

PyCAMA report generated by tropl2-proc

tropl2-proc

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1 Short Introduction

1.1 The list of parameters

You may want to keep the list given in table 1 at hand when viewing the results.

2 Definitions

The averages shown here are *unweighed* averages:

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N x_i \quad (1)$$

with N the number of observations in the dataset.

The spread of the measurements is indicated with the variance $V(x)$, or rather the standard deviation $\sigma(x) = \sqrt{V(x)}$.

$$V(x) = \frac{1}{N-1} \sum_{i=1}^N (x_i - \bar{x})^2 \quad (2)$$

We also report the more robust statistics median, minimum, maximum, various percentiles and inter quartile range.

The median m is the value of parameter x for which half of the observations of x is smaller than m :

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^m f(x) dx = \frac{1}{2} \quad (3)$$

with $f(x)$ the probability density function.

The median is a special case of a percentile. Instead of $\frac{1}{2}$ in equation 3, other threshold values can be used. We report results for 1 %, 5 %, 10 %, 15.9 %, 25 %, 75 %, 84.1 %, 90 %, 95 % and 99 %. The inter quartile range is the difference between the 75 % and 25 % percentiles. Similarly the minimum and maximum values correspond to the 0 % and 100 % percentiles respectively.

For normally distributed parameters the mean and median are the same, while the $\mu \pm \sigma$ values and the 15.9 % and 84.1 % percentiles coincide.

To get a measure for the relation of one variable $x_{(k)}$ with another $x_{(l)}$, we calculate the covariance matrix C_{kl} .

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1} \sum_{i=1}^N (x_{(k),i} - \bar{x}_{(k)})(x_{(l),i} - \bar{x}_{(l)}) \quad (4)$$

Rather than a dimensionally dependent covariance, it is often easier to interpret a correlation matrix R_{kl} , a matrix of Pearson's r coefficients:

$$R_{kl} = R(x_{(k)}, x_{(l)}) = \frac{C_{kl}}{\sqrt{C_{kk}C_{ll}}} = \frac{C_{kl}}{\sqrt{V(x_k)V(x_l)}} \quad (5)$$

The diagonal elements of the covariance matrix are the variances of the elements, $V(x_{(k)}) = C_{kk}$ and obviously $R_{kk} = 1$.

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm \sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.689 ± 0.398	17248538	0.995	0.730	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.999 \pm 97.232) \times 10^{-2}$	17248538	0.294	0.460	1.087×10^{-2}	-124	1.155×10^3
sulfurdioxide total vertical column precision [DU]	0.513 ± 0.652	17248538	0.222	0.341	0.333	4.073×10^{-2}	208
sulfurdioxide slant column density corrected [DU]	$(1.938 \pm 43.229) \times 10^{-2}$	17248538	0.242	0.375	9.561×10^{-3}	-21.1	790
sulfurdioxide slant column density cobra [DU]	$(1.916 \pm 37.228) \times 10^{-2}$	17248538	0.242	0.375	9.561×10^{-3}	-21.1	34.5
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.139	17248538	0.213	0.143	0.261	8.457×10^{-2}	24.6
sulfurdioxide slant column density window1 [DU]	0.130 ± 0.699	17248538	0.175	0.749	0.136	-74.6	87.5
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.139	17248538	0.213	0.143	0.261	8.457×10^{-2}	24.6
sulfurdioxide slant column density corrected win1 [DU]	$(4.936 \pm 694.999) \times 10^{-3}$	17248538	-2.500×10^{-2}	0.741	-1.319×10^{-2}	-74.6	87.4
background so2 slant column offset window1 [DU]	-0.125 ± 0.138	17248538	-0.180	0.136	-0.148	-1.26	3.48
sulfurdioxide slant column density window2 [DU]	-0.464 ± 9.367	17248538	-1.25	11.8	-0.677	-1.566×10^3	1.223×10^3
sulfurdioxide slant column density window2 precision [DU]	8.47 ± 2.35	17248538	7.43	2.78	8.12	2.18	585
sulfurdioxide slant column density corrected win2 [DU]	-1.29 ± 9.19	17248538	-1.25	11.6	-1.29	-1.567×10^3	1.225×10^3
background so2 slant column offset window2 [DU]	-0.830 ± 2.277	17248538	0.750	3.06	-0.184	-21.0	9.71
sulfurdioxide slant column density window3 [DU]	-1.07 ± 25.09	17248538	0.560	31.5	-0.797	-1.022×10^3	615
sulfurdioxide slant column density window3 precision [DU]	30.6 ± 13.6	17248538	24.8	10.6	27.0	11.1	1.057×10^3
sulfurdioxide slant column density corrected win3 [DU]	1.46 ± 24.48	17248538	0.560	30.9	1.64	-1.026×10^3	611
background so2 slant column offset window3 [DU]	2.53 ± 5.78	17248538	-2.80	9.49	2.30	-17.1	21.7
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	17248538	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.209 \pm 6.507) \times 10^{-2}$	17248538	1.423×10^{-2}	1.987×10^{-2}	1.435×10^{-2}	2.990×10^{-4}	1.85
fitted radiance shift [nm]	$(-3.661 \pm 27.366) \times 10^{-4}$	17248538	-5.000×10^{-4}	1.905×10^{-3}	-3.567×10^{-4}	-5.538×10^{-2}	4.620×10^{-2}
fitted radiance squeeze [1]	$(-2.442 \pm 190.559) \times 10^{-6}$	17248538	1.000×10^{-5}	2.129×10^{-4}	2.038×10^{-6}	-1.463×10^{-2}	1.512×10^{-2}
fitted root mean square [1]	$(1.324 \pm 0.573) \times 10^{-3}$	17248538	9.750×10^{-4}	5.836×10^{-4}	1.158×10^{-3}	3.137×10^{-4}	7.536×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.872 ± 0.434	17248538	0.700	0.540	0.801	5.000×10^{-2}	3.03
sulfurdioxide total air mass factor polluted precision [1]	0.104 ± 0.098	17248538	3.500×10^{-2}	0.105	7.114×10^{-2}	3.910×10^{-3}	1.78
sulfurdioxide clear air mass factor polluted [1]	0.734 ± 0.279	17248538	0.700	0.340	0.706	8.089×10^{-2}	2.75
number of spectral points in retrieval [1]	73.4 ± 0.5	17248538	73.0	1.000	73.0	52.0	156

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	1.000×10^{-2}	7.000×10^{-2}	0.140	0.270	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.21	-0.869	-0.539	-0.365	-0.216	0.244	0.405	0.597	0.974	2.57
sulfurdioxide total vertical column precision [DU]	0.101	0.136	0.163	0.188	0.223	0.564	0.736	0.945	1.39	3.33
sulfurdioxide slant column density corrected [DU]	-0.884	-0.508	-0.367	-0.273	-0.176	0.199	0.302	0.404	0.566	1.06
sulfurdioxide slant column density cobra [DU]	-0.884	-0.508	-0.367	-0.273	-0.176	0.199	0.302	0.404	0.566	1.06
sulfurdioxide slant column density cobra precision [DU]	0.142	0.170	0.185	0.196	0.212	0.354	0.412	0.469	0.558	0.801
sulfurdioxide slant column density window1 [DU]	-1.77	-0.945	-0.641	-0.444	-0.241	0.508	0.704	0.893	1.18	1.97
sulfurdioxide slant column density window1 precision [DU]	0.142	0.170	0.185	0.196	0.212	0.354	0.412	0.469	0.558	0.801
sulfurdioxide slant column density corrected win1 [DU]	-1.74	-1.02	-0.749	-0.569	-0.379	0.363	0.568	0.771	1.09	1.98
background so2 slant column offset window1 [DU]	-0.370	-0.276	-0.247	-0.229	-0.207	-7.076×10^{-2}	-2.349×10^{-2}	2.803×10^{-2}	0.112	0.316
sulfurdioxide slant column density window2 [DU]	-22.1	-15.2	-11.9	-9.33	-6.49	5.31	8.38	11.2	15.0	23.3
sulfurdioxide slant column density window2 precision [DU]	4.46	5.41	5.95	6.39	6.91	9.69	10.6	11.5	12.7	15.3
sulfurdioxide slant column density corrected win2 [DU]	-23.5	-16.1	-12.6	-10.00	-7.09	4.50	7.39	9.99	13.5	21.1
background so2 slant column offset window2 [DU]	-6.99	-5.17	-4.16	-3.27	-2.23	0.833	1.10	1.32	1.65	3.49
sulfurdioxide slant column density window3 [DU]	-64.7	-42.7	-32.3	-24.8	-16.6	14.9	22.9	30.0	39.6	58.5
sulfurdioxide slant column density window3 precision [DU]	15.7	18.4	20.0	21.4	23.0	33.6	38.0	44.0	56.1	88.1
sulfurdioxide slant column density corrected win3 [DU]	-60.1	-39.0	-29.0	-21.7	-13.8	17.1	24.9	31.8	41.2	60.0
background so2 slant column offset window3 [DU]	-8.78	-5.97	-4.65	-3.60	-2.29	7.20	8.80	10.1	11.8	14.7
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]	9.231×10^{-4}	2.207×10^{-3}	3.757×10^{-3}	5.561×10^{-3}	7.791×10^{-3}	2.766×10^{-2}	4.394×10^{-2}	7.045×10^{-2}	0.126	0.291
fitted radiance shift [nm]	-8.490×10^{-3}	-4.427×10^{-3}	-2.985×10^{-3}	-2.125×10^{-3}	-1.357×10^{-3}	5.485×10^{-4}	1.303×10^{-3}	2.231×10^{-3}	3.813×10^{-3}	8.138×10^{-3}
fitted radiance squeeze [1]	-5.306×10^{-4}	-3.059×10^{-4}	-2.204×10^{-4}	-1.640×10^{-4}	-1.058×10^{-4}	1.071×10^{-4}	1.617×10^{-4}	2.132×10^{-4}	2.888×10^{-4}	4.719×10^{-4}
fitted root mean square [1]	6.031×10^{-4}	7.481×10^{-4}	8.256×10^{-4}	8.838×10^{-4}	9.555×10^{-4}	1.539×10^{-3}	1.787×10^{-3}	2.025×10^{-3}	2.396×10^{-3}	3.377×10^{-3}
sulfurdioxide total air mass factor polluted [1]	9.149×10^{-2}	0.267	0.382	0.472	0.569	1.11	1.31	1.49	1.71	2.13
sulfurdioxide total air mass factor polluted precision [1]	1.064×10^{-2}	2.001×10^{-2}	2.581×10^{-2}	3.047×10^{-2}	3.744×10^{-2}	0.142	0.179	0.217	0.285	0.474
sulfurdioxide clear air mass factor polluted [1]	0.249	0.346	0.413	0.473	0.545	0.885	0.975	1.06	1.18	1.67
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]	0.683 ± 0.404	9948454	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(2.198 \pm 90.965) \times 10^{-2}$	9948454	0.442	9.815×10^{-3}	-124	77.0	-0.209	0.233
sulfurdioxide total vertical column precision [DU]	0.505 ± 0.679	9948454	0.333	0.315	4.073×10^{-2}	208	0.215	0.548
sulfurdioxide slant column density corrected [DU]	$(1.455 \pm 32.634) \times 10^{-2}$	9948454	0.354	8.516×10^{-3}	-16.6	30.7	-0.167	0.187
sulfurdioxide slant column density cobra [DU]	$(1.454 \pm 32.620) \times 10^{-2}$	9948454	0.354	8.516×10^{-3}	-16.6	14.5	-0.167	0.187
sulfurdioxide slant column density cobra precision [DU]	0.280 ± 0.113	9948454	0.121	0.245	8.552×10^{-2}	14.9	0.205	0.325
sulfurdioxide slant column density window1 [DU]	0.131 ± 0.627	9948454	0.713	0.136	-9.09	30.7	-0.223	0.489
sulfurdioxide slant column density window1 precision [DU]	0.280 ± 0.113	9948454	0.121	0.245	8.552×10^{-2}	14.9	0.205	0.325
sulfurdioxide slant column density corrected win1 [DU]	$(-2.530 \pm 621.343) \times 10^{-3}$	9948454	0.704	-1.542×10^{-2}	-8.95	30.9	-0.363	0.341
background so2 slant column offset window1 [DU]	-0.134 ± 0.116	9948454	0.141	-0.152	-0.990	3.33	-0.210	-6.923×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.843 ± 8.999	9948454	11.5	-0.982	-995	646	-6.65	4.81
sulfurdioxide slant column density window2 precision [DU]	8.31 ± 2.28	9948454	2.73	7.95	2.18	498	6.76	9.49
sulfurdioxide slant column density corrected win2 [DU]	-1.23 ± 8.90	9948454	11.3	-1.23	-997	645	-6.90	4.43
background so2 slant column offset window2 [DU]	-0.391 ± 1.833	9948454	2.41	7.948×10^{-2}	-11.4	9.71	-1.54	0.872
sulfurdioxide slant column density window3 [DU]	-0.397 ± 25.145	9948454	31.4	-0.161	-1.022×10^3	615	-15.9	15.6
sulfurdioxide slant column density window3 precision [DU]	30.4 ± 14.1	9948454	11.0	26.6	11.1	1.057×10^3	22.5	33.5
sulfurdioxide slant column density corrected win3 [DU]	1.43 ± 24.41	9948454	30.7	1.62	-1.026×10^3	611	-13.7	17.0
background so2 slant column offset window3 [DU]	1.82 ± 5.96	9948454	10.3	1.54	-17.1	17.5	-3.35	6.99
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	9948454	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.831 \pm 7.727) \times 10^{-2}$	9948454	2.824×10^{-2}	1.576×10^{-2}	2.990×10^{-4}	1.85	7.162×10^{-3}	3.540×10^{-2}
fitted radiance shift [nm]	$(-1.146 \pm 28.575) \times 10^{-4}$	9948454	1.785×10^{-3}	-1.569×10^{-4}	-4.628×10^{-2}	4.620×10^{-2}	-1.024×10^{-3}	7.601×10^{-4}
fitted radiance squeeze [1]	$(-1.685 \pm 16.752) \times 10^{-5}$	9948454	2.003×10^{-4}	-1.059×10^{-5}	-1.297×10^{-2}	1.106×10^{-2}	-1.134×10^{-4}	8.696×10^{-5}
fitted root mean square [1]	$(1.240 \pm 0.469) \times 10^{-3}$	9948454	5.045×10^{-4}	1.109×10^{-3}	3.137×10^{-4}	2.310×10^{-2}	9.291×10^{-4}	1.434×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.867 ± 0.456	9948454	0.568	0.810	5.000×10^{-2}	3.03	0.542	1.11
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.107	9948454	0.105	6.803×10^{-2}	3.910×10^{-3}	1.78	3.728×10^{-2}	0.143
sulfurdioxide clear air mass factor polluted [1]	0.754 ± 0.318	9948454	0.408	0.726	8.089×10^{-2}	2.75	0.522	0.930
number of spectral points in retrieval [1]	73.5 ± 0.5	9948454	1.000	73.0	71.0	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]	0.697 ± 0.389	7300084	0.700	1.000	0.0	1.000	0.300	1.000
sulfurdioxide total vertical column [DU]	$(4.091 \pm 105.164) \times 10^{-2}$	7300084	0.486	1.241×10^{-2}	-53.4	1.155×10^3	-0.226	0.260
sulfurdioxide total vertical column precision [DU]	0.524 ± 0.614	7300084	0.347	0.356	4.223×10^{-2}	45.6	0.237	0.585
sulfurdioxide slant column density corrected [DU]	$(2.598 \pm 54.437) \times 10^{-2}$	7300084	0.407	1.121×10^{-2}	-21.1	790	-0.189	0.217
sulfurdioxide slant column density cobra [DU]	$(2.544 \pm 42.708) \times 10^{-2}$	7300084	0.407	1.121×10^{-2}	-21.1	34.5	-0.189	0.217
sulfurdioxide slant column density cobra precision [DU]	0.332 ± 0.163	7300084	0.166	0.288	8.457×10^{-2}	24.6	0.225	0.391
sulfurdioxide slant column density window1 [DU]	0.128 ± 0.786	7300084	0.803	0.137	-74.6	87.5	-0.268	0.535
sulfurdioxide slant column density window1 precision [DU]	0.332 ± 0.163	7300084	0.166	0.288	8.457×10^{-2}	24.6	0.225	0.391
sulfurdioxide slant column density corrected win1 [DU]	$(1.511 \pm 78.420) \times 10^{-2}$	7300084	0.797	-9.790×10^{-3}	-74.6	87.4	-0.402	0.396
background so2 slant column offset window1 [DU]	-0.113 ± 0.163	7300084	0.129	-0.144	-1.26	3.48	-0.202	-7.316×10^{-2}
sulfurdioxide slant column density window2 [DU]	$(5.373 \pm 982.164) \times 10^{-2}$	7300084	12.3	-0.234	-1.566×10^3	1.223×10^3	-6.25	6.03
sulfurdioxide slant column density window2 precision [DU]	8.71 ± 2.43	7300084	2.81	8.36	2.38	585	7.13	9.93
sulfurdioxide slant column density corrected win2 [DU]	-1.37 ± 9.58	7300084	12.0	-1.38	-1.567×10^3	1.225×10^3	-7.37	4.59
background so2 slant column offset window2 [DU]	-1.43 ± 2.66	7300084	4.28	-0.750	-21.0	9.68	-3.51	0.766
sulfurdioxide slant column density window3 [DU]	-1.98 ± 24.99	7300084	31.6	-1.66	-802	315	-17.6	14.1
sulfurdioxide slant column density window3 precision [DU]	30.9 ± 12.8	7300084	10.1	27.5	11.2	311	23.6	33.8
sulfurdioxide slant column density corrected win3 [DU]	1.51 ± 24.58	7300084	31.1	1.66	-801	315	-13.9	17.2
background so2 slant column offset window3 [DU]	3.49 ± 5.37	7300084	8.22	2.94	-14.6	21.7	-0.703	7.52
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	7300084	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.361 \pm 4.173) \times 10^{-2}$	7300084	1.286×10^{-2}	1.344×10^{-2}	4.140×10^{-4}	1.03	8.278×10^{-3}	2.114×10^{-2}
fitted radiance shift [nm]	$(-7.088 \pm 25.228) \times 10^{-4}$	7300084	1.958×10^{-3}	-6.617×10^{-4}	-5.538×10^{-2}	3.812×10^{-2}	-1.736×10^{-3}	2.213×10^{-4}
fitted radiance squeeze [1]	$(1.720 \pm 21.653) \times 10^{-5}$	7300084	2.306×10^{-4}	2.171×10^{-5}	-1.463×10^{-2}	1.512×10^{-2}	-9.348×10^{-5}	1.371×10^{-4}
fitted root mean square [1]	$(1.437 \pm 0.673) \times 10^{-3}$	7300084	6.881×10^{-4}	1.238×10^{-3}	3.381×10^{-4}	7.536×10^{-2}	1.001×10^{-3}	1.689×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.878 ± 0.402	7300084	0.514	0.790	5.000×10^{-2}	2.68	0.594	1.11
sulfurdioxide total air mass factor polluted precision [1]	0.100 ± 0.083	7300084	0.103	7.551×10^{-2}	4.605×10^{-3}	1.71	3.762×10^{-2}	0.141
sulfurdioxide clear air mass factor polluted [1]	0.707 ± 0.211	7300084	0.265	0.689	8.581×10^{-2}	2.61	0.566	0.831
number of spectral points in retrieval [1]	73.4 ± 0.5	7300084	1.000	73.0	52.0	156	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]	0.694 ± 0.391	11569609	0.710	1.000	0.0	1.000	0.290	1.000
sulfurdioxide total vertical column [DU]	$(3.094 \pm 91.458) \times 10^{-2}$	11569609	0.446	1.080×10^{-2}	-53.4	190	-0.210	0.237
sulfurdioxide total vertical column precision [DU]	0.493 ± 0.626	11569609	0.309	0.316	5.316×10^{-2}	30.8	0.221	0.530
sulfurdioxide slant column density corrected [DU]	$(1.964 \pm 39.553) \times 10^{-2}$	11569609	0.372	9.556×10^{-3}	-21.1	169	-0.175	0.197
sulfurdioxide slant column density cobra [DU]	$(1.942 \pm 38.001) \times 10^{-2}$	11569609	0.372	9.556×10^{-3}	-21.1	19.7	-0.175	0.197
sulfurdioxide slant column density cobra precision [DU]	0.305 ± 0.148	11569609	0.154	0.255	8.457×10^{-2}	13.4	0.208	0.362
sulfurdioxide slant column density window1 [DU]	0.131 ± 0.713	11569609	0.746	0.142	-74.6	37.0	-0.236	0.511
sulfurdioxide slant column density window1 precision [DU]	0.305 ± 0.148	11569609	0.154	0.255	8.457×10^{-2}	13.4	0.208	0.362
sulfurdioxide slant column density corrected win1 [DU]	$(8.307 \pm 709.984) \times 10^{-3}$	11569609	0.739	-1.024×10^{-2}	-74.6	36.8	-0.375	0.364
background so2 slant column offset window1 [DU]	-0.123 ± 0.150	11569609	0.135	-0.152	-1.26	3.48	-0.208	-7.307×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.344 ± 9.284	11569609	11.7	-0.616	-1.425×10^3	646	-6.36	5.35
sulfurdioxide slant column density window2 precision [DU]	8.33 ± 2.24	11569609	2.68	7.97	2.18	498	6.82	9.50
sulfurdioxide slant column density corrected win2 [DU]	-1.29 ± 9.06	11569609	11.4	-1.30	-1.426×10^3	645	-7.03	4.42
background so2 slant column offset window2 [DU]	-0.947 ± 2.452	11569609	3.46	-0.129	-21.0	9.71	-2.59	0.866
sulfurdioxide slant column density window3 [DU]	1.45 ± 24.63	11569609	31.2	1.49	-433	315	-14.0	17.2
sulfurdioxide slant column density window3 precision [DU]	29.4 ± 12.1	11569609	9.83	26.1	11.1	805	22.5	32.3
sulfurdioxide slant column density corrected win3 [DU]	3.87 ± 23.74	11569609	30.2	3.78	-434	315	-11.2	19.0
background so2 slant column offset window3 [DU]	2.42 ± 5.86	11569609	9.50	1.84	-17.1	21.7	-2.39	7.12
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	11569609	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.014 \pm 3.571) \times 10^{-2}$	11569609	1.325×10^{-2}	1.334×10^{-2}	4.126×10^{-4}	1.85	8.160×10^{-3}	2.141×10^{-2}
fitted radiance shift [nm]	$(-4.337 \pm 24.806) \times 10^{-4}$	11569609	1.923×10^{-3}	-3.936×10^{-4}	-4.421×10^{-2}	3.844×10^{-2}	-1.437×10^{-3}	4.859×10^{-4}
fitted radiance squeeze [1]	$(5.071 \pm 195.584) \times 10^{-6}$	11569609	2.118×10^{-4}	1.028×10^{-5}	-1.354×10^{-2}	1.399×10^{-2}	-9.679×10^{-5}	1.150×10^{-4}
fitted root mean square [1]	$(1.334 \pm 0.614) \times 10^{-3}$	11569609	6.298×10^{-4}	1.132×10^{-3}	3.137×10^{-4}	3.892×10^{-2}	9.415×10^{-4}	1.571×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.876 ± 0.392	11569609	0.488	0.822	5.000×10^{-2}	2.61	0.611	1.10
sulfurdioxide total air mass factor polluted precision [1]	$(9.861 \pm 8.420) \times 10^{-2}$	11569609	9.541×10^{-2}	7.095×10^{-2}	4.019×10^{-3}	1.78	3.979×10^{-2}	0.135
sulfurdioxide clear air mass factor polluted [1]	0.737 ± 0.228	11569609	0.298	0.728	8.089×10^{-2}	2.61	0.583	0.881
number of spectral points in retrieval [1]	73.4 ± 0.5	11569609	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]	0.717 $\pm$ 0.400	3997368	0.710	1.000	0.0	1.000	0.290	1.000
sulfurdioxide total vertical column [DU]	$(2.448 \pm 104.540) \times 10^{-2}$	3997368	0.481	9.916×10^{-3}	-124	1.155×10^3	-0.226	0.255
sulfurdioxide total vertical column precision [DU]	0.526 $\pm$ 0.626	3997368	0.378	0.377	4.073×10^{-2}	208	0.224	0.602
sulfurdioxide slant column density corrected [DU]	$(1.807 \pm 53.964) \times 10^{-2}$	3997368	0.366	8.555×10^{-3}	-19.3	790	-0.173	0.194
sulfurdioxide slant column density cobra [DU]	$(1.775 \pm 34.625) \times 10^{-2}$	3997368	0.366	8.555×10^{-3}	-19.3	34.5	-0.173	0.194
sulfurdioxide slant column density cobra precision [DU]	0.287 $\pm$ 0.113	3997368	0.109	0.260	8.579×10^{-2}	24.6	0.216	0.324
sulfurdioxide slant column density window1 [DU]	0.144 $\pm$ 0.645	3997368	0.728	0.139	-67.1	87.5	-0.225	0.504
sulfurdioxide slant column density window1 precision [DU]	0.287 $\pm$ 0.113	3997368	0.109	0.260	8.579×10^{-2}	24.6	0.216	0.324
sulfurdioxide slant column density corrected win1 [DU]	$(-2.088 \pm 640.530) \times 10^{-3}$	3997368	0.721	-1.930×10^{-2}	-67.1	87.4	-0.374	0.347
background so2 slant column offset window1 [DU]	-0.146 $\pm$ 0.106	3997368	0.124	-0.159	-0.885	0.973	-0.213	-8.979×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.976 $\pm$ 9.442	3997368	11.9	-1.06	-1.566×10^3	1.223×10^3	-6.95	4.91
sulfurdioxide slant column density window2 precision [DU]	8.68 $\pm$ 2.56	3997368	2.81	8.34	2.28	585	7.07	9.88
sulfurdioxide slant column density corrected win2 [DU]	-1.24 $\pm$ 9.38	3997368	11.7	-1.22	-1.567×10^3	1.225×10^3	-7.10	4.64
background so2 slant column offset window2 [DU]	-0.268 $\pm$ 1.738	3997368	2.16	0.130	-11.0	9.71	-1.28	0.883
sulfurdioxide slant column density window3 [DU]	-6.22 $\pm$ 25.21	3997368	31.4	-5.49	-1.022×10^3	615	-21.6	9.83
sulfurdioxide slant column density window3 precision [DU]	33.2 $\pm$ 16.4	3997368	11.3	28.7	11.2	1.057×10^3	24.3	35.7
sulfurdioxide slant column density corrected win3 [DU]	-4.46 $\pm$ 25.16	3997368	31.5	-3.92	-1.026×10^3	611	-20.0	11.5
background so2 slant column offset window3 [DU]	1.75 $\pm$ 5.48	3997368	9.07	1.28	-17.1	17.9	-2.74	6.33
sulfurdioxide slant column cobra flag [1]	1.98 $\pm$ 0.18	3997368	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.150 \pm 9.696) \times 10^{-2}$	3997368	6.752×10^{-2}	2.683×10^{-2}	2.990×10^{-4}	1.82	7.860×10^{-3}	7.538×10^{-2}
fitted radiance shift [nm]	$(-2.444 \pm 32.851) \times 10^{-4}$	3997368	1.753×10^{-3}	-3.046×10^{-4}	-5.538×10^{-2}	4.620×10^{-2}	-1.150×10^{-3}	6.025×10^{-4}
fitted radiance squeeze [1]	$(-1.161 \pm 17.335) \times 10^{-5}$	3997368	2.064×10^{-4}	-9.561×10^{-6}	-1.463×10^{-2}	1.512×10^{-2}	-1.137×10^{-4}	9.273×10^{-5}
fitted root mean square [1]	$(1.257 \pm 0.452) \times 10^{-3}$	3997368	4.578×10^{-4}	1.164×10^{-3}	3.441×10^{-4}	7.536×10^{-2}	9.706×10^{-4}	1.428×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.851 $\pm$ 0.502	3997368	0.591	0.709	5.000×10^{-2}	3.03	0.505	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.115 $\pm$ 0.124	3997368	0.125	6.252×10^{-2}	3.910×10^{-3}	1.71	3.084×10^{-2}	0.156
sulfurdioxide clear air mass factor polluted [1]	0.725 $\pm$ 0.362	3997368	0.397	0.638	0.108	2.75	0.488	0.885
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	3997368	1.000	73.0	52.0	156	73.0	74.0

3 Granule outlines

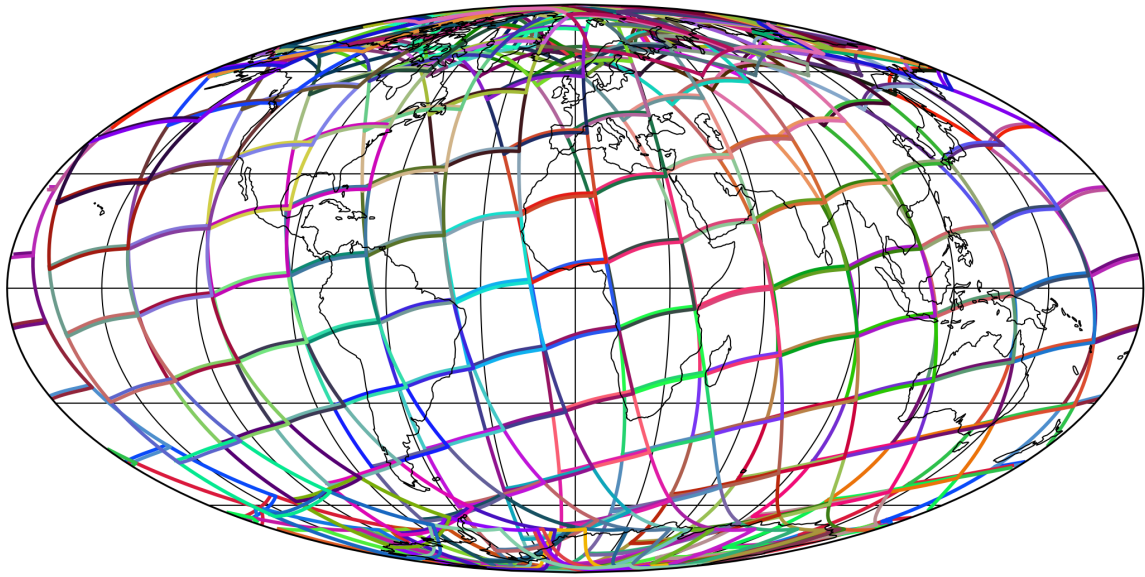


Figure 1: Outline of the granules.

