

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]	0.646 ± 0.398	17309481	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.163 \pm 87.111) \times 10^{-2}$	17309481	0.278	0.466	1.206×10^{-2}	-62.4	369
sulfurdioxide total vertical column precision [DU]	0.503 ± 0.603	17309481	0.222	0.332	0.333	4.346×10^{-2}	35.6
sulfurdioxide slant column density corrected [DU]	$(2.282 \pm 39.853) \times 10^{-2}$	17309481	0.267	0.379	1.052×10^{-2}	-24.1	336
sulfurdioxide slant column density cobra [DU]	$(2.261 \pm 37.783) \times 10^{-2}$	17309481	0.267	0.379	1.052×10^{-2}	-24.1	33.3
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.132	17309481	0.213	0.138	0.264	8.351×10^{-2}	28.1
sulfurdioxide slant column density window1 [DU]	0.193 ± 0.704	17309481	0.175	0.757	0.200	-55.3	84.5
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.132	17309481	0.213	0.138	0.264	8.351×10^{-2}	28.1
sulfurdioxide slant column density corrected win1 [DU]	$(5.719 \pm 69.760) \times 10^{-2}$	17309481	2.500×10^{-2}	0.746	3.589×10^{-2}	-55.3	84.7
background so2 slant column offset window1 [DU]	-0.135 ± 0.153	17309481	-0.180	0.157	-0.163	-1.38	3.39
sulfurdioxide slant column density window2 [DU]	3.38 ± 9.21	17309481	3.25	11.7	3.28	-1.077×10^3	981
sulfurdioxide slant column density window2 precision [DU]	8.13 ± 2.26	17309481	7.43	2.56	7.79	2.37	716
sulfurdioxide slant column density corrected win2 [DU]	0.256 ± 8.847	17309481	0.250	11.1	0.306	-1.079×10^3	980
background so2 slant column offset window2 [DU]	-3.12 ± 3.02	17309481	-0.750	4.01	-2.12	-20.0	7.33
sulfurdioxide slant column density window3 [DU]	-15.8 ± 23.8	17309481	-17.4	29.9	-16.1	-586	863
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 13.2	17309481	22.5	9.83	24.7	9.47	409
sulfurdioxide slant column density corrected win3 [DU]	-1.89 ± 23.10	17309481	-1.68	28.8	-1.78	-572	877
background so2 slant column offset window3 [DU]	13.9 ± 6.7	17309481	7.28	11.1	13.6	-10.7	35.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	17309481	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.185 \pm 8.795) \times 10^{-2}$	17309481	1.041×10^{-2}	1.716×10^{-2}	1.256×10^{-2}	1.858×10^{-4}	2.89
fitted radiance shift [nm]	$(-3.211 \pm 25.990) \times 10^{-4}$	17309481	-5.000×10^{-4}	1.752×10^{-3}	-3.069×10^{-4}	-4.552×10^{-2}	8.262×10^{-2}
fitted radiance squeeze [1]	$(-1.965 \pm 18.039) \times 10^{-5}$	17309481	-1.000×10^{-5}	2.056×10^{-4}	-1.443×10^{-5}	-2.688×10^{-2}	1.612×10^{-2}
fitted root mean square [1]	$(1.315 \pm 0.547) \times 10^{-3}$	17309481	9.750×10^{-4}	5.550×10^{-4}	1.162×10^{-3}	3.288×10^{-4}	8.070×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.871 ± 0.431	17309481	0.620	0.544	0.810	5.000×10^{-2}	2.93
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.113	17309481	3.500×10^{-2}	0.100	6.547×10^{-2}	2.837×10^{-3}	1.85
sulfurdioxide clear air mass factor polluted [1]	0.741 ± 0.300	17309481	0.620	0.381	0.703	6.721×10^{-2}	3.02
number of spectral points in retrieval [1]	73.4 ± 0.5	17309481	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.120	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.11	-0.858	-0.535	-0.364	-0.217	0.249	0.409	0.599	0.971	2.47
sulfurdioxide total vertical column precision [DU]	0.106	0.144	0.171	0.195	0.227	0.559	0.733	0.938	1.34	3.06
sulfurdioxide slant column density corrected [DU]	-0.866	-0.505	-0.367	-0.274	-0.177	0.202	0.306	0.409	0.572	1.09
sulfurdioxide slant column density cobra [DU]	-0.866	-0.505	-0.367	-0.274	-0.177	0.202	0.306	0.409	0.572	1.09
sulfurdioxide slant column density cobra precision [DU]	0.148	0.175	0.189	0.200	0.215	0.353	0.403	0.454	0.548	0.788
sulfurdioxide slant column density window1 [DU]	-1.71	-0.895	-0.589	-0.389	-0.183	0.575	0.771	0.959	1.24	2.05
sulfurdioxide slant column density window1 precision [DU]	0.148	0.175	0.189	0.200	0.215	0.353	0.403	0.454	0.548	0.788
sulfurdioxide slant column density corrected win1 [DU]	-1.67	-0.966	-0.700	-0.521	-0.331	0.415	0.622	0.825	1.14	2.06
background so2 slant column offset window1 [DU]	-0.424	-0.307	-0.278	-0.260	-0.232	-7.545×10^{-2}	-1.808×10^{-2}	4.816×10^{-2}	0.154	0.397
sulfurdioxide slant column density window2 [DU]	-18.5	-11.3	-7.91	-5.37	-2.51	9.18	12.2	14.8	18.4	25.9
sulfurdioxide slant column density window2 precision [DU]	4.33	5.22	5.75	6.16	6.66	9.22	10.1	10.9	12.2	14.8
sulfurdioxide slant column density corrected win2 [DU]	-21.5	-14.1	-10.6	-8.08	-5.27	5.84	8.61	11.1	14.4	21.5
background so2 slant column offset window2 [DU]	-11.4	-9.42	-7.87	-6.43	-4.83	-0.815	-0.493	-0.268	3.244×10^{-2}	0.912
sulfurdioxide slant column density window3 [DU]	-74.2	-54.1	-44.8	-38.1	-30.8	-0.888	7.05	14.2	23.9	43.0
sulfurdioxide slant column density window3 precision [DU]	13.6	16.1	18.0	19.5	21.0	30.8	35.5	41.5	53.3	84.5
sulfurdioxide slant column density corrected win3 [DU]	-60.1	-39.9	-30.4	-23.6	-16.2	12.6	20.0	26.6	35.7	54.3
background so2 slant column offset window3 [DU]	8.021×10^{-2}	4.65	5.99	6.93	8.26	19.3	21.3	22.7	24.6	27.5
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]	5.103×10^{-4}	8.345×10^{-4}	1.403×10^{-3}	3.089×10^{-3}	6.589×10^{-3}	2.376×10^{-2}	3.570×10^{-2}	5.948×10^{-2}	0.121	0.366
fitted radiance shift [nm]	-8.225×10^{-3}	-4.196×10^{-3}	-2.756×10^{-3}	-1.926×10^{-3}	-1.222×10^{-3}	5.301×10^{-4}	1.223×10^{-3}	2.100×10^{-3}	3.619×10^{-3}	7.800×10^{-3}
fitted radiance squeeze [1]	-5.178×10^{-4}	-3.103×10^{-4}	-2.293×10^{-4}	-1.753×10^{-4}	-1.190×10^{-4}	8.663×10^{-5}	1.383×10^{-4}	1.861×10^{-4}	2.546×10^{-4}	4.171×10^{-4}
fitted root mean square [1]	6.088×10^{-4}	7.553×10^{-4}	8.323×10^{-4}	8.909×10^{-4}	9.626×10^{-4}	1.518×10^{-3}	1.752×10^{-3}	1.988×10^{-3}	2.343×10^{-3}	3.327×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.112	0.268	0.370	0.458	0.562	1.11	1.30	1.49	1.71	2.06
sulfurdioxide total air mass factor polluted precision [1]	1.175×10^{-2}	1.978×10^{-2}	2.591×10^{-2}	3.080×10^{-2}	3.852×10^{-2}	0.139	0.183	0.231	0.319	0.573
sulfurdioxide clear air mass factor polluted [1]	0.227	0.326	0.391	0.451	0.531	0.912	1.01	1.10	1.29	1.70
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]	0.606 ± 0.401	10906108	0.790	0.490	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(3.183 \pm 88.571) \times 10^{-2}$	10906108	0.451	1.100×10^{-2}	-62.4	58.7	-0.210	0.241
sulfurdioxide total vertical column precision [DU]	0.502 ± 0.637	10906108	0.326	0.322	4.346×10^{-2}	26.9	0.217	0.544
sulfurdioxide slant column density corrected [DU]	$(2.418 \pm 39.913) \times 10^{-2}$	10906108	0.375	9.828×10^{-3}	-11.5	72.0	-0.175	0.200
sulfurdioxide slant column density cobra [DU]	$(2.392 \pm 38.298) \times 10^{-2}$	10906108	0.375	9.828×10^{-3}	-11.5	28.1	-0.175	0.200
sulfurdioxide slant column density cobra precision [DU]	0.301 ± 0.137	10906108	0.143	0.260	8.351×10^{-2}	11.0	0.210	0.353
sulfurdioxide slant column density window1 [DU]	0.188 ± 0.719	10906108	0.753	0.198	-22.8	75.0	-0.183	0.570
sulfurdioxide slant column density window1 precision [DU]	0.301 ± 0.137	10906108	0.143	0.260	8.351×10^{-2}	11.0	0.210	0.353
sulfurdioxide slant column density corrected win1 [DU]	$(6.018 \pm 71.083) \times 10^{-2}$	10906108	0.741	3.505×10^{-2}	-22.8	74.7	-0.328	0.413
background so2 slant column offset window1 [DU]	-0.127 ± 0.170	10906108	0.174	-0.167	-1.29	3.39	-0.237	-6.311×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.86 ± 8.87	10906108	11.4	3.76	-272	673	-1.89	9.52
sulfurdioxide slant column density window2 precision [DU]	7.75 ± 2.03	10906108	2.31	7.44	2.38	242	6.41	8.72
sulfurdioxide slant column density corrected win2 [DU]	0.108 ± 8.356	10906108	10.6	0.192	-273	665	-5.16	5.48
background so2 slant column offset window2 [DU]	-3.75 ± 3.42	10906108	5.54	-2.90	-20.0	7.33	-6.30	-0.761
sulfurdioxide slant column density window3 [DU]	-17.0 ± 22.5	10906108	28.1	-17.5	-204	172	-31.2	-3.09
sulfurdioxide slant column density window3 precision [DU]	26.6 ± 12.7	10906108	8.08	23.1	9.47	243	20.1	28.2
sulfurdioxide slant column density corrected win3 [DU]	-1.69 ± 21.60	10906108	26.9	-1.57	-187	179	-15.1	11.9
background so2 slant column offset window3 [DU]	15.3 ± 7.0	10906108	12.3	16.4	-10.7	35.2	8.71	21.0
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	10906108	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.980 \pm 10.559) \times 10^{-2}$	10906108	2.741×10^{-2}	1.270×10^{-2}	1.858×10^{-4}	2.89	3.164×10^{-3}	3.057×10^{-2}
fitted radiance shift [nm]	$(-1.787 \pm 25.022) \times 10^{-4}$	10906108	1.579×10^{-3}	-1.970×10^{-4}	-4.188×10^{-2}	3.827×10^{-2}	-9.944×10^{-4}	5.848×10^{-4}
fitted radiance squeeze [1]	$(-3.884 \pm 17.877) \times 10^{-5}$	10906108	2.028×10^{-4}	-2.765×10^{-5}	-1.091×10^{-2}	1.321×10^{-2}	-1.330×10^{-4}	6.979×10^{-5}
fitted root mean square [1]	$(1.314 \pm 0.578) \times 10^{-3}$	10906108	5.683×10^{-4}	1.145×10^{-3}	3.288×10^{-4}	3.402×10^{-2}	9.437×10^{-4}	1.512×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.903 ± 0.468	10906108	0.632	0.831	5.000×10^{-2}	2.93	0.552	1.18
sulfurdioxide total air mass factor polluted precision [1]	0.115 ± 0.126	10906108	0.107	6.945×10^{-2}	2.837×10^{-3}	1.85	3.849×10^{-2}	0.145
sulfurdioxide clear air mass factor polluted [1]	0.749 ± 0.343	10906108	0.459	0.695	6.721×10^{-2}	3.02	0.489	0.947
number of spectral points in retrieval [1]	73.5 ± 0.5	10906108	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]	0.715 ± 0.382	6403373	0.660	1.000	0.0	1.000	0.340	1.000
sulfurdioxide total vertical column [DU]	$(3.129 \pm 84.566) \times 10^{-2}$	6403373	0.493	1.409×10^{-2}	-50.5	369	-0.229	0.263
sulfurdioxide total vertical column precision [DU]	0.505 ± 0.540	6403373	0.339	0.351	5.069×10^{-2}	35.6	0.244	0.583
sulfurdioxide slant column density corrected [DU]	$(2.051 \pm 39.750) \times 10^{-2}$	6403373	0.386	1.172×10^{-2}	-24.1	336	-0.180	0.206
sulfurdioxide slant column density cobra [DU]	$(2.040 \pm 36.889) \times 10^{-2}$	6403373	0.386	1.172×10^{-2}	-24.1	33.3	-0.180	0.206
sulfurdioxide slant column density cobra precision [DU]	0.304 ± 0.123	6403373	0.129	0.270	9.153×10^{-2}	28.1	0.223	0.353
sulfurdioxide slant column density window1 [DU]	0.201 ± 0.679	6403373	0.764	0.203	-55.3	84.5	-0.182	0.583
sulfurdioxide slant column density window1 precision [DU]	0.304 ± 0.123	6403373	0.129	0.270	9.153×10^{-2}	28.1	0.223	0.353
sulfurdioxide slant column density corrected win1 [DU]	$(5.208 \pm 67.444) \times 10^{-2}$	6403373	0.754	3.736×10^{-2}	-55.3	84.7	-0.336	0.419
background so2 slant column offset window1 [DU]	-0.149 ± 0.117	6403373	0.135	-0.160	-1.38	1.74	-0.223	-8.798×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.56 ± 9.71	6403373	12.1	2.43	-1.077×10^3	981	-3.57	8.54
sulfurdioxide slant column density window2 precision [DU]	8.77 ± 2.47	6403373	2.75	8.44	2.37	716	7.22	9.97
sulfurdioxide slant column density corrected win2 [DU]	0.508 ± 9.619	6403373	12.0	0.527	-1.079×10^3	980	-5.48	6.52
background so2 slant column offset window2 [DU]	-2.05 ± 1.70	6403373	2.12	-1.62	-10.6	6.07	-2.99	-0.868
sulfurdioxide slant column density window3 [DU]	-13.7 ± 25.9	6403373	32.8	-13.5	-586	863	-29.9	2.88
sulfurdioxide slant column density window3 precision [DU]	31.2 ± 13.5	6403373	10.5	27.7	10.4	409	23.5	34.1
sulfurdioxide slant column density corrected win3 [DU]	-2.21 ± 25.44	6403373	32.4	-2.20	-572	877	-18.3	14.1
background so2 slant column offset window3 [DU]	11.5 ± 5.2	6403373	7.52	10.6	-8.40	28.1	7.79	15.3
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	6403373	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.830 \pm 4.039) \times 10^{-2}$	6403373	9.138×10^{-3}	1.246×10^{-2}	7.182×10^{-4}	2.42	8.926×10^{-3}	1.806×10^{-2}
fitted radiance shift [nm]	$(-5.637 \pm 27.390) \times 10^{-4}$	6403373	2.024×10^{-3}	-5.407×10^{-4}	-4.552×10^{-2}	8.262×10^{-2}	-1.619×10^{-3}	4.055×10^{-4}
fitted radiance squeeze [1]	$(1.304 \pm 17.842) \times 10^{-5}$	6403373	2.103×10^{-4}	9.078×10^{-6}	-2.688×10^{-2}	1.612×10^{-2}	-9.445×10^{-5}	1.158×10^{-4}
fitted root mean square [1]	$(1.317 \pm 0.490) \times 10^{-3}$	6403373	5.301×10^{-4}	1.186×10^{-3}	3.435×10^{-4}	8.070×10^{-2}	9.961×10^{-4}	1.526×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.817 ± 0.351	6403373	0.445	0.784	5.000×10^{-2}	2.65	0.575	1.02
sulfurdioxide total air mass factor polluted precision [1]	$(9.406 \pm 8.297) \times 10^{-2}$	6403373	8.971×10^{-2}	5.910×10^{-2}	3.581×10^{-3}	1.66	3.856×10^{-2}	0.128
sulfurdioxide clear air mass factor polluted [1]	0.728 ± 0.205	6403373	0.286	0.712	8.761×10^{-2}	1.59	0.582	0.868
number of spectral points in retrieval [1]	73.4 ± 0.5	6403373	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]	0.684 ± 0.386	11393341	0.710	1.000	0.0	1.000	0.290	1.000
sulfurdioxide total vertical column [DU]	$(2.863 \pm 83.581) \times 10^{-2}$	11393341	0.457	1.132×10^{-2}	-62.4	369	-0.214	0.243
sulfurdioxide total vertical column precision [DU]	0.488 ± 0.575	11393341	0.319	0.321	5.562×10^{-2}	35.6	0.226	0.545
sulfurdioxide slant column density corrected [DU]	$(1.937 \pm 38.090) \times 10^{-2}$	11393341	0.373	9.804×10^{-3}	-20.1	336	-0.175	0.198
sulfurdioxide slant column density cobra [DU]	$(1.930 \pm 36.427) \times 10^{-2}$	11393341	0.373	9.804×10^{-3}	-20.1	26.6	-0.175	0.198
sulfurdioxide slant column density cobra precision [DU]	0.300 ± 0.133	11393341	0.143	0.257	8.467×10^{-2}	28.1	0.211	0.355
sulfurdioxide slant column density window1 [DU]	0.190 ± 0.692	11393341	0.751	0.201	-55.3	77.6	-0.179	0.572
sulfurdioxide slant column density window1 precision [DU]	0.300 ± 0.133	11393341	0.143	0.257	8.467×10^{-2}	28.1	0.211	0.355
sulfurdioxide slant column density corrected win1 [DU]	$(5.008 \pm 68.455) \times 10^{-2}$	11393341	0.741	3.313×10^{-2}	-55.3	77.4	-0.332	0.409
background so2 slant column offset window1 [DU]	-0.140 ± 0.146	11393341	0.153	-0.166	-1.38	3.39	-0.233	-7.987×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.09 ± 9.21	11393341	11.7	2.94	-485	821	-2.81	8.85
sulfurdioxide slant column density window2 precision [DU]	8.16 ± 2.20	11393341	2.55	7.83	2.37	716	6.71	9.26
sulfurdioxide slant column density corrected win2 [DU]	0.274 ± 8.894	11393341	11.2	0.320	-486	820	-5.30	5.91
background so2 slant column offset window2 [DU]	-2.82 ± 2.91	11393341	3.36	-1.82	-20.0	7.33	-4.10	-0.742
sulfurdioxide slant column density window3 [DU]	-12.8 ± 24.1	11393341	30.7	-13.2	-586	863	-28.2	2.45
sulfurdioxide slant column density window3 precision [DU]	27.9 ± 11.8	11393341	9.21	24.7	9.47	409	21.4	30.6
sulfurdioxide slant column density corrected win3 [DU]	0.304 ± 23.183	11393341	29.3	0.190	-572	877	-14.3	15.0
background so2 slant column offset window3 [DU]	13.1 ± 6.5	11393341	10.4	12.2	-10.7	35.2	7.86	18.3
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	11393341	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.972 \pm 4.053) \times 10^{-2}$	11393341	1.183×10^{-2}	1.219×10^{-2}	3.095×10^{-4}	2.42	7.528×10^{-3}	1.936×10^{-2}
fitted radiance shift [nm]	$(-3.639 \pm 23.568) \times 10^{-4}$	11393341	1.726×10^{-3}	-3.319×10^{-4}	-4.552×10^{-2}	8.262×10^{-2}	-1.250×10^{-3}	4.768×10^{-4}
fitted radiance squeeze [1]	$(-1.195 \pm 17.950) \times 10^{-5}$	11393341	2.037×10^{-4}	-7.734×10^{-6}	-1.435×10^{-2}	1.369×10^{-2}	-1.108×10^{-4}	9.284×10^{-5}
fitted root mean square [1]	$(1.310 \pm 0.547) \times 10^{-3}$	11393341	5.917×10^{-4}	1.141×10^{-3}	3.435×10^{-4}	5.671×10^{-2}	9.500×10^{-4}	1.542×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.860 ± 0.385	11393341	0.488	0.829	5.000×10^{-2}	2.82	0.588	1.08
sulfurdioxide total air mass factor polluted precision [1]	$(9.605 \pm 9.345) \times 10^{-2}$	11393341	8.252×10^{-2}	6.237×10^{-2}	3.026×10^{-3}	1.85	4.037×10^{-2}	0.123
sulfurdioxide clear air mass factor polluted [1]	0.755 ± 0.274	11393341	0.351	0.734	7.537×10^{-2}	3.02	0.566	0.918
number of spectral points in retrieval [1]	73.4 ± 0.5	11393341	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]	0.616 ± 0.416	4131986	0.830	1.000	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(3.101 \pm 82.930) \times 10^{-2}$	4131986	0.468	1.214×10^{-2}	-41.0	66.8	-0.217	0.250
sulfurdioxide total vertical column precision [DU]	0.492 ± 0.560	4131986	0.313	0.350	4.346×10^{-2}	26.7	0.230	0.543
sulfurdioxide slant column density corrected [DU]	$(2.622 \pm 41.420) \times 10^{-2}$	4131986	0.373	1.057×10^{-2}	-24.1	72.0	-0.174	0.199
sulfurdioxide slant column density cobra [DU]	$(2.572 \pm 38.022) \times 10^{-2}$	4131986	0.373	1.057×10^{-2}	-24.1	28.1	-0.174	0.199
sulfurdioxide slant column density cobra precision [DU]	0.293 ± 0.120	4131986	0.115	0.261	8.948×10^{-2}	25.5	0.217	0.332
sulfurdioxide slant column density window1 [DU]	0.216 ± 0.685	4131986	0.737	0.213	-31.6	84.5	-0.157	0.580
sulfurdioxide slant column density window1 precision [DU]	0.293 ± 0.120	4131986	0.115	0.261	8.948×10^{-2}	25.5	0.217	0.332
sulfurdioxide slant column density corrected win1 [DU]	$(6.275 \pm 67.954) \times 10^{-2}$	4131986	0.726	3.816×10^{-2}	-31.6	84.7	-0.319	0.407
background so2 slant column offset window1 [DU]	-0.153 ± 0.143	4131986	0.146	-0.178	-0.771	1.67	-0.242	-9.612×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.27 ± 9.17	4131986	11.6	3.26	-1.077×10^3	748	-2.54	9.08
sulfurdioxide slant column density window2 precision [DU]	8.14 ± 2.42	4131986	2.57	7.79	2.48	451	6.64	9.20
sulfurdioxide slant column density corrected win2 [DU]	0.218 ± 8.817	4131986	11.0	0.270	-1.079×10^3	747	-5.27	5.77
background so2 slant column offset window2 [DU]	-3.05 ± 2.92	4131986	4.01	-2.04	-18.1	6.17	-4.82	-0.813
sulfurdioxide slant column density window3 [DU]	-21.2 ± 22.7	4131986	28.1	-21.0	-447	175	-35.2	-7.01
sulfurdioxide slant column density window3 precision [DU]	29.8 ± 16.1	4131986	11.8	25.2	9.59	243	20.7	32.4
sulfurdioxide slant column density corrected win3 [DU]	-7.11 ± 22.95	4131986	28.5	-6.31	-441	180	-21.0	7.51
background so2 slant column offset window3 [DU]	14.1 ± 6.6	4131986	11.2	14.0	-10.7	32.3	8.48	19.6
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.10	4131986	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.939 \pm 13.994) \times 10^{-2}$	4131986	4.565×10^{-2}	1.840×10^{-2}	1.858×10^{-4}	2.89	5.971×10^{-3}	5.162×10^{-2}
fitted radiance shift [nm]	$(-2.075 \pm 31.660) \times 10^{-4}$	4131986	1.855×10^{-3}	-2.269×10^{-4}	-4.426×10^{-2}	5.064×10^{-2}	-1.157×10^{-3}	6.985×10^{-4}
fitted radiance squeeze [1]	$(-2.496 \pm 17.367) \times 10^{-5}$	4131986	2.018×10^{-4}	-2.026×10^{-5}	-2.688×10^{-2}	1.612×10^{-2}	-1.228×10^{-4}	7.898×10^{-5}
fitted root mean square [1]	$(1.265 \pm 0.499) \times 10^{-3}$	4131986	4.503×10^{-4}	1.148×10^{-3}	3.508×10^{-4}	8.070×10^{-2}	9.653×10^{-4}	1.416×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.882 ± 0.497	4131986	0.620	0.739	5.000×10^{-2}	2.93	0.531	1.15
sulfurdioxide total air mass factor polluted precision [1]	0.131 ± 0.141	4131986	0.146	7.799×10^{-2}	2.993×10^{-3}	1.66	3.351×10^{-2}	0.179
sulfurdioxide clear air mass factor polluted [1]	0.708 ± 0.323	4131986	0.362	0.638	6.907×10^{-2}	2.80	0.487	0.849
number of spectral points in retrieval [1]	73.4 ± 0.5	4131986	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

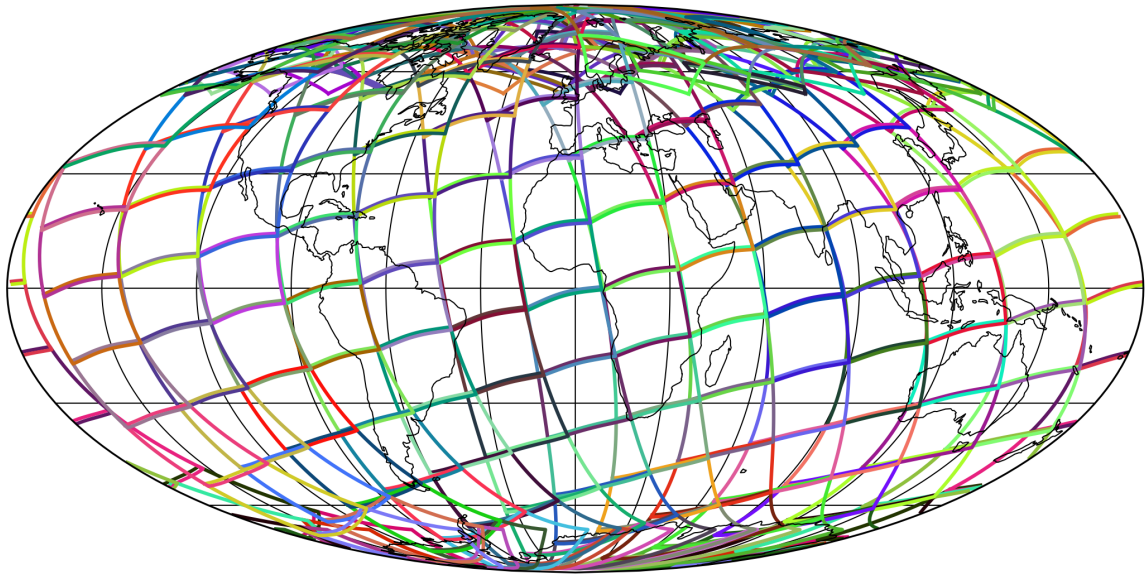


Figure 1: Outline of the granules.

