

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]	0.650 ± 0.403	17441259	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.026 \pm 98.149) \times 10^{-2}$	17441259	0.278	0.453	1.066×10^{-2}	-116	308
sulfurdioxide total vertical column precision [DU]	0.502 ± 0.668	17441259	0.222	0.328	0.331	4.639×10^{-2}	83.6
sulfurdioxide slant column density corrected [DU]	$(2.044 \pm 42.997) \times 10^{-2}$	17441259	0.258	0.368	9.422×10^{-3}	-42.5	378
sulfurdioxide slant column density cobra [DU]	$(2.000 \pm 38.699) \times 10^{-2}$	17441259	0.258	0.368	9.422×10^{-3}	-42.5	73.2
sulfurdioxide slant column density cobra precision [DU]	0.295 ± 0.137	17441259	0.213	0.133	0.253	8.431×10^{-2}	41.8
sulfurdioxide slant column density window1 [DU]	0.124 ± 0.693	17441259	0.125	0.740	0.124	-133	108
sulfurdioxide slant column density window1 precision [DU]	0.295 ± 0.137	17441259	0.213	0.133	0.253	8.431×10^{-2}	41.8
sulfurdioxide slant column density corrected win1 [DU]	$(3.170 \pm 68.481) \times 10^{-2}$	17441259	-2.500×10^{-2}	0.724	1.130×10^{-2}	-133	108
background so2 slant column offset window1 [DU]	$(-9.182 \pm 14.042) \times 10^{-2}$	17441259	-0.180	0.170	-0.121	-1.31	3.13
sulfurdioxide slant column density window2 [DU]	1.04 ± 9.19	17441259	0.750	11.3	0.892	-2.036×10^3	1.457×10^3
sulfurdioxide slant column density window2 precision [DU]	8.25 ± 2.48	17441259	7.43	2.71	7.88	2.22	624
sulfurdioxide slant column density corrected win2 [DU]	-0.341 ± 9.075	17441259	-0.250	11.2	-0.351	-2.039×10^3	1.456×10^3
background so2 slant column offset window2 [DU]	-1.38 ± 1.86	17441259	-0.250	2.20	-1.06	-14.7	8.56
sulfurdioxide slant column density window3 [DU]	-7.49 ± 24.16	17441259	-6.16	29.8	-7.26	-628	4.309×10^3
sulfurdioxide slant column density window3 precision [DU]	28.8 ± 13.9	17441259	22.5	10.9	25.2	9.68	1.473×10^3
sulfurdioxide slant column density corrected win3 [DU]	-0.802 ± 23.886	17441259	-0.560	29.6	-0.581	-620	4.308×10^3
background so2 slant column offset window3 [DU]	6.69 ± 4.52	17441259	9.52	6.45	6.81	-10.5	34.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17441259	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.104 \pm 6.964) \times 10^{-2}$	17441259	1.664×10^{-2}	2.297×10^{-2}	1.535×10^{-2}	1.819×10^{-4}	2.75
fitted radiance shift [nm]	$(-1.192 \pm 26.583) \times 10^{-4}$	17441259	1.000×10^{-4}	1.800×10^{-3}	-1.212×10^{-4}	-6.573×10^{-2}	8.549×10^{-2}
fitted radiance squeeze [1]	$(-5.255 \pm 19.152) \times 10^{-5}$	17441259	-3.000×10^{-5}	2.220×10^{-4}	-4.579×10^{-5}	-2.505×10^{-2}	1.952×10^{-2}
fitted root mean square [1]	$(1.289 \pm 0.536) \times 10^{-3}$	17441259	9.750×10^{-4}	5.311×10^{-4}	1.139×10^{-3}	3.304×10^{-4}	6.218×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.878 ± 0.453	17441259	0.700	0.546	0.792	5.000×10^{-2}	2.74
sulfurdioxide total air mass factor polluted precision [1]	0.122 ± 0.148	17441259	3.500×10^{-2}	0.116	7.090×10^{-2}	2.884×10^{-3}	2.23
sulfurdioxide clear air mass factor polluted [1]	0.743 ± 0.318	17441259	0.700	0.355	0.699	6.405×10^{-2}	2.74
number of spectral points in retrieval [1]	73.4 ± 0.5	17441259	73.0	1.000	73.0	52.0	155

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	6.000×10^{-2}	0.120	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.16	-0.852	-0.530	-0.360	-0.213	0.240	0.399	0.587	0.953	2.50
sulfurdioxide total vertical column precision [DU]	9.421×10^{-2}	0.129	0.157	0.185	0.222	0.550	0.715	0.929	1.36	3.11
sulfurdioxide slant column density corrected [DU]	-0.862	-0.495	-0.358	-0.268	-0.173	0.195	0.296	0.395	0.552	1.04
sulfurdioxide slant column density cobra [DU]	-0.862	-0.495	-0.358	-0.268	-0.173	0.195	0.296	0.395	0.552	1.04
sulfurdioxide slant column density cobra precision [DU]	0.142	0.170	0.185	0.196	0.210	0.343	0.400	0.453	0.543	0.788
sulfurdioxide slant column density window1 [DU]	-1.66	-0.918	-0.635	-0.446	-0.248	0.492	0.685	0.871	1.15	1.93
sulfurdioxide slant column density window1 precision [DU]	0.142	0.170	0.185	0.196	0.210	0.343	0.400	0.453	0.543	0.788
sulfurdioxide slant column density corrected win1 [DU]	-1.63	-0.956	-0.701	-0.528	-0.345	0.380	0.580	0.775	1.08	1.93
background so2 slant column offset window1 [DU]	-0.319	-0.258	-0.233	-0.213	-0.187	-1.730×10^{-2}	4.144×10^{-2}	9.389×10^{-2}	0.165	0.306
sulfurdioxide slant column density window2 [DU]	-20.3	-13.4	-10.0	-7.52	-4.73	6.62	9.54	12.2	15.9	24.2
sulfurdioxide slant column density window2 precision [DU]	4.29	5.16	5.71	6.16	6.69	9.40	10.3	11.2	12.6	15.5
sulfurdioxide slant column density corrected win2 [DU]	-22.1	-14.8	-11.3	-8.80	-5.97	5.26	8.08	10.6	14.1	21.7
background so2 slant column offset window2 [DU]	-7.12	-4.91	-3.73	-3.04	-2.35	-0.145	0.130	0.374	0.749	2.78
sulfurdioxide slant column density window3 [DU]	-69.4	-47.5	-37.2	-30.0	-22.2	7.62	15.3	22.2	31.6	50.6
sulfurdioxide slant column density window3 precision [DU]	13.4	15.7	17.6	19.2	20.9	31.8	36.6	42.6	54.7	87.8
sulfurdioxide slant column density corrected win3 [DU]	-61.4	-40.2	-30.3	-23.1	-15.5	14.2	21.7	28.5	37.8	56.9
background so2 slant column offset window3 [DU]	-3.70	-0.650	0.925	2.13	3.45	9.90	11.1	12.3	13.8	17.3
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]	3.521×10^{-4}	6.633×10^{-4}	1.285×10^{-3}	3.008×10^{-3}	6.647×10^{-3}	2.962×10^{-2}	4.537×10^{-2}	6.444×10^{-2}	0.108	0.275
fitted radiance shift [nm]	-8.159×10^{-3}	-4.033×10^{-3}	-2.586×10^{-3}	-1.748×10^{-3}	-1.044×10^{-3}	7.567×10^{-4}	1.470×10^{-3}	2.352×10^{-3}	3.883×10^{-3}	8.187×10^{-3}
fitted radiance squeeze [1]	-5.611×10^{-4}	-3.656×10^{-4}	-2.809×10^{-4}	-2.222×10^{-4}	-1.604×10^{-4}	6.167×10^{-5}	1.156×10^{-4}	1.653×10^{-4}	2.365×10^{-4}	4.100×10^{-4}
fitted root mean square [1]	5.955×10^{-4}	7.340×10^{-4}	8.161×10^{-4}	8.775×10^{-4}	9.495×10^{-4}	1.481×10^{-3}	1.723×10^{-3}	1.962×10^{-3}	2.313×10^{-3}	3.202×10^{-3}
sulfurdioxide total air mass factor polluted [1]	9.440×10^{-2}	0.259	0.376	0.462	0.566	1.11	1.34	1.54	1.78	2.18
sulfurdioxide total air mass factor polluted precision [1]	9.842×10^{-3}	1.948×10^{-2}	2.527×10^{-2}	3.058×10^{-2}	3.751×10^{-2}	0.154	0.201	0.255	0.369	0.763
sulfurdioxide clear air mass factor polluted [1]	0.227	0.316	0.388	0.454	0.534	0.890	0.992	1.12	1.36	1.83
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]	0.611 ± 0.413	12124090	0.820	1.000	0.0	1.000	0.180	1.000
sulfurdioxide total vertical column [DU]	$(2.217 \pm 94.043) \times 10^{-2}$	12124090	0.414	9.019×10^{-3}	-116	155	-0.196	0.218
sulfurdioxide total vertical column precision [DU]	0.470 ± 0.682	12124090	0.280	0.300	4.639×10^{-2}	44.4	0.206	0.486
sulfurdioxide slant column density corrected [DU]	$(1.528 \pm 32.962) \times 10^{-2}$	12124090	0.344	8.110×10^{-3}	-12.0	93.4	-0.162	0.181
sulfurdioxide slant column density cobra [DU]	$(1.524 \pm 32.552) \times 10^{-2}$	12124090	0.344	8.110×10^{-3}	-12.0	21.9	-0.162	0.181
sulfurdioxide slant column density cobra precision [DU]	0.271 ± 0.112	12124090	0.106	0.237	8.431×10^{-2}	11.3	0.202	0.308
sulfurdioxide slant column density window1 [DU]	0.112 ± 0.620	12124090	0.699	0.116	-15.8	55.9	-0.237	0.462
sulfurdioxide slant column density window1 precision [DU]	0.271 ± 0.112	12124090	0.106	0.237	8.431×10^{-2}	11.3	0.202	0.308
sulfurdioxide slant column density corrected win1 [DU]	$(2.093 \pm 60.564) \times 10^{-2}$	12124090	0.680	6.247×10^{-3}	-15.8	55.6	-0.329	0.351
background so2 slant column offset window1 [DU]	$(-9.059 \pm 14.046) \times 10^{-2}$	12124090	0.192	-0.116	-0.894	2.35	-0.196	-4.110×10^{-3}
sulfurdioxide slant column density window2 [DU]	0.724 ± 8.418	12124090	10.7	0.680	-366	451	-4.67	6.06
sulfurdioxide slant column density window2 precision [DU]	7.81 ± 2.14	12124090	2.39	7.50	2.22	283	6.41	8.80
sulfurdioxide slant column density corrected win2 [DU]	-0.365 ± 8.368	12124090	10.7	-0.357	-369	452	-5.70	4.96
background so2 slant column offset window2 [DU]	-1.09 ± 1.54	12124090	2.07	-0.892	-9.36	8.38	-2.11	-3.808×10^{-2}
sulfurdioxide slant column density window3 [DU]	-6.73 ± 22.74	12124090	28.2	-6.75	-491	4.309×10^3	-20.8	7.41
sulfurdioxide slant column density window3 precision [DU]	27.3 ± 13.9	12124090	9.43	23.5	9.68	1.473×10^3	19.9	29.4
sulfurdioxide slant column density corrected win3 [DU]	-0.649 ± 22.462	12124090	28.0	-0.487	-491	4.308×10^3	-14.5	13.5
background so2 slant column offset window3 [DU]	6.08 ± 4.35	12124090	6.79	6.55	-10.5	19.5	2.76	9.55
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	12124090	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.122 \pm 7.134) \times 10^{-2}$	12124090	2.543×10^{-2}	1.152×10^{-2}	1.819×10^{-4}	2.57	3.601×10^{-3}	2.903×10^{-2}
fitted radiance shift [nm]	$(1.635 \pm 269.549) \times 10^{-5}$	12124090	1.707×10^{-3}	-1.131×10^{-5}	-4.266×10^{-2}	5.181×10^{-2}	-8.559×10^{-4}	8.510×10^{-4}
fitted radiance squeeze [1]	$(-8.057 \pm 17.828) \times 10^{-5}$	12124090	2.157×10^{-4}	-6.746×10^{-5}	-1.337×10^{-2}	9.522×10^{-3}	-1.813×10^{-4}	3.441×10^{-5}
fitted root mean square [1]	$(1.204 \pm 0.463) \times 10^{-3}$	12124090	4.491×10^{-4}	1.079×10^{-3}	3.304×10^{-4}	3.945×10^{-2}	9.151×10^{-4}	1.364×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.909 ± 0.491	12124090	0.623	0.818	5.000×10^{-2}	2.74	0.561	1.18
sulfurdioxide total air mass factor polluted precision [1]	0.135 ± 0.167	12124090	0.128	7.759×10^{-2}	2.884×10^{-3}	2.23	3.931×10^{-2}	0.168
sulfurdioxide clear air mass factor polluted [1]	0.769 ± 0.358	12124090	0.422	0.719	6.405×10^{-2}	2.74	0.517	0.938
number of spectral points in retrieval [1]	73.5 ± 0.5	12124090	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]	0.741 ± 0.361	5317169	0.590	1.000	0.0	1.000	0.410	1.000
sulfurdioxide total vertical column [DU]	$(4.872 \pm 106.902) \times 10^{-2}$	5317169	0.562	1.568×10^{-2}	-87.3	308	-0.260	0.302
sulfurdioxide total vertical column precision [DU]	0.575 ± 0.630	5317169	0.392	0.418	5.275×10^{-2}	83.6	0.276	0.668
sulfurdioxide slant column density corrected [DU]	$(3.221 \pm 59.874) \times 10^{-2}$	5317169	0.435	1.318×10^{-2}	-42.5	378	-0.202	0.233
sulfurdioxide slant column density cobra [DU]	$(3.085 \pm 49.946) \times 10^{-2}$	5317169	0.435	1.318×10^{-2}	-42.5	73.2	-0.202	0.233
sulfurdioxide slant column density cobra precision [DU]	0.351 ± 0.169	5317169	0.174	0.309	0.103	41.8	0.240	0.414
sulfurdioxide slant column density window1 [DU]	0.151 ± 0.836	5317169	0.847	0.147	-133	108	-0.277	0.570
sulfurdioxide slant column density window1 precision [DU]	0.351 ± 0.169	5317169	0.174	0.309	0.103	41.8	0.240	0.414
sulfurdioxide slant column density corrected win1 [DU]	$(5.626 \pm 83.731) \times 10^{-2}$	5317169	0.845	2.539×10^{-2}	-133	108	-0.388	0.457
background so2 slant column offset window1 [DU]	$(-9.462 \pm 14.028) \times 10^{-2}$	5317169	0.125	-0.126	-1.31	3.13	-0.172	-4.727×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.77 ± 10.70	5317169	12.9	1.47	-2.036×10^3	1.457×10^3	-4.87	8.08
sulfurdioxide slant column density window2 precision [DU]	9.27 ± 2.87	5317169	2.98	8.90	2.32	624	7.58	10.6
sulfurdioxide slant column density corrected win2 [DU]	-0.287 ± 10.510	5317169	12.7	-0.336	-2.039×10^3	1.456×10^3	-6.69	6.04
background so2 slant column offset window2 [DU]	-2.06 ± 2.31	5317169	2.98	-1.39	-14.7	8.56	-3.39	-0.415
sulfurdioxide slant column density window3 [DU]	-9.24 ± 27.04	5317169	34.1	-8.66	-628	488	-26.0	8.19
sulfurdioxide slant column density window3 precision [DU]	32.2 ± 13.3	5317169	10.7	29.0	10.1	309	24.6	35.4
sulfurdioxide slant column density corrected win3 [DU]	-1.15 ± 26.85	5317169	34.0	-0.843	-620	495	-17.9	16.1
background so2 slant column offset window3 [DU]	8.09 ± 4.61	5317169	6.51	7.27	-9.35	34.3	4.78	11.3
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.28	5317169	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.064 \pm 6.559) \times 10^{-2}$	5317169	1.619×10^{-2}	2.003×10^{-2}	1.259×10^{-3}	2.75	1.403×10^{-2}	3.023×10^{-2}
fitted radiance shift [nm]	$(-4.282 \pm 25.446) \times 10^{-4}$	5317169	1.925×10^{-3}	-4.126×10^{-4}	-6.573×10^{-2}	8.549×10^{-2}	-1.425×10^{-3}	5.004×10^{-4}
fitted radiance squeeze [1]	$(1.134 \pm 20.488) \times 10^{-5}$	5317169	2.298×10^{-4}	7.877×10^{-6}	-2.505×10^{-2}	1.952×10^{-2}	-1.055×10^{-4}	1.244×10^{-4}
fitted root mean square [1]	$(1.482 \pm 0.632) \times 10^{-3}$	5317169	6.781×10^{-4}	1.309×10^{-3}	3.495×10^{-4}	6.218×10^{-2}	1.064×10^{-3}	1.742×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.807 ± 0.341	5317169	0.414	0.748	5.000×10^{-2}	2.59	0.575	0.990
sulfurdioxide total air mass factor polluted precision [1]	$(9.073 \pm 8.006) \times 10^{-2}$	5317169	9.003×10^{-2}	5.932×10^{-2}	3.258×10^{-3}	1.70	3.509×10^{-2}	0.125
sulfurdioxide clear air mass factor polluted [1]	0.684 ± 0.187	5317169	0.240	0.673	6.721×10^{-2}	1.58	0.558	0.798
number of spectral points in retrieval [1]	73.4 ± 0.5	5317169	1.000	73.0	52.0	155	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]	0.653 ± 0.391	11285223	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.139 \pm 98.403) \times 10^{-2}$	11285223	0.460	1.125×10^{-2}	-116	308	-0.216	0.244
sulfurdioxide total vertical column precision [DU]	0.506 ± 0.663	11285223	0.326	0.329	5.041×10^{-2}	82.4	0.227	0.553
sulfurdioxide slant column density corrected [DU]	$(2.006 \pm 40.251) \times 10^{-2}$	11285223	0.372	9.758×10^{-3}	-35.2	378	-0.175	0.198
sulfurdioxide slant column density cobra [DU]	$(1.989 \pm 37.855) \times 10^{-2}$	11285223	0.372	9.758×10^{-3}	-35.2	39.6	-0.175	0.198
sulfurdioxide slant column density cobra precision [DU]	0.301 ± 0.141	11285223	0.147	0.257	8.431×10^{-2}	41.8	0.209	0.357
sulfurdioxide slant column density window1 [DU]	0.120 ± 0.694	11285223	0.752	0.127	-109	55.9	-0.254	0.498
sulfurdioxide slant column density window1 precision [DU]	0.301 ± 0.141	11285223	0.147	0.257	8.431×10^{-2}	41.8	0.209	0.357
sulfurdioxide slant column density corrected win1 [DU]	$(3.360 \pm 68.553) \times 10^{-2}$	11285223	0.736	1.470×10^{-2}	-109	55.6	-0.348	0.388
background so2 slant column offset window1 [DU]	$(-8.611 \pm 14.807) \times 10^{-2}$	11285223	0.181	-0.120	-1.31	3.13	-0.187	-5.607×10^{-3}
sulfurdioxide slant column density window2 [DU]	1.16 ± 9.09	11285223	11.3	0.955	-1.174×10^3	1.457×10^3	-4.64	6.70
sulfurdioxide slant column density window2 precision [DU]	8.18 ± 2.28	11285223	2.62	7.82	2.22	570	6.68	9.30
sulfurdioxide slant column density corrected win2 [DU]	-0.329 ± 8.953	11285223	11.2	-0.350	-1.177×10^3	1.456×10^3	-5.96	5.26
background so2 slant column offset window2 [DU]	-1.49 ± 2.01	11285223	2.42	-1.04	-14.7	8.56	-2.55	-0.132
sulfurdioxide slant column density window3 [DU]	-4.96 ± 23.75	11285223	29.7	-4.95	-378	312	-19.7	10.00
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 11.7	11285223	9.75	24.4	9.68	309	20.7	30.4
sulfurdioxide slant column density corrected win3 [DU]	1.61 ± 23.26	11285223	29.3	1.56	-364	321	-13.0	16.3
background so2 slant column offset window3 [DU]	6.57 ± 4.60	11285223	6.35	6.39	-10.5	34.3	3.32	9.67
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	11285223	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.170 \pm 4.744) \times 10^{-2}$	11285223	1.529×10^{-2}	1.422×10^{-2}	2.604×10^{-4}	2.55	7.404×10^{-3}	2.270×10^{-2}
fitted radiance shift [nm]	$(-1.357 \pm 22.941) \times 10^{-4}$	11285223	1.740×10^{-3}	-1.089×10^{-4}	-5.322×10^{-2}	8.549×10^{-2}	-1.022×10^{-3}	7.181×10^{-4}
fitted radiance squeeze [1]	$(-4.522 \pm 19.294) \times 10^{-5}$	11285223	2.226×10^{-4}	-3.758×10^{-5}	-1.594×10^{-2}	1.952×10^{-2}	-1.529×10^{-4}	6.964×10^{-5}
fitted root mean square [1]	$(1.308 \pm 0.553) \times 10^{-3}$	11285223	5.801×10^{-4}	1.144×10^{-3}	3.304×10^{-4}	6.218×10^{-2}	9.469×10^{-4}	1.527×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.865 ± 0.415	11285223	0.494	0.801	5.000×10^{-2}	2.56	0.590	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.117 ± 0.151	11285223	9.910×10^{-2}	6.818×10^{-2}	2.884×10^{-3}	2.08	3.959×10^{-2}	0.139
sulfurdioxide clear air mass factor polluted [1]	0.750 ± 0.309	11285223	0.332	0.717	6.405×10^{-2}	2.56	0.559	0.891
number of spectral points in retrieval [1]	73.4 ± 0.5	11285223	1.000	73.0	52.0	74.0	73.0	74.0

Table 6: Parameterlist and basic statistics for the analysis for observations over land

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.676 ± 0.415	4271462	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(2.690 \pm 82.229) \times 10^{-2}$	4271462	0.426	9.233×10^{-3}	-87.3	237	-0.201	0.226
sulfurdioxide total vertical column precision [DU]	0.464 ± 0.549	4271462	0.320	0.326	4.639×10^{-2}	83.6	0.204	0.524
sulfurdioxide slant column density corrected [DU]	$(2.118 \pm 45.171) \times 10^{-2}$	4271462	0.354	8.549×10^{-3}	-42.5	107	-0.167	0.187
sulfurdioxide slant column density cobra [DU]	$(2.038 \pm 39.903) \times 10^{-2}$	4271462	0.354	8.549×10^{-3}	-42.5	73.2	-0.167	0.187
sulfurdioxide slant column density cobra precision [DU]	0.280 ± 0.127	4271462	0.102	0.243	8.539×10^{-2}	33.9	0.209	0.311
sulfurdioxide slant column density window1 [DU]	0.149 ± 0.682	4271462	0.707	0.137	-133	108	-0.214	0.493
sulfurdioxide slant column density window1 precision [DU]	0.280 ± 0.127	4271462	0.102	0.243	8.539×10^{-2}	33.9	0.209	0.311
sulfurdioxide slant column density corrected win1 [DU]	$(2.974 \pm 67.419) \times 10^{-2}$	4271462	0.693	7.271×10^{-3}	-133	108	-0.332	0.360
background so2 slant column offset window1 [DU]	-0.119 ± 0.125	4271462	0.139	-0.145	-0.894	2.35	-0.202	-6.228×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.692 ± 9.451	4271462	11.4	0.637	-2.036×10^3	1.366×10^3	-5.06	6.35
sulfurdioxide slant column density window2 precision [DU]	8.43 ± 2.90	4271462	2.87	8.01	2.30	621	6.73	9.60
sulfurdioxide slant column density corrected win2 [DU]	-0.323 ± 9.384	4271462	11.3	-0.314	-2.039×10^3	1.365×10^3	-5.98	5.32
background so2 slant column offset window2 [DU]	-1.01 ± 1.55	4271462	1.82	-0.777	-14.5	8.56	-1.87	-5.084×10^{-2}
sulfurdioxide slant column density window3 [DU]	-12.5 ± 24.5	4271462	29.7	-11.8	-628	4.309×10^3	-27.0	2.74
sulfurdioxide slant column density window3 precision [DU]	31.6 ± 17.6	4271462	13.0	26.8	9.85	1.473×10^3	21.8	34.8
sulfurdioxide slant column density corrected win3 [DU]	-6.27 ± 24.62	4271462	30.1	-5.60	-620	4.308×10^3	-21.0	9.07
background so2 slant column offset window3 [DU]	6.22 ± 4.44	4271462	6.65	6.53	-10.5	25.6	2.99	9.64
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.10	4271462	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.294 \pm 9.968) \times 10^{-2}$	4271462	5.017×10^{-2}	2.592×10^{-2}	1.819×10^{-4}	2.75	7.813×10^{-3}	5.799×10^{-2}
fitted radiance shift [nm]	$(-9.807 \pm 331.110) \times 10^{-5}$	4271462	1.799×10^{-3}	-1.609×10^{-4}	-4.502×10^{-2}	8.355×10^{-2}	-1.039×10^{-3}	7.596×10^{-4}
fitted radiance squeeze [1]	$(-5.163 \pm 18.608) \times 10^{-5}$	4271462	2.151×10^{-4}	-4.715×10^{-5}	-2.505×10^{-2}	1.496×10^{-2}	-1.571×10^{-4}	5.809×10^{-5}
fitted root mean square [1]	$(1.231 \pm 0.485) \times 10^{-3}$	4271462	4.277×10^{-4}	1.113×10^{-3}	3.495×10^{-4}	5.544×10^{-2}	9.466×10^{-4}	1.374×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.908 ± 0.517	4271462	0.619	0.761	5.000×10^{-2}	2.74	0.541	1.16
sulfurdioxide total air mass factor polluted precision [1]	0.129 ± 0.143	4271462	0.150	7.333×10^{-2}	3.258×10^{-3}	2.23	3.209×10^{-2}	0.182
sulfurdioxide clear air mass factor polluted [1]	0.737 ± 0.333	4271462	0.361	0.663	6.721×10^{-2}	2.74	0.517	0.878
number of spectral points in retrieval [1]	73.4 ± 0.5	4271462	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

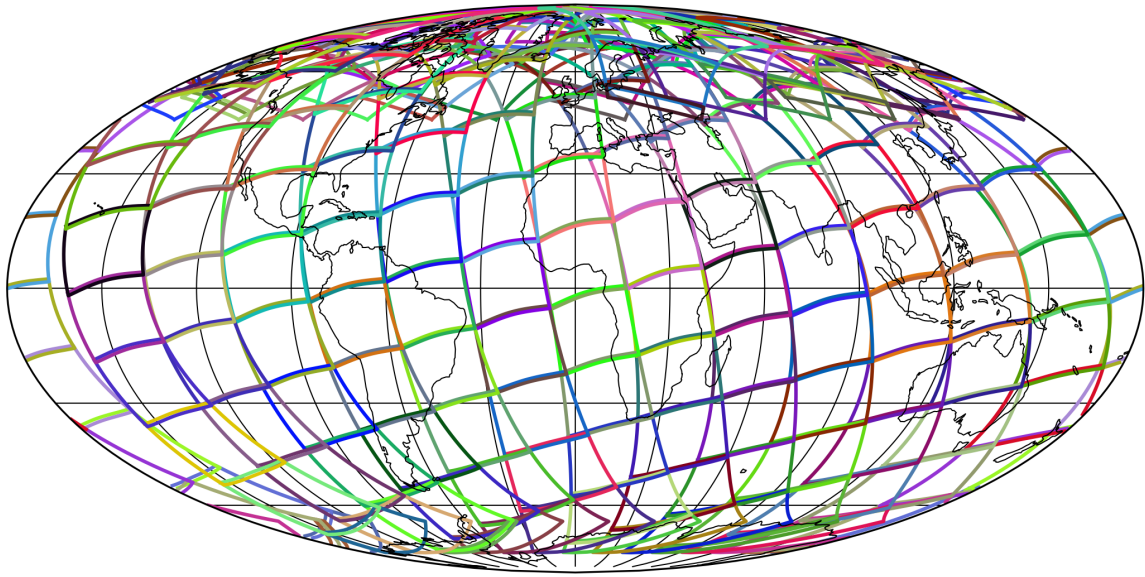


Figure 1: Outline of the granules.

