

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]	0.686 ± 0.400	17306710	0.995	0.740	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.091 \pm 94.748) \times 10^{-2}$	17306710	0.263	0.463	1.105×10^{-2}	-161	477
sulfurdioxide total vertical column precision [DU]	0.503 ± 0.651	17306710	0.247	0.330	0.341	4.453×10^{-2}	136
sulfurdioxide slant column density corrected [DU]	$(1.960 \pm 38.701) \times 10^{-2}$	17306710	0.250	0.372	9.645×10^{-3}	-53.9	255
sulfurdioxide slant column density cobra [DU]	$(1.944 \pm 36.895) \times 10^{-2}$	17306710	0.250	0.372	9.645×10^{-3}	-53.9	53.1
sulfurdioxide slant column density cobra precision [DU]	0.300 ± 0.138	17306710	0.213	0.146	0.259	8.586×10^{-2}	39.3
sulfurdioxide slant column density window1 [DU]	0.157 ± 0.688	17306710	0.175	0.742	0.159	-79.5	85.2
sulfurdioxide slant column density window1 precision [DU]	0.300 ± 0.138	17306710	0.213	0.146	0.259	8.586×10^{-2}	39.3
sulfurdioxide slant column density corrected win1 [DU]	$(6.208 \pm 68.560) \times 10^{-2}$	17306710	2.500×10^{-2}	0.736	4.153×10^{-2}	-79.5	85.6
background so2 slant column offset window1 [DU]	$(-9.487 \pm 12.522) \times 10^{-2}$	17306710	-0.180	0.130	-0.115	-0.813	4.09
sulfurdioxide slant column density window2 [DU]	2.92 ± 9.36	17306710	2.25	11.8	2.70	-971	823
sulfurdioxide slant column density window2 precision [DU]	8.43 ± 2.38	17306710	7.43	2.80	8.09	2.34	441
sulfurdioxide slant column density corrected win2 [DU]	1.22 ± 9.14	17306710	1.75	11.5	1.24	-977	821
background so2 slant column offset window2 [DU]	-1.71 ± 2.38	17306710	0.250	2.86	-1.04	-14.1	5.28
sulfurdioxide slant column density window3 [DU]	-13.3 ± 25.1	17306710	-11.8	31.3	-13.0	-1.845×10^3	6.413×10^3
sulfurdioxide slant column density window3 precision [DU]	29.6 ± 14.0	17306710	23.7	10.7	26.0	9.47	2.953×10^3
sulfurdioxide slant column density corrected win3 [DU]	-5.90 ± 24.54	17306710	-6.16	30.8	-5.74	-1.846×10^3	6.411×10^3
background so2 slant column offset window3 [DU]	7.39 ± 5.72	17306710	3.92	8.96	7.18	-20.1	49.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	17306710	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.260 \pm 6.003) \times 10^{-2}$	17306710	1.664×10^{-2}	2.034×10^{-2}	1.693×10^{-2}	1.403×10^{-4}	2.25
fitted radiance shift [nm]	$(-3.654 \pm 27.383) \times 10^{-4}$	17306710	-5.000×10^{-4}	1.894×10^{-3}	-3.632×10^{-4}	-6.547×10^{-2}	0.102
fitted radiance squeeze [1]	$(-2.353 \pm 18.224) \times 10^{-5}$	17306710	-1.000×10^{-5}	2.095×10^{-4}	-1.993×10^{-5}	-1.639×10^{-2}	1.927×10^{-2}
fitted root mean square [1]	$(1.311 \pm 0.557) \times 10^{-3}$	17306710	9.750×10^{-4}	5.840×10^{-4}	1.150×10^{-3}	2.884×10^{-4}	9.649×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.857 ± 0.420	17306710	0.740	0.503	0.783	5.000×10^{-2}	2.89
sulfurdioxide total air mass factor polluted precision [1]	0.109 ± 0.107	17306710	3.500×10^{-2}	0.109	6.997×10^{-2}	2.747×10^{-3}	1.70
sulfurdioxide clear air mass factor polluted [1]	0.725 ± 0.277	17306710	0.620	0.318	0.695	3.817×10^{-2}	2.99
number of spectral points in retrieval [1]	73.4 ± 0.5	17306710	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	6.000×10^{-2}	0.140	0.260	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.06	-0.853	-0.538	-0.367	-0.217	0.246	0.408	0.598	0.959	2.43
sulfurdioxide total vertical column precision [DU]	9.281×10^{-2}	0.130	0.161	0.191	0.229	0.559	0.726	0.921	1.30	2.93
sulfurdioxide slant column density corrected [DU]	-0.874	-0.505	-0.364	-0.271	-0.174	0.197	0.300	0.402	0.564	1.06
sulfurdioxide slant column density cobra [DU]	-0.874	-0.505	-0.364	-0.271	-0.174	0.197	0.300	0.402	0.564	1.06
sulfurdioxide slant column density cobra precision [DU]	0.141	0.168	0.183	0.195	0.210	0.356	0.412	0.463	0.550	0.787
sulfurdioxide slant column density window1 [DU]	-1.68	-0.900	-0.607	-0.414	-0.214	0.528	0.724	0.915	1.21	2.01
sulfurdioxide slant column density window1 precision [DU]	0.141	0.168	0.183	0.195	0.210	0.356	0.412	0.463	0.550	0.787
sulfurdioxide slant column density corrected win1 [DU]	-1.64	-0.951	-0.686	-0.508	-0.320	0.416	0.621	0.824	1.14	2.02
background so2 slant column offset window1 [DU]	-0.332	-0.240	-0.210	-0.194	-0.174	-4.362×10^{-2}	5.822×10^{-3}	5.454×10^{-2}	0.129	0.296
sulfurdioxide slant column density window2 [DU]	-18.8	-11.9	-8.46	-5.93	-3.09	8.68	11.8	14.6	18.5	26.8
sulfurdioxide slant column density window2 precision [DU]	4.36	5.30	5.86	6.32	6.85	9.65	10.6	11.4	12.7	15.4
sulfurdioxide slant column density corrected win2 [DU]	-21.1	-13.6	-10.1	-7.44	-4.54	6.99	9.87	12.5	16.0	23.4
background so2 slant column offset window2 [DU]	-9.08	-6.75	-5.07	-3.90	-2.86	7.925×10^{-3}	0.288	0.504	0.831	2.09
sulfurdioxide slant column density window3 [DU]	-76.7	-54.8	-44.4	-36.8	-28.7	2.56	10.5	17.7	27.3	46.4
sulfurdioxide slant column density window3 precision [DU]	13.7	16.2	18.4	20.0	21.9	32.5	37.3	43.5	55.9	88.3
sulfurdioxide slant column density corrected win3 [DU]	-67.4	-46.3	-36.3	-29.0	-21.1	9.64	17.4	24.4	33.9	53.0
background so2 slant column offset window3 [DU]	-4.90	-1.24	0.250	1.48	2.96	11.9	13.5	14.7	16.2	19.5
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	7.171×10^{-4}	1.611×10^{-3}	3.622×10^{-3}	6.153×10^{-3}	9.039×10^{-3}	2.938×10^{-2}	4.518×10^{-2}	7.223×10^{-2}	0.121	0.278
fitted radiance shift [nm]	-8.541×10^{-3}	-4.447×10^{-3}	-2.973×10^{-3}	-2.106×10^{-3}	-1.350×10^{-3}	5.444×10^{-4}	1.304×10^{-3}	2.237×10^{-3}	3.834×10^{-3}	8.198×10^{-3}
fitted radiance squeeze [1]	-5.050×10^{-4}	-3.167×10^{-4}	-2.376×10^{-4}	-1.834×10^{-4}	-1.265×10^{-4}	8.304×10^{-5}	1.359×10^{-4}	1.853×10^{-4}	2.568×10^{-4}	4.322×10^{-4}
fitted root mean square [1]	5.920×10^{-4}	7.318×10^{-4}	8.139×10^{-4}	8.757×10^{-4}	9.497×10^{-4}	1.534×10^{-3}	1.779×10^{-3}	2.009×10^{-3}	2.363×10^{-3}	3.301×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.118	0.290	0.395	0.474	0.569	1.07	1.26	1.44	1.67	2.13
sulfurdioxide total air mass factor polluted precision [1]	1.231×10^{-2}	2.079×10^{-2}	2.603×10^{-2}	3.070×10^{-2}	3.749×10^{-2}	0.146	0.188	0.232	0.309	0.530
sulfurdioxide clear air mass factor polluted [1]	0.257	0.358	0.422	0.476	0.544	0.862	0.957	1.04	1.18	1.60
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]	0.660 ± 0.411	10514841	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(2.084 \pm 74.287) \times 10^{-2}$	10514841	0.416	8.764×10^{-3}	-83.2	80.1	-0.197	0.219
sulfurdioxide total vertical column precision [DU]	0.439 ± 0.531	10514841	0.279	0.301	4.468×10^{-2}	29.3	0.212	0.490
sulfurdioxide slant column density corrected [DU]	$(1.470 \pm 31.986) \times 10^{-2}$	10514841	0.346	7.852×10^{-3}	-6.45	41.9	-0.164	0.182
sulfurdioxide slant column density cobra [DU]	$(1.469 \pm 31.912) \times 10^{-2}$	10514841	0.346	7.852×10^{-3}	-6.45	12.4	-0.164	0.182
sulfurdioxide slant column density cobra precision [DU]	0.273 ± 0.107	10514841	0.116	0.241	8.586×10^{-2}	4.97	0.202	0.318
sulfurdioxide slant column density window1 [DU]	0.160 ± 0.612	10514841	0.696	0.160	-8.99	26.8	-0.189	0.507
sulfurdioxide slant column density window1 precision [DU]	0.273 ± 0.107	10514841	0.116	0.241	8.586×10^{-2}	4.97	0.202	0.318
sulfurdioxide slant column density corrected win1 [DU]	$(5.107 \pm 60.627) \times 10^{-2}$	10514841	0.688	3.661×10^{-2}	-9.03	27.0	-0.303	0.385
background so2 slant column offset window1 [DU]	-0.109 ± 0.103	10514841	0.121	-0.124	-0.715	1.70	-0.178	-5.672×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.41 ± 8.83	10514841	11.2	2.31	-470	182	-3.26	7.97
sulfurdioxide slant column density window2 precision [DU]	8.15 ± 2.26	10514841	2.68	7.80	2.34	140	6.62	9.30
sulfurdioxide slant column density corrected win2 [DU]	1.29 ± 8.74	10514841	11.1	1.32	-474	176	-4.25	6.87
background so2 slant column offset window2 [DU]	-1.12 ± 1.65	10514841	2.36	-0.765	-10.1	5.26	-2.24	0.113
sulfurdioxide slant column density window3 [DU]	-12.6 ± 24.7	10514841	30.5	-12.4	-1.845×10^3	6.413×10^3	-27.7	2.83
sulfurdioxide slant column density window3 precision [DU]	29.0 ± 14.5	10514841	10.8	25.0	9.47	2.953×10^3	21.1	31.9
sulfurdioxide slant column density corrected win3 [DU]	-6.09 ± 24.06	10514841	30.0	-5.95	-1.846×10^3	6.411×10^3	-20.9	9.05
background so2 slant column offset window3 [DU]	6.50 ± 5.80	10514841	9.77	6.23	-20.1	34.2	1.75	11.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	10514841	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.421 \pm 6.436) \times 10^{-2}$	10514841	2.578×10^{-2}	1.651×10^{-2}	1.403×10^{-4}	2.25	7.298×10^{-3}	3.308×10^{-2}
fitted radiance shift [nm]	$(-1.298 \pm 28.502) \times 10^{-4}$	10514841	1.804×10^{-3}	-1.746×10^{-4}	-4.277×10^{-2}	4.169×10^{-2}	-1.051×10^{-3}	7.531×10^{-4}
fitted radiance squeeze [1]	$(-4.296 \pm 16.643) \times 10^{-5}$	10514841	1.998×10^{-4}	-3.497×10^{-5}	-9.762×10^{-3}	7.368×10^{-3}	-1.385×10^{-4}	6.133×10^{-5}
fitted root mean square [1]	$(1.213 \pm 0.452) \times 10^{-3}$	10514841	4.936×10^{-4}	1.091×10^{-3}	3.243×10^{-4}	2.072×10^{-2}	9.151×10^{-4}	1.409×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.894 ± 0.449	10514841	0.536	0.821	5.000×10^{-2}	2.89	0.583	1.12
sulfurdioxide total air mass factor polluted precision [1]	0.117 ± 0.115	10514841	0.117	7.514×10^{-2}	3.236×10^{-3}	1.66	4.003×10^{-2}	0.157
sulfurdioxide clear air mass factor polluted [1]	0.769 ± 0.313	10514841	0.376	0.746	6.471×10^{-2}	2.99	0.552	0.928
number of spectral points in retrieval [1]	73.5 ± 0.5	10514841	1.000	73.0	71.0	74.0	73.0	74.0

Table 4: Parameterlist and basic statistics for the analysis for observations in the southern hemisphere

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.726 ± 0.377	6791869	0.640	1.000	0.0	1.000	0.360	1.000
sulfurdioxide total vertical column [DU]	$(4.651 \pm 119.699) \times 10^{-2}$	6791869	0.553	1.562×10^{-2}	-161	477	-0.255	0.298
sulfurdioxide total vertical column precision [DU]	0.603 ± 0.792	6791869	0.398	0.409	4.453×10^{-2}	136	0.275	0.672
sulfurdioxide slant column density corrected [DU]	$(2.719 \pm 47.241) \times 10^{-2}$	6791869	0.419	1.297×10^{-2}	-53.9	255	-0.194	0.225
sulfurdioxide slant column density cobra [DU]	$(2.678 \pm 43.489) \times 10^{-2}$	6791869	0.419	1.297×10^{-2}	-53.9	53.1	-0.194	0.225
sulfurdioxide slant column density cobra precision [DU]	0.342 ± 0.166	6791869	0.184	0.298	8.833×10^{-2}	39.3	0.230	0.414
sulfurdioxide slant column density window1 [DU]	0.152 ± 0.792	6791869	0.823	0.156	-79.5	85.2	-0.258	0.565
sulfurdioxide slant column density window1 precision [DU]	0.342 ± 0.166	6791869	0.184	0.298	8.833×10^{-2}	39.3	0.230	0.414
sulfurdioxide slant column density corrected win1 [DU]	$(7.912 \pm 79.261) \times 10^{-2}$	6791869	0.820	5.053×10^{-2}	-79.5	85.6	-0.350	0.469
background so2 slant column offset window1 [DU]	$(-7.249 \pm 15.106) \times 10^{-2}$	6791869	0.146	-0.102	-0.813	4.09	-0.165	-1.951×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.72 ± 10.08	6791869	12.6	3.39	-971	823	-2.78	9.86
sulfurdioxide slant column density window2 precision [DU]	8.88 ± 2.49	6791869	2.86	8.54	2.50	441	7.27	10.1
sulfurdioxide slant column density corrected win2 [DU]	1.10 ± 9.72	6791869	12.2	1.11	-977	821	-5.00	7.20
background so2 slant column offset window2 [DU]	-2.62 ± 2.98	6791869	4.55	-1.66	-14.1	5.28	-4.78	-0.229
sulfurdioxide slant column density window3 [DU]	-14.3 ± 25.6	6791869	32.5	-14.0	-347	666	-30.4	2.14
sulfurdioxide slant column density window3 precision [DU]	30.5 ± 13.0	6791869	10.1	27.3	9.72	285	23.2	33.3
sulfurdioxide slant column density corrected win3 [DU]	-5.60 ± 25.26	6791869	32.1	-5.40	-343	667	-21.5	10.6
background so2 slant column offset window3 [DU]	8.75 ± 5.33	6791869	7.88	7.95	-17.3	49.4	4.84	12.7
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	6791869	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.012 \pm 5.252) \times 10^{-2}$	6791869	1.512×10^{-2}	1.734×10^{-2}	1.159×10^{-3}	1.40	1.095×10^{-2}	2.607×10^{-2}
fitted radiance shift [nm]	$(-7.301 \pm 25.121) \times 10^{-4}$	6791869	1.919×10^{-3}	-6.818×10^{-4}	-6.547×10^{-2}	0.102	-1.736×10^{-3}	1.824×10^{-4}
fitted radiance squeeze [1]	$(6.553 \pm 200.636) \times 10^{-6}$	6791869	2.238×10^{-4}	6.245×10^{-6}	-1.639×10^{-2}	1.927×10^{-2}	-1.051×10^{-4}	1.187×10^{-4}
fitted root mean square [1]	$(1.463 \pm 0.661) \times 10^{-3}$	6791869	7.324×10^{-4}	1.264×10^{-3}	2.884×10^{-4}	9.649×10^{-2}	1.017×10^{-3}	1.750×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.800 ± 0.365	6791869	0.445	0.729	5.000×10^{-2}	2.67	0.553	0.998
sulfurdioxide total air mass factor polluted precision [1]	$(9.628 \pm 9.101) \times 10^{-2}$	6791869	9.641×10^{-2}	6.308×10^{-2}	2.747×10^{-3}	1.70	3.449×10^{-2}	0.131
sulfurdioxide clear air mass factor polluted [1]	0.658 ± 0.190	6791869	0.228	0.643	3.817×10^{-2}	1.79	0.536	0.764
number of spectral points in retrieval [1]	73.4 ± 0.5	6791869	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]	0.695 ± 0.391	11510480	0.710	1.000	0.0	1.000	0.290	1.000
sulfurdioxide total vertical column [DU]	$(3.476 \pm 97.226) \times 10^{-2}$	11510480	0.462	1.191×10^{-2}	-100	477	-0.215	0.247
sulfurdioxide total vertical column precision [DU]	0.502 ± 0.672	11510480	0.318	0.332	5.079×10^{-2}	73.1	0.230	0.548
sulfurdioxide slant column density corrected [DU]	$(2.192 \pm 40.050) \times 10^{-2}$	11510480	0.373	1.025×10^{-2}	-53.9	255	-0.174	0.199
sulfurdioxide slant column density cobra [DU]	$(2.173 \pm 38.427) \times 10^{-2}$	11510480	0.373	1.025×10^{-2}	-53.9	53.1	-0.174	0.199
sulfurdioxide slant column density cobra precision [DU]	0.305 ± 0.148	11510480	0.165	0.254	8.586×10^{-2}	39.3	0.207	0.372
sulfurdioxide slant column density window1 [DU]	0.160 ± 0.709	11510480	0.747	0.166	-55.5	85.2	-0.211	0.536
sulfurdioxide slant column density window1 precision [DU]	0.305 ± 0.148	11510480	0.165	0.254	8.586×10^{-2}	39.3	0.207	0.372
sulfurdioxide slant column density corrected win1 [DU]	$(6.956 \pm 70.693) \times 10^{-2}$	11510480	0.740	4.749×10^{-2}	-55.5	85.6	-0.316	0.424
background so2 slant column offset window1 [DU]	$(-9.068 \pm 13.528) \times 10^{-2}$	11510480	0.138	-0.116	-0.733	4.09	-0.175	-3.760×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.10 ± 9.35	11510480	11.8	2.81	-960	600	-2.95	8.81
sulfurdioxide slant column density window2 precision [DU]	8.34 ± 2.28	11510480	2.75	7.99	2.34	358	6.80	9.55
sulfurdioxide slant column density corrected win2 [DU]	1.20 ± 9.06	11510480	11.5	1.22	-960	597	-4.52	6.94
background so2 slant column offset window2 [DU]	-1.90 ± 2.65	11510480	3.34	-0.995	-14.1	5.28	-3.31	3.646×10^{-2}
sulfurdioxide slant column density window3 [DU]	-10.9 ± 24.7	11510480	31.2	-10.8	-409	520	-26.3	4.91
sulfurdioxide slant column density window3 precision [DU]	28.5 ± 12.2	11510480	9.84	25.4	9.51	247	21.7	31.5
sulfurdioxide slant column density corrected win3 [DU]	-3.51 ± 23.93	11510480	30.4	-3.59	-407	509	-18.7	11.7
background so2 slant column offset window3 [DU]	7.35 ± 5.87	11510480	9.13	6.80	-20.1	49.4	2.87	12.0
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	11510480	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.272 \pm 3.616) \times 10^{-2}$	11510480	1.478×10^{-2}	1.617×10^{-2}	1.999×10^{-4}	2.16	9.666×10^{-3}	2.445×10^{-2}
fitted radiance shift [nm]	$(-4.163 \pm 24.543) \times 10^{-4}$	11510480	1.911×10^{-3}	-3.807×10^{-4}	-6.547×10^{-2}	0.102	-1.412×10^{-3}	4.987×10^{-4}
fitted radiance squeeze [1]	$(-1.328 \pm 18.391) \times 10^{-5}$	11510480	2.076×10^{-4}	-1.017×10^{-5}	-1.539×10^{-2}	1.927×10^{-2}	-1.154×10^{-4}	9.221×10^{-5}
fitted root mean square [1]	$(1.329 \pm 0.597) \times 10^{-3}$	11510480	6.562×10^{-4}	1.131×10^{-3}	3.243×10^{-4}	9.649×10^{-2}	9.373×10^{-4}	1.593×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.845 ± 0.371	11510480	0.450	0.792	5.000×10^{-2}	2.73	0.595	1.04
sulfurdioxide total air mass factor polluted precision [1]	0.104 ± 0.102	11510480	9.665×10^{-2}	6.812×10^{-2}	2.867×10^{-3}	1.63	3.917×10^{-2}	0.136
sulfurdioxide clear air mass factor polluted [1]	0.716 ± 0.223	11510480	0.289	0.704	4.461×10^{-2}	2.63	0.563	0.851
number of spectral points in retrieval [1]	73.4 ± 0.5	11510480	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]	0.685 ± 0.413	4063590	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(1.973 \pm 79.598) \times 10^{-2}$	4063590	0.439	8.102×10^{-3}	-67.4	209	-0.209	0.230
sulfurdioxide total vertical column precision [DU]	0.476 ± 0.540	4063590	0.333	0.343	4.453×10^{-2}	41.0	0.214	0.547
sulfurdioxide slant column density corrected [DU]	$(1.338 \pm 33.278) \times 10^{-2}$	4063590	0.356	7.403×10^{-3}	-15.5	108	-0.170	0.187
sulfurdioxide slant column density cobra [DU]	$(1.329 \pm 32.307) \times 10^{-2}$	4063590	0.356	7.403×10^{-3}	-15.5	27.8	-0.170	0.187
sulfurdioxide slant column density cobra precision [DU]	0.280 ± 0.110	4063590	0.104	0.253	8.948×10^{-2}	17.1	0.211	0.315
sulfurdioxide slant column density window1 [DU]	0.161 ± 0.617	4063590	0.705	0.154	-45.3	54.4	-0.198	0.508
sulfurdioxide slant column density window1 precision [DU]	0.280 ± 0.110	4063590	0.104	0.253	8.948×10^{-2}	17.1	0.211	0.315
sulfurdioxide slant column density corrected win1 [DU]	$(4.288 \pm 61.322) \times 10^{-2}$	4063590	0.700	2.748×10^{-2}	-45.3	54.3	-0.318	0.382
background so2 slant column offset window1 [DU]	-0.118 ± 0.098	4063590	0.108	-0.130	-0.813	1.62	-0.179	-7.131×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.27 ± 9.24	4063590	11.6	2.21	-956	823	-3.57	8.06
sulfurdioxide slant column density window2 precision [DU]	8.50 ± 2.57	4063590	2.77	8.15	2.40	441	6.89	9.67
sulfurdioxide slant column density corrected win2 [DU]	1.22 ± 9.16	4063590	11.5	1.25	-955	821	-4.51	6.99
background so2 slant column offset window2 [DU]	-1.05 ± 1.62	4063590	2.10	-0.725	-14.1	5.28	-2.01	8.658×10^{-2}
sulfurdioxide slant column density window3 [DU]	-17.8 ± 24.8	4063590	30.3	-17.1	-1.845×10^3	6.413×10^3	-32.7	-2.33
sulfurdioxide slant column density window3 precision [DU]	31.7 ± 17.3	4063590	12.2	27.1	9.47	1.601×10^3	22.2	34.4
sulfurdioxide slant column density corrected win3 [DU]	-11.3 ± 24.8	4063590	30.6	-10.7	-1.846×10^3	6.411×10^3	-26.3	4.26
background so2 slant column offset window3 [DU]	6.53 ± 5.32	4063590	8.42	6.28	-20.1	28.2	2.46	10.9
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.14	4063590	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.757 \pm 8.879) \times 10^{-2}$	4063590	6.226×10^{-2}	2.618×10^{-2}	1.403×10^{-4}	2.25	9.224×10^{-3}	7.148×10^{-2}
fitted radiance shift [nm]	$(-2.780 \pm 33.376) \times 10^{-4}$	4063590	1.803×10^{-3}	-3.487×10^{-4}	-4.398×10^{-2}	5.333×10^{-2}	-1.208×10^{-3}	5.951×10^{-4}
fitted radiance squeeze [1]	$(-3.563 \pm 17.150) \times 10^{-5}$	4063590	2.038×10^{-4}	-3.256×10^{-5}	-1.639×10^{-2}	1.399×10^{-2}	-1.359×10^{-4}	6.790×10^{-5}
fitted root mean square [1]	$(1.227 \pm 0.439) \times 10^{-3}$	4063590	4.297×10^{-4}	1.137×10^{-3}	3.324×10^{-4}	5.362×10^{-2}	9.565×10^{-4}	1.386×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.896 ± 0.518	4063590	0.637	0.760	5.000×10^{-2}	2.89	0.524	1.16
sulfurdioxide total air mass factor polluted precision [1]	0.118 ± 0.120	4063590	0.138	7.373×10^{-2}	2.747×10^{-3}	1.70	3.284×10^{-2}	0.170
sulfurdioxide clear air mass factor polluted [1]	0.762 ± 0.379	4063590	0.385	0.681	3.820×10^{-2}	2.99	0.518	0.903
number of spectral points in retrieval [1]	73.4 ± 0.5	4063590	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

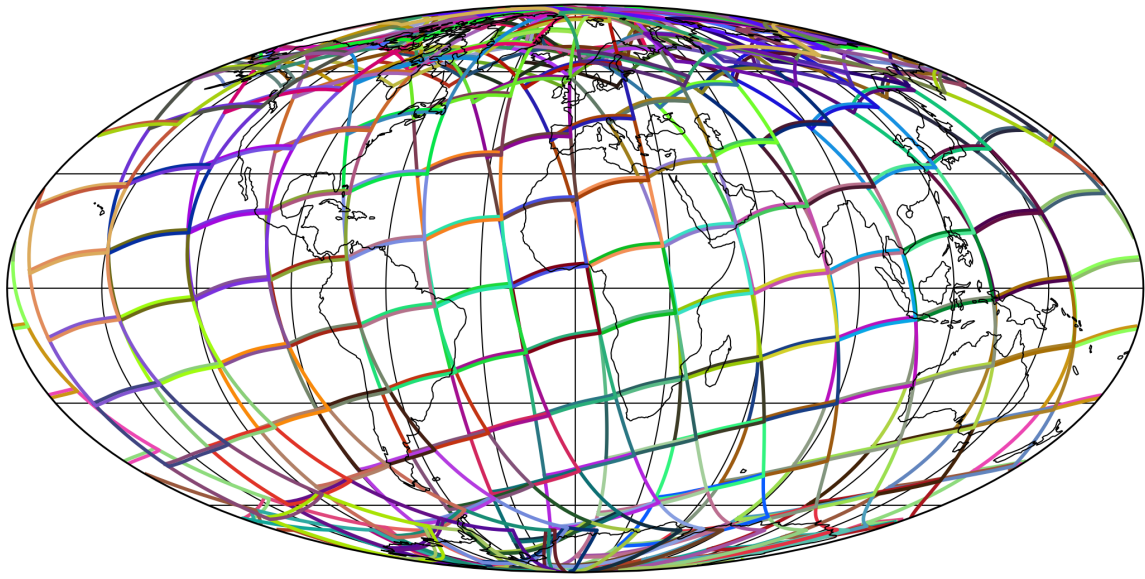


Figure 1: Outline of the granules.