4 Input data monitoring

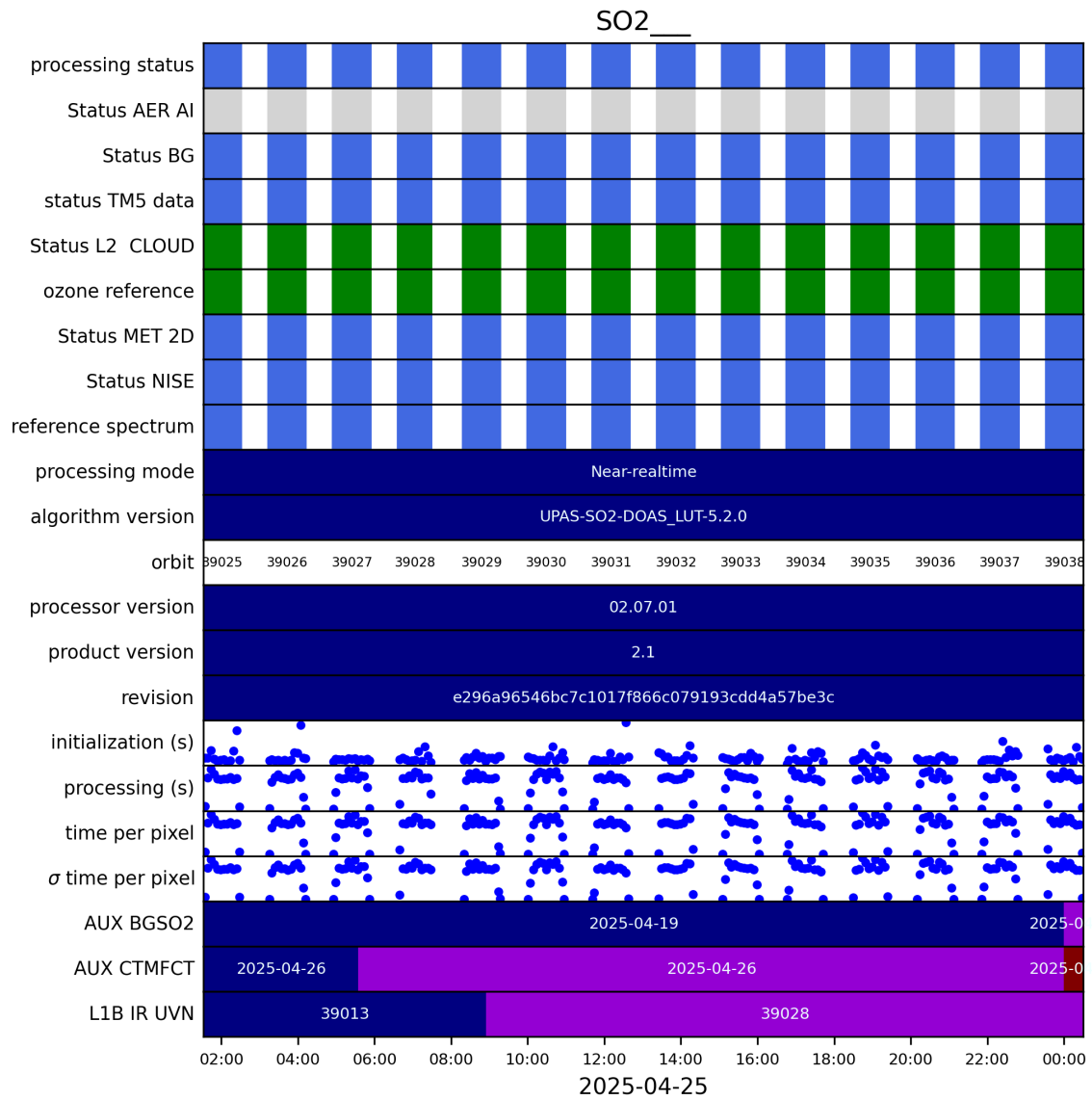


Figure 2: Input data per granule

5 Warnings and errors

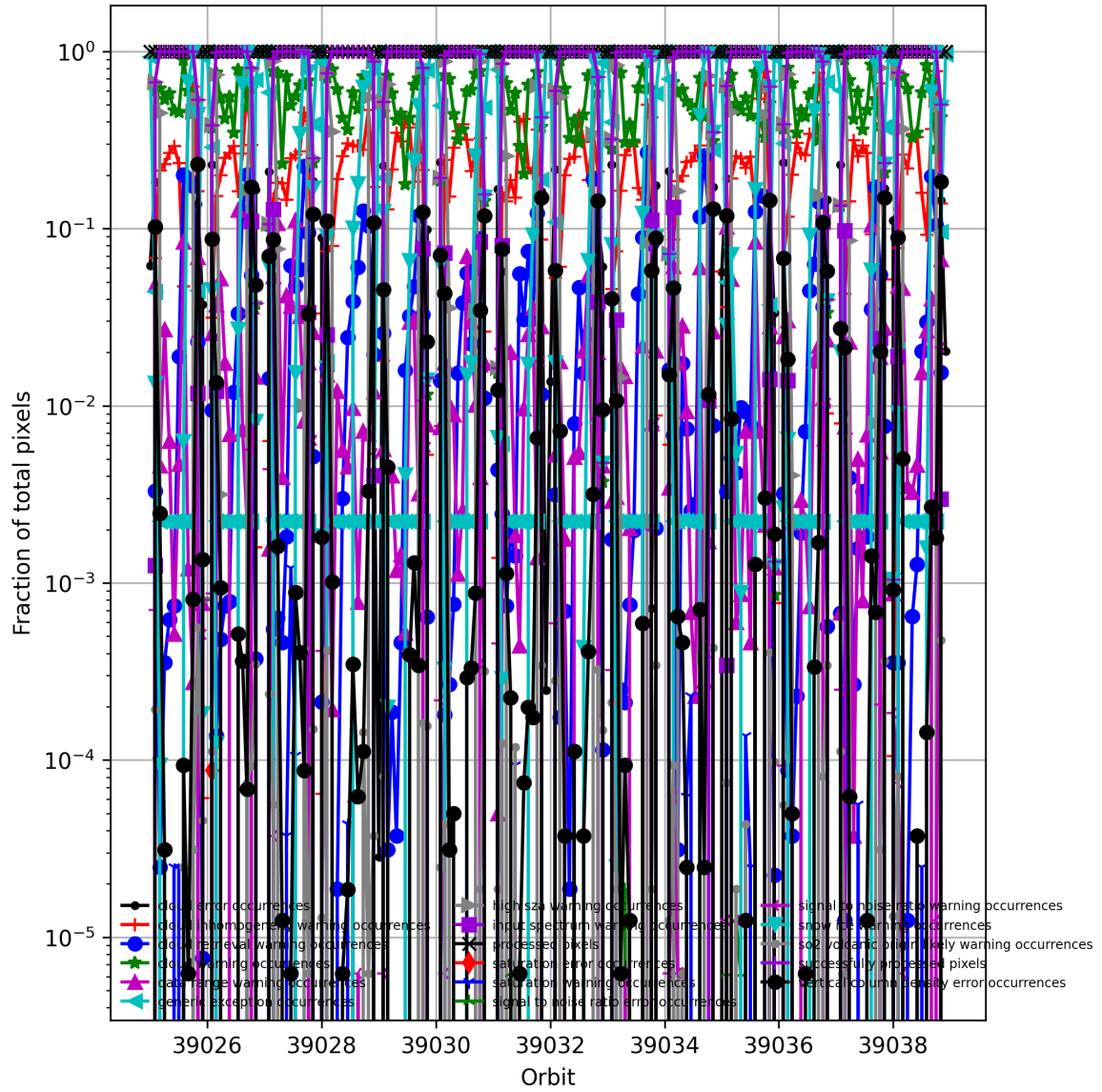


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

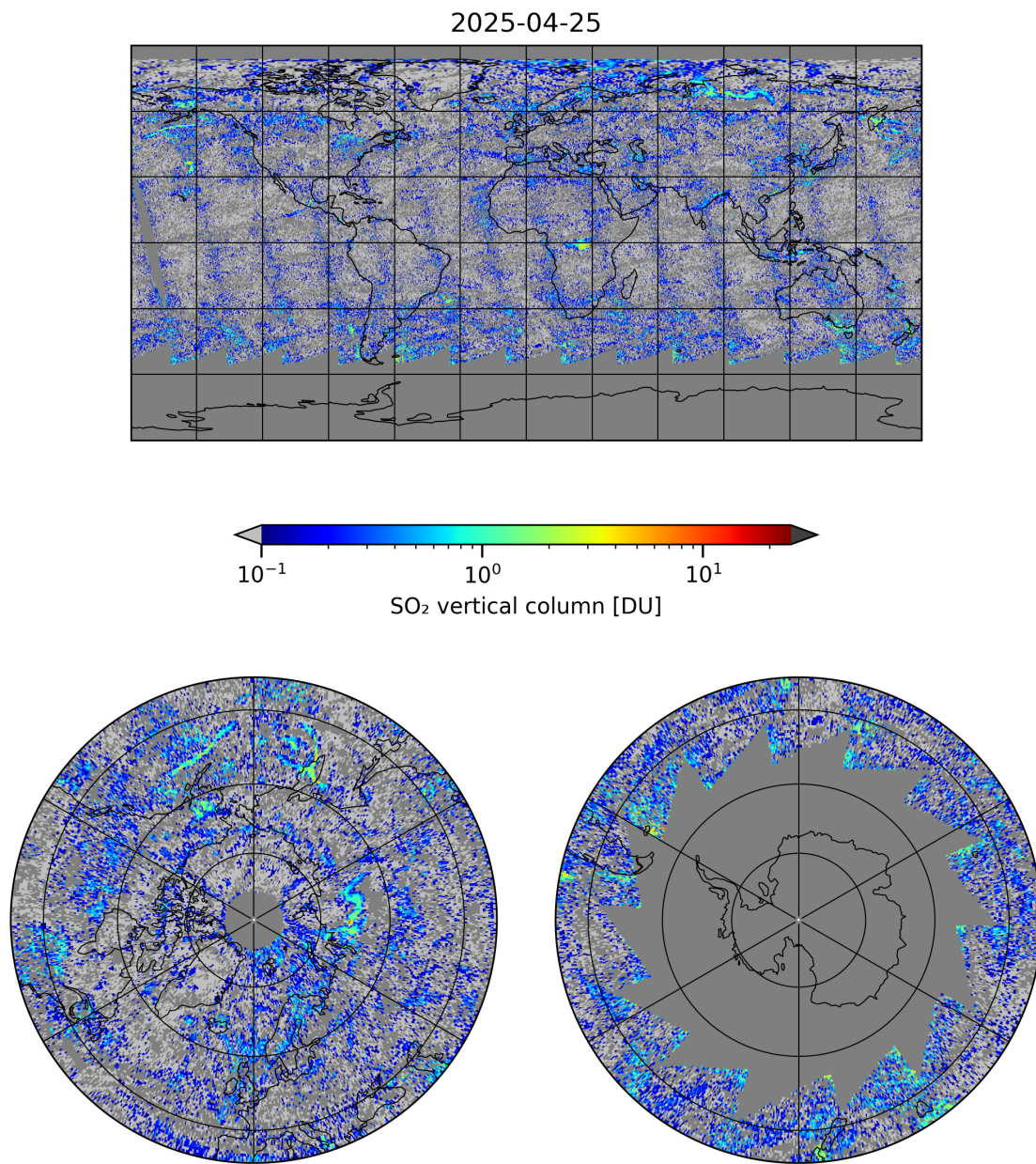


Figure 4: Map of “SO₂ vertical column” for 2025-04-25 to 2025-04-26

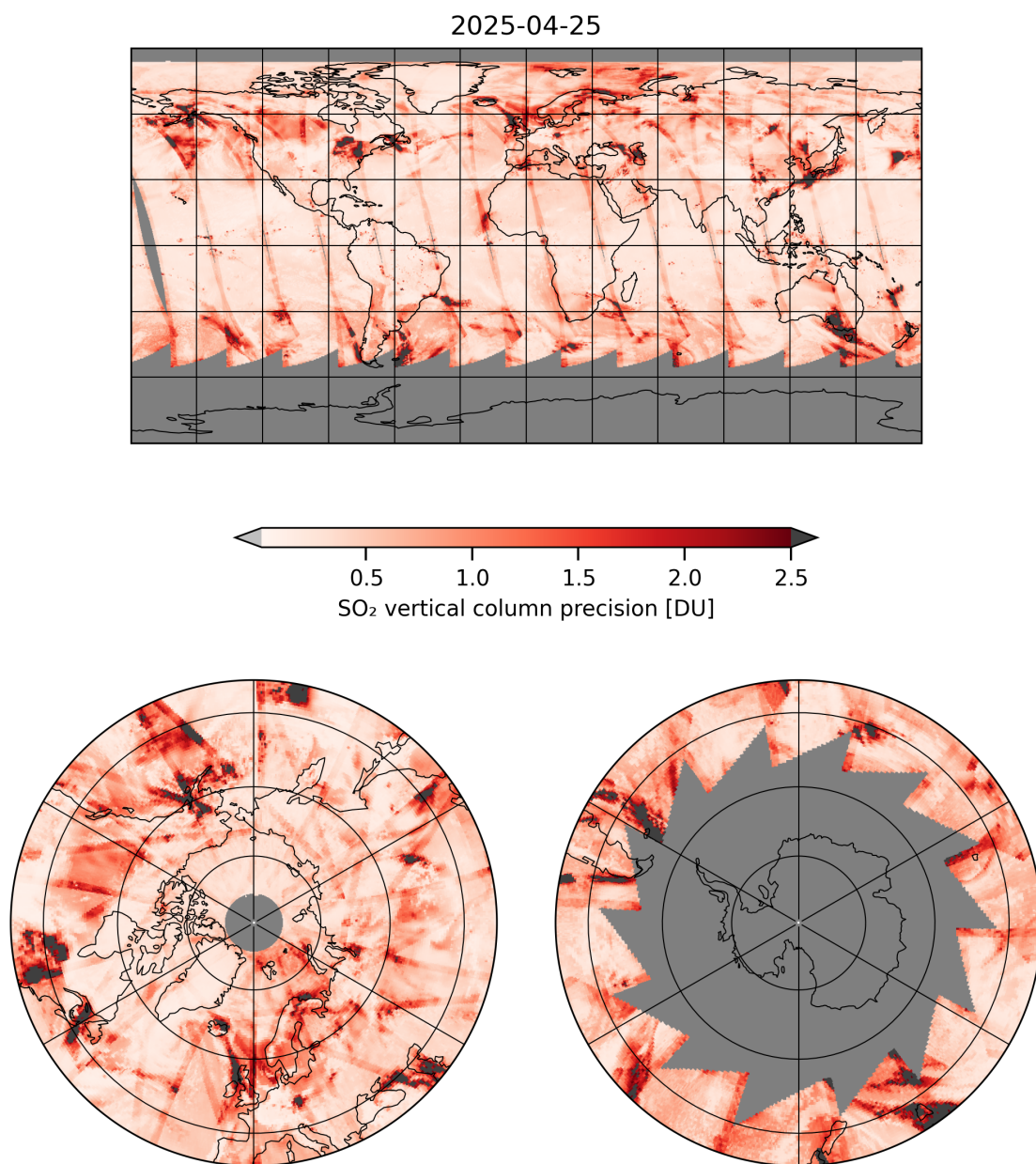


Figure 5: Map of “SO₂ vertical column precision” for 2025-04-25 to 2025-04-26

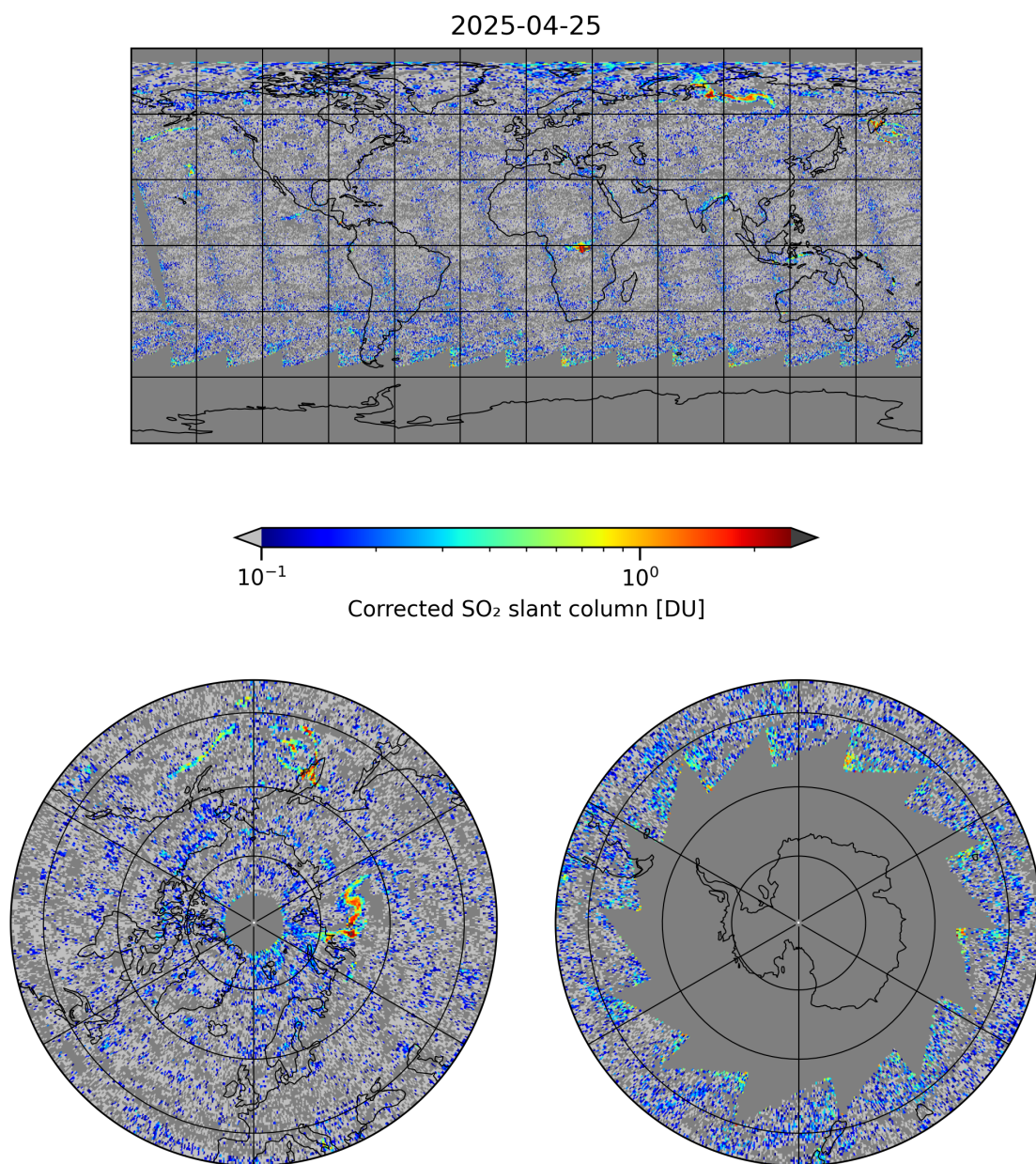


Figure 6: Map of “Corrected SO₂ slant column” for 2025-04-25 to 2025-04-26

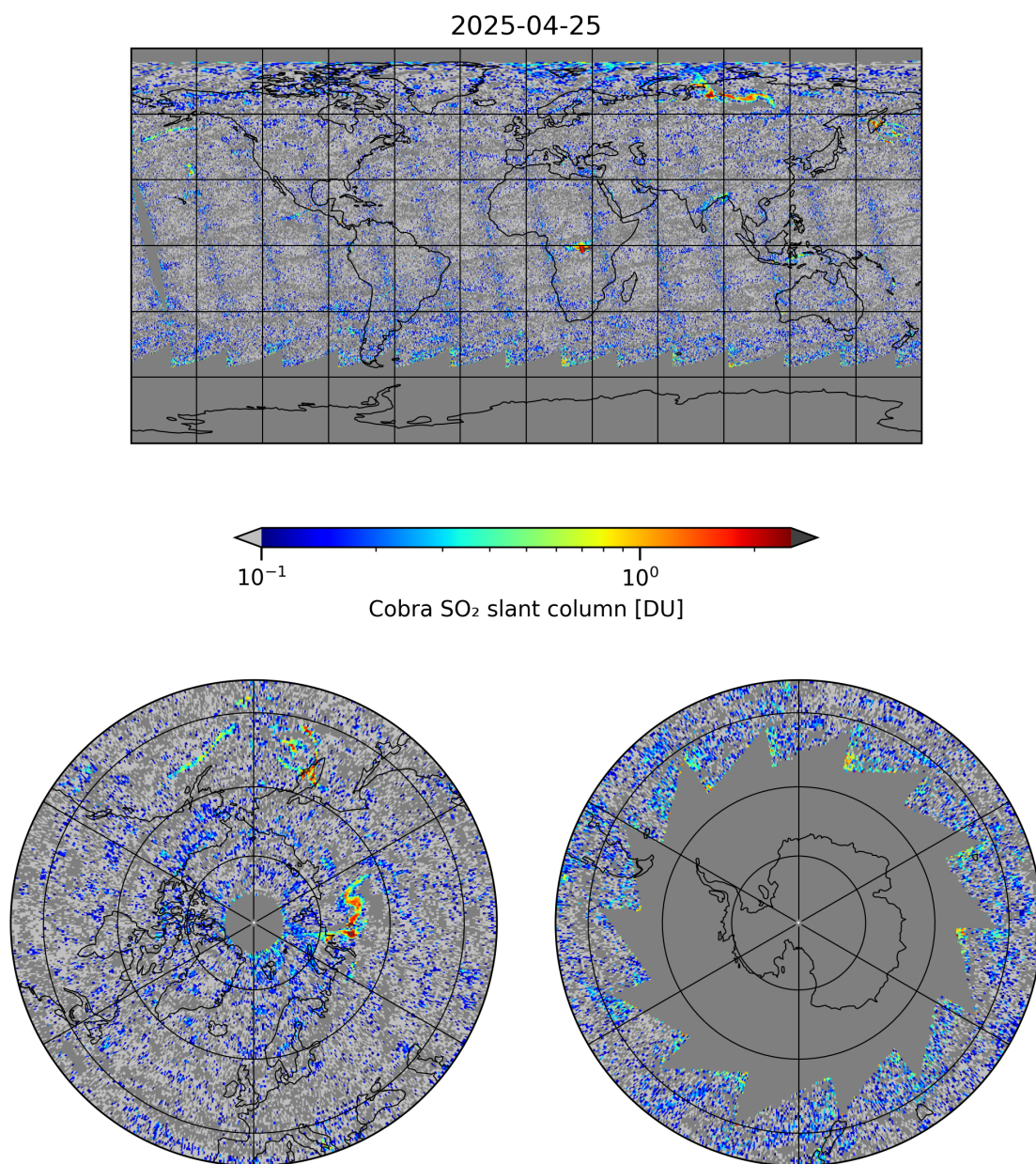


Figure 7: Map of “Cobra SO₂ slant column” for 2025-04-25 to 2025-04-26

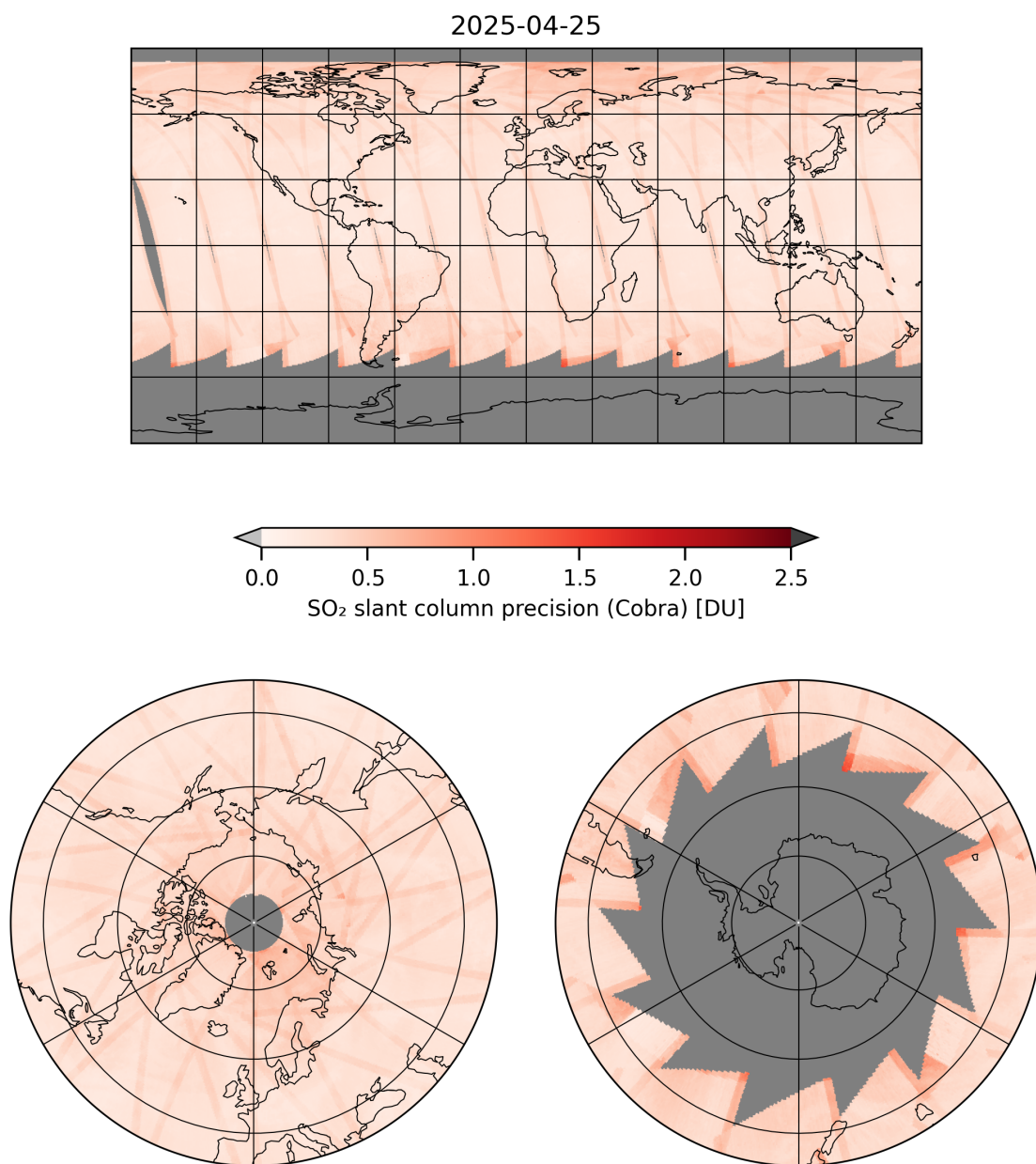


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-04-25 to 2025-04-26

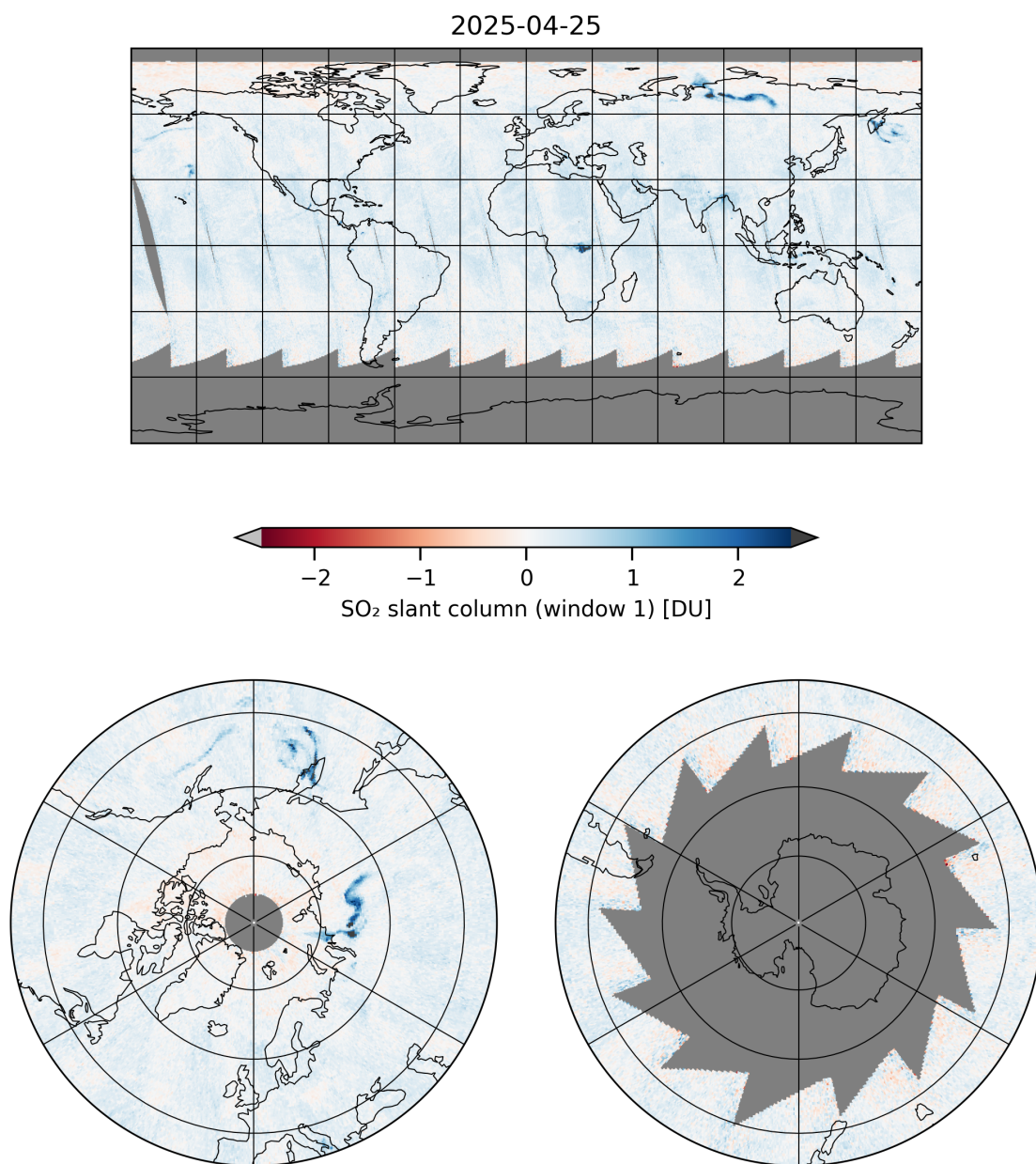


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-04-25 to 2025-04-26

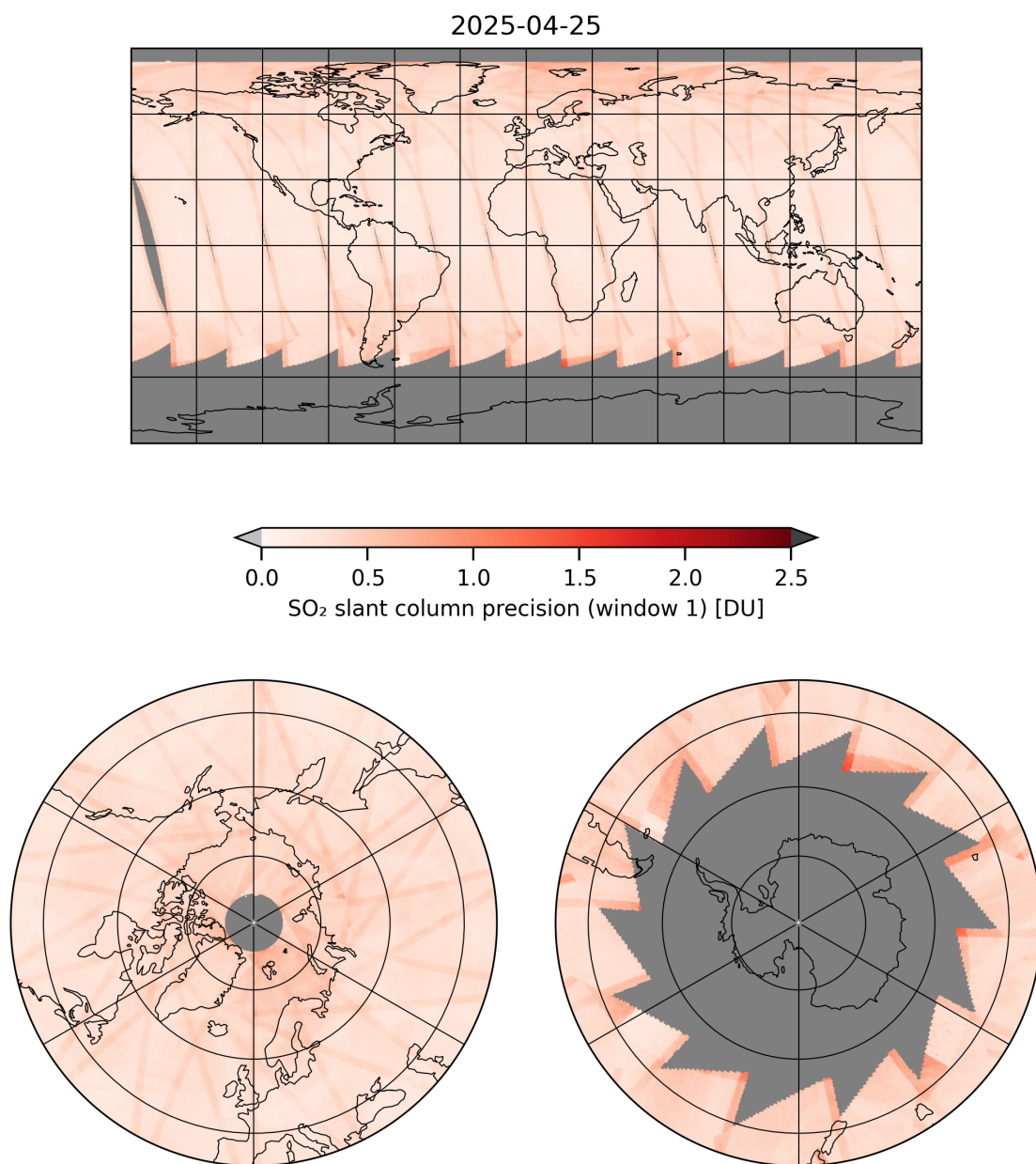


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-04-25 to 2025-04-26

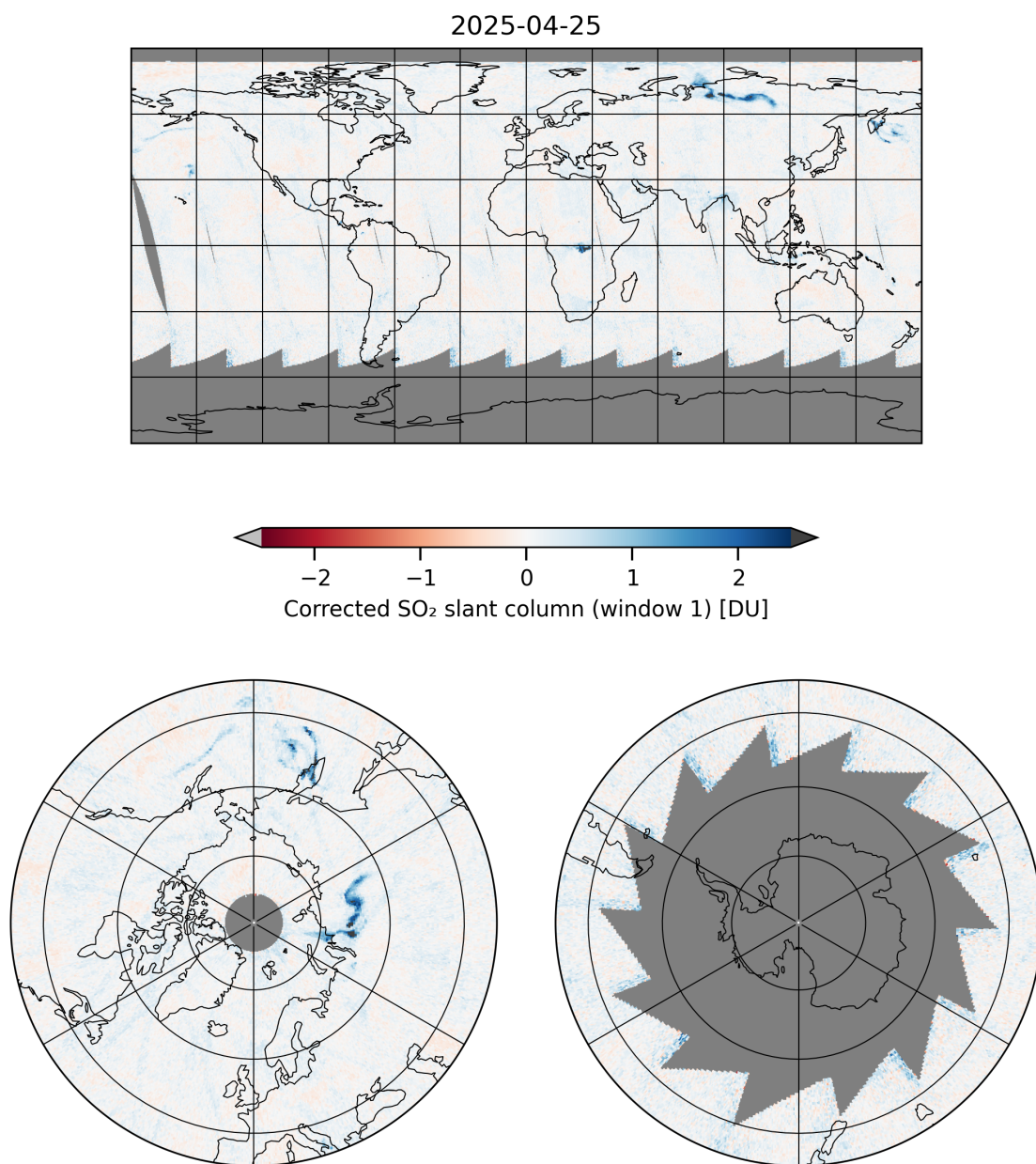


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-04-25 to 2025-04-26

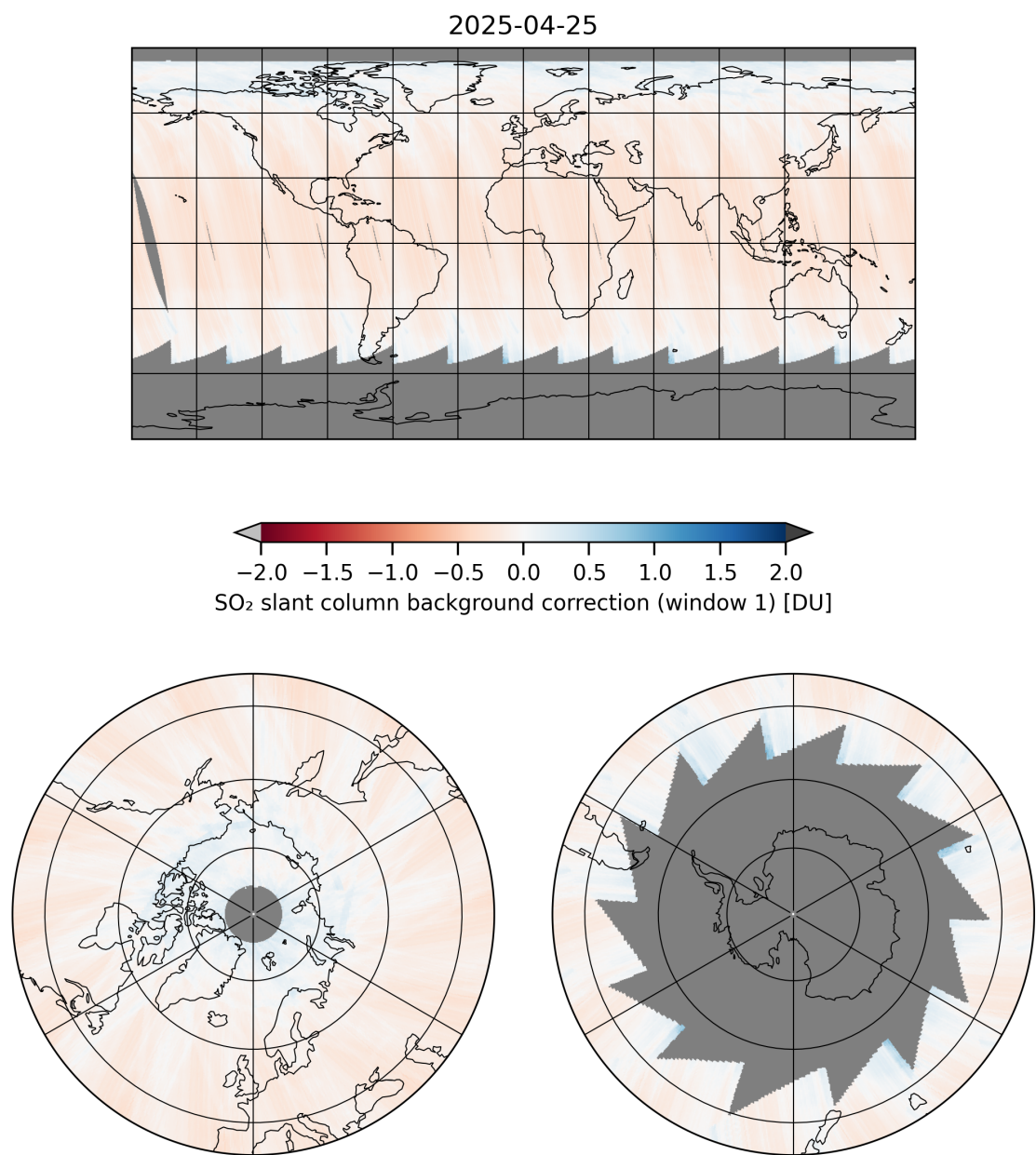


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-04-25 to 2025-04-26

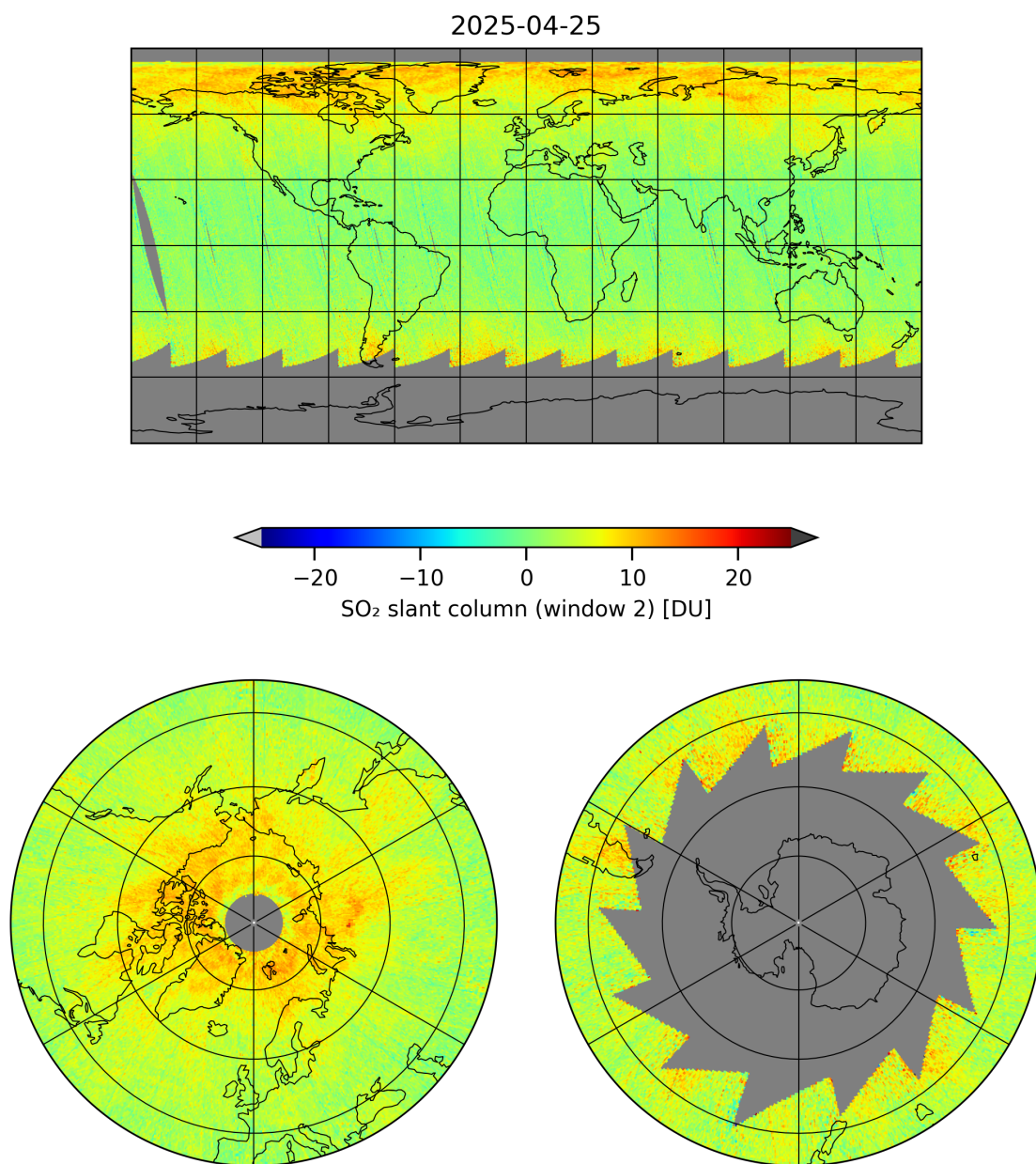


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-04-25 to 2025-04-26

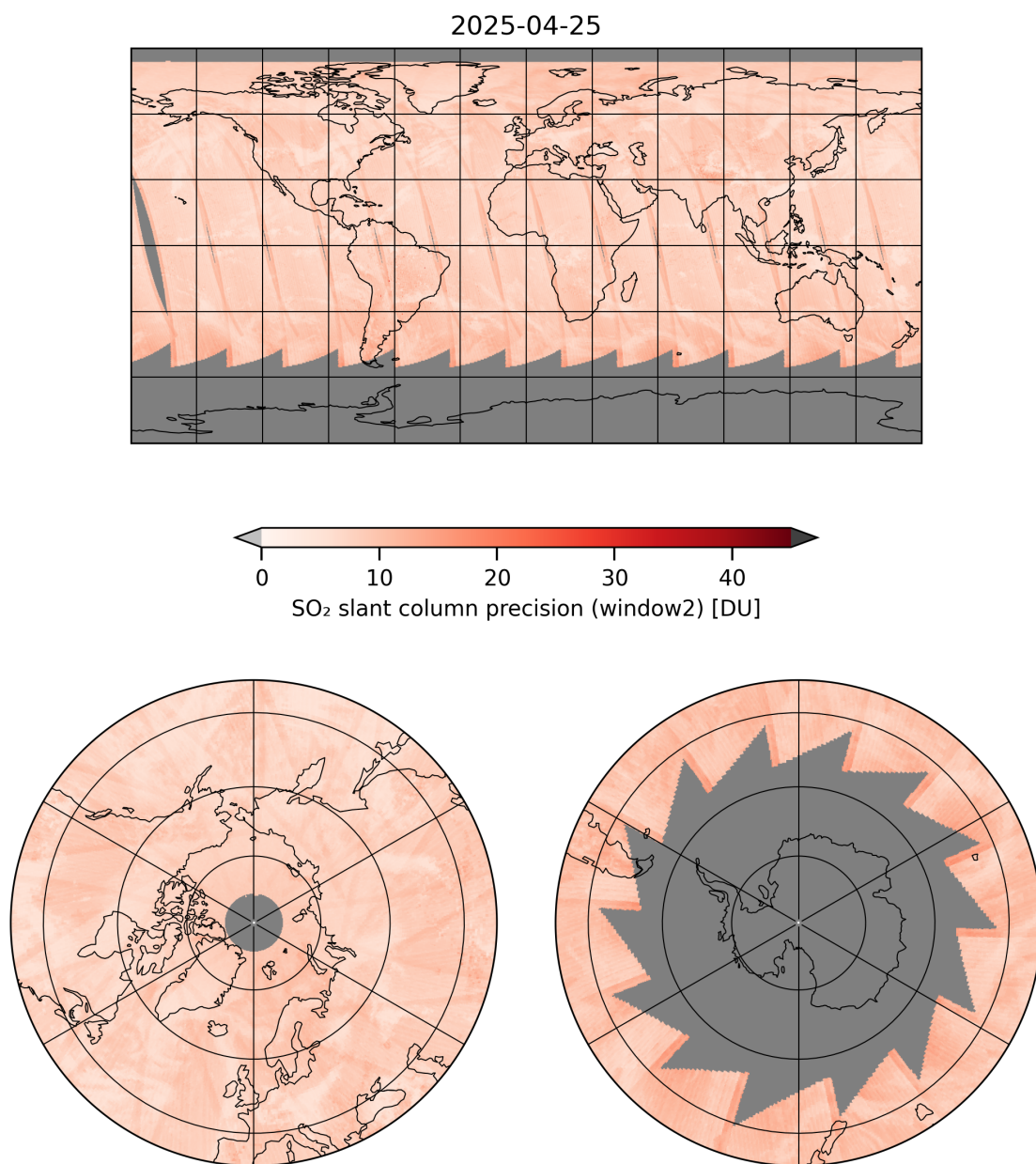


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-04-25 to 2025-04-26

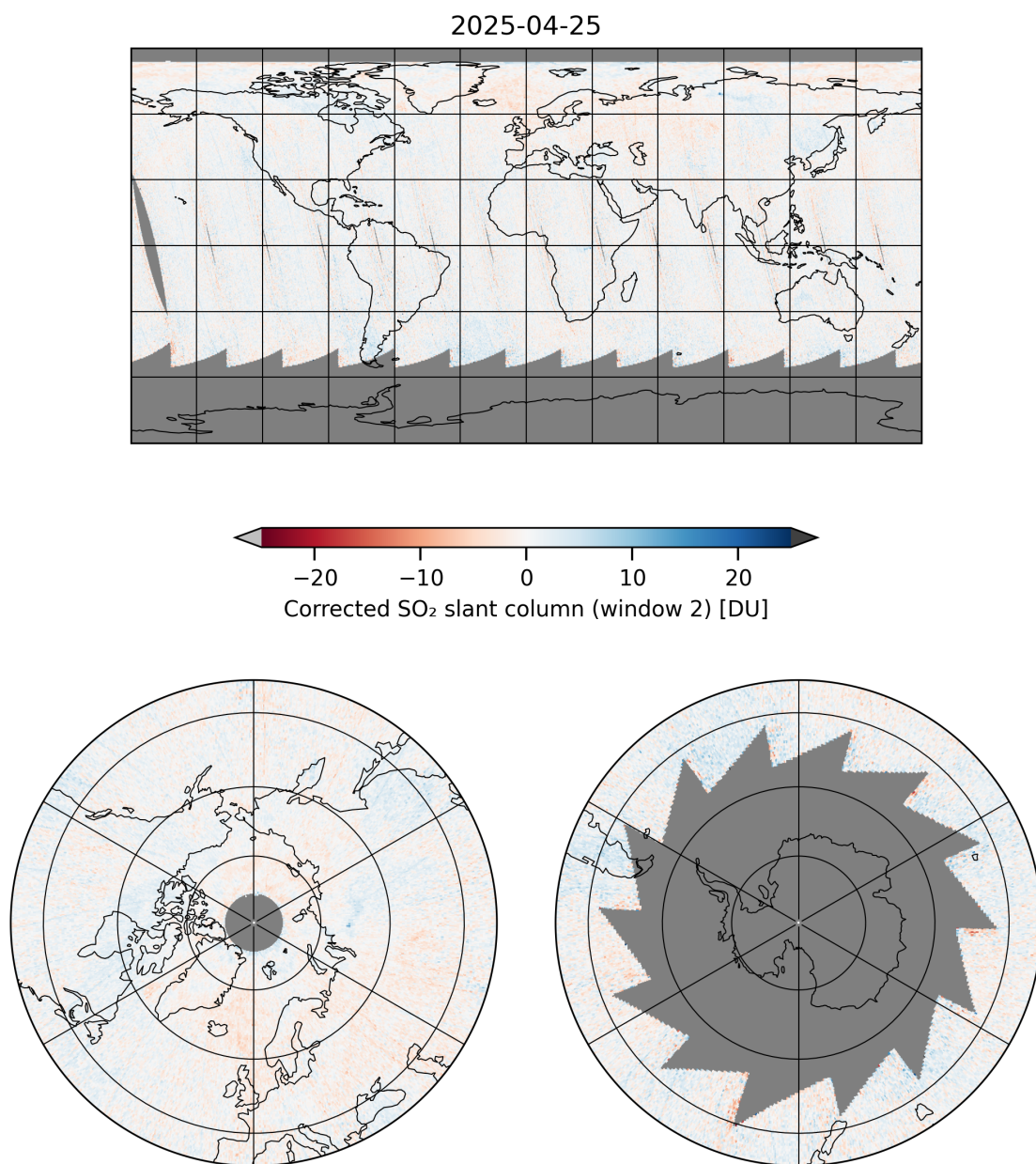


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-04-25 to 2025-04-26

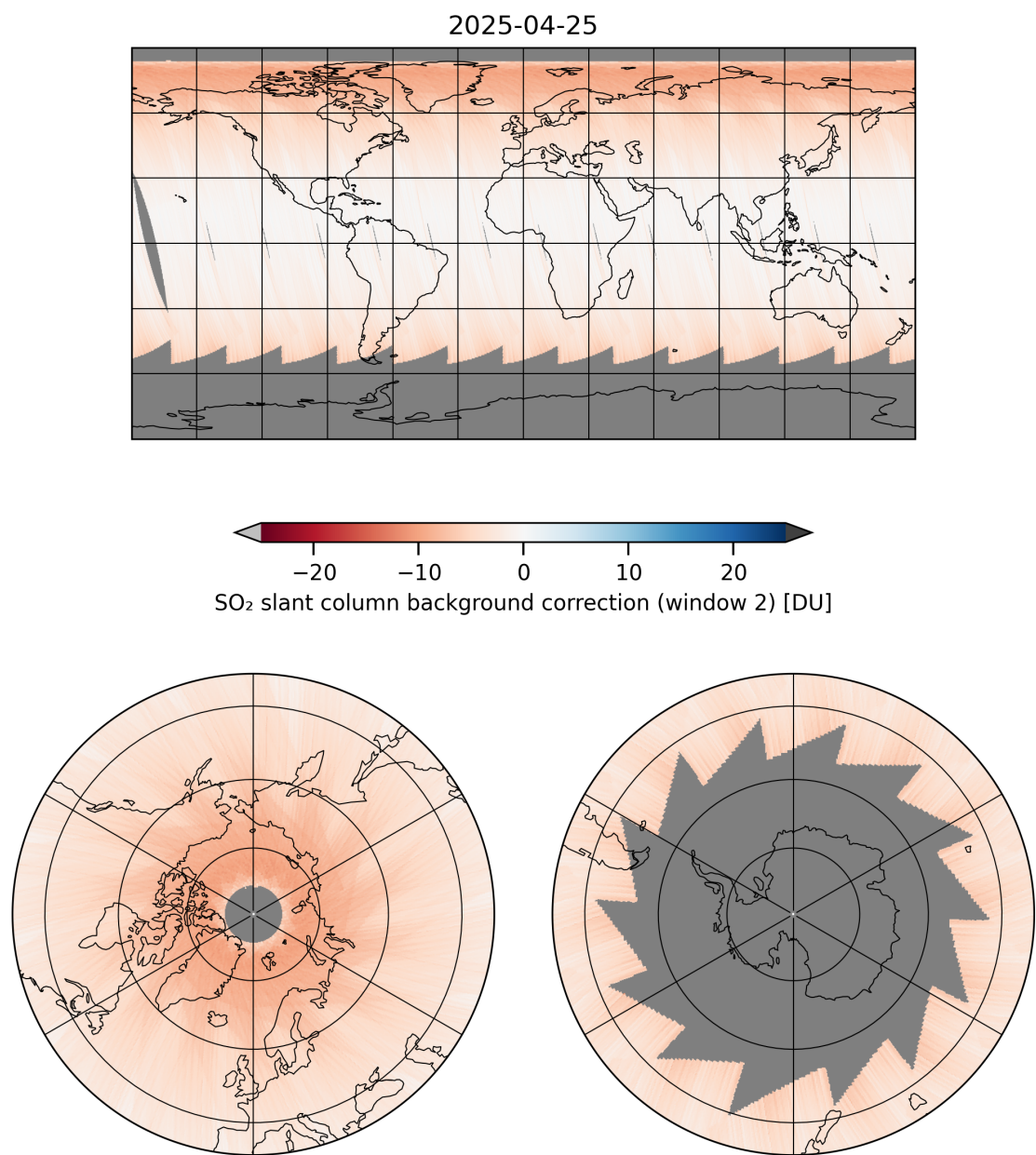


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-04-25 to 2025-04-26

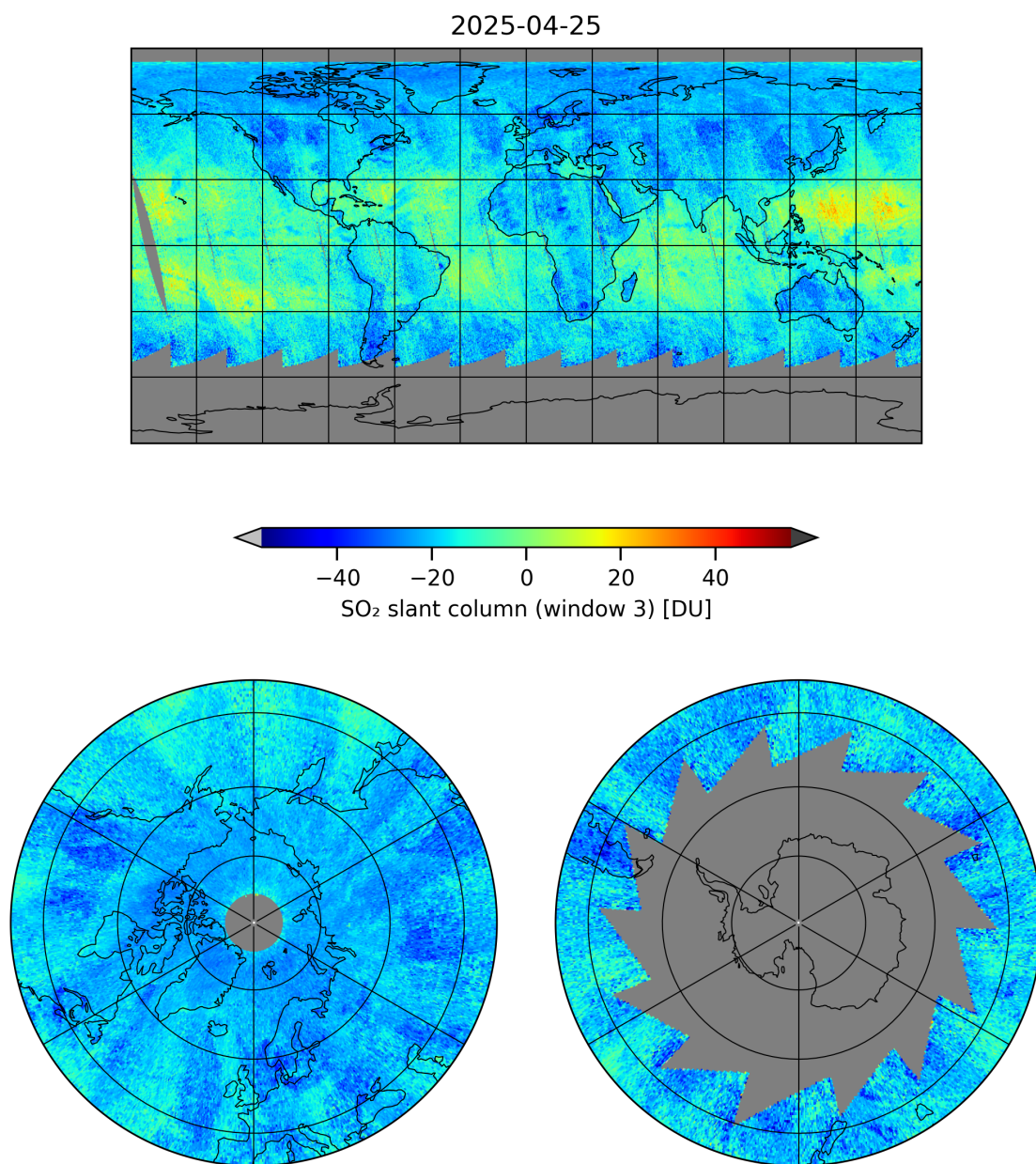


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-04-25 to 2025-04-26

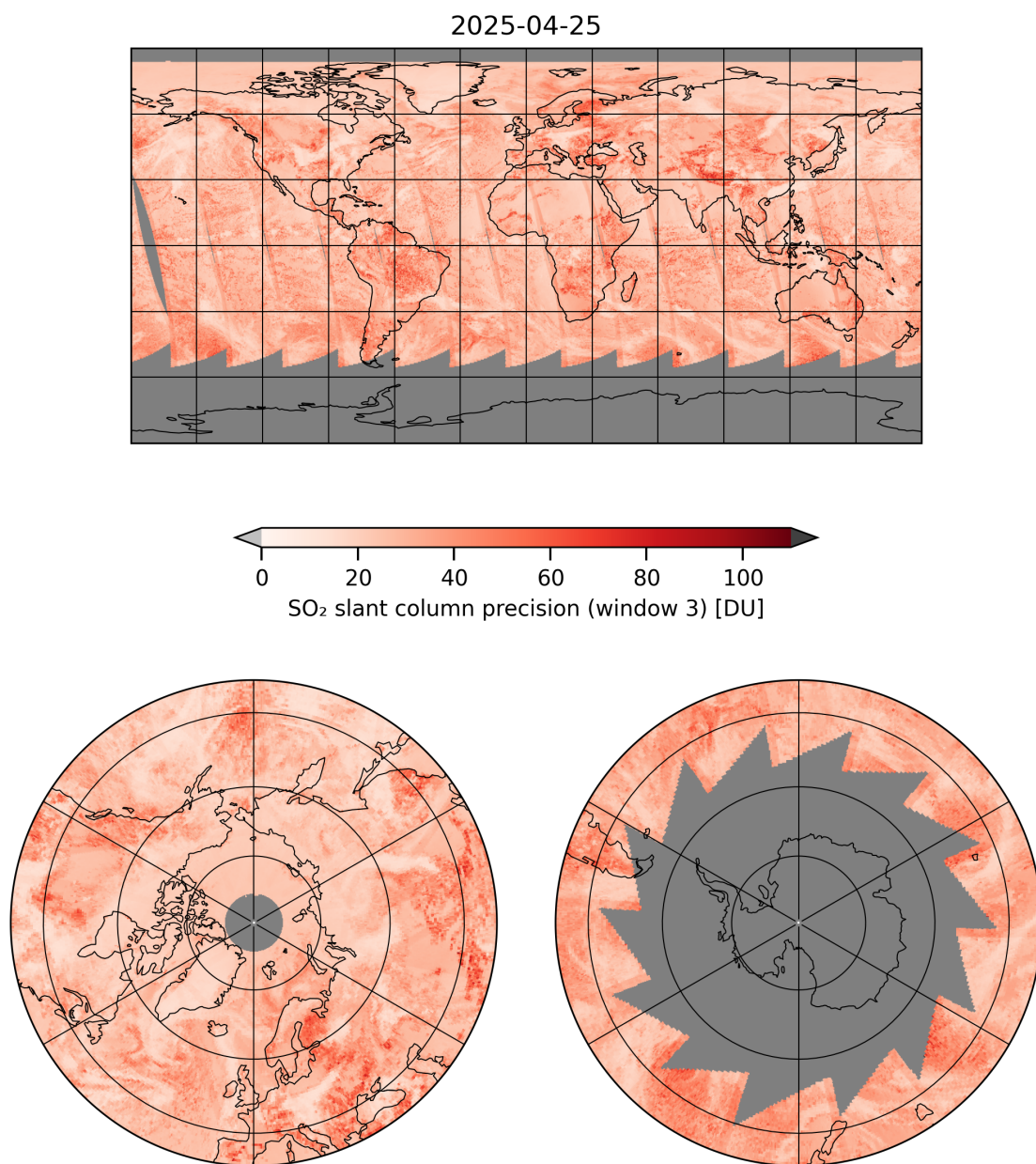


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-04-25 to 2025-04-26

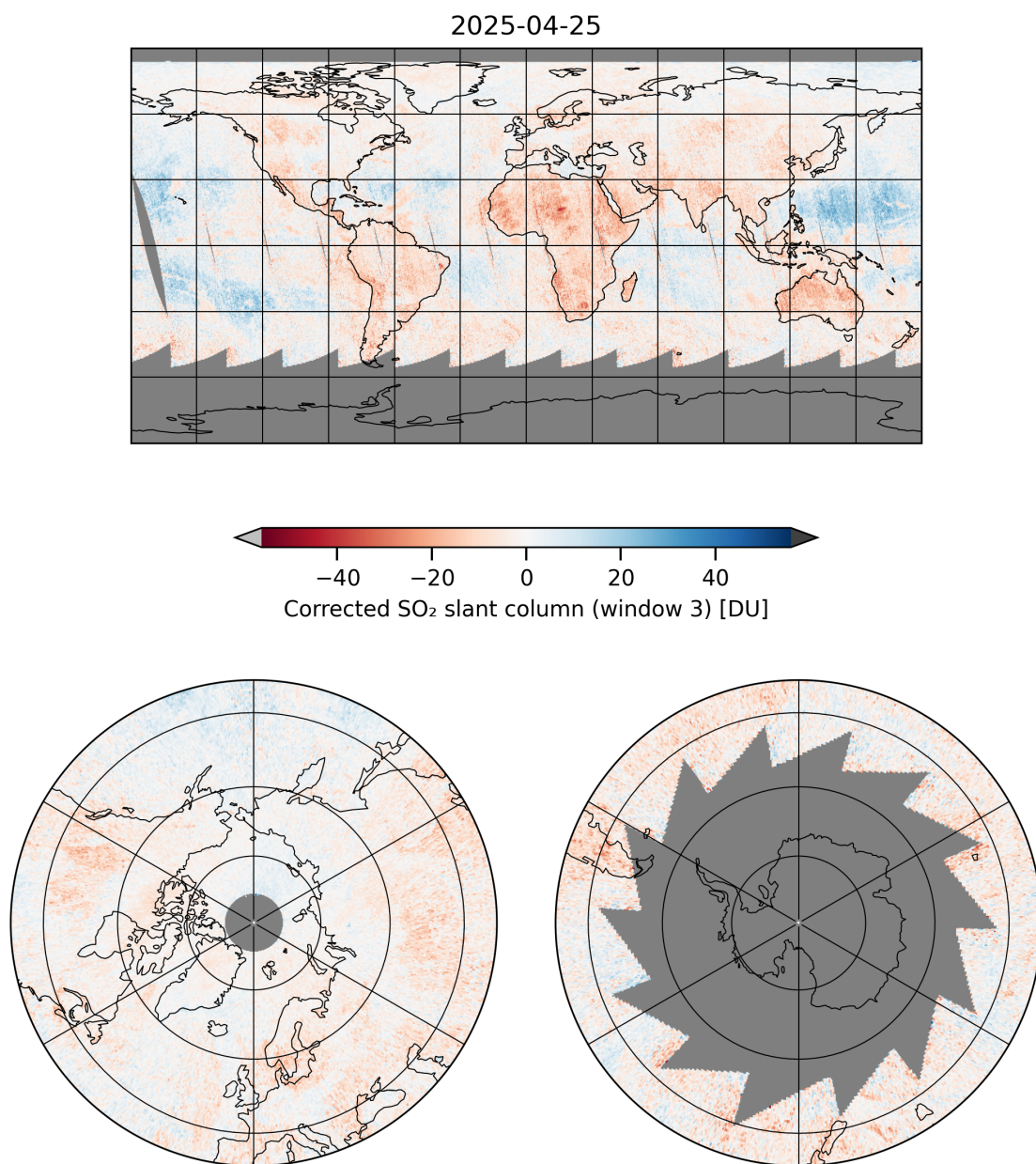


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-04-25 to 2025-04-26