4 Input data monitoring

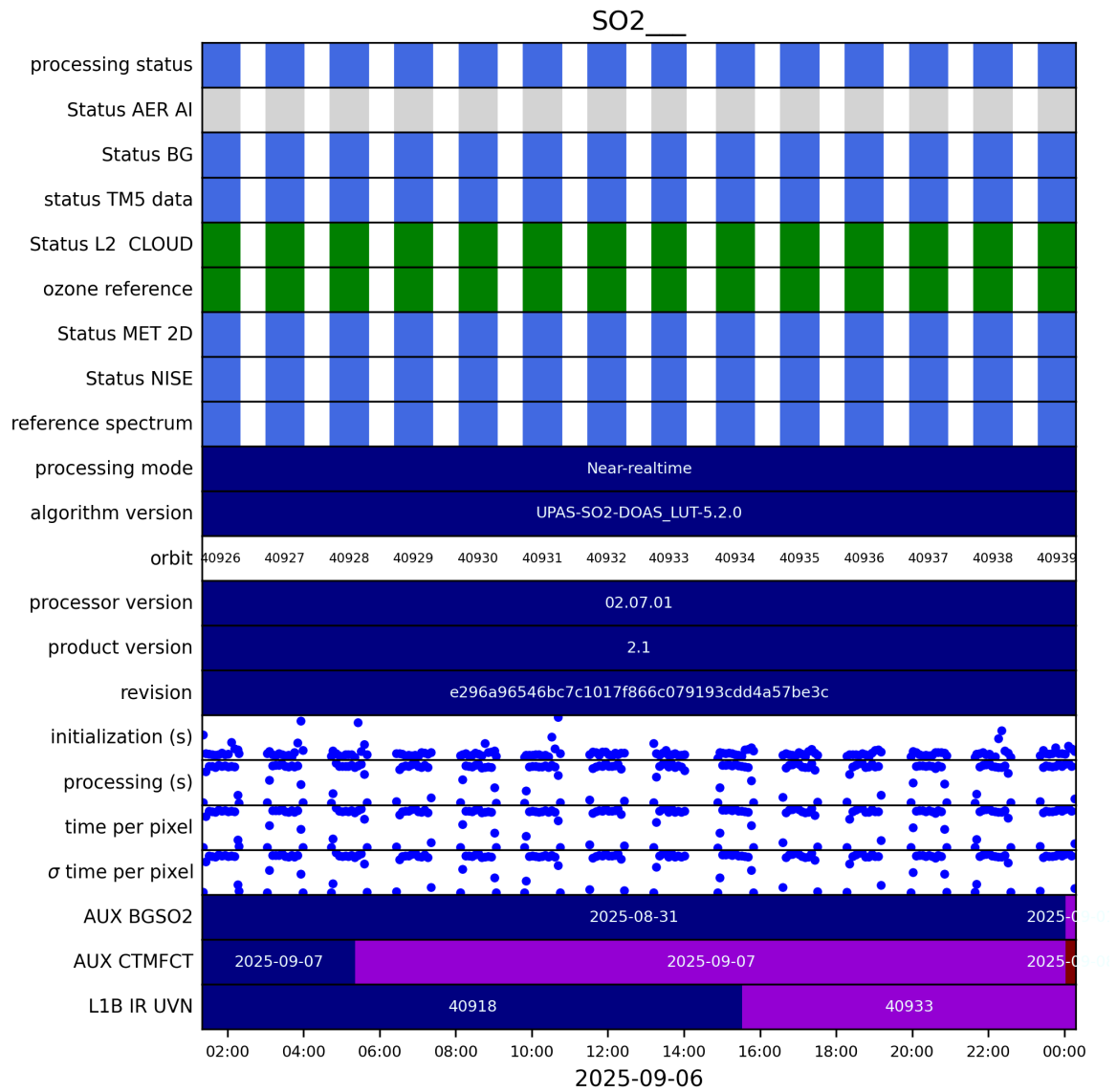


Figure 2: Input data per granule

5 Warnings and errors

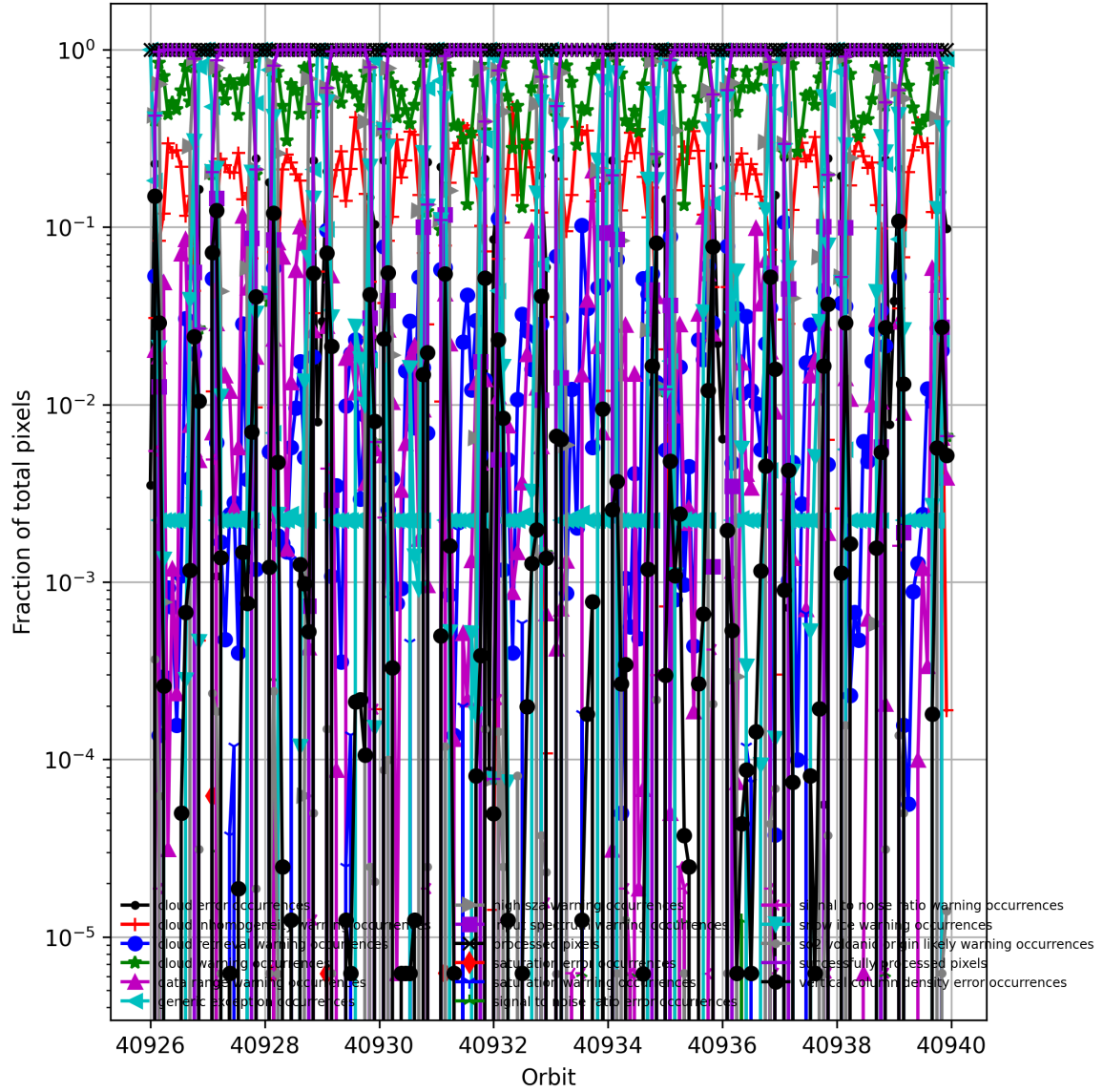


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

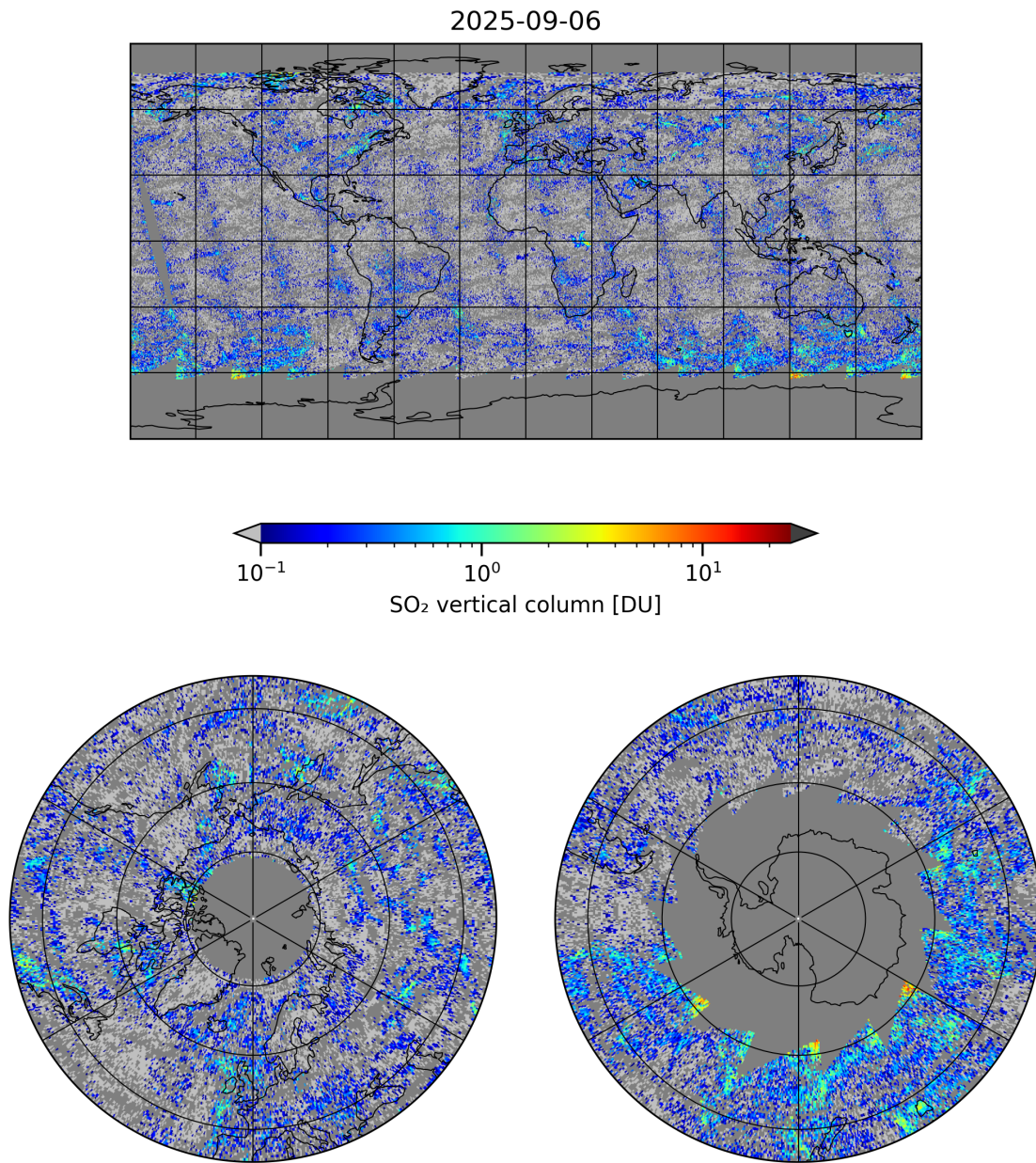


Figure 4: Map of “SO₂ vertical column” for 2025-09-06 to 2025-09-07

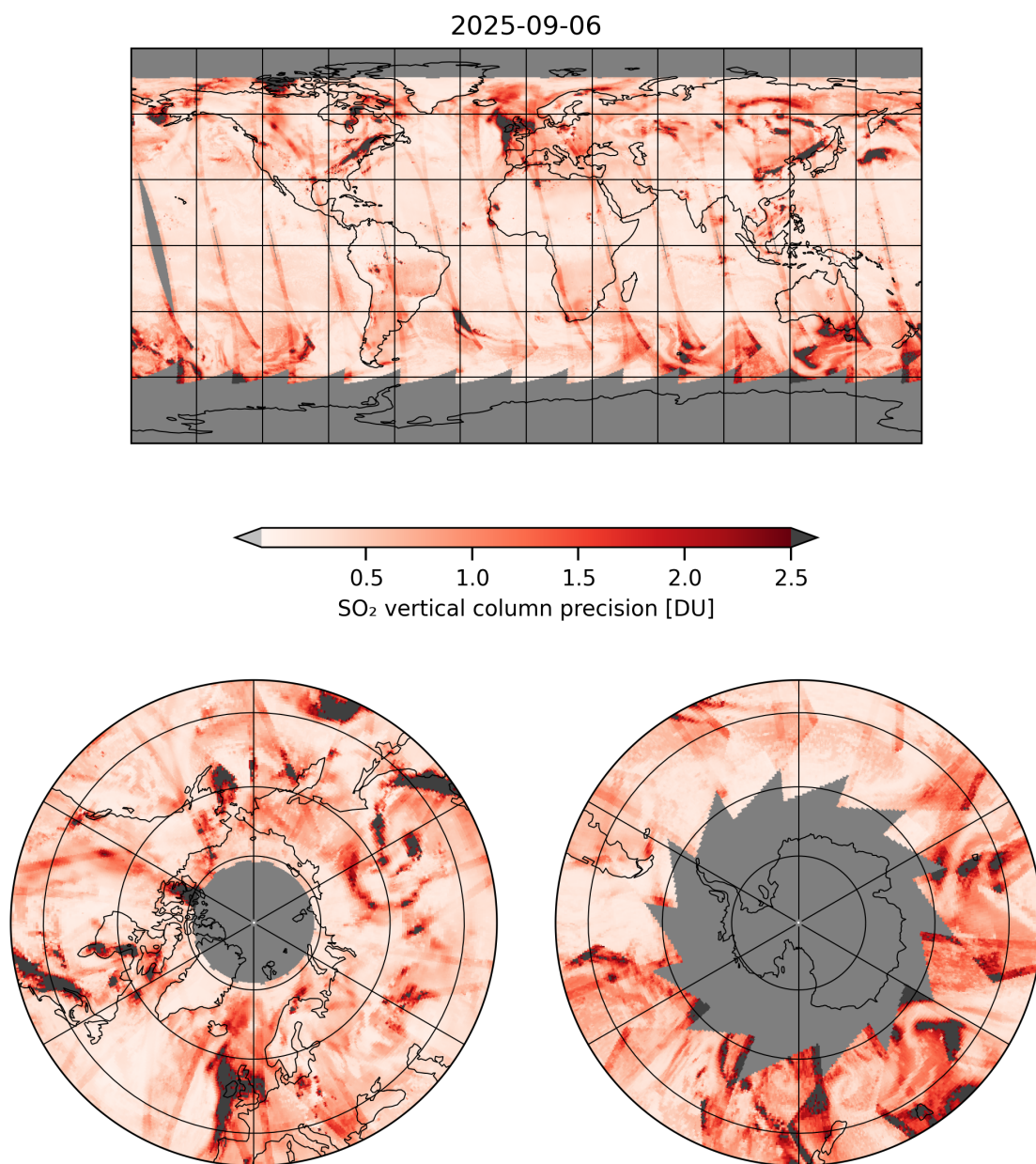


Figure 5: Map of “SO₂ vertical column precision” for 2025-09-06 to 2025-09-07

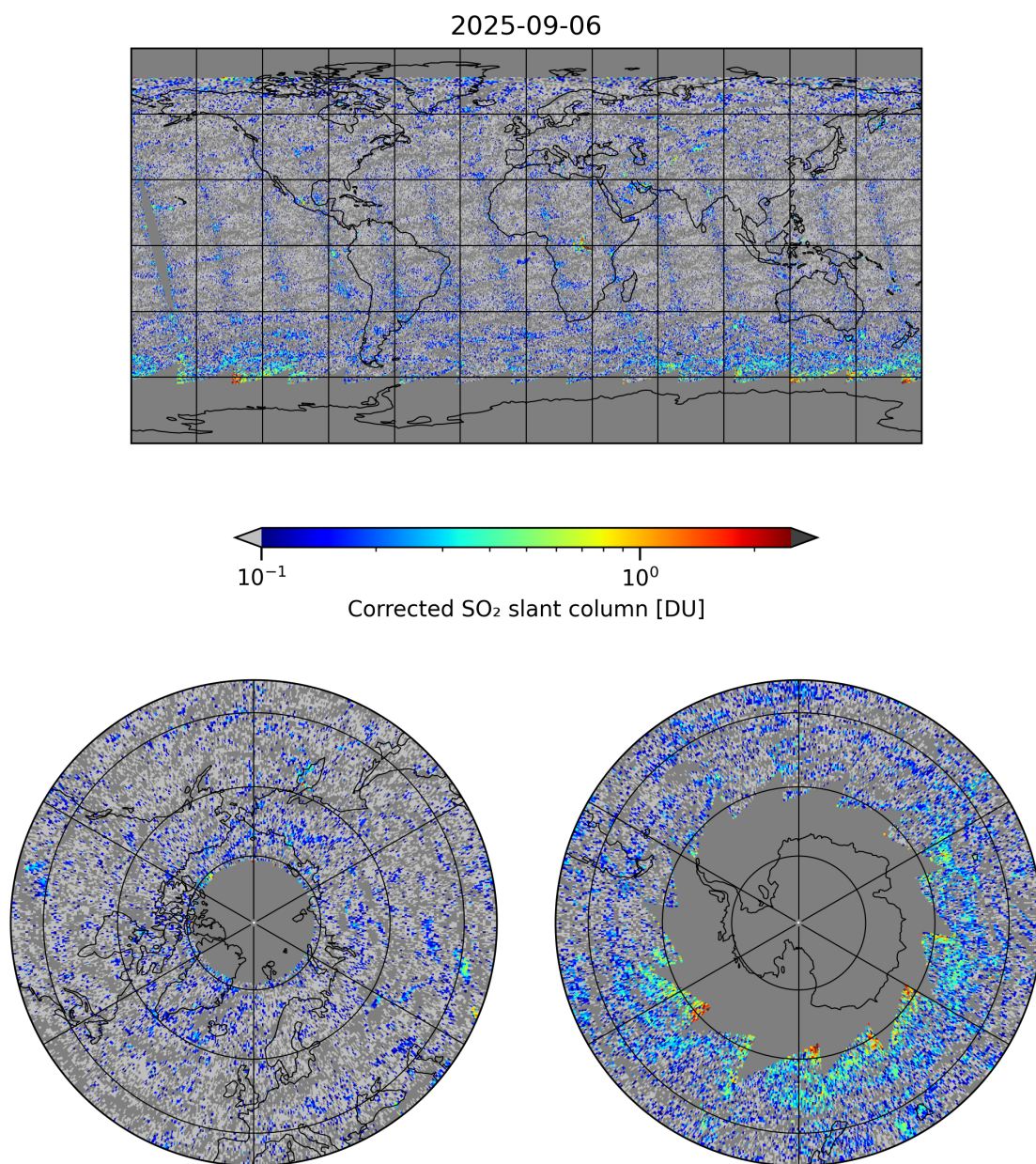


Figure 6: Map of “Corrected SO₂ slant column” for 2025-09-06 to 2025-09-07

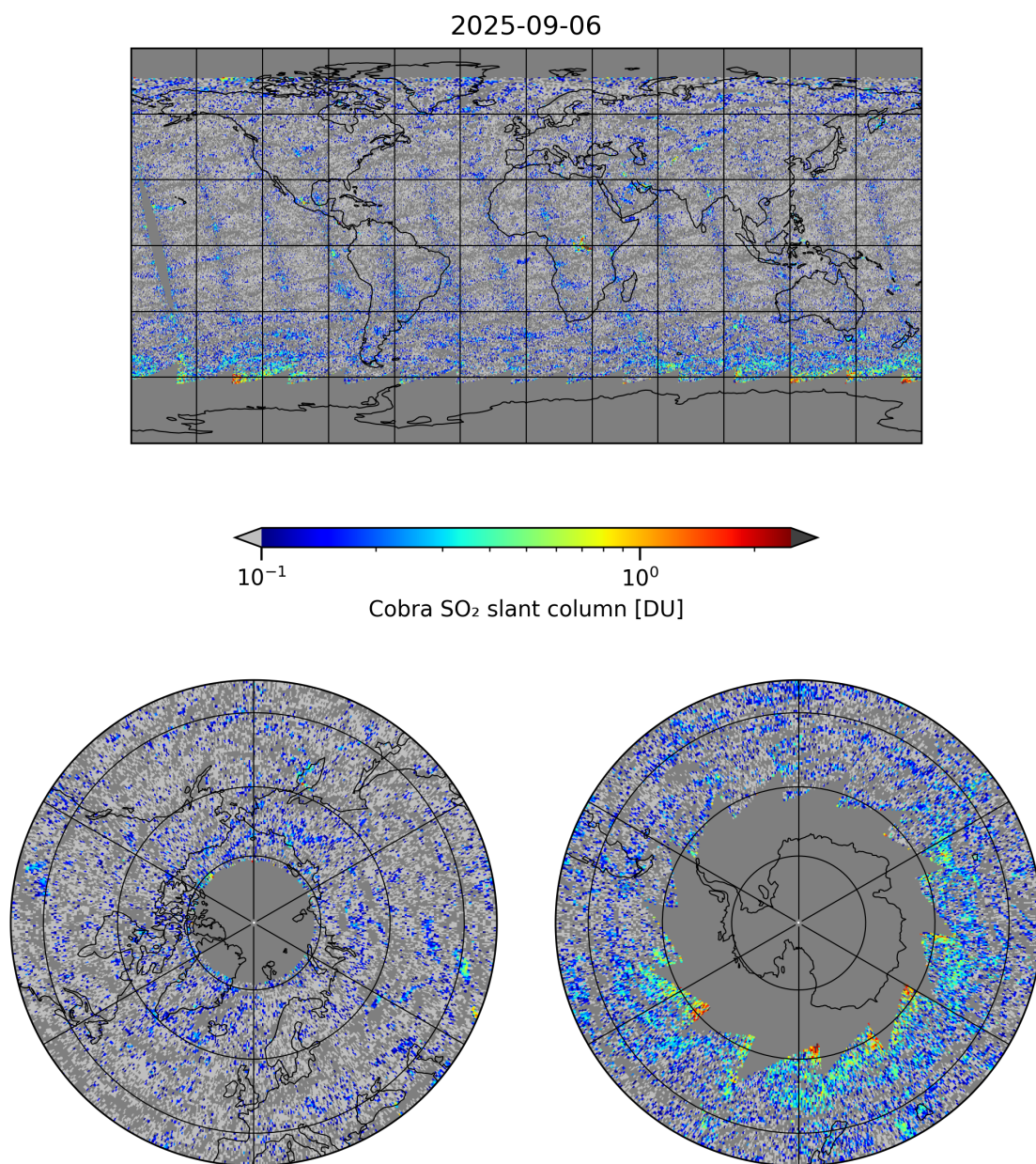


Figure 7: Map of “Cobra SO₂ slant column” for 2025-09-06 to 2025-09-07

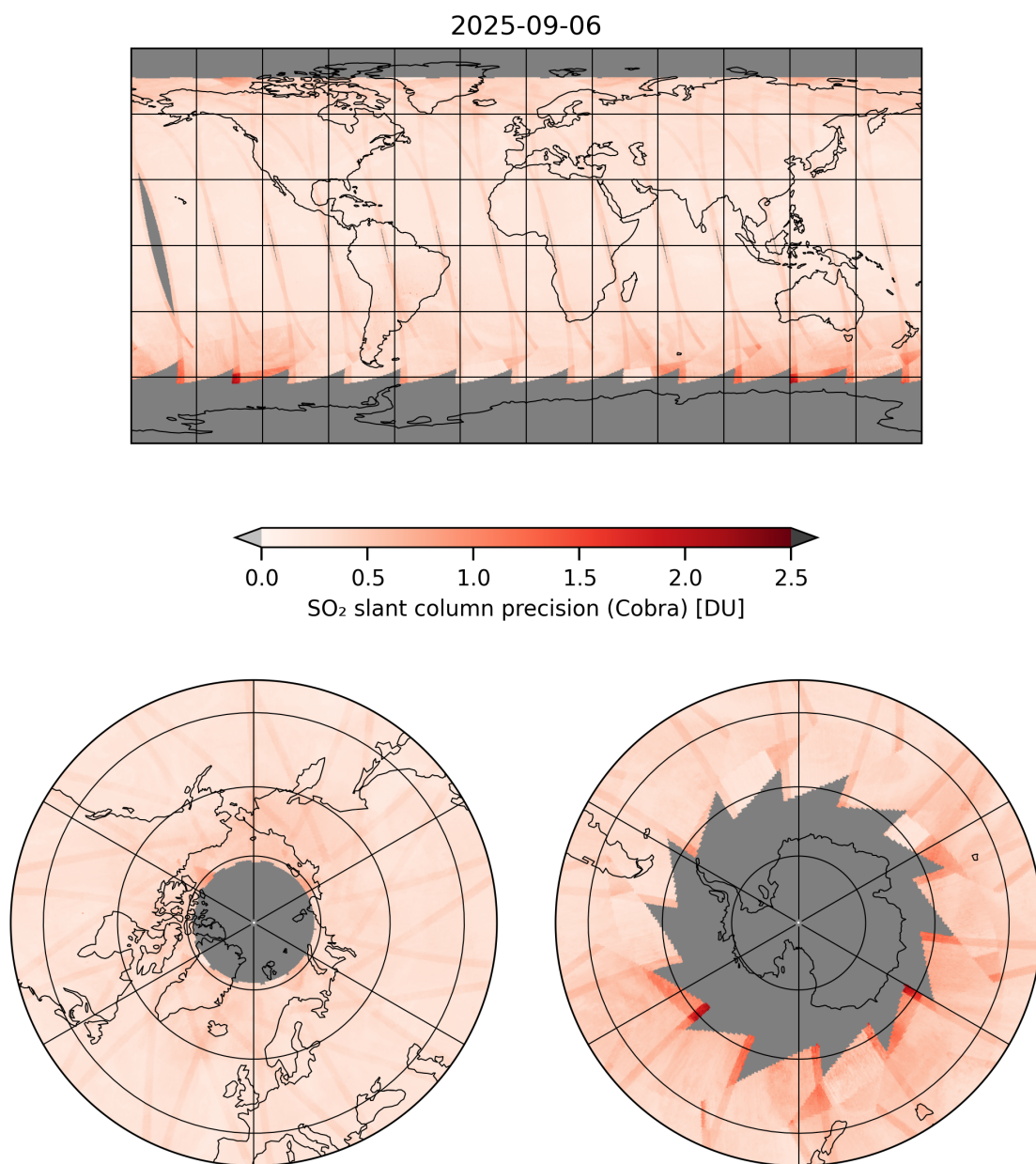


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-09-06 to 2025-09-07

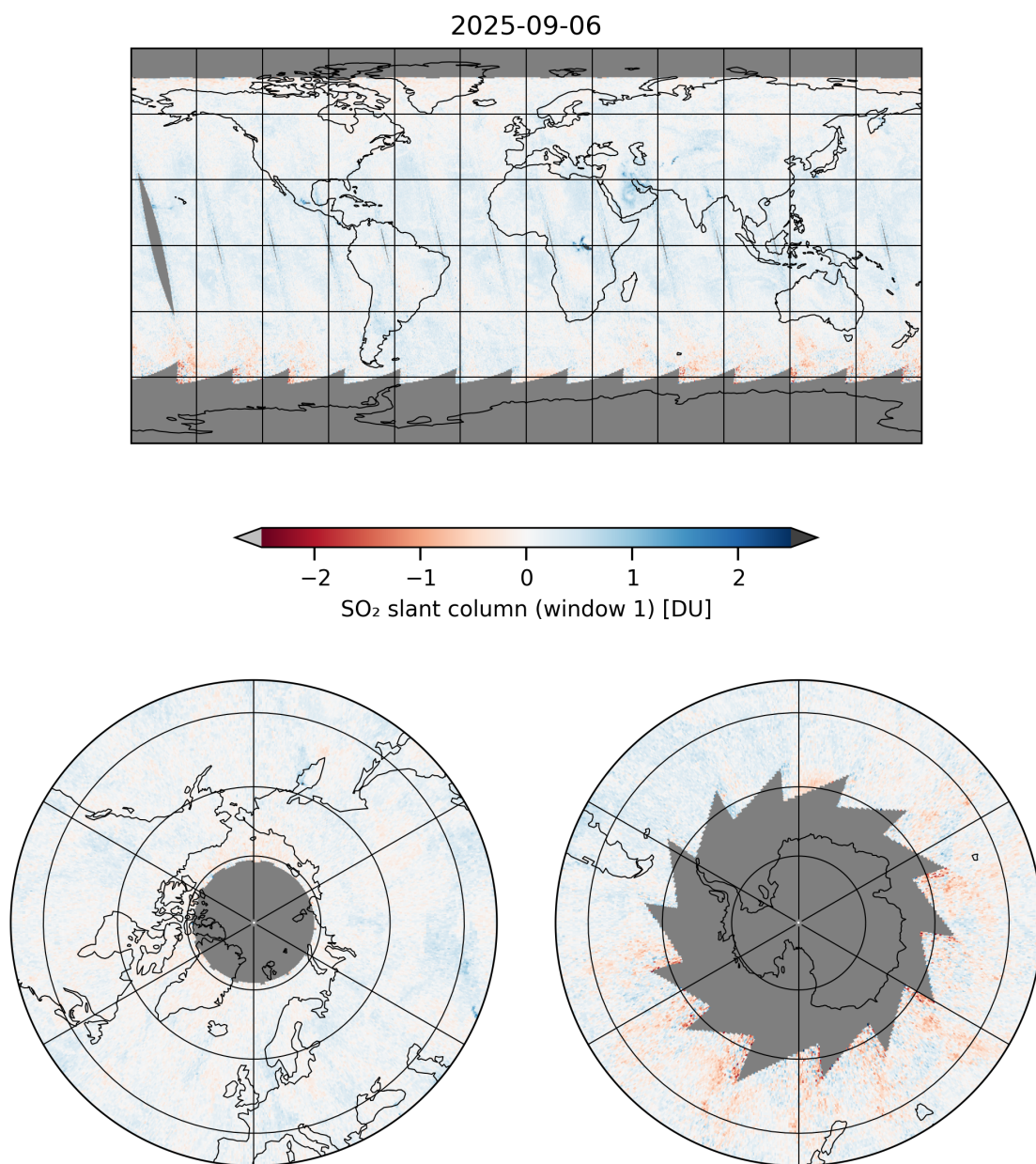


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-09-06 to 2025-09-07

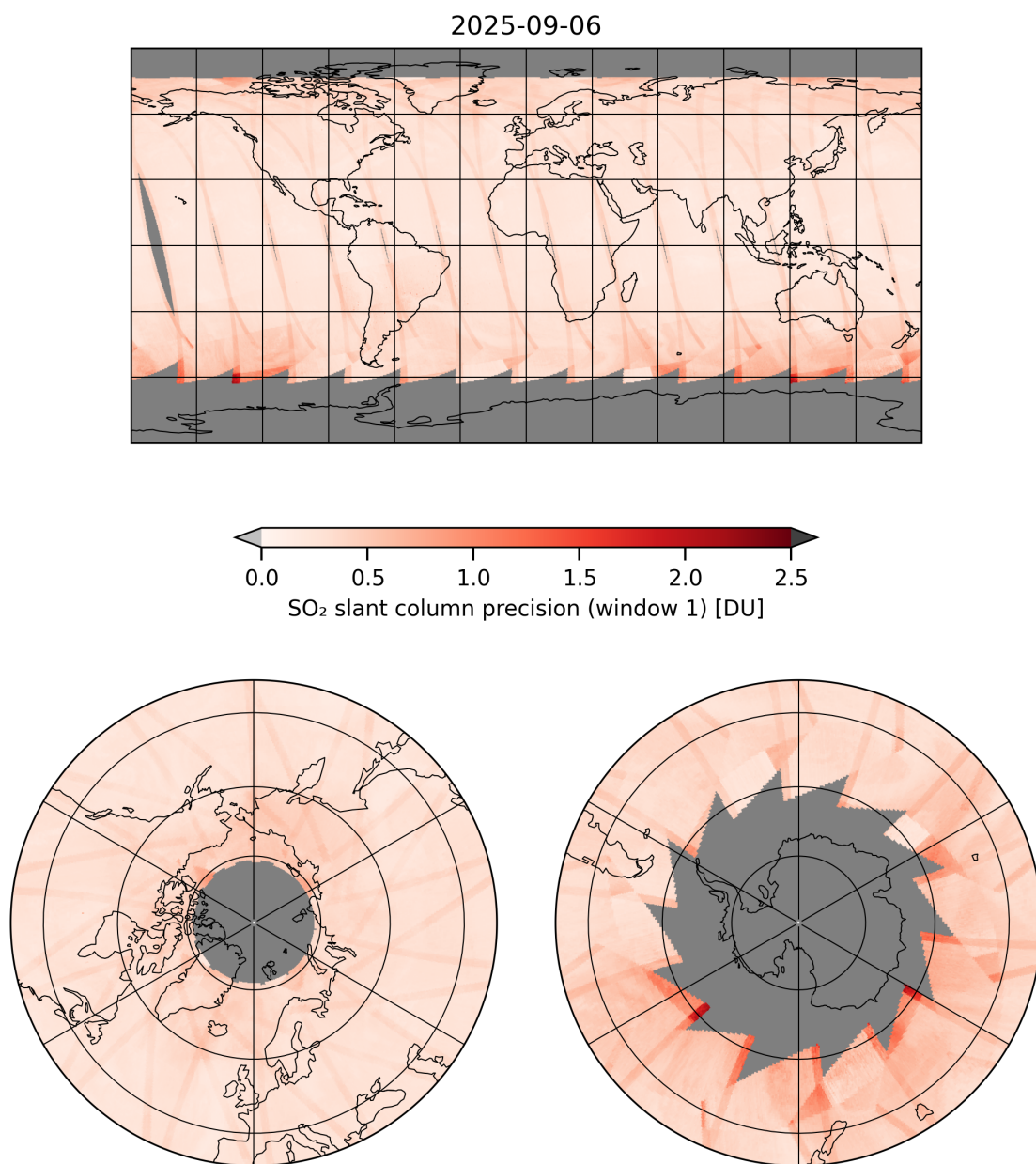


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-09-06 to 2025-09-07

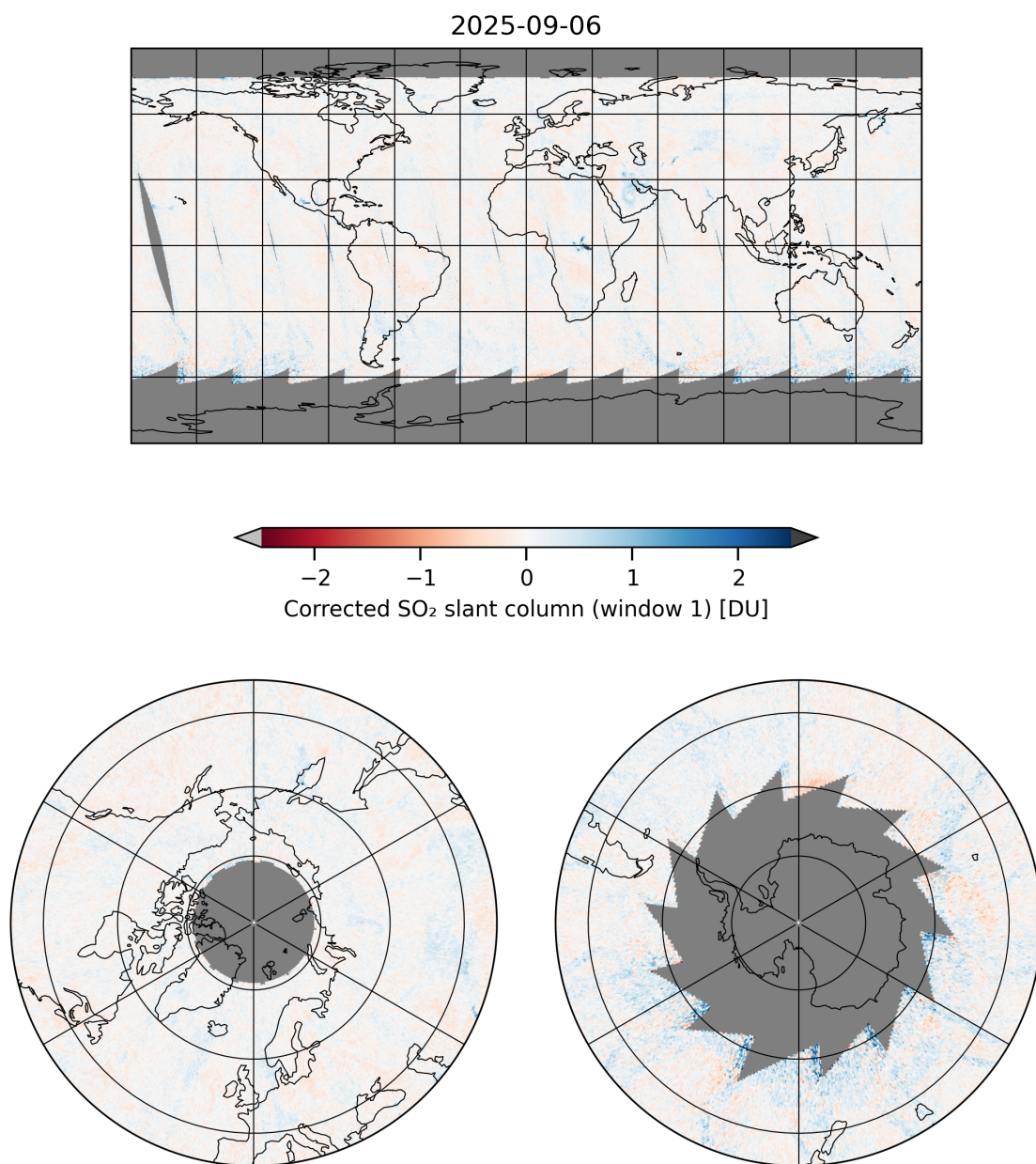


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-09-06 to 2025-09-07

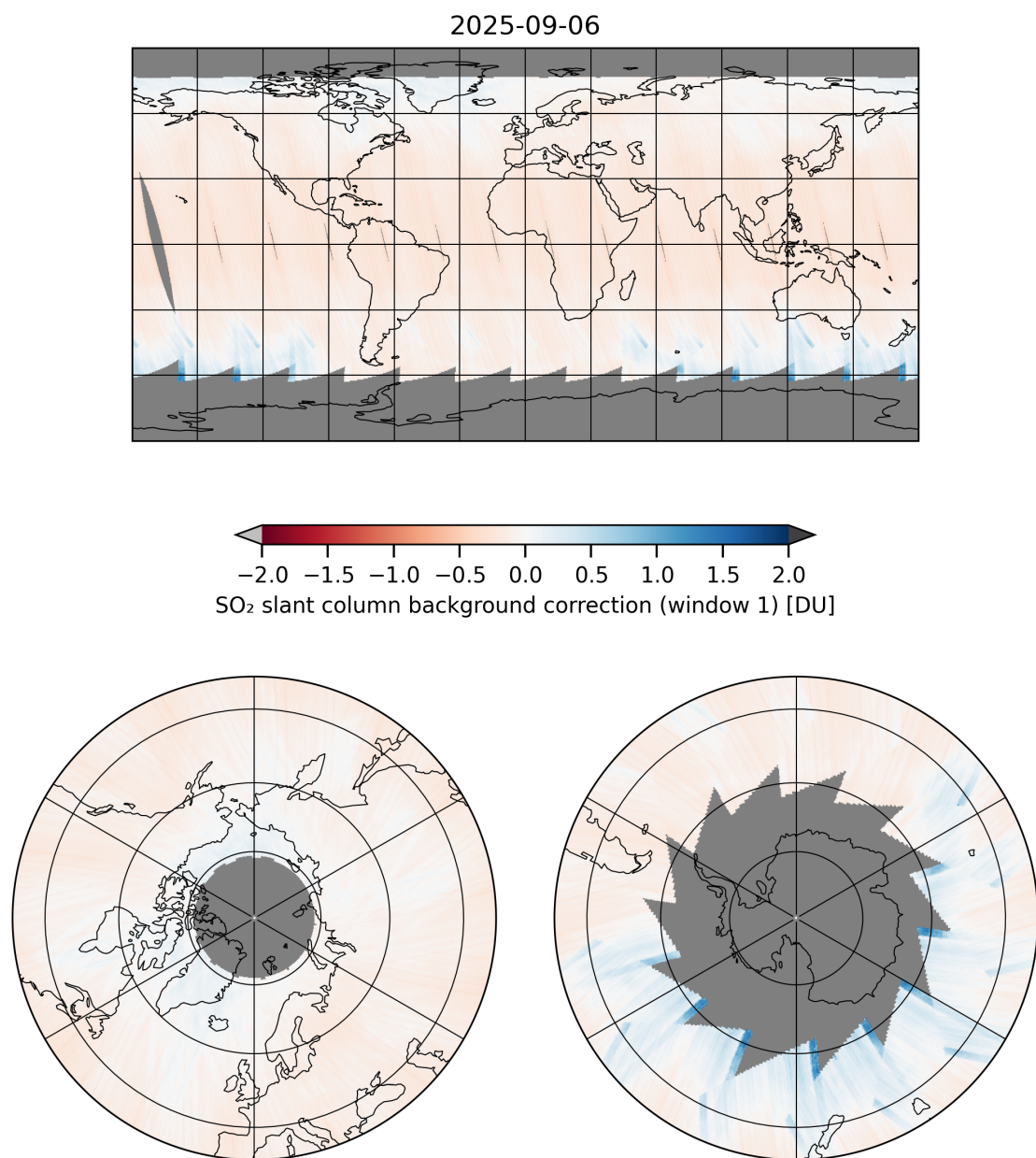


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-09-06 to 2025-09-07

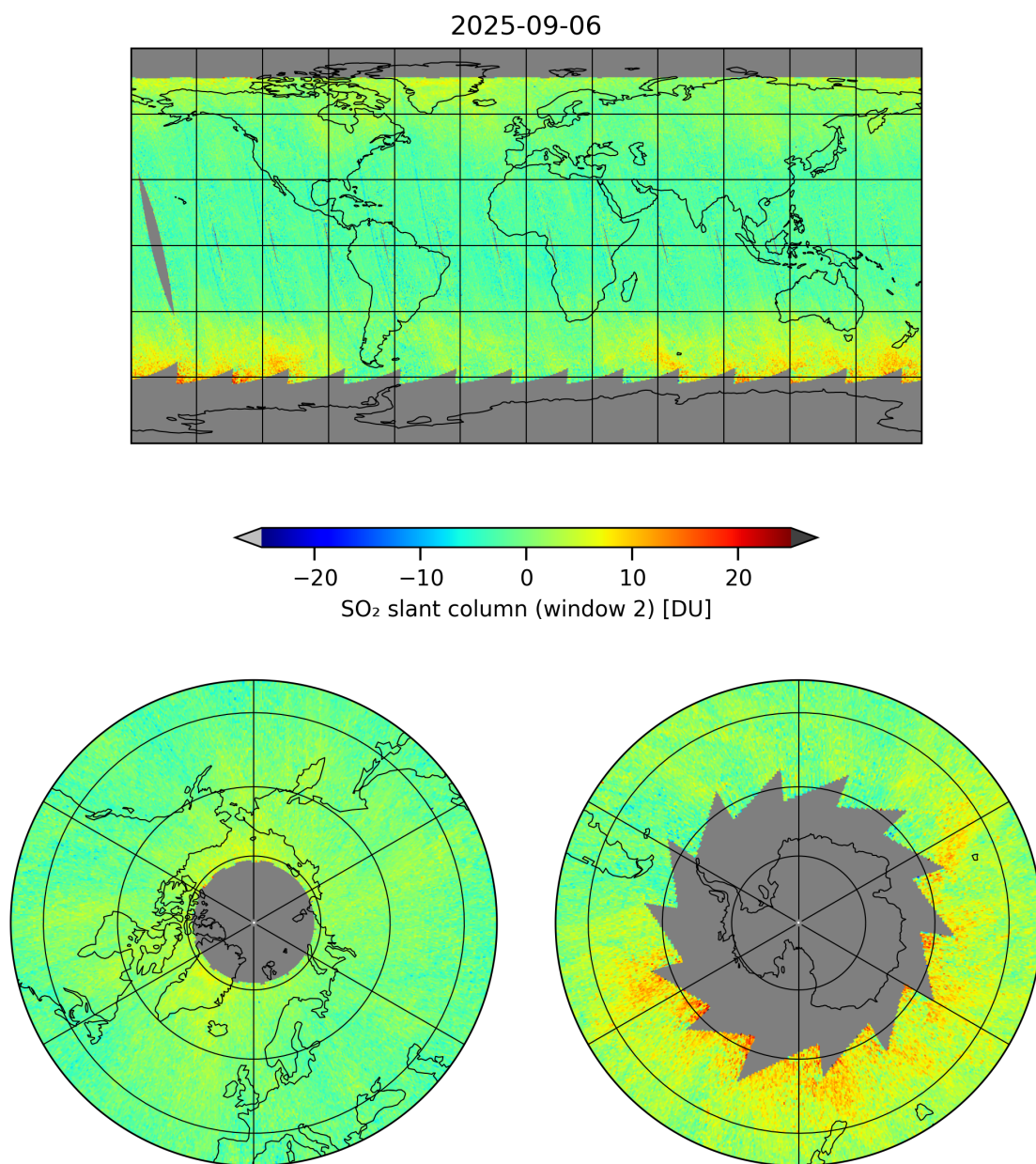


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-09-06 to 2025-09-07

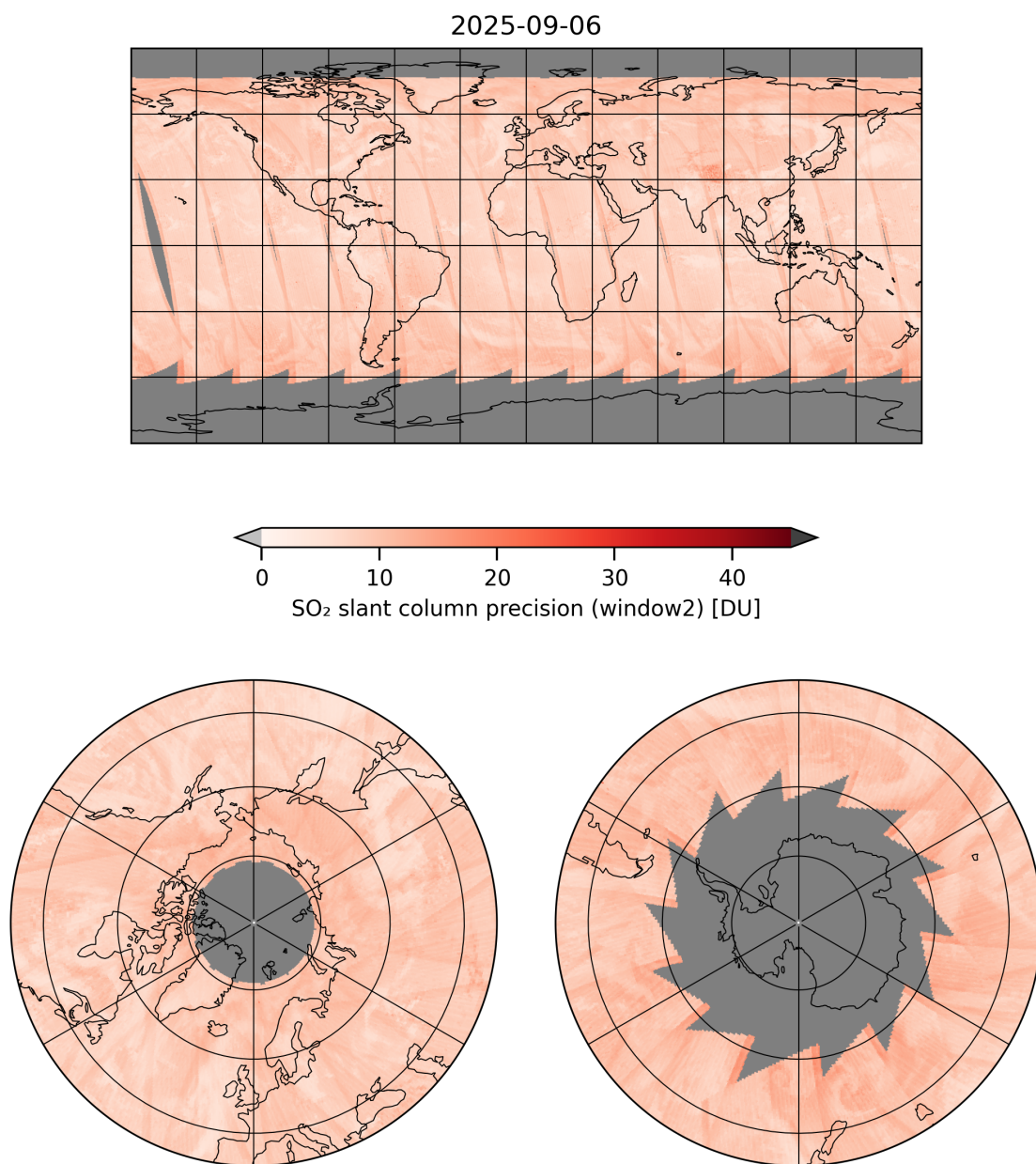


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-09-06 to 2025-09-07

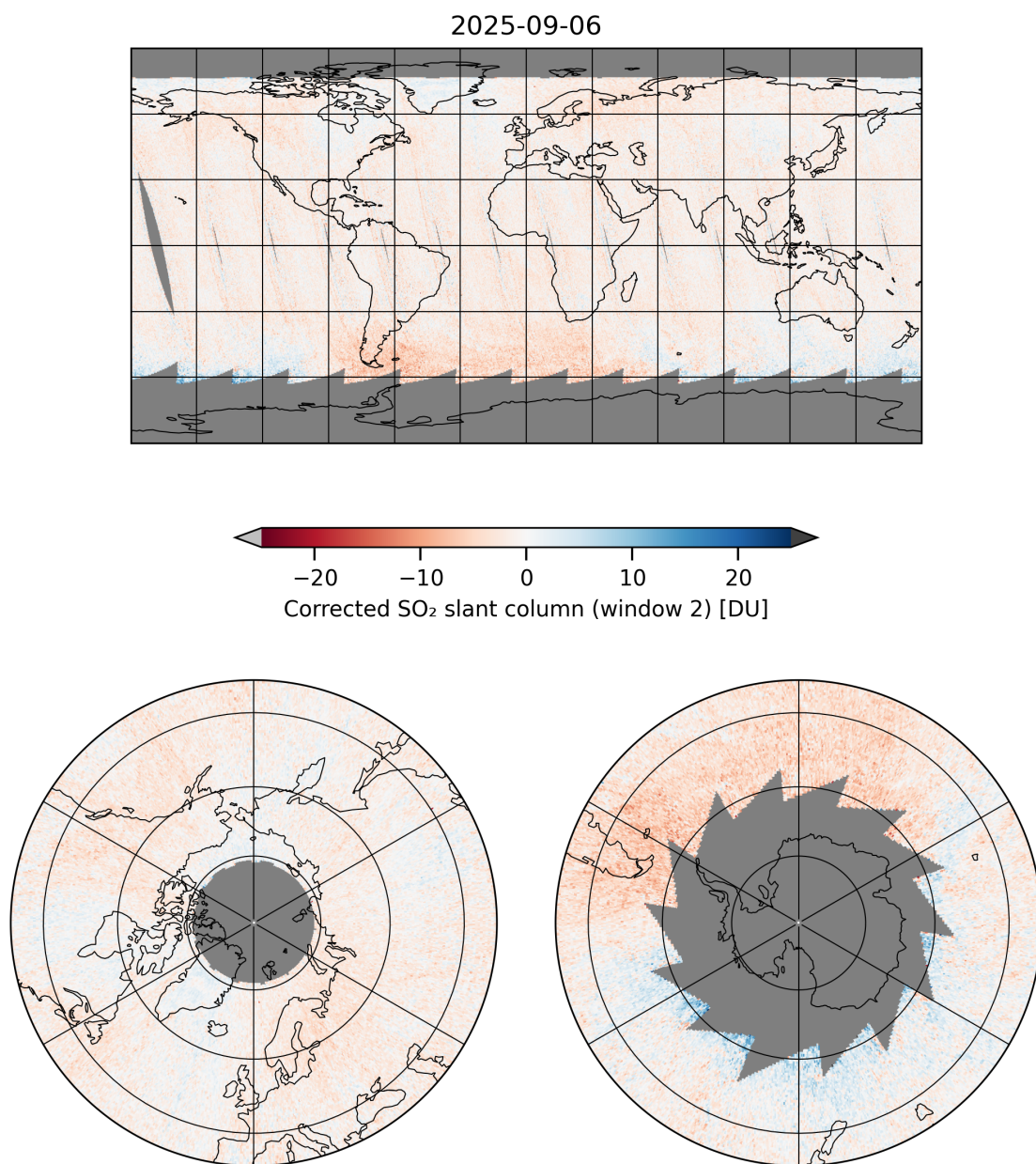


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-09-06 to 2025-09-07

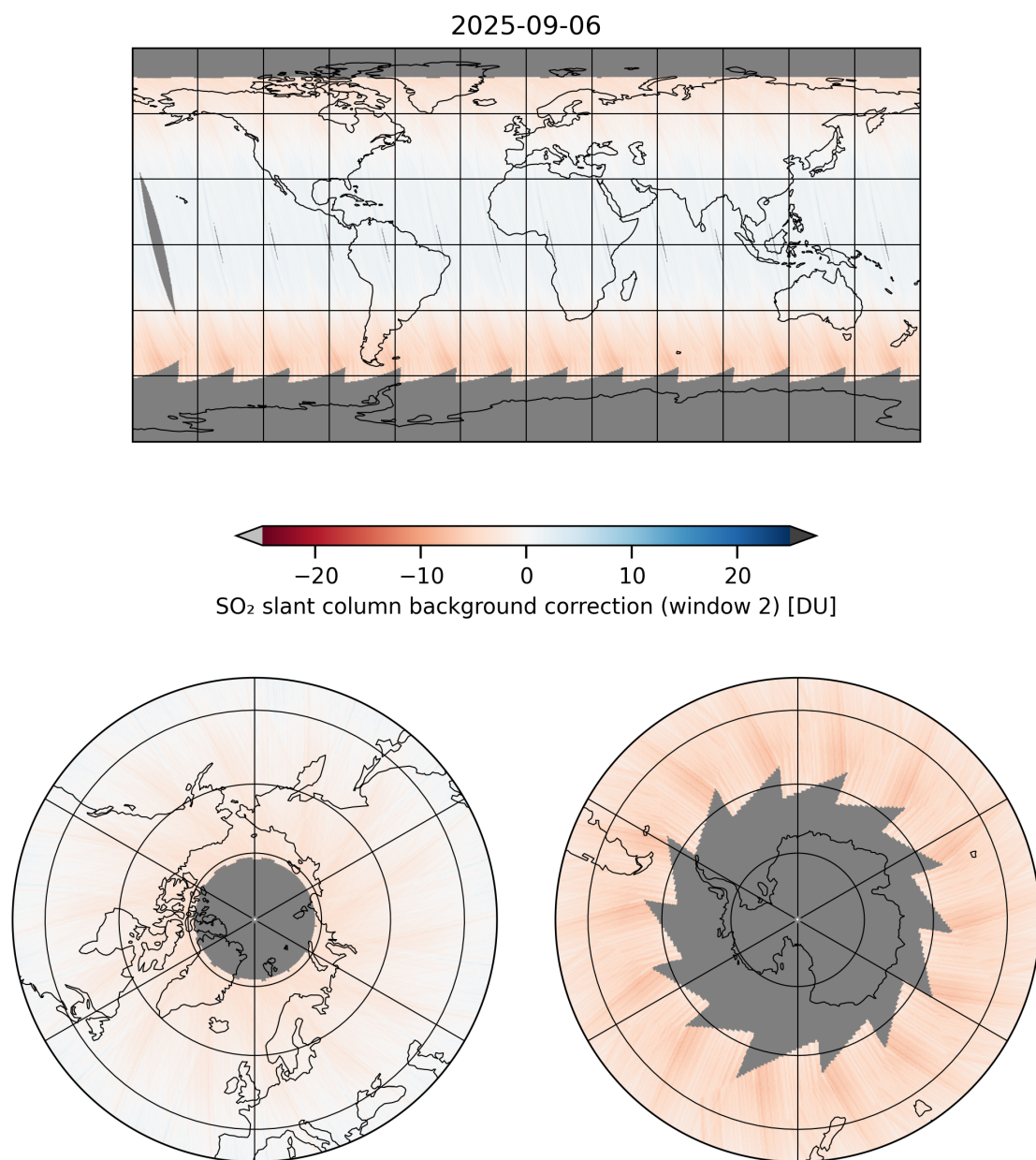


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-09-06 to 2025-09-07

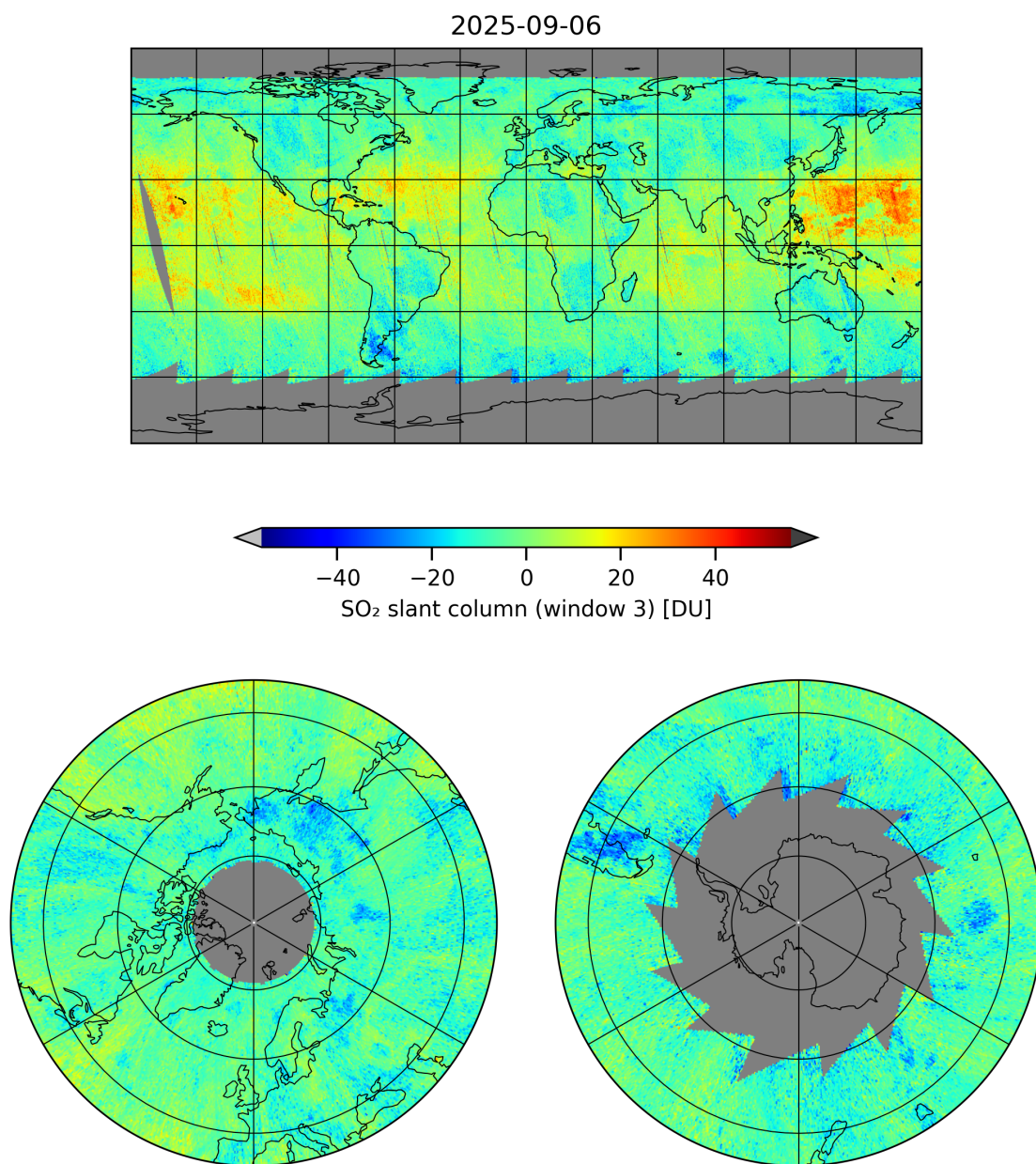


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-09-06 to 2025-09-07

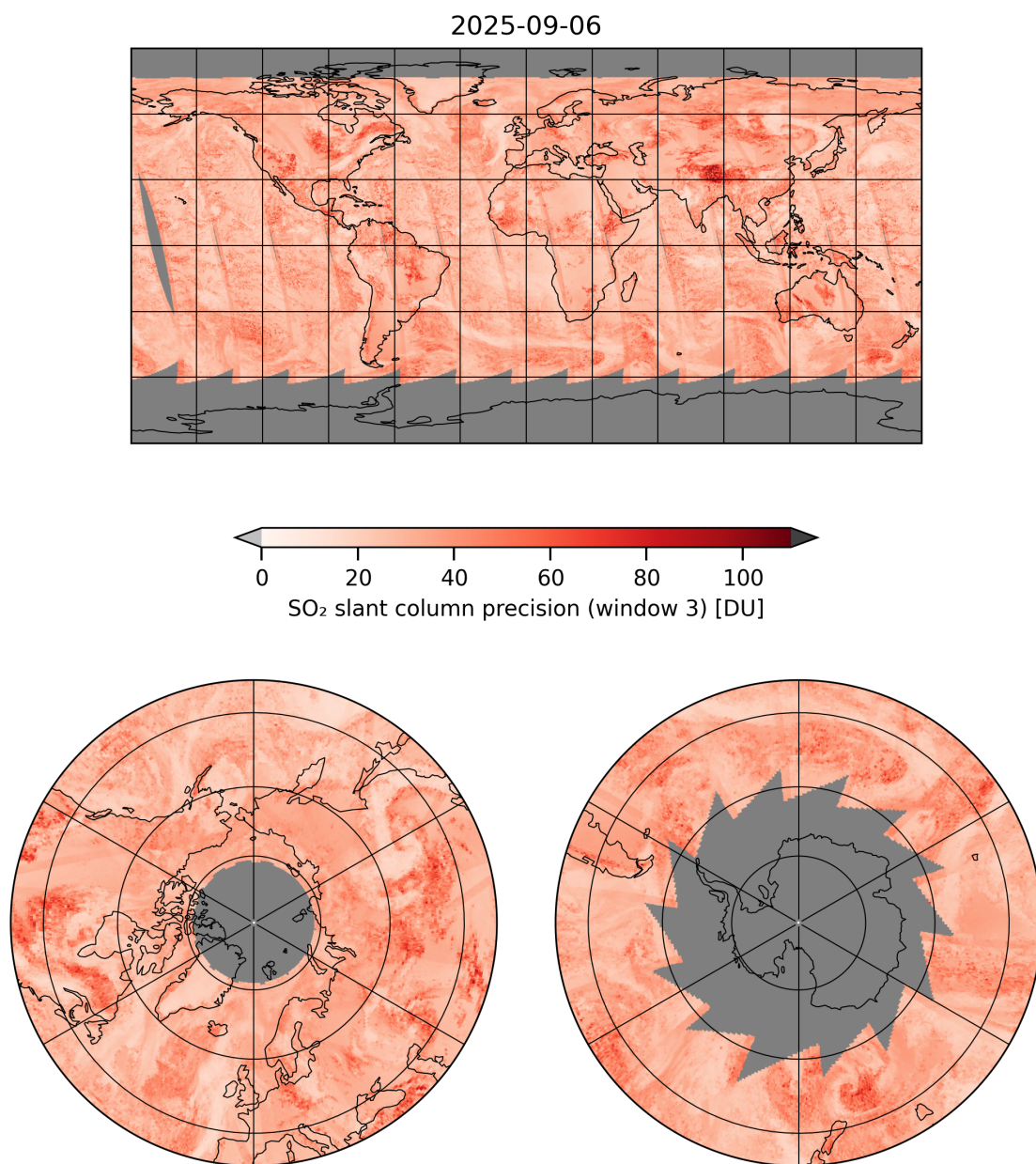


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-09-06 to 2025-09-07

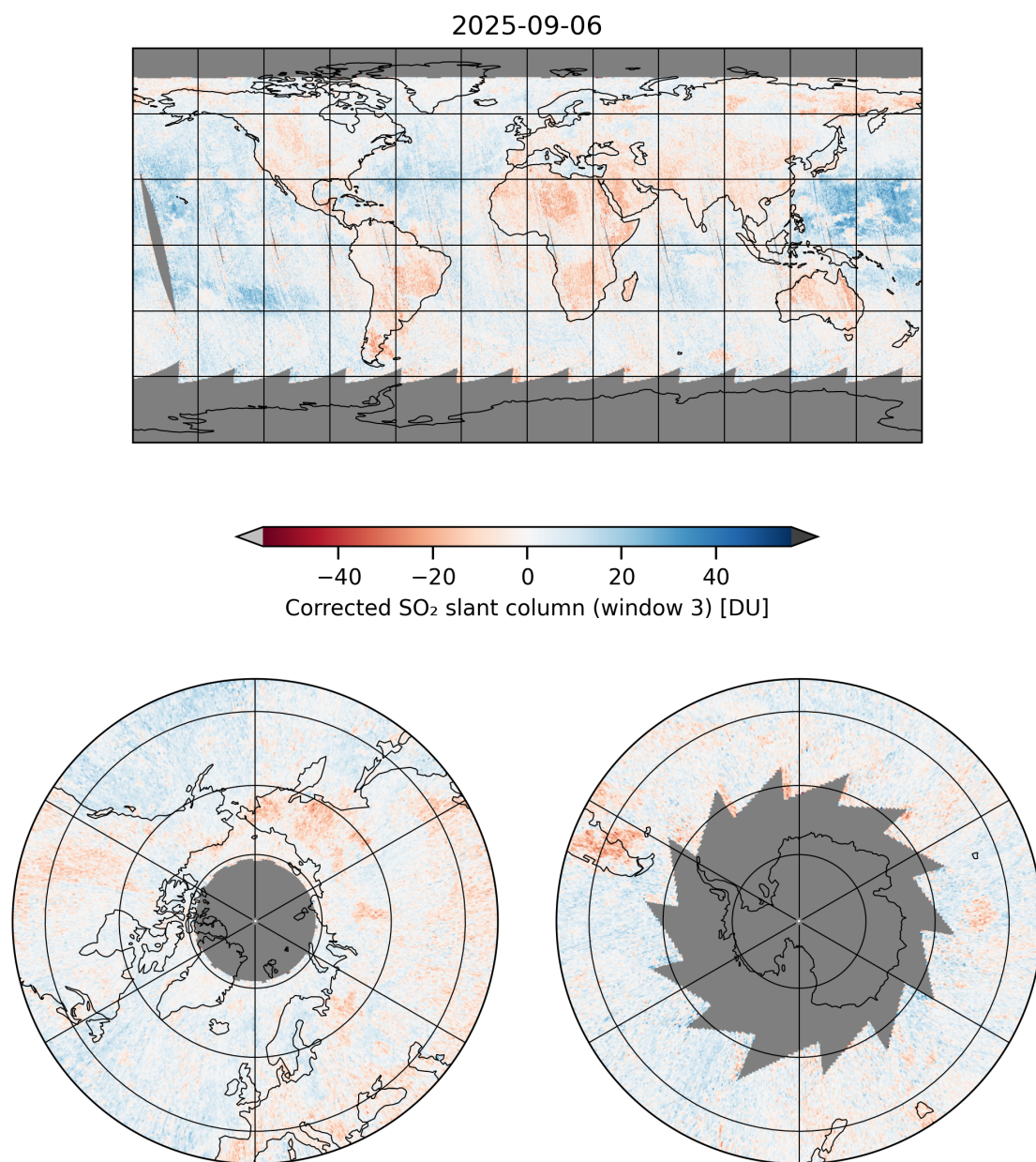


