

PyCAMA report generated by tropl2-proc

tropl2-proc

2025-03-04 (04:46)

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]	0.656 $\pm$ 0.407	17310768	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.862 \pm 131.347) \times 10^{-2}$	17310768	0.263	0.462	1.099×10^{-2}	-144	136
sulfurdioxide total vertical column precision [DU]	0.594 $\pm$ 0.961	17310768	0.222	0.378	0.329	4.319×10^{-2}	47.2
sulfurdioxide slant column density corrected [DU]	$(1.869 \pm 35.654) \times 10^{-2}$	17310768	0.242	0.356	9.303×10^{-3}	-17.9	52.0
sulfurdioxide slant column density cobra [DU]	$(1.860 \pm 35.171) \times 10^{-2}$	17310768	0.242	0.356	9.303×10^{-3}	-17.9	25.3
sulfurdioxide slant column density cobra precision [DU]	0.288 $\pm$ 0.133	17310768	0.213	0.137	0.248	8.275×10^{-2}	21.2
sulfurdioxide slant column density window1 [DU]	0.196 $\pm$ 0.679	17310768	0.225	0.734	0.209	-70.1	74.4
sulfurdioxide slant column density window1 precision [DU]	0.288 $\pm$ 0.133	17310768	0.213	0.137	0.248	8.275×10^{-2}	21.2
sulfurdioxide slant column density corrected win1 [DU]	$(4.512 \pm 66.506) \times 10^{-2}$	17310768	2.500×10^{-2}	0.712	2.696×10^{-2}	-70.1	74.4
background so2 slant column offset window1 [DU]	-0.151 $\pm$ 0.184	17310768	-0.300	0.213	-0.185	-1.35	8.91
sulfurdioxide slant column density window2 [DU]	1.96 $\pm$ 9.04	17310768	1.25	11.4	1.76	-1.621×10^3	2.051×10^3
sulfurdioxide slant column density window2 precision [DU]	8.04 $\pm$ 2.17	17310768	7.43	2.49	7.73	1.99	501
sulfurdioxide slant column density corrected win2 [DU]	0.415 $\pm$ 8.759	17310768	0.750	11.1	0.455	-1.621×10^3	2.052×10^3
background so2 slant column offset window2 [DU]	-1.55 $\pm$ 2.73	17310768	0.250	3.54	-0.561	-20.6	6.51
sulfurdioxide slant column density window3 [DU]	-12.8 $\pm$ 24.1	17310768	-14.0	30.6	-13.0	-1.519×10^3	561
sulfurdioxide slant column density window3 precision [DU]	27.4 $\pm$ 12.5	17310768	22.5	8.95	24.2	9.49	303
sulfurdioxide slant column density corrected win3 [DU]	-5.34 $\pm$ 23.18	17310768	-6.16	29.3	-5.36	-1.511×10^3	578
background so2 slant column offset window3 [DU]	7.49 $\pm$ 7.46	17310768	2.80	12.0	6.91	-17.0	34.4
sulfurdioxide slant column cobra flag [1]	1.98 $\pm$ 0.21	17310768	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.393 \pm 6.649) \times 10^{-2}$	17310768	1.800×10^{-2}	1.983×10^{-2}	1.775×10^{-2}	5.491×10^{-4}	1.72
fitted radiance shift [nm]	$(-4.488 \pm 24.668) \times 10^{-4}$	17310768	-5.000×10^{-4}	1.745×10^{-3}	-4.493×10^{-4}	-3.987×10^{-2}	4.735×10^{-2}
fitted radiance squeeze [1]	$(-1.968 \pm 18.639) \times 10^{-5}$	17310768	-1.000×10^{-5}	2.049×10^{-4}	-1.529×10^{-5}	-1.600×10^{-2}	1.363×10^{-2}
fitted root mean square [1]	$(1.266 \pm 0.549) \times 10^{-3}$	17310768	9.250×10^{-4}	5.626×10^{-4}	1.105×10^{-3}	3.403×10^{-4}	6.469×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.830 $\pm$ 0.456	17310768	0.780	0.556	0.758	5.000×10^{-2}	2.92
sulfurdioxide total air mass factor polluted precision [1]	0.117 $\pm$ 0.130	17310768	3.500×10^{-2}	0.123	6.423×10^{-2}	2.684×10^{-3}	1.85
sulfurdioxide clear air mass factor polluted [1]	0.709 $\pm$ 0.348	17310768	0.500	0.382	0.667	3.330×10^{-2}	2.94
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	17310768	73.0	1.000	73.0	70.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.110	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.89	-0.978	-0.568	-0.373	-0.216	0.246	0.417	0.636	1.11	3.36
sulfurdioxide total vertical column precision [DU]	9.532×10^{-2}	0.130	0.157	0.182	0.217	0.595	0.825	1.17	1.80	4.72
sulfurdioxide slant column density corrected [DU]	-0.842	-0.483	-0.348	-0.259	-0.167	0.189	0.288	0.385	0.540	1.01
sulfurdioxide slant column density cobra [DU]	-0.842	-0.483	-0.348	-0.259	-0.167	0.189	0.288	0.385	0.540	1.01
sulfurdioxide slant column density cobra precision [DU]	0.136	0.162	0.175	0.186	0.201	0.338	0.390	0.442	0.538	0.775
sulfurdioxide slant column density window1 [DU]	-1.68	-0.865	-0.562	-0.366	-0.164	0.570	0.759	0.939	1.21	1.95
sulfurdioxide slant column density window1 precision [DU]	0.136	0.162	0.175	0.186	0.201	0.338	0.390	0.442	0.538	0.775
sulfurdioxide slant column density corrected win1 [DU]	-1.62	-0.934	-0.677	-0.506	-0.324	0.388	0.586	0.781	1.09	1.94
background so2 slant column offset window1 [DU]	-0.473	-0.355	-0.321	-0.300	-0.278	-6.512×10^{-2}	8.807×10^{-3}	8.625×10^{-2}	0.190	0.417
sulfurdioxide slant column density window2 [DU]	-19.0	-12.3	-9.03	-6.60	-3.86	7.56	10.5	13.2	16.9	24.7
sulfurdioxide slant column density window2 precision [DU]	4.30	5.20	5.72	6.14	6.62	9.11	9.94	10.7	11.9	14.4
sulfurdioxide slant column density corrected win2 [DU]	-20.9	-13.8	-10.4	-7.89	-5.10	5.97	8.72	11.2	14.5	21.4
background so2 slant column offset window2 [DU]	-9.36	-7.22	-5.80	-4.54	-3.07	0.471	0.719	0.927	1.25	2.34
sulfurdioxide slant column density window3 [DU]	-72.0	-52.2	-42.7	-35.8	-28.1	2.49	10.4	17.5	27.0	45.7
sulfurdioxide slant column density window3 precision [DU]	13.3	16.0	17.8	19.1	20.6	29.6	33.9	39.4	50.6	81.1
sulfurdioxide slant column density corrected win3 [DU]	-62.9	-43.3	-34.0	-27.3	-19.9	9.41	16.9	23.6	32.6	50.7
background so2 slant column offset window3 [DU]	-6.05	-3.36	-2.07	-0.623	1.46	13.5	15.8	17.5	19.7	23.6
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]	1.569×10^{-3}	3.862×10^{-3}	6.155×10^{-3}	8.359×10^{-3}	1.095×10^{-2}	3.078×10^{-2}	4.234×10^{-2}	6.006×10^{-2}	0.110	0.342
fitted radiance shift [nm]	-7.869×10^{-3}	-4.085×10^{-3}	-2.769×10^{-3}	-2.018×10^{-3}	-1.361×10^{-3}	3.838×10^{-4}	1.049×10^{-3}	1.882×10^{-3}	3.332×10^{-3}	7.348×10^{-3}
fitted radiance squeeze [1]	-5.412×10^{-4}	-3.172×10^{-4}	-2.316×10^{-4}	-1.760×10^{-4}	-1.193×10^{-4}	8.558×10^{-5}	1.384×10^{-4}	1.890×10^{-4}	2.655×10^{-4}	4.565×10^{-4}
fitted root mean square [1]	5.808×10^{-4}	7.162×10^{-4}	7.895×10^{-4}	8.455×10^{-4}	9.146×10^{-4}	1.477×10^{-3}	1.704×10^{-3}	1.920×10^{-3}	2.288×10^{-3}	3.281×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.934×10^{-2}	0.204	0.306	0.397	0.508	1.06	1.28	1.48	1.73	2.15
sulfurdioxide total air mass factor polluted precision [1]	9.273×10^{-3}	1.617×10^{-2}	2.243×10^{-2}	2.812×10^{-2}	3.525×10^{-2}	0.158	0.214	0.274	0.372	0.609
sulfurdioxide clear air mass factor polluted [1]	0.166	0.266	0.344	0.406	0.484	0.865	0.965	1.06	1.23	2.19
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]	0.661 ± 0.404	8102297	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(6.096 \pm 175.896) \times 10^{-2}$	8102297	0.587	1.442×10^{-2}	-144	136	-0.270	0.317
sulfurdioxide total vertical column precision [DU]	0.808 ± 1.259	8102297	0.589	0.429	4.822×10^{-2}	47.2	0.254	0.843
sulfurdioxide slant column density corrected [DU]	$(2.467 \pm 40.725) \times 10^{-2}$	8102297	0.385	1.077×10^{-2}	-17.9	52.0	-0.179	0.206
sulfurdioxide slant column density cobra [DU]	$(2.447 \pm 39.830) \times 10^{-2}$	8102297	0.385	1.077×10^{-2}	-17.9	23.8	-0.179	0.206
sulfurdioxide slant column density cobra precision [DU]	0.315 ± 0.153	8102297	0.161	0.273	8.401×10^{-2}	21.2	0.211	0.372
sulfurdioxide slant column density window1 [DU]	0.231 ± 0.754	8102297	0.785	0.244	-17.2	26.5	-0.153	0.632
sulfurdioxide slant column density window1 precision [DU]	0.315 ± 0.153	8102297	0.161	0.273	8.401×10^{-2}	21.2	0.211	0.372
sulfurdioxide slant column density corrected win1 [DU]	$(6.625 \pm 74.436) \times 10^{-2}$	8102297	0.769	4.188×10^{-2}	-17.2	26.4	-0.335	0.434
background so2 slant column offset window1 [DU]	-0.164 ± 0.195	8102297	0.209	-0.205	-1.35	3.25	-0.290	-8.112×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.60 ± 9.35	8102297	11.9	2.33	-434	119	-3.52	8.41
sulfurdioxide slant column density window2 precision [DU]	8.26 ± 2.14	8102297	2.59	7.95	2.20	202	6.80	9.40
sulfurdioxide slant column density corrected win2 [DU]	0.173 ± 8.975	8102297	11.4	0.236	-441	112	-5.51	5.92
background so2 slant column offset window2 [DU]	-2.42 ± 3.27	8102297	5.48	-1.32	-20.6	6.51	-5.09	0.383
sulfurdioxide slant column density window3 [DU]	-15.8 ± 24.0	8102297	30.5	-15.7	-202	561	-30.9	-0.440
sulfurdioxide slant column density window3 precision [DU]	27.7 ± 12.2	8102297	8.92	24.6	9.65	202	21.1	30.0
sulfurdioxide slant column density corrected win3 [DU]	-5.30 ± 23.24	8102297	29.5	-5.19	-185	578	-19.9	9.54
background so2 slant column offset window3 [DU]	10.5 ± 7.0	8102297	12.1	10.6	-10.7	34.4	4.14	16.2
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	8102297	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.913 \pm 9.096) \times 10^{-2}$	8102297	3.389×10^{-2}	2.091×10^{-2}	5.491×10^{-4}	1.72	1.153×10^{-2}	4.541×10^{-2}
fitted radiance shift [nm]	$(-2.619 \pm 24.392) \times 10^{-4}$	8102297	1.668×10^{-3}	-2.912×10^{-4}	-3.289×10^{-2}	3.717×10^{-2}	-1.119×10^{-3}	5.487×10^{-4}
fitted radiance squeeze [1]	$(-1.143 \pm 210.889) \times 10^{-6}$	8102297	2.228×10^{-4}	2.608×10^{-6}	-3.458×10^{-3}	1.211×10^{-2}	-1.089×10^{-4}	1.139×10^{-4}
fitted root mean square [1]	$(1.375 \pm 0.640) \times 10^{-3}$	8102297	6.666×10^{-4}	1.184×10^{-3}	3.417×10^{-4}	2.666×10^{-2}	9.536×10^{-4}	1.620×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.711 ± 0.409	8102297	0.517	0.652	5.000×10^{-2}	2.72	0.408	0.926
sulfurdioxide total air mass factor polluted precision [1]	0.105 ± 0.141	8102297	9.629×10^{-2}	5.016×10^{-2}	2.684×10^{-3}	1.85	2.856×10^{-2}	0.125
sulfurdioxide clear air mass factor polluted [1]	0.604 ± 0.275	8102297	0.410	0.572	3.330×10^{-2}	2.17	0.387	0.797
number of spectral points in retrieval [1]	73.5 ± 0.5	8102297	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]	0.651 ± 0.409	9208471	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(1.897 \pm 72.114) \times 10^{-2}$	9208471	0.386	8.866×10^{-3}	-54.9	69.1	-0.182	0.204
sulfurdioxide total vertical column precision [DU]	0.406 ± 0.516	9208471	0.249	0.277	4.319×10^{-2}	28.1	0.195	0.444
sulfurdioxide slant column density corrected [DU]	$(1.343 \pm 30.493) \times 10^{-2}$	9208471	0.334	8.182×10^{-3}	-14.3	28.6	-0.157	0.176
sulfurdioxide slant column density cobra [DU]	$(1.343 \pm 30.479) \times 10^{-2}$	9208471	0.334	8.182×10^{-3}	-14.3	25.3	-0.157	0.176
sulfurdioxide slant column density cobra precision [DU]	0.264 ± 0.106	9208471	0.112	0.233	8.275×10^{-2}	21.2	0.194	0.307
sulfurdioxide slant column density window1 [DU]	0.165 ± 0.604	9208471	0.692	0.182	-70.1	74.4	-0.173	0.520
sulfurdioxide slant column density window1 precision [DU]	0.264 ± 0.106	9208471	0.112	0.233	8.275×10^{-2}	21.2	0.194	0.307
sulfurdioxide slant column density corrected win1 [DU]	$(2.652 \pm 58.585) \times 10^{-2}$	9208471	0.667	1.535×10^{-2}	-70.1	74.4	-0.315	0.352
background so2 slant column offset window1 [DU]	-0.139 ± 0.172	9208471	0.214	-0.169	-1.20	8.91	-0.265	-5.082×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.40 ± 8.72	9208471	11.0	1.30	-1.621×10^3	2.051×10^3	-4.13	6.83
sulfurdioxide slant column density window2 precision [DU]	7.84 ± 2.17	9208471	2.36	7.54	1.99	501	6.49	8.85
sulfurdioxide slant column density corrected win2 [DU]	0.628 ± 8.558	9208471	10.8	0.636	-1.621×10^3	2.052×10^3	-4.75	6.01
background so2 slant column offset window2 [DU]	-0.776 ± 1.809	9208471	2.33	-0.224	-8.53	6.15	-1.81	0.518
sulfurdioxide slant column density window3 [DU]	-10.2 ± 24.0	9208471	30.4	-10.6	-1.519×10^3	465	-25.5	4.94
sulfurdioxide slant column density window3 precision [DU]	27.1 ± 12.7	9208471	8.95	23.8	9.49	303	20.2	29.2
sulfurdioxide slant column density corrected win3 [DU]	-5.38 ± 23.13	9208471	29.2	-5.50	-1.511×10^3	466	-19.9	9.29
background so2 slant column offset window3 [DU]	4.84 ± 6.82	9208471	11.7	3.72	-17.0	27.0	-1.03	10.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	9208471	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.057 \pm 2.546) \times 10^{-2}$	9208471	1.364×10^{-2}	1.586×10^{-2}	7.268×10^{-4}	1.46	1.066×10^{-2}	2.430×10^{-2}
fitted radiance shift [nm]	$(-6.133 \pm 24.791) \times 10^{-4}$	9208471	1.780×10^{-3}	-5.960×10^{-4}	-3.987×10^{-2}	4.735×10^{-2}	-1.558×10^{-3}	2.227×10^{-4}
fitted radiance squeeze [1]	$(-3.598 \pm 16.002) \times 10^{-5}$	9208471	1.903×10^{-4}	-2.893×10^{-5}	-1.600×10^{-2}	1.363×10^{-2}	-1.269×10^{-4}	6.334×10^{-5}
fitted root mean square [1]	$(1.170 \pm 0.432) \times 10^{-3}$	9208471	4.643×10^{-4}	1.052×10^{-3}	3.403×10^{-4}	6.469×10^{-2}	8.875×10^{-4}	1.352×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.934 ± 0.469	9208471	0.575	0.845	5.000×10^{-2}	2.92	0.608	1.18
sulfurdioxide total air mass factor polluted precision [1]	0.128 ± 0.118	9208471	0.140	8.377×10^{-2}	4.874×10^{-3}	1.65	4.156×10^{-2}	0.182
sulfurdioxide clear air mass factor polluted [1]	0.800 ± 0.378	9208471	0.356	0.731	0.122	2.94	0.564	0.920
number of spectral points in retrieval [1]	73.4 ± 0.5	9208471	1.000	73.0	70.0	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]	0.687 ± 0.399	12506836	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	$(2.744 \pm 101.163) \times 10^{-2}$	12506836	0.430	9.452×10^{-3}	-99.6	106	-0.203	0.227
sulfurdioxide total vertical column precision [DU]	0.508 ± 0.745	12506836	0.312	0.302	4.822×10^{-2}	34.7	0.212	0.523
sulfurdioxide slant column density corrected [DU]	$(1.547 \pm 33.442) \times 10^{-2}$	12506836	0.342	8.057×10^{-3}	-17.9	52.0	-0.161	0.181
sulfurdioxide slant column density cobra [DU]	$(1.537 \pm 32.932) \times 10^{-2}$	12506836	0.342	8.057×10^{-3}	-17.9	23.8	-0.161	0.181
sulfurdioxide slant column density cobra precision [DU]	0.276 ± 0.125	12506836	0.125	0.236	8.275×10^{-2}	17.4	0.196	0.321
sulfurdioxide slant column density window1 [DU]	0.187 ± 0.645	12506836	0.705	0.202	-70.1	74.4	-0.157	0.548
sulfurdioxide slant column density window1 precision [DU]	0.276 ± 0.125	12506836	0.125	0.236	8.275×10^{-2}	17.4	0.196	0.321
sulfurdioxide slant column density corrected win1 [DU]	$(3.406 \pm 63.131) \times 10^{-2}$	12506836	0.684	1.988×10^{-2}	-70.1	74.4	-0.319	0.366
background so2 slant column offset window1 [DU]	-0.153 ± 0.176	12506836	0.209	-0.184	-1.35	8.91	-0.276	-6.766×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.63 ± 8.82	12506836	11.1	1.45	-1.621×10^3	717	-4.04	7.09
sulfurdioxide slant column density window2 precision [DU]	7.89 ± 2.09	12506836	2.40	7.59	2.06	469	6.53	8.92
sulfurdioxide slant column density corrected win2 [DU]	0.477 ± 8.578	12506836	10.9	0.497	-1.621×10^3	718	-4.95	5.93
background so2 slant column offset window2 [DU]	-1.15 ± 2.35	12506836	2.81	-0.388	-20.6	6.51	-2.30	0.502
sulfurdioxide slant column density window3 [DU]	-9.99 ± 23.88	12506836	30.4	-10.3	-1.519×10^3	465	-25.2	5.22
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 11.9	12506836	8.63	23.8	9.65	219	20.4	29.1
sulfurdioxide slant column density corrected win3 [DU]	-3.29 ± 22.71	12506836	29.0	-3.55	-1.511×10^3	466	-17.8	11.2
background so2 slant column offset window3 [DU]	6.69 ± 7.00	12506836	11.0	6.04	-17.0	34.3	1.19	12.2
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.16	12506836	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.470 \pm 3.882) \times 10^{-2}$	12506836	1.471×10^{-2}	1.694×10^{-2}	5.491×10^{-4}	1.63	1.132×10^{-2}	2.603×10^{-2}
fitted radiance shift [nm]	$(-4.428 \pm 23.545) \times 10^{-4}$	12506836	1.739×10^{-3}	-4.218×10^{-4}	-3.987×10^{-2}	4.735×10^{-2}	-1.352×10^{-3}	3.873×10^{-4}
fitted radiance squeeze [1]	$(-2.593 \pm 17.344) \times 10^{-5}$	12506836	1.947×10^{-4}	-1.888×10^{-5}	-1.600×10^{-2}	1.363×10^{-2}	-1.187×10^{-4}	7.602×10^{-5}
fitted root mean square [1]	$(1.214 \pm 0.520) \times 10^{-3}$	12506836	4.973×10^{-4}	1.059×10^{-3}	3.403×10^{-4}	6.469×10^{-2}	8.927×10^{-4}	1.390×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.842 ± 0.412	12506836	0.507	0.793	5.000×10^{-2}	2.52	0.556	1.06
sulfurdioxide total air mass factor polluted precision [1]	0.111 ± 0.108	12506836	0.114	6.634×10^{-2}	3.091×10^{-3}	1.44	3.882×10^{-2}	0.153
sulfurdioxide clear air mass factor polluted [1]	0.720 ± 0.273	12506836	0.353	0.701	3.330×10^{-2}	2.57	0.524	0.877
number of spectral points in retrieval [1]	73.4 ± 0.5	12506836	1.000	73.0	70.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.604 ± 0.417	3729149	0.830	1.000	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(5.083 \pm 152.829) \times 10^{-2}$	3729149	0.534	1.361×10^{-2}	-89.3	118	-0.246	0.289
sulfurdioxide total vertical column precision [DU]	0.721 ± 1.124	3729149	0.525	0.393	4.319×10^{-2}	37.5	0.234	0.759
sulfurdioxide slant column density corrected [DU]	$(2.290 \pm 38.102) \times 10^{-2}$	3729149	0.385	1.156×10^{-2}	-13.5	46.0	-0.179	0.207
sulfurdioxide slant column density cobra [DU]	$(2.283 \pm 37.750) \times 10^{-2}$	3729149	0.385	1.156×10^{-2}	-13.5	25.3	-0.179	0.207
sulfurdioxide slant column density cobra precision [DU]	0.306 ± 0.133	3729149	0.137	0.274	8.329×10^{-2}	21.2	0.218	0.355
sulfurdioxide slant column density window1 [DU]	0.225 ± 0.718	3729149	0.792	0.234	-34.4	54.5	-0.167	0.625
sulfurdioxide slant column density window1 precision [DU]	0.306 ± 0.133	3729149	0.137	0.274	8.329×10^{-2}	21.2	0.218	0.355
sulfurdioxide slant column density corrected win1 [DU]	$(6.870 \pm 70.211) \times 10^{-2}$	3729149	0.766	4.517×10^{-2}	-34.4	54.7	-0.330	0.436
background so2 slant column offset window1 [DU]	-0.156 ± 0.190	3729149	0.211	-0.198	-0.980	8.57	-0.285	-7.420×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.48 ± 9.35	3729149	11.9	2.34	-497	779	-3.56	8.38
sulfurdioxide slant column density window2 precision [DU]	8.35 ± 2.31	3729149	2.58	8.05	1.99	434	6.89	9.47
sulfurdioxide slant column density corrected win2 [DU]	0.338 ± 9.082	3729149	11.5	0.418	-497	780	-5.37	6.13
background so2 slant column offset window2 [DU]	-2.14 ± 3.11	3729149	5.05	-0.948	-20.5	4.19	-4.61	0.438
sulfurdioxide slant column density window3 [DU]	-20.2 ± 23.3	3729149	29.4	-19.8	-662	561	-34.7	-5.36
sulfurdioxide slant column density window3 precision [DU]	28.8 ± 14.0	3729149	9.61	25.3	9.49	220	21.2	30.8
sulfurdioxide slant column density corrected win3 [DU]	-11.6 ± 23.6	3729149	29.7	-11.0	-664	578	-26.1	3.59
background so2 slant column offset window3 [DU]	8.67 ± 8.06	3729149	13.8	8.87	-17.0	34.4	1.73	15.6
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.29	3729149	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.737 \pm 10.209) \times 10^{-2}$	3729149	4.549×10^{-2}	2.409×10^{-2}	5.564×10^{-4}	1.72	9.724×10^{-3}	5.521×10^{-2}
fitted radiance shift [nm]	$(-4.740 \pm 27.899) \times 10^{-4}$	3729149	1.698×10^{-3}	-5.420×10^{-4}	-3.520×10^{-2}	3.834×10^{-2}	-1.371×10^{-3}	3.273×10^{-4}
fitted radiance squeeze [1]	$(2.315 \pm 199.826) \times 10^{-6}$	3729149	2.249×10^{-4}	-1.286×10^{-6}	-1.139×10^{-2}	1.256×10^{-2}	-1.120×10^{-4}	1.129×10^{-4}
fitted root mean square [1]	$(1.345 \pm 0.543) \times 10^{-3}$	3729149	5.795×10^{-4}	1.213×10^{-3}	3.479×10^{-4}	2.659×10^{-2}	9.891×10^{-4}	1.569×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.825 ± 0.567	3729149	0.683	0.648	5.000×10^{-2}	2.92	0.415	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.135 ± 0.175	3729149	0.152	5.526×10^{-2}	2.701×10^{-3}	1.85	2.713×10^{-2}	0.179
sulfurdioxide clear air mass factor polluted [1]	0.710 ± 0.521	3729149	0.431	0.583	5.242×10^{-2}	2.94	0.383	0.814
number of spectral points in retrieval [1]	73.4 ± 0.5	3729149	1.000	73.0	70.0	74.0	73.0	74.0

3 Granule outlines

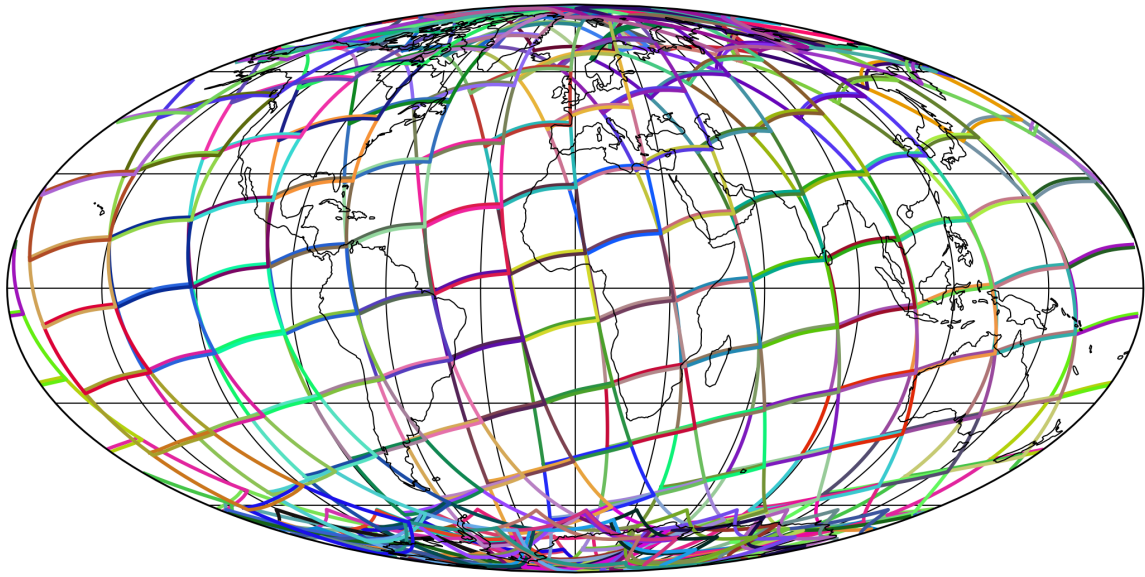


Figure 1: Outline of the granules.

