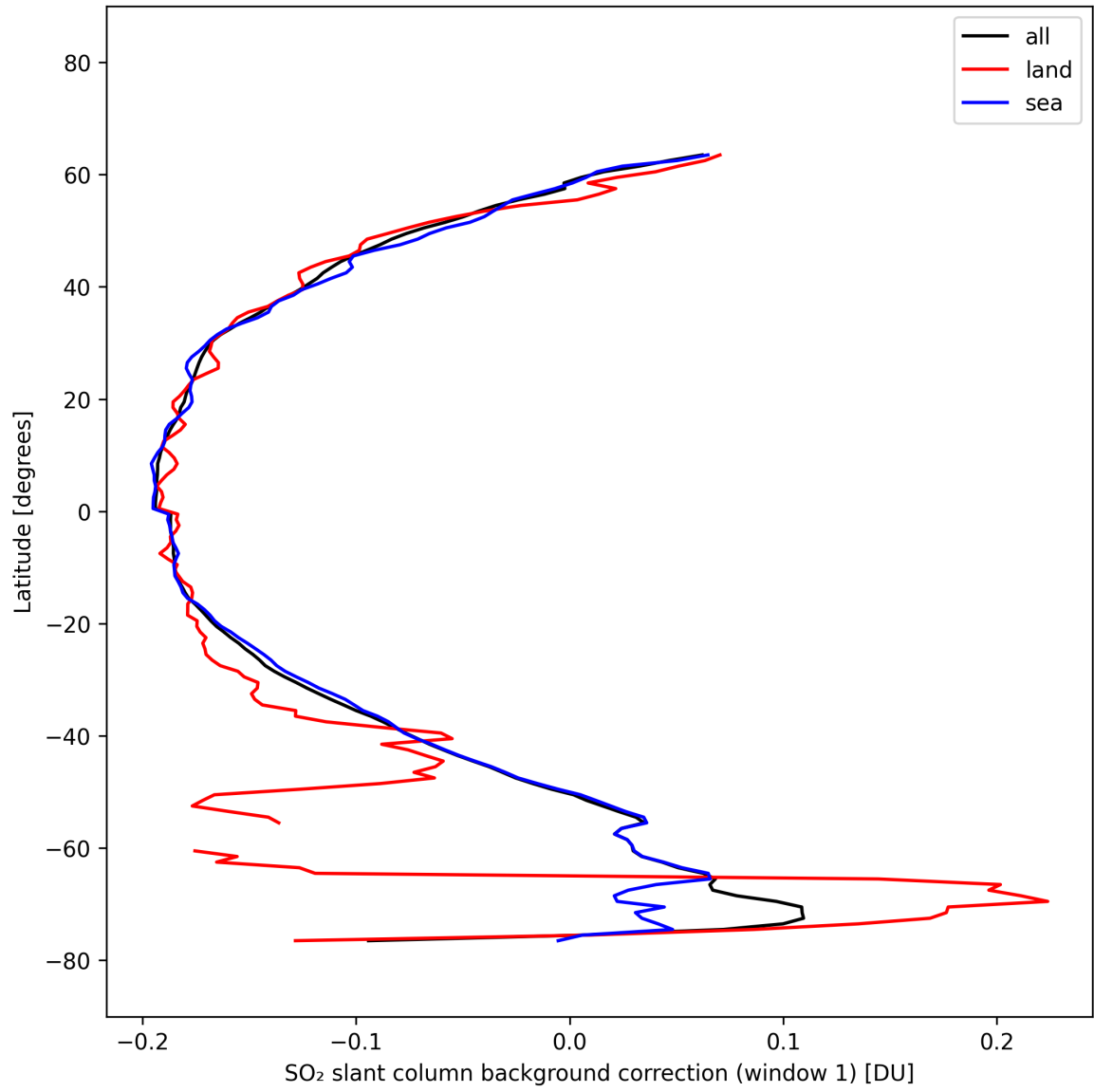


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-10-09 to 2025-10-09.

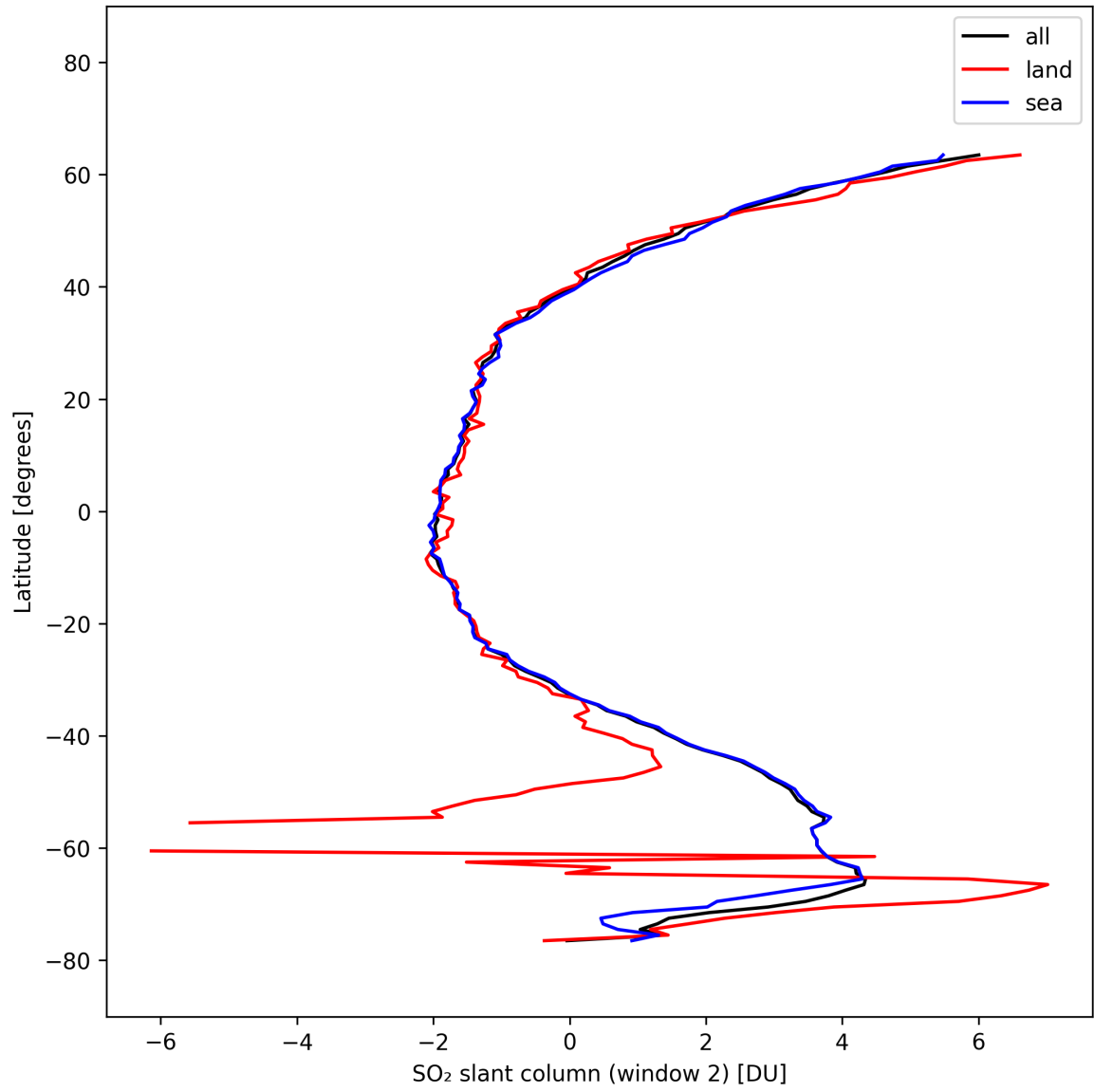


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-10-09 to 2025-10-09.

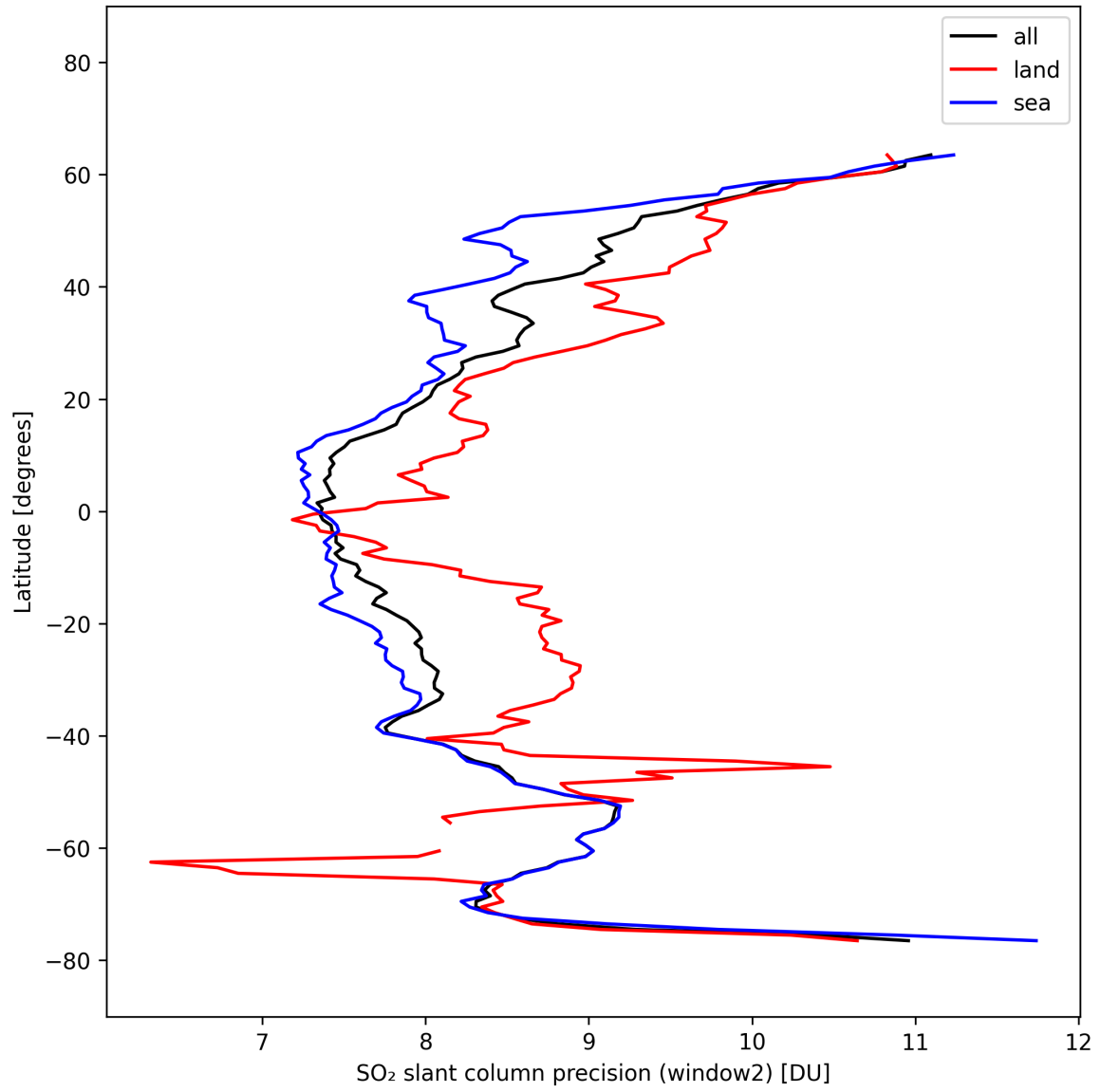


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-10-09 to 2025-10-09.

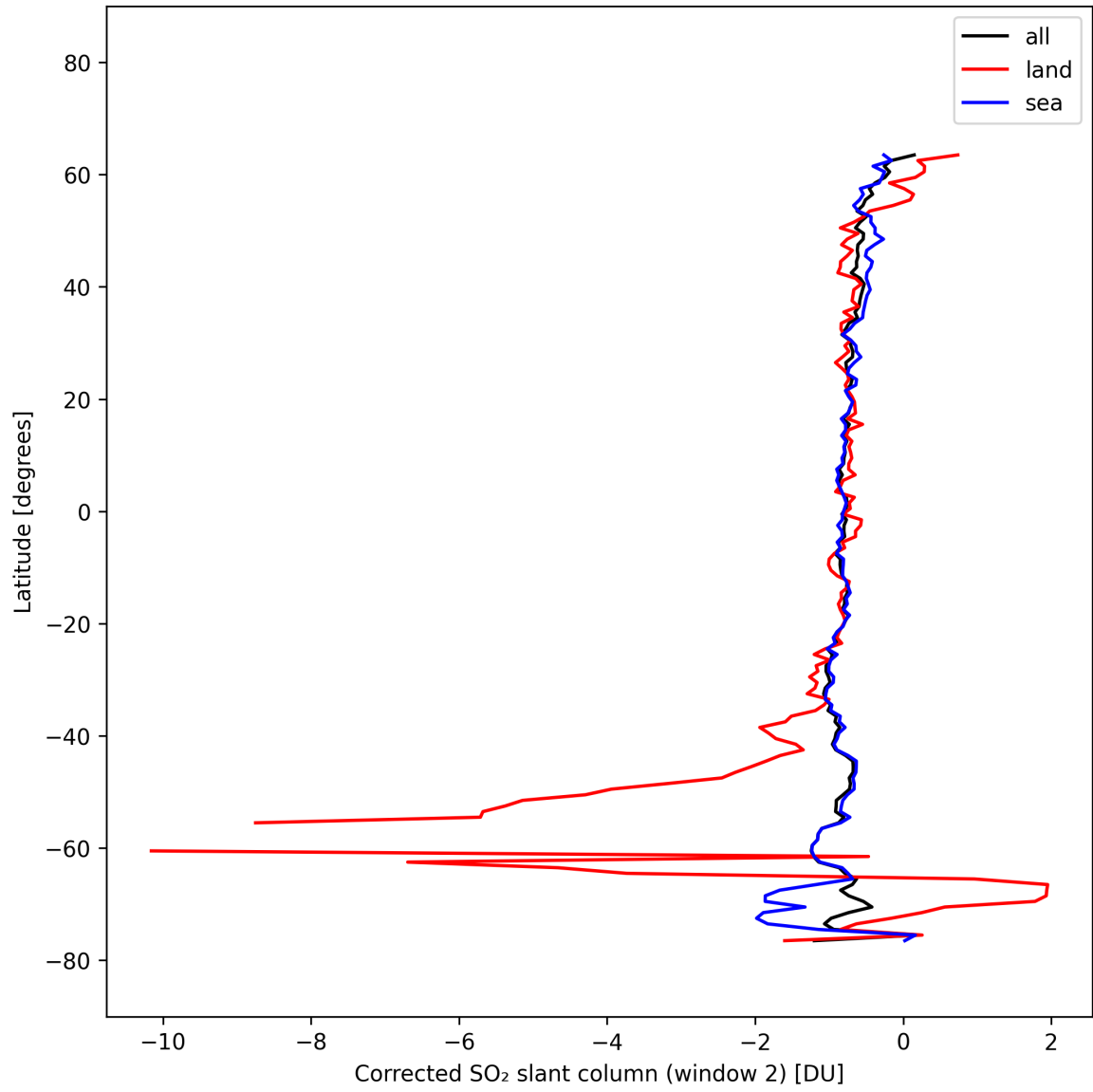


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-10-09 to 2025-10-09.

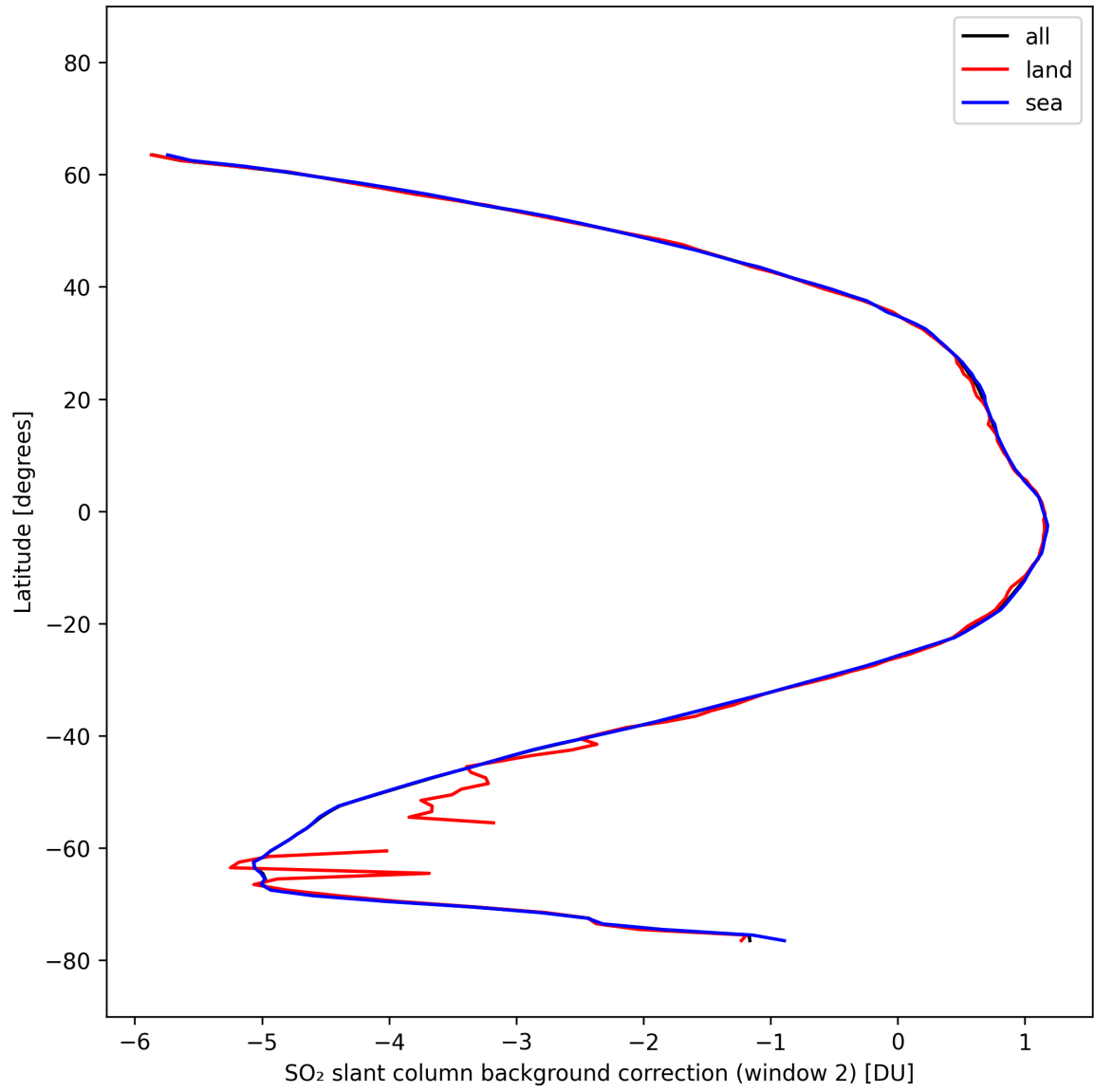


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-10-09 to 2025-10-09.

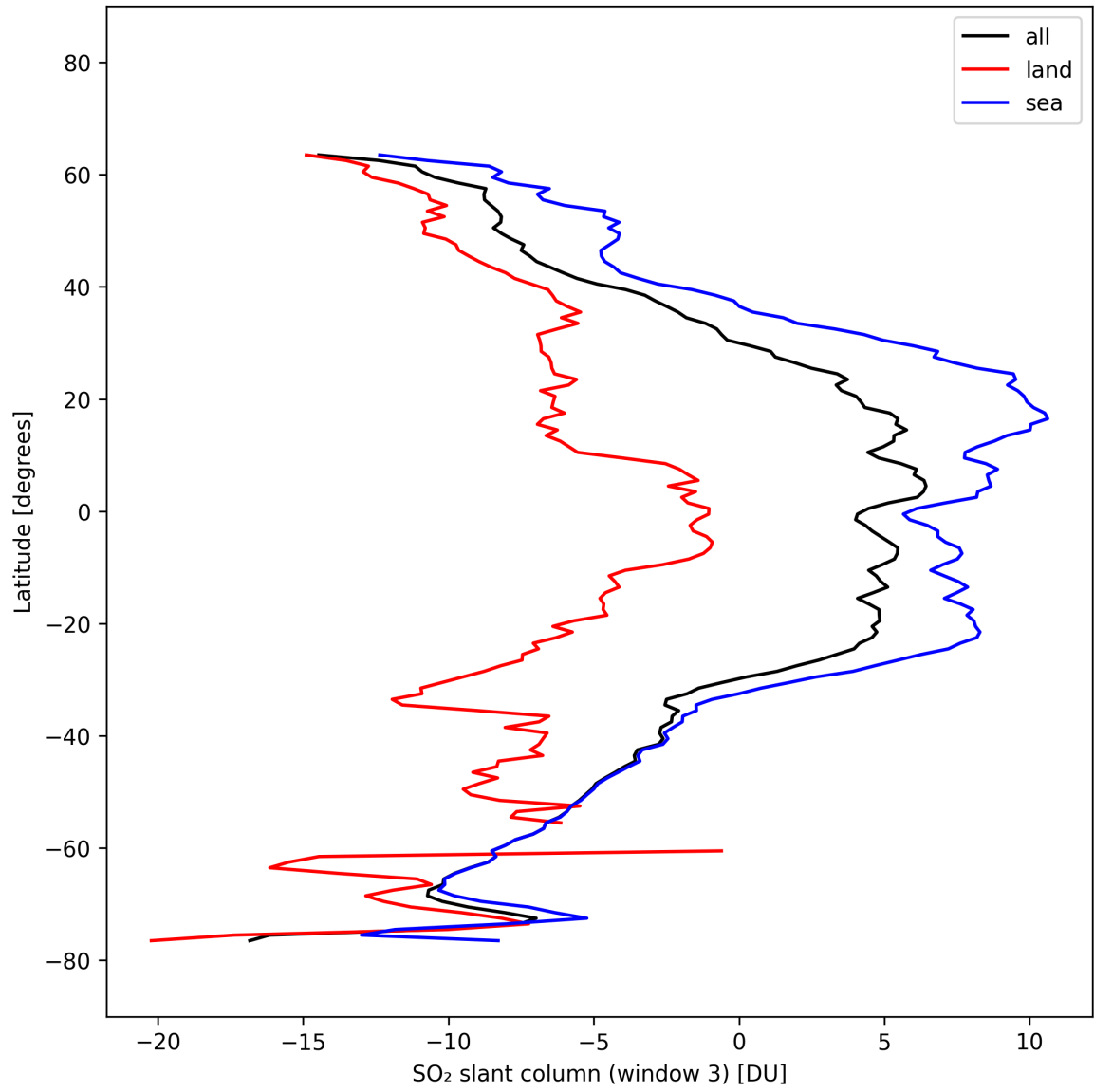


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-10-09 to 2025-10-09.

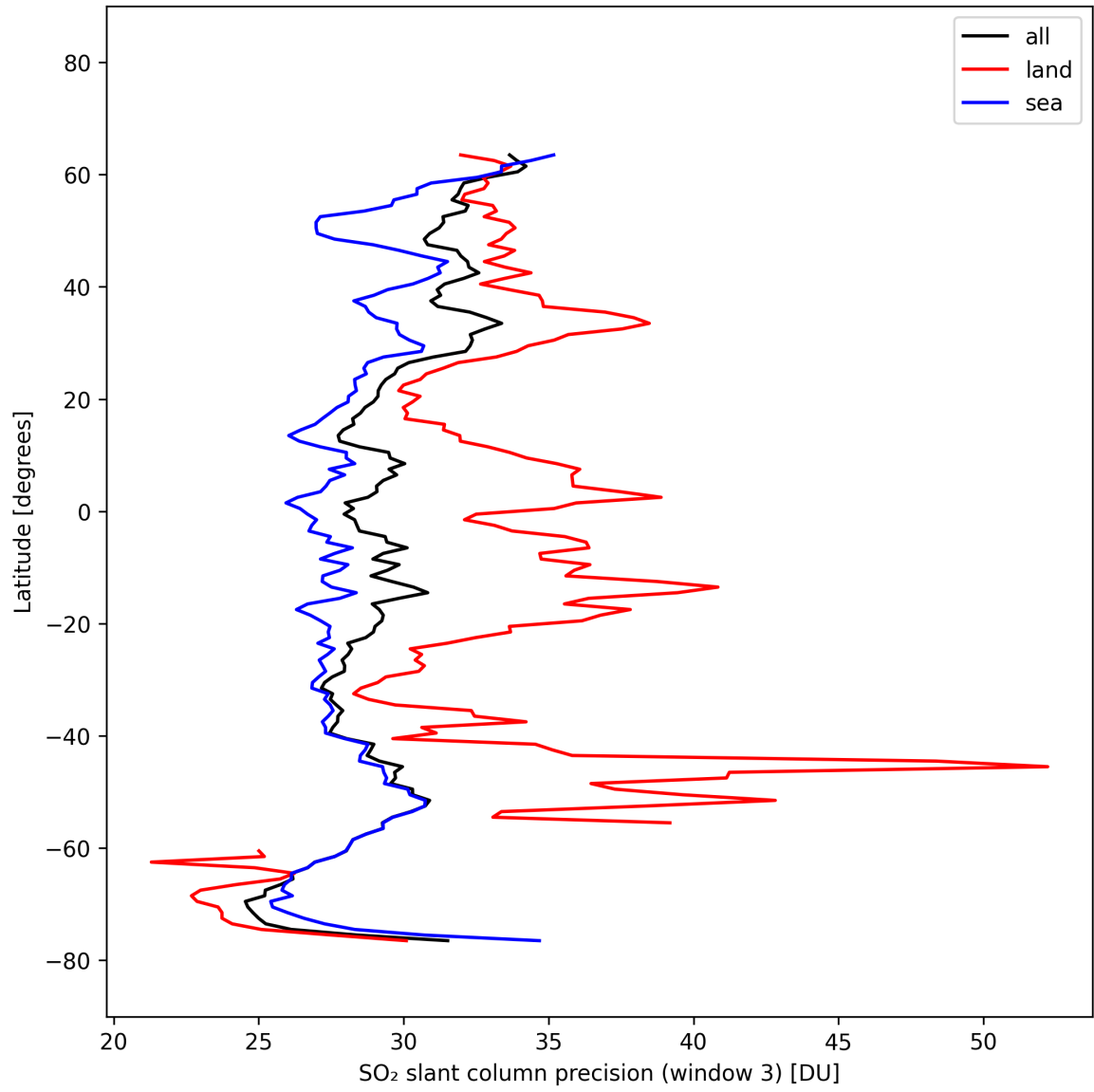


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-10-09 to 2025-10-09.

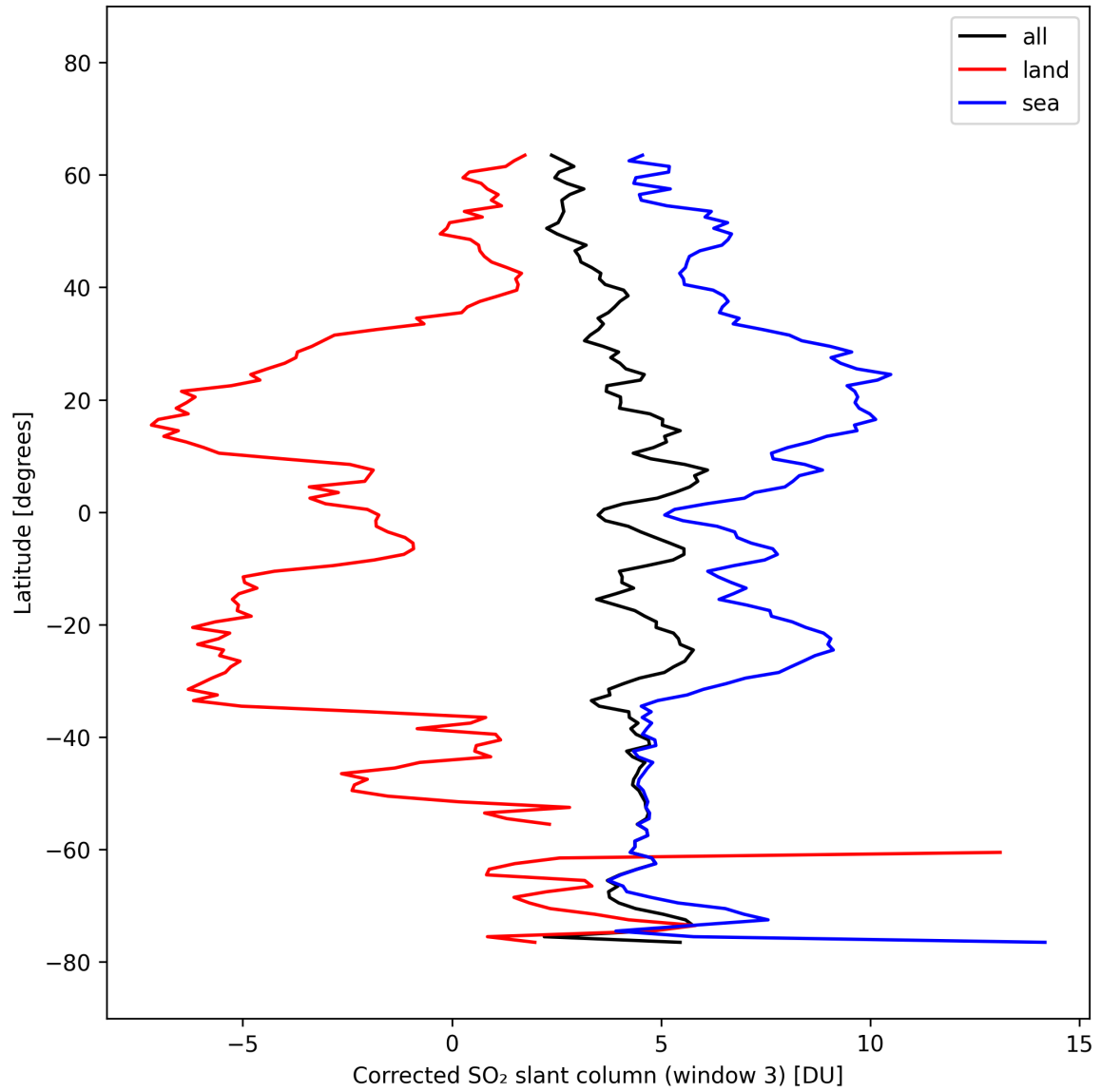


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-10-09 to 2025-10-09.

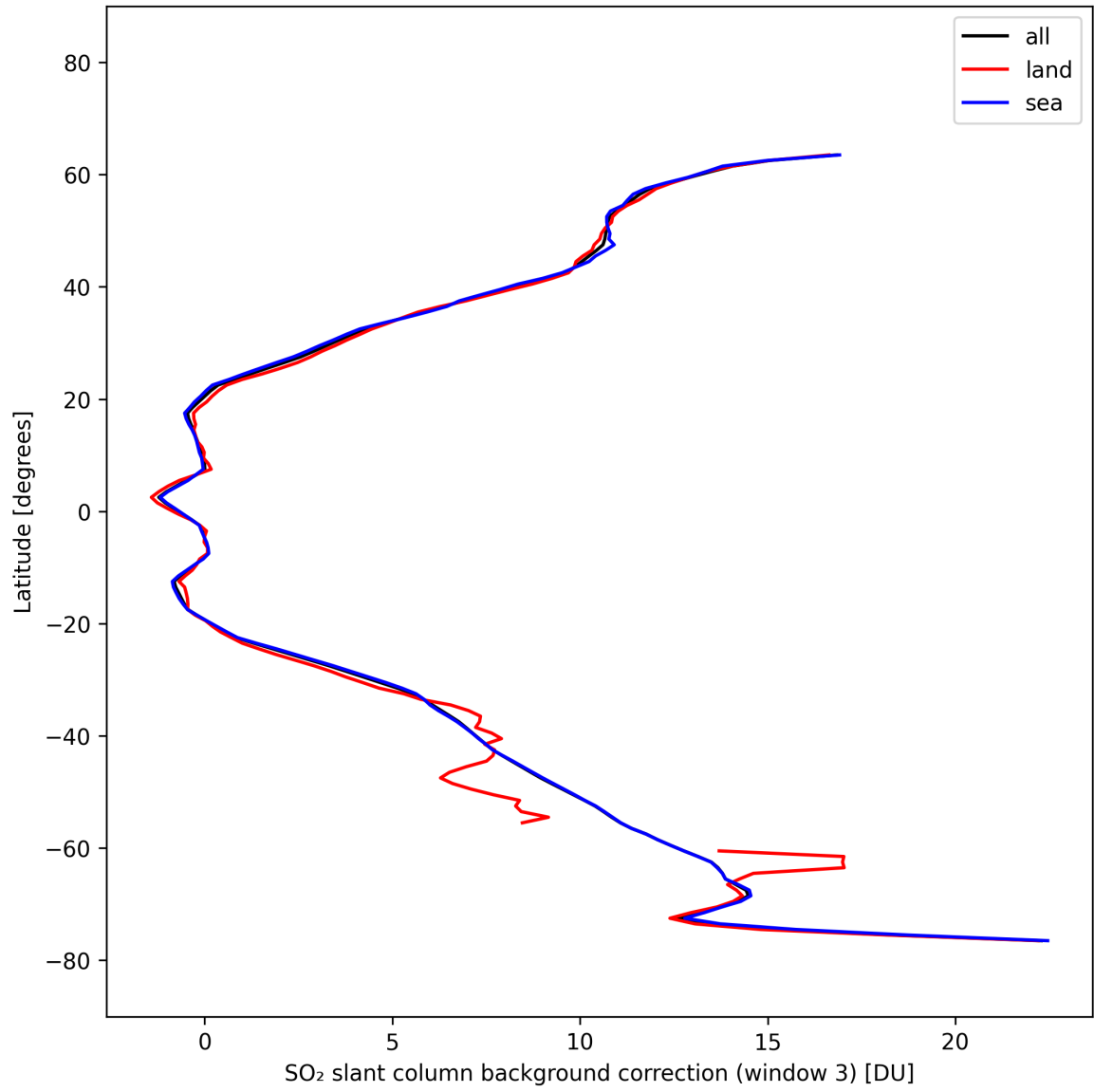


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-10-09 to 2025-10-09.