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-09-06 to 2025-09-07

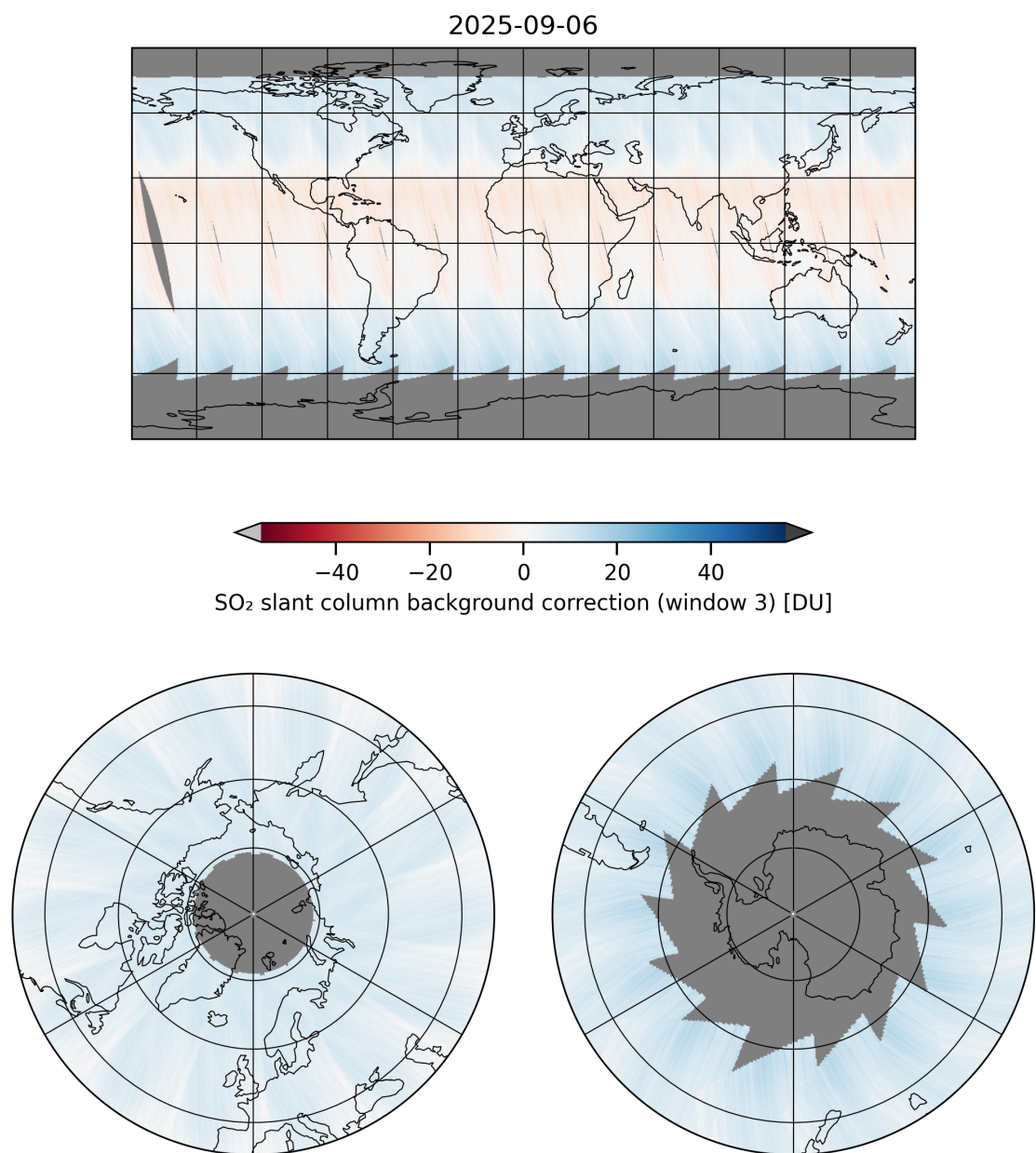


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-09-06 to 2025-09-07

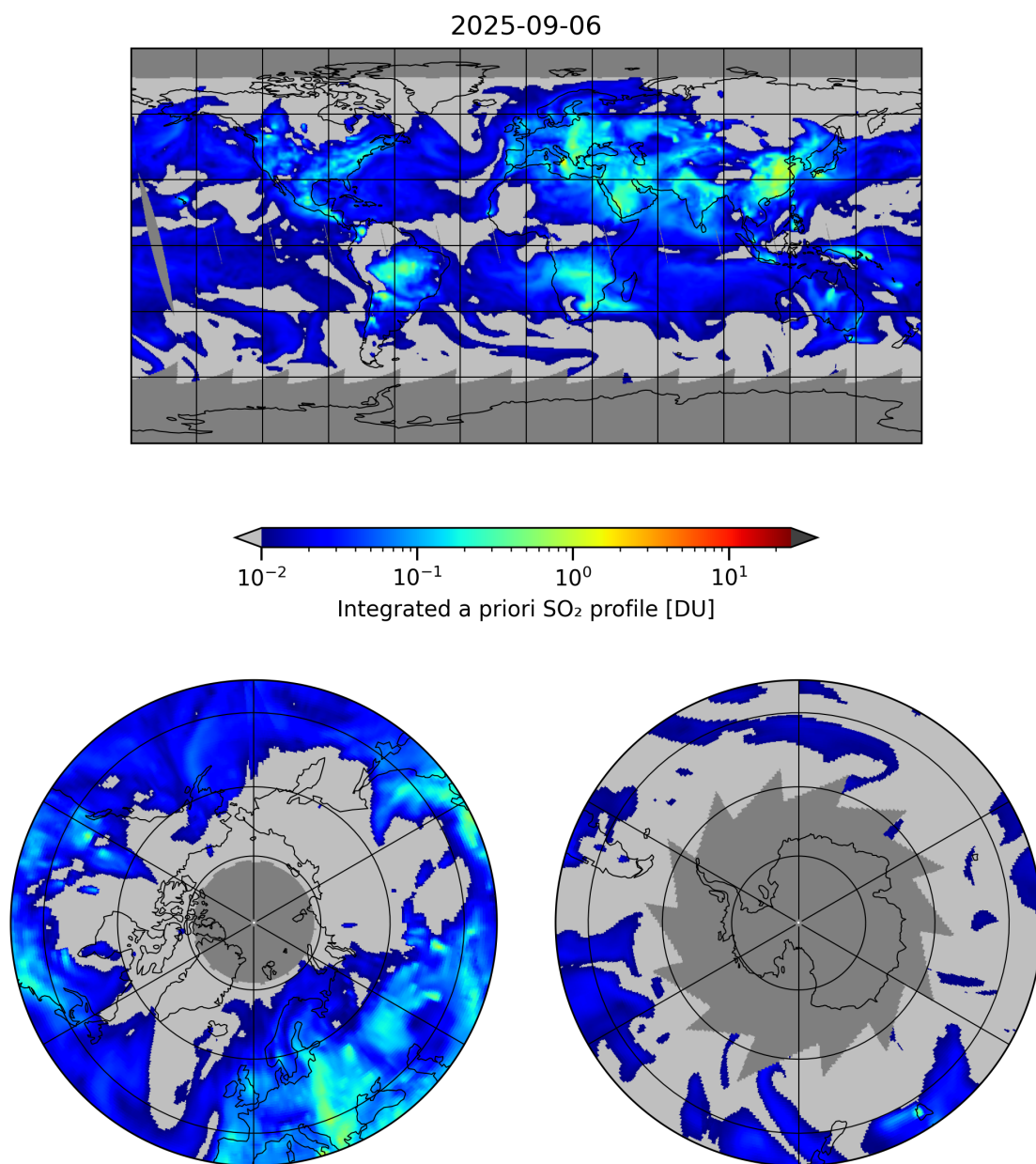


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-09-06 to 2025-09-07

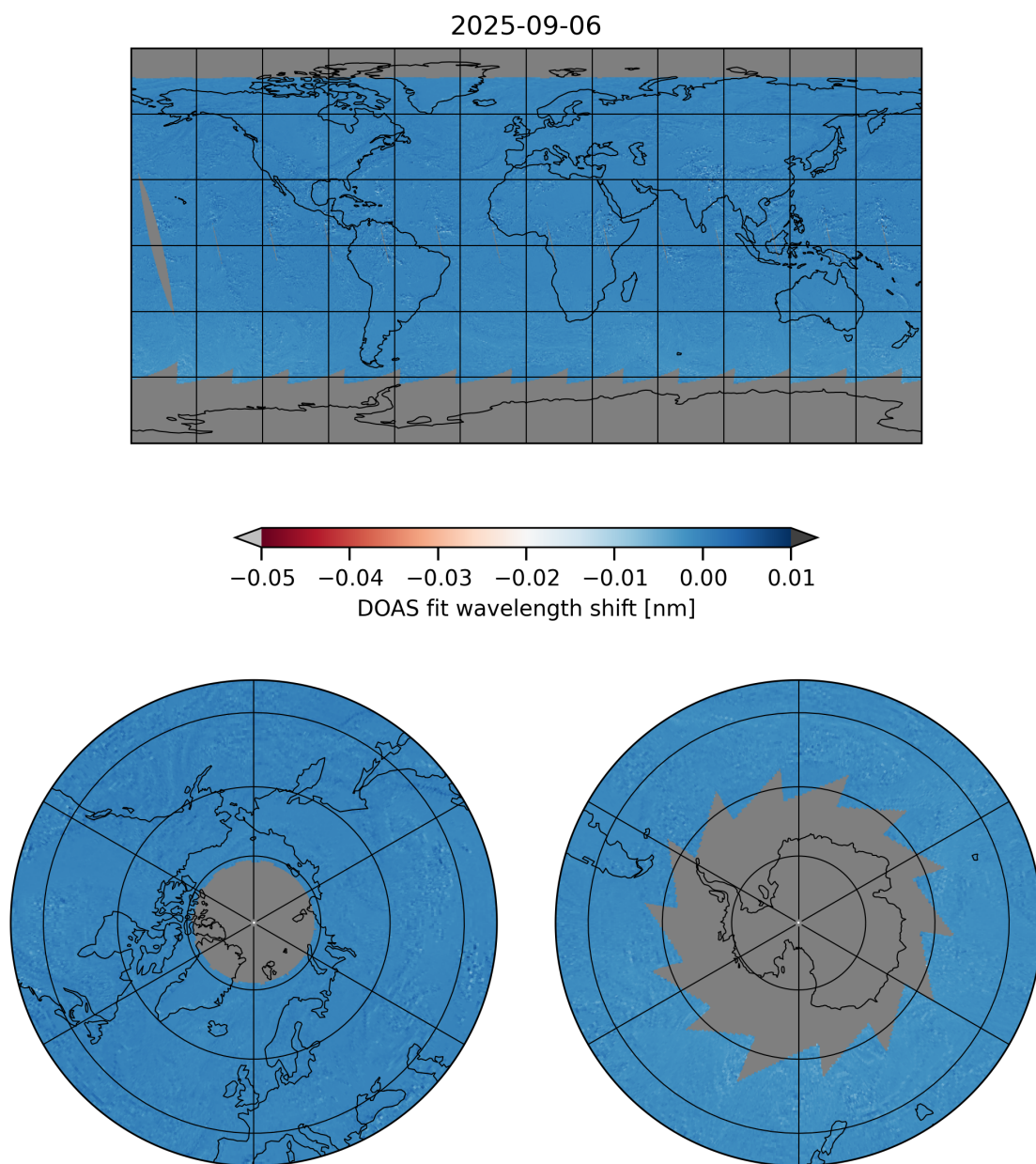


Figure 22: Map of “DOAS fit wavelength shift” for 2025-09-06 to 2025-09-07

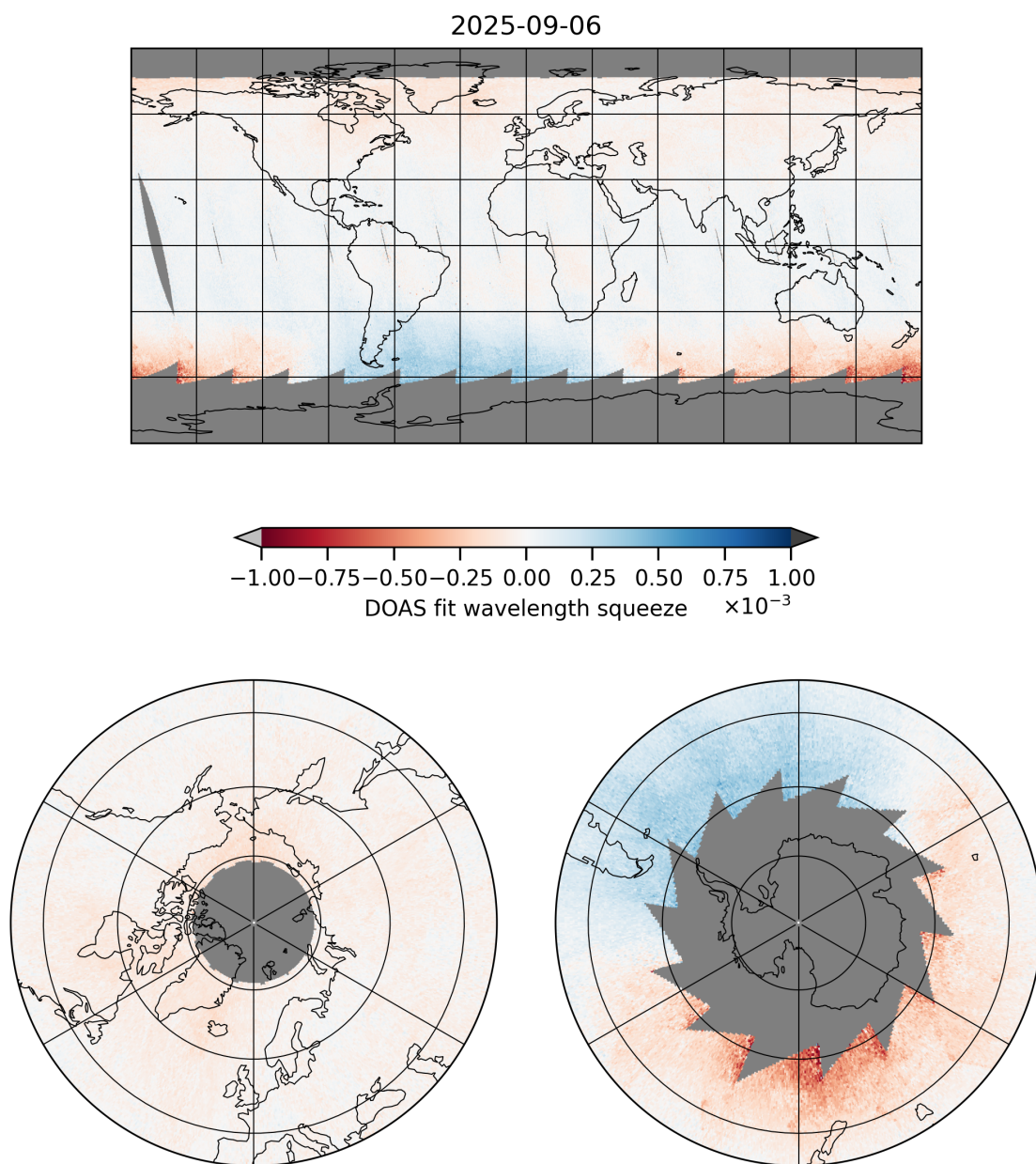


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-09-06 to 2025-09-07

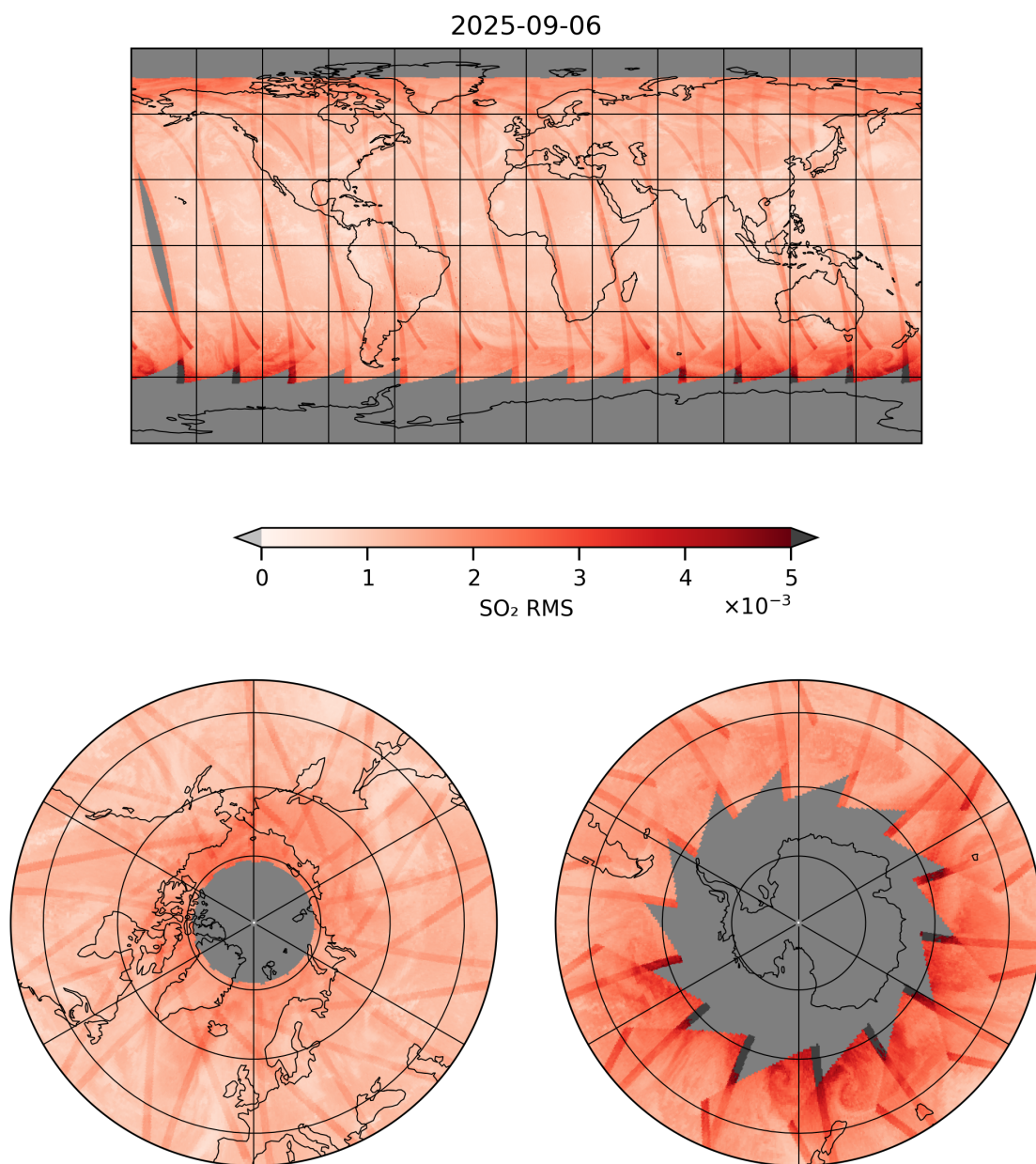


Figure 24: Map of “SO₂ RMS” for 2025-09-06 to 2025-09-07

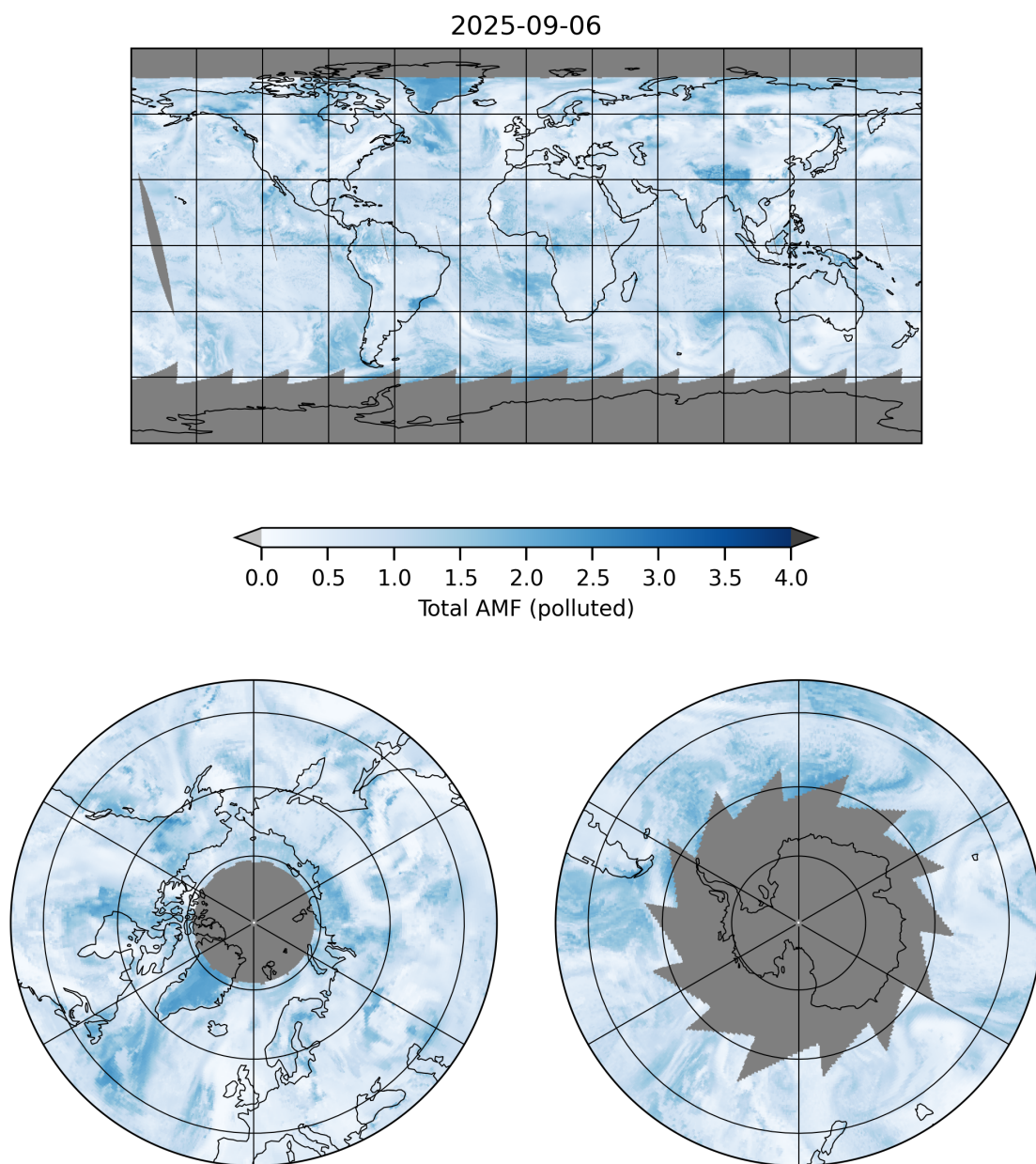


Figure 25: Map of “Total AMF (polluted)” for 2025-09-06 to 2025-09-07

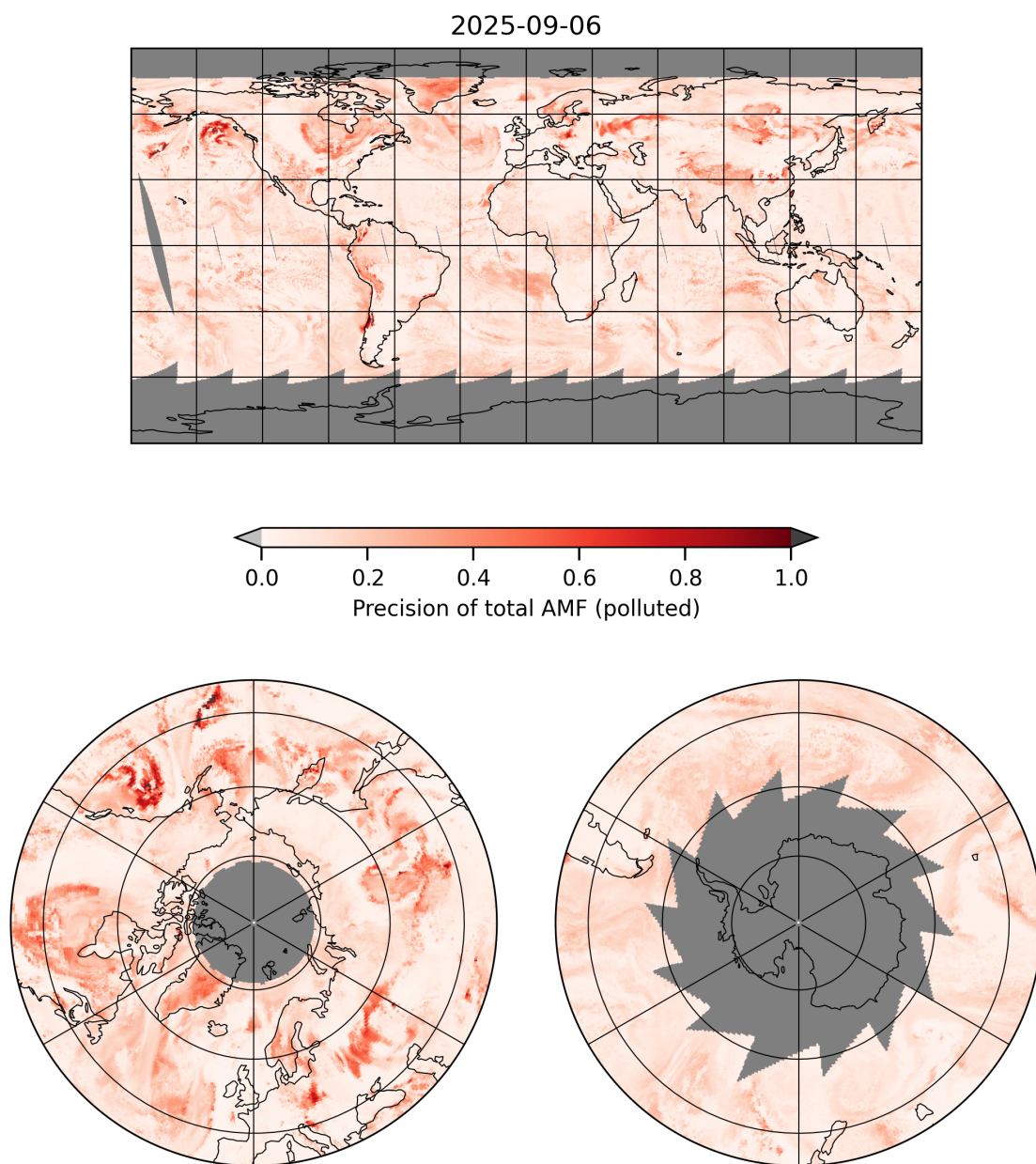


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-09-06 to 2025-09-07

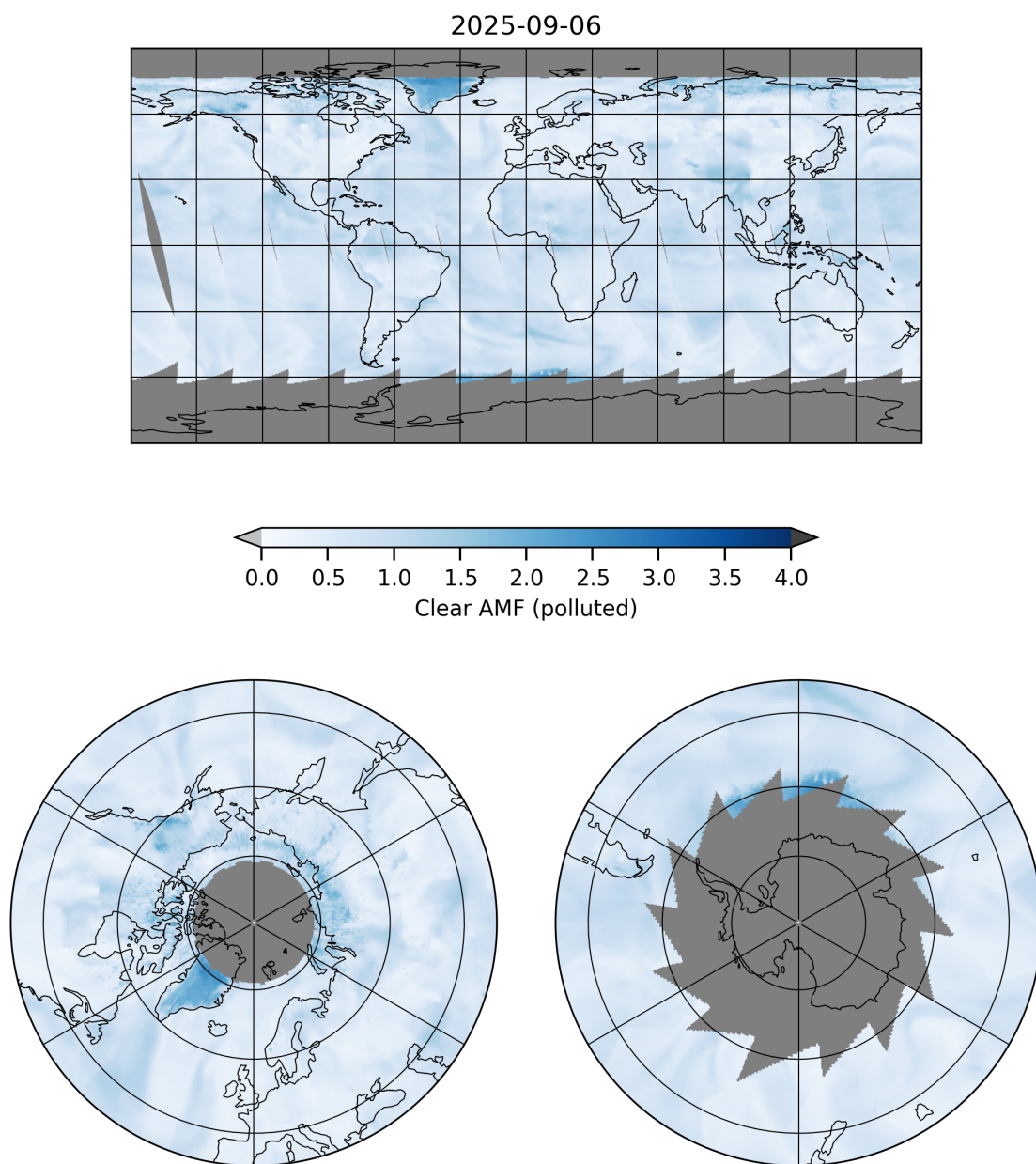


Figure 27: Map of “Clear AMF (polluted)” for 2025-09-06 to 2025-09-07

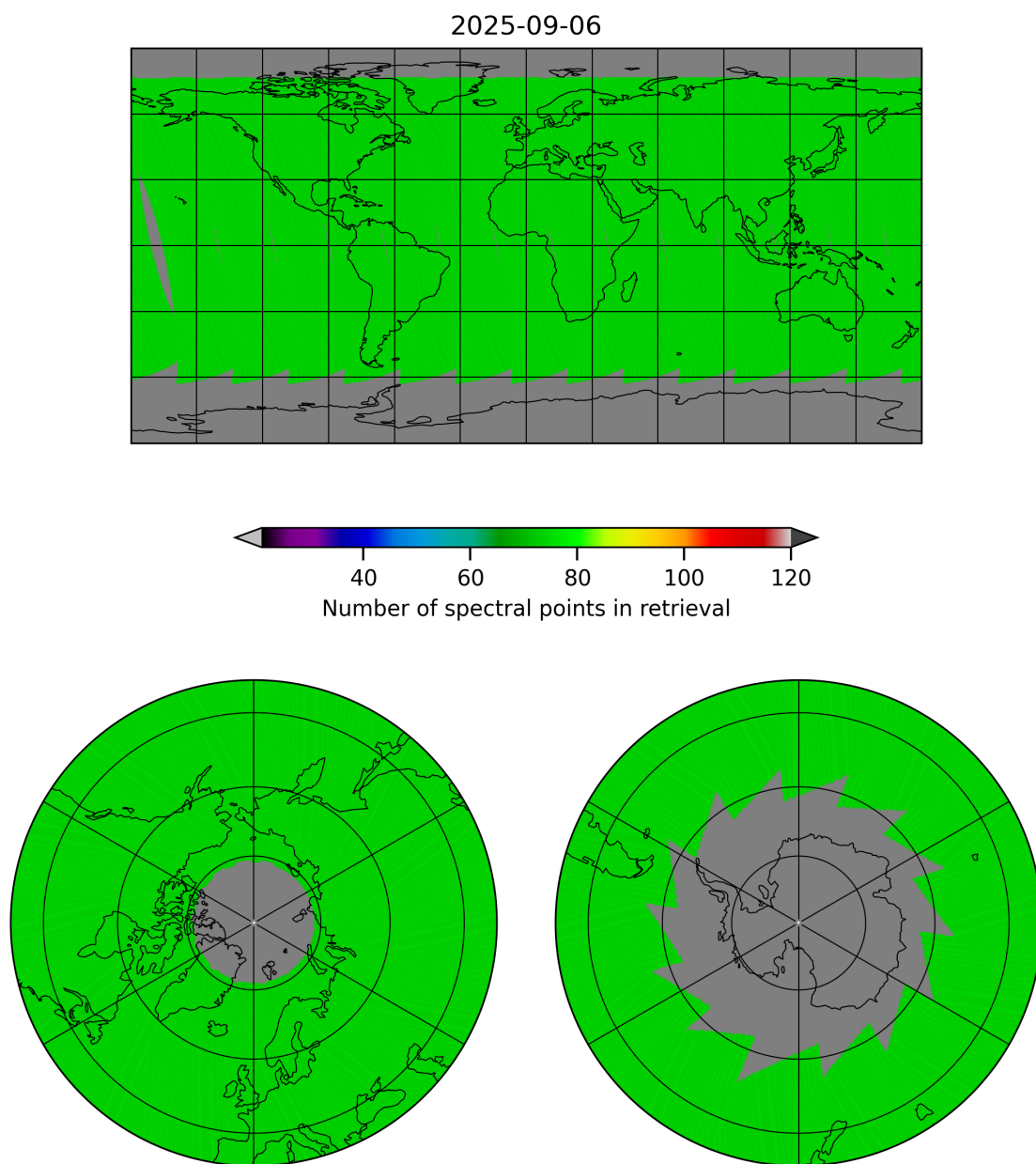


Figure 28: Map of “Number of spectral points in retrieval” for 2025-09-06 to 2025-09-07

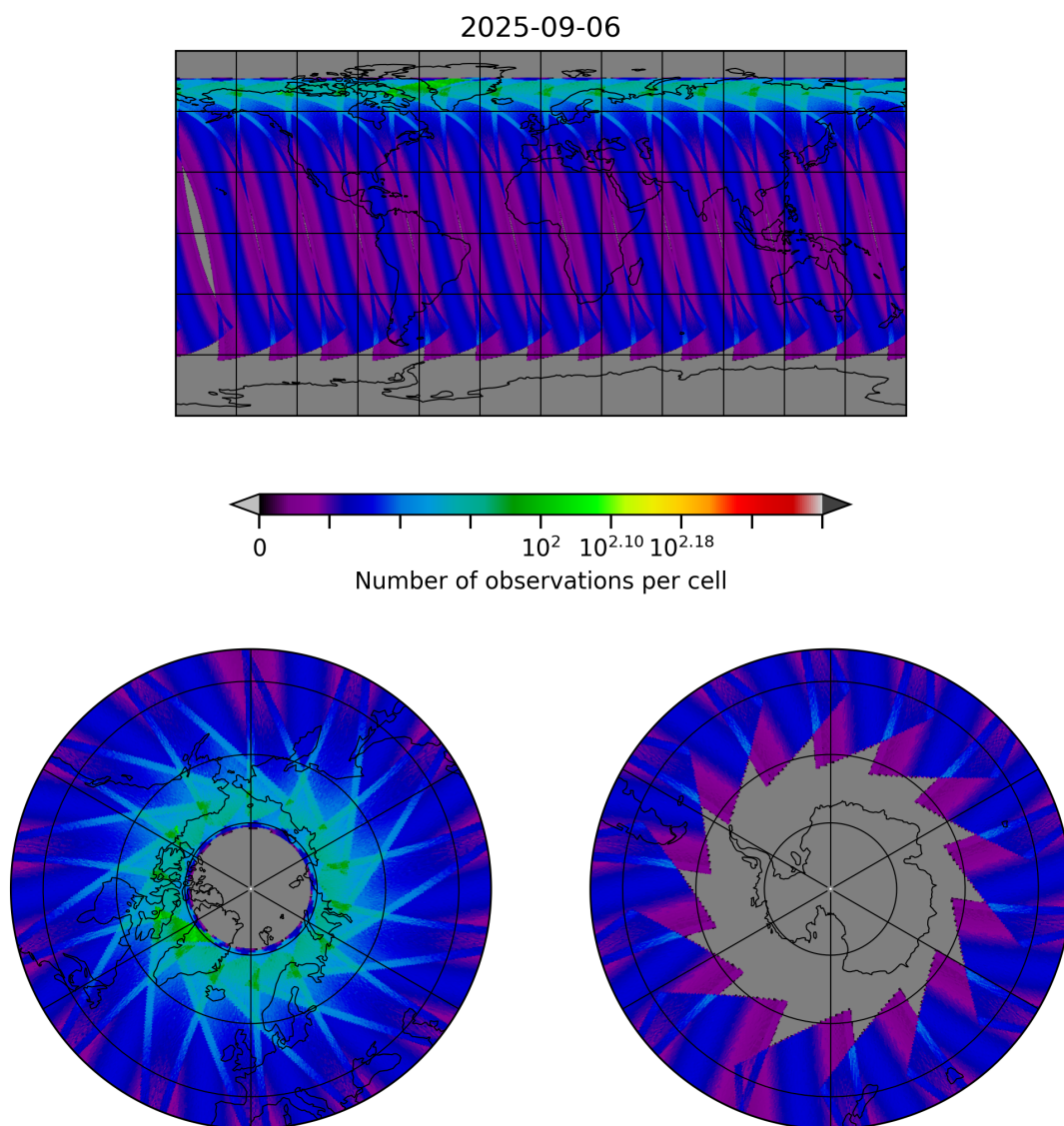


Figure 29: Map of the number of observations for 2025-09-06 to 2025-09-07

7 Zonal average

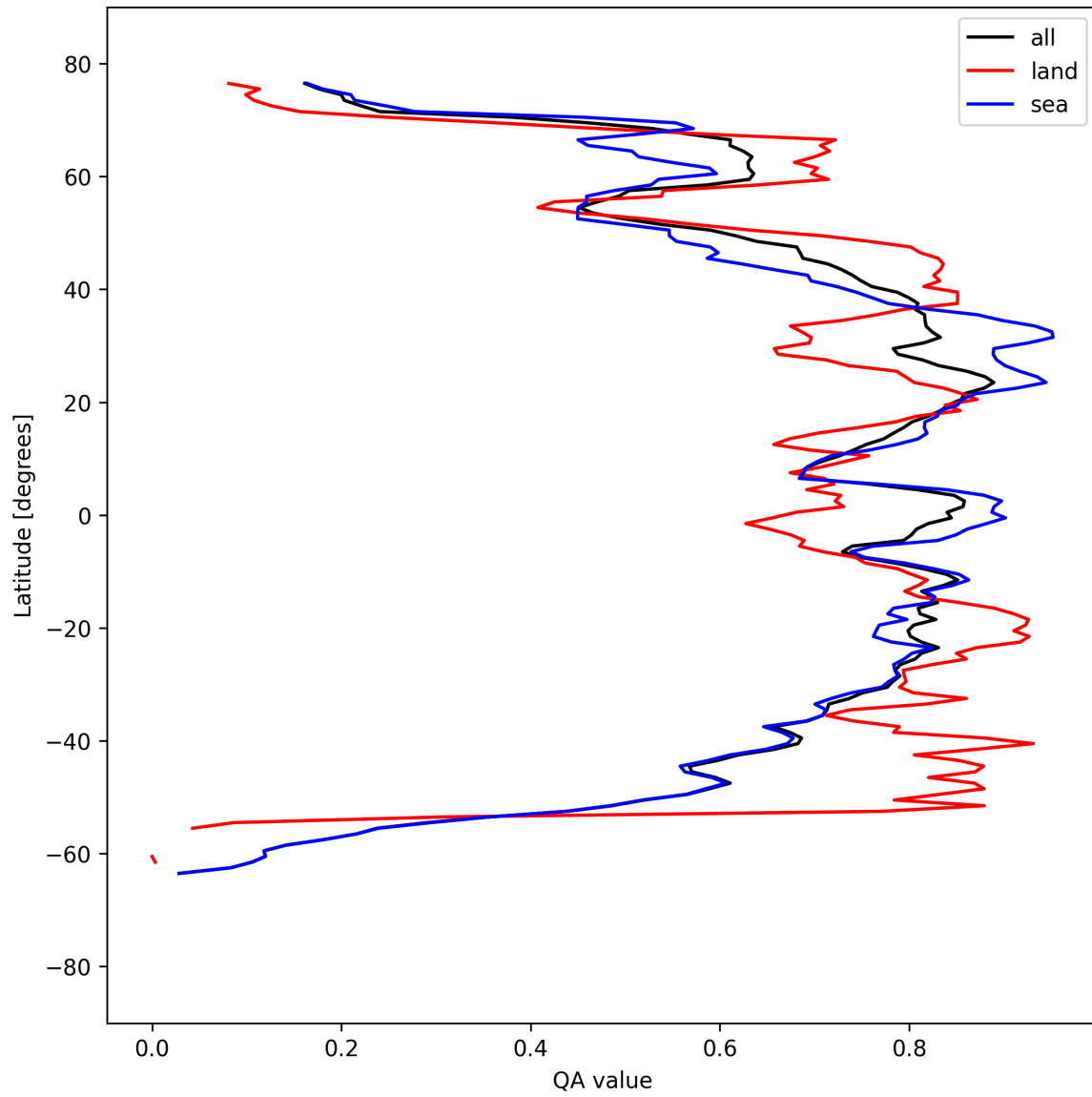


Figure 30: Zonal average of “QA value” for 2025-09-06 to 2025-09-07.

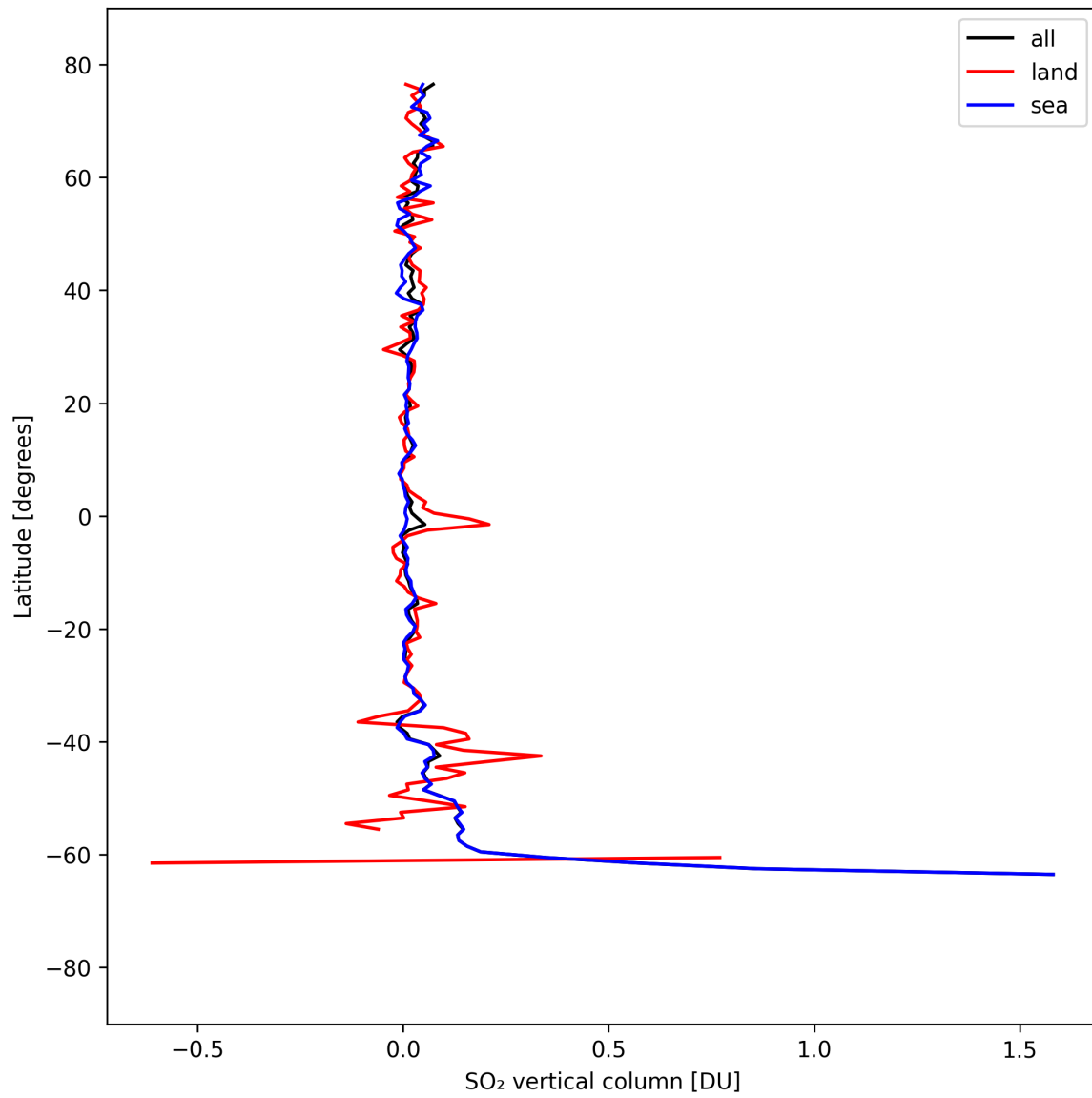


Figure 31: Zonal average of “SO₂ vertical column” for 2025-09-06 to 2025-09-07.

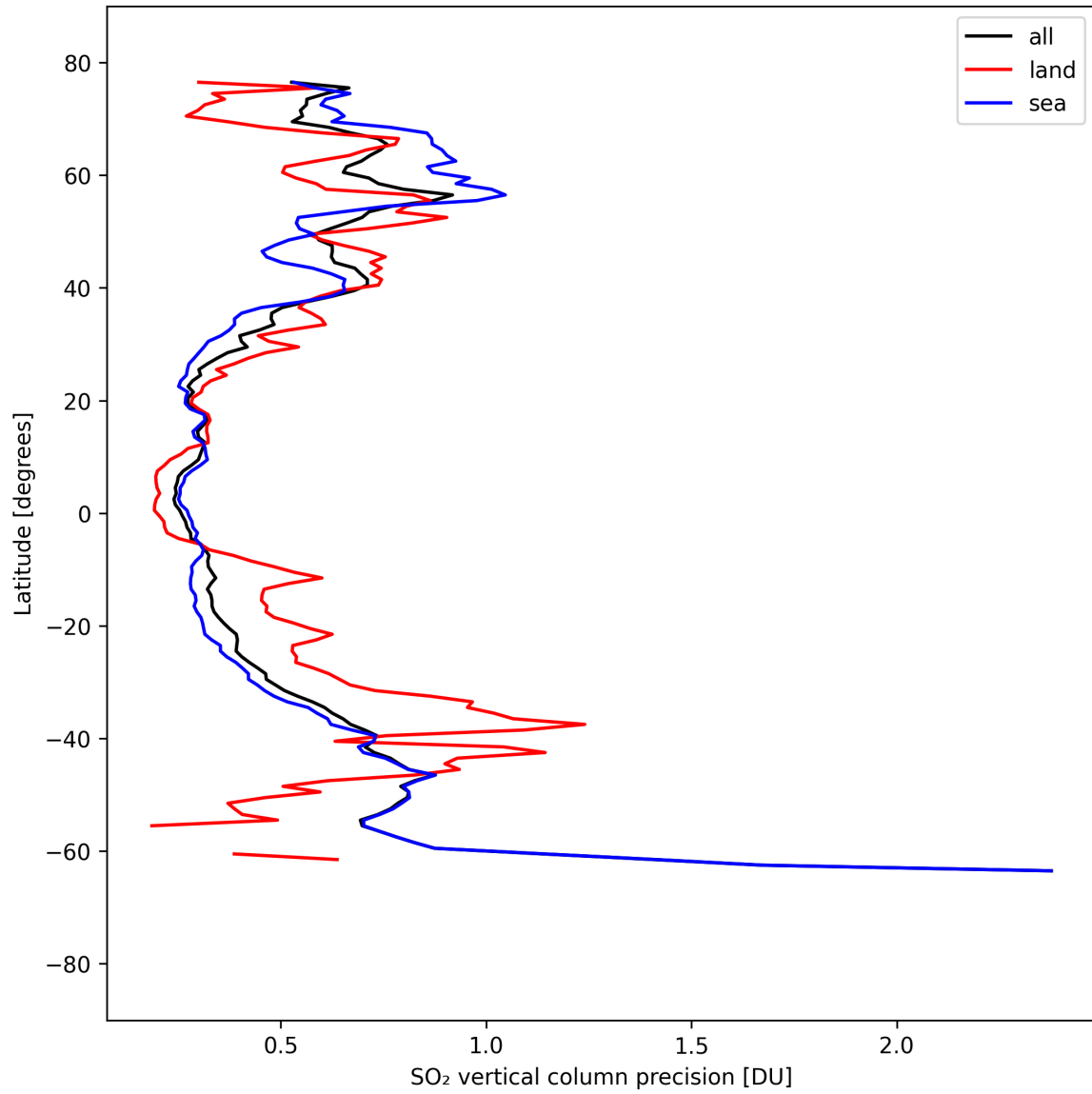


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-09-06 to 2025-09-07.

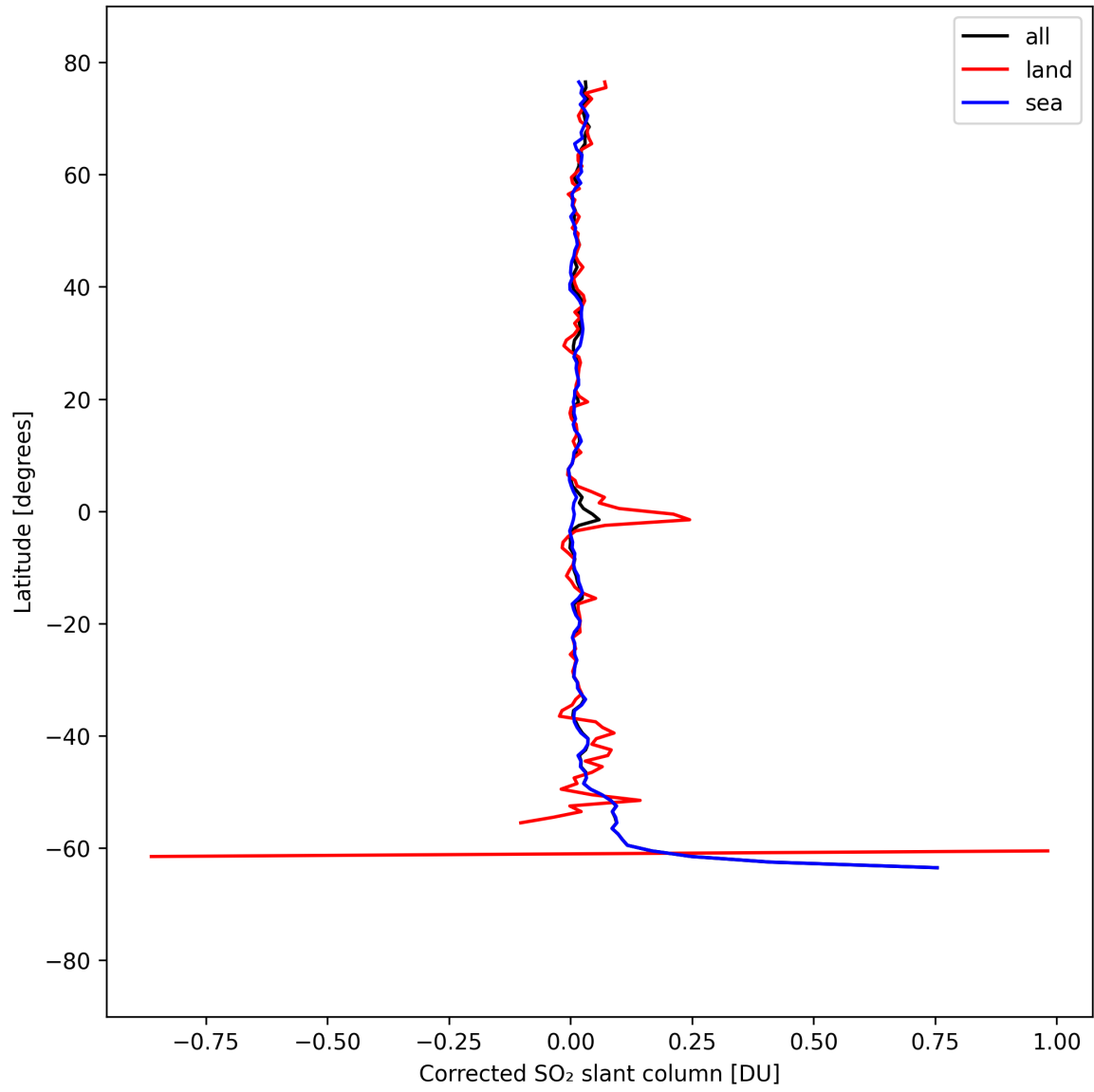


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-09-06 to 2025-09-07.

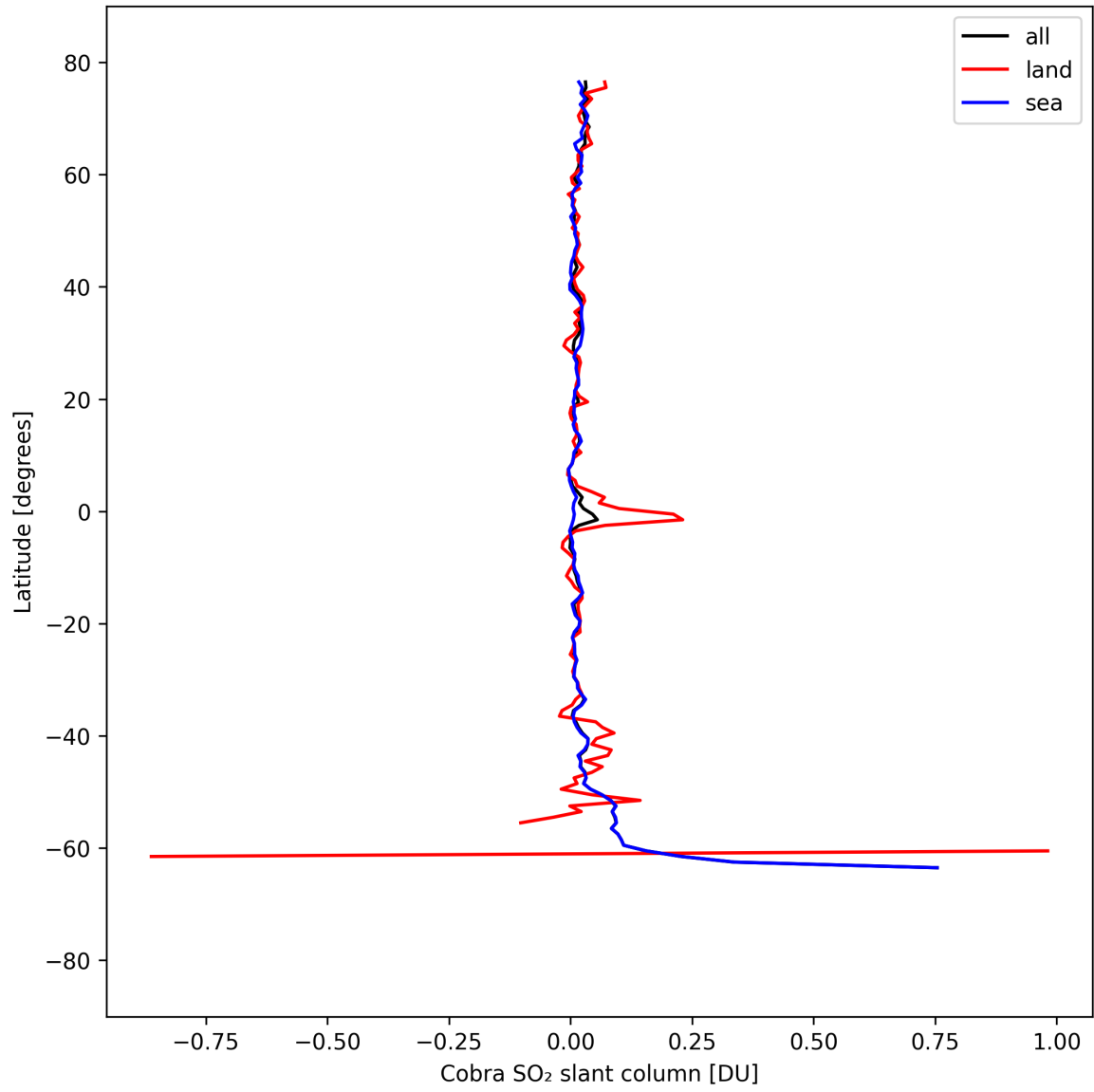


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-09-06 to 2025-09-07.

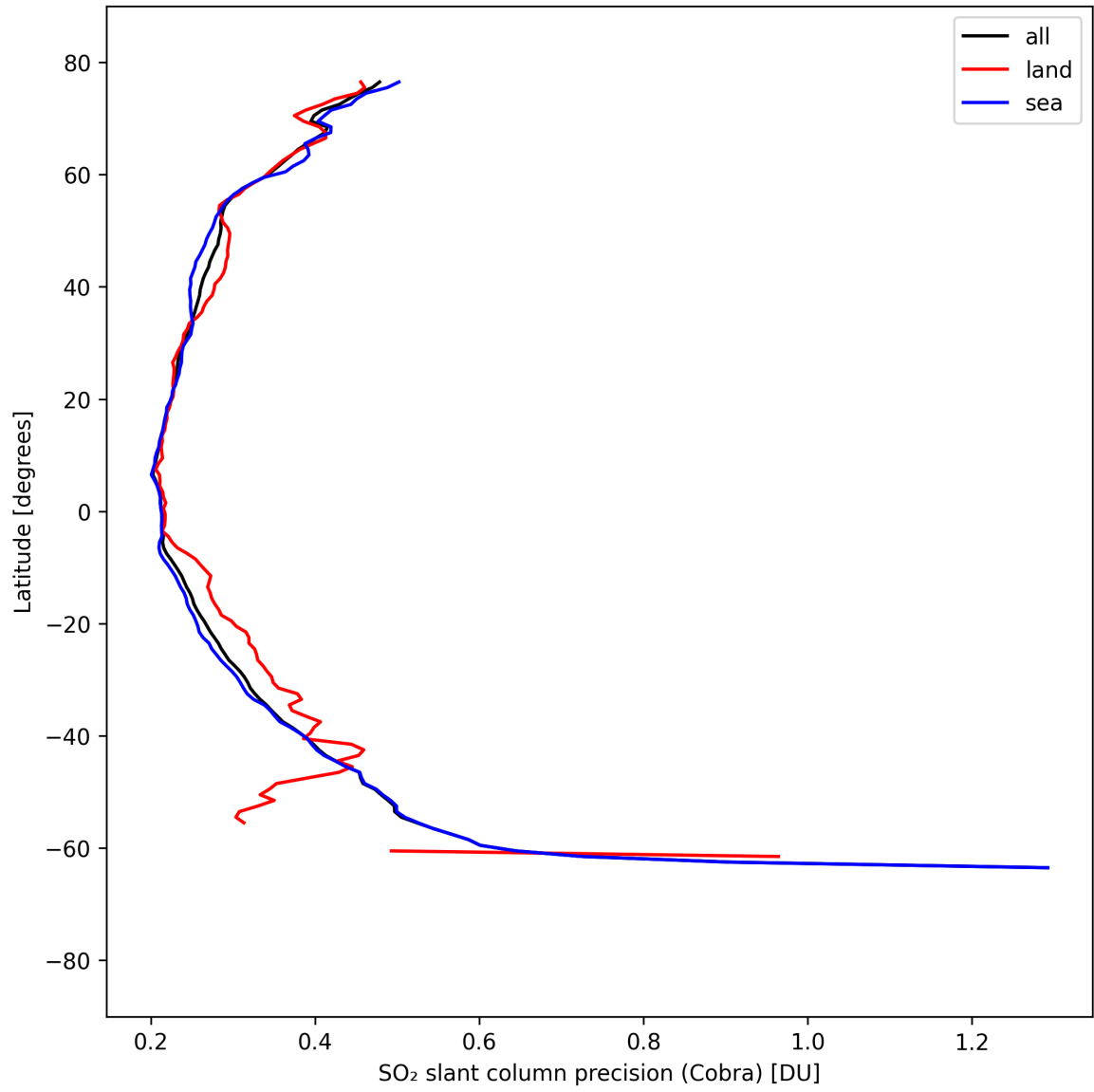


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-09-06 to 2025-09-07.

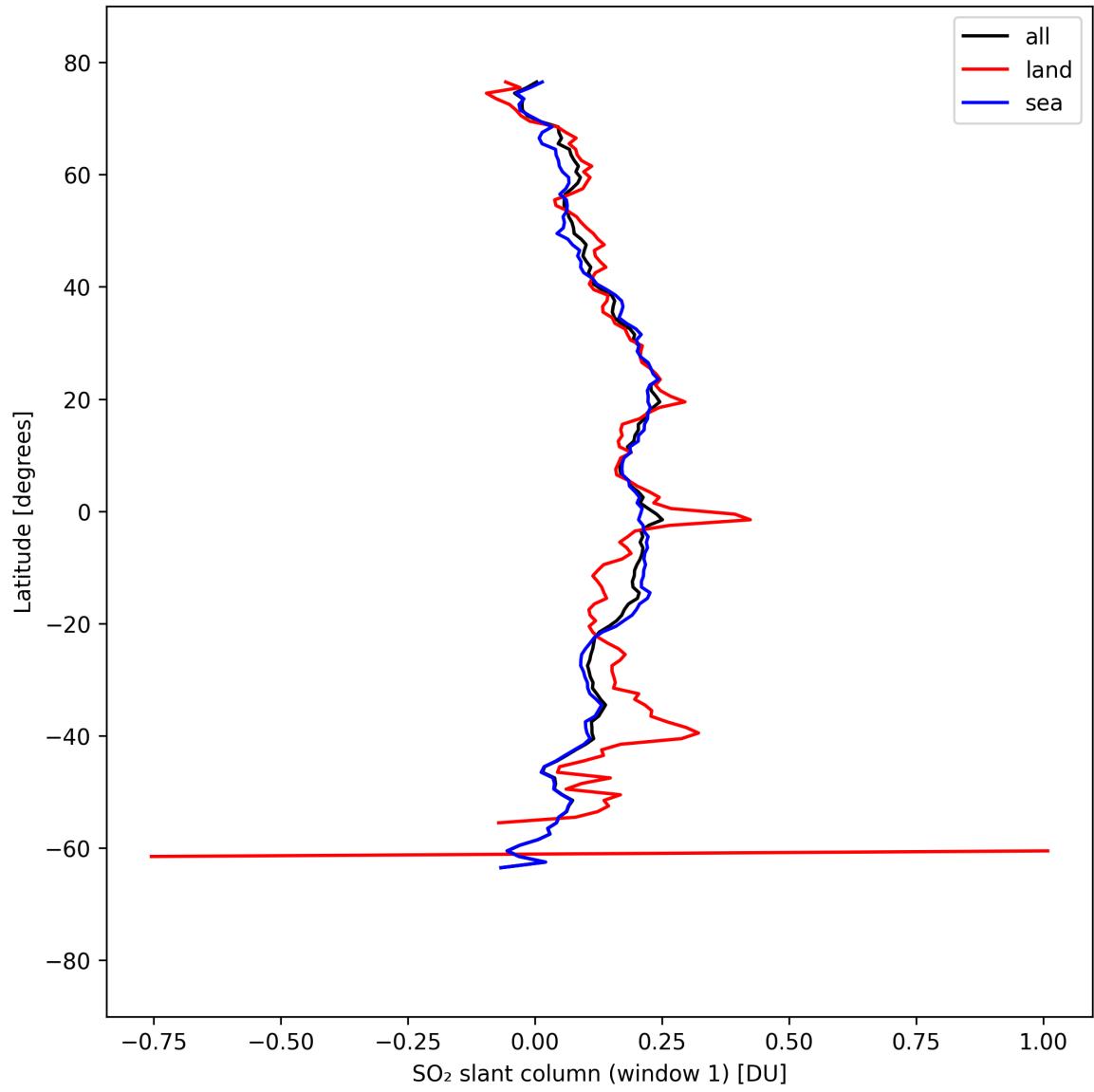


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-09-06 to 2025-09-07.