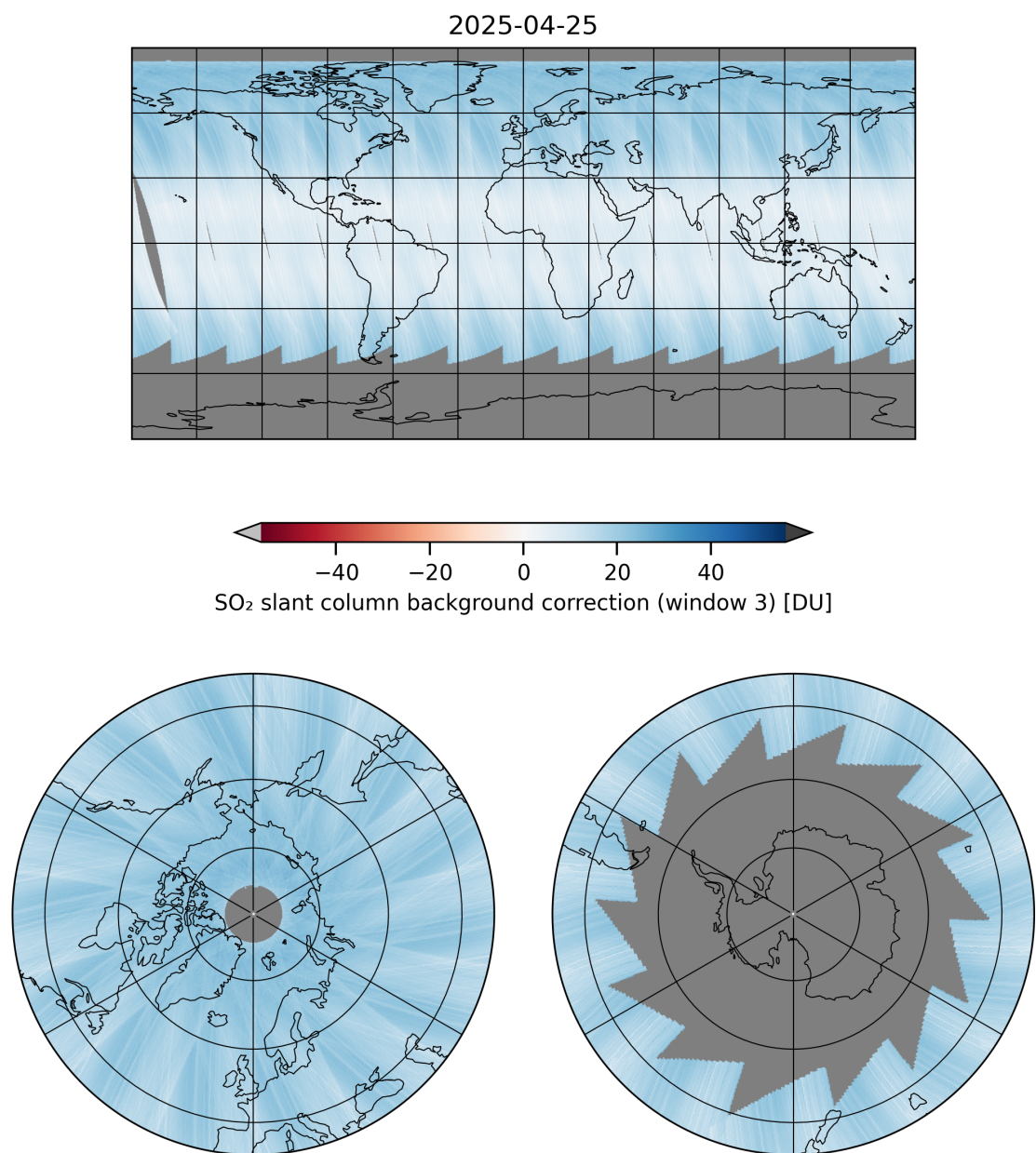


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-04-25 to 2025-04-26

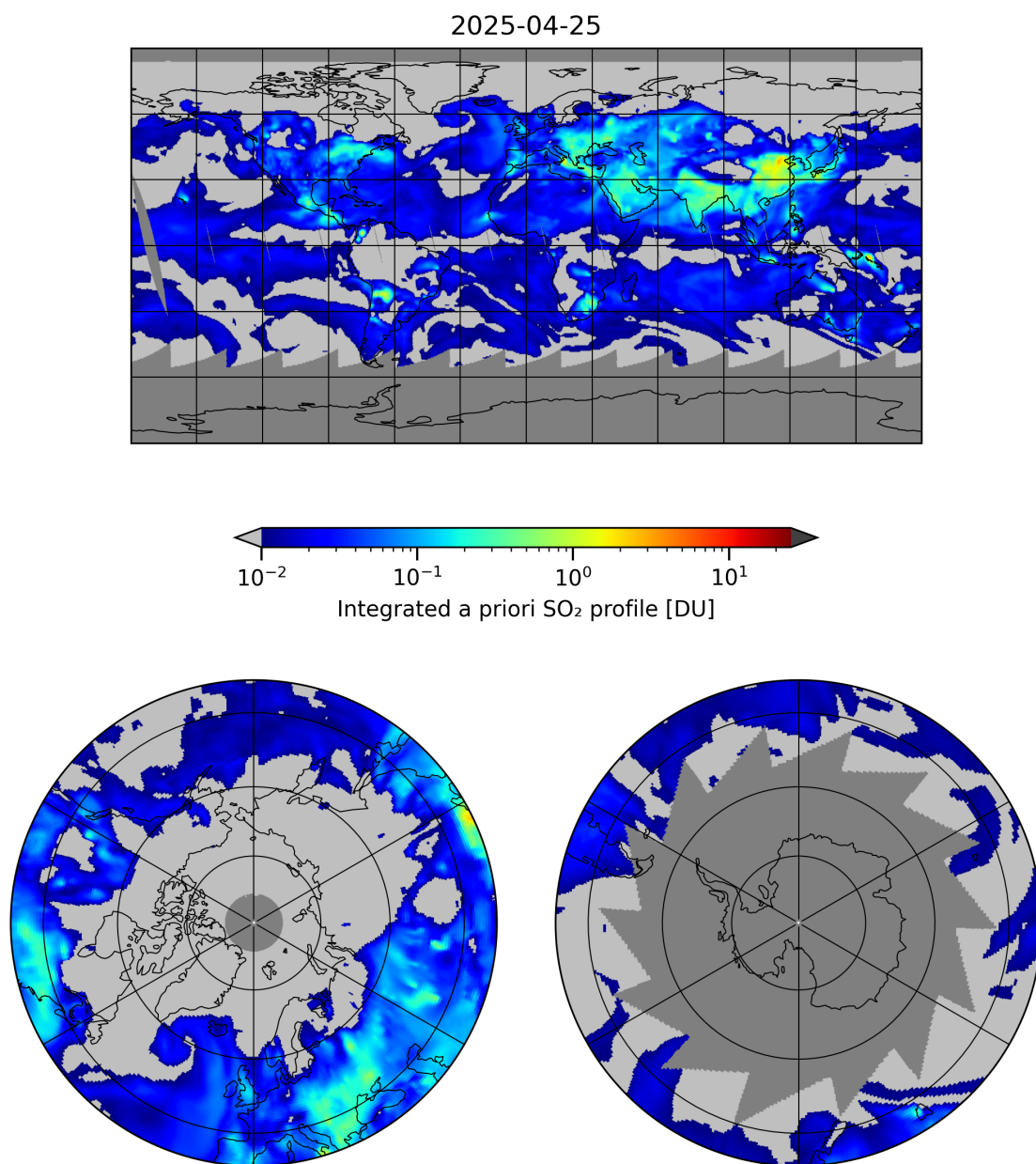


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-04-25 to 2025-04-26

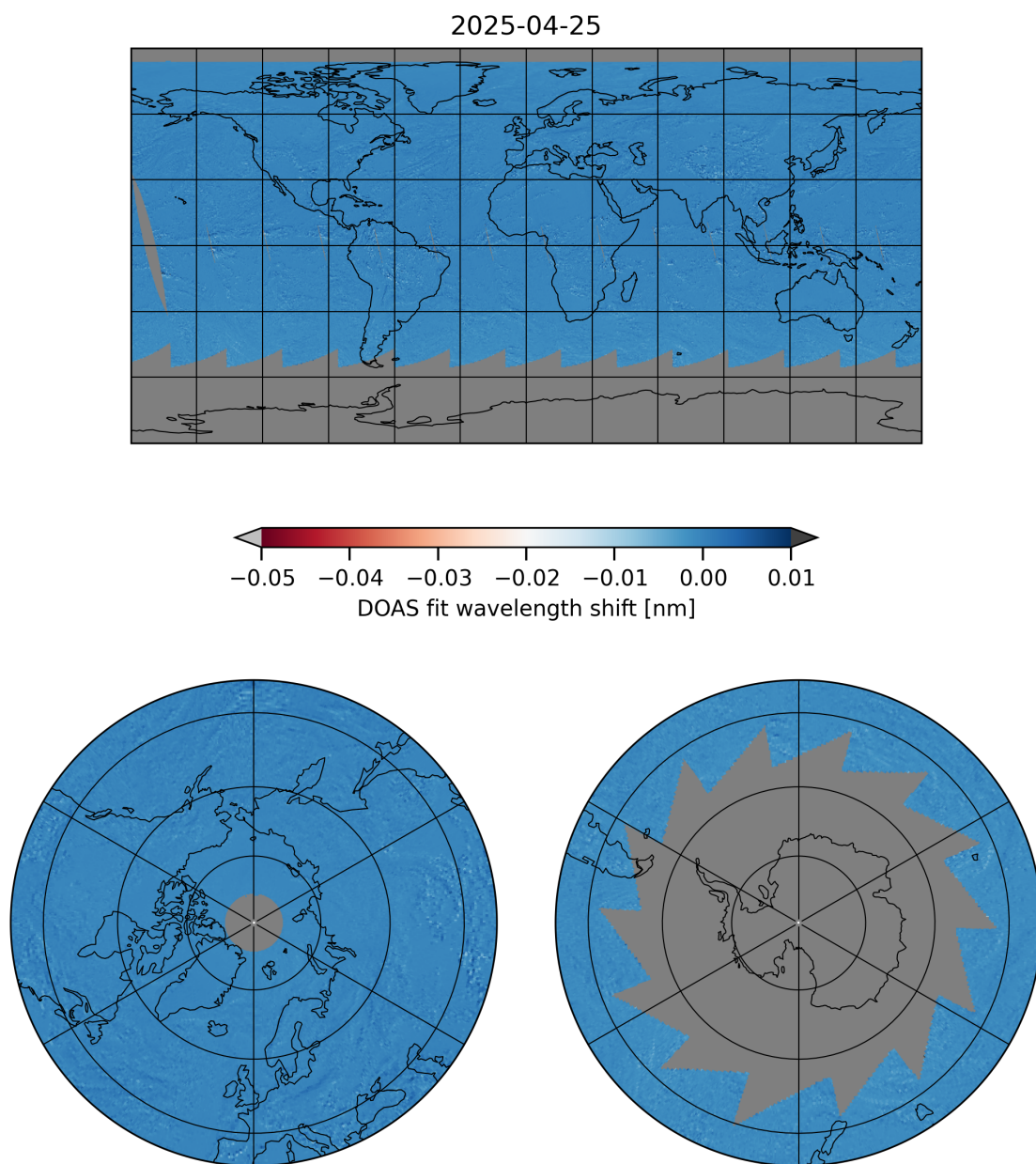


Figure 22: Map of “DOAS fit wavelength shift” for 2025-04-25 to 2025-04-26

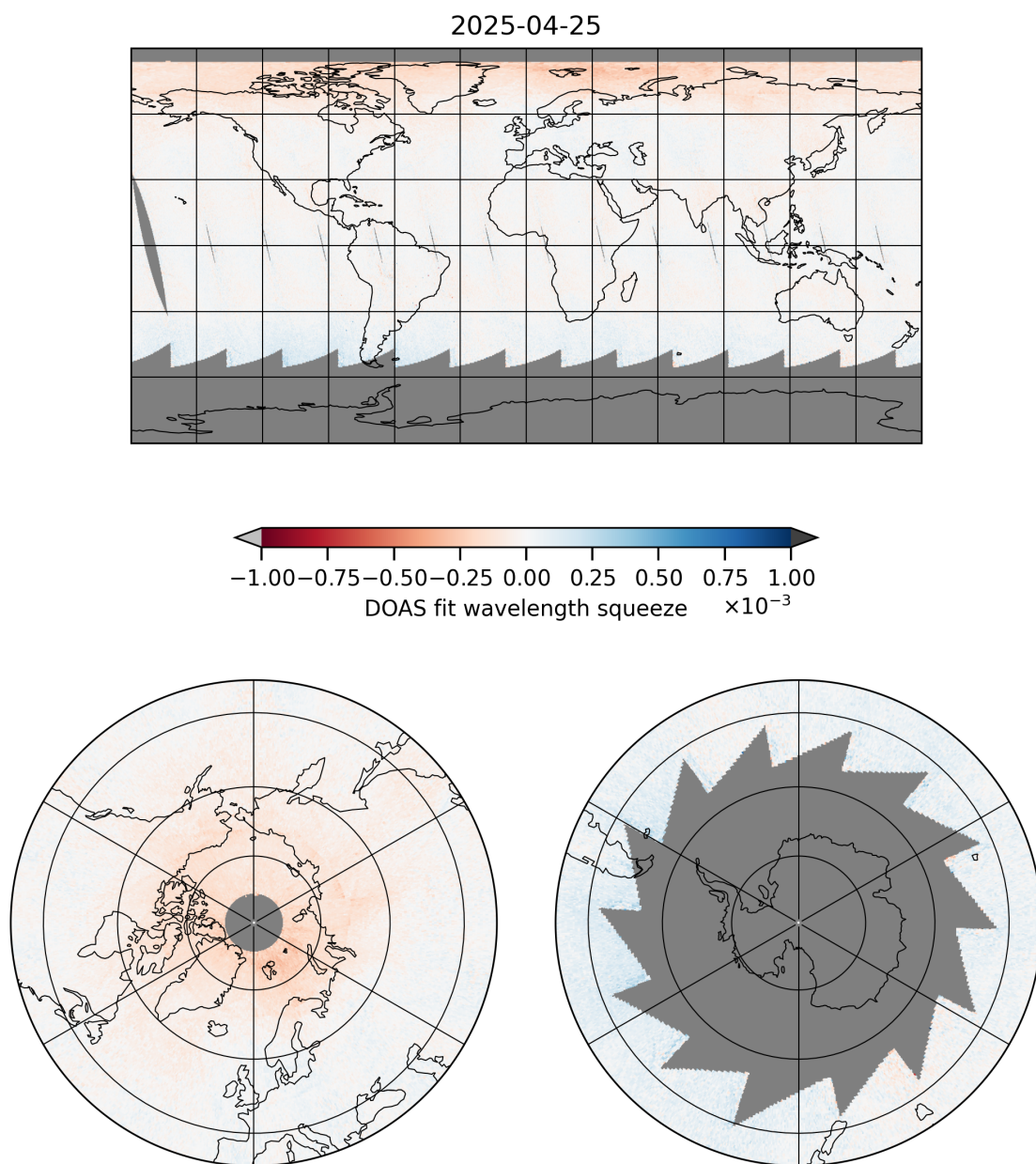


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-04-25 to 2025-04-26

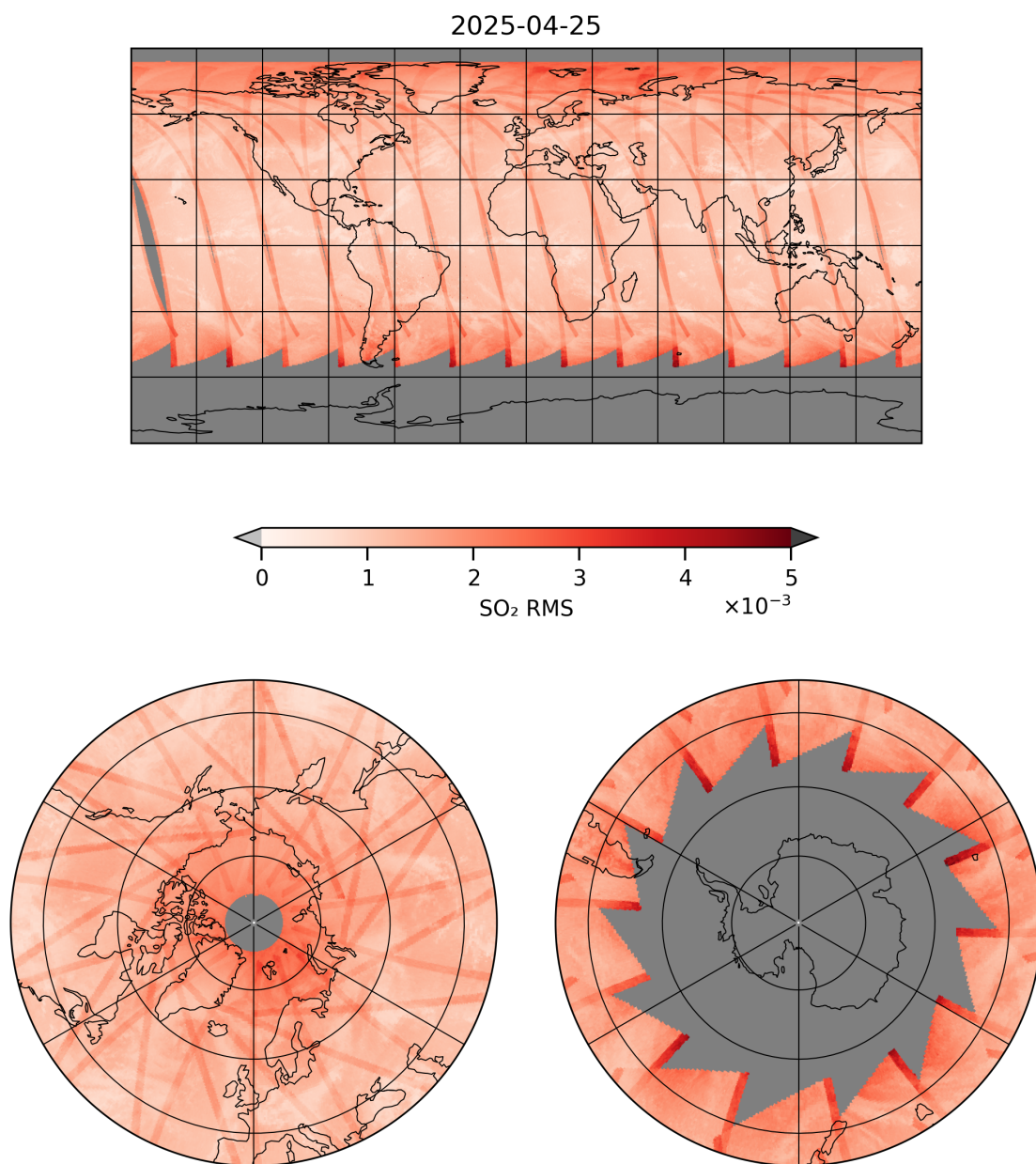


Figure 24: Map of “SO₂ RMS” for 2025-04-25 to 2025-04-26

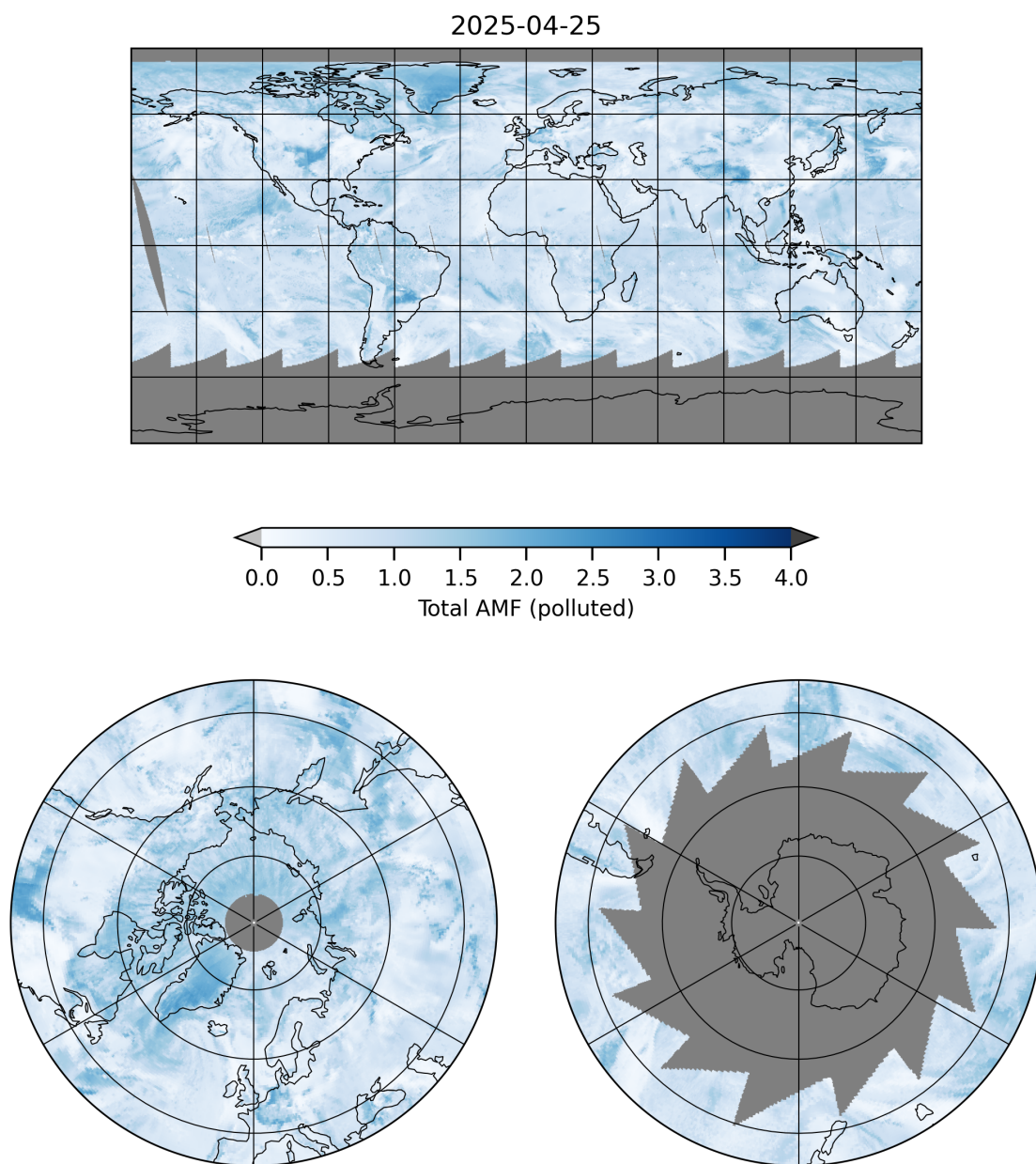


Figure 25: Map of “Total AMF (polluted)” for 2025-04-25 to 2025-04-26

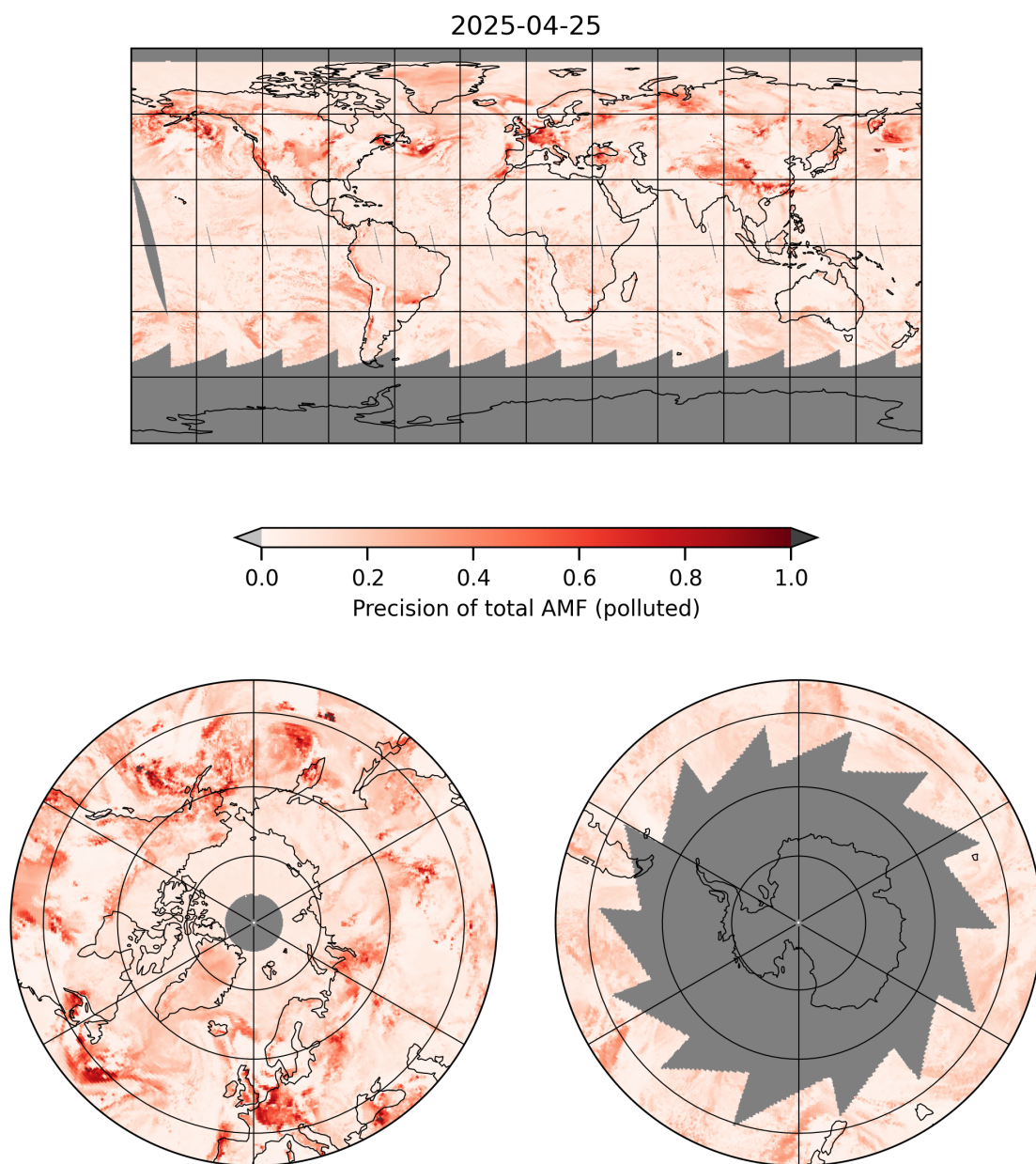


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-04-25 to 2025-04-26

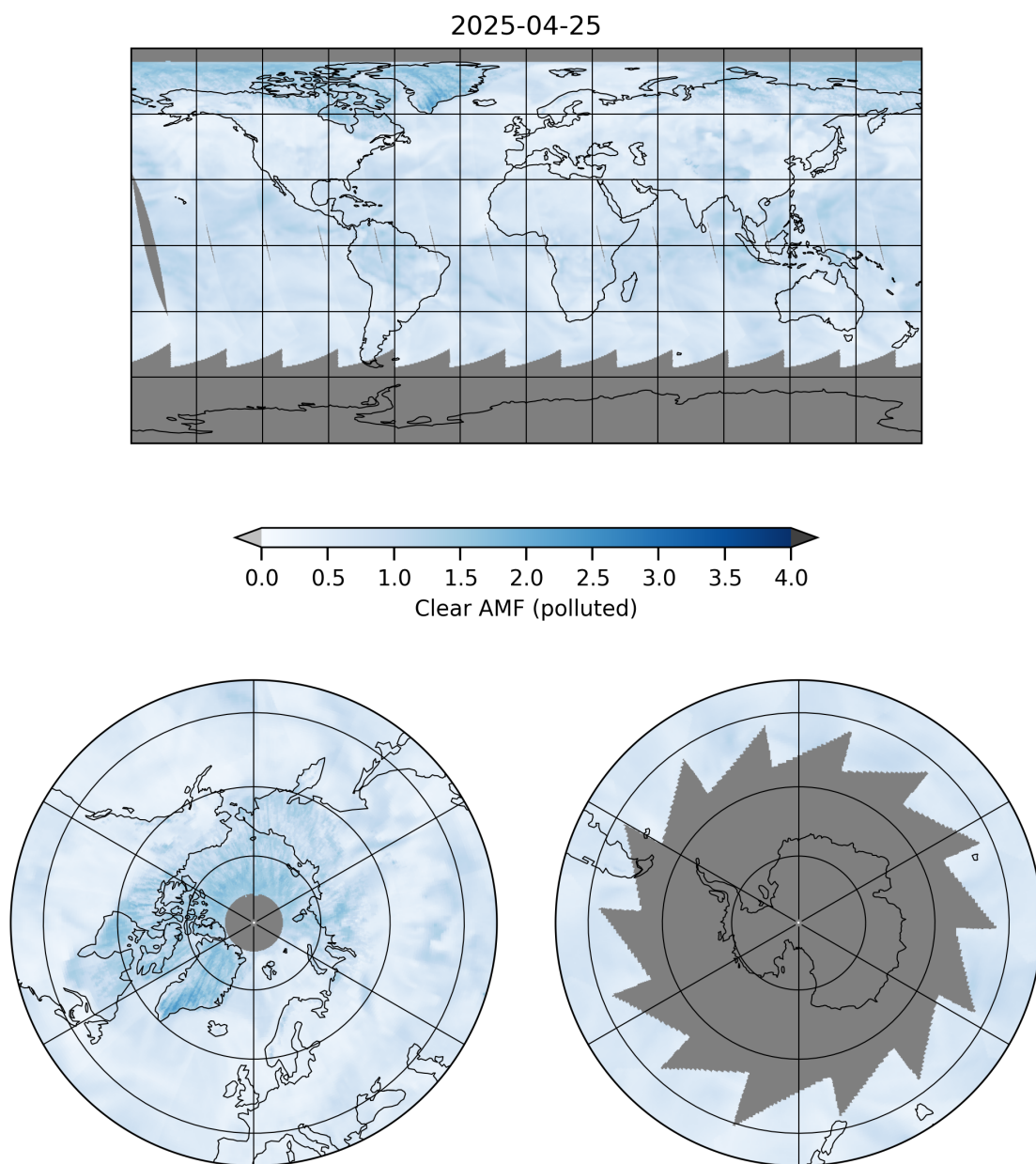


Figure 27: Map of “Clear AMF (polluted)” for 2025-04-25 to 2025-04-26

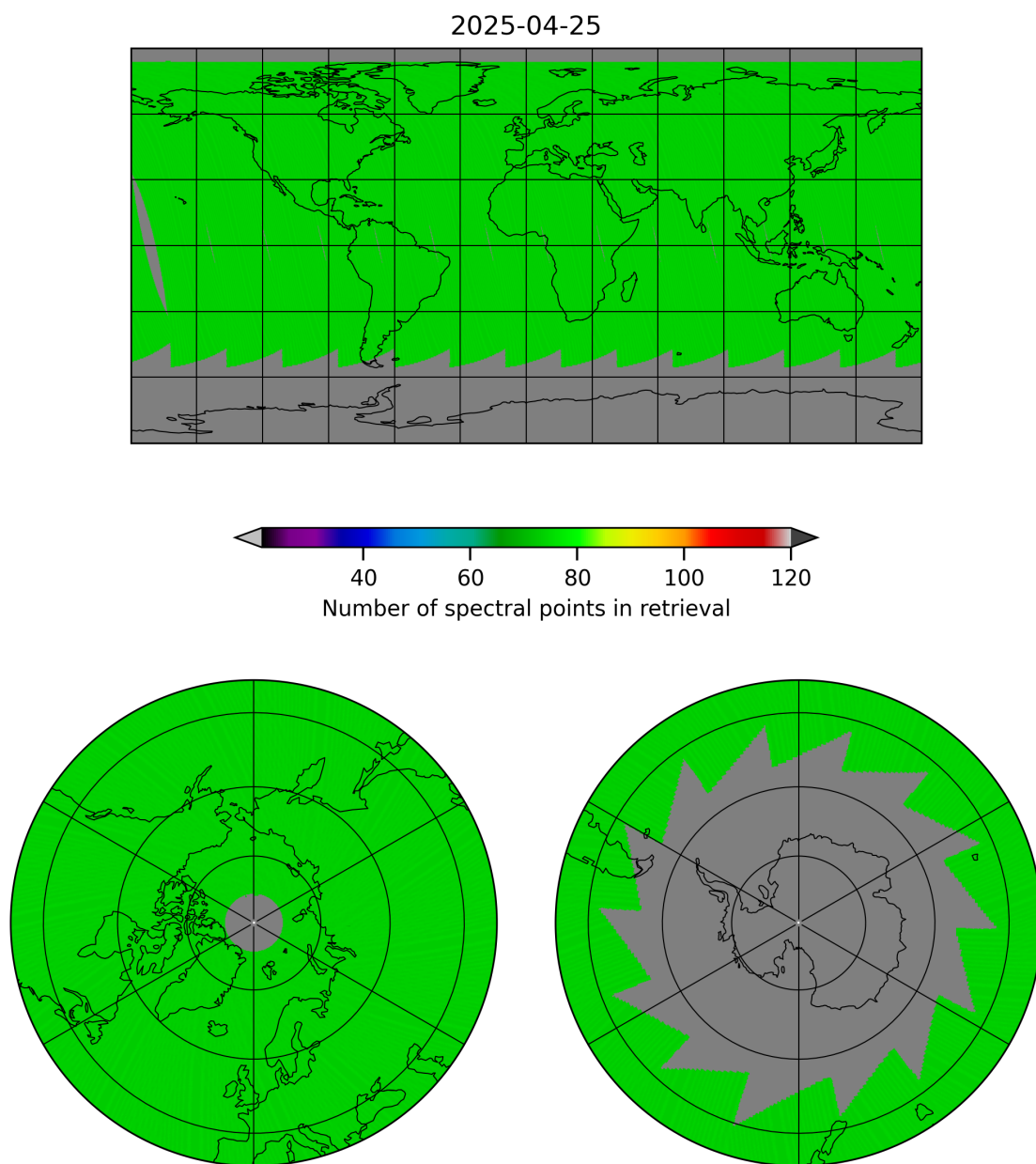


Figure 28: Map of “Number of spectral points in retrieval” for 2025-04-25 to 2025-04-26

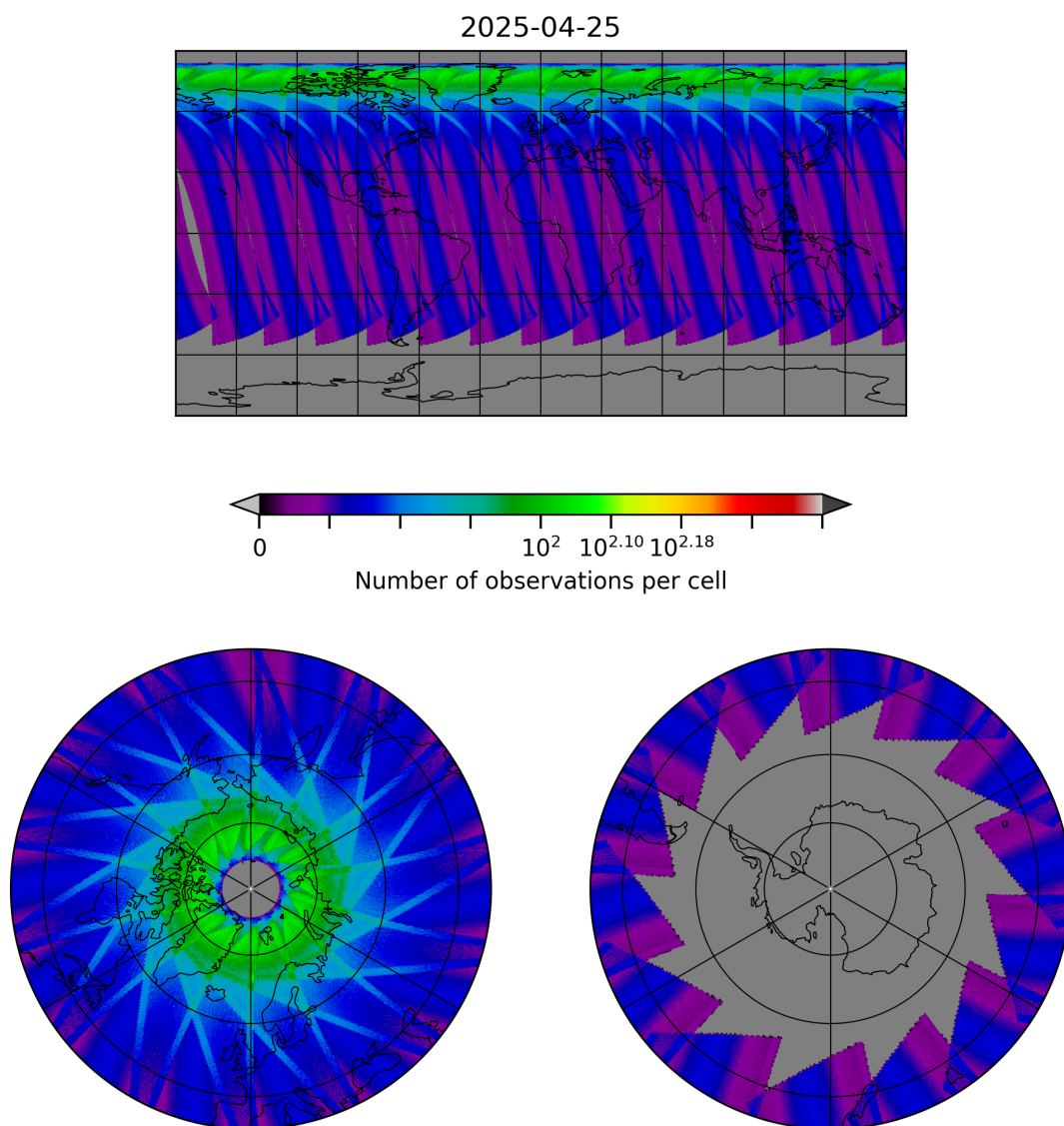


Figure 29: Map of the number of observations for 2025-04-25 to 2025-04-26

7 Zonal average

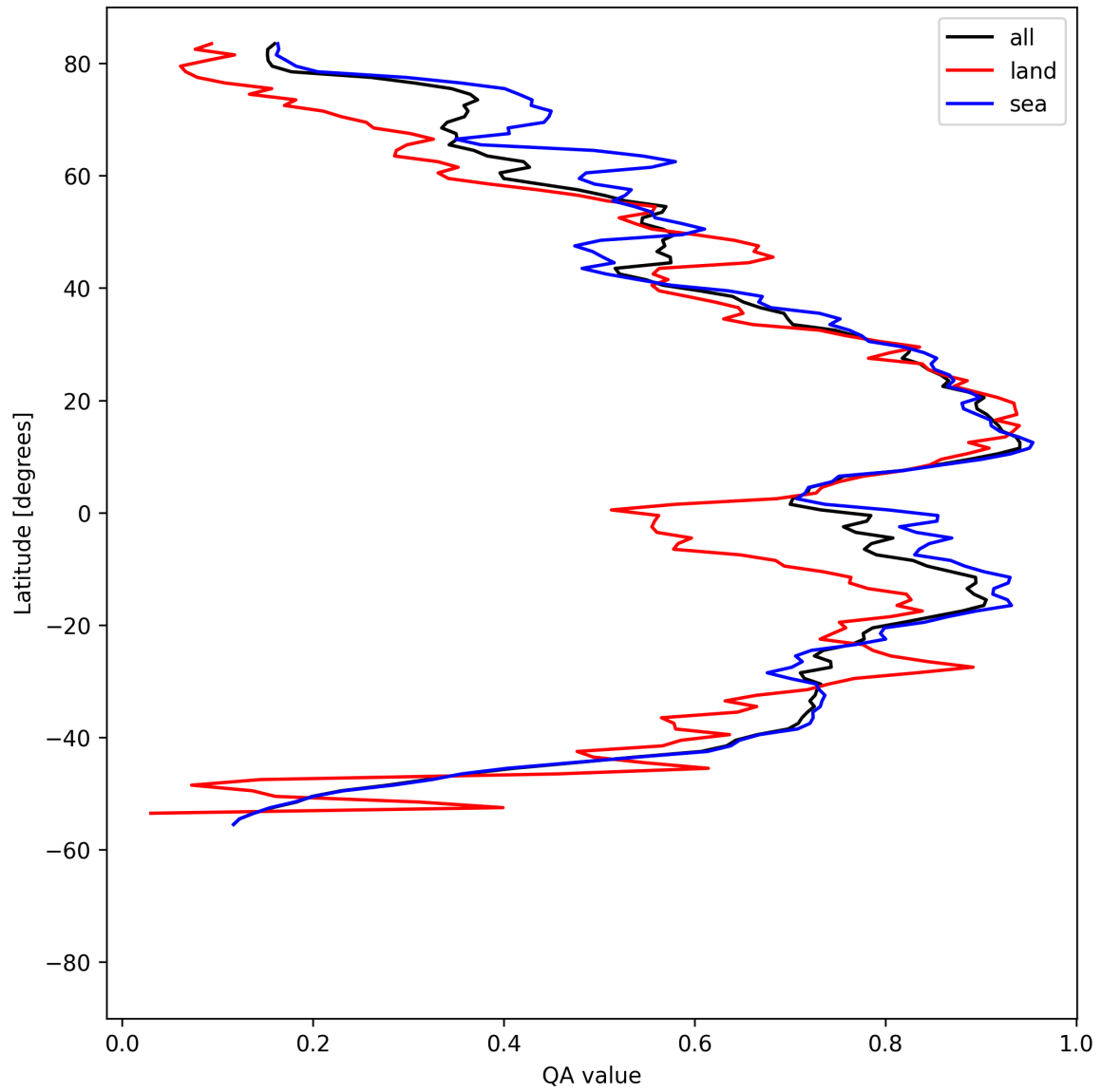


Figure 30: Zonal average of “QA value” for 2025-04-25 to 2025-04-26.

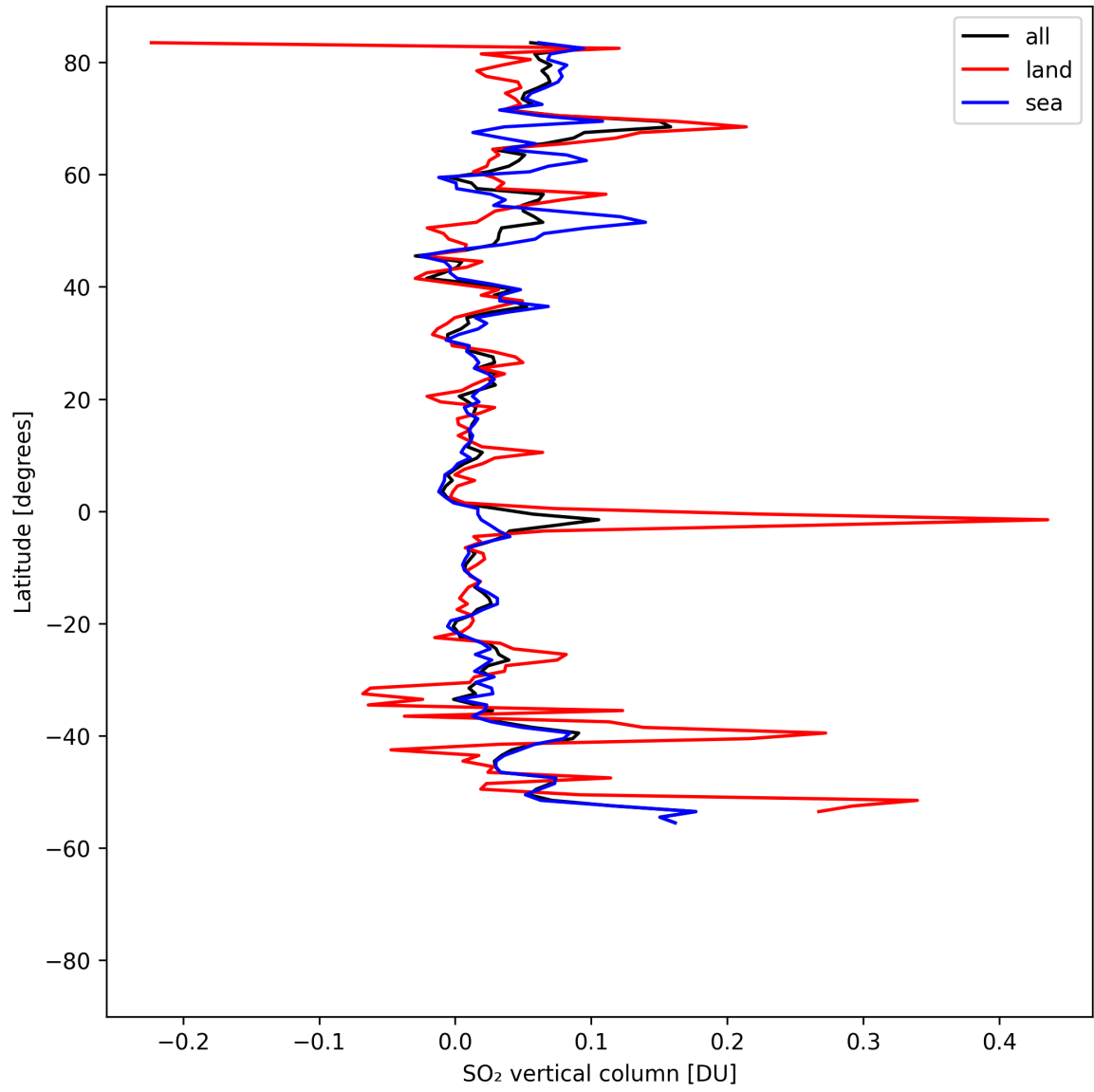


Figure 31: Zonal average of “SO₂ vertical column” for 2025-04-25 to 2025-04-26.

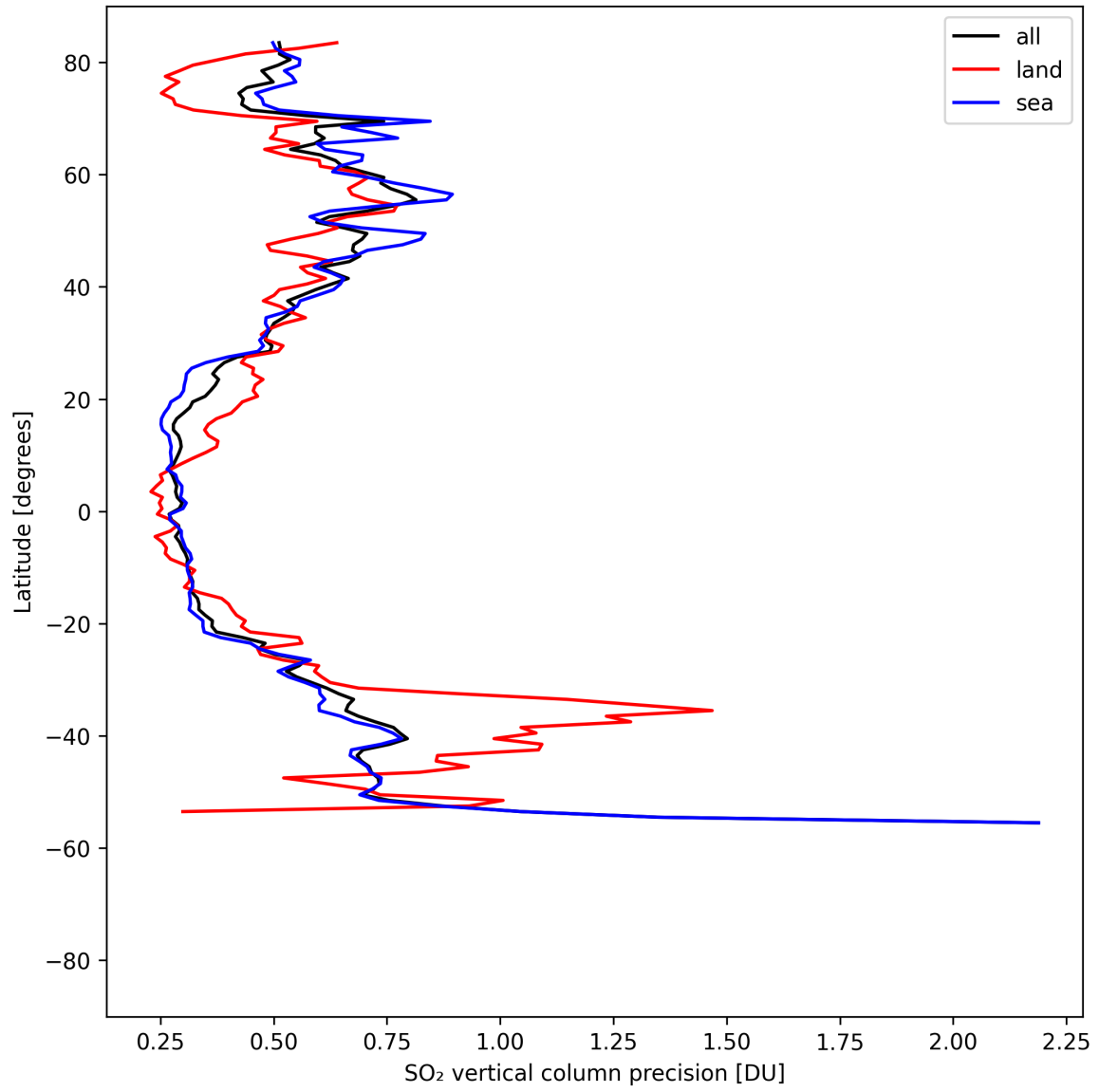


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-04-25 to 2025-04-26.

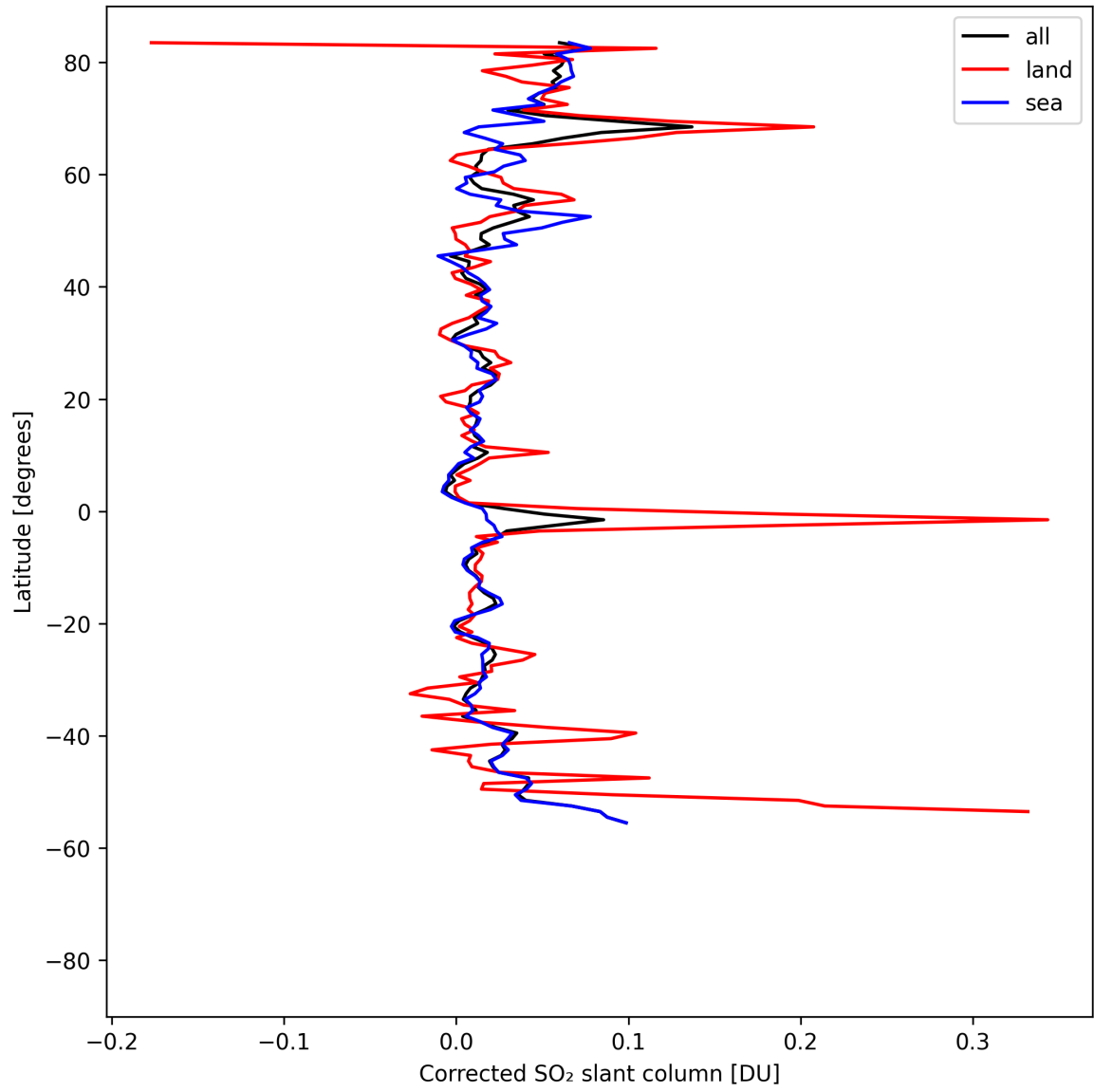


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-04-25 to 2025-04-26.

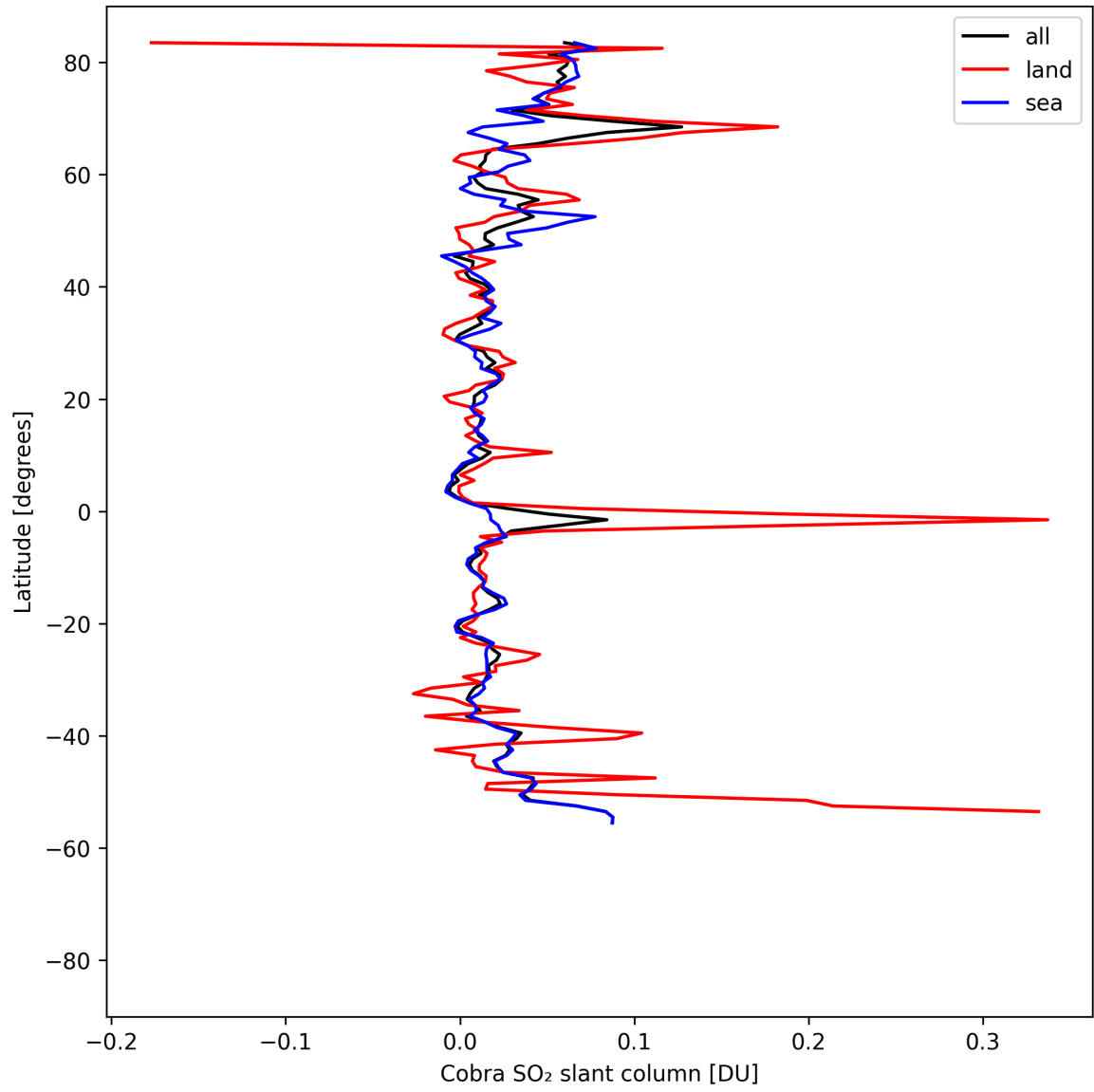


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-04-25 to 2025-04-26.

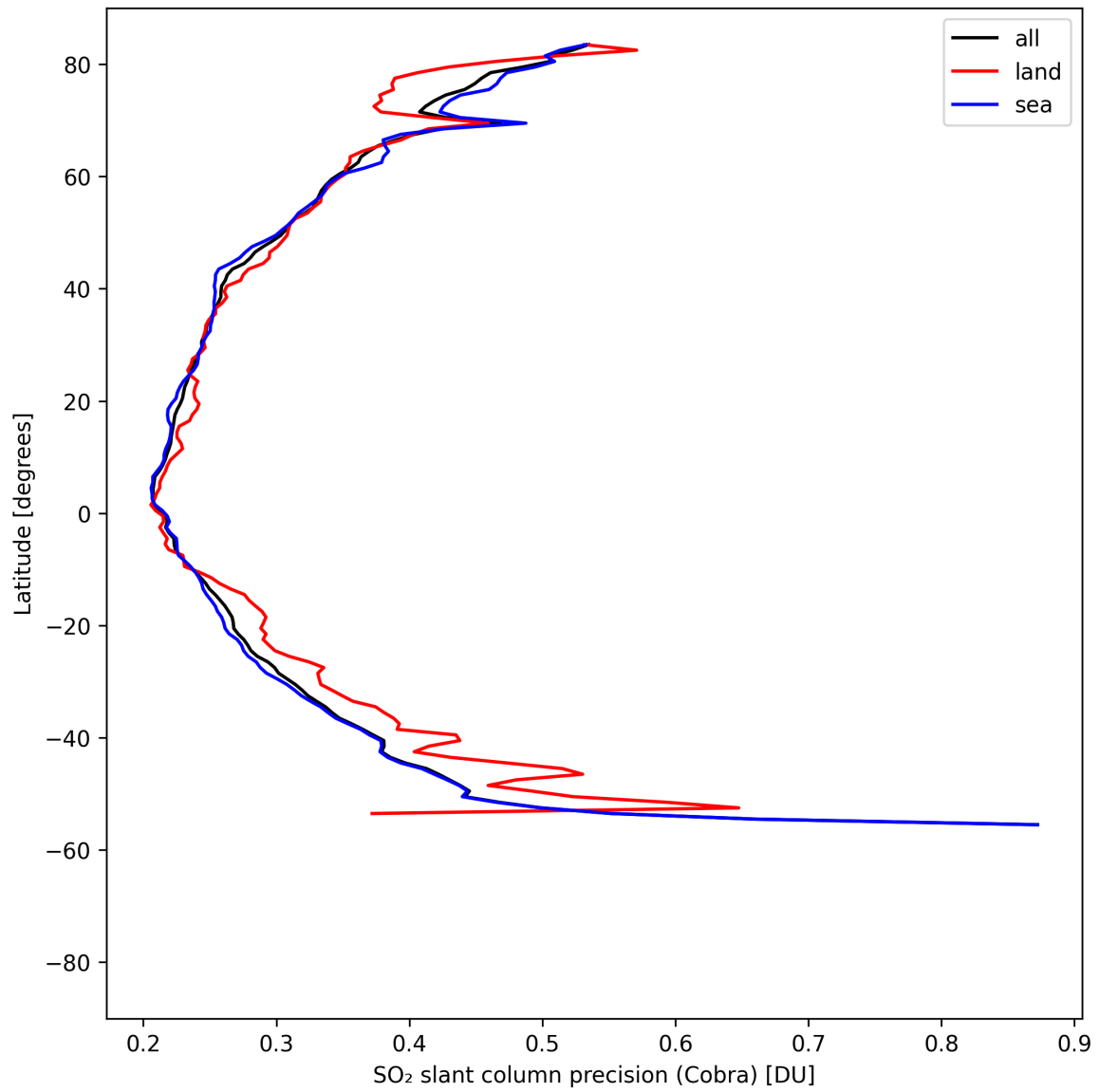


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-04-25 to 2025-04-26.

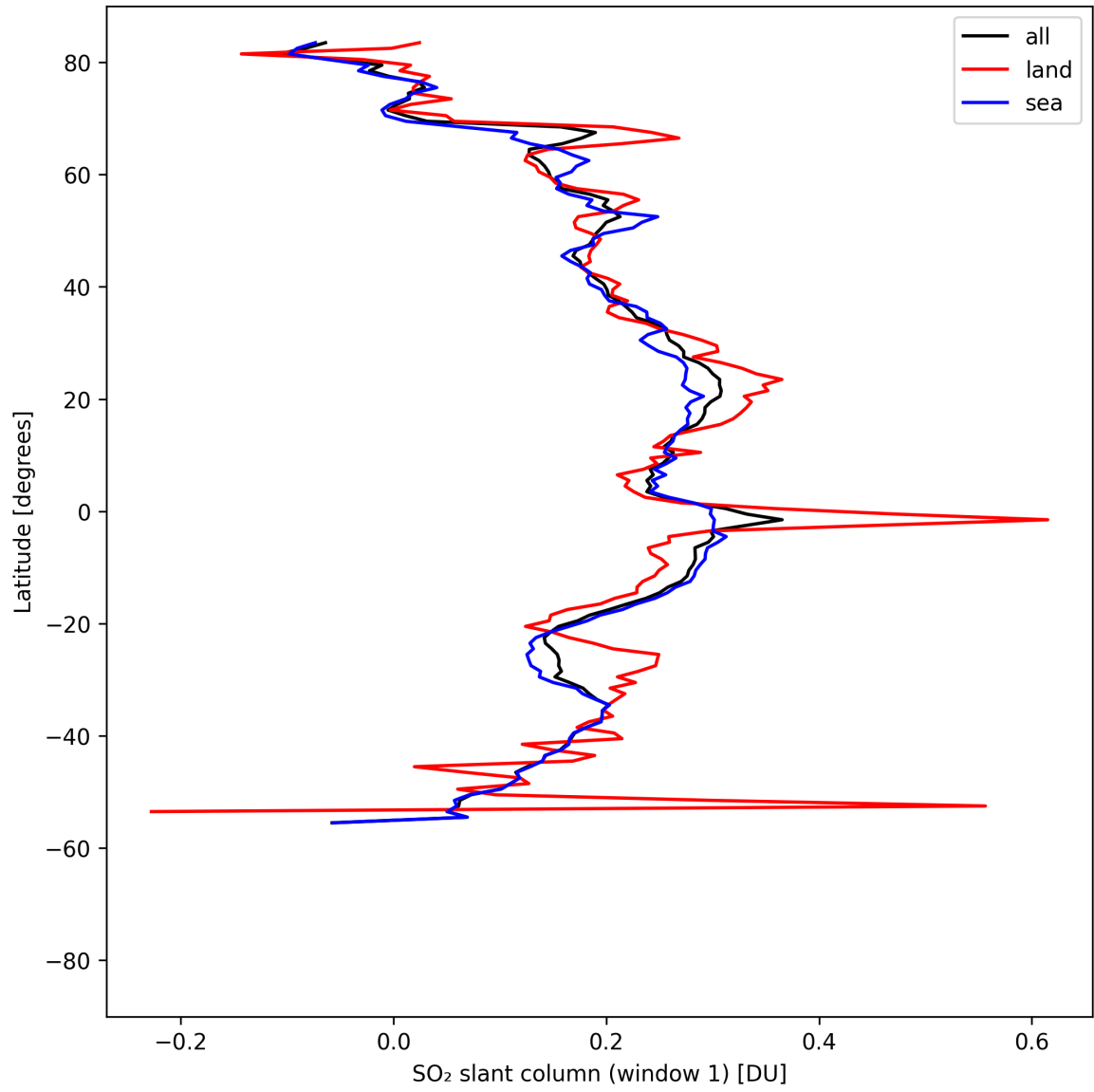


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-04-25 to 2025-04-26.

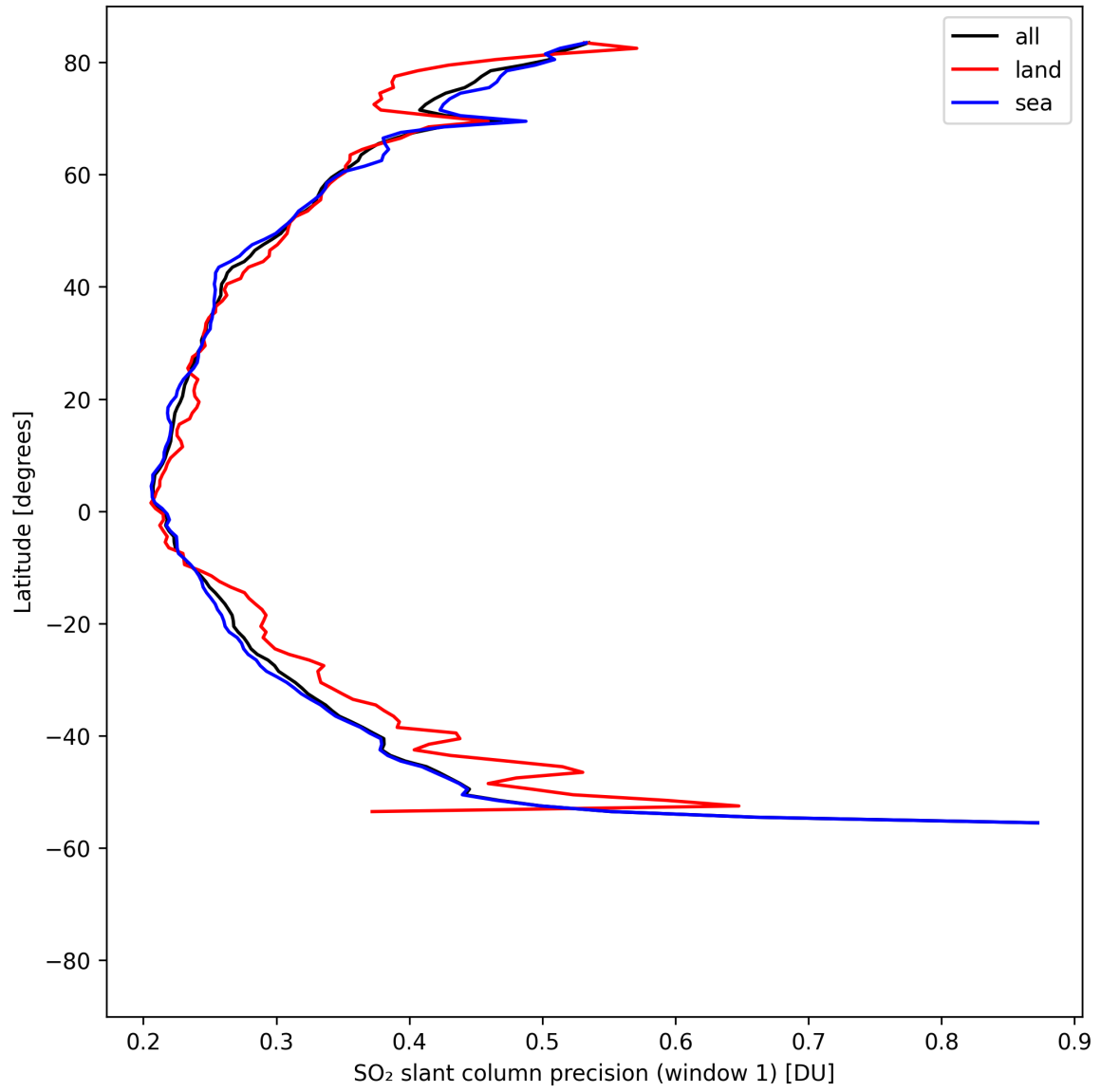


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-04-25 to 2025-04-26.