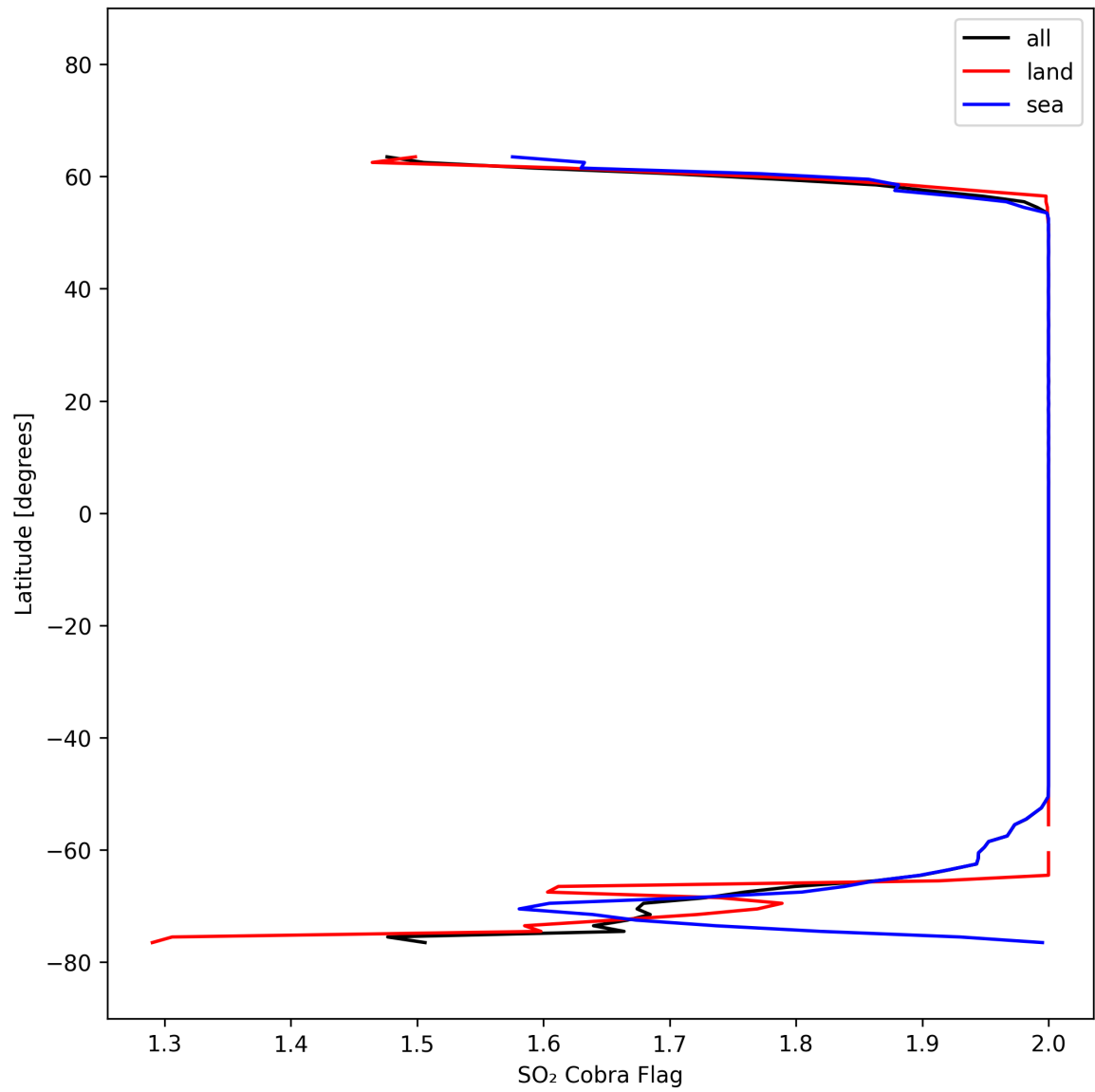


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-10-09 to 2025-10-09.

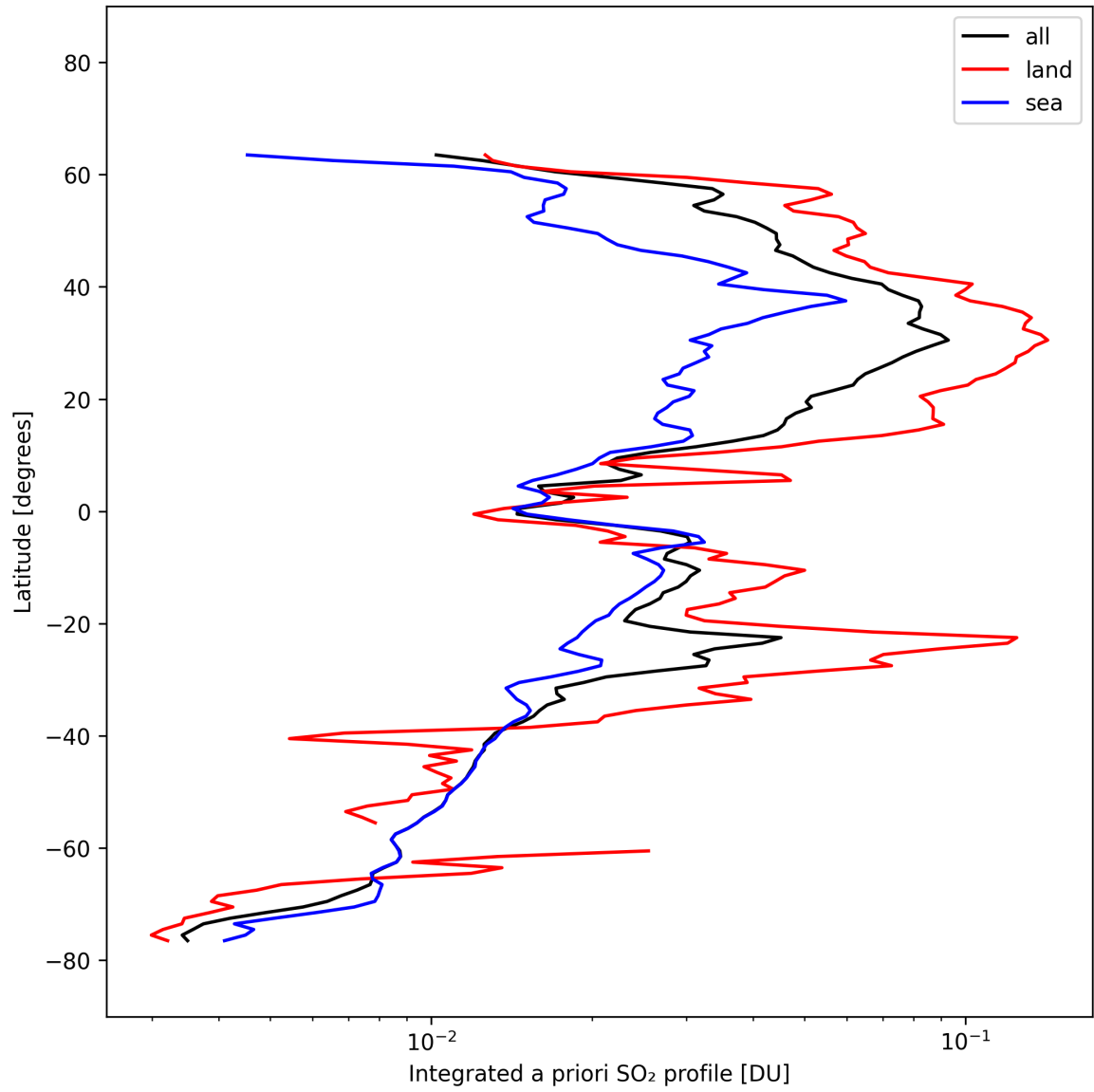


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-10-09 to 2025-10-09.

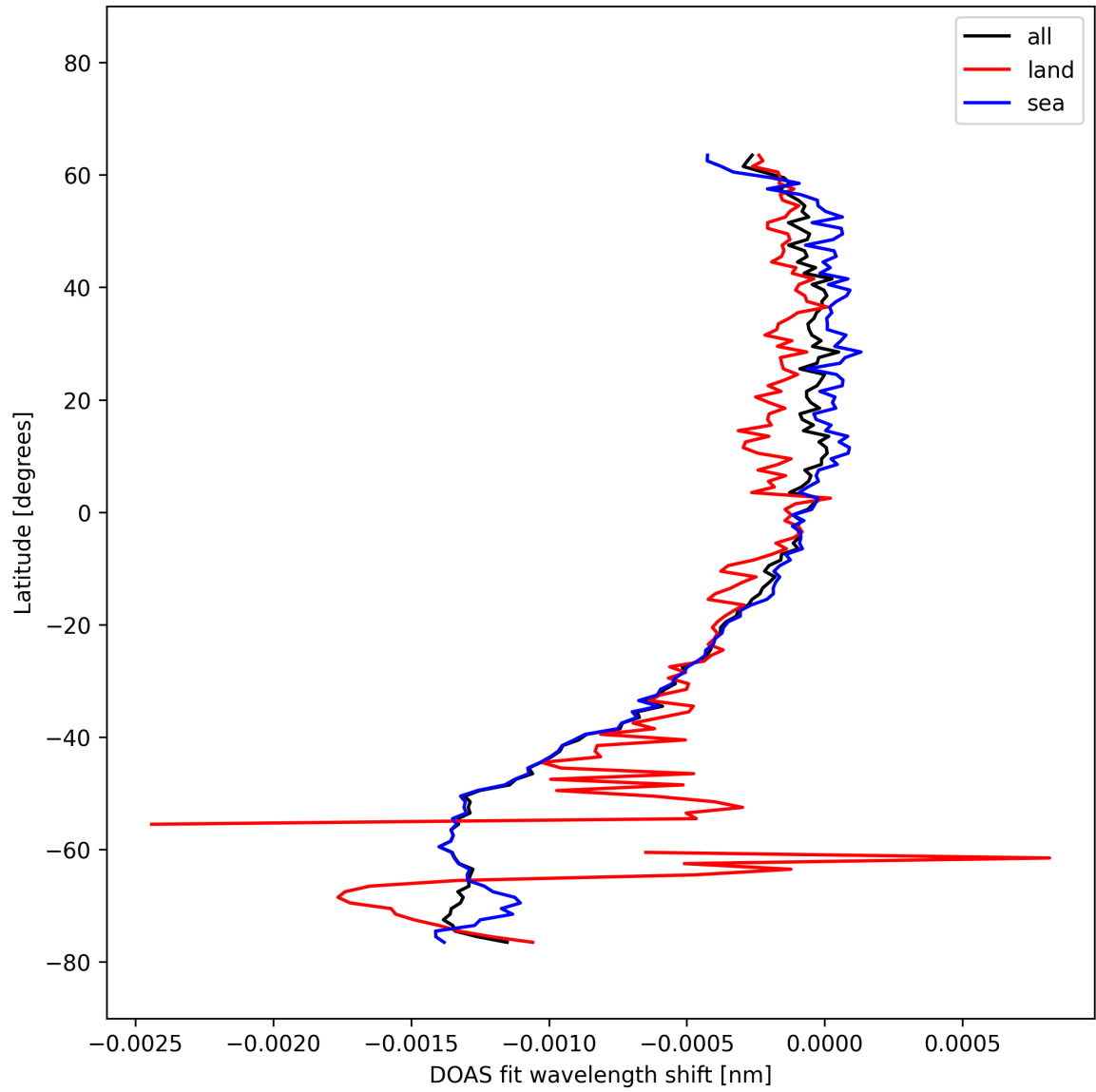


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-10-09 to 2025-10-09.

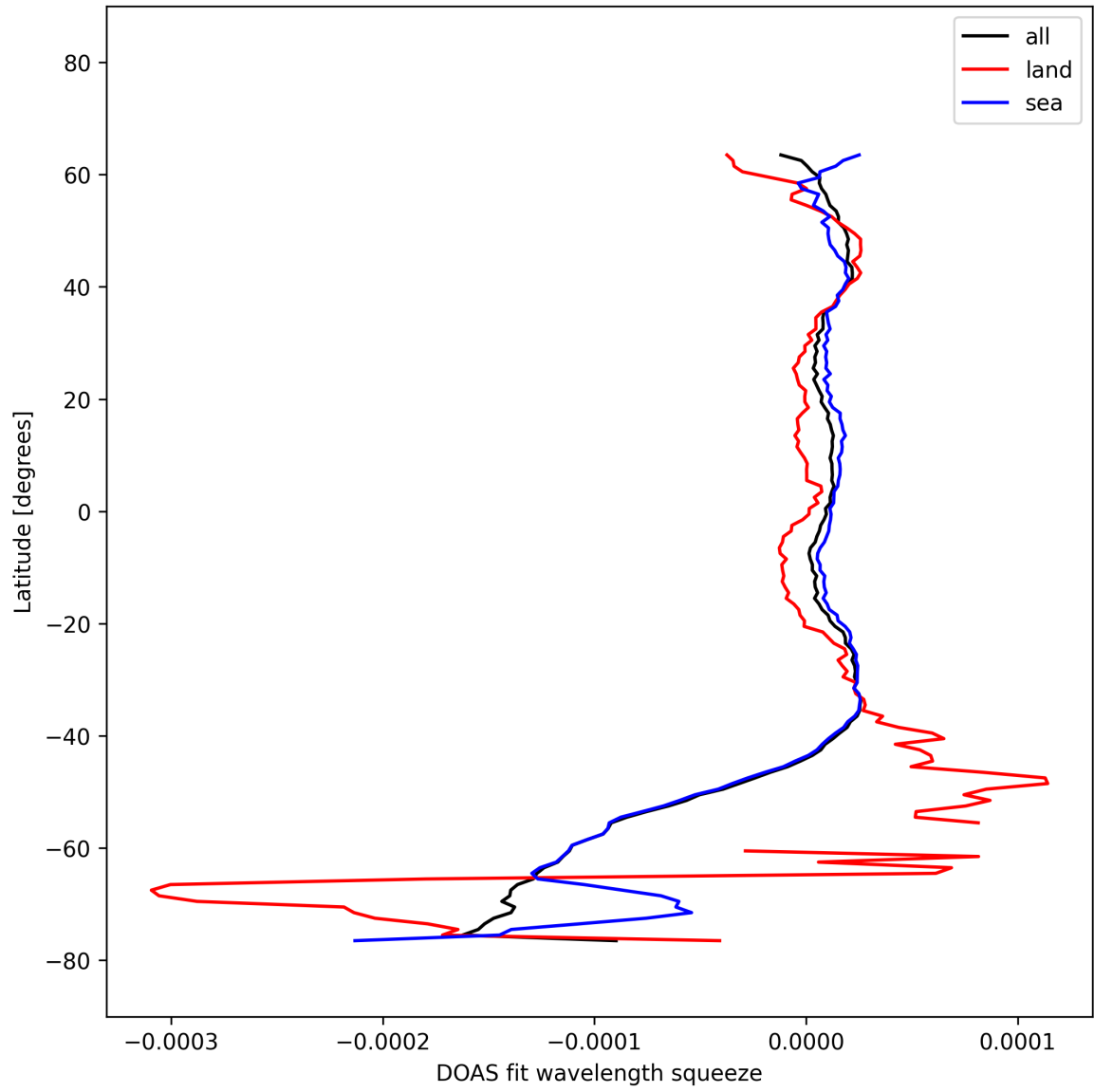


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-10-09 to 2025-10-09.

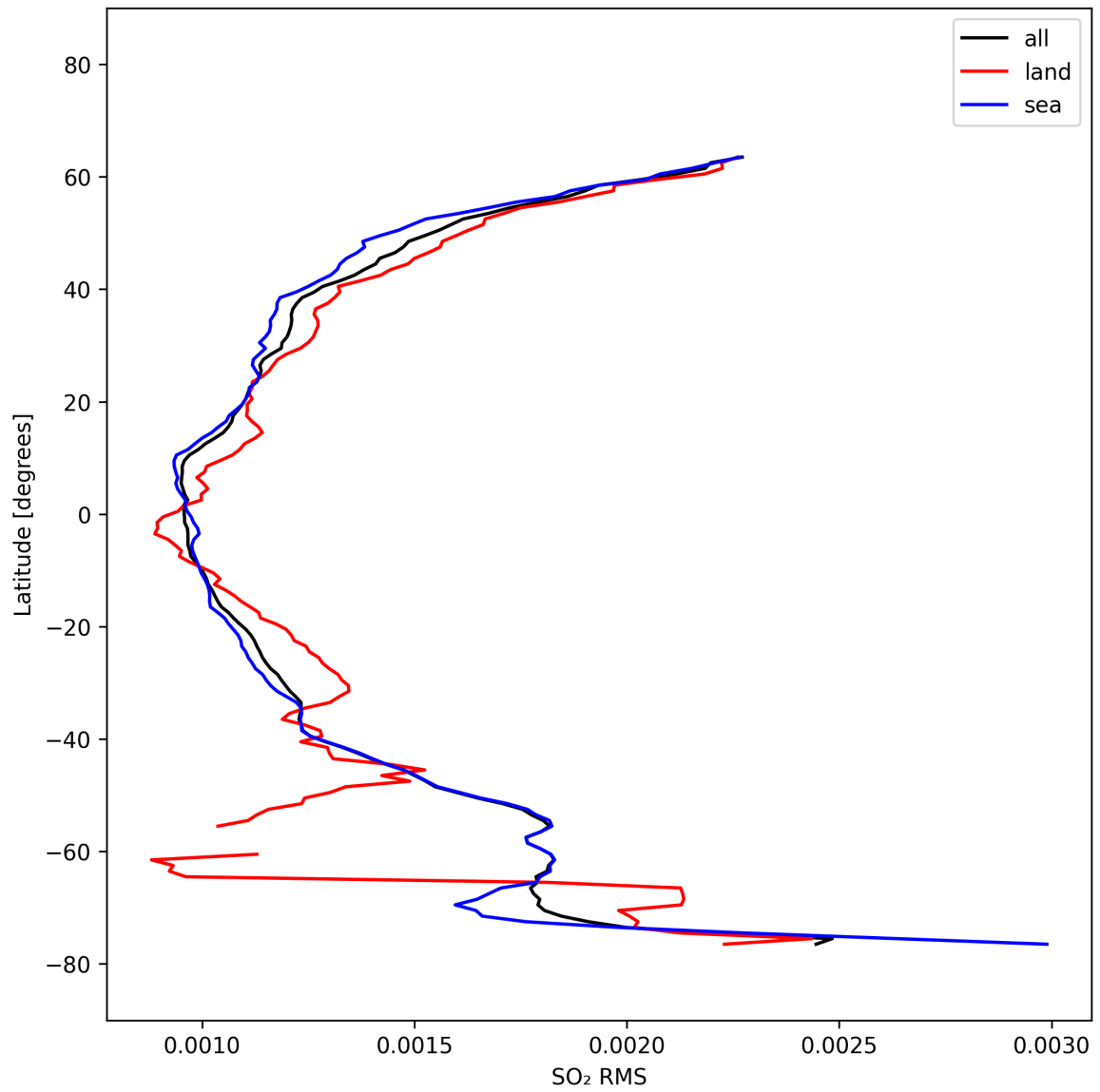


Figure 52: Zonal average of “SO₂ RMS” for 2025-10-09 to 2025-10-09.

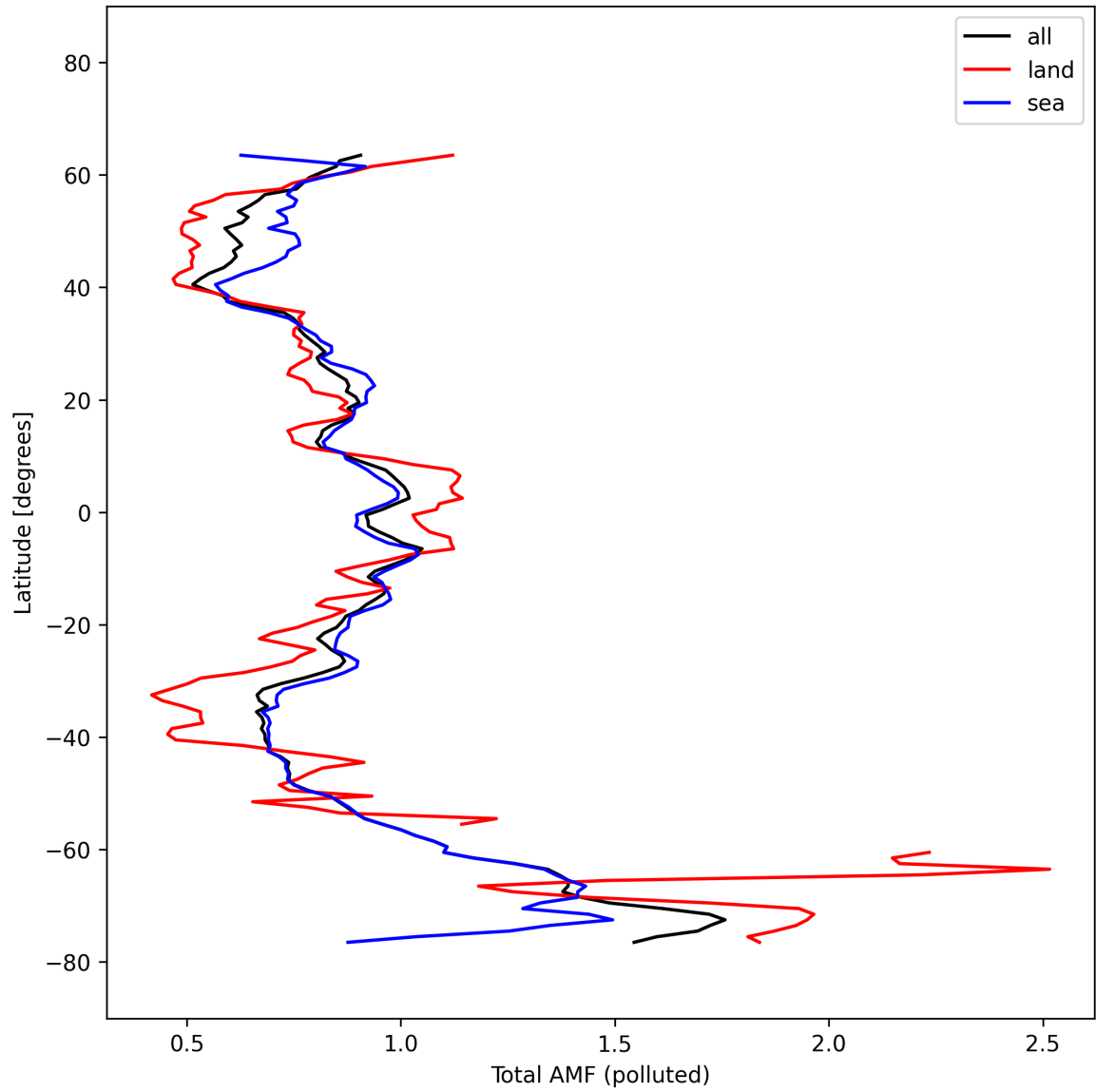


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-10-09 to 2025-10-09.

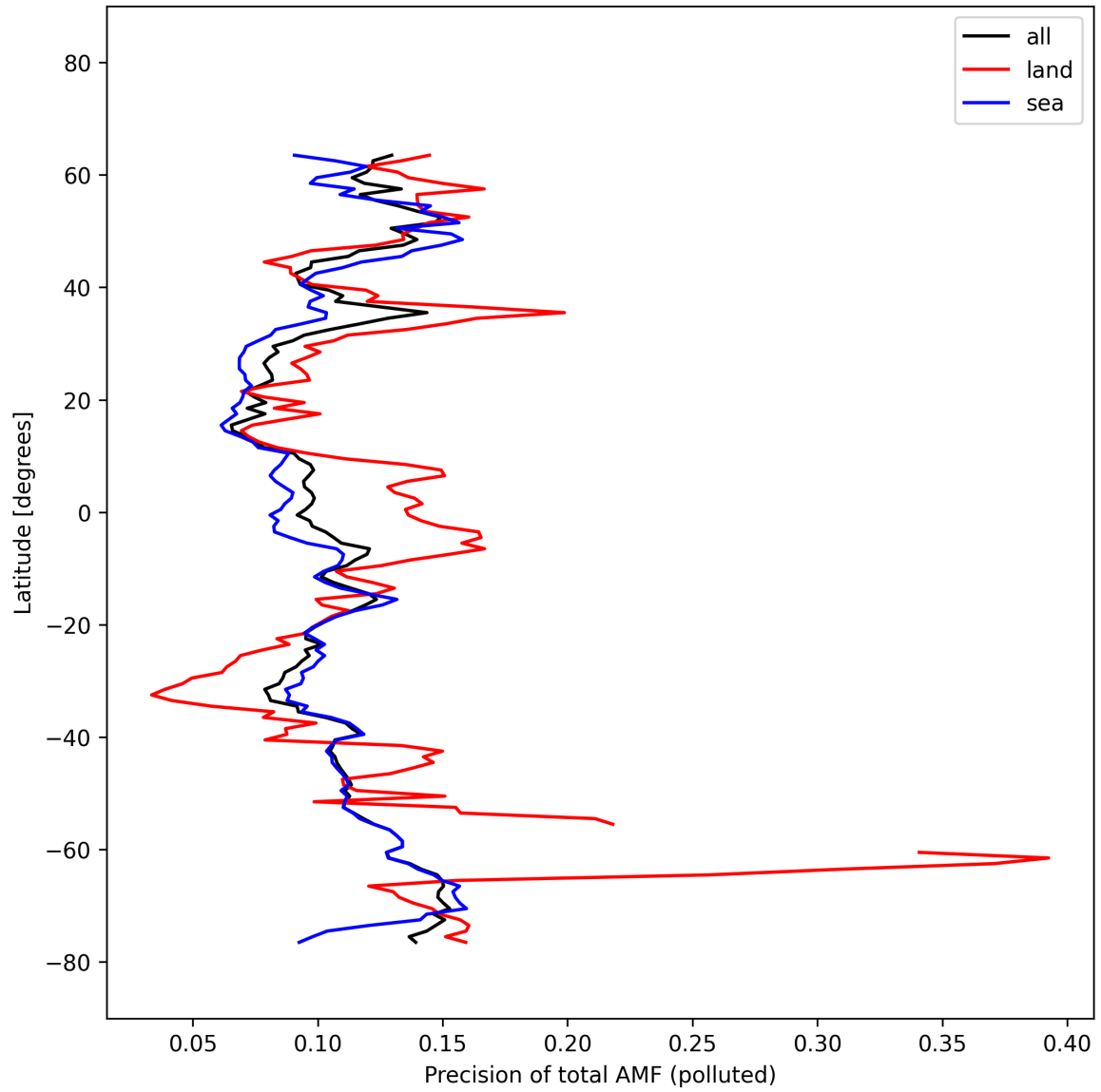


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-10-09 to 2025-10-09.

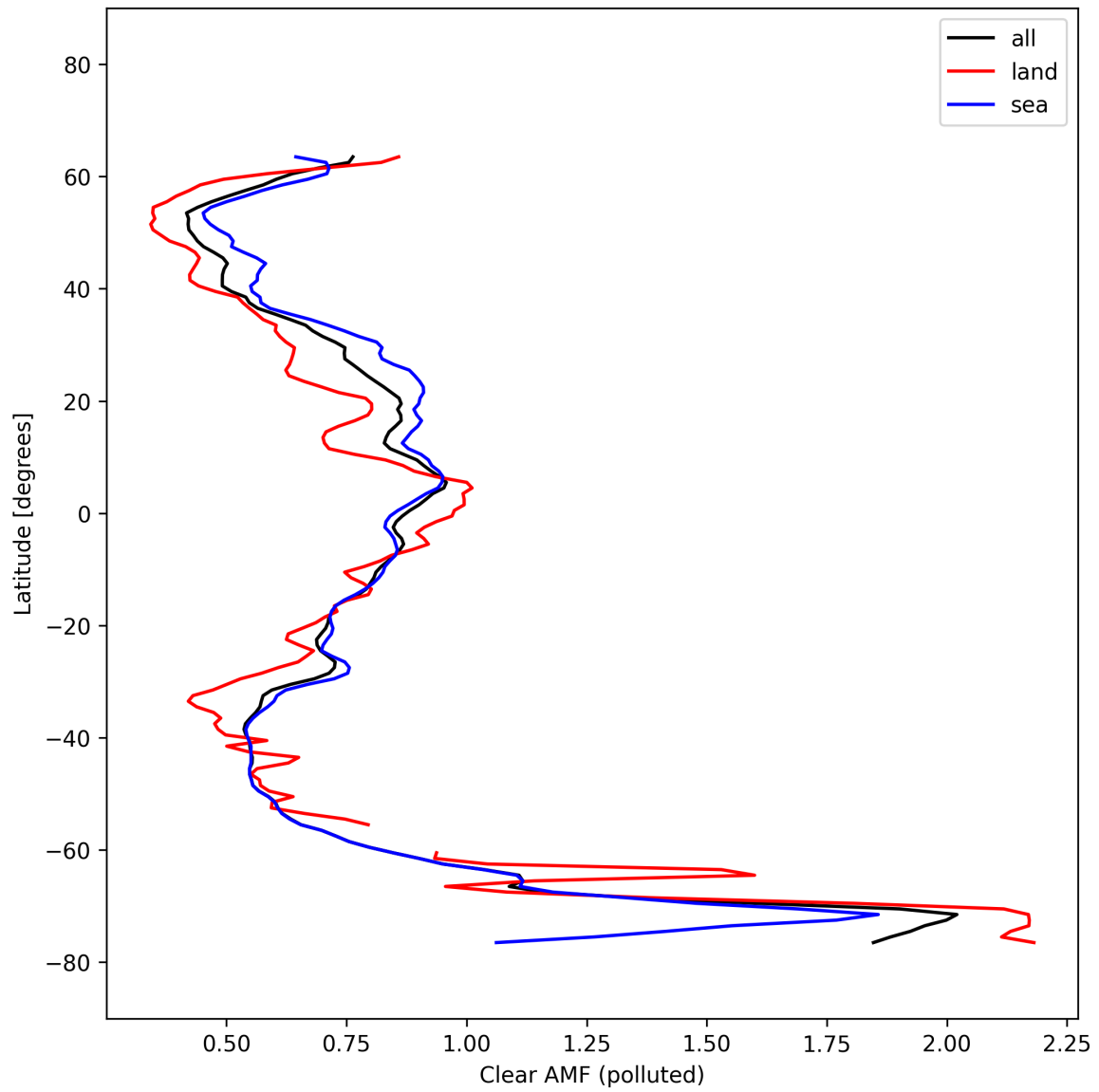


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-10-09 to 2025-10-09.

