

PyCAMA report generated by tropl2-proc

tropl2-proc

2025-07-14 (05:16)

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]	0.662 ± 0.399	18619930	0.995	0.760	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.819 \pm 98.514) \times 10^{-2}$	18619930	0.278	0.454	1.053×10^{-2}	-119	358
sulfurdioxide total vertical column precision [DU]	0.512 ± 0.699	18619930	0.222	0.339	0.331	4.588×10^{-2}	72.3
sulfurdioxide slant column density corrected [DU]	$(1.807 \pm 37.700) \times 10^{-2}$	18619930	0.258	0.368	9.289×10^{-3}	-49.9	211
sulfurdioxide slant column density cobra [DU]	$(1.794 \pm 36.580) \times 10^{-2}$	18619930	0.258	0.368	9.289×10^{-3}	-49.9	66.5
sulfurdioxide slant column density cobra precision [DU]	0.296 ± 0.135	18619930	0.213	0.139	0.254	8.545×10^{-2}	28.2
sulfurdioxide slant column density window1 [DU]	$(9.973 \pm 68.100) \times 10^{-2}$	18619930	0.125	0.741	0.104	-122	64.0
sulfurdioxide slant column density window1 precision [DU]	0.296 ± 0.135	18619930	0.213	0.139	0.254	8.545×10^{-2}	28.2
sulfurdioxide slant column density corrected win1 [DU]	$(2.592 \pm 67.149) \times 10^{-2}$	18619930	-2.500×10^{-2}	0.725	1.040×10^{-2}	-122	64.2
background so2 slant column offset window1 [DU]	$(-7.381 \pm 13.914) \times 10^{-2}$	18619930	-0.140	0.174	-0.108	-1.28	4.67
sulfurdioxide slant column density window2 [DU]	0.936 ± 9.157	18619930	0.750	11.4	0.816	-1.232×10^3	1.287×10^3
sulfurdioxide slant column density window2 precision [DU]	8.31 ± 2.44	18619930	7.43	2.75	7.95	2.31	690
sulfurdioxide slant column density corrected win2 [DU]	0.361 ± 9.141	18619930	0.750	11.3	0.429	-1.232×10^3	1.287×10^3
background so2 slant column offset window2 [DU]	-0.575 ± 1.953	18619930	0.750	2.01	-0.169	-20.8	7.50
sulfurdioxide slant column density window3 [DU]	-6.55 ± 24.44	18619930	-7.28	30.3	-6.28	-723	456
sulfurdioxide slant column density window3 precision [DU]	29.0 ± 13.9	18619930	22.5	10.9	25.5	9.32	848
sulfurdioxide slant column density corrected win3 [DU]	-3.67 ± 24.03	18619930	-3.92	29.9	-3.42	-718	459
background so2 slant column offset window3 [DU]	2.87 ± 4.69	18619930	6.16	6.72	3.16	-17.4	24.4
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	18619930	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(2.945 \pm 5.147) \times 10^{-2}$	18619930	2.104×10^{-2}	2.379×10^{-2}	1.641×10^{-2}	1.668×10^{-4}	3.45
fitted radiance shift [nm]	$(-1.903 \pm 26.984) \times 10^{-4}$	18619930	1.000×10^{-4}	1.829×10^{-3}	-2.084×10^{-4}	-9.125×10^{-2}	6.205×10^{-2}
fitted radiance squeeze [1]	$(-4.952 \pm 19.214) \times 10^{-5}$	18619930	-3.000×10^{-5}	2.225×10^{-4}	-4.220×10^{-5}	-1.672×10^{-2}	2.301×10^{-2}
fitted root mean square [1]	$(1.293 \pm 0.537) \times 10^{-3}$	18619930	9.750×10^{-4}	5.409×10^{-4}	1.141×10^{-3}	3.171×10^{-4}	0.134
sulfurdioxide total air mass factor polluted [1]	0.874 ± 0.454	18619930	0.660	0.546	0.798	5.000×10^{-2}	2.86
sulfurdioxide total air mass factor polluted precision [1]	0.122 ± 0.150	18619930	3.500×10^{-2}	0.113	7.095×10^{-2}	2.847×10^{-3}	2.24
sulfurdioxide clear air mass factor polluted [1]	0.744 ± 0.326	18619930	0.660	0.378	0.702	5.125×10^{-2}	2.92
number of spectral points in retrieval [1]	73.4 ± 0.5	18619930	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	1.000×10^{-2}	7.000×10^{-2}	0.130	0.240	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.22	-0.868	-0.537	-0.363	-0.213	0.241	0.401	0.593	0.964	2.52
sulfurdioxide total vertical column precision [DU]	9.248×10^{-2}	0.128	0.158	0.186	0.221	0.561	0.735	0.942	1.37	3.33
sulfurdioxide slant column density corrected [DU]	-0.869	-0.497	-0.359	-0.268	-0.173	0.195	0.296	0.395	0.552	1.02
sulfurdioxide slant column density cobra [DU]	-0.869	-0.497	-0.359	-0.268	-0.173	0.195	0.296	0.395	0.552	1.02
sulfurdioxide slant column density cobra precision [DU]	0.145	0.169	0.183	0.194	0.208	0.347	0.401	0.454	0.544	0.788
sulfurdioxide slant column density window1 [DU]	-1.70	-0.949	-0.661	-0.469	-0.269	0.472	0.664	0.849	1.13	1.89
sulfurdioxide slant column density window1 precision [DU]	0.145	0.169	0.183	0.194	0.208	0.347	0.401	0.454	0.544	0.788
sulfurdioxide slant column density corrected win1 [DU]	-1.65	-0.969	-0.708	-0.533	-0.347	0.378	0.576	0.770	1.07	1.89
background so2 slant column offset window1 [DU]	-0.331	-0.240	-0.211	-0.191	-0.168	5.203×10^{-3}	6.452×10^{-2}	0.114	0.183	0.322
sulfurdioxide slant column density window2 [DU]	-20.7	-13.6	-10.2	-7.66	-4.84	6.56	9.48	12.1	15.8	23.9
sulfurdioxide slant column density window2 precision [DU]	4.32	5.20	5.76	6.21	6.75	9.49	10.4	11.3	12.6	15.4
sulfurdioxide slant column density corrected win2 [DU]	-22.3	-14.4	-10.8	-8.16	-5.27	6.07	8.89	11.4	14.9	22.3
background so2 slant column offset window2 [DU]	-6.80	-4.16	-2.80	-2.07	-1.37	0.636	0.882	1.09	1.43	3.30
sulfurdioxide slant column density window3 [DU]	-69.3	-47.1	-36.8	-29.4	-21.5	8.84	16.6	23.6	33.0	51.9
sulfurdioxide slant column density window3 precision [DU]	13.3	15.8	17.9	19.5	21.2	32.1	36.8	42.8	54.9	87.7
sulfurdioxide slant column density corrected win3 [DU]	-64.8	-43.5	-33.4	-26.2	-18.4	11.5	19.0	25.9	35.2	54.2
background so2 slant column offset window3 [DU]	-8.09	-4.85	-3.32	-2.03	-0.449	6.27	7.40	8.44	10.1	13.2
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]	4.351×10^{-4}	8.844×10^{-4}	1.806×10^{-3}	3.755×10^{-3}	7.546×10^{-3}	3.134×10^{-2}	4.561×10^{-2}	6.274×10^{-2}	0.101	0.236
fitted radiance shift [nm]	-8.304×10^{-3}	-4.141×10^{-3}	-2.674×10^{-3}	-1.833×10^{-3}	-1.133×10^{-3}	6.954×10^{-4}	1.425×10^{-3}	2.322×10^{-3}	3.883×10^{-3}	8.278×10^{-3}
fitted radiance squeeze [1]	-5.655×10^{-4}	-3.662×10^{-4}	-2.797×10^{-4}	-2.198×10^{-4}	-1.572×10^{-4}	6.530×10^{-5}	1.193×10^{-4}	1.692×10^{-4}	2.408×10^{-4}	4.158×10^{-4}
fitted root mean square [1]	6.005×10^{-4}	7.339×10^{-4}	8.134×10^{-4}	8.747×10^{-4}	9.476×10^{-4}	1.488×10^{-3}	1.737×10^{-3}	1.978×10^{-3}	2.322×10^{-3}	3.211×10^{-3}
sulfurdioxide total air mass factor polluted [1]	9.241×10^{-2}	0.255	0.362	0.451	0.561	1.11	1.33	1.53	1.76	2.18
sulfurdioxide total air mass factor polluted precision [1]	1.005×10^{-2}	1.849×10^{-2}	2.489×10^{-2}	3.019×10^{-2}	3.789×10^{-2}	0.151	0.201	0.259	0.380	0.787
sulfurdioxide clear air mass factor polluted [1]	0.216	0.311	0.378	0.439	0.527	0.905	0.998	1.11	1.34	1.86
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]	0.615 ± 0.410	12800688	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(2.079 \pm 97.344) \times 10^{-2}$	12800688	0.413	8.556×10^{-3}	-119	240	-0.196	0.217
sulfurdioxide total vertical column precision [DU]	0.488 ± 0.731	12800688	0.305	0.293	4.588×10^{-2}	72.3	0.203	0.508
sulfurdioxide slant column density corrected [DU]	$(1.348 \pm 32.072) \times 10^{-2}$	12800688	0.342	7.735×10^{-3}	-9.39	42.5	-0.162	0.180
sulfurdioxide slant column density cobra [DU]	$(1.345 \pm 31.862) \times 10^{-2}$	12800688	0.342	7.735×10^{-3}	-9.39	21.5	-0.162	0.180
sulfurdioxide slant column density cobra precision [DU]	0.271 ± 0.113	12800688	0.110	0.235	8.545×10^{-2}	16.4	0.200	0.309
sulfurdioxide slant column density window1 [DU]	$(8.600 \pm 61.381) \times 10^{-2}$	12800688	0.697	9.400×10^{-2}	-15.5	23.8	-0.259	0.438
sulfurdioxide slant column density window1 precision [DU]	0.271 ± 0.113	12800688	0.110	0.235	8.545×10^{-2}	16.4	0.200	0.309
sulfurdioxide slant column density corrected win1 [DU]	$(1.695 \pm 59.887) \times 10^{-2}$	12800688	0.678	6.397×10^{-3}	-15.5	24.0	-0.329	0.349
background so2 slant column offset window1 [DU]	$(-6.904 \pm 14.047) \times 10^{-2}$	12800688	0.197	-0.102	-0.947	2.49	-0.173	2.394×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.597 ± 8.437	12800688	10.8	0.587	-356	968	-4.80	5.97
sulfurdioxide slant column density window2 precision [DU]	7.86 ± 2.15	12800688	2.42	7.55	2.31	417	6.45	8.87
sulfurdioxide slant column density corrected win2 [DU]	0.357 ± 8.491	12800688	10.8	0.441	-359	967	-4.97	5.79
background so2 slant column offset window2 [DU]	-0.240 ± 1.623	12800688	1.87	1.816×10^{-2}	-17.7	6.66	-1.11	0.758
sulfurdioxide slant column density window3 [DU]	-5.66 ± 22.95	12800688	28.6	-5.69	-383	175	-19.9	8.70
sulfurdioxide slant column density window3 precision [DU]	27.6 ± 14.1	12800688	9.65	23.7	9.32	261	20.2	29.8
sulfurdioxide slant column density corrected win3 [DU]	-3.56 ± 22.51	12800688	28.2	-3.38	-375	185	-17.5	10.7
background so2 slant column offset window3 [DU]	2.10 ± 4.59	12800688	7.37	2.65	-17.4	15.4	-1.46	5.90
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	12800688	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.952 \pm 5.673) \times 10^{-2}$	12800688	2.519×10^{-2}	1.285×10^{-2}	1.668×10^{-4}	3.45	4.404×10^{-3}	2.960×10^{-2}
fitted radiance shift [nm]	$(-3.868 \pm 277.797) \times 10^{-5}$	12800688	1.778×10^{-3}	-7.763×10^{-5}	-5.559×10^{-2}	5.379×10^{-2}	-9.439×10^{-4}	8.345×10^{-4}
fitted radiance squeeze [1]	$(-7.841 \pm 17.924) \times 10^{-5}$	12800688	2.160×10^{-4}	-6.421×10^{-5}	-2.655×10^{-3}	5.174×10^{-3}	-1.786×10^{-4}	3.738×10^{-5}
fitted root mean square [1]	$(1.204 \pm 0.465) \times 10^{-3}$	12800688	4.562×10^{-4}	1.075×10^{-3}	3.254×10^{-4}	2.816×10^{-2}	9.093×10^{-4}	1.365×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.905 ± 0.495	12800688	0.640	0.830	5.000×10^{-2}	2.86	0.544	1.18
sulfurdioxide total air mass factor polluted precision [1]	0.139 ± 0.171	12800688	0.129	8.096×10^{-2}	2.963×10^{-3}	2.24	4.076×10^{-2}	0.170
sulfurdioxide clear air mass factor polluted [1]	0.765 ± 0.369	12800688	0.458	0.721	7.838×10^{-2}	2.92	0.492	0.950
number of spectral points in retrieval [1]	73.5 ± 0.5	12800688	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]	0.767 ± 0.351	5819242	0.560	1.000	0.0	1.000	0.440	1.000
sulfurdioxide total vertical column [DU]	$(4.447 \pm 101.021) \times 10^{-2}$	5819242	0.562	1.648×10^{-2}	-60.5	358	-0.259	0.303
sulfurdioxide total vertical column precision [DU]	0.566 ± 0.619	5819242	0.362	0.413	5.413×10^{-2}	53.6	0.282	0.644
sulfurdioxide slant column density corrected [DU]	$(2.816 \pm 47.786) \times 10^{-2}$	5819242	0.435	1.365×10^{-2}	-49.9	211	-0.201	0.234
sulfurdioxide slant column density cobra [DU]	$(2.782 \pm 45.244) \times 10^{-2}$	5819242	0.435	1.365×10^{-2}	-49.9	66.5	-0.201	0.234
sulfurdioxide slant column density cobra precision [DU]	0.349 ± 0.160	5819242	0.171	0.313	9.230×10^{-2}	28.2	0.242	0.412
sulfurdioxide slant column density window1 [DU]	0.130 ± 0.809	5819242	0.851	0.132	-122	64.0	-0.295	0.556
sulfurdioxide slant column density window1 precision [DU]	0.349 ± 0.160	5819242	0.171	0.313	9.230×10^{-2}	28.2	0.242	0.412
sulfurdioxide slant column density corrected win1 [DU]	$(4.565 \pm 80.825) \times 10^{-2}$	5819242	0.847	2.145×10^{-2}	-122	64.2	-0.395	0.453
background so2 slant column offset window1 [DU]	$(-8.429 \pm 13.557) \times 10^{-2}$	5819242	0.121	-0.115	-1.28	4.67	-0.159	-3.840×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.68 ± 10.53	5819242	13.0	1.43	-1.232×10^3	1.287×10^3	-4.96	8.04
sulfurdioxide slant column density window2 precision [DU]	9.32 ± 2.71	5819242	2.96	8.98	2.46	690	7.67	10.6
sulfurdioxide slant column density corrected win2 [DU]	0.368 ± 10.428	5819242	12.8	0.396	-1.232×10^3	1.287×10^3	-6.04	6.81
background so2 slant column offset window2 [DU]	-1.31 ± 2.37	5819242	2.87	-0.556	-20.8	7.50	-2.54	0.333
sulfurdioxide slant column density window3 [DU]	-8.49 ± 27.34	5819242	34.7	-7.84	-723	456	-25.5	9.20
sulfurdioxide slant column density window3 precision [DU]	32.1 ± 12.9	5819242	10.3	29.2	10.1	848	24.8	35.1
sulfurdioxide slant column density corrected win3 [DU]	-3.92 ± 27.07	5819242	34.4	-3.53	-718	459	-20.9	13.5
background so2 slant column offset window3 [DU]	4.57 ± 4.44	5819242	6.14	3.94	-14.3	24.4	1.48	7.61
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.26	5819242	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.930 \pm 3.735) \times 10^{-2}$	5819242	1.979×10^{-2}	2.079×10^{-2}	1.149×10^{-3}	2.40	1.378×10^{-2}	3.357×10^{-2}
fitted radiance shift [nm]	$(-5.240 \pm 24.822) \times 10^{-4}$	5819242	1.827×10^{-3}	-5.173×10^{-4}	-9.125×10^{-2}	6.205×10^{-2}	-1.477×10^{-3}	3.502×10^{-4}
fitted radiance squeeze [1]	$(1.402 \pm 20.391) \times 10^{-5}$	5819242	2.310×10^{-4}	1.062×10^{-5}	-1.672×10^{-2}	2.301×10^{-2}	-1.034×10^{-4}	1.277×10^{-4}
fitted root mean square [1]	$(1.488 \pm 0.627) \times 10^{-3}$	5819242	6.736×10^{-4}	1.317×10^{-3}	3.171×10^{-4}	0.134	1.074×10^{-3}	1.747×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.807 ± 0.339	5819242	0.392	0.749	5.000×10^{-2}	2.64	0.583	0.976
sulfurdioxide total air mass factor polluted precision [1]	$(8.480 \pm 7.285) \times 10^{-2}$	5819242	7.930×10^{-2}	5.541×10^{-2}	2.847×10^{-3}	1.33	3.429×10^{-2}	0.114
sulfurdioxide clear air mass factor polluted [1]	0.698 ± 0.191	5819242	0.248	0.682	5.125×10^{-2}	1.75	0.573	0.821
number of spectral points in retrieval [1]	73.4 ± 0.5	5819242	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]	0.667 ± 0.388	12435149	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	$(3.106 \pm 102.024) \times 10^{-2}$	12435149	0.459	1.172×10^{-2}	-119	240	-0.214	0.244
sulfurdioxide total vertical column precision [DU]	0.517 ± 0.724	12435149	0.327	0.325	5.126×10^{-2}	41.3	0.225	0.552
sulfurdioxide slant column density corrected [DU]	$(1.917 \pm 37.269) \times 10^{-2}$	12435149	0.371	1.017×10^{-2}	-9.64	80.2	-0.173	0.198
sulfurdioxide slant column density cobra [DU]	$(1.910 \pm 36.772) \times 10^{-2}$	12435149	0.371	1.017×10^{-2}	-9.64	24.6	-0.173	0.198
sulfurdioxide slant column density cobra precision [DU]	0.300 ± 0.139	12435149	0.151	0.257	8.545×10^{-2}	22.7	0.206	0.358
sulfurdioxide slant column density window1 [DU]	$(9.926 \pm 69.166) \times 10^{-2}$	12435149	0.750	0.109	-122	64.0	-0.270	0.479
sulfurdioxide slant column density window1 precision [DU]	0.300 ± 0.139	12435149	0.151	0.257	8.545×10^{-2}	22.7	0.206	0.358
sulfurdioxide slant column density corrected win1 [DU]	$(3.109 \pm 68.180) \times 10^{-2}$	12435149	0.734	1.591×10^{-2}	-122	64.2	-0.346	0.387
background so2 slant column offset window1 [DU]	$(-6.817 \pm 14.710) \times 10^{-2}$	12435149	0.187	-0.108	-1.28	4.67	-0.169	1.821×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.09 ± 9.10	12435149	11.4	0.923	-599	968	-4.71	6.68
sulfurdioxide slant column density window2 precision [DU]	8.24 ± 2.29	12435149	2.67	7.89	2.31	580	6.72	9.39
sulfurdioxide slant column density corrected win2 [DU]	0.423 ± 9.059	12435149	11.3	0.487	-599	967	-5.20	6.12
background so2 slant column offset window2 [DU]	-0.670 ± 2.091	12435149	2.20	-0.135	-20.8	7.50	-1.55	0.648
sulfurdioxide slant column density window3 [DU]	-4.17 ± 24.14	12435149	30.2	-4.09	-517	164	-19.1	11.1
sulfurdioxide slant column density window3 precision [DU]	27.7 ± 11.8	12435149	9.79	24.7	9.36	228	21.0	30.8
sulfurdioxide slant column density corrected win3 [DU]	-1.40 ± 23.49	12435149	29.5	-1.40	-509	171	-16.1	13.5
background so2 slant column offset window3 [DU]	2.76 ± 4.78	12435149	6.70	2.82	-17.4	24.4	-0.594	6.10
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	12435149	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.142 \pm 2.970) \times 10^{-2}$	12435149	1.728×10^{-2}	1.558×10^{-2}	1.762×10^{-4}	3.27	8.378×10^{-3}	2.566×10^{-2}
fitted radiance shift [nm]	$(-2.087 \pm 23.368) \times 10^{-4}$	12435149	1.754×10^{-3}	-1.981×10^{-4}	-4.917×10^{-2}	5.412×10^{-2}	-1.109×10^{-3}	6.453×10^{-4}
fitted radiance squeeze [1]	$(-4.076 \pm 19.390) \times 10^{-5}$	12435149	2.217×10^{-4}	-3.285×10^{-5}	-1.636×10^{-2}	1.693×10^{-2}	-1.478×10^{-4}	7.393×10^{-5}
fitted root mean square [1]	$(1.311 \pm 0.558) \times 10^{-3}$	12435149	5.974×10^{-4}	1.142×10^{-3}	3.171×10^{-4}	4.486×10^{-2}	9.421×10^{-4}	1.540×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.864 ± 0.414	12435149	0.483	0.814	5.000×10^{-2}	2.58	0.591	1.07
sulfurdioxide total air mass factor polluted precision [1]	0.119 ± 0.158	12435149	9.504×10^{-2}	6.672×10^{-2}	2.963×10^{-3}	2.24	4.013×10^{-2}	0.135
sulfurdioxide clear air mass factor polluted [1]	0.748 ± 0.298	12435149	0.355	0.730	7.838×10^{-2}	2.49	0.554	0.909
number of spectral points in retrieval [1]	73.4 ± 0.5	12435149	1.000	73.0	53.0	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]	0.681 ± 0.414	4294076	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(2.100 \pm 82.026) \times 10^{-2}$	4294076	0.423	7.173×10^{-3}	-48.4	358	-0.202	0.221
sulfurdioxide total vertical column precision [DU]	0.463 ± 0.555	4294076	0.348	0.331	4.588×10^{-2}	53.6	0.197	0.546
sulfurdioxide slant column density corrected [DU]	$(1.518 \pm 38.138) \times 10^{-2}$	4294076	0.354	6.749×10^{-3}	-13.1	211	-0.169	0.185
sulfurdioxide slant column density cobra [DU]	$(1.494 \pm 35.523) \times 10^{-2}$	4294076	0.354	6.749×10^{-3}	-13.1	66.5	-0.169	0.185
sulfurdioxide slant column density cobra precision [DU]	0.280 ± 0.122	4294076	0.104	0.244	8.788×10^{-2}	28.2	0.208	0.312
sulfurdioxide slant column density window1 [DU]	0.121 ± 0.646	4294076	0.708	0.113	-114	49.3	-0.240	0.469
sulfurdioxide slant column density window1 precision [DU]	0.280 ± 0.122	4294076	0.104	0.244	8.788×10^{-2}	28.2	0.208	0.312
sulfurdioxide slant column density corrected win1 [DU]	$(1.494 \pm 63.712) \times 10^{-2}$	4294076	0.694	-7.447×10^{-4}	-114	49.3	-0.343	0.352
background so2 slant column offset window1 [DU]	-0.106 ± 0.115	4294076	0.127	-0.131	-0.715	2.97	-0.178	-5.084×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.463 ± 9.303	4294076	11.4	0.443	-1.232×10^3	1.287×10^3	-5.26	6.14
sulfurdioxide slant column density window2 precision [DU]	8.48 ± 2.79	4294076	2.89	8.08	2.31	690	6.79	9.68
sulfurdioxide slant column density corrected win2 [DU]	0.226 ± 9.343	4294076	11.4	0.301	-1.232×10^3	1.287×10^3	-5.42	5.96
background so2 slant column offset window2 [DU]	-0.237 ± 1.646	4294076	1.71	3.688×10^{-2}	-20.8	7.41	-0.992	0.714
sulfurdioxide slant column density window3 [DU]	-11.5 ± 24.6	4294076	30.0	-10.8	-723	456	-26.2	3.89
sulfurdioxide slant column density window3 precision [DU]	31.9 ± 17.6	4294076	12.9	27.3	9.38	848	22.0	34.9
sulfurdioxide slant column density corrected win3 [DU]	-9.08 ± 24.65	4294076	30.4	-8.37	-718	459	-24.0	6.41
background so2 slant column offset window3 [DU]	2.43 ± 4.56	4294076	6.95	2.86	-15.7	22.3	-0.901	6.04
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	4294076	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.984 \pm 7.875) \times 10^{-2}$	4294076	5.163×10^{-2}	2.435×10^{-2}	1.668×10^{-4}	3.22	7.524×10^{-3}	5.915×10^{-2}
fitted radiance shift [nm]	$(-1.681 \pm 33.852) \times 10^{-4}$	4294076	1.883×10^{-3}	-2.515×10^{-4}	-9.125×10^{-2}	6.205×10^{-2}	-1.147×10^{-3}	7.363×10^{-4}
fitted radiance squeeze [1]	$(-5.204 \pm 18.322) \times 10^{-5}$	4294076	2.161×10^{-4}	-4.743×10^{-5}	-1.672×10^{-2}	2.301×10^{-2}	-1.577×10^{-4}	5.842×10^{-5}
fitted root mean square [1]	$(1.226 \pm 0.467) \times 10^{-3}$	4294076	4.270×10^{-4}	1.118×10^{-3}	3.281×10^{-4}	0.134	9.458×10^{-4}	1.373×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.919 ± 0.540	4294076	0.667	0.752	5.000×10^{-2}	2.86	0.535	1.20
sulfurdioxide total air mass factor polluted precision [1]	0.125 ± 0.128	4294076	0.150	8.419×10^{-2}	2.847×10^{-3}	2.00	3.130×10^{-2}	0.182
sulfurdioxide clear air mass factor polluted [1]	0.764 ± 0.394	4294076	0.393	0.659	5.125×10^{-2}	2.92	0.516	0.909
number of spectral points in retrieval [1]	73.4 ± 0.5	4294076	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

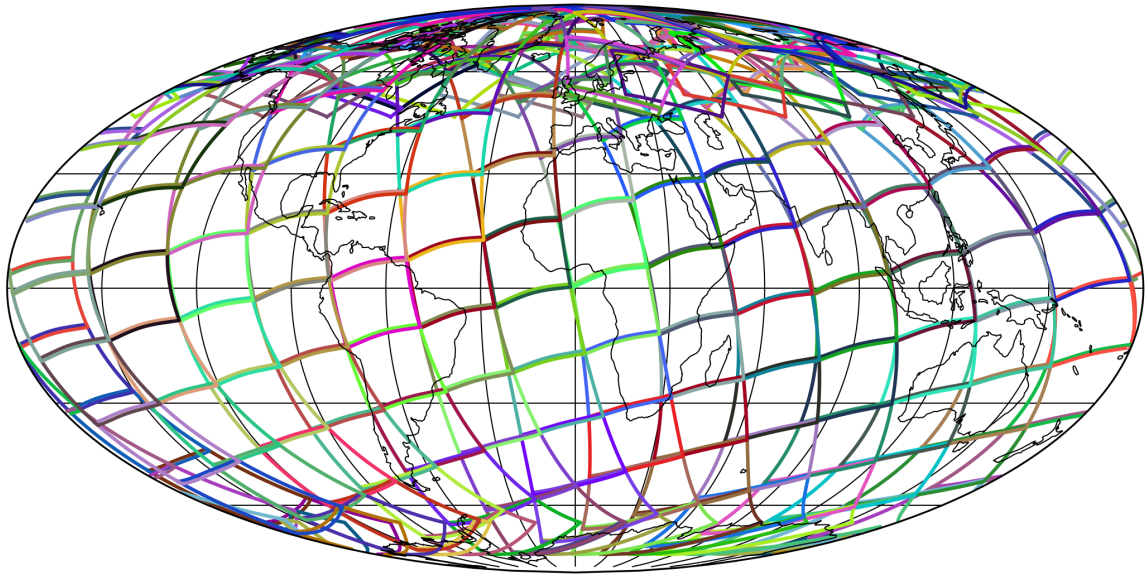


Figure 1: Outline of the granules.

