

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]	0.693 ± 0.395	17178068	0.995	0.720	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.046 \pm 84.194) \times 10^{-2}$	17178068	0.263	0.451	1.088×10^{-2}	-483	413
sulfurdioxide total vertical column precision [DU]	0.480 ± 0.568	17178068	0.222	0.311	0.325	4.458×10^{-2}	213
sulfurdioxide slant column density corrected [DU]	$(2.021 \pm 42.355) \times 10^{-2}$	17178068	0.258	0.378	9.768×10^{-3}	-27.9	569
sulfurdioxide slant column density cobra [DU]	$(2.003 \pm 37.713) \times 10^{-2}$	17178068	0.258	0.378	9.768×10^{-3}	-27.9	52.5
sulfurdioxide slant column density cobra precision [DU]	0.306 ± 0.140	17178068	0.213	0.147	0.266	7.411×10^{-2}	31.5
sulfurdioxide slant column density window1 [DU]	0.127 ± 0.705	17178068	0.125	0.756	0.132	-112	92.5
sulfurdioxide slant column density window1 precision [DU]	0.306 ± 0.140	17178068	0.213	0.147	0.266	7.411×10^{-2}	31.5
sulfurdioxide slant column density corrected win1 [DU]	$(4.748 \pm 70.226) \times 10^{-2}$	17178068	2.500×10^{-2}	0.748	2.638×10^{-2}	-112	93.3
background so2 slant column offset window1 [DU]	$(-7.972 \pm 13.911) \times 10^{-2}$	17178068	-0.140	0.137	-0.101	-1.38	3.93
sulfurdioxide slant column density window2 [DU]	0.889 ± 9.486	17178068	0.250	11.9	0.648	-1.626×10^3	936
sulfurdioxide slant column density window2 precision [DU]	8.51 ± 2.39	17178068	7.43	2.79	8.16	2.21	615
sulfurdioxide slant column density corrected win2 [DU]	$(3.901 \pm 9239.372) \times 10^{-3}$	17178068	0.250	11.6	2.308×10^{-2}	-1.629×10^3	937
background so2 slant column offset window2 [DU]	-0.885 ± 2.482	17178068	1.25	3.38	-0.110	-16.2	5.76
sulfurdioxide slant column density window3 [DU]	-2.72 ± 25.22	17178068	-1.68	31.7	-2.43	-892	1.386×10^3
sulfurdioxide slant column density window3 precision [DU]	30.0 ± 13.9	17178068	23.7	10.8	26.3	9.97	2.123×10^3
sulfurdioxide slant column density corrected win3 [DU]	0.621 ± 24.612	17178068	1.68	31.0	0.781	-895	1.382×10^3
background so2 slant column offset window3 [DU]	3.34 ± 5.95	17178068	-1.68	9.63	2.96	-23.3	35.9
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17178068	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.310 \pm 6.751) \times 10^{-2}$	17178068	1.664×10^{-2}	2.212×10^{-2}	1.437×10^{-2}	2.565×10^{-4}	2.82
fitted radiance shift [nm]	$(-2.950 \pm 27.596) \times 10^{-4}$	17178068	-5.000×10^{-4}	1.961×10^{-3}	-2.832×10^{-4}	-5.894×10^{-2}	0.106
fitted radiance squeeze [1]	$(-1.281 \pm 18.859) \times 10^{-5}$	17178068	-1.000×10^{-5}	2.119×10^{-4}	-7.314×10^{-6}	-1.525×10^{-2}	2.502×10^{-2}
fitted root mean square [1]	$(1.332 \pm 0.571) \times 10^{-3}$	17178068	9.750×10^{-4}	5.905×10^{-4}	1.173×10^{-3}	3.263×10^{-4}	5.075×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.895 ± 0.427	17178068	0.740	0.526	0.828	5.000×10^{-2}	2.87
sulfurdioxide total air mass factor polluted precision [1]	0.102 ± 0.091	17178068	3.500×10^{-2}	9.857×10^{-2}	7.072×10^{-2}	3.824×10^{-3}	1.80
sulfurdioxide clear air mass factor polluted [1]	0.758 ± 0.288	17178068	0.740	0.332	0.736	7.447×10^{-2}	2.87
number of spectral points in retrieval [1]	73.4 ± 0.5	17178068	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}	0.150	0.280	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-1.96	-0.813	-0.514	-0.353	-0.211	0.240	0.393	0.573	0.921	2.34
sulfurdioxide total vertical column precision [DU]	0.103	0.138	0.165	0.190	0.223	0.534	0.694	0.881	1.27	2.78
sulfurdioxide slant column density corrected [DU]	-0.894	-0.514	-0.371	-0.276	-0.177	0.201	0.306	0.409	0.574	1.08
sulfurdioxide slant column density cobra [DU]	-0.894	-0.514	-0.371	-0.276	-0.177	0.201	0.306	0.409	0.574	1.08
sulfurdioxide slant column density cobra precision [DU]	0.143	0.171	0.185	0.197	0.213	0.359	0.414	0.471	0.566	0.812
sulfurdioxide slant column density window1 [DU]	-1.77	-0.956	-0.652	-0.453	-0.249	0.507	0.706	0.899	1.19	2.00
sulfurdioxide slant column density window1 precision [DU]	0.143	0.171	0.185	0.197	0.213	0.359	0.414	0.471	0.566	0.812
sulfurdioxide slant column density corrected win1 [DU]	-1.70	-0.984	-0.714	-0.533	-0.341	0.407	0.616	0.823	1.15	2.05
background so2 slant column offset window1 [DU]	-0.306	-0.240	-0.210	-0.189	-0.165	-2.784×10^{-2}	2.372×10^{-2}	7.965×10^{-2}	0.158	0.356
sulfurdioxide slant column density window2 [DU]	-21.0	-14.0	-10.6	-8.08	-5.21	6.73	9.85	12.7	16.6	24.9
sulfurdioxide slant column density window2 precision [DU]	4.45	5.41	5.96	6.41	6.93	9.72	10.6	11.5	12.8	15.4
sulfurdioxide slant column density corrected win2 [DU]	-22.4	-14.9	-11.4	-8.74	-5.81	5.83	8.74	11.3	14.9	22.3
background so2 slant column offset window2 [DU]	-7.85	-5.74	-4.54	-3.55	-2.38	0.994	1.26	1.47	1.82	3.13
sulfurdioxide slant column density window3 [DU]	-66.6	-44.6	-34.2	-26.6	-18.3	13.4	21.3	28.5	38.2	57.2
sulfurdioxide slant column density window3 precision [DU]	14.3	17.2	19.0	20.5	22.2	33.0	37.7	44.0	56.4	88.6
sulfurdioxide slant column density corrected win3 [DU]	-61.2	-40.0	-29.9	-22.7	-14.7	16.3	24.1	31.2	40.6	59.6
background so2 slant column offset window3 [DU]	-7.92	-5.15	-3.91	-2.94	-1.58	8.05	9.85	11.3	13.1	16.3
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]	9.591×10^{-4}	2.373×10^{-3}	3.902×10^{-3}	5.168×10^{-3}	7.335×10^{-3}	2.945×10^{-2}	4.679×10^{-2}	7.099×10^{-2}	0.125	0.344
fitted radiance shift [nm]	-8.444×10^{-3}	-4.397×10^{-3}	-2.963×10^{-3}	-2.100×10^{-3}	-1.317×10^{-3}	6.436×10^{-4}	1.406×10^{-3}	2.344×10^{-3}	3.932×10^{-3}	8.277×10^{-3}
fitted radiance squeeze [1]	-5.398×10^{-4}	-3.147×10^{-4}	-2.295×10^{-4}	-1.730×10^{-4}	-1.150×10^{-4}	9.699×10^{-5}	1.506×10^{-4}	2.007×10^{-4}	2.732×10^{-4}	4.444×10^{-4}
fitted root mean square [1]	6.030×10^{-4}	7.462×10^{-4}	8.240×10^{-4}	8.842×10^{-4}	9.595×10^{-4}	1.550×10^{-3}	1.792×10^{-3}	2.034×10^{-3}	2.414×10^{-3}	3.390×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.122	0.295	0.405	0.496	0.599	1.13	1.32	1.50	1.73	2.11
sulfurdioxide total air mass factor polluted precision [1]	1.217×10^{-2}	2.122×10^{-2}	2.762×10^{-2}	3.286×10^{-2}	3.983×10^{-2}	0.138	0.174	0.209	0.268	0.448
sulfurdioxide clear air mass factor polluted [1]	0.248	0.359	0.431	0.495	0.571	0.903	0.985	1.07	1.21	1.80
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]	0.682 ± 0.403	9563625	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.299 \pm 84.869) \times 10^{-2}$	9563625	0.431	9.450×10^{-3}	-483	79.6	-0.204	0.228
sulfurdioxide total vertical column precision [DU]	0.477 ± 0.632	9563625	0.307	0.307	4.458×10^{-2}	213	0.212	0.518
sulfurdioxide slant column density corrected [DU]	$(1.500 \pm 32.983) \times 10^{-2}$	9563625	0.355	8.336×10^{-3}	-24.2	48.7	-0.168	0.188
sulfurdioxide slant column density cobra [DU]	$(1.497 \pm 32.753) \times 10^{-2}$	9563625	0.355	8.336×10^{-3}	-24.2	35.0	-0.168	0.188
sulfurdioxide slant column density cobra precision [DU]	0.280 ± 0.111	9563625	0.122	0.249	8.652×10^{-2}	20.7	0.205	0.328
sulfurdioxide slant column density window1 [DU]	0.134 ± 0.628	9563625	0.715	0.136	-10.5	27.8	-0.224	0.491
sulfurdioxide slant column density window1 precision [DU]	0.280 ± 0.111	9563625	0.122	0.249	8.652×10^{-2}	20.7	0.205	0.328
sulfurdioxide slant column density corrected win1 [DU]	$(3.572 \pm 62.268) \times 10^{-2}$	9563625	0.707	2.157×10^{-2}	-10.5	27.6	-0.327	0.380
background so2 slant column offset window1 [DU]	$(-9.867 \pm 10.578) \times 10^{-2}$	9563625	0.128	-0.111	-0.592	2.19	-0.170	-4.146×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.368 ± 9.069	9563625	11.5	0.218	-482	334	-5.48	6.05
sulfurdioxide slant column density window2 precision [DU]	8.37 ± 2.33	9563625	2.81	8.00	2.21	329	6.78	9.58
sulfurdioxide slant column density corrected win2 [DU]	$(3.257 \pm 894.768) \times 10^{-2}$	9563625	11.4	6.519×10^{-2}	-482	334	-5.65	5.74
background so2 slant column offset window2 [DU]	-0.335 ± 1.939	9563625	2.54	0.220	-13.9	5.70	-1.49	1.04
sulfurdioxide slant column density window3 [DU]	-2.07 ± 25.42	9563625	31.6	-1.79	-892	1.386×10^3	-17.6	14.0
sulfurdioxide slant column density window3 precision [DU]	30.1 ± 14.7	9563625	11.6	26.1	9.99	2.123×10^3	21.8	33.4
sulfurdioxide slant column density corrected win3 [DU]	0.457 ± 24.698	9563625	31.0	0.619	-895	1.382×10^3	-14.8	16.1
background so2 slant column offset window3 [DU]	2.52 ± 6.17	9563625	10.6	1.97	-21.0	26.6	-2.85	7.78
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	9563625	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.144 \pm 7.654) \times 10^{-2}$	9563625	3.300×10^{-2}	1.830×10^{-2}	2.565×10^{-4}	2.82	9.178×10^{-3}	4.218×10^{-2}
fitted radiance shift [nm]	$(-1.277 \pm 2903.637) \times 10^{-6}$	9563625	1.881×10^{-3}	-4.584×10^{-5}	-5.894×10^{-2}	0.106	-9.597×10^{-4}	9.214×10^{-4}
fitted radiance squeeze [1]	$(-1.842 \pm 16.678) \times 10^{-5}$	9563625	1.996×10^{-4}	-1.417×10^{-5}	-1.124×10^{-2}	2.103×10^{-2}	-1.159×10^{-4}	8.373×10^{-5}
fitted root mean square [1]	$(1.242 \pm 0.463) \times 10^{-3}$	9563625	5.175×10^{-4}	1.120×10^{-3}	3.349×10^{-4}	4.253×10^{-2}	9.288×10^{-4}	1.446×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.886 ± 0.452	9563625	0.544	0.830	5.000×10^{-2}	2.87	0.569	1.11
sulfurdioxide total air mass factor polluted precision [1]	0.106 ± 0.101	9563625	0.104	6.924×10^{-2}	3.824×10^{-3}	1.80	3.951×10^{-2}	0.143
sulfurdioxide clear air mass factor polluted [1]	0.770 ± 0.321	9563625	0.389	0.750	7.447×10^{-2}	2.87	0.549	0.938
number of spectral points in retrieval [1]	73.5 ± 0.5	9563625	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]	0.707 ± 0.385	7614443	0.690	1.000	0.0	1.000	0.310	1.000
sulfurdioxide total vertical column [DU]	$(3.985 \pm 83.330) \times 10^{-2}$	7614443	0.477	1.290×10^{-2}	-53.7	413	-0.221	0.256
sulfurdioxide total vertical column precision [DU]	0.484 ± 0.477	7614443	0.311	0.343	4.573×10^{-2}	90.0	0.241	0.553
sulfurdioxide slant column density corrected [DU]	$(2.675 \pm 51.769) \times 10^{-2}$	7614443	0.412	1.184×10^{-2}	-27.9	569	-0.191	0.220
sulfurdioxide slant column density cobra [DU]	$(2.637 \pm 43.133) \times 10^{-2}$	7614443	0.412	1.184×10^{-2}	-27.9	52.5	-0.191	0.220
sulfurdioxide slant column density cobra precision [DU]	0.337 ± 0.165	7614443	0.175	0.295	7.411×10^{-2}	31.5	0.224	0.399
sulfurdioxide slant column density window1 [DU]	0.118 ± 0.791	7614443	0.813	0.126	-112	92.5	-0.284	0.529
sulfurdioxide slant column density window1 precision [DU]	0.337 ± 0.165	7614443	0.175	0.295	7.411×10^{-2}	31.5	0.224	0.399
sulfurdioxide slant column density corrected win1 [DU]	$(6.226 \pm 79.071) \times 10^{-2}$	7614443	0.806	3.317×10^{-2}	-112	93.3	-0.361	0.444
background so2 slant column offset window1 [DU]	$(-5.592 \pm 16.907) \times 10^{-2}$	7614443	0.153	-8.995×10^{-2}	-1.38	3.93	-0.157	-4.403×10^{-3}
sulfurdioxide slant column density window2 [DU]	1.54 ± 9.95	7614443	12.4	1.23	-1.626×10^3	936	-4.85	7.60
sulfurdioxide slant column density window2 precision [DU]	8.70 ± 2.45	7614443	2.75	8.34	2.33	615	7.13	9.88
sulfurdioxide slant column density corrected win2 [DU]	$(-3.211 \pm 959.306) \times 10^{-2}$	7614443	12.0	-3.321×10^{-2}	-1.629×10^3	937	-6.03	5.95
background so2 slant column offset window2 [DU]	-1.58 ± 2.88	7614443	4.73	-0.886	-16.2	5.76	-3.83	0.898
sulfurdioxide slant column density window3 [DU]	-3.54 ± 24.95	7614443	31.7	-3.23	-563	361	-19.2	12.5
sulfurdioxide slant column density window3 precision [DU]	29.9 ± 13.0	7614443	9.82	26.5	9.97	263	22.7	32.5
sulfurdioxide slant column density corrected win3 [DU]	0.828 ± 24.502	7614443	31.1	0.984	-565	359	-14.6	16.5
background so2 slant column offset window3 [DU]	4.37 ± 5.49	7614443	8.41	3.72	-23.3	35.9	-4.007×10^{-2}	8.37
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	7614443	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.262 \pm 5.220) \times 10^{-2}$	7614443	1.257×10^{-2}	1.101×10^{-2}	8.428×10^{-4}	1.81	6.425×10^{-3}	1.900×10^{-2}
fitted radiance shift [nm]	$(-6.639 \pm 25.192) \times 10^{-4}$	7614443	1.946×10^{-3}	-5.960×10^{-4}	-4.322×10^{-2}	4.199×10^{-2}	-1.685×10^{-3}	2.616×10^{-4}
fitted radiance squeeze [1]	$(-5.767 \pm 212.638) \times 10^{-6}$	7614443	2.287×10^{-4}	2.458×10^{-6}	-1.525×10^{-2}	2.502×10^{-2}	-1.136×10^{-4}	1.151×10^{-4}
fitted root mean square [1]	$(1.445 \pm 0.665) \times 10^{-3}$	7614443	6.852×10^{-4}	1.253×10^{-3}	3.263×10^{-4}	5.075×10^{-2}	1.006×10^{-3}	1.691×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.907 ± 0.394	7614443	0.516	0.827	5.000×10^{-2}	2.77	0.626	1.14
sulfurdioxide total air mass factor polluted precision [1]	$(9.694 \pm 7.598) \times 10^{-2}$	7614443	9.319×10^{-2}	7.240×10^{-2}	5.099×10^{-3}	1.48	4.011×10^{-2}	0.133
sulfurdioxide clear air mass factor polluted [1]	0.742 ± 0.239	7614443	0.273	0.723	8.685×10^{-2}	2.49	0.590	0.863
number of spectral points in retrieval [1]	73.4 ± 0.5	7614443	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]	0.705 ± 0.387	11629743	0.690	1.000	0.0	1.000	0.310	1.000
sulfurdioxide total vertical column [DU]	$(3.107 \pm 77.535) \times 10^{-2}$	11629743	0.435	1.072×10^{-2}	-53.7	413	-0.204	0.231
sulfurdioxide total vertical column precision [DU]	0.452 ± 0.503	11629743	0.280	0.307	4.724×10^{-2}	90.0	0.220	0.500
sulfurdioxide slant column density corrected [DU]	$(2.117 \pm 42.767) \times 10^{-2}$	11629743	0.376	9.755×10^{-3}	-18.8	569	-0.176	0.200
sulfurdioxide slant column density cobra [DU]	$(2.098 \pm 38.627) \times 10^{-2}$	11629743	0.376	9.755×10^{-3}	-18.8	37.6	-0.176	0.200
sulfurdioxide slant column density cobra precision [DU]	0.308 ± 0.151	11629743	0.159	0.259	7.411×10^{-2}	31.5	0.208	0.367
sulfurdioxide slant column density window1 [DU]	0.130 ± 0.720	11629743	0.753	0.137	-67.6	92.5	-0.242	0.510
sulfurdioxide slant column density window1 precision [DU]	0.308 ± 0.151	11629743	0.159	0.259	7.411×10^{-2}	31.5	0.208	0.367
sulfurdioxide slant column density corrected win1 [DU]	$(5.502 \pm 71.746) \times 10^{-2}$	11629743	0.745	3.148×10^{-2}	-67.6	93.3	-0.335	0.411
background so2 slant column offset window1 [DU]	$(-7.452 \pm 15.243) \times 10^{-2}$	11629743	0.143	-0.102	-1.38	3.93	-0.166	-2.342×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.05 ± 9.40	11629743	11.9	0.744	-1.626×10^3	690	-5.05	6.80
sulfurdioxide slant column density window2 precision [DU]	8.37 ± 2.27	11629743	2.71	8.01	2.21	471	6.83	9.54
sulfurdioxide slant column density corrected win2 [DU]	$(2.879 \pm 908.756) \times 10^{-2}$	11629743	11.5	3.560×10^{-2}	-1.629×10^3	690	-5.72	5.78
background so2 slant column offset window2 [DU]	-1.02 ± 2.67	11629743	3.82	-7.236×10^{-2}	-16.2	5.76	-2.79	1.02
sulfurdioxide slant column density window3 [DU]	-0.210 ± 24.832	11629743	31.4	-0.131	-496	349	-15.8	15.7
sulfurdioxide slant column density window3 precision [DU]	28.8 ± 12.5	11629743	9.88	25.5	9.97	240	21.8	31.6
sulfurdioxide slant column density corrected win3 [DU]	3.01 ± 23.88	11629743	30.4	2.89	-500	359	-12.1	18.2
background so2 slant column offset window3 [DU]	3.22 ± 6.01	11629743	9.61	2.53	-23.3	35.9	-1.69	7.92
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	11629743	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.957 \pm 3.510) \times 10^{-2}$	11629743	1.339×10^{-2}	1.241×10^{-2}	3.933×10^{-4}	2.79	7.065×10^{-3}	2.045×10^{-2}
fitted radiance shift [nm]	$(-3.835 \pm 25.170) \times 10^{-4}$	11629743	1.961×10^{-3}	-3.320×10^{-4}	-4.322×10^{-2}	0.106	-1.409×10^{-3}	5.521×10^{-4}
fitted radiance squeeze [1]	$(-8.608 \pm 192.765) \times 10^{-6}$	11629743	2.107×10^{-4}	-1.754×10^{-6}	-1.525×10^{-2}	2.502×10^{-2}	-1.088×10^{-4}	1.019×10^{-4}
fitted root mean square [1]	$(1.342 \pm 0.613) \times 10^{-3}$	11629743	6.353×10^{-4}	1.148×10^{-3}	3.263×10^{-4}	4.616×10^{-2}	9.421×10^{-4}	1.577×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.907 ± 0.388	11629743	0.476	0.855	5.000×10^{-2}	2.58	0.644	1.12
sulfurdioxide total air mass factor polluted precision [1]	$(9.617 \pm 7.788) \times 10^{-2}$	11629743	8.648×10^{-2}	7.013×10^{-2}	3.857×10^{-3}	1.80	4.247×10^{-2}	0.129
sulfurdioxide clear air mass factor polluted [1]	0.772 ± 0.245	11629743	0.300	0.764	7.447×10^{-2}	2.50	0.611	0.911
number of spectral points in retrieval [1]	73.4 ± 0.5	11629743	1.000	73.0	71.0	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]	0.704 ± 0.402	3943582	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(2.652 \pm 88.735) \times 10^{-2}$	3943582	0.474	1.029×10^{-2}	-49.4	381	-0.223	0.252
sulfurdioxide total vertical column precision [DU]	0.509 ± 0.608	3943582	0.336	0.358	4.573×10^{-2}	154	0.234	0.571
sulfurdioxide slant column density corrected [DU]	$(1.723 \pm 42.503) \times 10^{-2}$	3943582	0.370	8.899×10^{-3}	-27.9	329	-0.175	0.196
sulfurdioxide slant column density cobra [DU]	$(1.697 \pm 34.480) \times 10^{-2}$	3943582	0.370	8.899×10^{-3}	-27.9	52.5	-0.175	0.196
sulfurdioxide slant column density cobra precision [DU]	0.288 ± 0.110	3943582	0.107	0.263	8.718×10^{-2}	17.4	0.219	0.326
sulfurdioxide slant column density window1 [DU]	0.135 ± 0.651	3943582	0.734	0.131	-112	70.1	-0.237	0.497
sulfurdioxide slant column density window1 precision [DU]	0.288 ± 0.110	3943582	0.107	0.263	8.718×10^{-2}	17.4	0.219	0.326
sulfurdioxide slant column density corrected win1 [DU]	$(3.031 \pm 64.585) \times 10^{-2}$	3943582	0.726	1.469×10^{-2}	-112	70.0	-0.344	0.383
background so2 slant column offset window1 [DU]	-0.105 ± 0.101	3943582	0.118	-0.114	-0.922	2.19	-0.171	-5.289×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.237 ± 9.556	3943582	11.9	0.152	-1.333×10^3	936	-5.78	6.17
sulfurdioxide slant column density window2 precision [DU]	8.71 ± 2.65	3943582	2.76	8.35	2.33	615	7.11	9.88
sulfurdioxide slant column density corrected win2 [DU]	$(-8.988 \pm 9461.721) \times 10^{-3}$	3943582	11.8	3.004×10^{-2}	-1.332×10^3	937	-5.89	5.91
background so2 slant column offset window2 [DU]	-0.246 ± 1.853	3943582	2.32	0.231	-16.2	5.76	-1.28	1.04
sulfurdioxide slant column density window3 [DU]	-7.92 ± 25.04	3943582	31.3	-7.20	-784	652	-23.2	8.08
sulfurdioxide slant column density window3 precision [DU]	32.6 ± 16.9	3943582	11.9	27.9	9.99	945	23.5	35.3
sulfurdioxide slant column density corrected win3 [DU]	-5.40 ± 25.17	3943582	31.6	-4.85	-786	652	-20.9	10.7
background so2 slant column offset window3 [DU]	2.51 ± 5.59	3943582	8.99	1.97	-21.0	25.7	-2.00	6.98
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.11	3943582	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.490 \pm 10.517) \times 10^{-2}$	3943582	6.428×10^{-2}	2.822×10^{-2}	2.565×10^{-4}	2.81	1.001×10^{-2}	7.429×10^{-2}
fitted radiance shift [nm]	$(-1.312 \pm 33.061) \times 10^{-4}$	3943582	1.881×10^{-3}	-2.168×10^{-4}	-5.870×10^{-2}	5.010×10^{-2}	-1.097×10^{-3}	7.839×10^{-4}
fitted radiance squeeze [1]	$(-1.864 \pm 17.388) \times 10^{-5}$	3943582	2.067×10^{-4}	-1.666×10^{-5}	-1.417×10^{-2}	1.431×10^{-2}	-1.210×10^{-4}	8.573×10^{-5}
fitted root mean square [1]	$(1.261 \pm 0.444) \times 10^{-3}$	3943582	4.431×10^{-4}	1.171×10^{-3}	3.401×10^{-4}	5.075×10^{-2}	9.830×10^{-4}	1.426×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.858 ± 0.480	3943582	0.573	0.742	5.000×10^{-2}	2.87	0.529	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.112 ± 0.113	3943582	0.128	6.455×10^{-2}	3.824×10^{-3}	1.49	3.336×10^{-2}	0.161
sulfurdioxide clear air mass factor polluted [1]	0.722 ± 0.342	3943582	0.350	0.669	8.685×10^{-2}	2.87	0.504	0.855
number of spectral points in retrieval [1]	73.4 ± 0.5	3943582	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

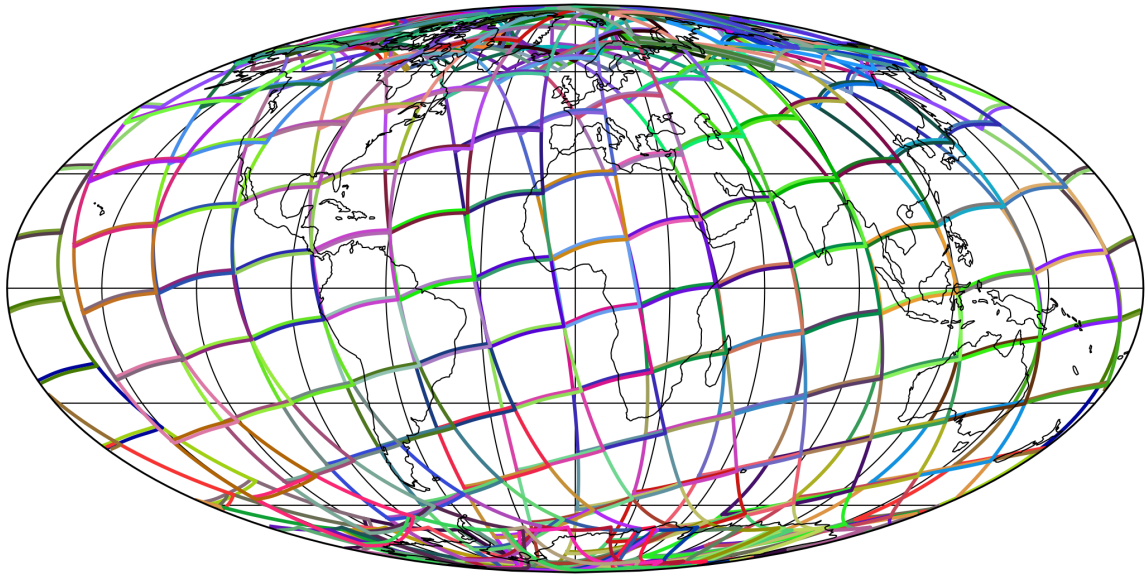


Figure 1: Outline of the granules.