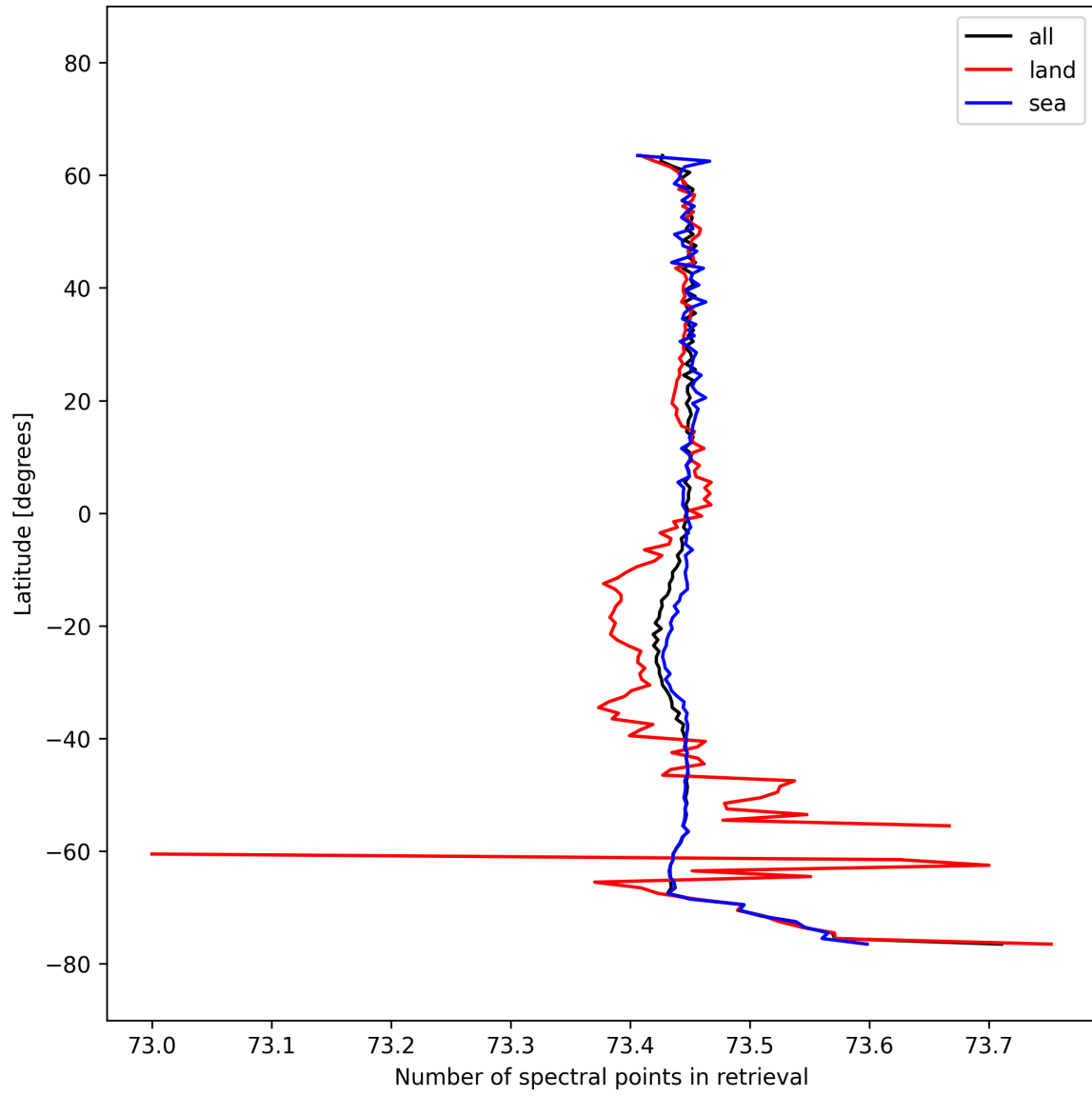


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-10-09 to 2025-10-09.