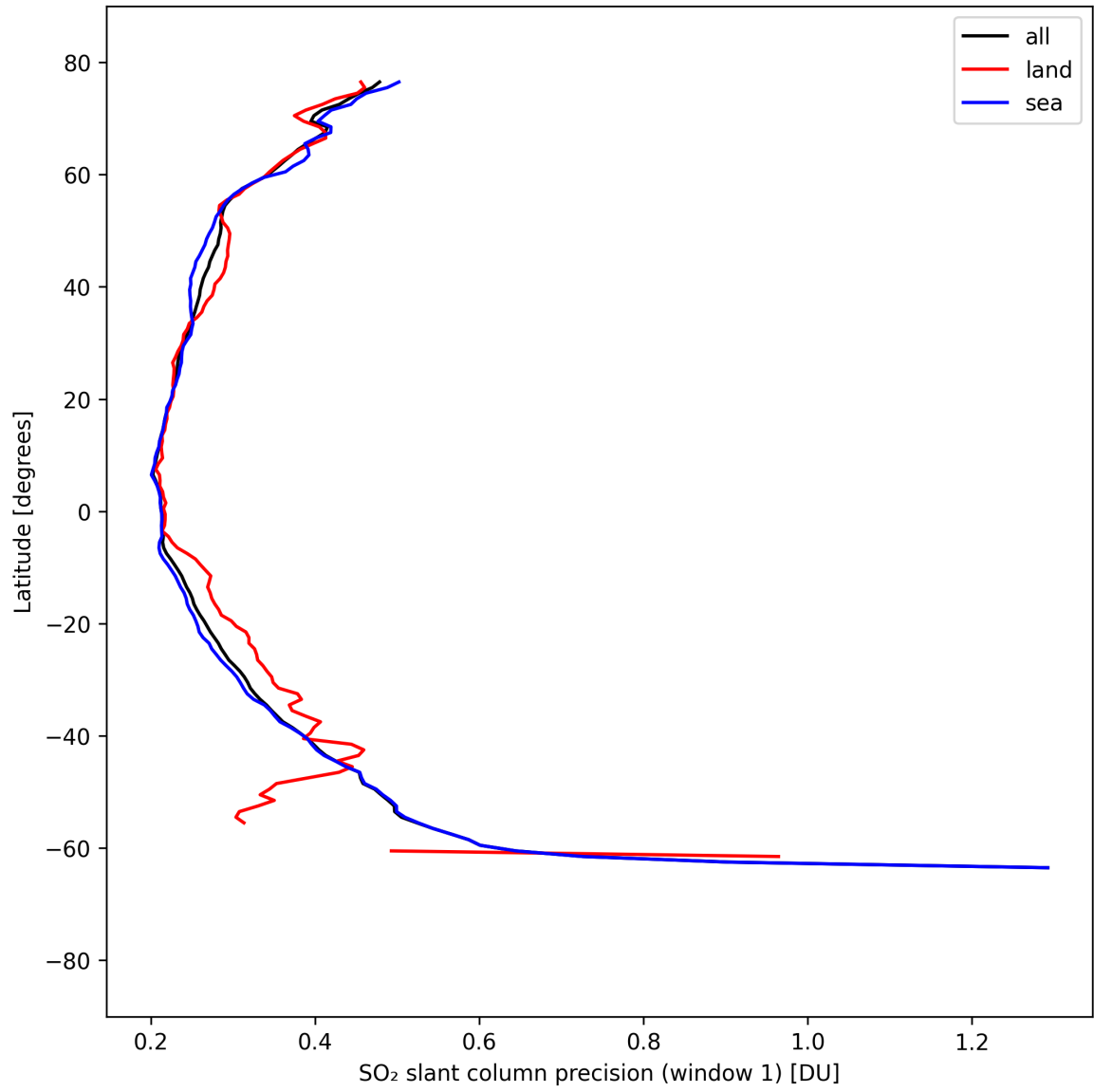


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-09-06 to 2025-09-07.

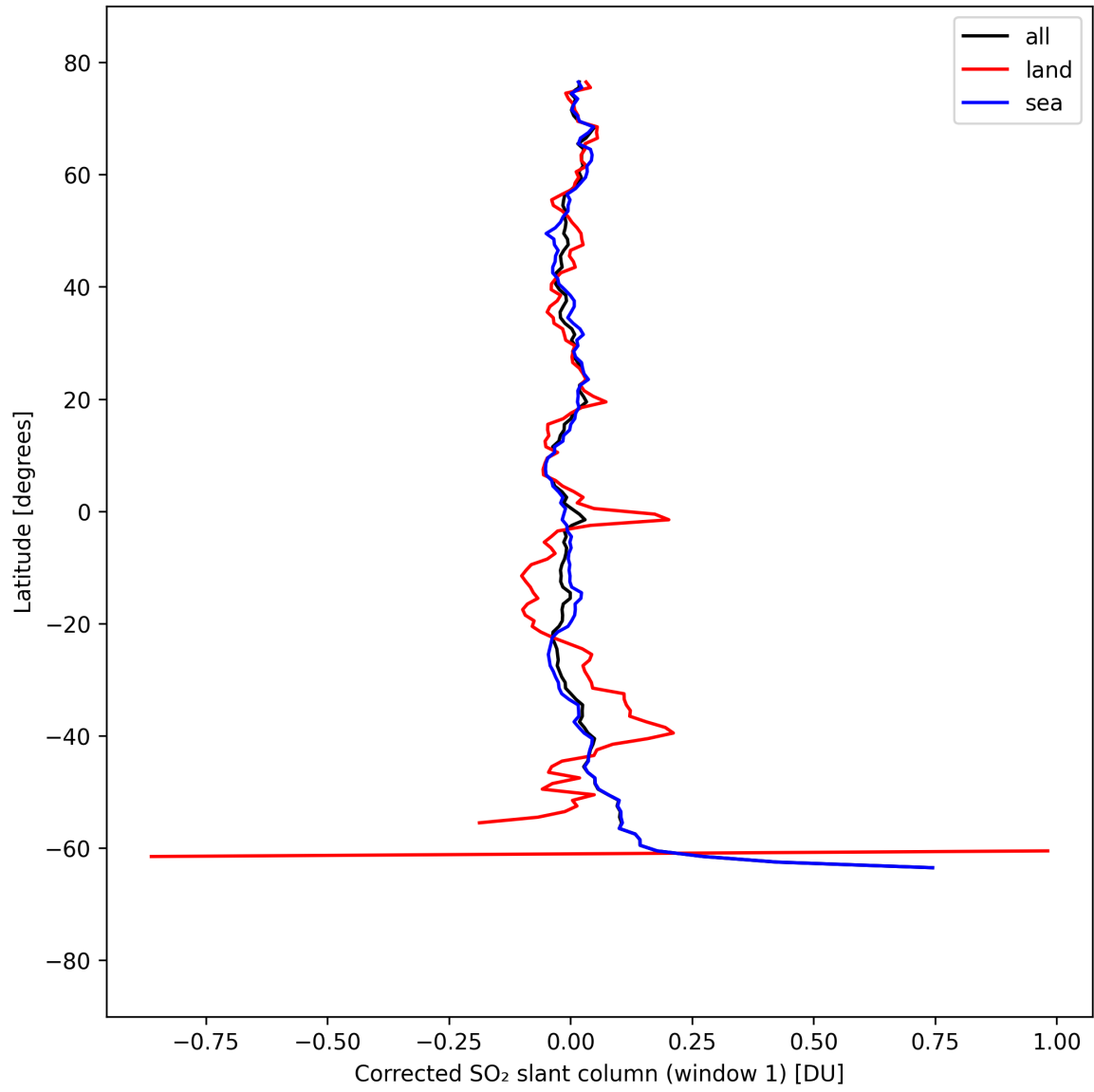


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-09-06 to 2025-09-07.

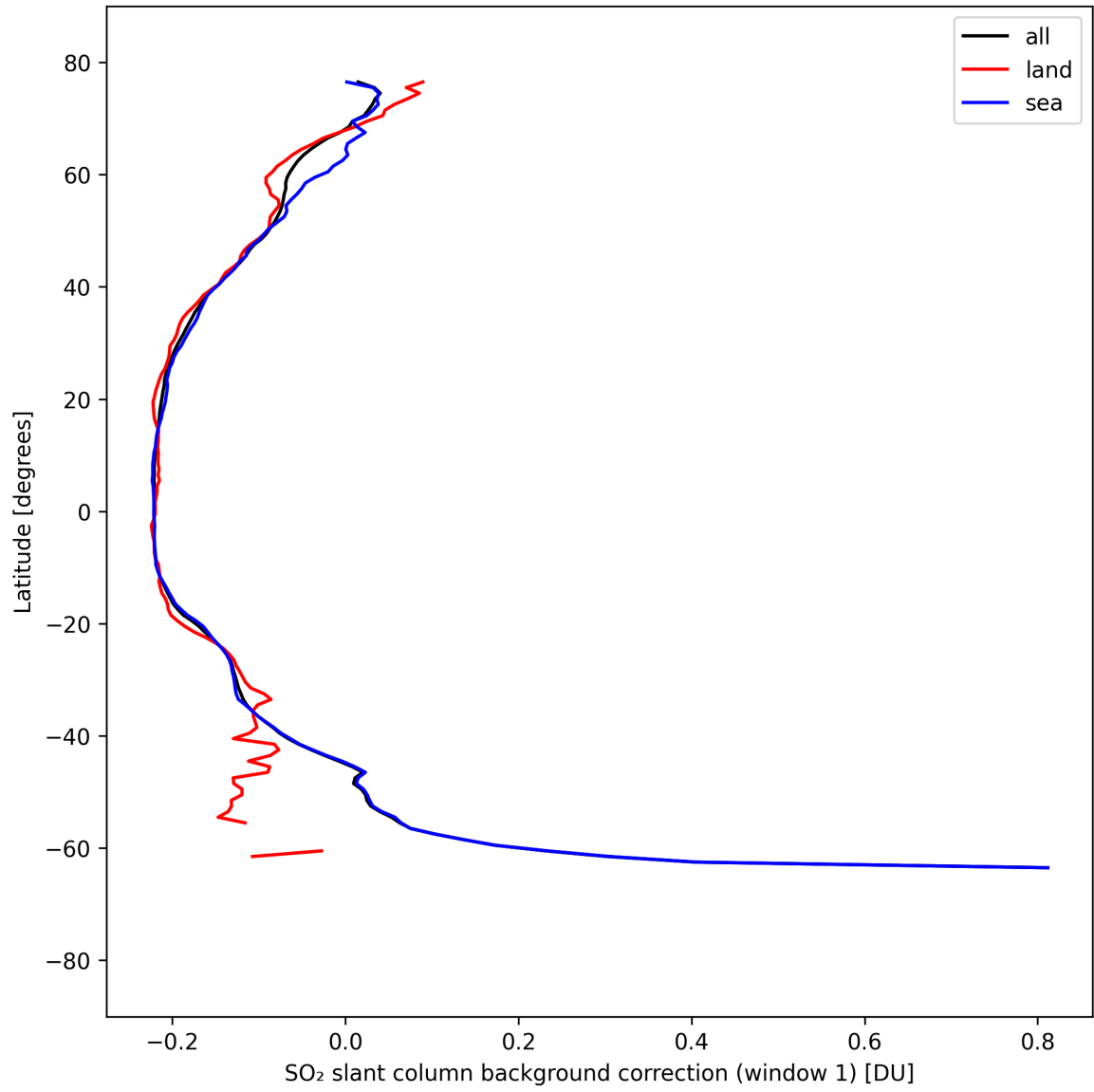


Figure 39: Zonal average of "SO₂ slant column background correction (window 1)" for 2025-09-06 to 2025-09-07.

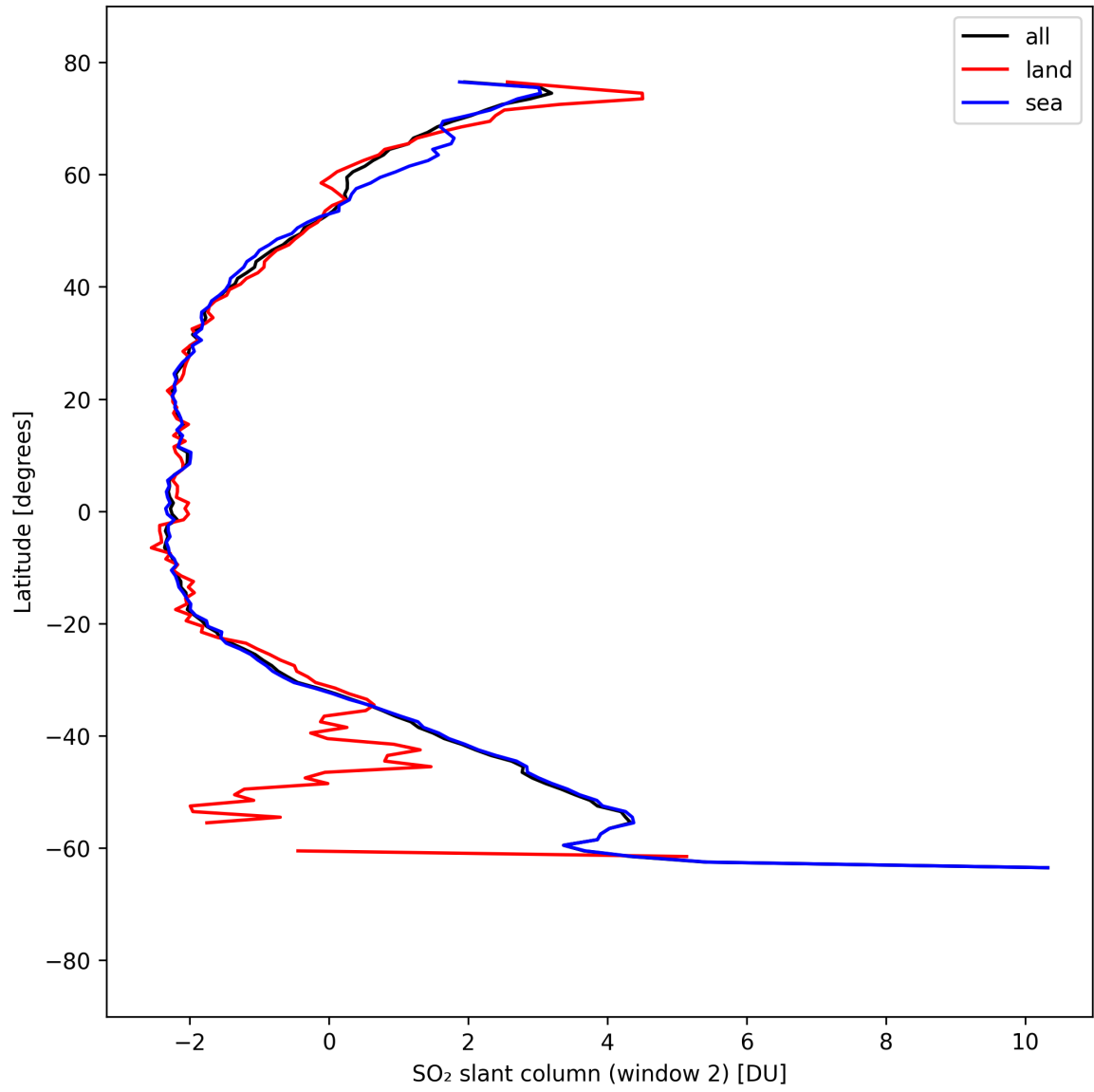


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-09-06 to 2025-09-07.

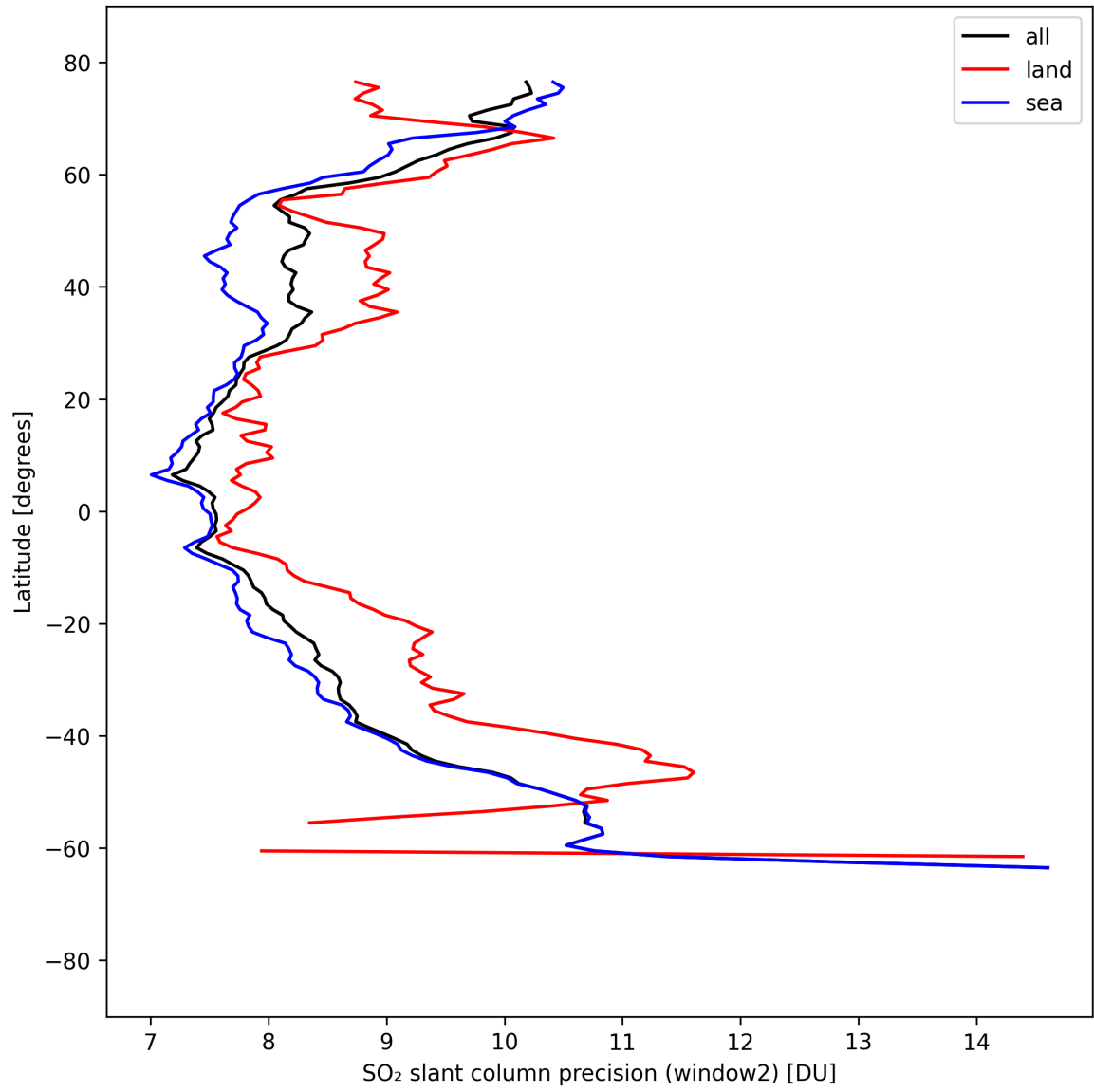


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-09-06 to 2025-09-07.

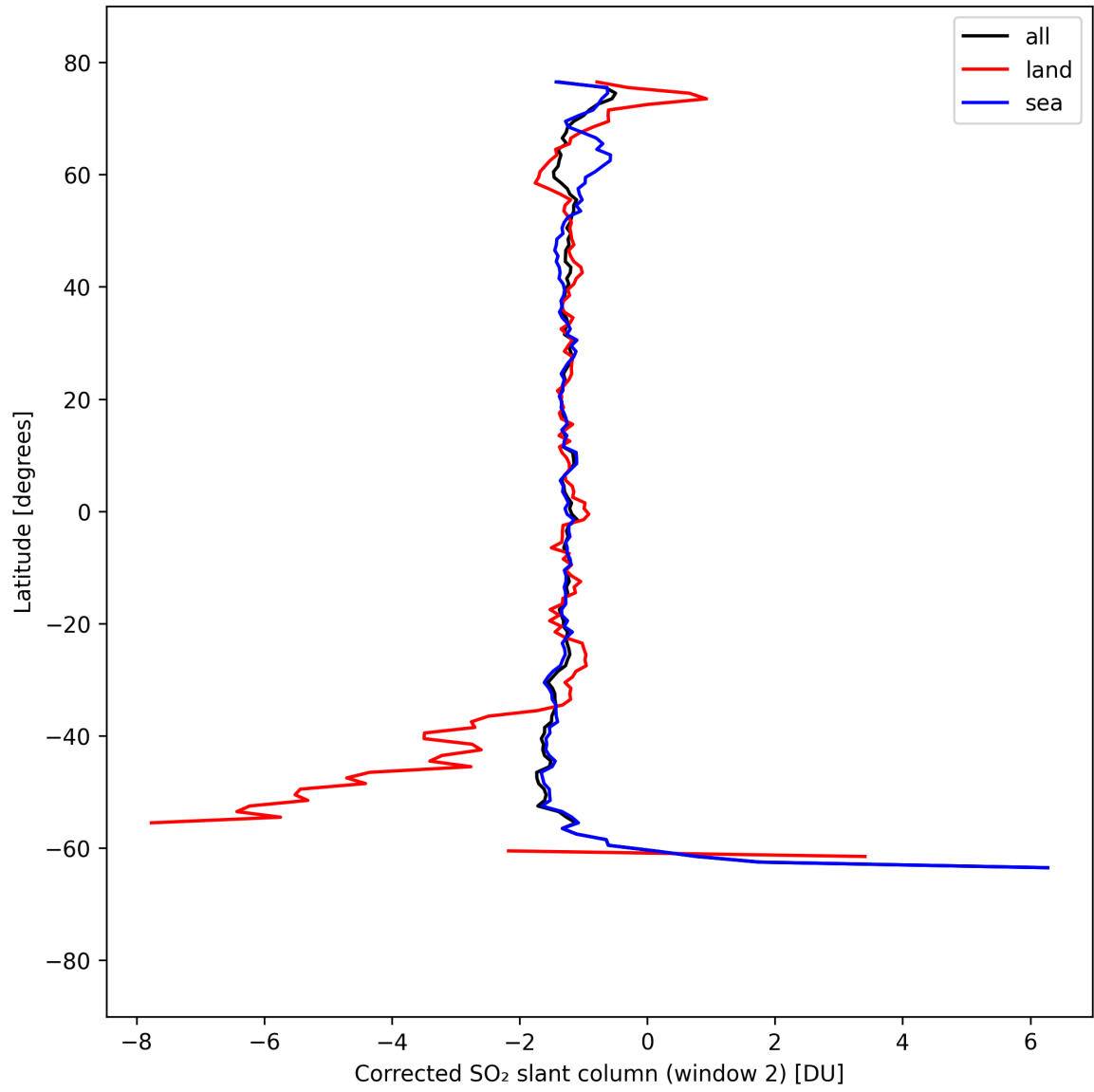


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-09-06 to 2025-09-07.

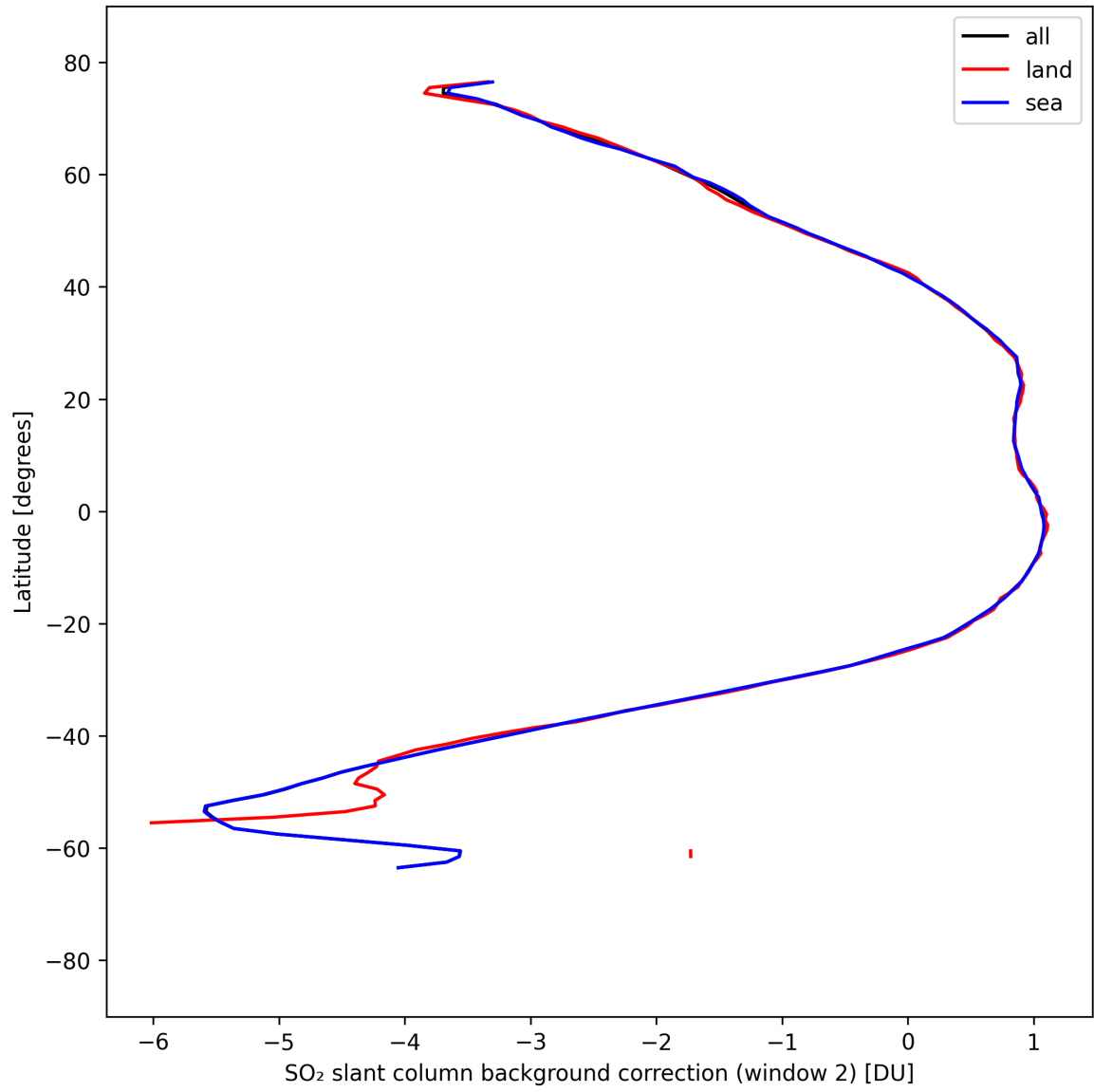


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-09-06 to 2025-09-07.

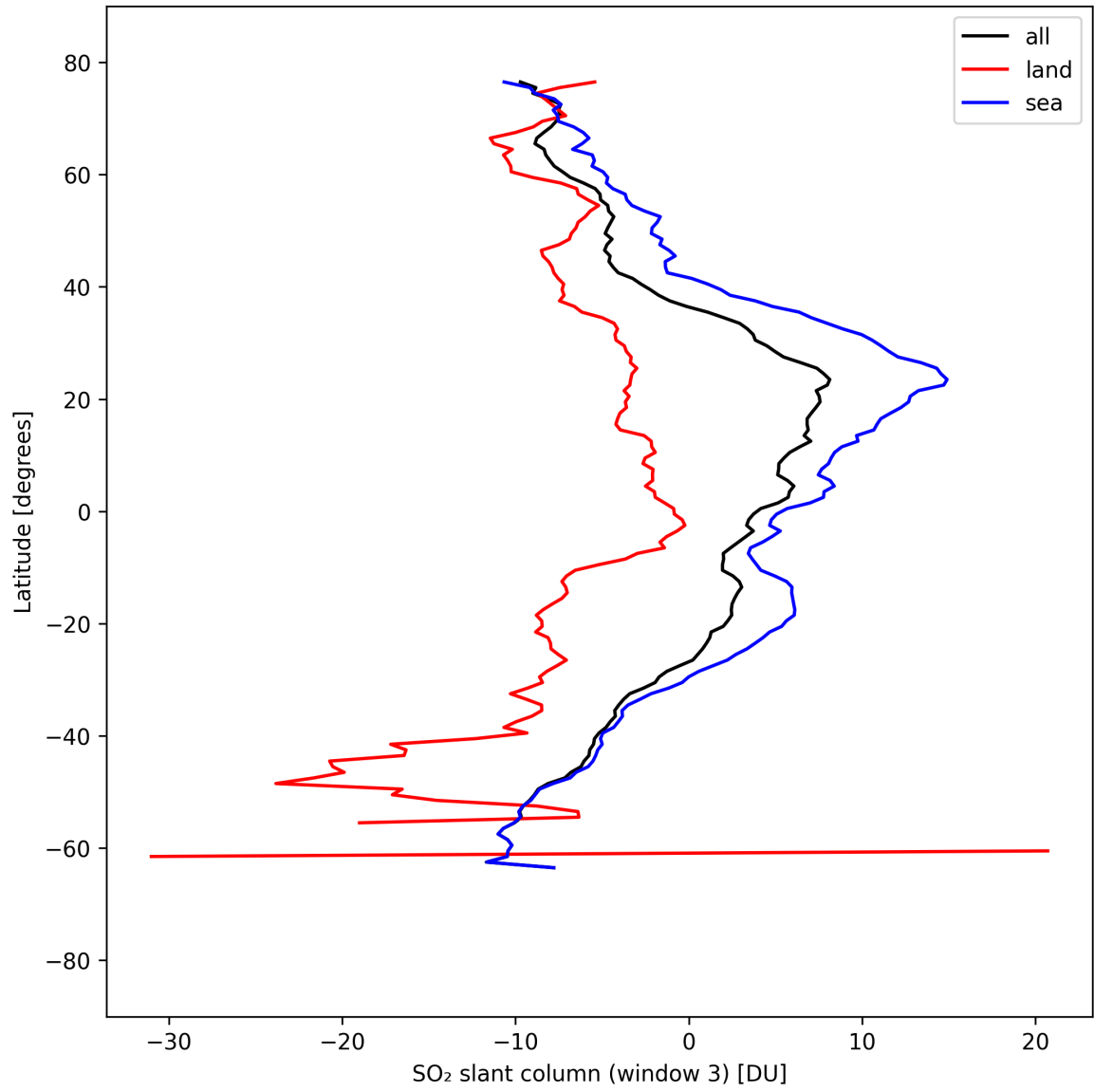


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-09-06 to 2025-09-07.

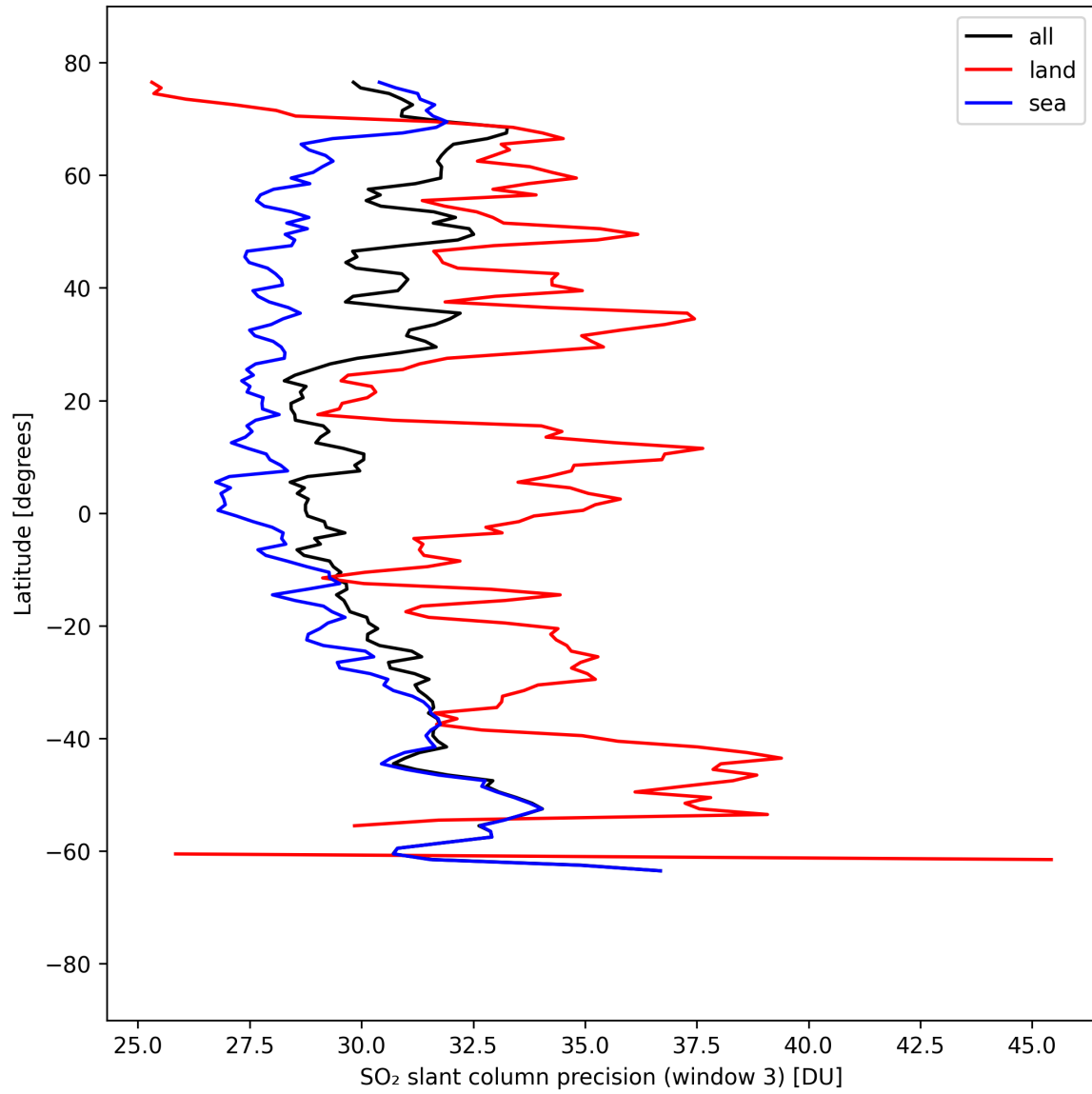


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-09-06 to 2025-09-07.

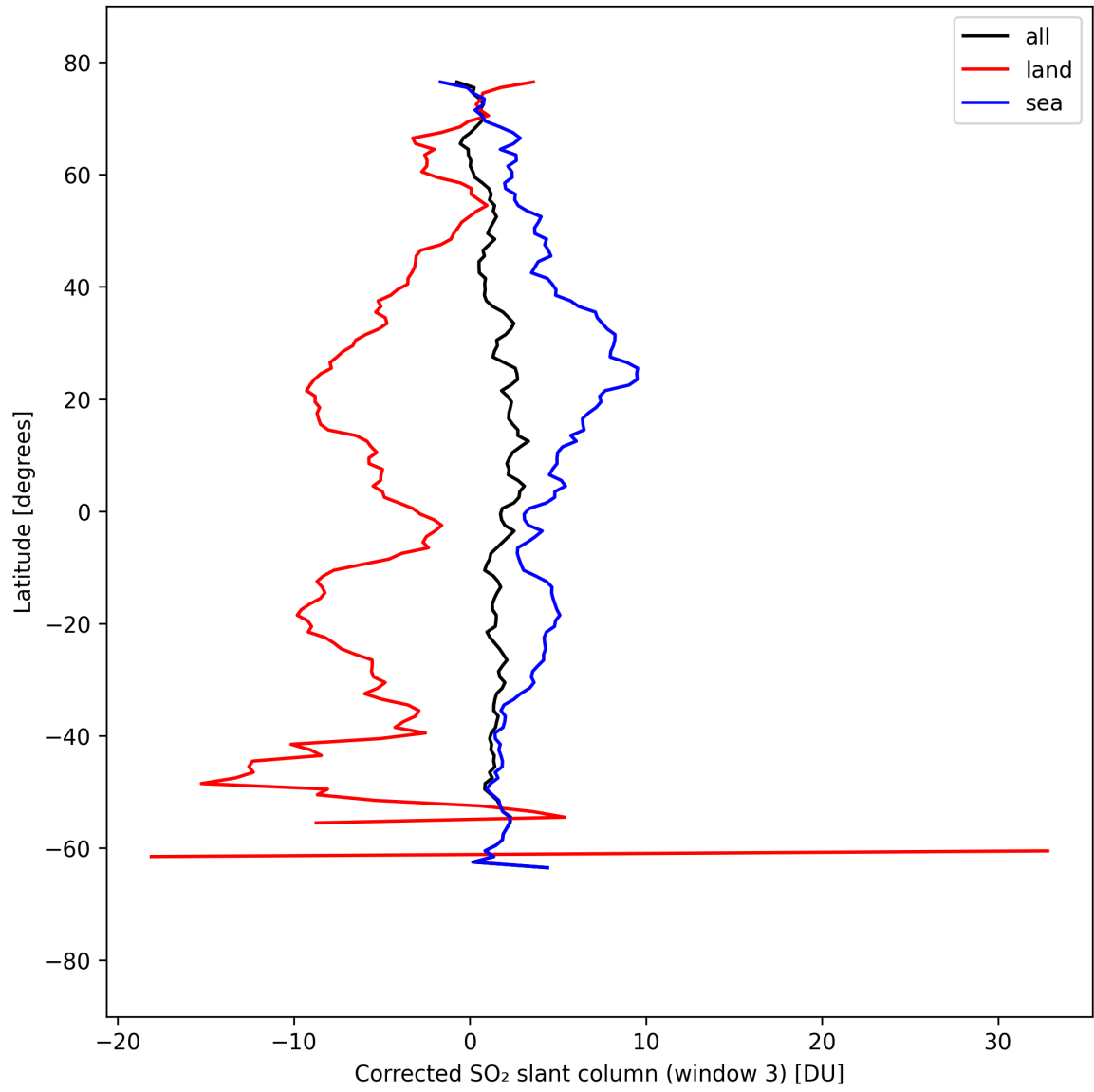


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-09-06 to 2025-09-07.

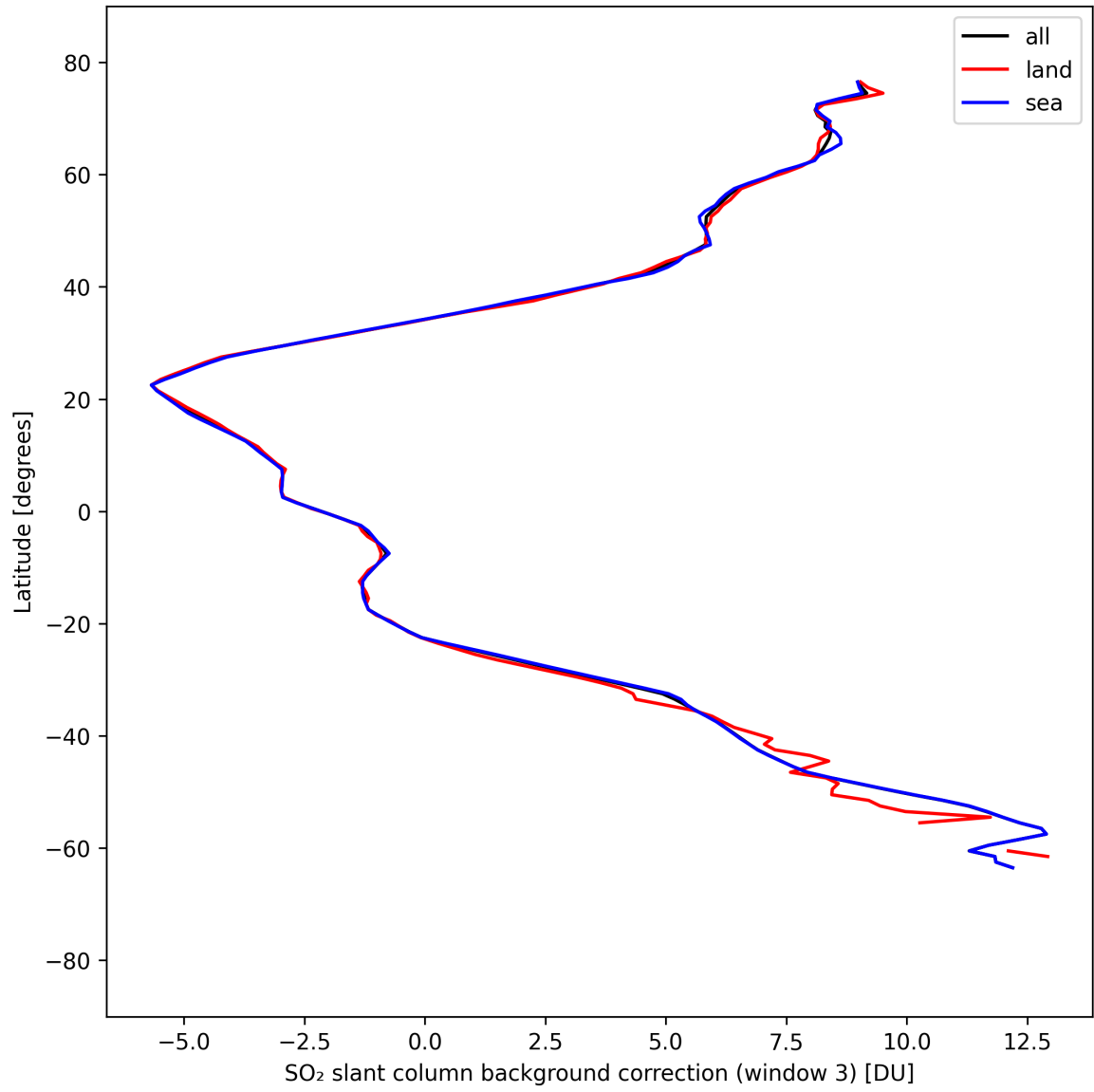


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-09-06 to 2025-09-07.

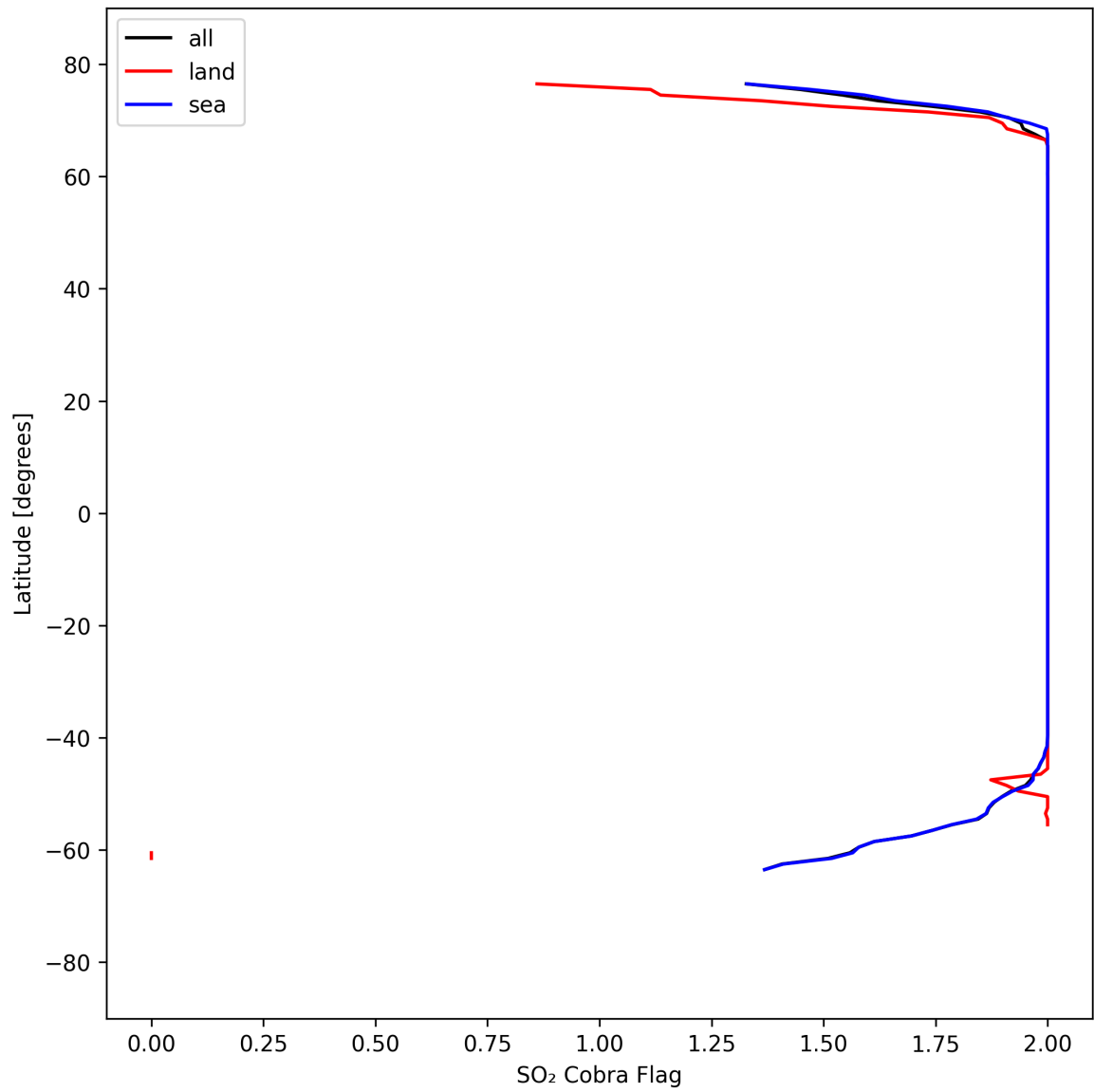


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-09-06 to 2025-09-07.

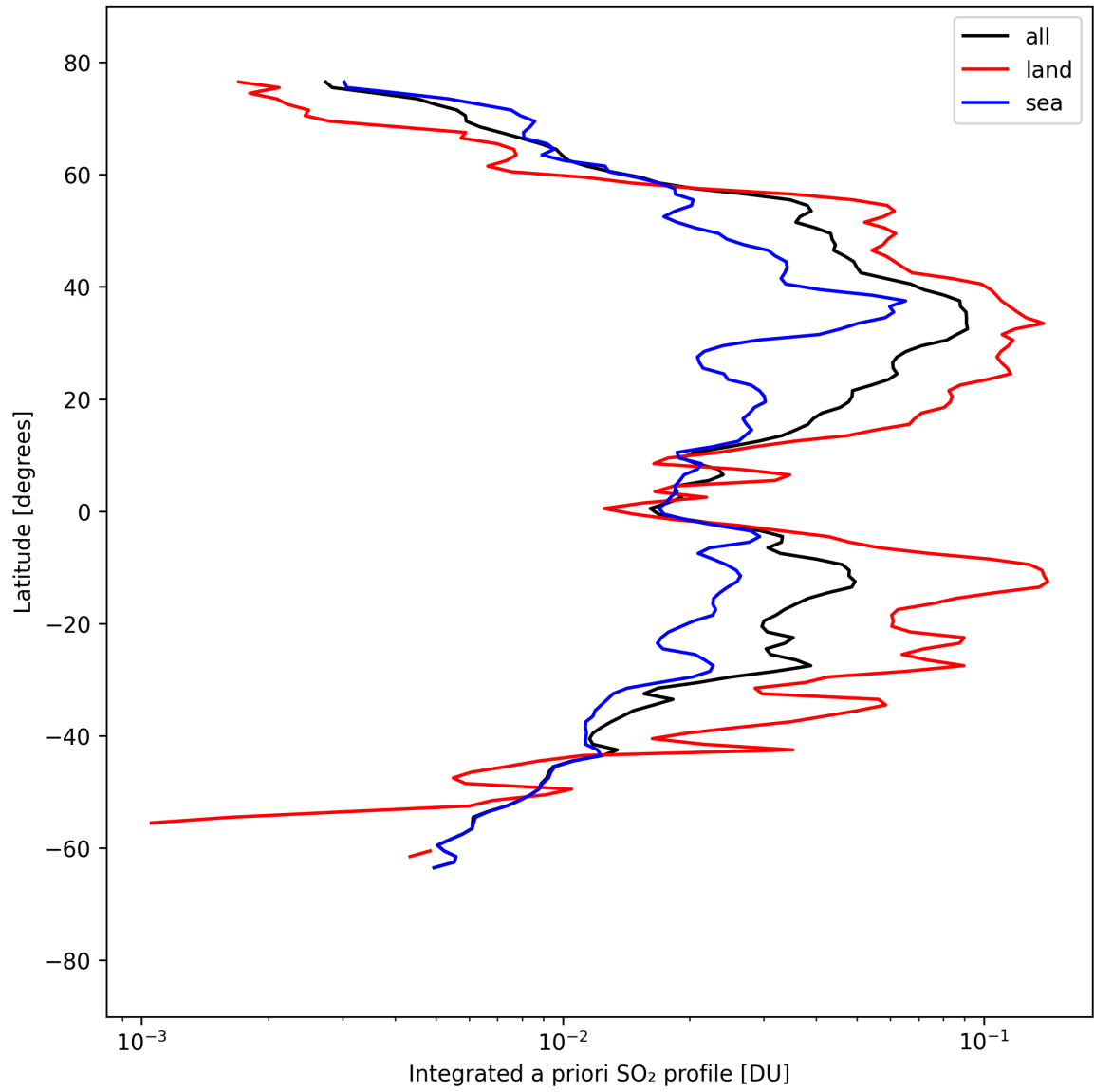


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-09-06 to 2025-09-07.

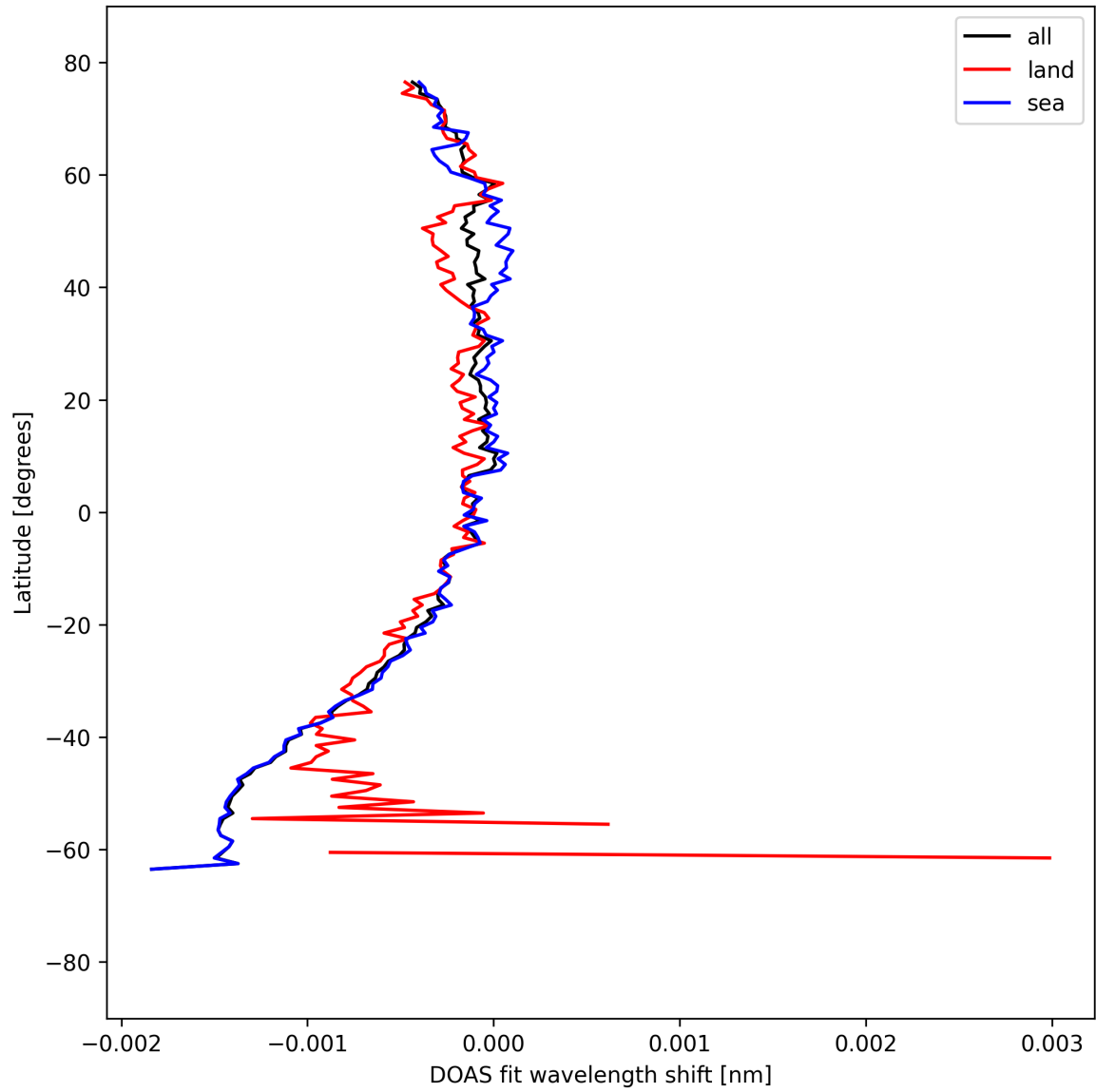


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2025-09-06 to 2025-09-07.