4 Input data monitoring

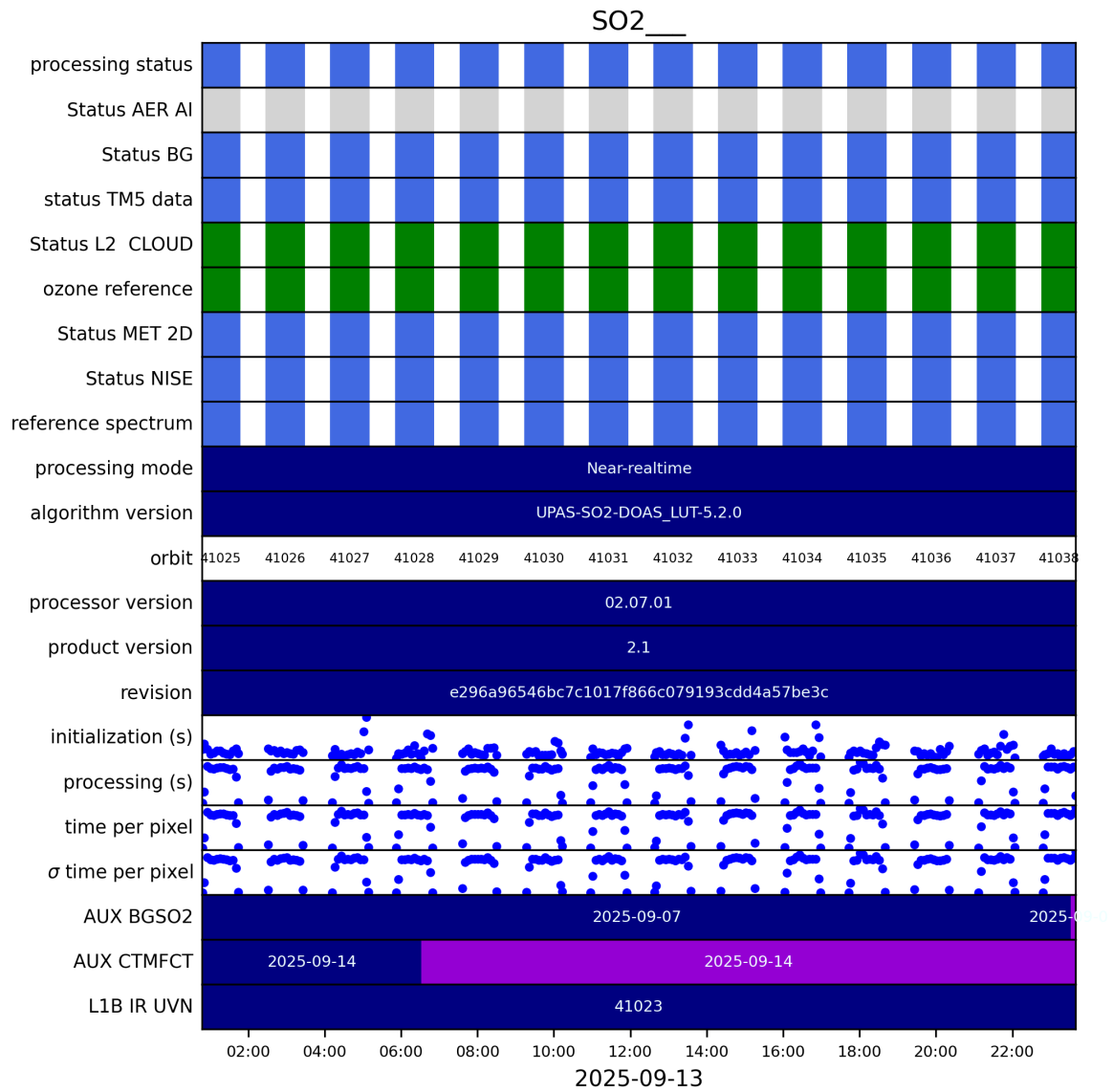


Figure 2: Input data per granule

5 Warnings and errors

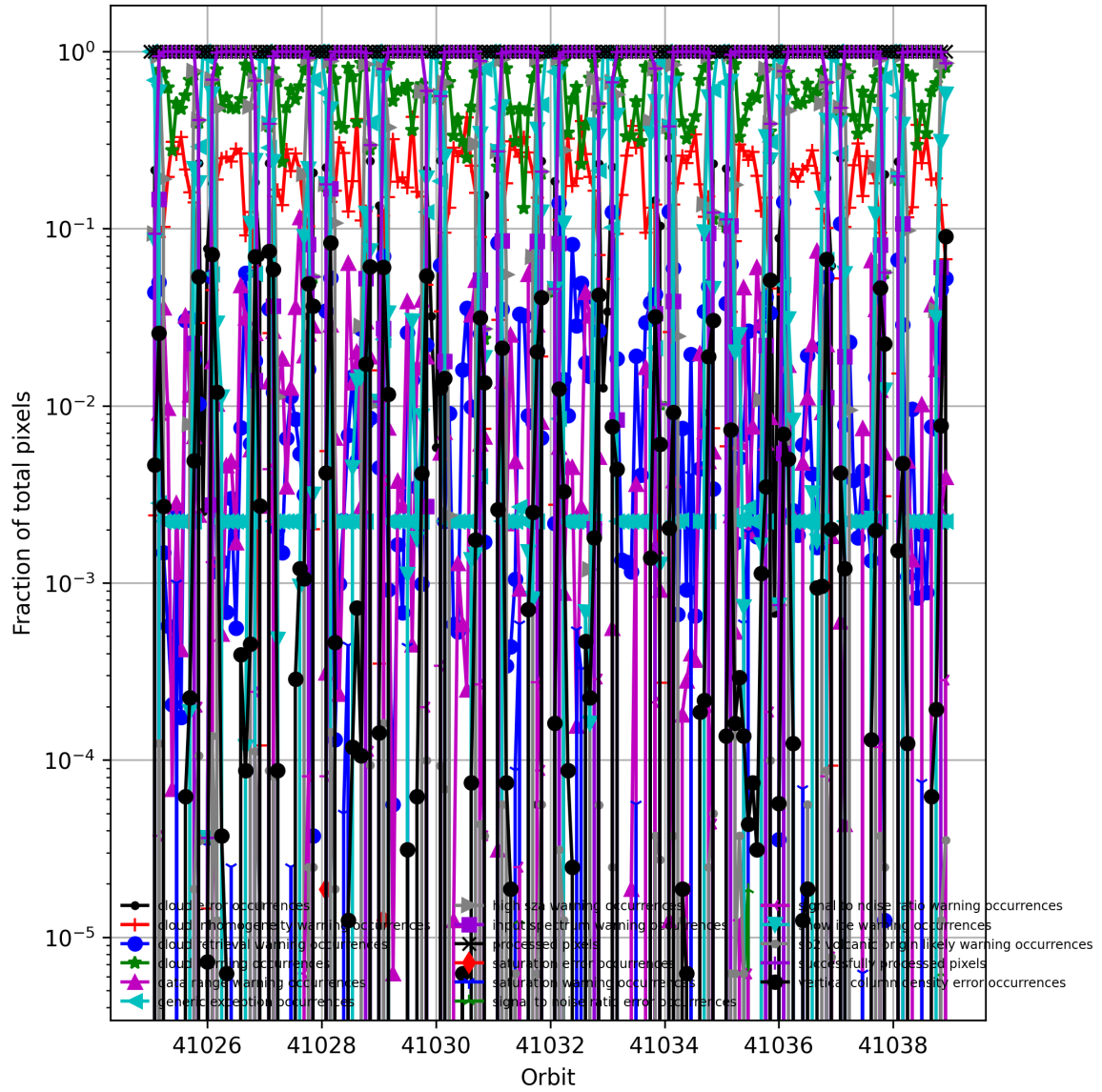


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

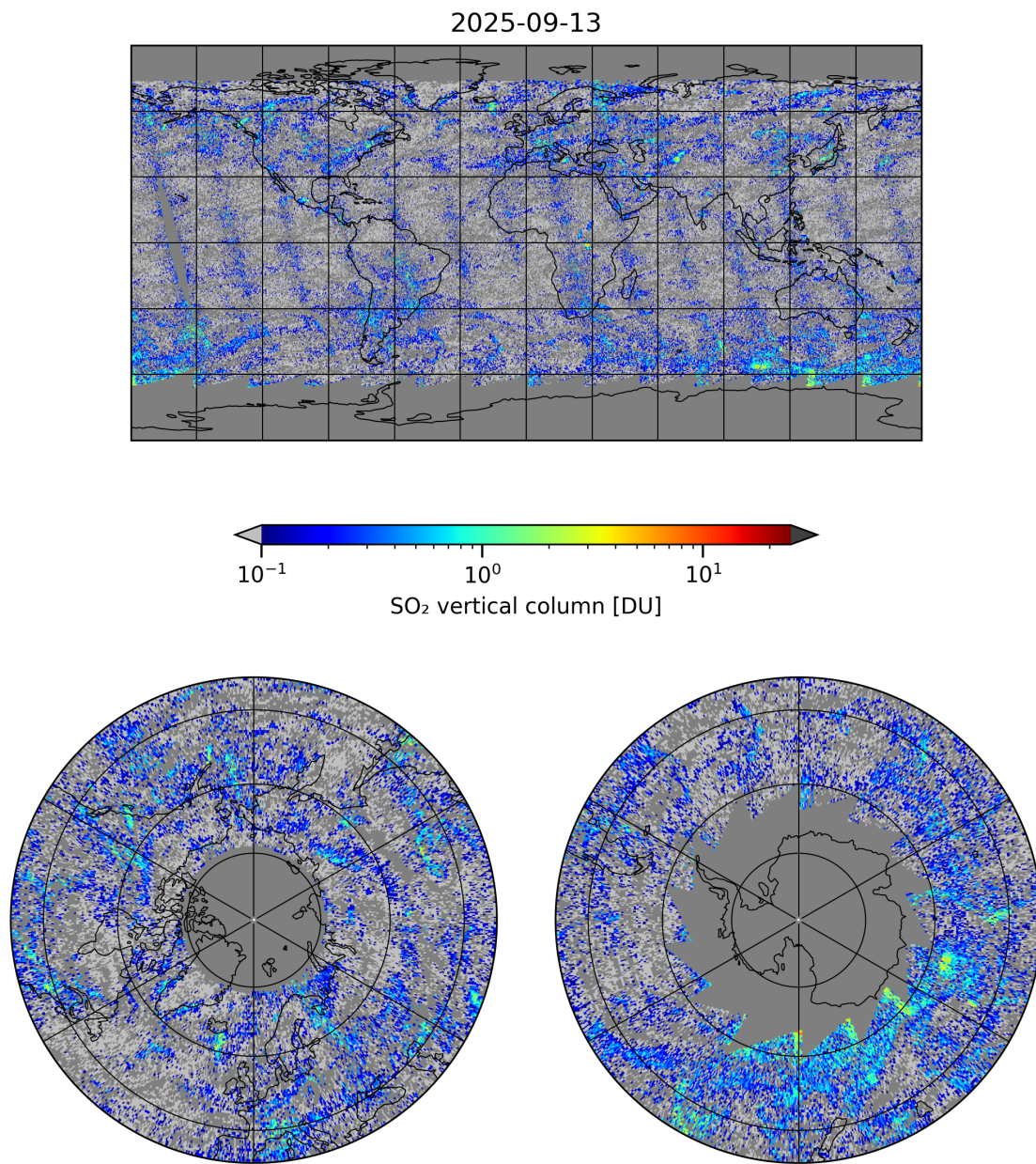


Figure 4: Map of “SO₂ vertical column” for 2025-09-13 to 2025-09-13

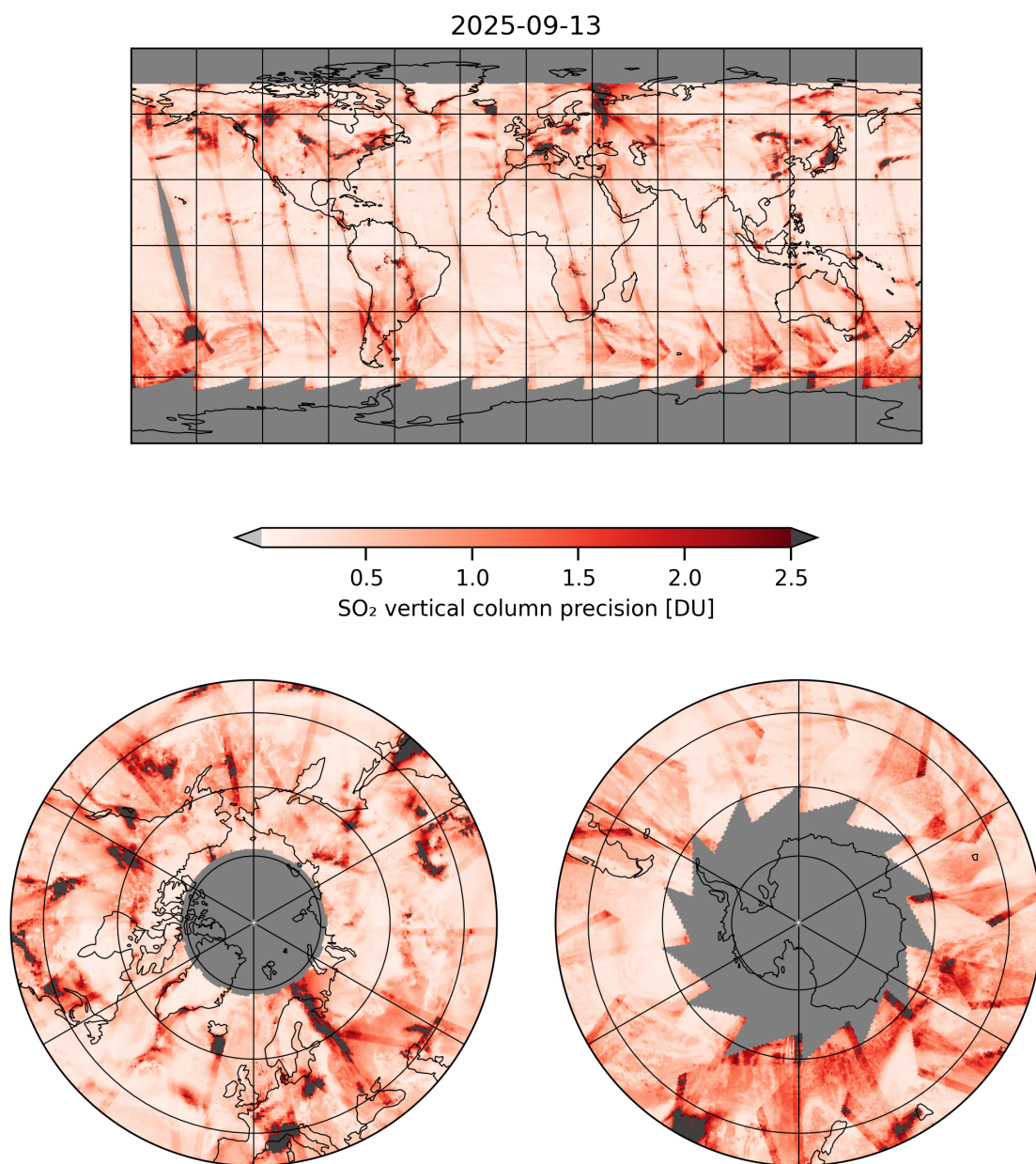


Figure 5: Map of “SO₂ vertical column precision” for 2025-09-13 to 2025-09-13

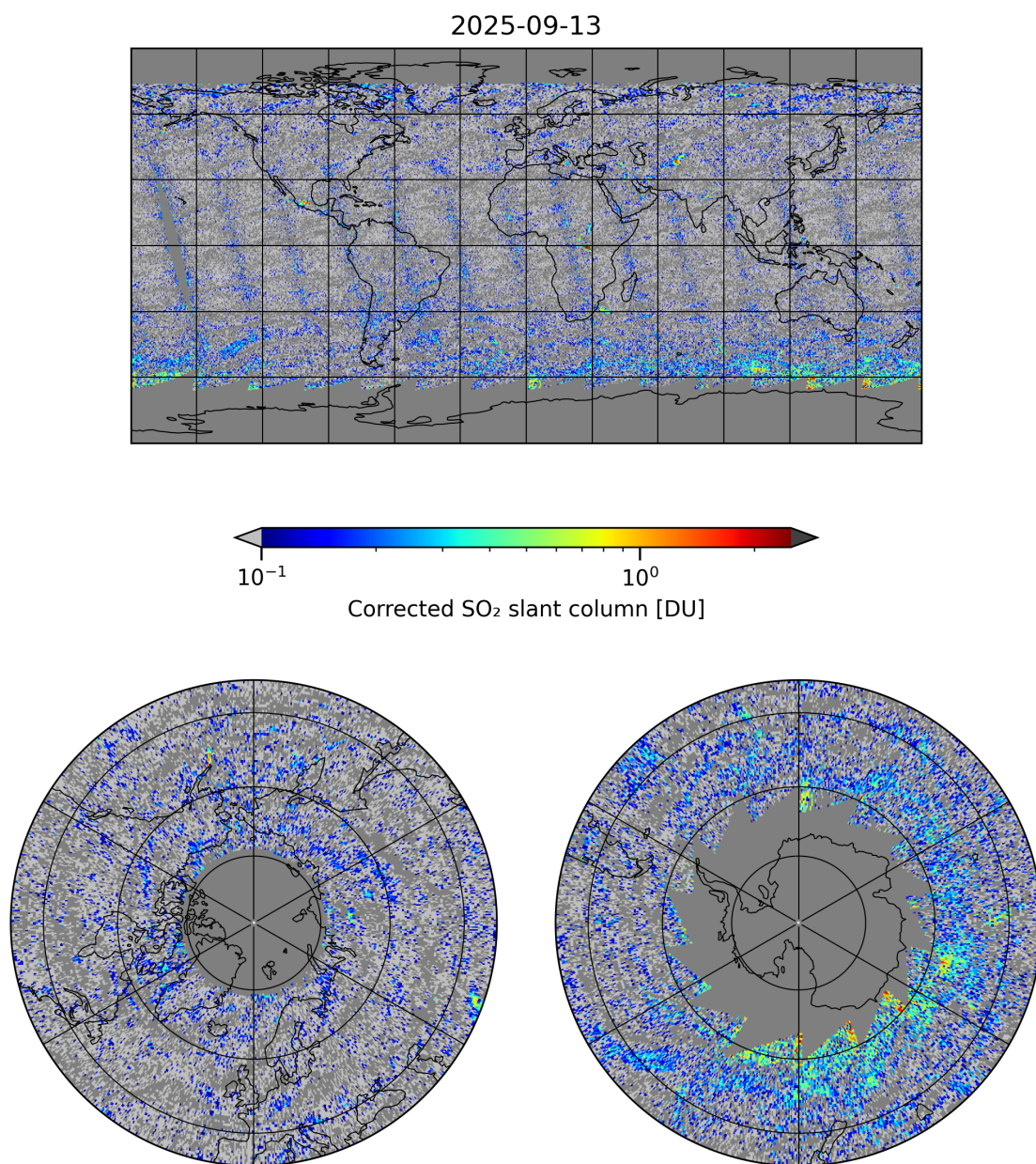


Figure 6: Map of “Corrected SO₂ slant column” for 2025-09-13 to 2025-09-13

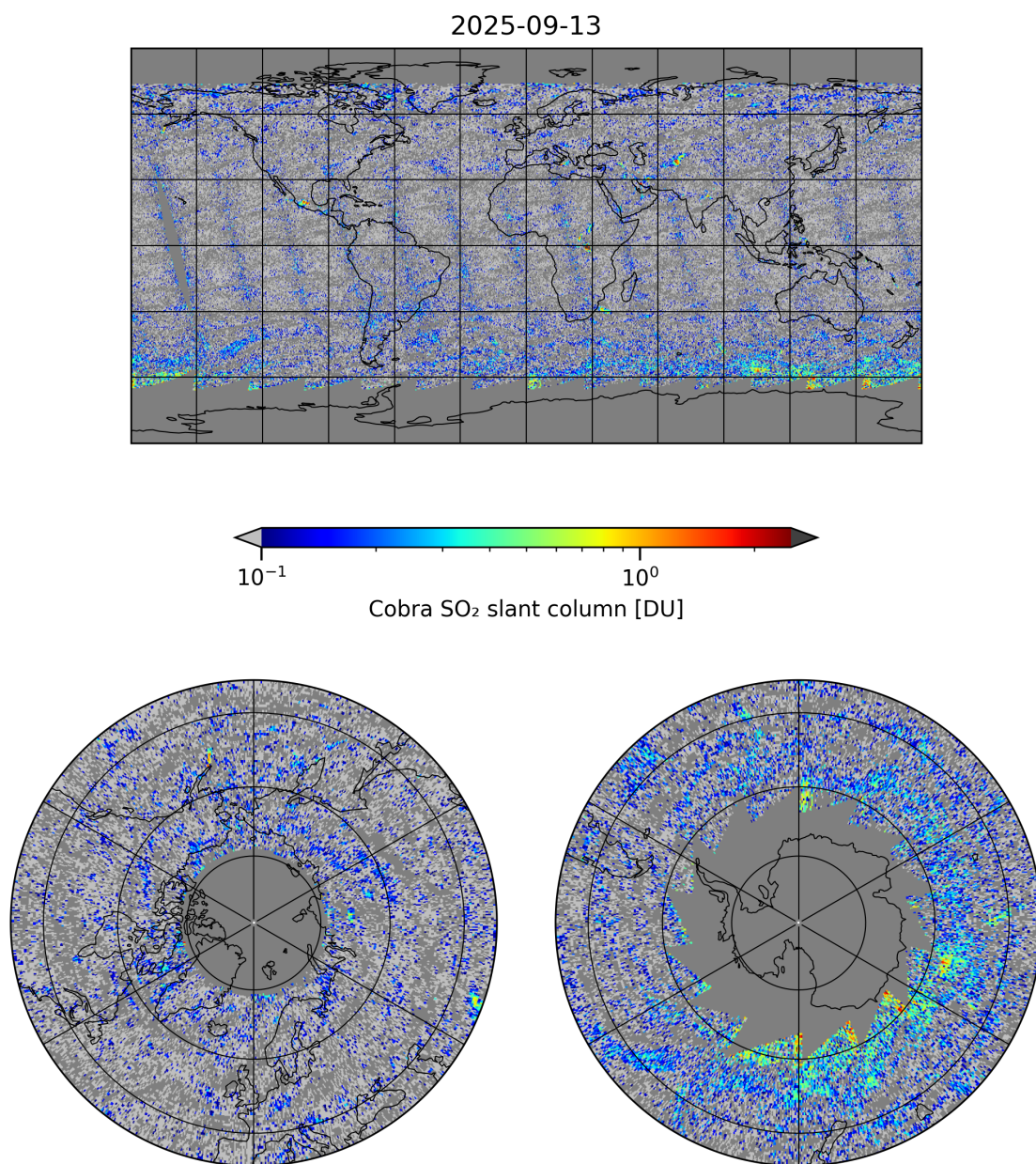


Figure 7: Map of “Cobra SO₂ slant column” for 2025-09-13 to 2025-09-13

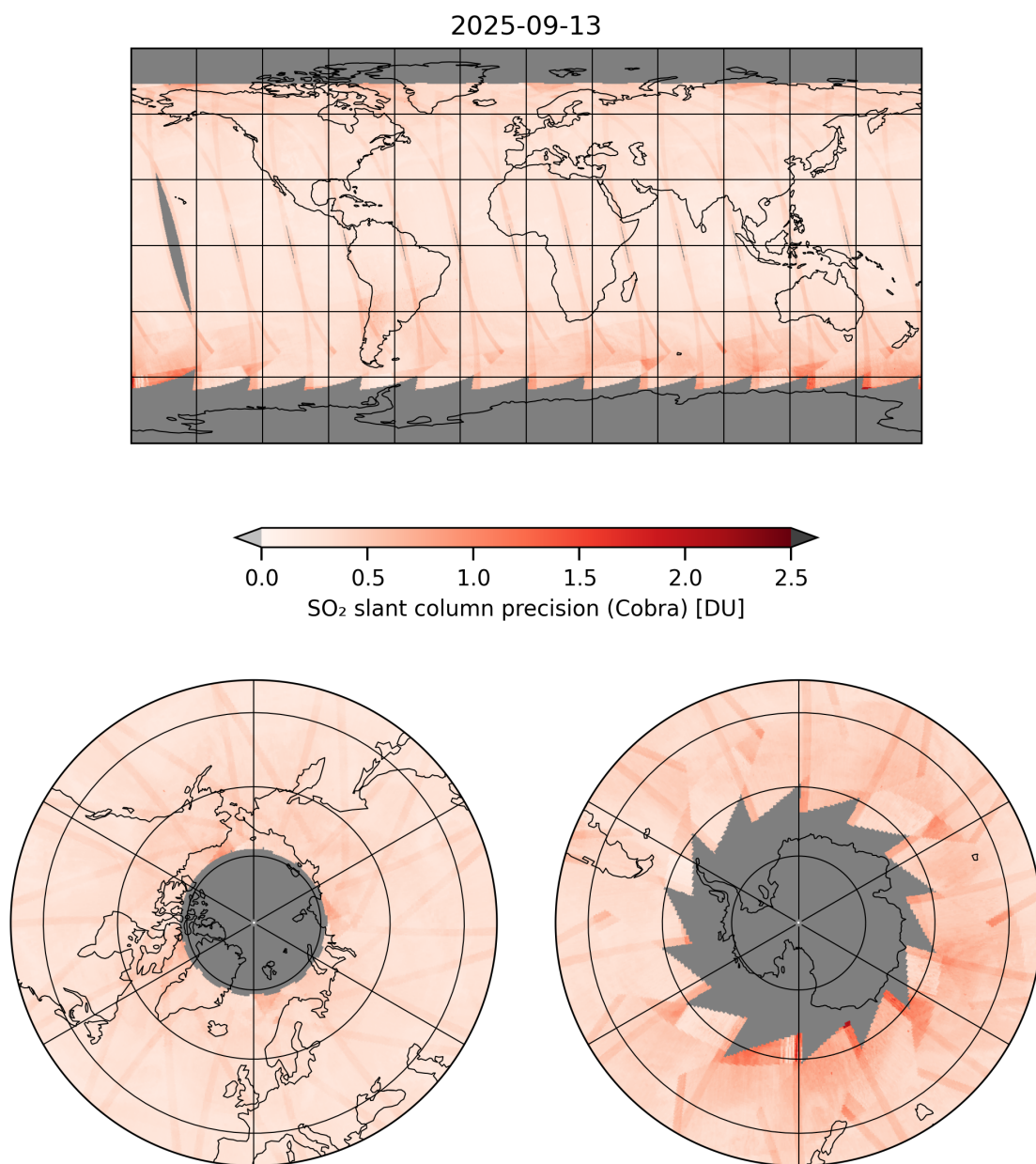


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-09-13 to 2025-09-13

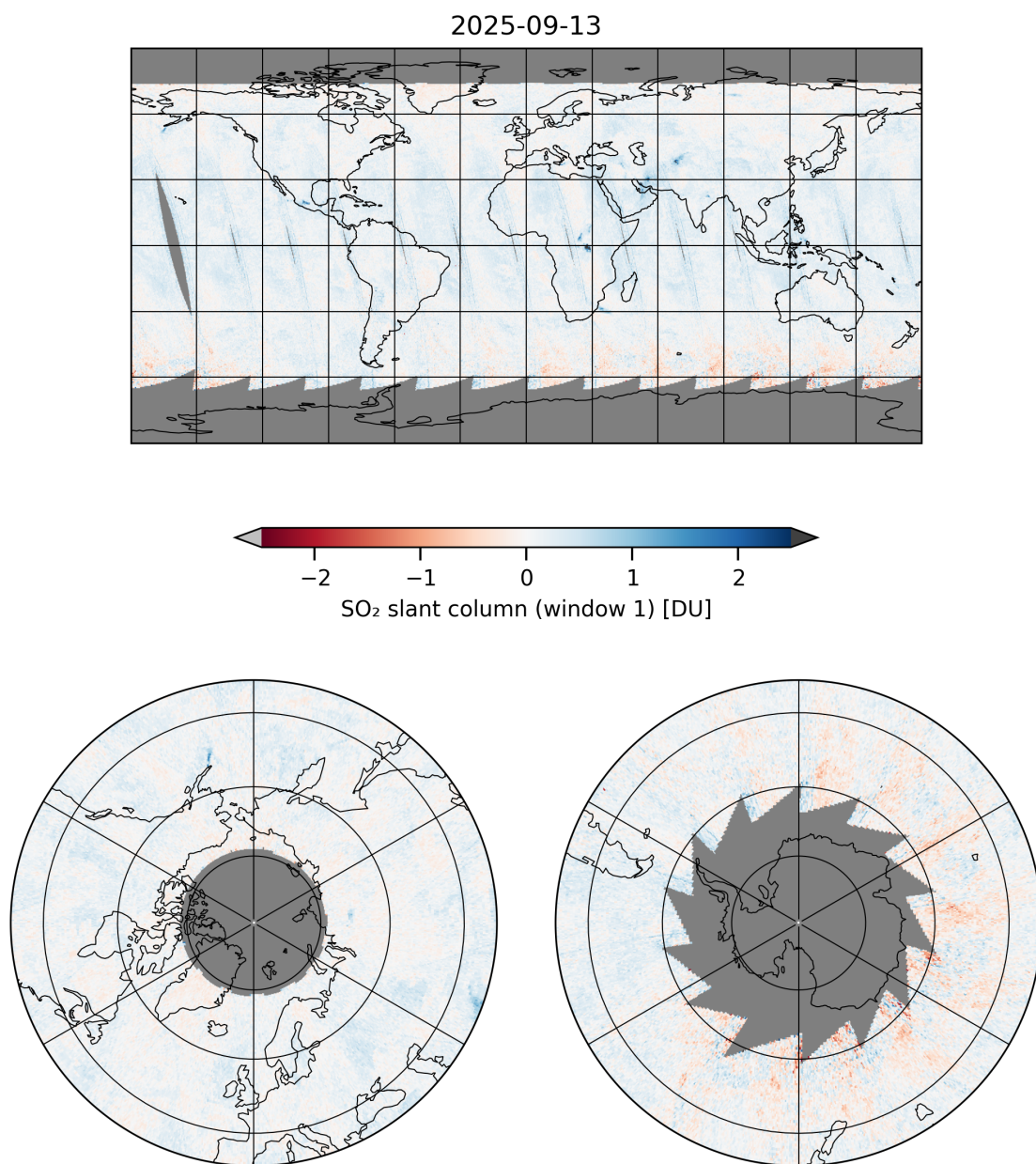


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-09-13 to 2025-09-13

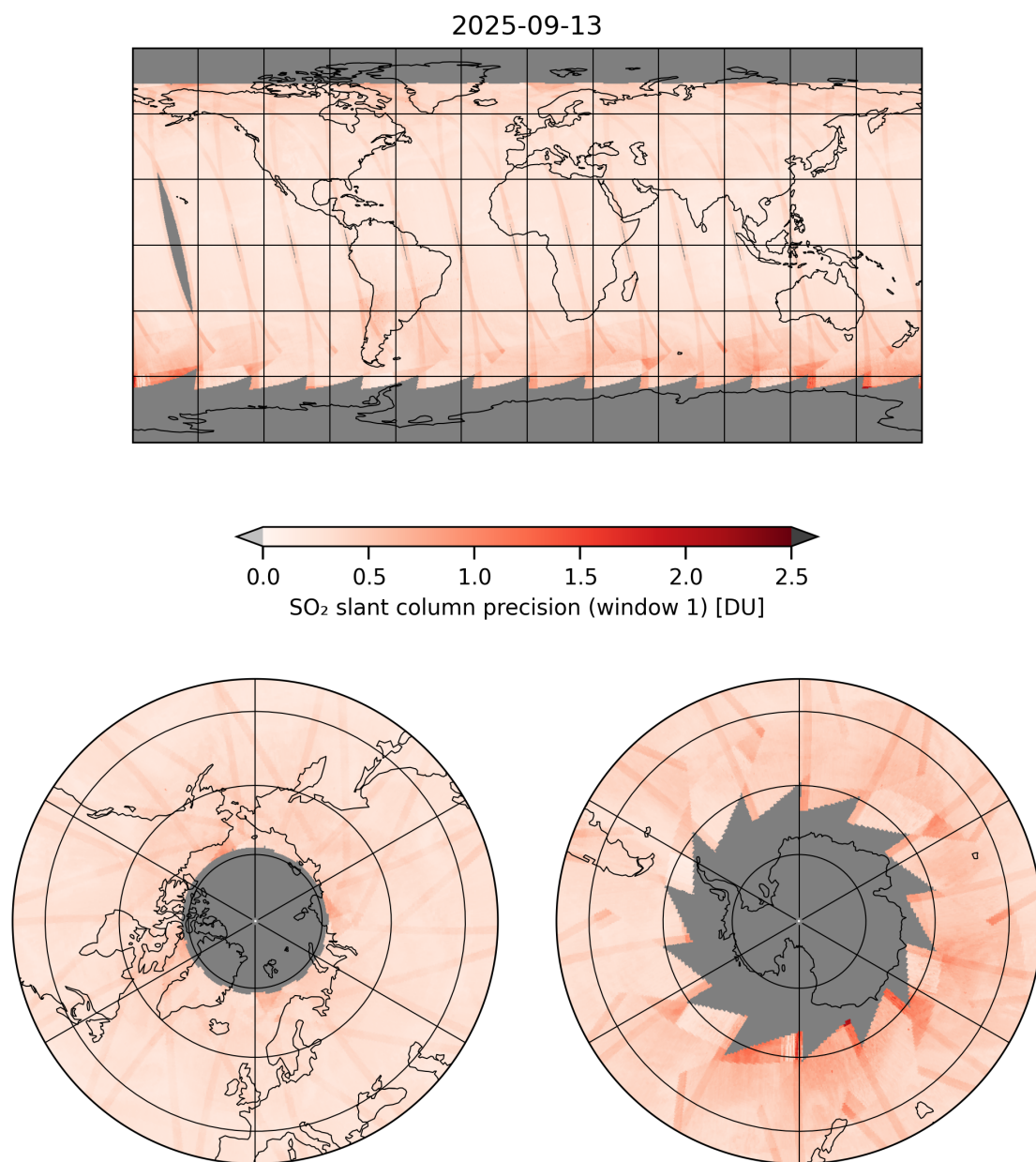


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-09-13 to 2025-09-13

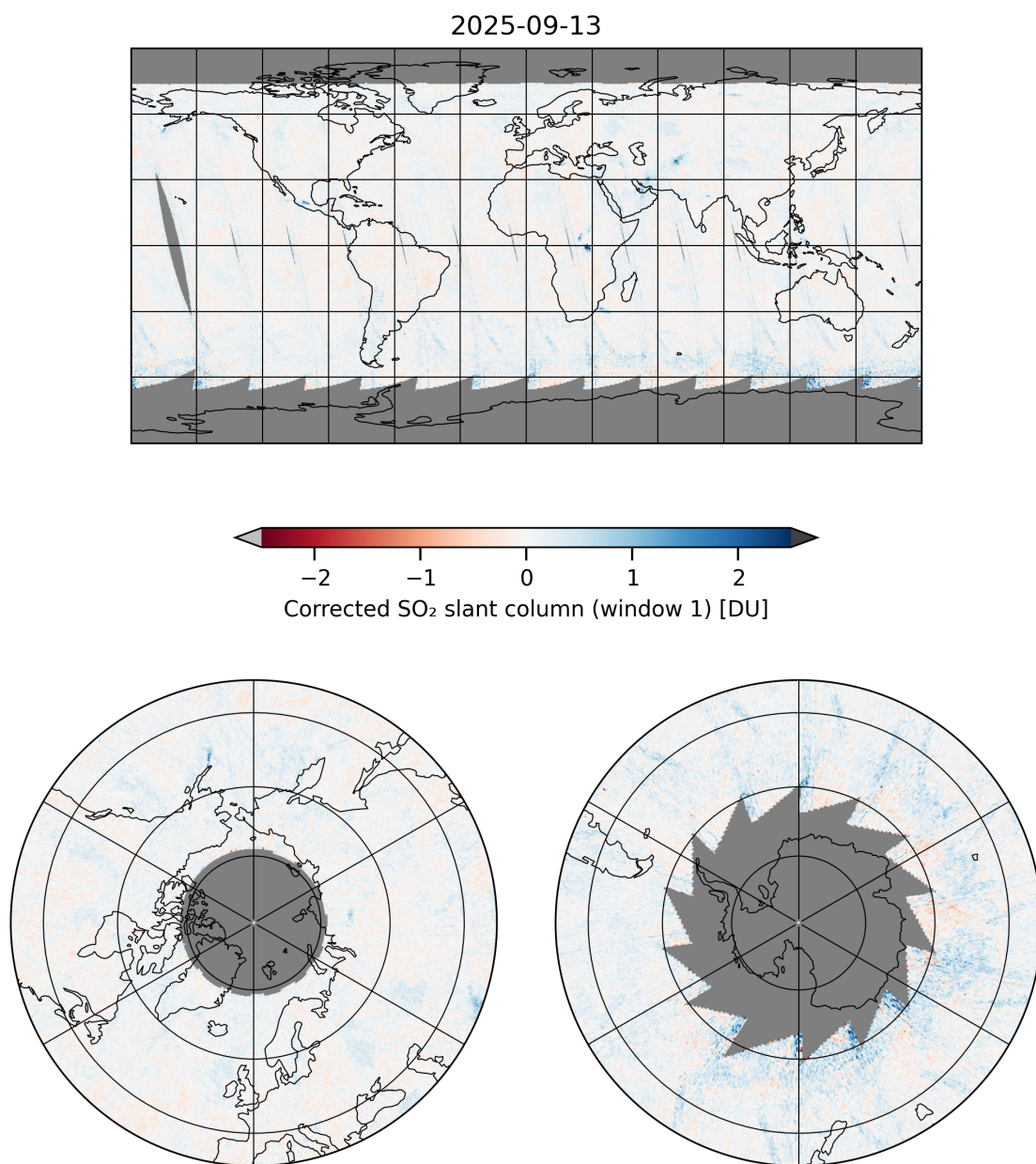


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-09-13 to 2025-09-13

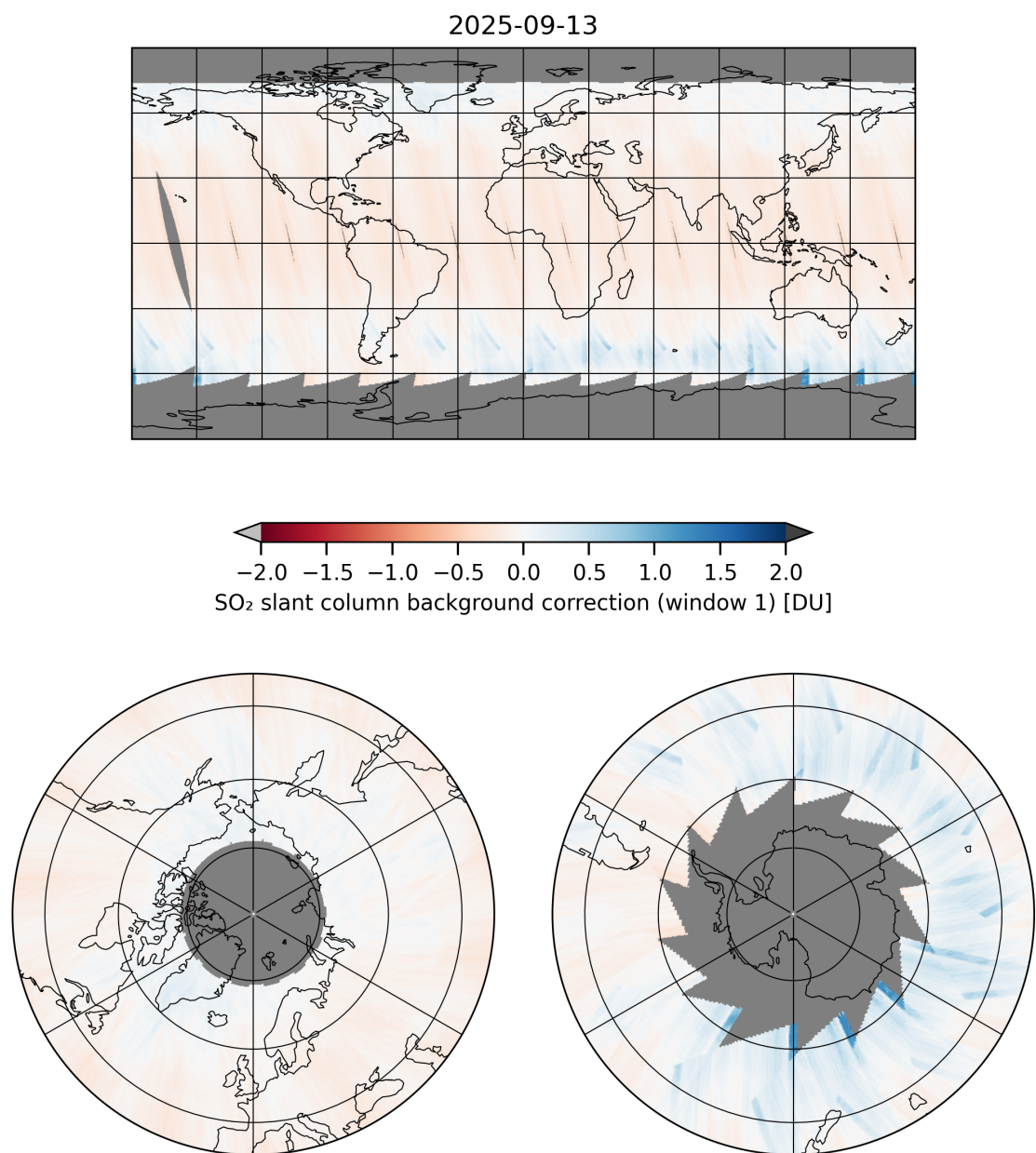


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-09-13 to 2025-09-13

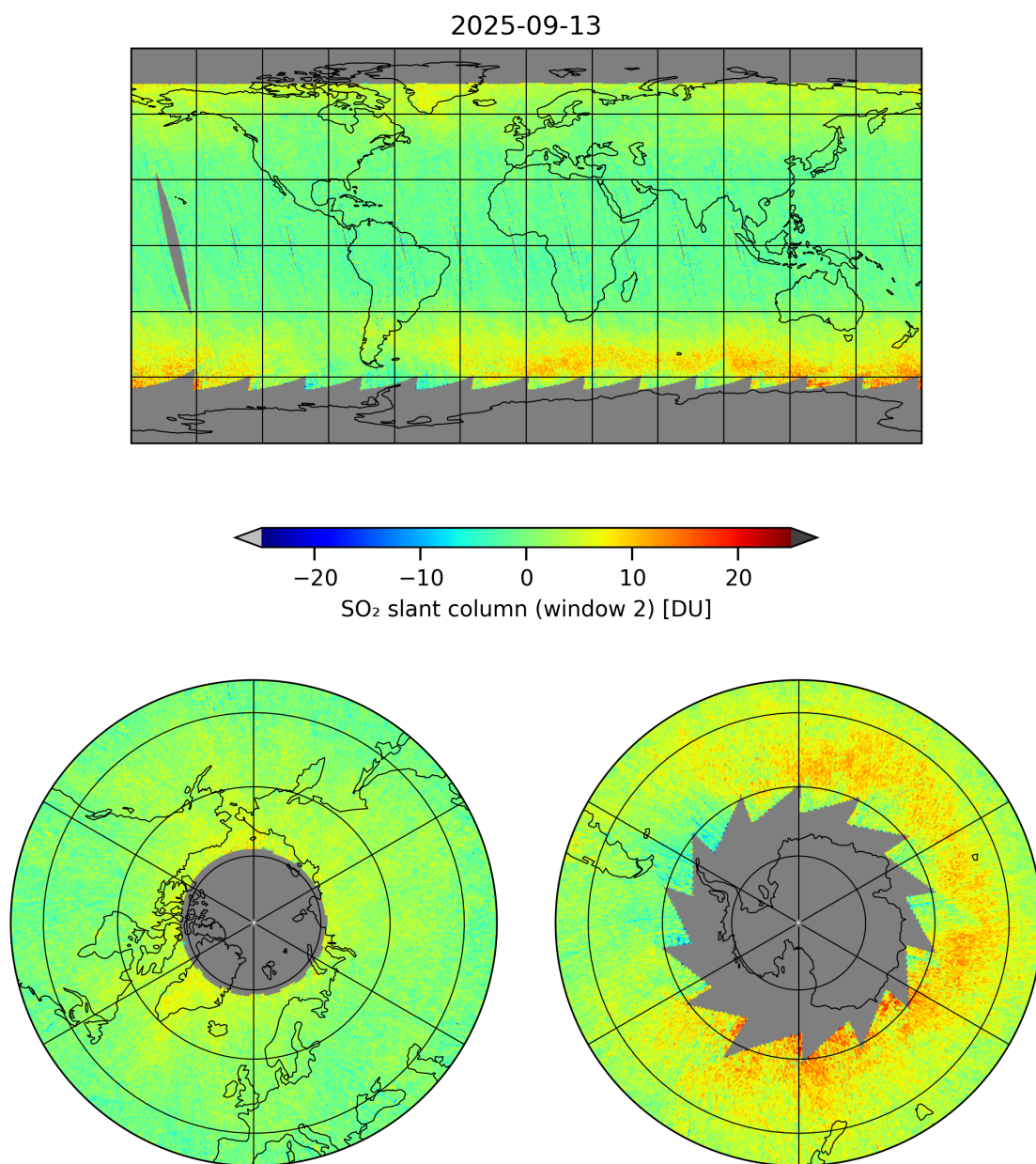


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-09-13 to 2025-09-13

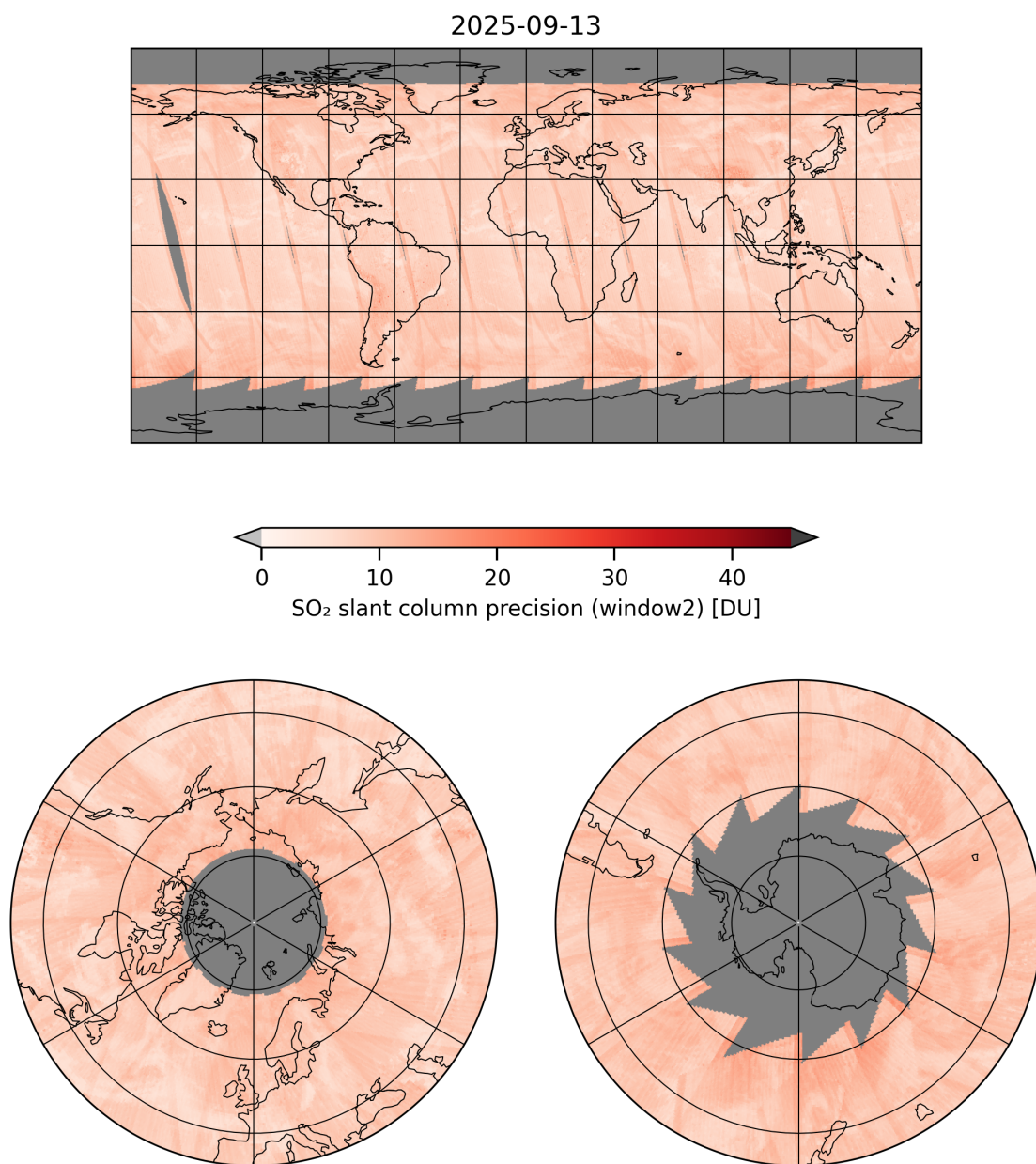


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-09-13 to 2025-09-13

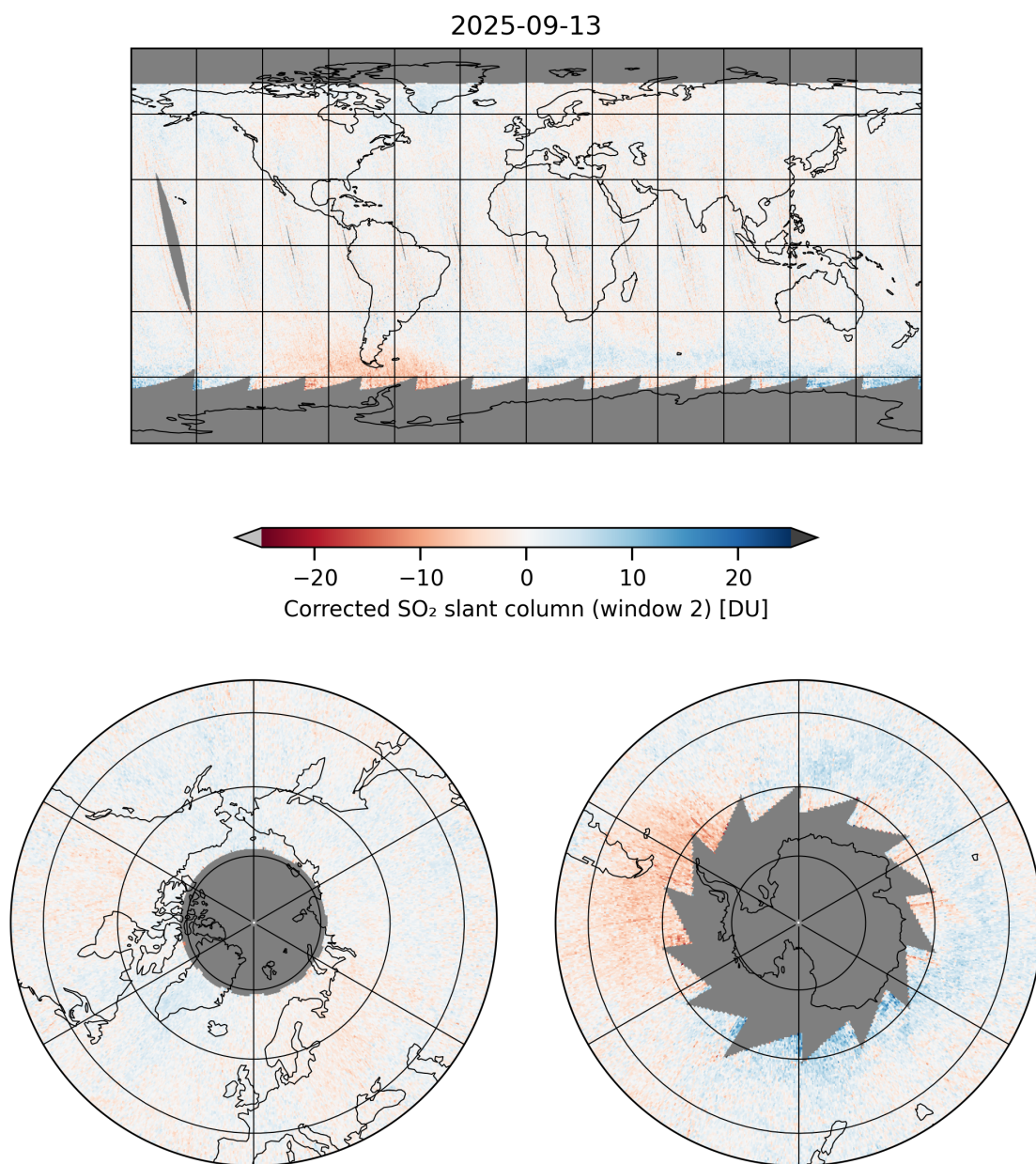


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-09-13 to 2025-09-13

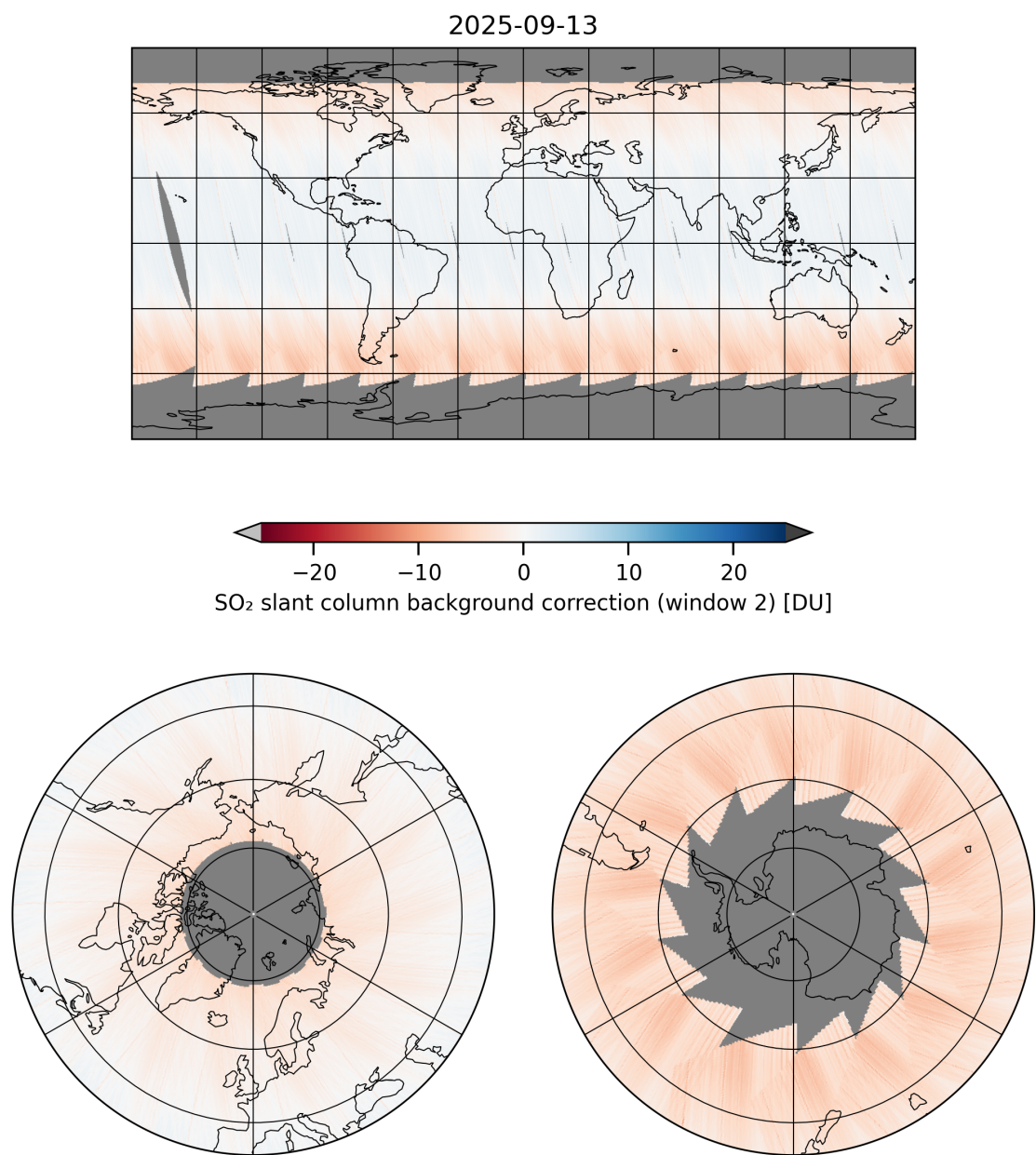


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-09-13 to 2025-09-13

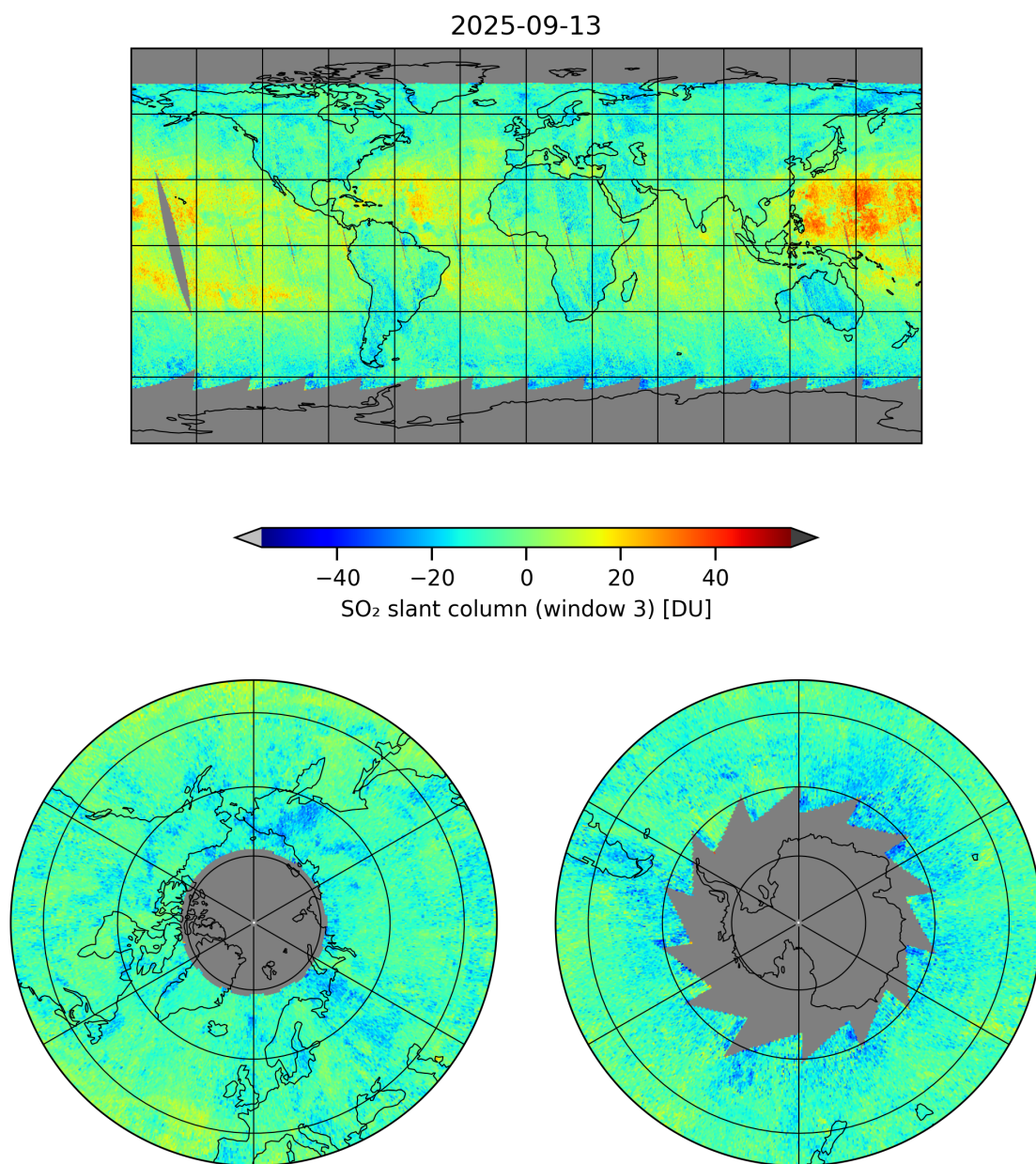


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-09-13 to 2025-09-13

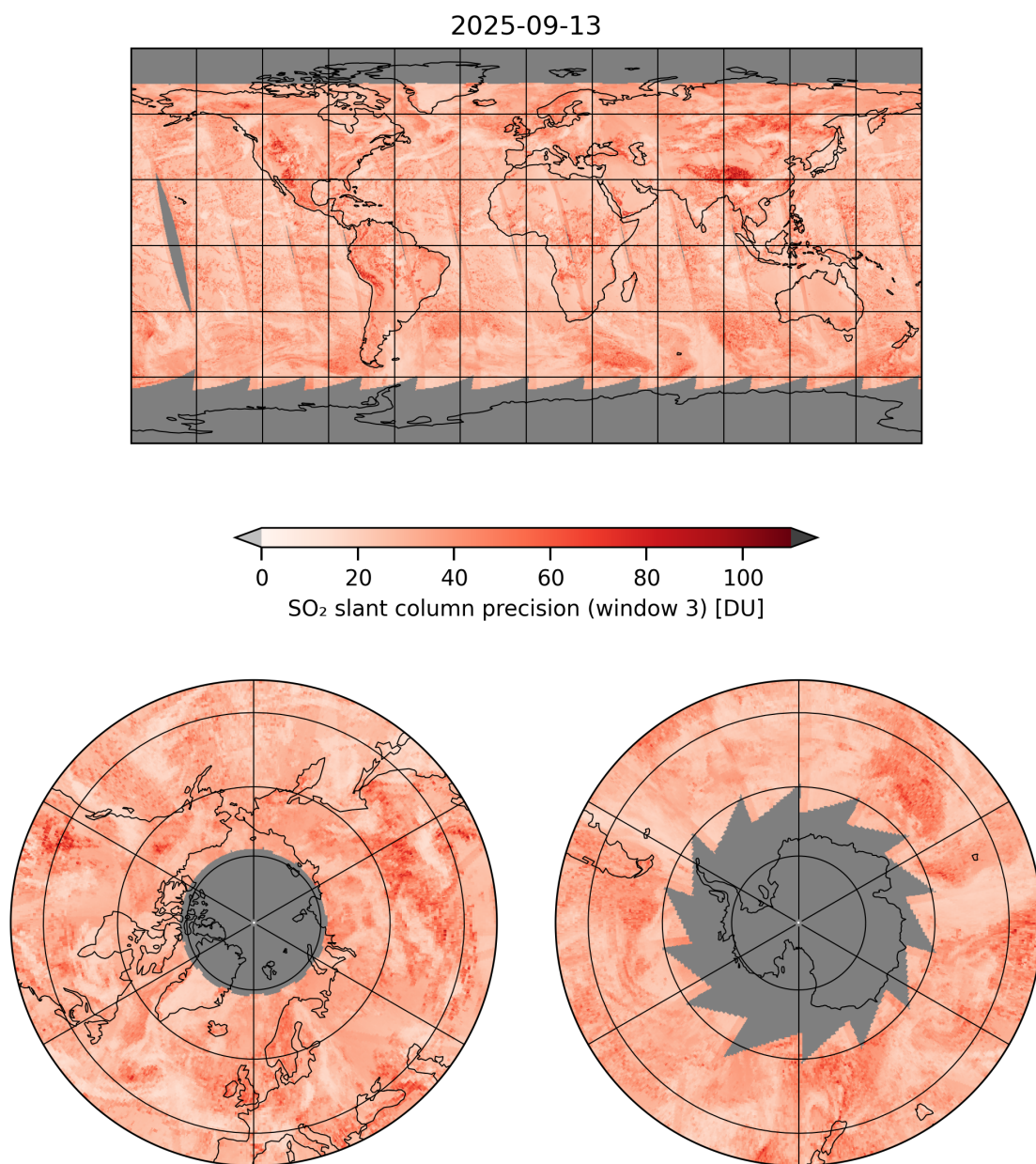


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-09-13 to 2025-09-13

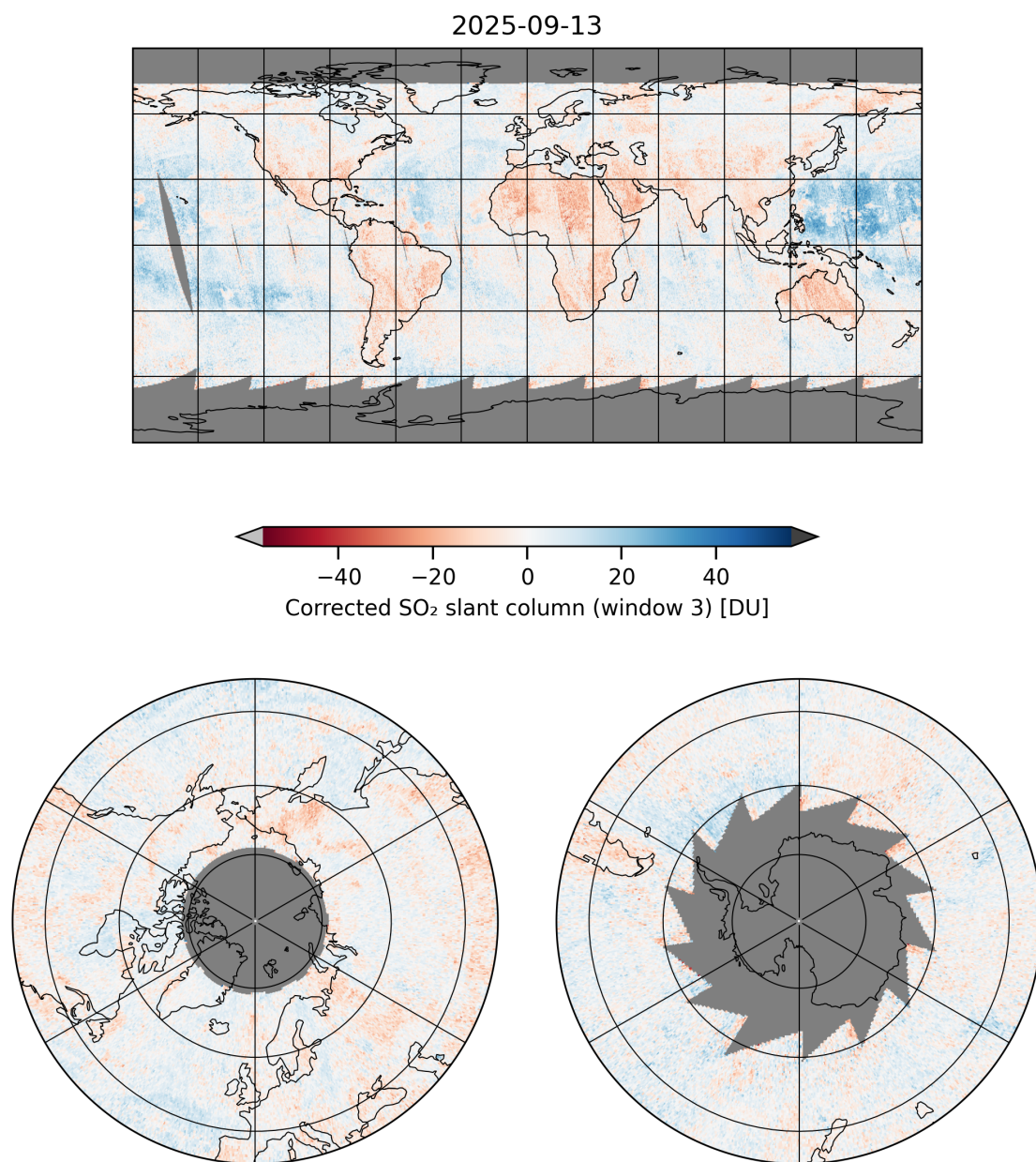


