

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]	0.682 ± 0.398	17208857	0.995	0.740	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.702 \pm 84.484) \times 10^{-2}$	17208857	0.278	0.456	1.063×10^{-2}	-61.4	516
sulfurdioxide total vertical column precision [DU]	0.486 ± 0.577	17208857	0.222	0.314	0.330	4.662×10^{-2}	366
sulfurdioxide slant column density corrected [DU]	$(1.872 \pm 38.926) \times 10^{-2}$	17208857	0.276	0.376	9.404×10^{-3}	-24.6	361
sulfurdioxide slant column density cobra [DU]	$(1.860 \pm 36.841) \times 10^{-2}$	17208857	0.276	0.376	9.404×10^{-3}	-24.6	52.4
sulfurdioxide slant column density cobra precision [DU]	0.303 ± 0.137	17208857	0.213	0.149	0.263	7.959×10^{-2}	23.4
sulfurdioxide slant column density window1 [DU]	0.117 ± 0.696	17208857	0.125	0.749	0.123	-149	97.0
sulfurdioxide slant column density window1 precision [DU]	0.303 ± 0.137	17208857	0.213	0.149	0.263	7.959×10^{-2}	23.4
sulfurdioxide slant column density corrected win1 [DU]	$(2.999 \pm 69.383) \times 10^{-2}$	17208857	-2.500×10^{-2}	0.743	1.009×10^{-2}	-149	96.8
background so2 slant column offset window1 [DU]	$(-8.664 \pm 13.793) \times 10^{-2}$	17208857	-0.140	0.138	-0.110	-0.769	4.47
sulfurdioxide slant column density window2 [DU]	0.999 ± 9.436	17208857	0.250	11.8	0.747	-1.785×10^3	1.929×10^3
sulfurdioxide slant column density window2 precision [DU]	8.46 ± 2.42	17208857	7.43	2.78	8.10	2.20	621
sulfurdioxide slant column density corrected win2 [DU]	1.04 ± 9.21	17208857	0.750	11.6	1.02	-1.782×10^3	1.927×10^3
background so2 slant column offset window2 [DU]	$(3.587 \pm 232.360) \times 10^{-2}$	17208857	1.75	3.18	0.688	-11.3	6.86
sulfurdioxide slant column density window3 [DU]	-3.53 ± 24.95	17208857	-2.80	31.4	-3.24	-433	351
sulfurdioxide slant column density window3 precision [DU]	29.9 ± 14.0	17208857	23.7	10.8	26.2	9.48	360
sulfurdioxide slant column density corrected win3 [DU]	-1.82 ± 24.35	17208857	-2.80	30.7	-1.68	-432	353
background so2 slant column offset window3 [DU]	1.71 ± 6.06	17208857	-2.80	9.71	1.38	-22.7	45.0
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	17208857	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.264 \pm 6.582) \times 10^{-2}$	17208857	1.800×10^{-2}	2.081×10^{-2}	1.409×10^{-2}	1.834×10^{-4}	1.85
fitted radiance shift [nm]	$(-3.831 \pm 27.951) \times 10^{-4}$	17208857	-5.000×10^{-4}	1.963×10^{-3}	-3.825×10^{-4}	-5.401×10^{-2}	7.015×10^{-2}
fitted radiance squeeze [1]	$(-1.817 \pm 18.422) \times 10^{-5}$	17208857	-1.000×10^{-5}	2.082×10^{-4}	-1.354×10^{-5}	-1.416×10^{-2}	3.078×10^{-2}
fitted root mean square [1]	$(1.324 \pm 0.564) \times 10^{-3}$	17208857	9.750×10^{-4}	5.906×10^{-4}	1.166×10^{-3}	3.317×10^{-4}	6.536×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.881 ± 0.424	17208857	0.780	0.524	0.811	5.000×10^{-2}	2.98
sulfurdioxide total air mass factor polluted precision [1]	0.105 ± 0.096	17208857	3.500×10^{-2}	0.104	7.483×10^{-2}	3.313×10^{-3}	1.68
sulfurdioxide clear air mass factor polluted [1]	0.742 ± 0.275	17208857	0.780	0.332	0.722	5.045×10^{-2}	2.65
number of spectral points in retrieval [1]	73.4 ± 0.5	17208857	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	1.000×10^{-2}	7.000×10^{-2}	0.140	0.260	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.00	-0.830	-0.524	-0.359	-0.215	0.242	0.397	0.577	0.921	2.29
sulfurdioxide total vertical column precision [DU]	9.766×10^{-2}	0.136	0.166	0.193	0.227	0.541	0.705	0.900	1.27	2.83
sulfurdioxide slant column density corrected [DU]	-0.884	-0.511	-0.369	-0.275	-0.177	0.199	0.303	0.406	0.568	1.05
sulfurdioxide slant column density cobra [DU]	-0.884	-0.511	-0.369	-0.275	-0.177	0.199	0.303	0.406	0.568	1.05
sulfurdioxide slant column density cobra precision [DU]	0.141	0.169	0.184	0.196	0.212	0.361	0.417	0.468	0.554	0.786
sulfurdioxide slant column density window1 [DU]	-1.77	-0.960	-0.657	-0.459	-0.255	0.494	0.691	0.881	1.17	1.96
sulfurdioxide slant column density window1 precision [DU]	0.141	0.169	0.184	0.196	0.212	0.361	0.417	0.468	0.554	0.786
sulfurdioxide slant column density corrected win1 [DU]	-1.70	-0.995	-0.726	-0.546	-0.355	0.387	0.595	0.800	1.12	2.01
background so2 slant column offset window1 [DU]	-0.330	-0.247	-0.216	-0.195	-0.172	-3.370×10^{-2}	1.971×10^{-2}	7.420×10^{-2}	0.159	0.353
sulfurdioxide slant column density window2 [DU]	-20.7	-13.8	-10.4	-7.89	-5.06	6.78	9.90	12.7	16.7	24.9
sulfurdioxide slant column density window2 precision [DU]	4.37	5.34	5.91	6.35	6.88	9.67	10.6	11.5	12.7	15.4
sulfurdioxide slant column density corrected win2 [DU]	-21.1	-13.8	-10.2	-7.65	-4.76	6.80	9.71	12.3	15.9	23.4
background so2 slant column offset window2 [DU]	-6.39	-4.45	-3.37	-2.49	-1.40	1.78	2.05	2.28	2.61	4.29
sulfurdioxide slant column density window3 [DU]	-66.7	-45.0	-34.6	-27.1	-19.0	12.4	20.3	27.4	36.9	55.8
sulfurdioxide slant column density window3 precision [DU]	14.1	17.0	18.9	20.3	22.1	32.9	37.7	44.2	56.7	89.1
sulfurdioxide slant column density corrected win3 [DU]	-62.9	-42.0	-32.1	-24.9	-17.0	13.7	21.4	28.4	37.7	56.6
background so2 slant column offset window3 [DU]	-10.4	-6.88	-5.69	-4.64	-3.23	6.47	8.28	9.71	11.6	14.8
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]	8.987×10^{-4}	1.925×10^{-3}	3.376×10^{-3}	4.893×10^{-3}	6.944×10^{-3}	2.775×10^{-2}	4.667×10^{-2}	7.273×10^{-2}	0.126	0.334
fitted radiance shift [nm]	-8.665×10^{-3}	-4.524×10^{-3}	-3.061×10^{-3}	-2.191×10^{-3}	-1.409×10^{-3}	5.544×10^{-4}	1.342×10^{-3}	2.300×10^{-3}	3.918×10^{-3}	8.308×10^{-3}
fitted radiance squeeze [1]	-5.215×10^{-4}	-3.130×10^{-4}	-2.310×10^{-4}	-1.762×10^{-4}	-1.192×10^{-4}	8.898×10^{-5}	1.419×10^{-4}	1.913×10^{-4}	2.626×10^{-4}	4.323×10^{-4}
fitted root mean square [1]	5.894×10^{-4}	7.353×10^{-4}	8.174×10^{-4}	8.794×10^{-4}	9.555×10^{-4}	1.546×10^{-3}	1.792×10^{-3}	2.027×10^{-3}	2.389×10^{-3}	3.348×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.111	0.295	0.403	0.487	0.587	1.11	1.30	1.48	1.71	2.10
sulfurdioxide total air mass factor polluted precision [1]	1.222×10^{-2}	2.114×10^{-2}	2.696×10^{-2}	3.203×10^{-2}	3.933×10^{-2}	0.143	0.179	0.213	0.274	0.467
sulfurdioxide clear air mass factor polluted [1]	0.254	0.353	0.424	0.484	0.557	0.889	0.970	1.05	1.17	1.73
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]	0.671 ± 0.405	9729345	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(1.988 \pm 78.618) \times 10^{-2}$	9729345	0.438	9.518×10^{-3}	-50.6	304	-0.208	0.231
sulfurdioxide total vertical column precision [DU]	0.468 ± 0.570	9729345	0.296	0.313	4.729×10^{-2}	366	0.219	0.516
sulfurdioxide slant column density corrected [DU]	$(1.456 \pm 33.623) \times 10^{-2}$	9729345	0.353	8.230×10^{-3}	-5.99	245	-0.167	0.186
sulfurdioxide slant column density cobra [DU]	$(1.452 \pm 32.569) \times 10^{-2}$	9729345	0.353	8.230×10^{-3}	-5.99	38.1	-0.167	0.186
sulfurdioxide slant column density cobra precision [DU]	0.280 ± 0.113	9729345	0.123	0.247	8.843×10^{-2}	23.4	0.204	0.327
sulfurdioxide slant column density window1 [DU]	0.124 ± 0.627	9729345	0.708	0.128	-11.3	34.5	-0.229	0.479
sulfurdioxide slant column density window1 precision [DU]	0.280 ± 0.113	9729345	0.123	0.247	8.843×10^{-2}	23.4	0.204	0.327
sulfurdioxide slant column density corrected win1 [DU]	$(2.350 \pm 62.168) \times 10^{-2}$	9729345	0.701	9.724×10^{-3}	-11.3	34.8	-0.336	0.365
background so2 slant column offset window1 [DU]	-0.100 ± 0.110	9729345	0.134	-0.115	-0.769	1.53	-0.175	-4.084×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.500 ± 9.018	9729345	11.4	0.323	-405	577	-5.32	6.12
sulfurdioxide slant column density window2 precision [DU]	8.31 ± 2.34	9729345	2.80	7.96	2.20	296	6.73	9.53
sulfurdioxide slant column density corrected win2 [DU]	1.00 ± 8.90	9729345	11.3	1.00	-410	576	-4.65	6.65
background so2 slant column offset window2 [DU]	0.501 ± 1.873	9729345	2.48	0.993	-10.6	6.86	-0.649	1.83
sulfurdioxide slant column density window3 [DU]	-3.00 ± 24.98	9729345	31.2	-2.71	-199	202	-18.3	12.8
sulfurdioxide slant column density window3 precision [DU]	30.1 ± 14.8	9729345	11.6	26.1	9.48	360	21.7	33.3
sulfurdioxide slant column density corrected win3 [DU]	-2.17 ± 24.26	9729345	30.5	-2.04	-190	205	-17.3	13.2
background so2 slant column offset window3 [DU]	0.826 ± 6.289	9729345	10.7	0.240	-22.7	18.4	-4.55	6.16
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	9729345	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.051 \pm 7.666) \times 10^{-2}$	9729345	3.293×10^{-2}	1.762×10^{-2}	1.834×10^{-4}	1.85	7.467×10^{-3}	4.040×10^{-2}
fitted radiance shift [nm]	$(-1.104 \pm 29.749) \times 10^{-4}$	9729345	1.924×10^{-3}	-1.592×10^{-4}	-4.533×10^{-2}	4.824×10^{-2}	-1.088×10^{-3}	8.358×10^{-4}
fitted radiance squeeze [1]	$(-2.659 \pm 16.756) \times 10^{-5}$	9729345	1.986×10^{-4}	-2.123×10^{-5}	-9.349×10^{-3}	3.078×10^{-2}	-1.230×10^{-4}	7.562×10^{-5}
fitted root mean square [1]	$(1.239 \pm 0.474) \times 10^{-3}$	9729345	5.187×10^{-4}	1.115×10^{-3}	3.317×10^{-4}	4.935×10^{-2}	9.227×10^{-4}	1.442×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.871 ± 0.440	9729345	0.541	0.809	5.000×10^{-2}	2.98	0.558	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.111 ± 0.109	9729345	0.109	7.378×10^{-2}	4.143×10^{-3}	1.68	3.944×10^{-2}	0.148
sulfurdioxide clear air mass factor polluted [1]	0.756 ± 0.307	9729345	0.382	0.738	0.108	2.61	0.536	0.917
number of spectral points in retrieval [1]	73.5 ± 0.5	9729345	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]	0.696 ± 0.390	7479512	0.700	1.000	0.0	1.000	0.300	1.000
sulfurdioxide total vertical column [DU]	$(3.632 \pm 91.544) \times 10^{-2}$	7479512	0.482	1.218×10^{-2}	-61.4	516	-0.224	0.258
sulfurdioxide total vertical column precision [DU]	0.510 ± 0.585	7479512	0.335	0.349	4.662×10^{-2}	50.9	0.241	0.577
sulfurdioxide slant column density corrected [DU]	$(2.413 \pm 44.891) \times 10^{-2}$	7479512	0.410	1.113×10^{-2}	-24.6	361	-0.191	0.218
sulfurdioxide slant column density cobra [DU]	$(2.391 \pm 41.742) \times 10^{-2}$	7479512	0.410	1.113×10^{-2}	-24.6	52.4	-0.191	0.218
sulfurdioxide slant column density cobra precision [DU]	0.334 ± 0.157	7479512	0.174	0.291	7.959×10^{-2}	22.4	0.226	0.400
sulfurdioxide slant column density window1 [DU]	0.107 ± 0.777	7479512	0.809	0.116	-149	97.0	-0.293	0.516
sulfurdioxide slant column density window1 precision [DU]	0.334 ± 0.157	7479512	0.174	0.291	7.959×10^{-2}	22.4	0.226	0.400
sulfurdioxide slant column density corrected win1 [DU]	$(3.842 \pm 77.764) \times 10^{-2}$	7479512	0.803	1.061×10^{-2}	-149	96.8	-0.383	0.420
background so2 slant column offset window1 [DU]	$(-6.890 \pm 16.548) \times 10^{-2}$	7479512	0.144	-0.105	-0.511	4.47	-0.166	-2.156×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.65 ± 9.92	7479512	12.3	1.35	-1.785×10^3	1.929×10^3	-4.69	7.65
sulfurdioxide slant column density window2 precision [DU]	8.65 ± 2.51	7479512	2.74	8.29	2.45	621	7.09	9.83
sulfurdioxide slant column density corrected win2 [DU]	1.08 ± 9.59	7479512	11.9	1.04	-1.782×10^3	1.927×10^3	-4.91	7.01
background so2 slant column offset window2 [DU]	-0.569 ± 2.686	7479512	4.31	8.373×10^{-2}	-11.3	6.80	-2.64	1.67
sulfurdioxide slant column density window3 [DU]	-4.23 ± 24.89	7479512	31.6	-3.95	-433	351	-19.8	11.8
sulfurdioxide slant column density window3 precision [DU]	29.7 ± 13.0	7479512	9.95	26.3	10.1	331	22.5	32.4
sulfurdioxide slant column density corrected win3 [DU]	-1.37 ± 24.45	7479512	31.0	-1.19	-432	353	-16.7	14.3
background so2 slant column offset window3 [DU]	2.86 ± 5.53	7479512	8.31	2.22	-19.8	45.0	-1.41	6.90
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	7479512	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.242 \pm 4.624) \times 10^{-2}$	7479512	1.225×10^{-2}	1.144×10^{-2}	7.306×10^{-4}	1.41	6.657×10^{-3}	1.891×10^{-2}
fitted radiance shift [nm]	$(-7.378 \pm 24.982) \times 10^{-4}$	7479512	1.906×10^{-3}	-6.796×10^{-4}	-5.401×10^{-2}	7.015×10^{-2}	-1.737×10^{-3}	1.684×10^{-4}
fitted radiance squeeze [1]	$(-7.225 \pm 203.353) \times 10^{-6}$	7479512	2.213×10^{-4}	-2.424×10^{-6}	-1.416×10^{-2}	1.853×10^{-2}	-1.139×10^{-4}	1.075×10^{-4}
fitted root mean square [1]	$(1.434 \pm 0.647) \times 10^{-3}$	7479512	6.811×10^{-4}	1.244×10^{-3}	3.535×10^{-4}	6.536×10^{-2}	1.004×10^{-3}	1.685×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.896 ± 0.402	7479512	0.509	0.815	5.000×10^{-2}	2.76	0.616	1.13
sulfurdioxide total air mass factor polluted precision [1]	$(9.777 \pm 7.487) \times 10^{-2}$	7479512	9.861×10^{-2}	7.607×10^{-2}	3.313×10^{-3}	1.55	3.923×10^{-2}	0.138
sulfurdioxide clear air mass factor polluted [1]	0.723 ± 0.226	7479512	0.276	0.707	5.045×10^{-2}	2.65	0.576	0.851
number of spectral points in retrieval [1]	73.4 ± 0.5	7479512	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.689 ± 0.392	11648266	0.710	1.000	0.0	1.000	0.290	1.000
sulfurdioxide total vertical column [DU]	$(2.750 \pm 83.320) \times 10^{-2}$	11648266	0.442	1.045×10^{-2}	-61.4	516	-0.208	0.234
sulfurdioxide total vertical column precision [DU]	0.471 ± 0.559	11648266	0.291	0.312	4.827×10^{-2}	37.1	0.223	0.515
sulfurdioxide slant column density corrected [DU]	$(1.954 \pm 39.801) \times 10^{-2}$	11648266	0.373	9.359×10^{-3}	-12.3	361	-0.175	0.198
sulfurdioxide slant column density cobra [DU]	$(1.941 \pm 37.636) \times 10^{-2}$	11648266	0.373	9.359×10^{-3}	-12.3	38.1	-0.175	0.198
sulfurdioxide slant column density cobra precision [DU]	0.305 ± 0.145	11648266	0.163	0.256	7.959×10^{-2}	22.4	0.208	0.371
sulfurdioxide slant column density window1 [DU]	0.119 ± 0.708	11648266	0.745	0.129	-62.1	97.0	-0.248	0.497
sulfurdioxide slant column density window1 precision [DU]	0.305 ± 0.145	11648266	0.163	0.256	7.959×10^{-2}	22.4	0.208	0.371
sulfurdioxide slant column density corrected win1 [DU]	$(3.555 \pm 70.646) \times 10^{-2}$	11648266	0.739	1.382×10^{-2}	-62.1	96.8	-0.350	0.389
background so2 slant column offset window1 [DU]	$(-8.378 \pm 14.875) \times 10^{-2}$	11648266	0.139	-0.114	-0.511	4.47	-0.173	-3.374×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.12 ± 9.36	11648266	11.7	0.809	-1.785×10^3	1.929×10^3	-4.91	6.80
sulfurdioxide slant column density window2 precision [DU]	8.30 ± 2.31	11648266	2.70	7.94	2.20	621	6.77	9.47
sulfurdioxide slant column density corrected win2 [DU]	1.05 ± 9.08	11648266	11.4	1.02	-1.782×10^3	1.927×10^3	-4.67	6.72
background so2 slant column offset window2 [DU]	$(-7.461 \pm 249.205) \times 10^{-2}$	11648266	3.55	0.747	-11.3	6.86	-1.74	1.81
sulfurdioxide slant column density window3 [DU]	-1.02 ± 24.49	11648266	31.0	-0.941	-222	351	-16.4	14.6
sulfurdioxide slant column density window3 precision [DU]	28.7 ± 12.5	11648266	10.0	25.3	9.48	331	21.6	31.6
sulfurdioxide slant column density corrected win3 [DU]	0.561 ± 23.598	11648266	30.0	0.443	-222	347	-14.4	15.6
background so2 slant column offset window3 [DU]	1.58 ± 6.13	11648266	9.71	0.973	-22.7	45.0	-3.36	6.35
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	11648266	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.992 \pm 3.404) \times 10^{-2}$	11648266	1.382×10^{-2}	1.268×10^{-2}	3.805×10^{-4}	1.31	7.077×10^{-3}	2.090×10^{-2}
fitted radiance shift [nm]	$(-4.561 \pm 25.216) \times 10^{-4}$	11648266	1.968×10^{-3}	-4.202×10^{-4}	-4.608×10^{-2}	4.037×10^{-2}	-1.490×10^{-3}	4.775×10^{-4}
fitted radiance squeeze [1]	$(-1.212 \pm 18.572) \times 10^{-5}$	11648266	2.052×10^{-4}	-7.009×10^{-6}	-1.408×10^{-2}	1.853×10^{-2}	-1.110×10^{-4}	9.424×10^{-5}
fitted root mean square [1]	$(1.329 \pm 0.600) \times 10^{-3}$	11648266	6.371×10^{-4}	1.138×10^{-3}	3.317×10^{-4}	6.536×10^{-2}	9.370×10^{-4}	1.574×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.892 ± 0.395	11648266	0.483	0.839	5.000×10^{-2}	2.76	0.626	1.11
sulfurdioxide total air mass factor polluted precision [1]	$(9.795 \pm 7.789) \times 10^{-2}$	11648266	9.192×10^{-2}	7.351×10^{-2}	3.313×10^{-3}	1.25	4.189×10^{-2}	0.134
sulfurdioxide clear air mass factor polluted [1]	0.753 ± 0.236	11648266	0.302	0.750	5.184×10^{-2}	2.65	0.594	0.896
number of spectral points in retrieval [1]	73.4 ± 0.5	11648266	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]	0.701 ± 0.403	3934523	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	$(2.364 \pm 83.301) \times 10^{-2}$	3934523	0.474	1.001×10^{-2}	-37.6	304	-0.224	0.250
sulfurdioxide total vertical column precision [DU]	0.498 ± 0.590	3934523	0.328	0.364	4.729×10^{-2}	366	0.235	0.563
sulfurdioxide slant column density corrected [DU]	$(1.551 \pm 36.400) \times 10^{-2}$	3934523	0.367	8.580×10^{-3}	-18.3	245	-0.173	0.194
sulfurdioxide slant column density cobra [DU]	$(1.536 \pm 33.661) \times 10^{-2}$	3934523	0.367	8.580×10^{-3}	-18.3	52.4	-0.173	0.194
sulfurdioxide slant column density cobra precision [DU]	0.287 ± 0.111	3934523	0.108	0.261	9.456×10^{-2}	23.4	0.217	0.325
sulfurdioxide slant column density window1 [DU]	0.124 ± 0.640	3934523	0.728	0.121	-149	59.1	-0.243	0.485
sulfurdioxide slant column density window1 precision [DU]	0.287 ± 0.111	3934523	0.108	0.261	9.456×10^{-2}	23.4	0.217	0.325
sulfurdioxide slant column density corrected win1 [DU]	$(1.419 \pm 63.616) \times 10^{-2}$	3934523	0.721	-7.077×10^{-4}	-149	58.9	-0.356	0.365
background so2 slant column offset window1 [DU]	-0.109 ± 0.107	3934523	0.122	-0.120	-0.769	1.64	-0.178	-5.582×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.419 ± 9.470	3934523	11.9	0.308	-1.248×10^3	1.028×10^3	-5.60	6.33
sulfurdioxide slant column density window2 precision [DU]	8.69 ± 2.62	3934523	2.74	8.32	2.50	556	7.09	9.83
sulfurdioxide slant column density corrected win2 [DU]	1.02 ± 9.37	3934523	11.8	1.03	-1.247×10^3	1.029×10^3	-4.86	6.91
background so2 slant column offset window2 [DU]	0.600 ± 1.779	3934523	2.24	0.995	-10.6	6.84	-0.408	1.84
sulfurdioxide slant column density window3 [DU]	-8.71 ± 24.87	3934523	31.2	-8.06	-433	239	-24.0	7.19
sulfurdioxide slant column density window3 precision [DU]	32.7 ± 17.1	3934523	11.9	27.9	10.4	360	23.3	35.2
sulfurdioxide slant column density corrected win3 [DU]	-7.79 ± 24.92	3934523	31.3	-7.31	-432	241	-23.2	8.11
background so2 slant column offset window3 [DU]	0.917 ± 5.709	3934523	9.05	0.495	-22.7	19.6	-3.64	5.41
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.17	3934523	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.409 \pm 10.207) \times 10^{-2}$	3934523	6.743×10^{-2}	2.675×10^{-2}	1.834×10^{-4}	1.85	8.560×10^{-3}	7.599×10^{-2}
fitted radiance shift [nm]	$(-2.529 \pm 34.140) \times 10^{-4}$	3934523	1.884×10^{-3}	-3.401×10^{-4}	-4.533×10^{-2}	7.015×10^{-2}	-1.216×10^{-3}	6.675×10^{-4}
fitted radiance squeeze [1]	$(-2.617 \pm 17.434) \times 10^{-5}$	3934523	2.062×10^{-4}	-2.389×10^{-5}	-1.352×10^{-2}	3.078×10^{-2}	-1.280×10^{-4}	7.819×10^{-5}
fitted root mean square [1]	$(1.260 \pm 0.445) \times 10^{-3}$	3934523	4.451×10^{-4}	1.171×10^{-3}	3.534×10^{-4}	5.037×10^{-2}	9.804×10^{-4}	1.425×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.848 ± 0.468	3934523	0.559	0.730	5.000×10^{-2}	2.98	0.520	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.119 ± 0.125	3934523	0.135	7.246×10^{-2}	4.085×10^{-3}	1.68	3.232×10^{-2}	0.168
sulfurdioxide clear air mass factor polluted [1]	0.713 ± 0.328	3934523	0.352	0.650	5.045×10^{-2}	2.61	0.497	0.850
number of spectral points in retrieval [1]	73.4 ± 0.5	3934523	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

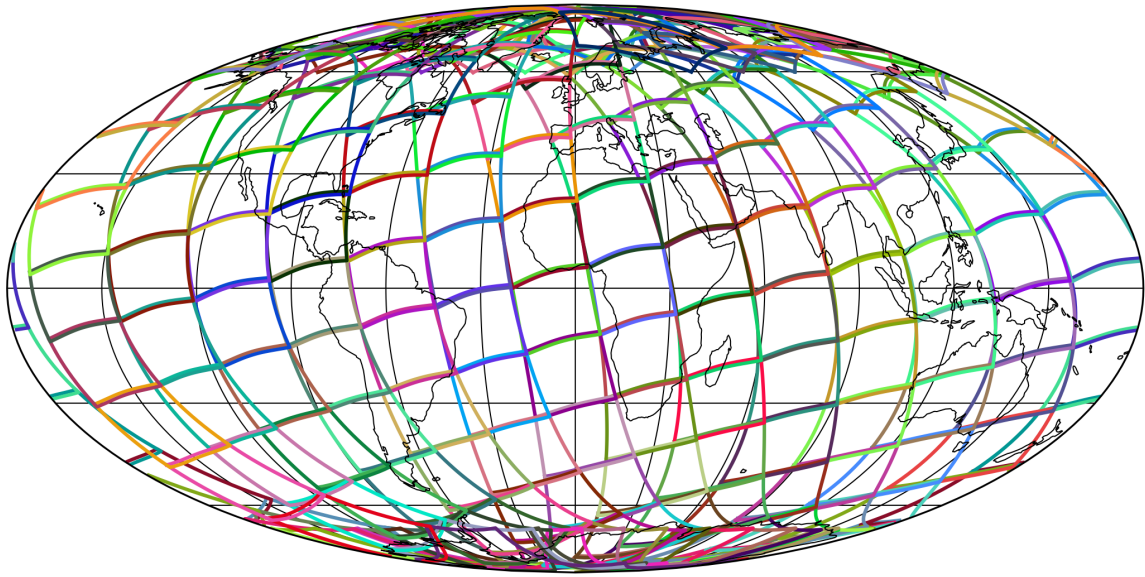


Figure 1: Outline of the granules.