4 Input data monitoring

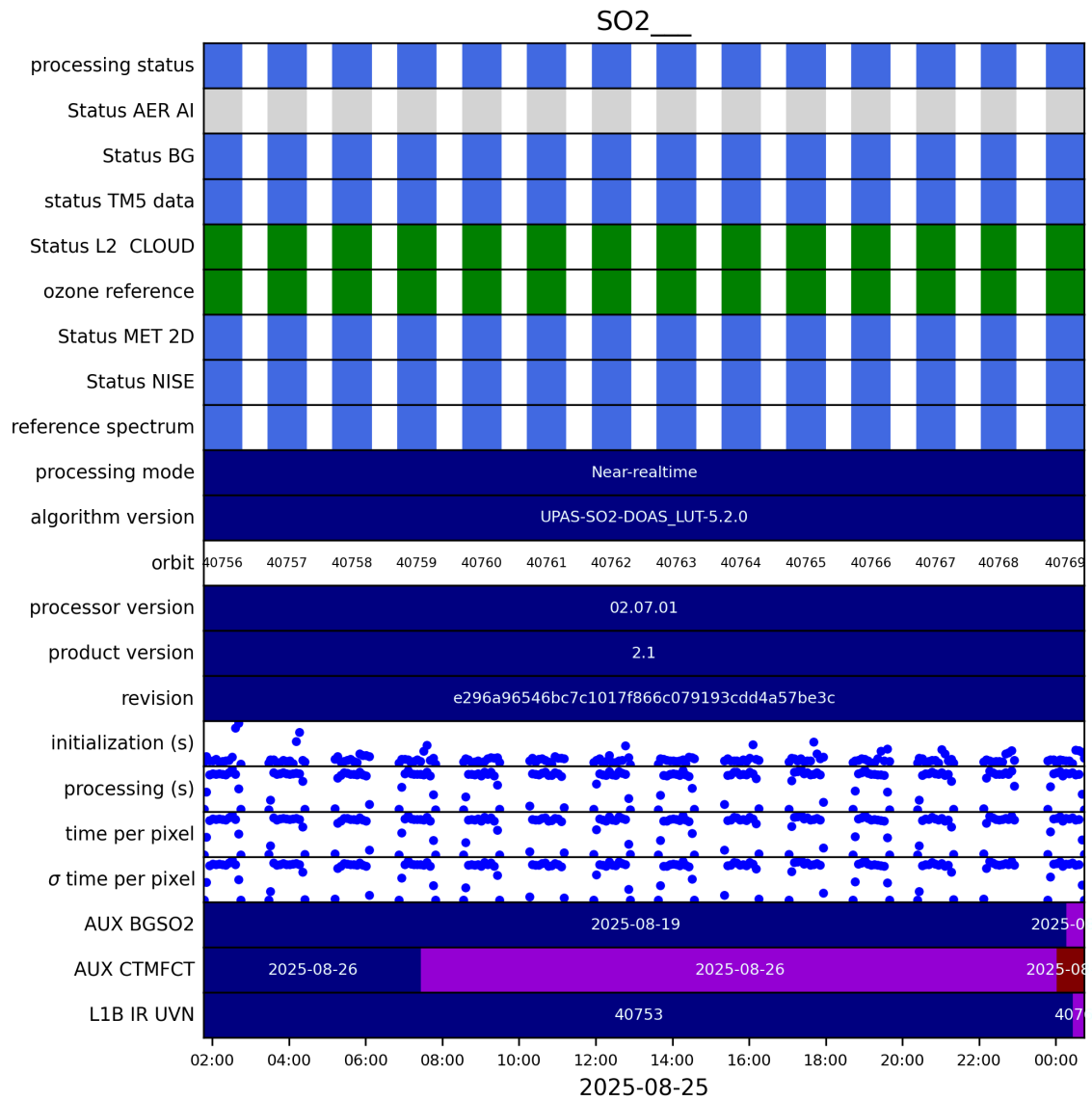


Figure 2: Input data per granule

5 Warnings and errors

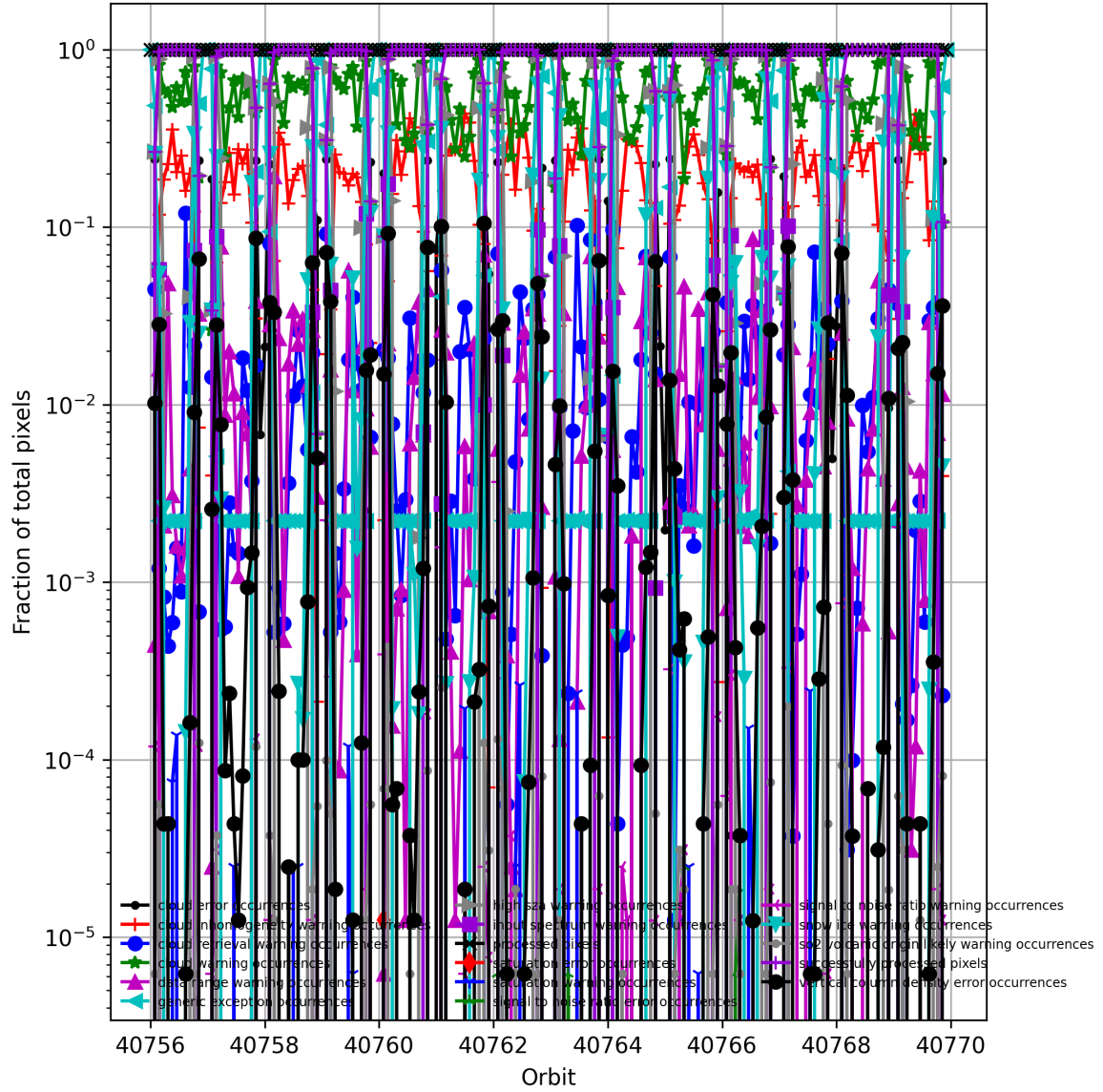


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

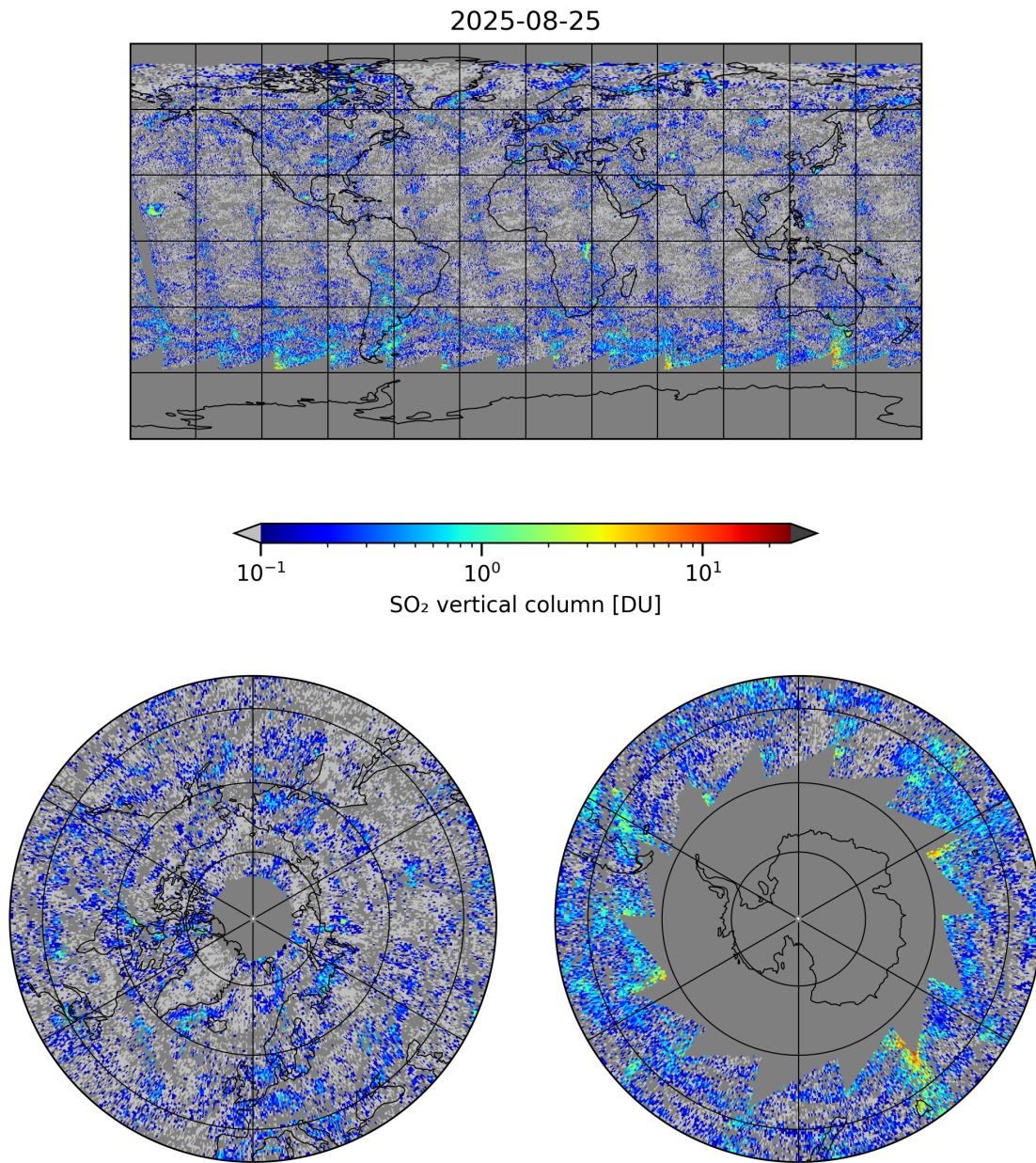


Figure 4: Map of “SO₂ vertical column” for 2025-08-25 to 2025-08-26

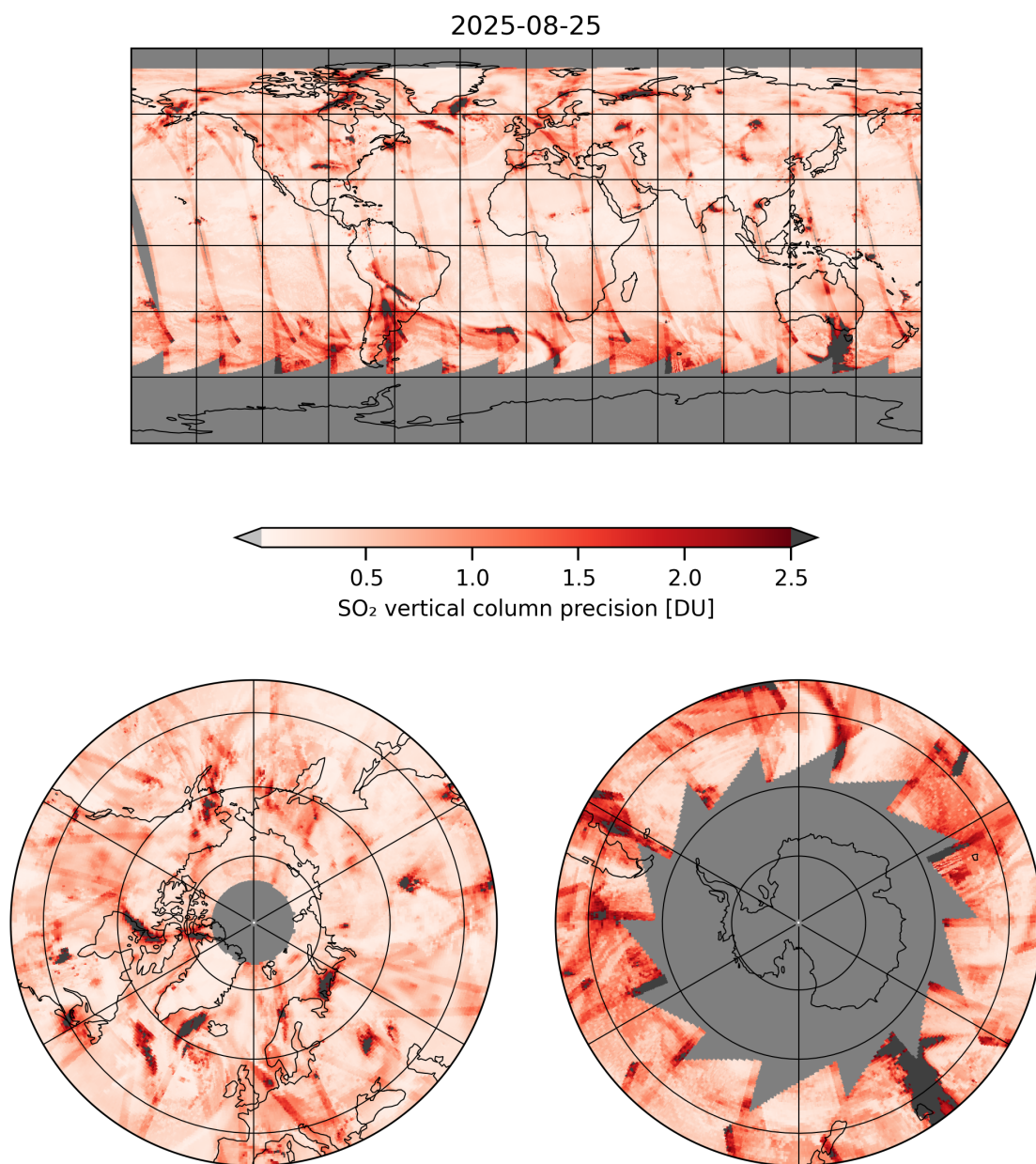


Figure 5: Map of “SO₂ vertical column precision” for 2025-08-25 to 2025-08-26

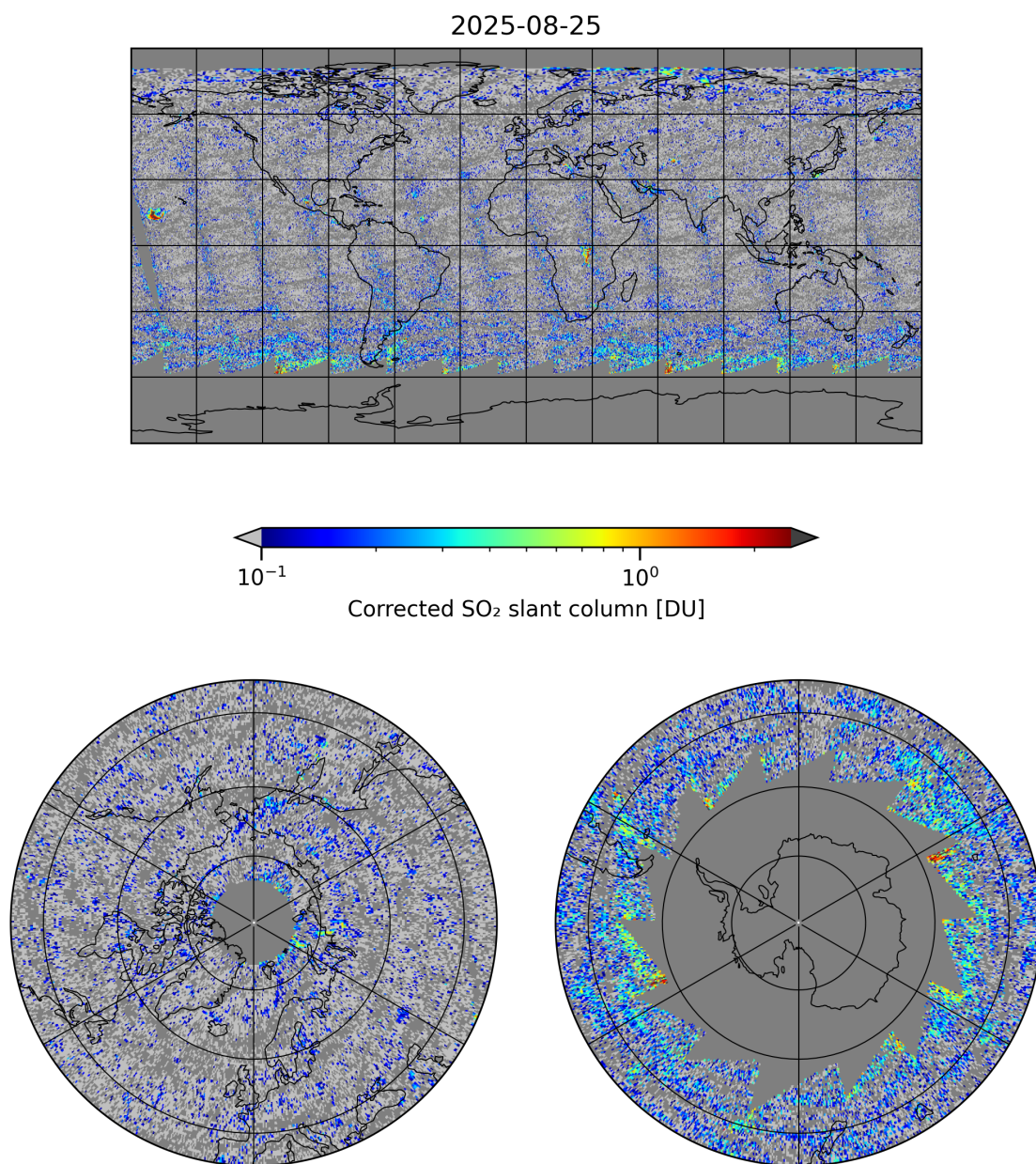


Figure 6: Map of “Corrected SO₂ slant column” for 2025-08-25 to 2025-08-26

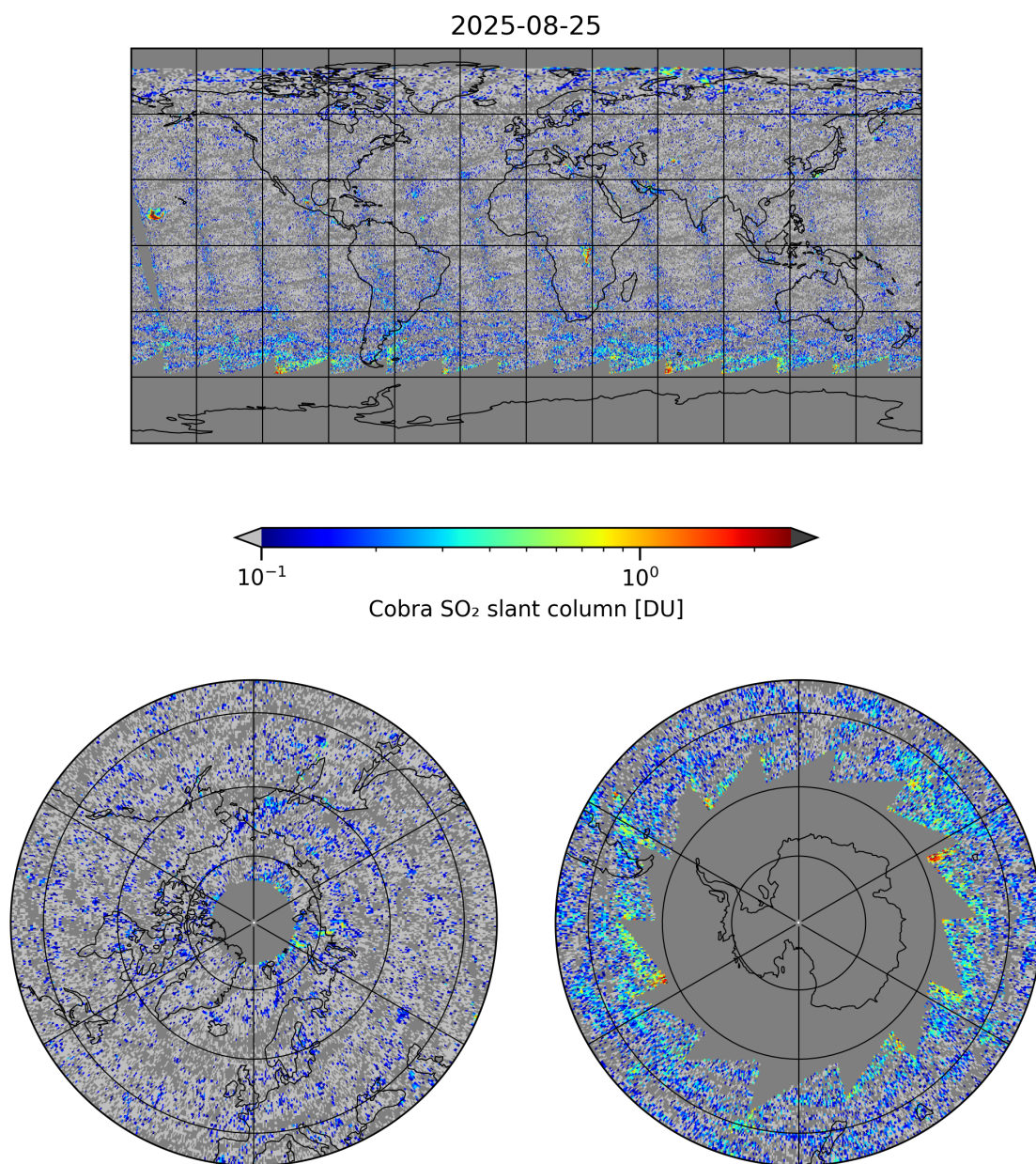


Figure 7: Map of “Cobra SO₂ slant column” for 2025-08-25 to 2025-08-26

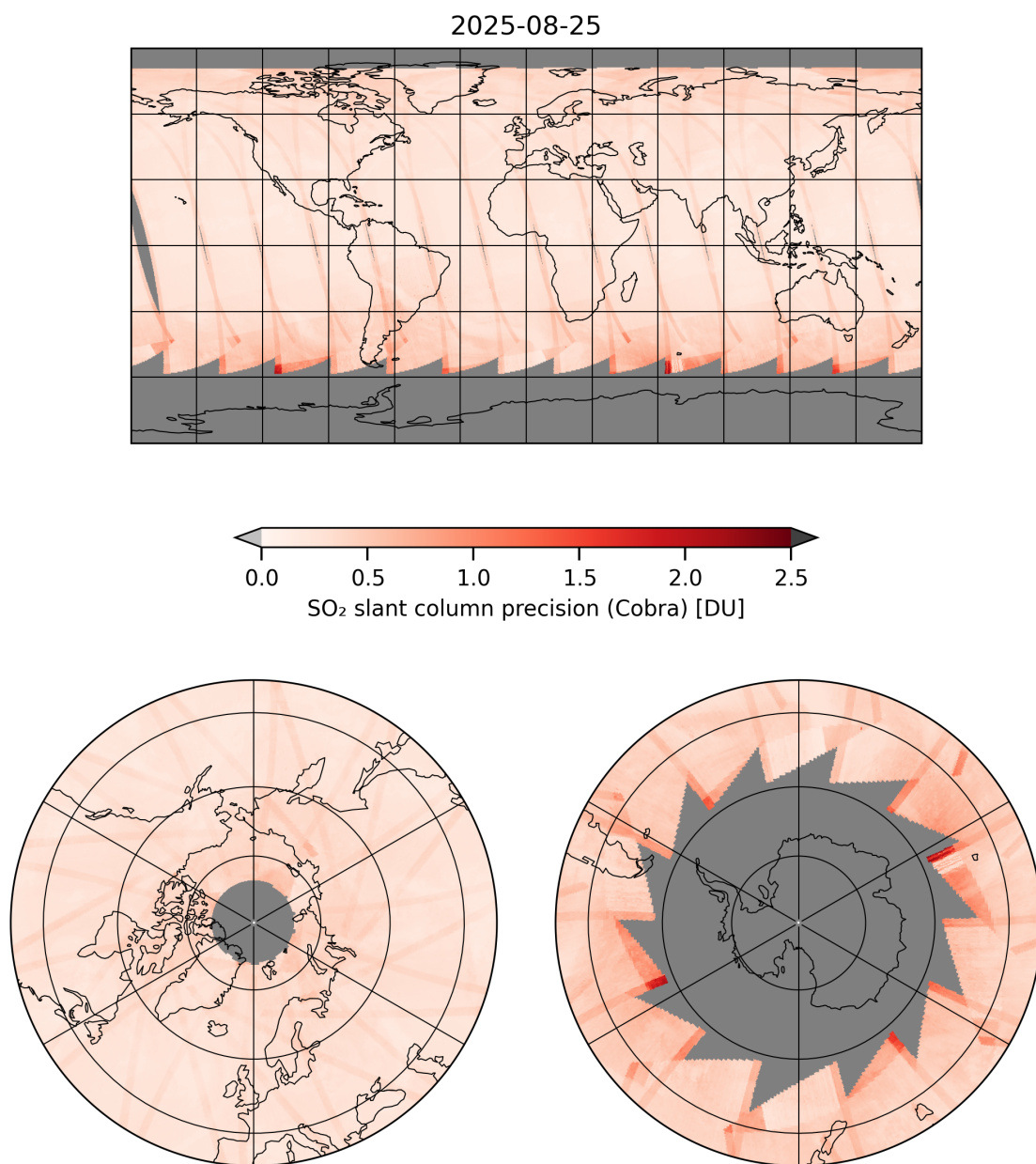


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-08-25 to 2025-08-26

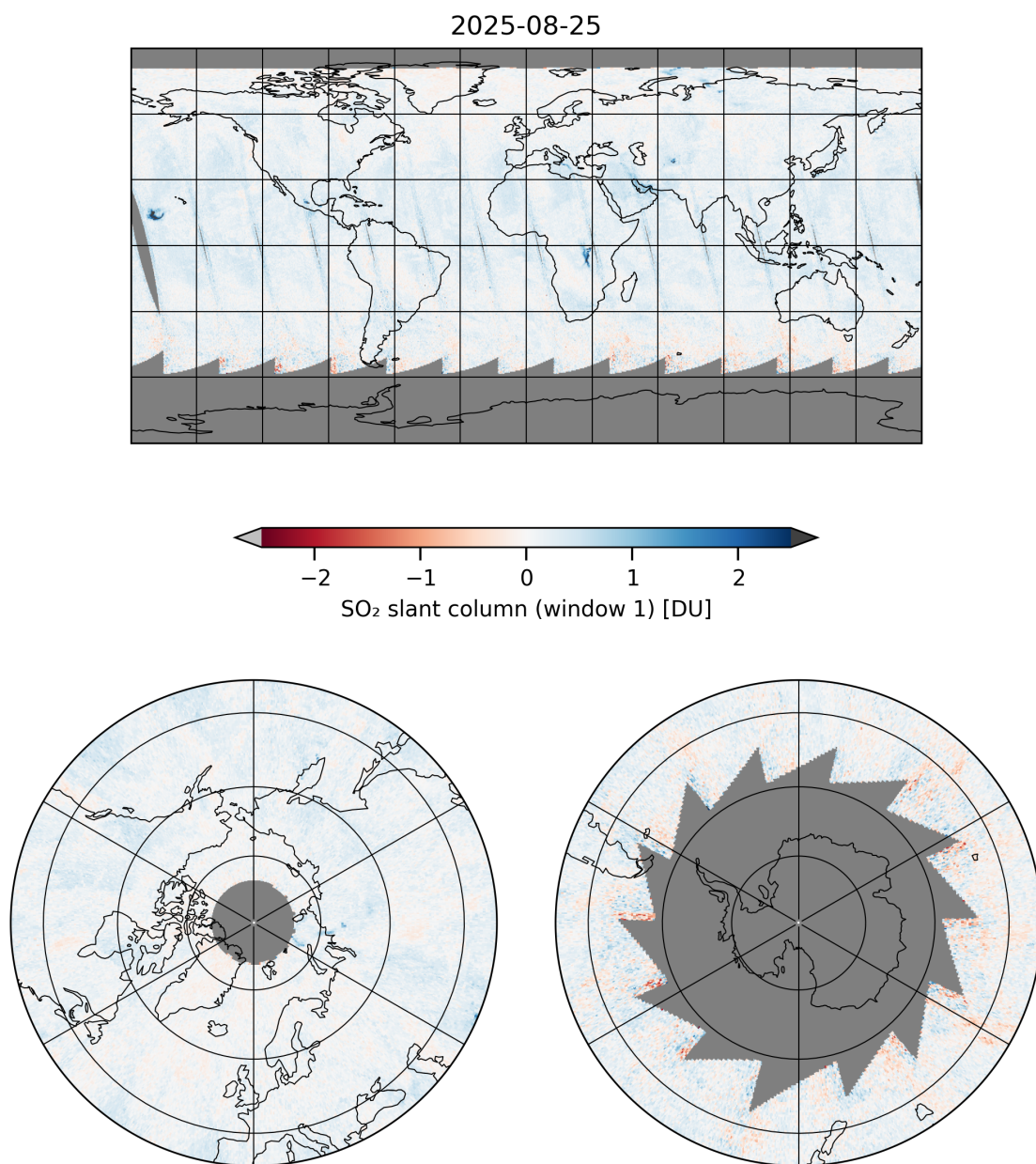


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-08-25 to 2025-08-26

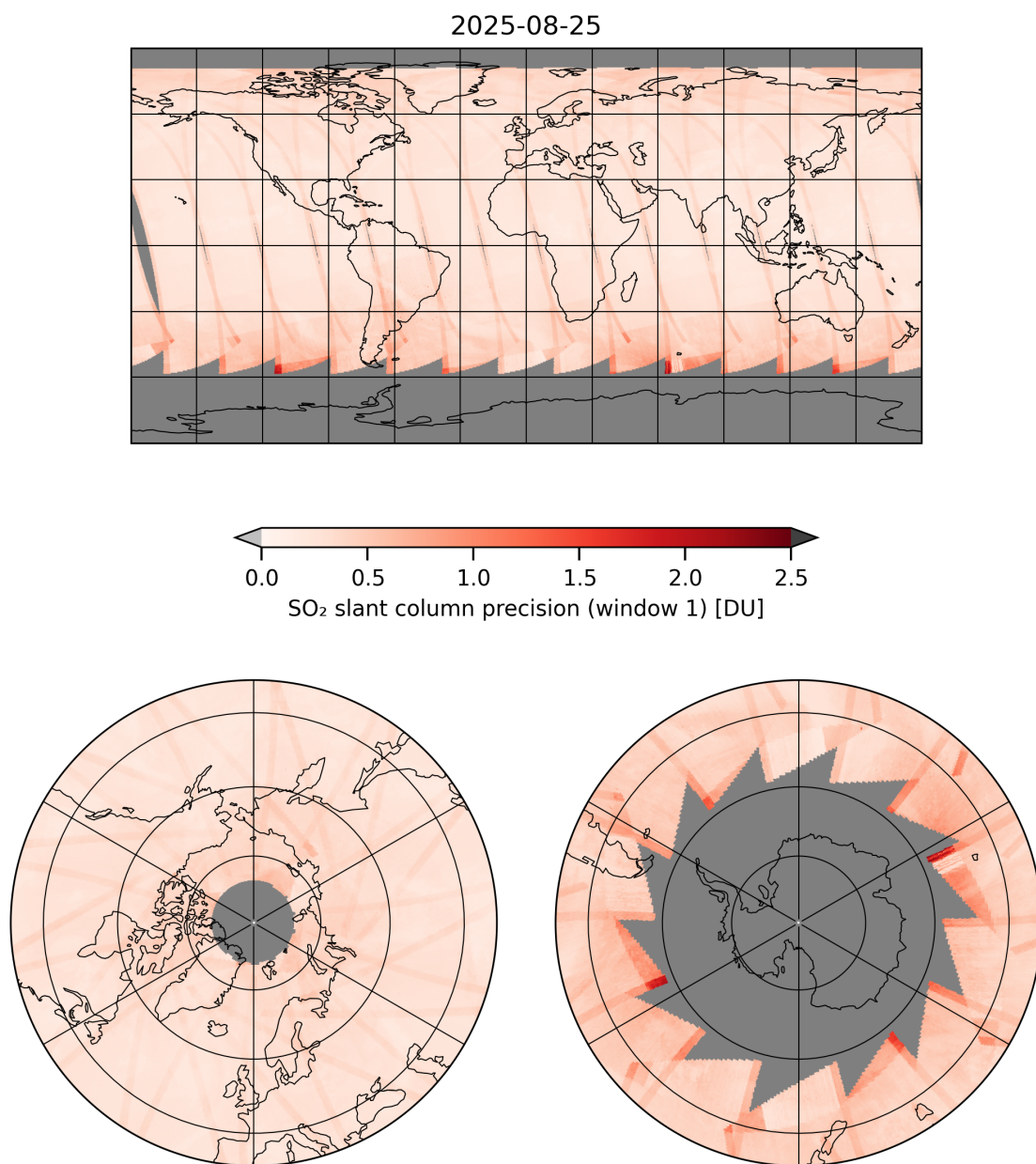


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-08-25 to 2025-08-26

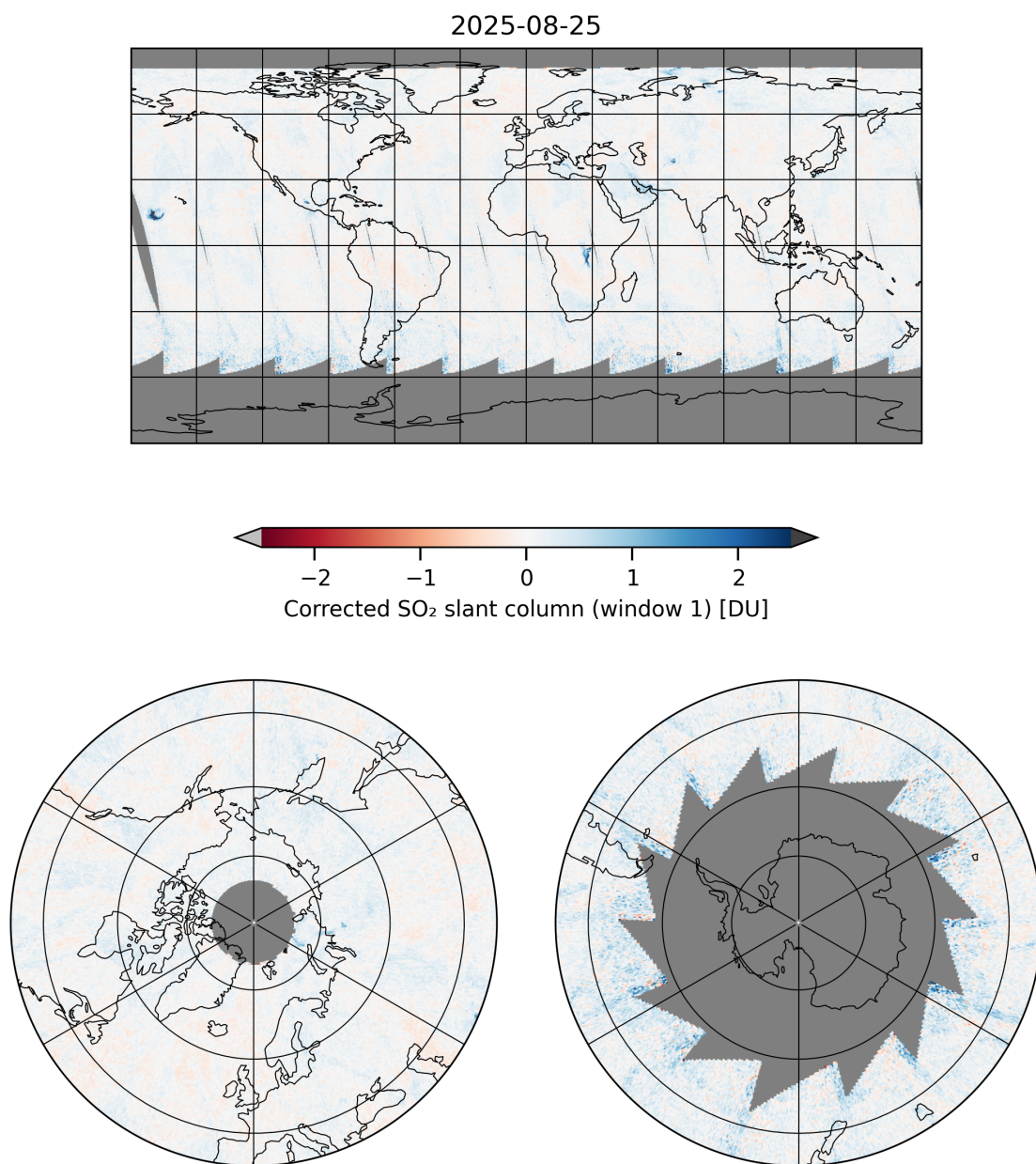


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-08-25 to 2025-08-26

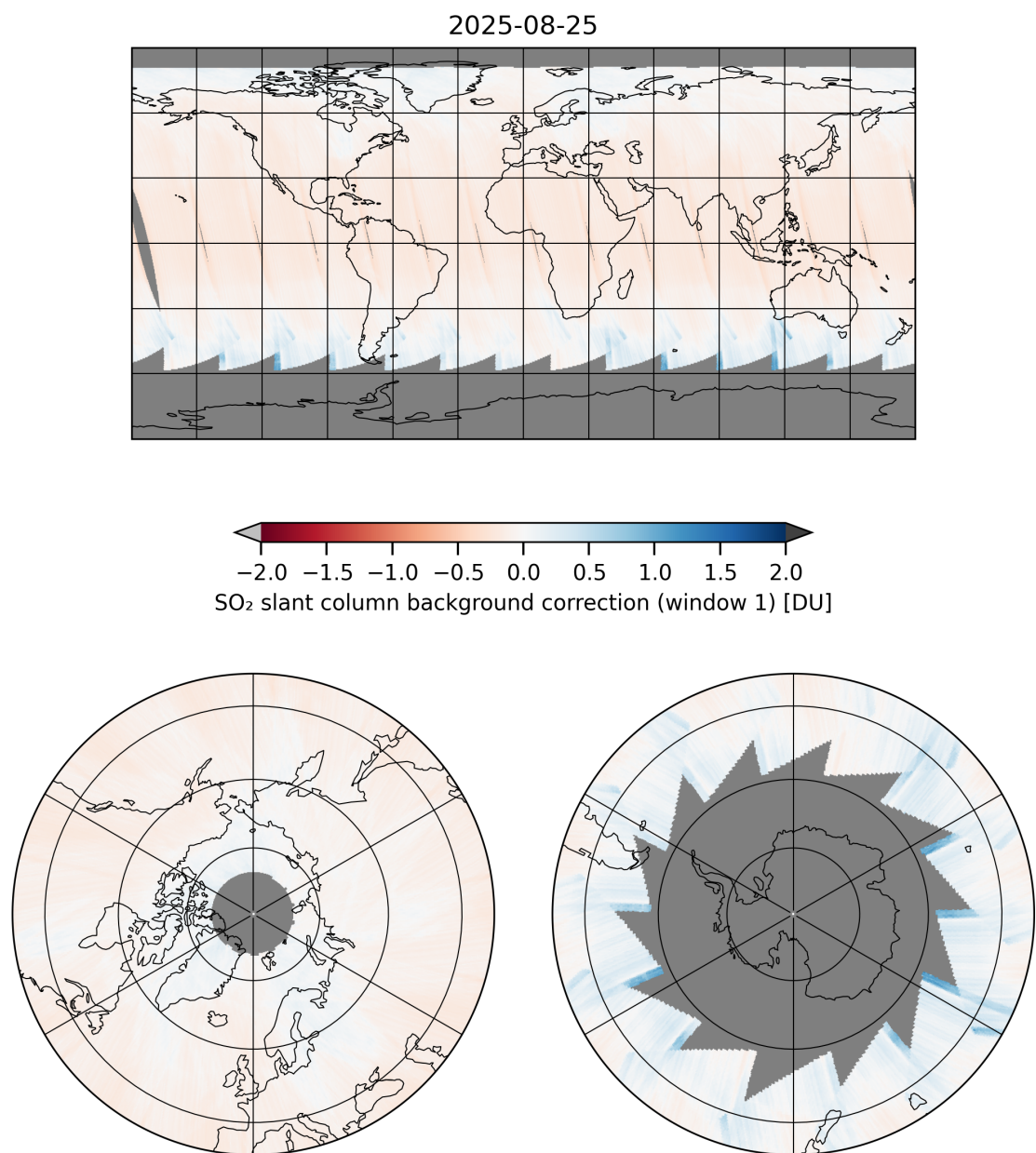


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-08-25 to 2025-08-26

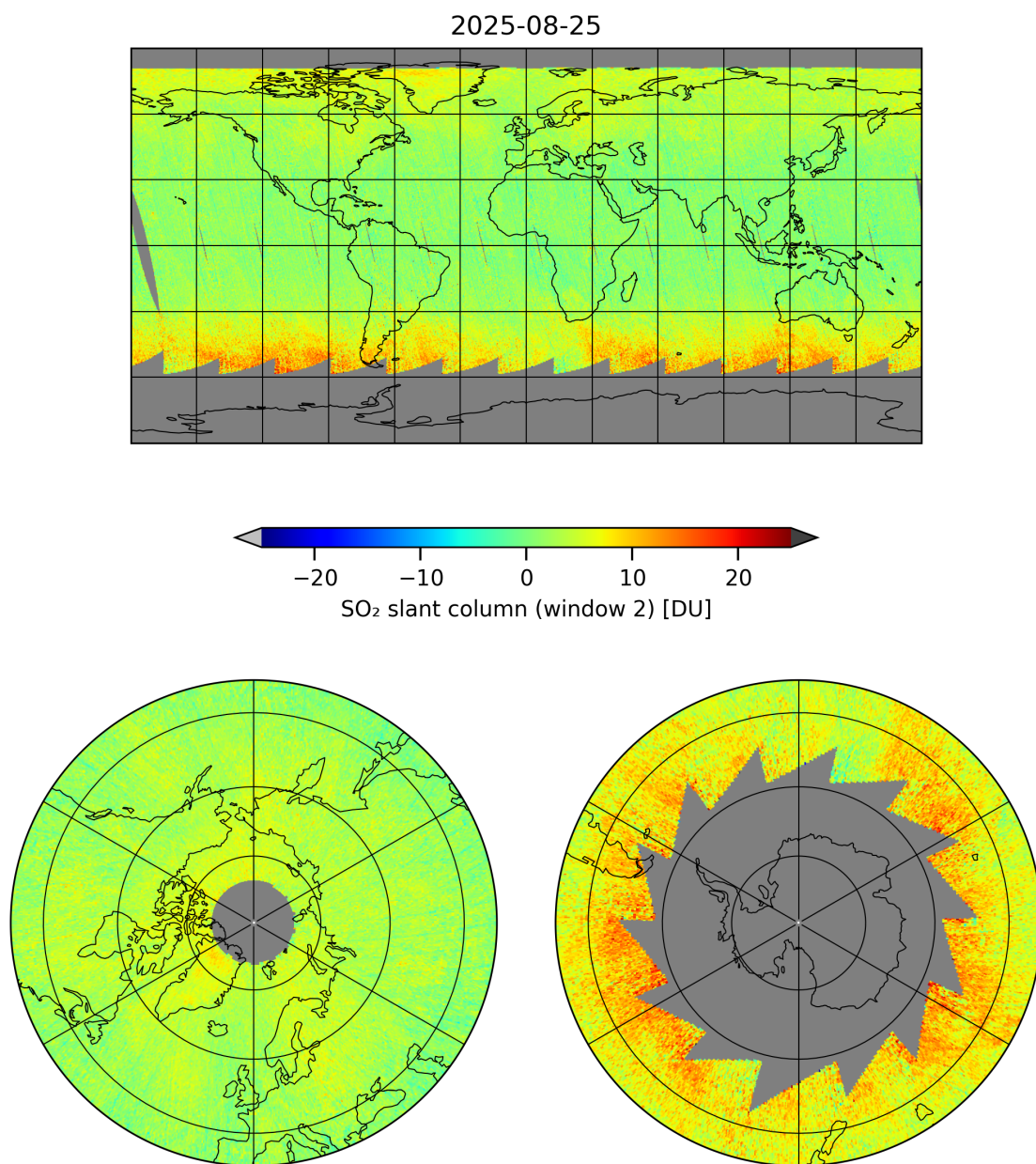


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-08-25 to 2025-08-26

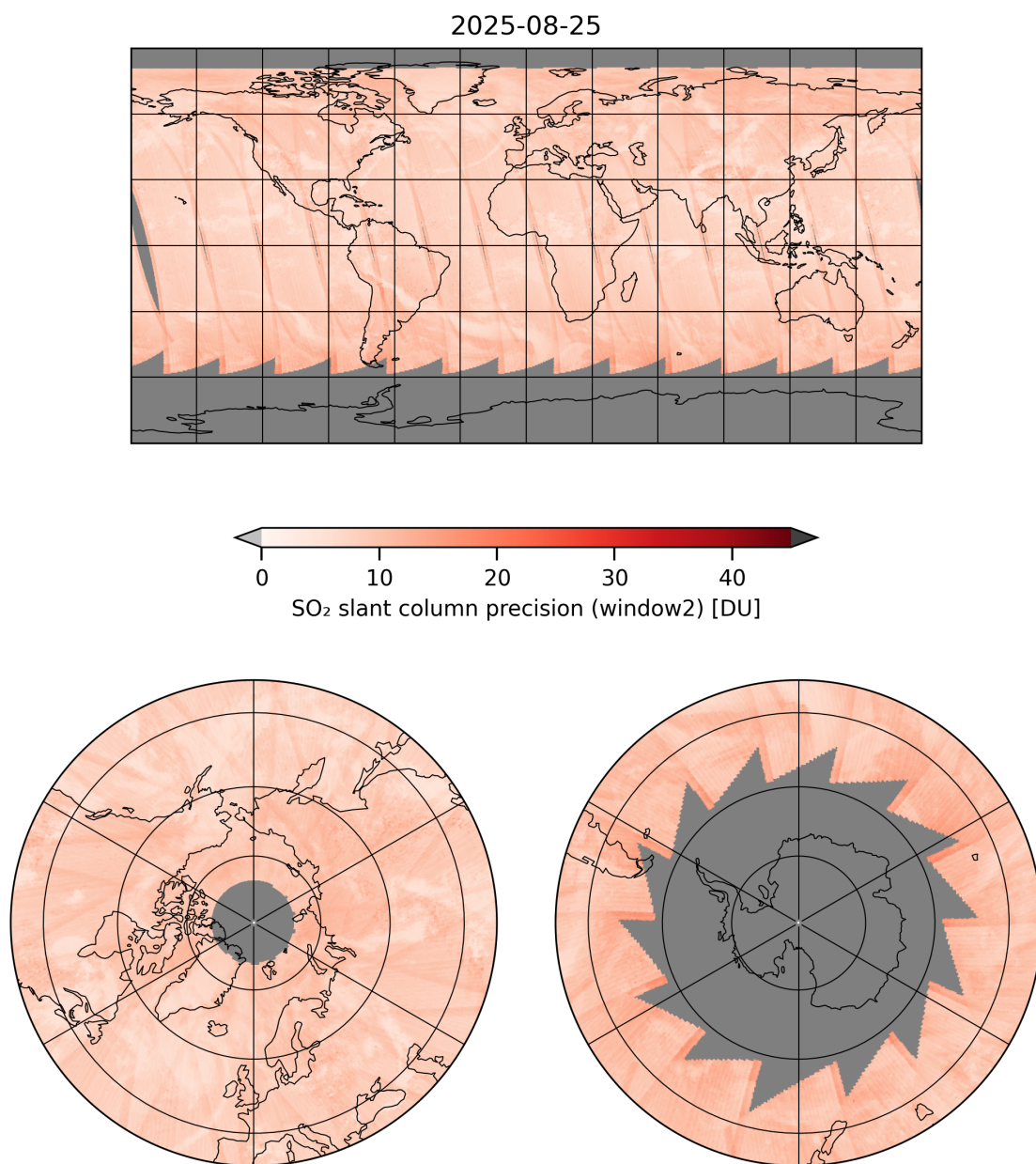


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-08-25 to 2025-08-26

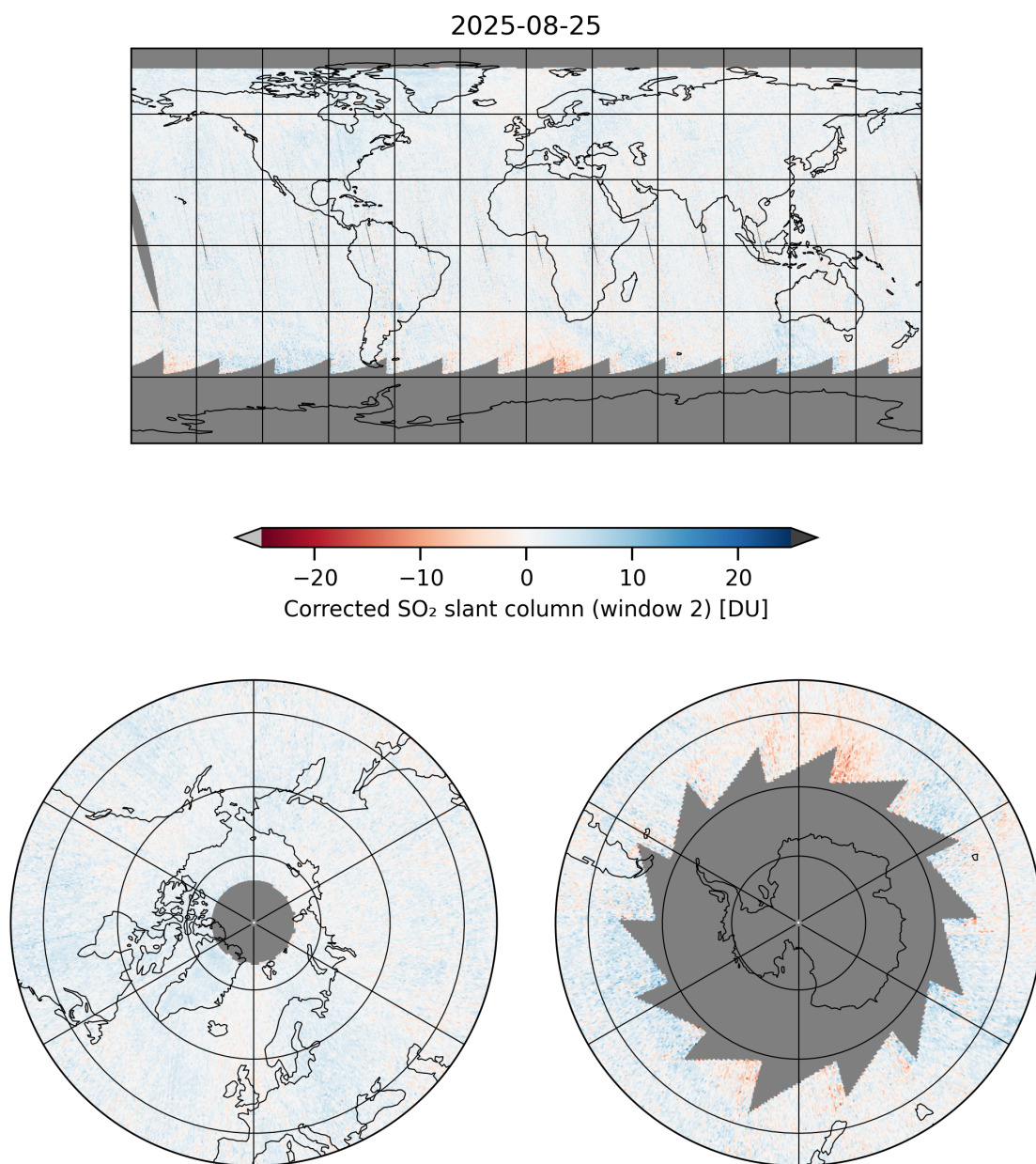


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-08-25 to 2025-08-26

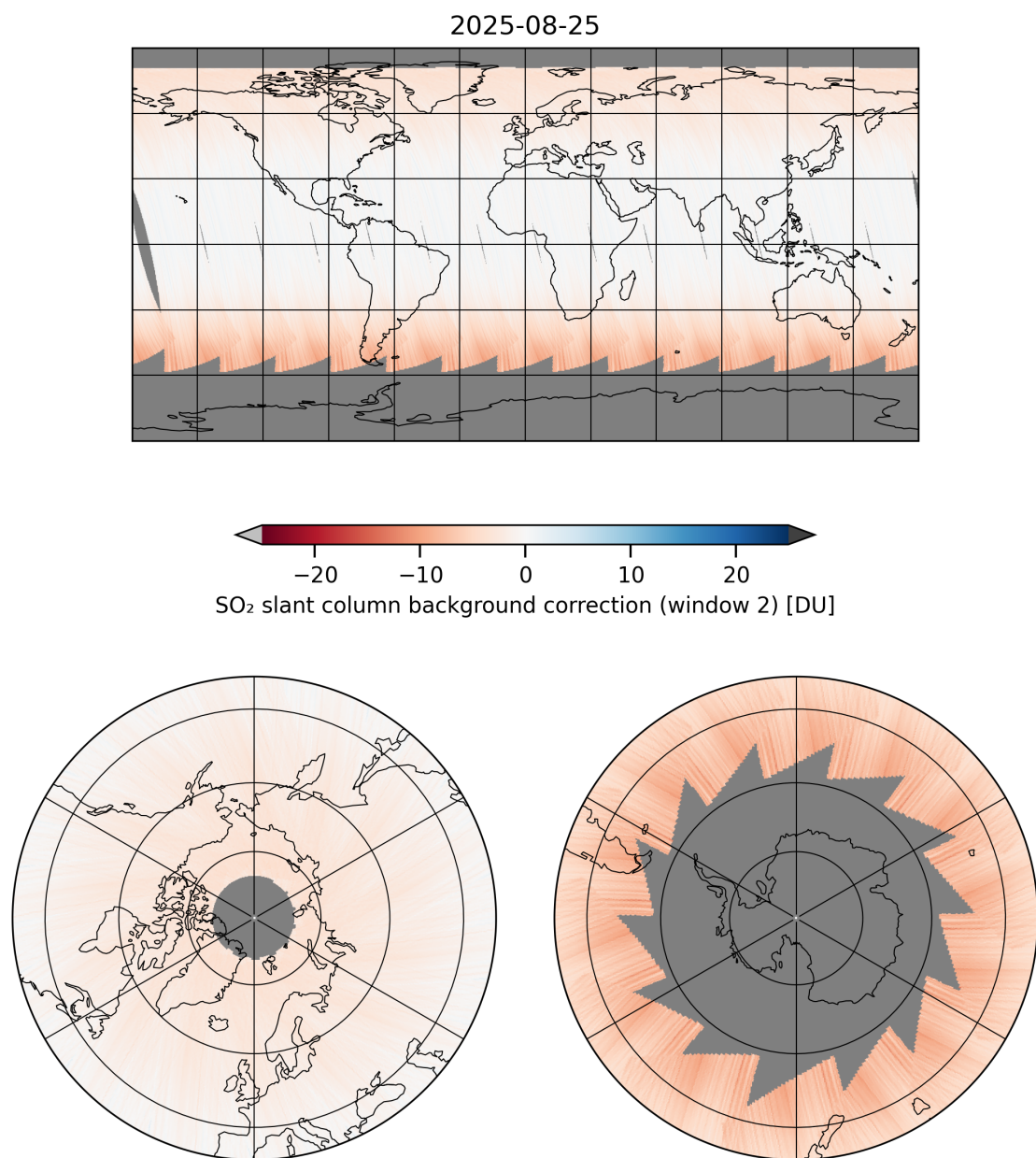


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-08-25 to 2025-08-26

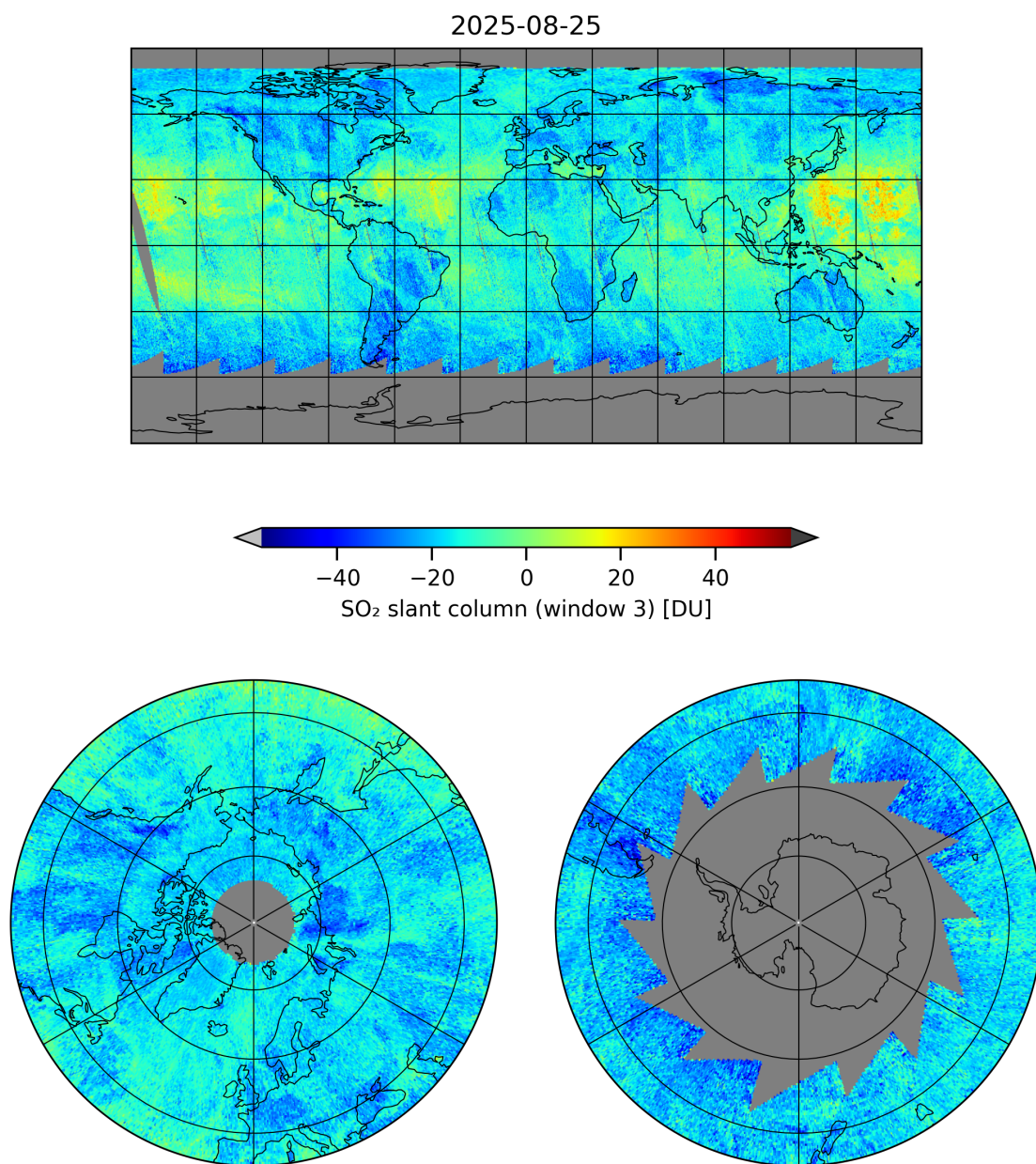


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-08-25 to 2025-08-26

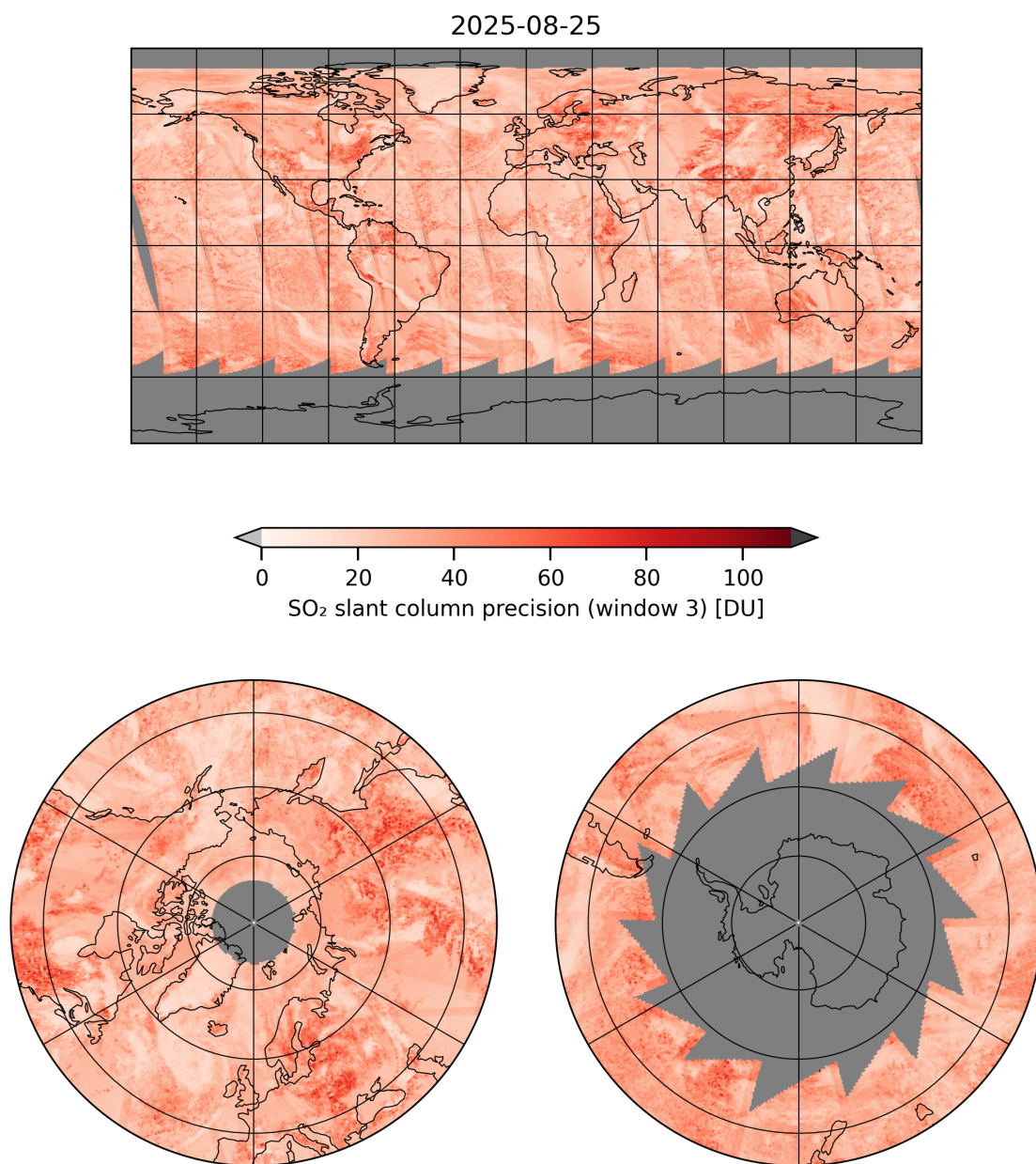


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-08-25 to 2025-08-26

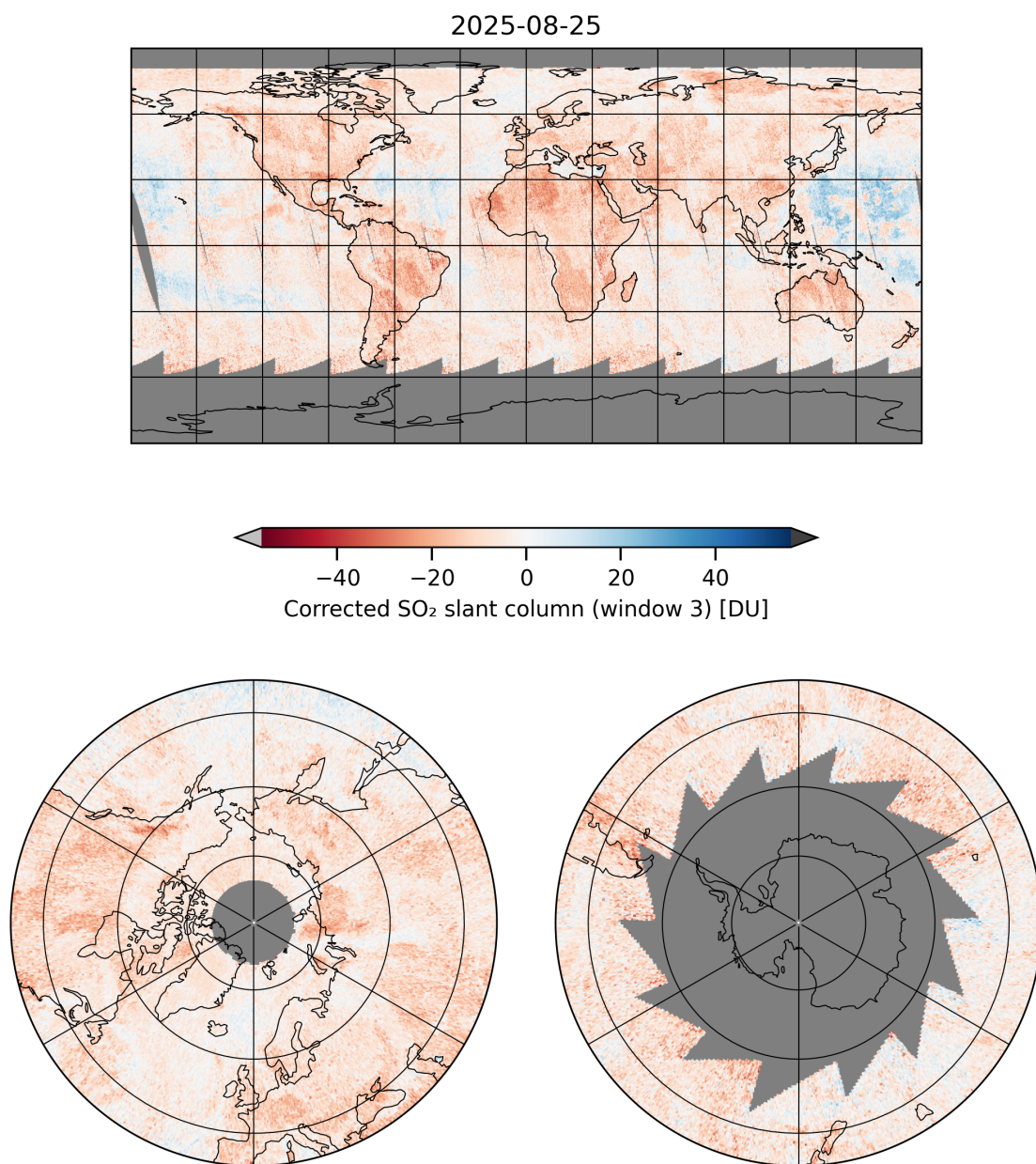


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-08-25 to 2025-08-26

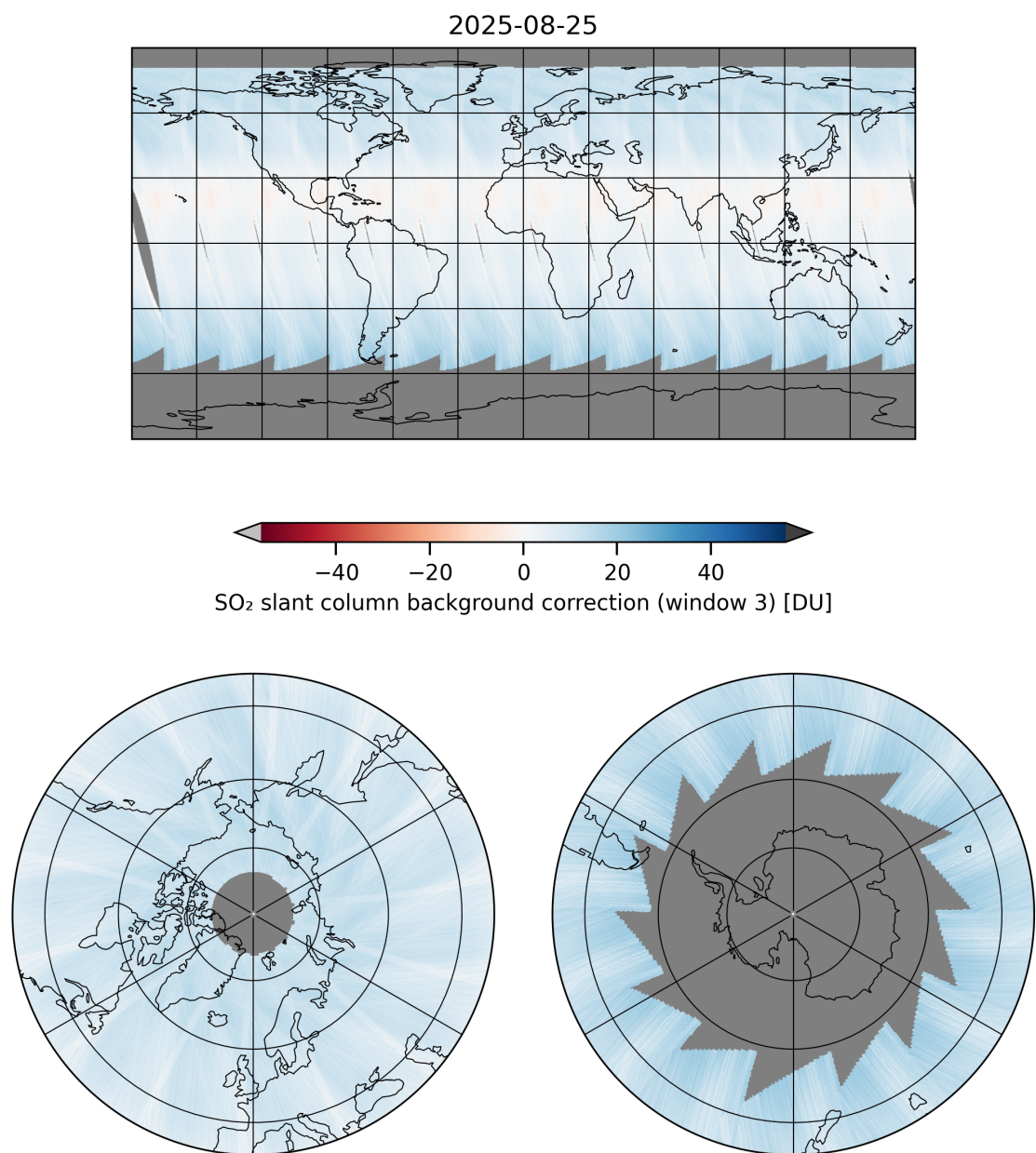