4 Input data monitoring

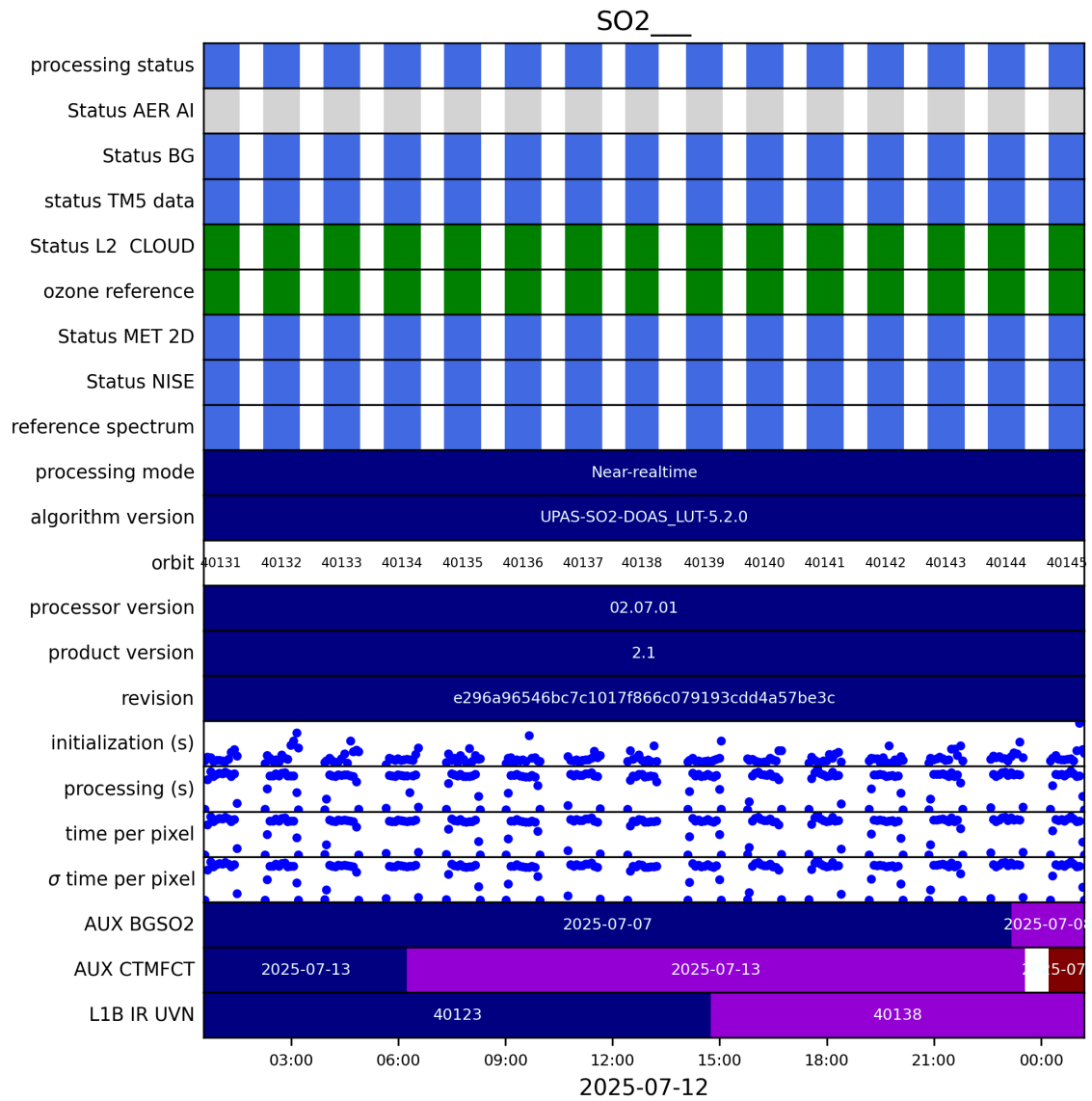


Figure 2: Input data per granule

5 Warnings and errors

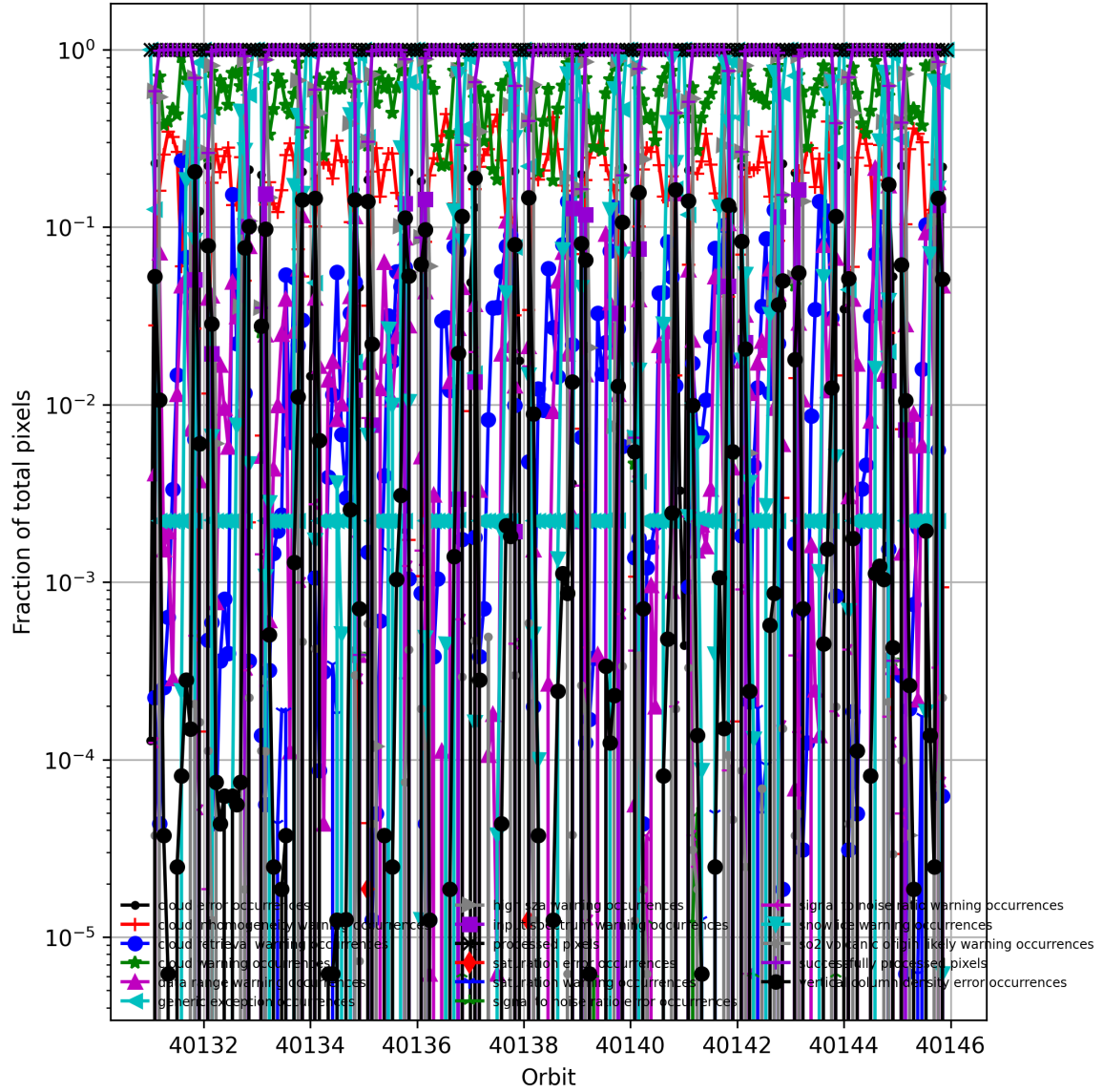


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

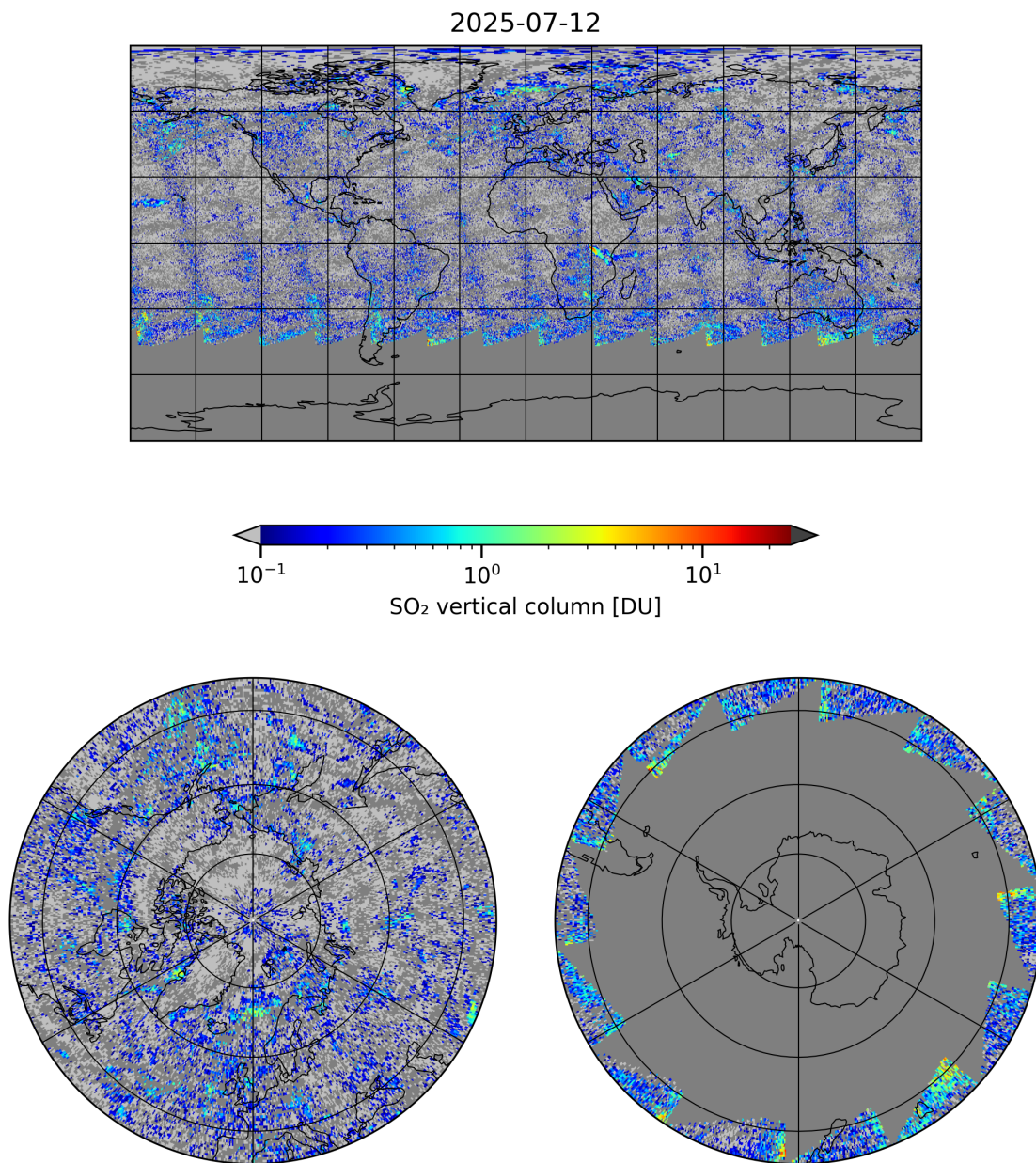


Figure 4: Map of “SO₂ vertical column” for 2025-07-12 to 2025-07-13

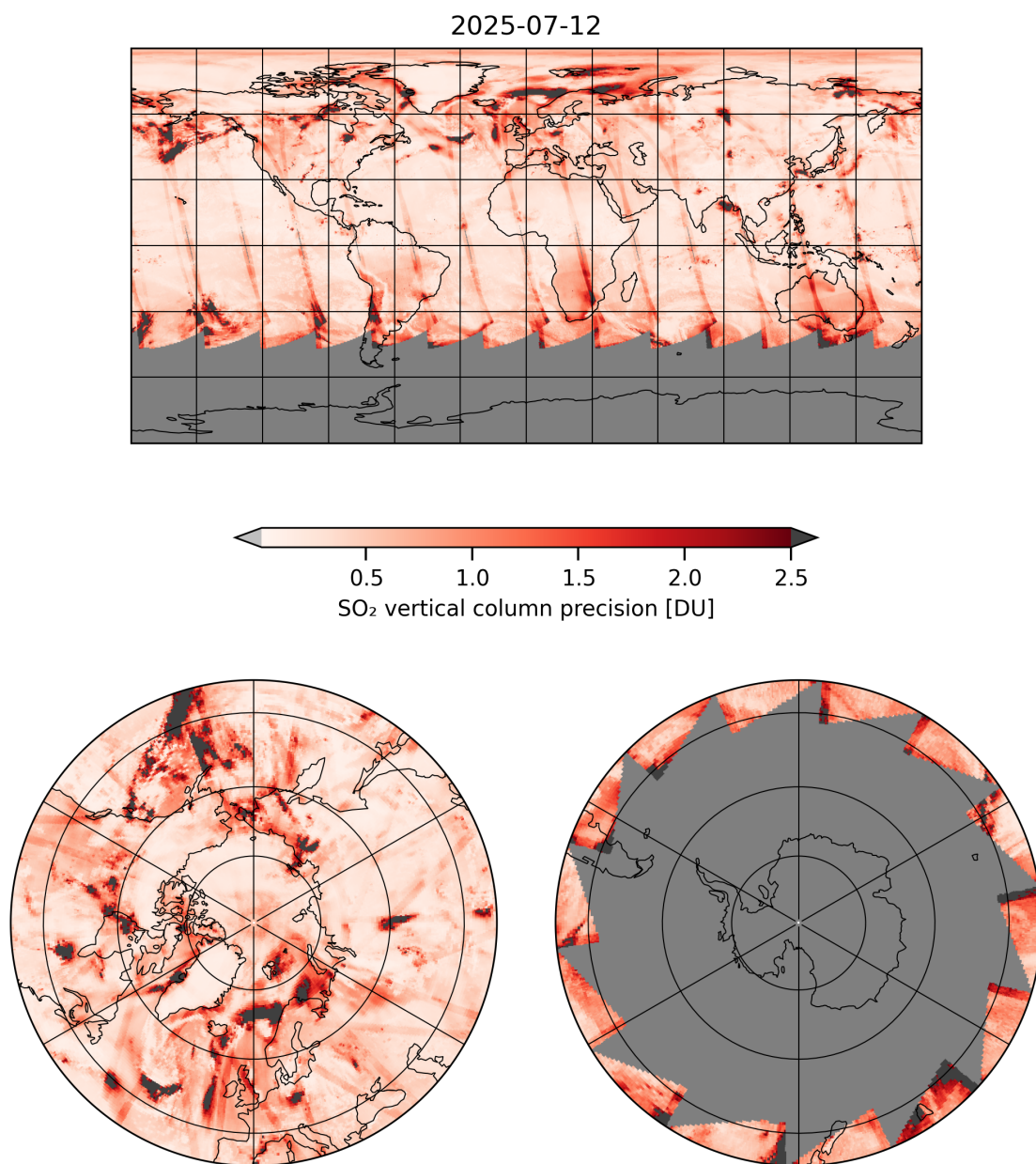


Figure 5: Map of “SO₂ vertical column precision” for 2025-07-12 to 2025-07-13

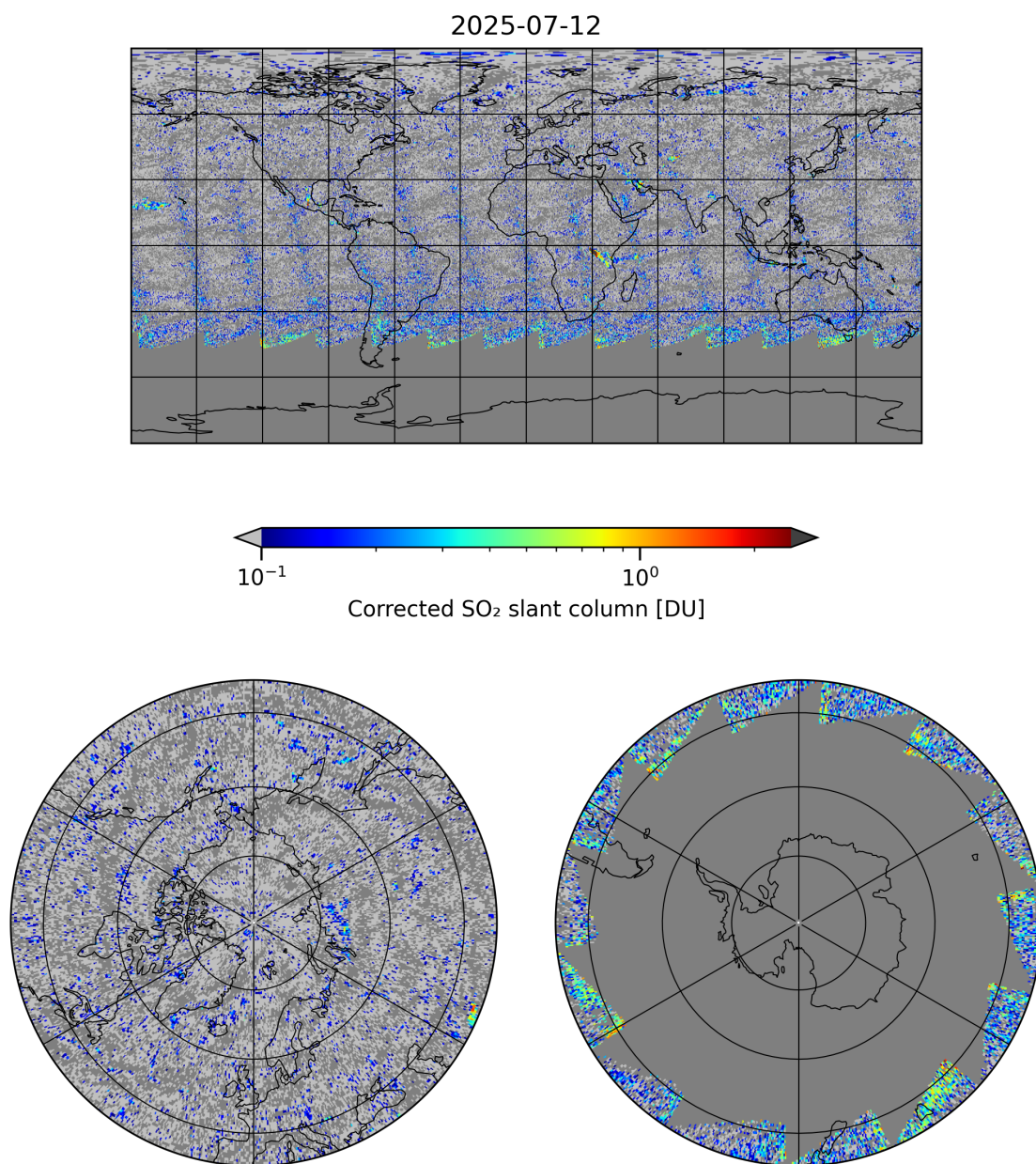


Figure 6: Map of “Corrected SO₂ slant column” for 2025-07-12 to 2025-07-13

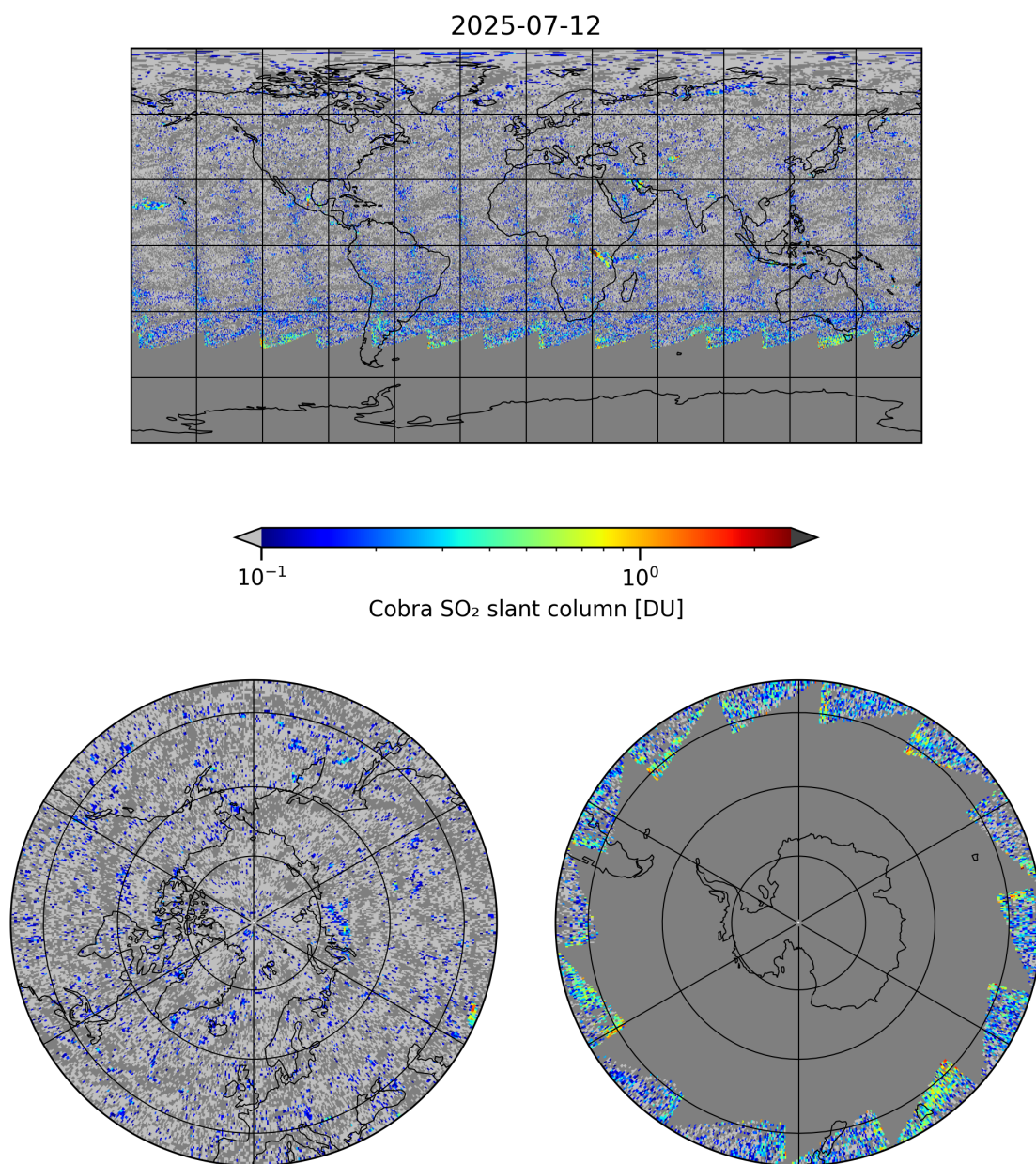


Figure 7: Map of “Cobra SO₂ slant column” for 2025-07-12 to 2025-07-13

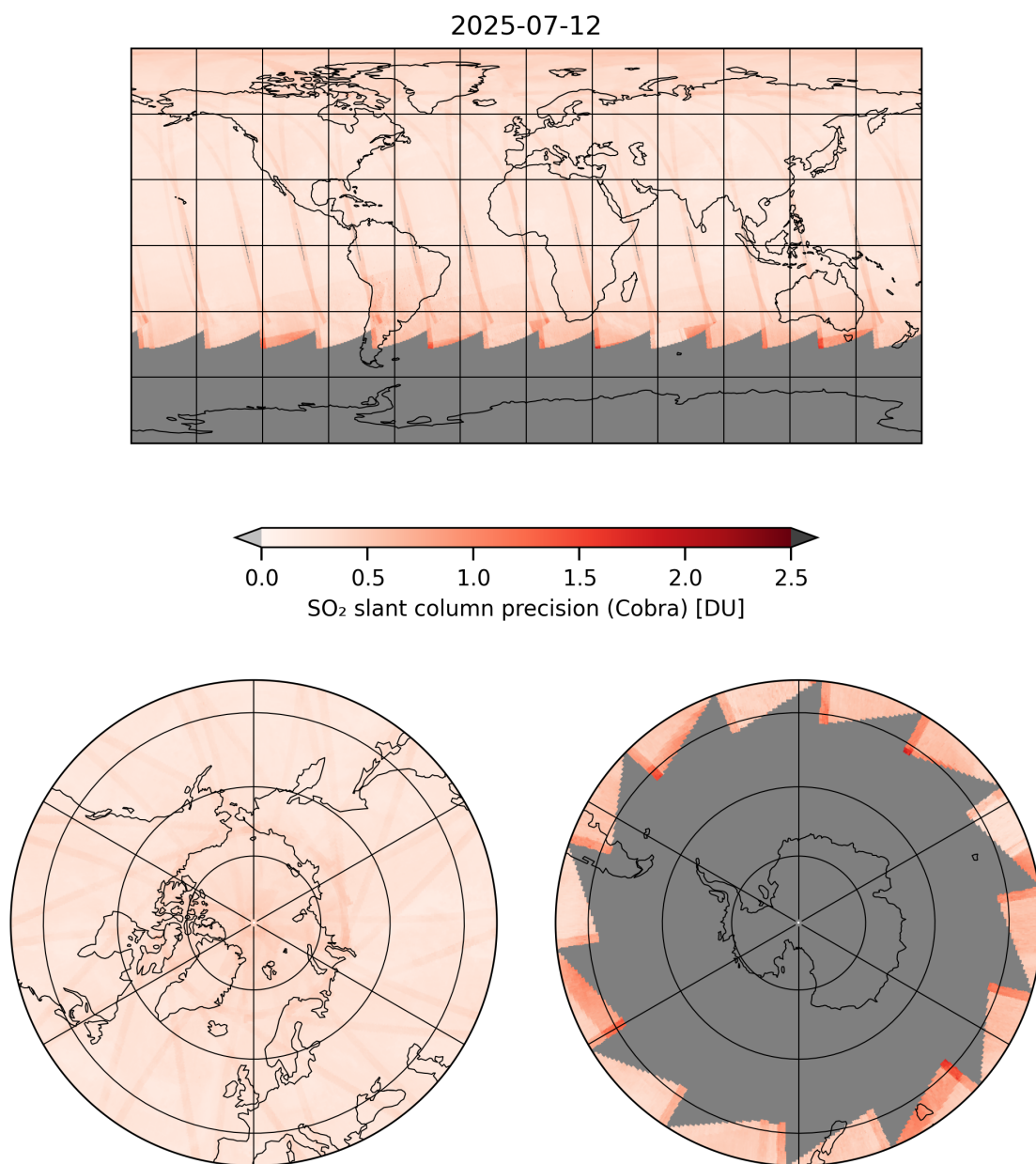


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-07-12 to 2025-07-13

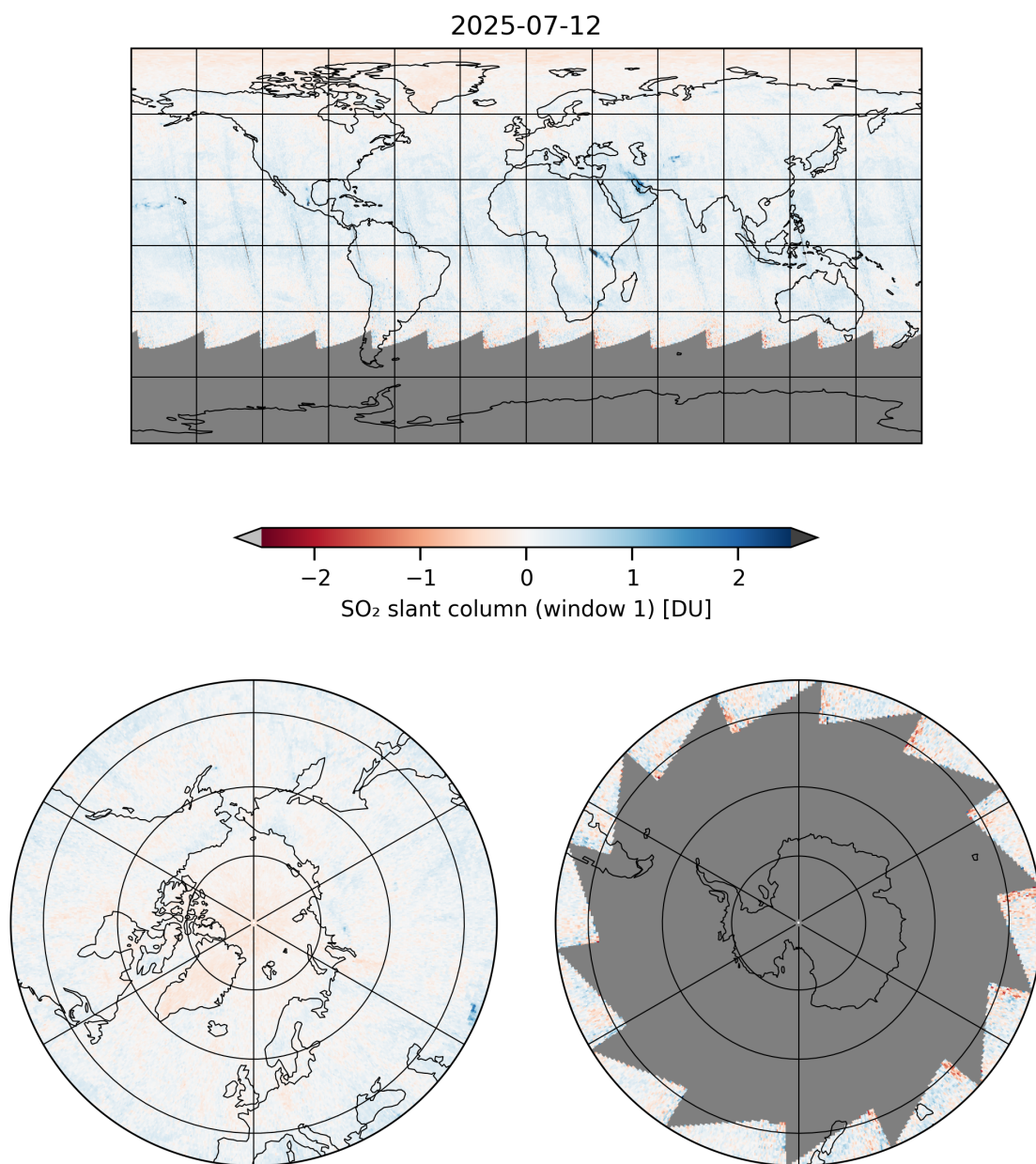


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-07-12 to 2025-07-13

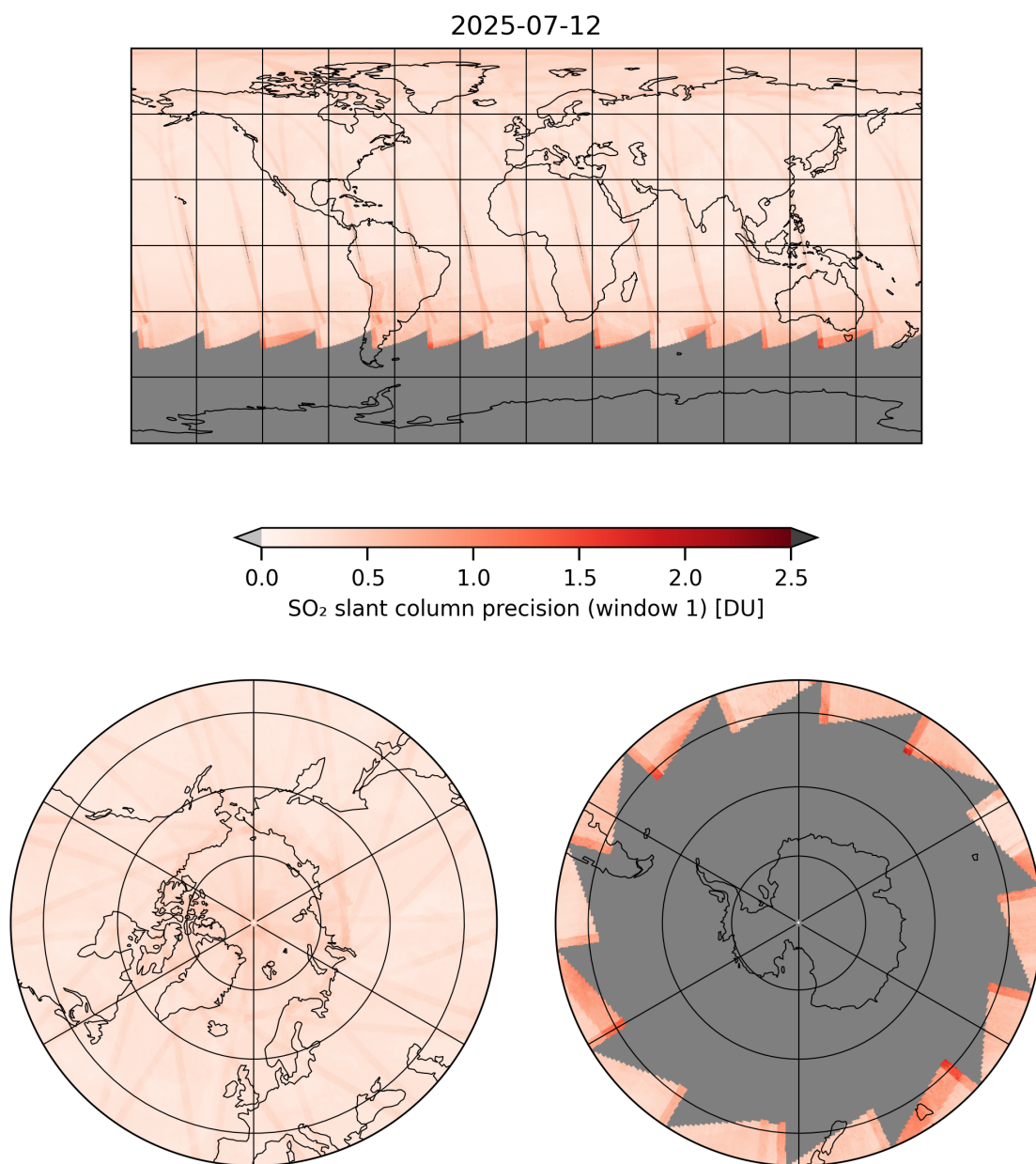


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-07-12 to 2025-07-13

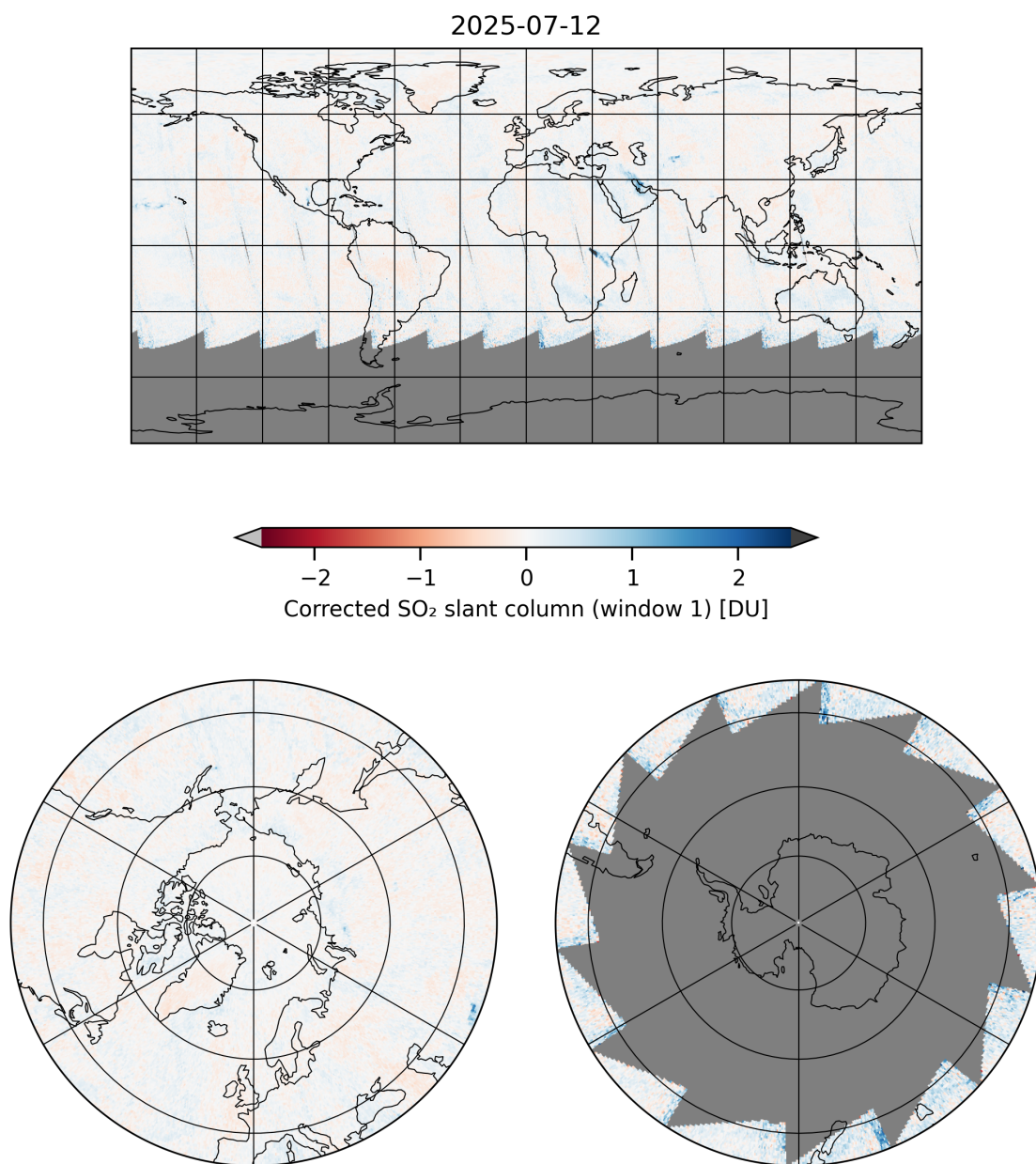


Figure 11: Map of "Corrected SO₂ slant column (window 1)" for 2025-07-12 to 2025-07-13