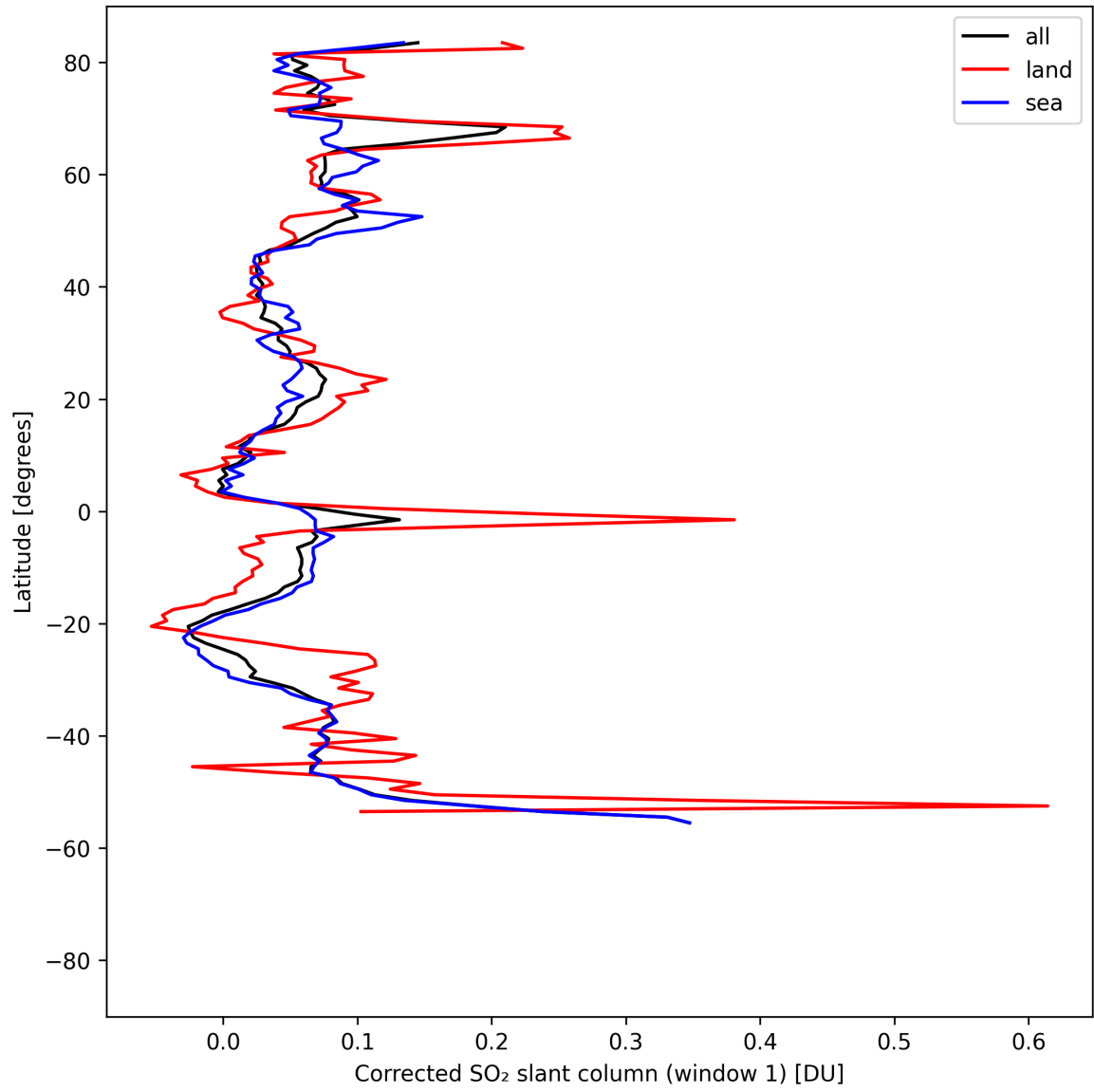


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-04-25 to 2025-04-26.

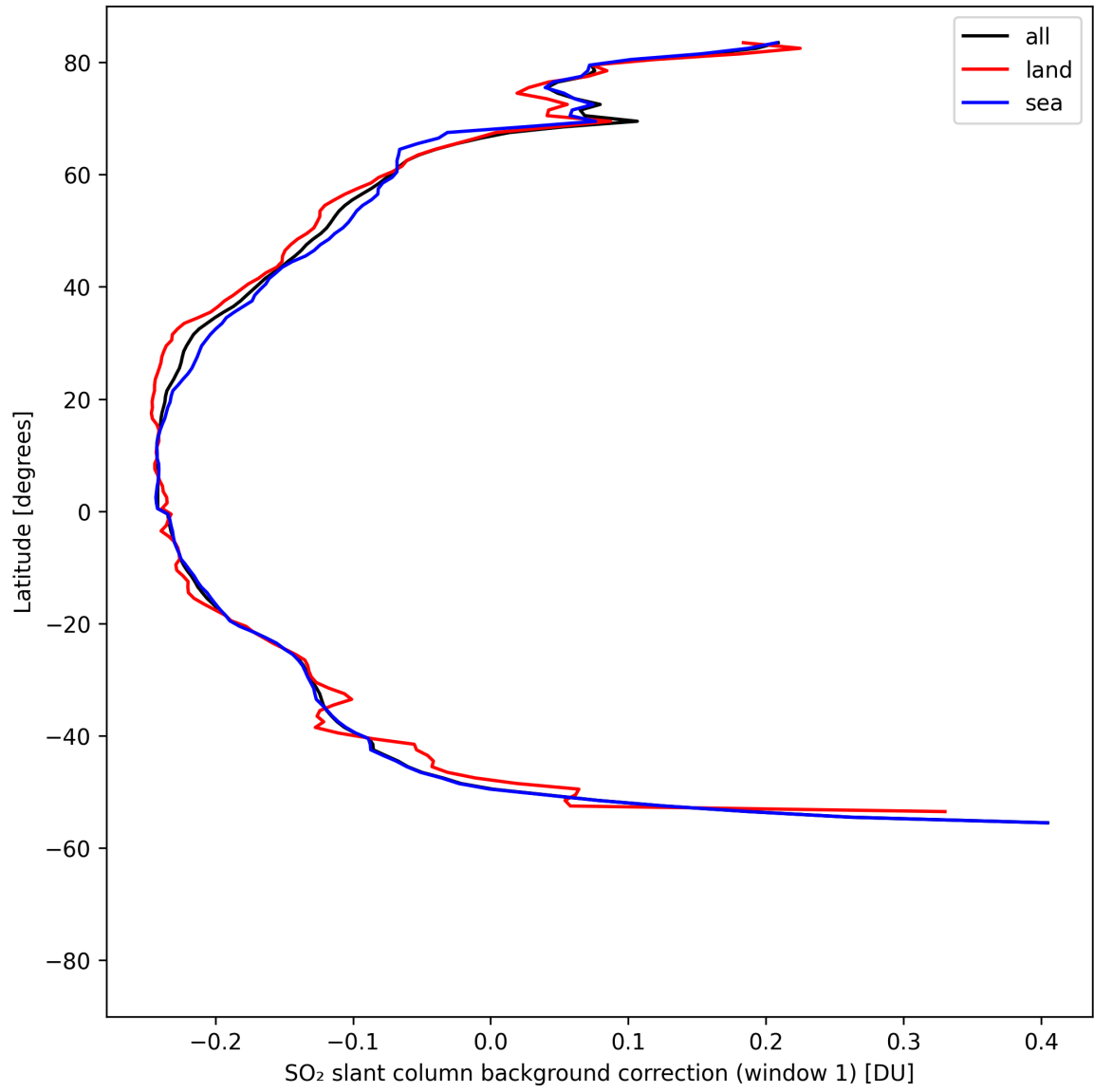


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-04-25 to 2025-04-26.

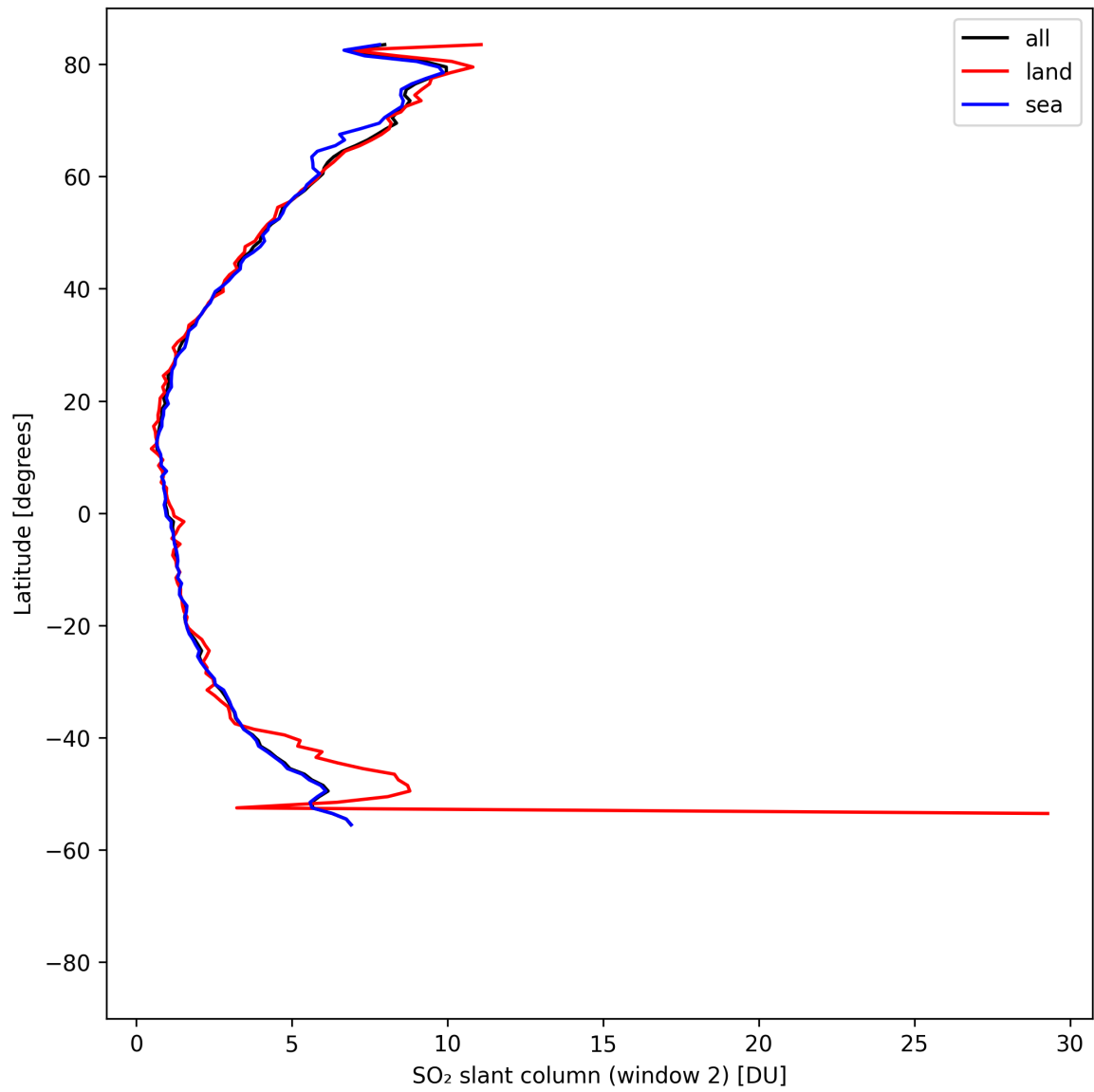


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-04-25 to 2025-04-26.

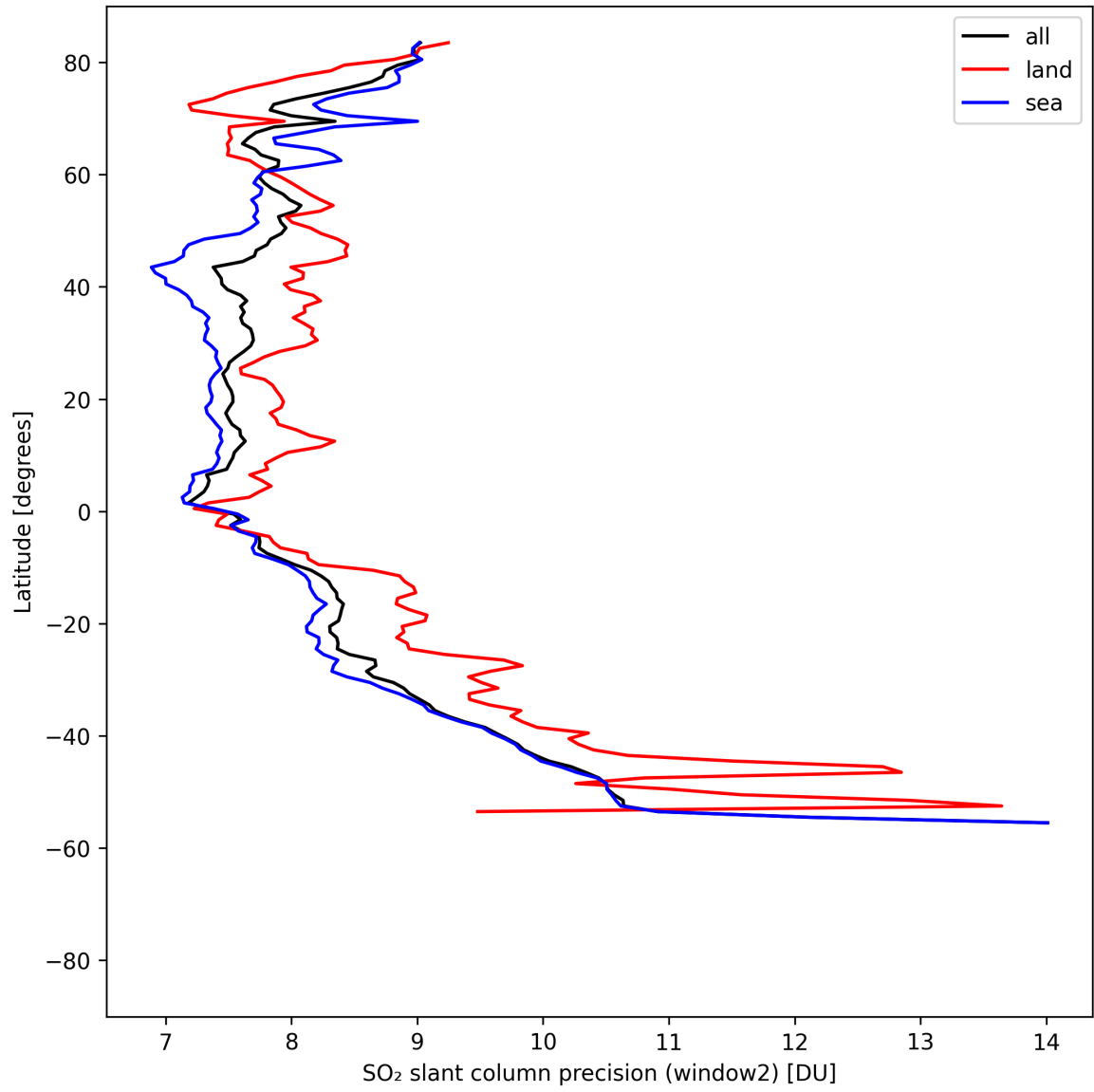


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-04-25 to 2025-04-26.

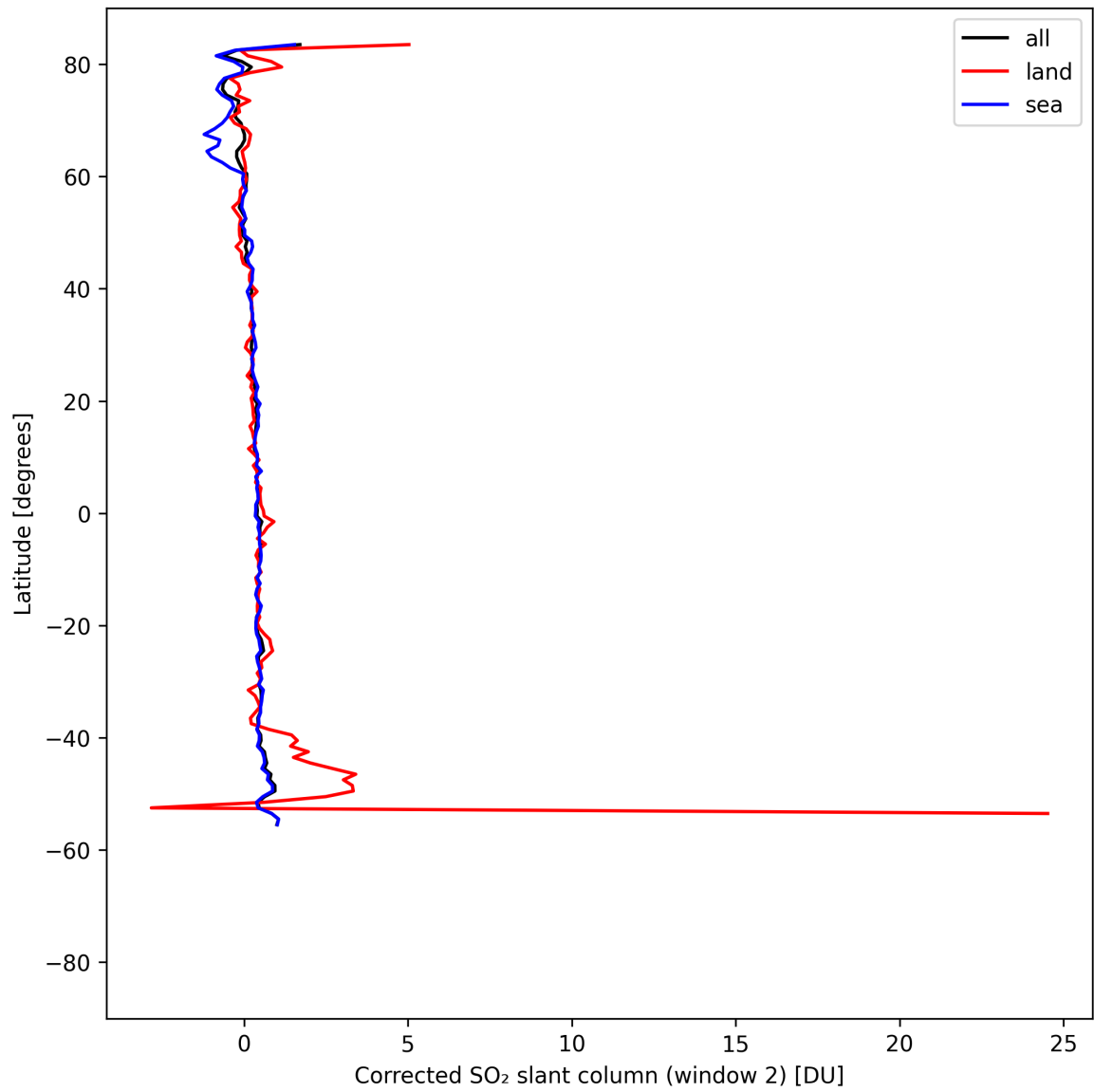


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-04-25 to 2025-04-26.

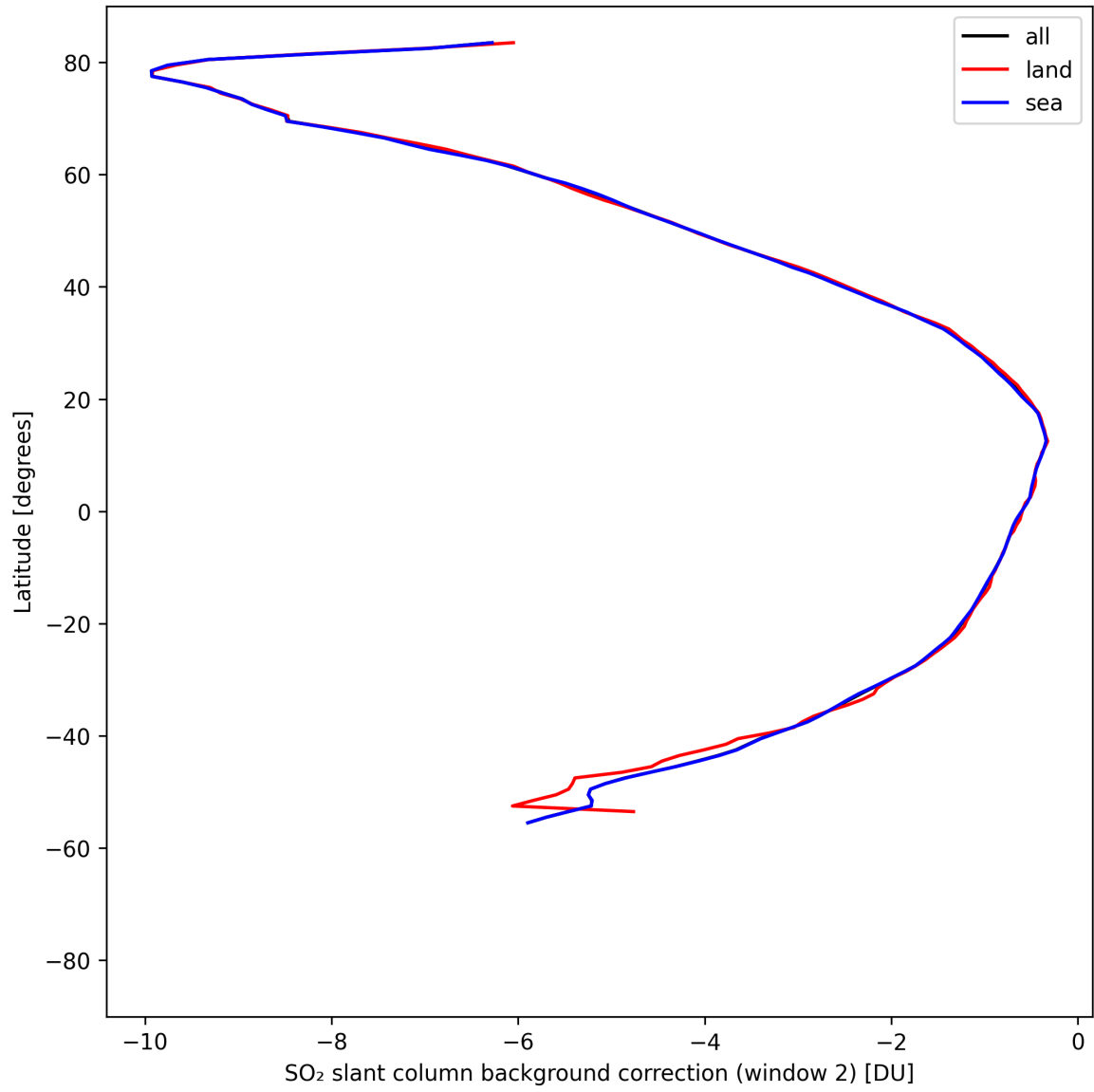


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-04-25 to 2025-04-26.

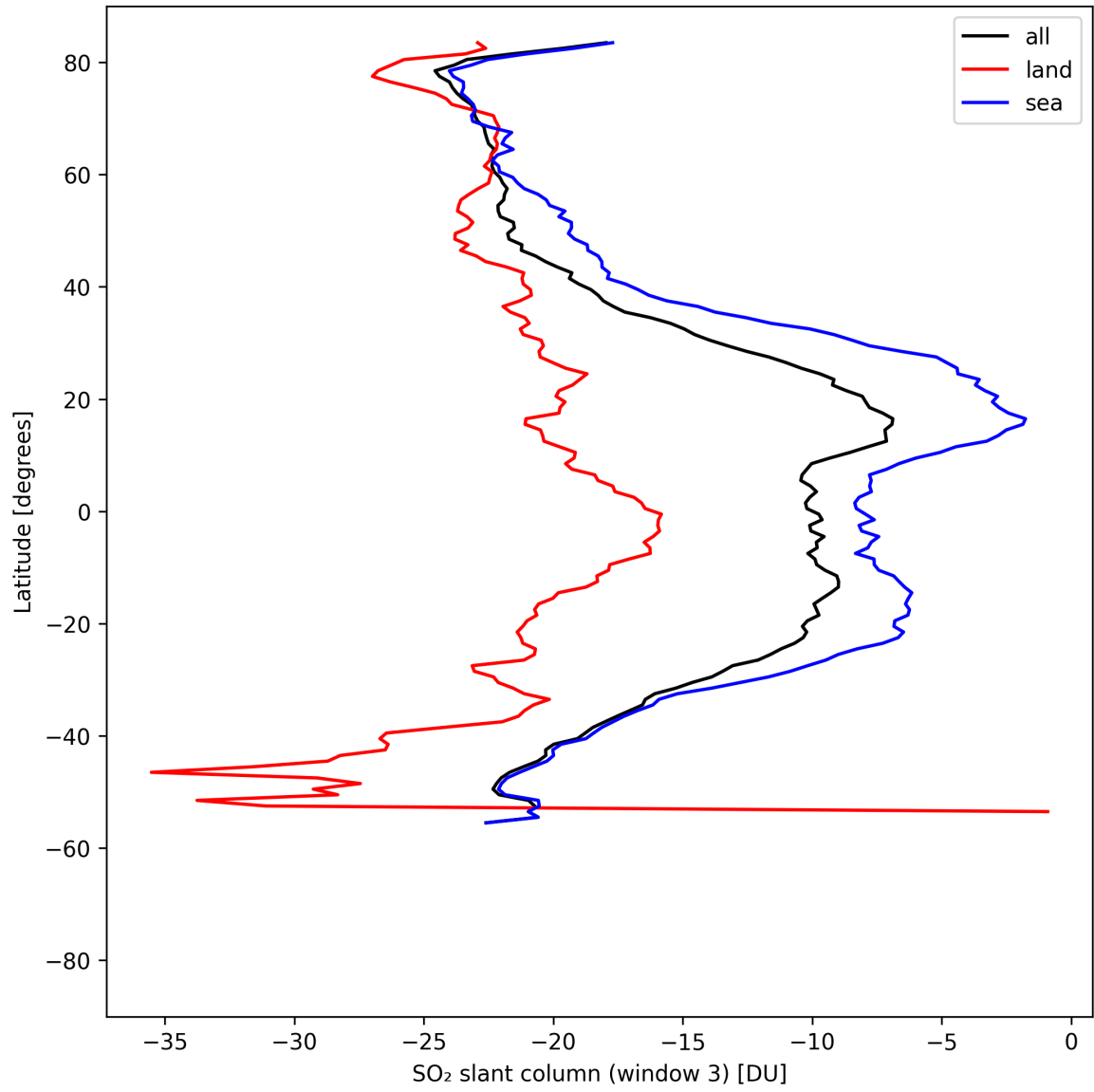


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-04-25 to 2025-04-26.

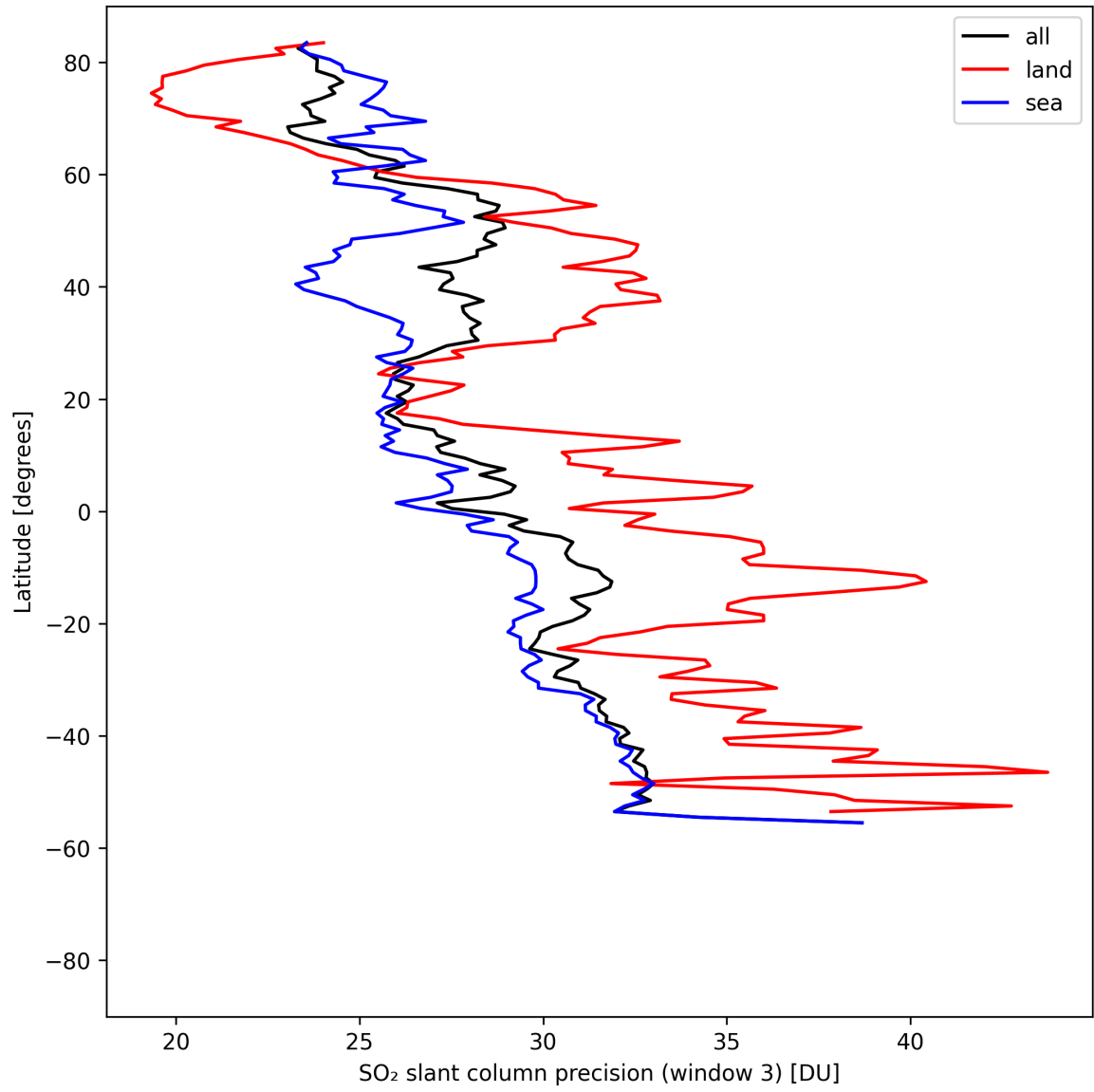


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-04-25 to 2025-04-26.

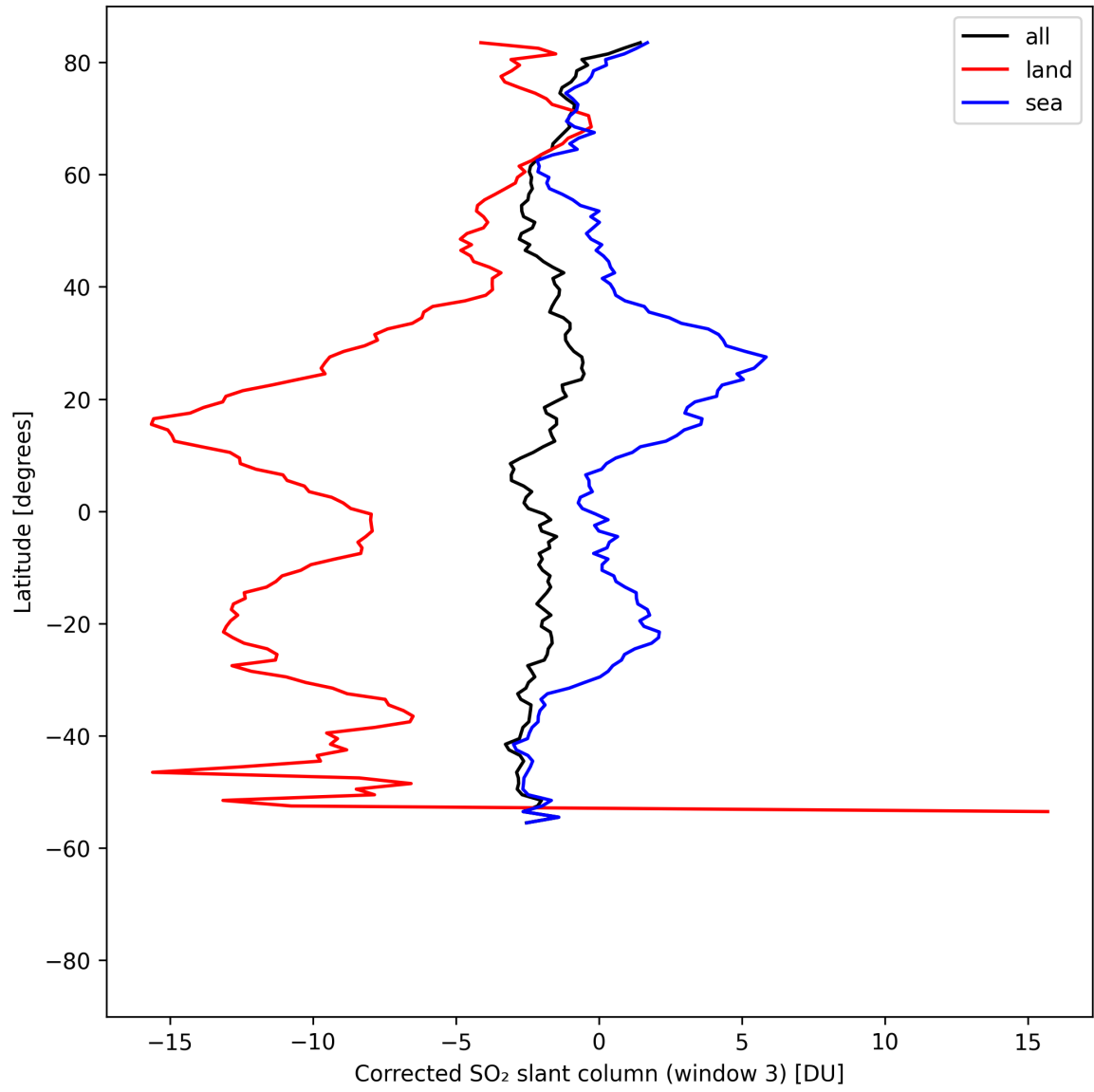


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-04-25 to 2025-04-26.

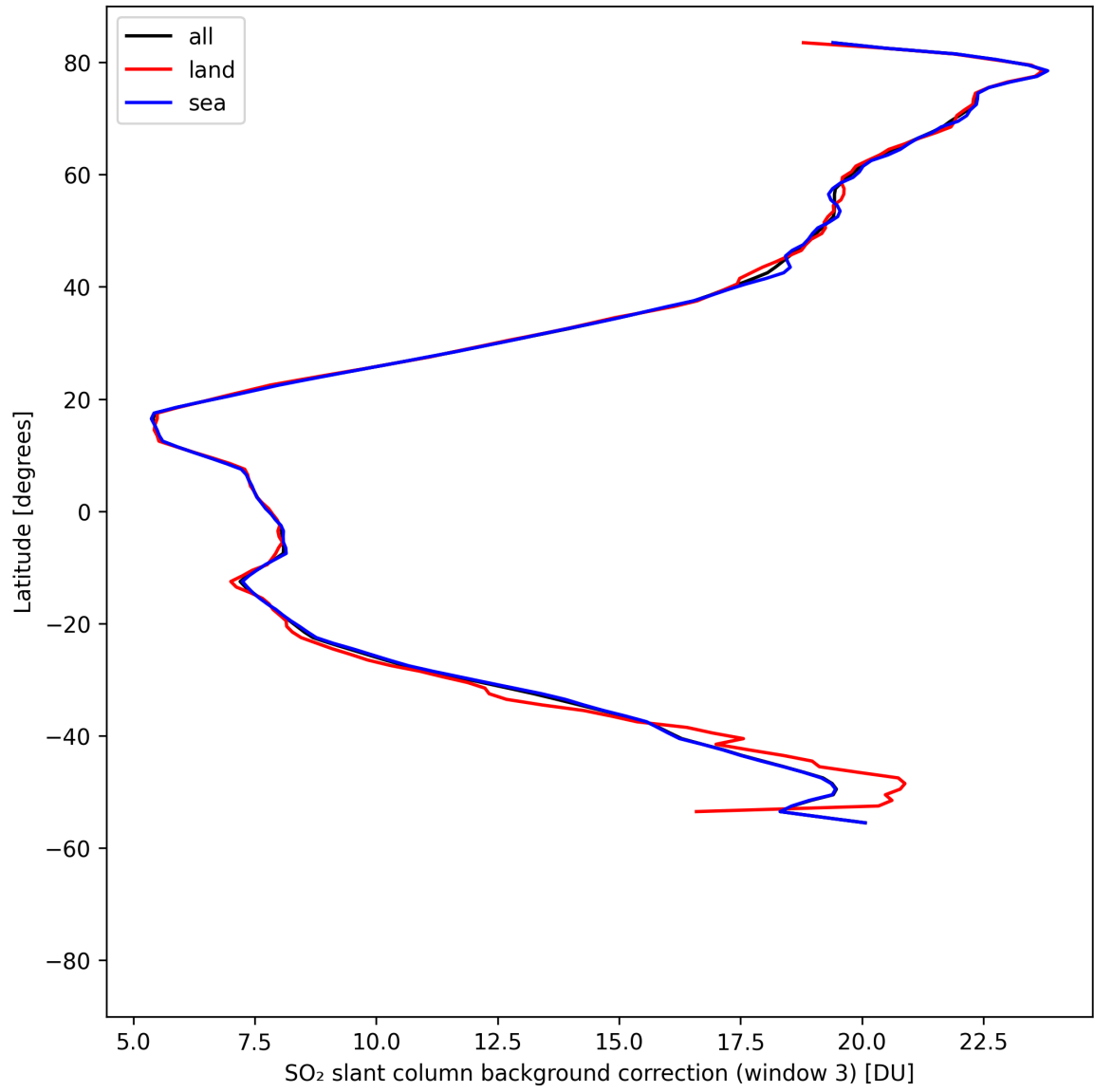


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-04-25 to 2025-04-26.

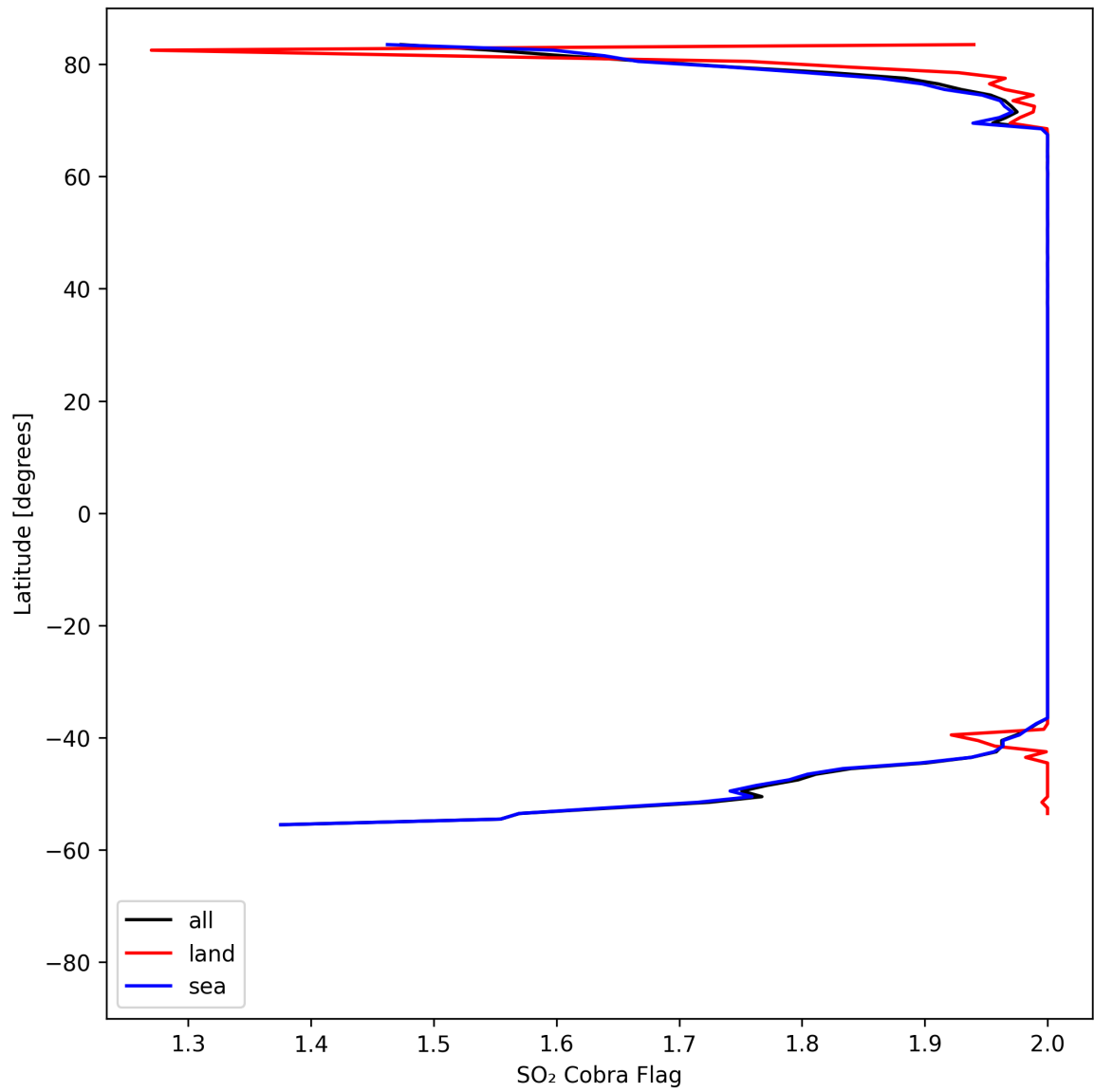


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-04-25 to 2025-04-26.

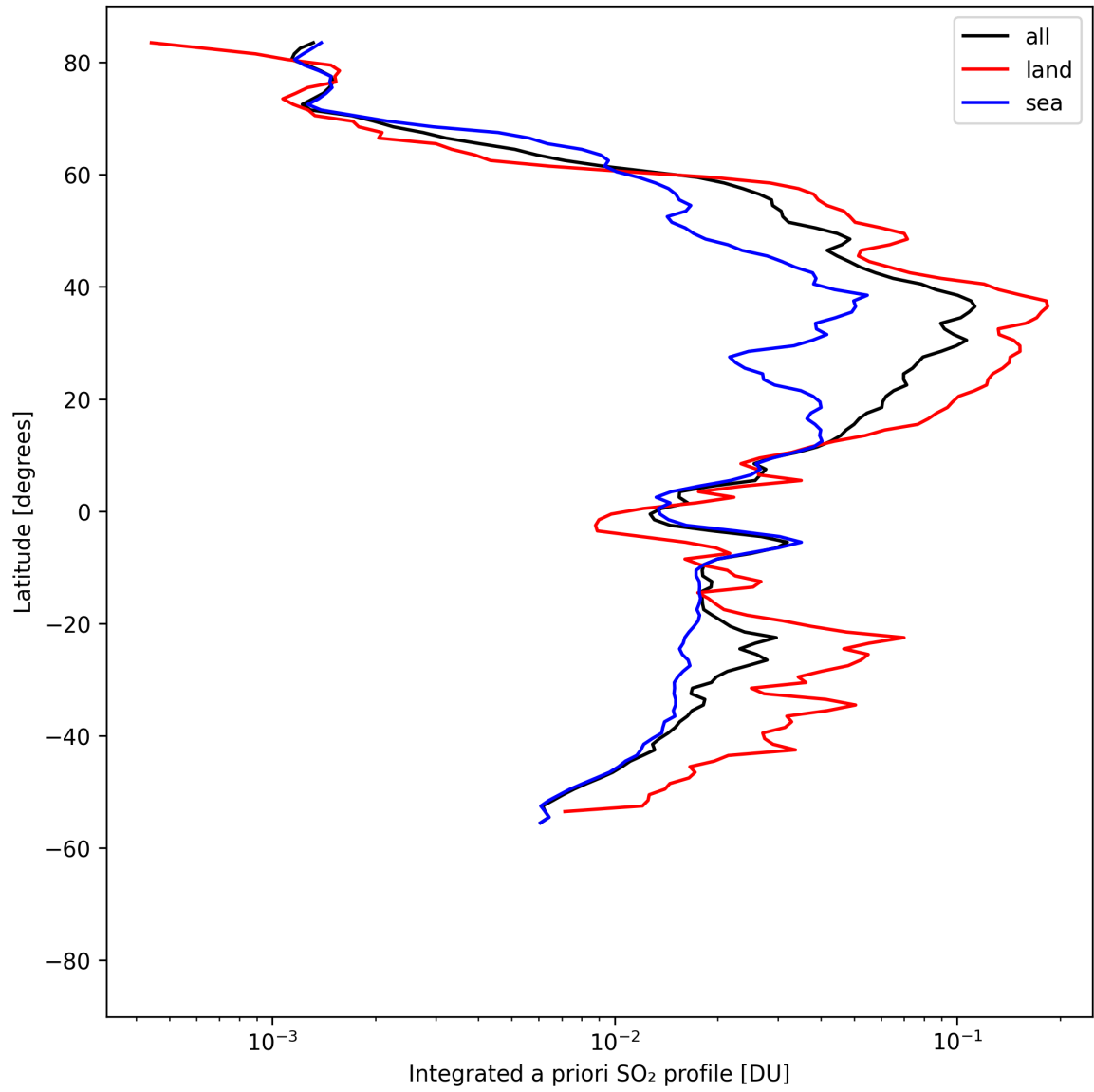


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-04-25 to 2025-04-26.

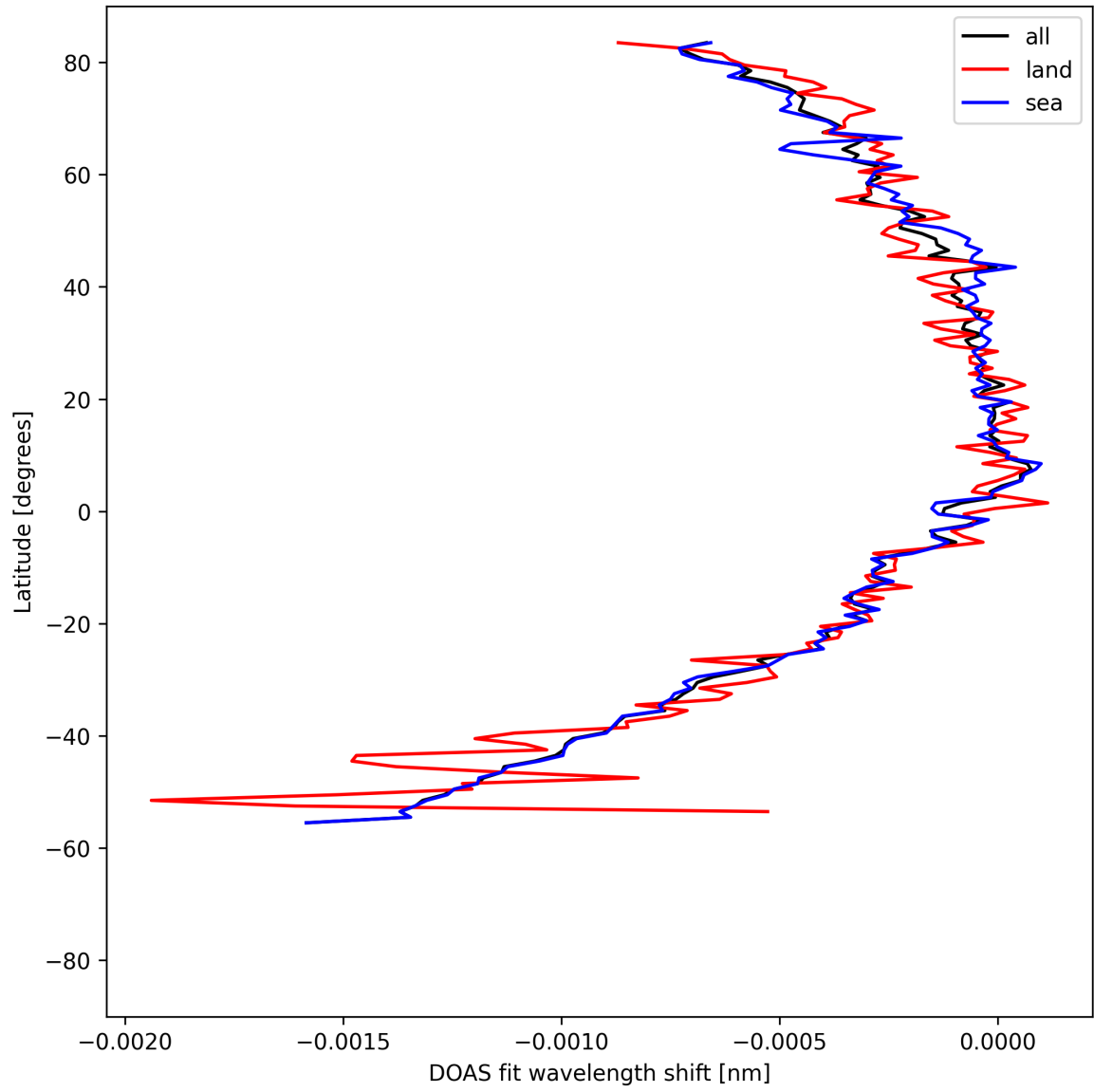


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2025-04-25 to 2025-04-26.

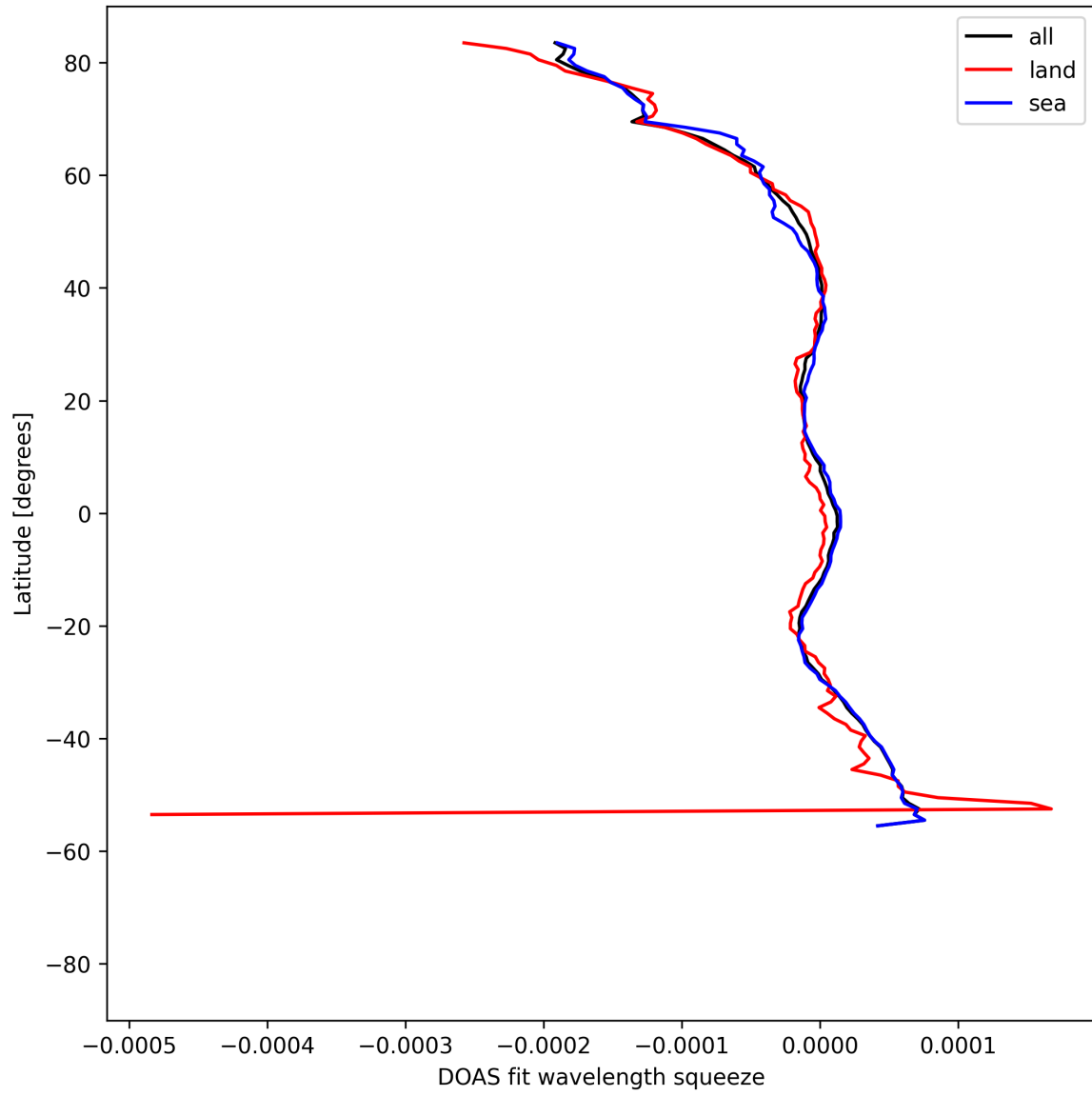


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-04-25 to 2025-04-26.