4 Input data monitoring

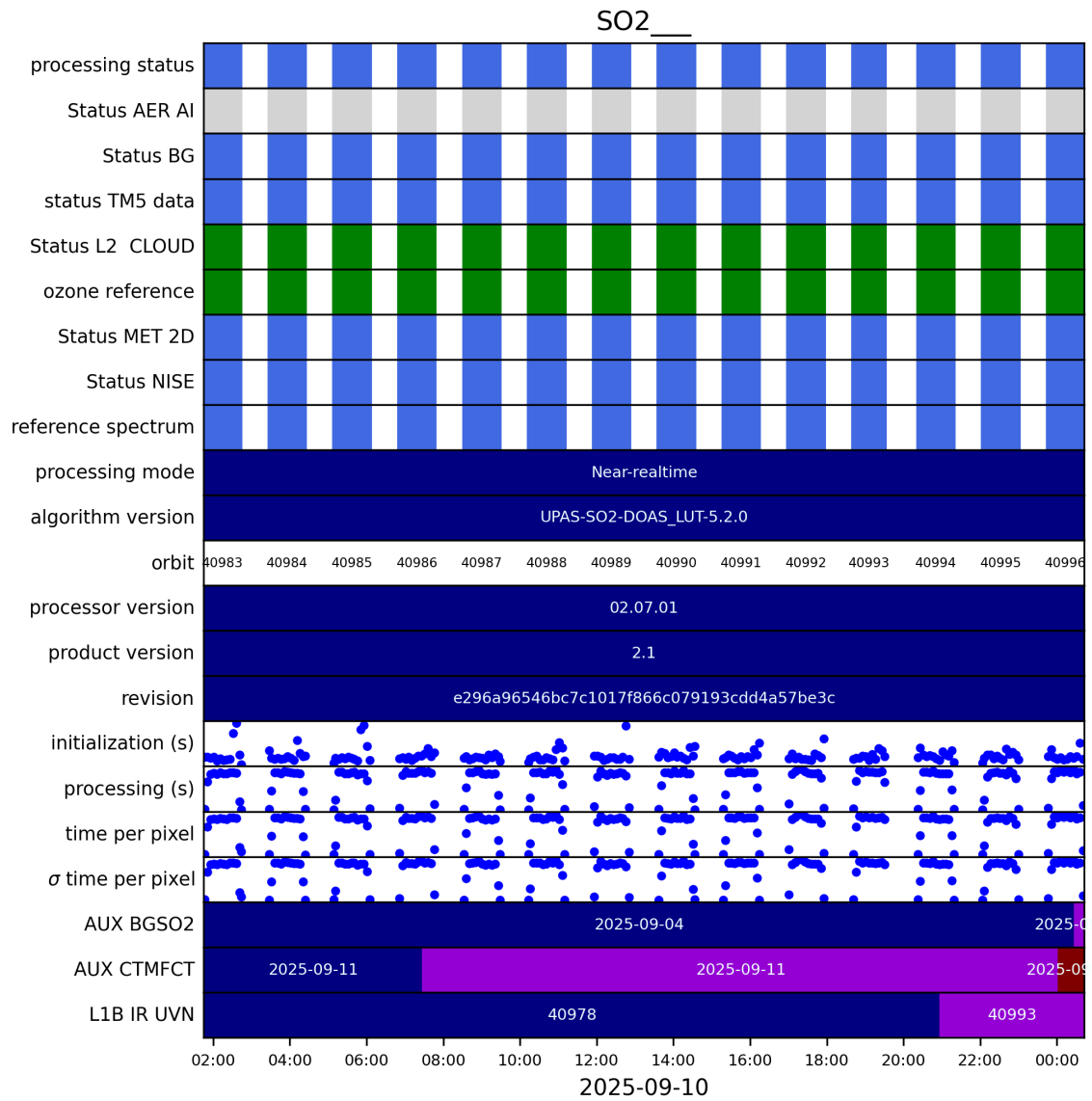


Figure 2: Input data per granule

5 Warnings and errors

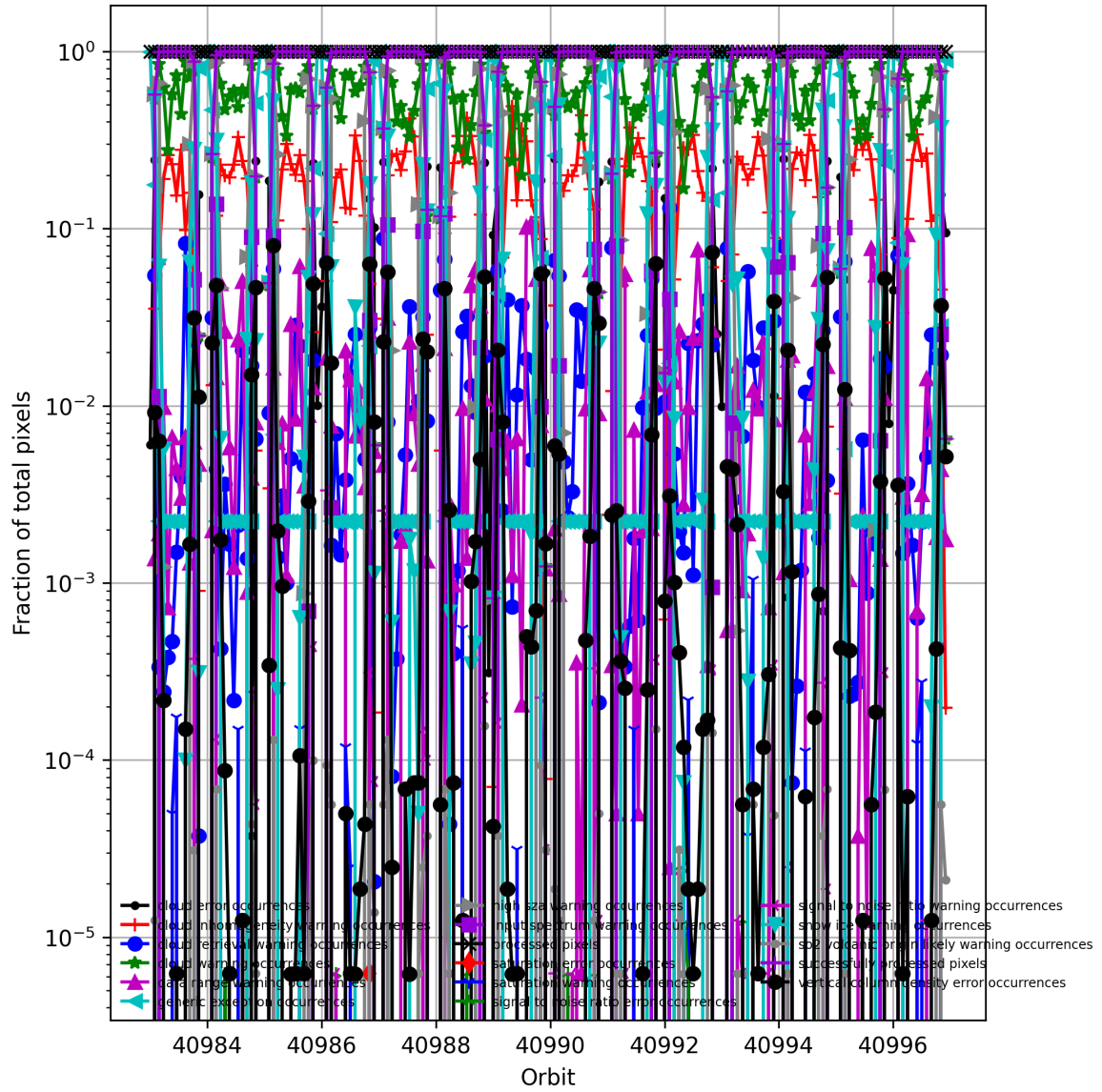


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

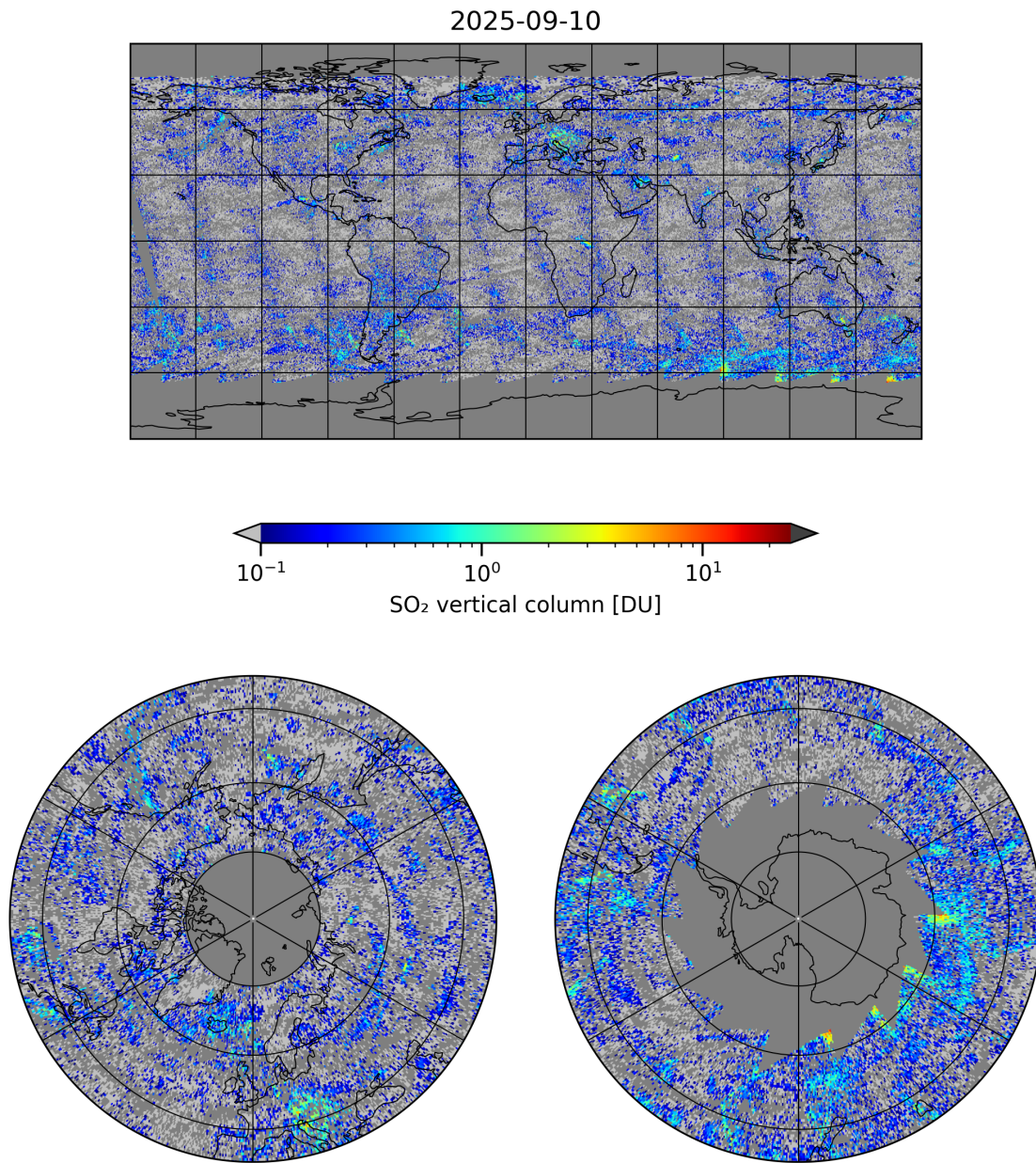


Figure 4: Map of “SO₂ vertical column” for 2025-09-10 to 2025-09-11

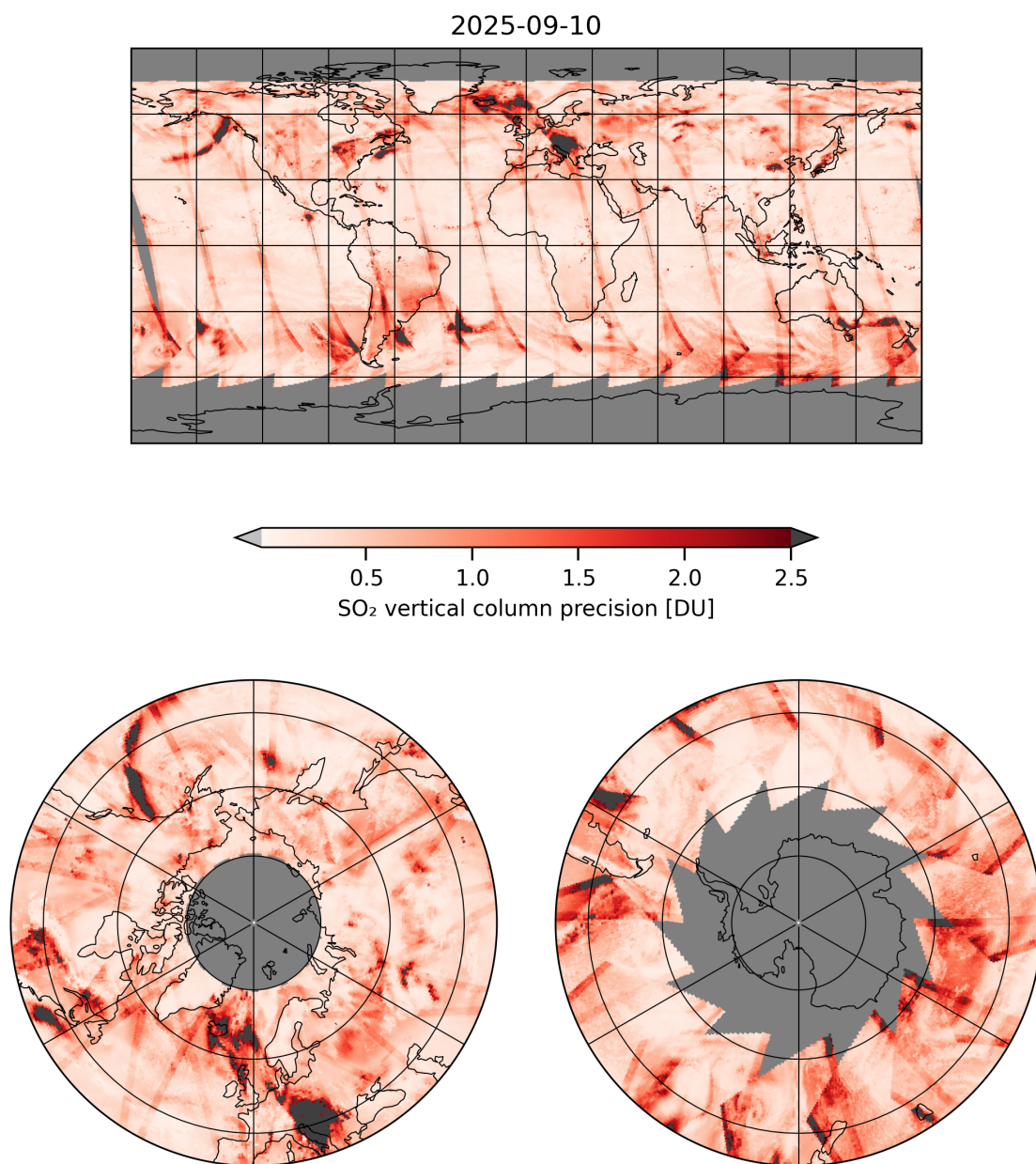


Figure 5: Map of “SO₂ vertical column precision” for 2025-09-10 to 2025-09-11

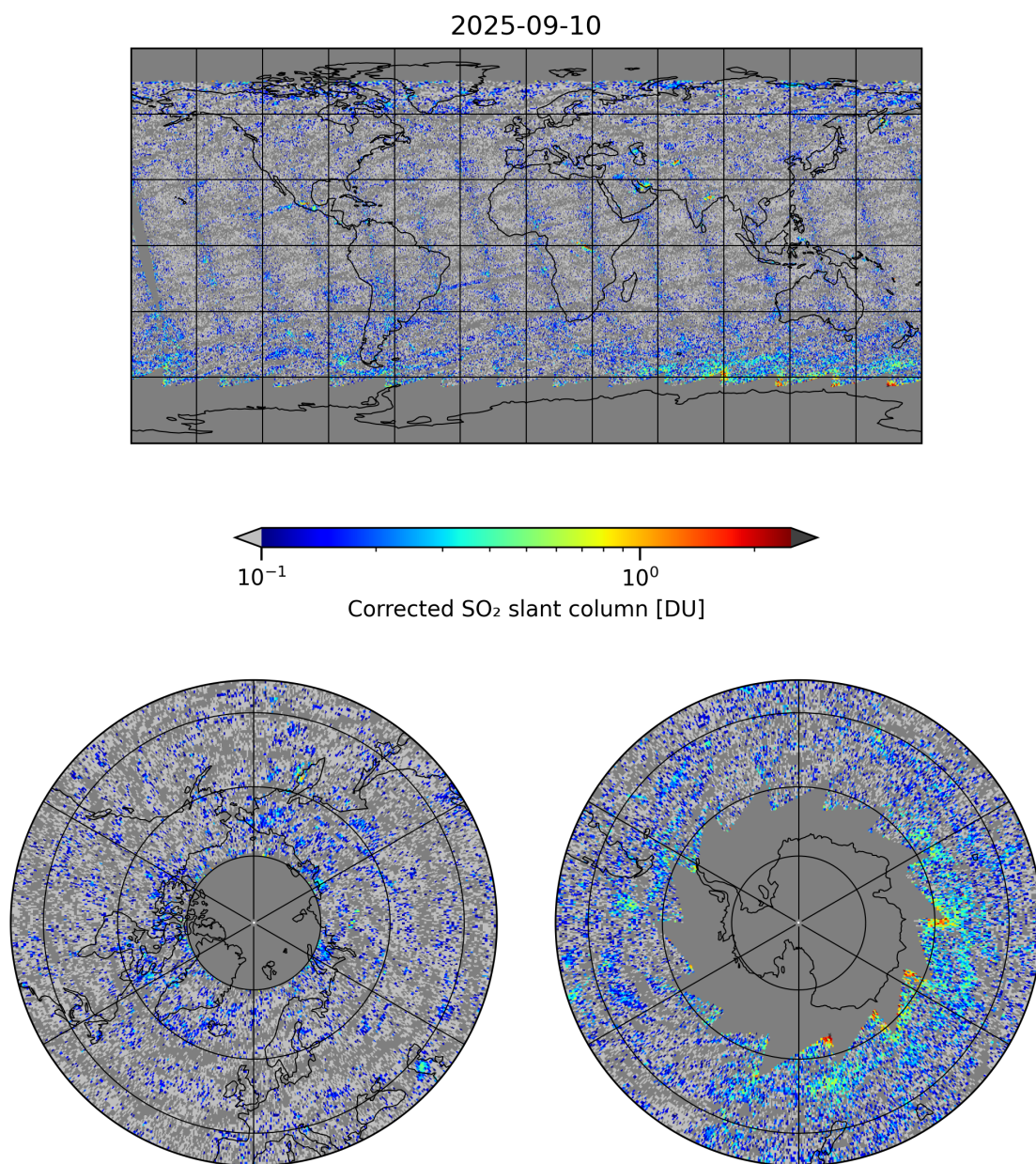


Figure 6: Map of “Corrected SO₂ slant column” for 2025-09-10 to 2025-09-11

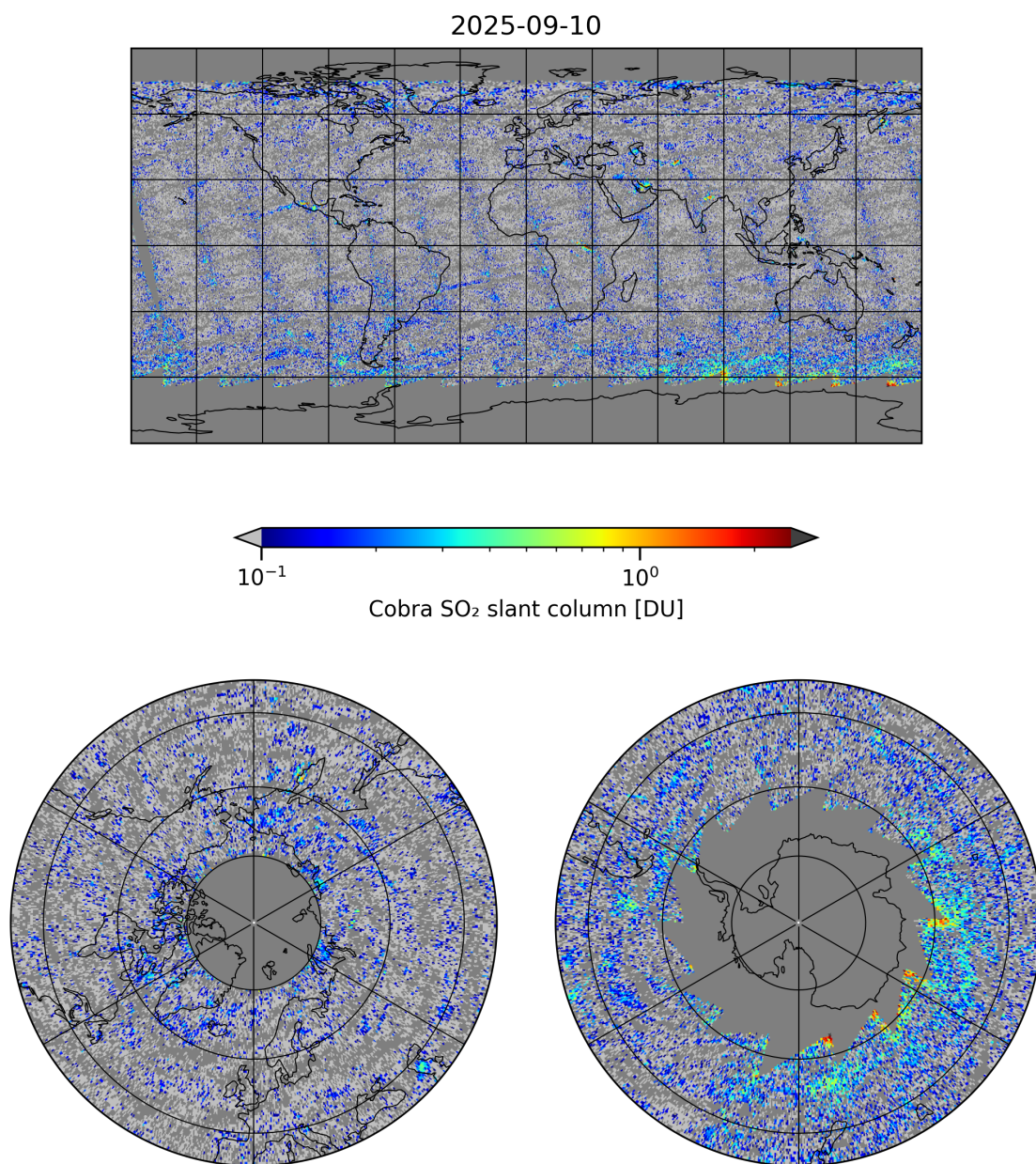


Figure 7: Map of “Cobra SO₂ slant column” for 2025-09-10 to 2025-09-11

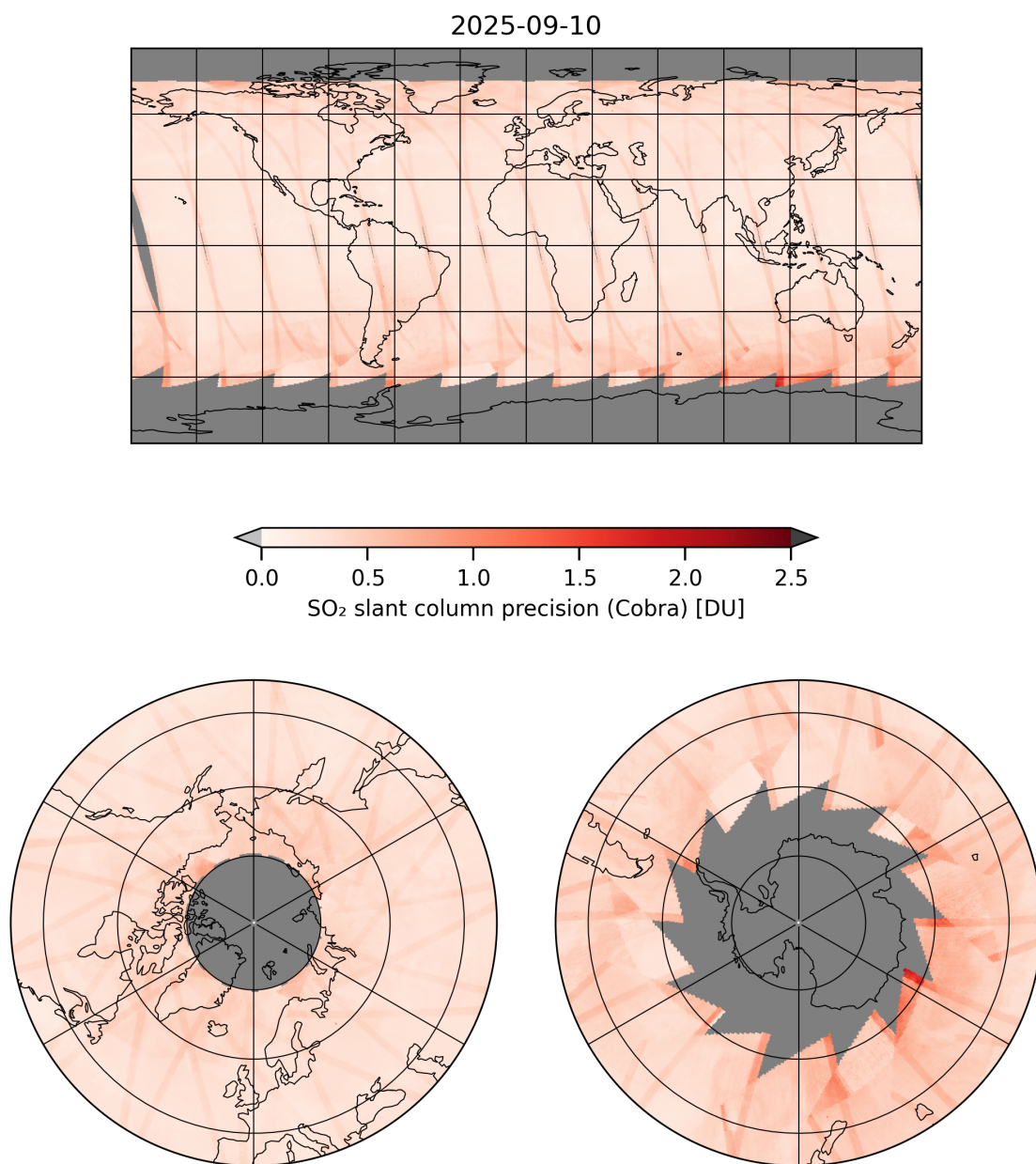


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-09-10 to 2025-09-11

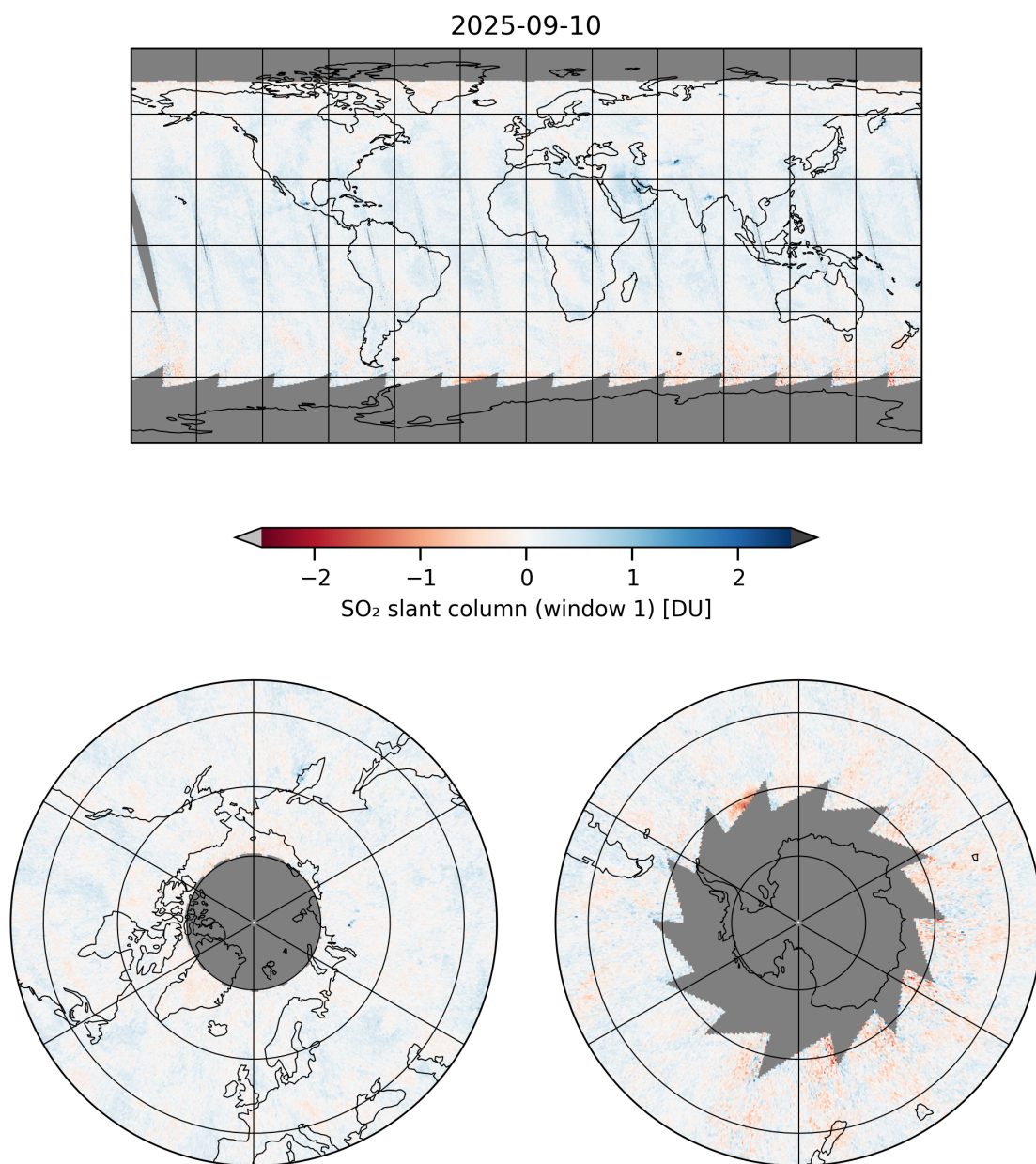


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-09-10 to 2025-09-11

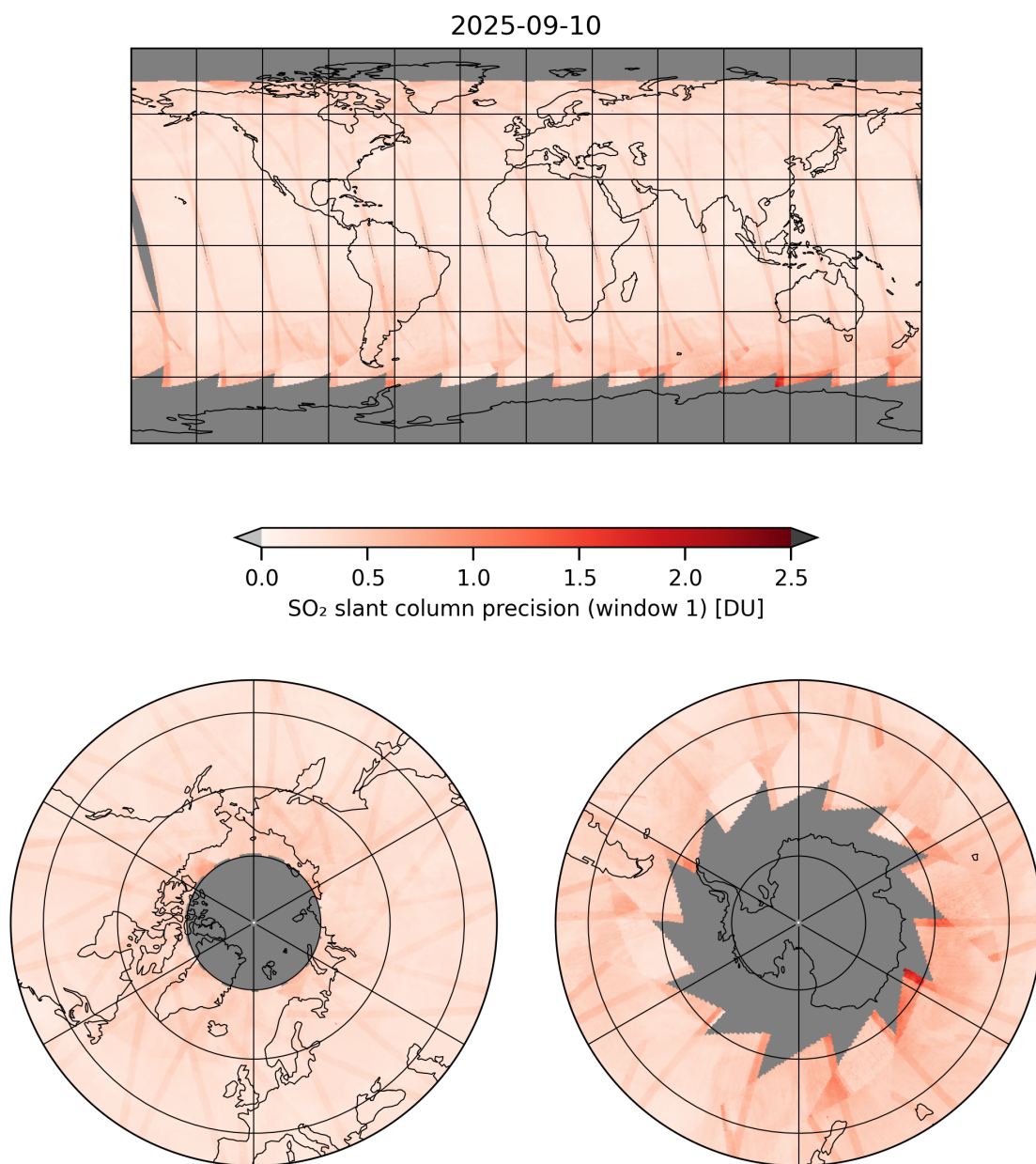


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-09-10 to 2025-09-11

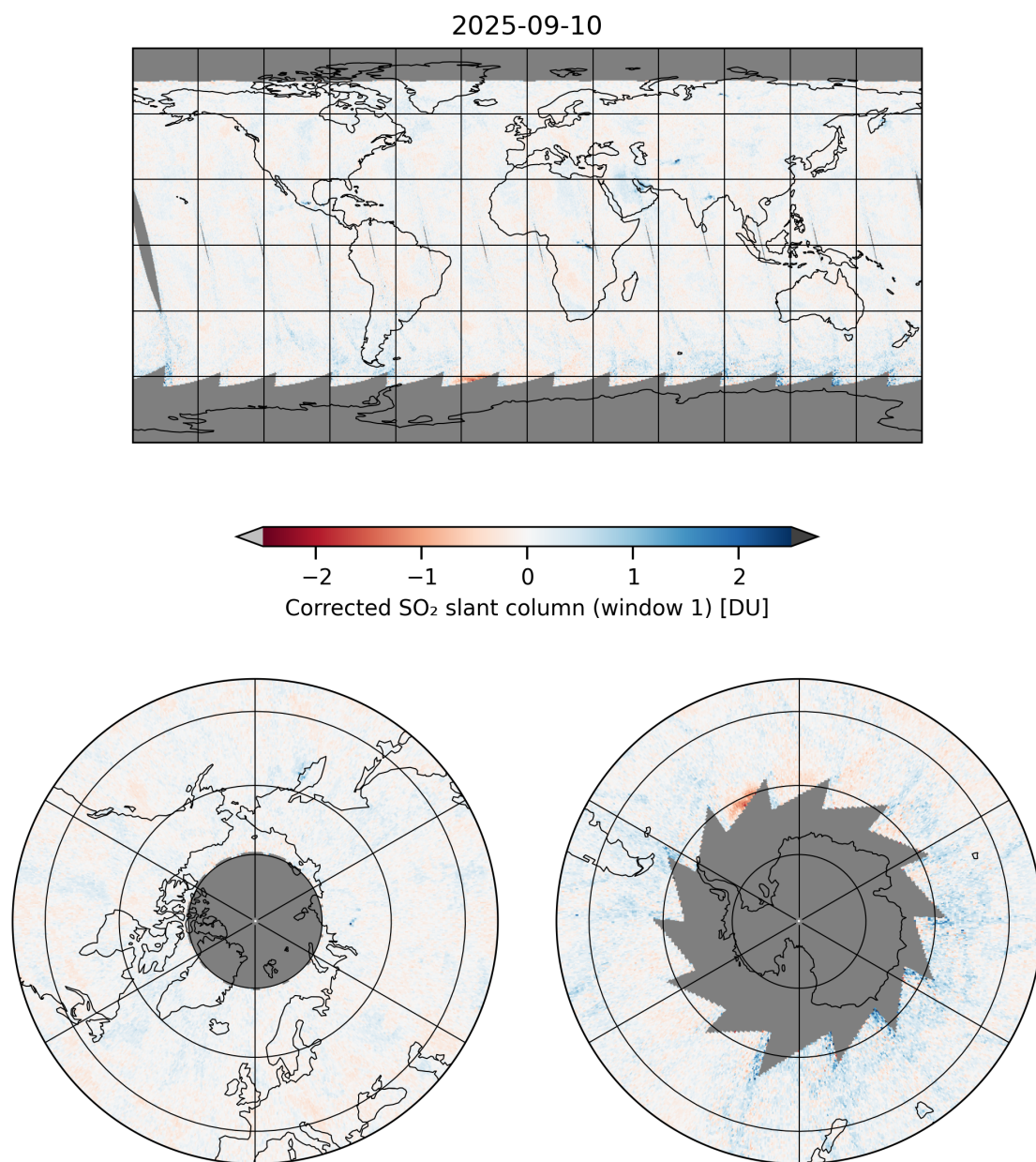


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-09-10 to 2025-09-11

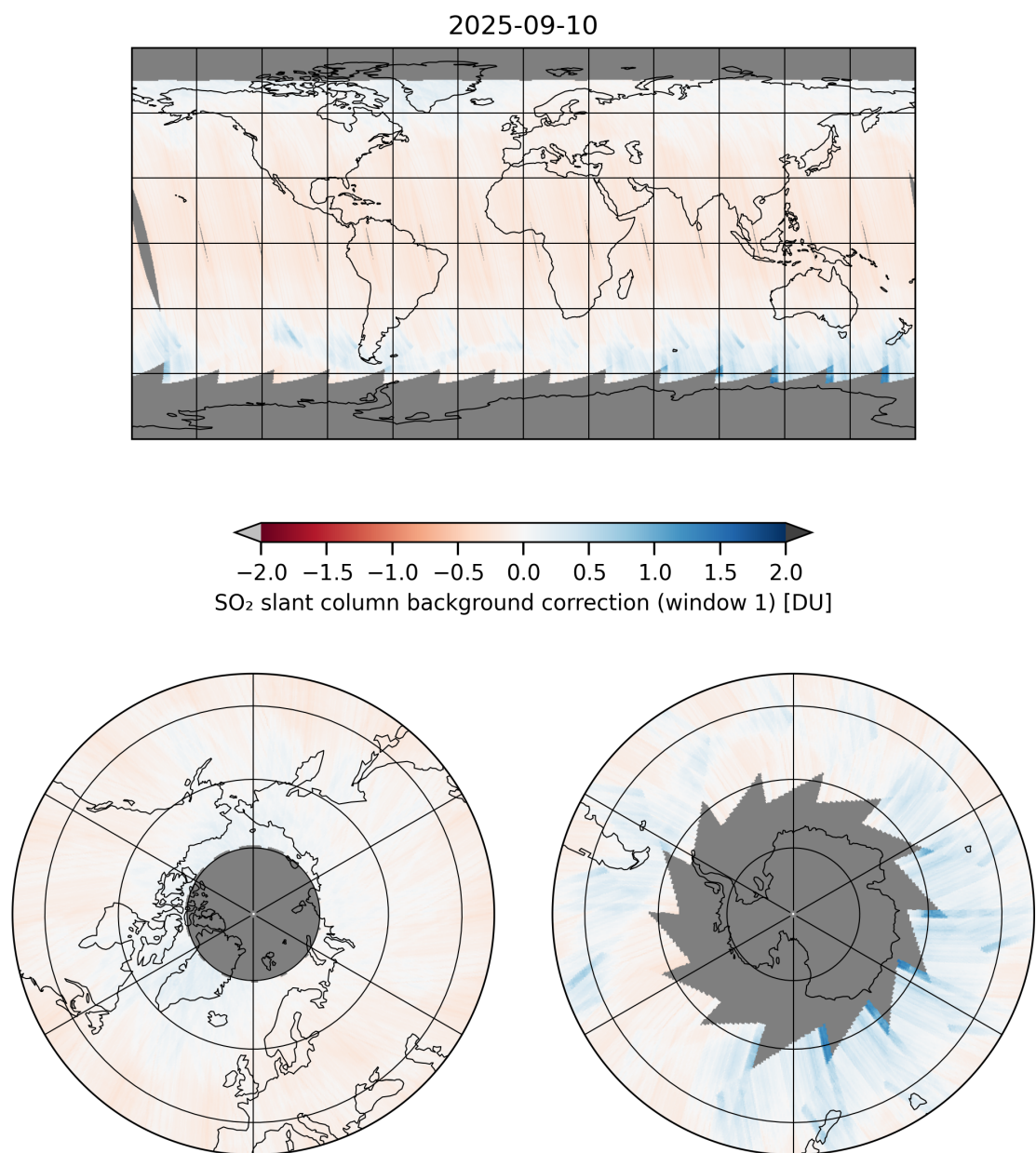


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-09-10 to 2025-09-11

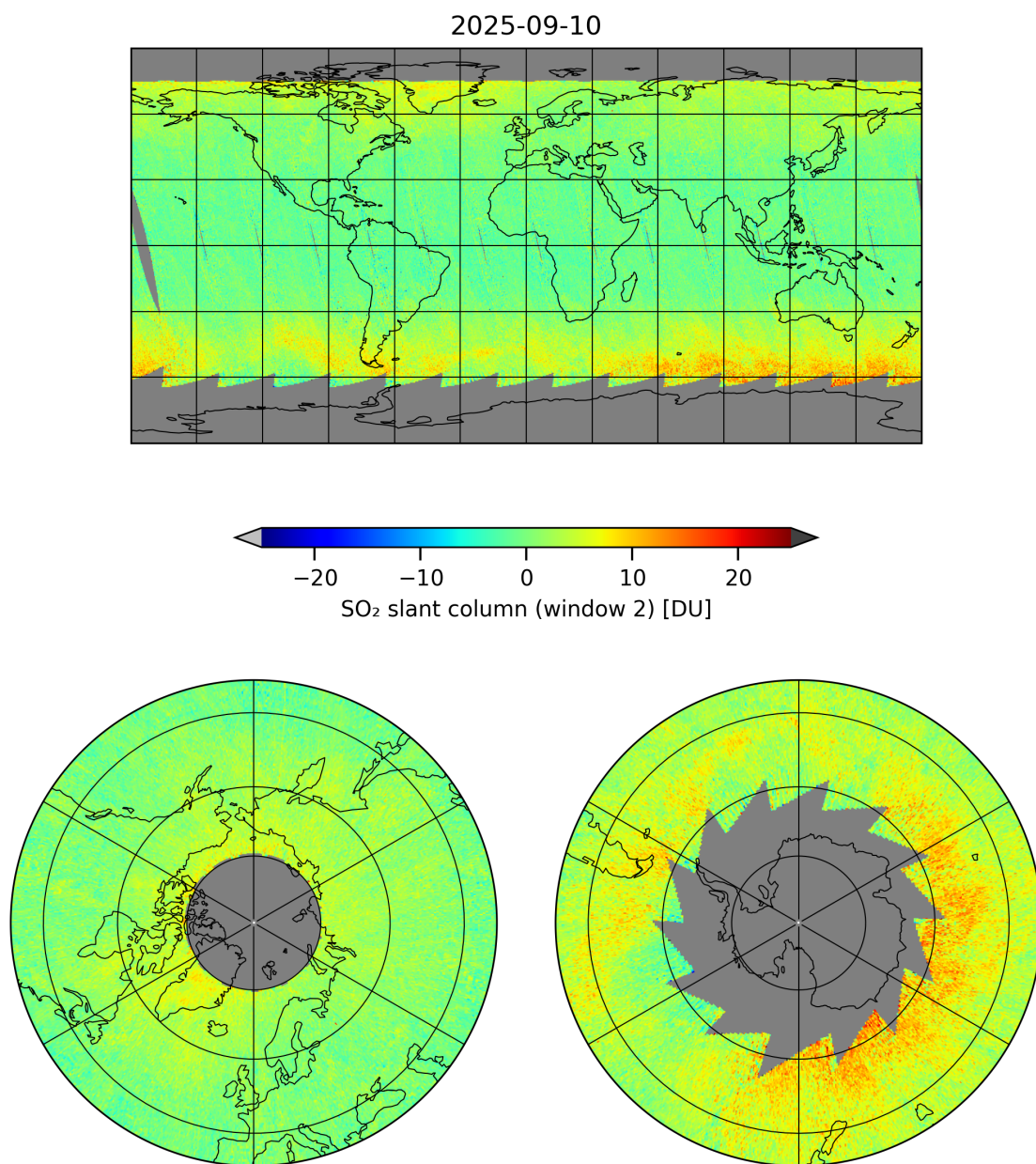


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-09-10 to 2025-09-11

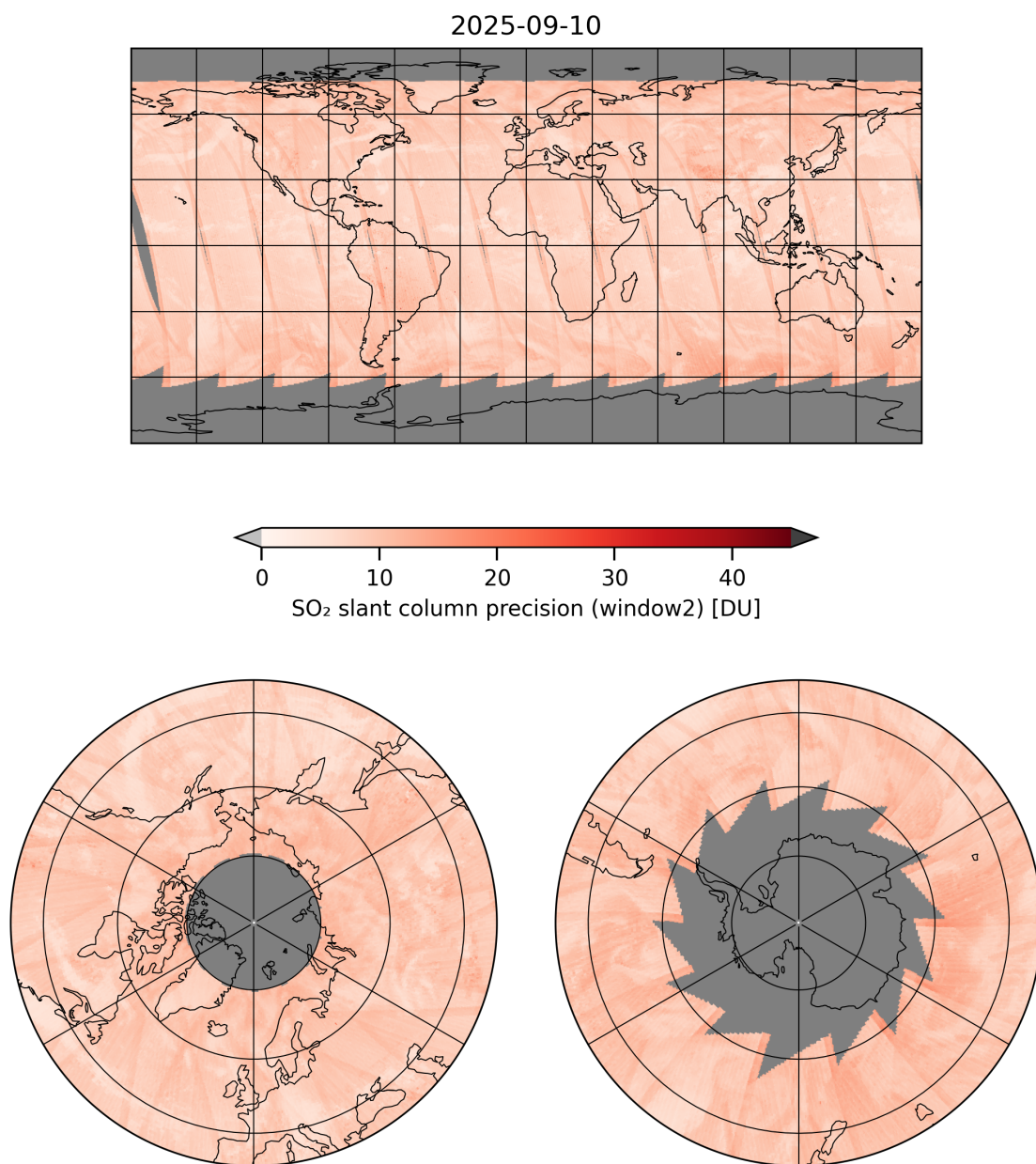


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-09-10 to 2025-09-11

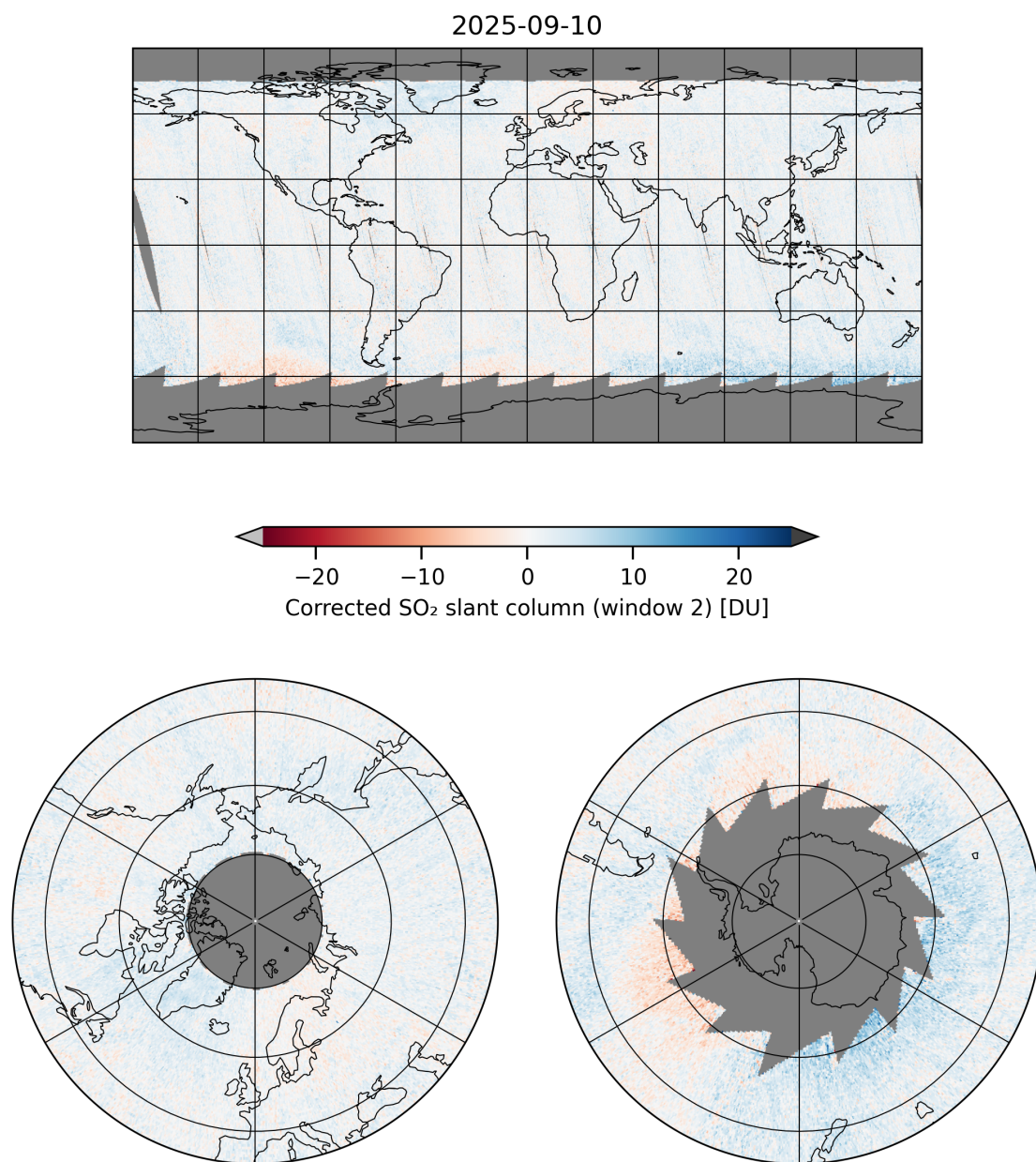


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-09-10 to 2025-09-11

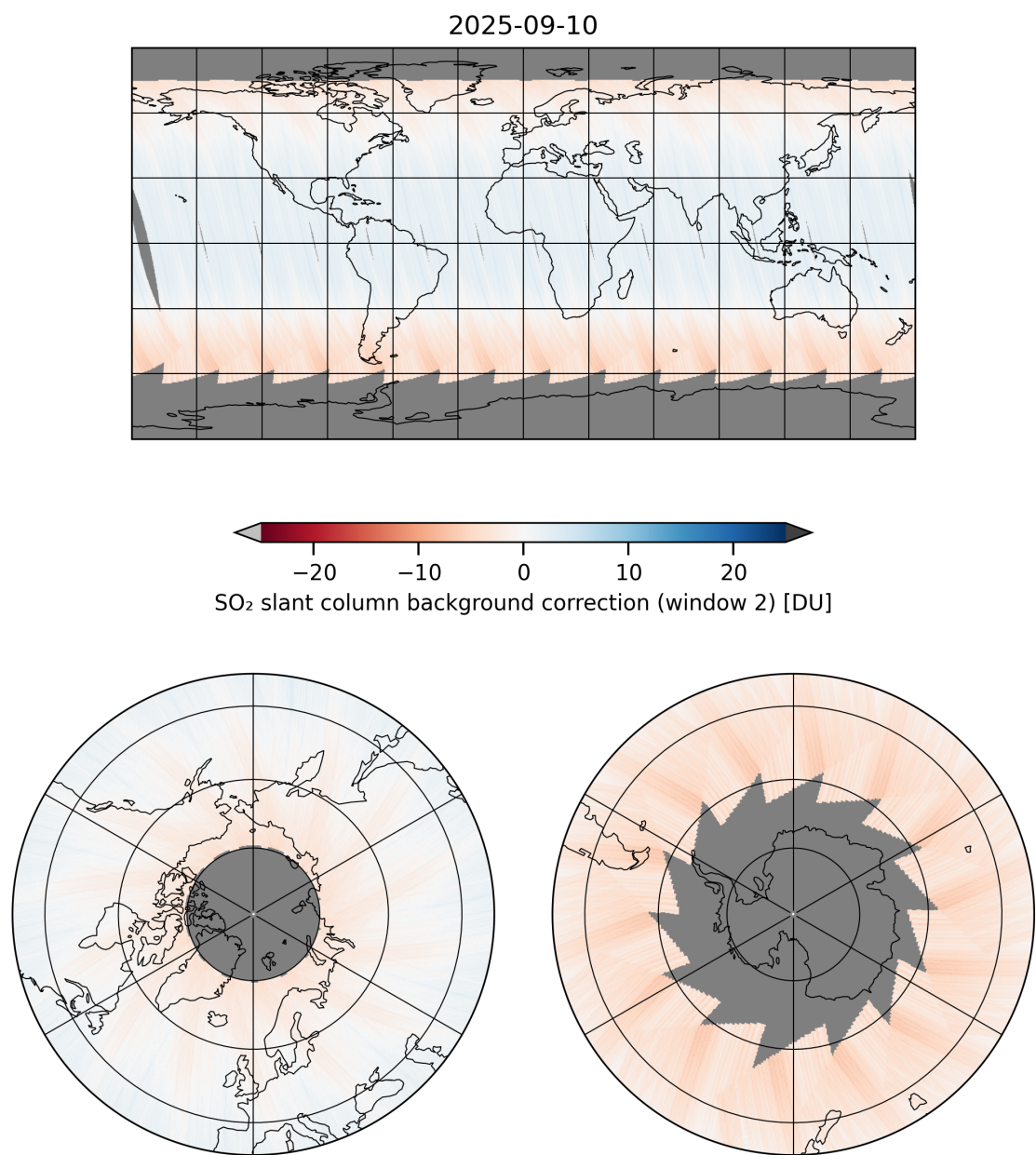


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-09-10 to 2025-09-11

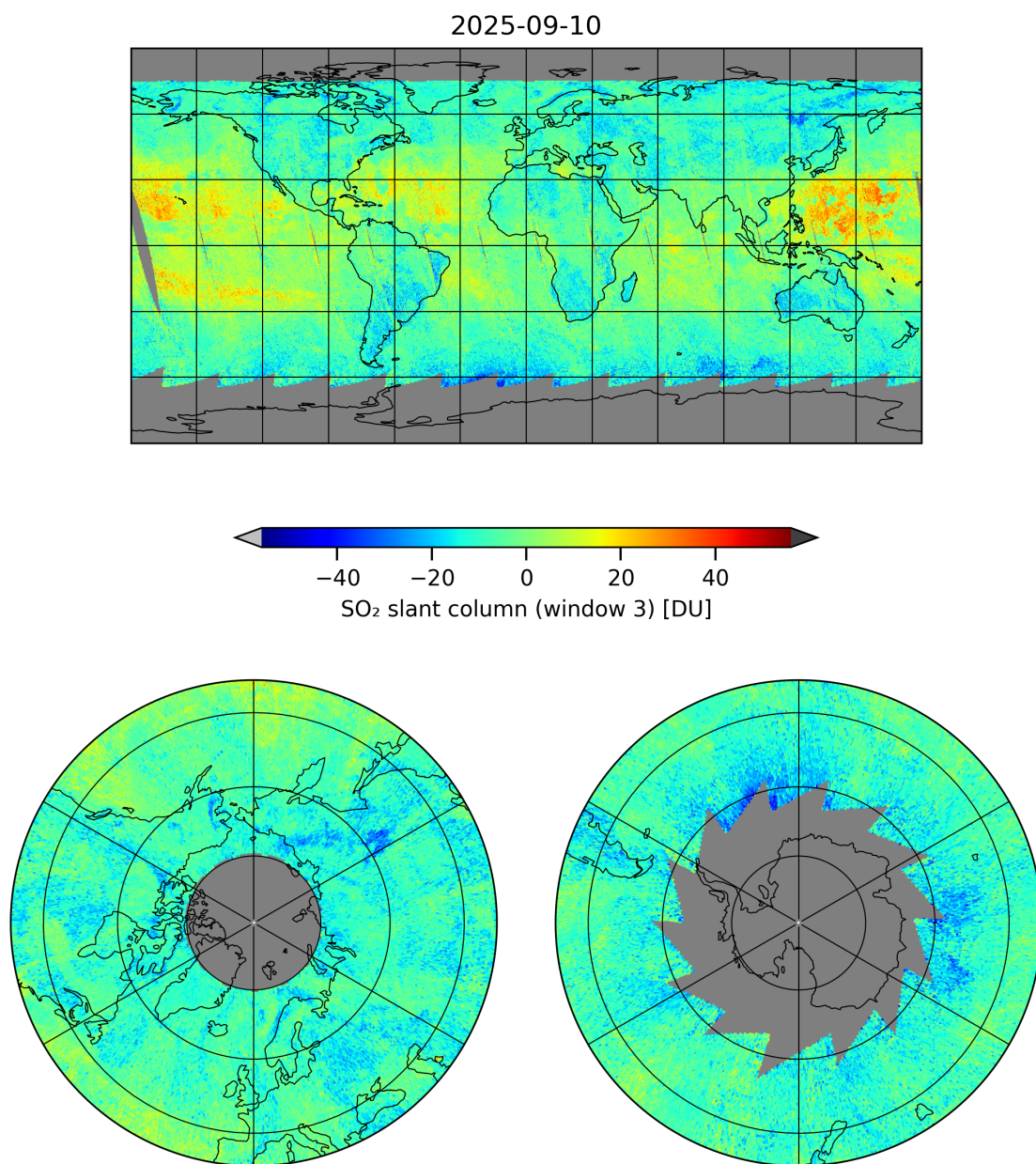


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-09-10 to 2025-09-11

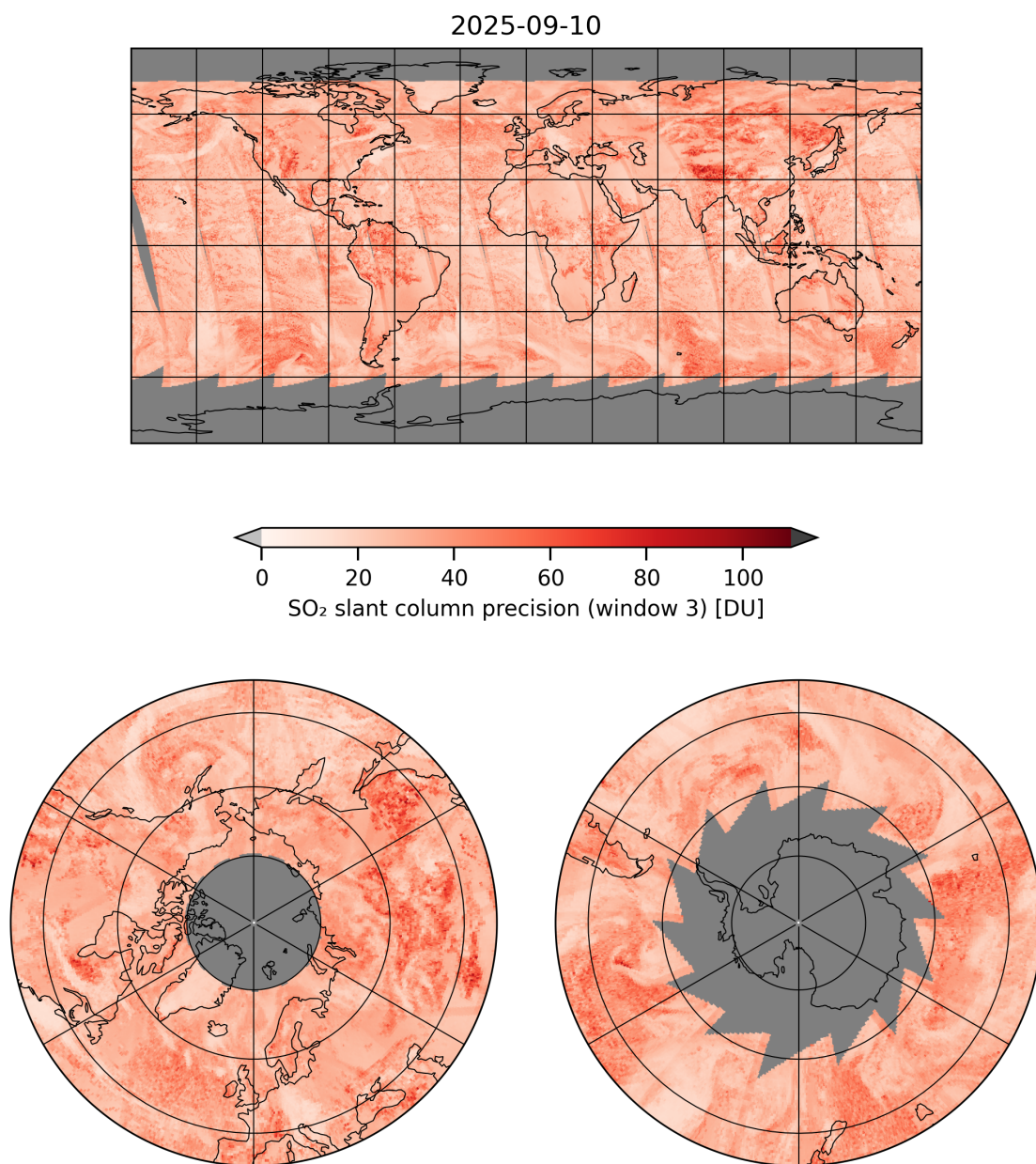


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-09-10 to 2025-09-11

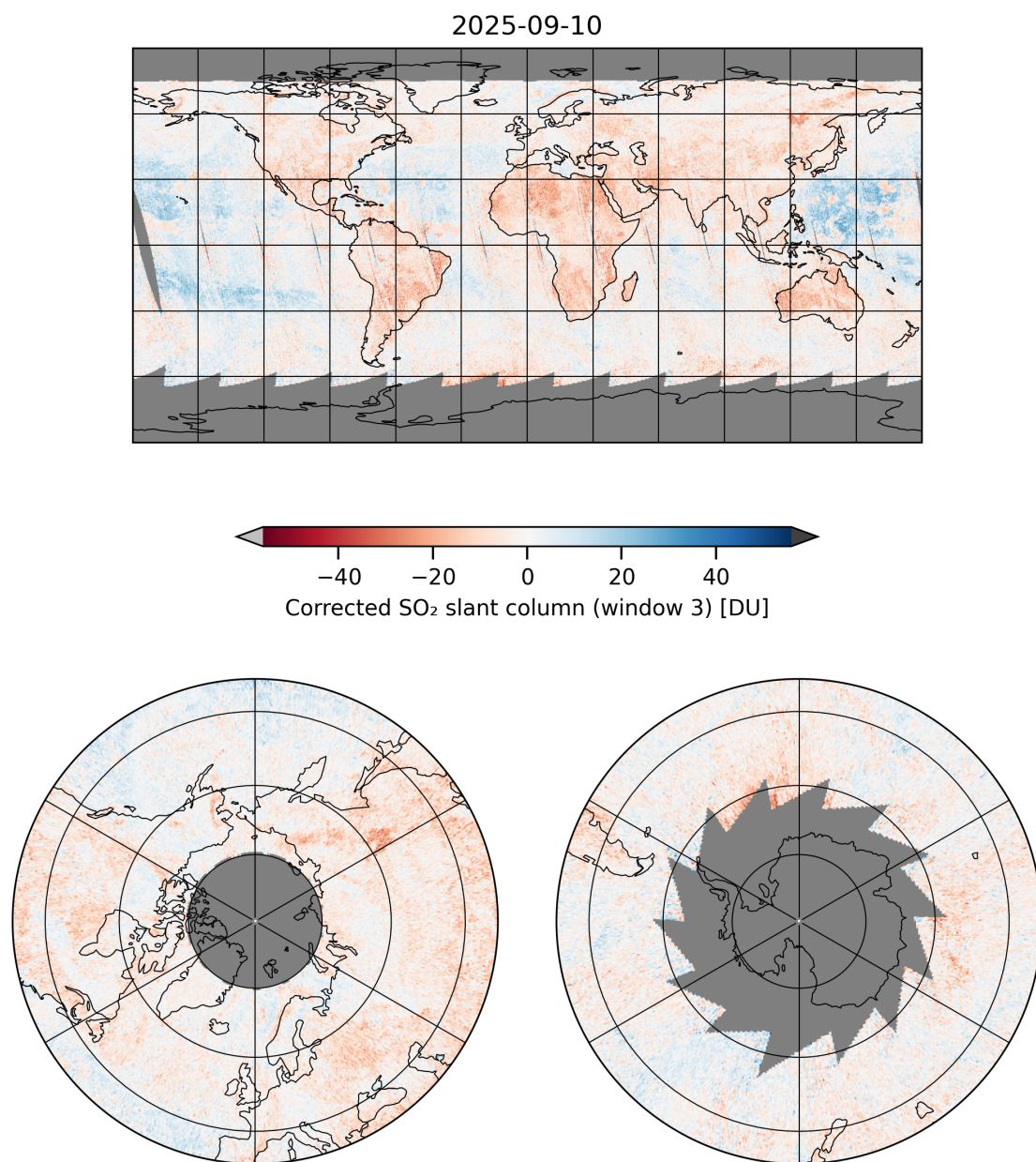