8 Histograms

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

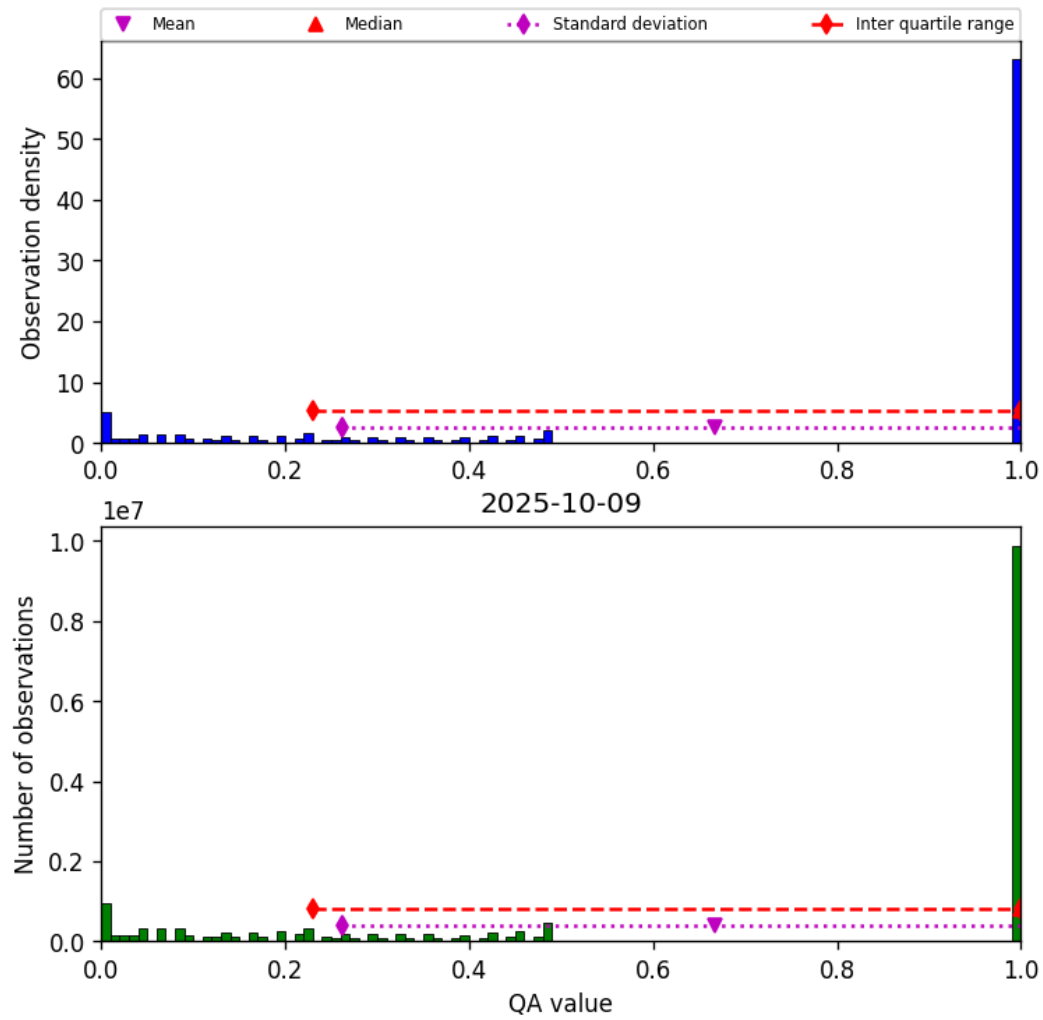


Figure 57: Histogram of “QA value” for 2025-10-09 to 2025-10-09

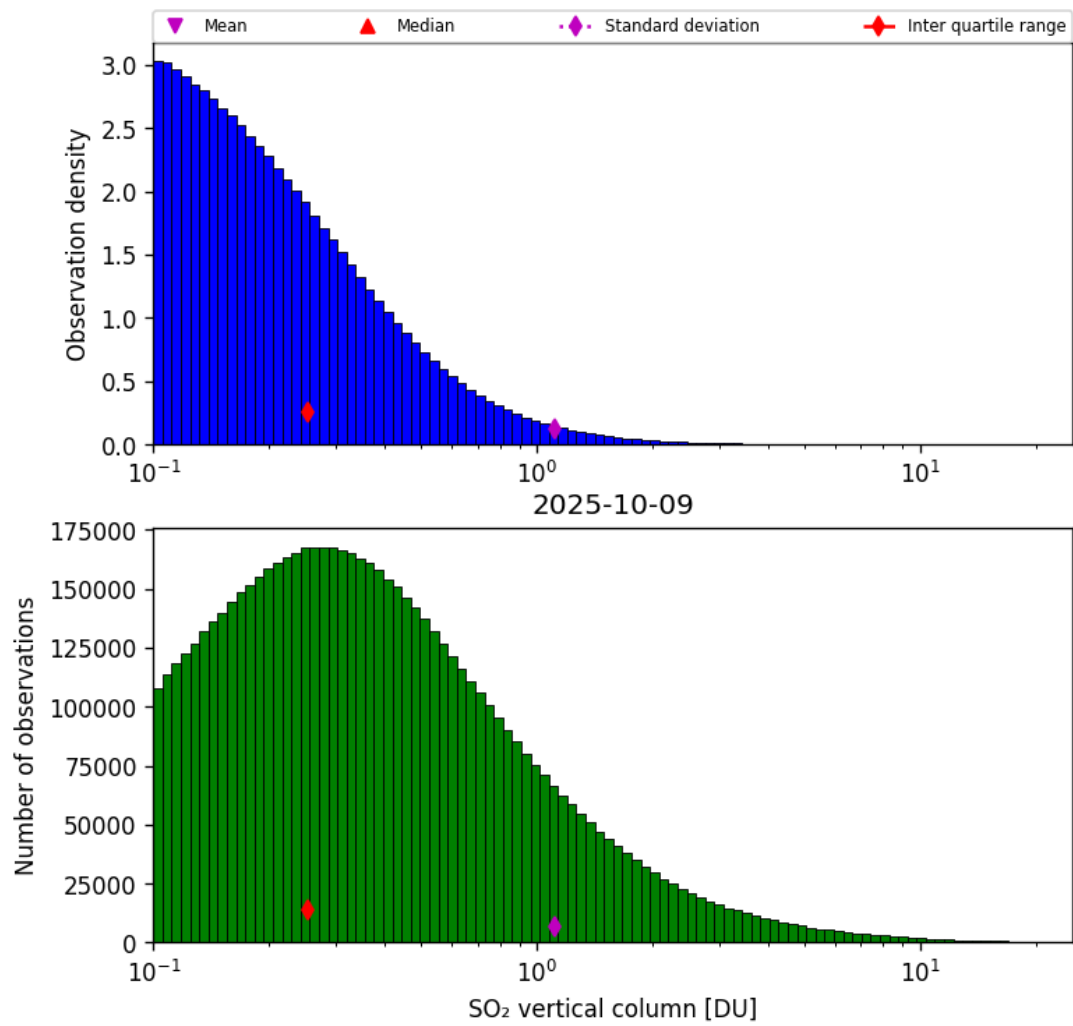


Figure 58: Histogram of “SO₂ vertical column” for 2025-10-09 to 2025-10-09

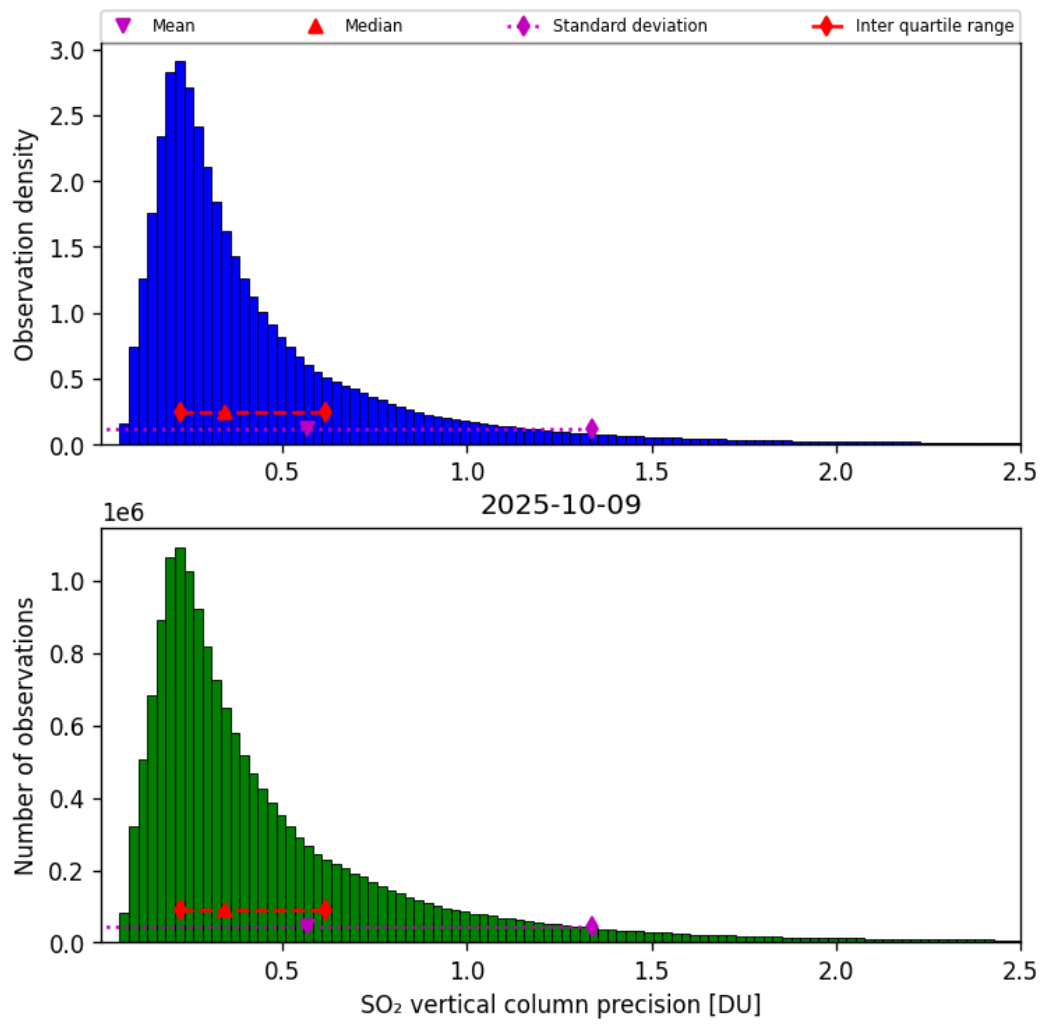


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-10-09 to 2025-10-09

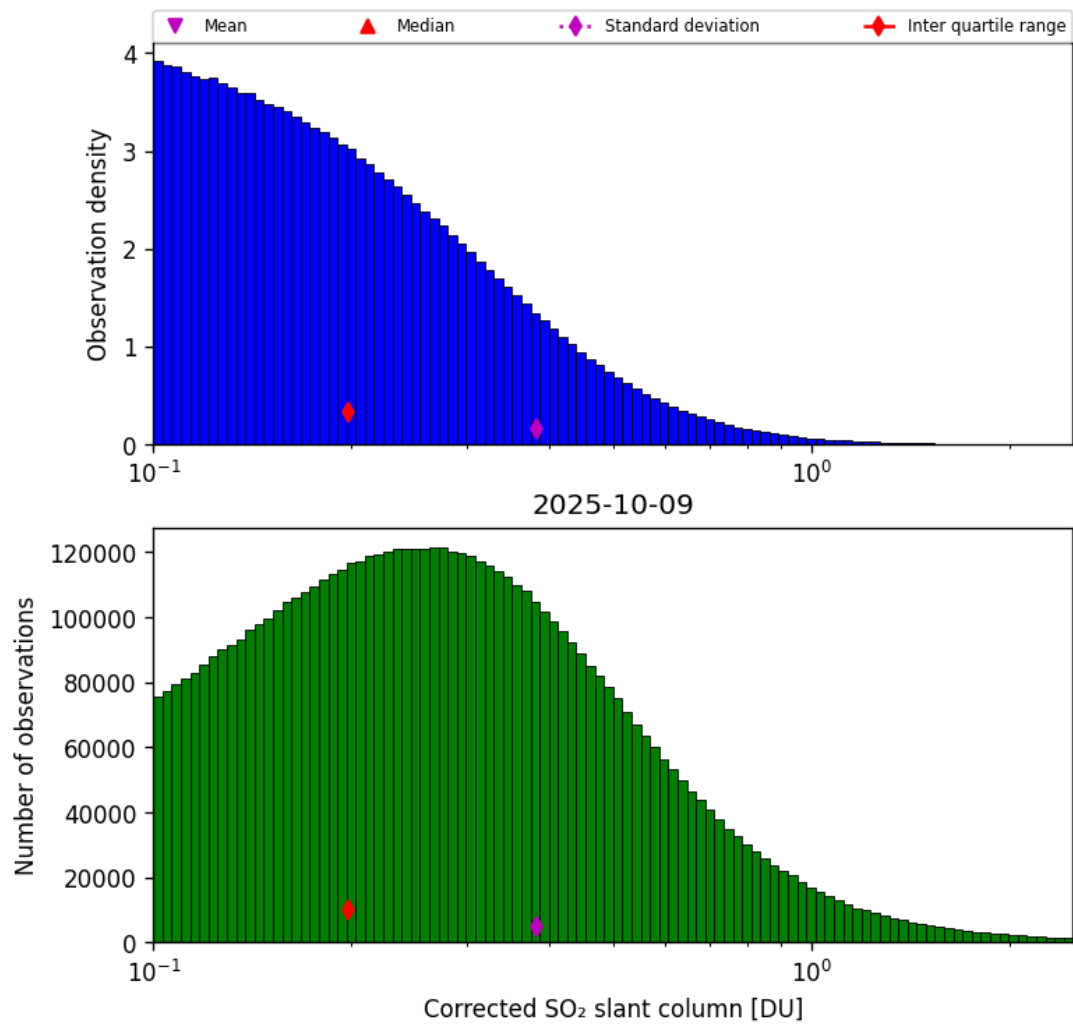


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-10-09 to 2025-10-09

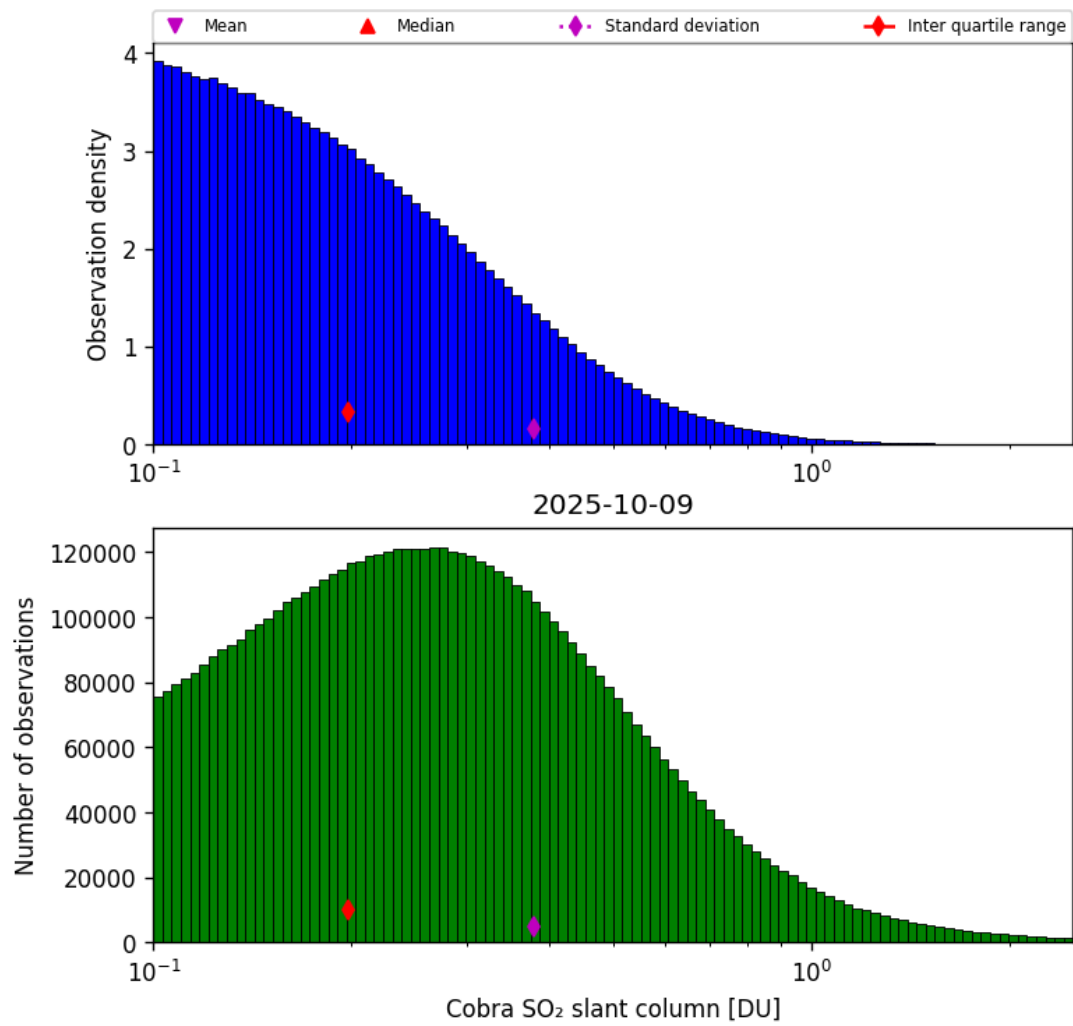


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-10-09 to 2025-10-09

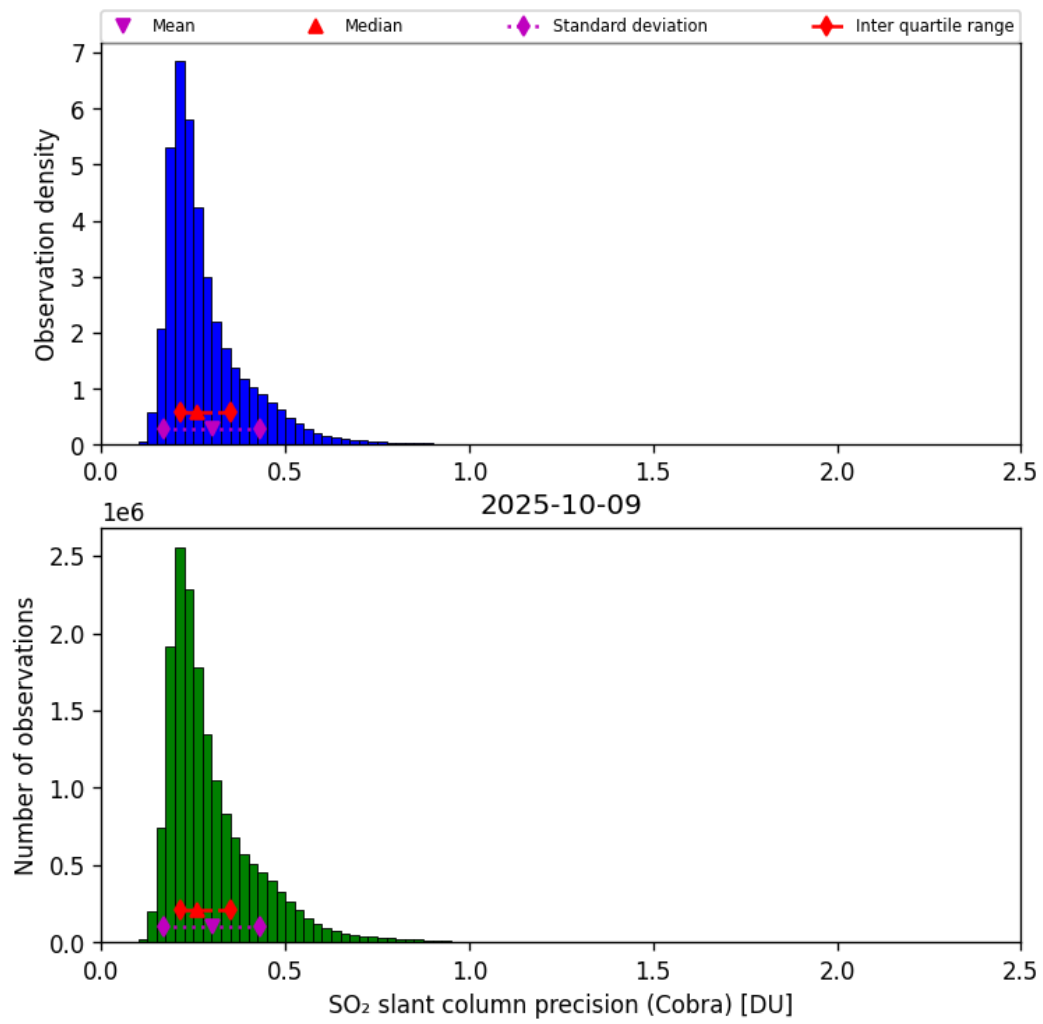


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-10-09 to 2025-10-09

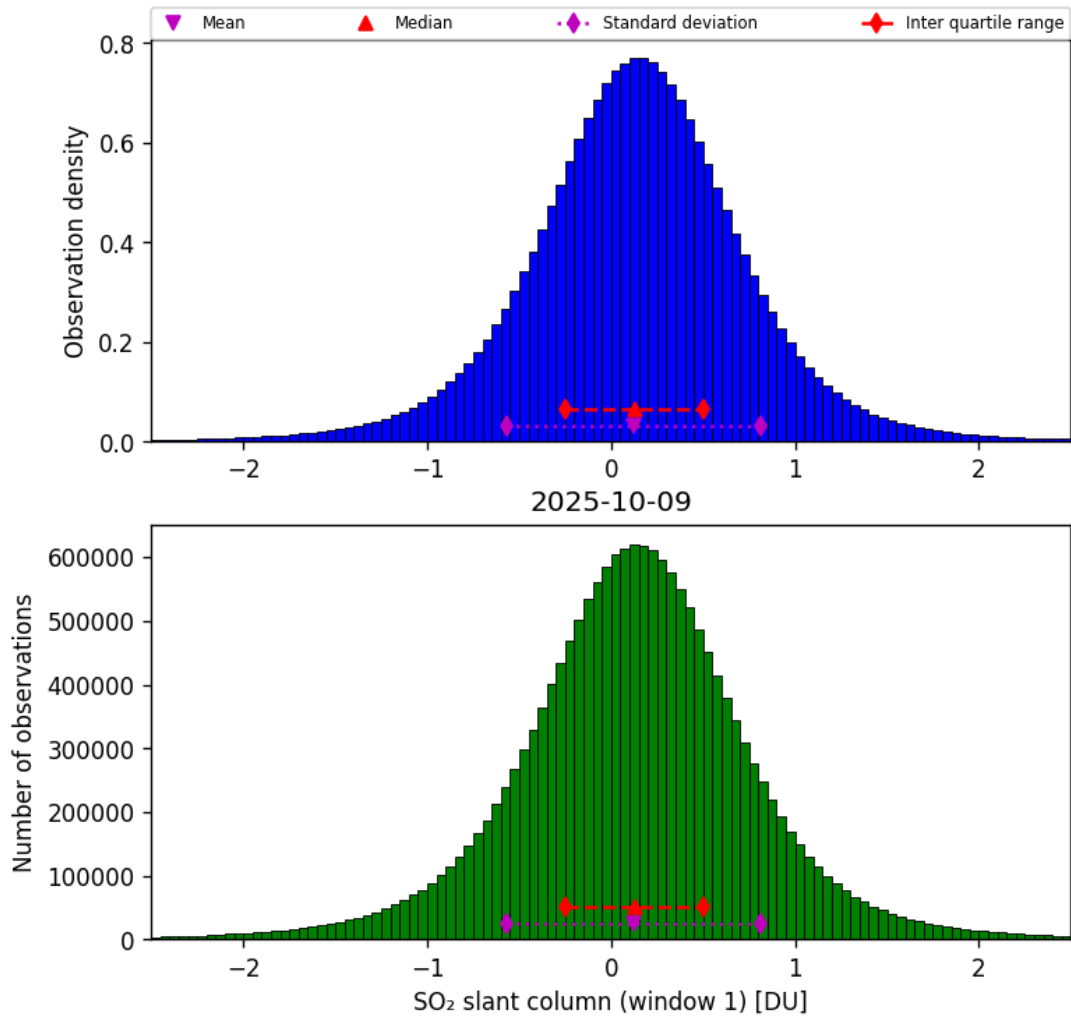


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-10-09 to 2025-10-09

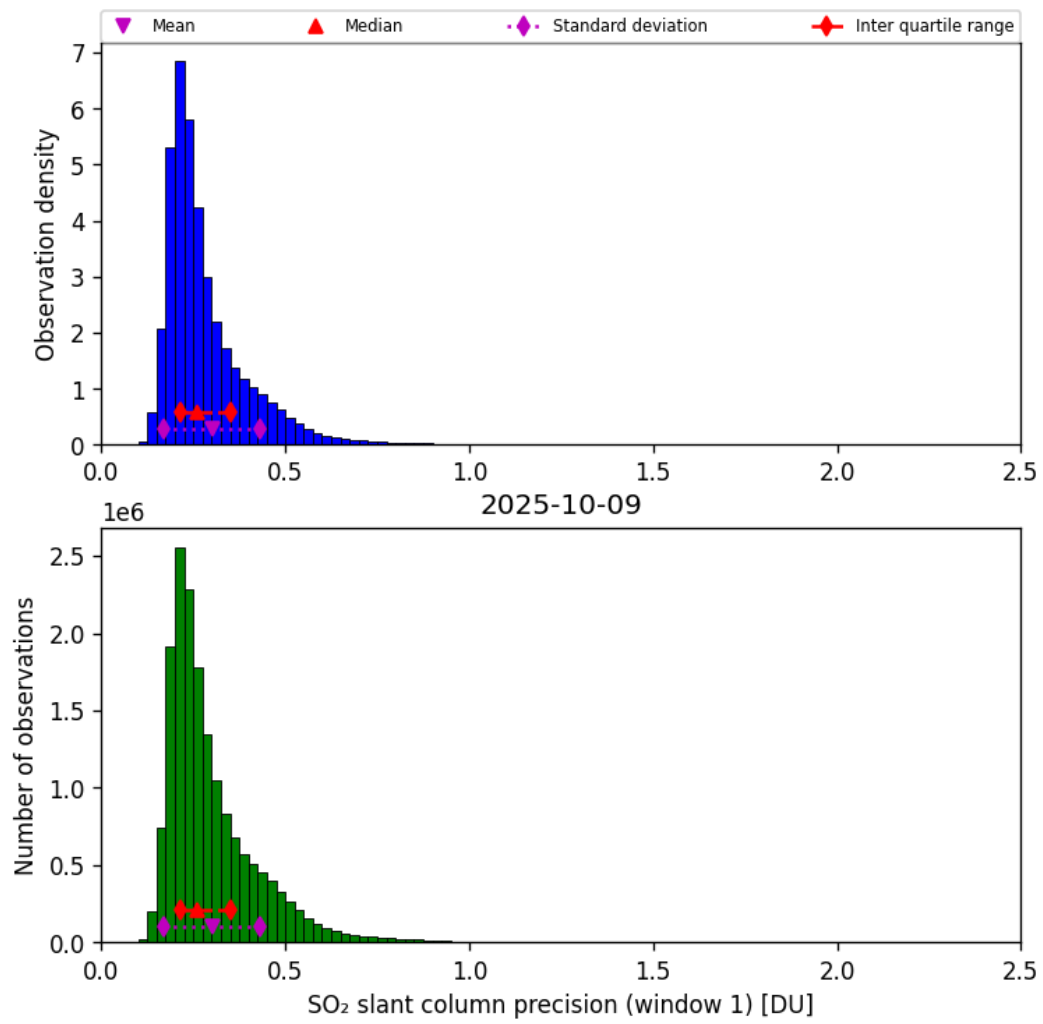


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-10-09 to 2025-10-09

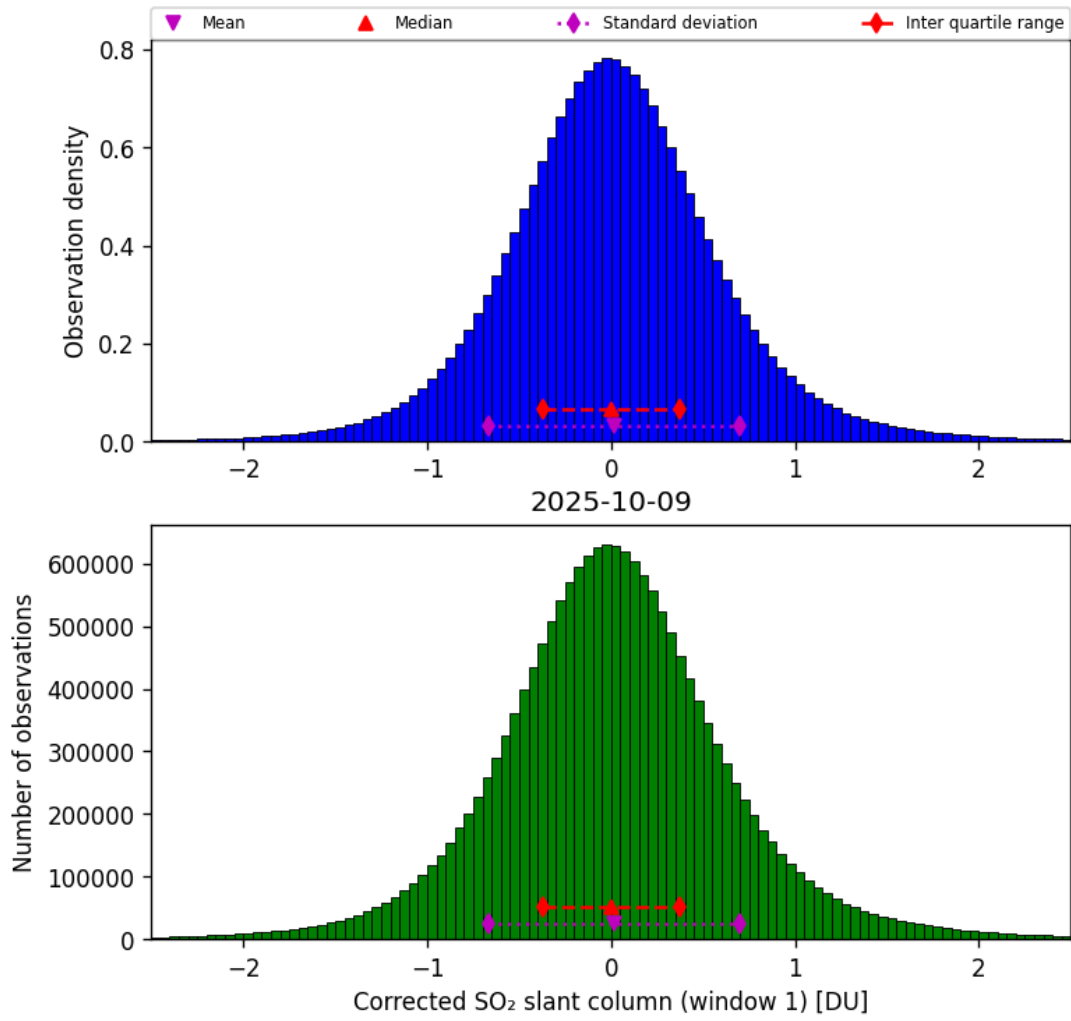


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-10-09 to 2025-10-09

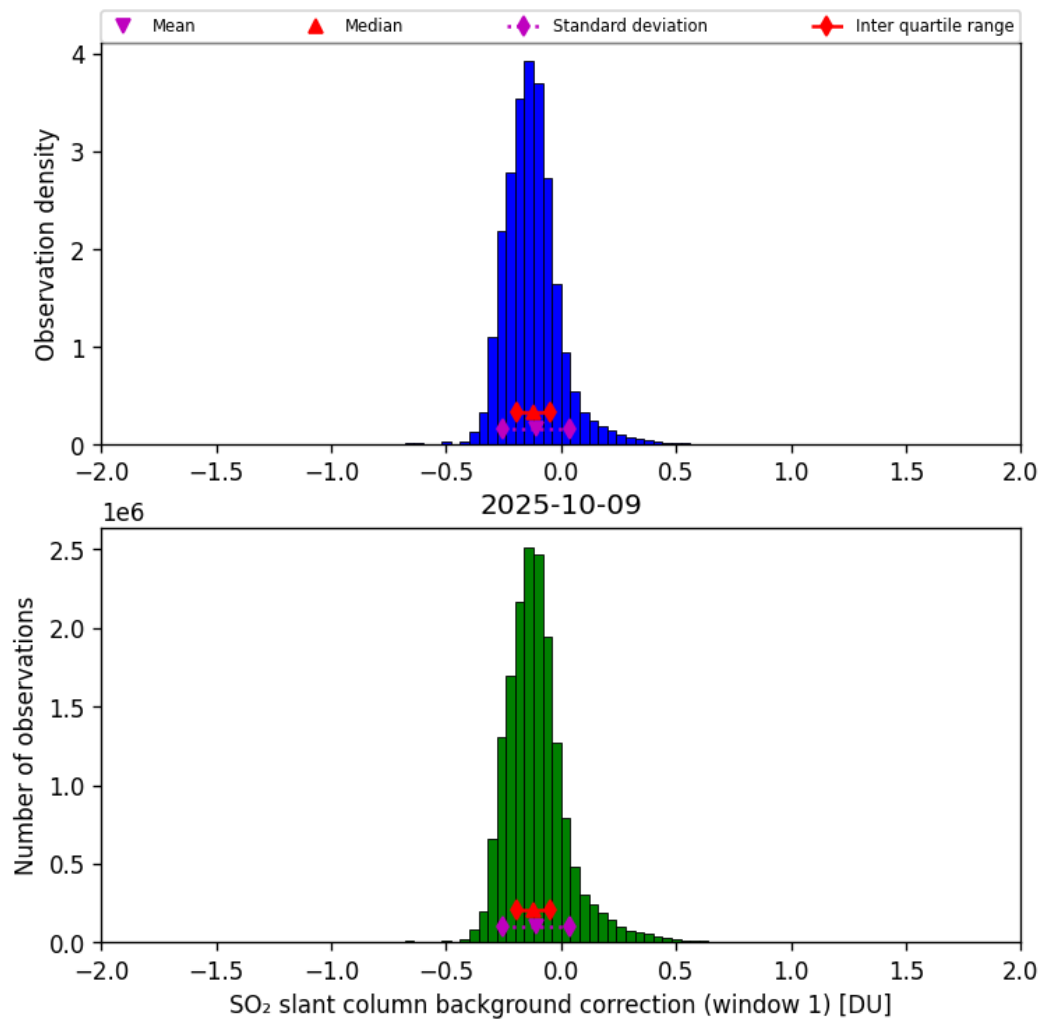


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-10-09 to 2025-10-09

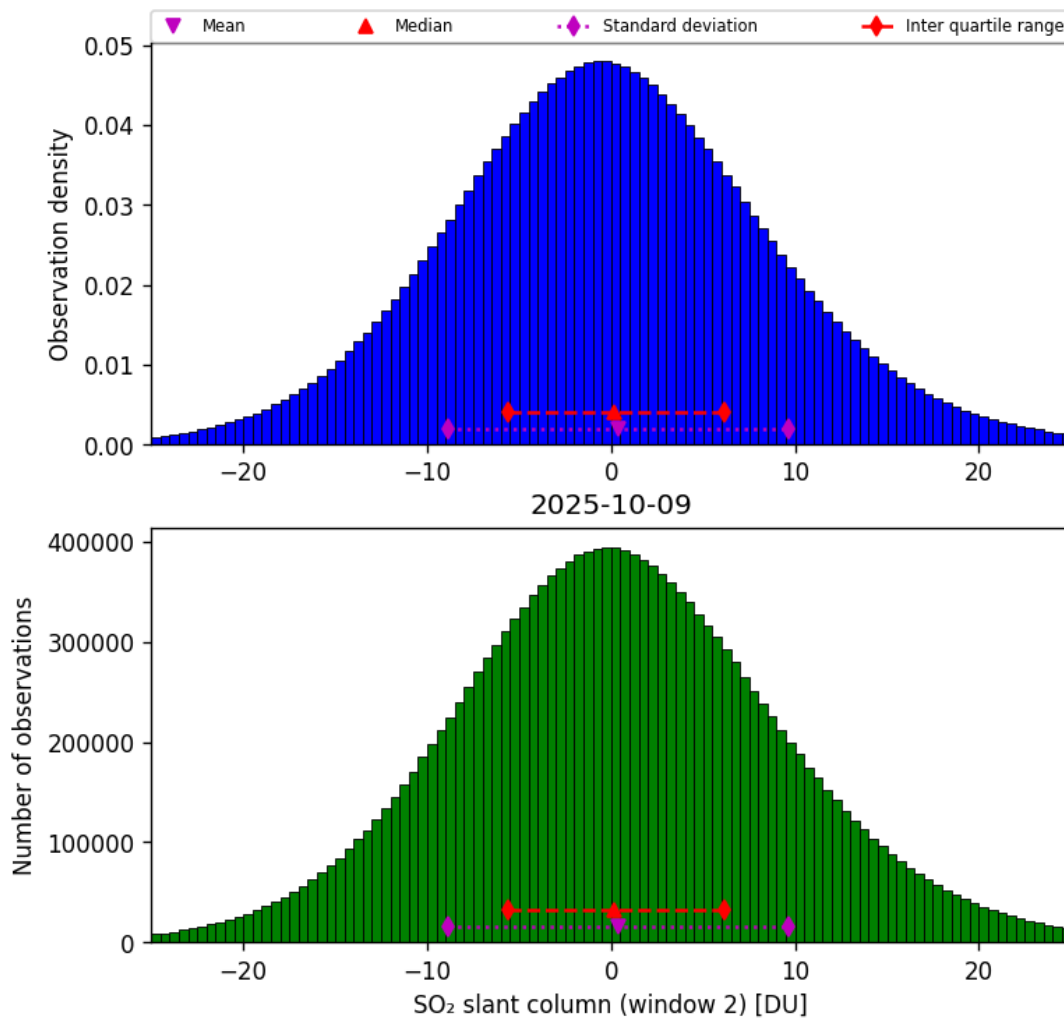


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-10-09 to 2025-10-09