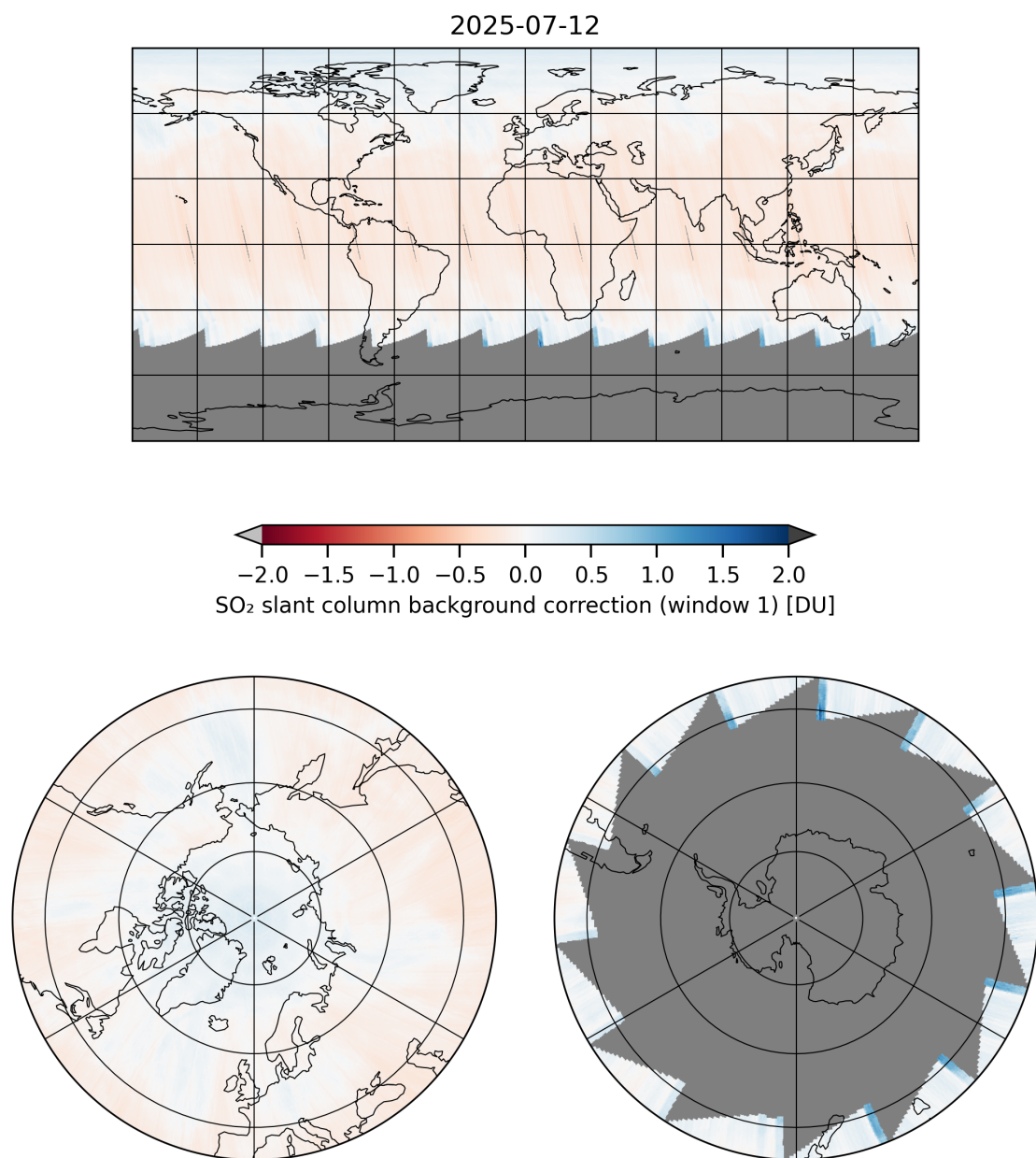


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-07-12 to 2025-07-13

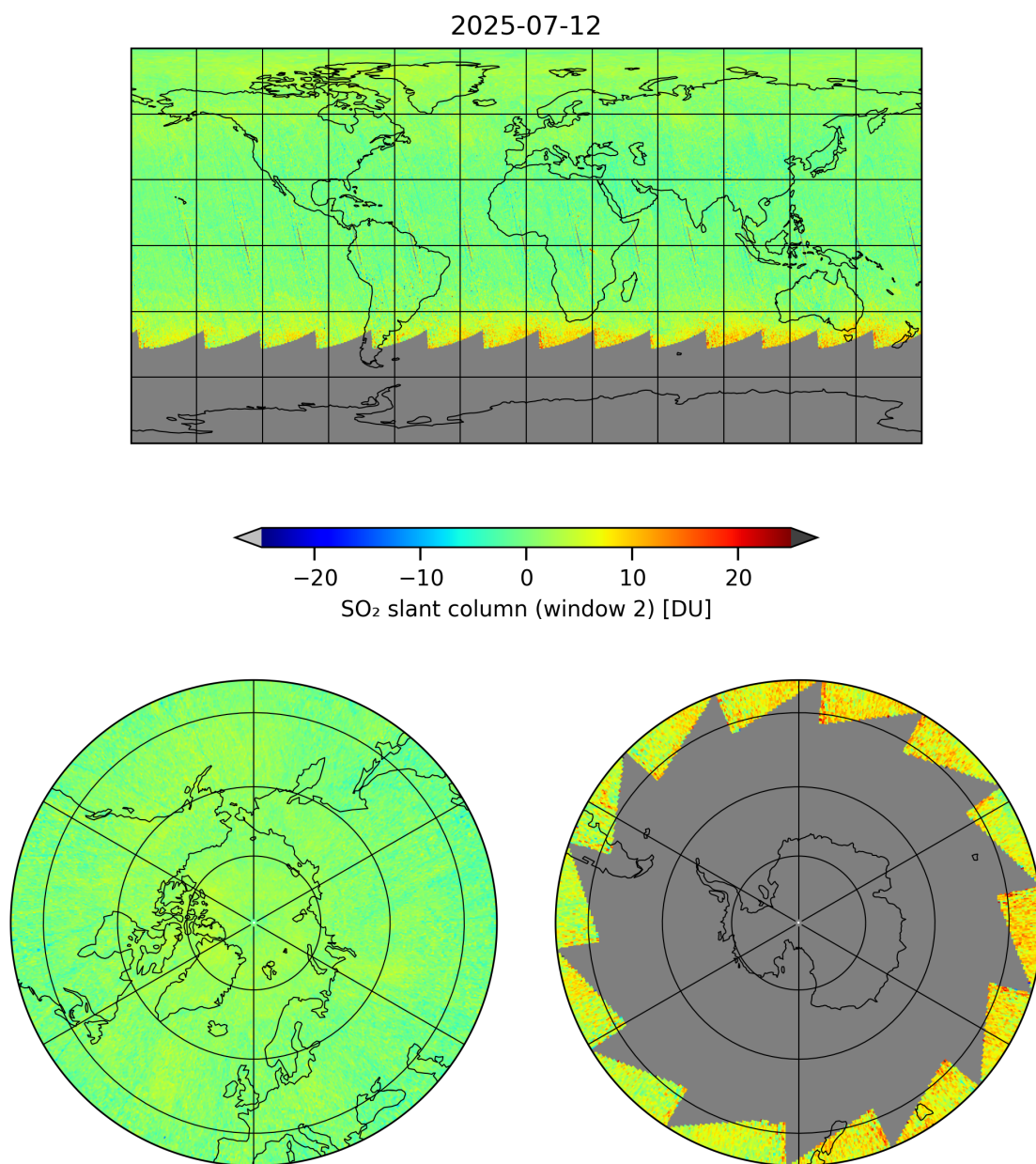


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-07-12 to 2025-07-13

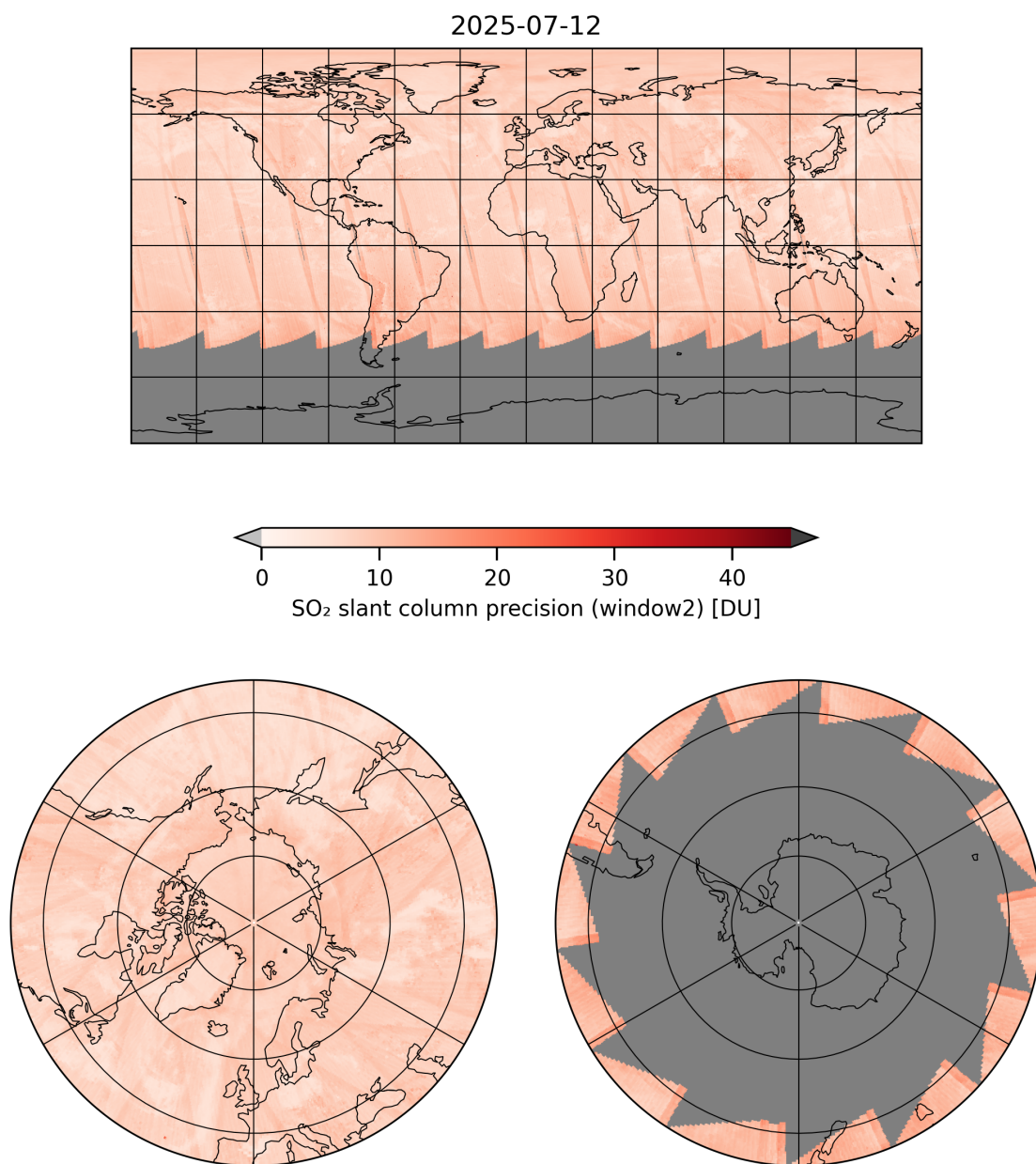


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-07-12 to 2025-07-13

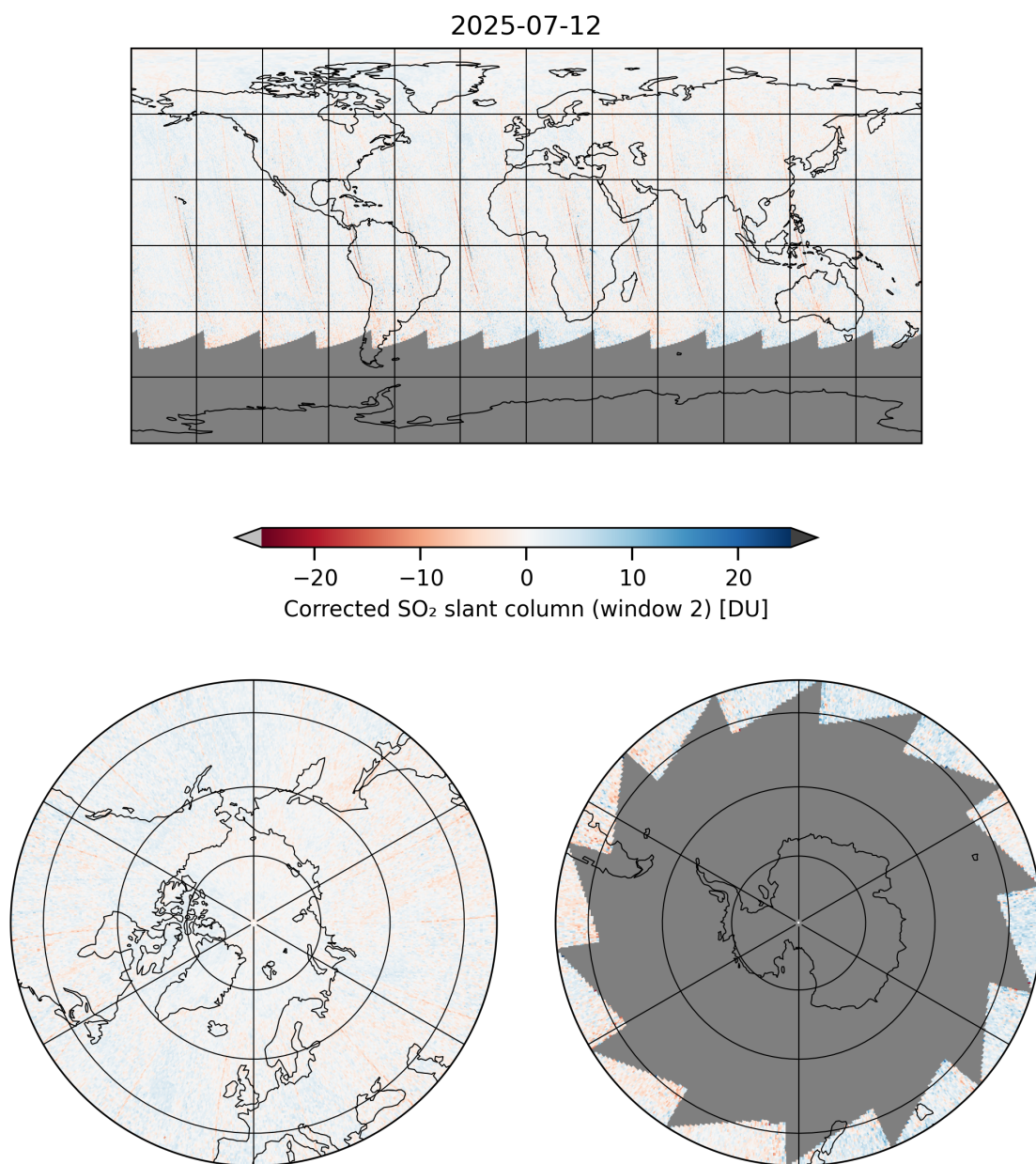


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-07-12 to 2025-07-13

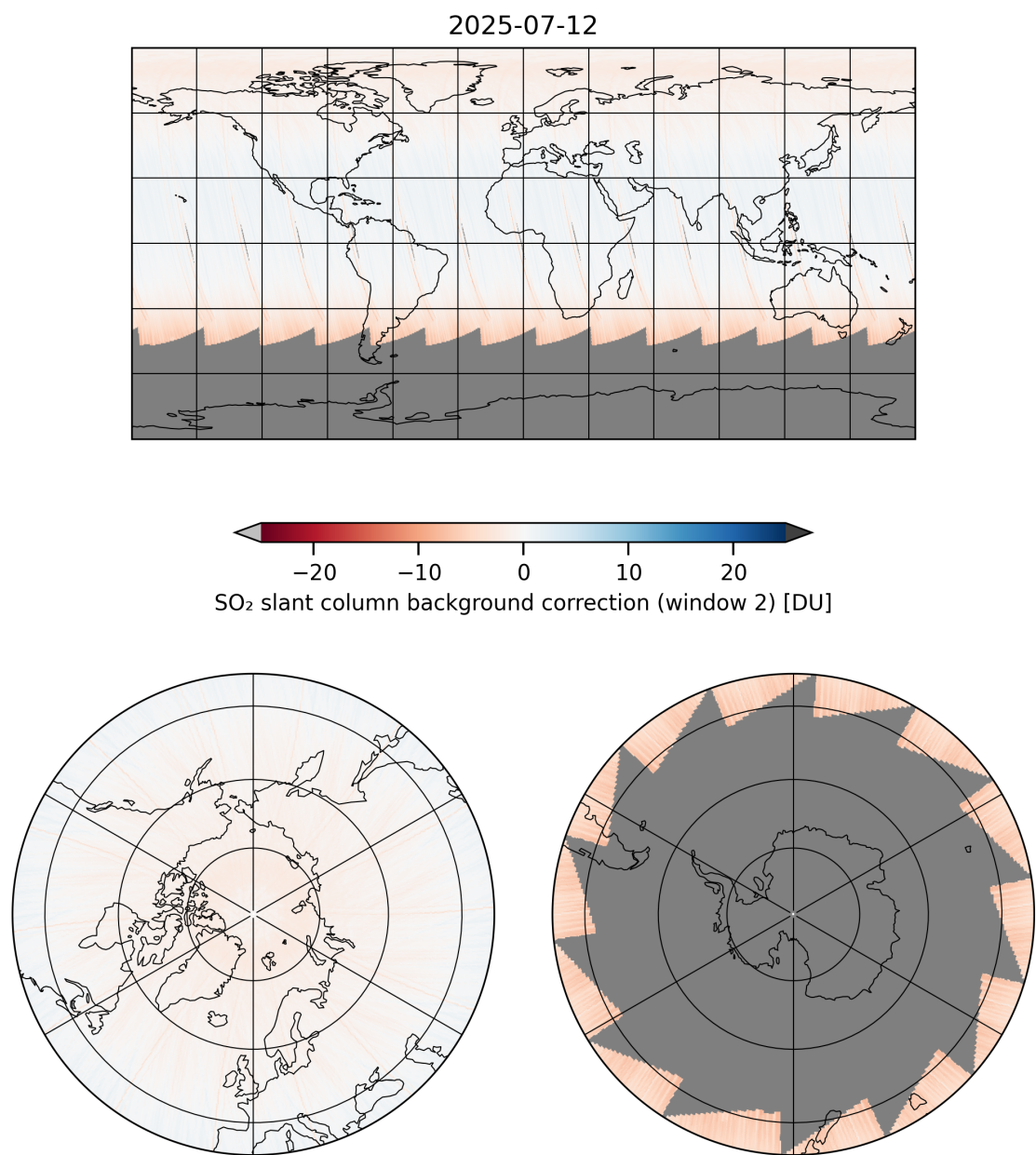


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-07-12 to 2025-07-13

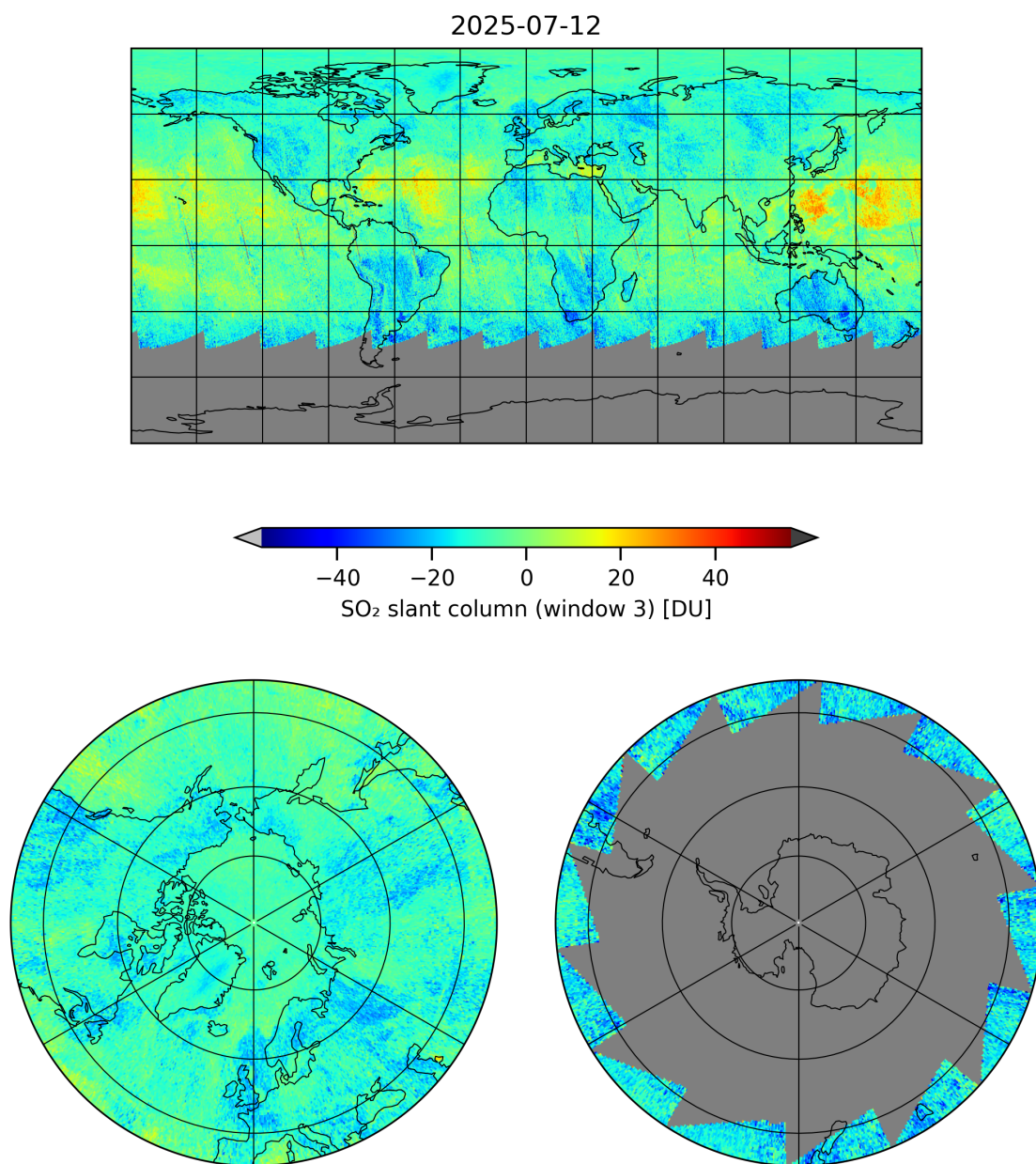


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-07-12 to 2025-07-13

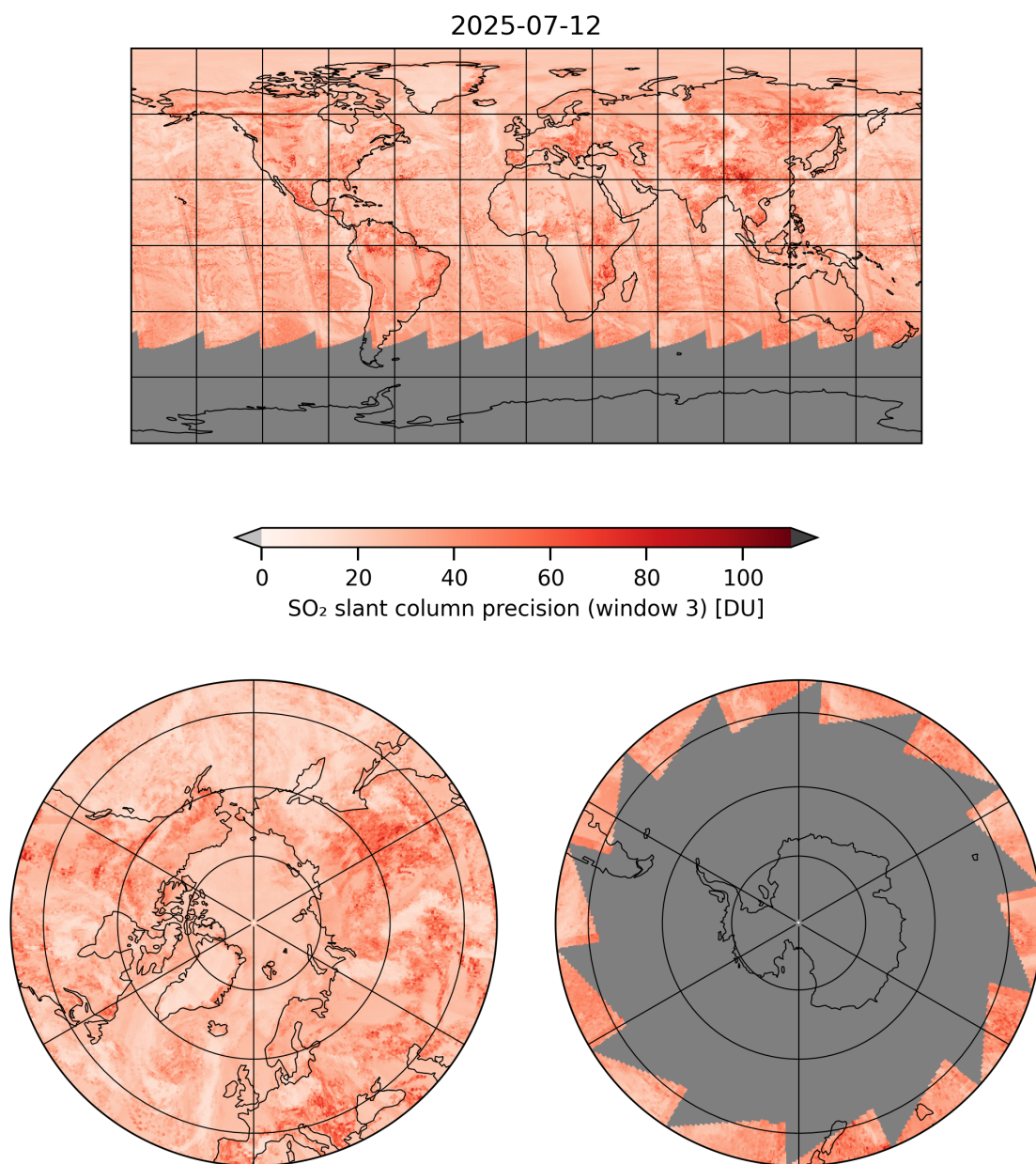


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-07-12 to 2025-07-13

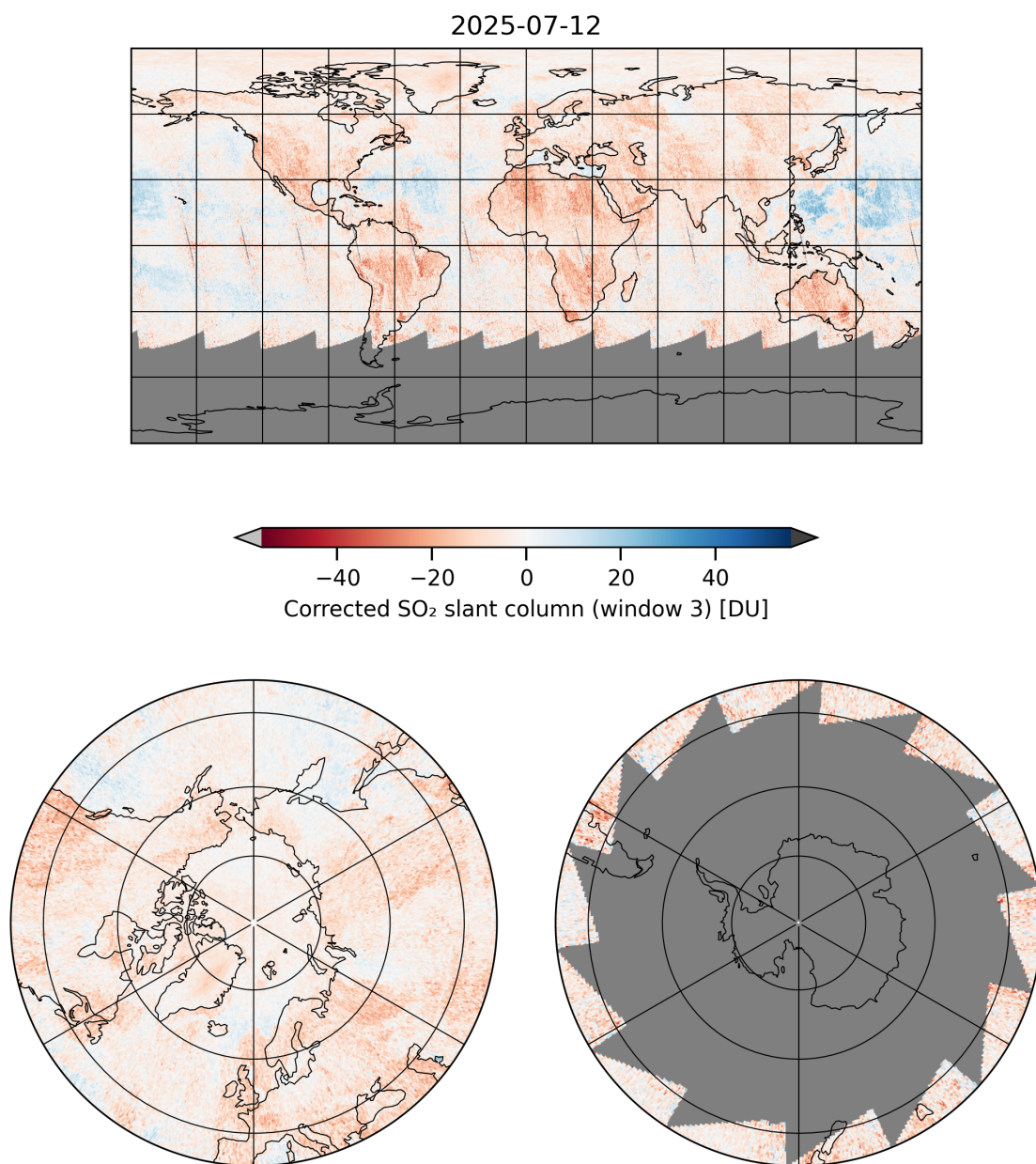


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-07-12 to 2025-07-13

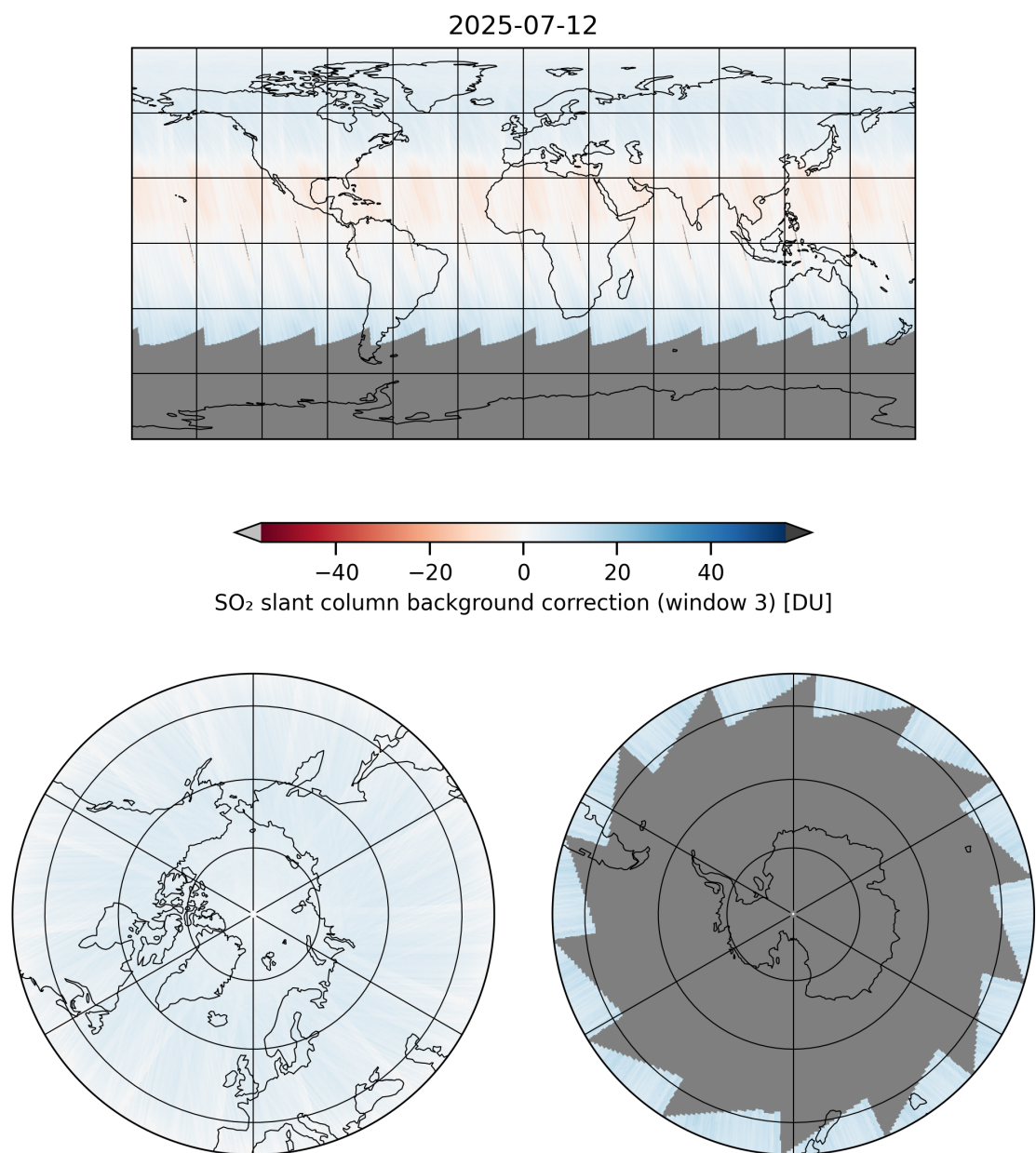


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-07-12 to 2025-07-13

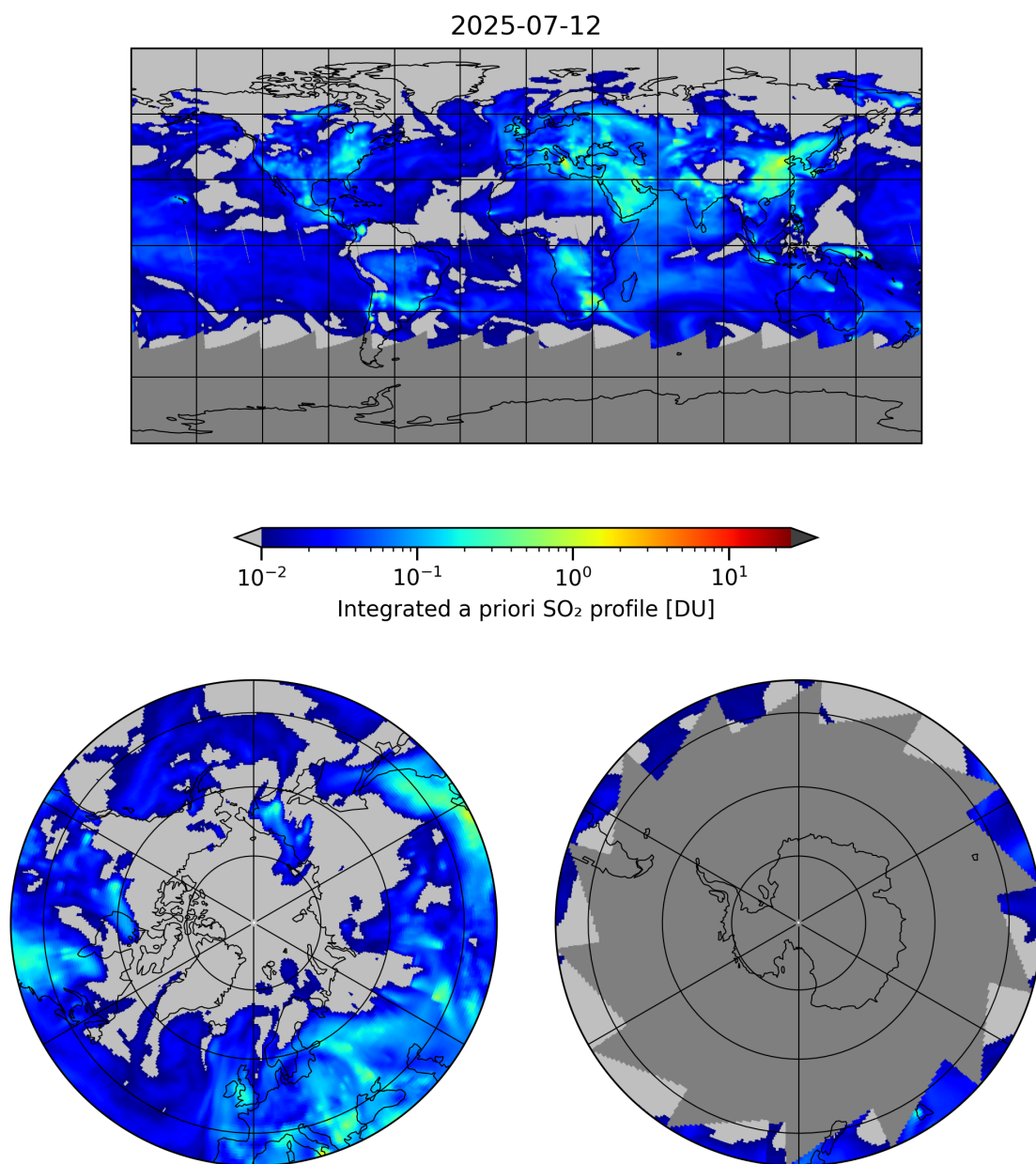


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-07-12 to 2025-07-13

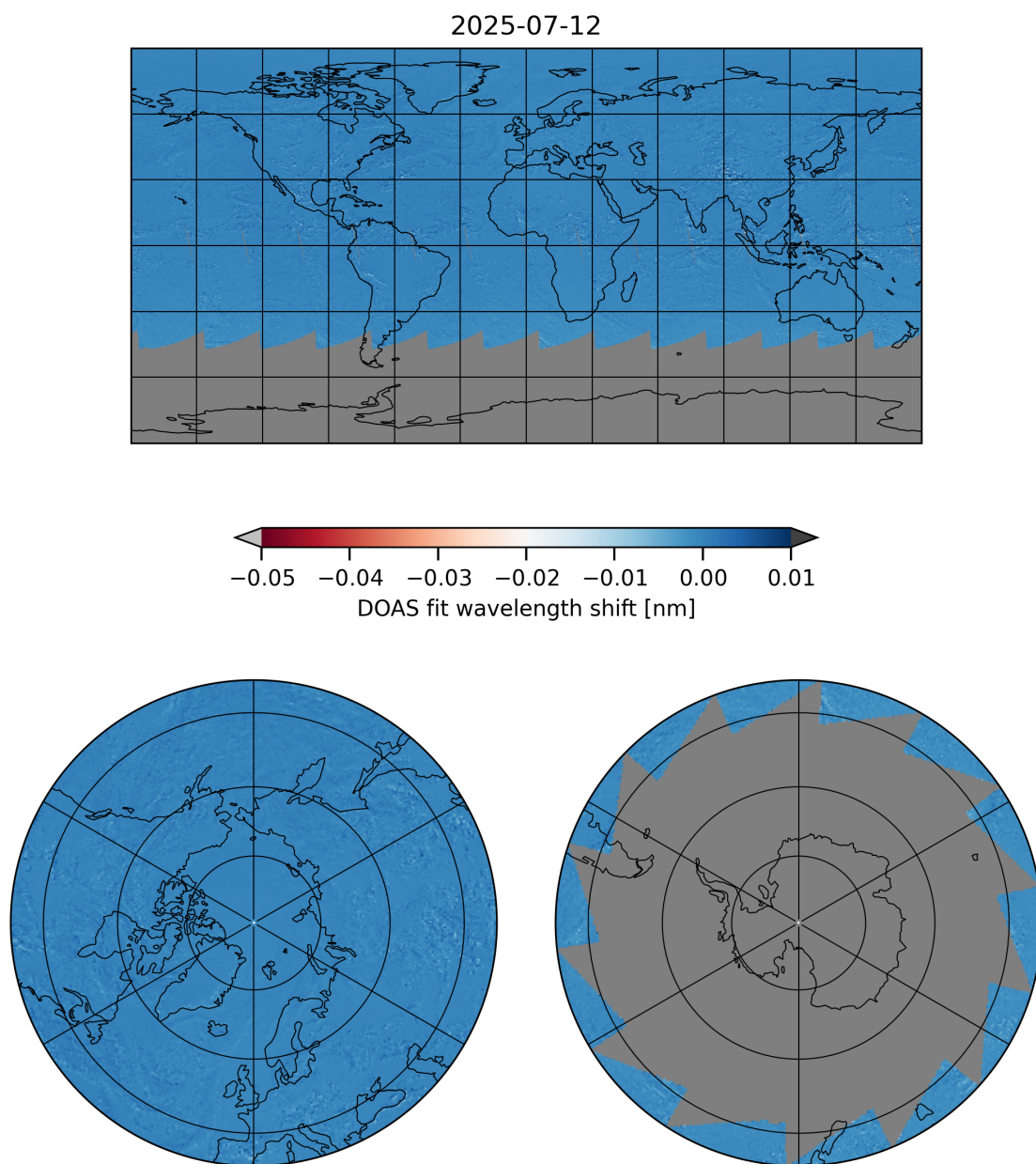


Figure 22: Map of “DOAS fit wavelength shift” for 2025-07-12 to 2025-07-13

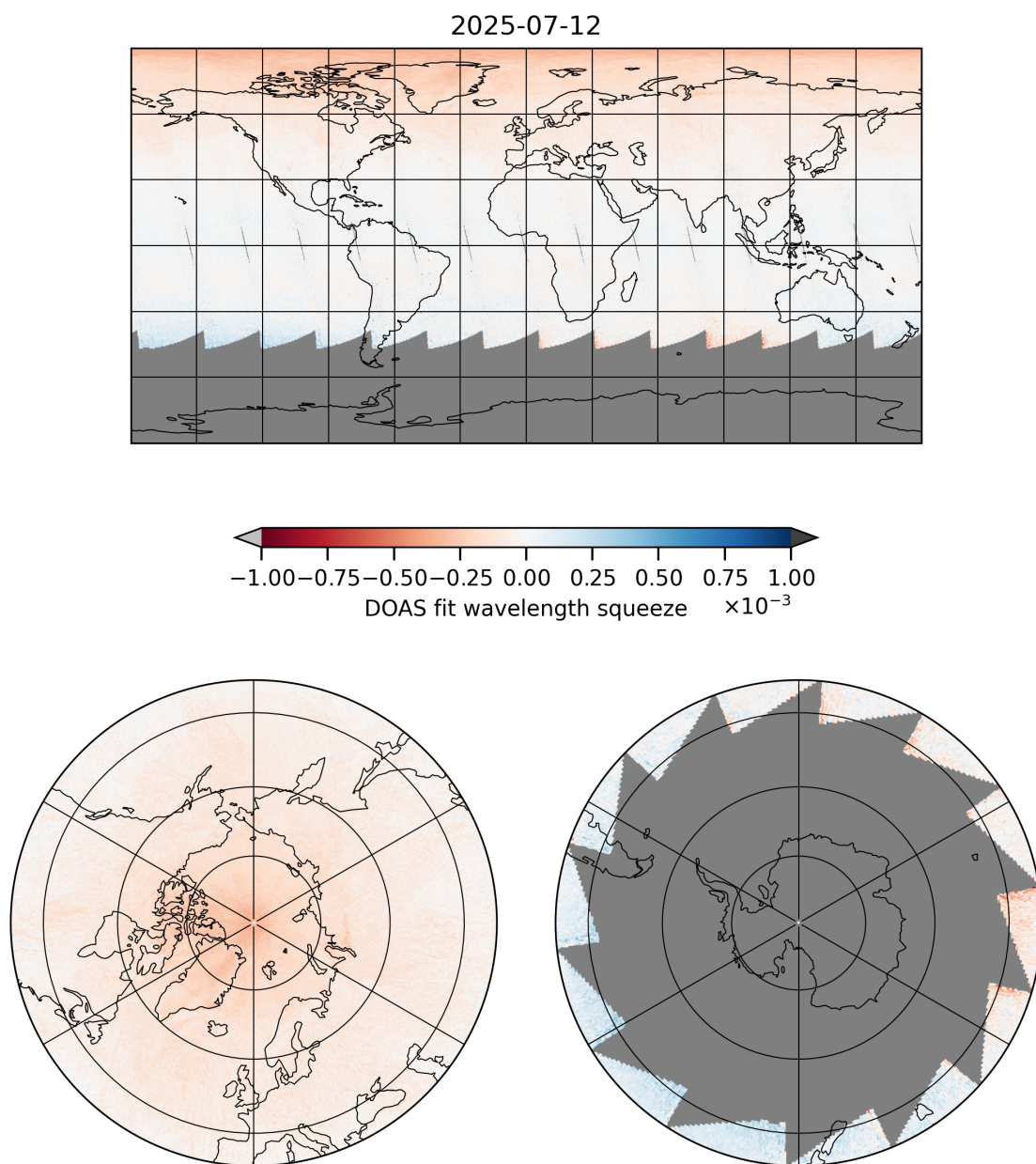


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-07-12 to 2025-07-13

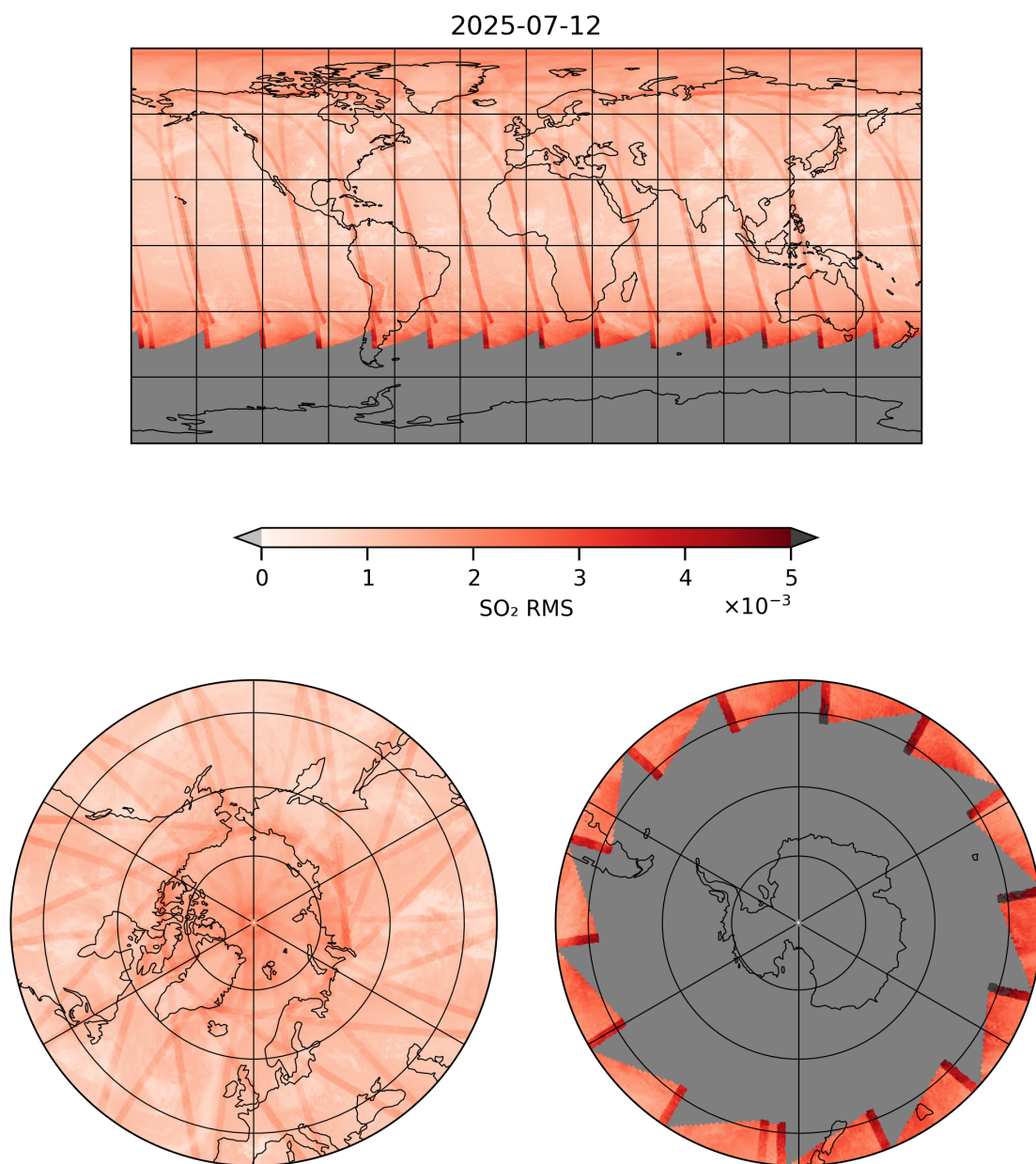


Figure 24: Map of “SO₂ RMS” for 2025-07-12 to 2025-07-13

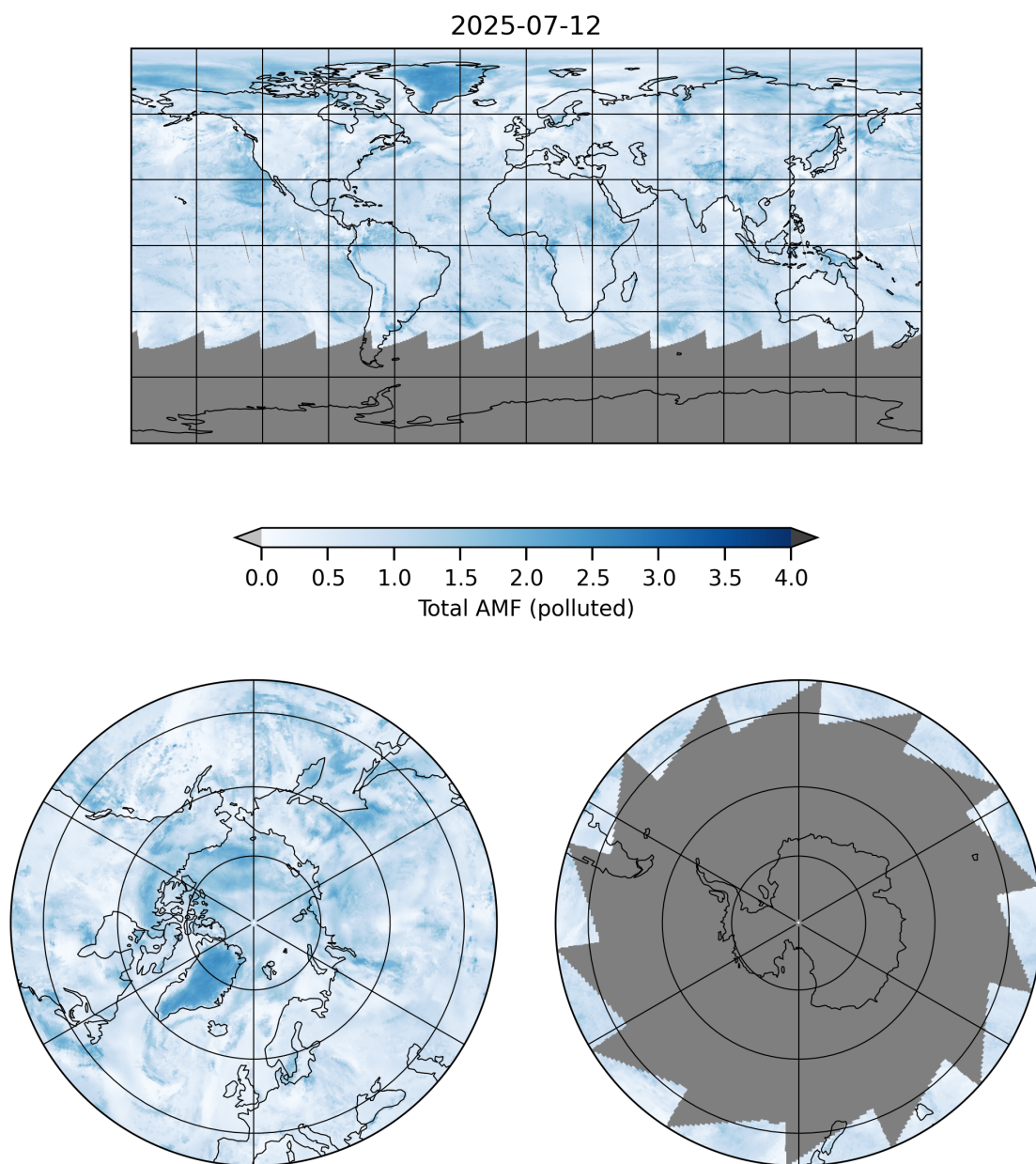


Figure 25: Map of “Total AMF (polluted)” for 2025-07-12 to 2025-07-13

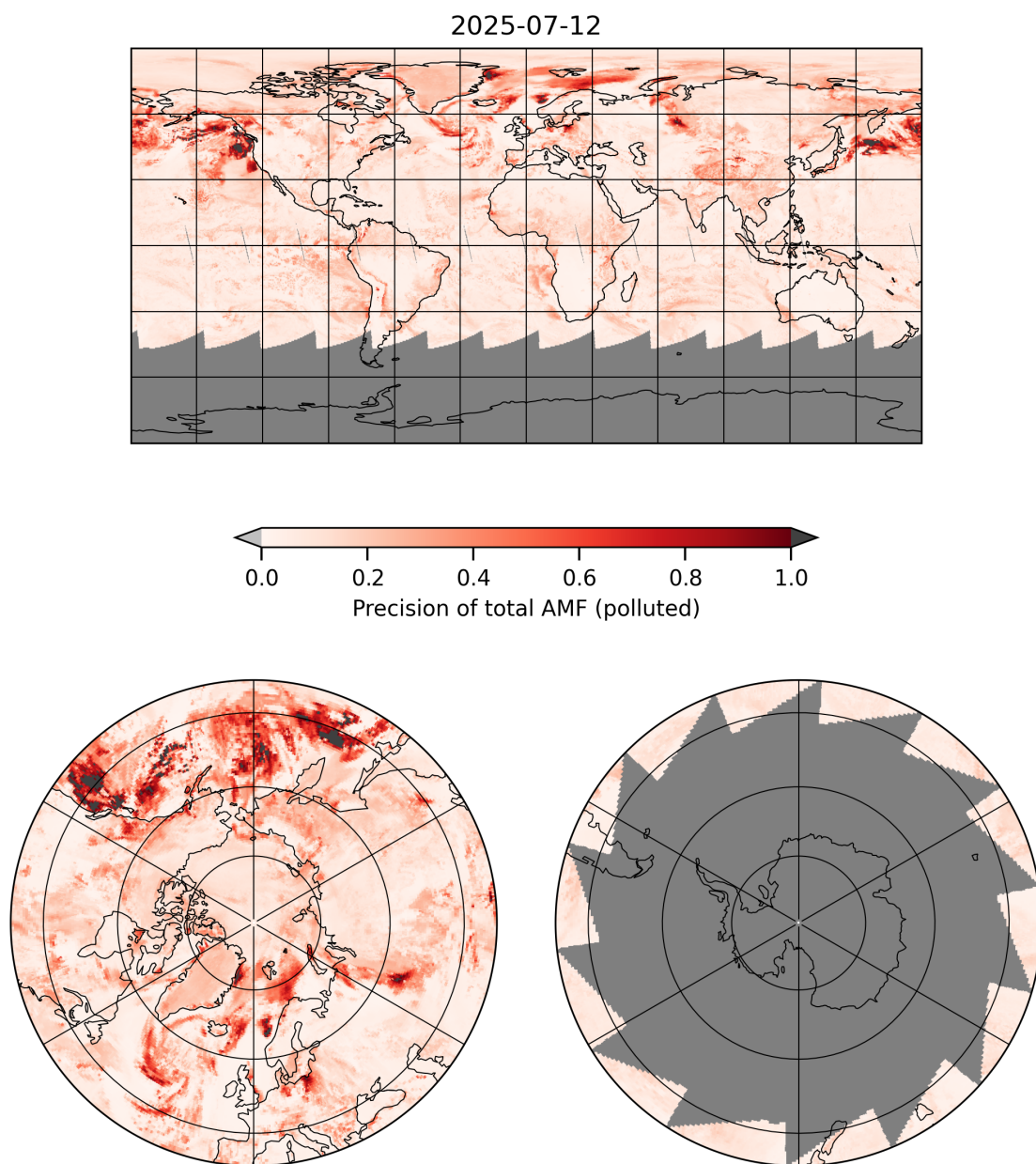


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-07-12 to 2025-07-13

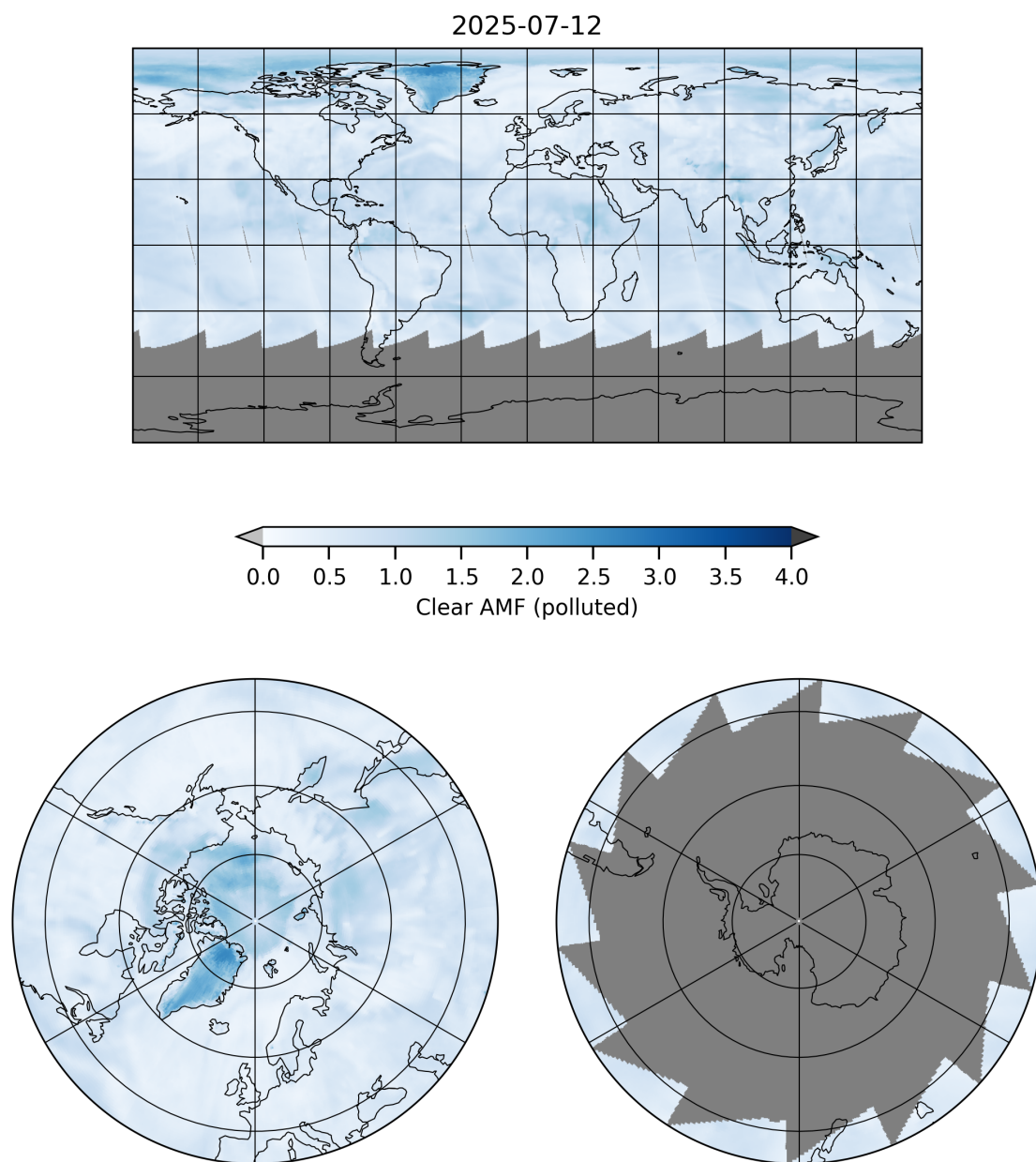


Figure 27: Map of “Clear AMF (polluted)” for 2025-07-12 to 2025-07-13

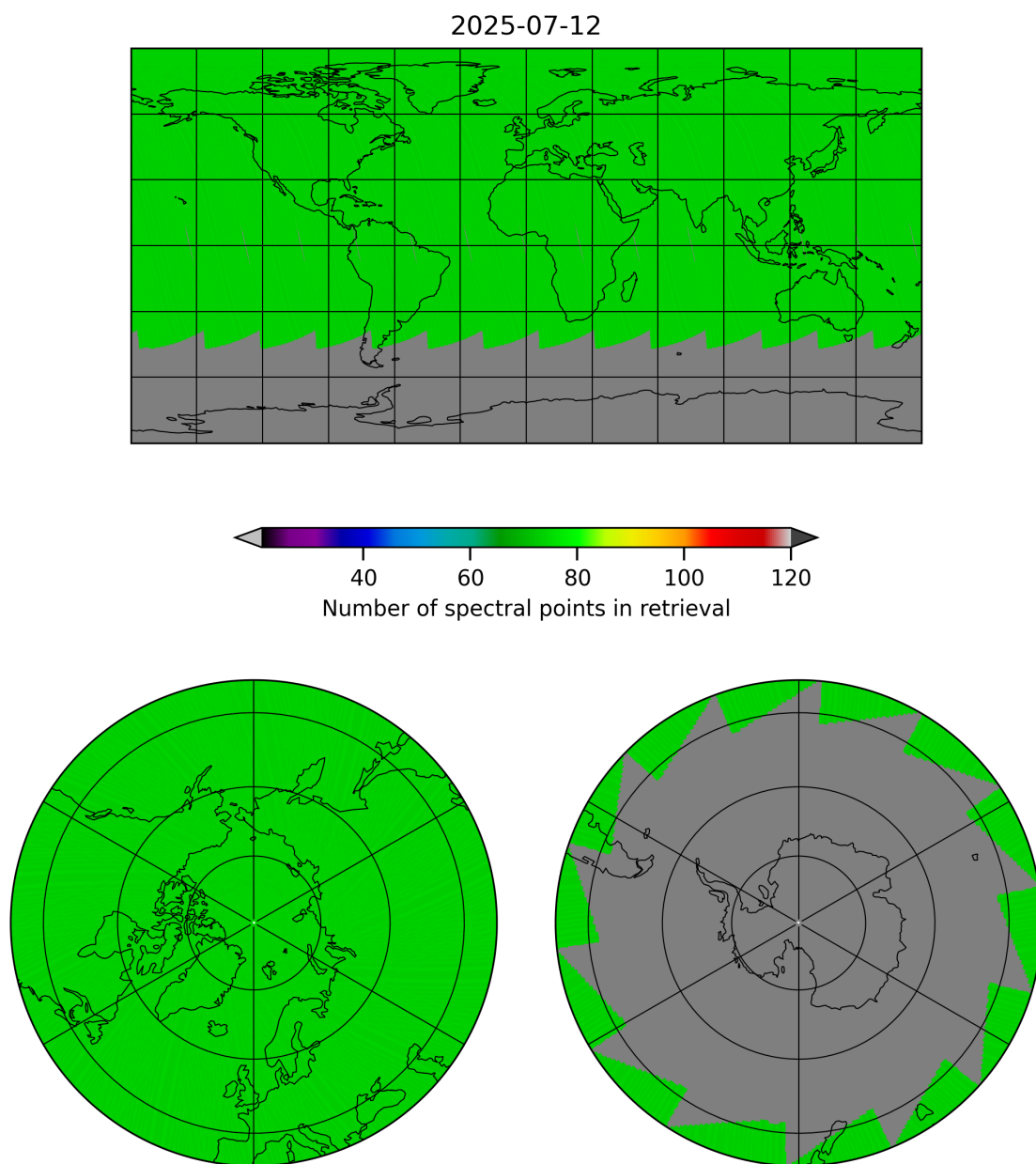


Figure 28: Map of “Number of spectral points in retrieval” for 2025-07-12 to 2025-07-13

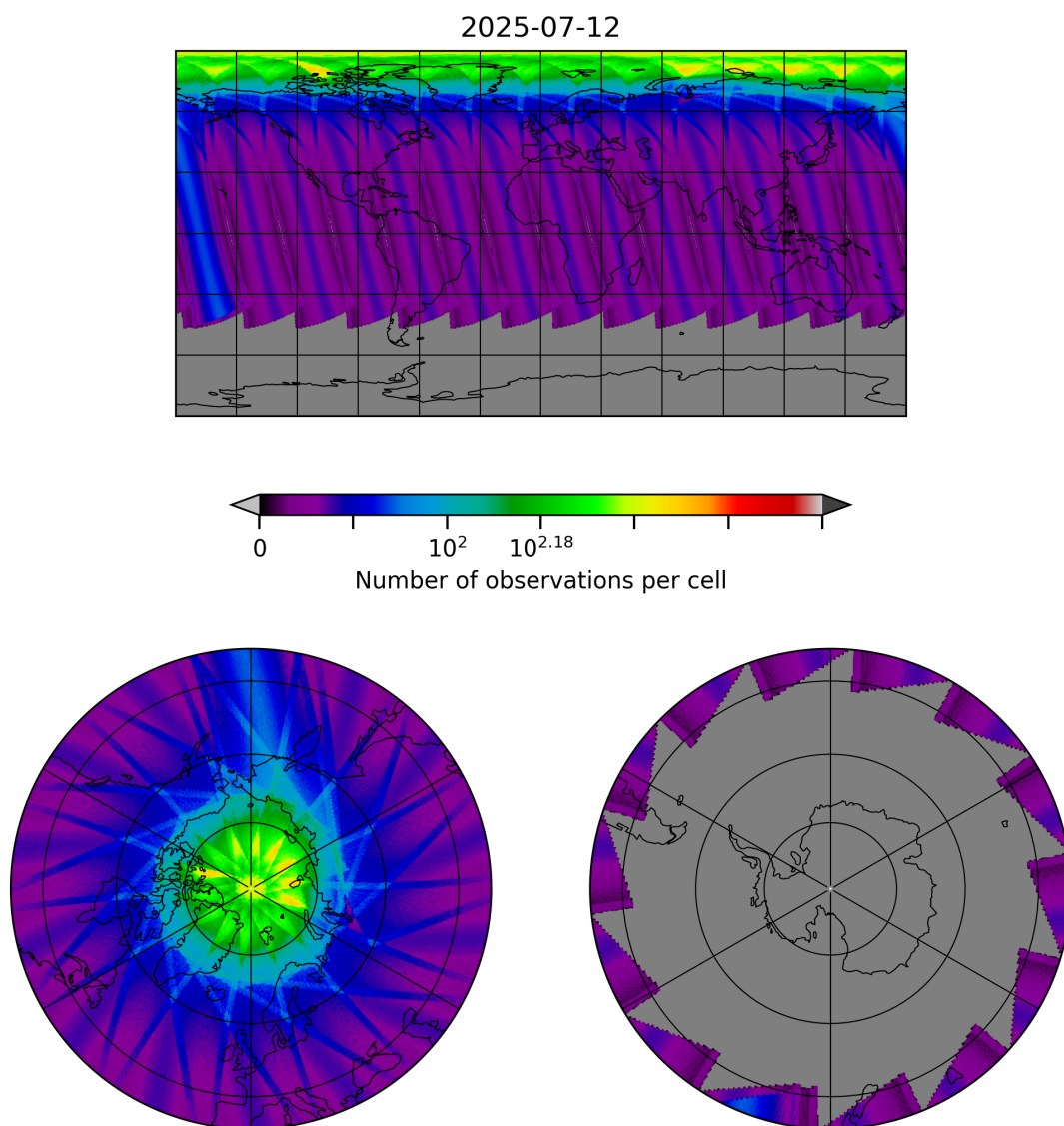


Figure 29: Map of the number of observations for 2025-07-12 to 2025-07-13

7 Zonal average

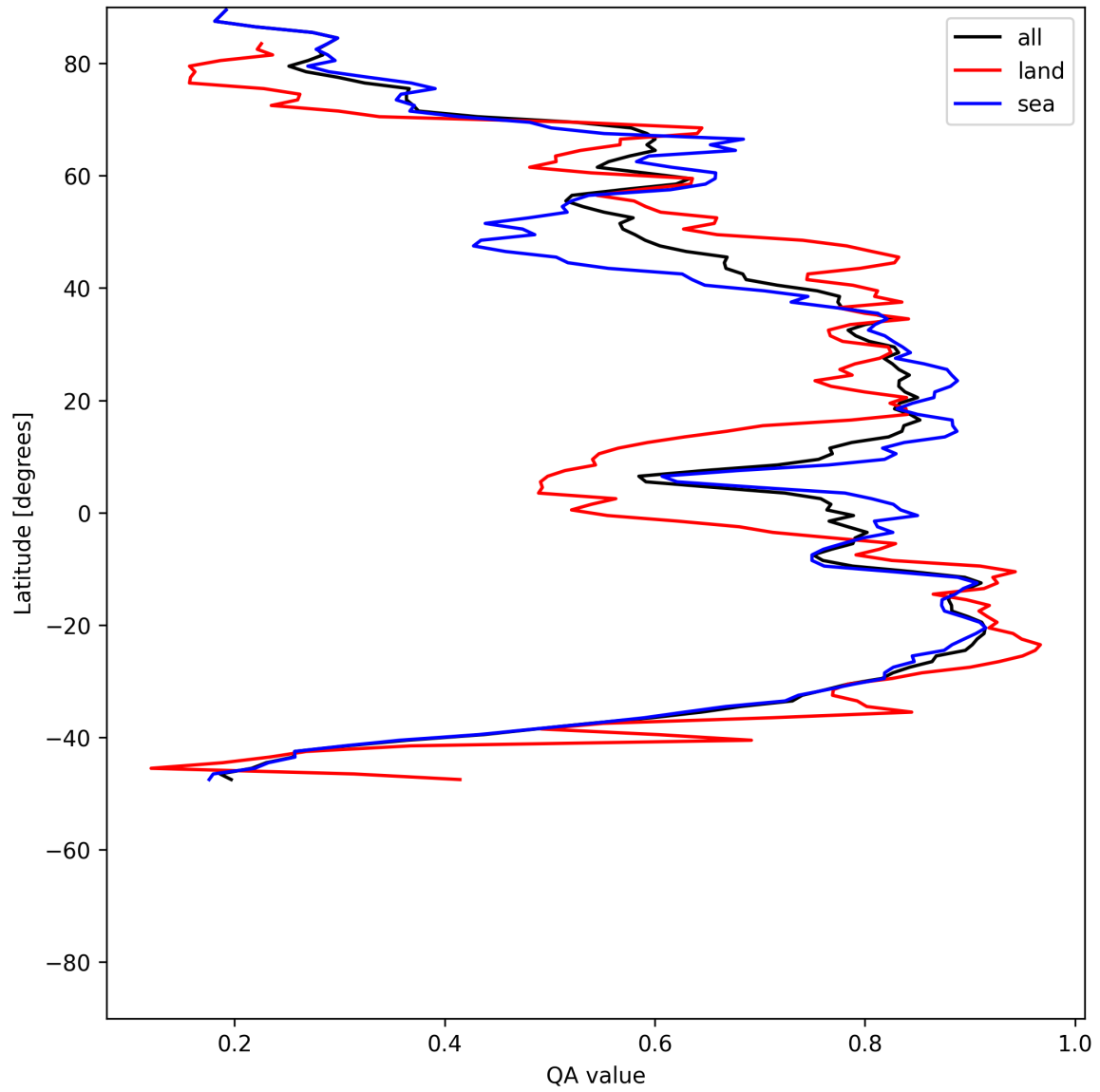


Figure 30: Zonal average of “QA value” for 2025-07-12 to 2025-07-13.

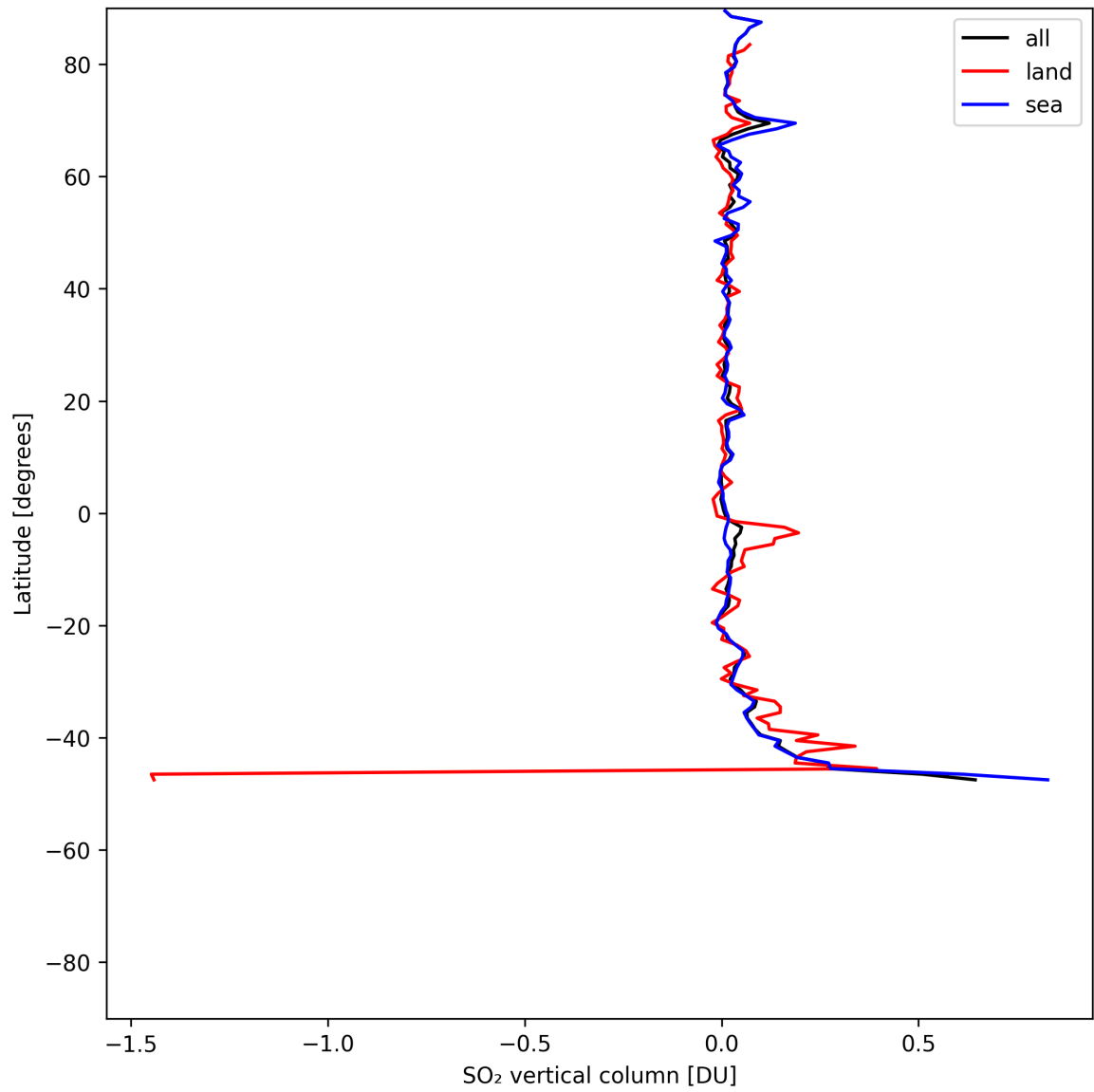


Figure 31: Zonal average of “SO₂ vertical column” for 2025-07-12 to 2025-07-13.

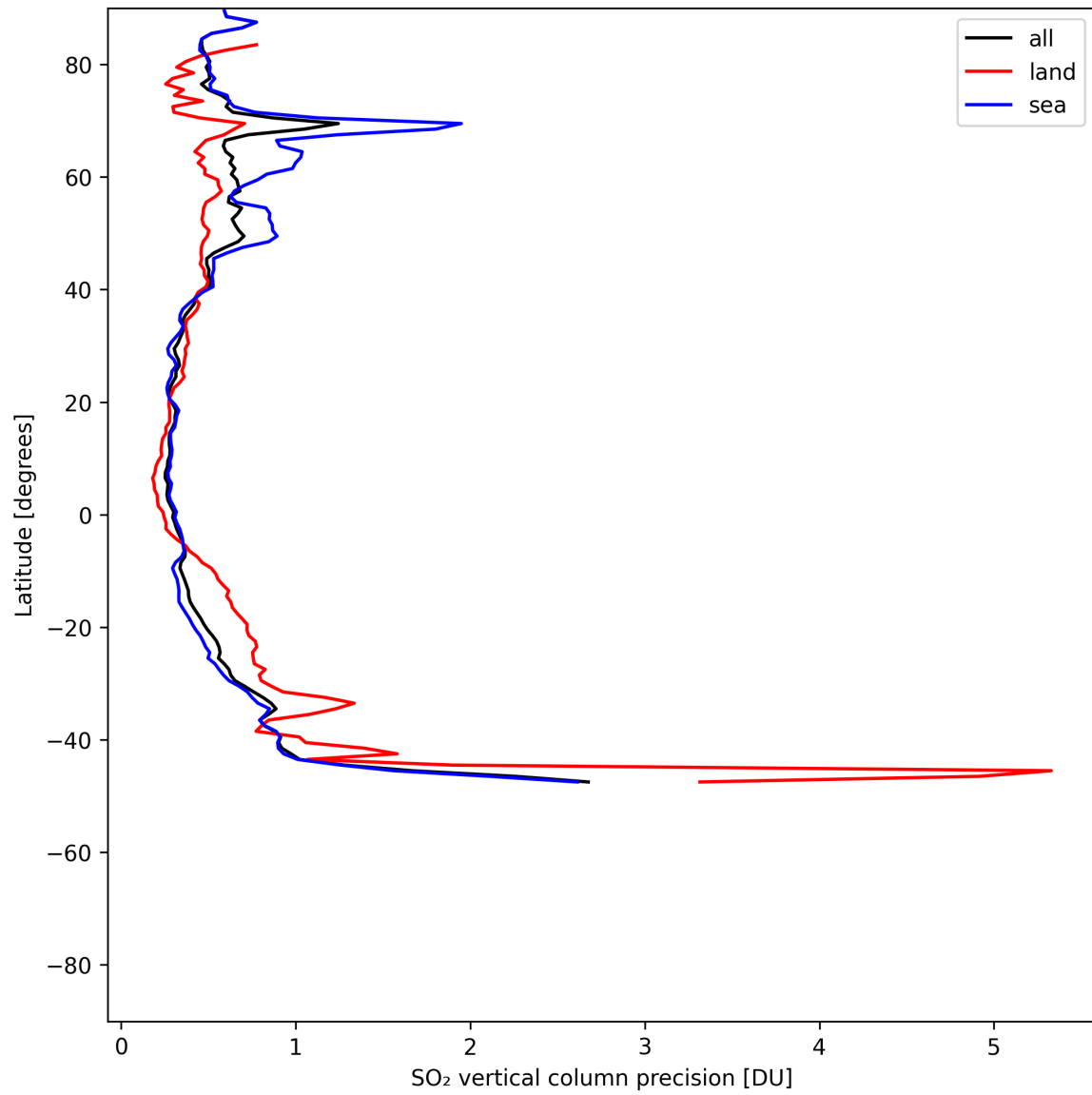


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-07-12 to 2025-07-13.

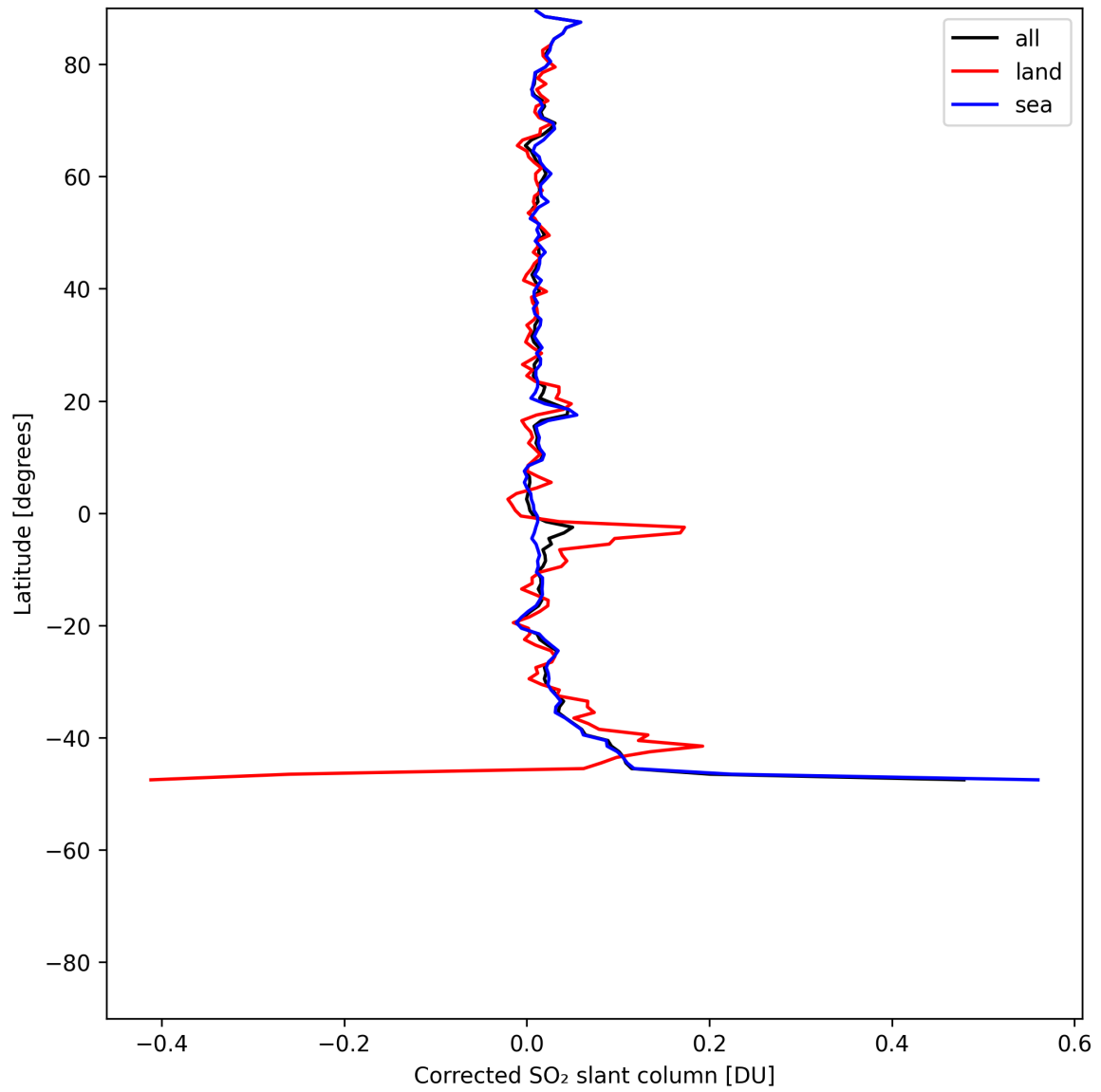


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-07-12 to 2025-07-13.

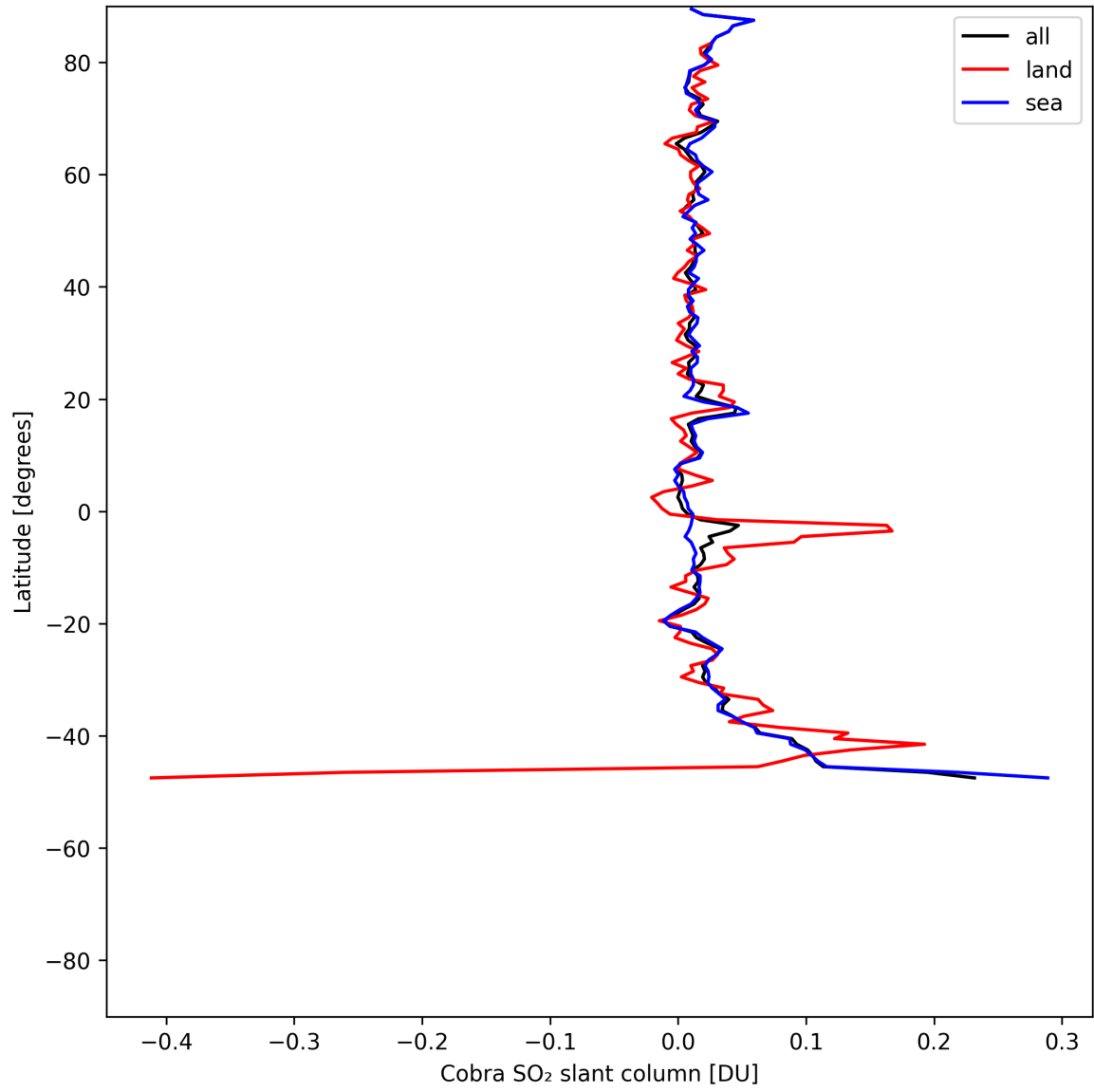


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-07-12 to 2025-07-13.

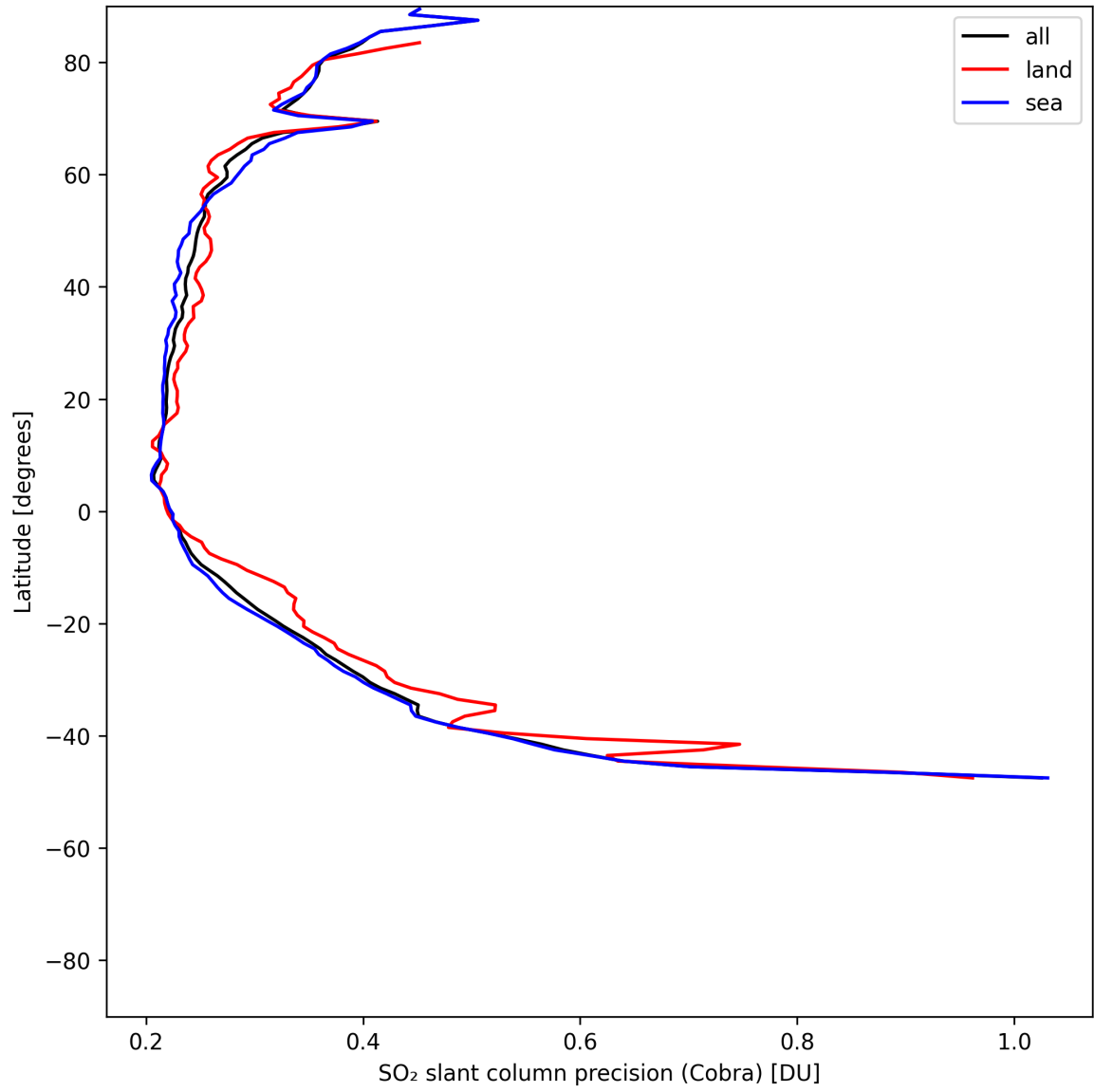


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-07-12 to 2025-07-13.

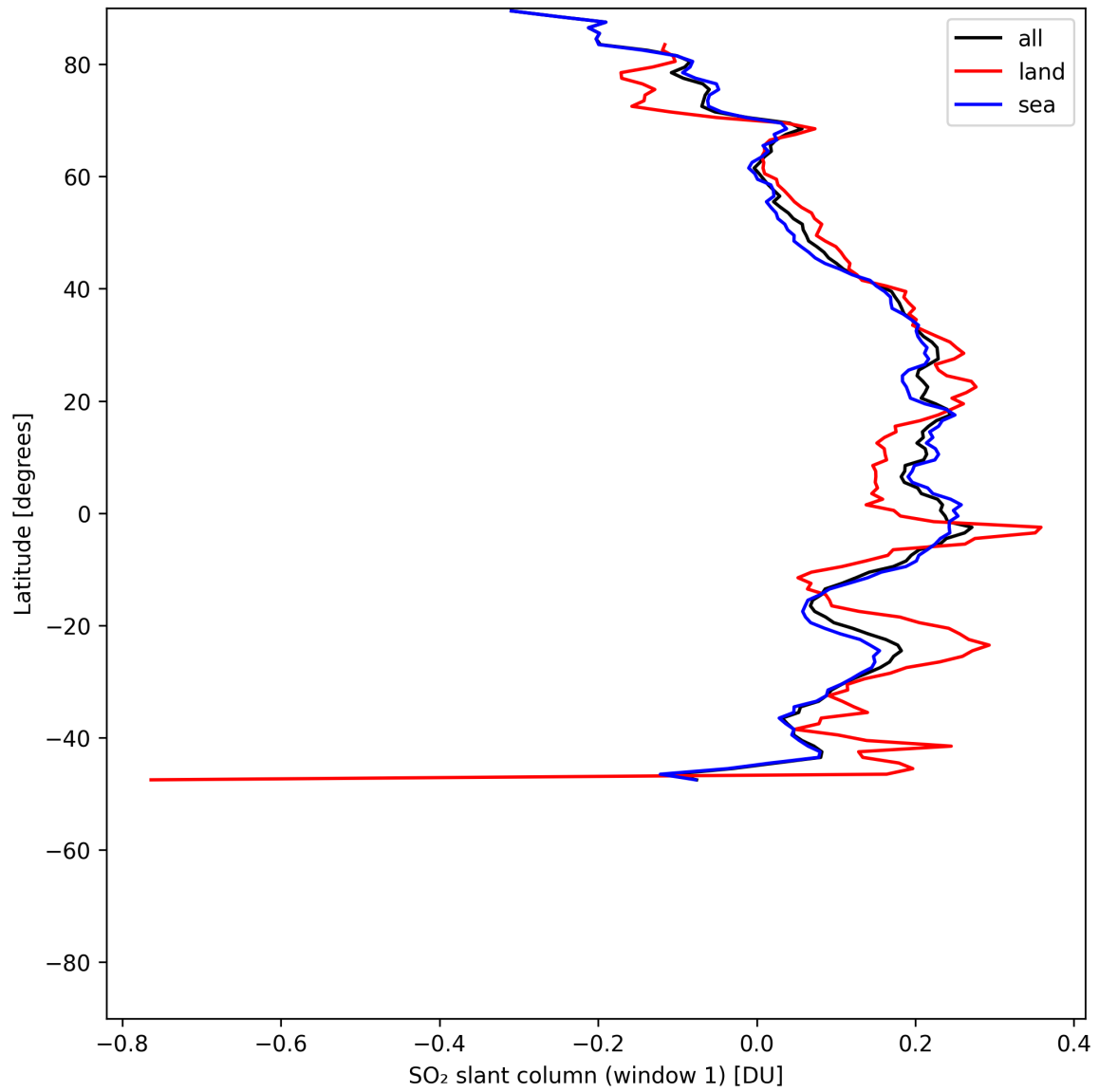


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-07-12 to 2025-07-13.