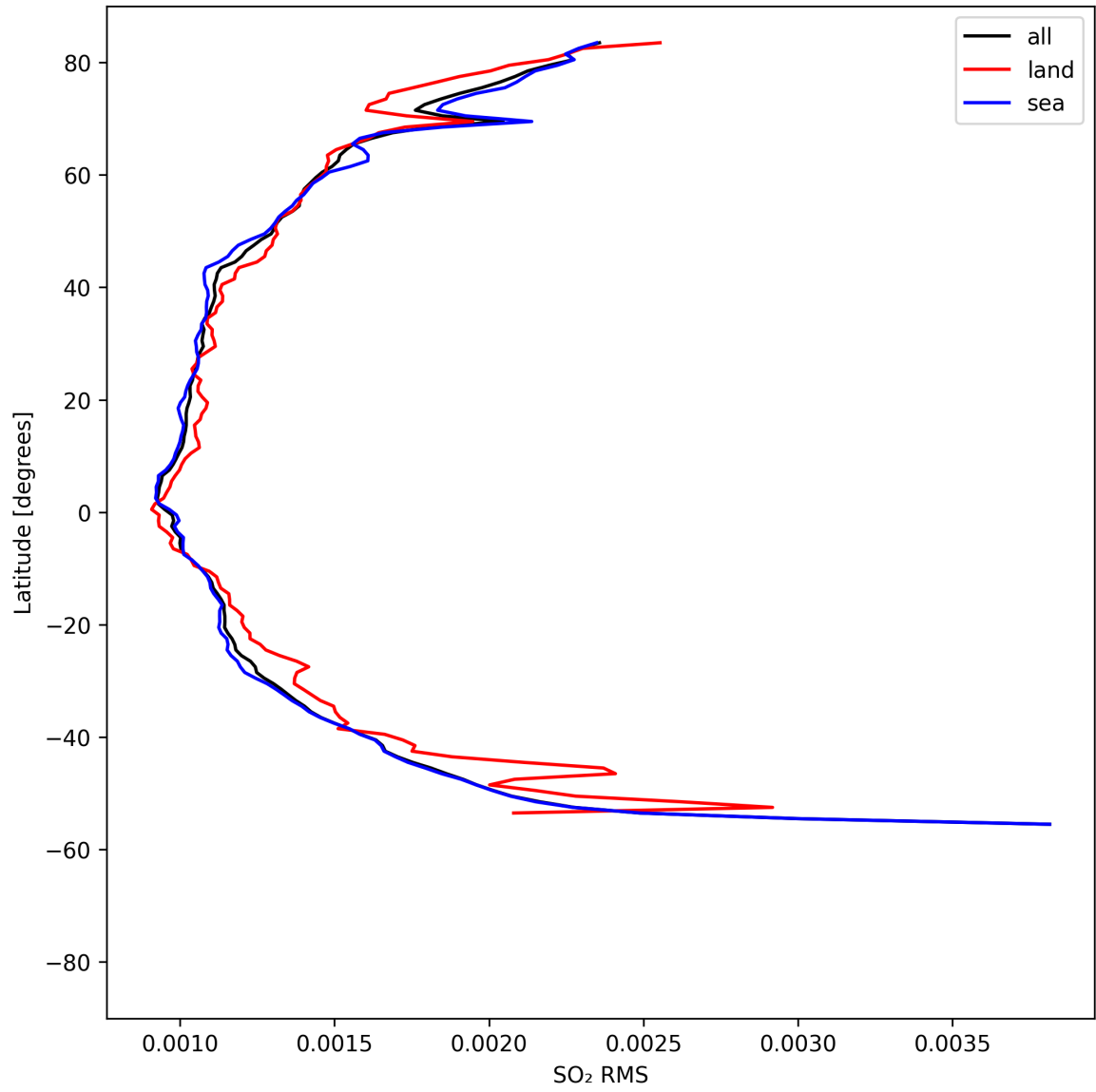


Figure 52: Zonal average of “SO₂ RMS” for 2025-04-25 to 2025-04-26.

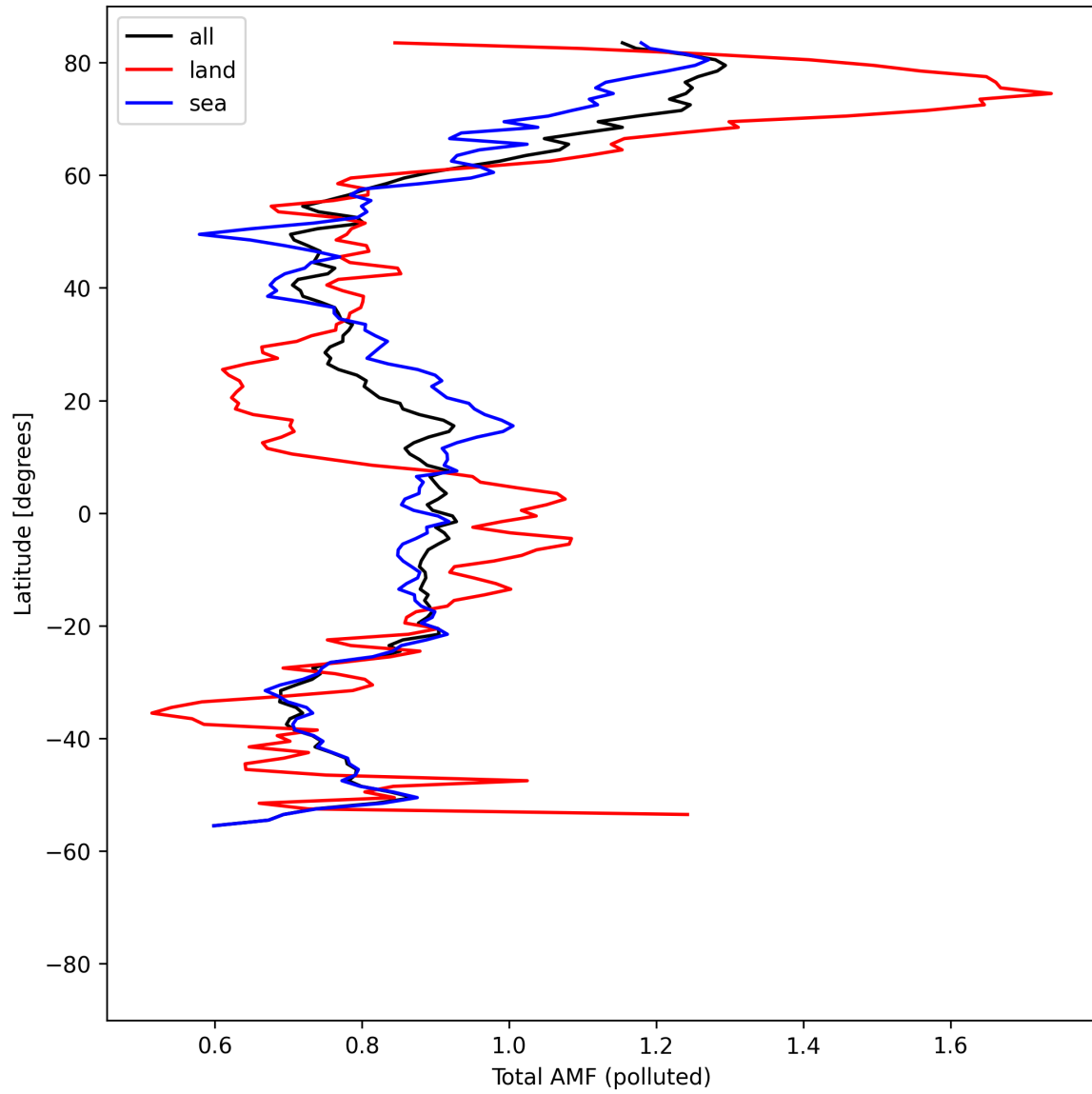


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-04-25 to 2025-04-26.

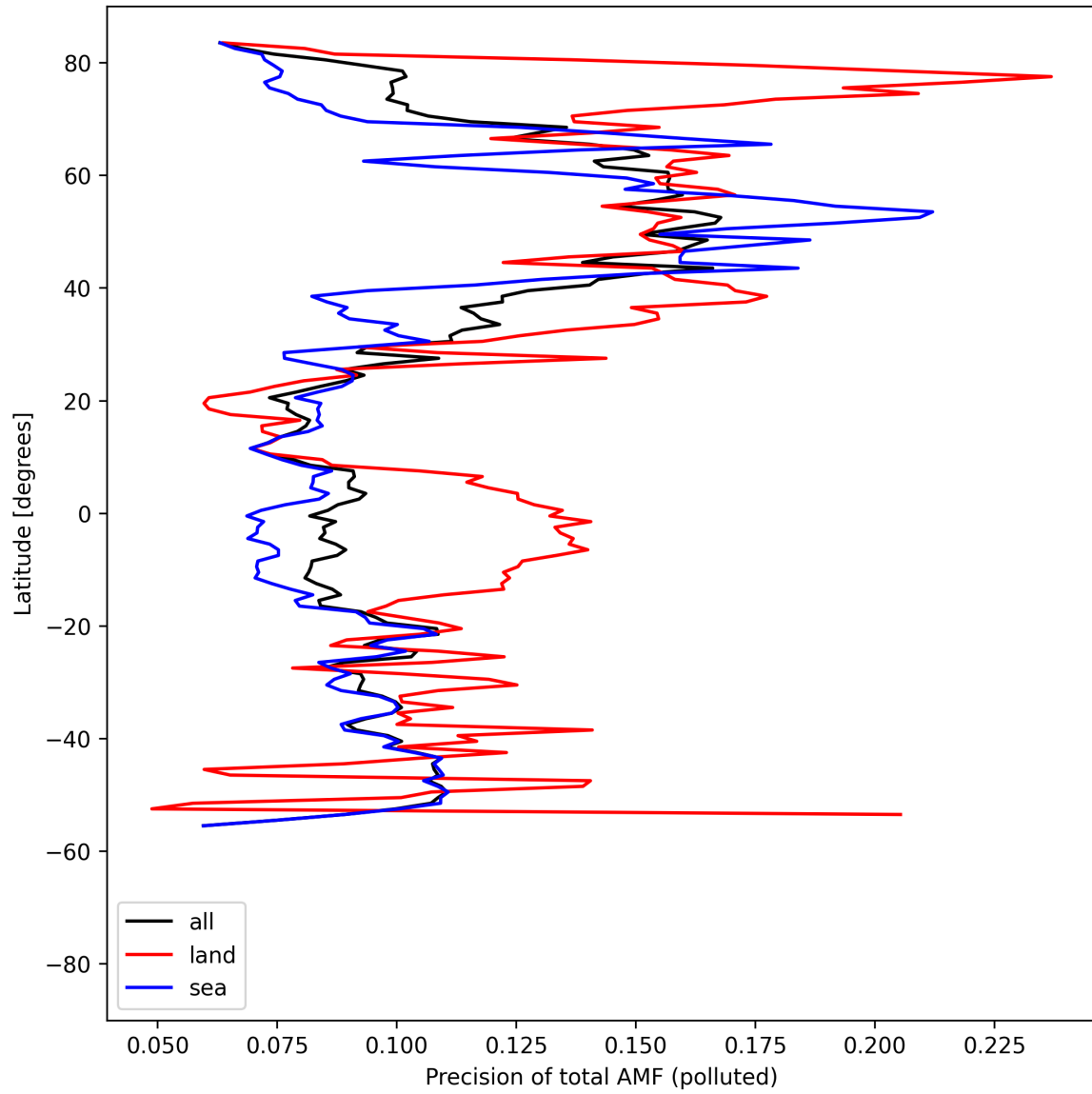


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-04-25 to 2025-04-26.

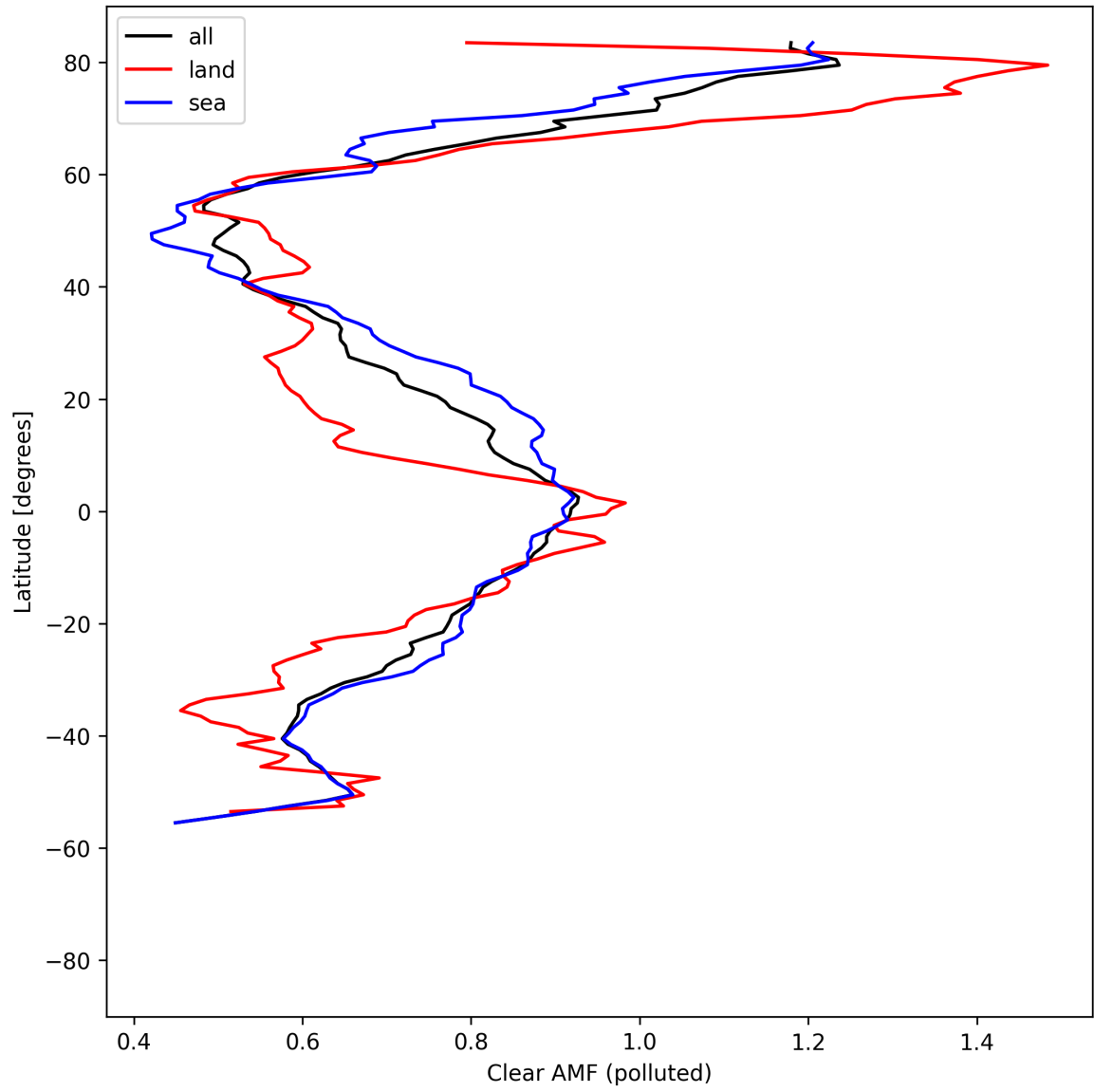


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-04-25 to 2025-04-26.

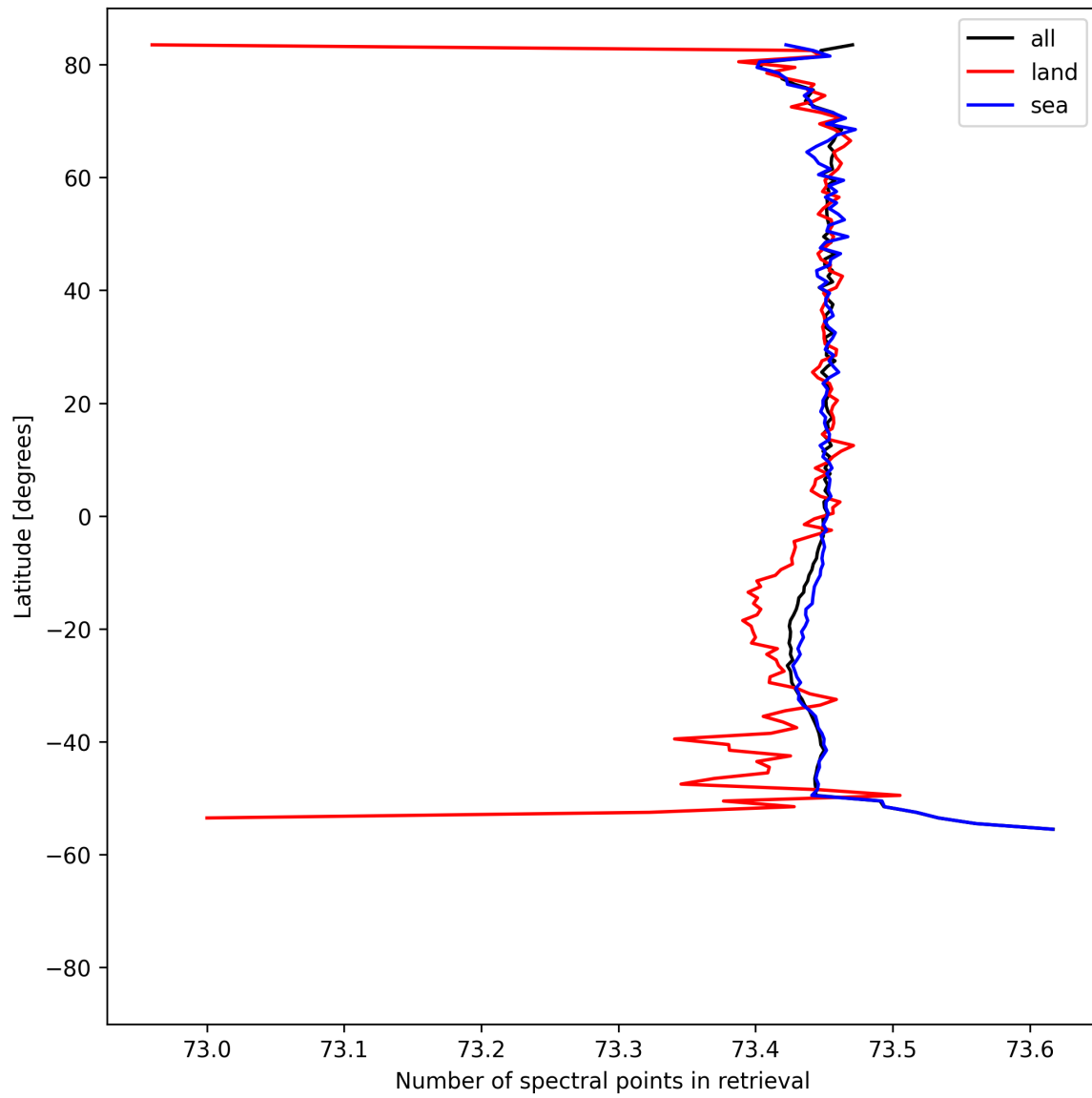


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-04-25 to 2025-04-26.