4 Input data monitoring

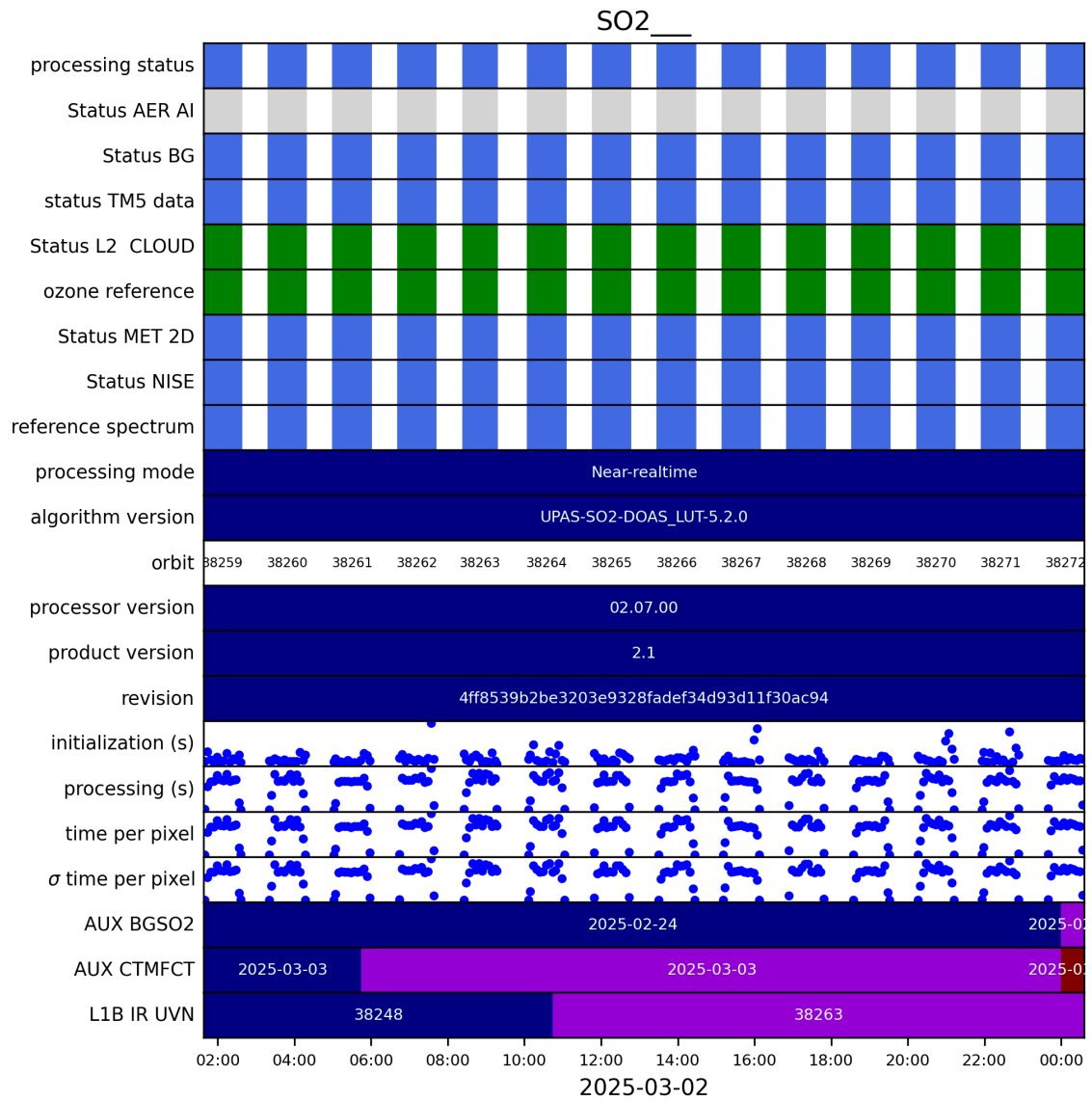


Figure 2: Input data per granule

5 Warnings and errors

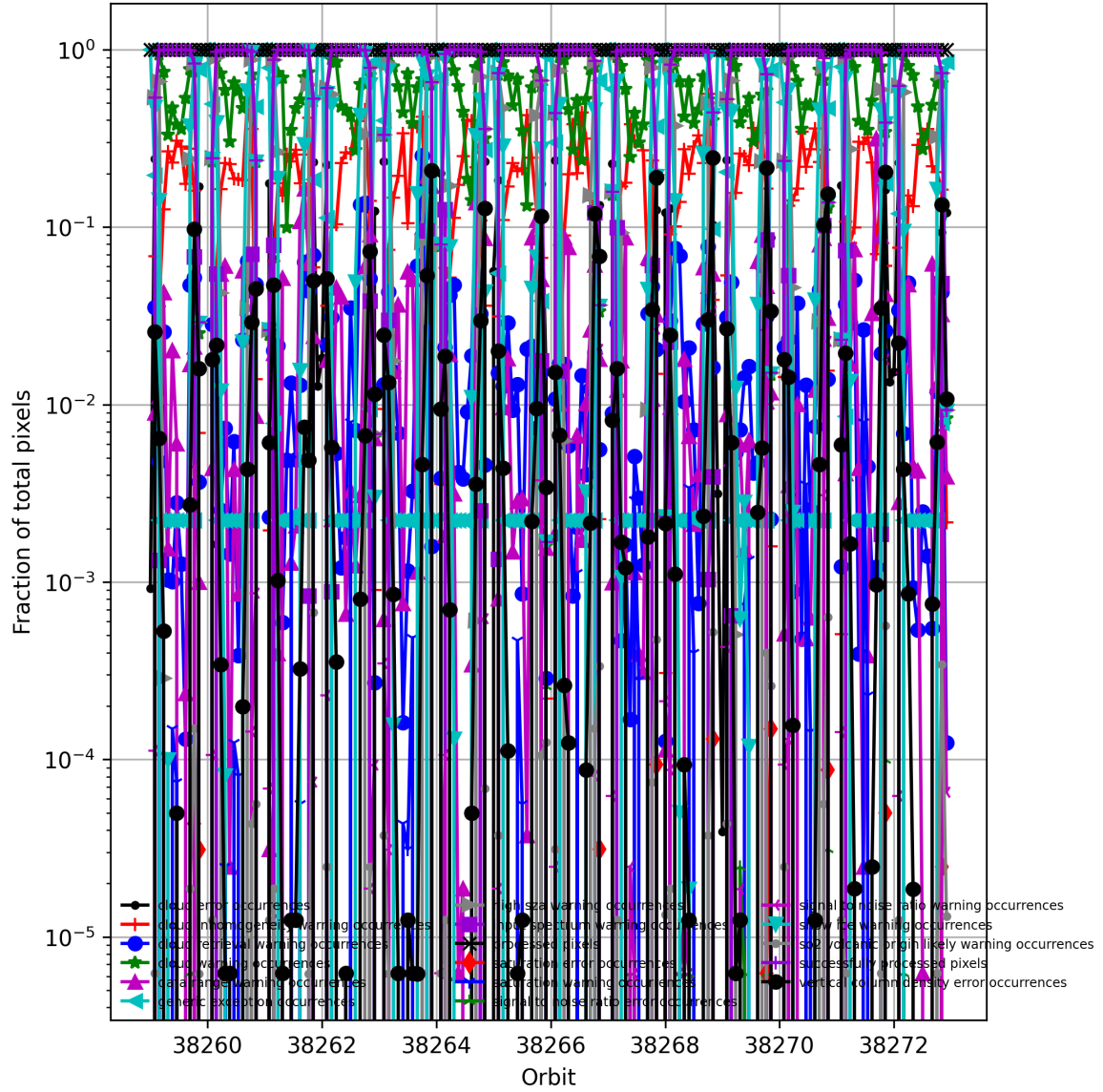


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

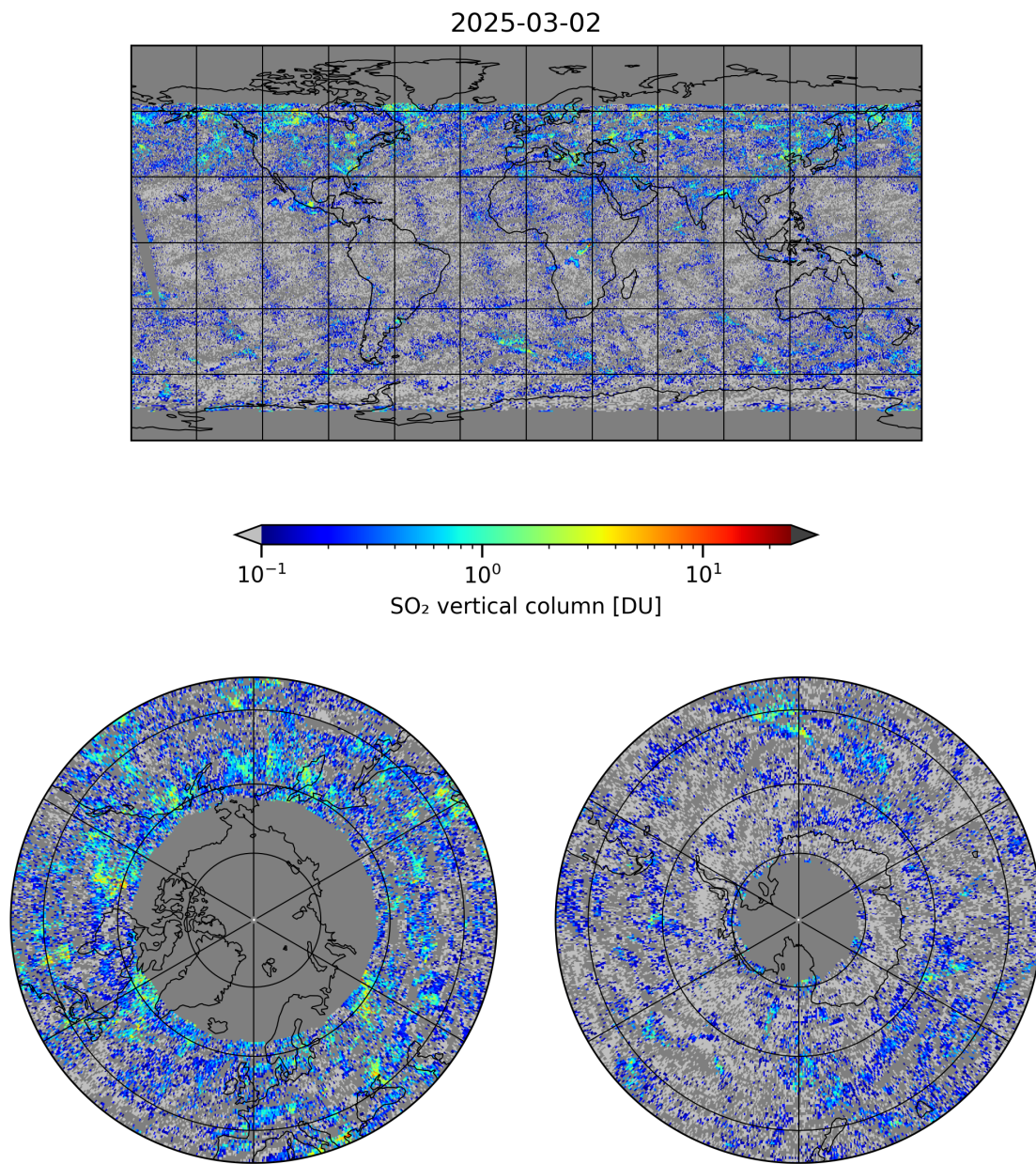


Figure 4: Map of “SO₂ vertical column” for 2025-03-02 to 2025-03-03

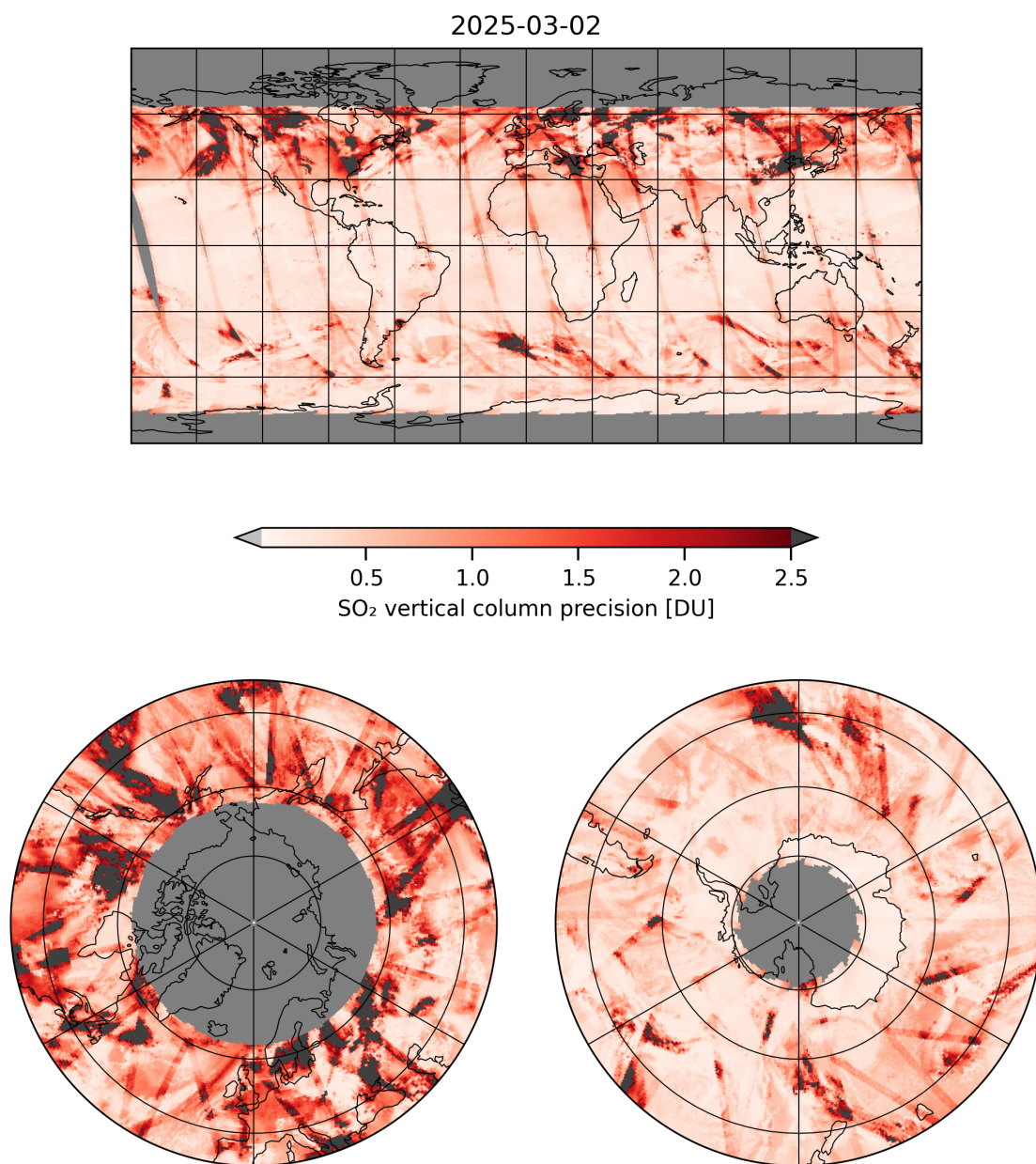


Figure 5: Map of “SO₂ vertical column precision” for 2025-03-02 to 2025-03-03

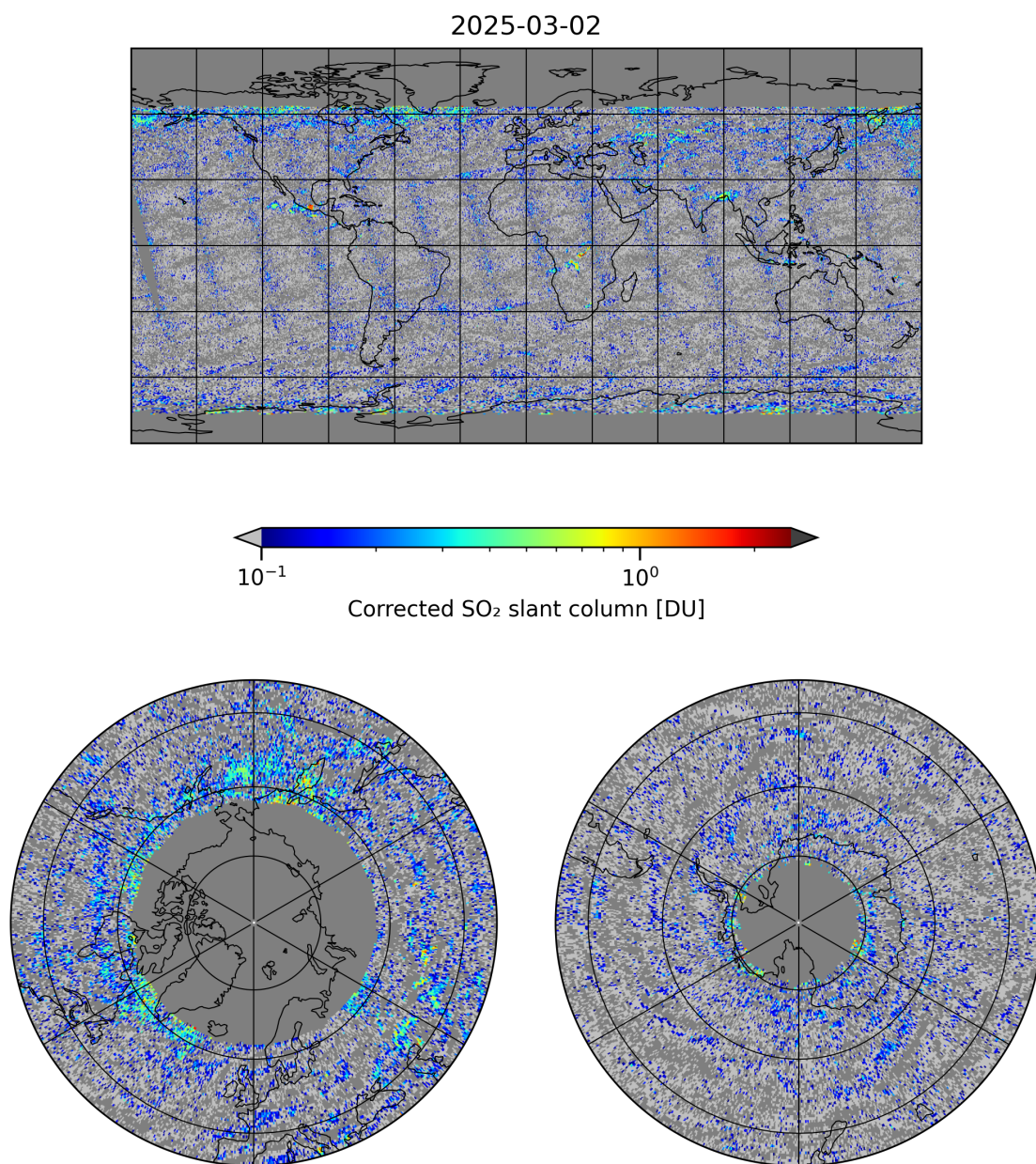


Figure 6: Map of “Corrected SO₂ slant column” for 2025-03-02 to 2025-03-03

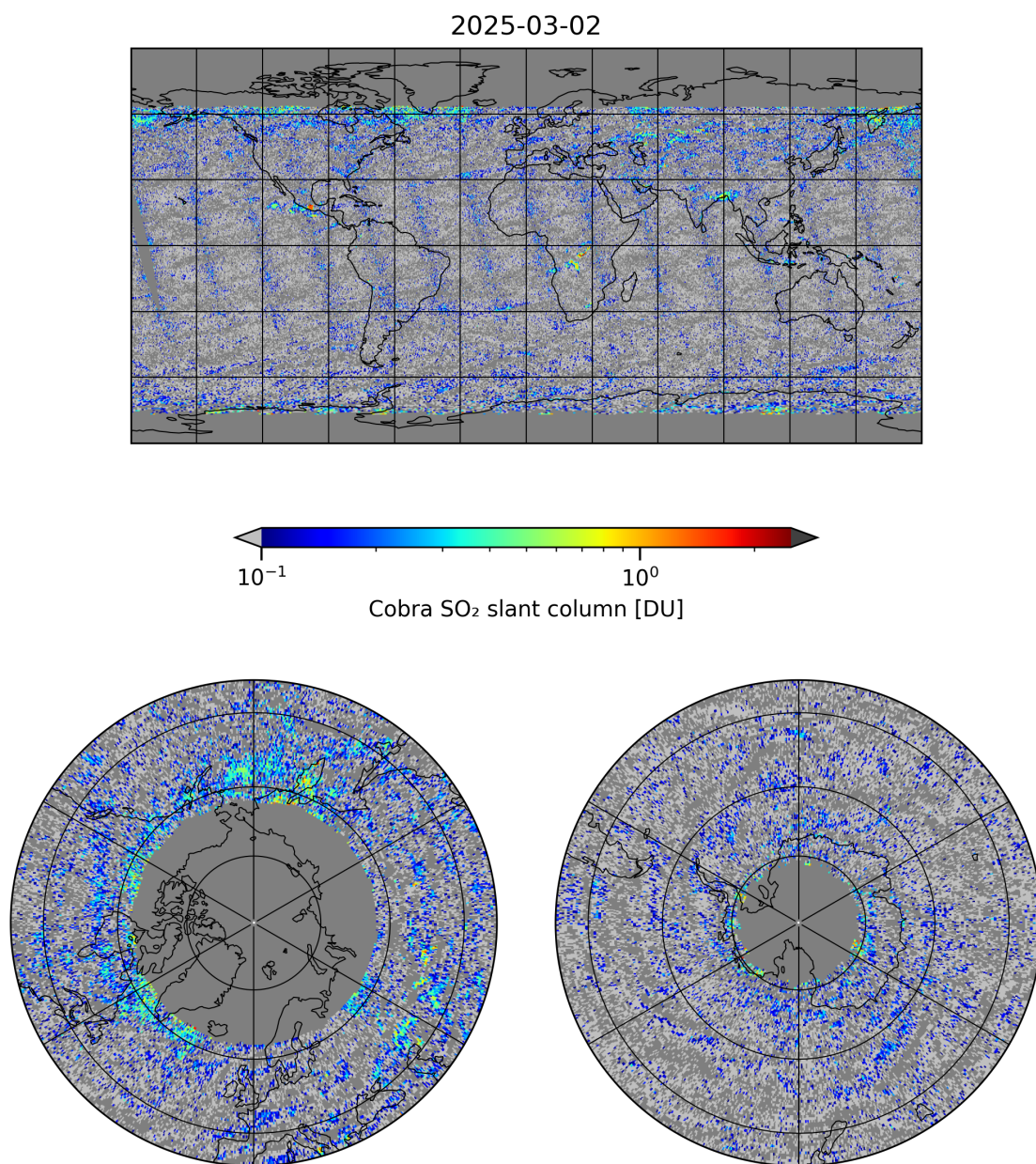


Figure 7: Map of “Cobra SO₂ slant column” for 2025-03-02 to 2025-03-03

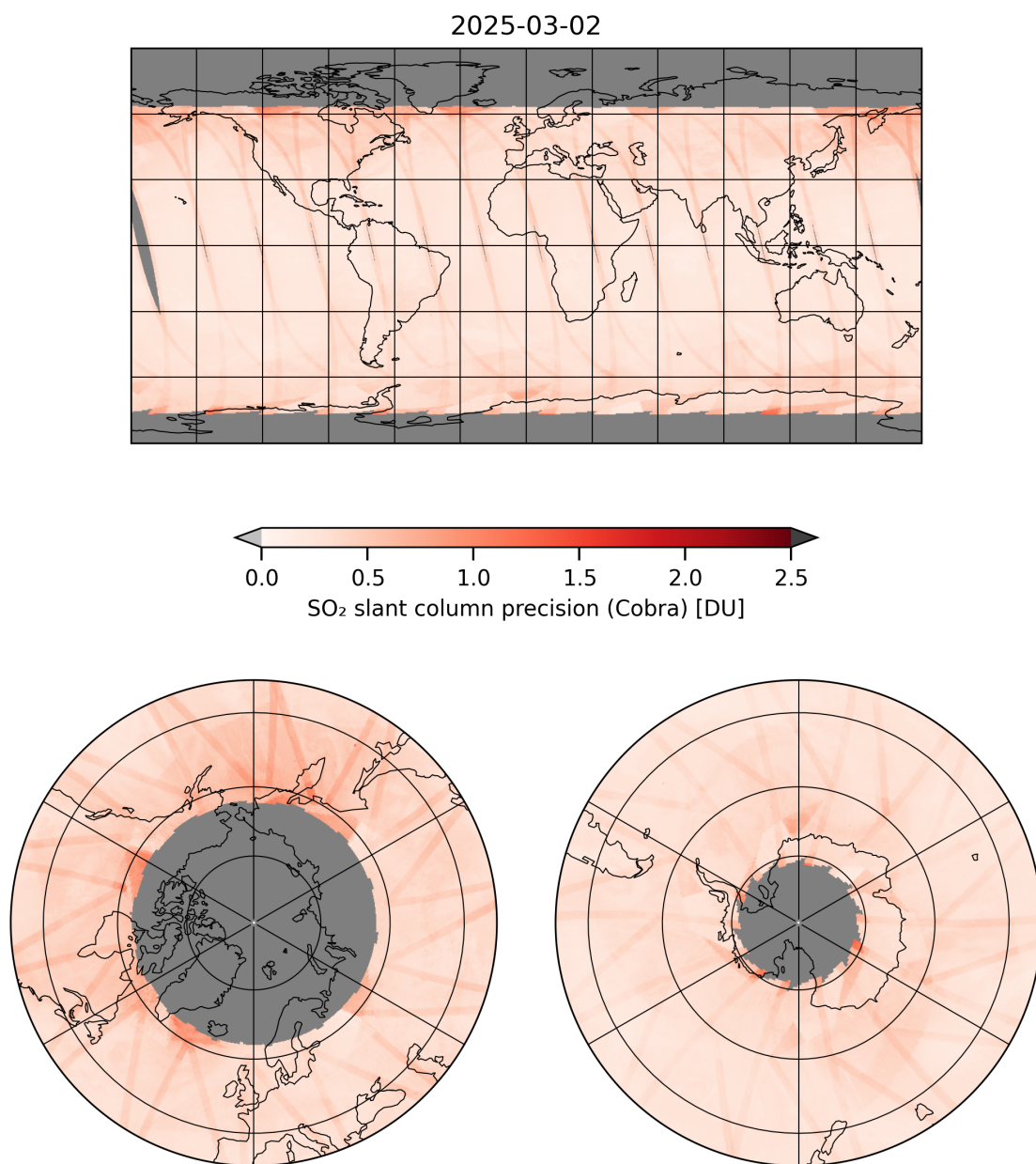


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-03-02 to 2025-03-03

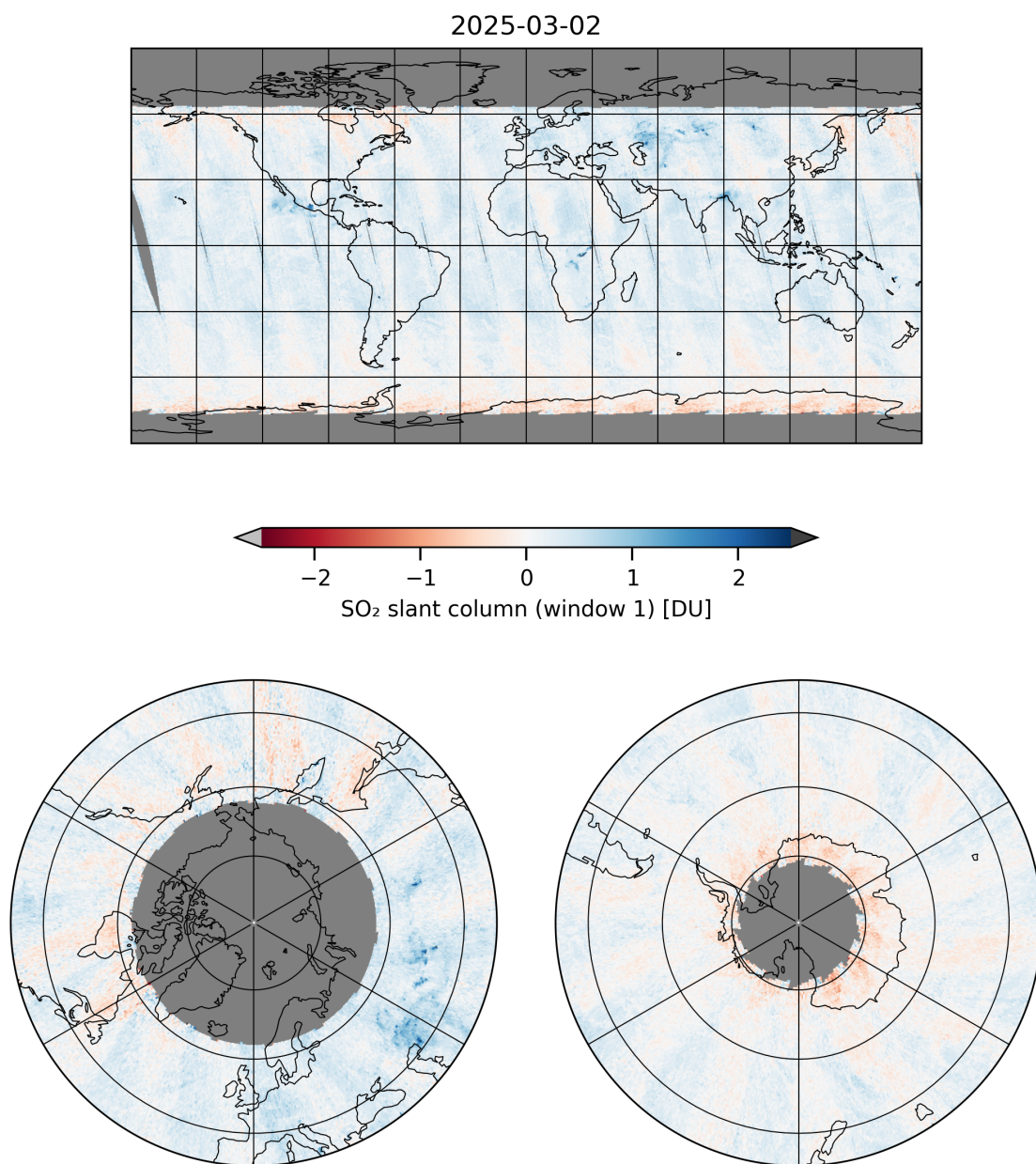


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-03-02 to 2025-03-03

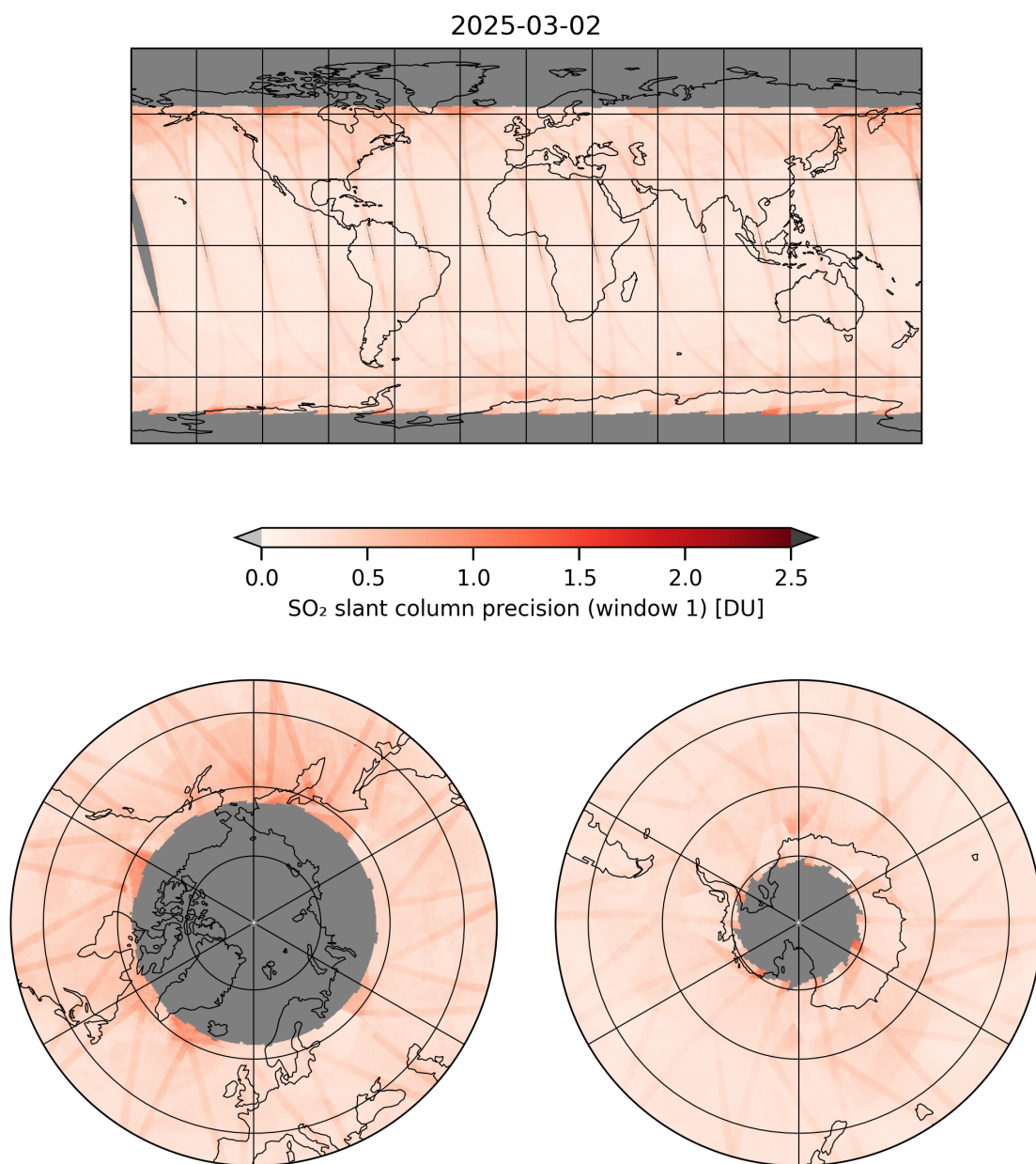