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-09-13 to 2025-09-13

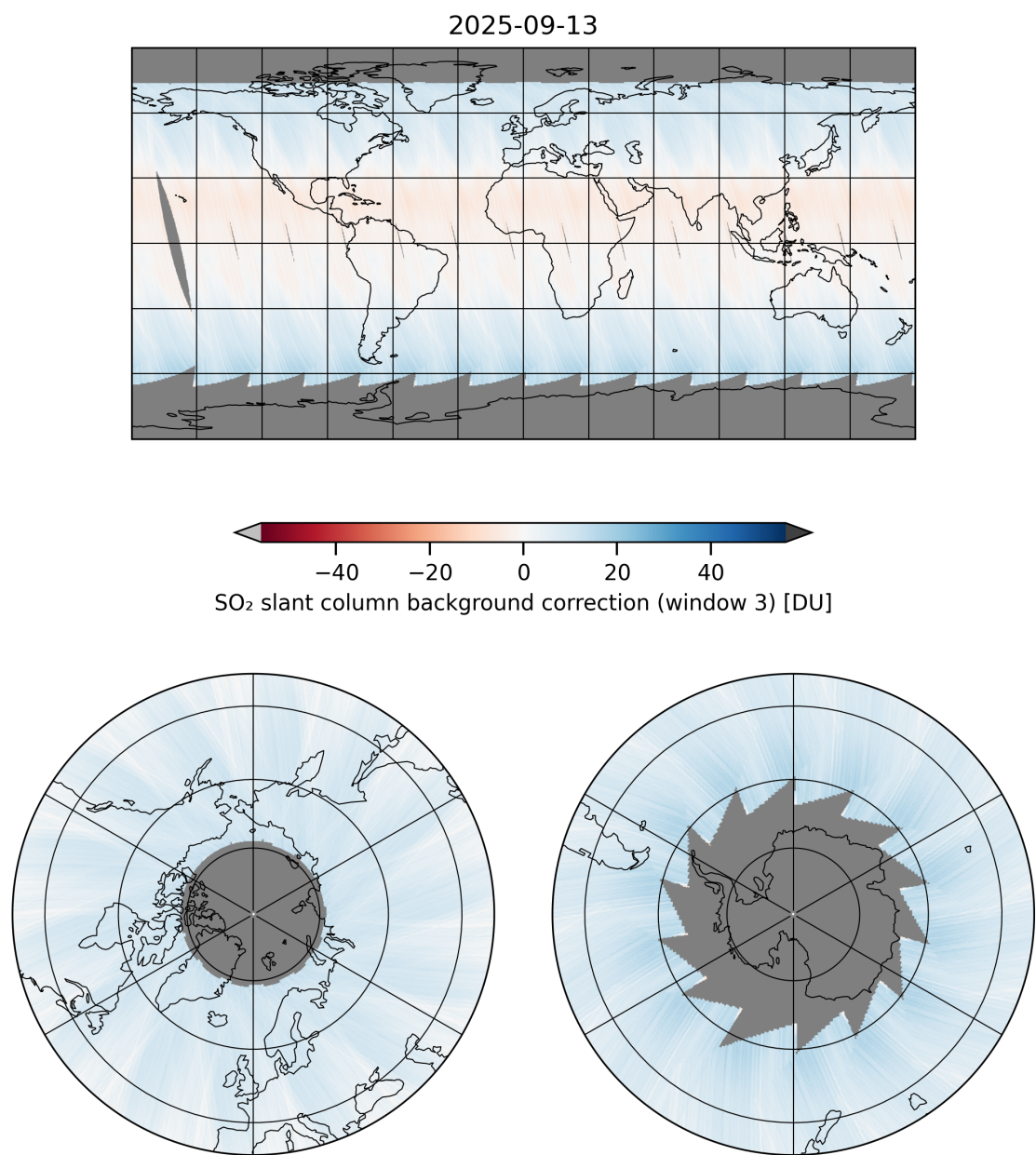


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-09-13 to 2025-09-13

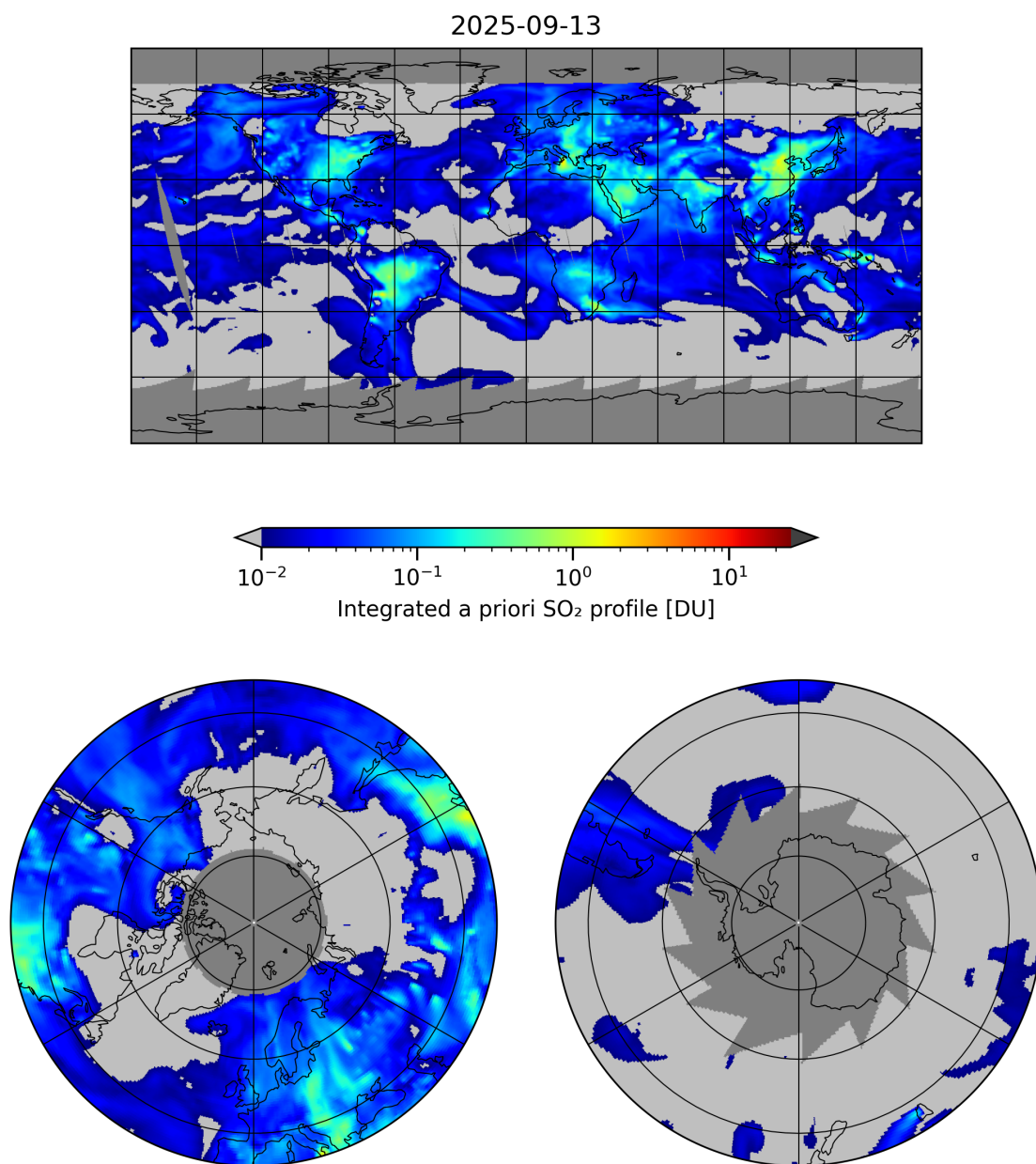


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-09-13 to 2025-09-13

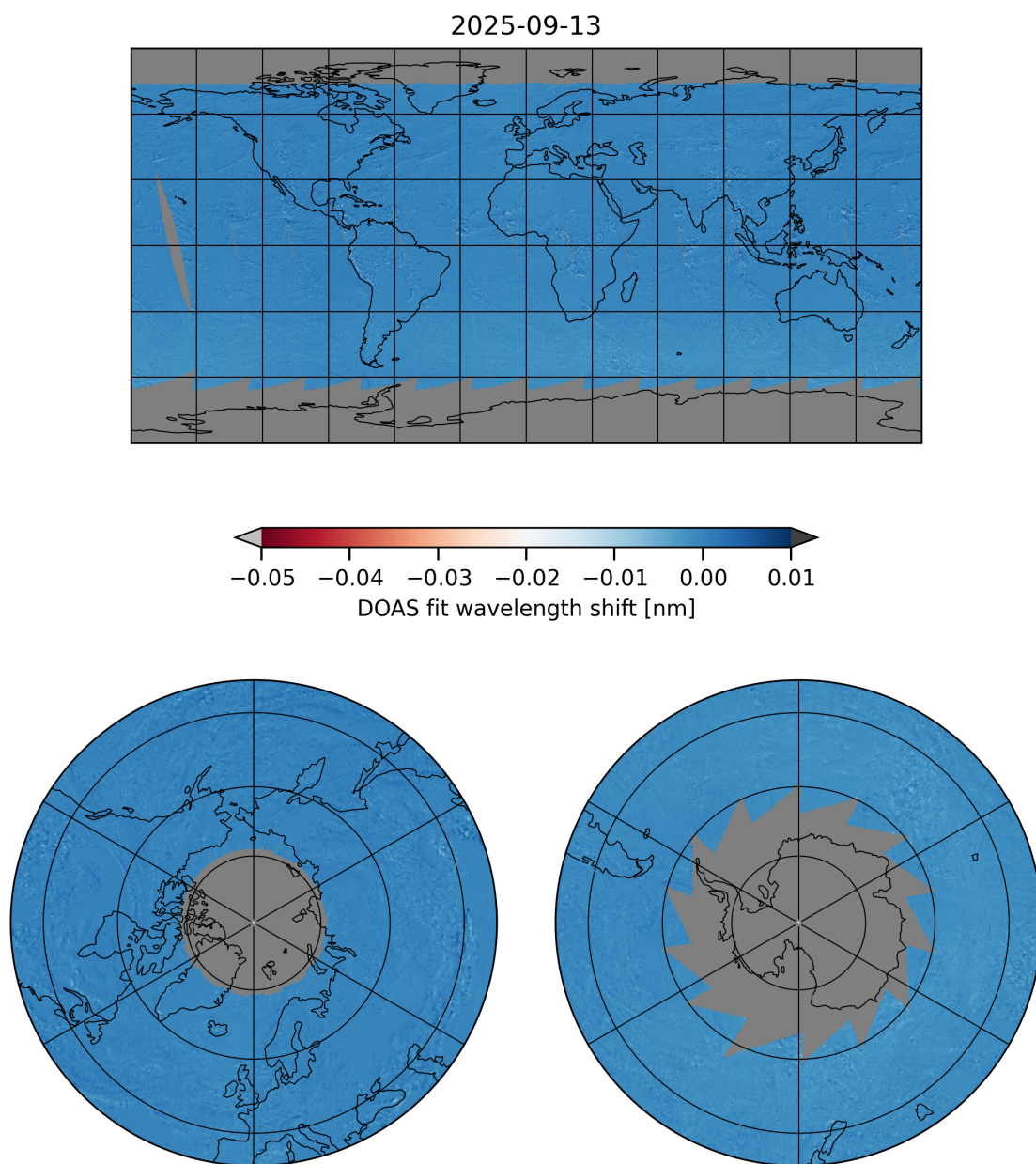


Figure 22: Map of “DOAS fit wavelength shift” for 2025-09-13 to 2025-09-13

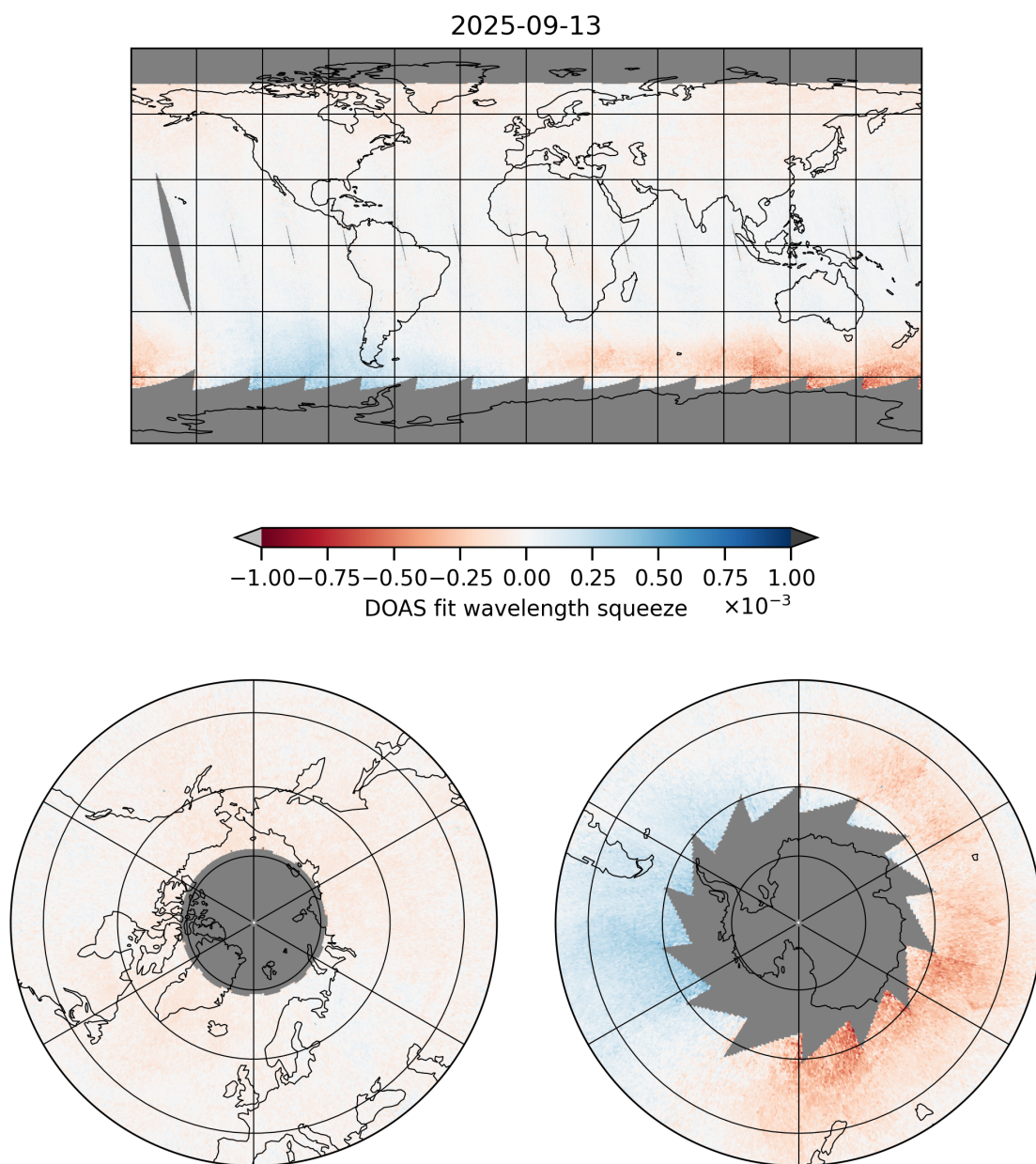


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-09-13 to 2025-09-13

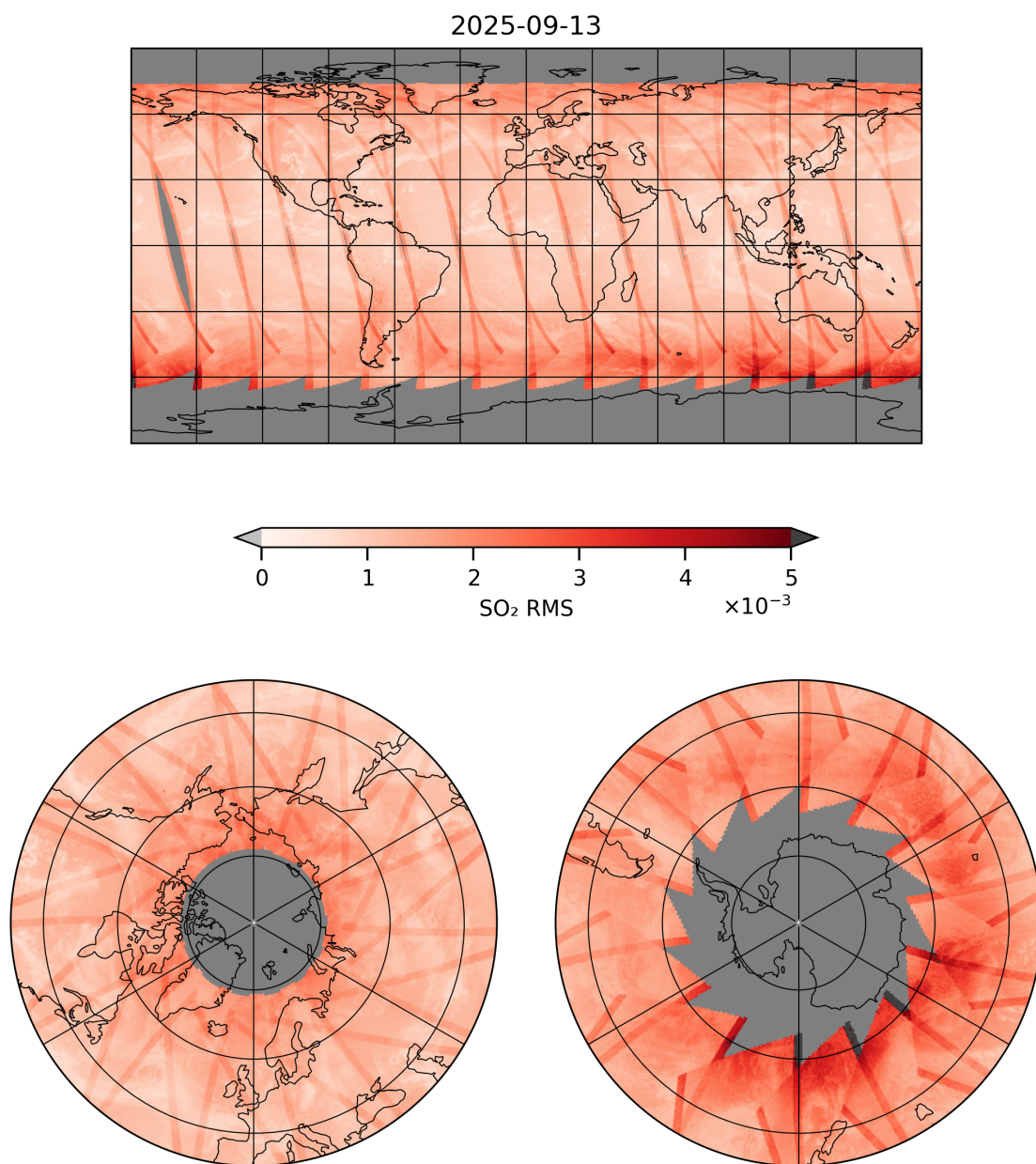


Figure 24: Map of “SO₂ RMS” for 2025-09-13 to 2025-09-13

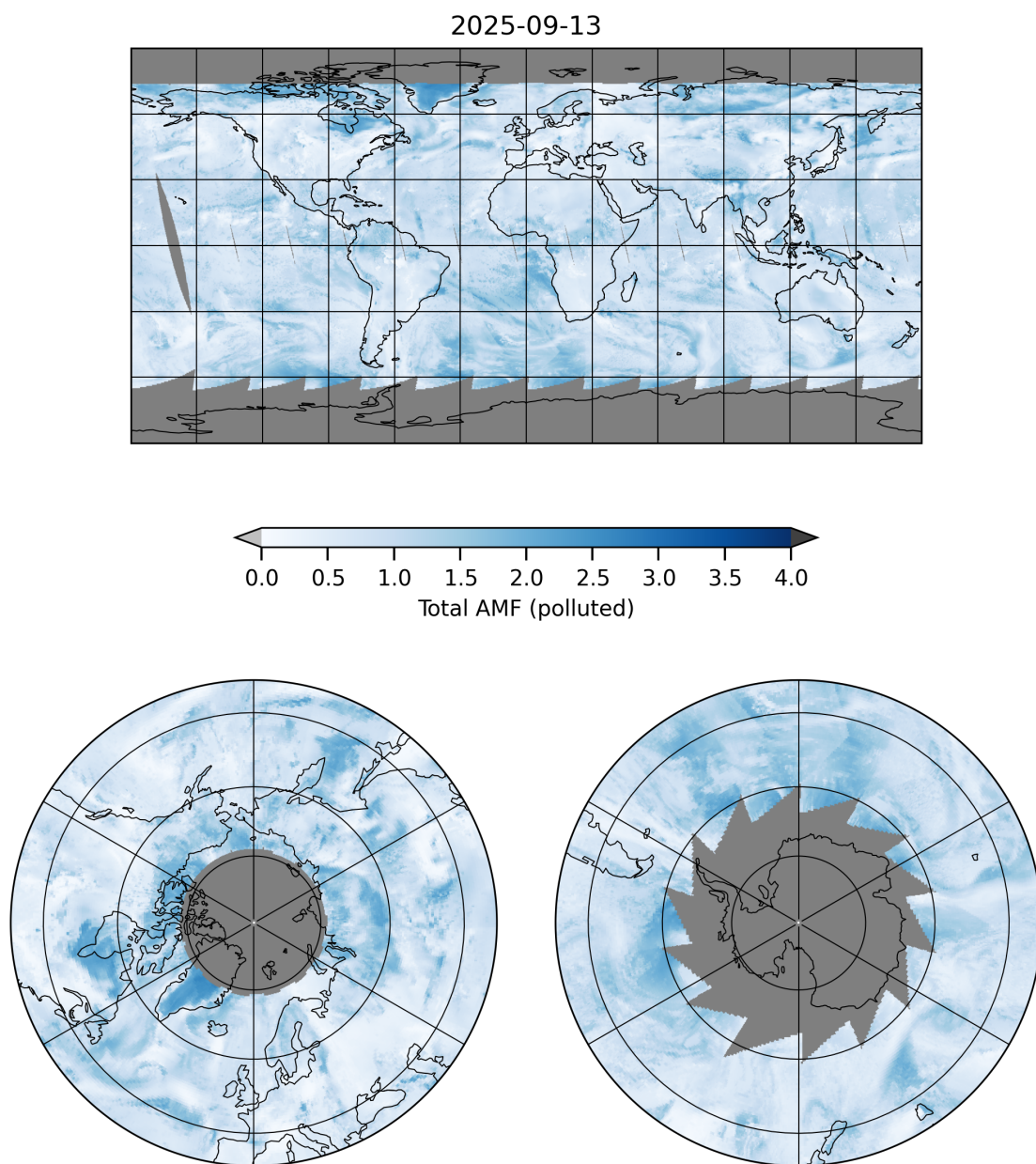


Figure 25: Map of “Total AMF (polluted)” for 2025-09-13 to 2025-09-13

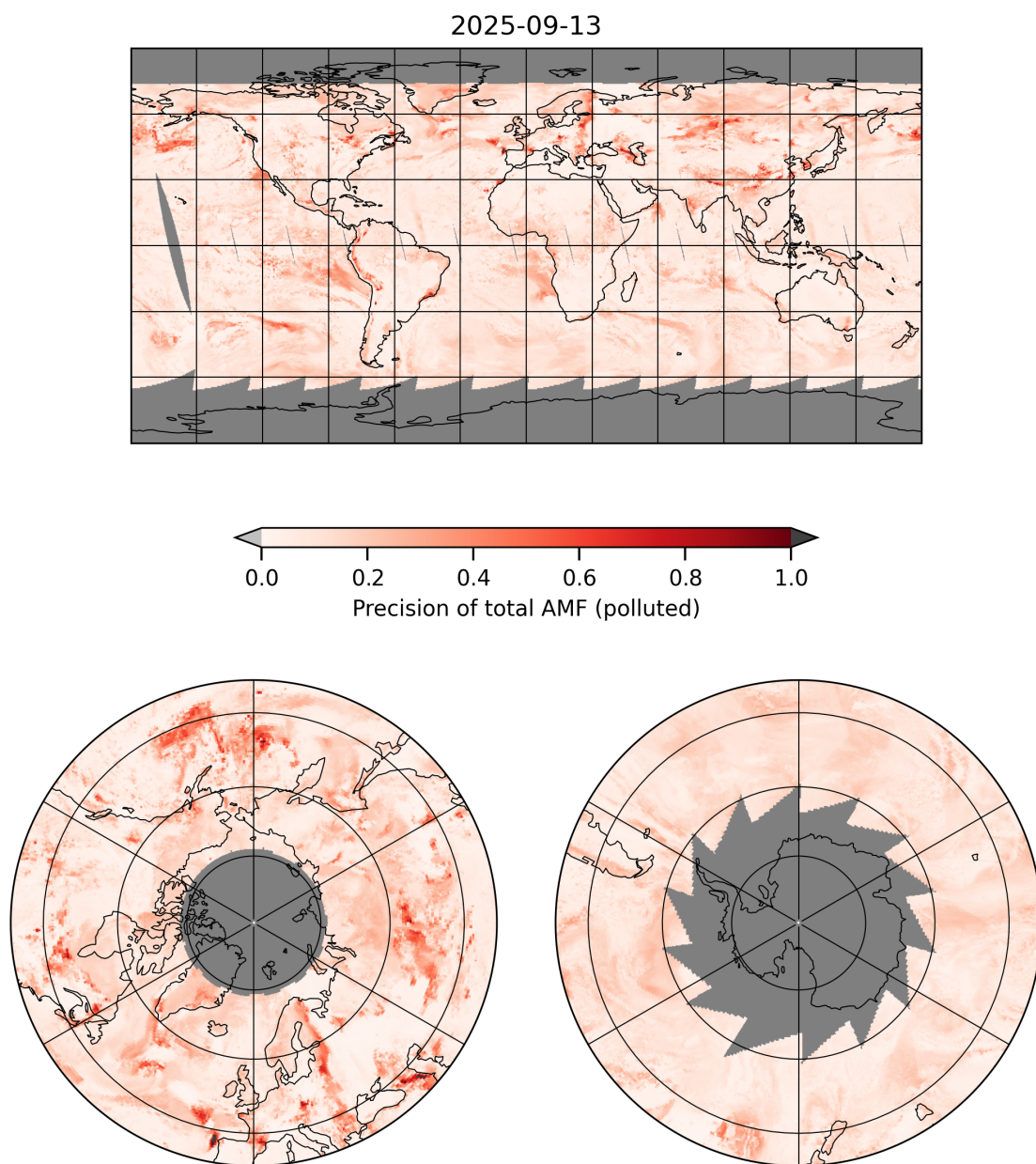


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-09-13 to 2025-09-13

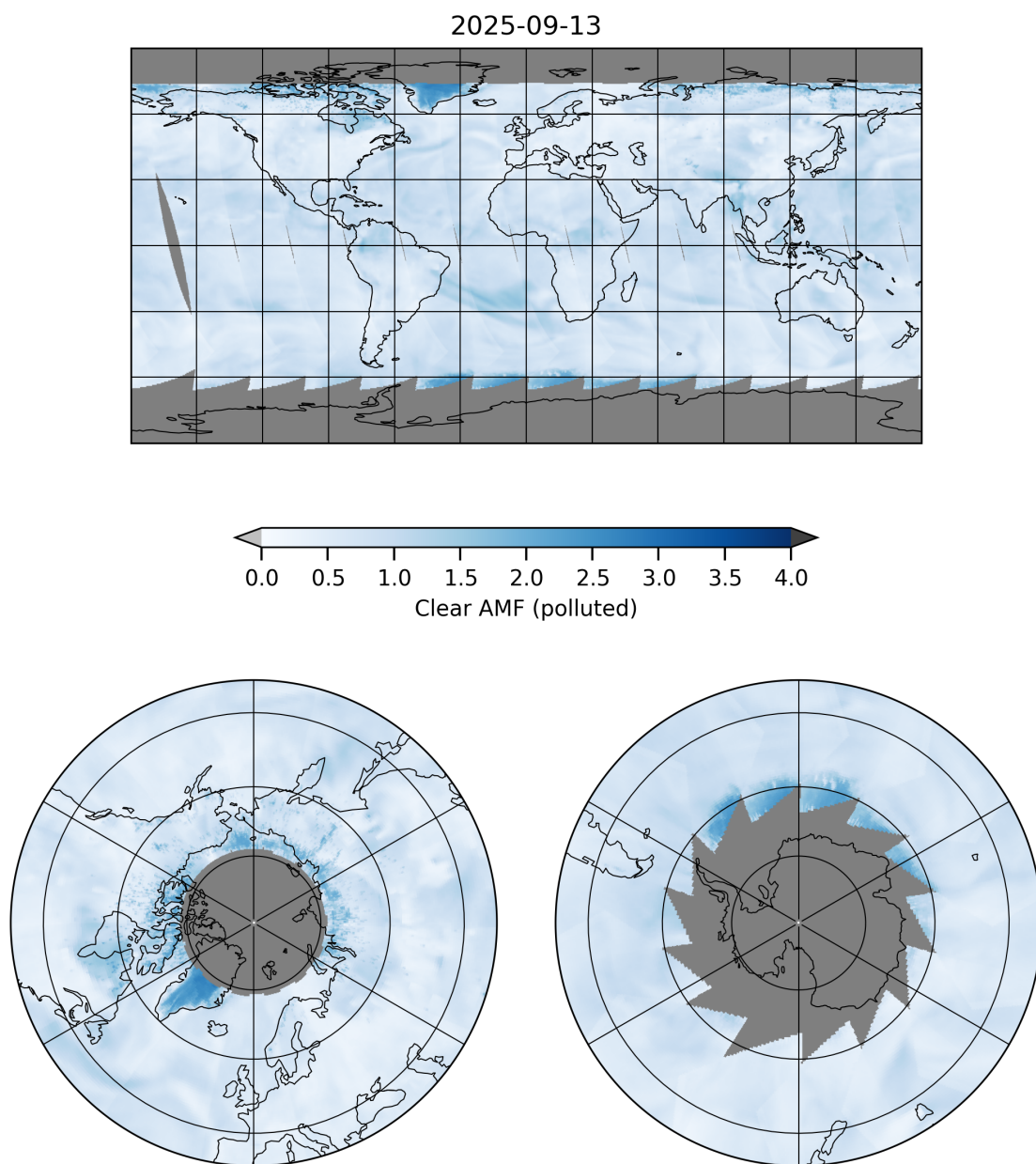


Figure 27: Map of “Clear AMF (polluted)” for 2025-09-13 to 2025-09-13

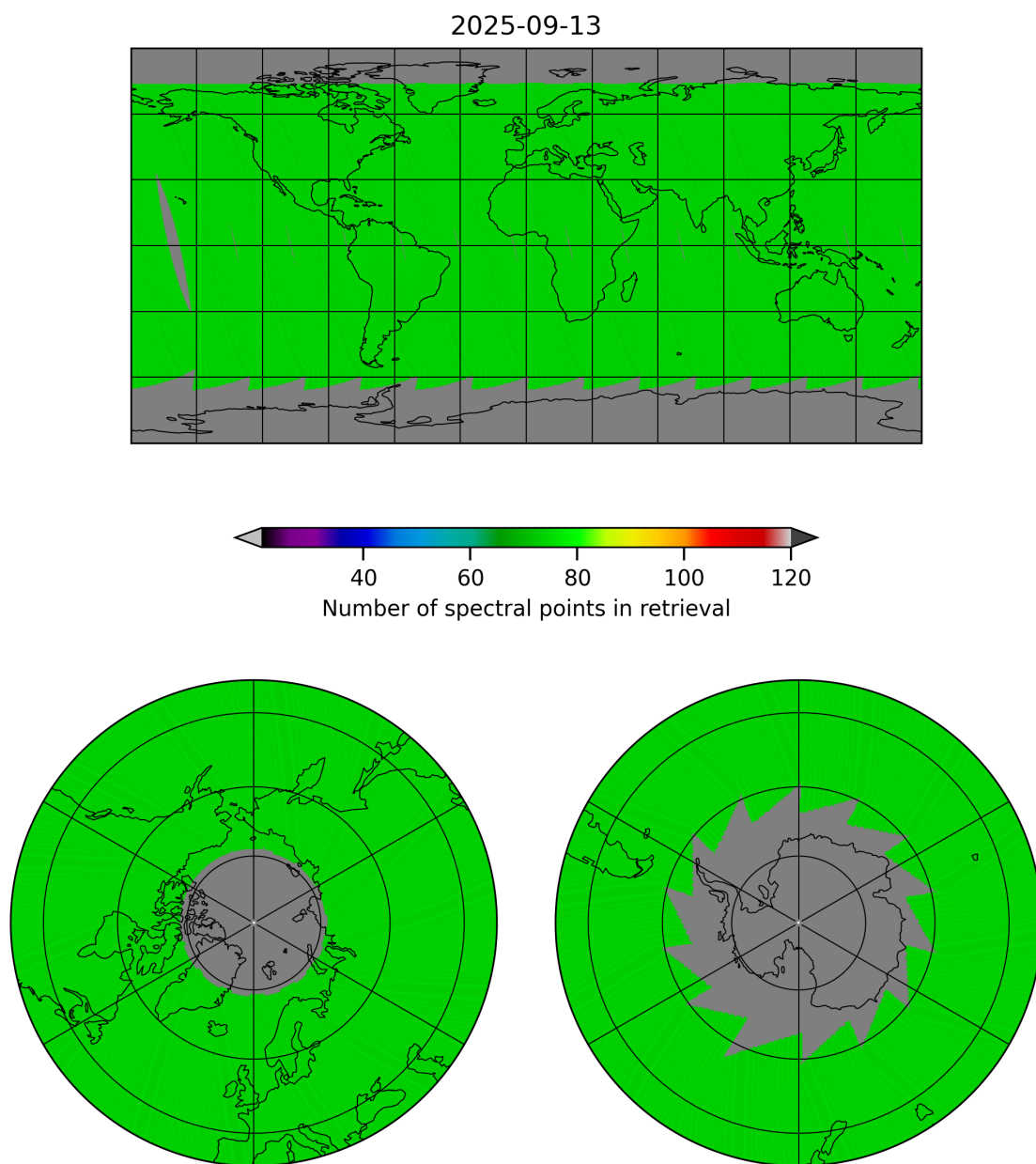


Figure 28: Map of “Number of spectral points in retrieval” for 2025-09-13 to 2025-09-13

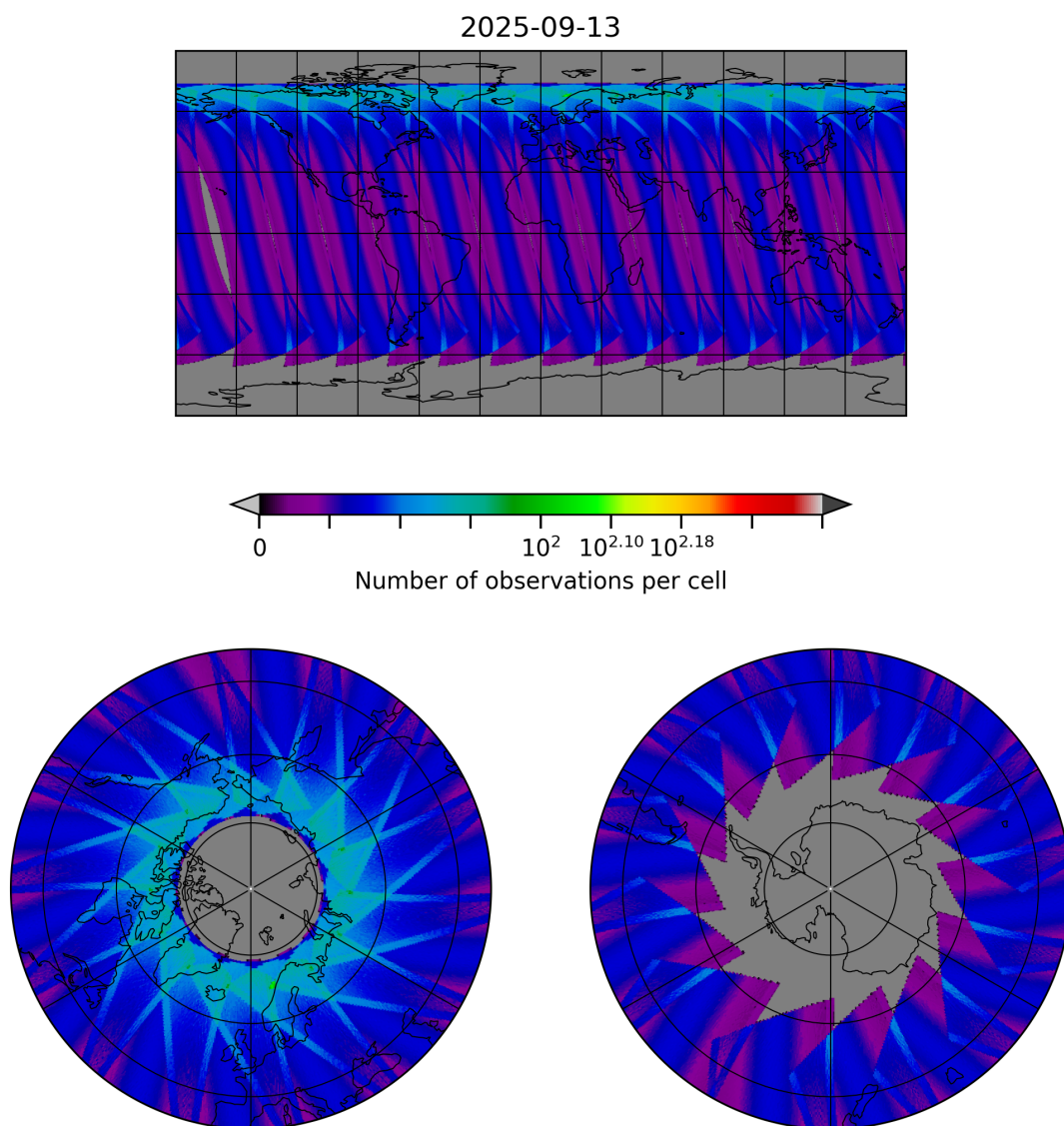


Figure 29: Map of the number of observations for 2025-09-13 to 2025-09-13

7 Zonal average

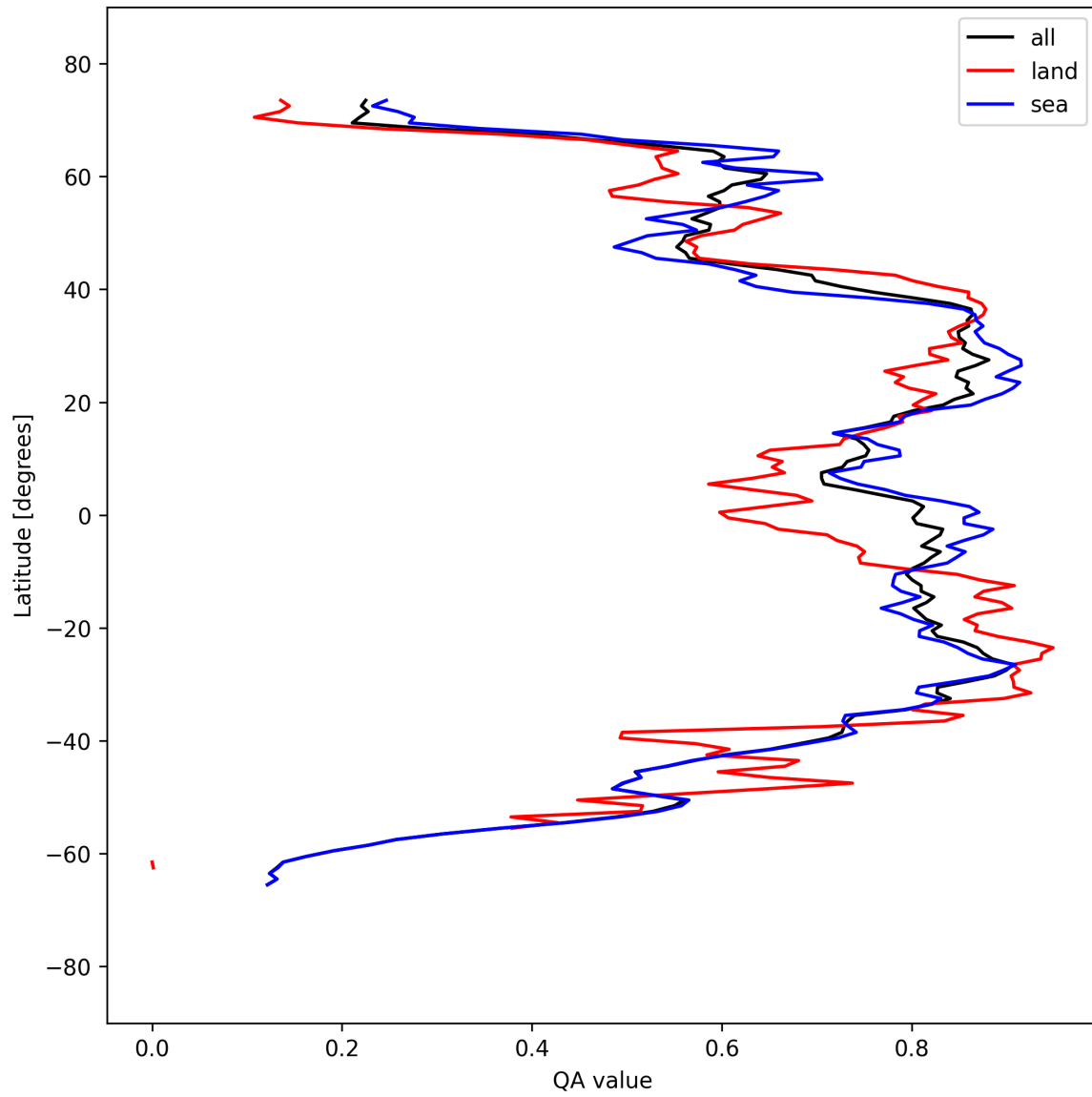


Figure 30: Zonal average of “QA value” for 2025-09-13 to 2025-09-13.

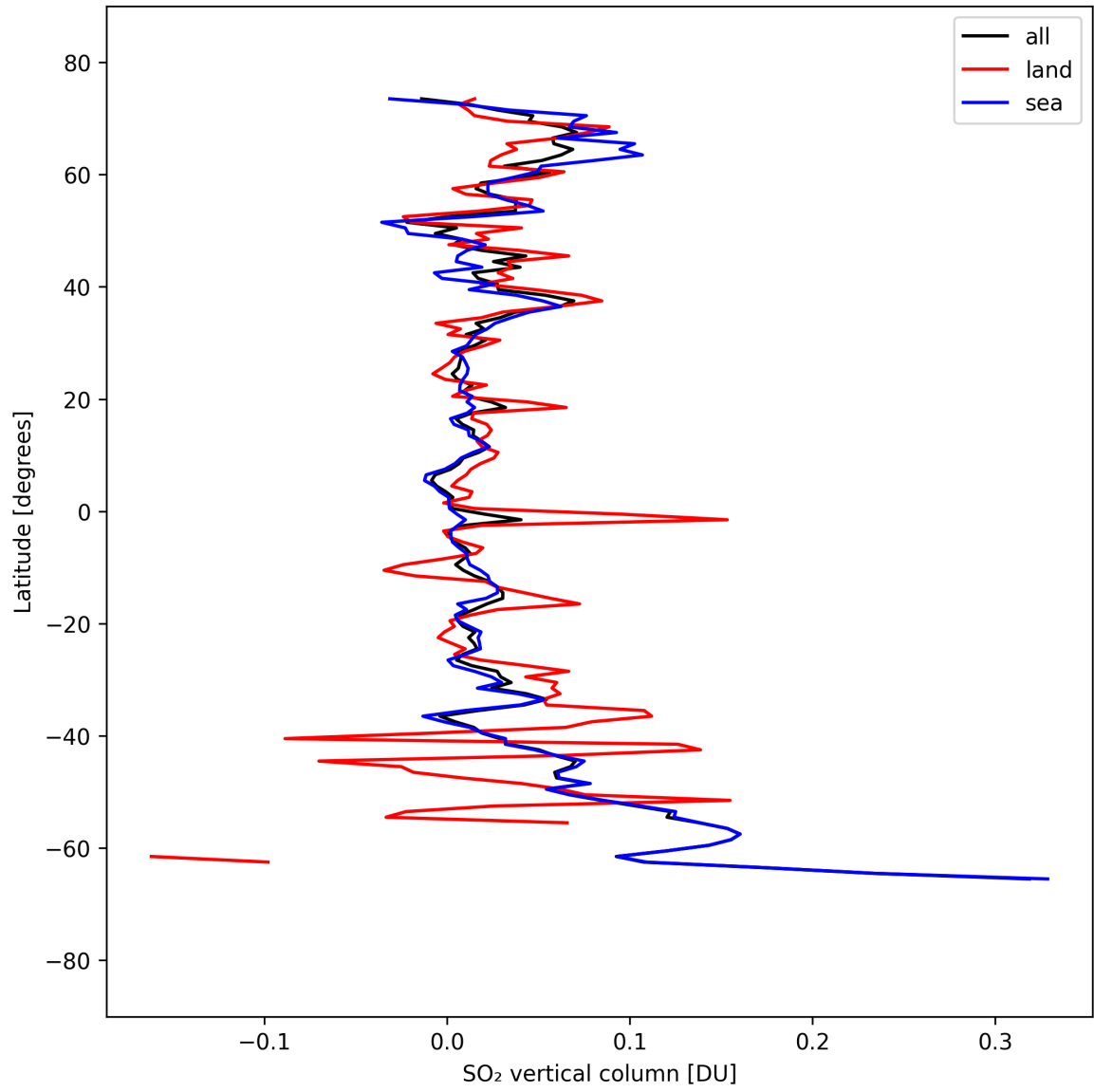


Figure 31: Zonal average of “SO₂ vertical column” for 2025-09-13 to 2025-09-13.

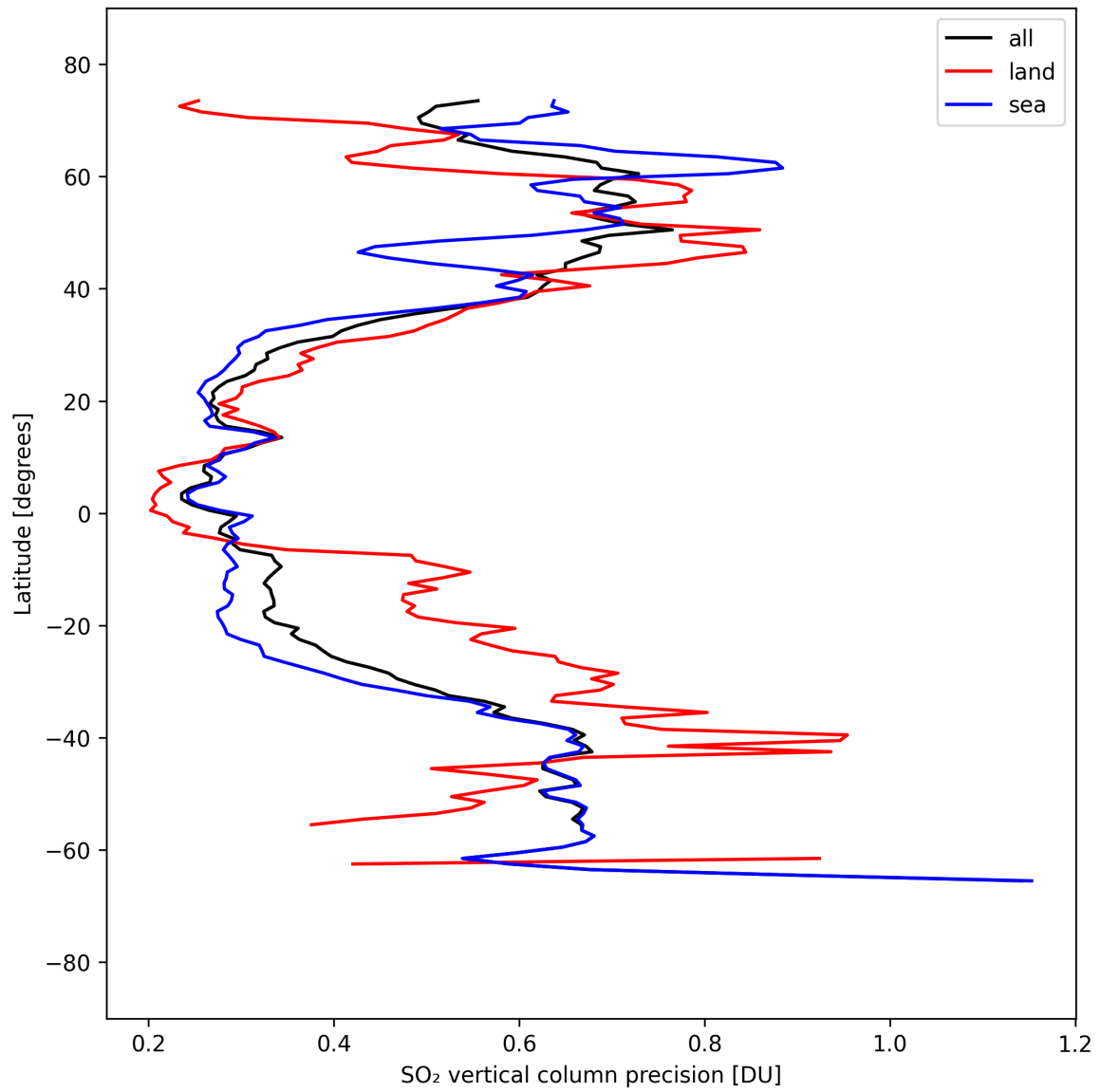


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-09-13 to 2025-09-13.

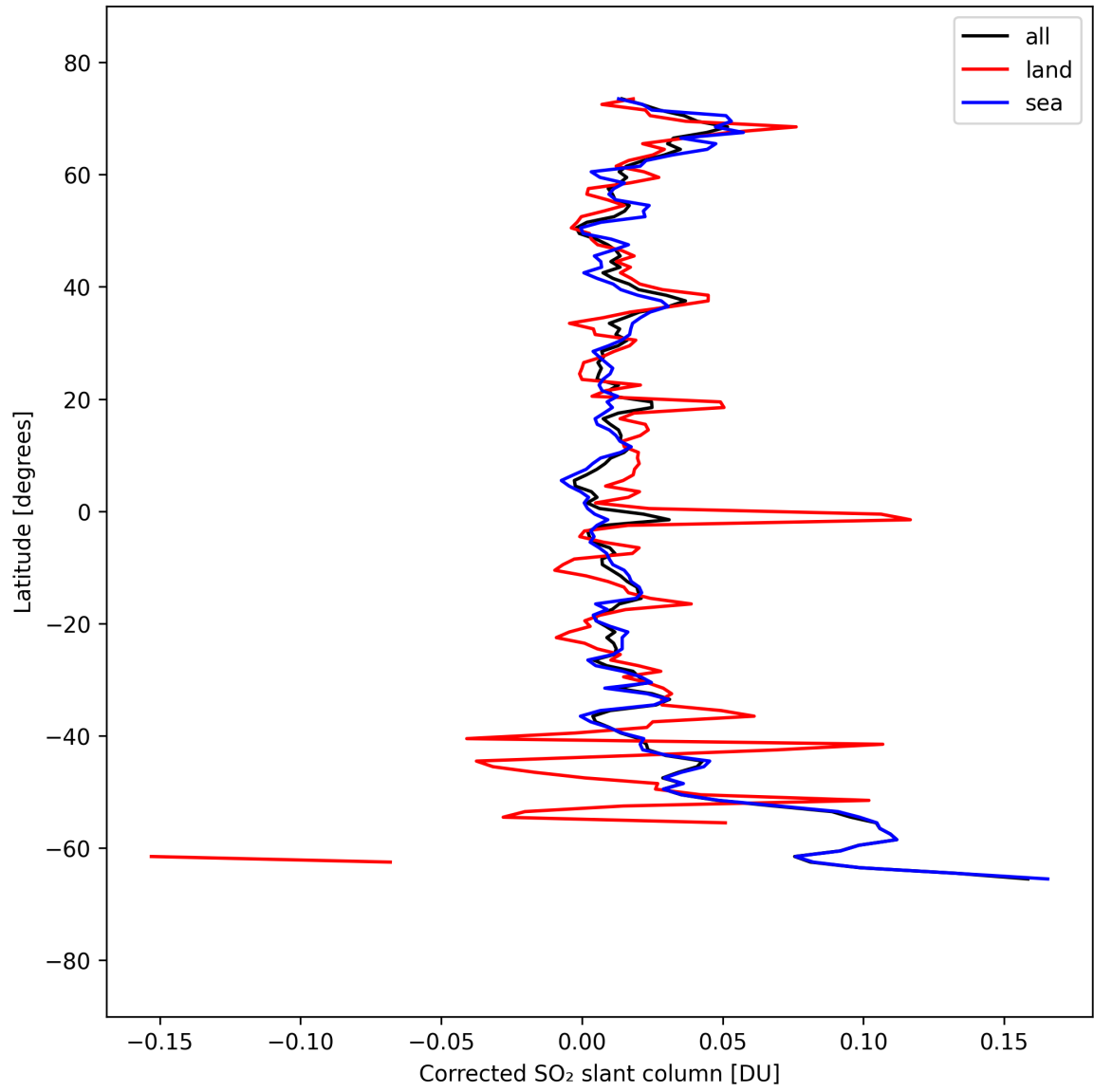


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-09-13 to 2025-09-13.

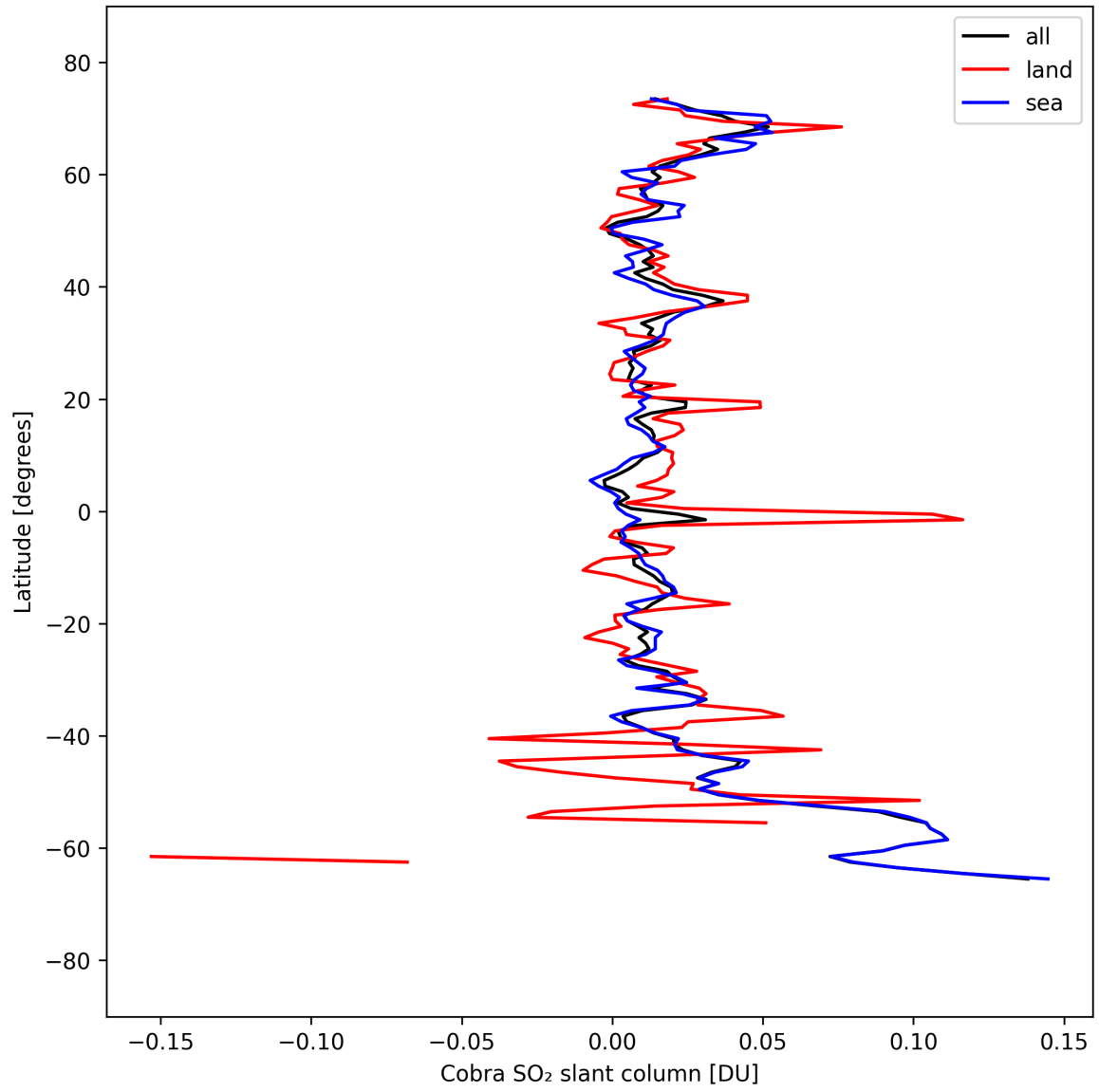


Figure 34: Zonal average of "Cobra SO₂ slant column" for 2025-09-13 to 2025-09-13.

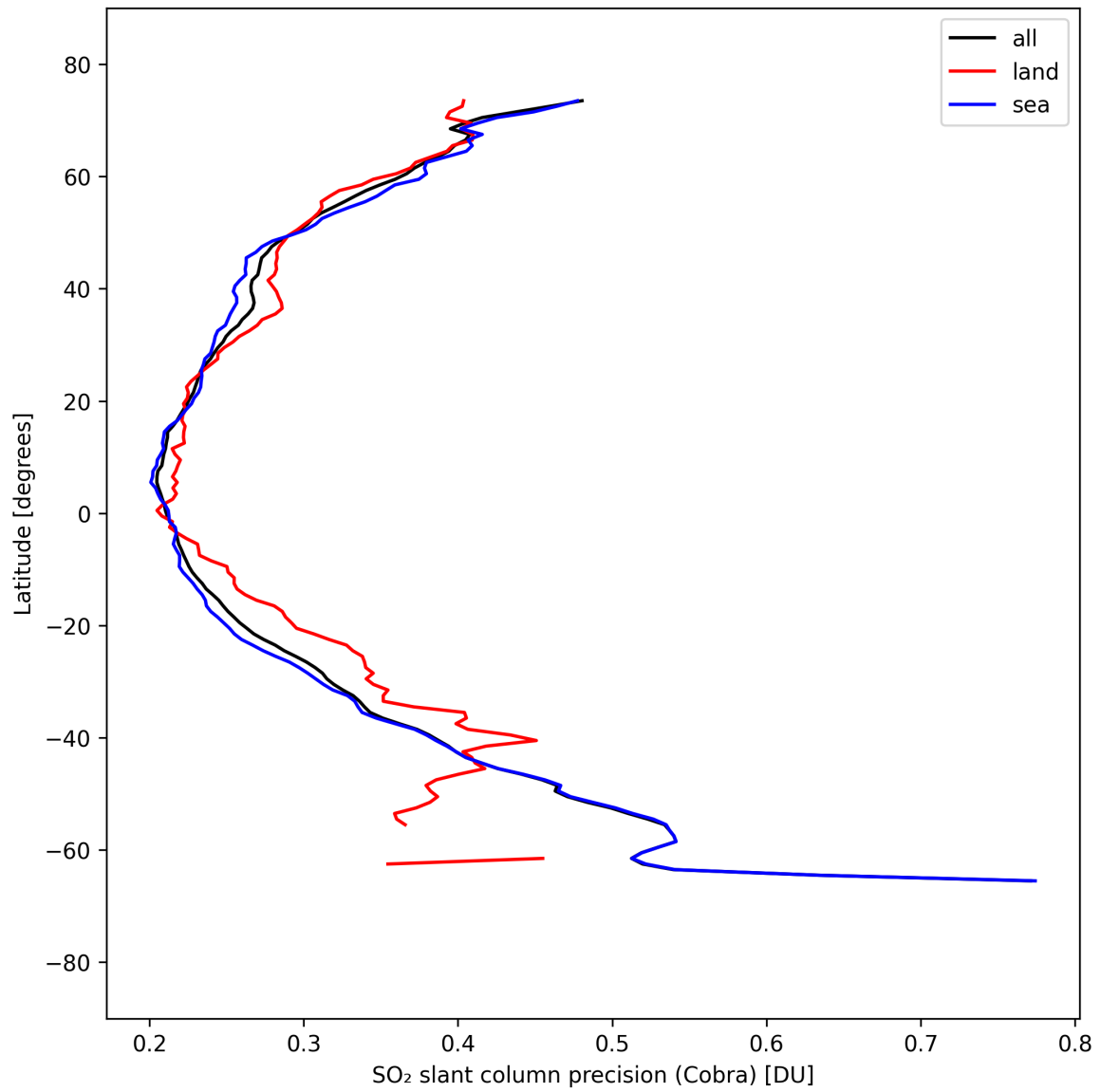


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-09-13 to 2025-09-13.

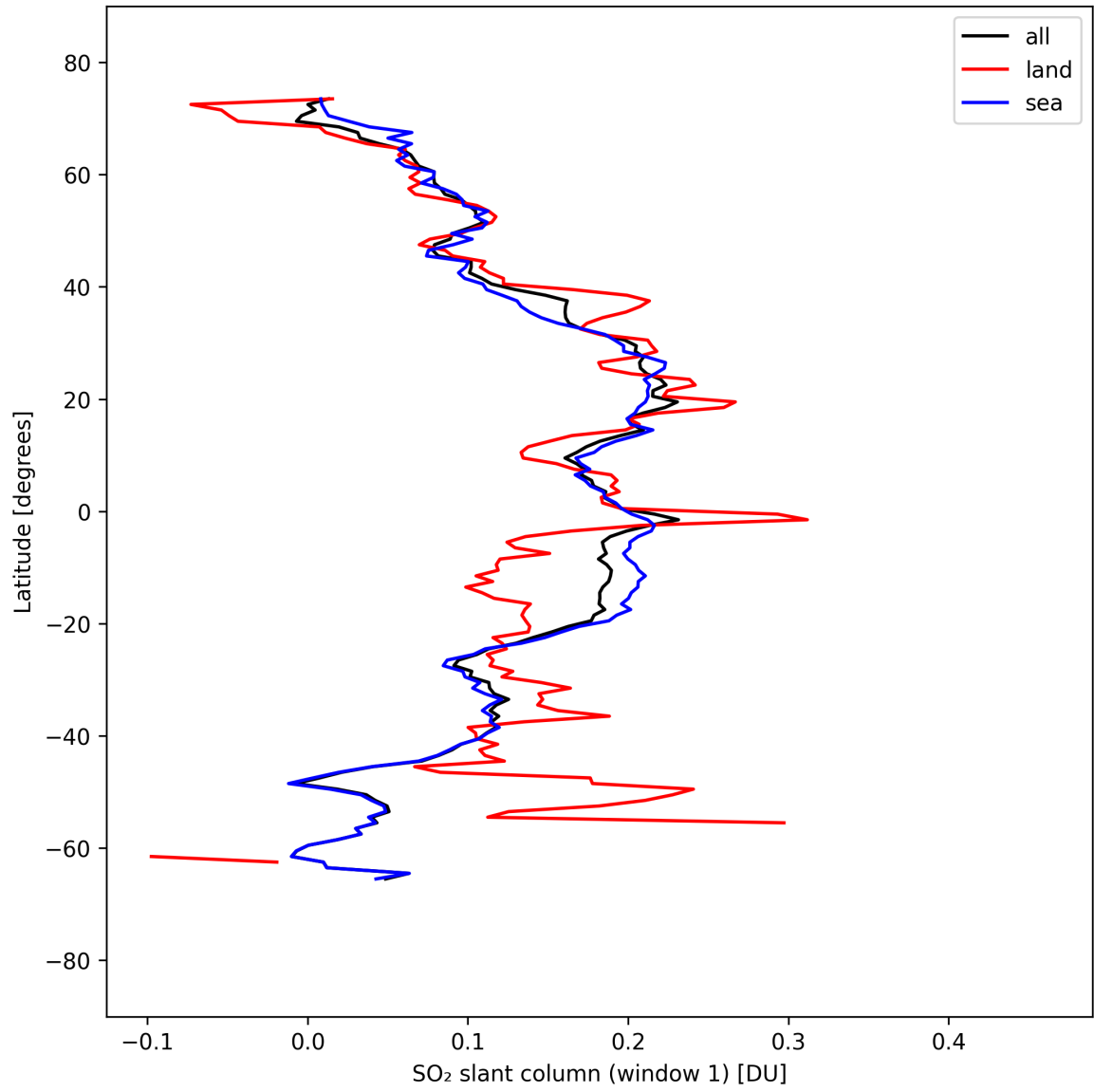


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-09-13 to 2025-09-13.