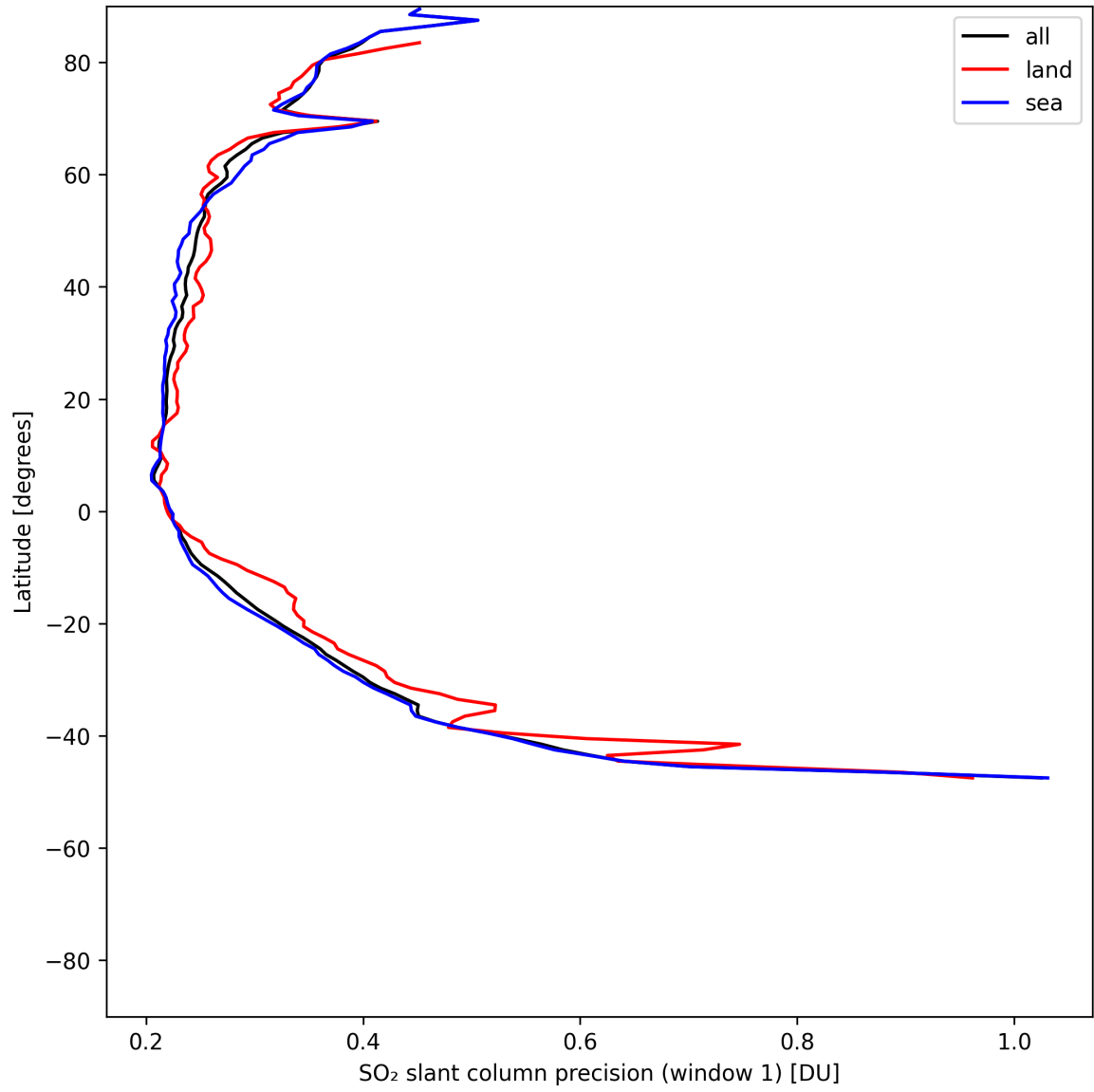


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-07-12 to 2025-07-13.

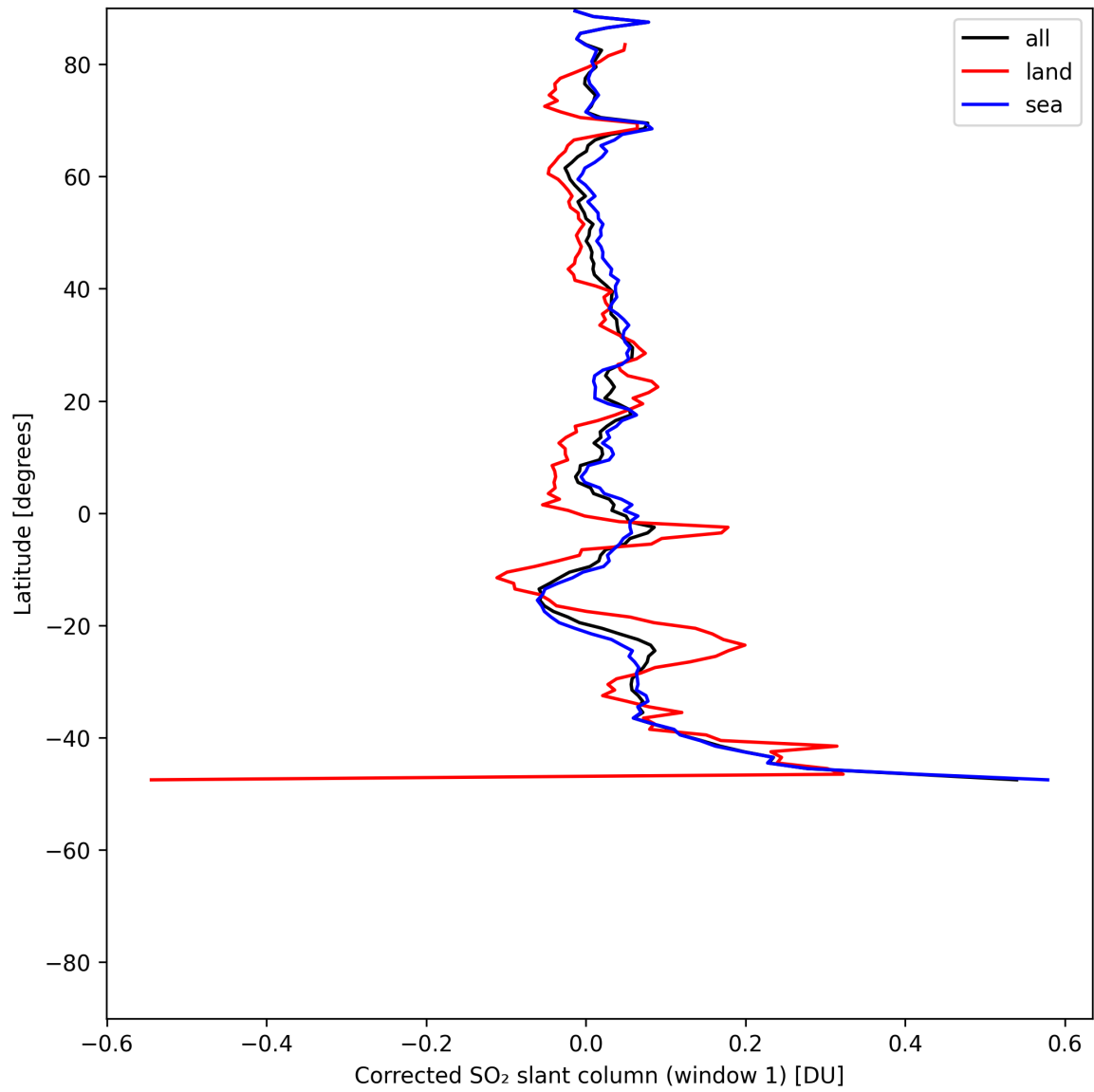


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-07-12 to 2025-07-13.

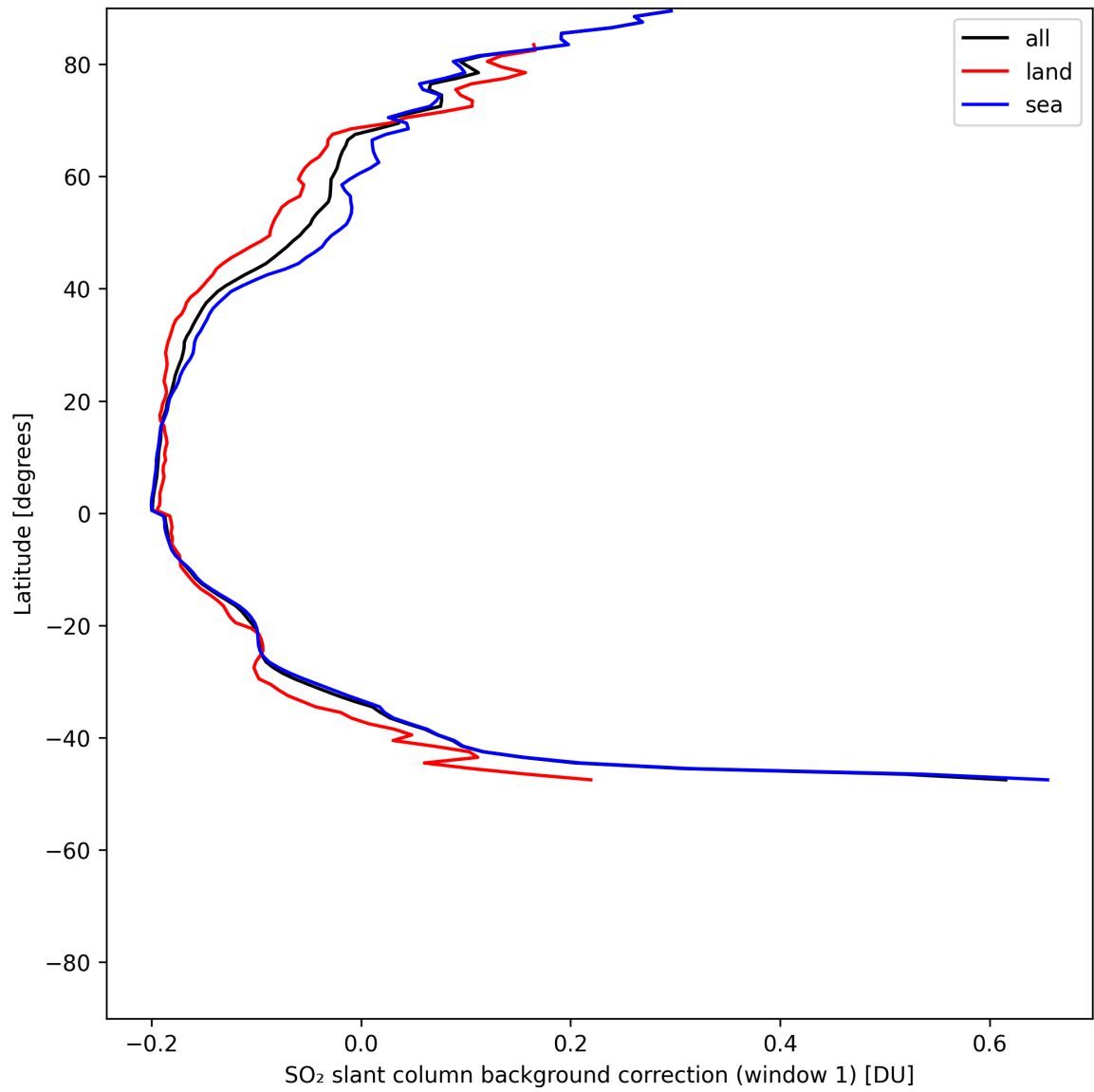


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-07-12 to 2025-07-13.

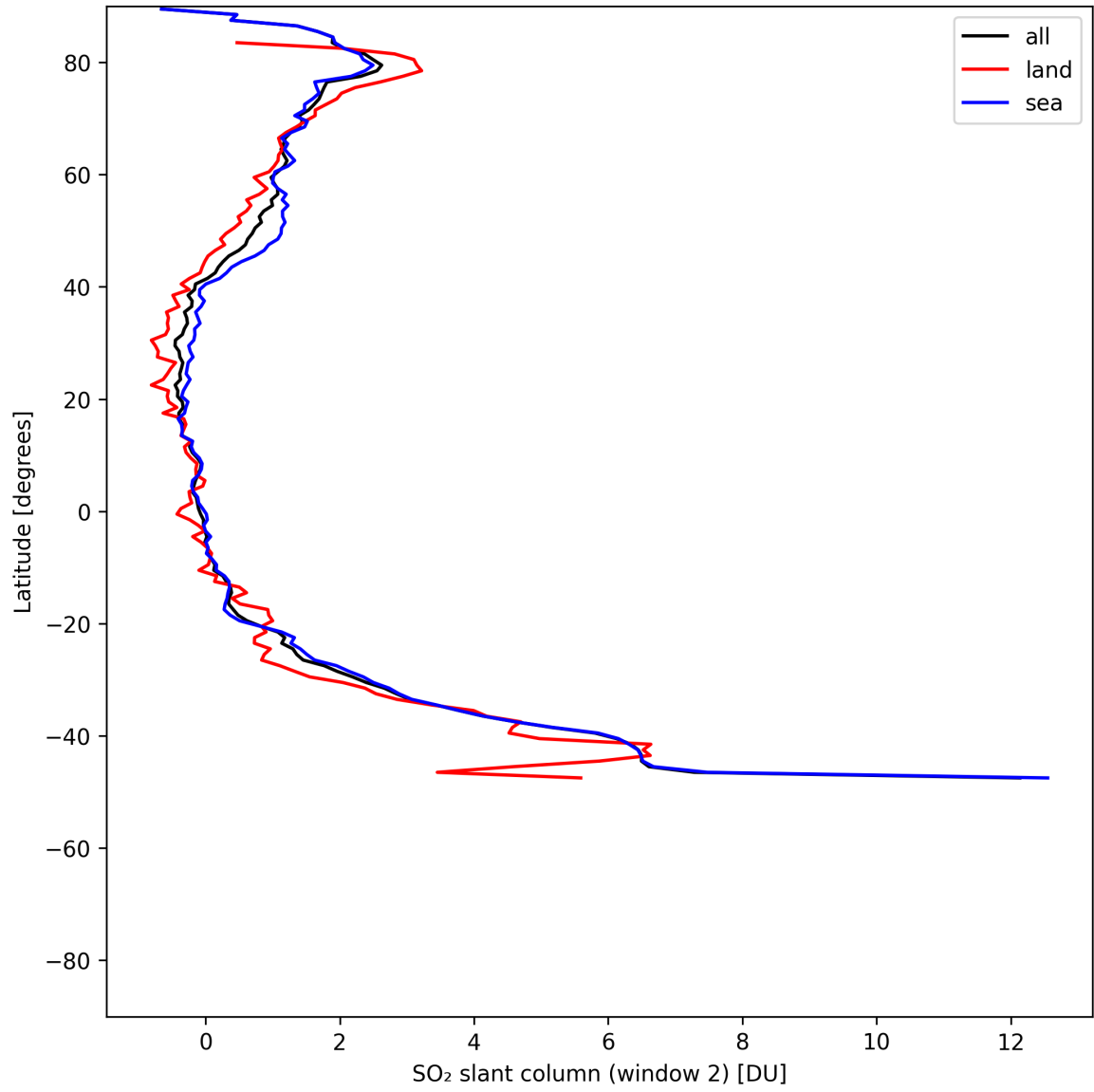


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-07-12 to 2025-07-13.

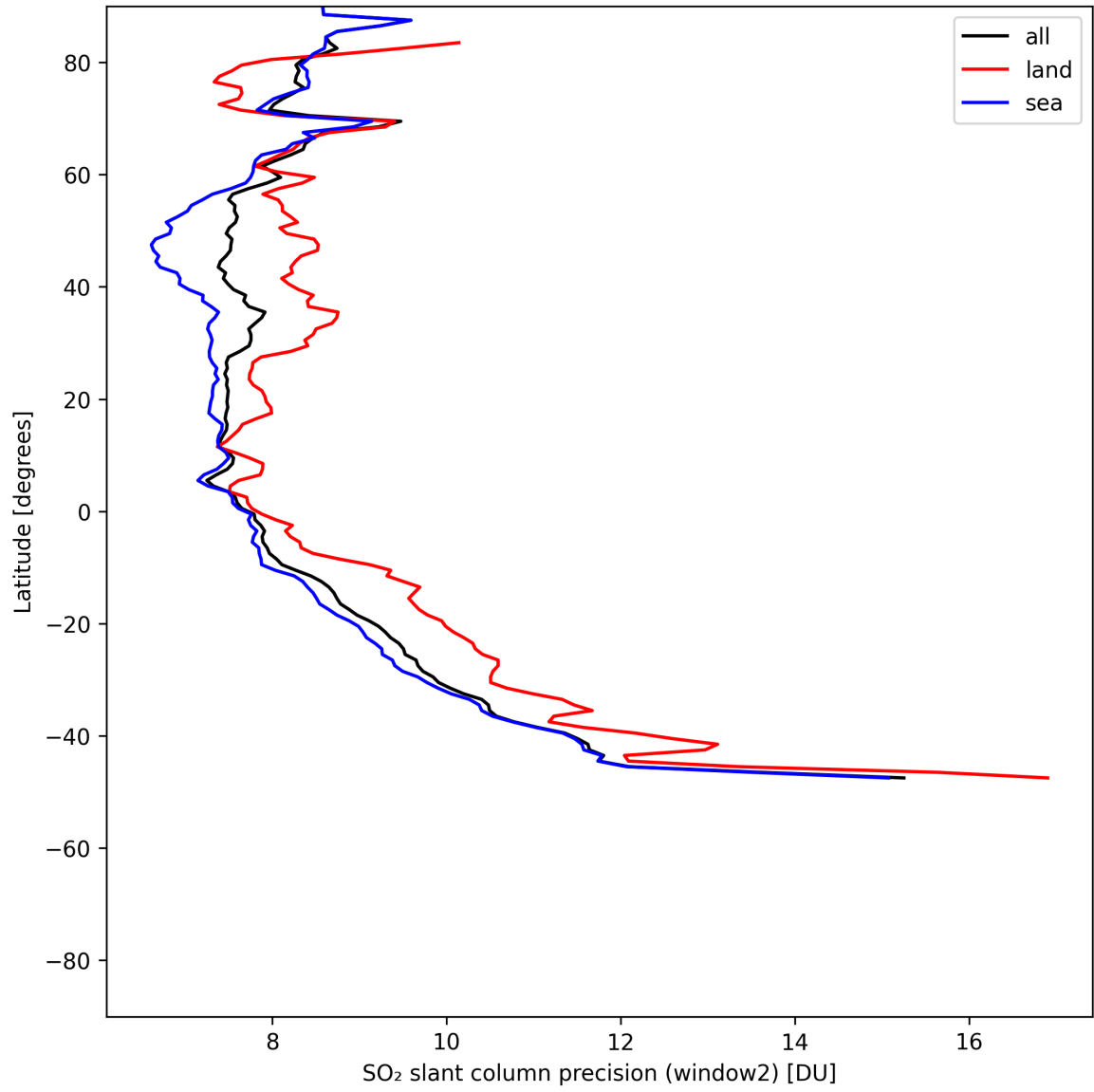


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-07-12 to 2025-07-13.

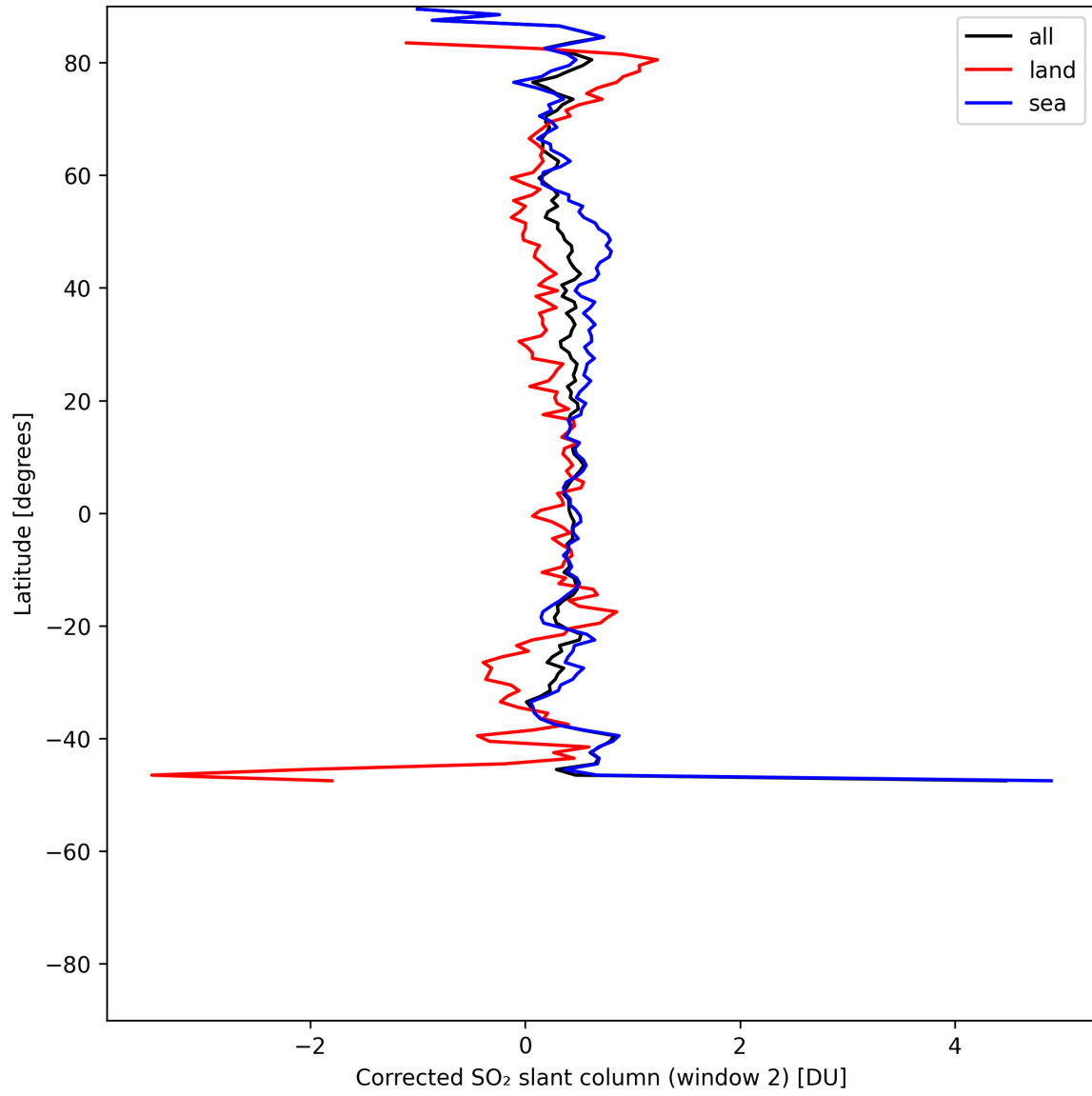


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-07-12 to 2025-07-13.

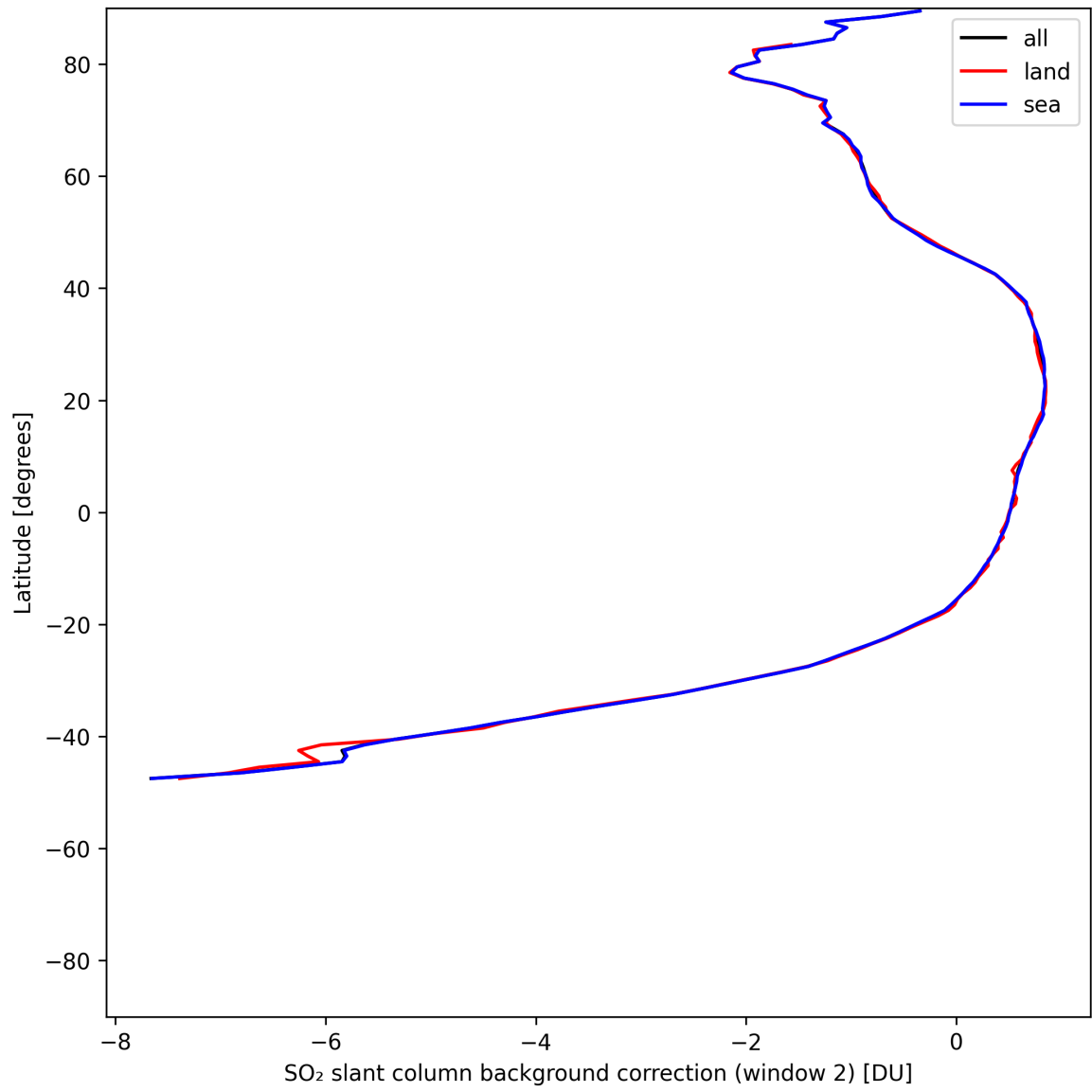


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-07-12 to 2025-07-13.

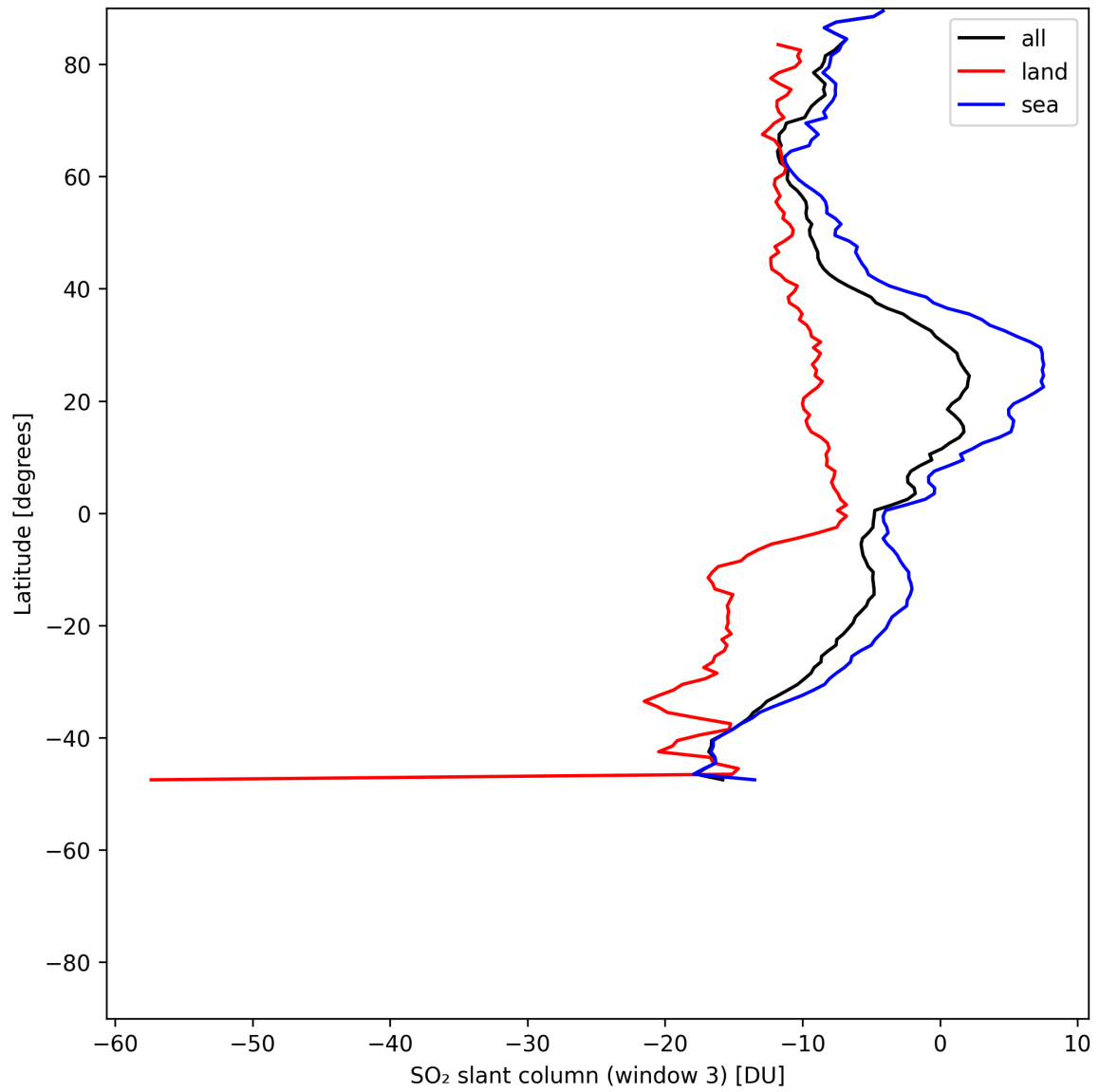


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-07-12 to 2025-07-13.

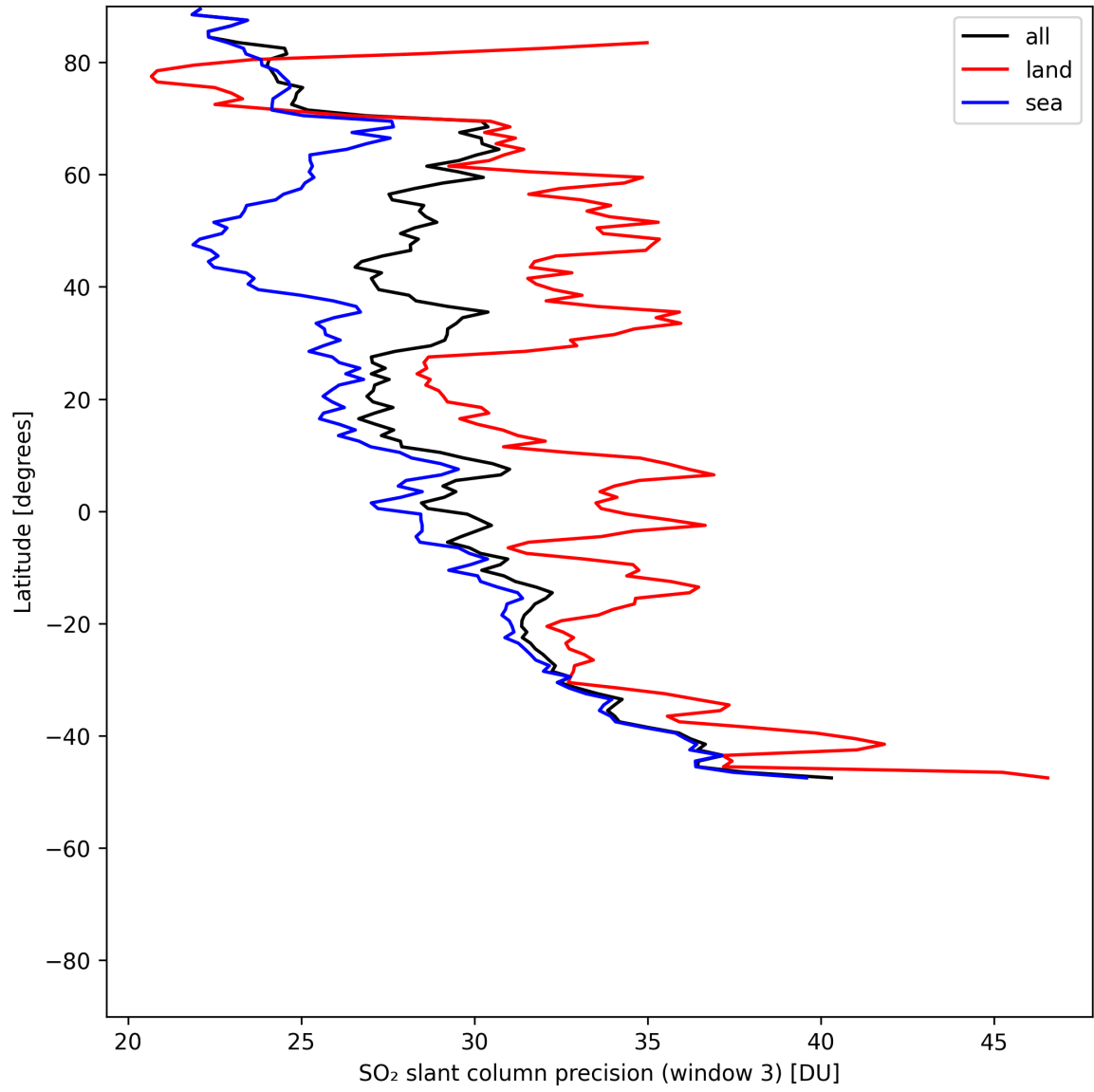


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-07-12 to 2025-07-13.

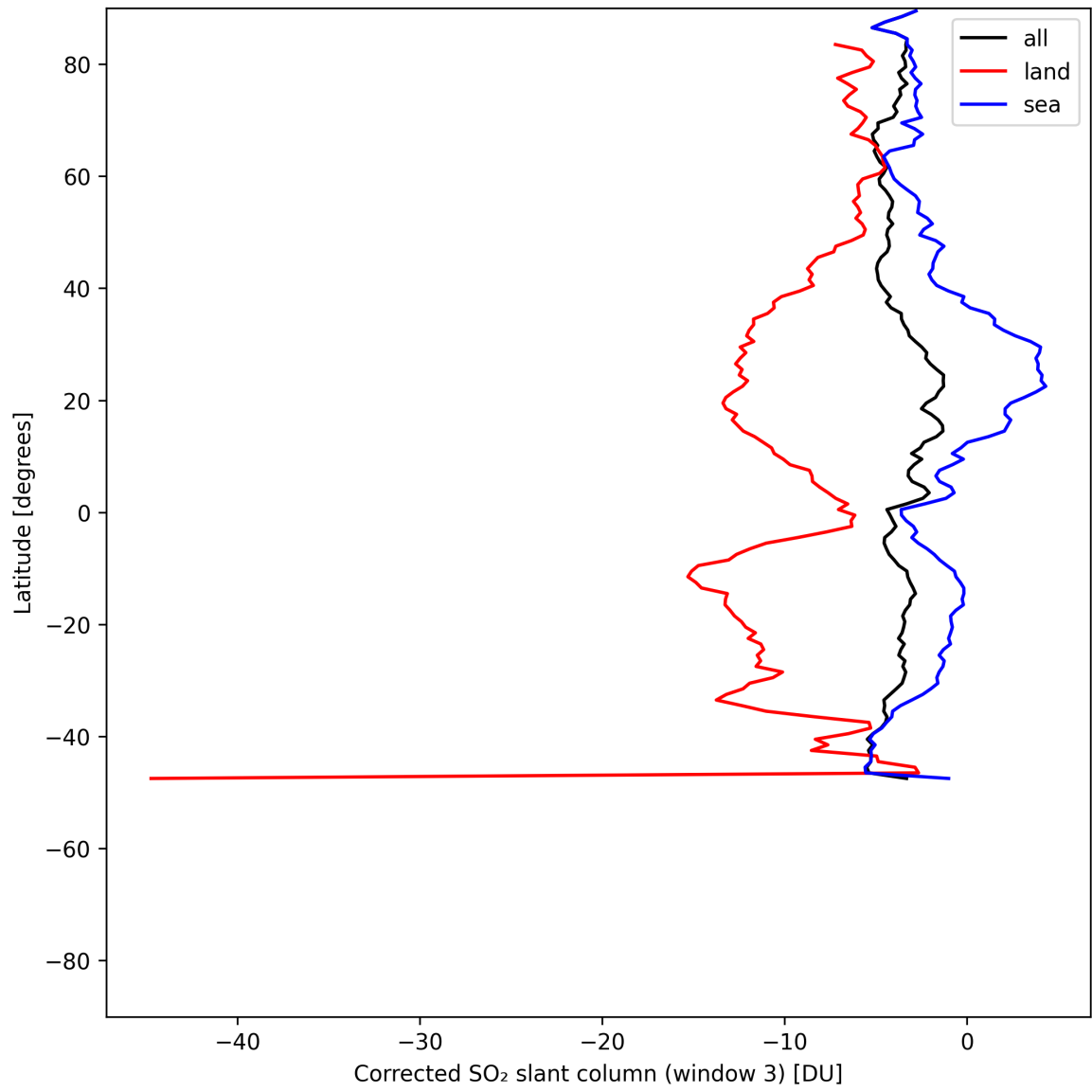


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-07-12 to 2025-07-13.

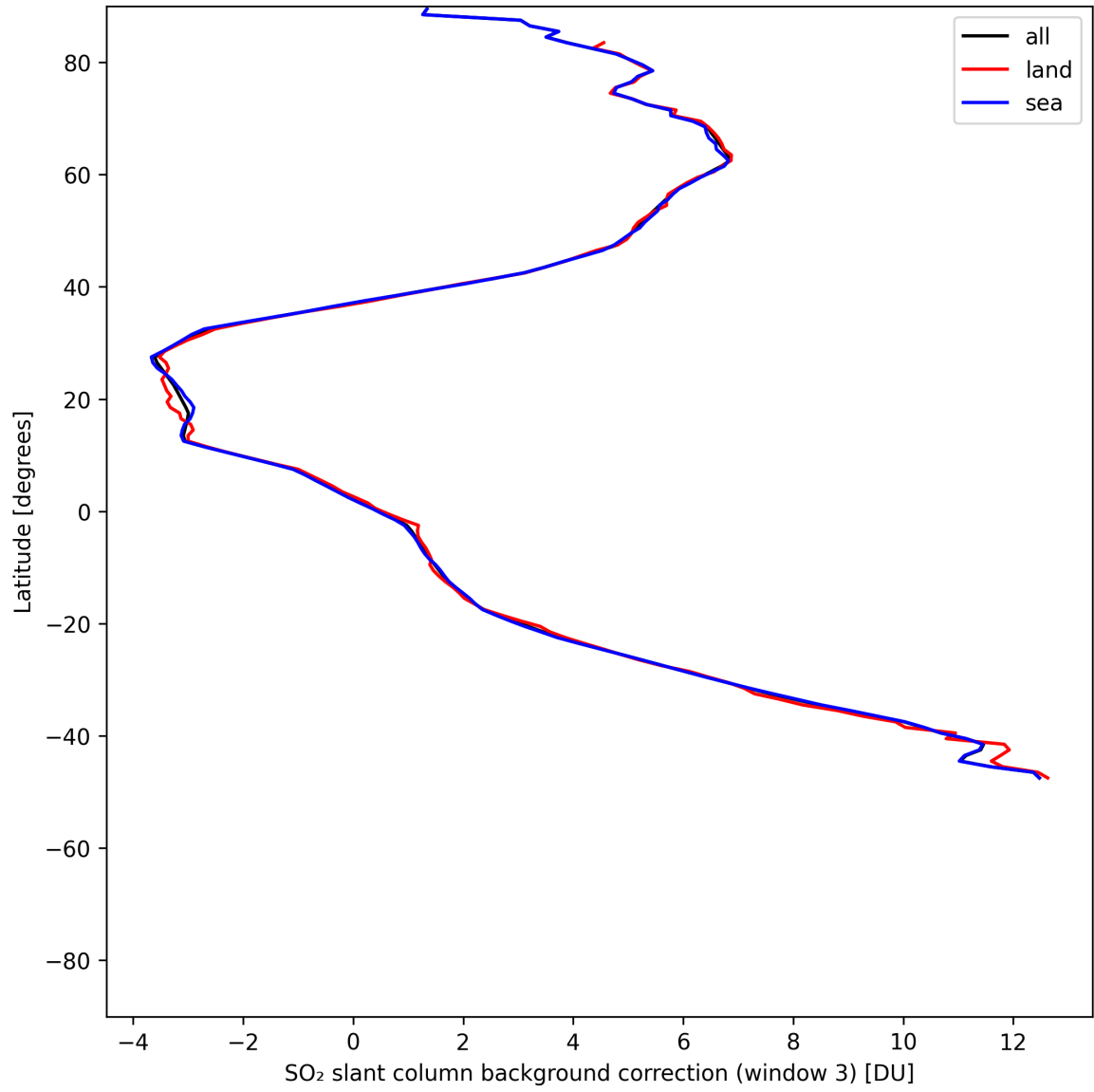


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-07-12 to 2025-07-13.

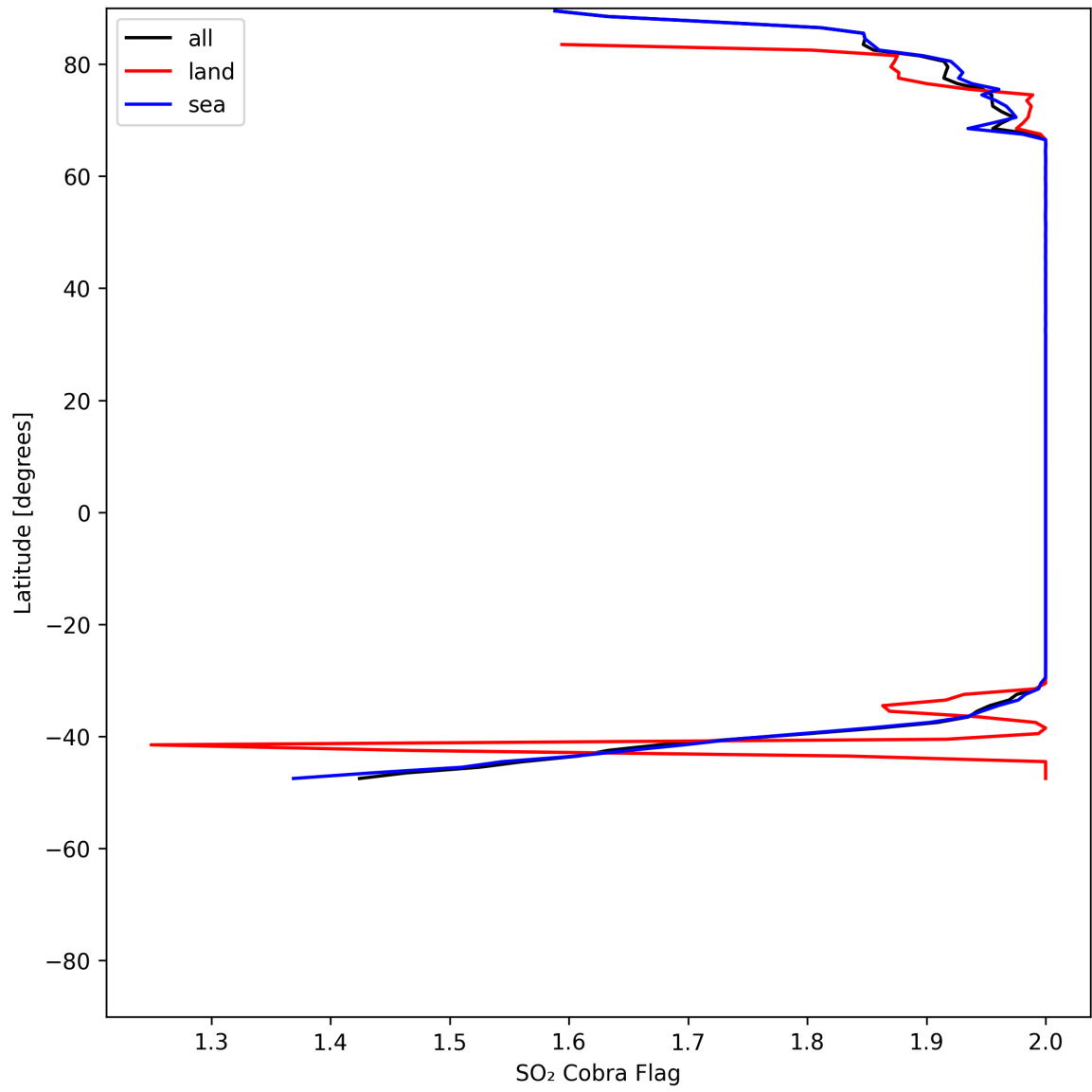


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-07-12 to 2025-07-13.

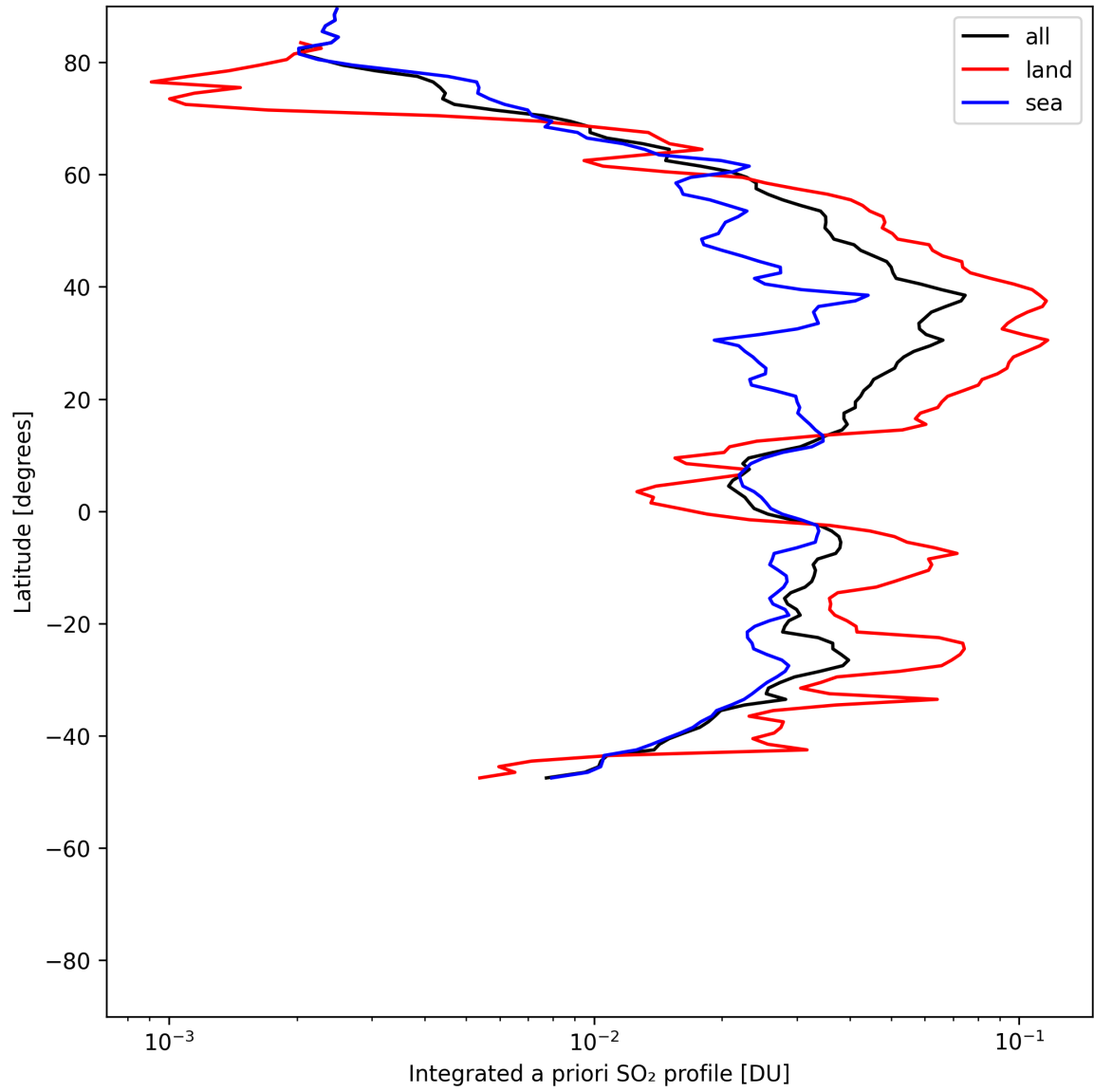


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-07-12 to 2025-07-13.

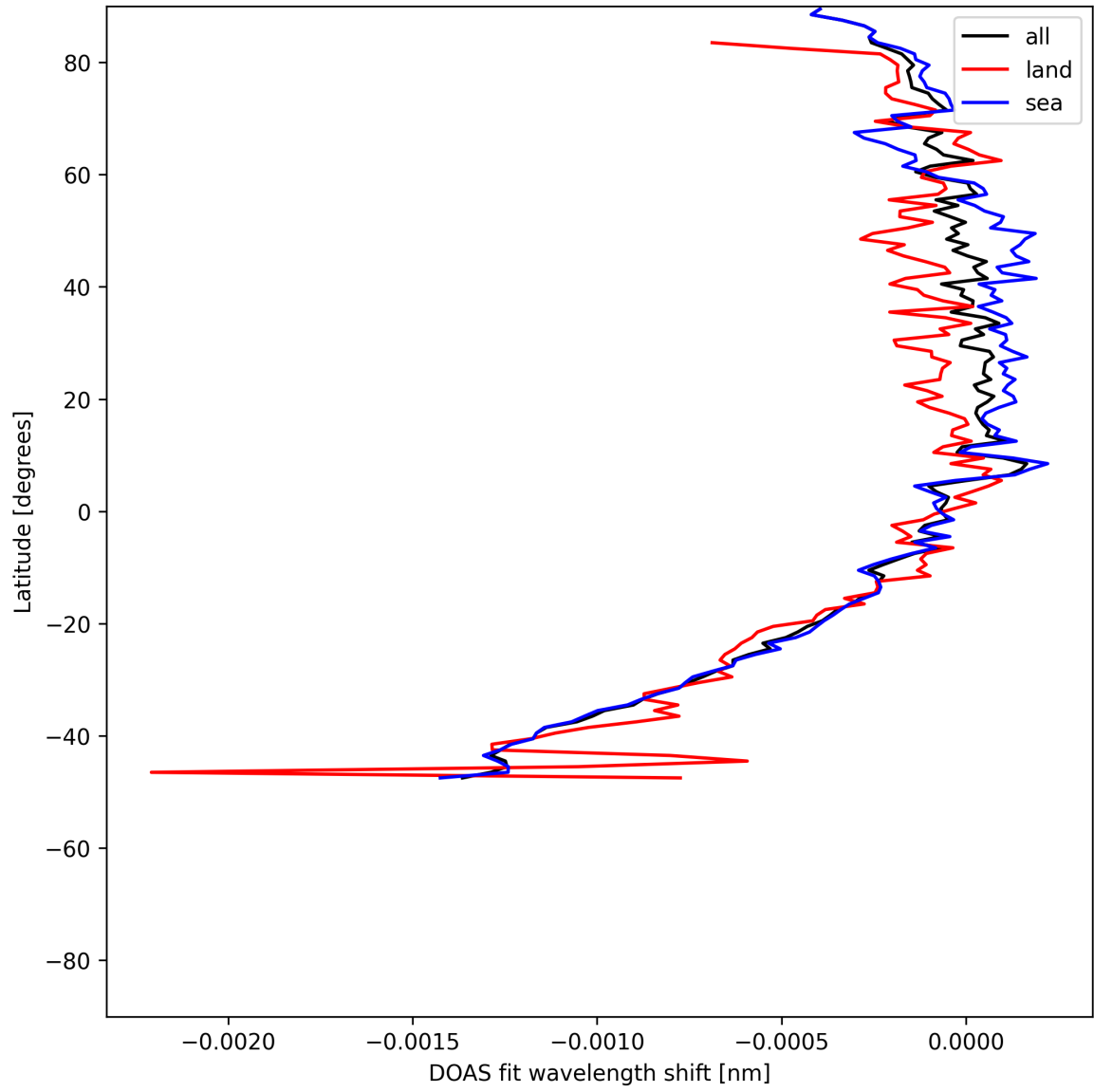


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-07-12 to 2025-07-13.

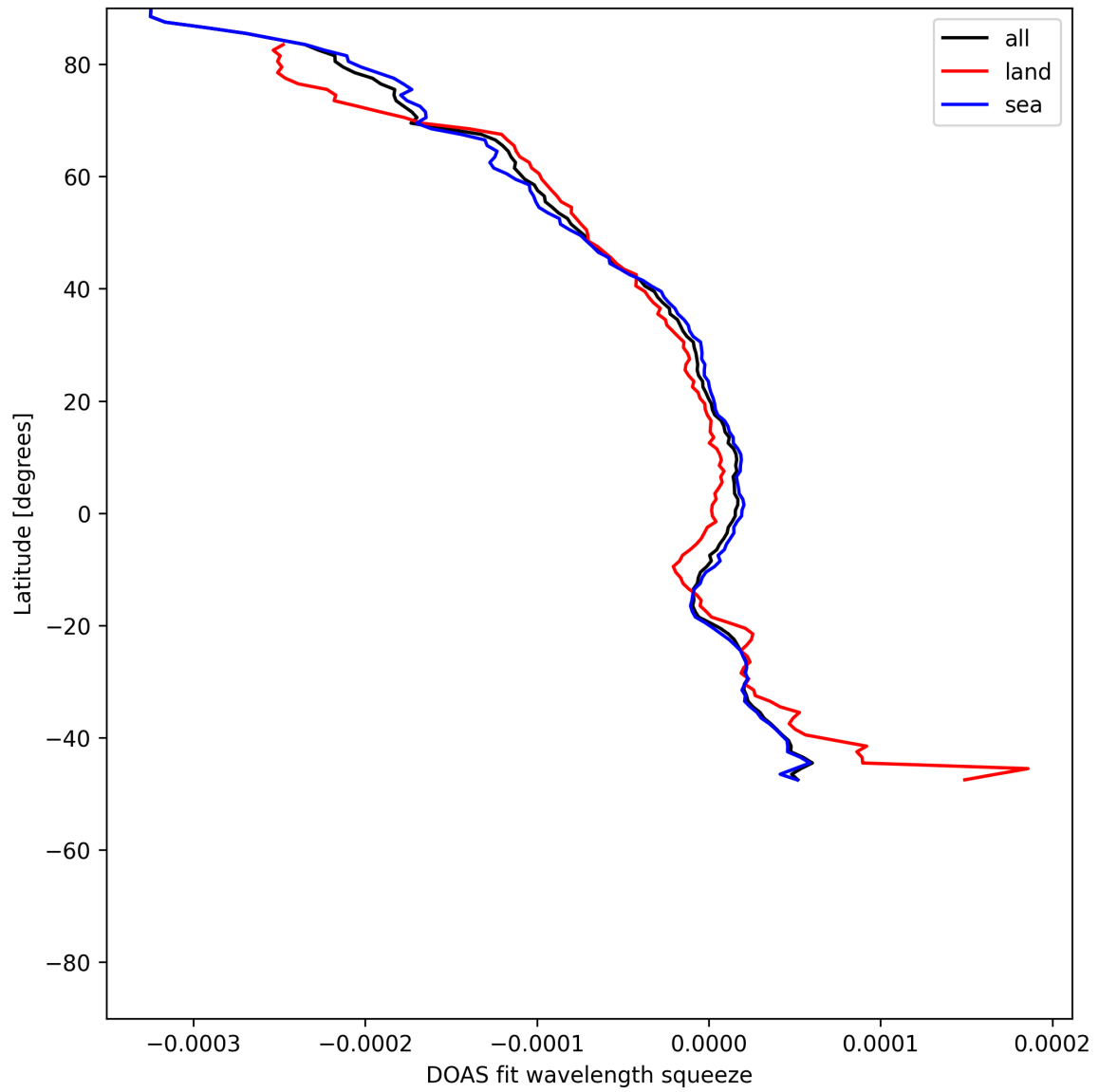


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-07-12 to 2025-07-13.