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-08-25 to 2025-08-26

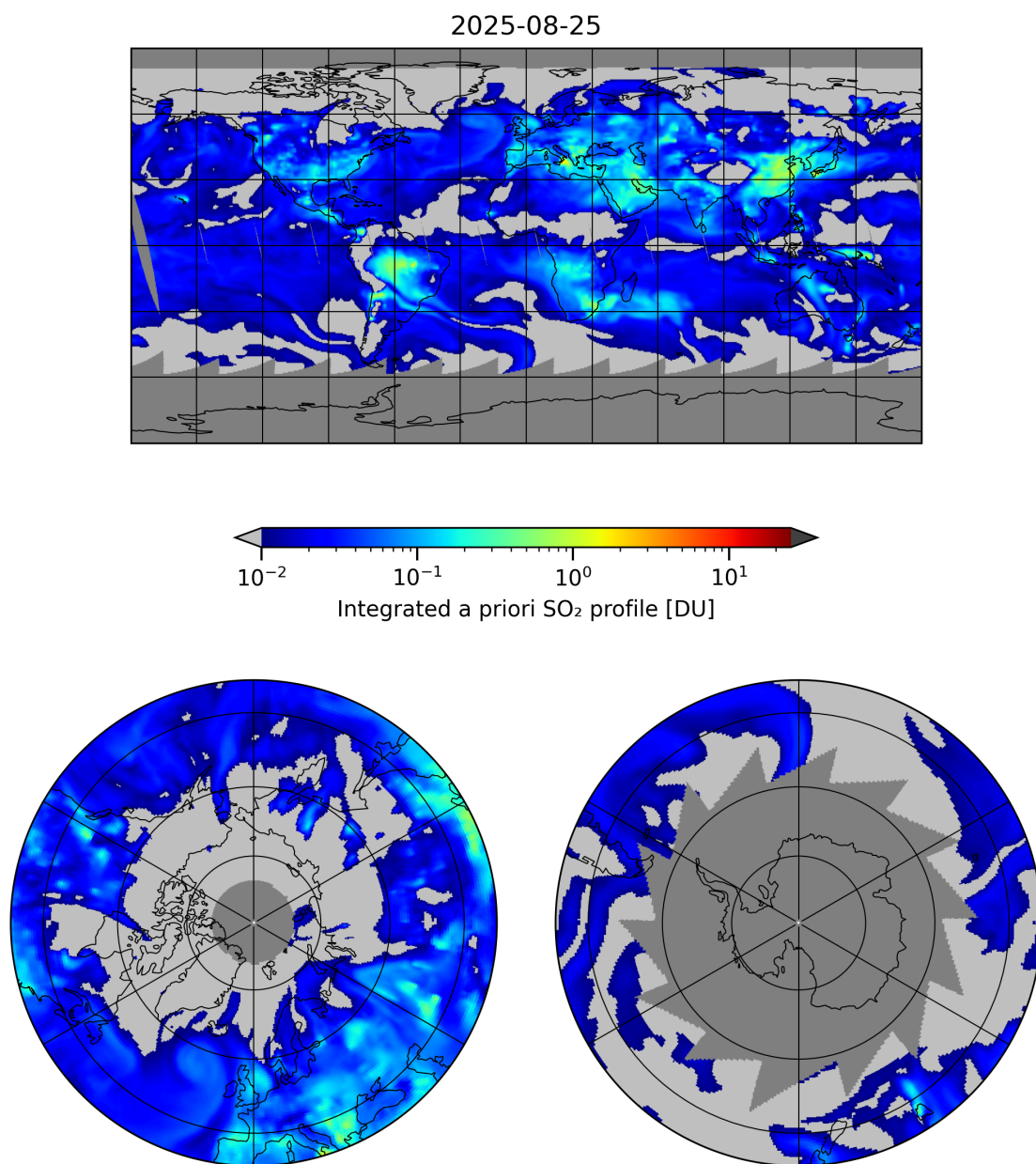


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-08-25 to 2025-08-26

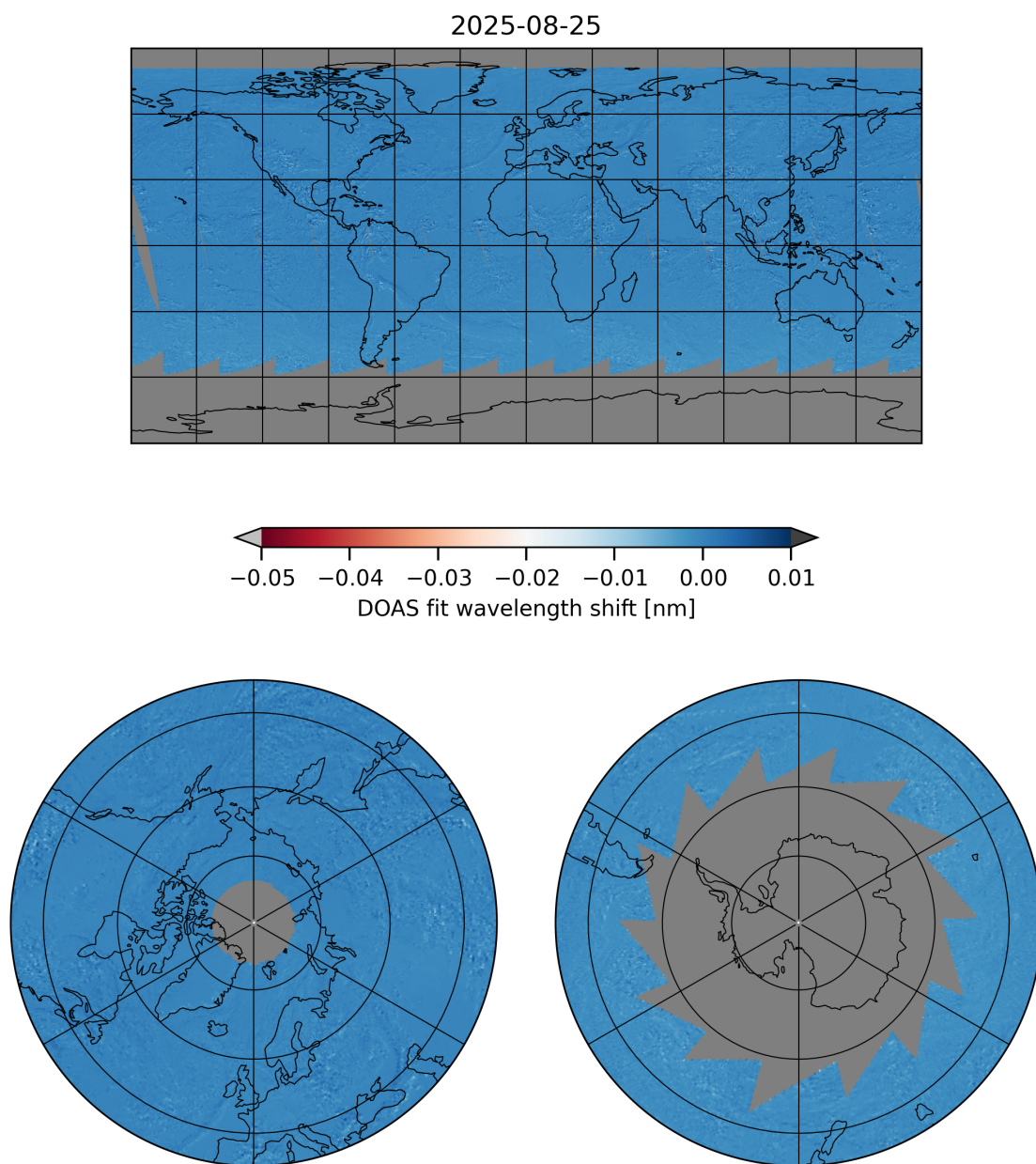


Figure 22: Map of “DOAS fit wavelength shift” for 2025-08-25 to 2025-08-26

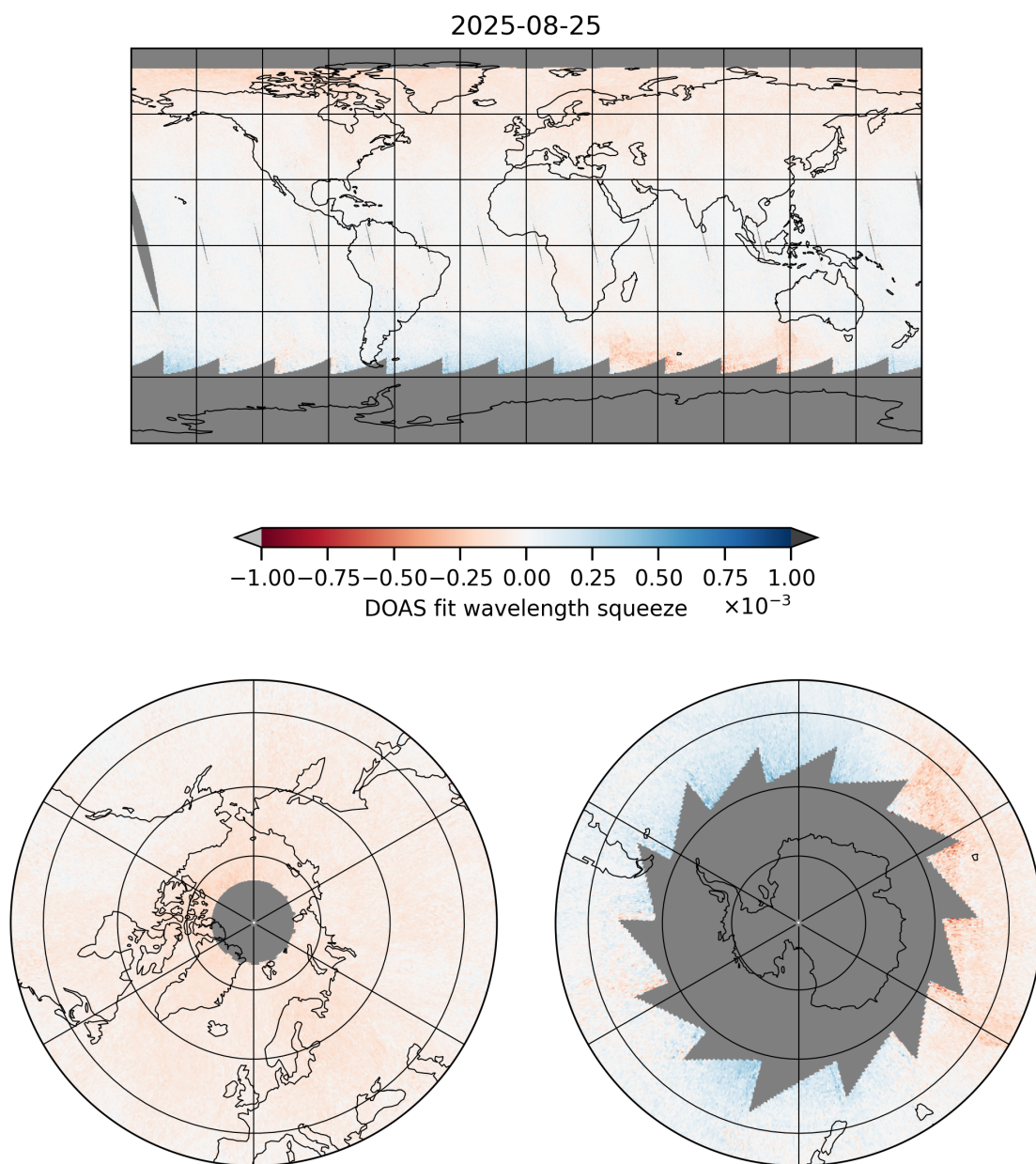


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-08-25 to 2025-08-26

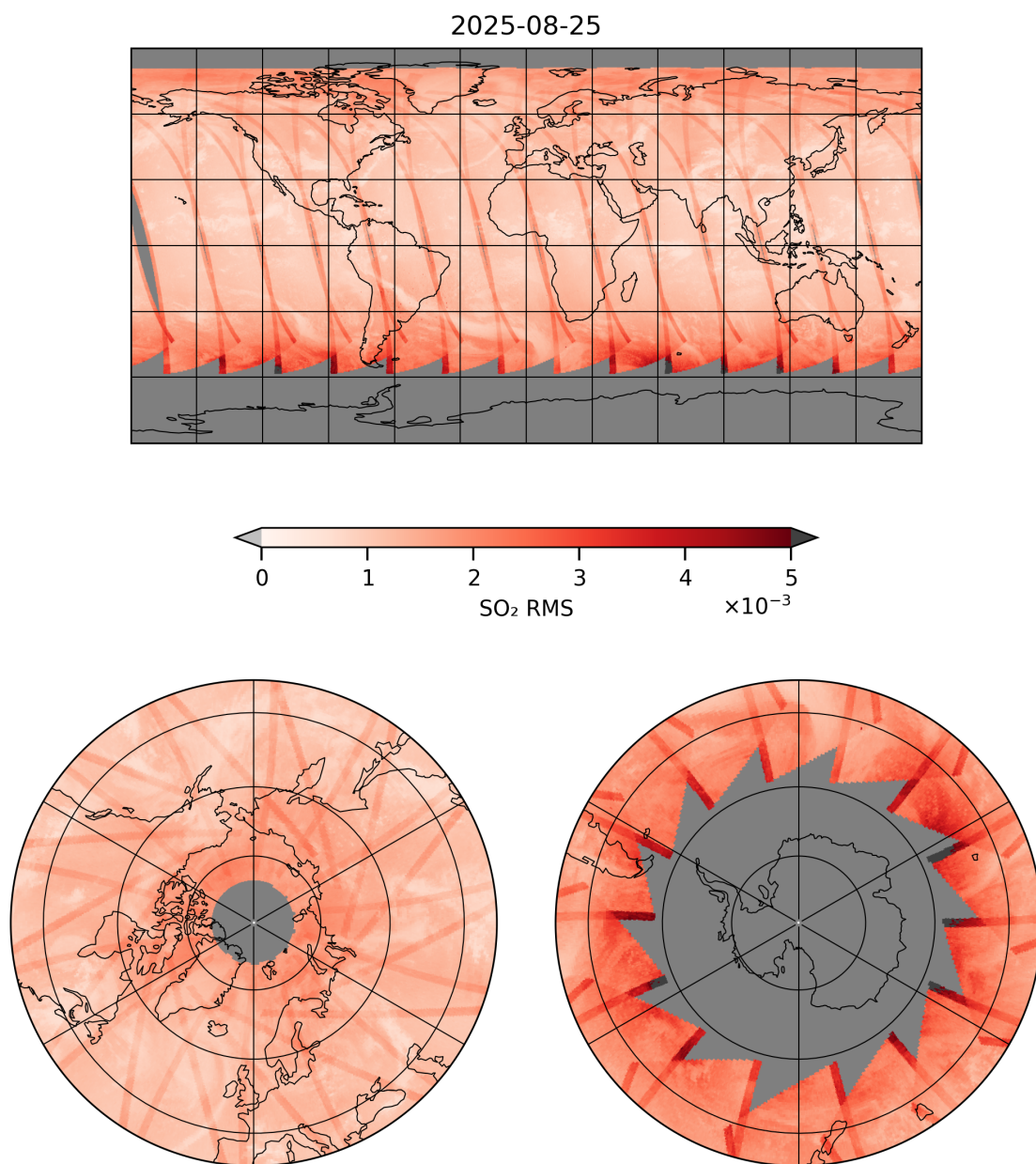


Figure 24: Map of “SO₂ RMS” for 2025-08-25 to 2025-08-26

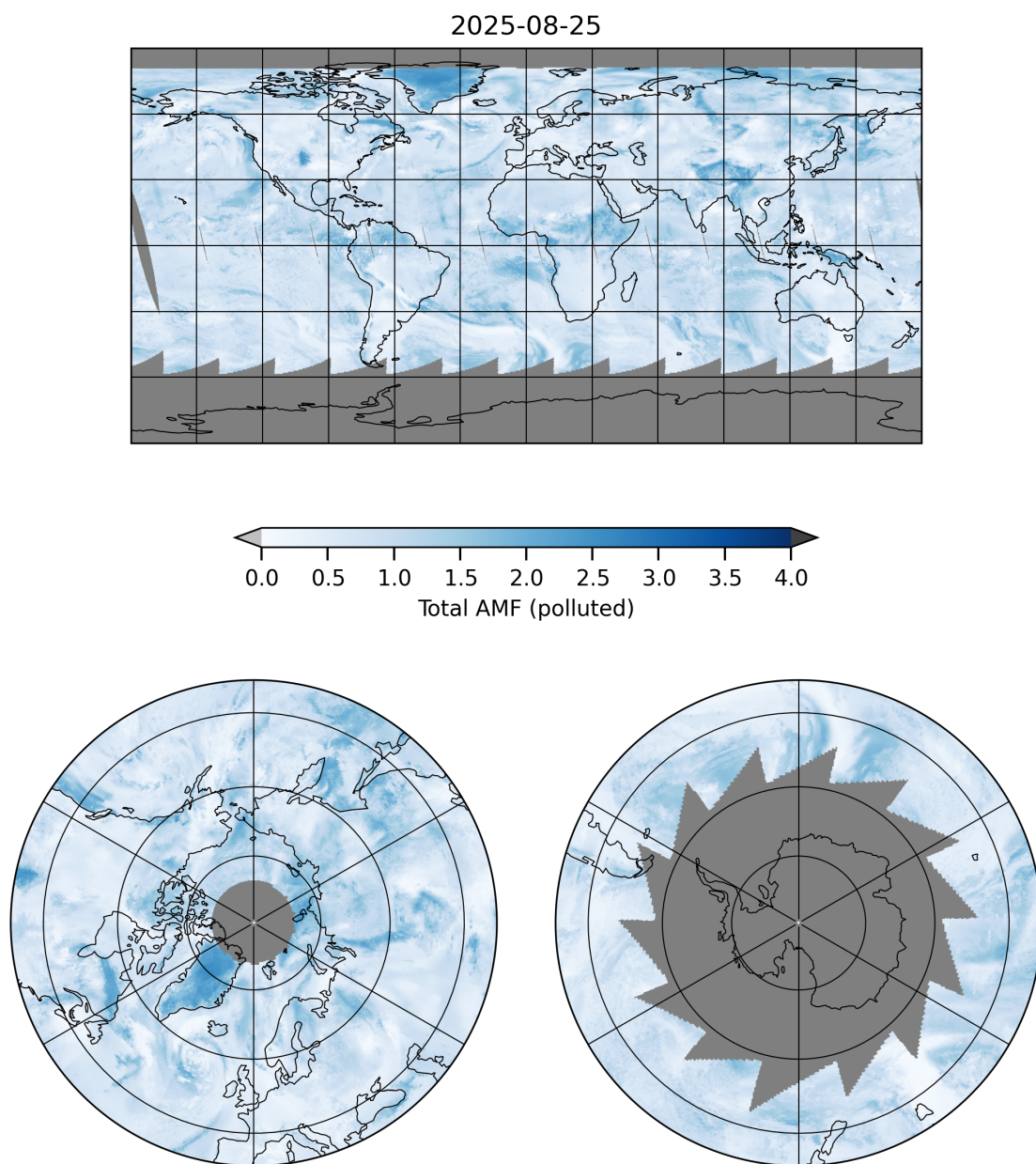


Figure 25: Map of “Total AMF (polluted)” for 2025-08-25 to 2025-08-26

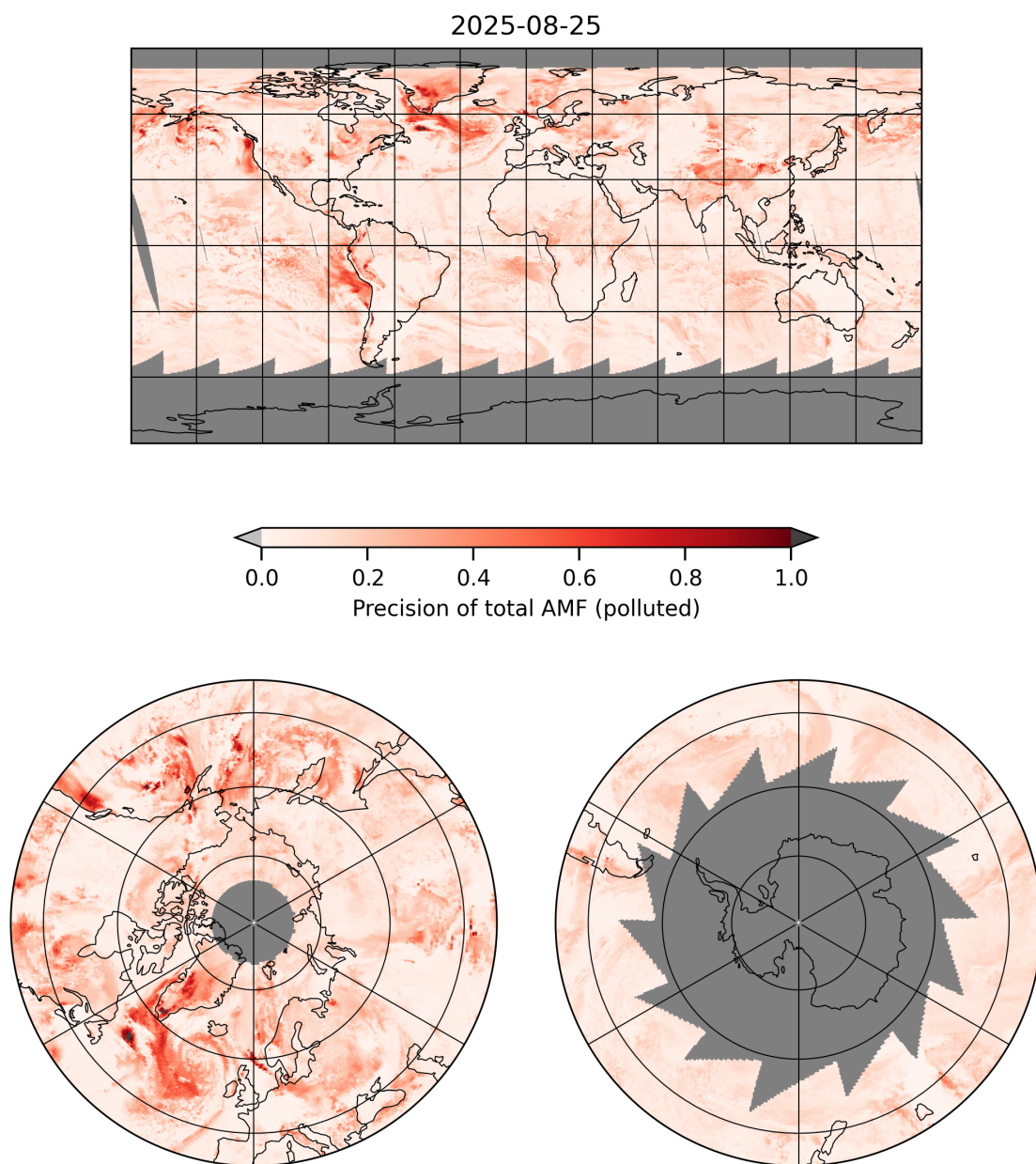


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-08-25 to 2025-08-26

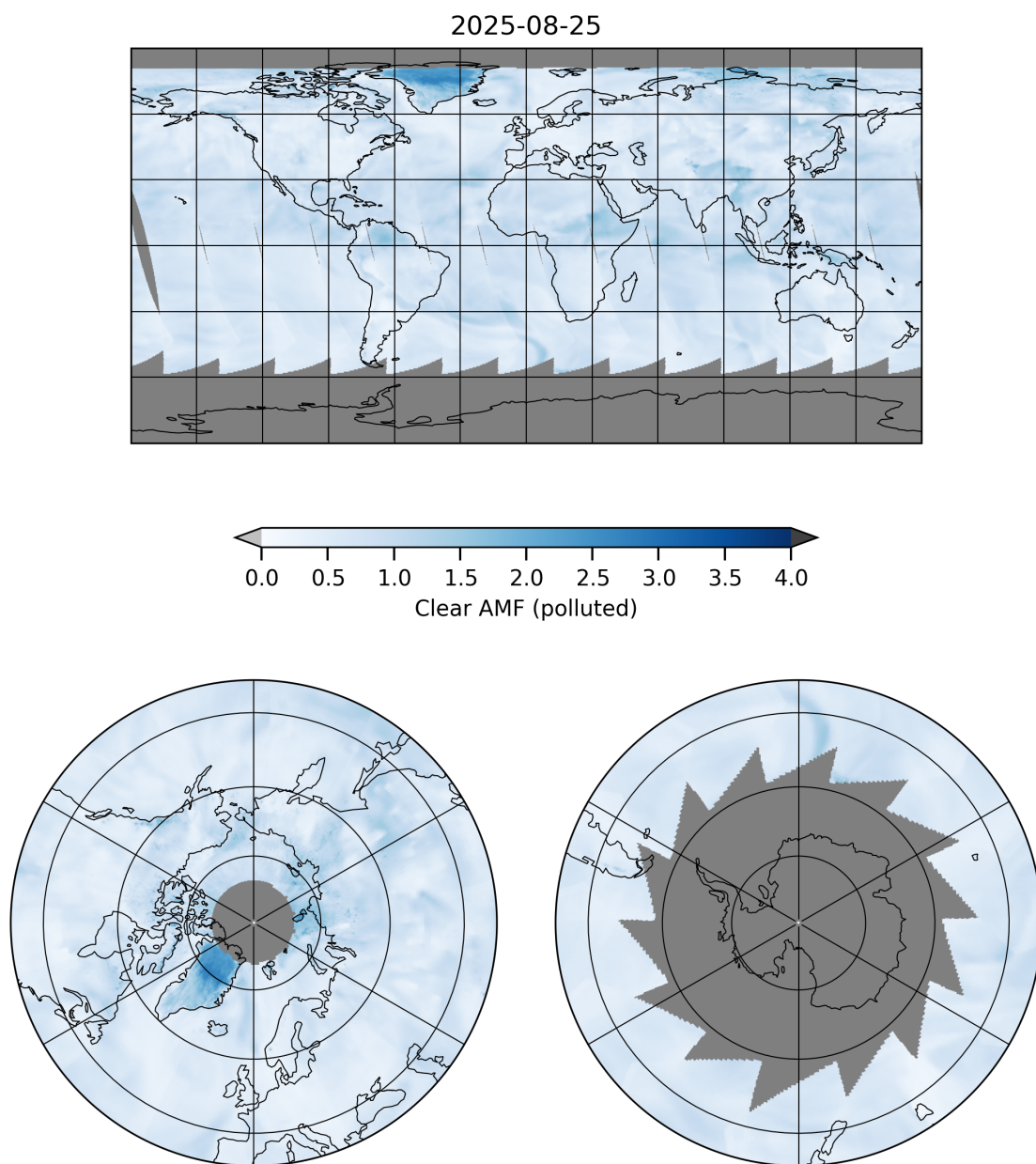


Figure 27: Map of “Clear AMF (polluted)” for 2025-08-25 to 2025-08-26

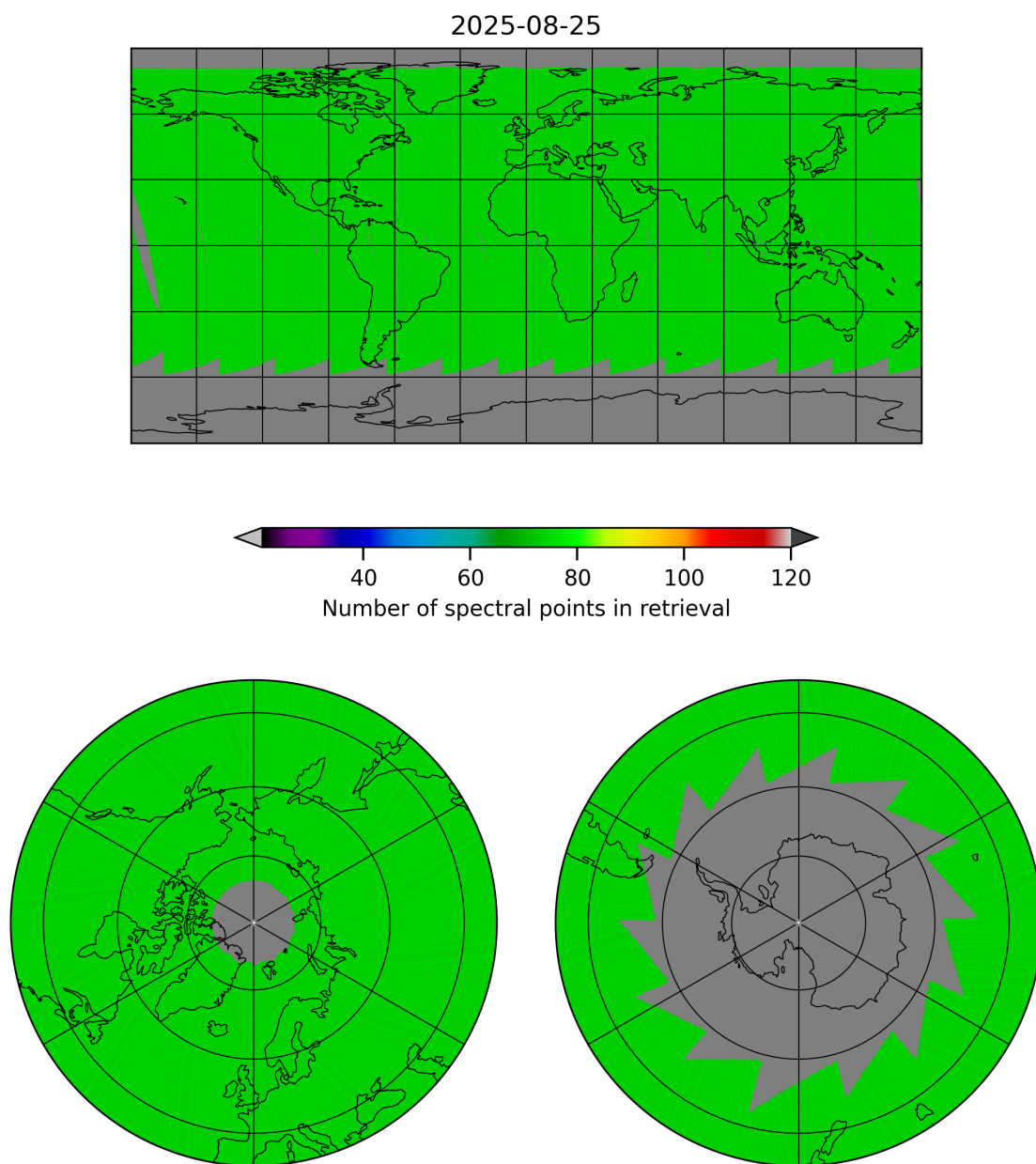


Figure 28: Map of “Number of spectral points in retrieval” for 2025-08-25 to 2025-08-26

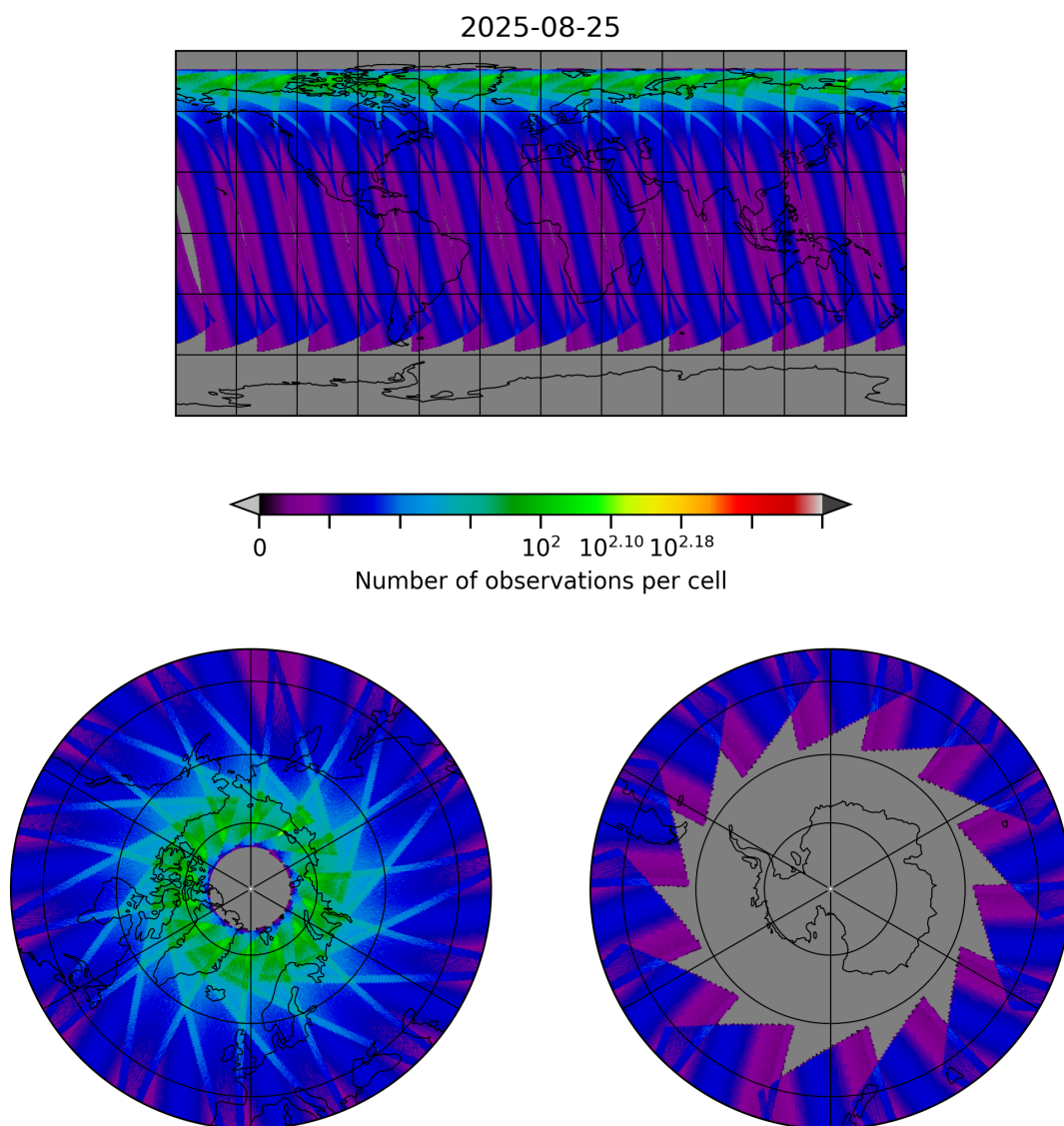


Figure 29: Map of the number of observations for 2025-08-25 to 2025-08-26

7 Zonal average

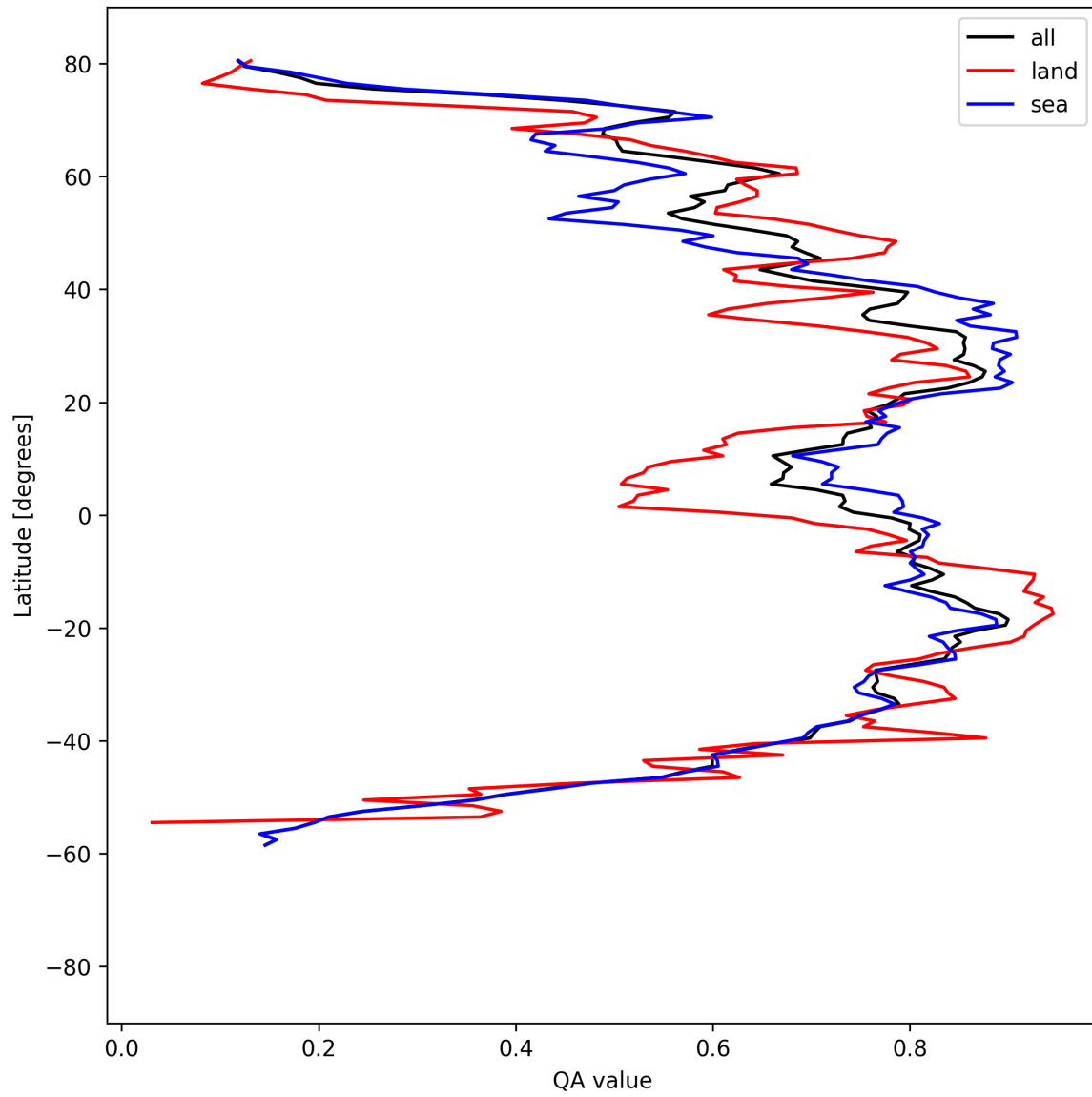


Figure 30: Zonal average of “QA value” for 2025-08-25 to 2025-08-26.

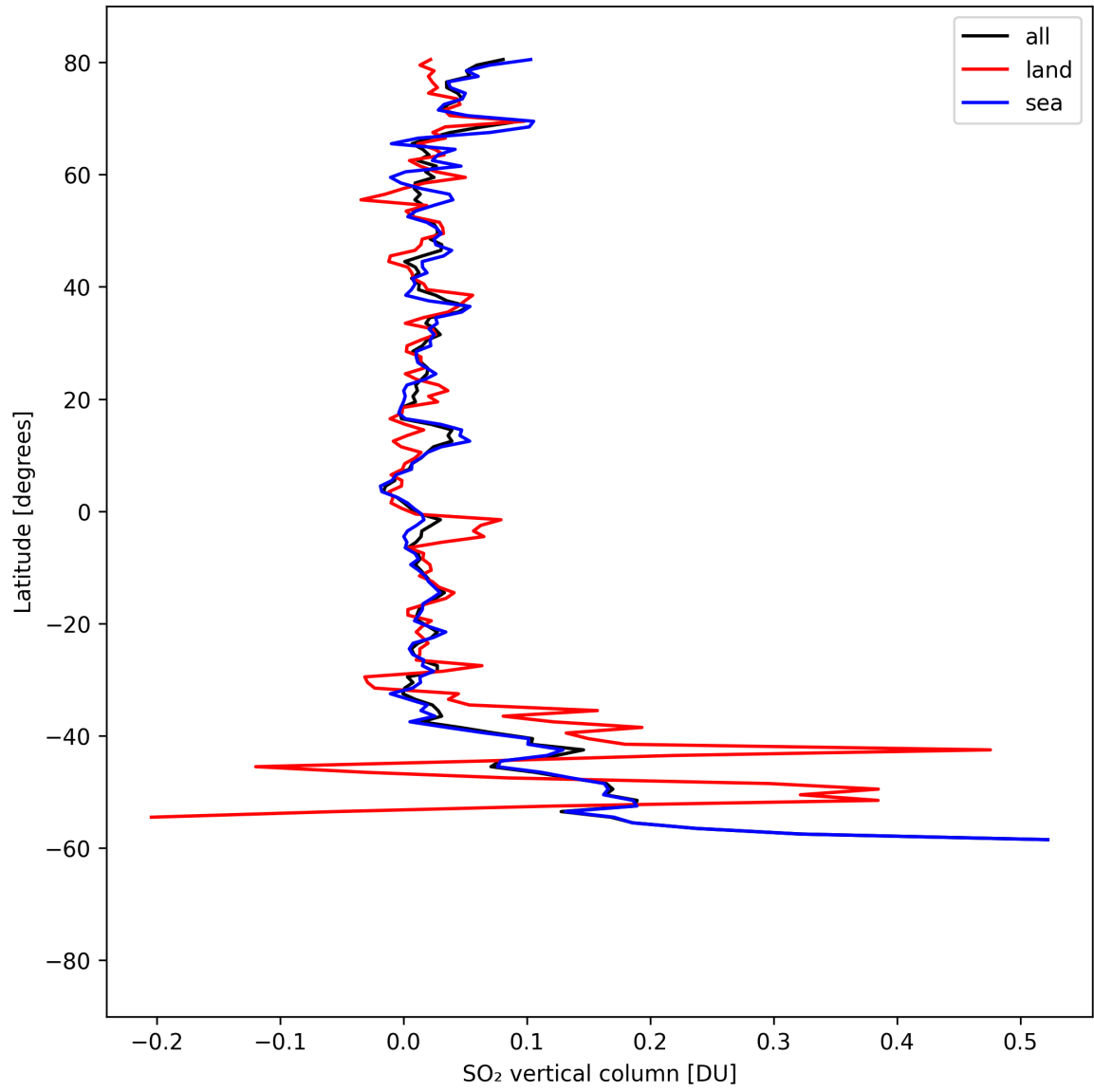


Figure 31: Zonal average of “SO₂ vertical column” for 2025-08-25 to 2025-08-26.

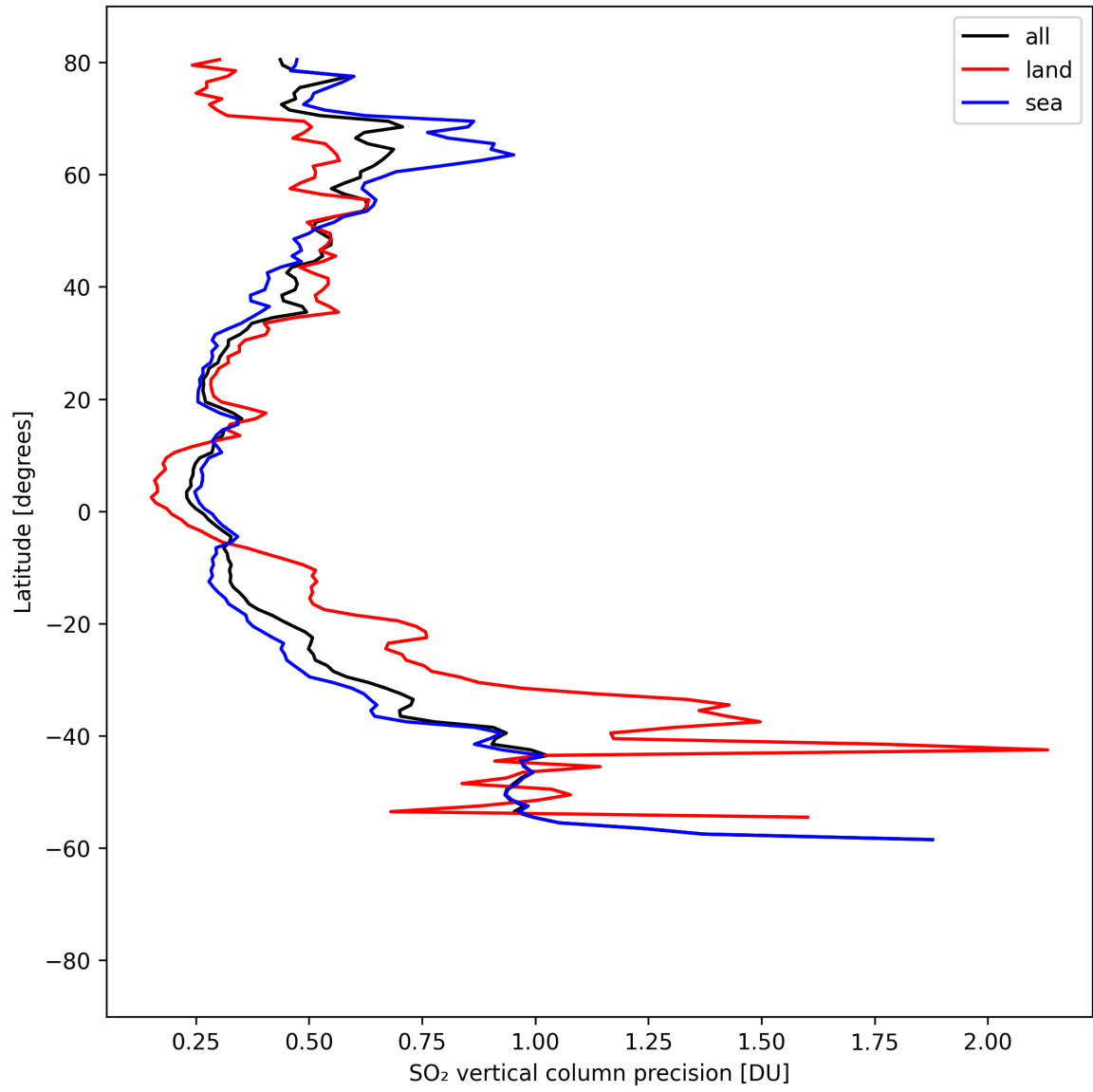


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-08-25 to 2025-08-26.

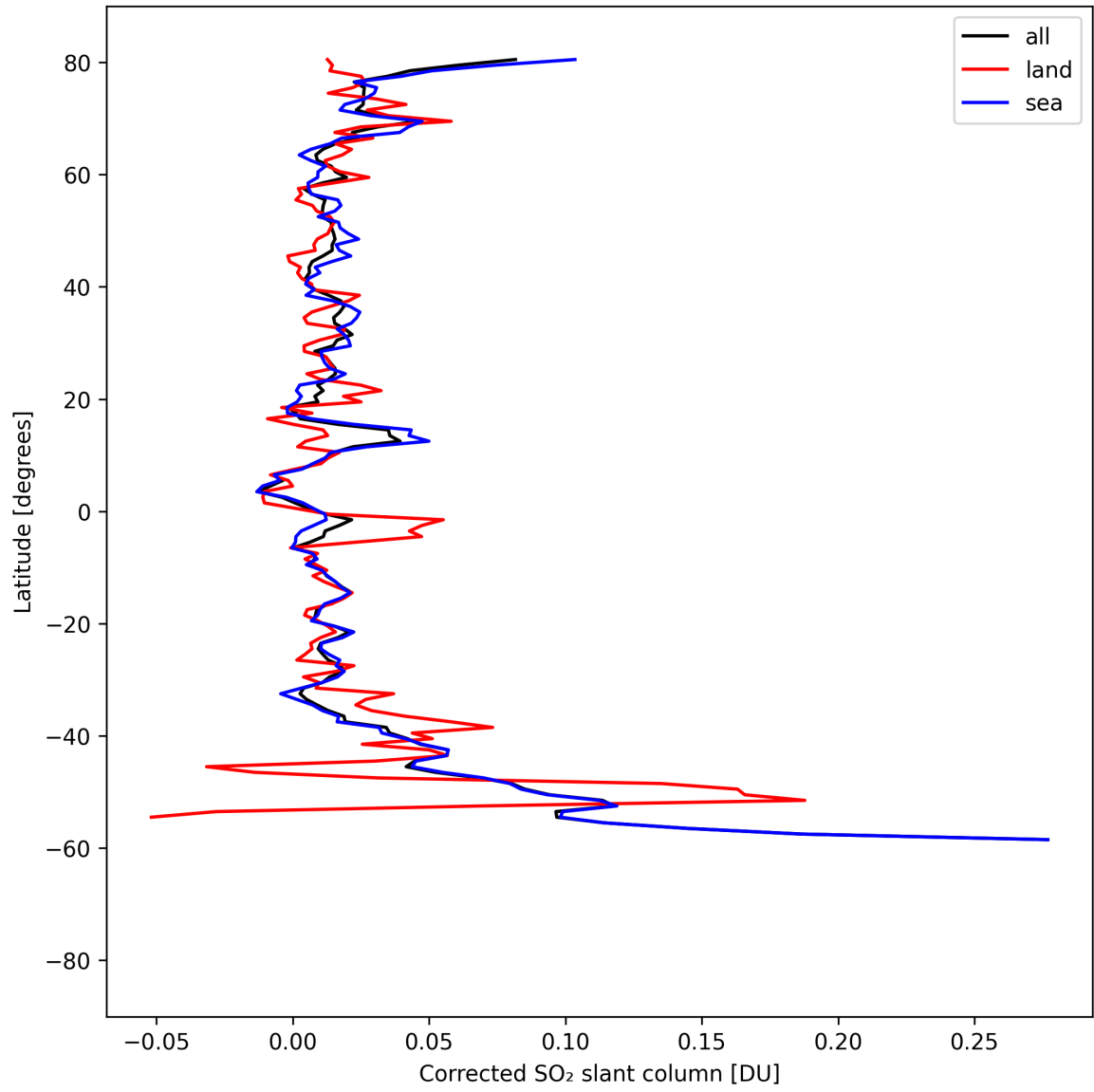


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-08-25 to 2025-08-26.

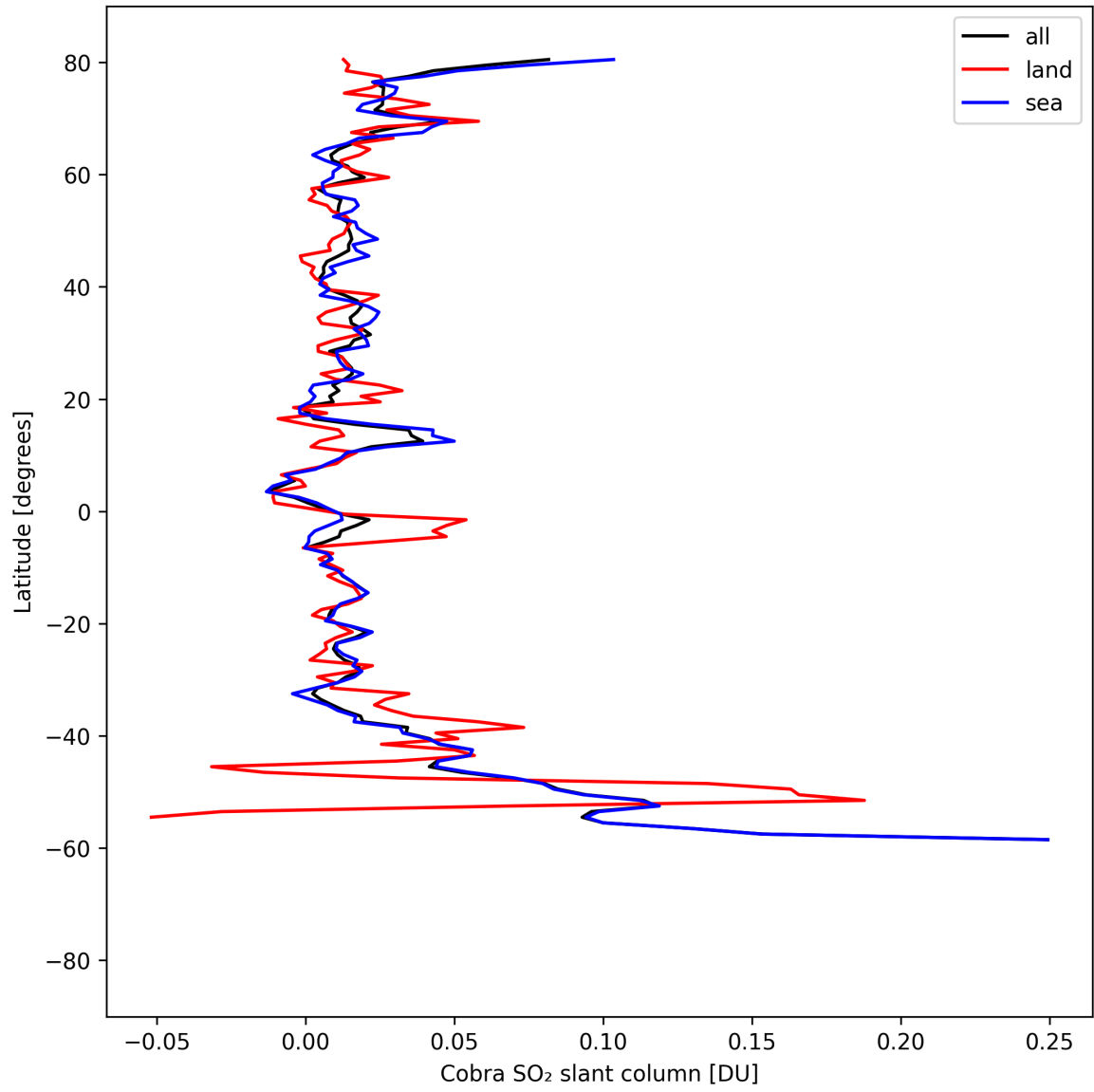


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-08-25 to 2025-08-26.

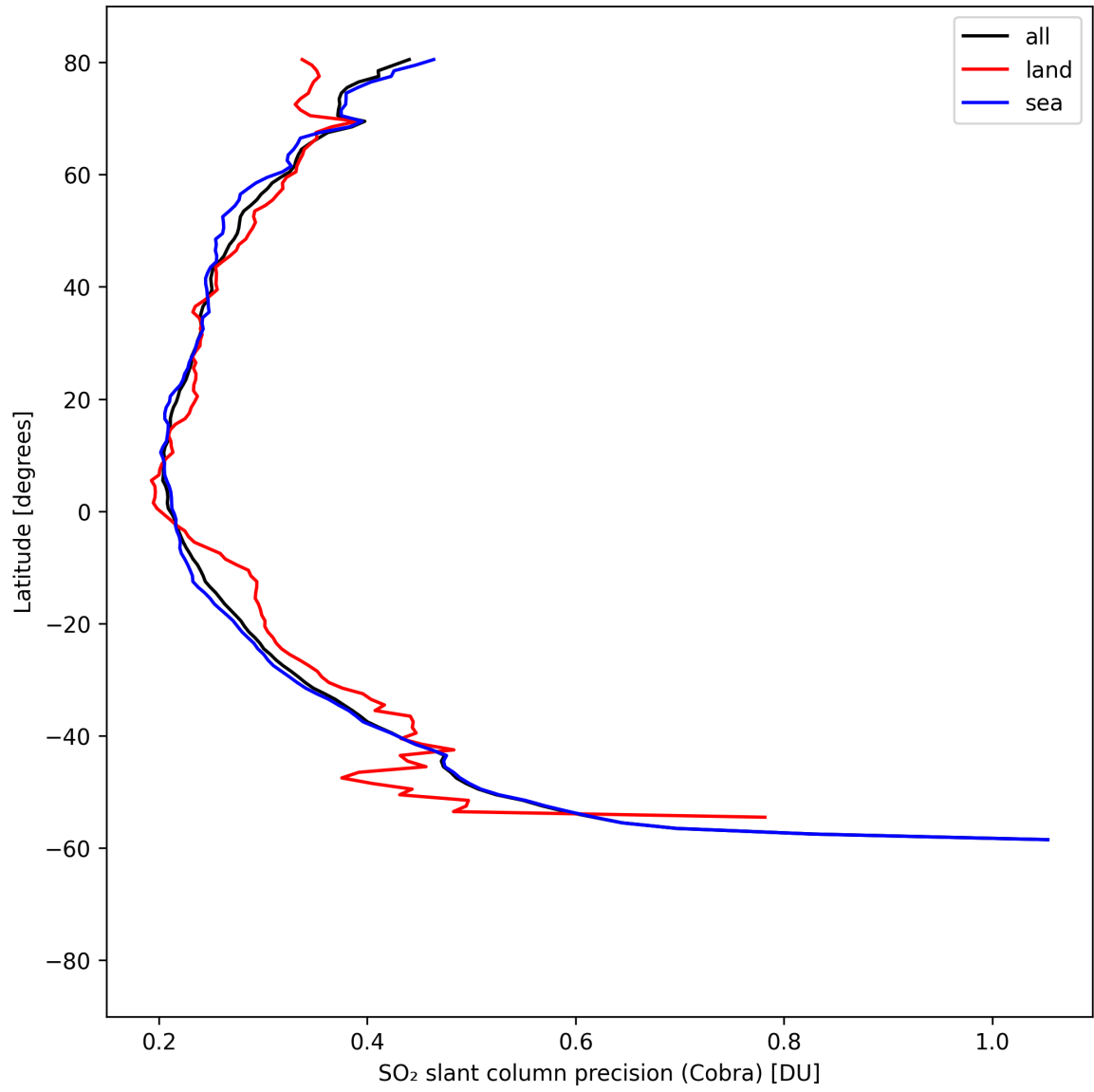


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-08-25 to 2025-08-26.

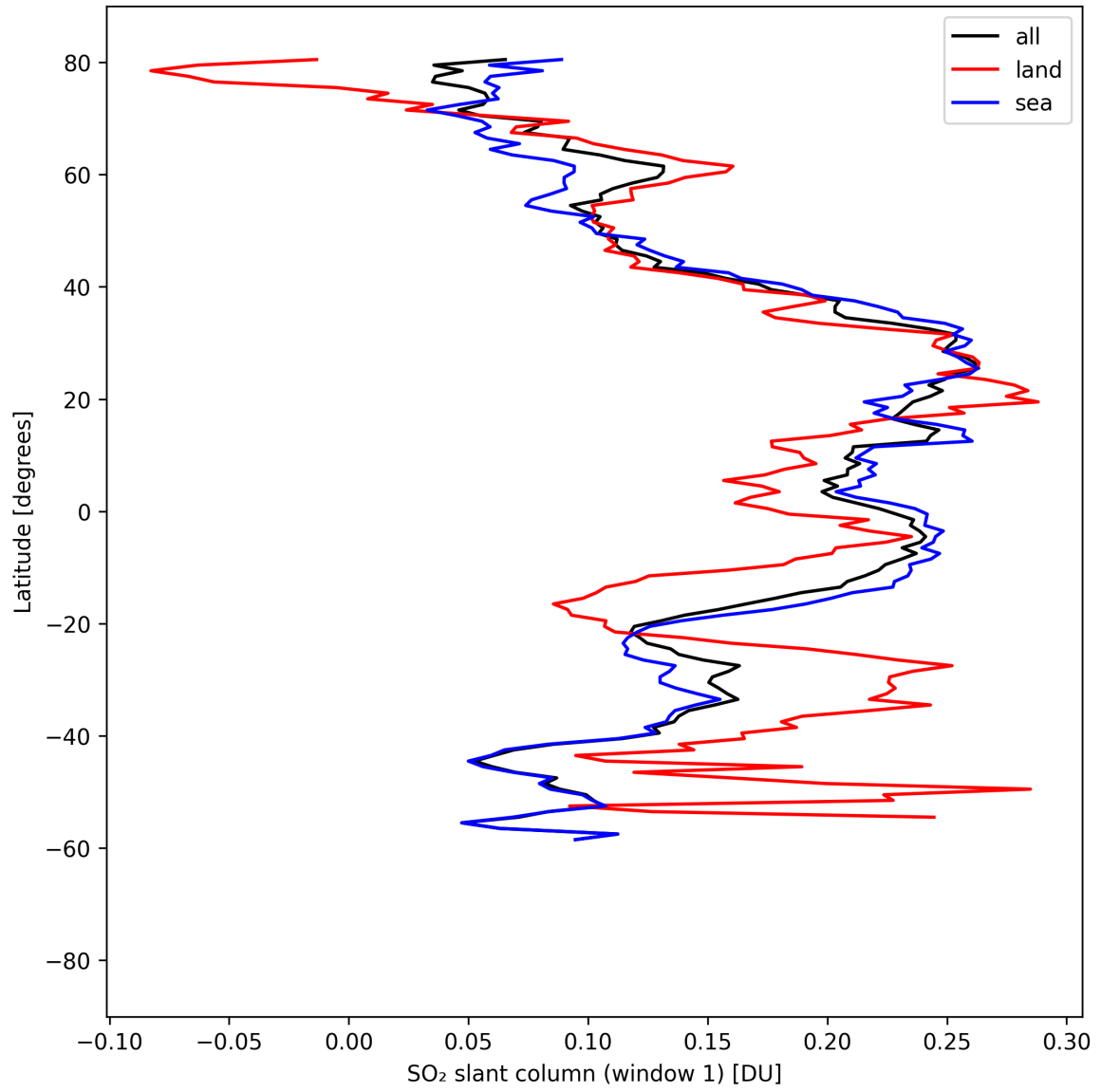


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-08-25 to 2025-08-26.

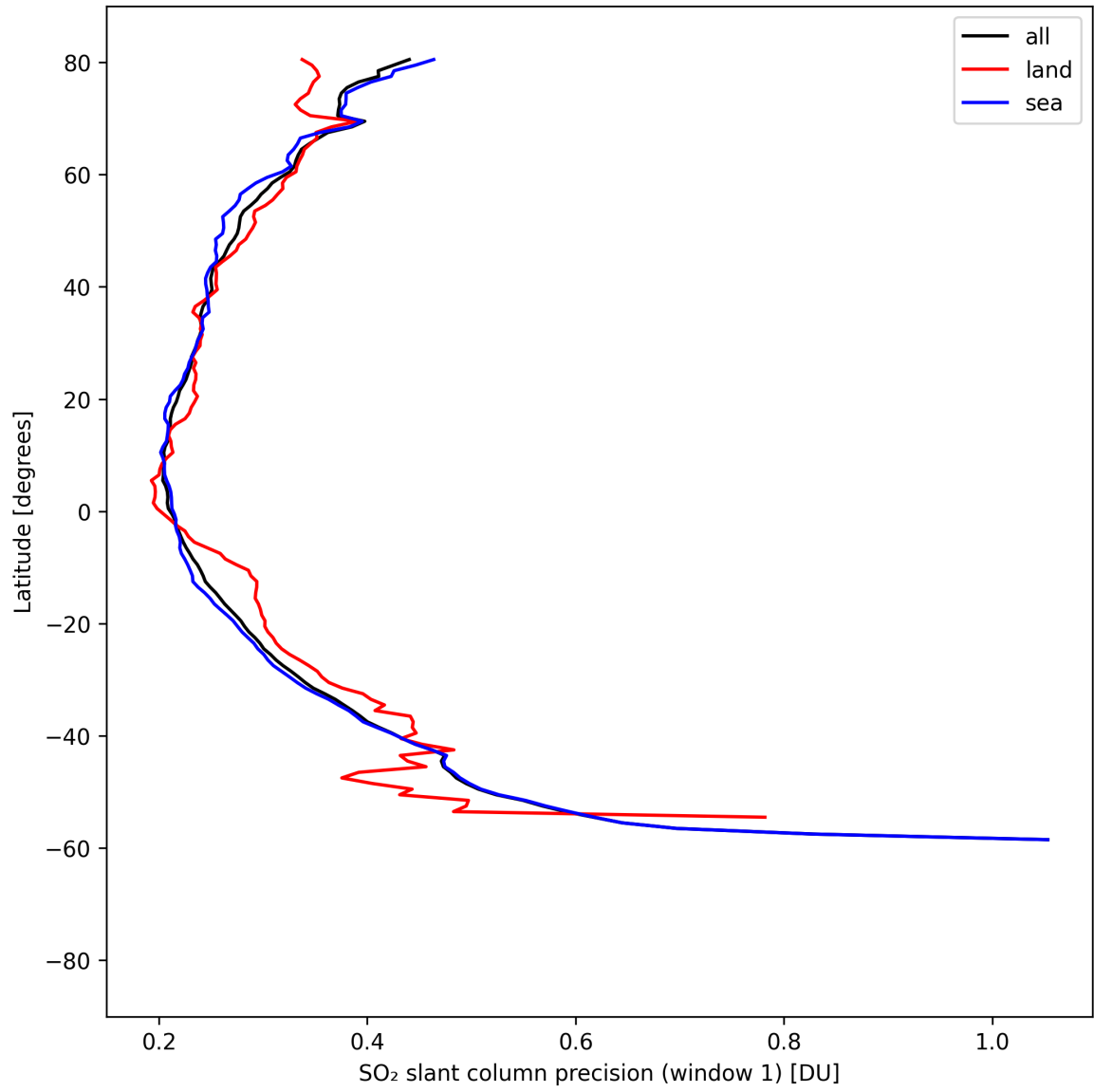


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-08-25 to 2025-08-26.

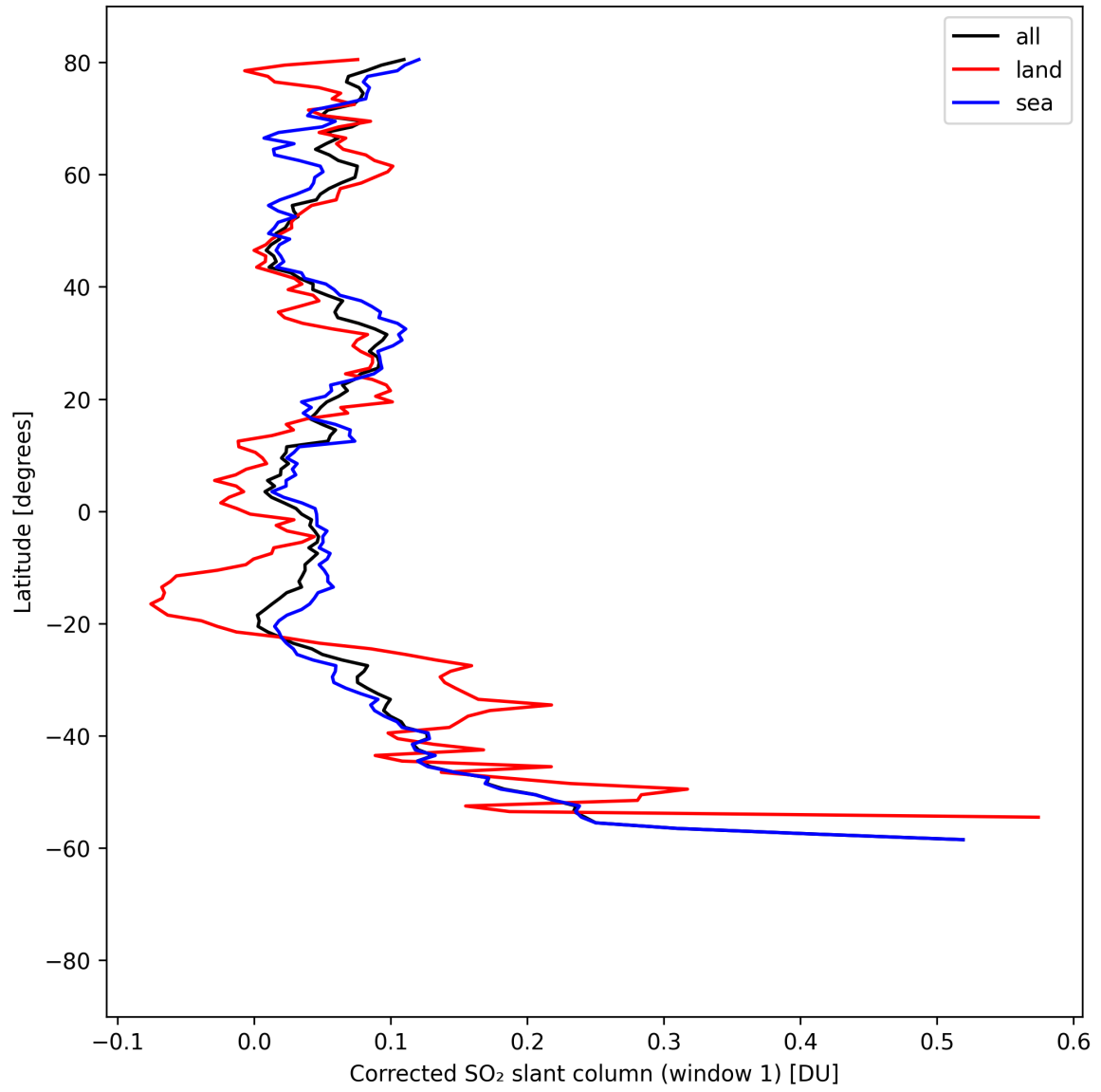


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-08-25 to 2025-08-26.