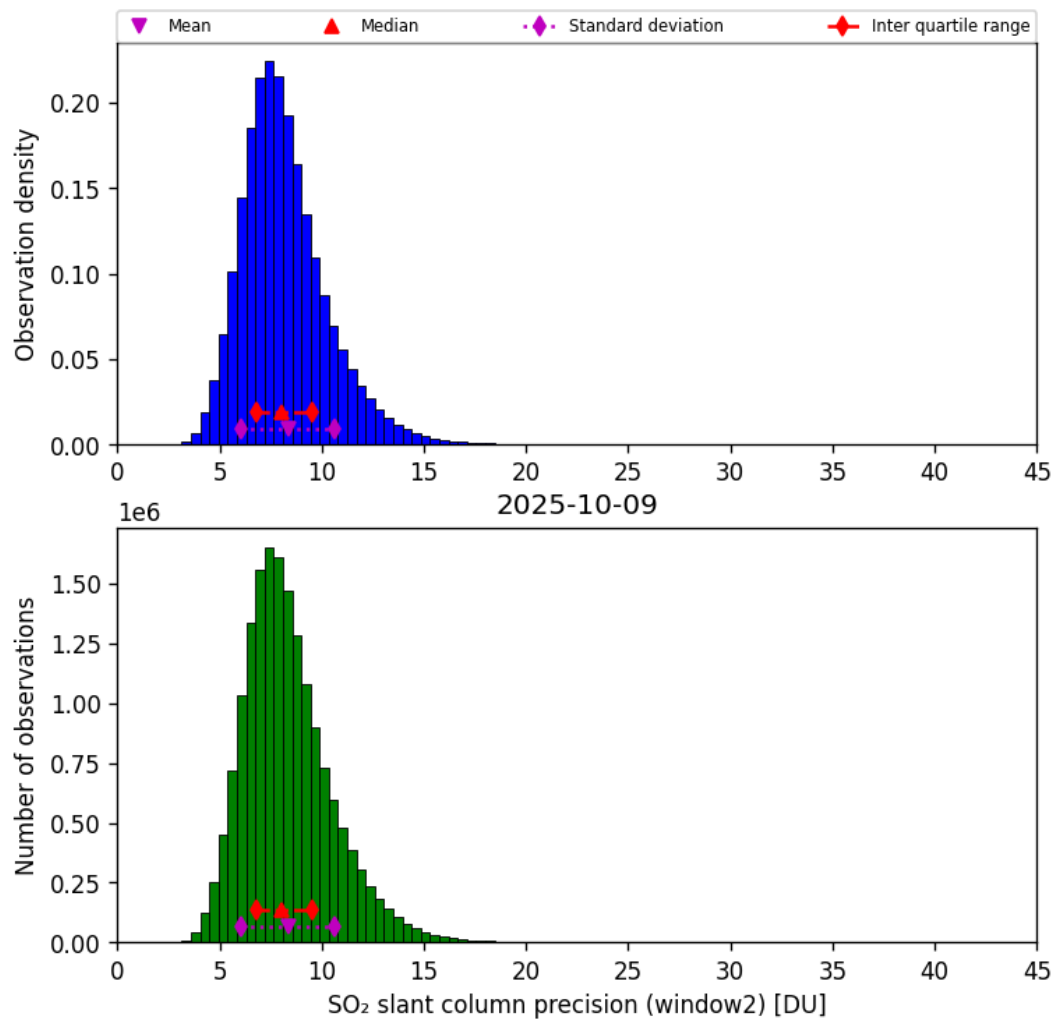


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-10-09 to 2025-10-09

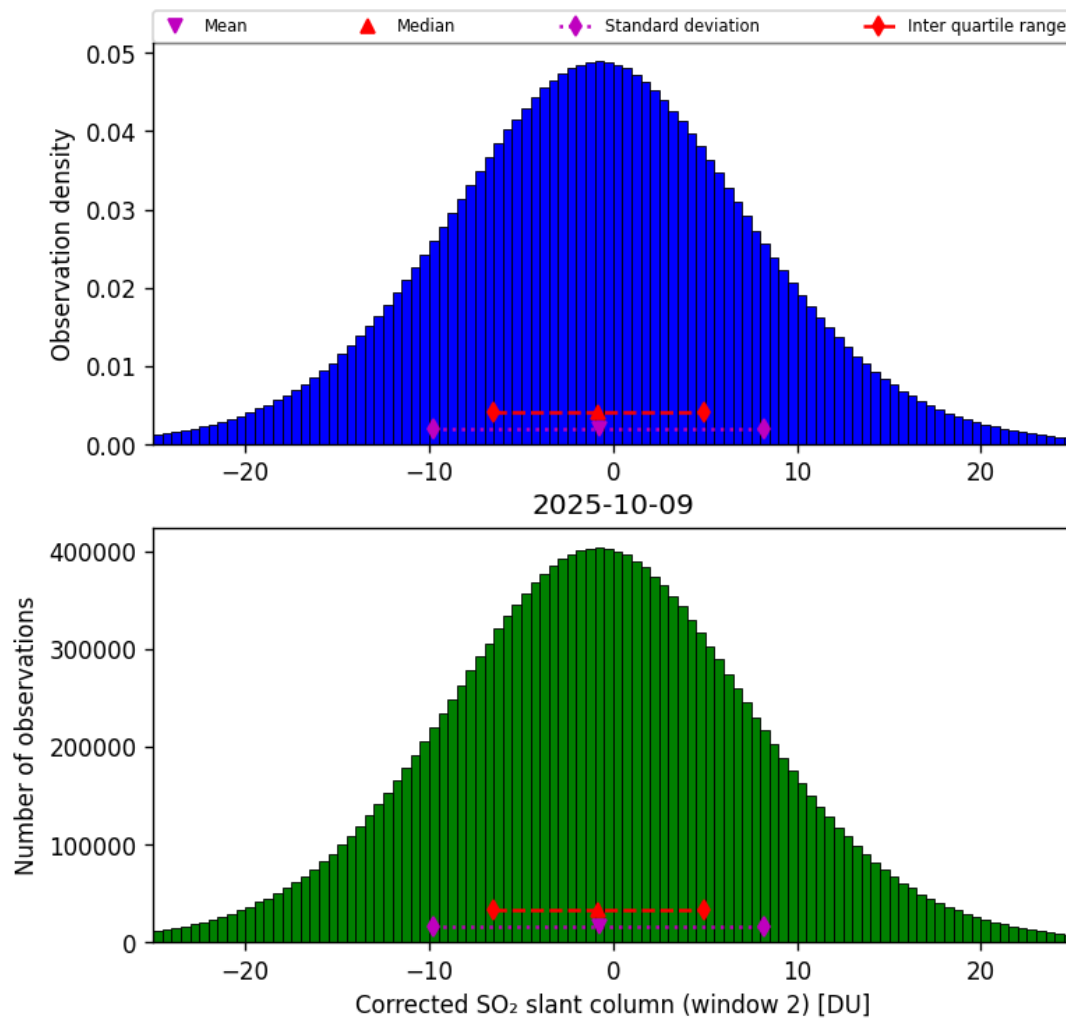


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-10-09 to 2025-10-09

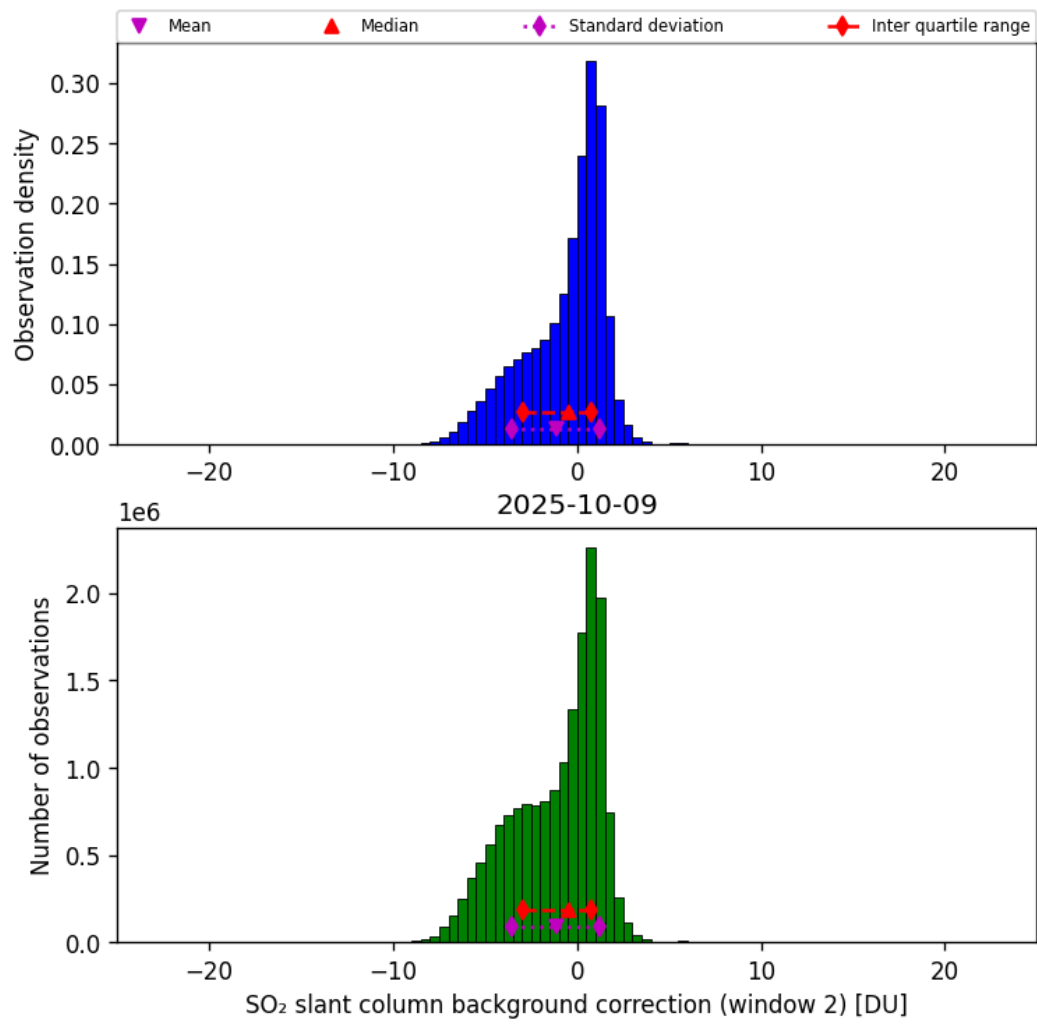


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-10-09 to 2025-10-09

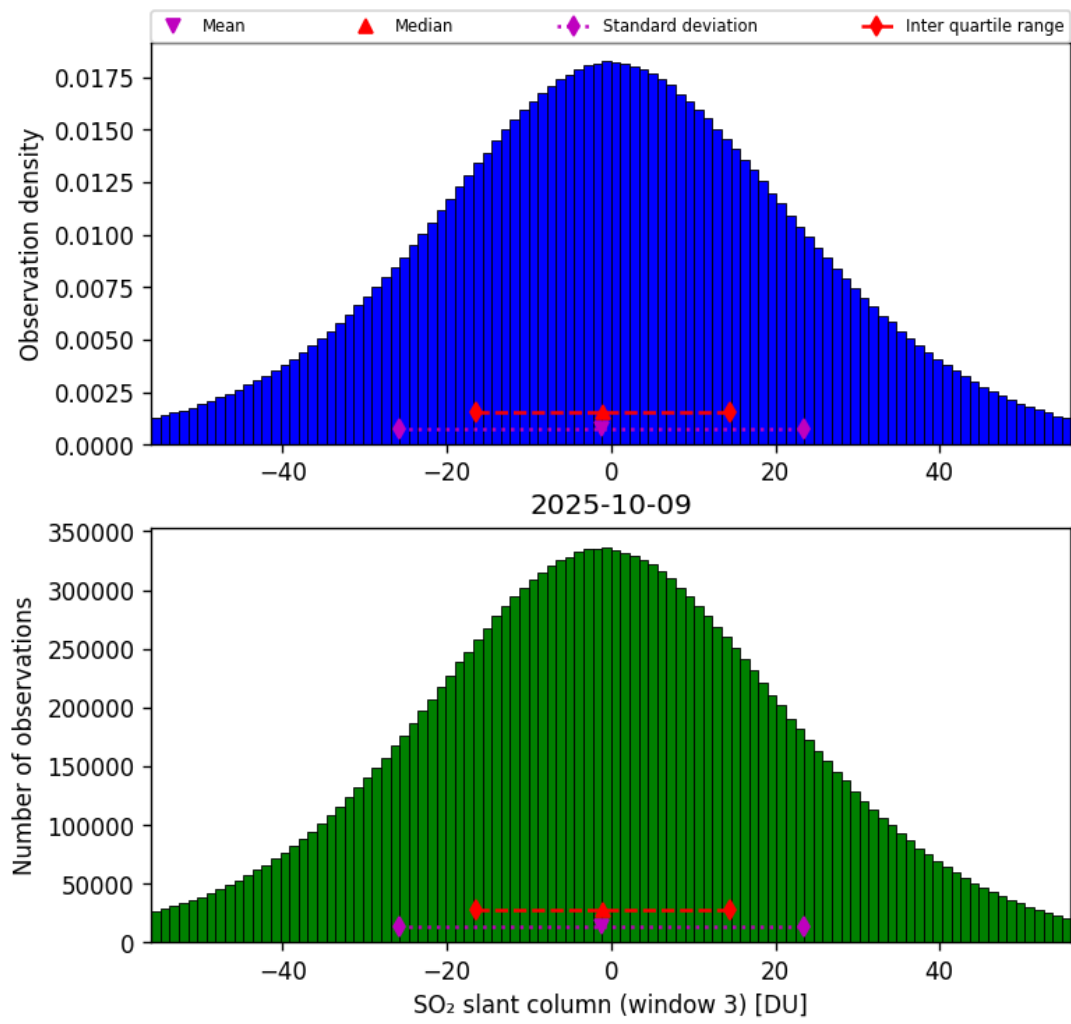


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-10-09 to 2025-10-09

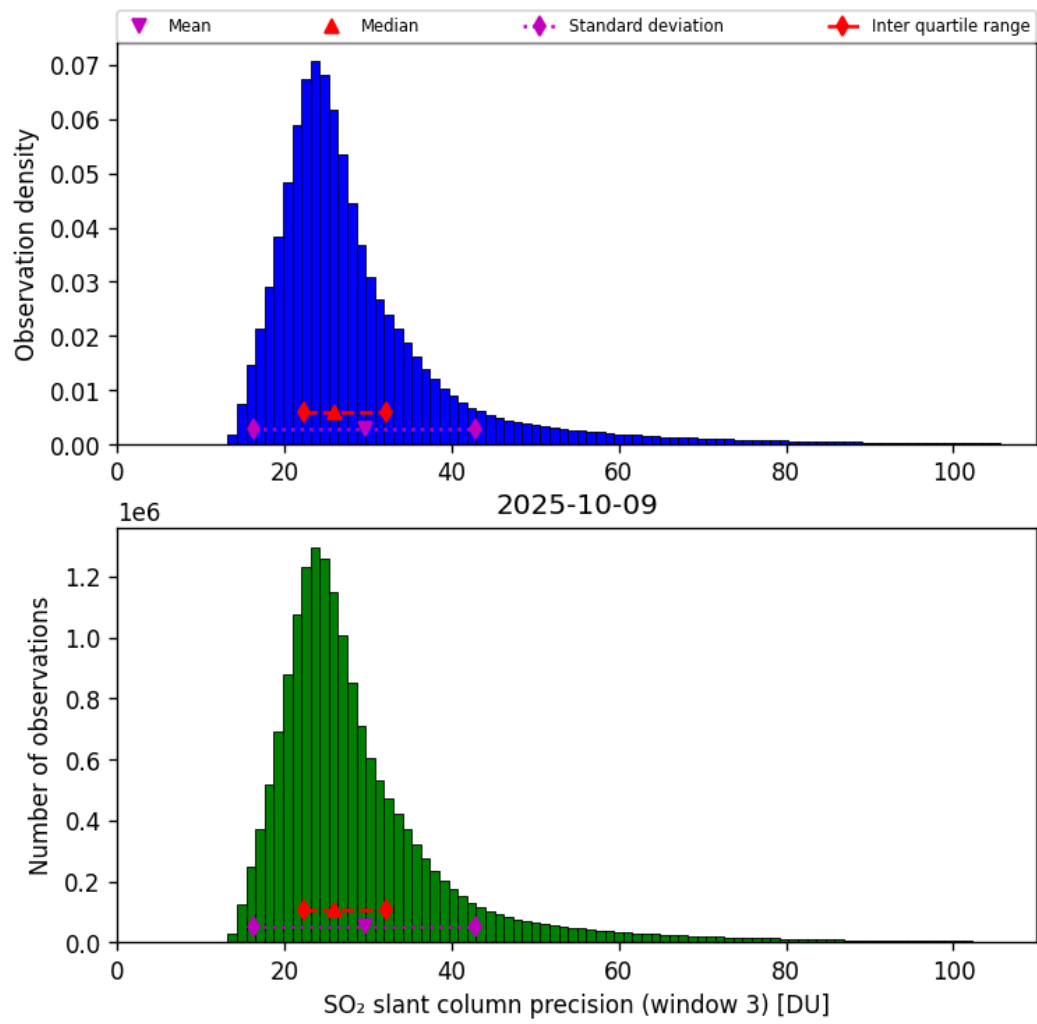


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-10-09 to 2025-10-09

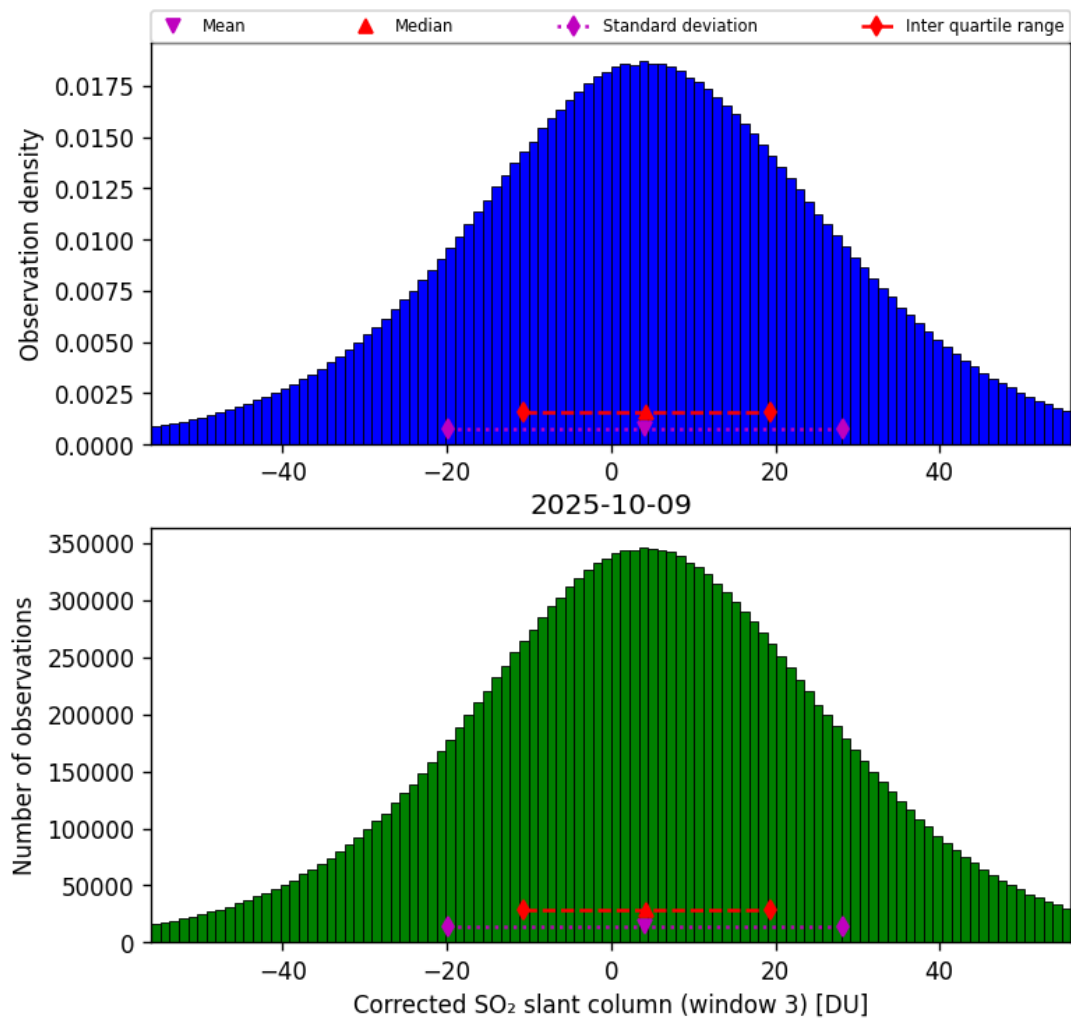


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-10-09 to 2025-10-09

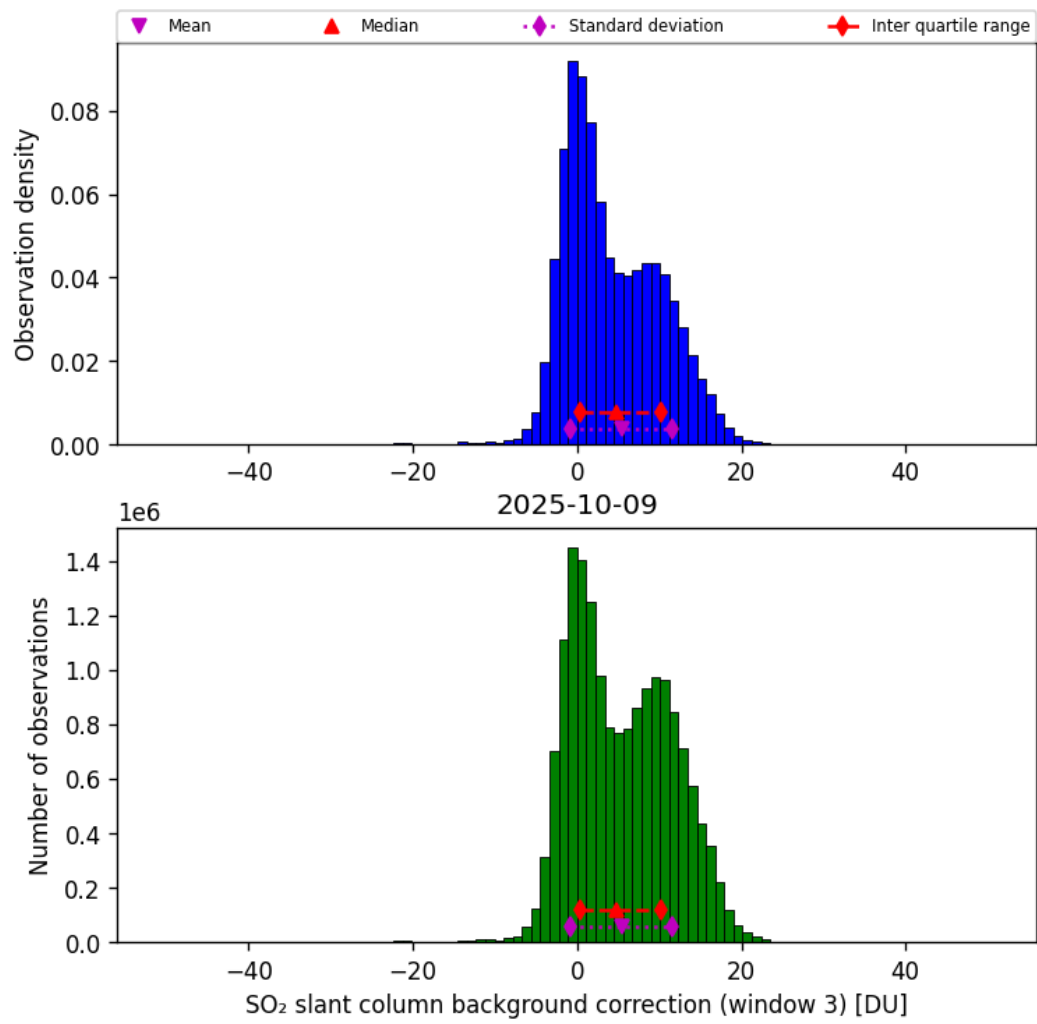


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-10-09 to 2025-10-09

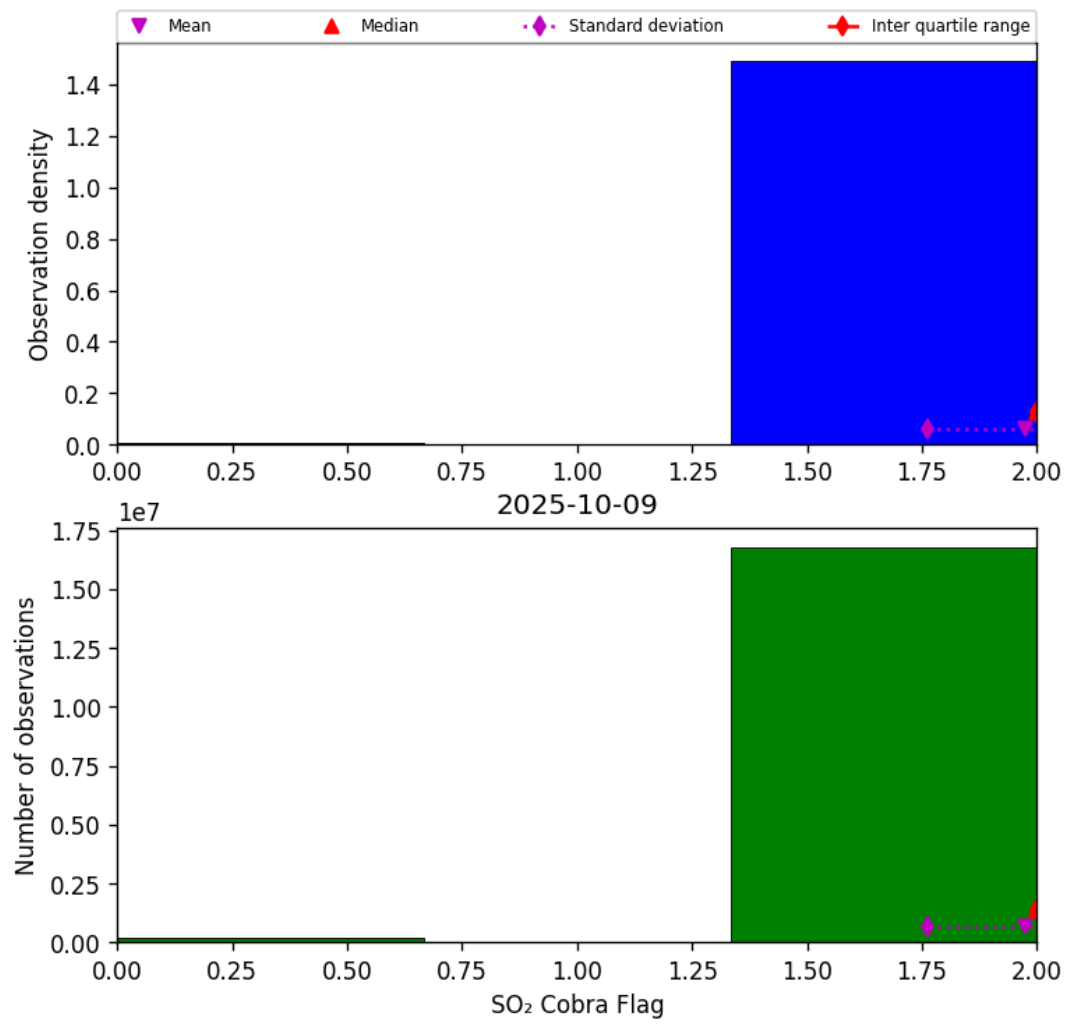


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-10-09 to 2025-10-09

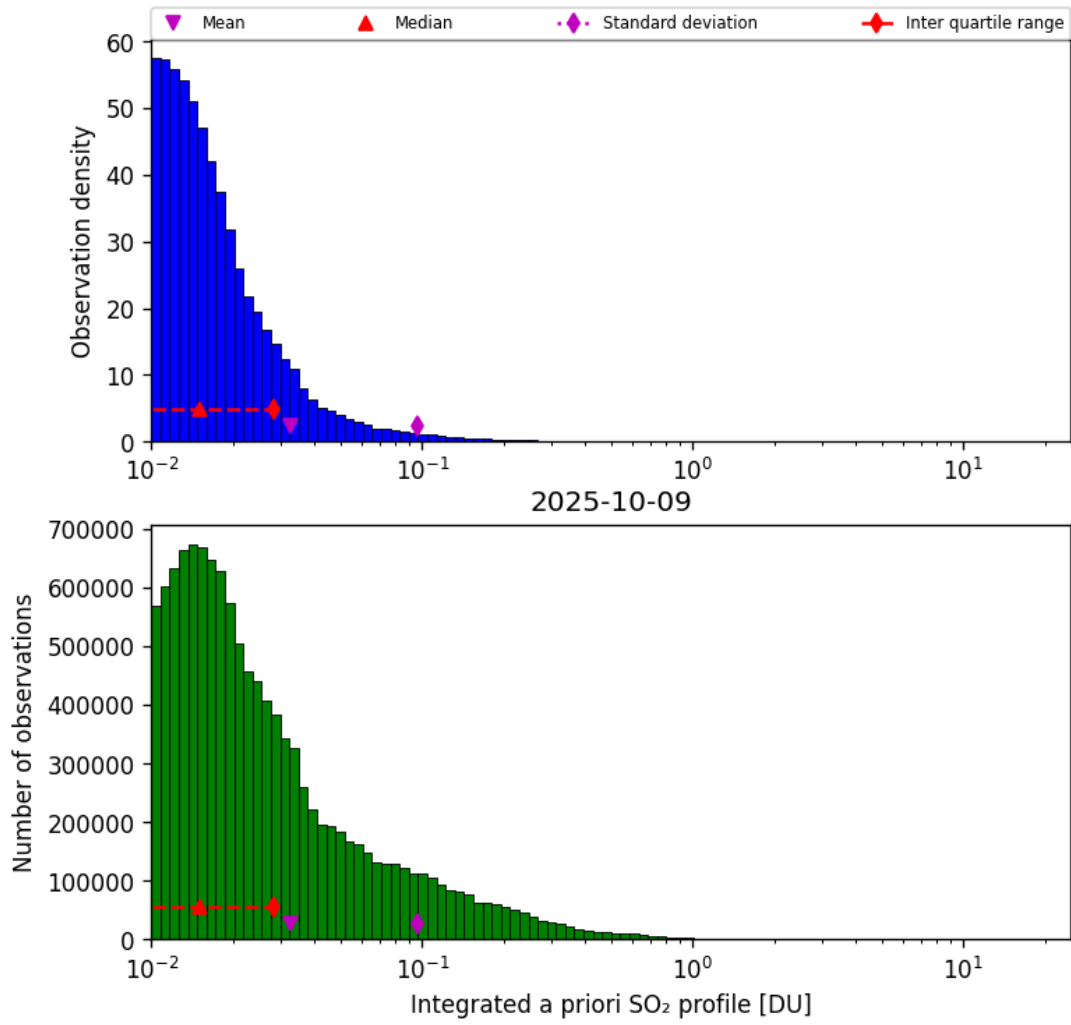


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-10-09 to 2025-10-09

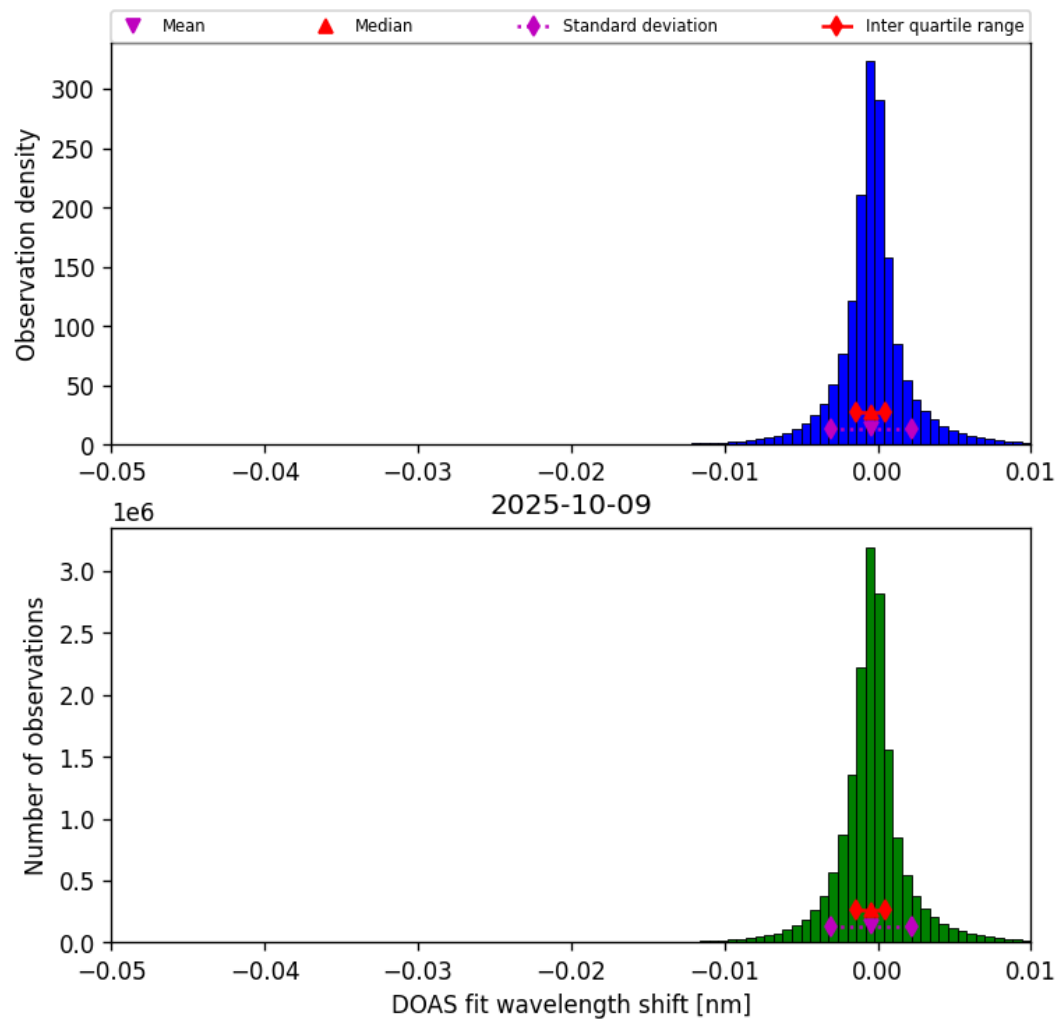


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-10-09 to 2025-10-09

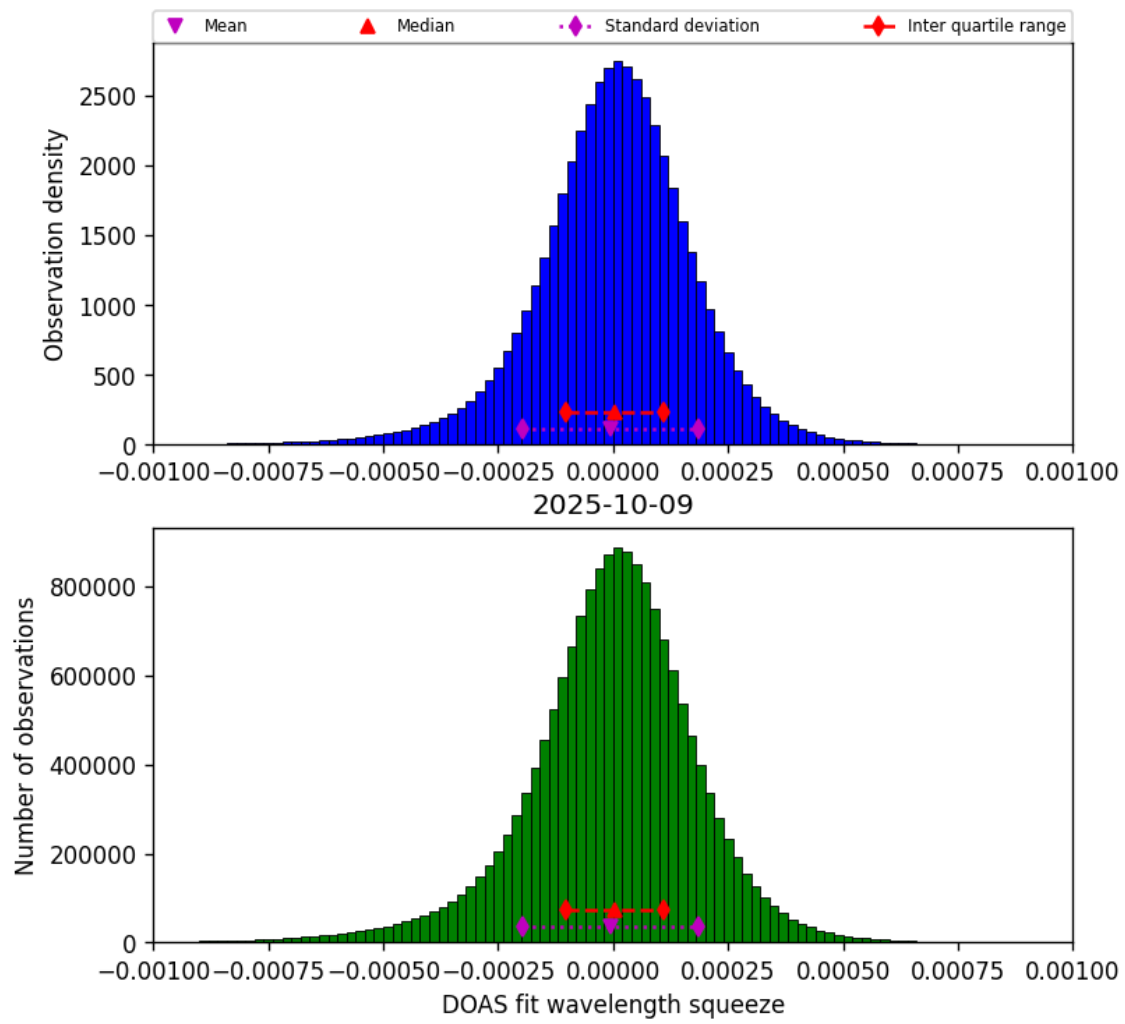


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-10-09 to 2025-10-09