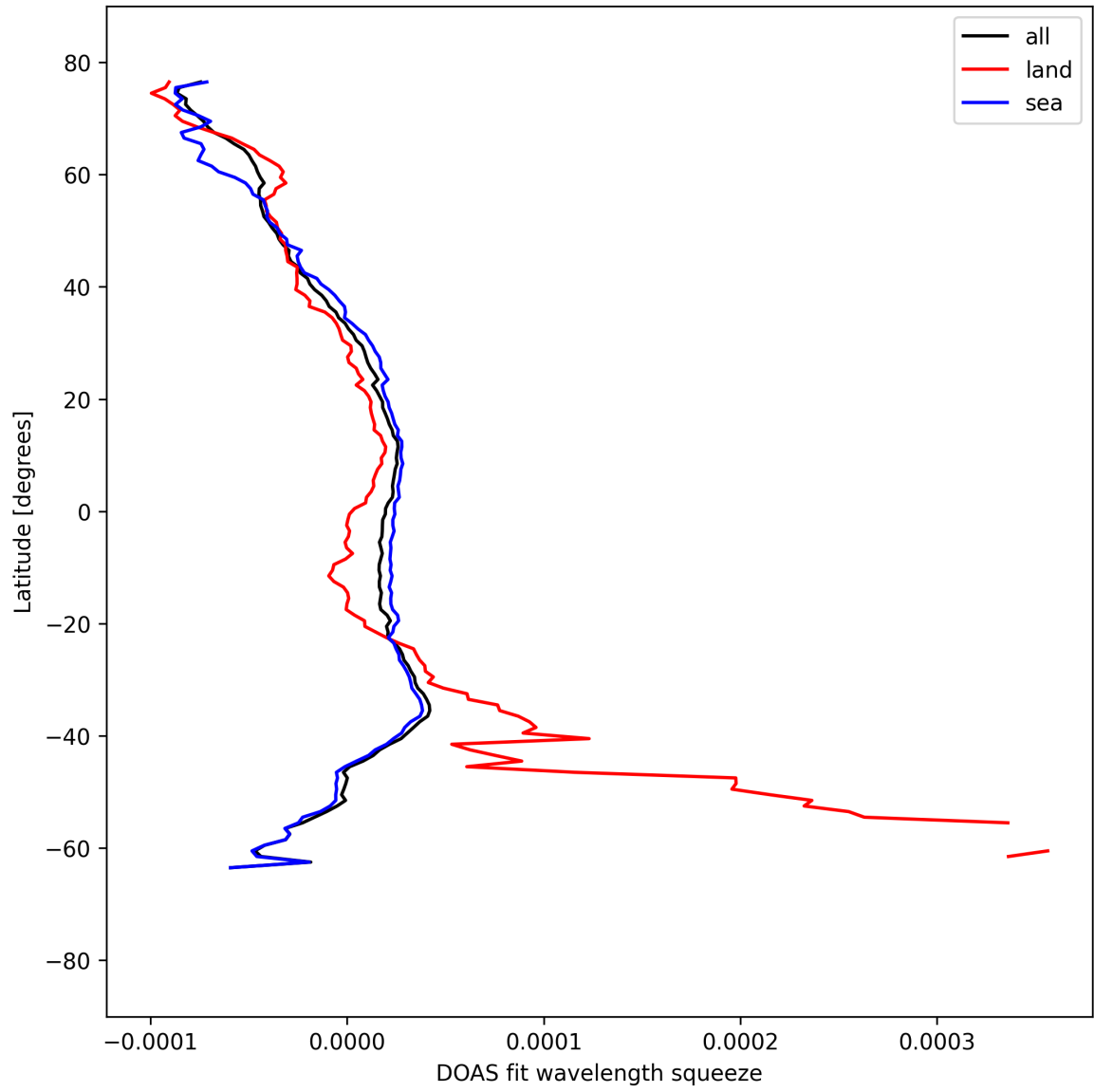


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-09-06 to 2025-09-07.



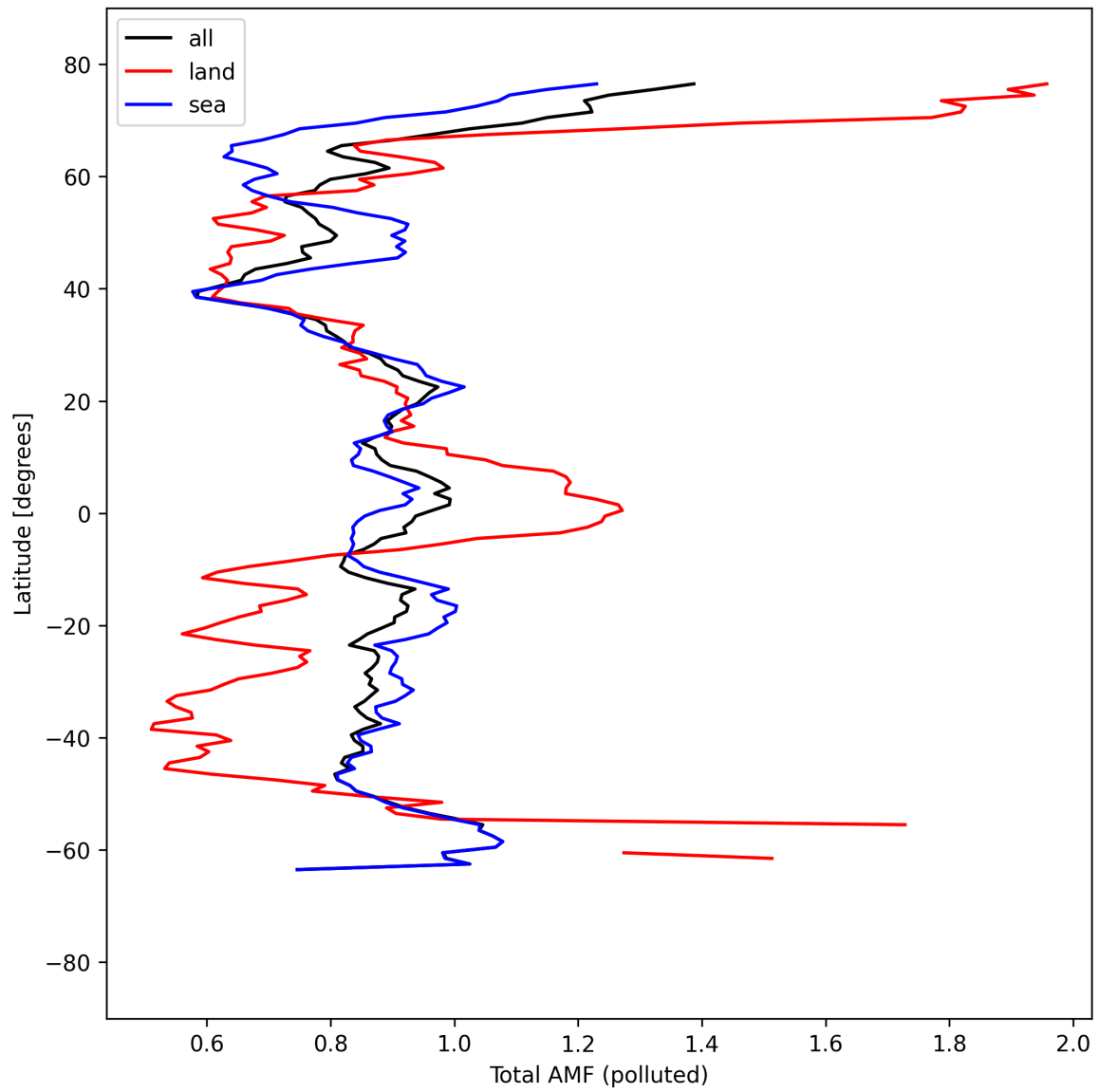


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-09-06 to 2025-09-07.

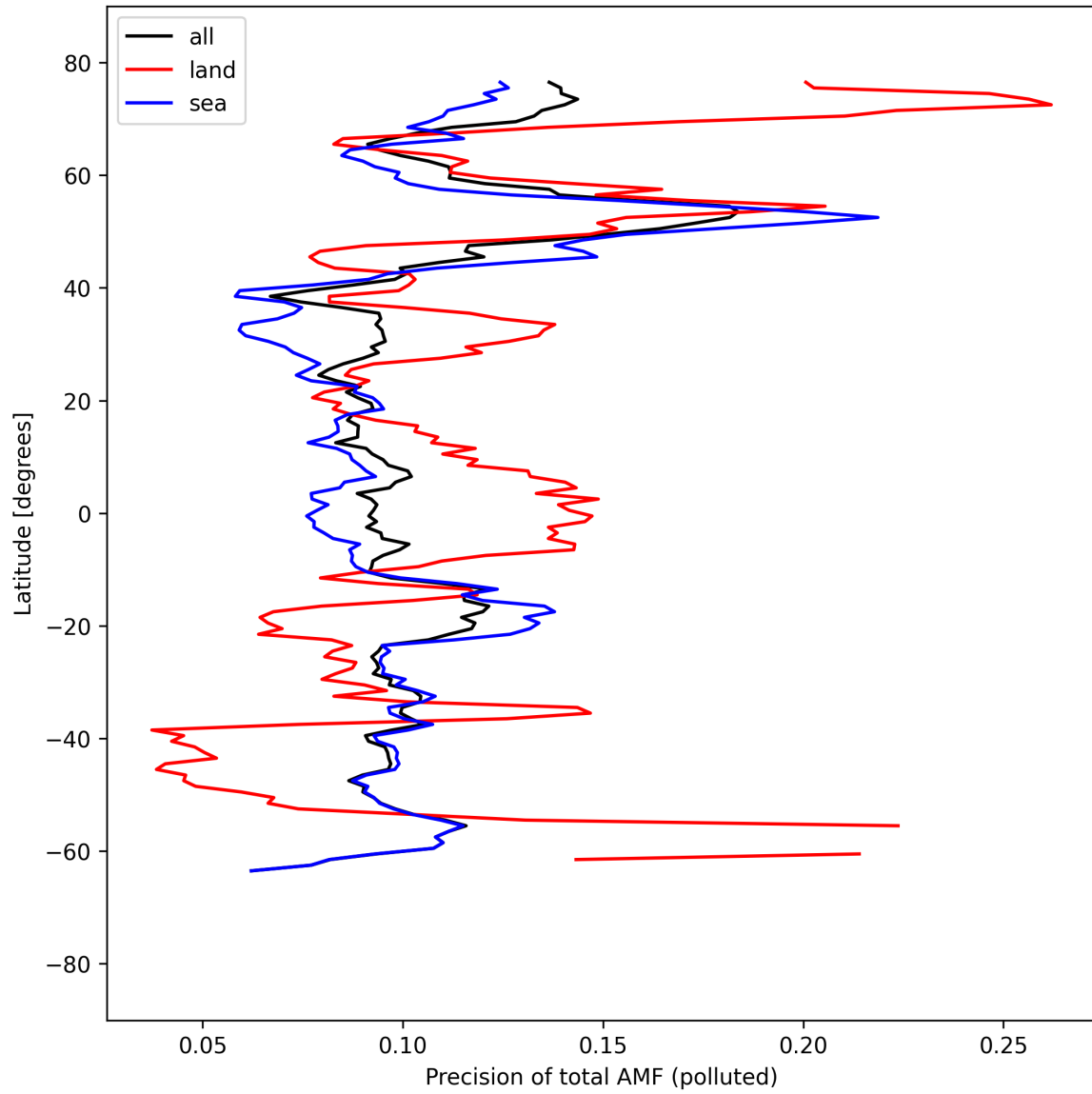


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-09-06 to 2025-09-07.

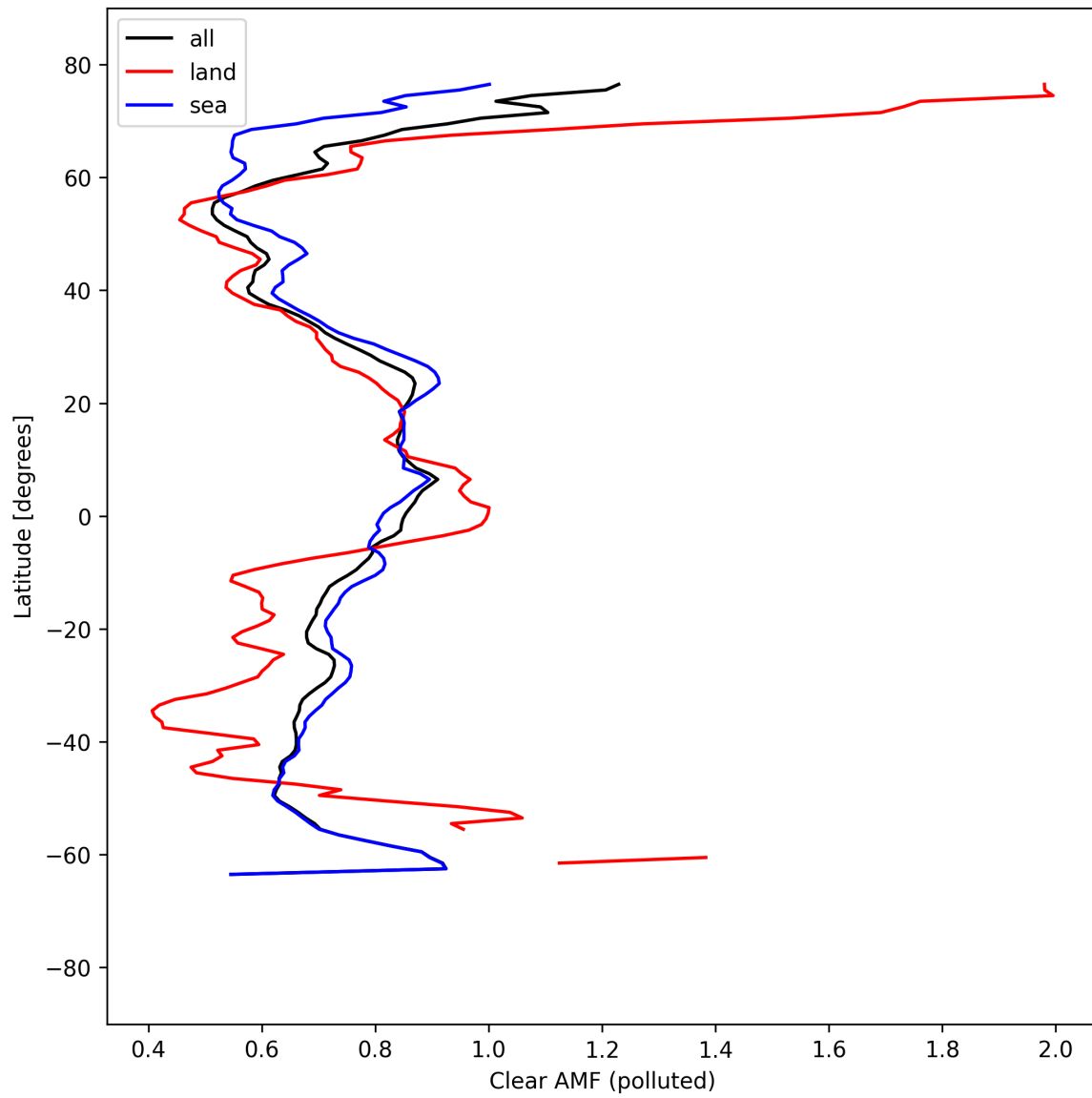


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-09-06 to 2025-09-07.

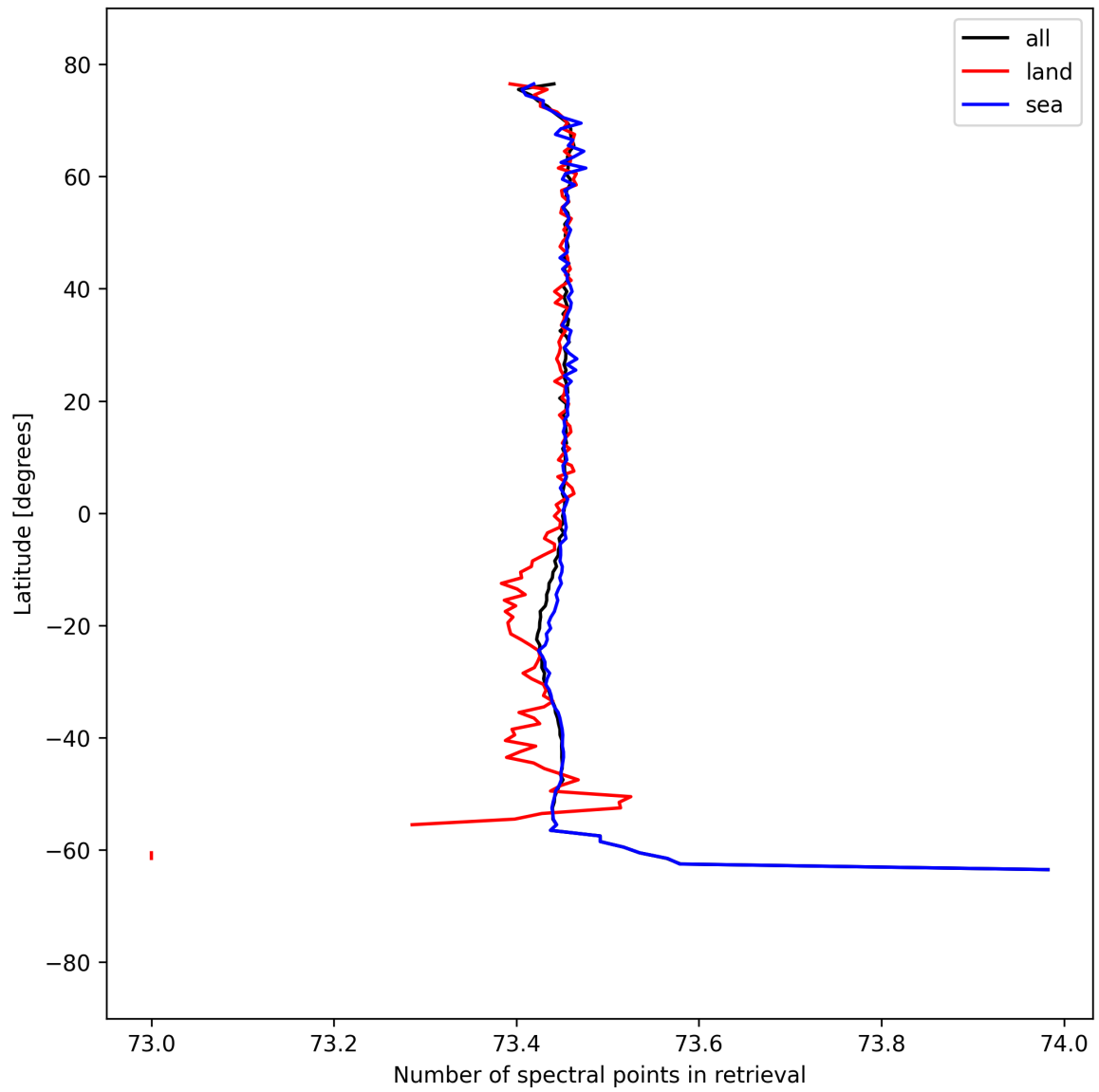


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-09-06 to 2025-09-07.