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-03-02 to 2025-03-03

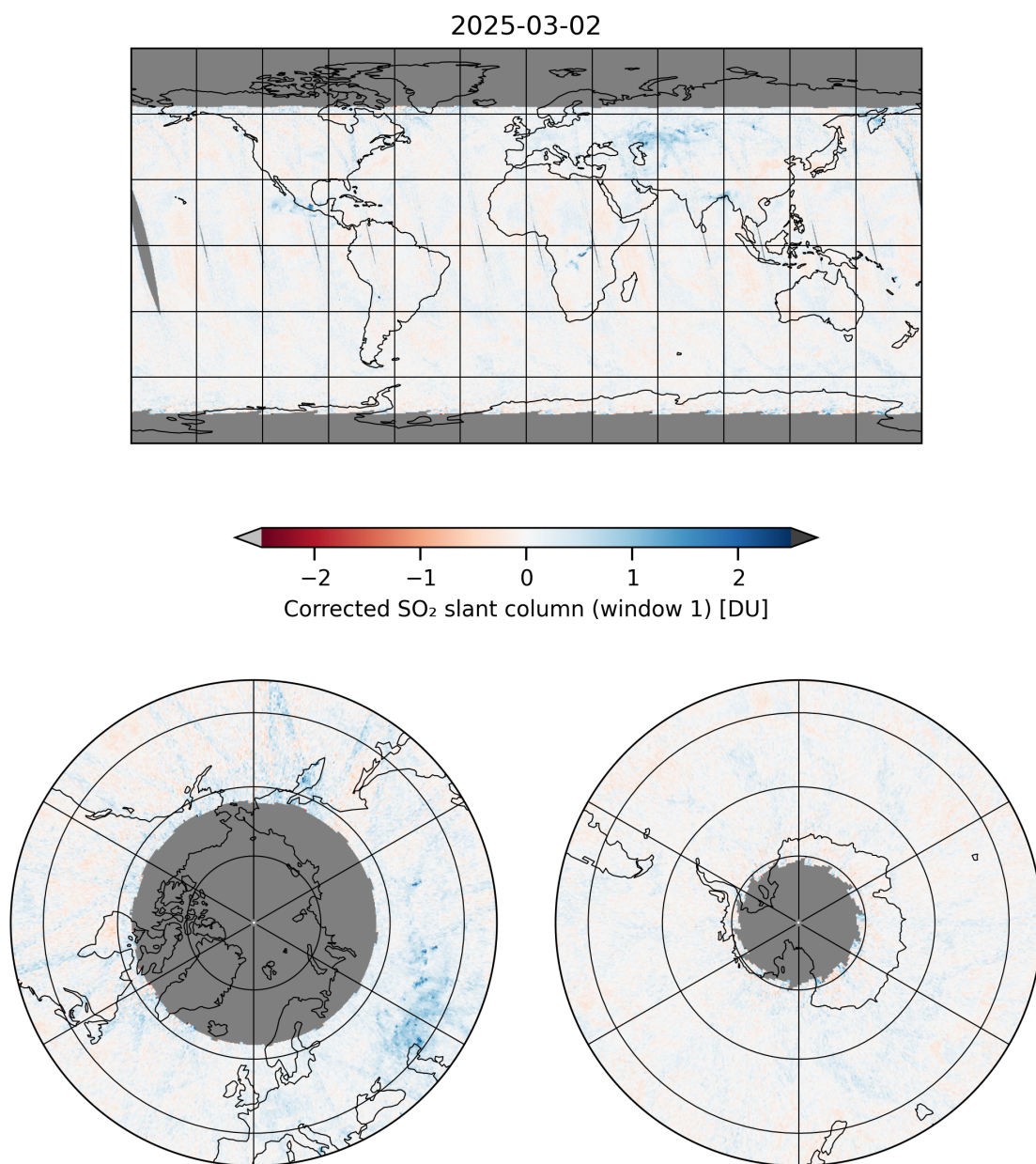


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-03-02 to 2025-03-03

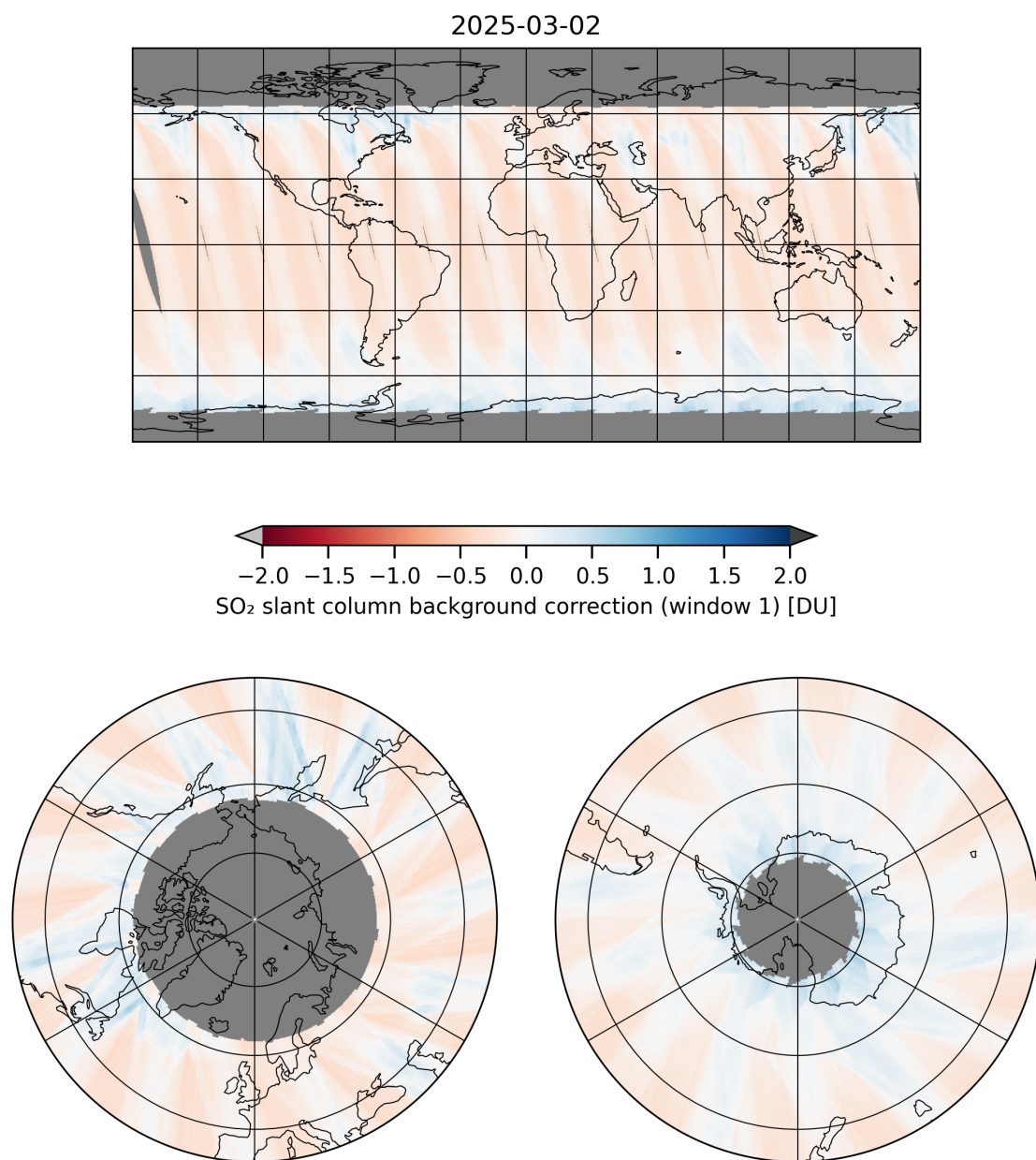


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-03-02 to 2025-03-03

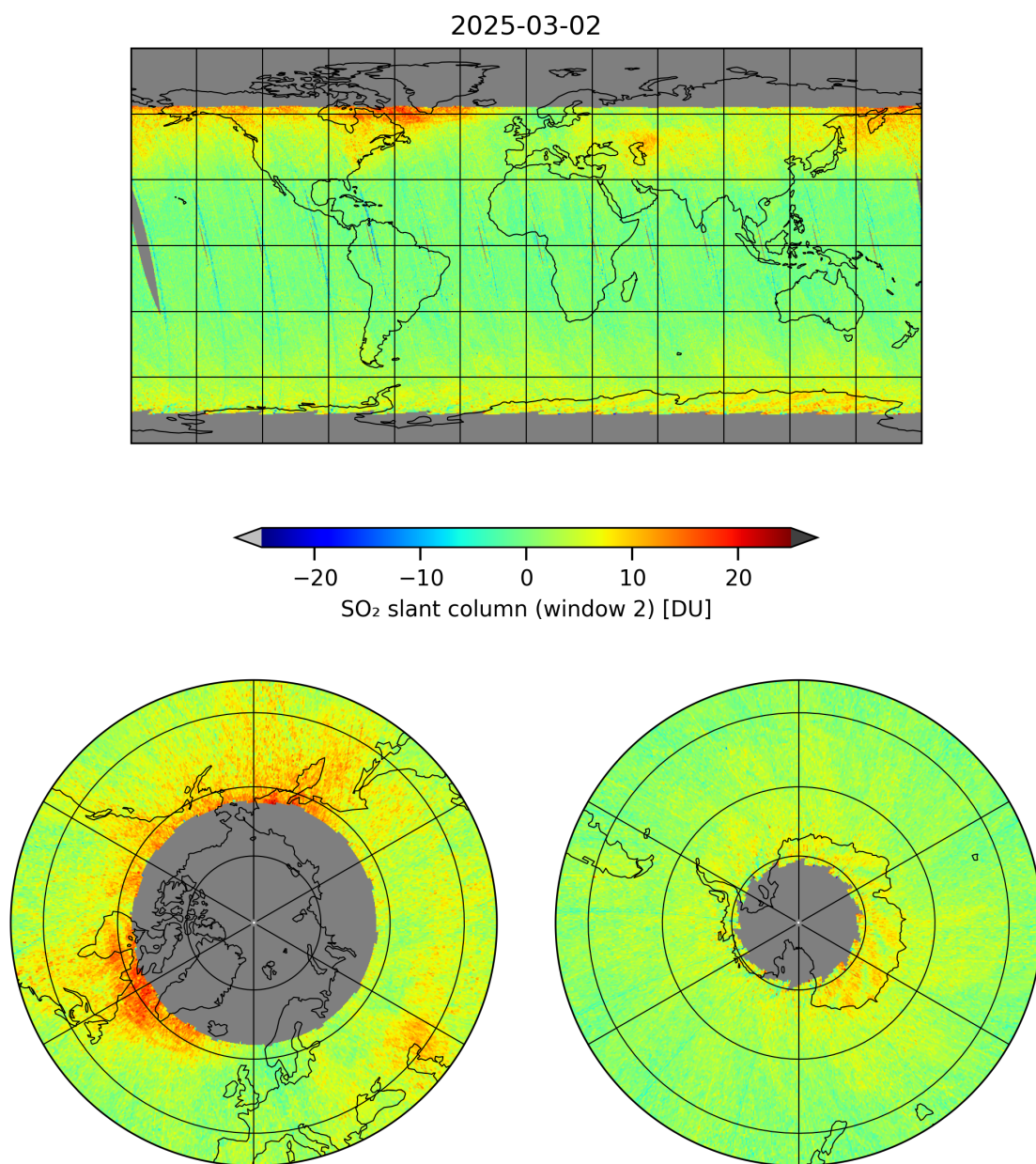


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-03-02 to 2025-03-03

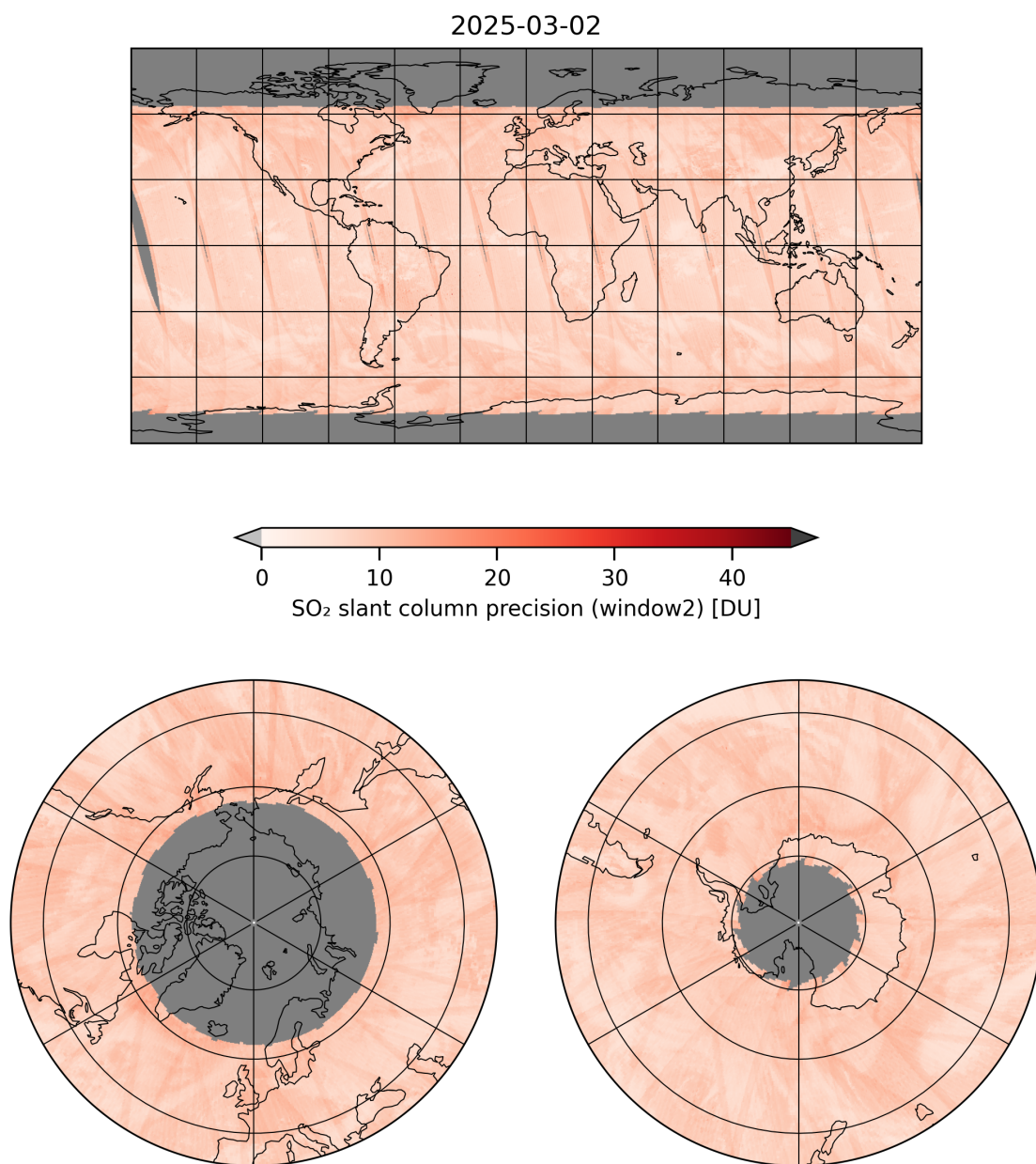


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-03-02 to 2025-03-03

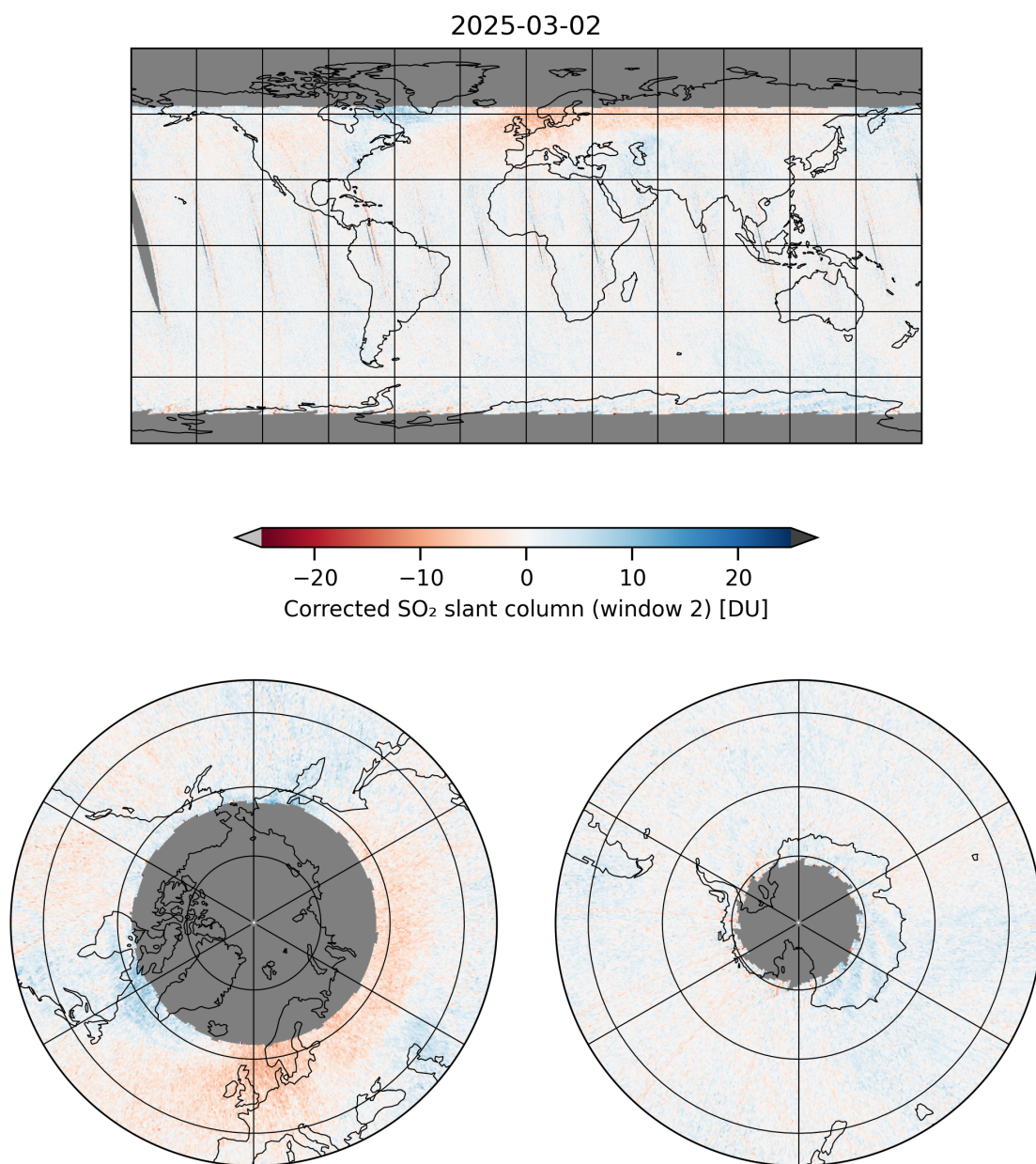


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-03-02 to 2025-03-03

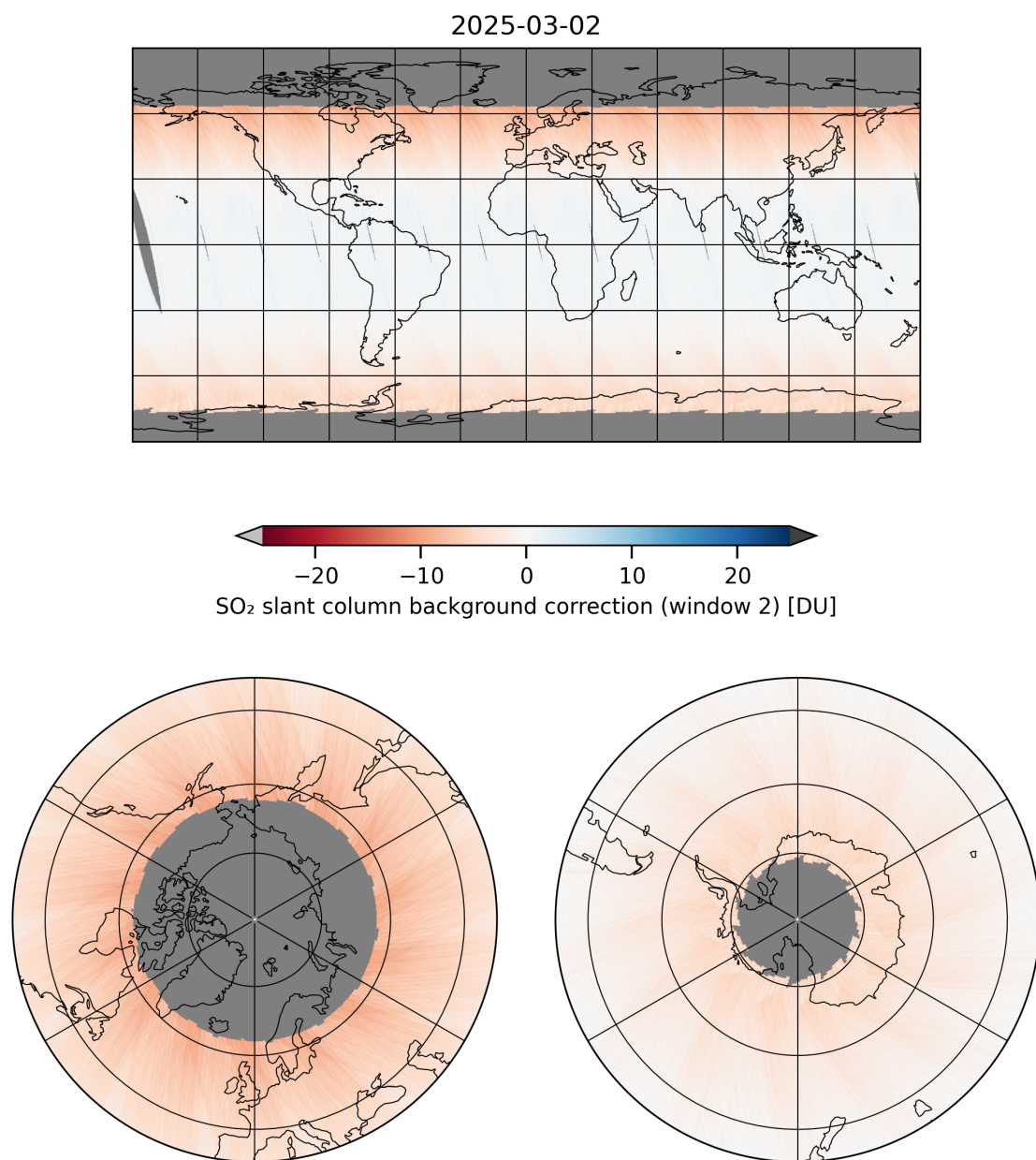


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-03-02 to 2025-03-03

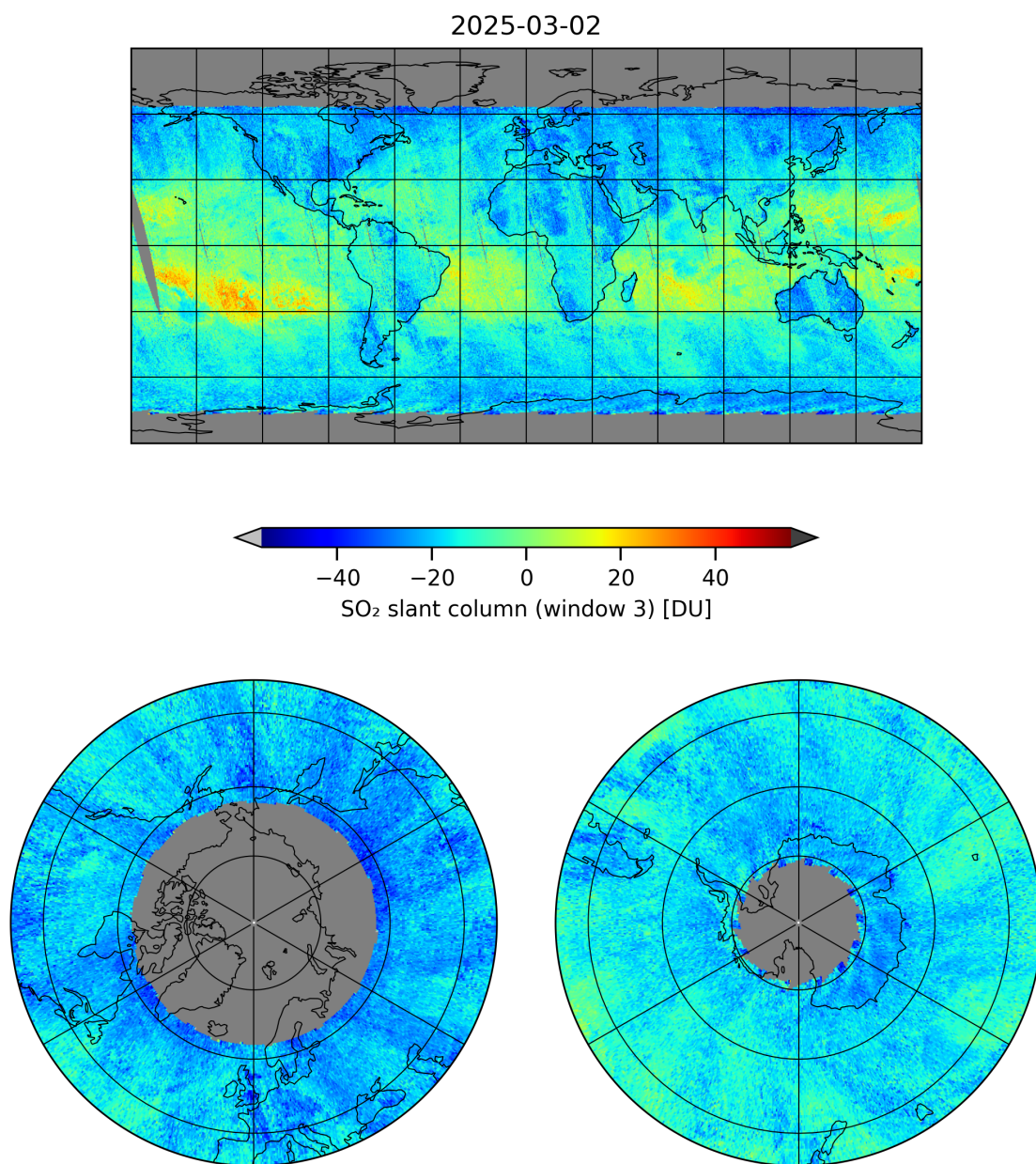


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-03-02 to 2025-03-03

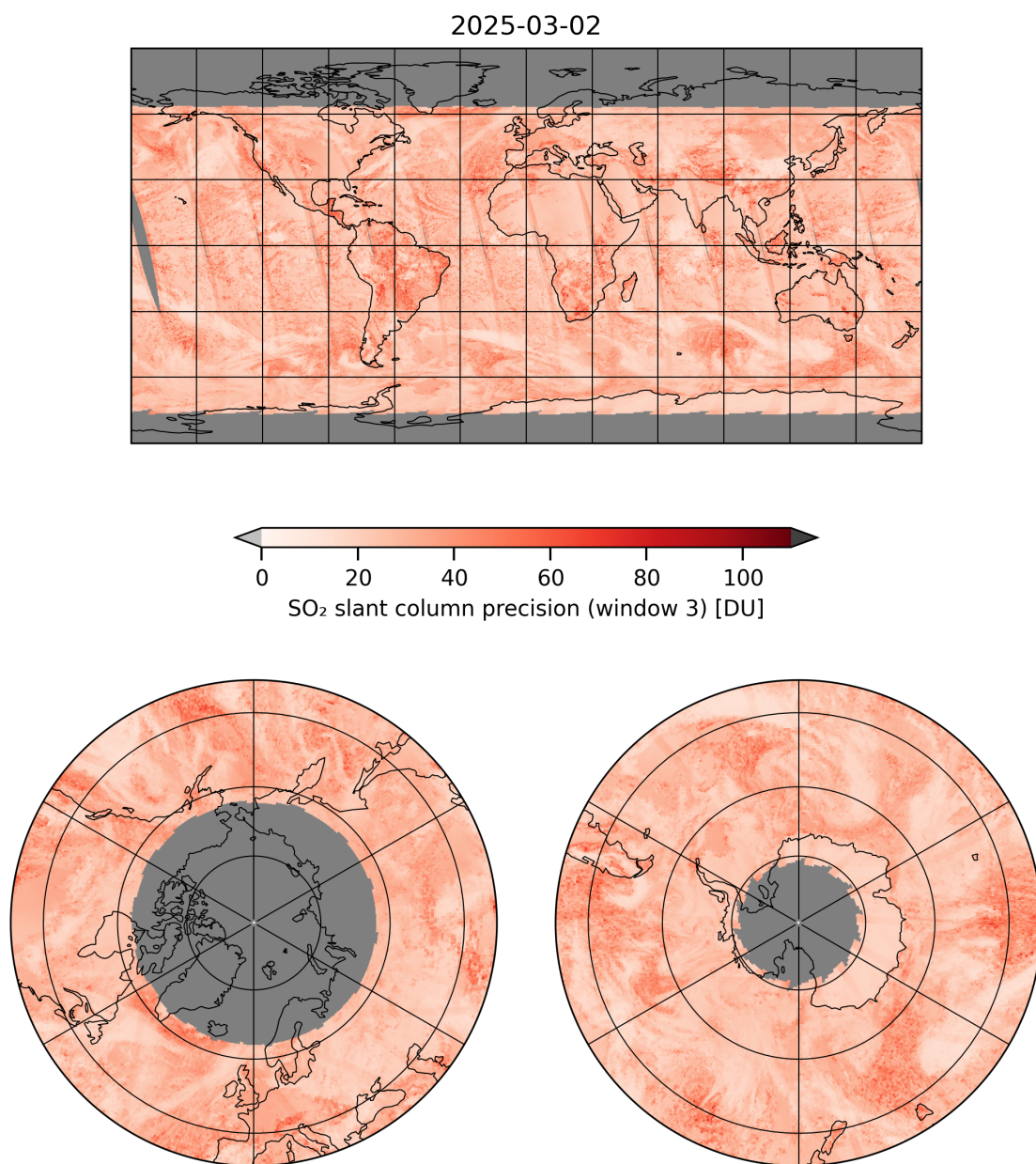