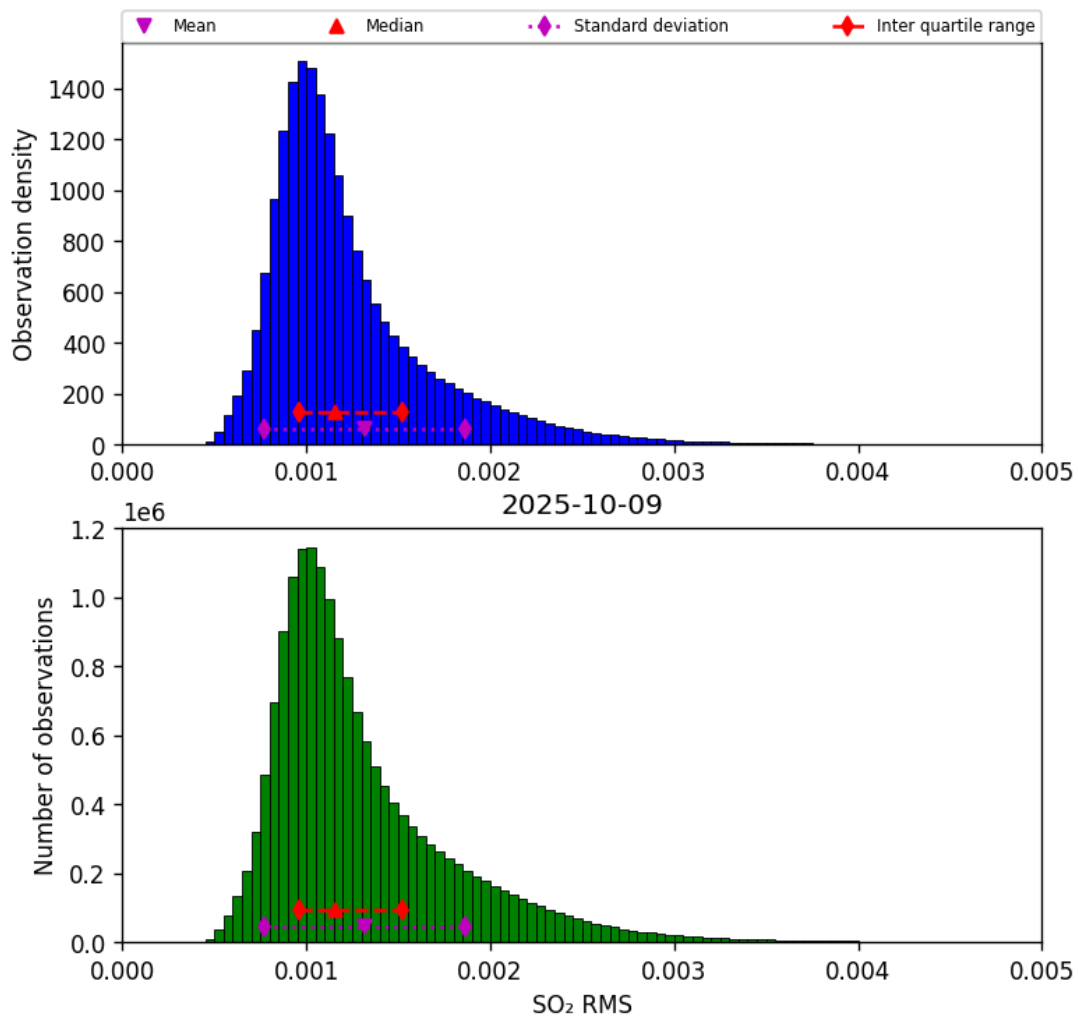


Figure 79: Histogram of “SO₂ RMS” for 2025-10-09 to 2025-10-09

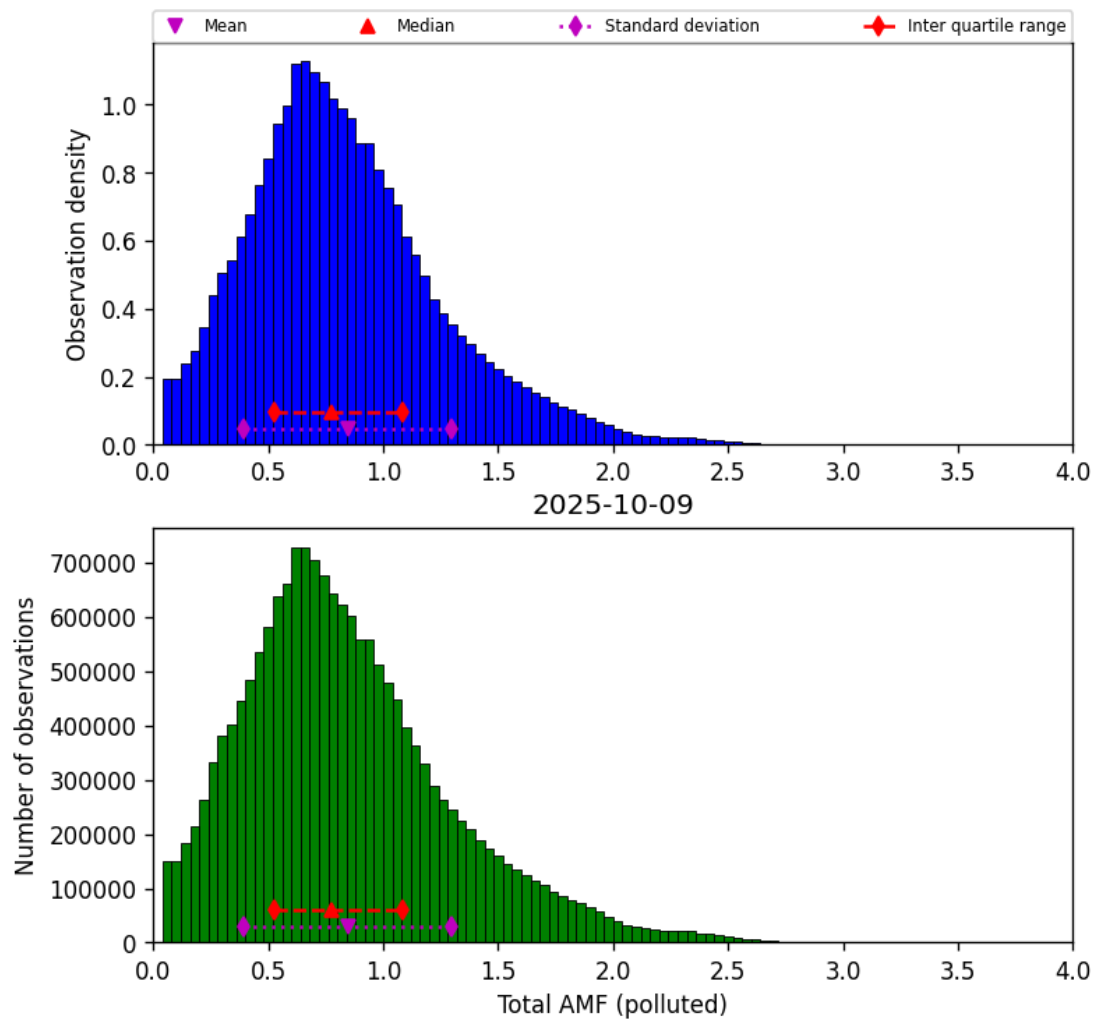


Figure 80: Histogram of “Total AMF (polluted)” for 2025-10-09 to 2025-10-09

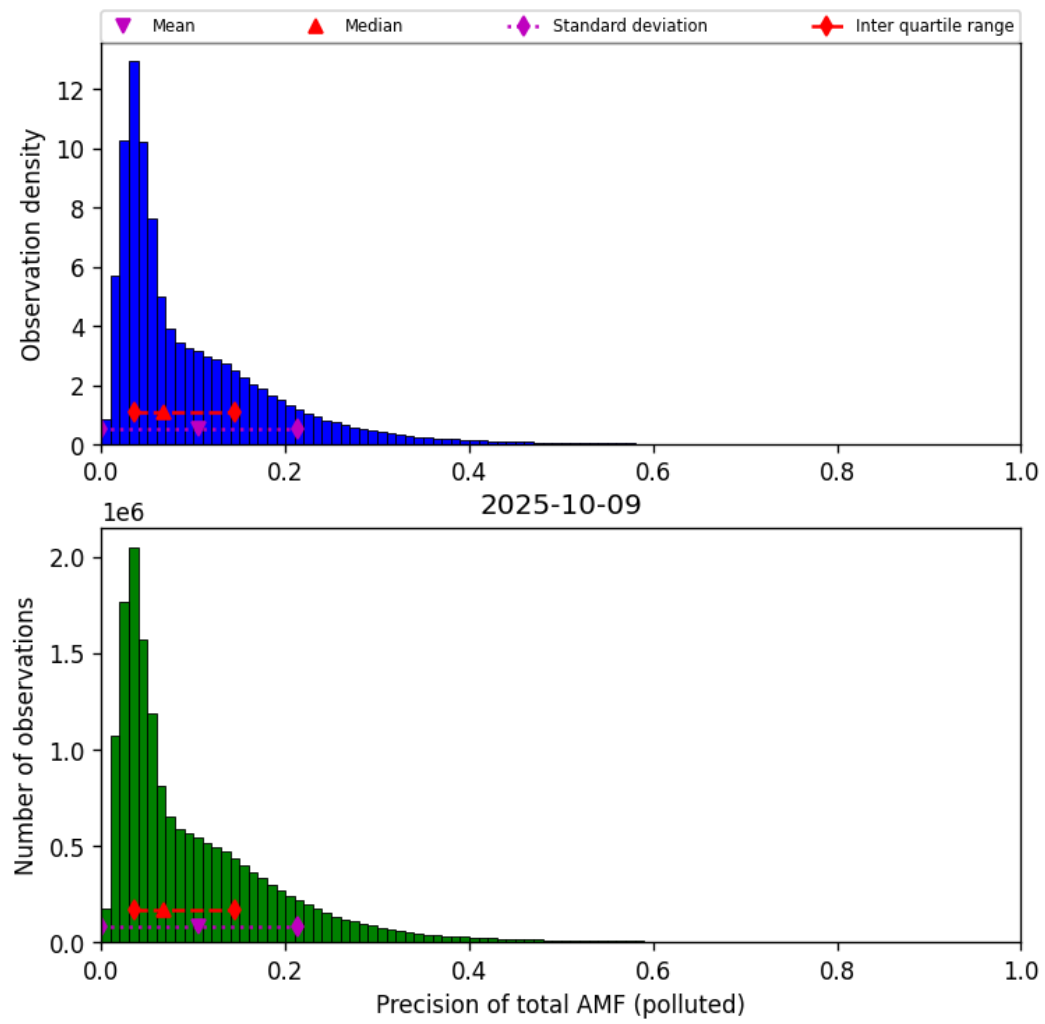


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-10-09 to 2025-10-09

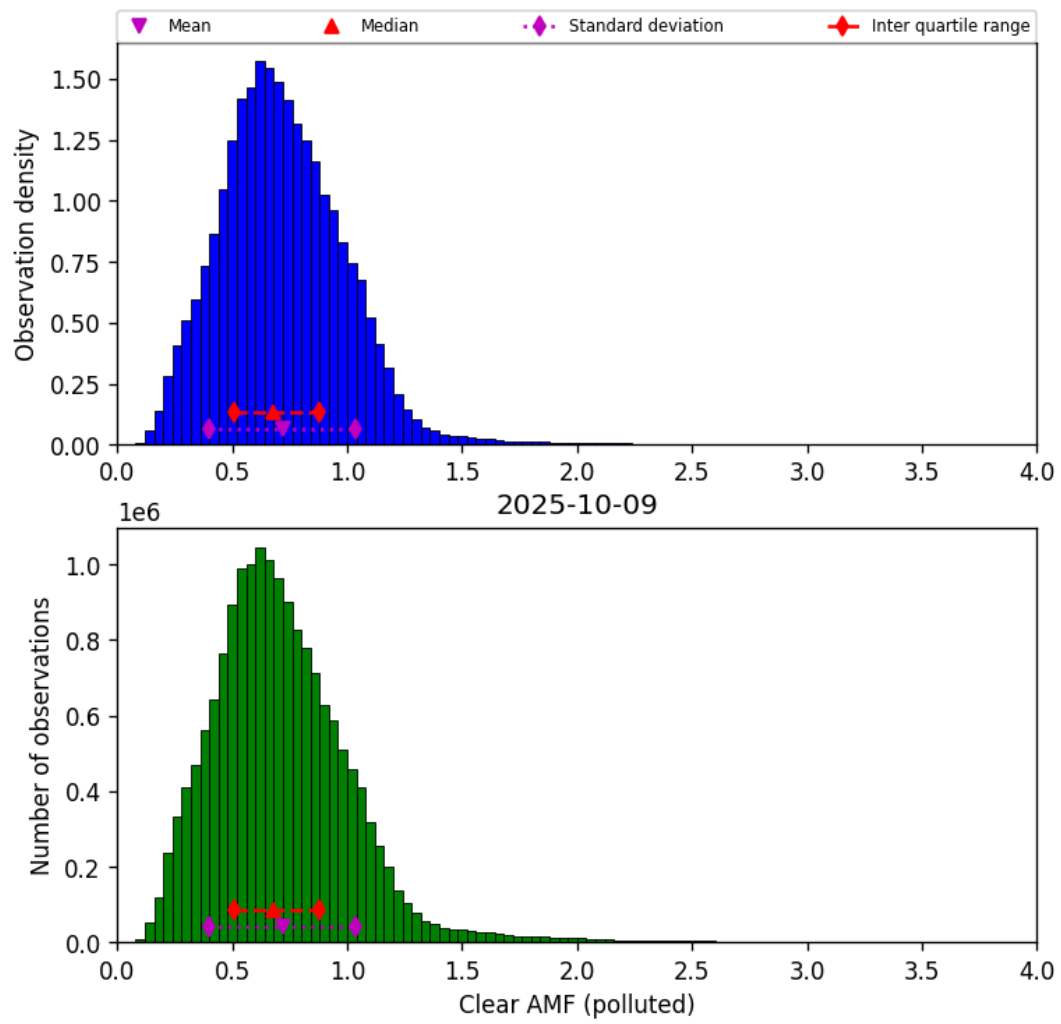


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-10-09 to 2025-10-09

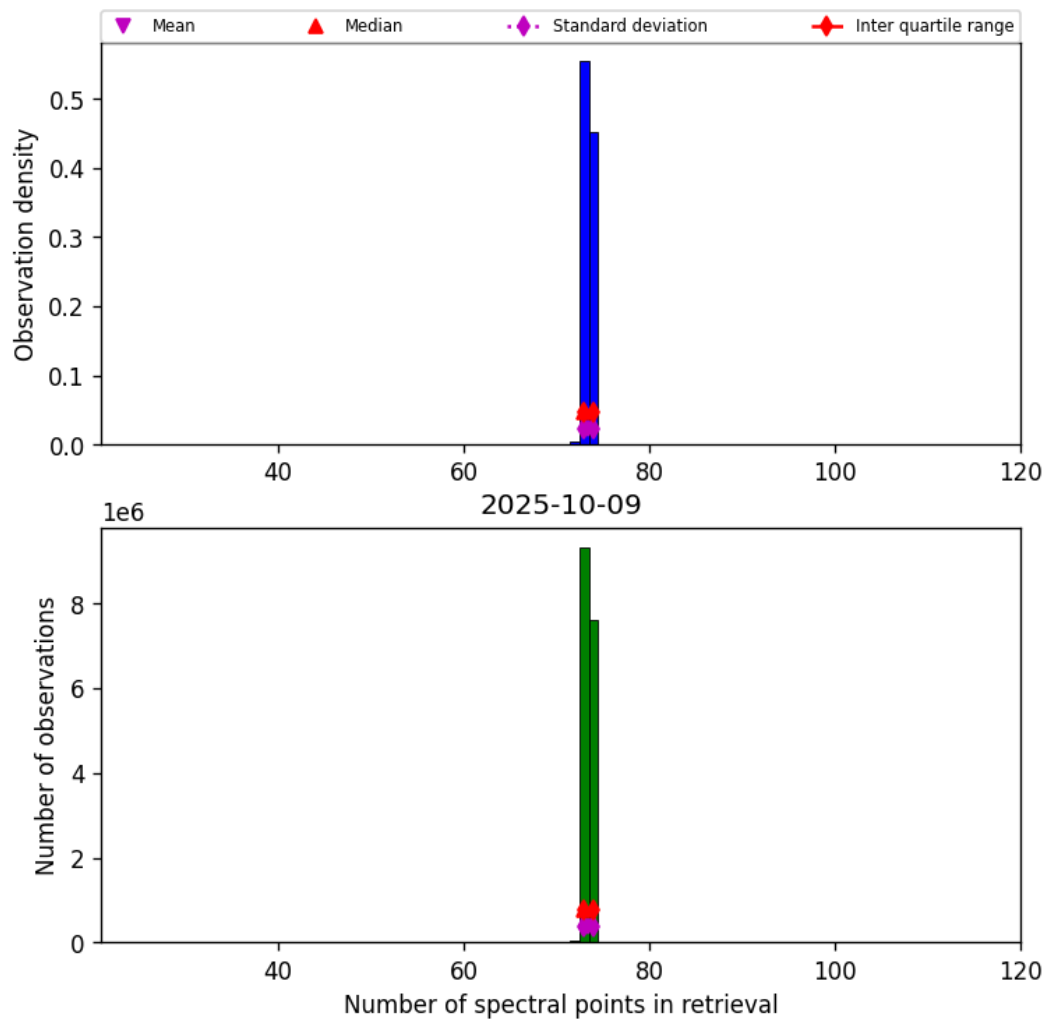


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-10-09 to 2025-10-09

9 Along track statistics

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

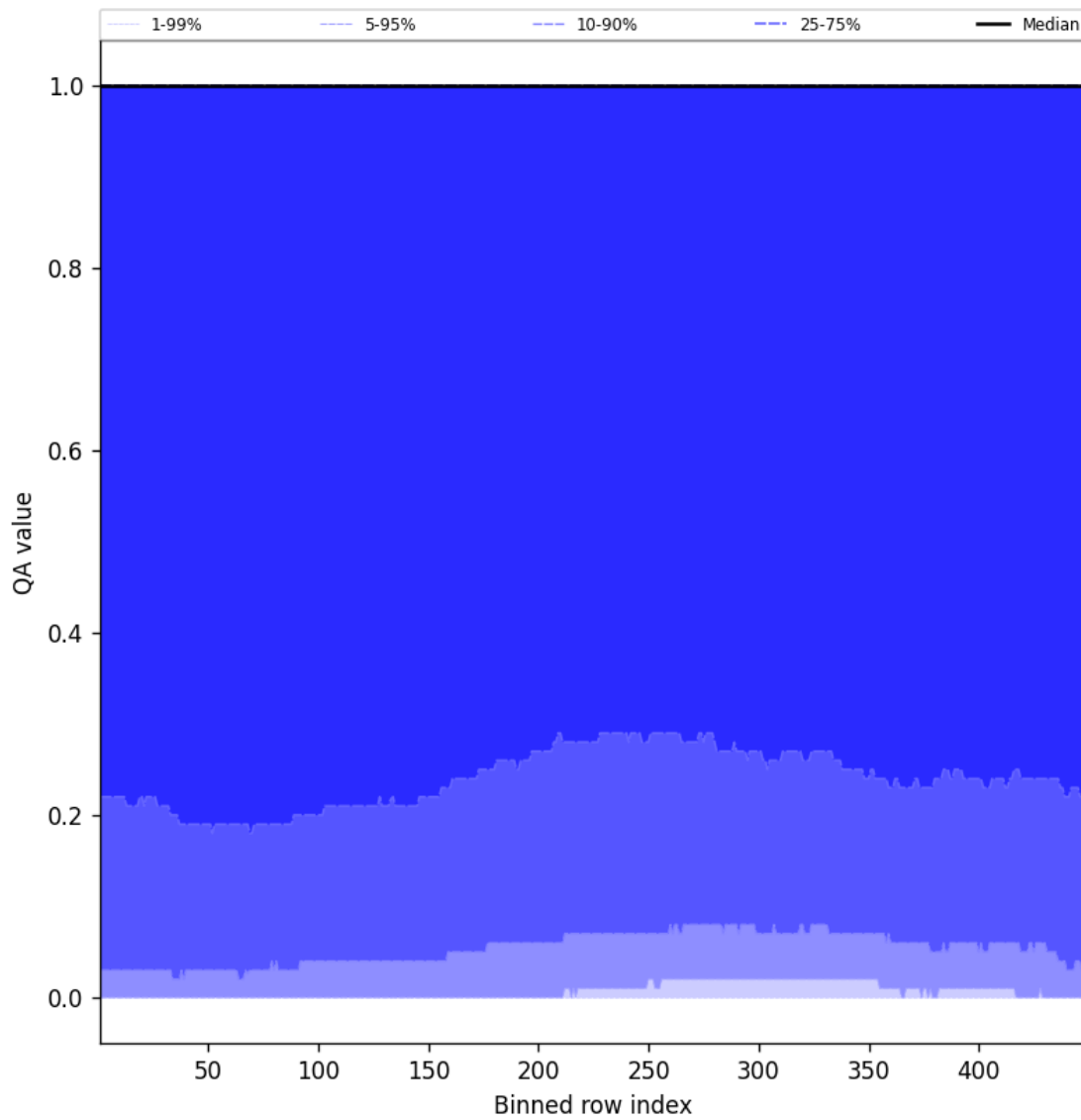


Figure 84: Along track statistics of “QA value” for 2025-10-09 to 2025-10-09

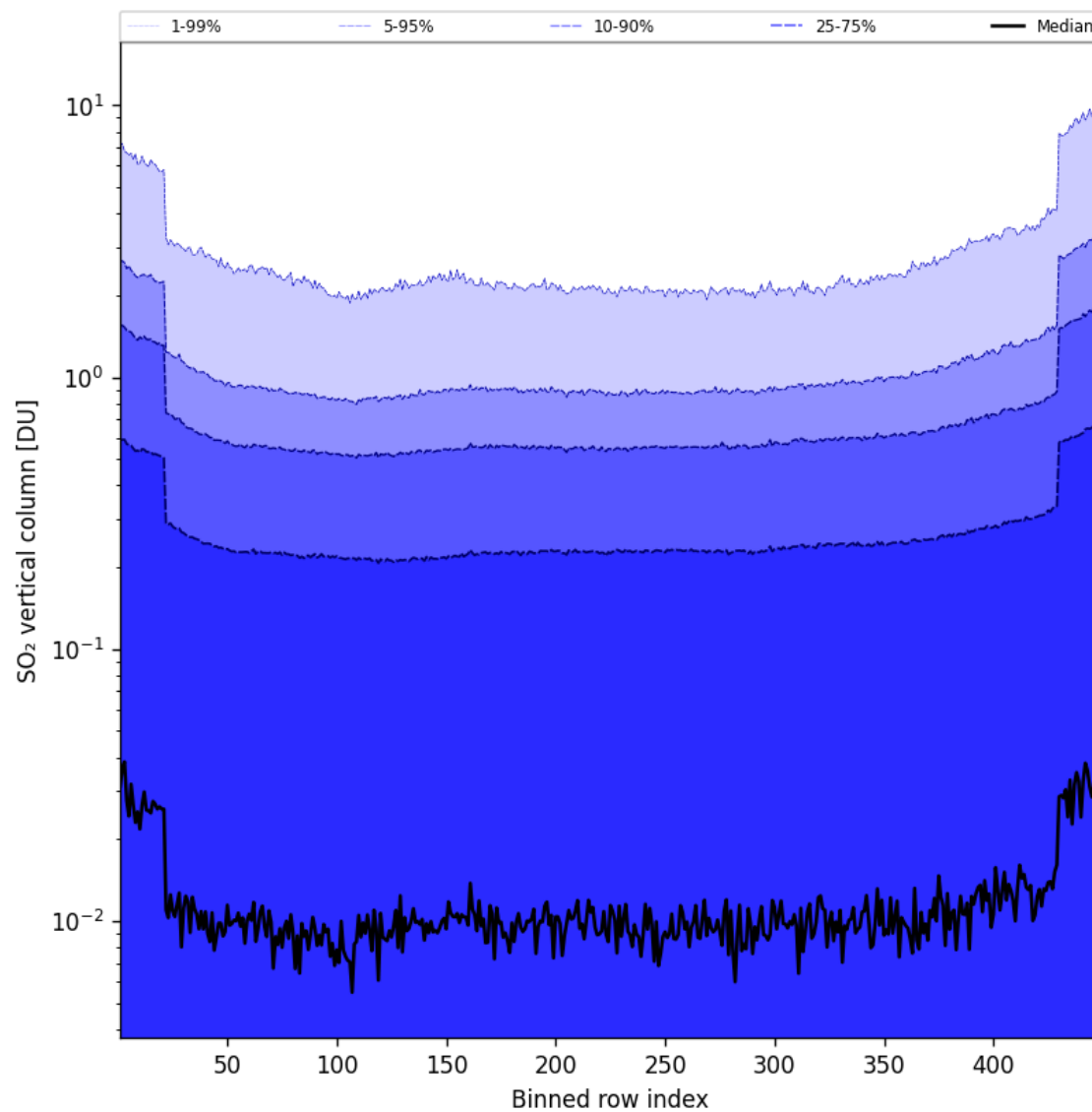


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-10-09 to 2025-10-09

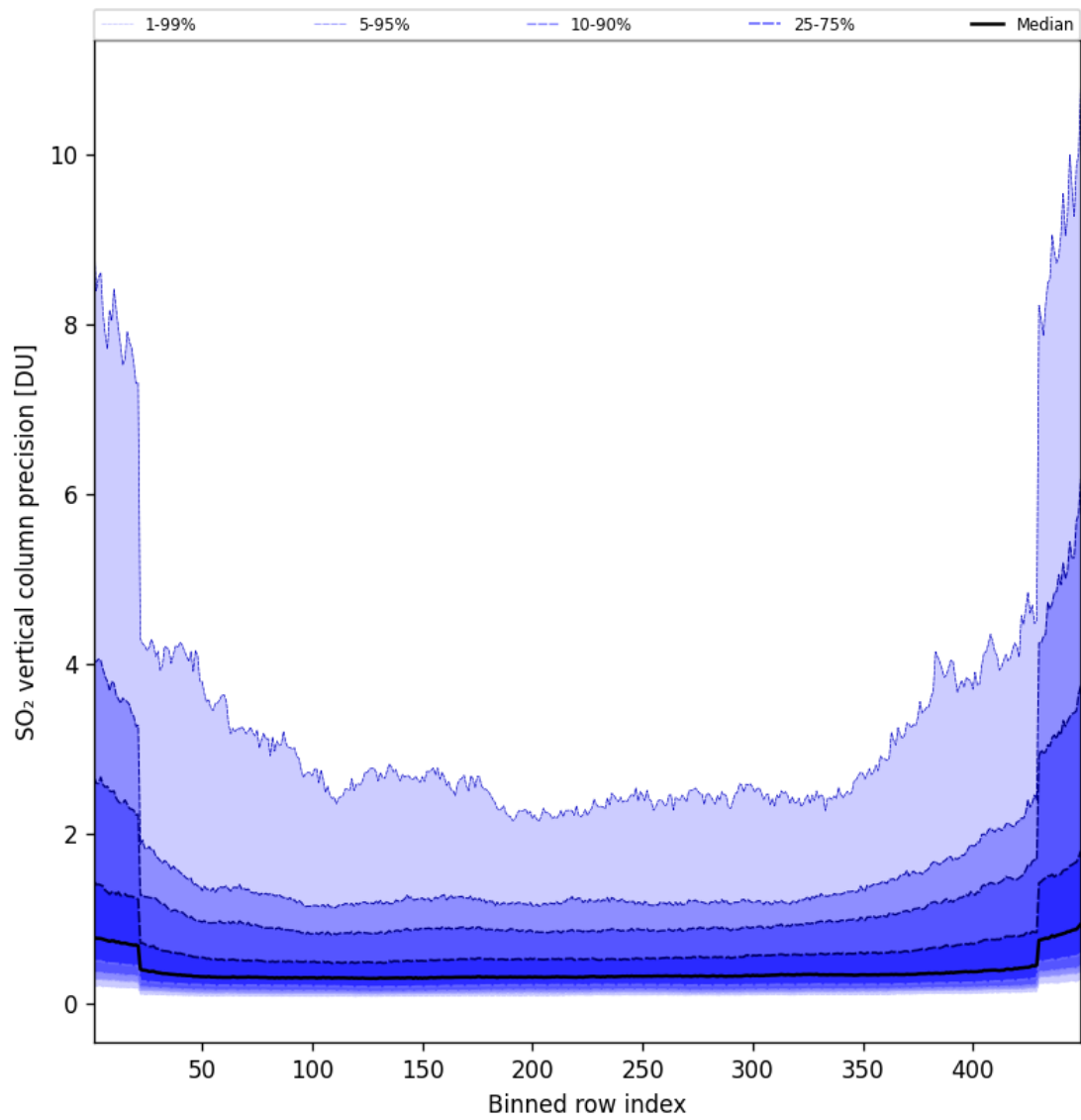


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-10-09 to 2025-10-09

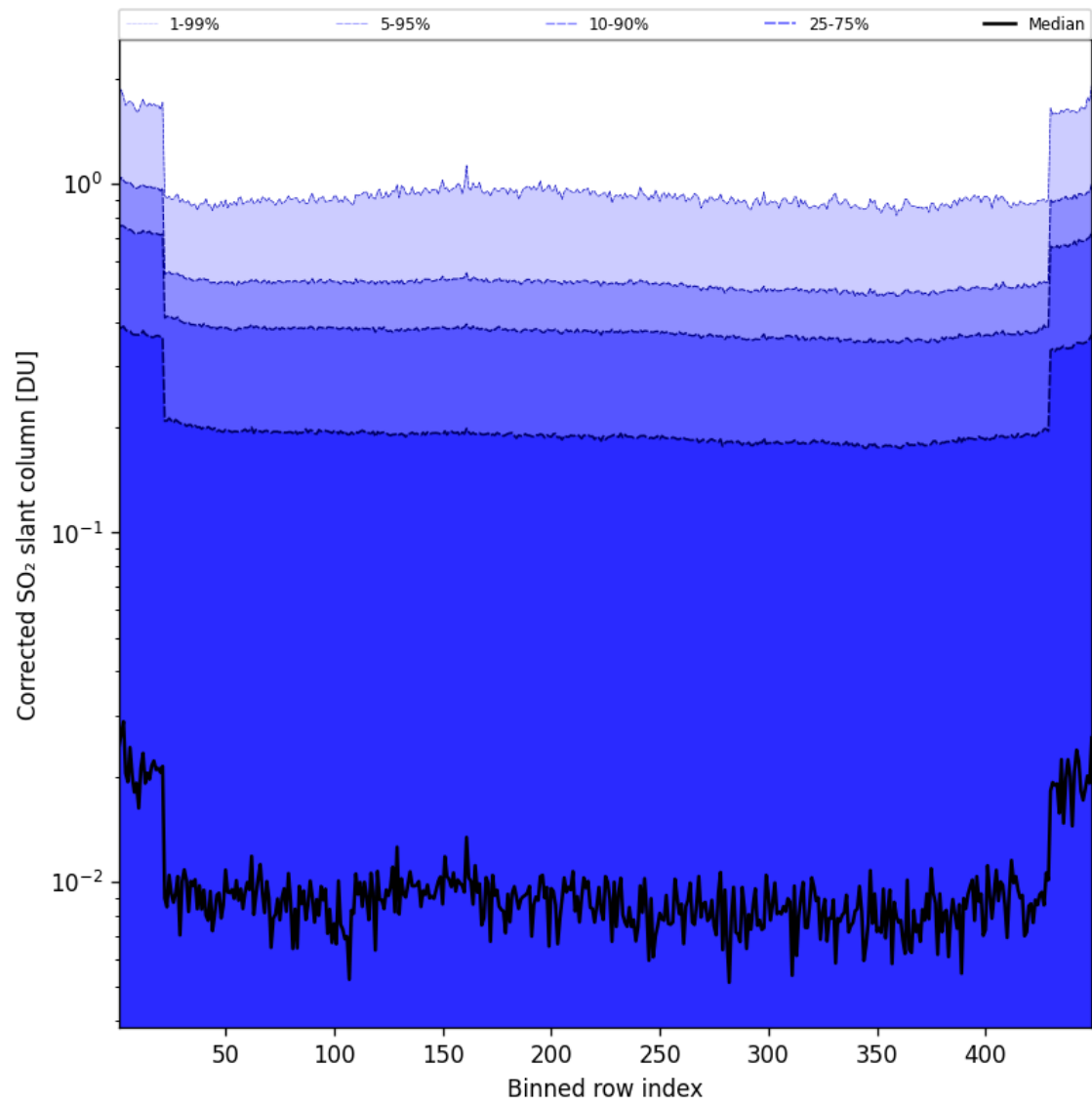


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-10-09 to 2025-10-09

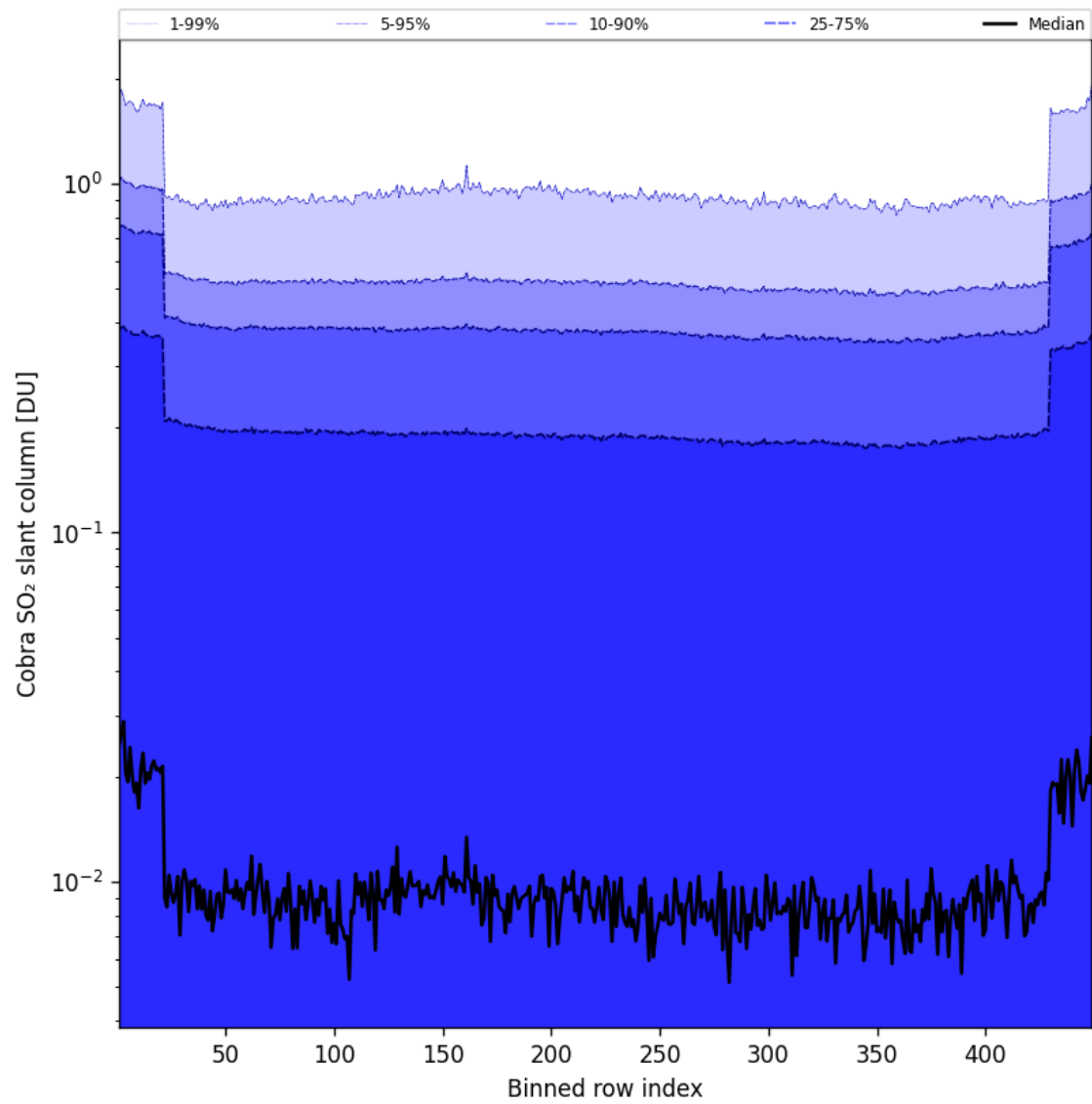


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-10-09 to 2025-10-09

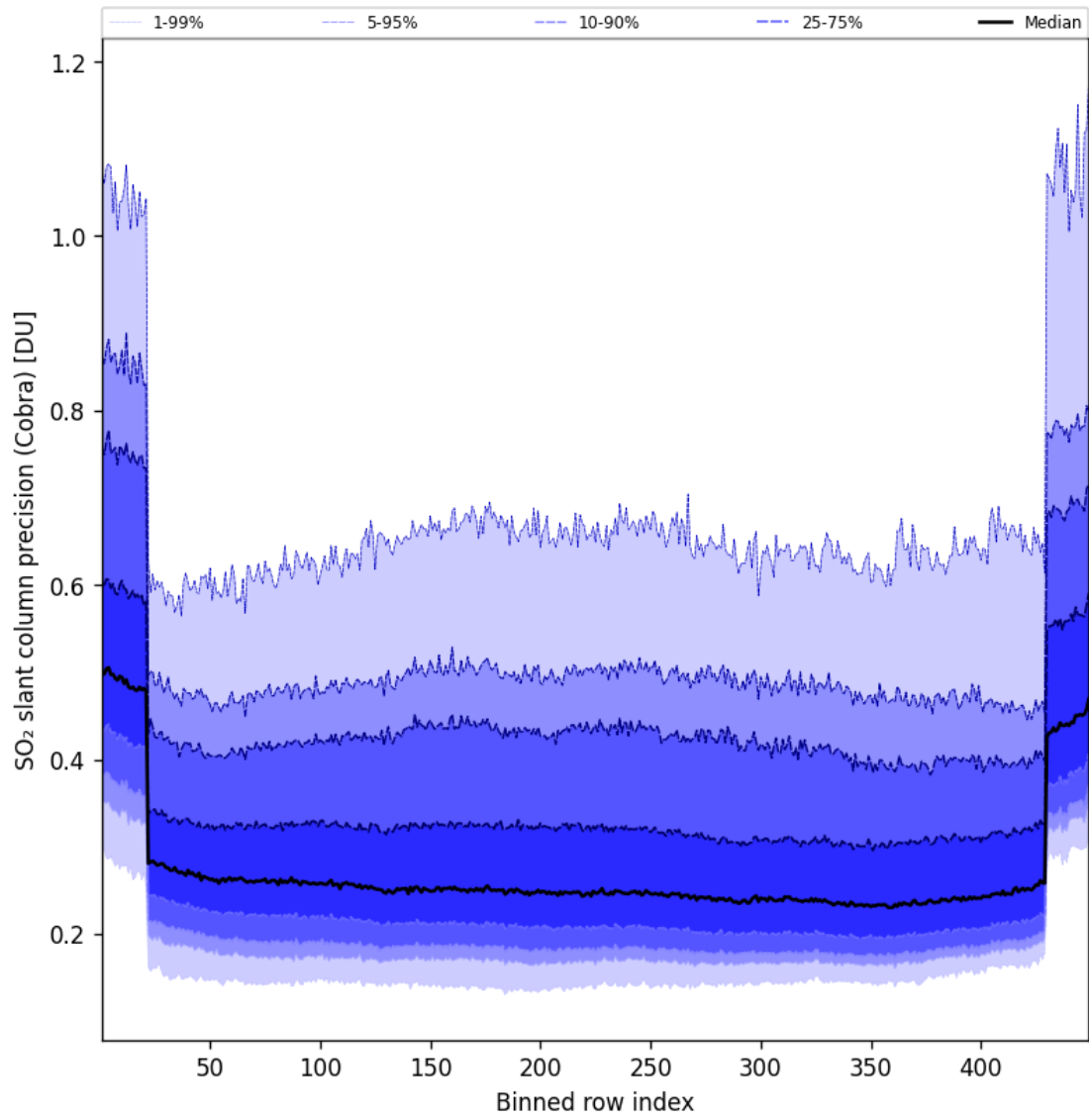