8 Histograms

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

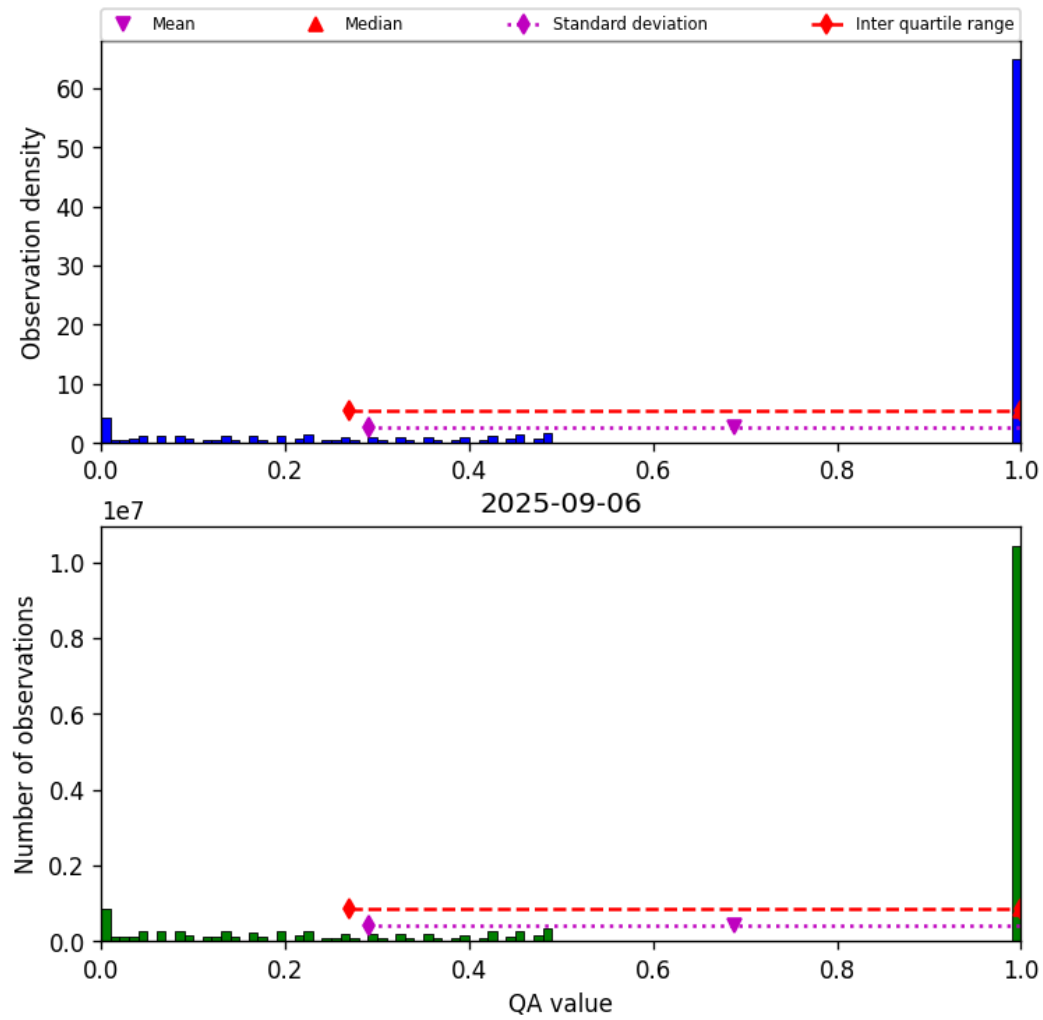


Figure 57: Histogram of “QA value” for 2025-09-06 to 2025-09-07

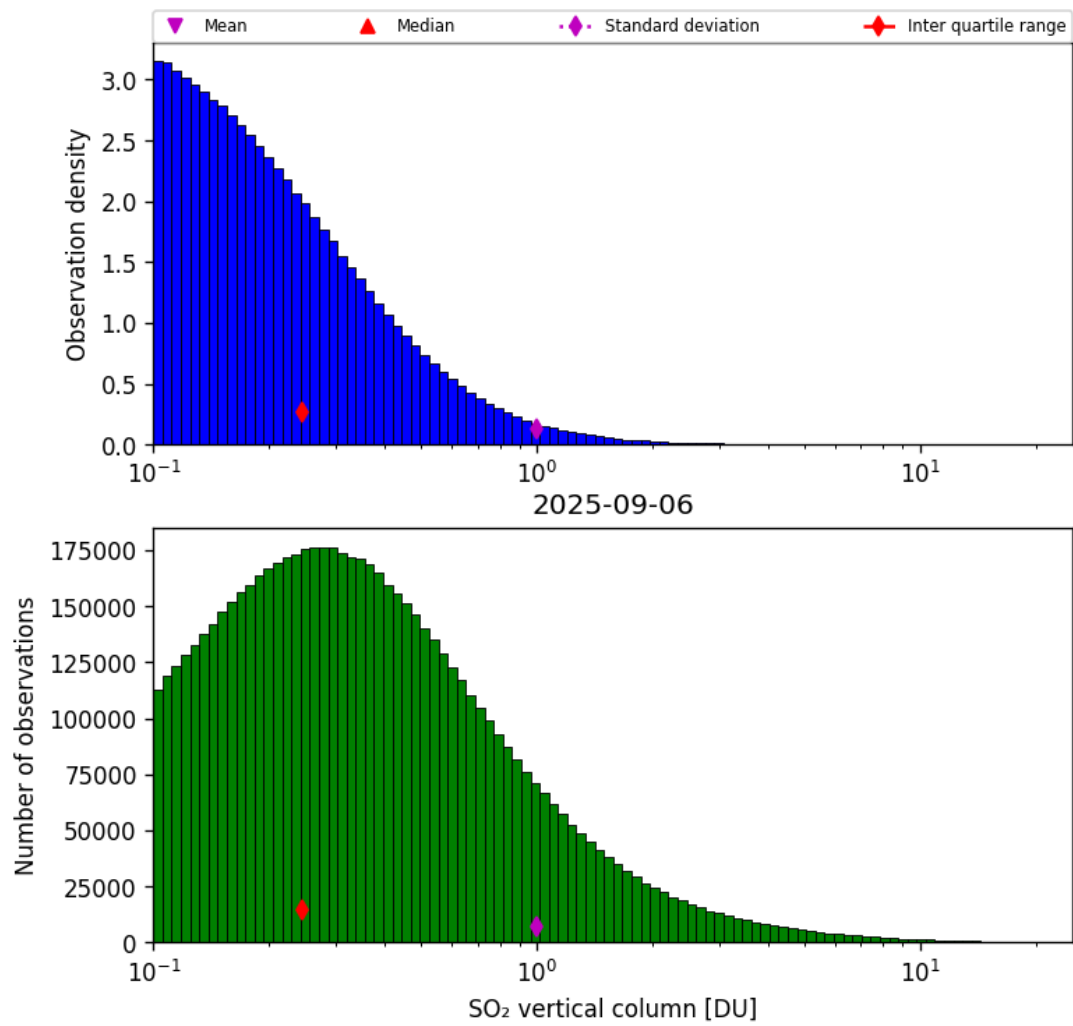


Figure 58: Histogram of “SO₂ vertical column” for 2025-09-06 to 2025-09-07

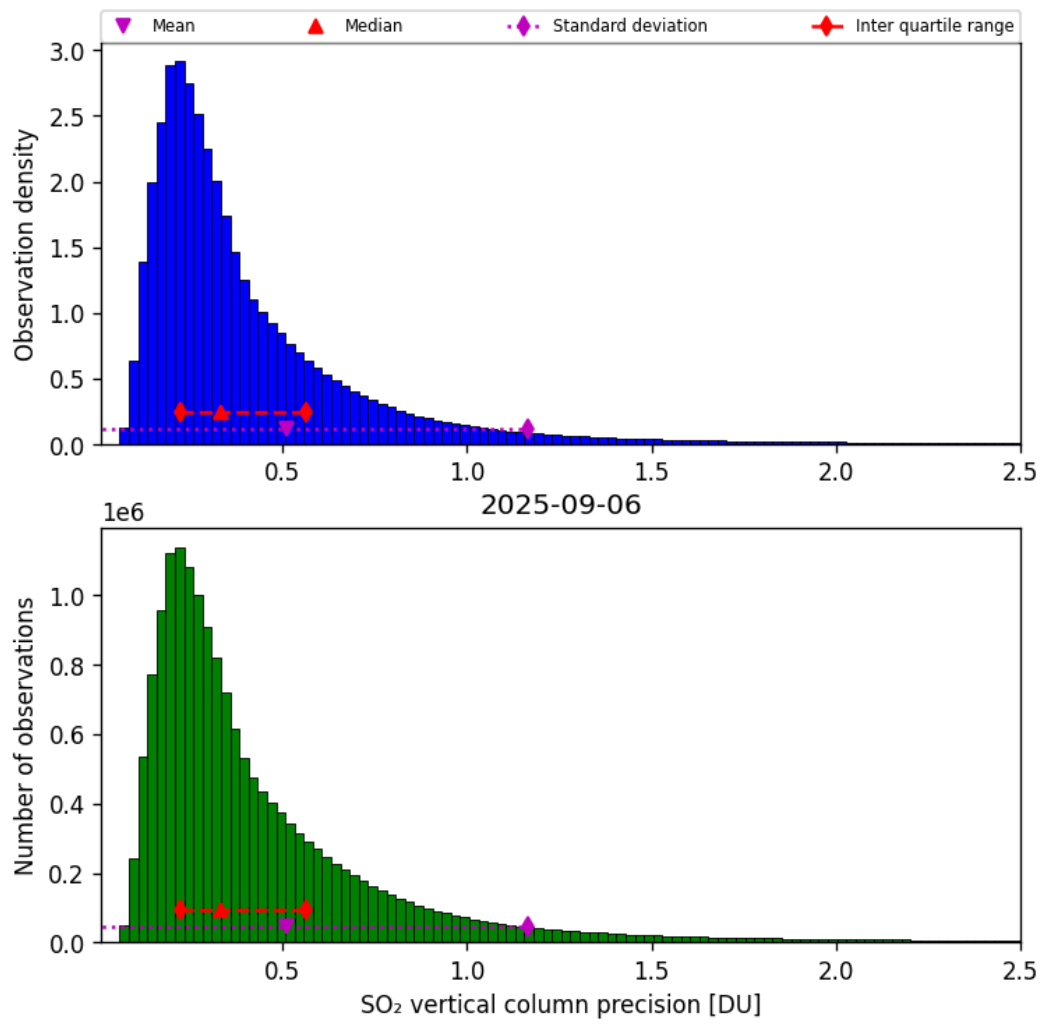


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-09-06 to 2025-09-07

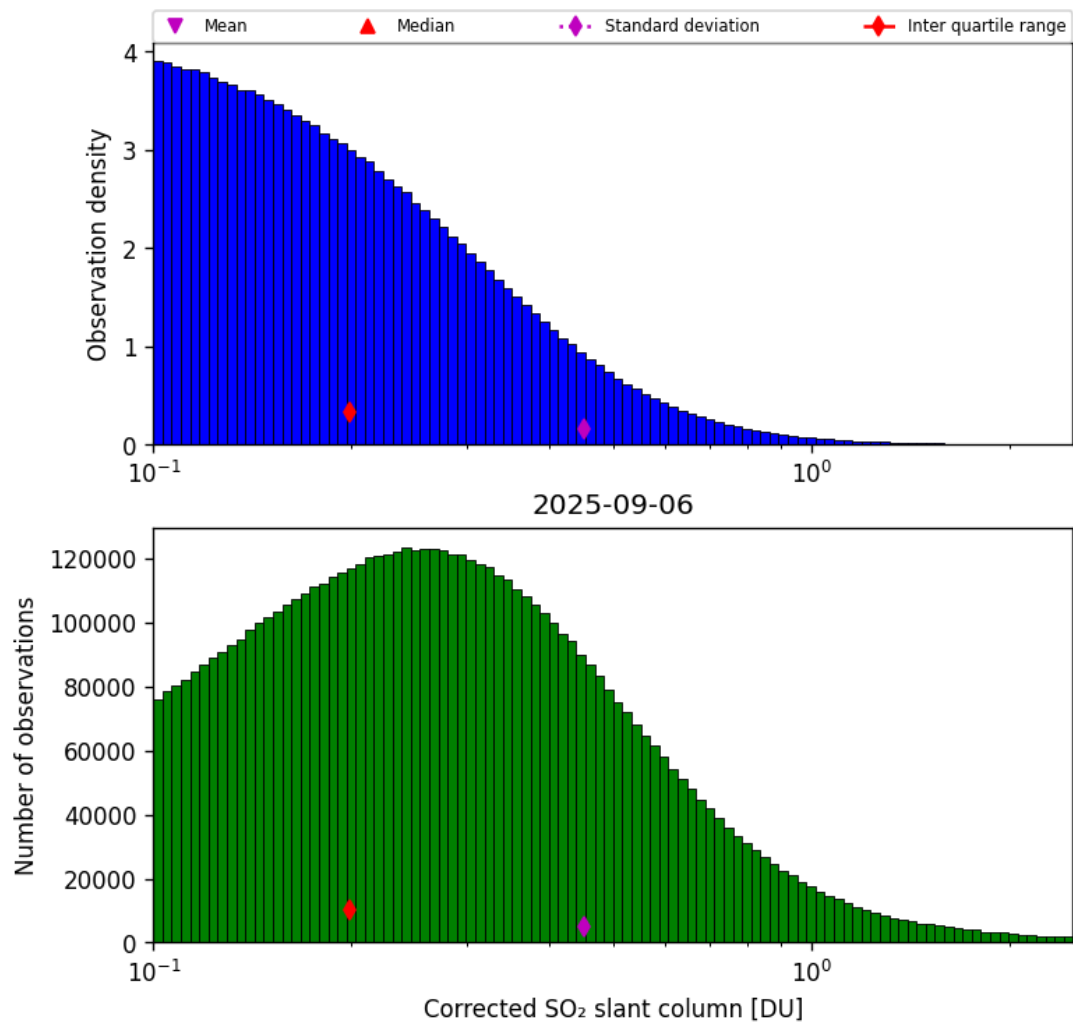


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-09-06 to 2025-09-07

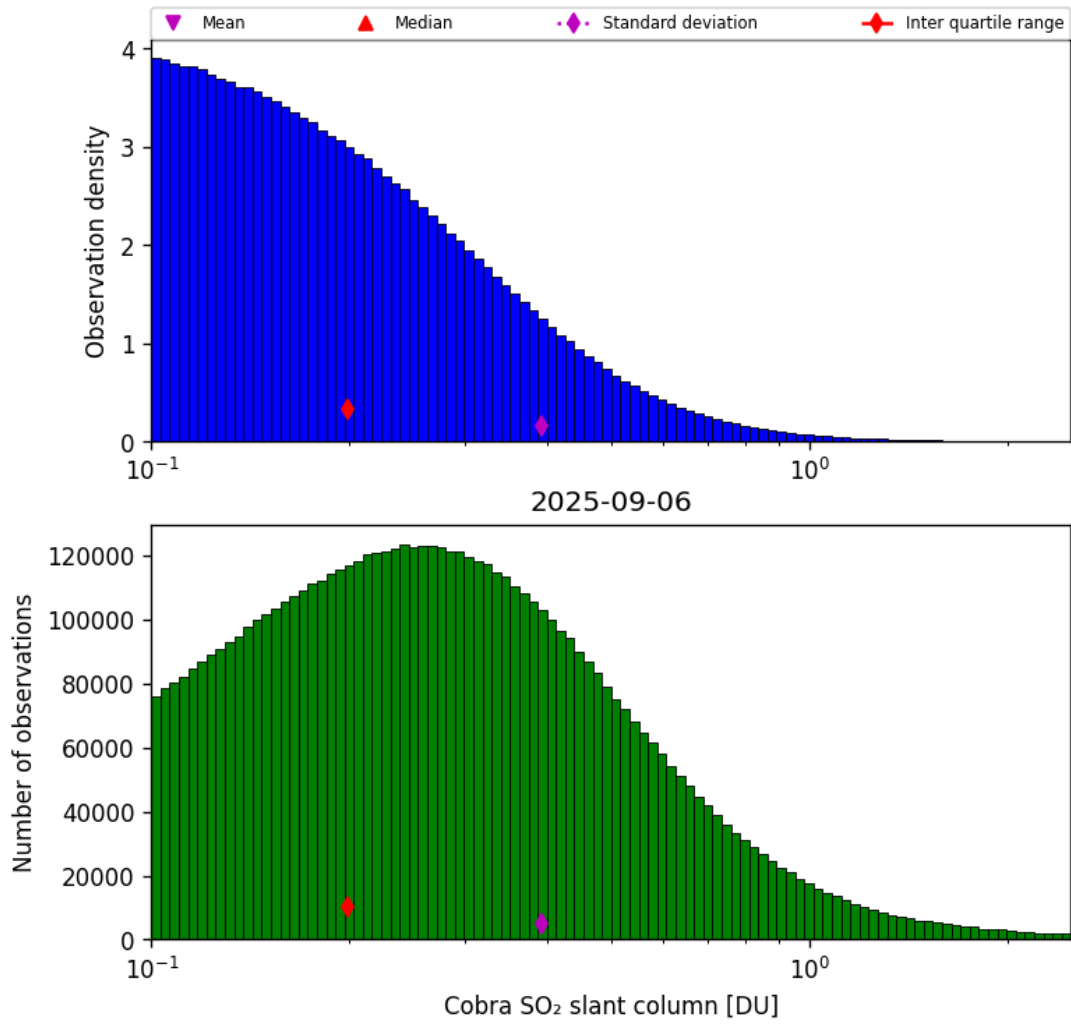


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-09-06 to 2025-09-07

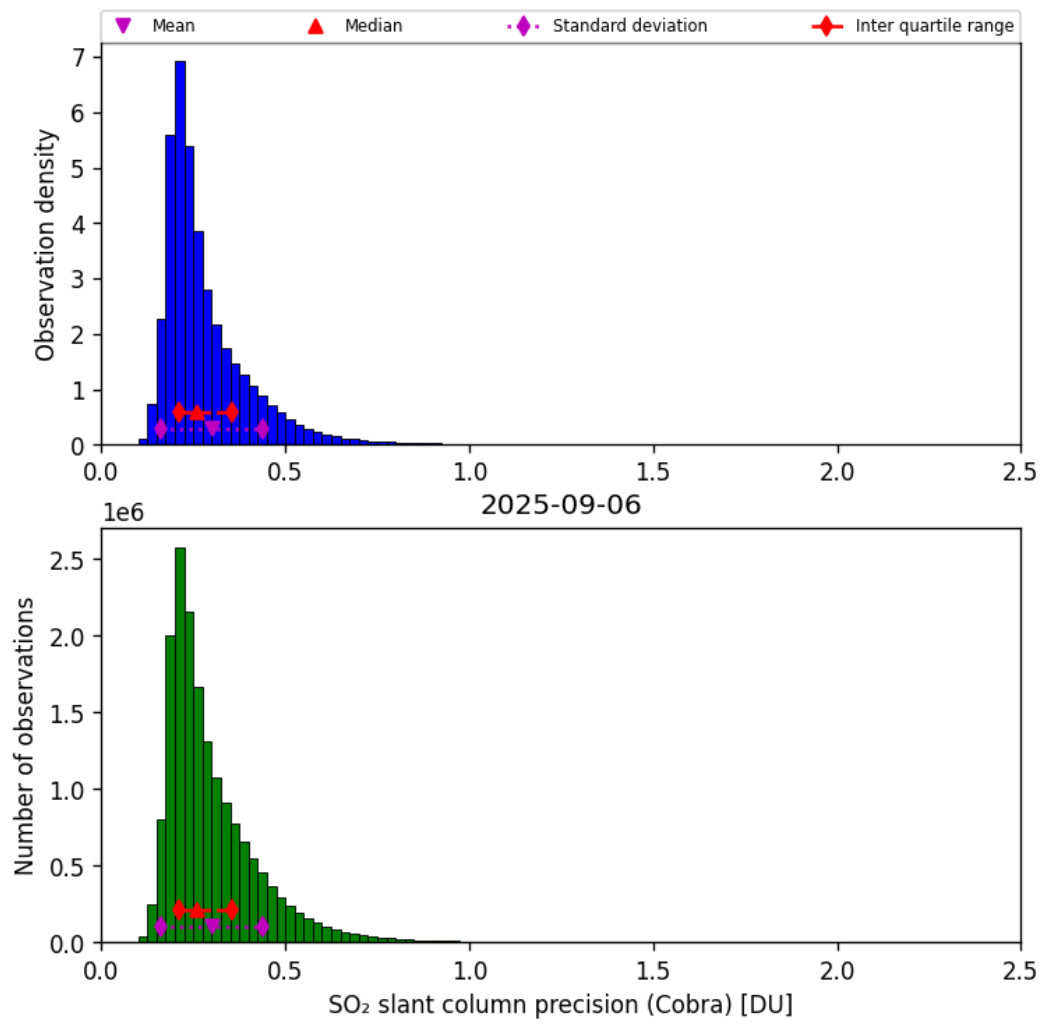


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-09-06 to 2025-09-07

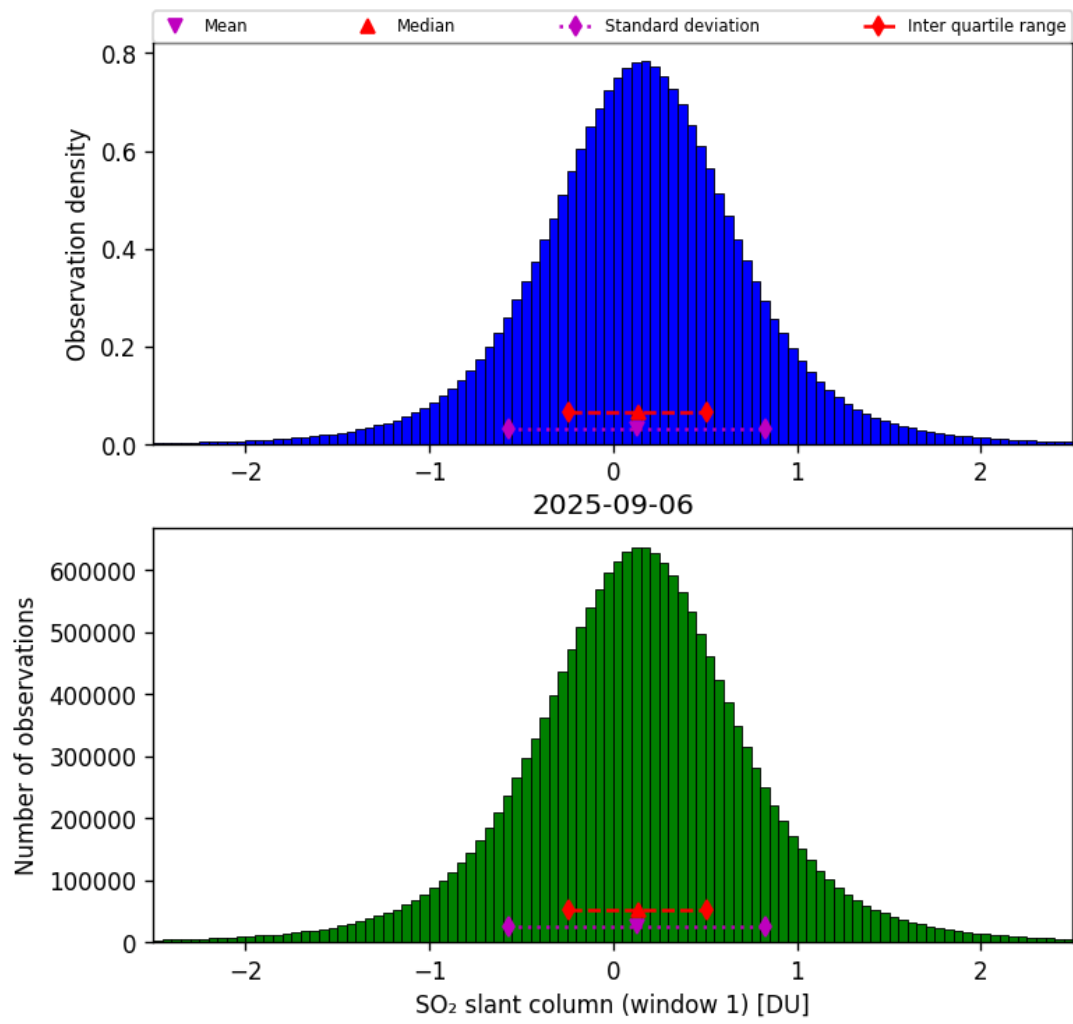


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-09-06 to 2025-09-07

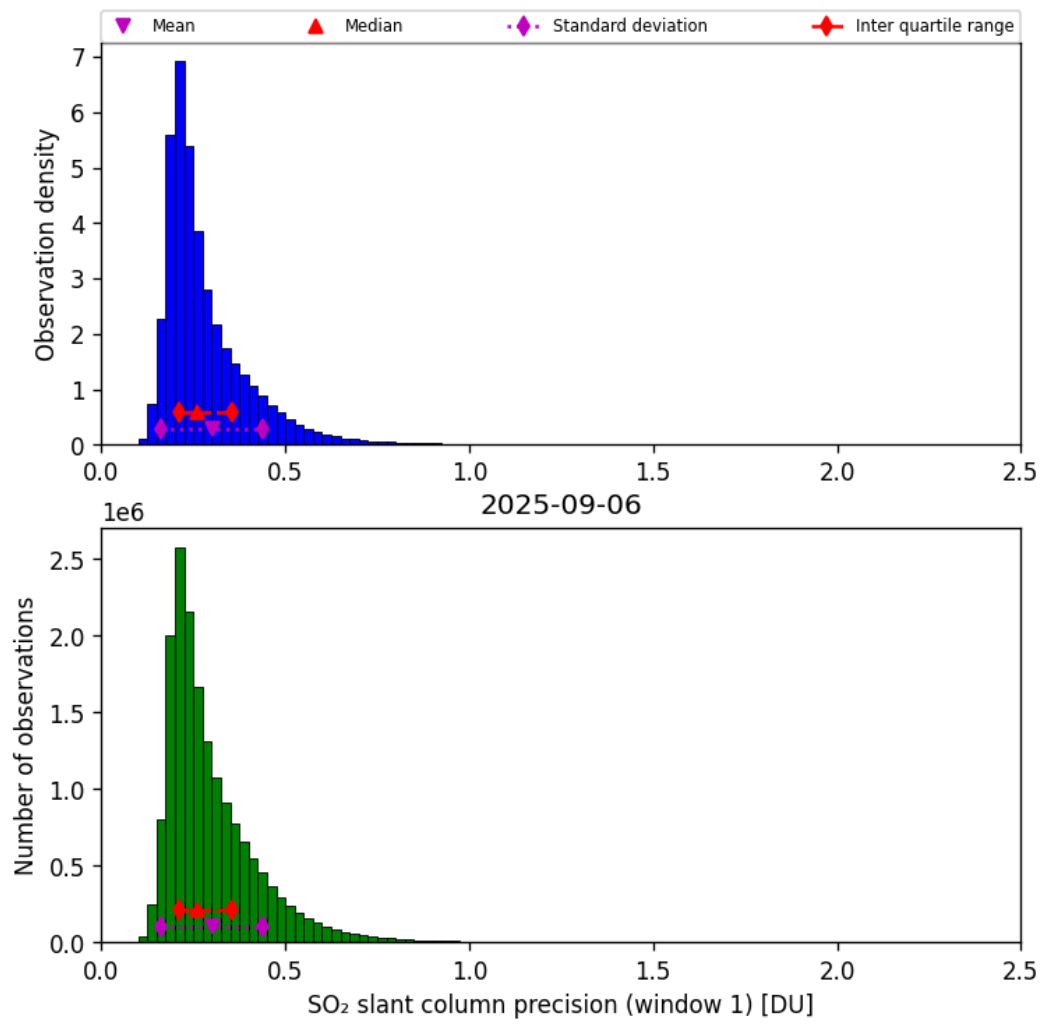


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-09-06 to 2025-09-07

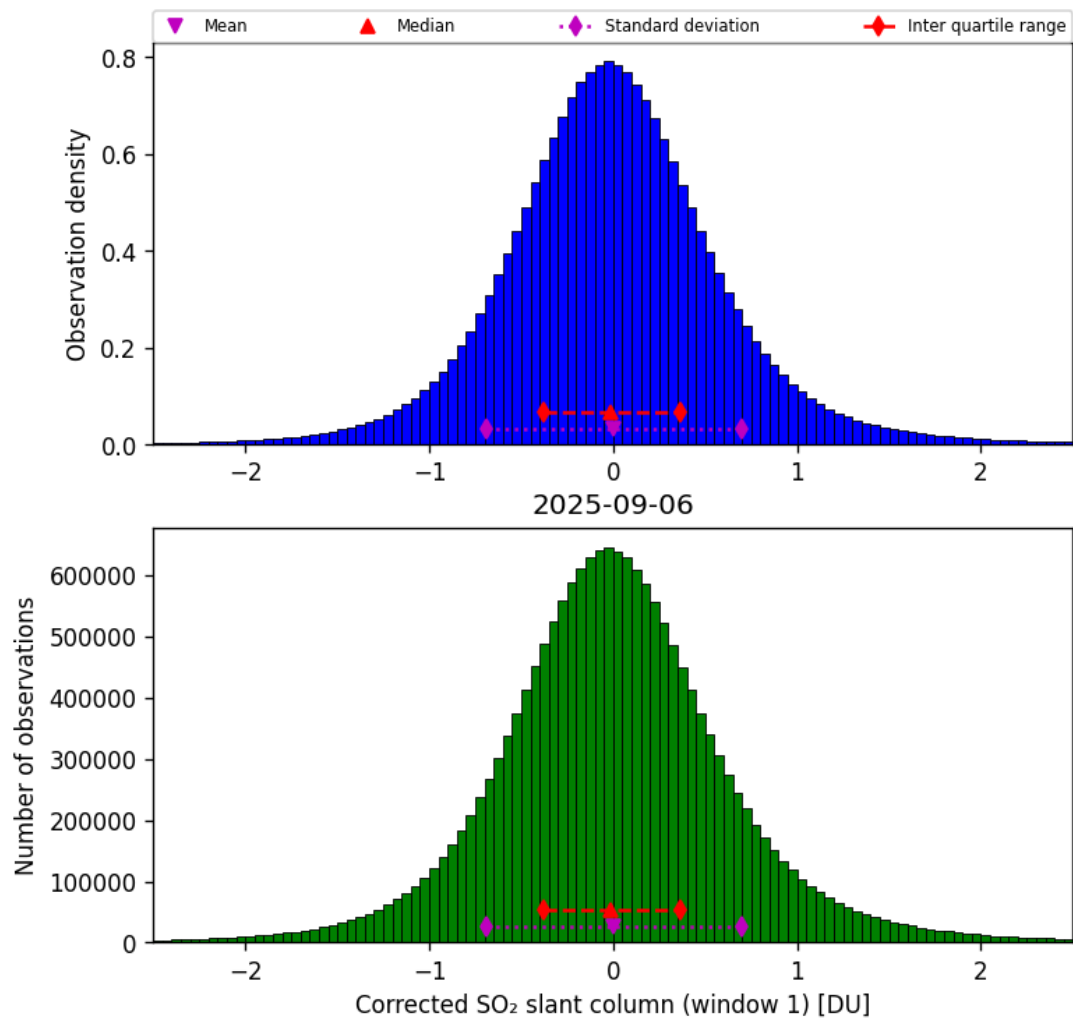


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-09-06 to 2025-09-07

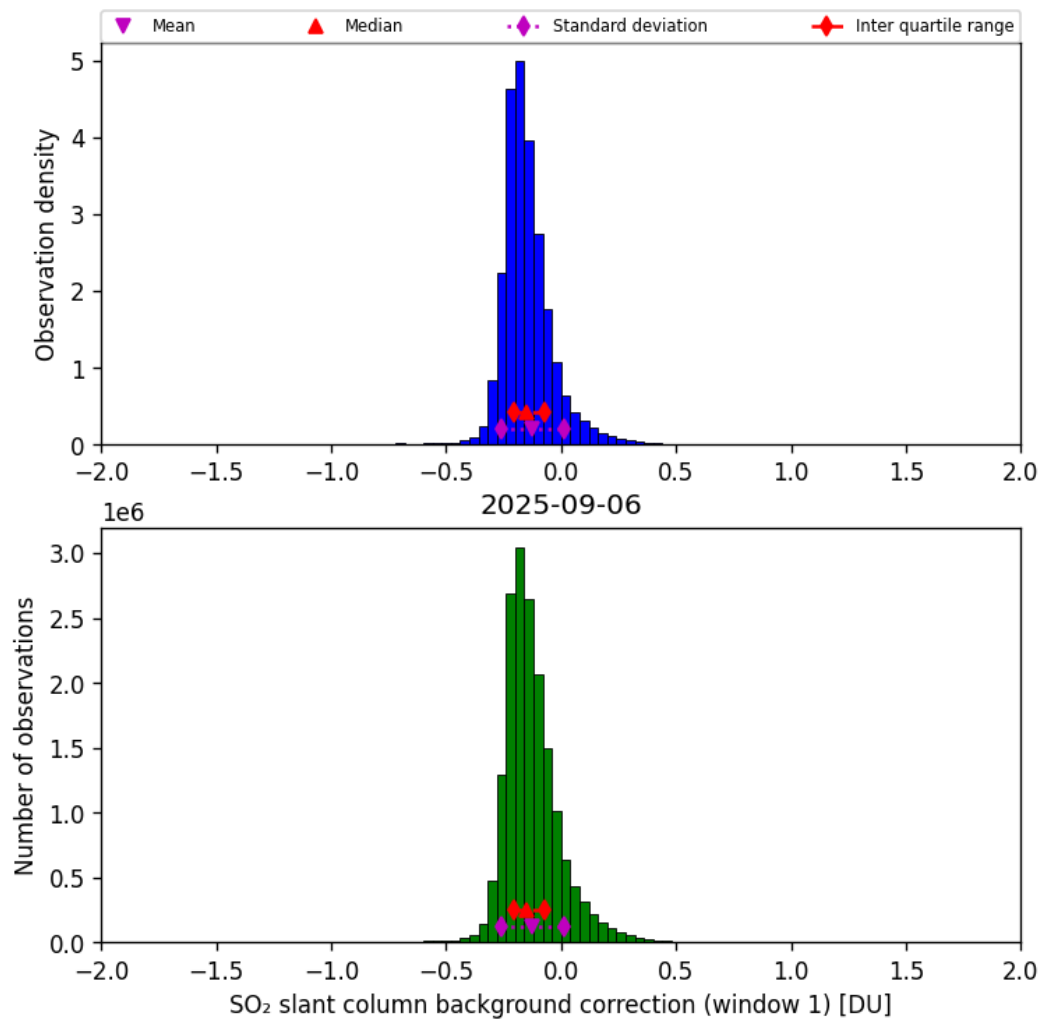


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-09-06 to 2025-09-07

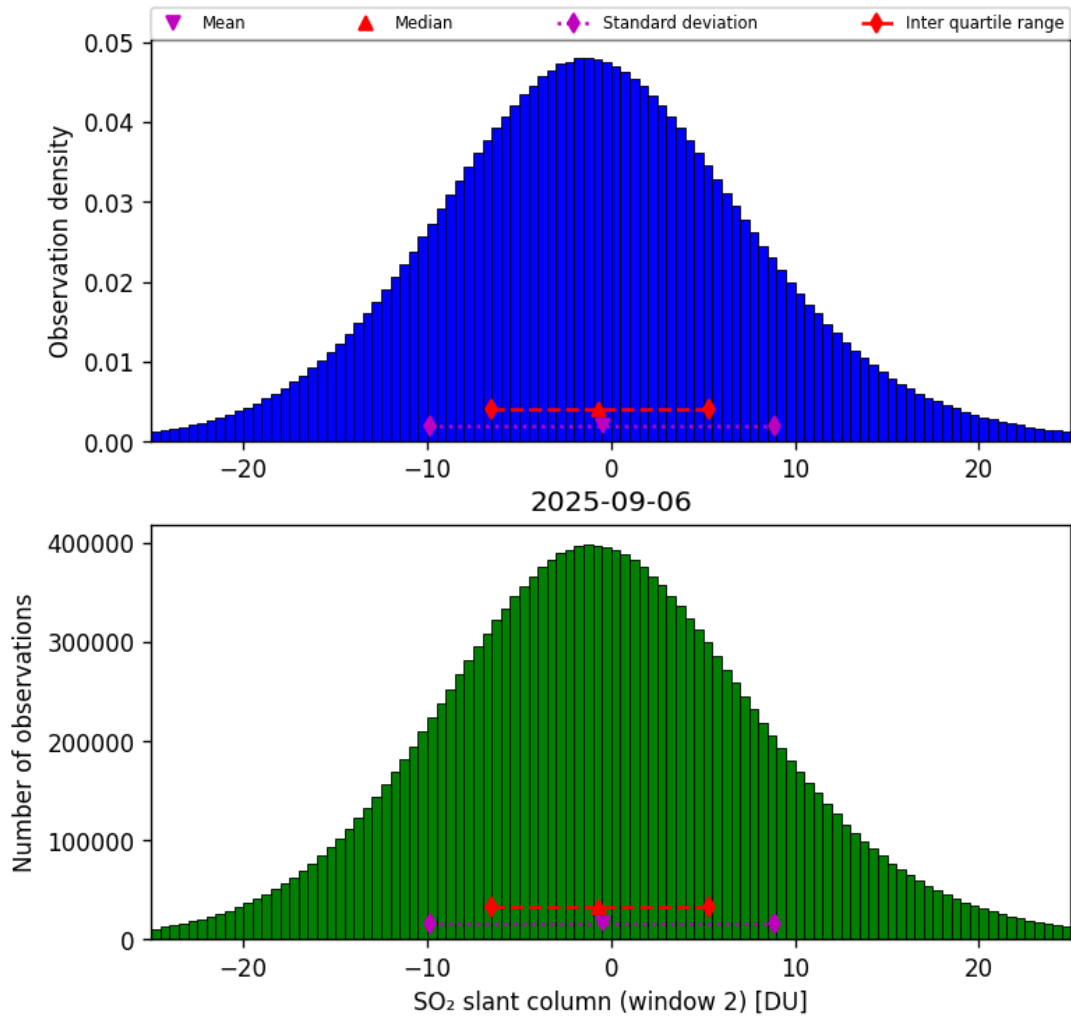


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-09-06 to 2025-09-07

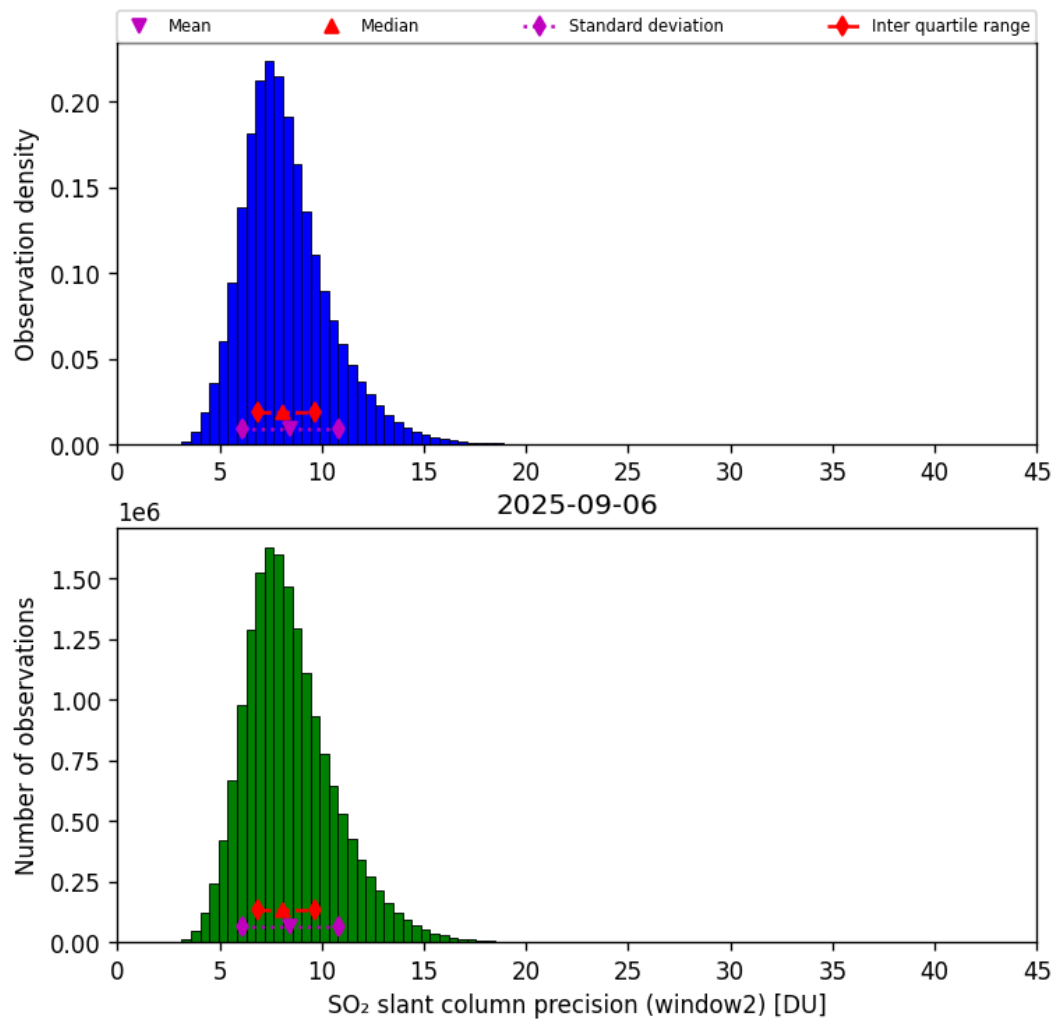


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-09-06 to 2025-09-07

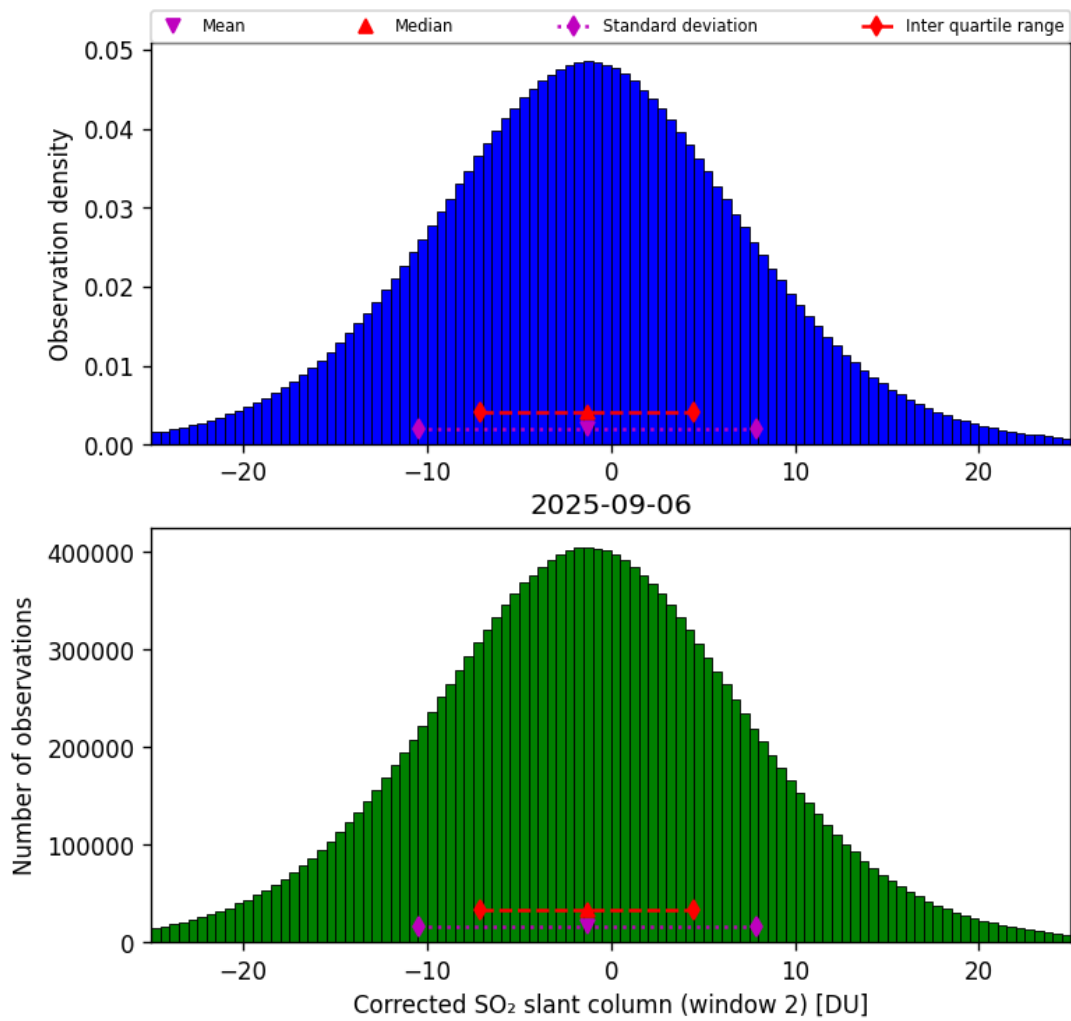


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-09-06 to 2025-09-07

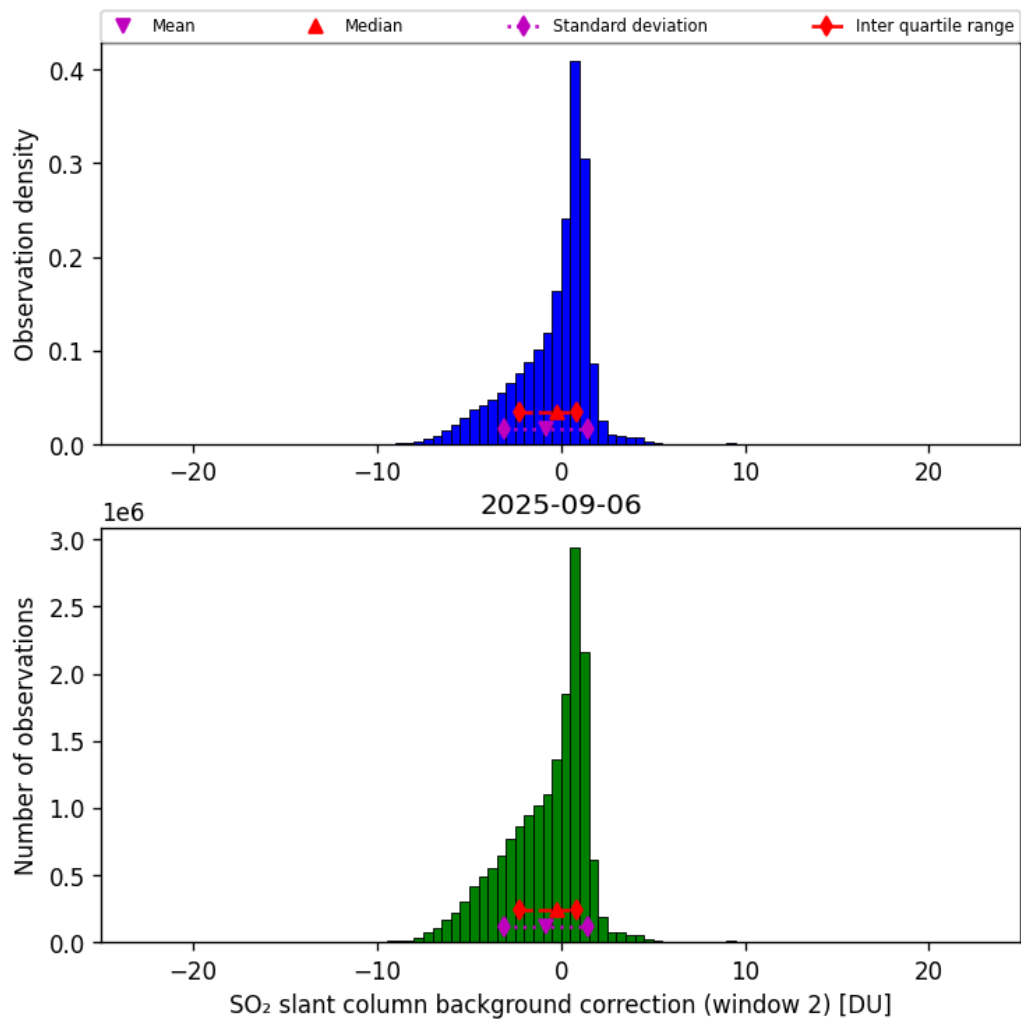


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-09-06 to 2025-09-07

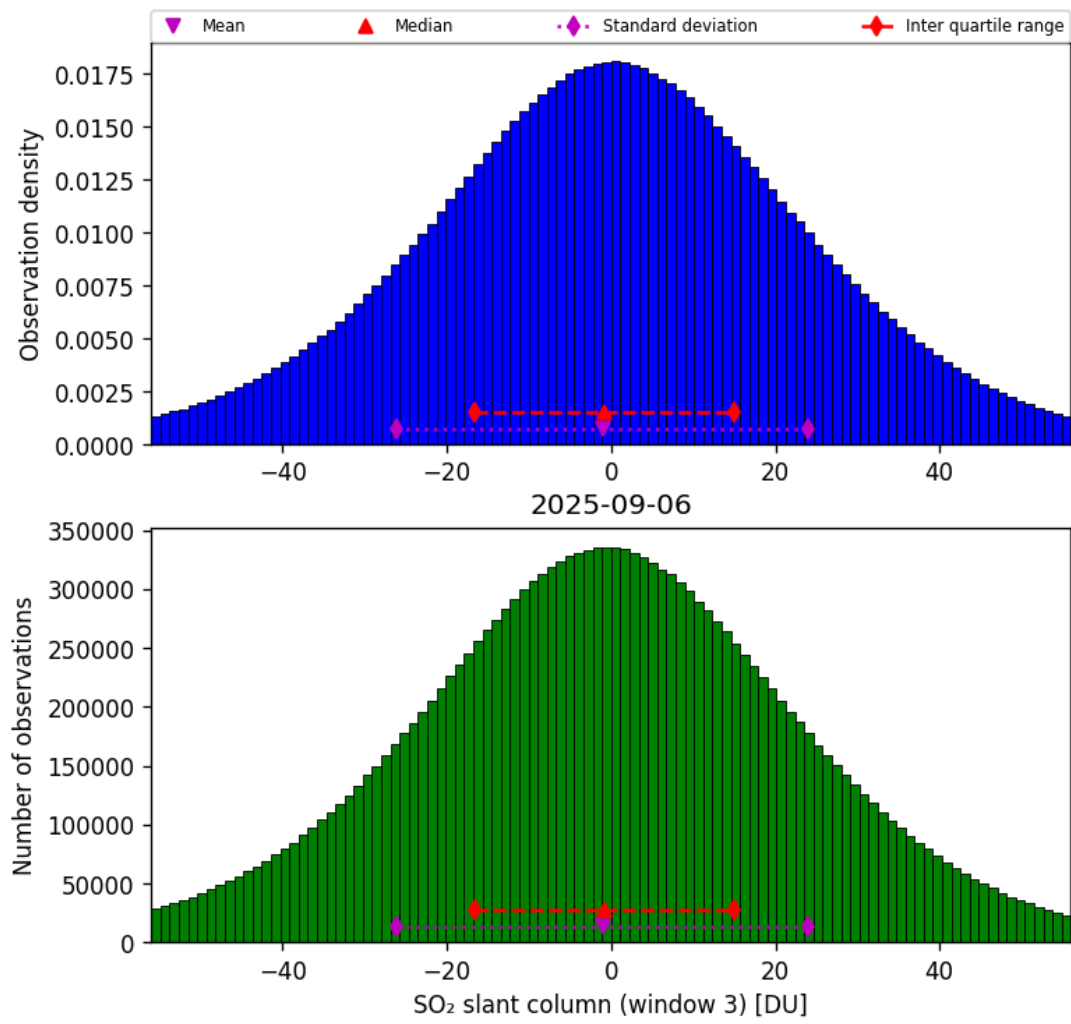


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-09-06 to 2025-09-07

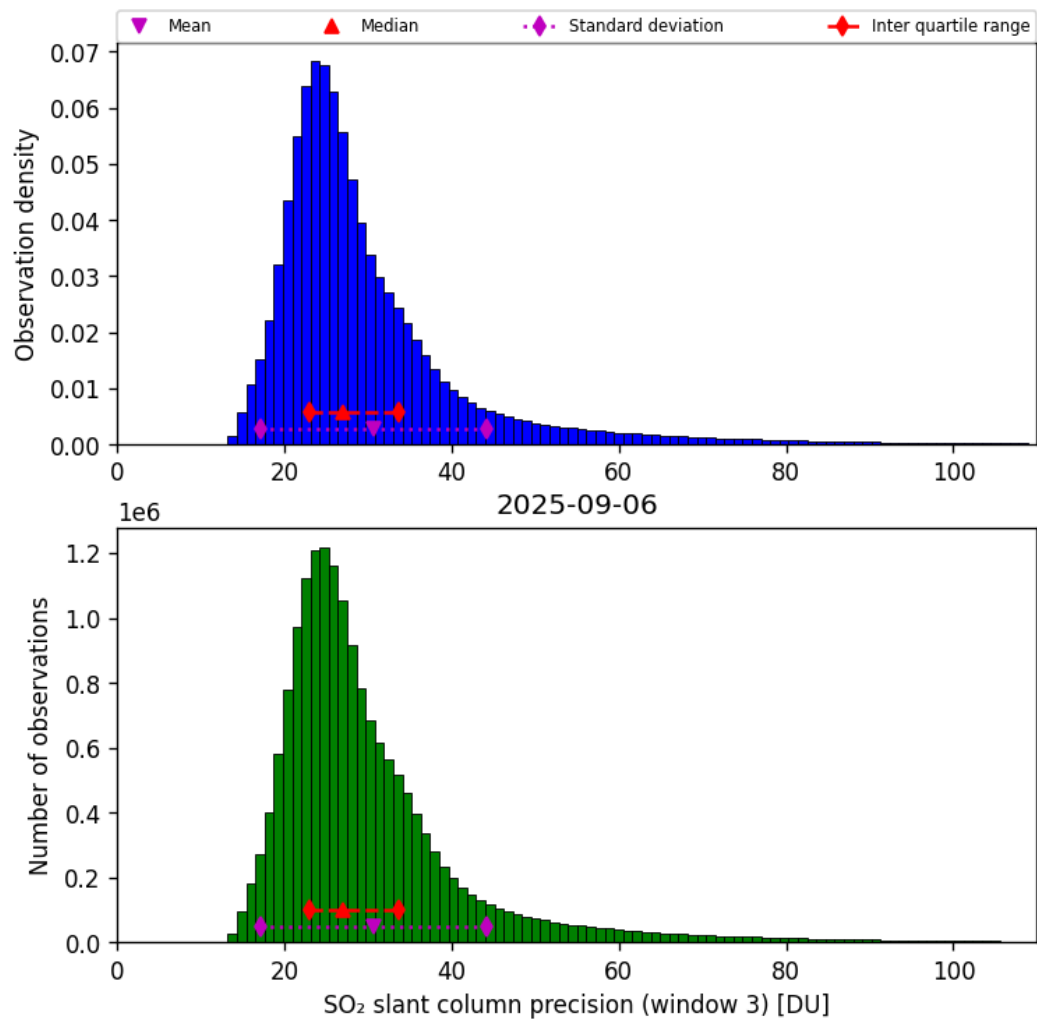


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-09-06 to 2025-09-07

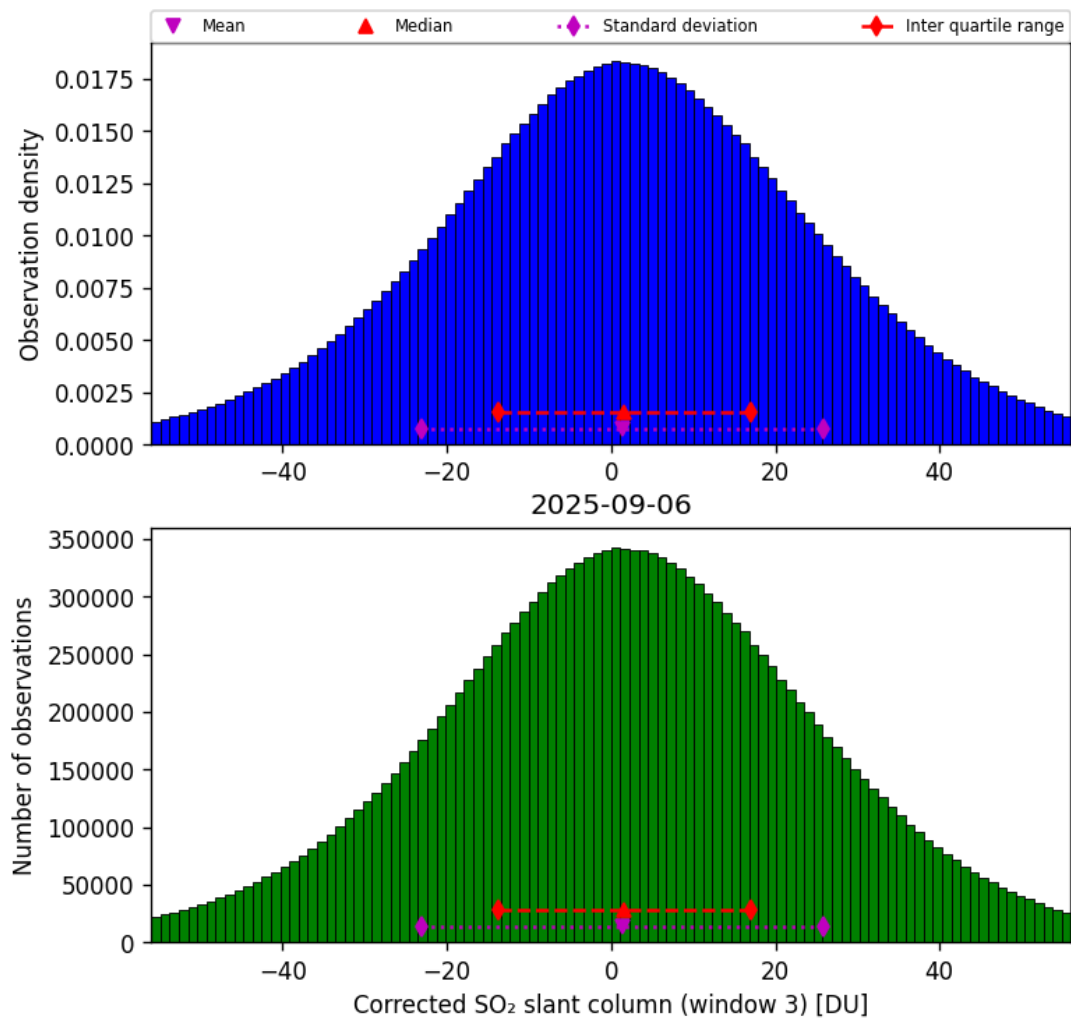


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-09-06 to 2025-09-07

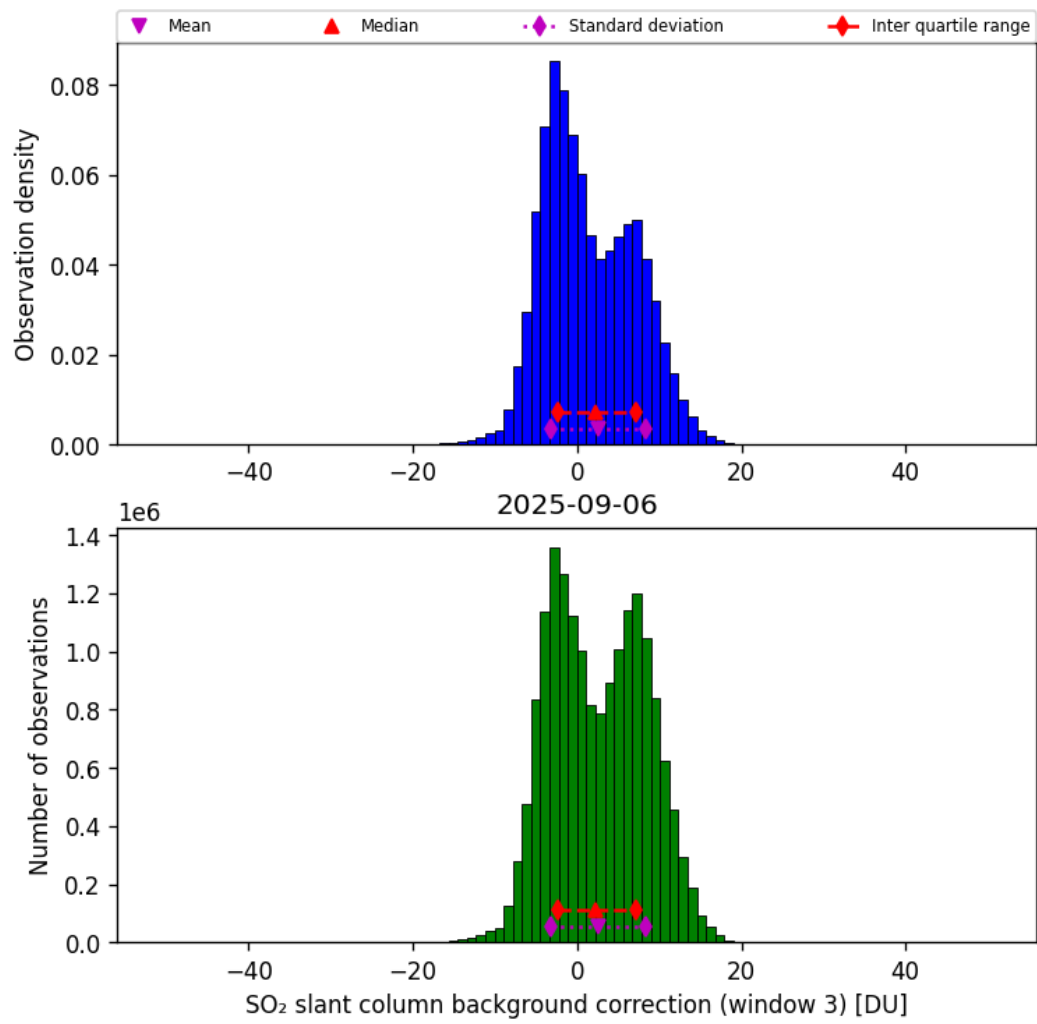


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-09-06 to 2025-09-07

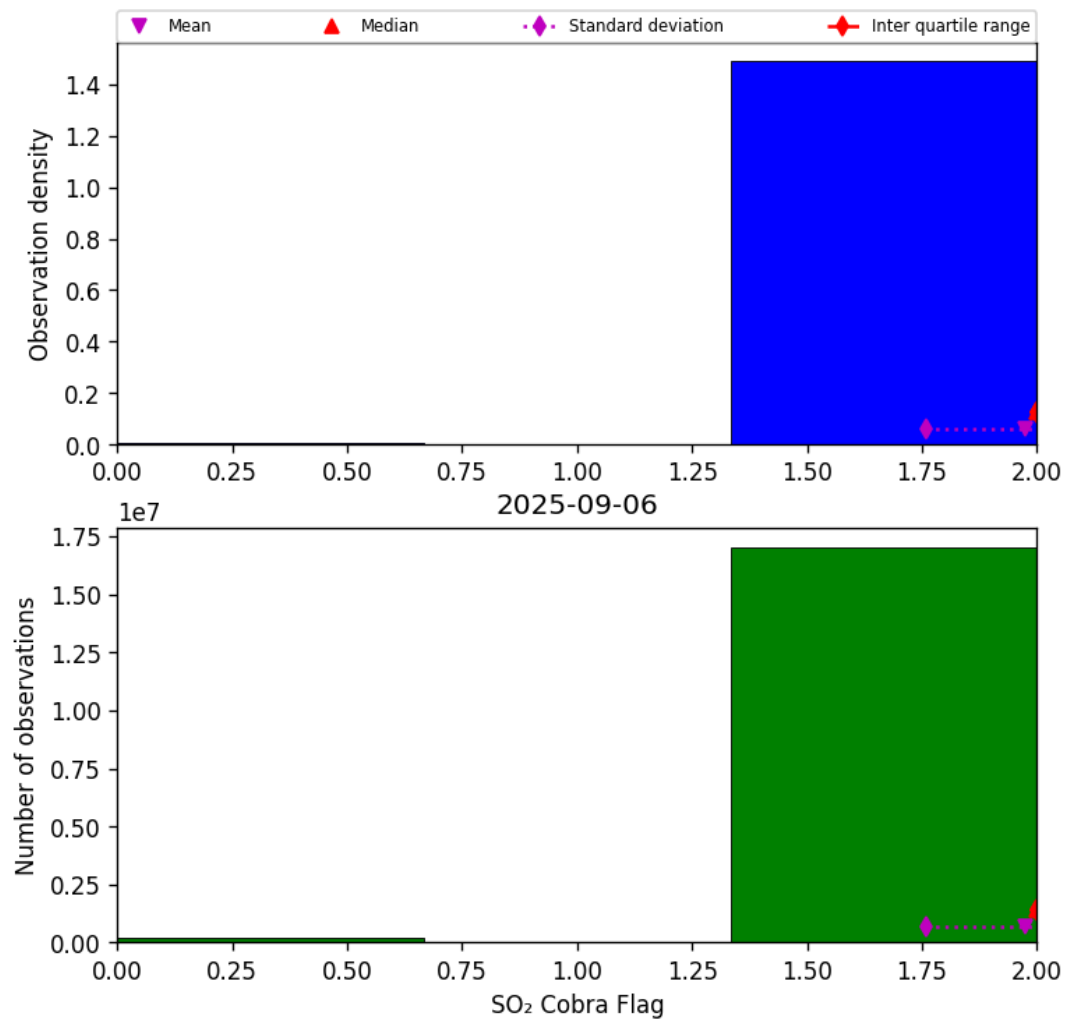


Figure 75: Histogram of "SO₂ Cobra Flag" for 2025-09-06 to 2025-09-07

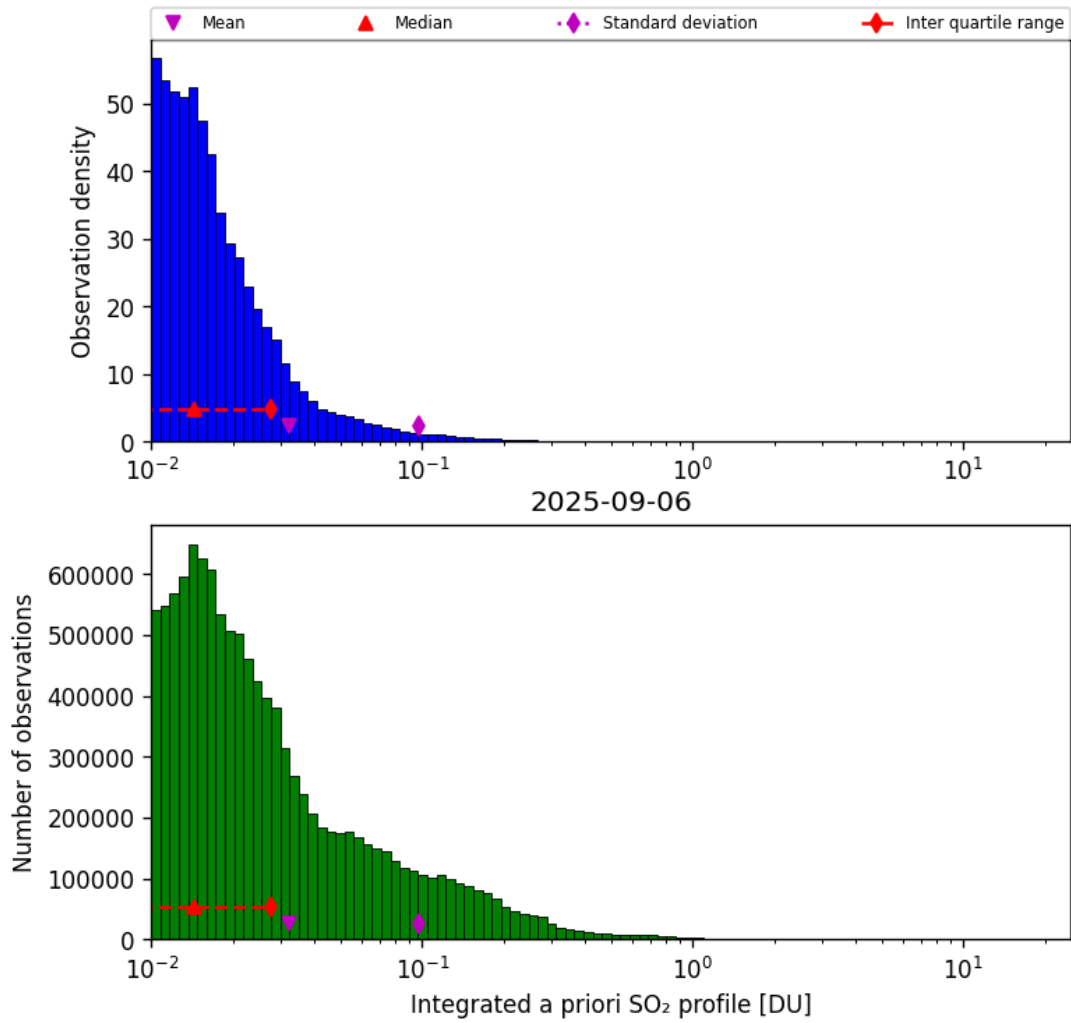


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-09-06 to 2025-09-07

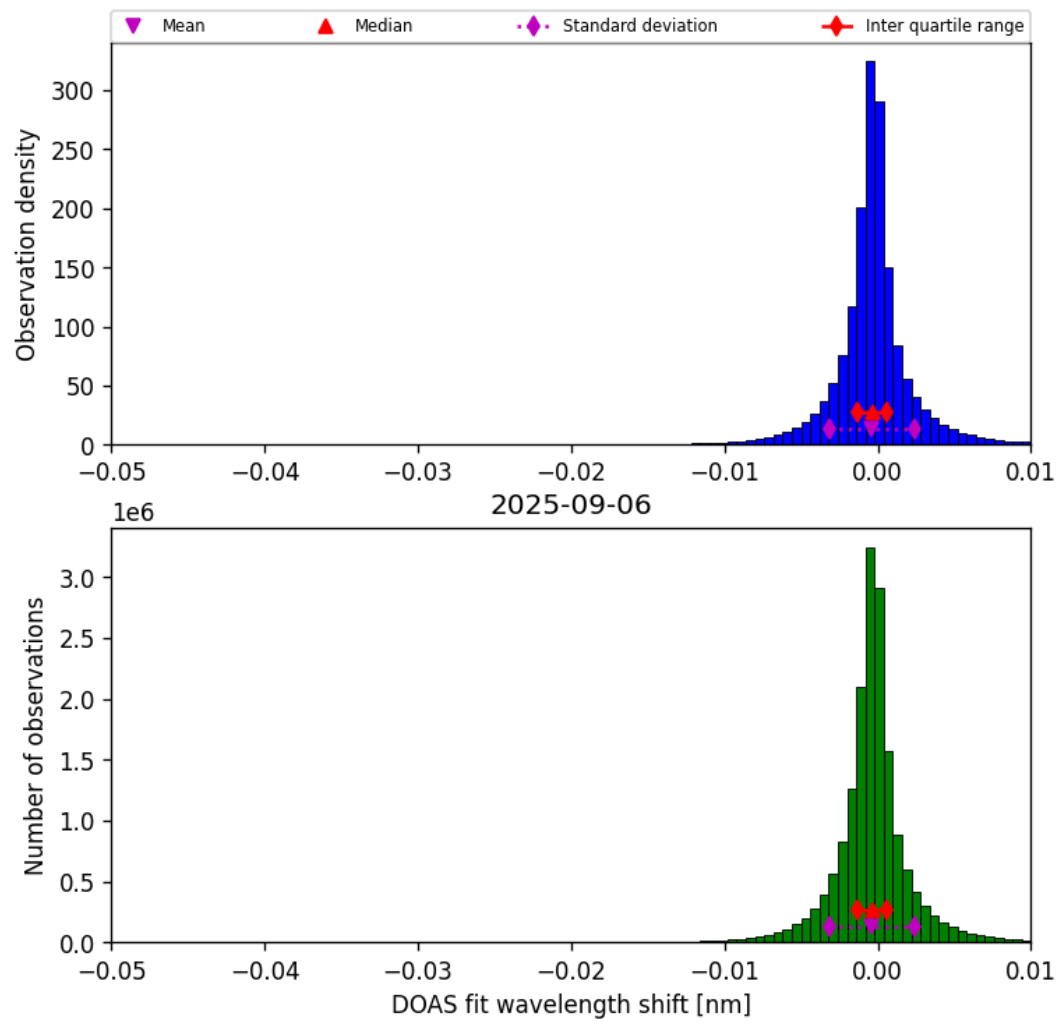


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-09-06 to 2025-09-07

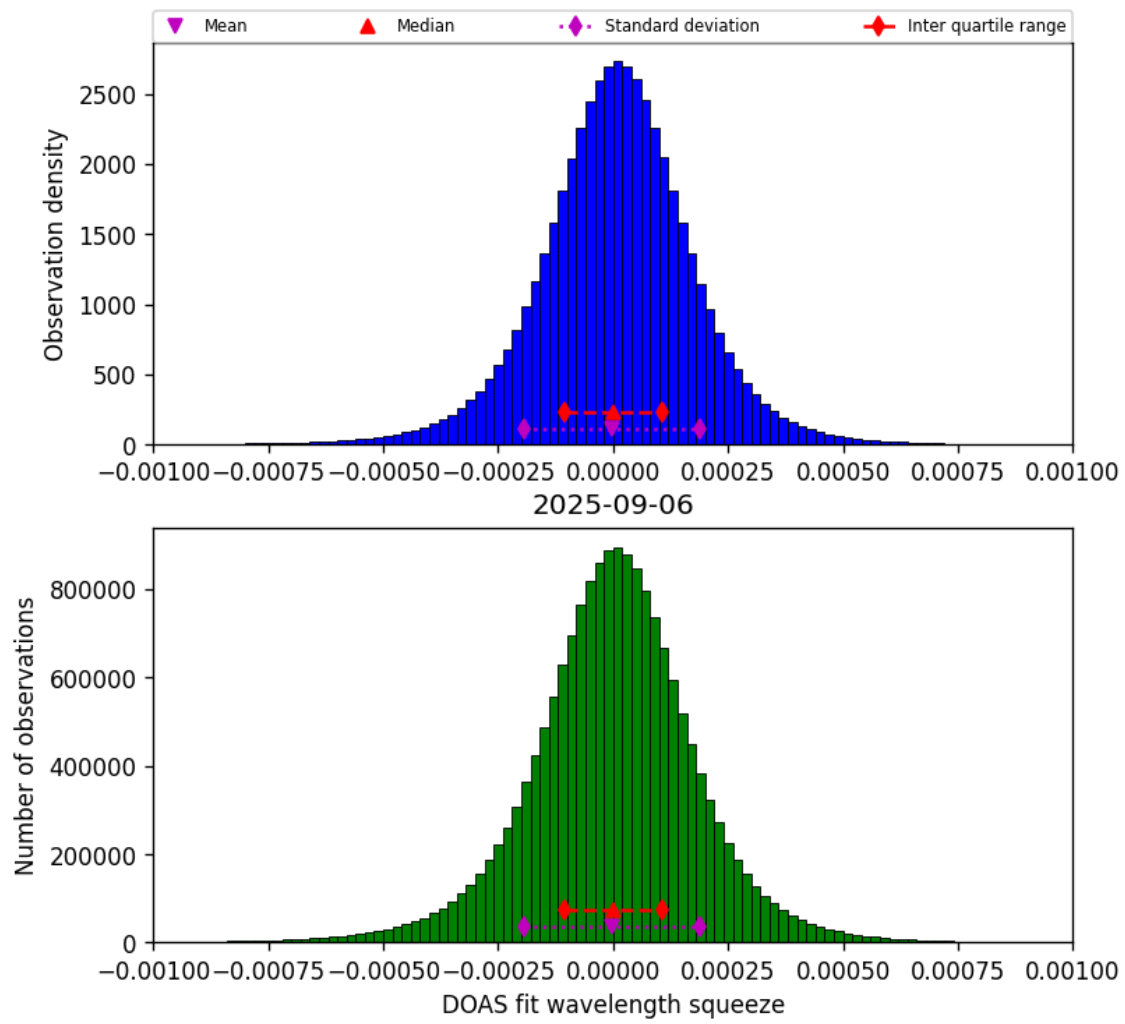


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-09-06 to 2025-09-07

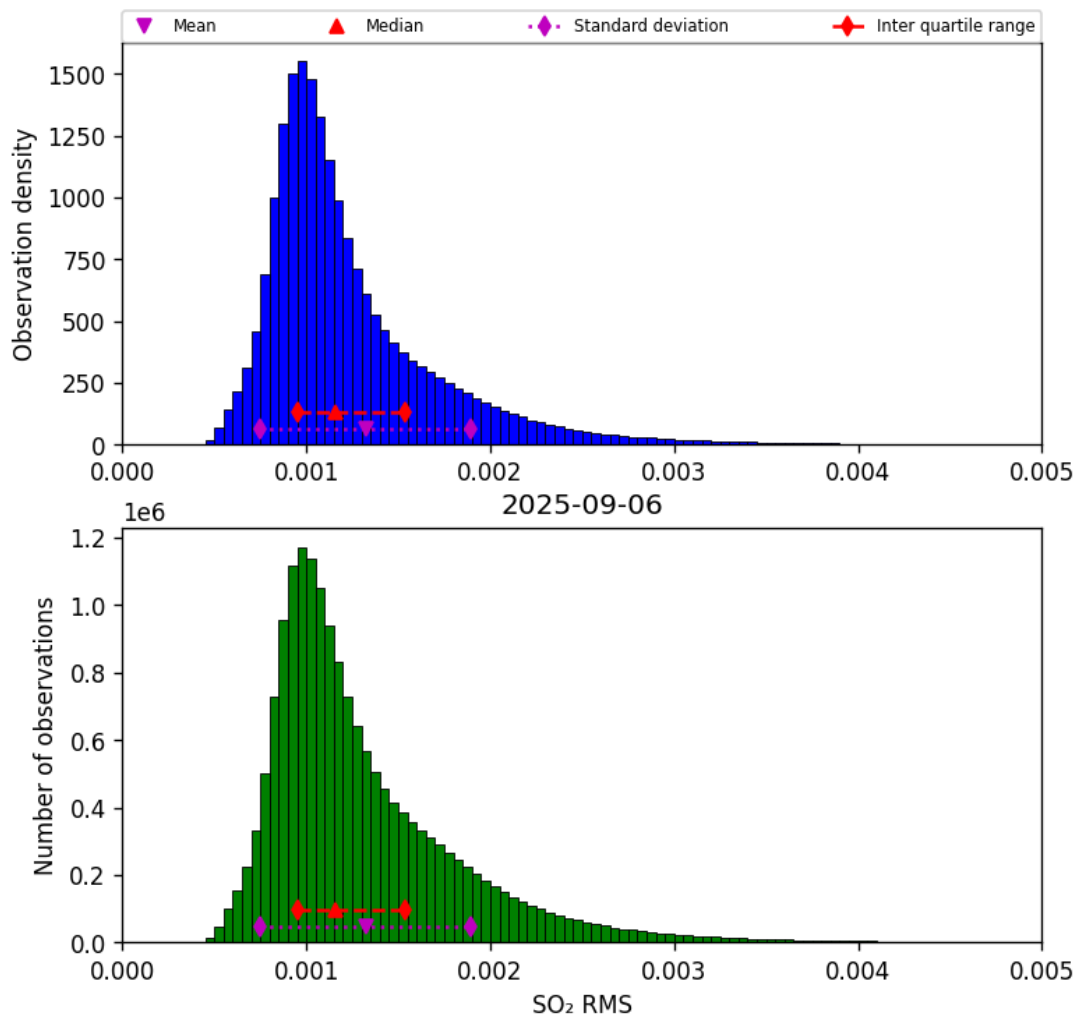


Figure 79: Histogram of "SO₂ RMS" for 2025-09-06 to 2025-09-07

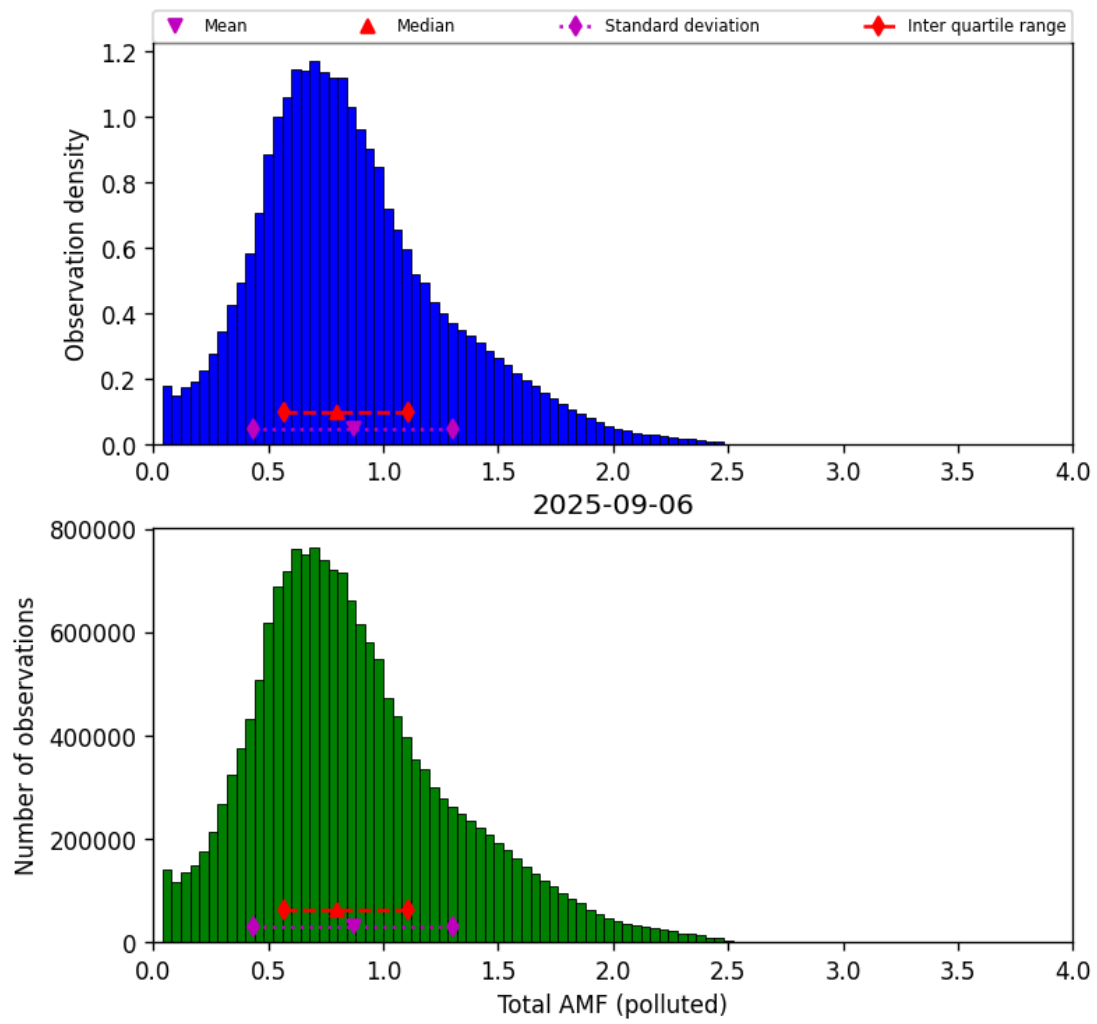


Figure 80: Histogram of “Total AMF (polluted)” for 2025-09-06 to 2025-09-07

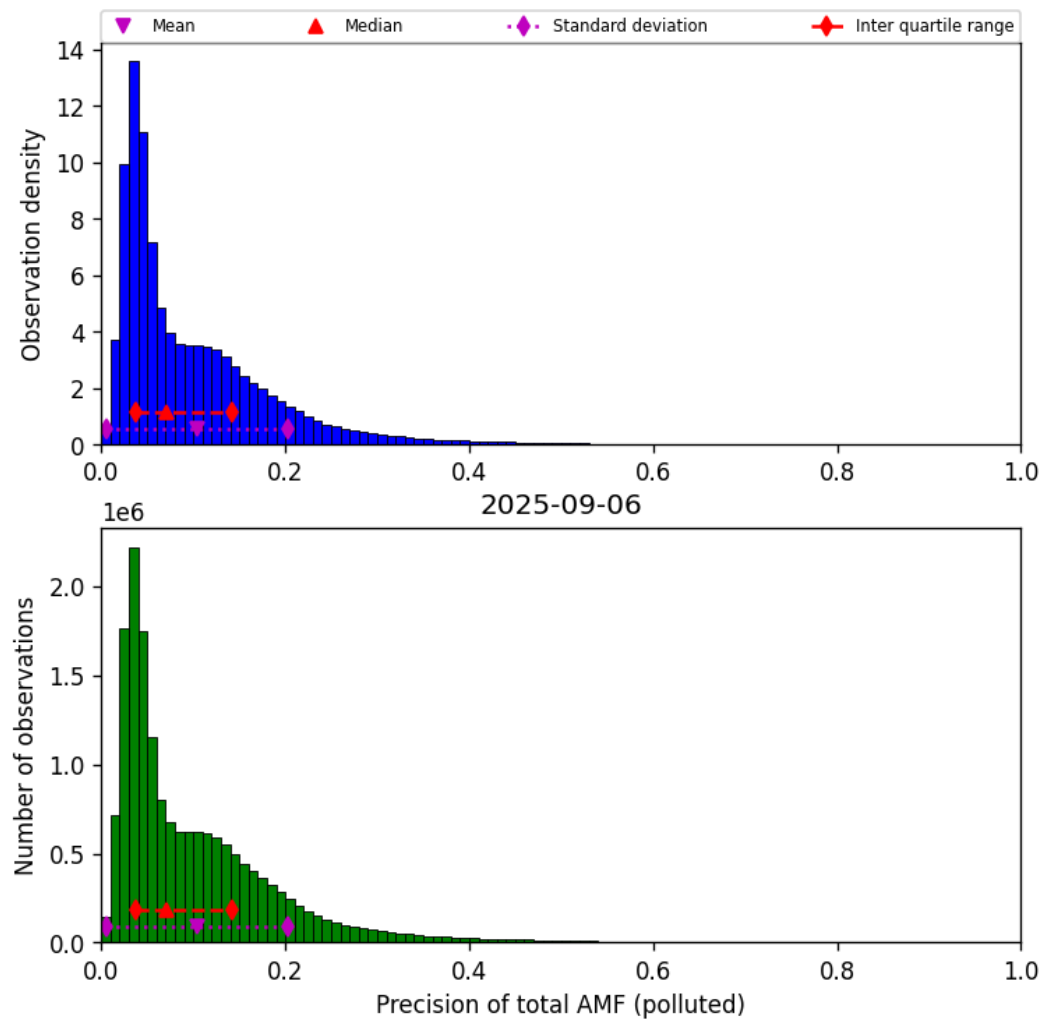


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-09-06 to 2025-09-07

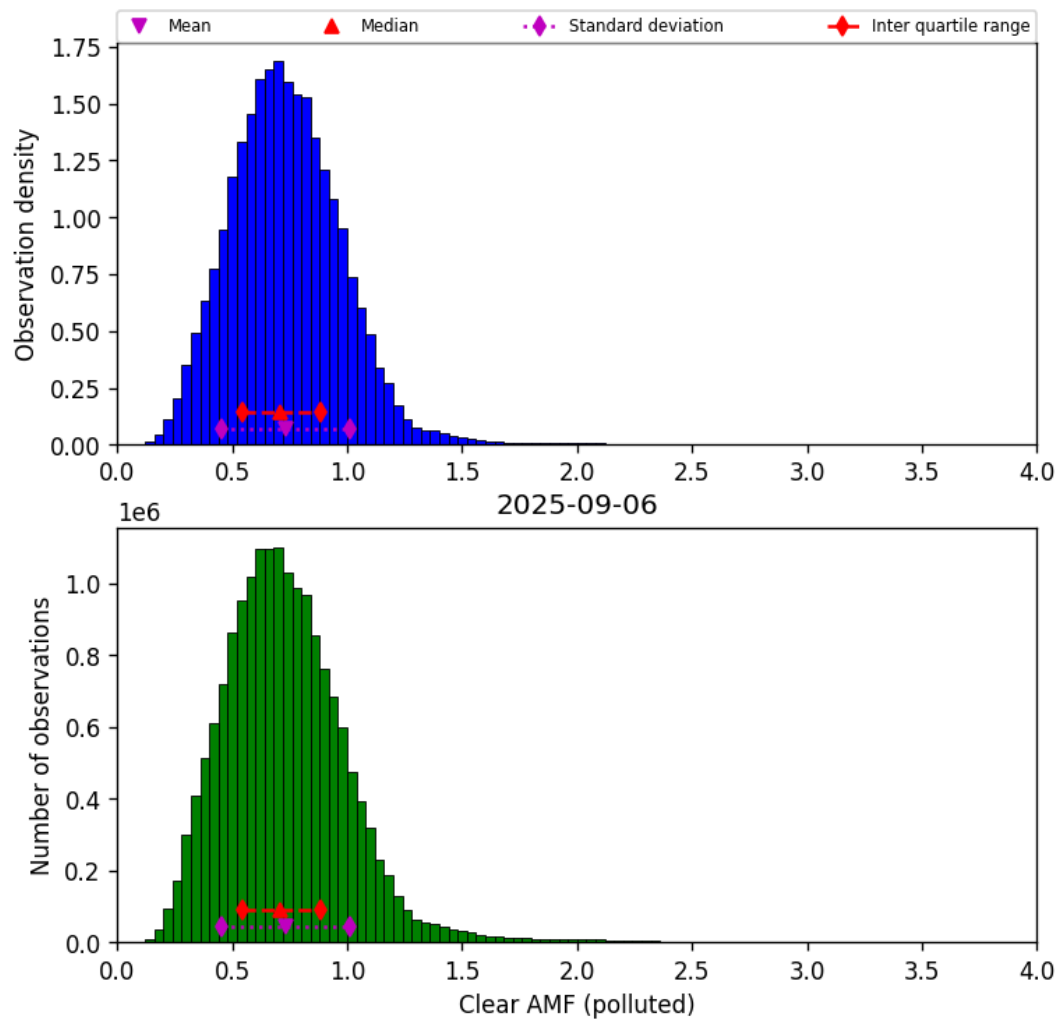


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-09-06 to 2025-09-07

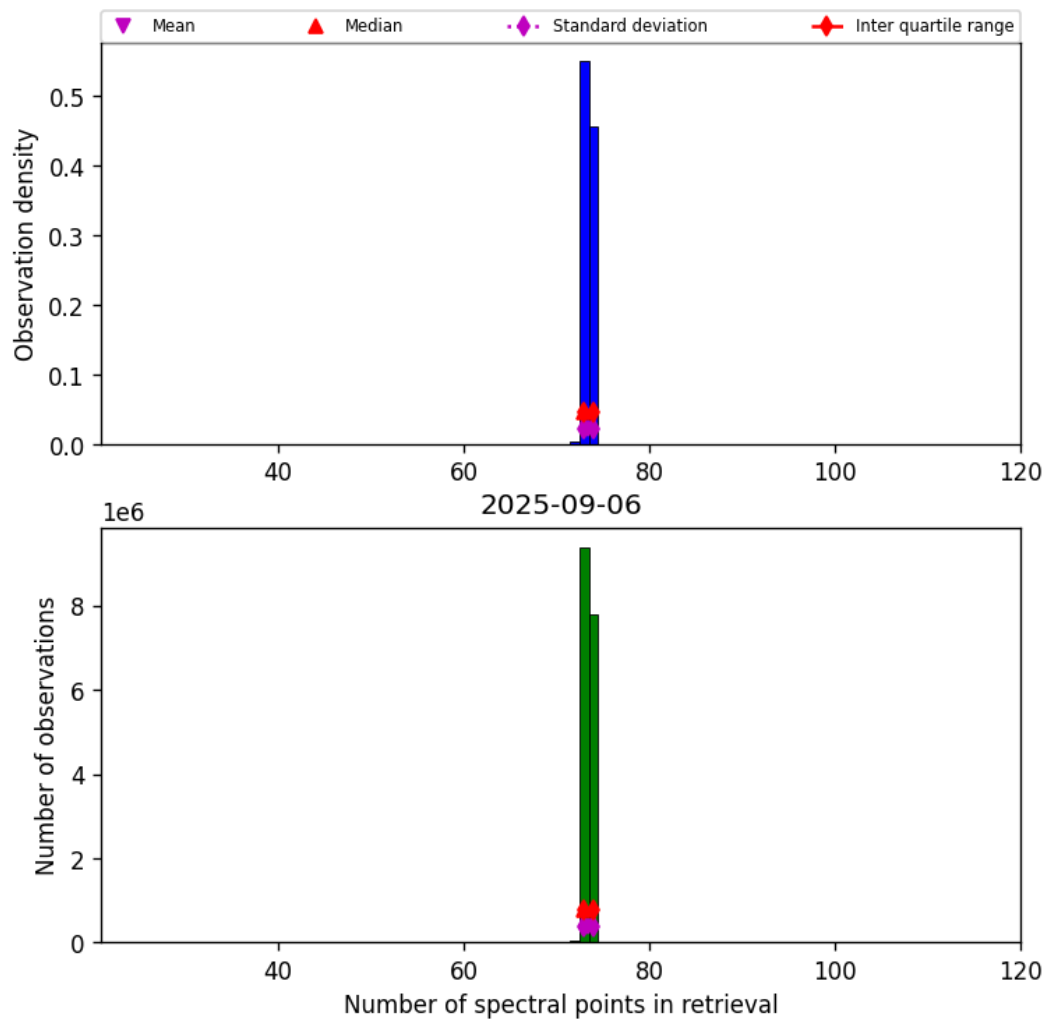


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-09-06 to 2025-09-07

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.