4 Input data monitoring

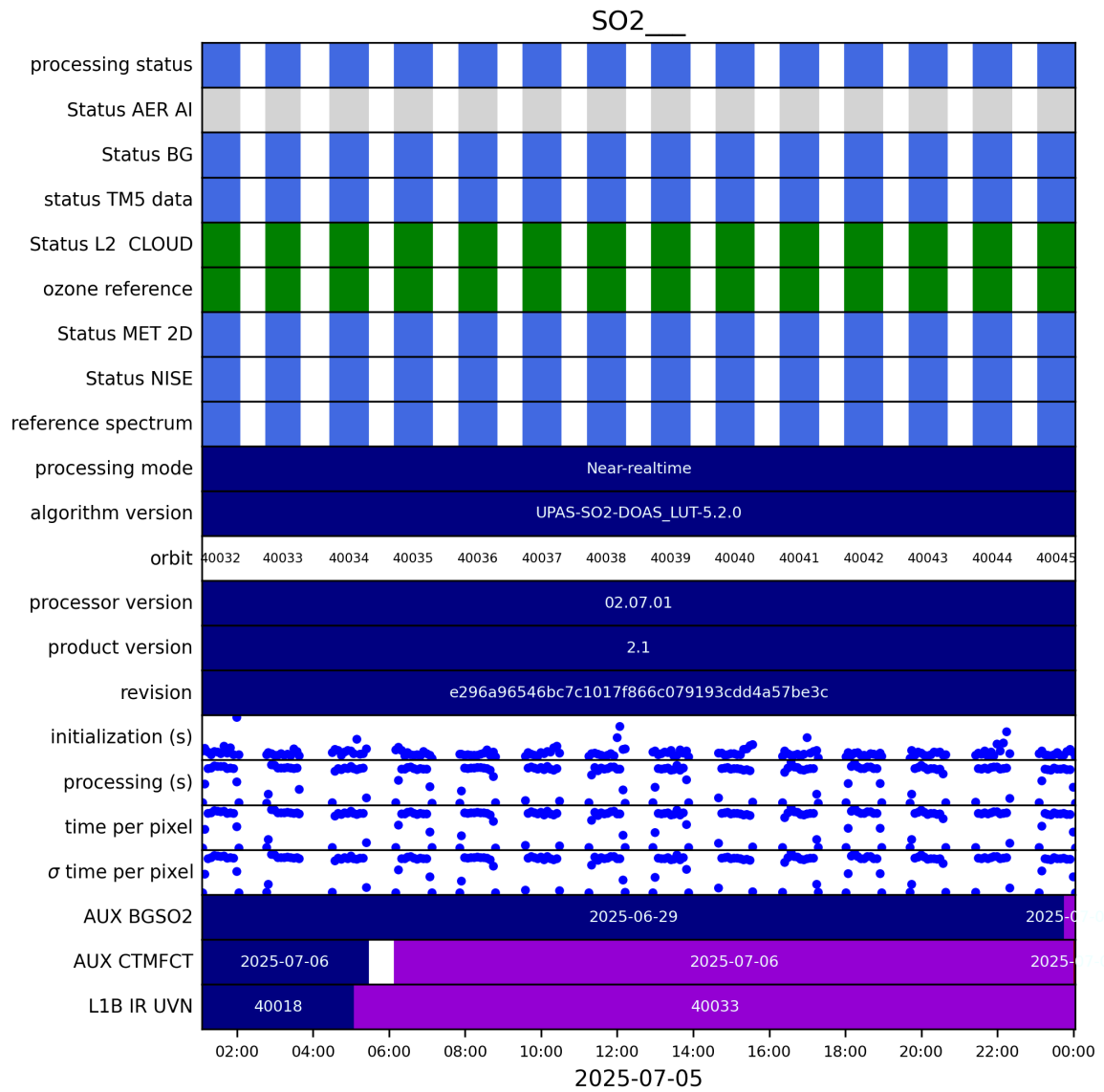


Figure 2: Input data per granule

5 Warnings and errors

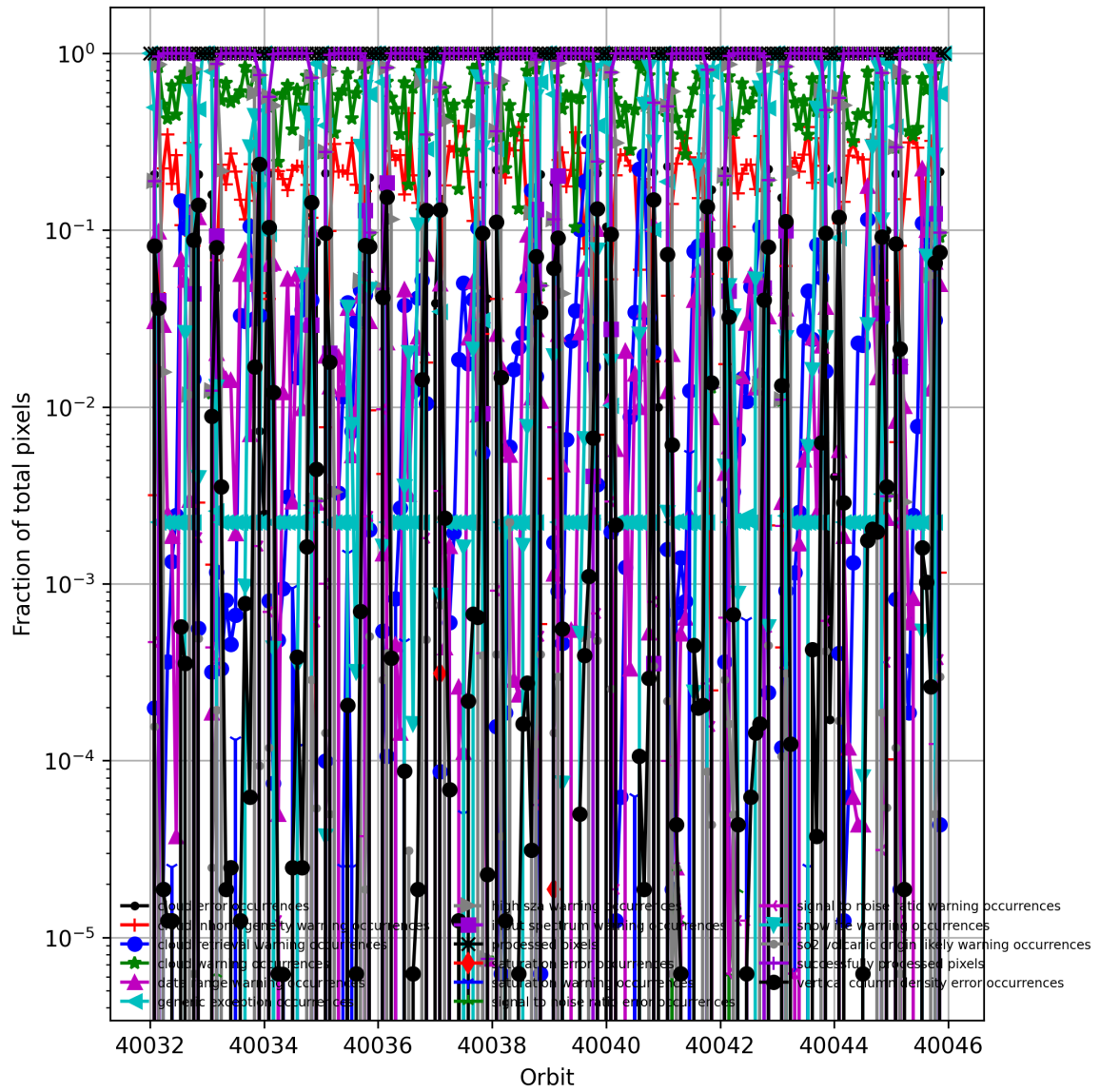


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

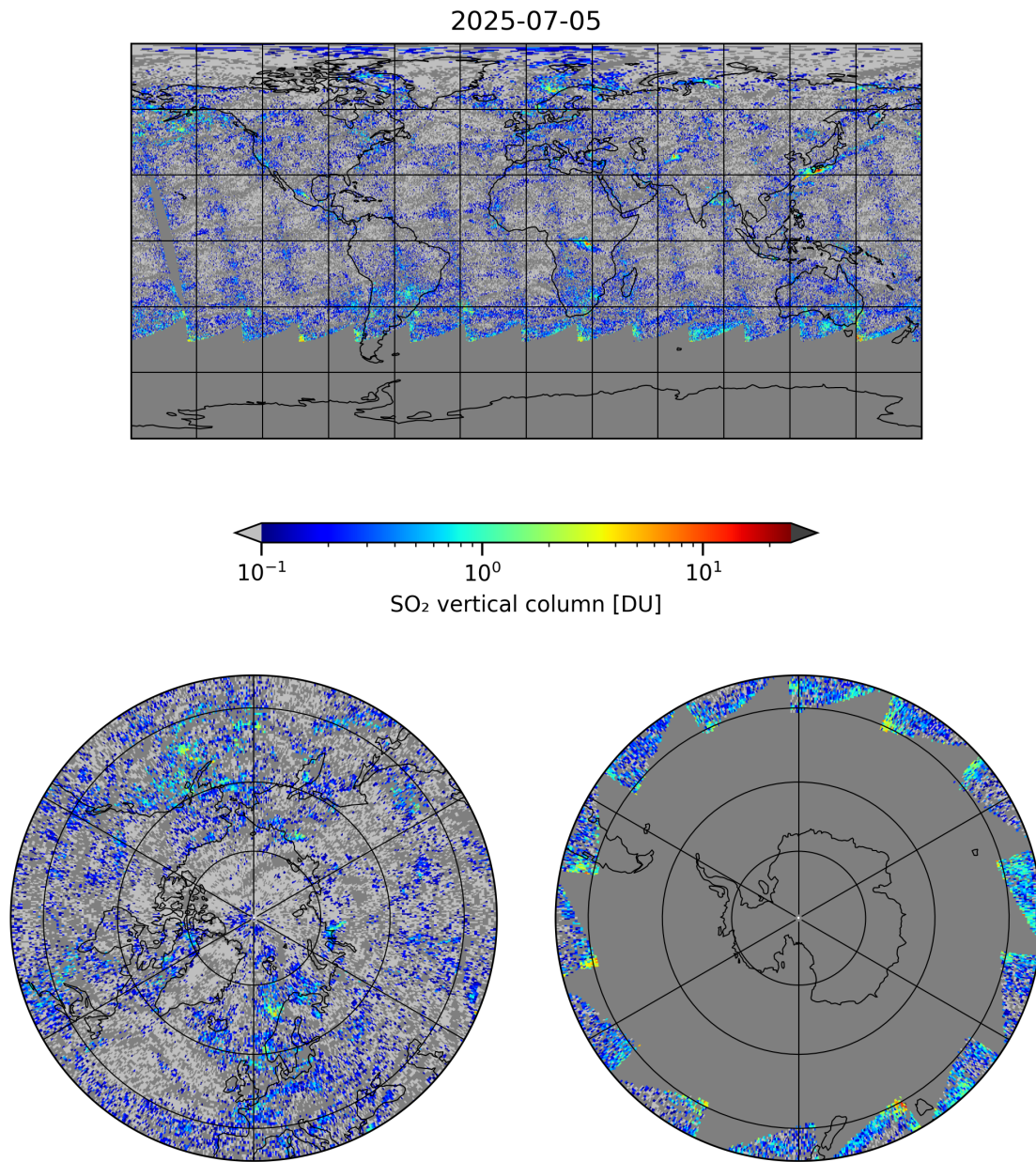


Figure 4: Map of “SO₂ vertical column” for 2025-07-05 to 2025-07-06

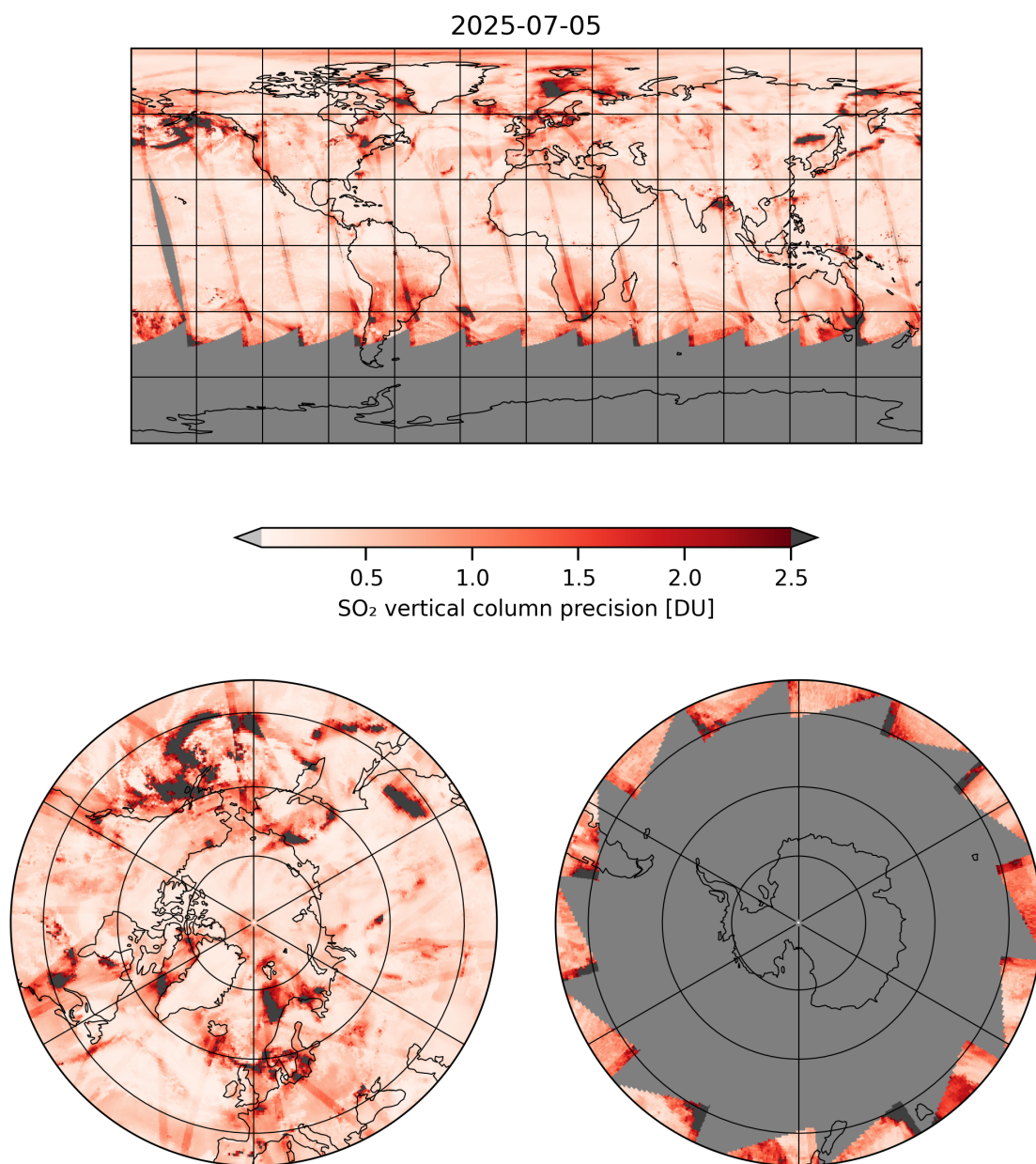


Figure 5: Map of “SO₂ vertical column precision” for 2025-07-05 to 2025-07-06

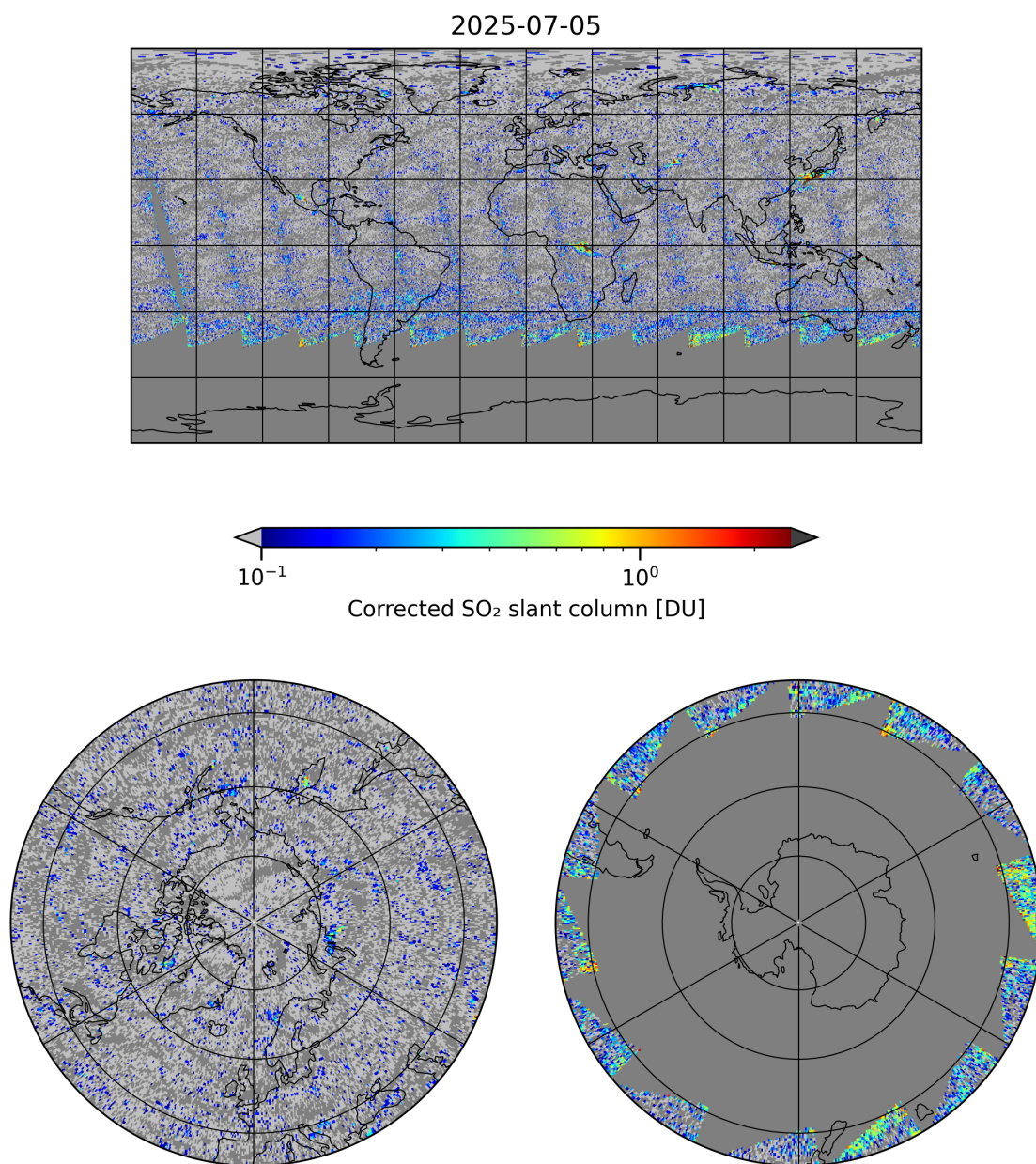


Figure 6: Map of “Corrected SO₂ slant column” for 2025-07-05 to 2025-07-06

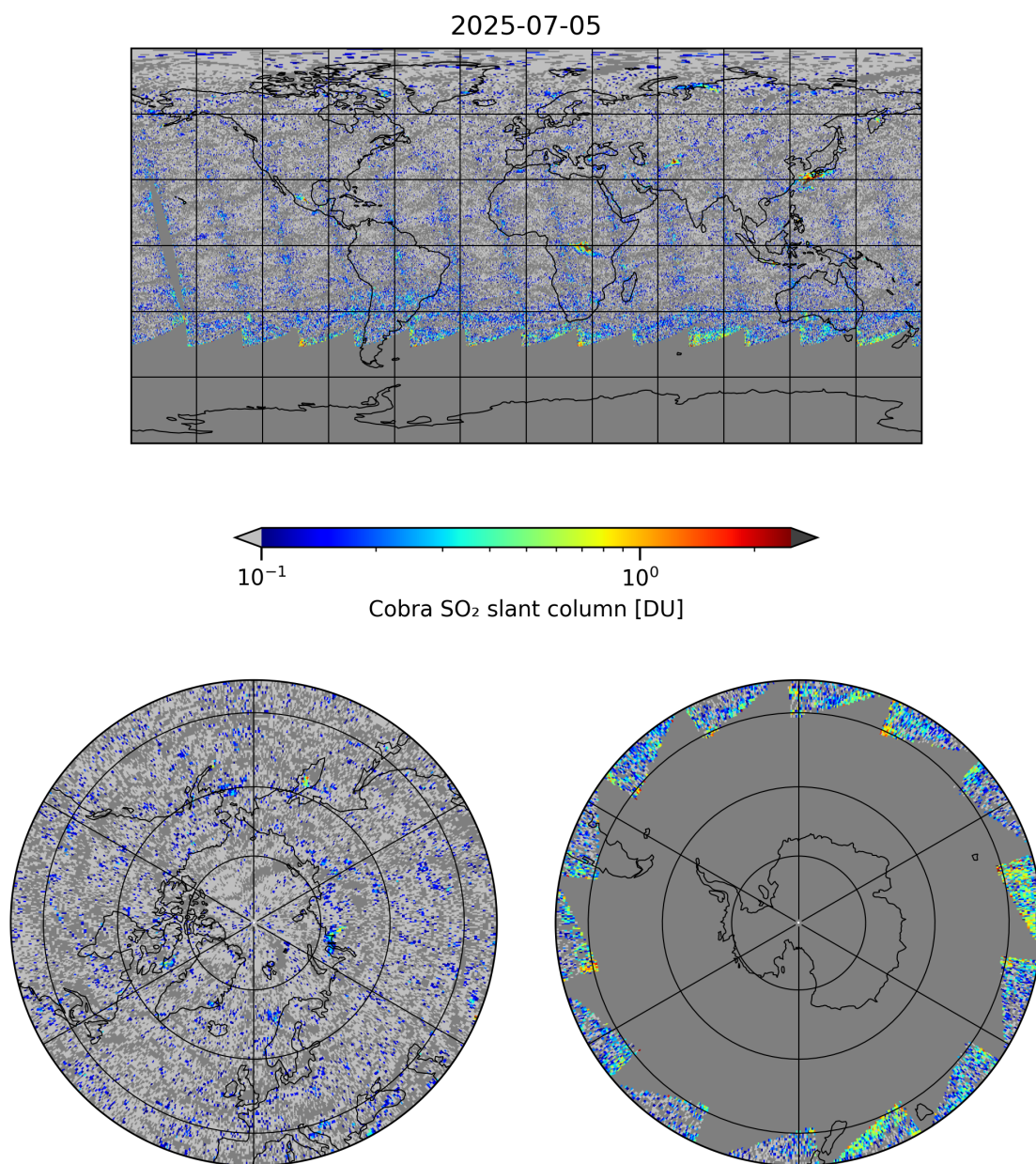


Figure 7: Map of “Cobra SO₂ slant column” for 2025-07-05 to 2025-07-06

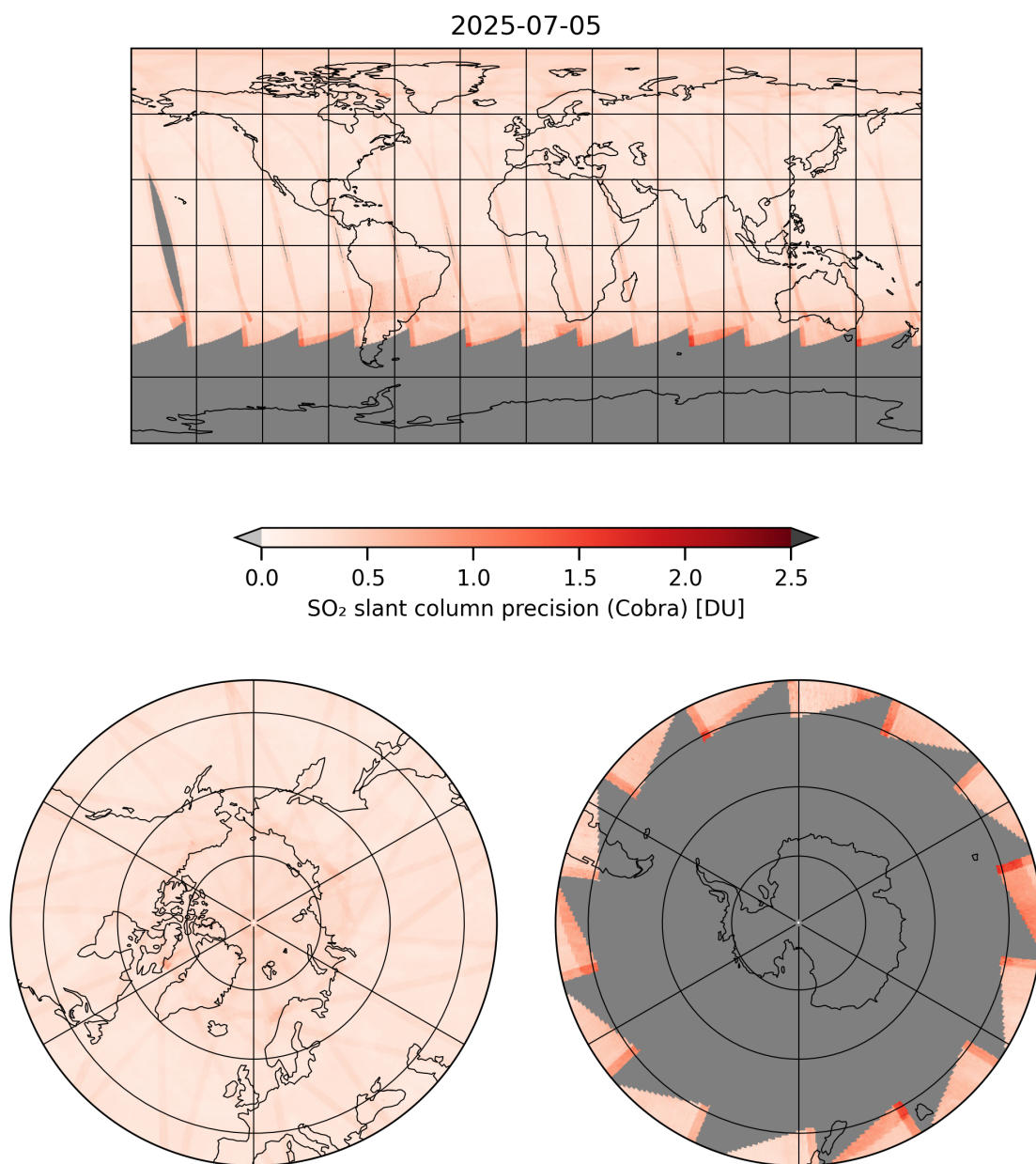


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-07-05 to 2025-07-06

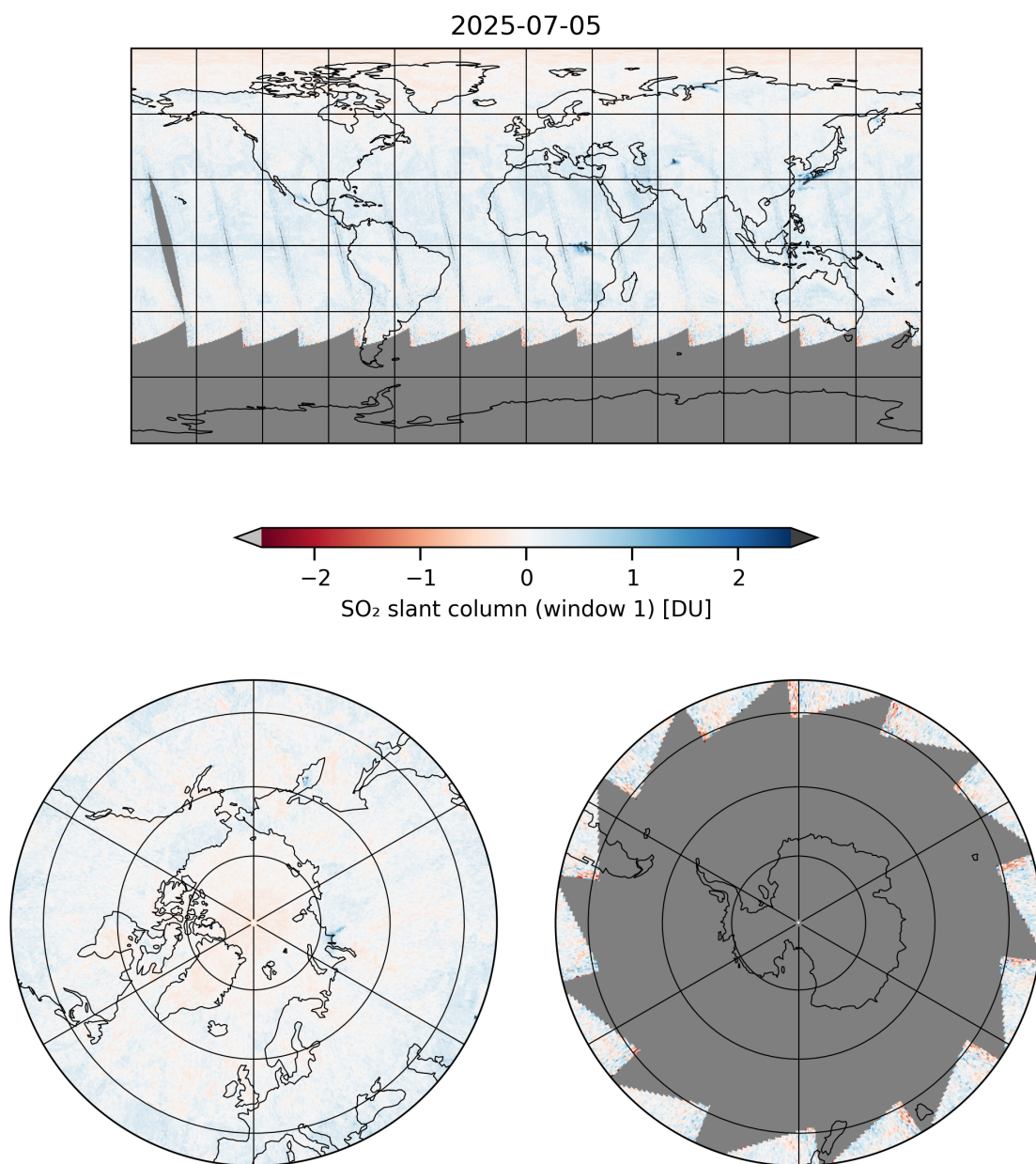


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-07-05 to 2025-07-06

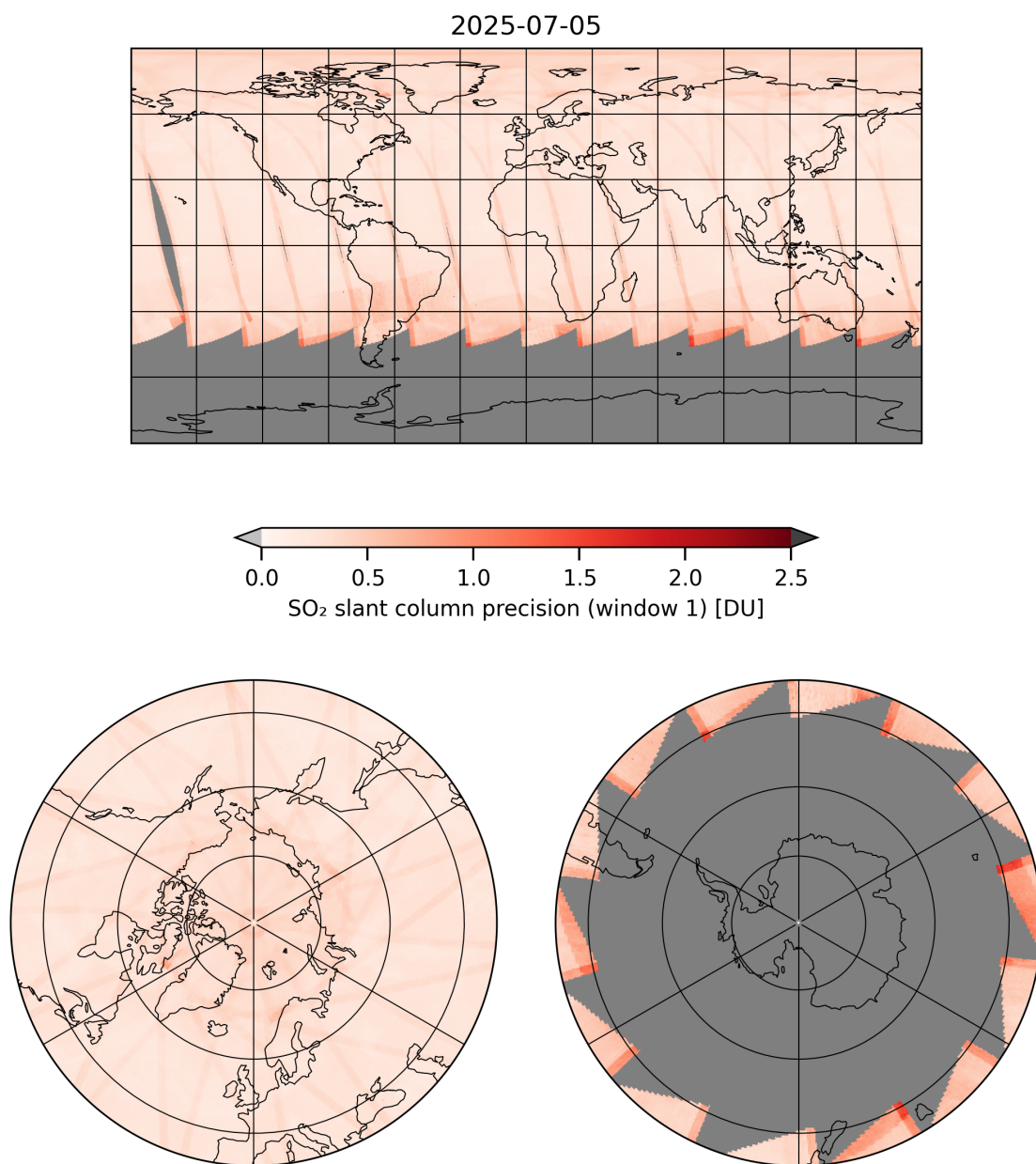


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-07-05 to 2025-07-06

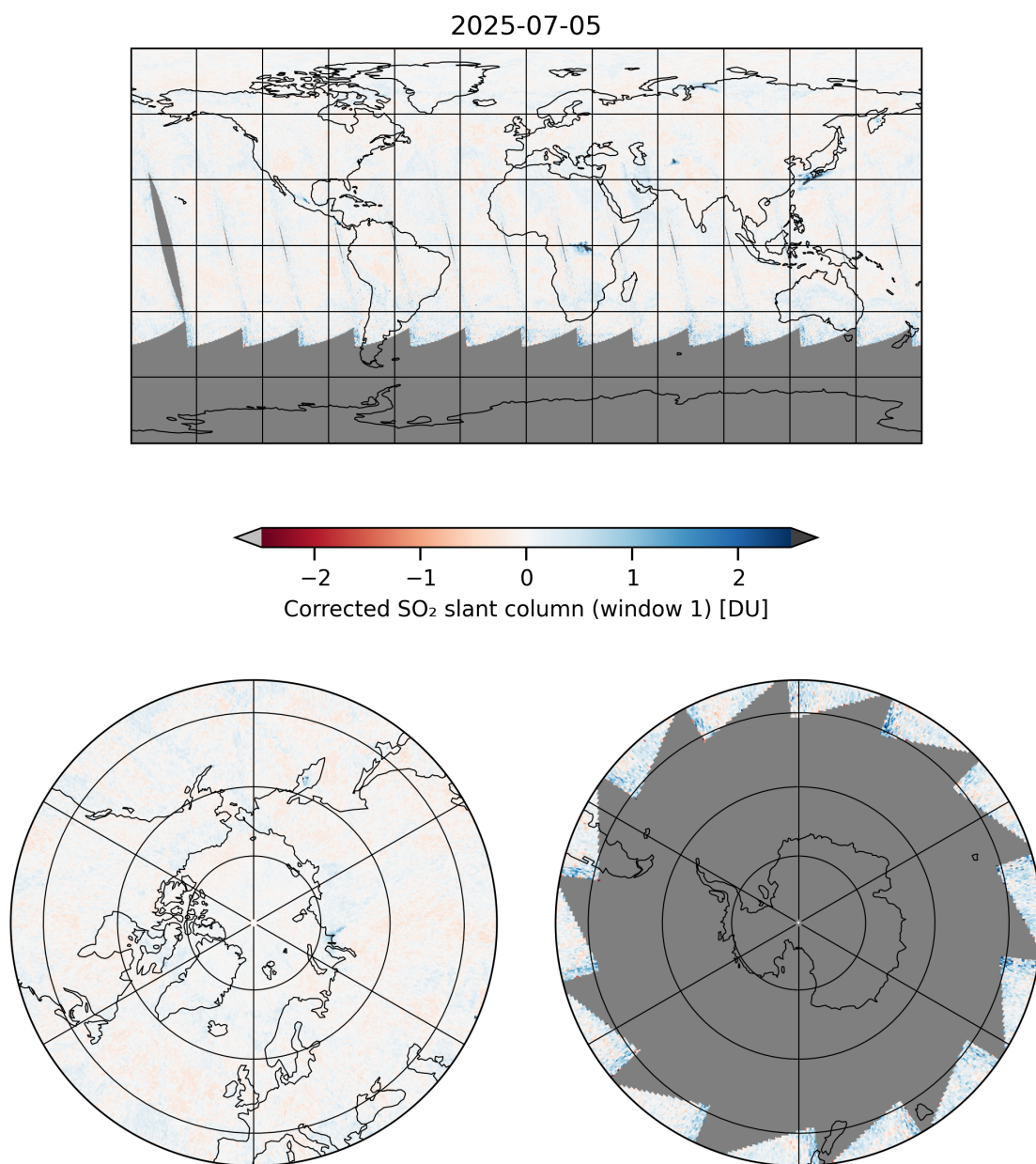


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-07-05 to 2025-07-06

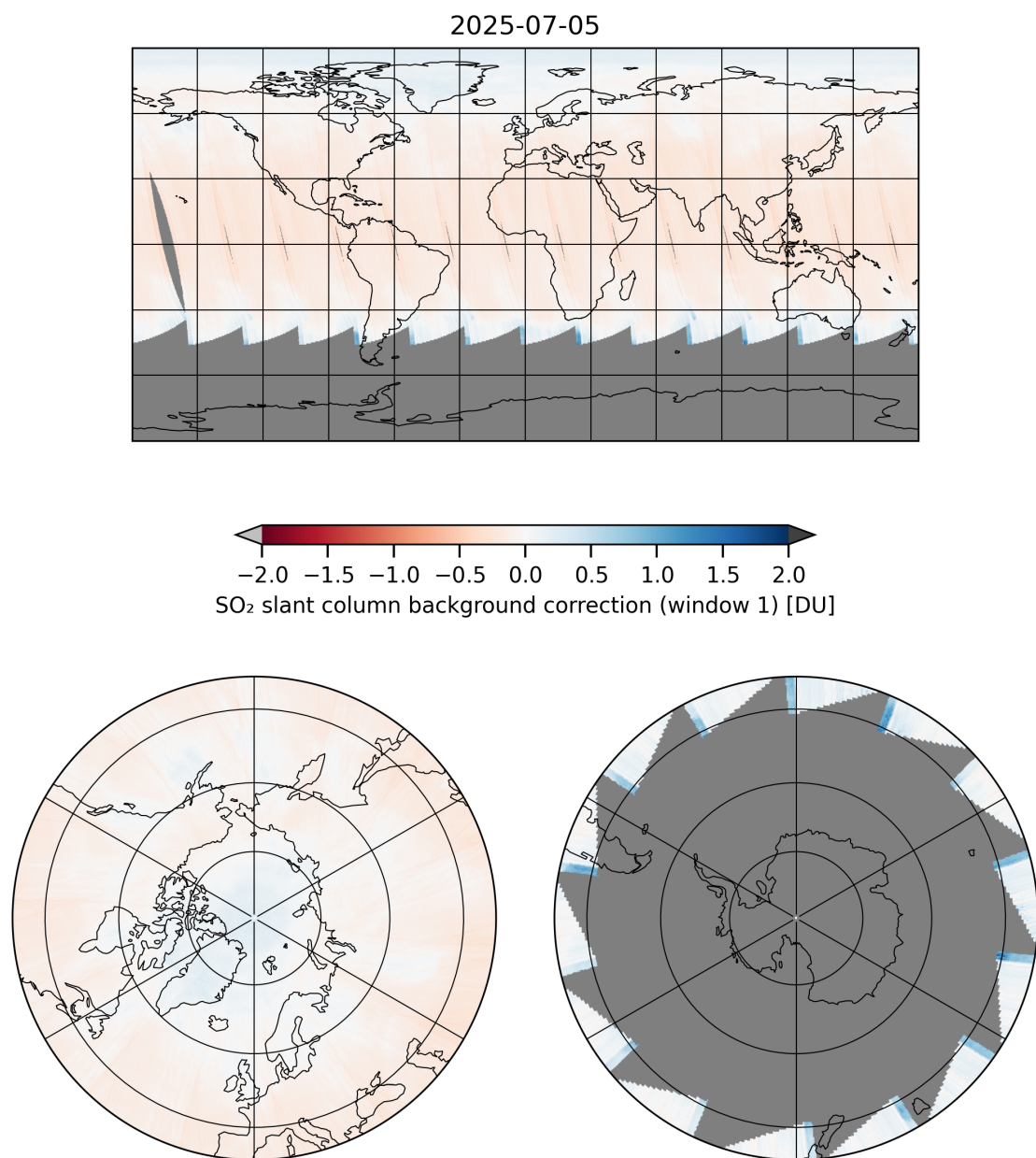


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-07-05 to 2025-07-06

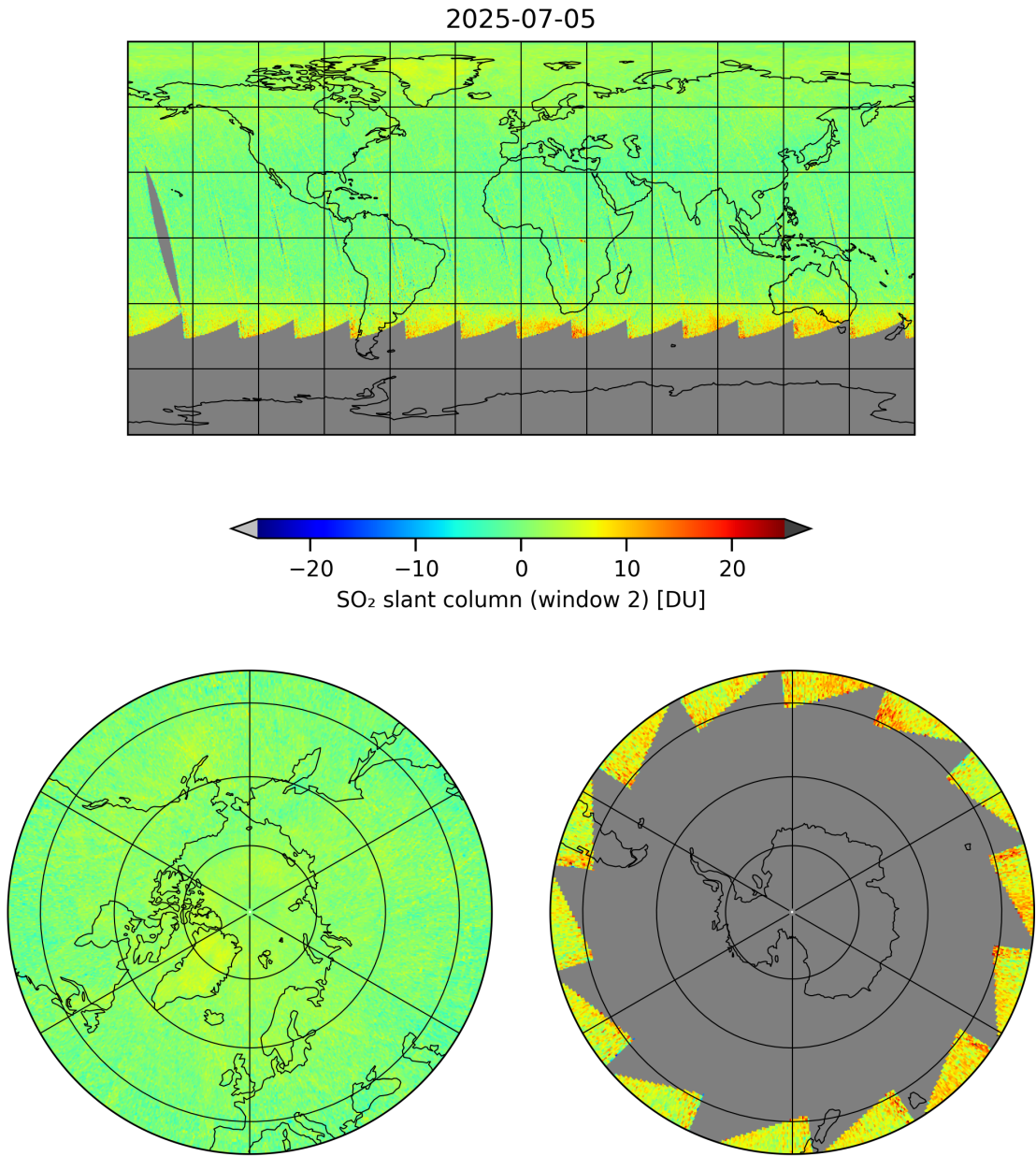


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-07-05 to 2025-07-06

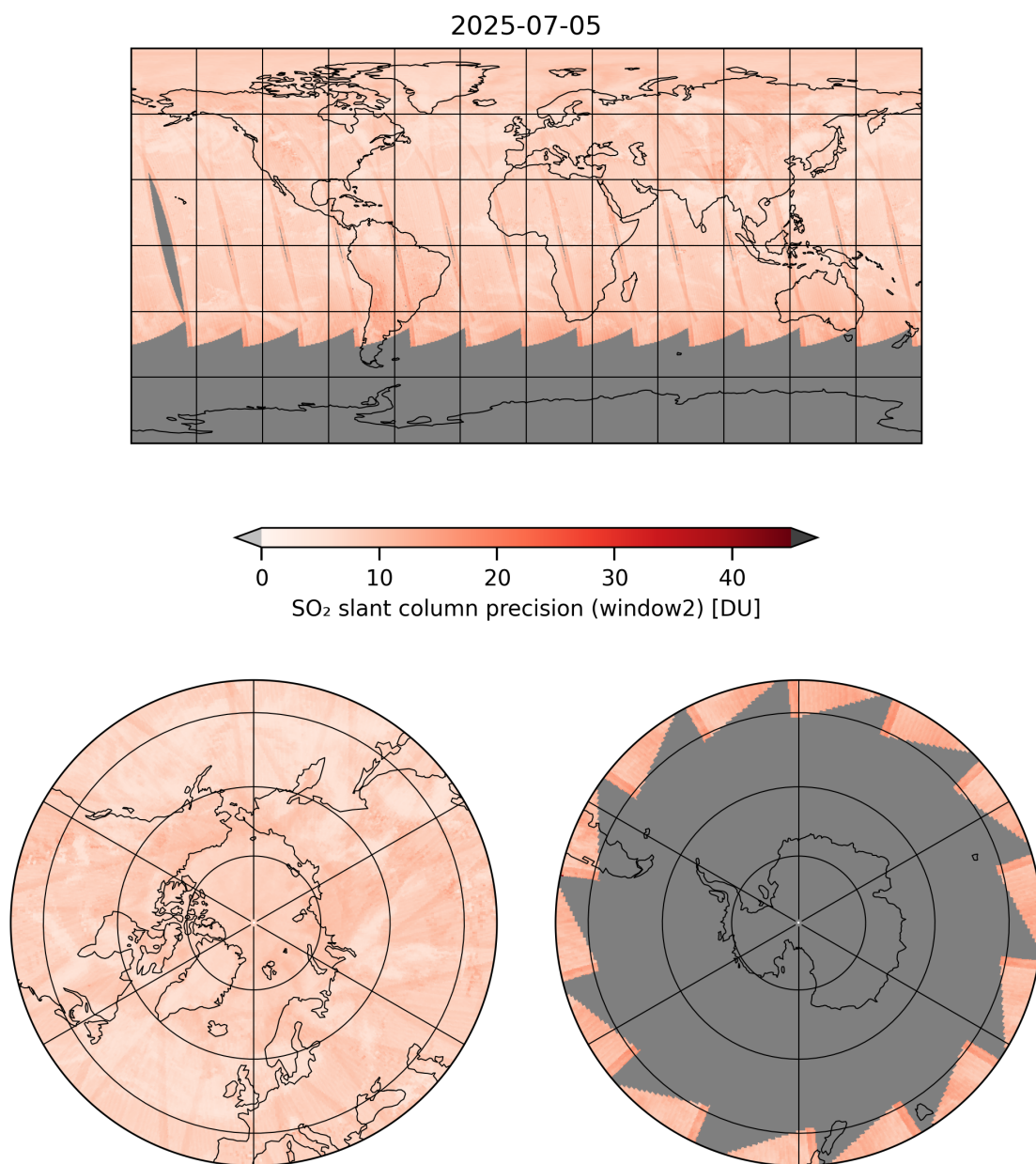


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-07-05 to 2025-07-06

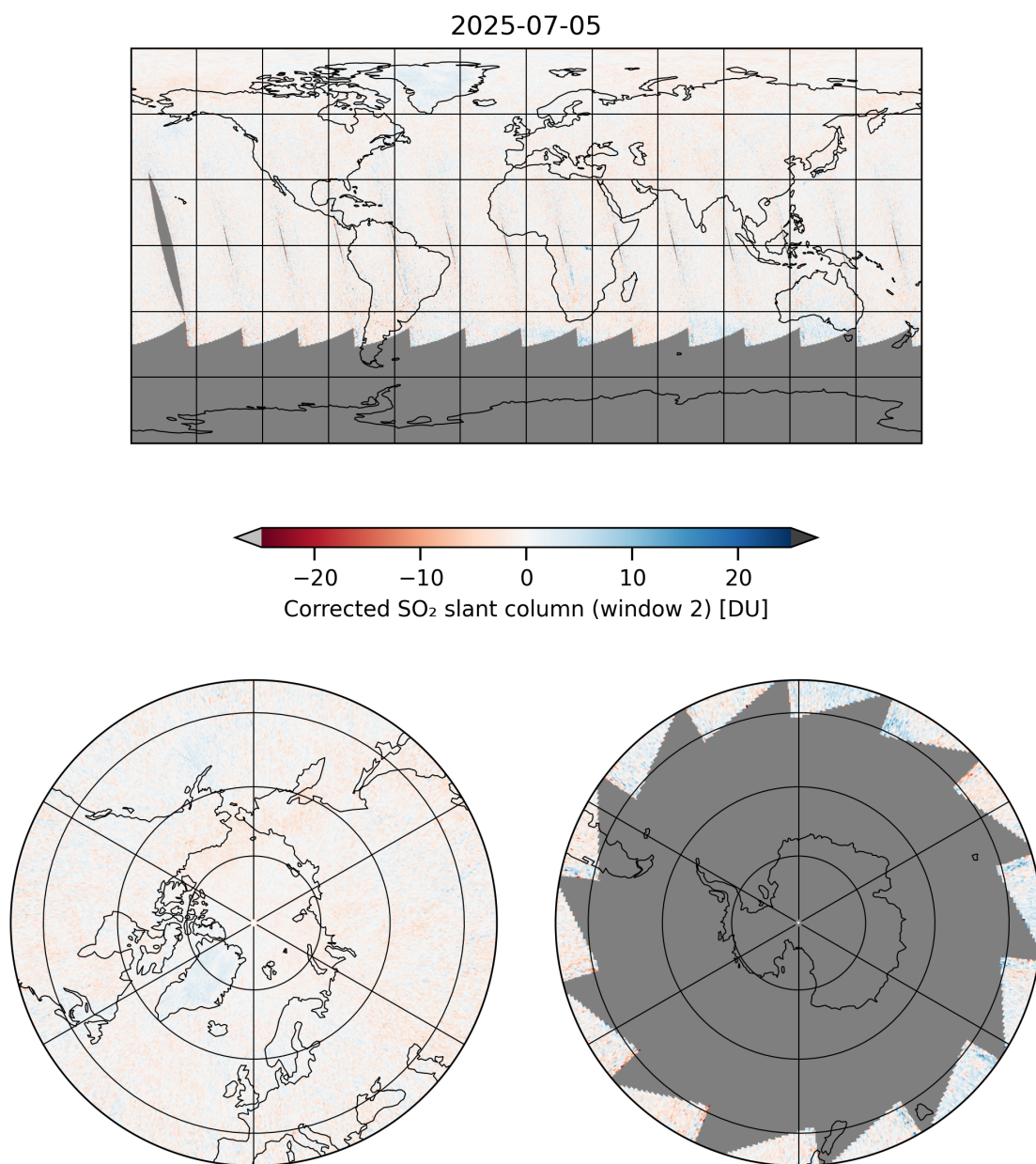


Figure 15: Map of "Corrected SO₂ slant column (window 2)" for 2025-07-05 to 2025-07-06