8 Histograms

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

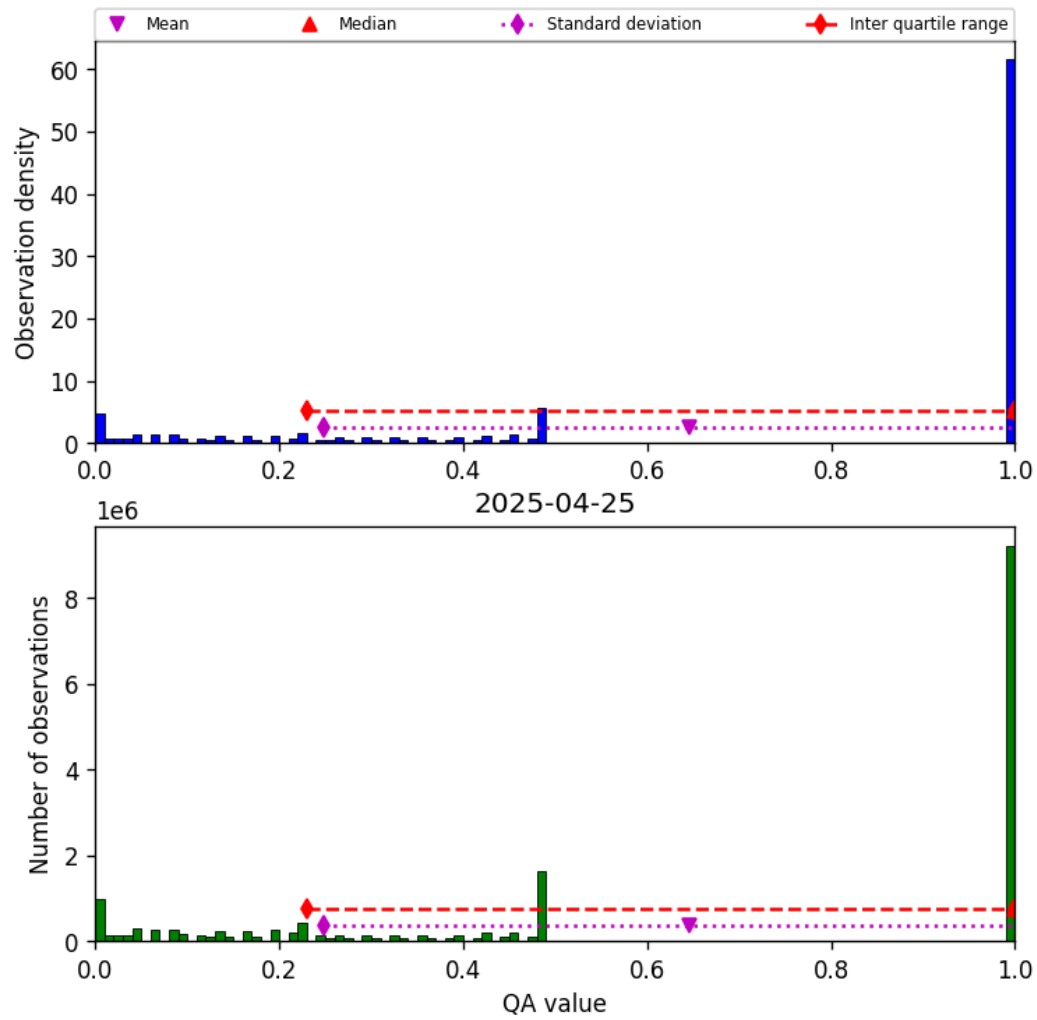


Figure 57: Histogram of “QA value” for 2025-04-25 to 2025-04-26

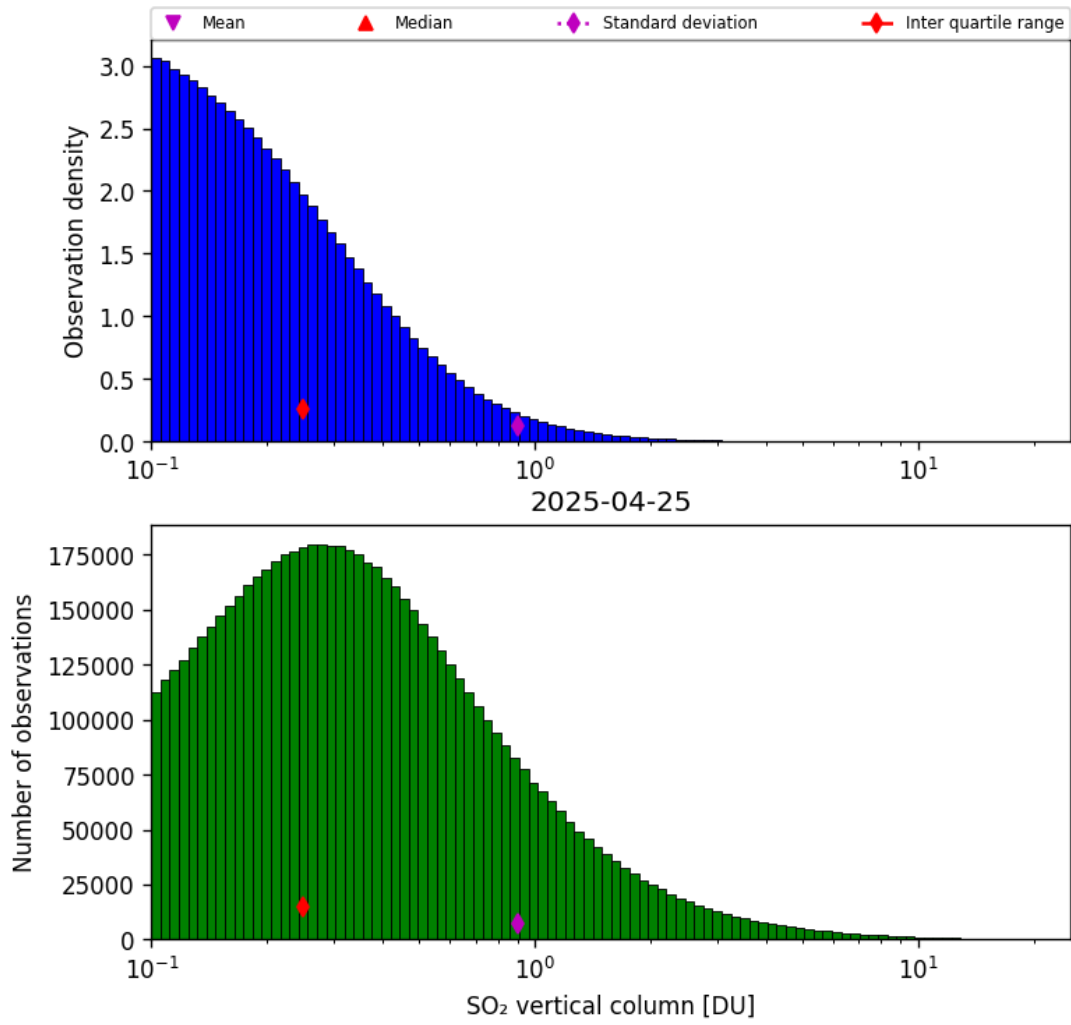


Figure 58: Histogram of “SO₂ vertical column” for 2025-04-25 to 2025-04-26

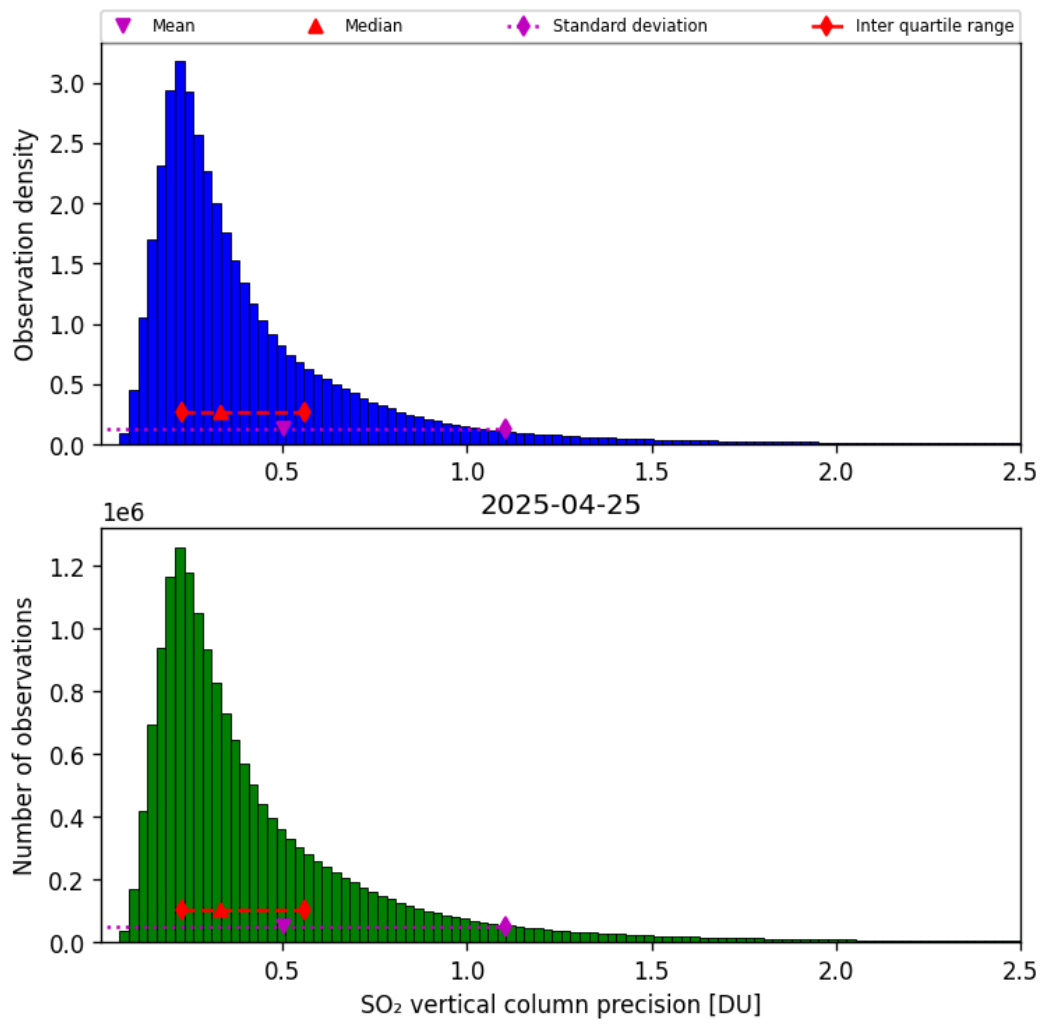


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-04-25 to 2025-04-26

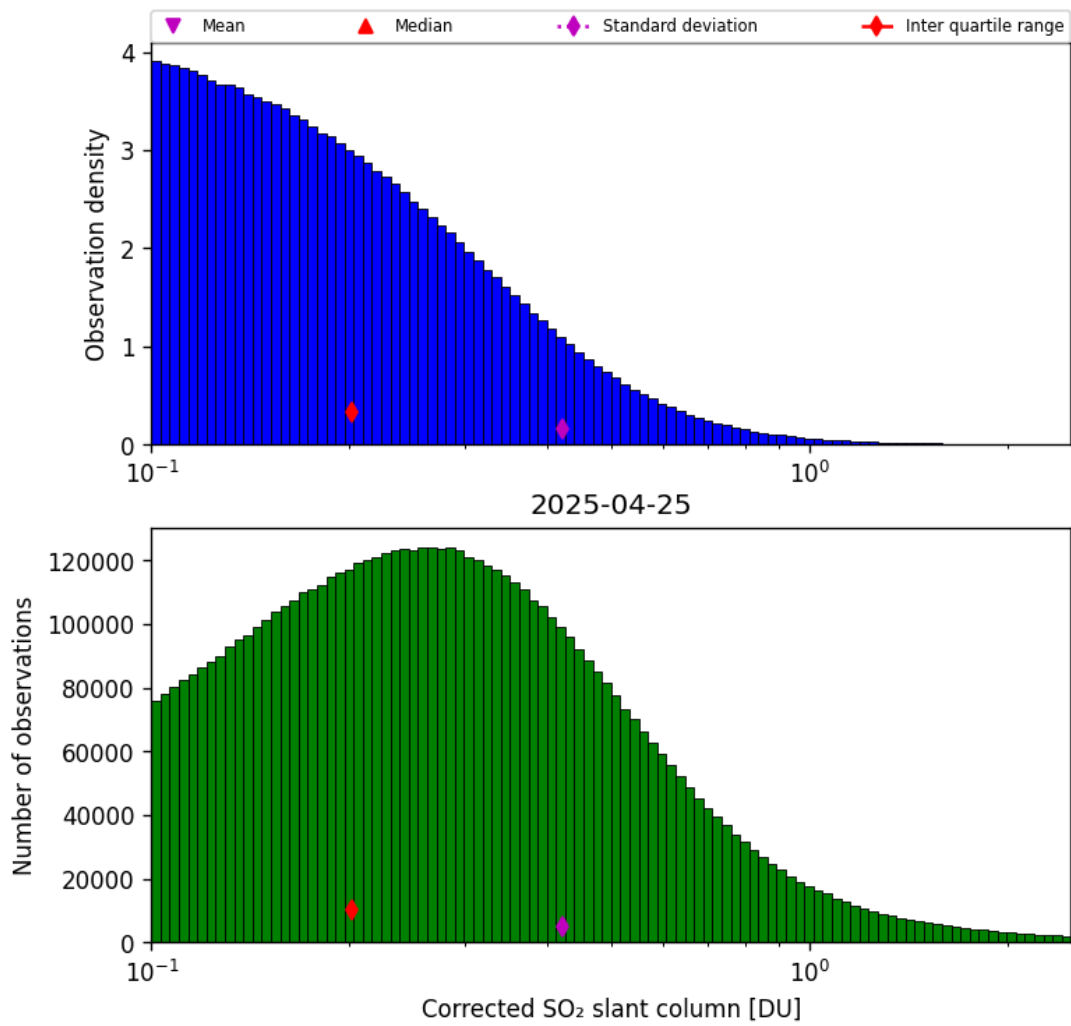


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-04-25 to 2025-04-26

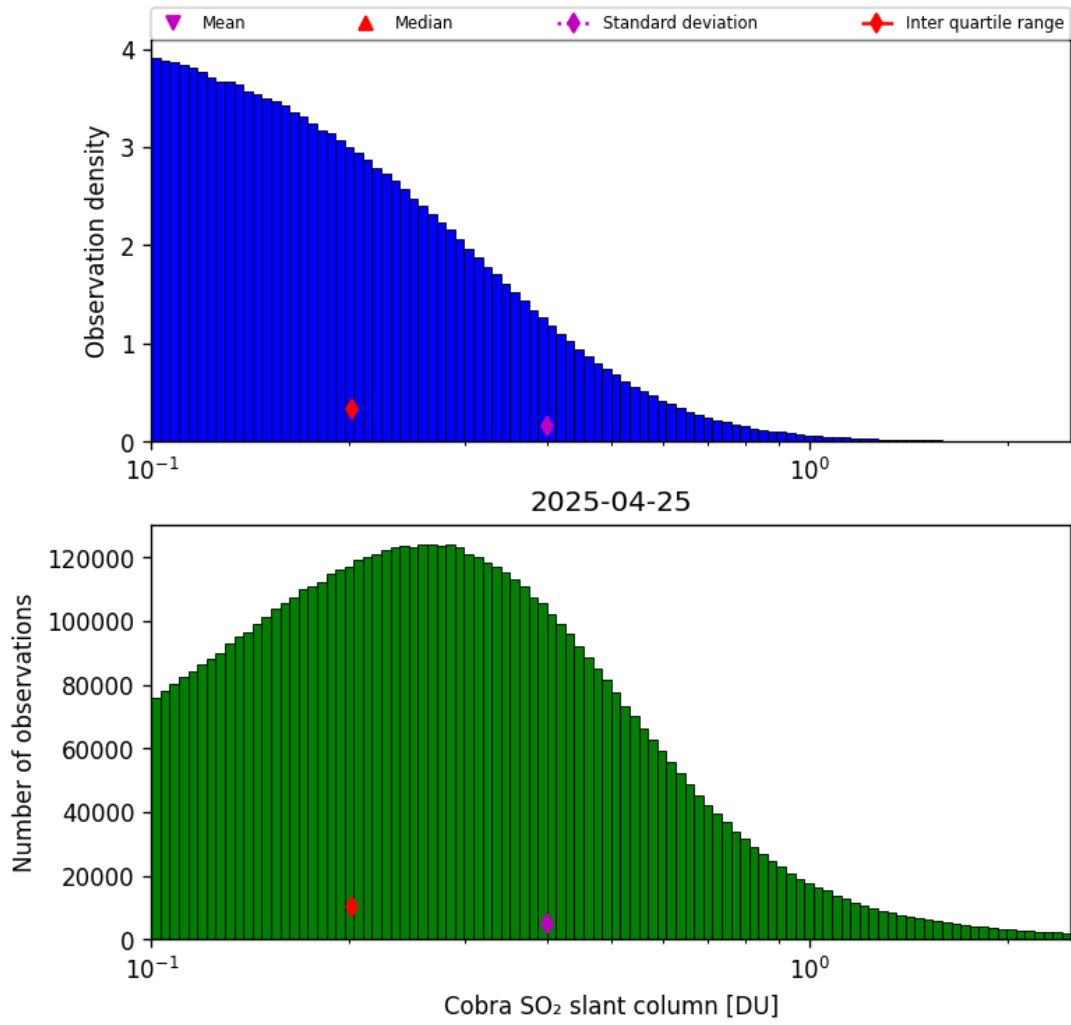


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-04-25 to 2025-04-26

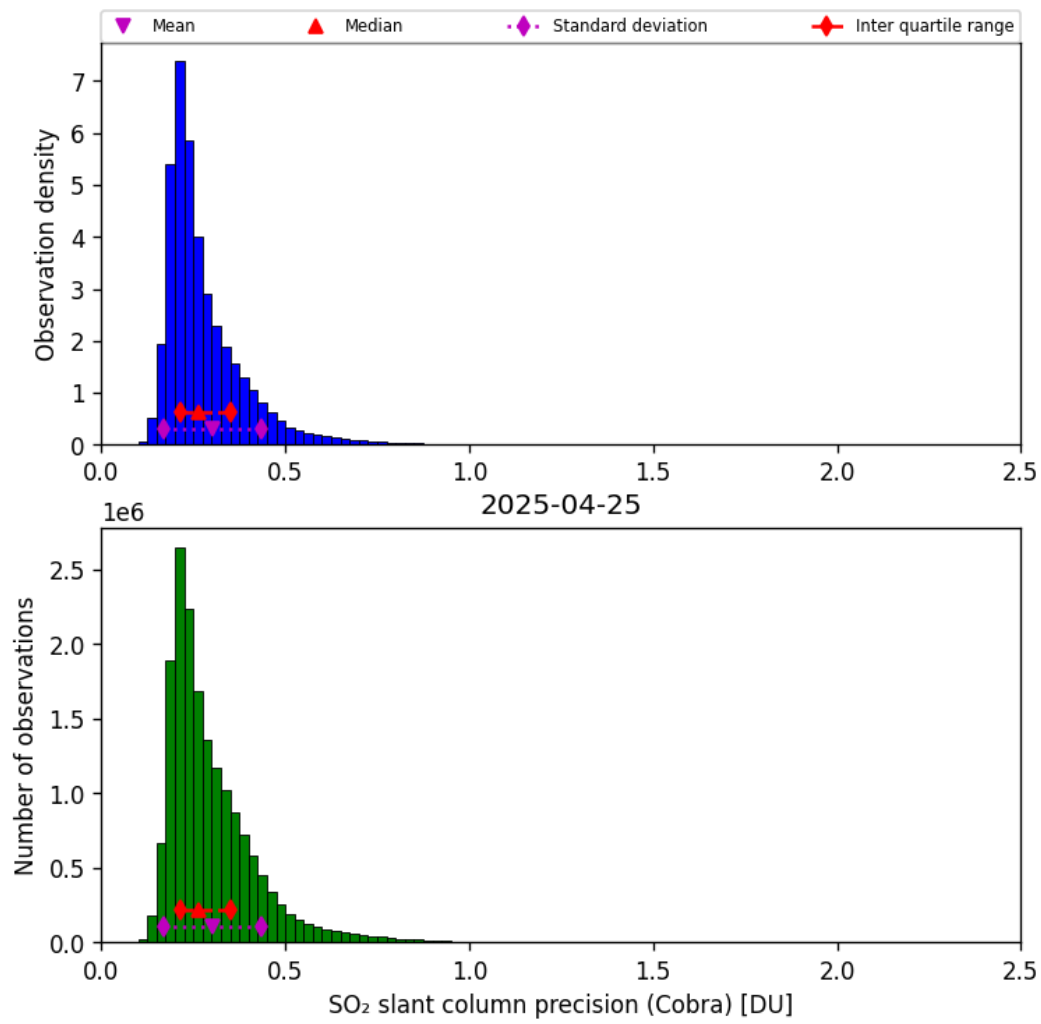


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-04-25 to 2025-04-26

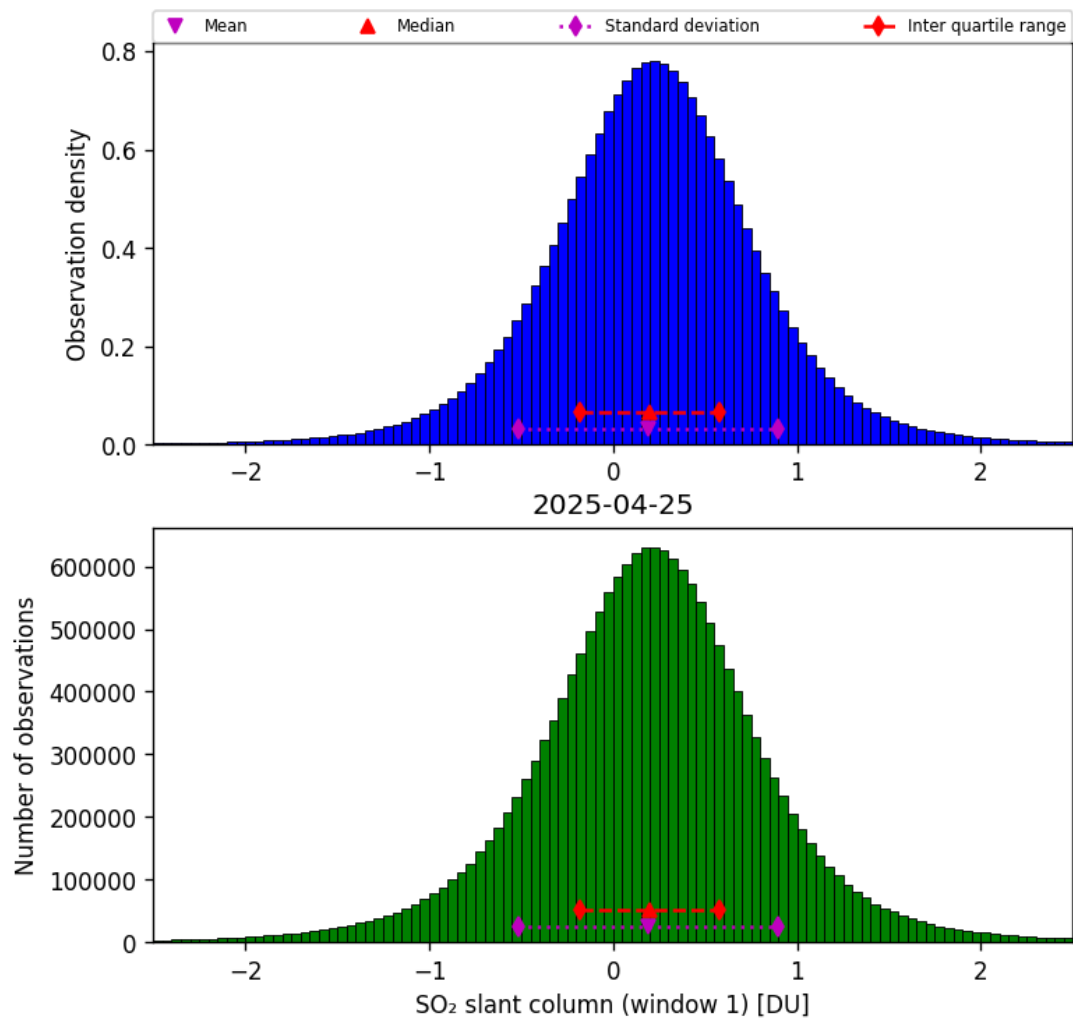


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-04-25 to 2025-04-26

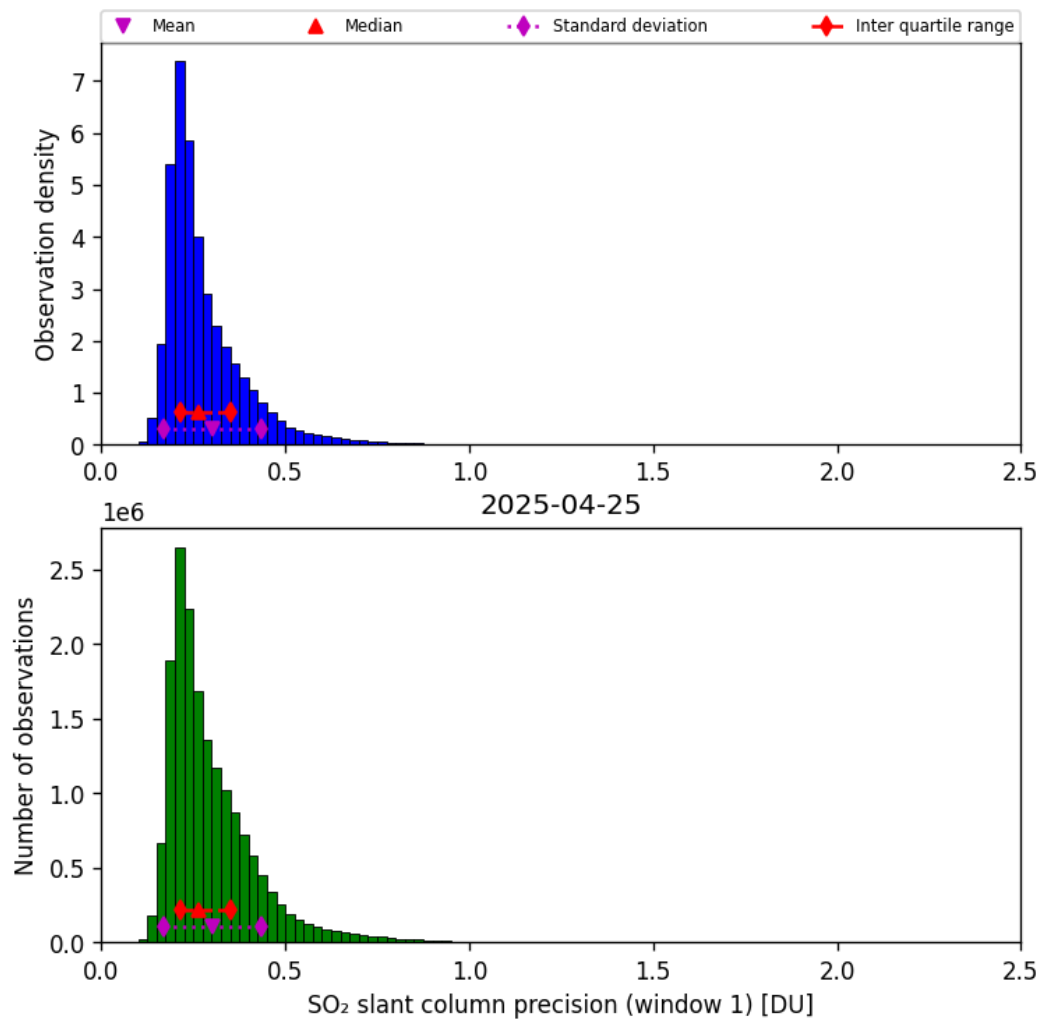


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-04-25 to 2025-04-26

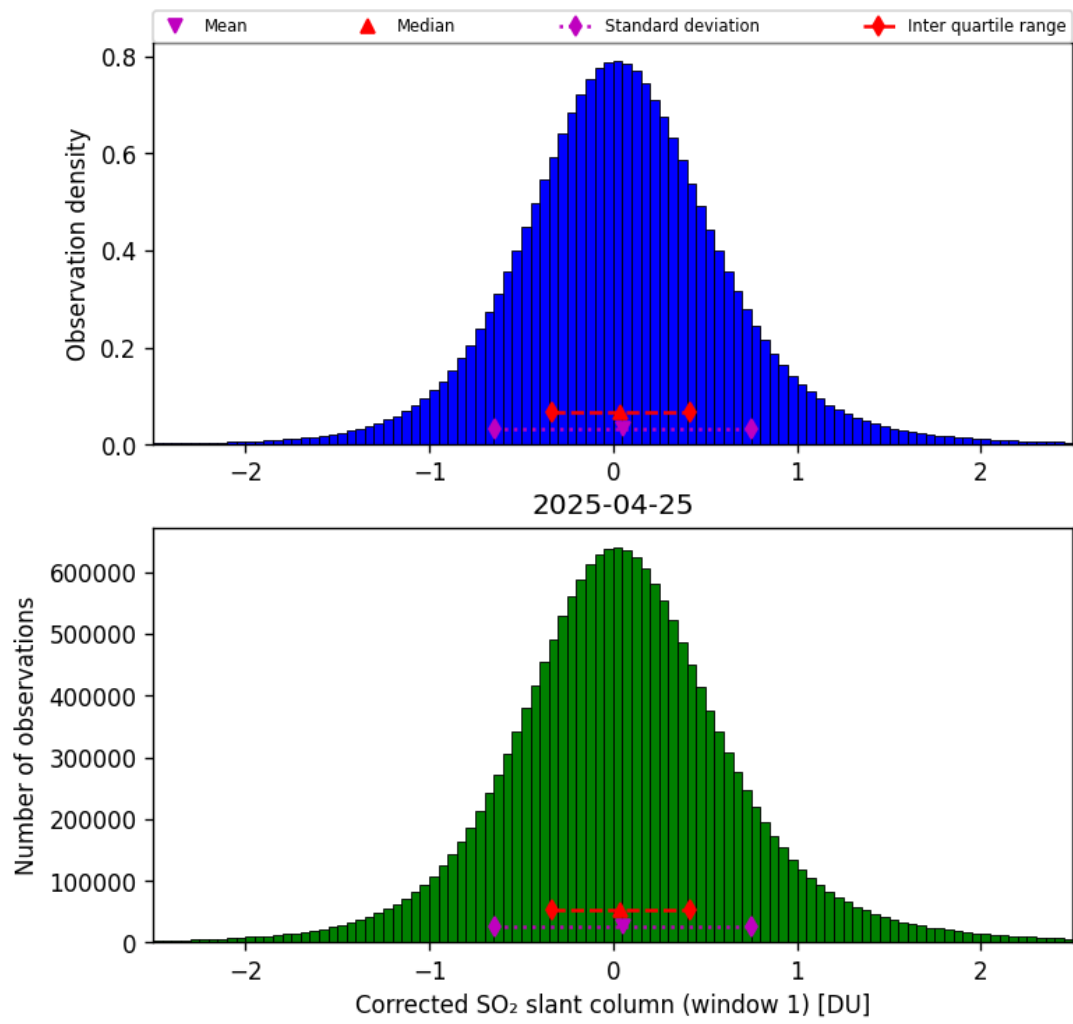


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-04-25 to 2025-04-26

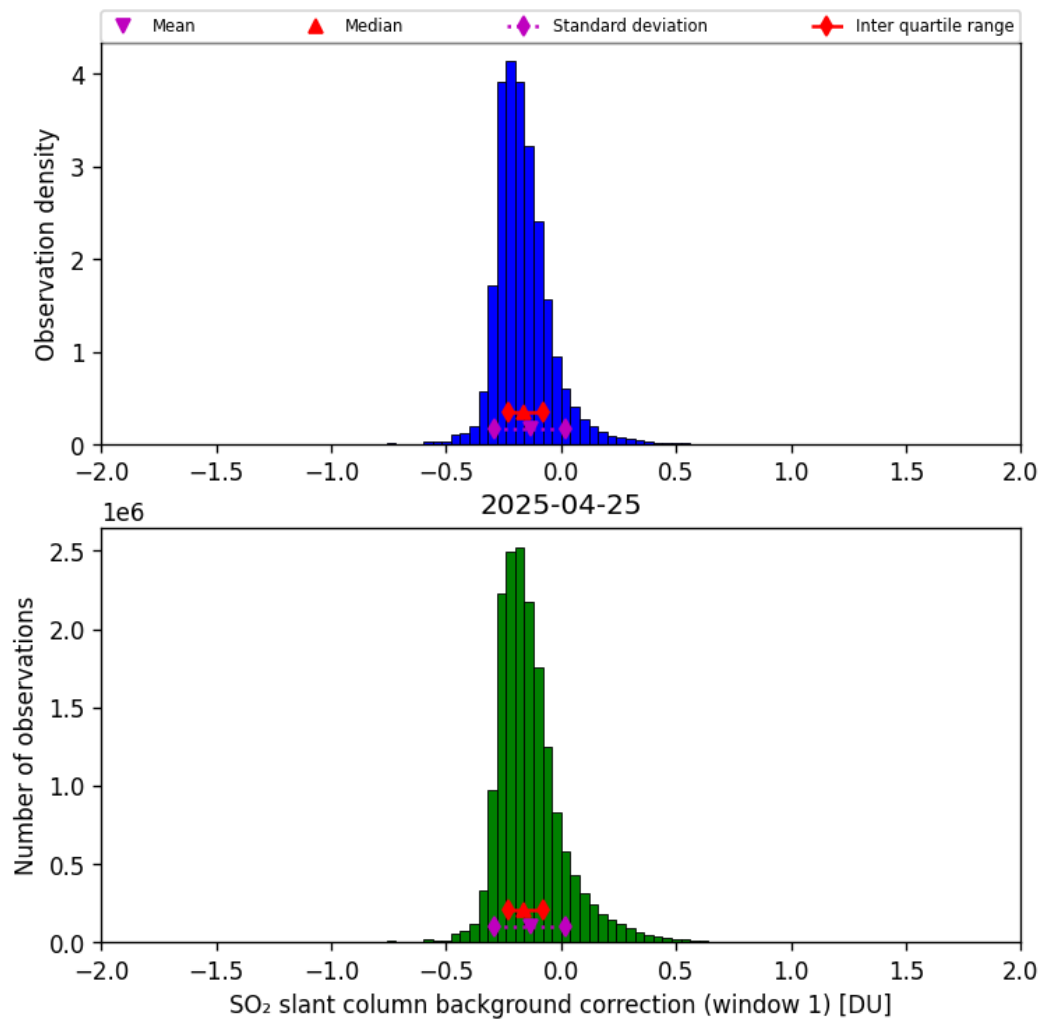


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-04-25 to 2025-04-26

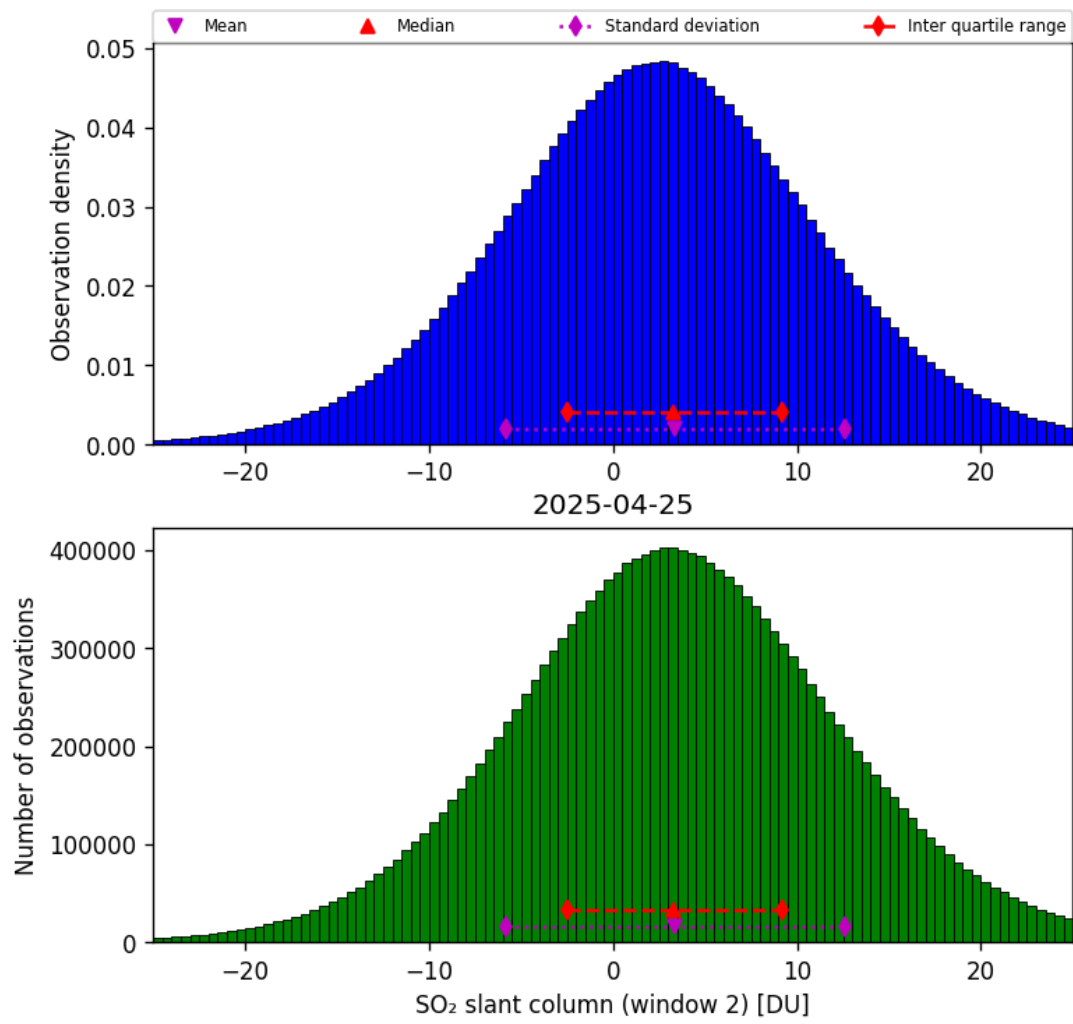


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-04-25 to 2025-04-26

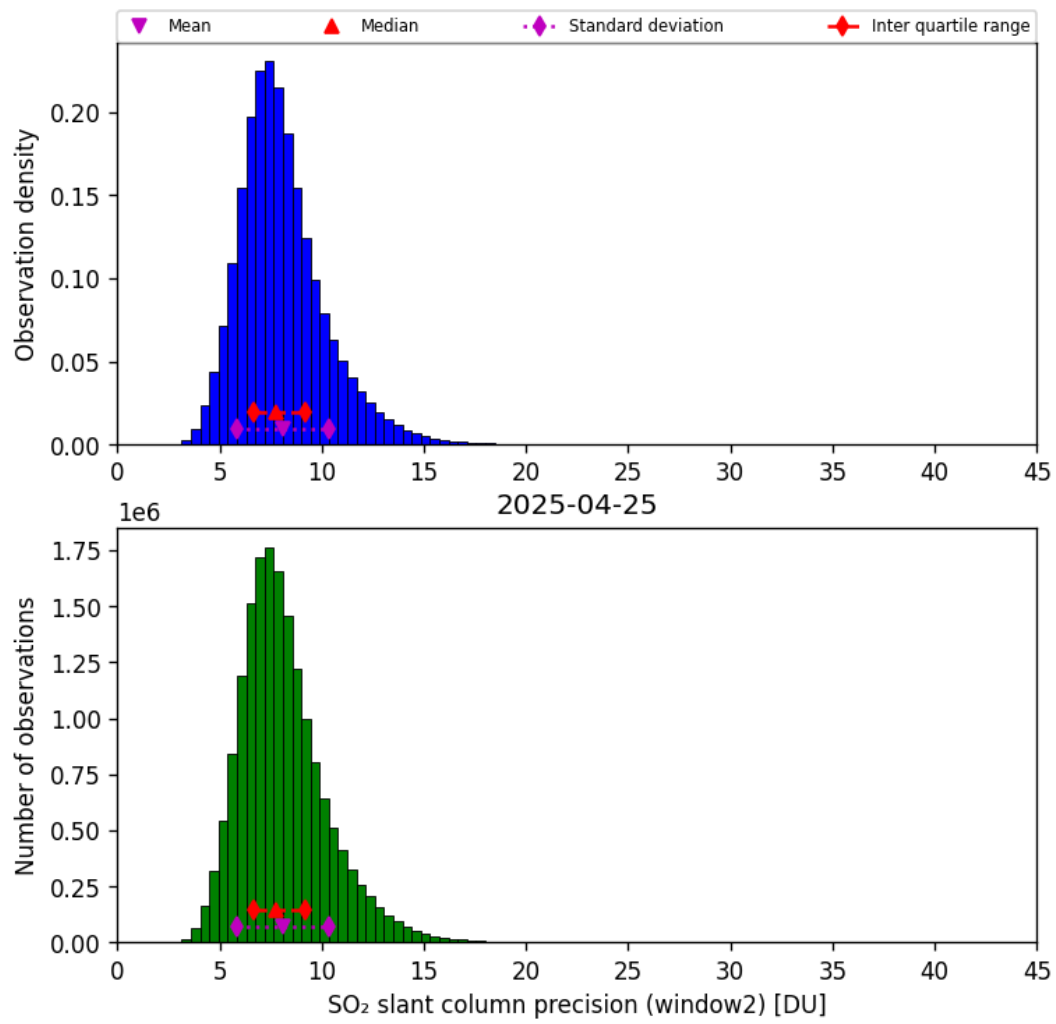


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-04-25 to 2025-04-26

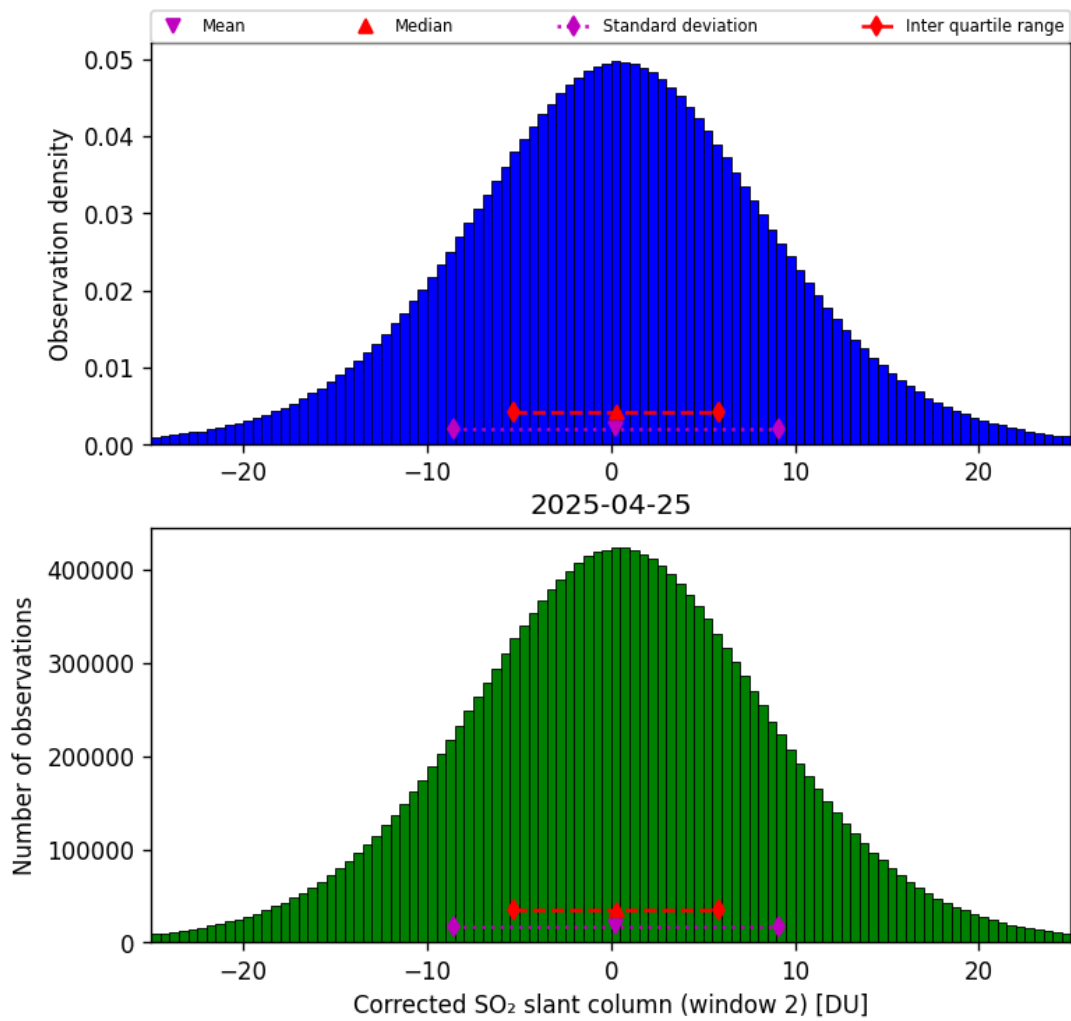


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-04-25 to 2025-04-26

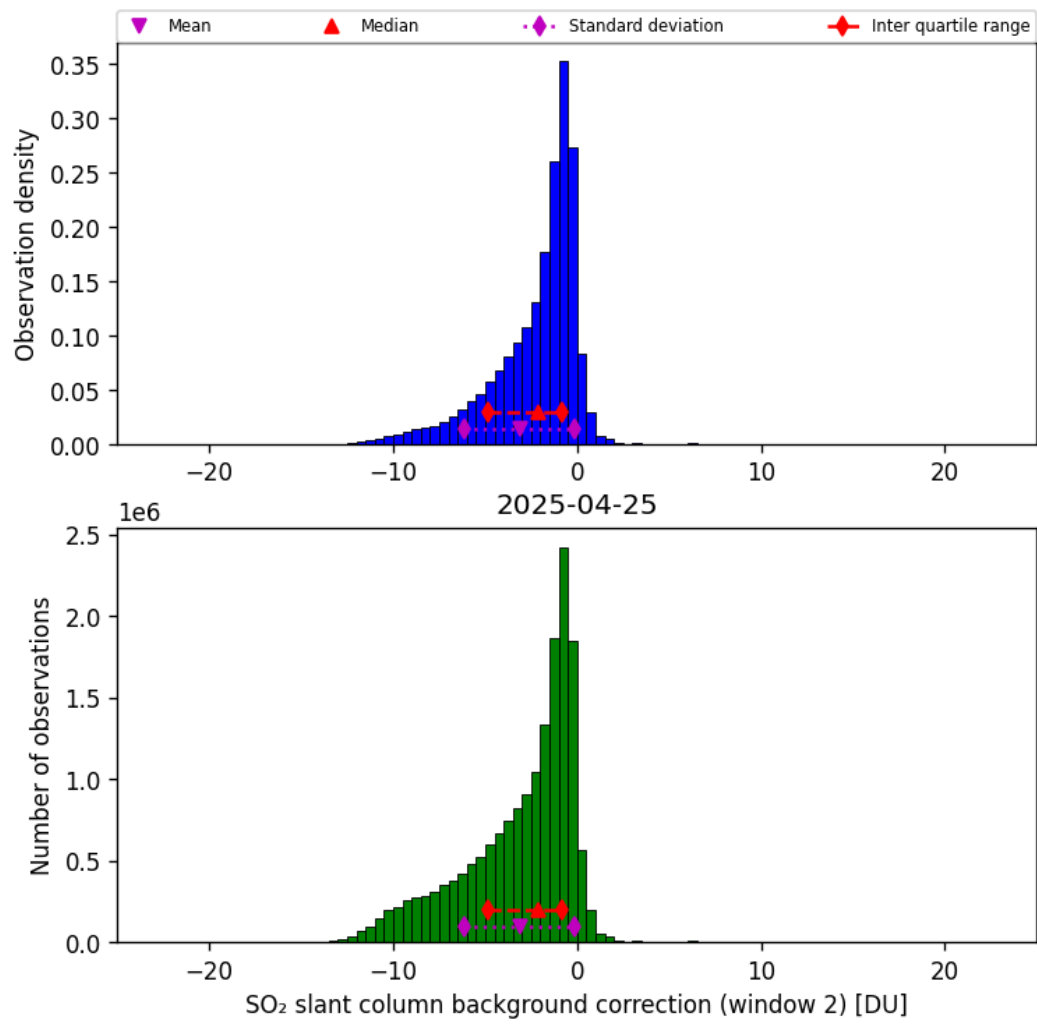


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-04-25 to 2025-04-26

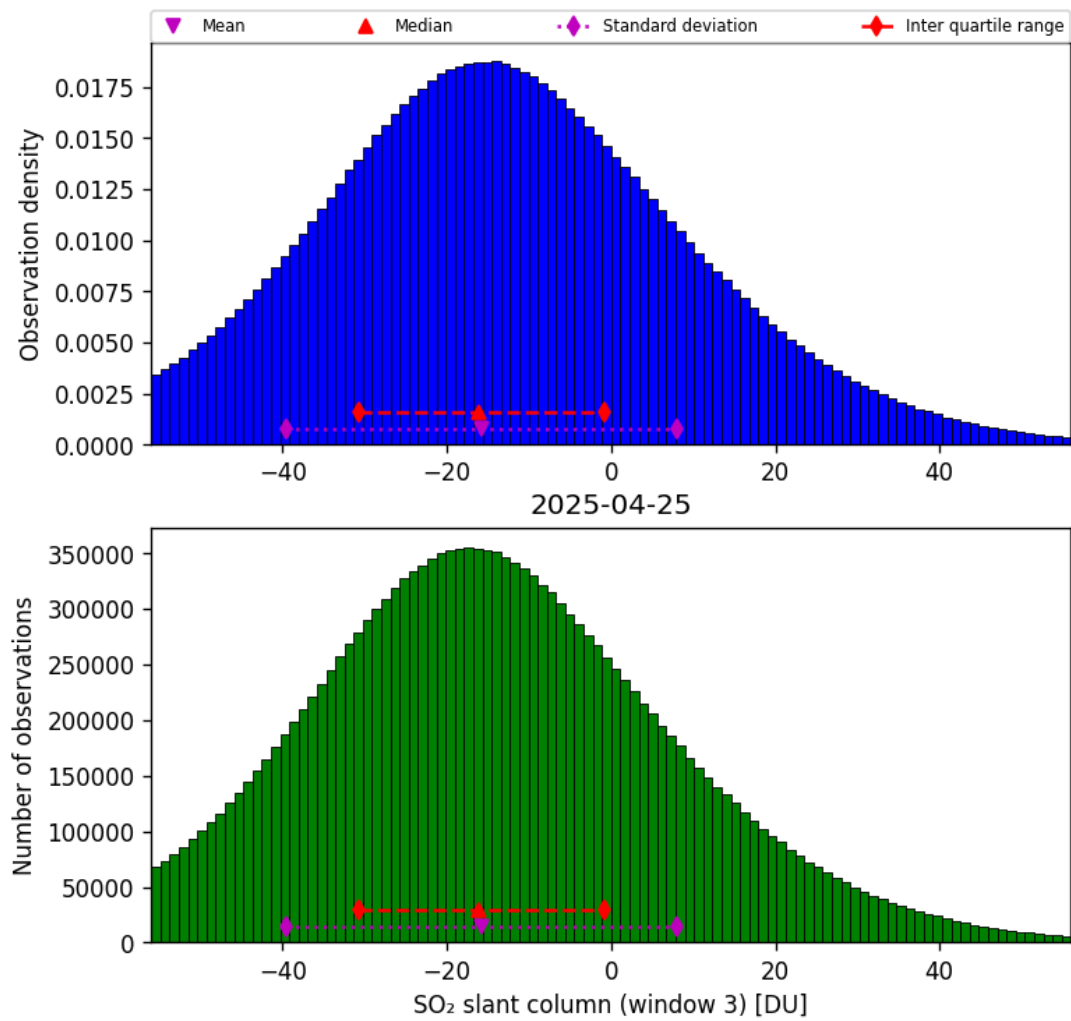


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-04-25 to 2025-04-26

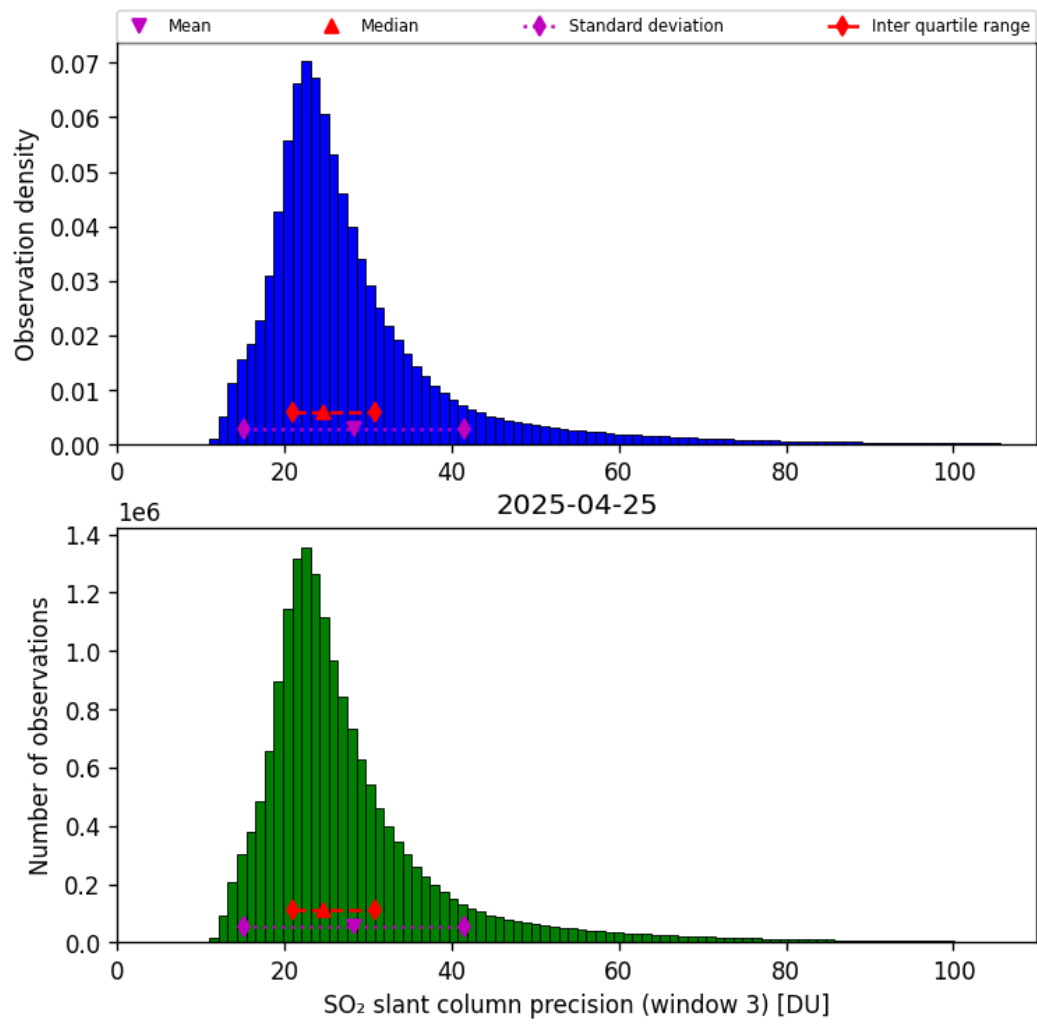


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-04-25 to 2025-04-26

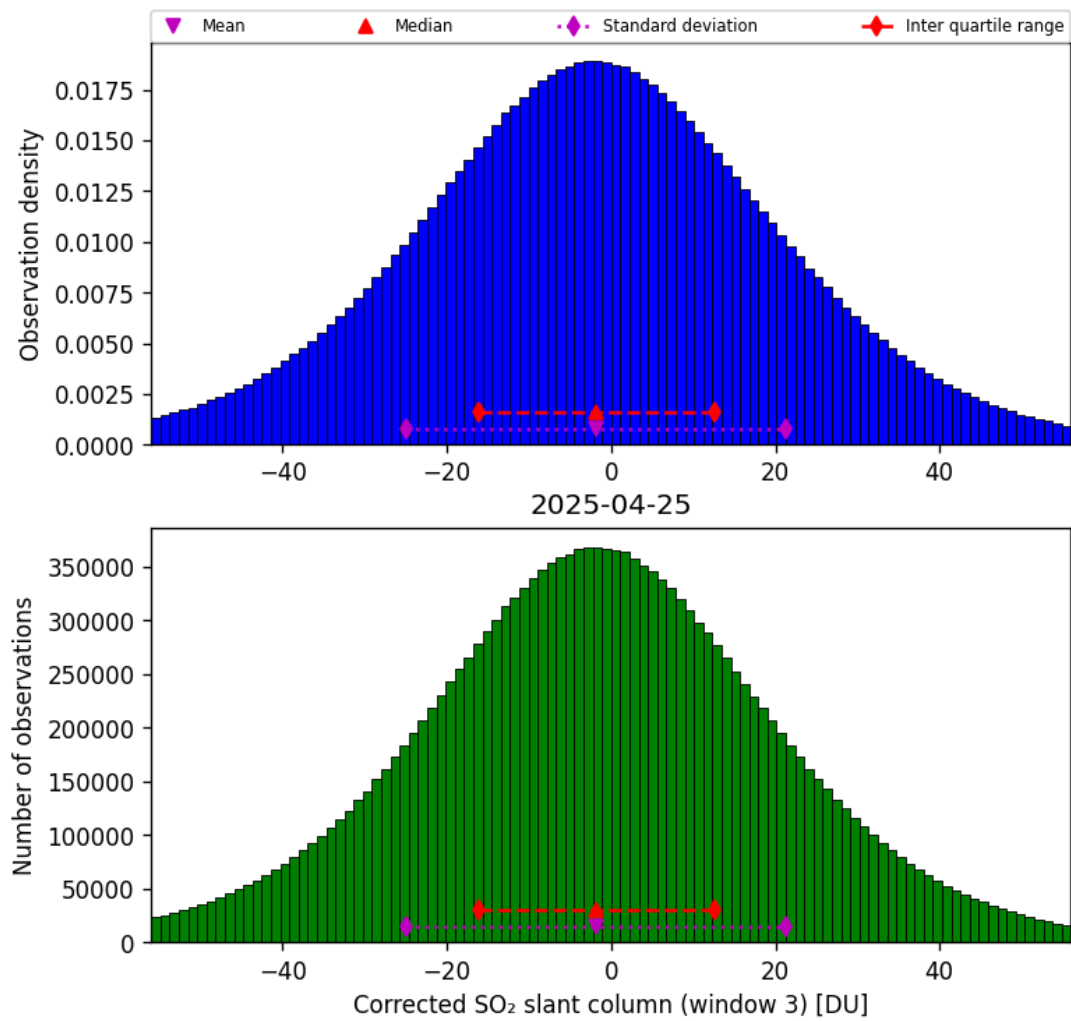


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-04-25 to 2025-04-26

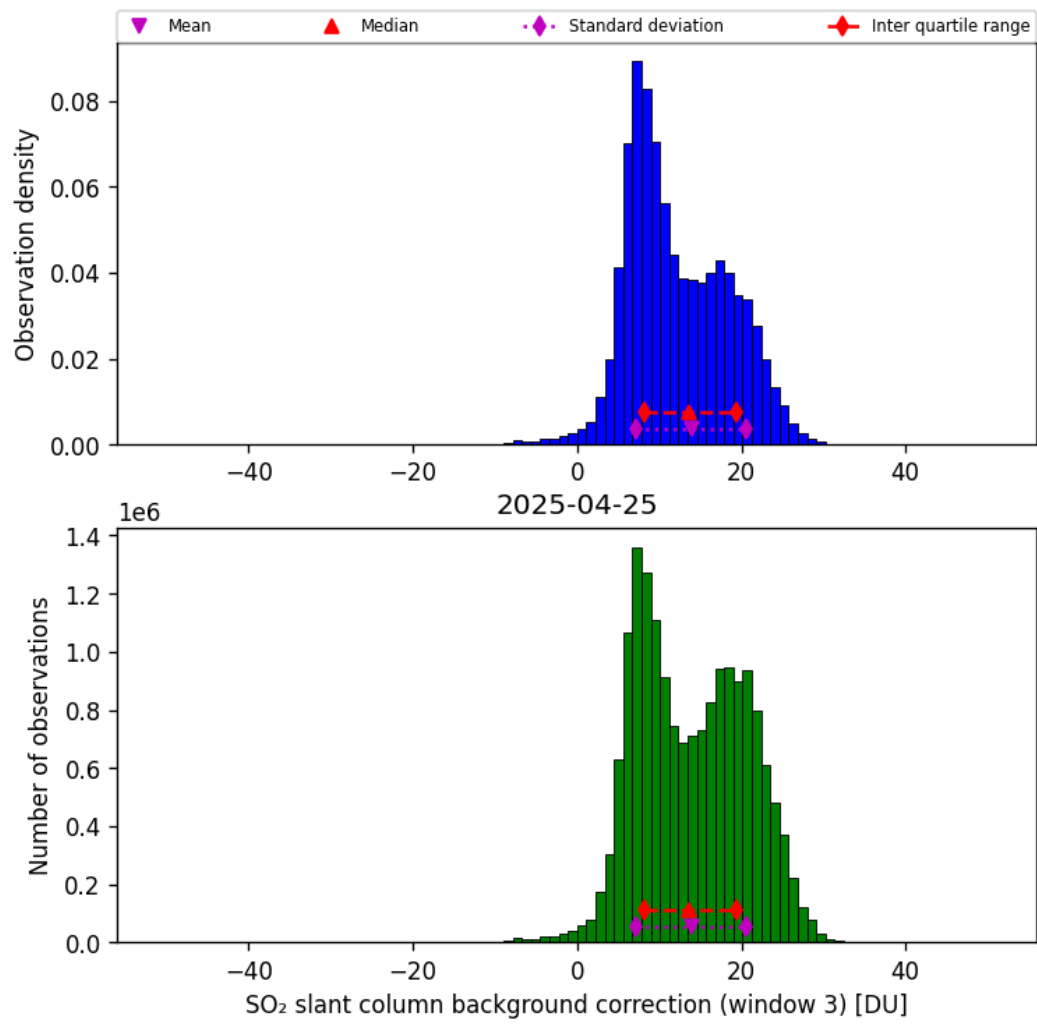


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-04-25 to 2025-04-26

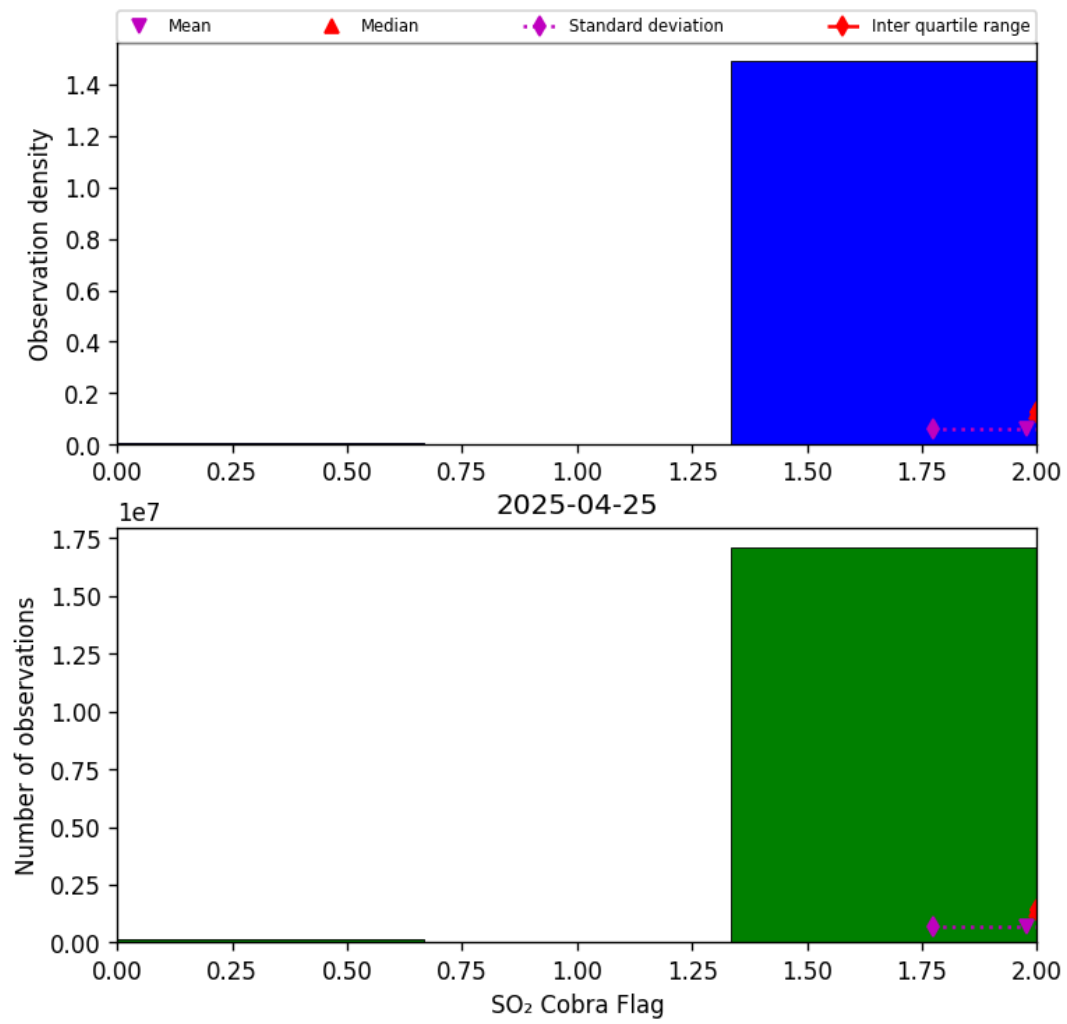


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-04-25 to 2025-04-26

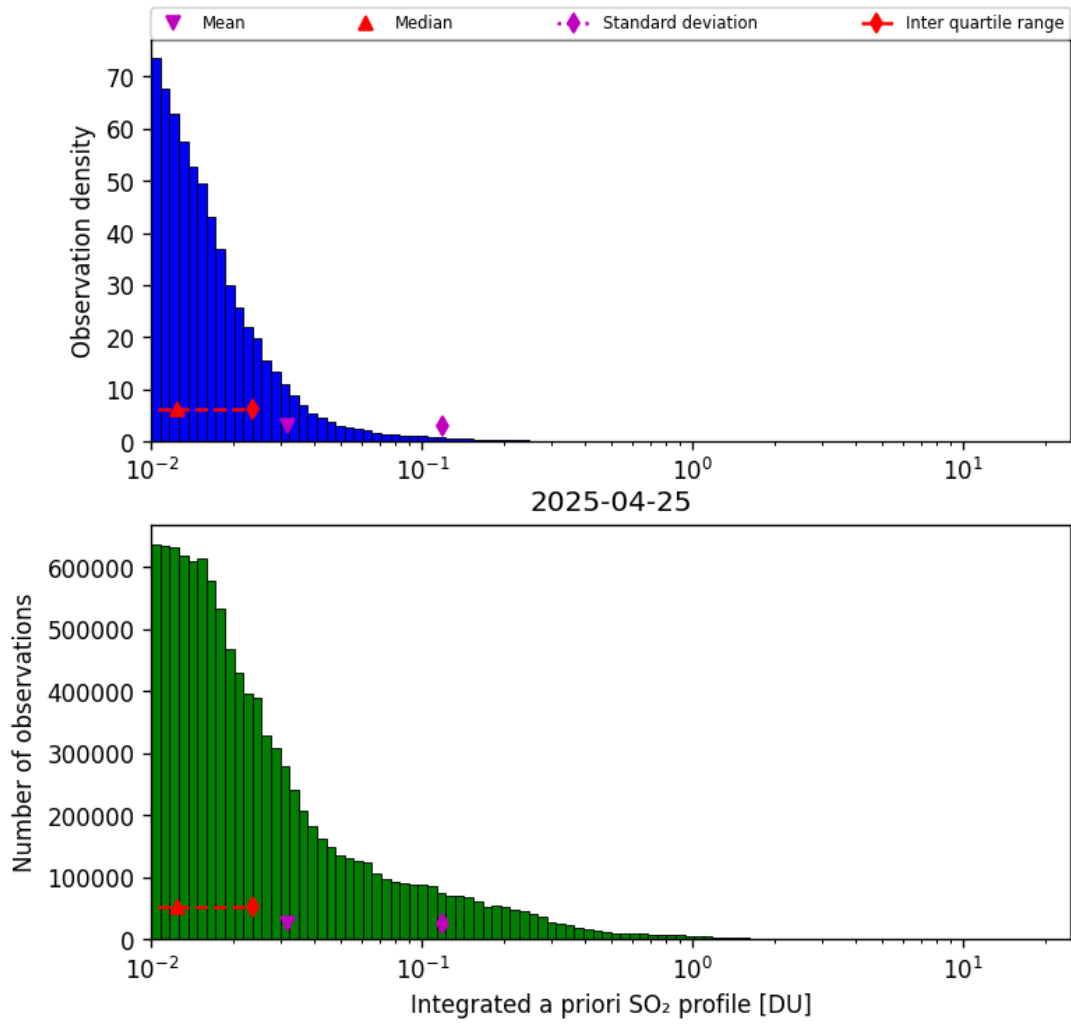


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-04-25 to 2025-04-26

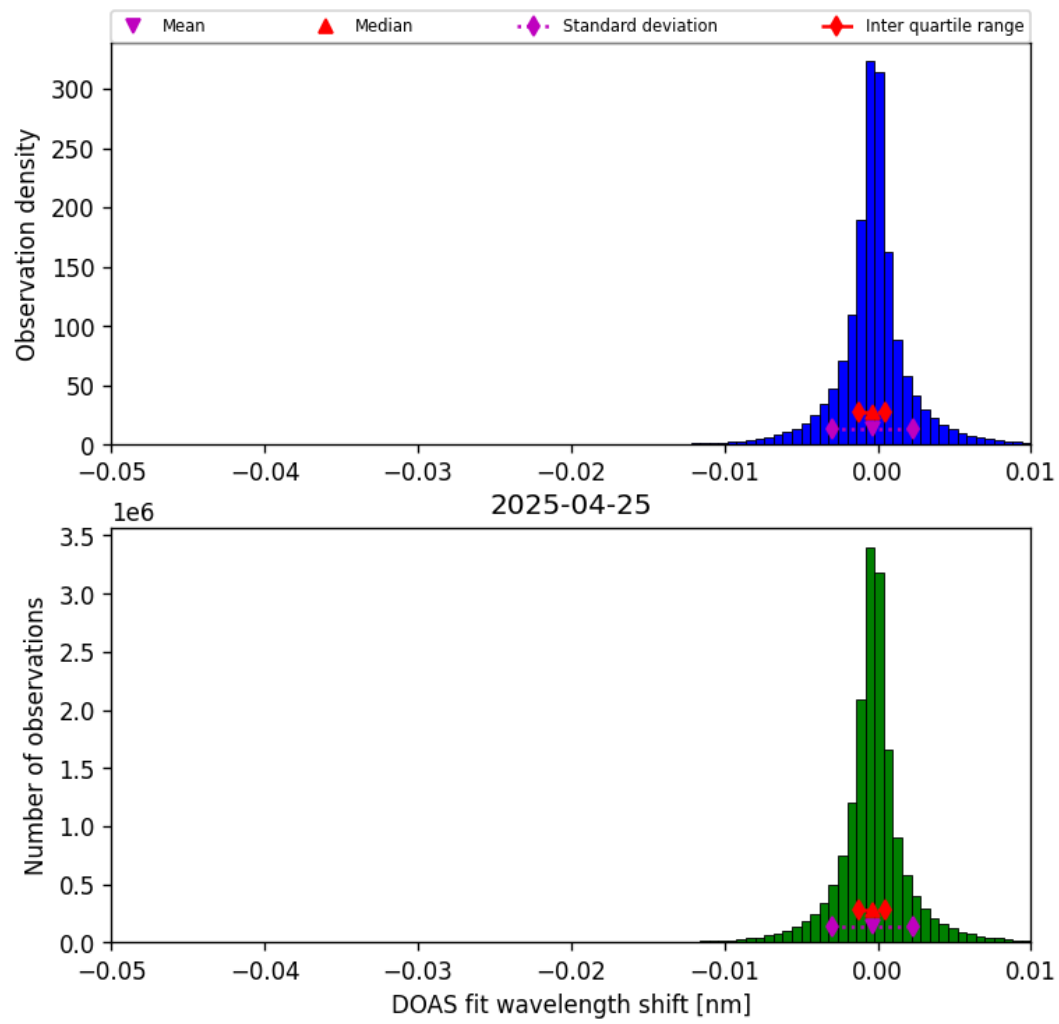


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-04-25 to 2025-04-26

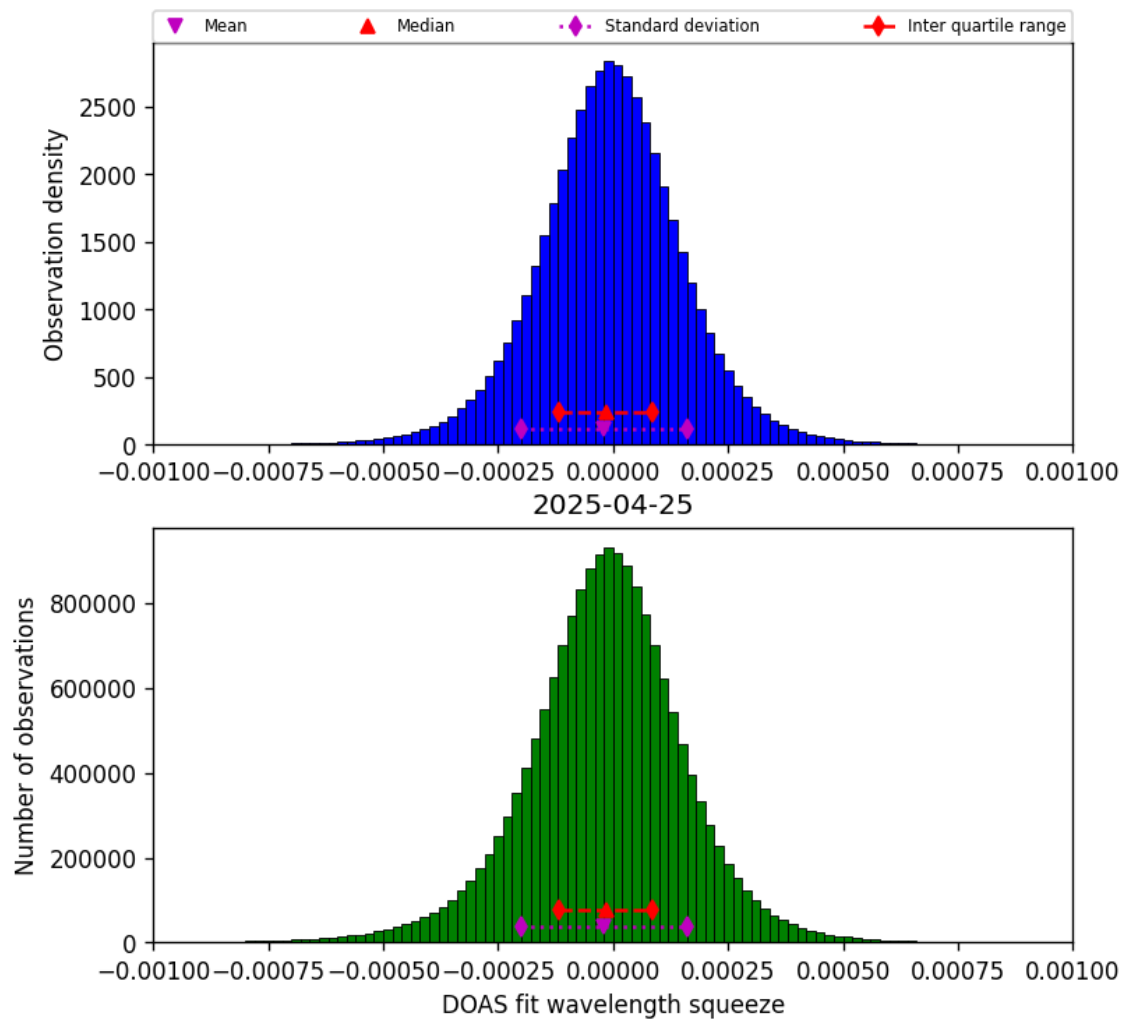


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-04-25 to 2025-04-26

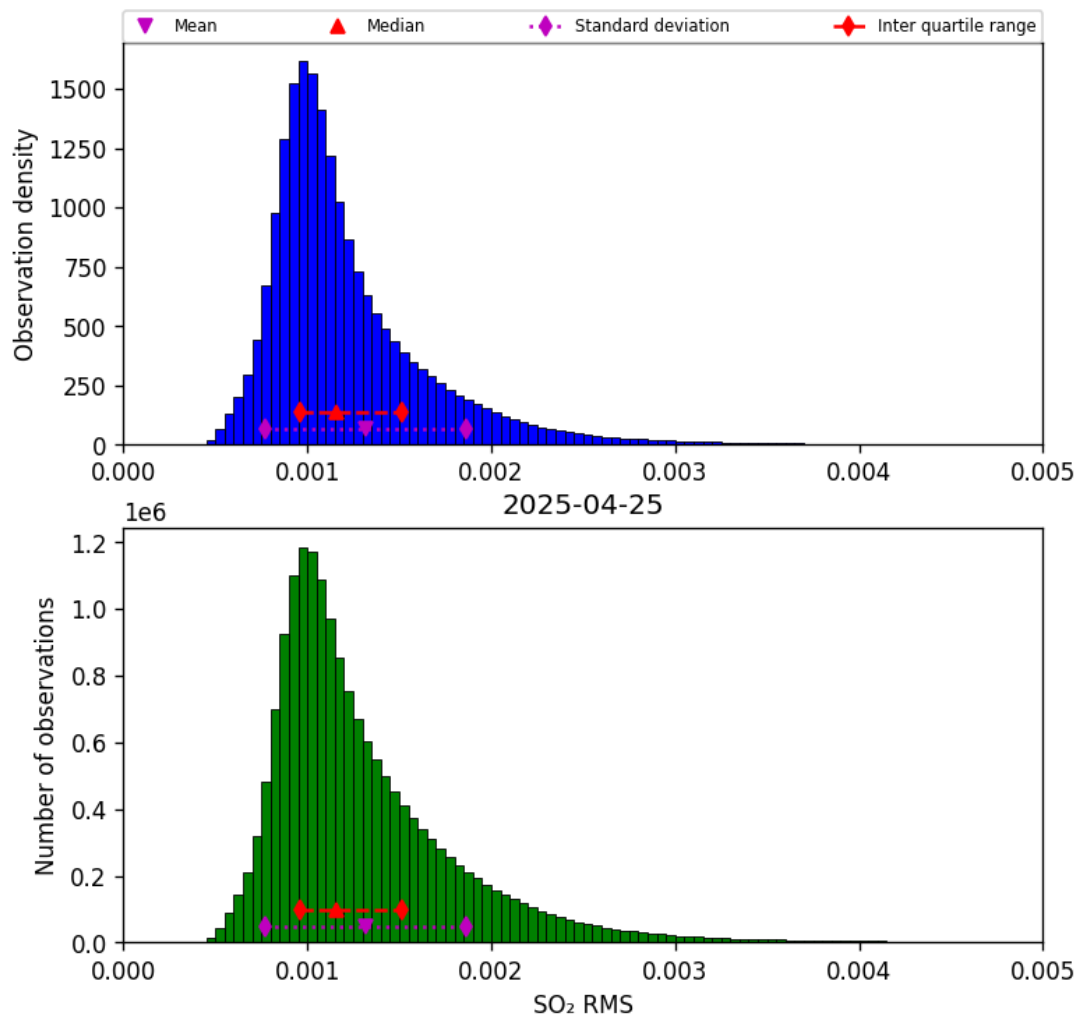


Figure 79: Histogram of “SO₂ RMS” for 2025-04-25 to 2025-04-26

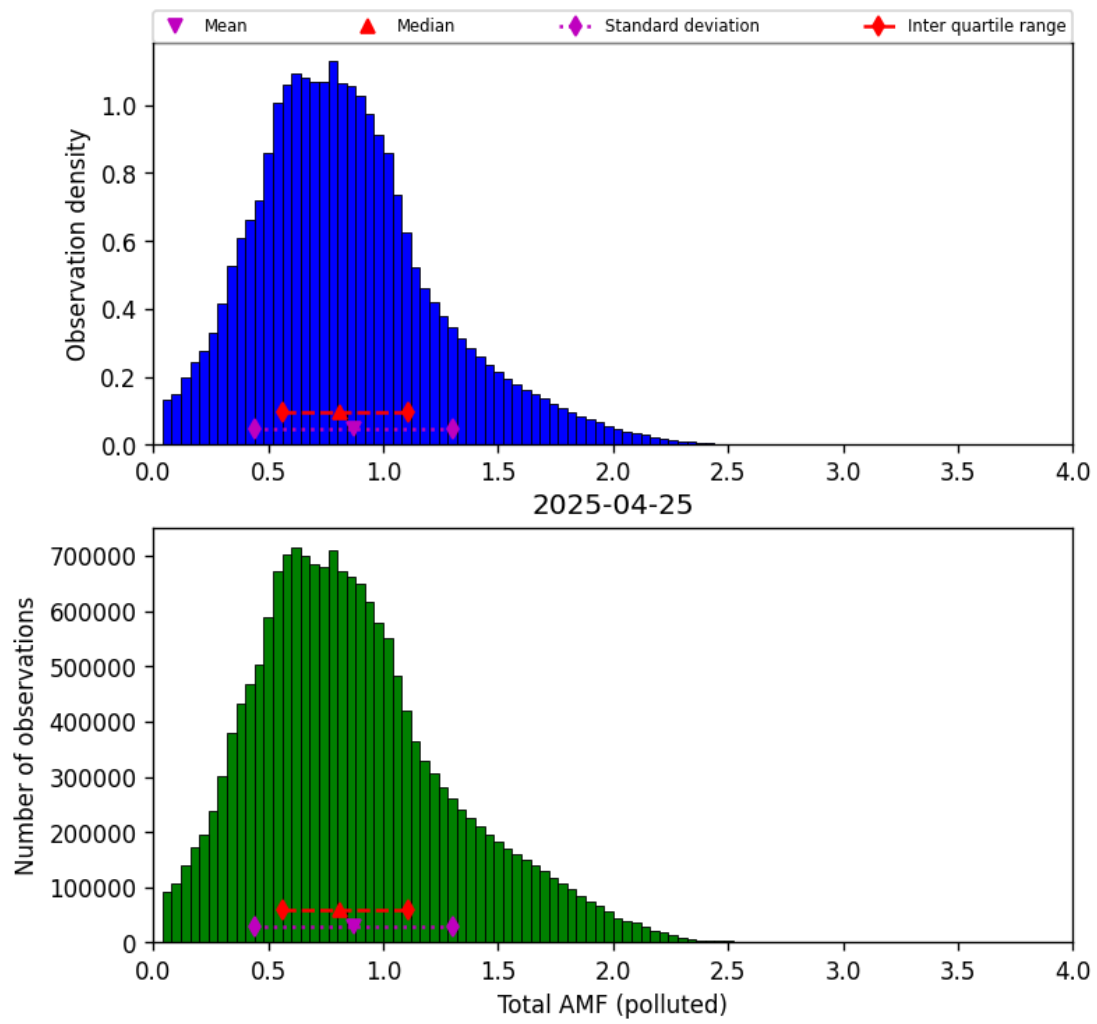


Figure 80: Histogram of “Total AMF (polluted)” for 2025-04-25 to 2025-04-26

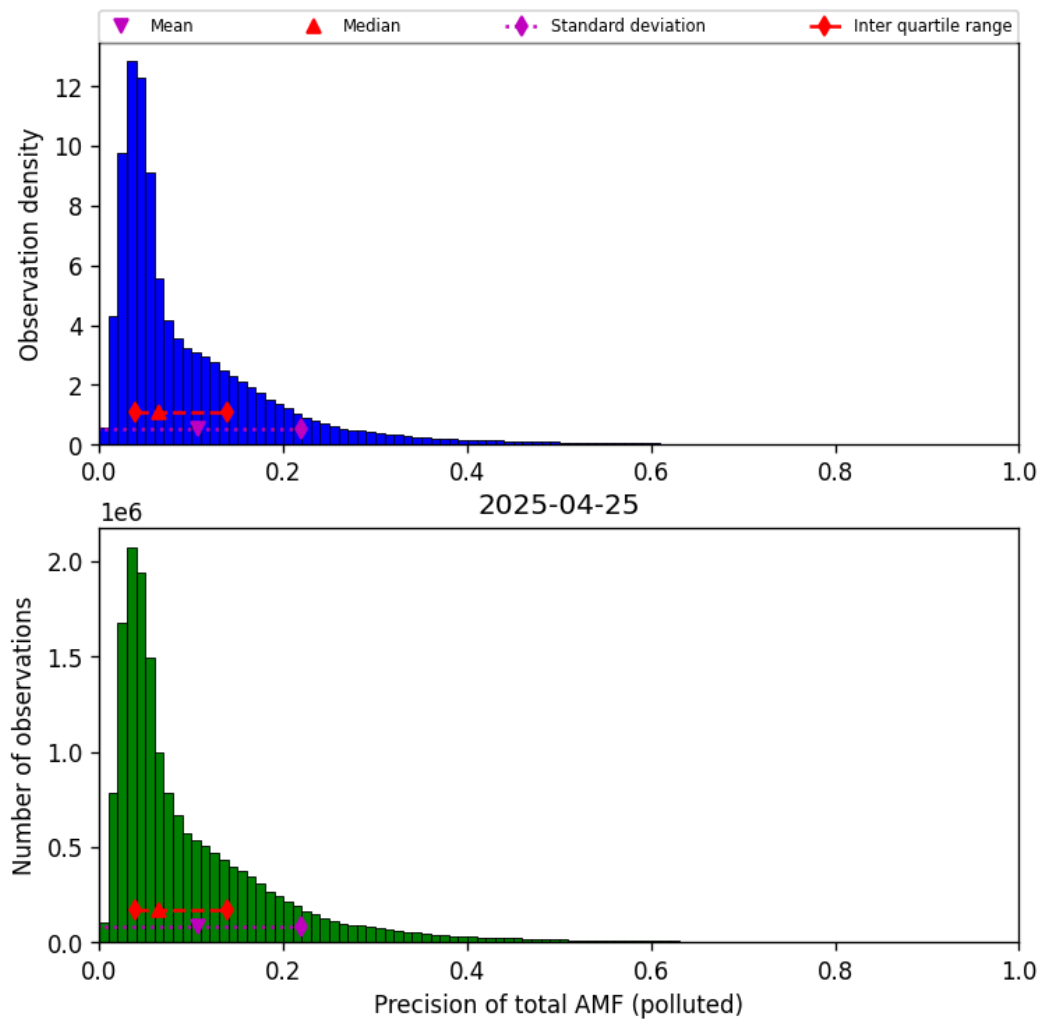


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-04-25 to 2025-04-26

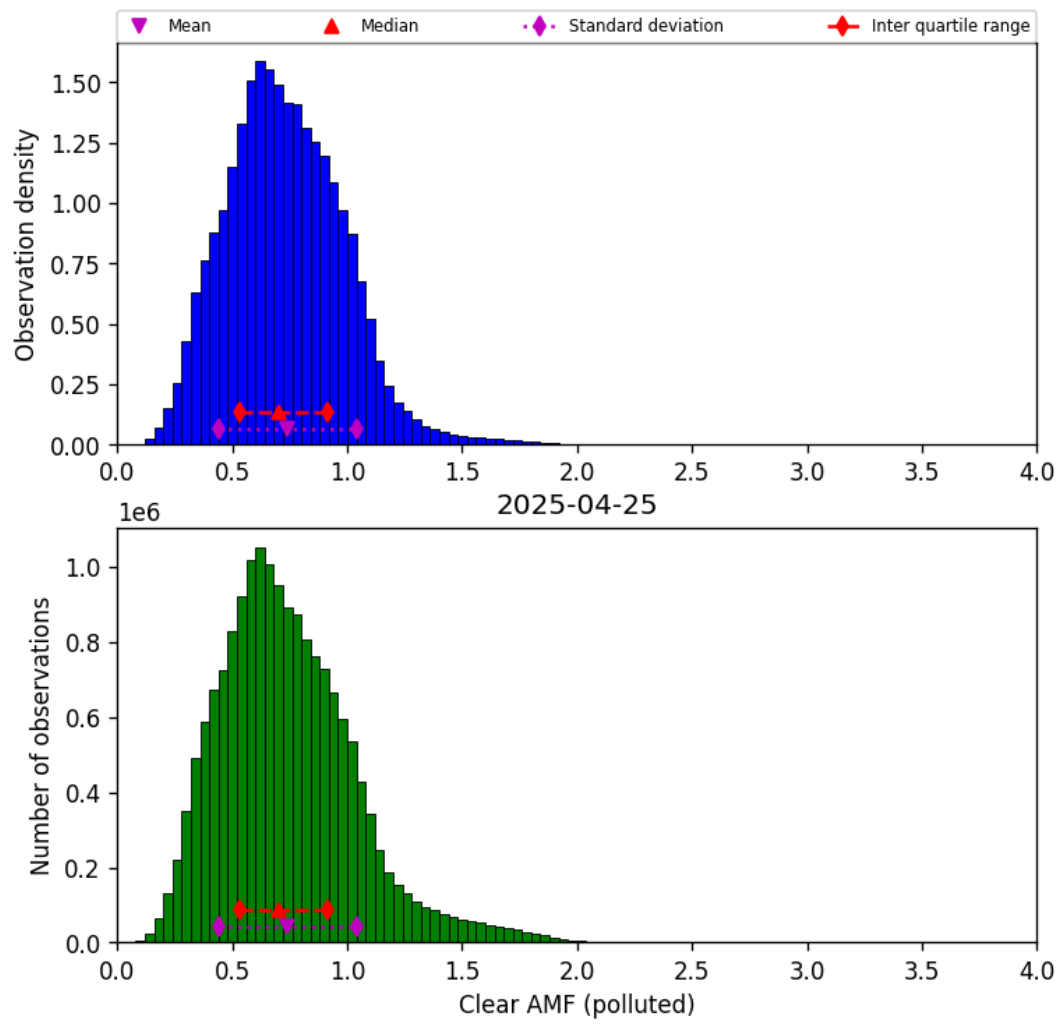


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-04-25 to 2025-04-26

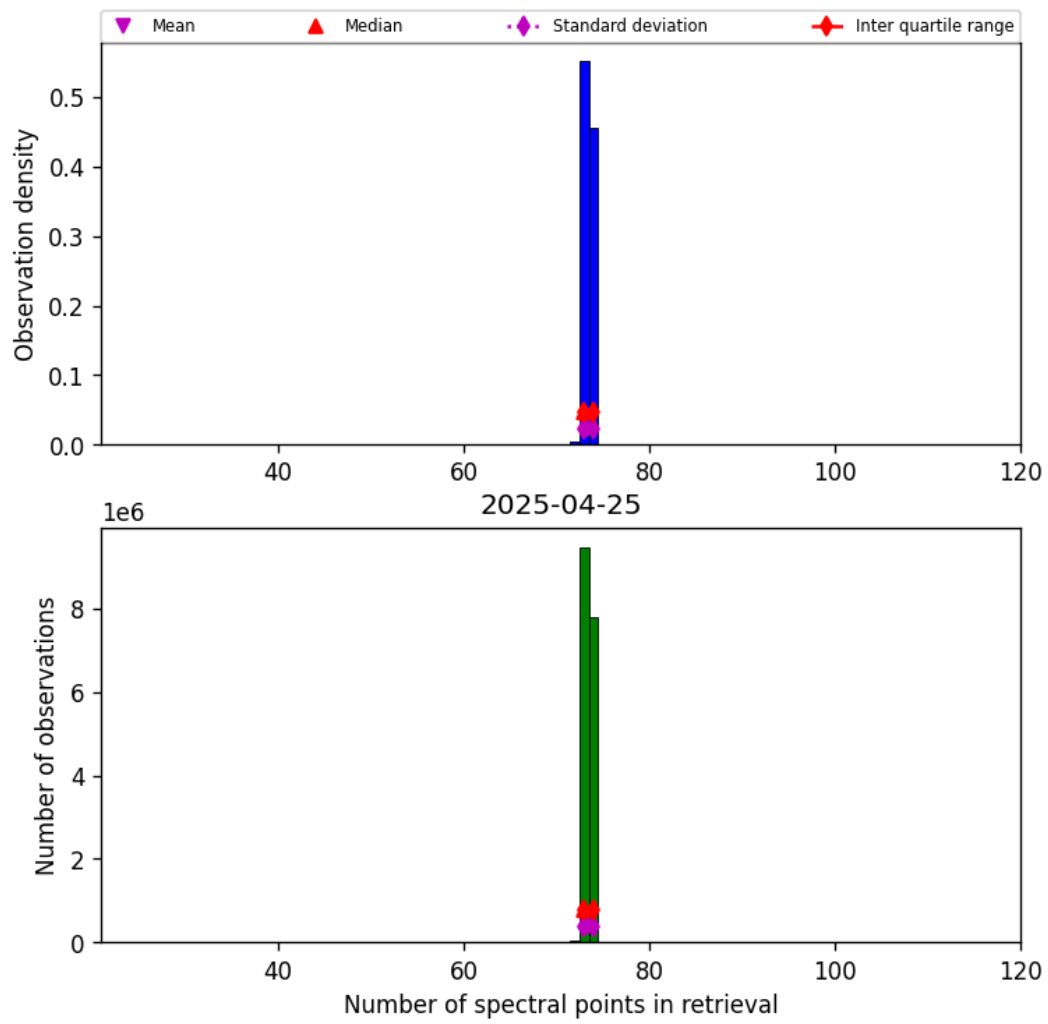


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-04-25 to 2025-04-26

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.