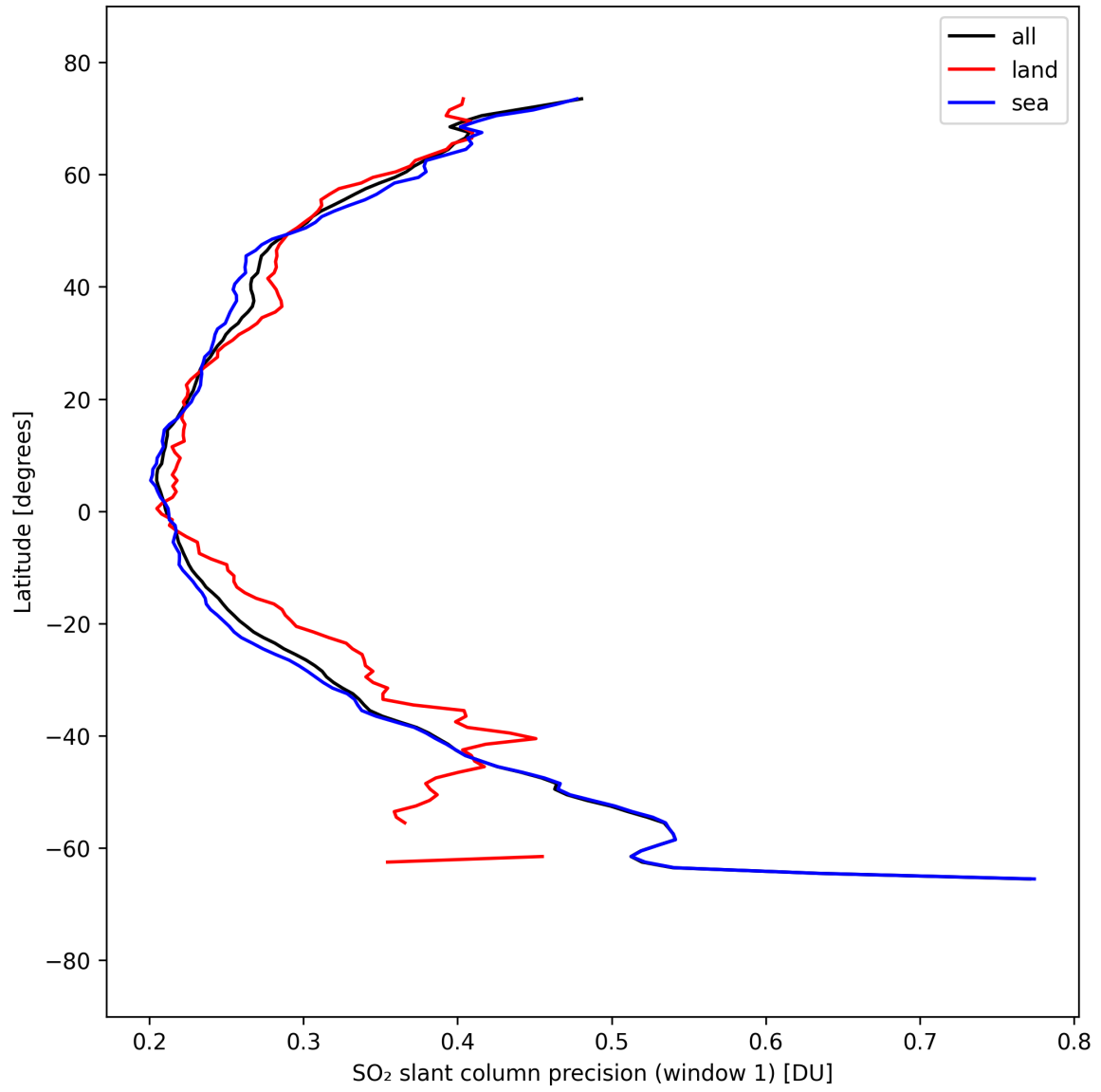


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-09-13 to 2025-09-13.

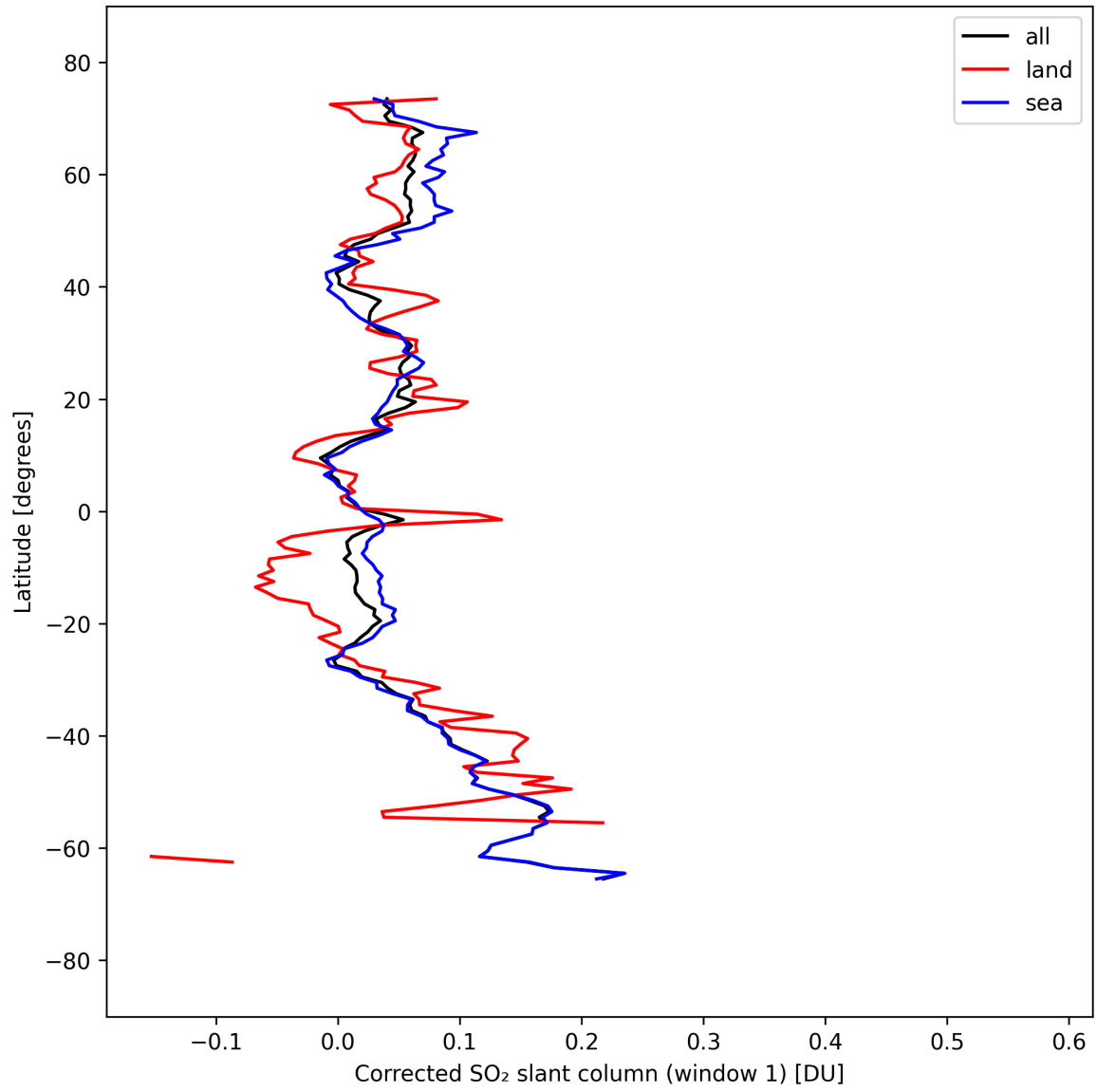


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-09-13 to 2025-09-13.

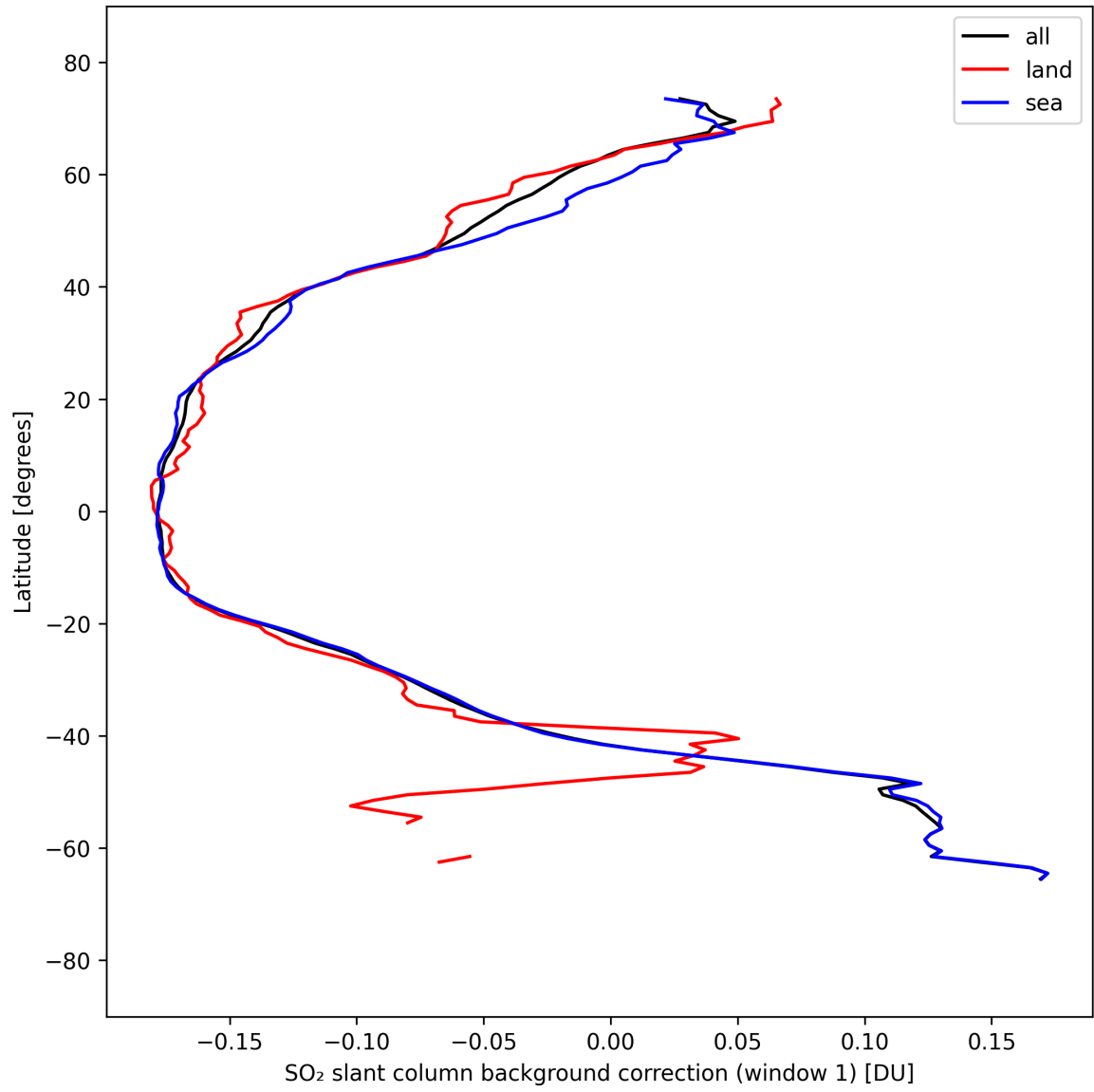


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-09-13 to 2025-09-13.

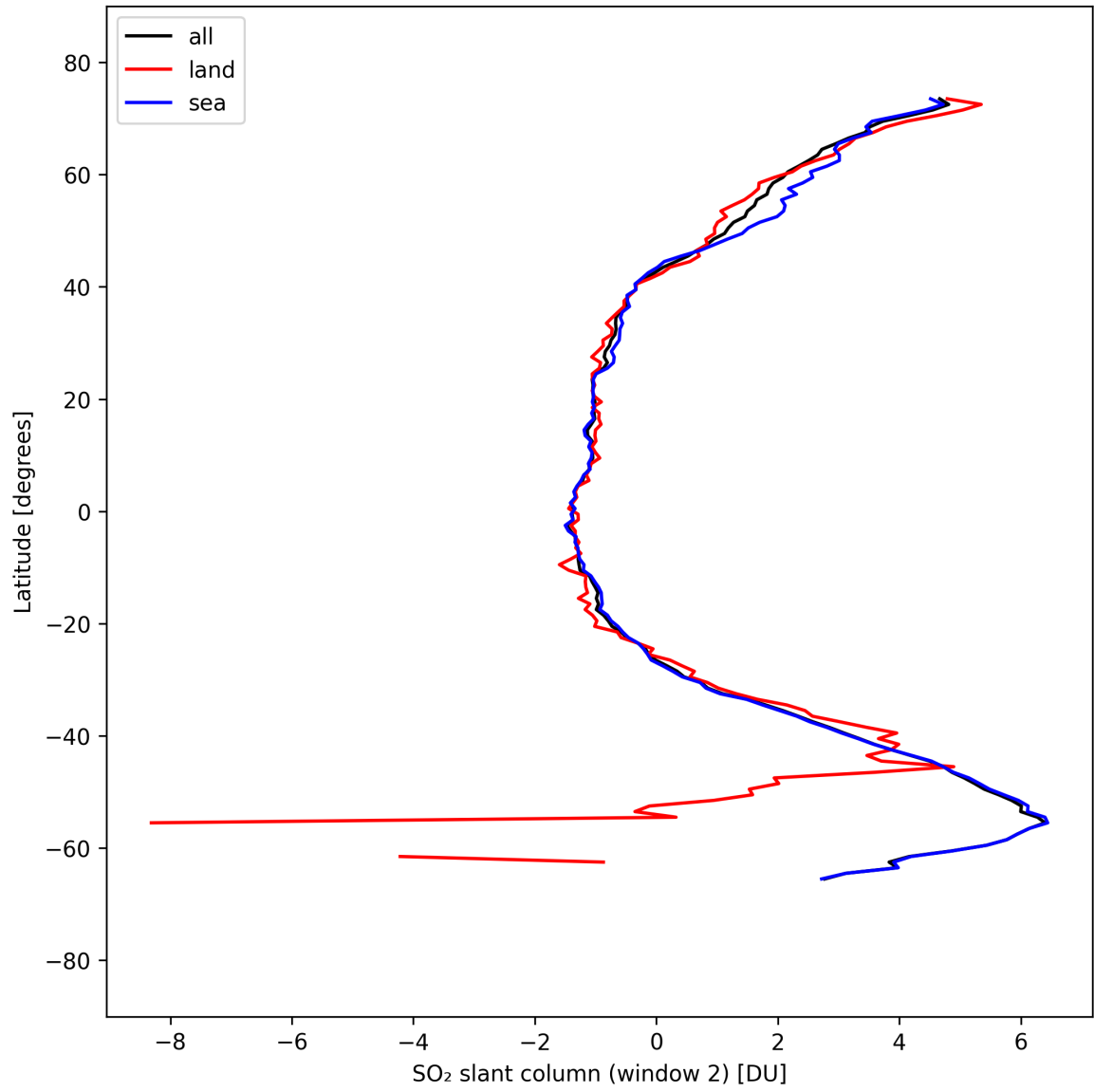


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-09-13 to 2025-09-13.

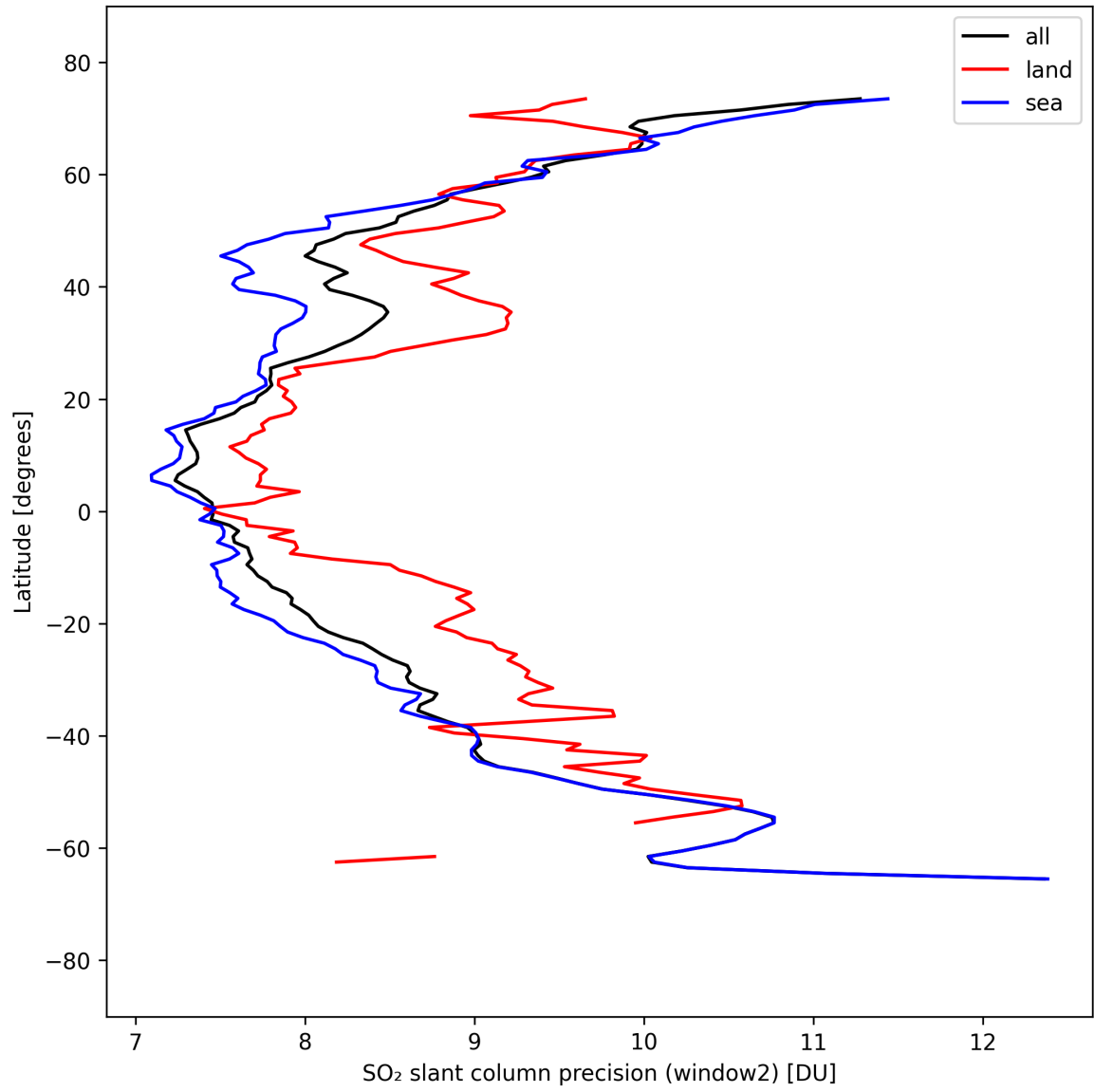


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-09-13 to 2025-09-13.

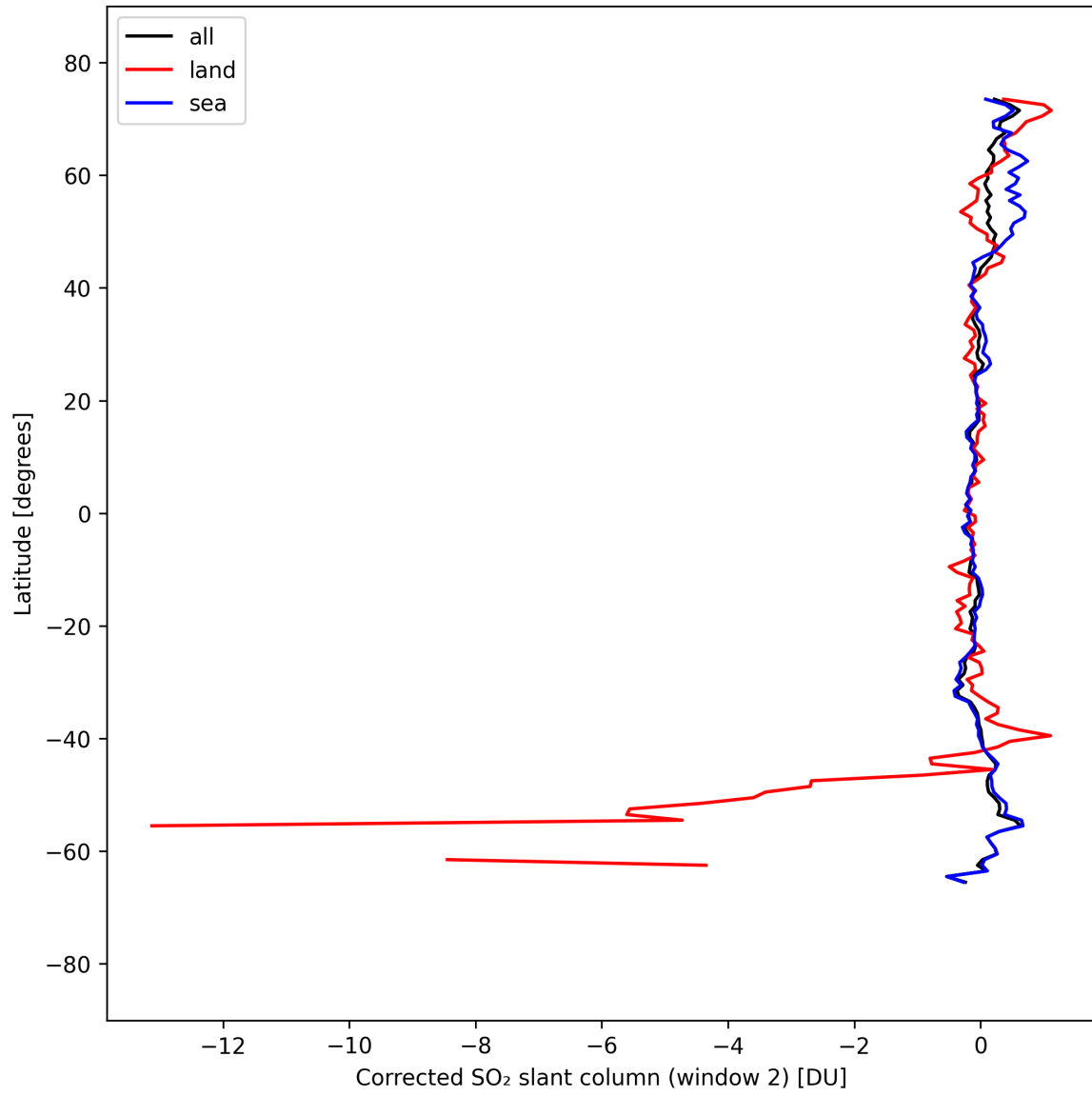


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-09-13 to 2025-09-13.

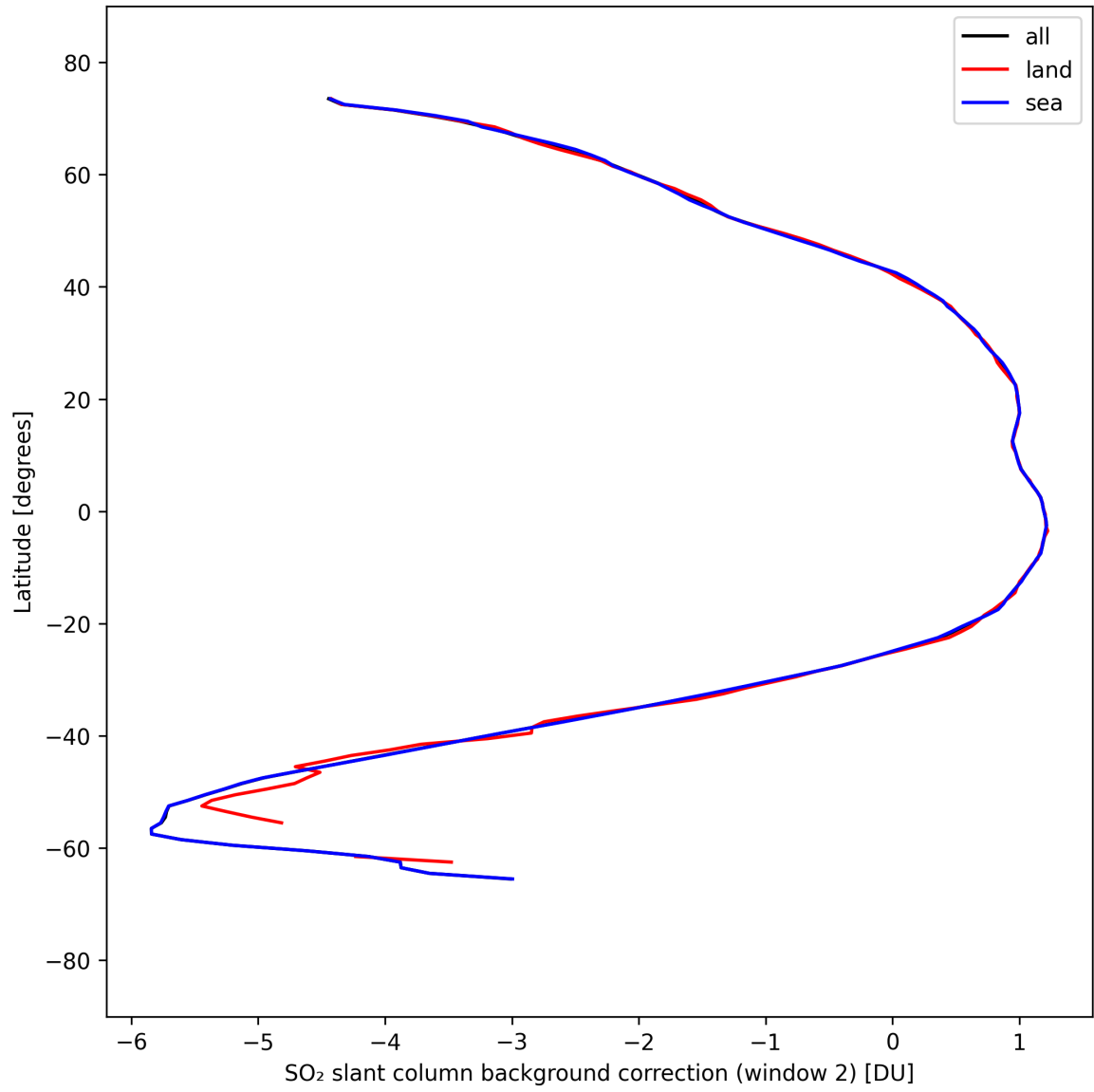


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-09-13 to 2025-09-13.

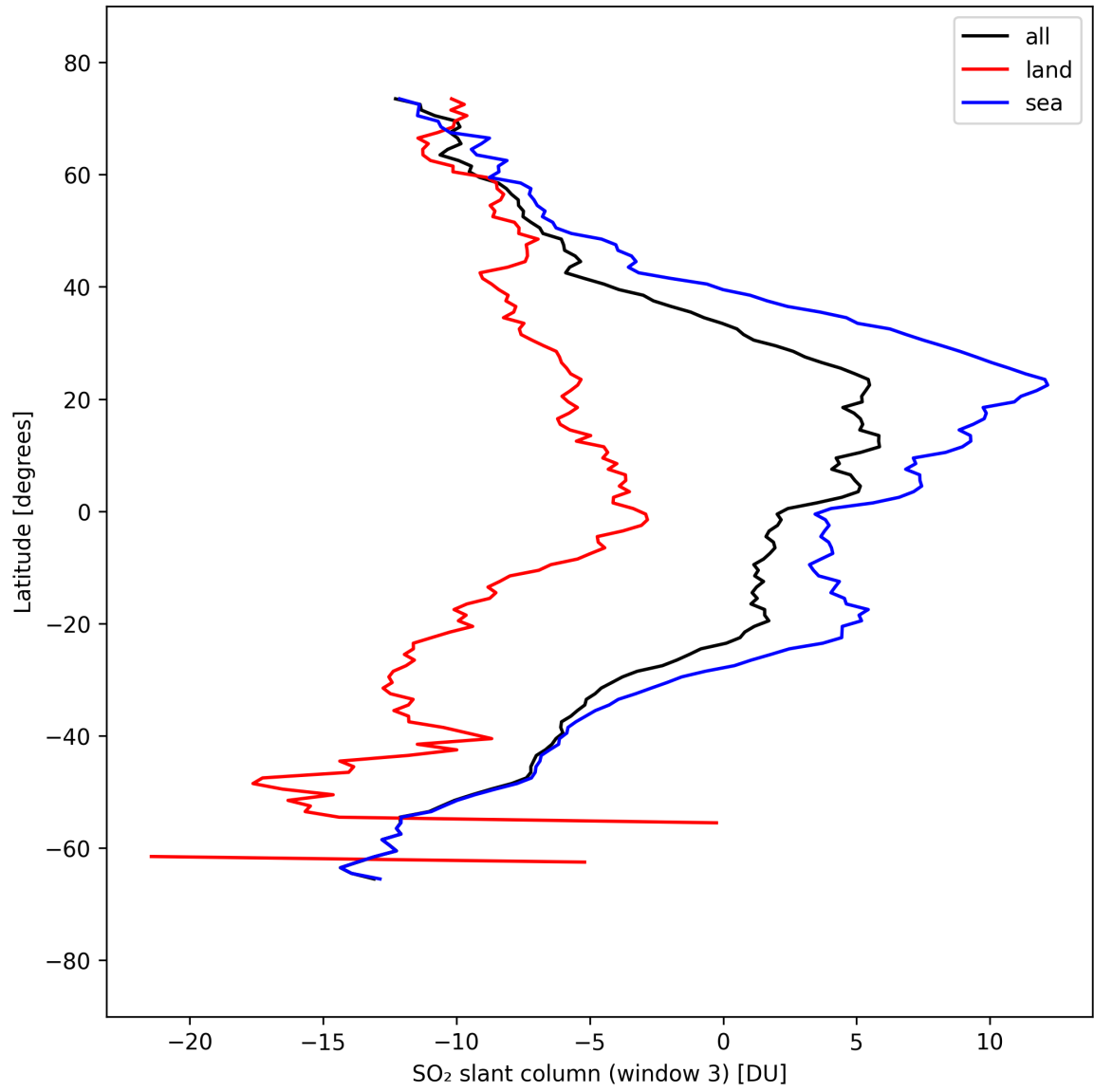


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-09-13 to 2025-09-13.

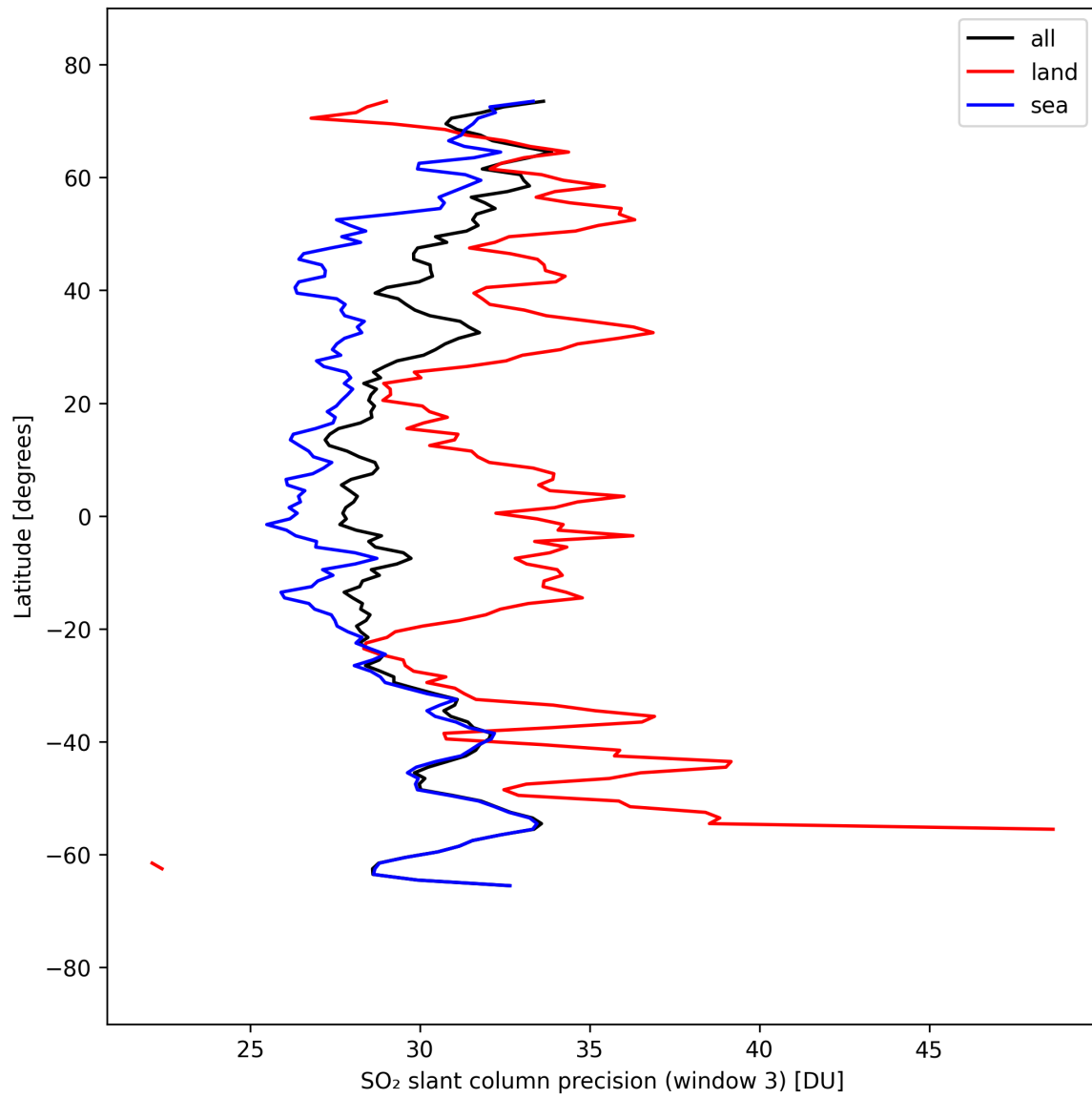


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-09-13 to 2025-09-13.

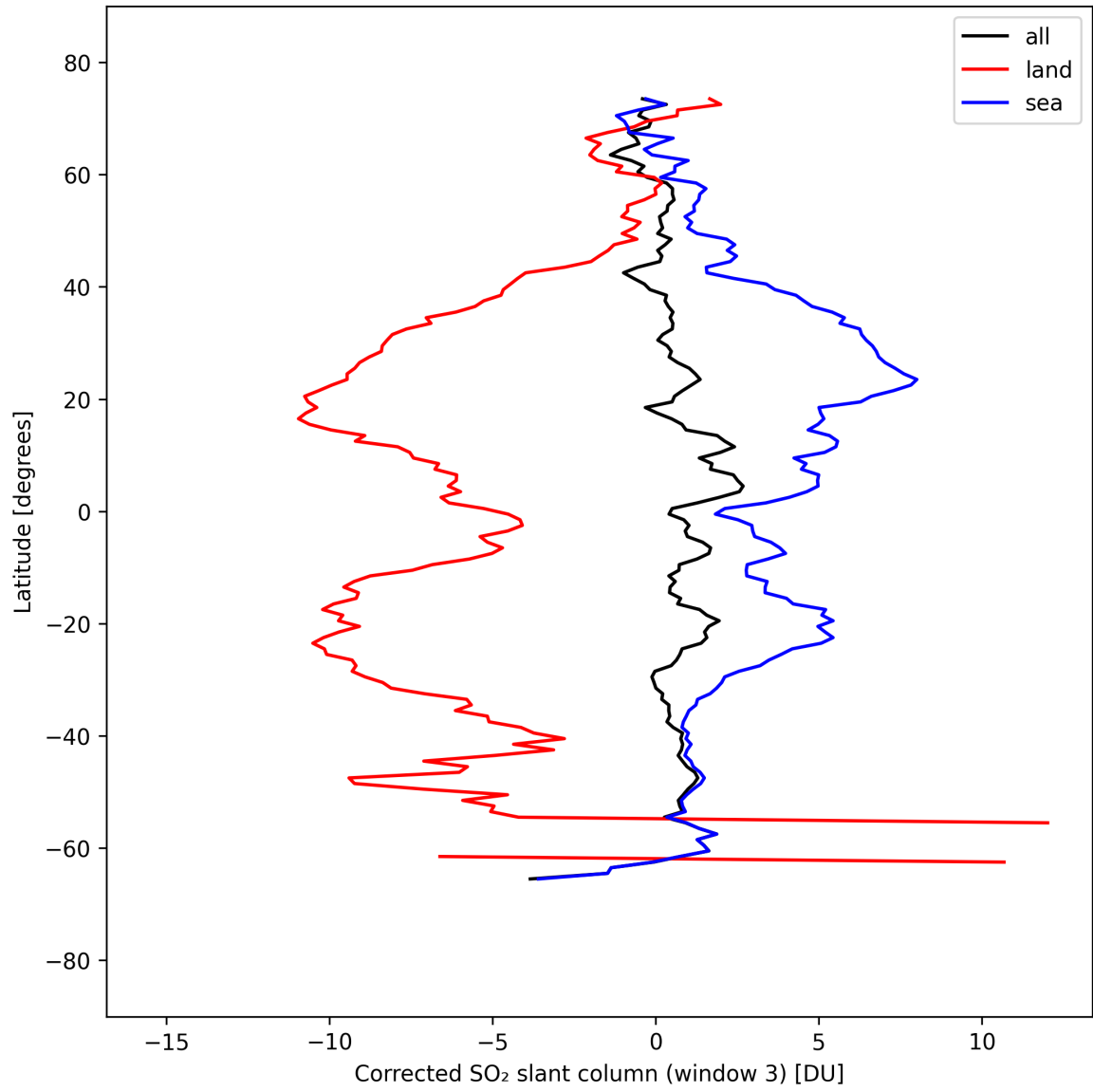


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-09-13 to 2025-09-13.

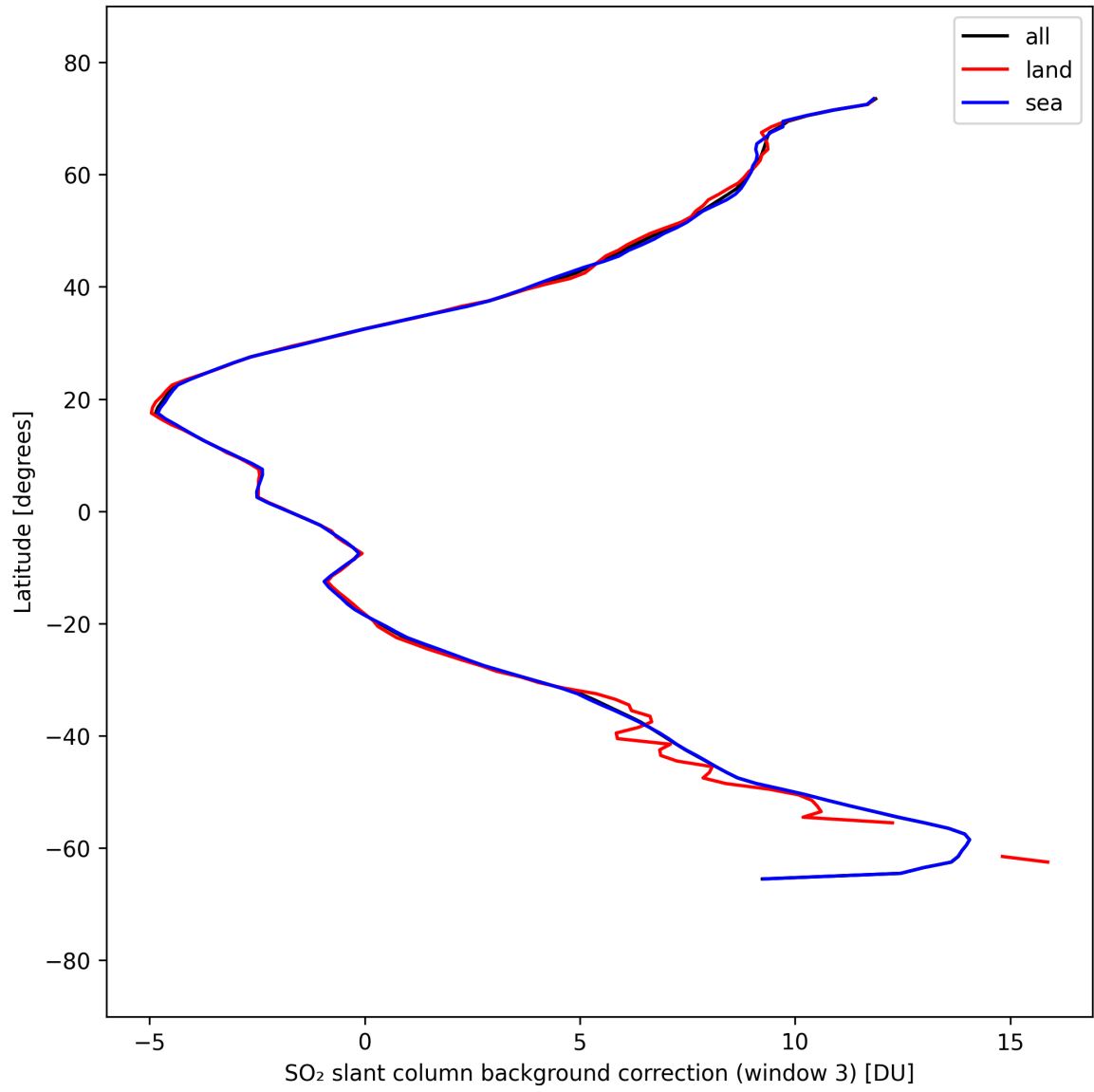


Figure 47: Zonal average of "SO₂ slant column background correction (window 3)" for 2025-09-13 to 2025-09-13.

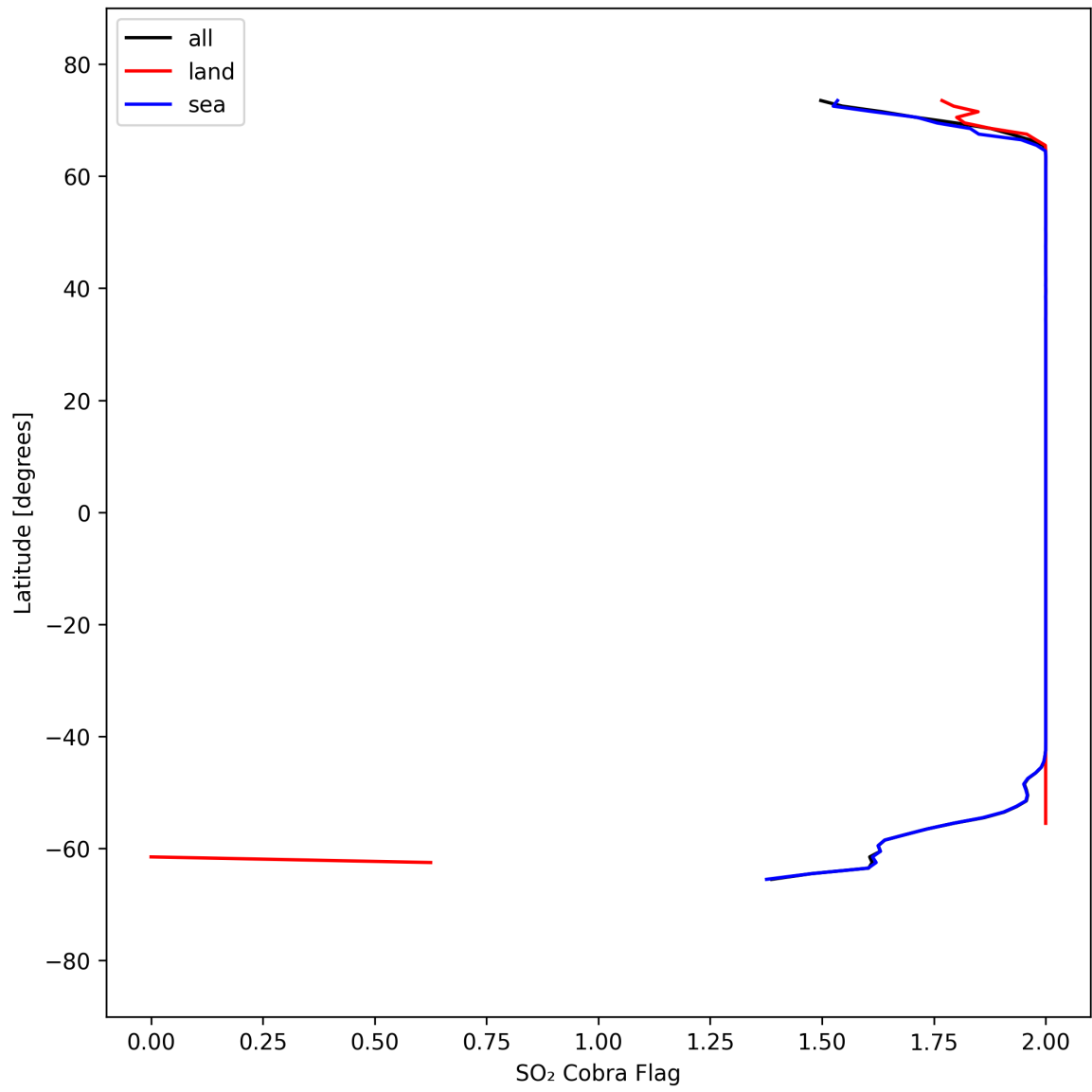


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-09-13 to 2025-09-13.

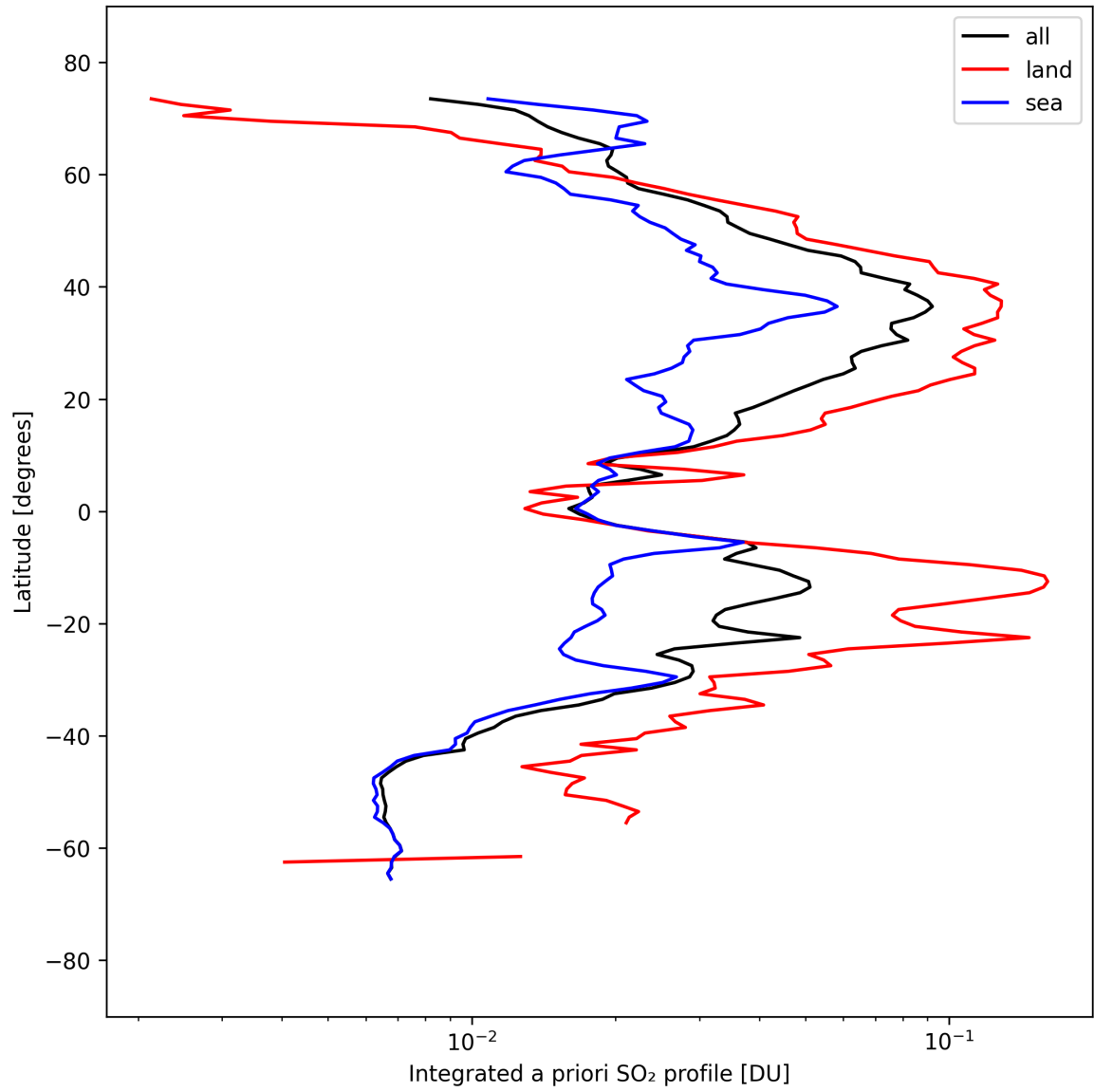


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-09-13 to 2025-09-13.

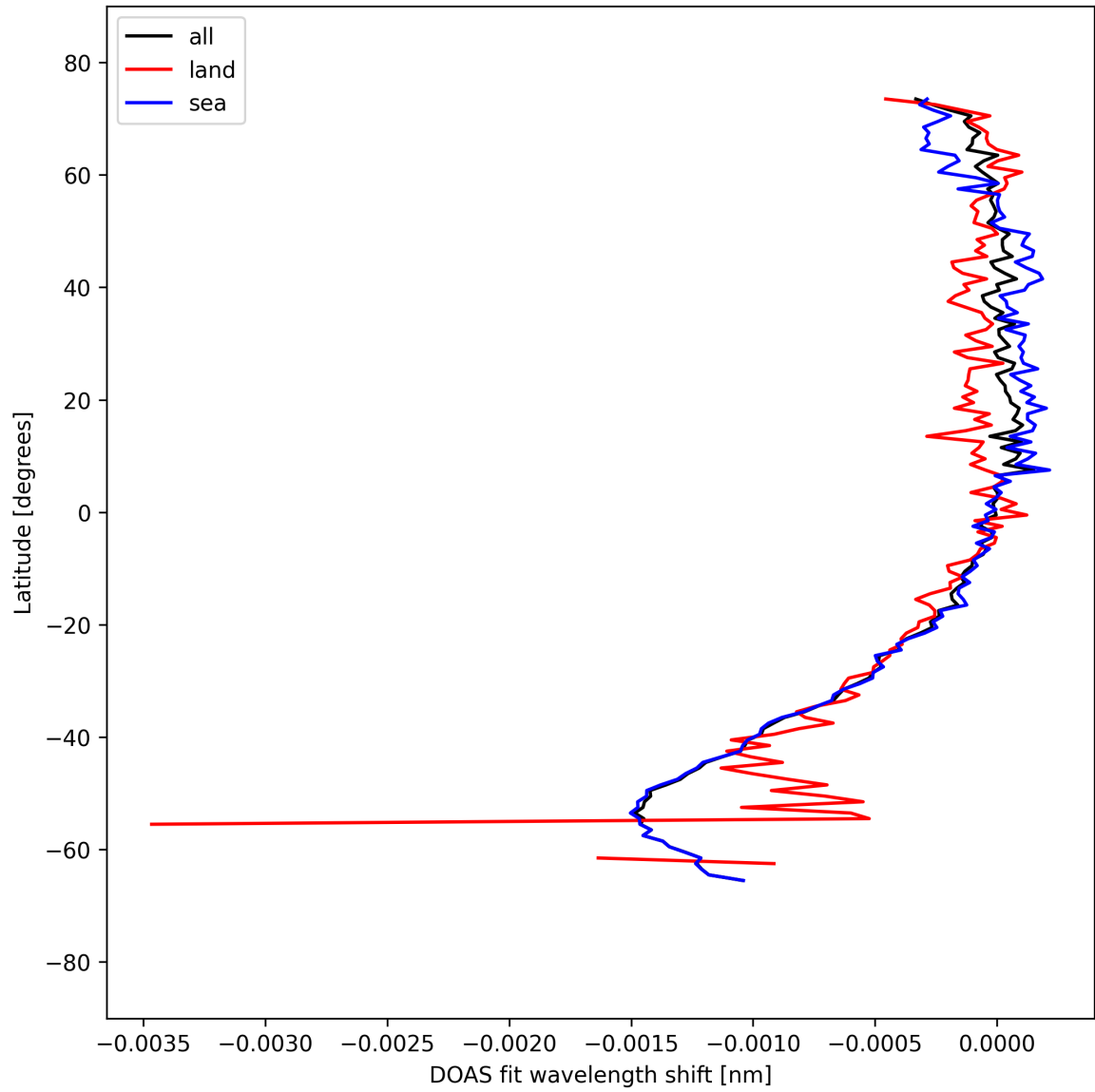


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-09-13 to 2025-09-13.

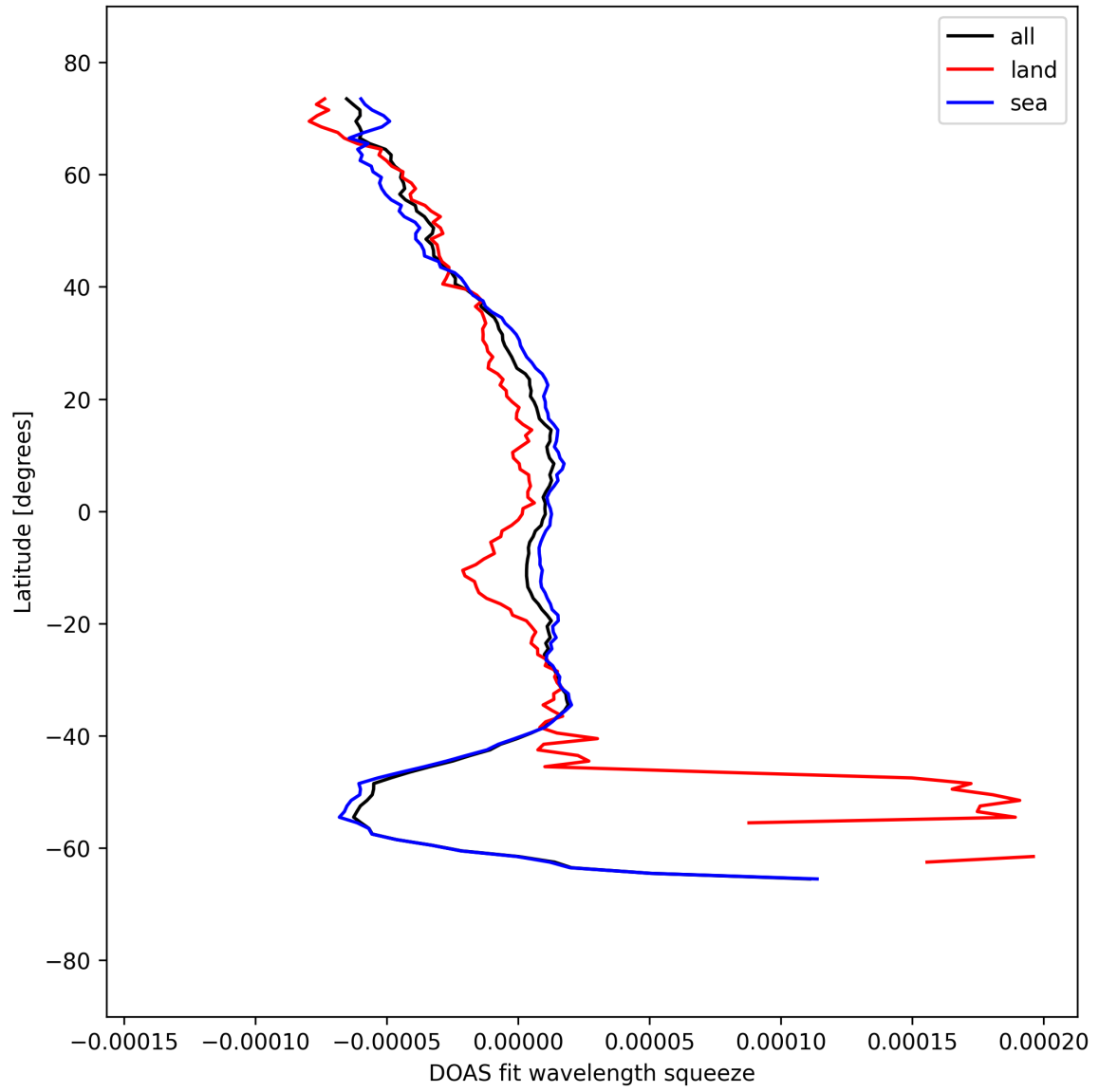


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-09-13 to 2025-09-13.