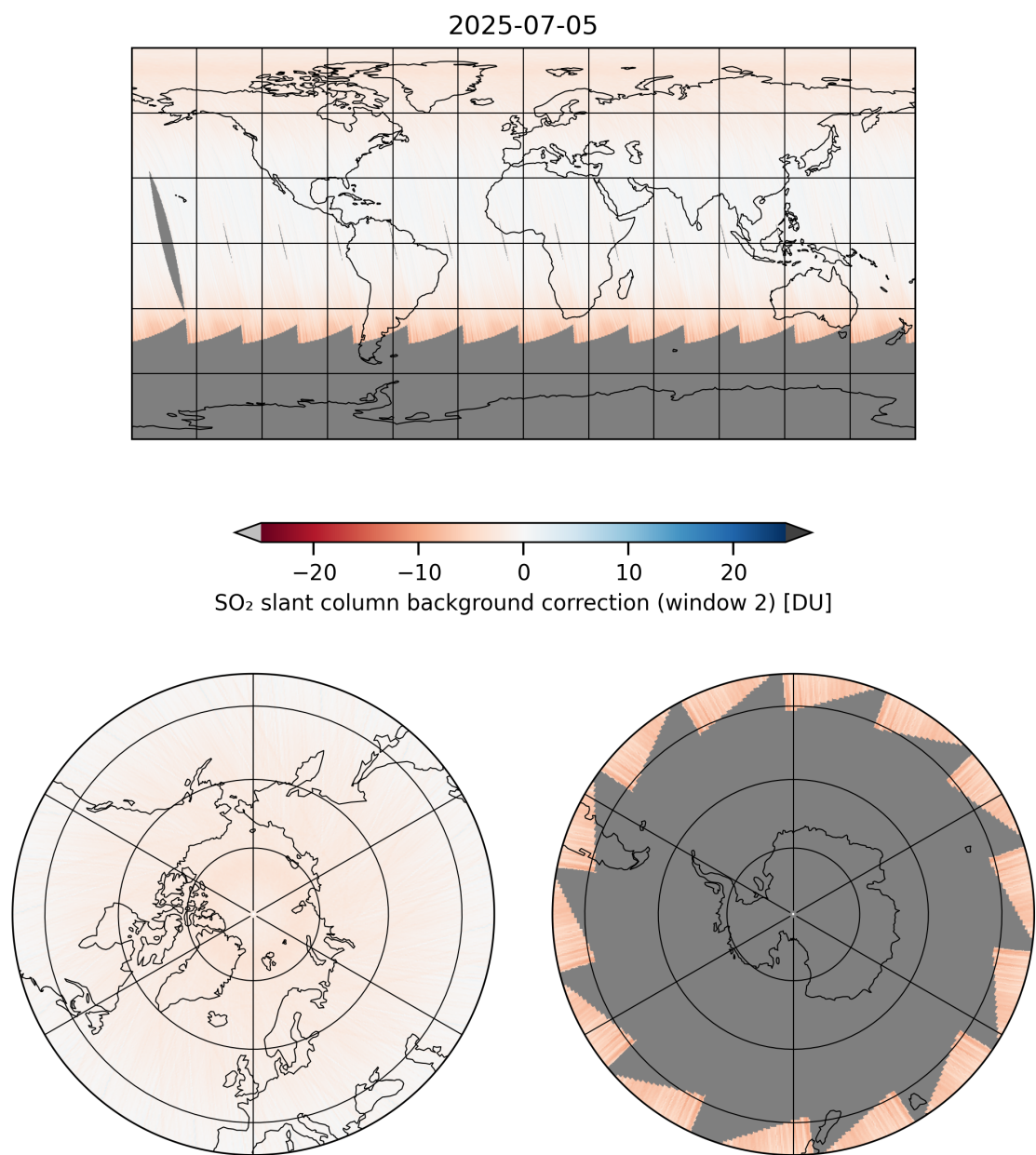


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-07-05 to 2025-07-06

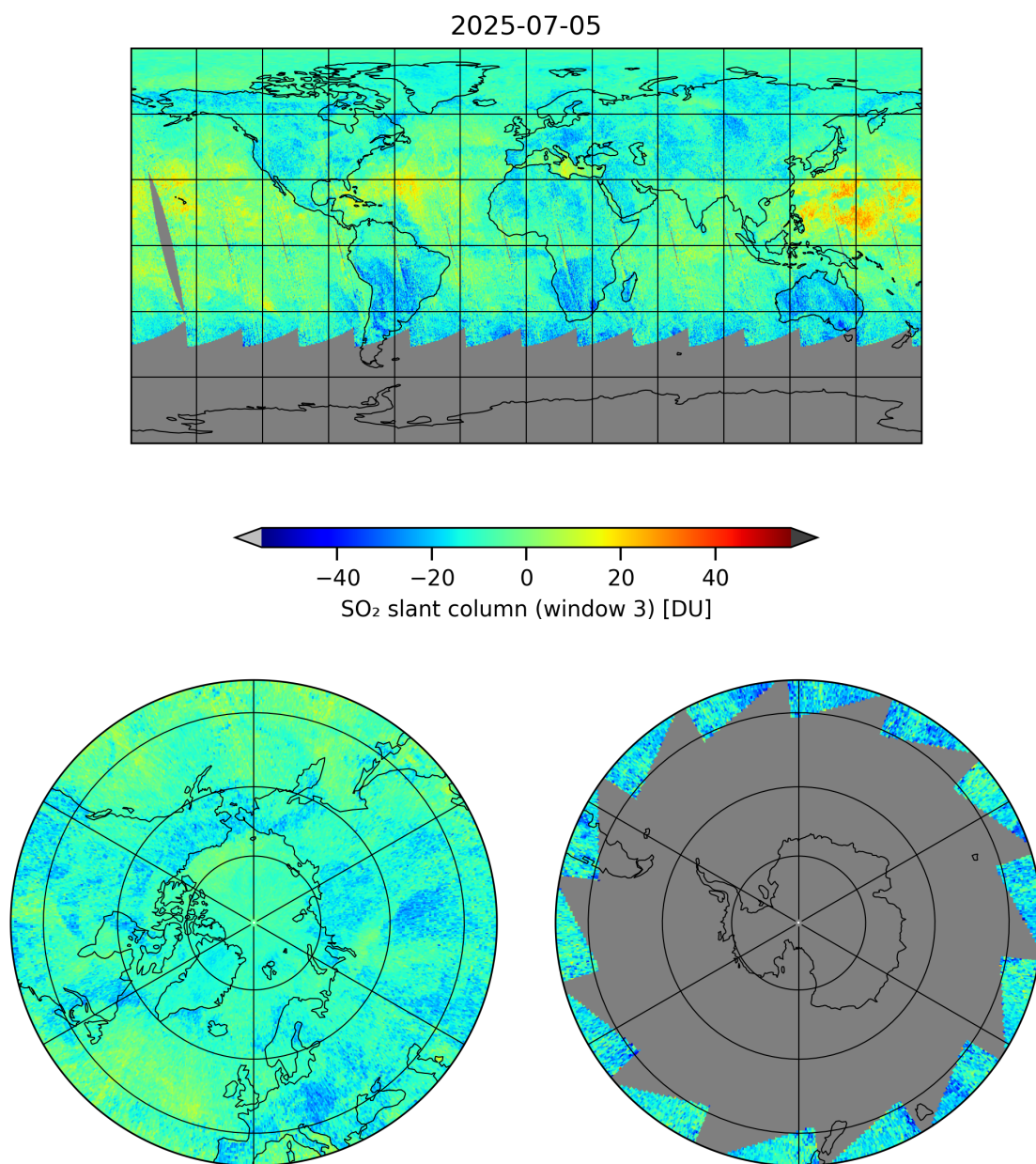


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-07-05 to 2025-07-06

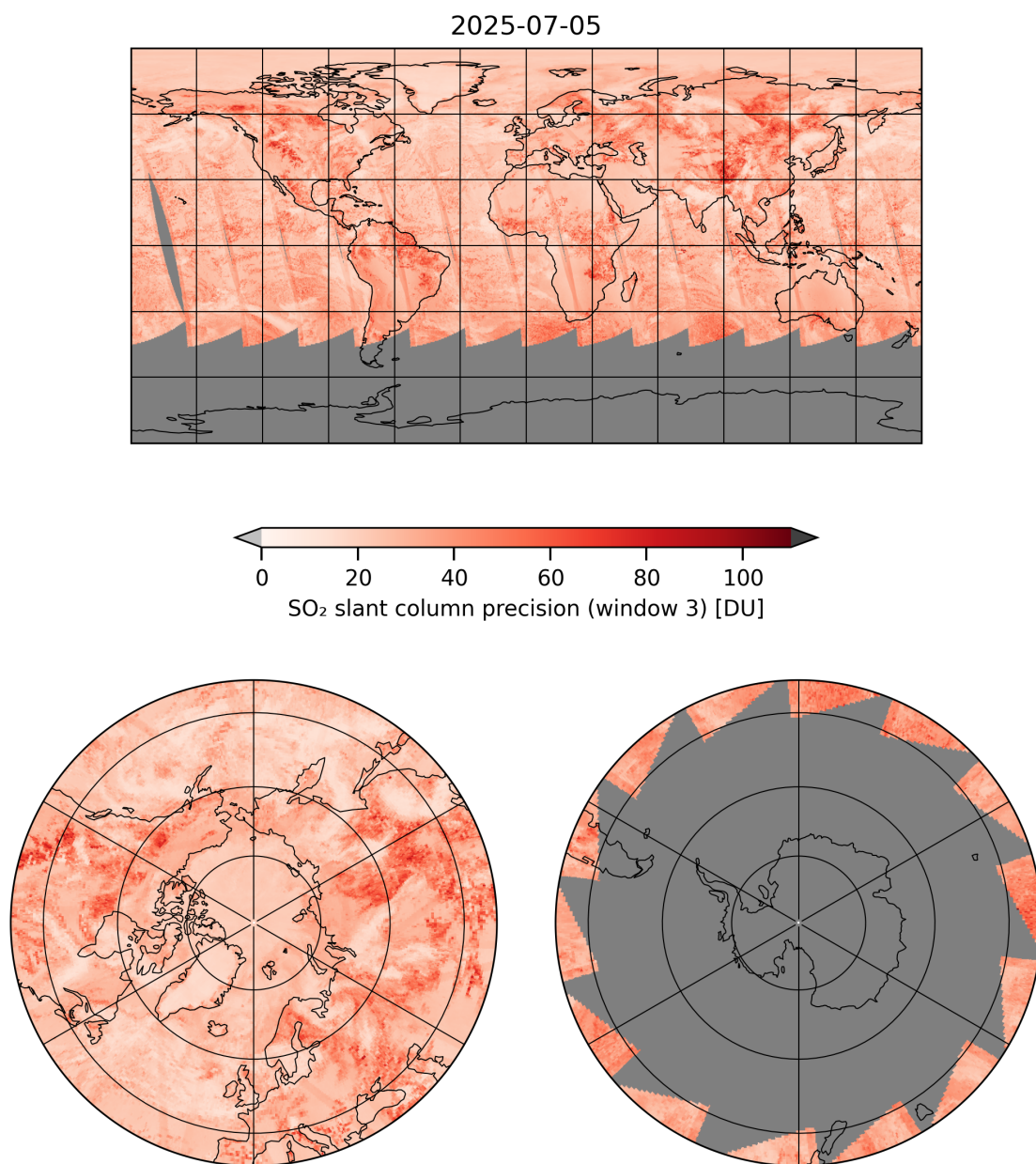


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-07-05 to 2025-07-06

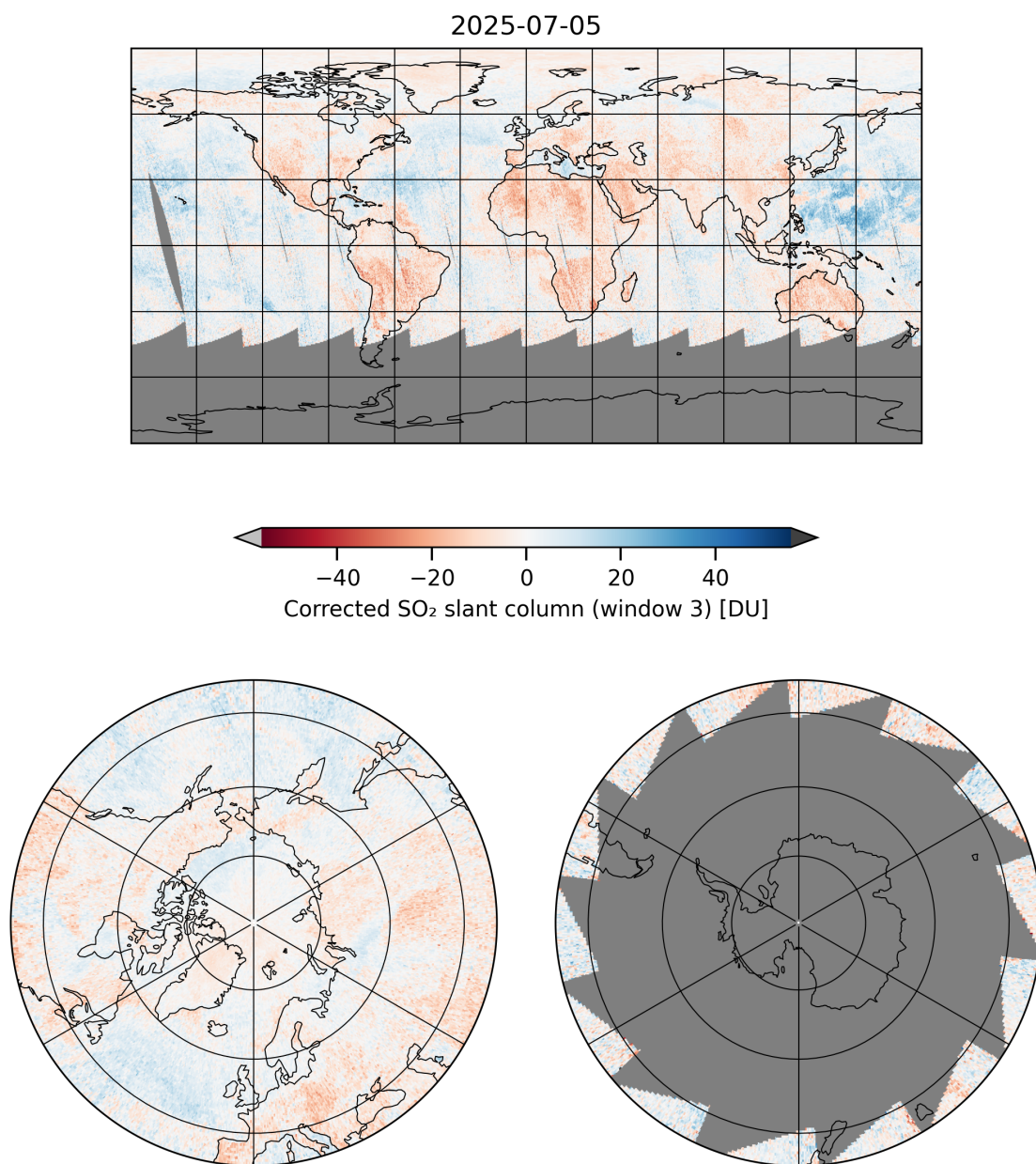


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-07-05 to 2025-07-06

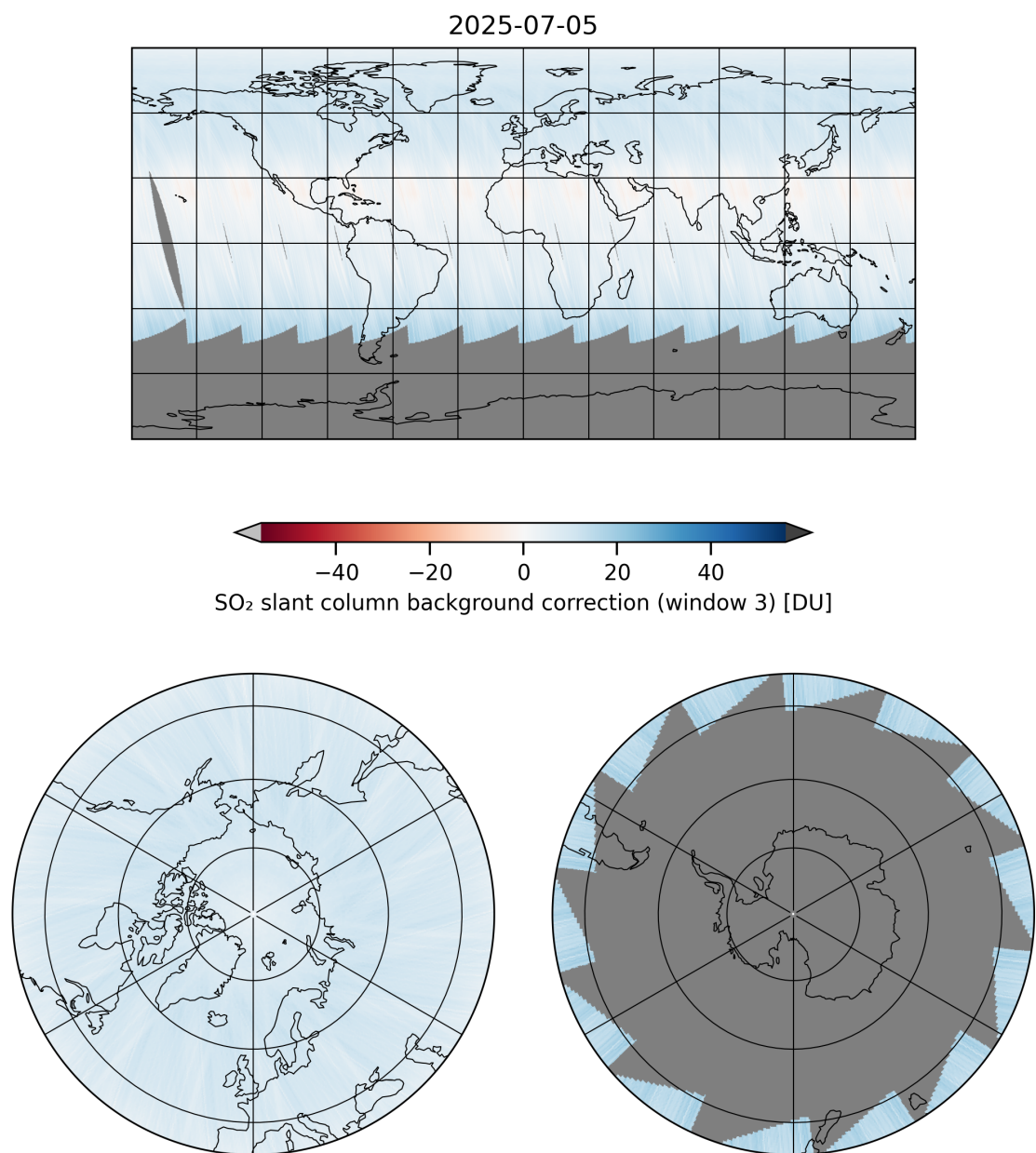


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-07-05 to 2025-07-06

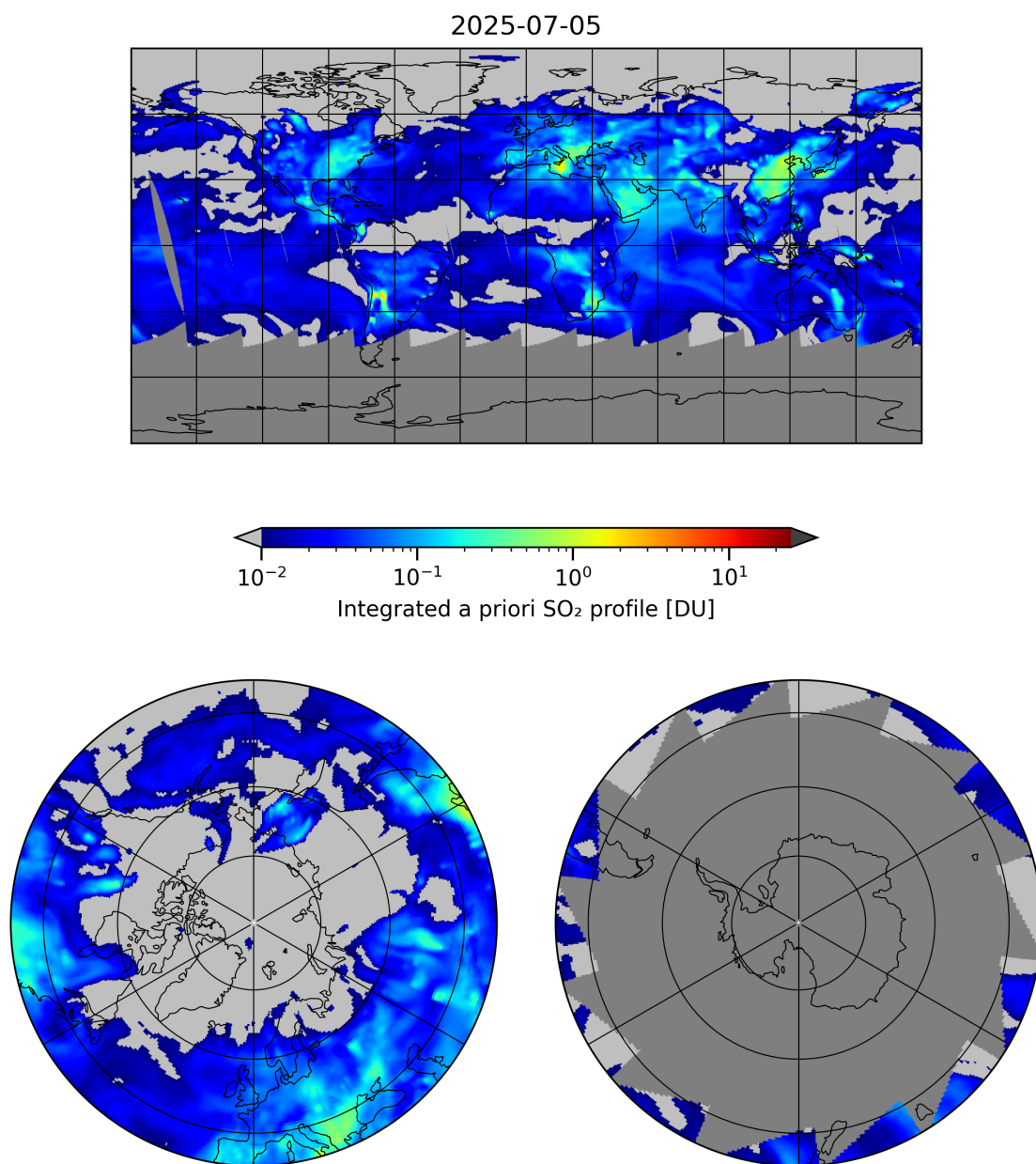


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-07-05 to 2025-07-06

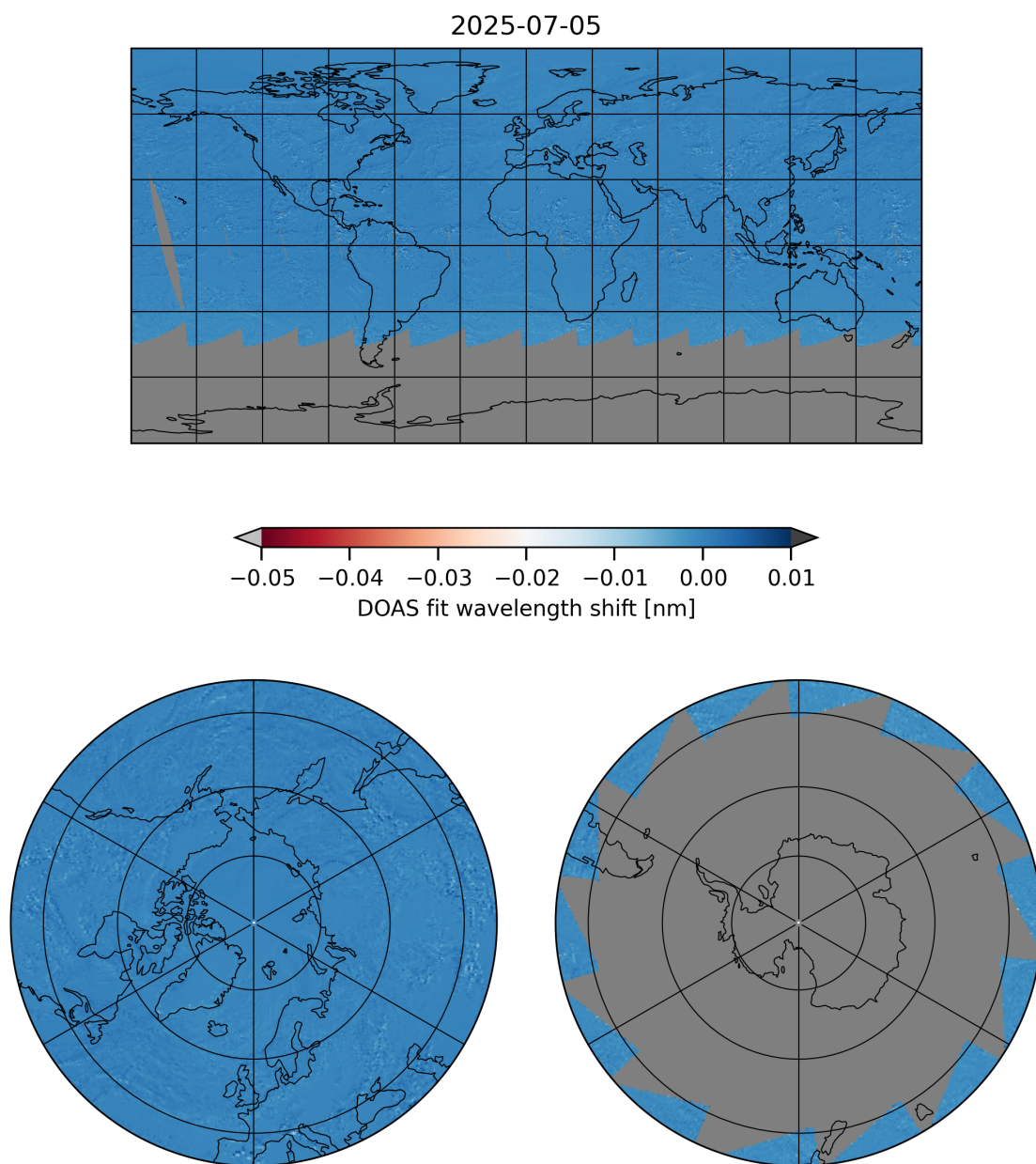


Figure 22: Map of “DOAS fit wavelength shift” for 2025-07-05 to 2025-07-06

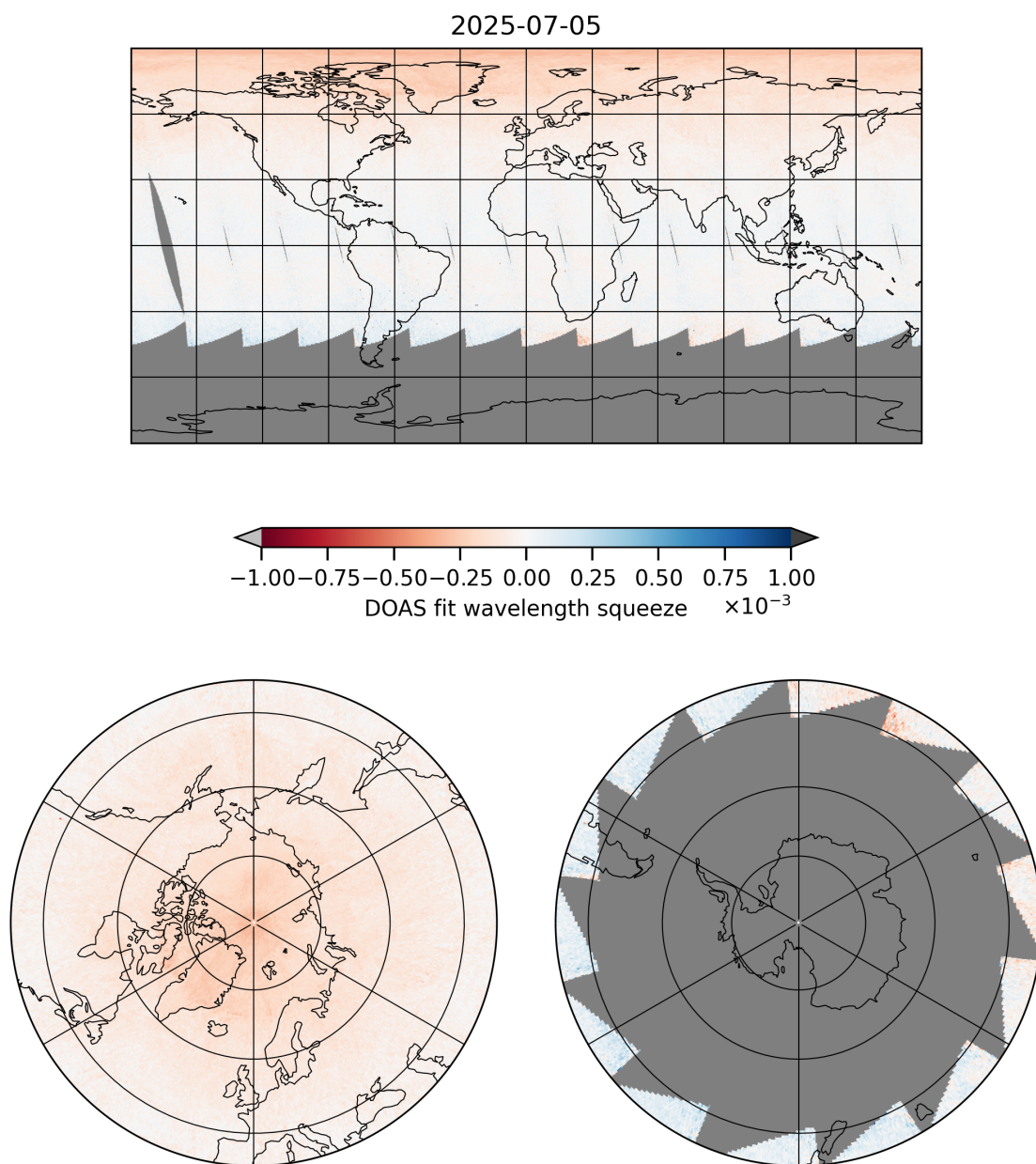


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-07-05 to 2025-07-06

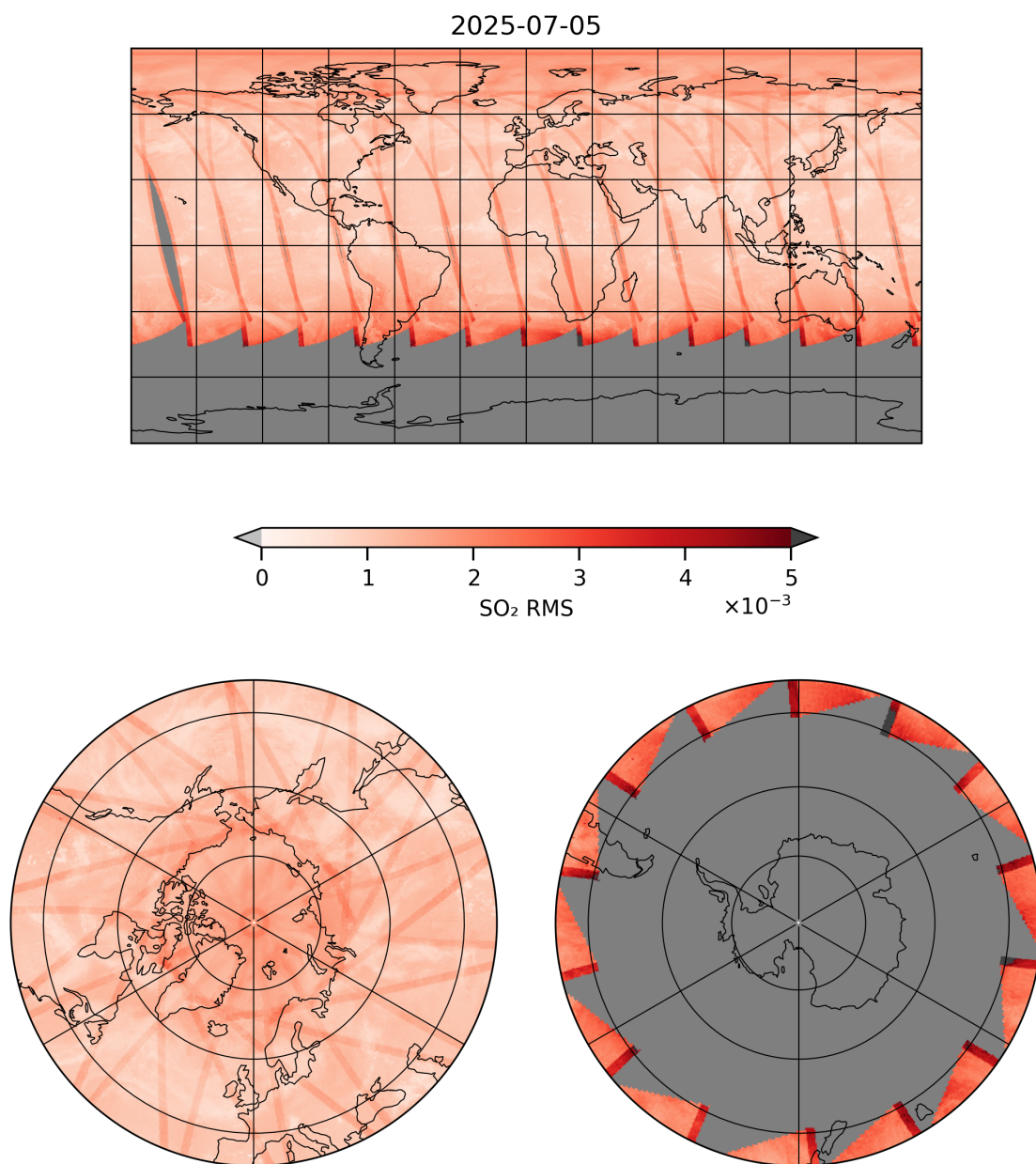


Figure 24: Map of “SO₂ RMS” for 2025-07-05 to 2025-07-06

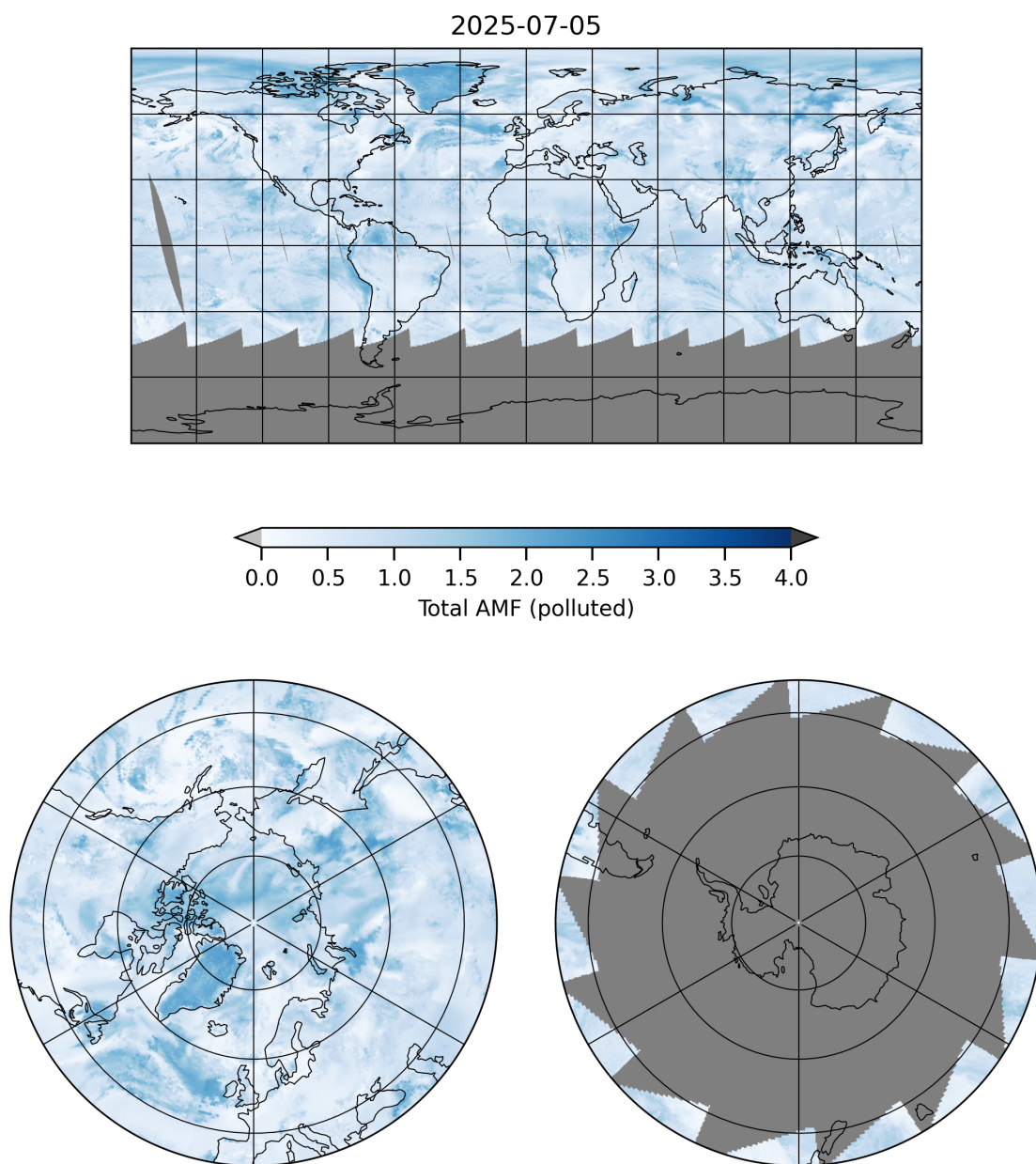


Figure 25: Map of “Total AMF (polluted)” for 2025-07-05 to 2025-07-06

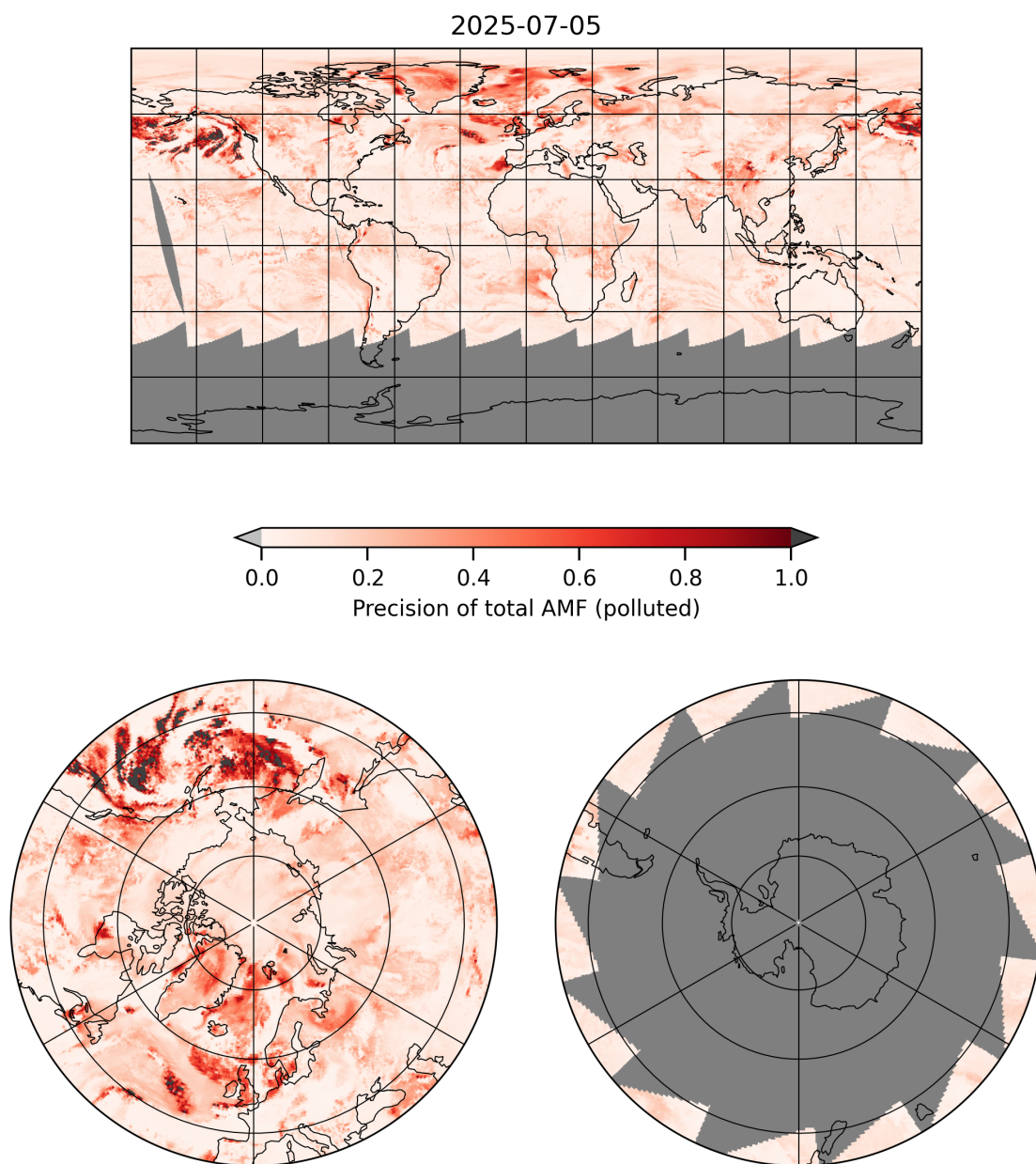


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-07-05 to 2025-07-06

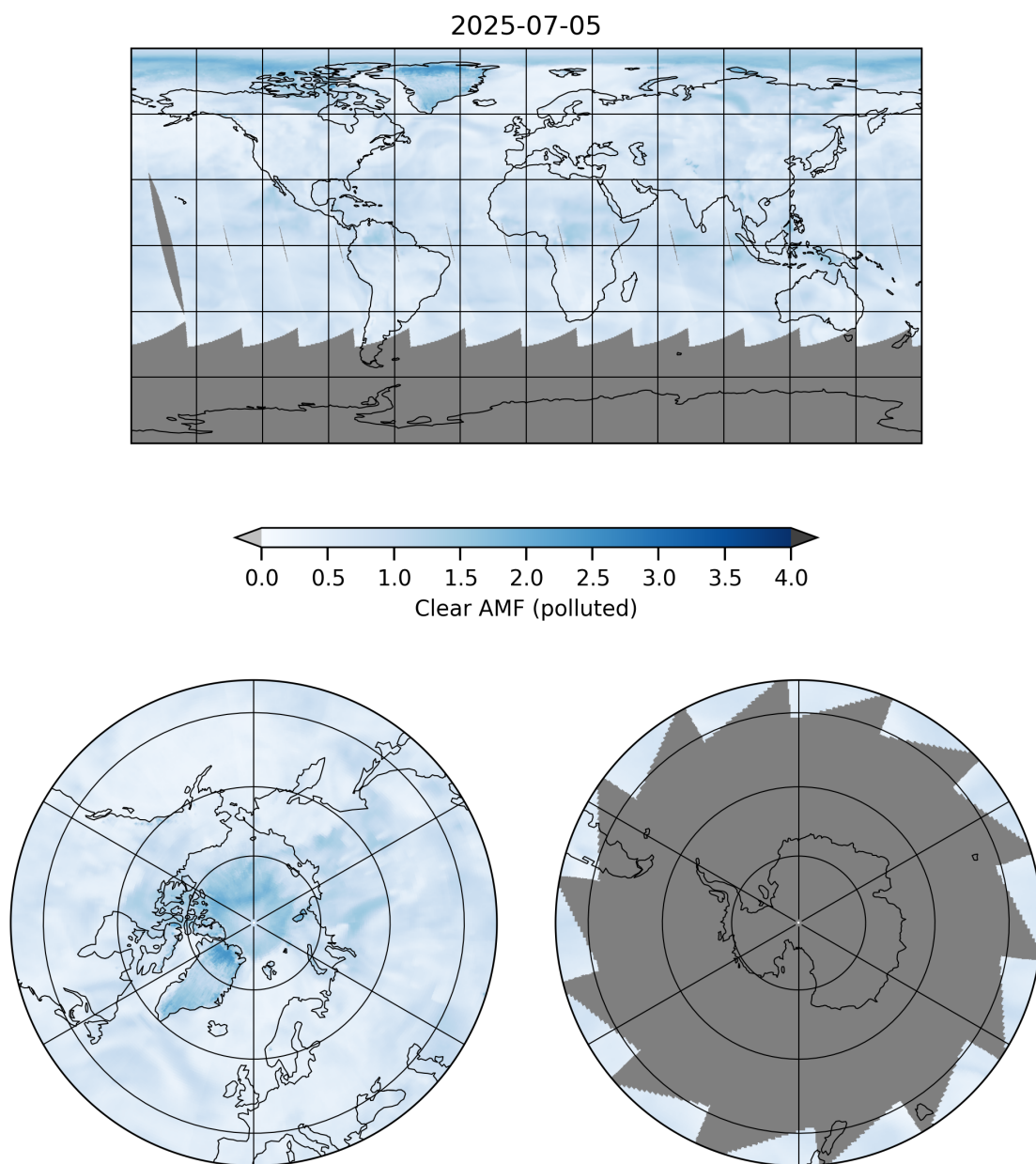


Figure 27: Map of “Clear AMF (polluted)” for 2025-07-05 to 2025-07-06

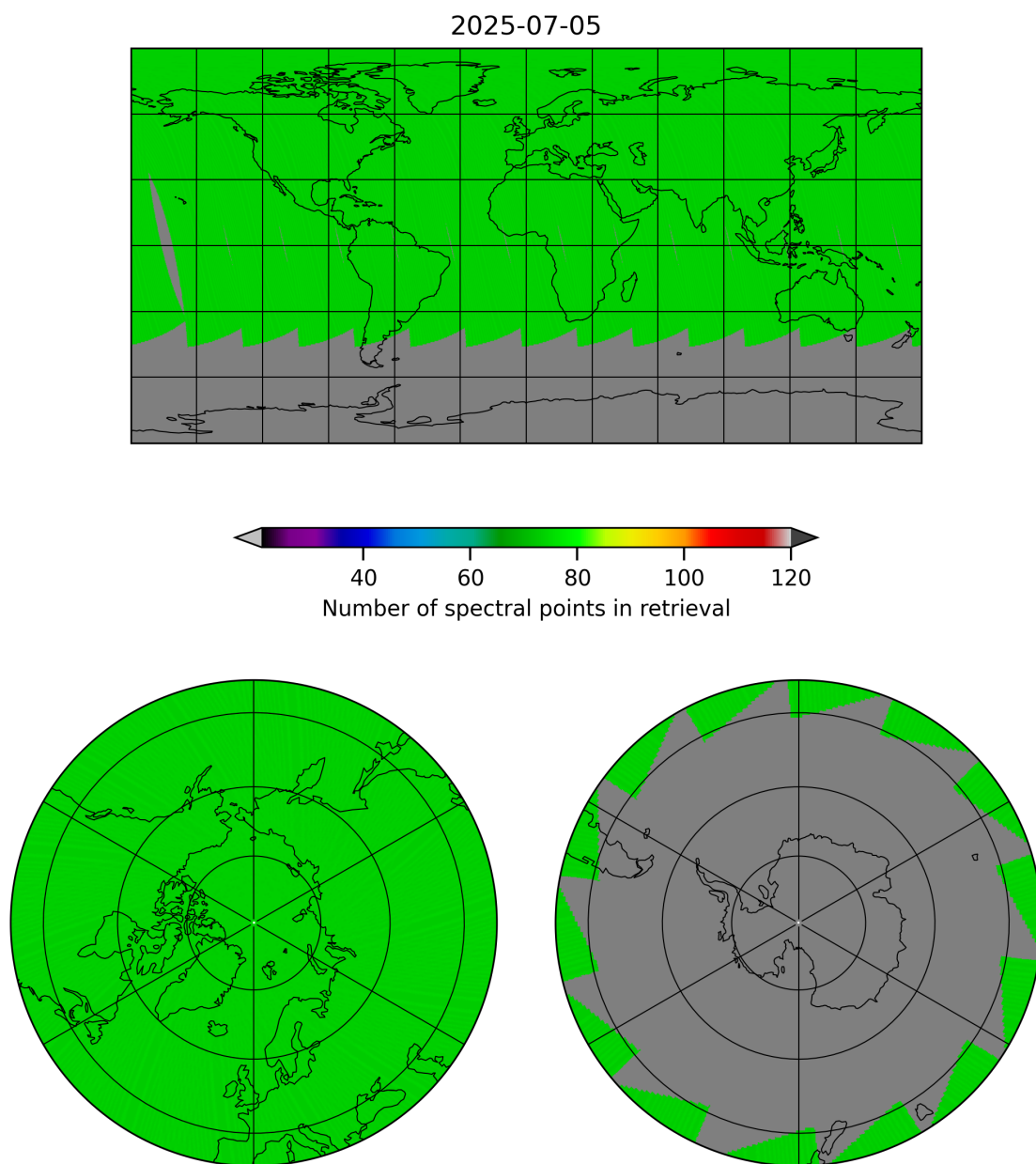


Figure 28: Map of “Number of spectral points in retrieval” for 2025-07-05 to 2025-07-06

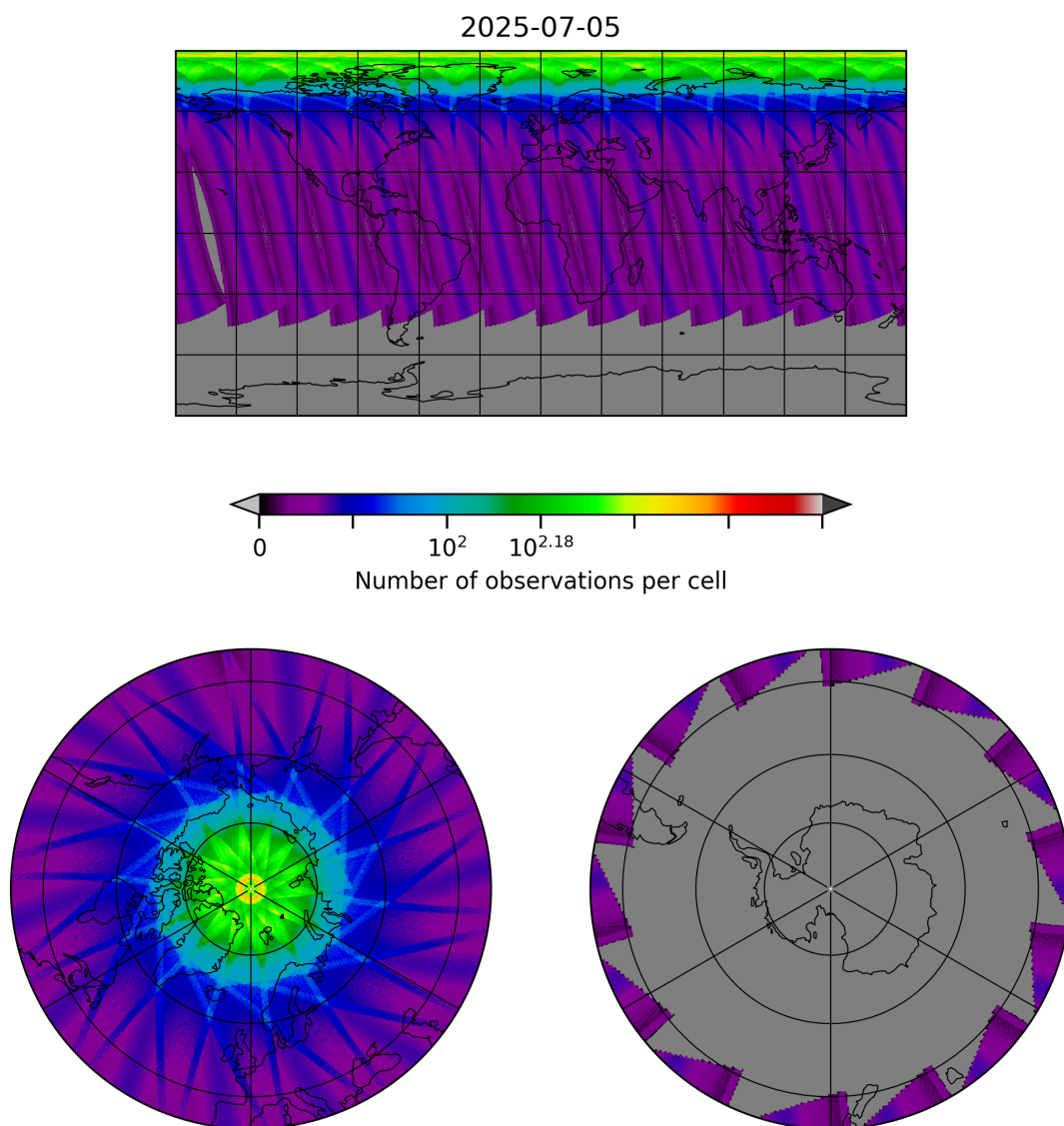


Figure 29: Map of the number of observations for 2025-07-05 to 2025-07-06

7 Zonal average

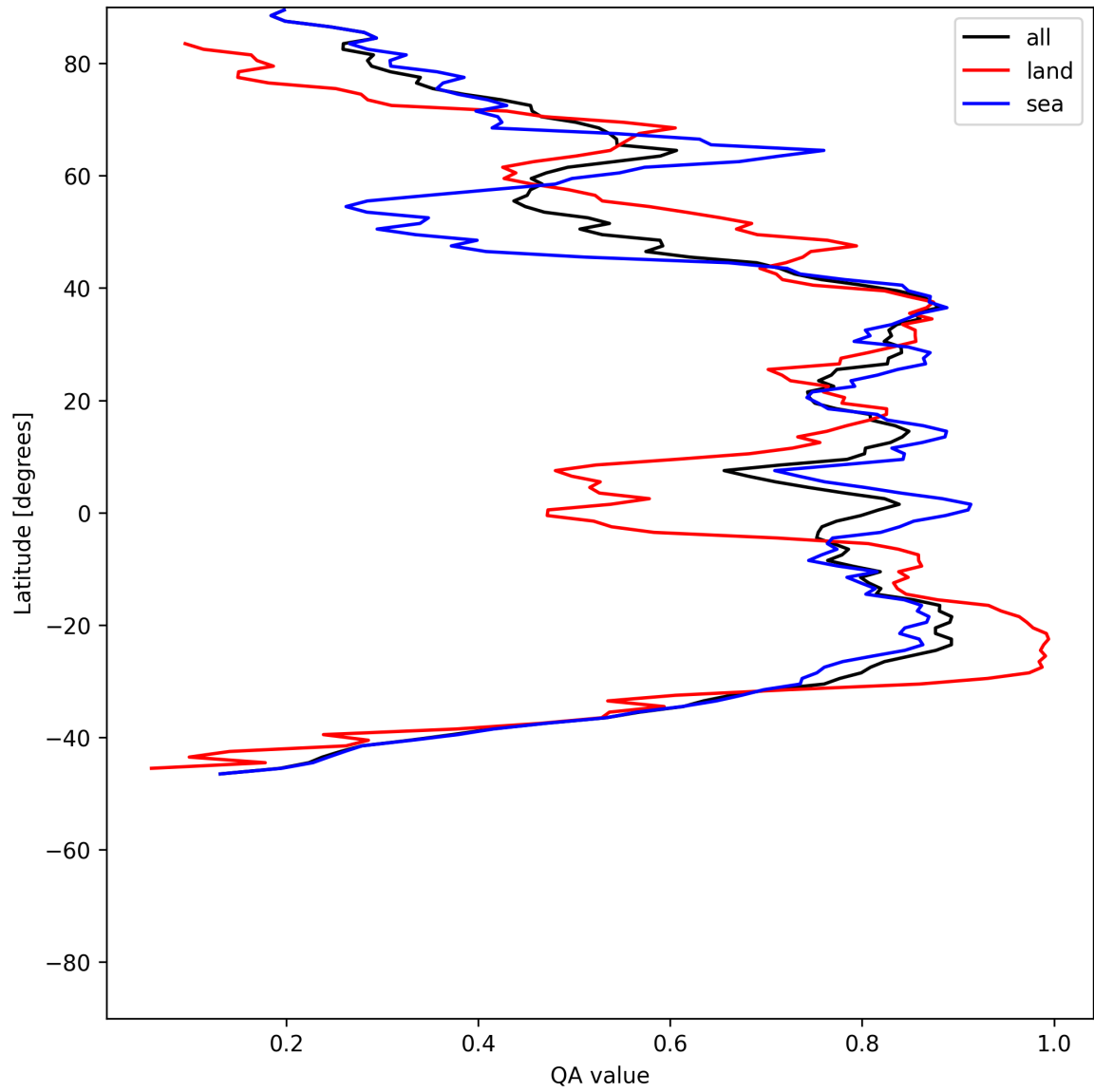
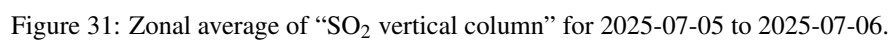


Figure 30: Zonal average of “QA value” for 2025-07-05 to 2025-07-06.



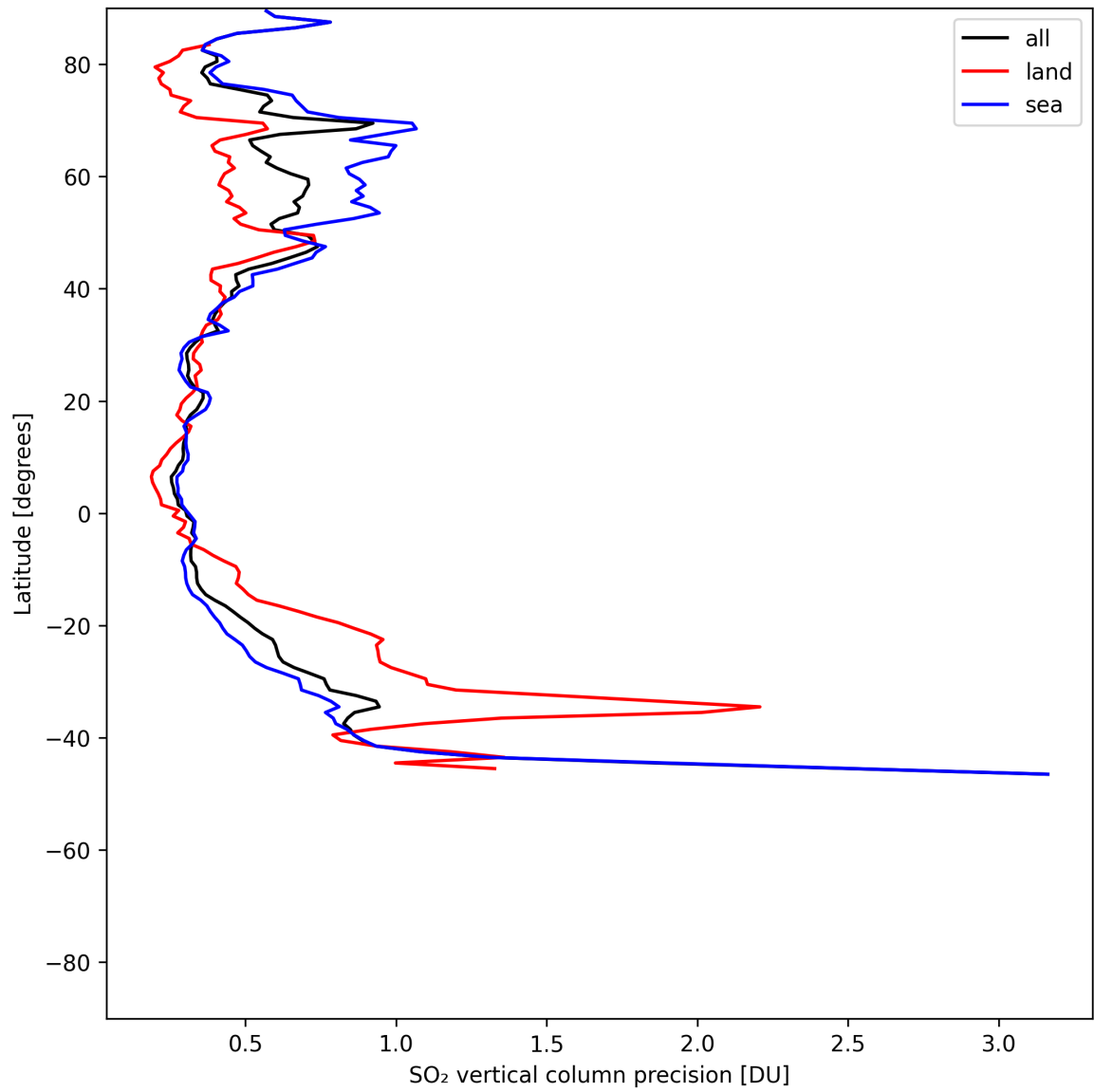


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-07-05 to 2025-07-06.

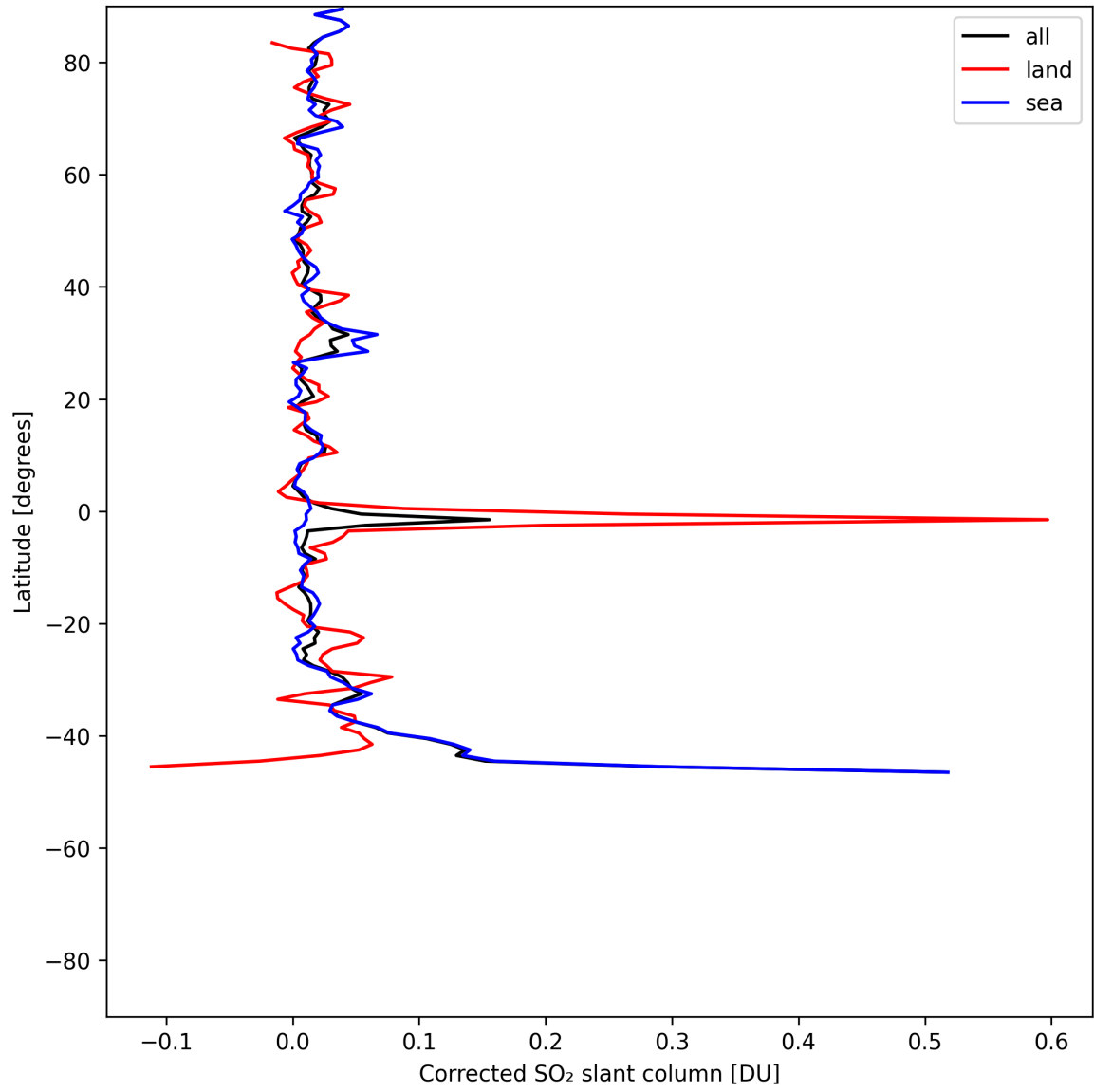


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-07-05 to 2025-07-06.

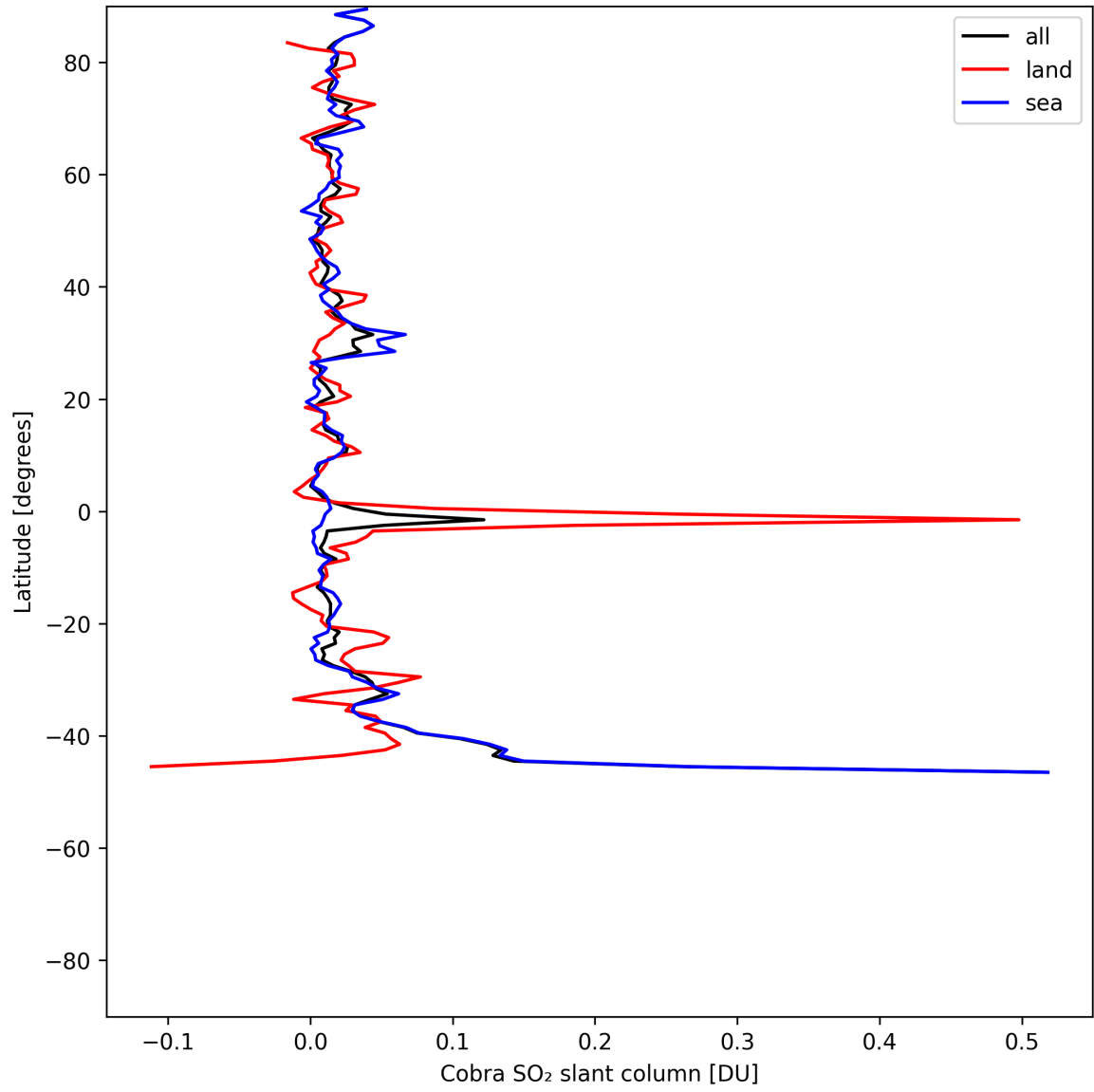


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-07-05 to 2025-07-06.

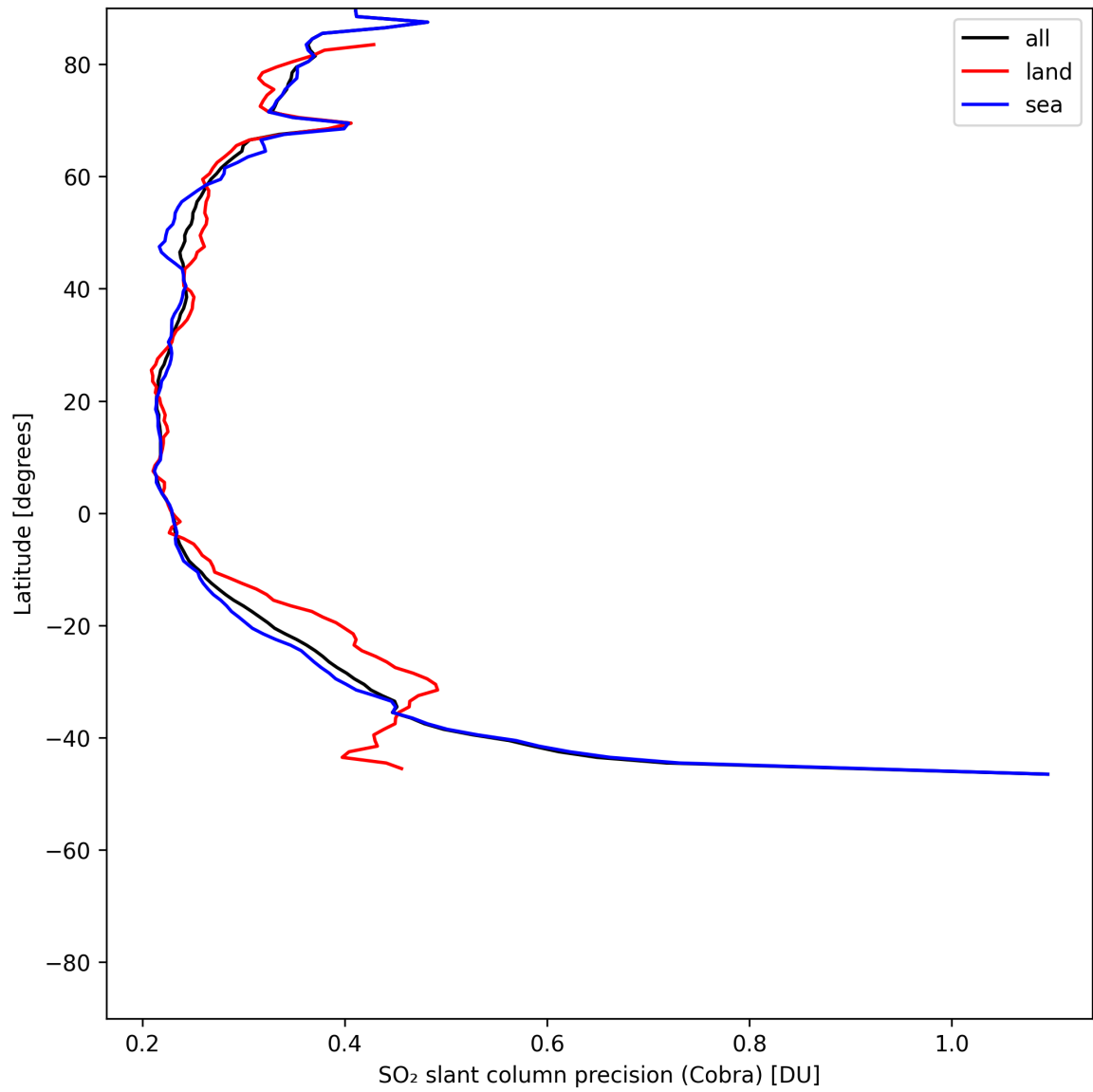


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-07-05 to 2025-07-06.

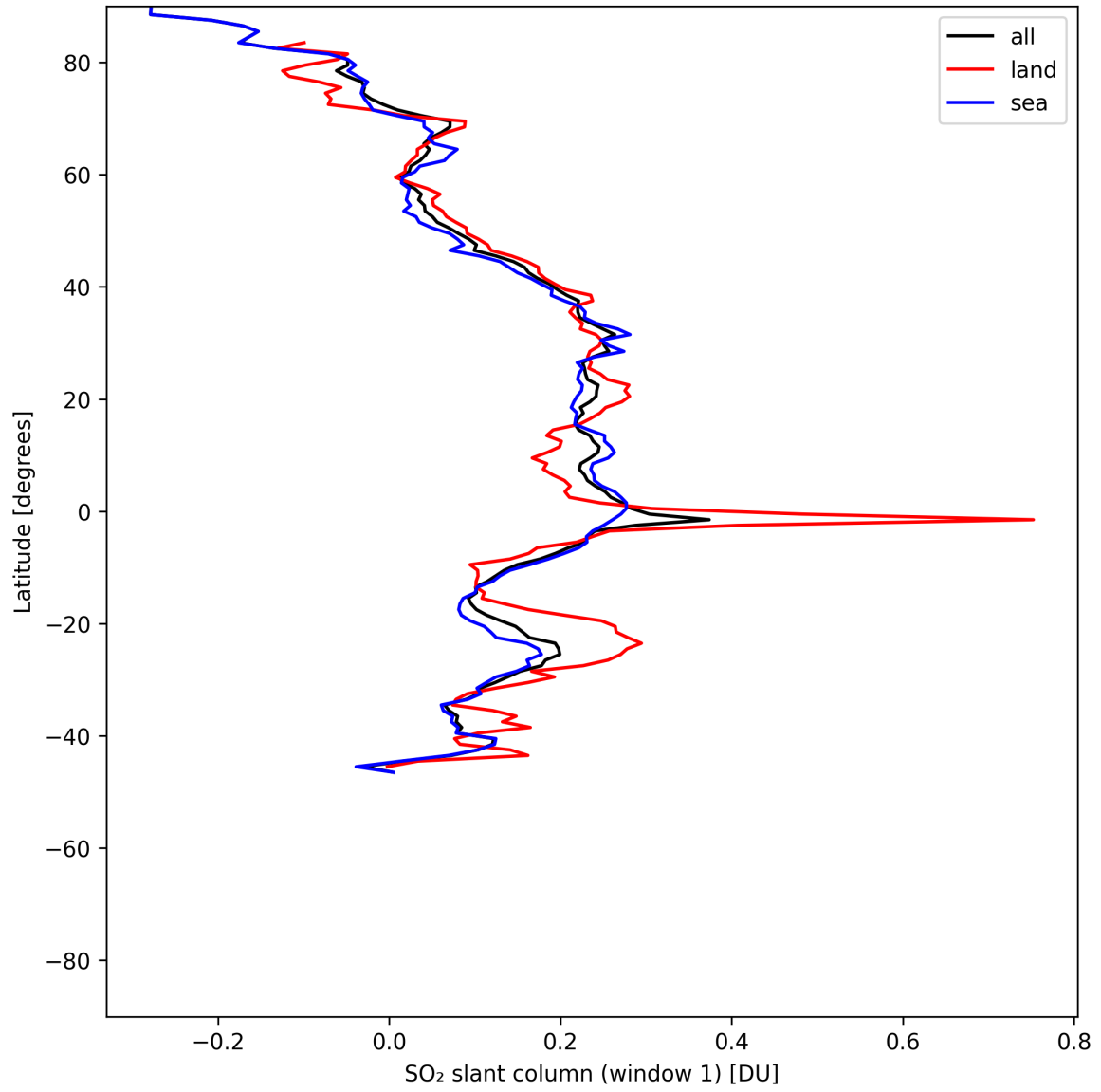


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-07-05 to 2025-07-06.

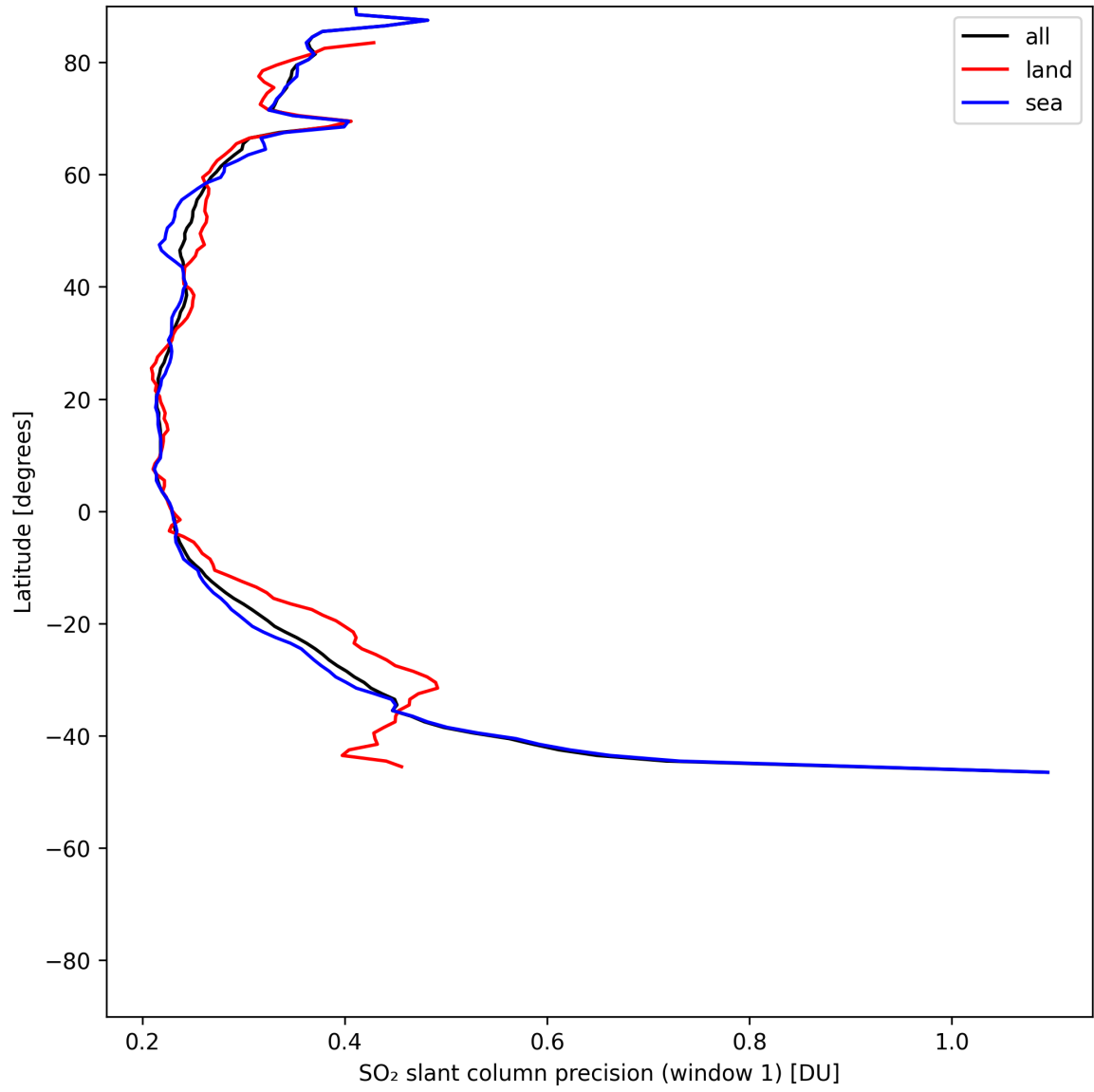


Figure 37: Zonal average of "SO₂ slant column precision (window 1)" for 2025-07-05 to 2025-07-06.