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-10-09 to 2025-10-09

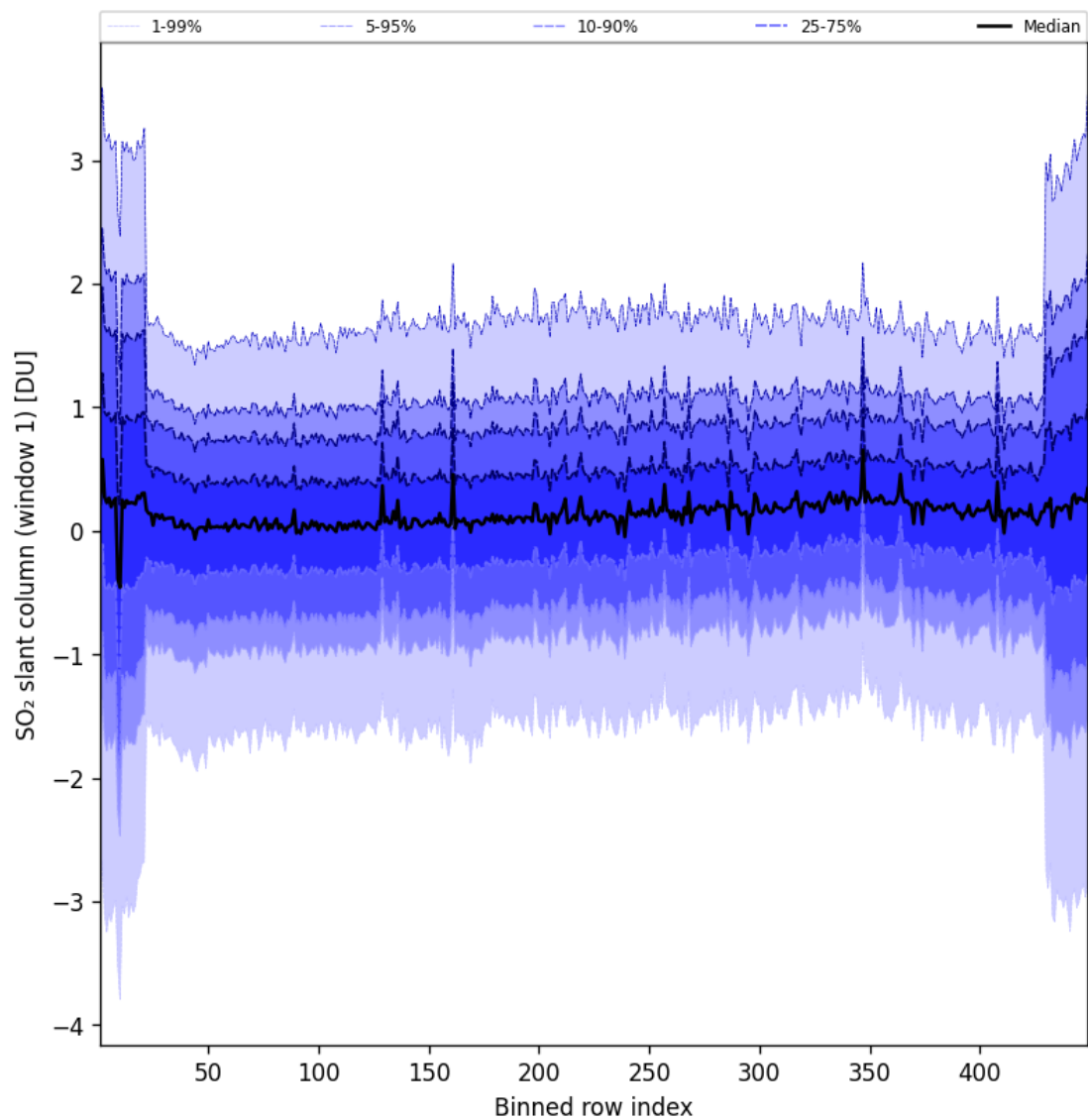


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-10-09 to 2025-10-09

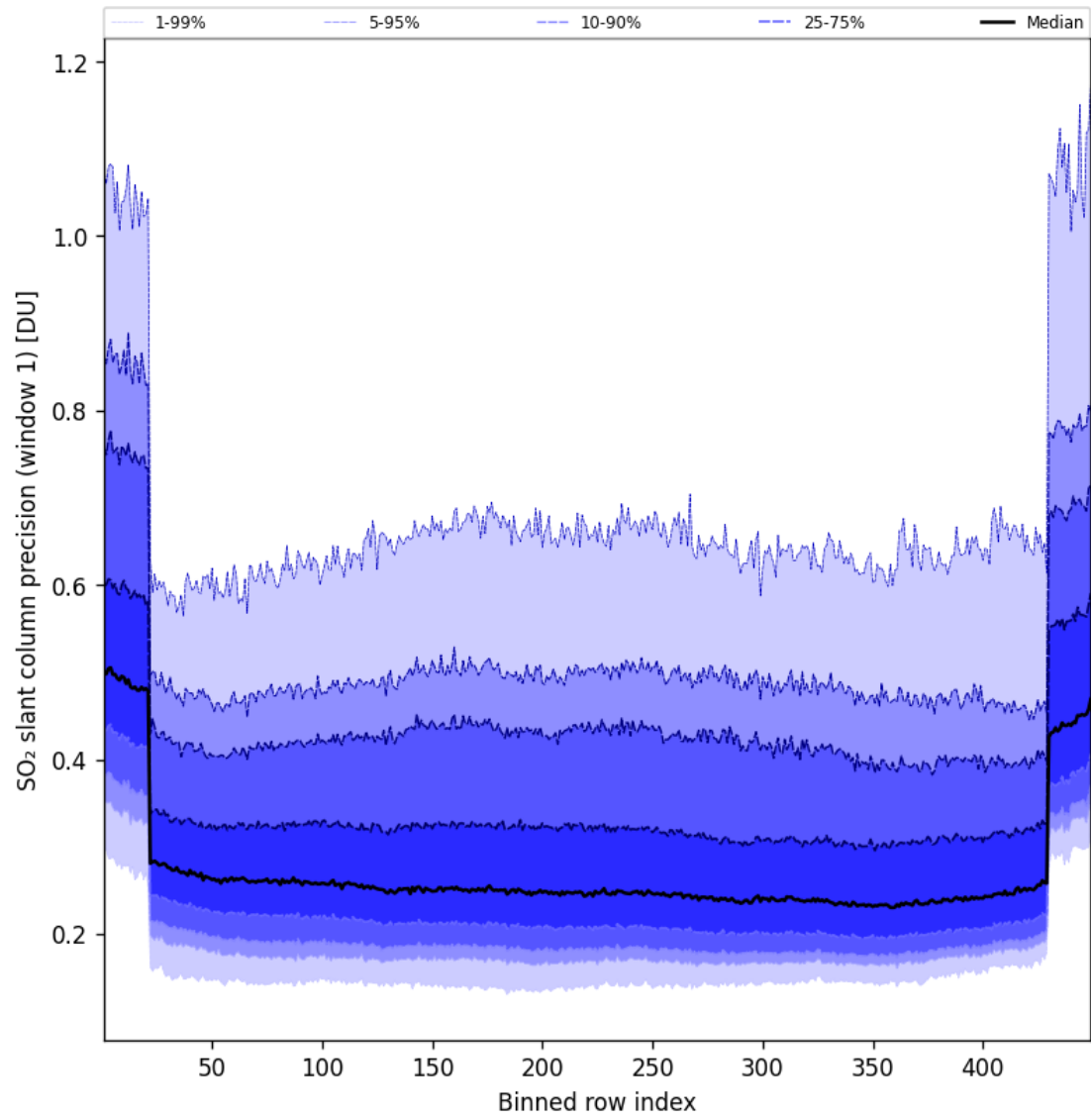


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-10-09 to 2025-10-09

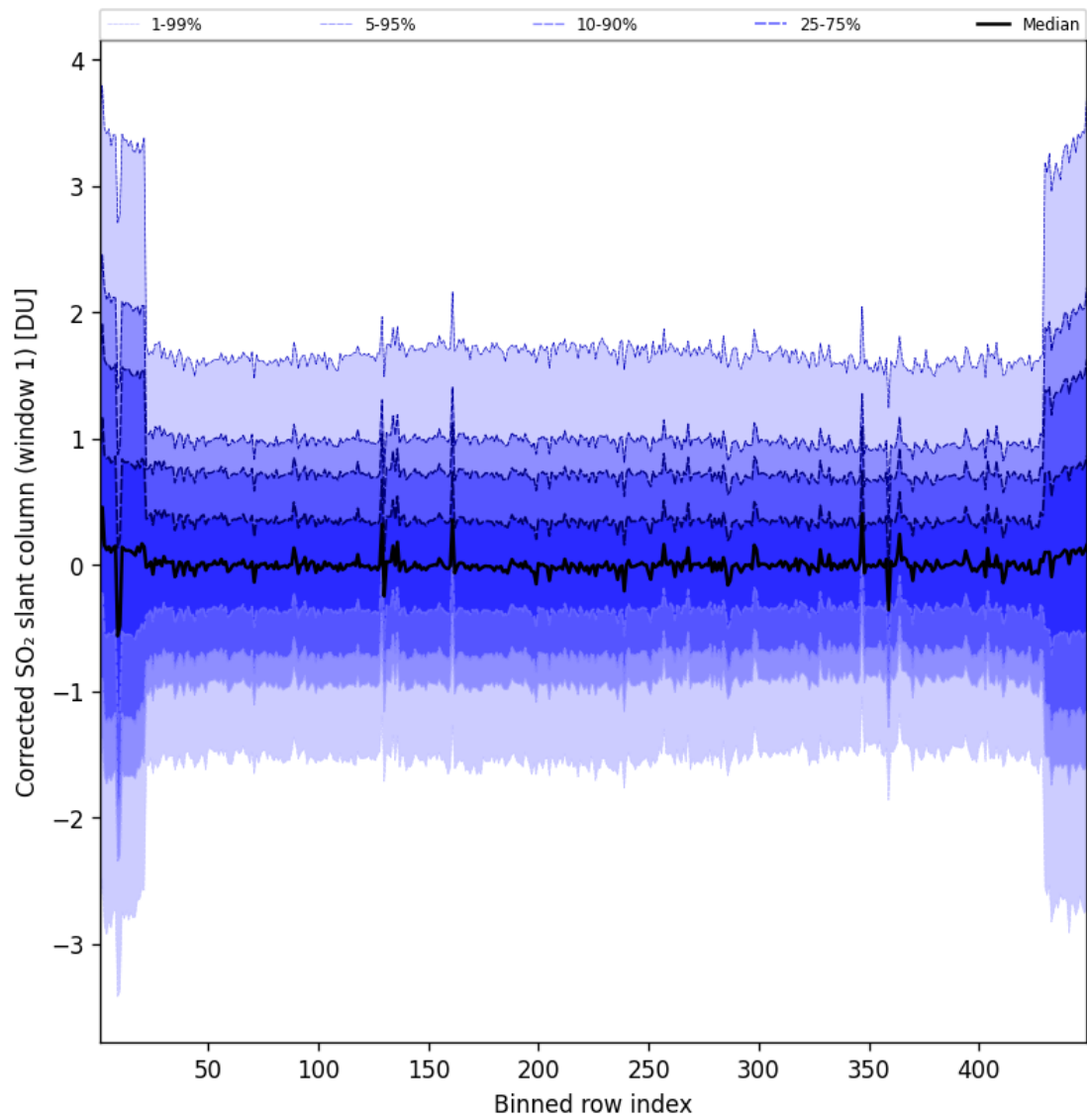


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-10-09 to 2025-10-09

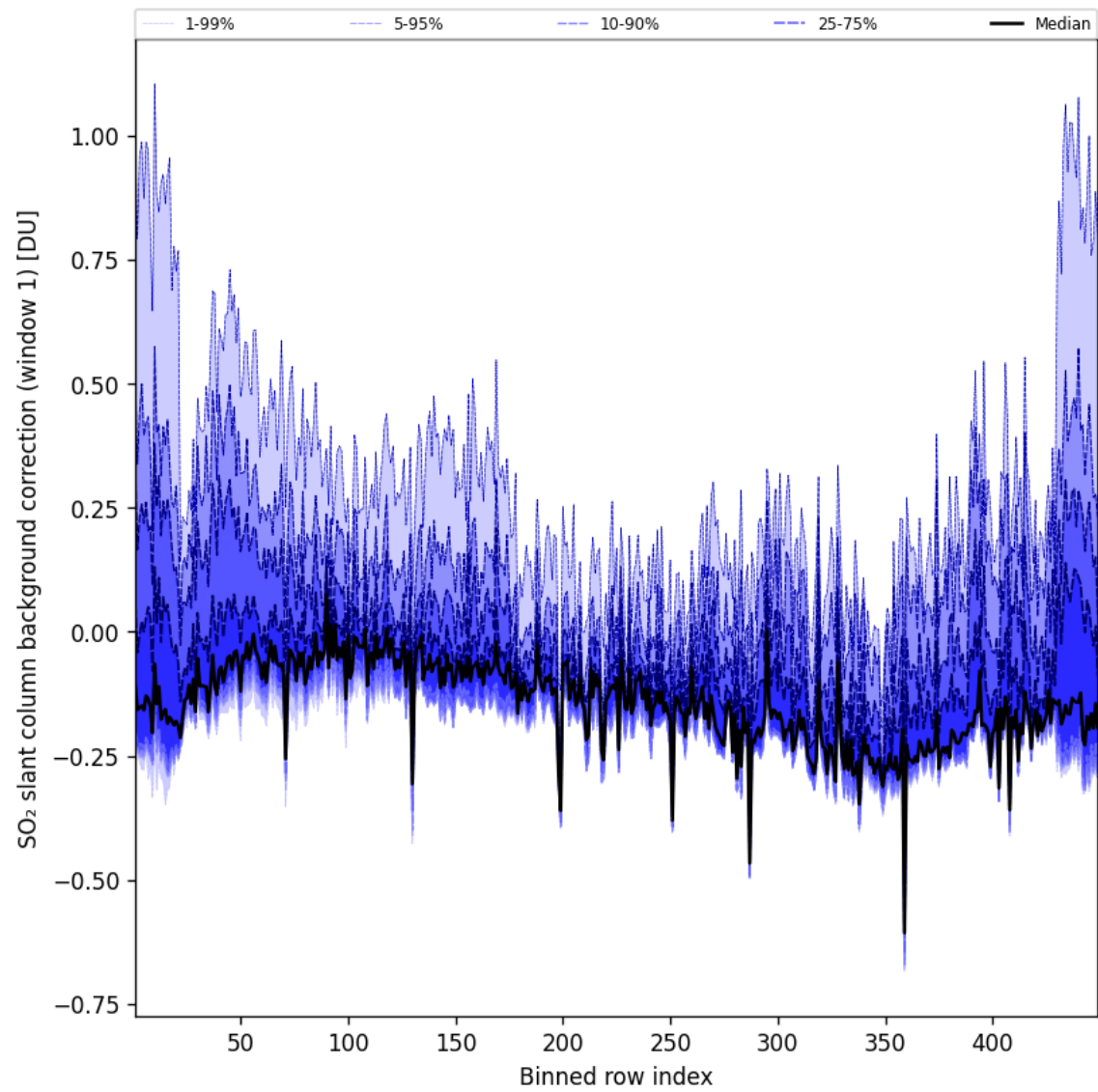


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-10-09 to 2025-10-09

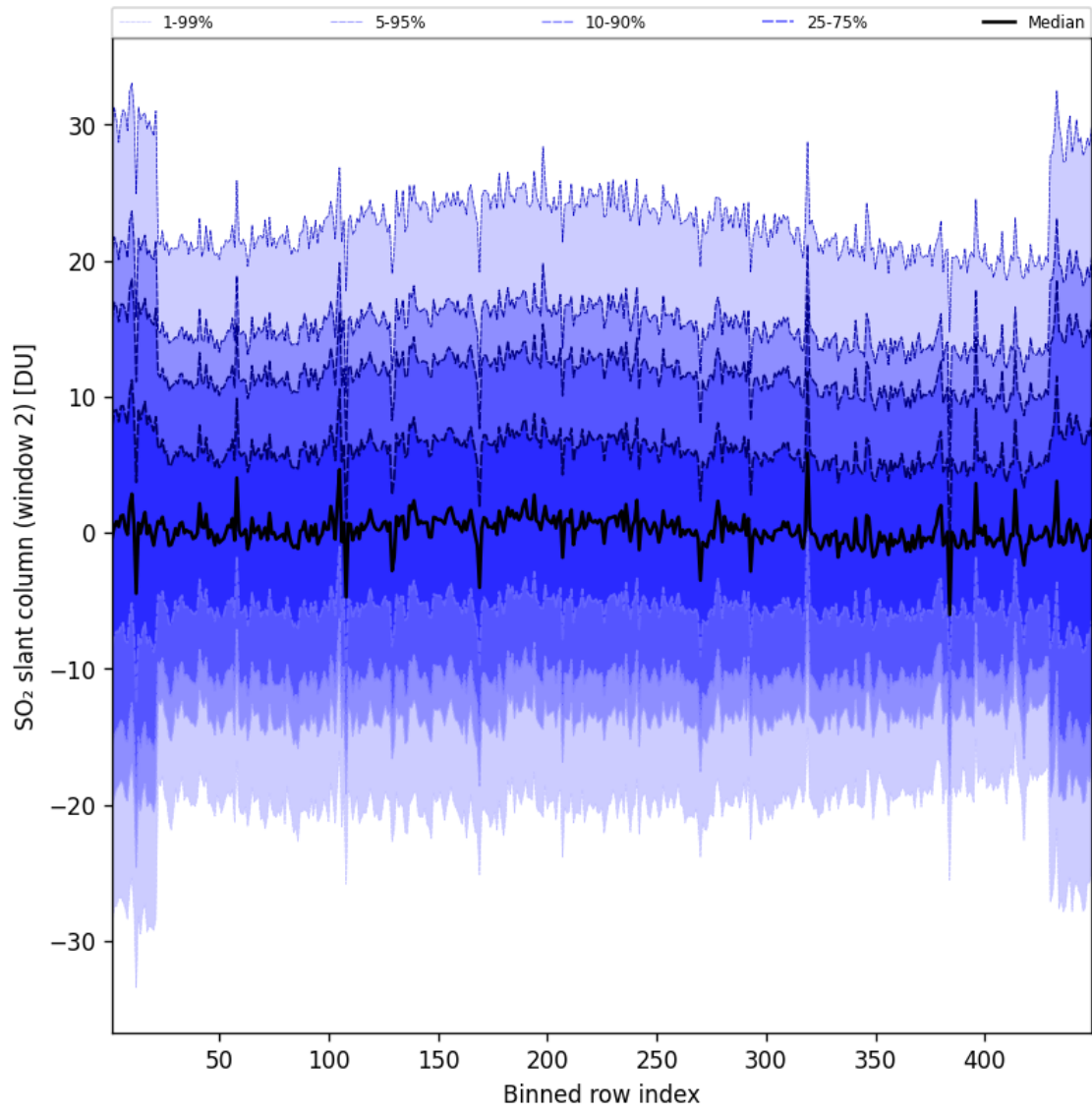


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-10-09 to 2025-10-09

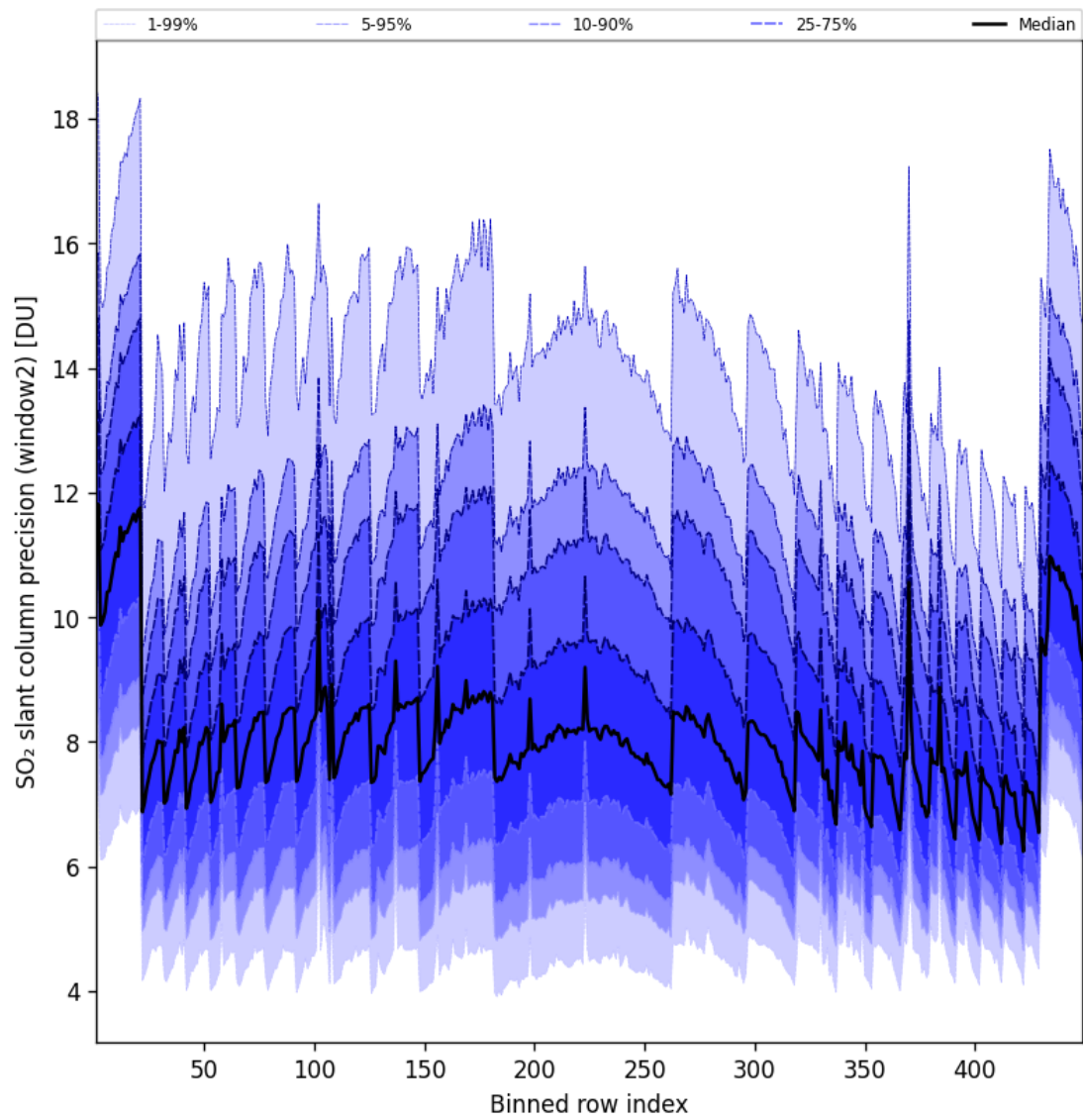


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-10-09 to 2025-10-09

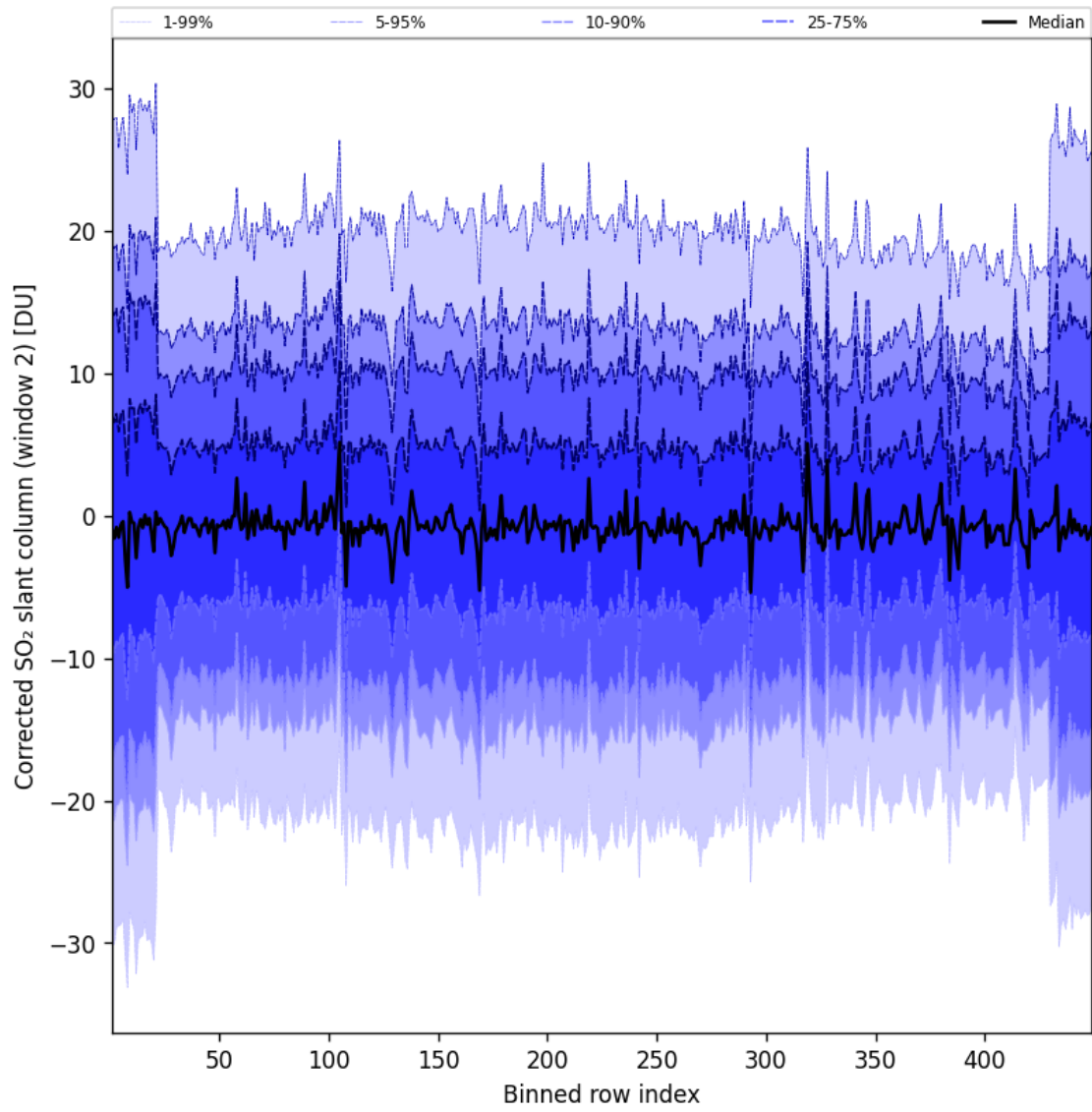


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-10-09 to 2025-10-09

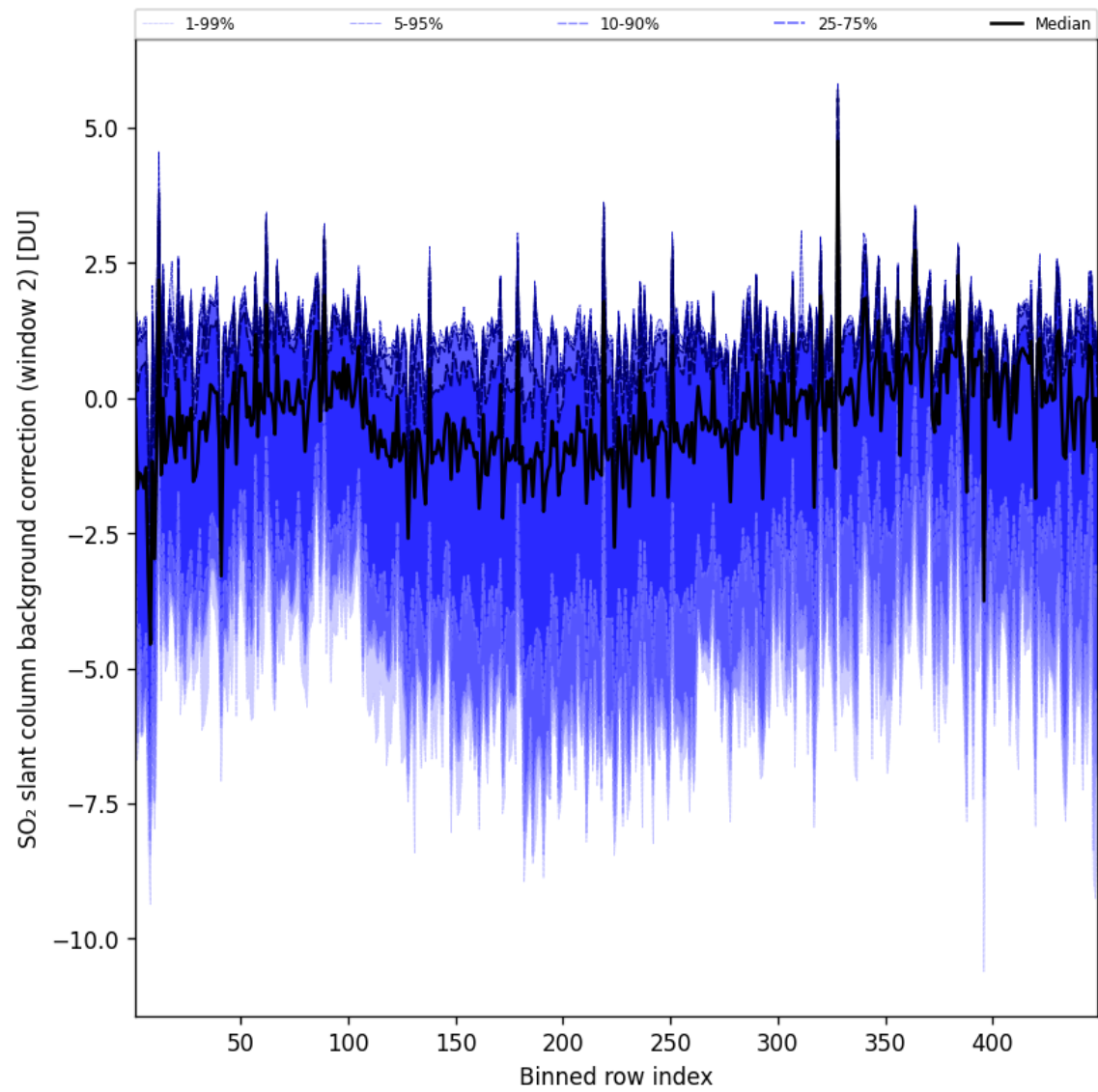


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-10-09 to 2025-10-09

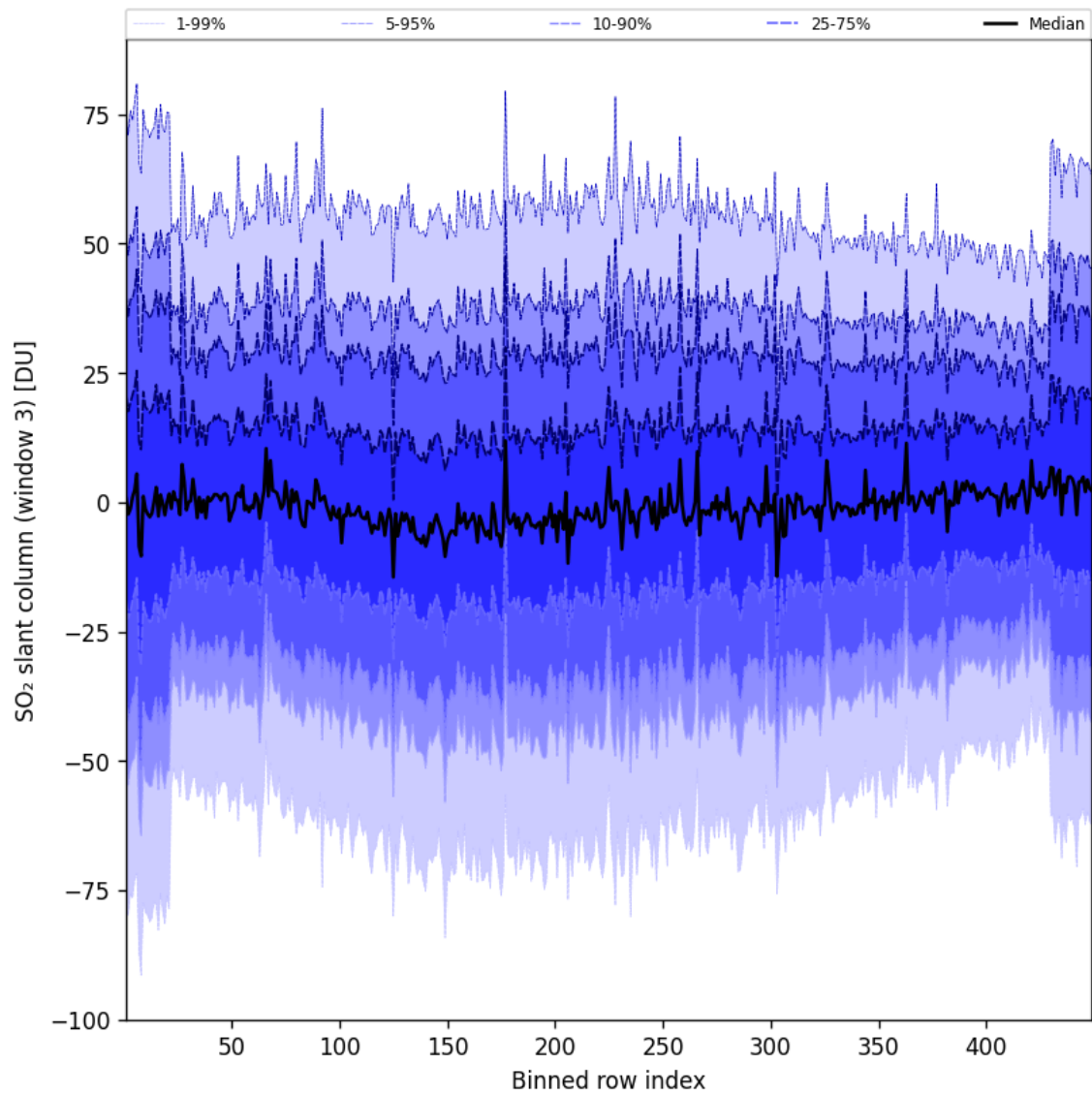


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-10-09 to 2025-10-09

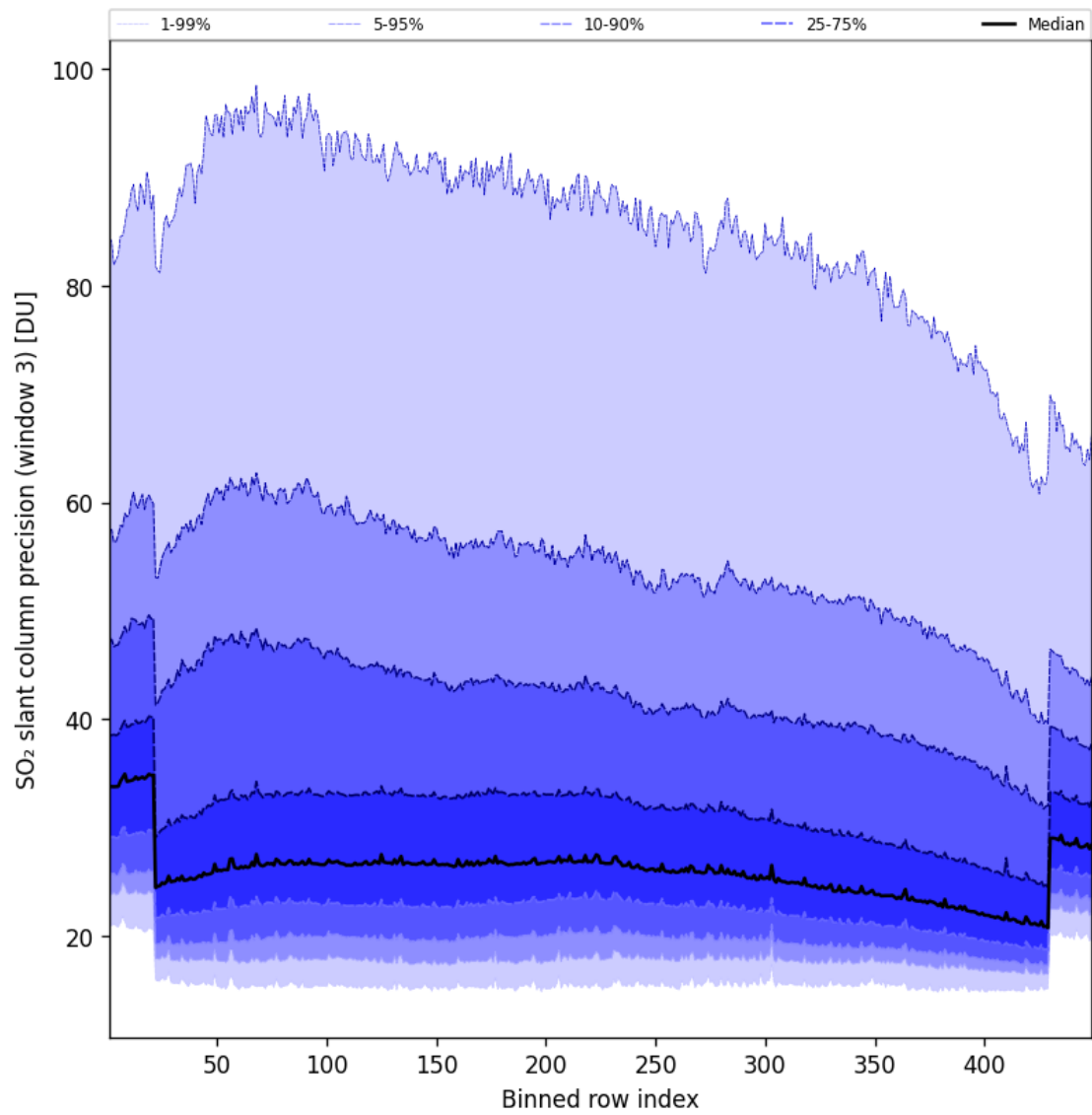


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-10-09 to 2025-10-09

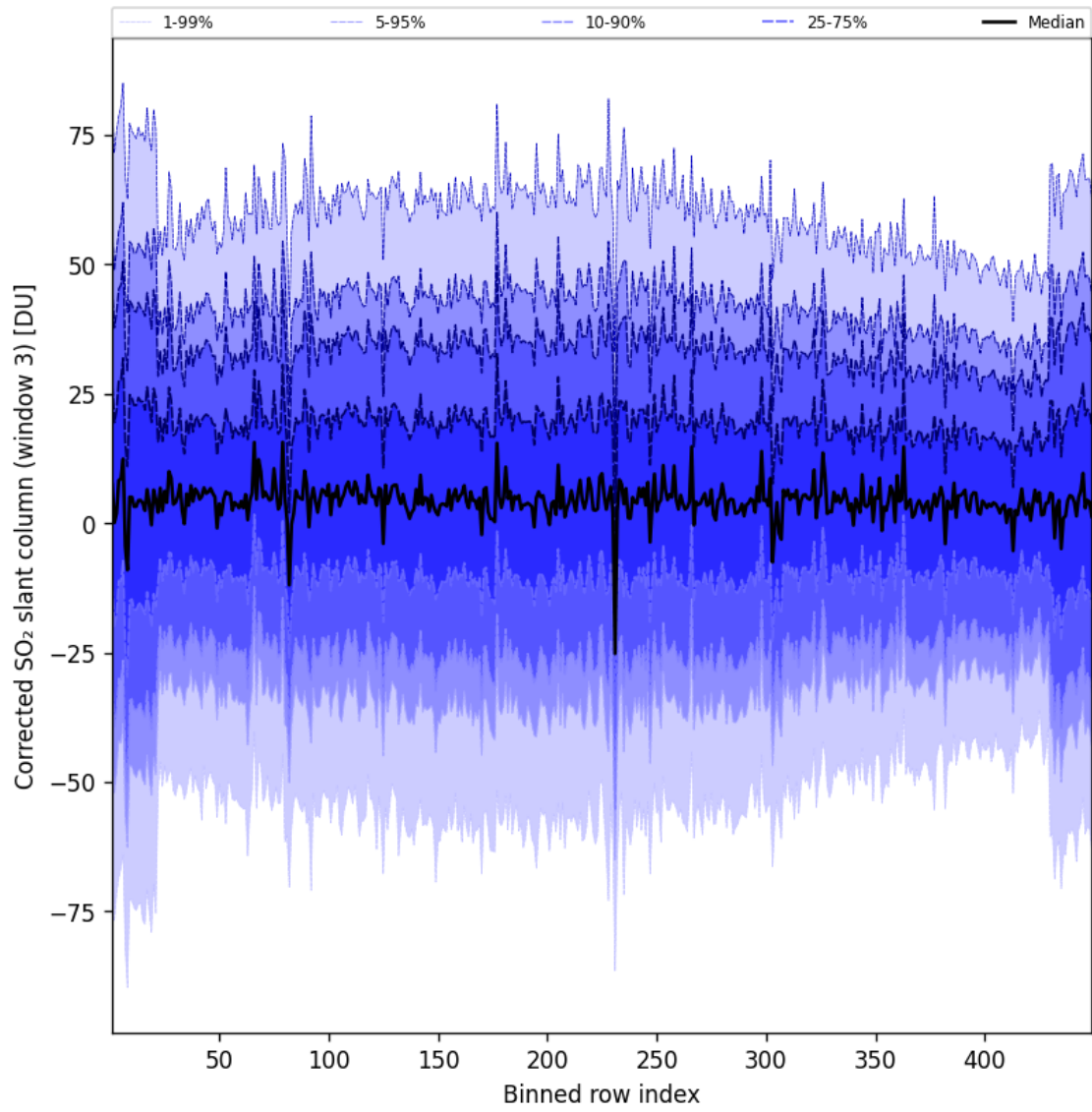


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-10-09 to 2025-10-09