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-09-10 to 2025-09-11

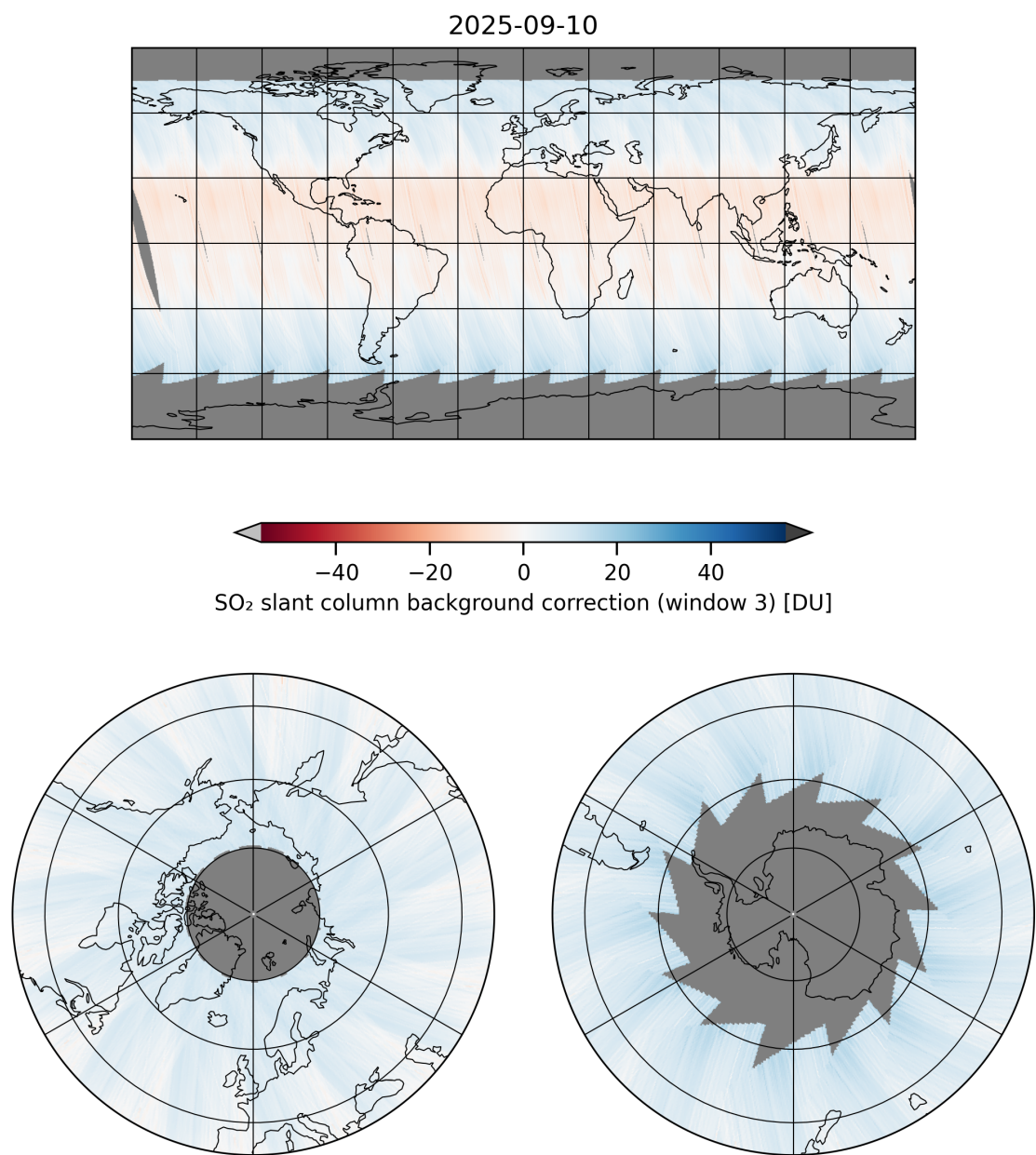


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-09-10 to 2025-09-11

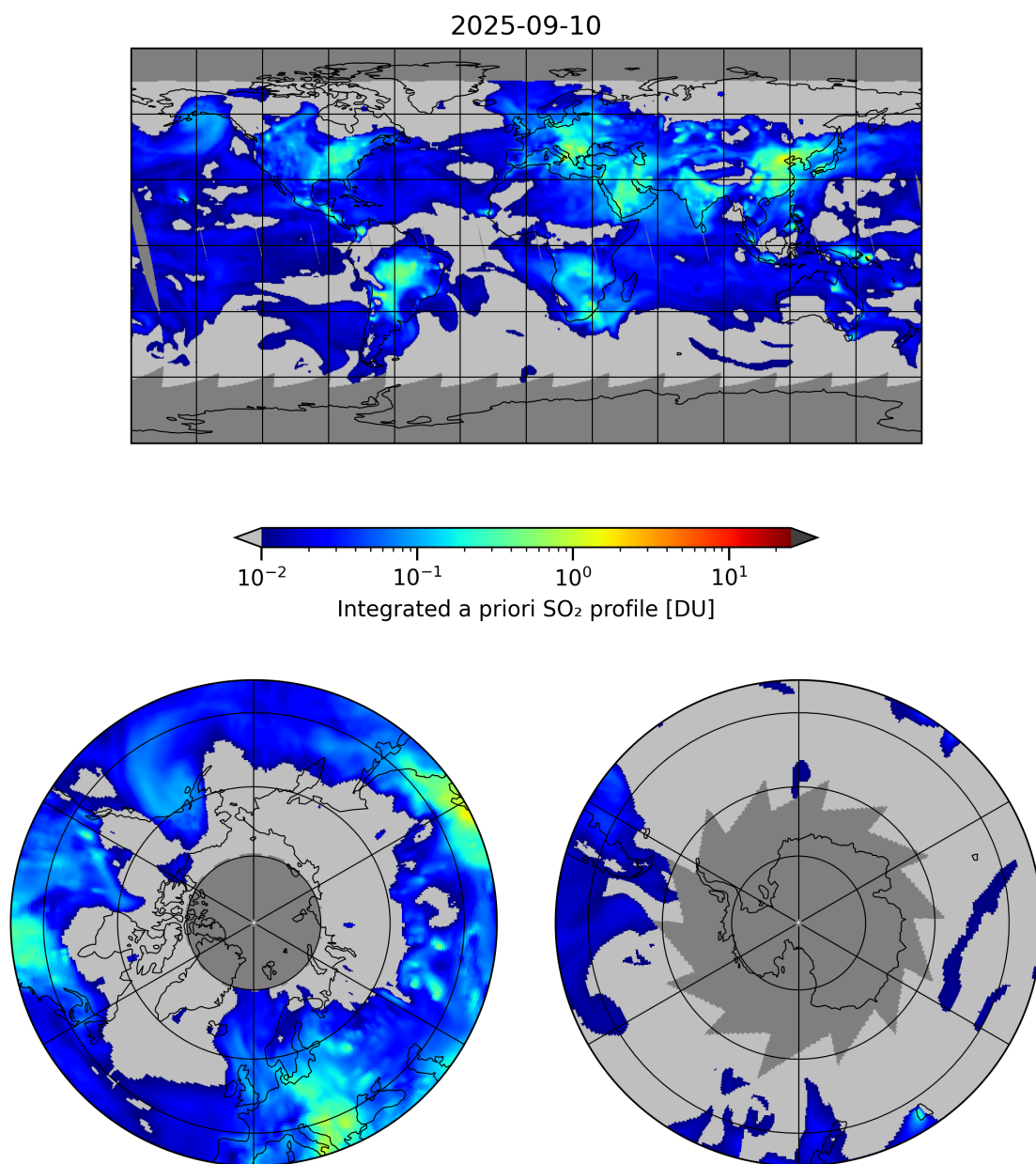


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-09-10 to 2025-09-11

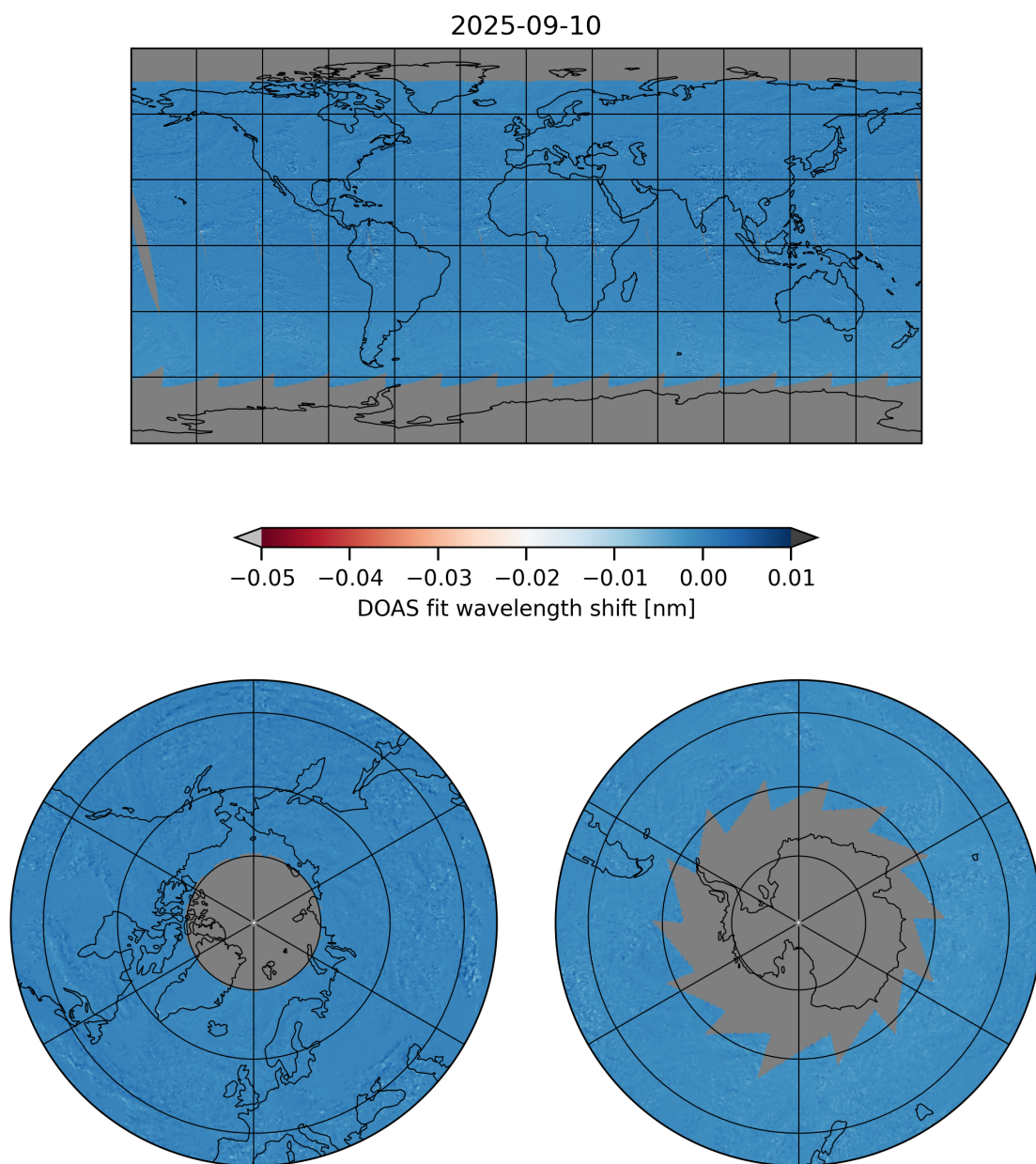


Figure 22: Map of “DOAS fit wavelength shift” for 2025-09-10 to 2025-09-11

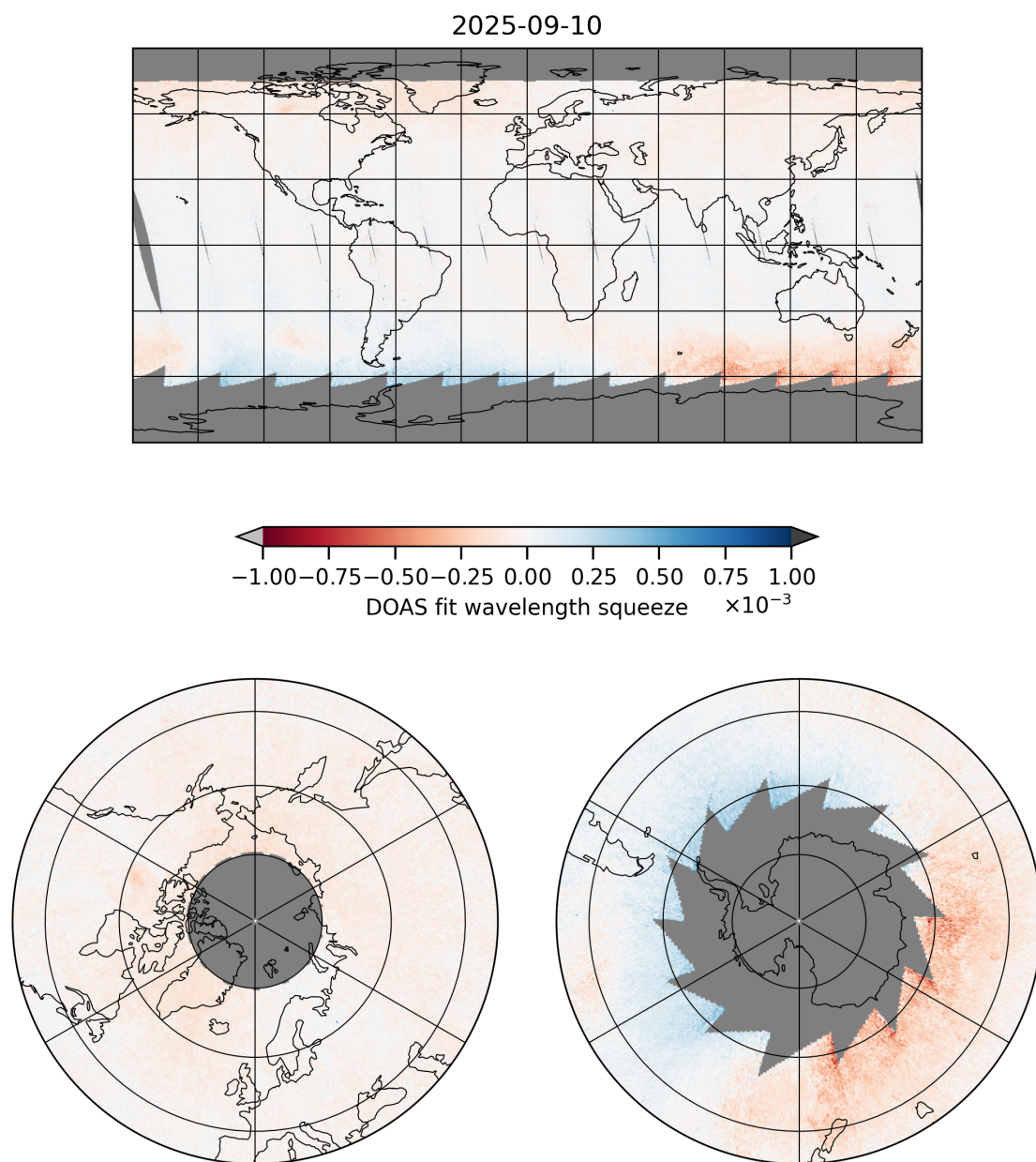


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-09-10 to 2025-09-11

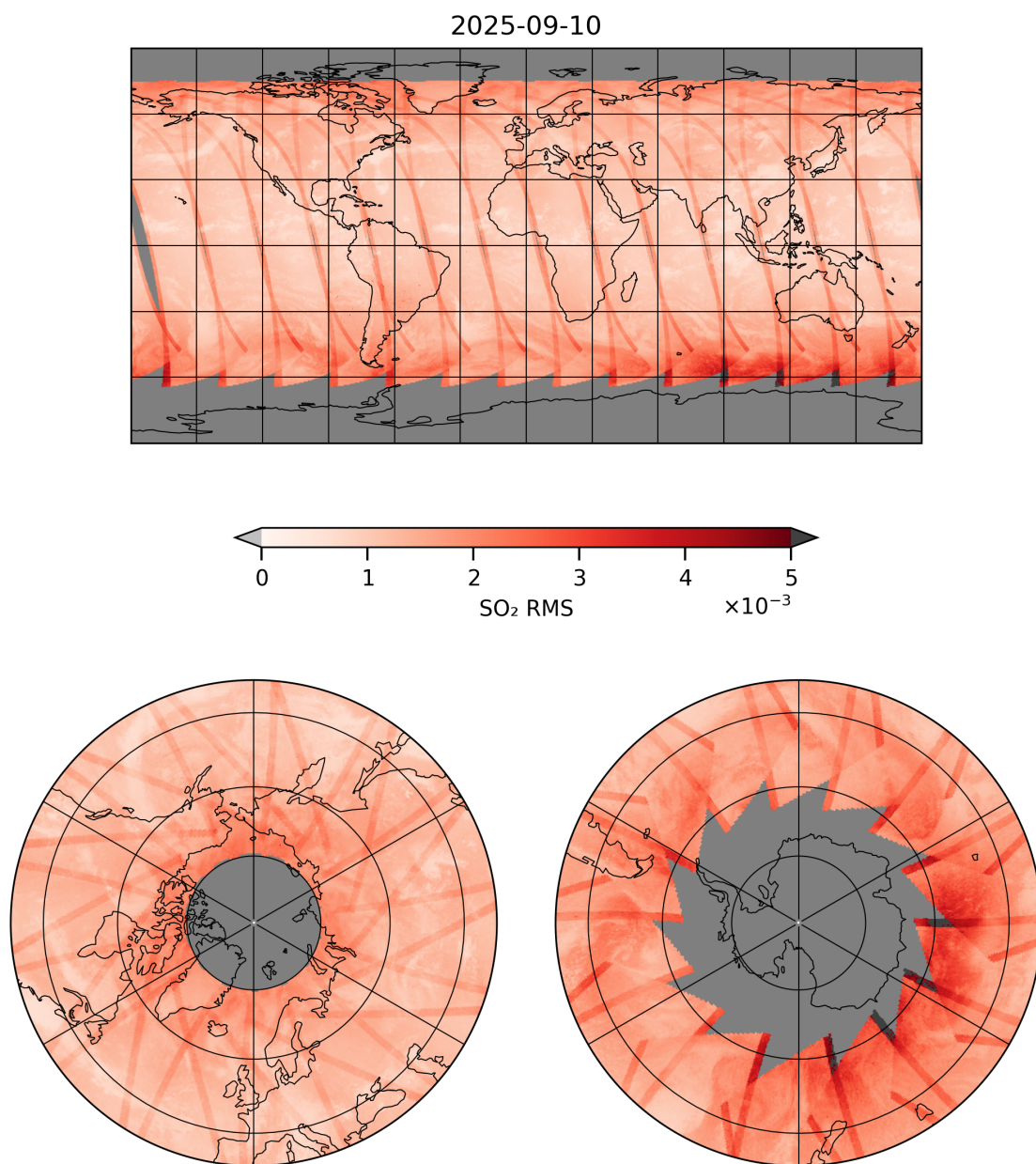


Figure 24: Map of “SO₂ RMS” for 2025-09-10 to 2025-09-11

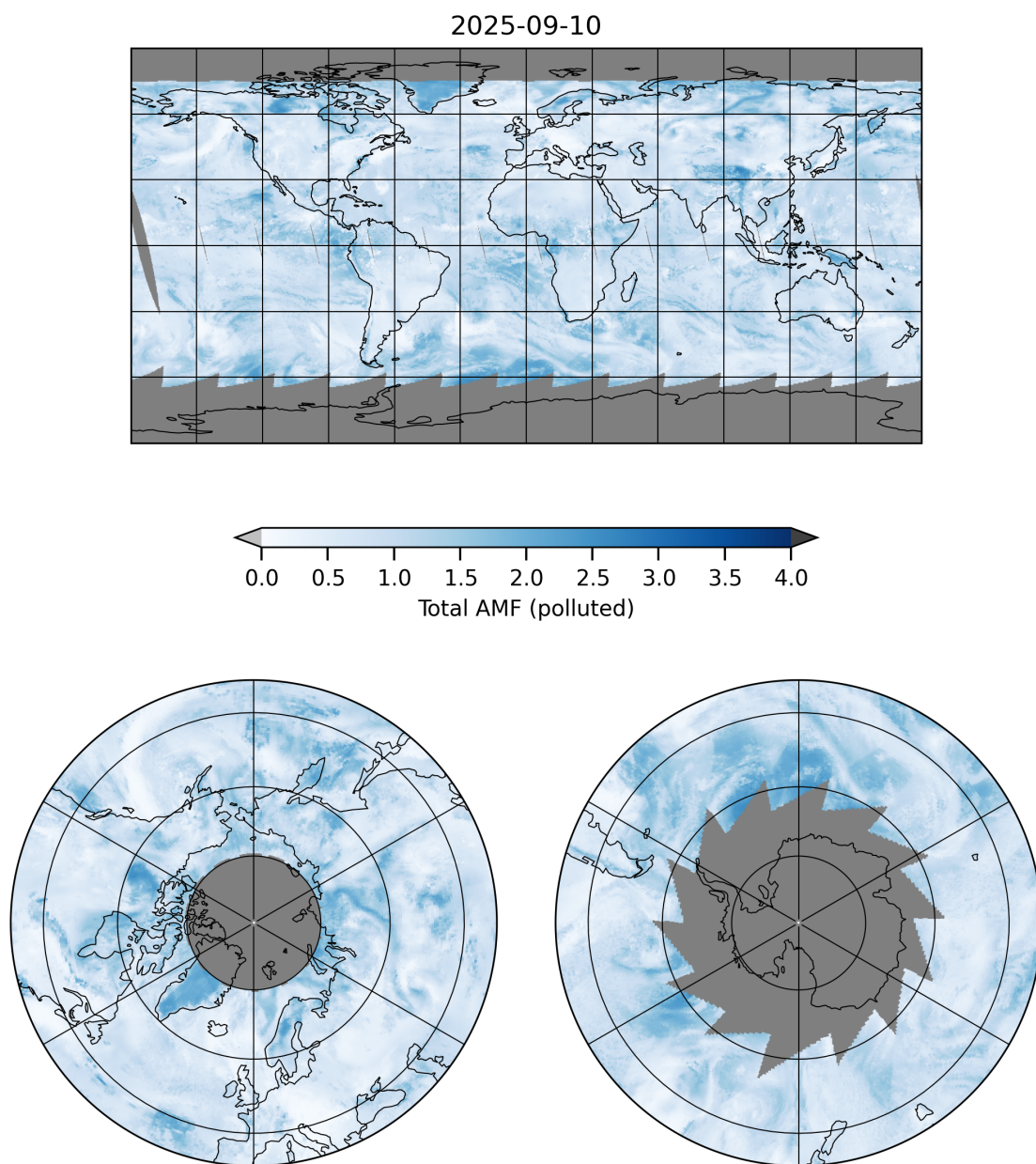


Figure 25: Map of “Total AMF (polluted)” for 2025-09-10 to 2025-09-11

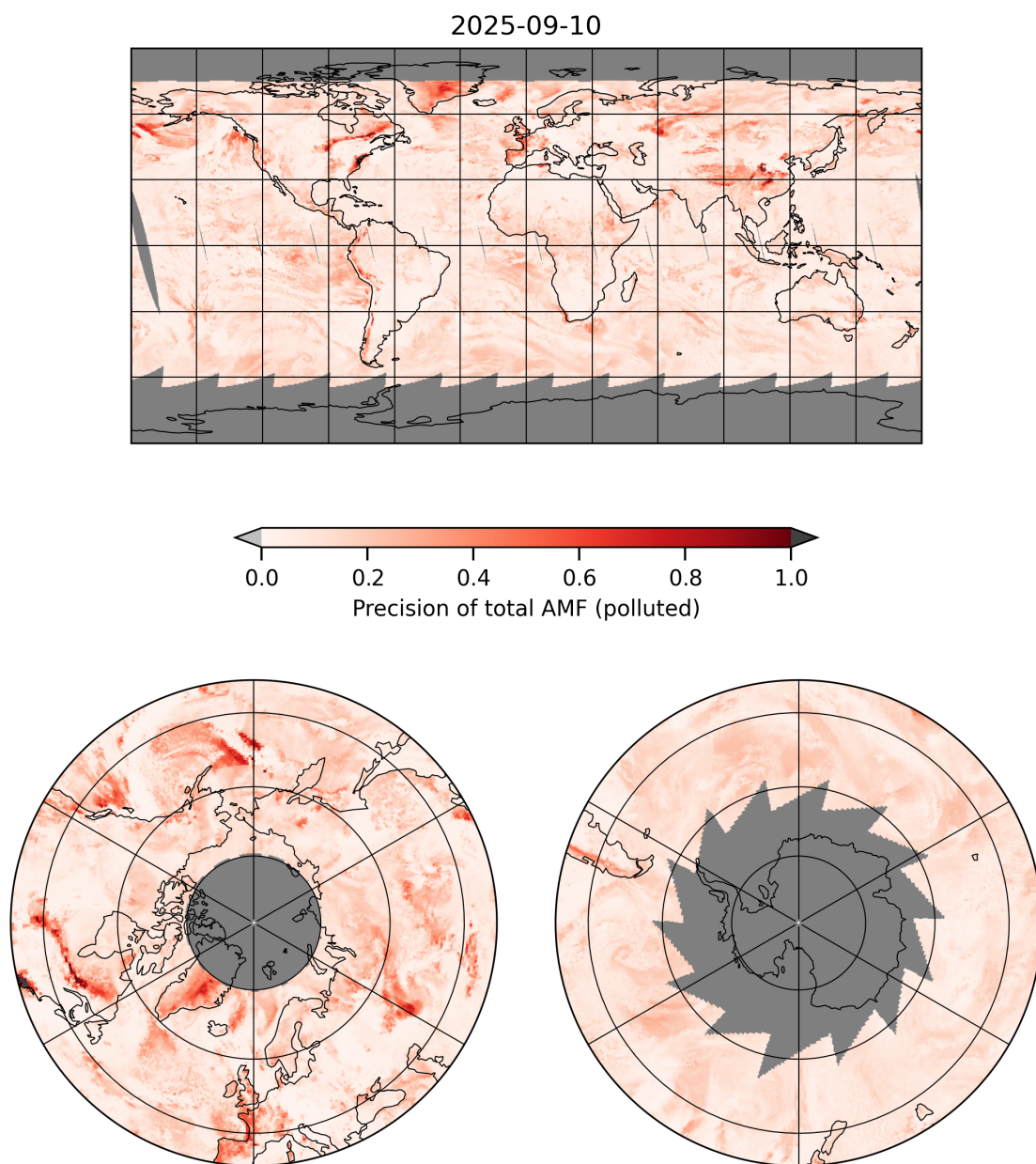


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-09-10 to 2025-09-11

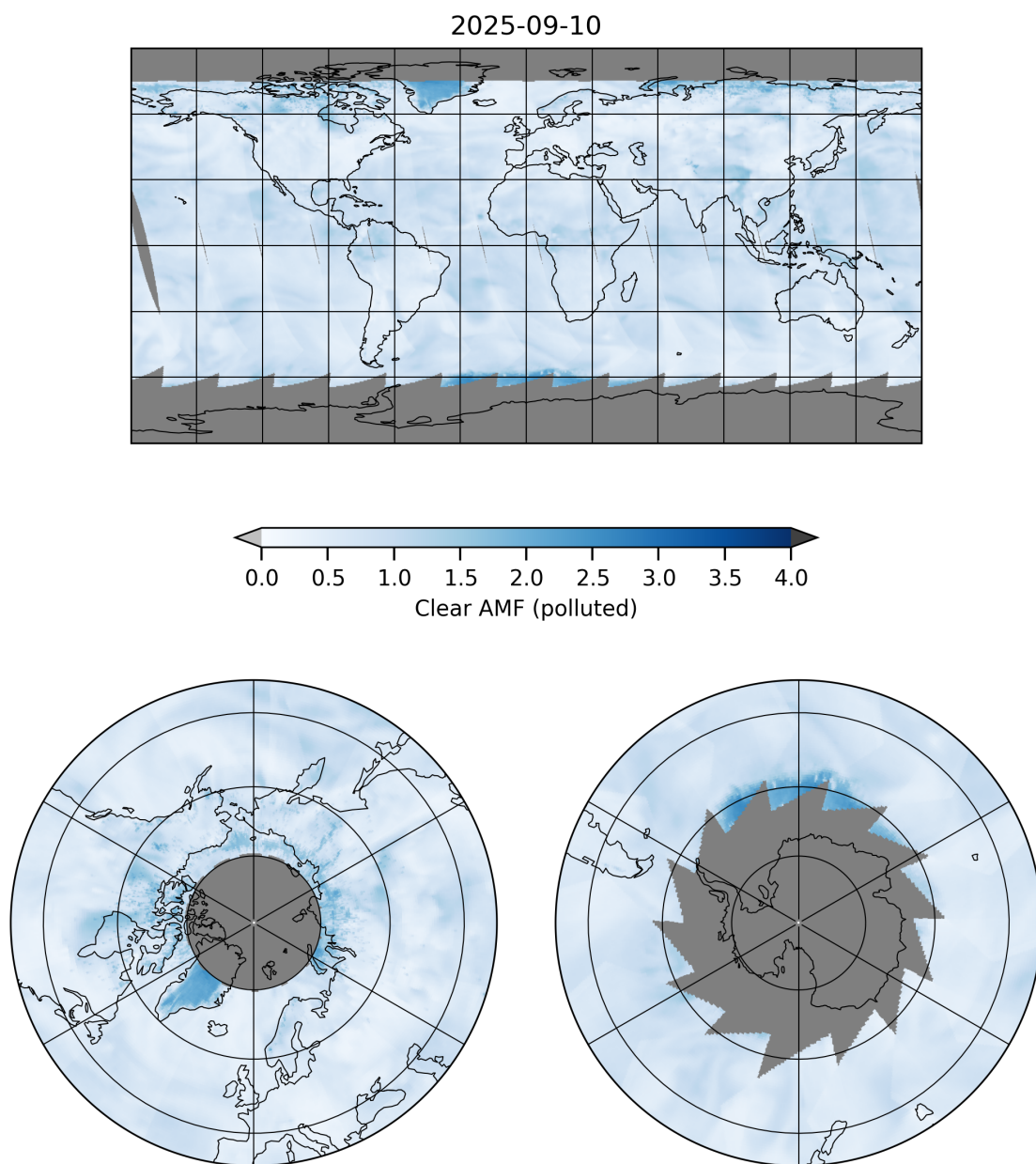


Figure 27: Map of “Clear AMF (polluted)” for 2025-09-10 to 2025-09-11

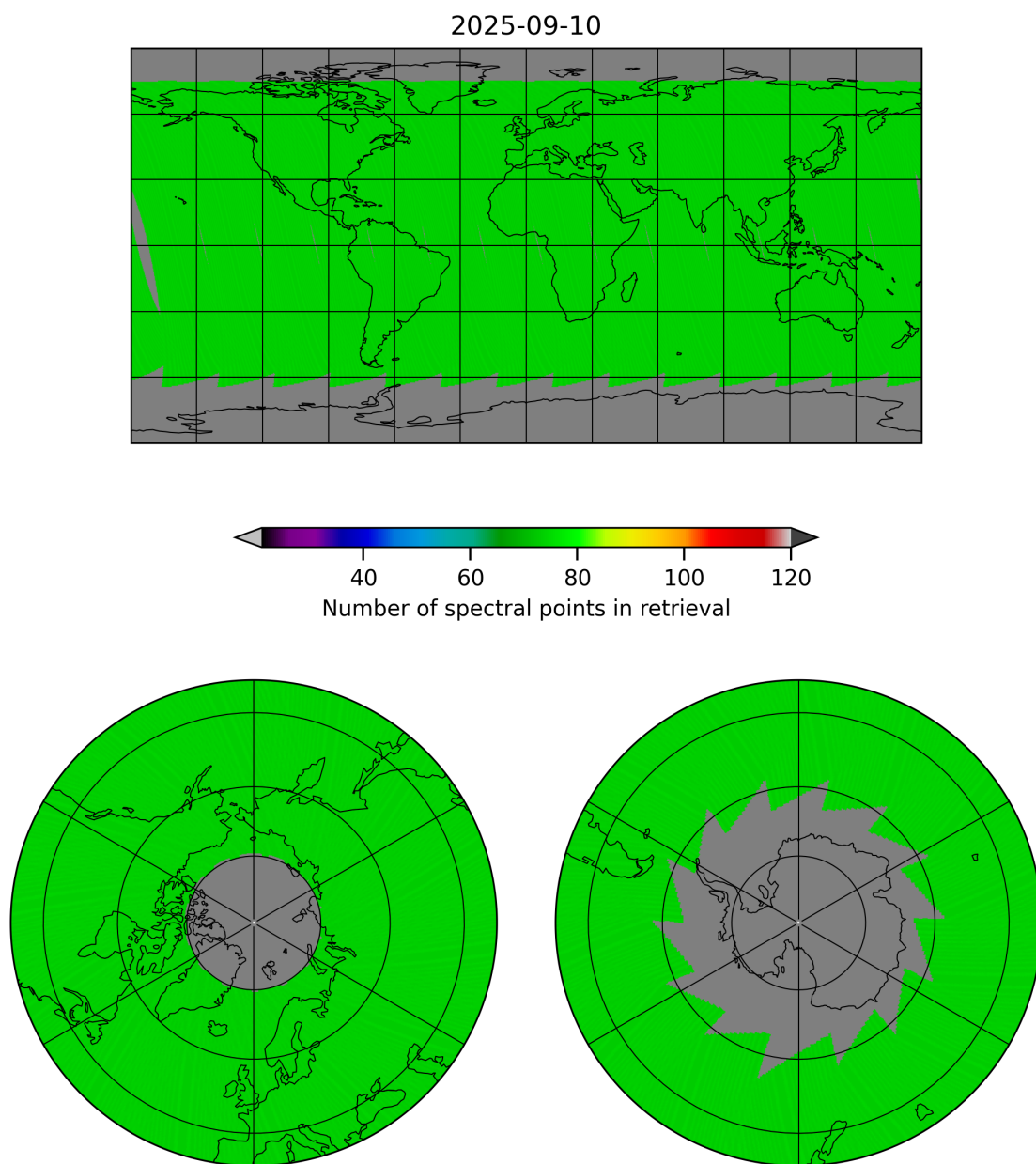


Figure 28: Map of “Number of spectral points in retrieval” for 2025-09-10 to 2025-09-11

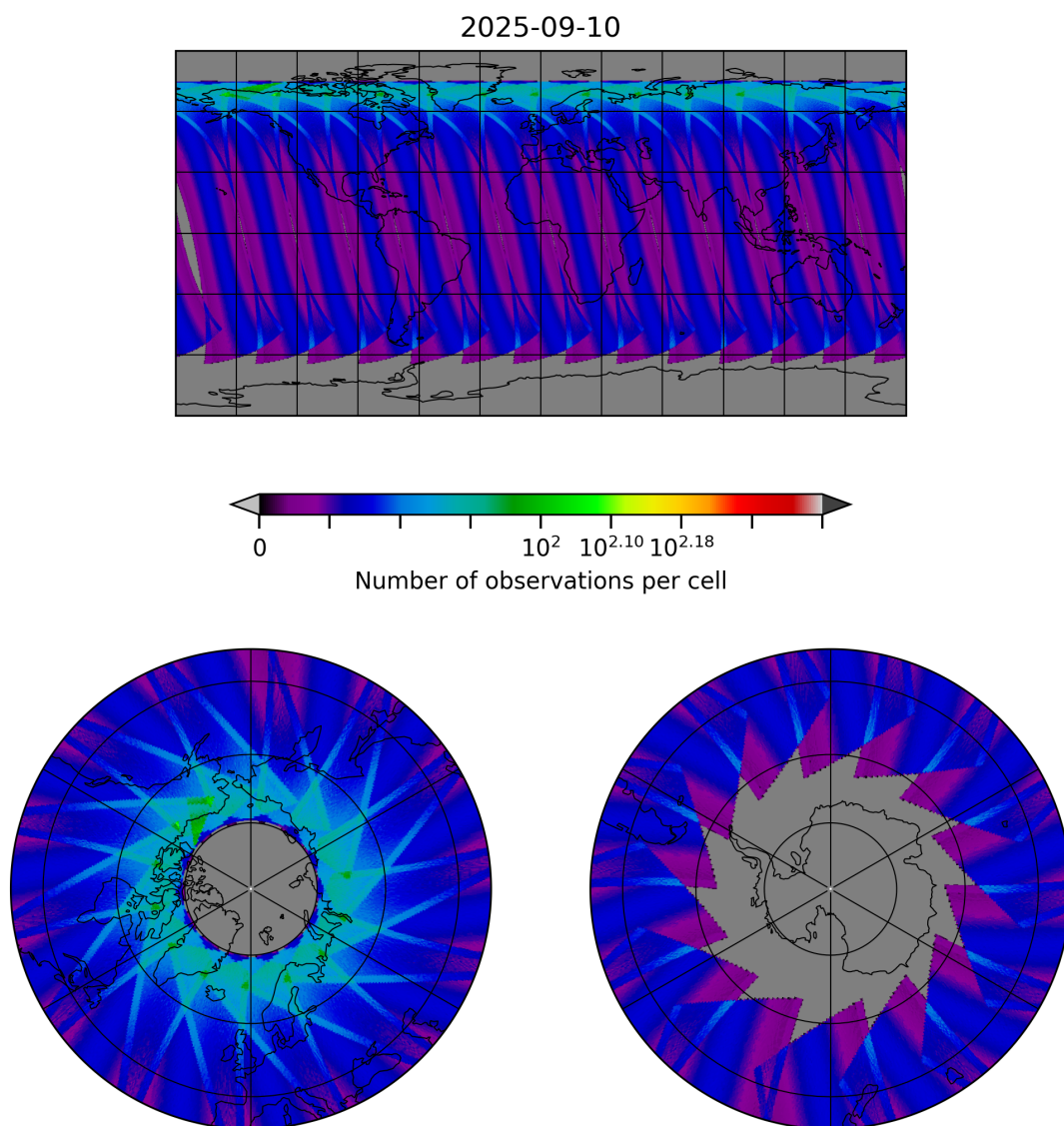


Figure 29: Map of the number of observations for 2025-09-10 to 2025-09-11

7 Zonal average

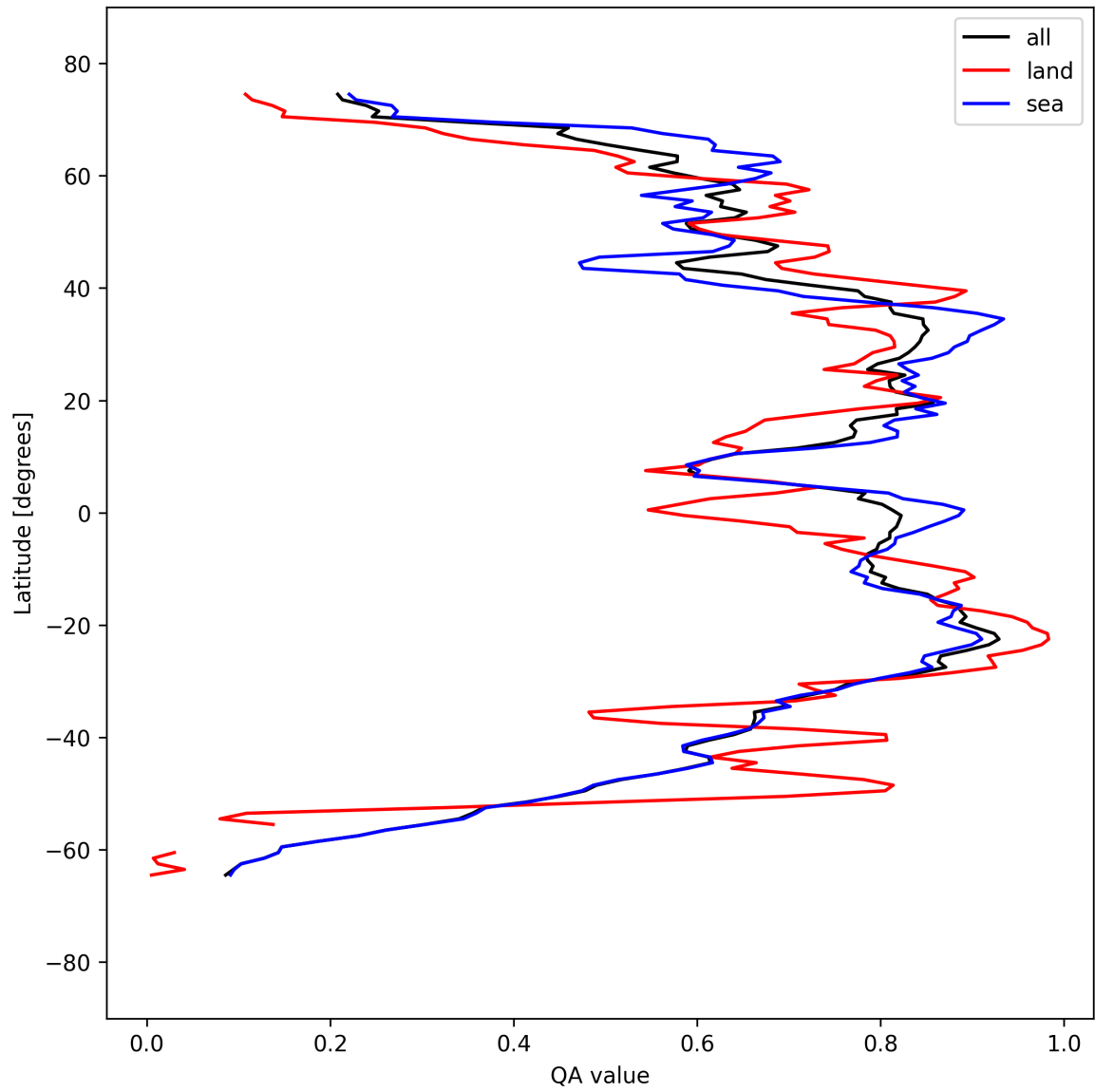


Figure 30: Zonal average of “QA value” for 2025-09-10 to 2025-09-11.

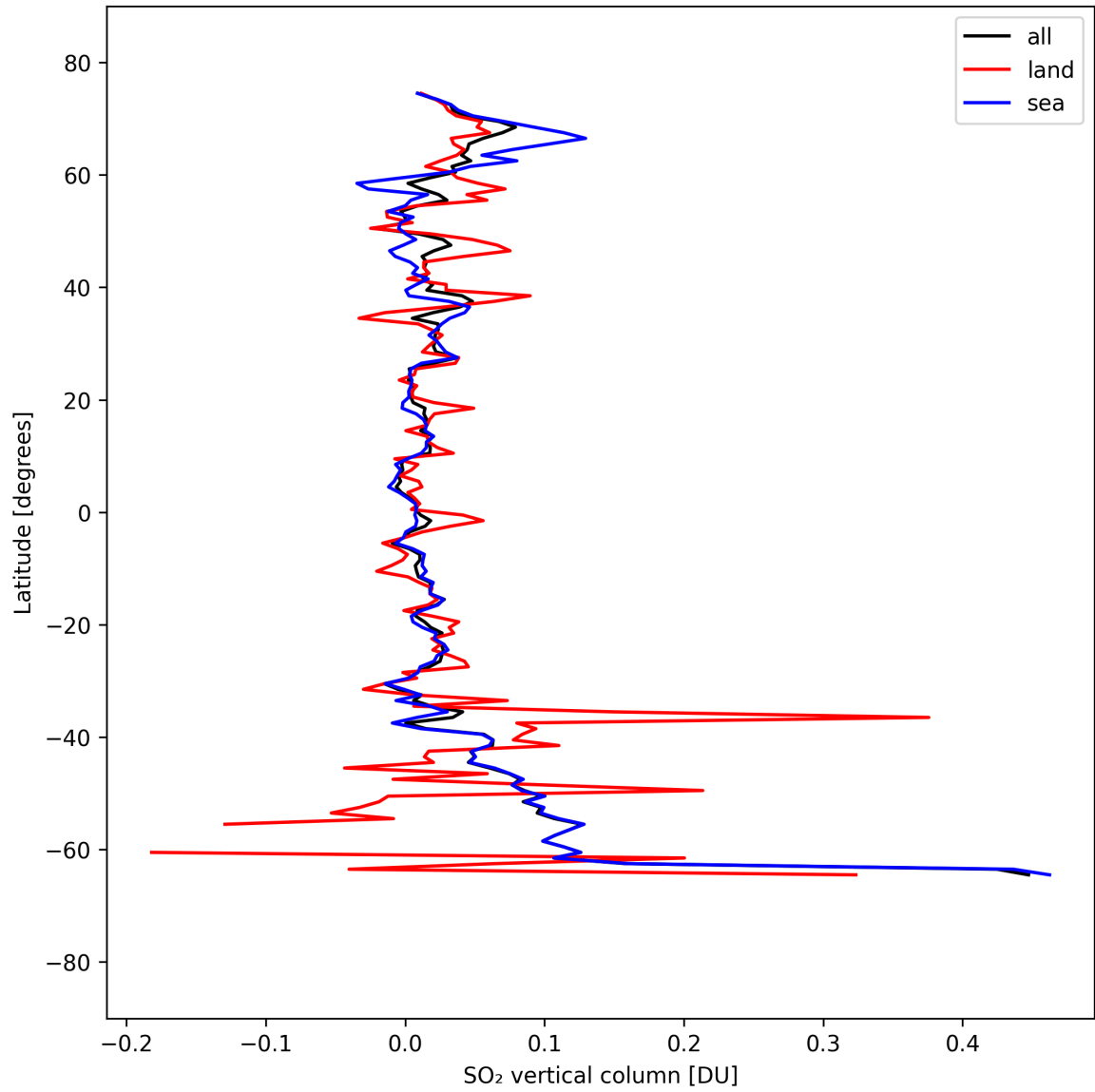


Figure 31: Zonal average of “SO₂ vertical column” for 2025-09-10 to 2025-09-11.

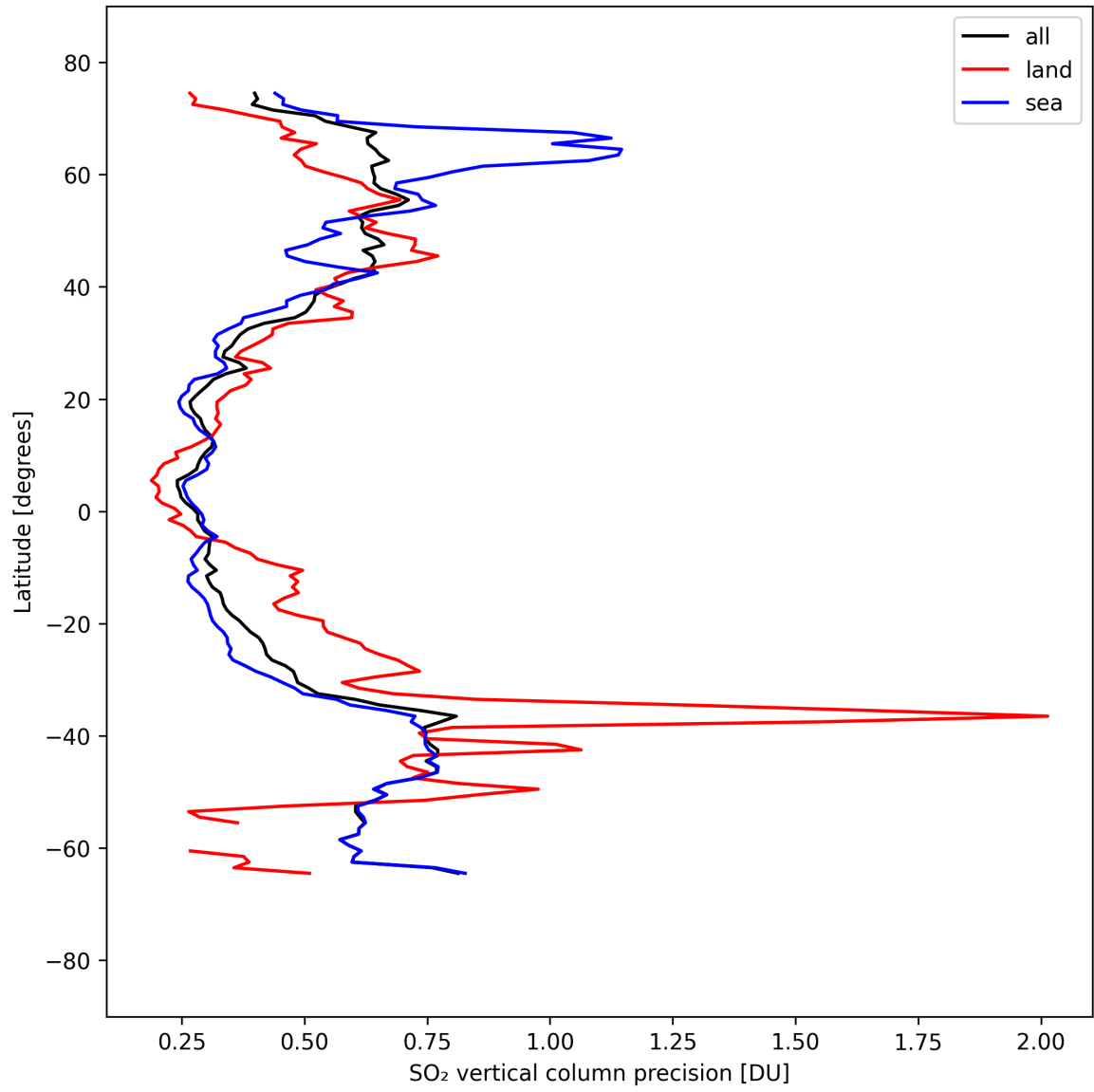


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-09-10 to 2025-09-11.

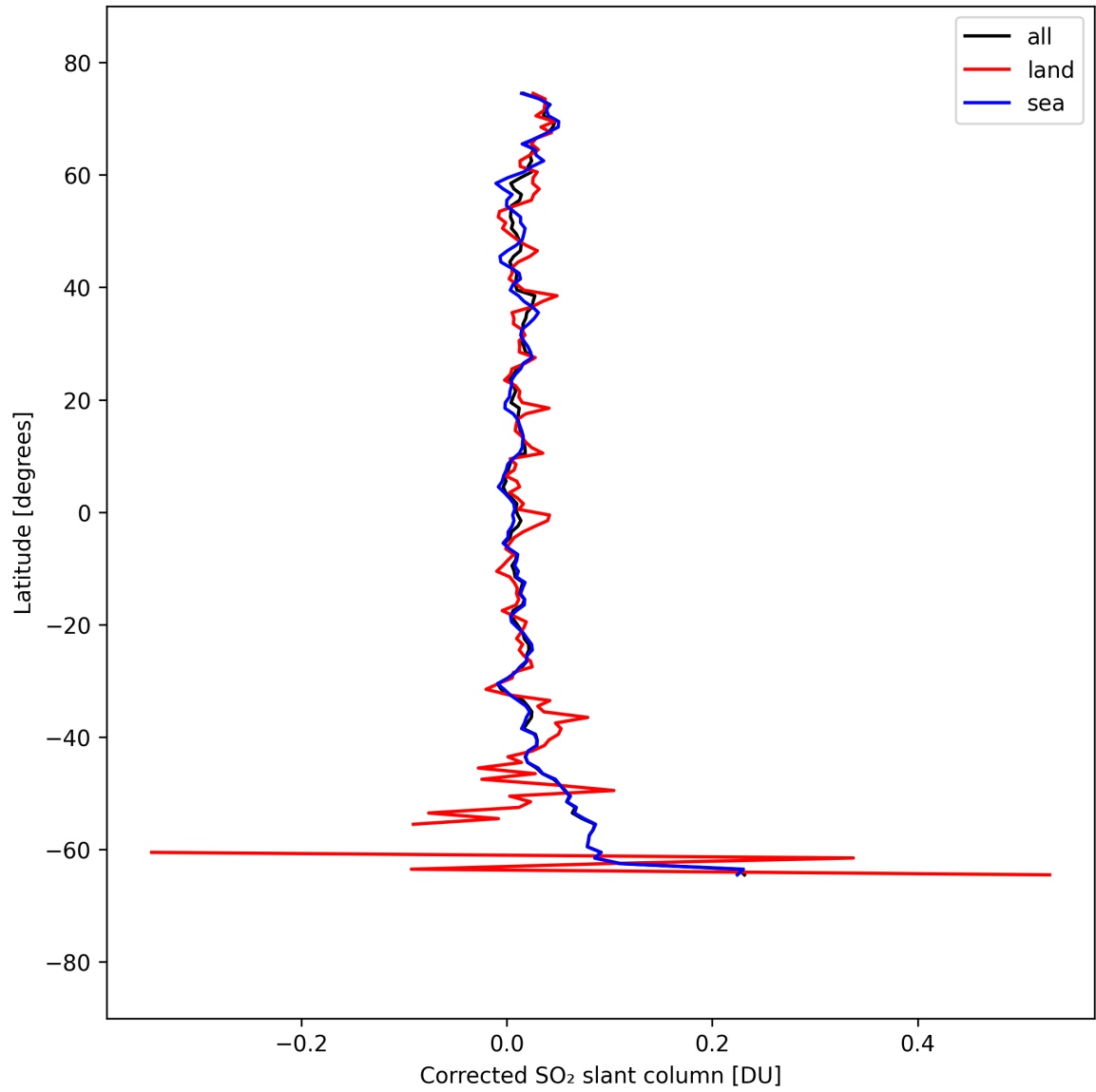


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-09-10 to 2025-09-11.

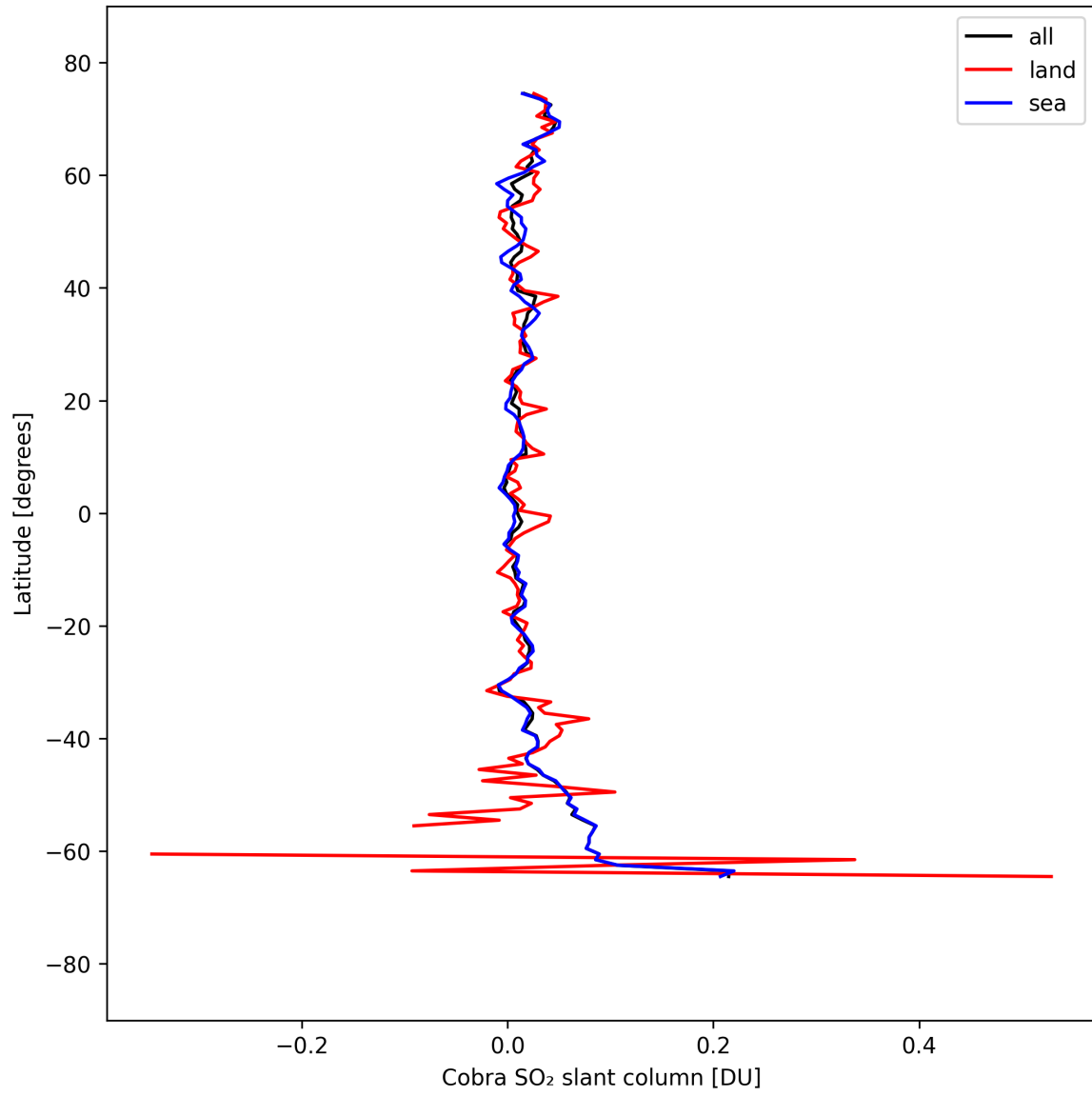


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-09-10 to 2025-09-11.

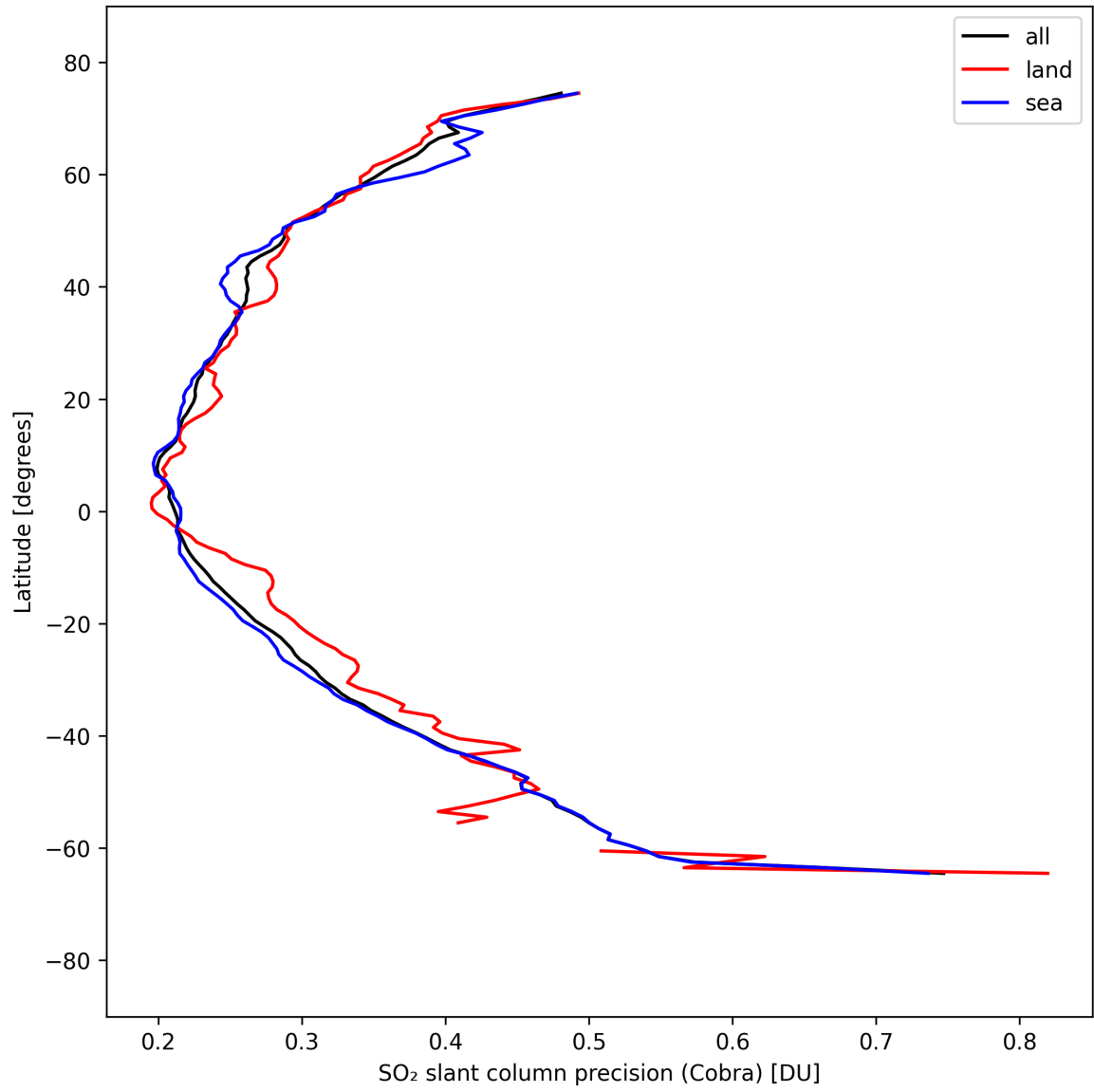


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-09-10 to 2025-09-11.

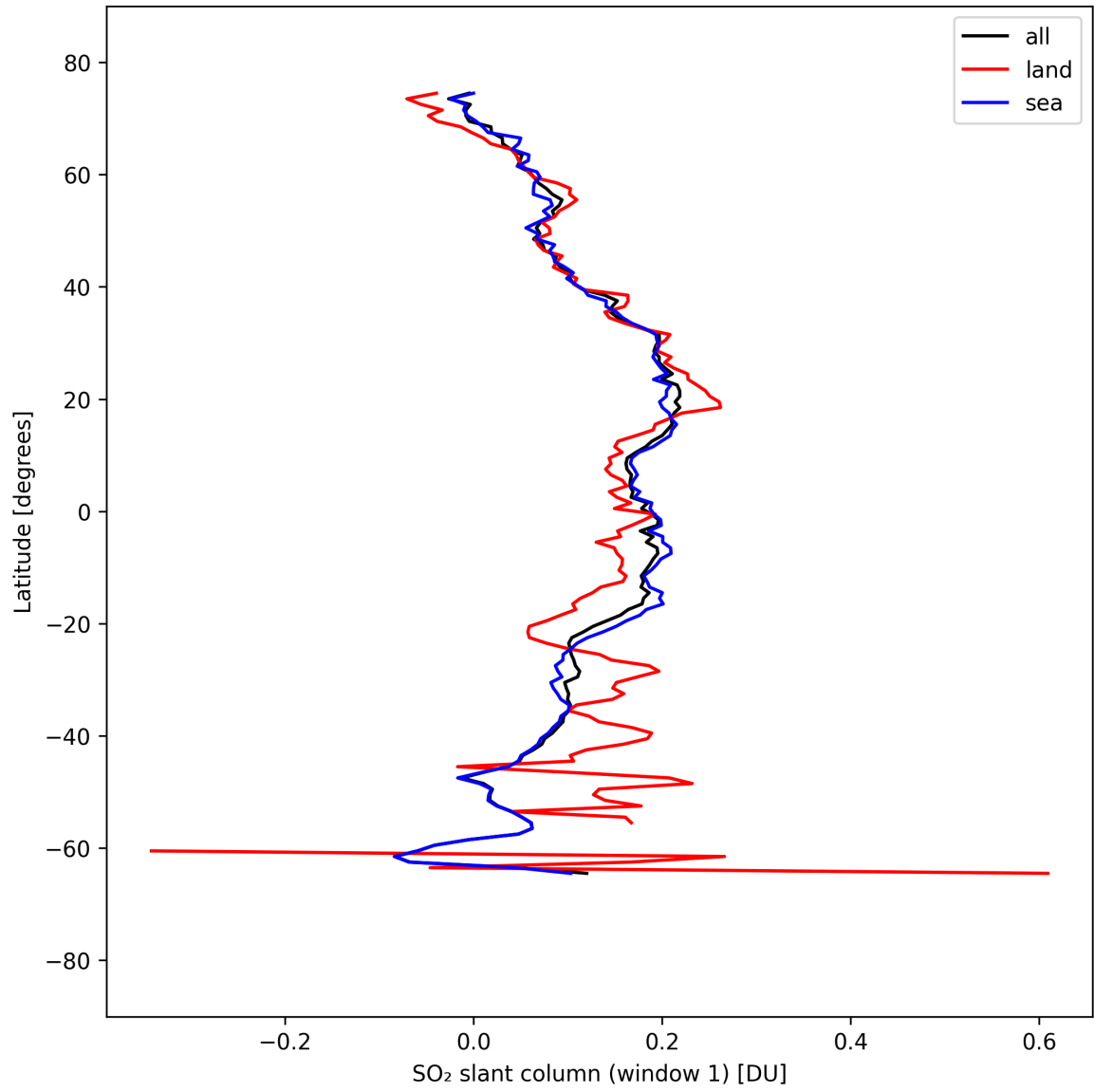


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-09-10 to 2025-09-11.