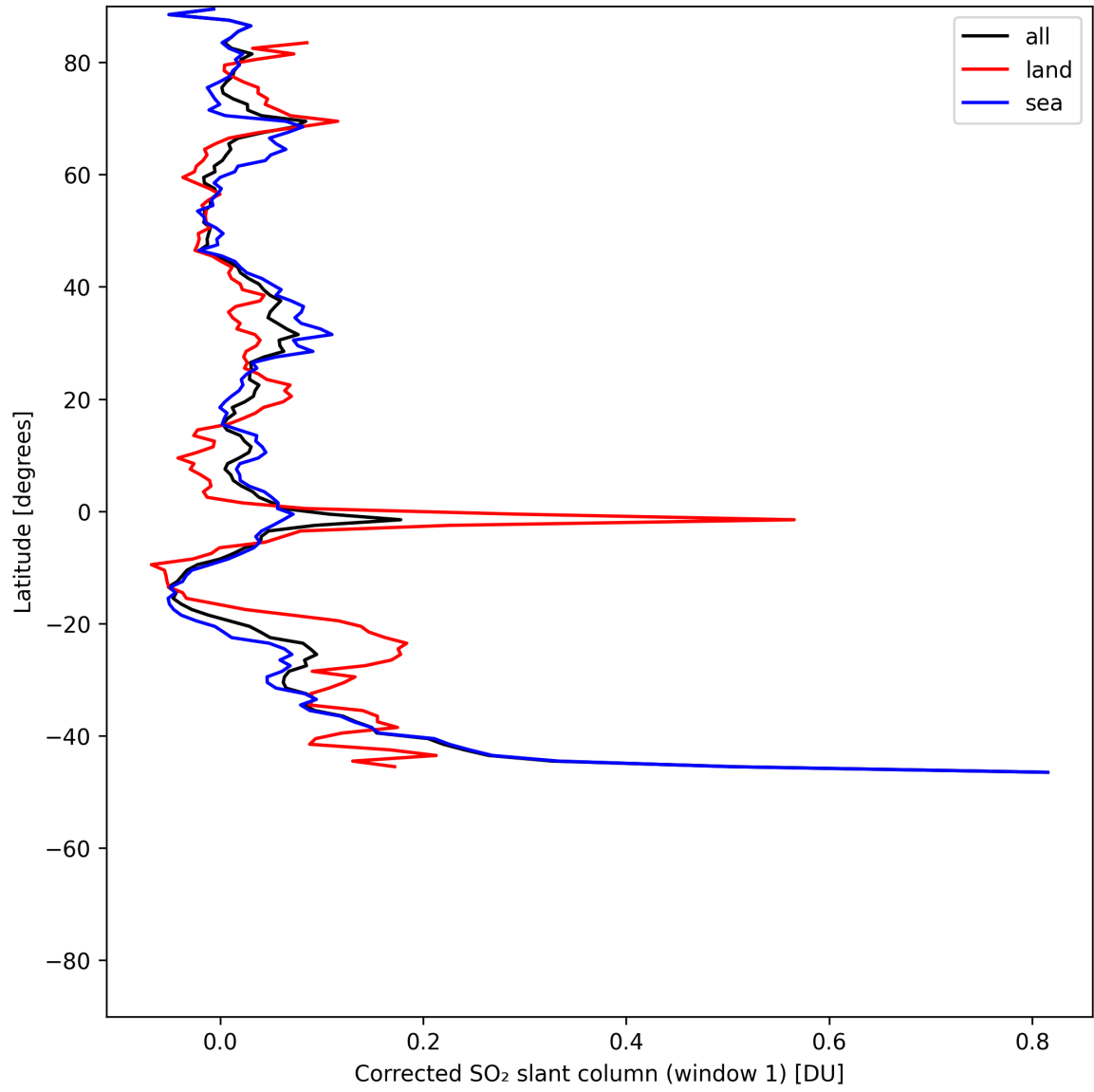


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-07-05 to 2025-07-06.

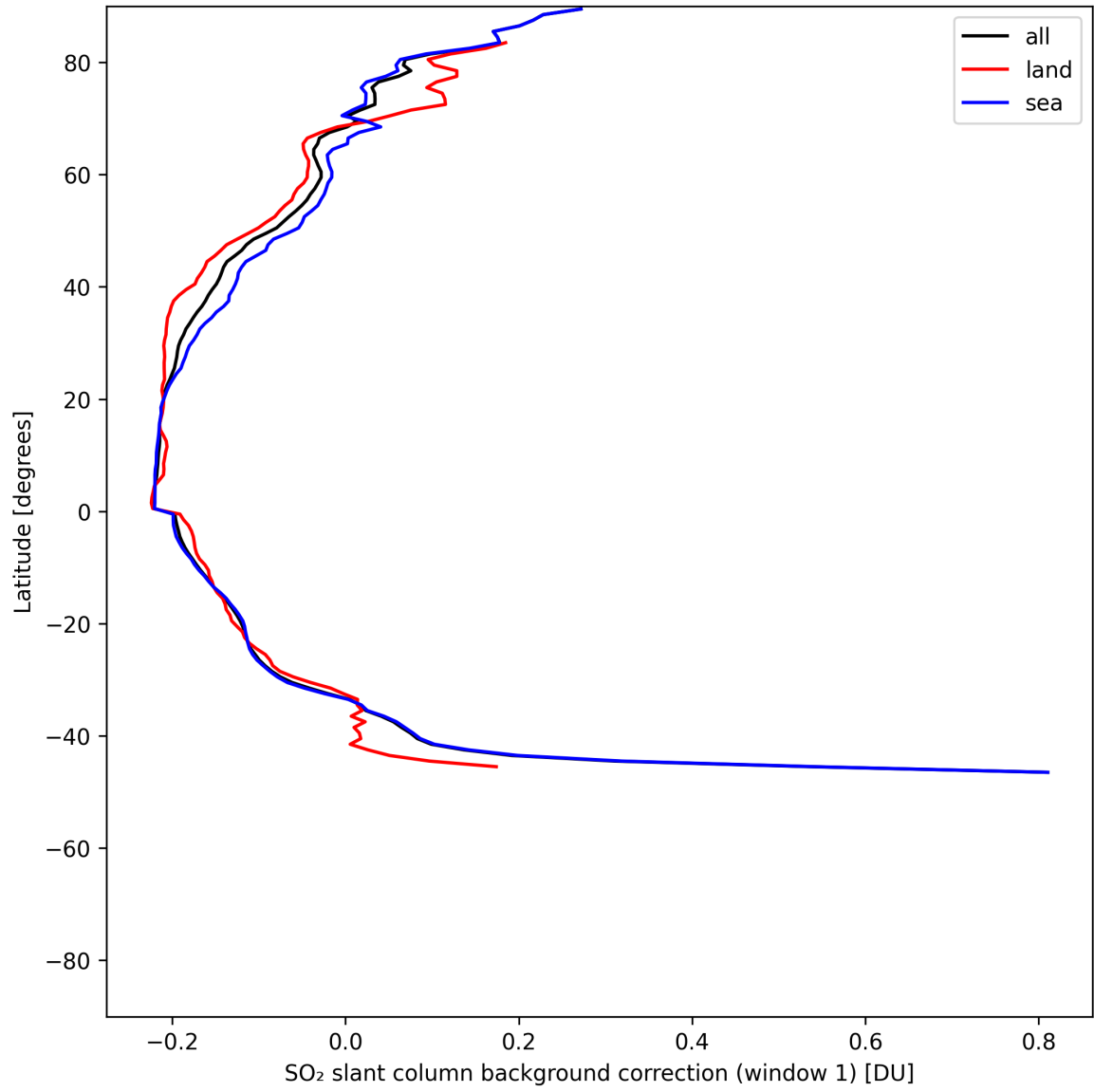


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-07-05 to 2025-07-06.

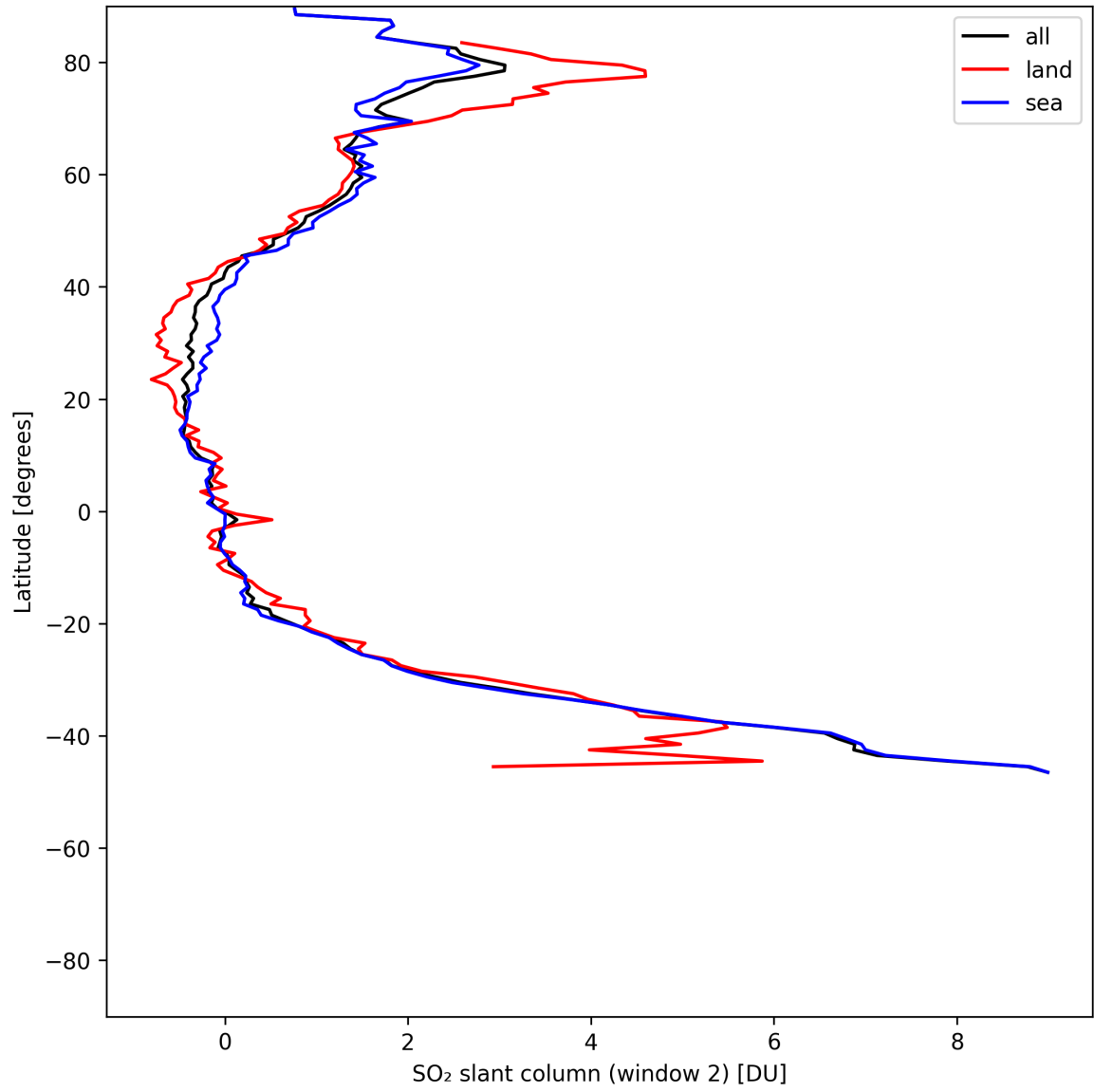


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-07-05 to 2025-07-06.

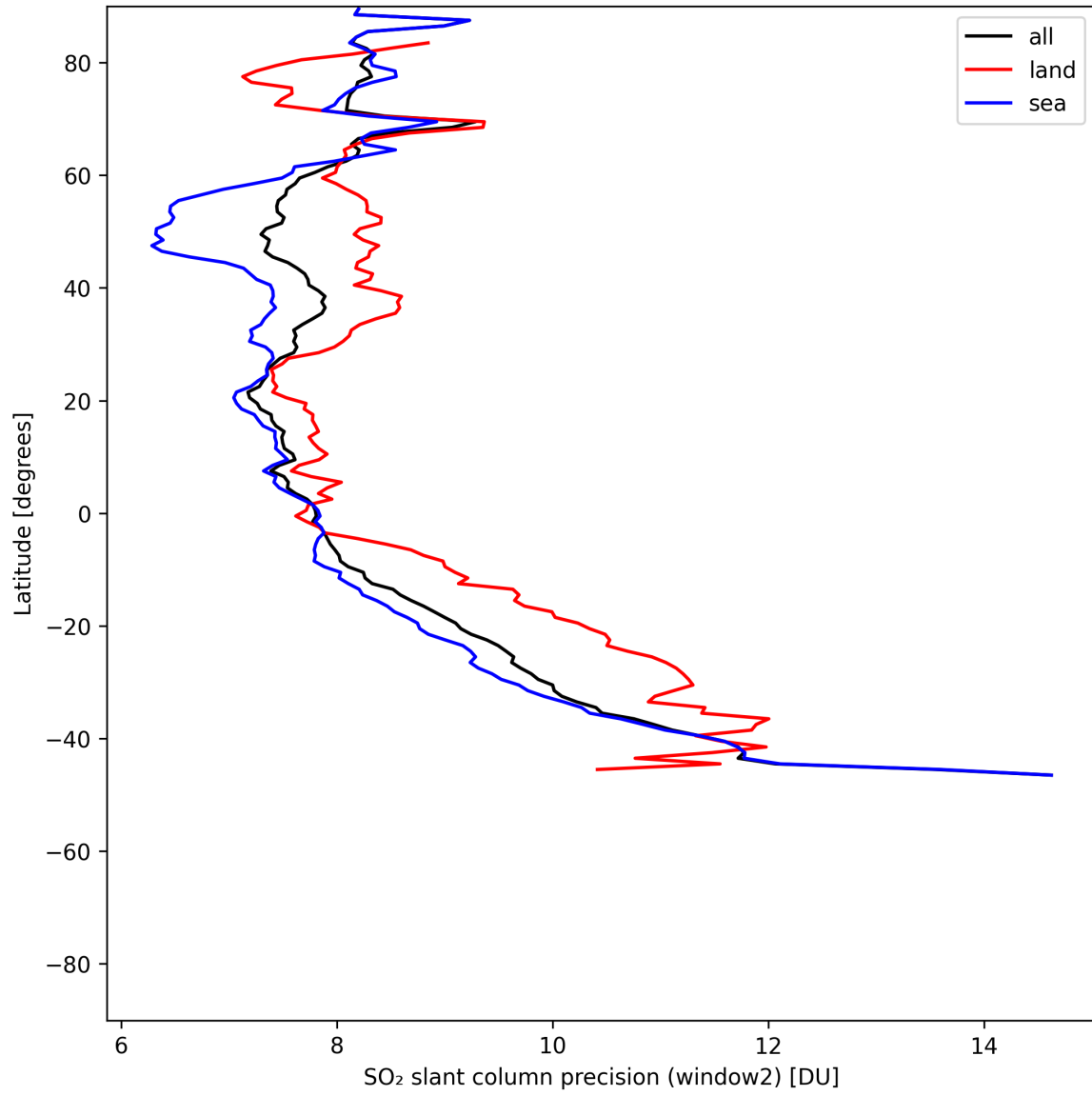


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-07-05 to 2025-07-06.

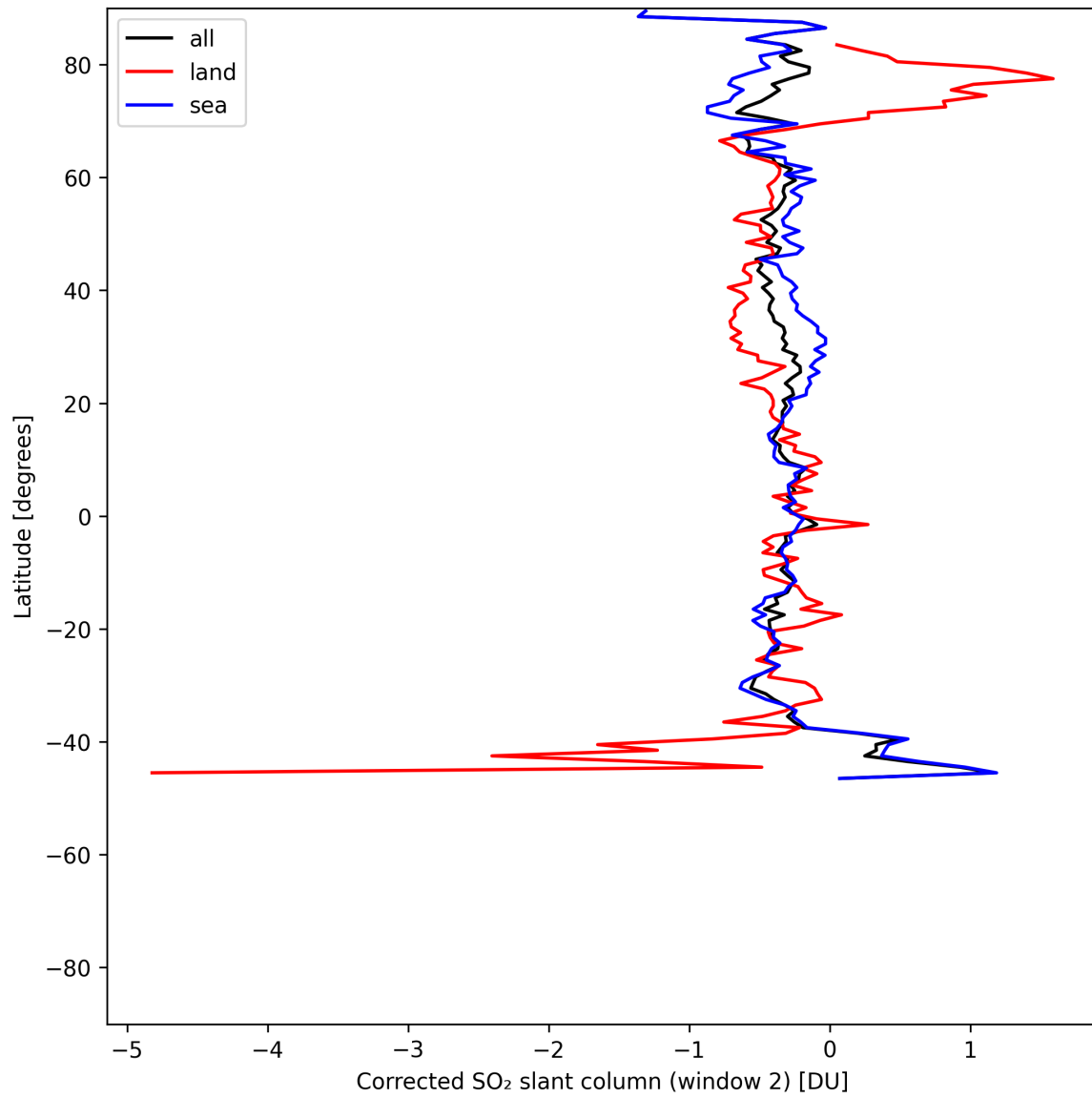


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-07-05 to 2025-07-06.

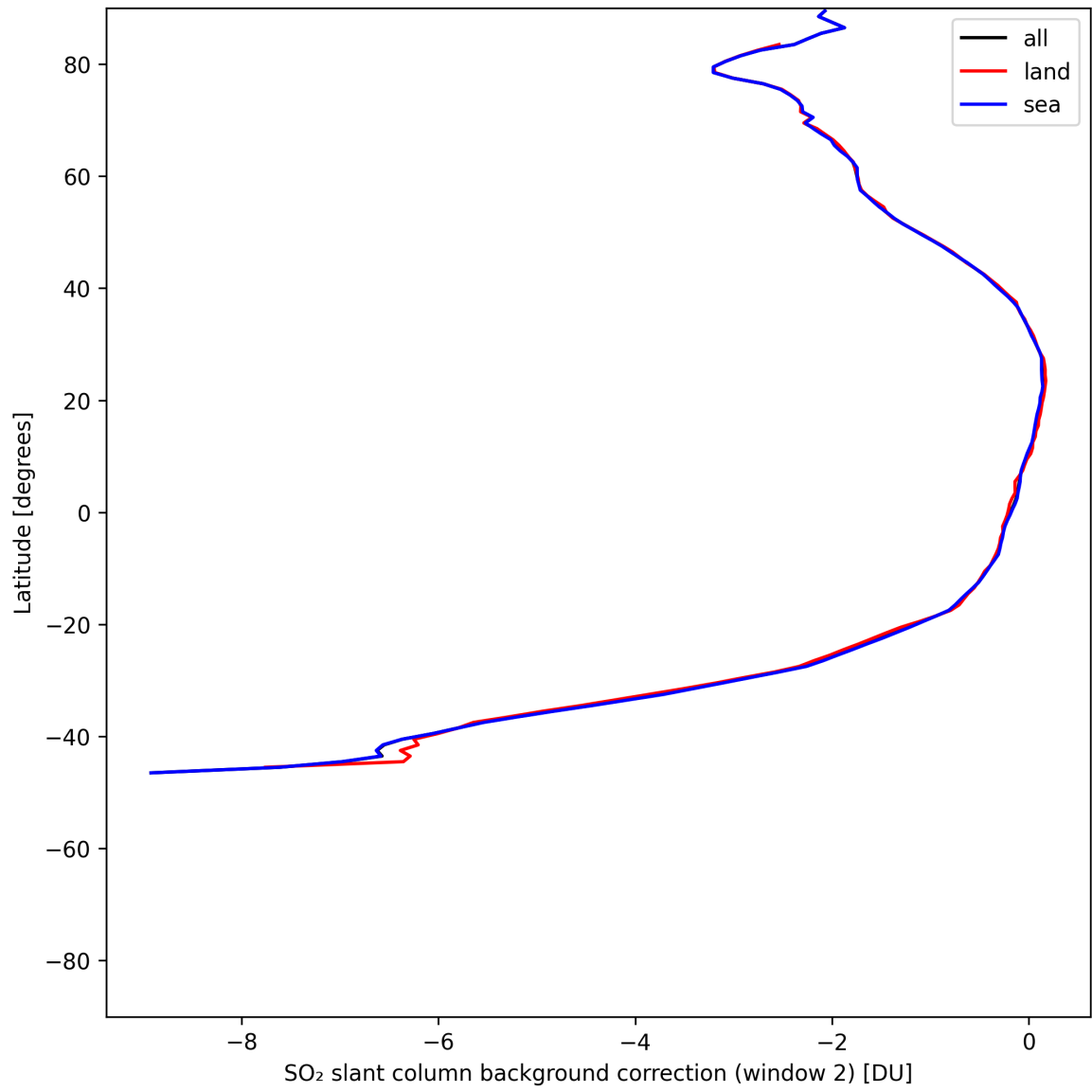


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-07-05 to 2025-07-06.

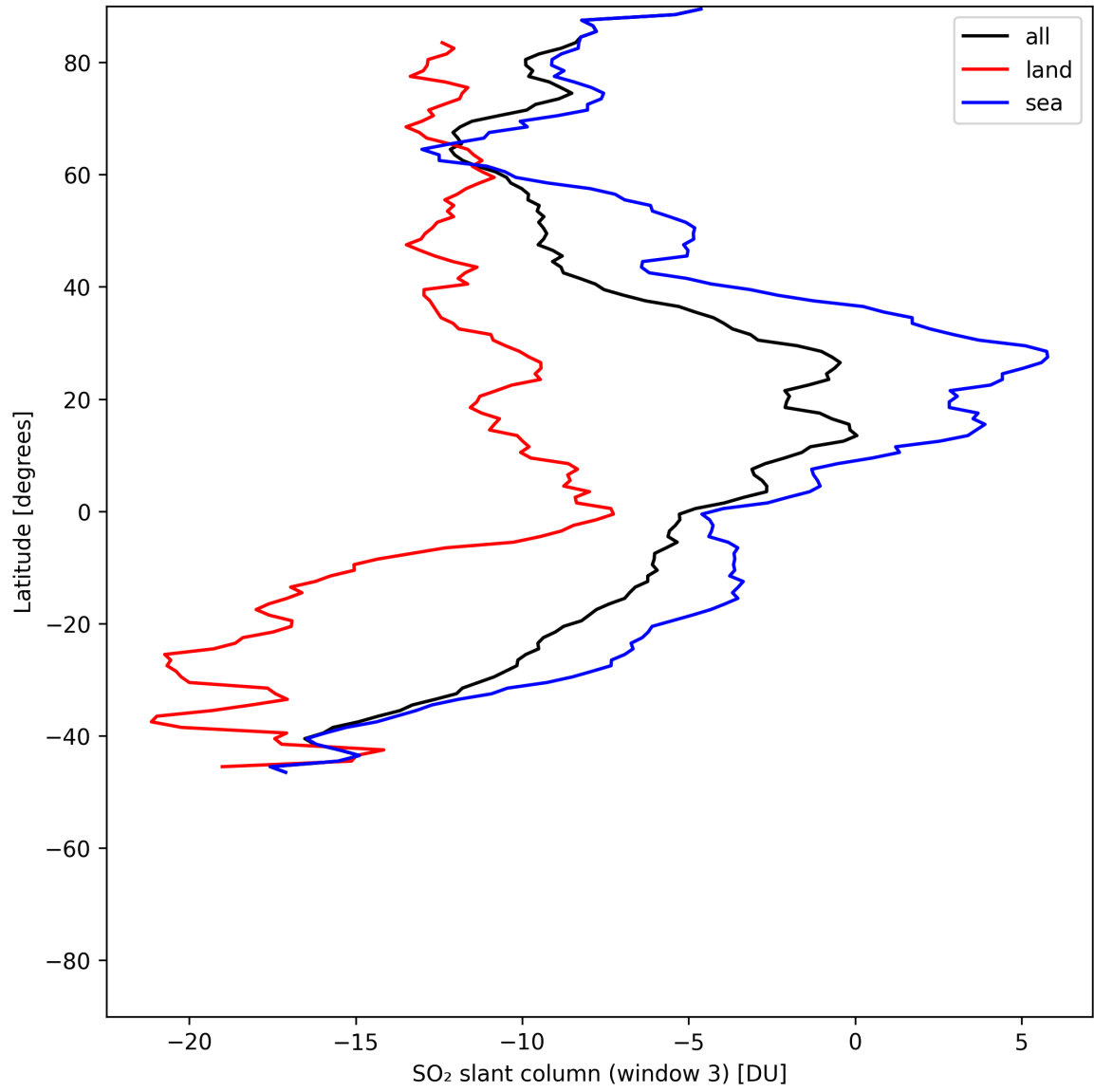


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-07-05 to 2025-07-06.

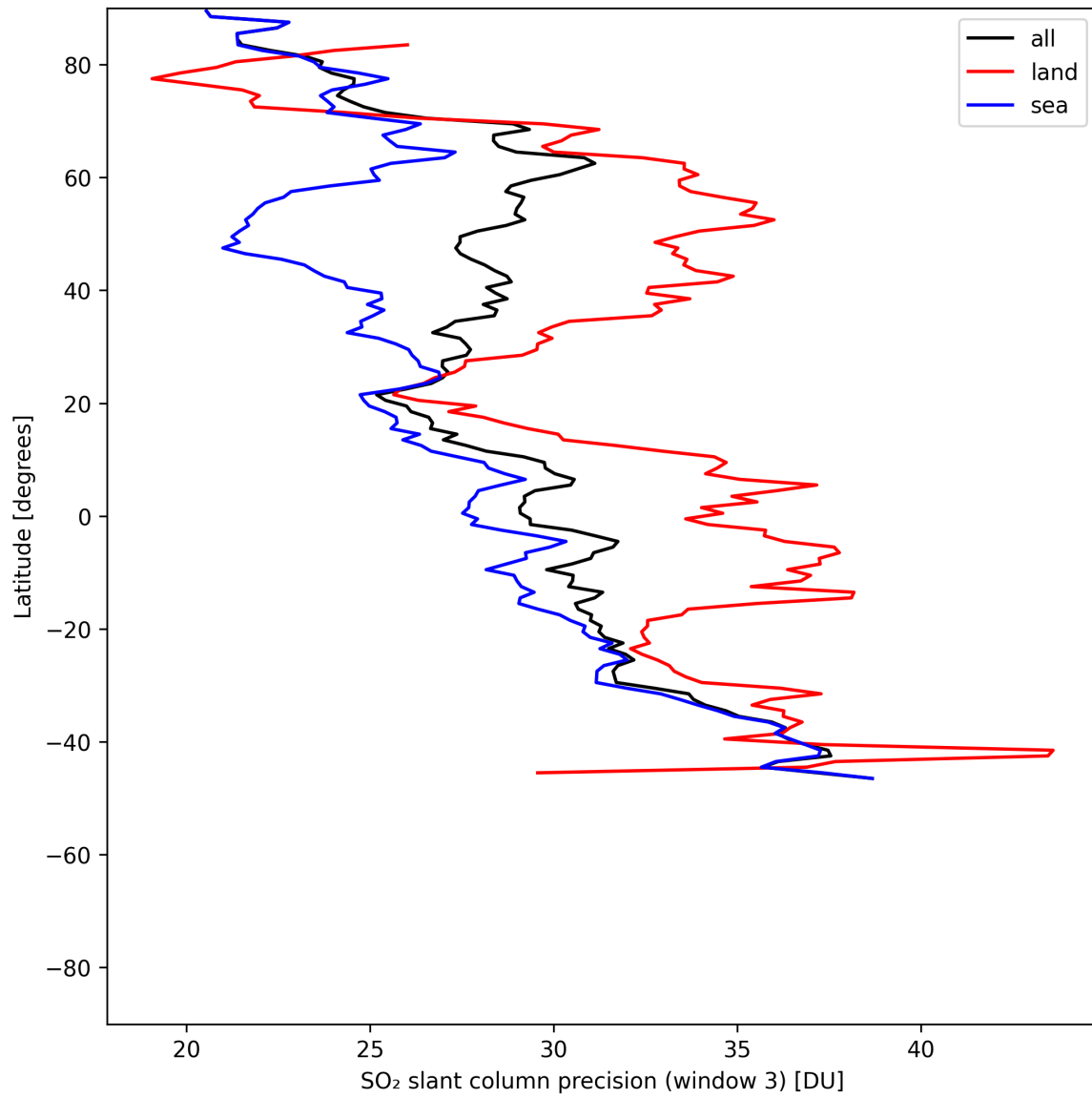


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-07-05 to 2025-07-06.

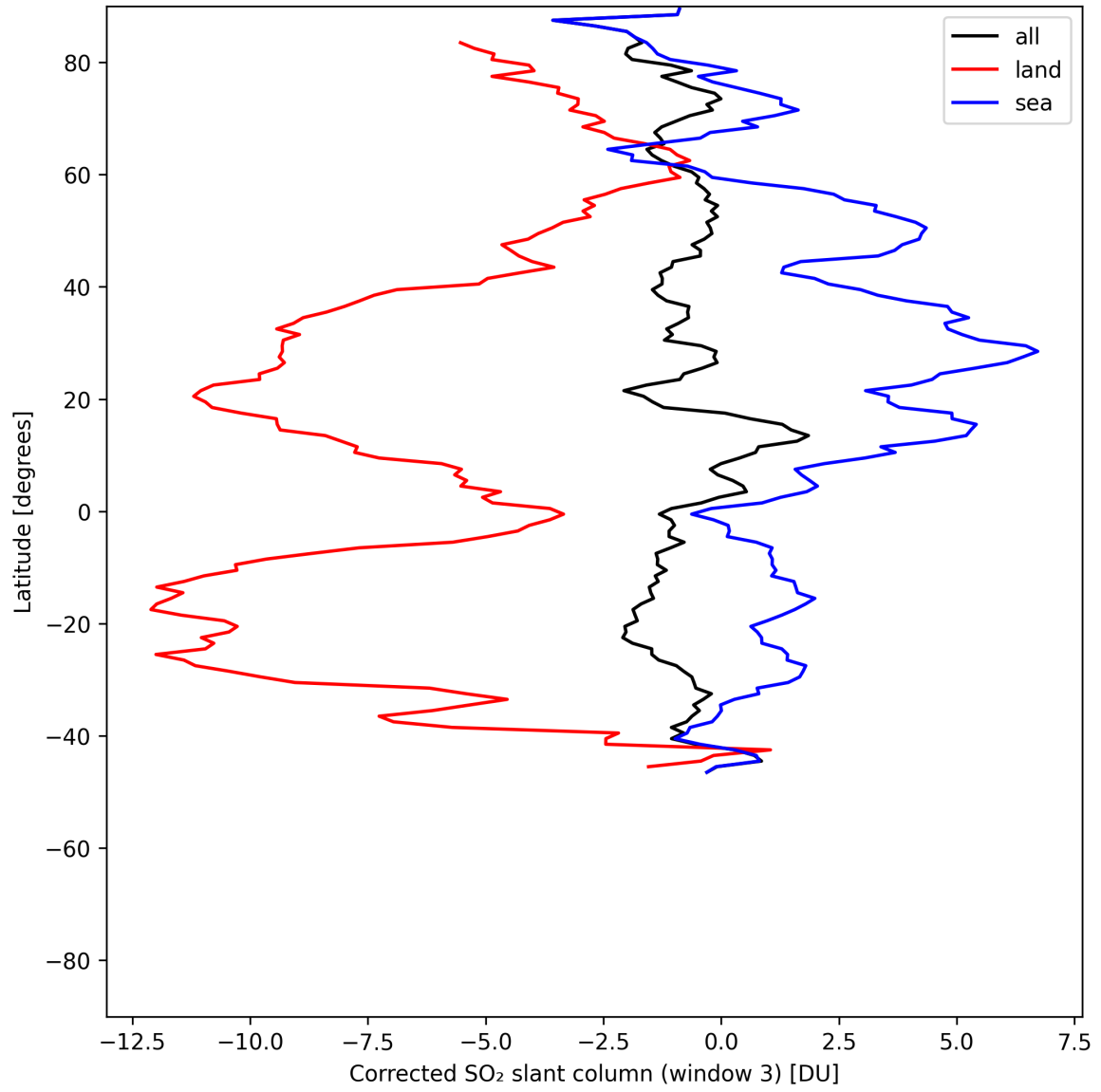


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-07-05 to 2025-07-06.

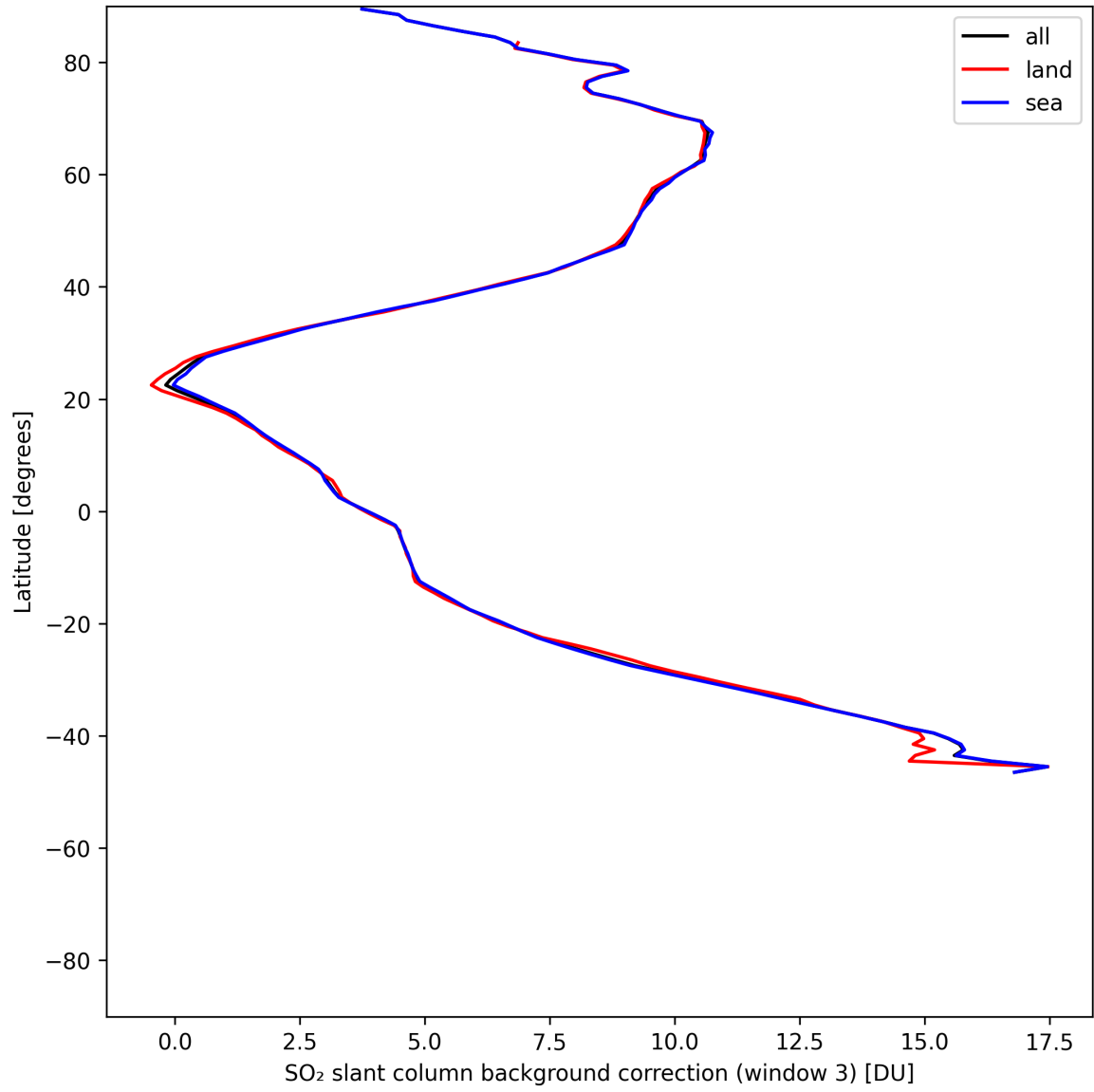


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-07-05 to 2025-07-06.

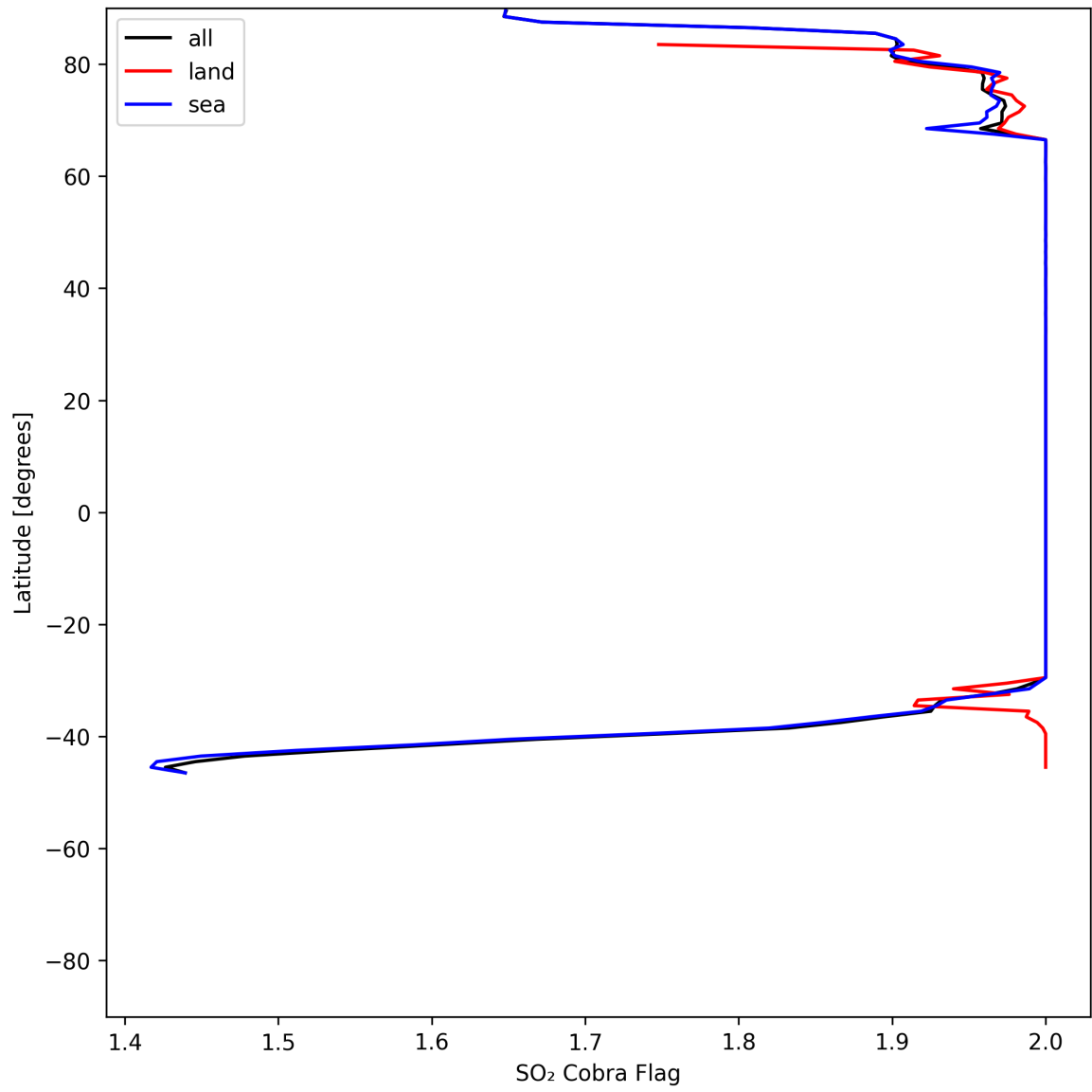


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-07-05 to 2025-07-06.

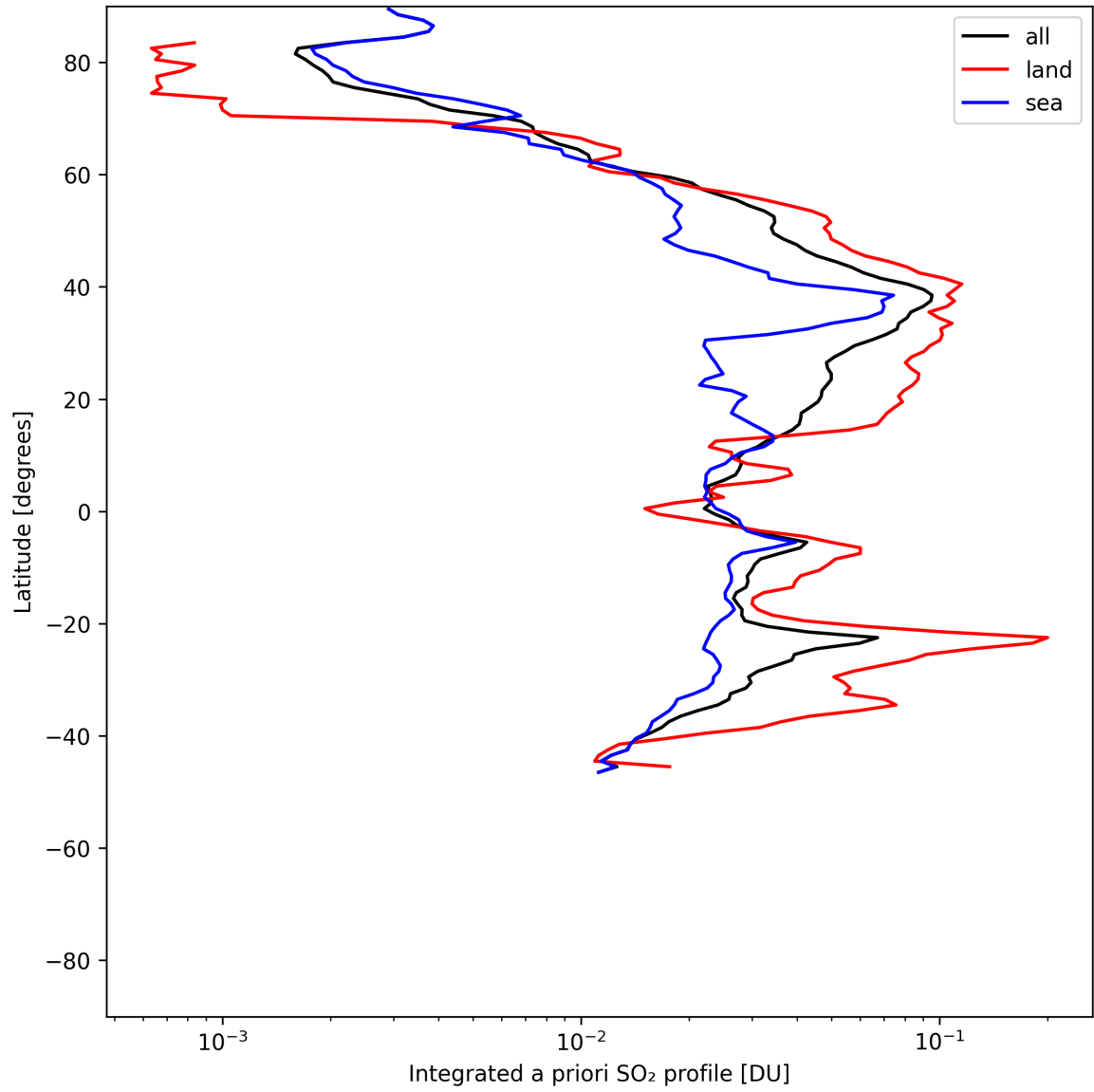


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-07-05 to 2025-07-06.

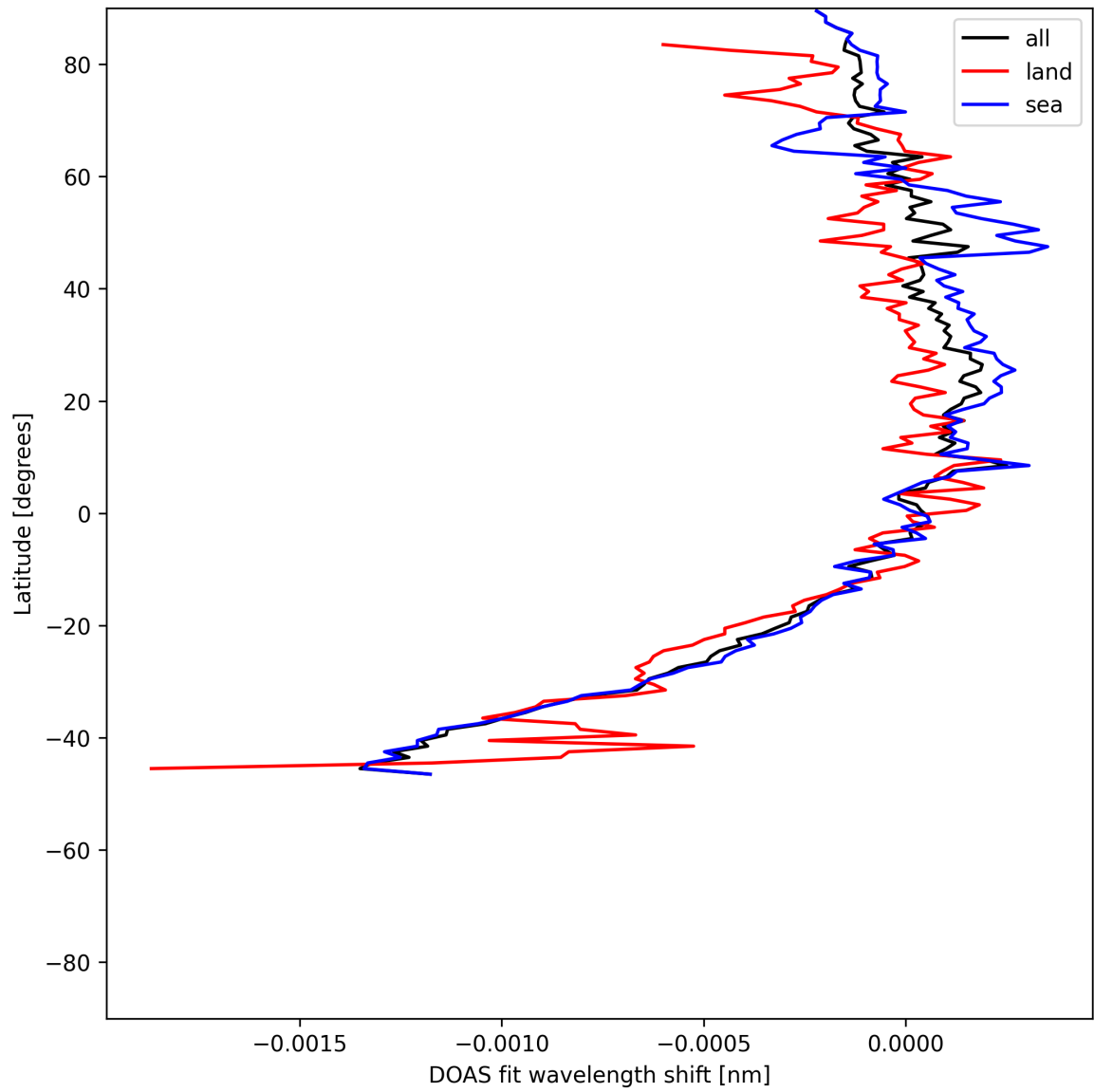


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-07-05 to 2025-07-06.

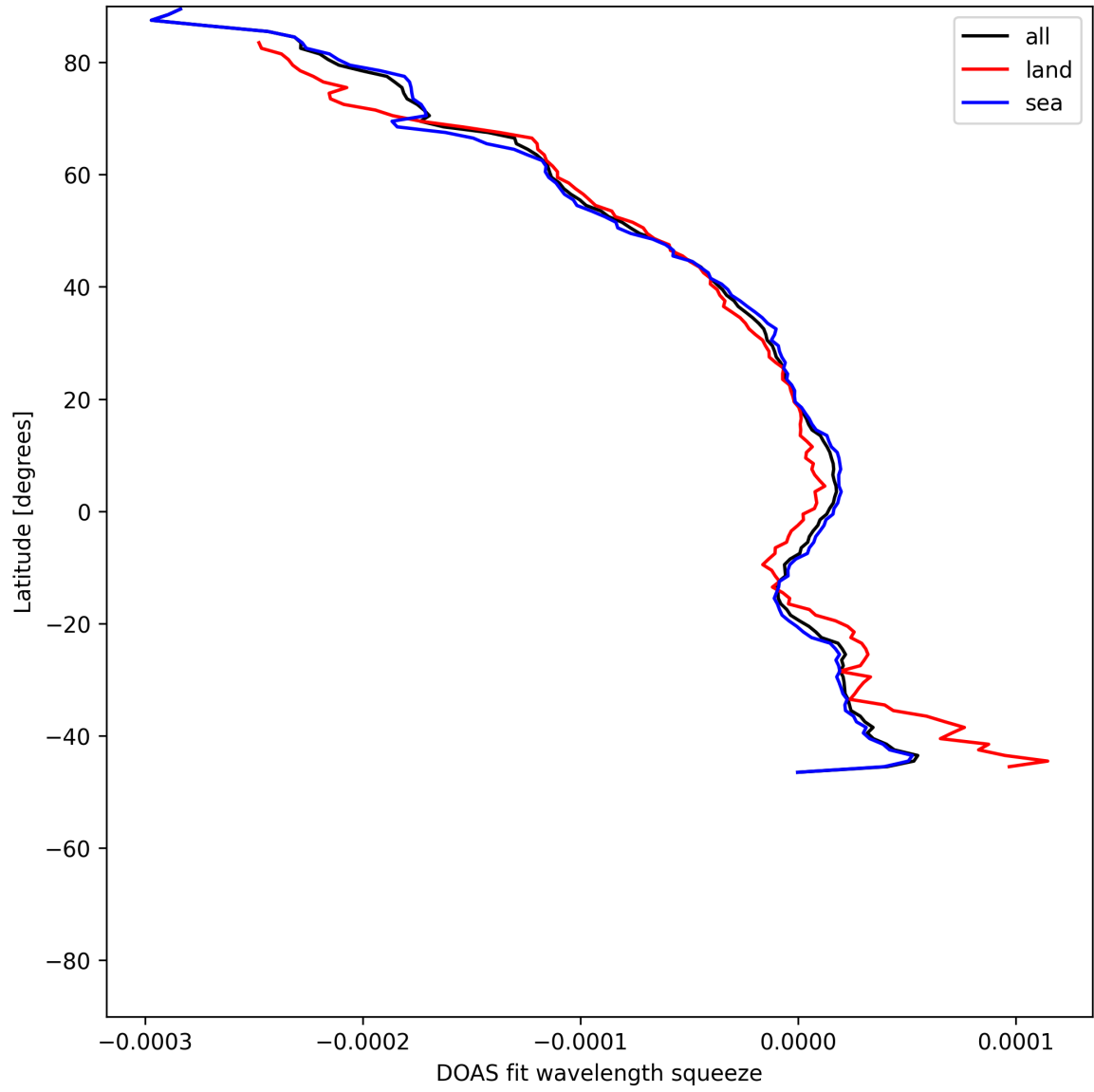


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-07-05 to 2025-07-06.