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-03-02 to 2025-03-03

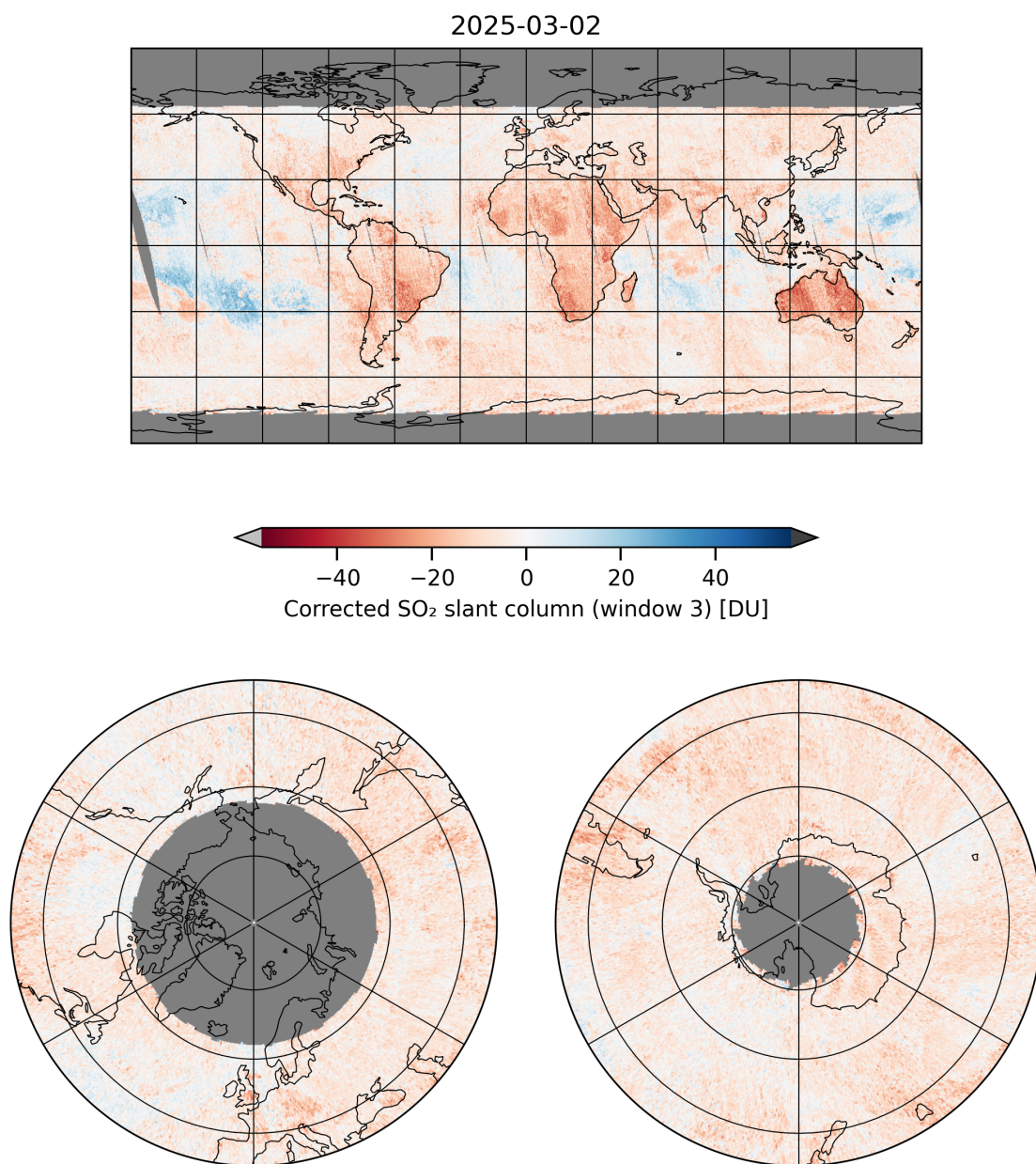


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-03-02 to 2025-03-03

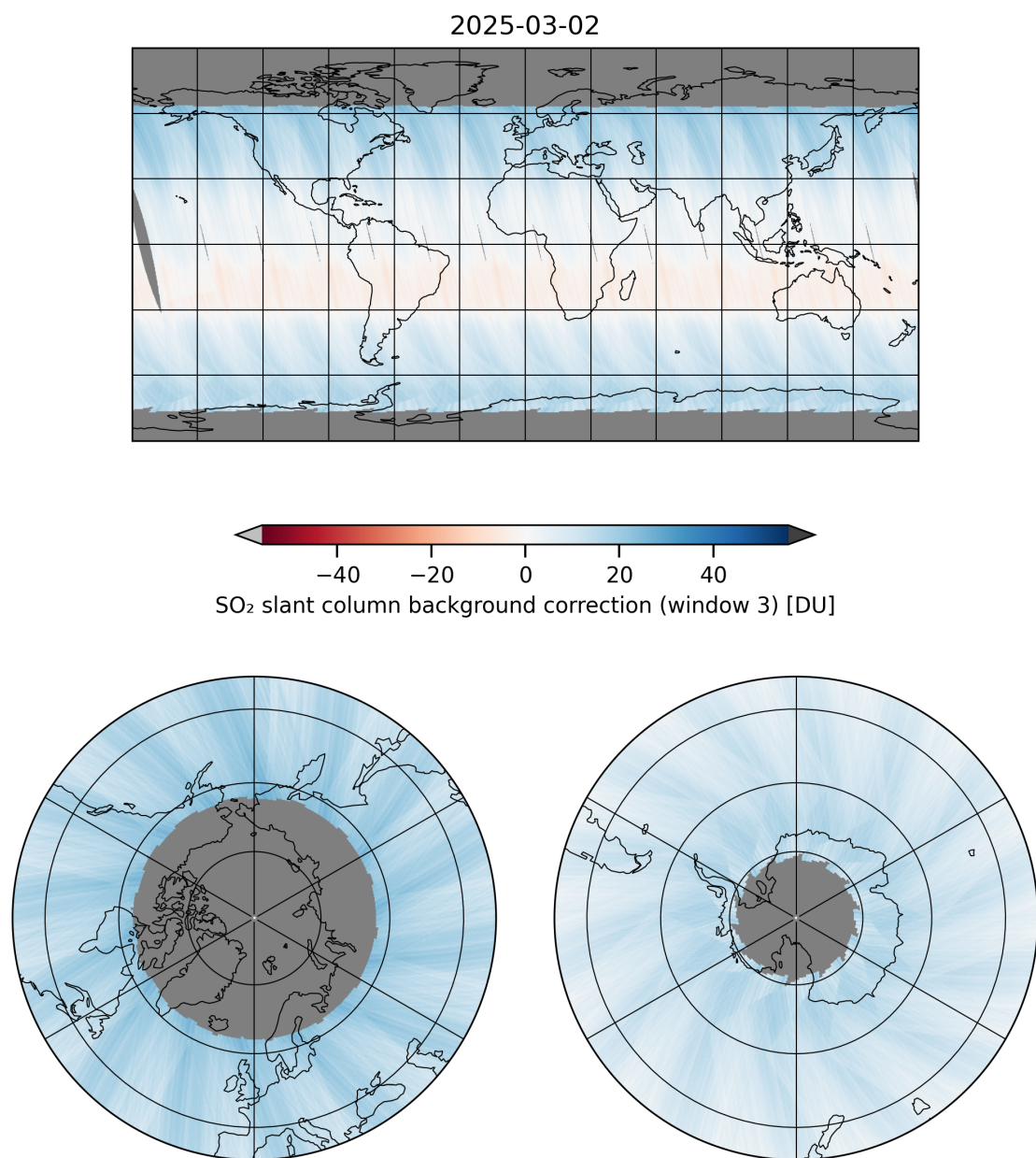


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-03-02 to 2025-03-03

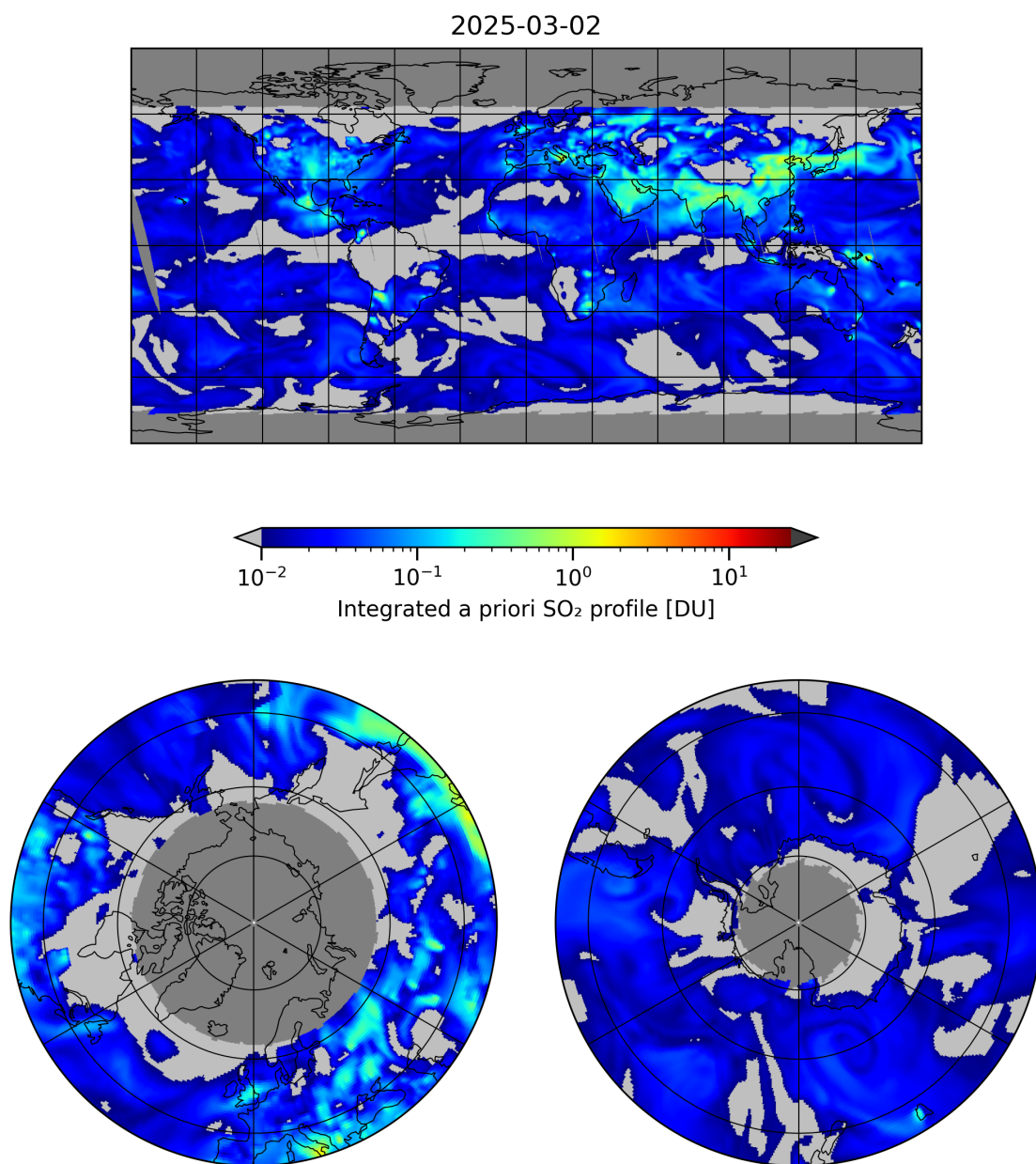


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-03-02 to 2025-03-03

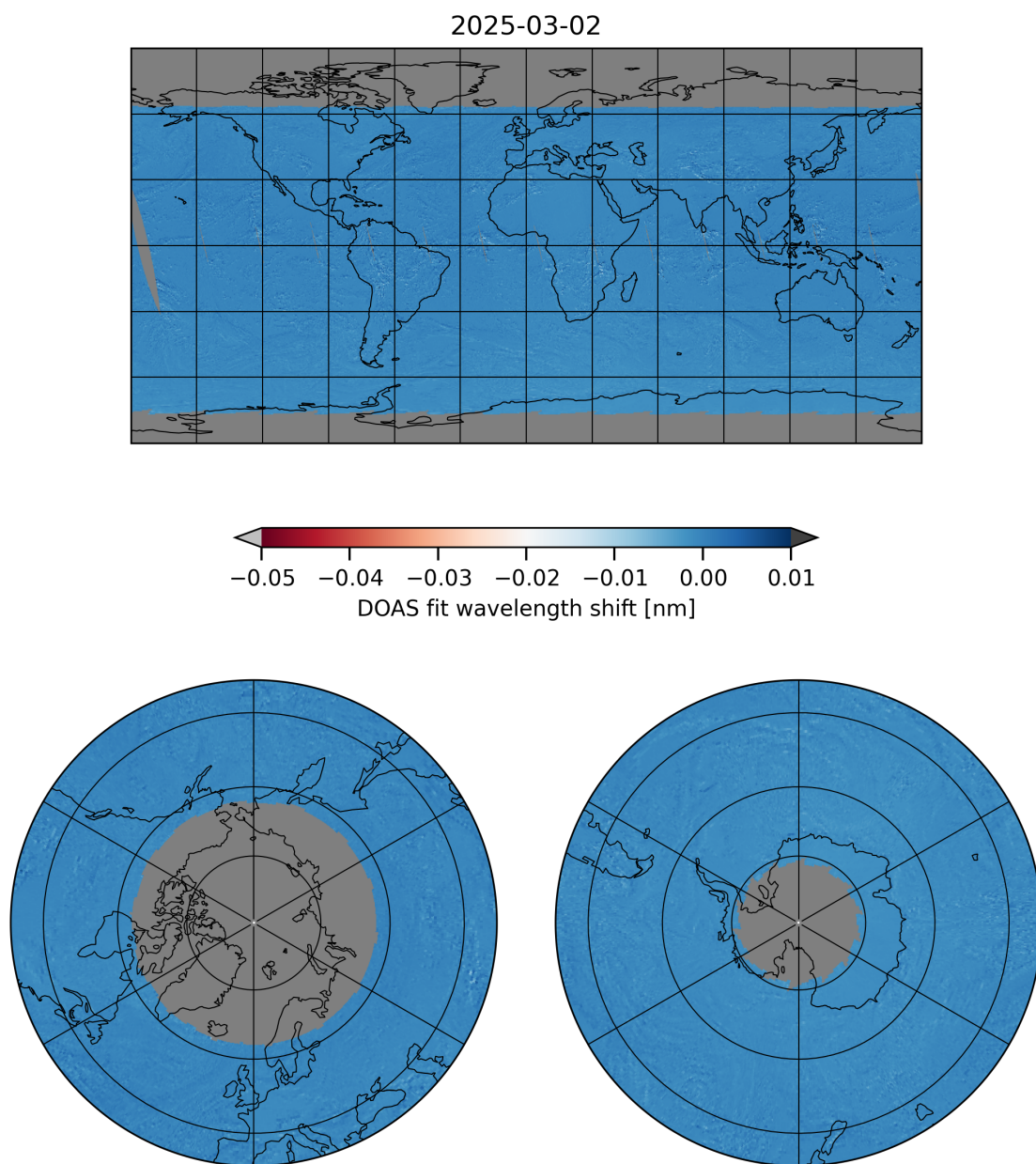


Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-02 to 2025-03-03

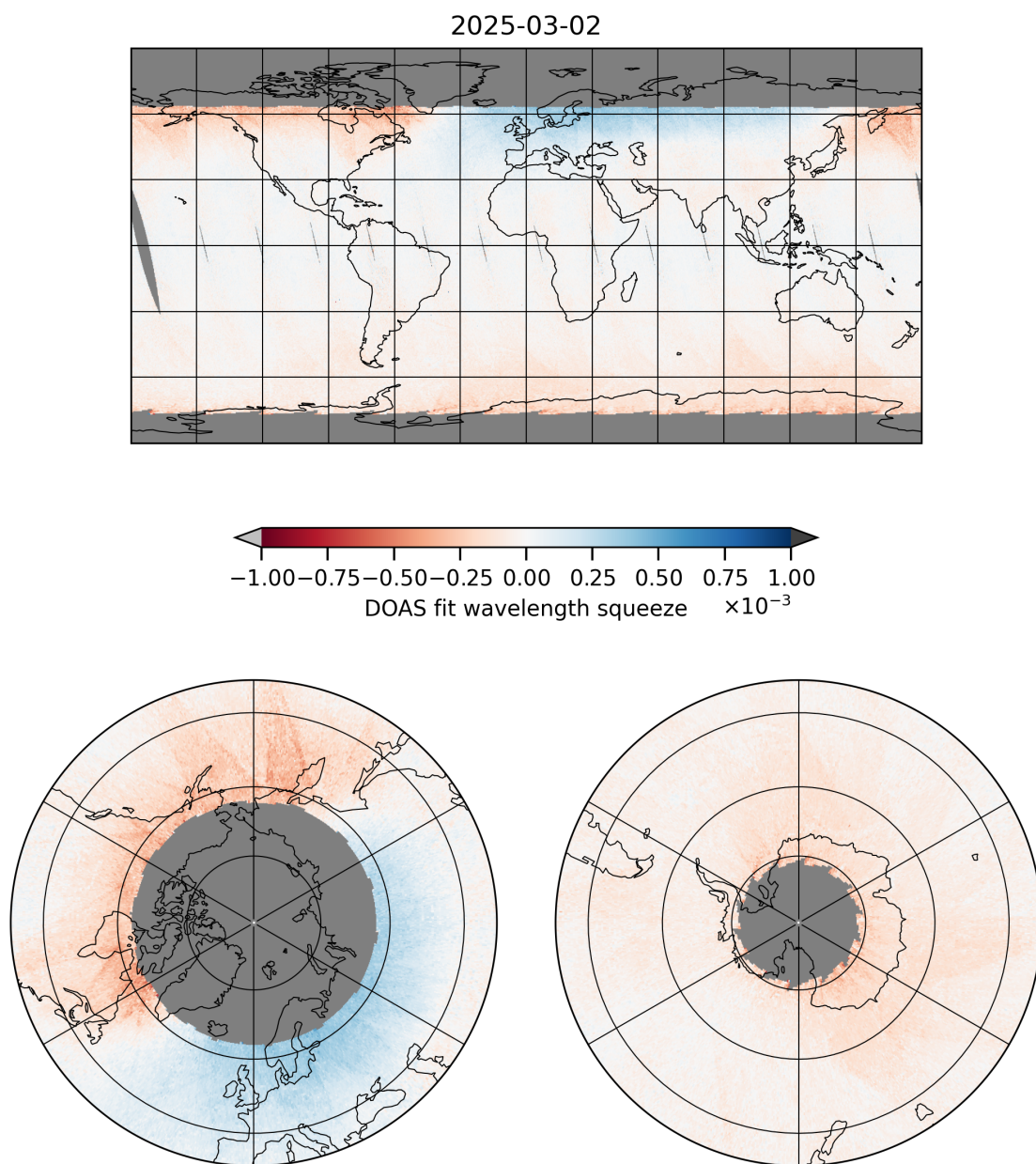


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-02 to 2025-03-03

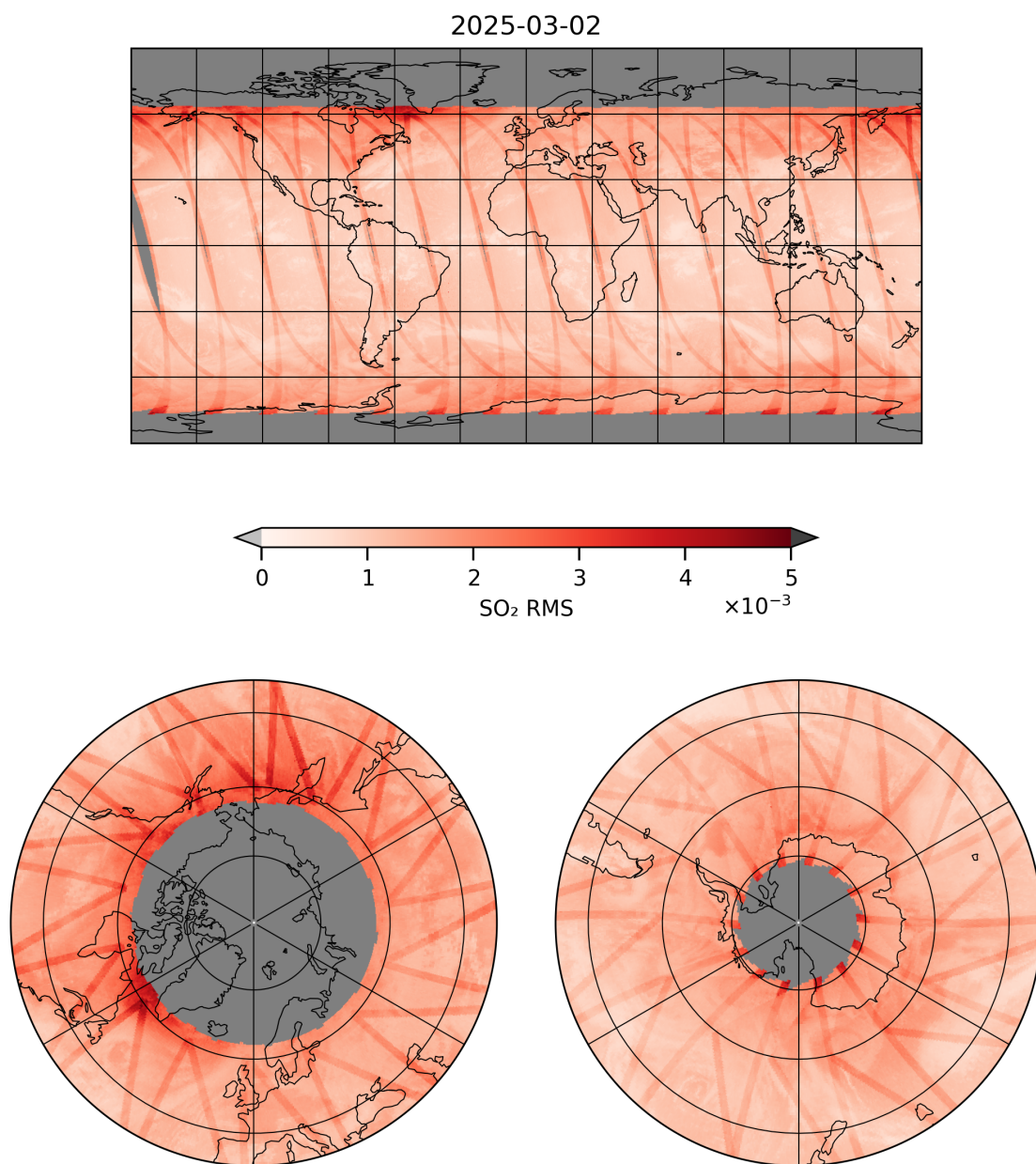


Figure 24: Map of “SO₂ RMS” for 2025-03-02 to 2025-03-03

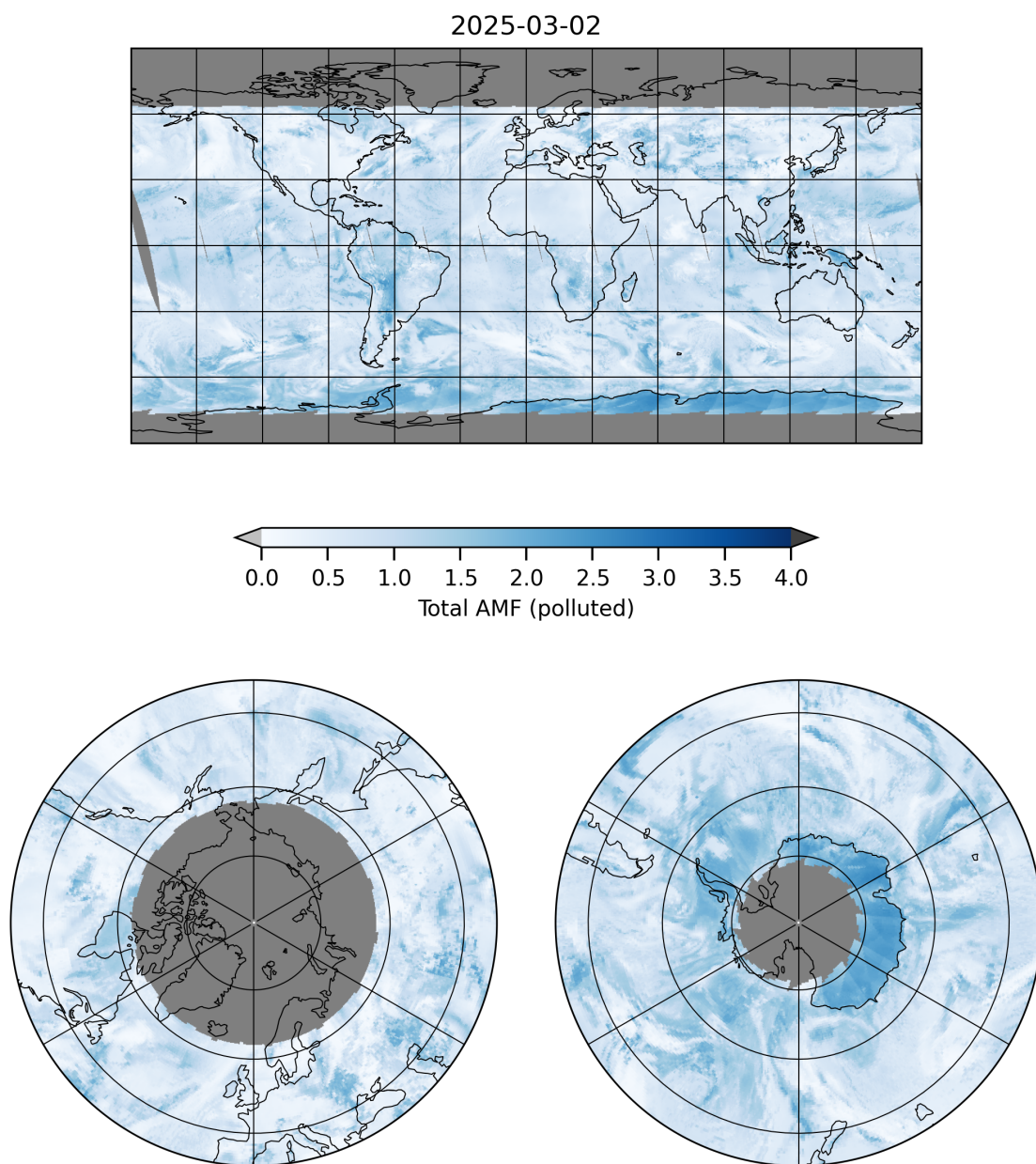


Figure 25: Map of “Total AMF (polluted)” for 2025-03-02 to 2025-03-03

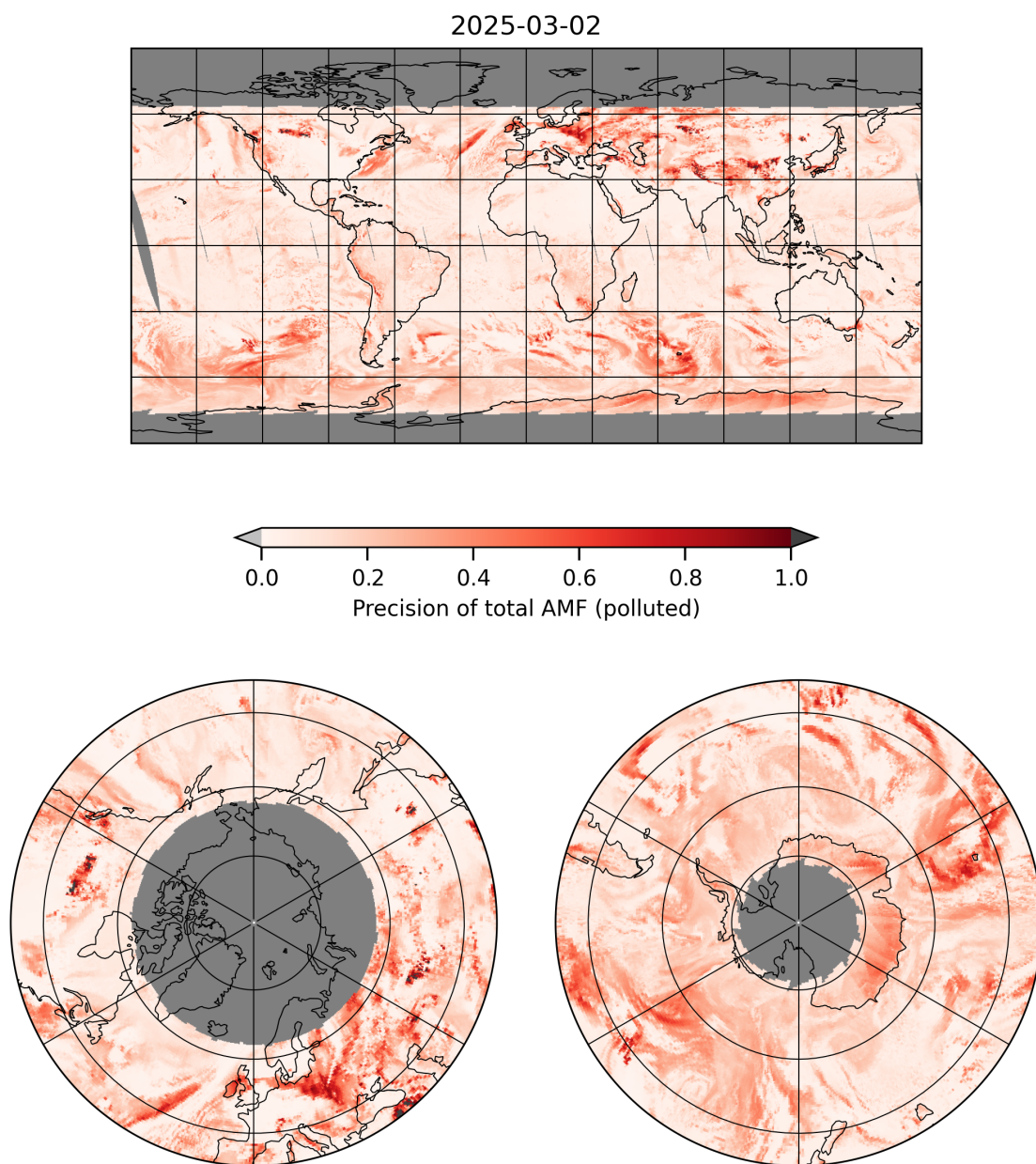


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-02 to 2025-03-03