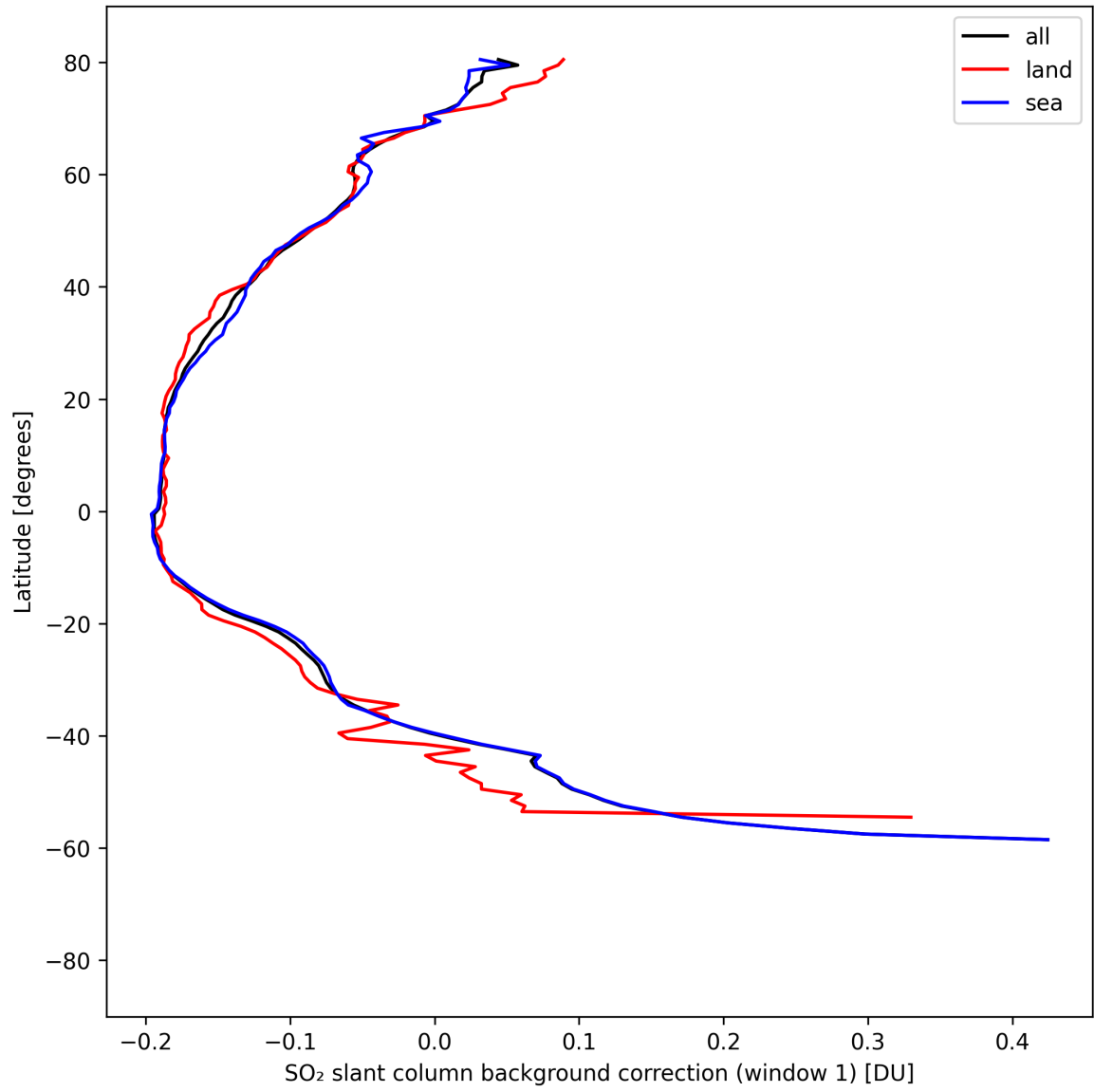


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-08-25 to 2025-08-26.

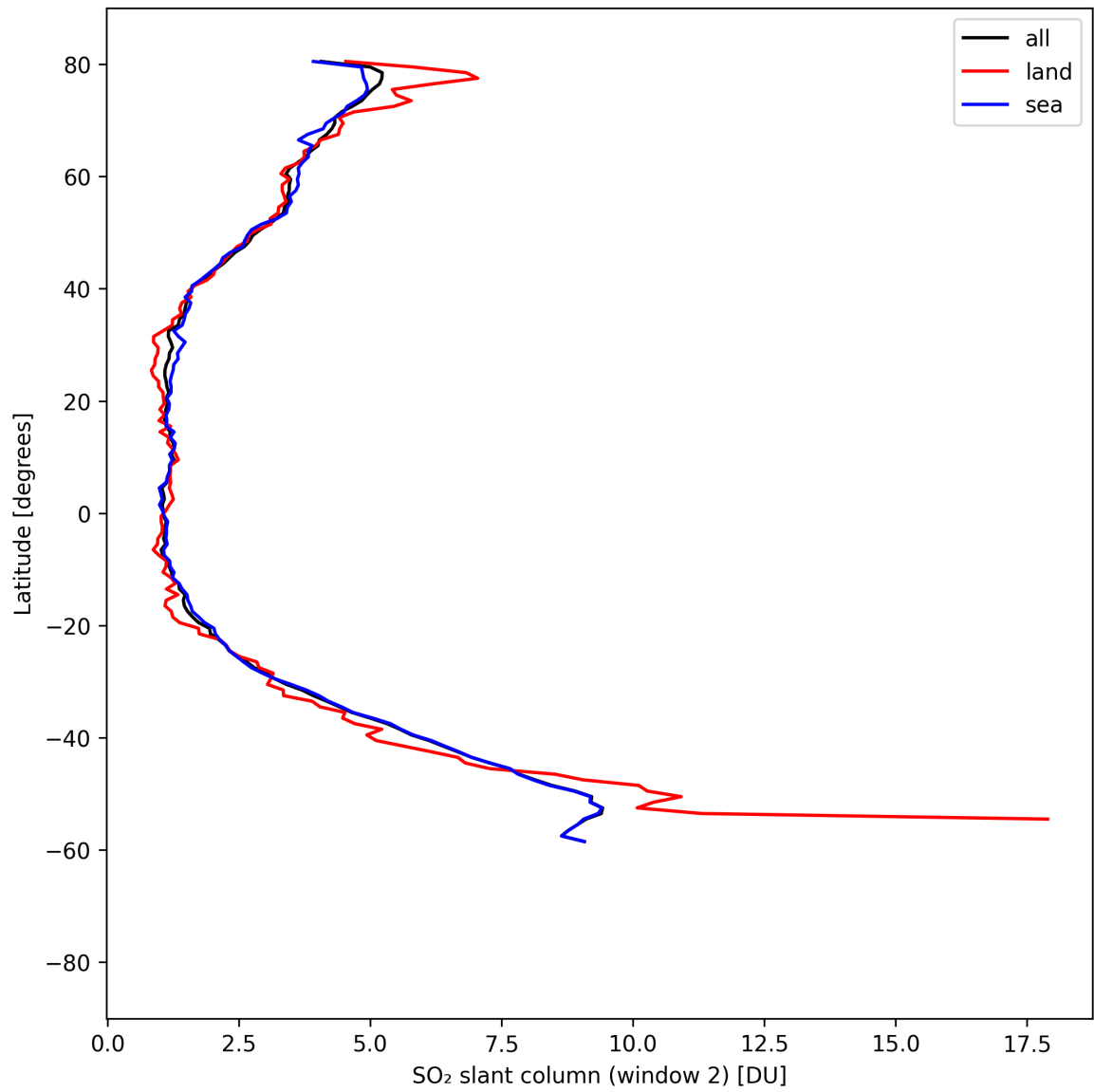


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-08-25 to 2025-08-26.

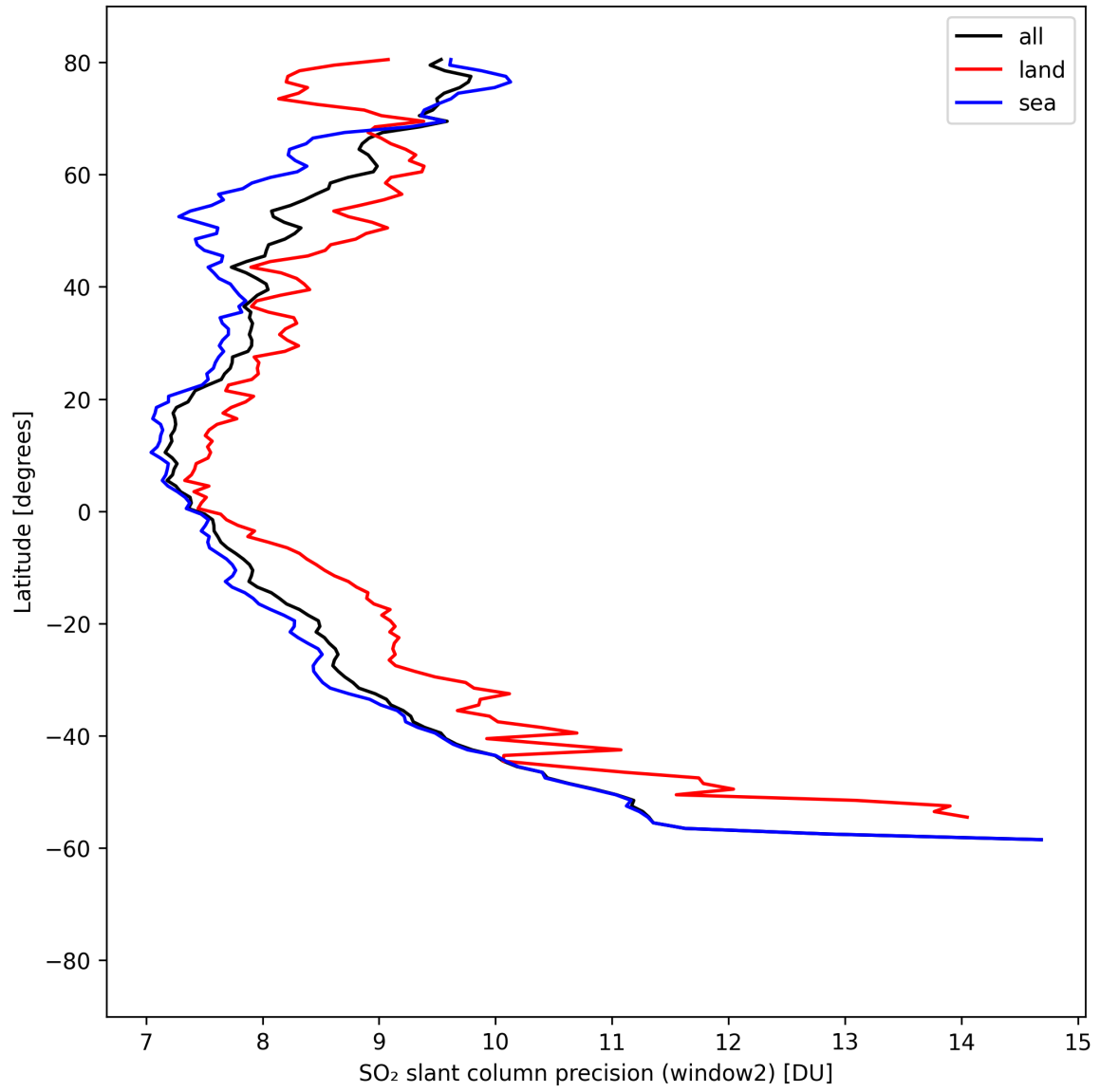


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-08-25 to 2025-08-26.

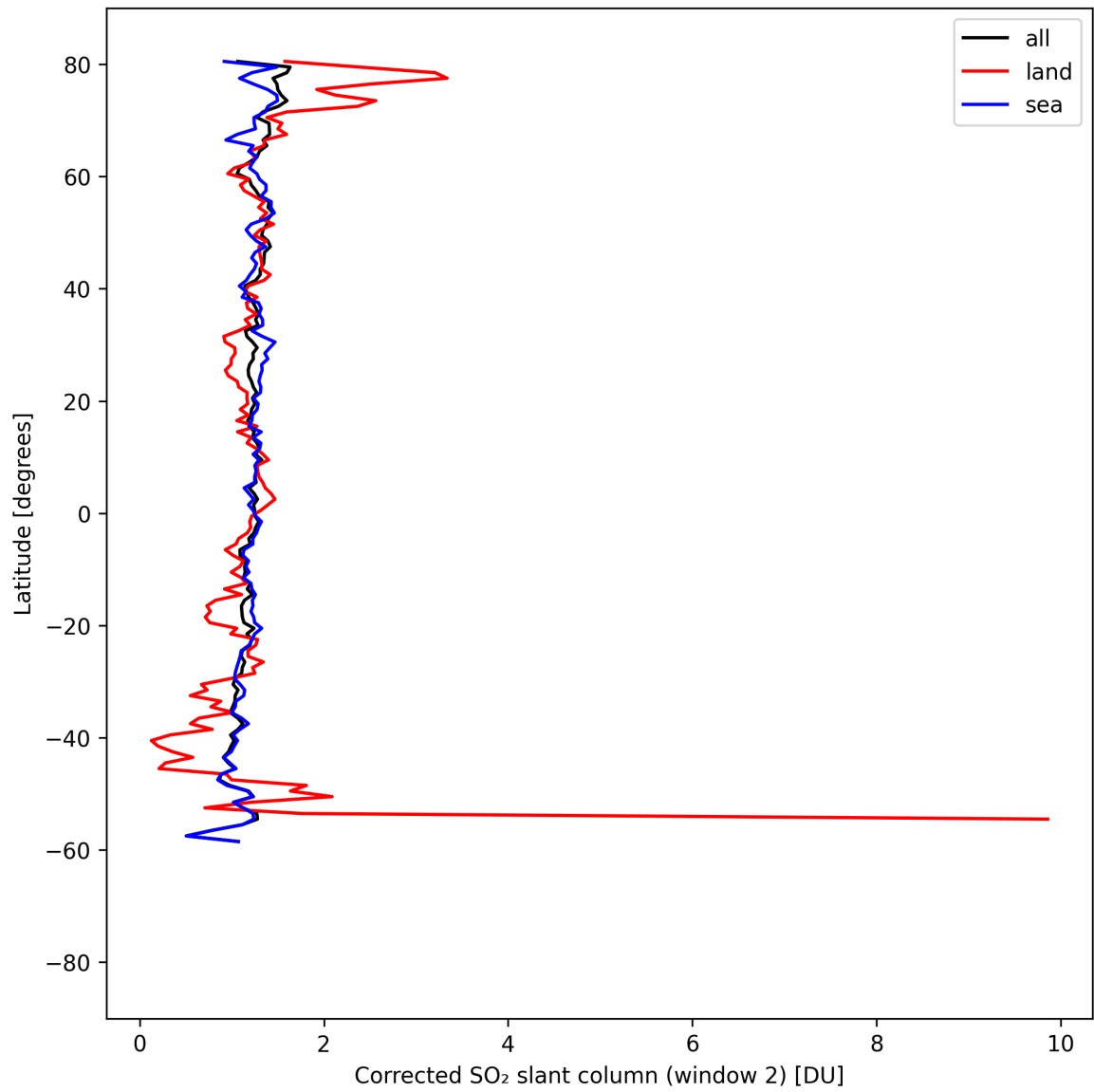


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-08-25 to 2025-08-26.

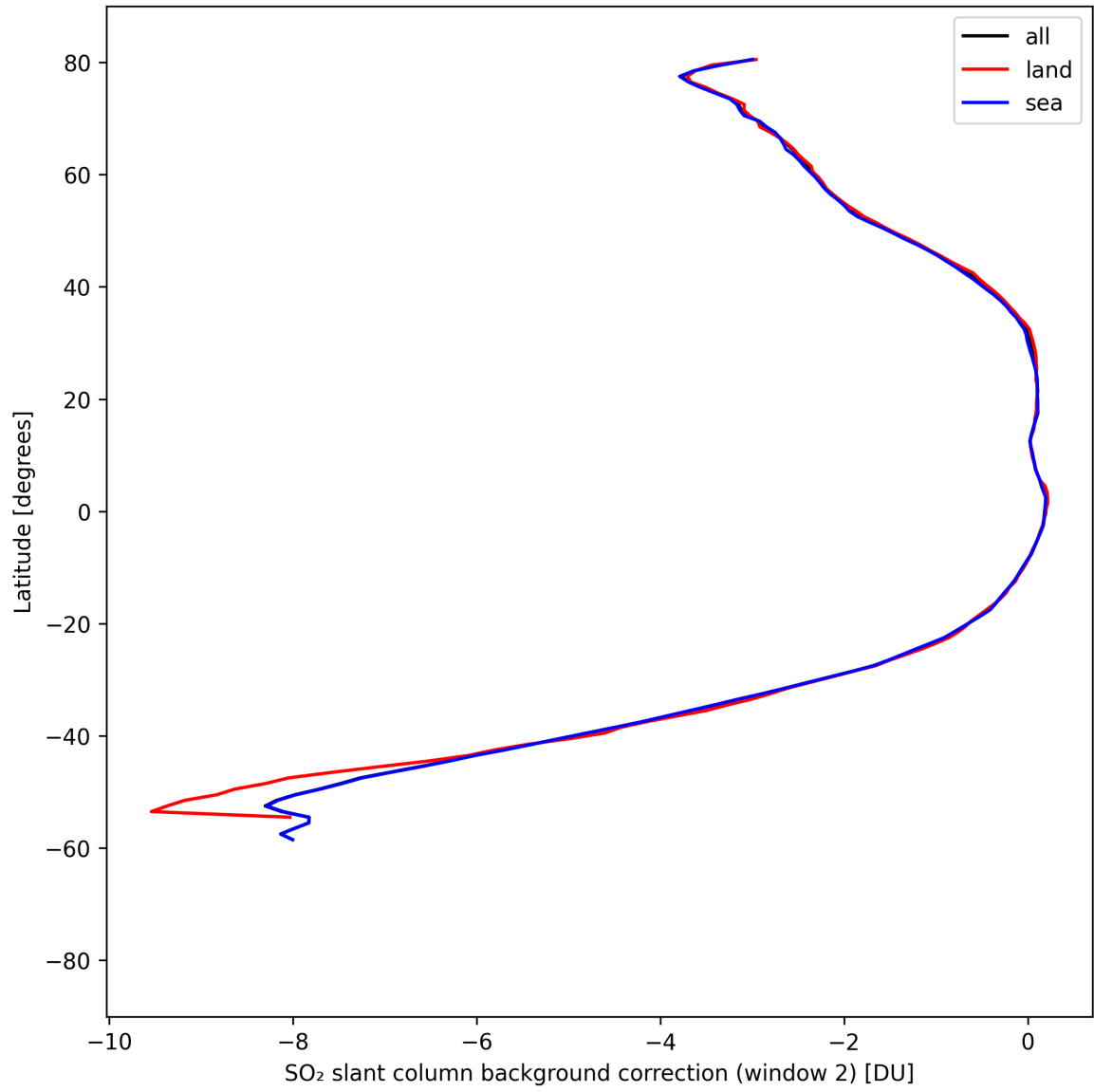


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-08-25 to 2025-08-26.

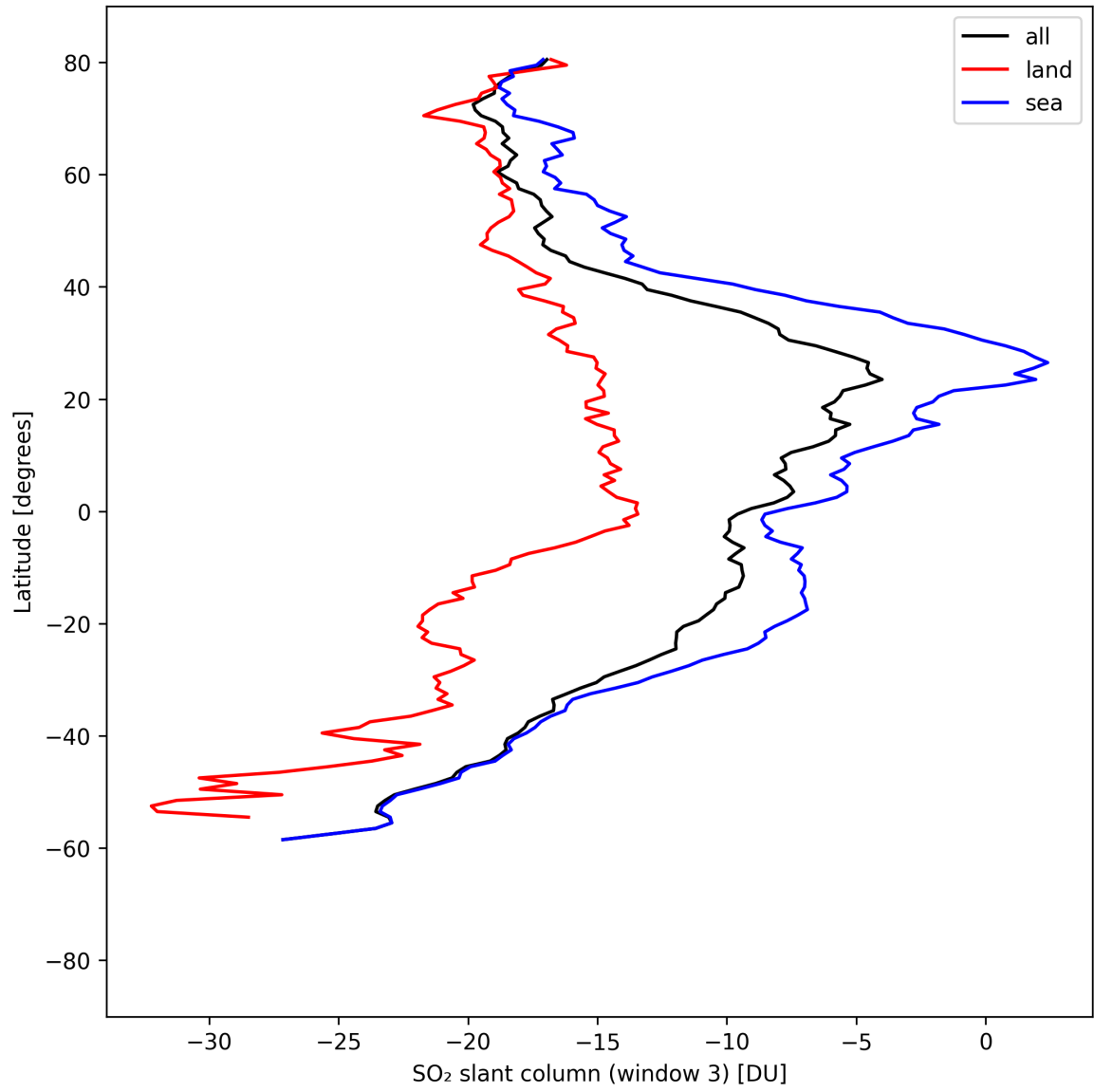


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-08-25 to 2025-08-26.

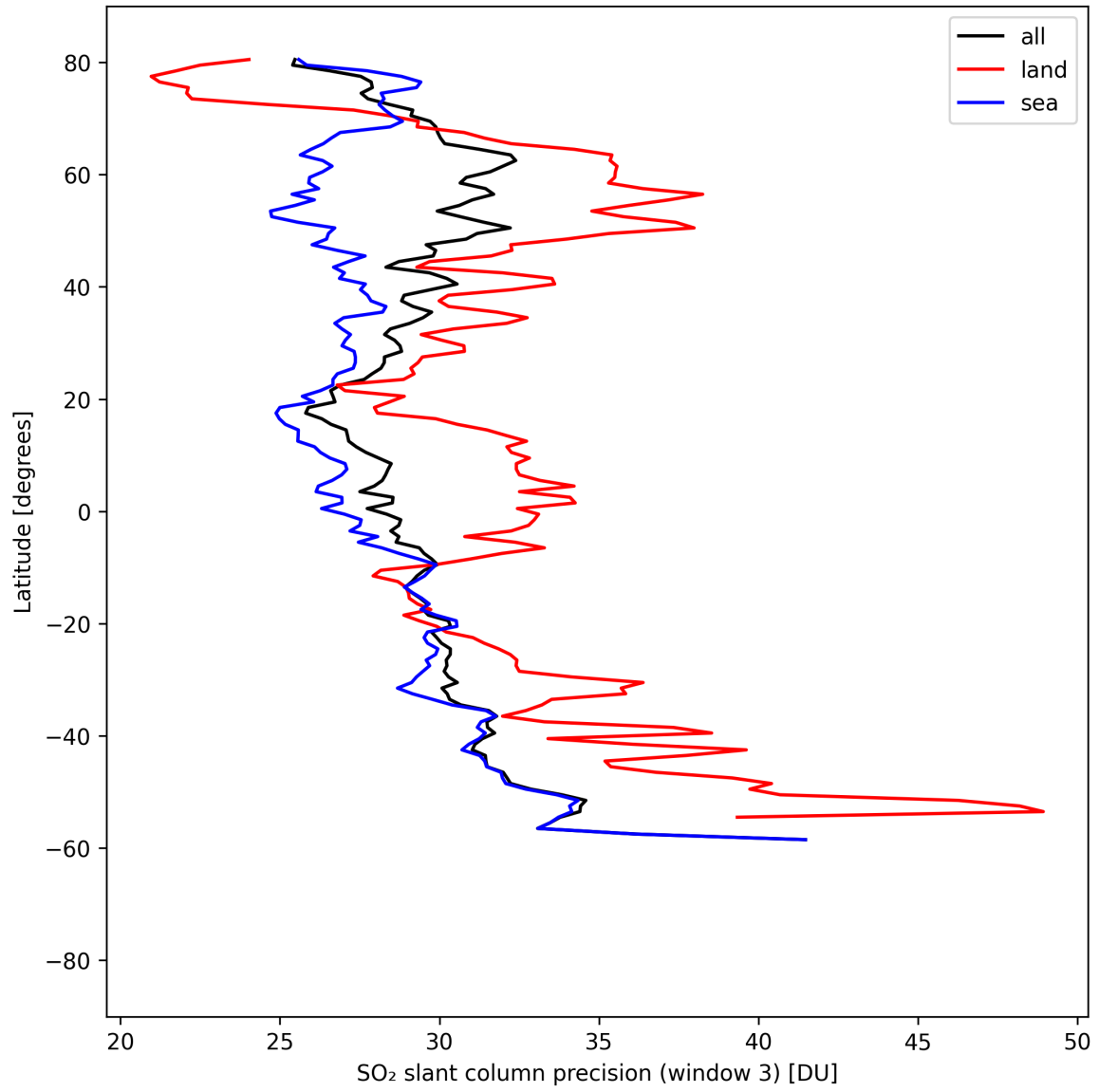


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-08-25 to 2025-08-26.

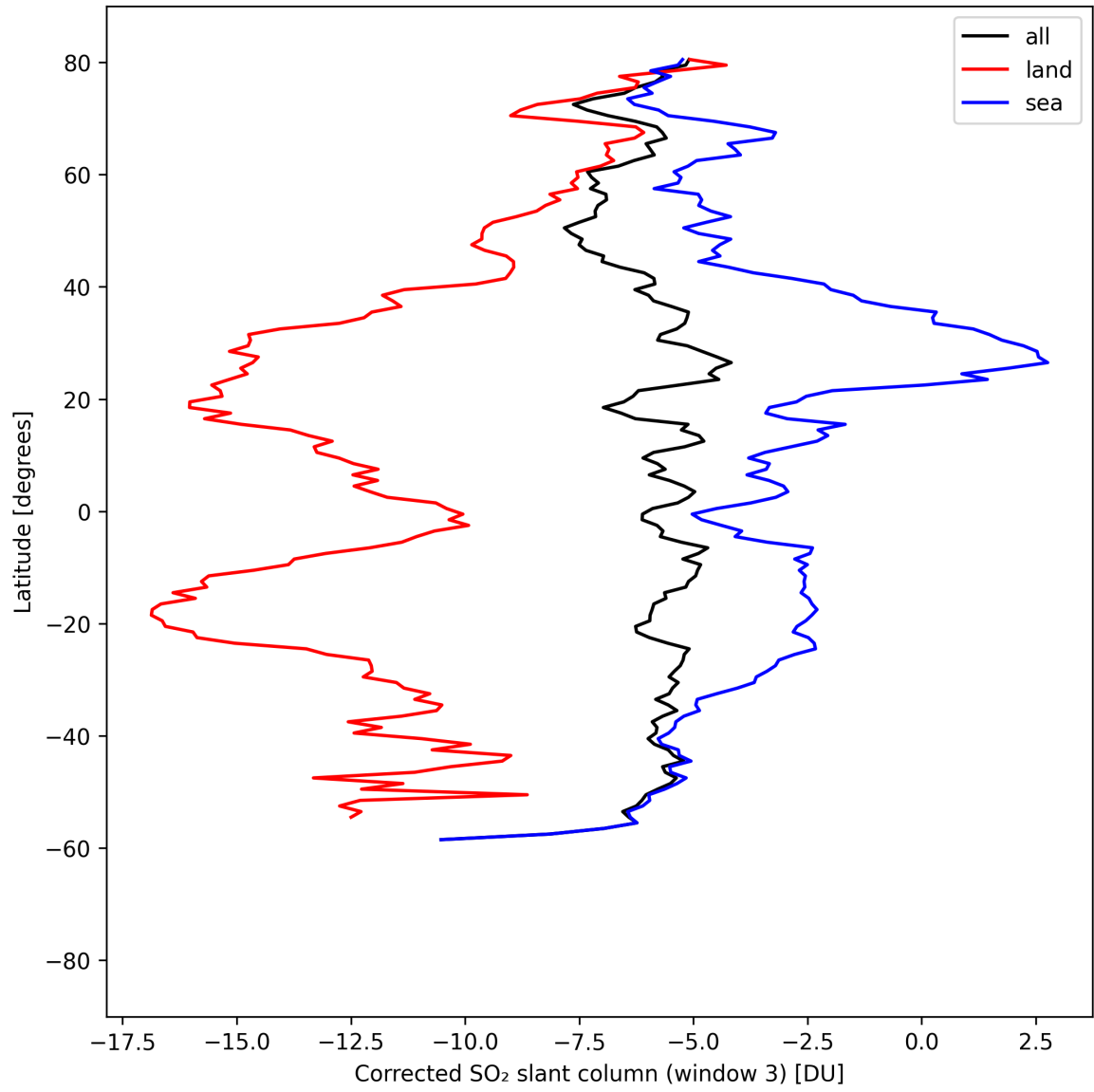


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-08-25 to 2025-08-26.

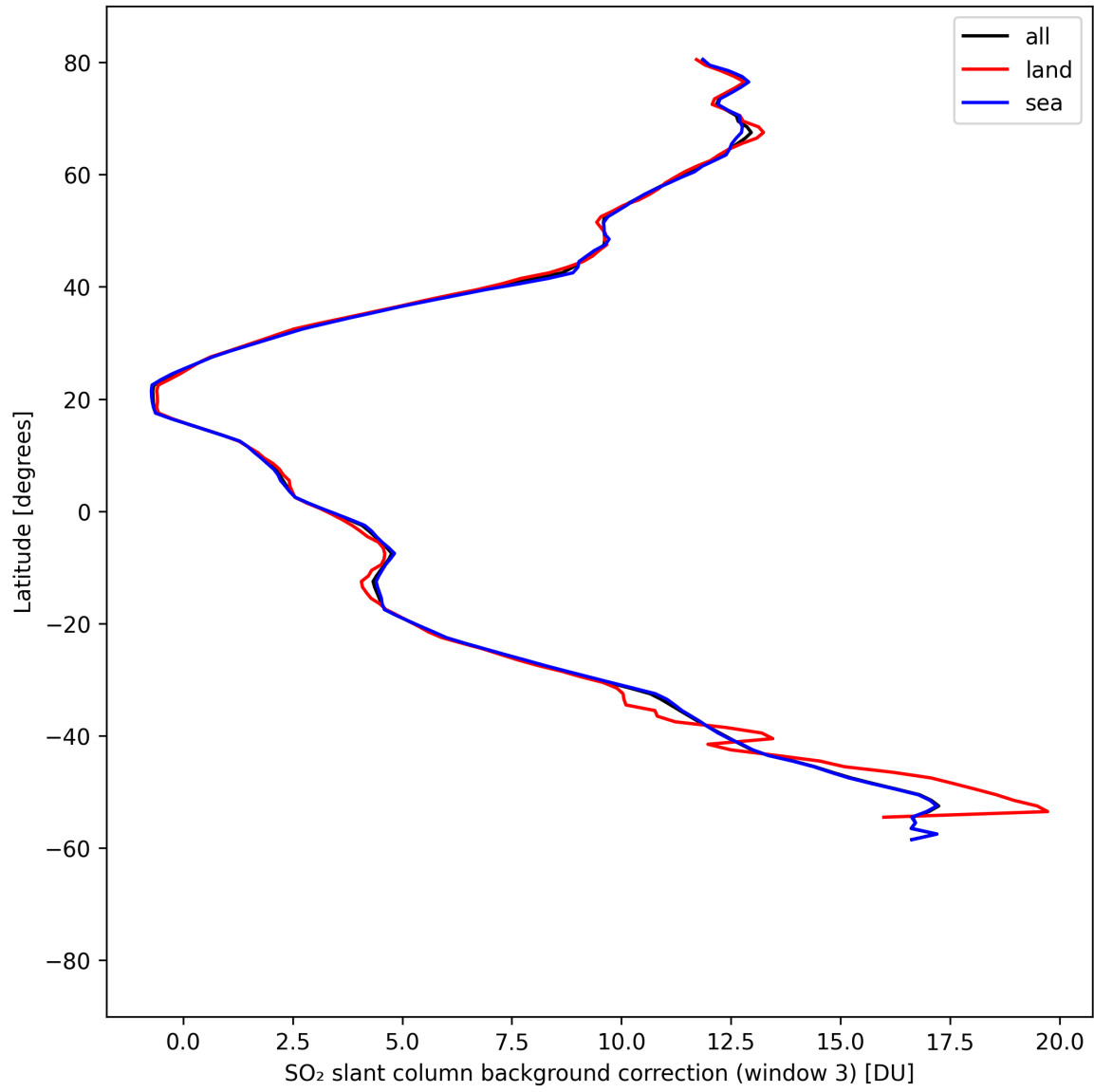


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-08-25 to 2025-08-26.

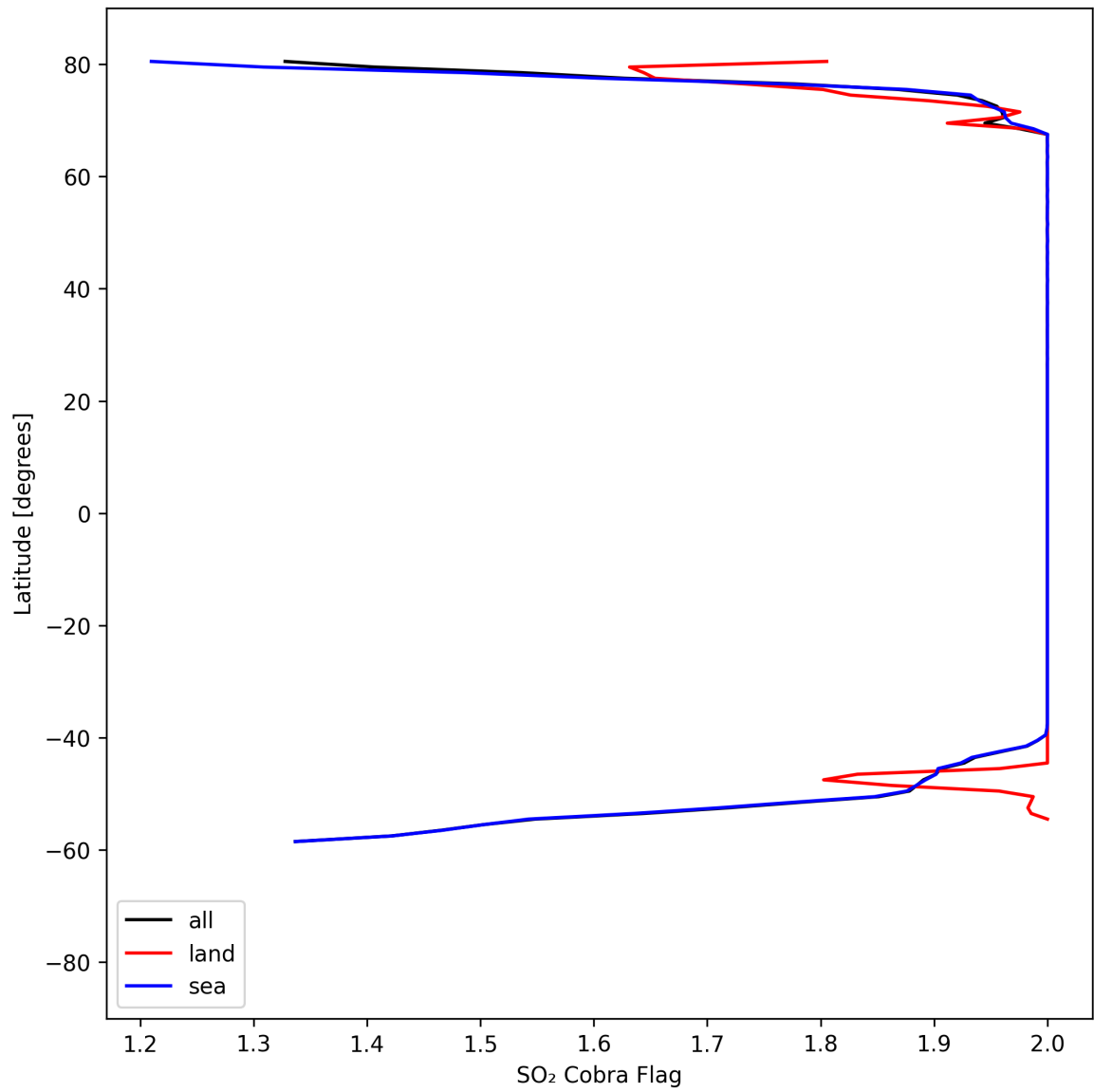


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-08-25 to 2025-08-26.

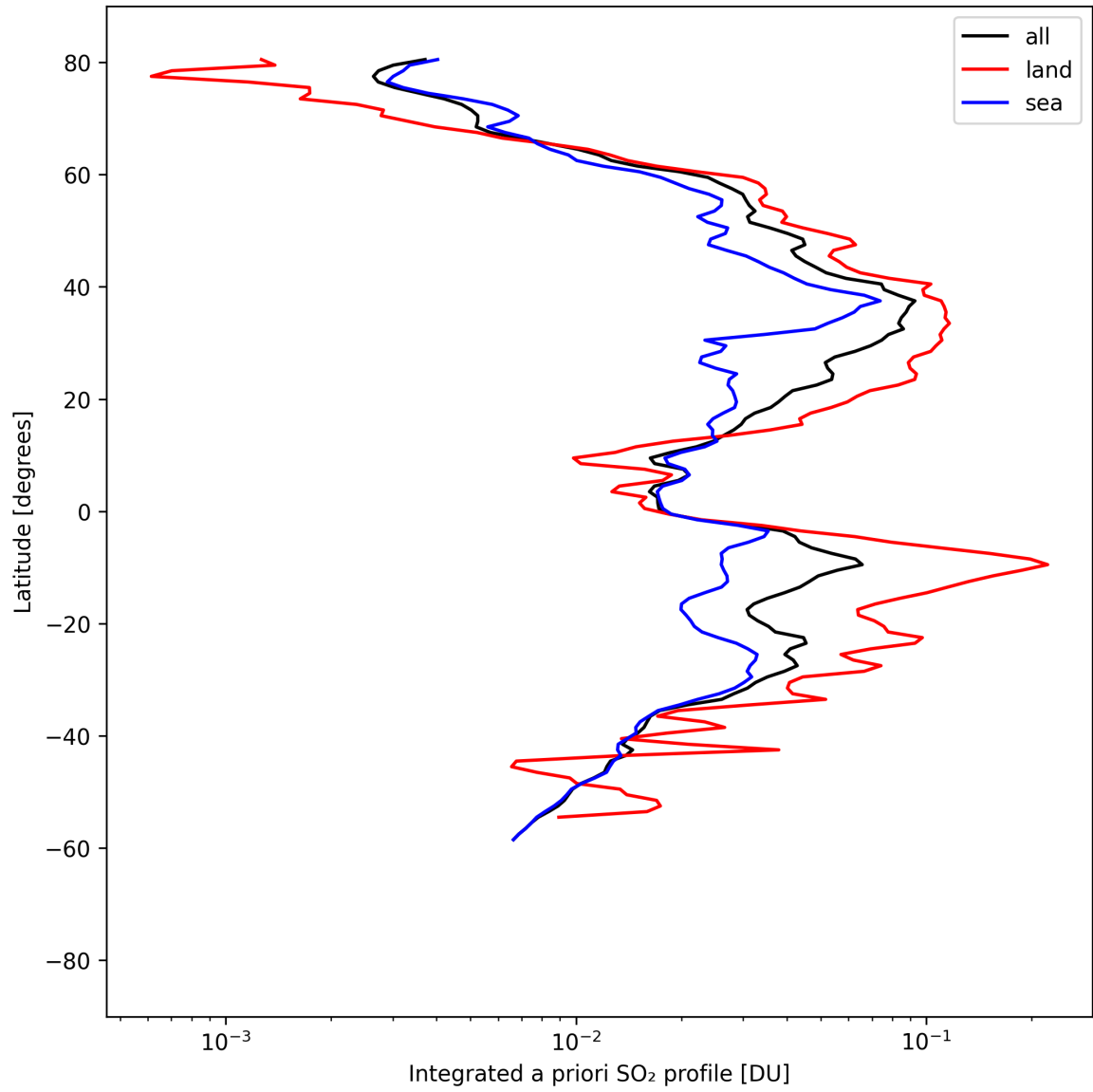


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-08-25 to 2025-08-26.

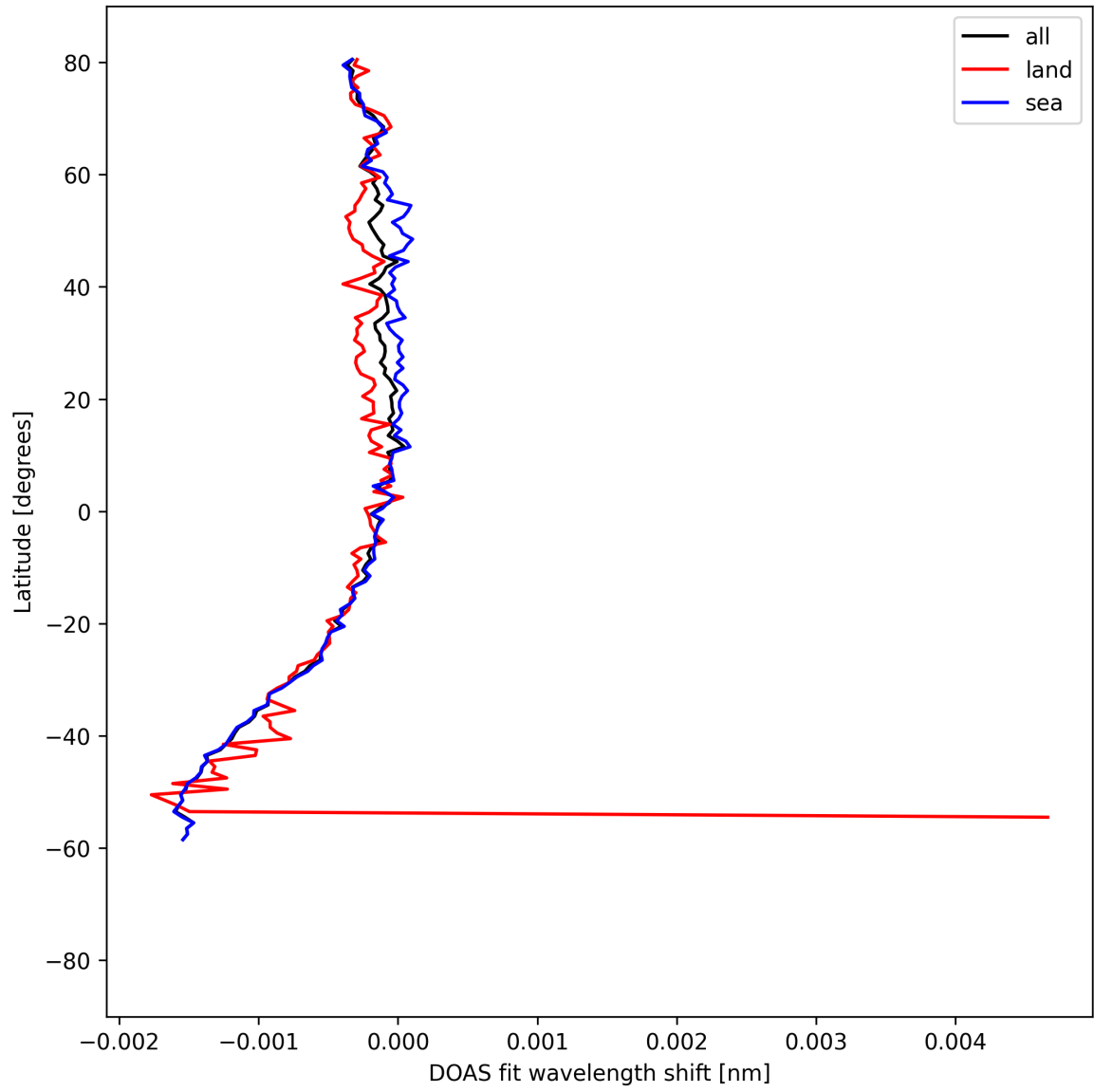


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-08-25 to 2025-08-26.

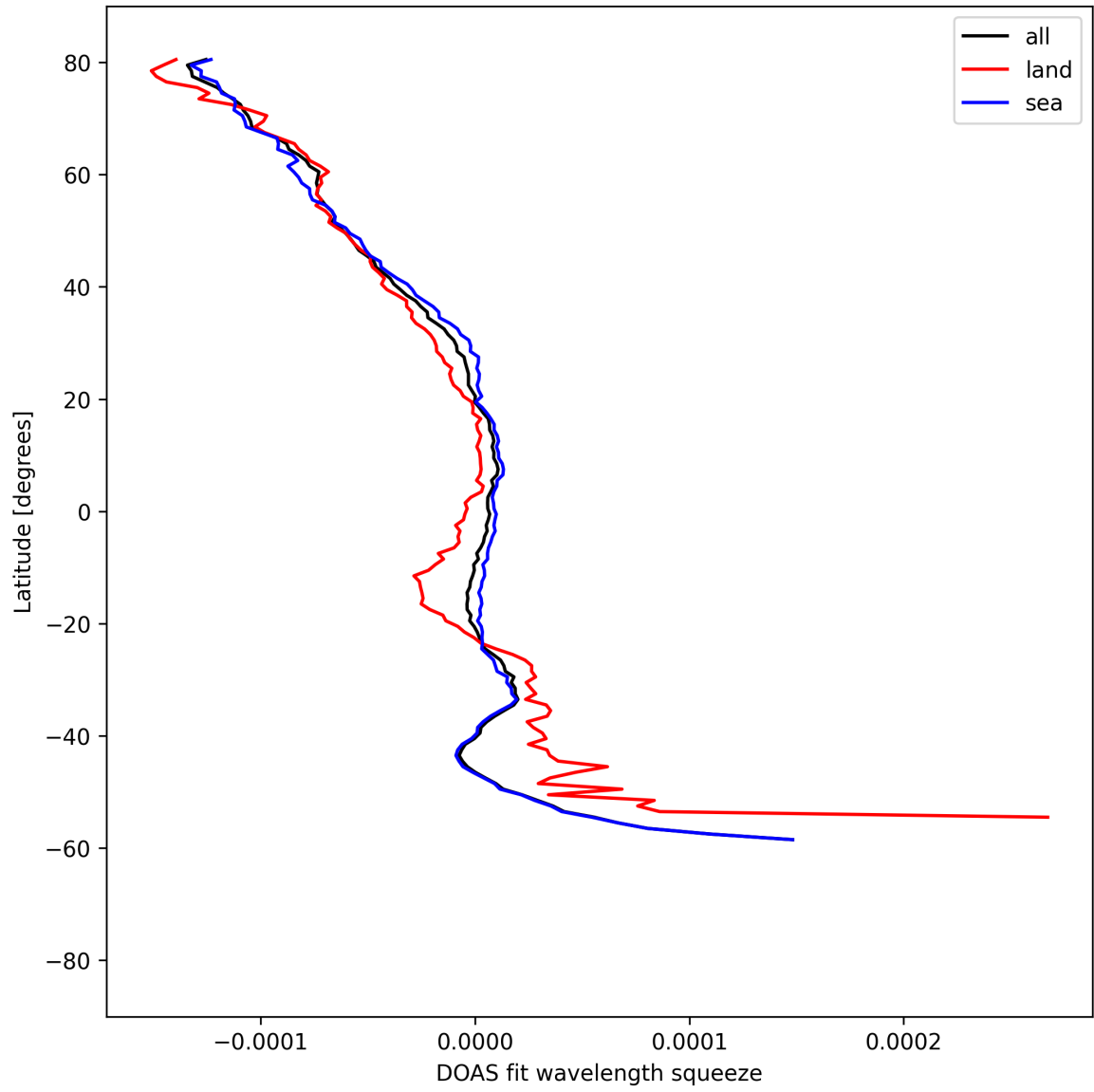


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-08-25 to 2025-08-26.

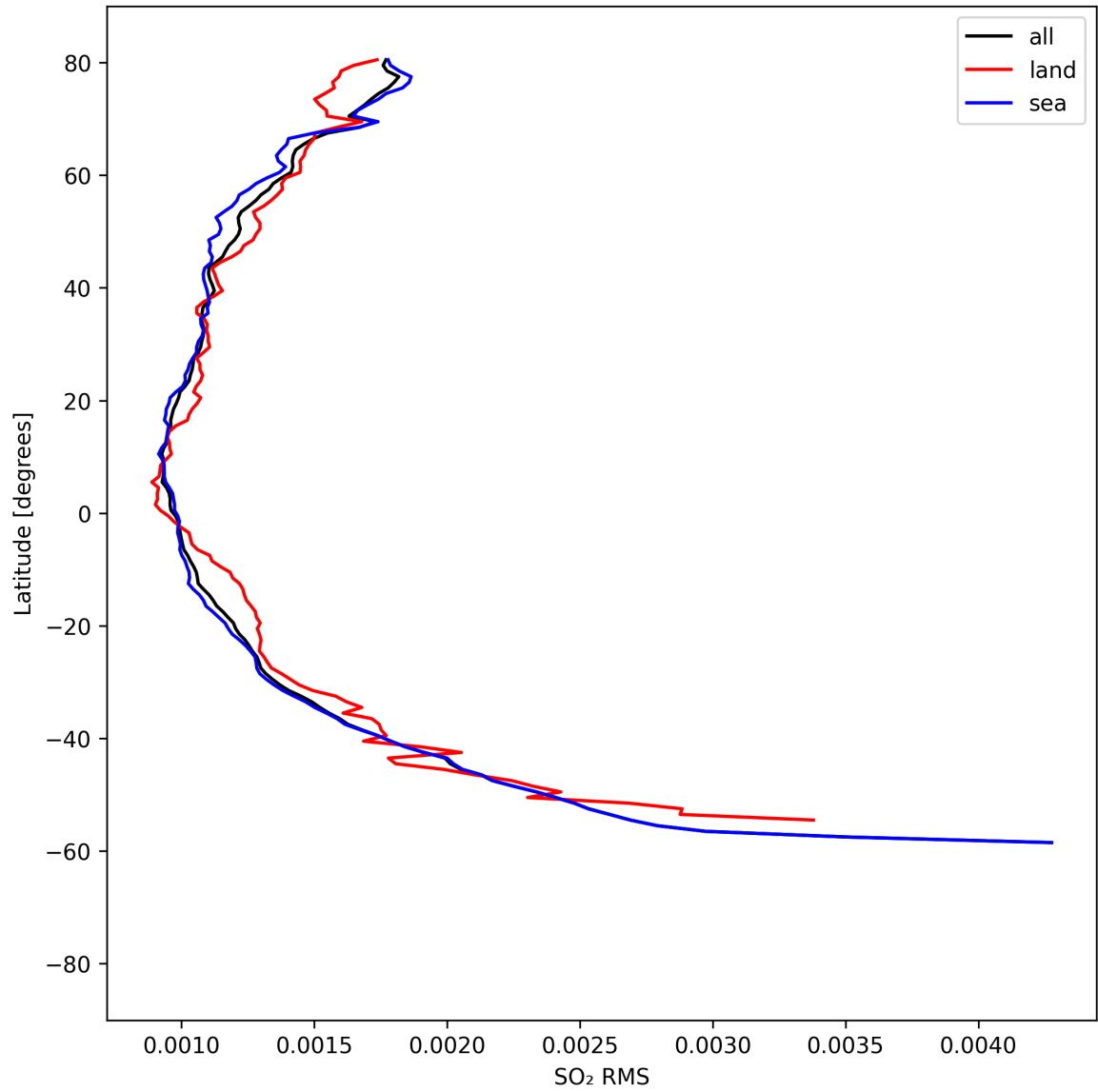


Figure 52: Zonal average of “SO₂ RMS” for 2025-08-25 to 2025-08-26.