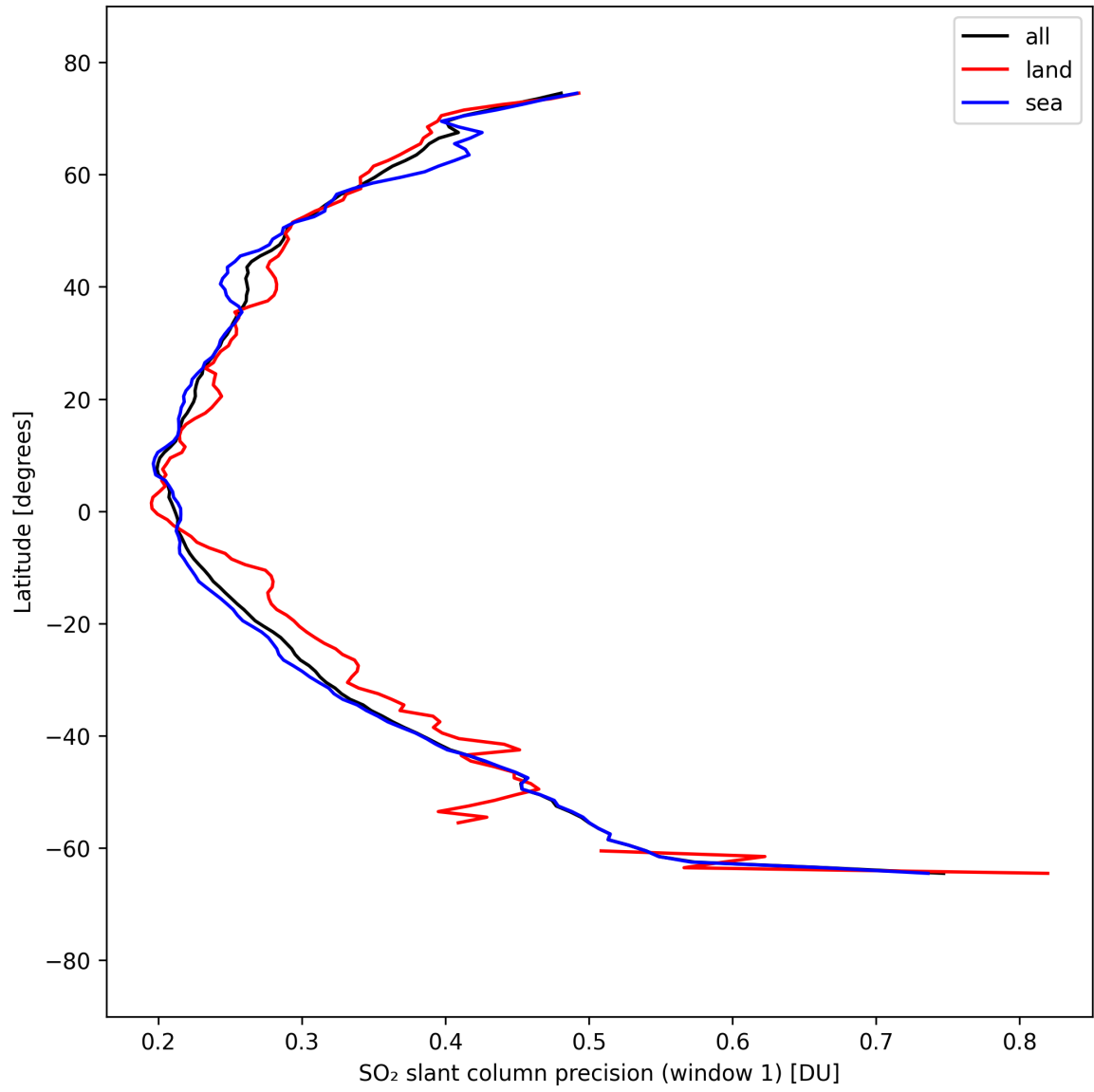


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-09-10 to 2025-09-11.

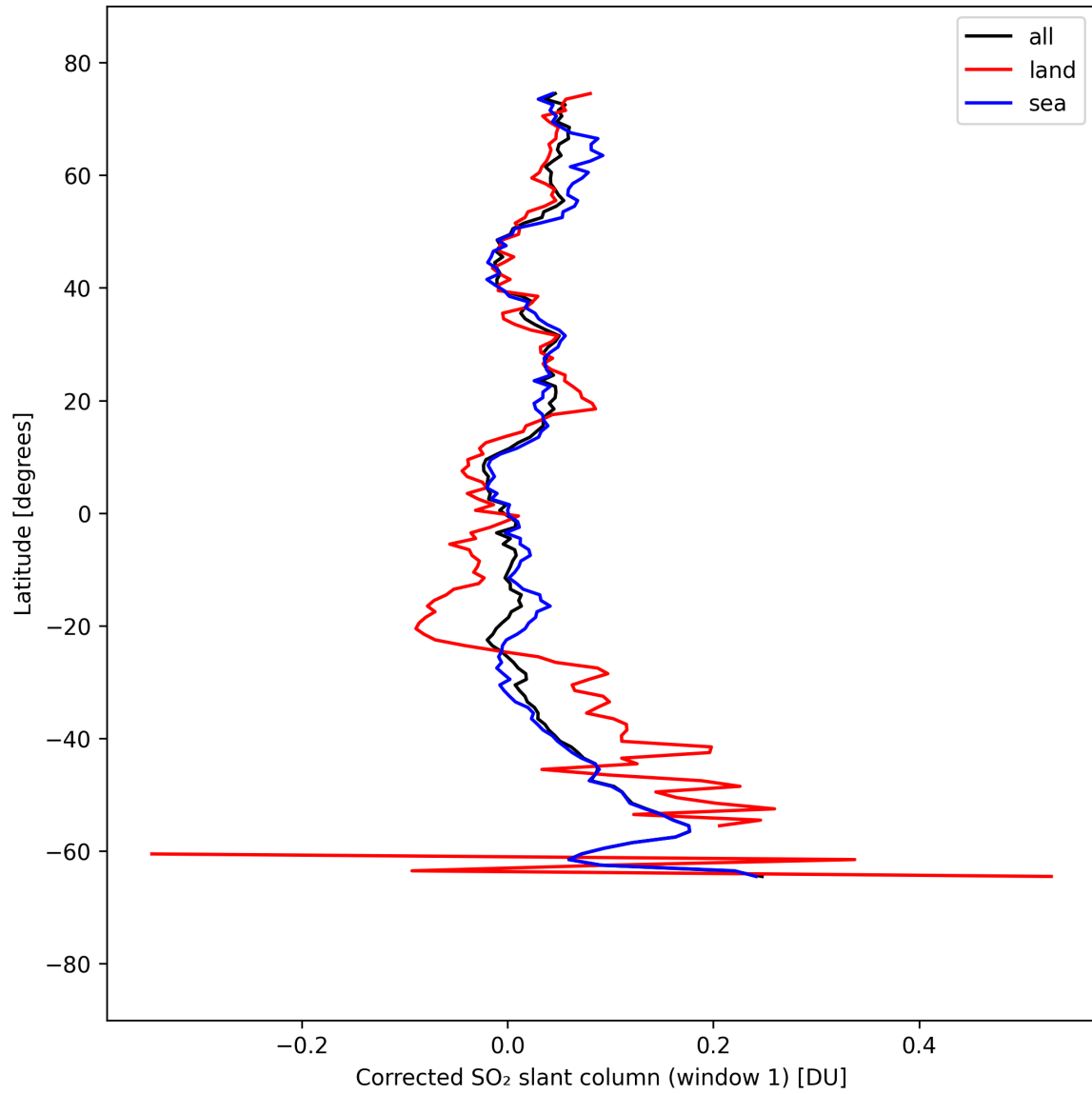


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-09-10 to 2025-09-11.

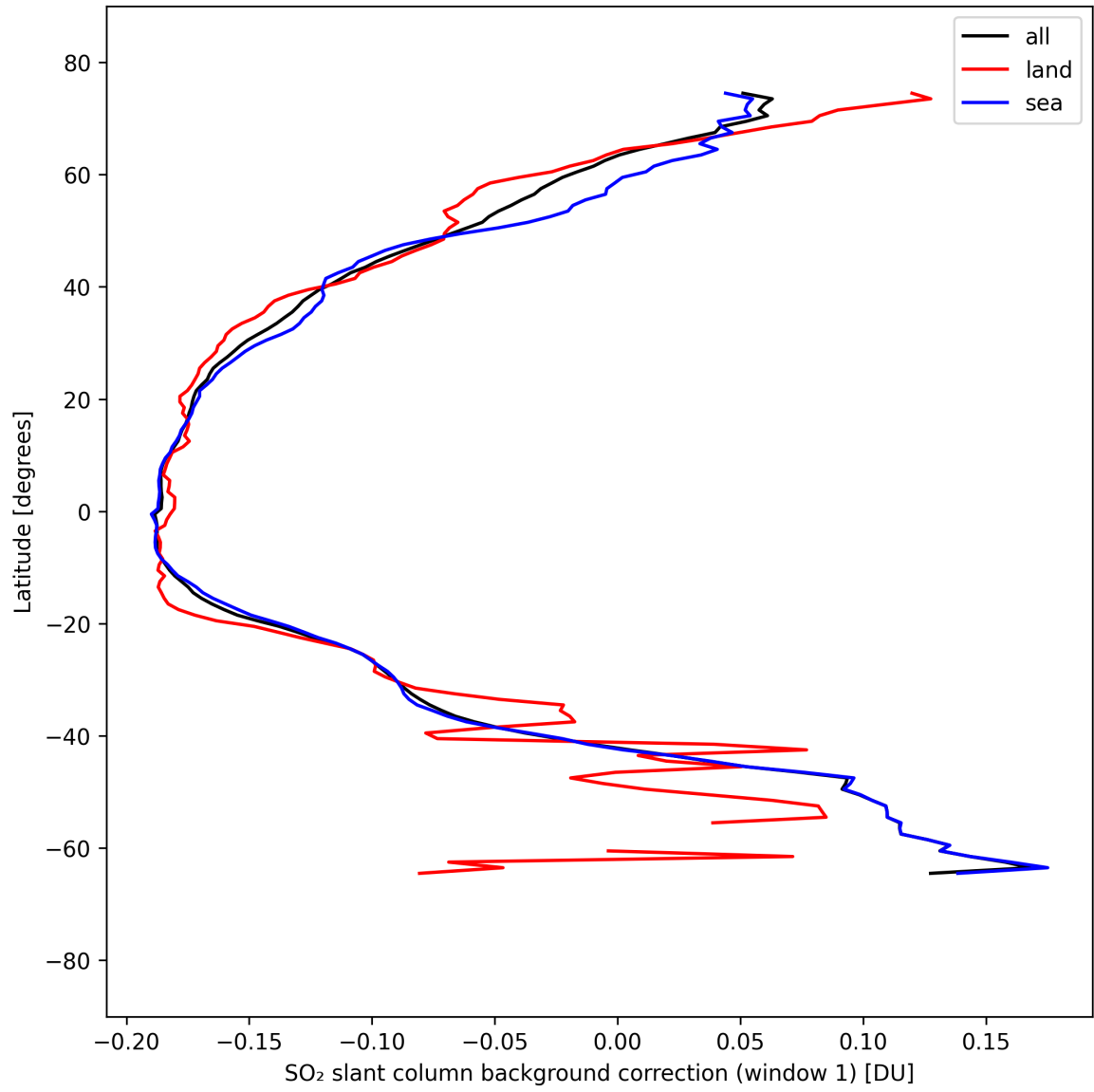


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-09-10 to 2025-09-11.

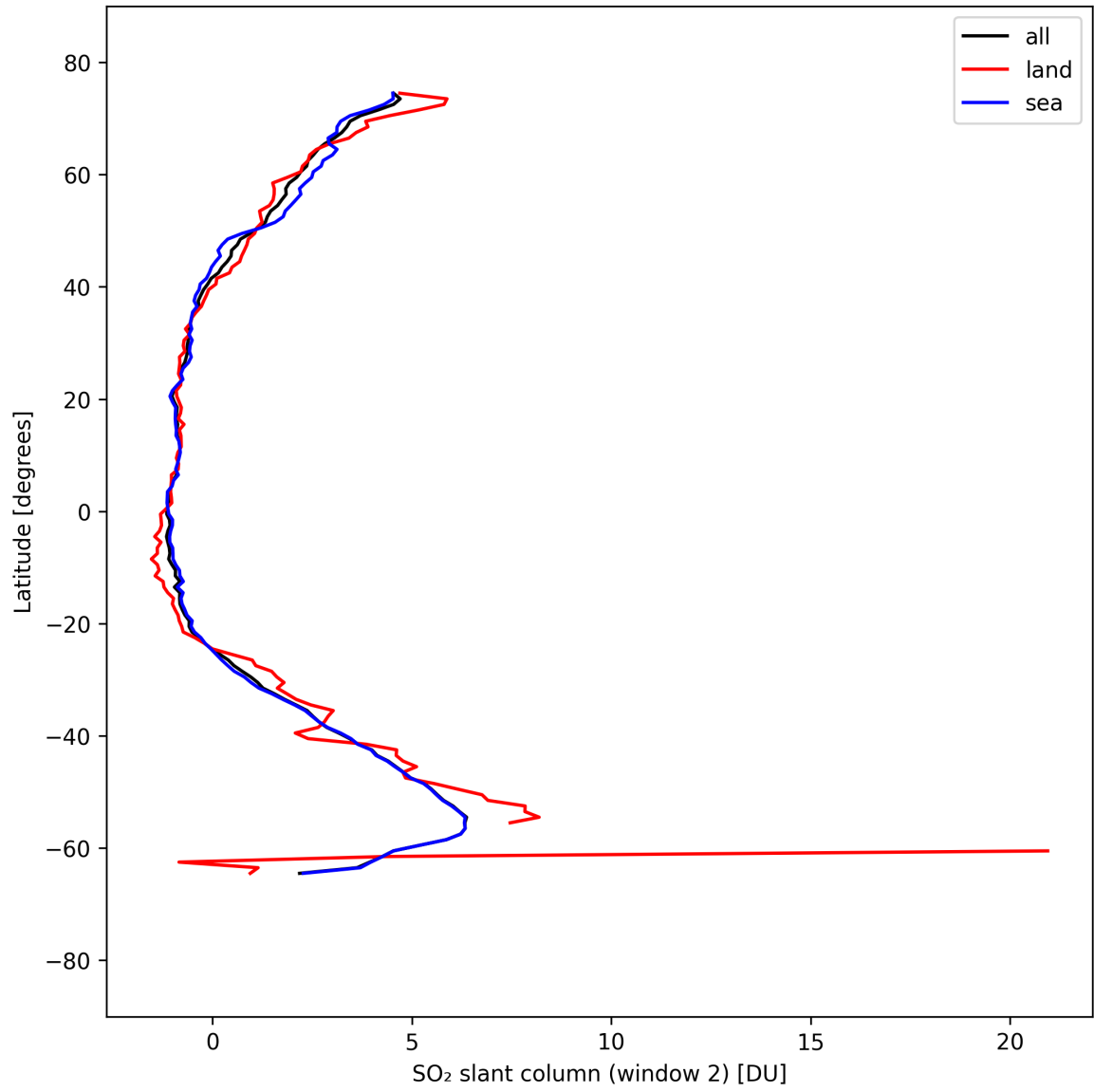


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-09-10 to 2025-09-11.

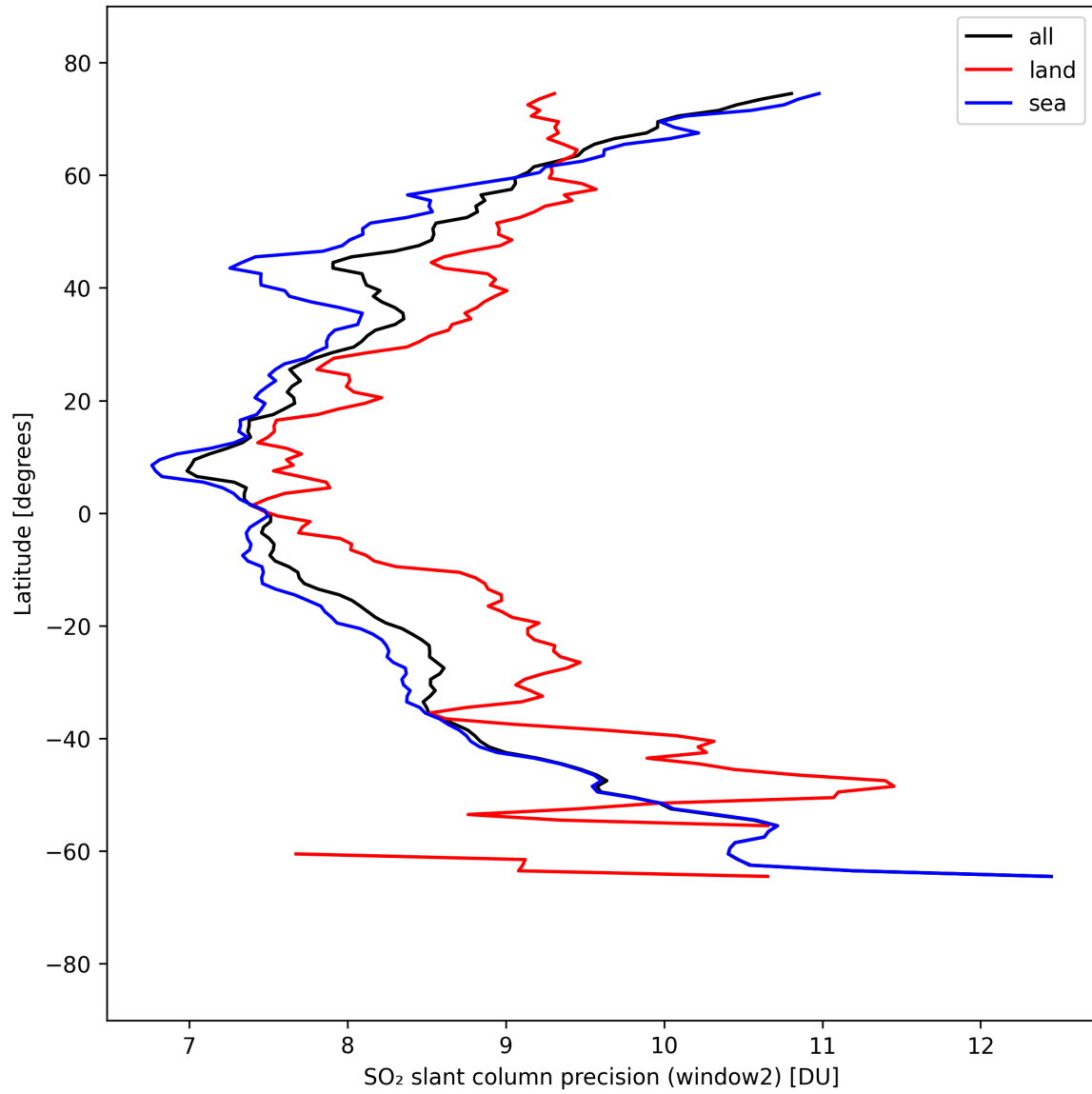


Figure 41: Zonal average of "SO₂ slant column precision (window2)" for 2025-09-10 to 2025-09-11.

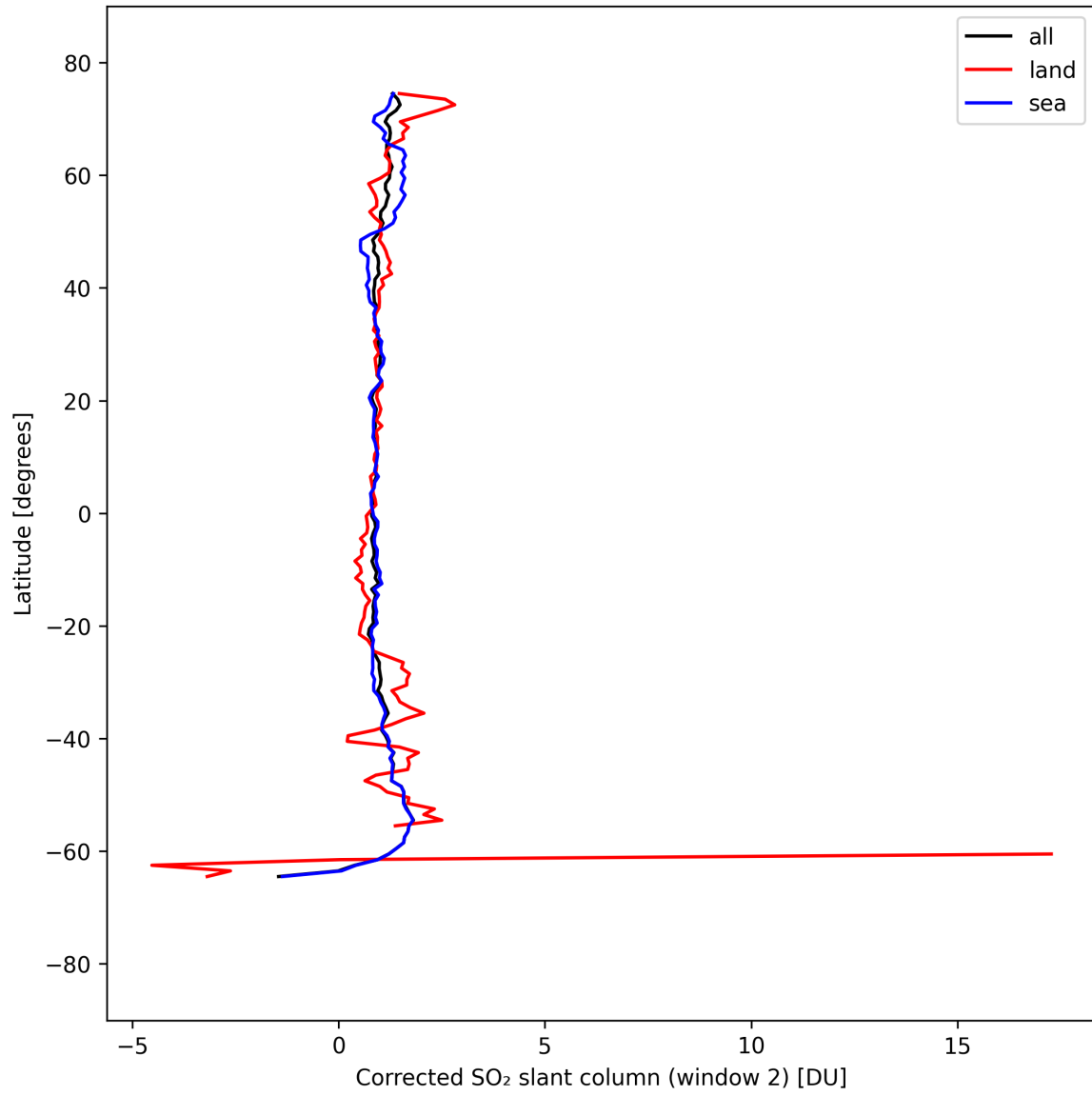


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-09-10 to 2025-09-11.

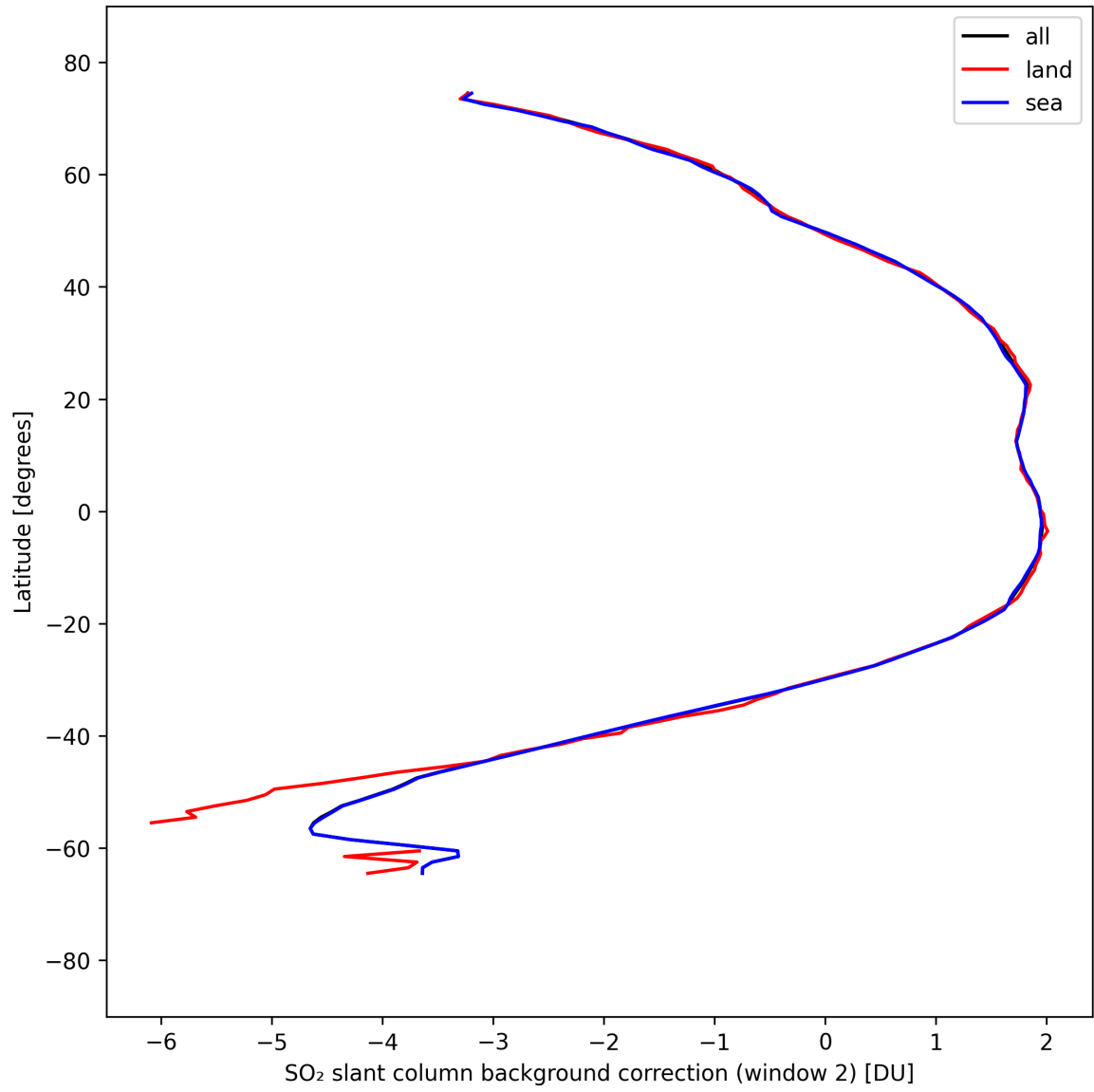


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-09-10 to 2025-09-11.

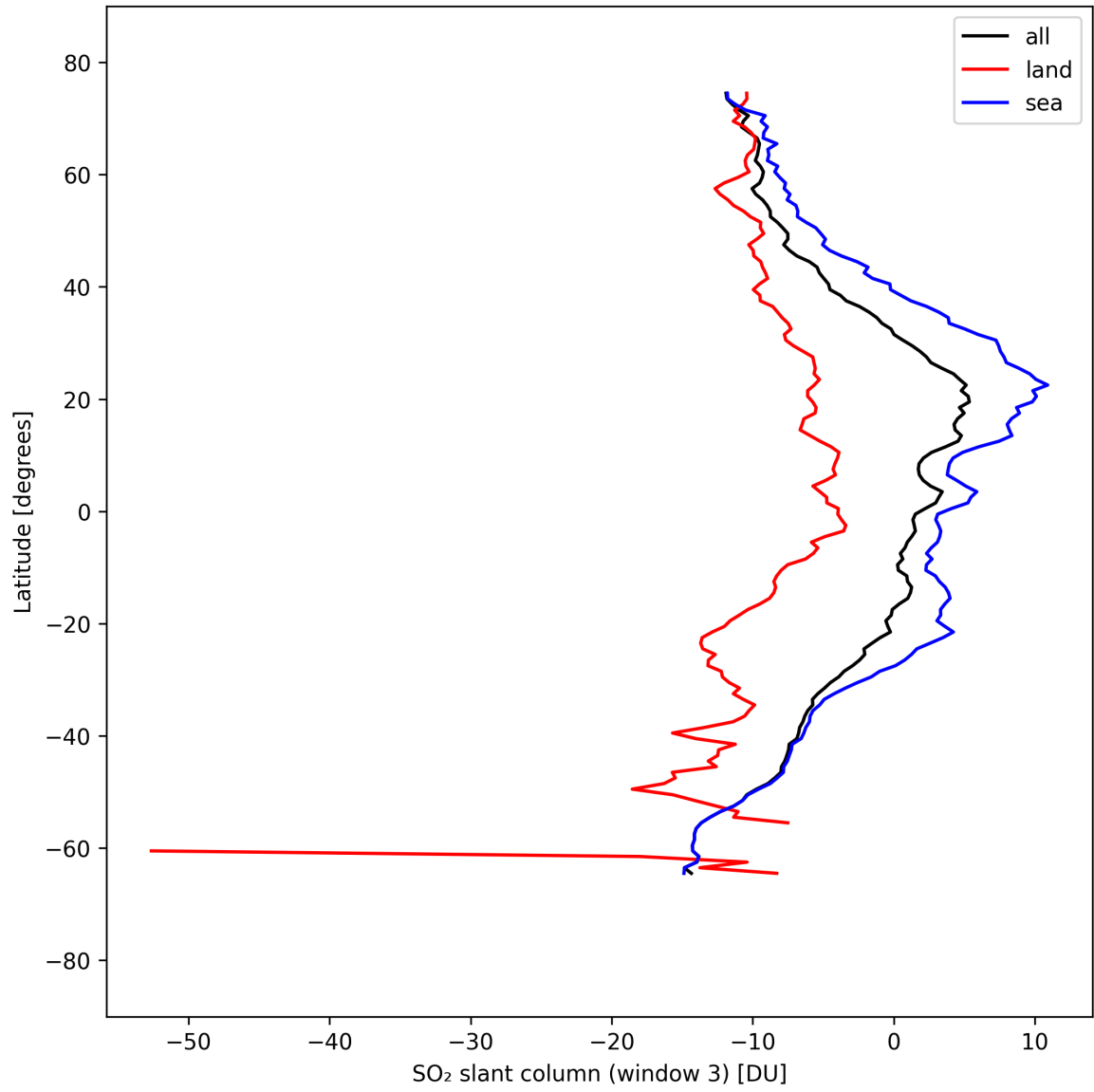


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-09-10 to 2025-09-11.

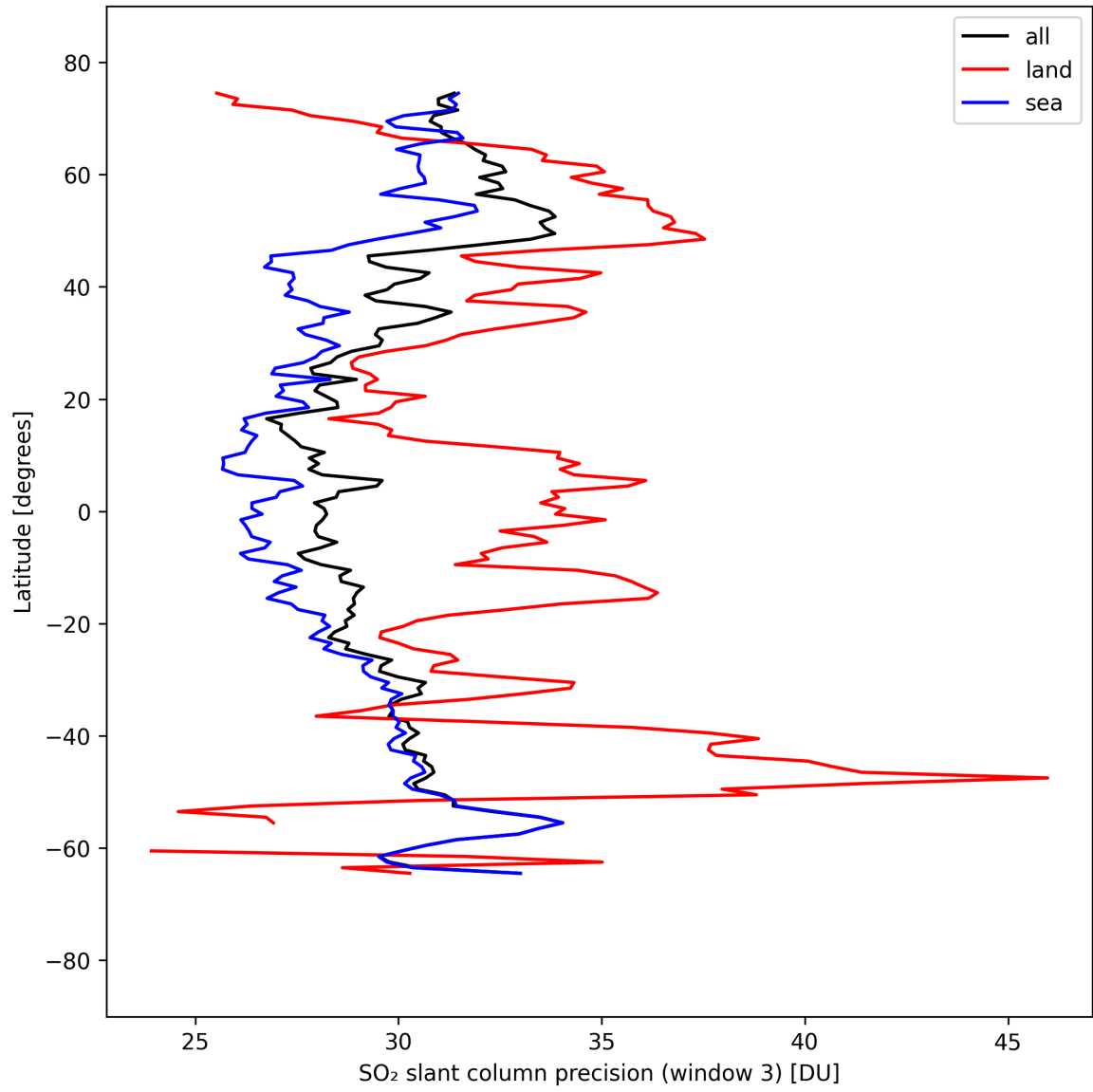


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-09-10 to 2025-09-11.

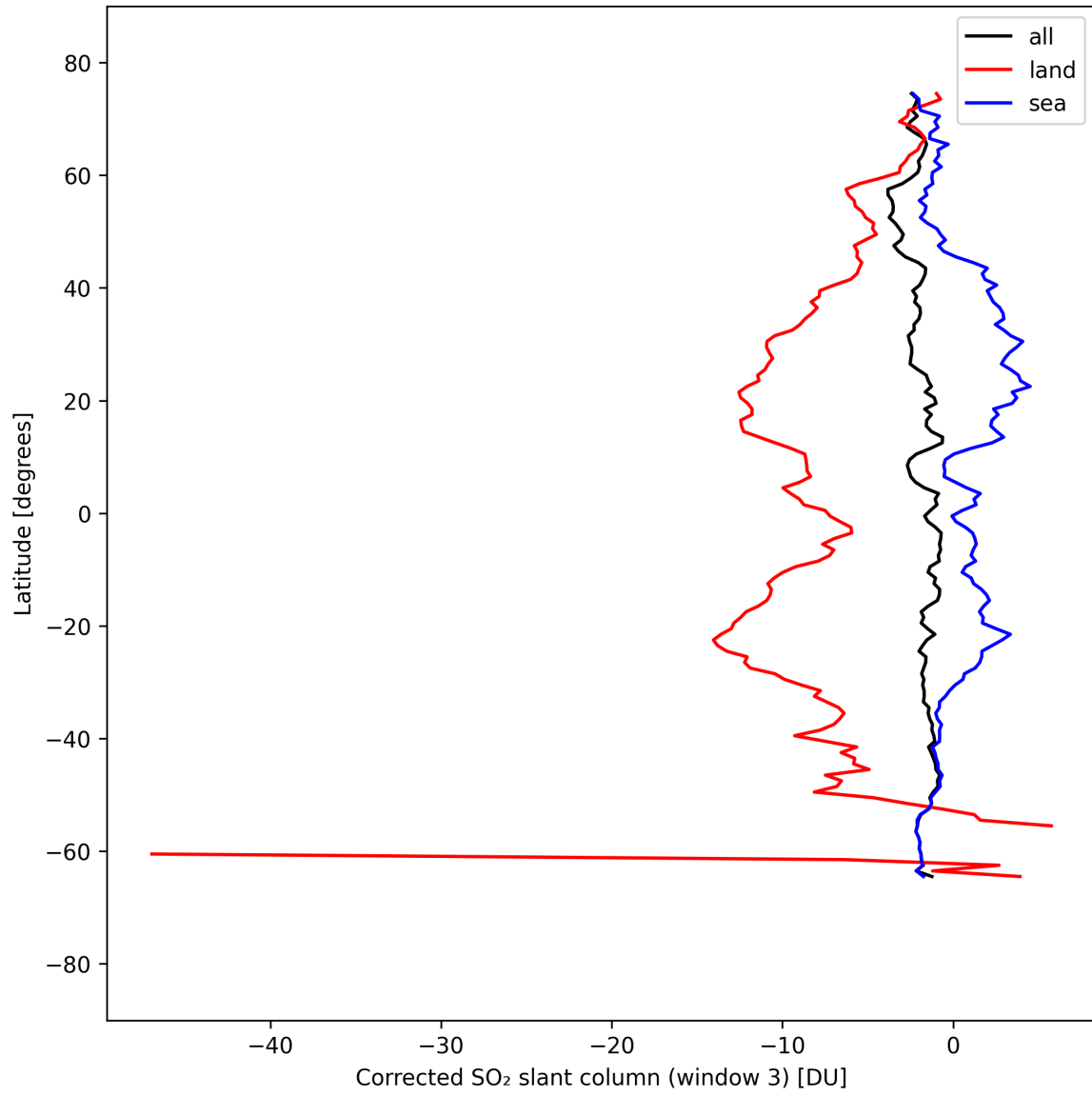


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-09-10 to 2025-09-11.

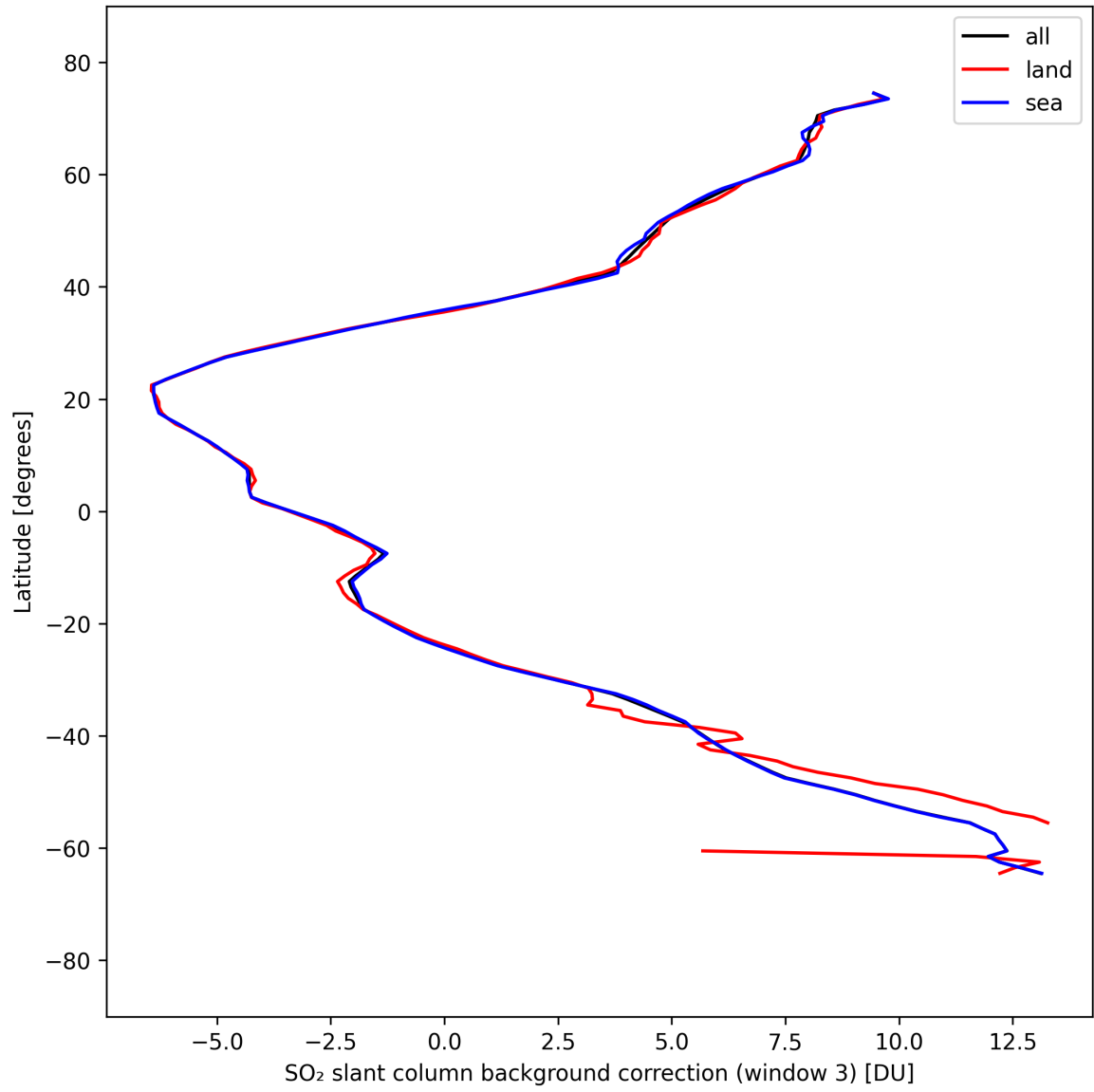


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-09-10 to 2025-09-11.

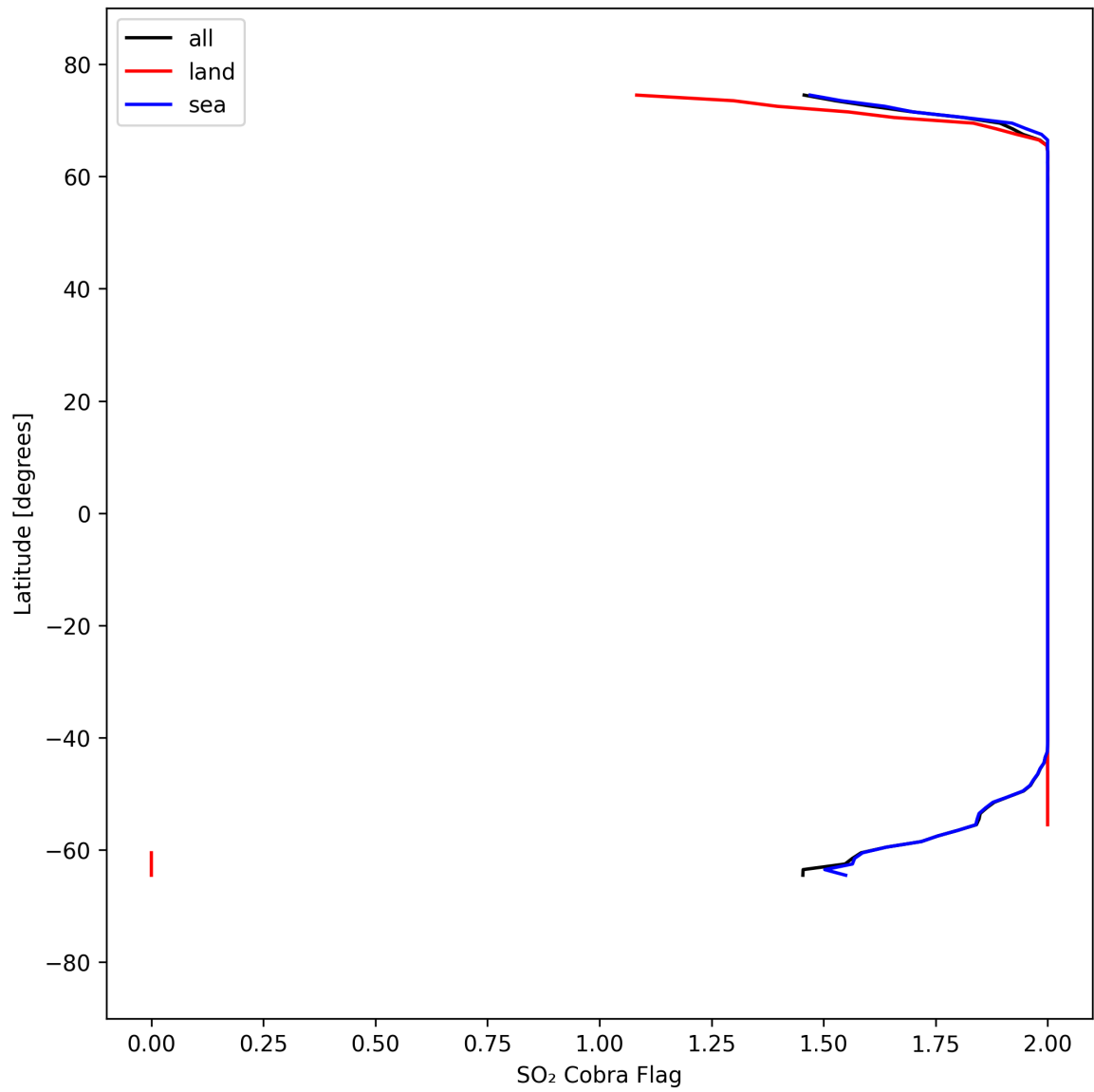


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-09-10 to 2025-09-11.

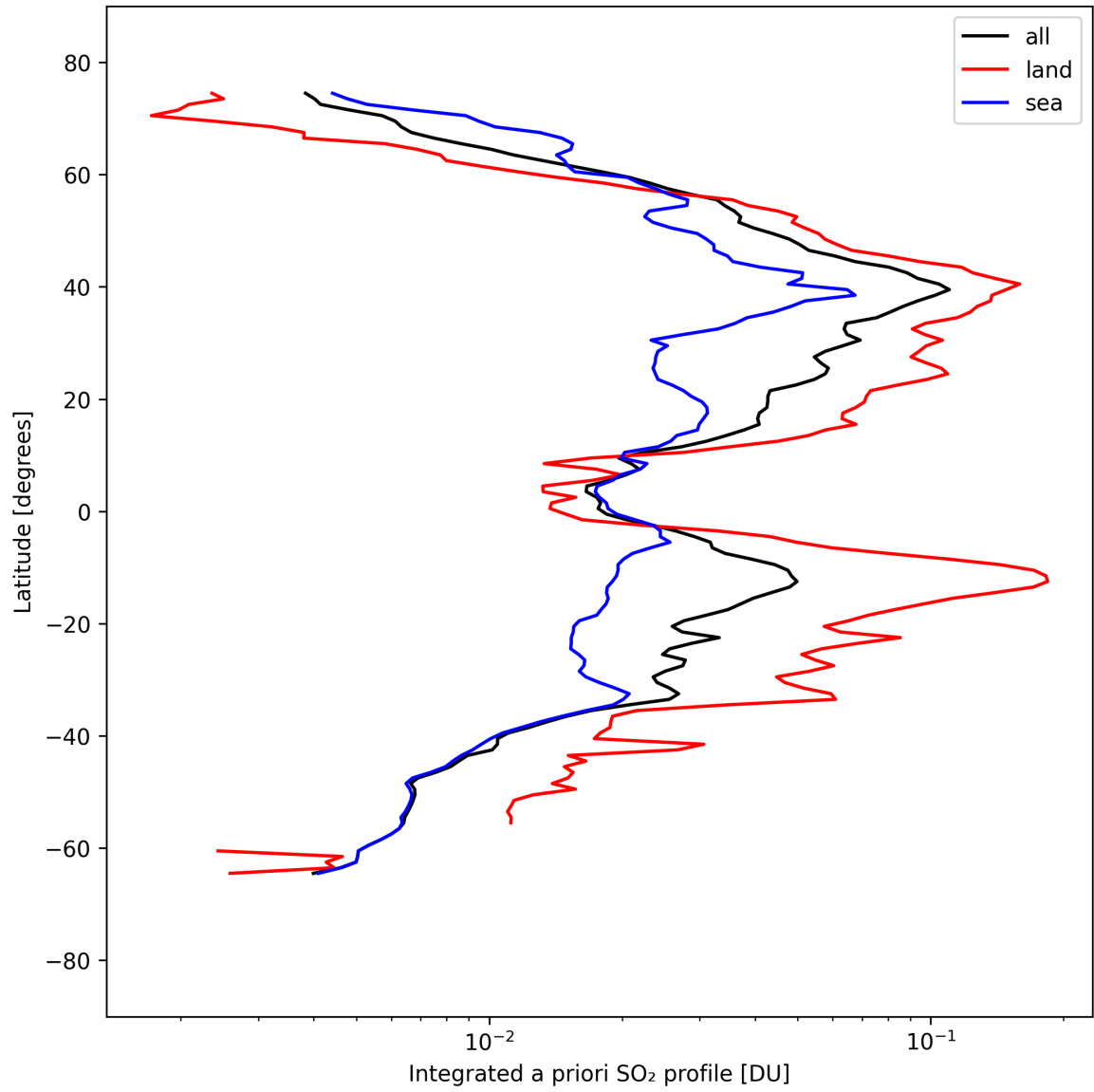


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-09-10 to 2025-09-11.

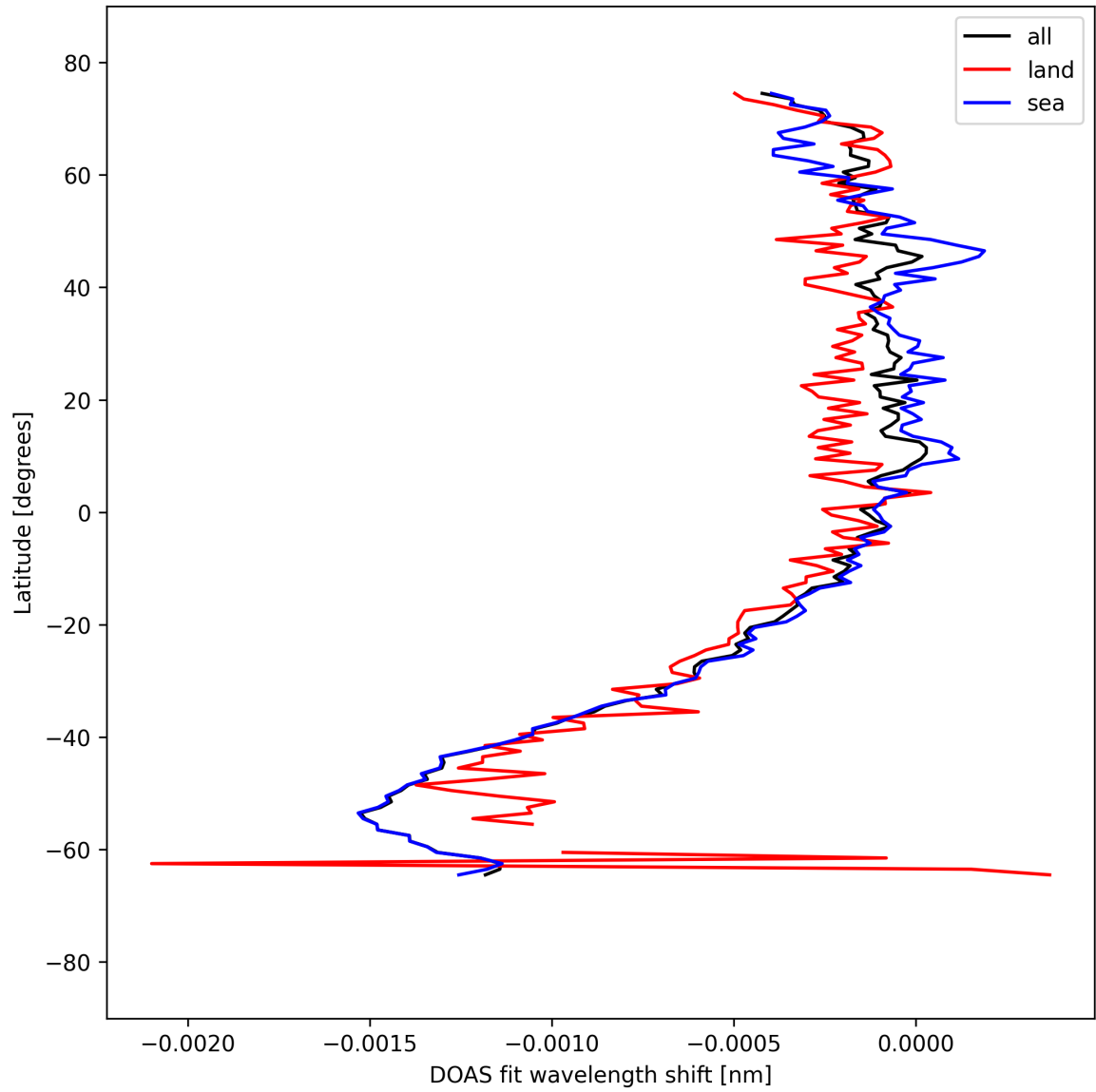


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2025-09-10 to 2025-09-11.

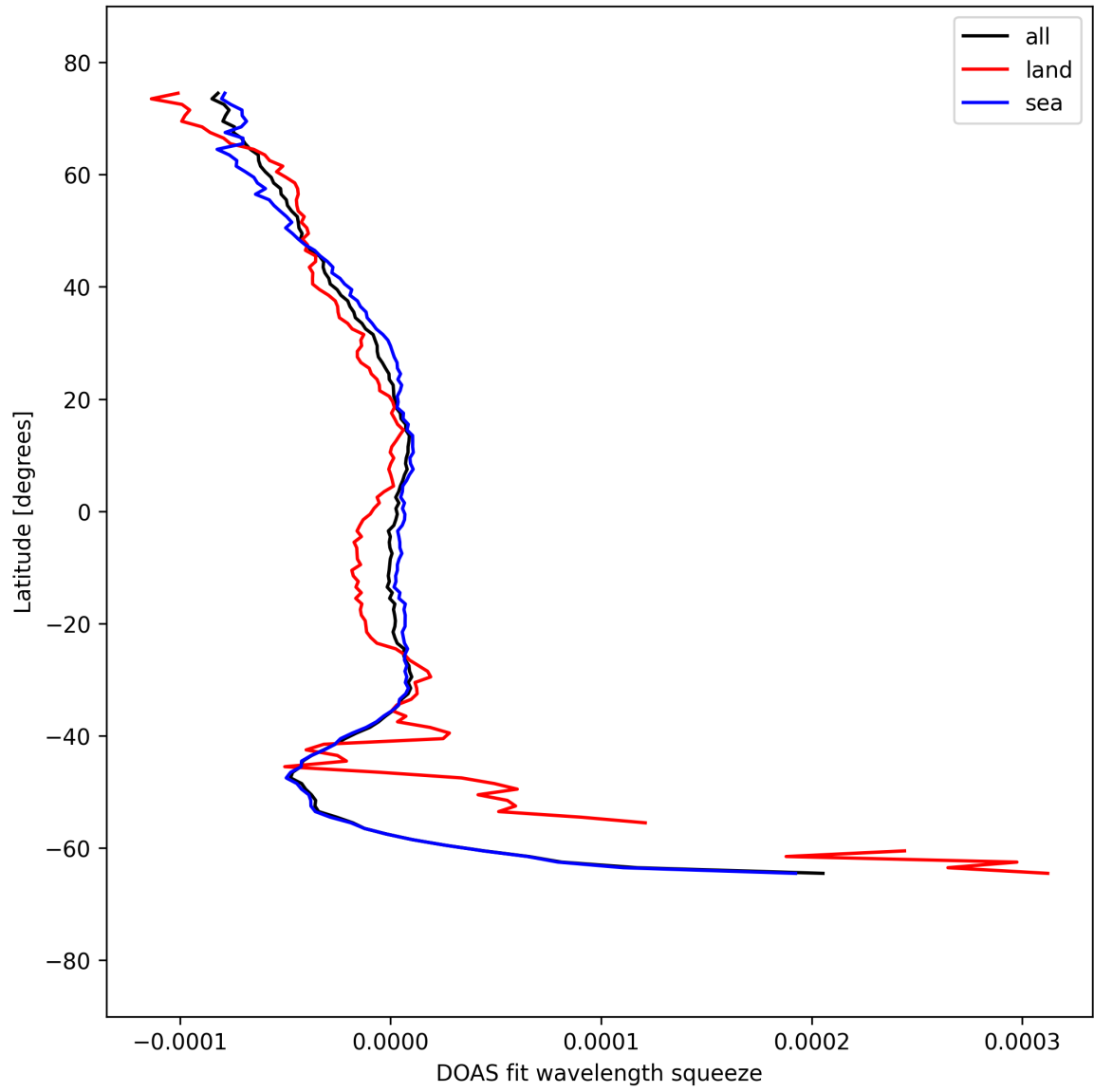


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-09-10 to 2025-09-11.