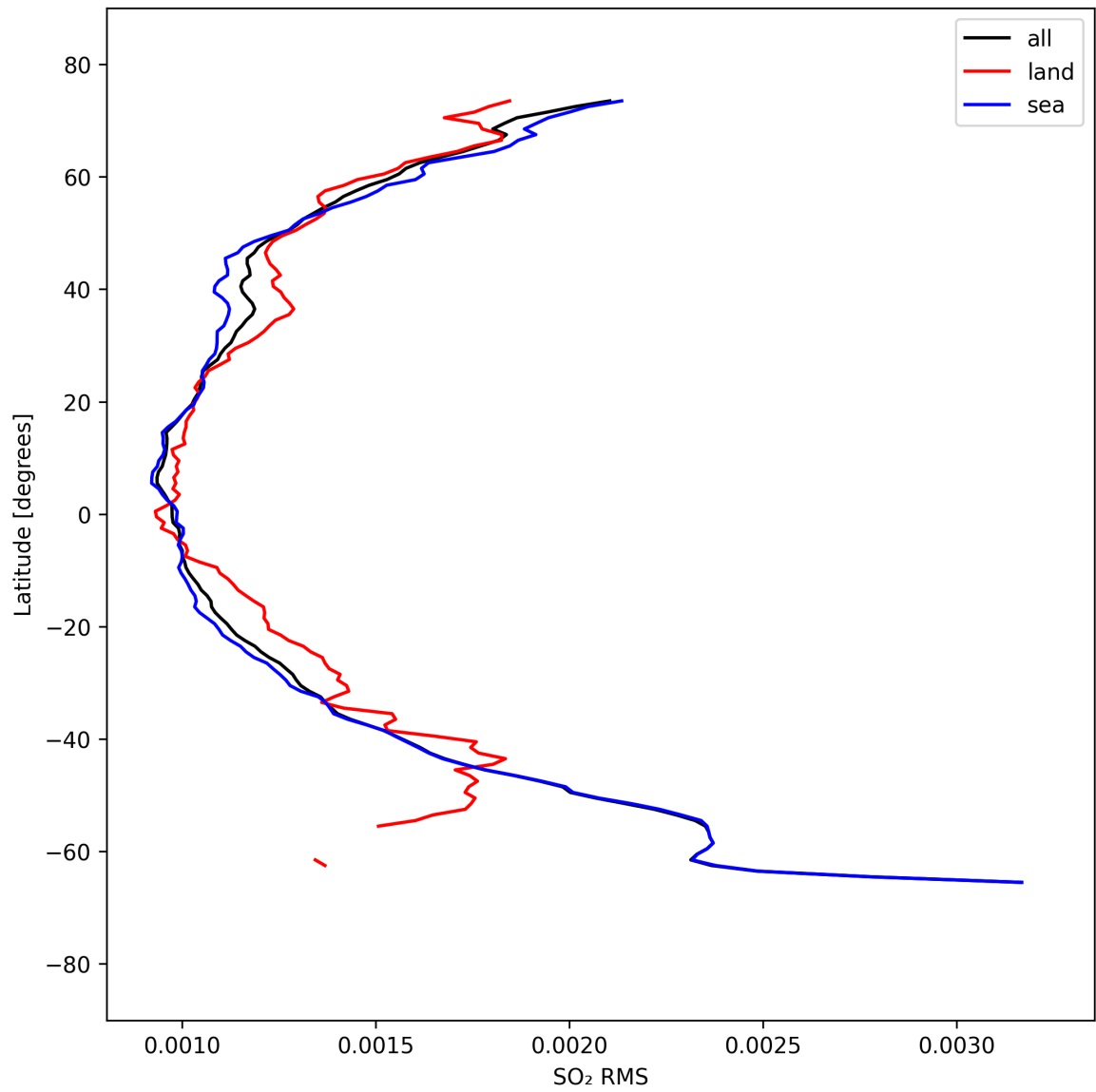


Figure 52: Zonal average of “SO₂ RMS” for 2025-09-13 to 2025-09-13.

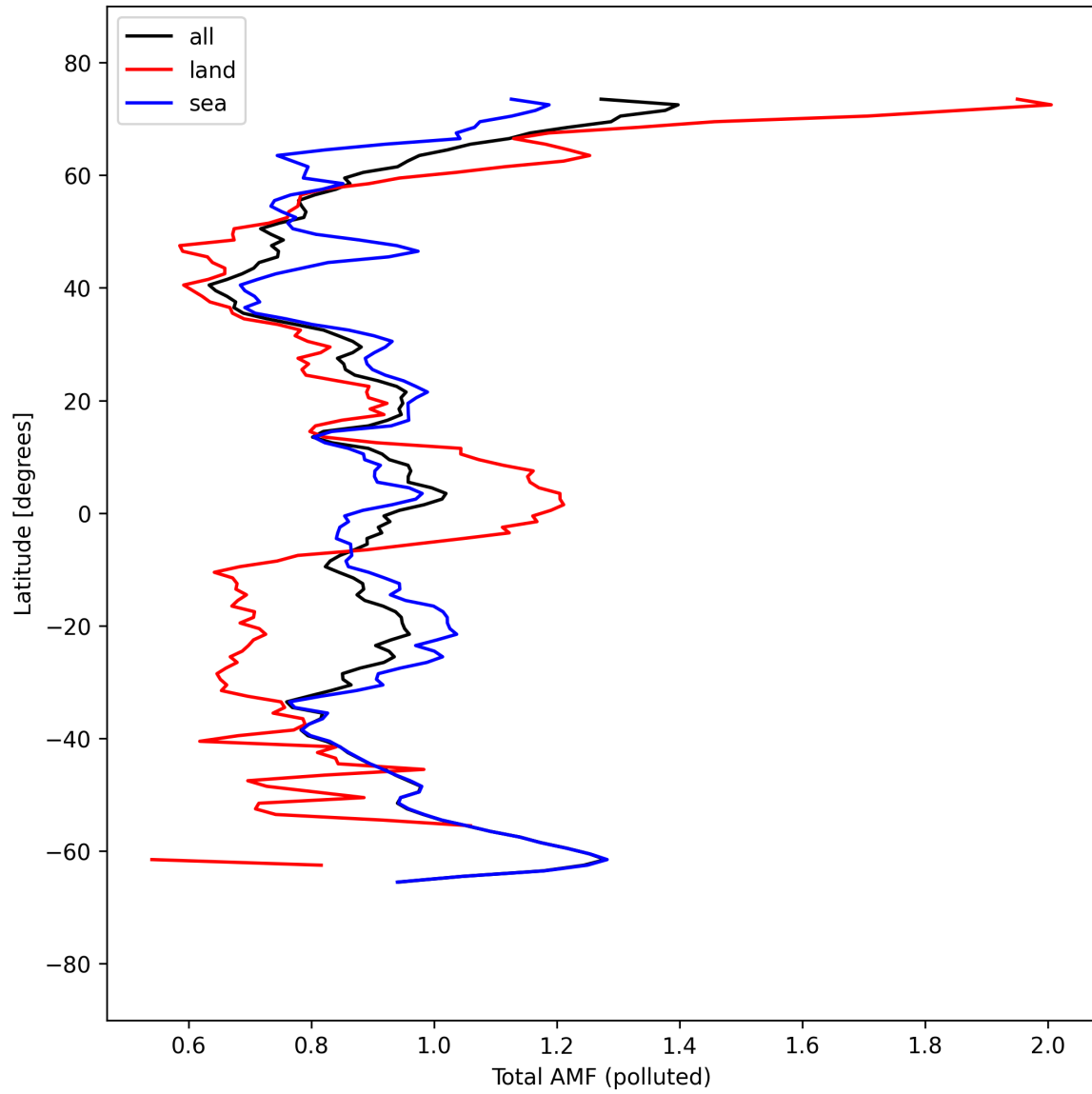


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-09-13 to 2025-09-13.

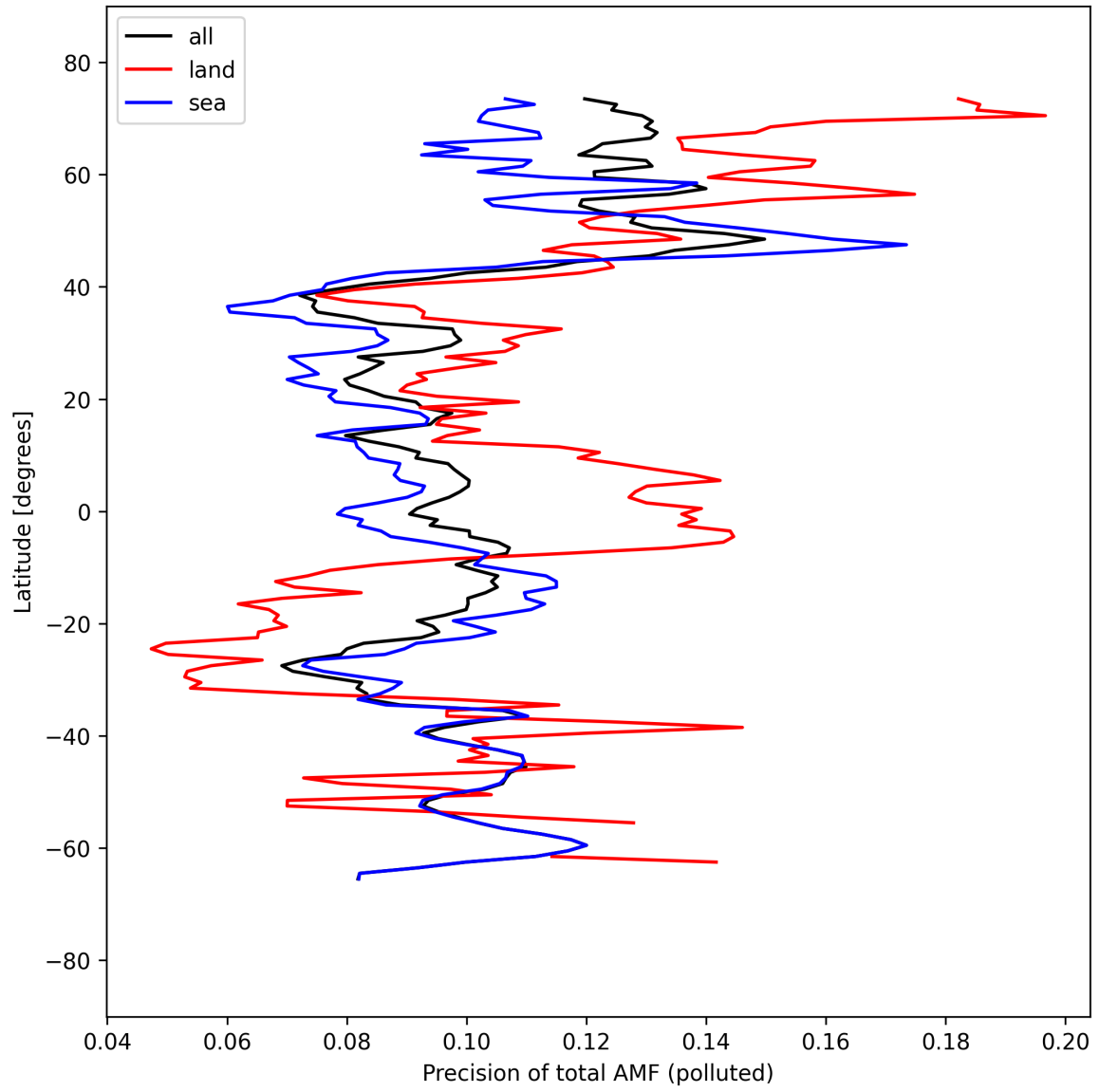


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-09-13 to 2025-09-13.

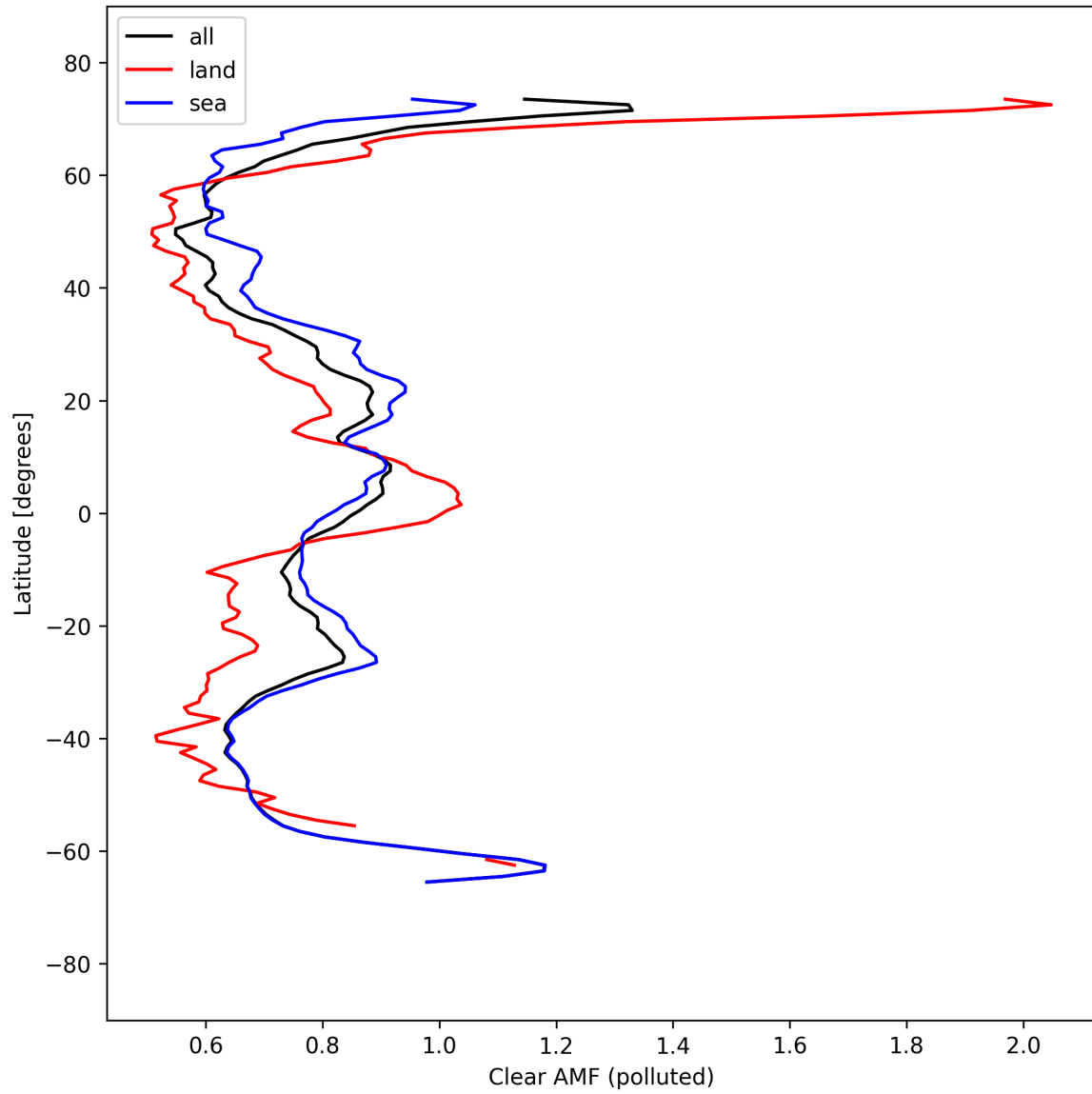


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-09-13 to 2025-09-13.

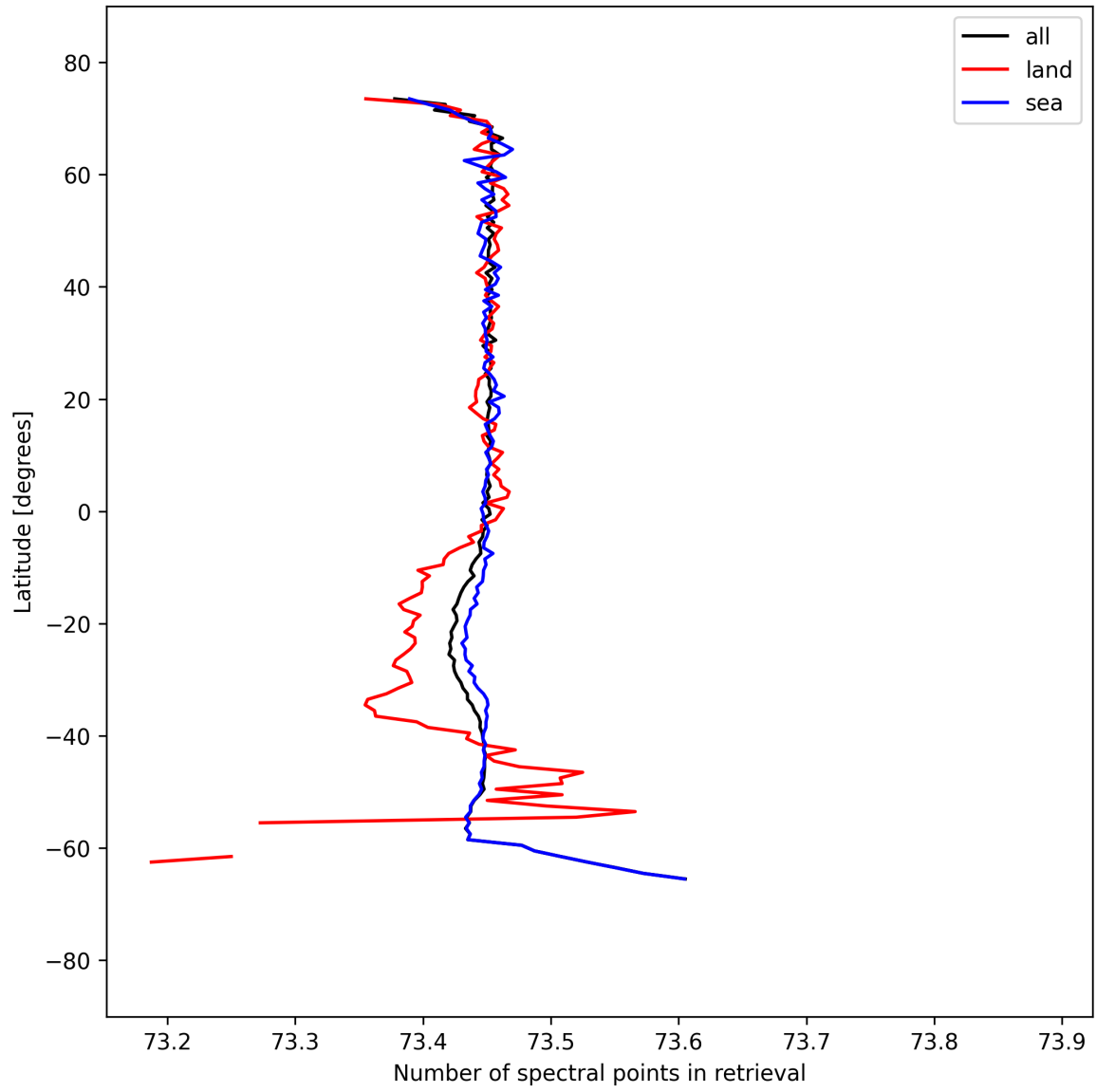


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-09-13 to 2025-09-13.