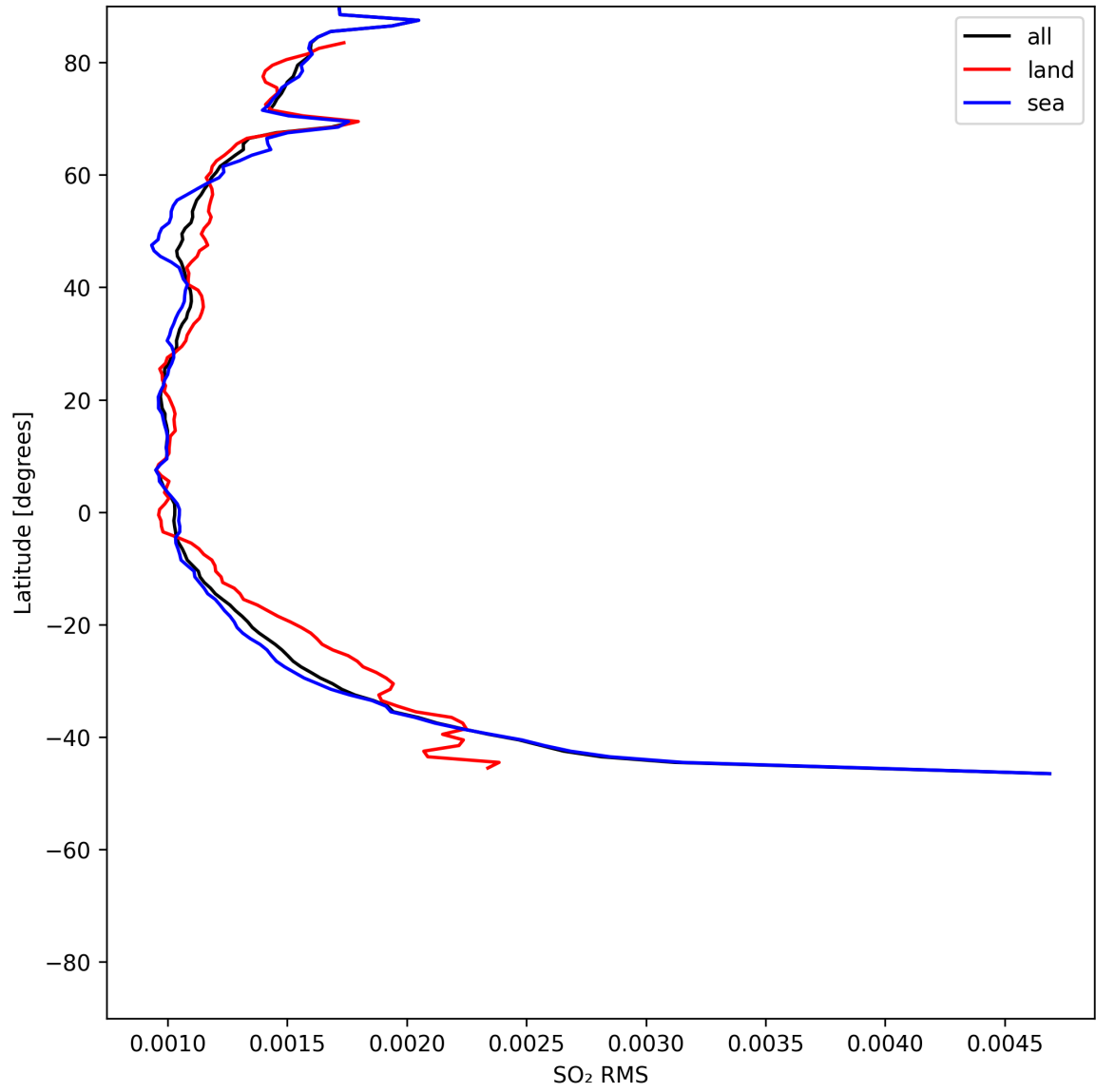


Figure 52: Zonal average of “SO₂ RMS” for 2025-07-05 to 2025-07-06.

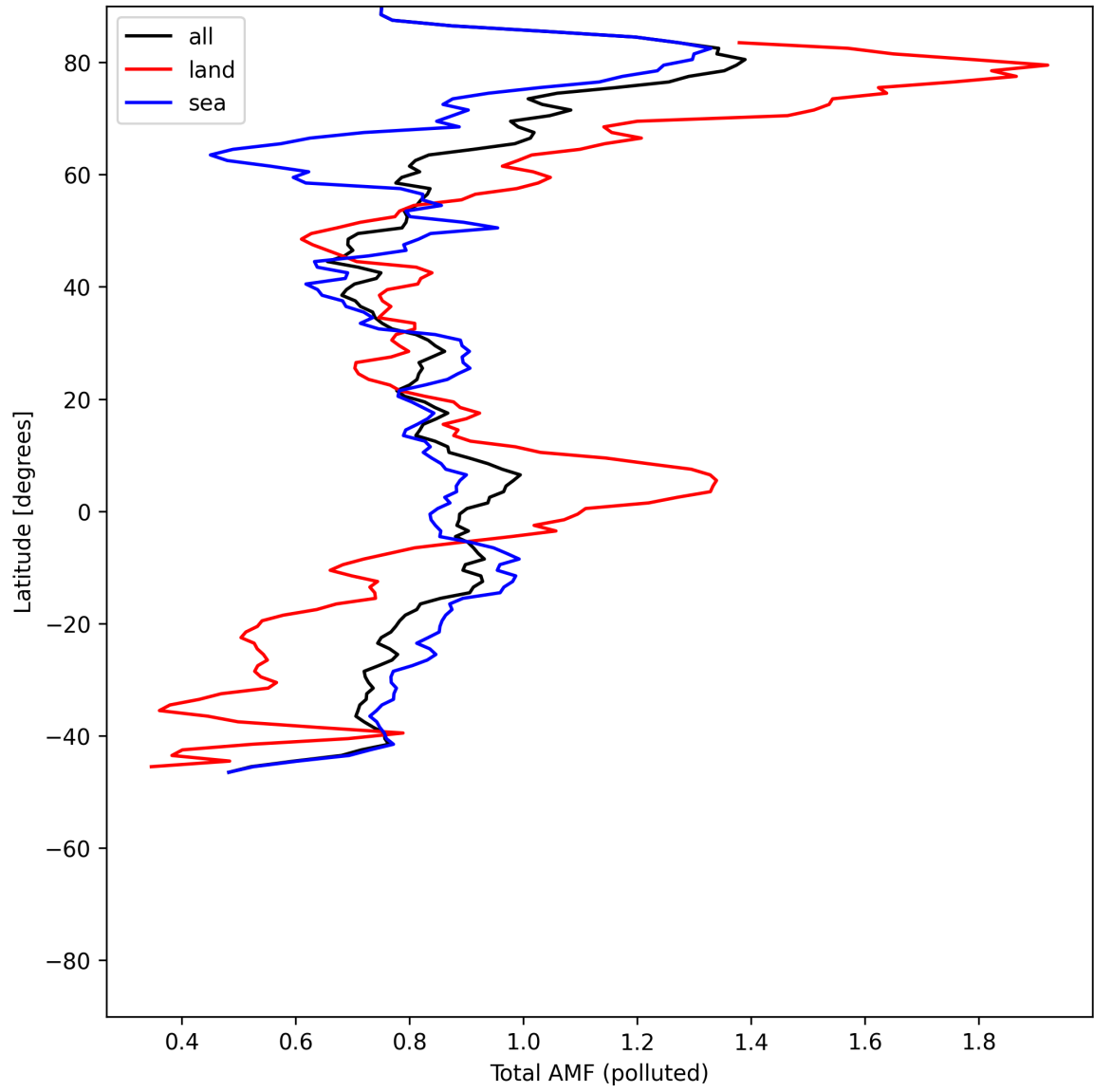


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-07-05 to 2025-07-06.

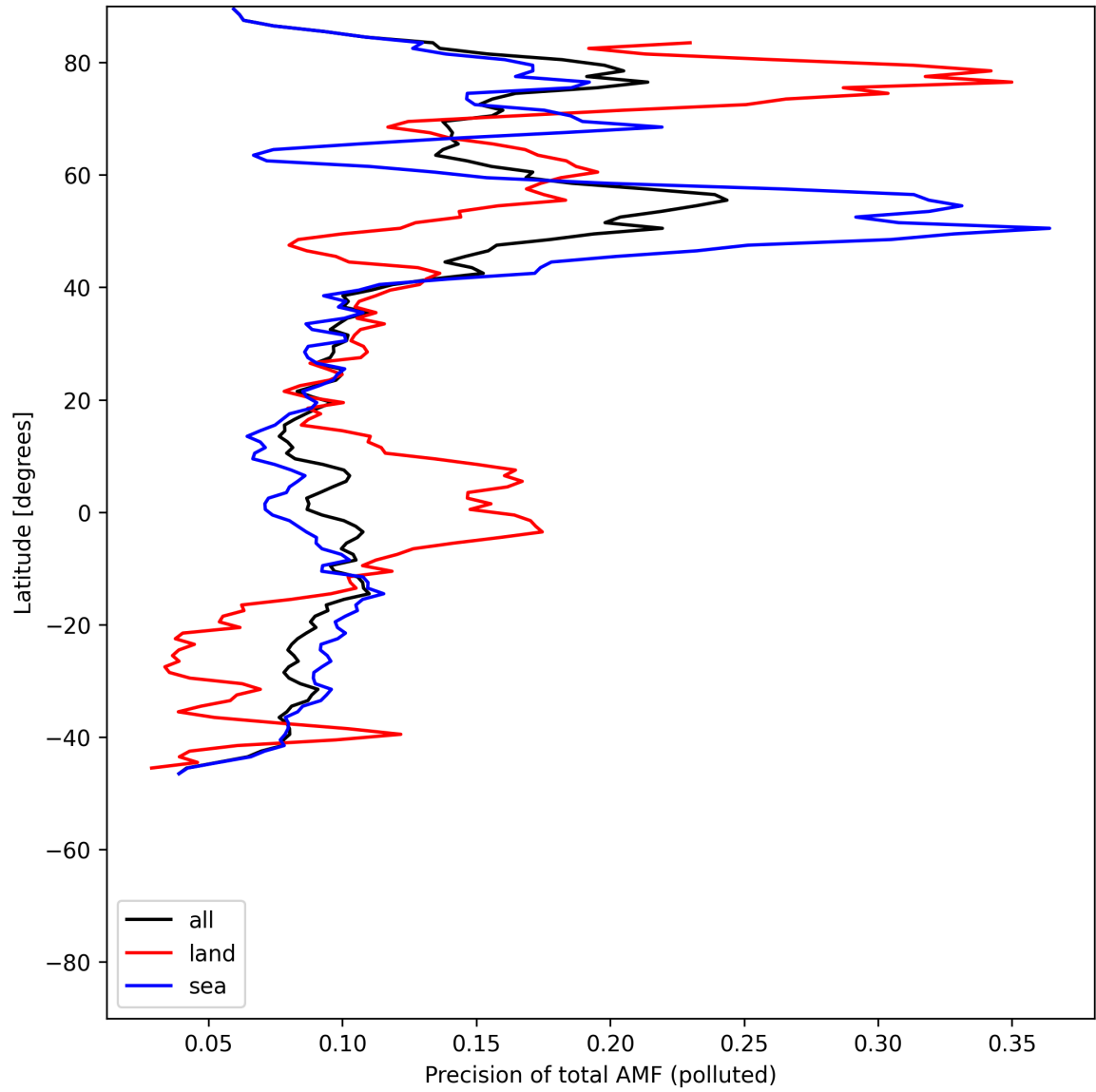


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-07-05 to 2025-07-06.

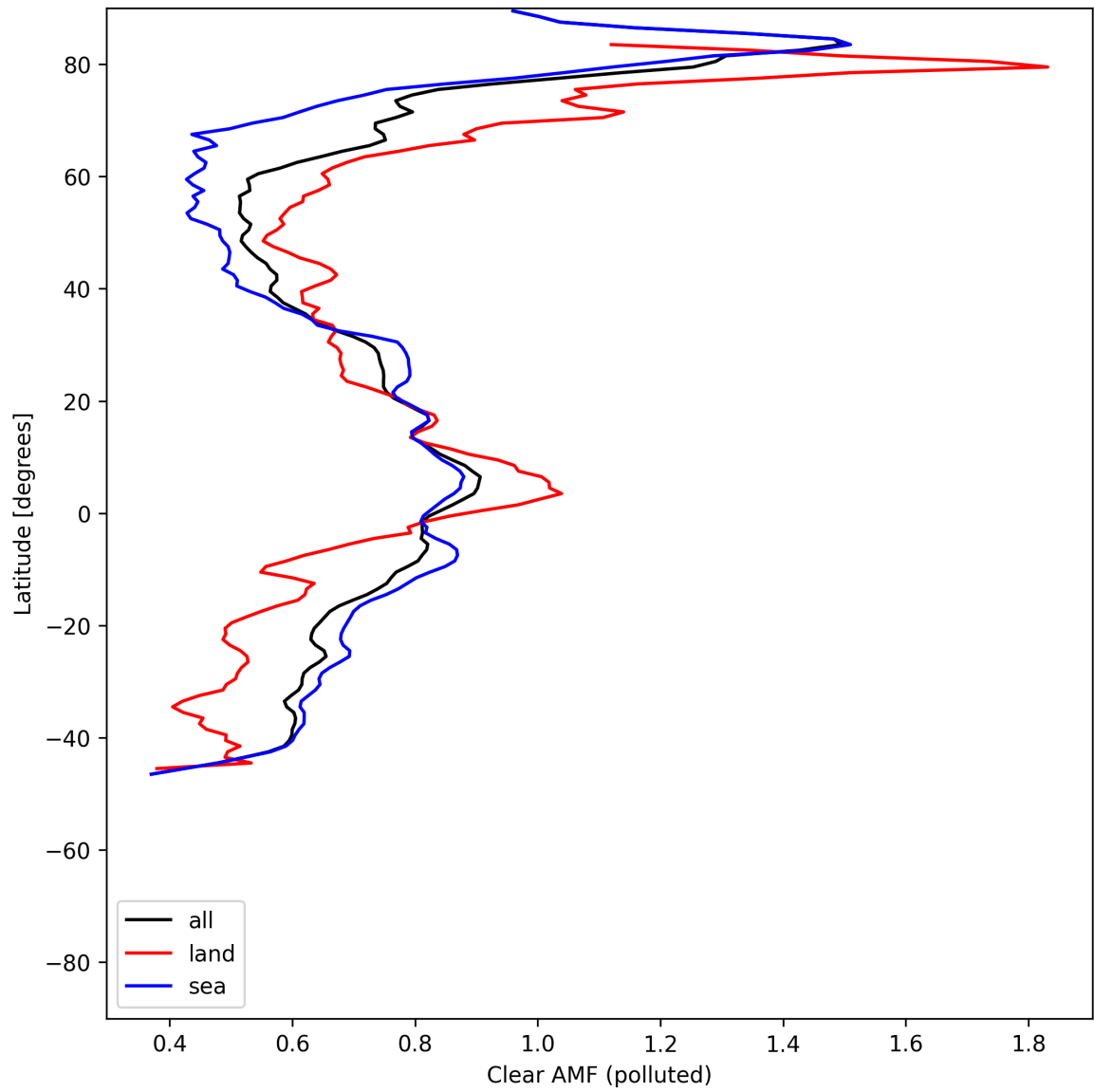


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-07-05 to 2025-07-06.

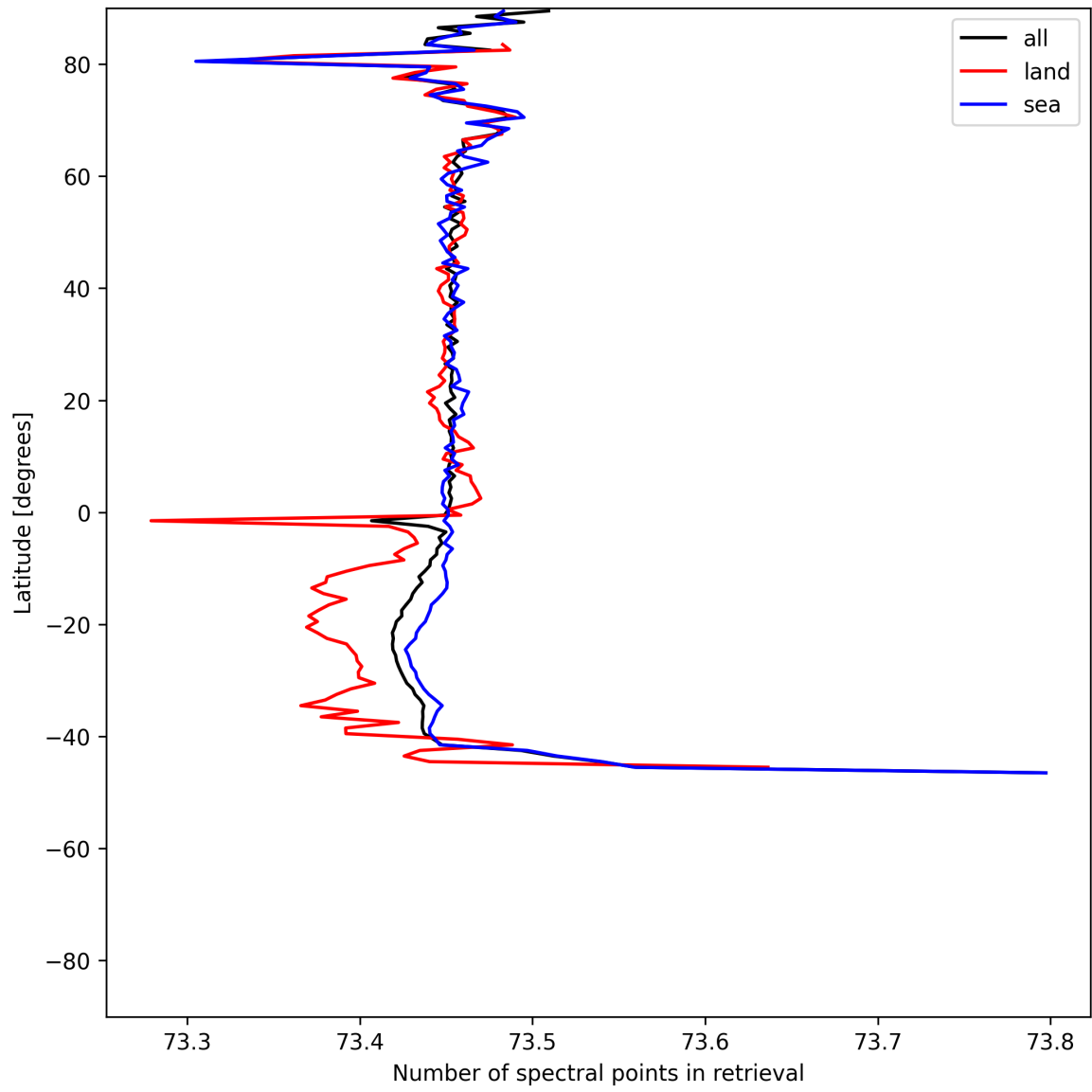


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-07-05 to 2025-07-06.