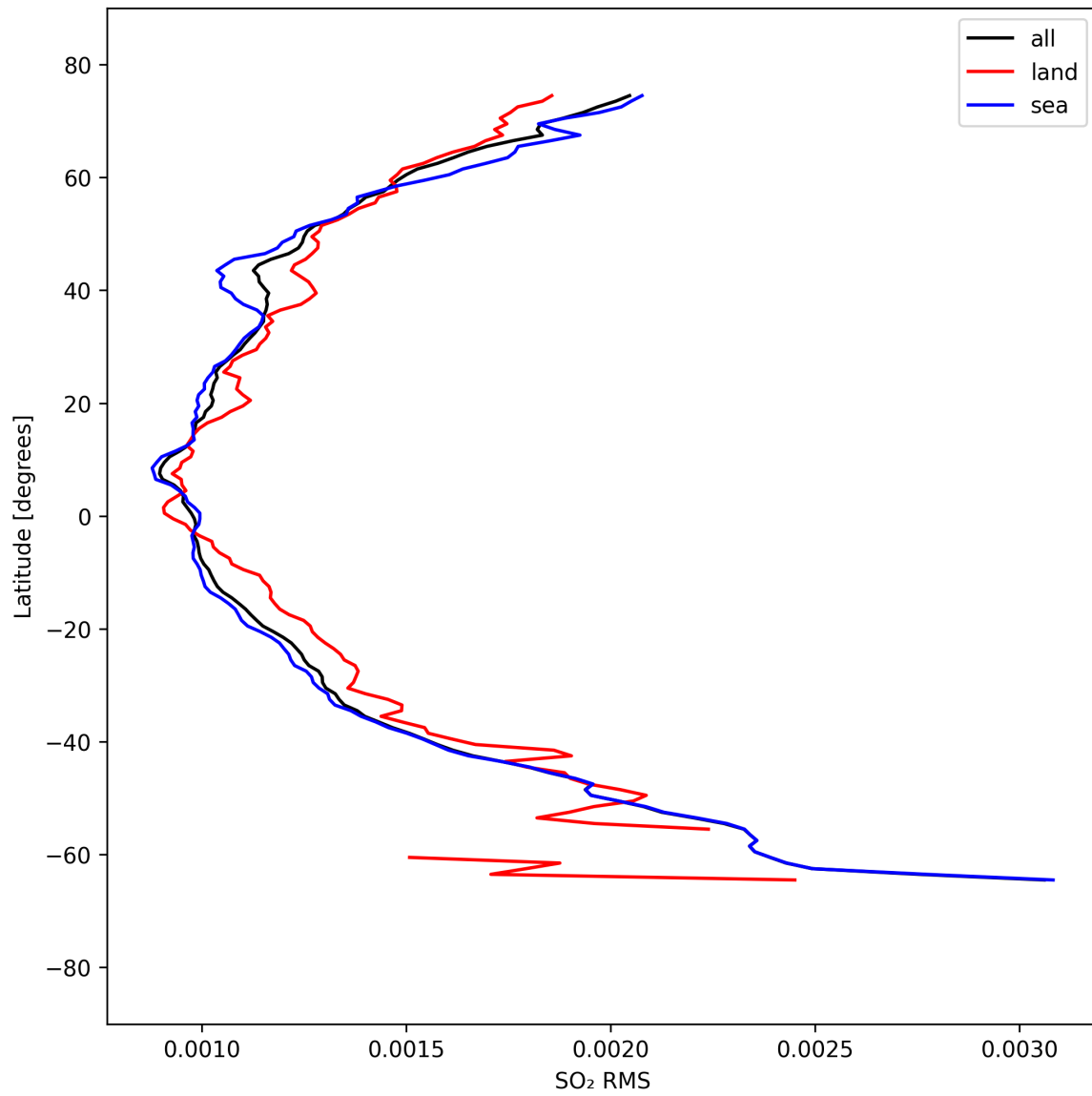


Figure 52: Zonal average of “SO₂ RMS” for 2025-09-10 to 2025-09-11.

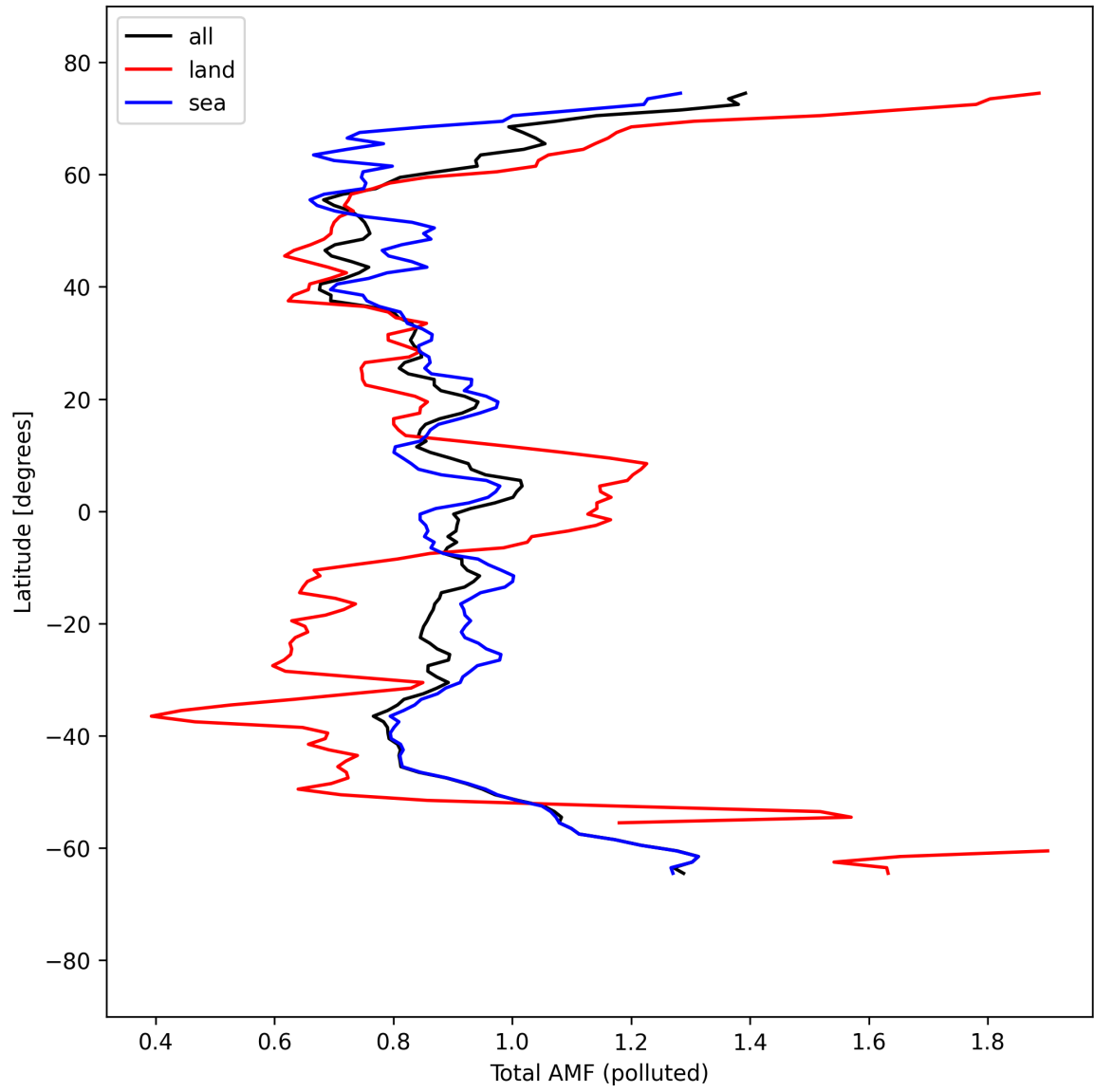


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-09-10 to 2025-09-11.

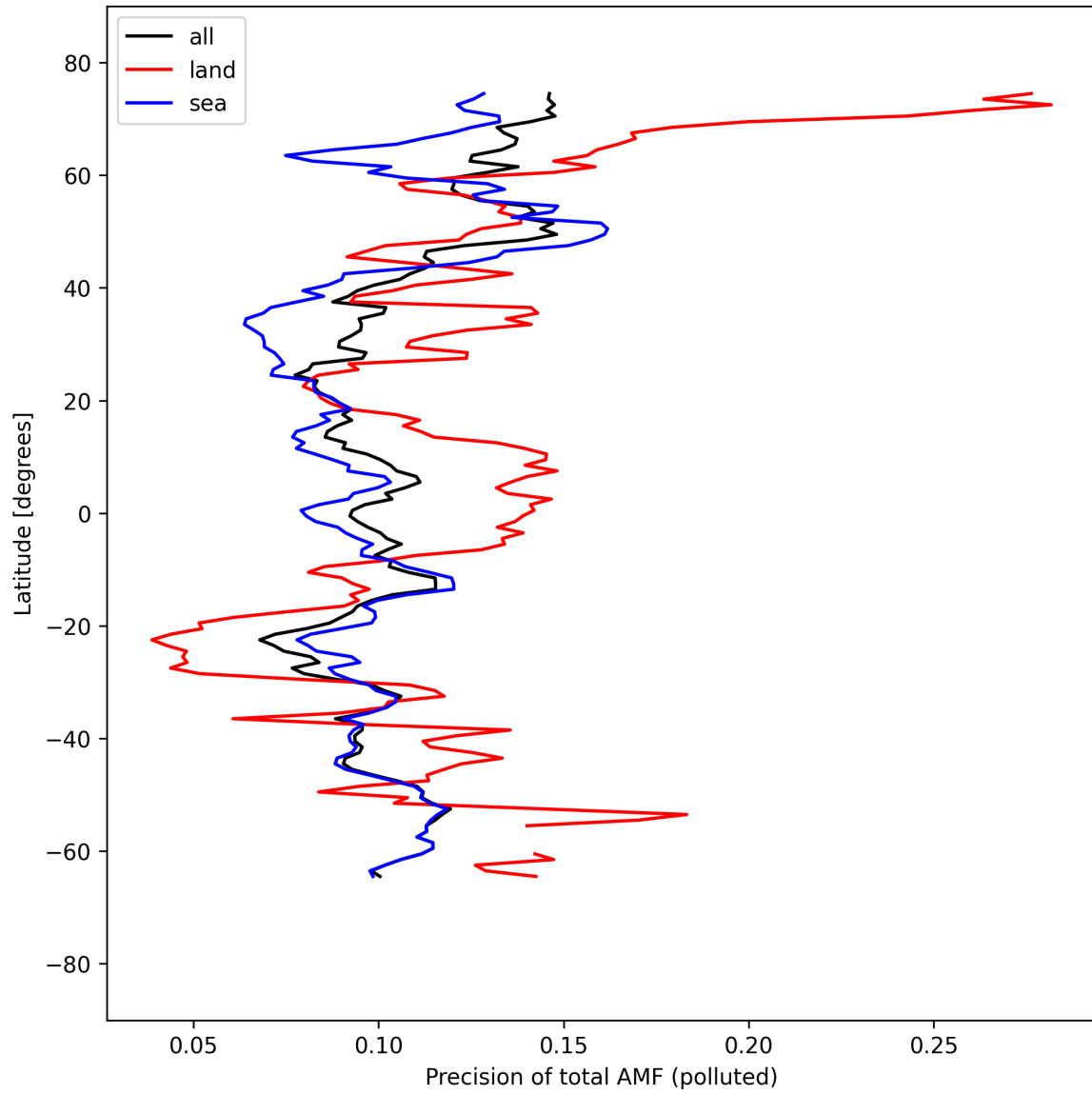


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-09-10 to 2025-09-11.

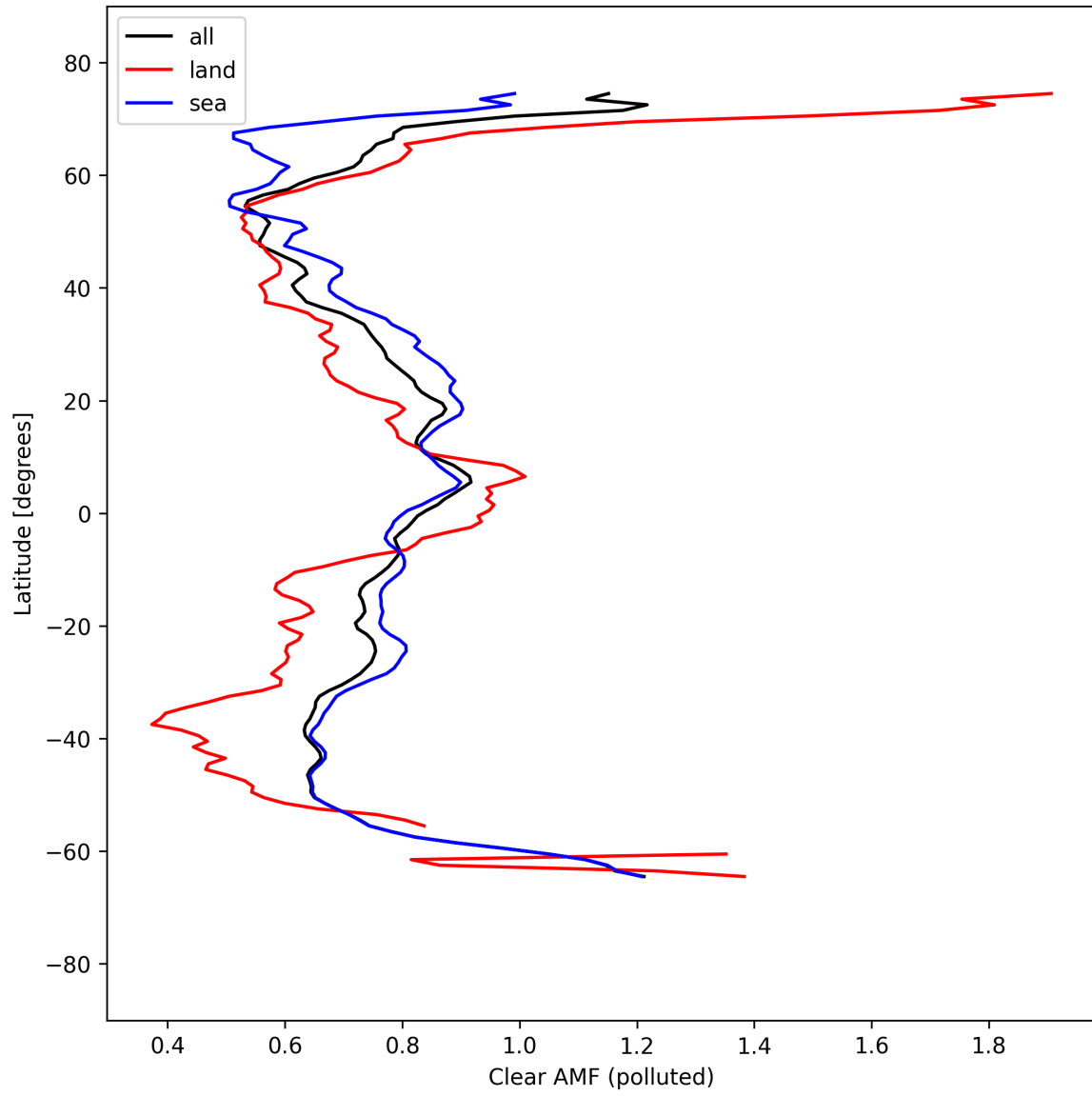


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-09-10 to 2025-09-11.

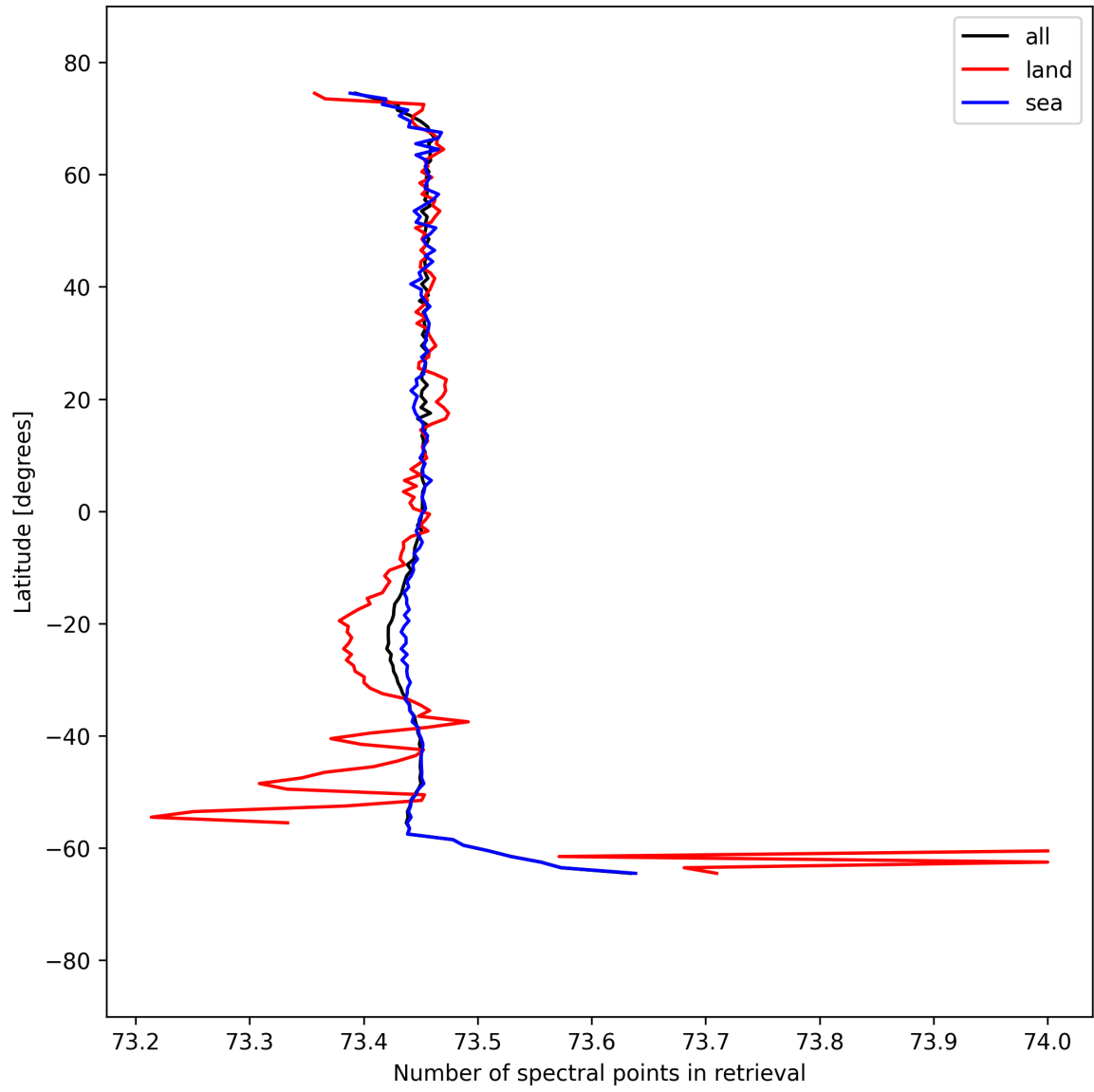


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-09-10 to 2025-09-11.