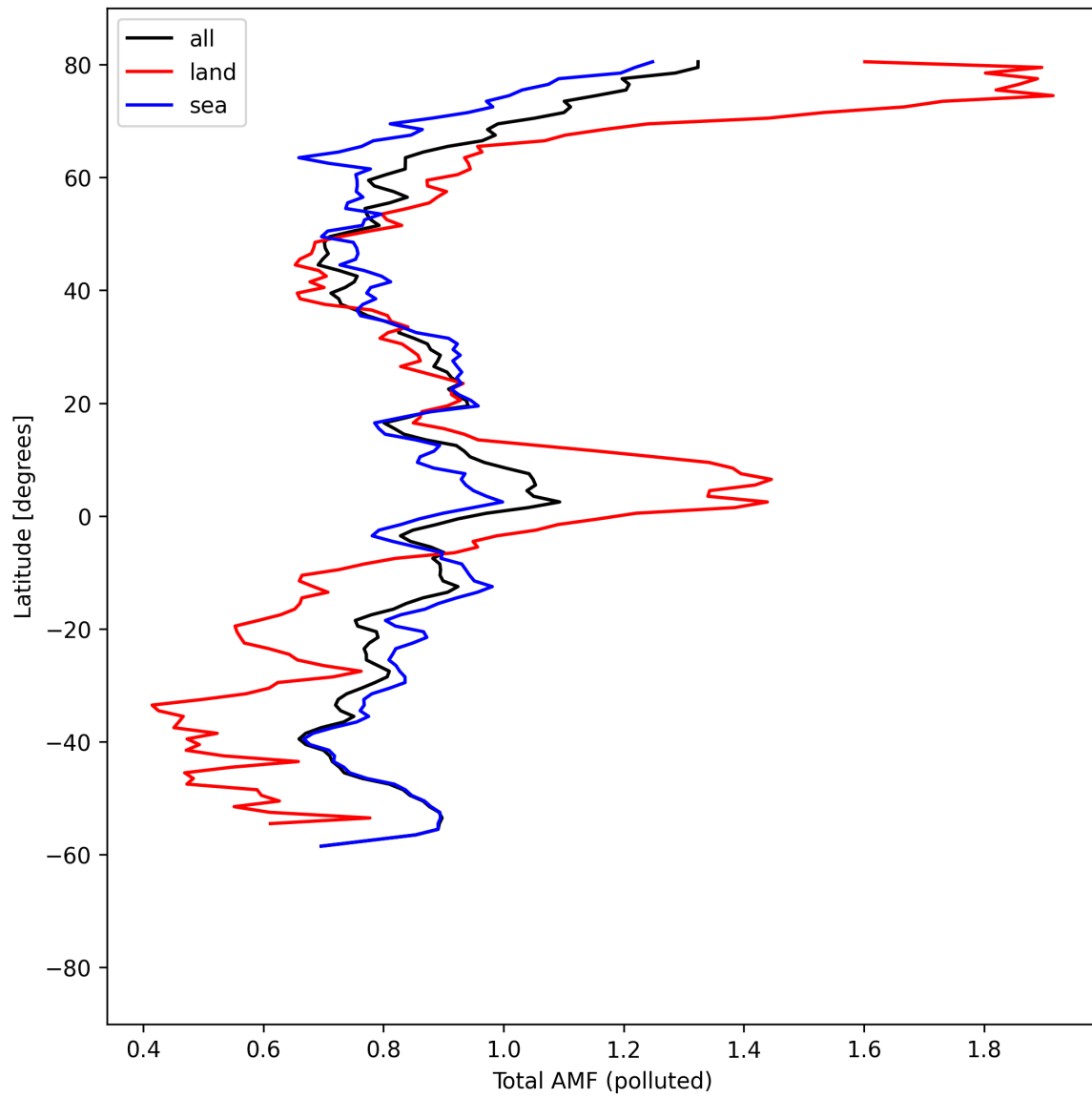


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-08-25 to 2025-08-26.

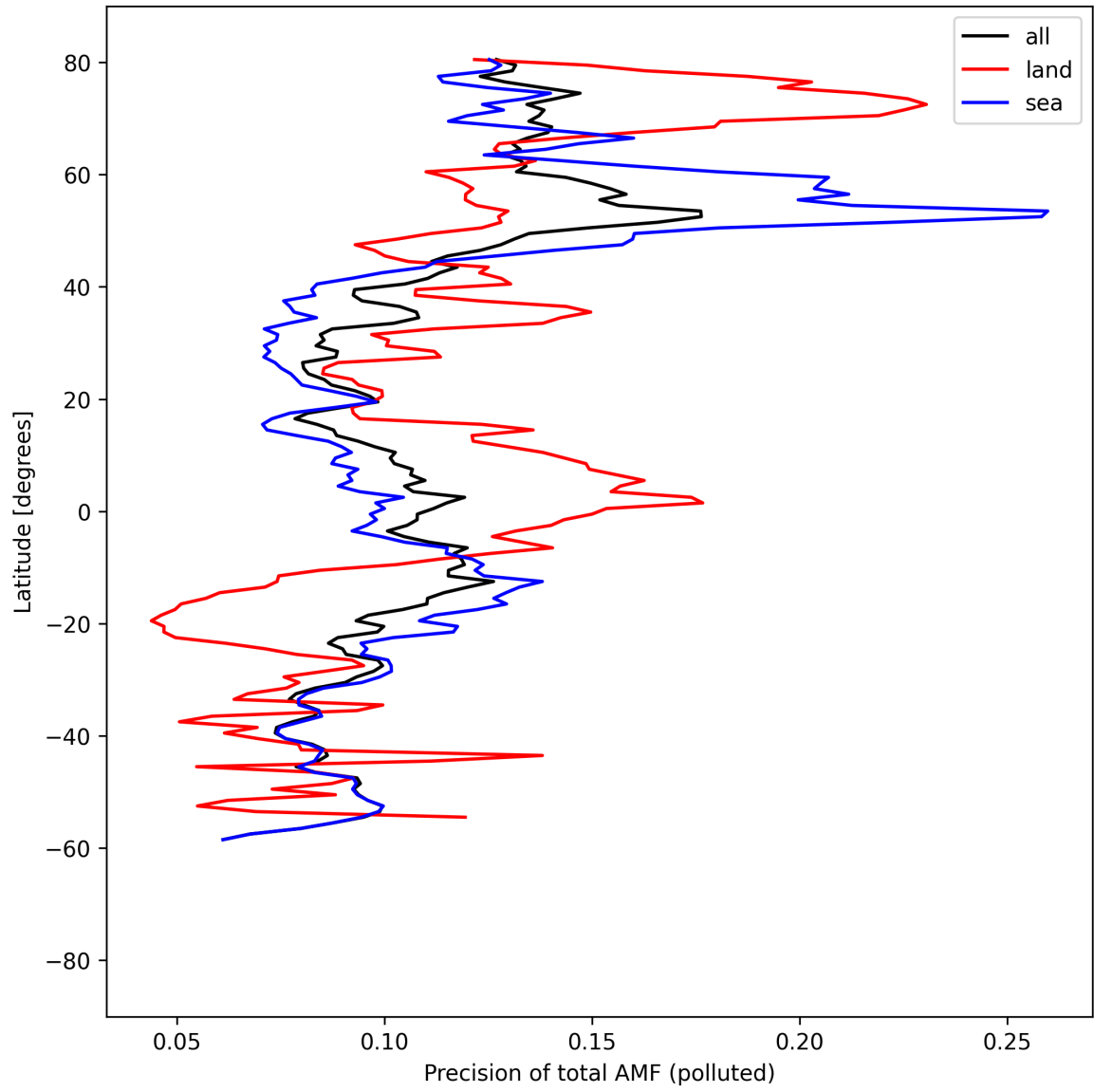


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-08-25 to 2025-08-26.

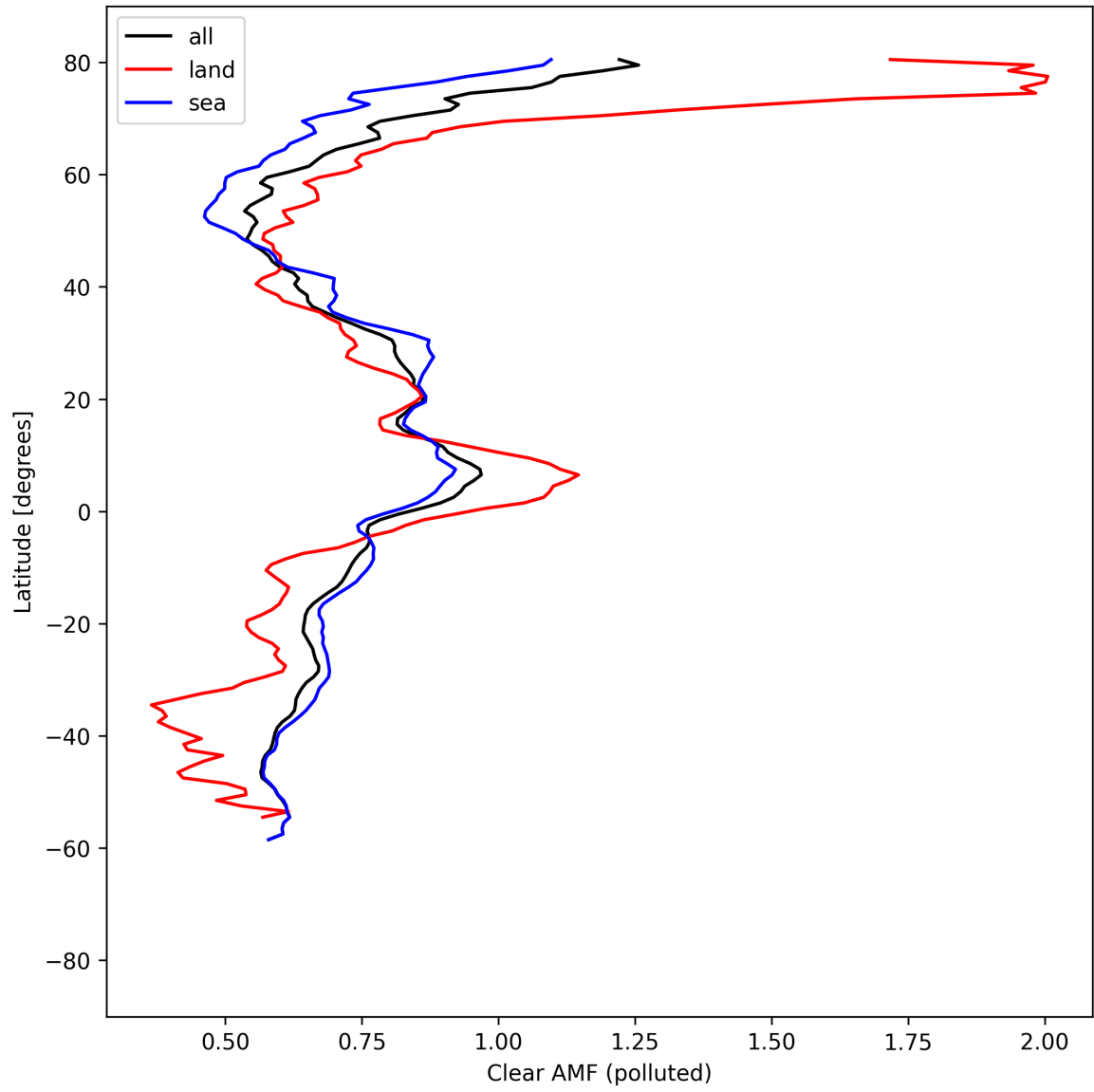


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-08-25 to 2025-08-26.

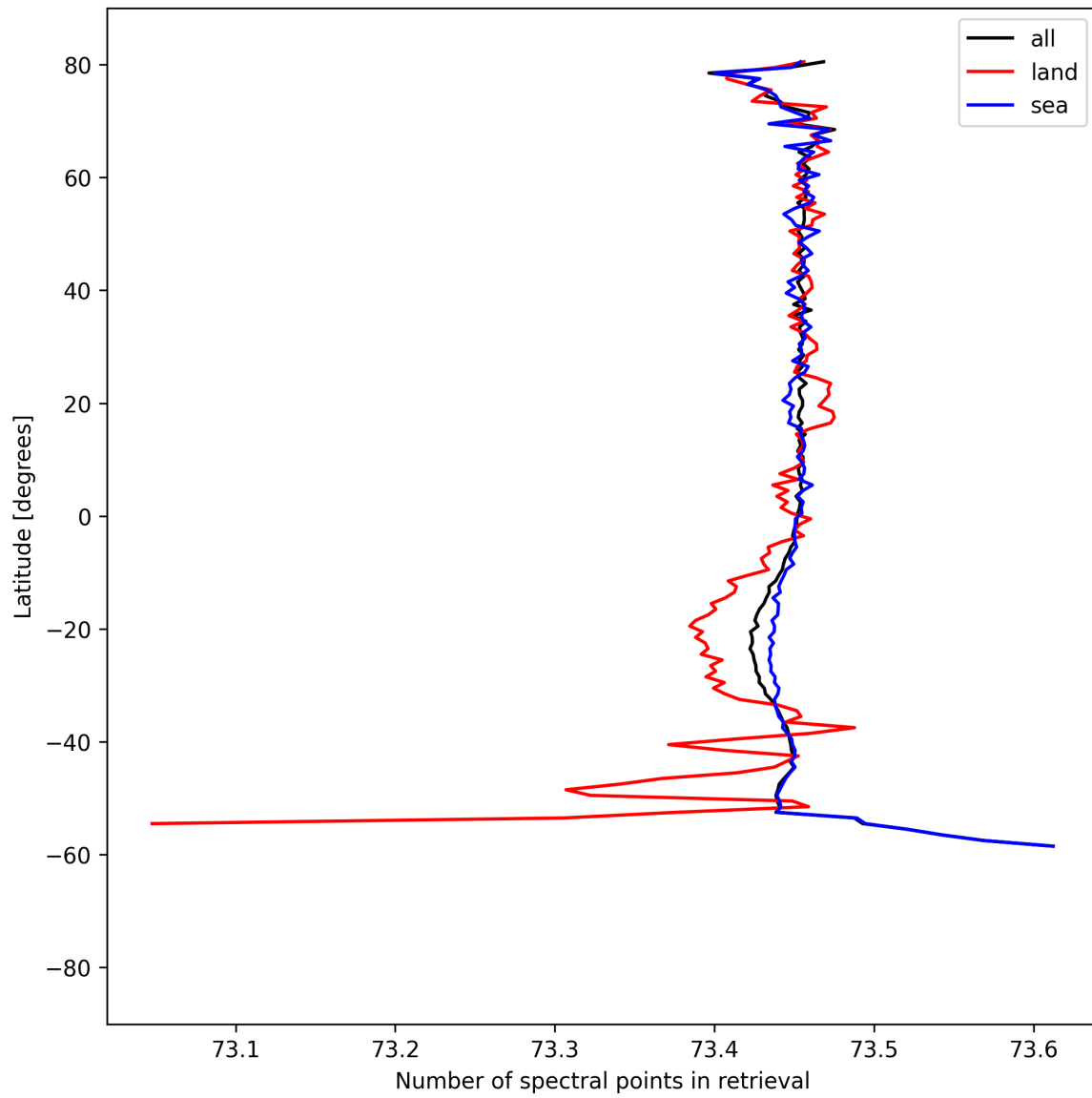


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-08-25 to 2025-08-26.