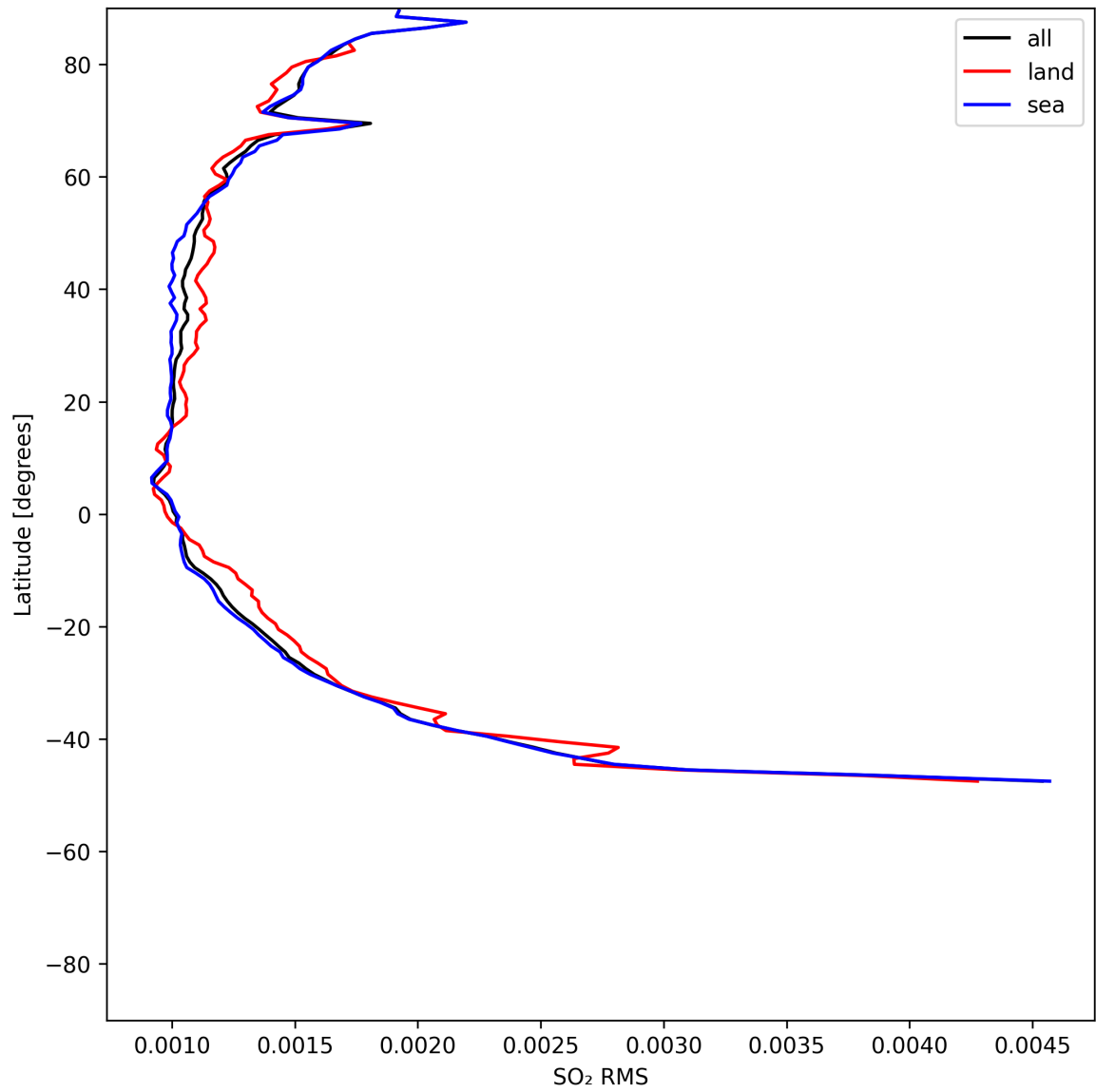


Figure 52: Zonal average of “SO₂ RMS” for 2025-07-12 to 2025-07-13.

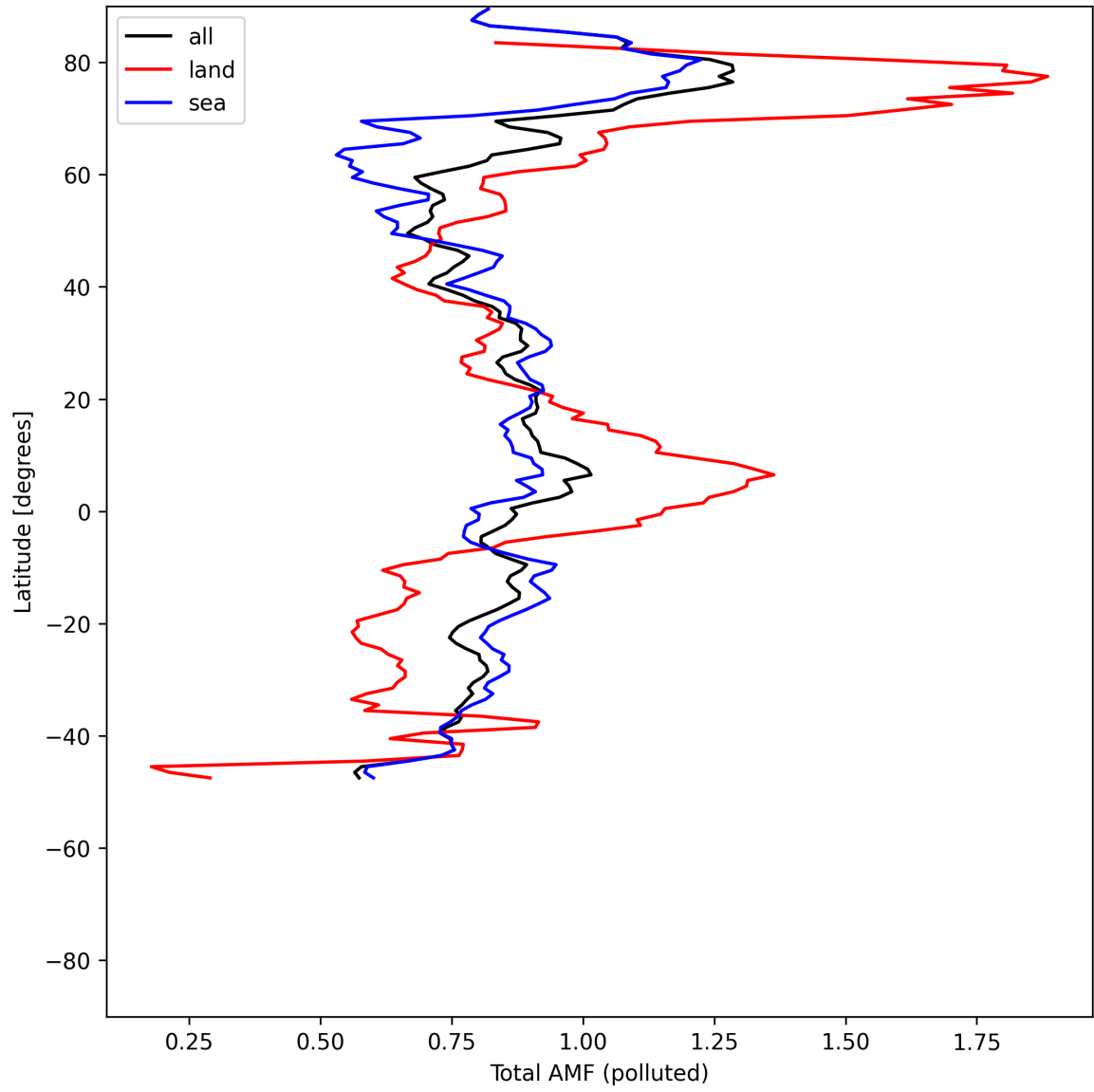


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-07-12 to 2025-07-13.

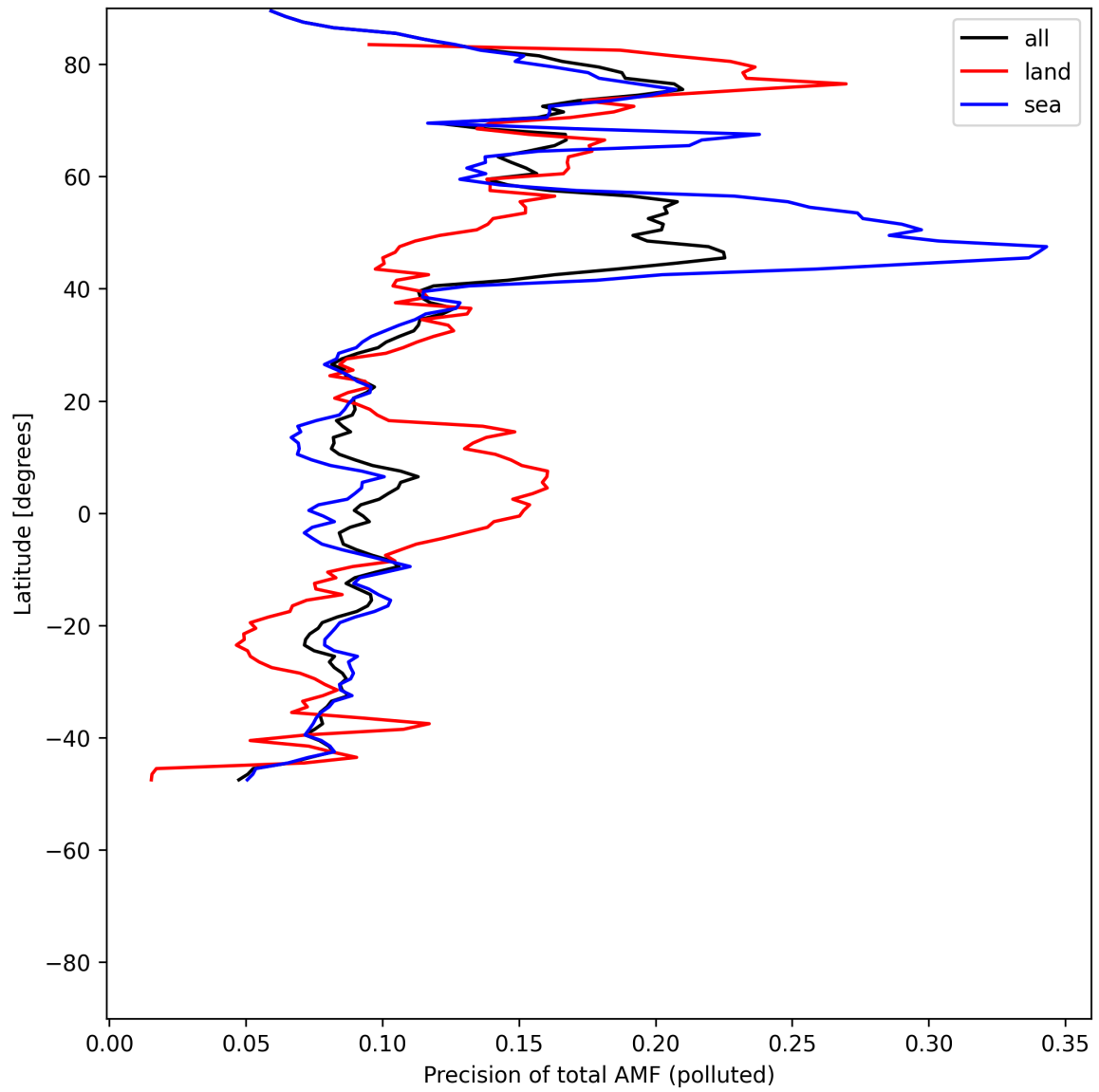


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-07-12 to 2025-07-13.

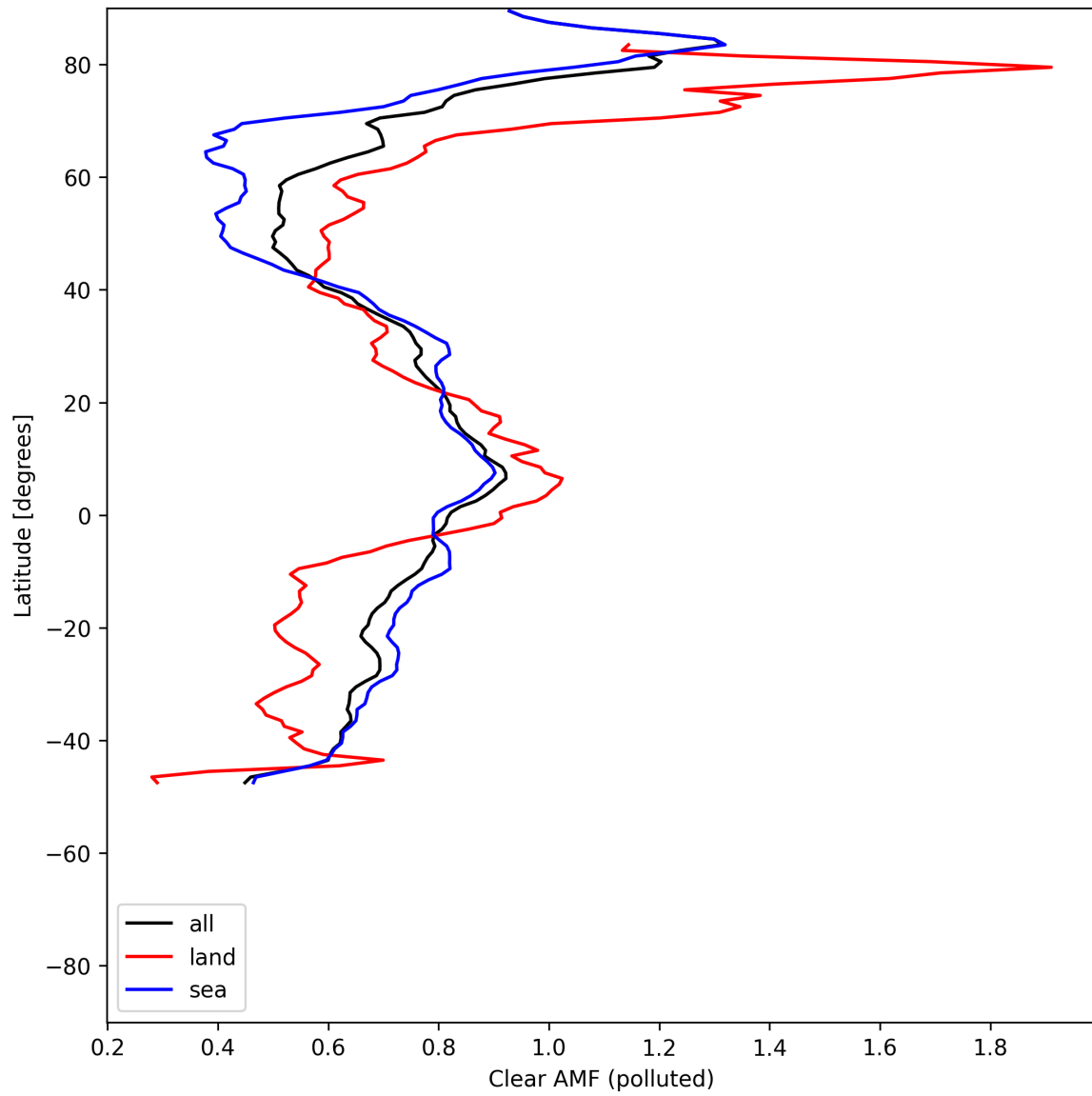


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-07-12 to 2025-07-13.

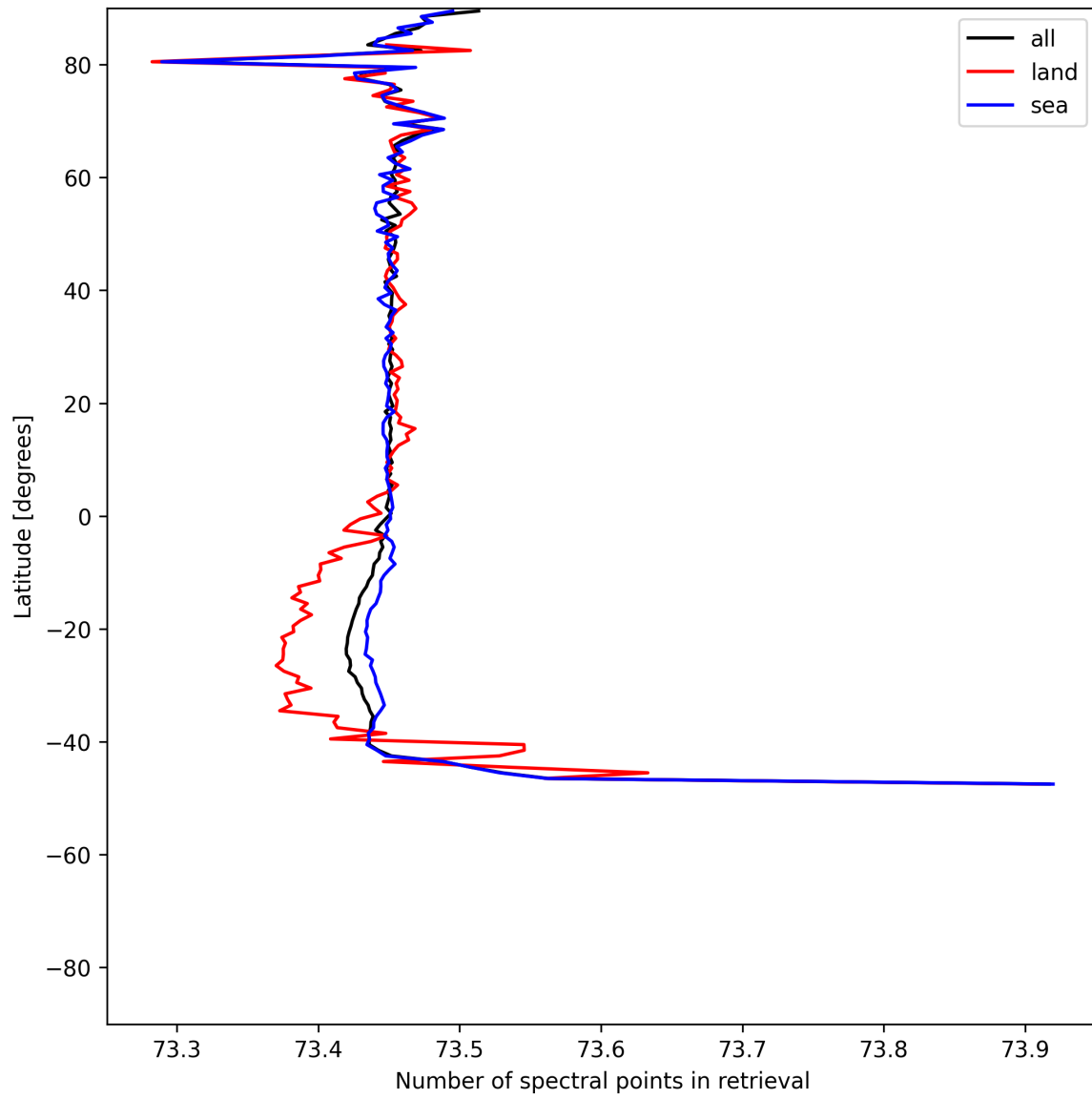


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-07-12 to 2025-07-13.