8 Histograms

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

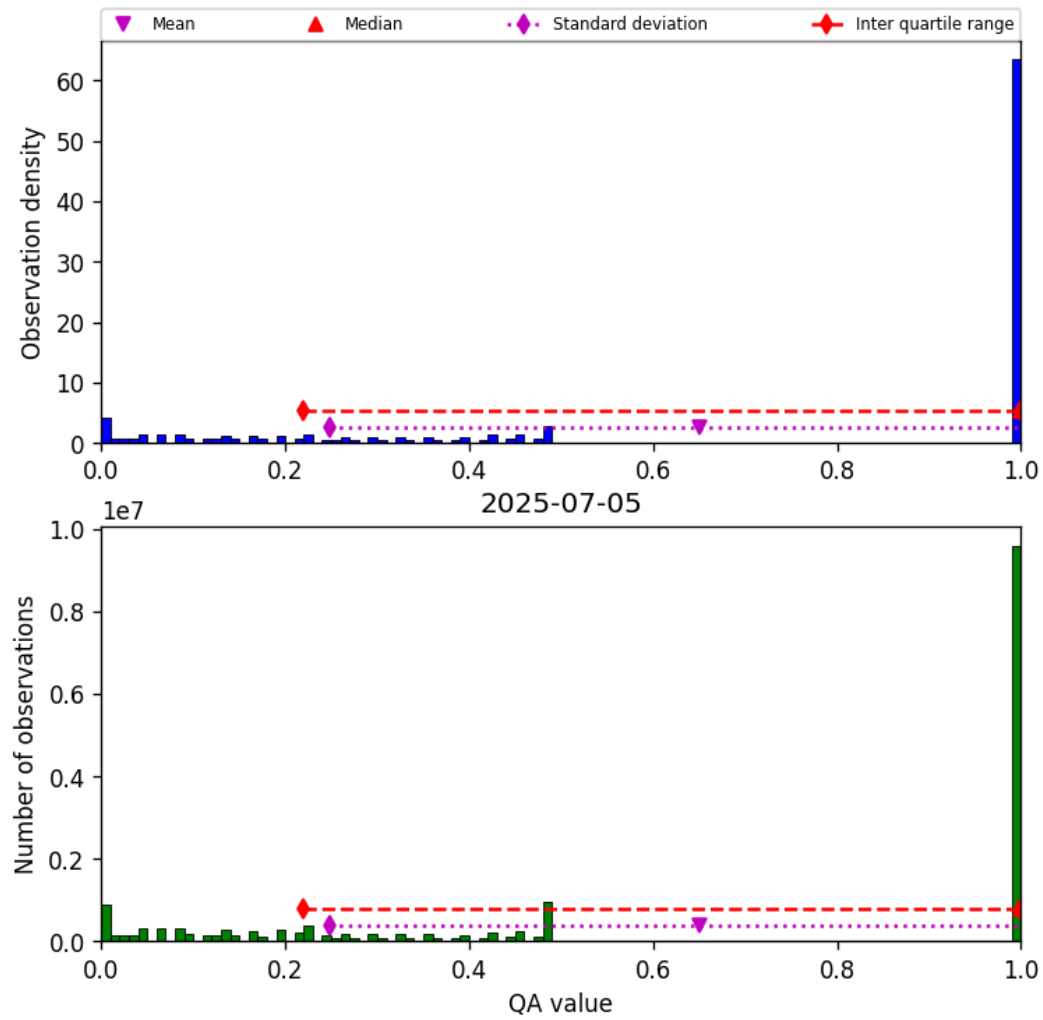


Figure 57: Histogram of “QA value” for 2025-07-05 to 2025-07-06

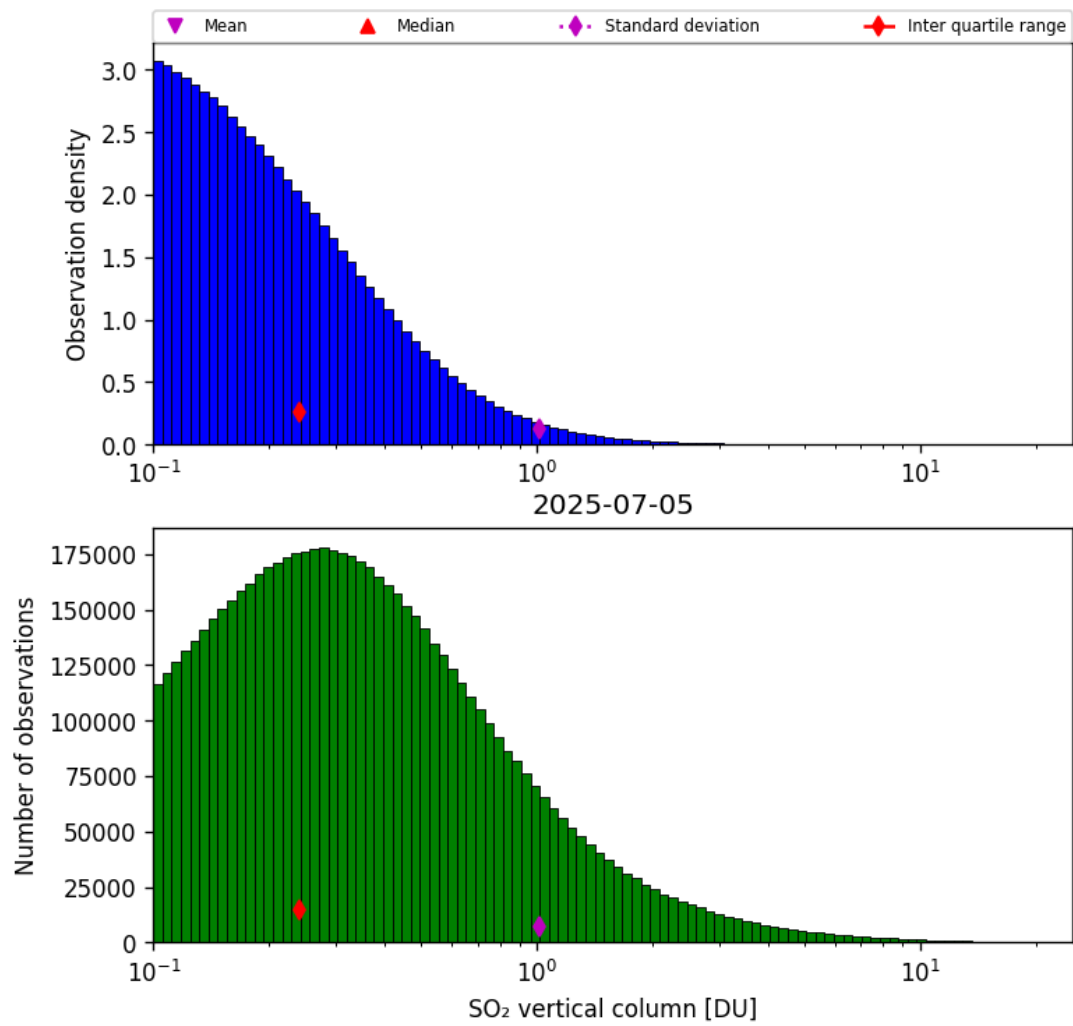


Figure 58: Histogram of “SO₂ vertical column” for 2025-07-05 to 2025-07-06

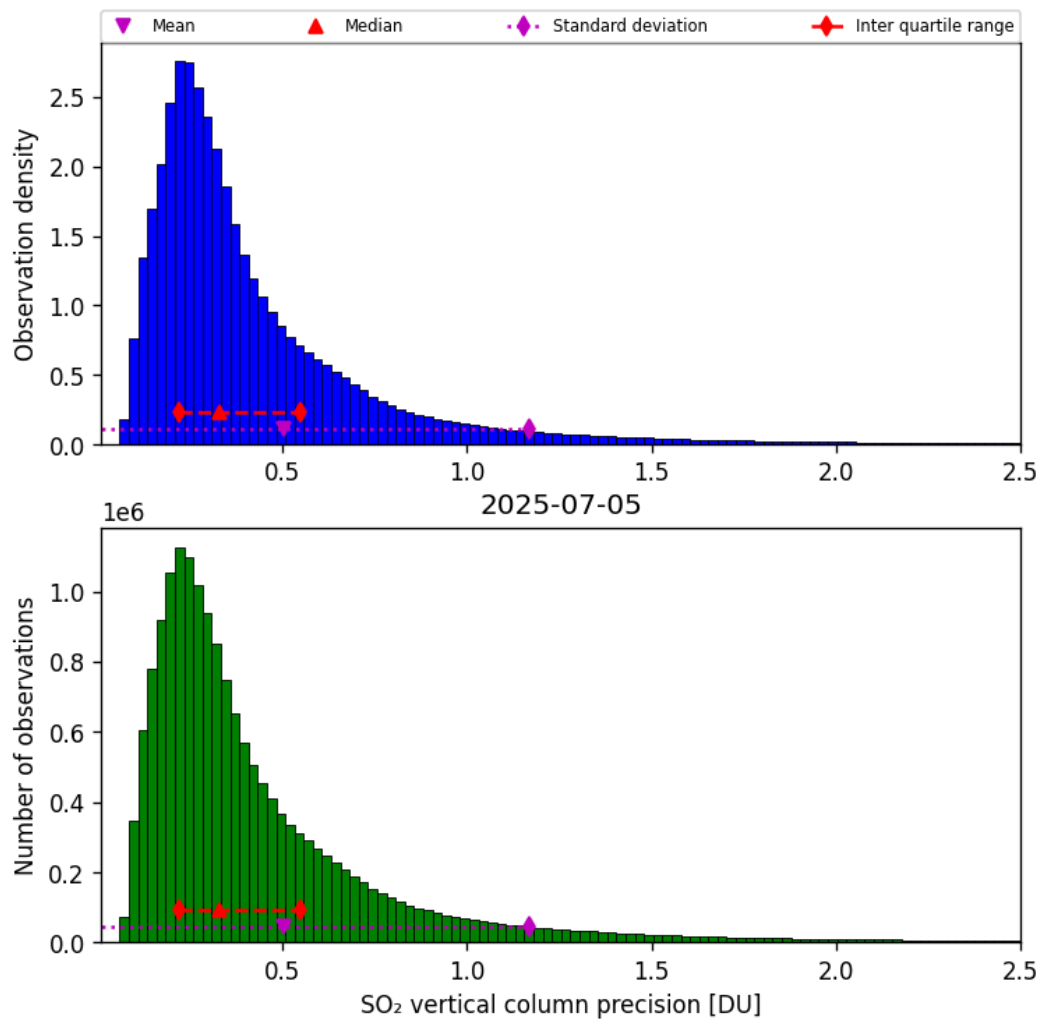


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-07-05 to 2025-07-06

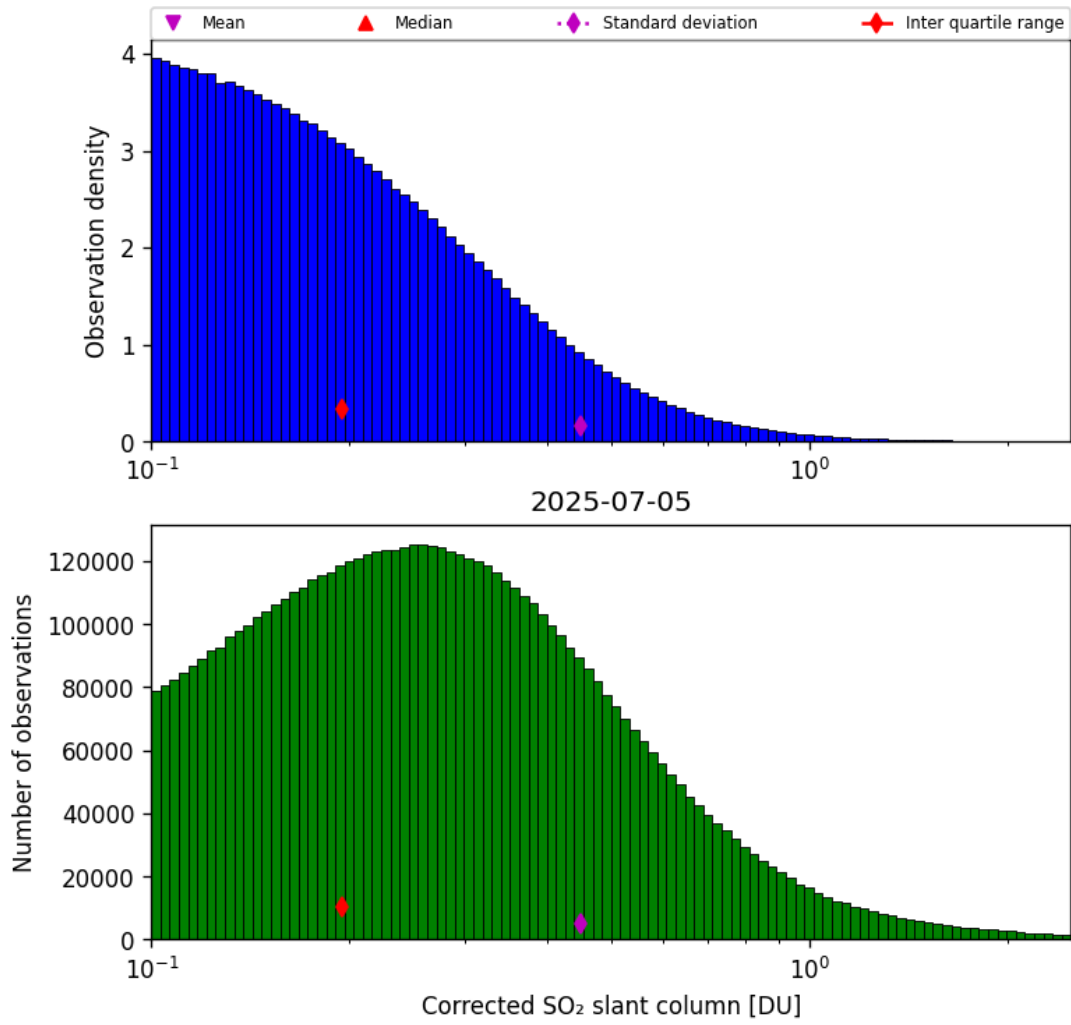


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-07-05 to 2025-07-06

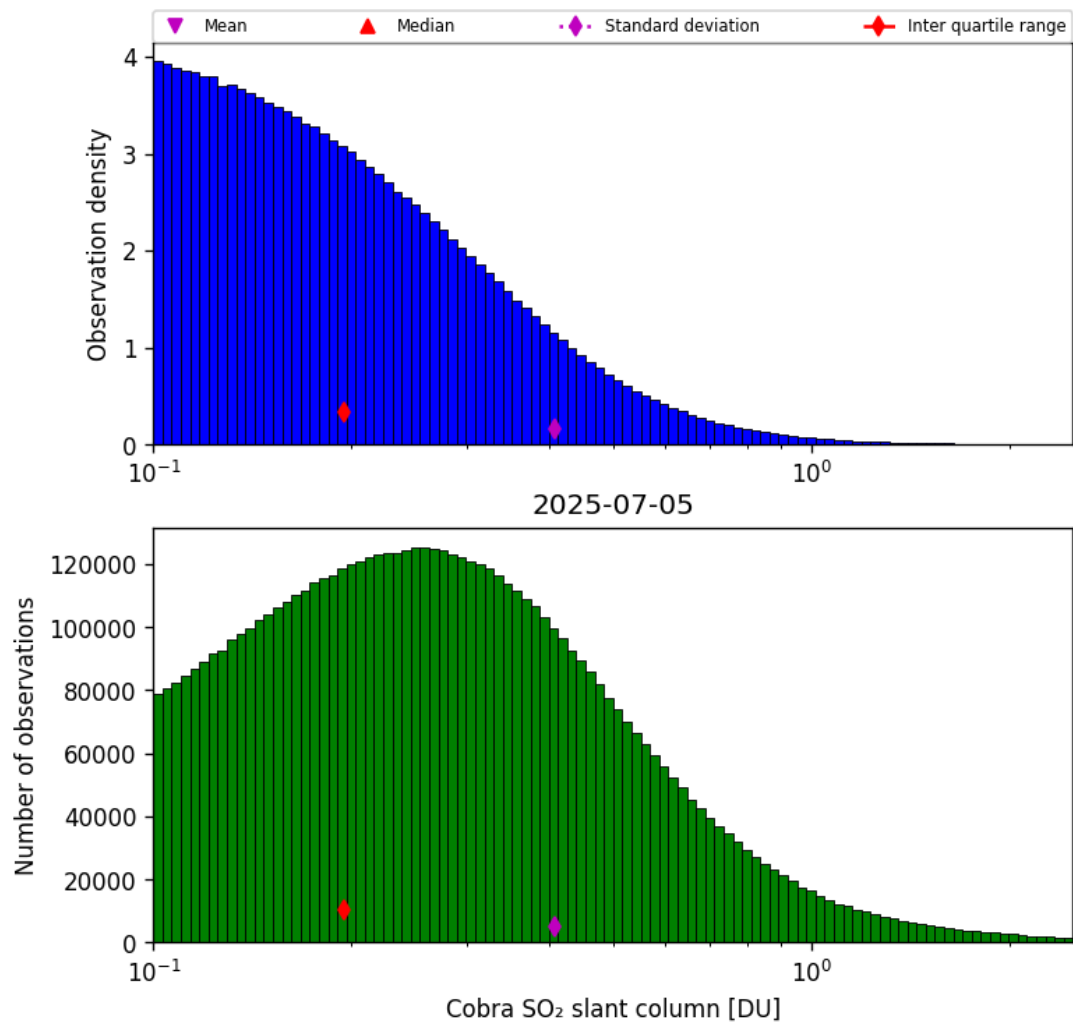


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-07-05 to 2025-07-06

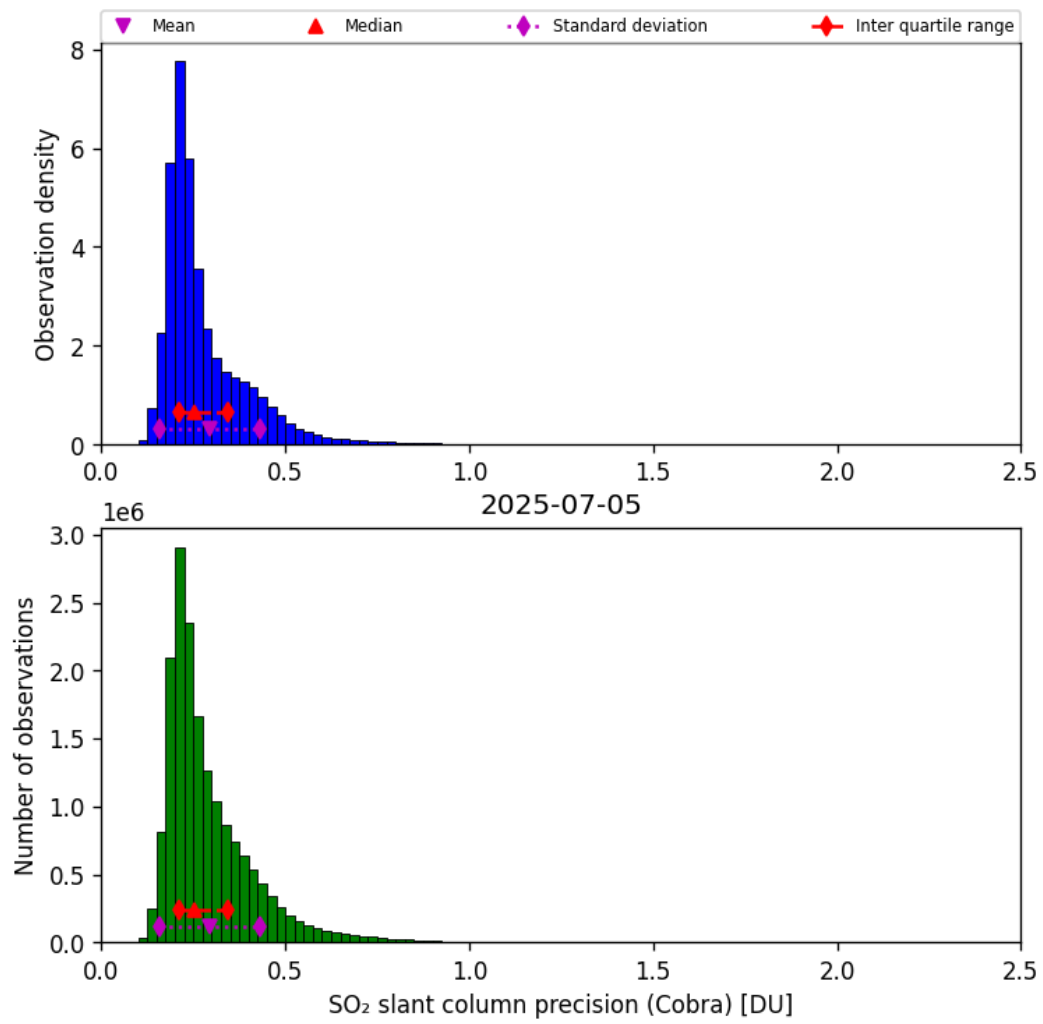


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-07-05 to 2025-07-06

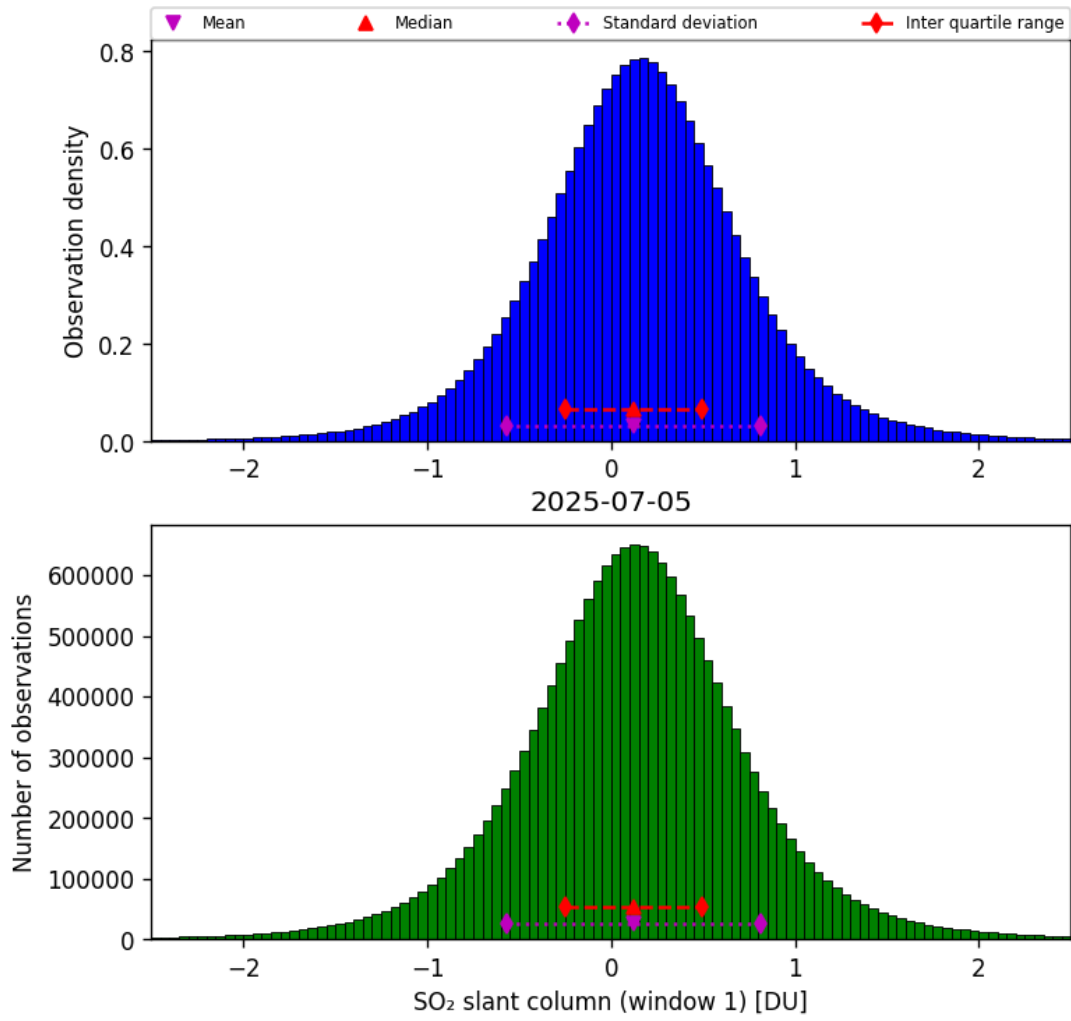


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-07-05 to 2025-07-06

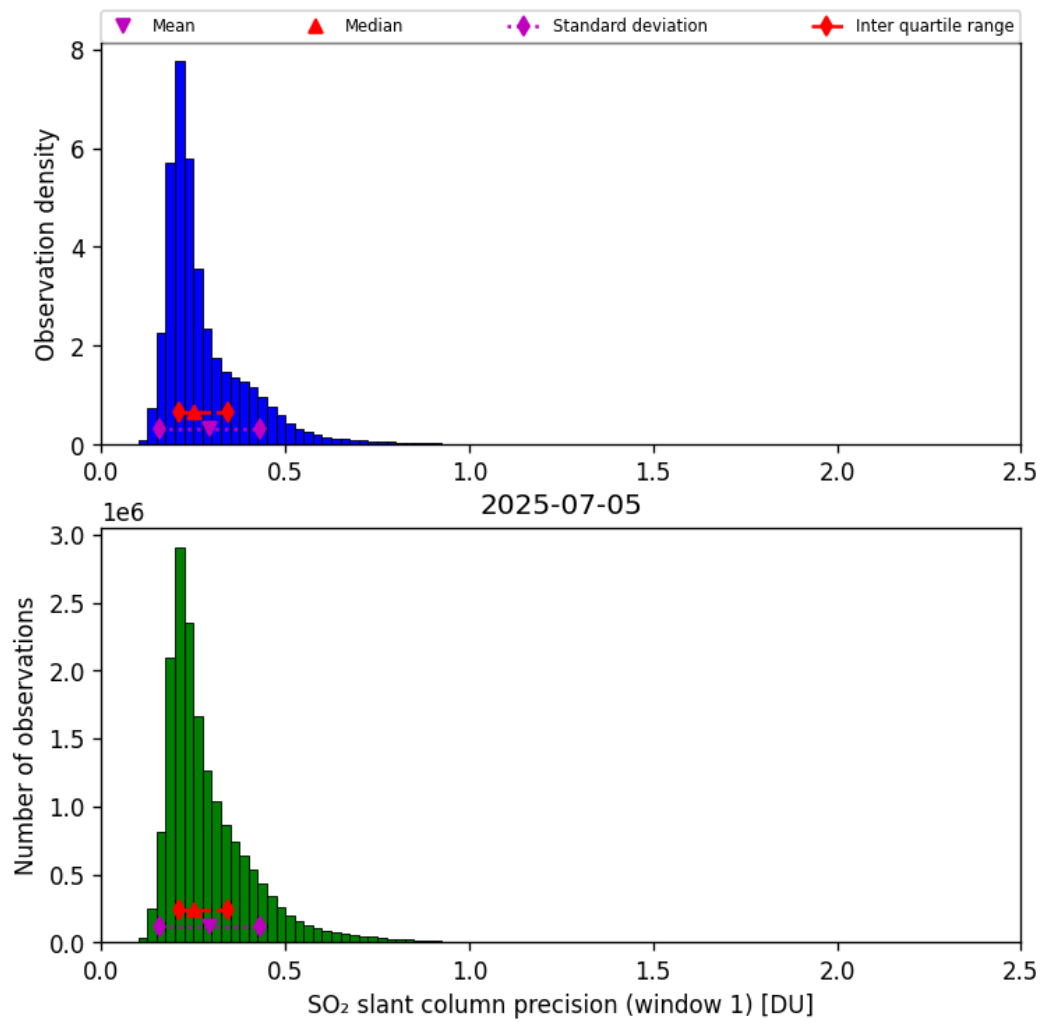


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-07-05 to 2025-07-06

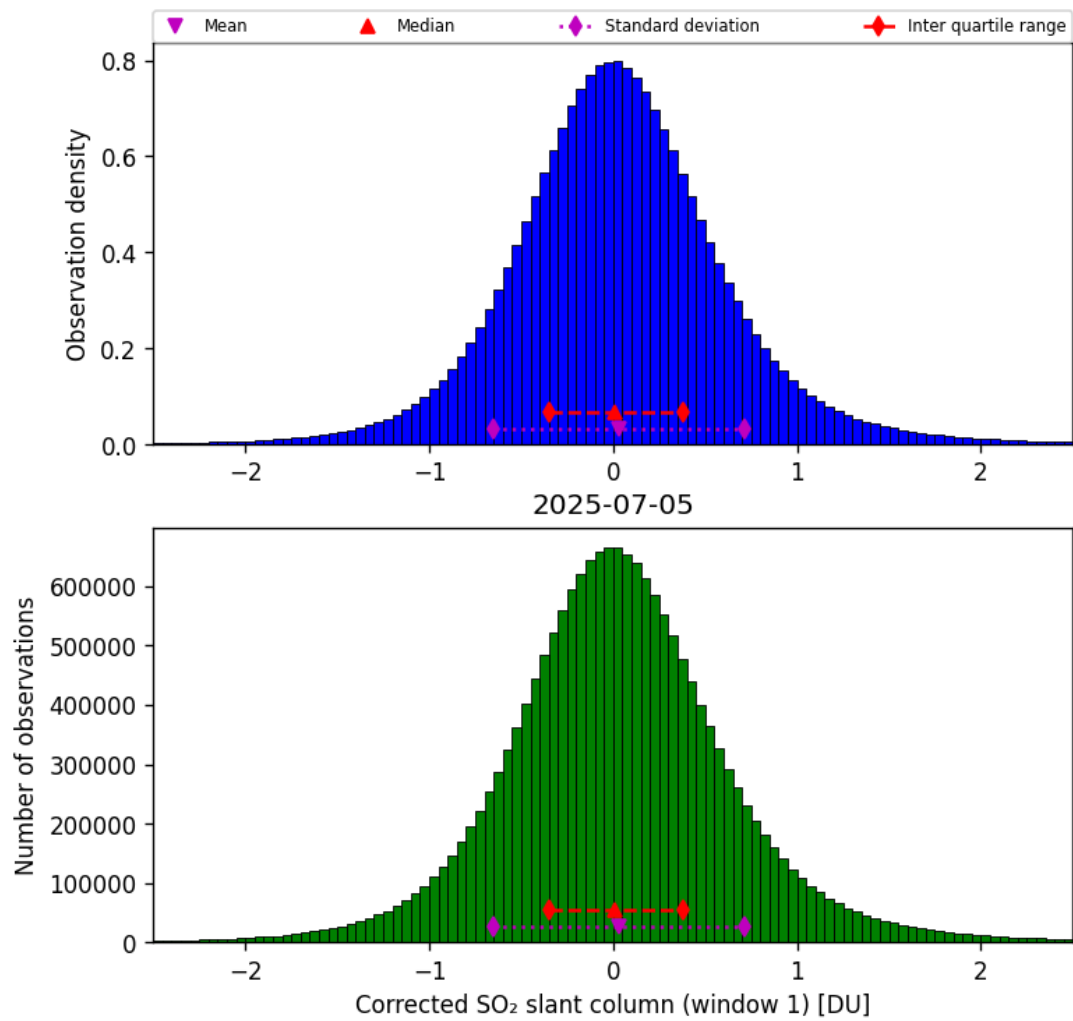


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-07-05 to 2025-07-06

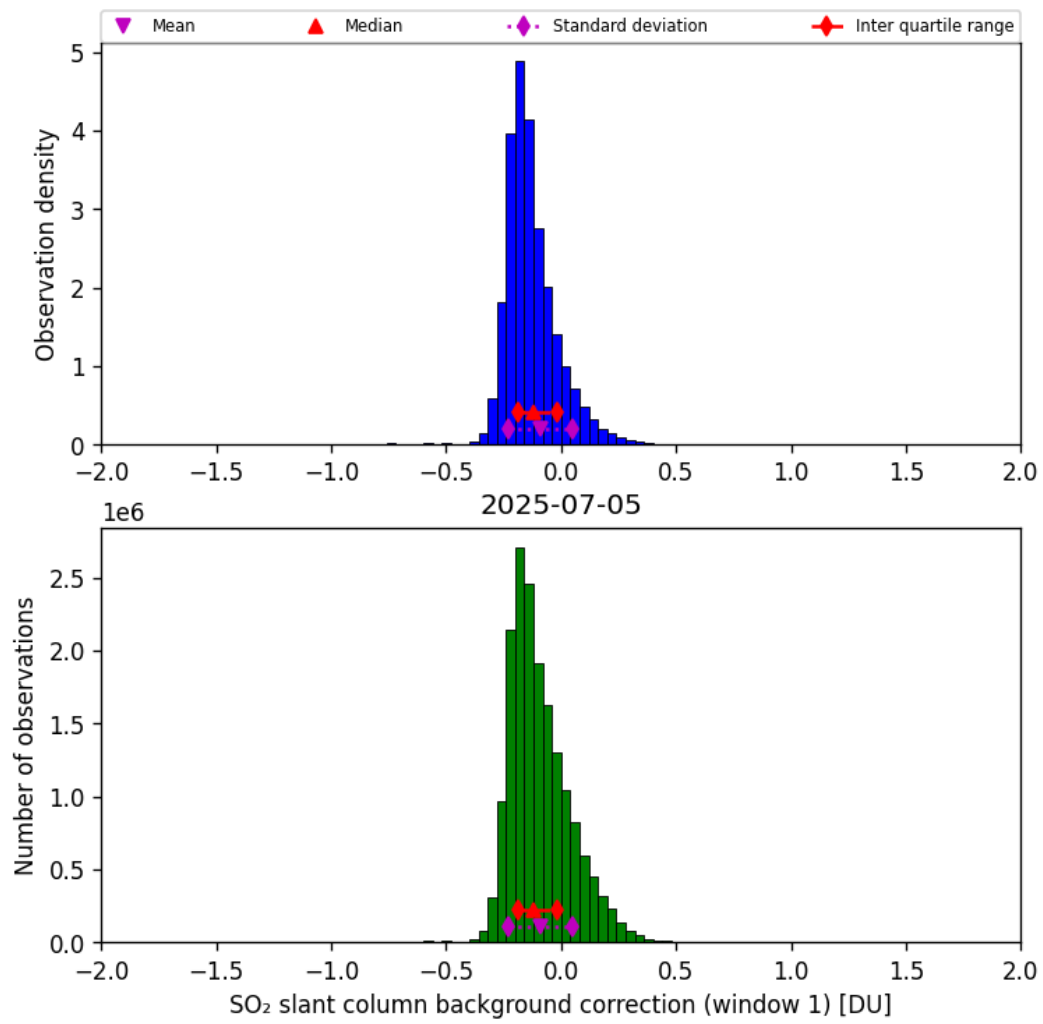


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-07-05 to 2025-07-06

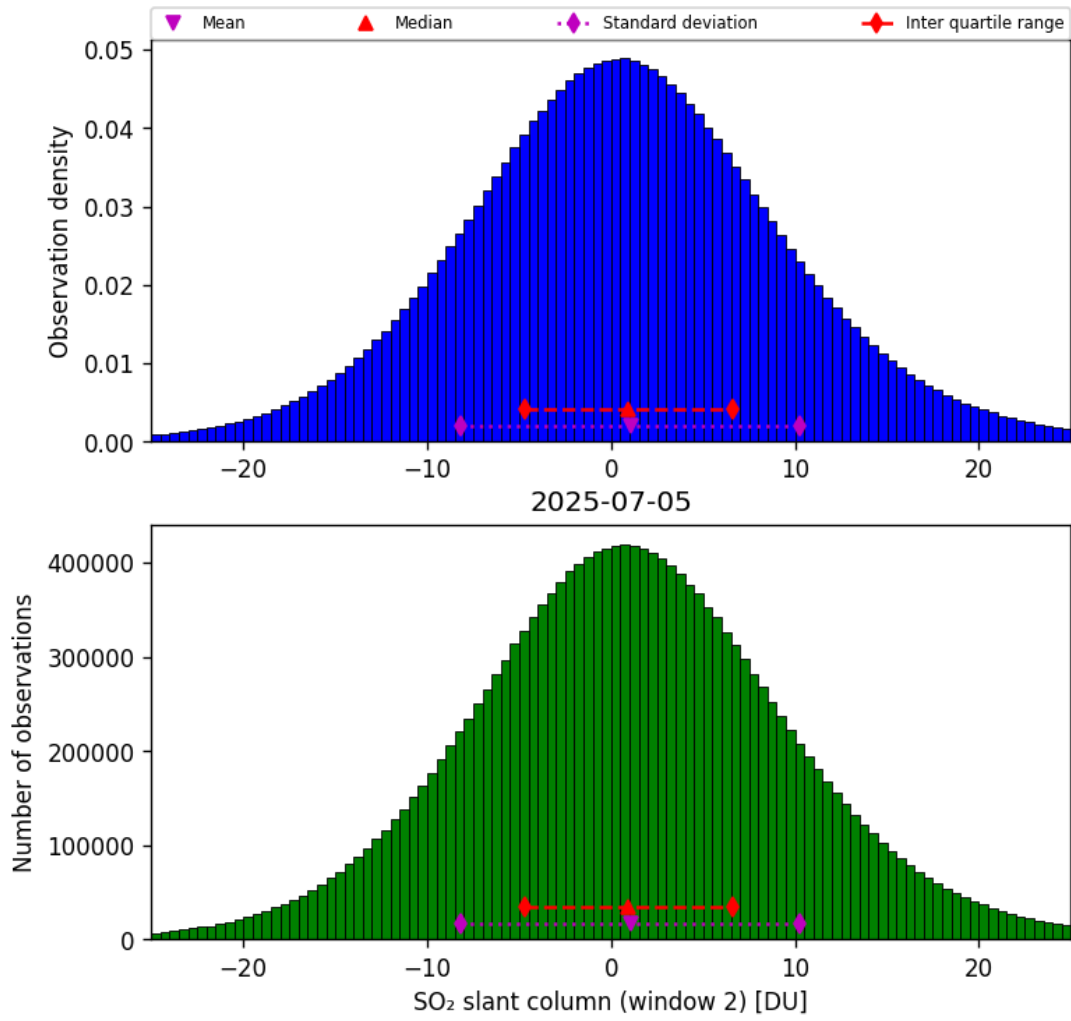


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-07-05 to 2025-07-06

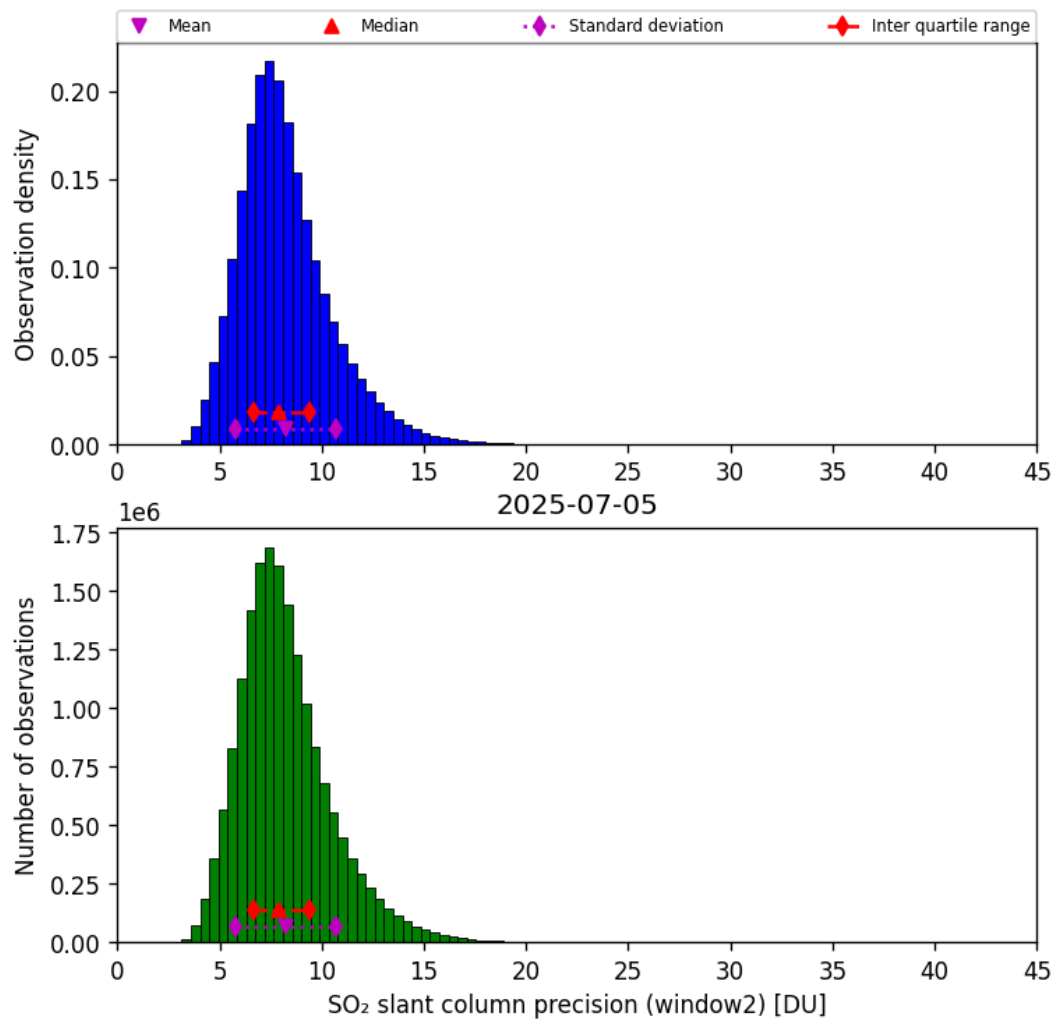


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-07-05 to 2025-07-06

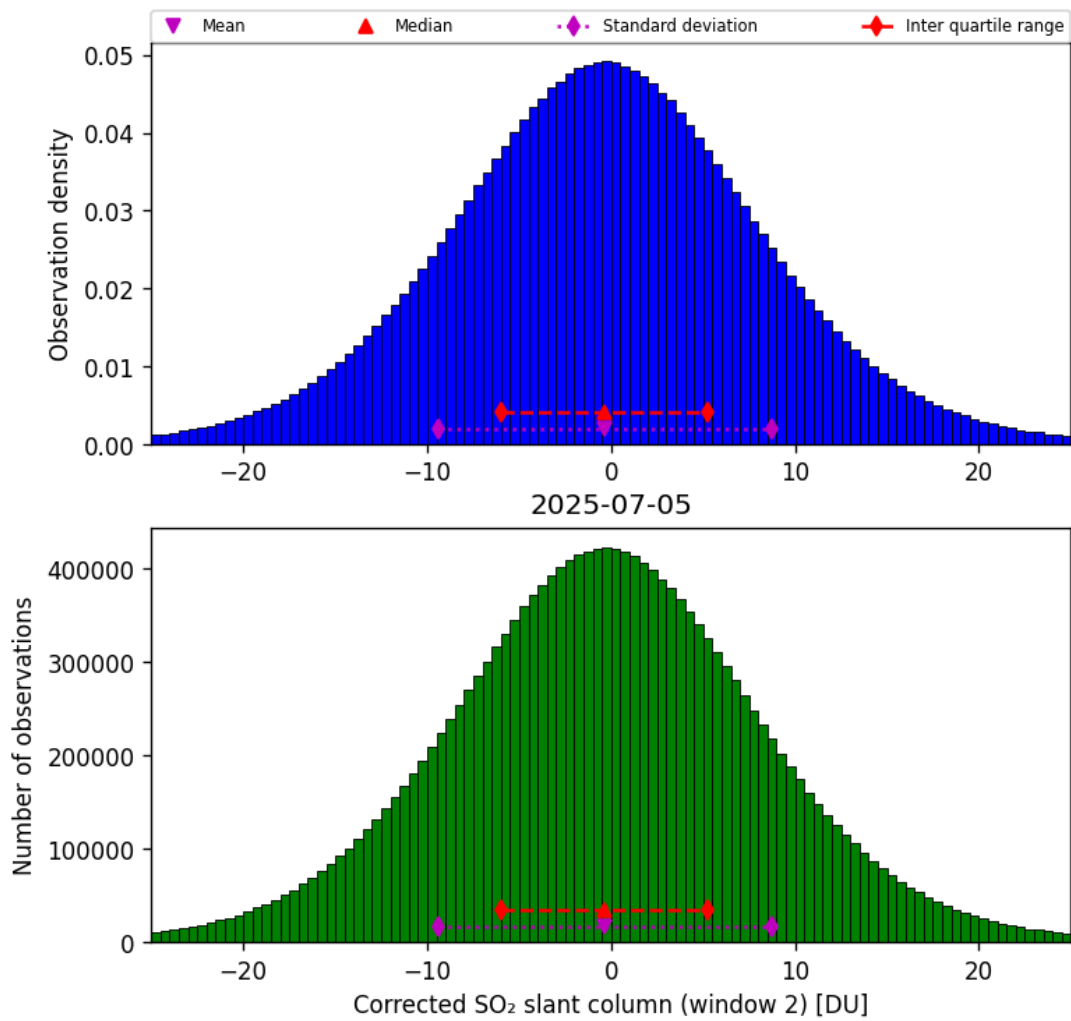


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-07-05 to 2025-07-06

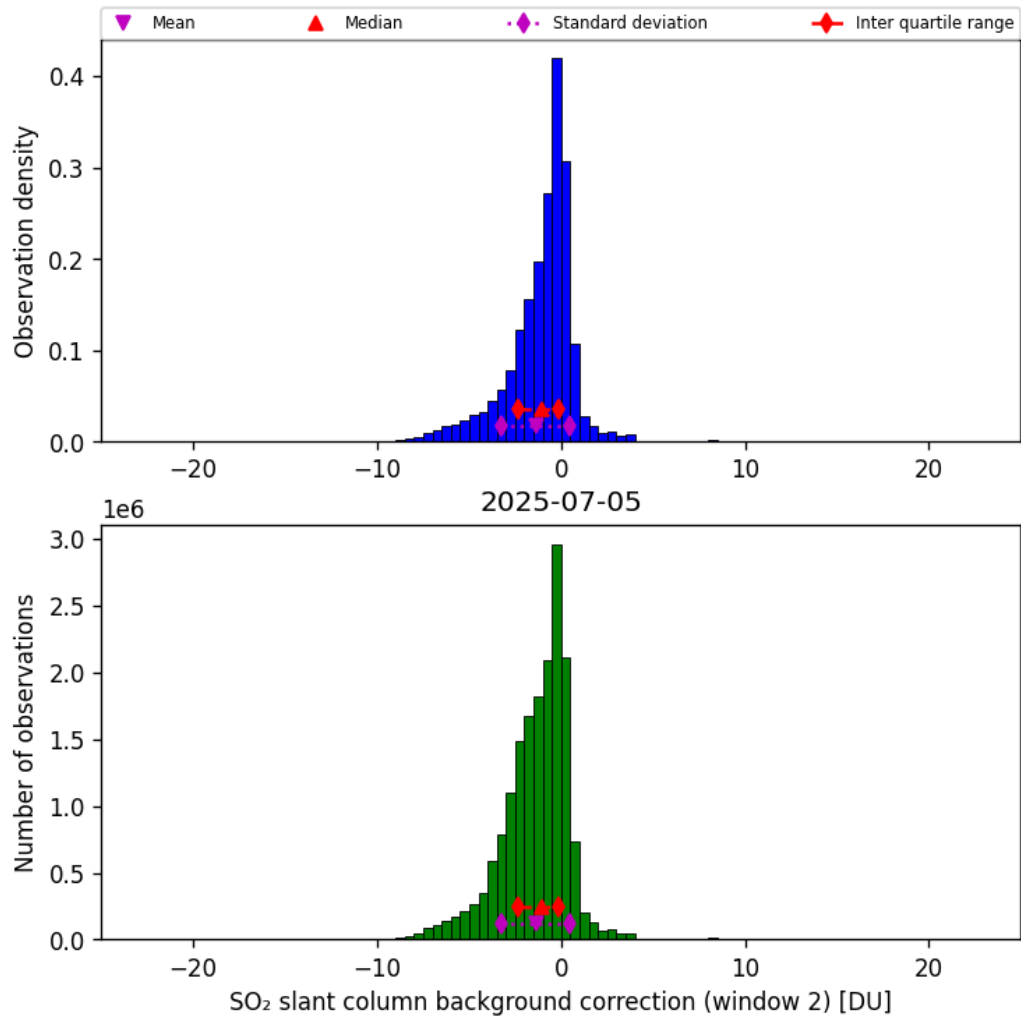


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-07-05 to 2025-07-06

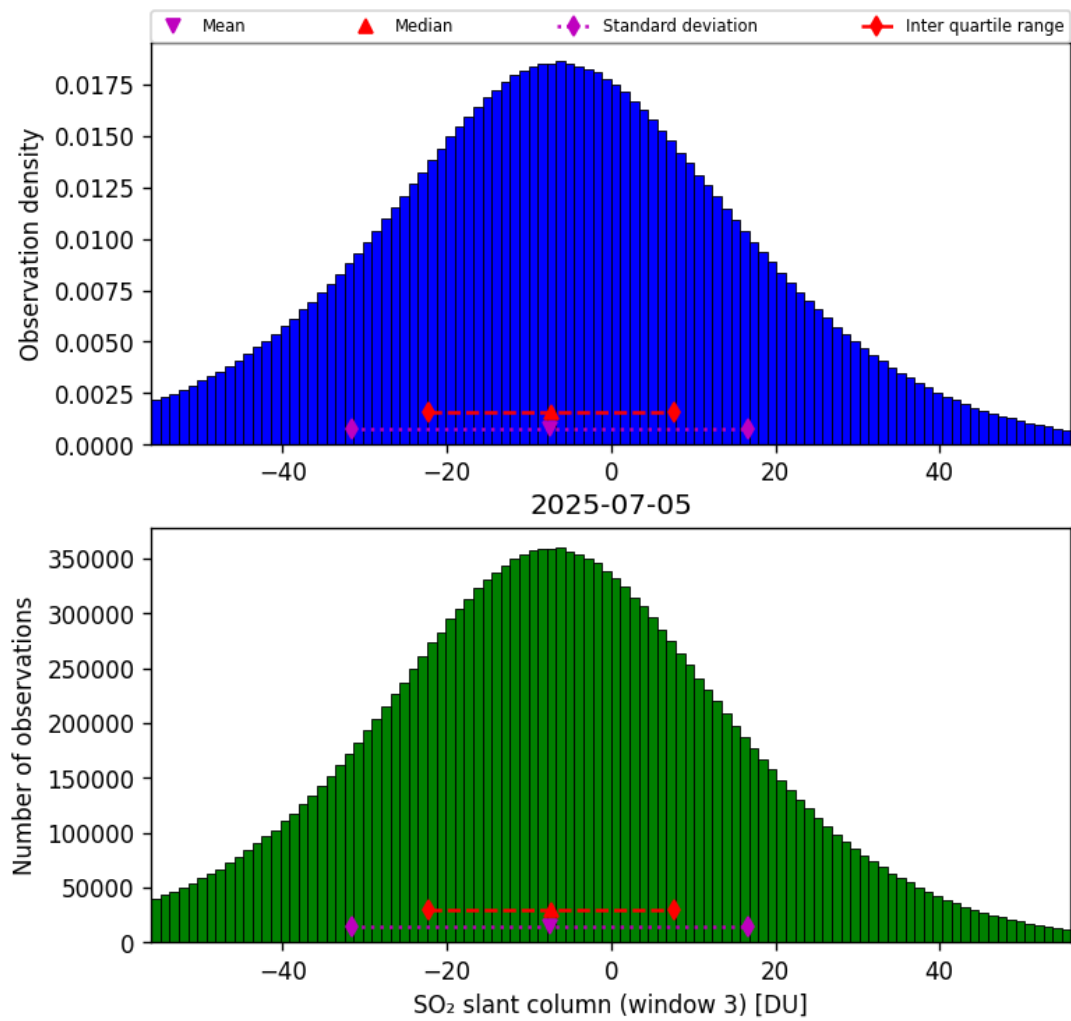


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-07-05 to 2025-07-06

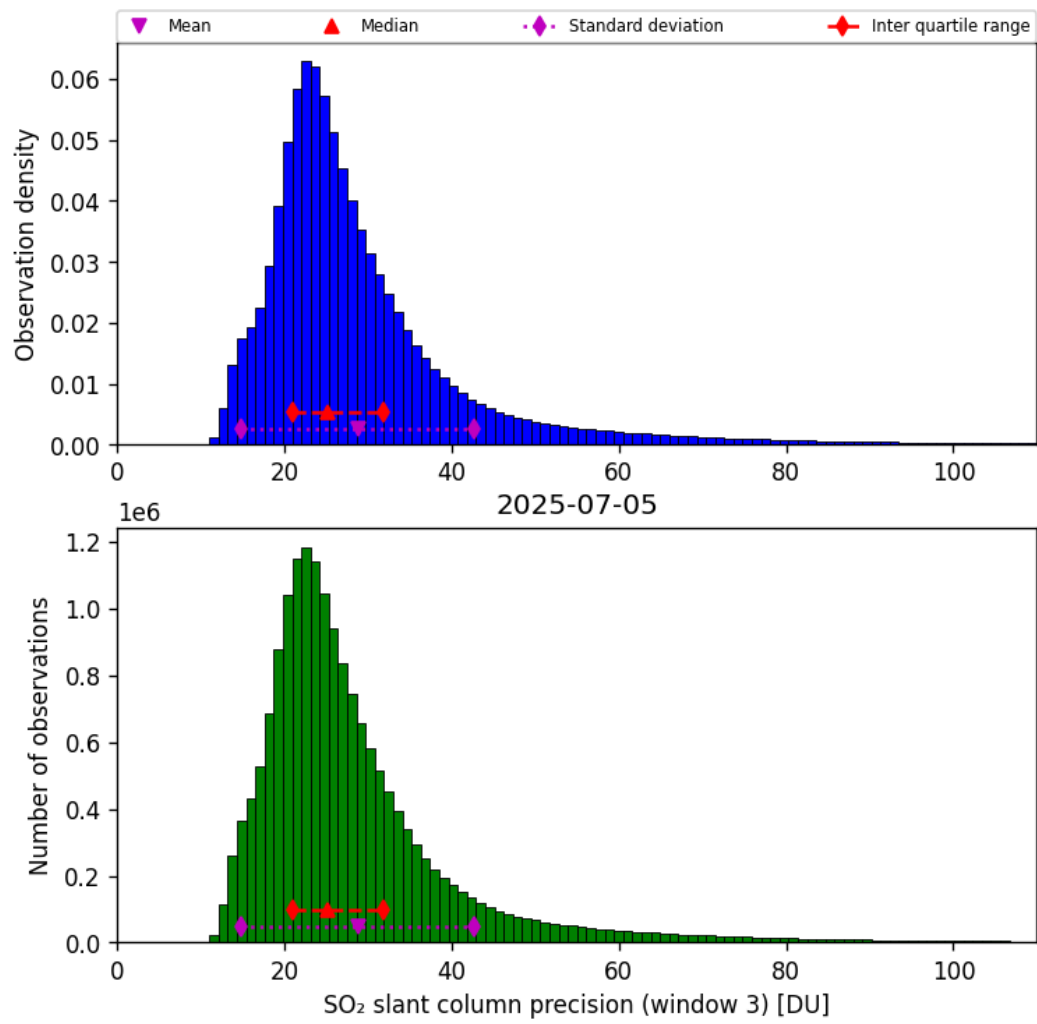


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-07-05 to 2025-07-06

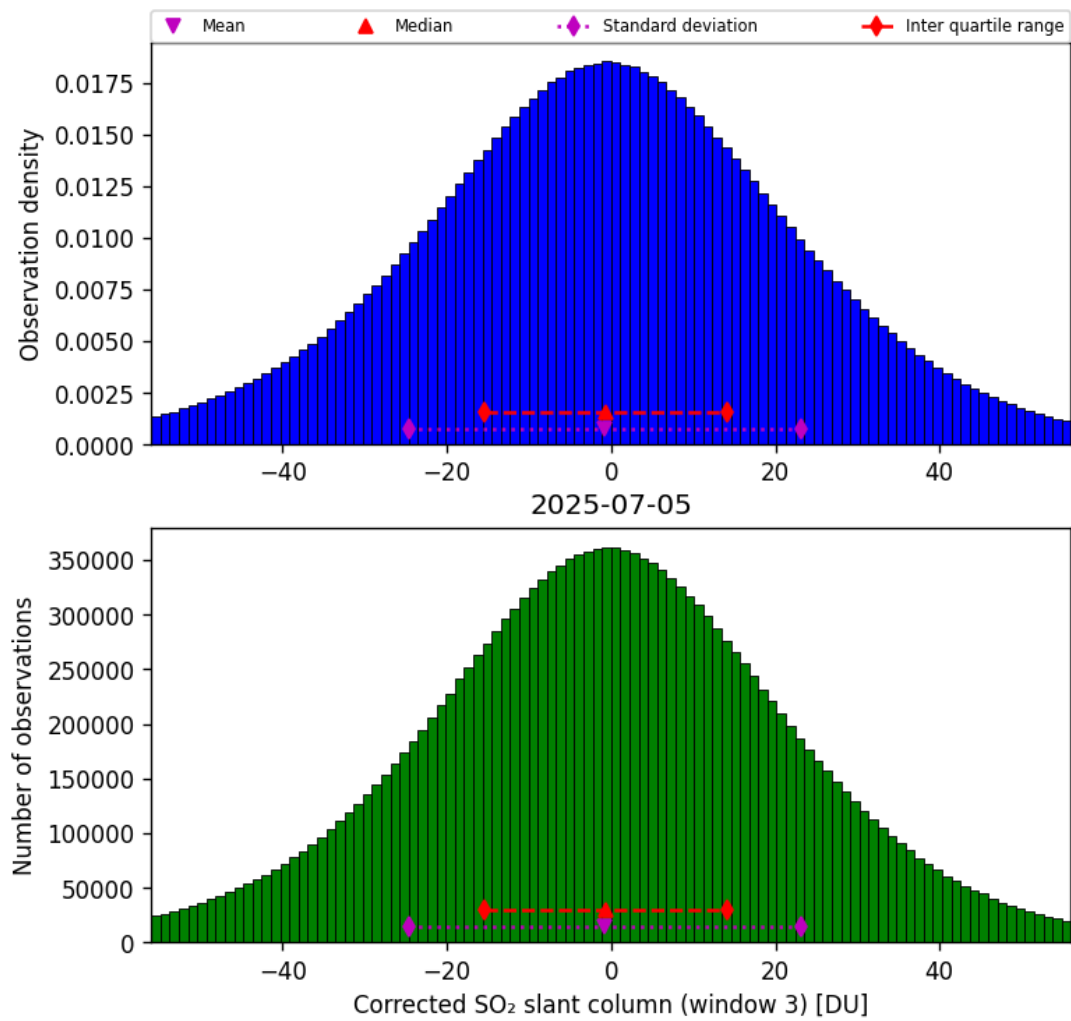


Figure 73: Histogram of "Corrected SO₂ slant column (window 3)" for 2025-07-05 to 2025-07-06

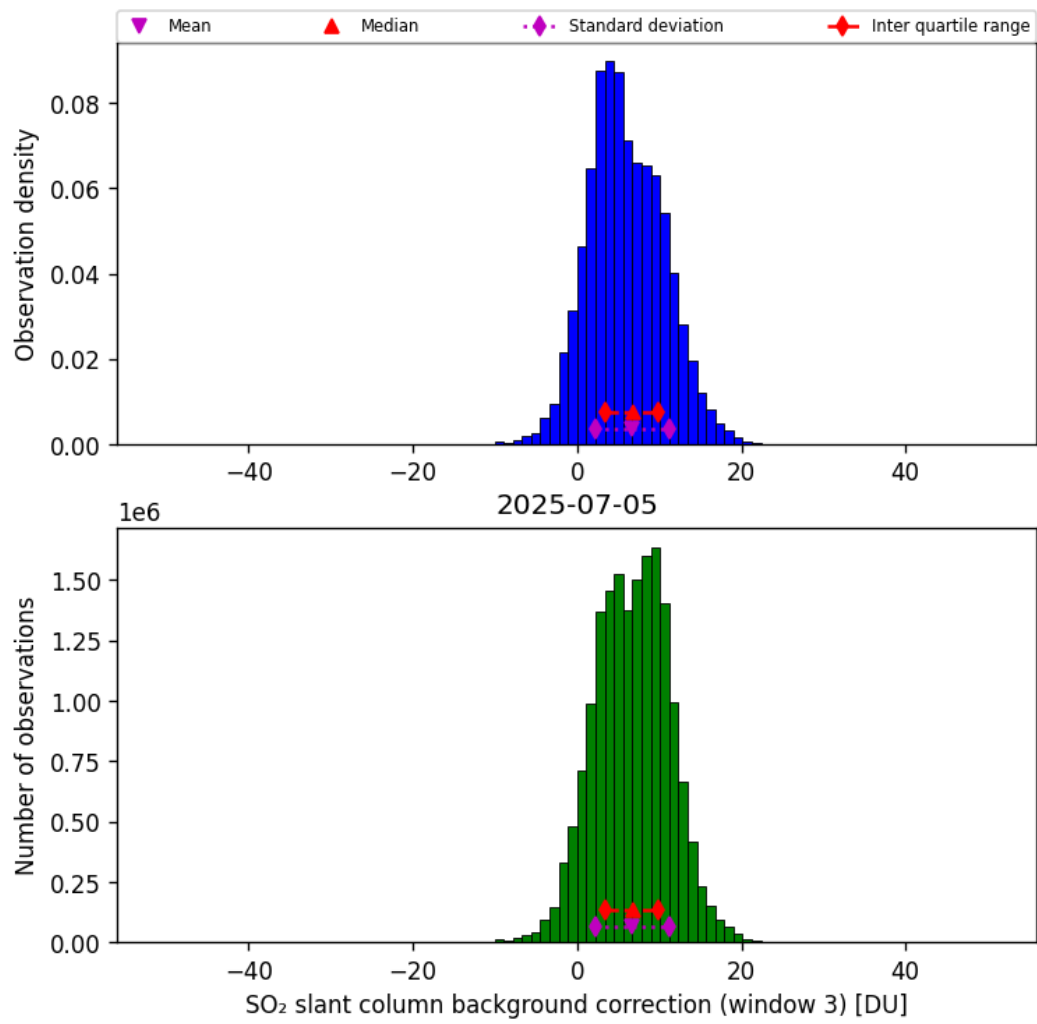


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-07-05 to 2025-07-06

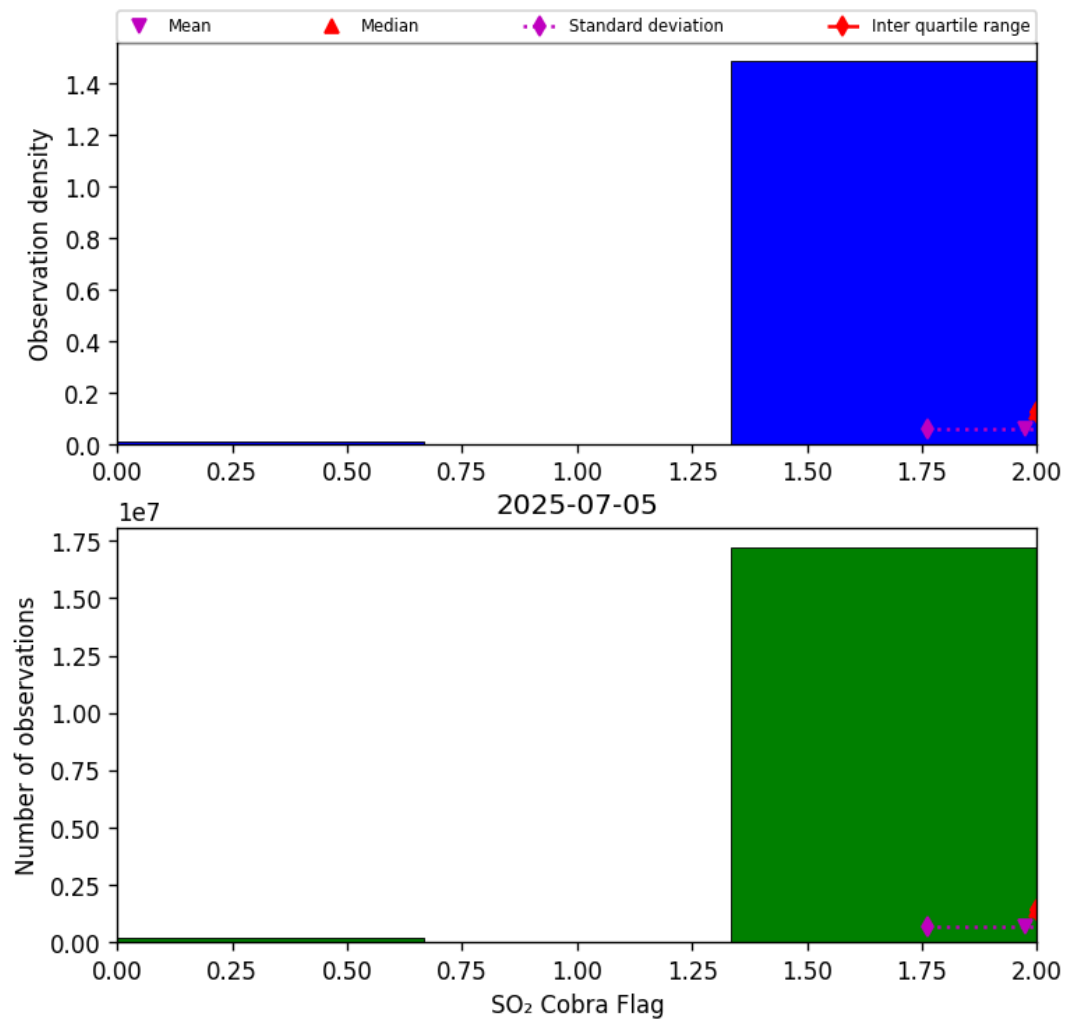


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-07-05 to 2025-07-06

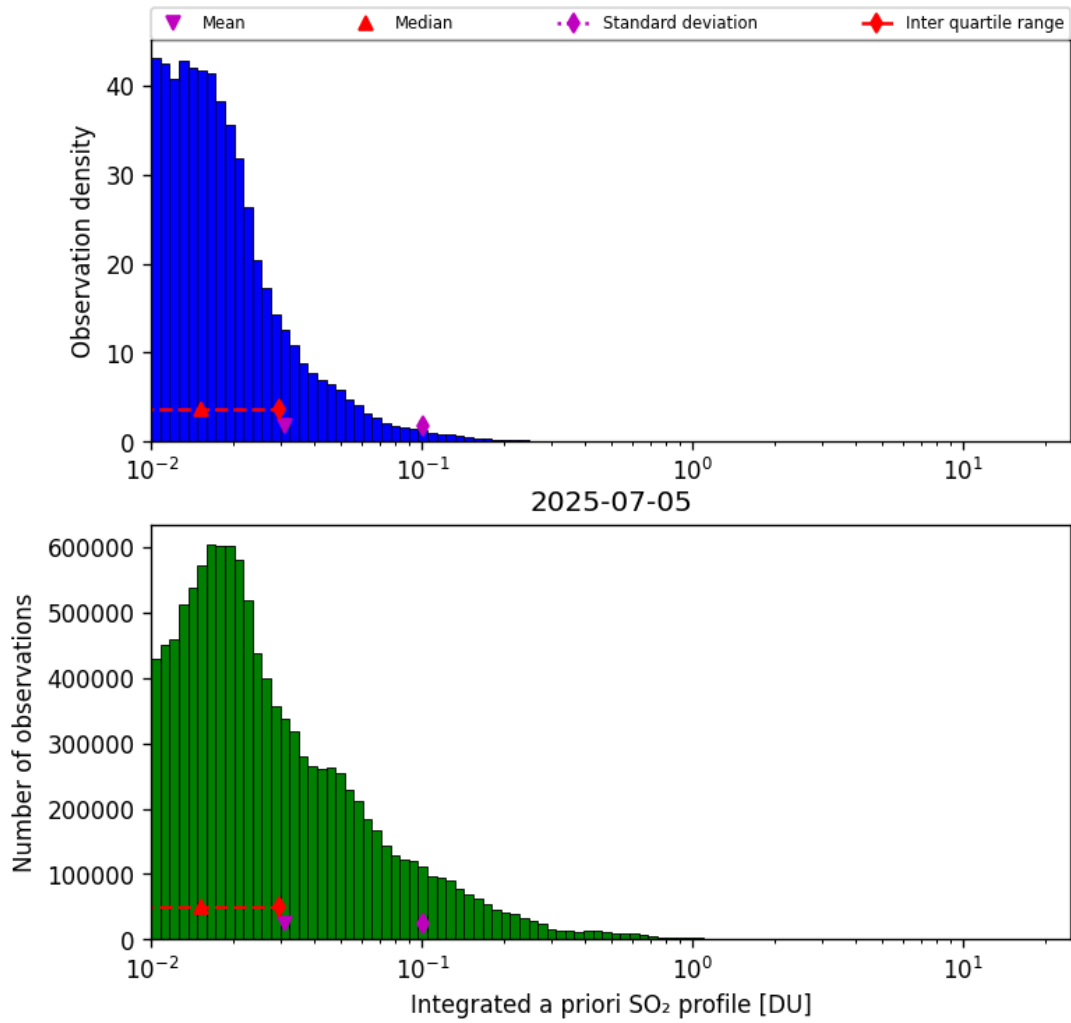


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-07-05 to 2025-07-06

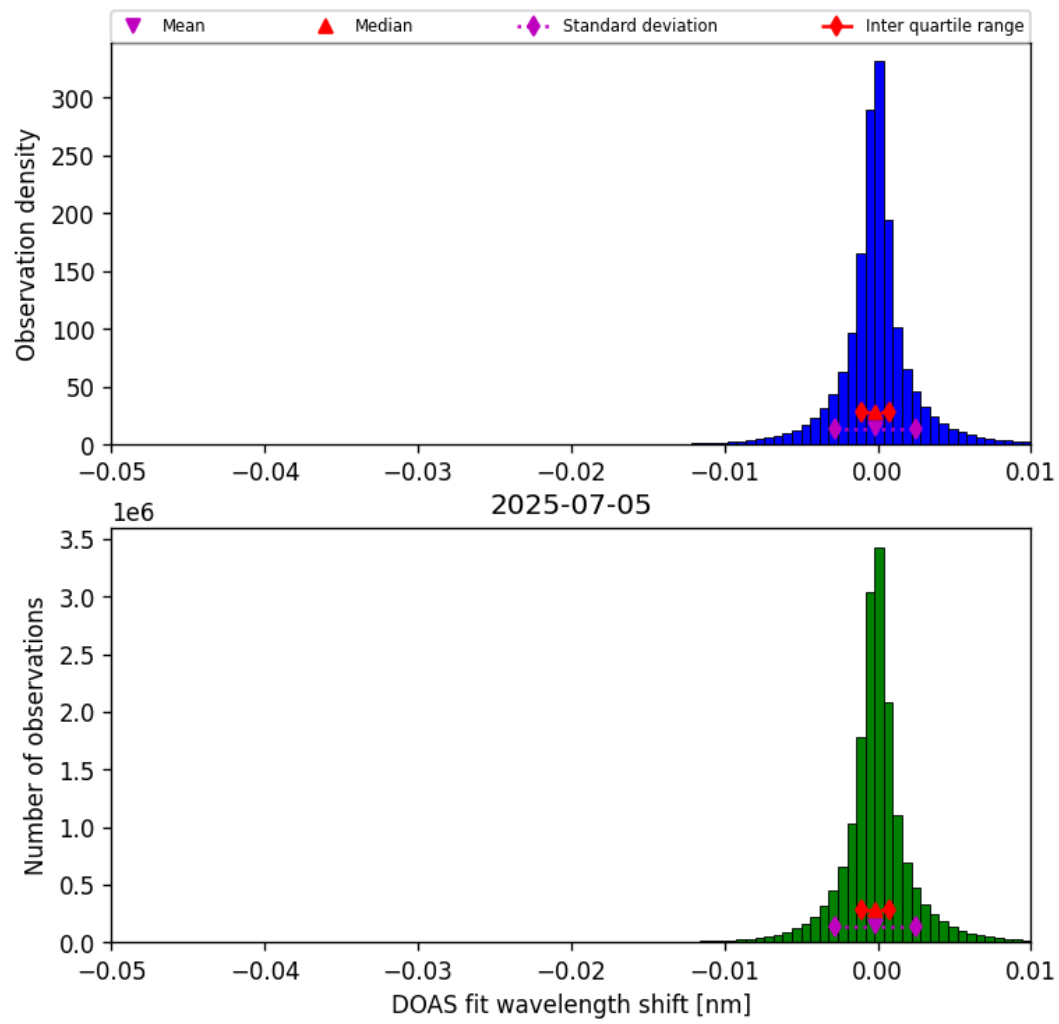


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-07-05 to 2025-07-06

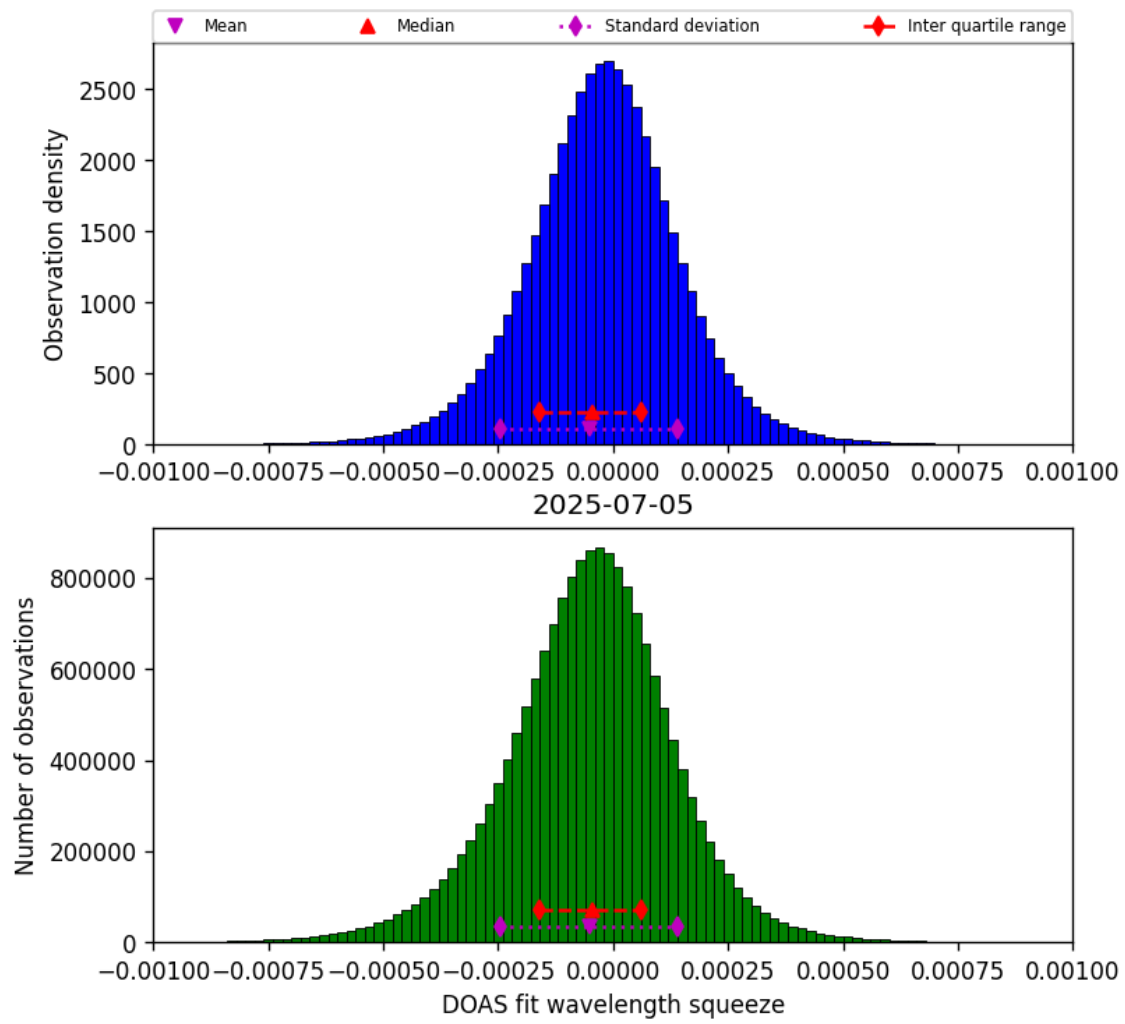


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-07-05 to 2025-07-06

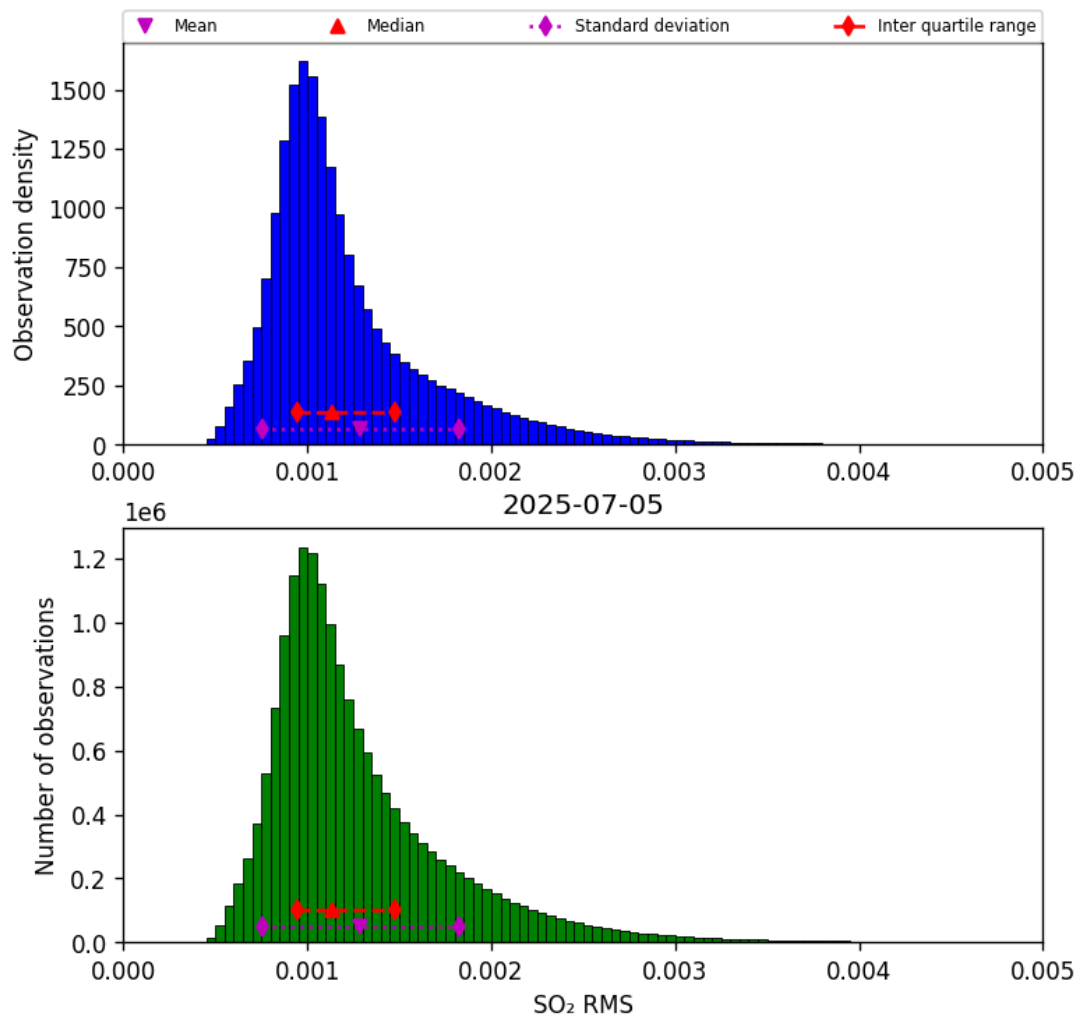


Figure 79: Histogram of “SO₂ RMS” for 2025-07-05 to 2025-07-06

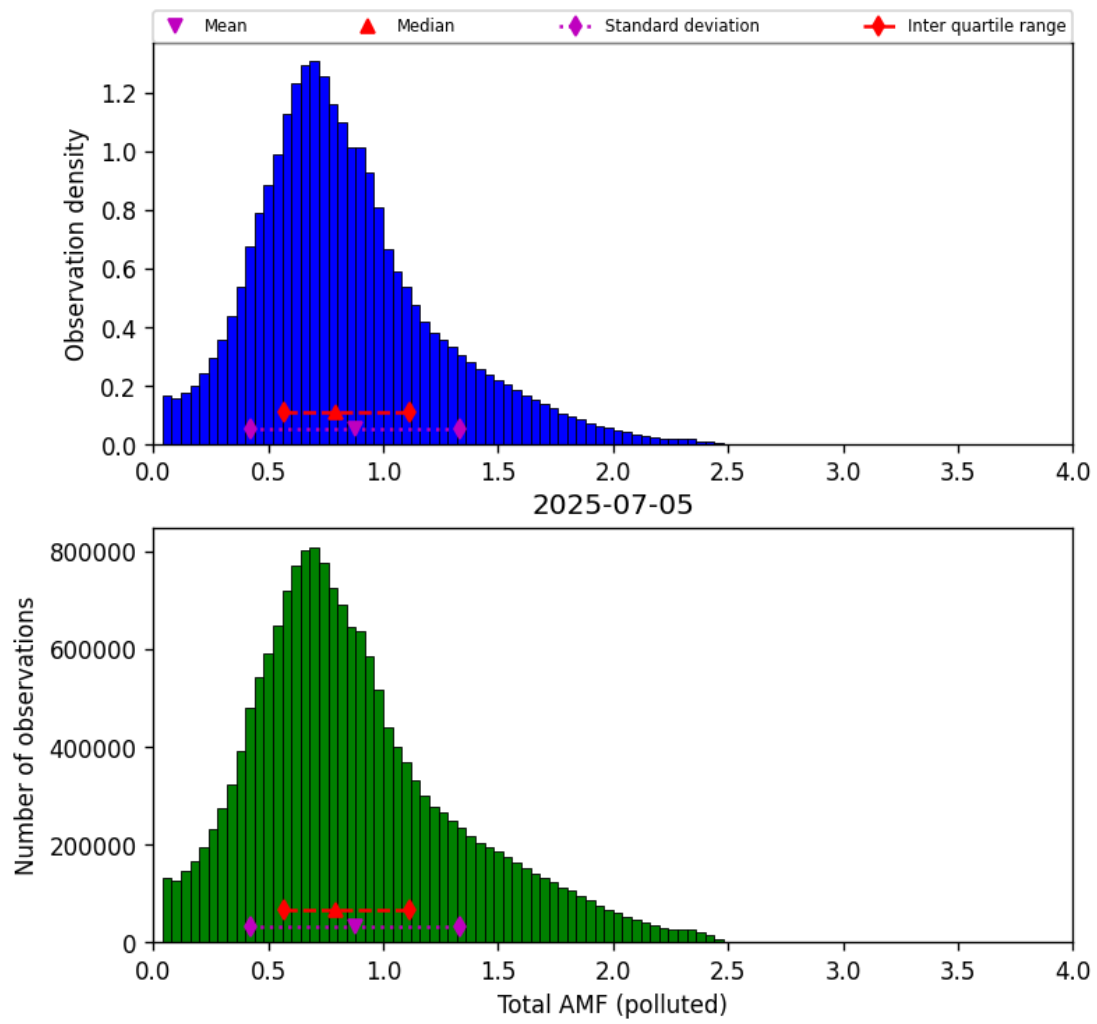


Figure 80: Histogram of “Total AMF (polluted)” for 2025-07-05 to 2025-07-06

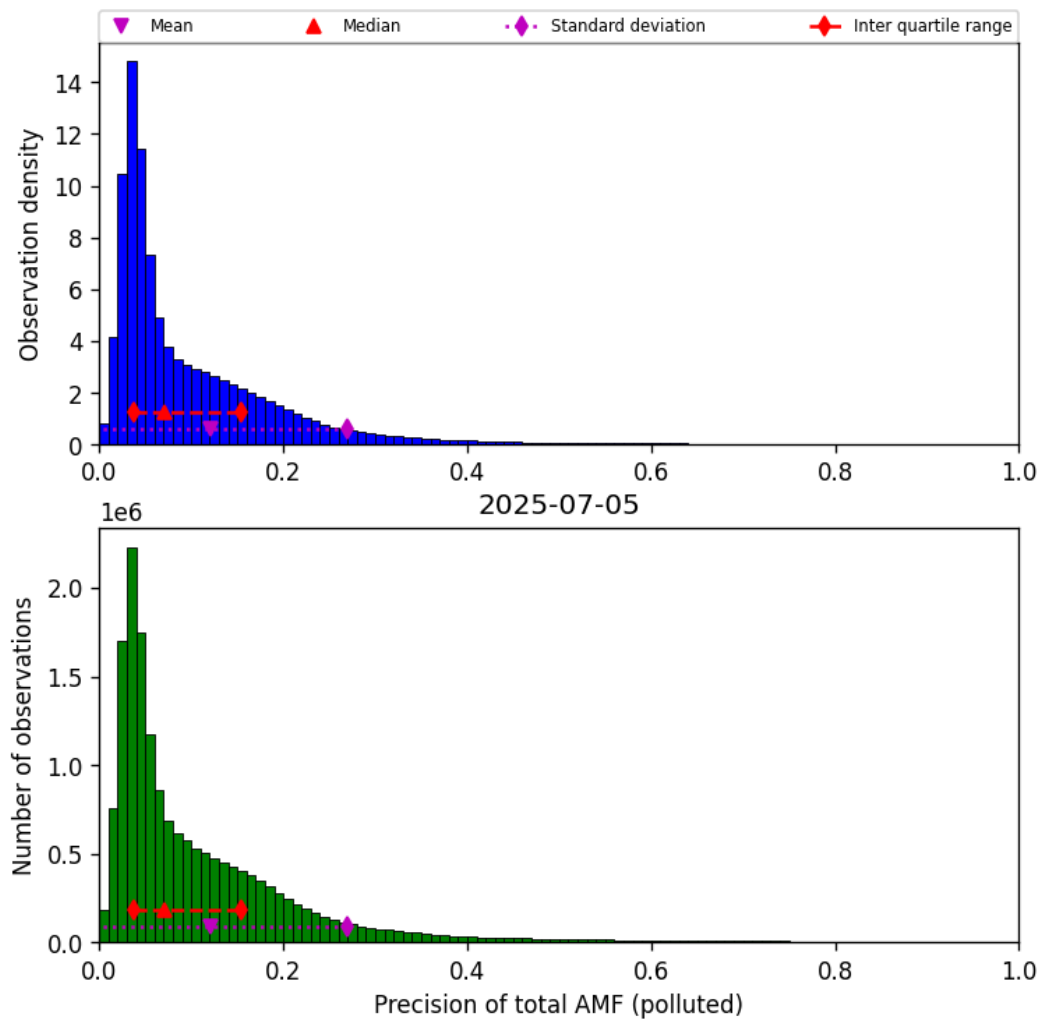


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-07-05 to 2025-07-06

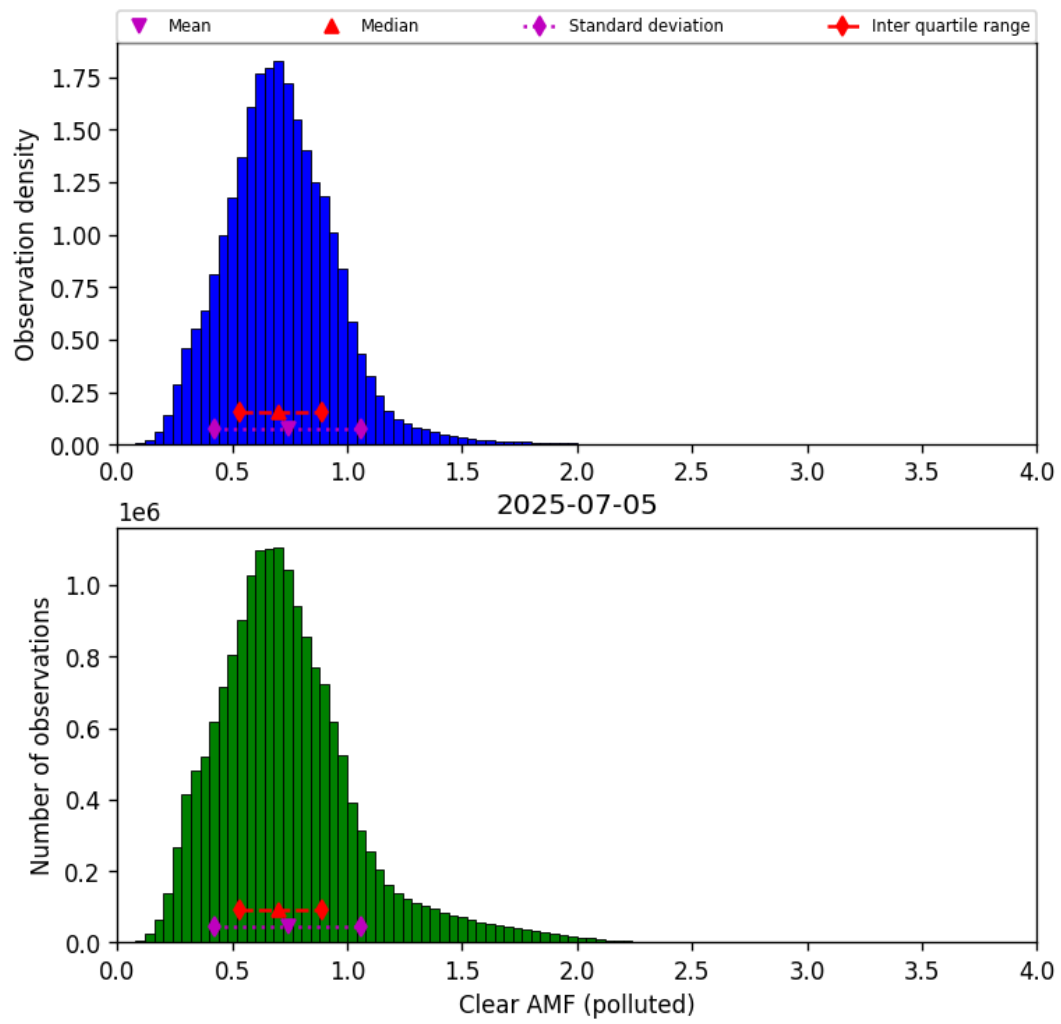


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-07-05 to 2025-07-06

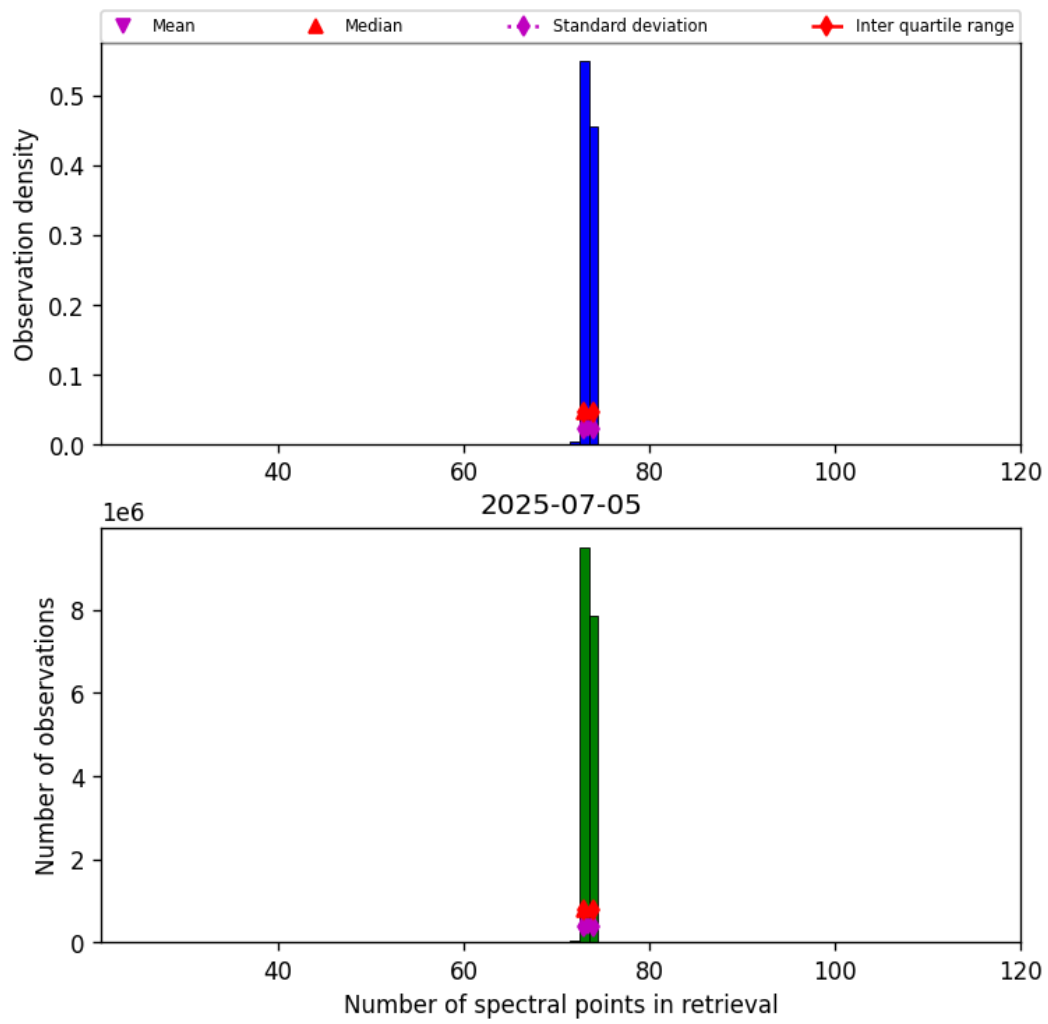


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-07-05 to 2025-07-06

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.