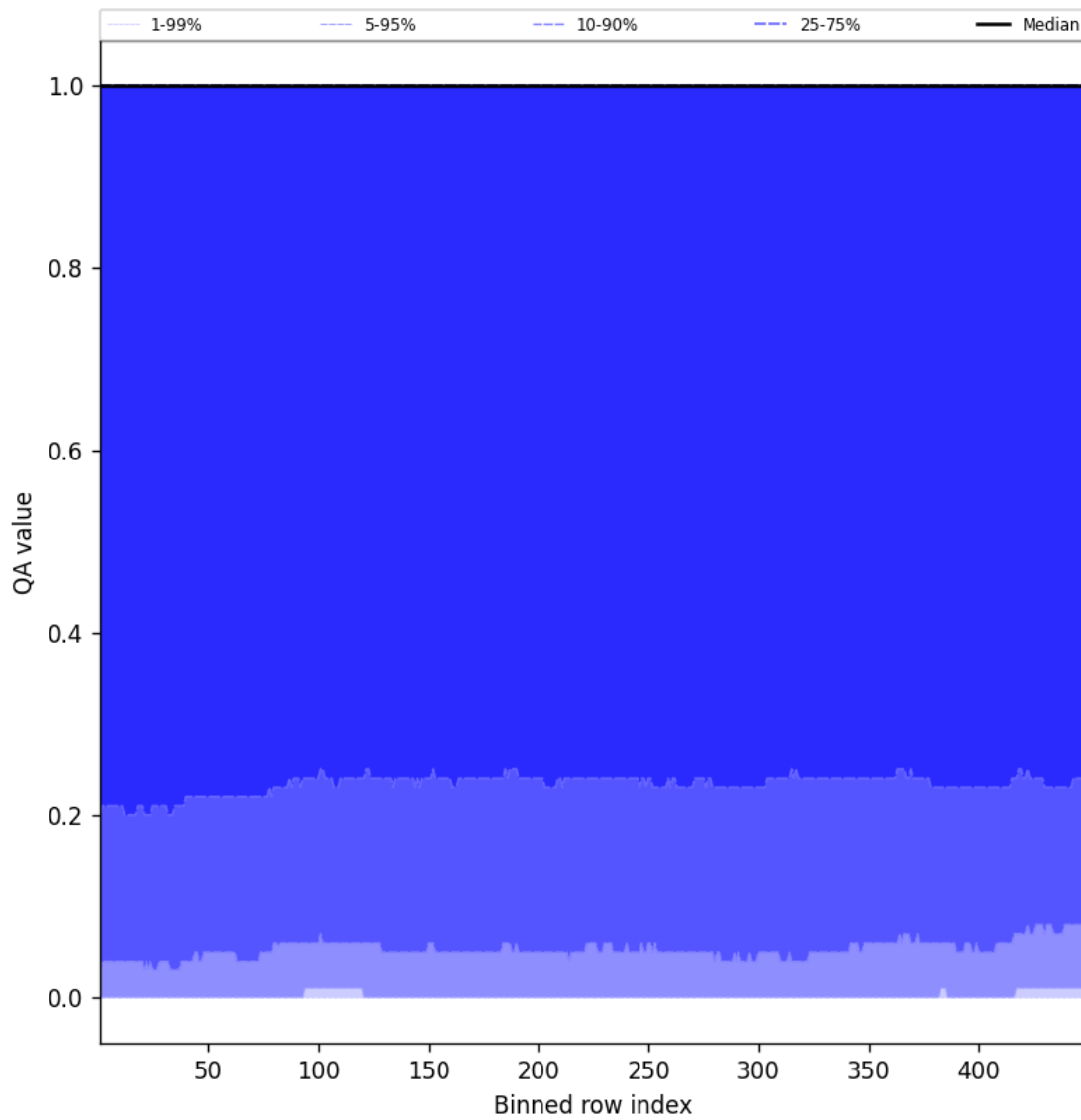


Figure 84: Along track statistics of “QA value” for 2025-04-25 to 2025-04-26

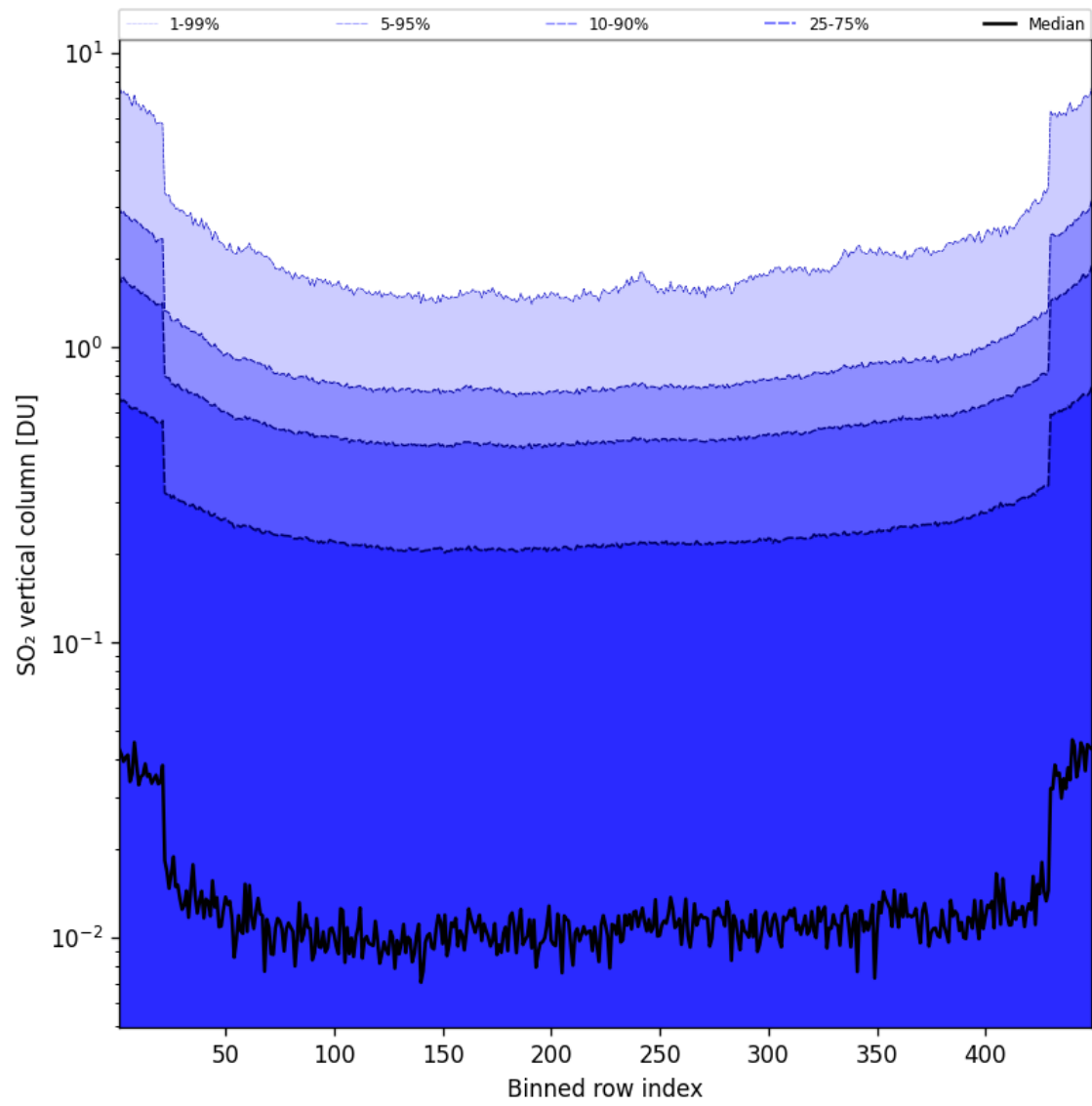


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-04-25 to 2025-04-26

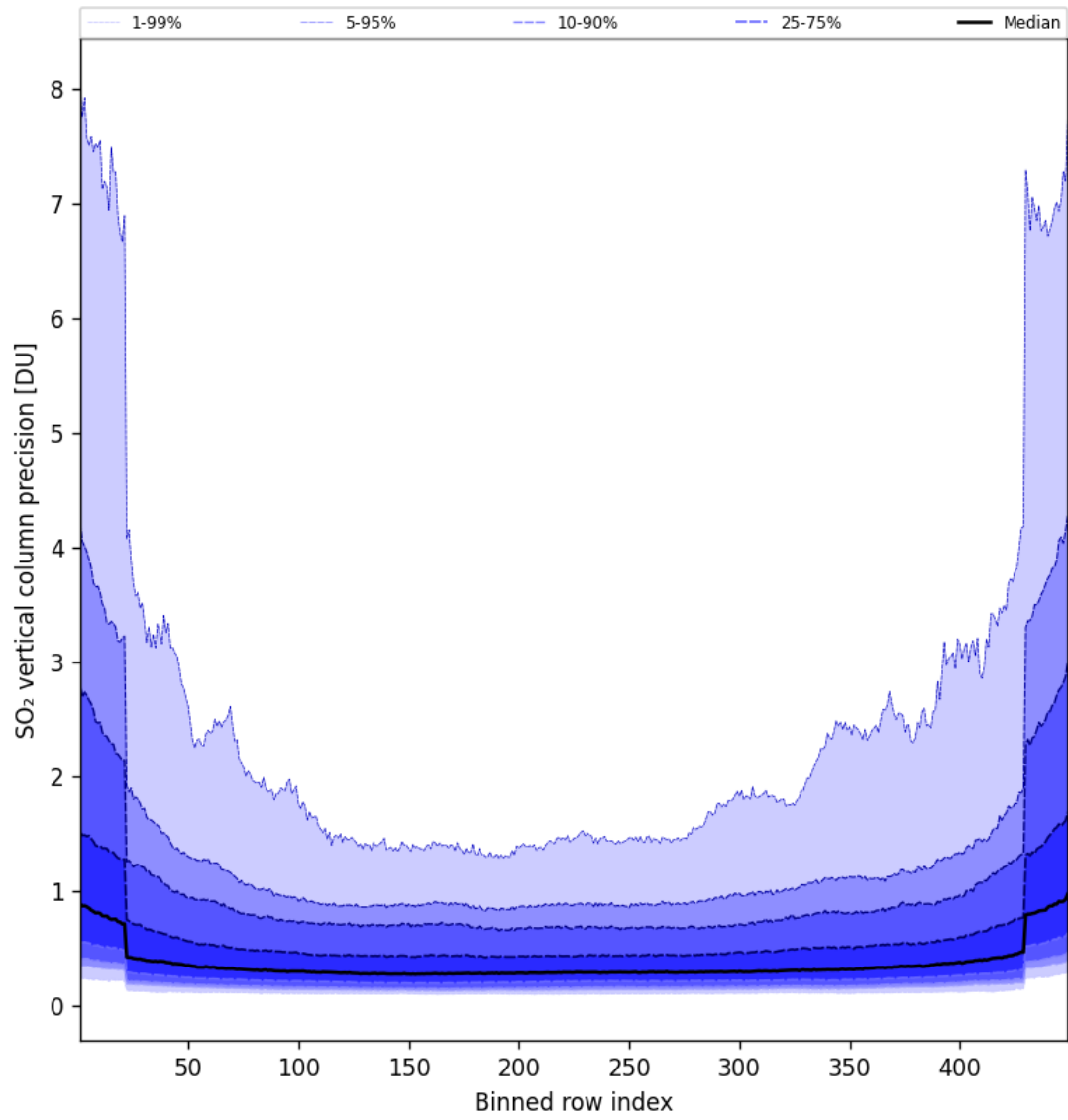


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-04-25 to 2025-04-26

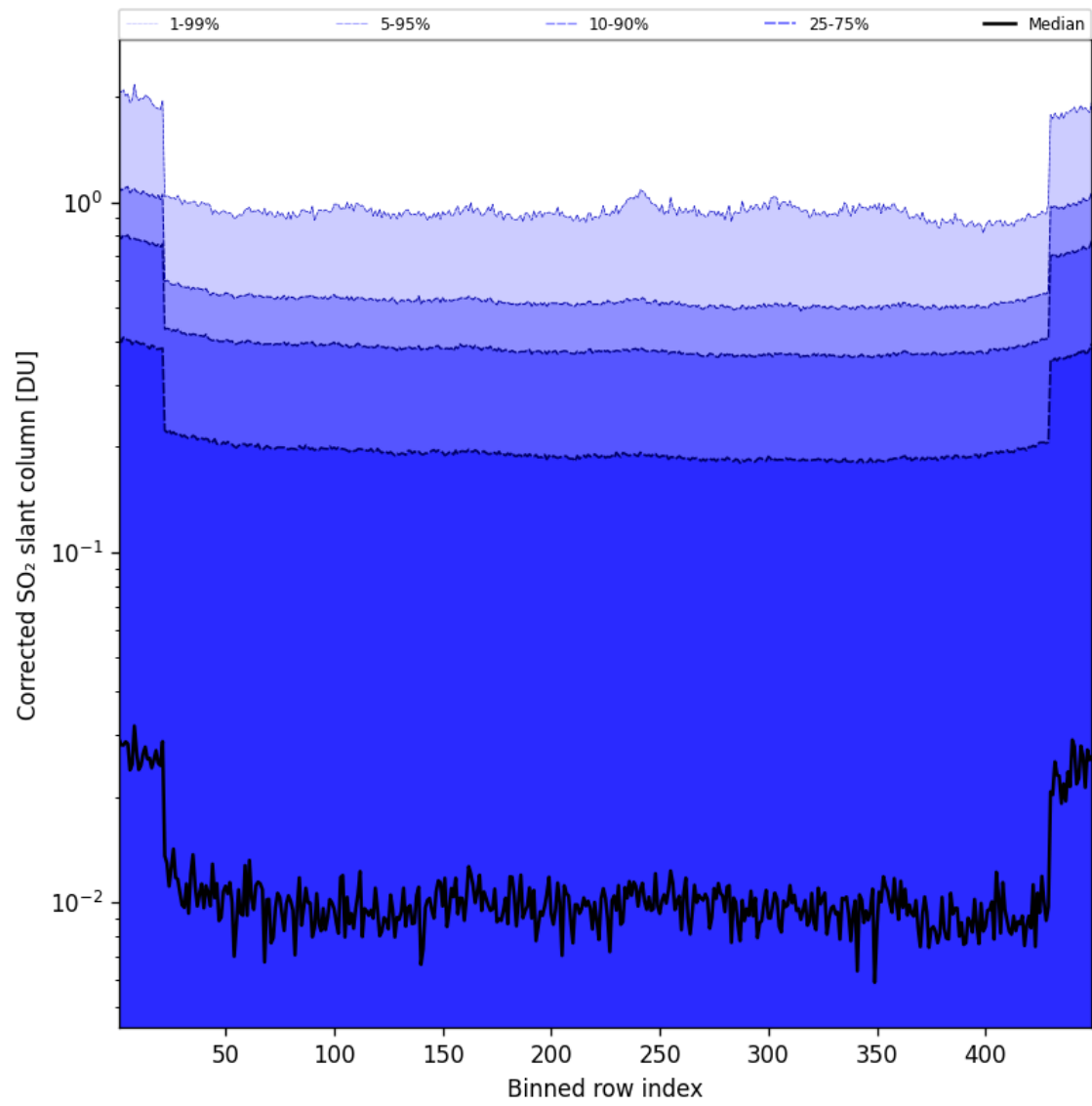


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-04-25 to 2025-04-26

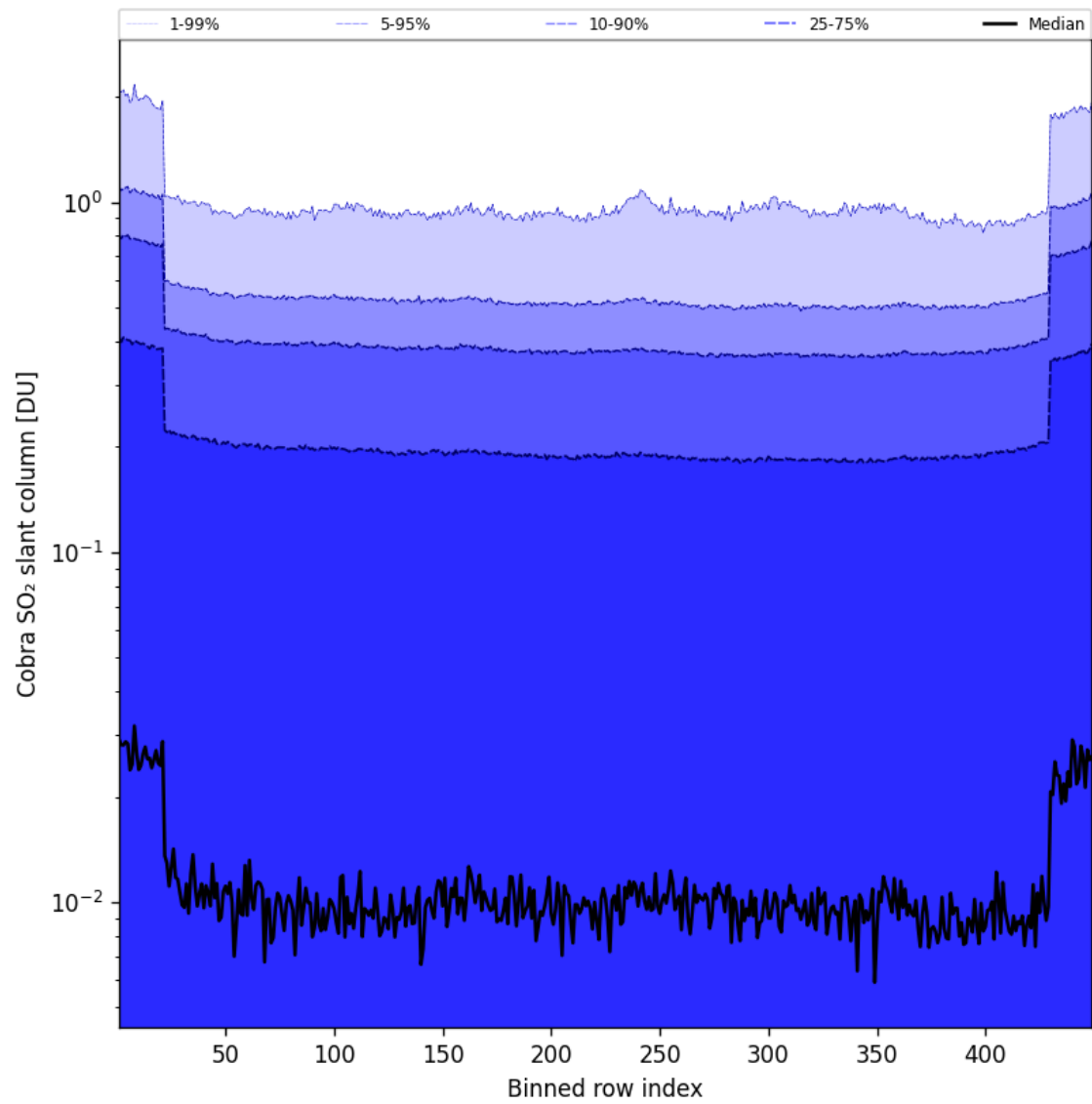


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-04-25 to 2025-04-26

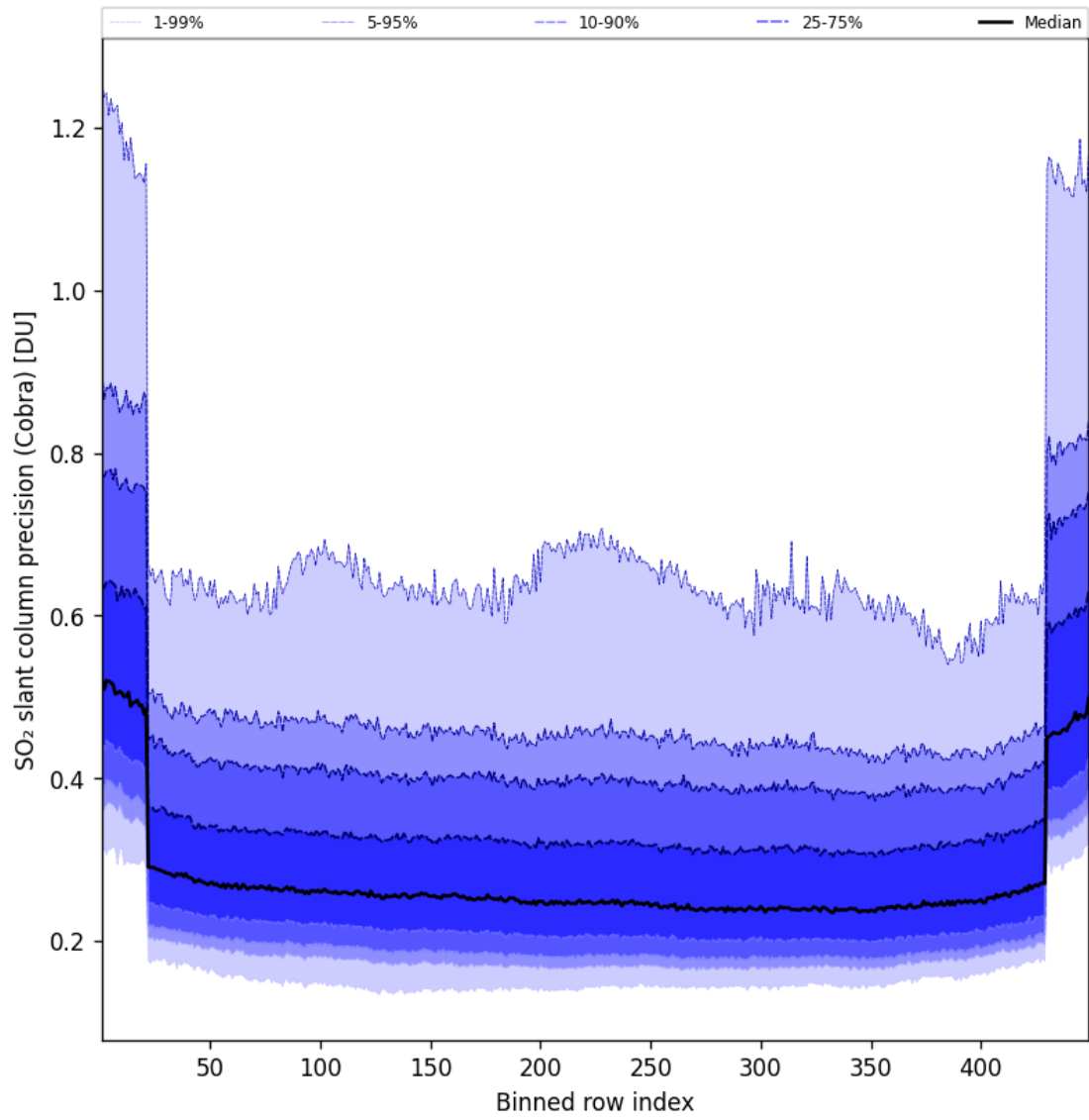


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-04-25 to 2025-04-26

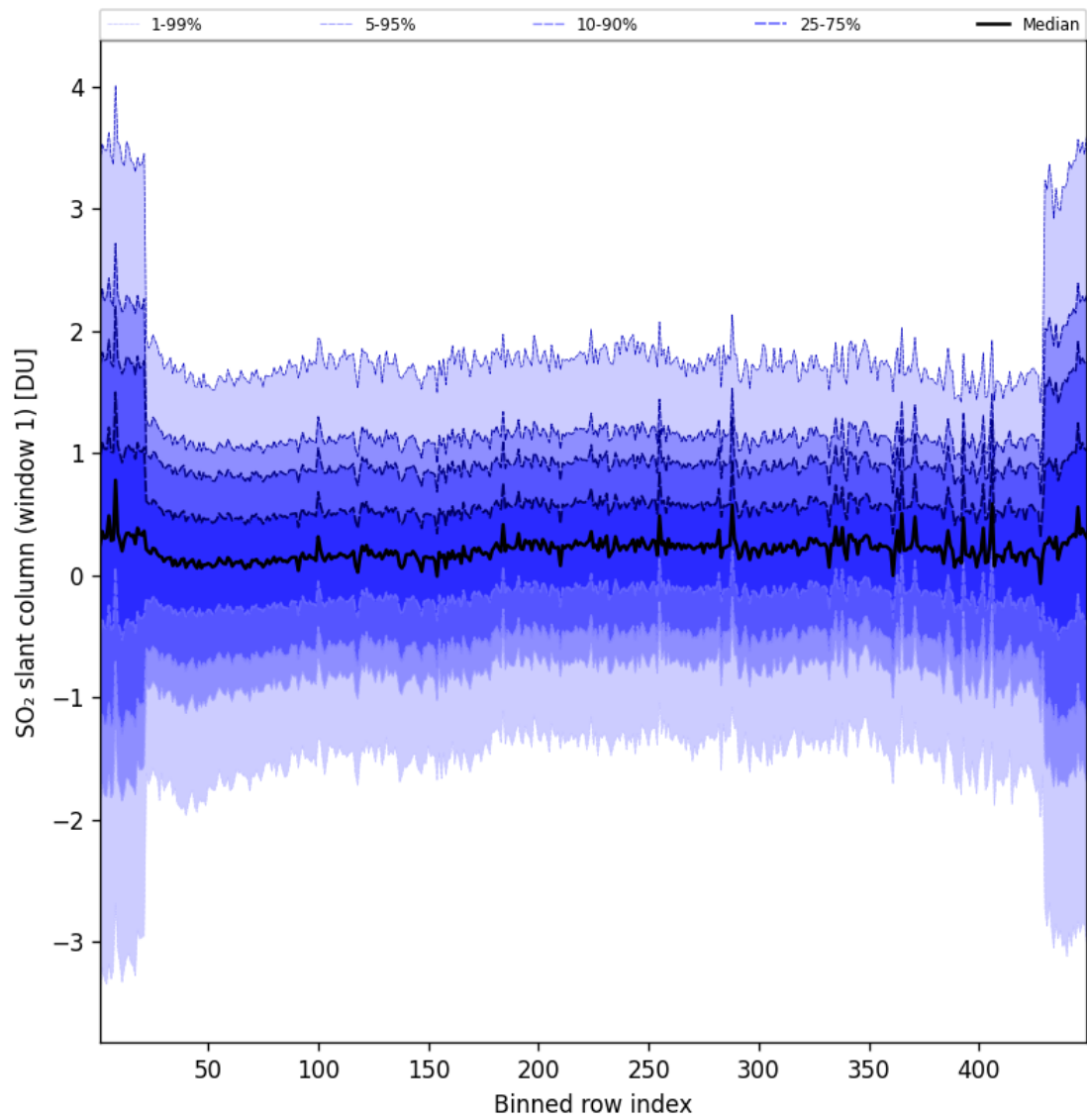


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-04-25 to 2025-04-26

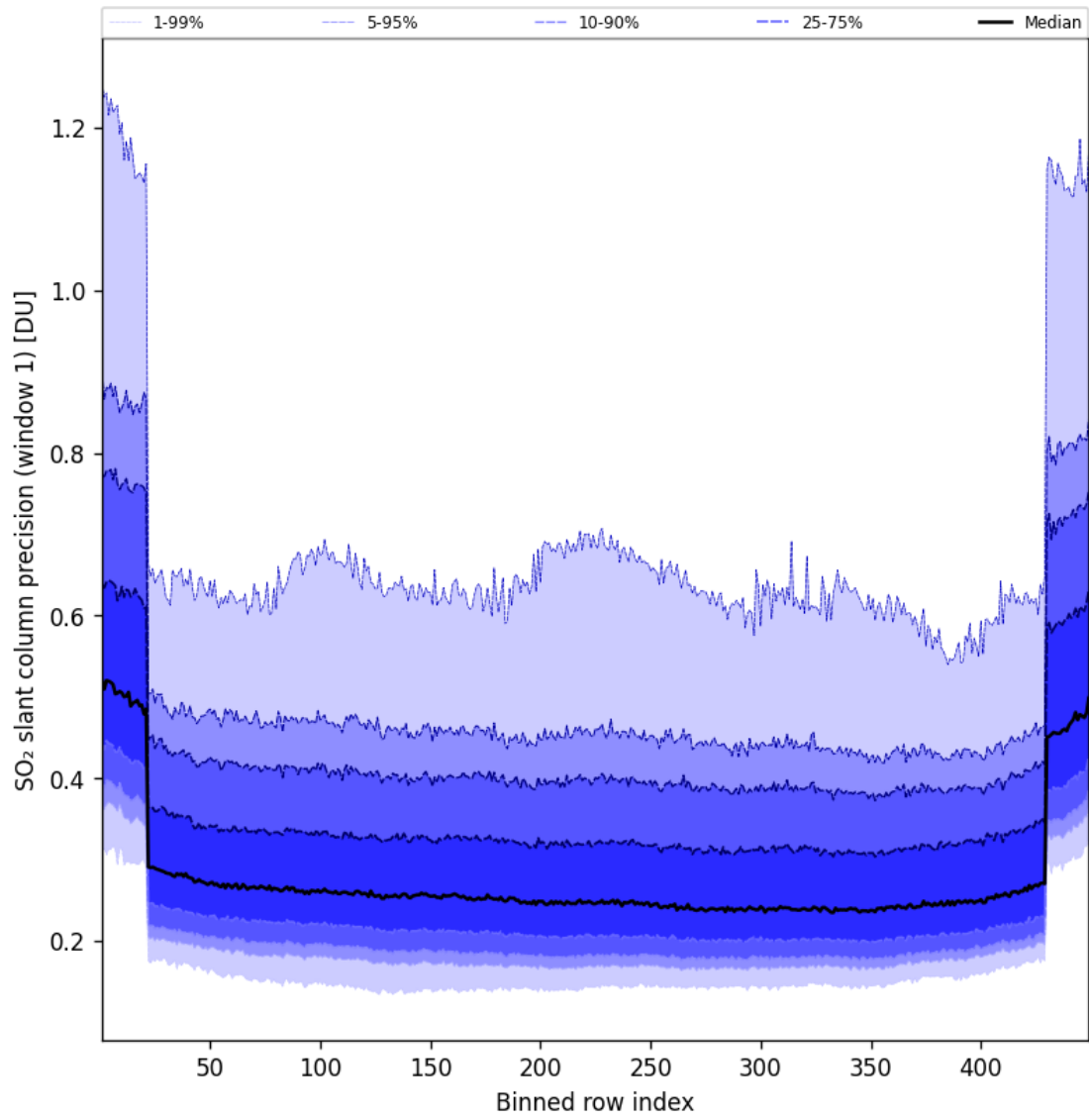


Figure 91: Along track statistics of "SO₂ slant column precision (window 1)" for 2025-04-25 to 2025-04-26