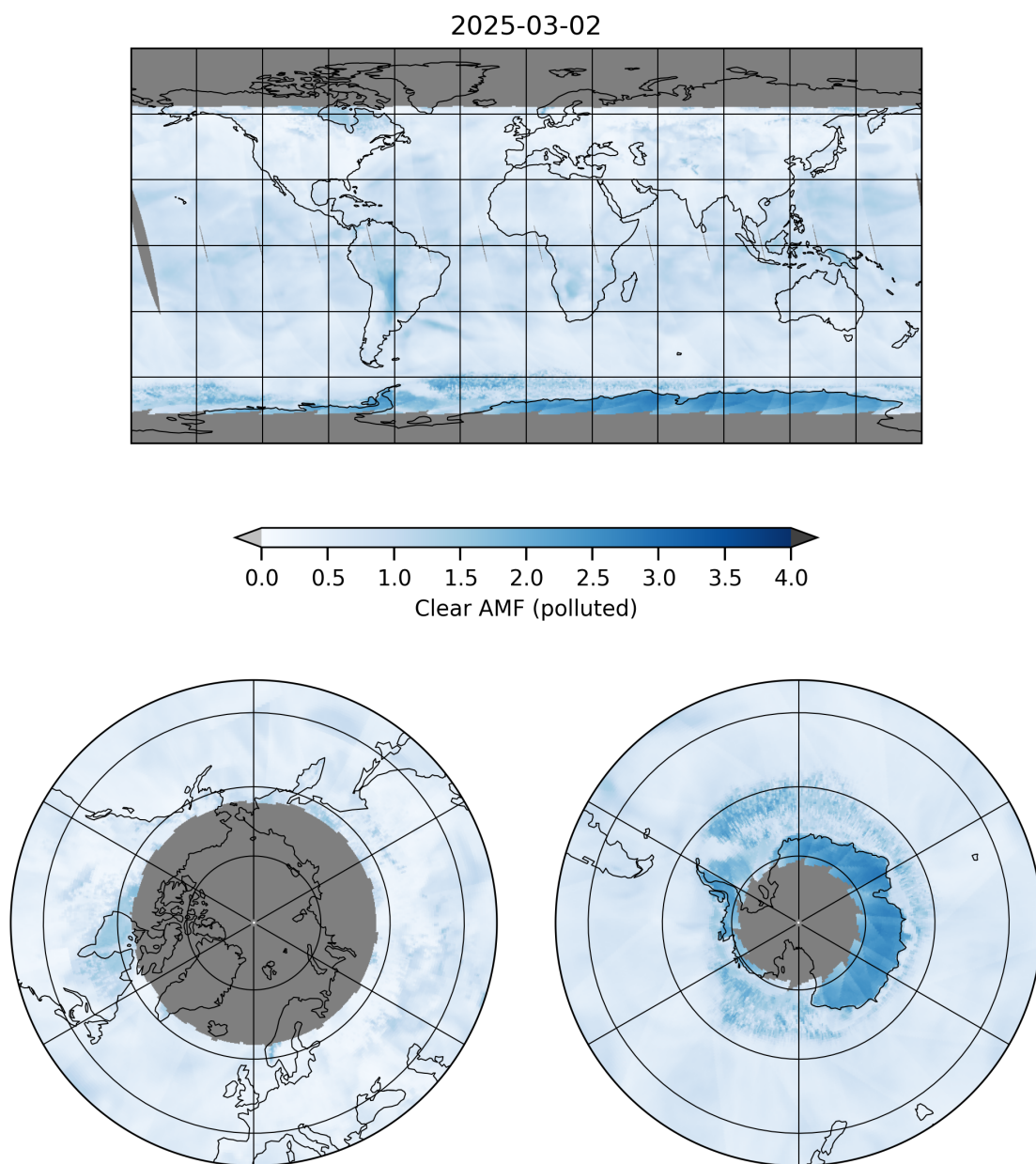


Figure 27: Map of “Clear AMF (polluted)” for 2025-03-02 to 2025-03-03

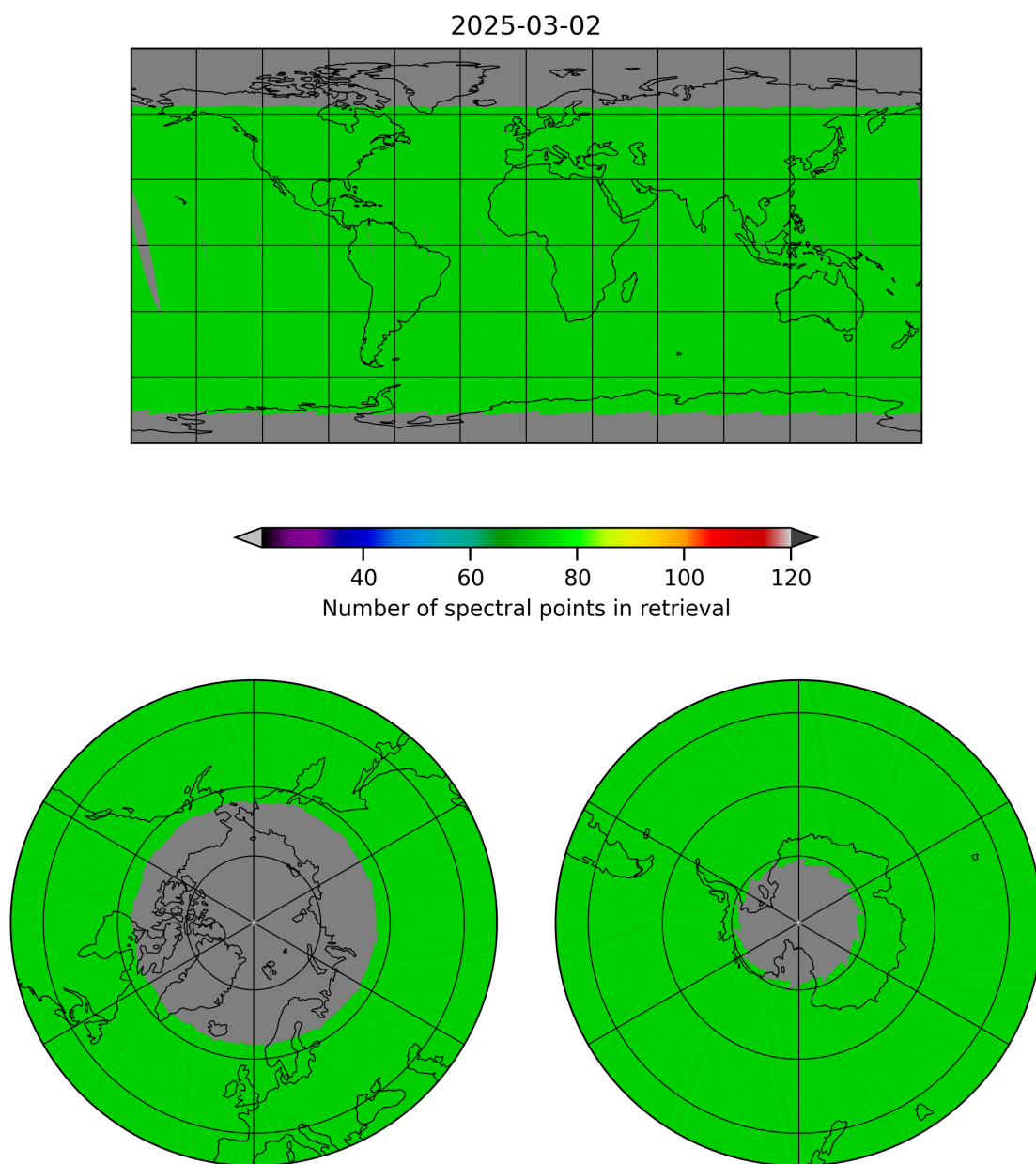


Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-02 to 2025-03-03

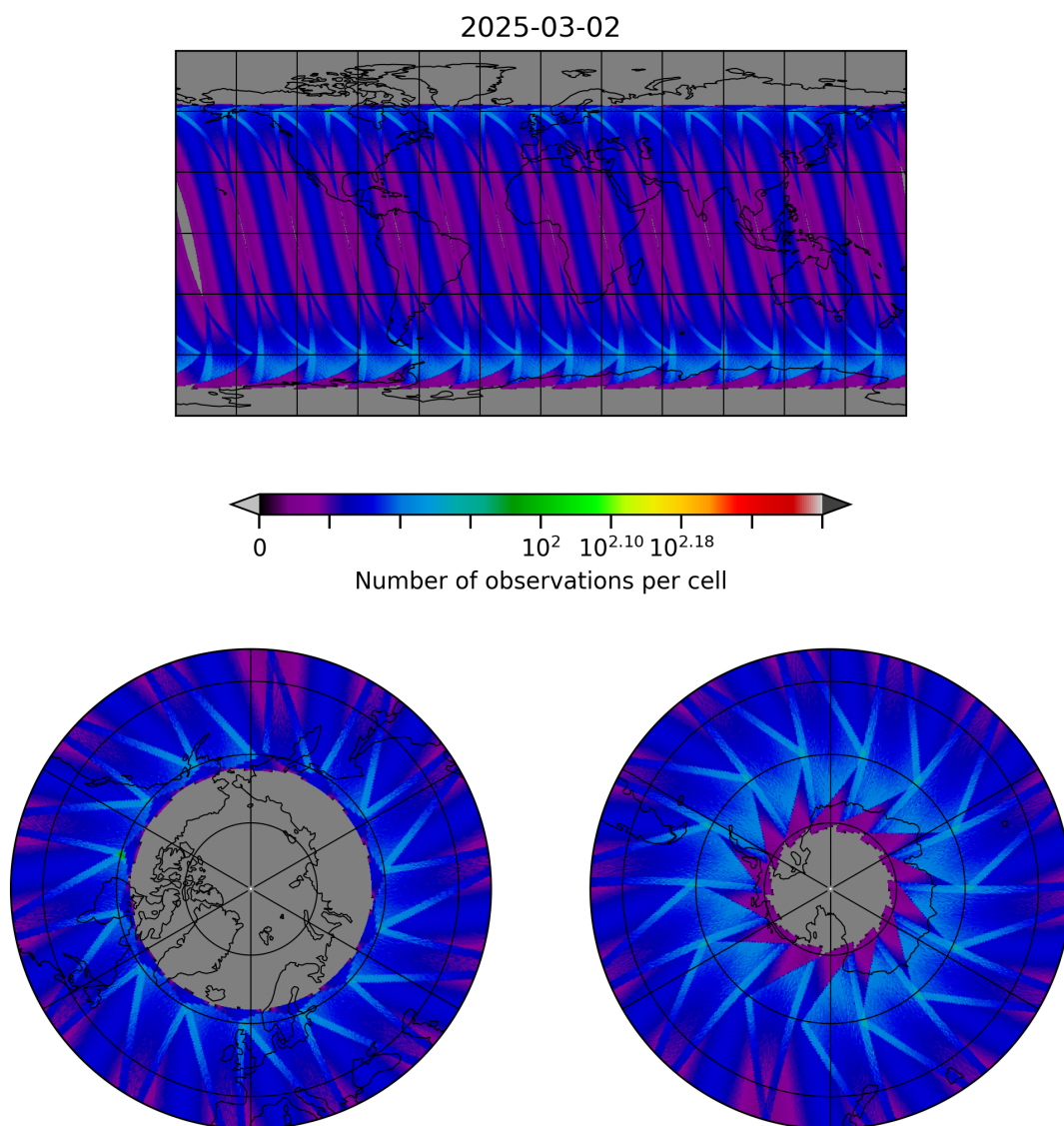


Figure 29: Map of the number of observations for 2025-03-02 to 2025-03-03

7 Zonal average

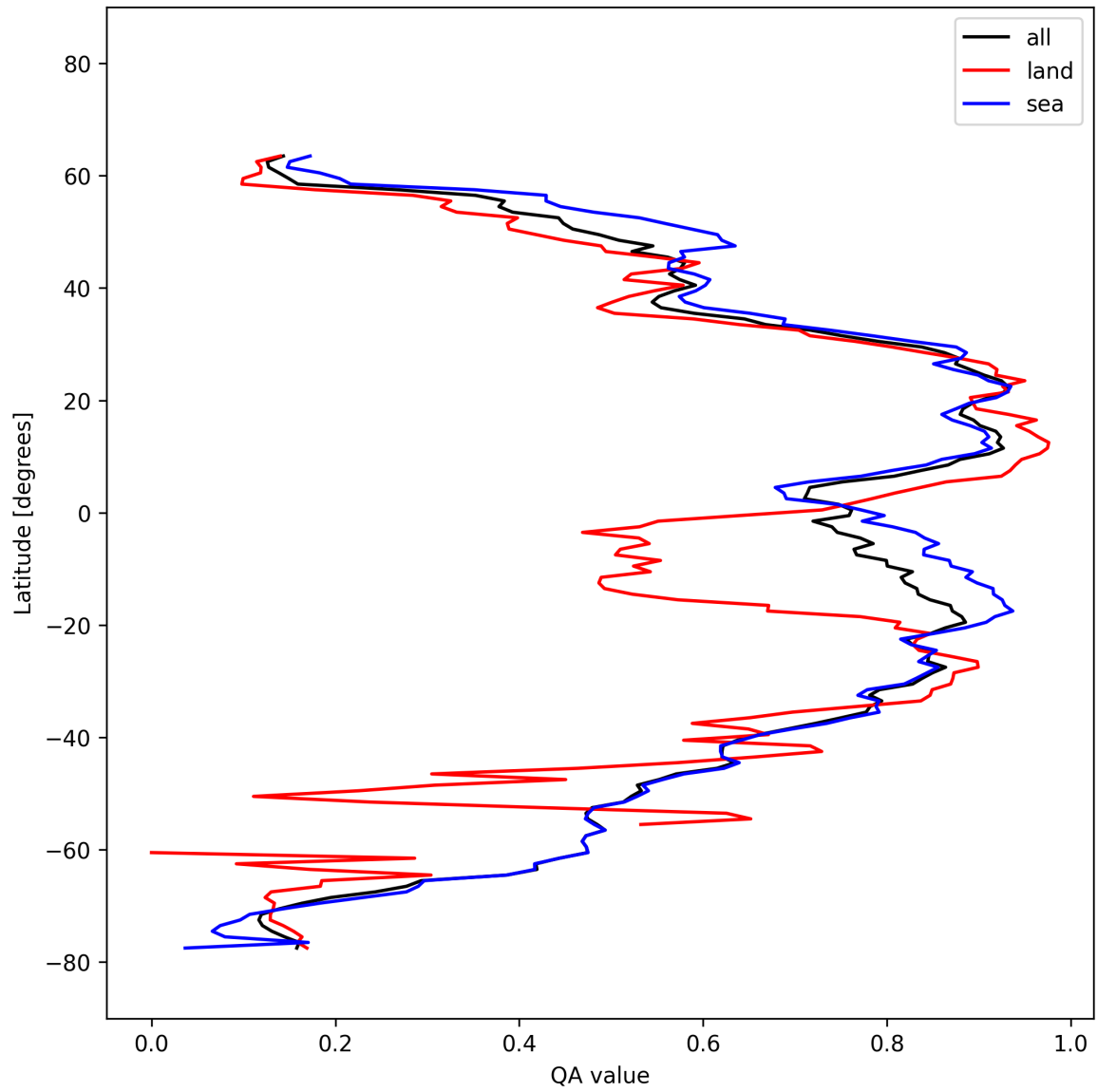


Figure 30: Zonal average of “QA value” for 2025-03-02 to 2025-03-03.

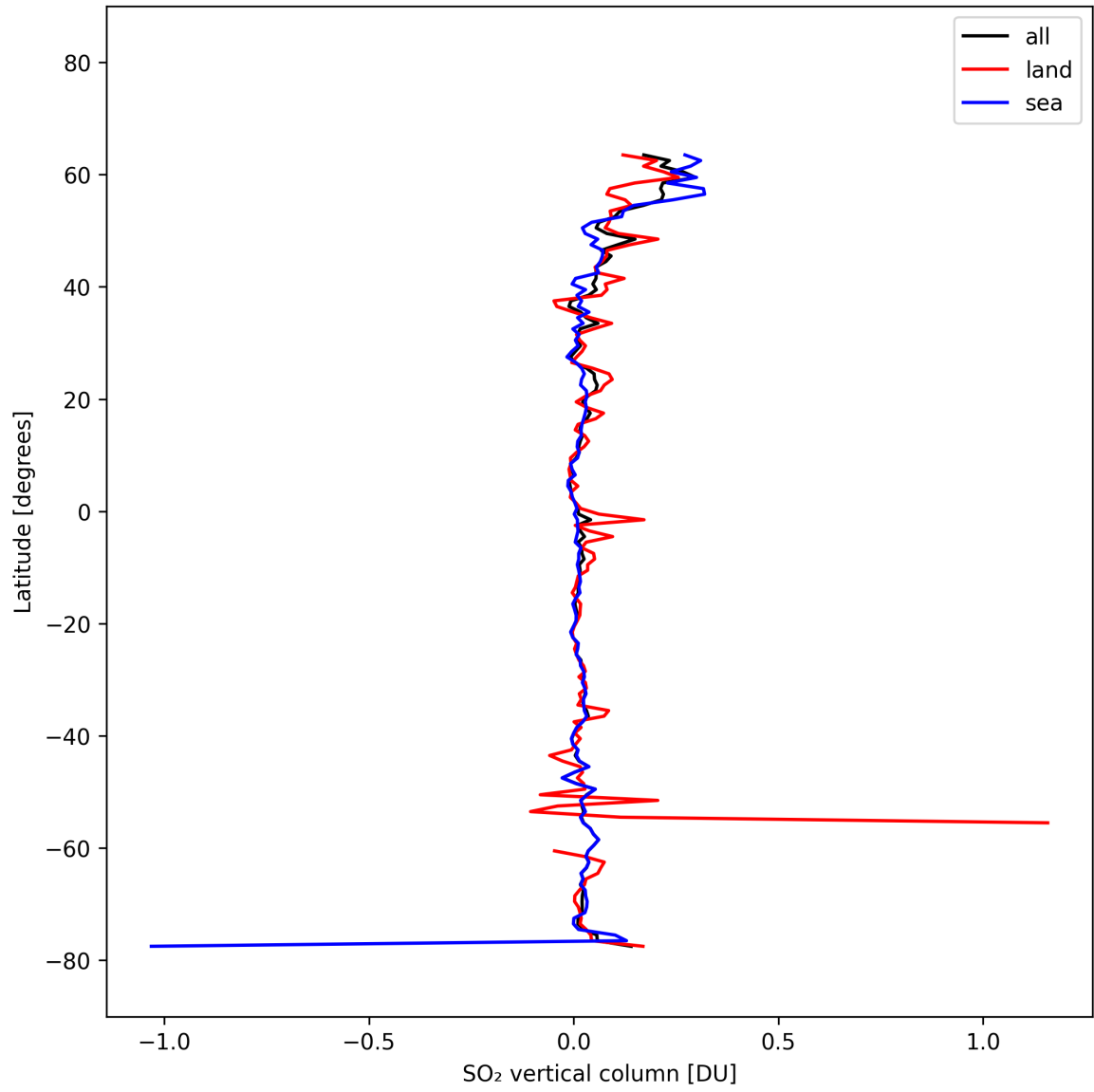


Figure 31: Zonal average of “SO₂ vertical column” for 2025-03-02 to 2025-03-03.

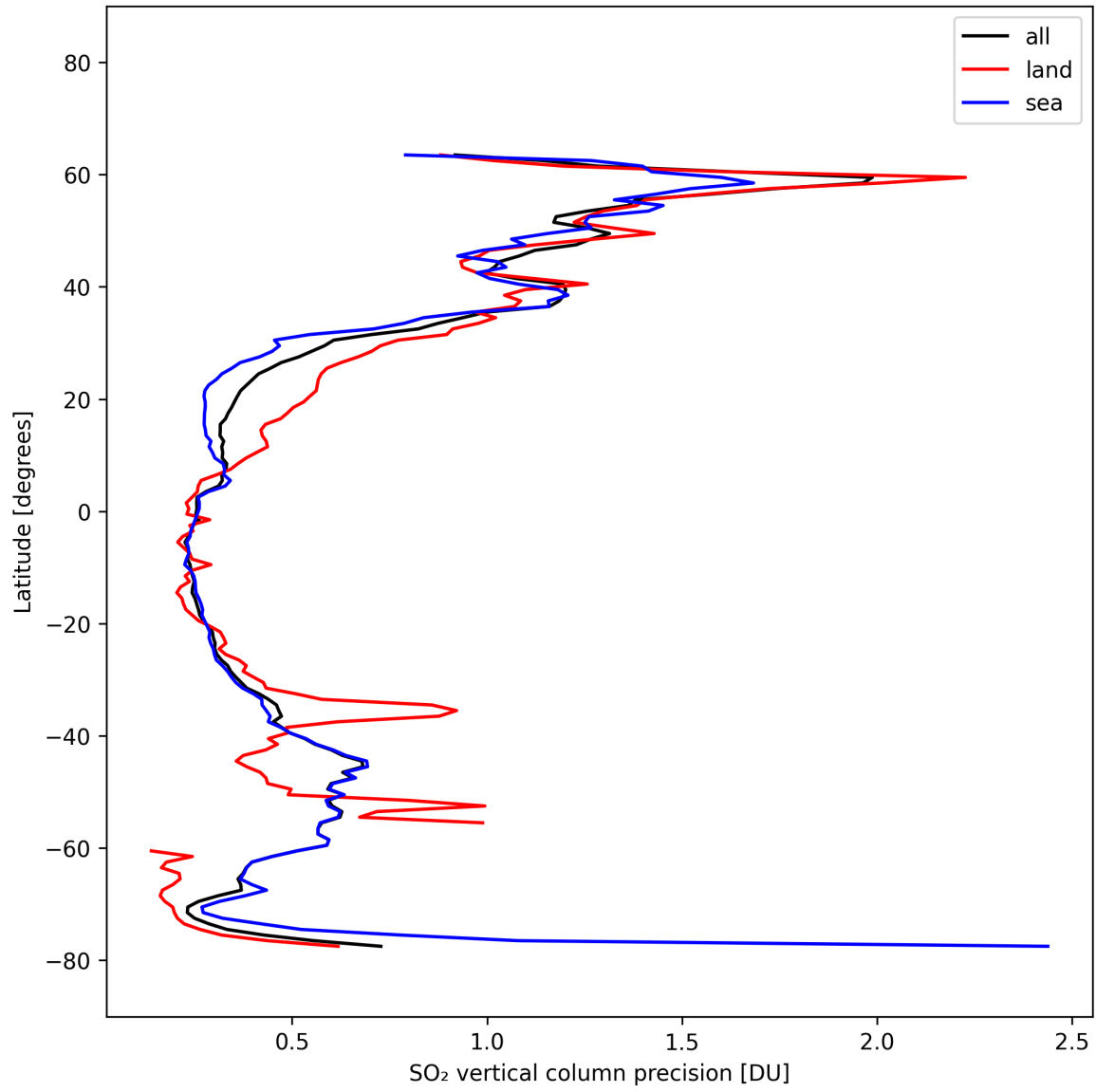


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-03-02 to 2025-03-03.

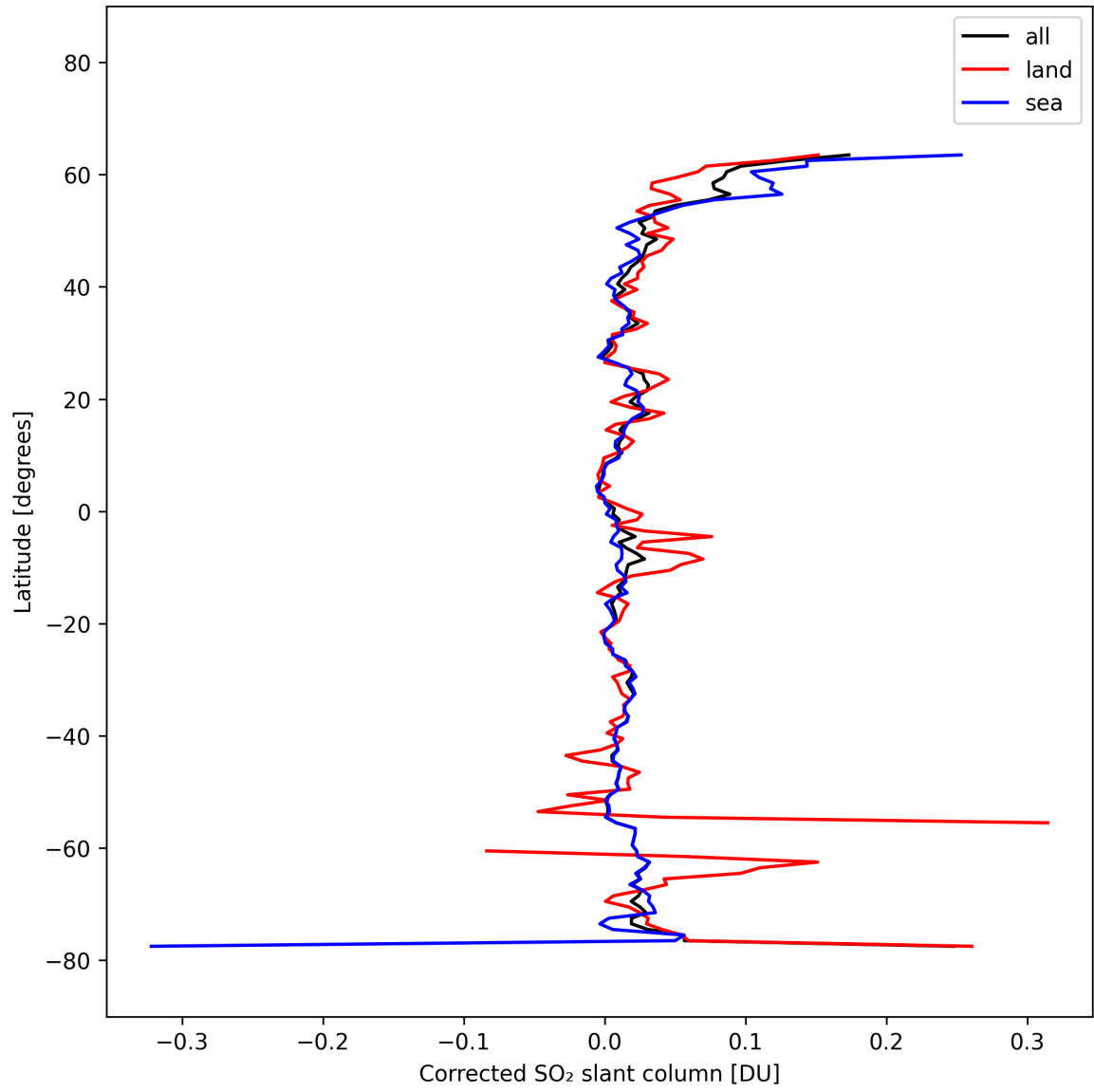


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-03-02 to 2025-03-03.

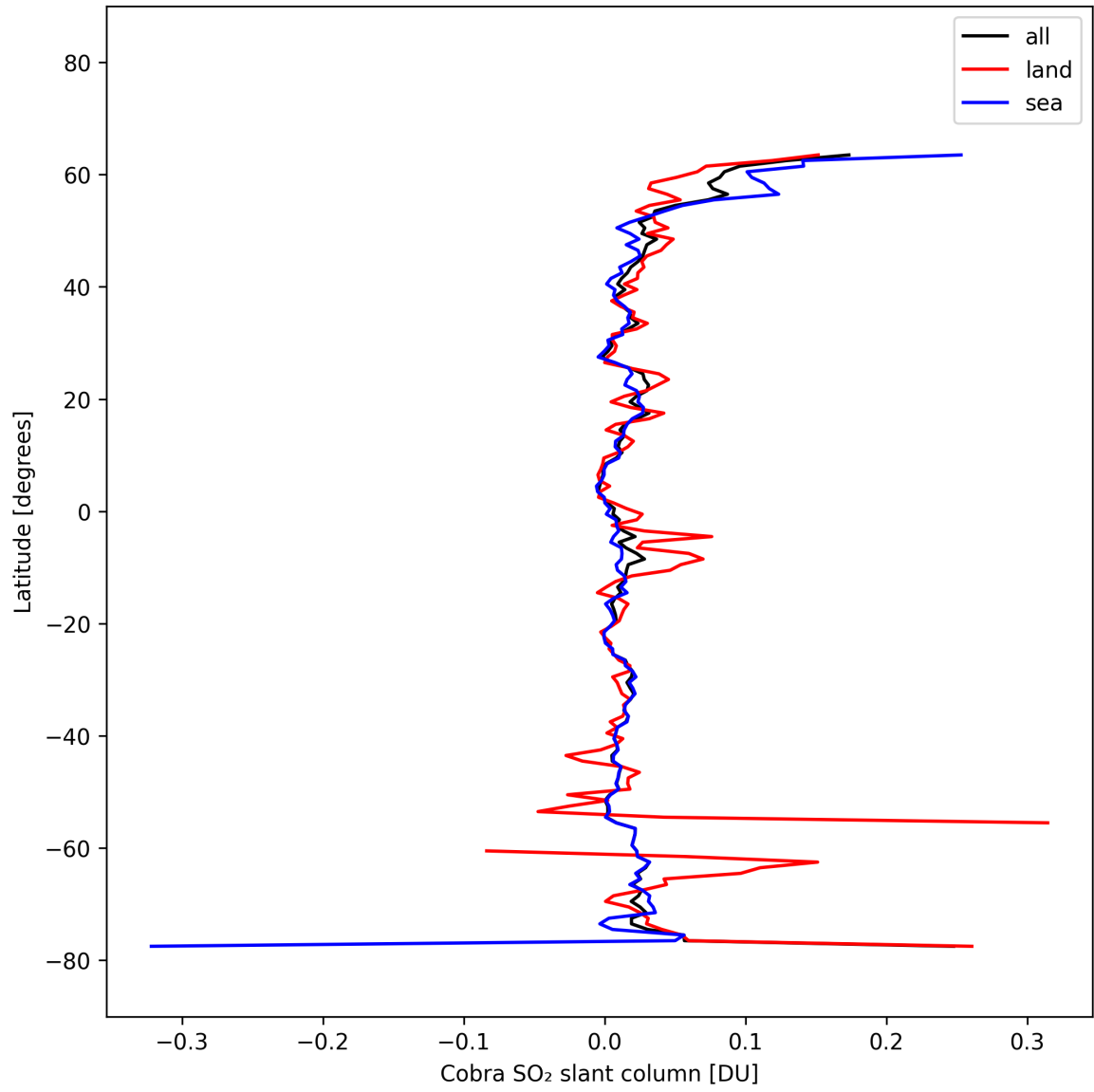


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-03-02 to 2025-03-03.