8 Histograms

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

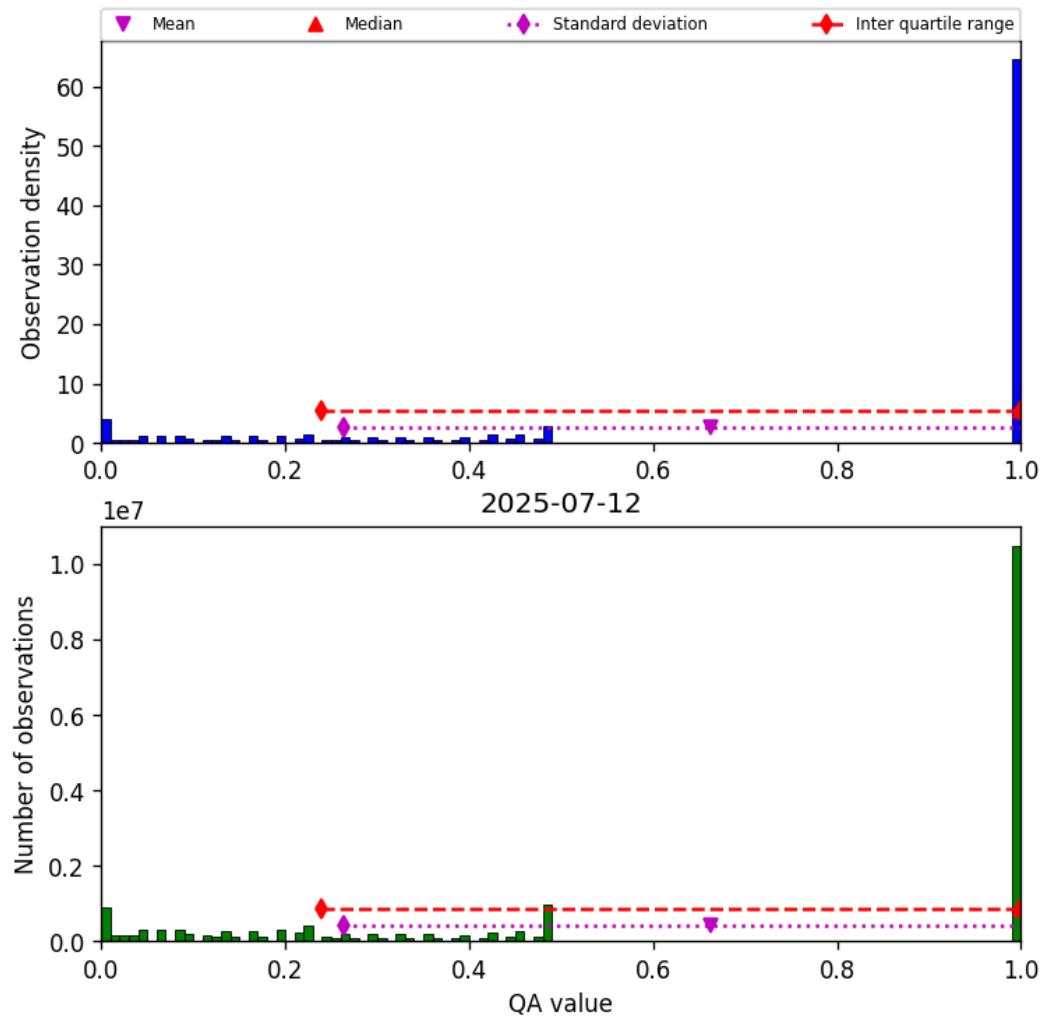


Figure 57: Histogram of “QA value” for 2025-07-12 to 2025-07-13

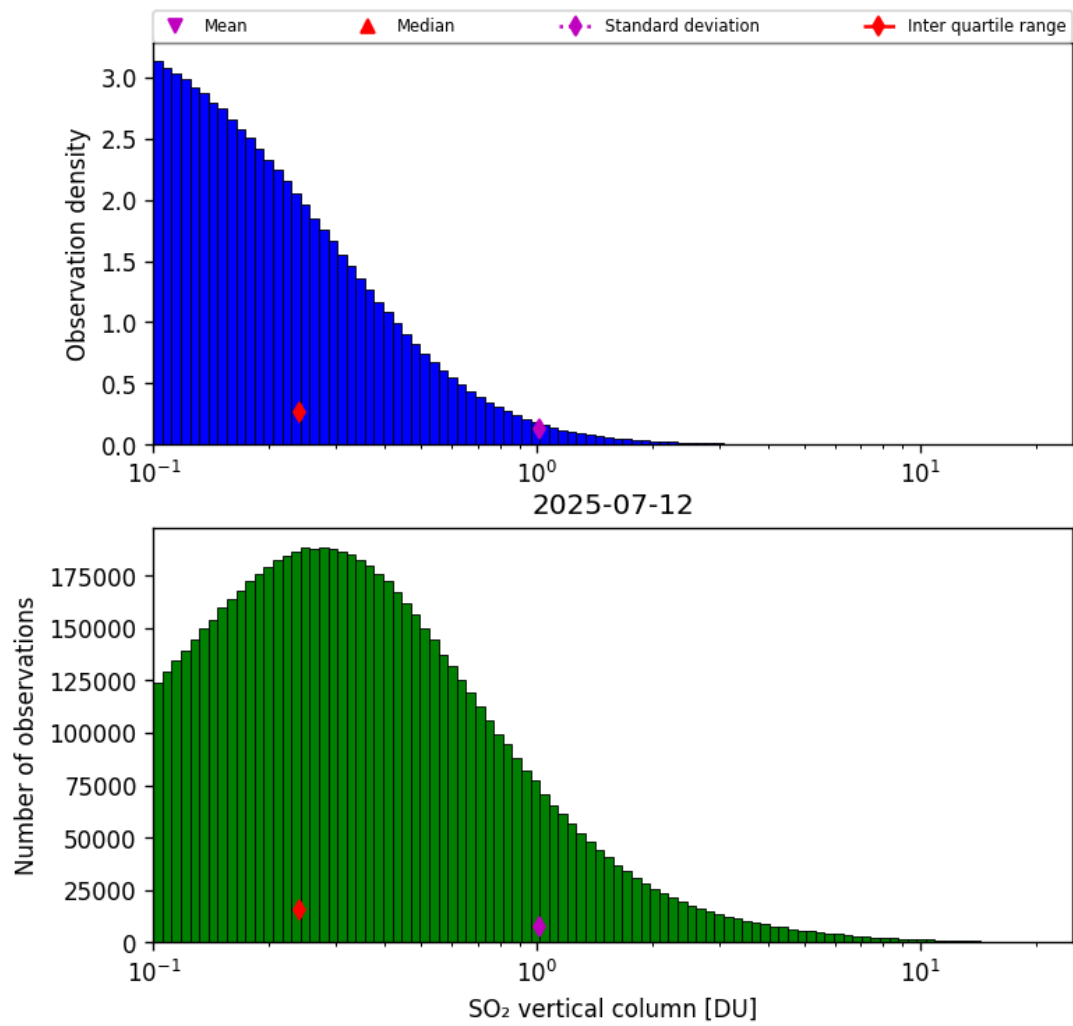


Figure 58: Histogram of “SO₂ vertical column” for 2025-07-12 to 2025-07-13

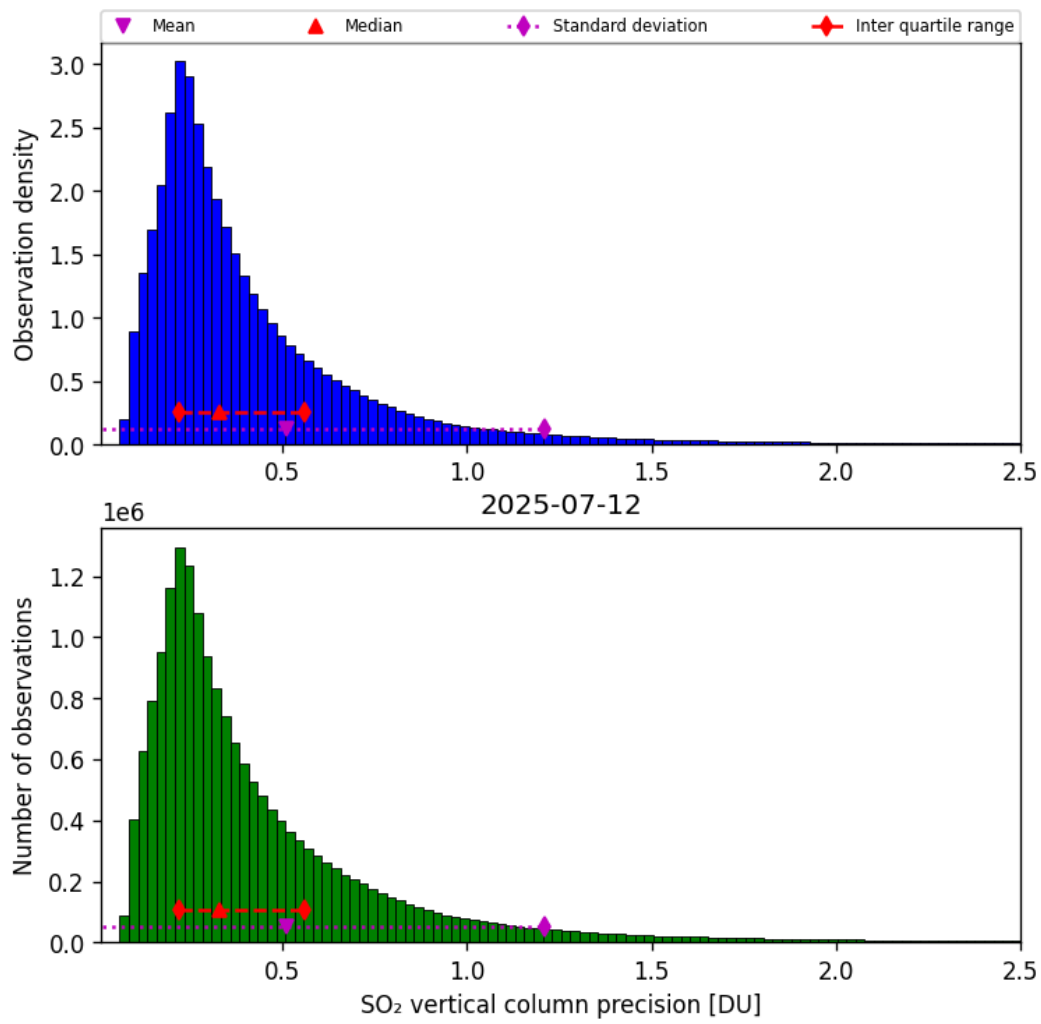


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-07-12 to 2025-07-13

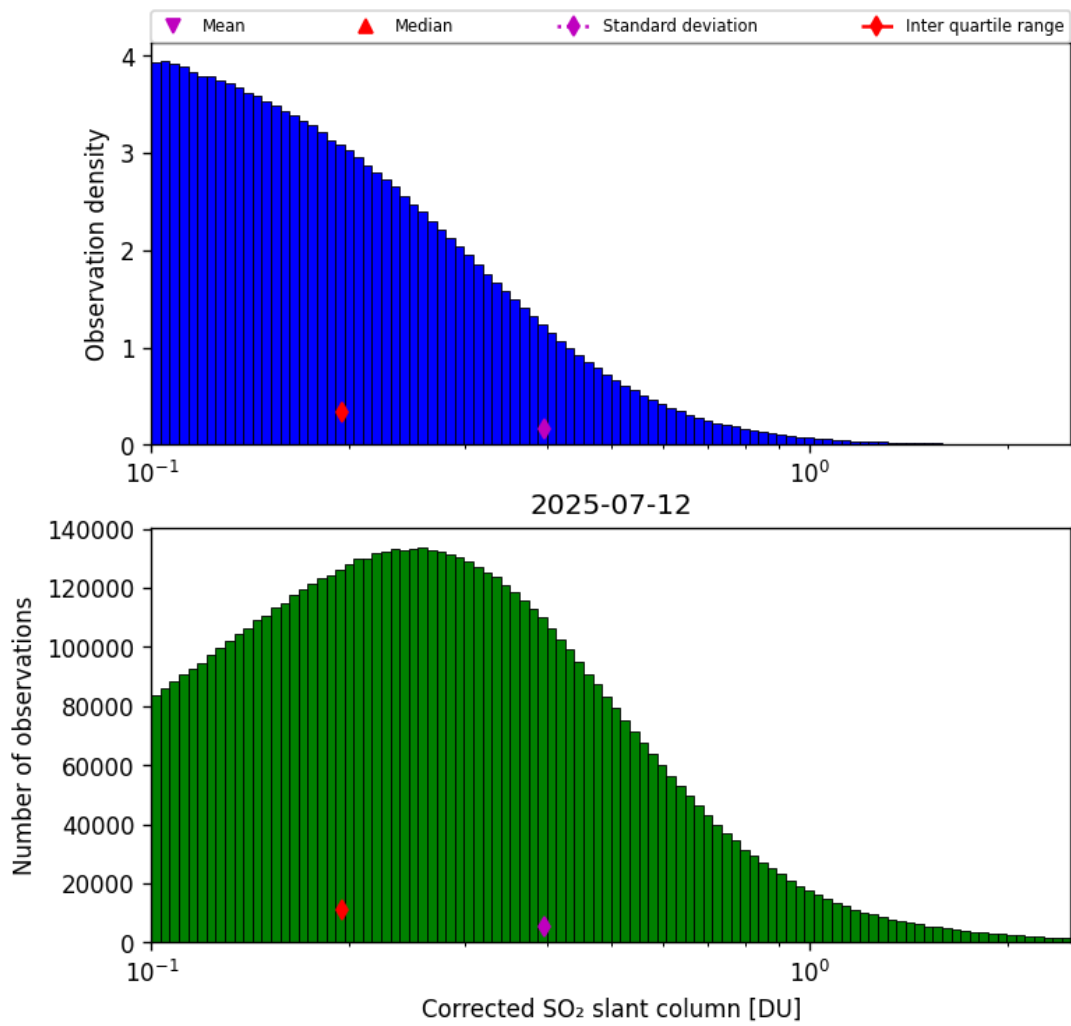


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-07-12 to 2025-07-13

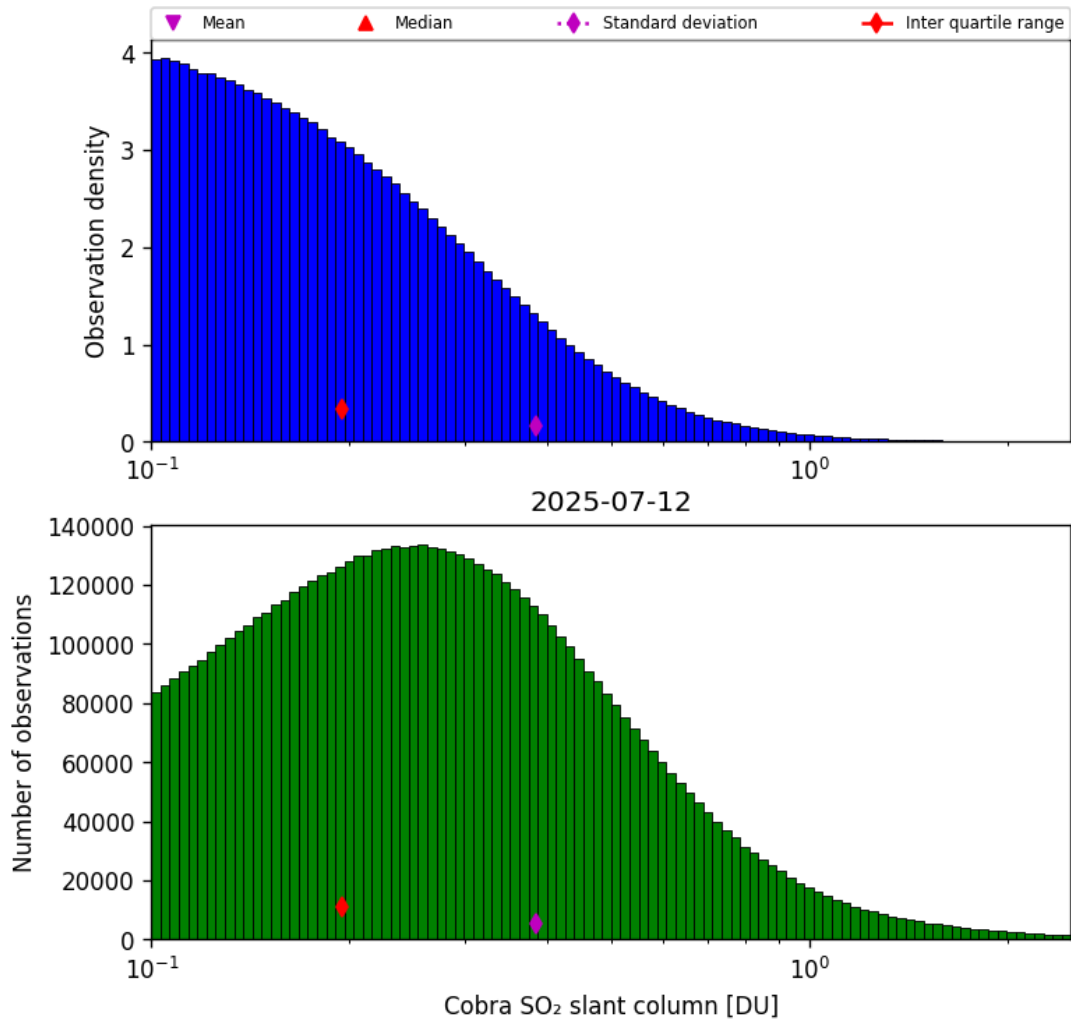


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-07-12 to 2025-07-13

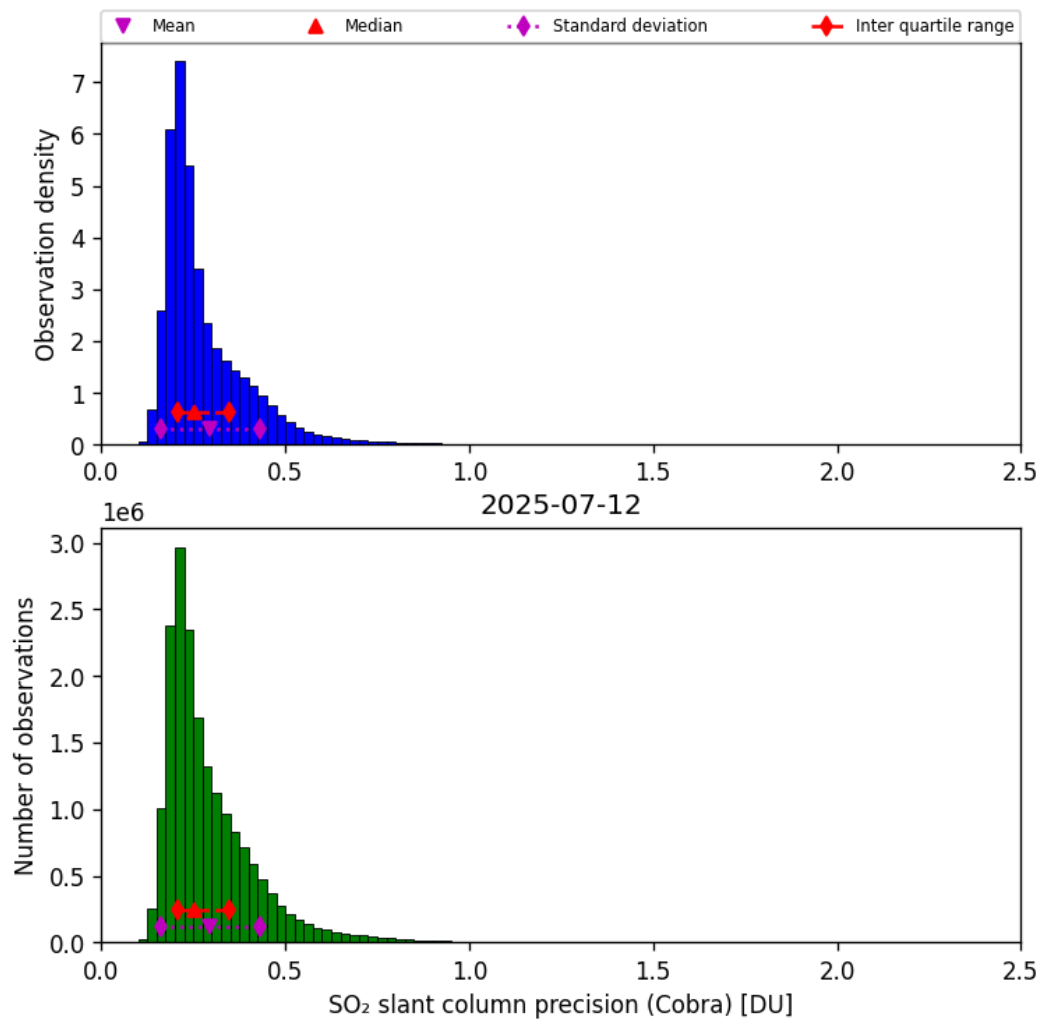


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-07-12 to 2025-07-13

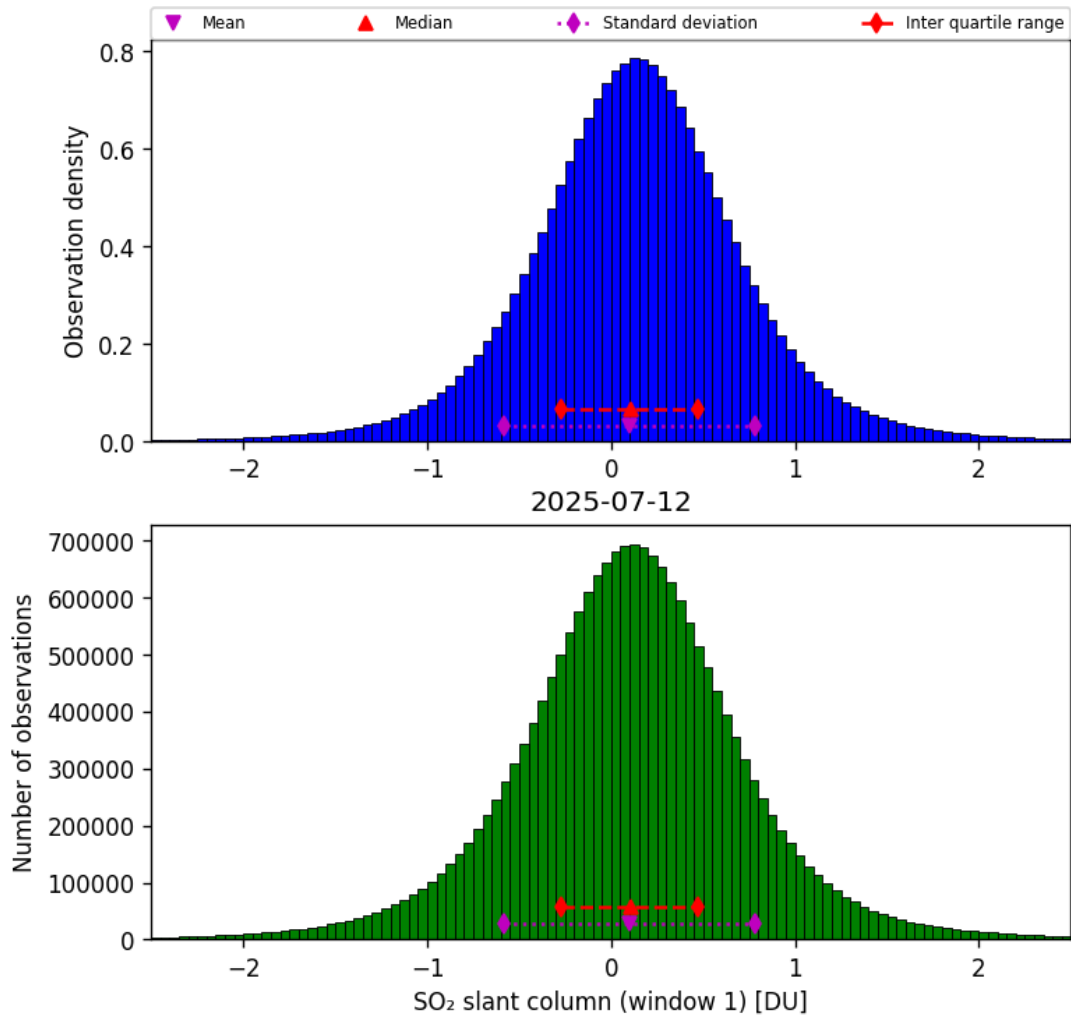


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-07-12 to 2025-07-13

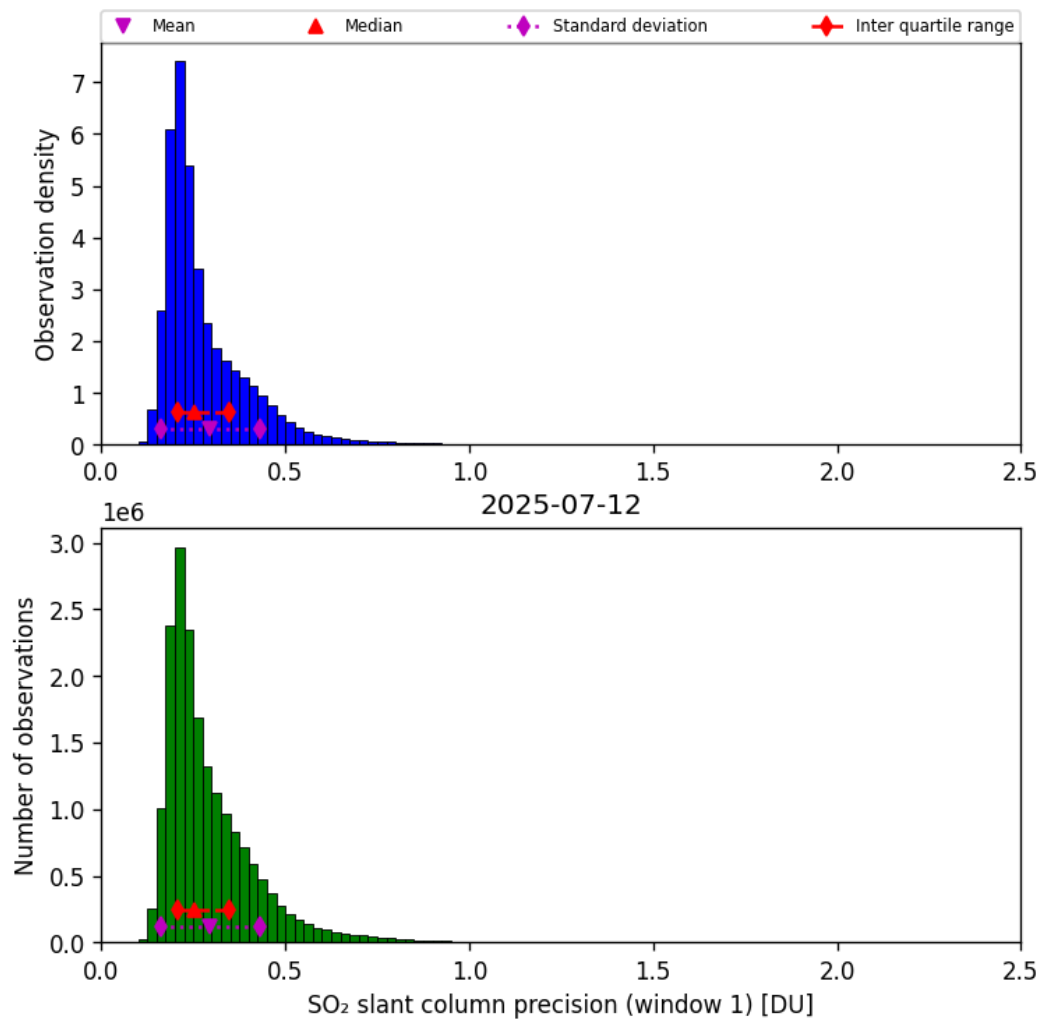


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-07-12 to 2025-07-13

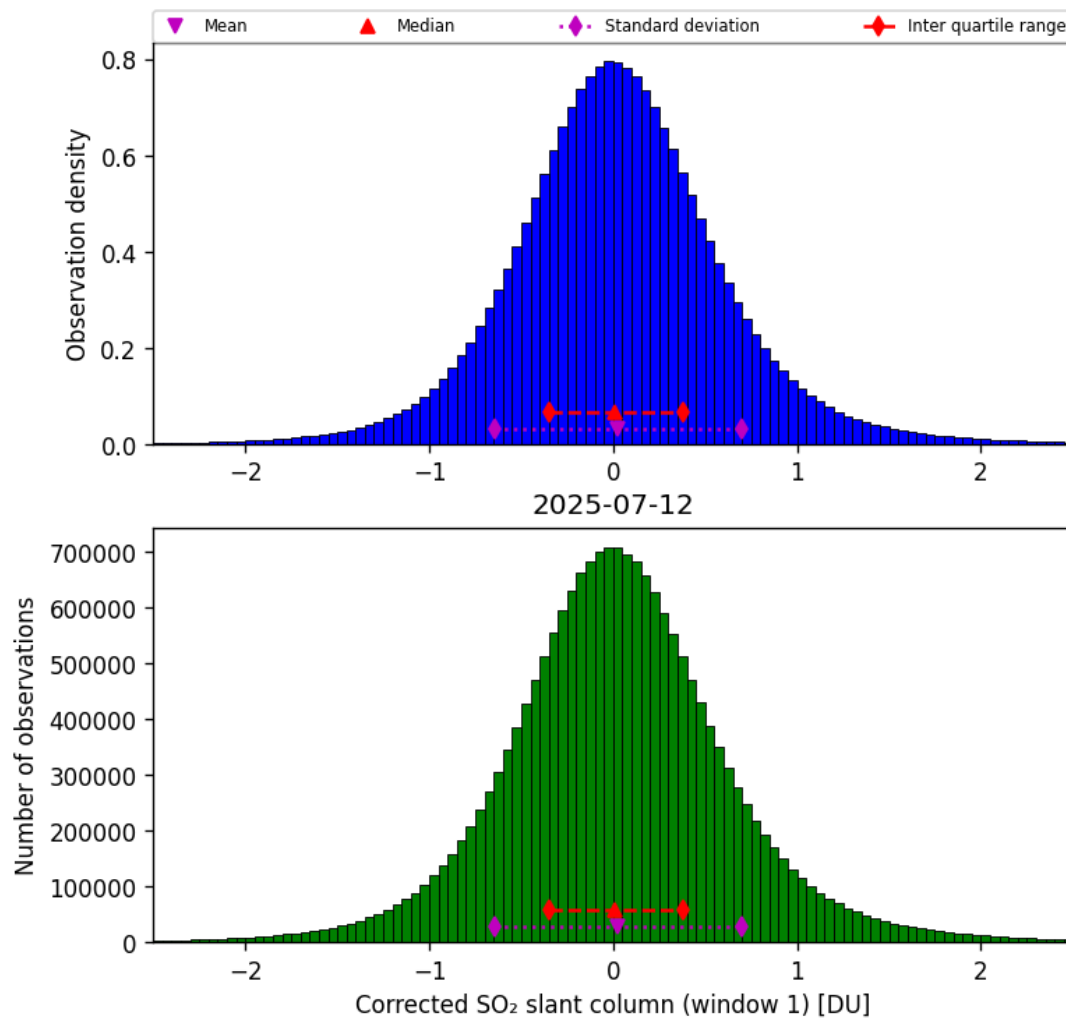


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-07-12 to 2025-07-13

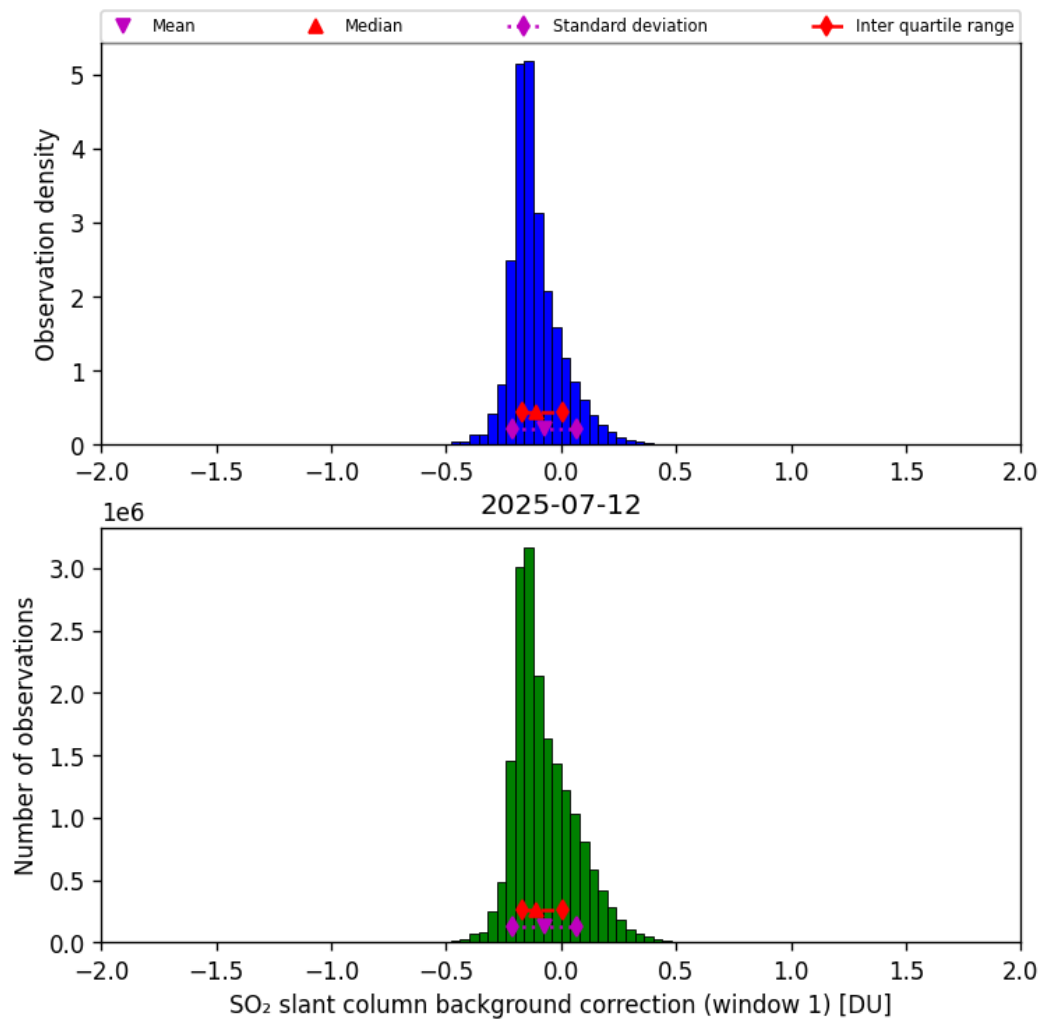


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-07-12 to 2025-07-13

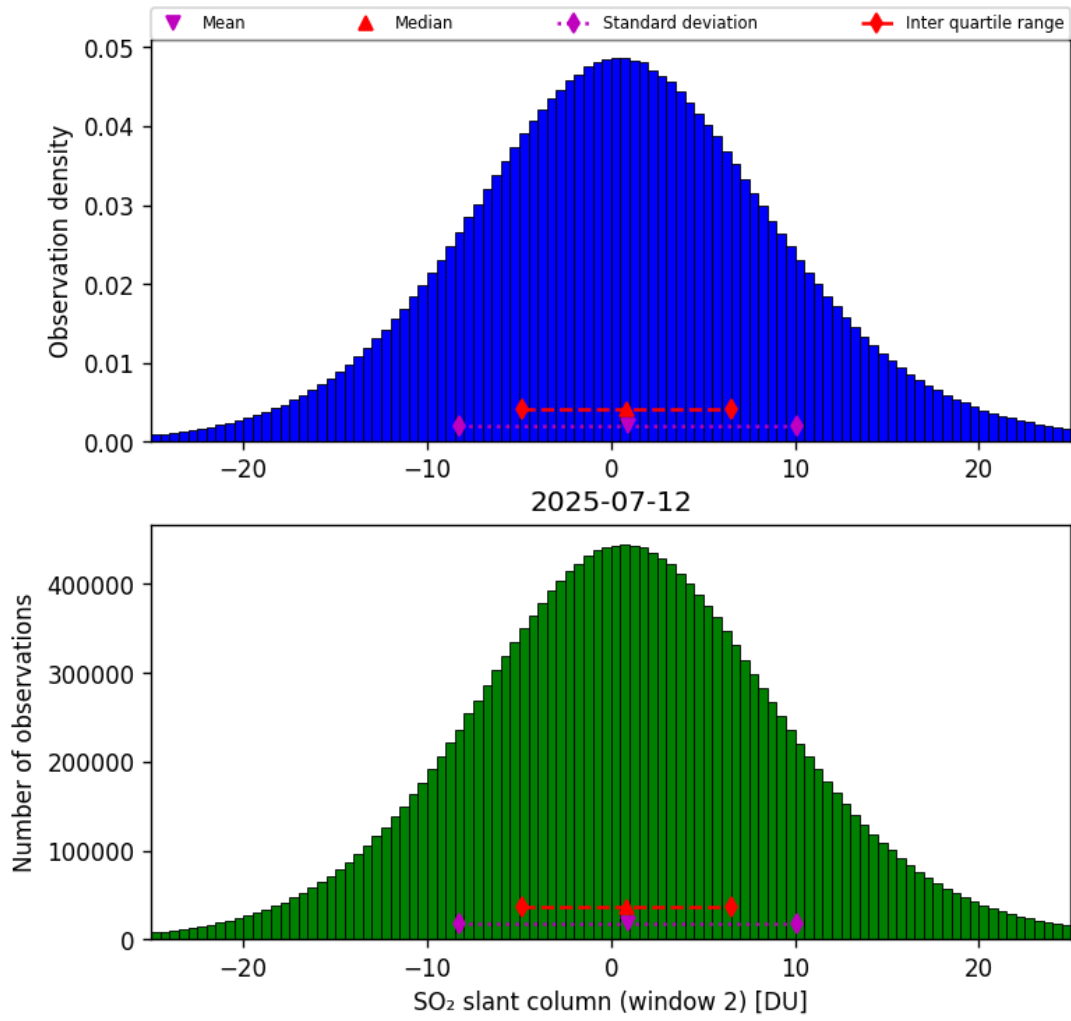


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-07-12 to 2025-07-13

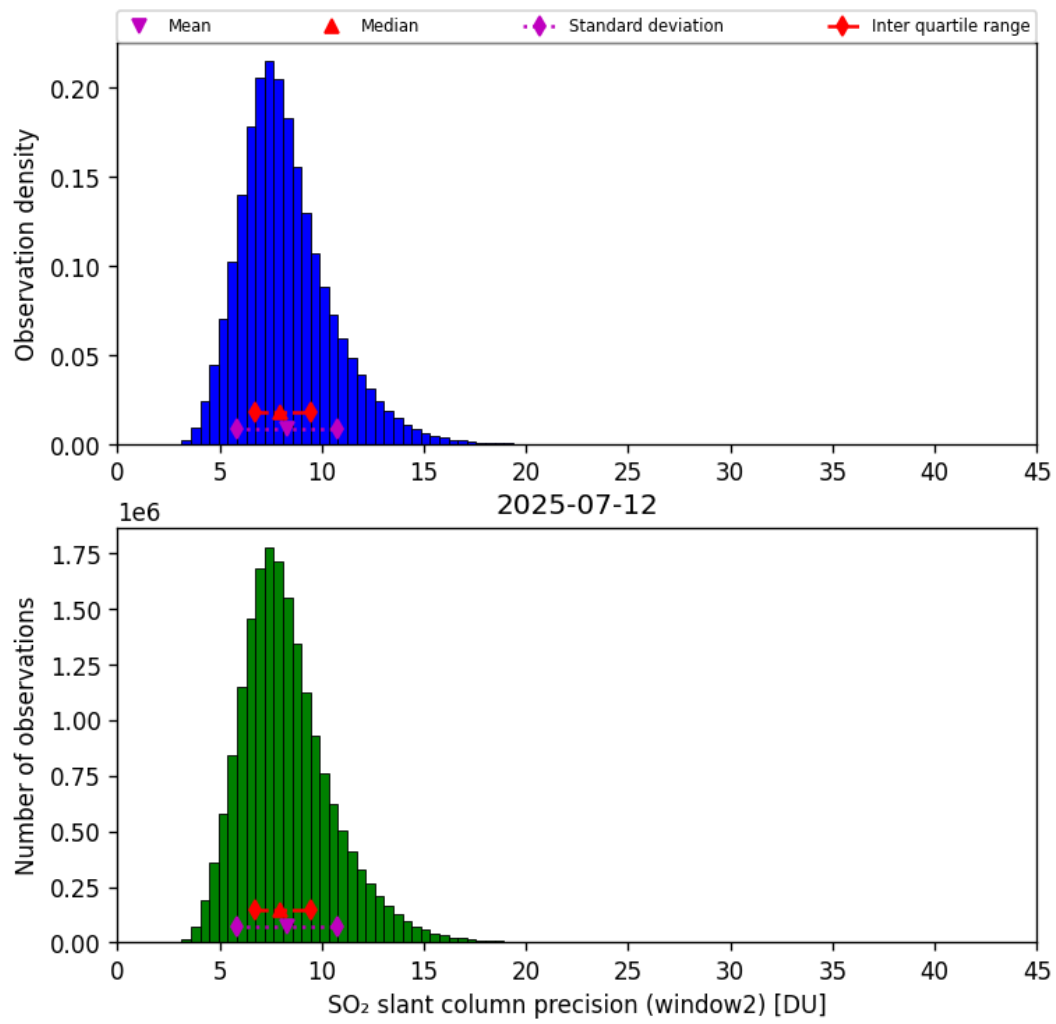


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-07-12 to 2025-07-13

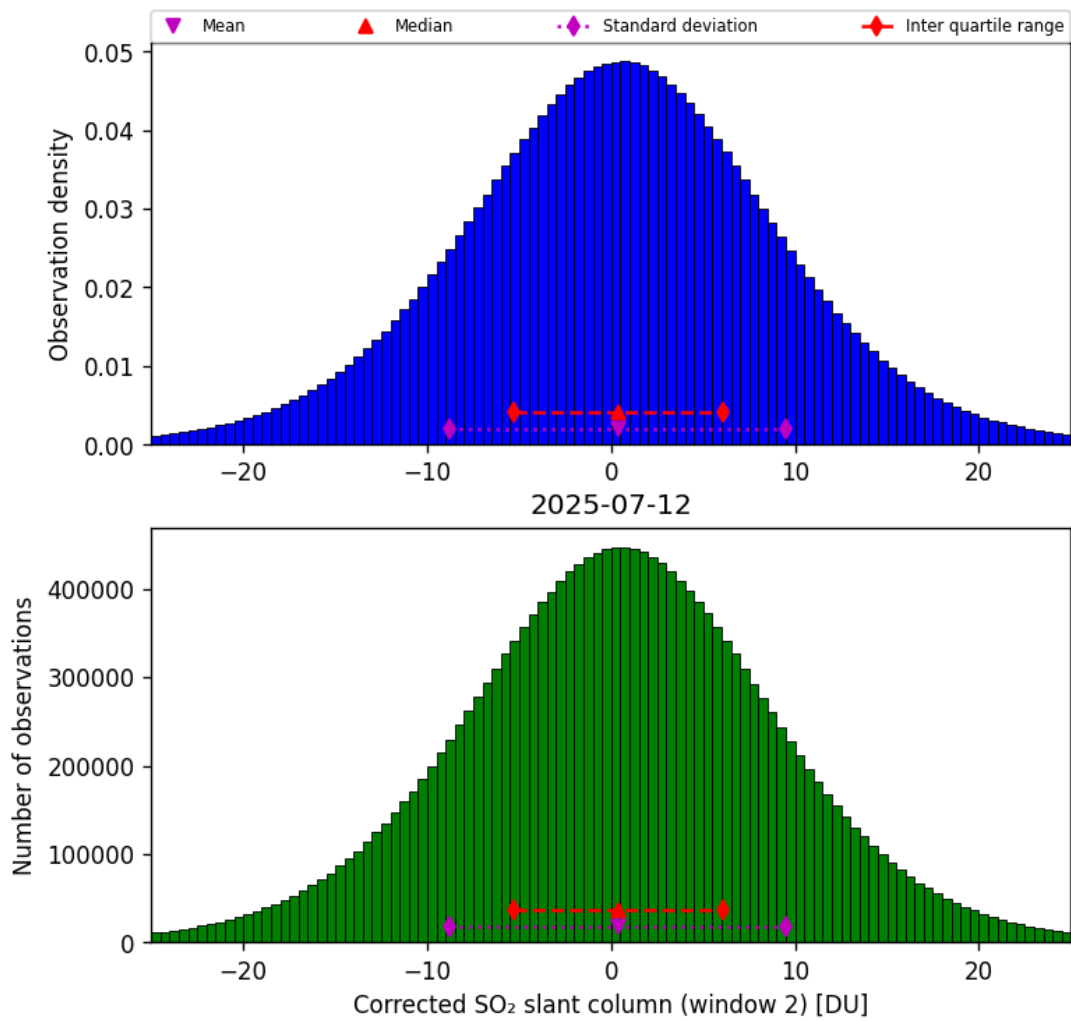


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-07-12 to 2025-07-13

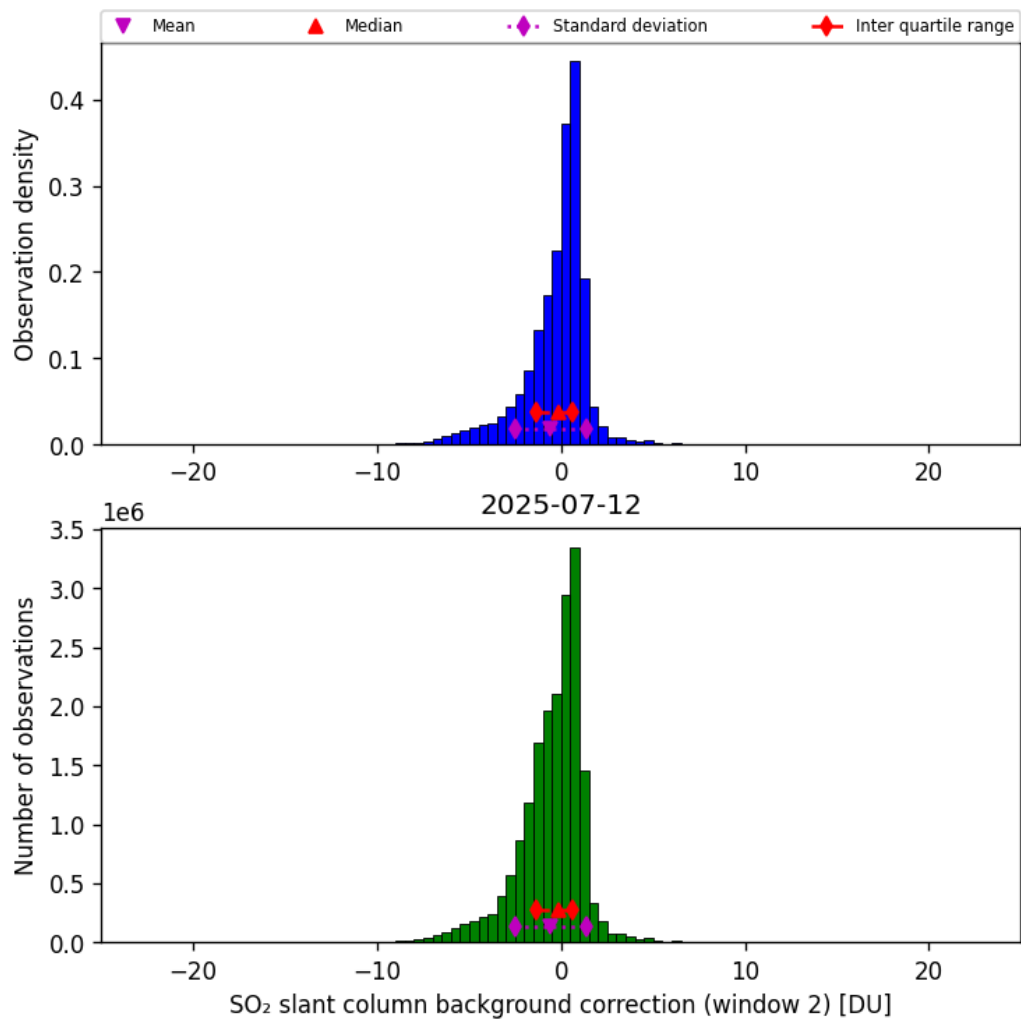


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-07-12 to 2025-07-13

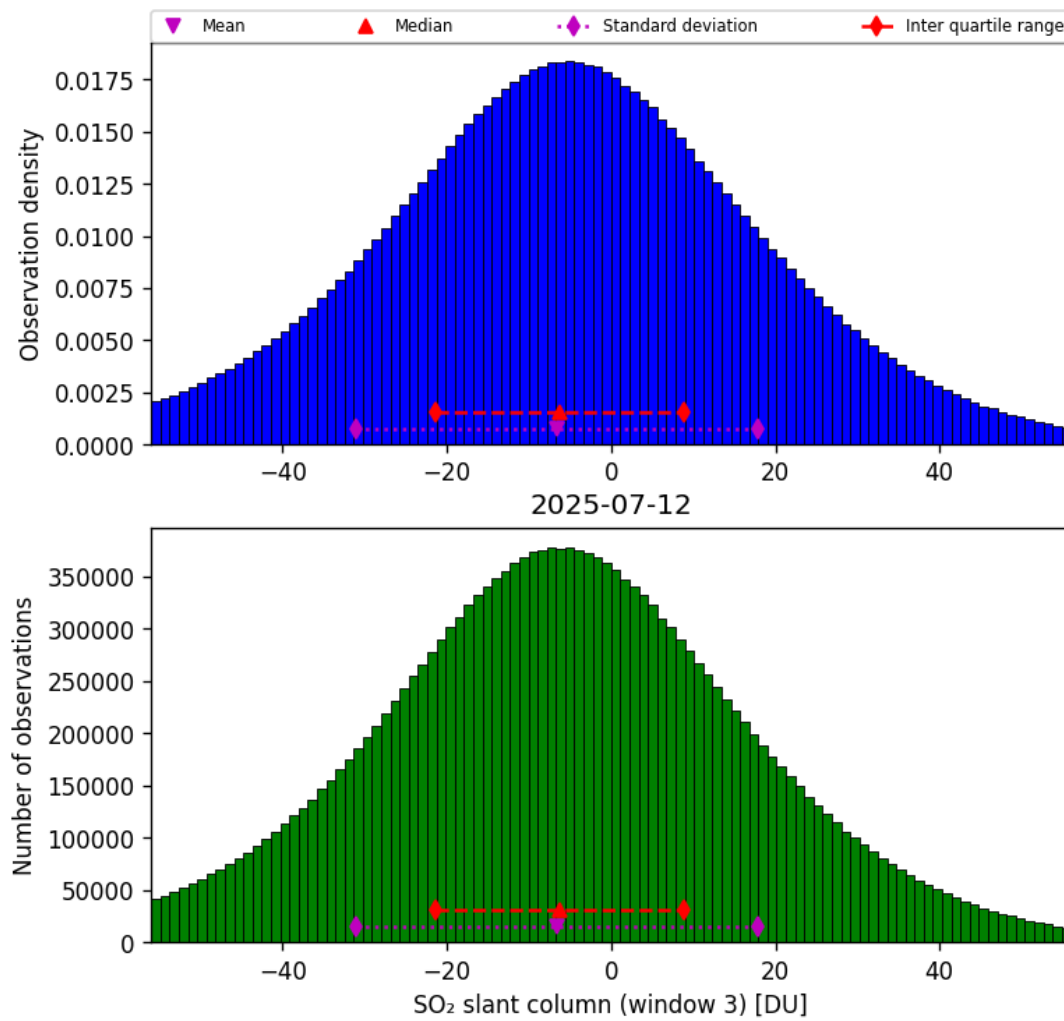


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-07-12 to 2025-07-13

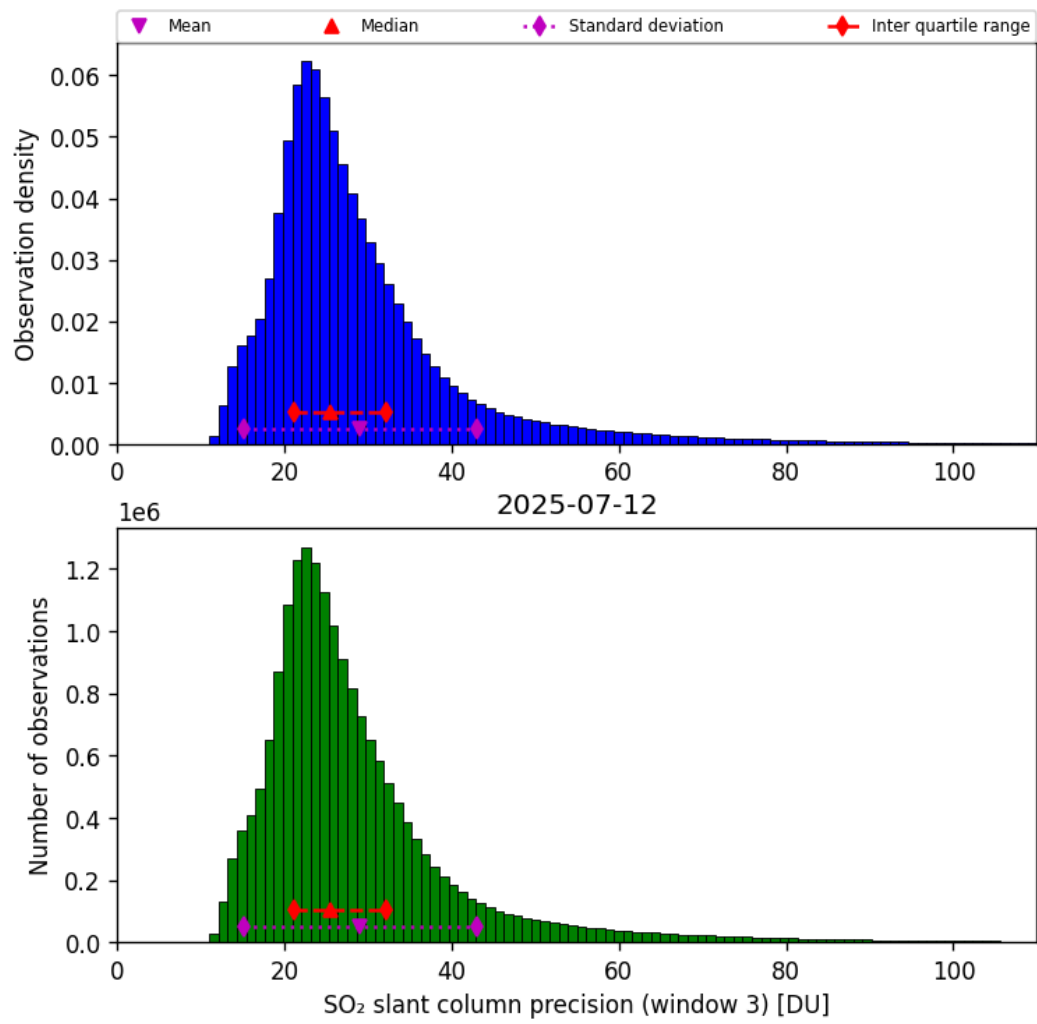


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-07-12 to 2025-07-13

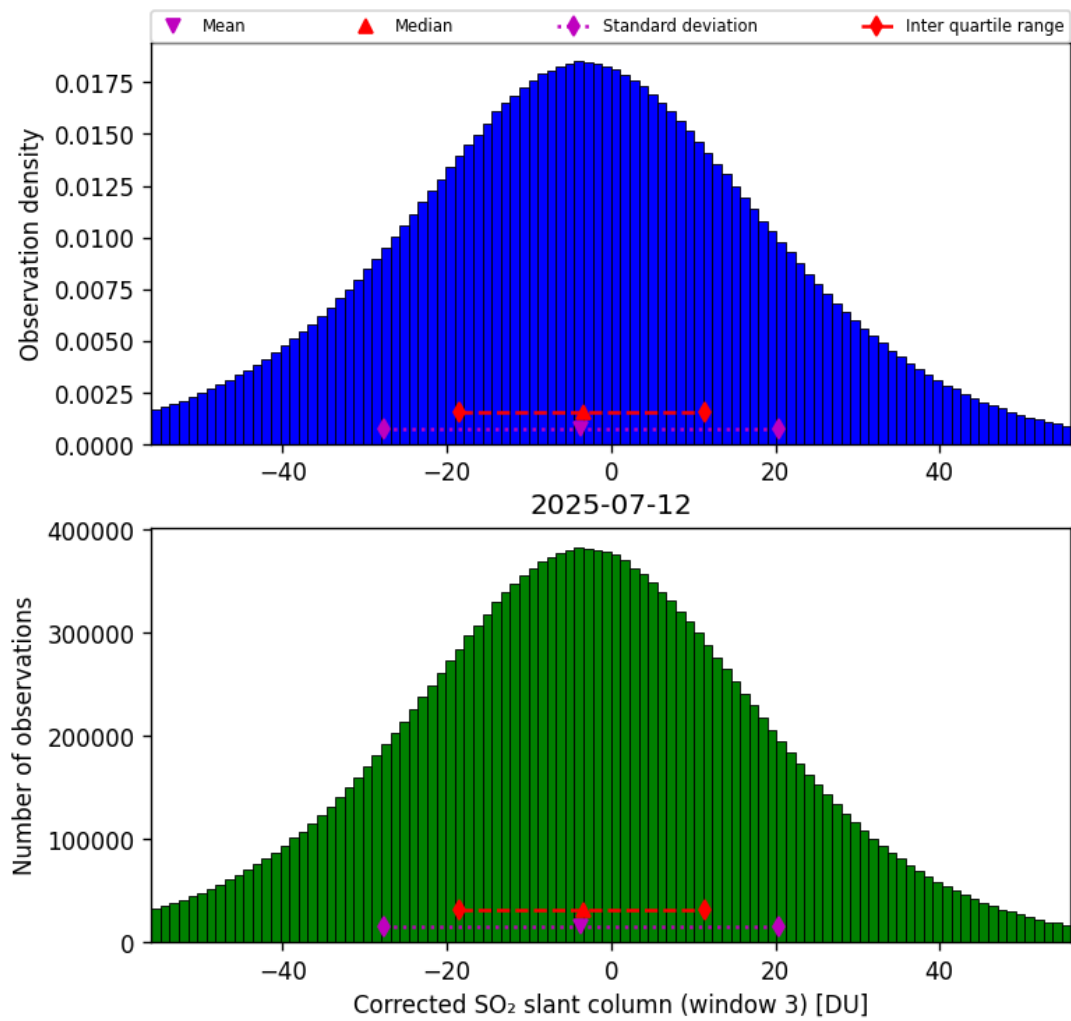


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-07-12 to 2025-07-13

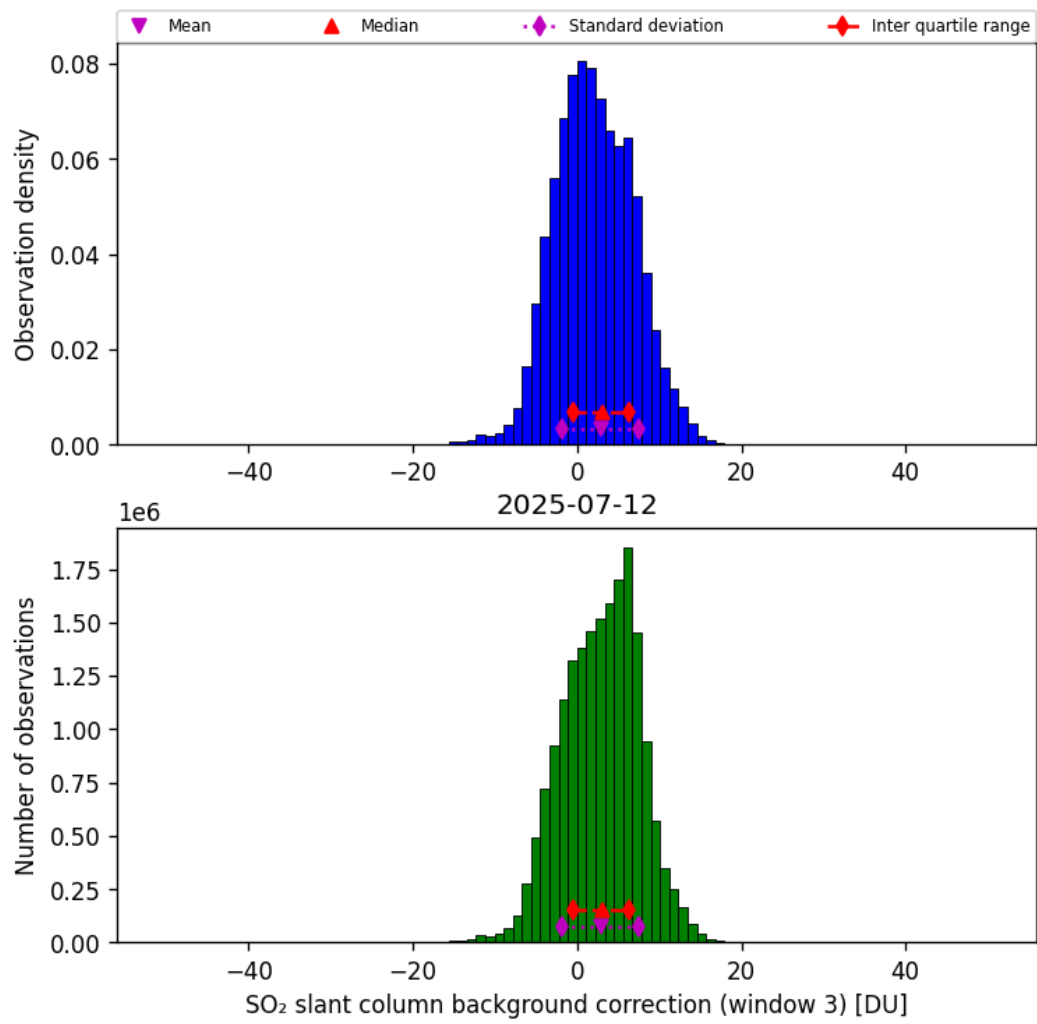


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-07-12 to 2025-07-13

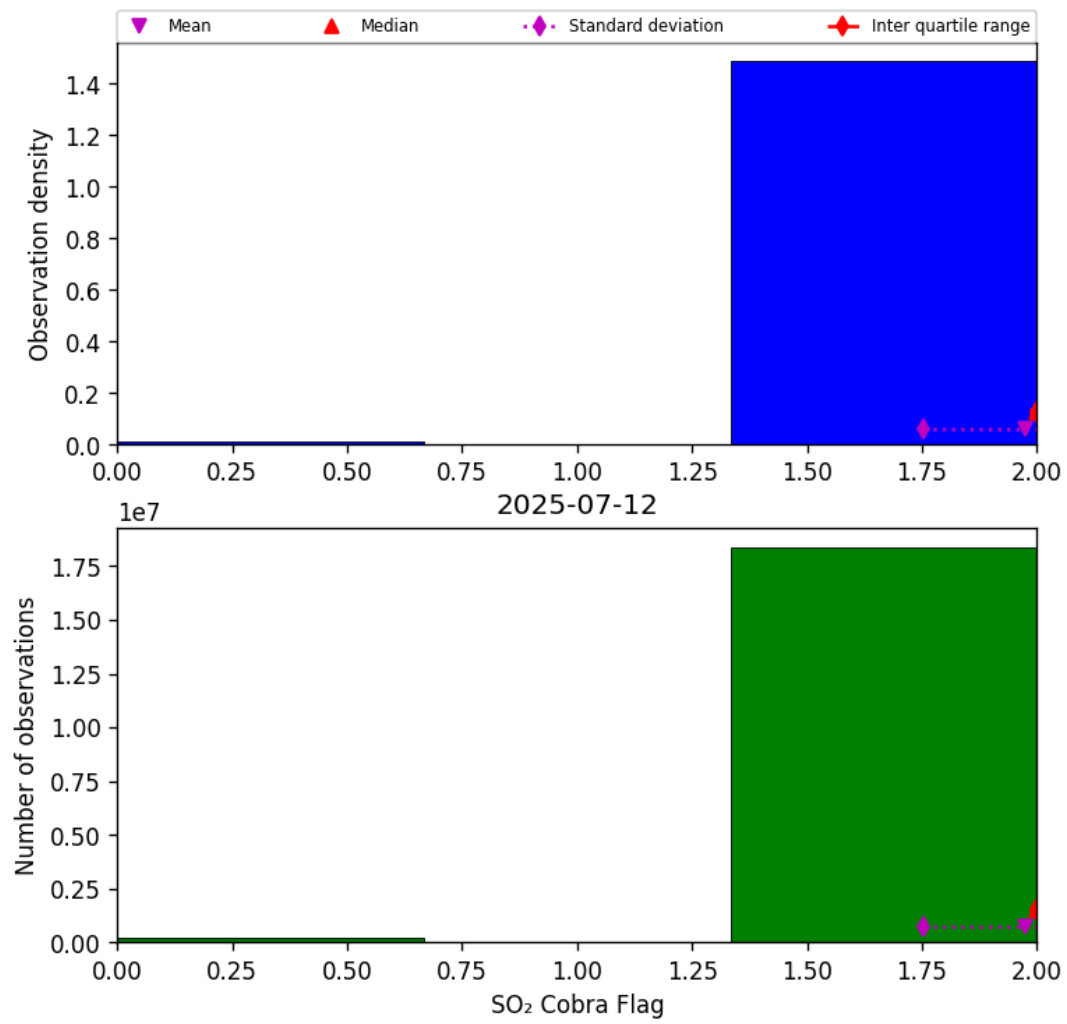


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-07-12 to 2025-07-13