8 Histograms

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

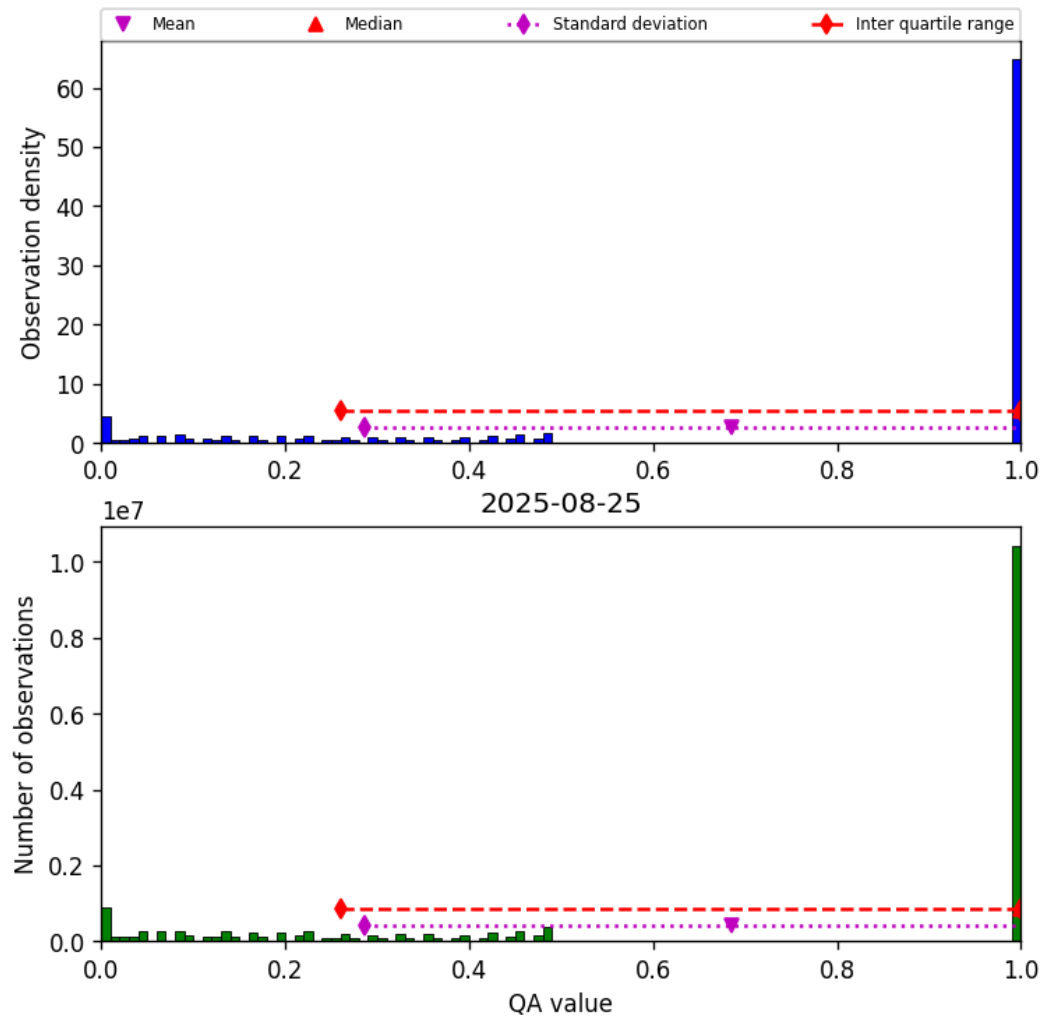


Figure 57: Histogram of “QA value” for 2025-08-25 to 2025-08-26

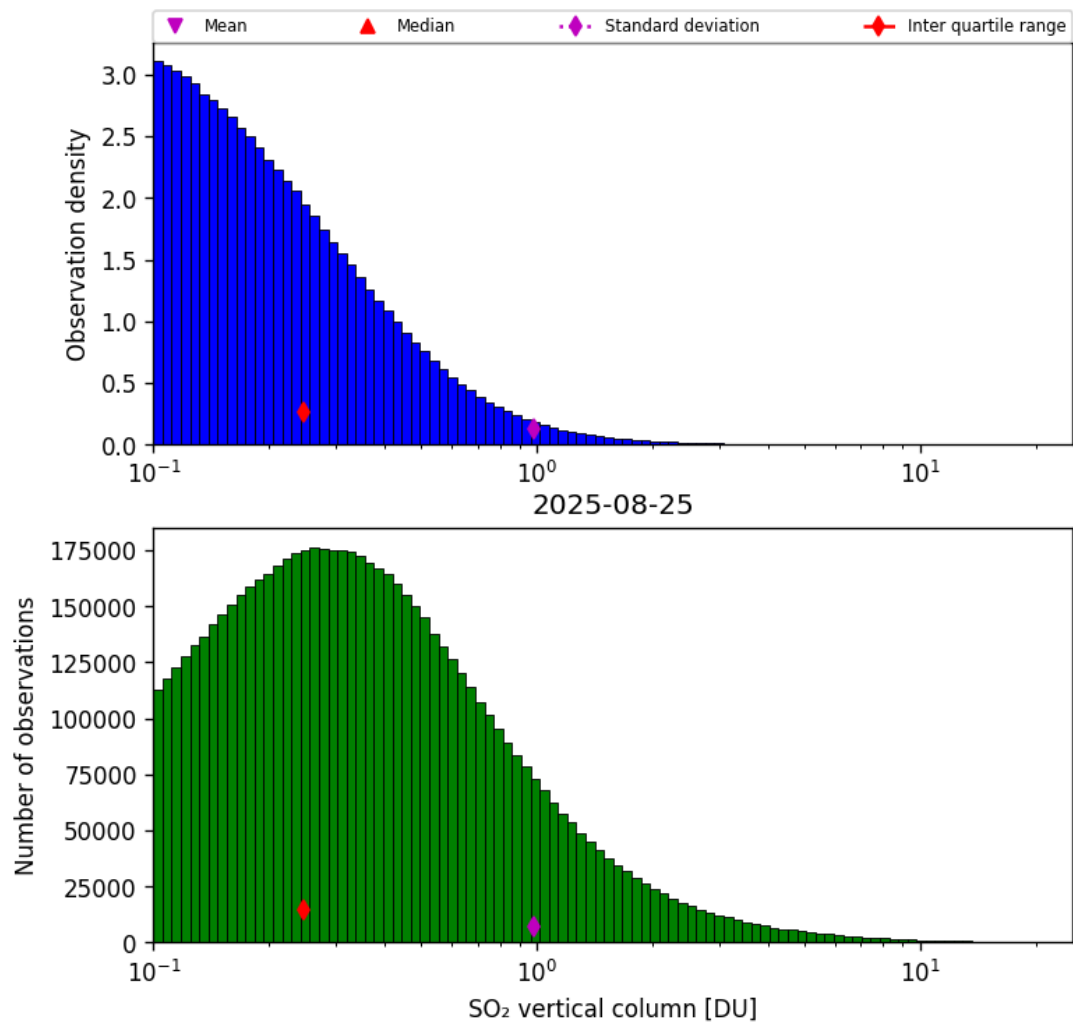


Figure 58: Histogram of “SO₂ vertical column” for 2025-08-25 to 2025-08-26

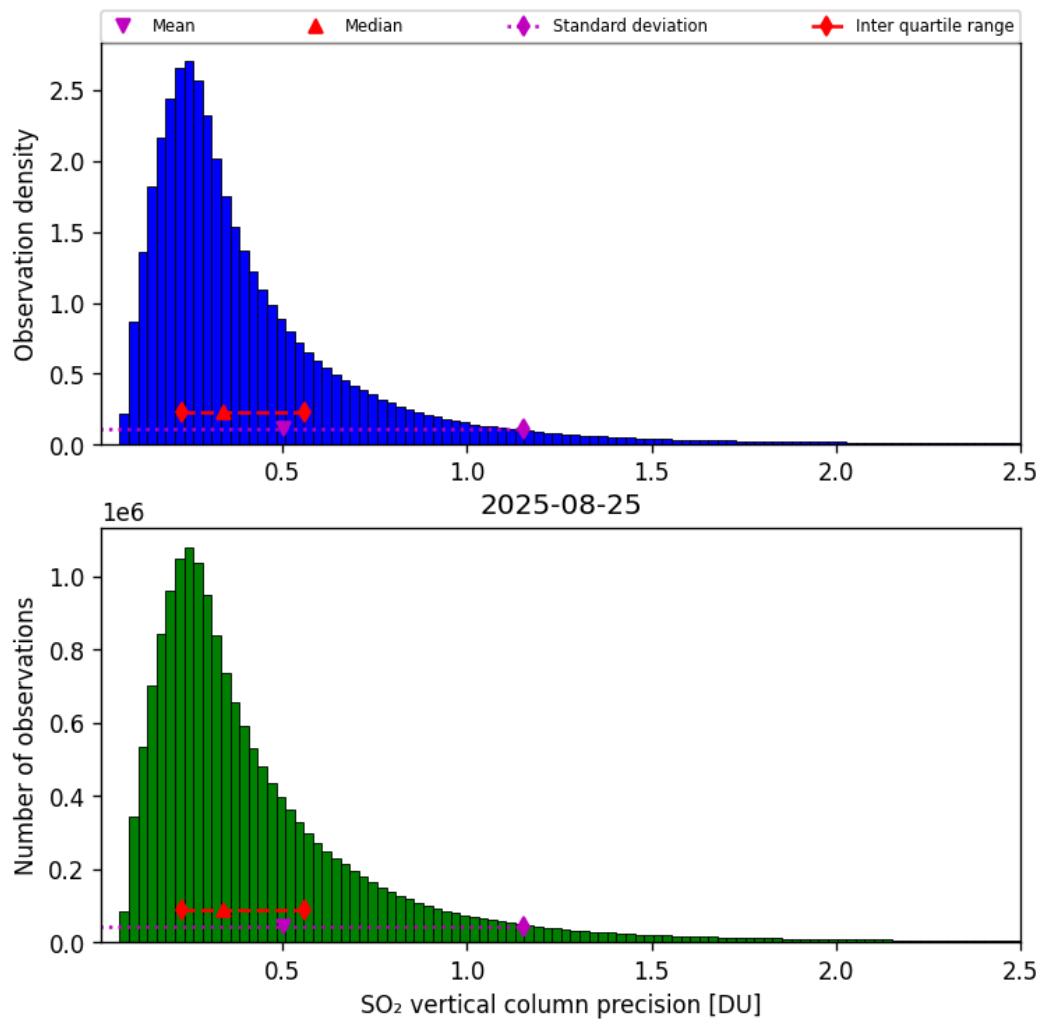


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-08-25 to 2025-08-26

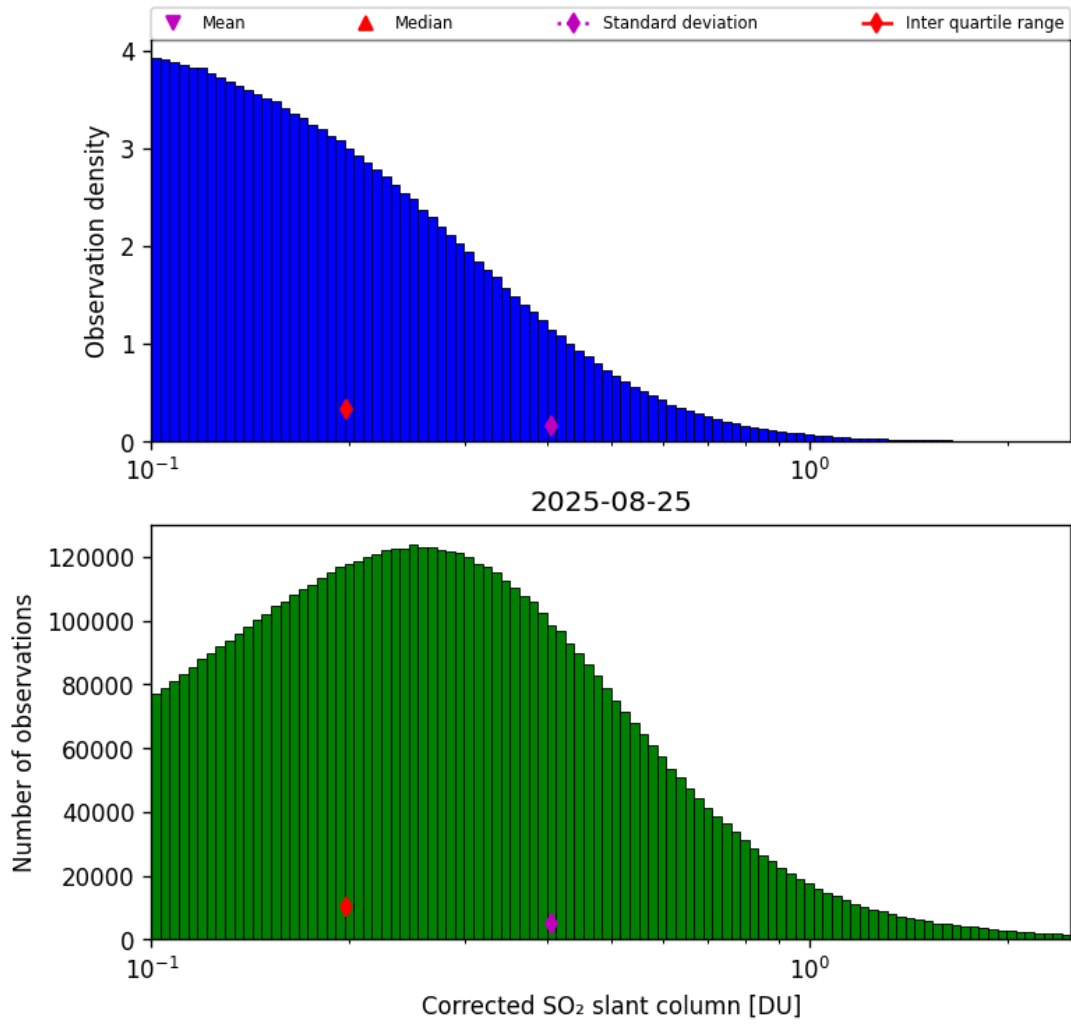


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-08-25 to 2025-08-26

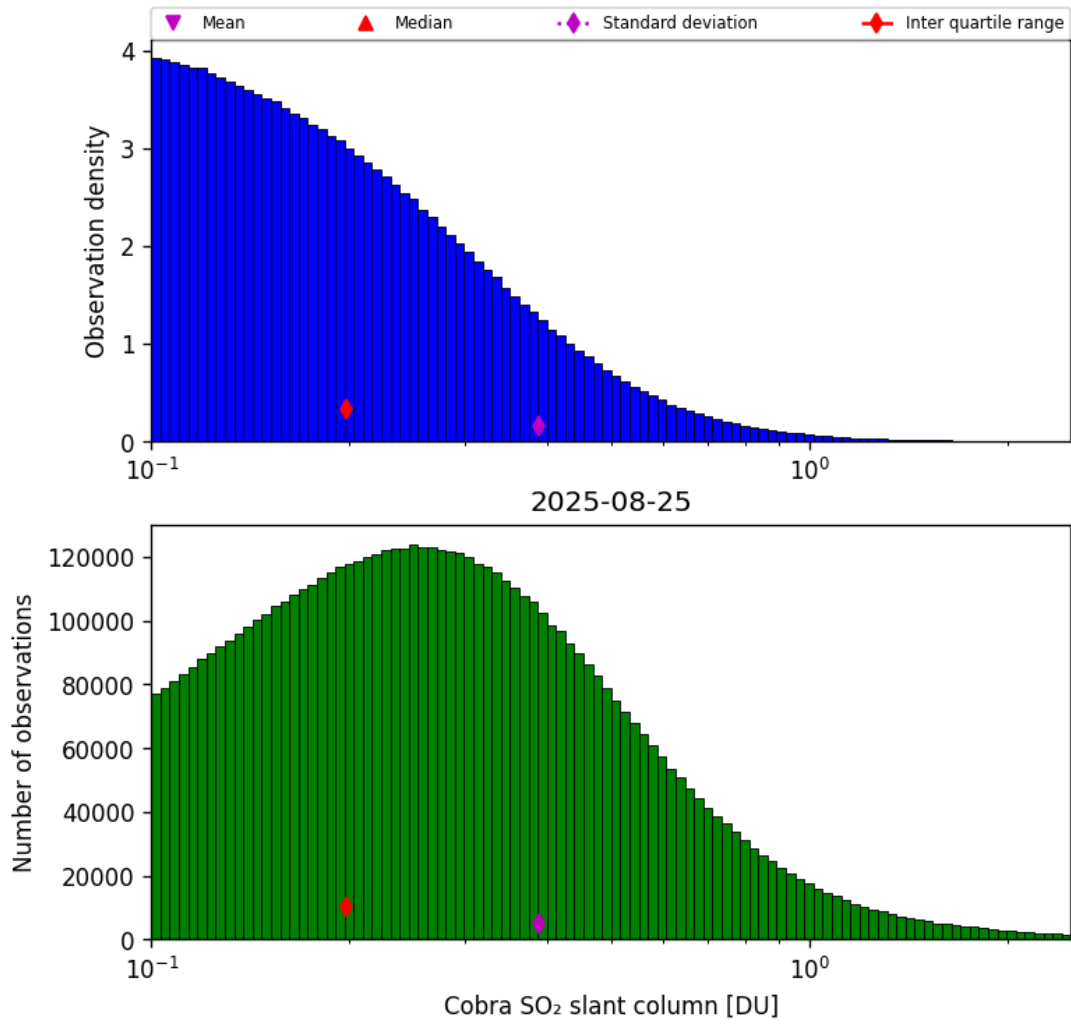


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-08-25 to 2025-08-26

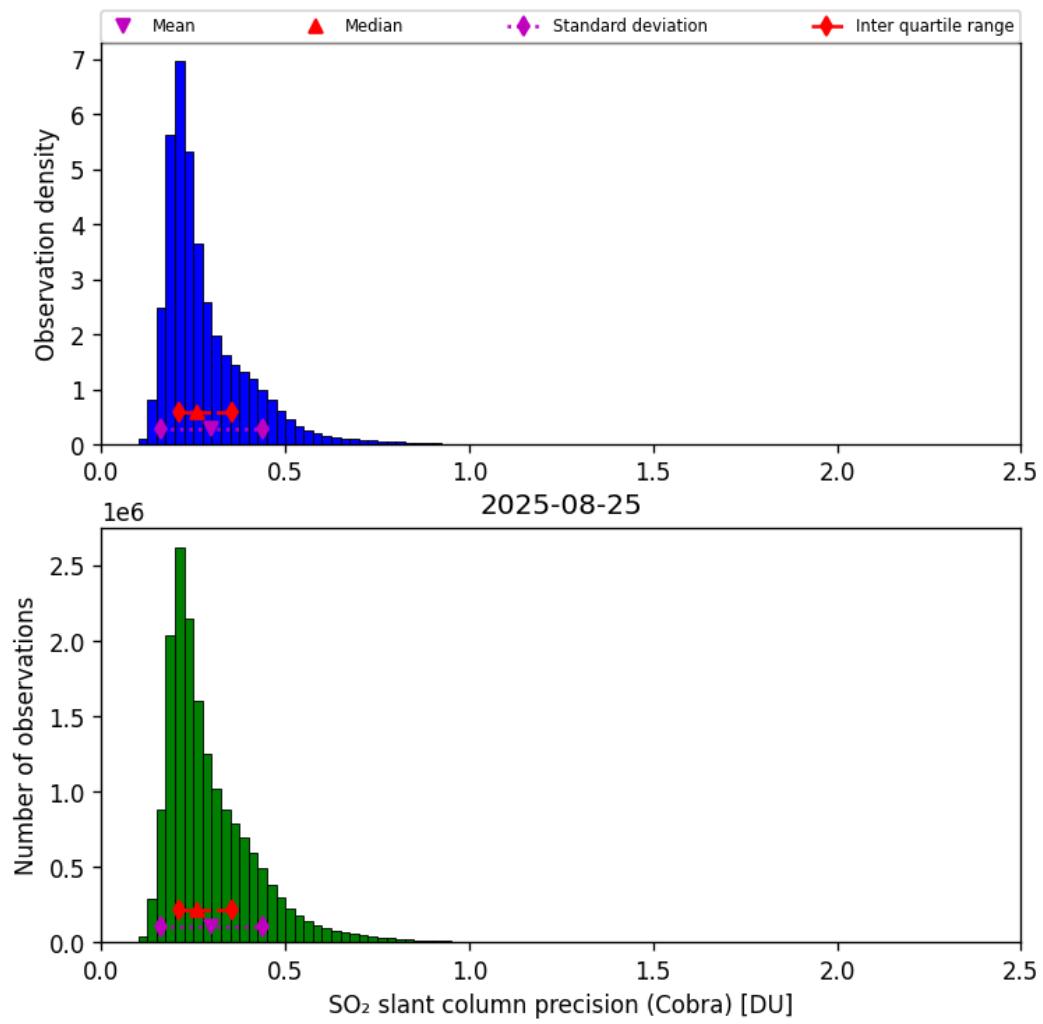


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-08-25 to 2025-08-26

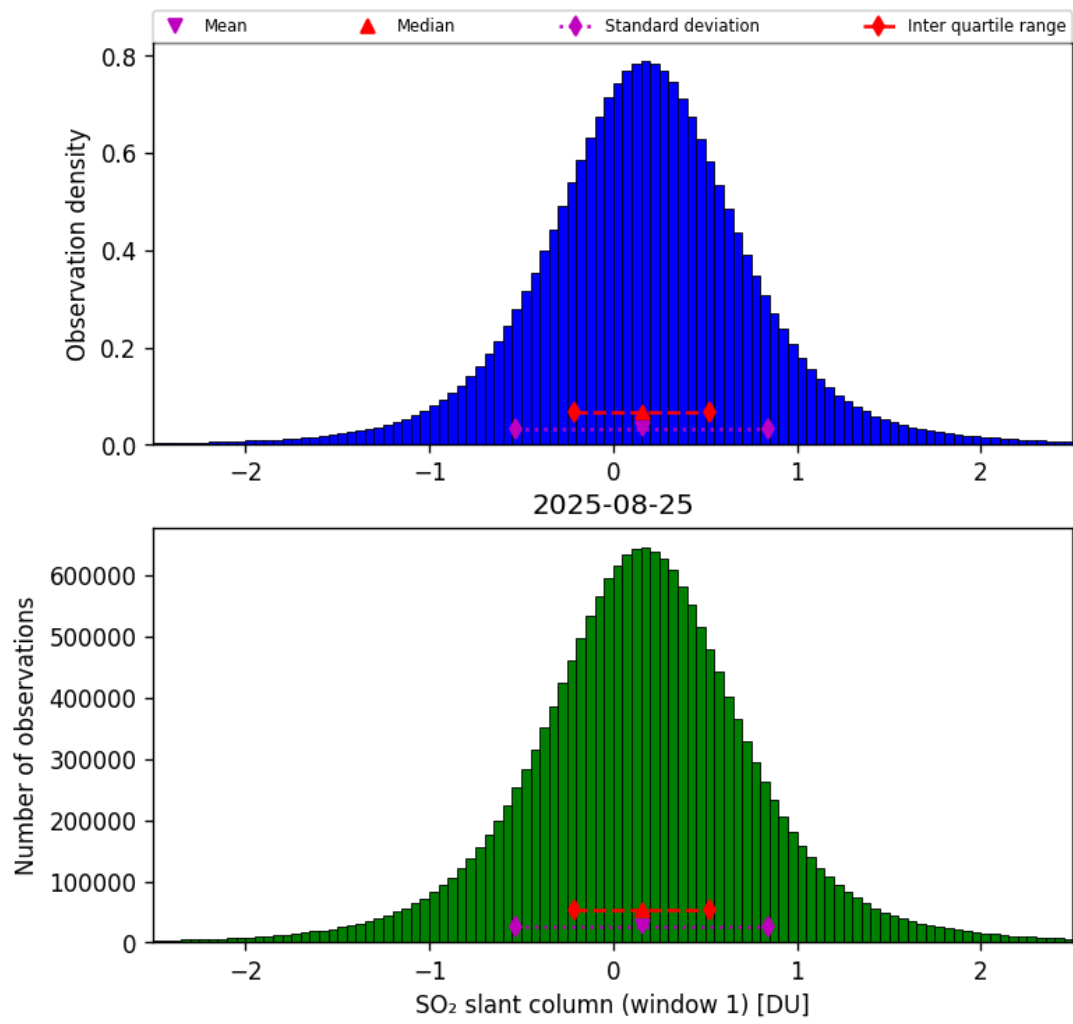


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-08-25 to 2025-08-26

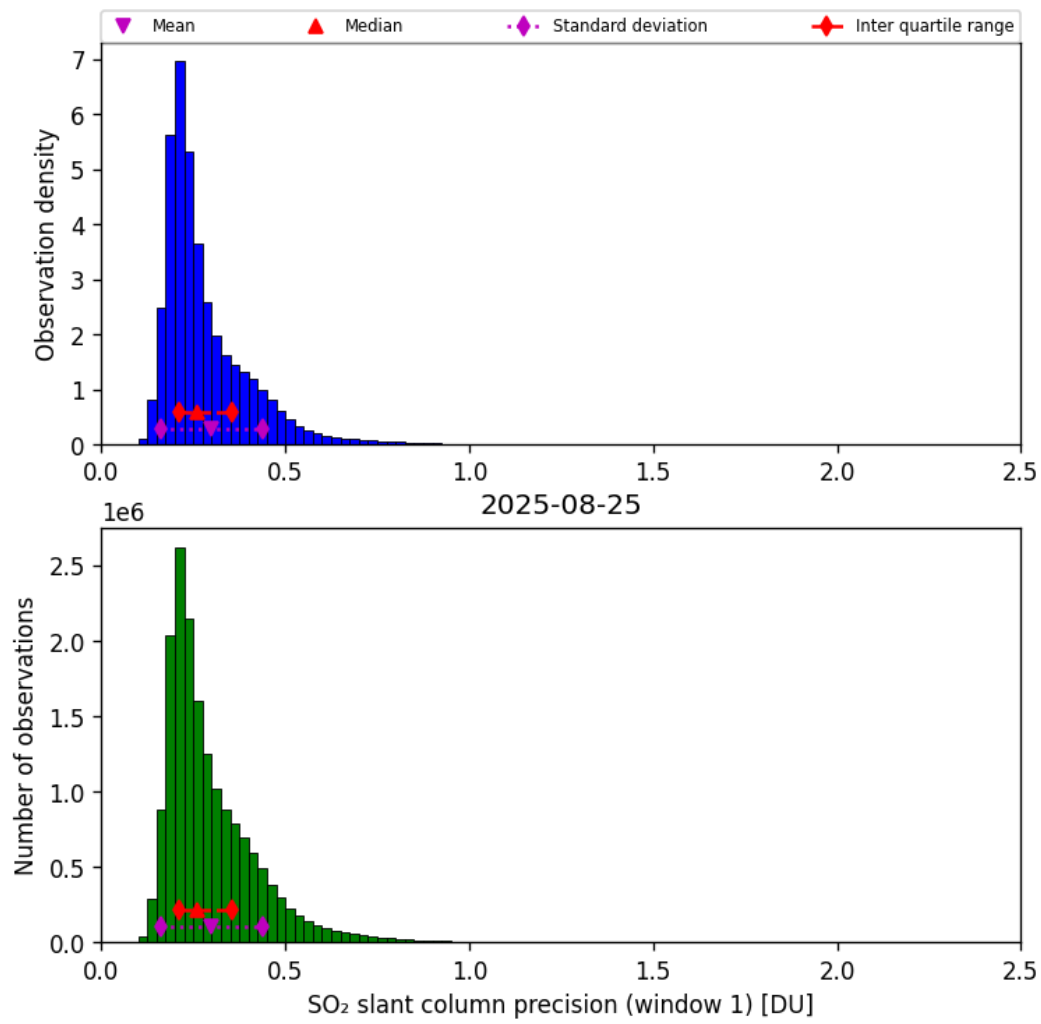


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-08-25 to 2025-08-26

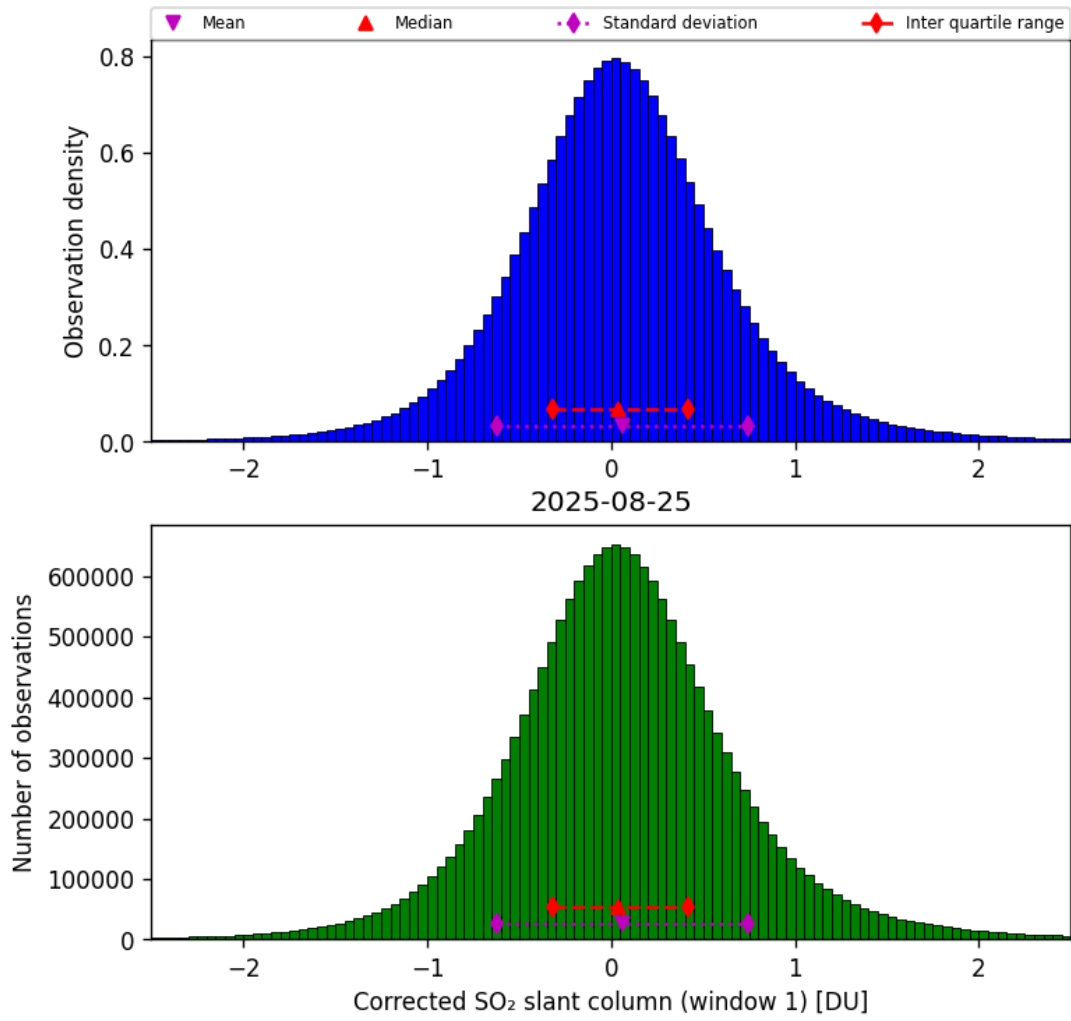


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-08-25 to 2025-08-26

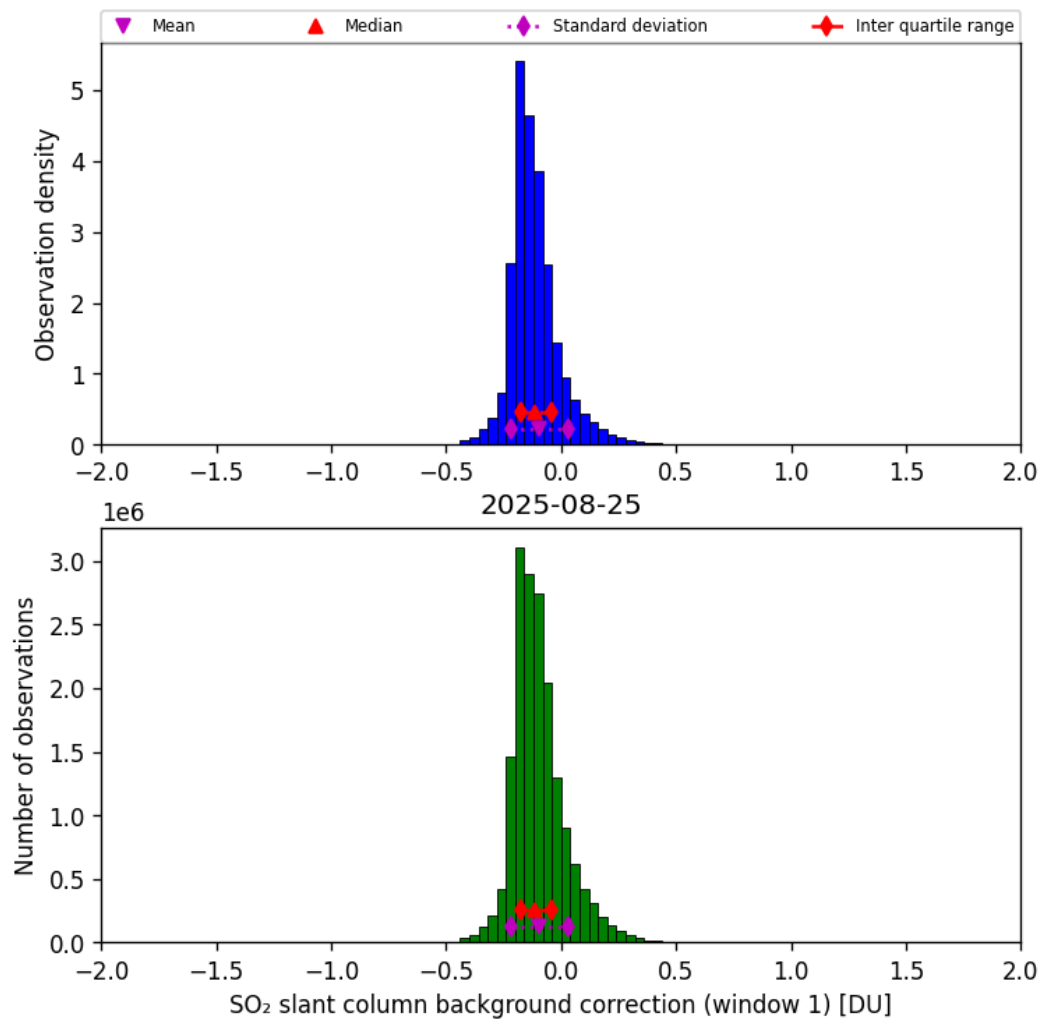


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-08-25 to 2025-08-26

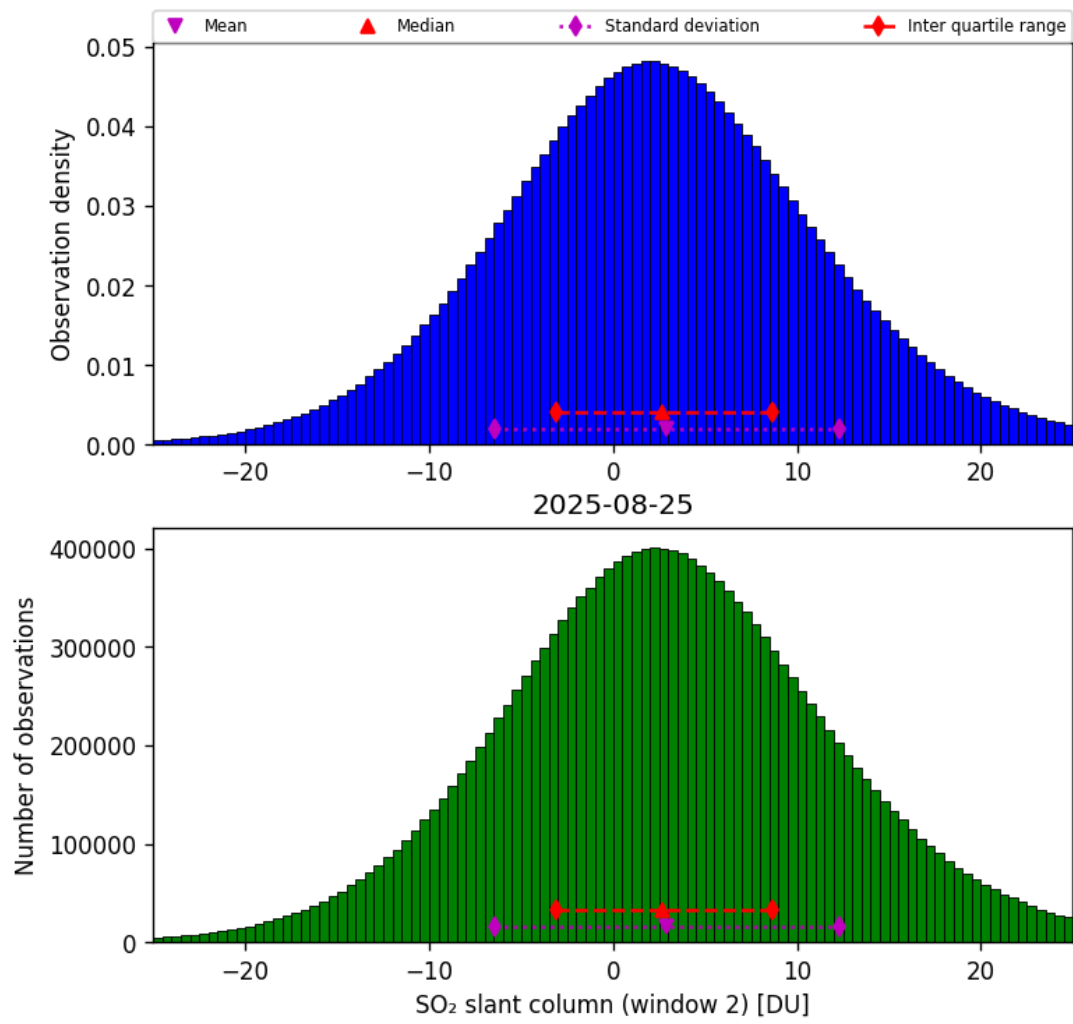


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-08-25 to 2025-08-26

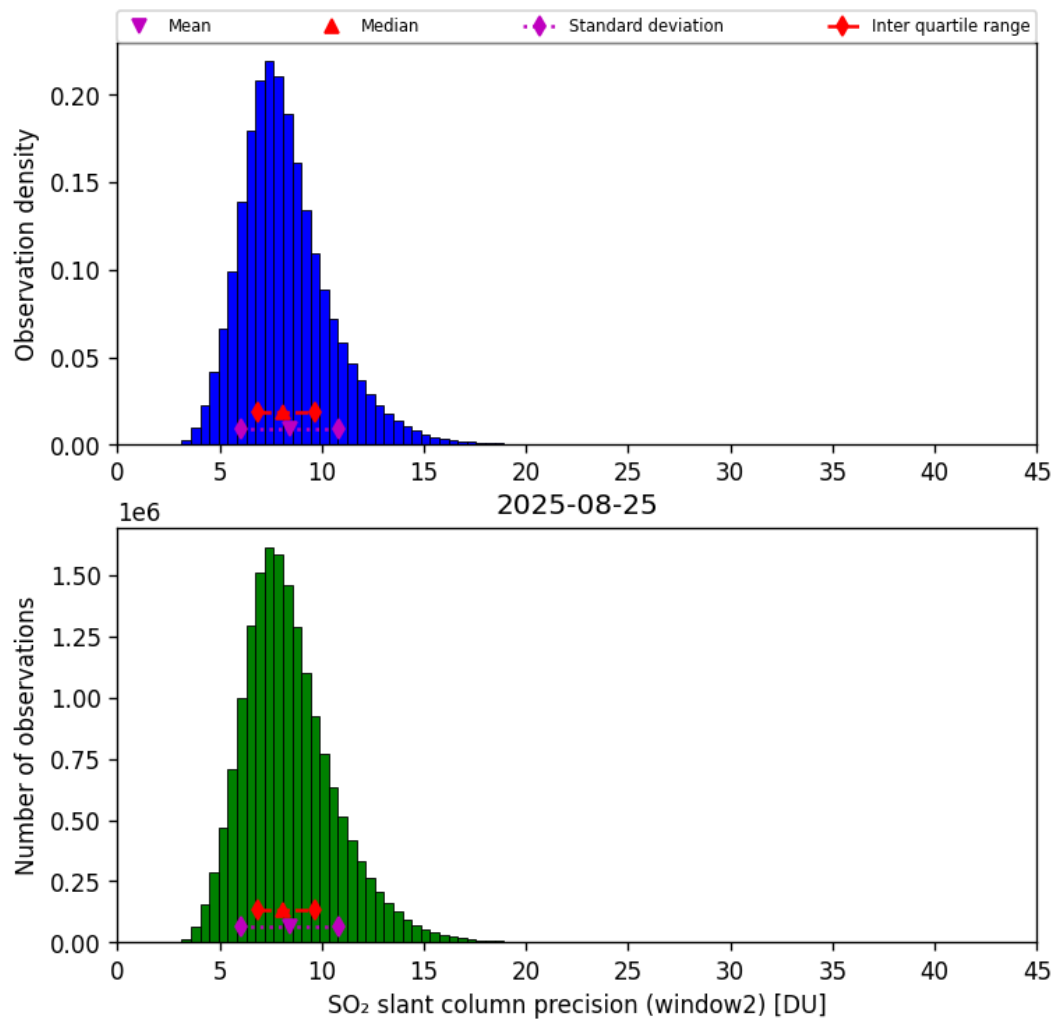


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-08-25 to 2025-08-26

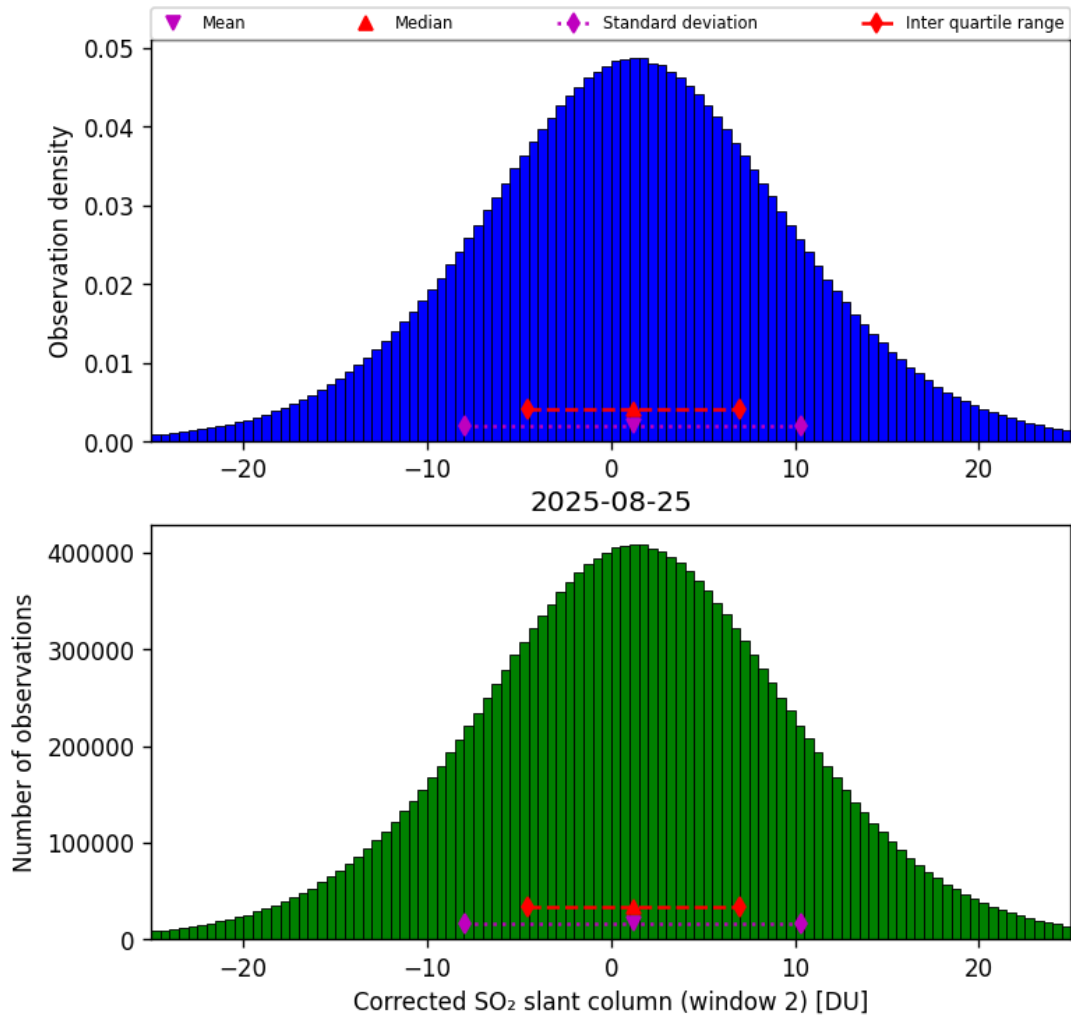


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-08-25 to 2025-08-26

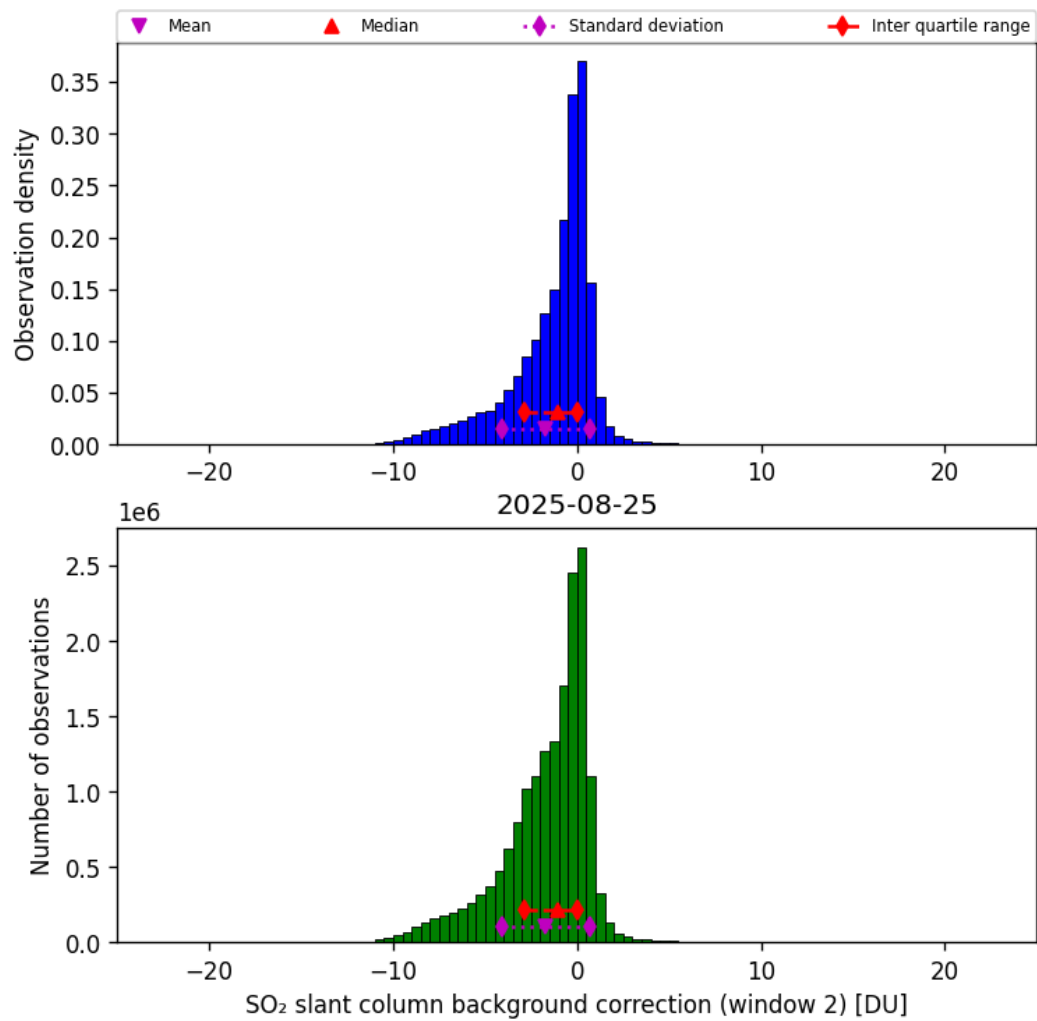


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-08-25 to 2025-08-26

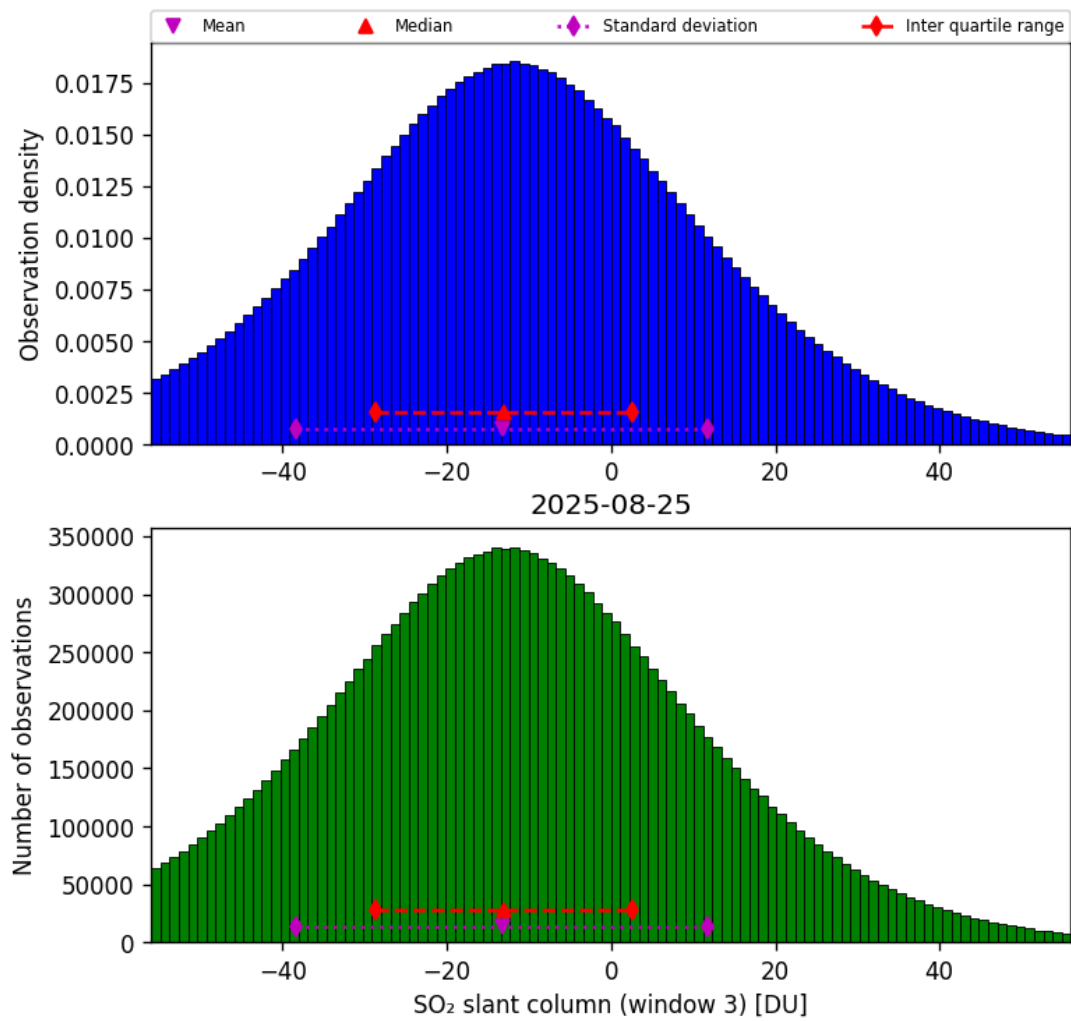


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-08-25 to 2025-08-26

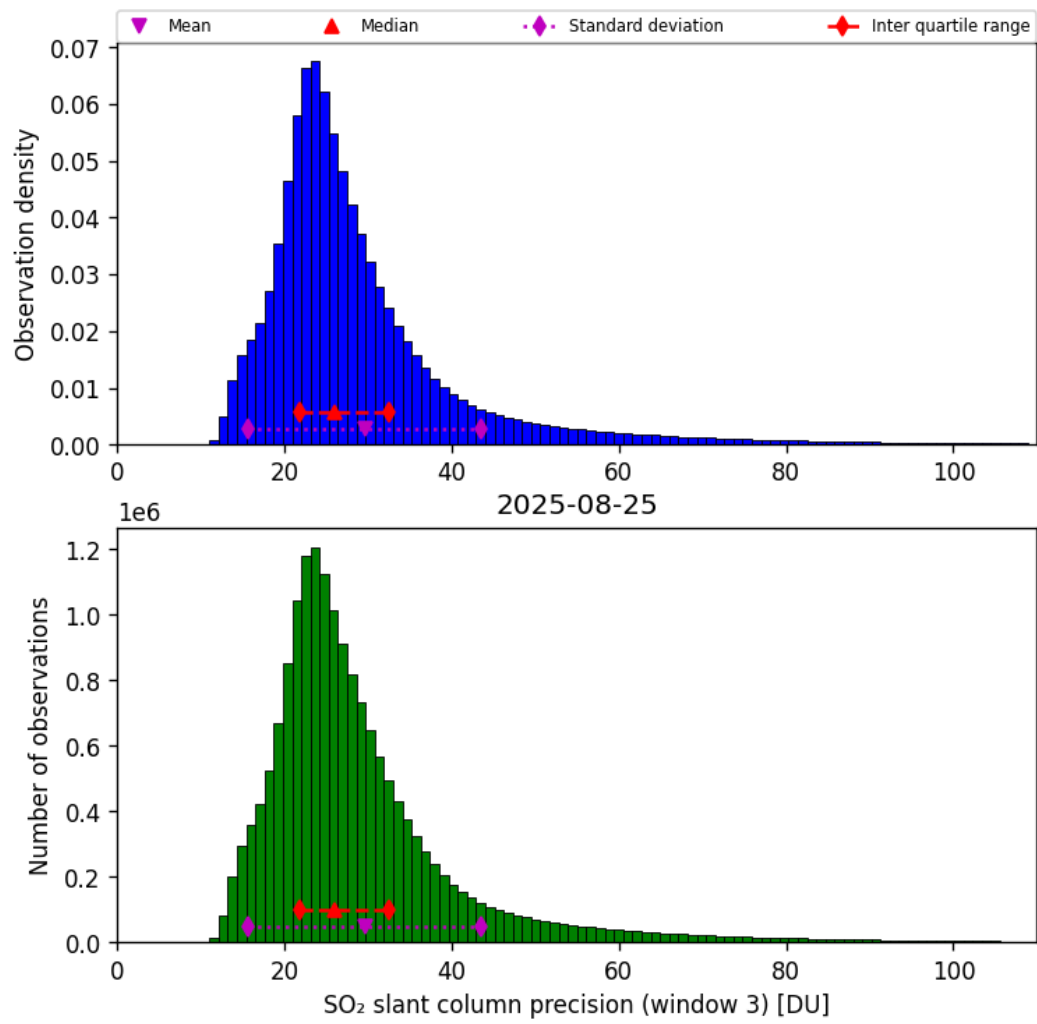


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-08-25 to 2025-08-26

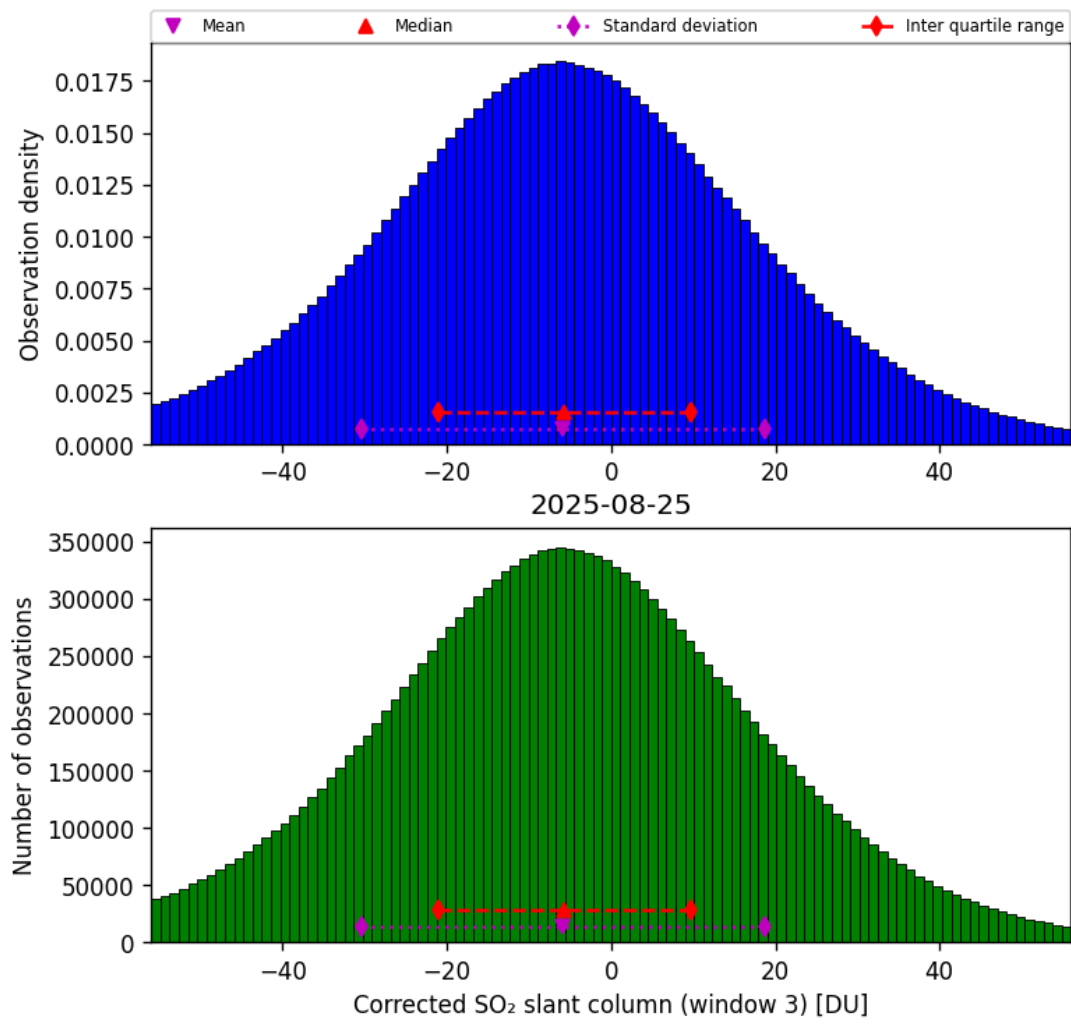


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-08-25 to 2025-08-26

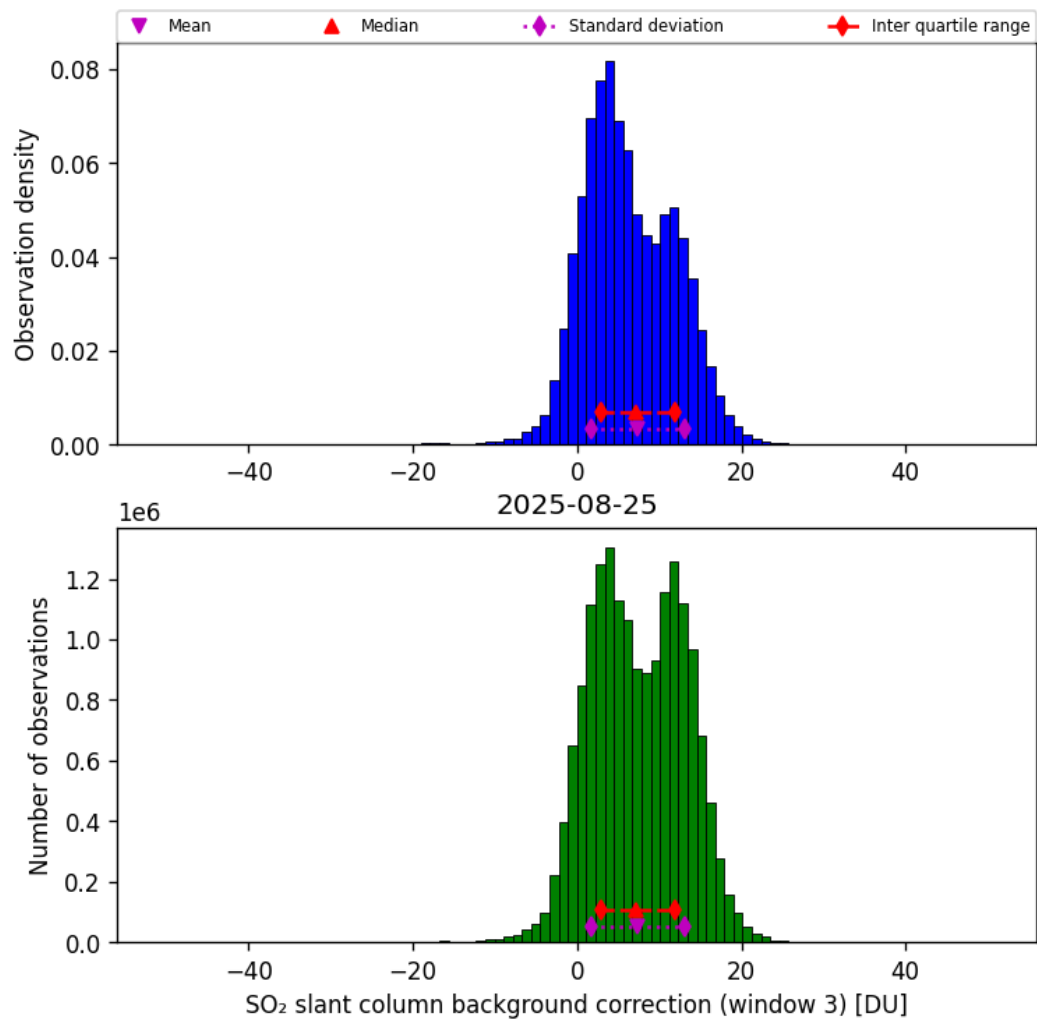


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-08-25 to 2025-08-26

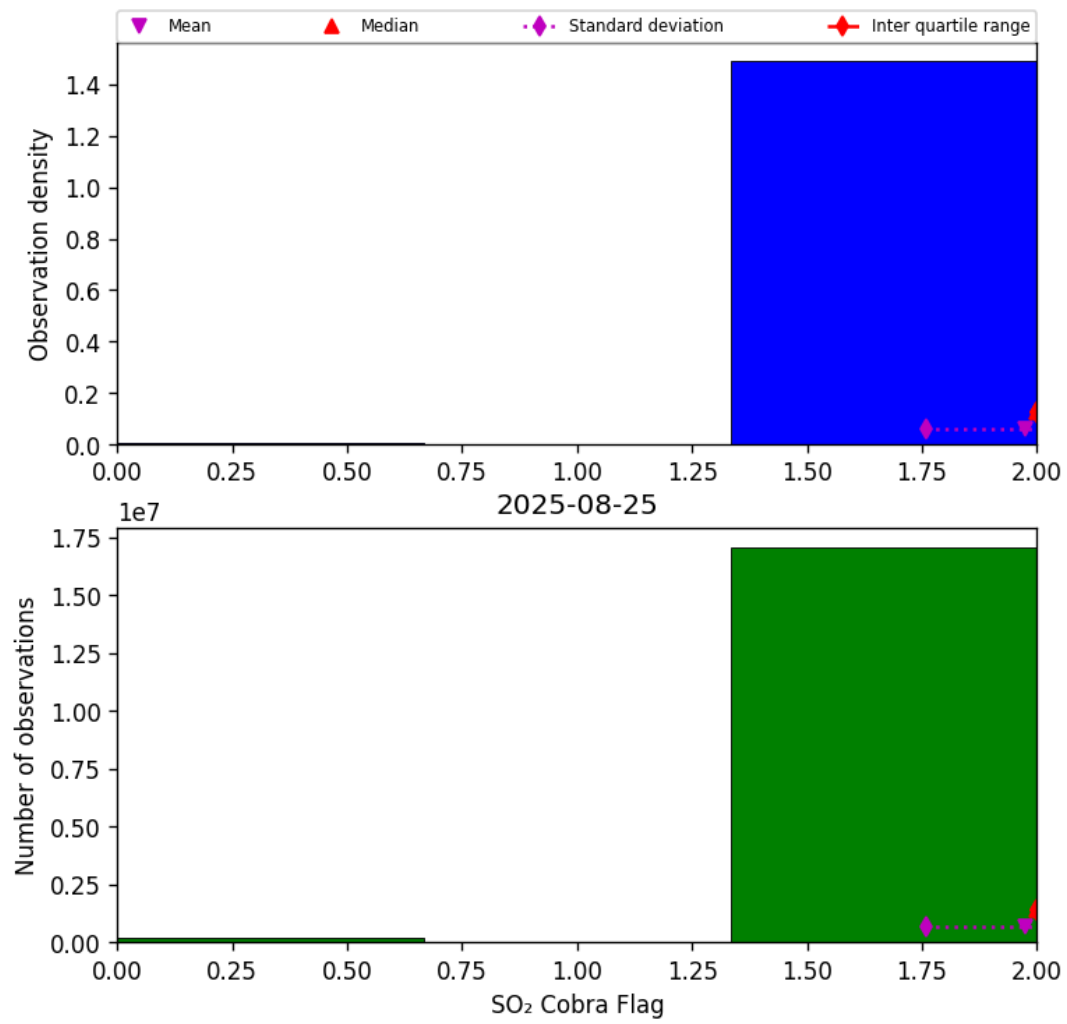


Figure 75: Histogram of "SO₂ Cobra Flag" for 2025-08-25 to 2025-08-26

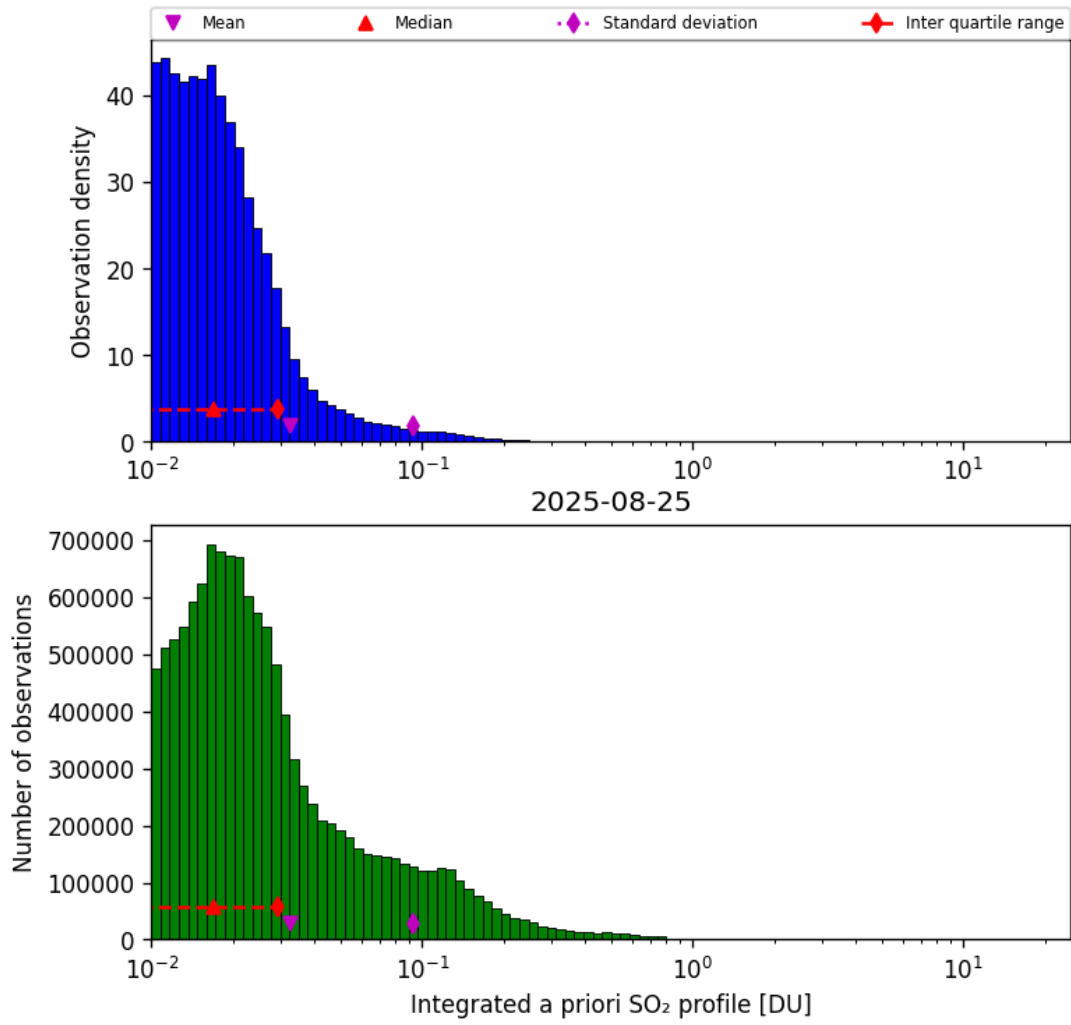


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-08-25 to 2025-08-26

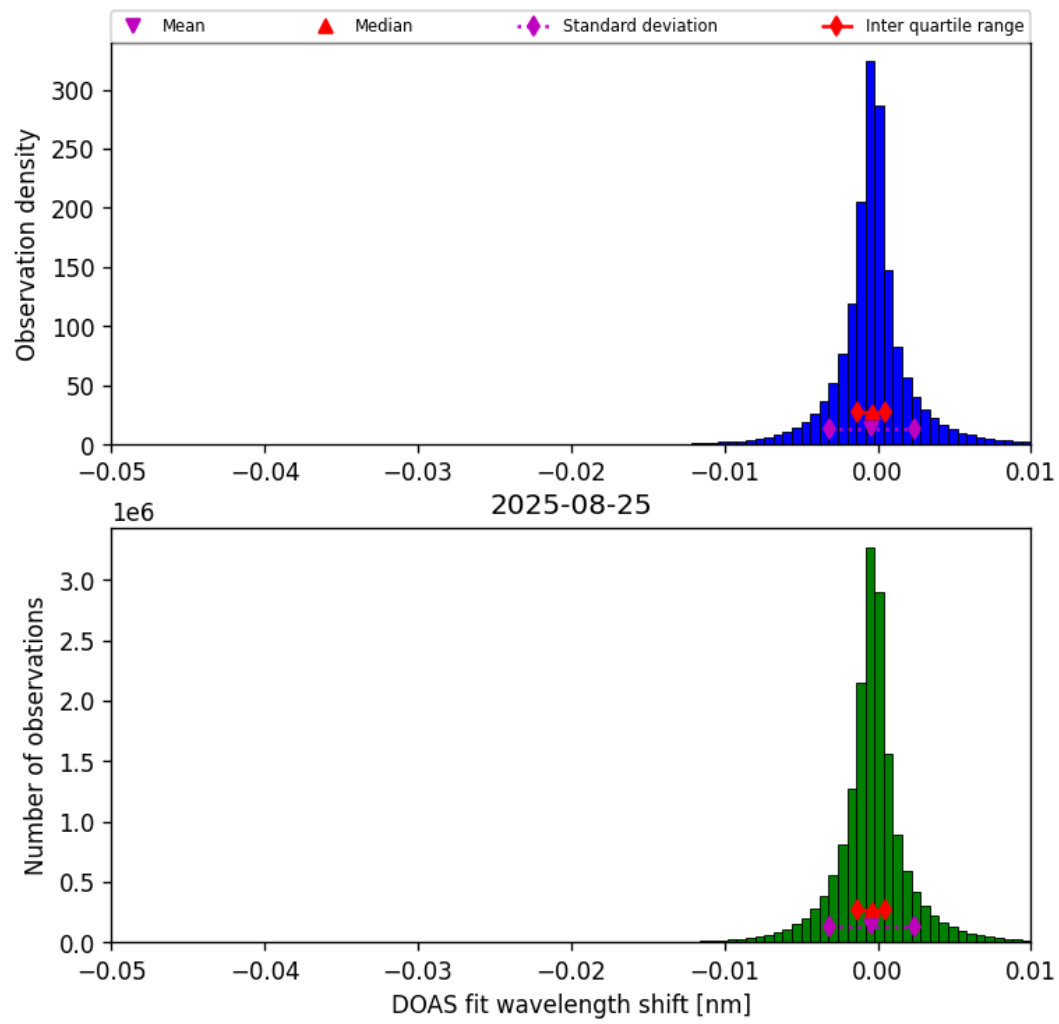


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-08-25 to 2025-08-26

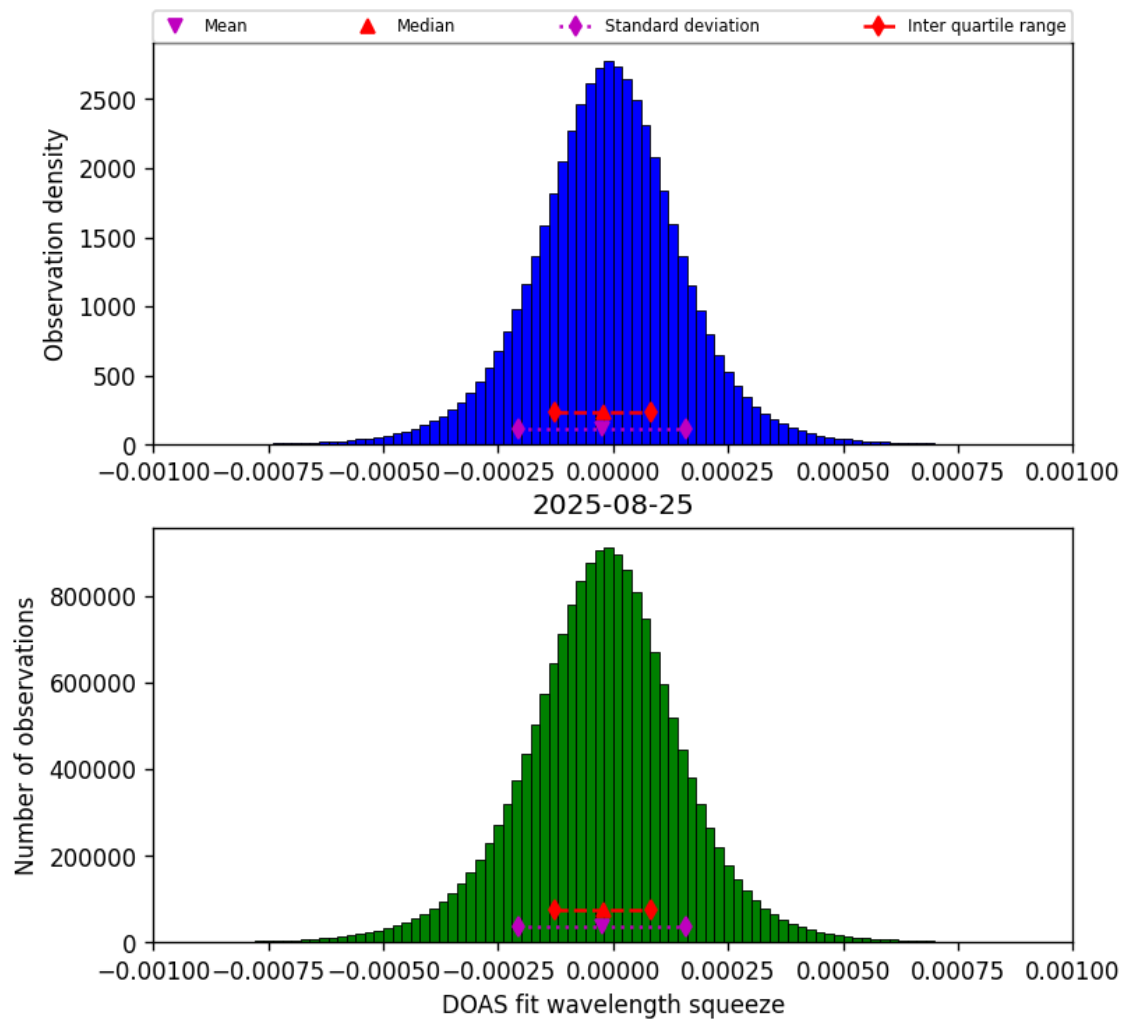


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-08-25 to 2025-08-26

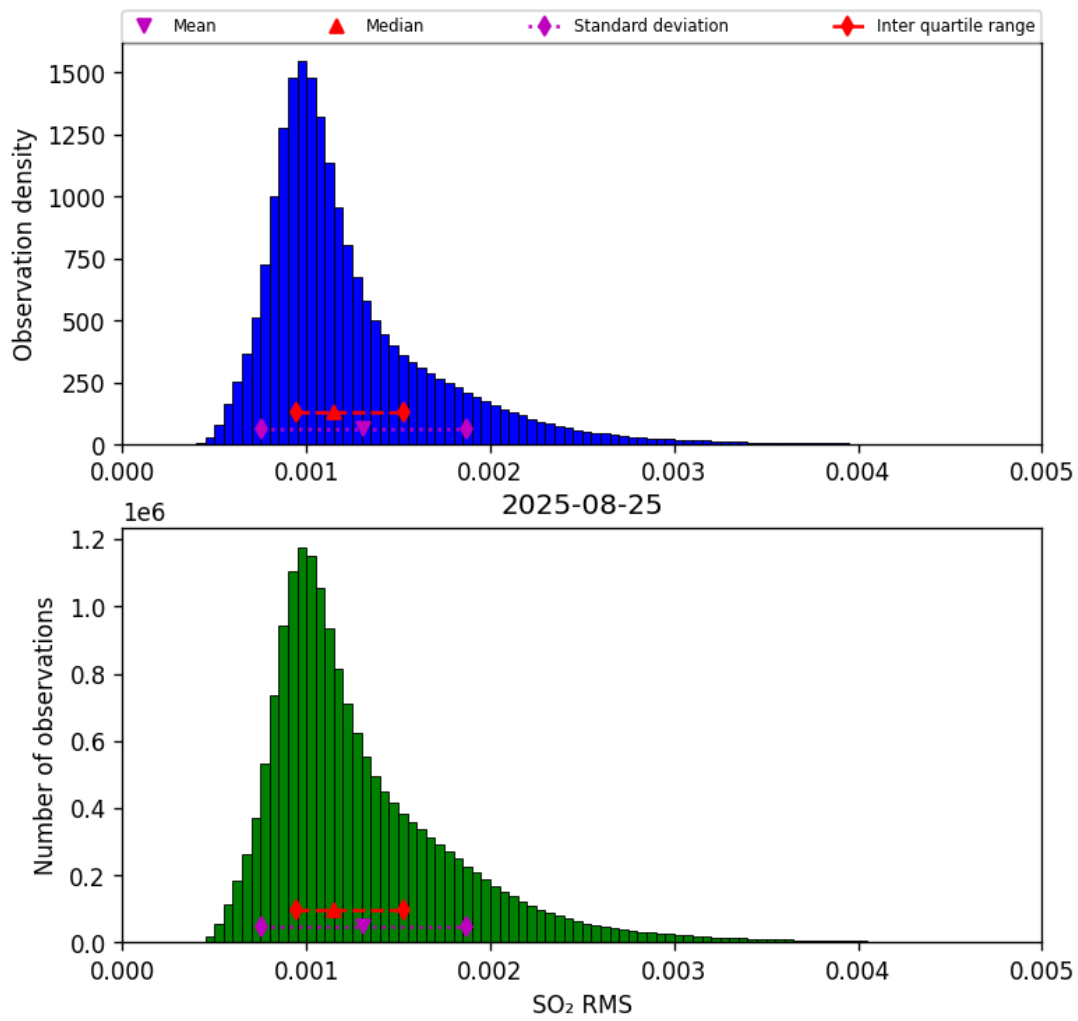


Figure 79: Histogram of "SO₂ RMS" for 2025-08-25 to 2025-08-26

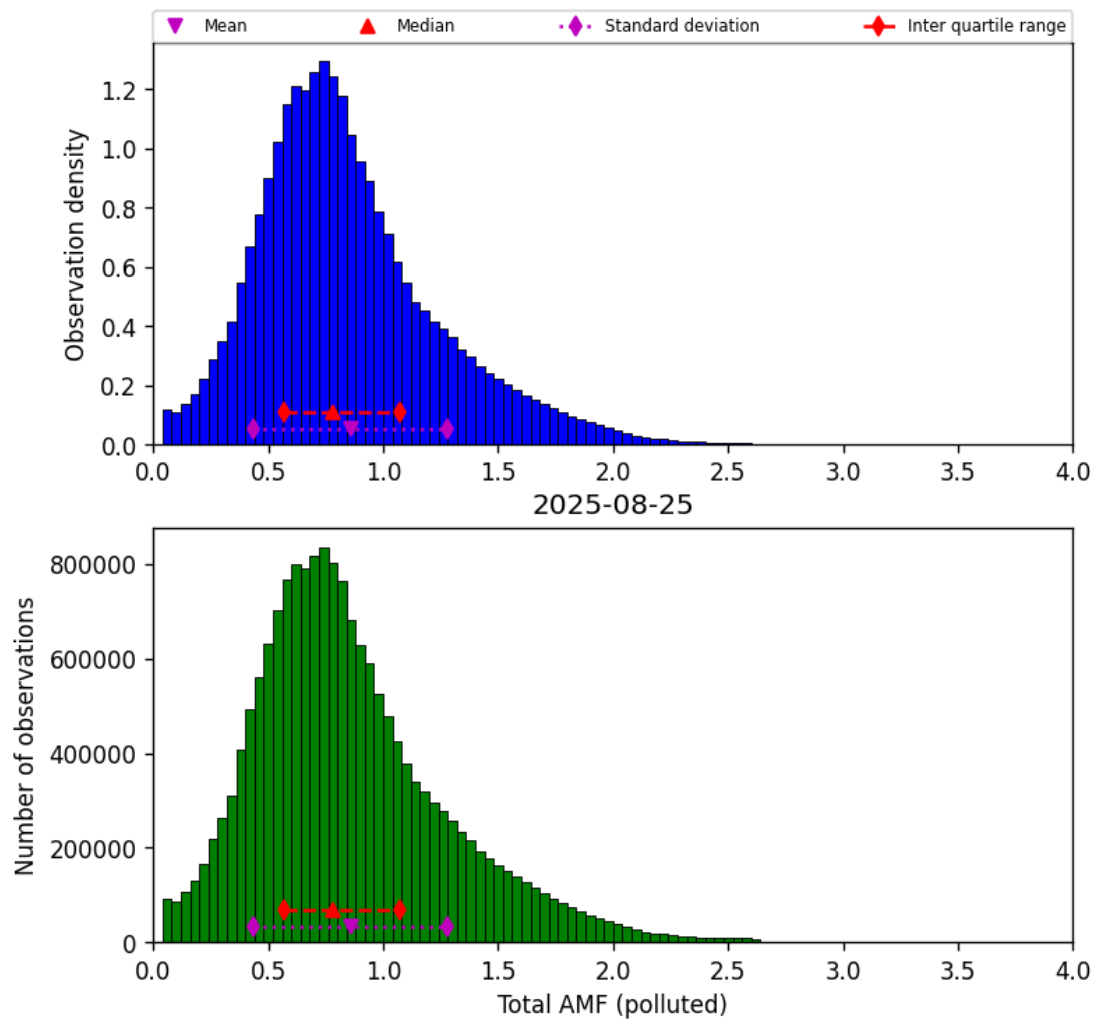


Figure 80: Histogram of “Total AMF (polluted)” for 2025-08-25 to 2025-08-26

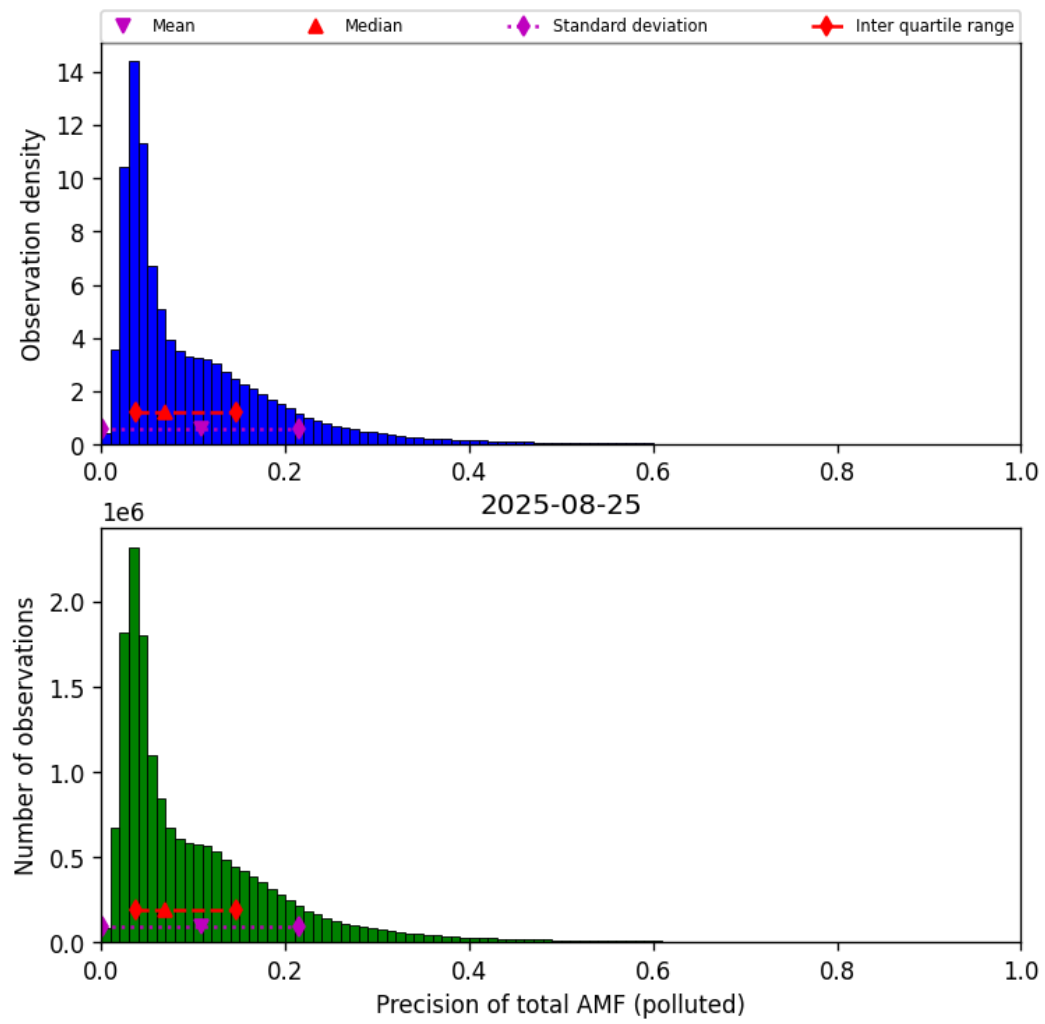


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-08-25 to 2025-08-26

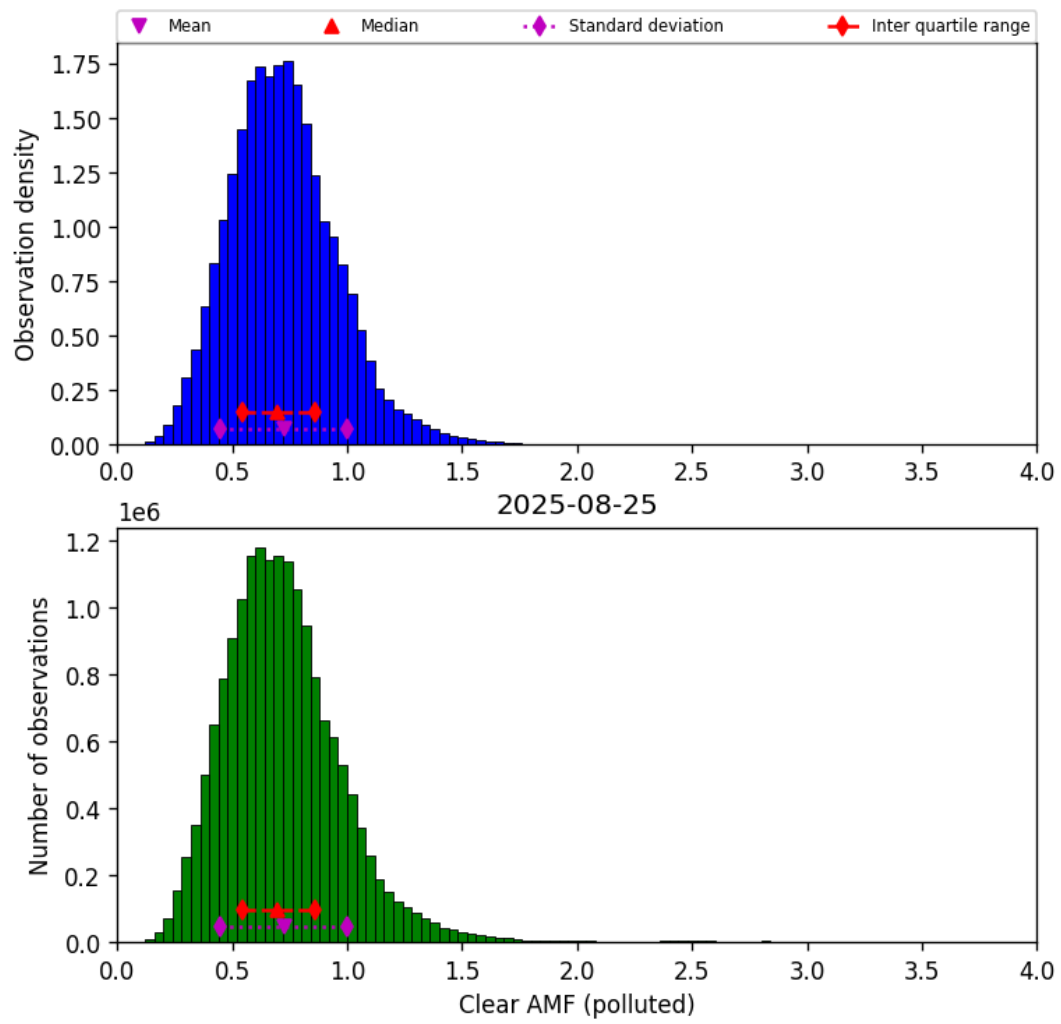


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-08-25 to 2025-08-26

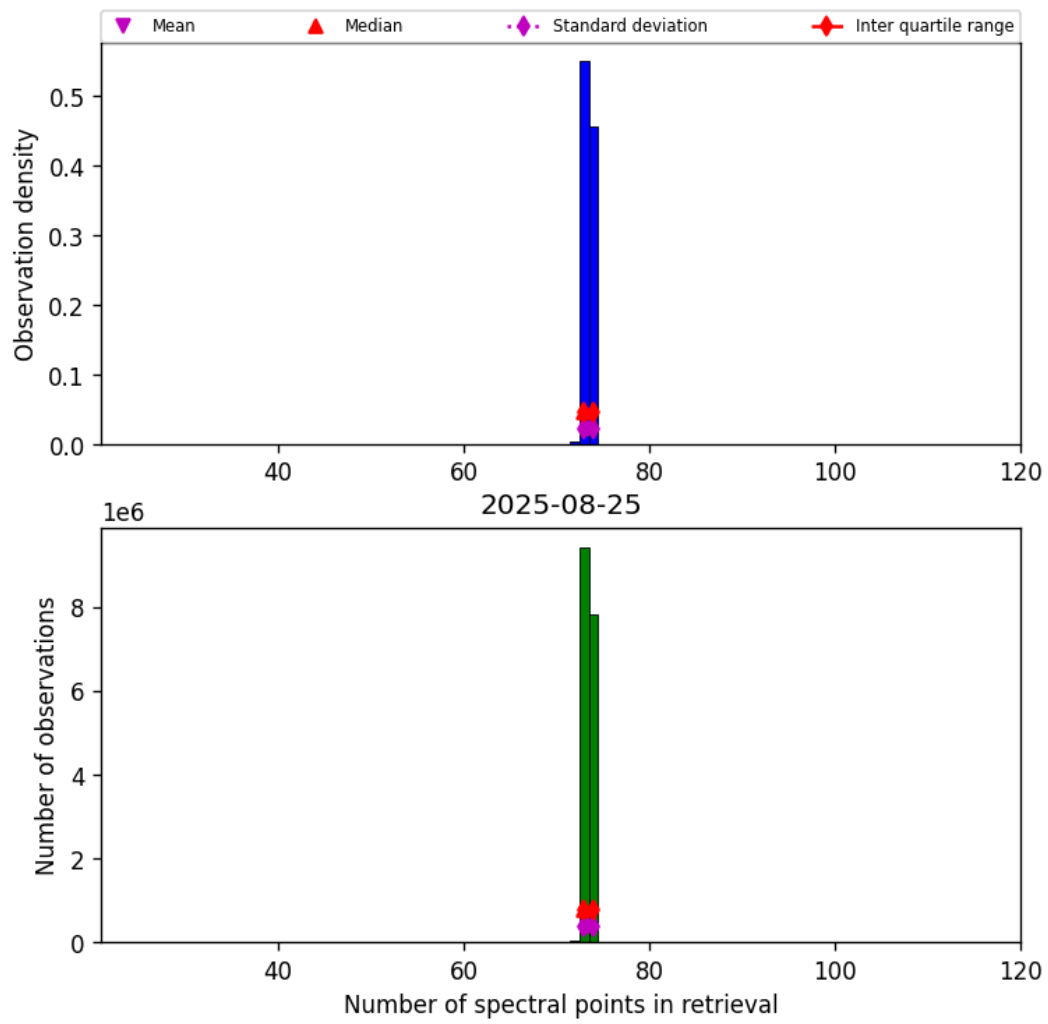


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-08-25 to 2025-08-26

9 Along track statistics

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

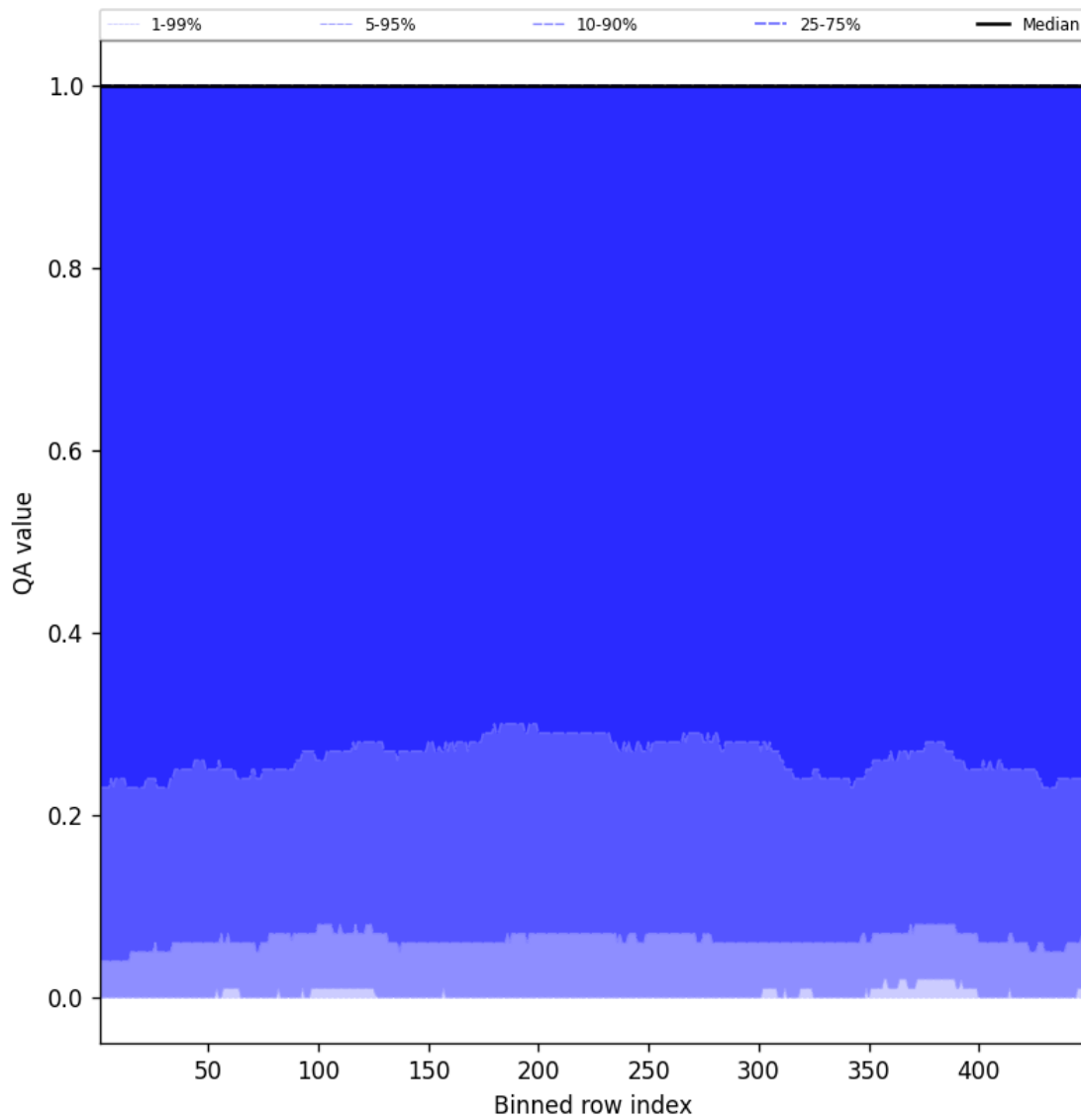


Figure 84: Along track statistics of “QA value” for 2025-08-25 to 2025-08-26

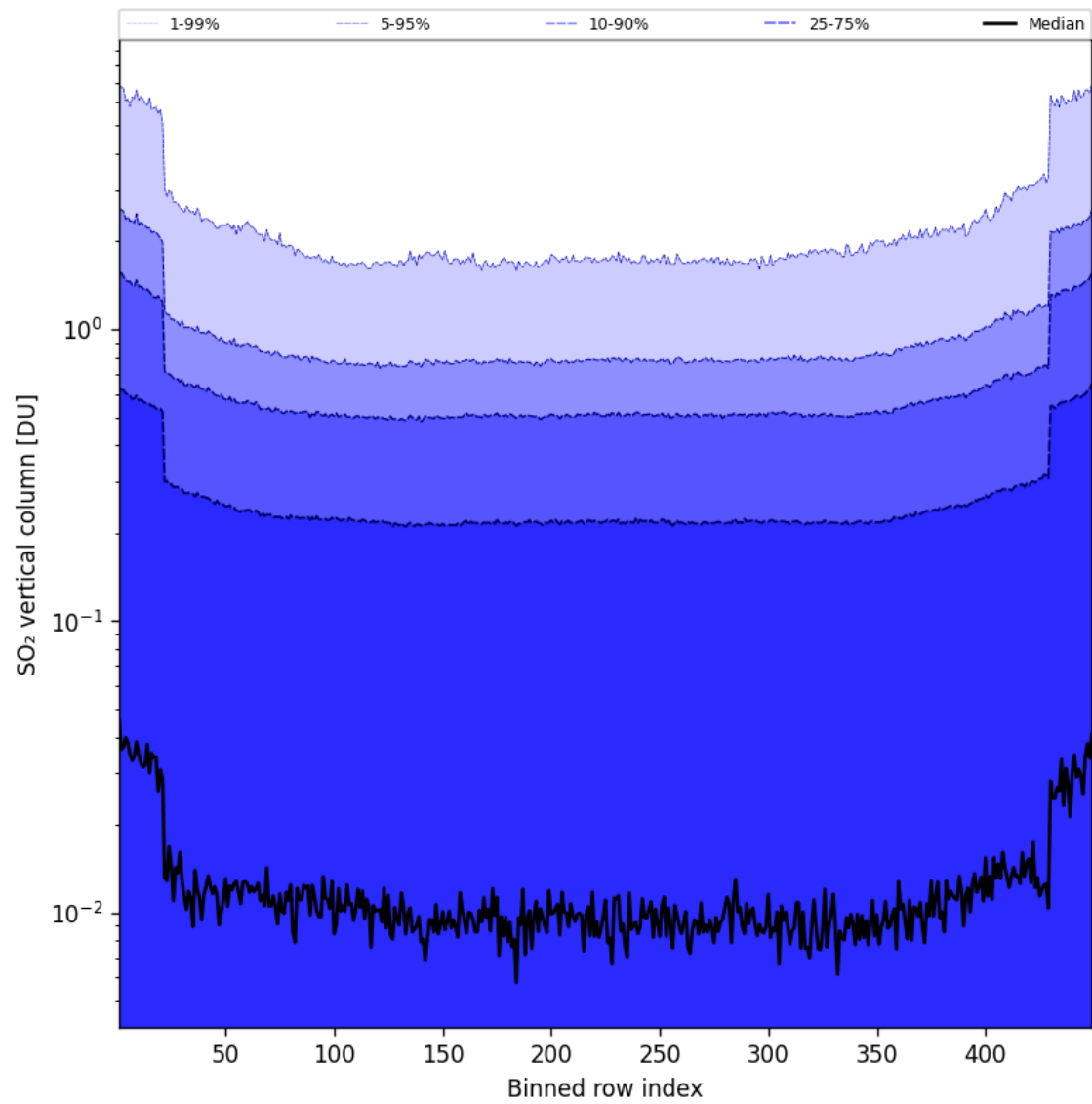


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-08-25 to 2025-08-26

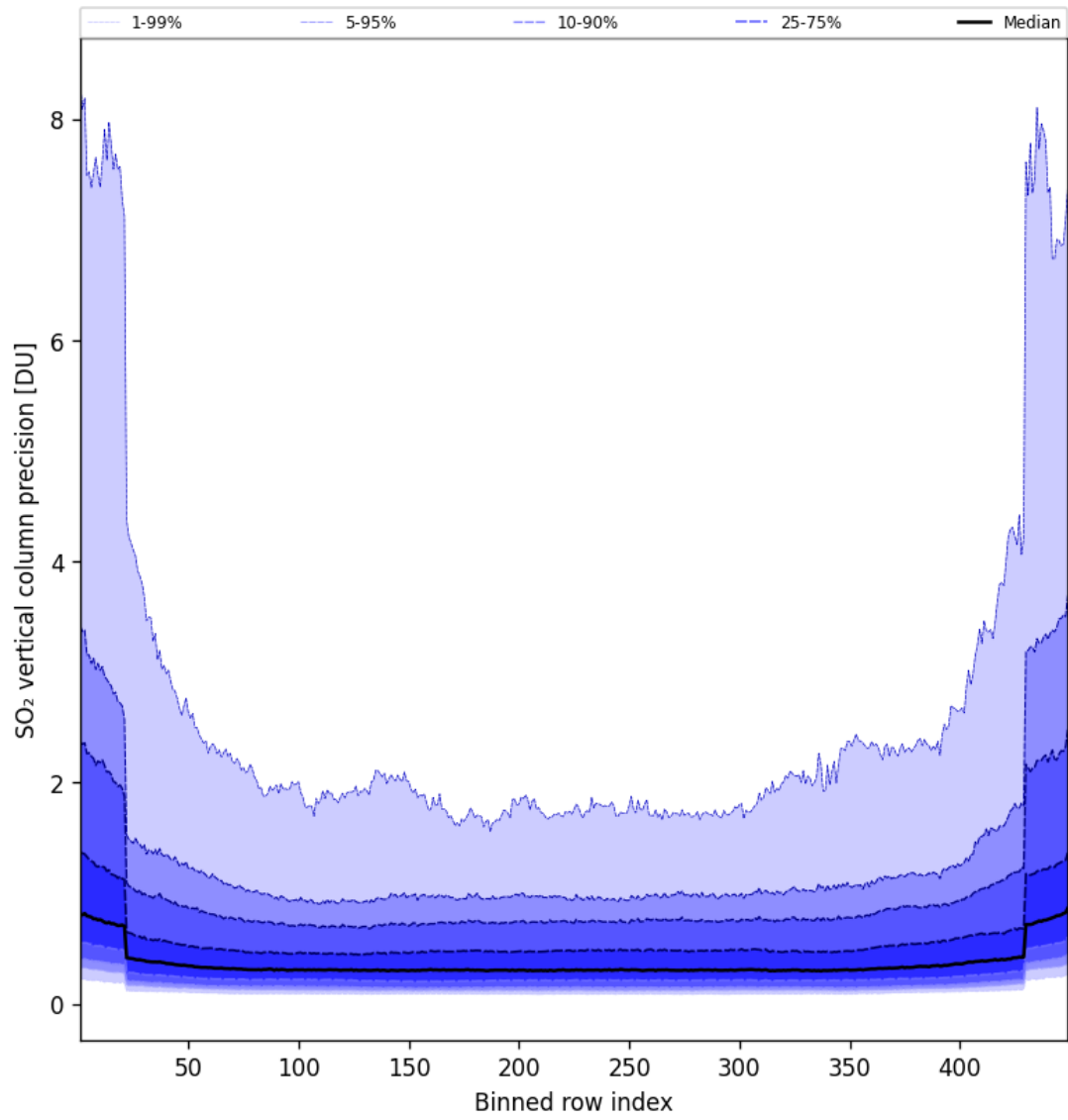


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-08-25 to 2025-08-26

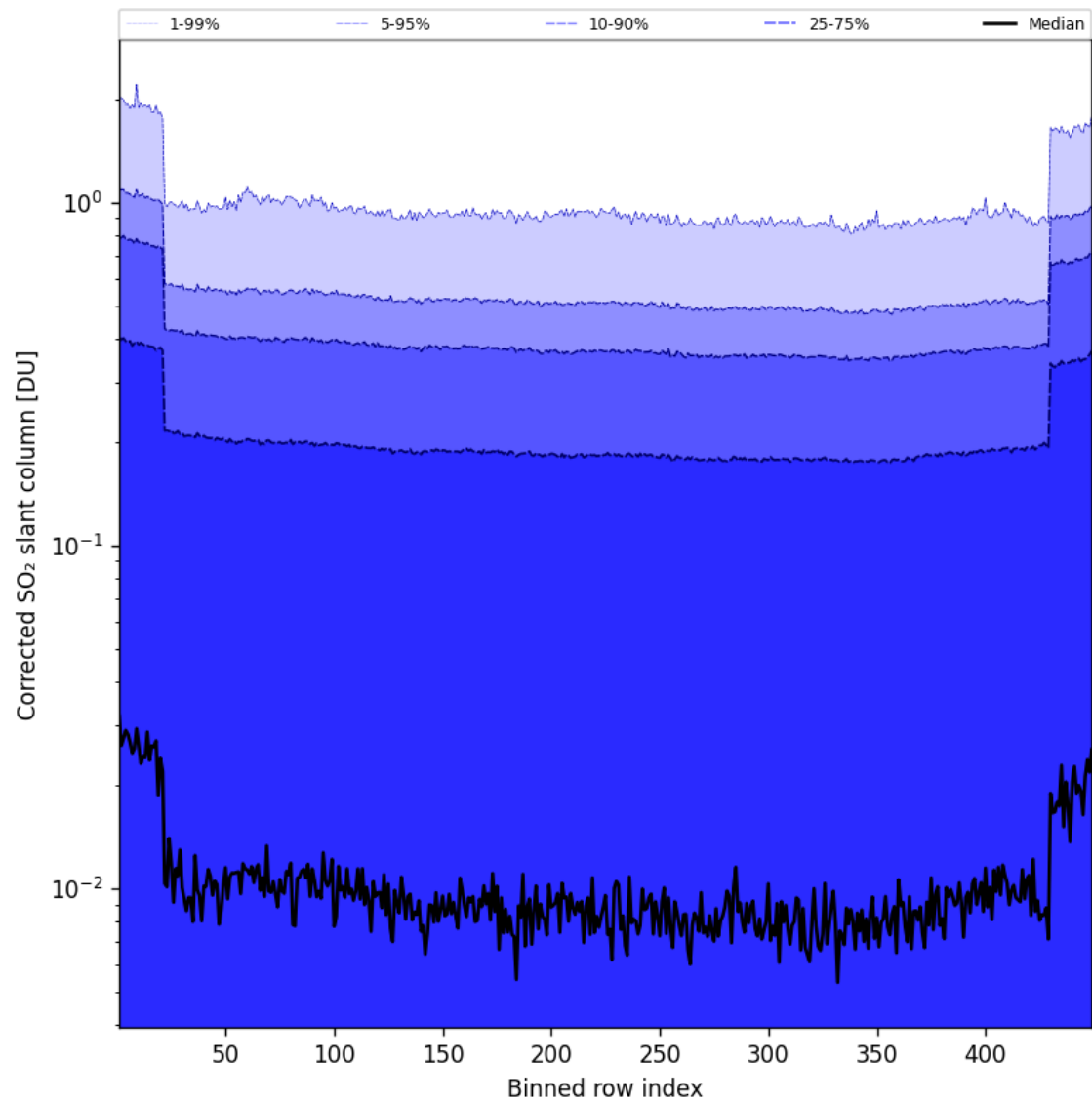


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-08-25 to 2025-08-26

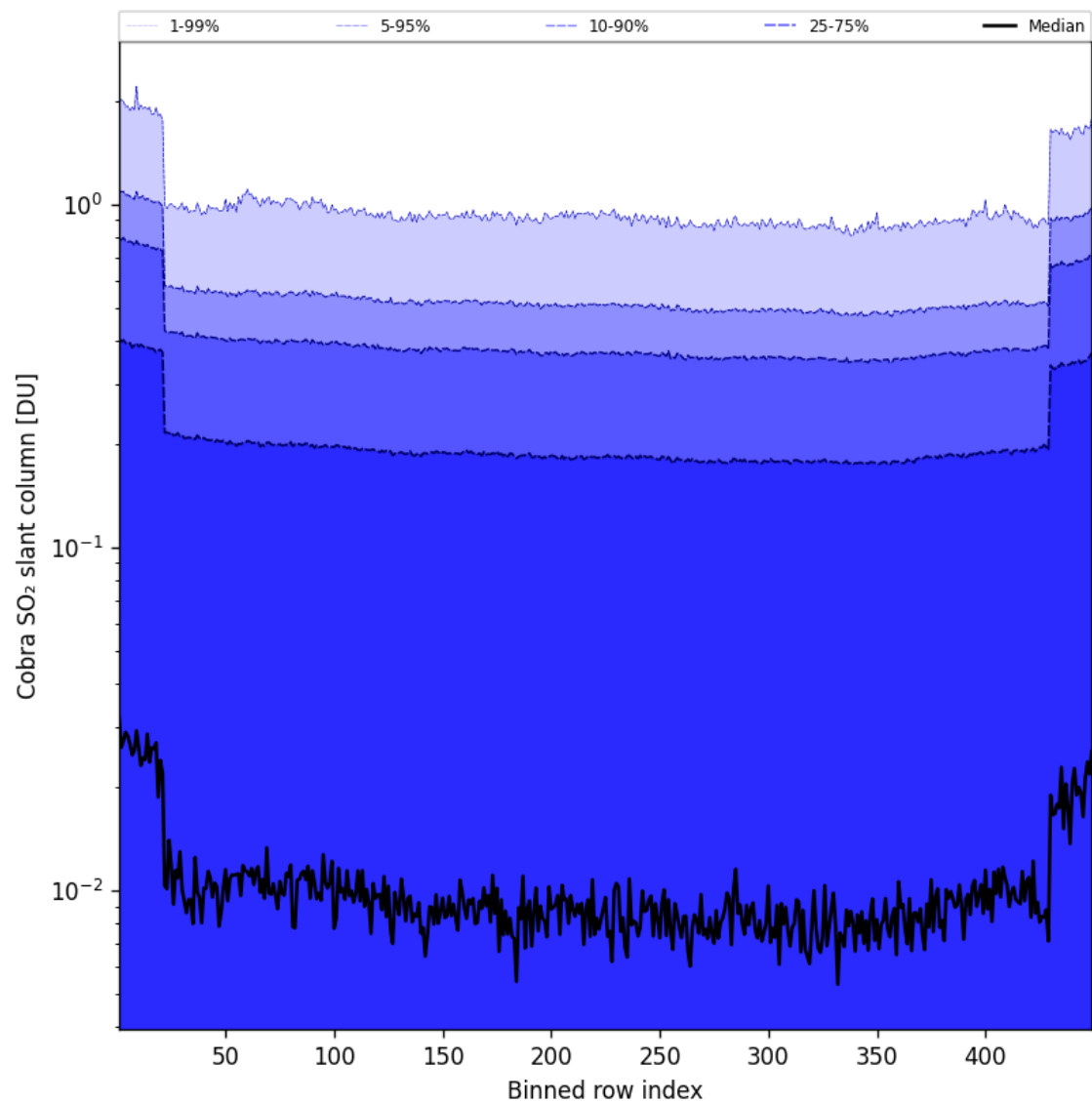


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-08-25 to 2025-08-26

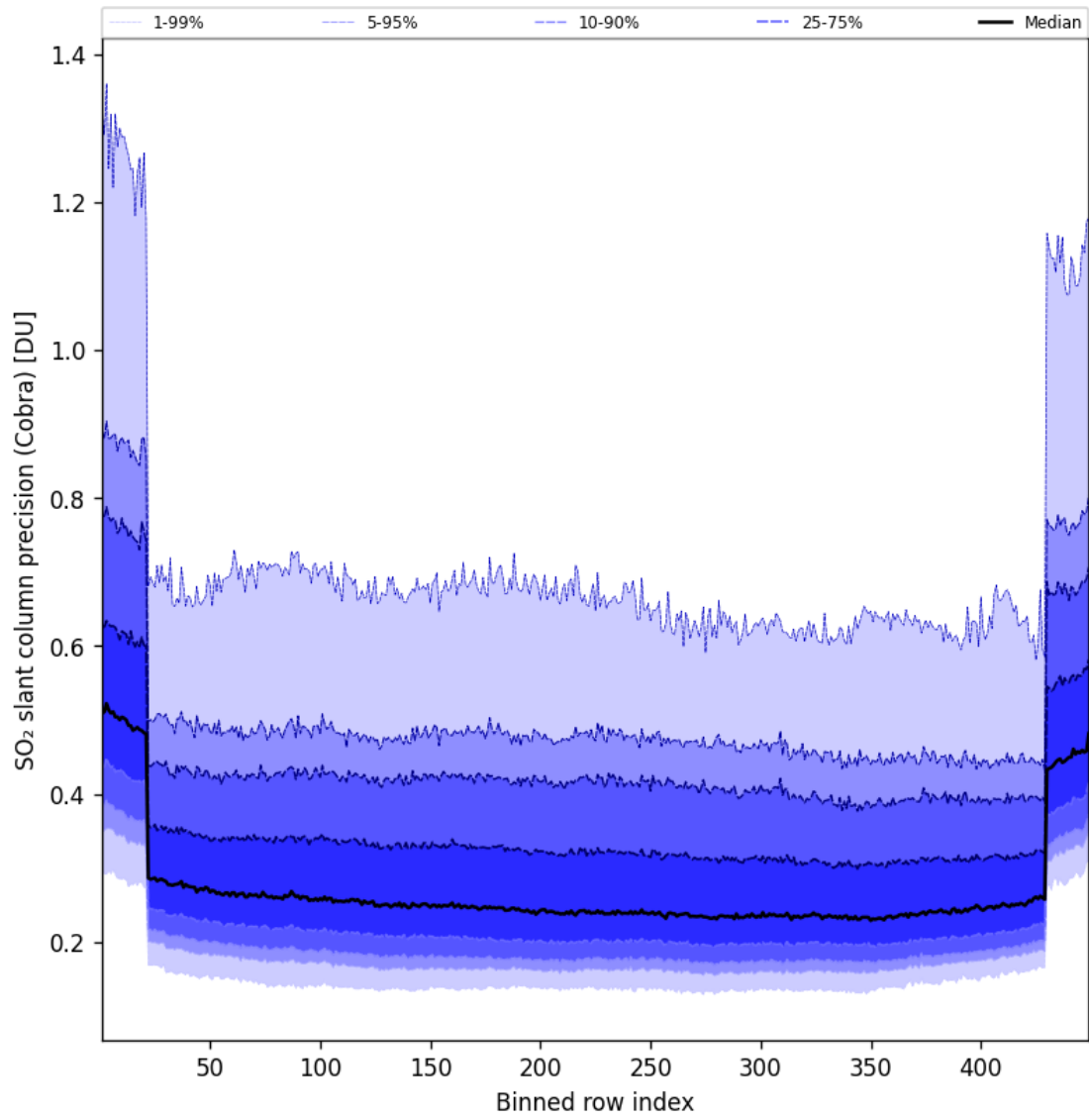


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-08-25 to 2025-08-26

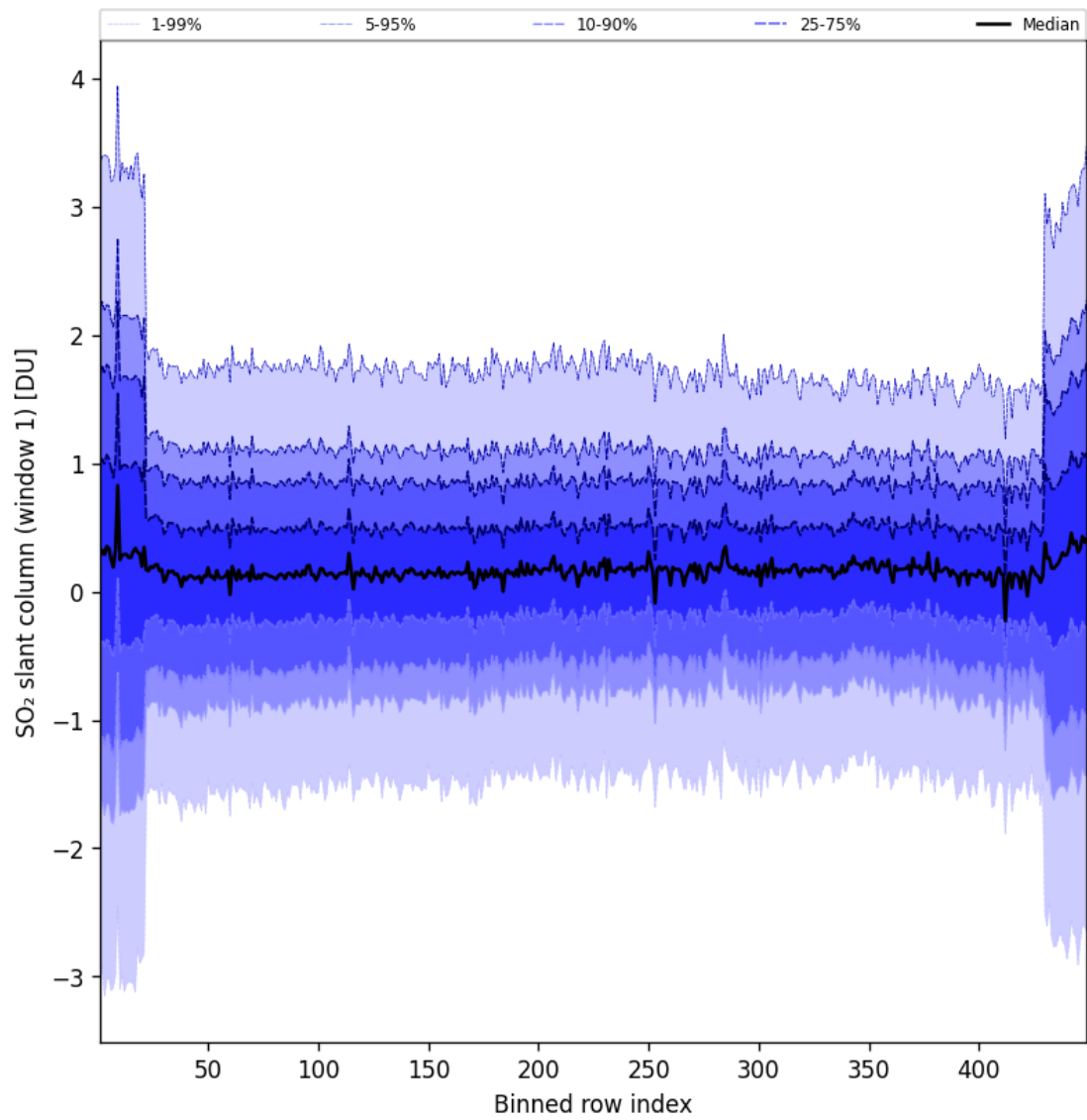


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-08-25 to 2025-08-26

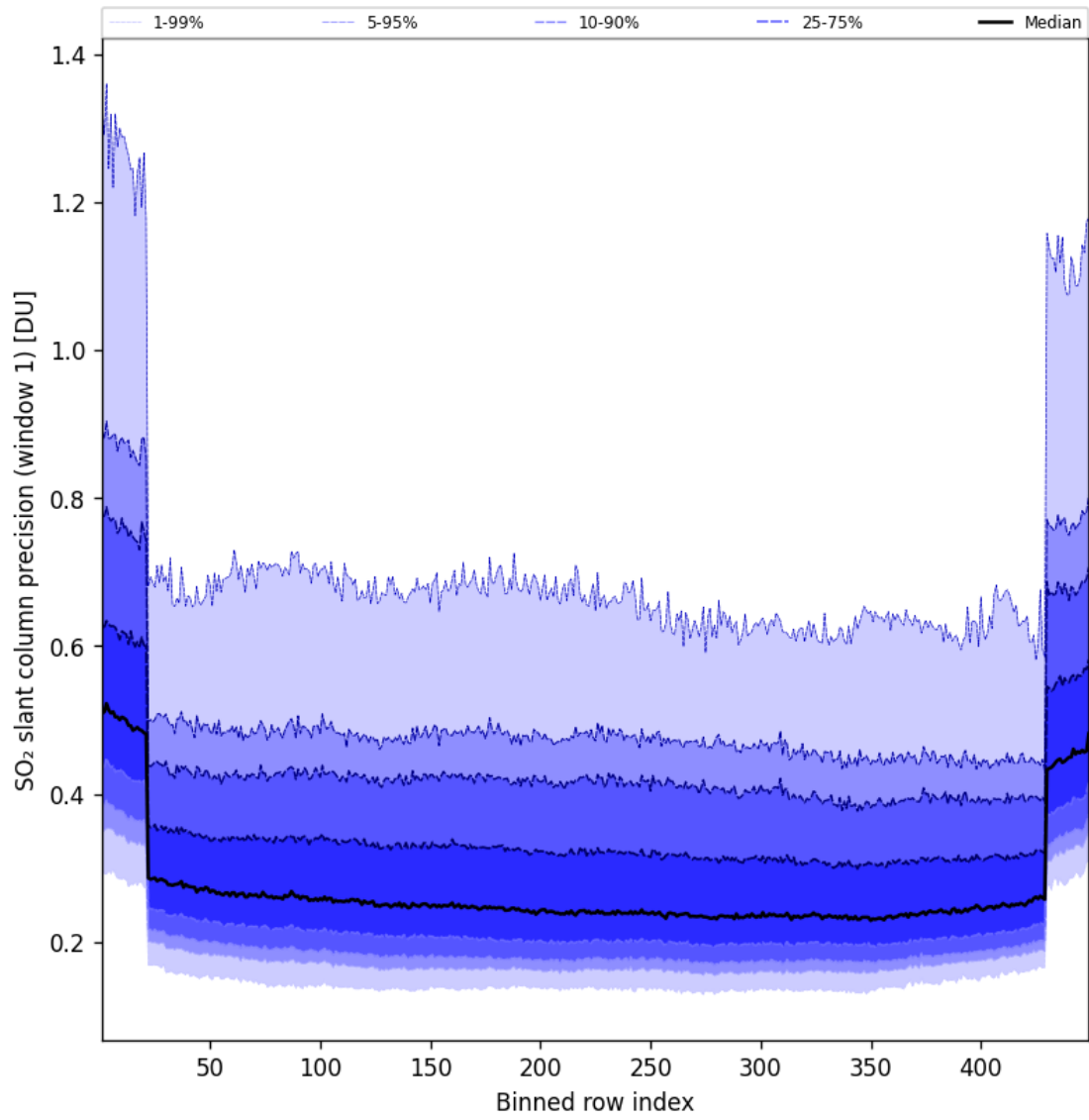


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-08-25 to 2025-08-26

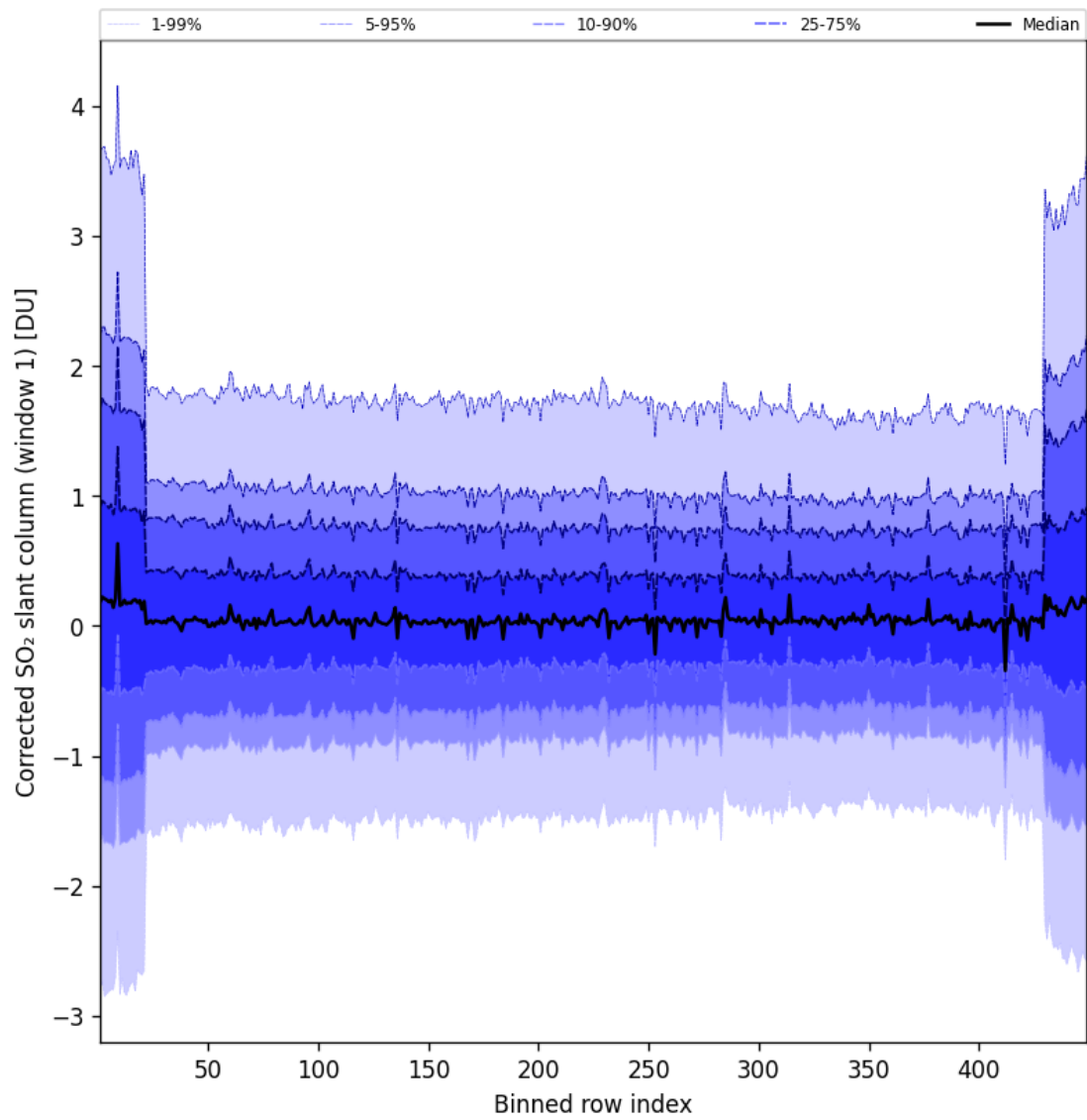


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-08-25 to 2025-08-26

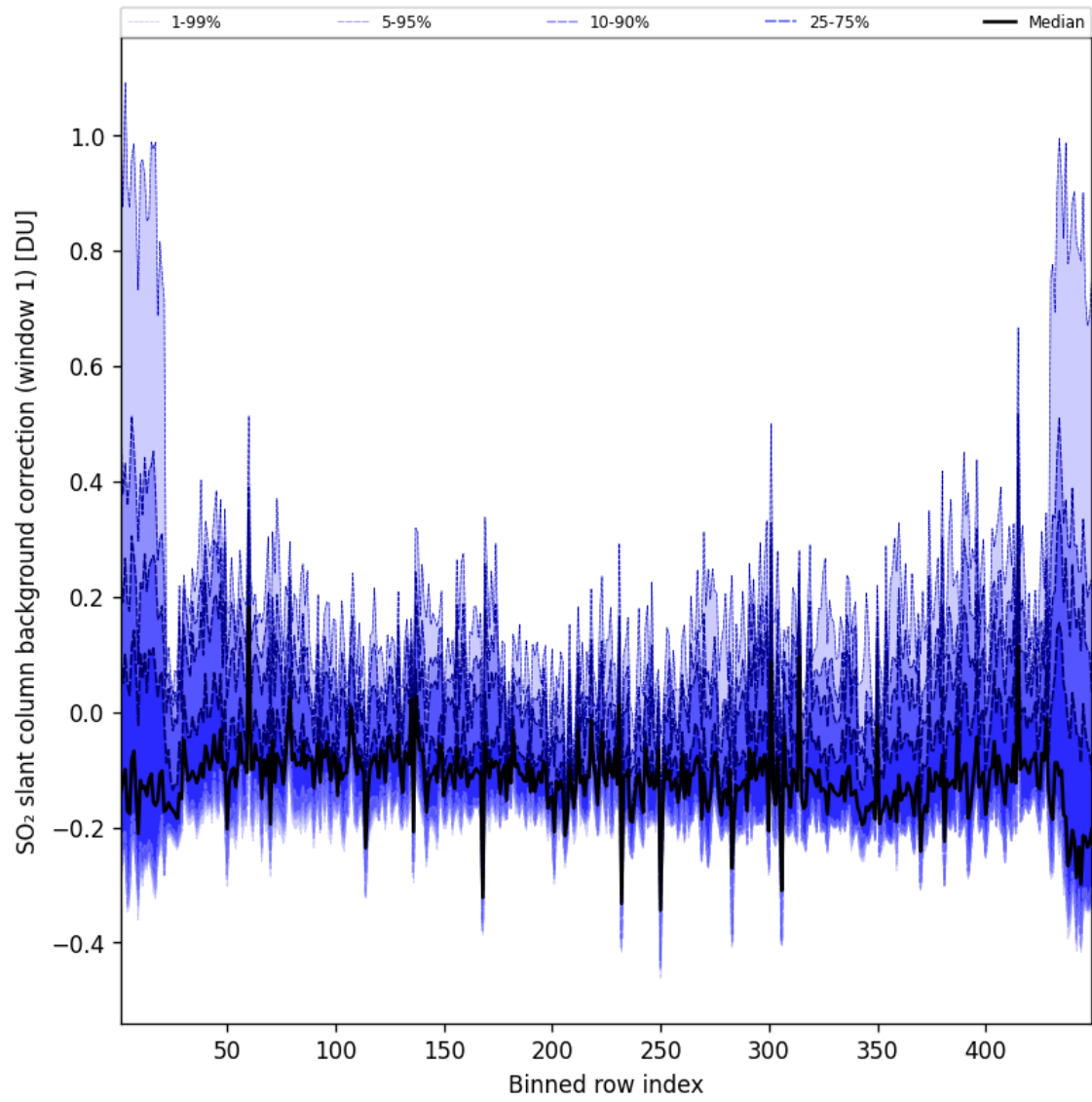


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-08-25 to 2025-08-26

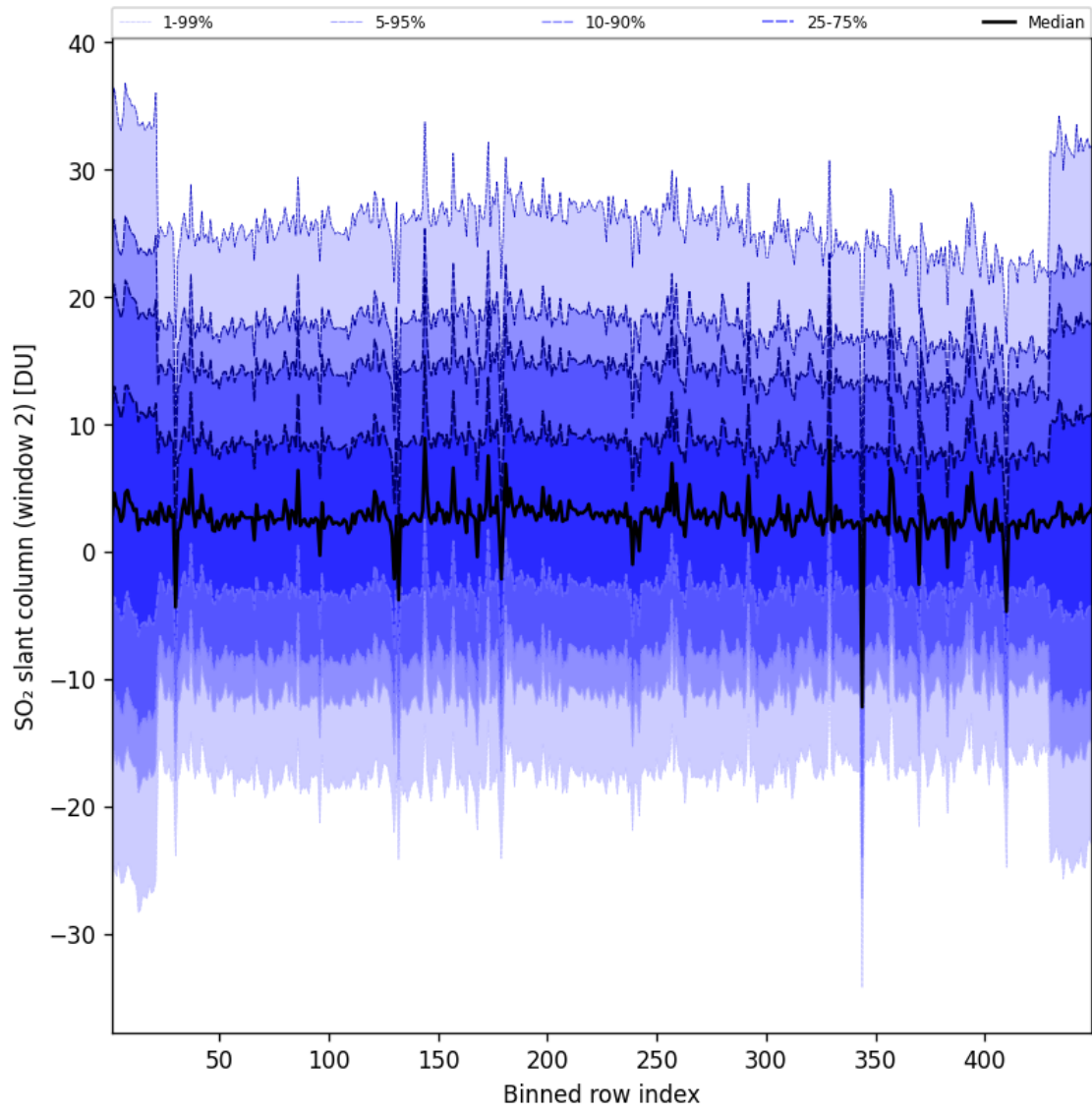


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-08-25 to 2025-08-26

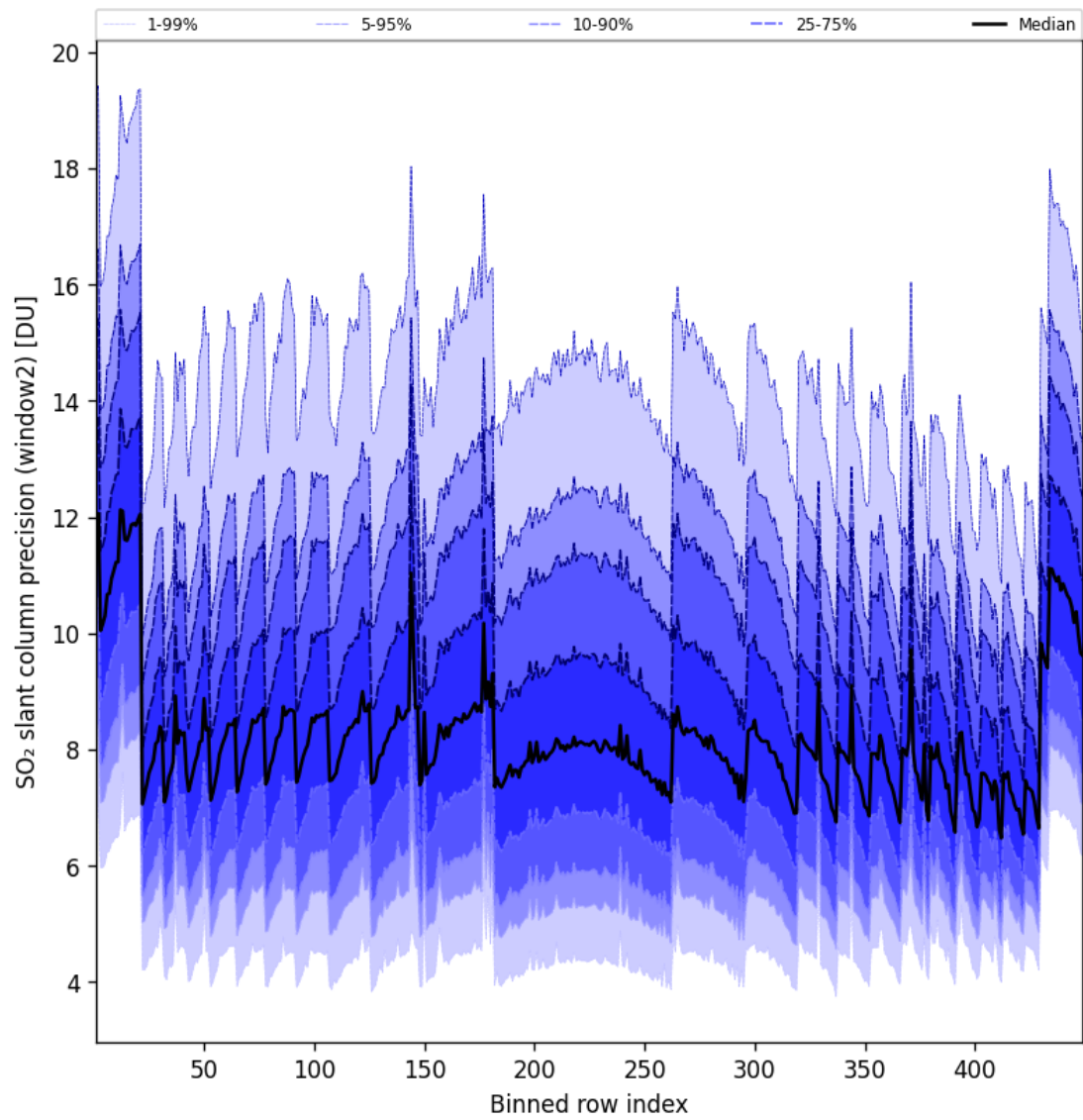


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-08-25 to 2025-08-26

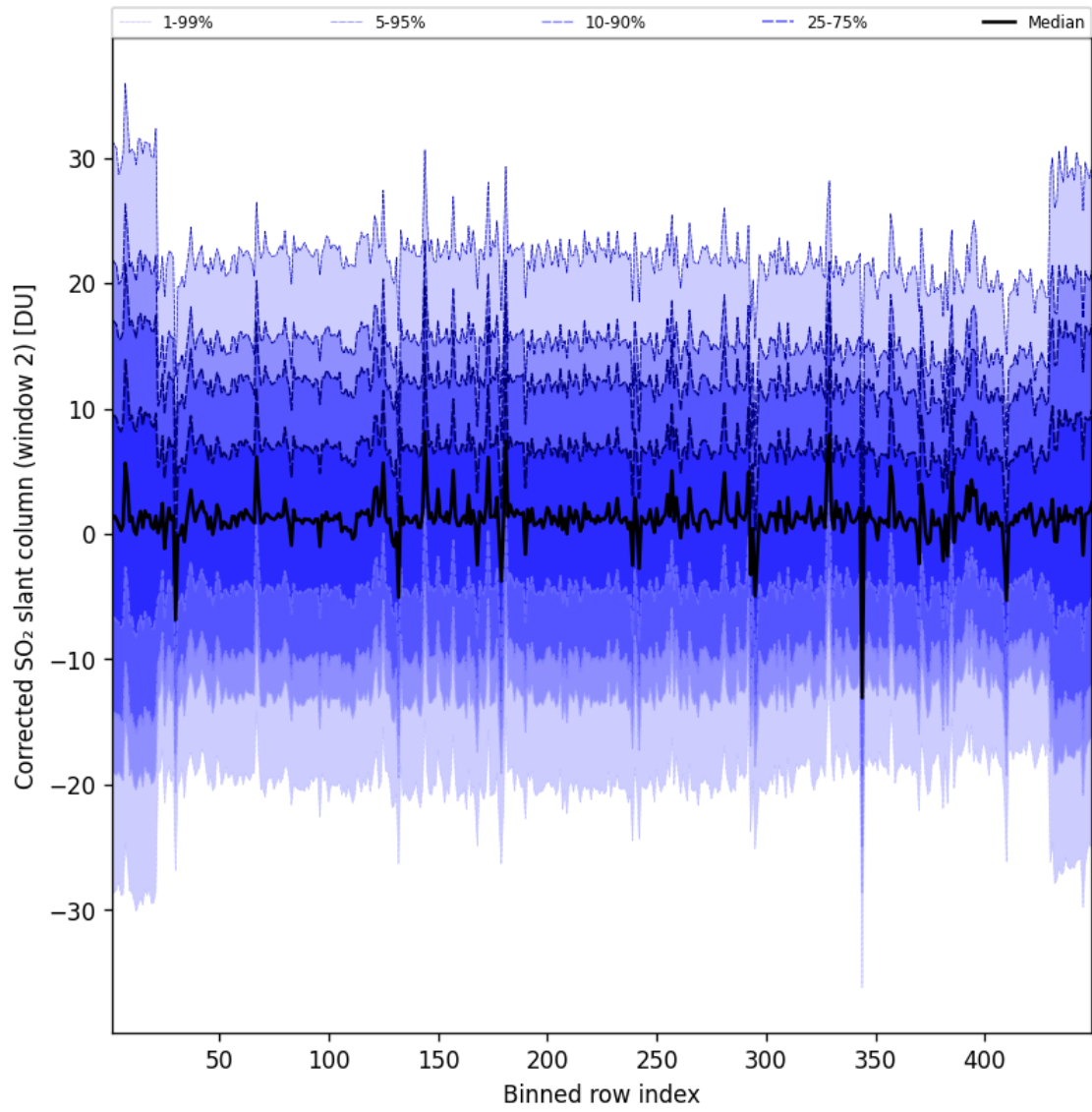


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-08-25 to 2025-08-26

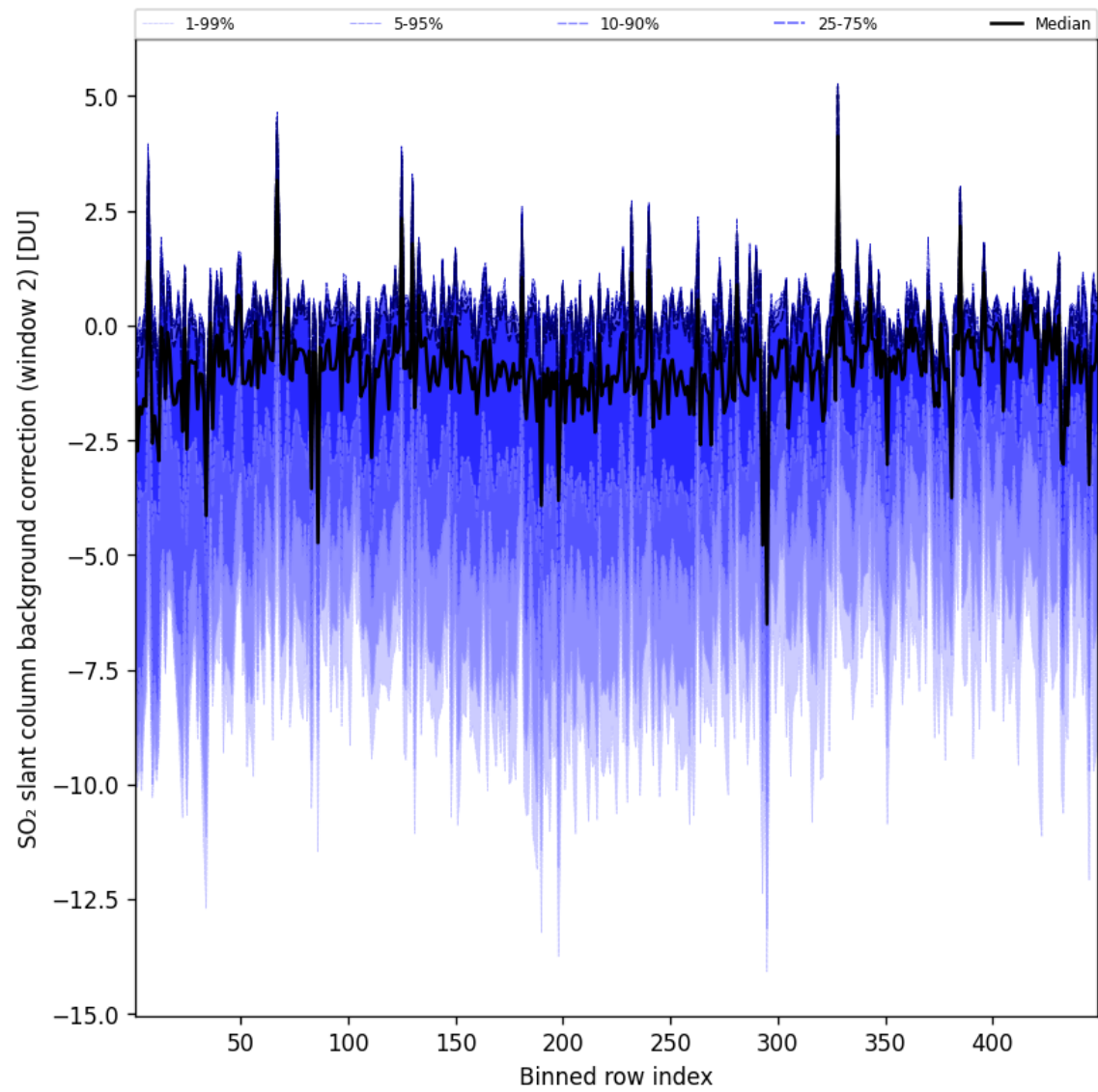


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-08-25 to 2025-08-26

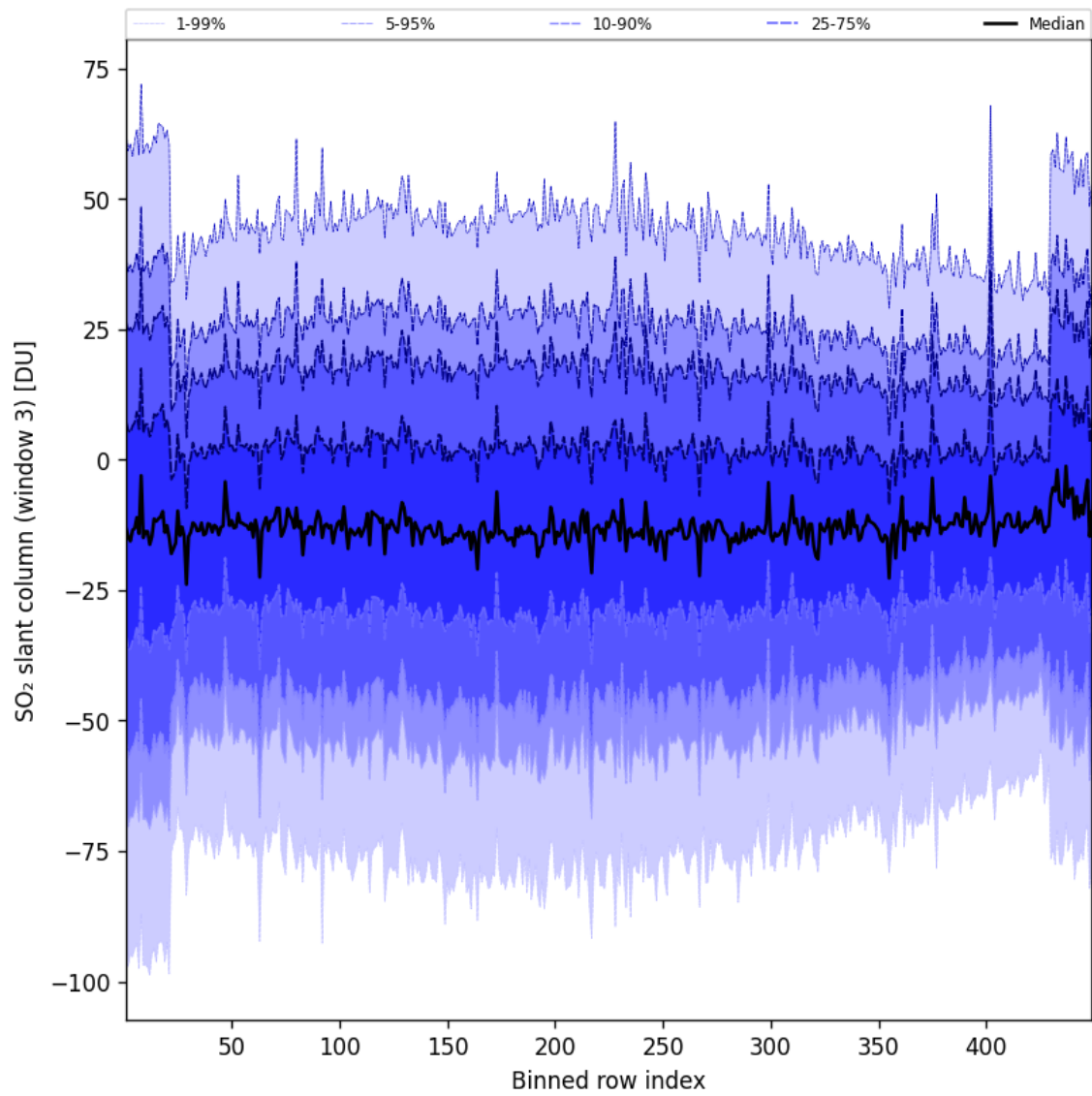


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-08-25 to 2025-08-26

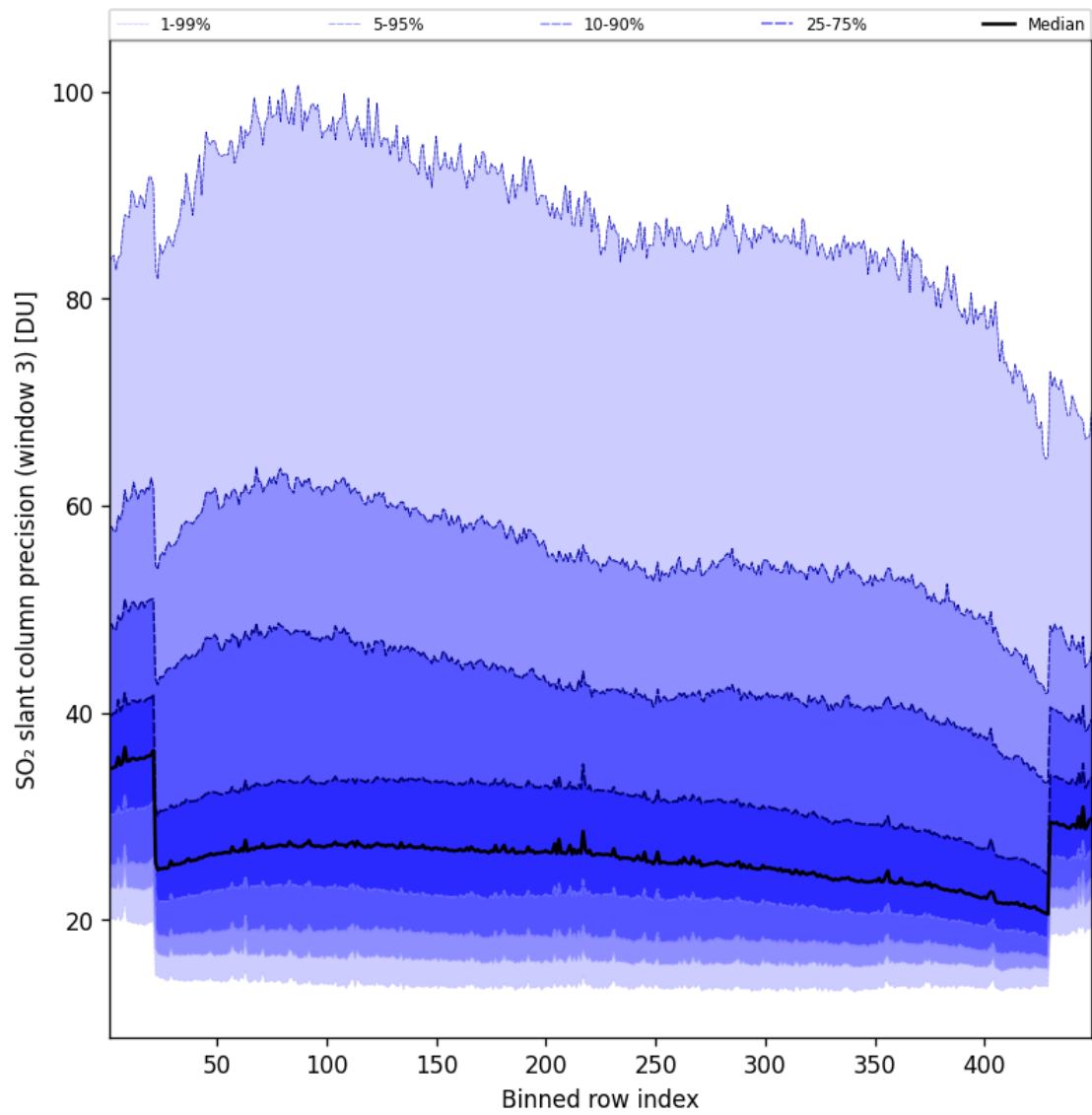


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-08-25 to 2025-08-26

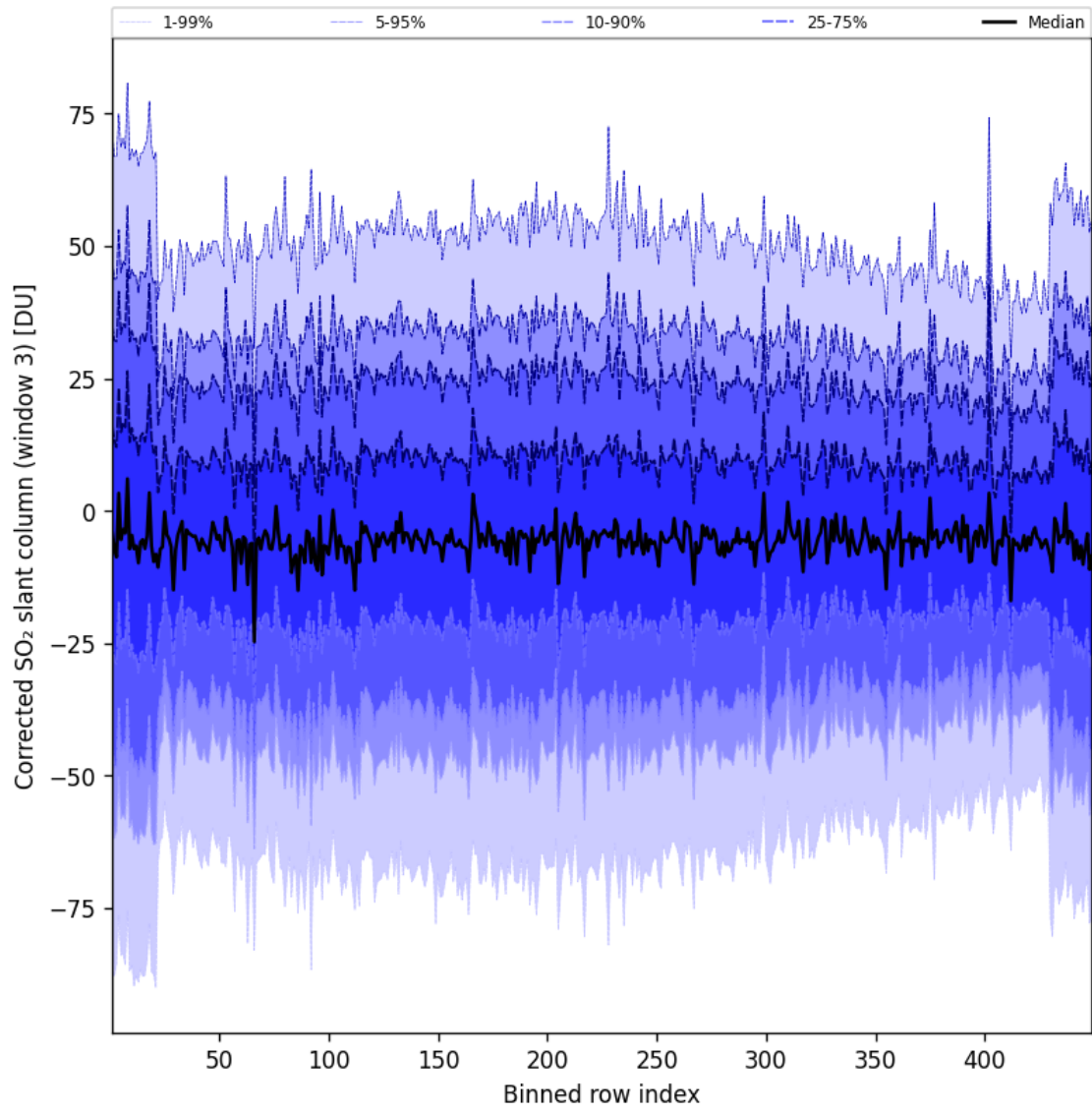


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-08-25 to 2025-08-26

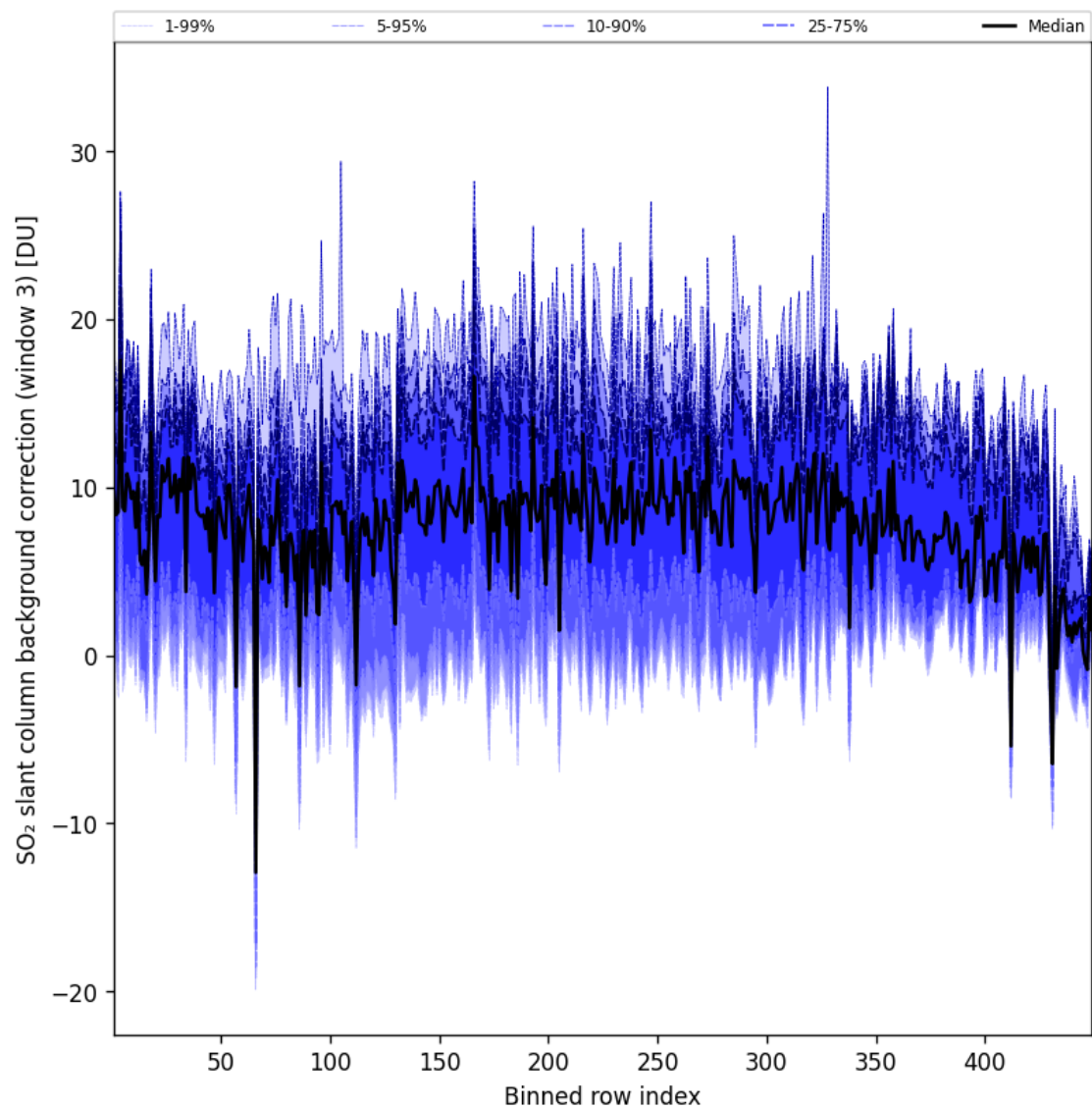


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-08-25 to 2025-08-26

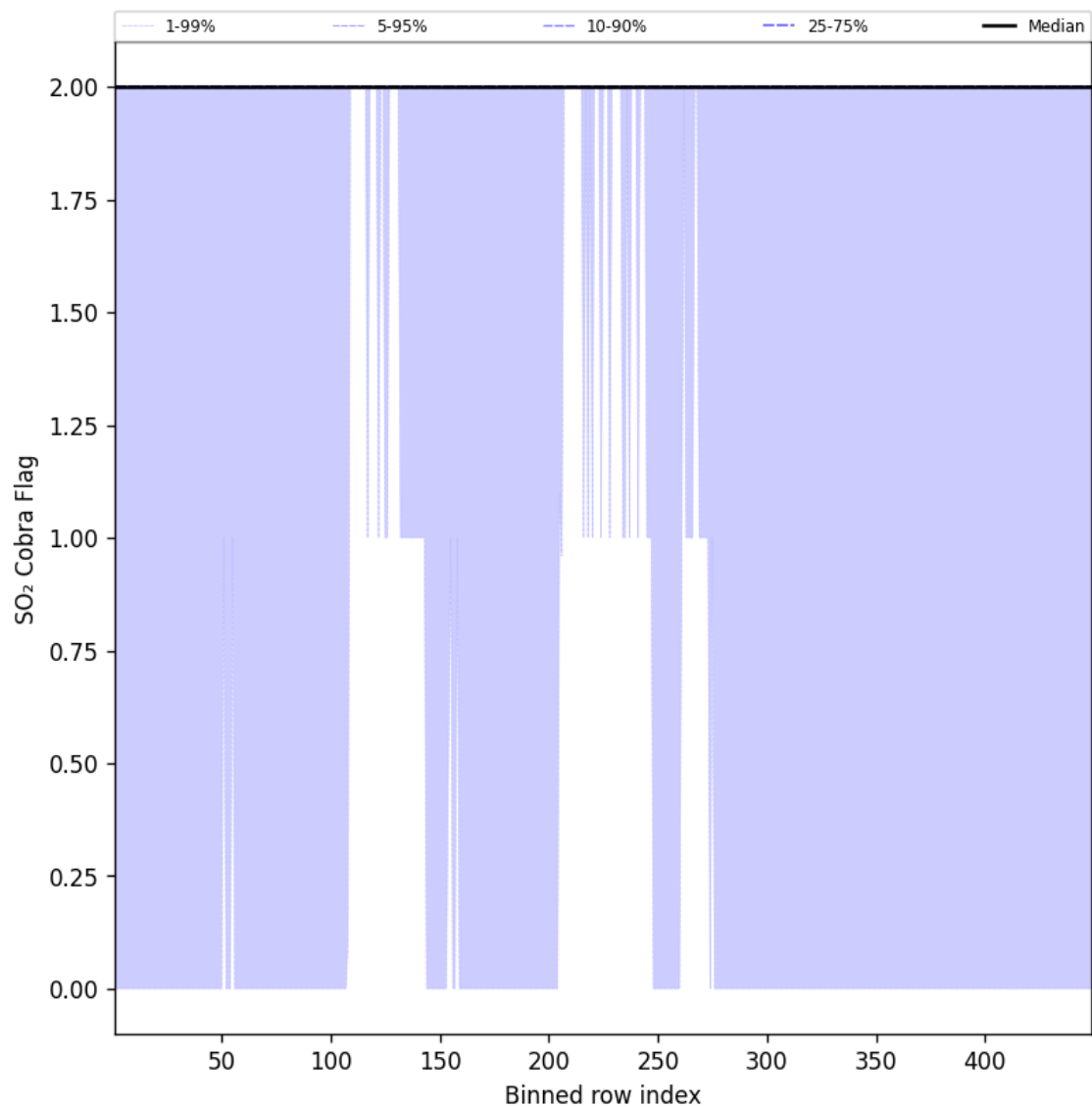


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-08-25 to 2025-08-26