8 Histograms

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

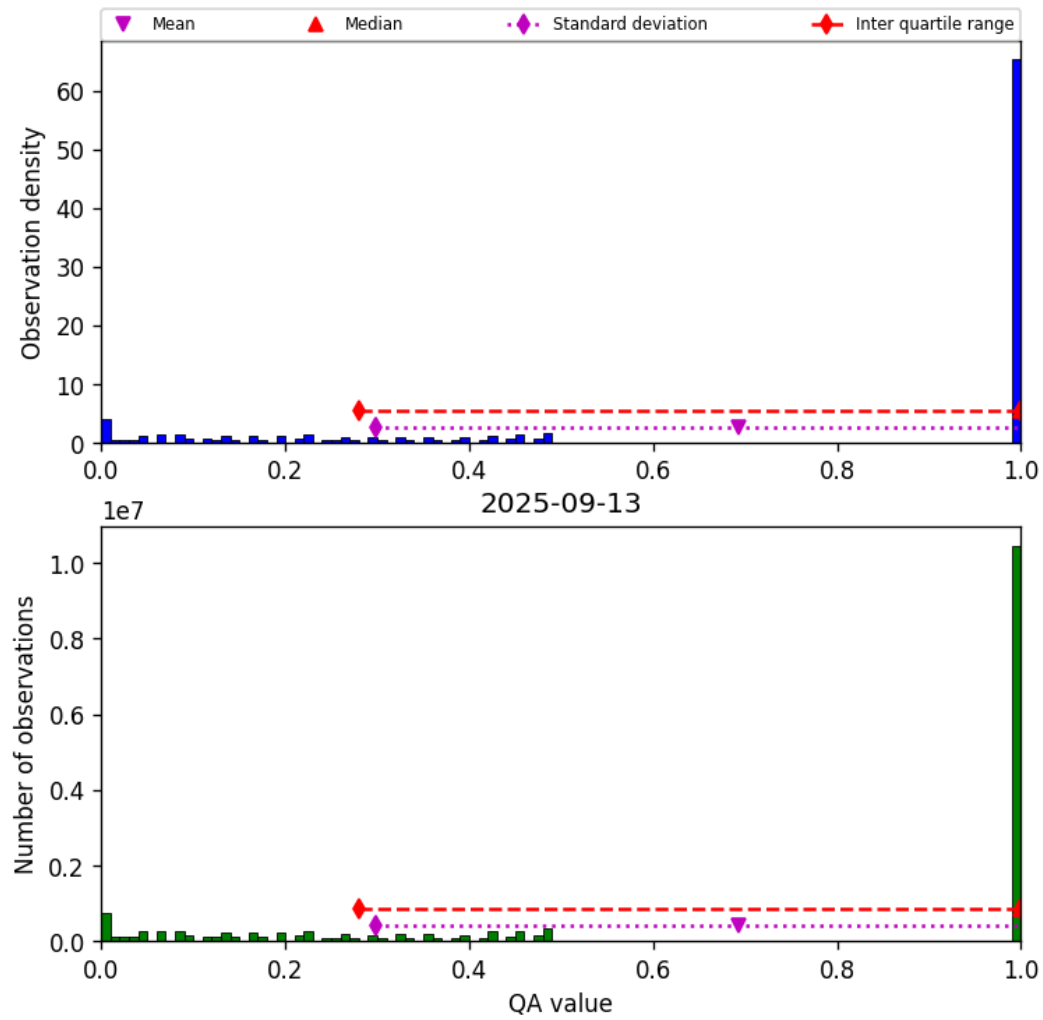


Figure 57: Histogram of “QA value” for 2025-09-13 to 2025-09-13

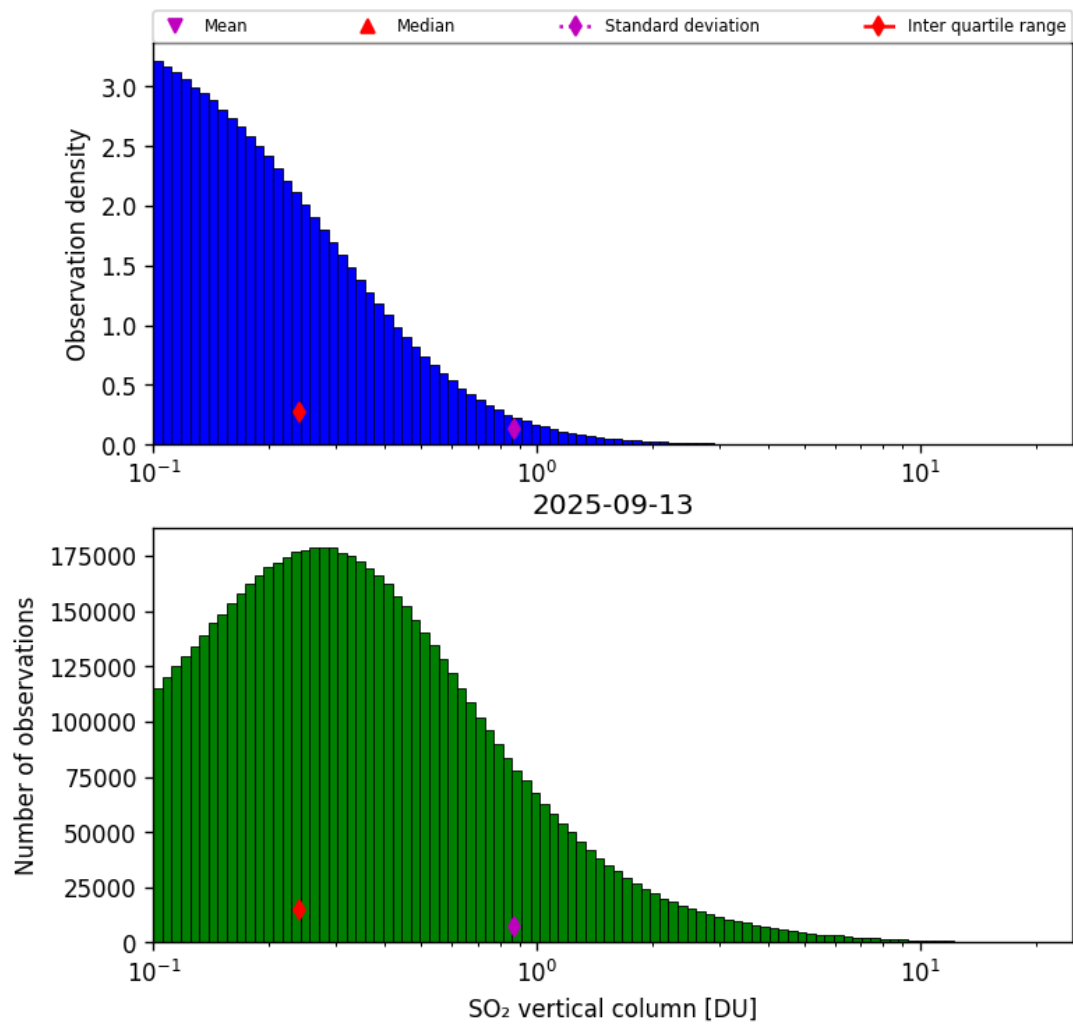


Figure 58: Histogram of “SO₂ vertical column” for 2025-09-13 to 2025-09-13

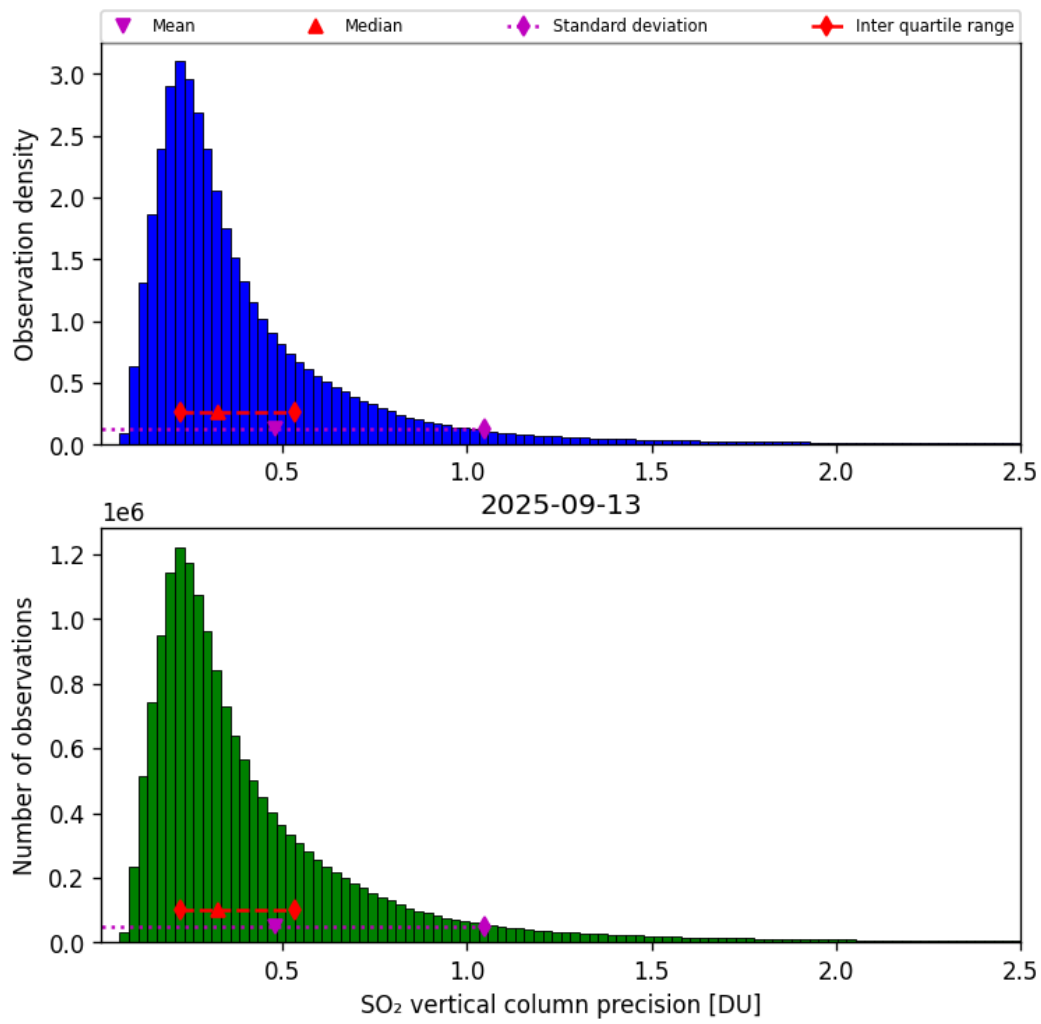


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-09-13 to 2025-09-13

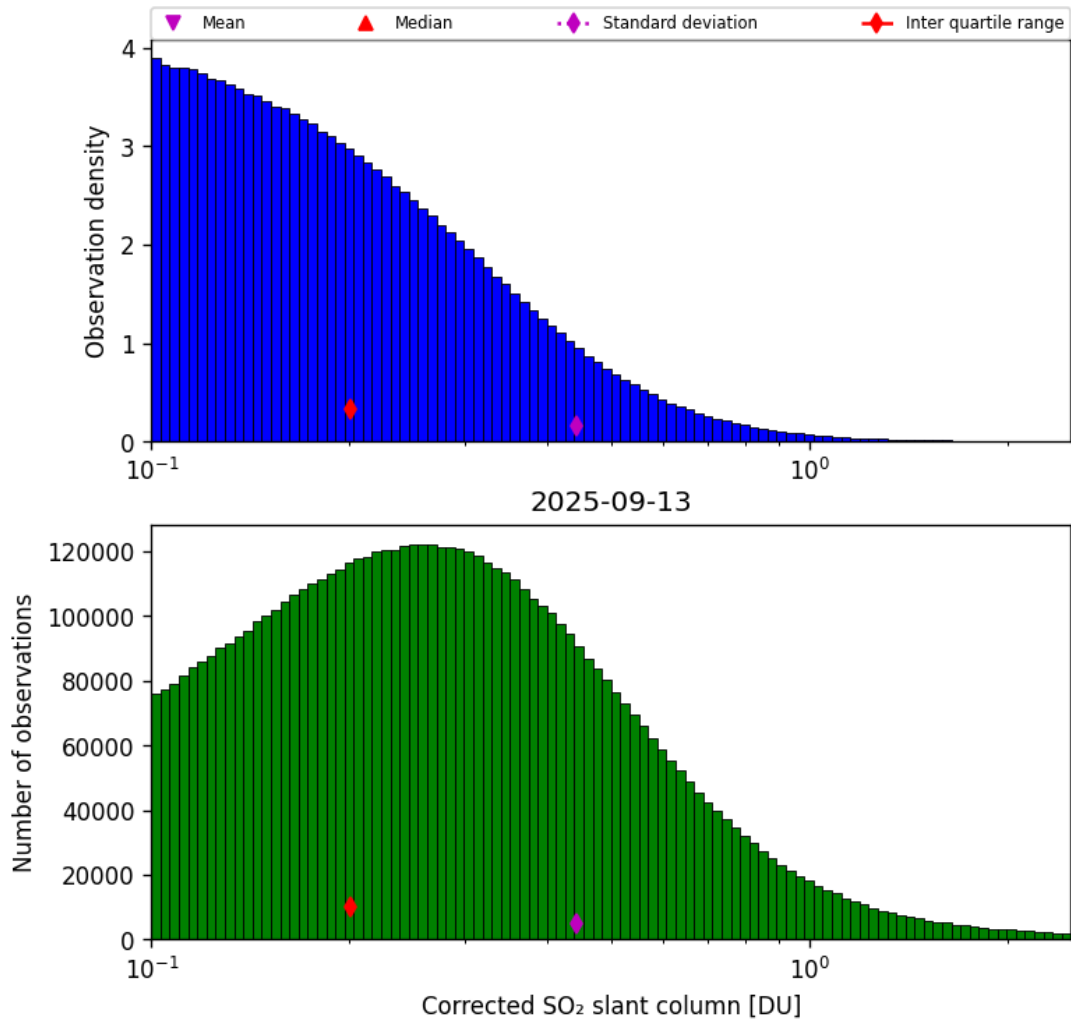


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-09-13 to 2025-09-13

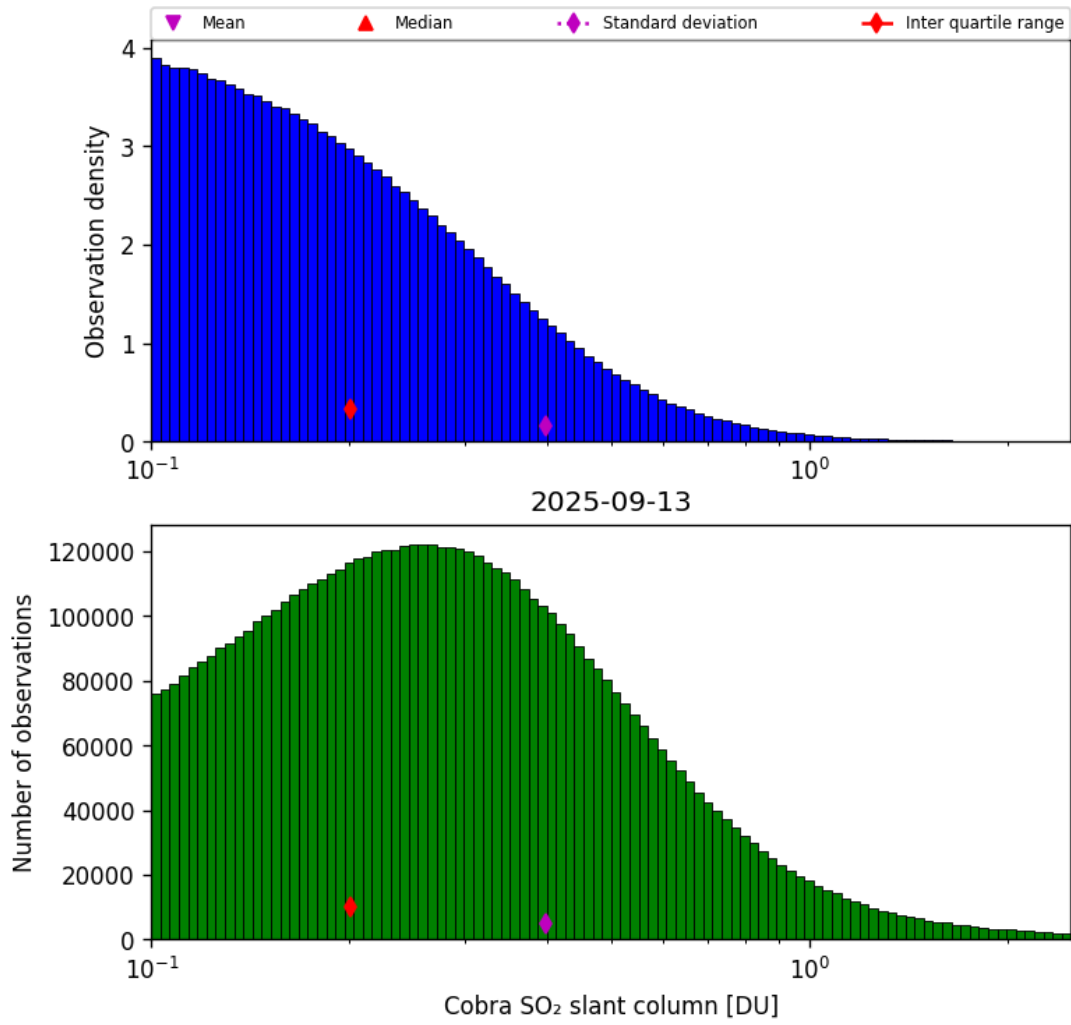


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-09-13 to 2025-09-13

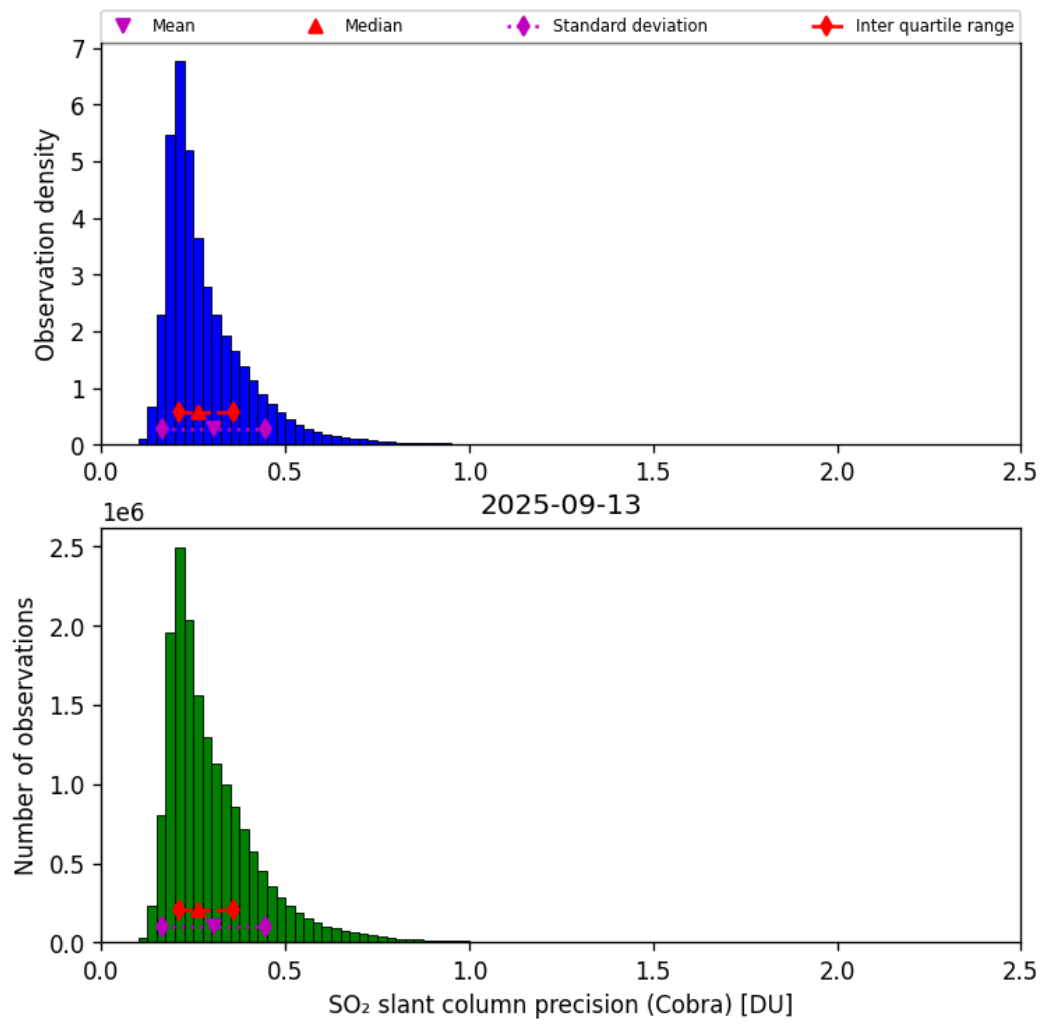


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-09-13 to 2025-09-13

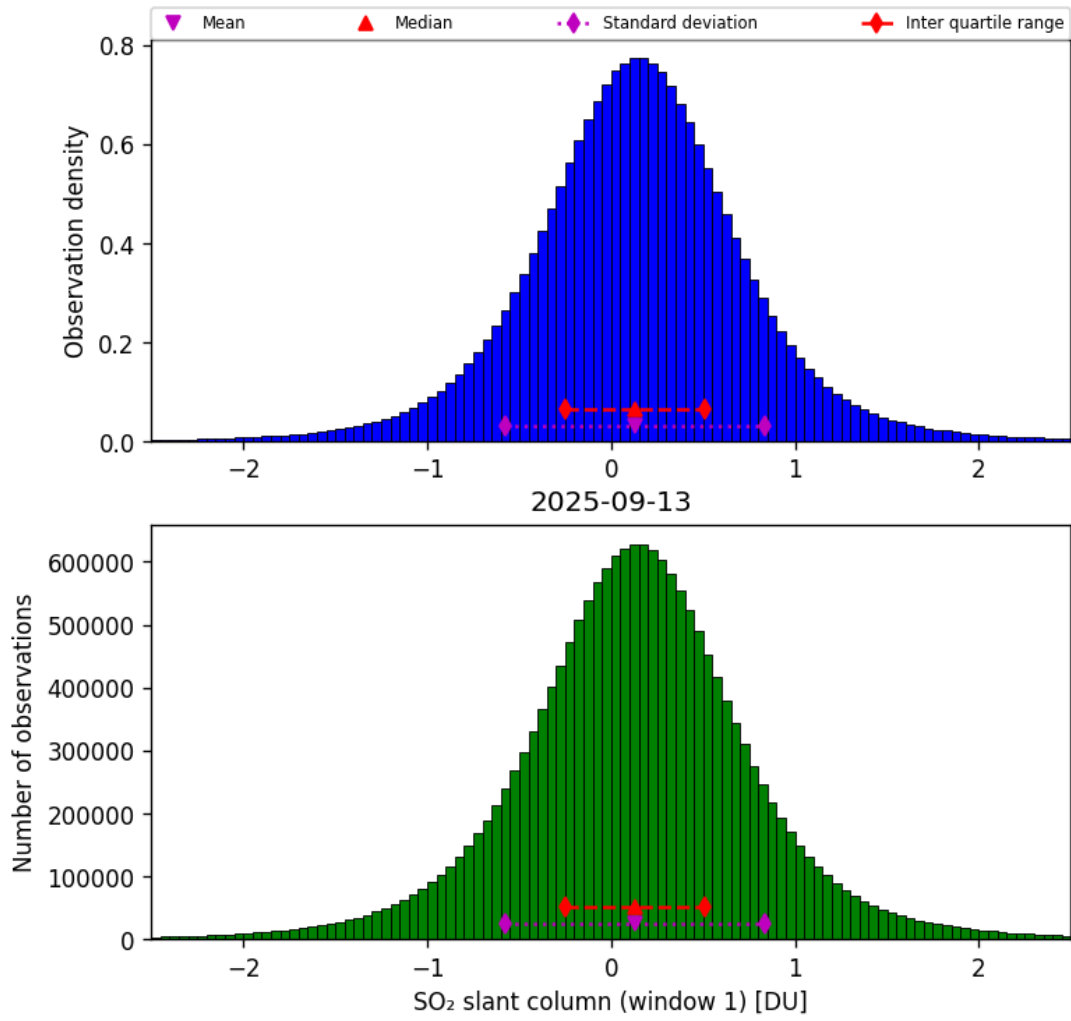


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-09-13 to 2025-09-13

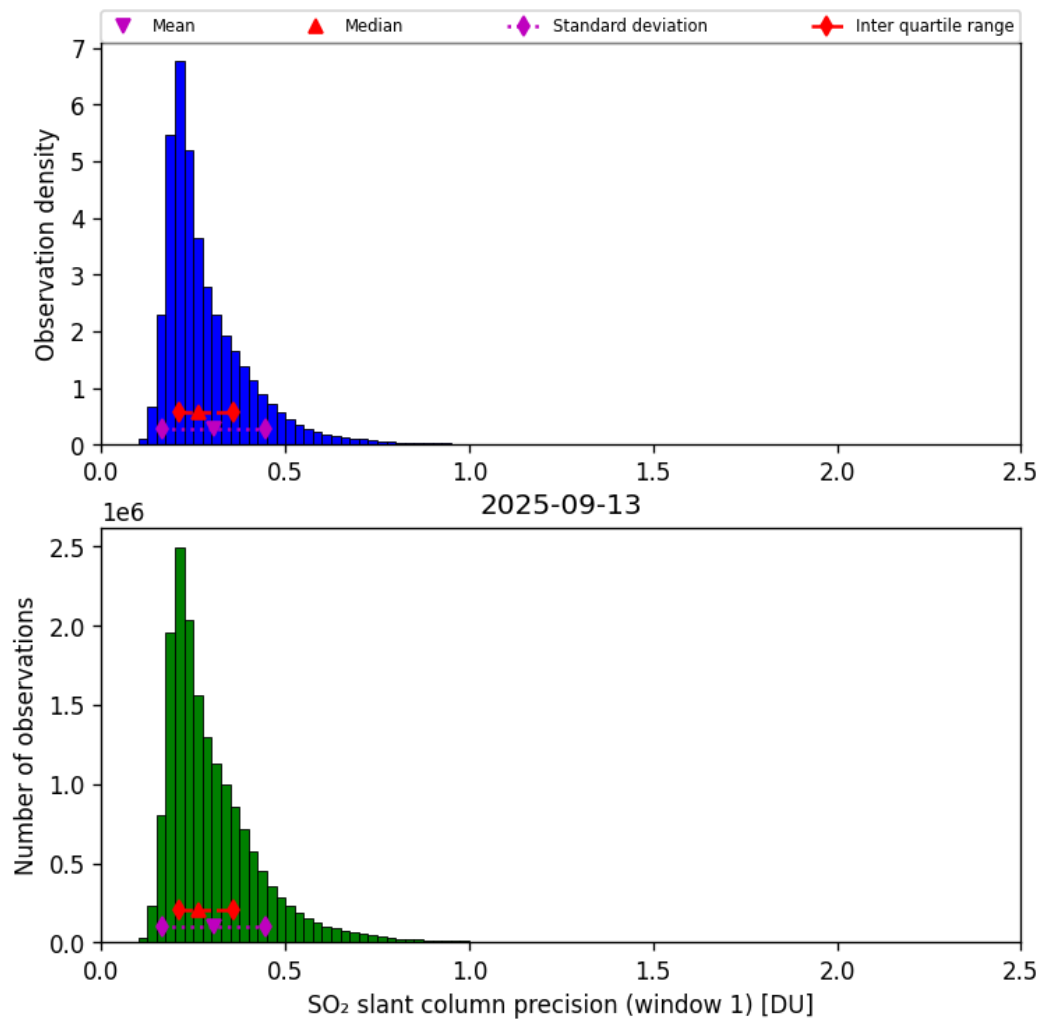


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-09-13 to 2025-09-13

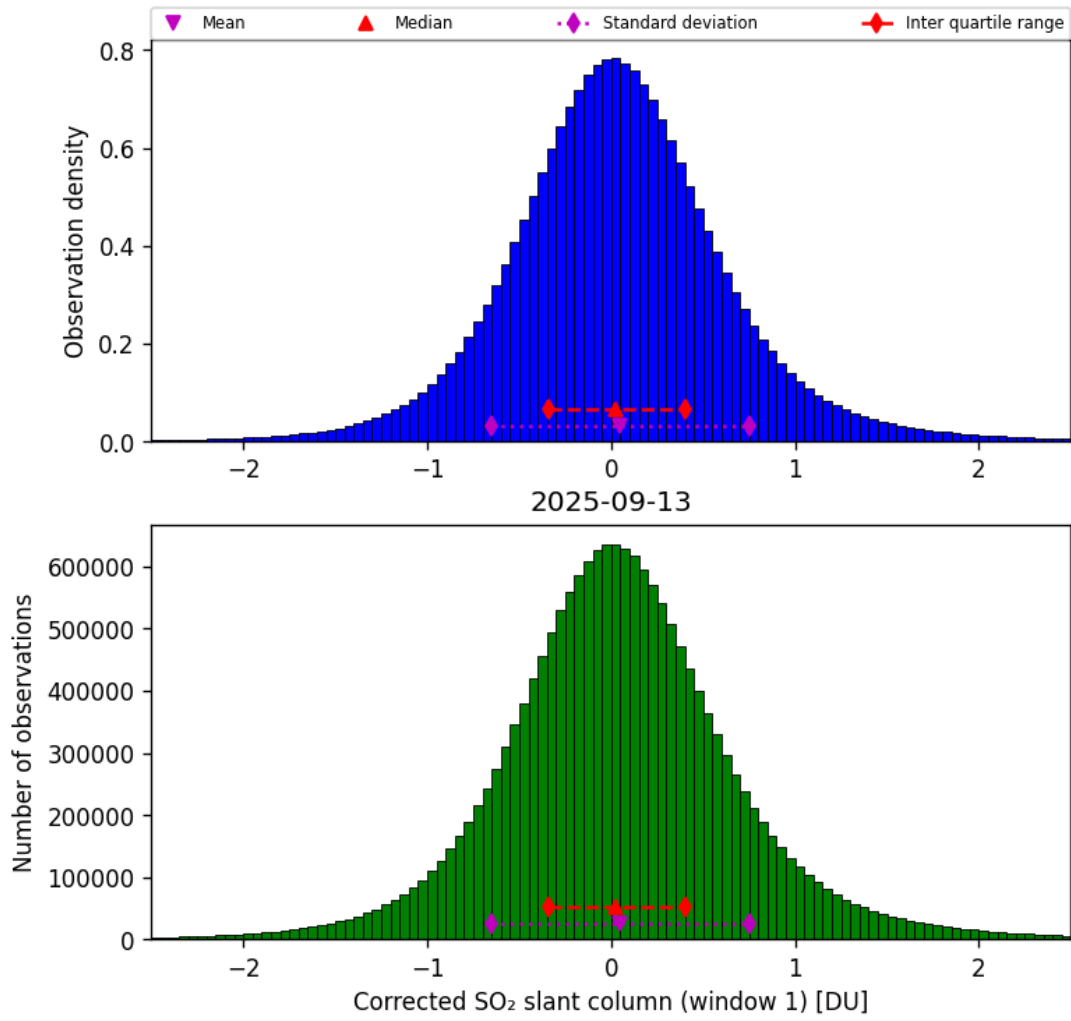


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-09-13 to 2025-09-13

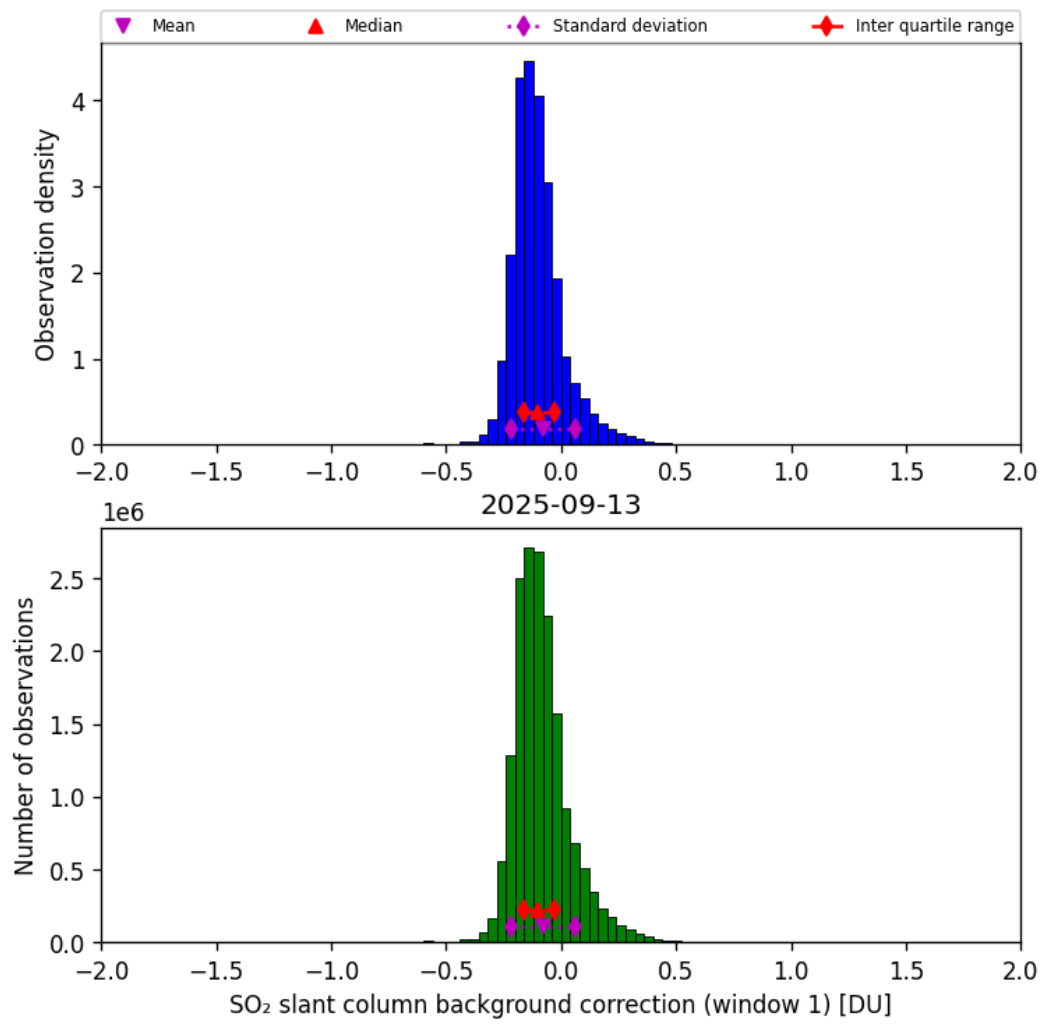


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-09-13 to 2025-09-13

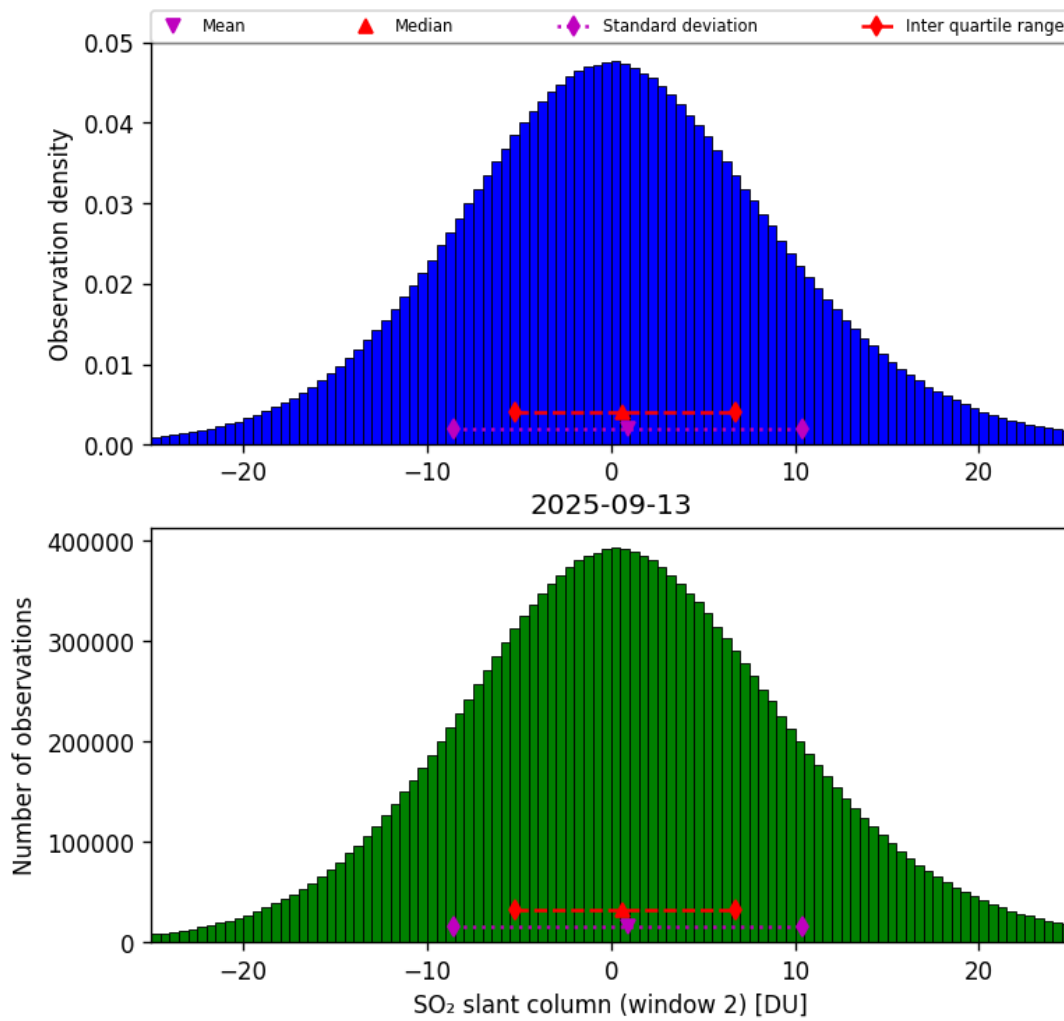


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-09-13 to 2025-09-13

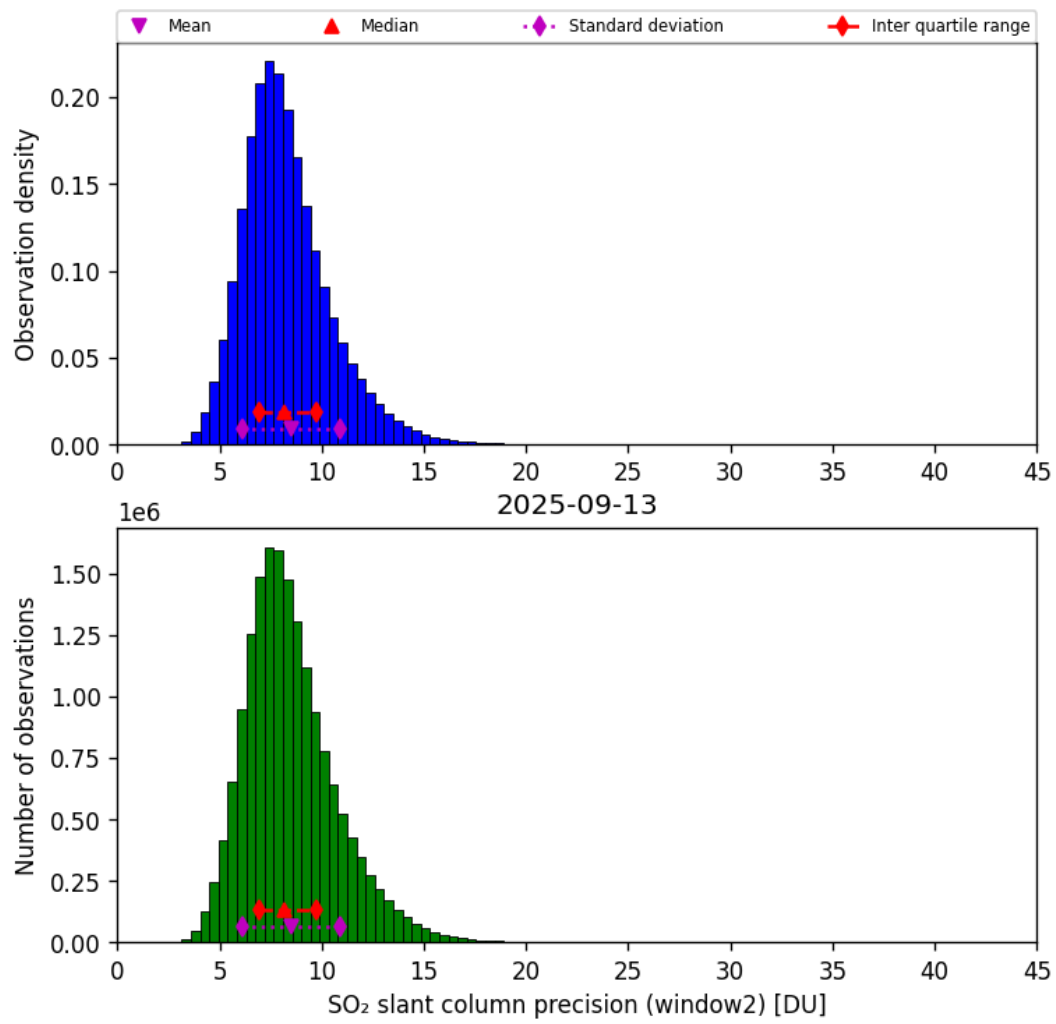


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-09-13 to 2025-09-13

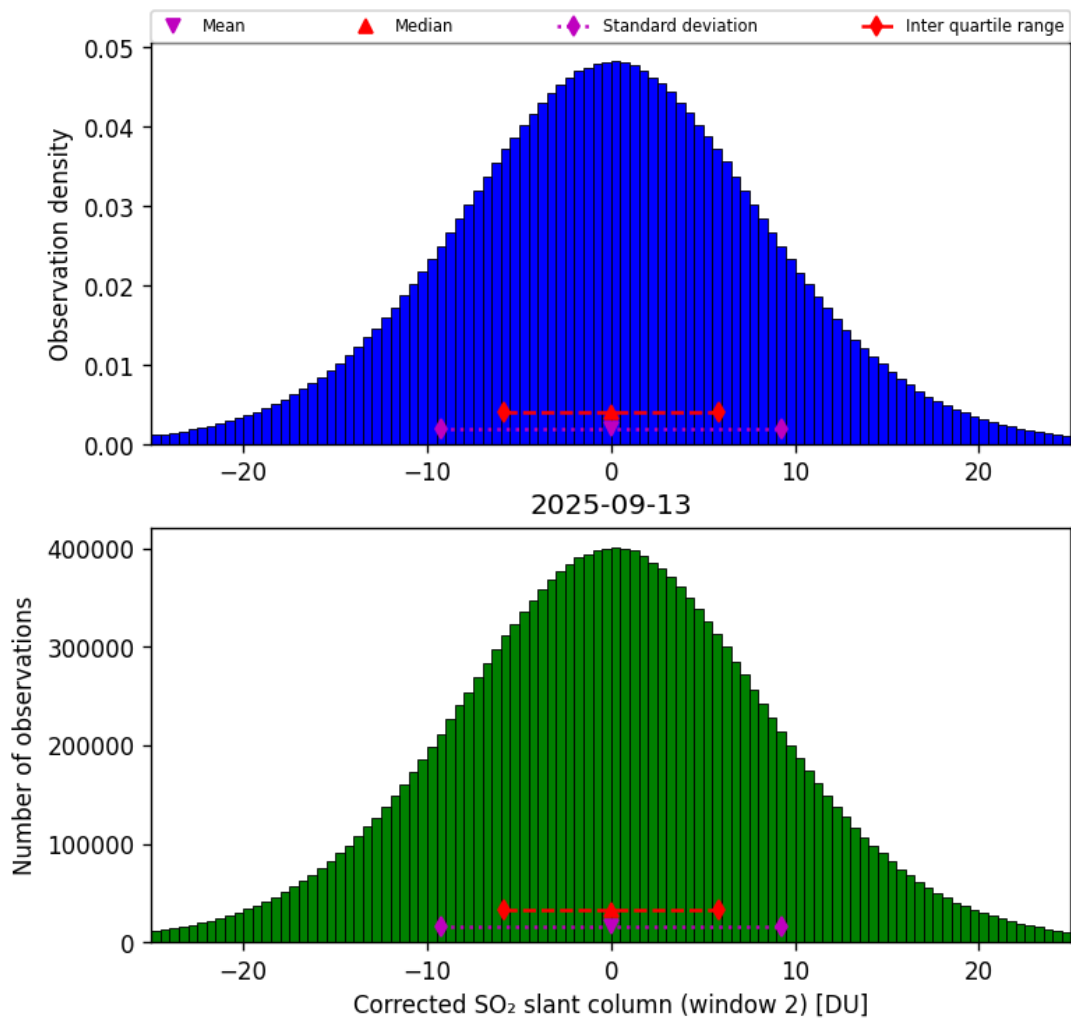


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-09-13 to 2025-09-13

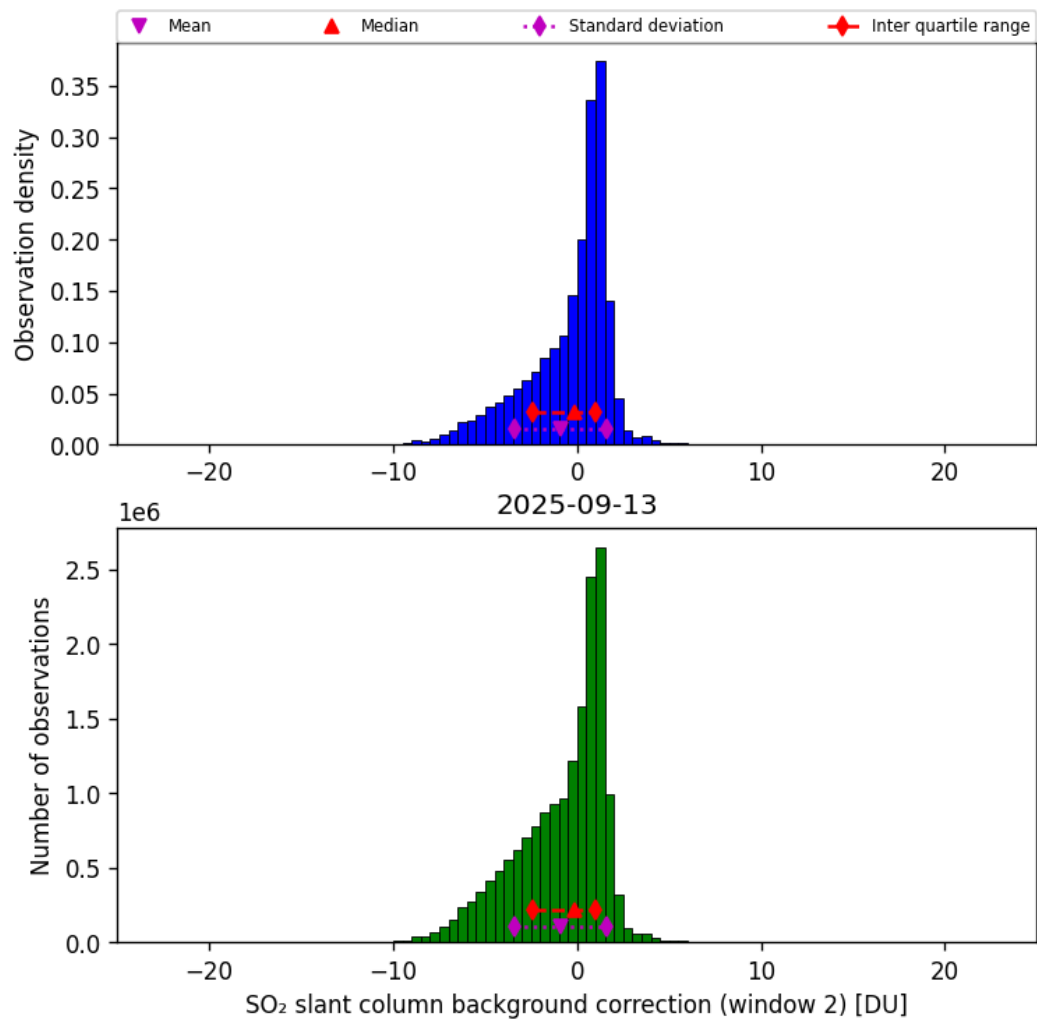


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-09-13 to 2025-09-13

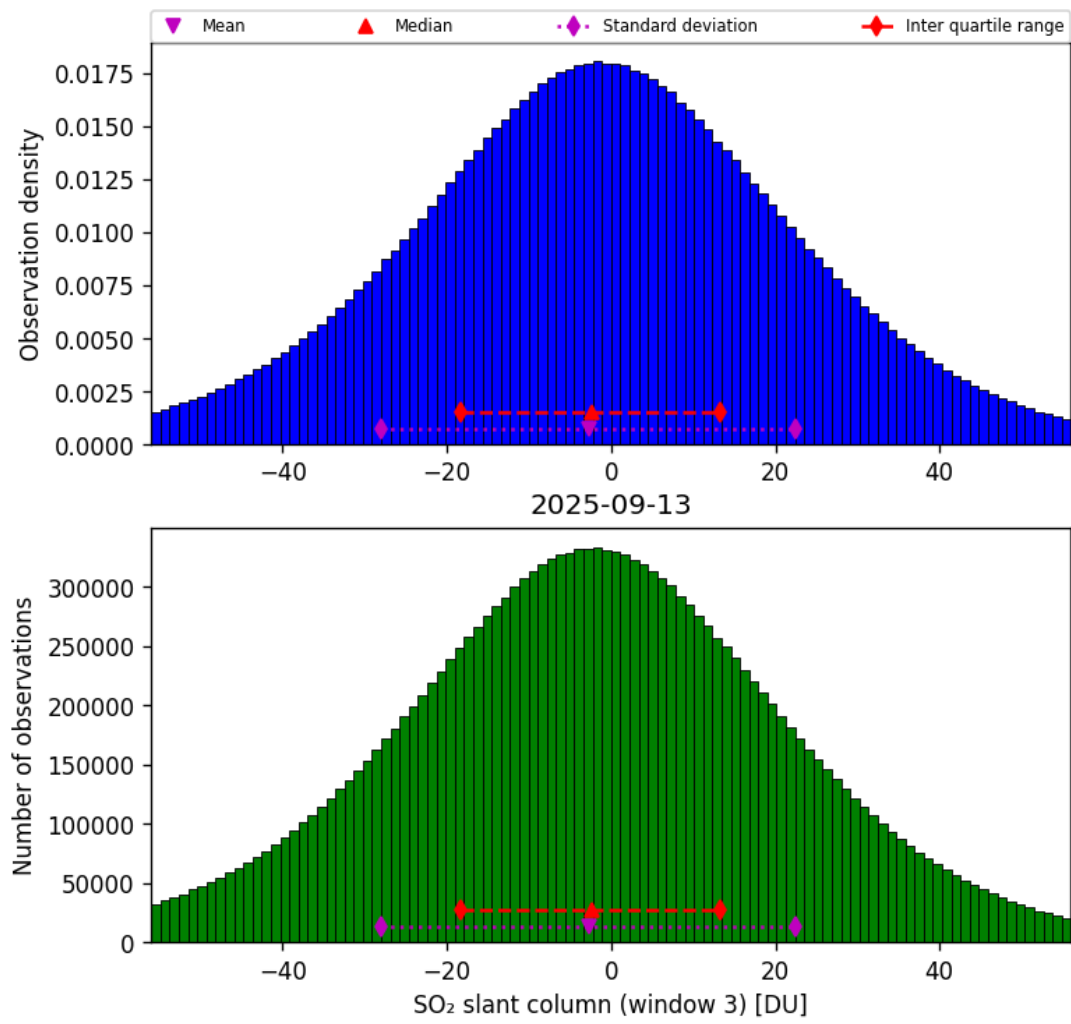


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-09-13 to 2025-09-13

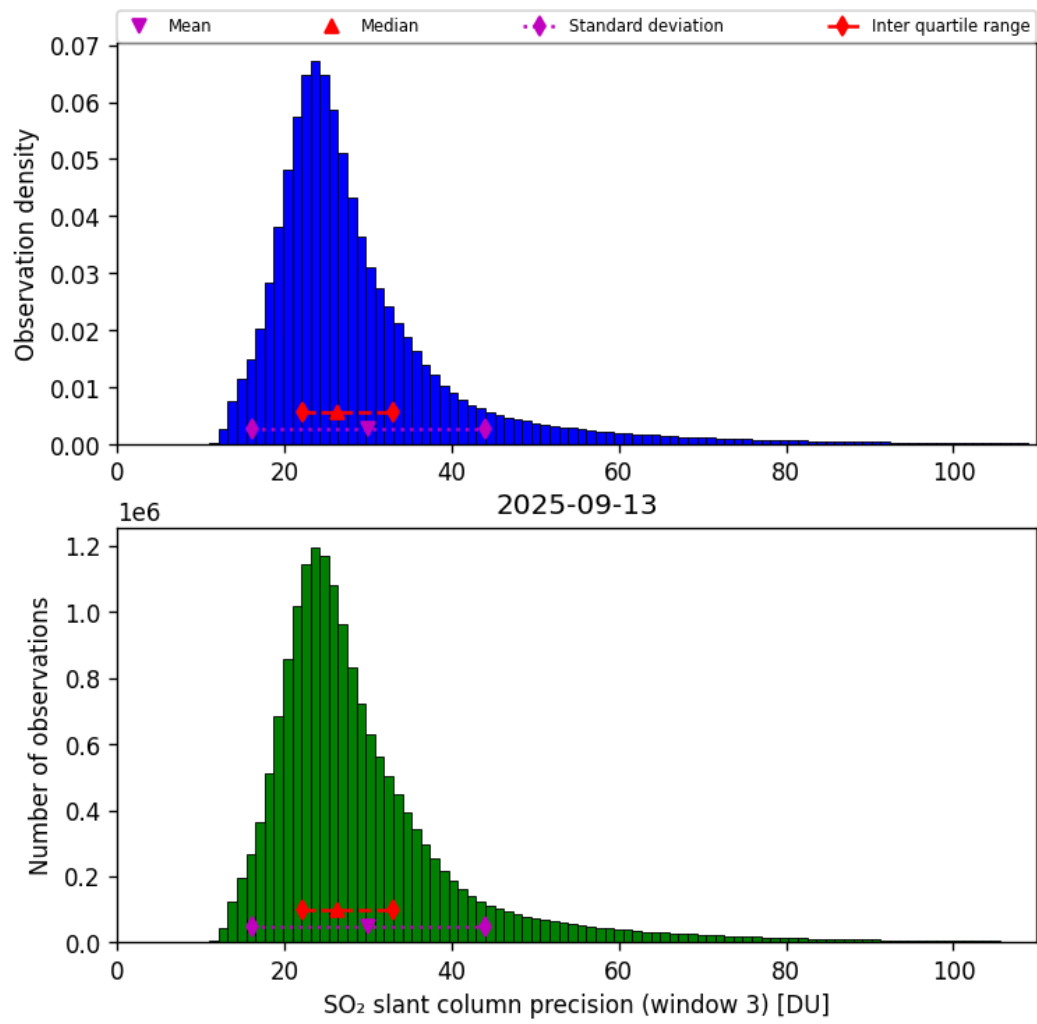


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-09-13 to 2025-09-13

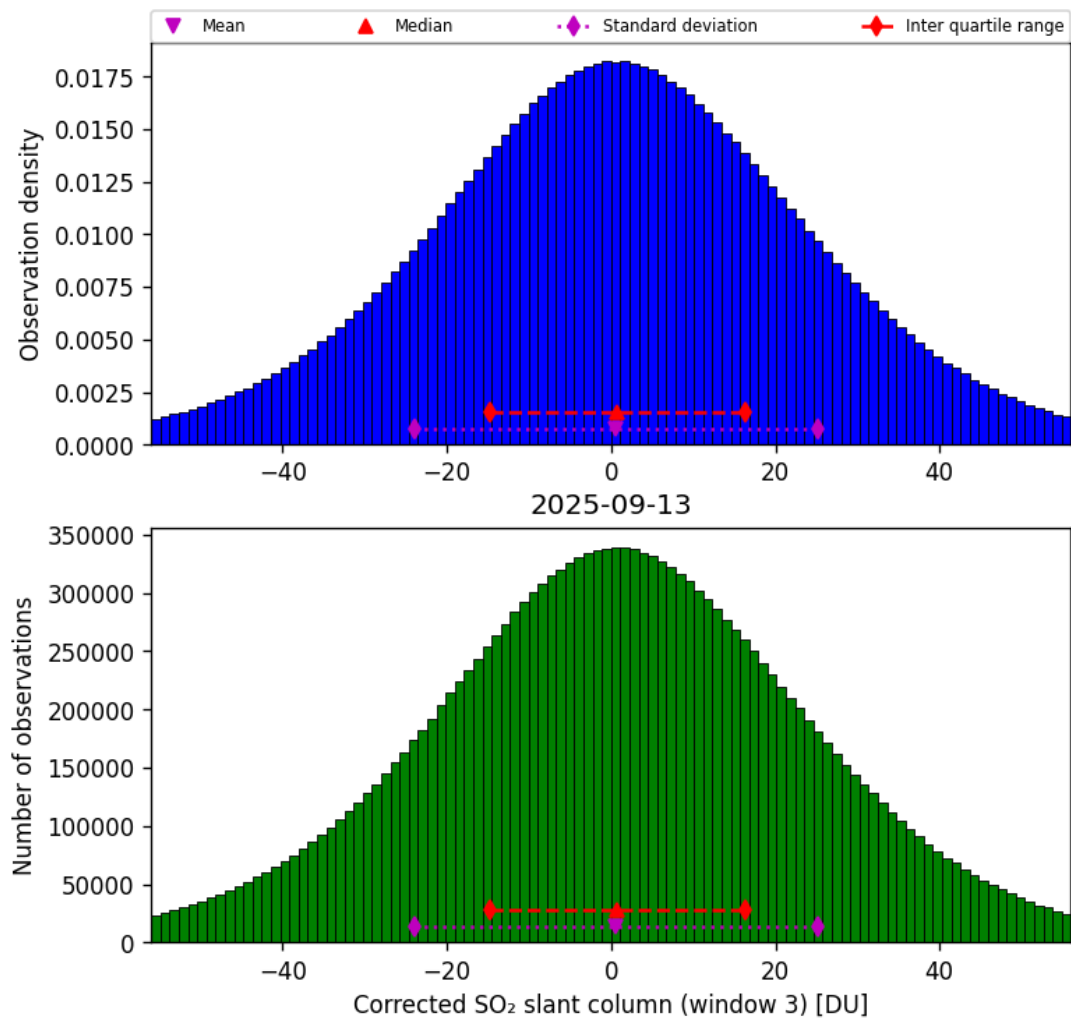


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-09-13 to 2025-09-13

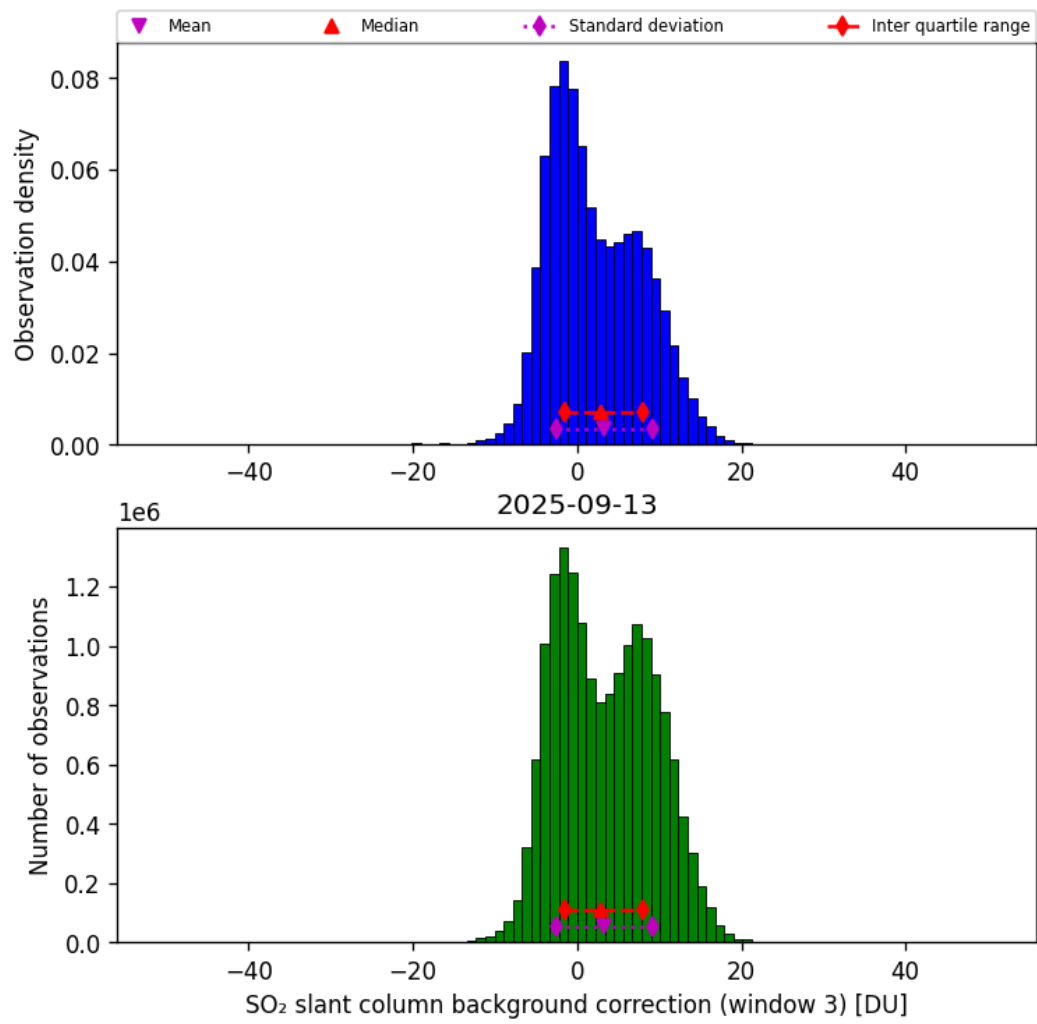


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-09-13 to 2025-09-13

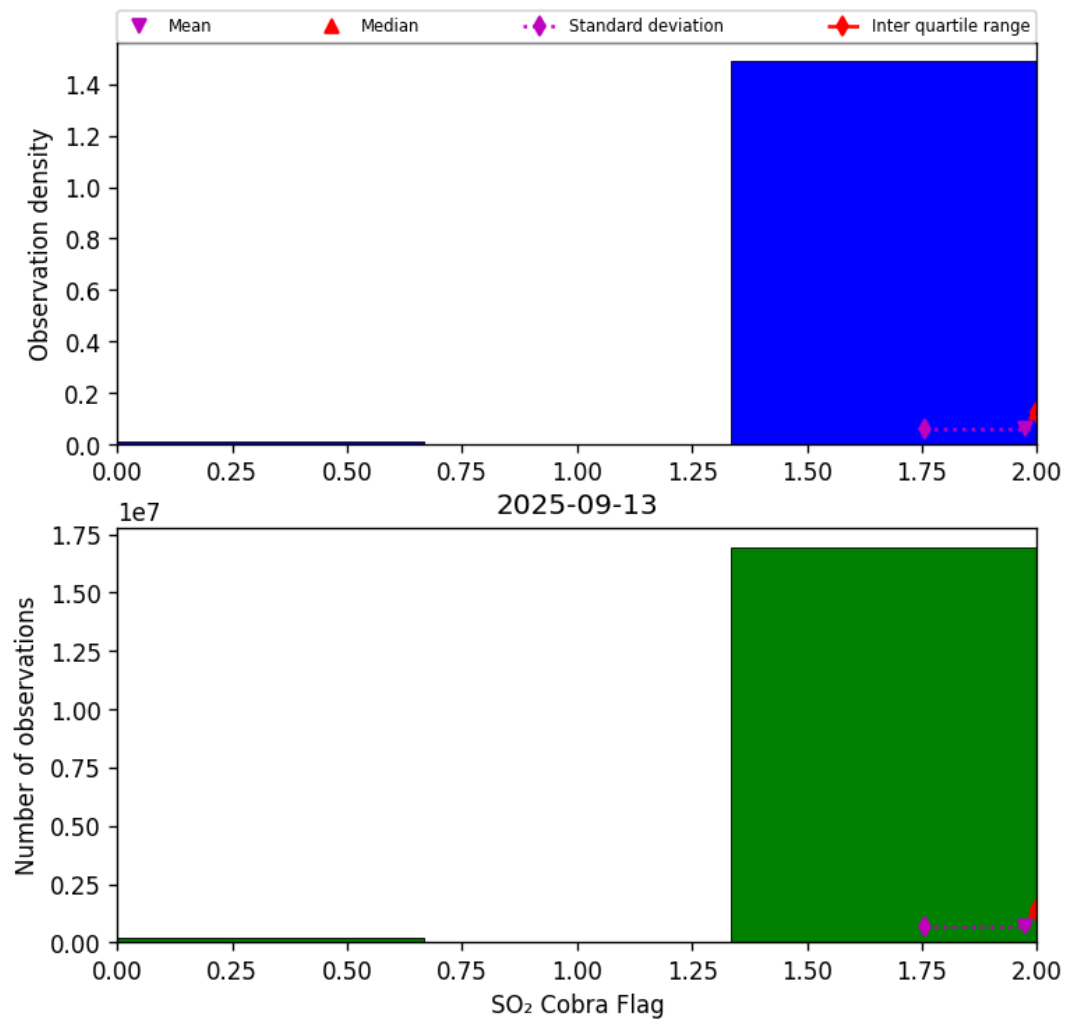


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-09-13 to 2025-09-13

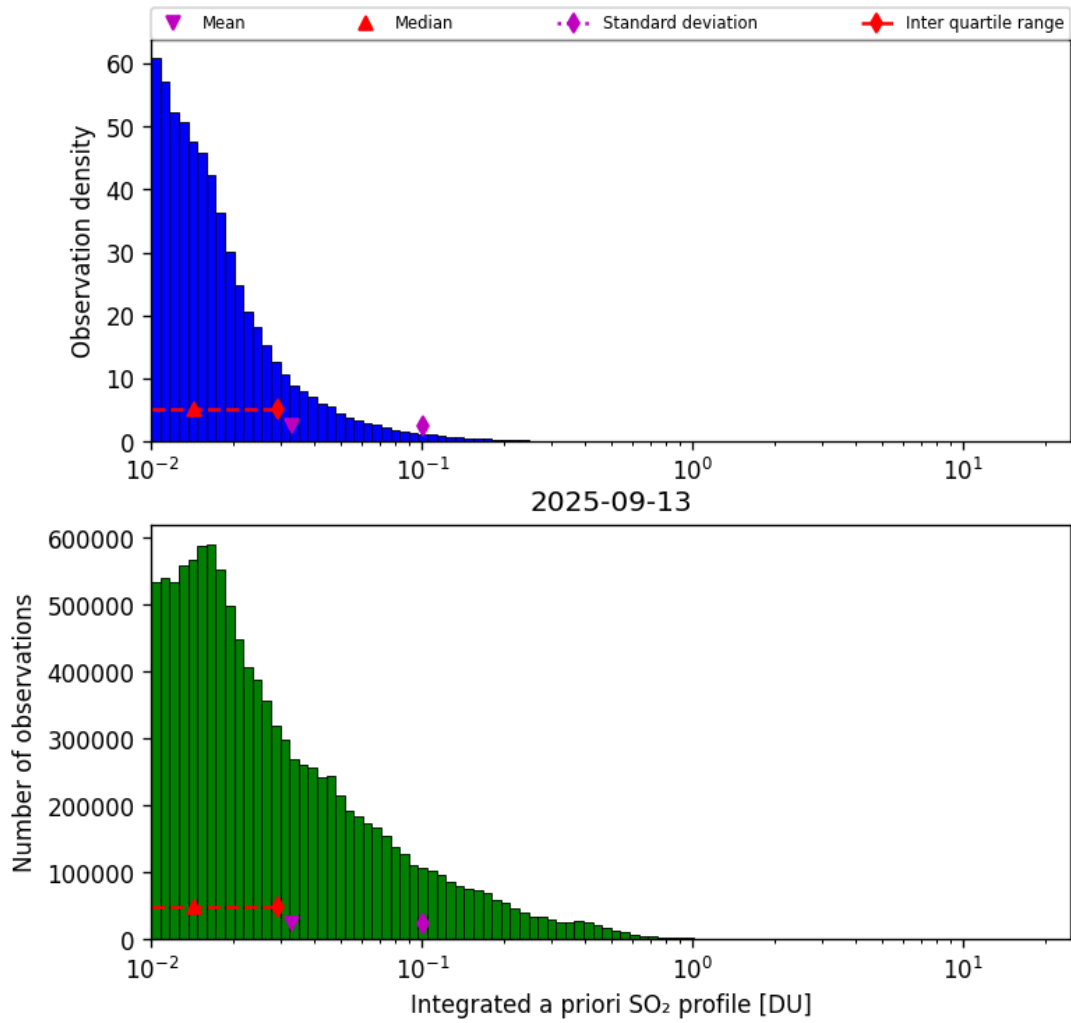


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-09-13 to 2025-09-13

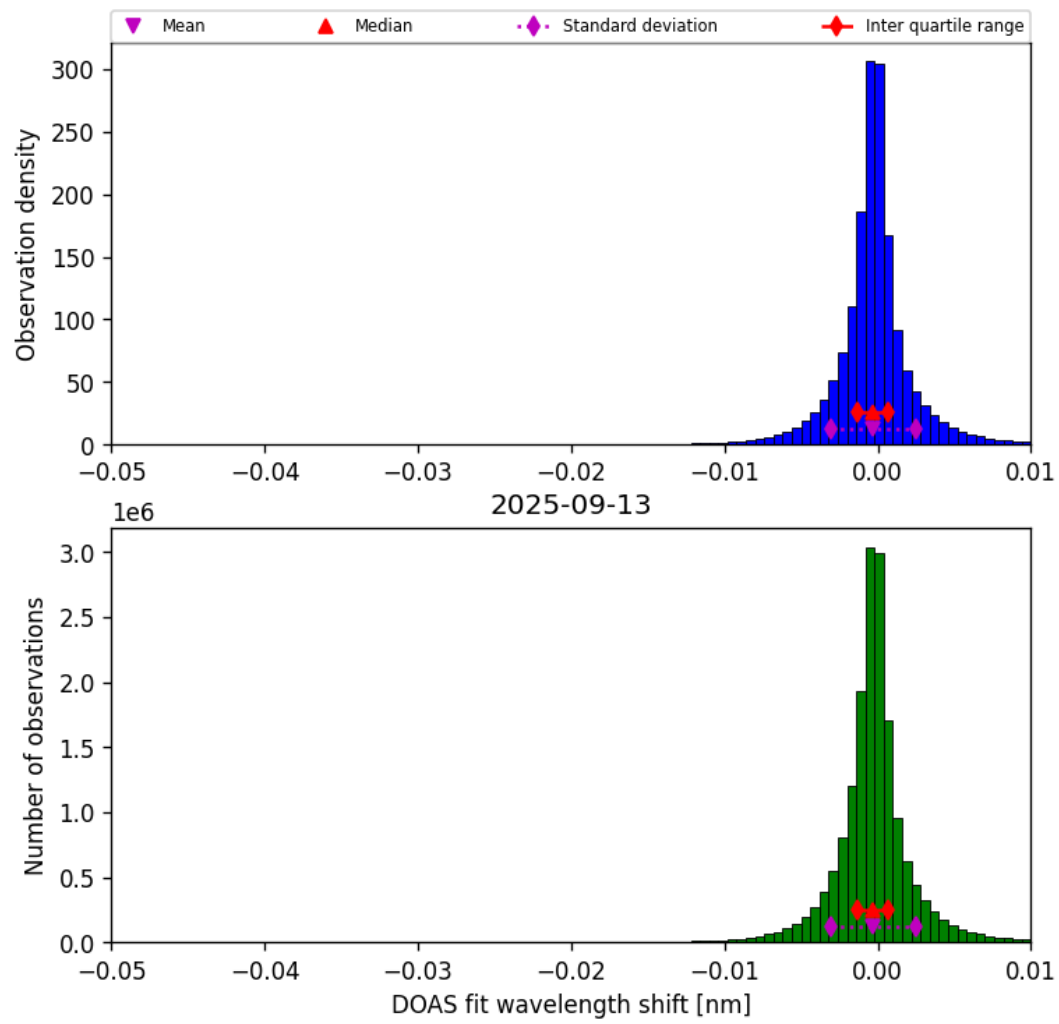


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-09-13 to 2025-09-13

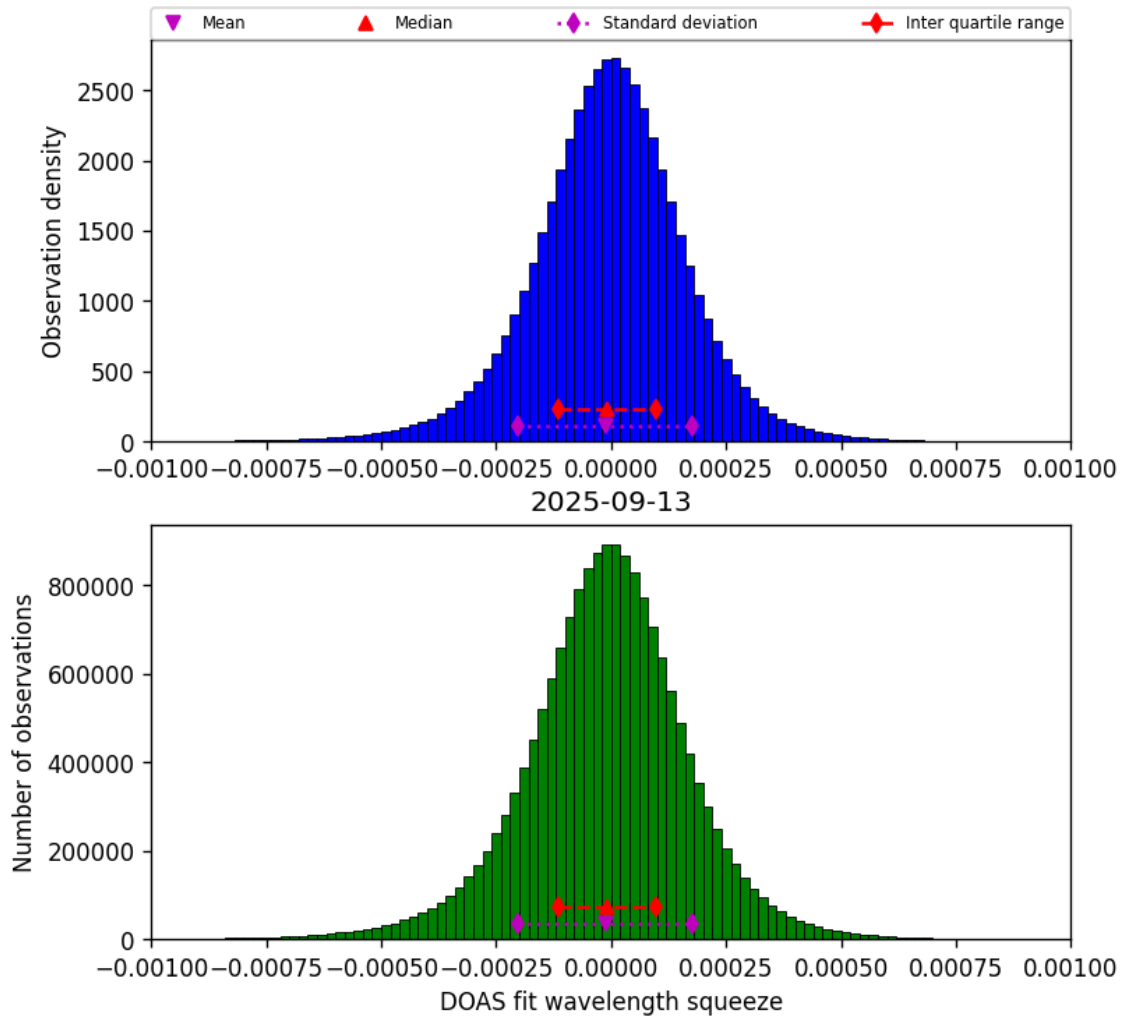


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-09-13 to 2025-09-13

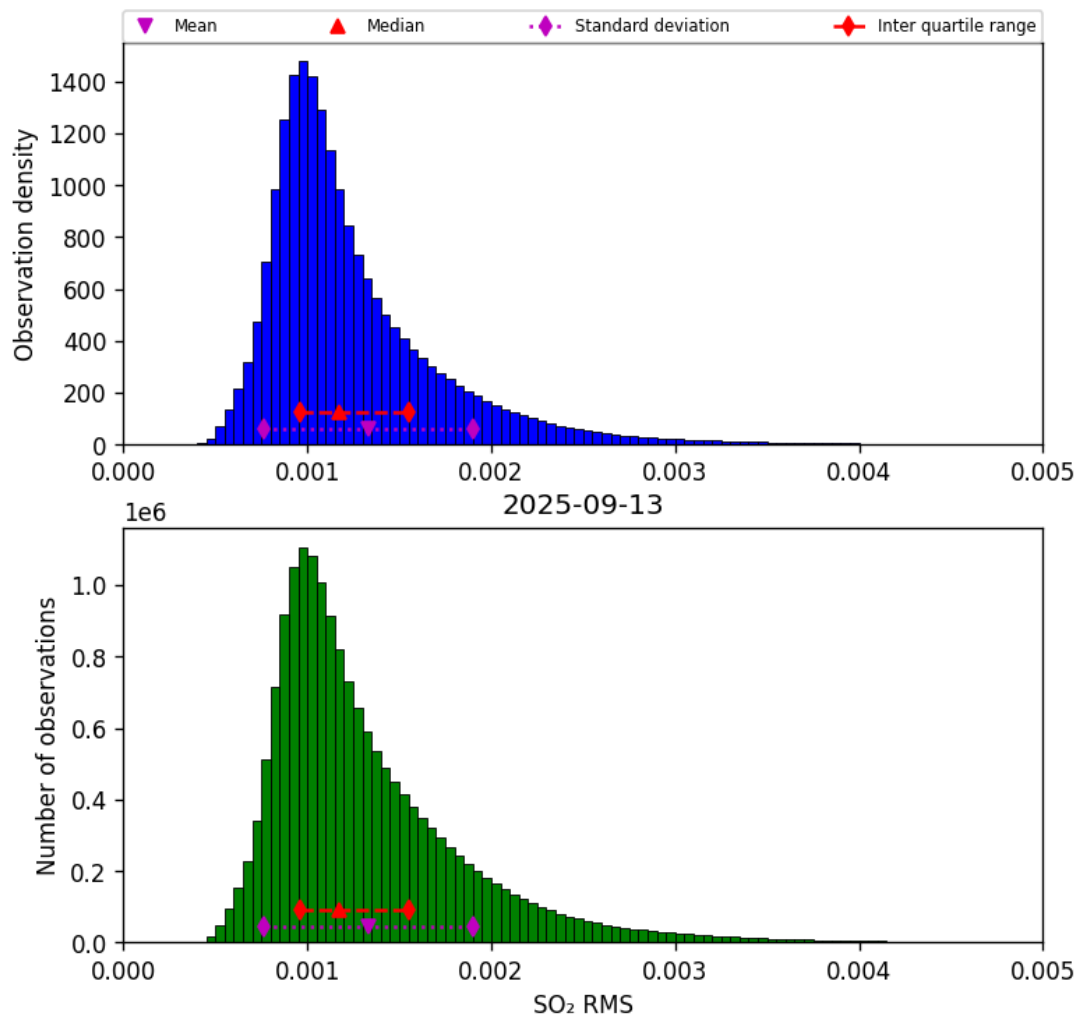


Figure 79: Histogram of “SO₂ RMS” for 2025-09-13 to 2025-09-13

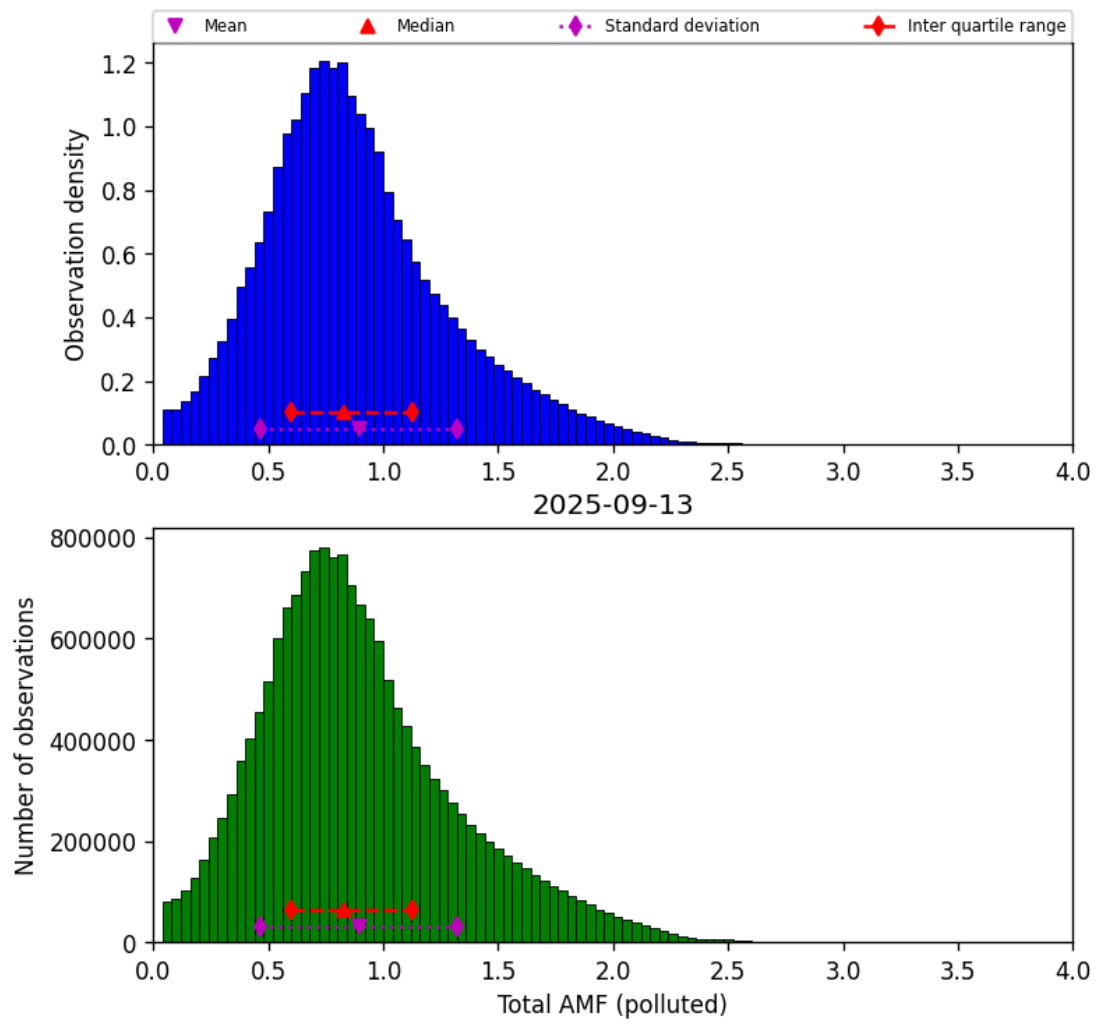


Figure 80: Histogram of “Total AMF (polluted)” for 2025-09-13 to 2025-09-13

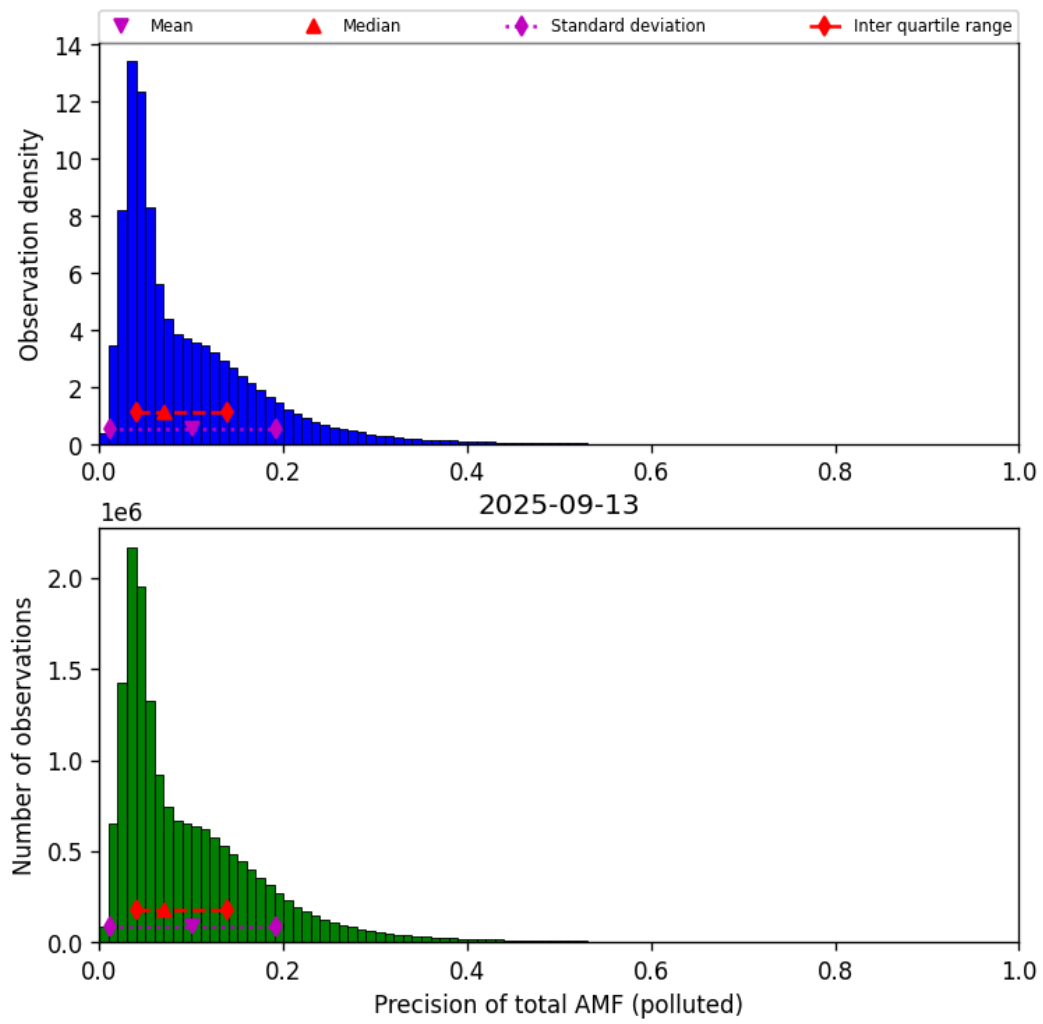


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-09-13 to 2025-09-13

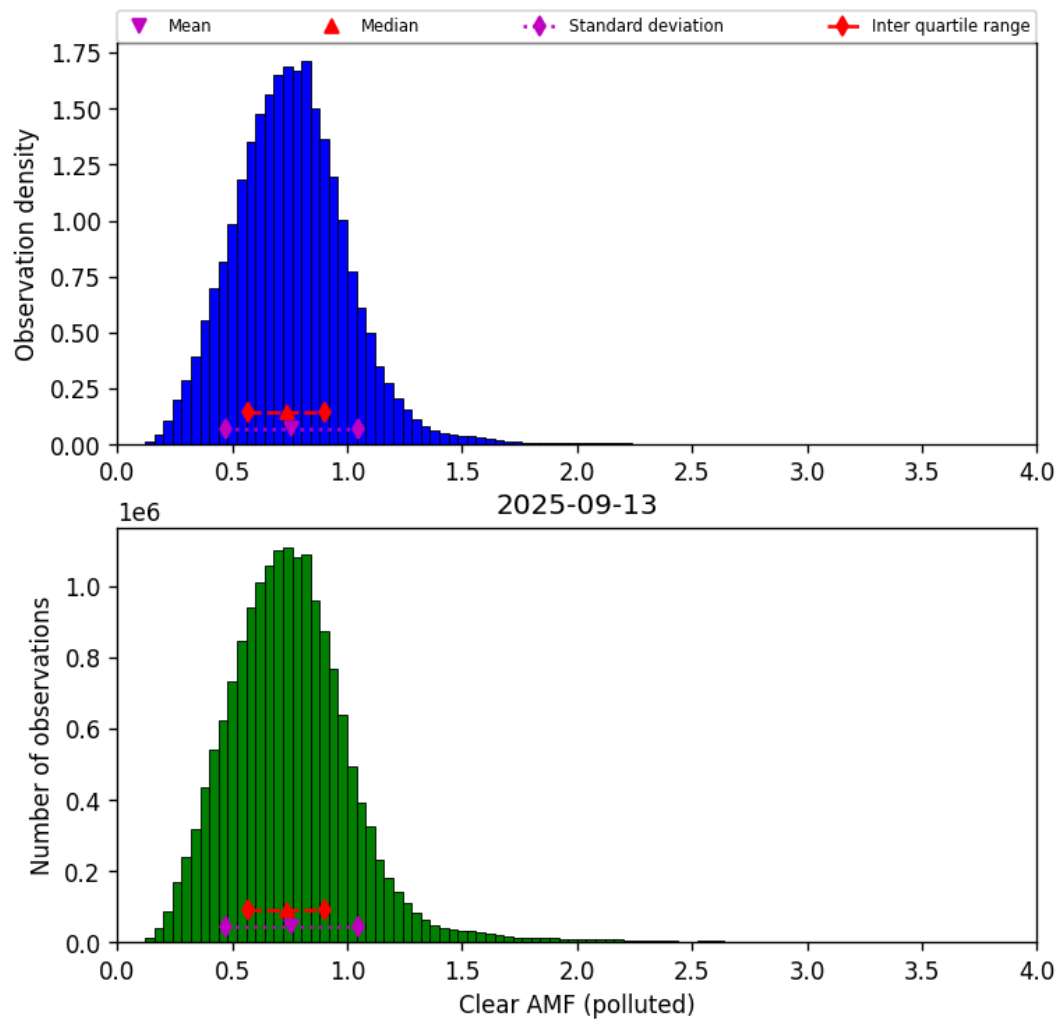


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-09-13 to 2025-09-13

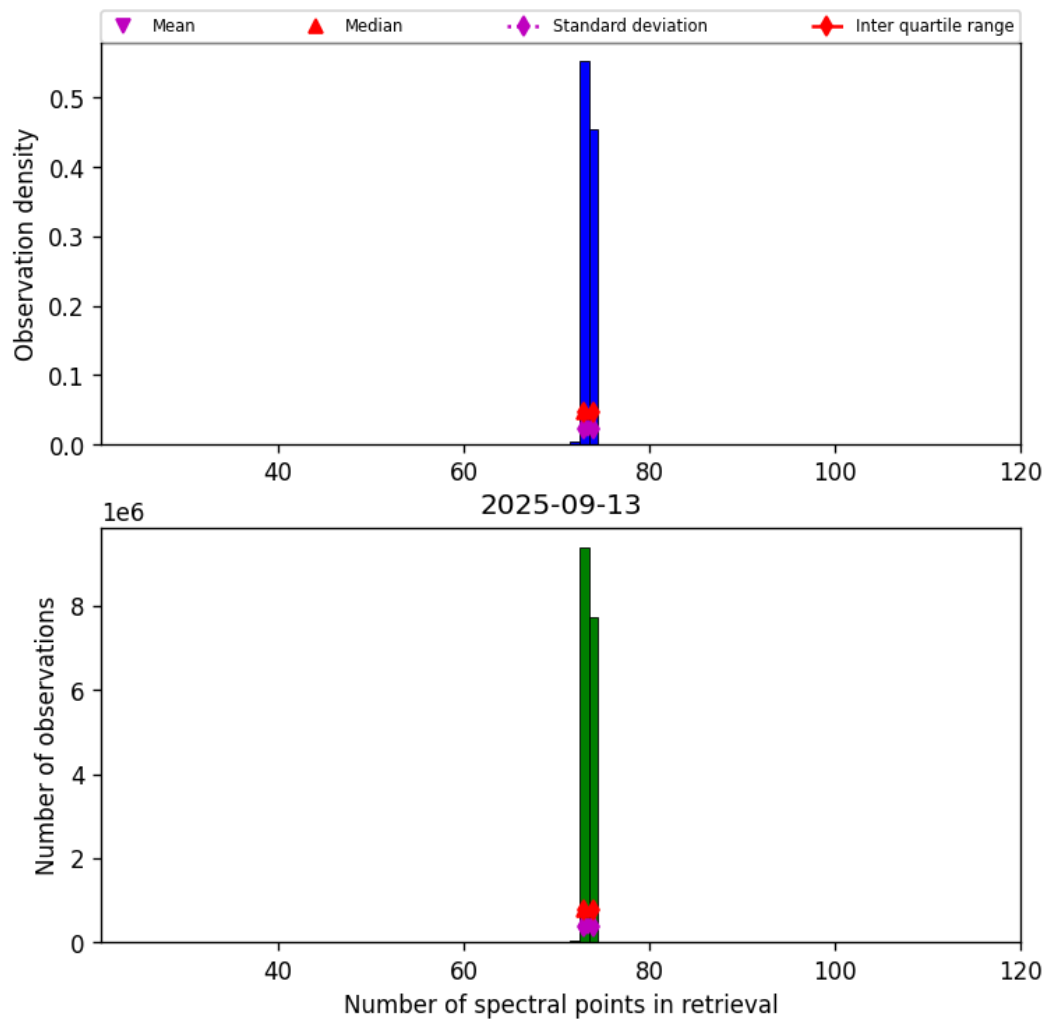


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-09-13 to 2025-09-13

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.