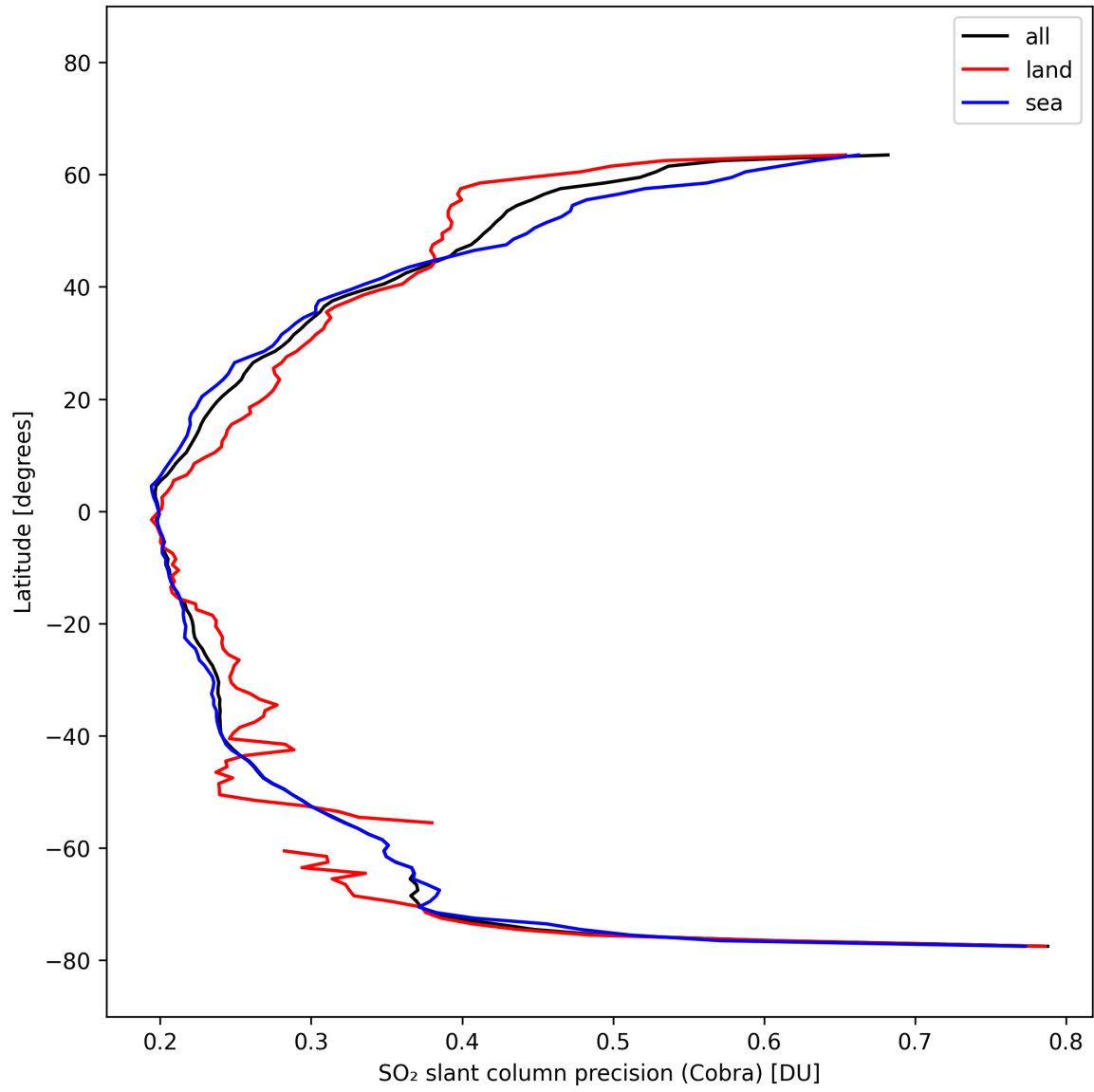


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-03-02 to 2025-03-03.

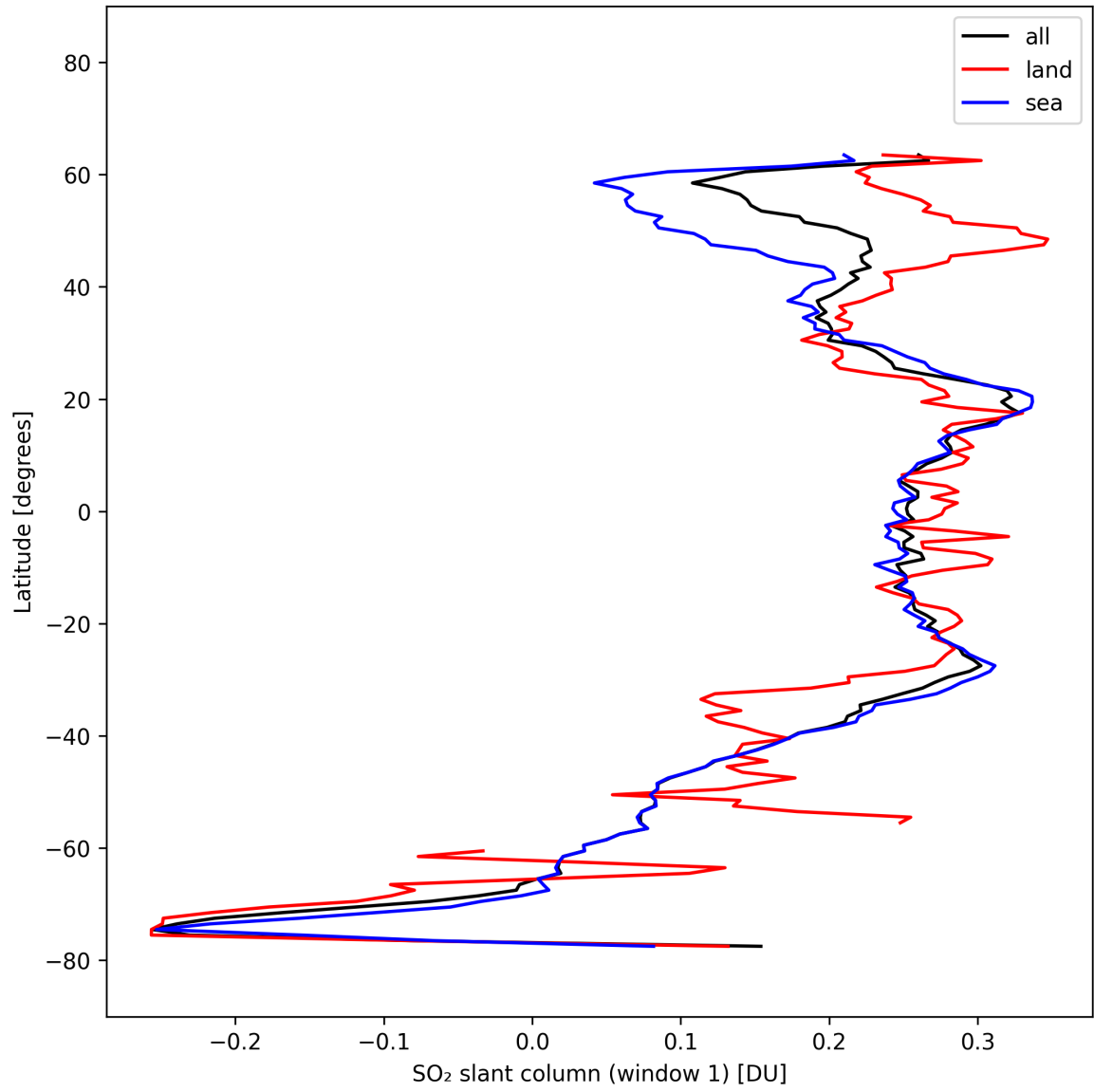


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-03-02 to 2025-03-03.

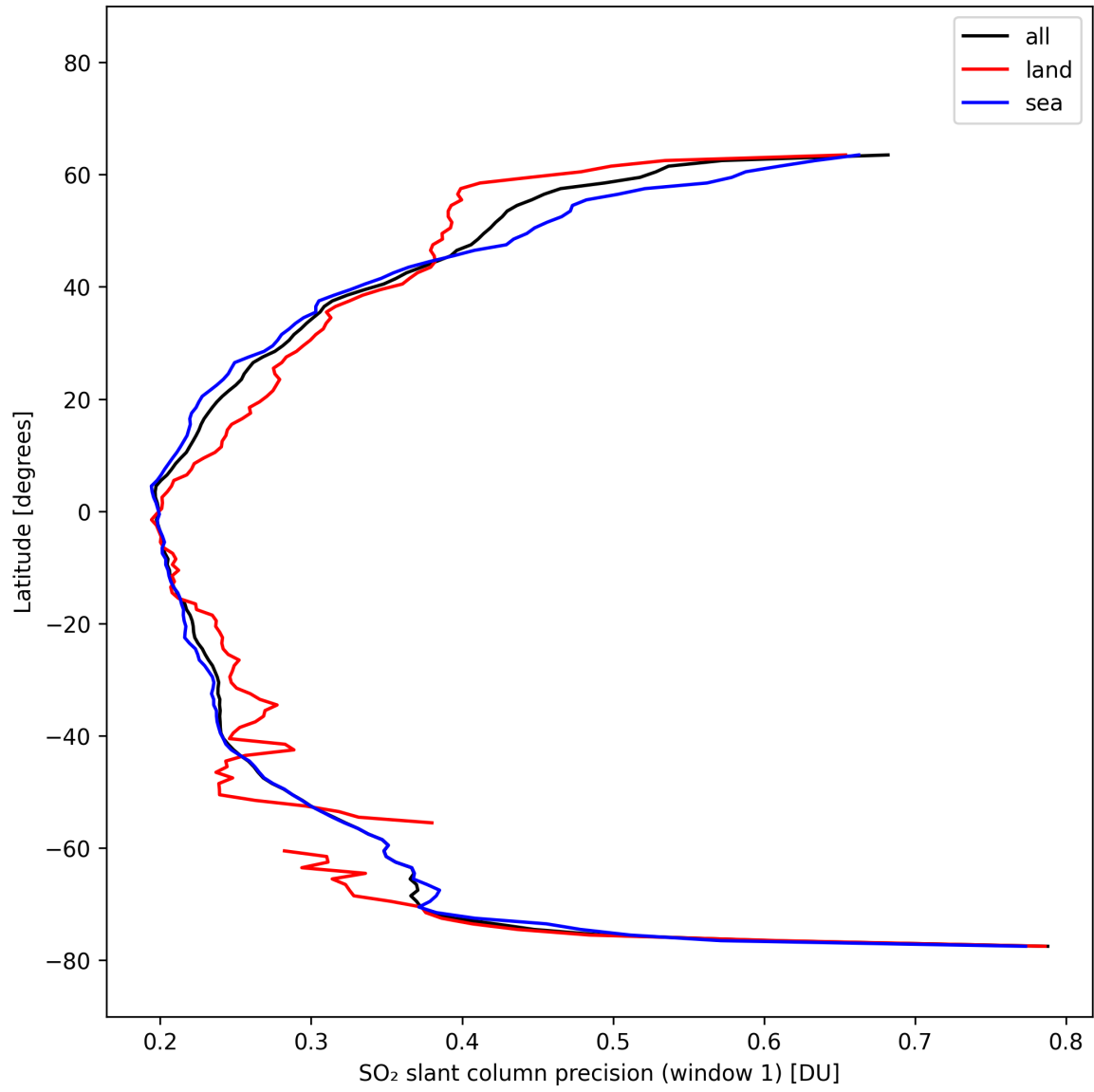


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-03-02 to 2025-03-03.

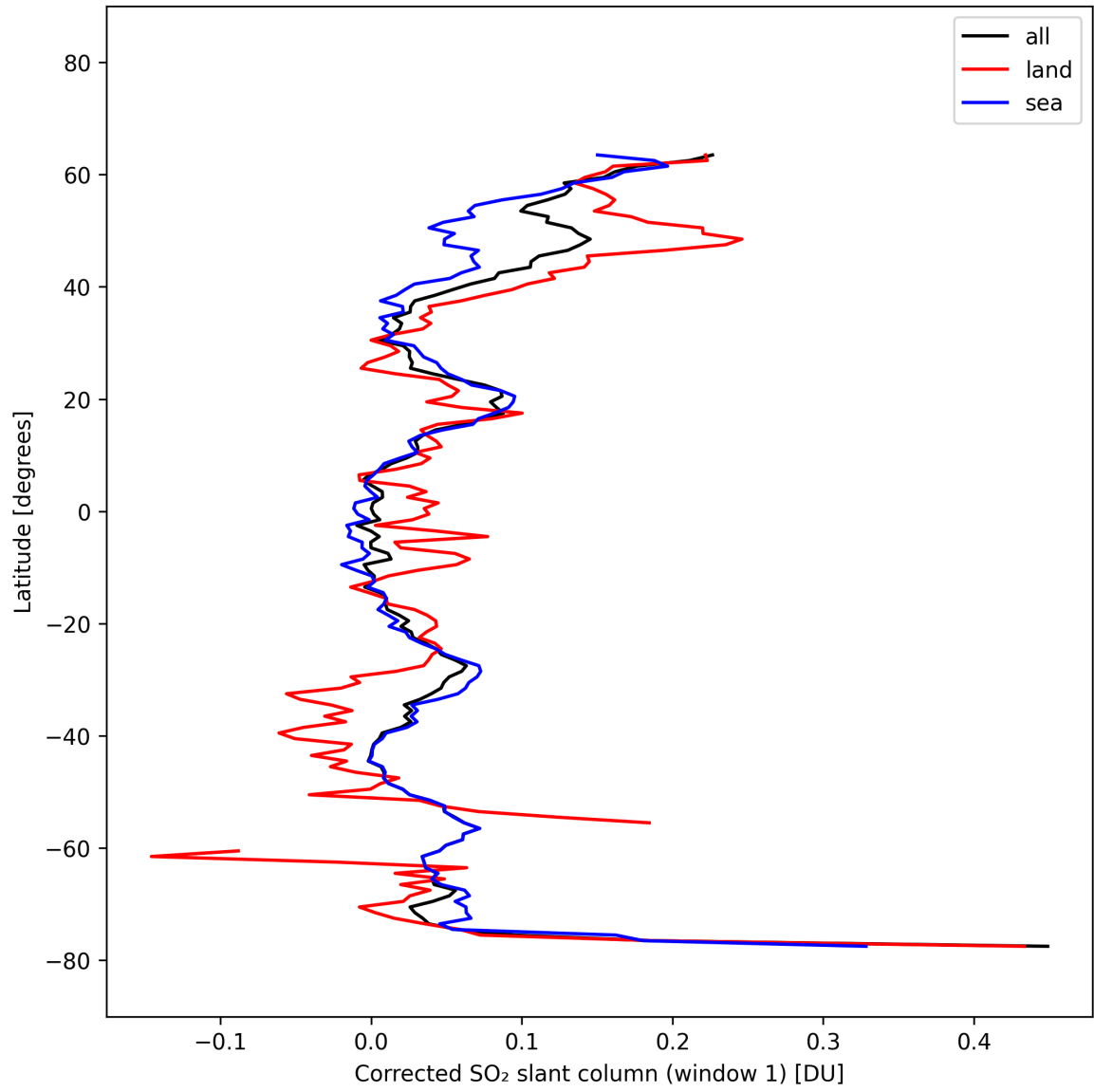


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-03-02 to 2025-03-03.

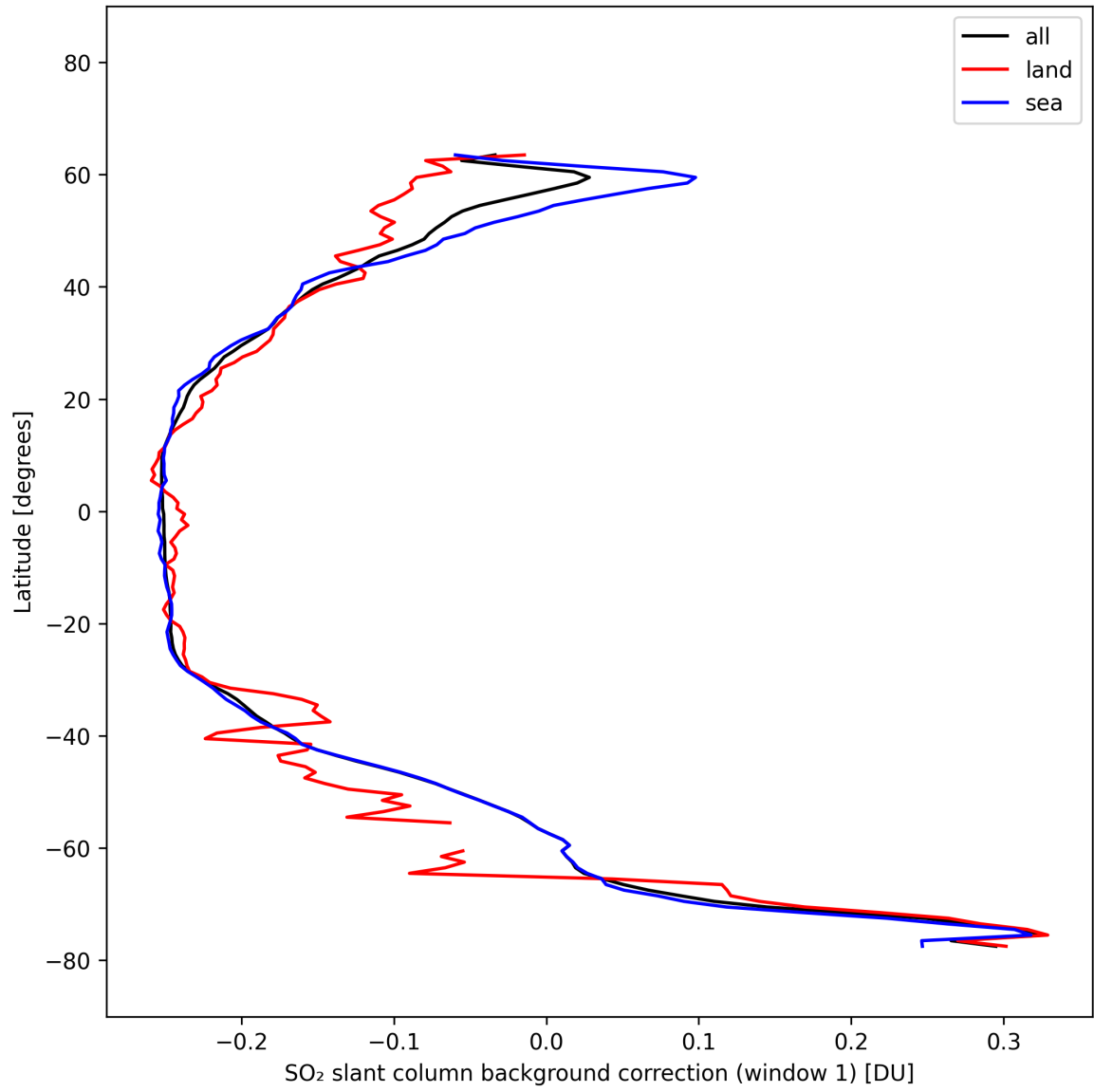


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-03-02 to 2025-03-03.

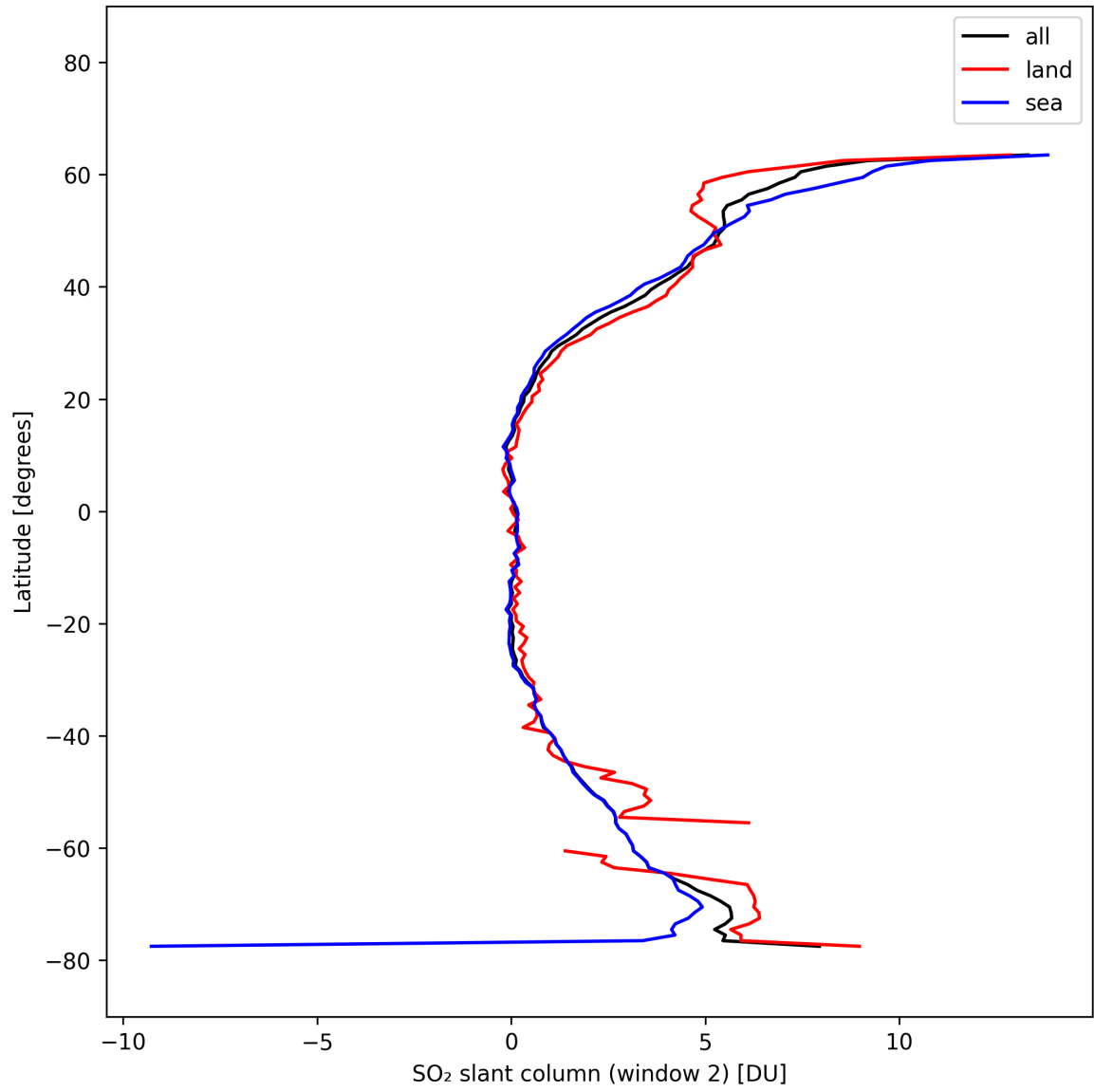


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-03-02 to 2025-03-03.

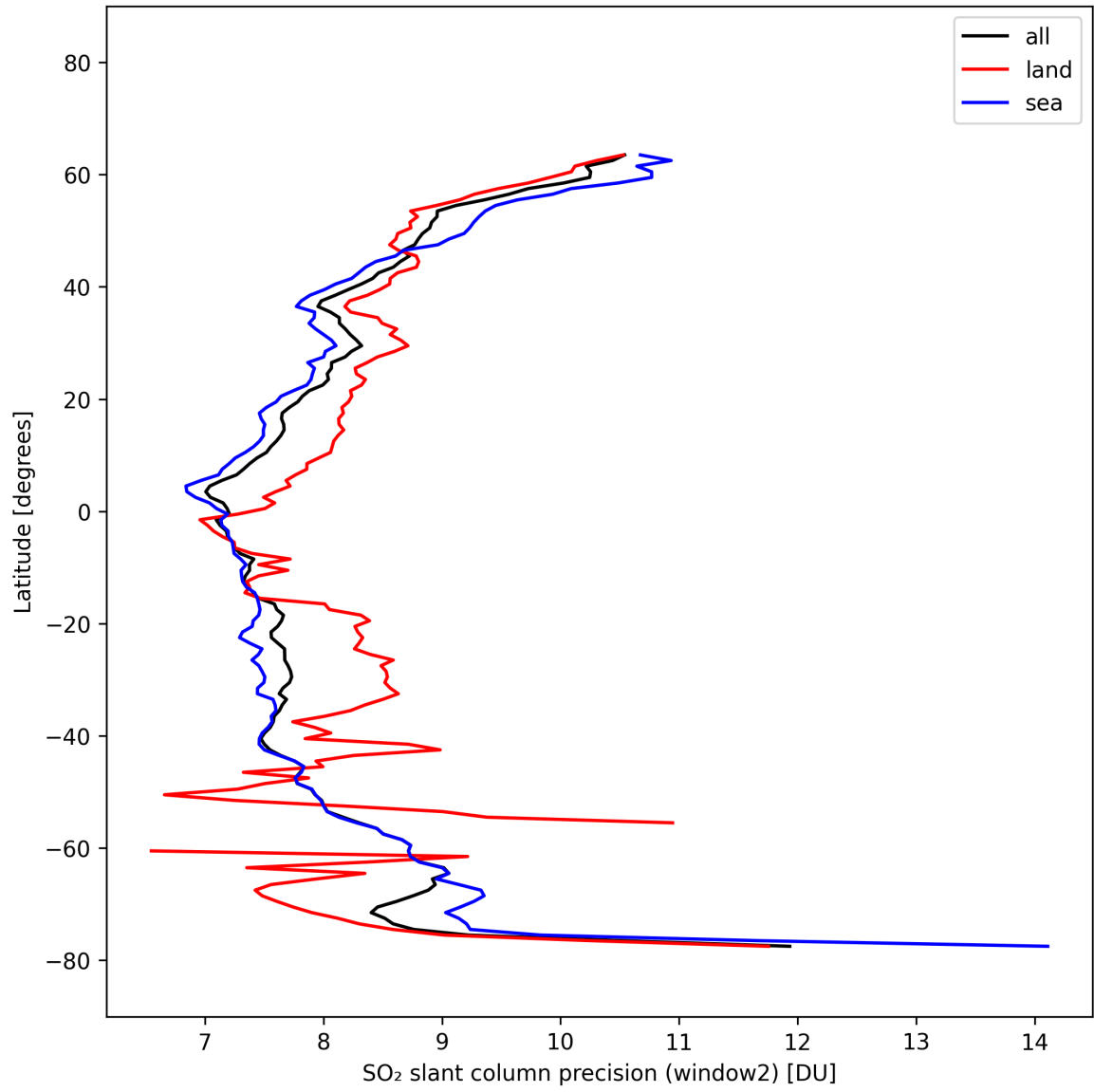


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-03-02 to 2025-03-03.

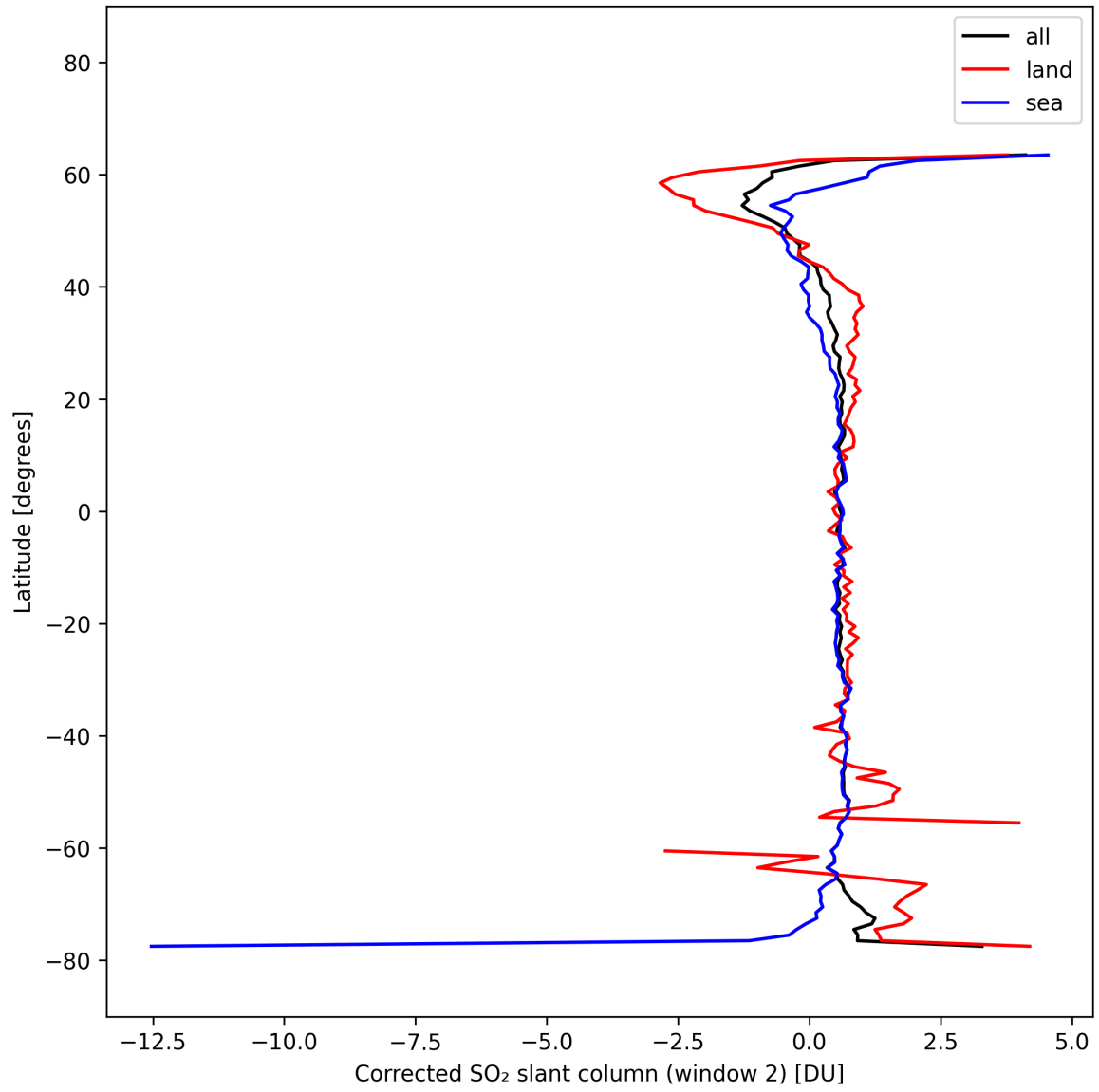


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-03-02 to 2025-03-03.