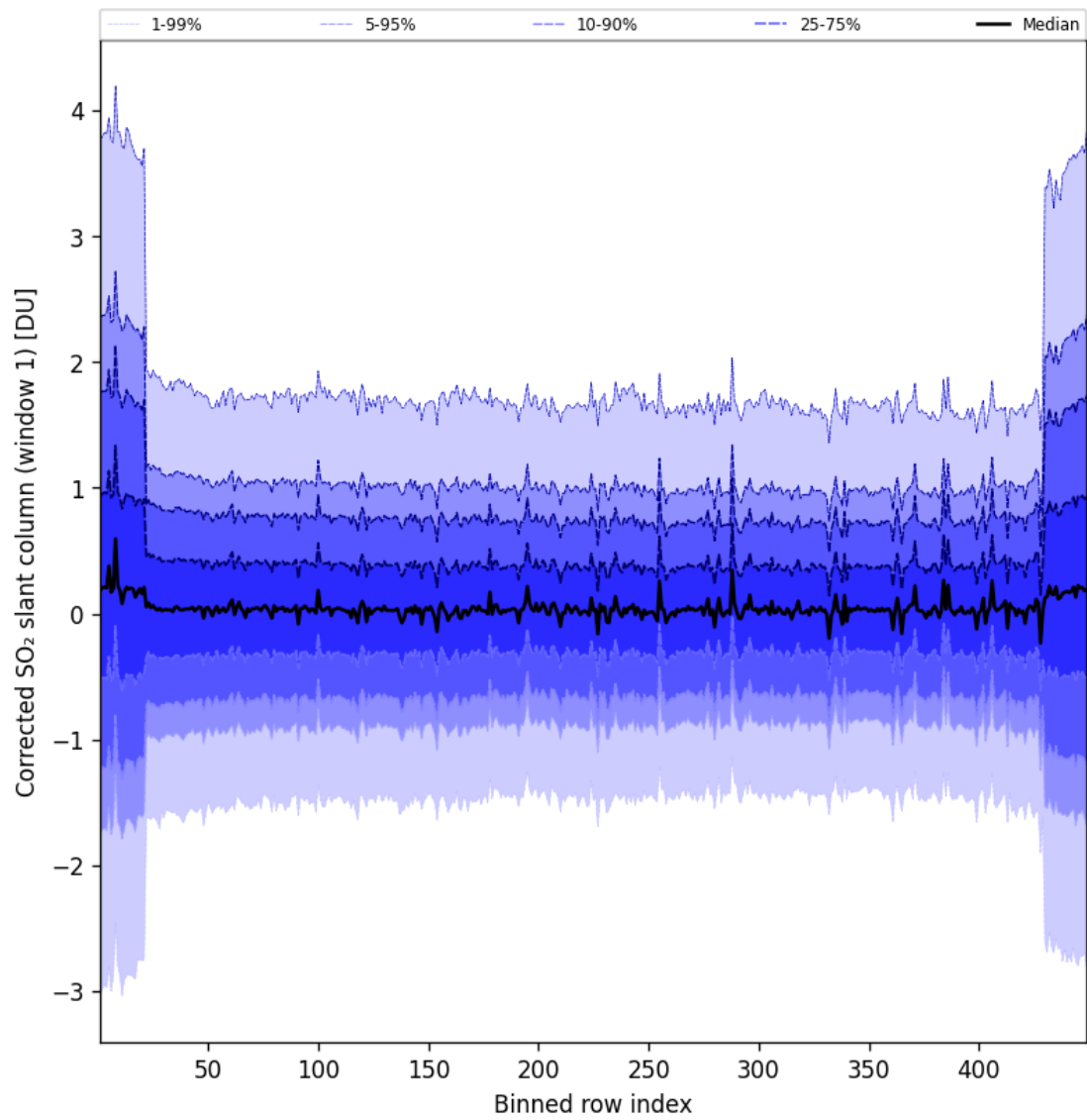


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-04-25 to 2025-04-26

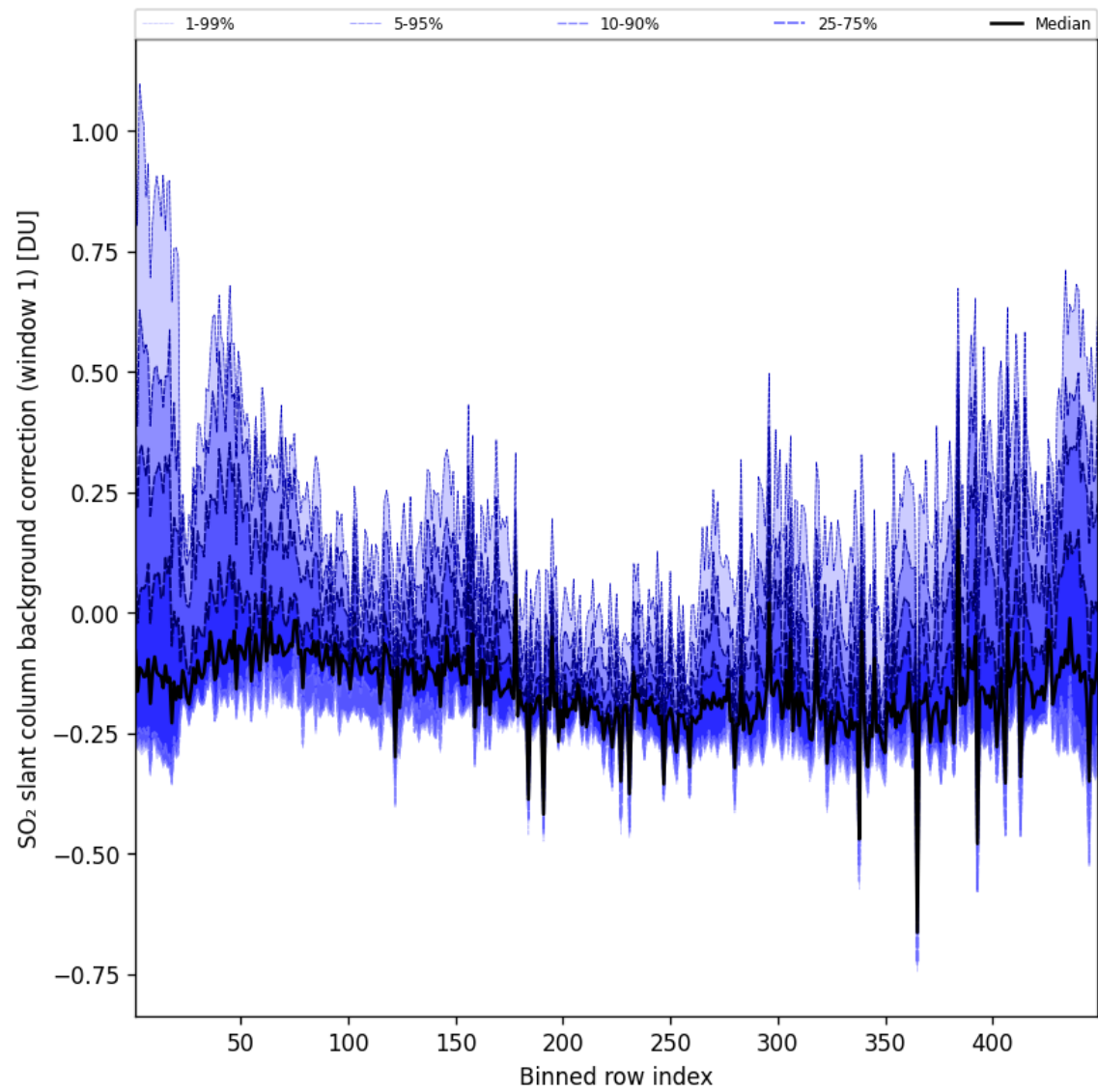


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-04-25 to 2025-04-26

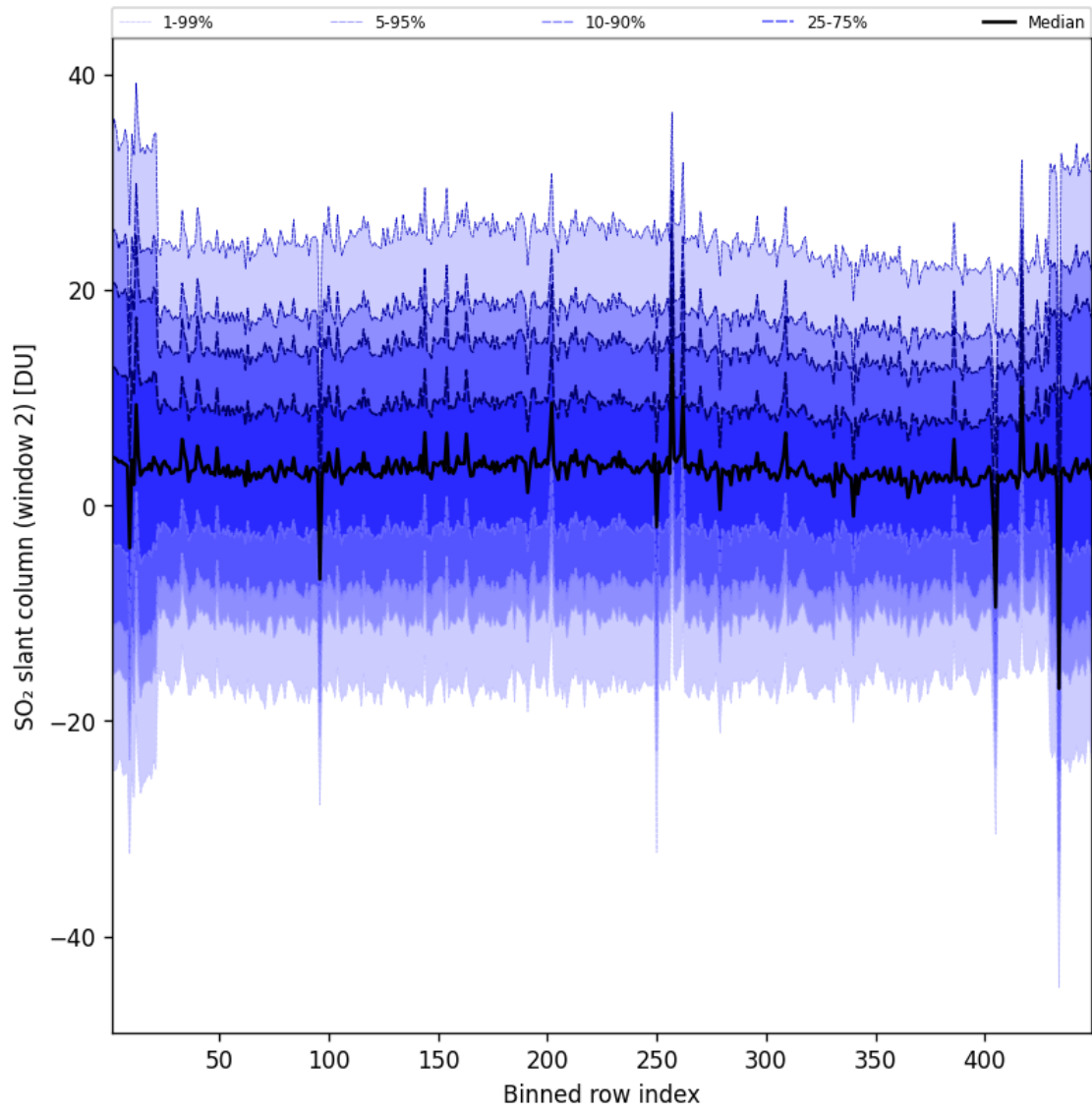


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-04-25 to 2025-04-26

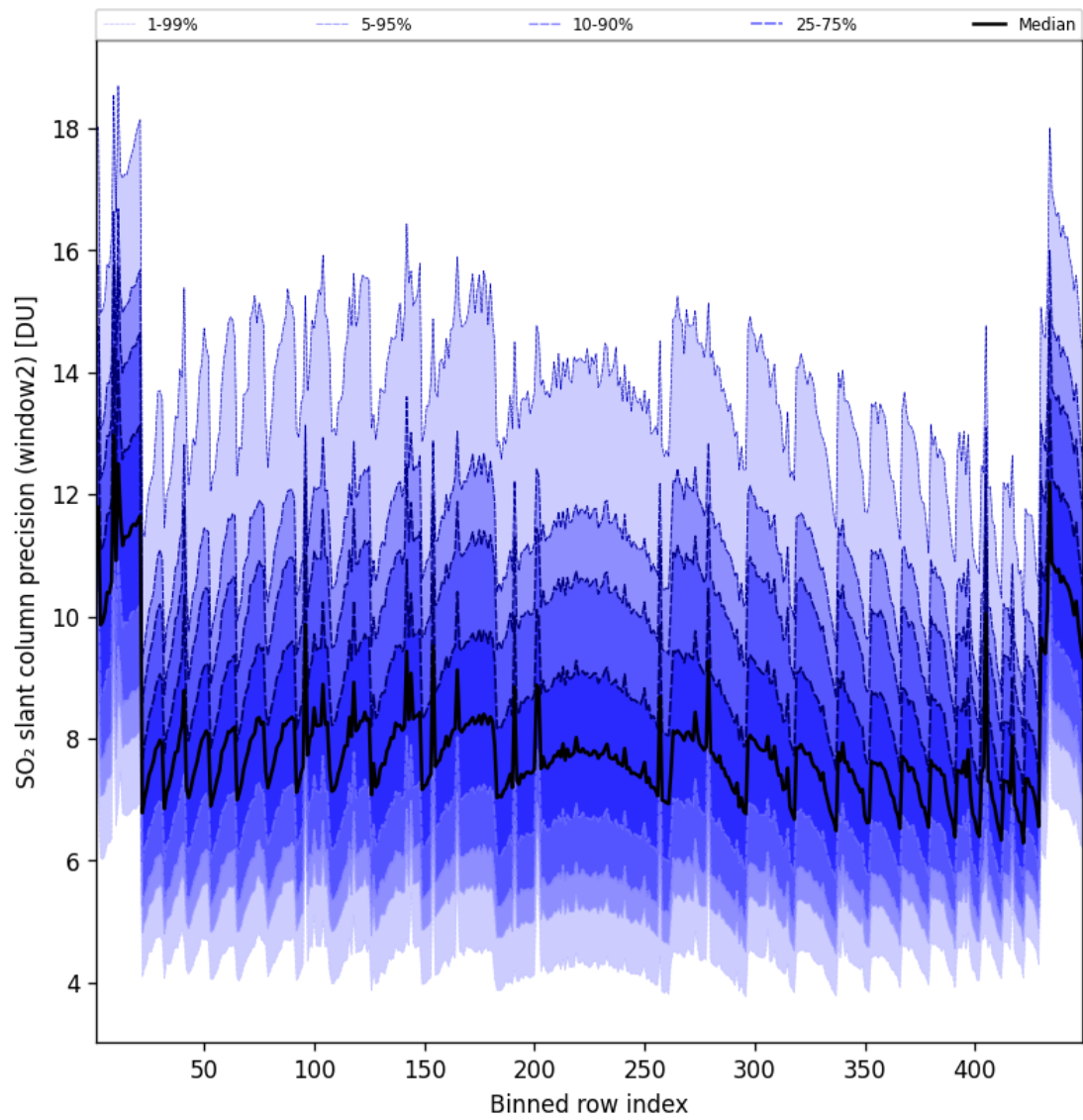


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-04-25 to 2025-04-26

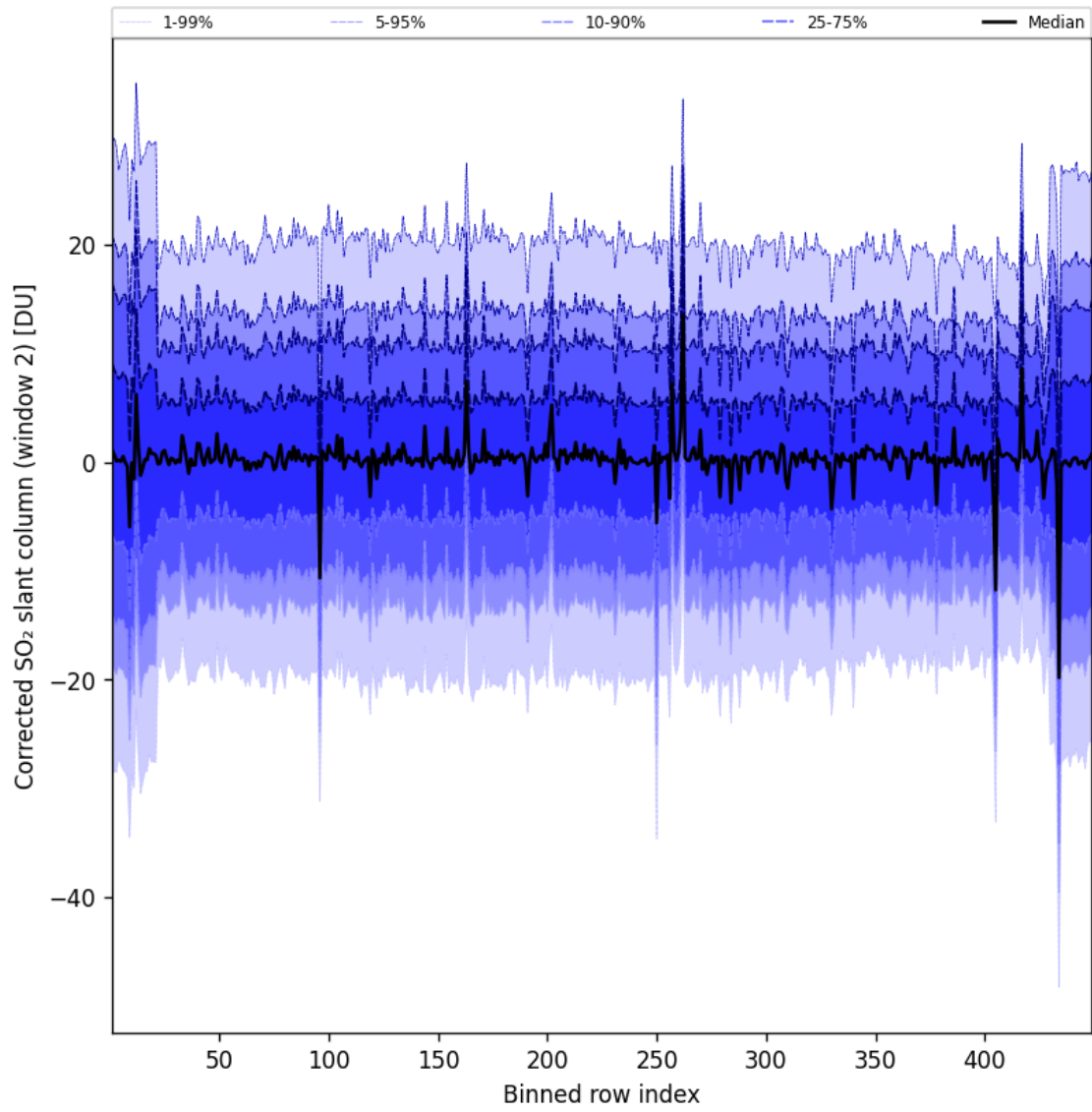


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-04-25 to 2025-04-26

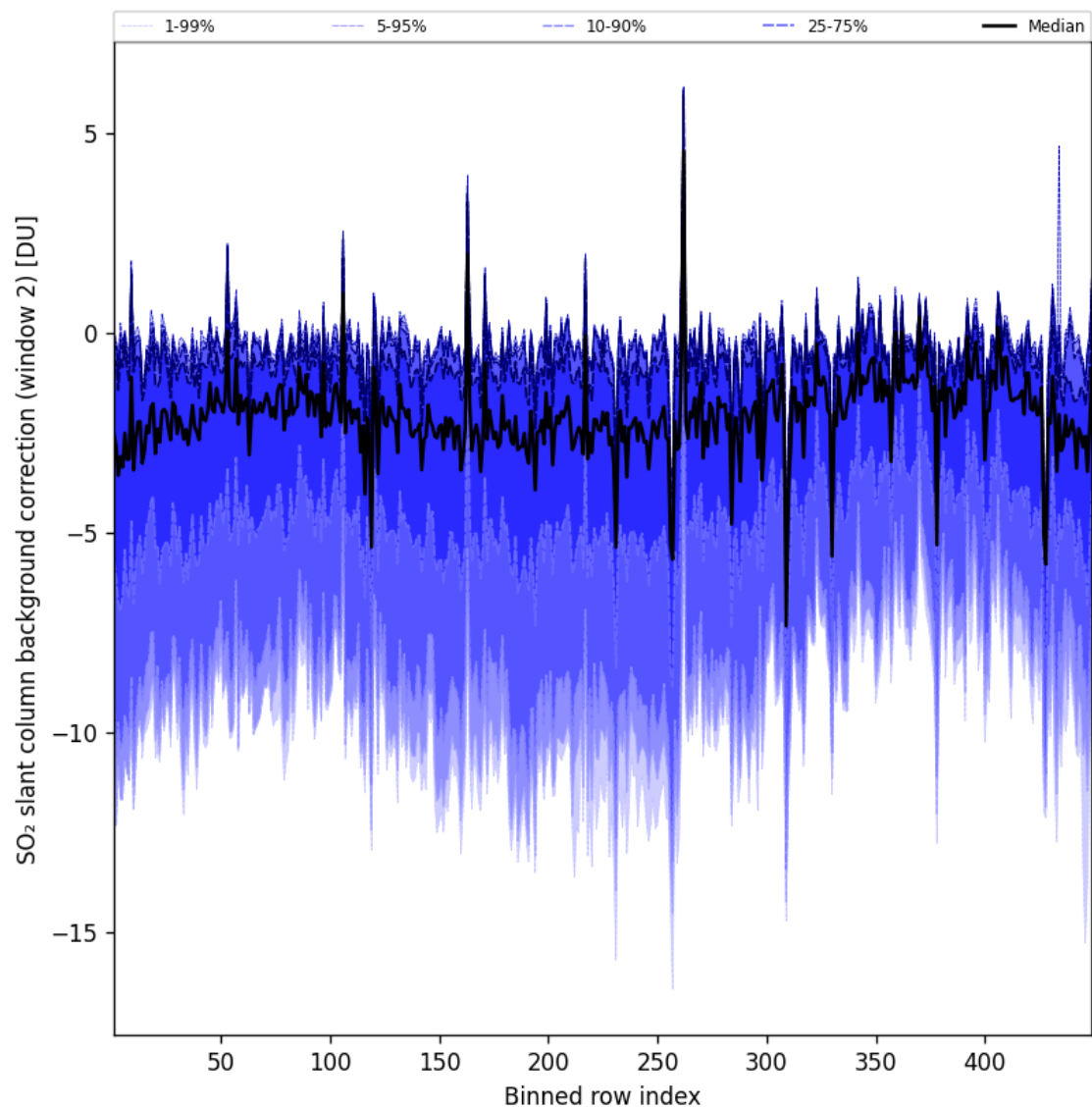


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-04-25 to 2025-04-26

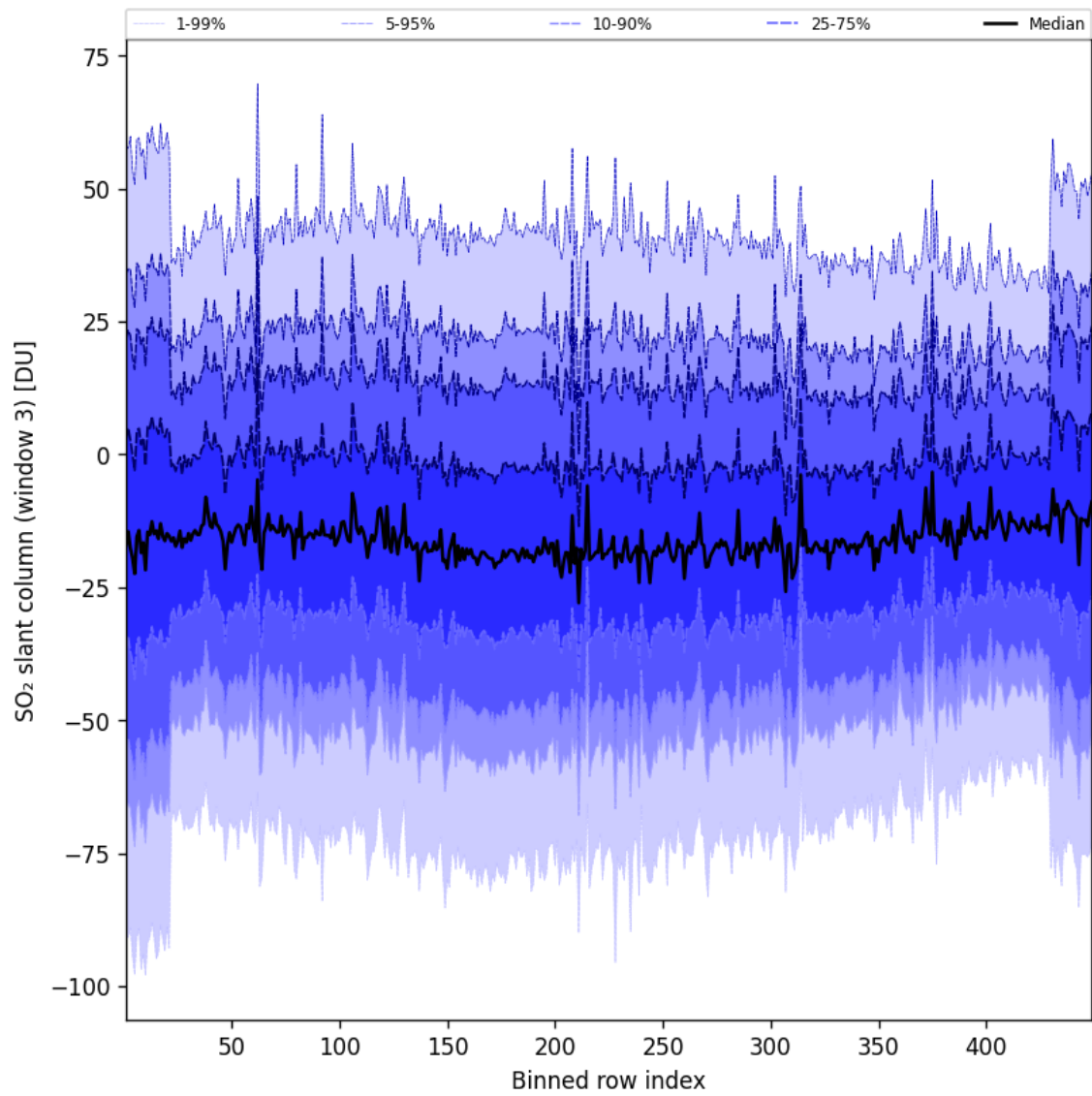


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-04-25 to 2025-04-26

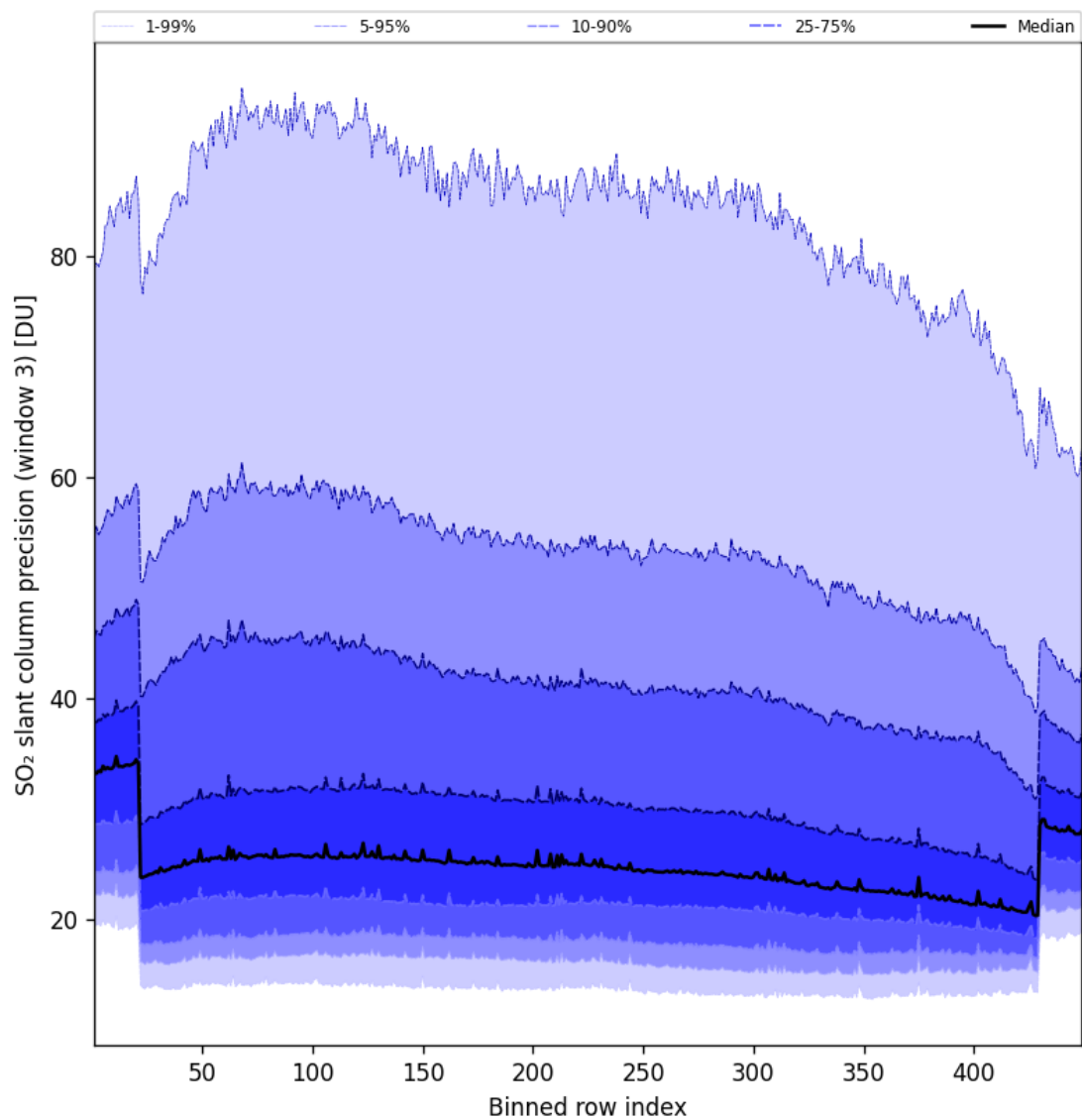


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-04-25 to 2025-04-26

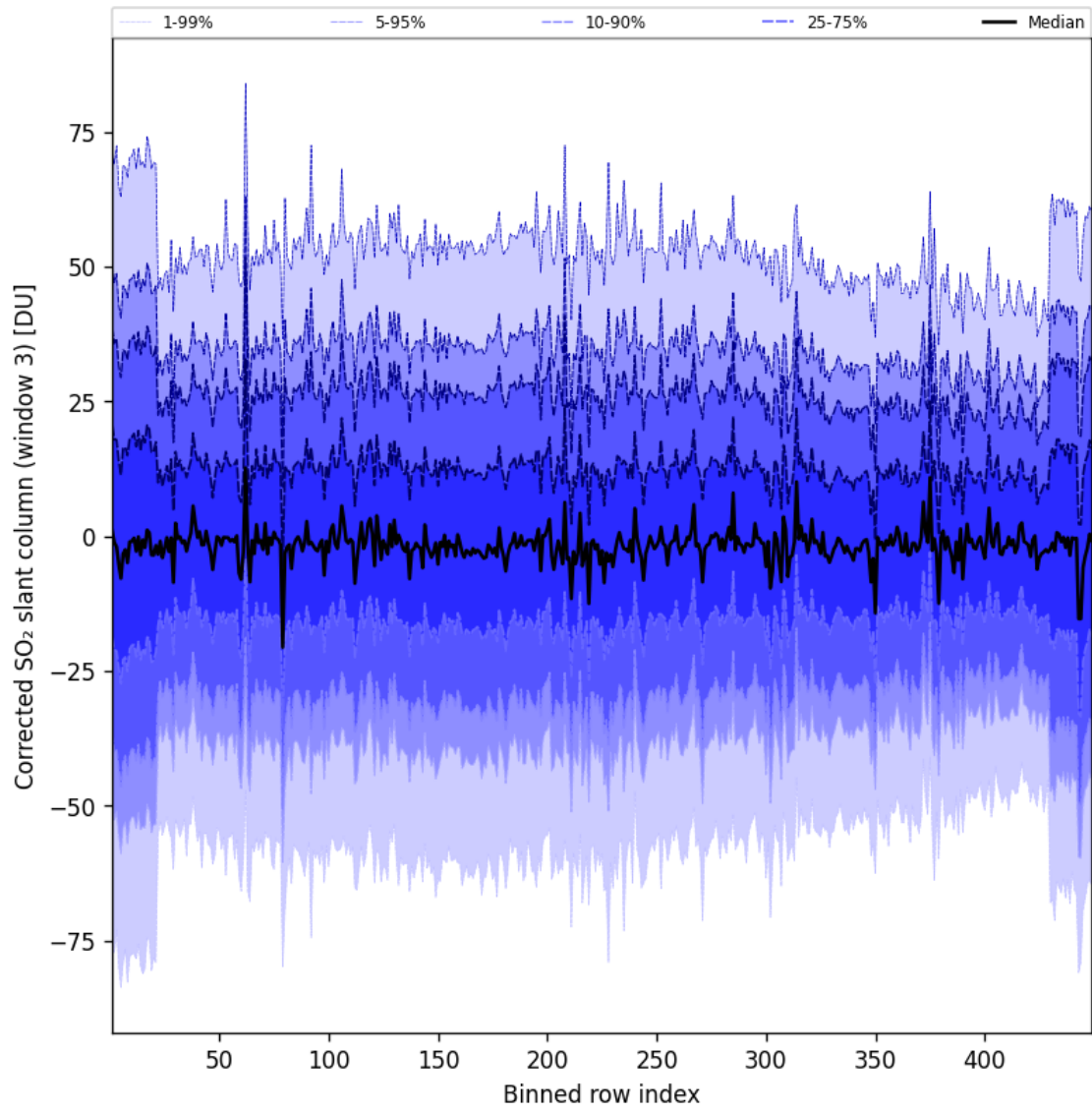


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-04-25 to 2025-04-26

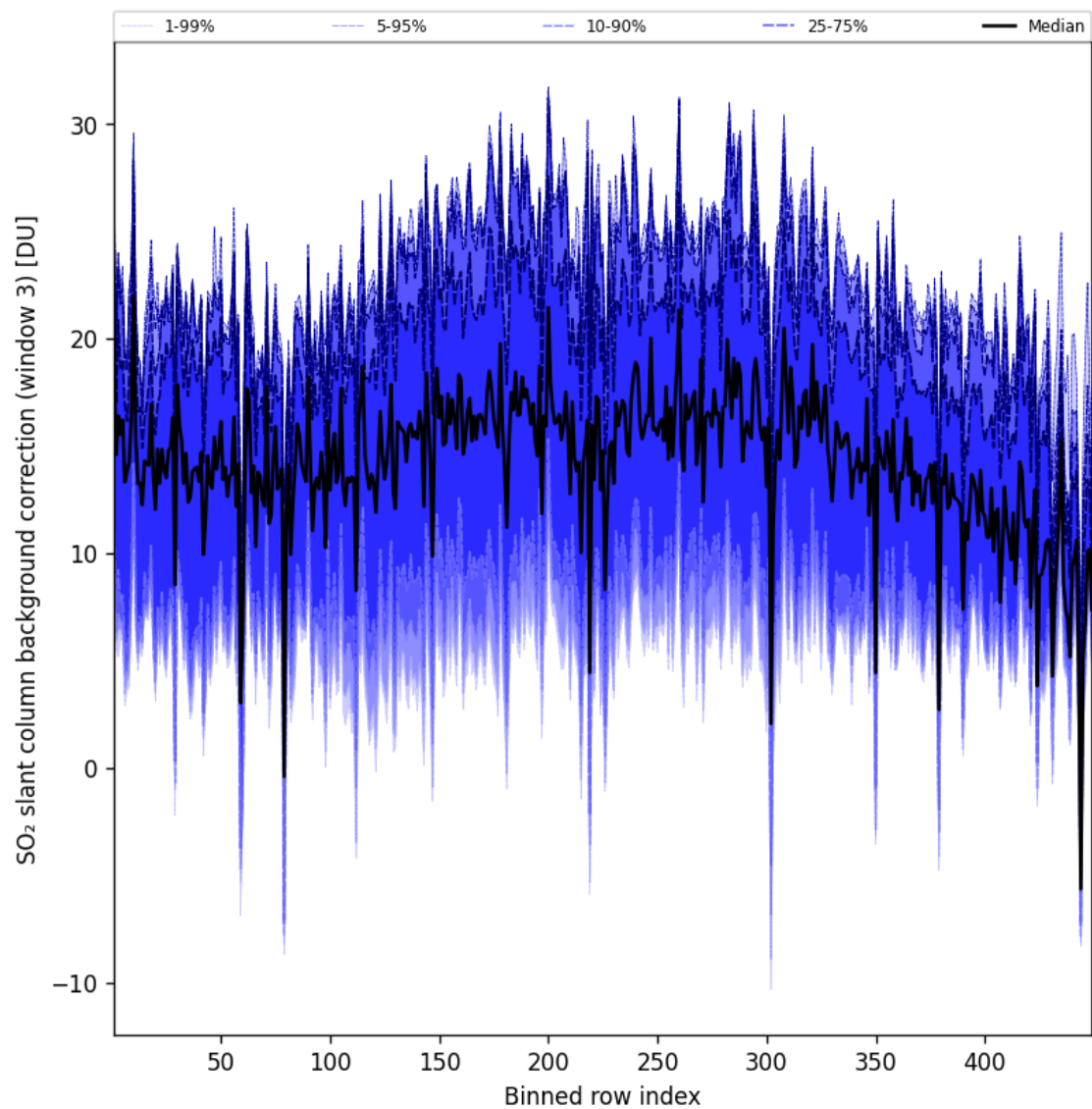


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-04-25 to 2025-04-26

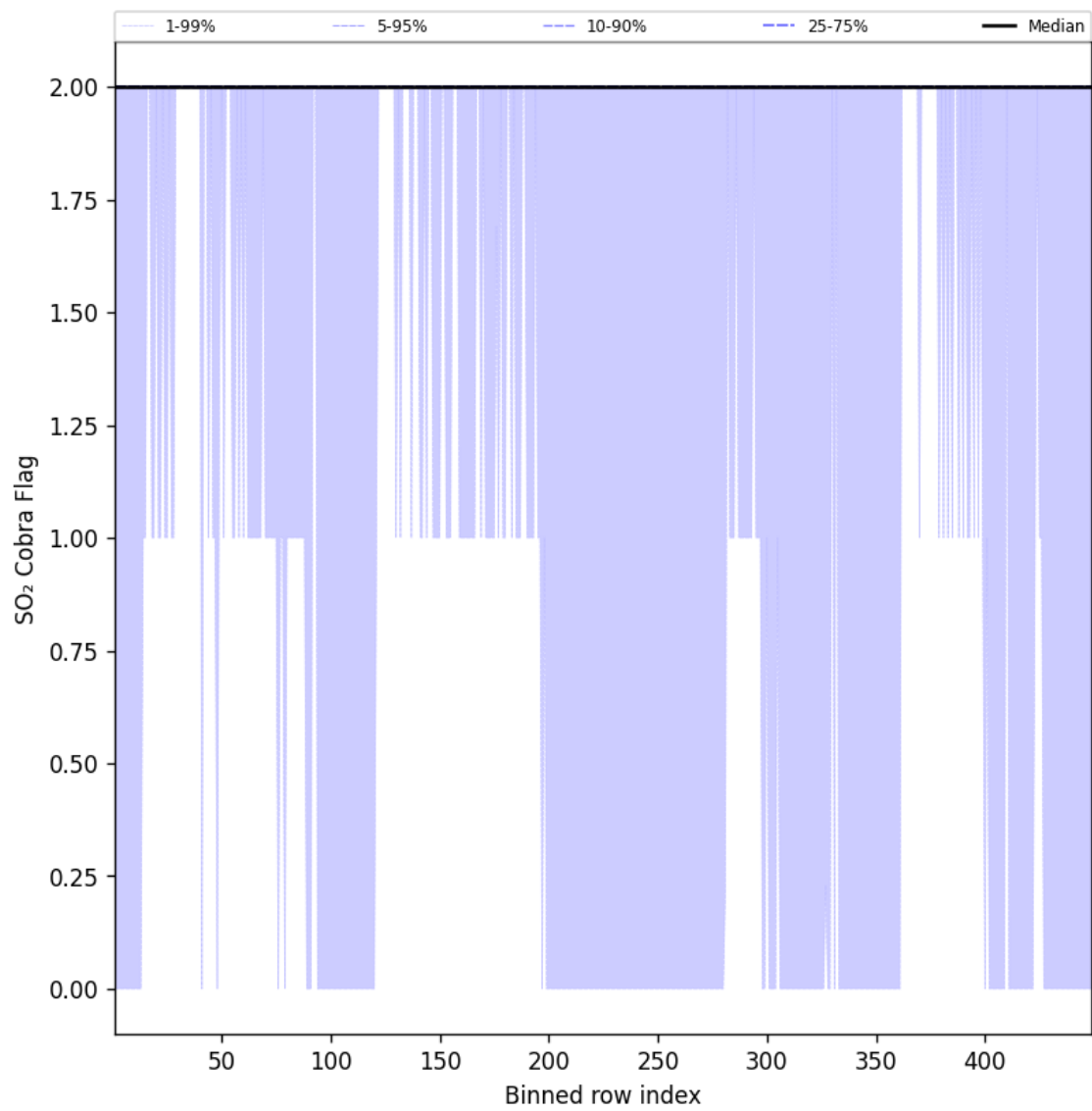


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-04-25 to 2025-04-26

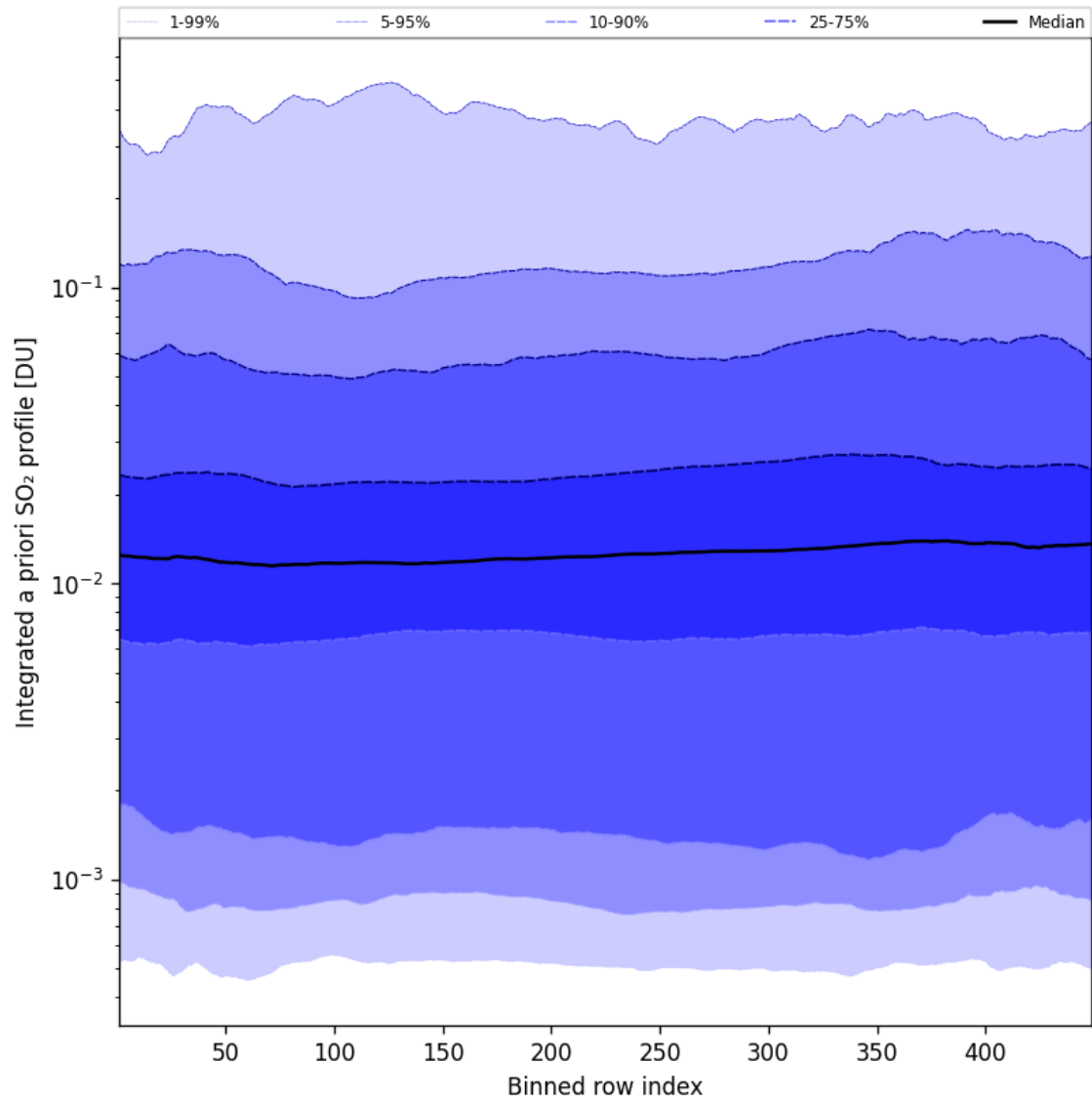


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-04-25 to 2025-04-26

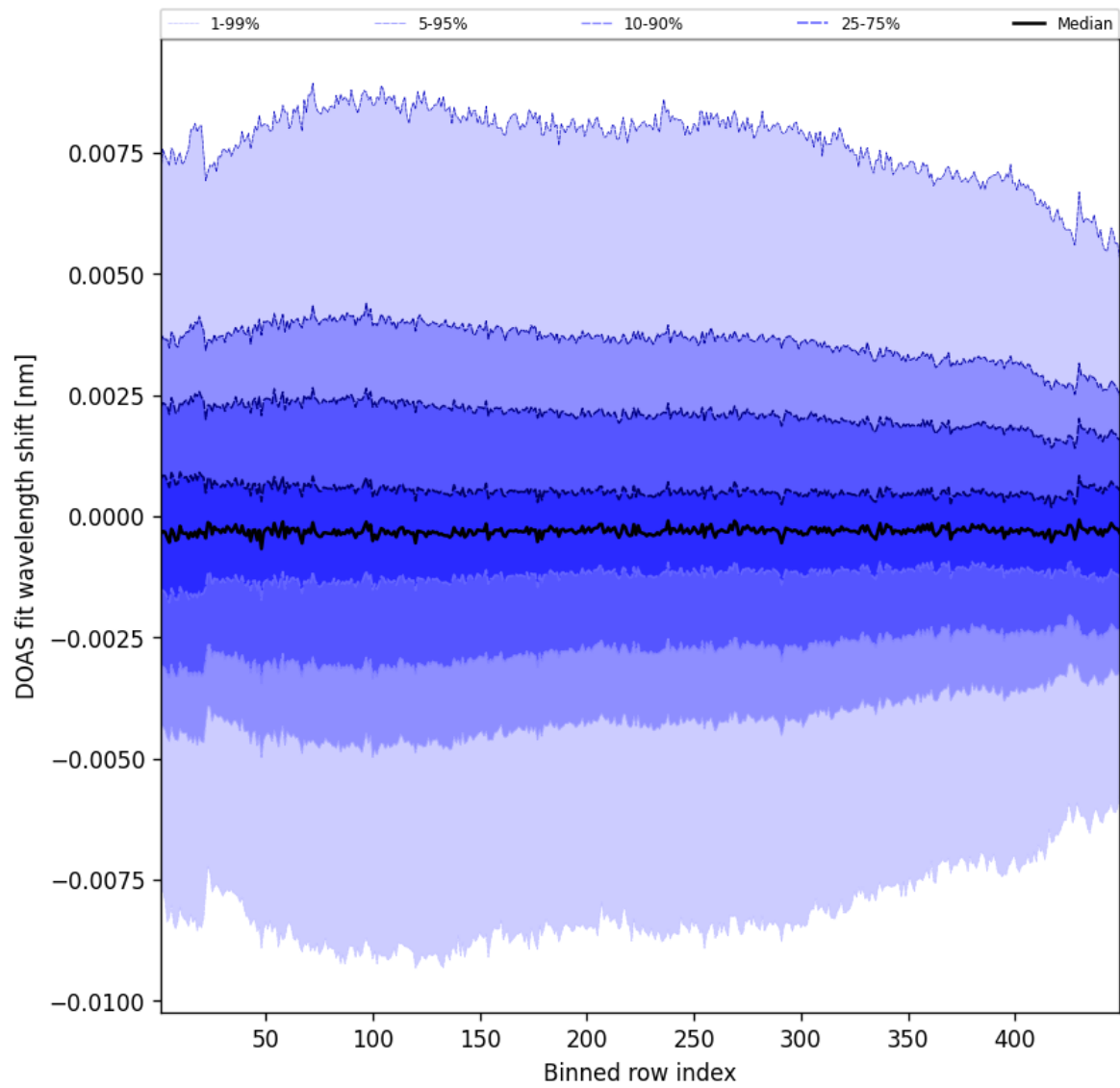


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-04-25 to 2025-04-26

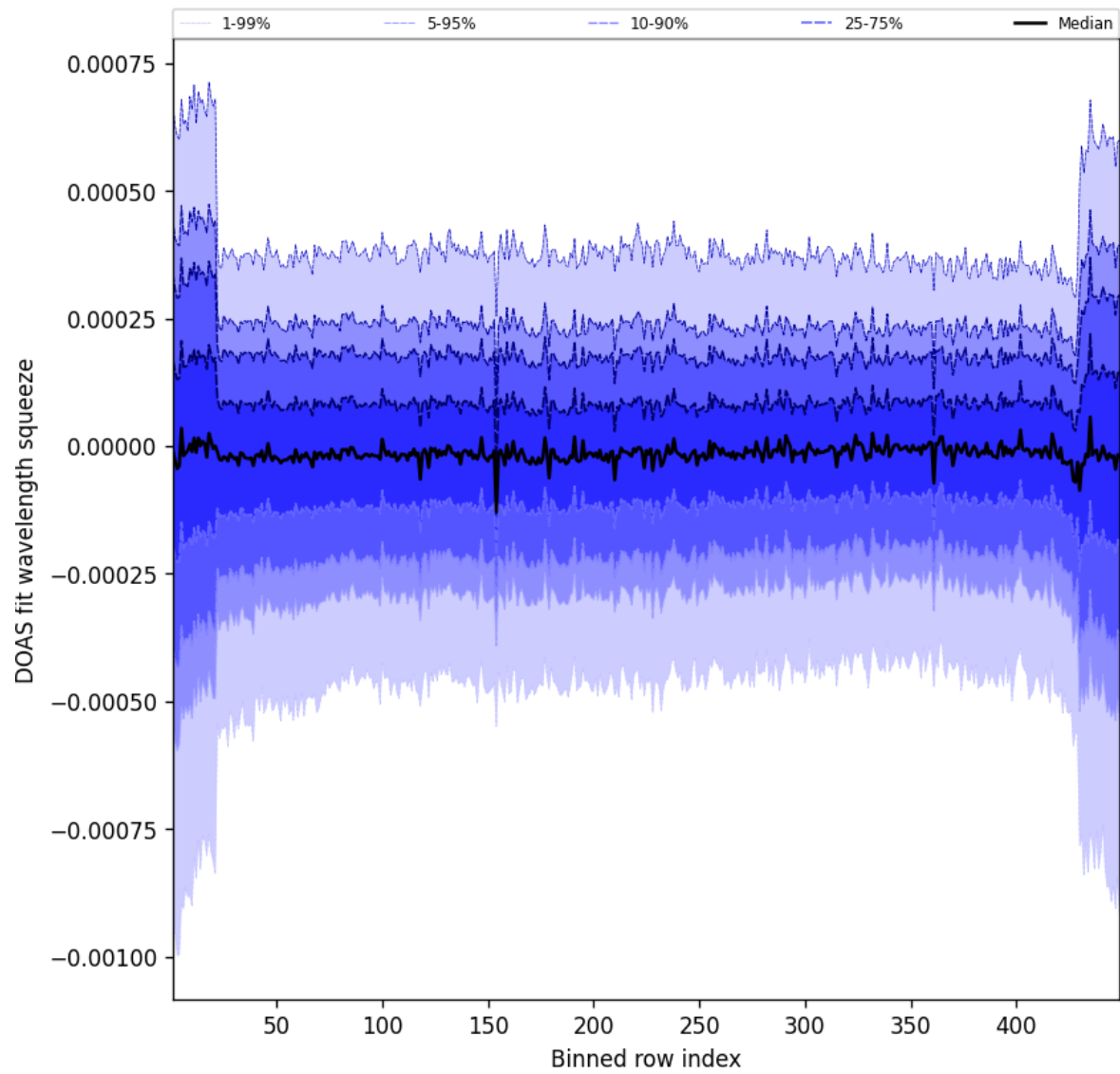


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-04-25 to 2025-04-26

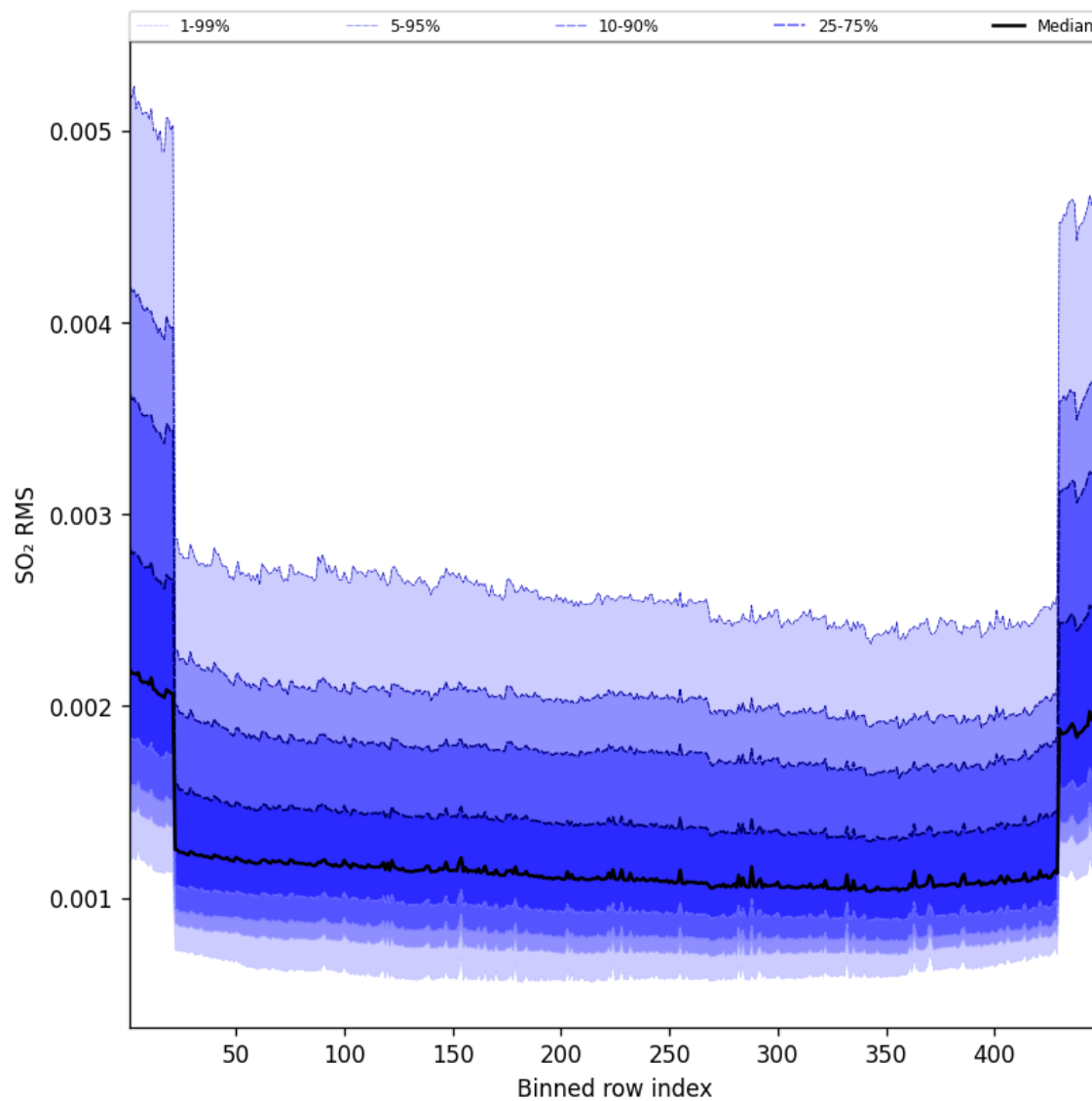


Figure 106: Along track statistics of “SO₂ RMS” for 2025-04-25 to 2025-04-26

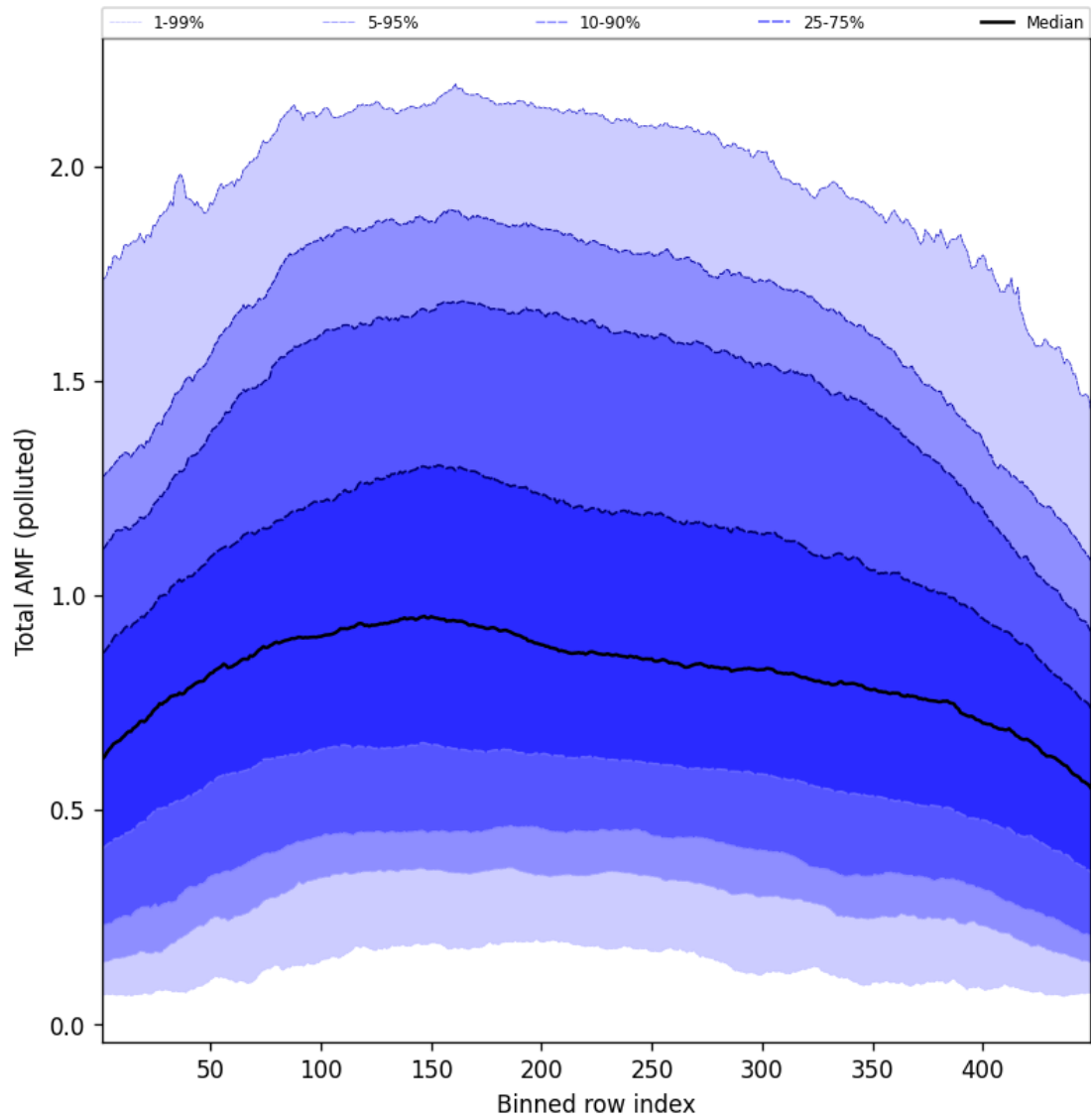


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-04-25 to 2025-04-26

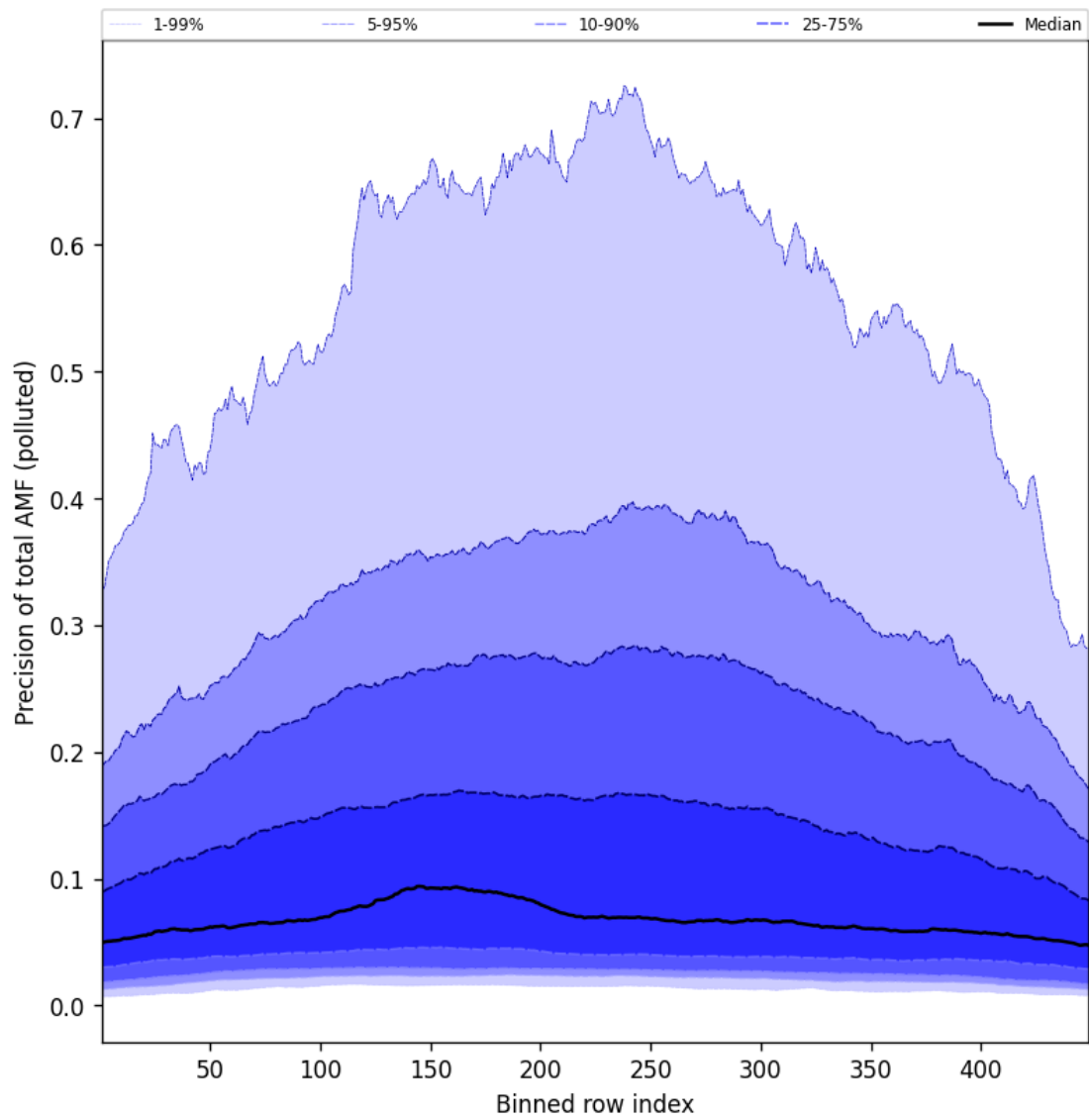


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-04-25 to 2025-04-26

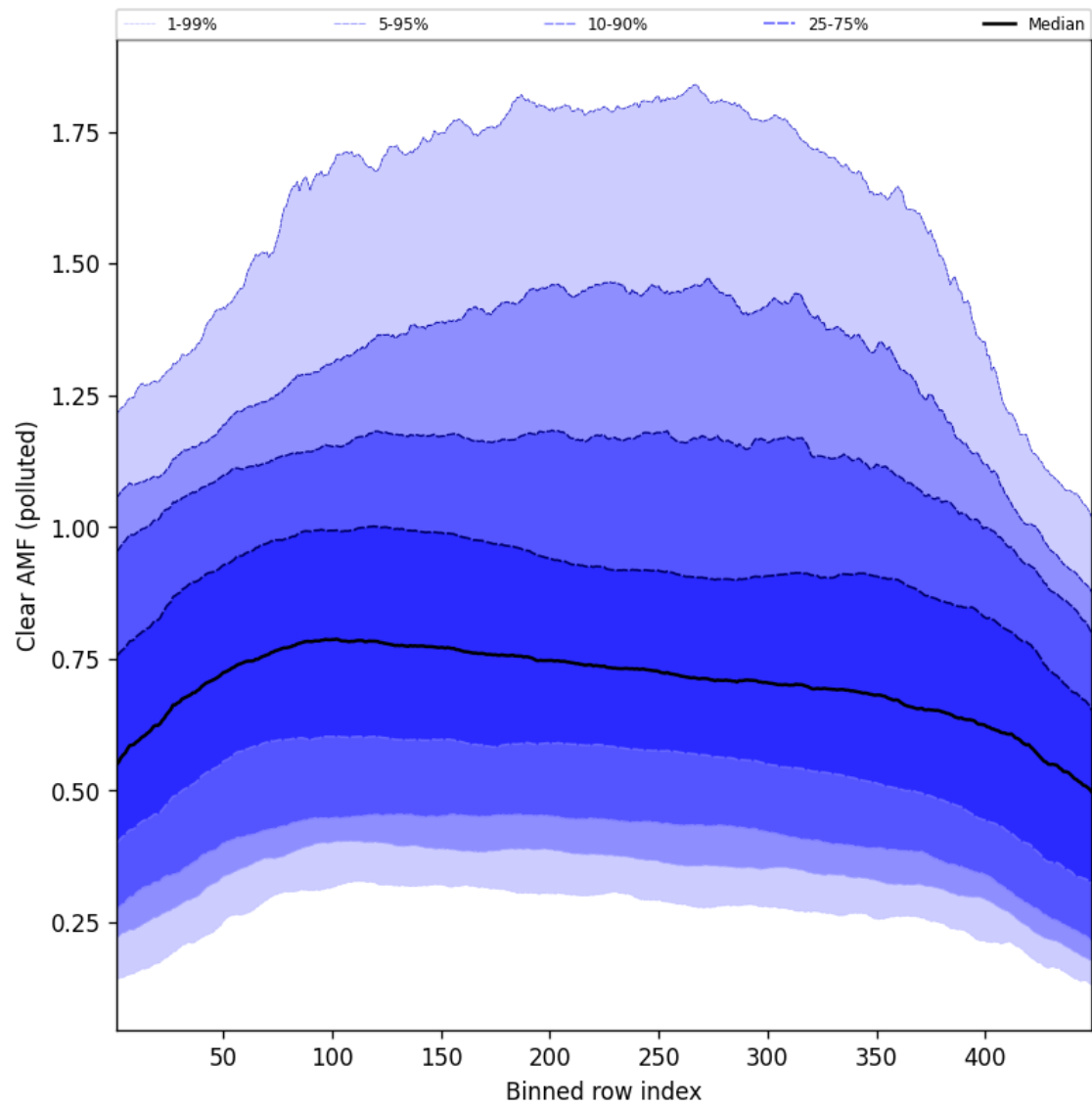


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-04-25 to 2025-04-26

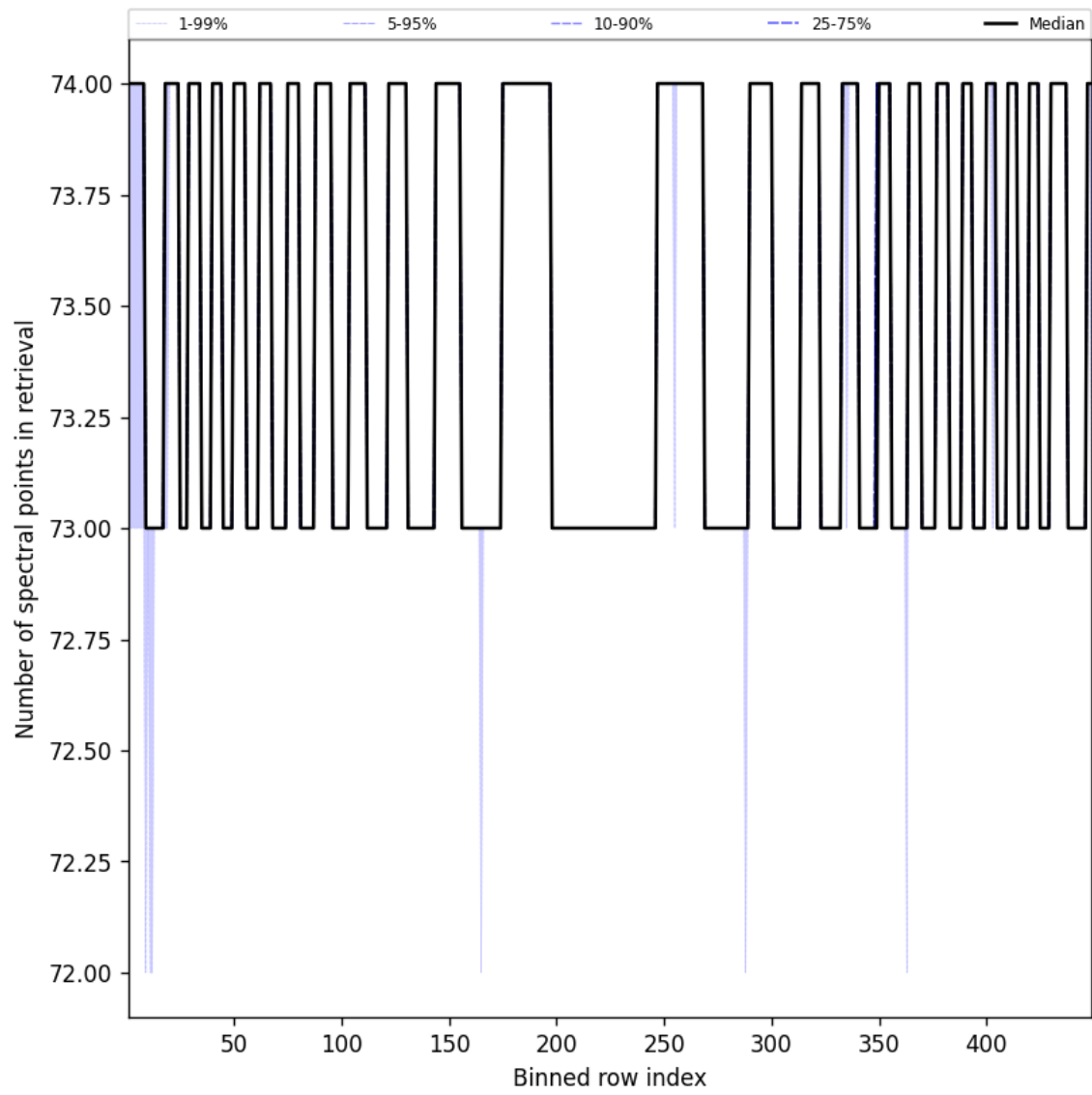


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-04-25 to 2025-04-26

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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