8 Histograms

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

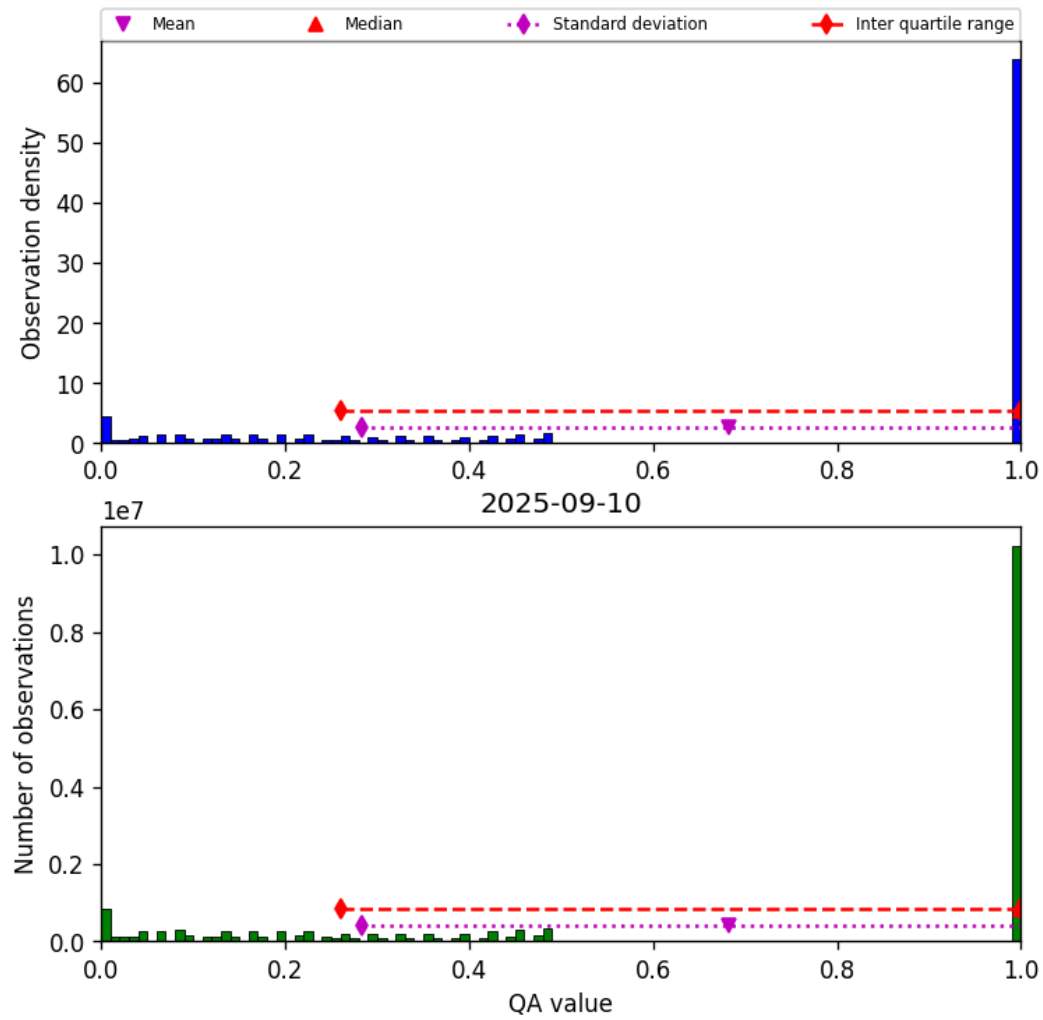


Figure 57: Histogram of “QA value” for 2025-09-10 to 2025-09-11

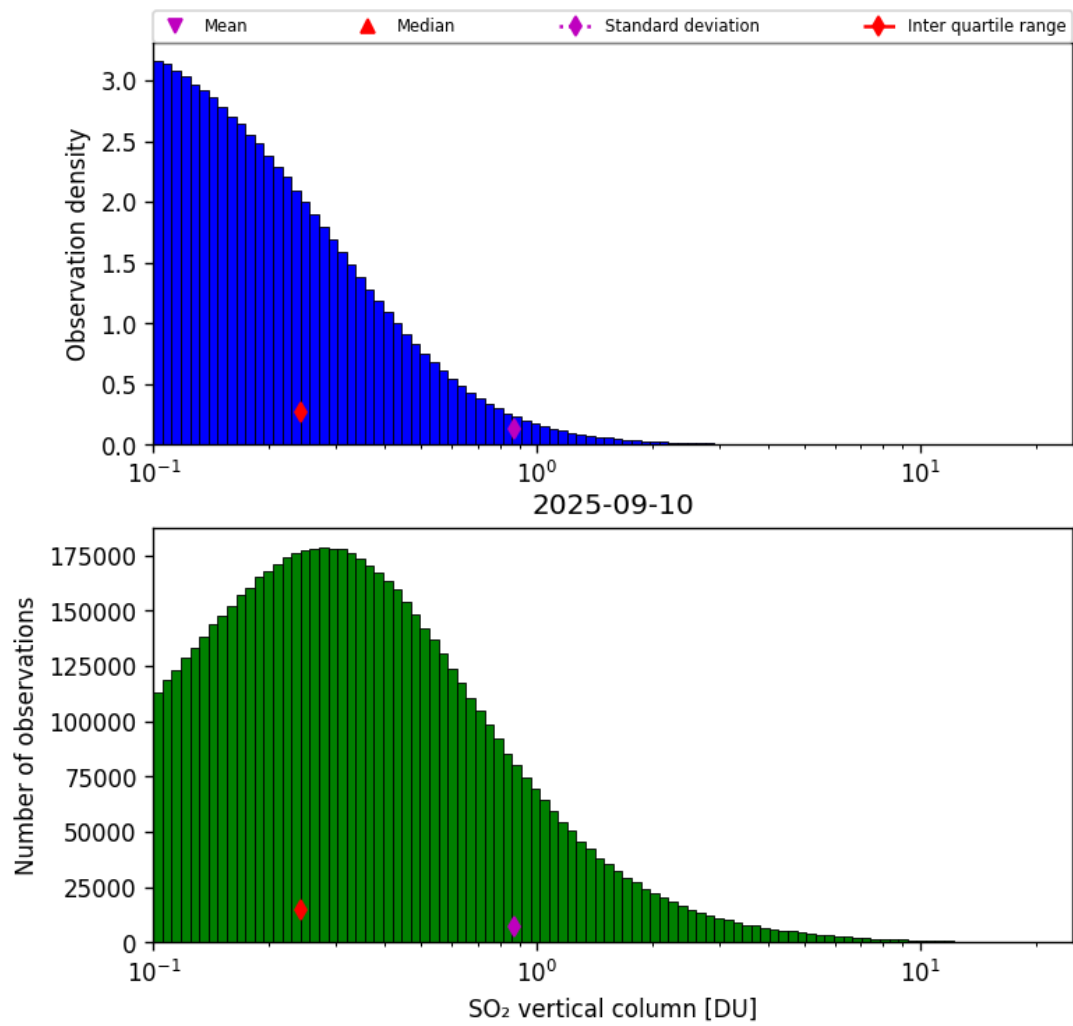


Figure 58: Histogram of “SO₂ vertical column” for 2025-09-10 to 2025-09-11

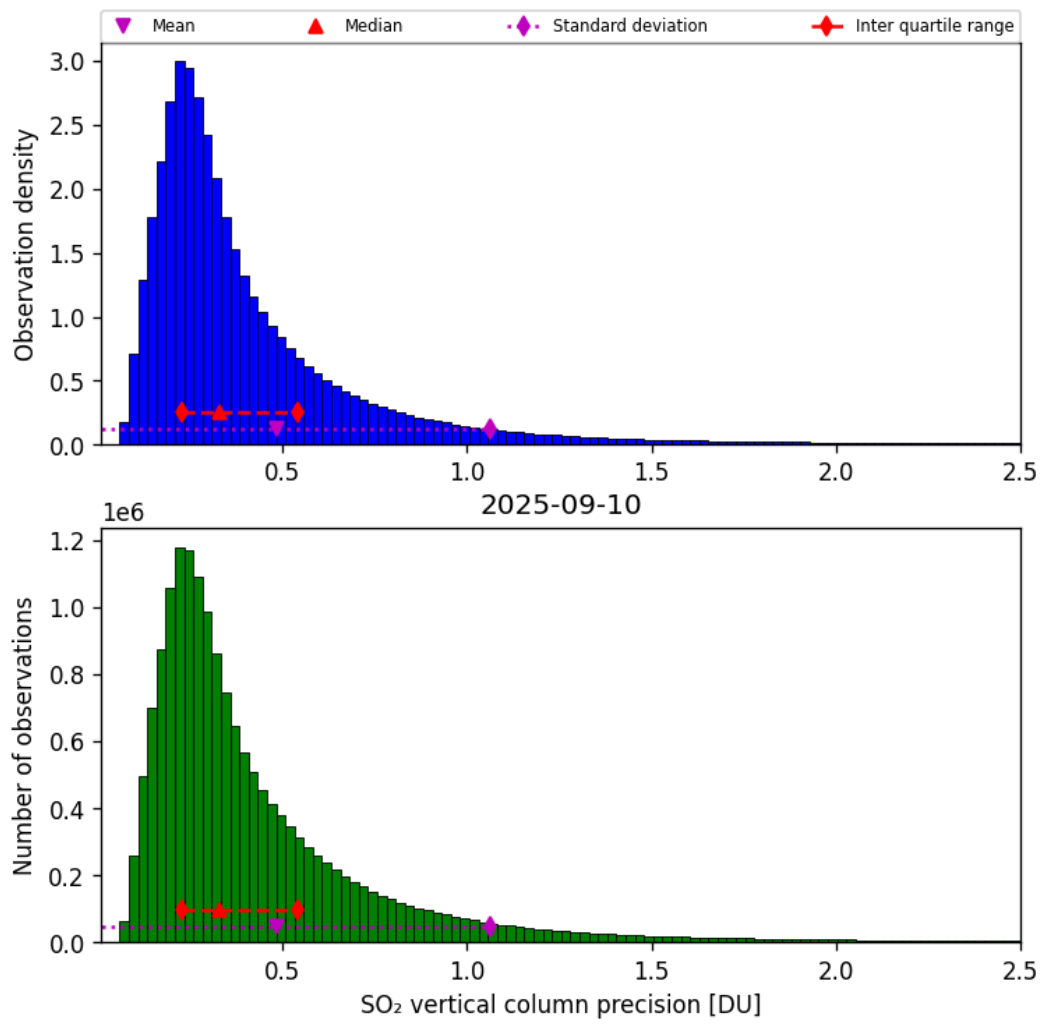


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-09-10 to 2025-09-11

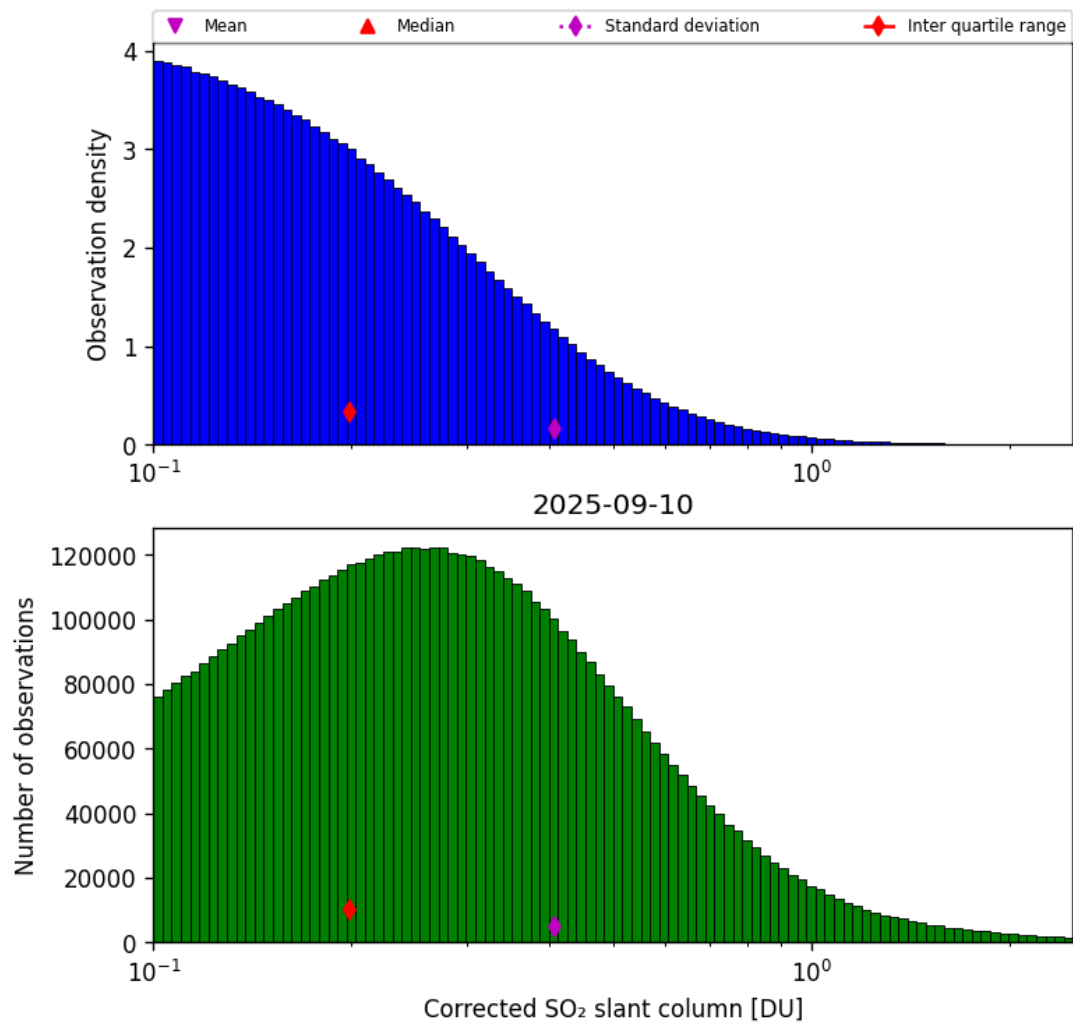


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-09-10 to 2025-09-11

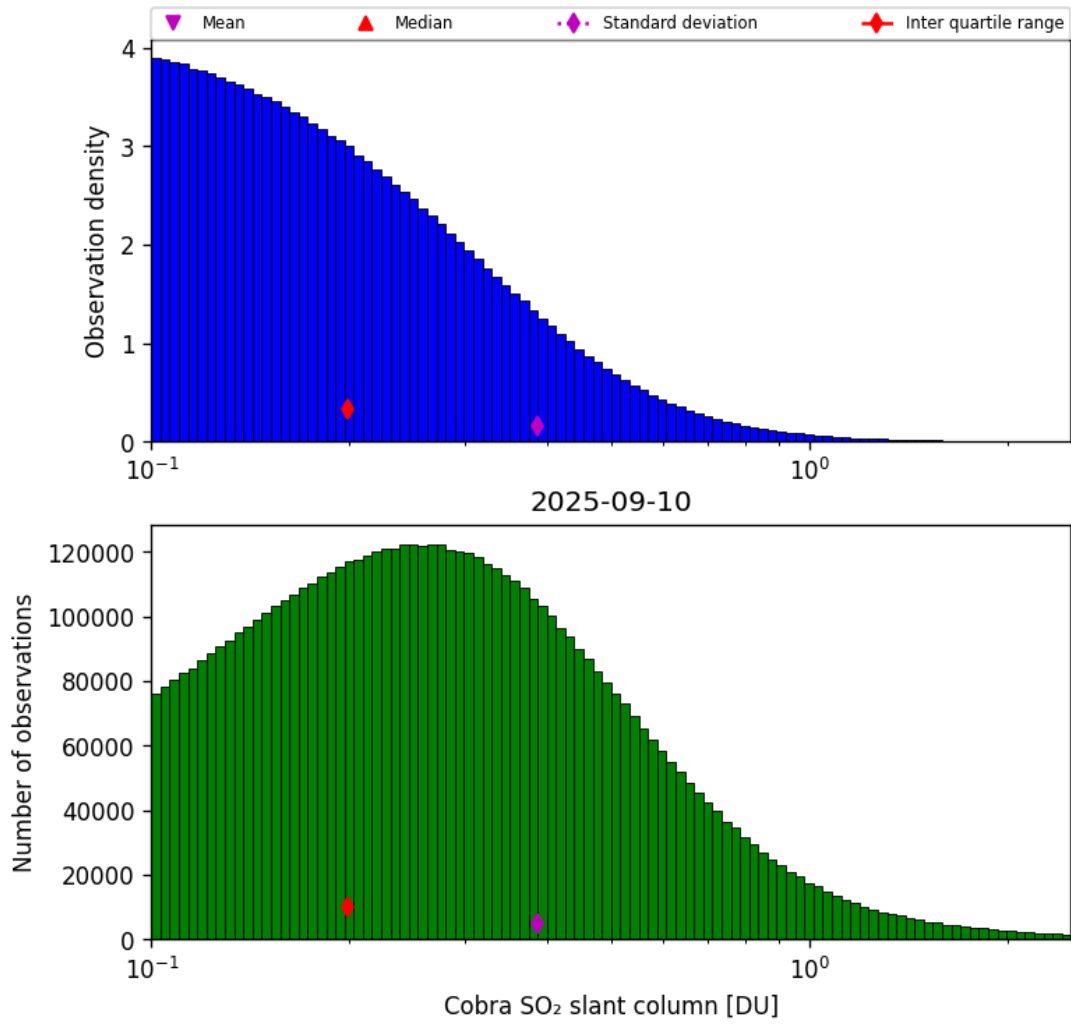


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-09-10 to 2025-09-11

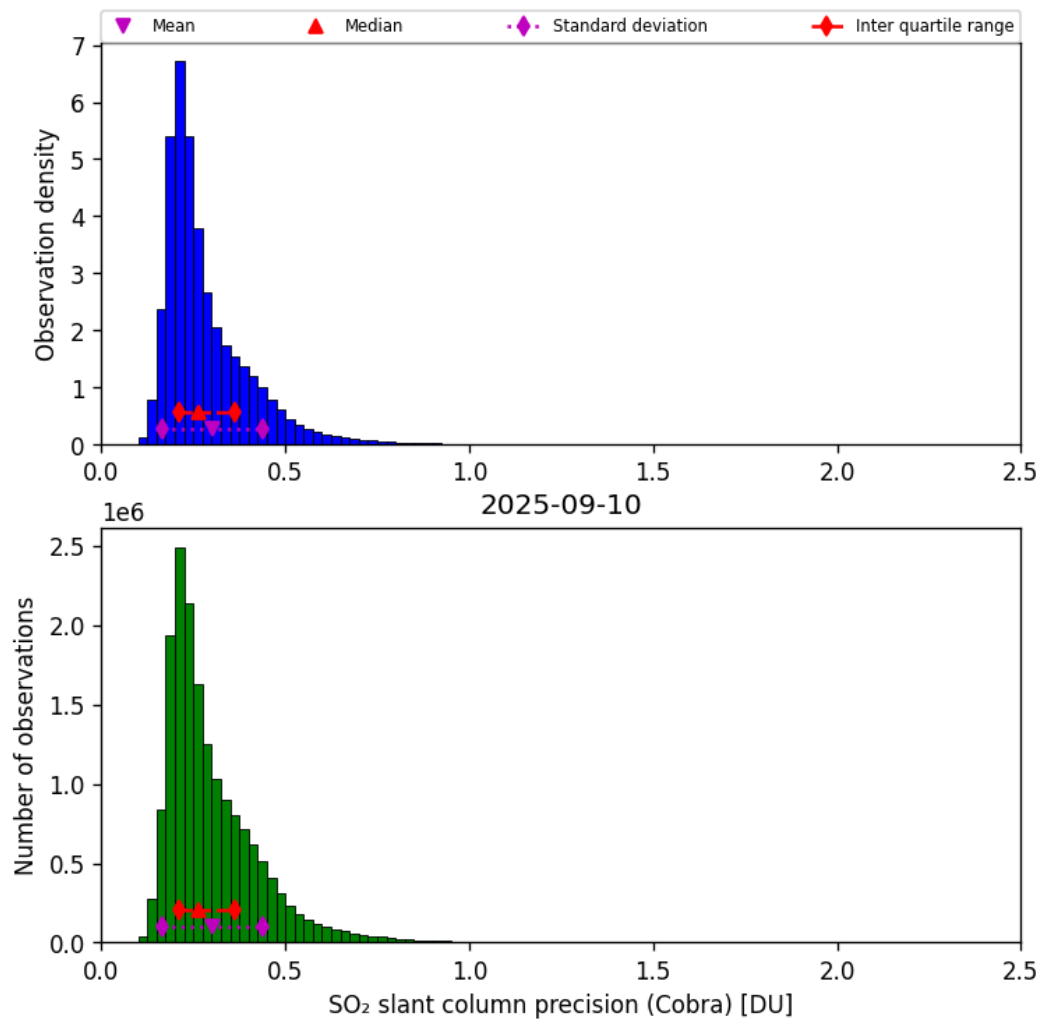


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-09-10 to 2025-09-11

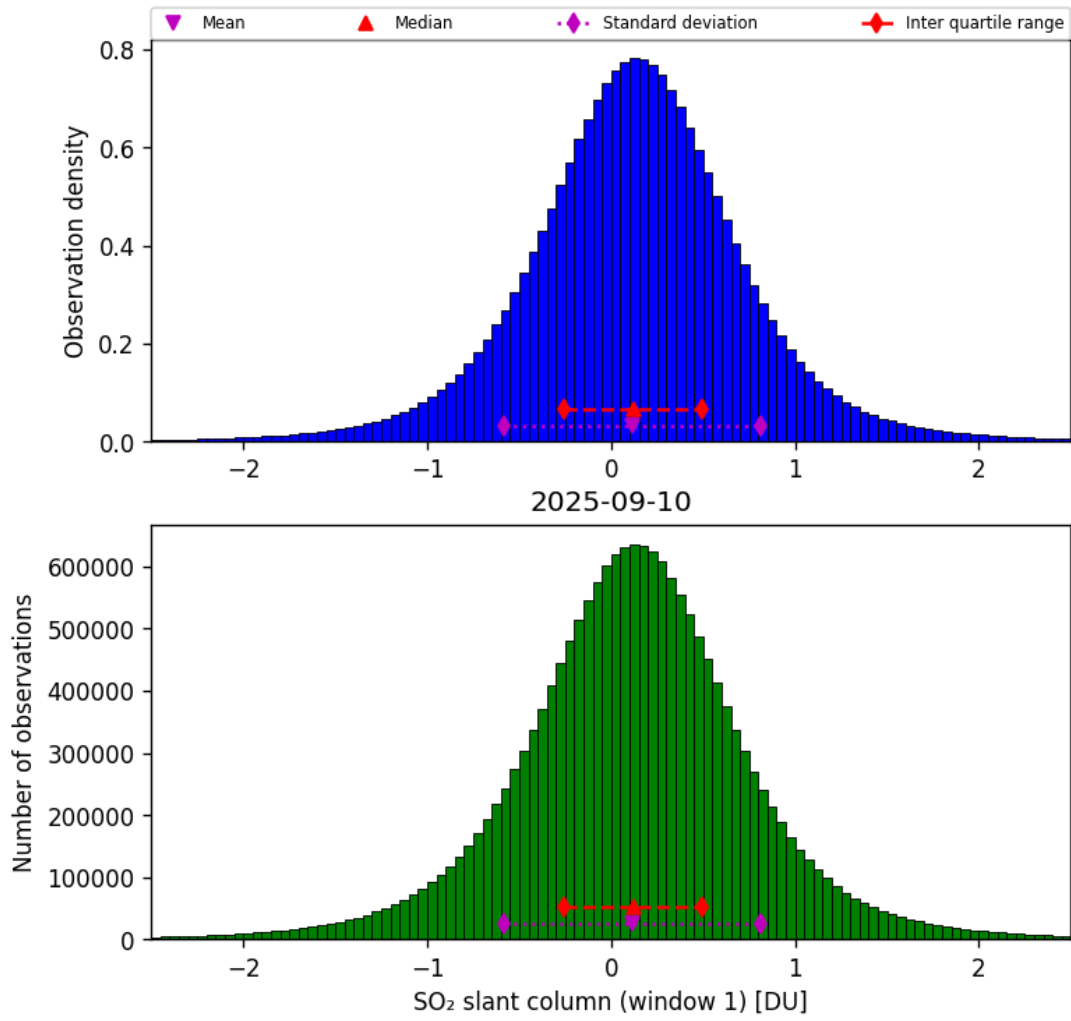


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-09-10 to 2025-09-11

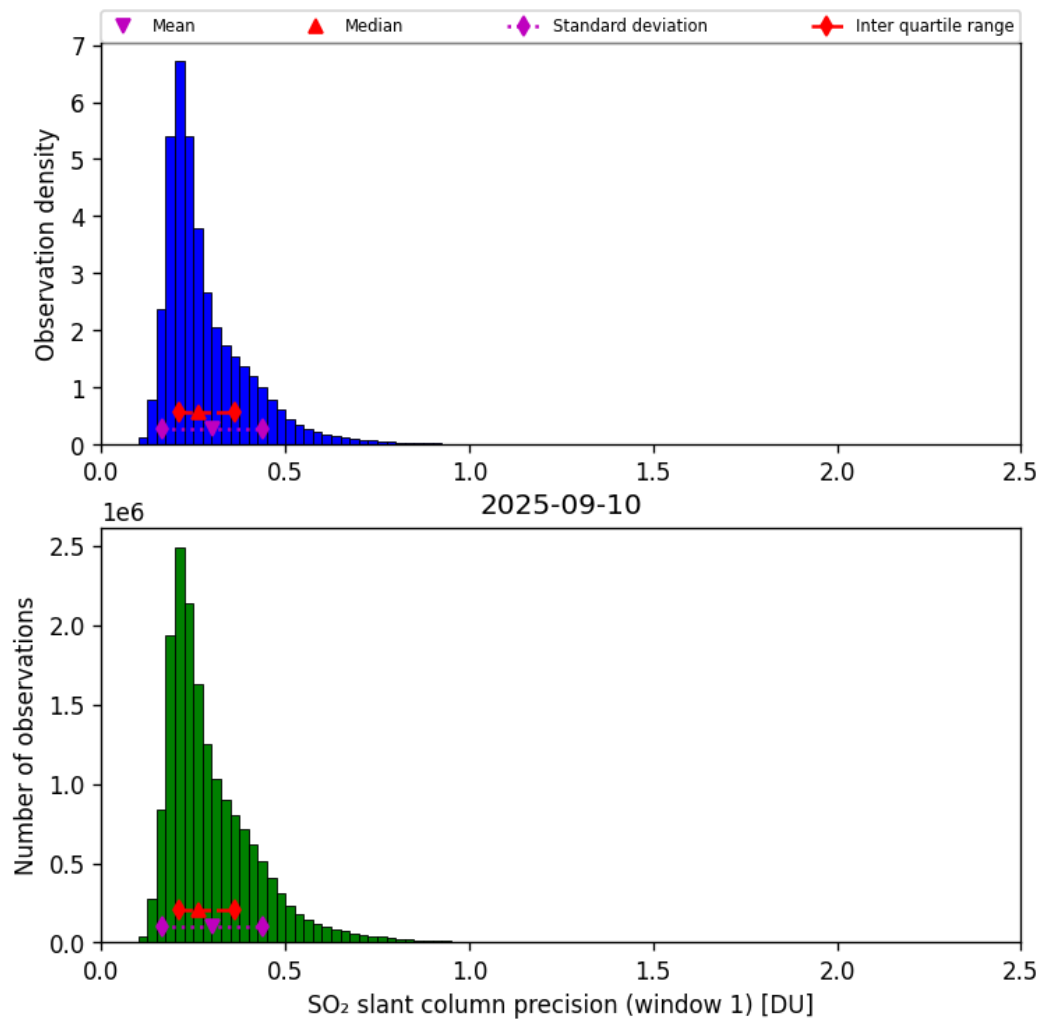


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-09-10 to 2025-09-11

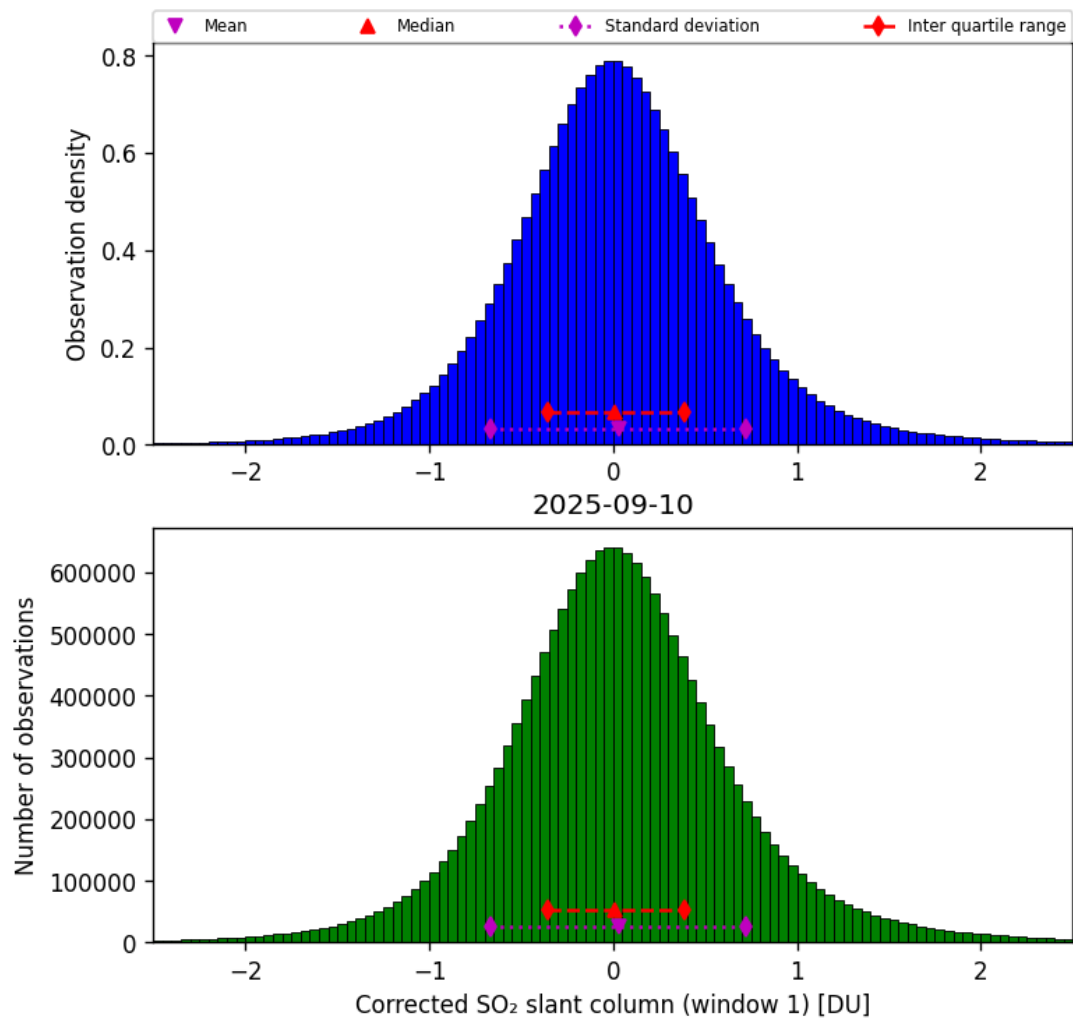


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-09-10 to 2025-09-11

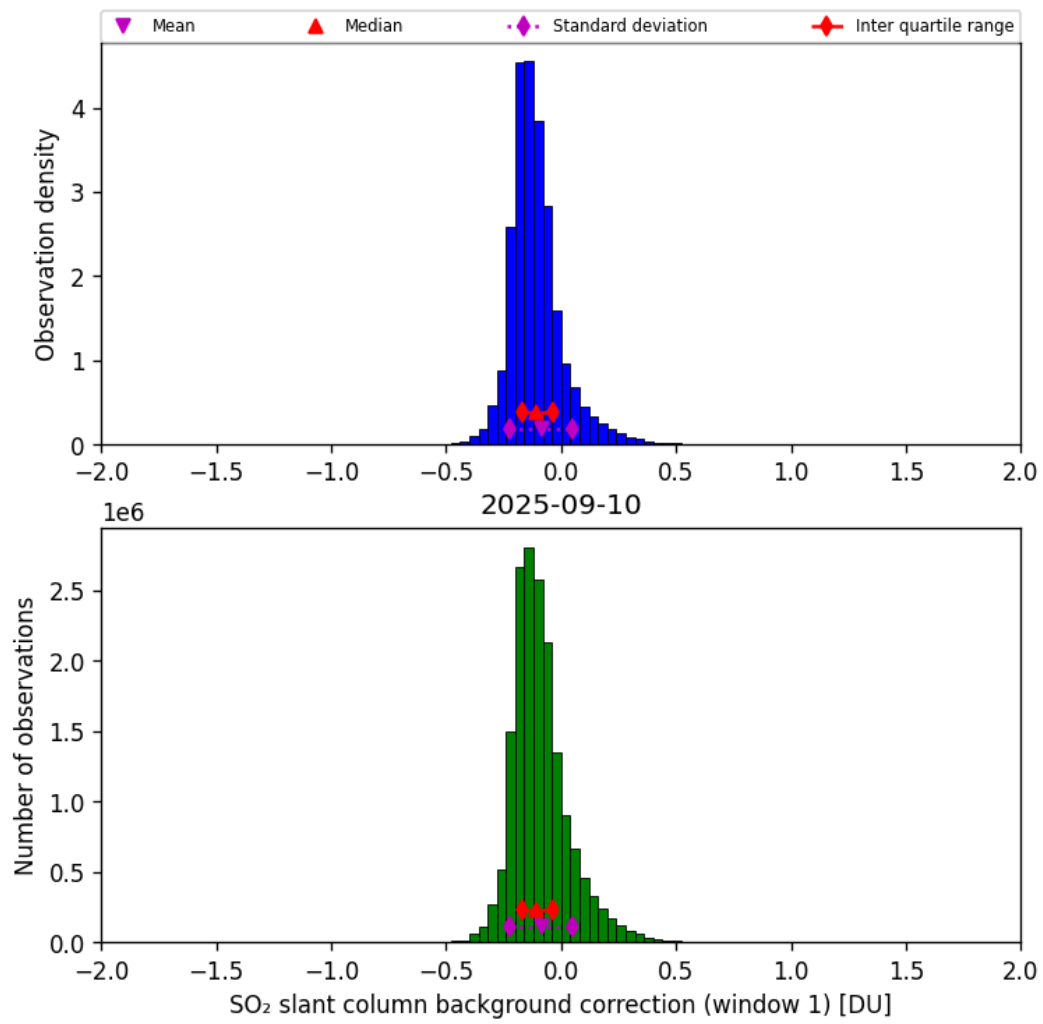


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-09-10 to 2025-09-11

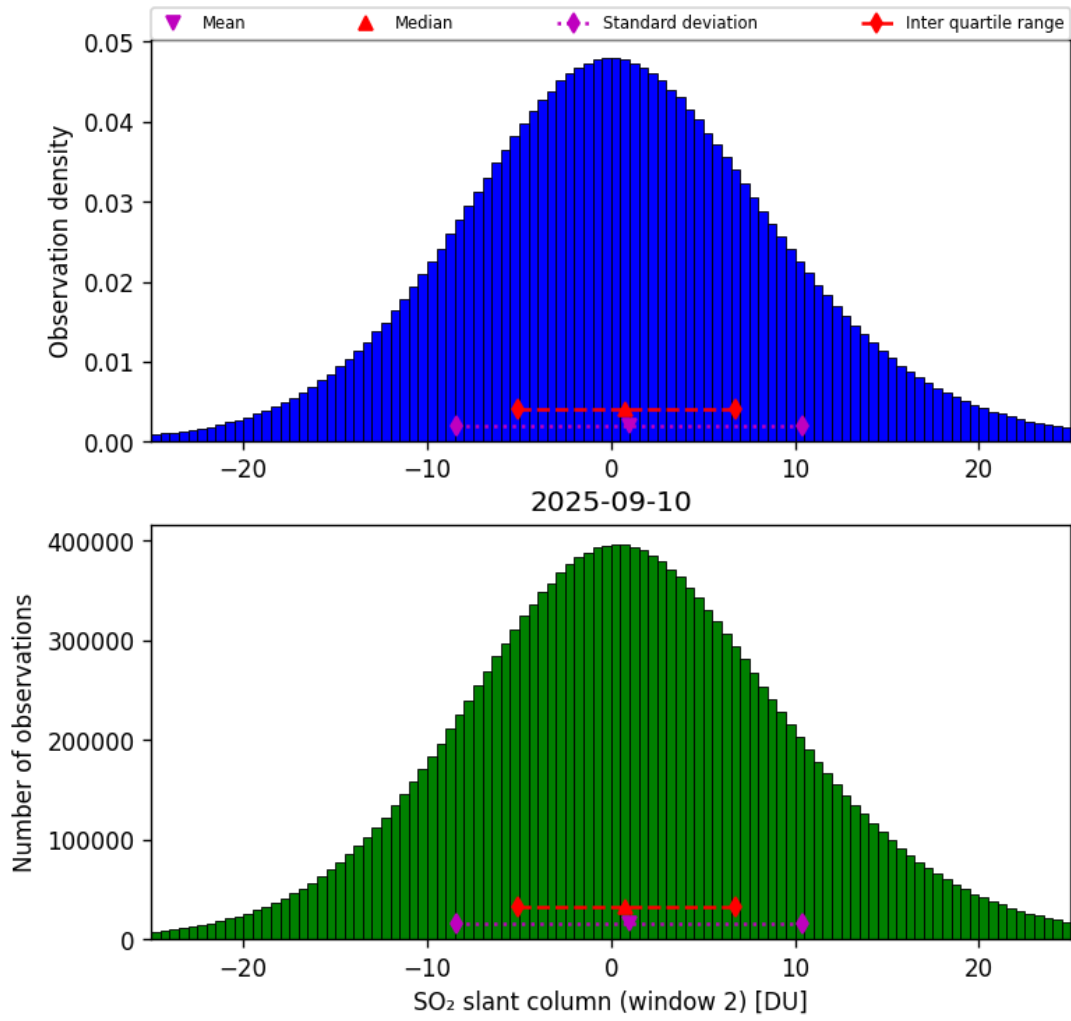


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-09-10 to 2025-09-11

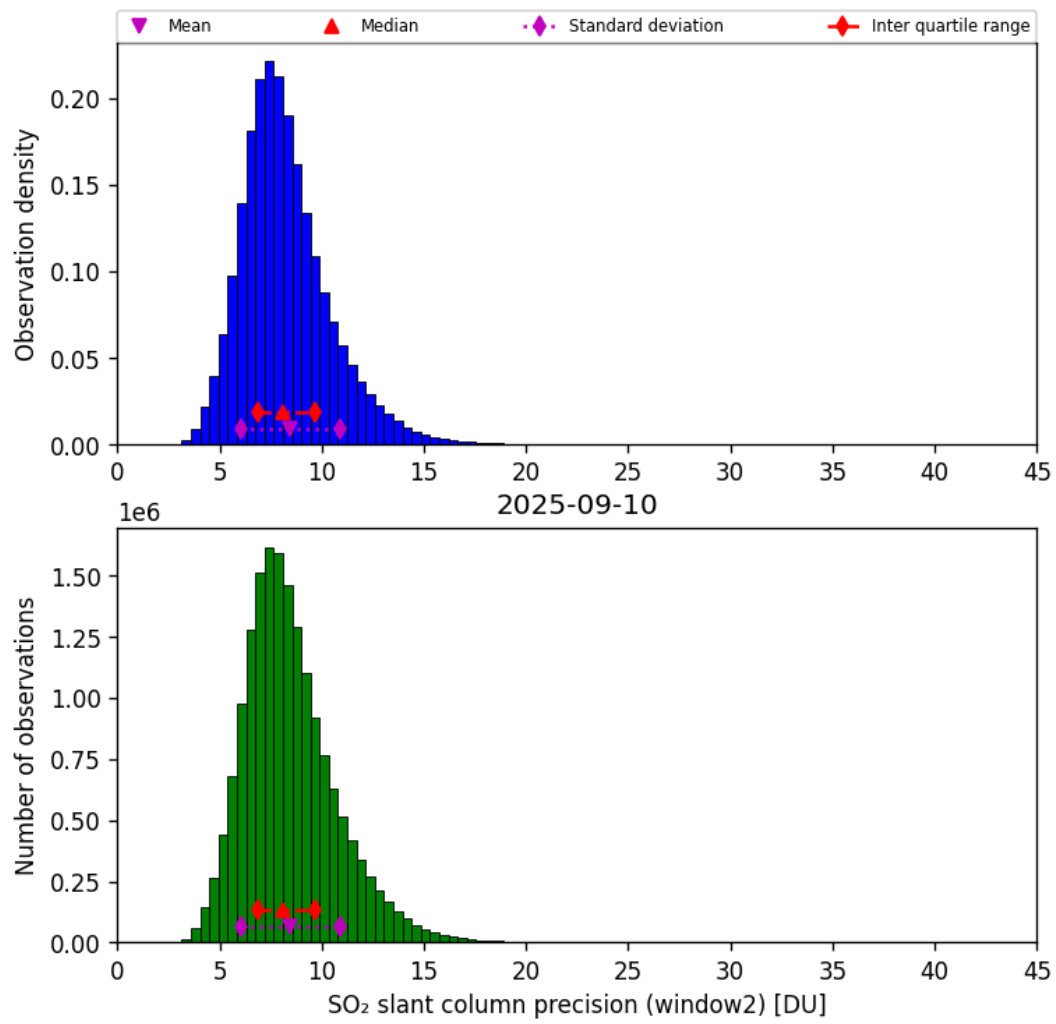


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-09-10 to 2025-09-11

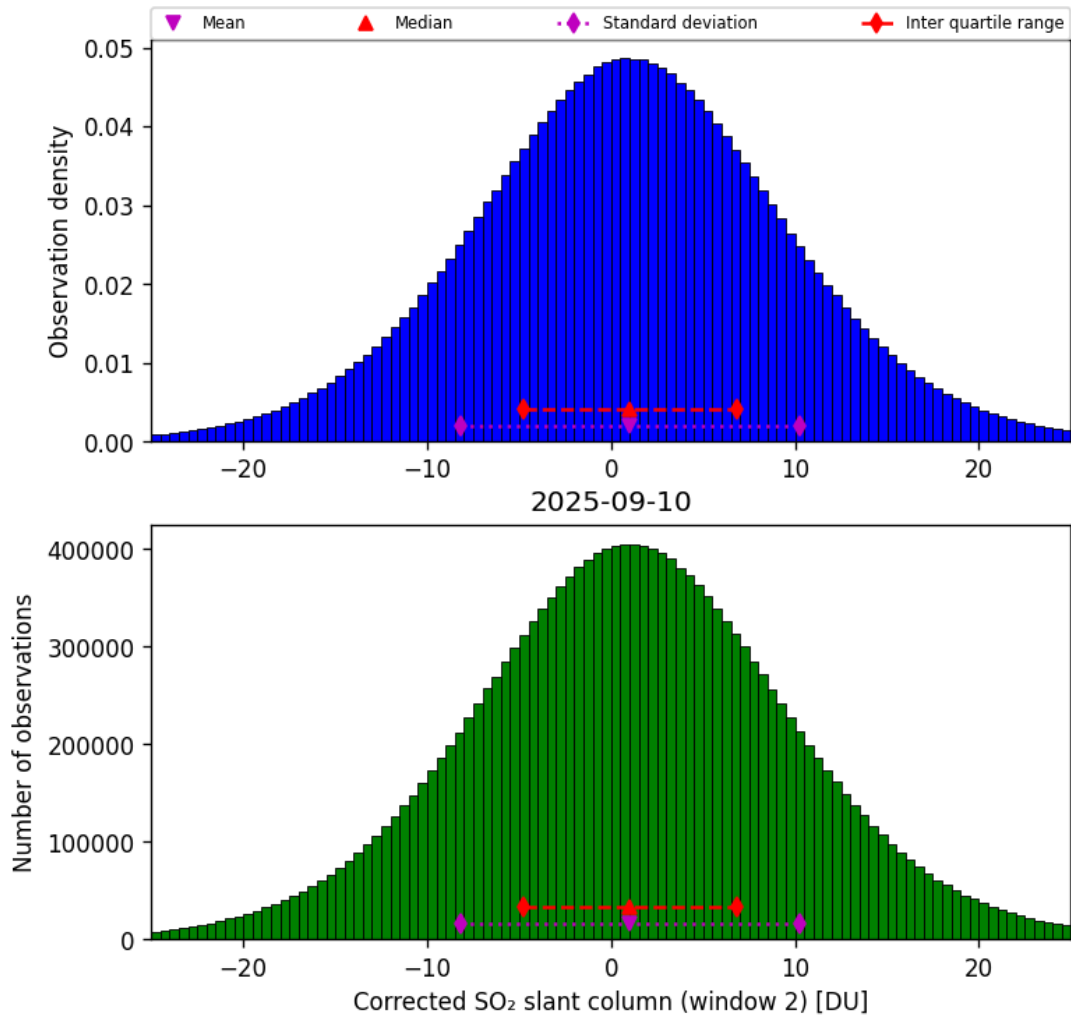


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-09-10 to 2025-09-11

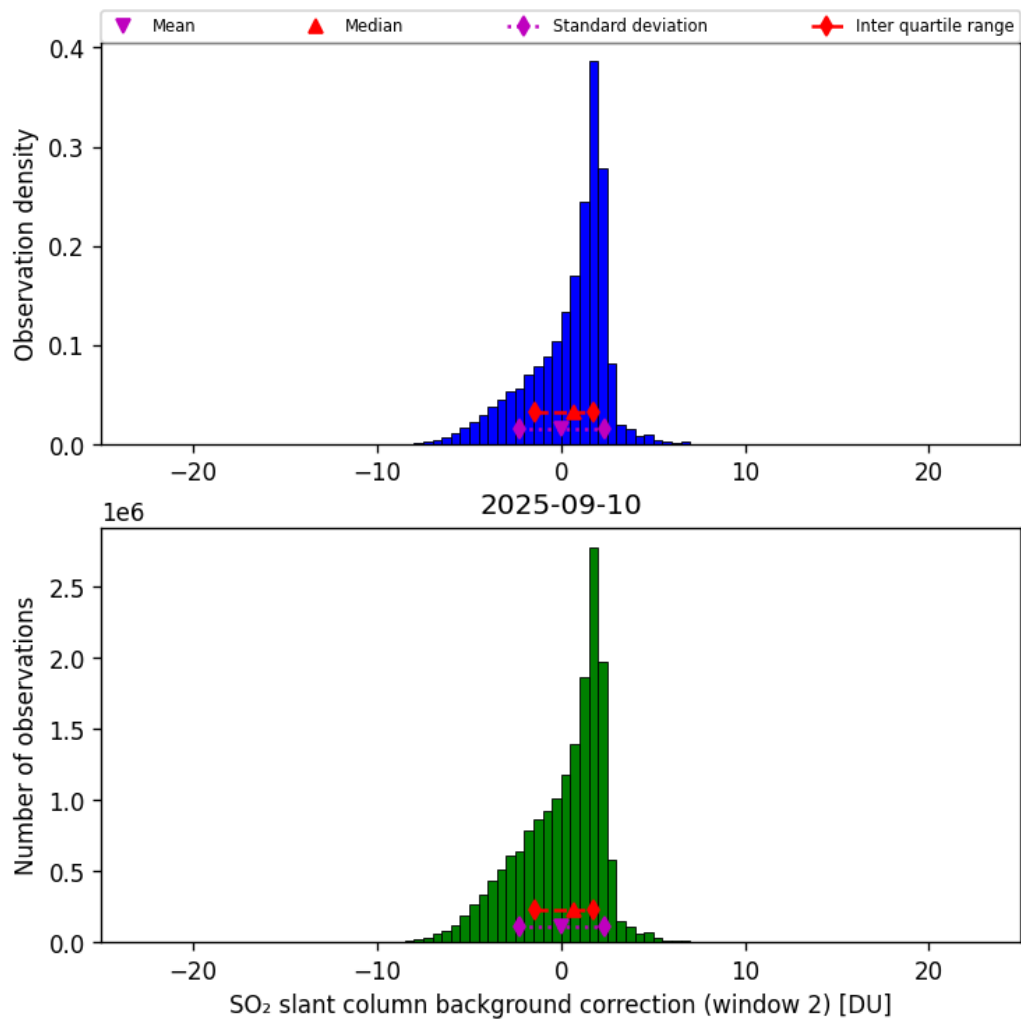


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-09-10 to 2025-09-11

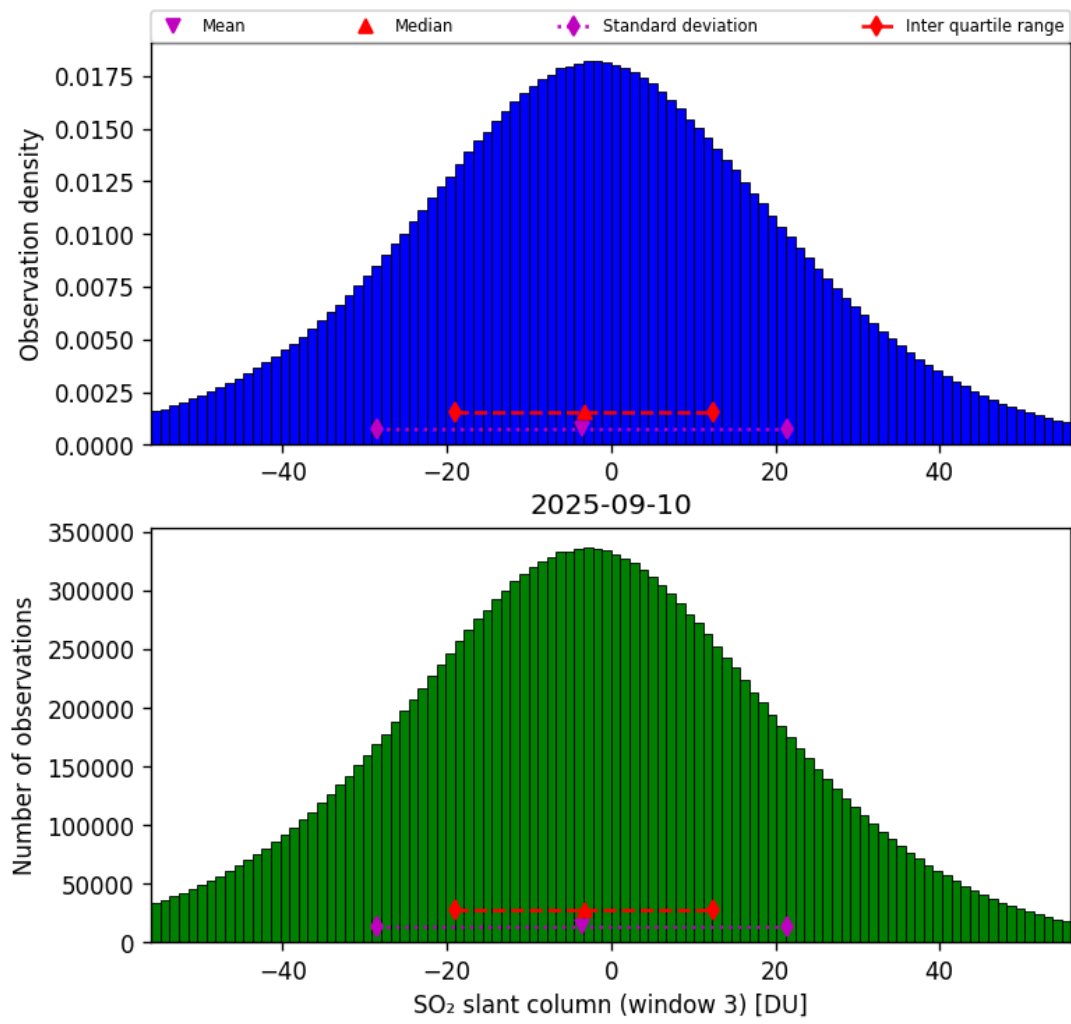


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-09-10 to 2025-09-11

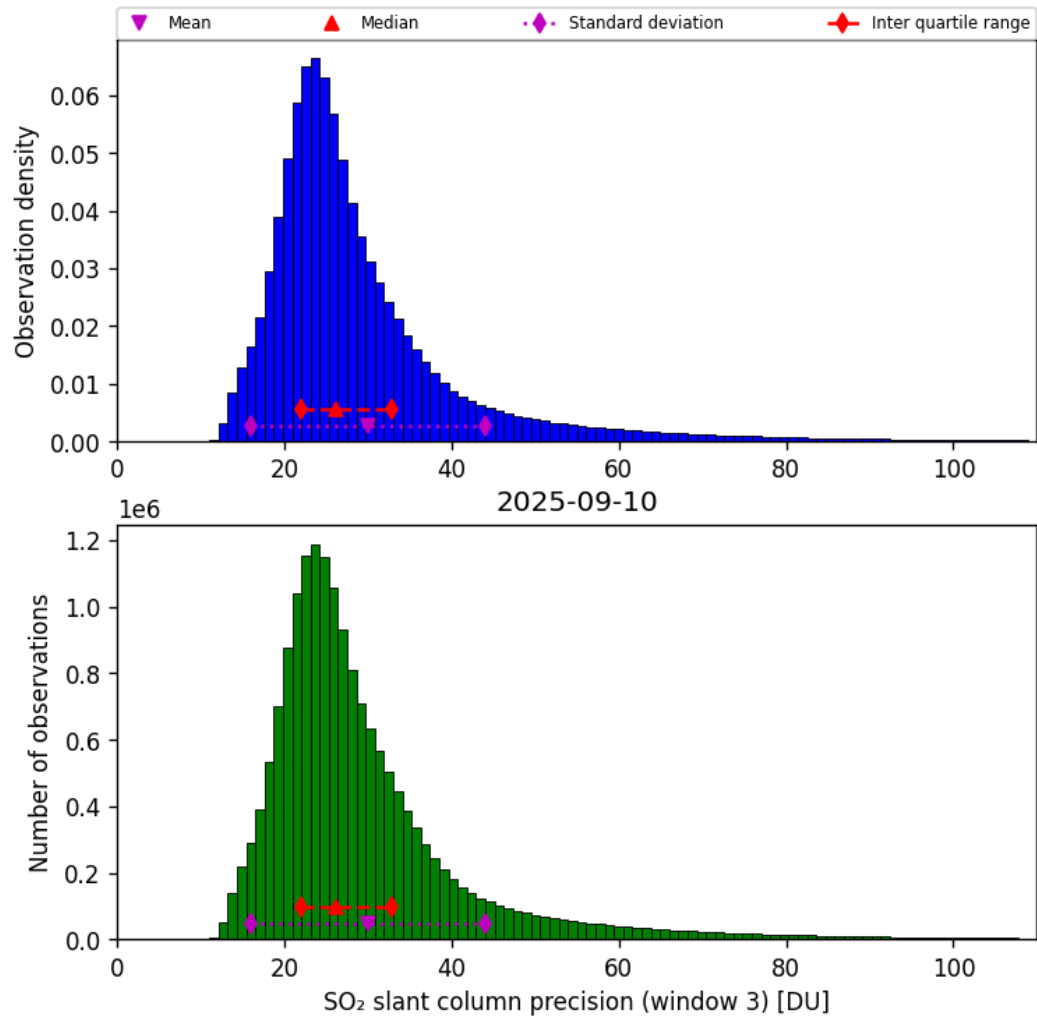


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-09-10 to 2025-09-11

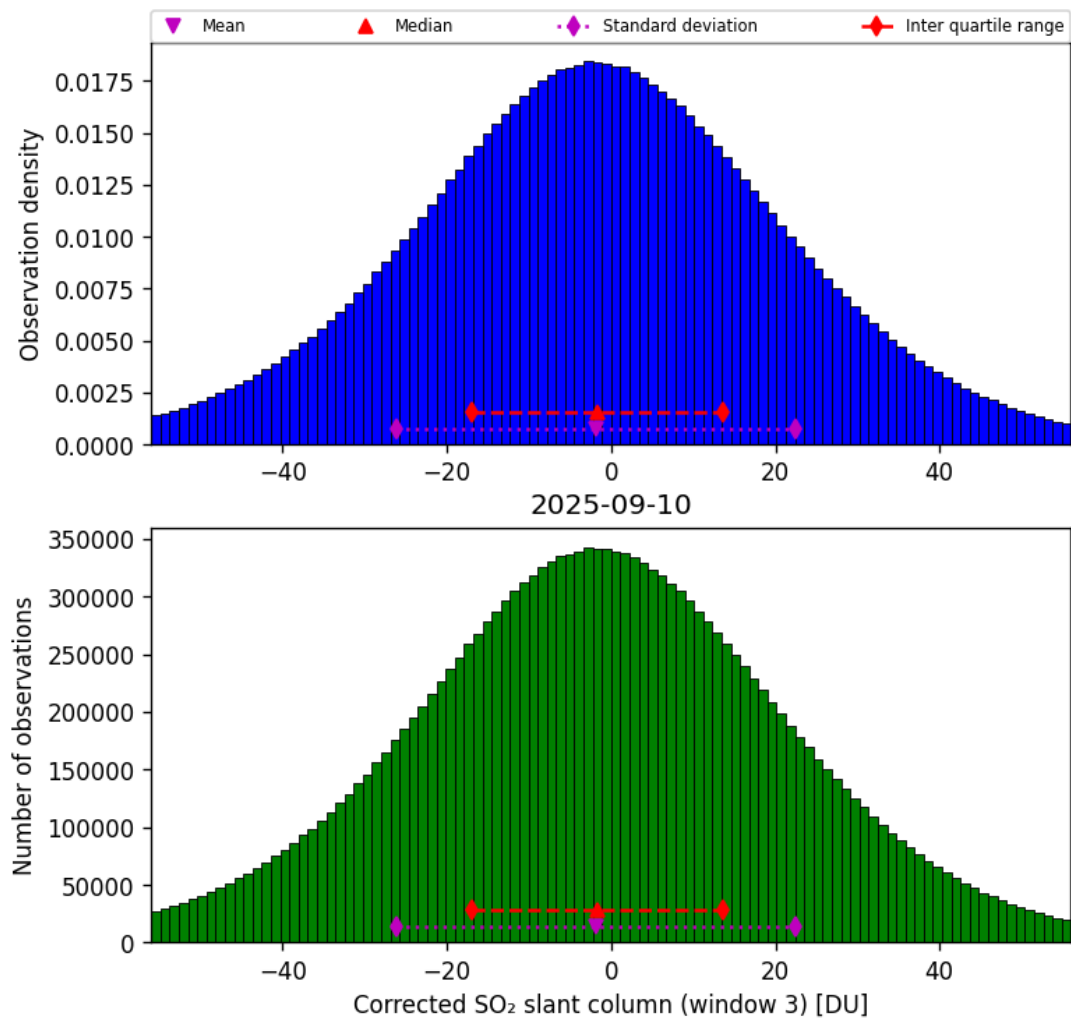


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-09-10 to 2025-09-11

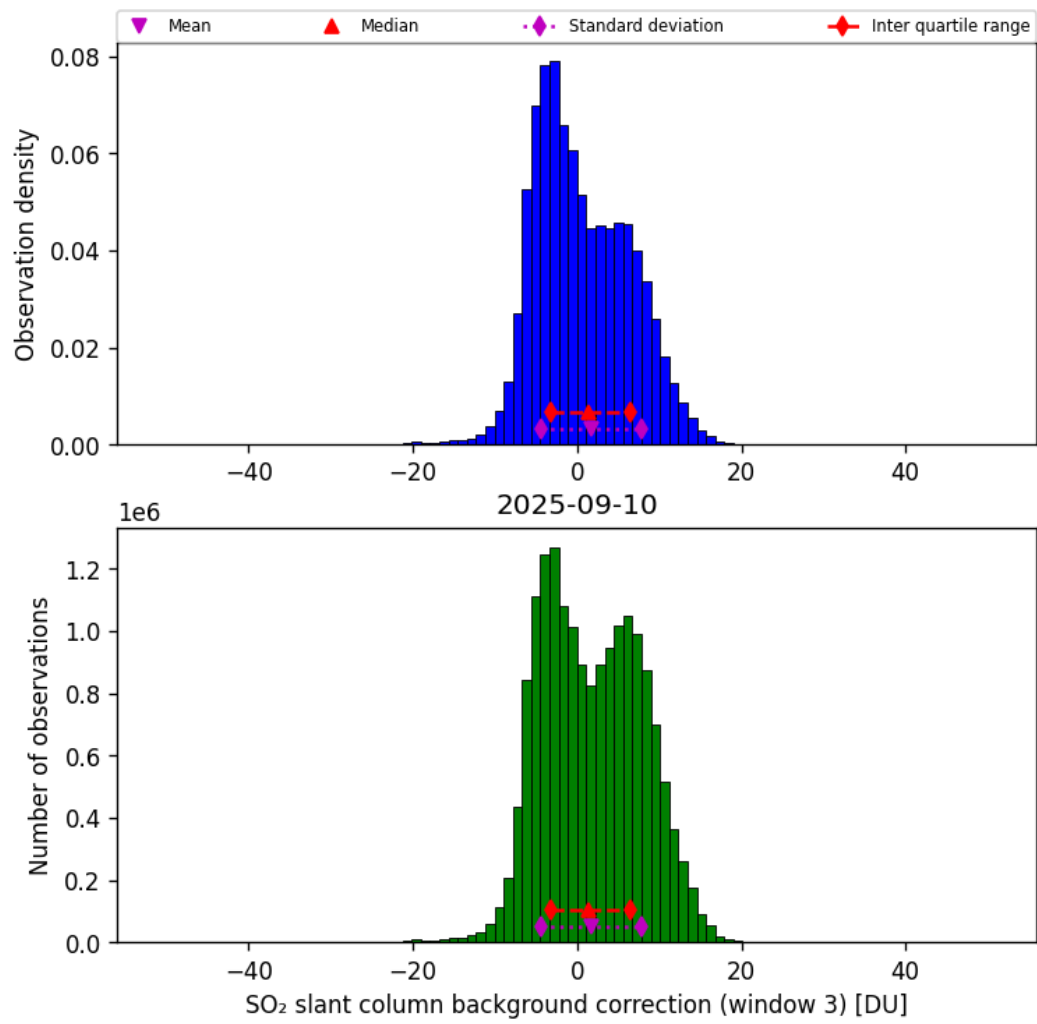


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-09-10 to 2025-09-11