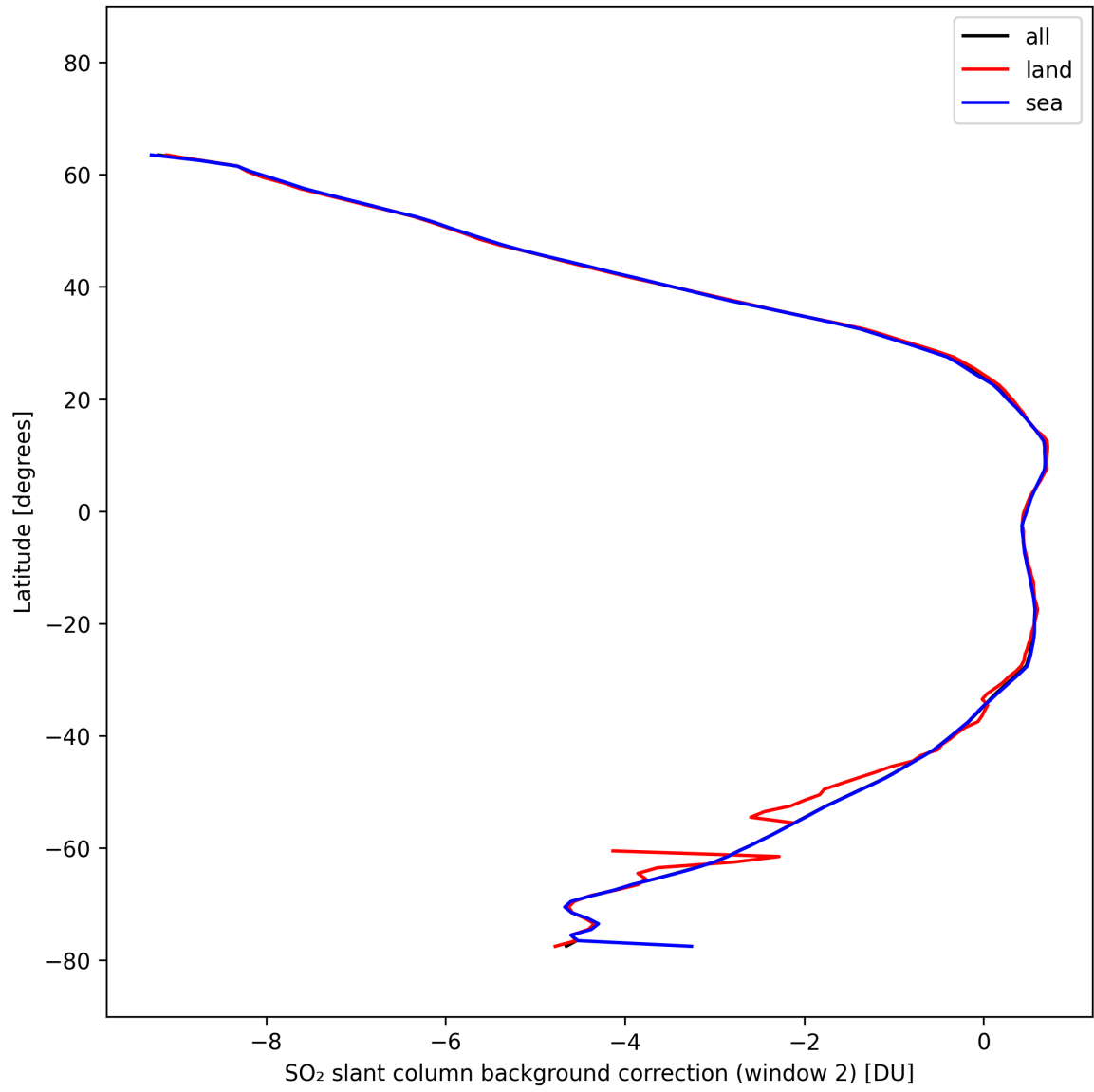


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-03-02 to 2025-03-03.

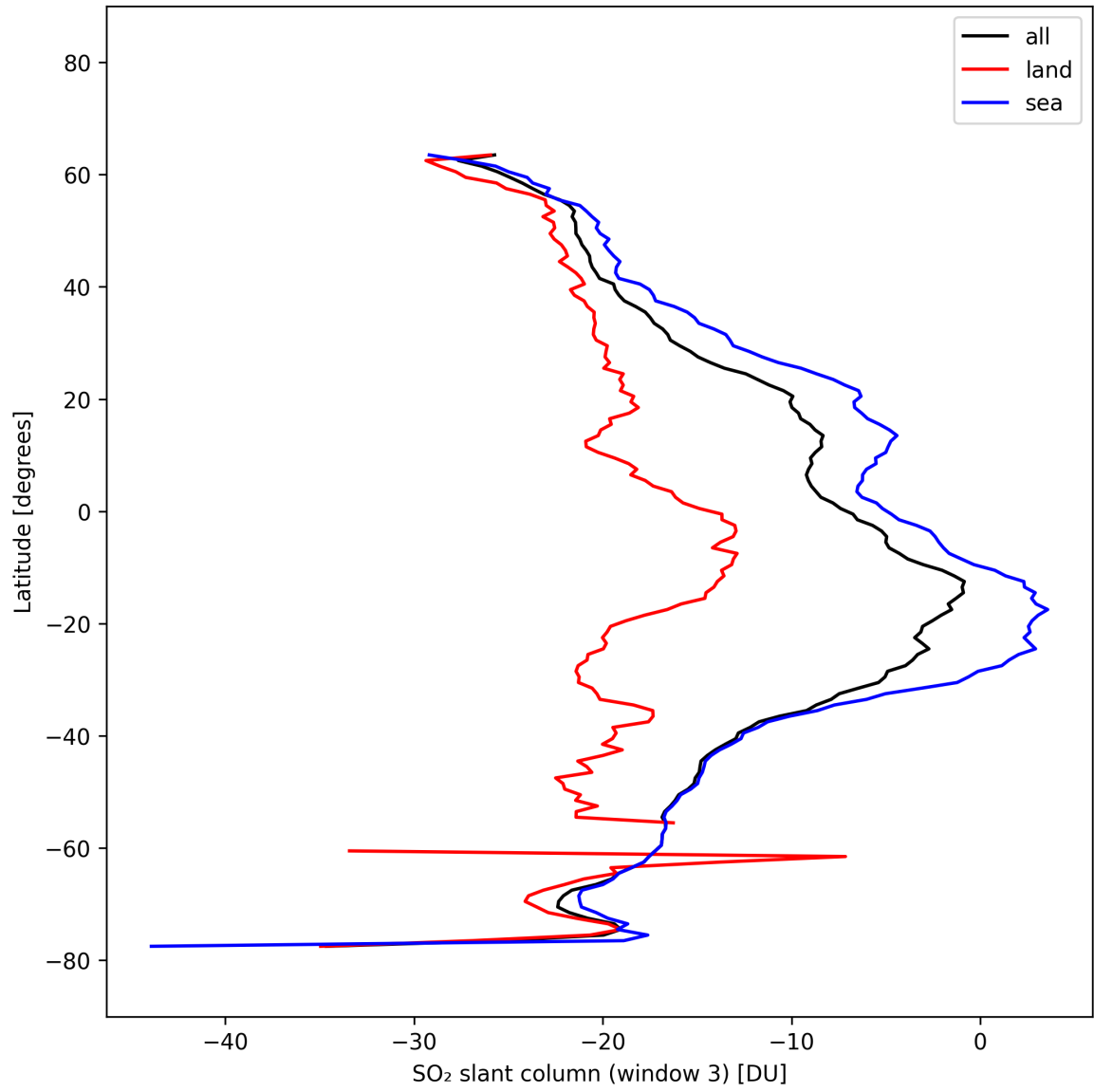


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-03-02 to 2025-03-03.

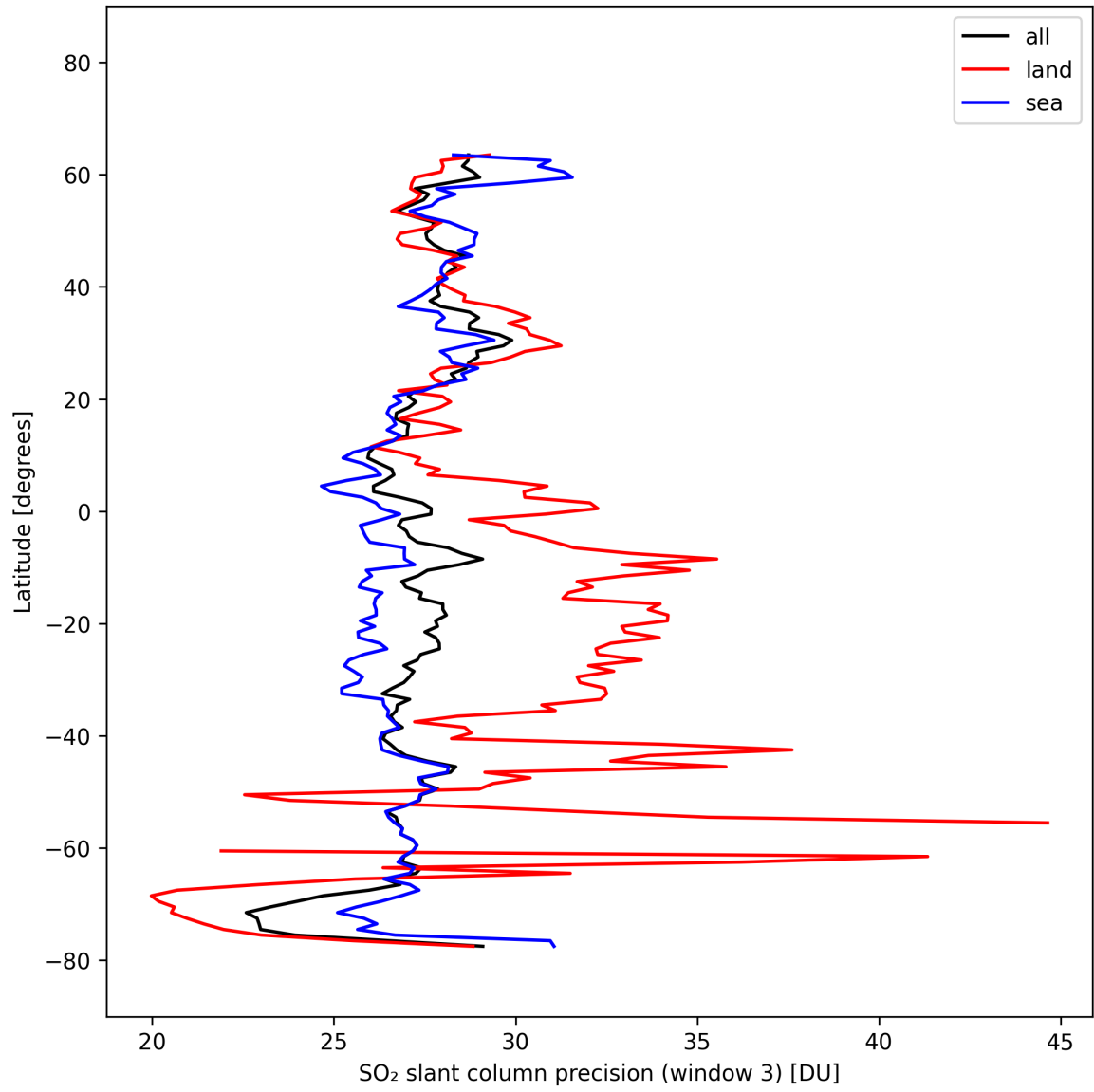


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-03-02 to 2025-03-03.

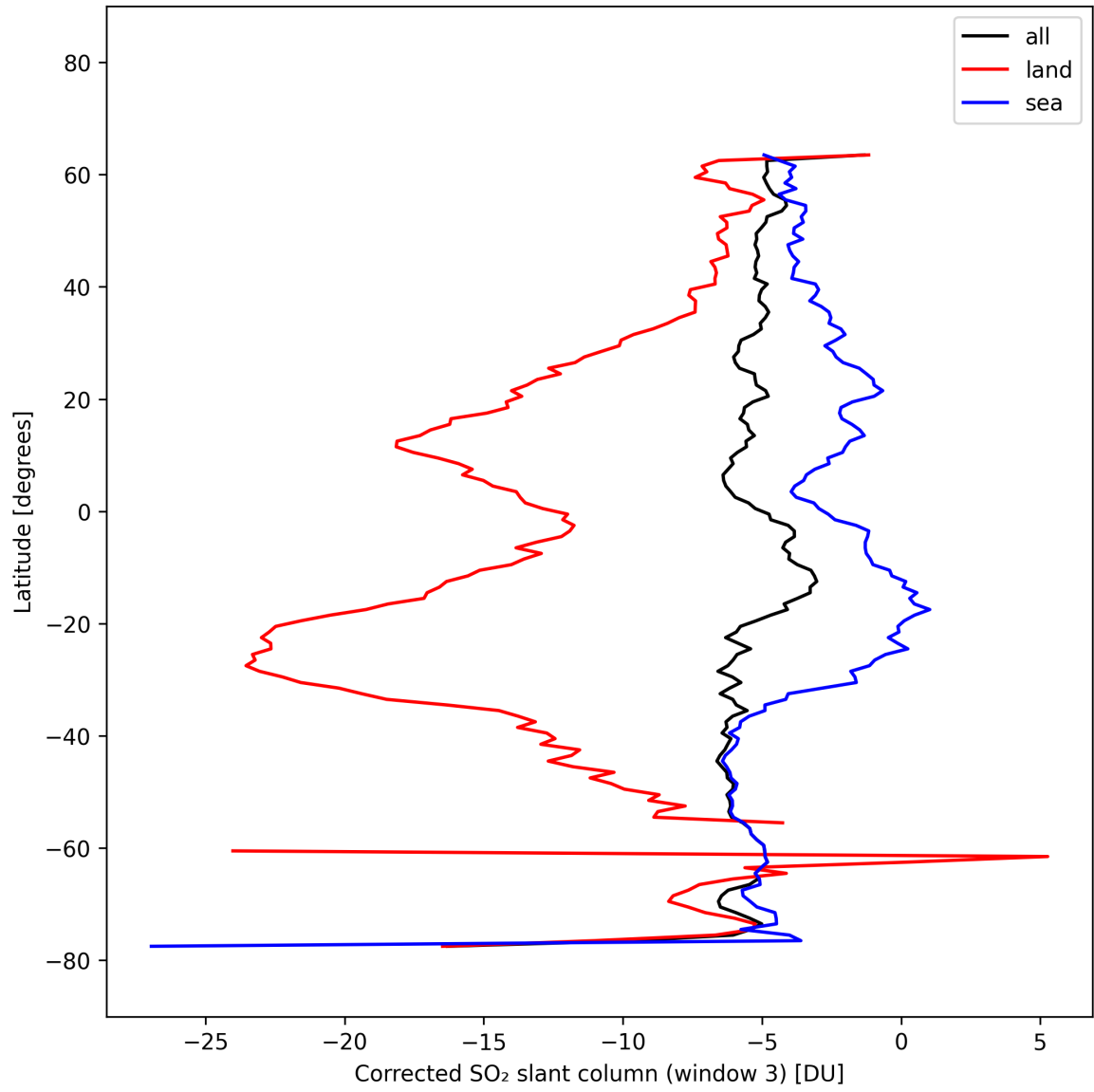


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-03-02 to 2025-03-03.

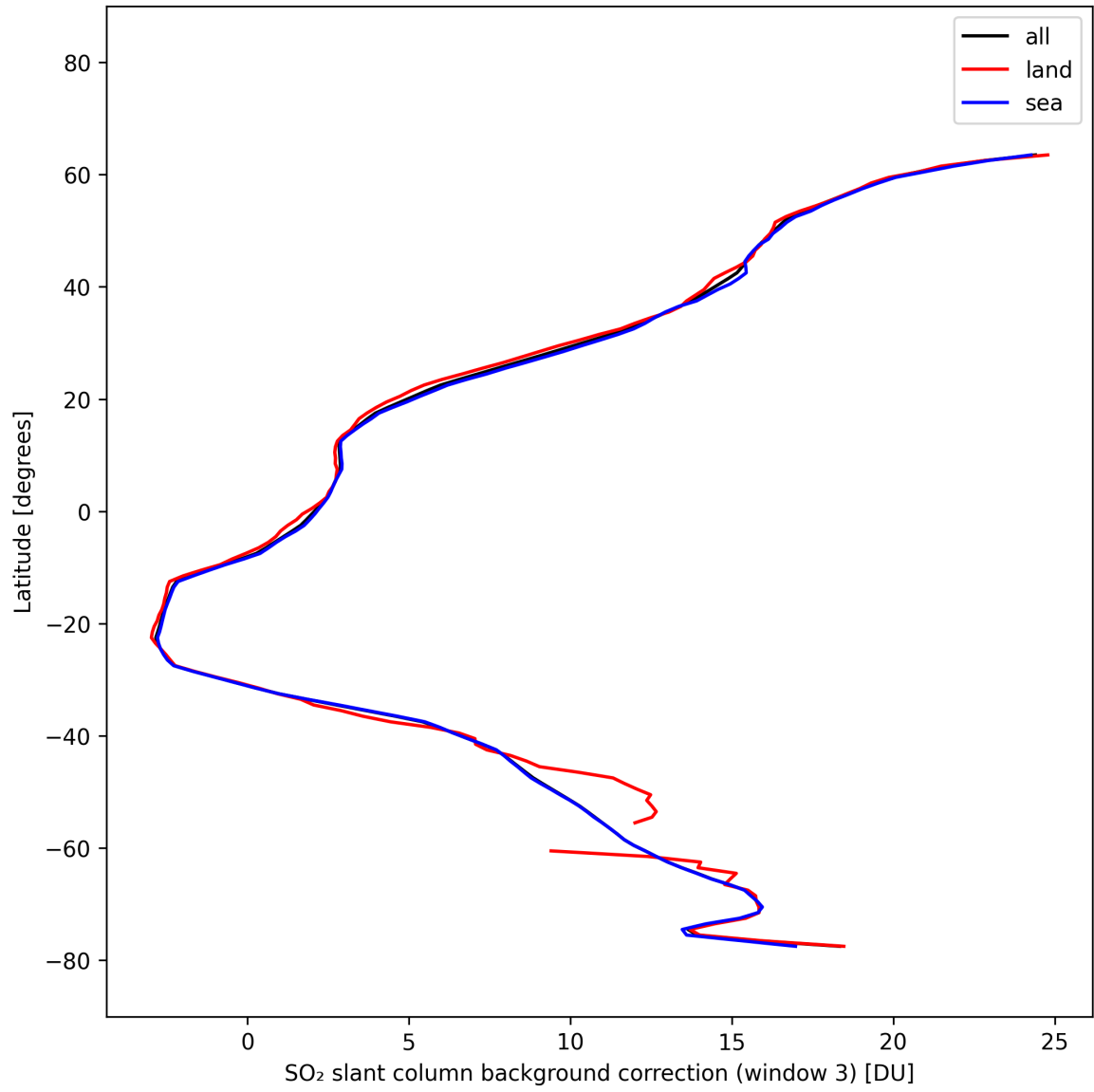


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-03-02 to 2025-03-03.

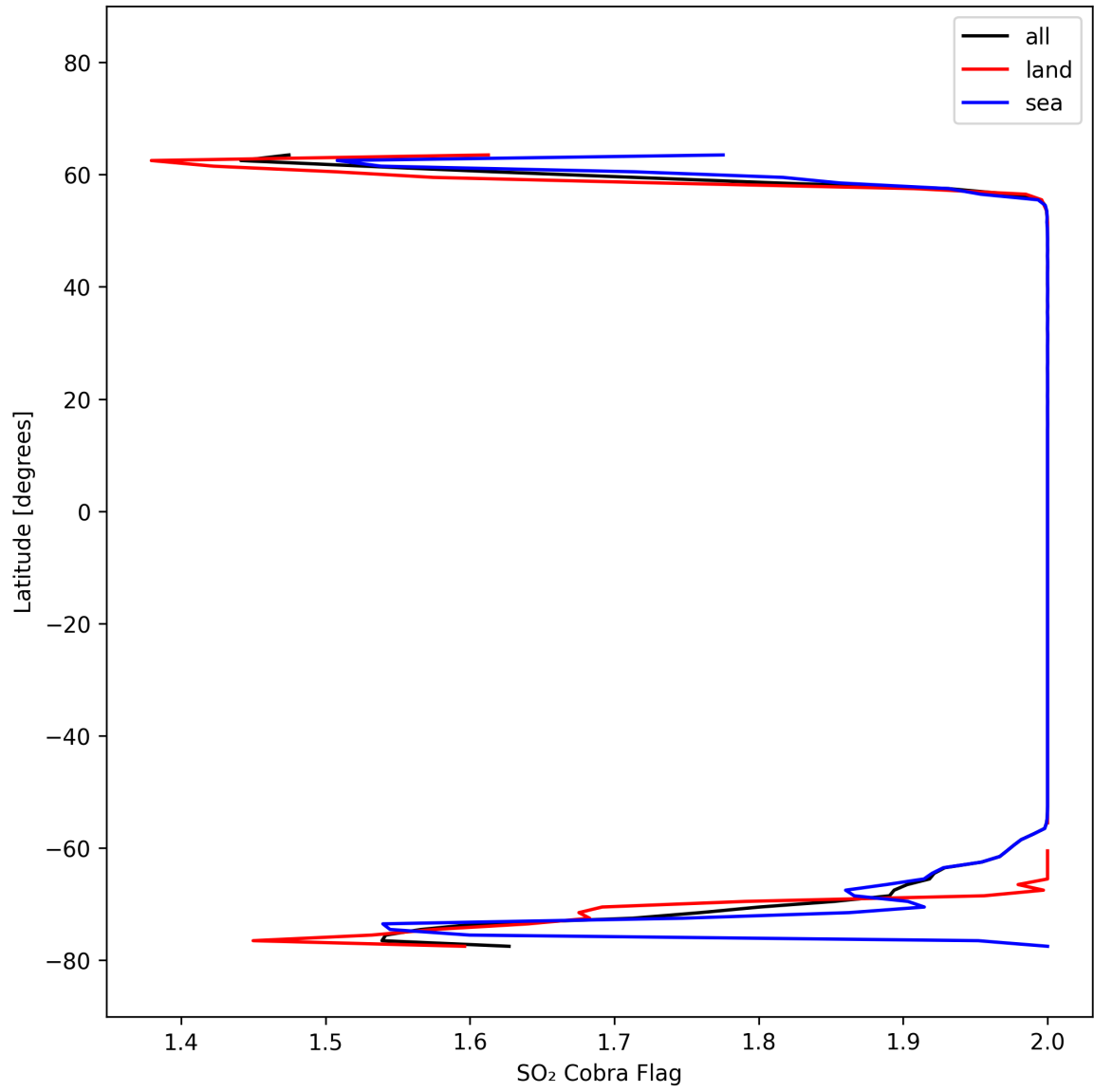


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-03-02 to 2025-03-03.

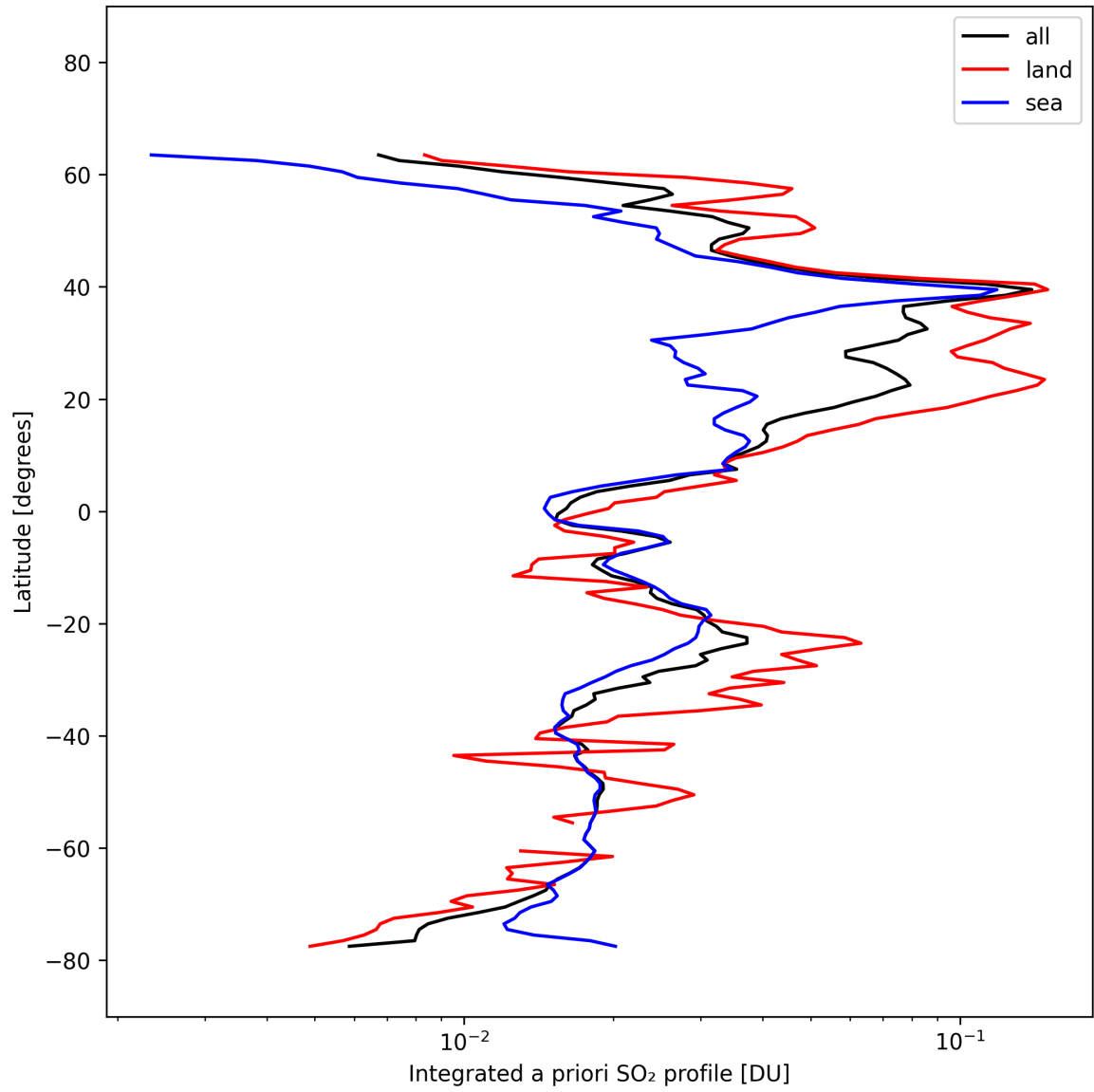


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-03-02 to 2025-03-03.

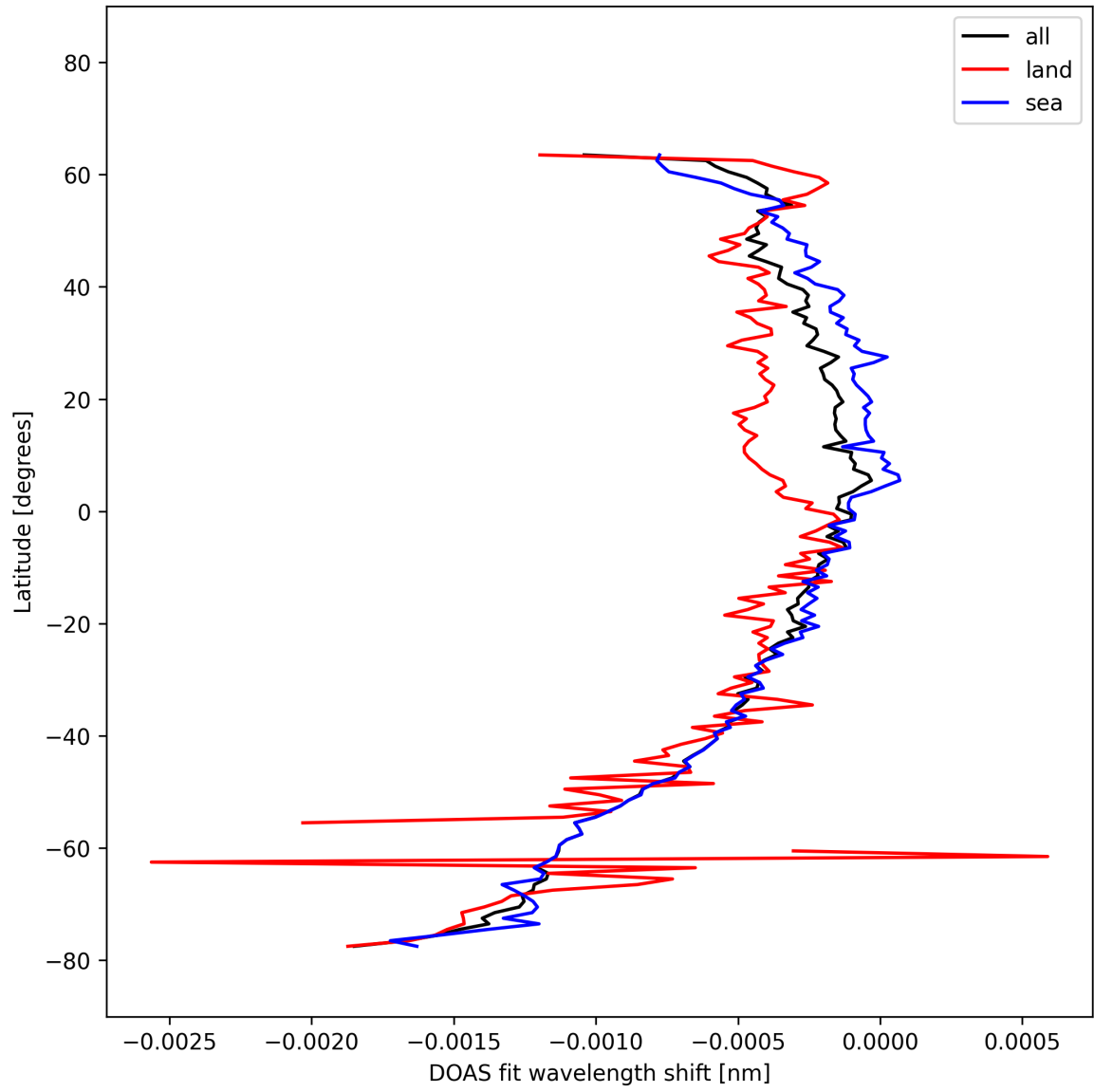


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-02 to 2025-03-03.

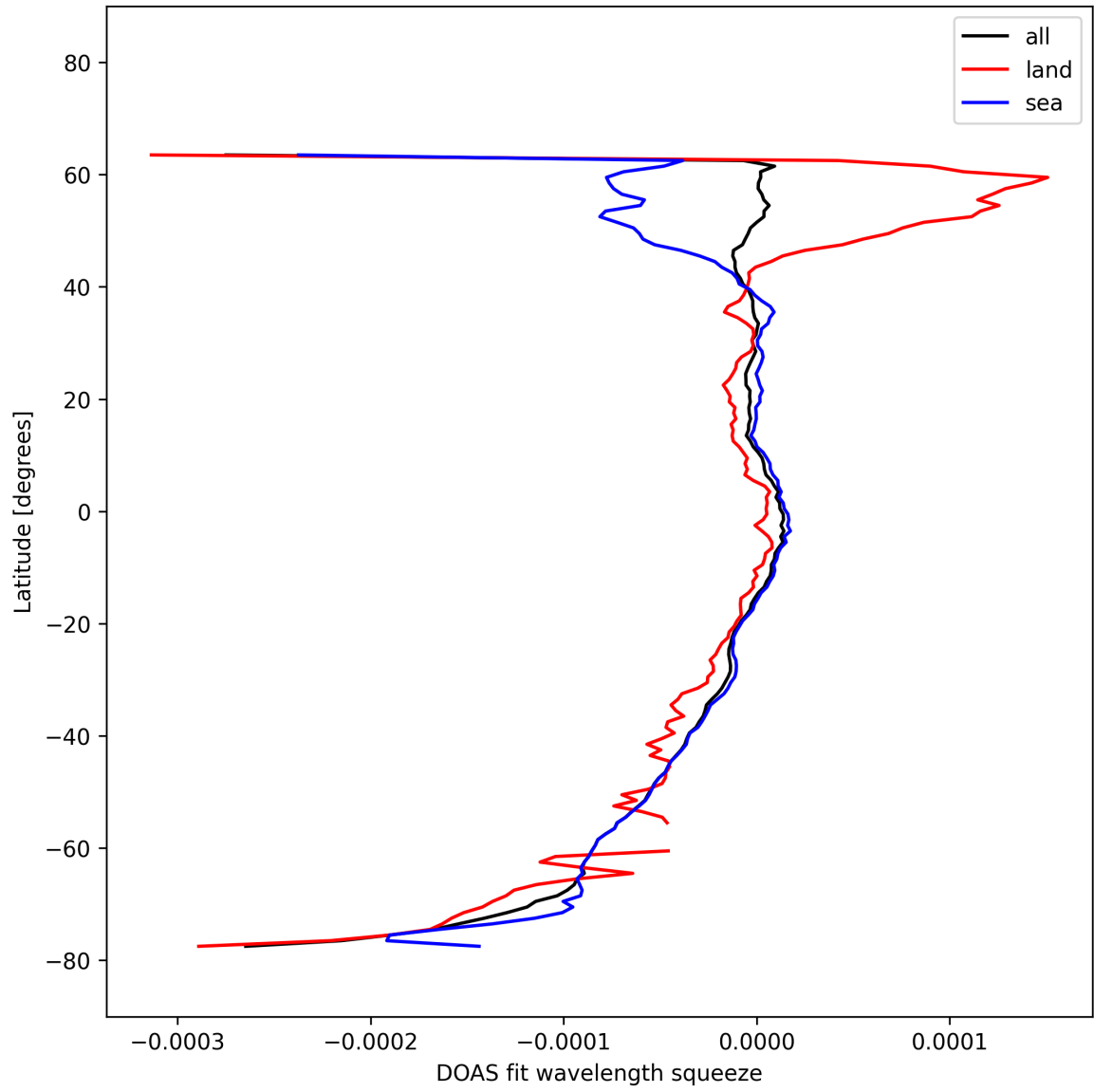


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-02 to 2025-03-03.