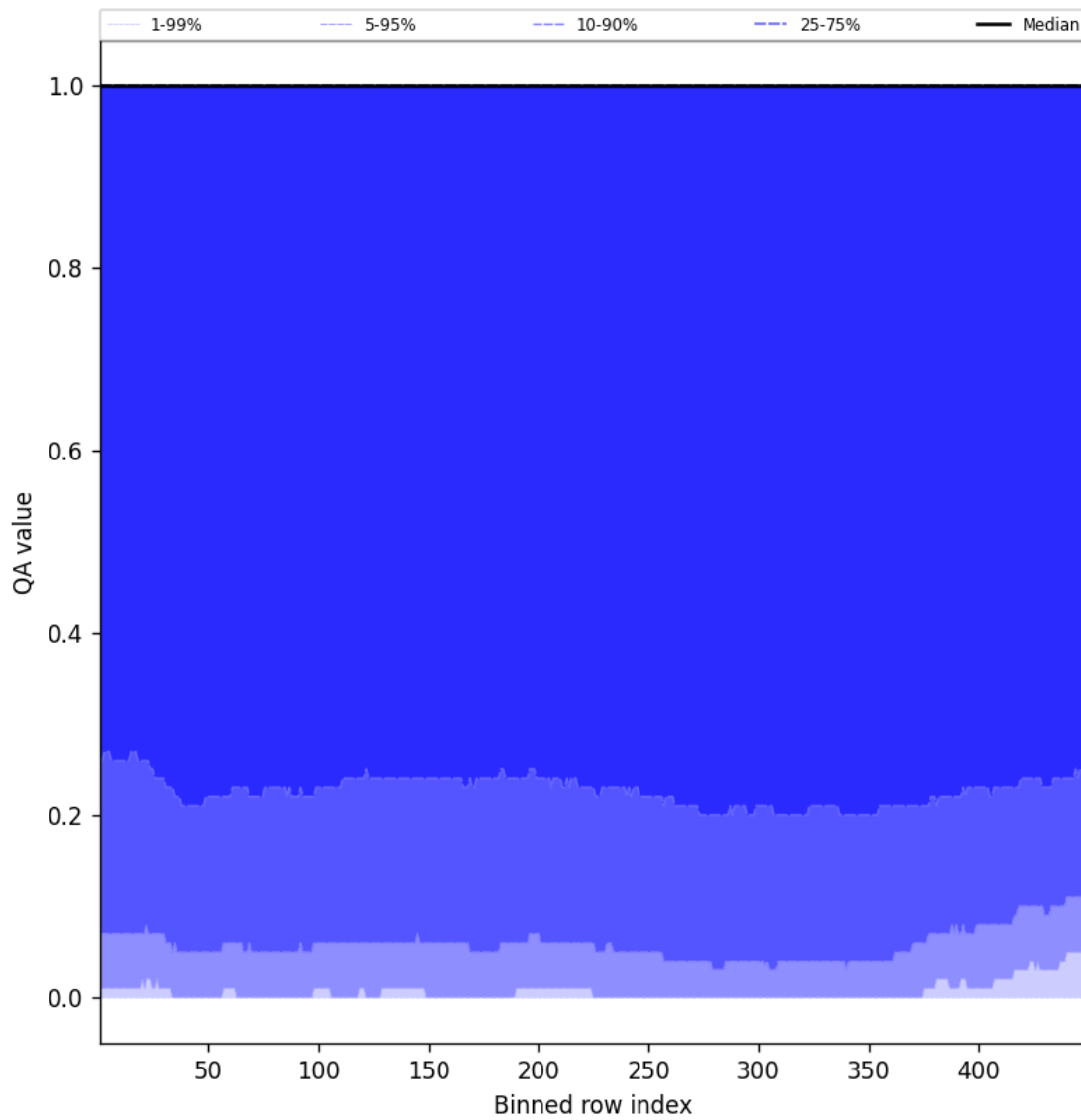


Figure 84: Along track statistics of “QA value” for 2025-07-05 to 2025-07-06

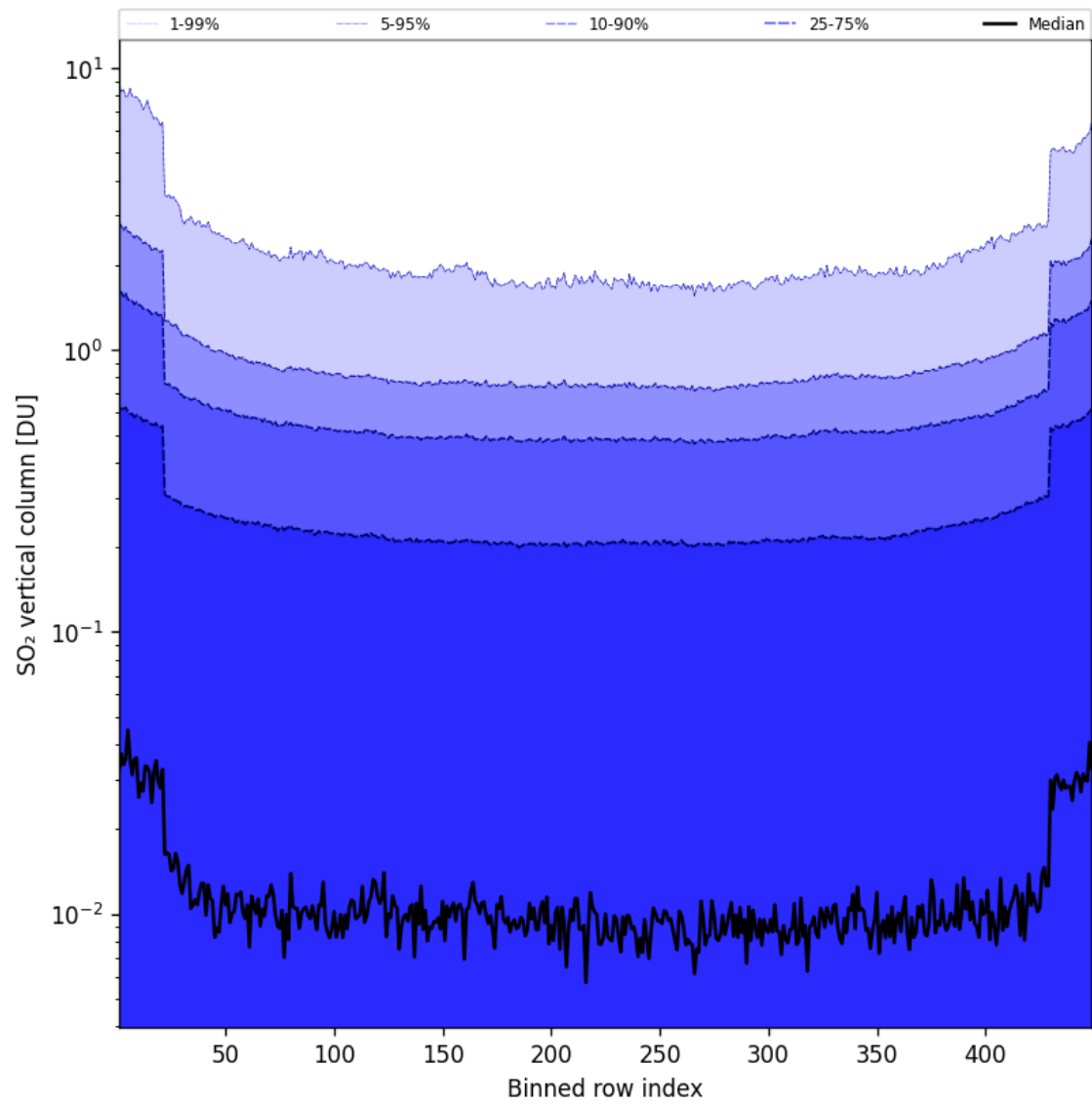


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-07-05 to 2025-07-06

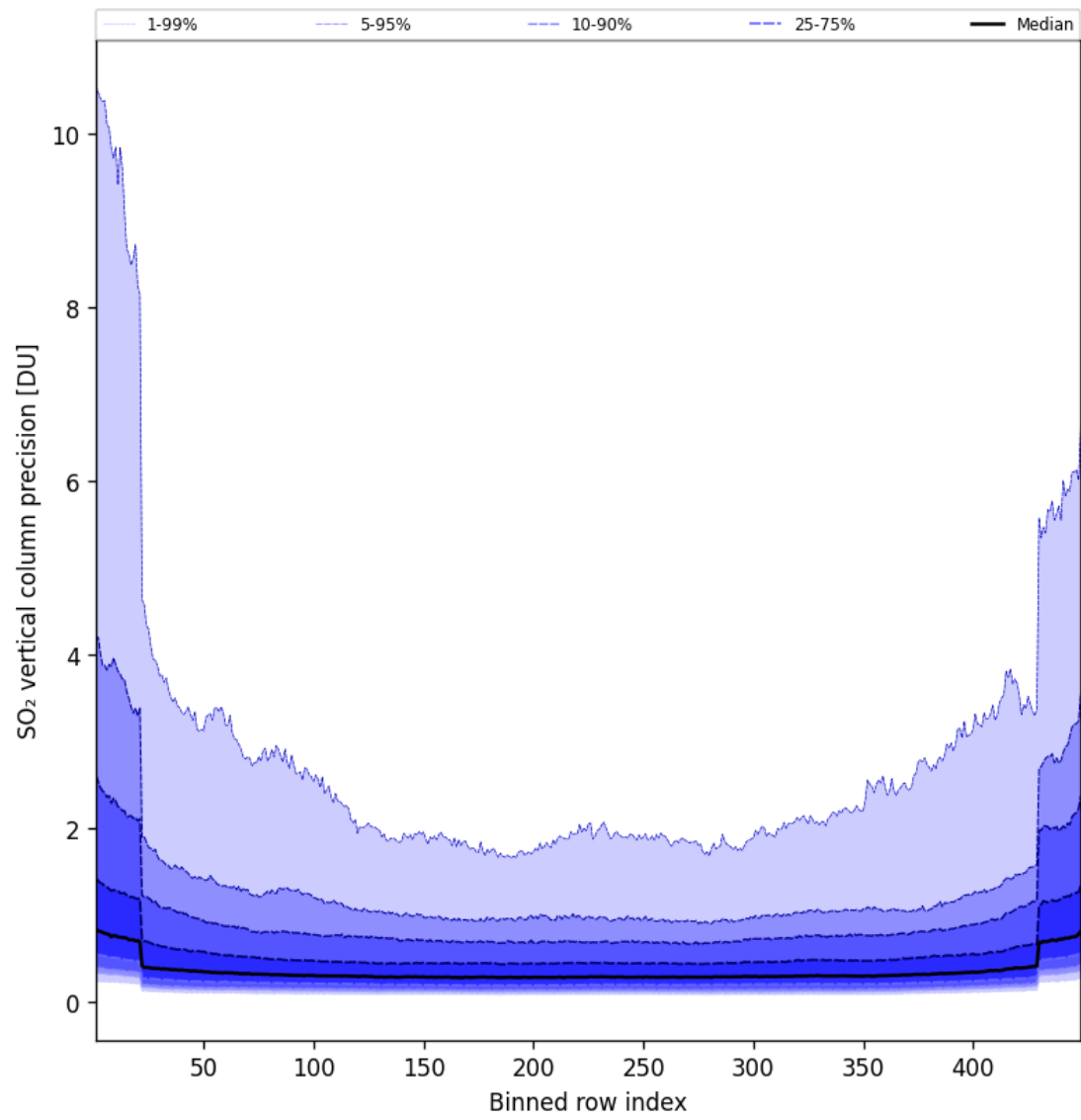


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-07-05 to 2025-07-06

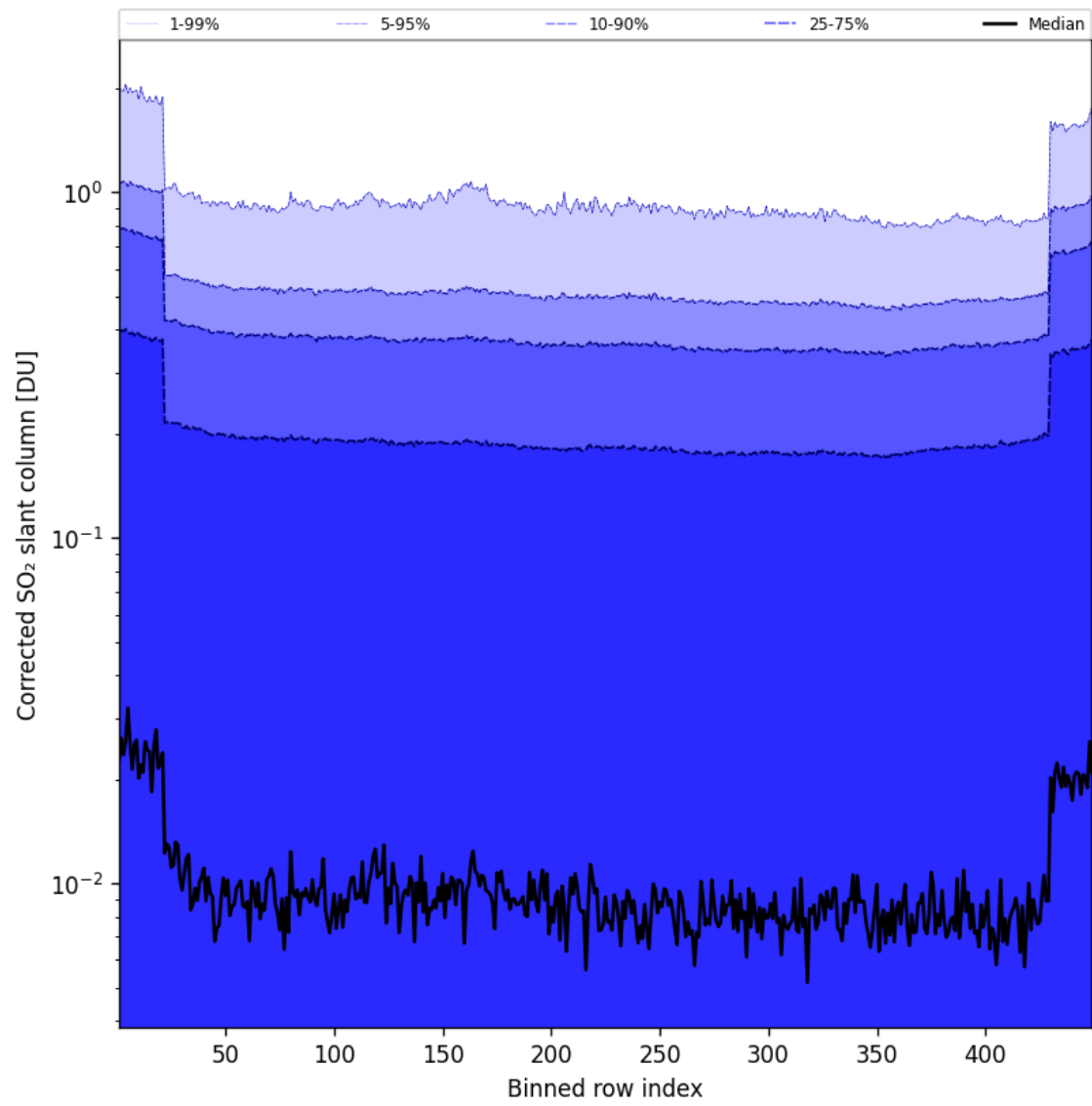


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-07-05 to 2025-07-06

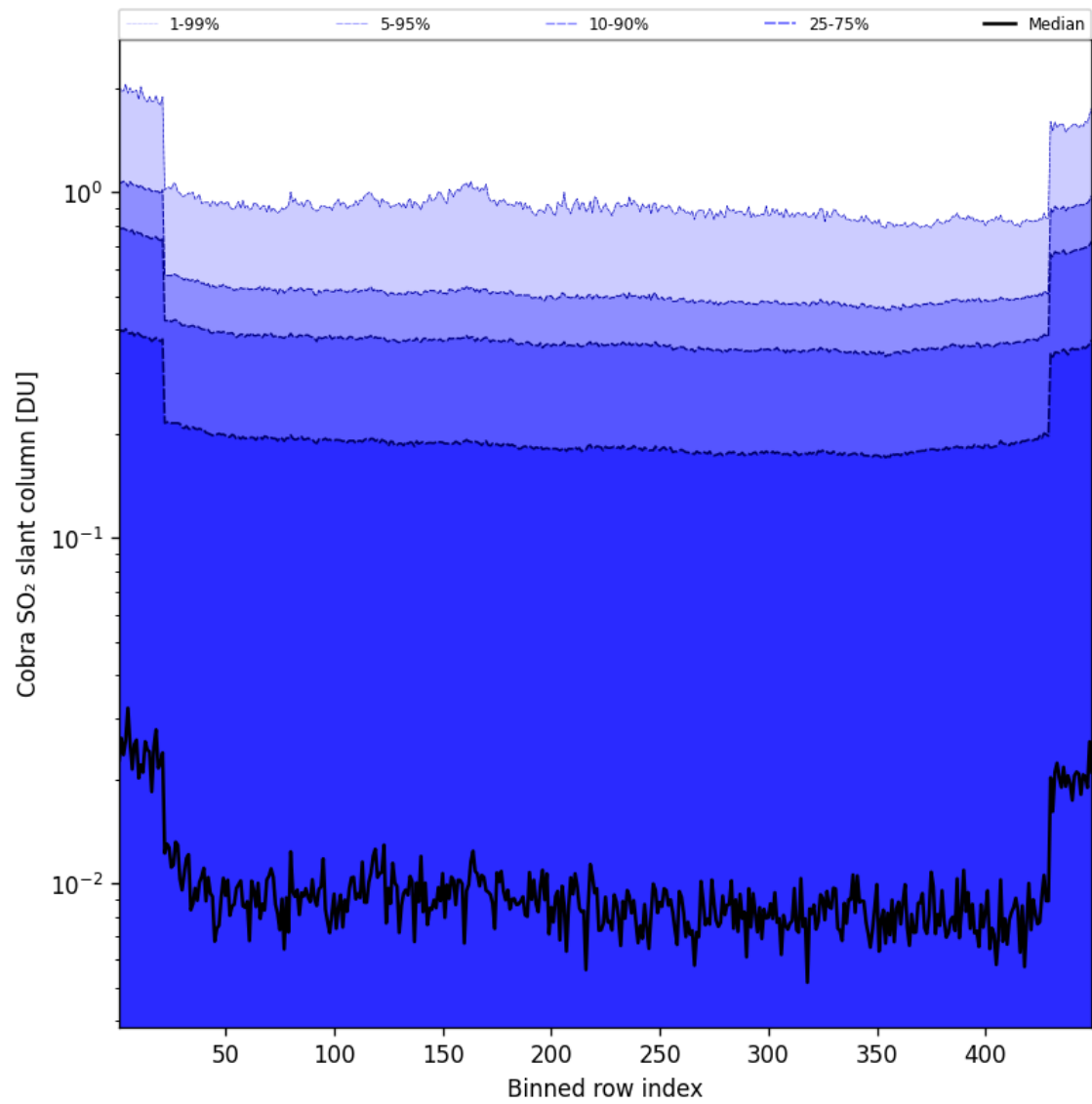


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-07-05 to 2025-07-06

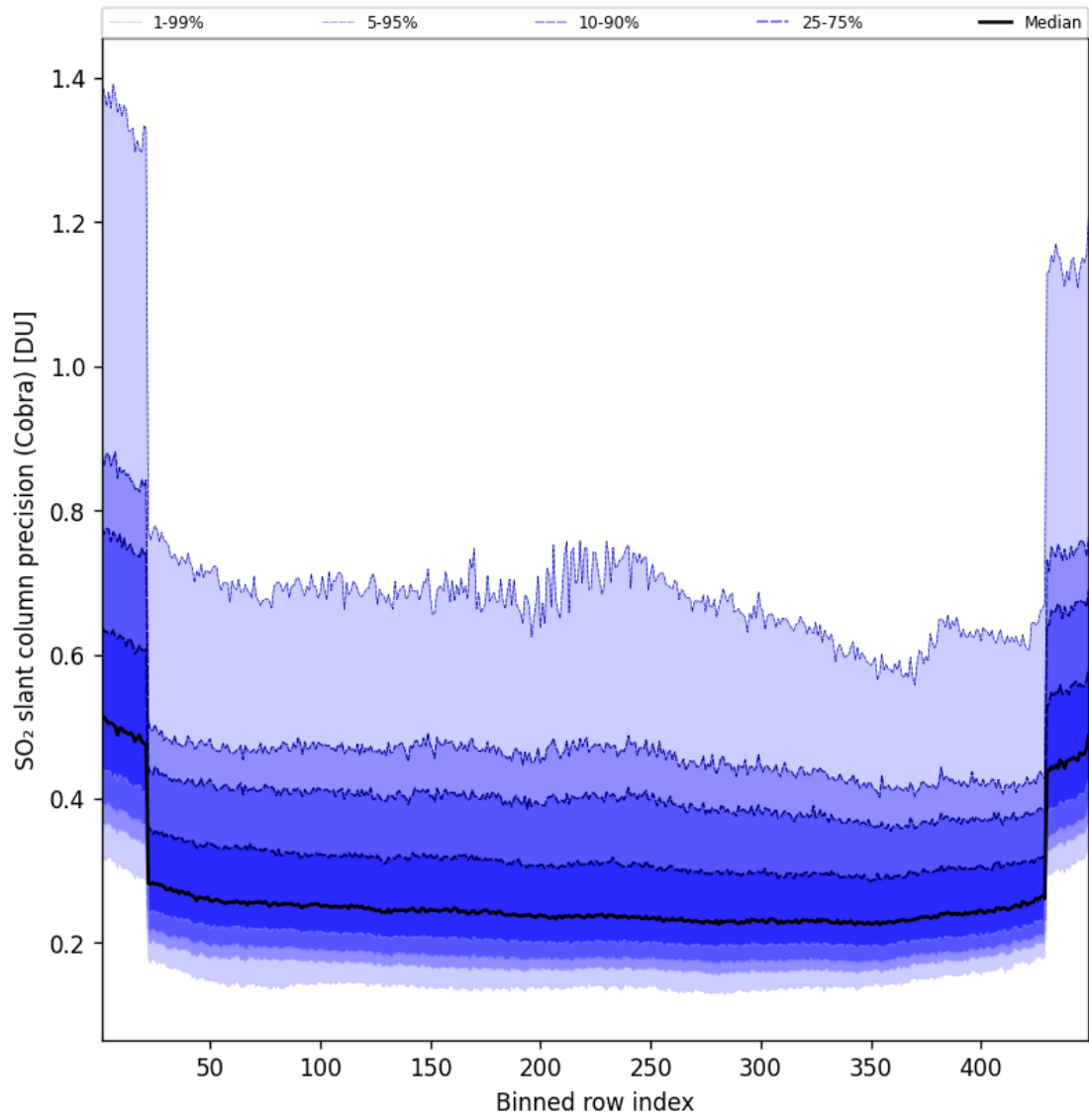


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-07-05 to 2025-07-06

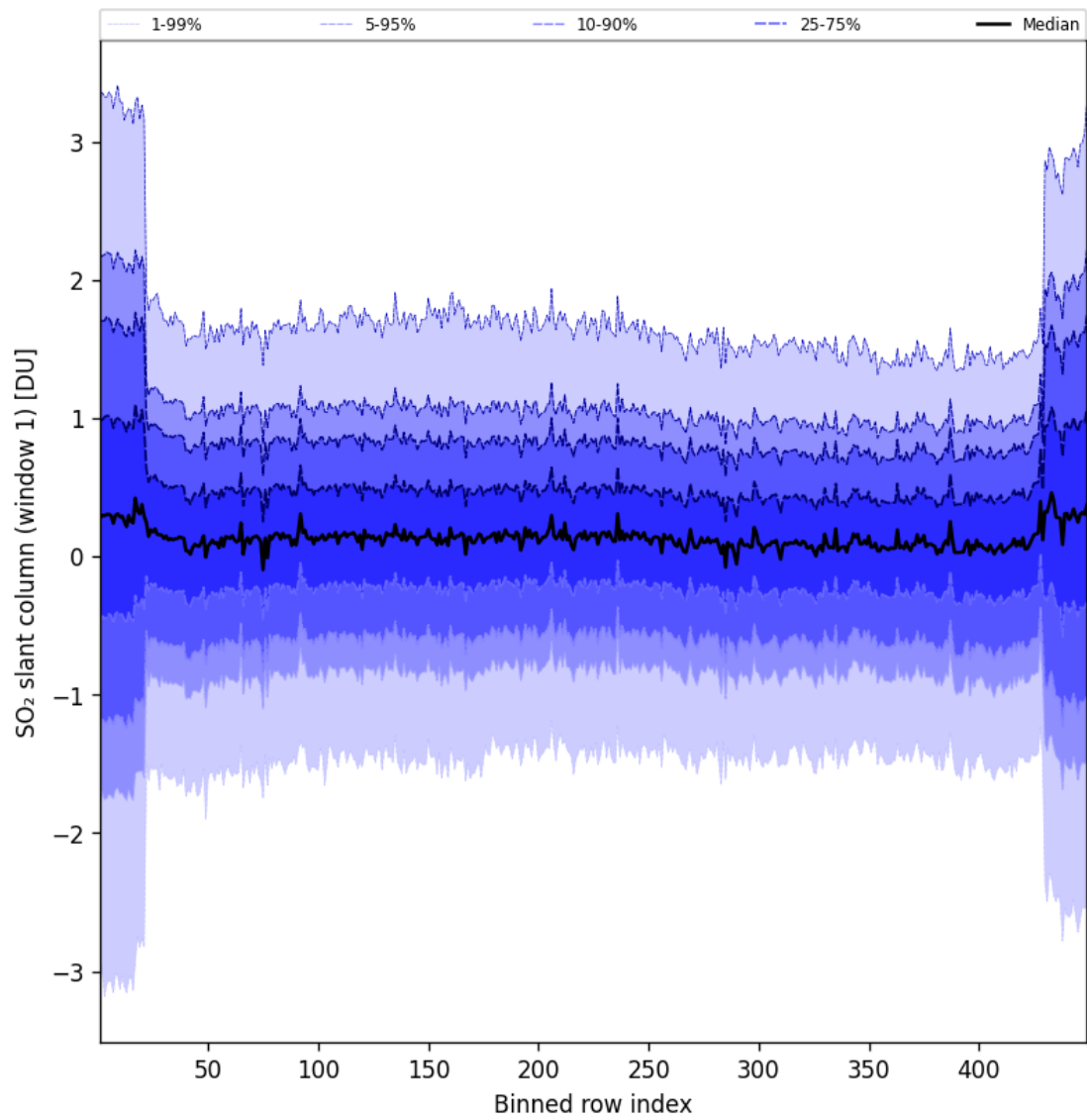


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-07-05 to 2025-07-06

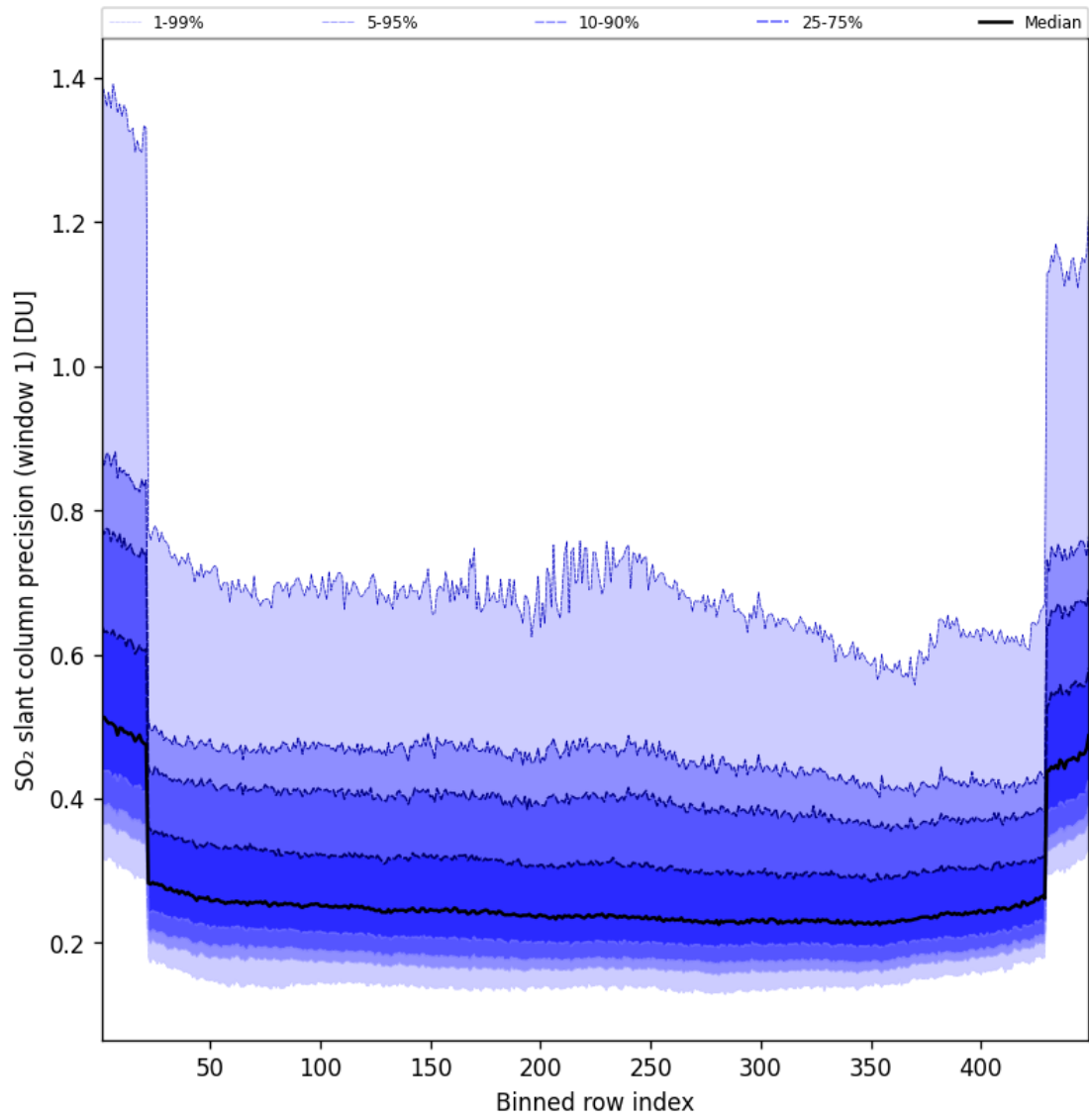


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-07-05 to 2025-07-06

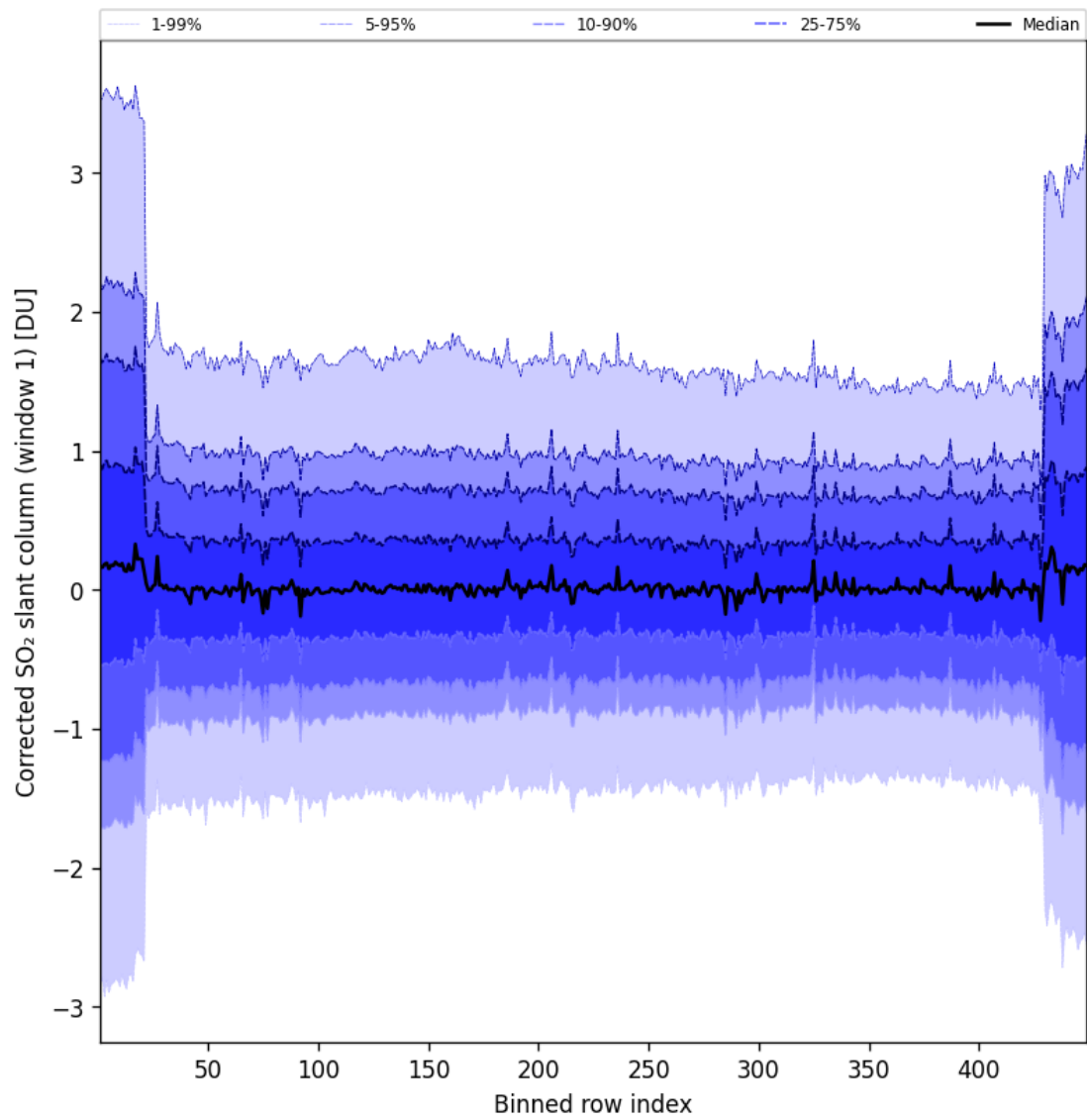


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-07-05 to 2025-07-06

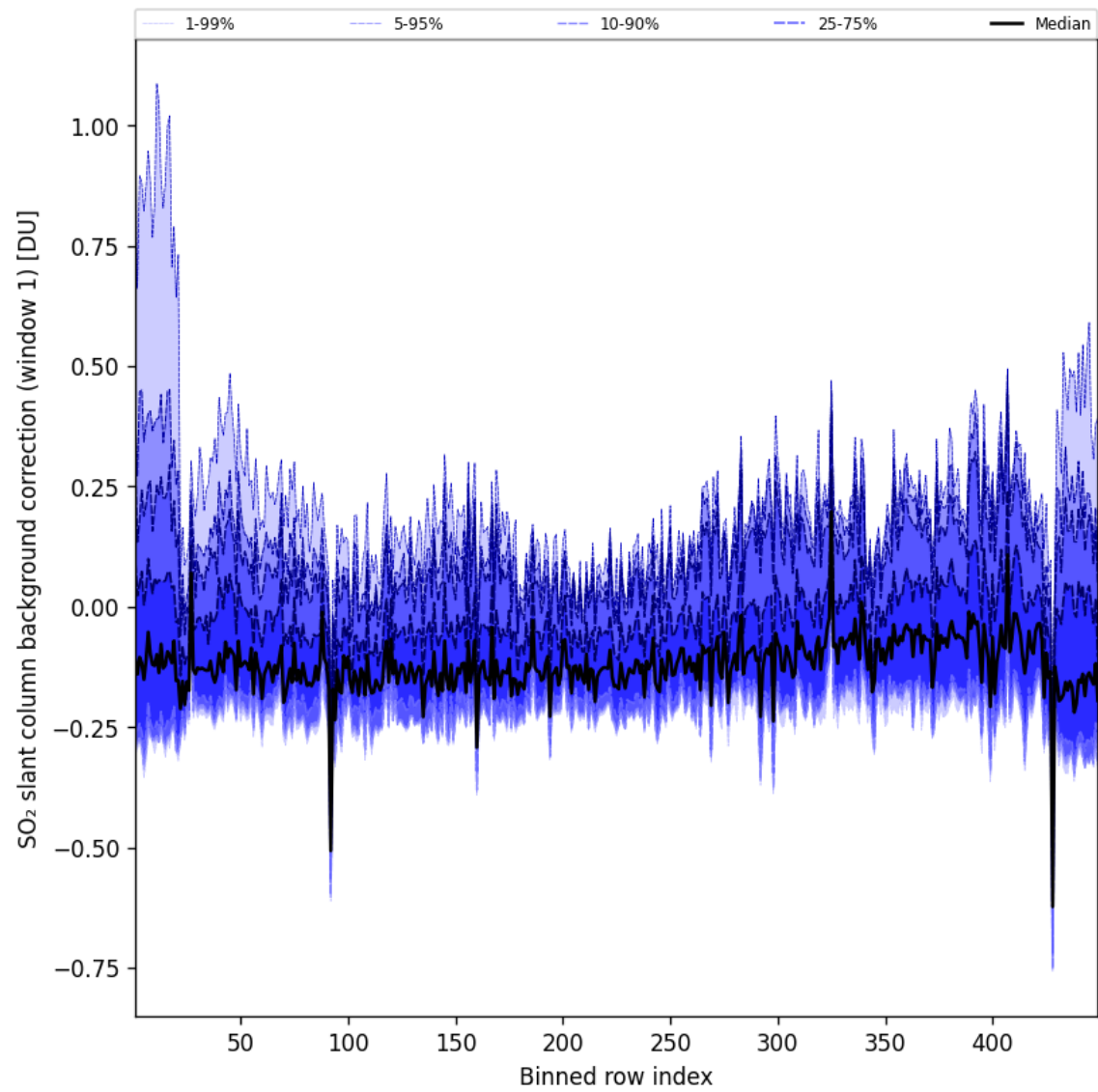


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-07-05 to 2025-07-06

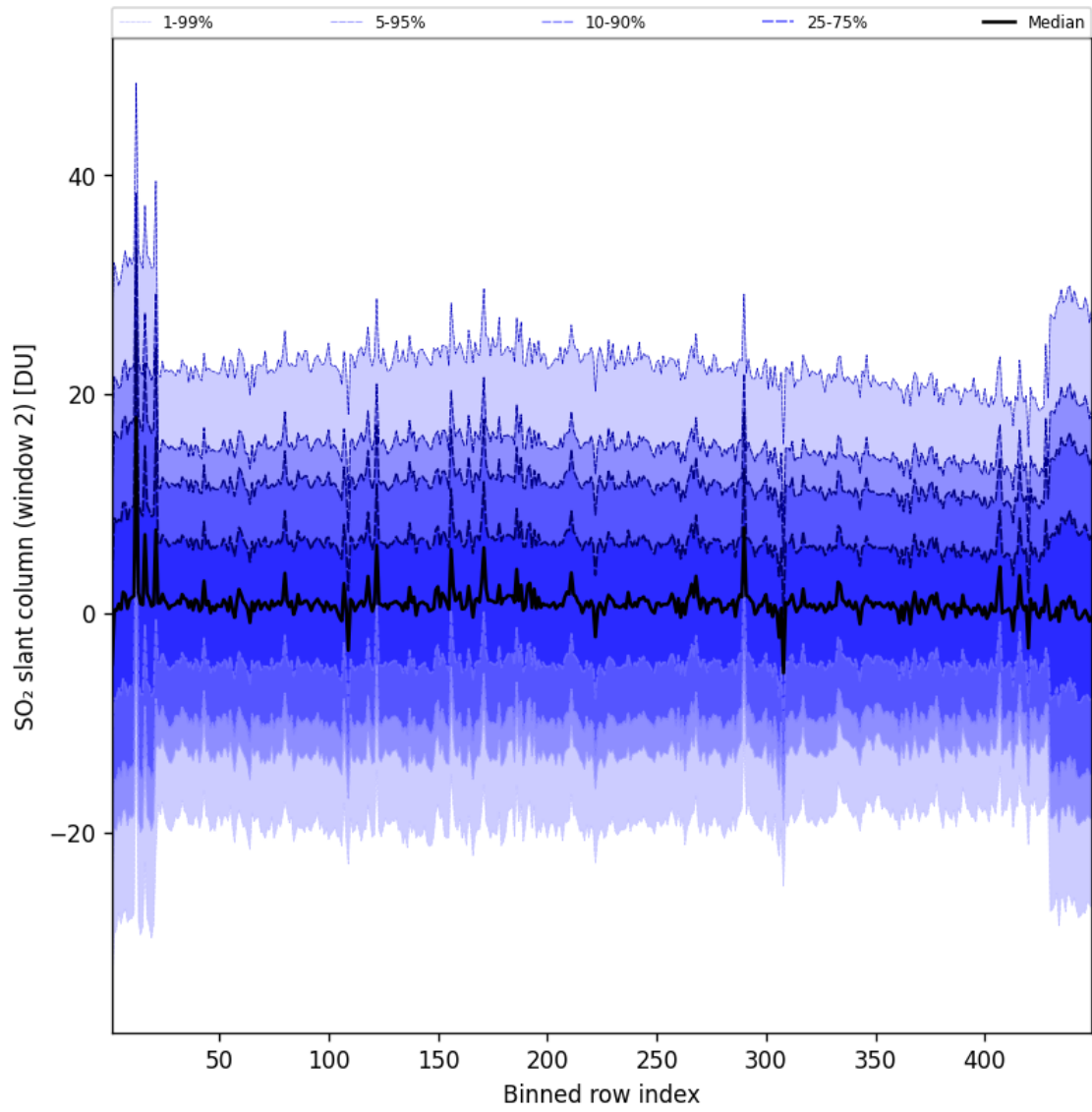


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-07-05 to 2025-07-06

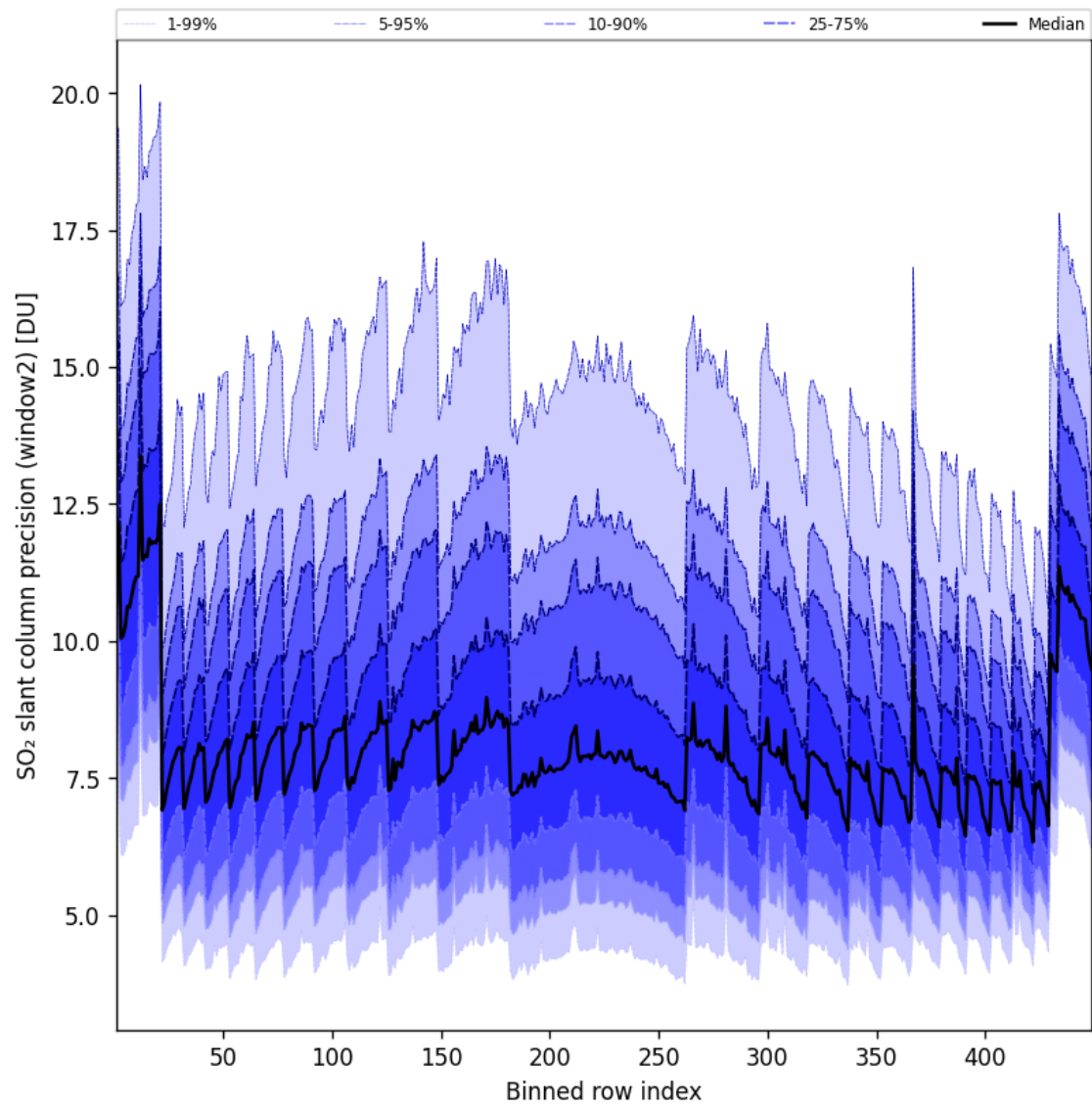


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-07-05 to 2025-07-06

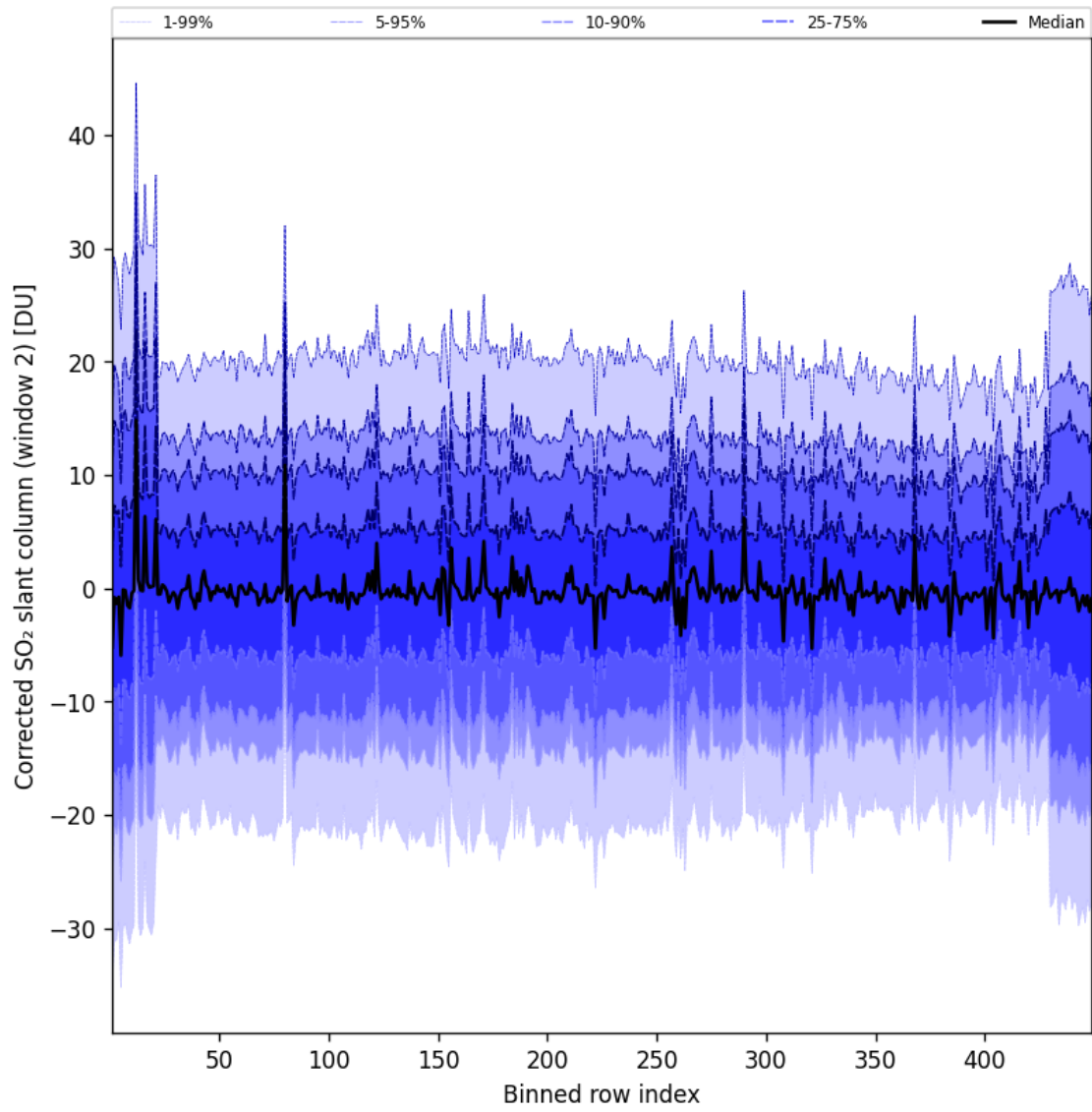


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-07-05 to 2025-07-06

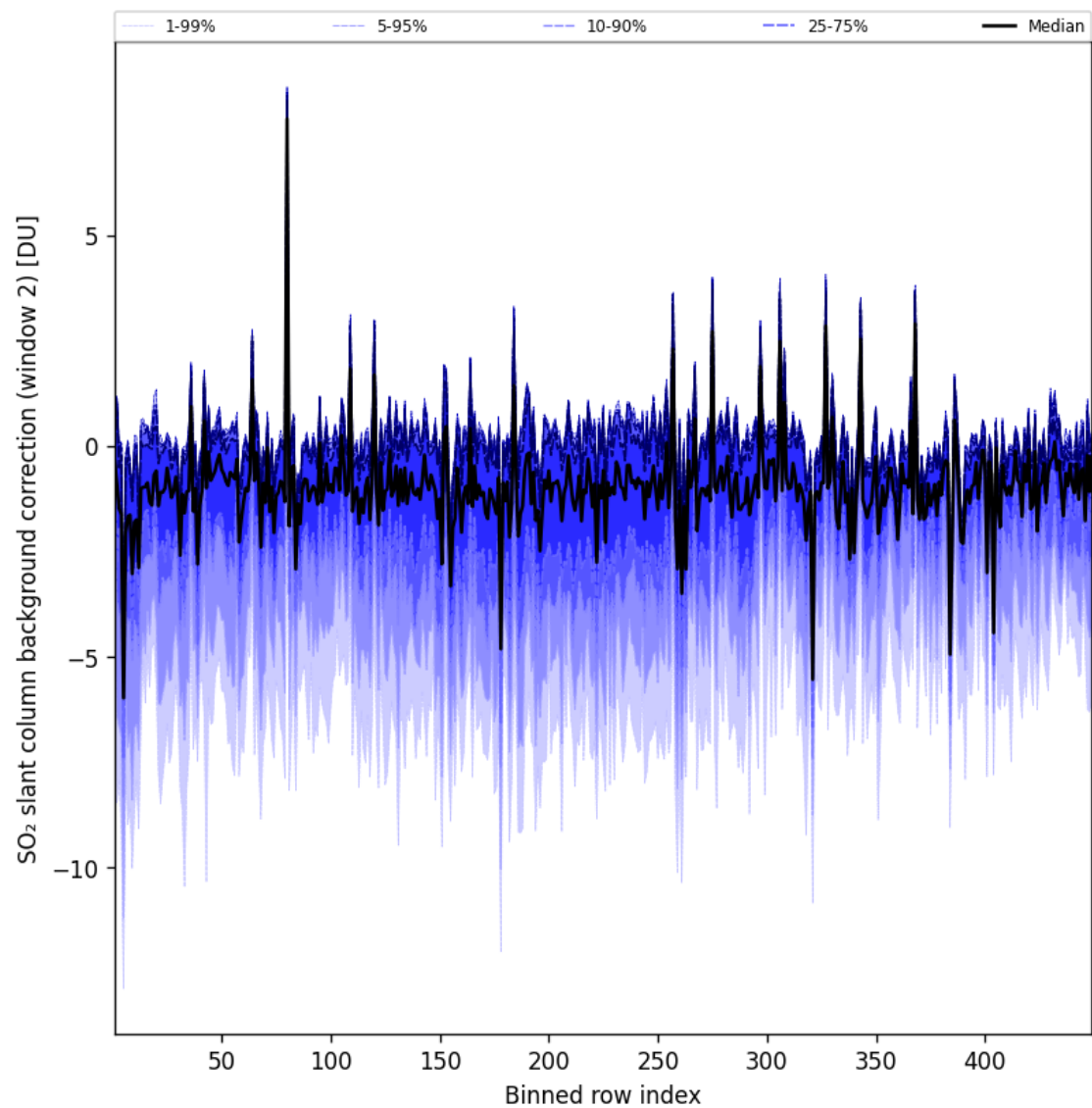


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-07-05 to 2025-07-06