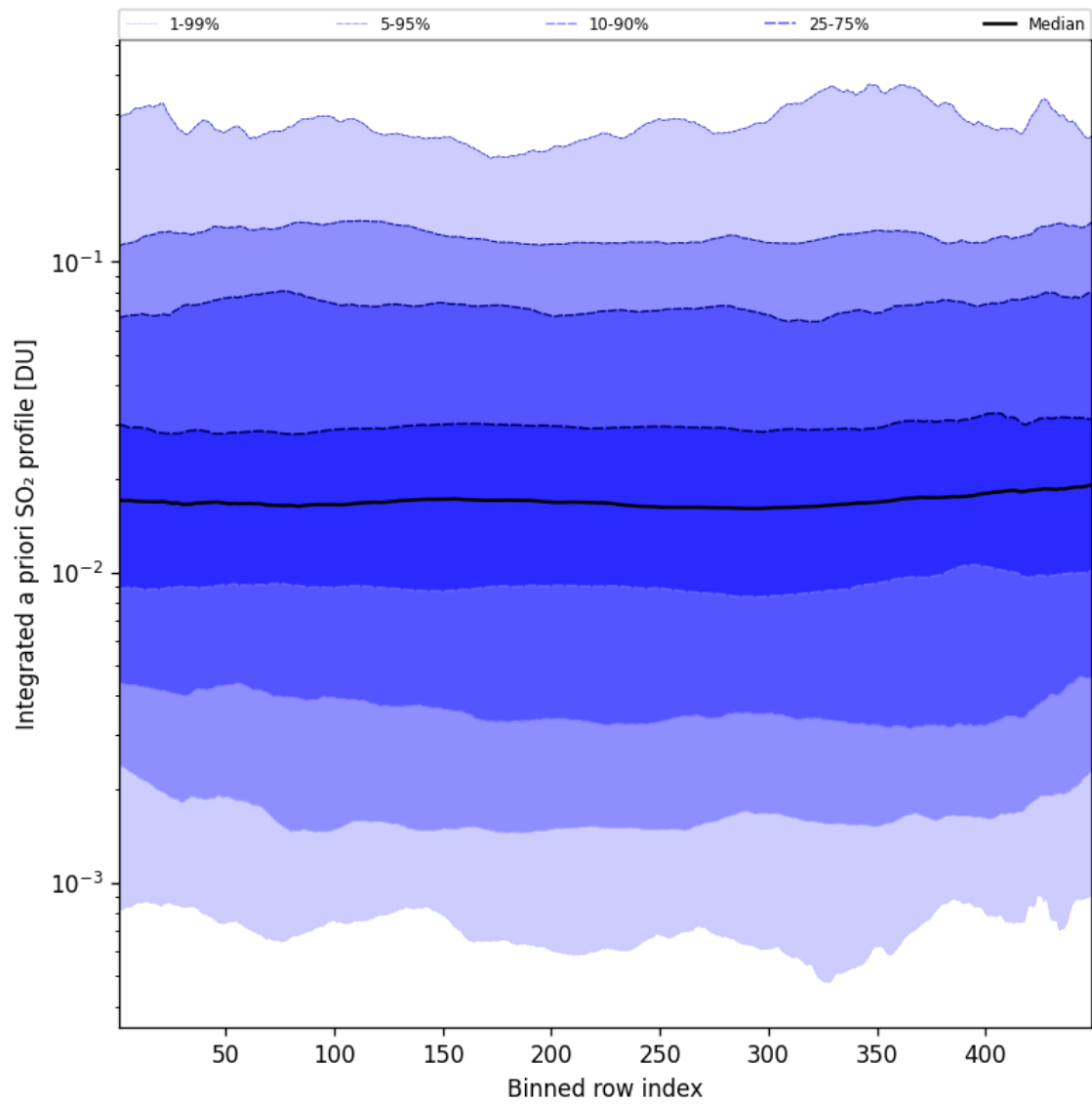


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-08-25 to 2025-08-26

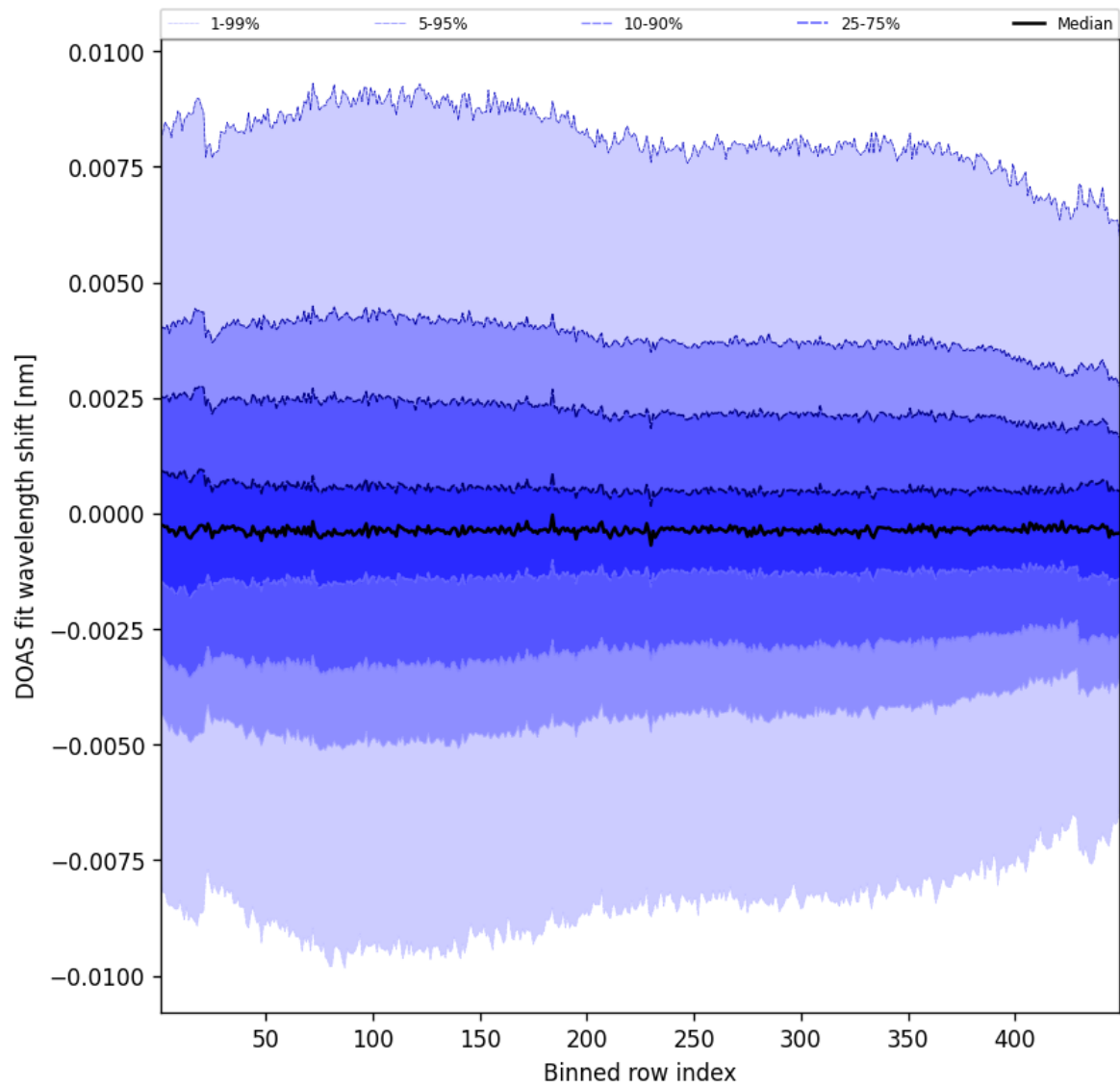


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-08-25 to 2025-08-26

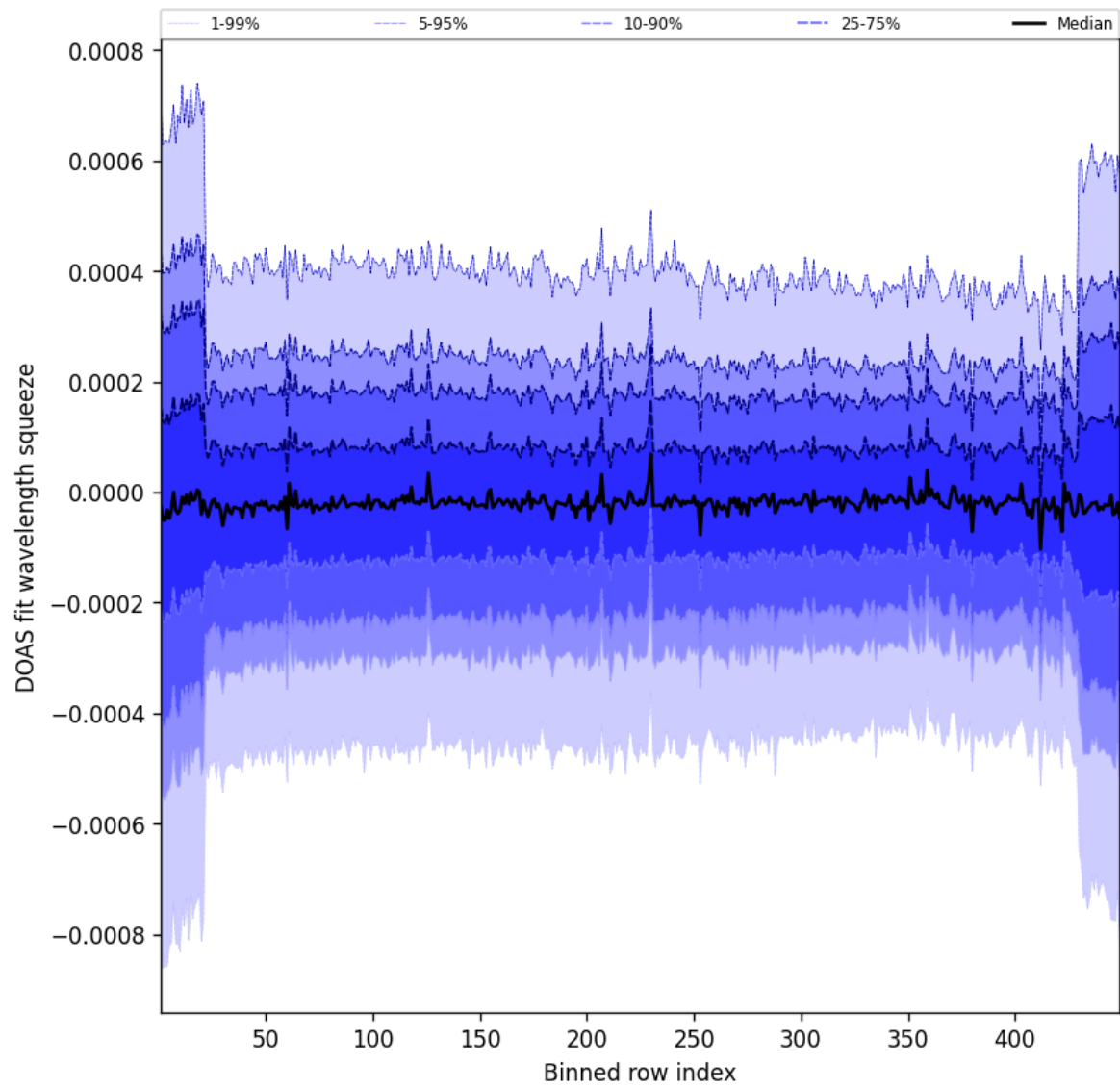


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-08-25 to 2025-08-26

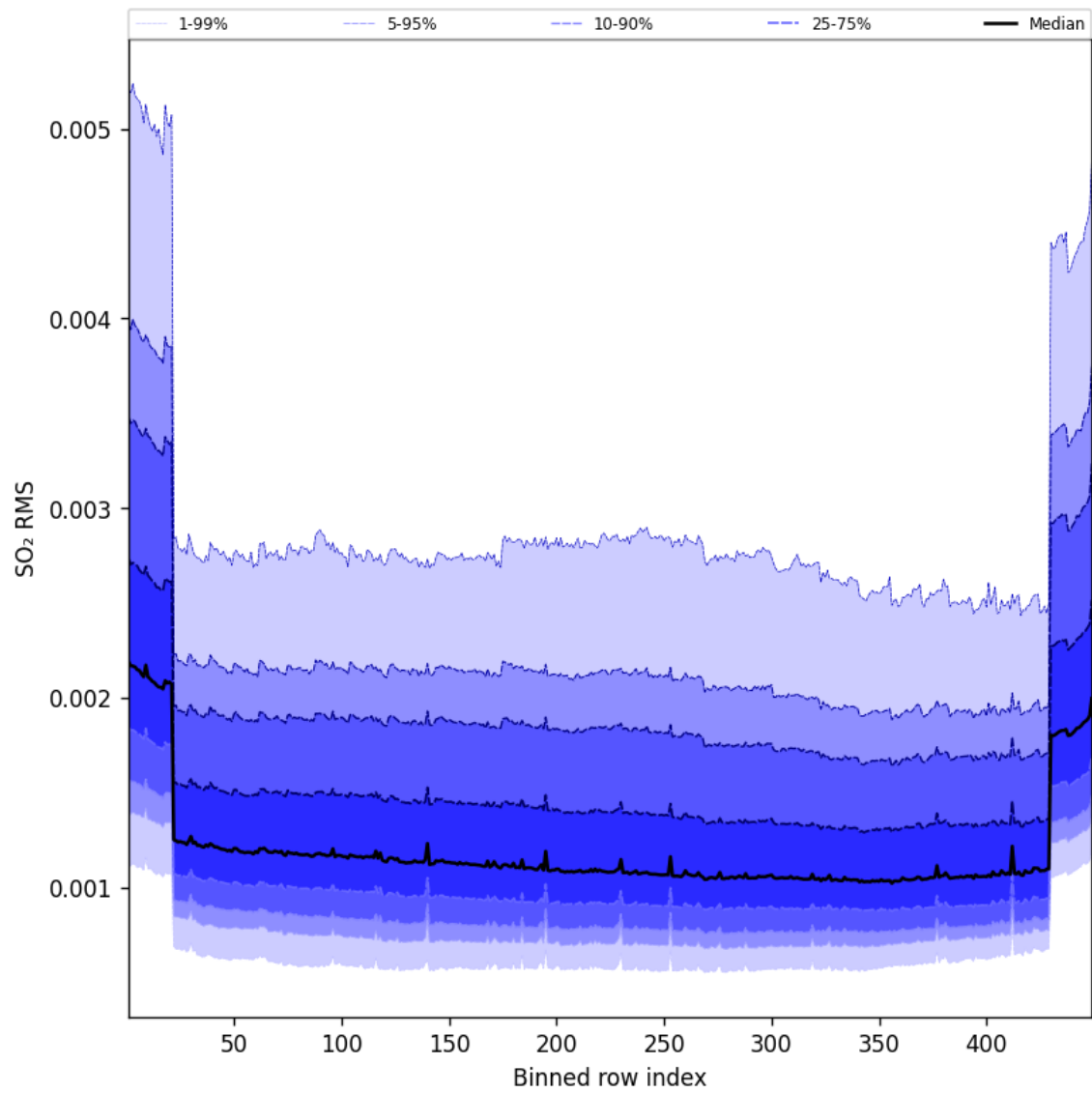


Figure 106: Along track statistics of “SO₂ RMS” for 2025-08-25 to 2025-08-26

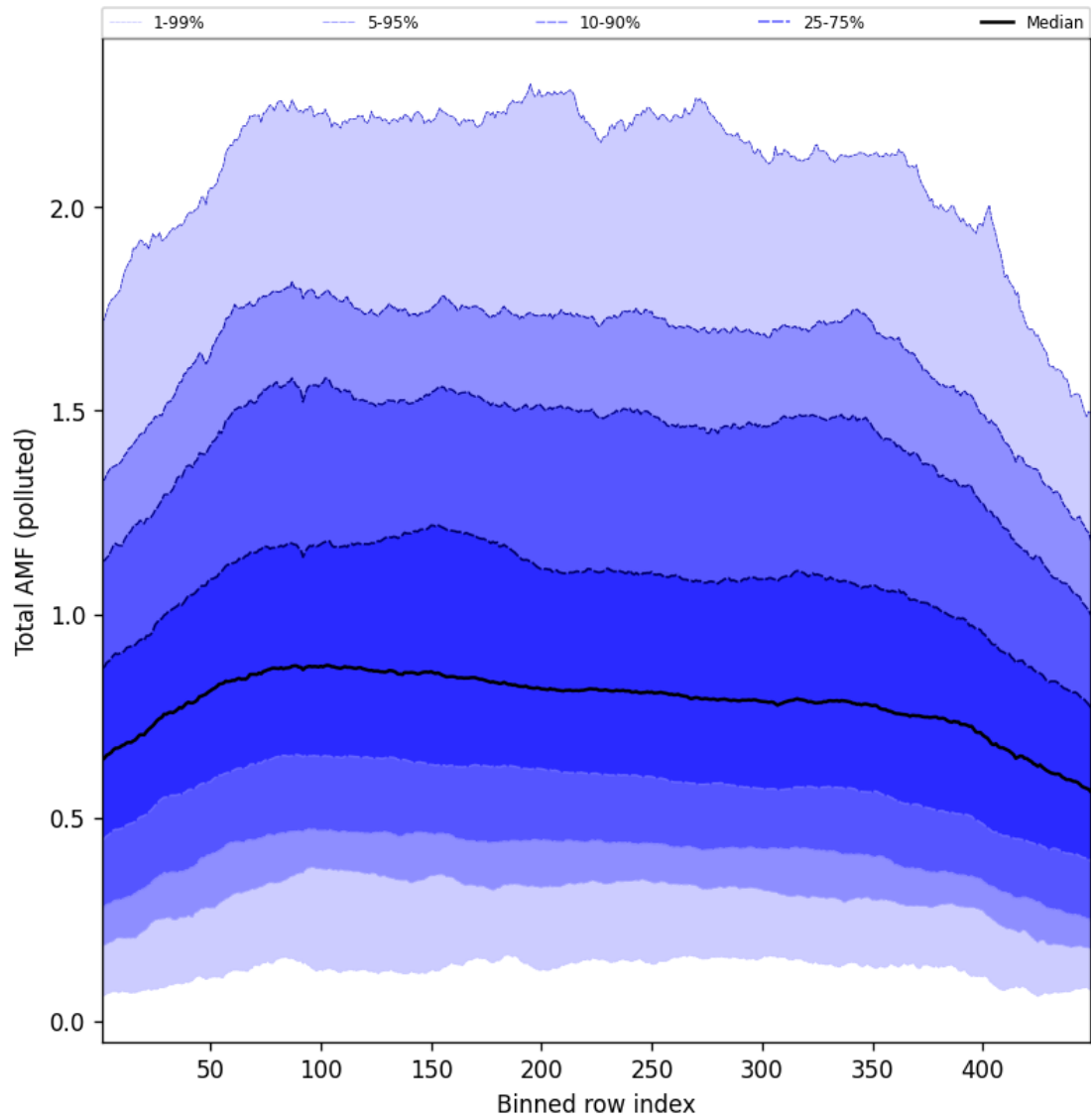


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-08-25 to 2025-08-26

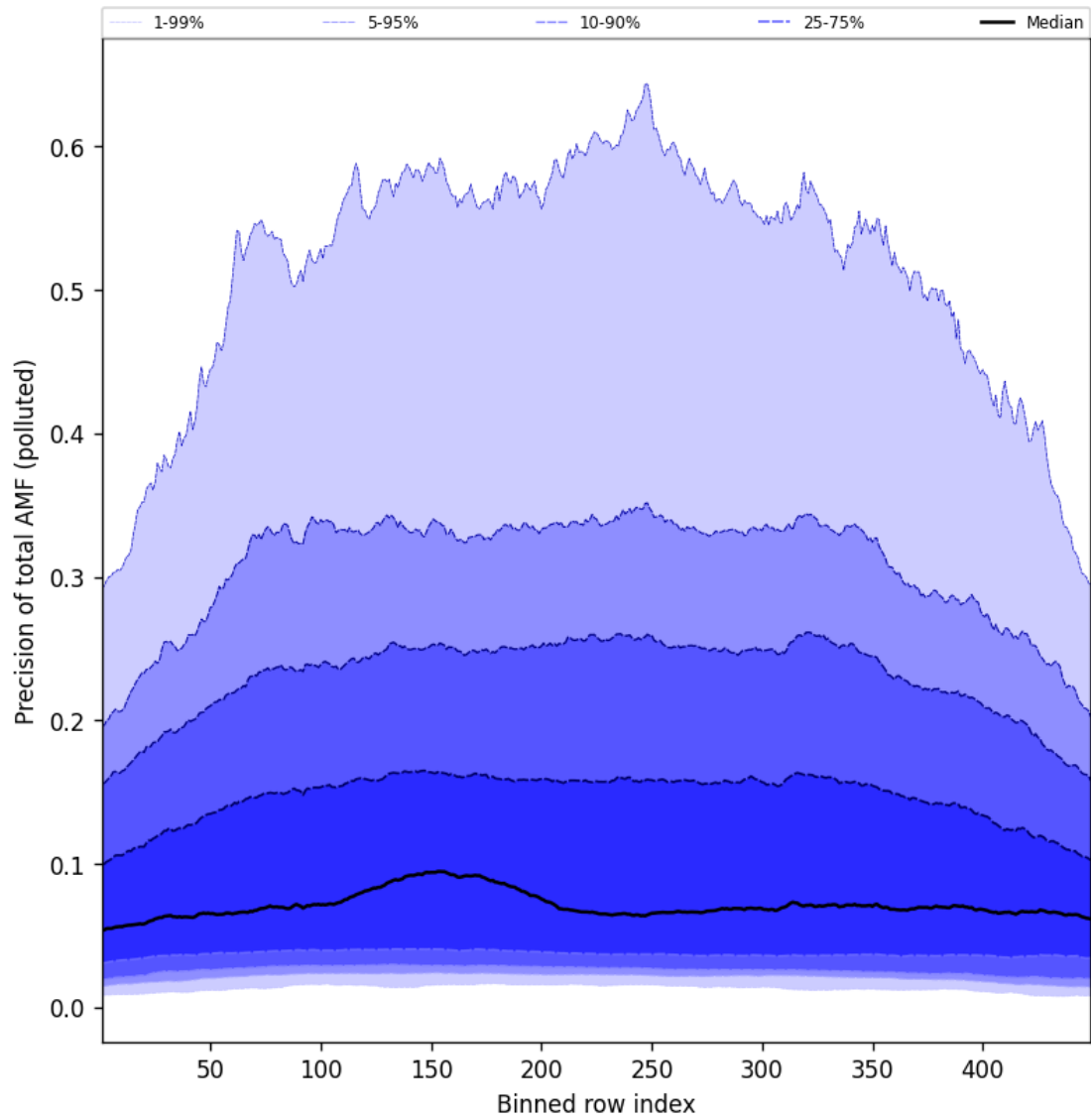


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-08-25 to 2025-08-26

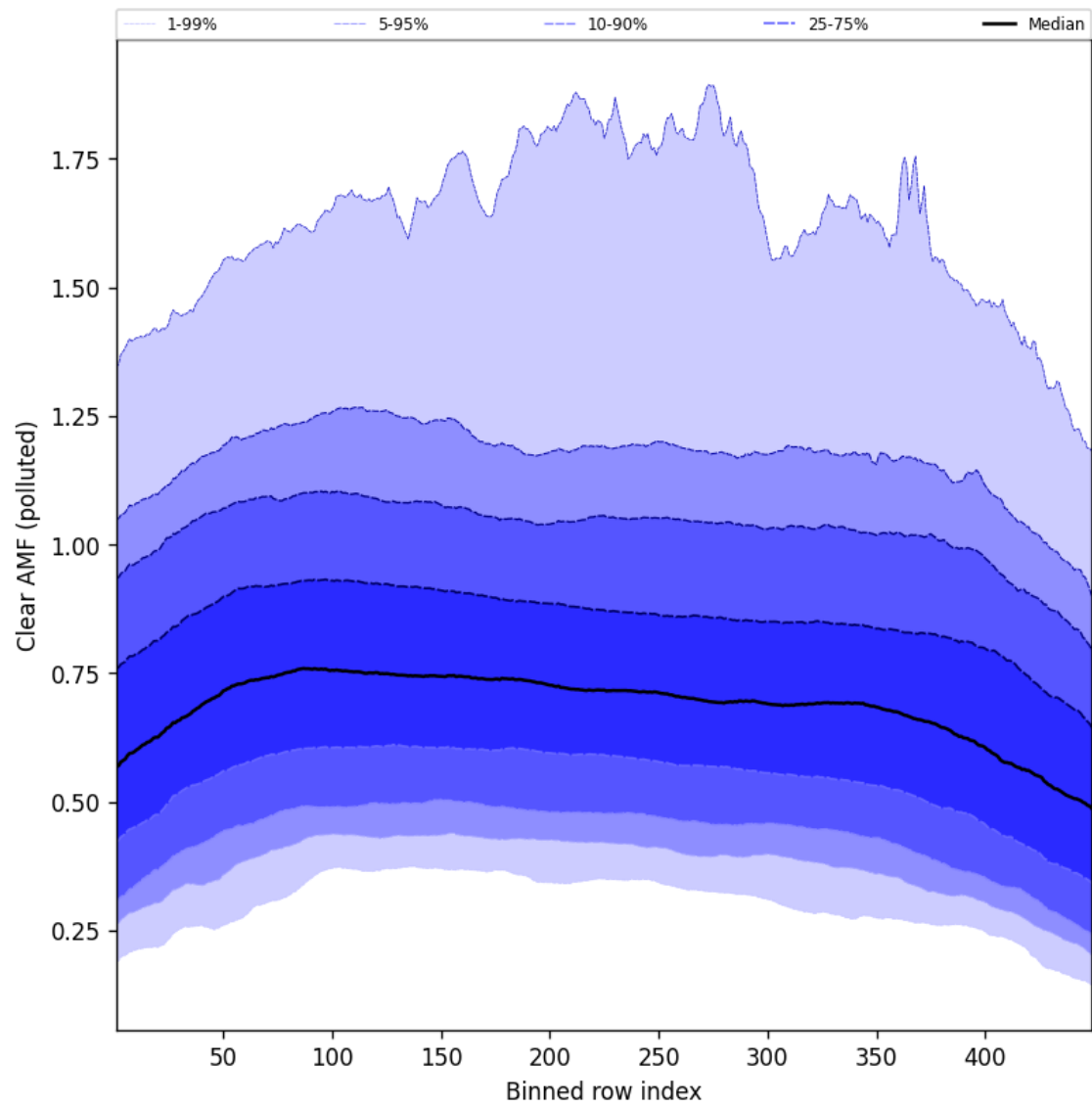


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-08-25 to 2025-08-26

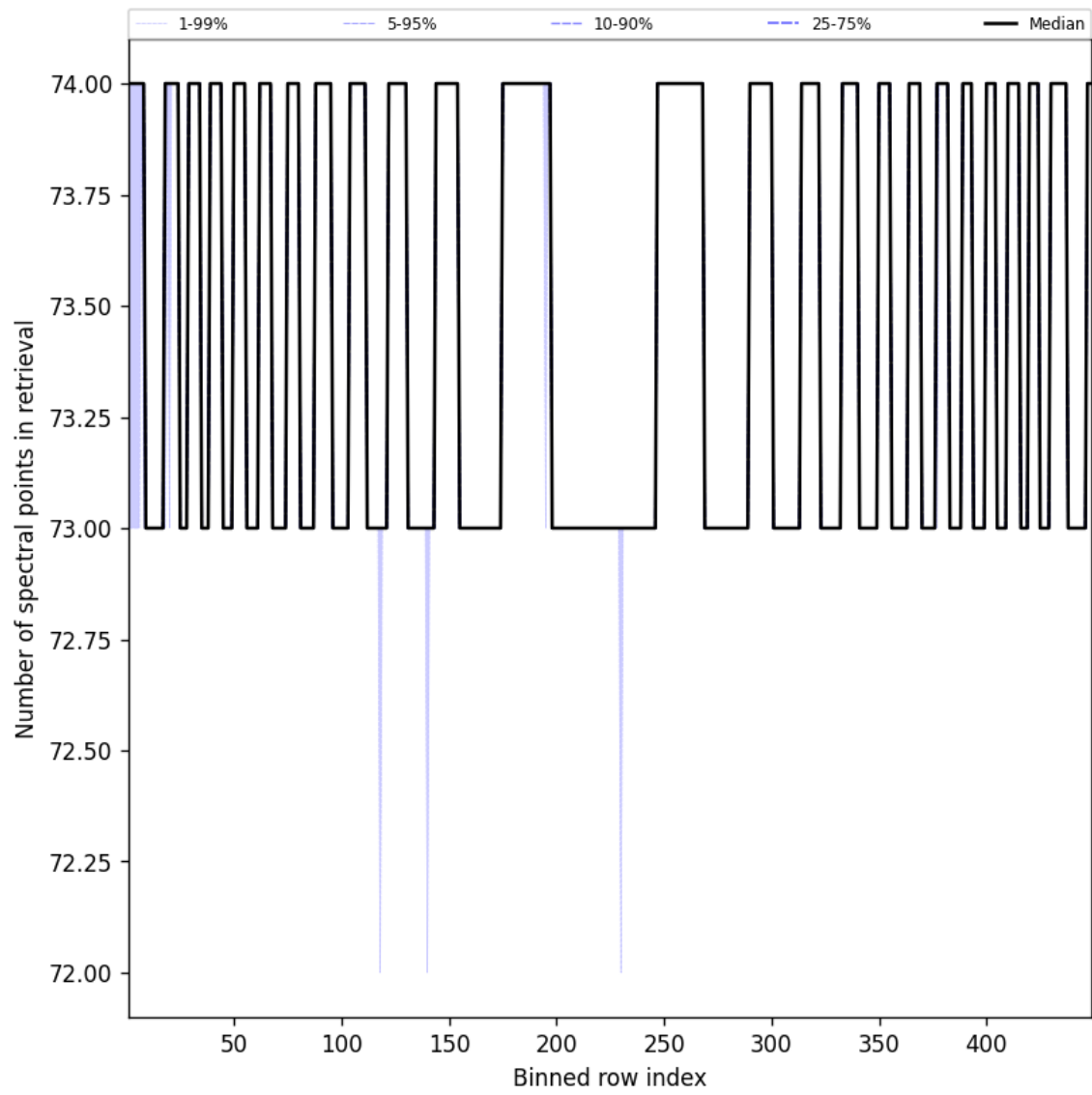


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-08-25 to 2025-08-26

10 Coincidence density

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

Contents

1	Short Introduction	1
1.1	The list of parameters	1
2	Definitions	1
3	Granule outlines	8
4	Input data monitoring	9
5	Warnings and errors	10
6	World maps	11
7	Zonal average	37
8	Histograms	64
9	Along track statistics	91
10	Coincidence density	118
11	Copyright information of ‘PyCAMA’	118

List of Figures

1	Outline of the granules.	8
2	Input data per granule	9
3	Fraction of pixels with specific warnings and errors during processing	10
4	Map of “SO ₂ vertical column” for 2025-08-25 to 2025-08-26	11
5	Map of “SO ₂ vertical column precision” for 2025-08-25 to 2025-08-26	12
6	Map of “Corrected SO ₂ slant column” for 2025-08-25 to 2025-08-26	13
7	Map of “Cobra SO ₂ slant column” for 2025-08-25 to 2025-08-26	14
8	Map of “SO ₂ slant column precision (Cobra)” for 2025-08-25 to 2025-08-26	15
9	Map of “SO ₂ slant column (window 1)” for 2025-08-25 to 2025-08-26	16
10	Map of “SO ₂ slant column precision (window 1)” for 2025-08-25 to 2025-08-26	17
11	Map of “Corrected SO ₂ slant column (window 1)” for 2025-08-25 to 2025-08-26	18
12	Map of “SO ₂ slant column background correction (window 1)” for 2025-08-25 to 2025-08-26	19
13	Map of “SO ₂ slant column (window 2)” for 2025-08-25 to 2025-08-26	20
14	Map of “SO ₂ slant column precision (window2)” for 2025-08-25 to 2025-08-26	21
15	Map of “Corrected SO ₂ slant column (window 2)” for 2025-08-25 to 2025-08-26	22
16	Map of “SO ₂ slant column background correction (window 2)” for 2025-08-25 to 2025-08-26	23
17	Map of “SO ₂ slant column (window 3)” for 2025-08-25 to 2025-08-26	24
18	Map of “SO ₂ slant column precision (window 3)” for 2025-08-25 to 2025-08-26	25
19	Map of “Corrected SO ₂ slant column (window 3)” for 2025-08-25 to 2025-08-26	26
20	Map of “SO ₂ slant column background correction (window 3)” for 2025-08-25 to 2025-08-26	27
21	Map of “Integrated a priori SO ₂ profile” for 2025-08-25 to 2025-08-26	28
22	Map of “DOAS fit wavelength shift” for 2025-08-25 to 2025-08-26	29
23	Map of “DOAS fit wavelength squeeze” for 2025-08-25 to 2025-08-26	30
24	Map of “SO ₂ RMS” for 2025-08-25 to 2025-08-26	31
25	Map of “Total AMF (polluted)” for 2025-08-25 to 2025-08-26	32
26	Map of “Precision of total AMF (polluted)” for 2025-08-25 to 2025-08-26	33
27	Map of “Clear AMF (polluted)” for 2025-08-25 to 2025-08-26	34
28	Map of “Number of spectral points in retrieval” for 2025-08-25 to 2025-08-26	35
29	Map of the number of observations for 2025-08-25 to 2025-08-26	36

30	Zonal average of “QA value” for 2025-08-25 to 2025-08-26.	37
31	Zonal average of “SO ₂ vertical column” for 2025-08-25 to 2025-08-26.	38
32	Zonal average of “SO ₂ vertical column precision” for 2025-08-25 to 2025-08-26.	39
33	Zonal average of “Corrected SO ₂ slant column” for 2025-08-25 to 2025-08-26.	40
34	Zonal average of “Cobra SO ₂ slant column” for 2025-08-25 to 2025-08-26.	41
35	Zonal average of “SO ₂ slant column precision (Cobra)” for 2025-08-25 to 2025-08-26.	42
36	Zonal average of “SO ₂ slant column (window 1)” for 2025-08-25 to 2025-08-26.	43
37	Zonal average of “SO ₂ slant column precision (window 1)” for 2025-08-25 to 2025-08-26.	44
38	Zonal average of “Corrected SO ₂ slant column (window 1)” for 2025-08-25 to 2025-08-26.	45
39	Zonal average of “SO ₂ slant column background correction (window 1)” for 2025-08-25 to 2025-08-26.	46
40	Zonal average of “SO ₂ slant column (window 2)” for 2025-08-25 to 2025-08-26.	47
41	Zonal average of “SO ₂ slant column precision (window2)” for 2025-08-25 to 2025-08-26.	48
42	Zonal average of “Corrected SO ₂ slant column (window 2)” for 2025-08-25 to 2025-08-26.	49
43	Zonal average of “SO ₂ slant column background correction (window 2)” for 2025-08-25 to 2025-08-26.	50
44	Zonal average of “SO ₂ slant column (window 3)” for 2025-08-25 to 2025-08-26.	51
45	Zonal average of “SO ₂ slant column precision (window 3)” for 2025-08-25 to 2025-08-26.	52
46	Zonal average of “Corrected SO ₂ slant column (window 3)” for 2025-08-25 to 2025-08-26.	53
47	Zonal average of “SO ₂ slant column background correction (window 3)” for 2025-08-25 to 2025-08-26.	54
48	Zonal average of “SO ₂ Cobra Flag” for 2025-08-25 to 2025-08-26.	55
49	Zonal average of “Integrated a priori SO ₂ profile” for 2025-08-25 to 2025-08-26.	56
50	Zonal average of “DOAS fit wavelength shift” for 2025-08-25 to 2025-08-26.	57
51	Zonal average of “DOAS fit wavelength squeeze” for 2025-08-25 to 2025-08-26.	58
52	Zonal average of “SO ₂ RMS” for 2025-08-25 to 2025-08-26.	59
53	Zonal average of “Total AMF (polluted)” for 2025-08-25 to 2025-08-26.	60