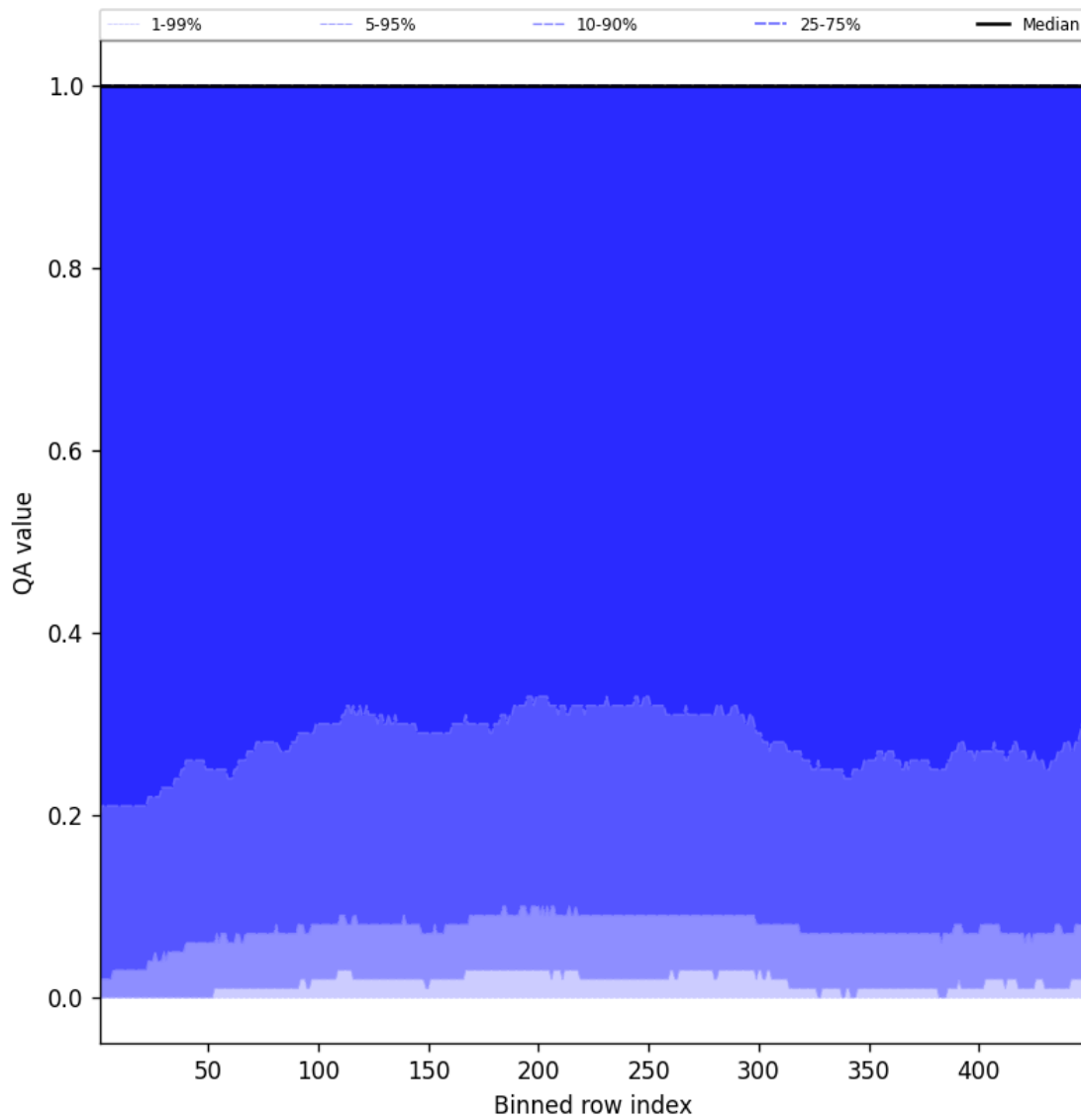


Figure 84: Along track statistics of “QA value” for 2025-09-13 to 2025-09-13

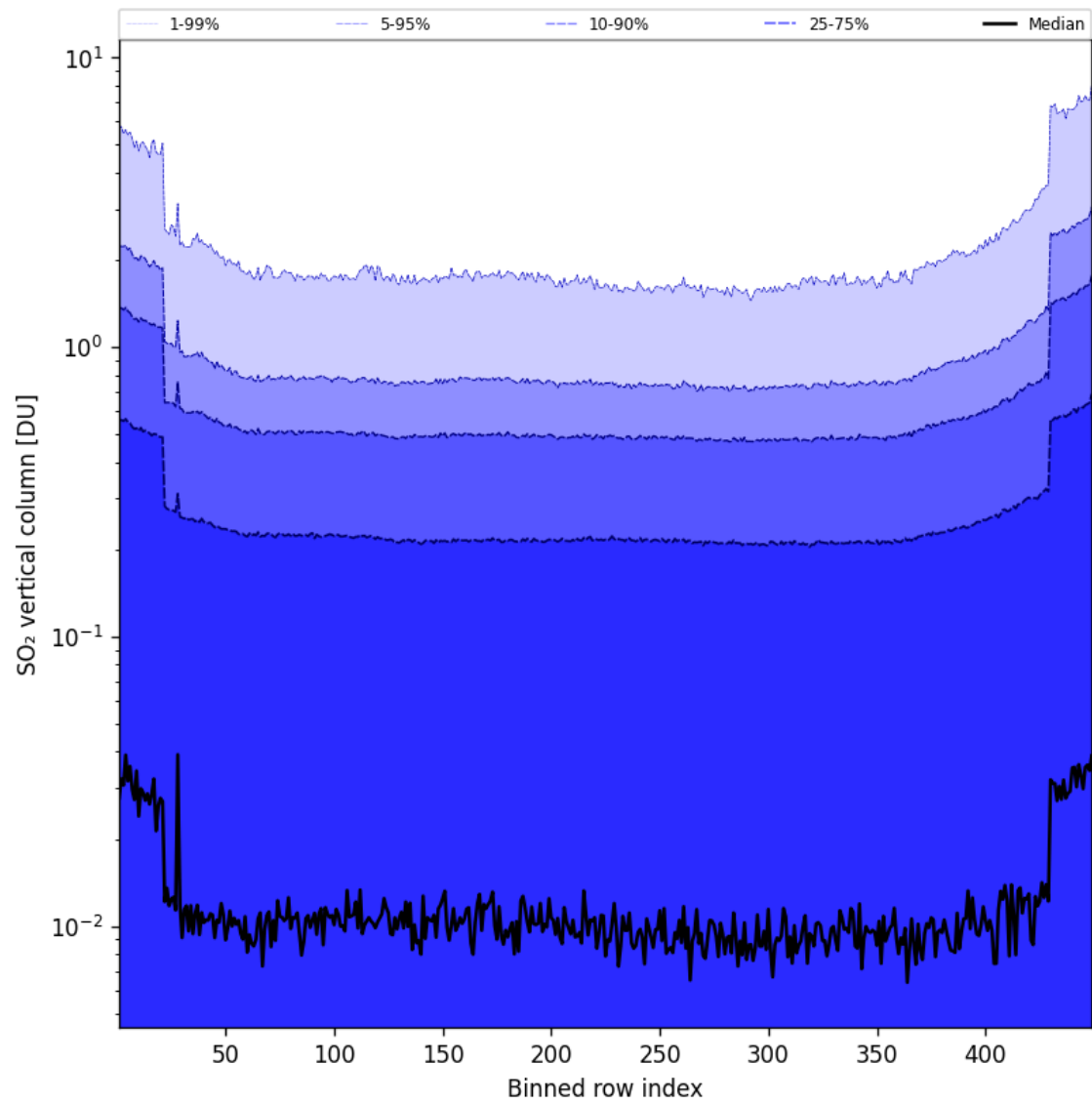


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-09-13 to 2025-09-13

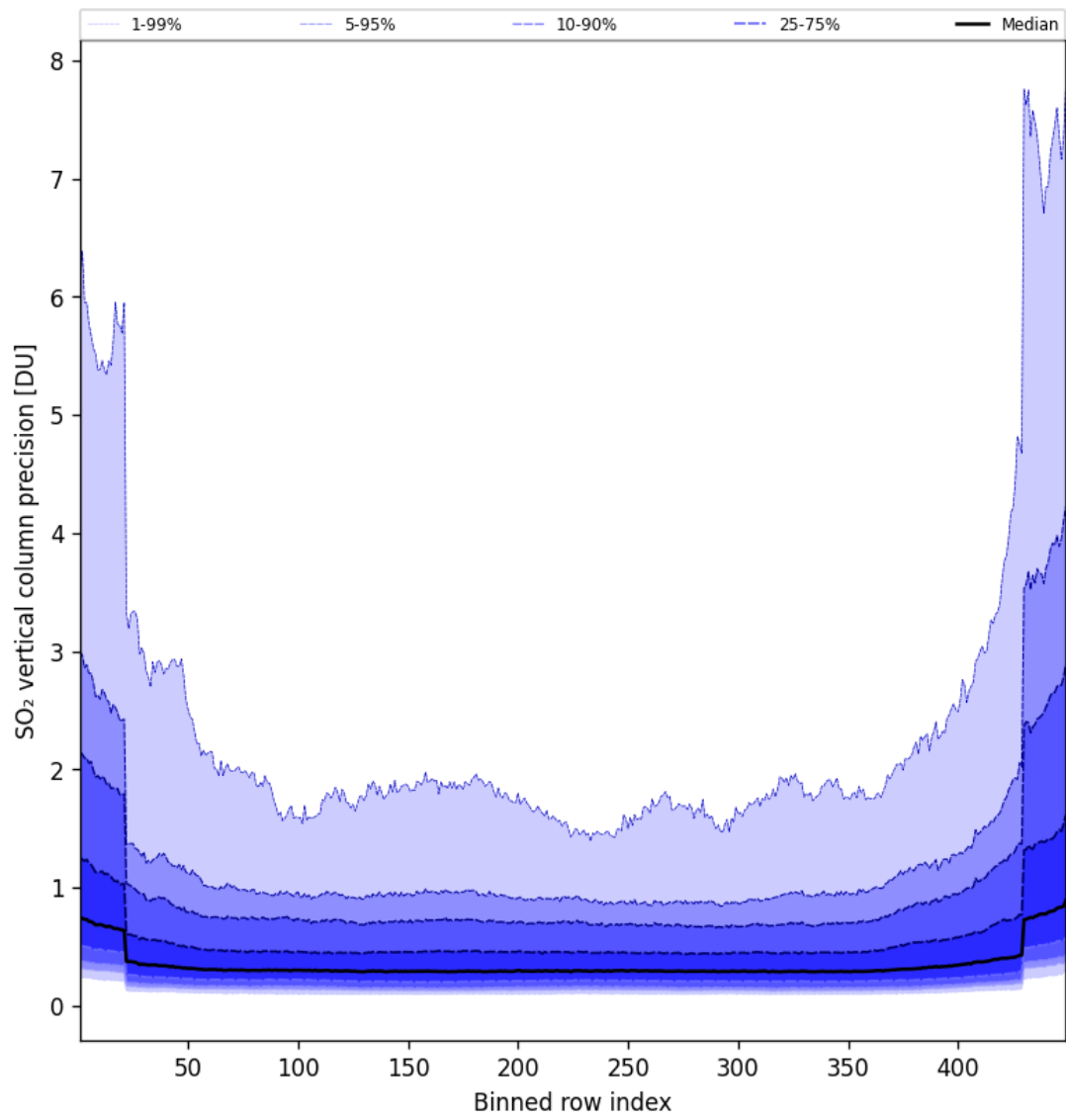


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-09-13 to 2025-09-13

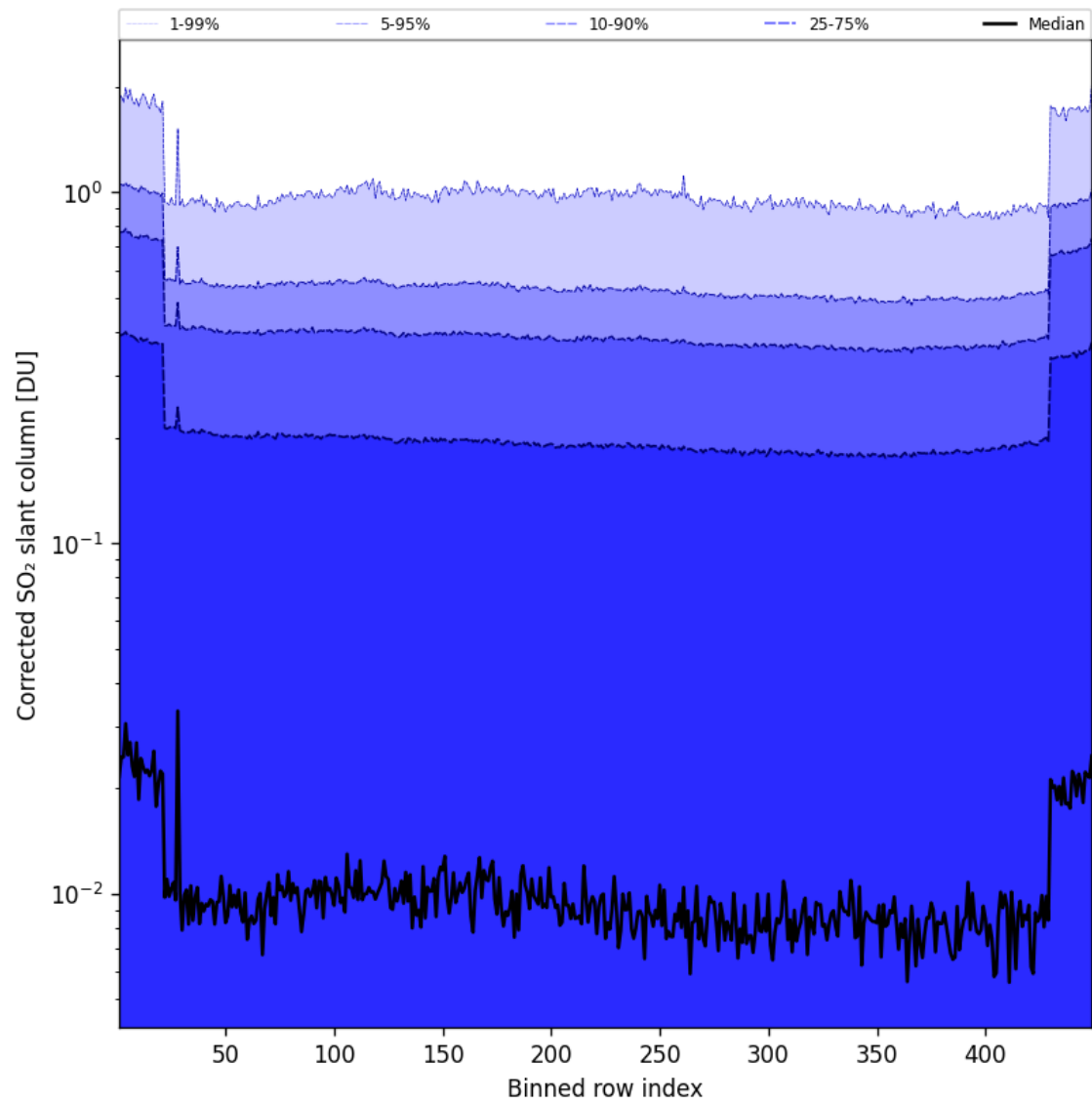


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-09-13 to 2025-09-13

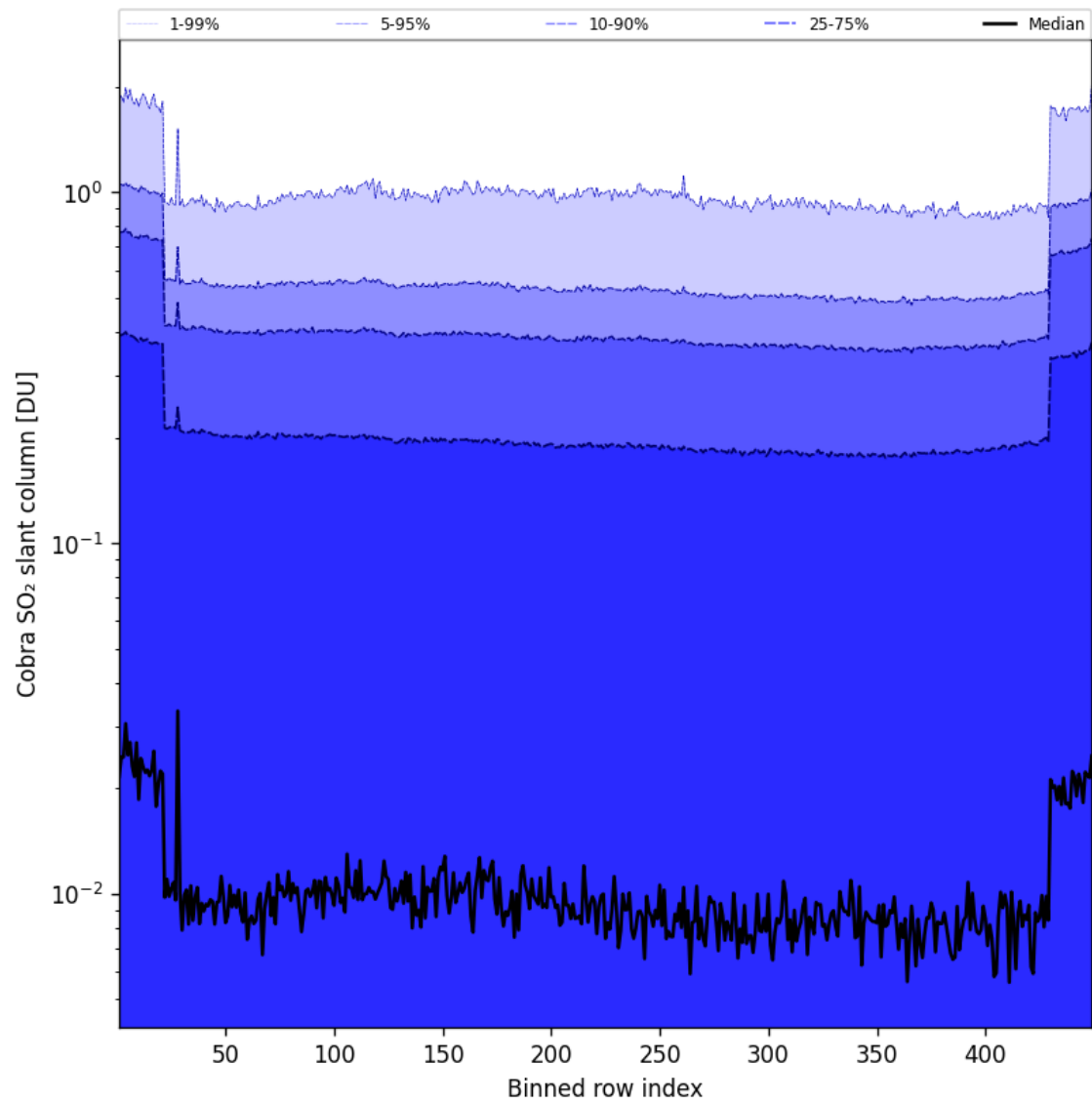


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-09-13 to 2025-09-13

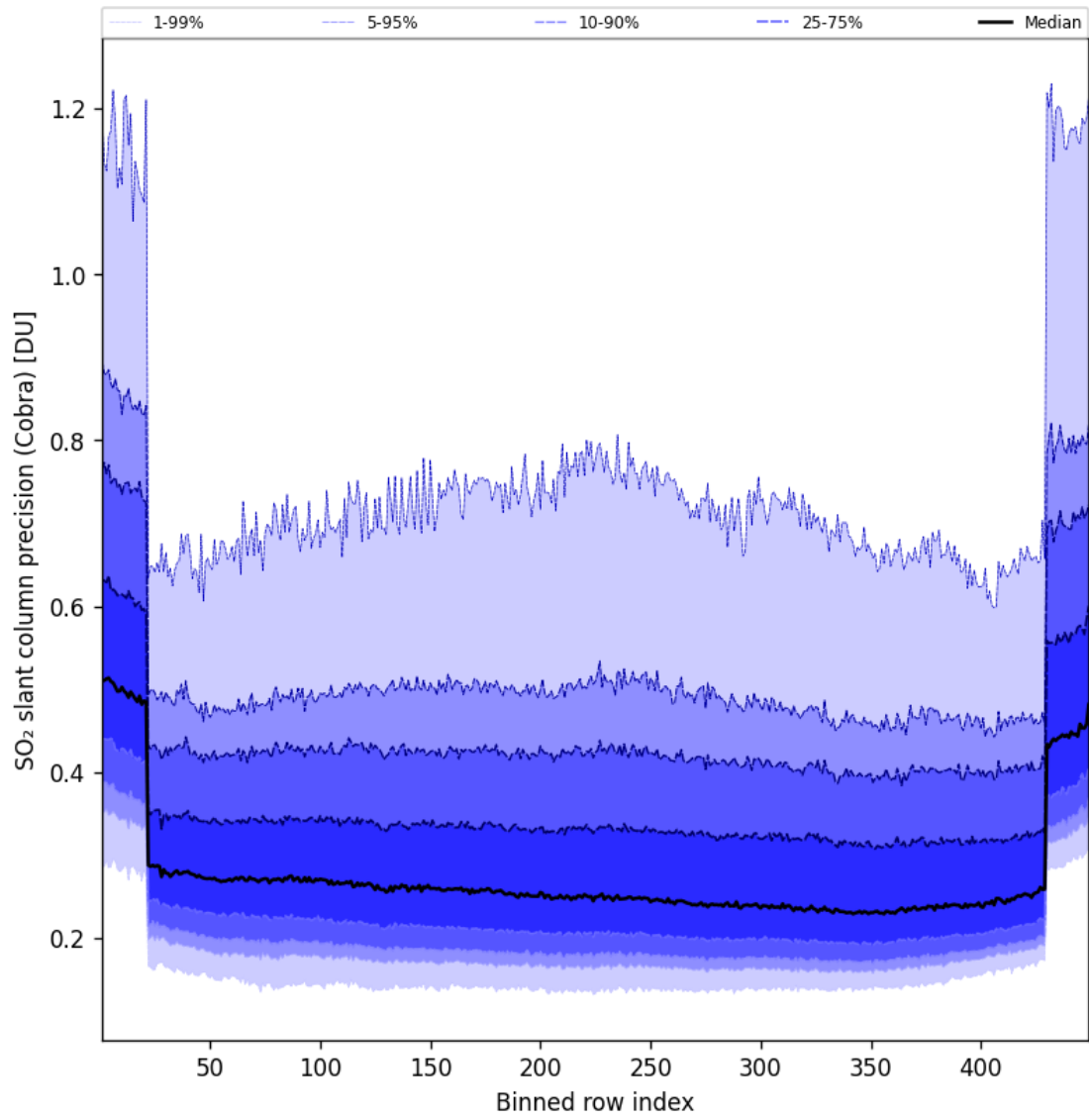


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-09-13 to 2025-09-13

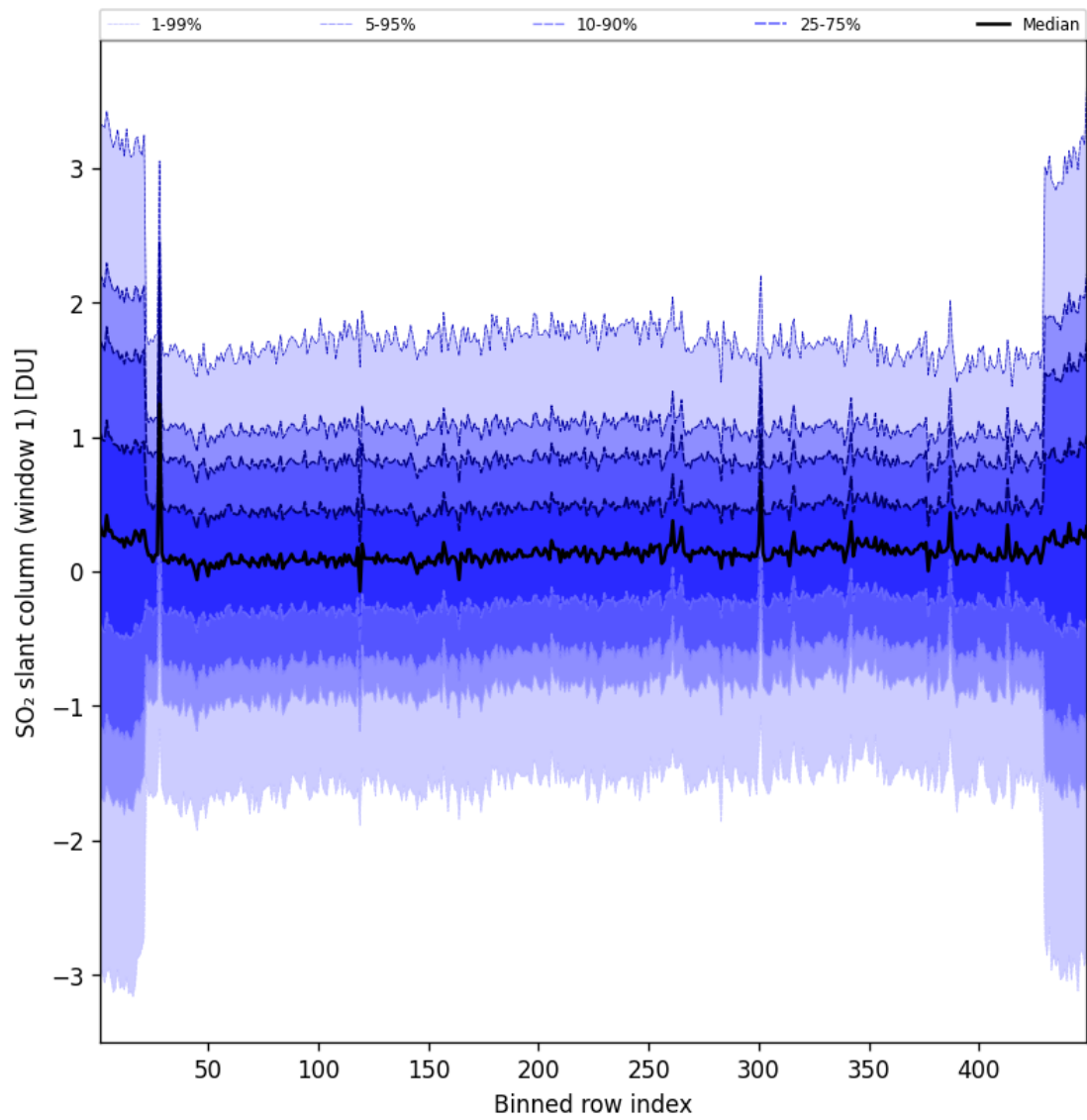


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-09-13 to 2025-09-13

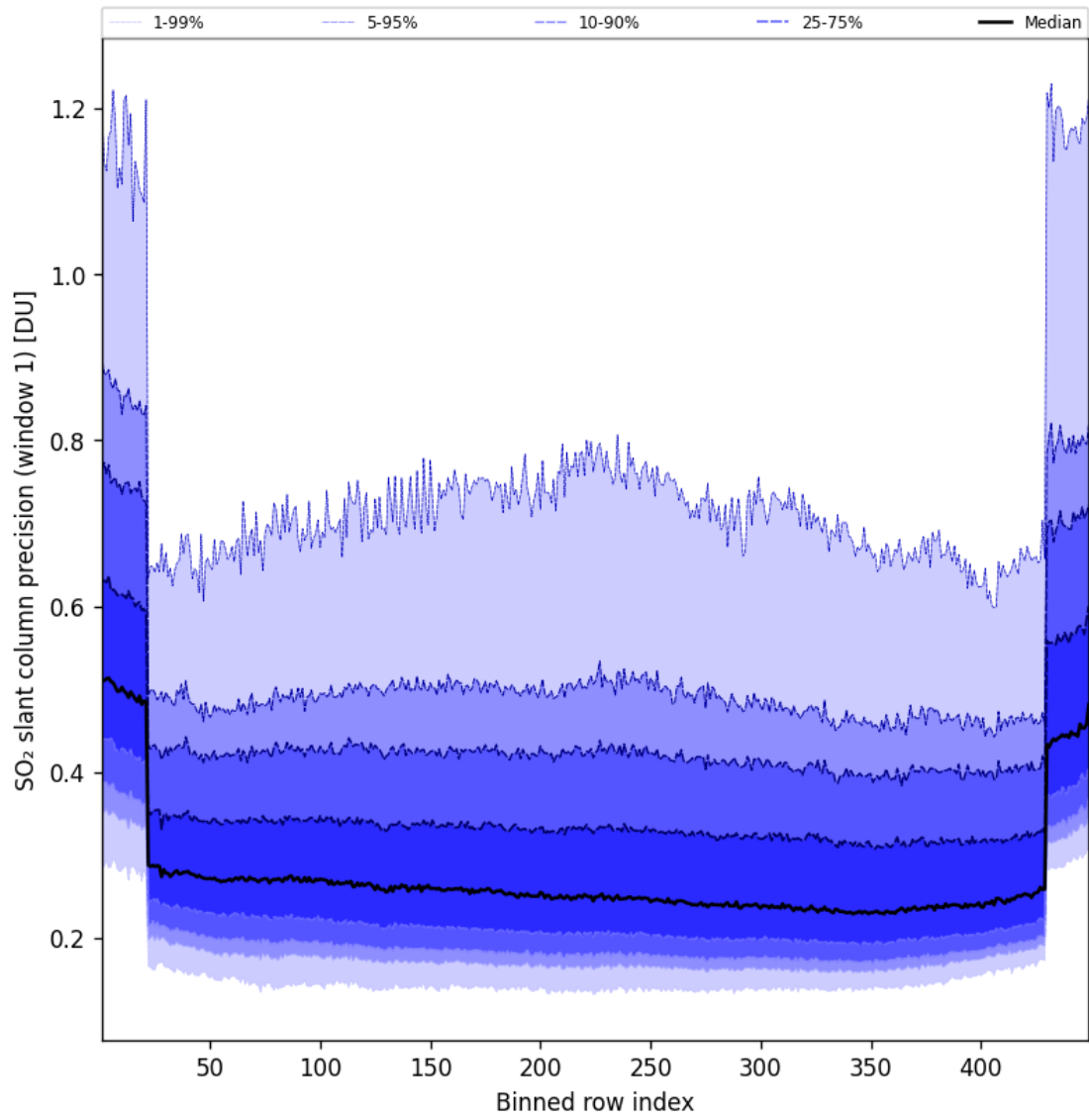


Figure 91: Along track statistics of "SO₂ slant column precision (window 1)" for 2025-09-13 to 2025-09-13