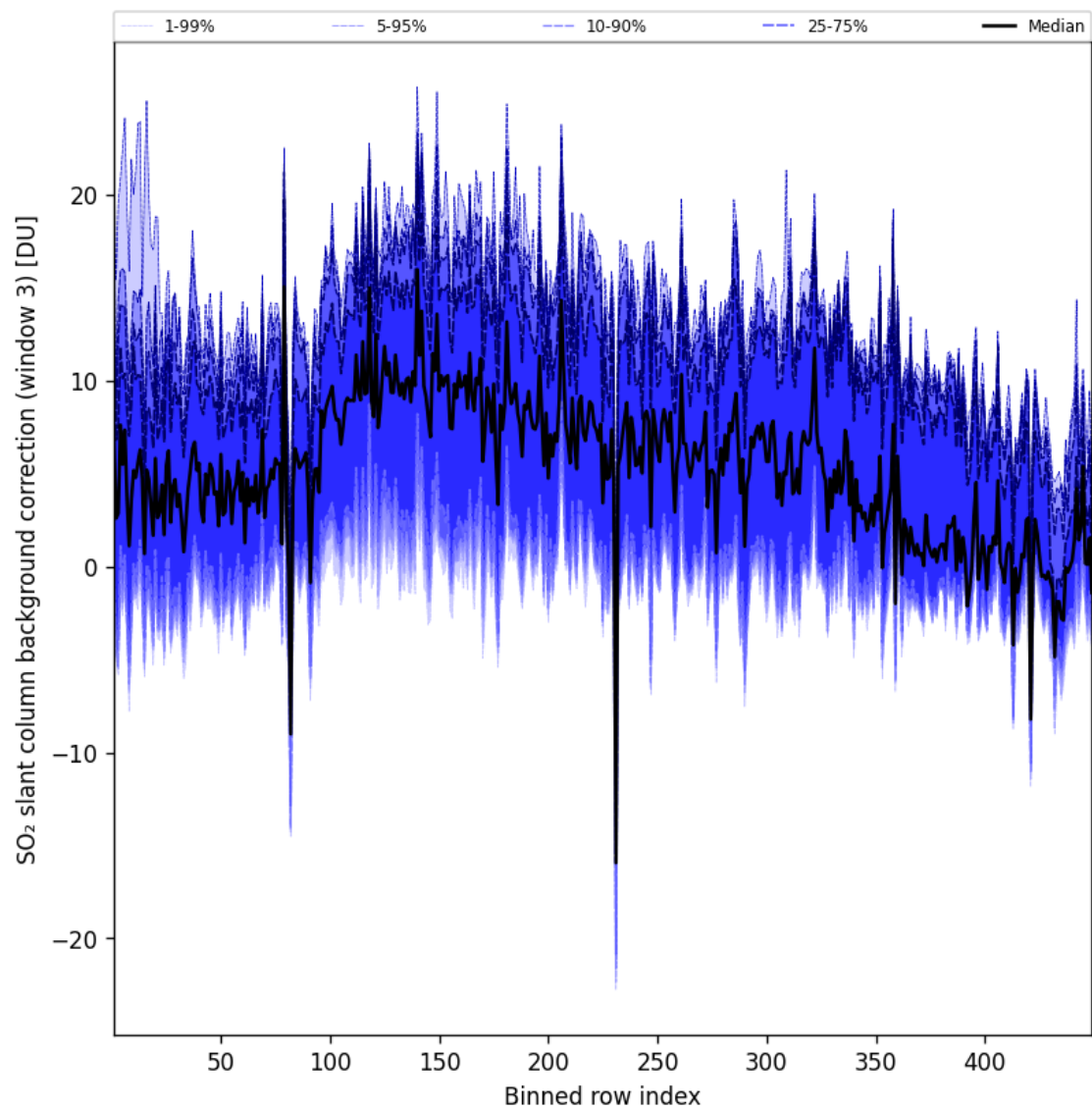


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-10-09 to 2025-10-09

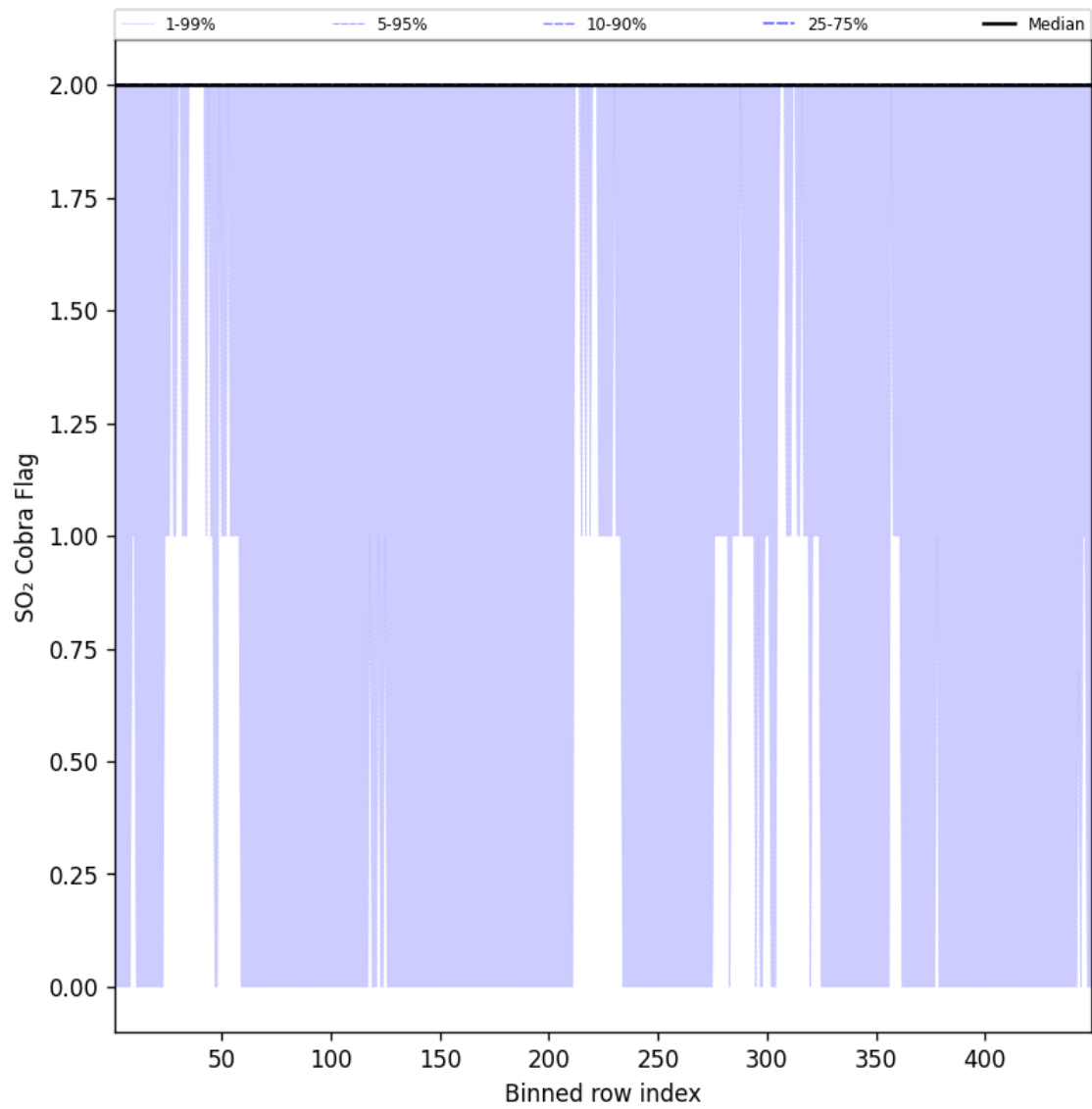


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-10-09 to 2025-10-09

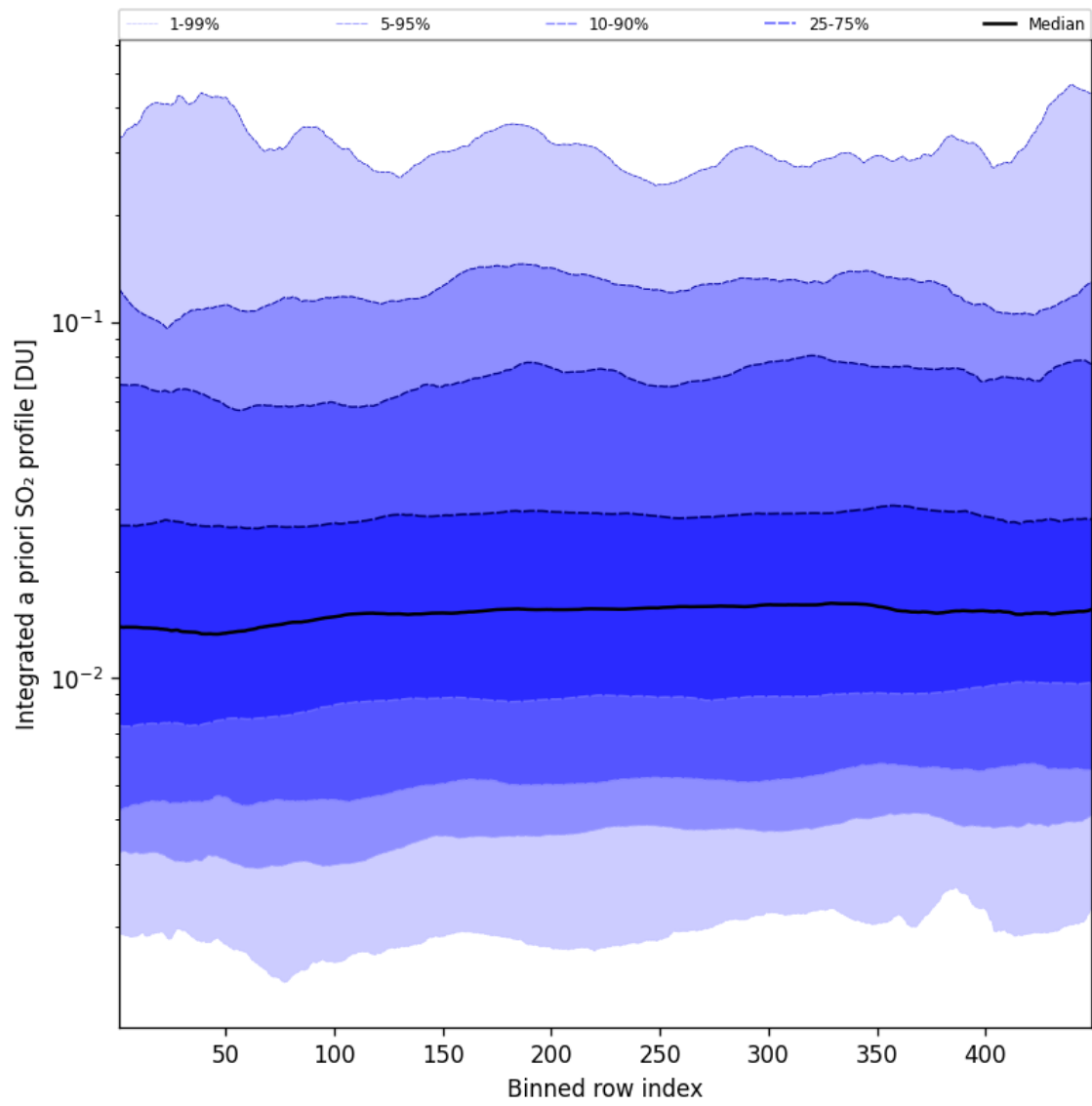


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-10-09 to 2025-10-09

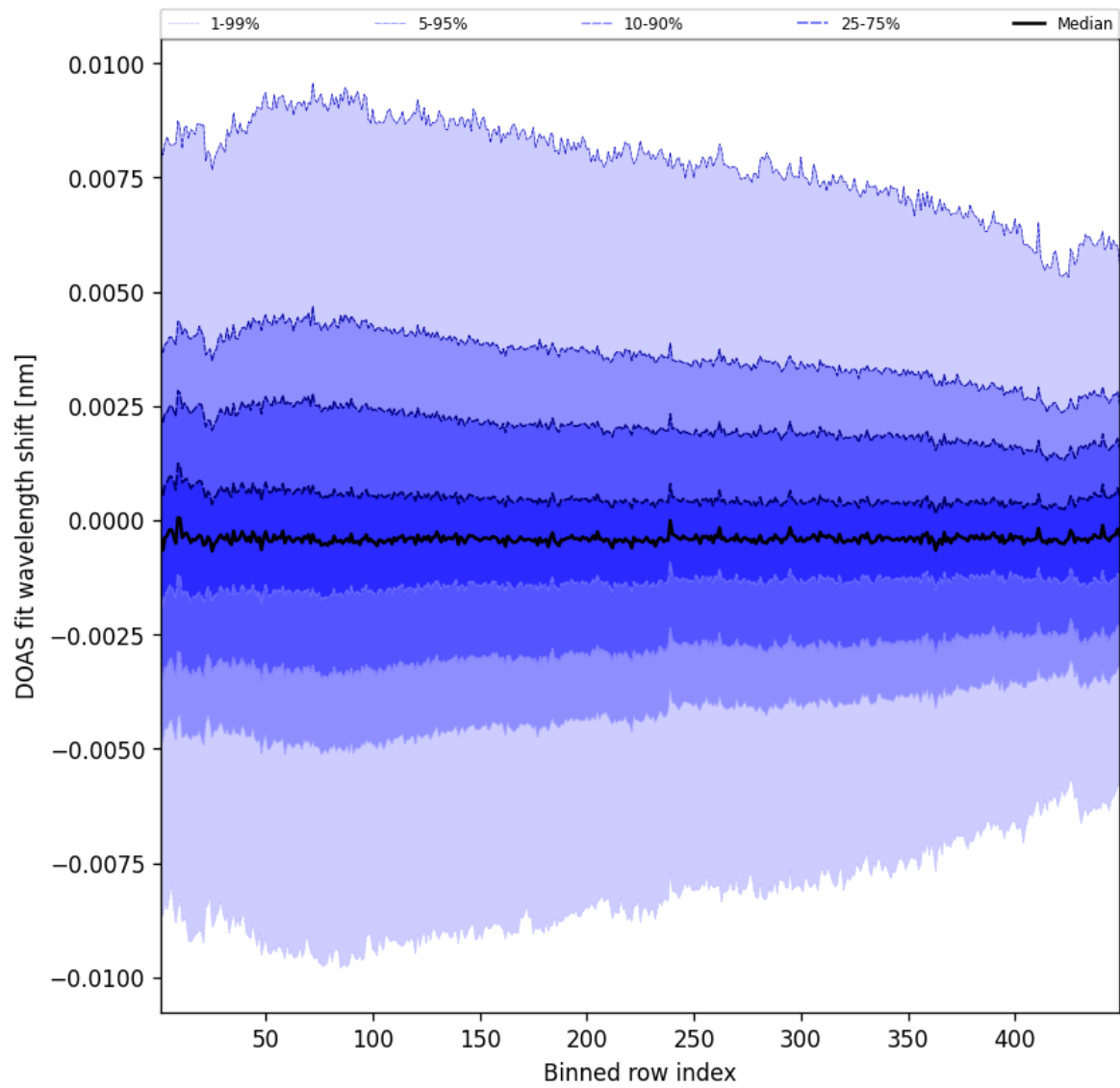


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-10-09 to 2025-10-09

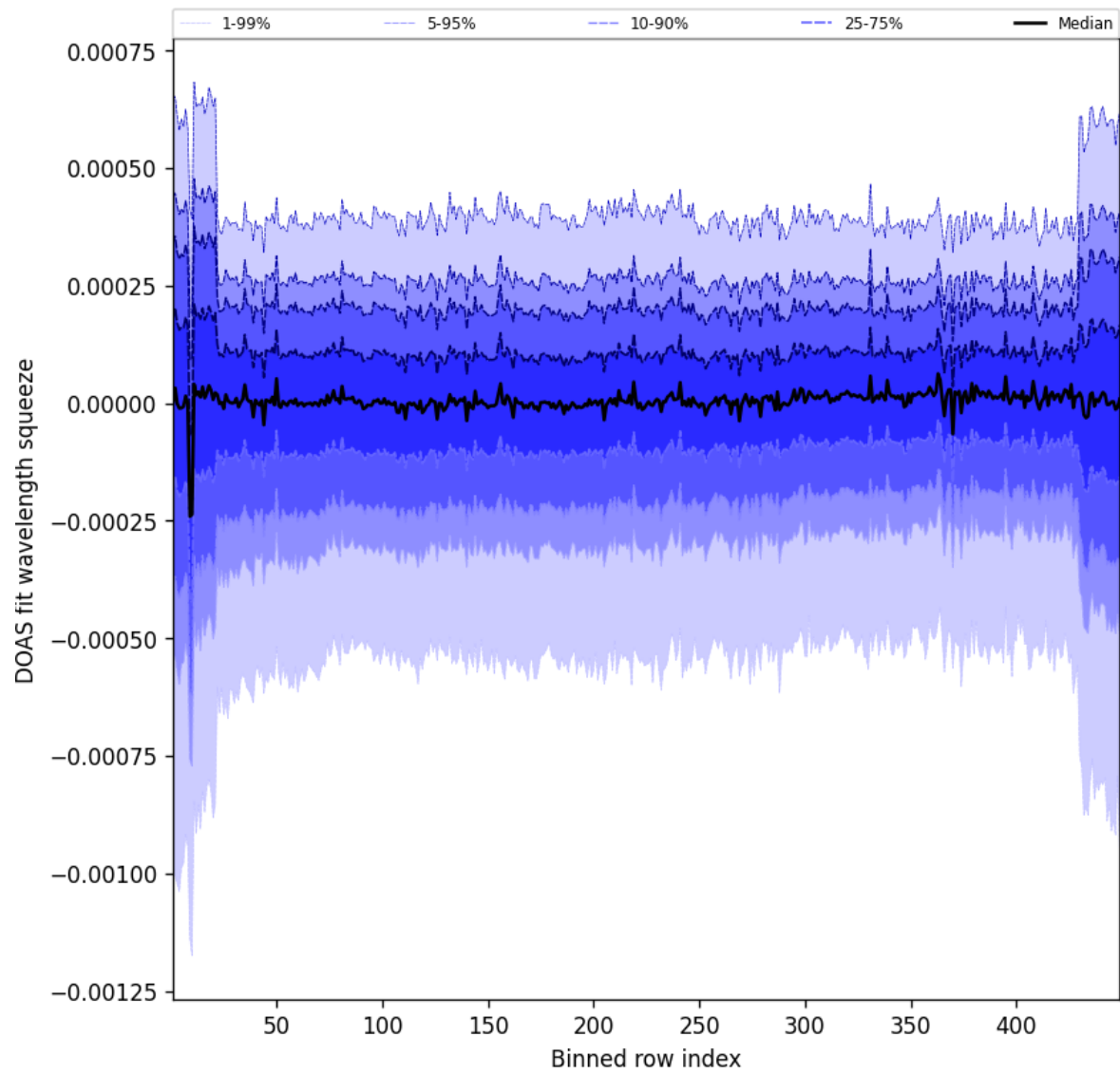


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-10-09 to 2025-10-09

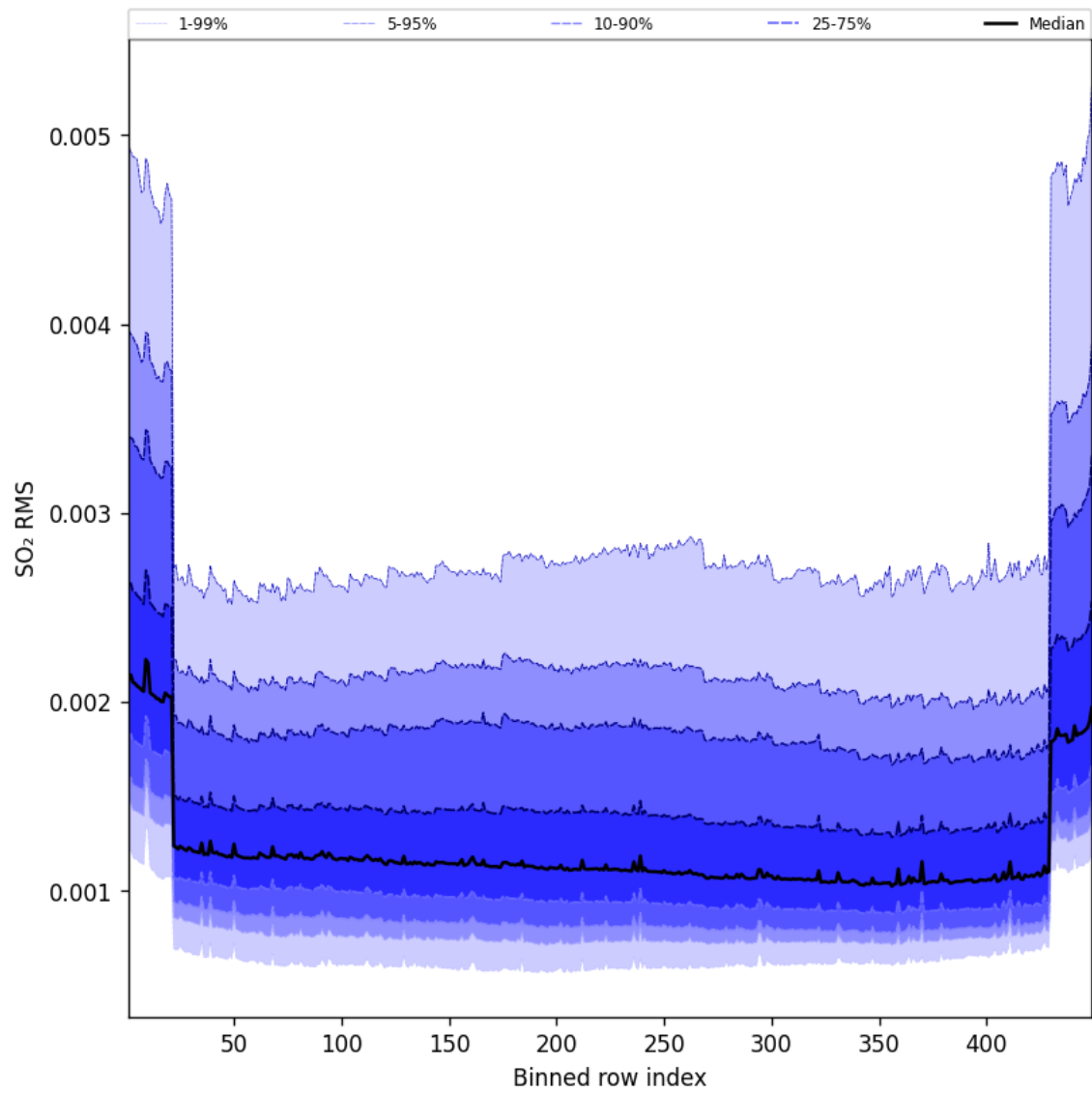


Figure 106: Along track statistics of “SO₂ RMS” for 2025-10-09 to 2025-10-09

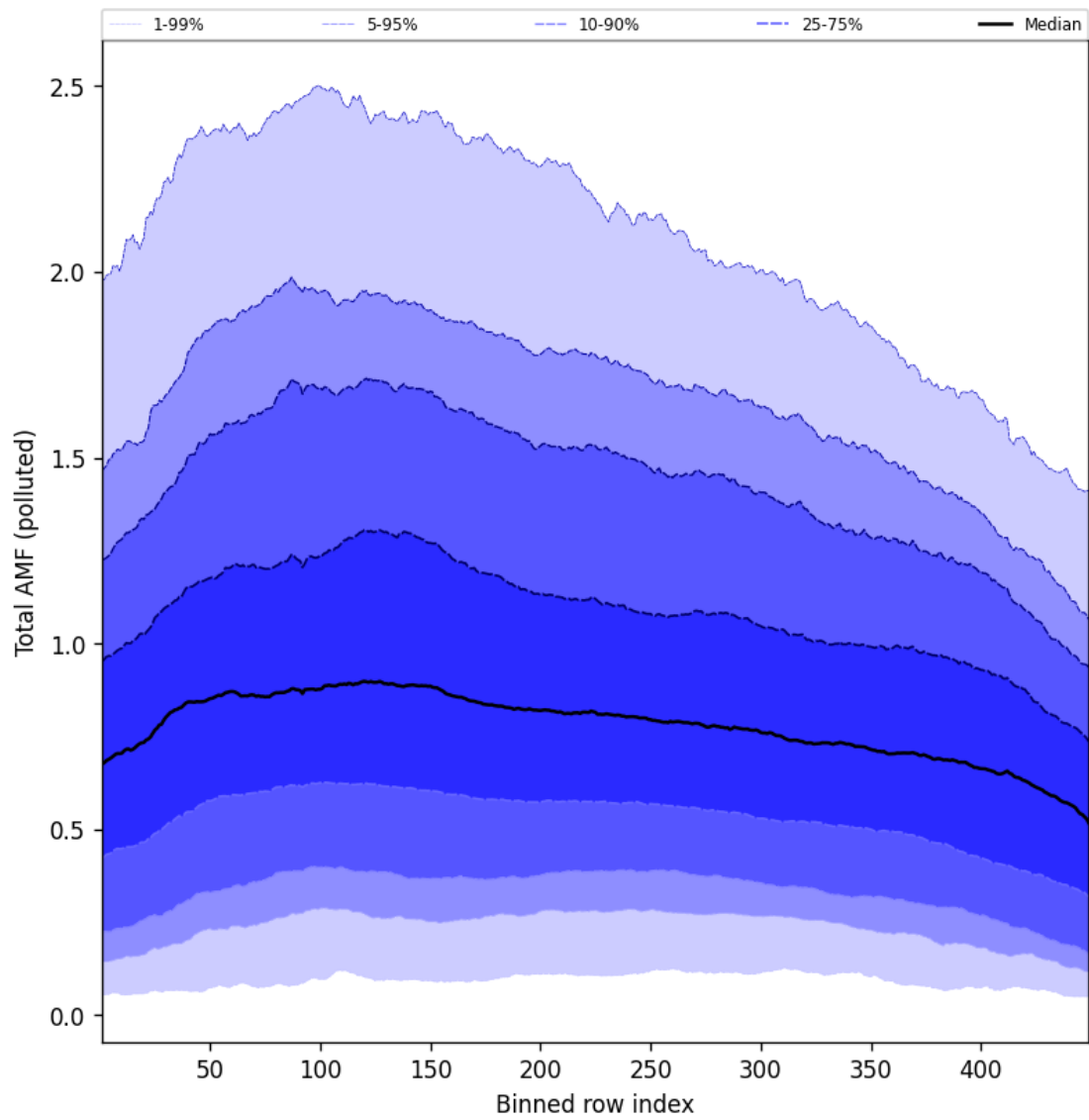


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-10-09 to 2025-10-09

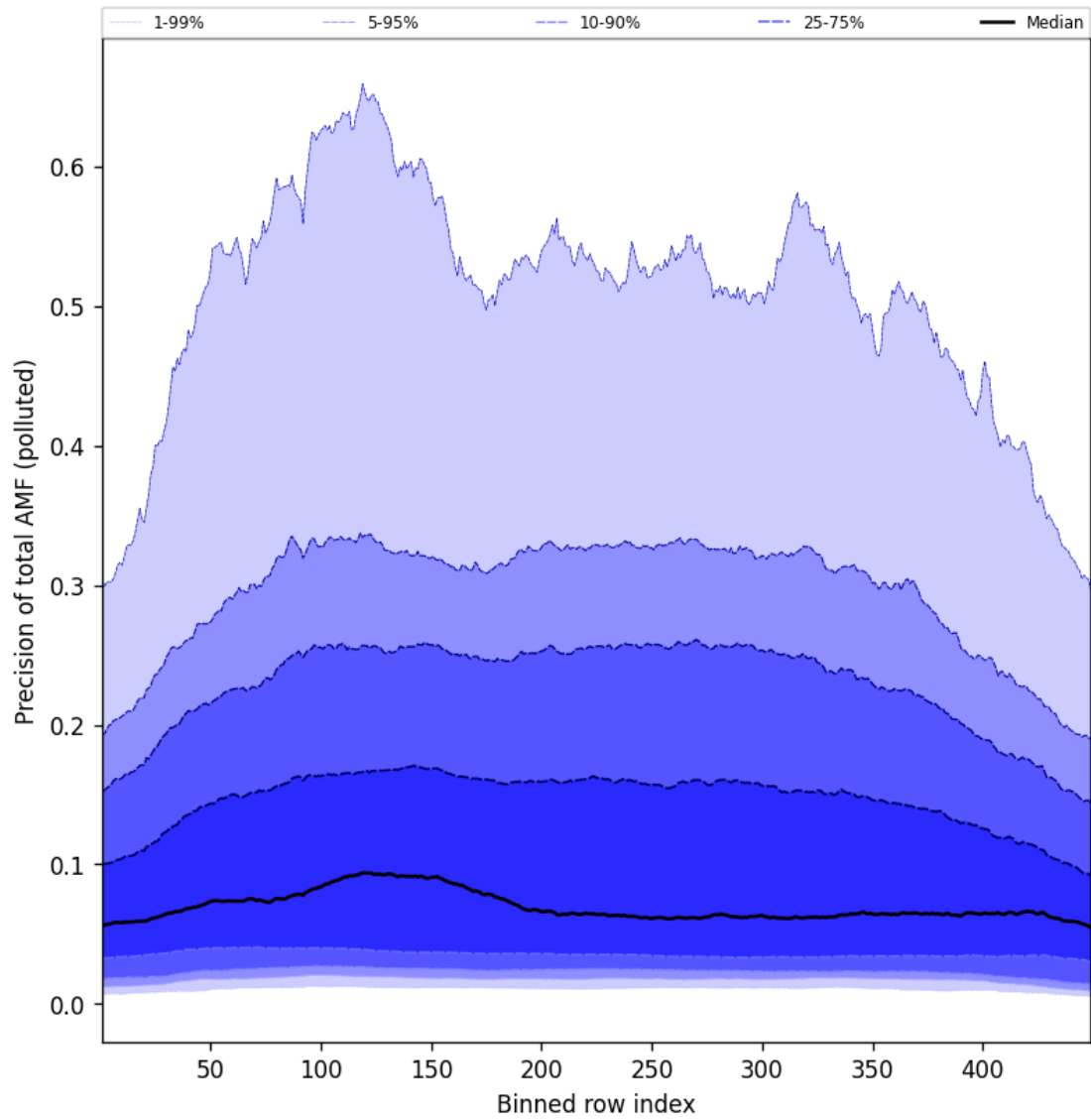


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-10-09 to 2025-10-09

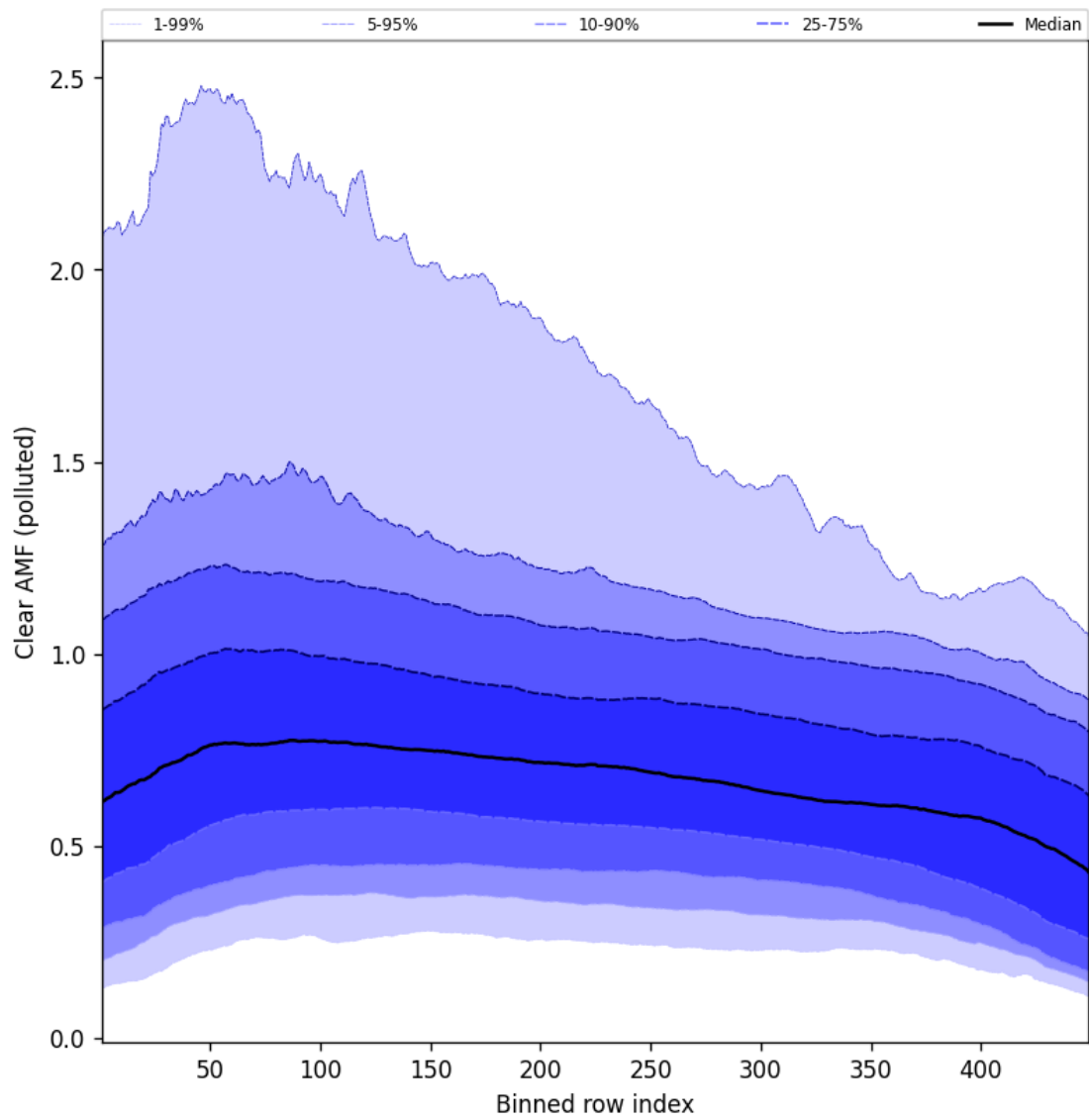


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-10-09 to 2025-10-09

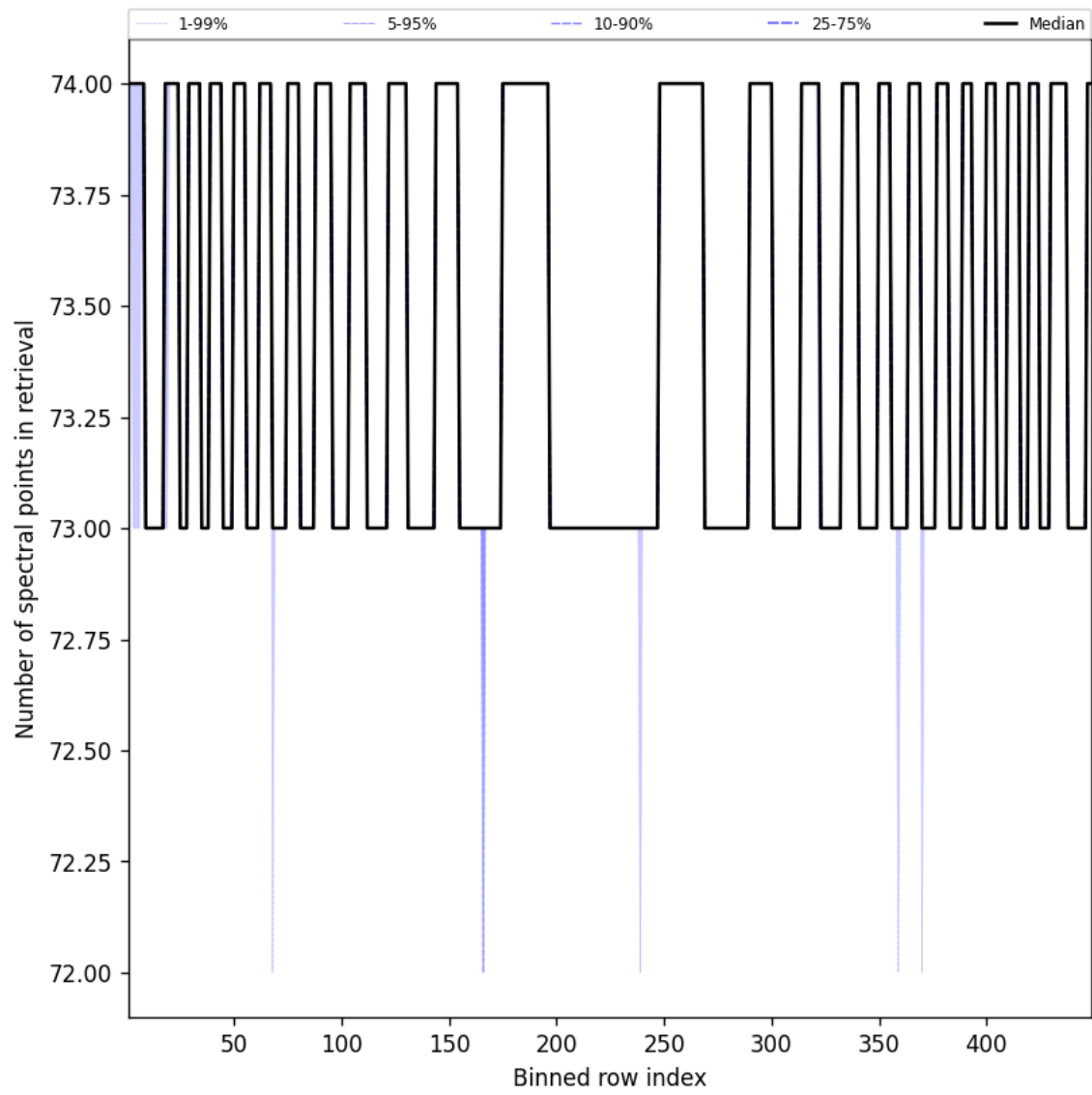


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-10-09 to 2025-10-09

10 Coincidence density

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

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