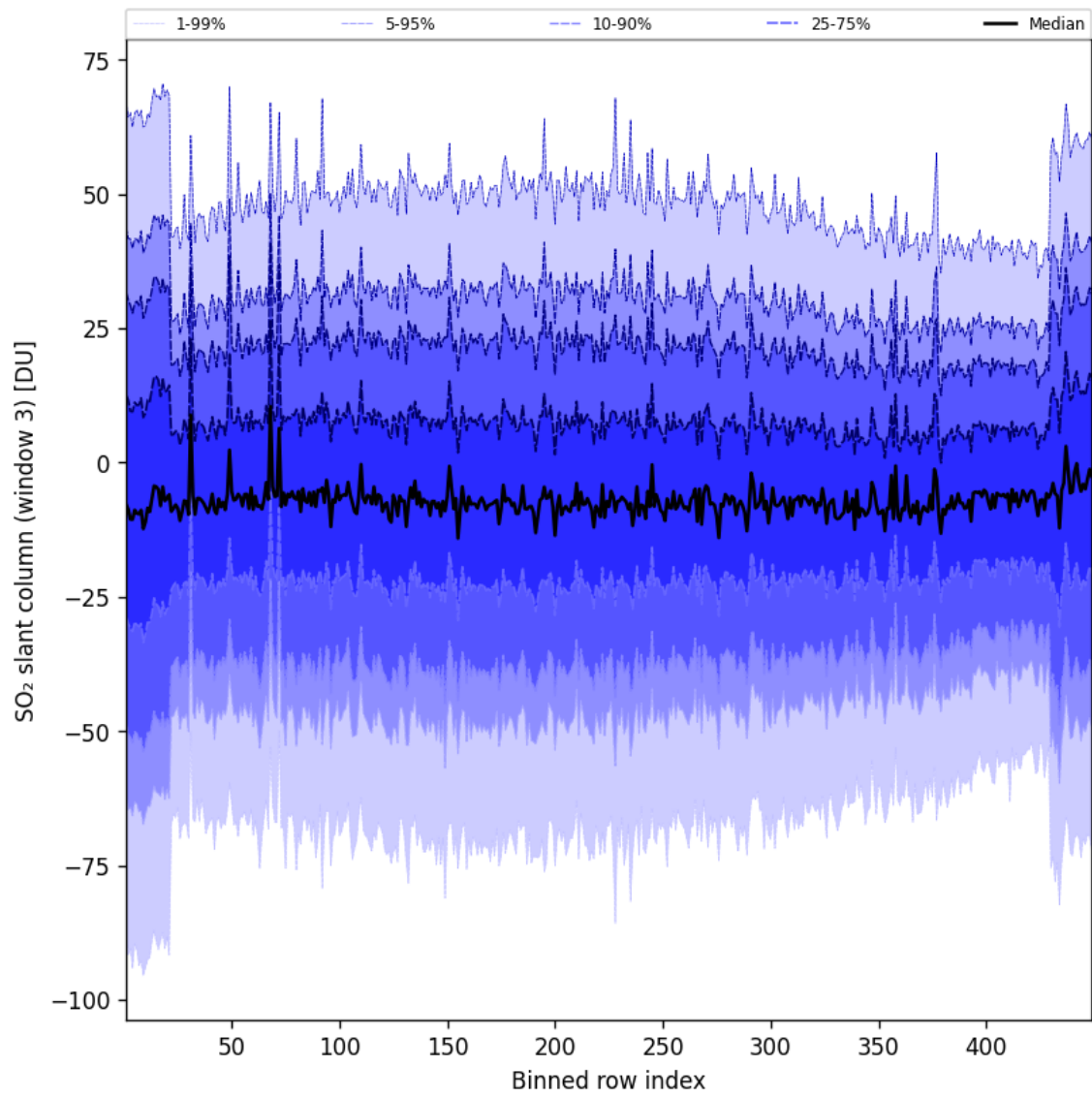


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-07-05 to 2025-07-06

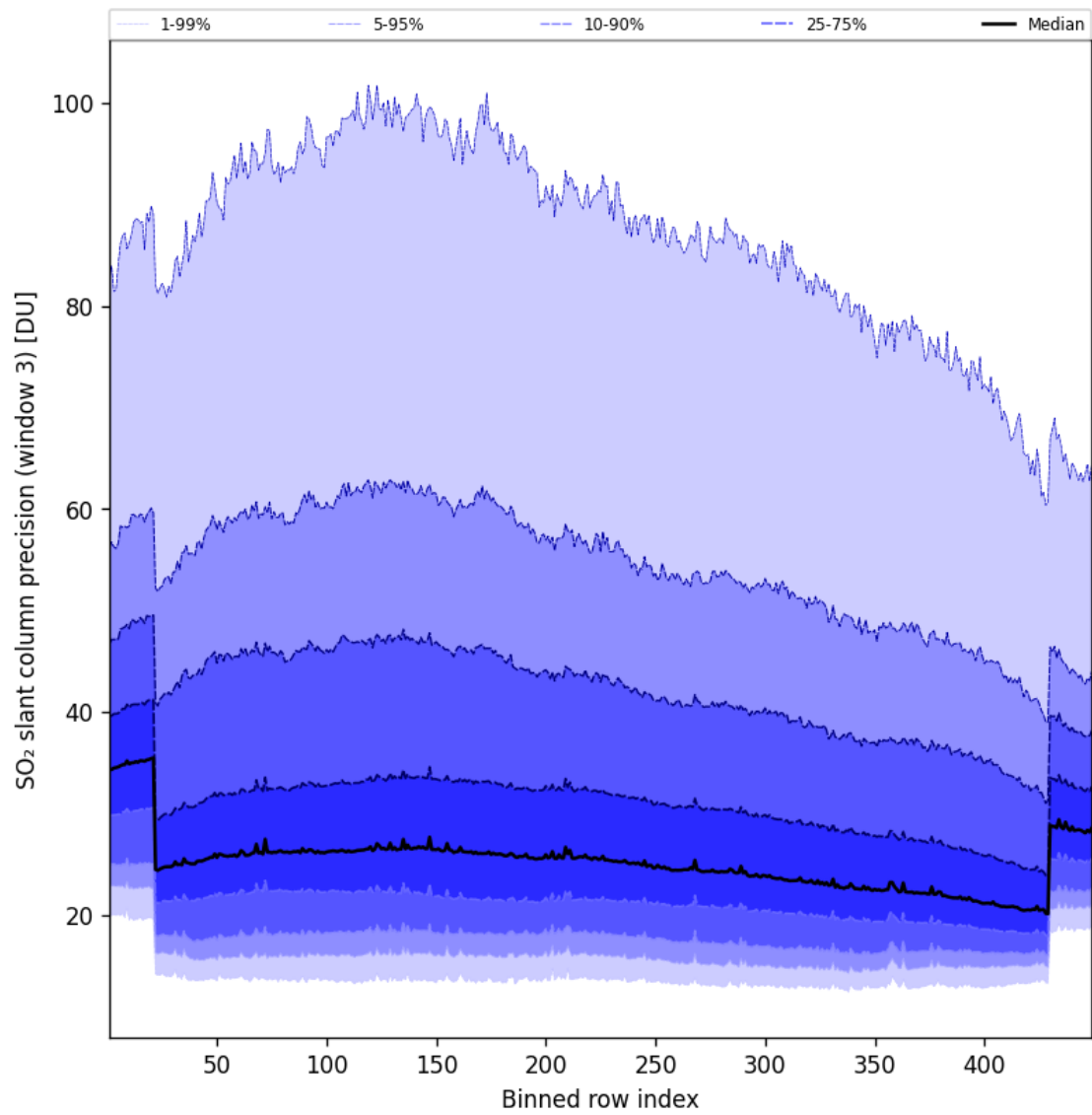


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-07-05 to 2025-07-06

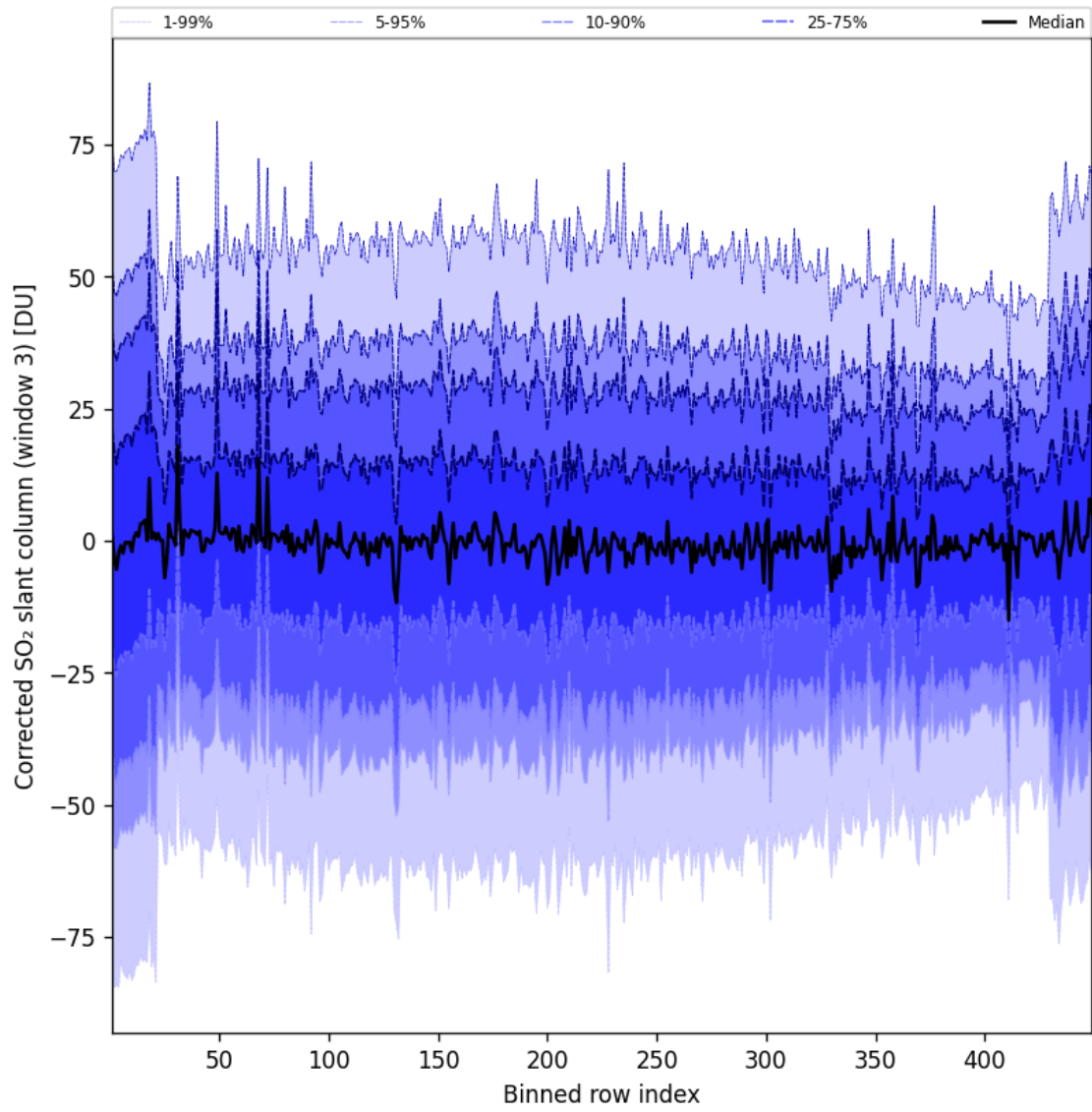


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-07-05 to 2025-07-06

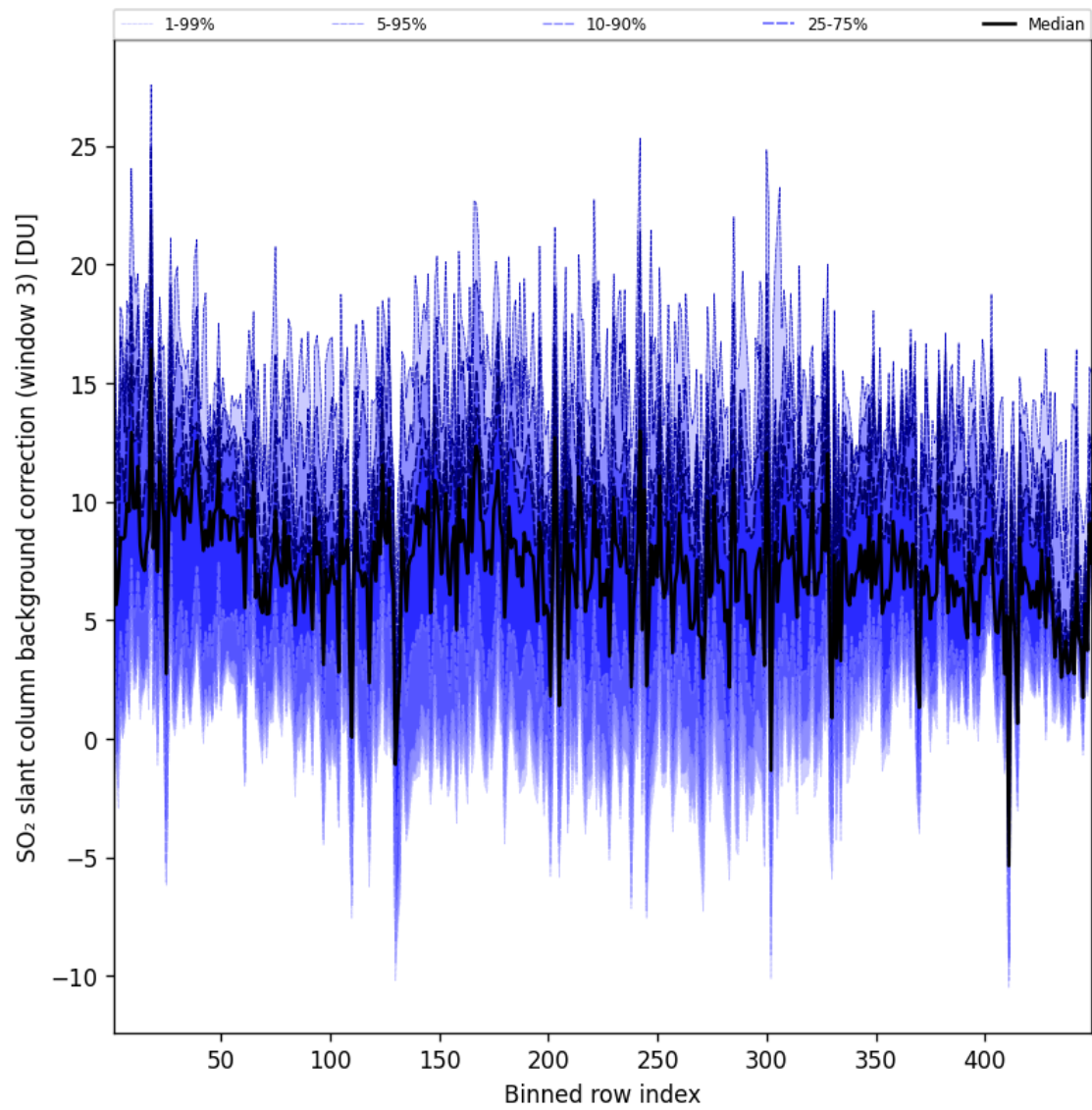


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-07-05 to 2025-07-06

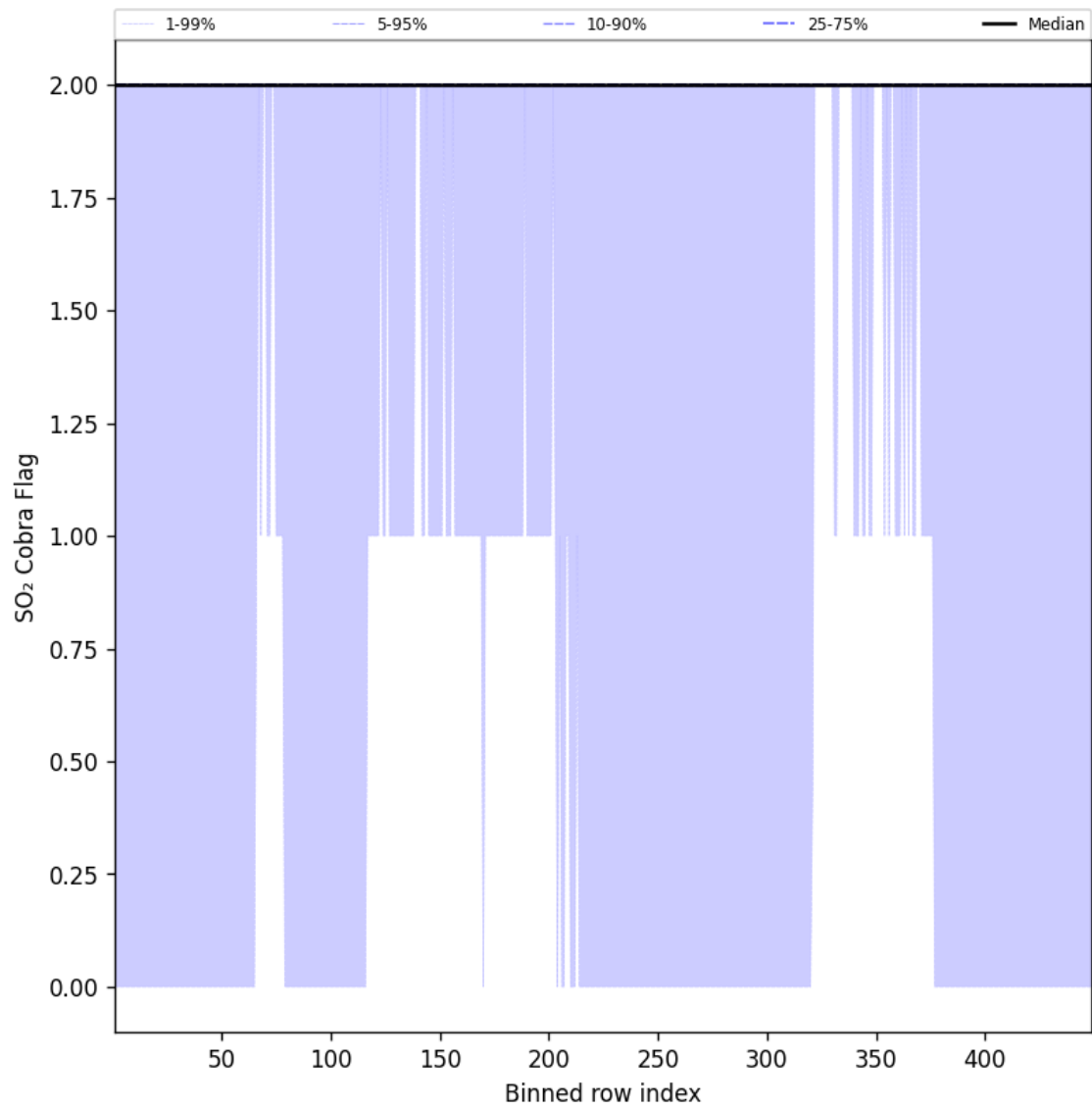


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-07-05 to 2025-07-06

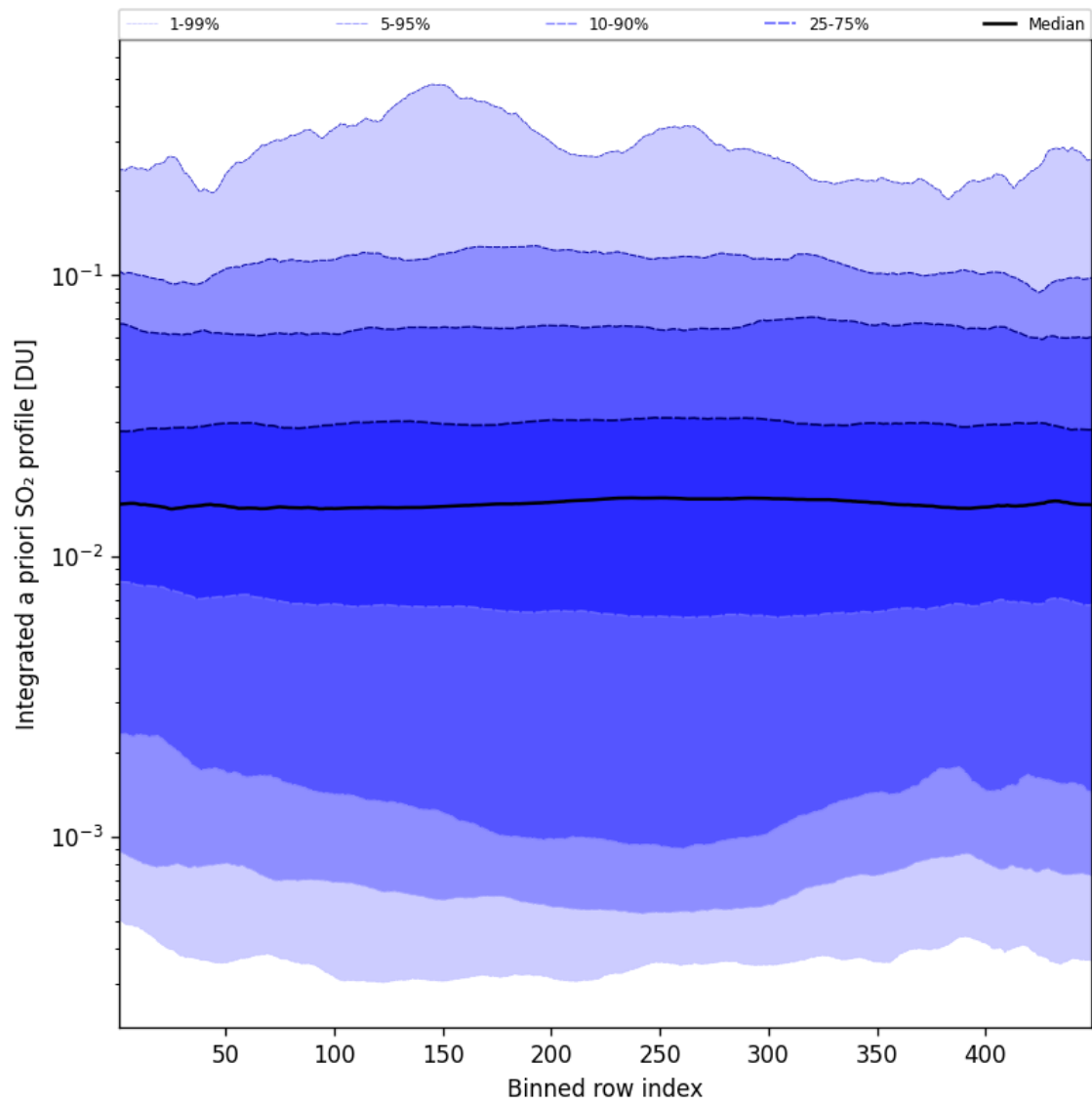


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-07-05 to 2025-07-06

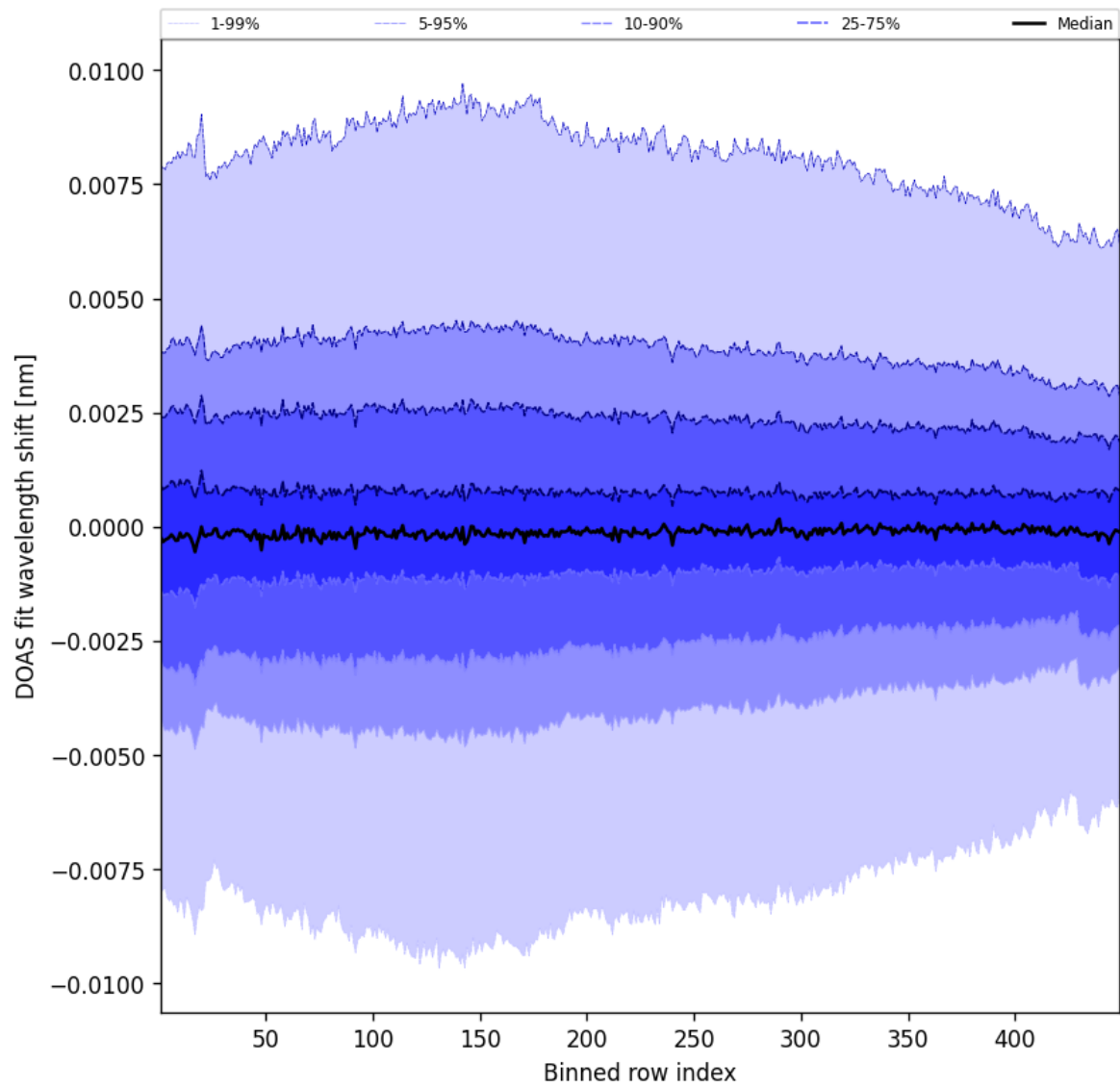


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-07-05 to 2025-07-06

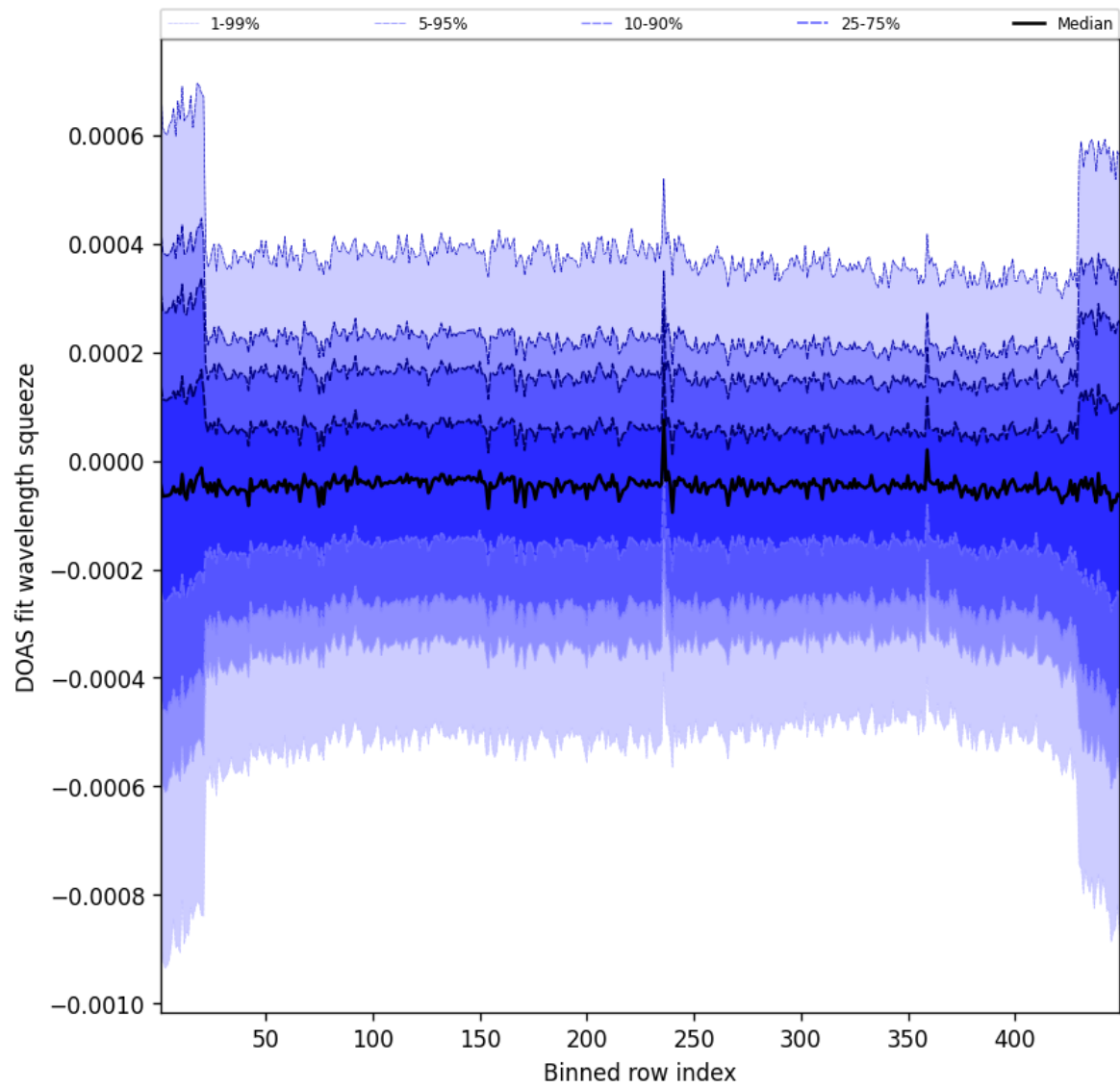


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-07-05 to 2025-07-06

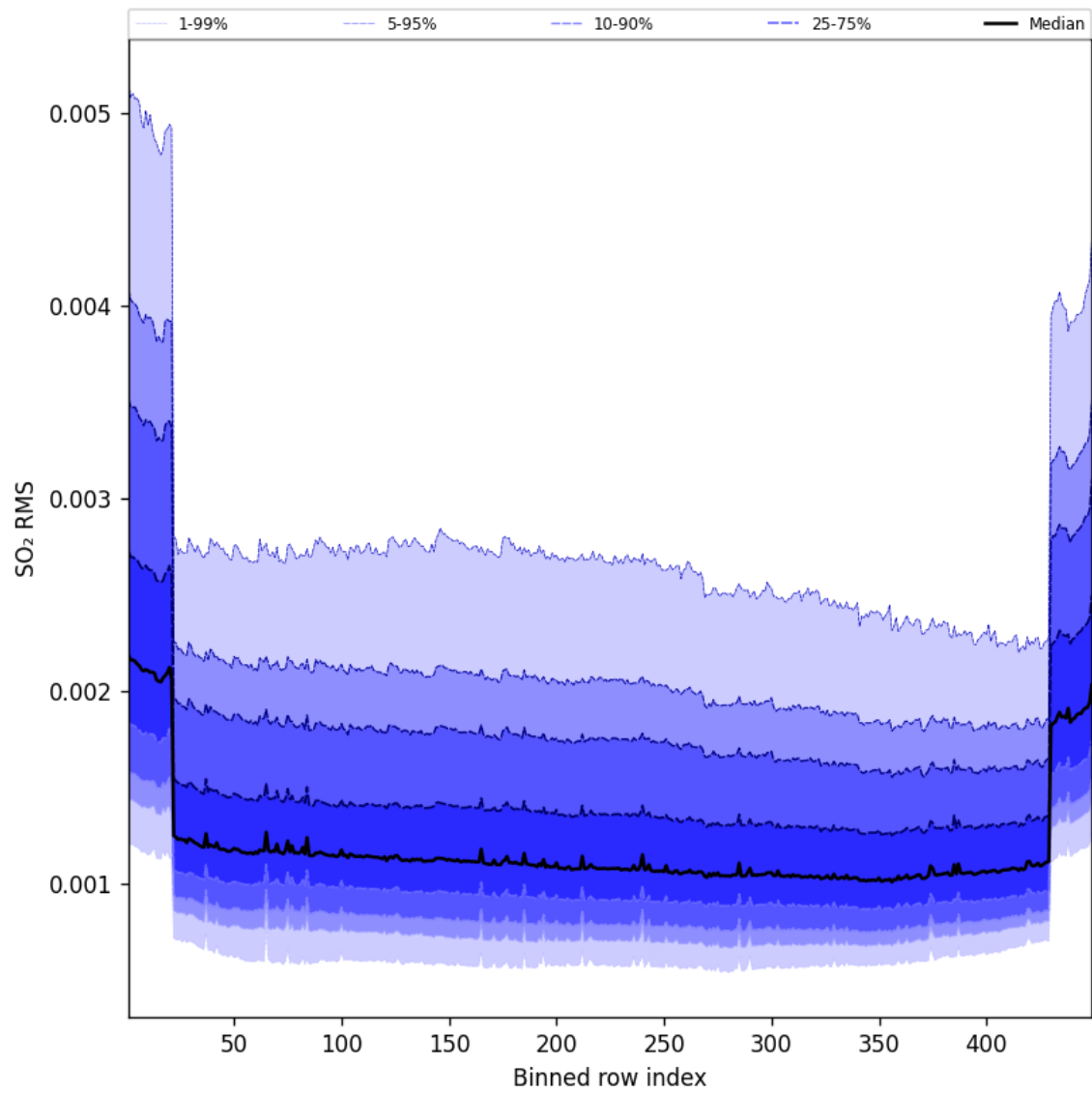


Figure 106: Along track statistics of “SO₂ RMS” for 2025-07-05 to 2025-07-06

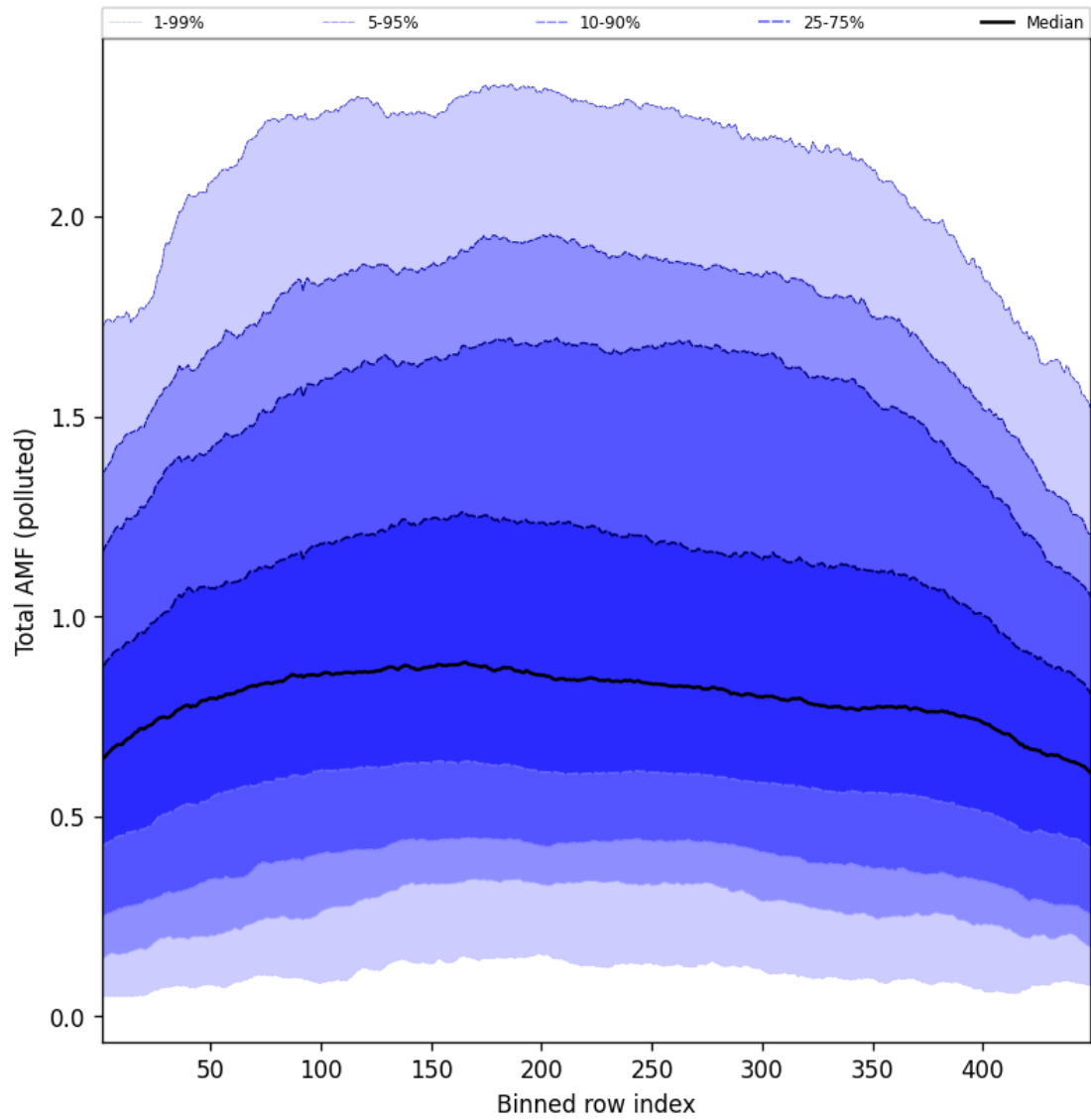


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-07-05 to 2025-07-06

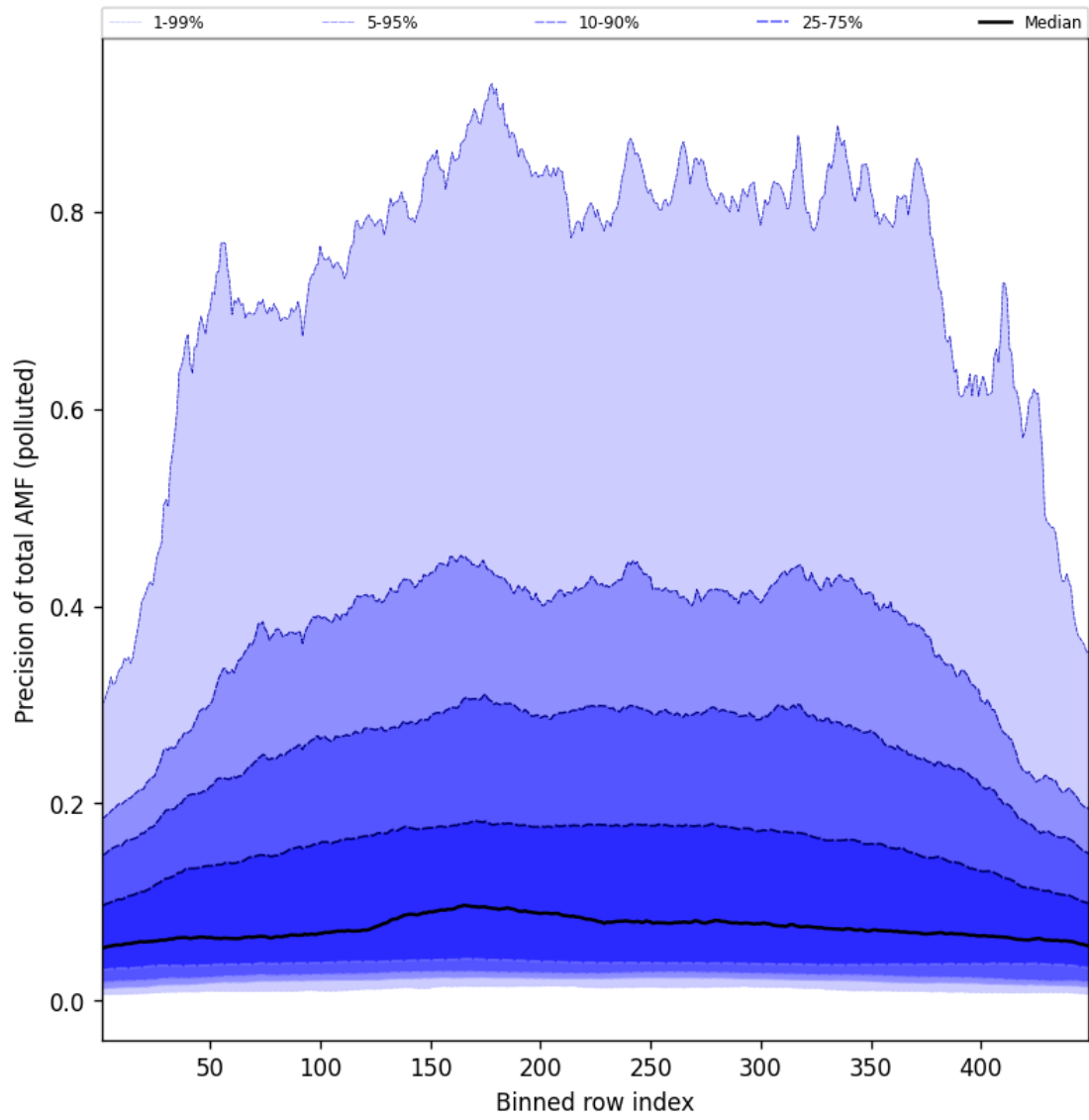


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-07-05 to 2025-07-06

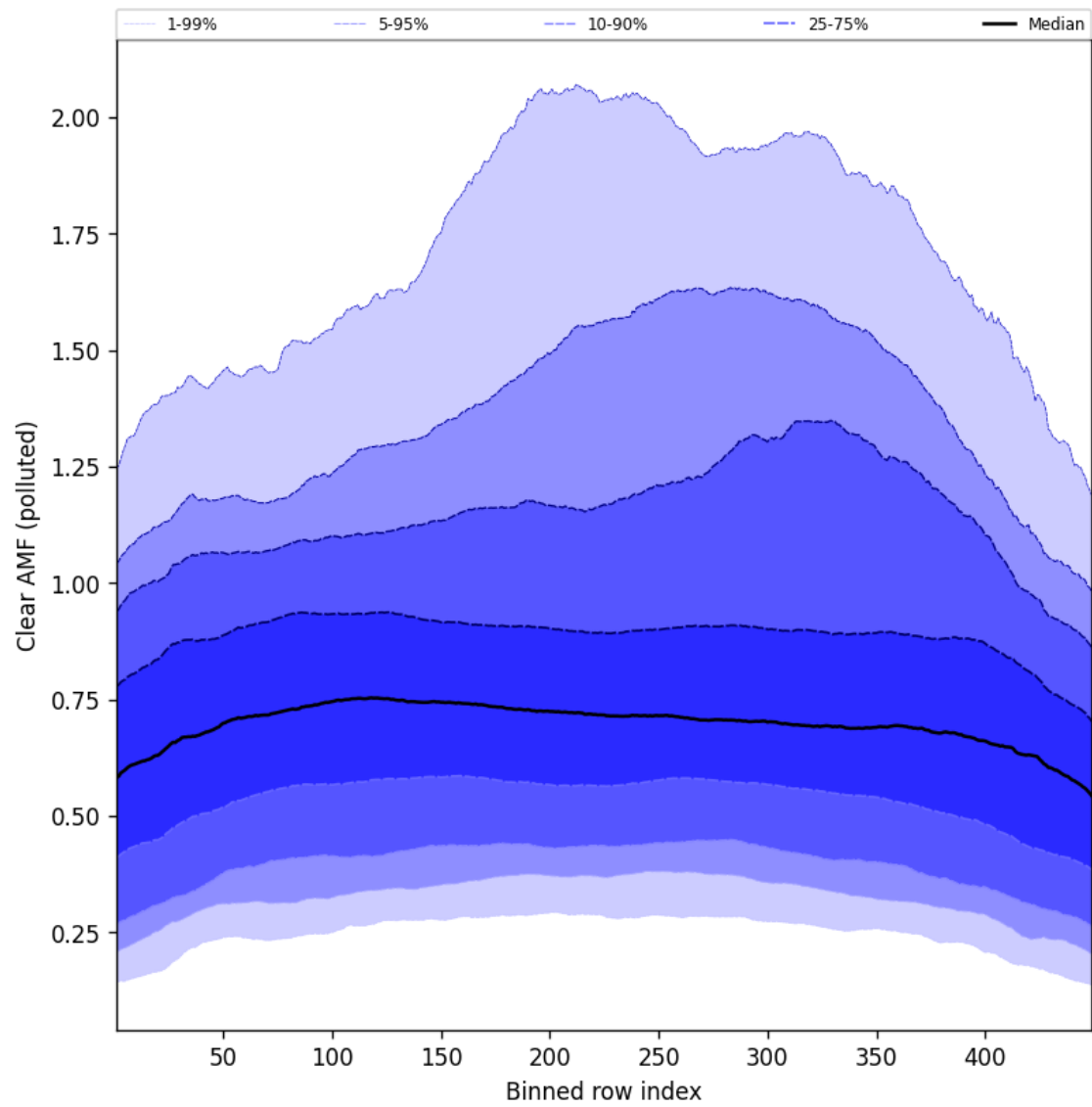


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-07-05 to 2025-07-06

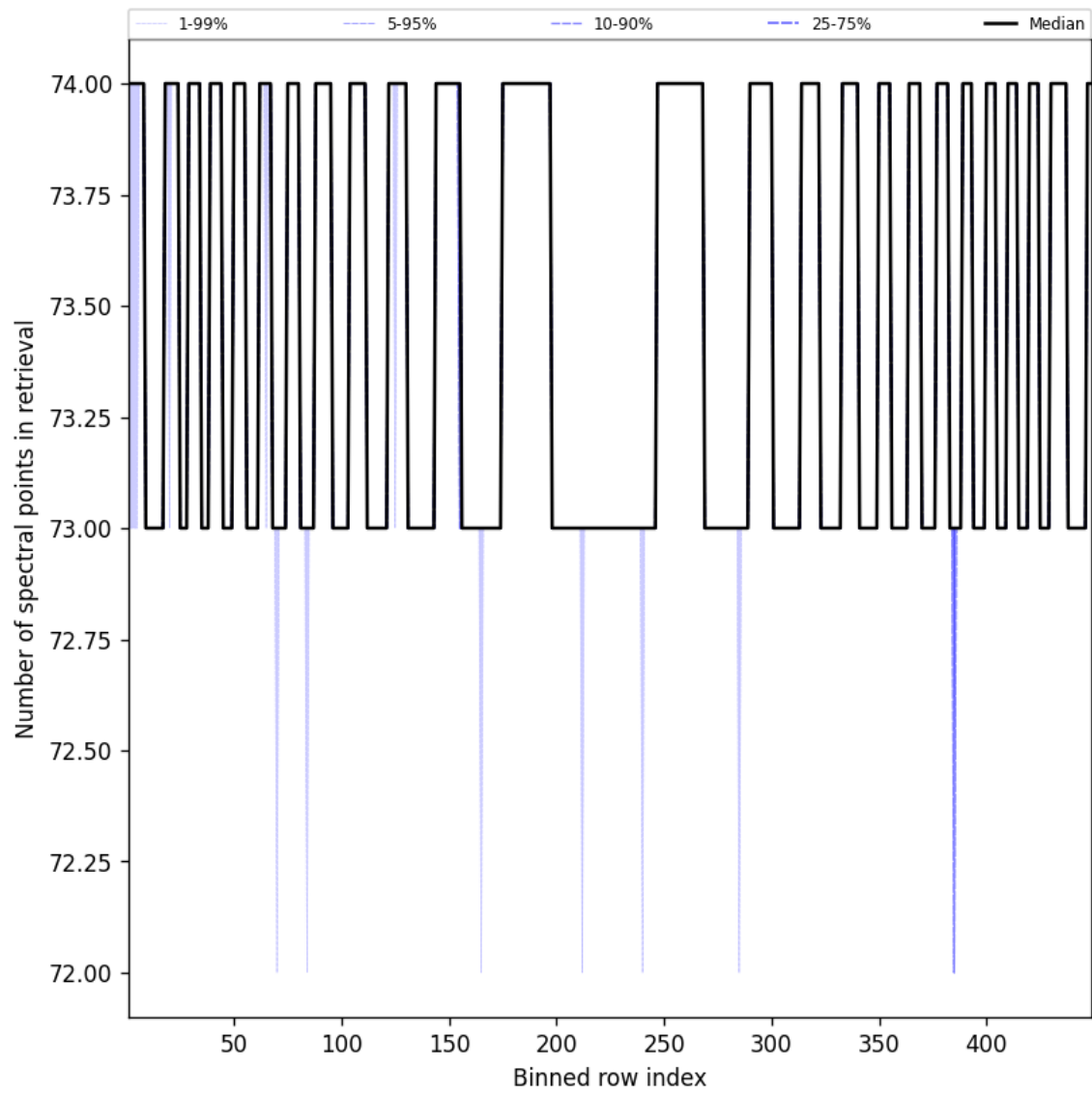


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-07-05 to 2025-07-06

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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