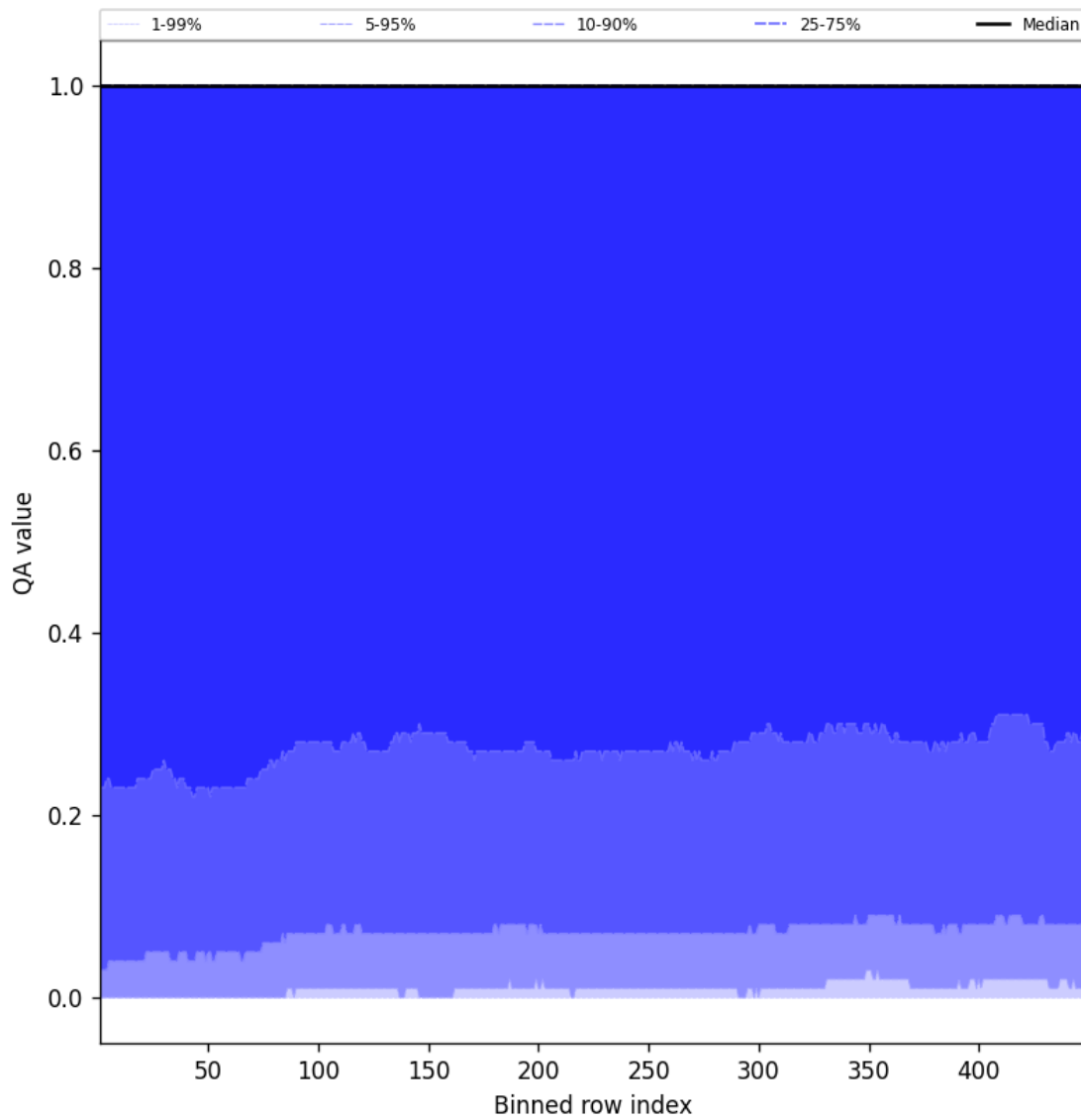


Figure 84: Along track statistics of “QA value” for 2025-09-06 to 2025-09-07

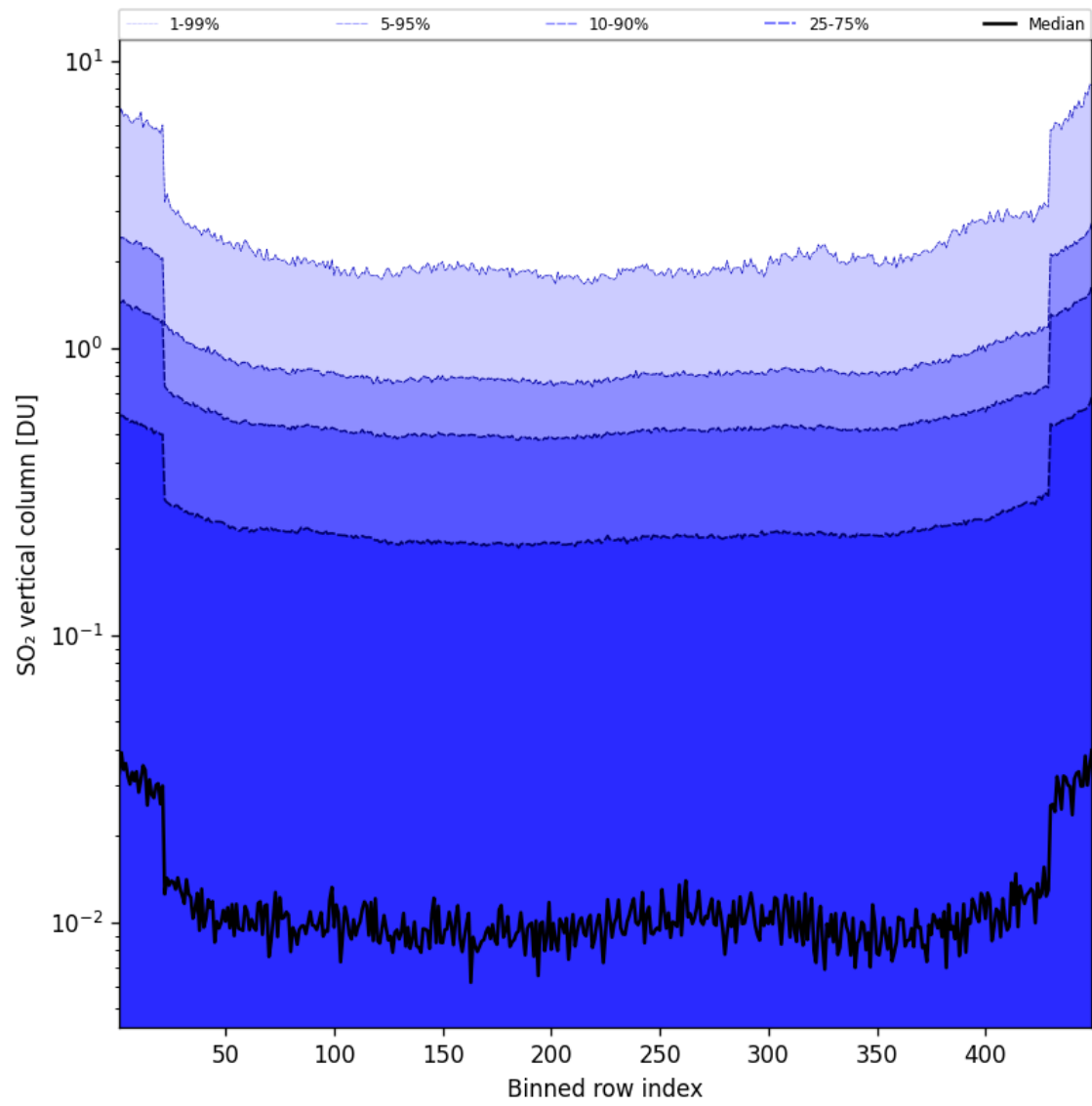


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-09-06 to 2025-09-07

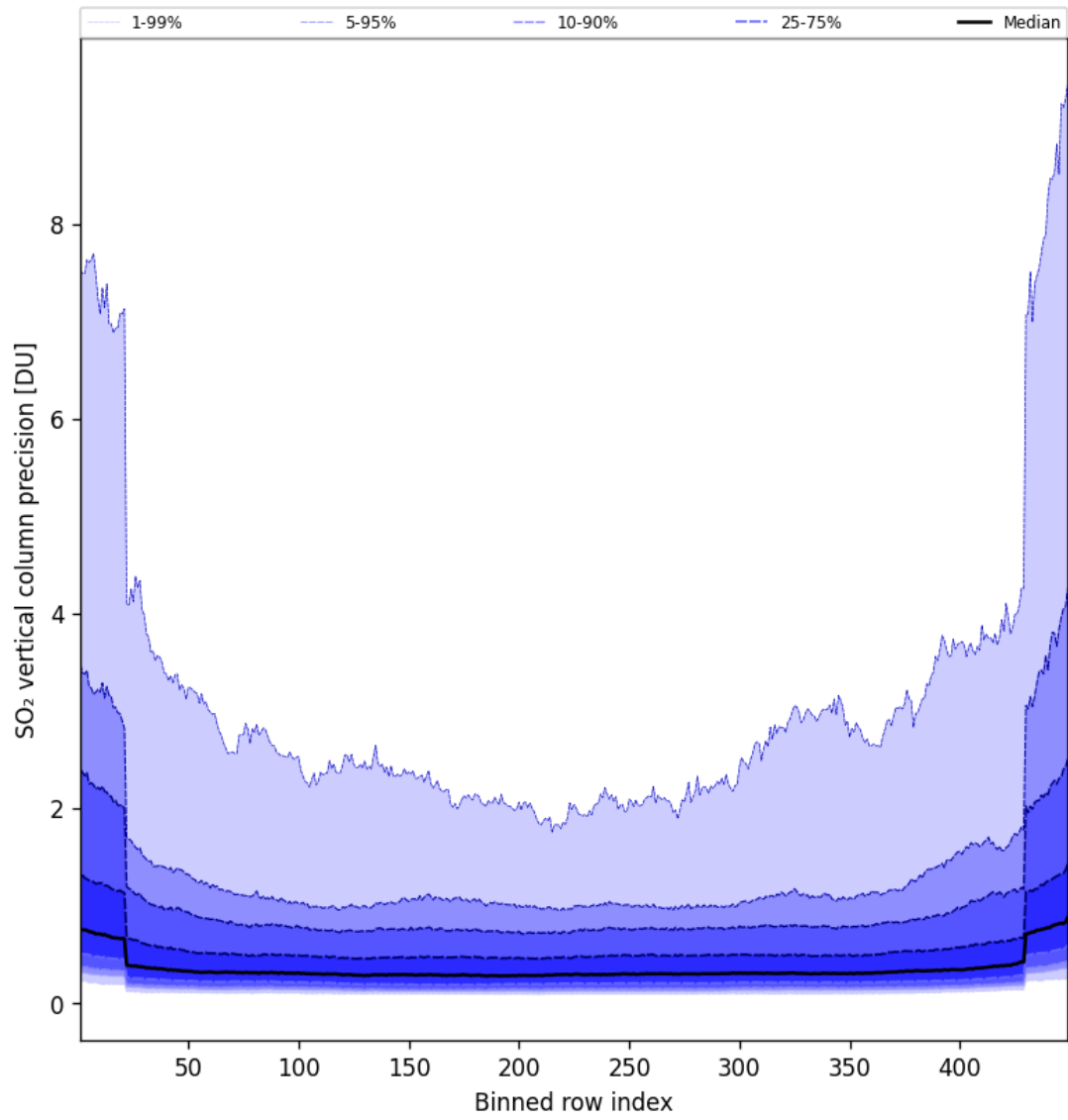


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-09-06 to 2025-09-07

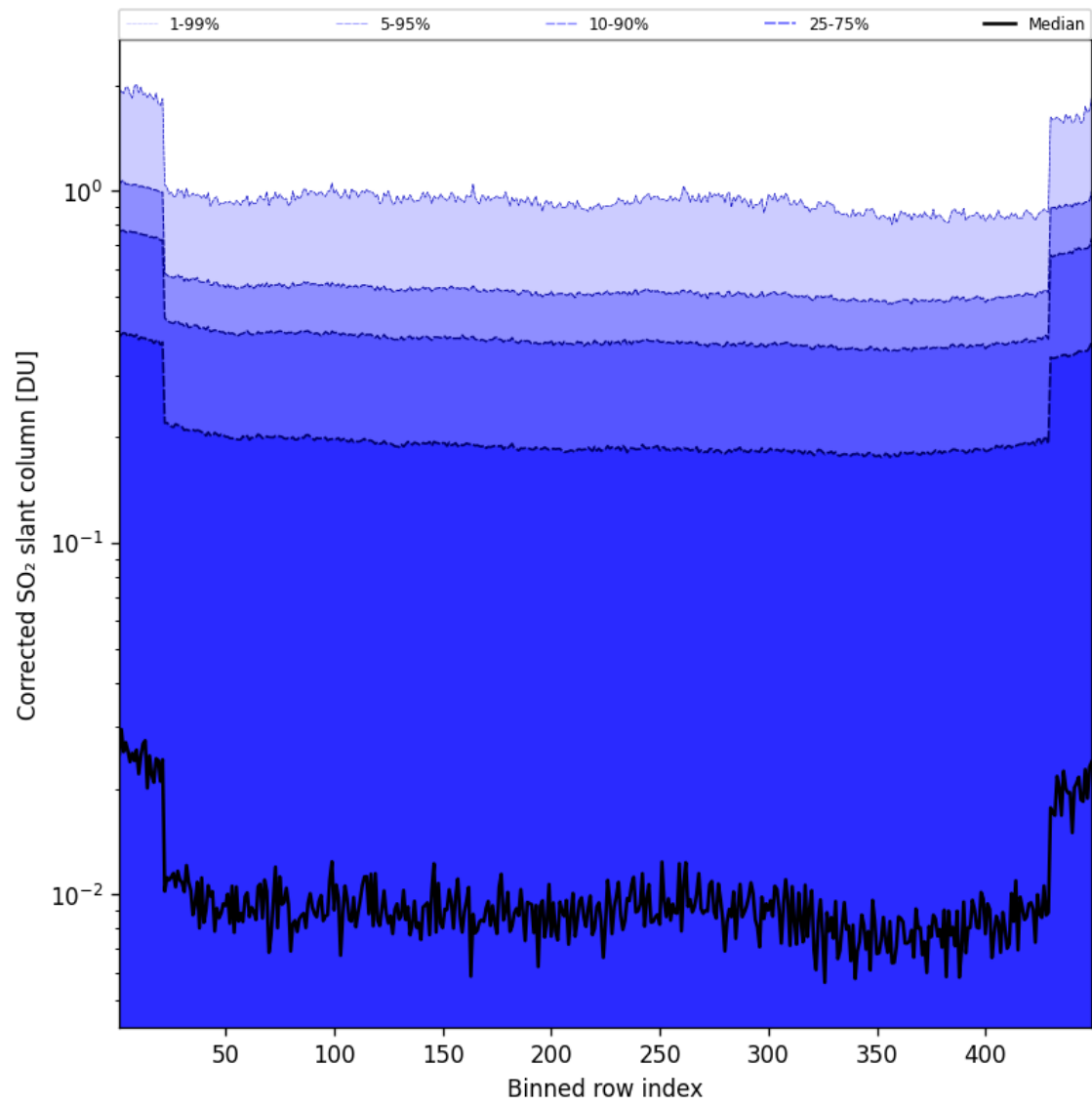


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-09-06 to 2025-09-07

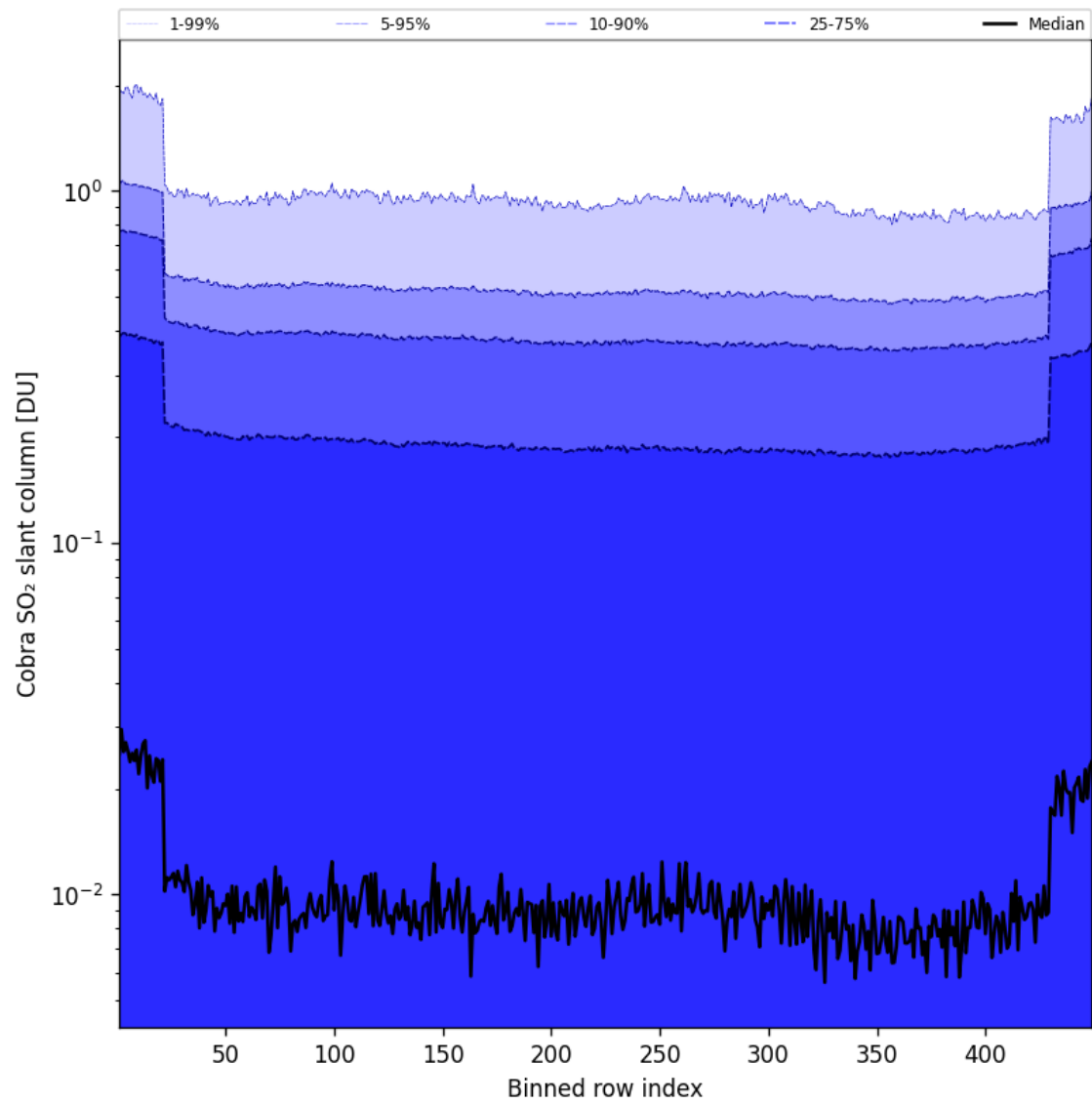


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-09-06 to 2025-09-07

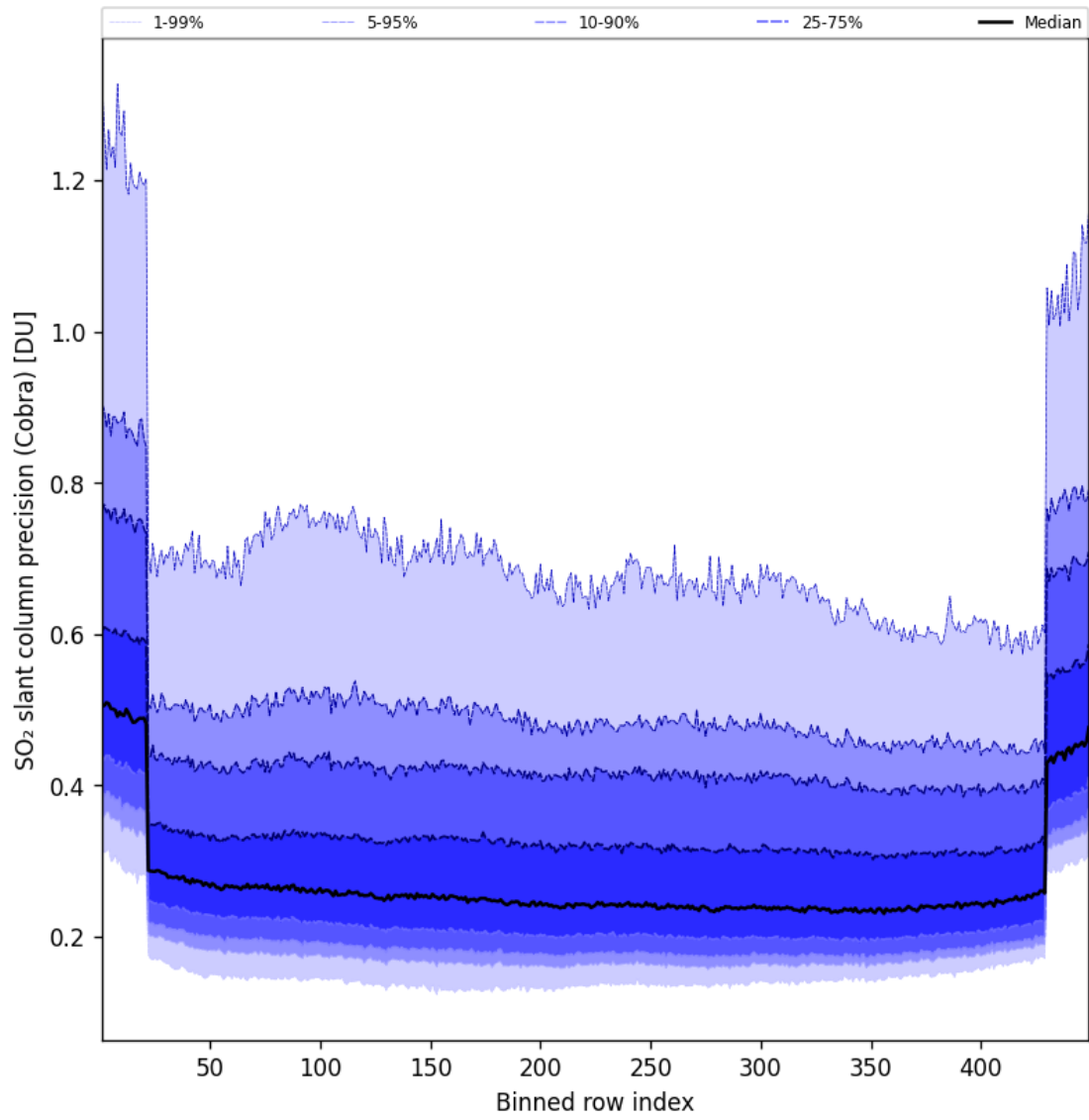


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-09-06 to 2025-09-07

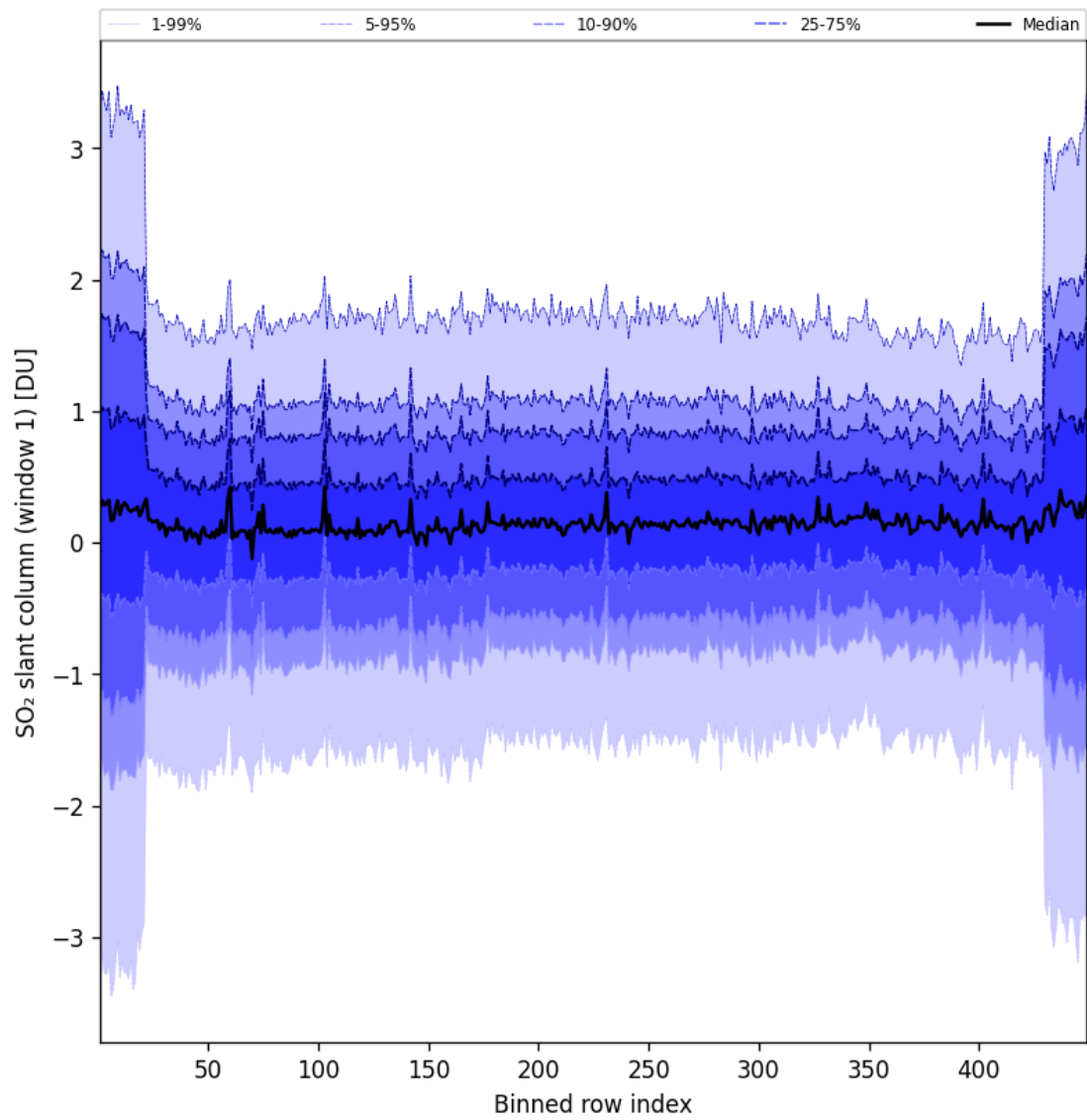


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-09-06 to 2025-09-07

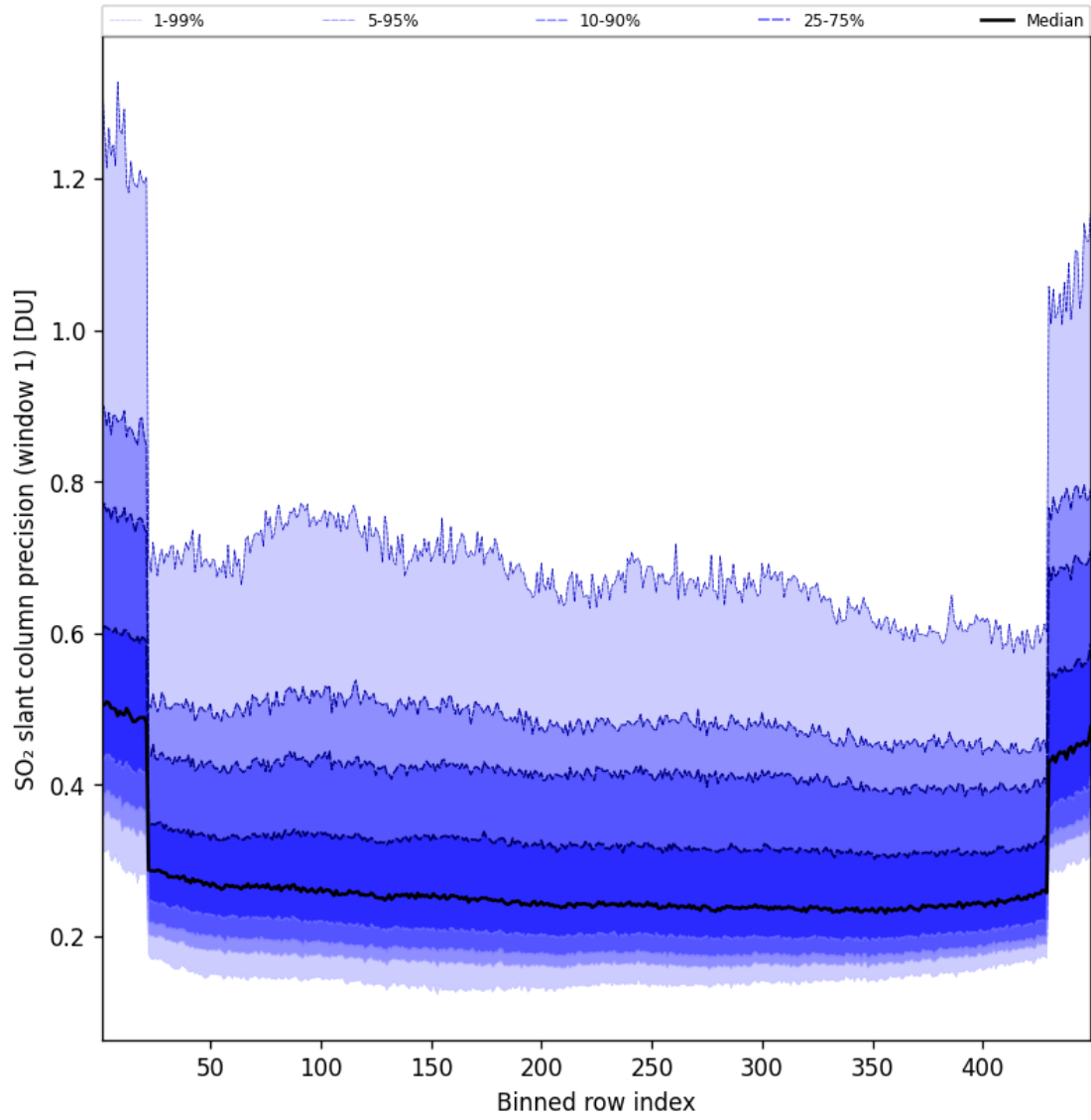


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-09-06 to 2025-09-07

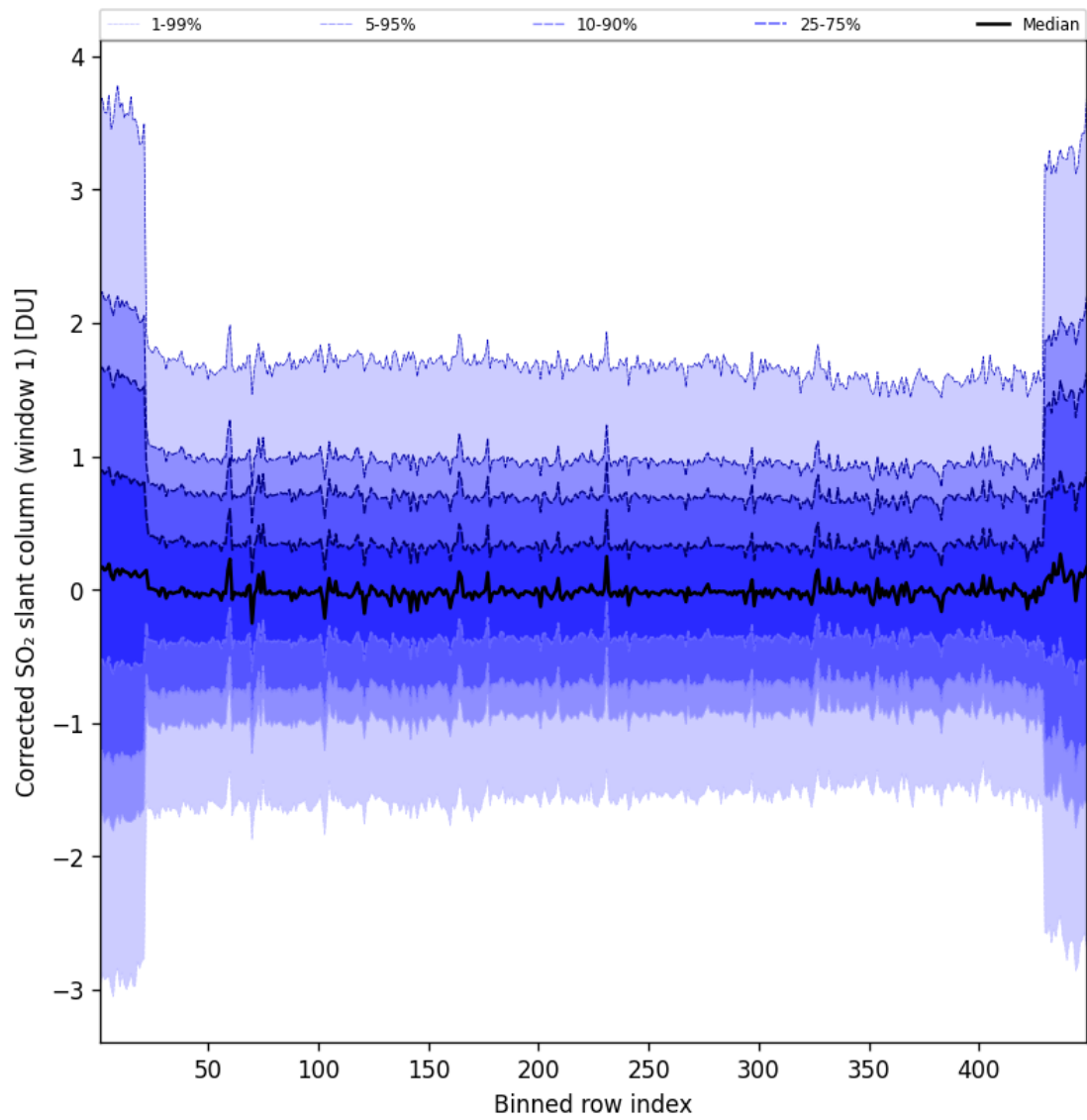


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-09-06 to 2025-09-07

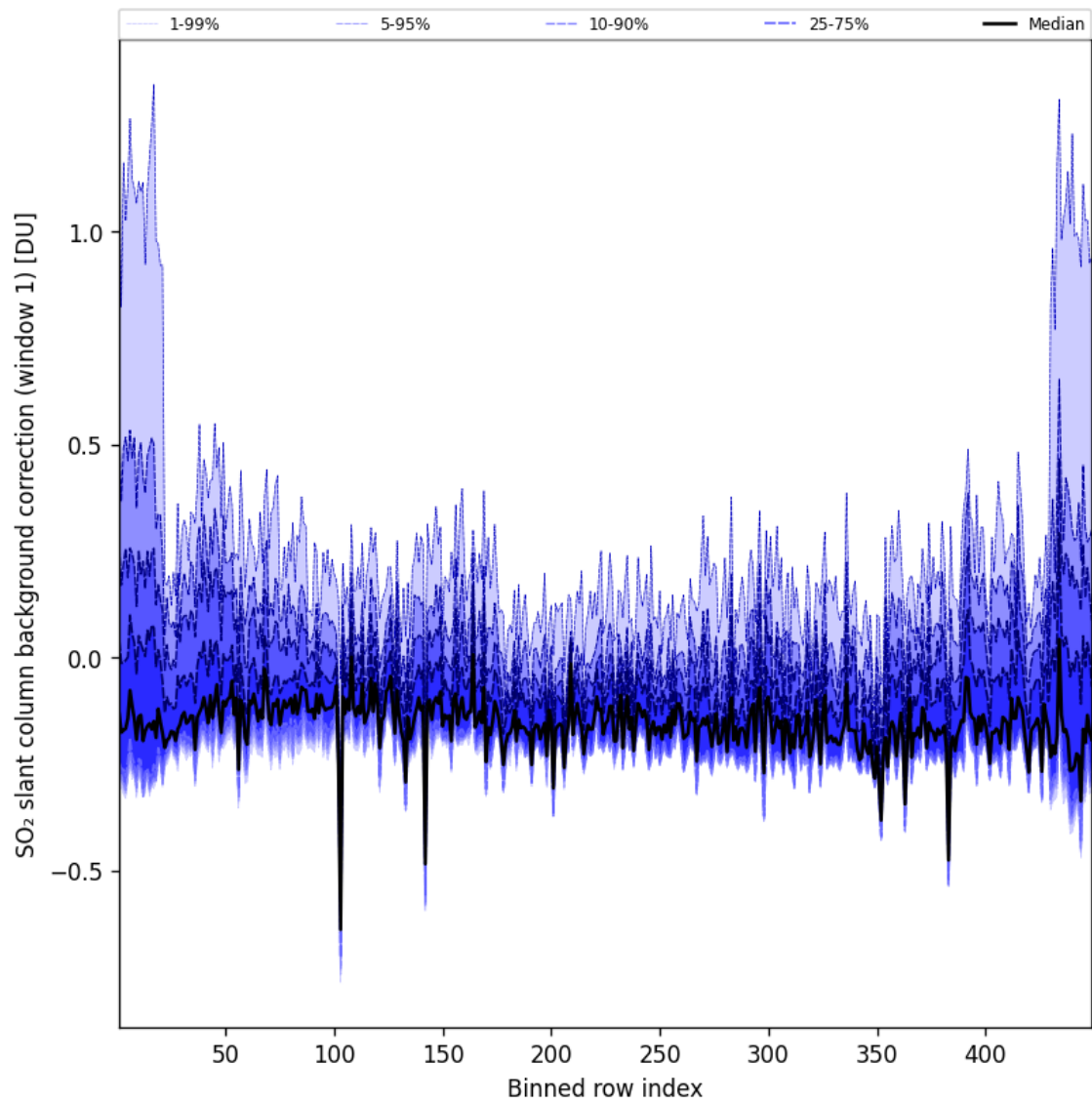


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-09-06 to 2025-09-07

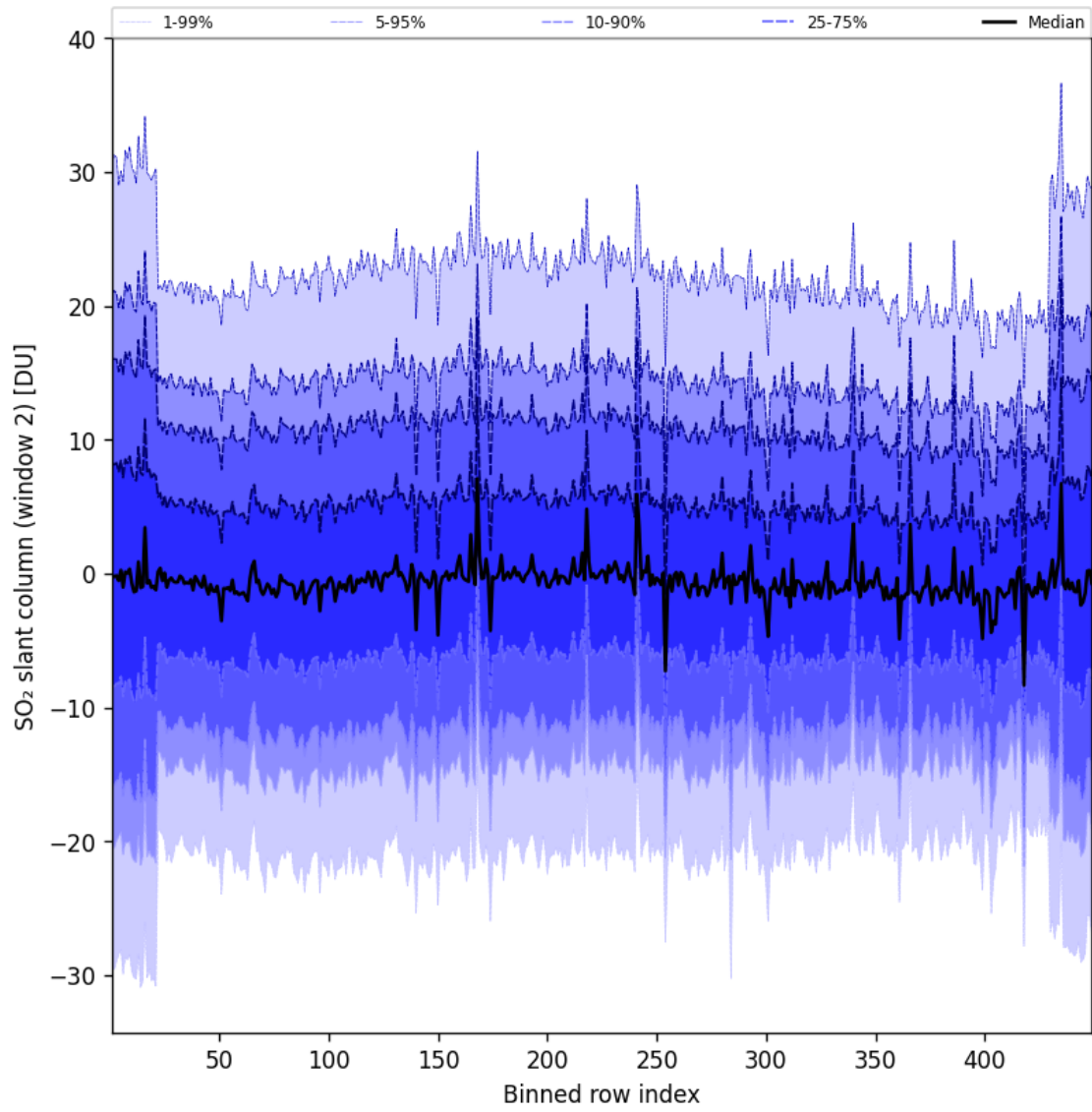


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-09-06 to 2025-09-07

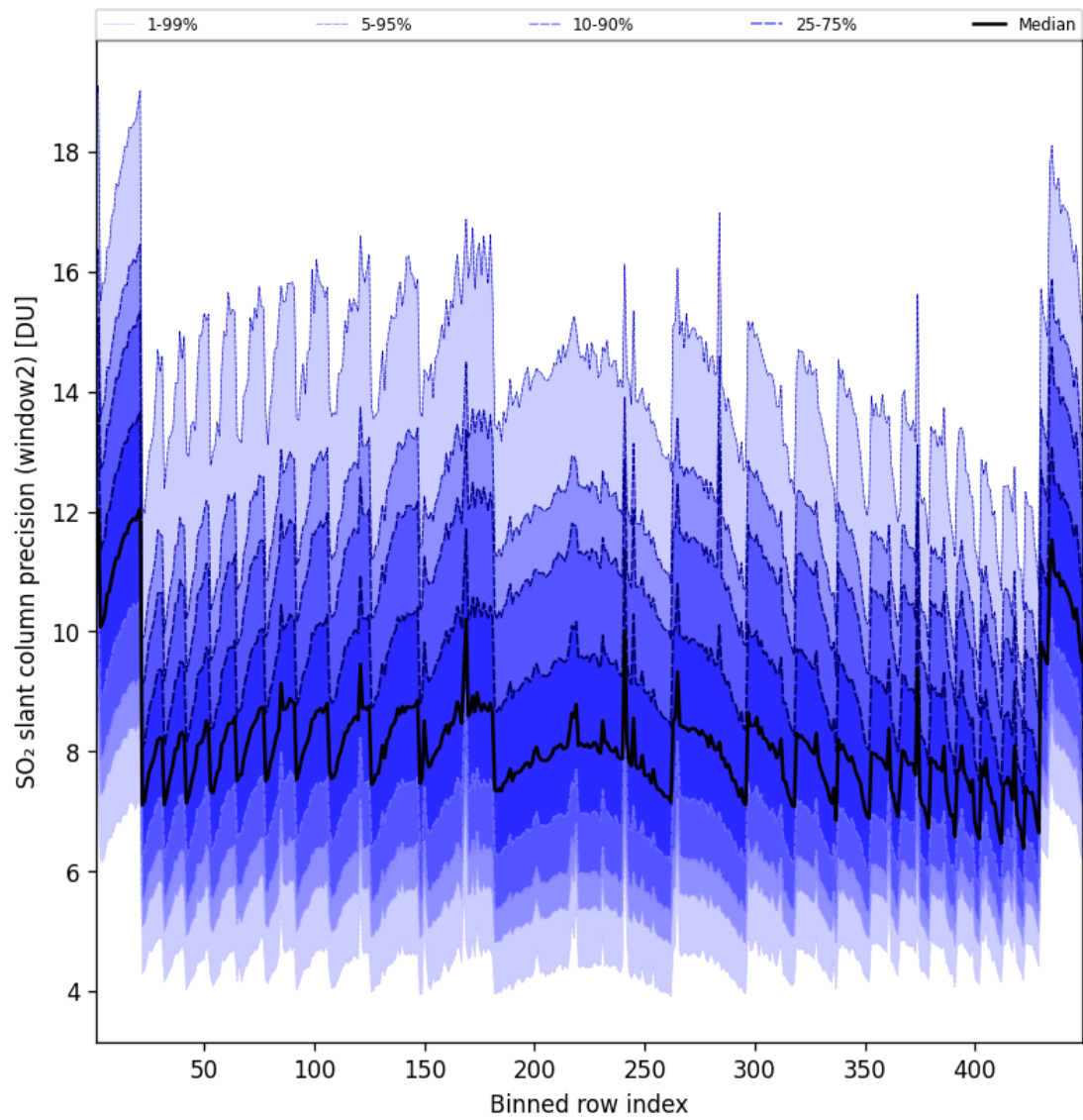


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-09-06 to 2025-09-07

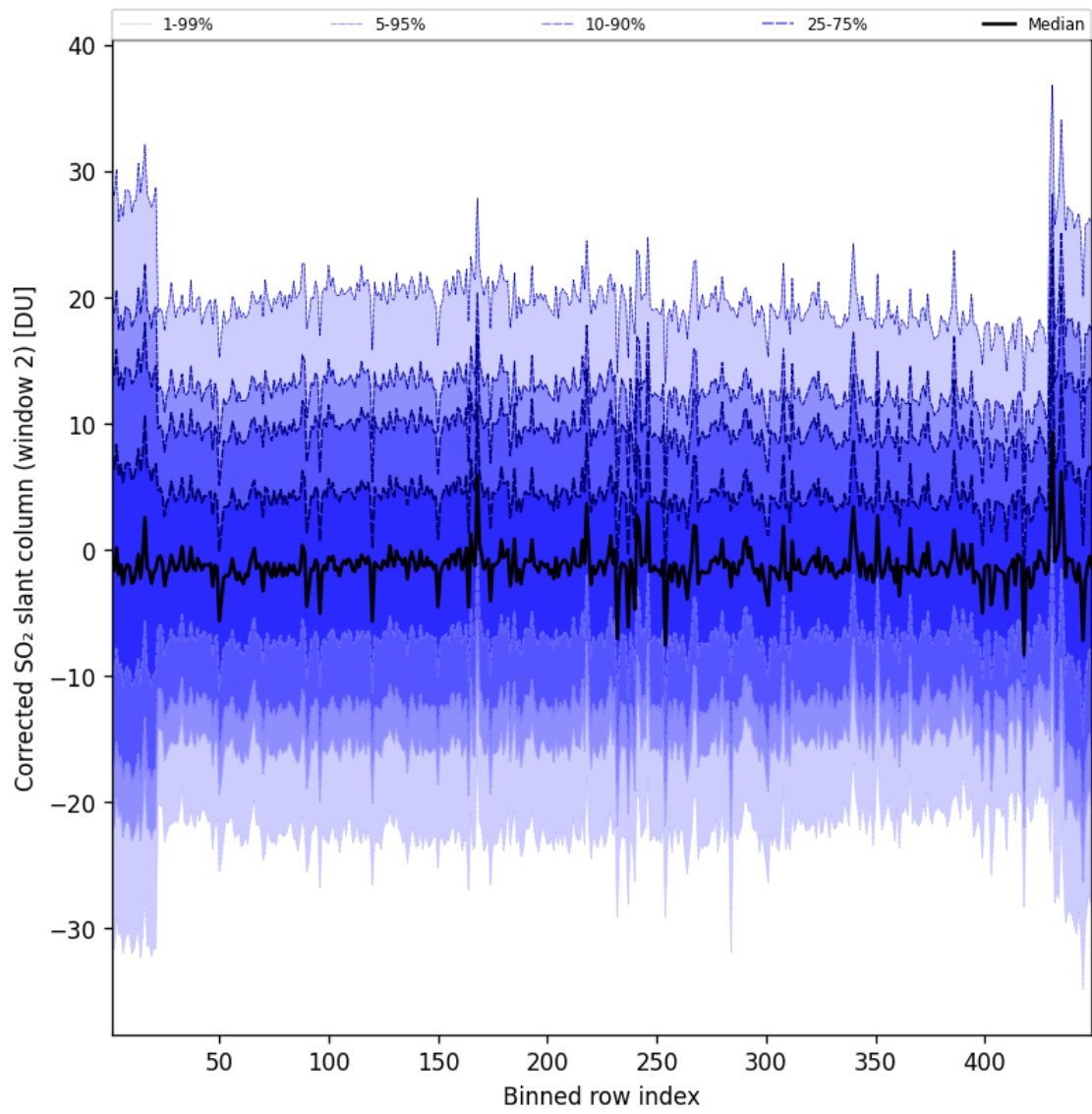


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-09-06 to 2025-09-07

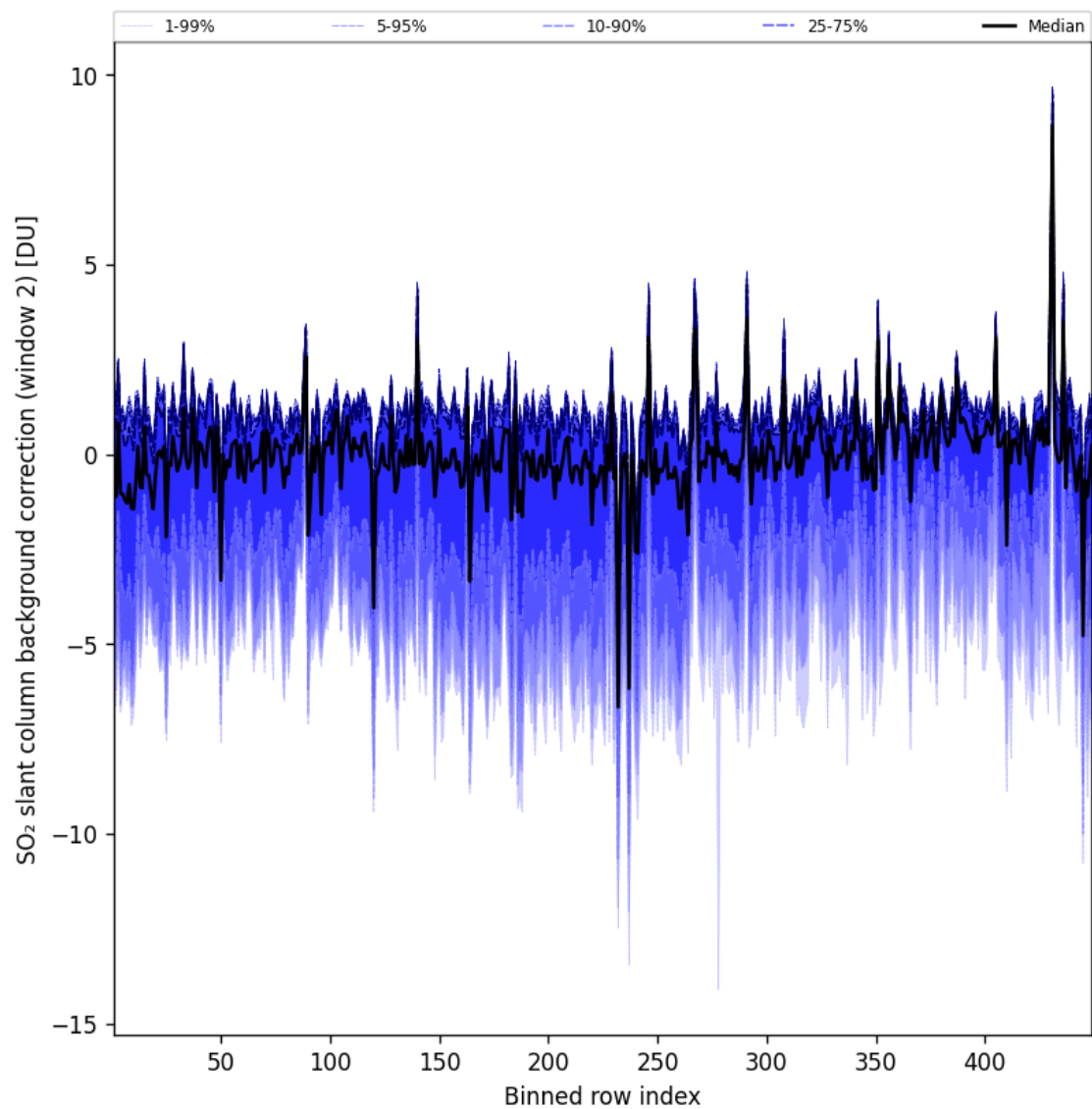


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-09-06 to 2025-09-07