54	Zonal average of “Precision of total AMF (polluted)” for 2025-08-25 to 2025-08-26.	61
55	Zonal average of “Clear AMF (polluted)” for 2025-08-25 to 2025-08-26.	62
56	Zonal average of “Number of spectral points in retrieval” for 2025-08-25 to 2025-08-26.	63
57	Histogram of “QA value” for 2025-08-25 to 2025-08-26	64
58	Histogram of “SO ₂ vertical column” for 2025-08-25 to 2025-08-26	65
59	Histogram of “SO ₂ vertical column precision” for 2025-08-25 to 2025-08-26	66
60	Histogram of “Corrected SO ₂ slant column” for 2025-08-25 to 2025-08-26	67
61	Histogram of “Cobra SO ₂ slant column” for 2025-08-25 to 2025-08-26	68
62	Histogram of “SO ₂ slant column precision (Cobra)” for 2025-08-25 to 2025-08-26	69
63	Histogram of “SO ₂ slant column (window 1)” for 2025-08-25 to 2025-08-26	70
64	Histogram of “SO ₂ slant column precision (window 1)” for 2025-08-25 to 2025-08-26	71
65	Histogram of “Corrected SO ₂ slant column (window 1)” for 2025-08-25 to 2025-08-26	72
66	Histogram of “SO ₂ slant column background correction (window 1)” for 2025-08-25 to 2025-08-26	73
67	Histogram of “SO ₂ slant column (window 2)” for 2025-08-25 to 2025-08-26	74
68	Histogram of “SO ₂ slant column precision (window2)” for 2025-08-25 to 2025-08-26	75
69	Histogram of “Corrected SO ₂ slant column (window 2)” for 2025-08-25 to 2025-08-26	76
70	Histogram of “SO ₂ slant column background correction (window 2)” for 2025-08-25 to 2025-08-26	77
71	Histogram of “SO ₂ slant column (window 3)” for 2025-08-25 to 2025-08-26	78
72	Histogram of “SO ₂ slant column precision (window 3)” for 2025-08-25 to 2025-08-26	79
73	Histogram of “Corrected SO ₂ slant column (window 3)” for 2025-08-25 to 2025-08-26	80
74	Histogram of “SO ₂ slant column background correction (window 3)” for 2025-08-25 to 2025-08-26	81
75	Histogram of “SO ₂ Cobra Flag” for 2025-08-25 to 2025-08-26	82
76	Histogram of “Integrated a priori SO ₂ profile” for 2025-08-25 to 2025-08-26	83
77	Histogram of “DOAS fit wavelength shift” for 2025-08-25 to 2025-08-26	84
78	Histogram of “DOAS fit wavelength squeeze” for 2025-08-25 to 2025-08-26	85
79	Histogram of “SO ₂ RMS” for 2025-08-25 to 2025-08-26	86
80	Histogram of “Total AMF (polluted)” for 2025-08-25 to 2025-08-26	87
81	Histogram of “Precision of total AMF (polluted)” for 2025-08-25 to 2025-08-26	88
82	Histogram of “Clear AMF (polluted)” for 2025-08-25 to 2025-08-26	89
83	Histogram of “Number of spectral points in retrieval” for 2025-08-25 to 2025-08-26	90
84	Along track statistics of “QA value” for 2025-08-25 to 2025-08-26	91
85	Along track statistics of “SO ₂ vertical column” for 2025-08-25 to 2025-08-26	92
86	Along track statistics of “SO ₂ vertical column precision” for 2025-08-25 to 2025-08-26	93
87	Along track statistics of “Corrected SO ₂ slant column” for 2025-08-25 to 2025-08-26	94
88	Along track statistics of “Cobra SO ₂ slant column” for 2025-08-25 to 2025-08-26	95
89	Along track statistics of “SO ₂ slant column precision (Cobra)” for 2025-08-25 to 2025-08-26	96
90	Along track statistics of “SO ₂ slant column (window 1)” for 2025-08-25 to 2025-08-26	97
91	Along track statistics of “SO ₂ slant column precision (window 1)” for 2025-08-25 to 2025-08-26	98

92	Along track statistics of “Corrected SO ₂ slant column (window 1)” for 2025-08-25 to 2025-08-26	99
93	Along track statistics of “SO ₂ slant column background correction (window 1)” for 2025-08-25 to 2025-08-26	100
94	Along track statistics of “SO ₂ slant column (window 2)” for 2025-08-25 to 2025-08-26	101
95	Along track statistics of “SO ₂ slant column precision (window 2)” for 2025-08-25 to 2025-08-26	102
96	Along track statistics of “Corrected SO ₂ slant column (window 2)” for 2025-08-25 to 2025-08-26	103
97	Along track statistics of “SO ₂ slant column background correction (window 2)” for 2025-08-25 to 2025-08-26	104
98	Along track statistics of “SO ₂ slant column (window 3)” for 2025-08-25 to 2025-08-26	105
99	Along track statistics of “SO ₂ slant column precision (window 3)” for 2025-08-25 to 2025-08-26	106
100	Along track statistics of “Corrected SO ₂ slant column (window 3)” for 2025-08-25 to 2025-08-26	107
101	Along track statistics of “SO ₂ slant column background correction (window 3)” for 2025-08-25 to 2025-08-26	108
102	Along track statistics of “SO ₂ Cobra Flag” for 2025-08-25 to 2025-08-26	109
103	Along track statistics of “Integrated a priori SO ₂ profile” for 2025-08-25 to 2025-08-26	110
104	Along track statistics of “DOAS fit wavelength shift” for 2025-08-25 to 2025-08-26	111
105	Along track statistics of “DOAS fit wavelength squeeze” for 2025-08-25 to 2025-08-26	112
106	Along track statistics of “SO ₂ RMS” for 2025-08-25 to 2025-08-26	113
107	Along track statistics of “Total AMF (polluted)” for 2025-08-25 to 2025-08-26	114
108	Along track statistics of “Precision of total AMF (polluted)” for 2025-08-25 to 2025-08-26	115
109	Along track statistics of “Clear AMF (polluted)” for 2025-08-25 to 2025-08-26	116
110	Along track statistics of “Number of spectral points in retrieval” for 2025-08-25 to 2025-08-26	117

List of Tables

1	Parameterlist and basic statistics for the analysis	2
2	Percentile ranges	3
3	Parameterlist and basic statistics for the analysis for observations in the northern hemisphere	4
4	Parameterlist and basic statistics for the analysis for observations in the southern hemisphere	5
5	Parameterlist and basic statistics for the analysis for observations over water	6
6	Parameterlist and basic statistics for the analysis for observations over land	7

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