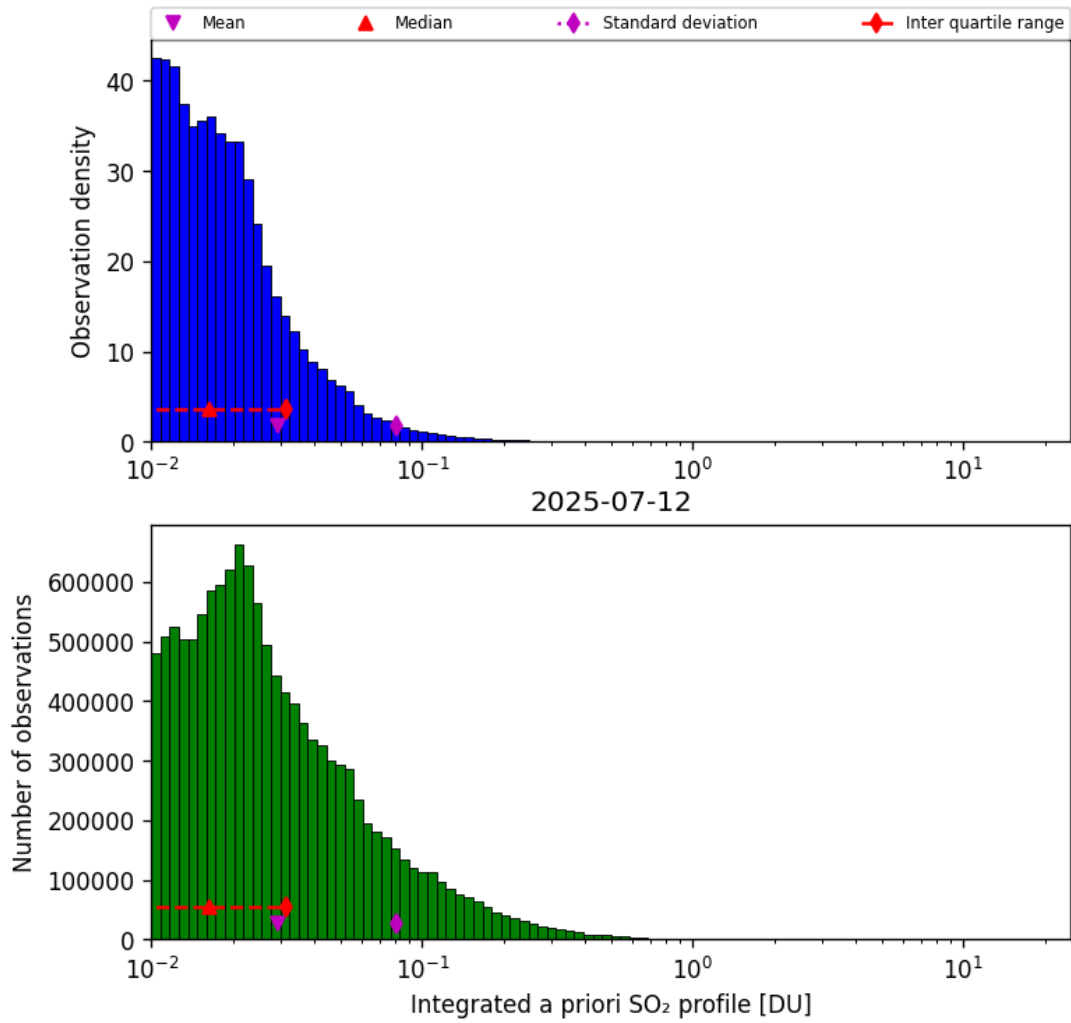


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-07-12 to 2025-07-13

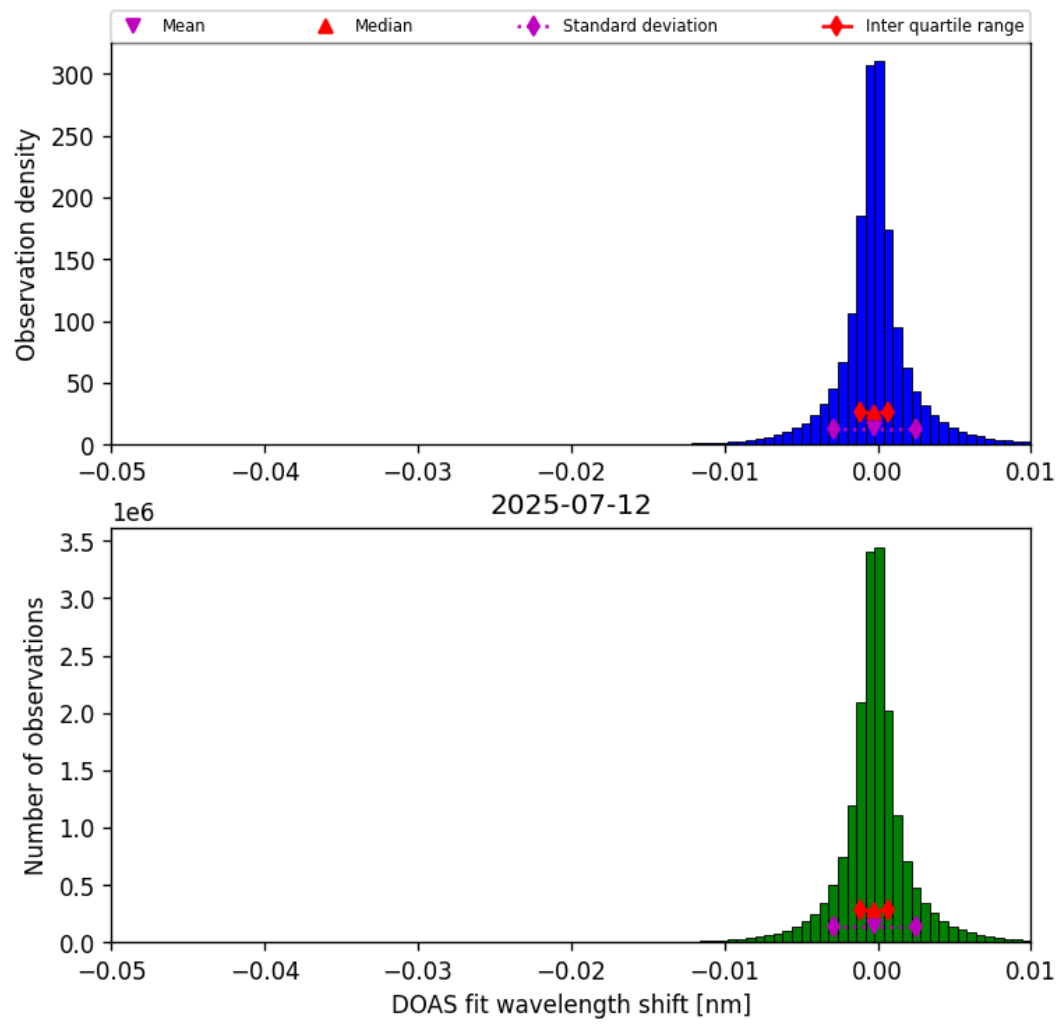


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-07-12 to 2025-07-13

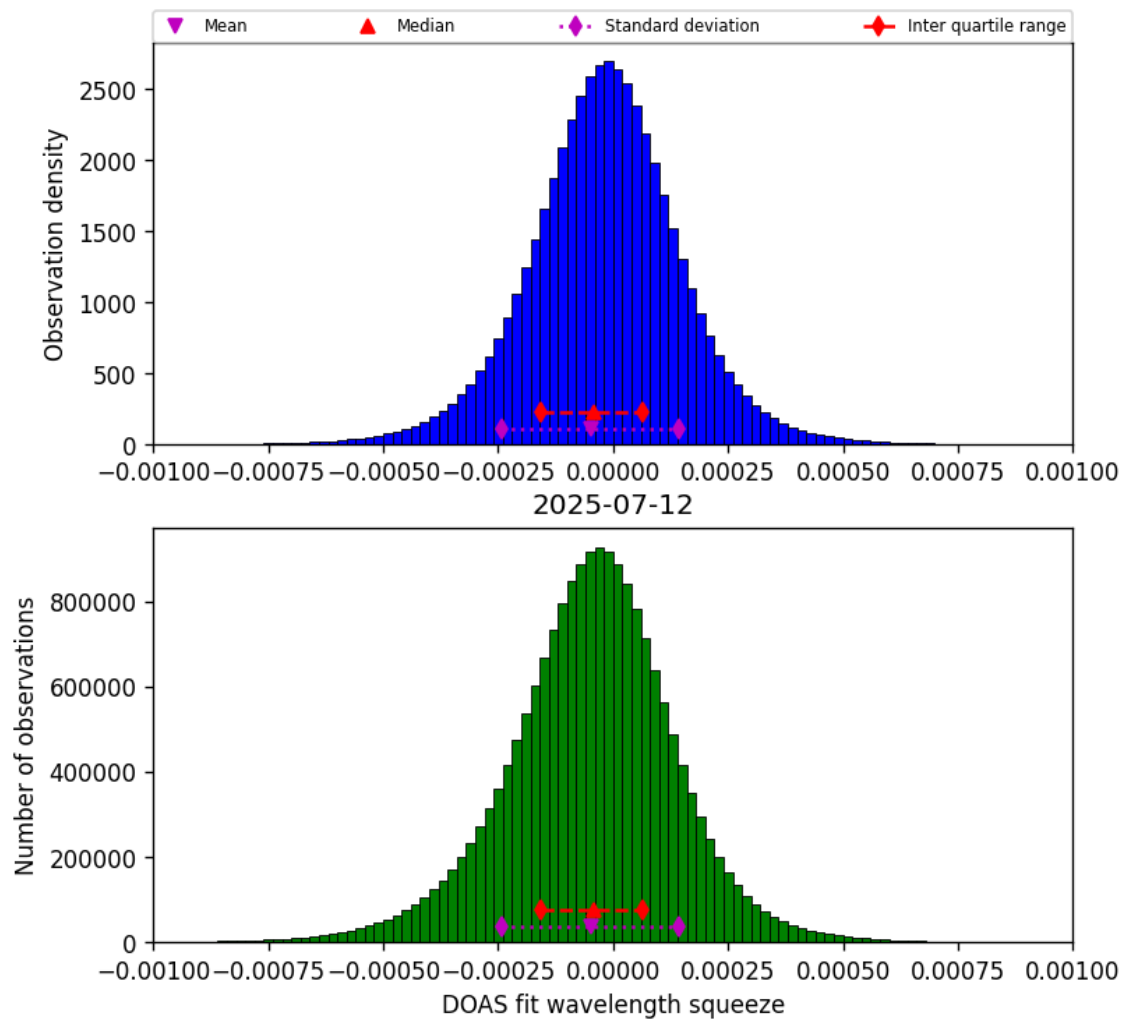


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-07-12 to 2025-07-13

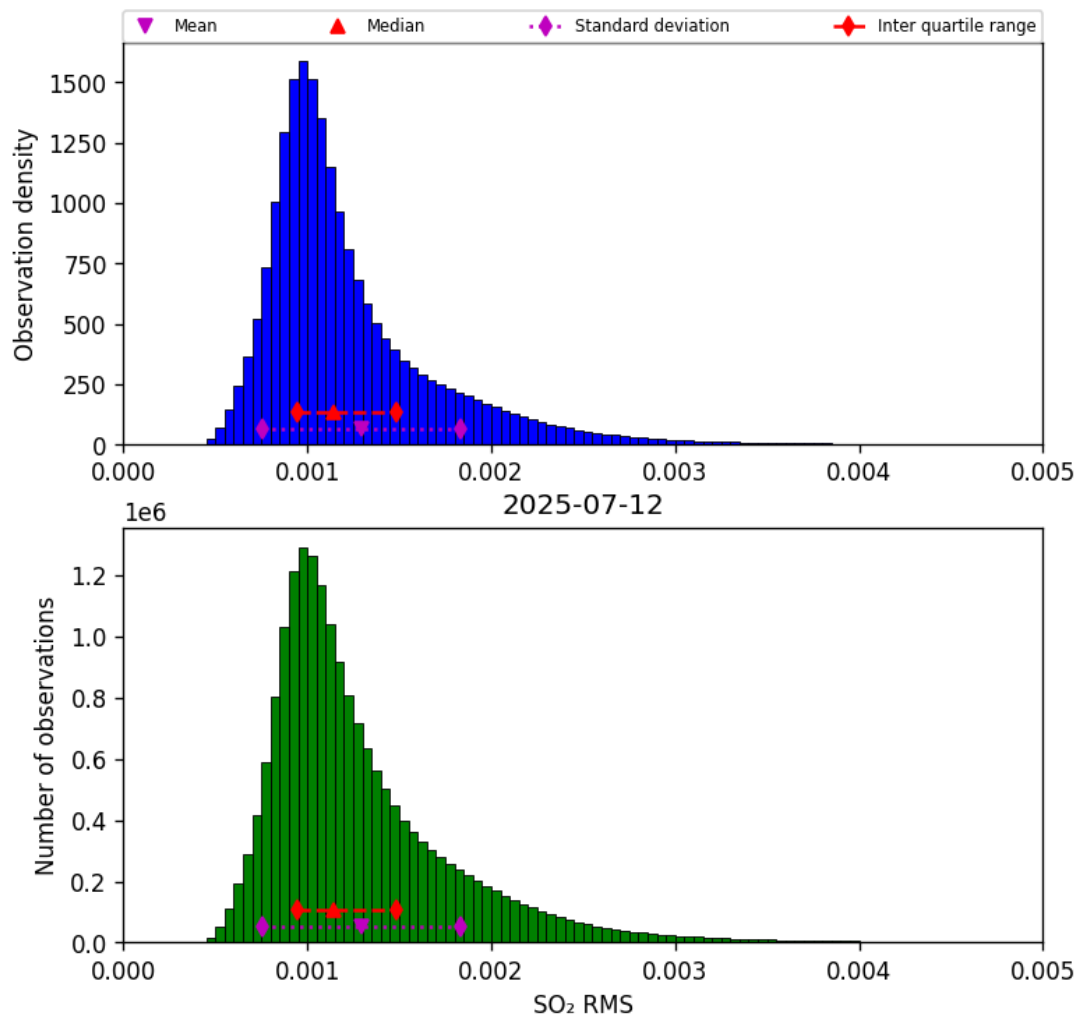


Figure 79: Histogram of “SO₂ RMS” for 2025-07-12 to 2025-07-13

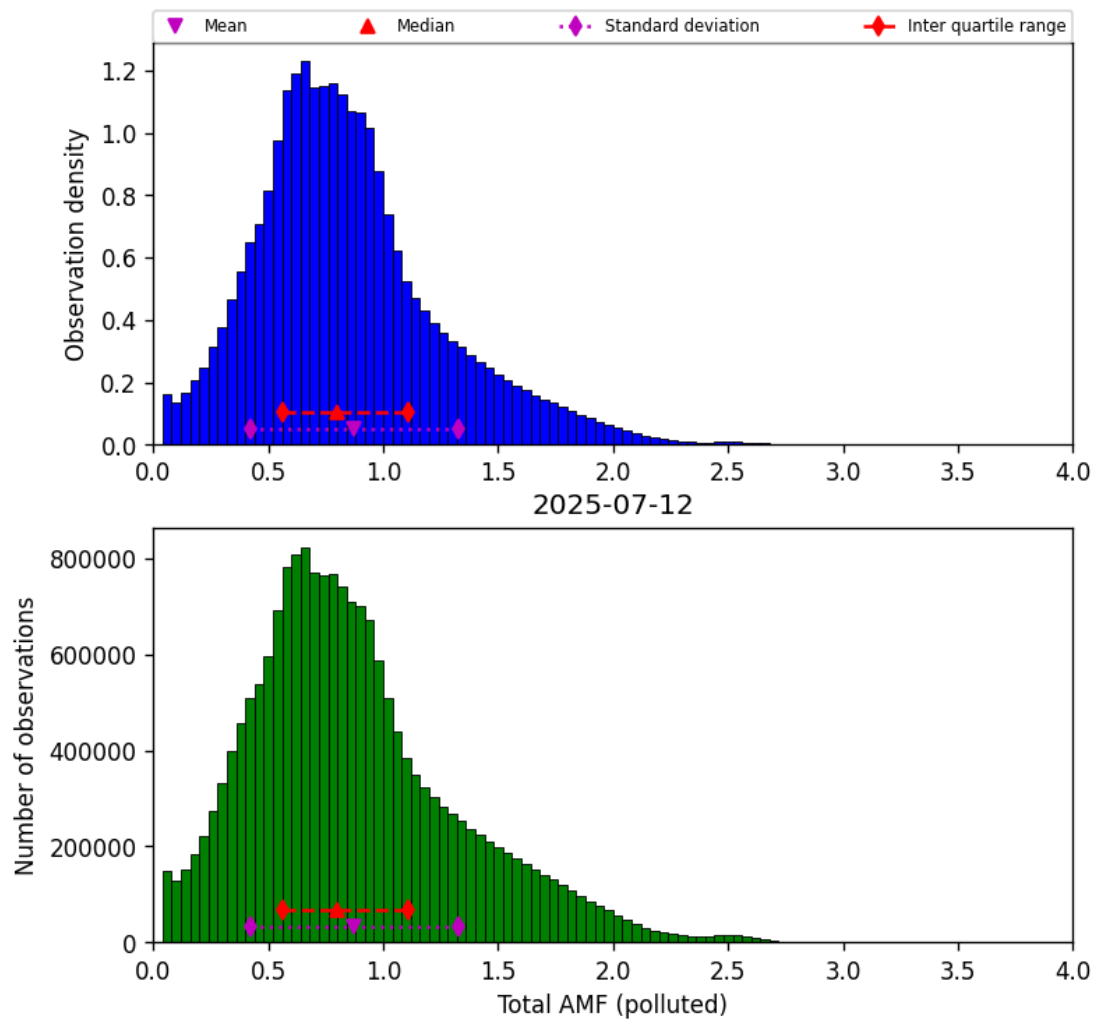


Figure 80: Histogram of “Total AMF (polluted)” for 2025-07-12 to 2025-07-13

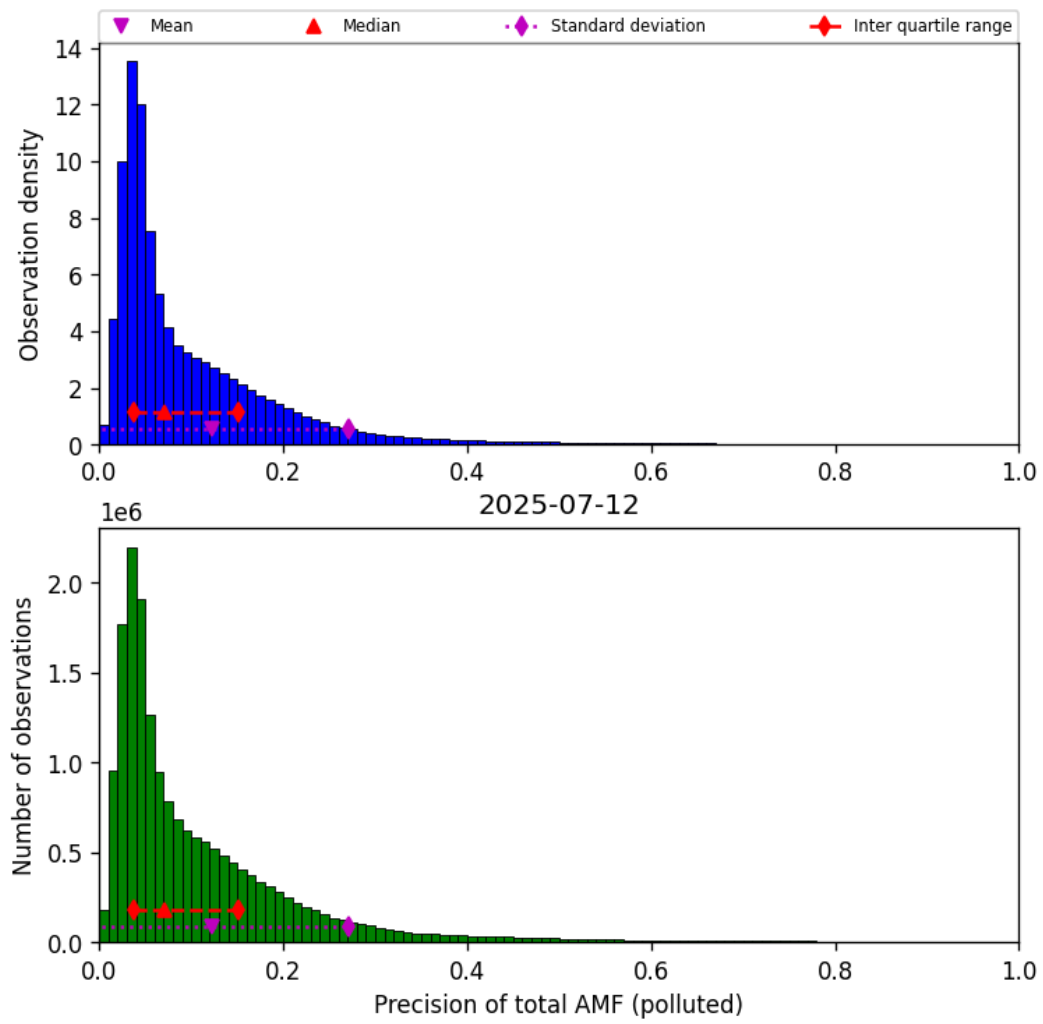


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-07-12 to 2025-07-13

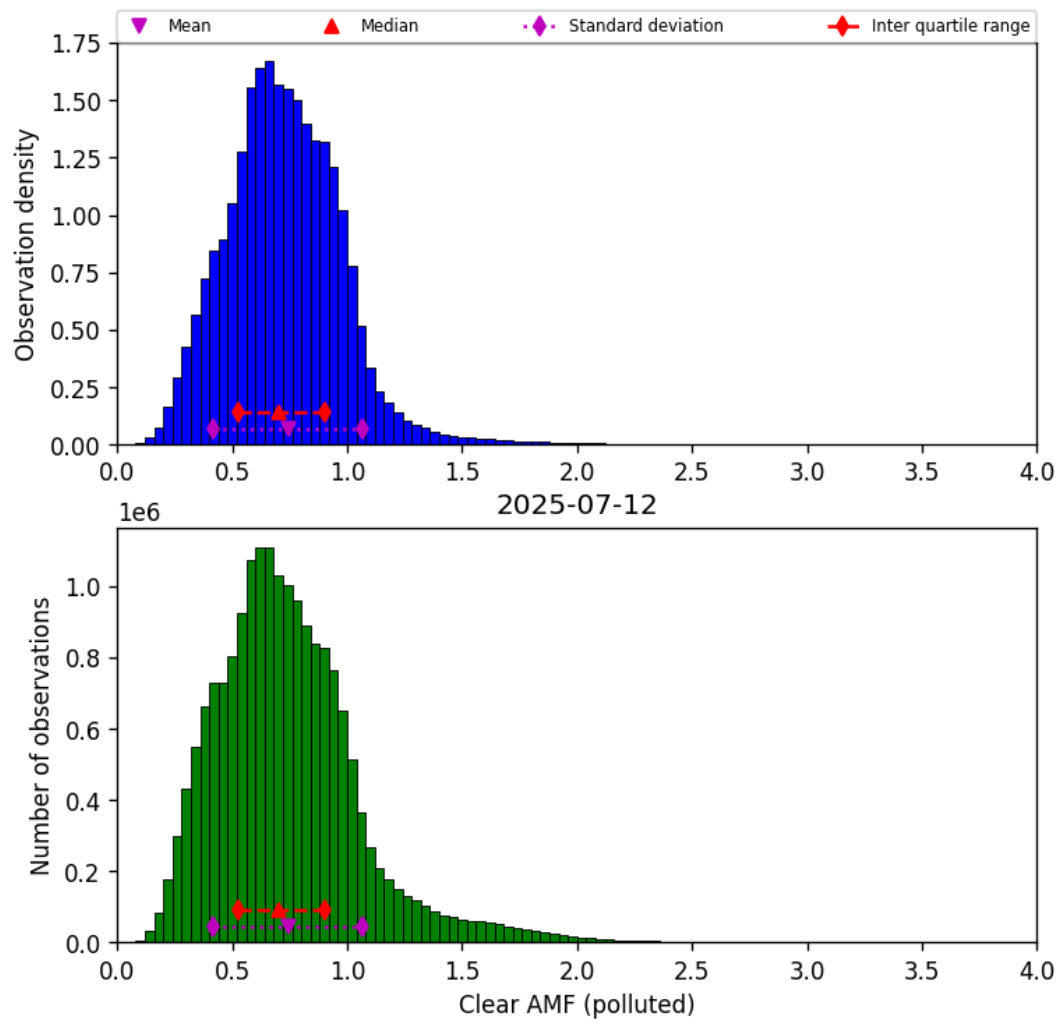


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-07-12 to 2025-07-13

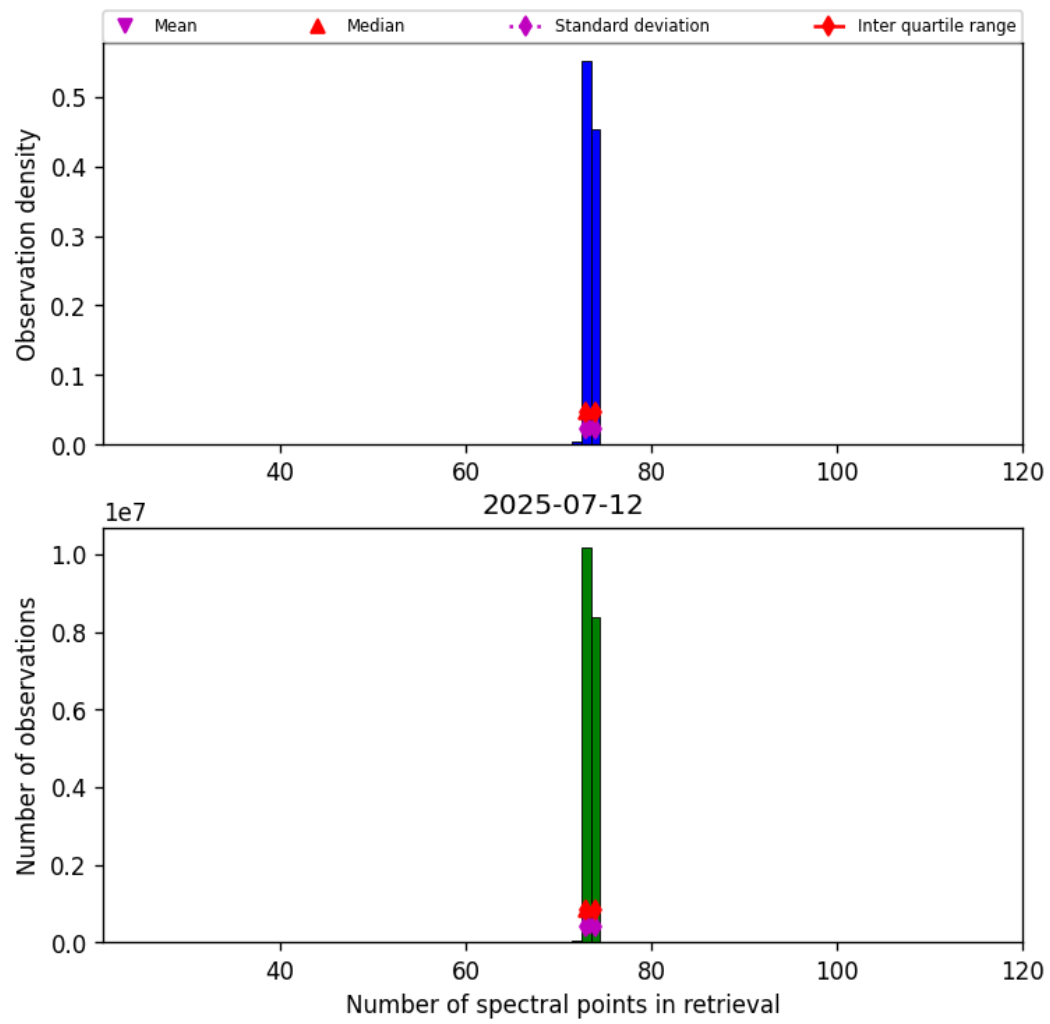


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-07-12 to 2025-07-13

9 Along track statistics

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

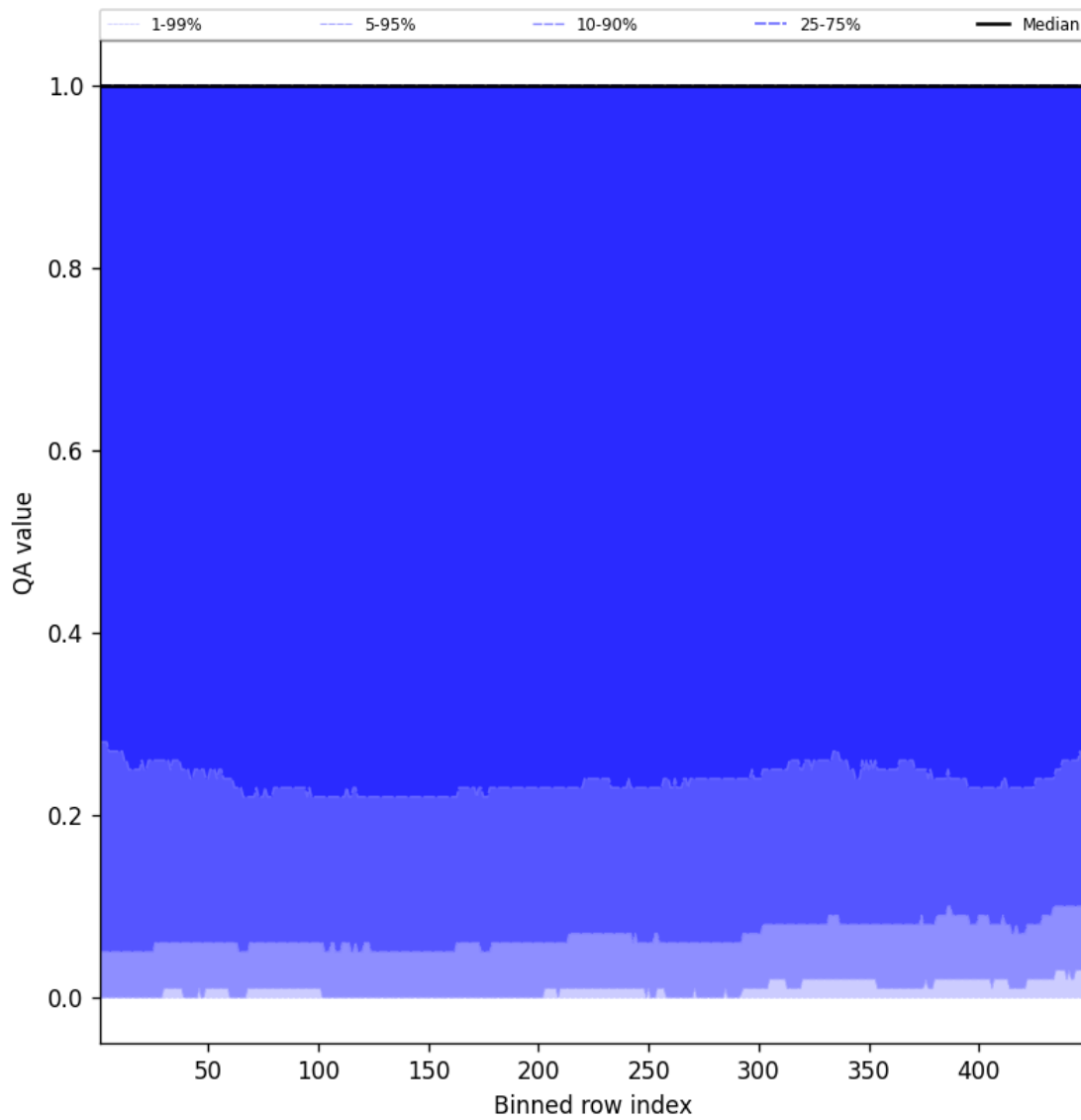


Figure 84: Along track statistics of “QA value” for 2025-07-12 to 2025-07-13

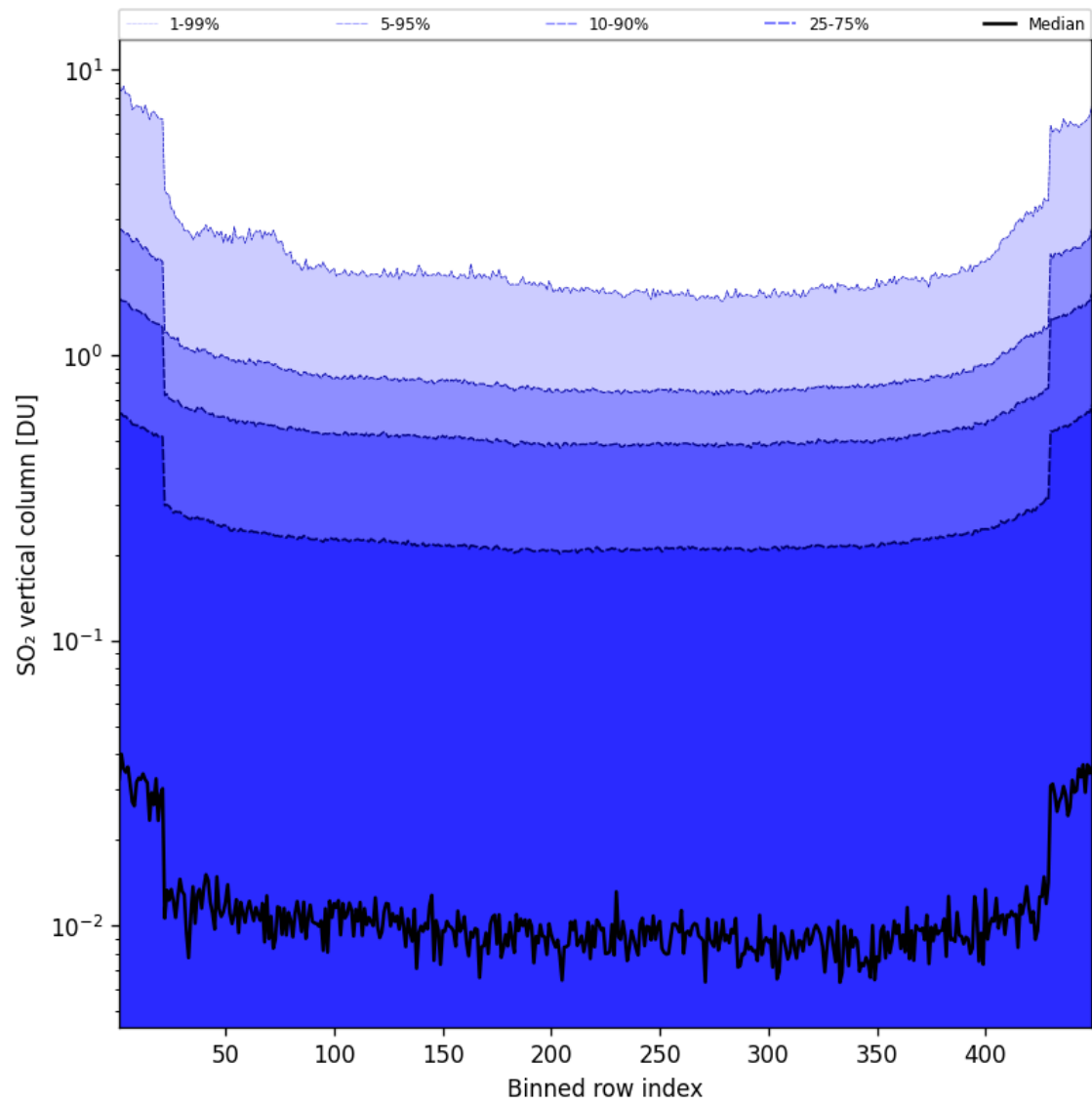


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-07-12 to 2025-07-13

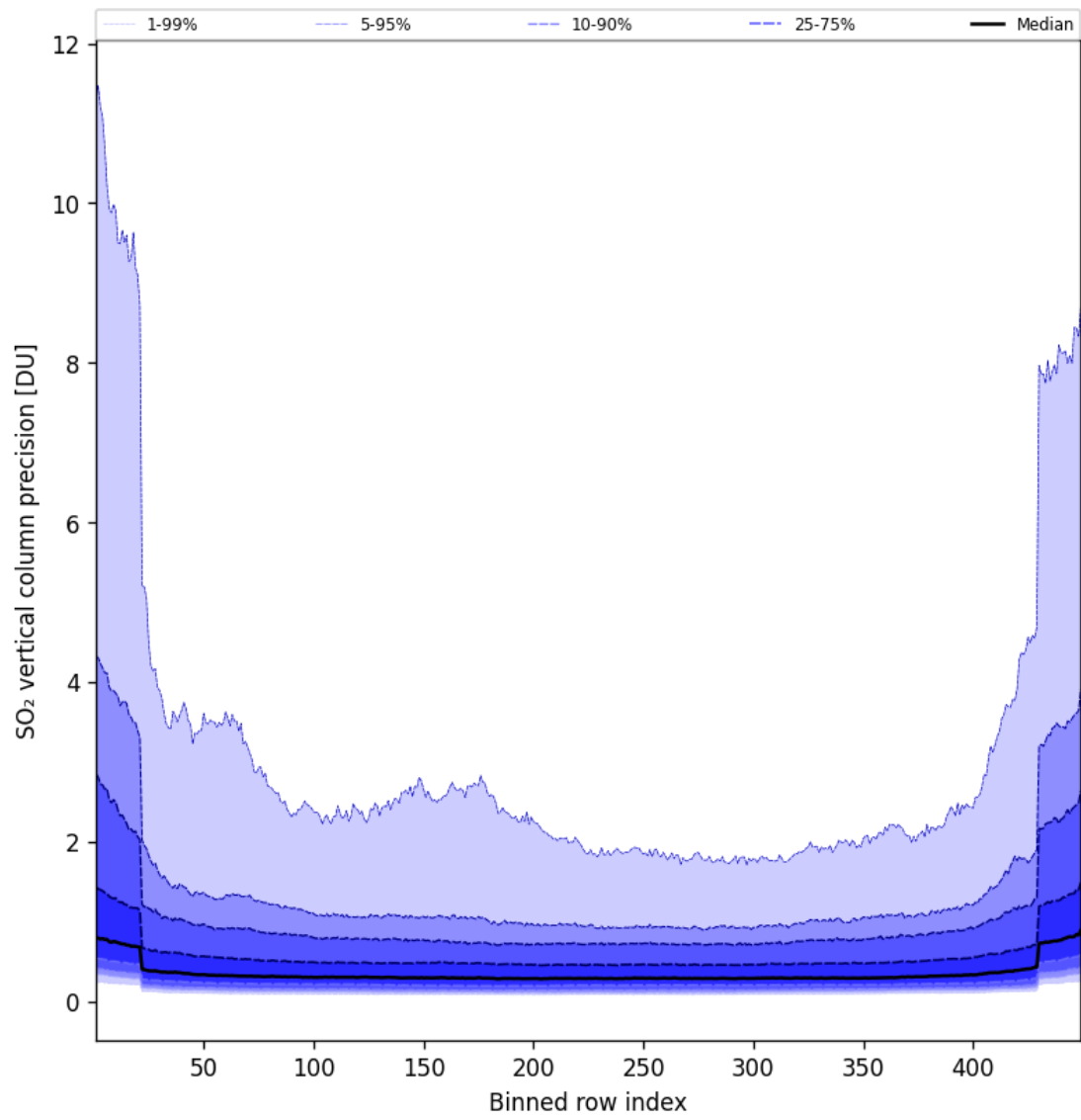


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-07-12 to 2025-07-13

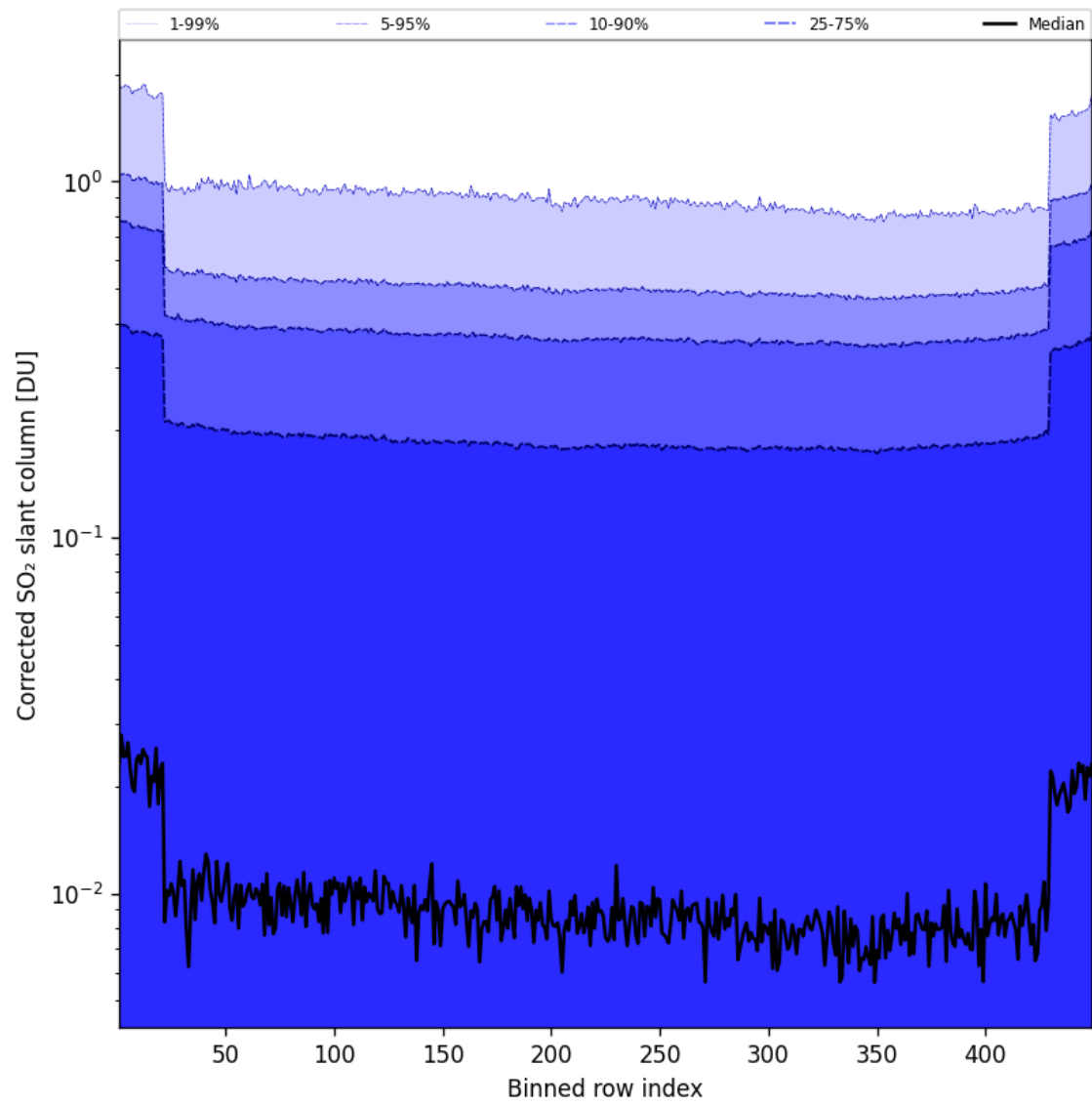


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-07-12 to 2025-07-13

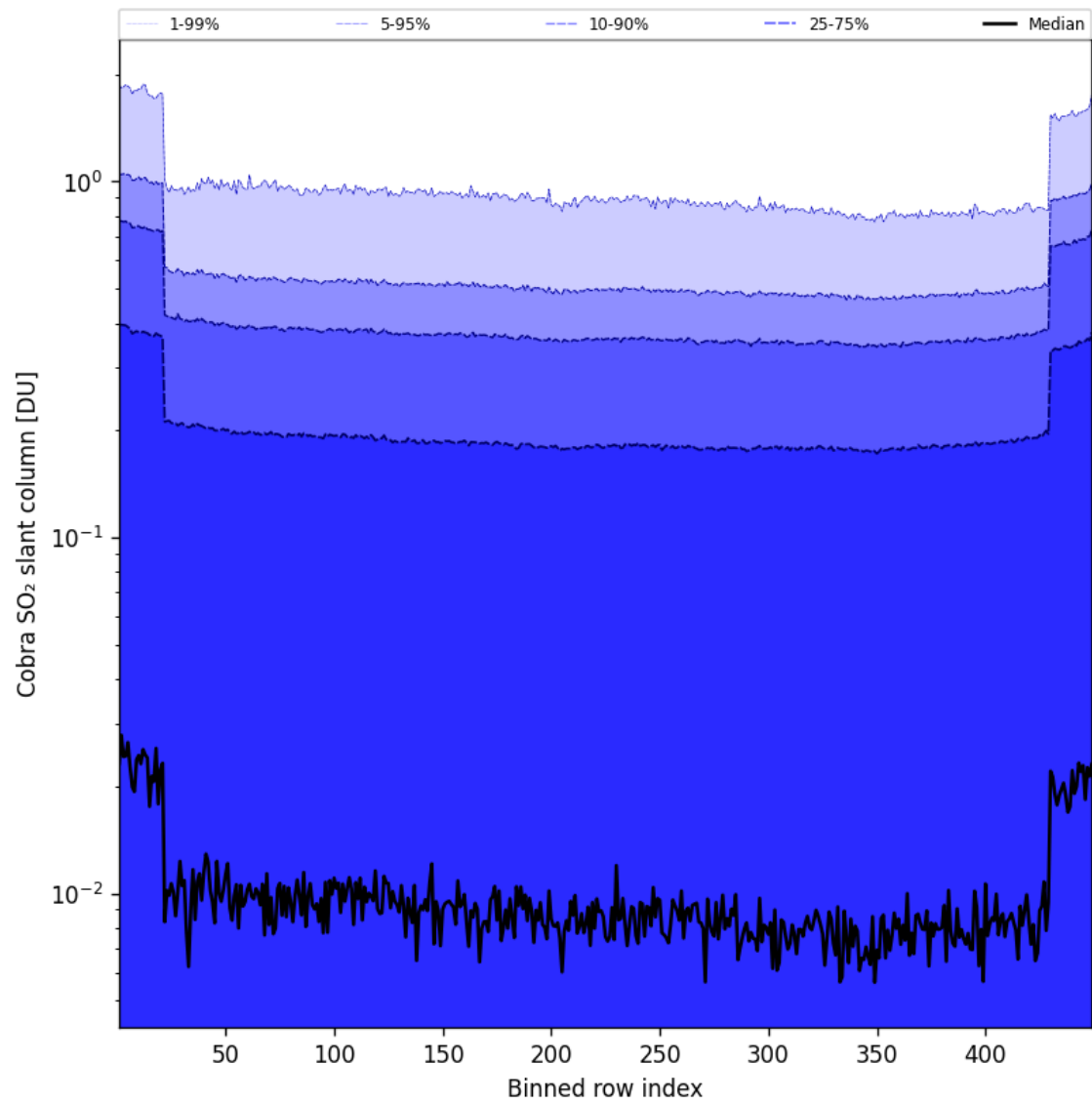


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-07-12 to 2025-07-13

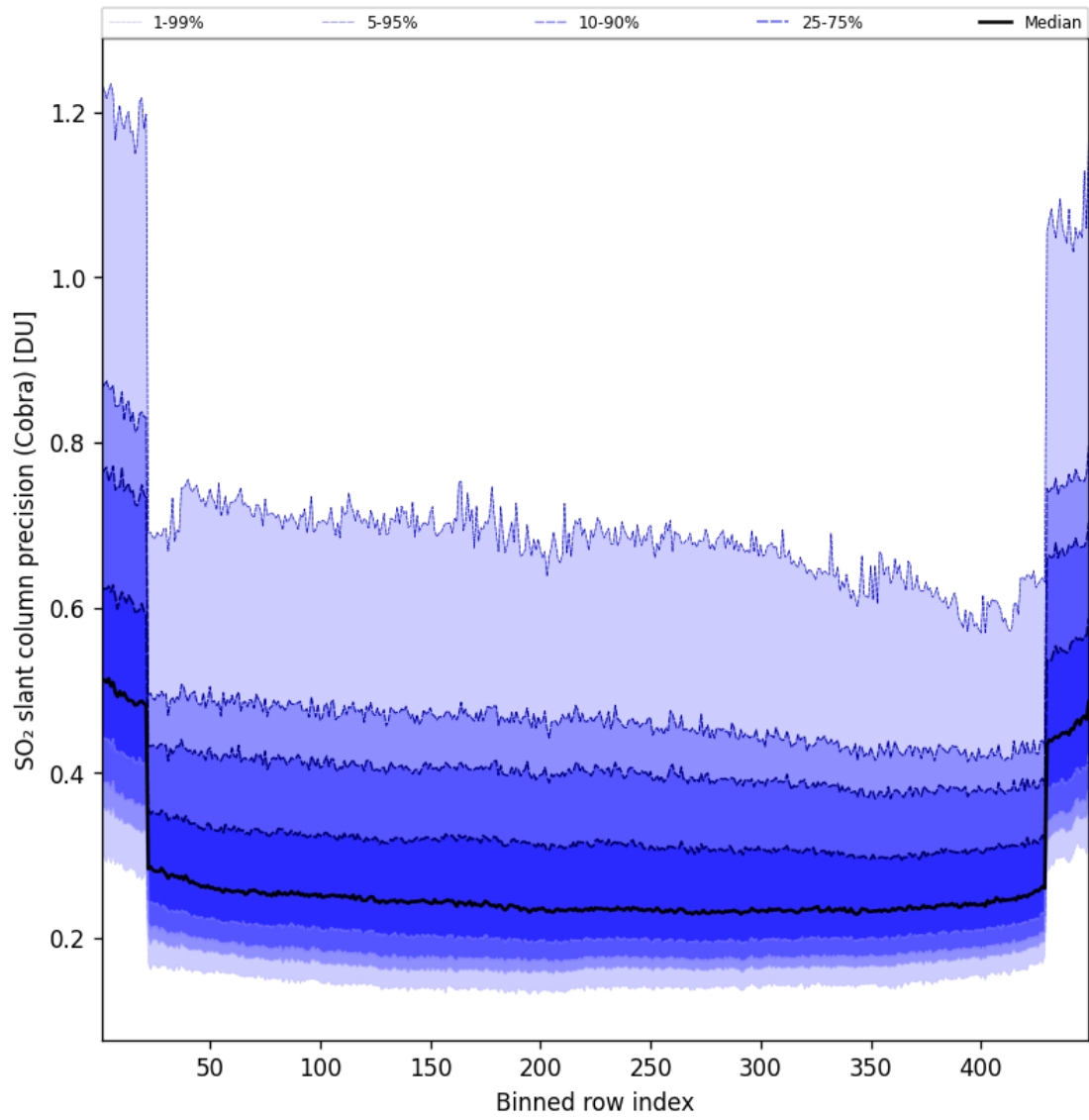


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-07-12 to 2025-07-13

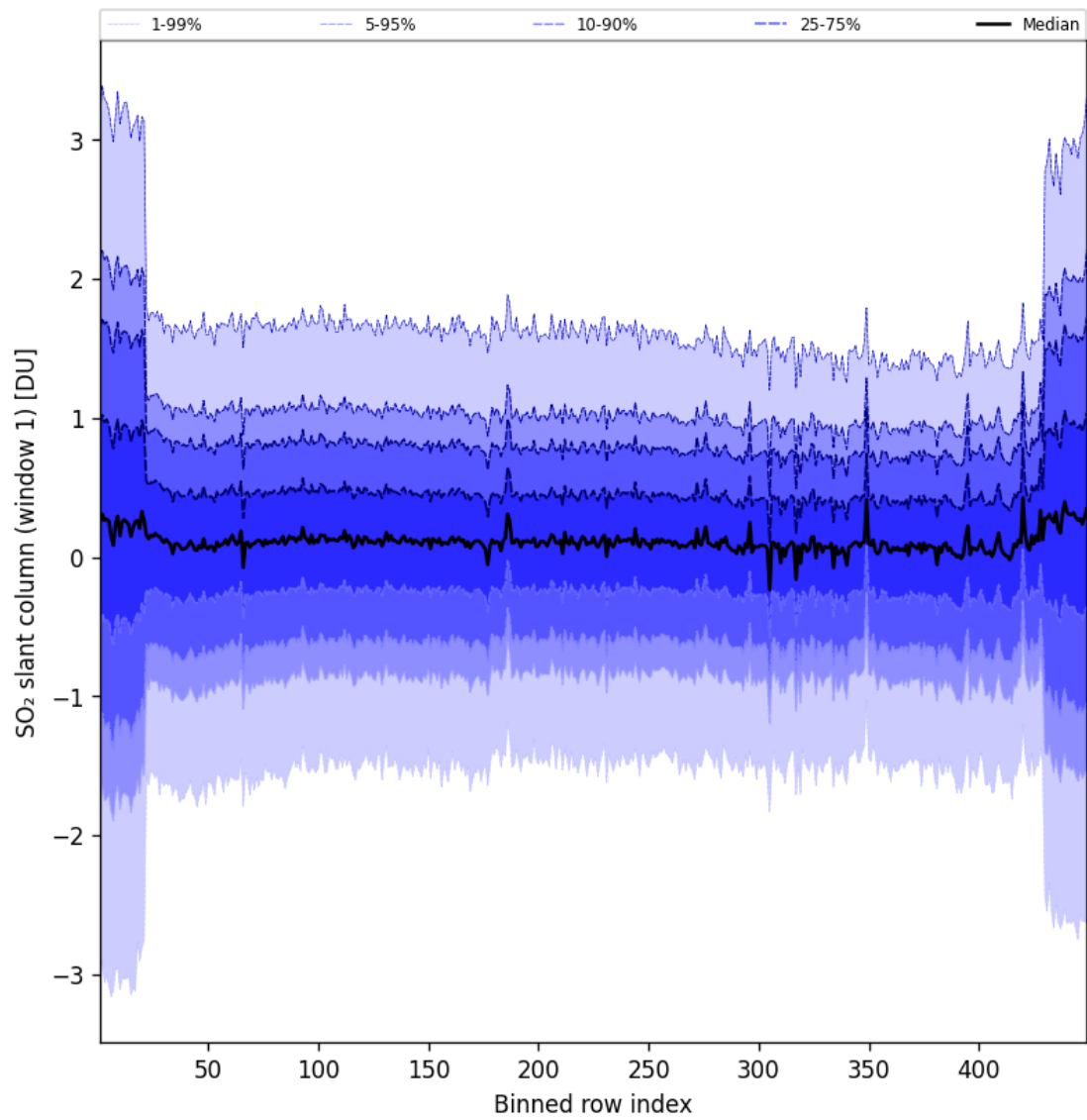


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-07-12 to 2025-07-13

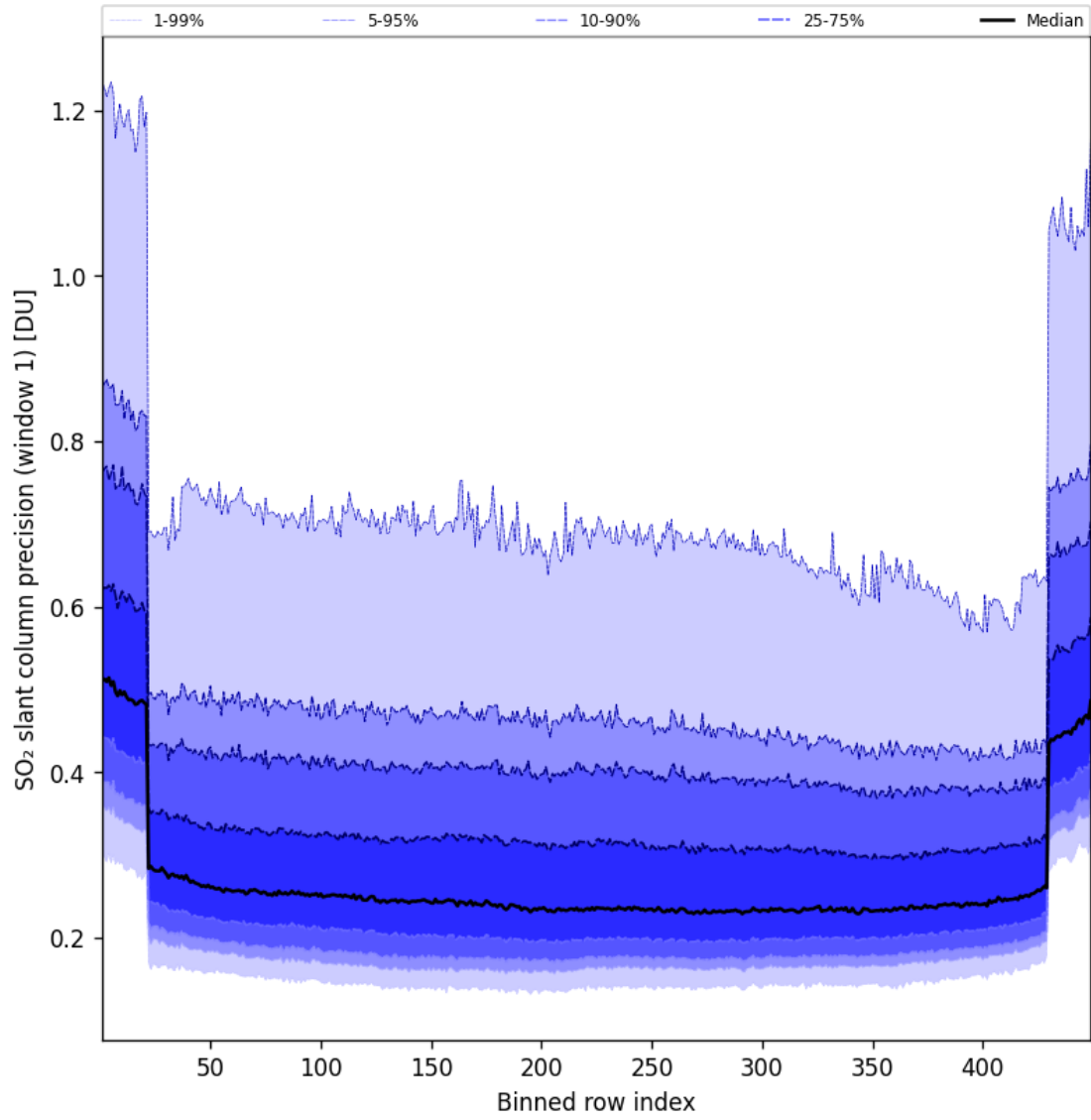


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-07-12 to 2025-07-13

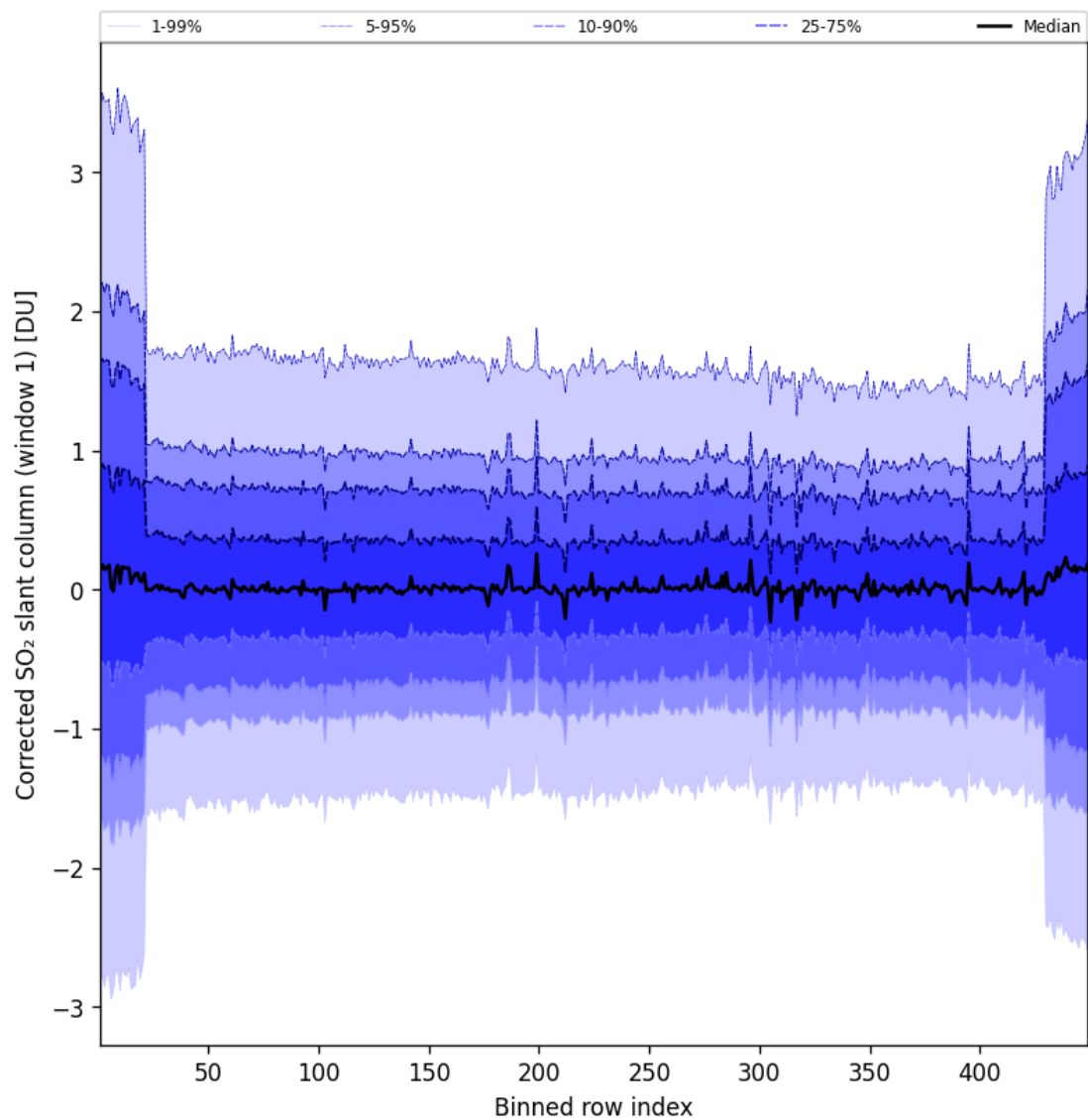


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-07-12 to 2025-07-13

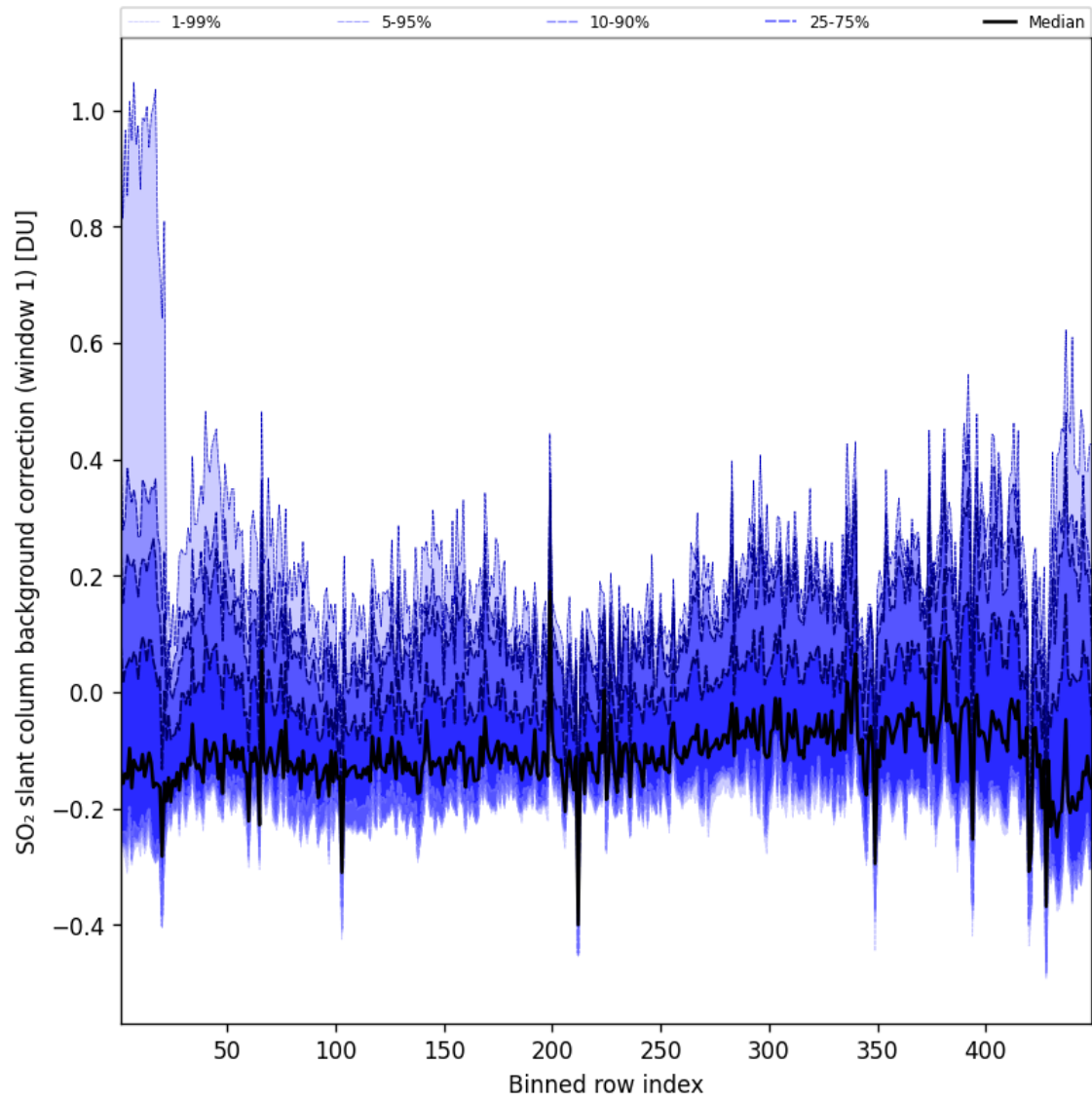


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-07-12 to 2025-07-13

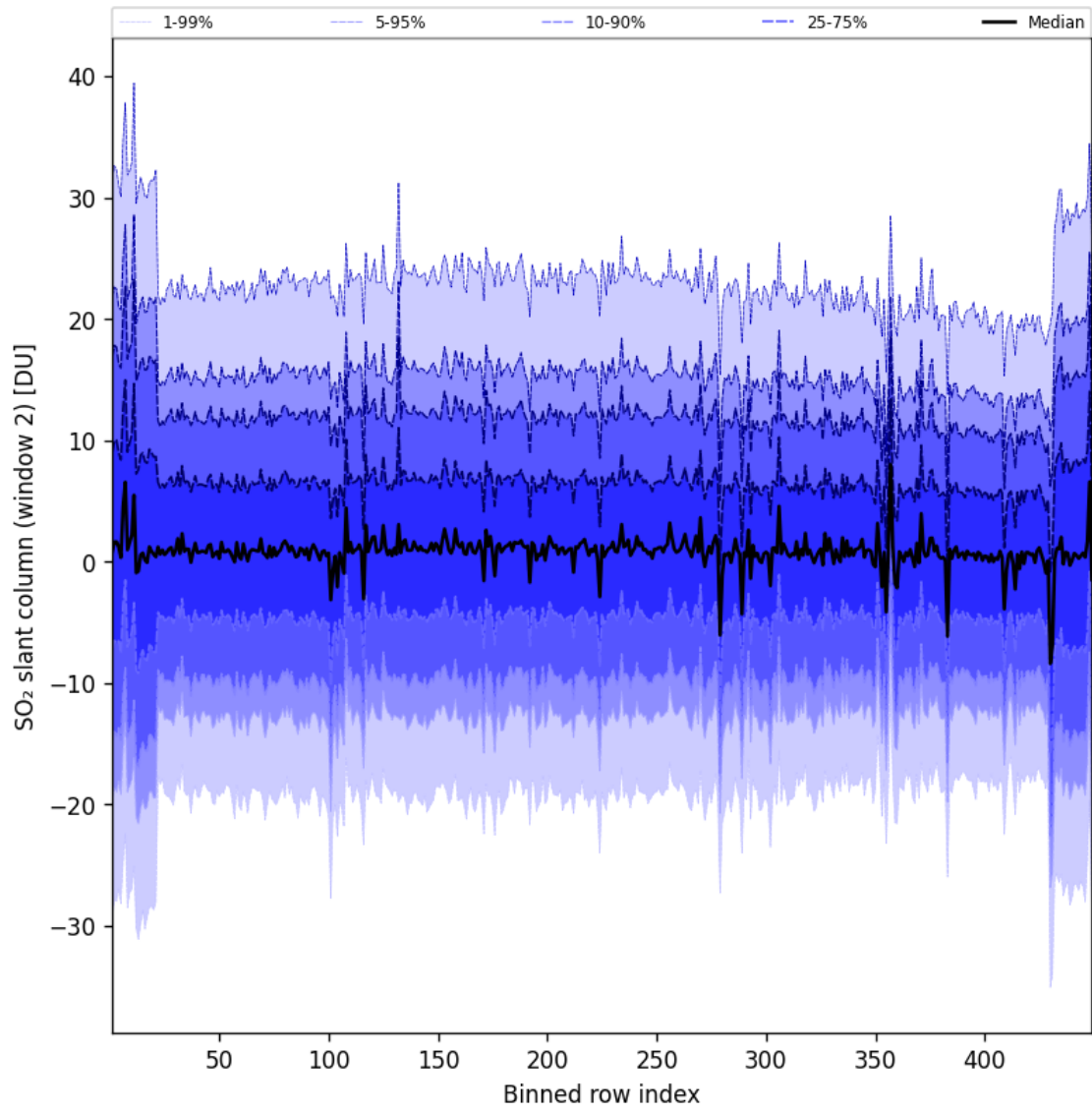


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-07-12 to 2025-07-13