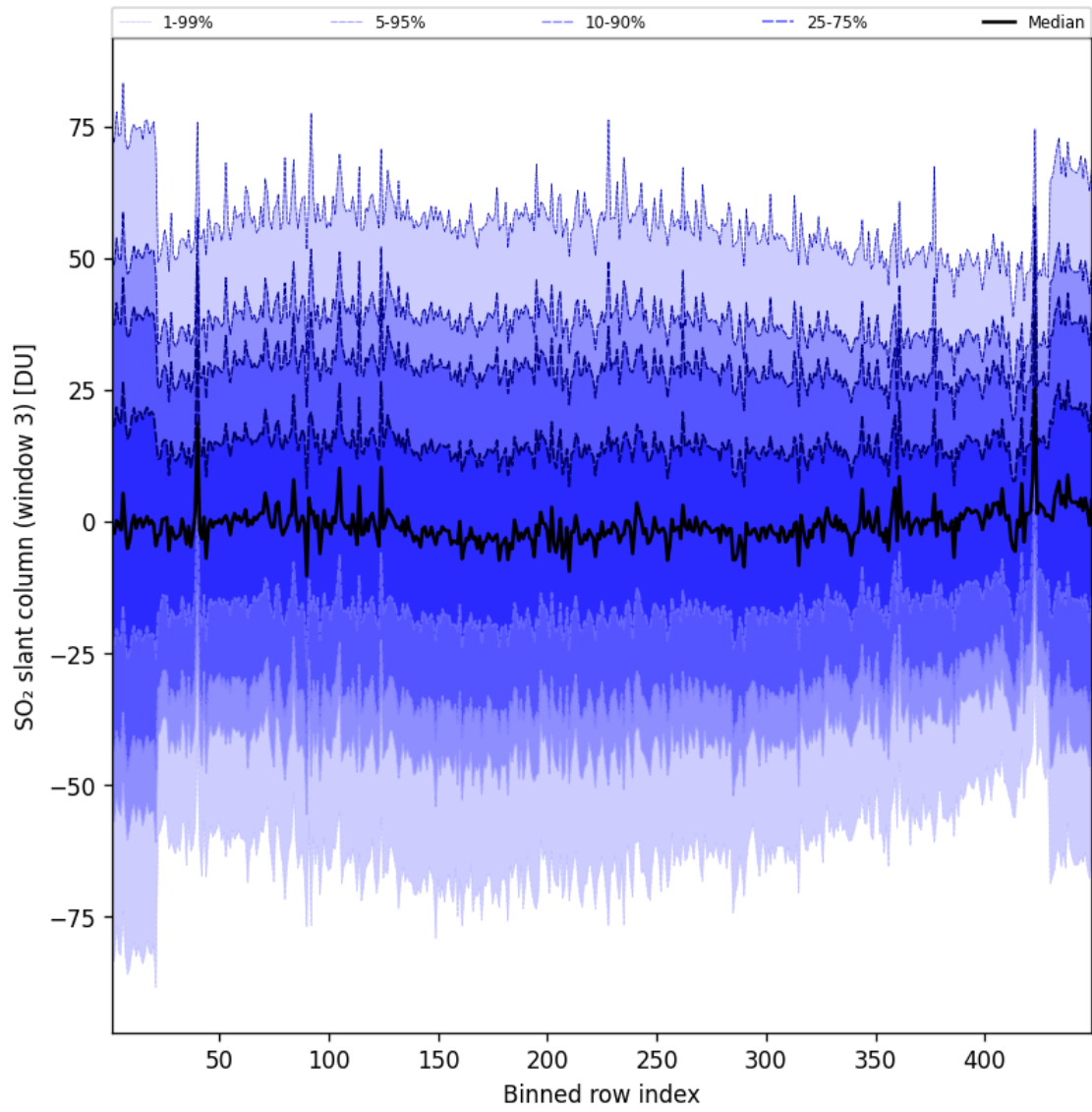


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-09-06 to 2025-09-07

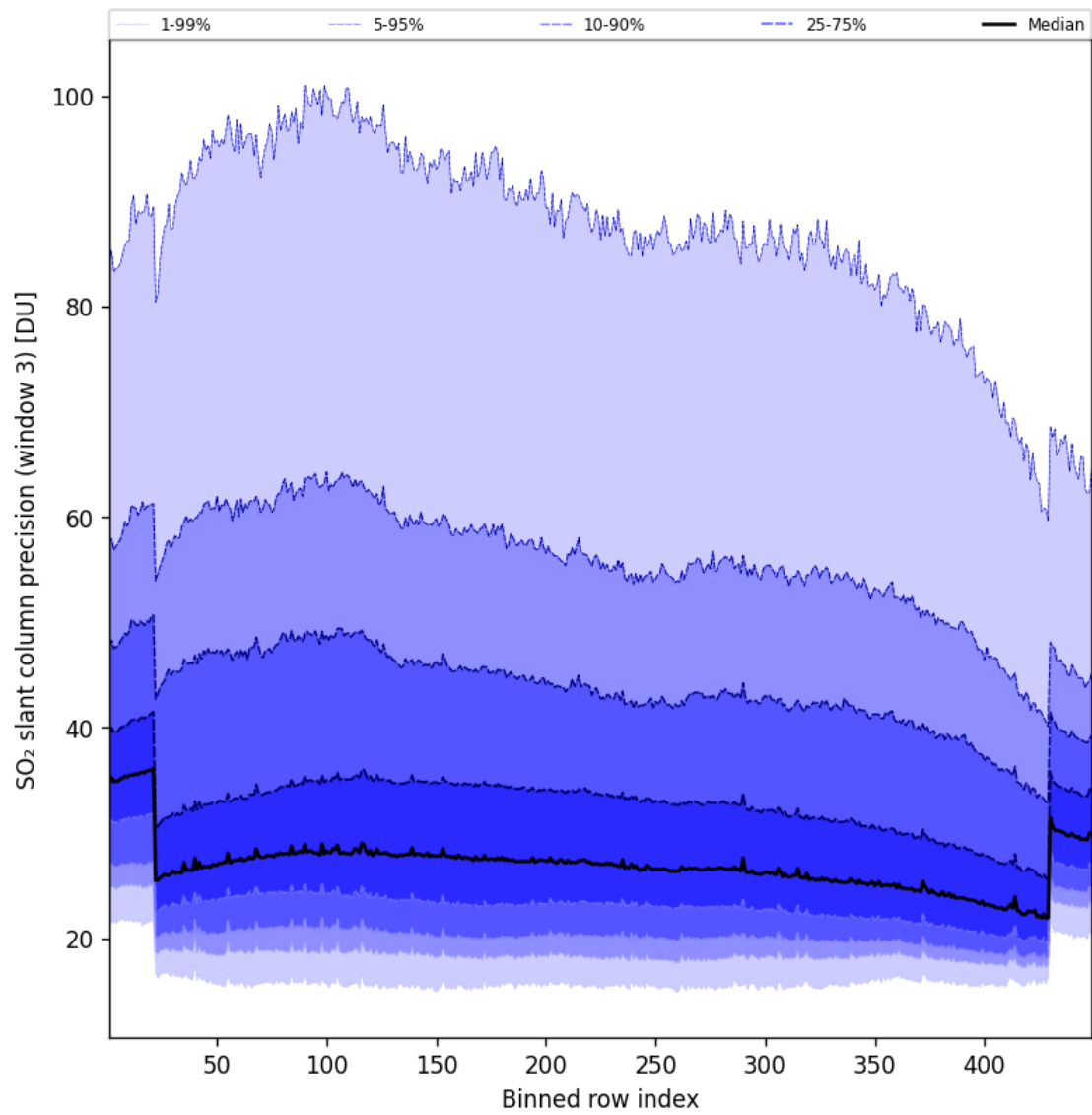


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-09-06 to 2025-09-07

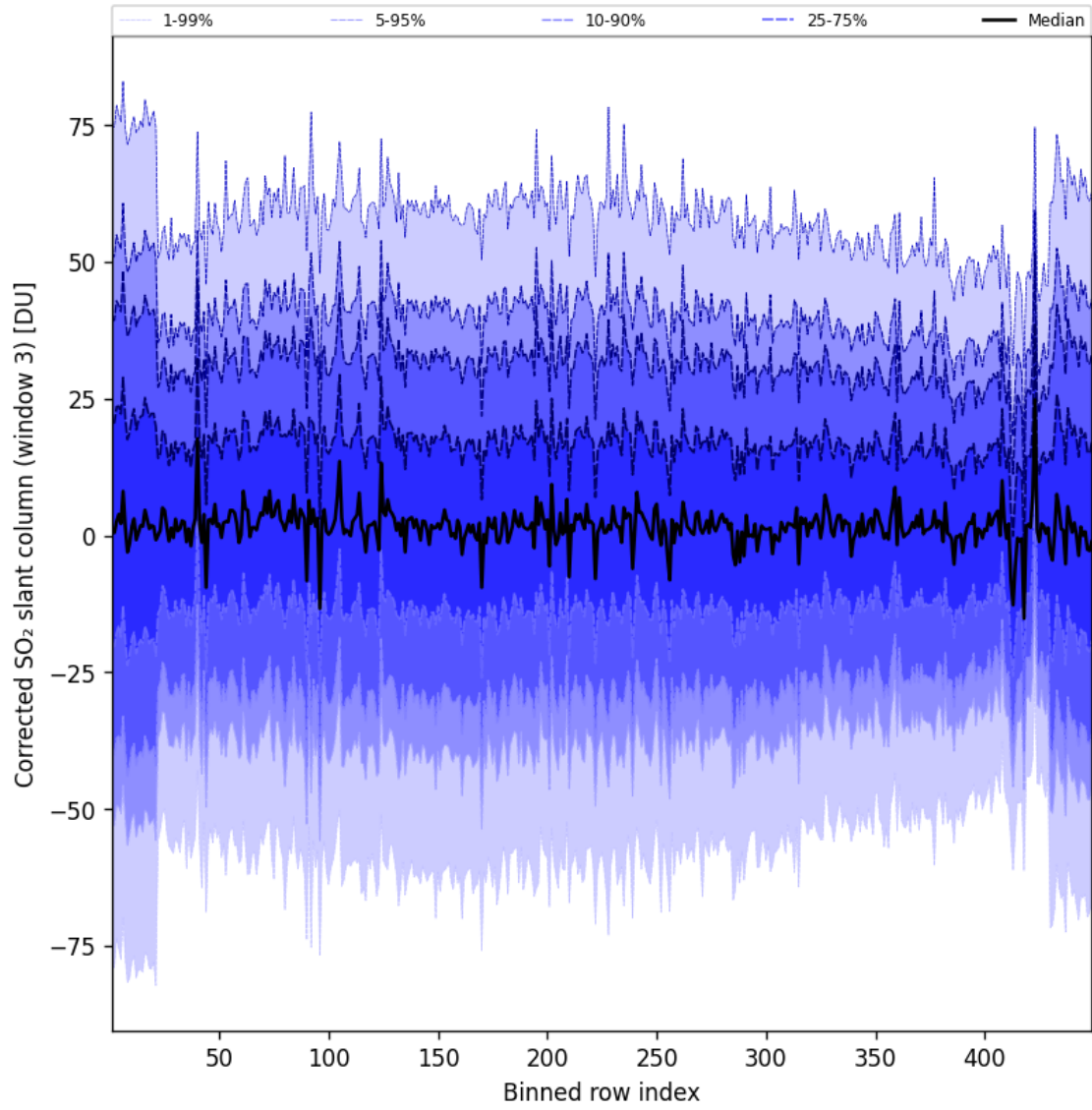


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-09-06 to 2025-09-07

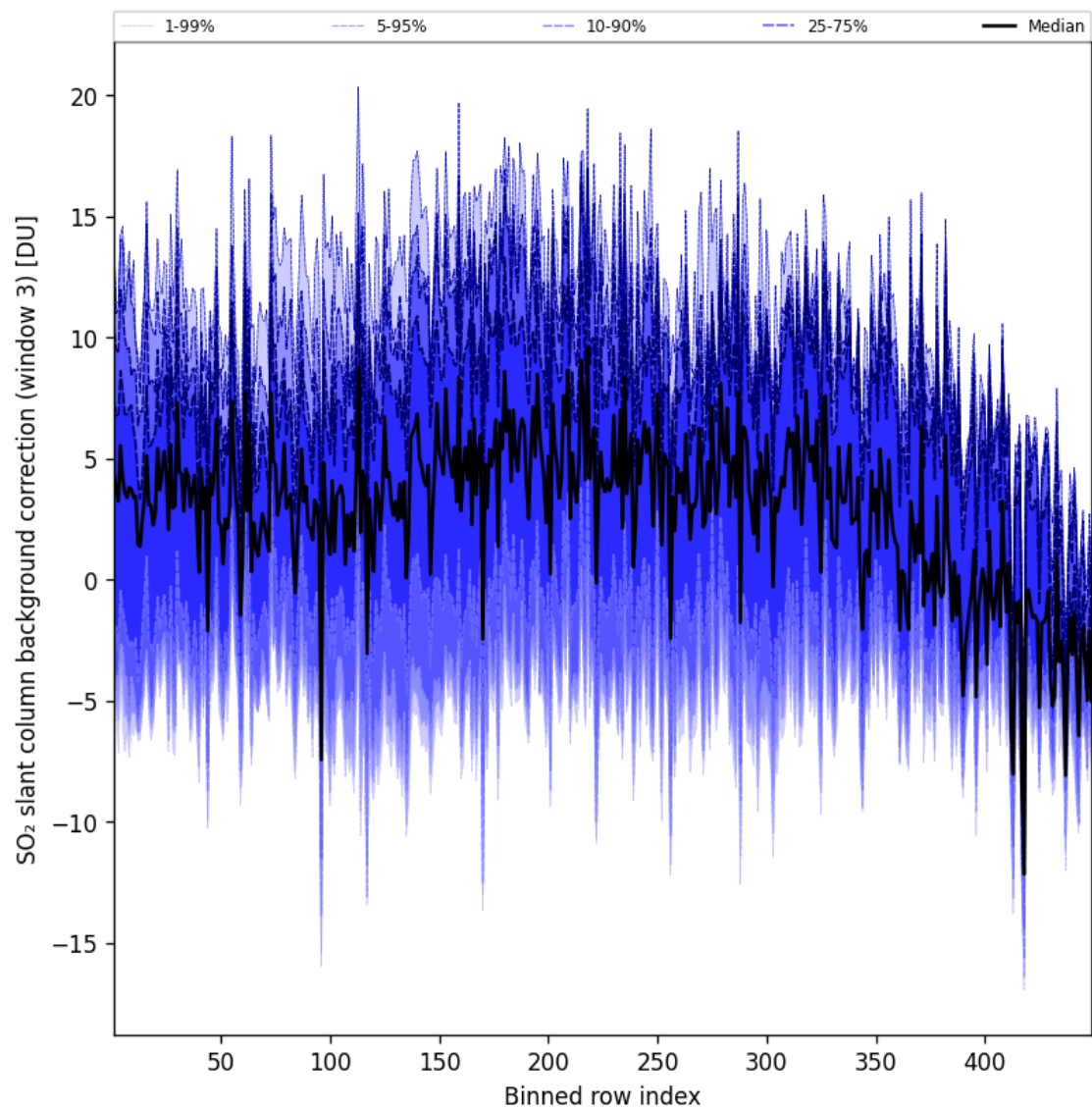


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-09-06 to 2025-09-07

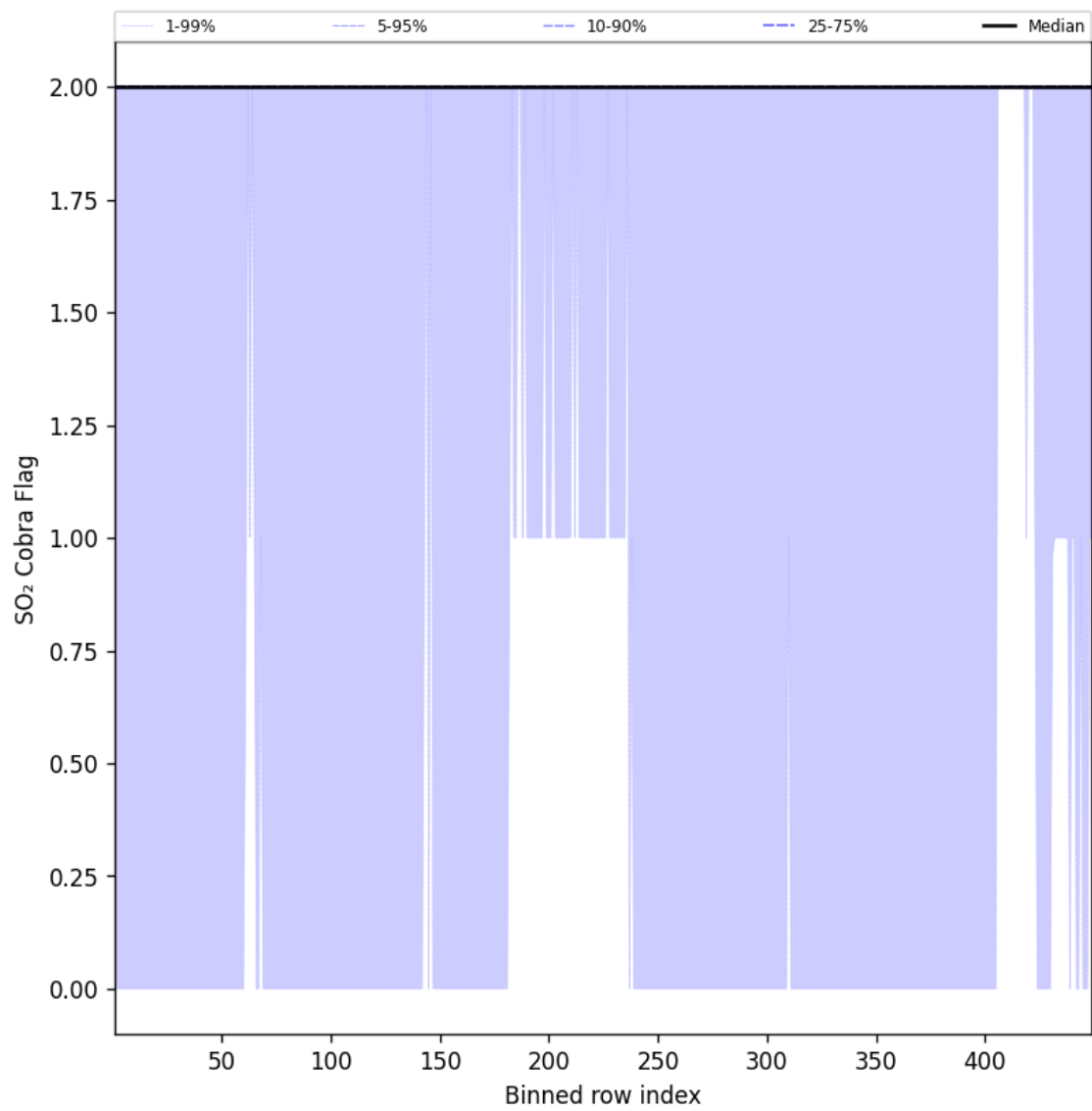


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-09-06 to 2025-09-07

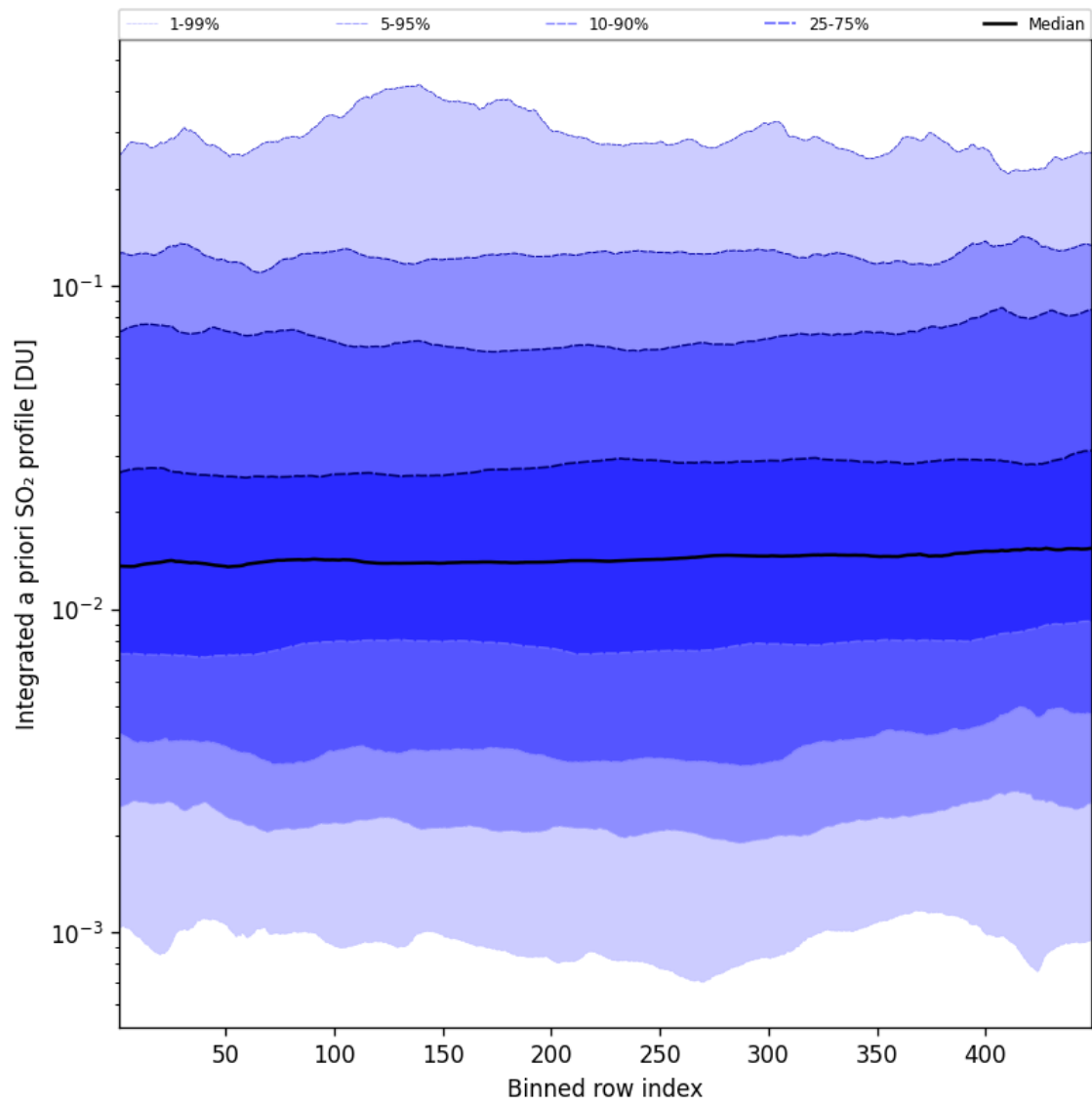


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-09-06 to 2025-09-07

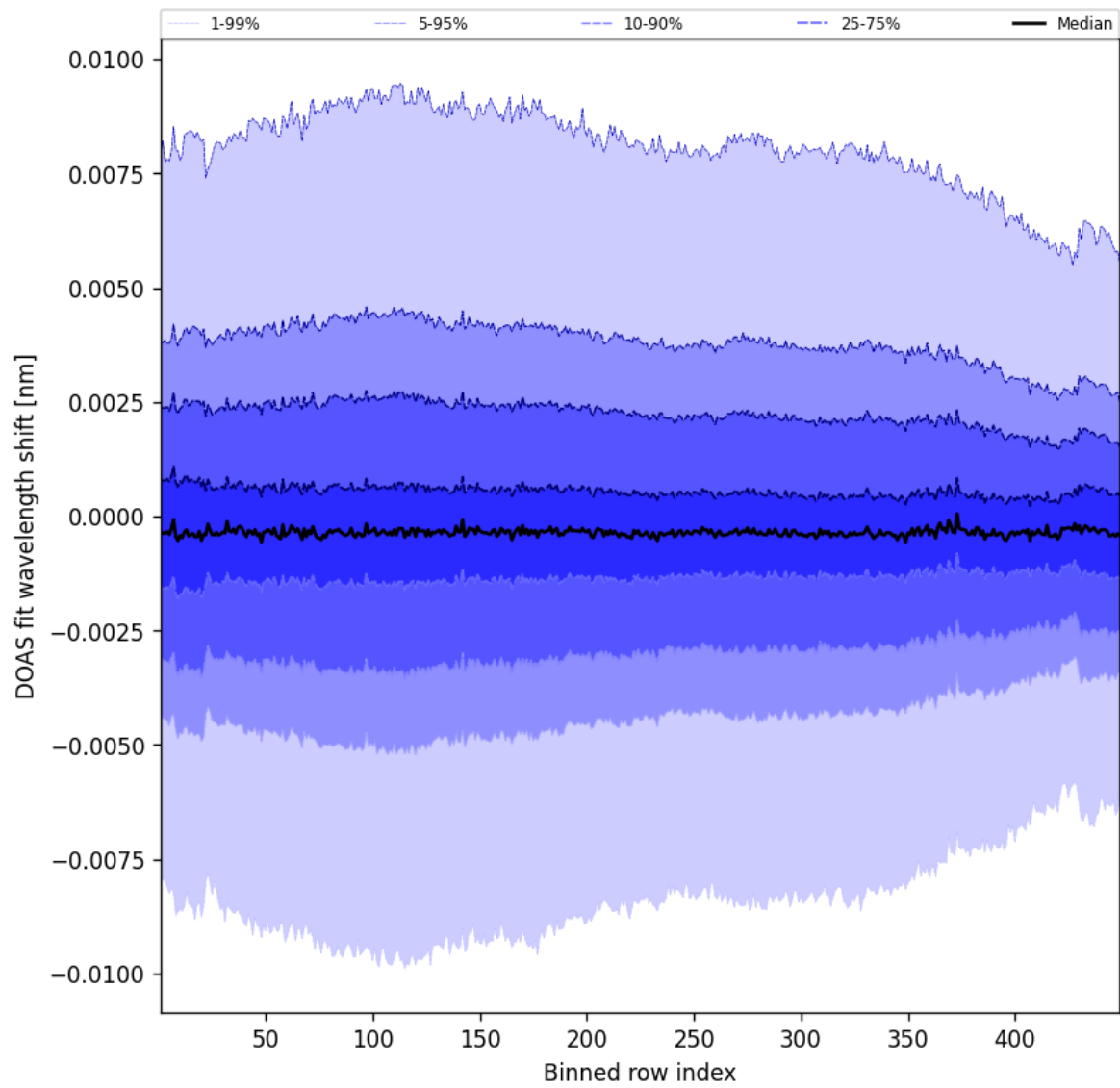


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-09-06 to 2025-09-07

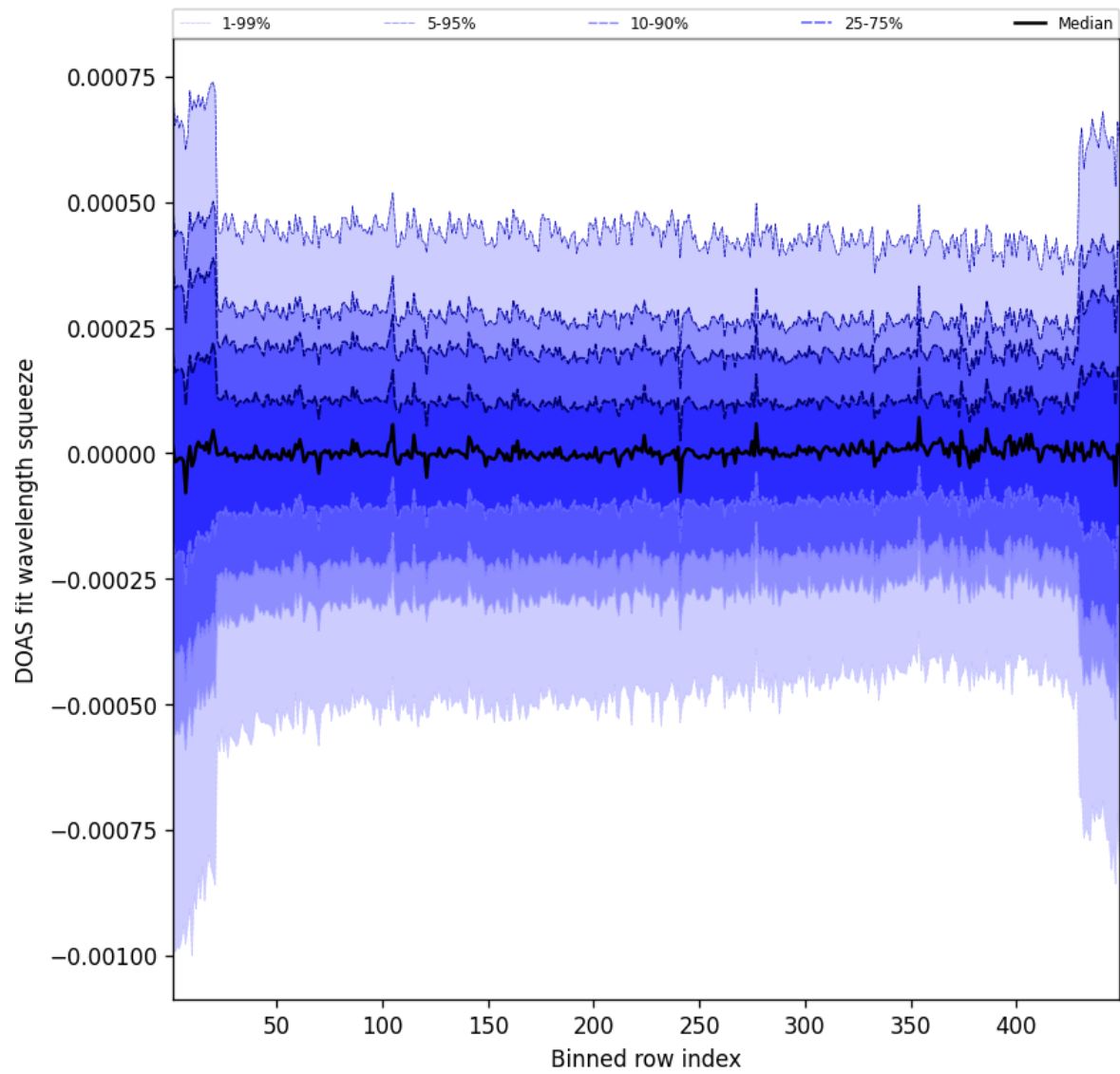


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-09-06 to 2025-09-07

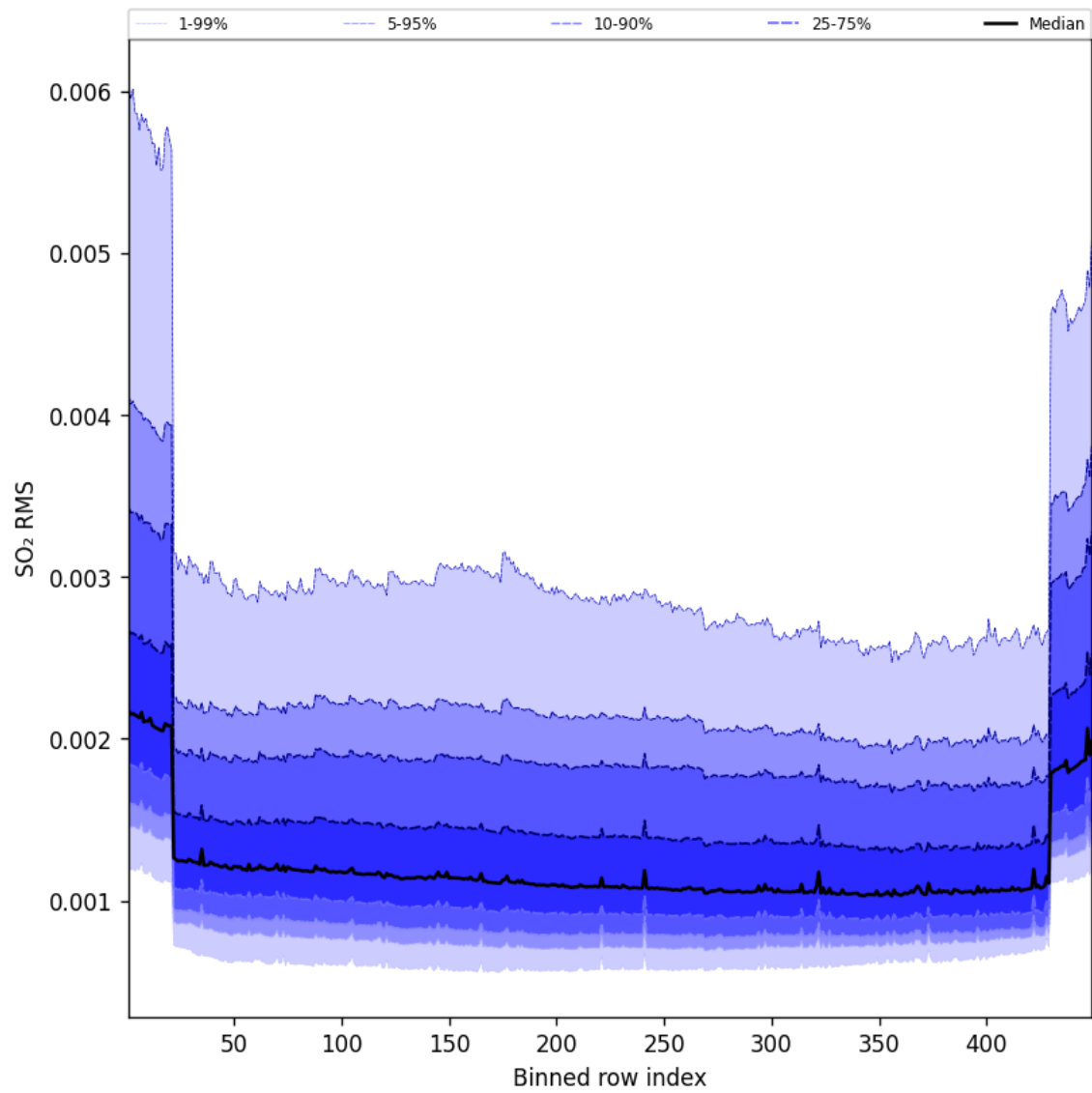


Figure 106: Along track statistics of “SO₂ RMS” for 2025-09-06 to 2025-09-07

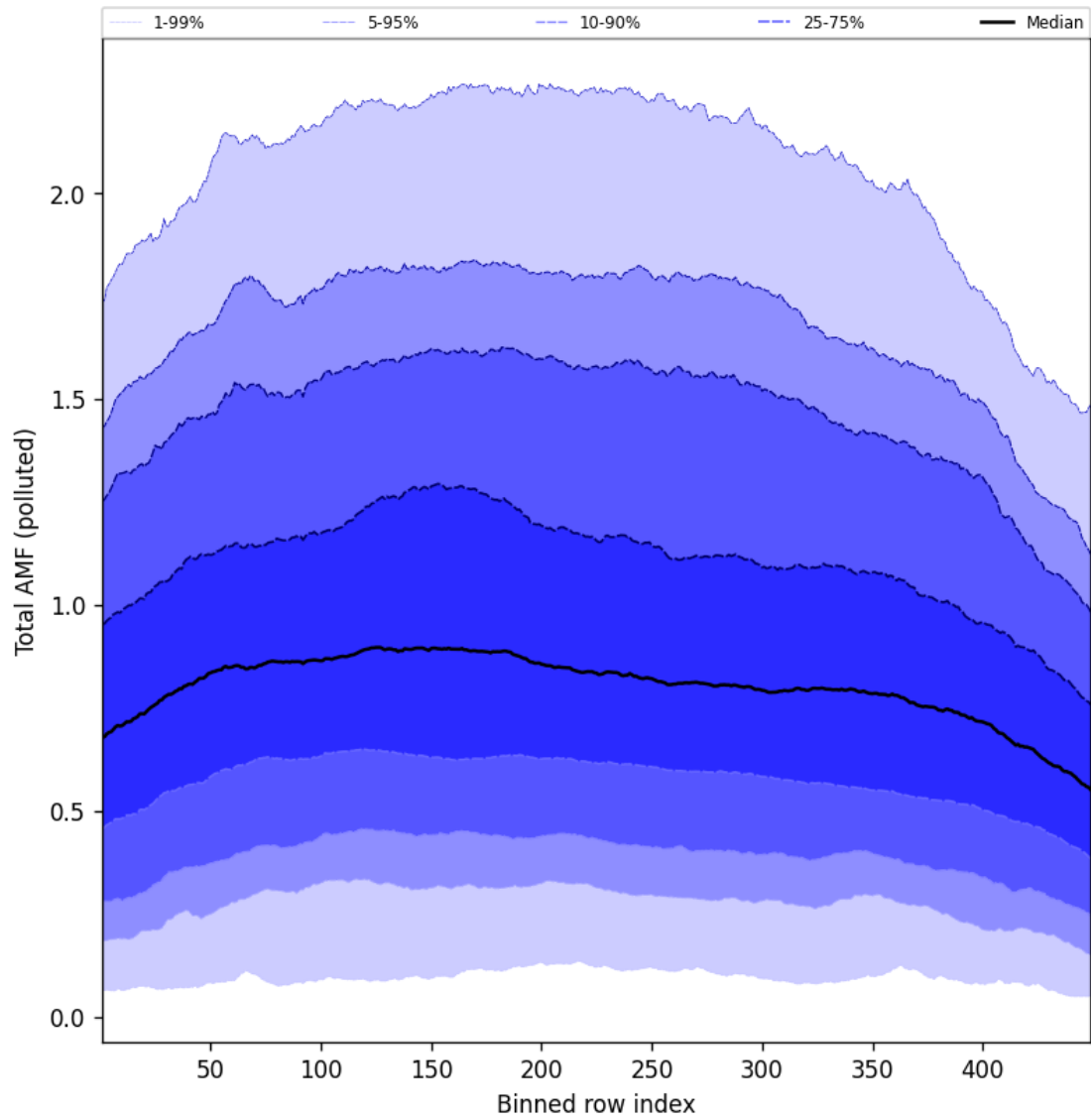


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-09-06 to 2025-09-07

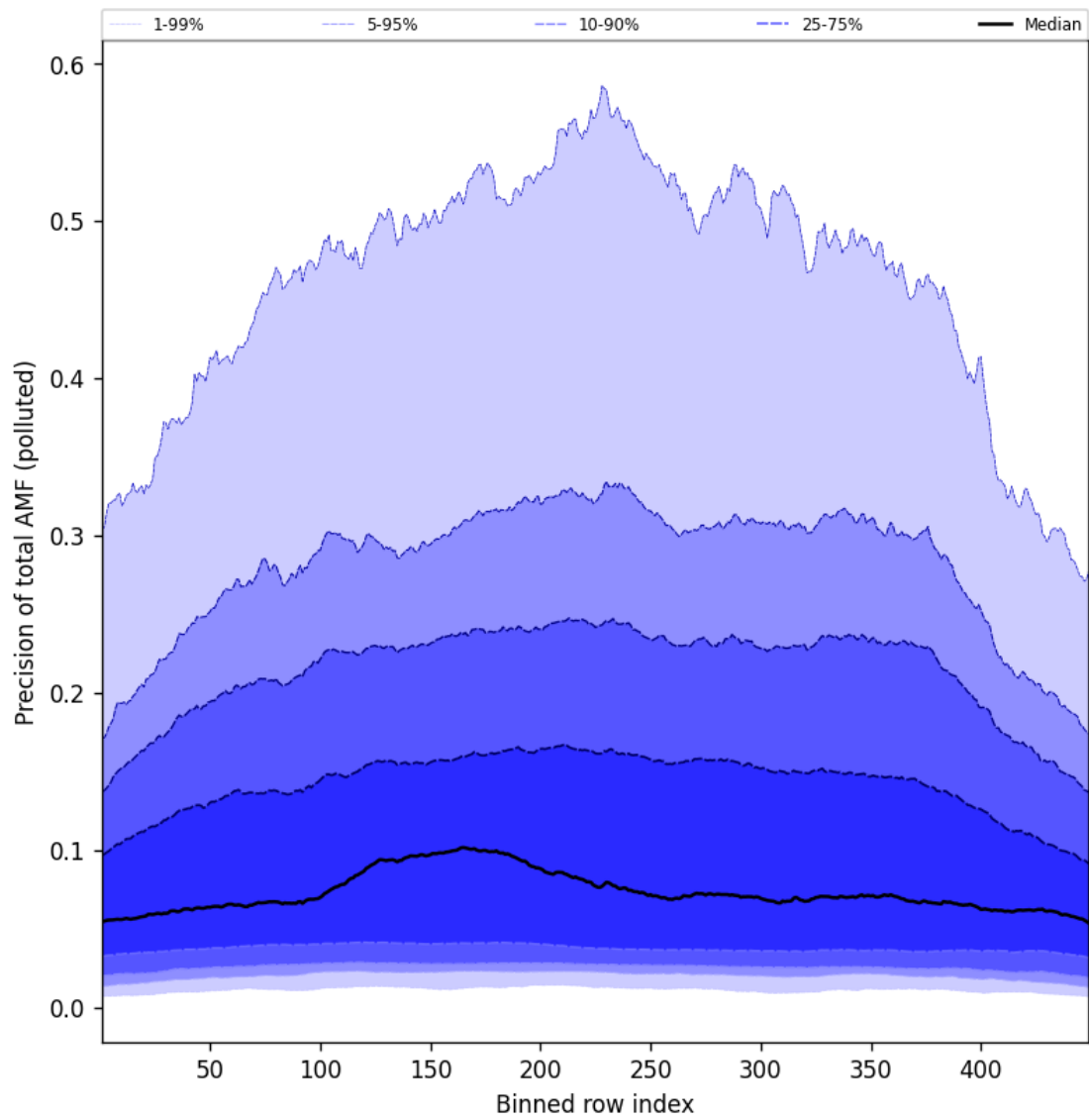


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-09-06 to 2025-09-07

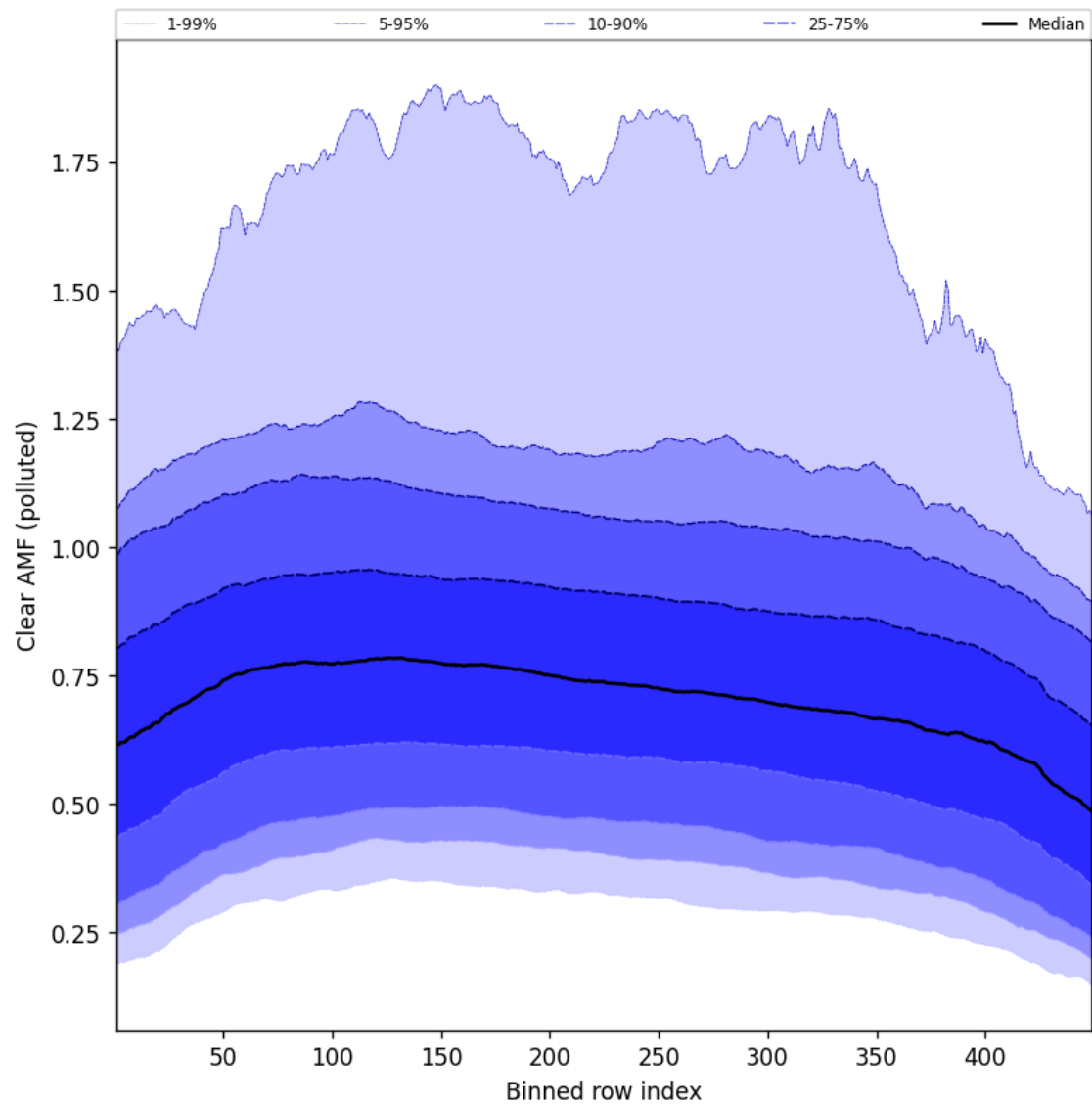


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-09-06 to 2025-09-07

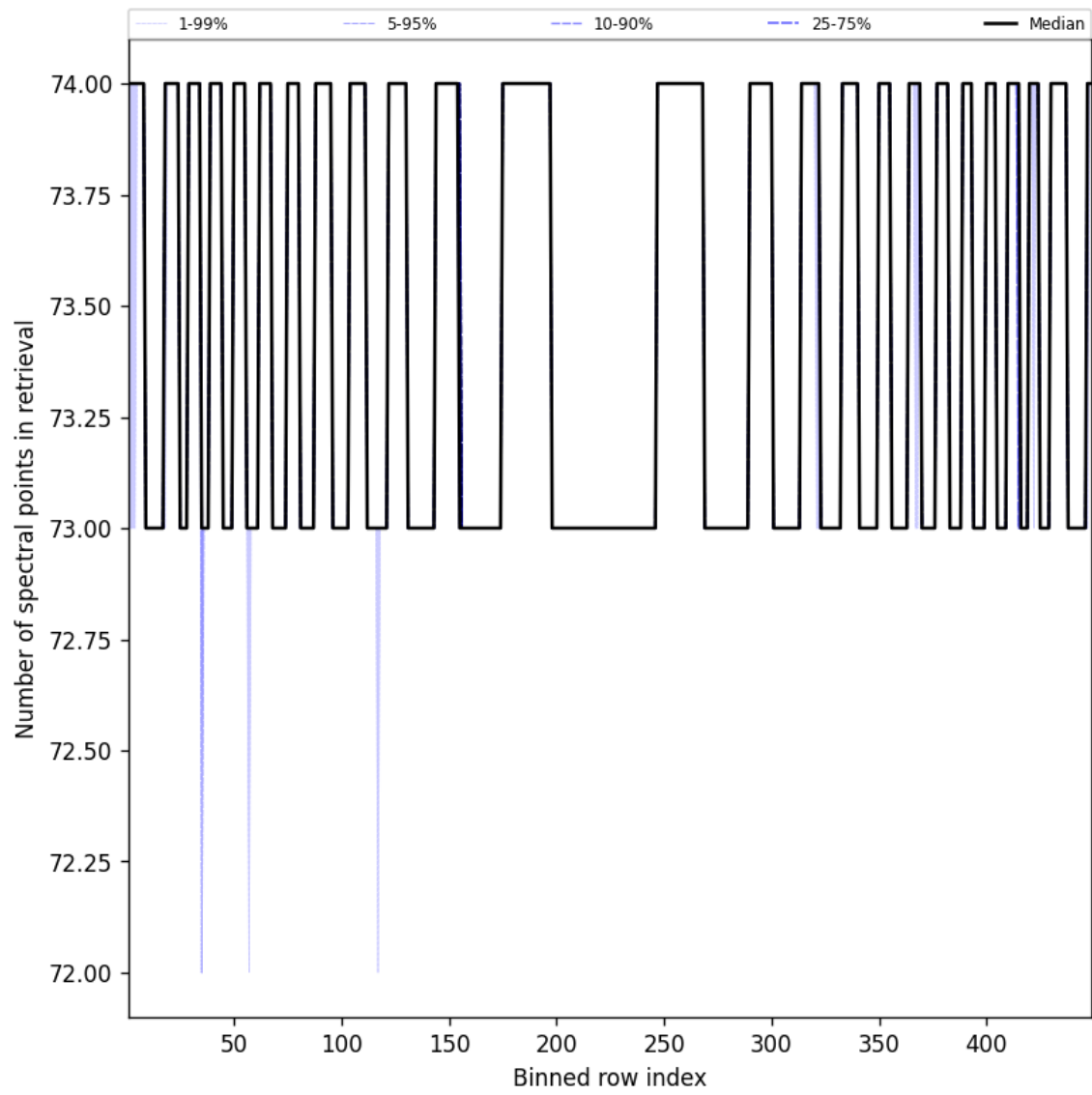


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-09-06 to 2025-09-07

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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