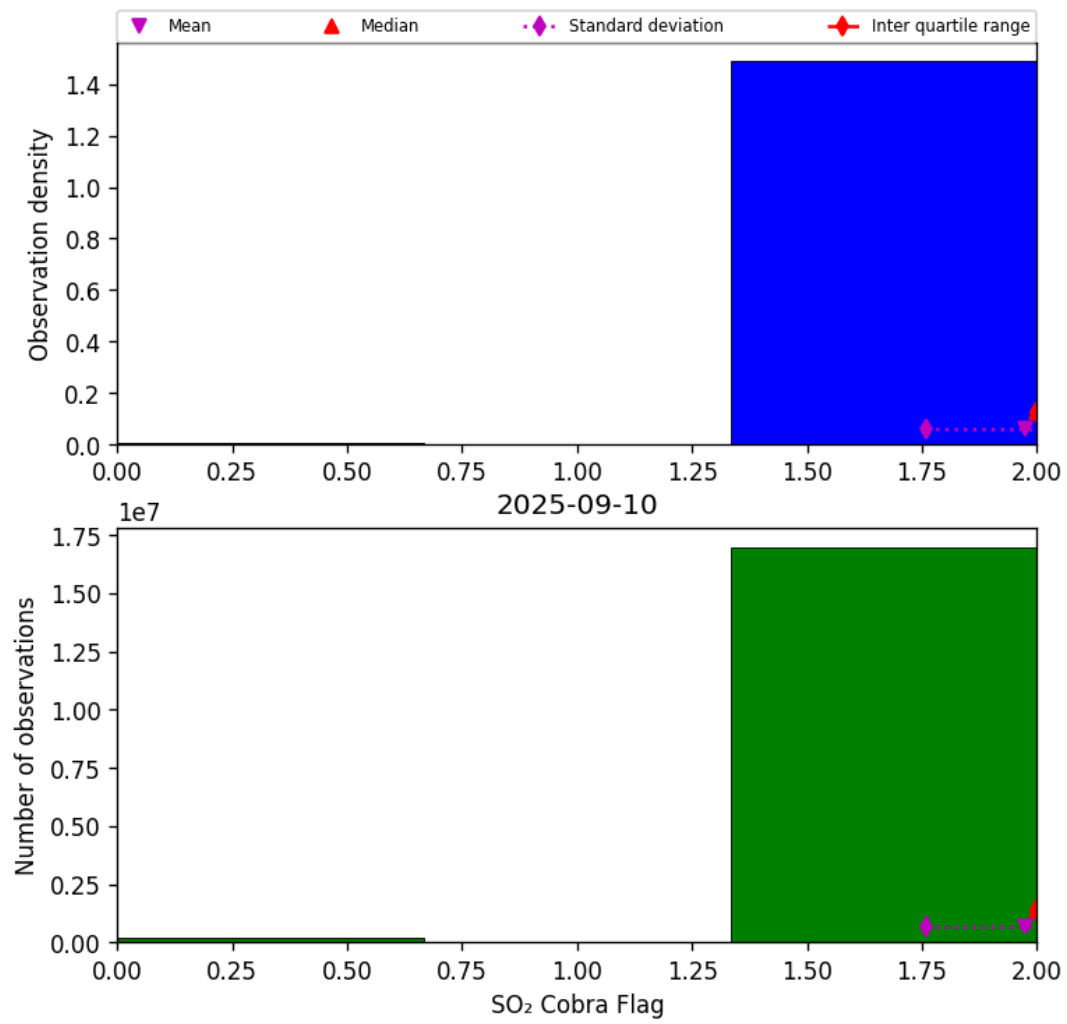


Figure 75: Histogram of "SO₂ Cobra Flag" for 2025-09-10 to 2025-09-11

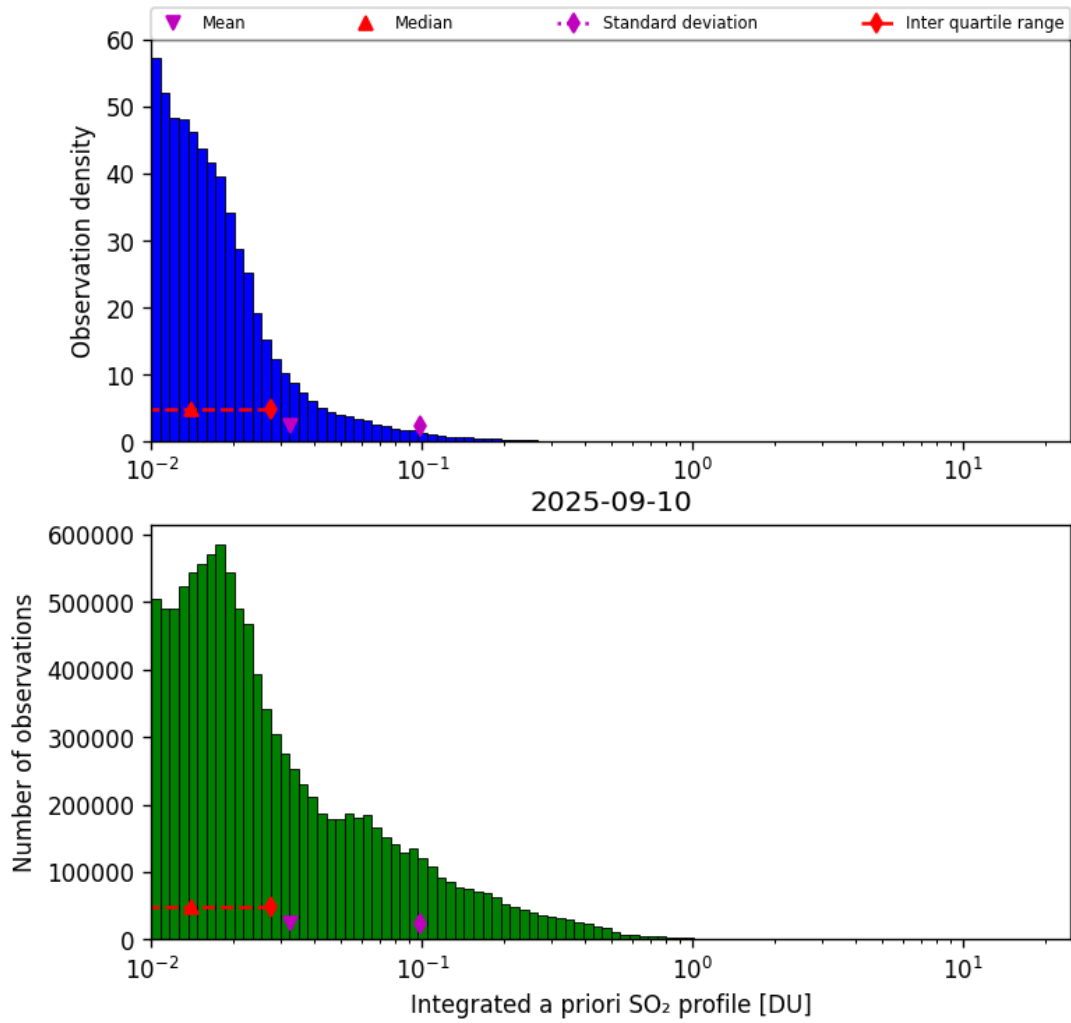


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-09-10 to 2025-09-11

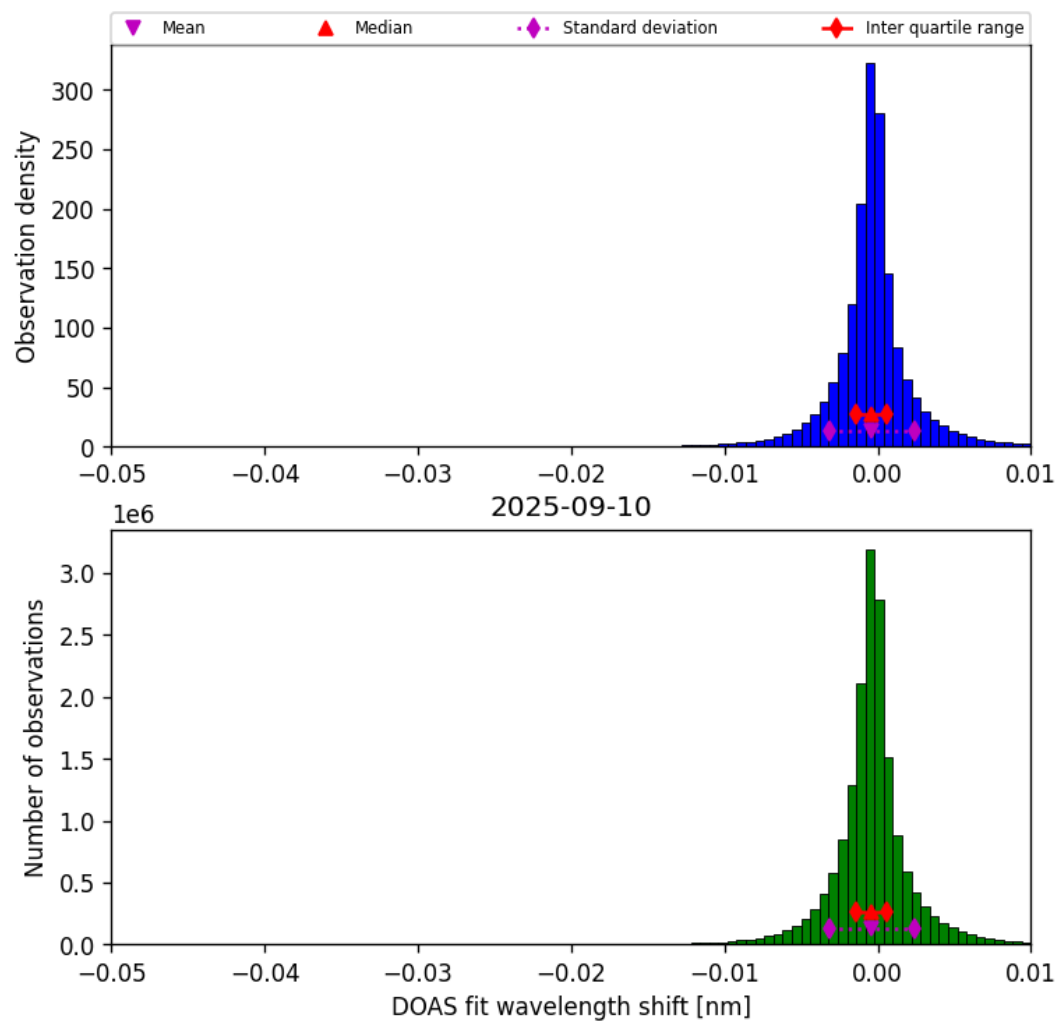


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-09-10 to 2025-09-11

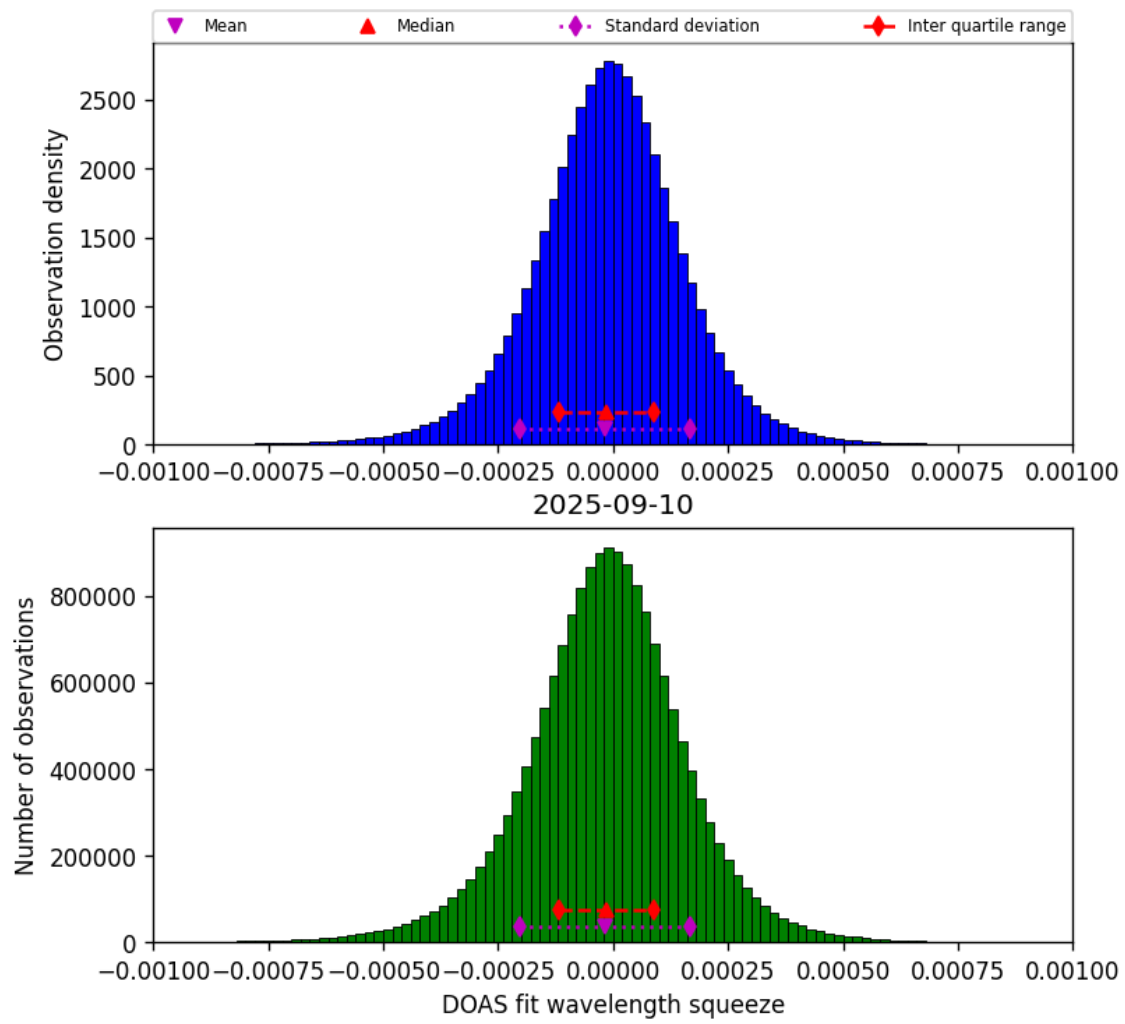


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-09-10 to 2025-09-11

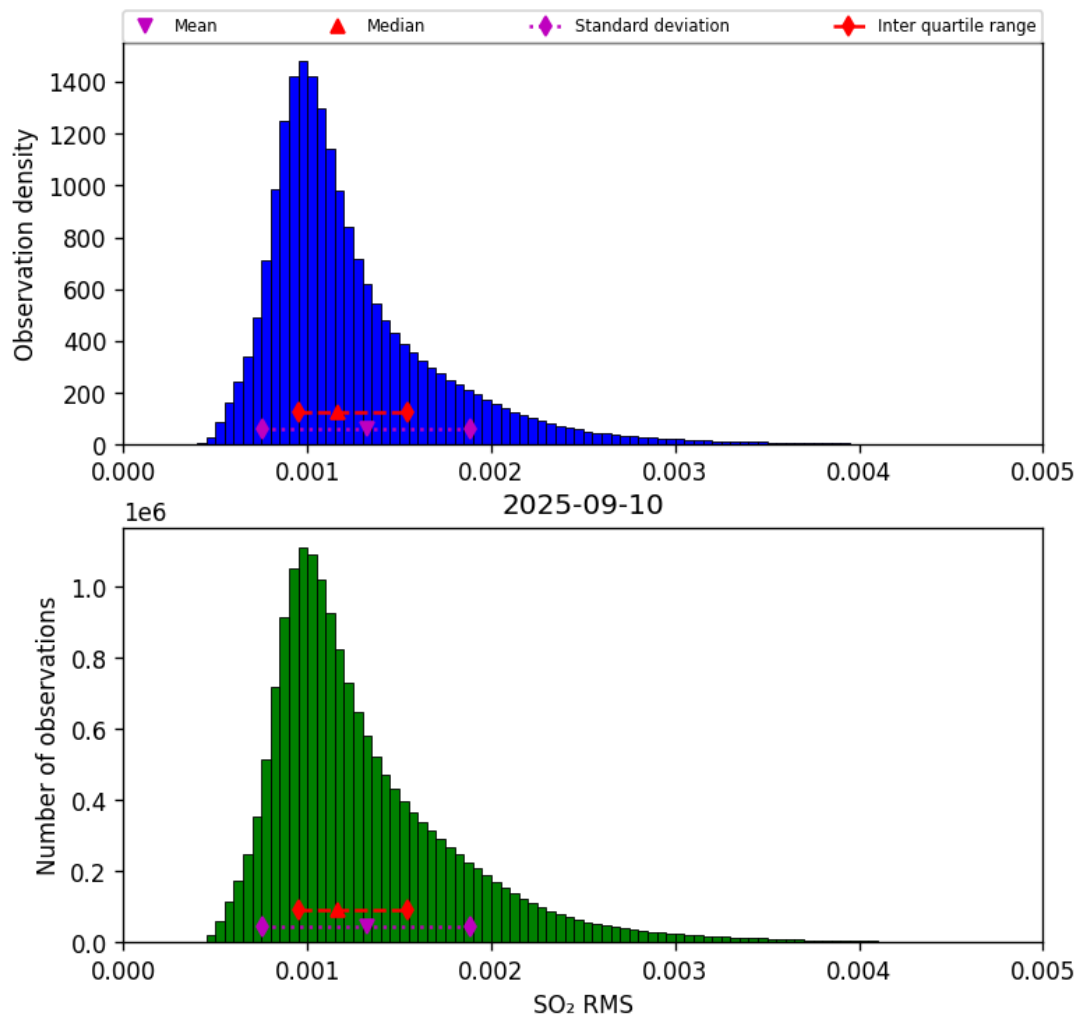


Figure 79: Histogram of “SO₂ RMS” for 2025-09-10 to 2025-09-11

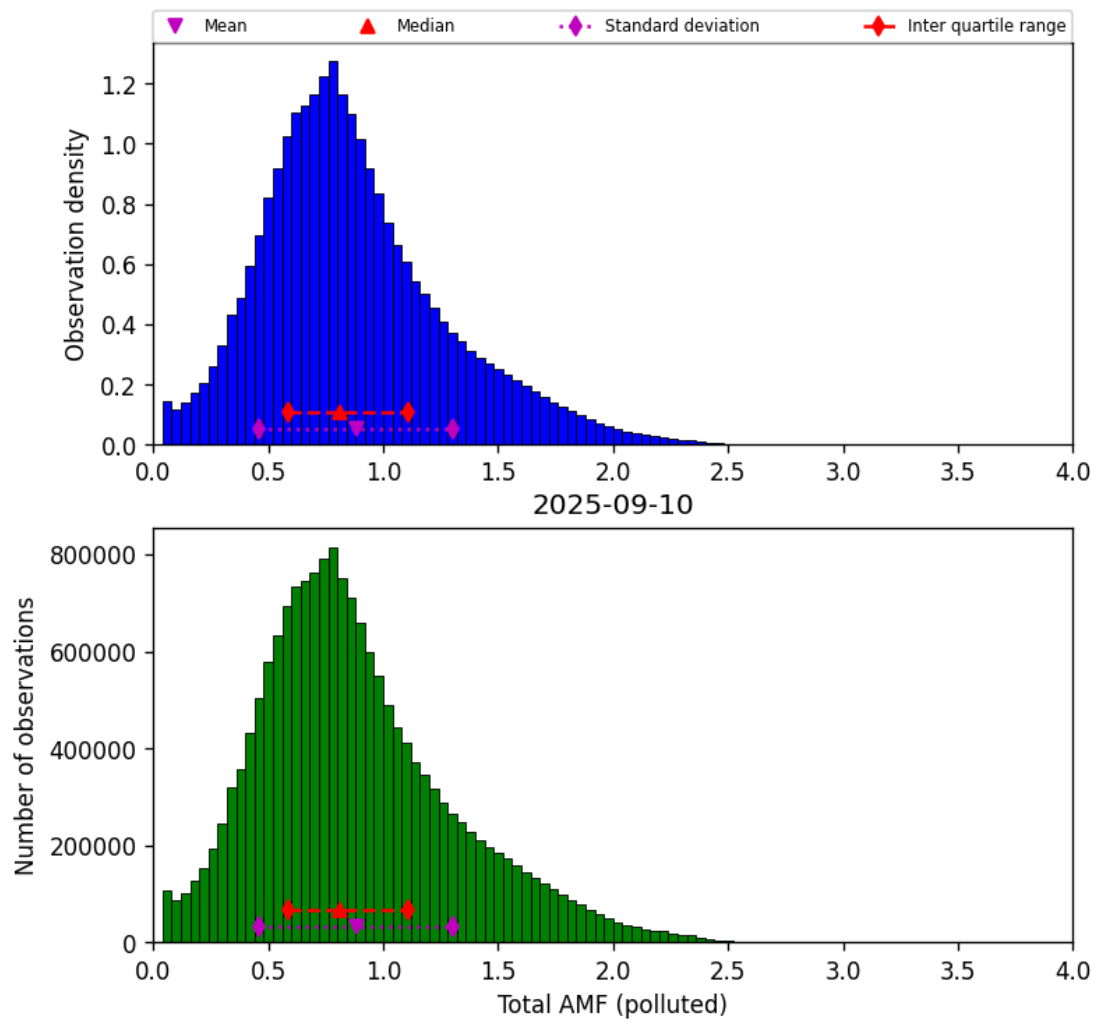


Figure 80: Histogram of “Total AMF (polluted)” for 2025-09-10 to 2025-09-11

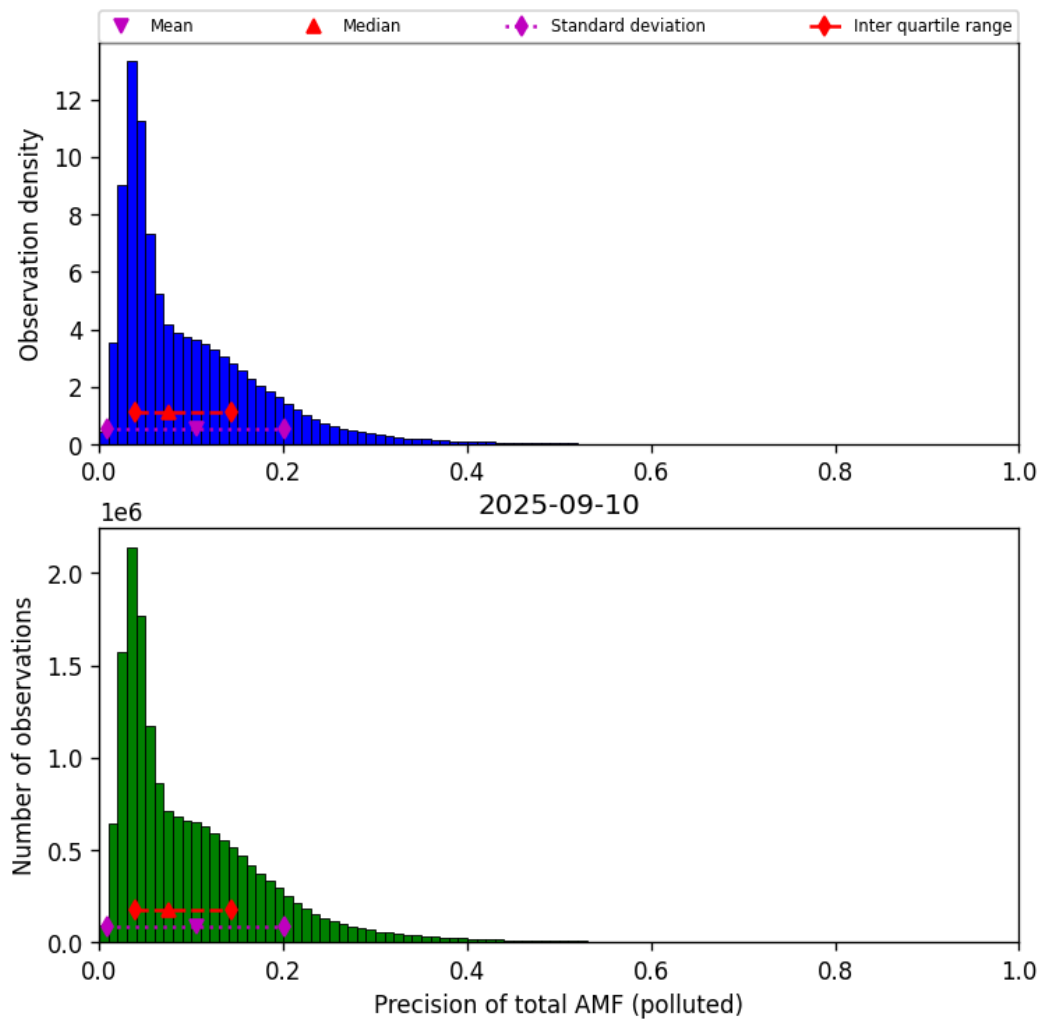


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-09-10 to 2025-09-11

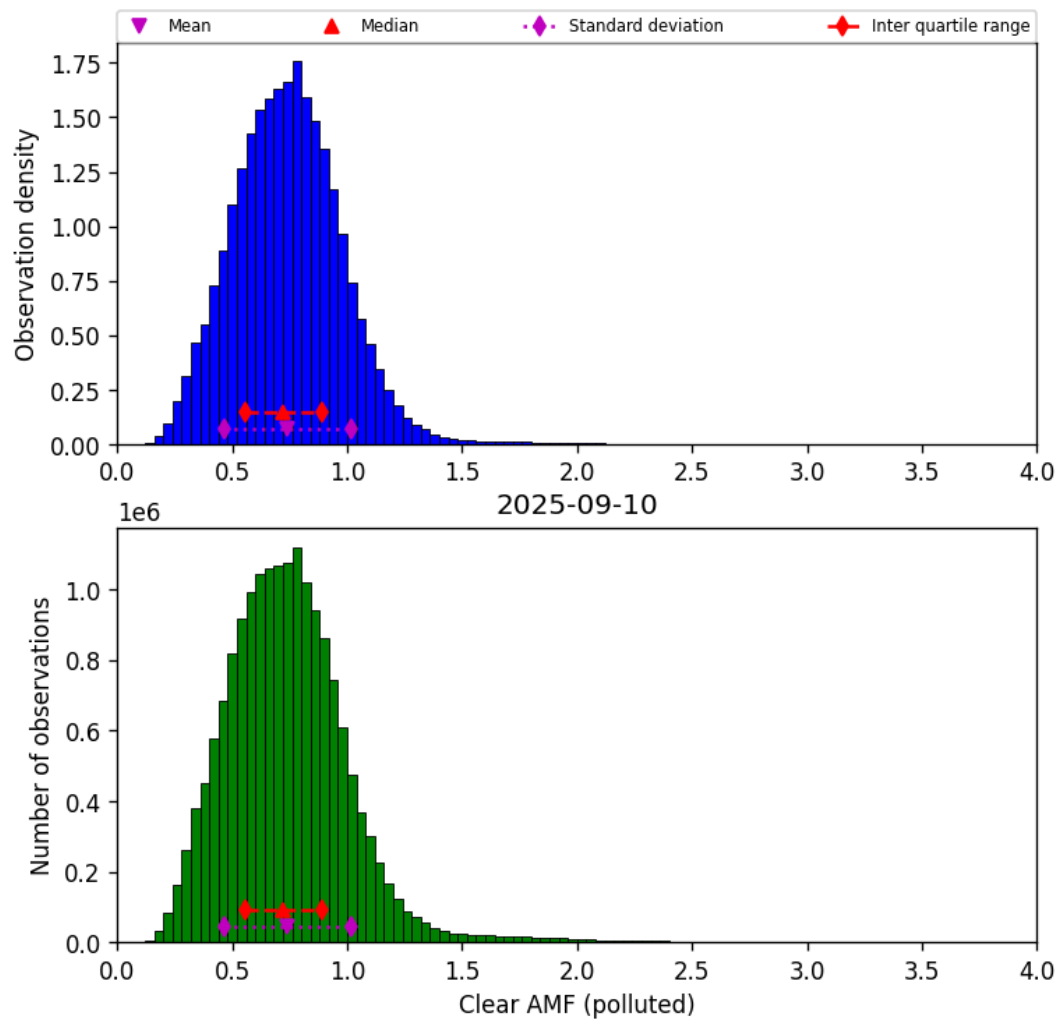


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-09-10 to 2025-09-11

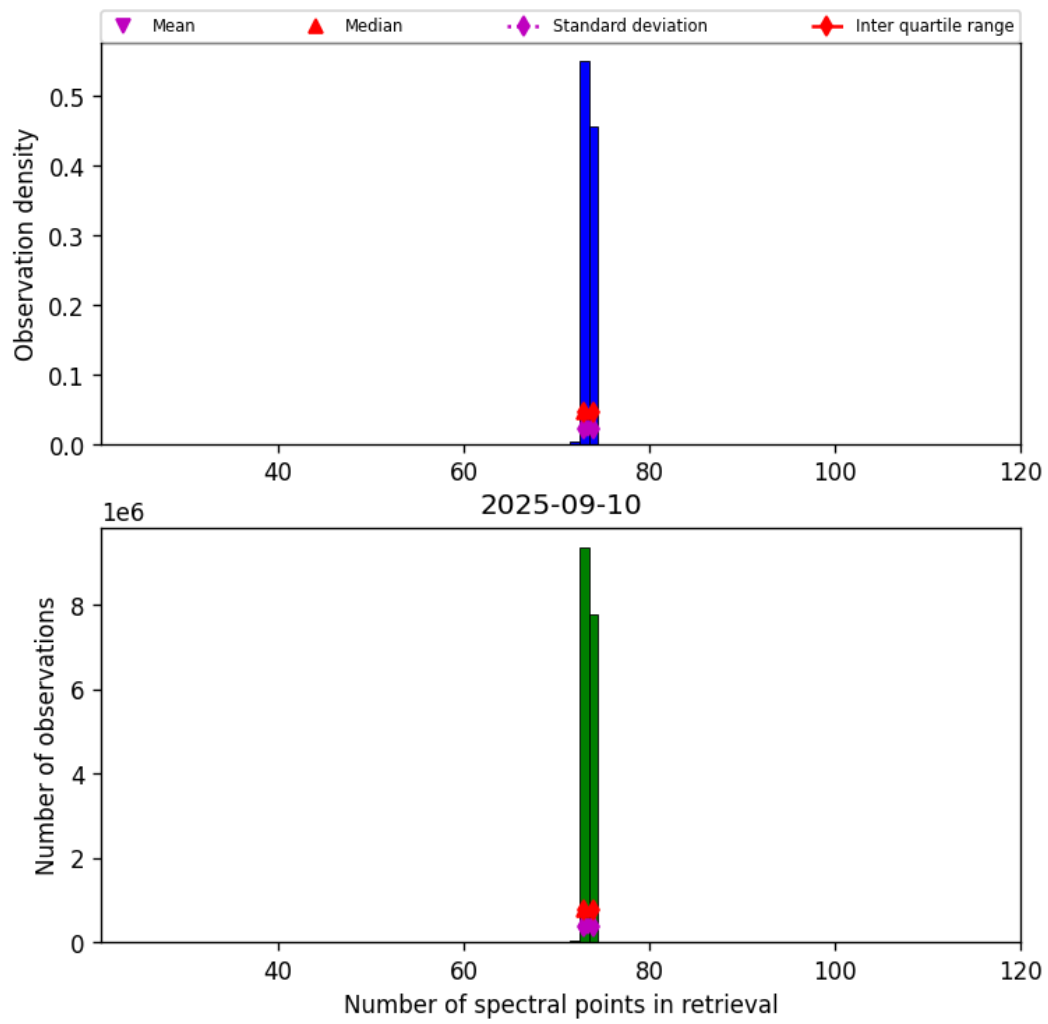


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-09-10 to 2025-09-11

9 Along track statistics

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

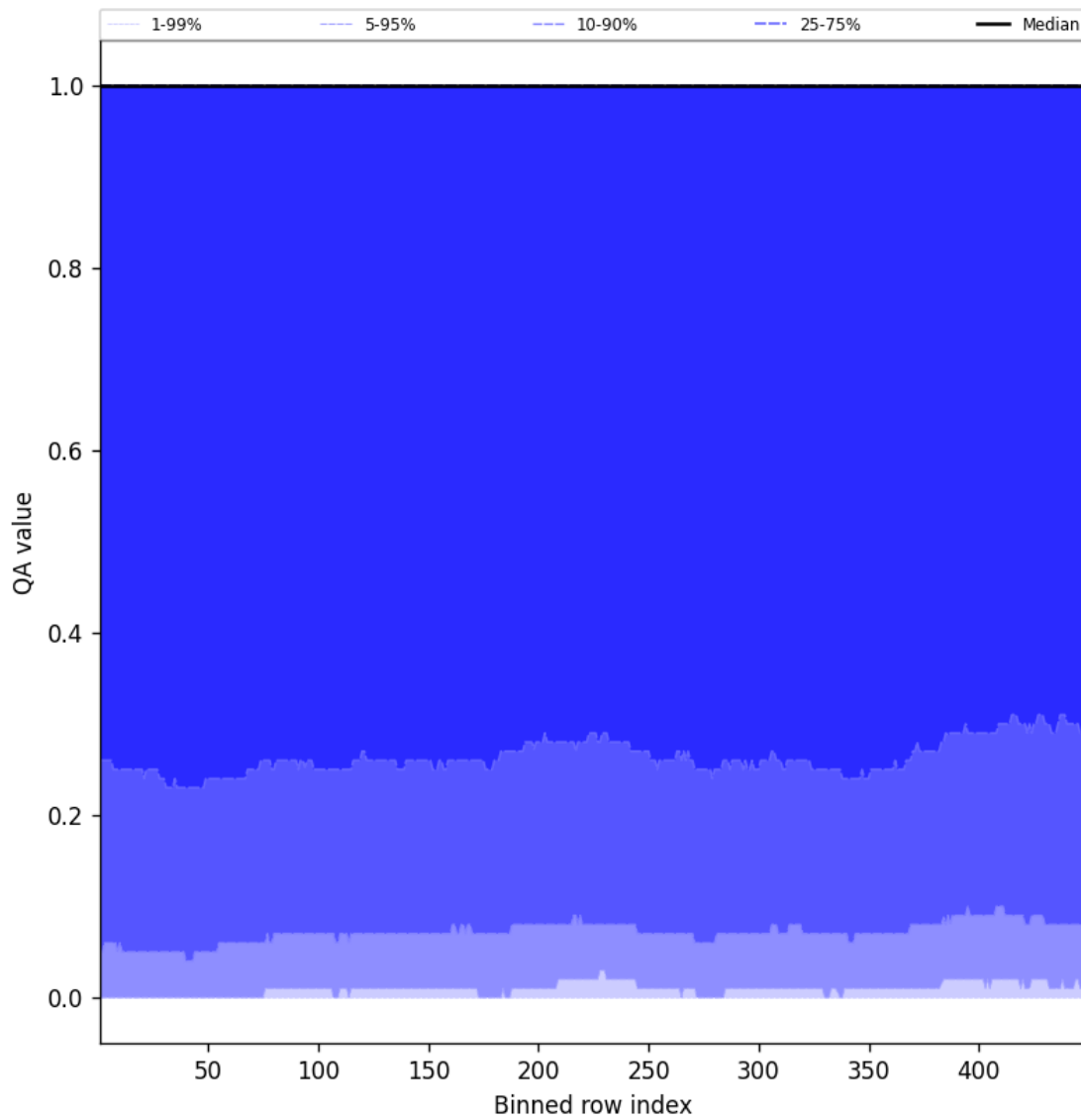


Figure 84: Along track statistics of “QA value” for 2025-09-10 to 2025-09-11

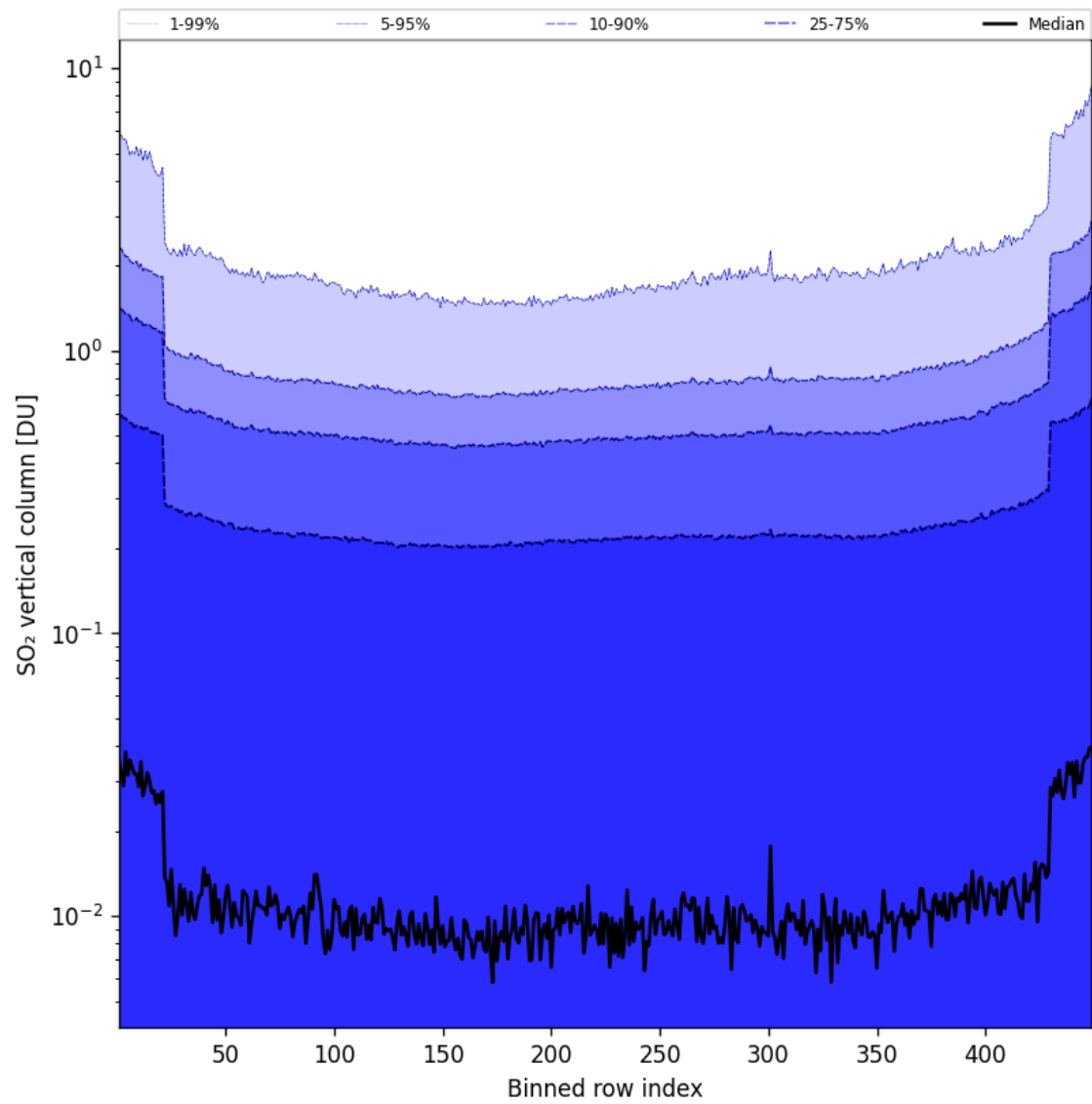


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-09-10 to 2025-09-11

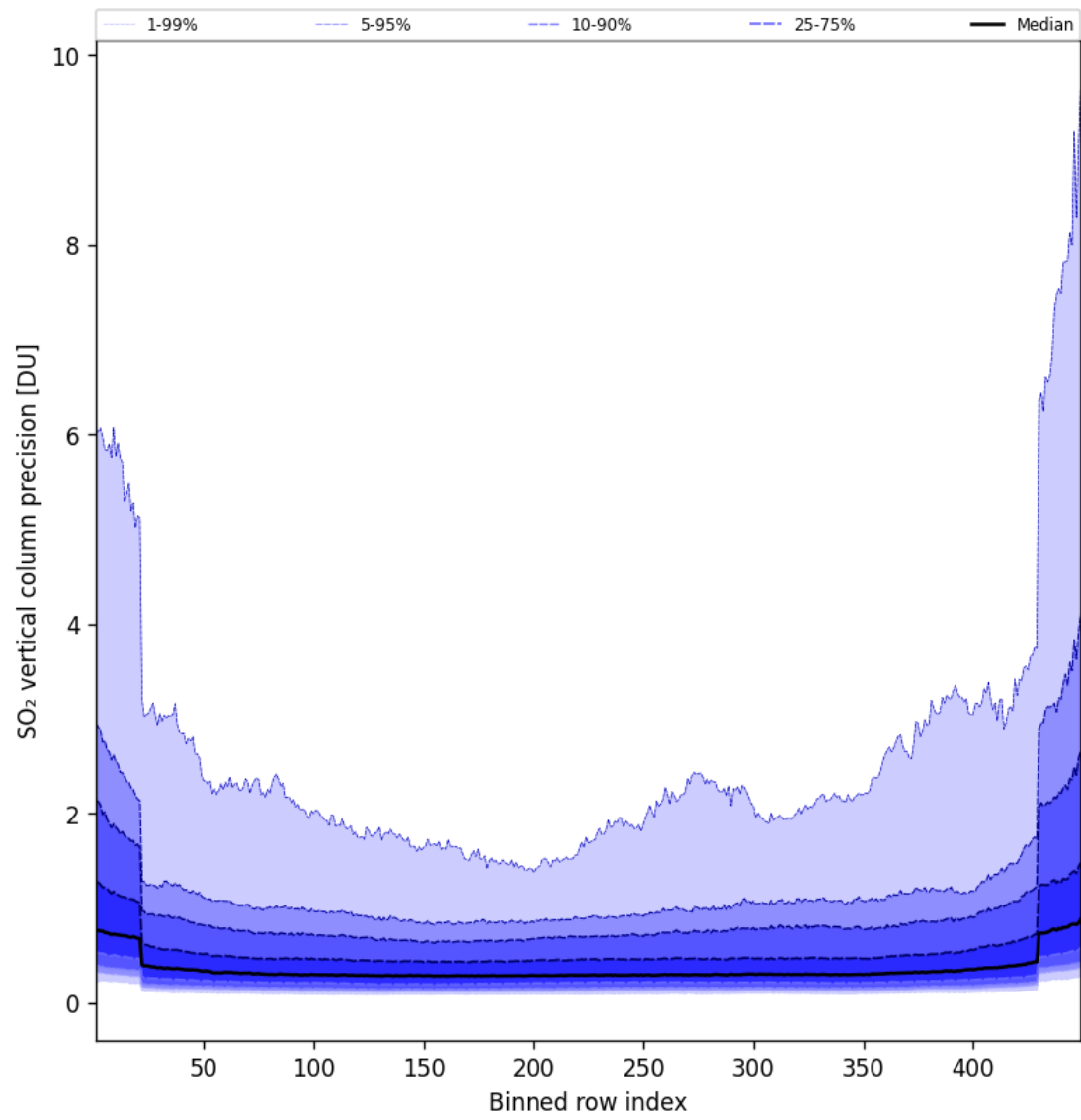


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-09-10 to 2025-09-11

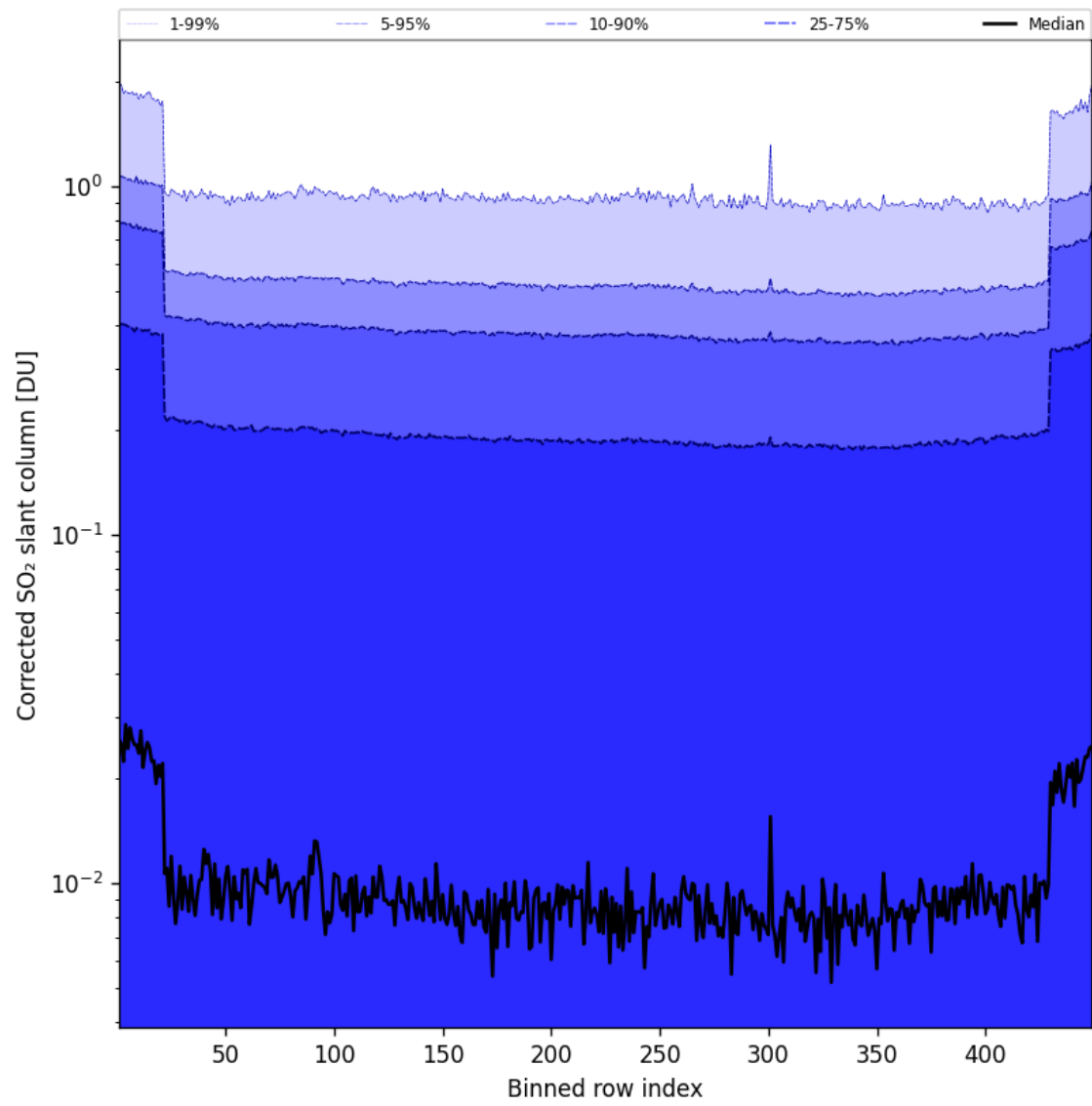


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-09-10 to 2025-09-11

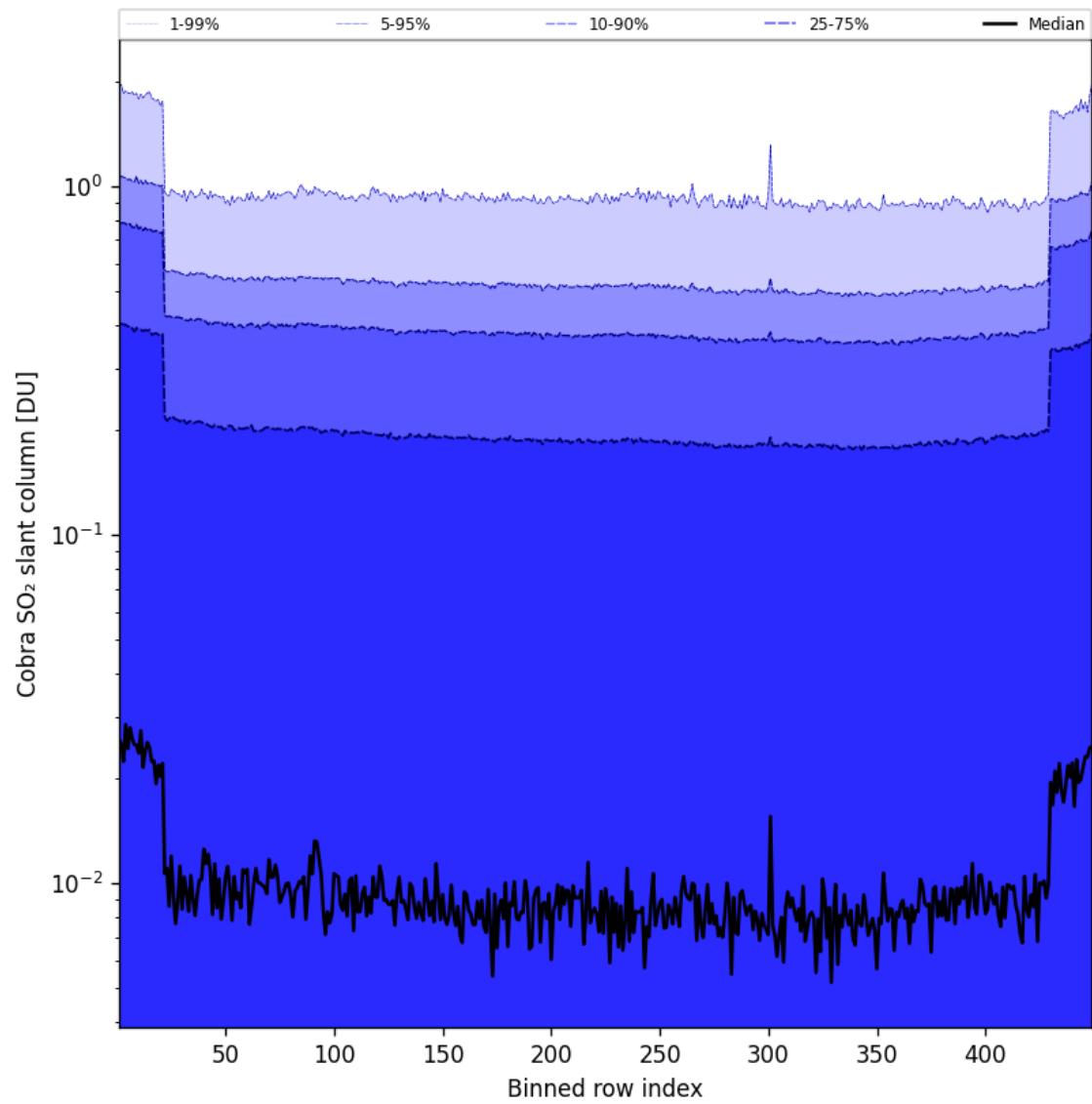


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-09-10 to 2025-09-11

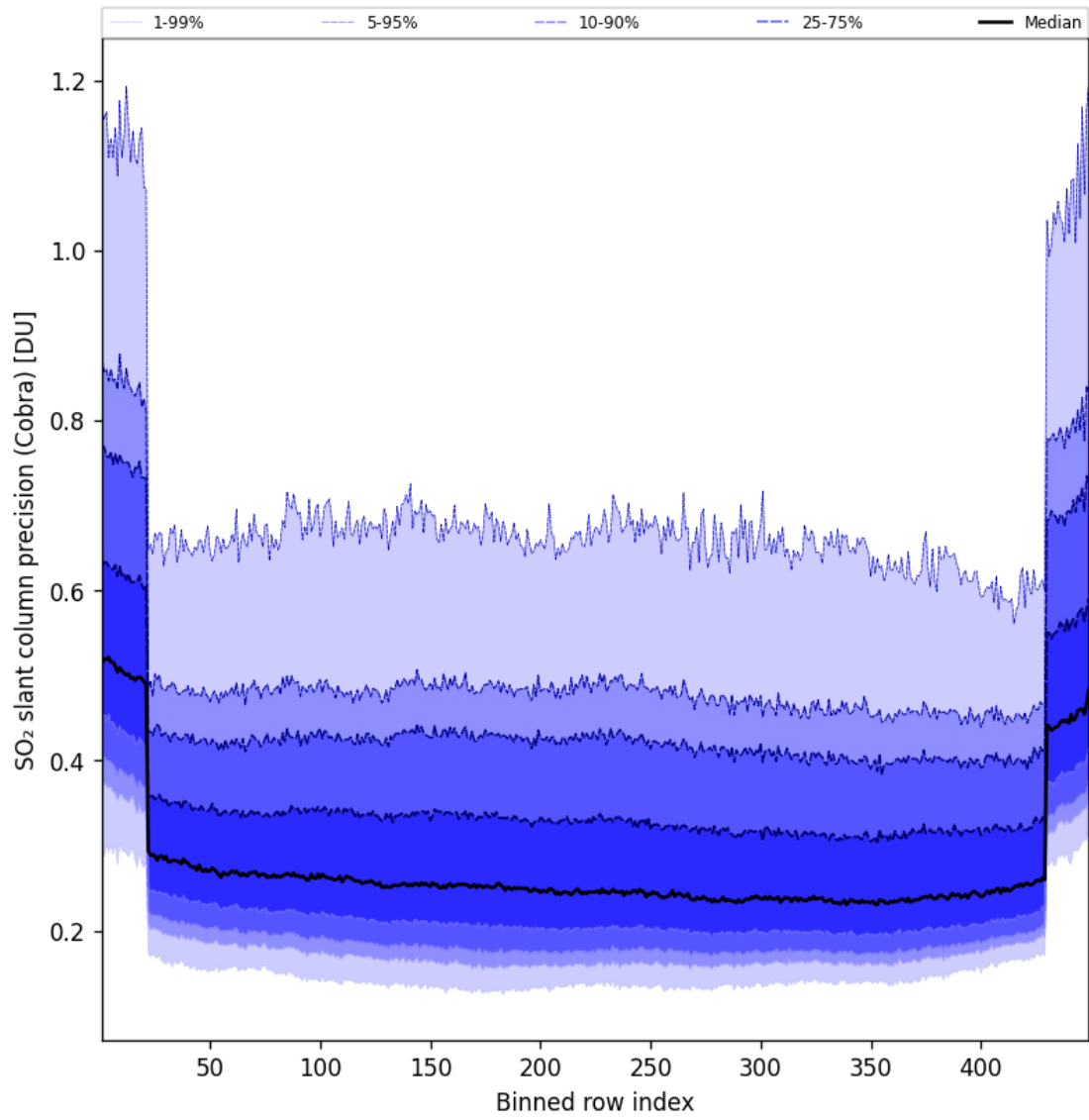


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-09-10 to 2025-09-11

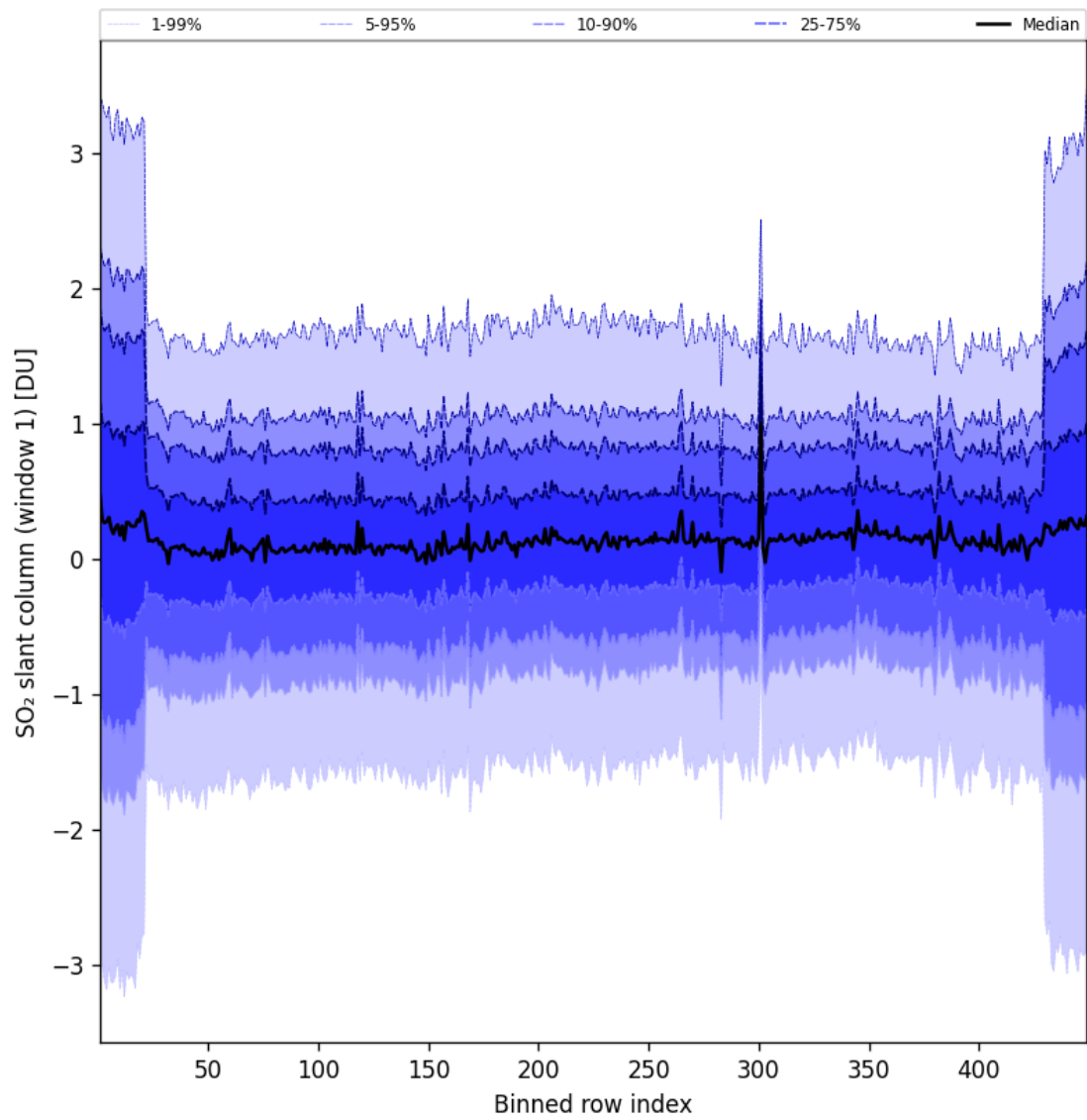


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-09-10 to 2025-09-11

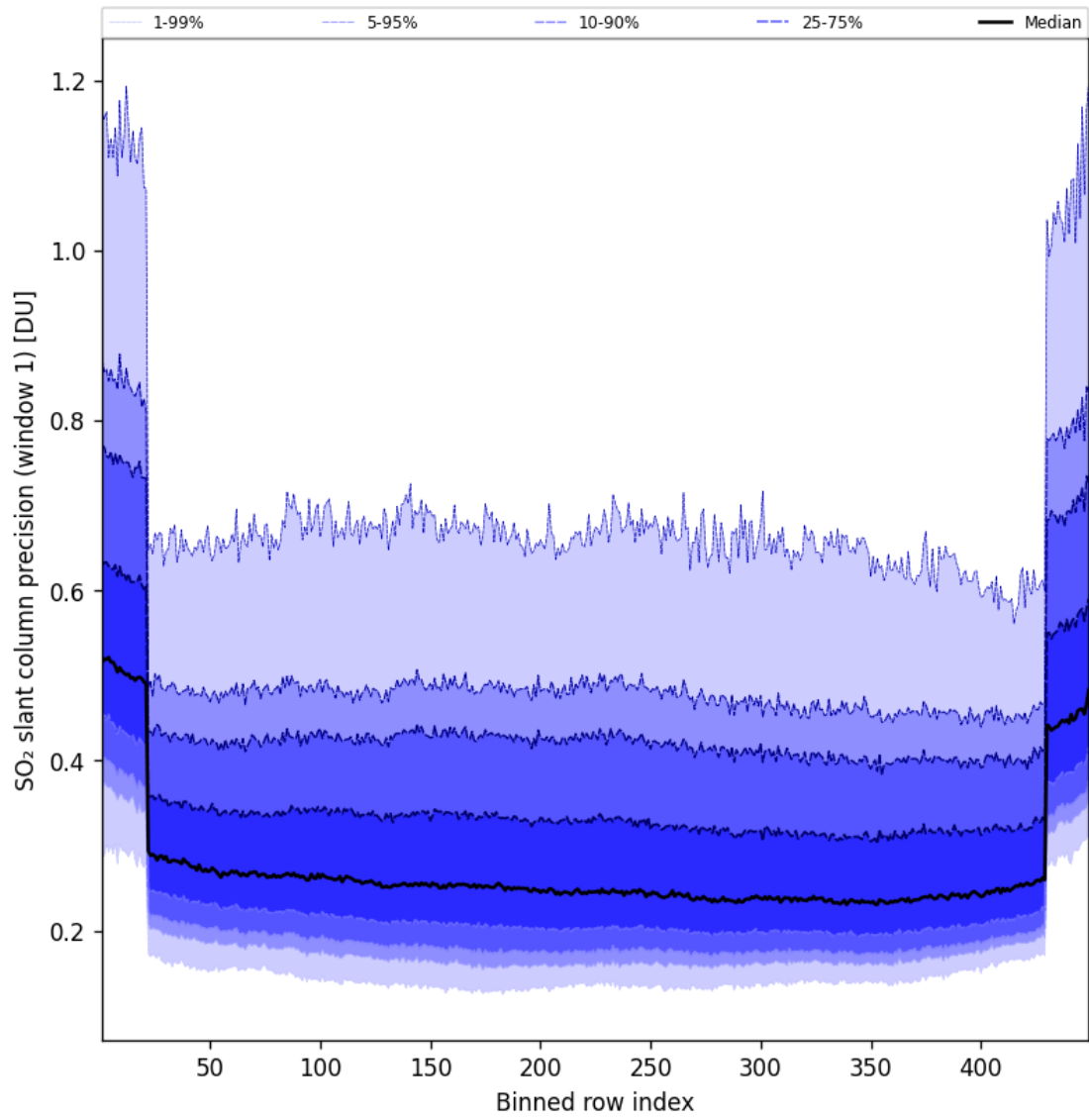


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-09-10 to 2025-09-11

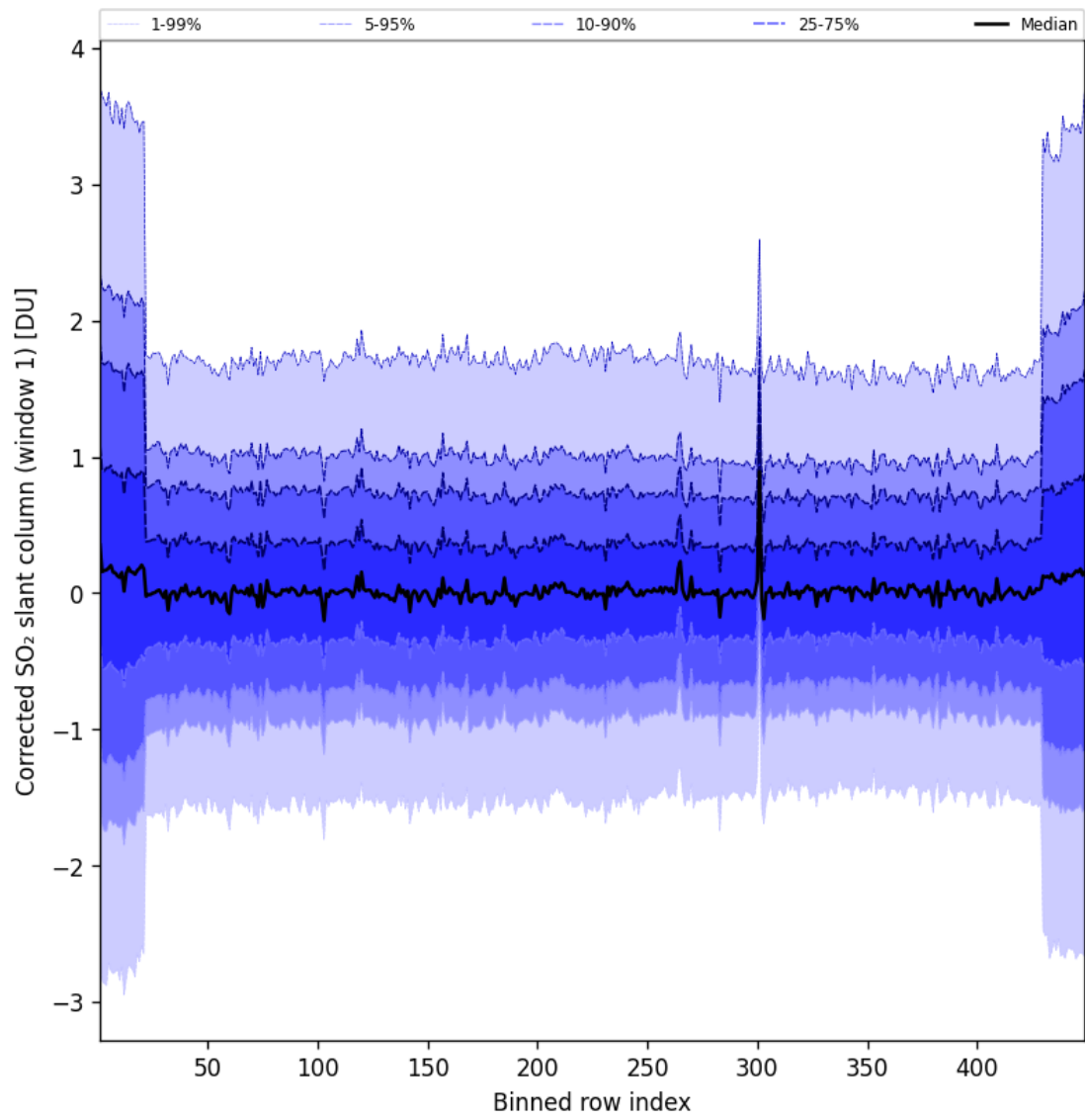


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-09-10 to 2025-09-11

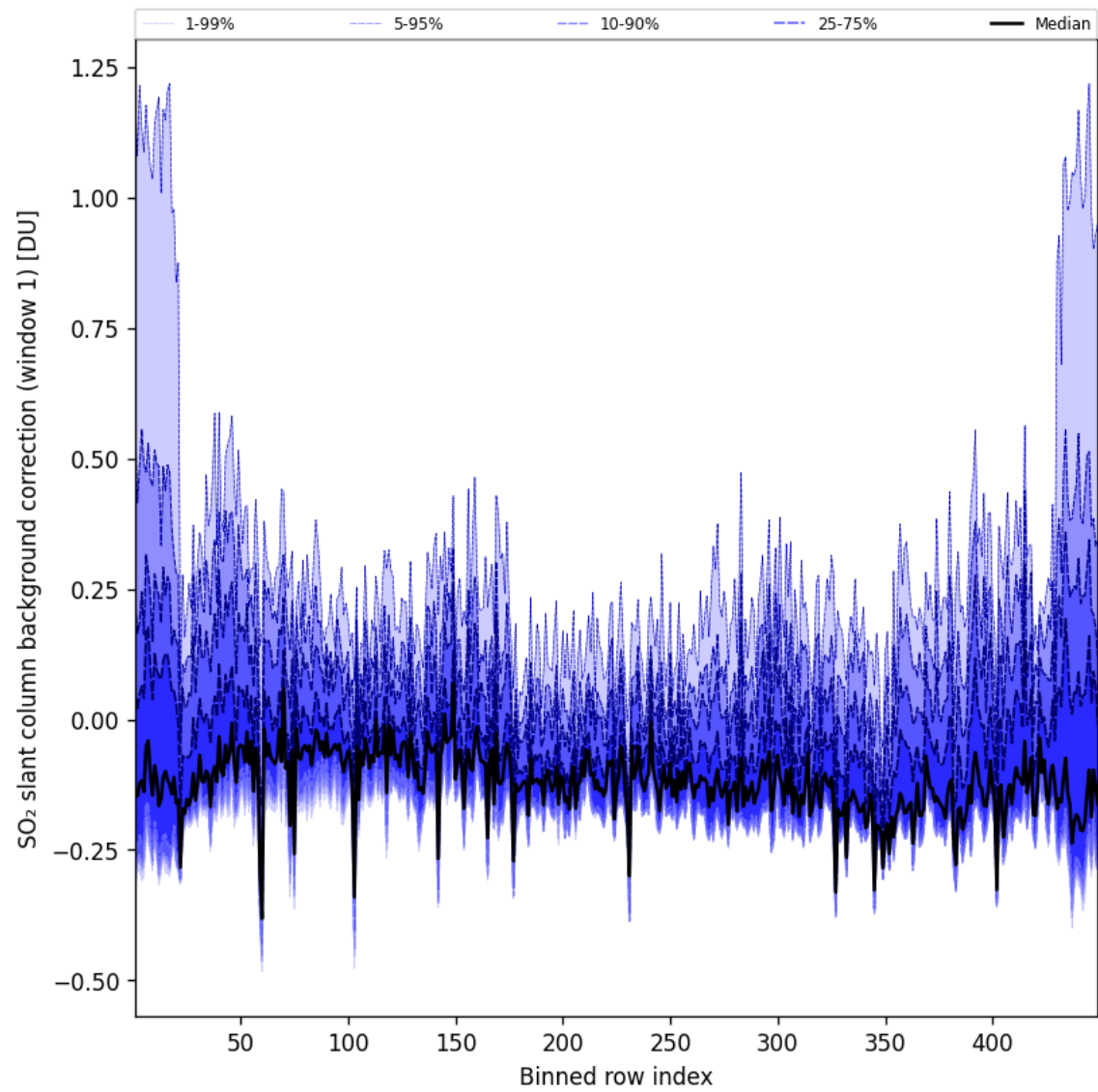