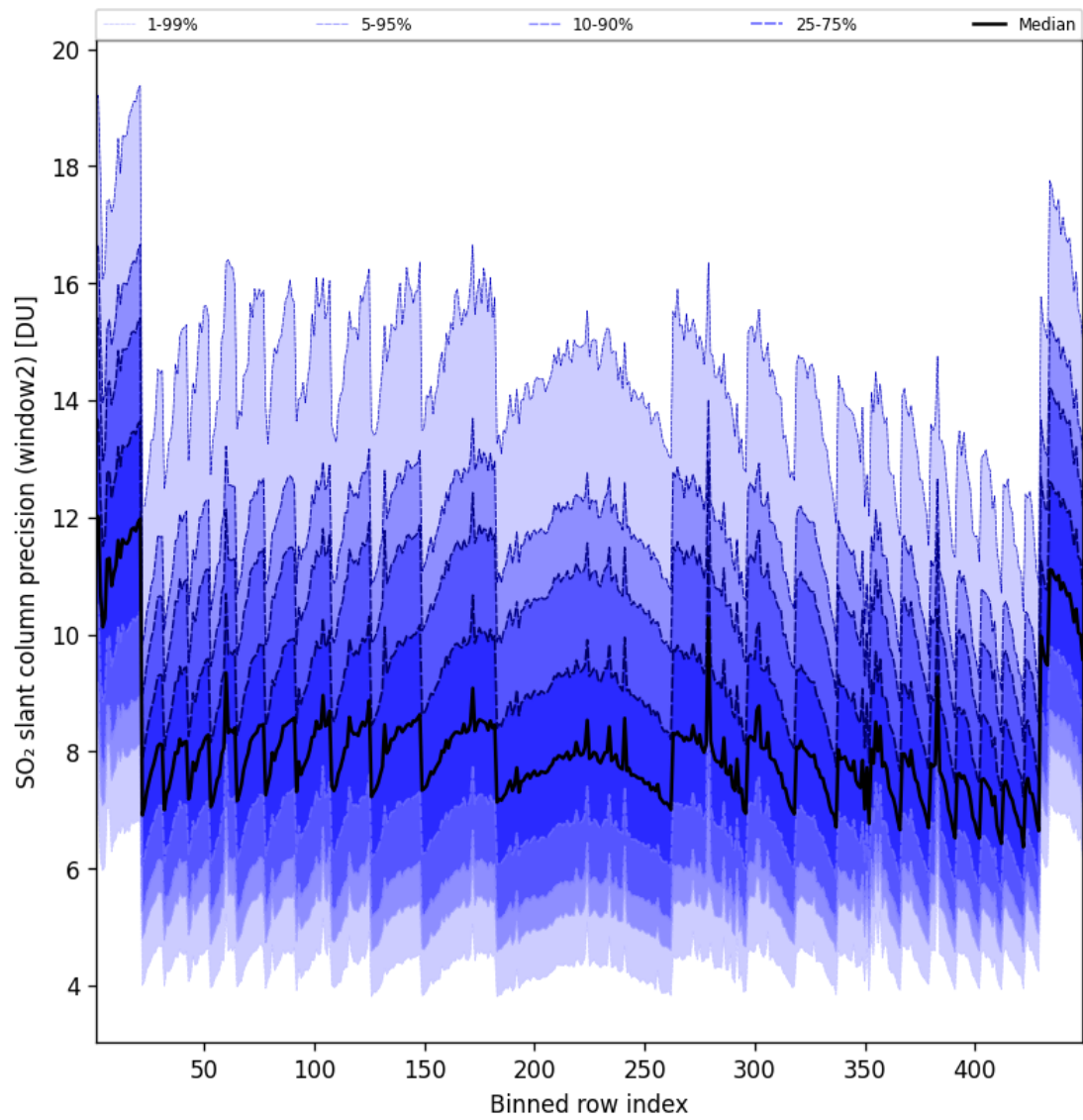


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-07-12 to 2025-07-13

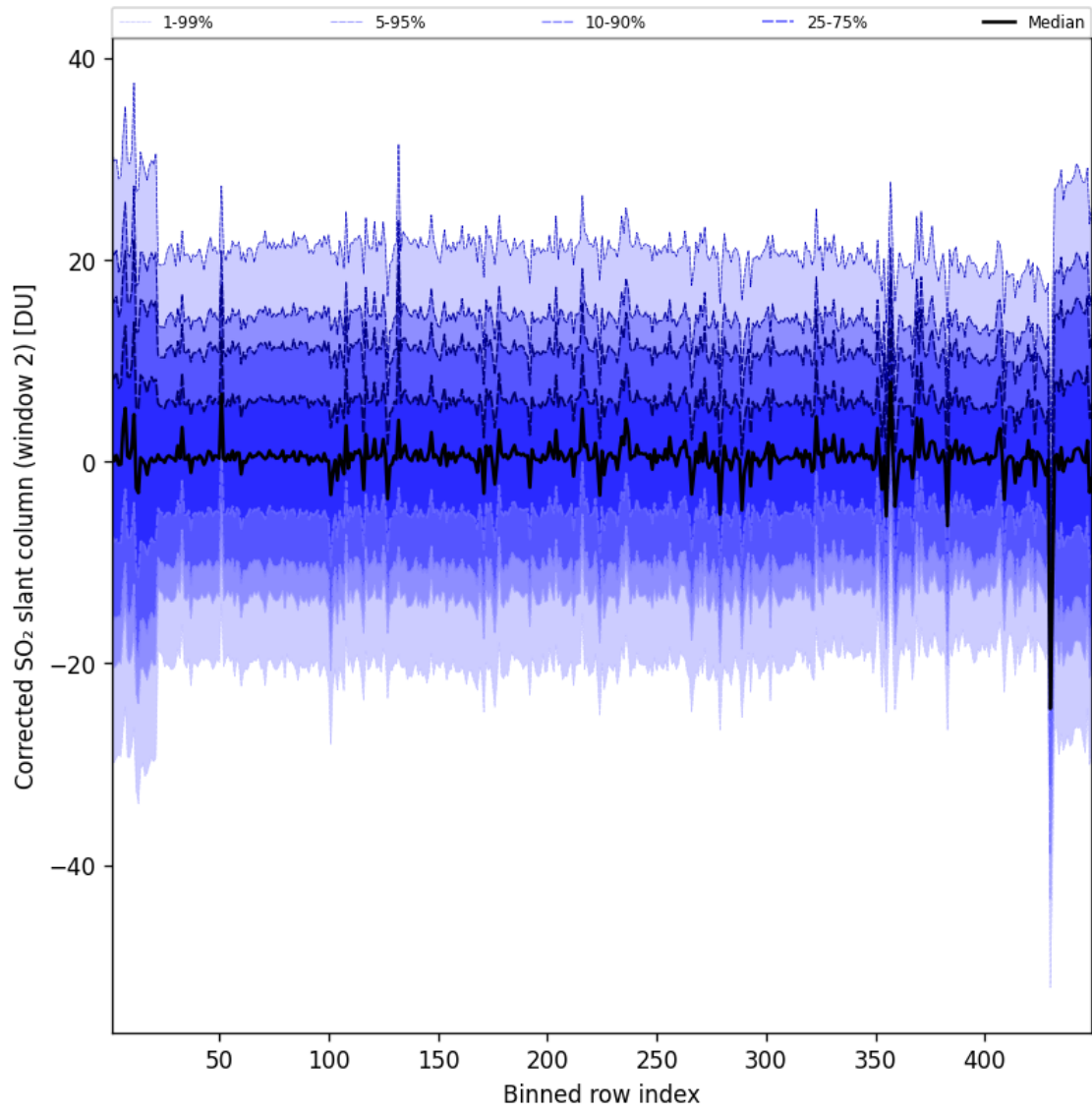


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-07-12 to 2025-07-13

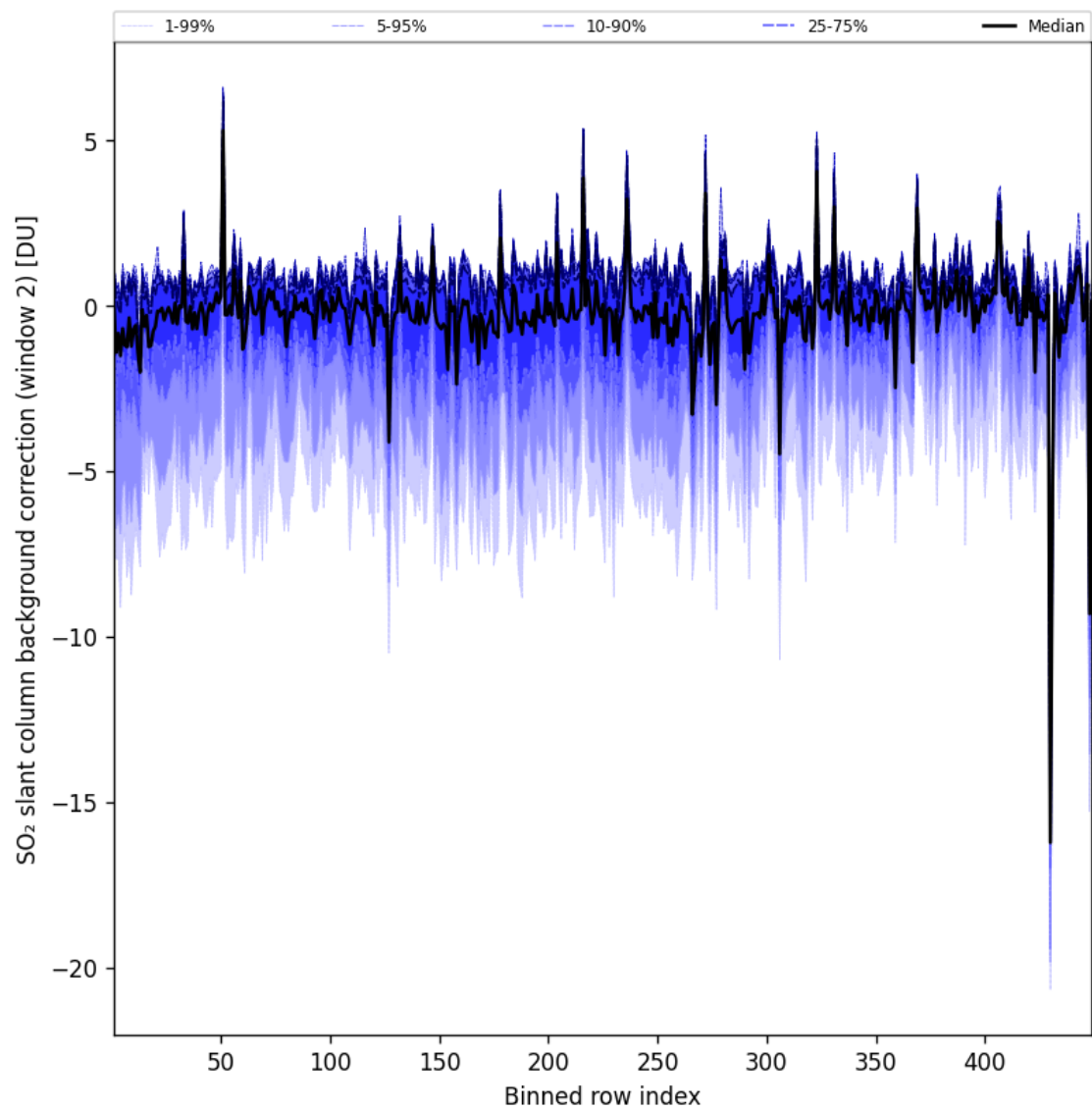


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-07-12 to 2025-07-13

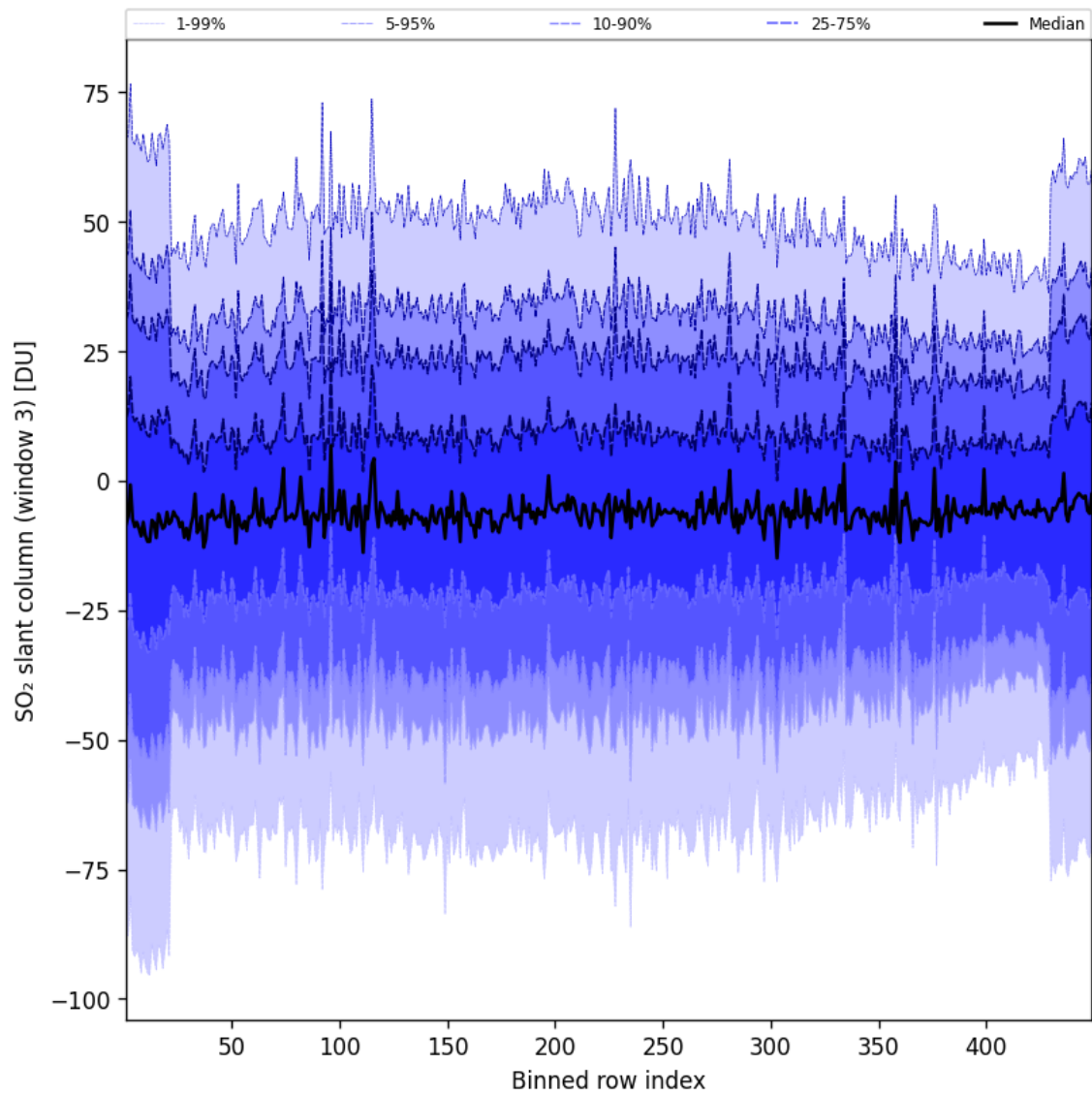


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-07-12 to 2025-07-13

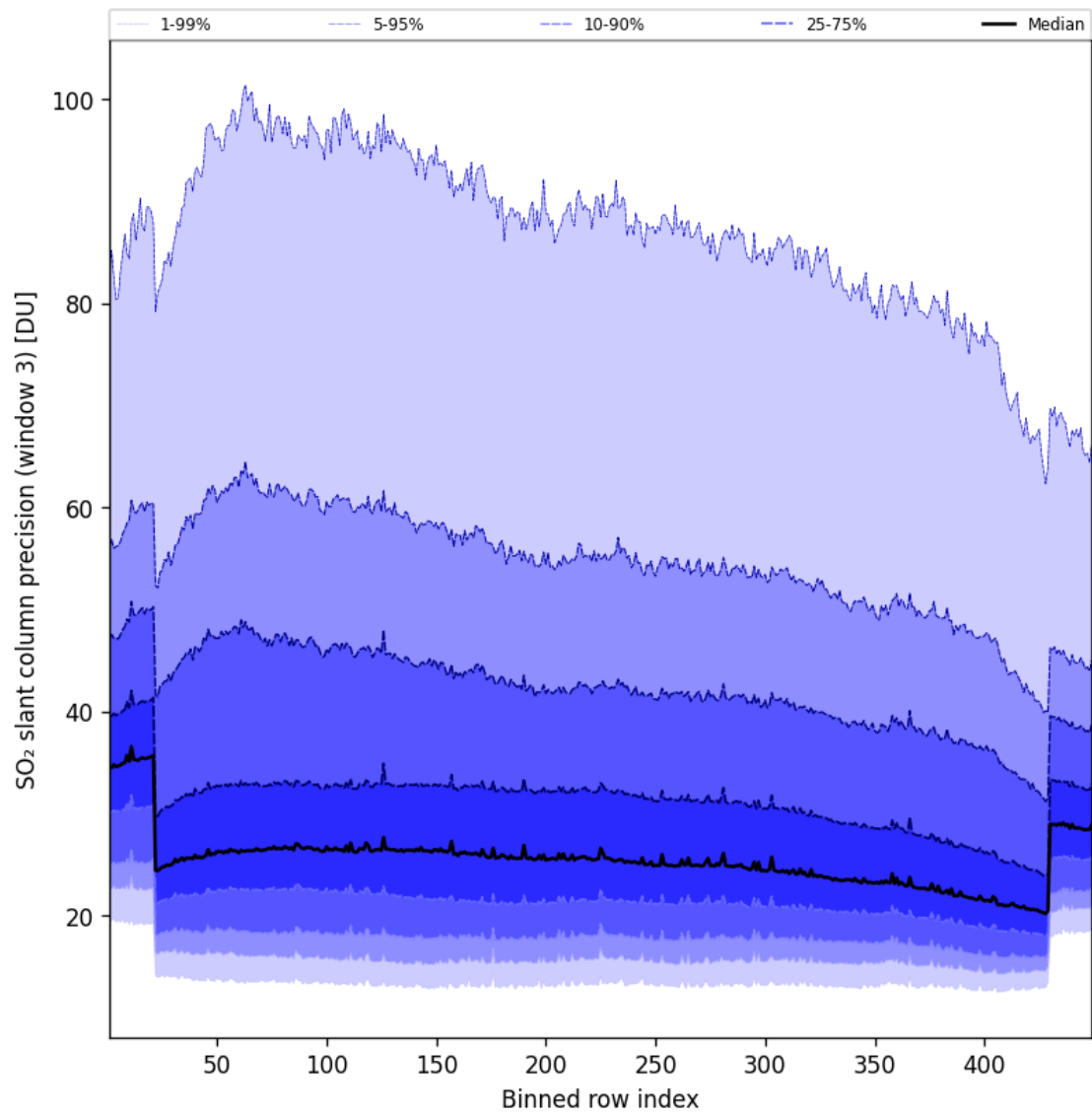


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-07-12 to 2025-07-13

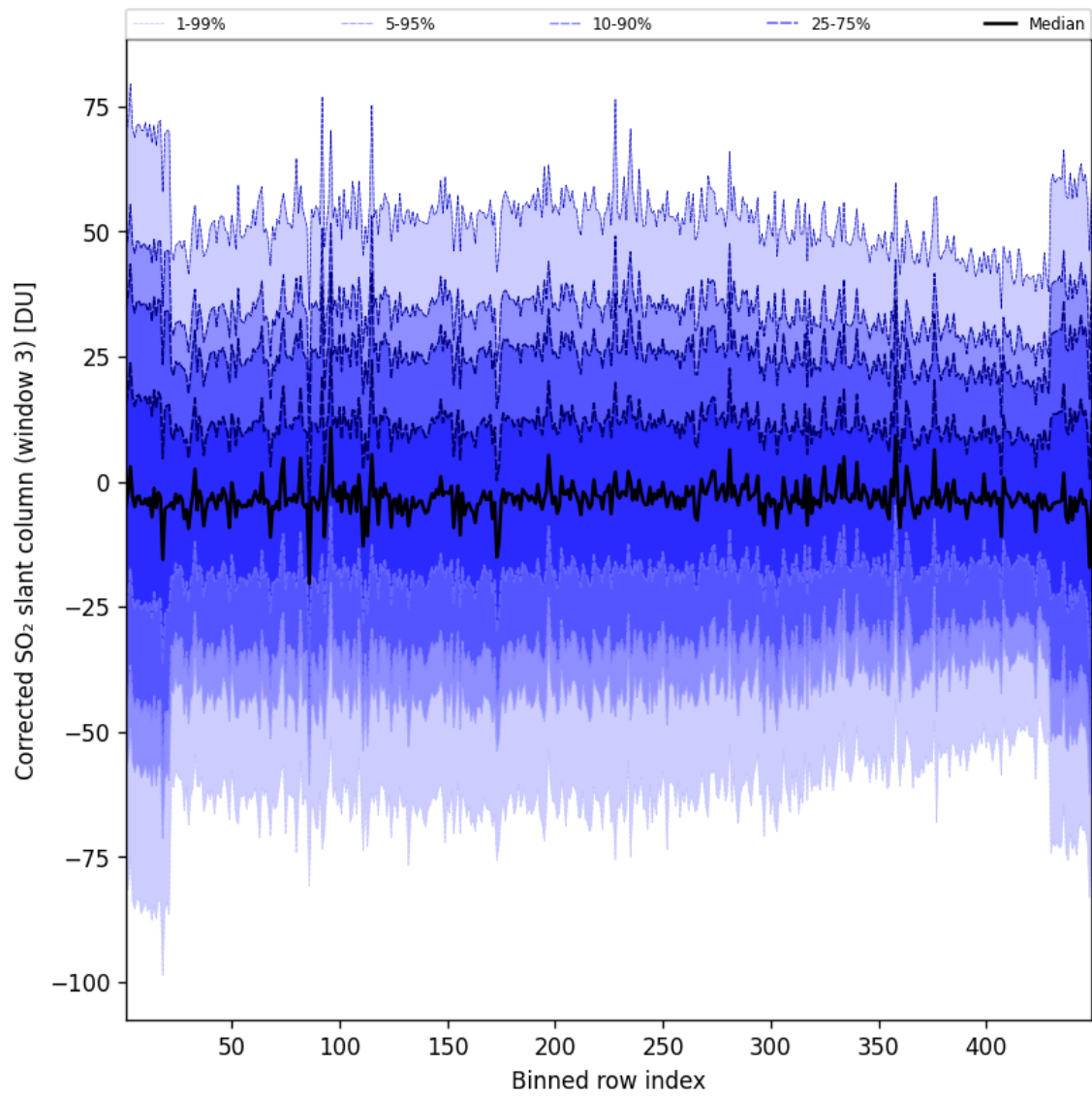


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-07-12 to 2025-07-13

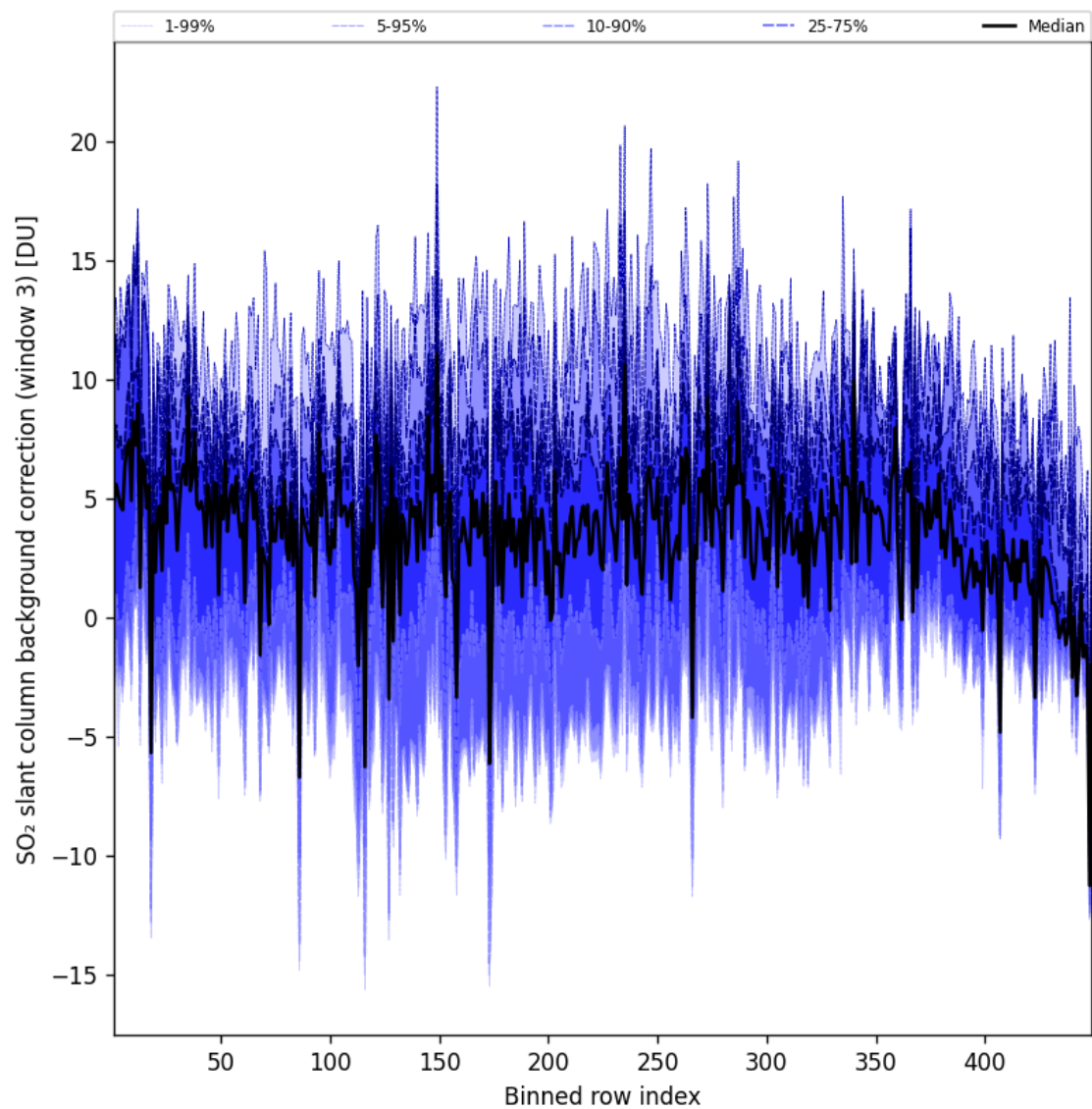


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-07-12 to 2025-07-13

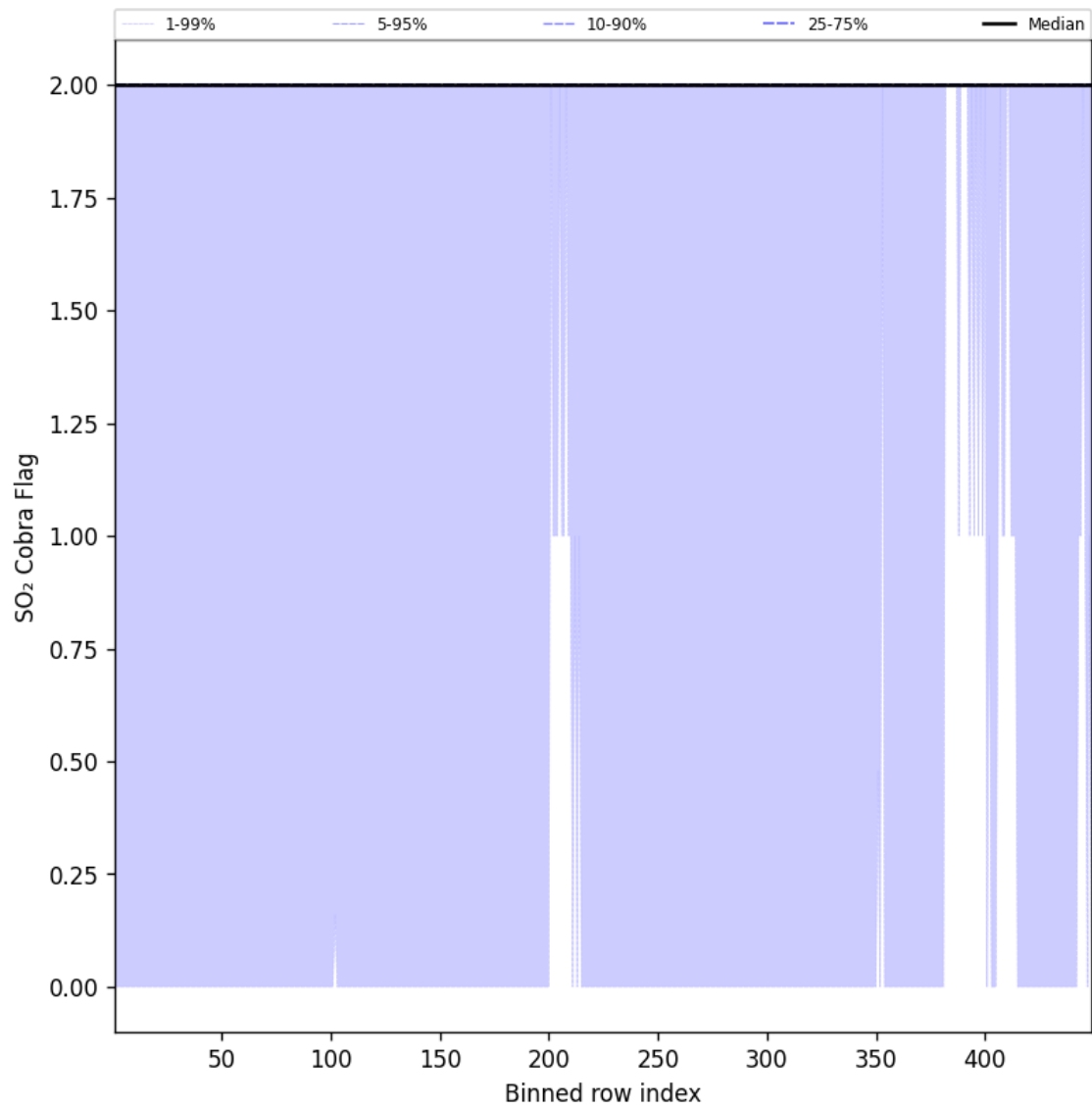


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-07-12 to 2025-07-13

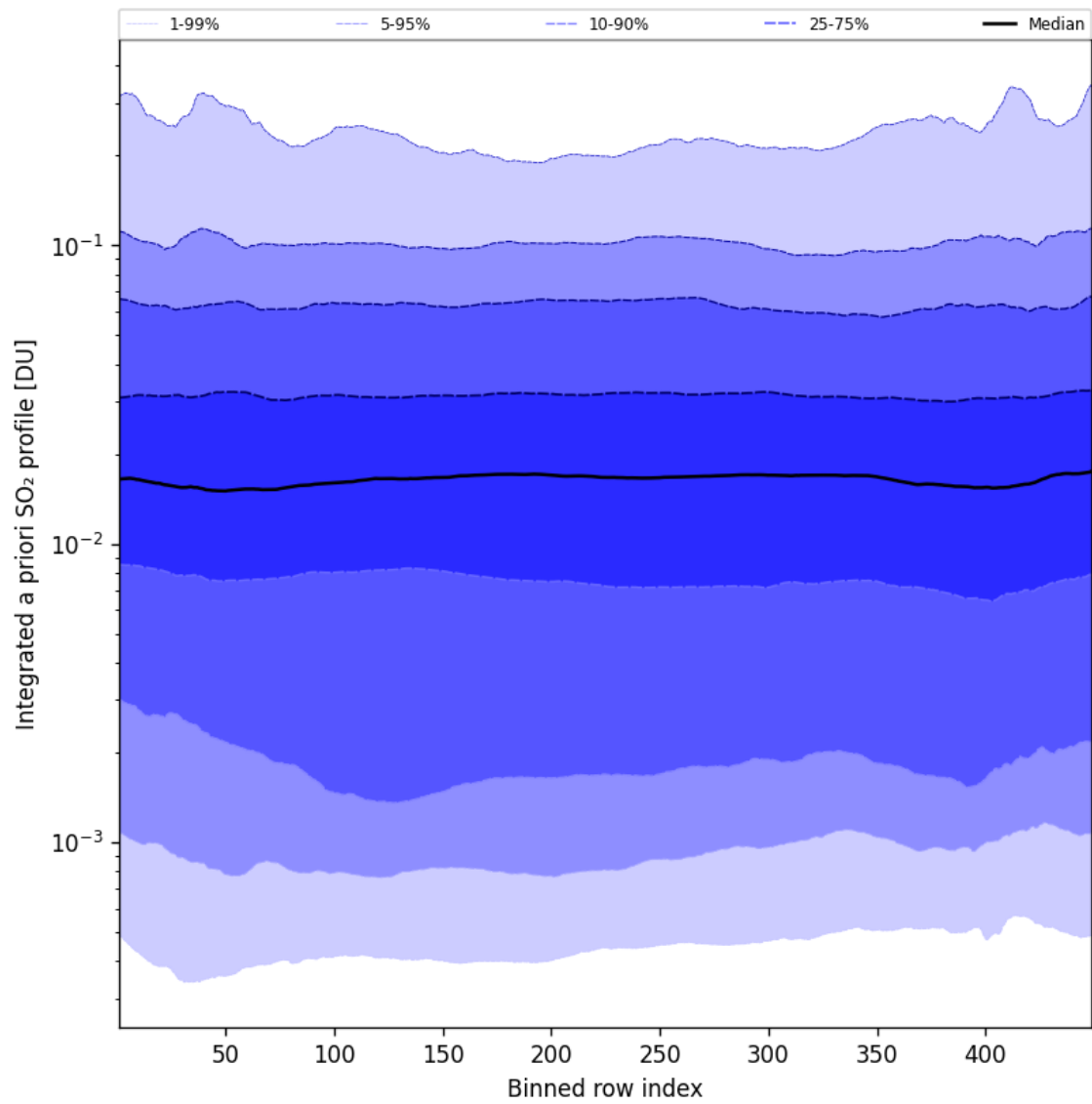


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-07-12 to 2025-07-13

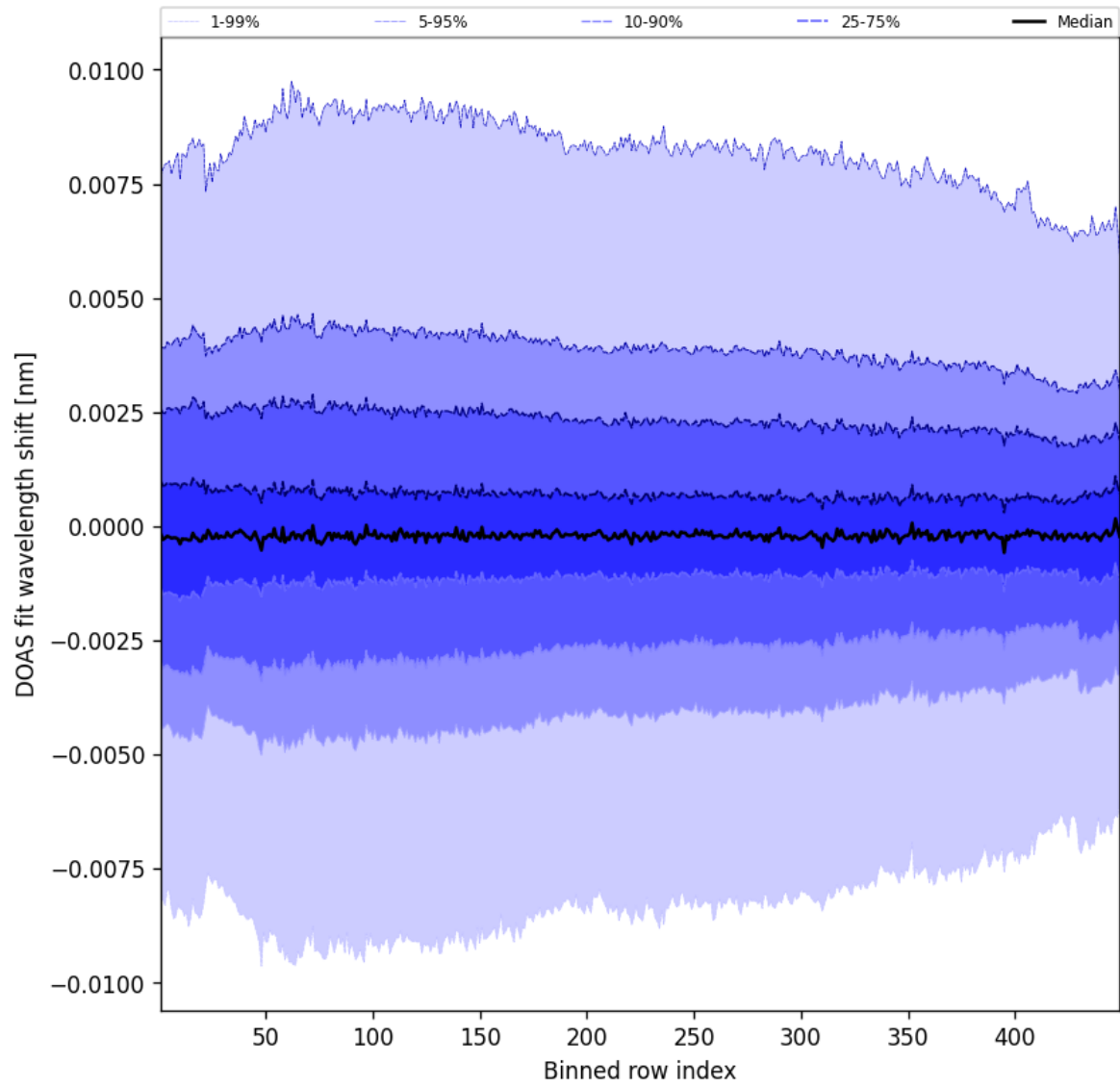


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-07-12 to 2025-07-13

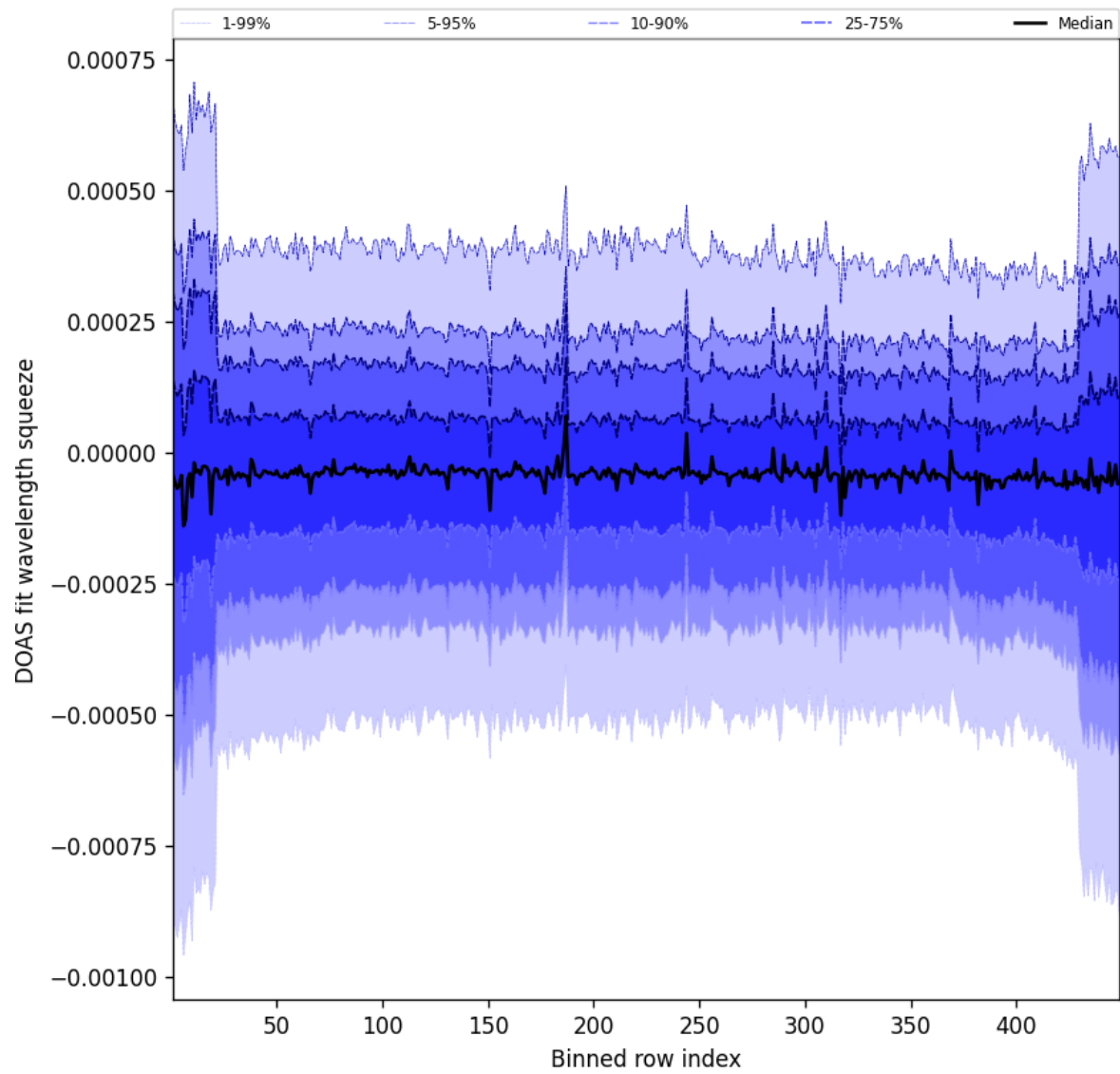


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-07-12 to 2025-07-13

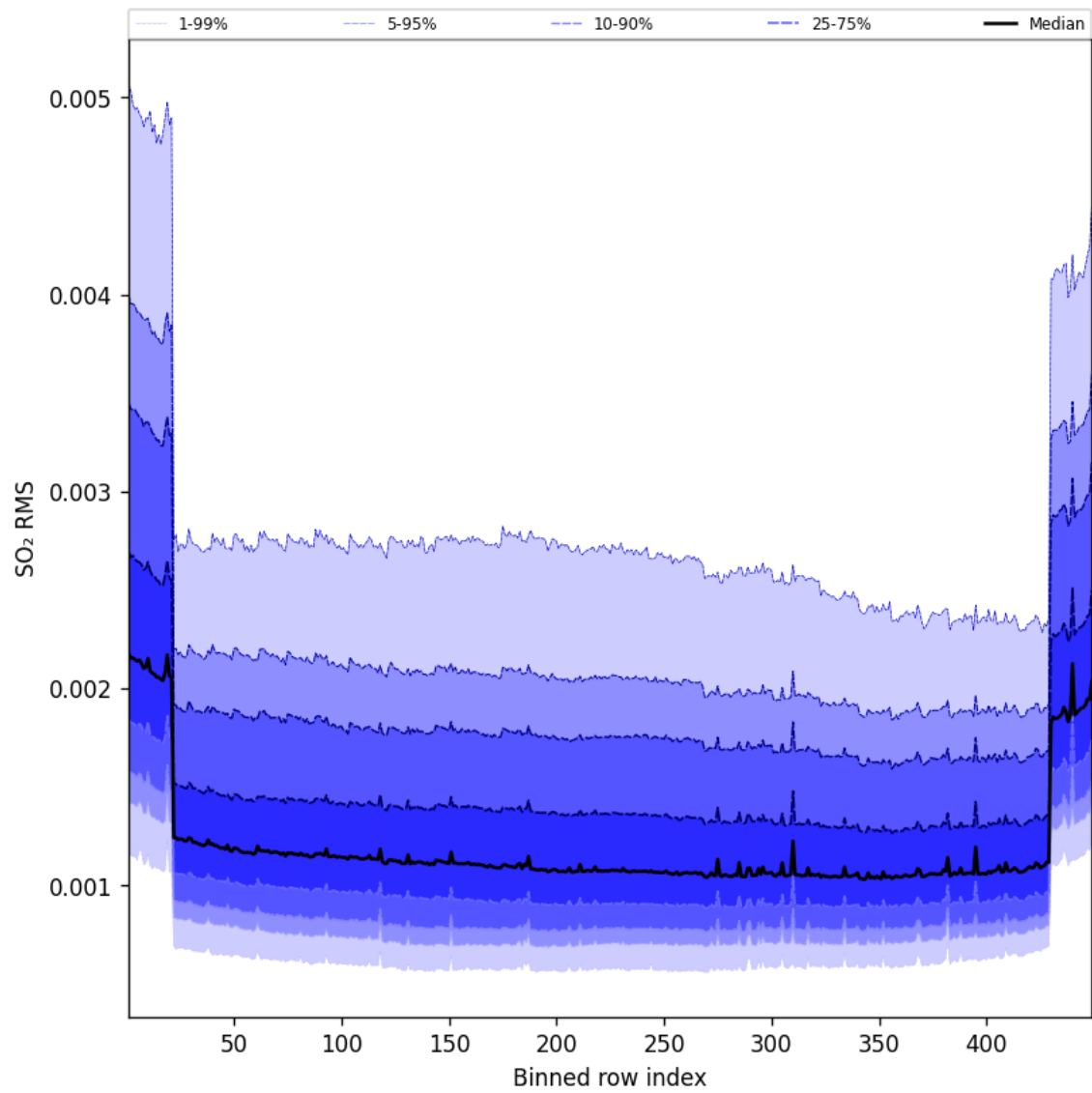


Figure 106: Along track statistics of “SO₂ RMS” for 2025-07-12 to 2025-07-13

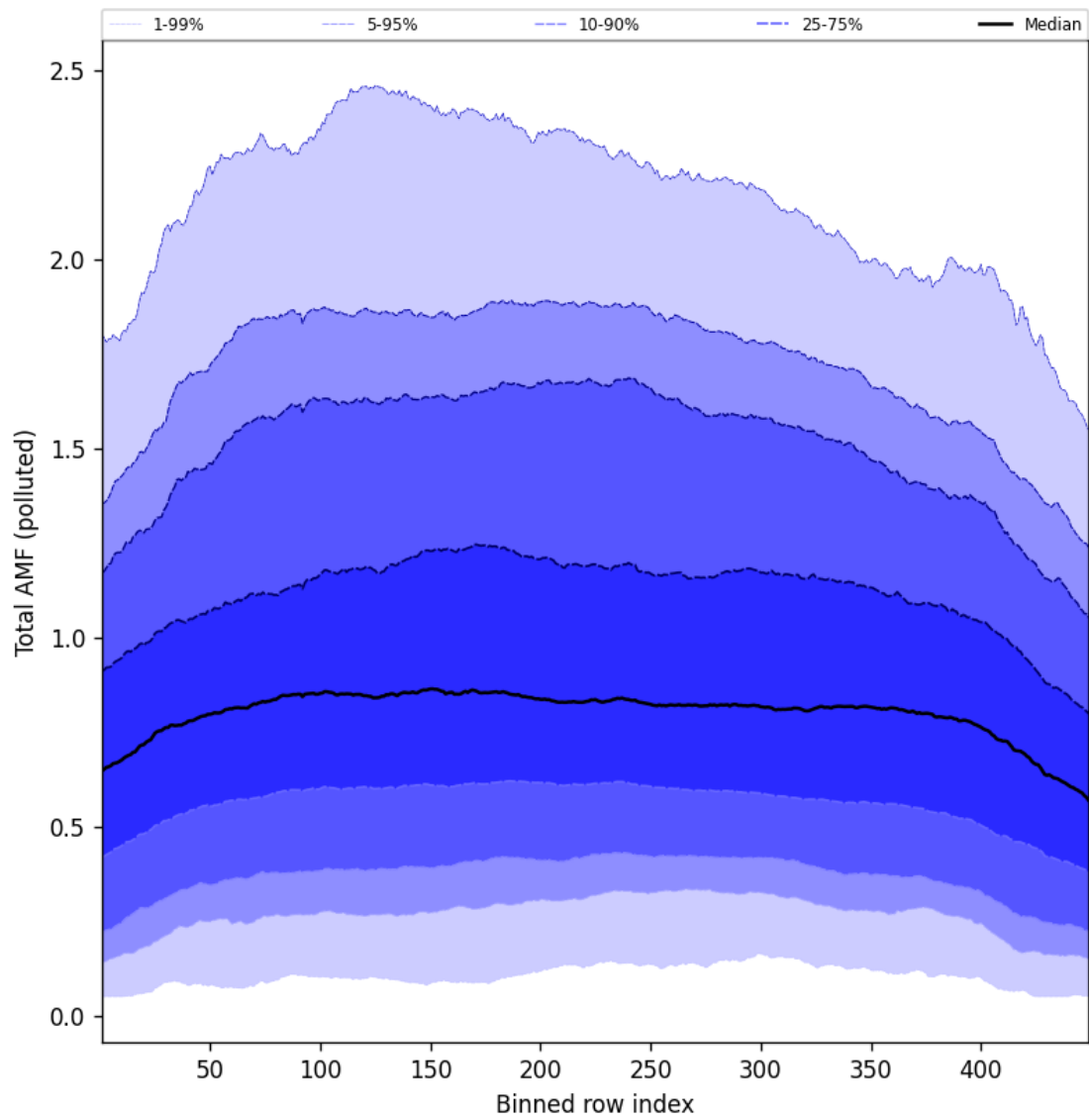


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-07-12 to 2025-07-13

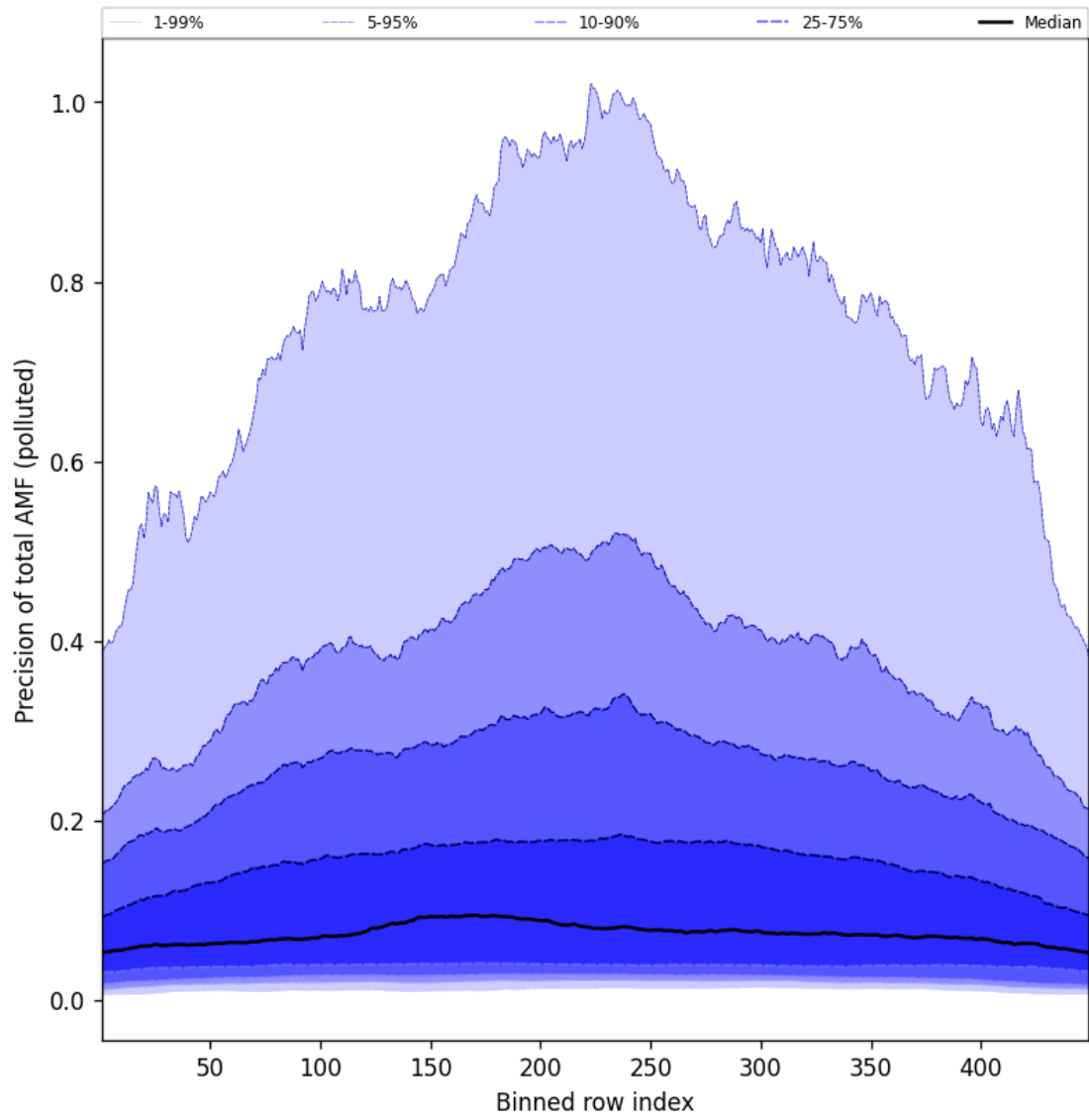


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-07-12 to 2025-07-13

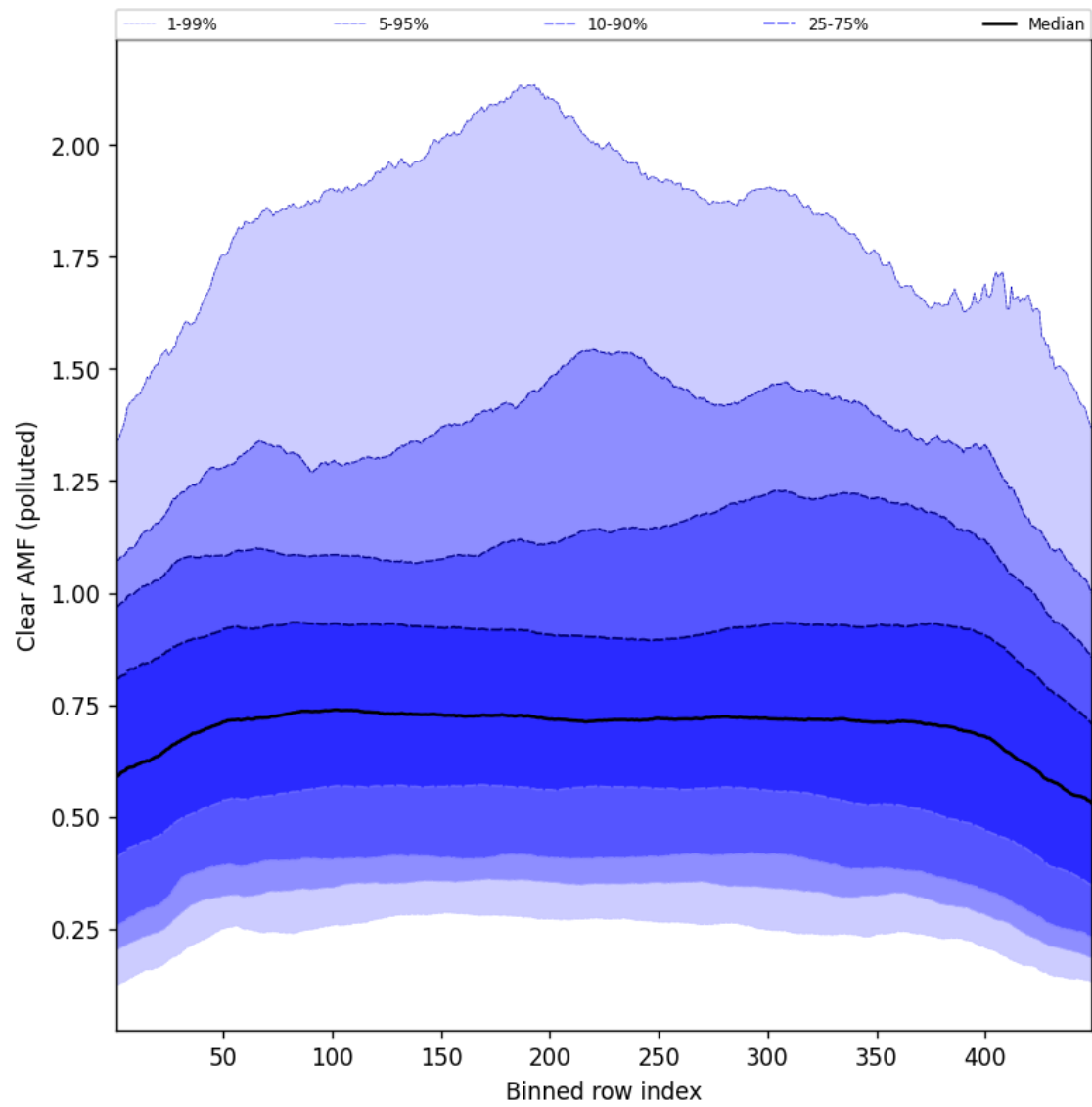


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-07-12 to 2025-07-13

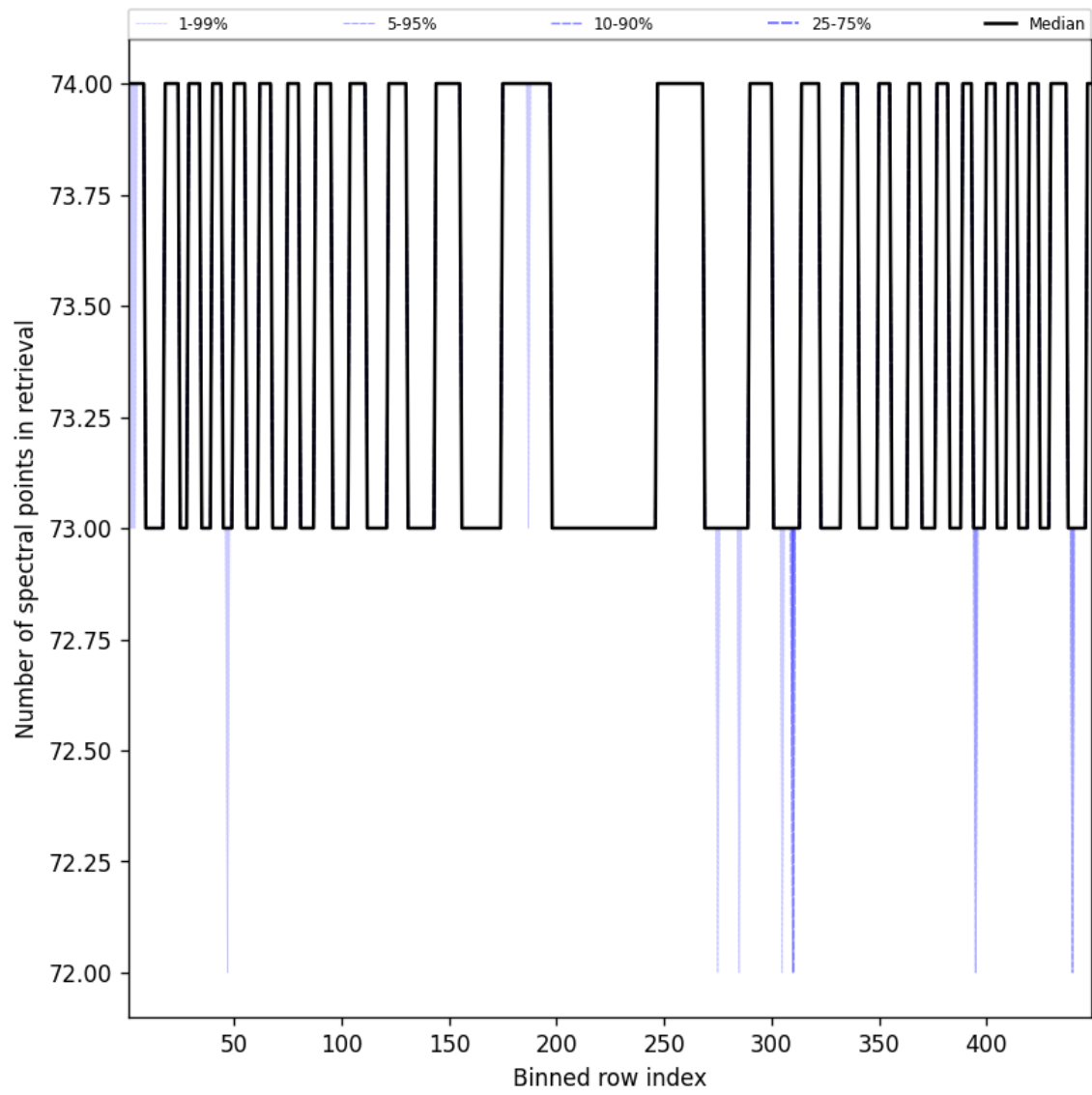


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-07-12 to 2025-07-13

10 Coincidence density

To investigate the relation between parameters scatter density plots are produced. These include some ‘hidden’ parameters, latitude and the solar- and viewing geometries, in addition to all configured parameters. All combinations of pairs of parameters are included *once*, in one direction alone.

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