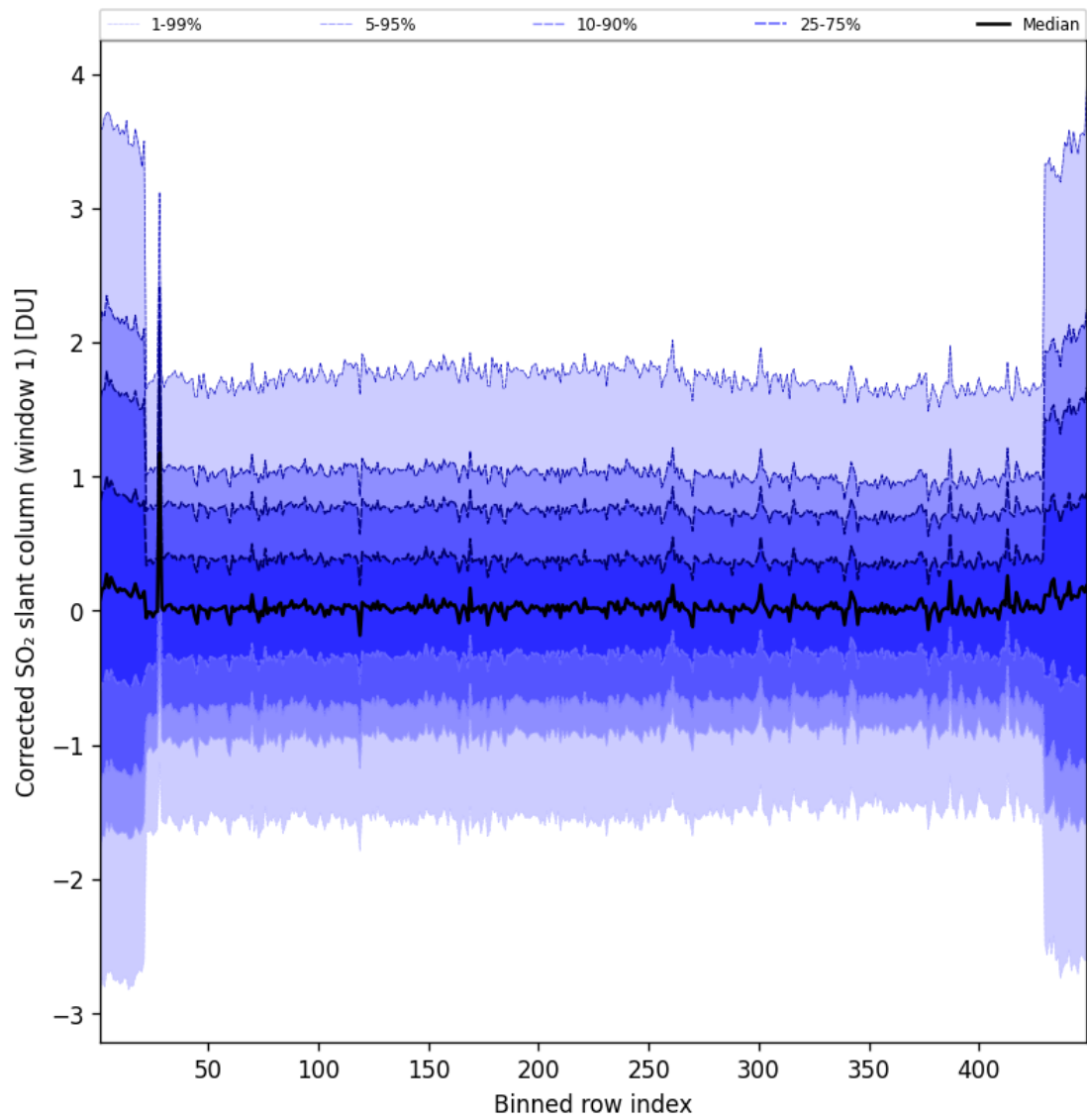


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-09-13 to 2025-09-13

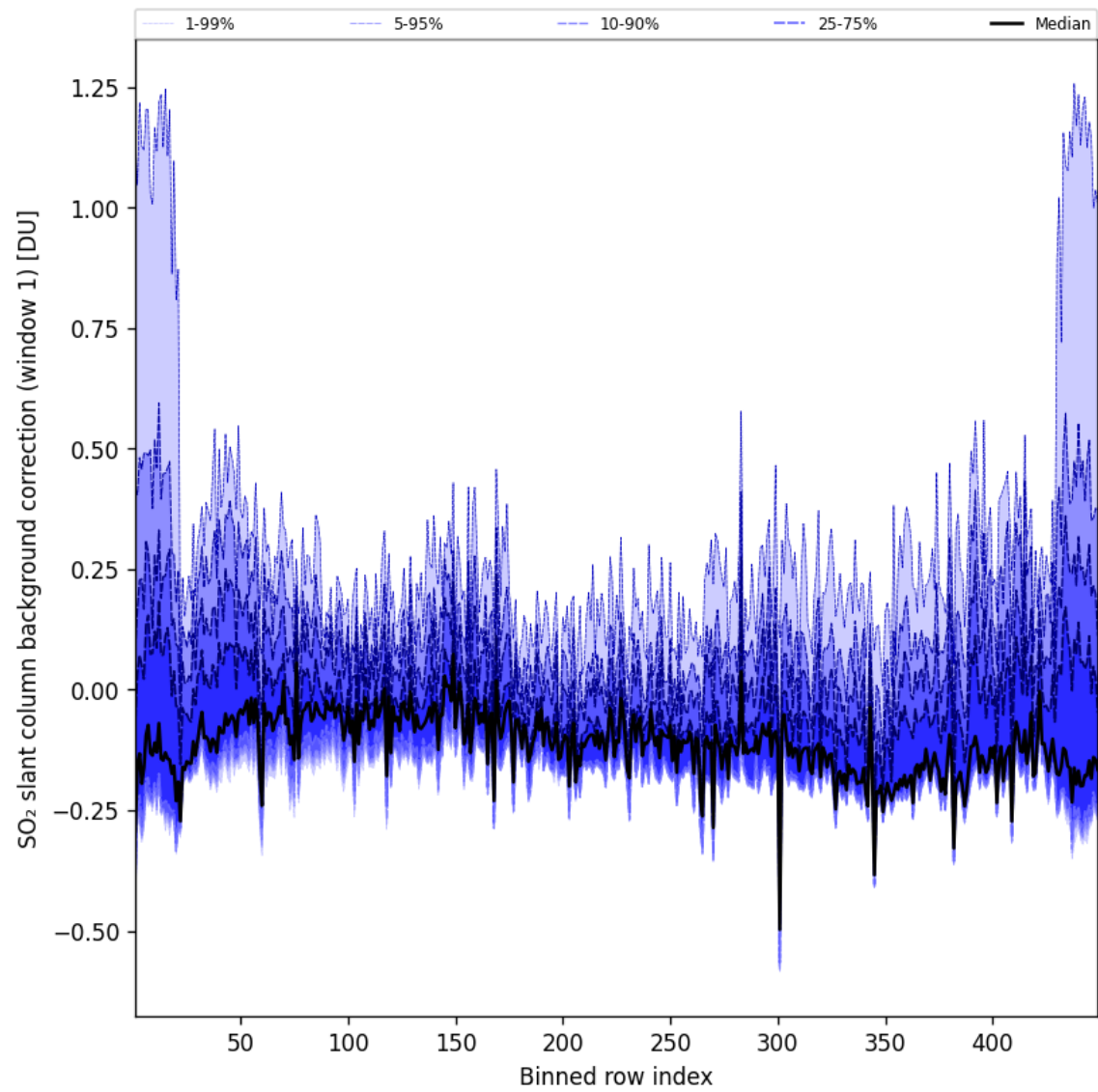


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-09-13 to 2025-09-13

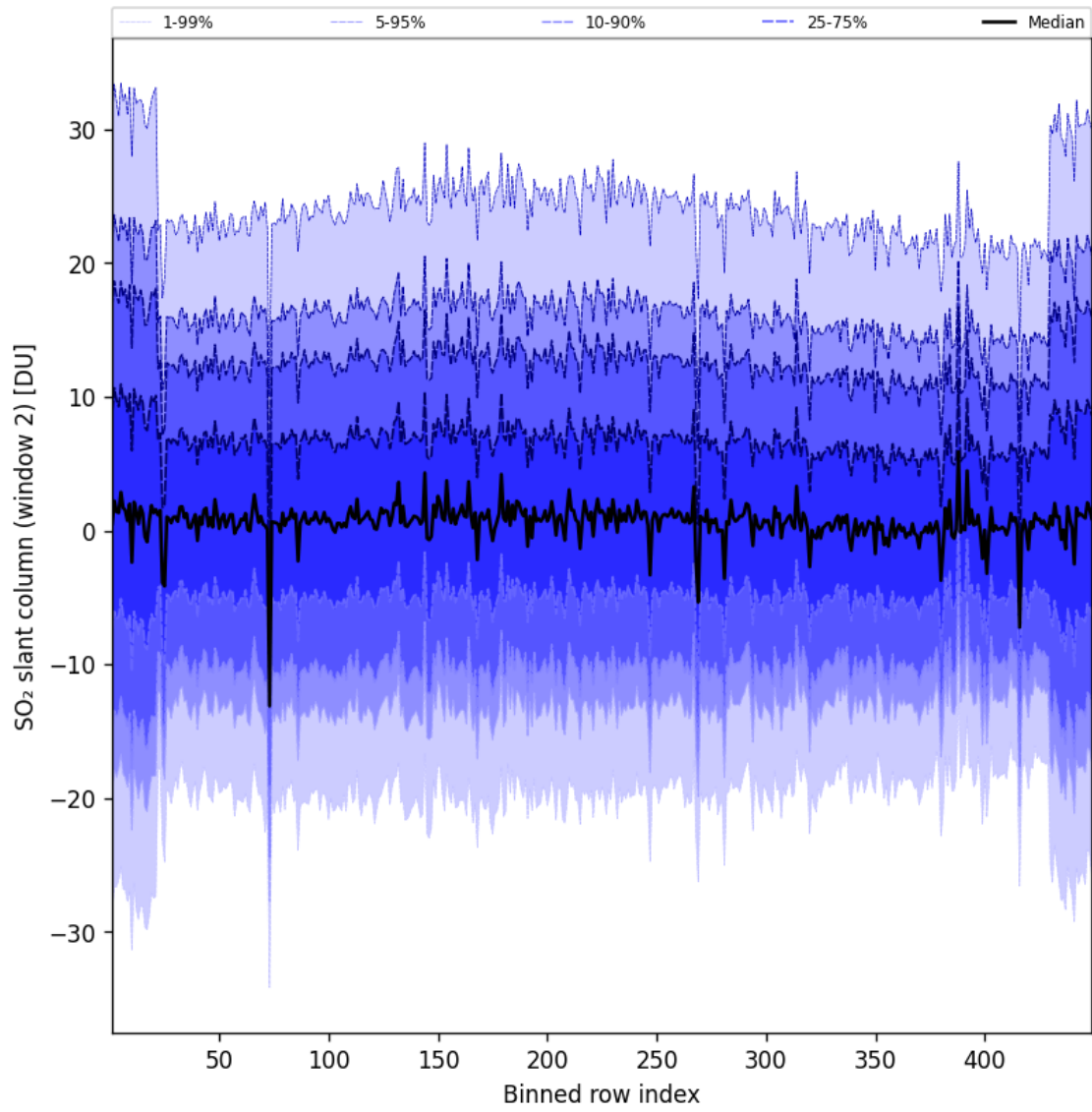


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-09-13 to 2025-09-13

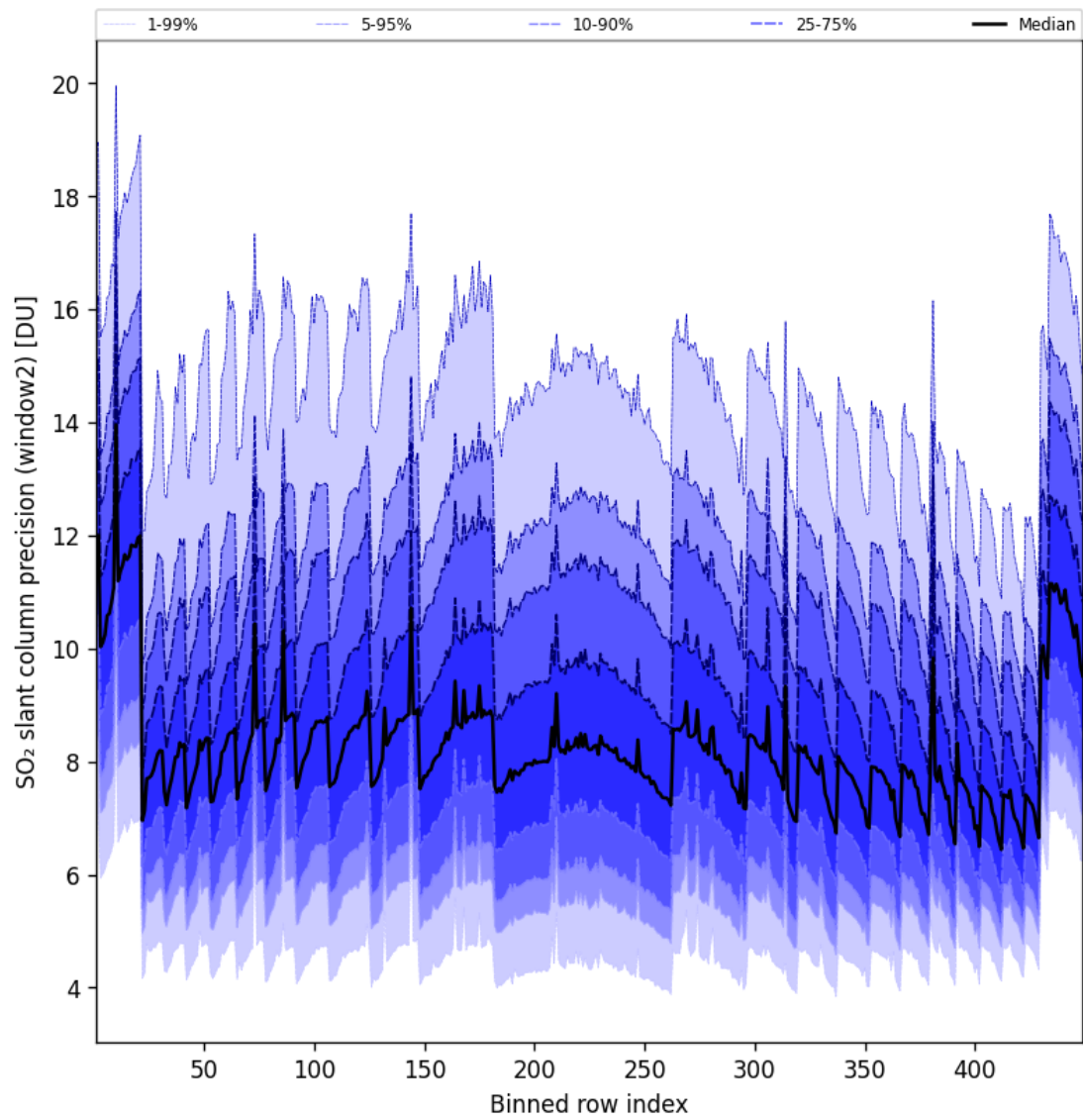


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-09-13 to 2025-09-13

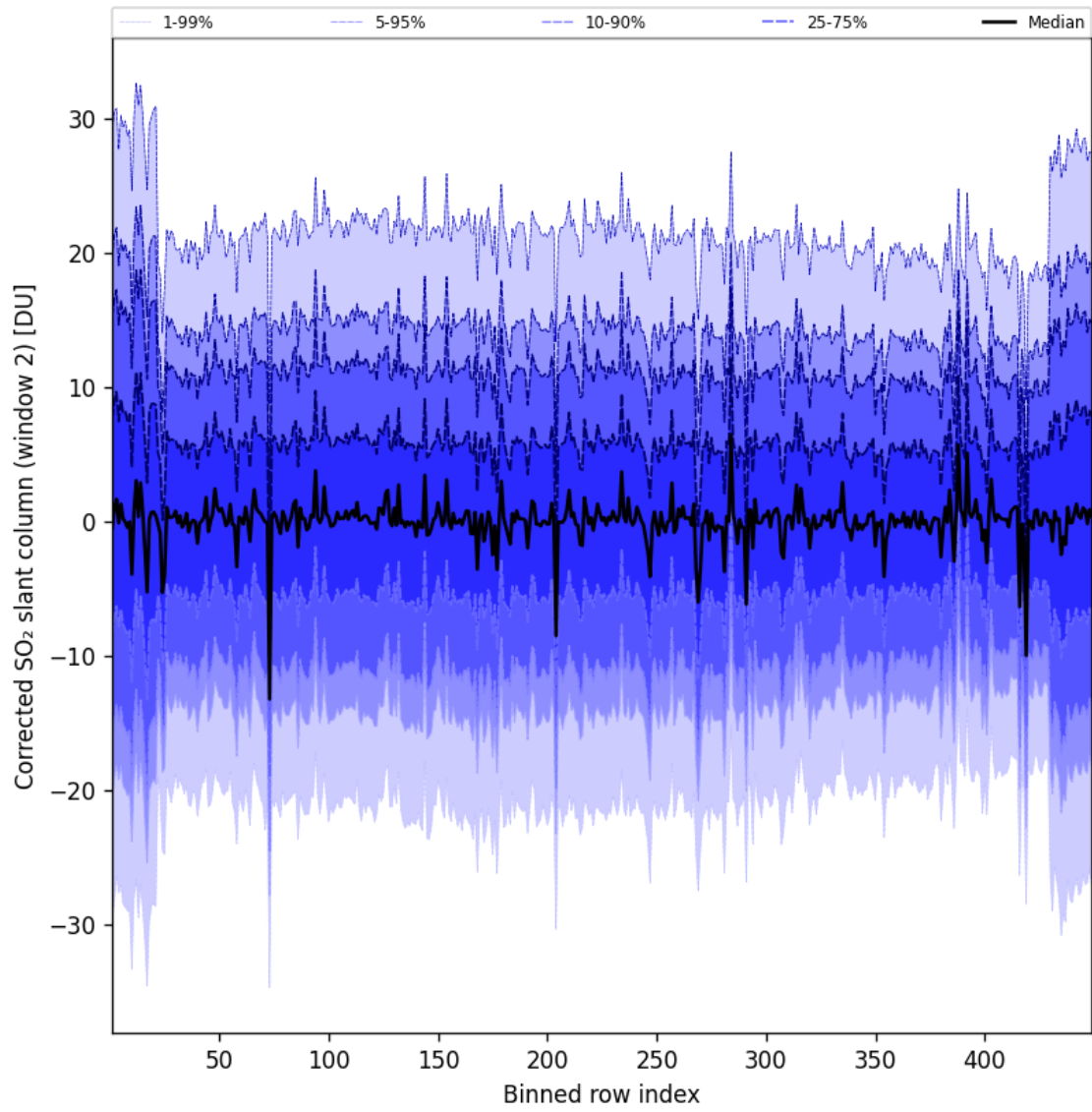


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-09-13 to 2025-09-13

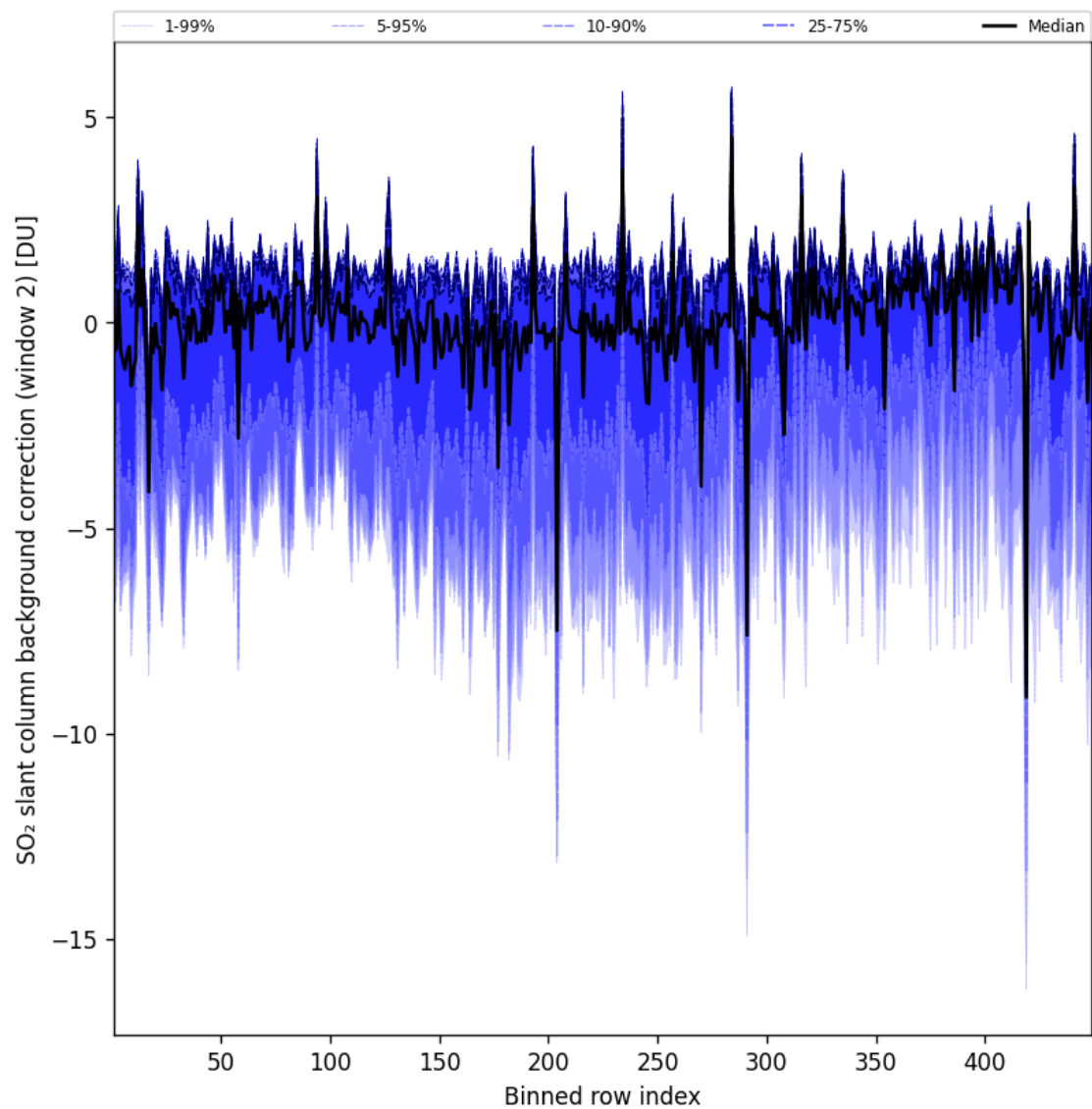


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-09-13 to 2025-09-13

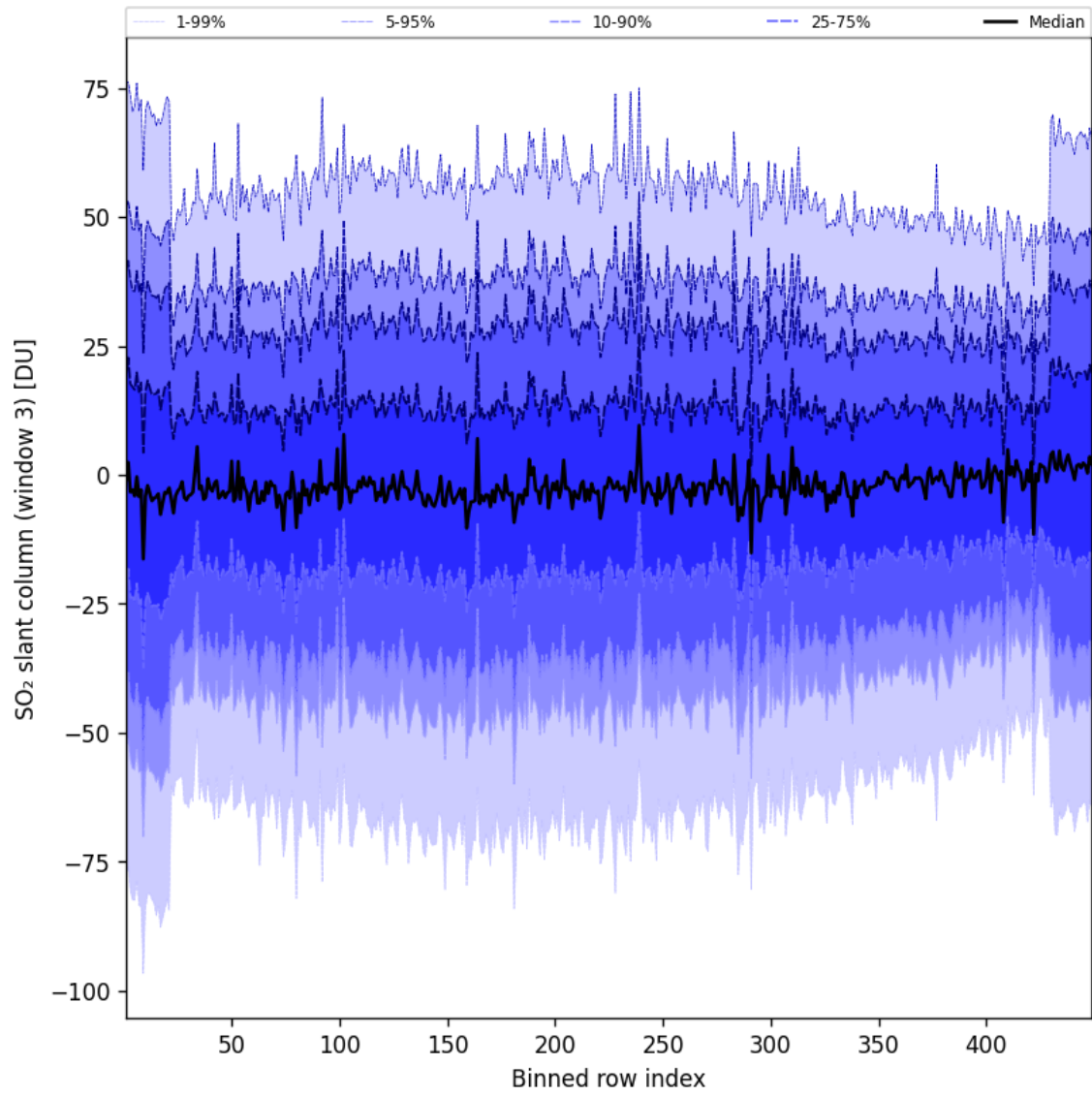


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-09-13 to 2025-09-13

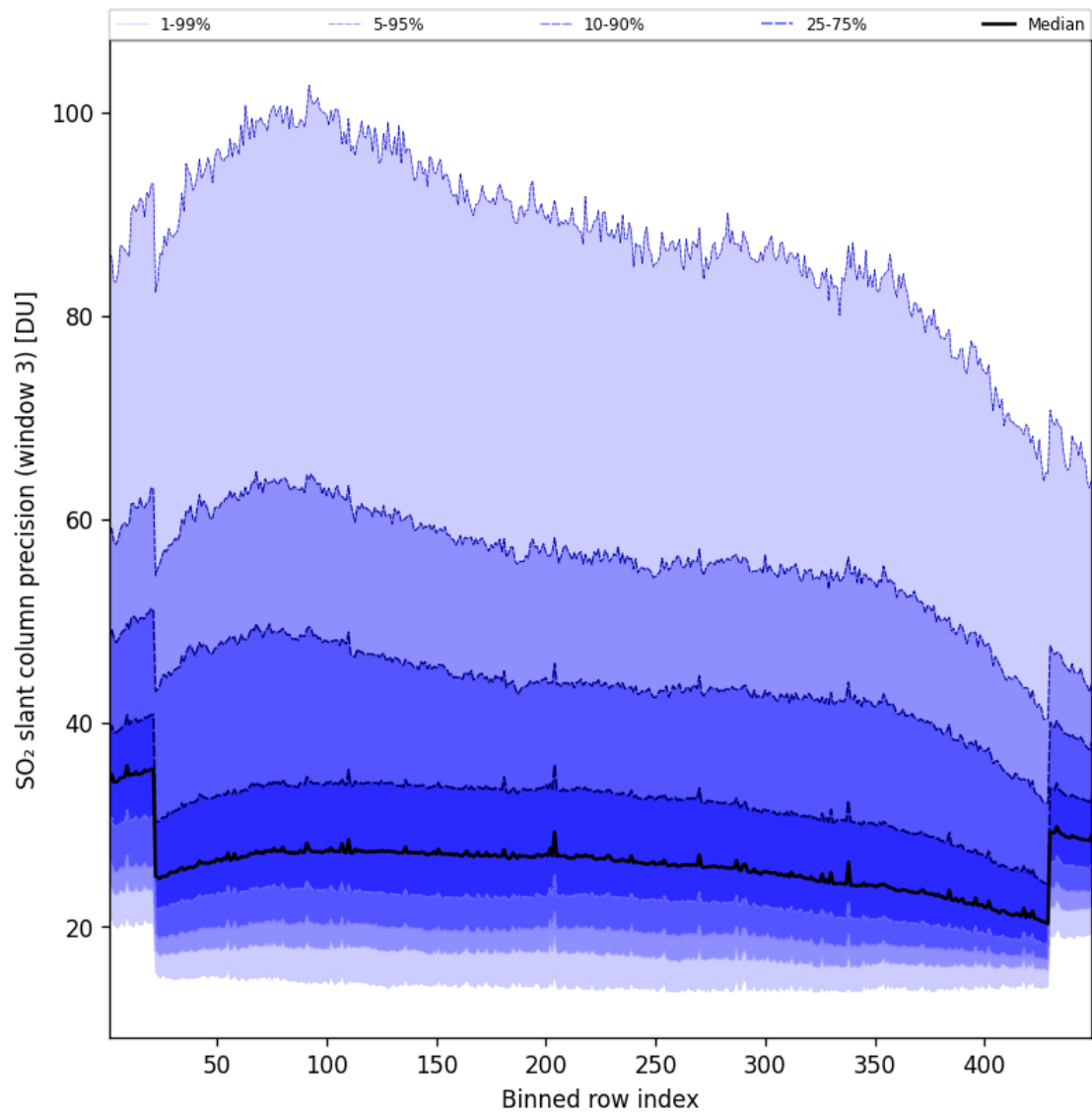


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-09-13 to 2025-09-13

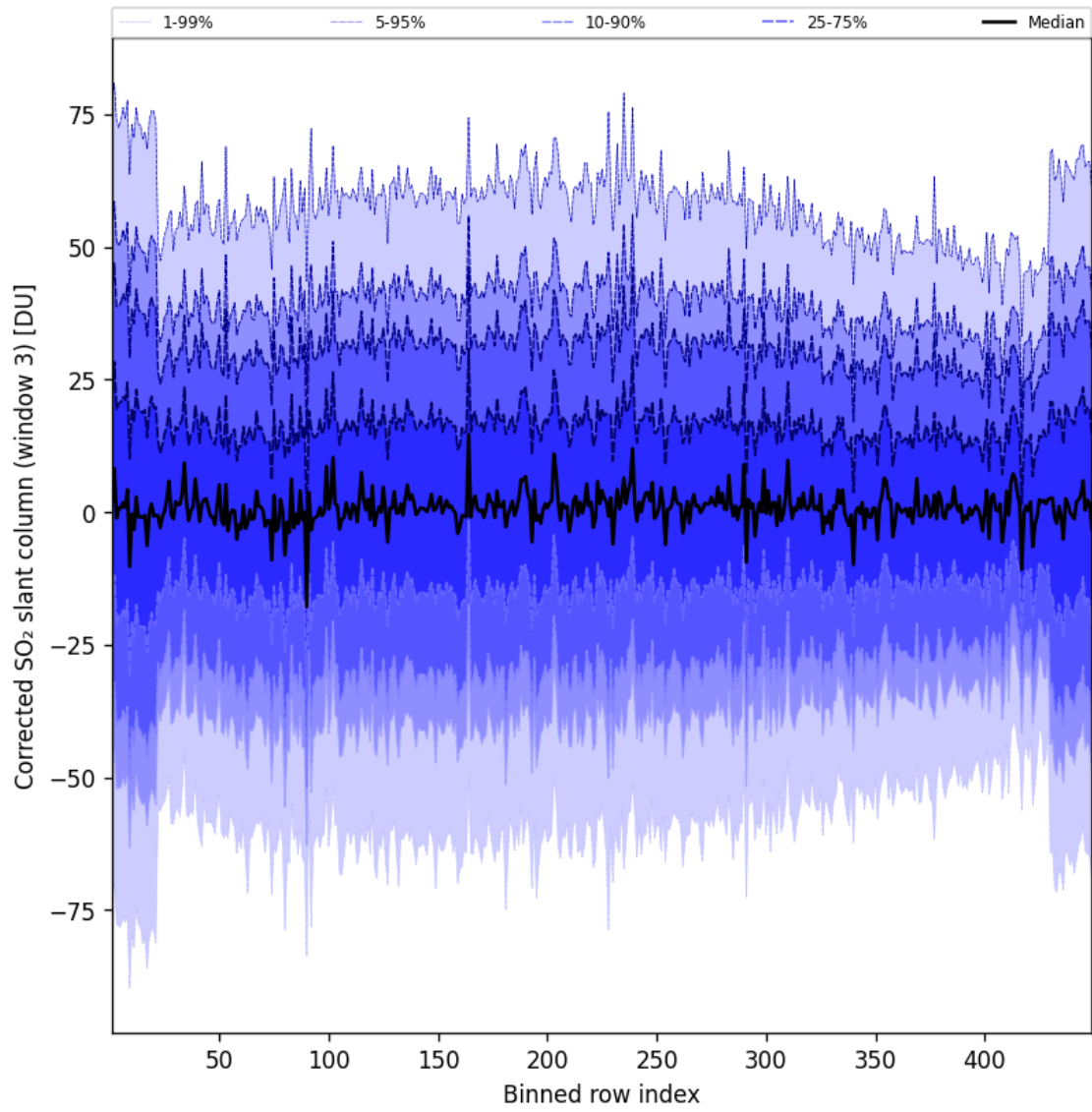


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-09-13 to 2025-09-13

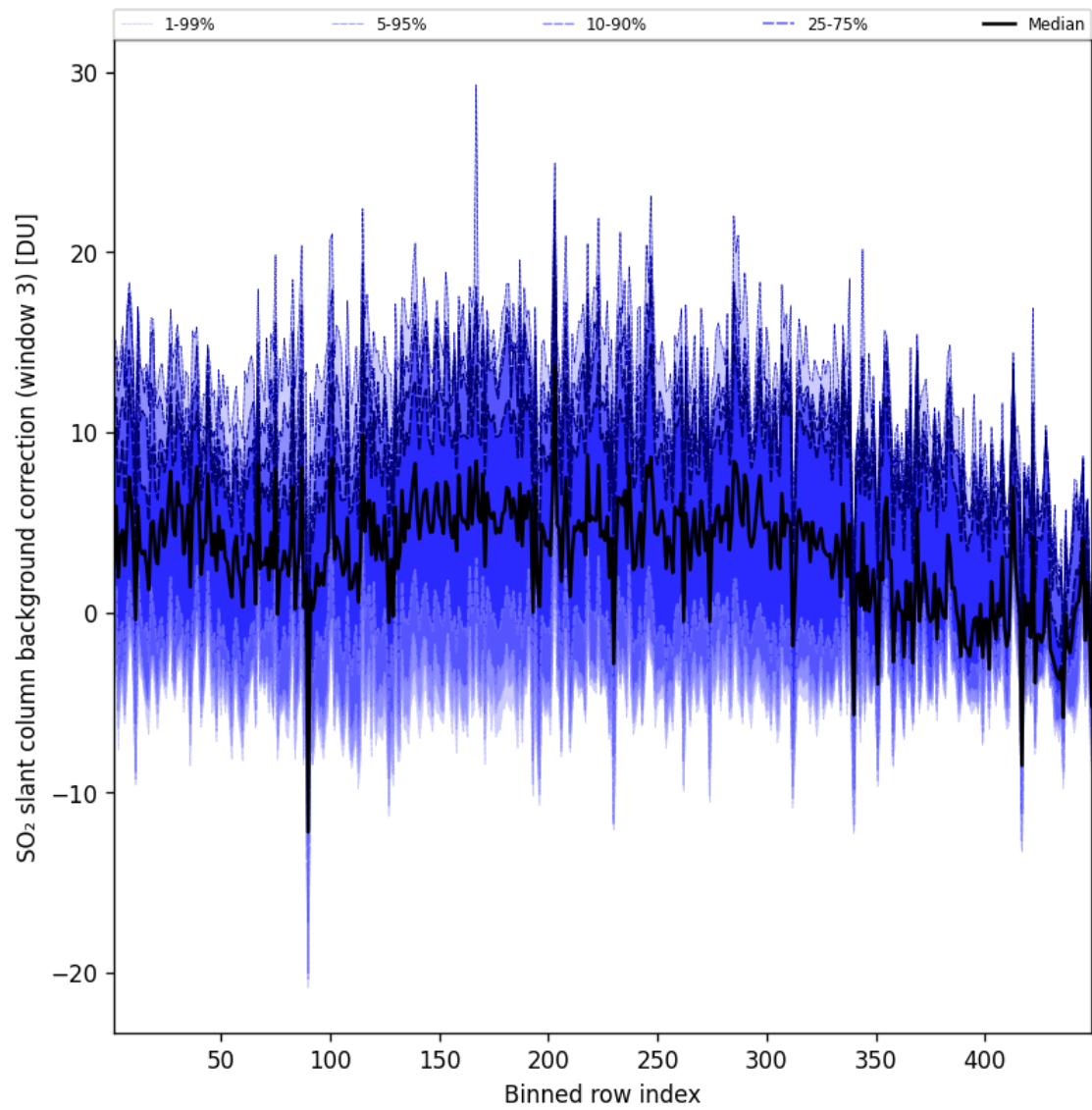


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-09-13 to 2025-09-13

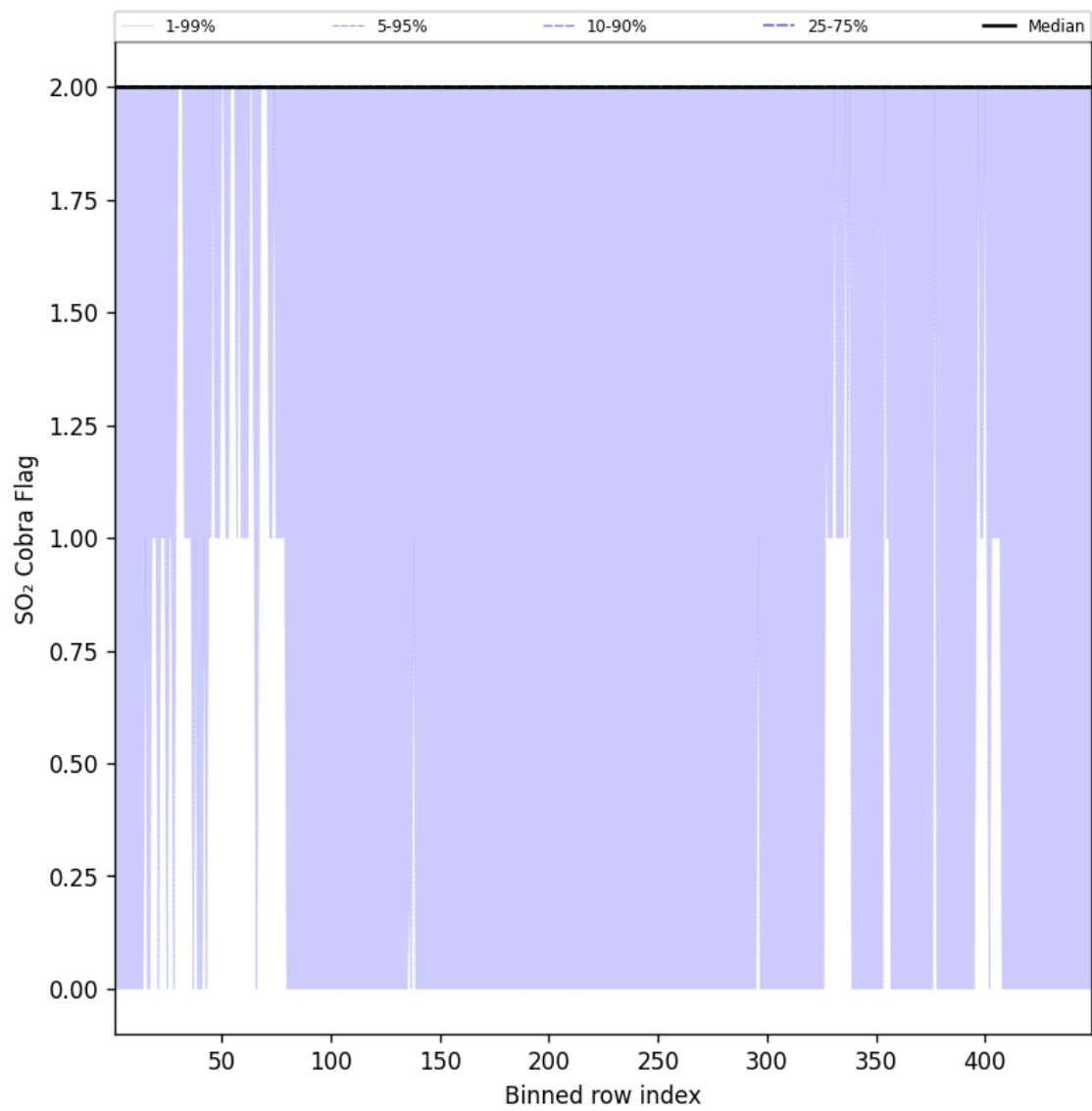


Figure 102: Along track statistics of "SO₂ Cobra Flag" for 2025-09-13 to 2025-09-13

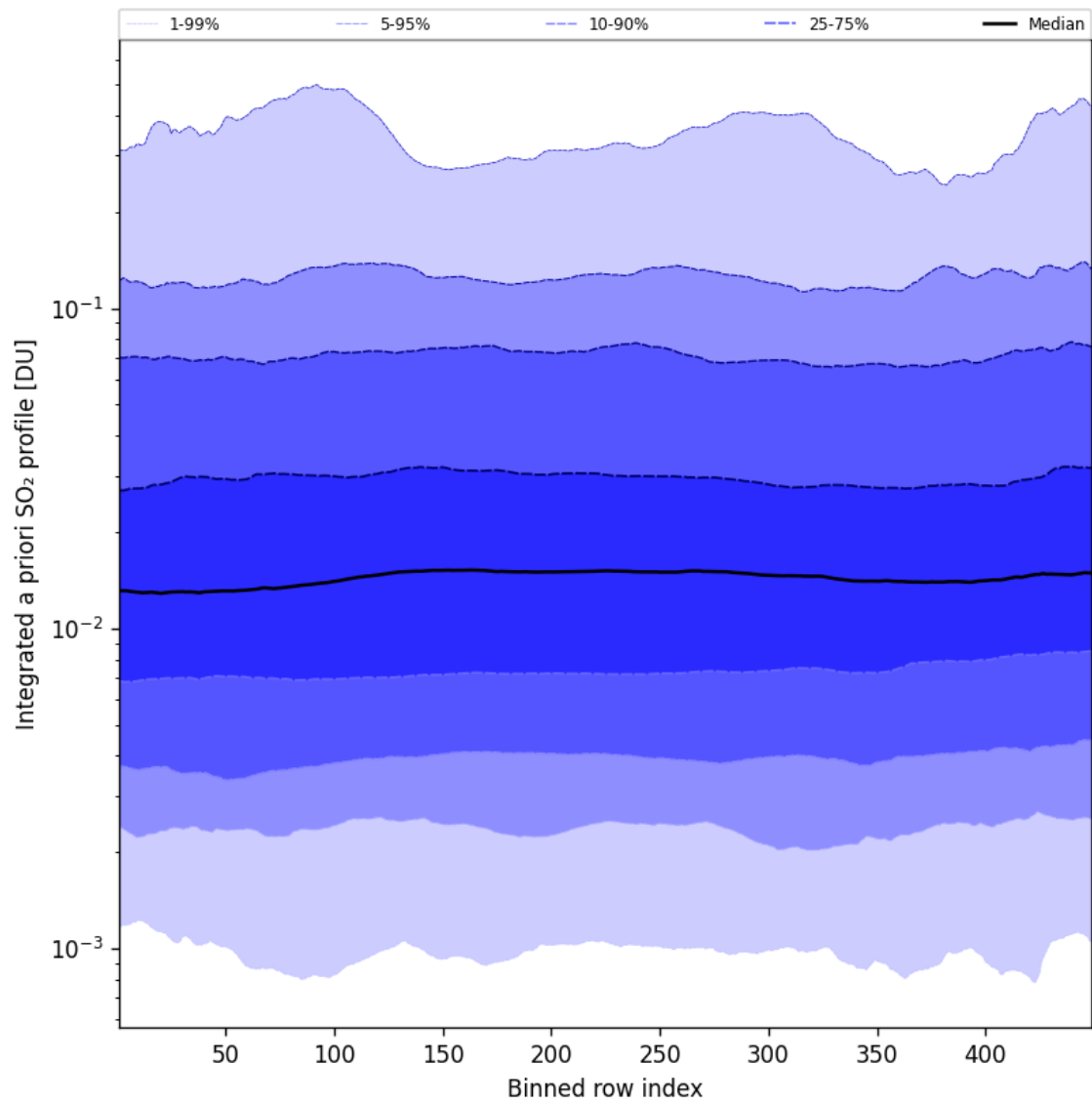


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-09-13 to 2025-09-13

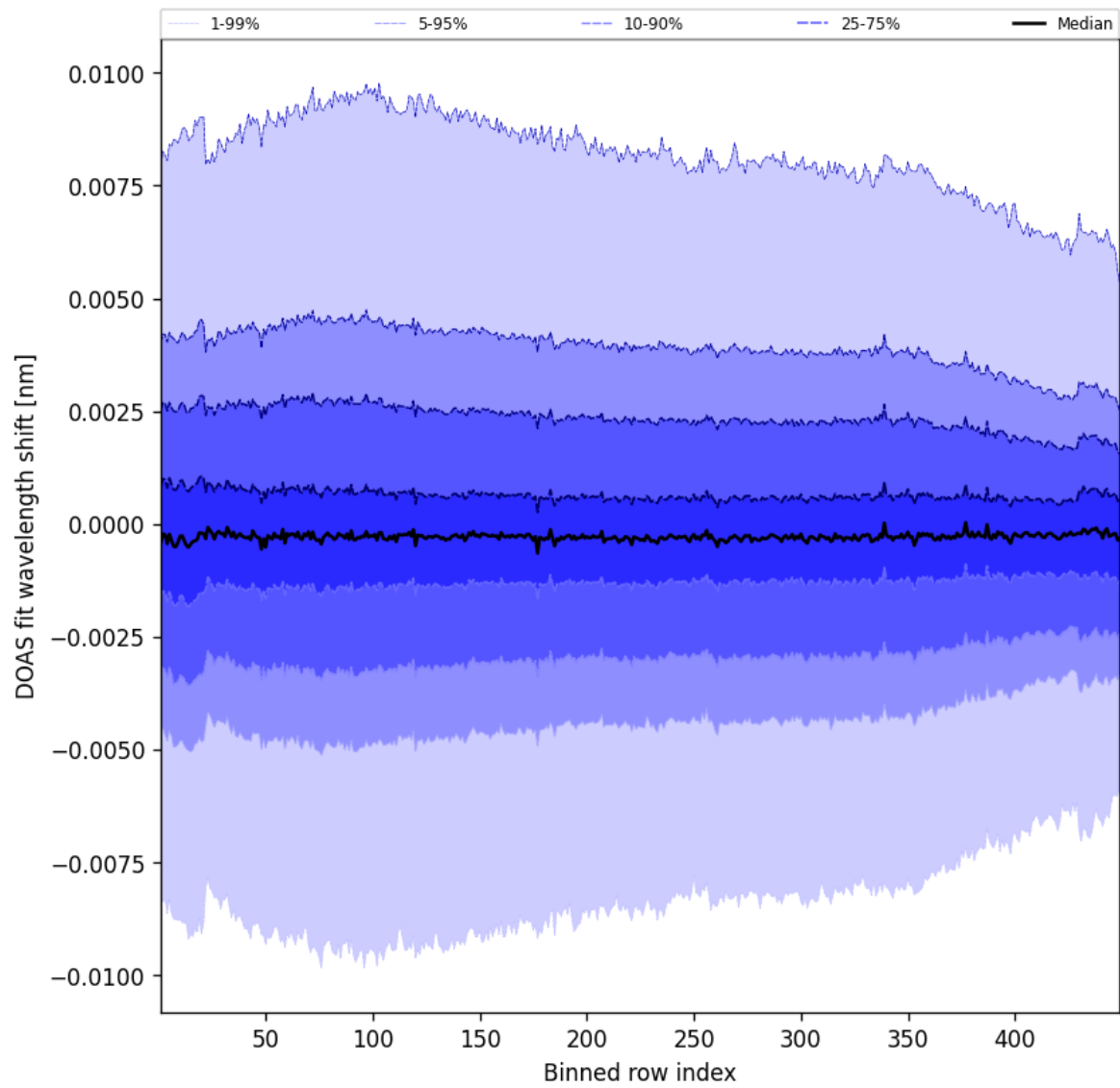


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-09-13 to 2025-09-13

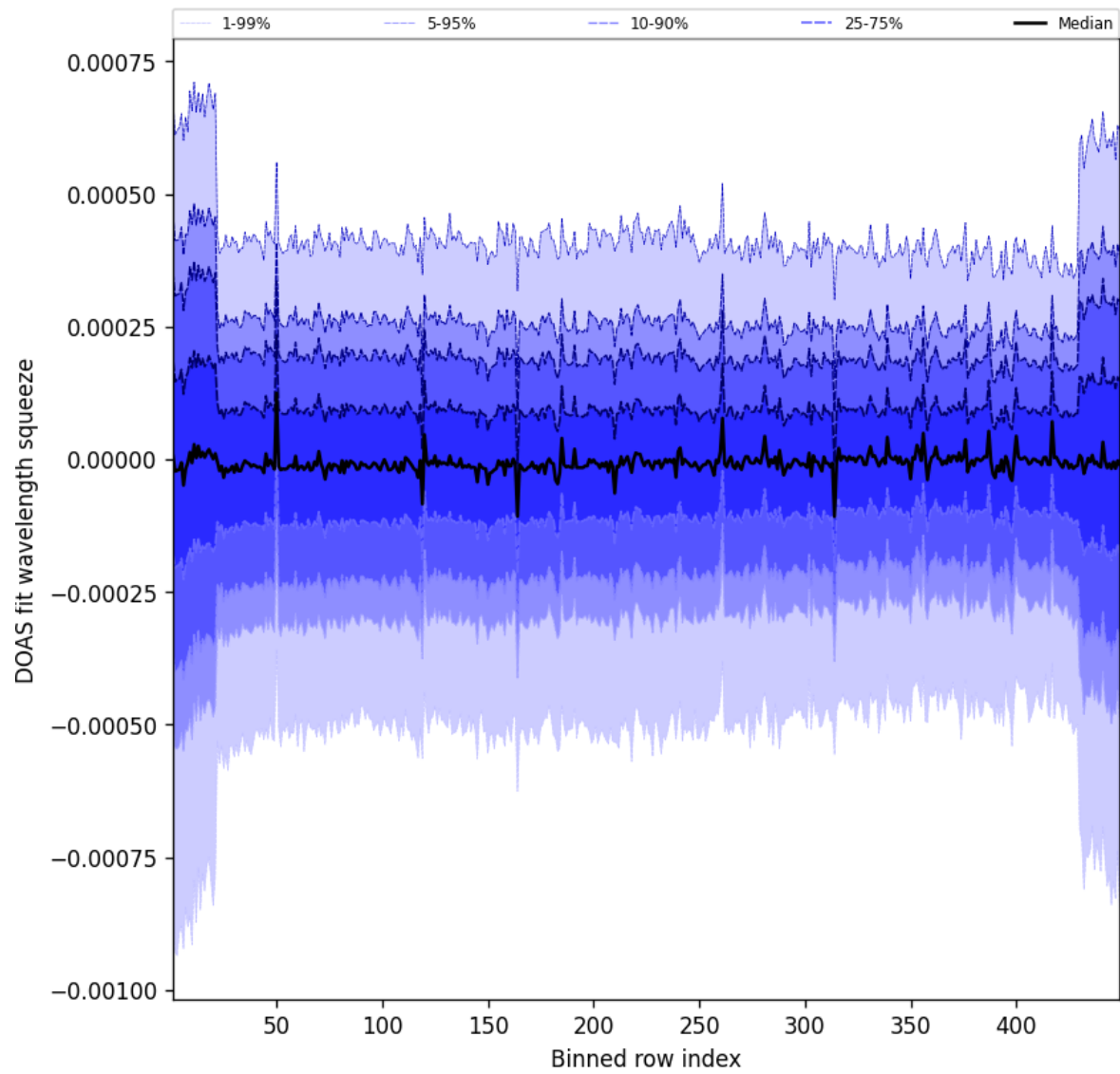


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-09-13 to 2025-09-13

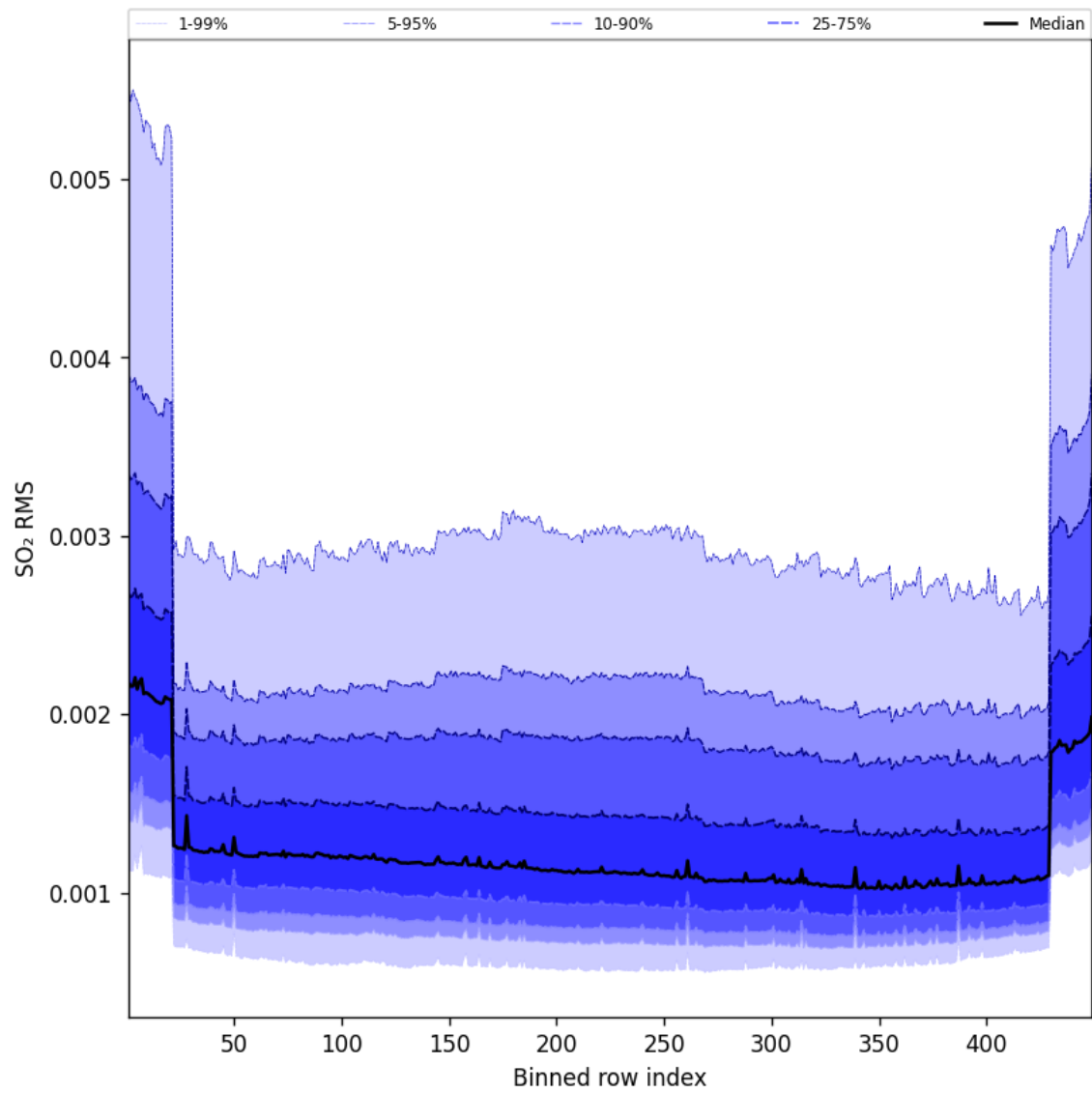


Figure 106: Along track statistics of “SO₂ RMS” for 2025-09-13 to 2025-09-13

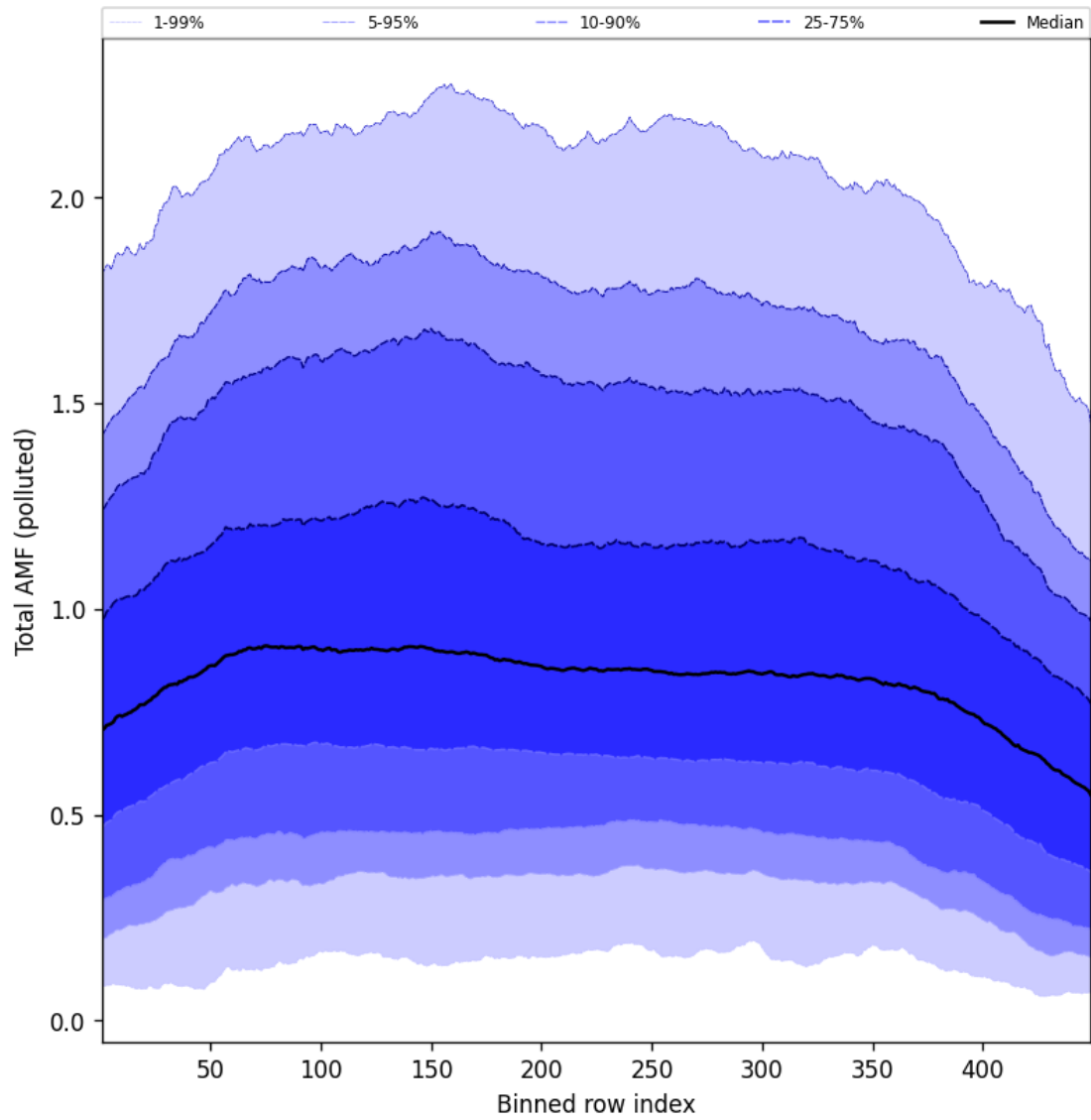


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-09-13 to 2025-09-13

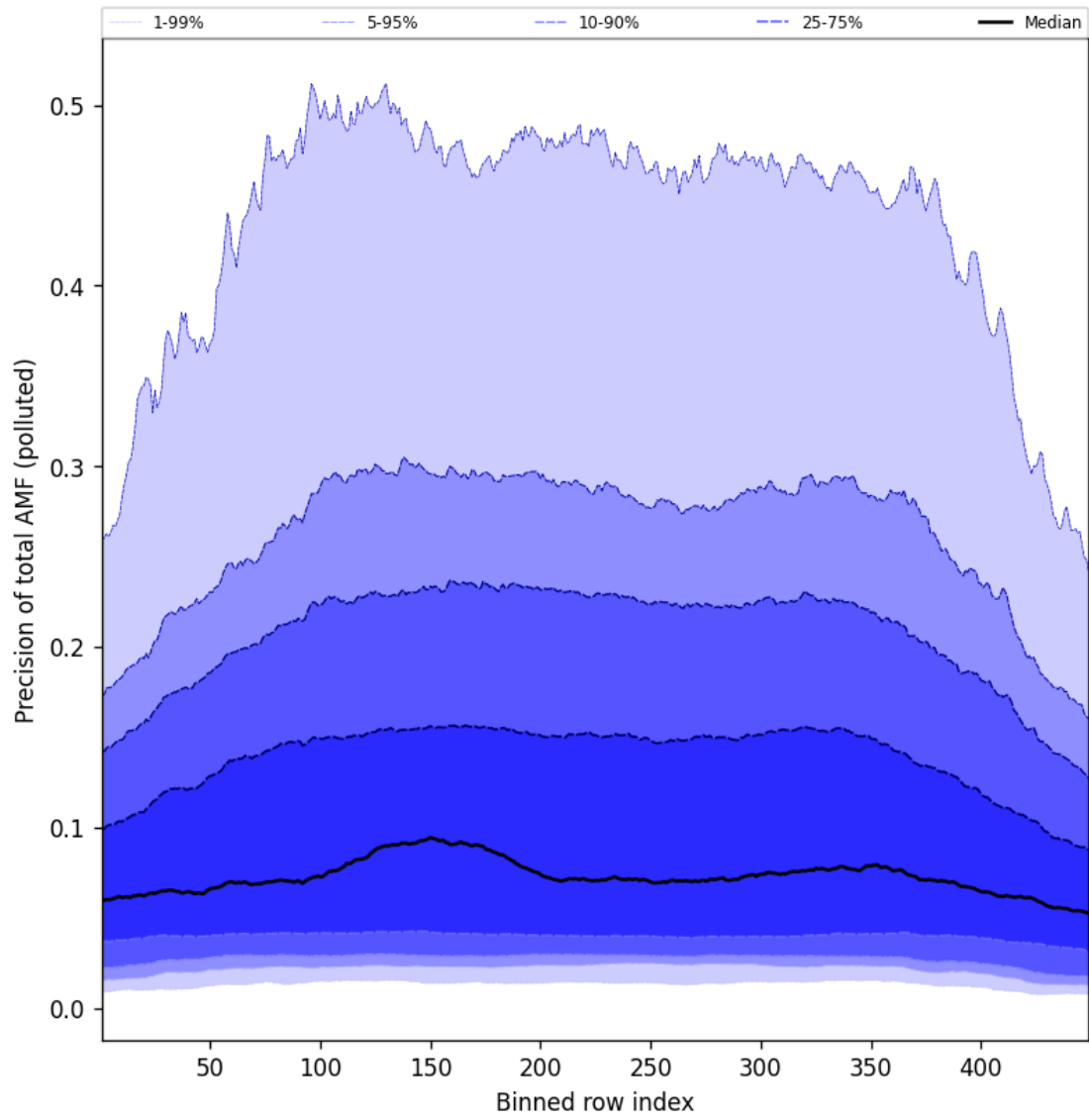


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-09-13 to 2025-09-13

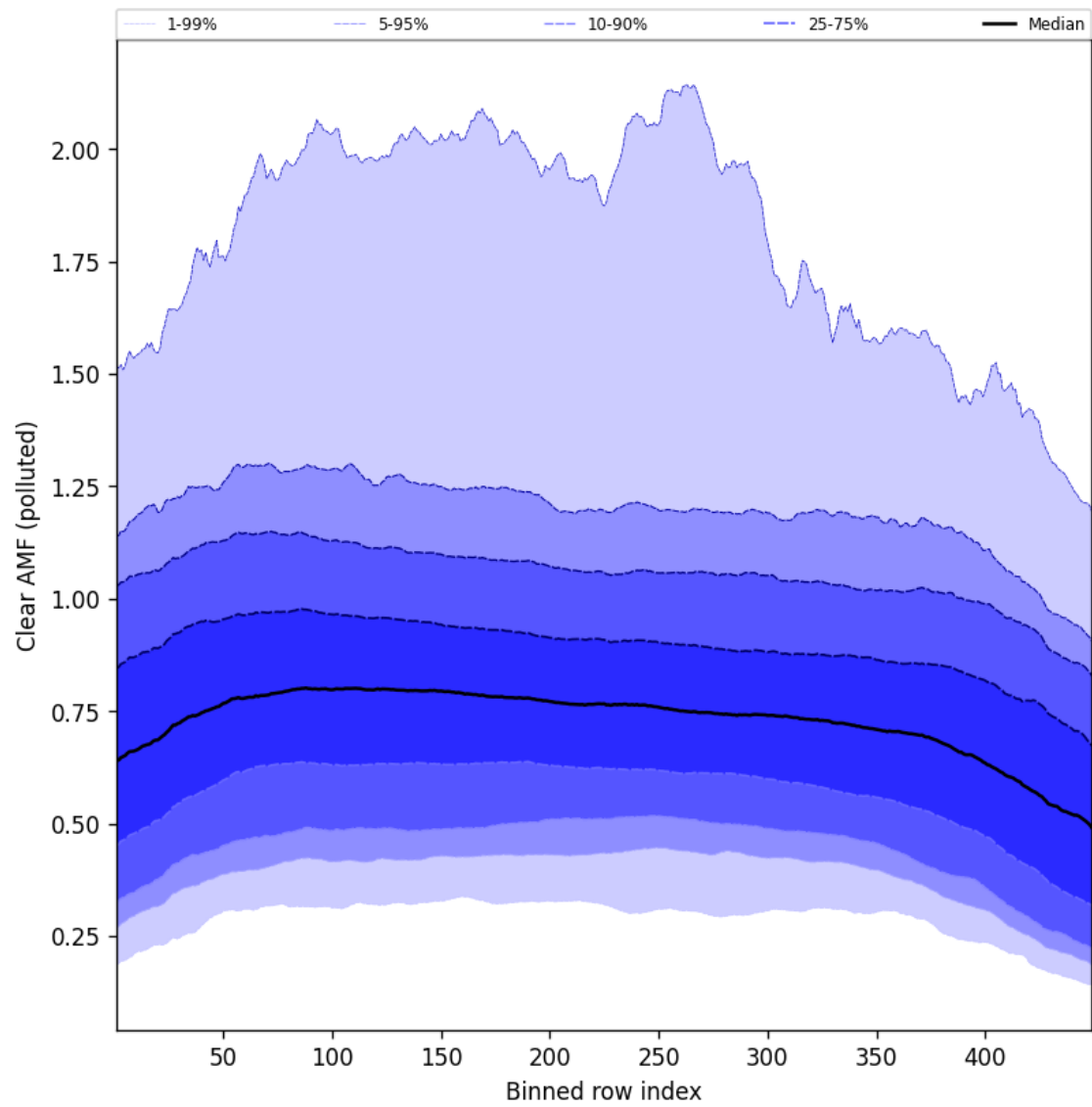


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-09-13 to 2025-09-13

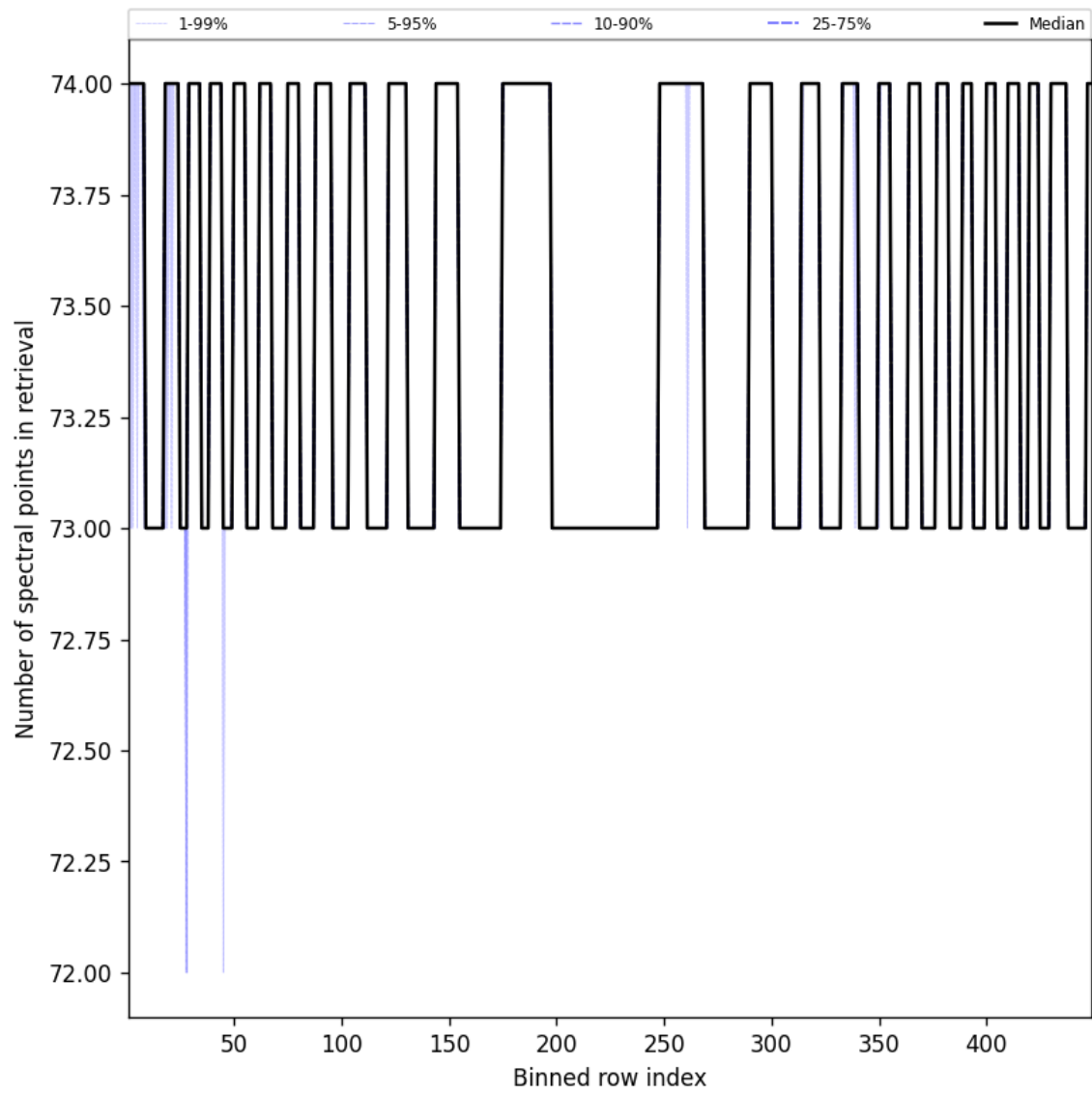


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-09-13 to 2025-09-13

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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