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-09-10 to 2025-09-11

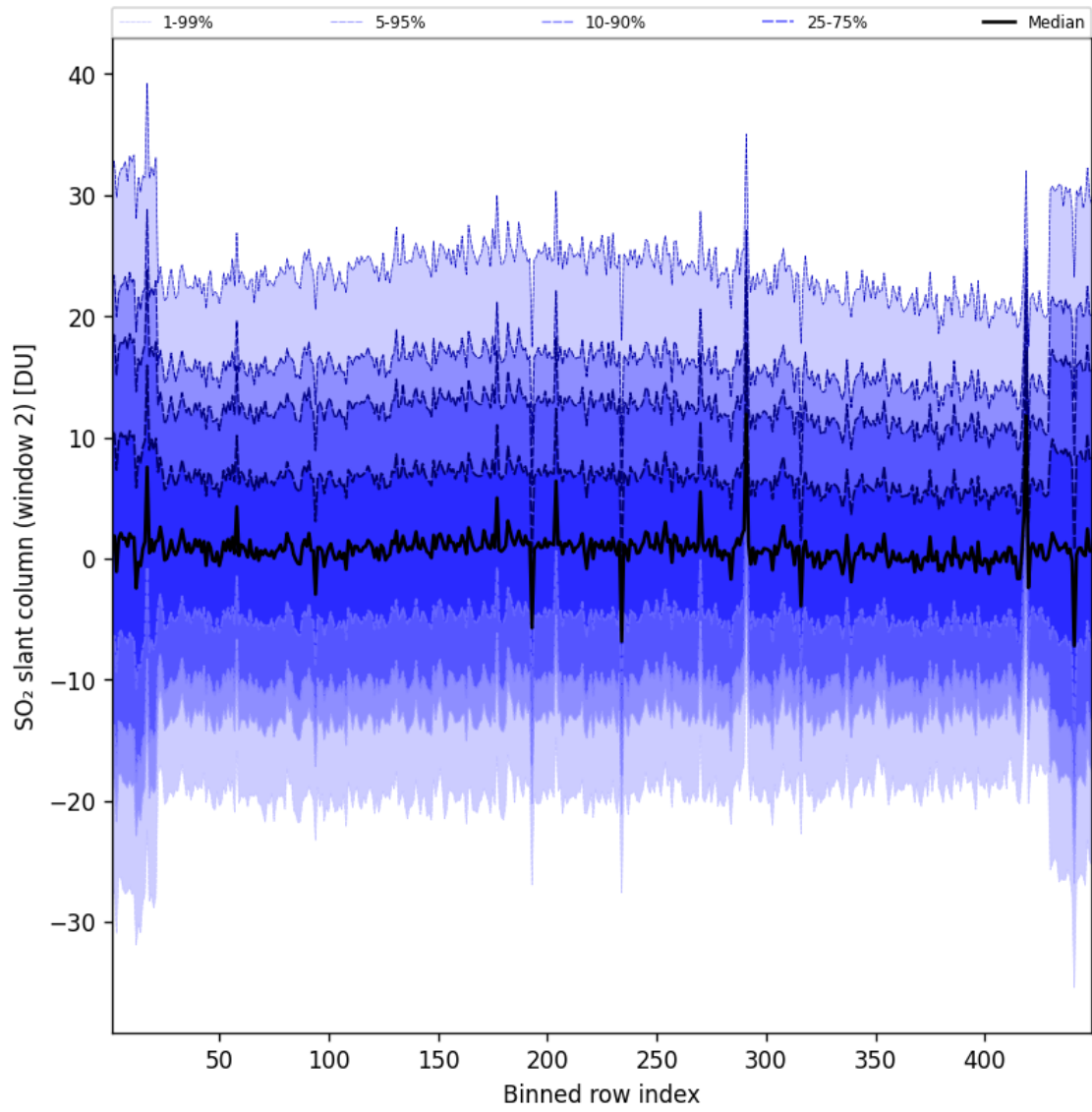


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-09-10 to 2025-09-11

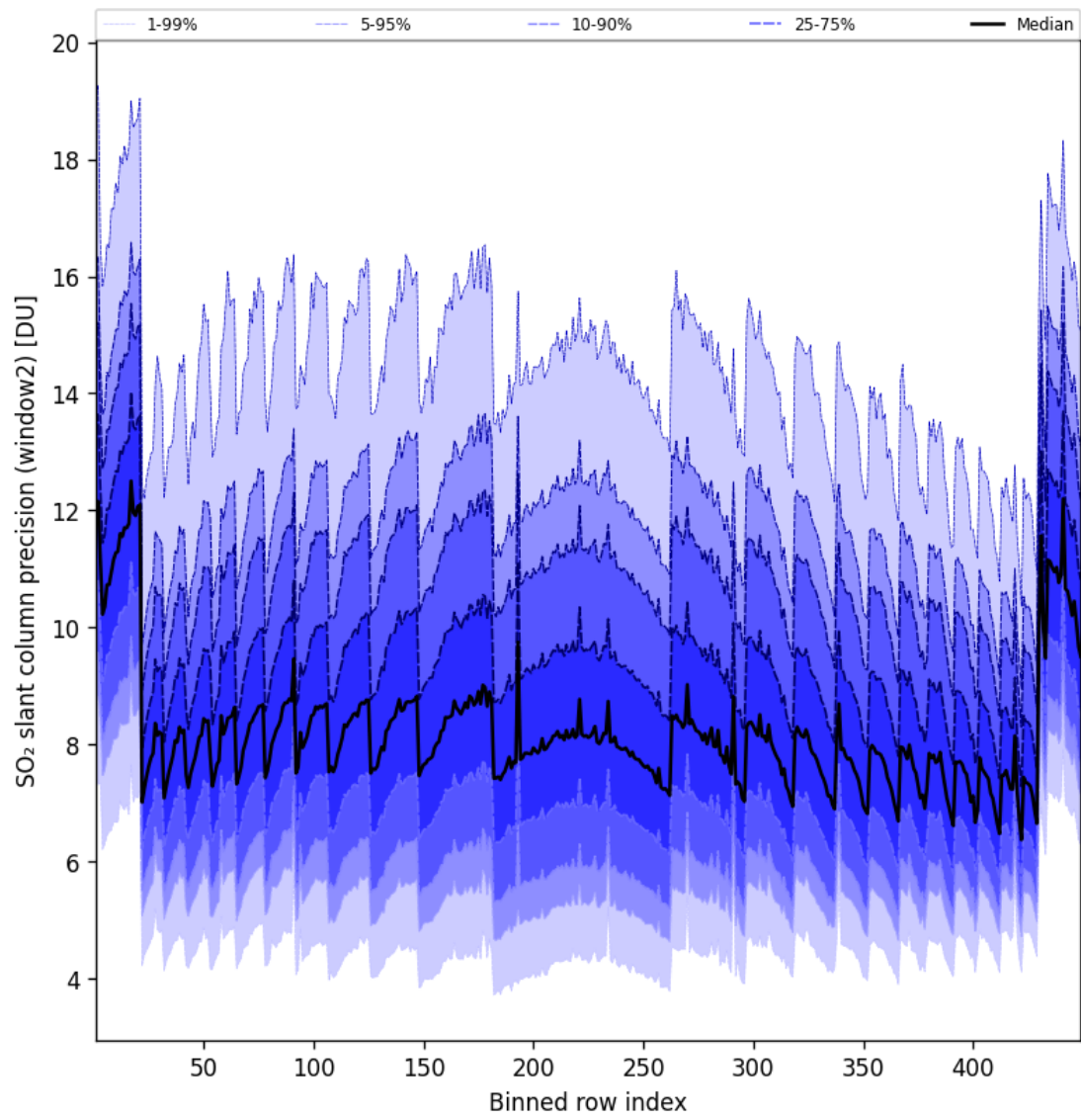


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-09-10 to 2025-09-11

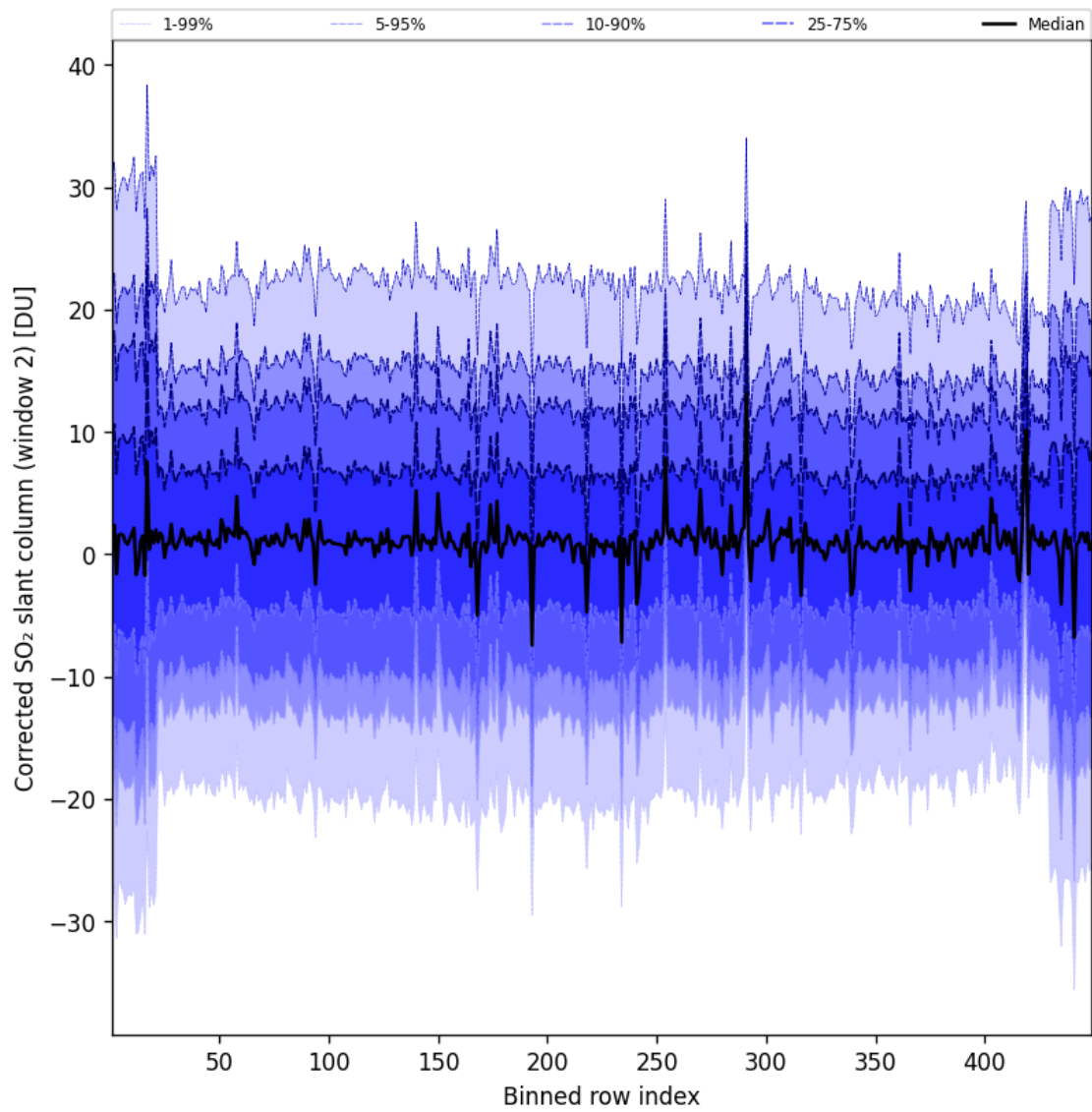


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-09-10 to 2025-09-11

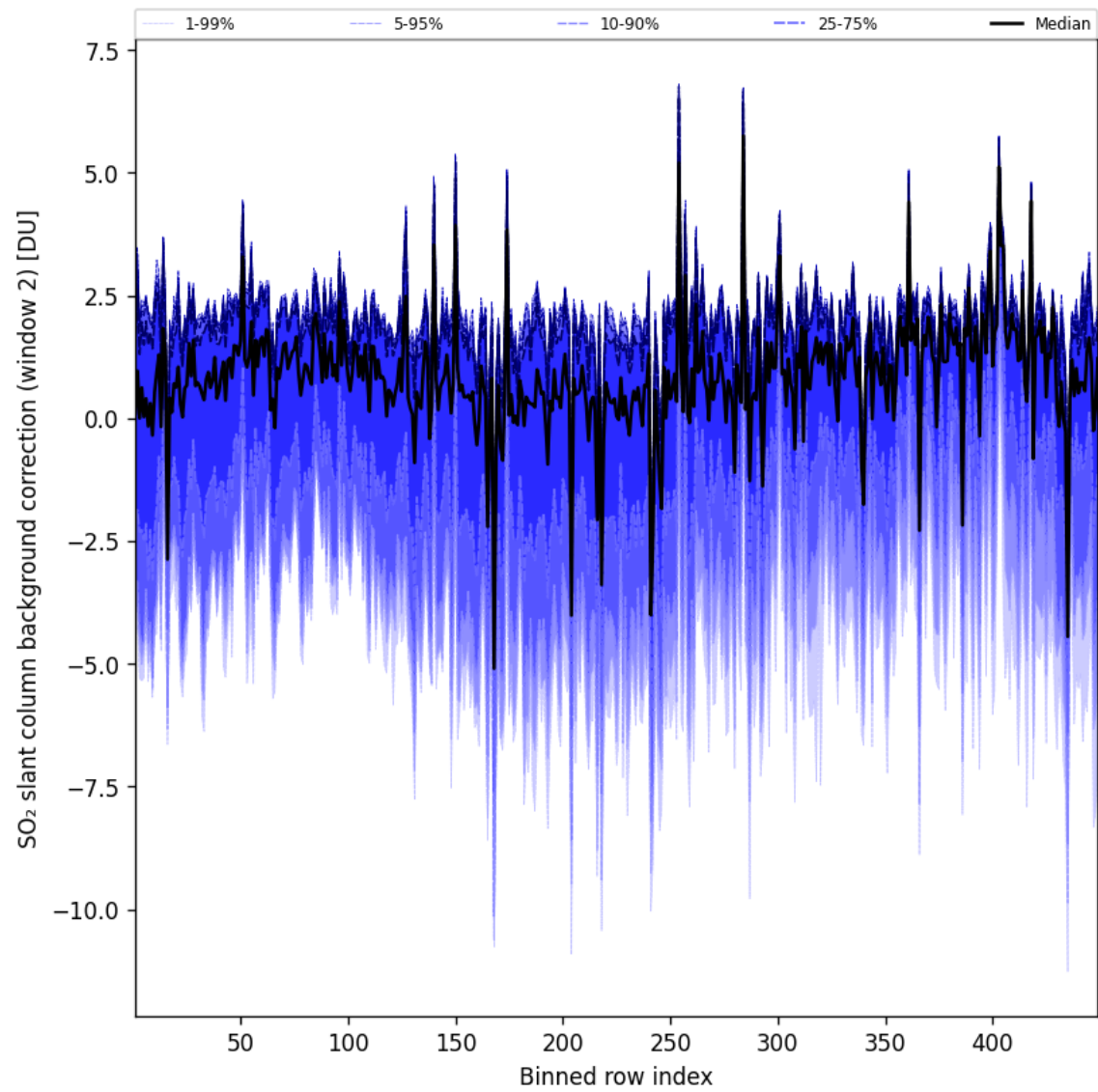


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-09-10 to 2025-09-11

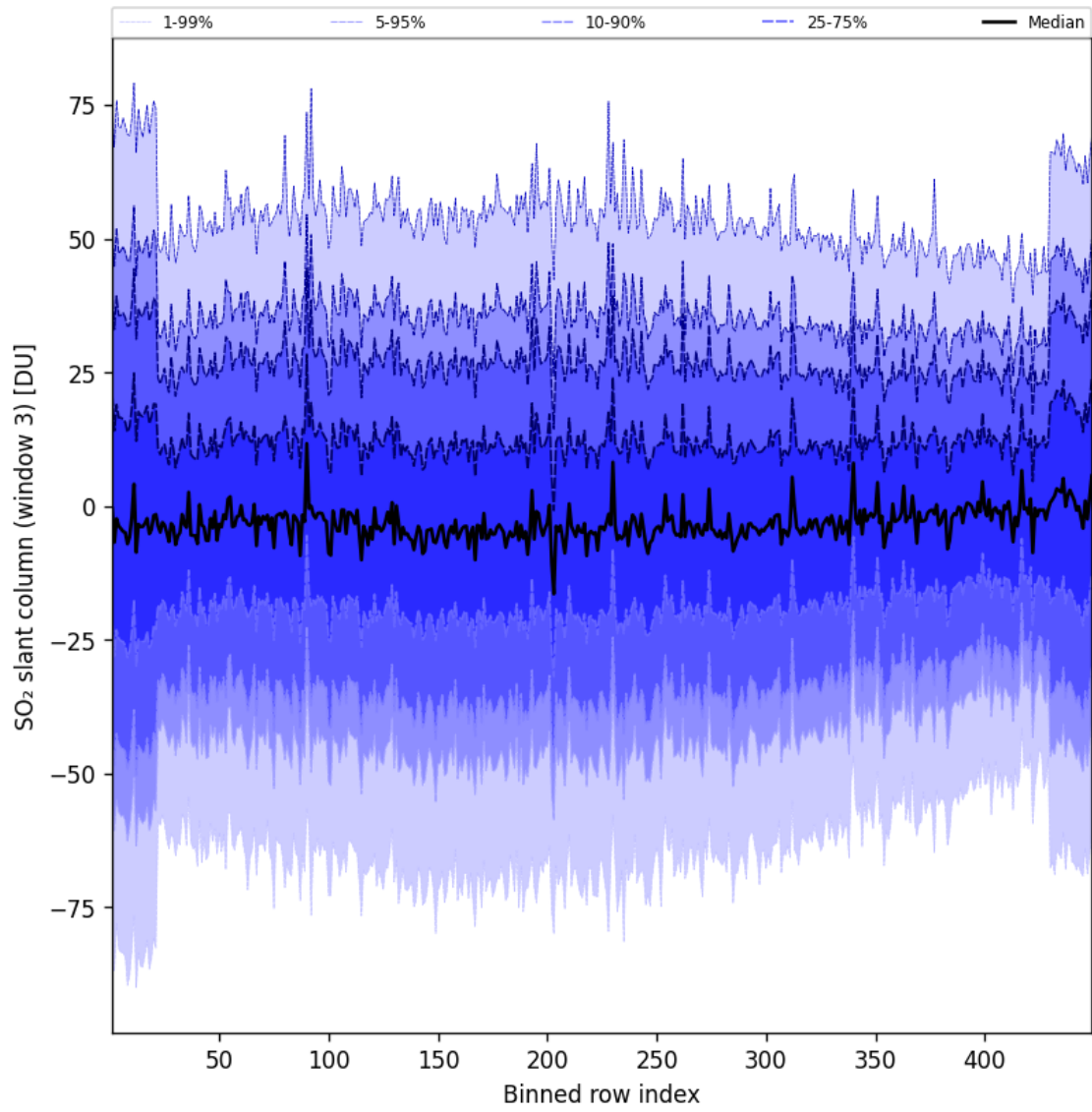


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-09-10 to 2025-09-11

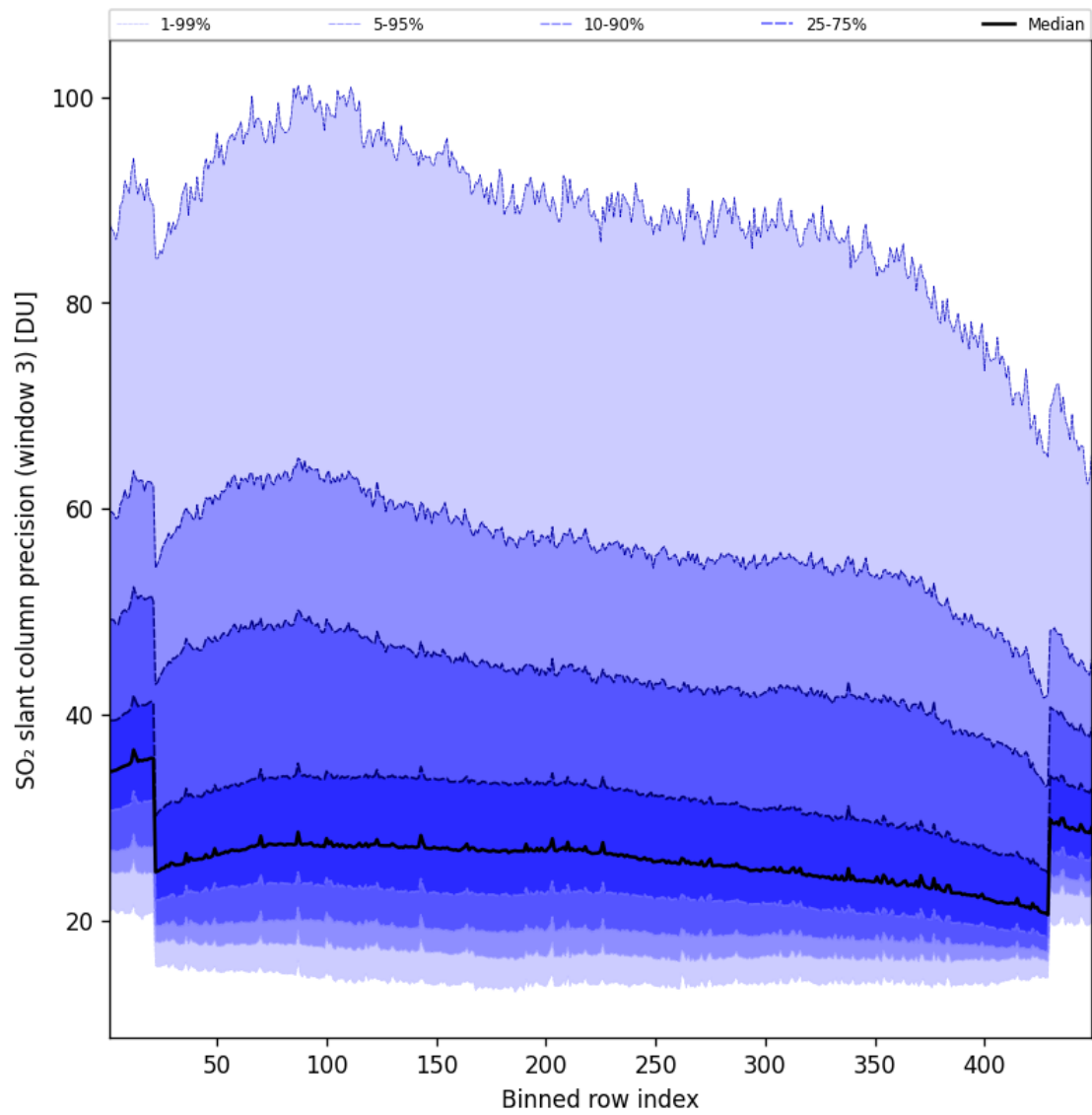


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-09-10 to 2025-09-11

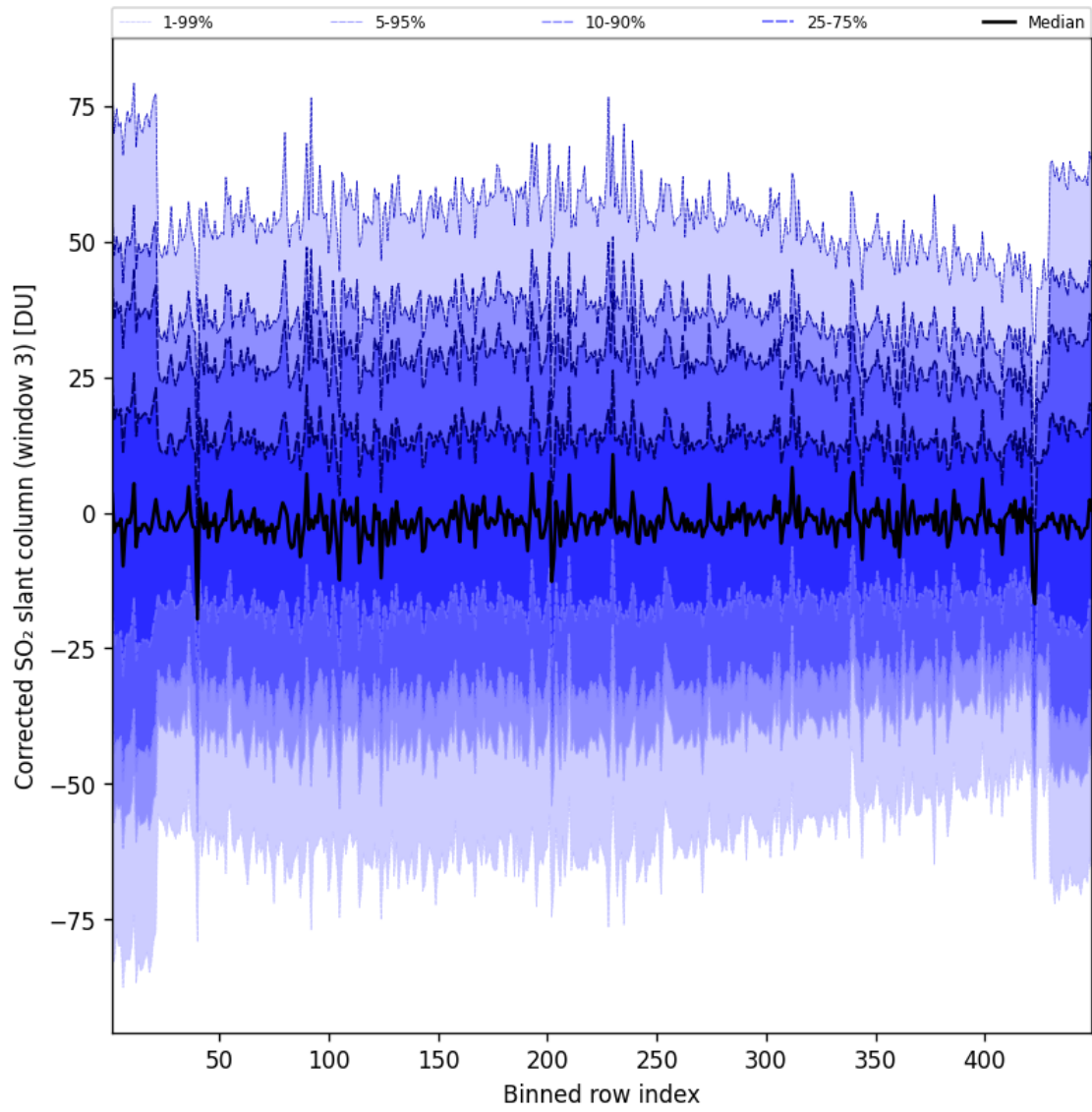


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-09-10 to 2025-09-11

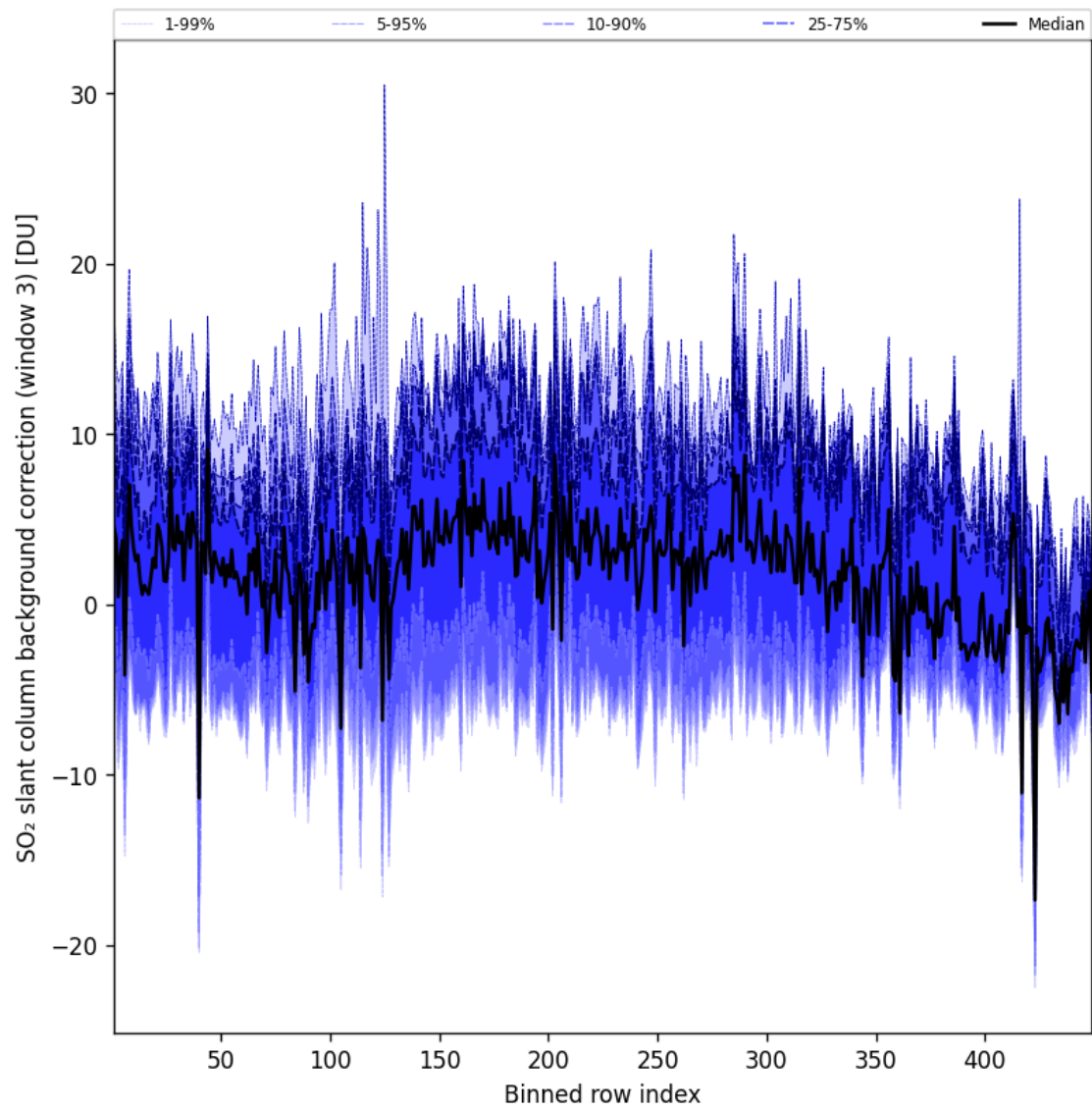


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-09-10 to 2025-09-11

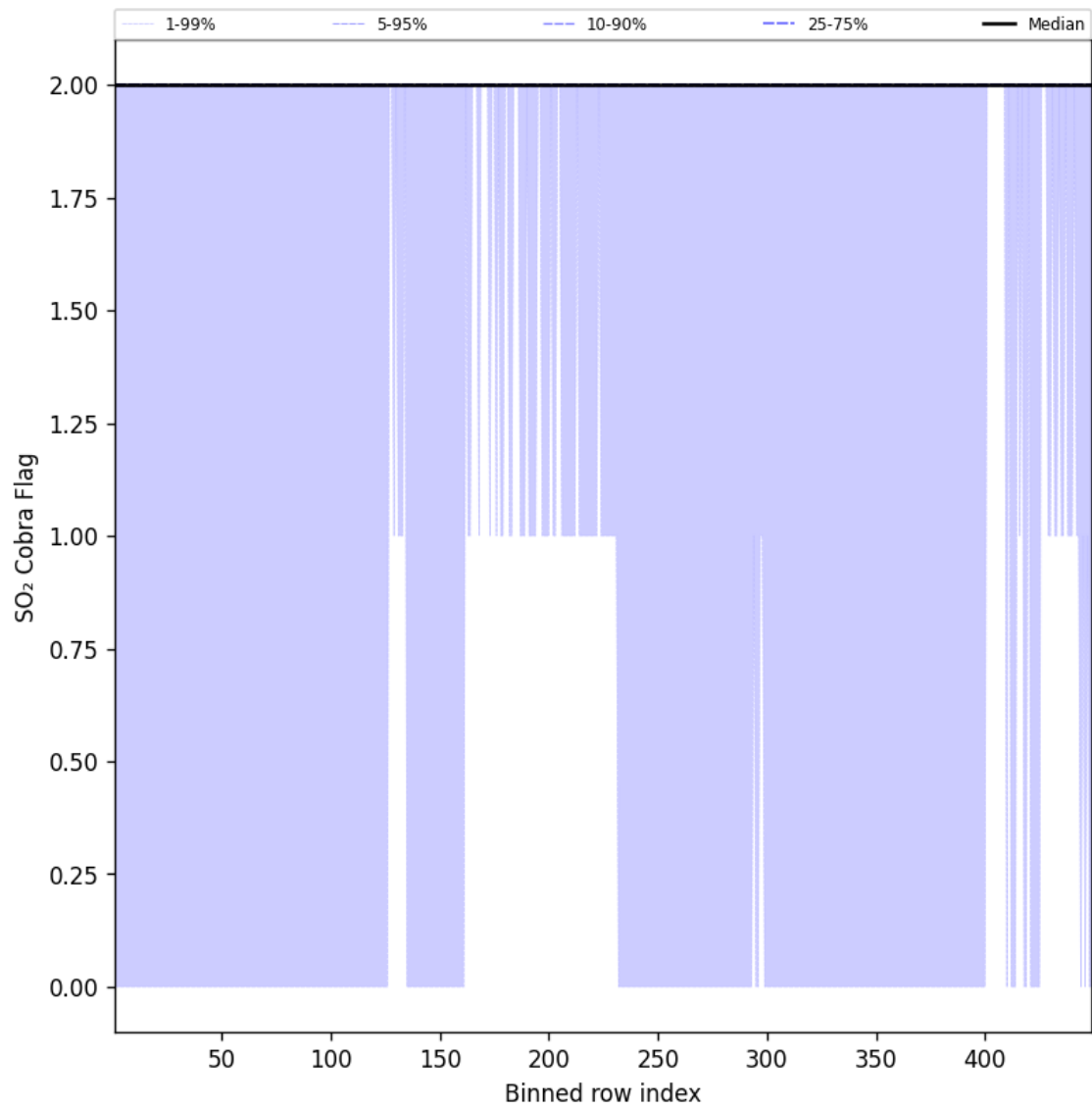


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-09-10 to 2025-09-11

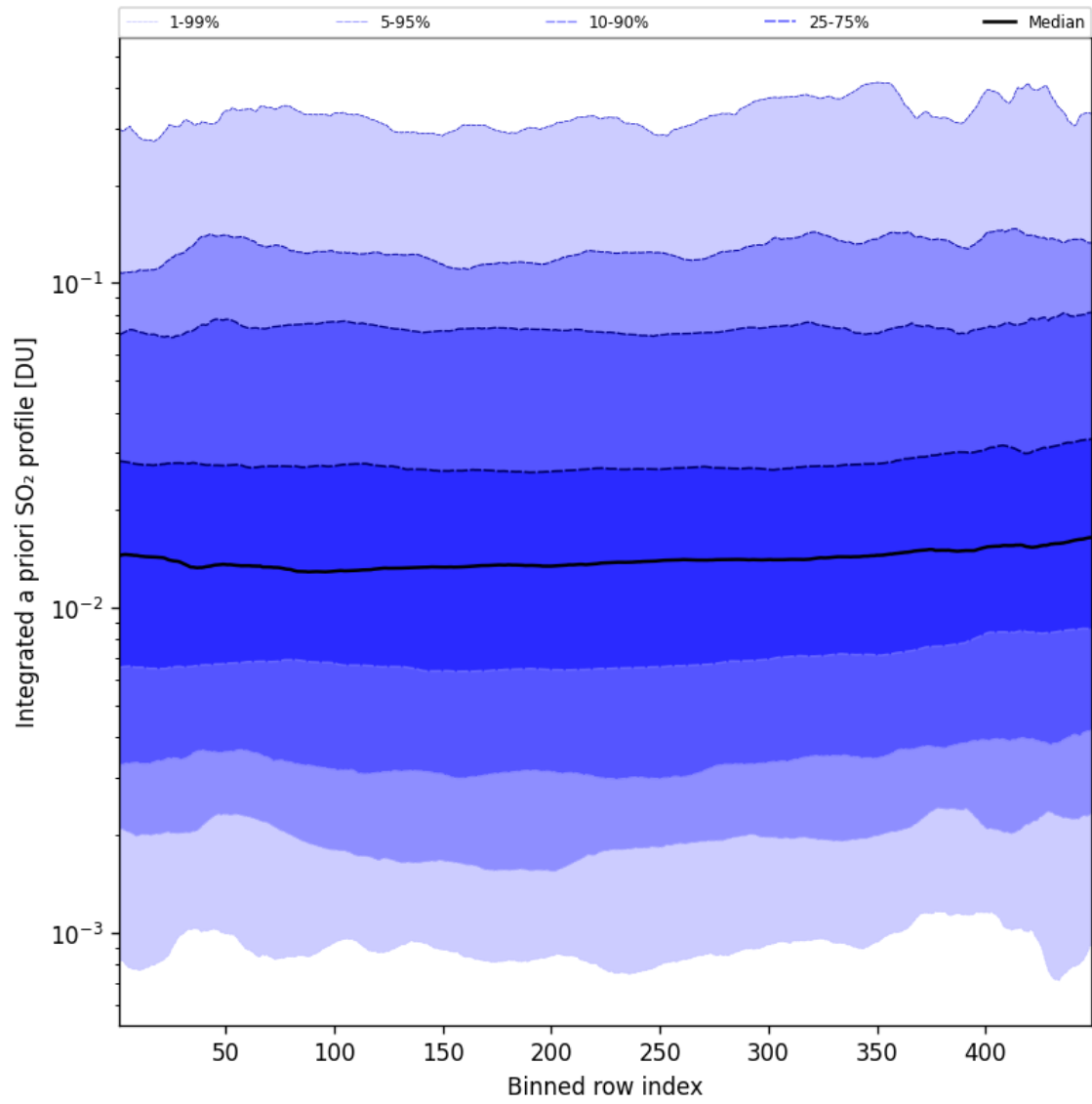


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-09-10 to 2025-09-11

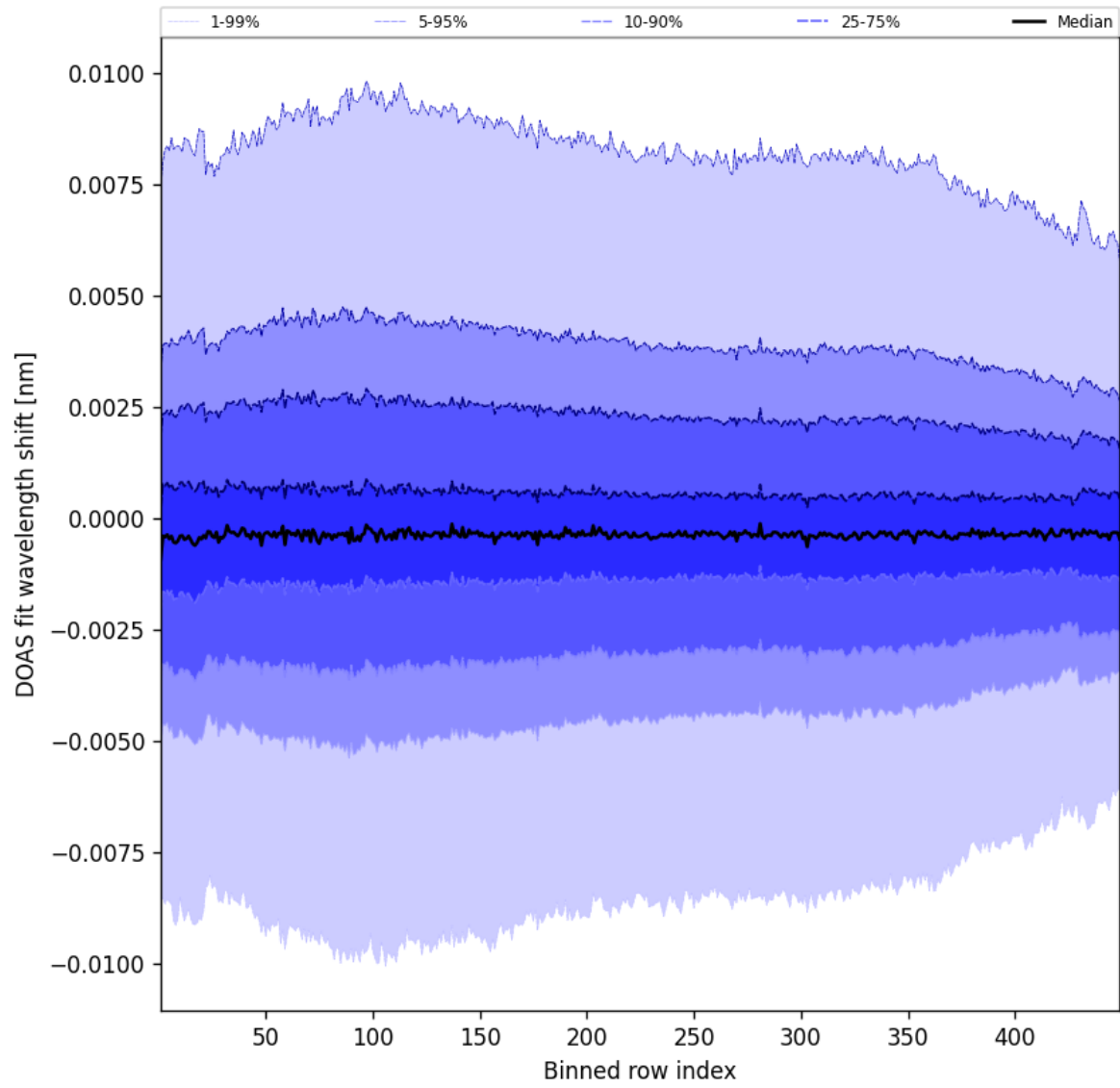


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-09-10 to 2025-09-11

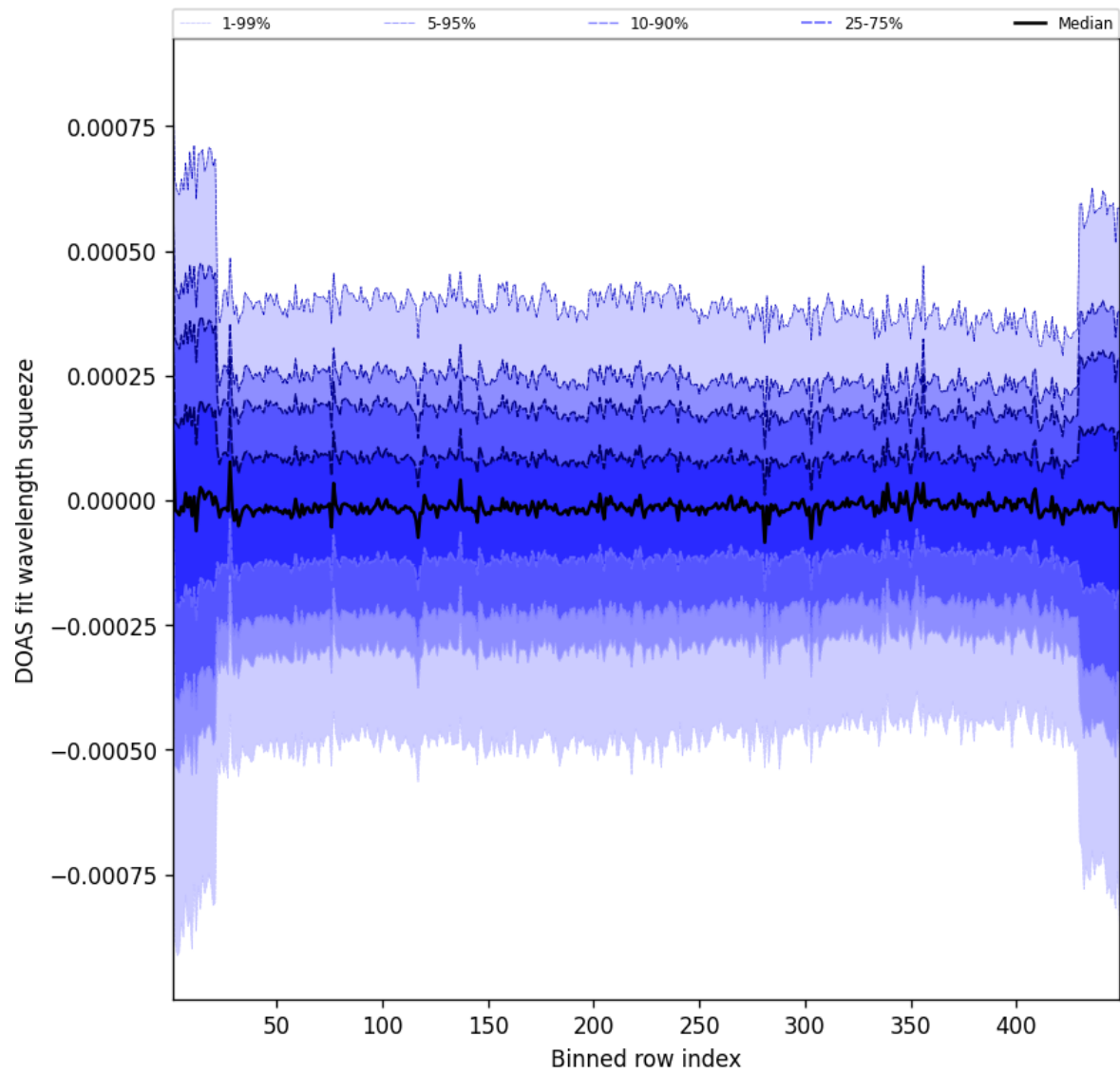


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-09-10 to 2025-09-11

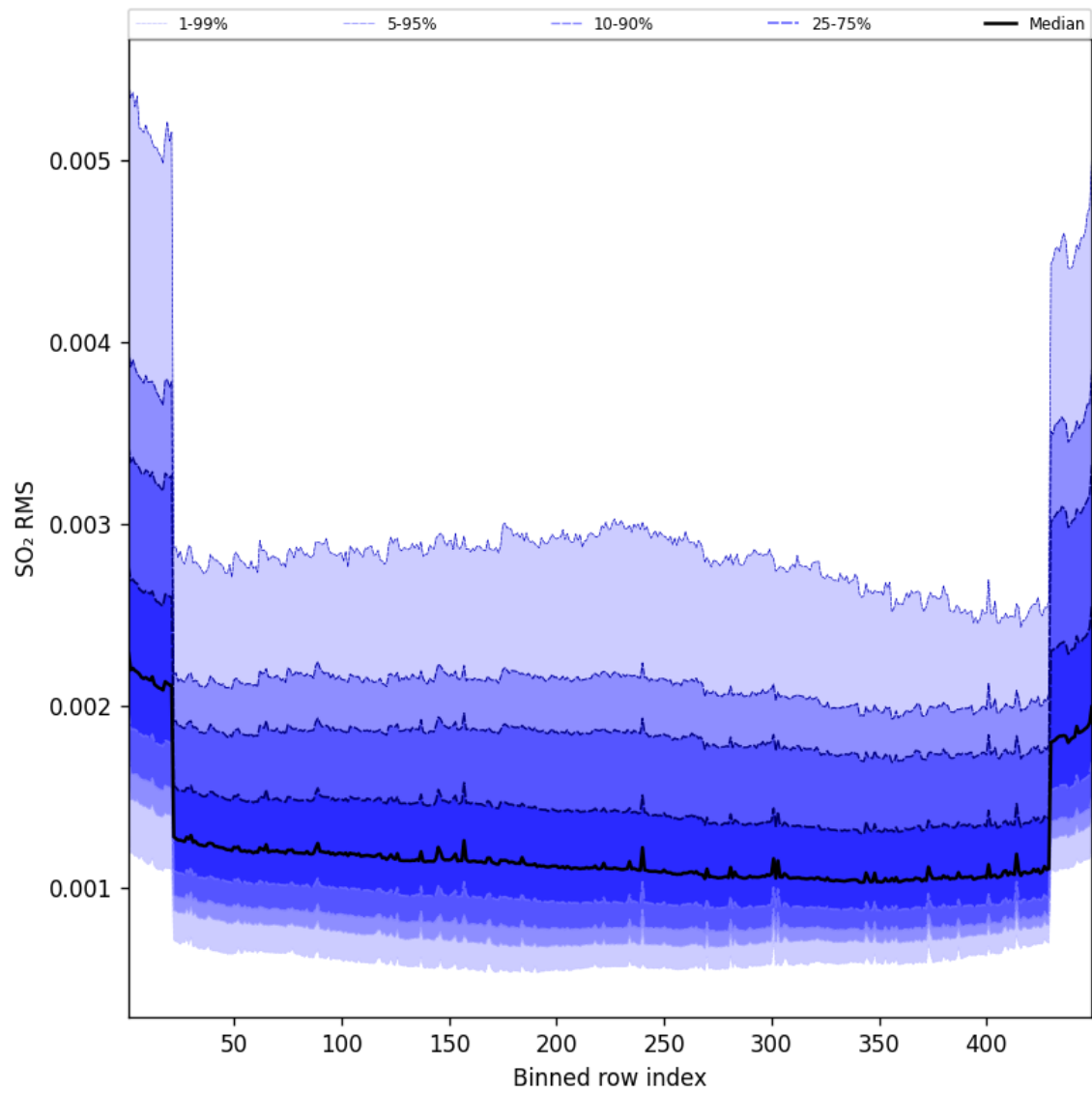


Figure 106: Along track statistics of “SO₂ RMS” for 2025-09-10 to 2025-09-11

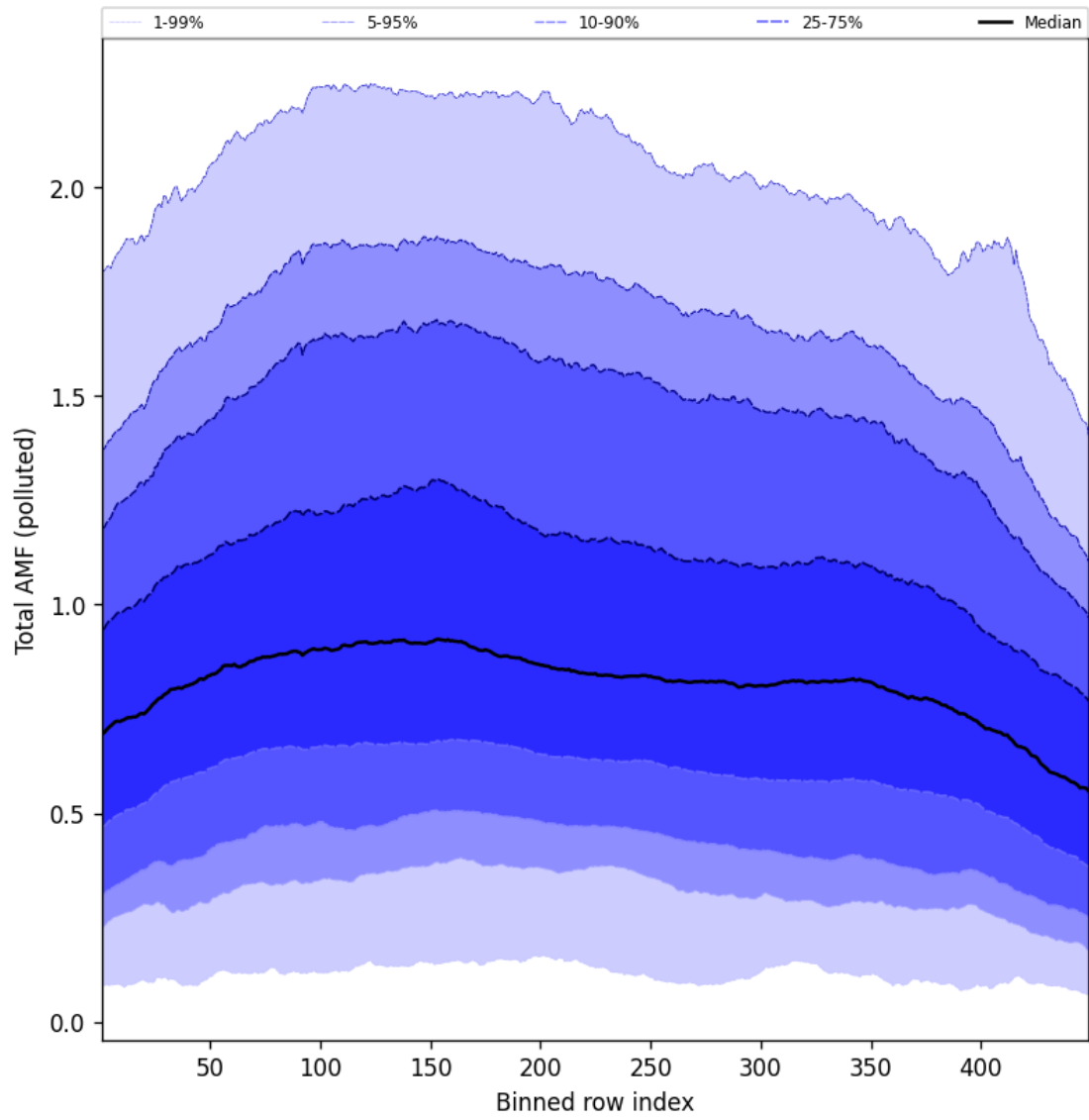


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-09-10 to 2025-09-11

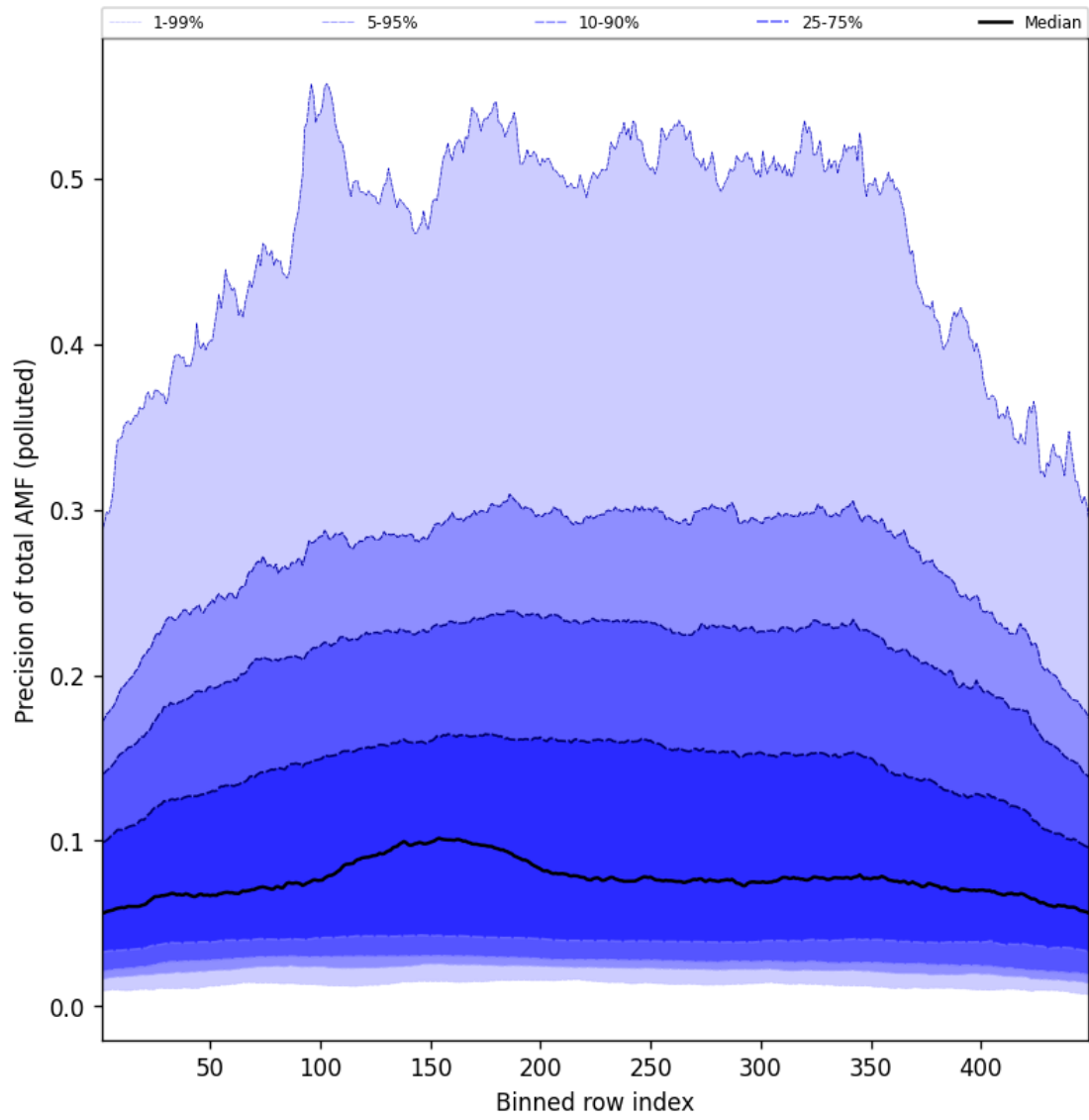


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-09-10 to 2025-09-11

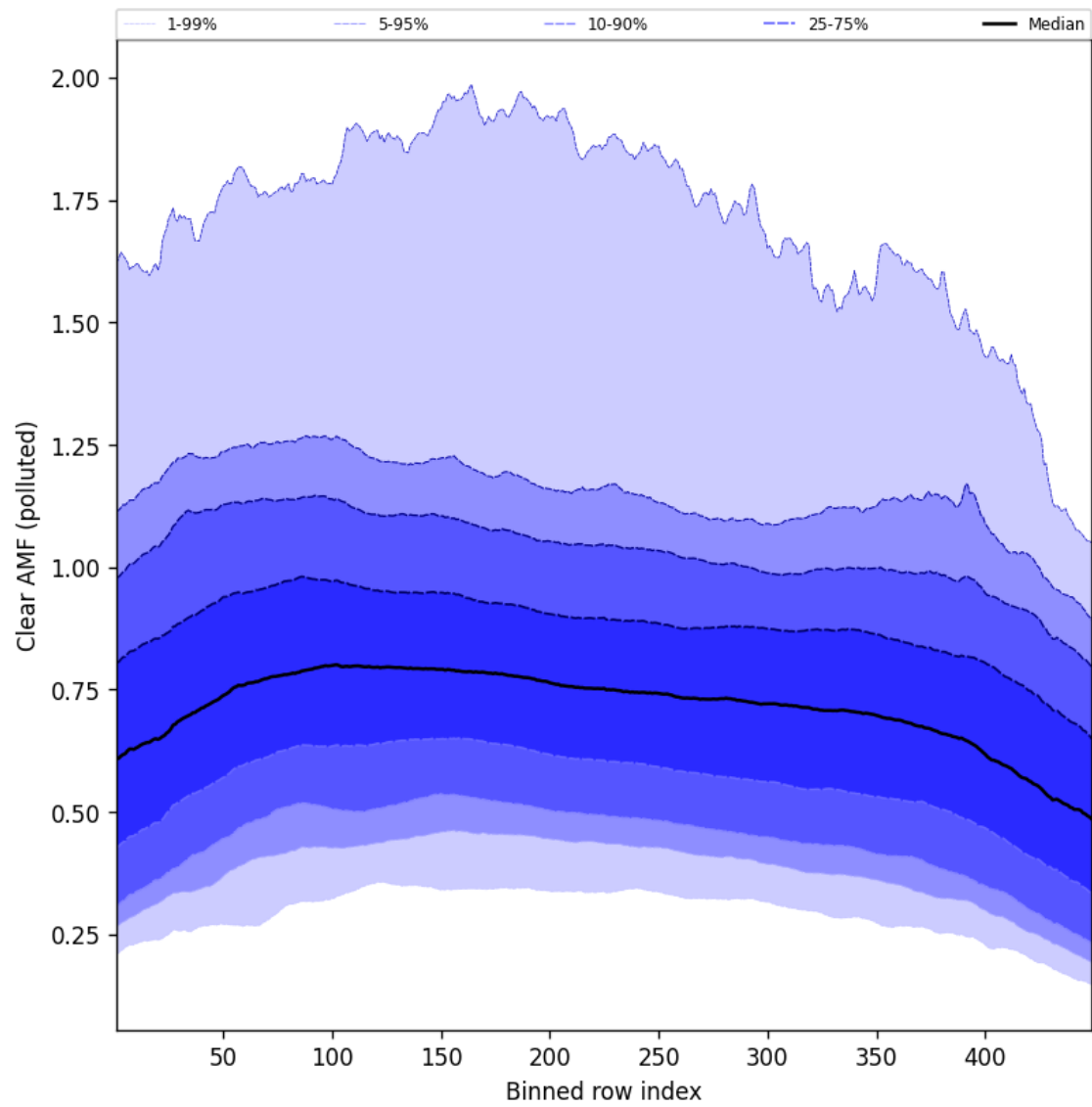


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-09-10 to 2025-09-11

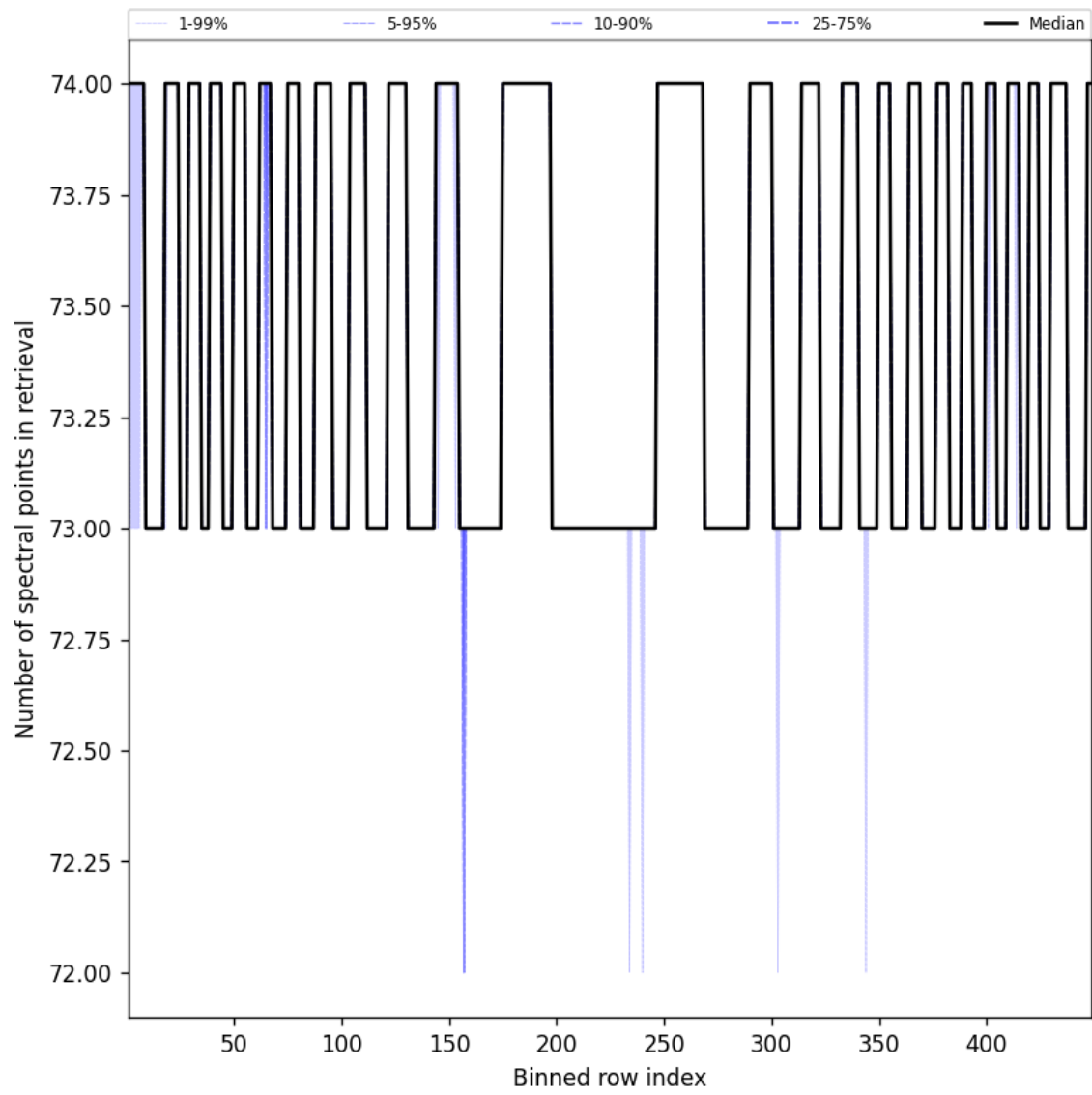


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-09-10 to 2025-09-11

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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