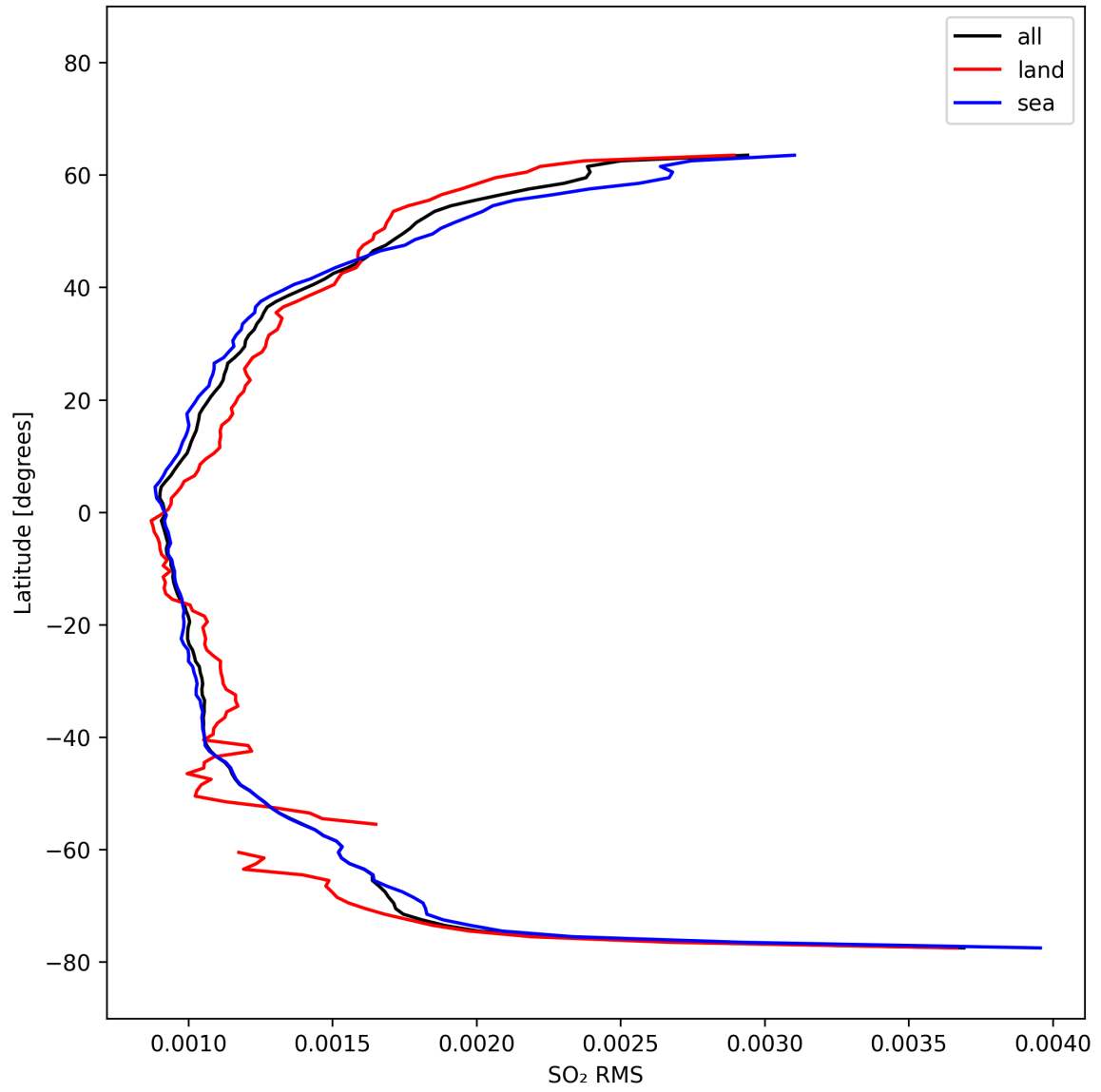


Figure 52: Zonal average of “SO₂ RMS” for 2025-03-02 to 2025-03-03.

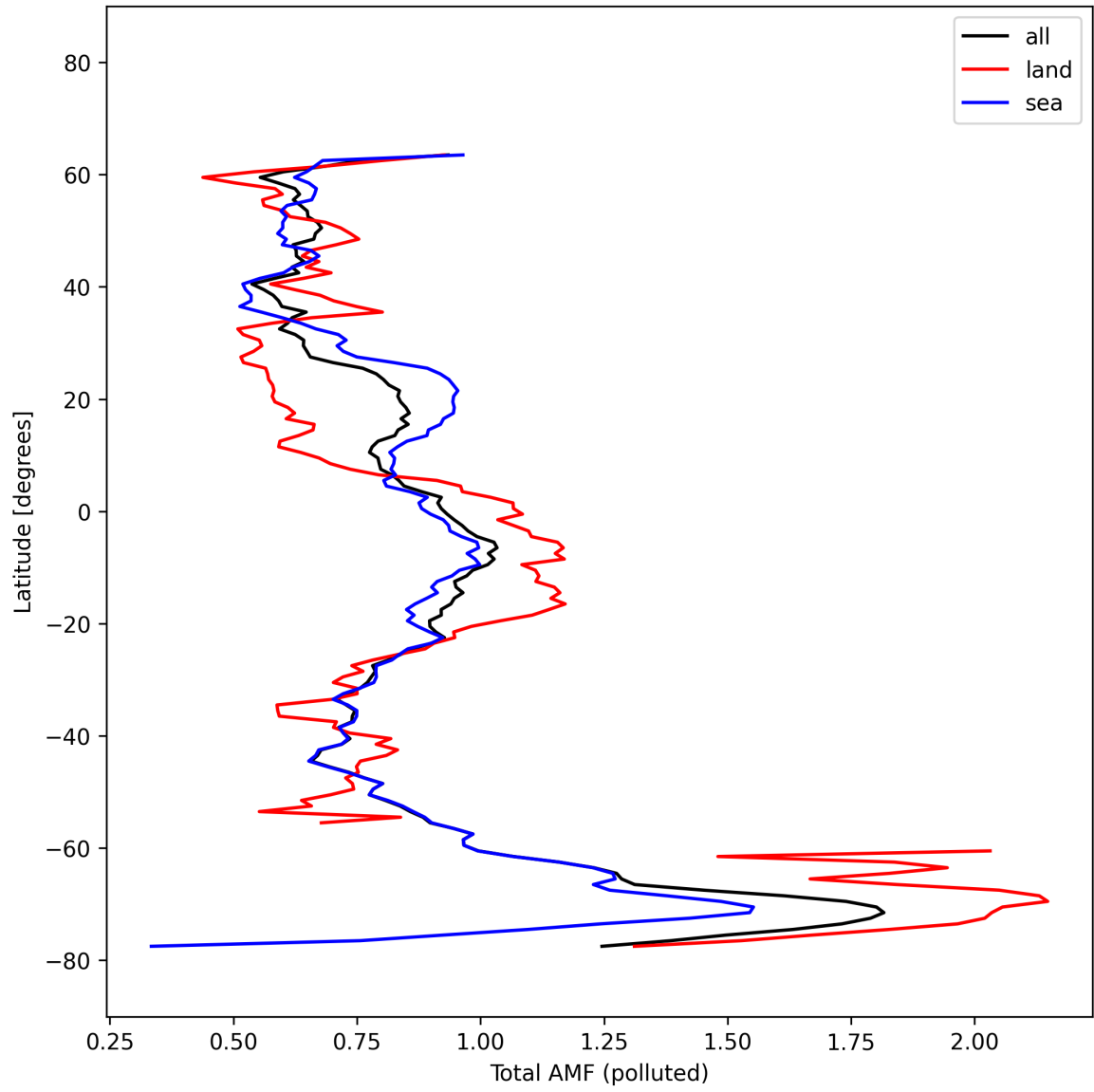


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-02 to 2025-03-03.

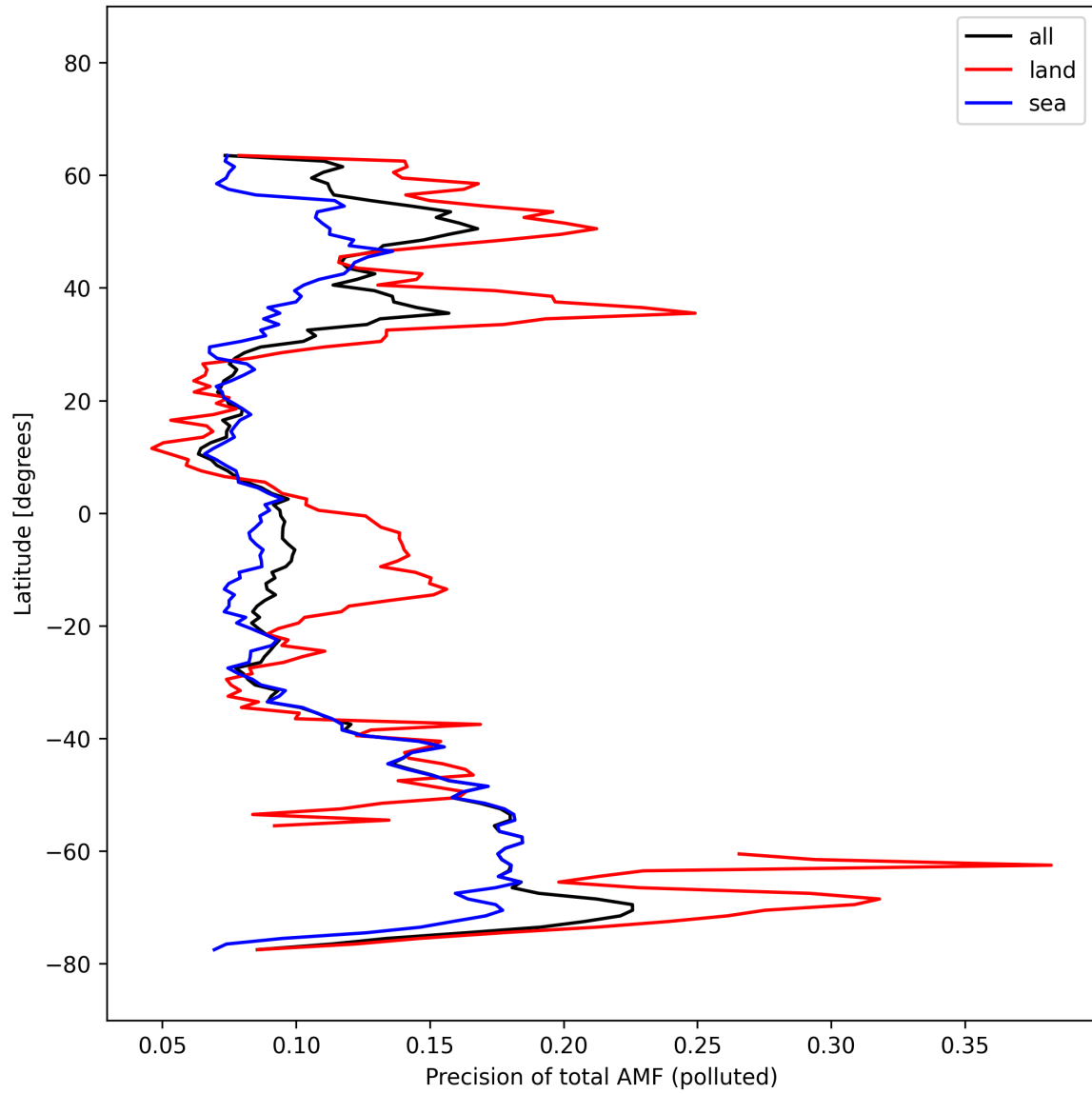


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-02 to 2025-03-03.

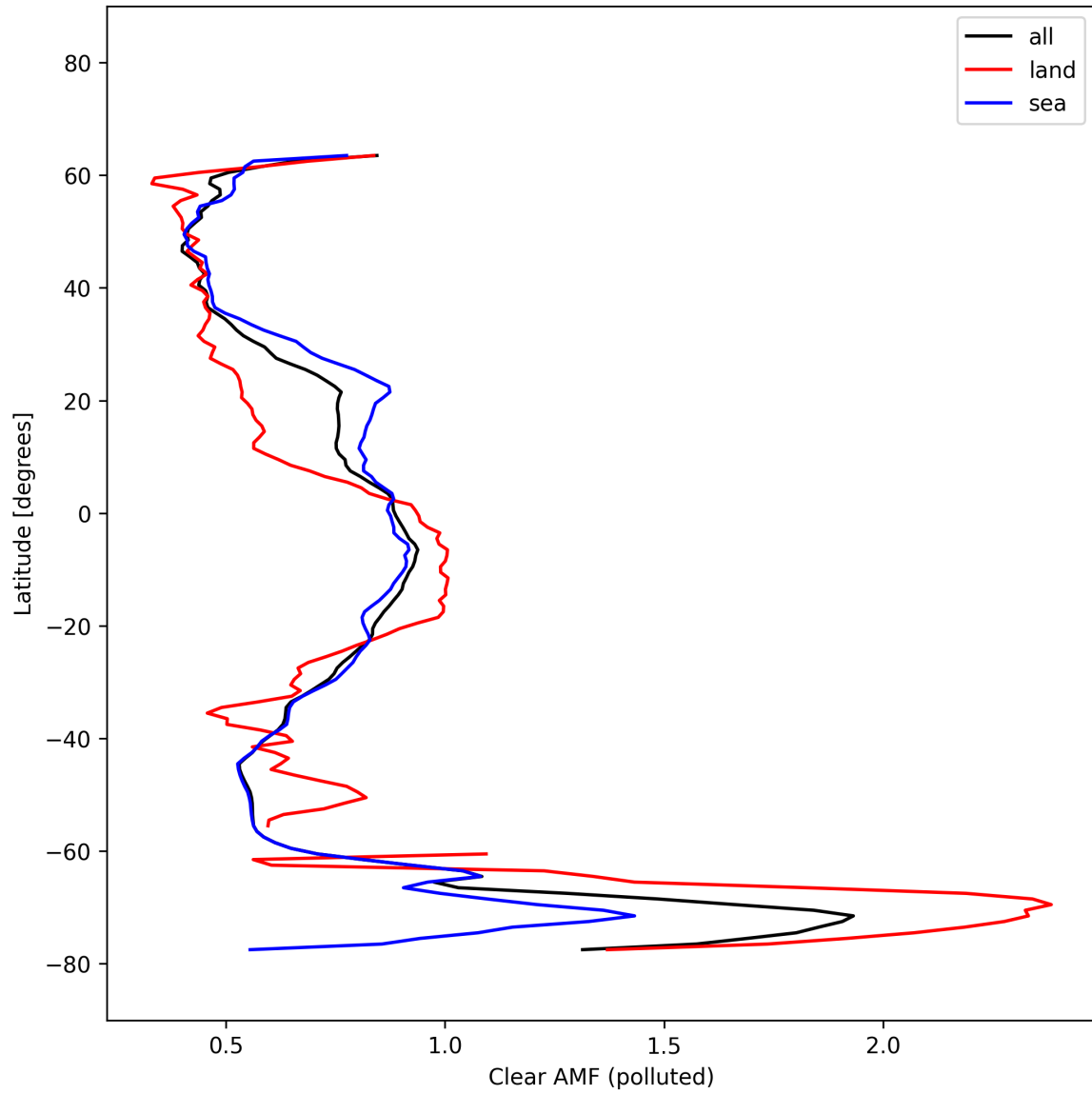


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-02 to 2025-03-03.

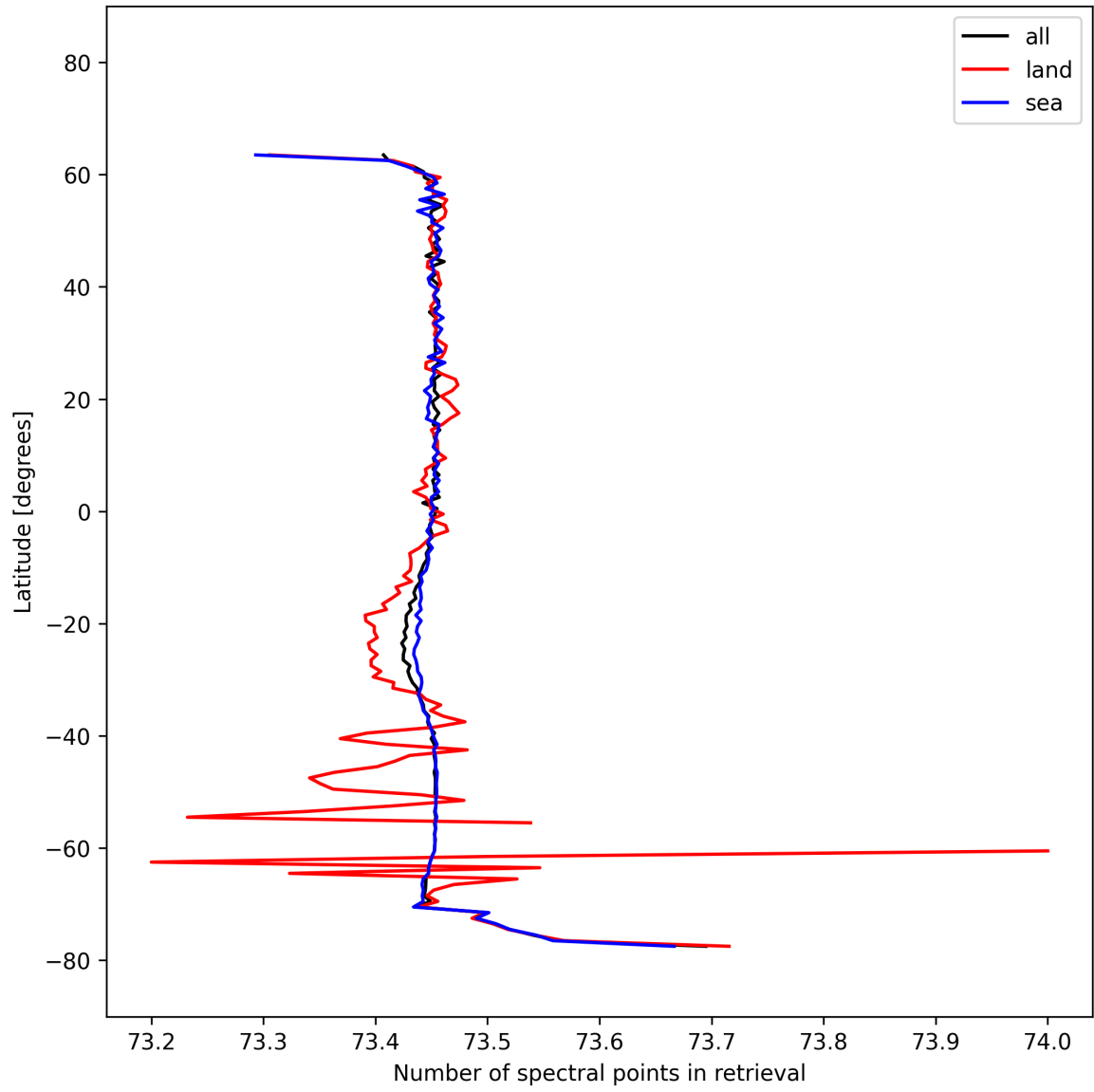


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-02 to 2025-03-03.

8 Histograms

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

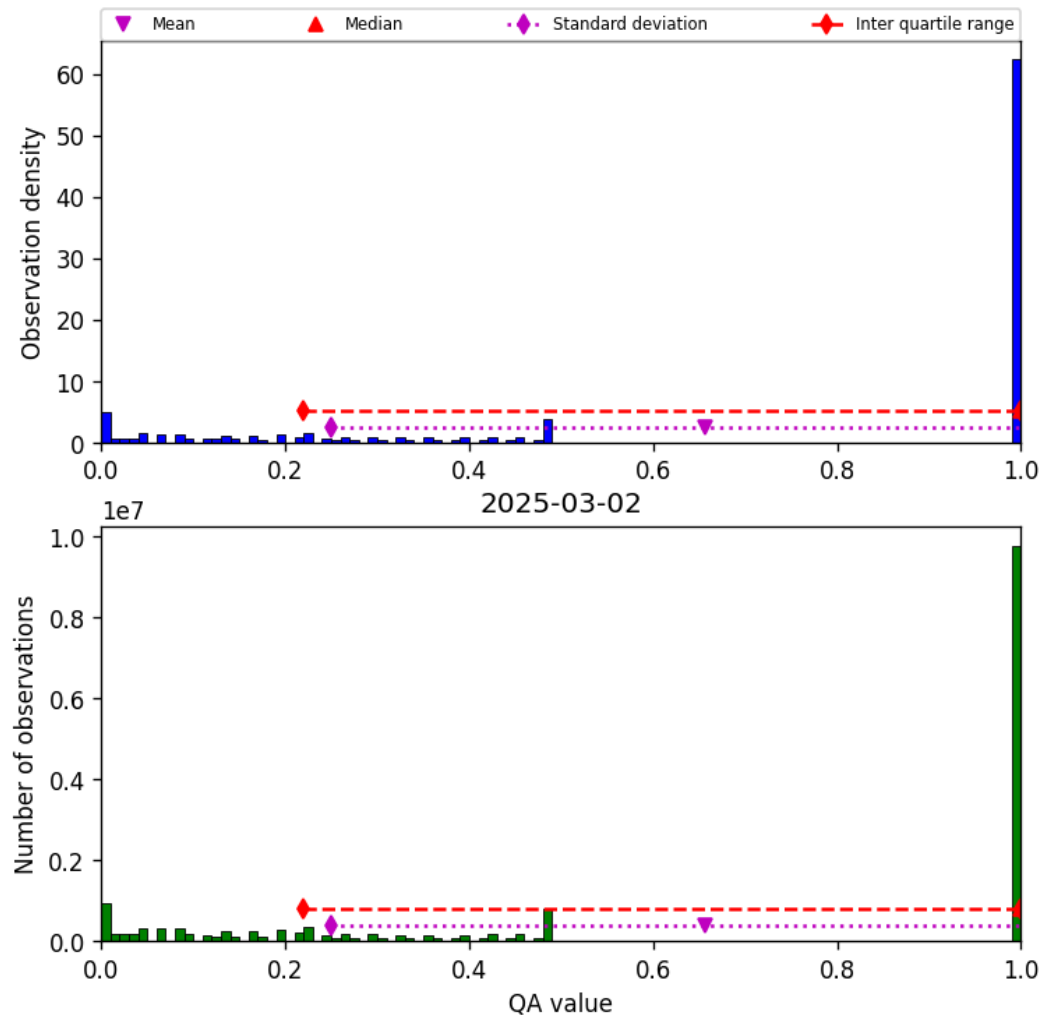


Figure 57: Histogram of “QA value” for 2025-03-02 to 2025-03-03

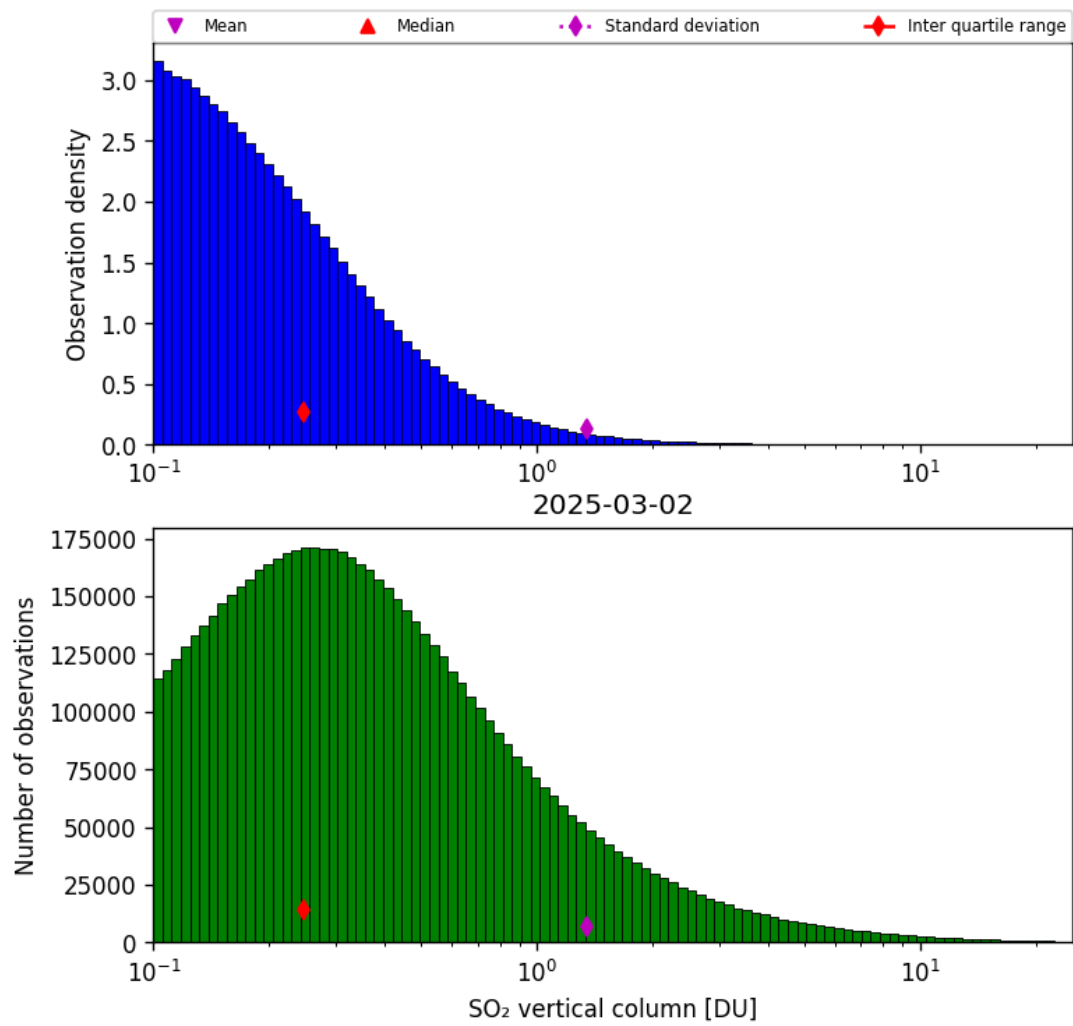


Figure 58: Histogram of “SO₂ vertical column” for 2025-03-02 to 2025-03-03

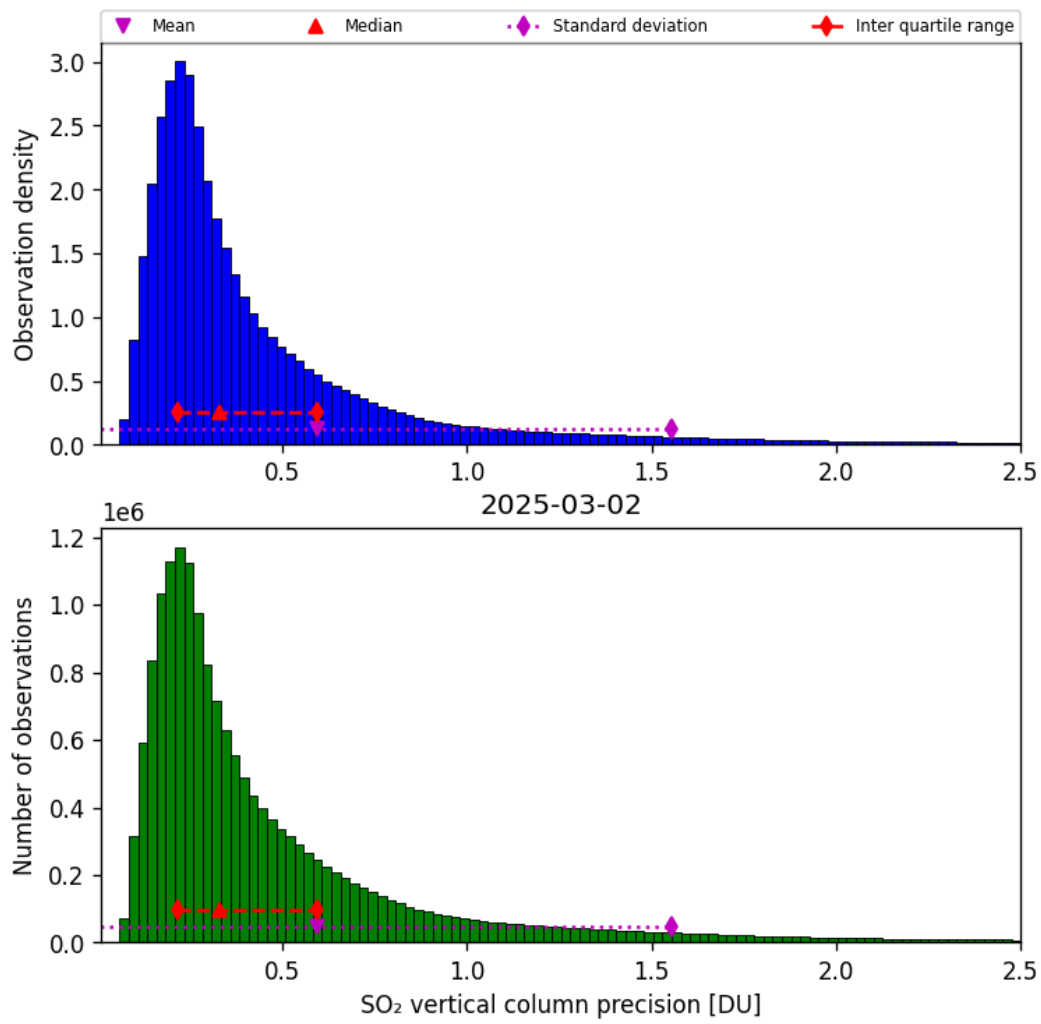


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-03-02 to 2025-03-03

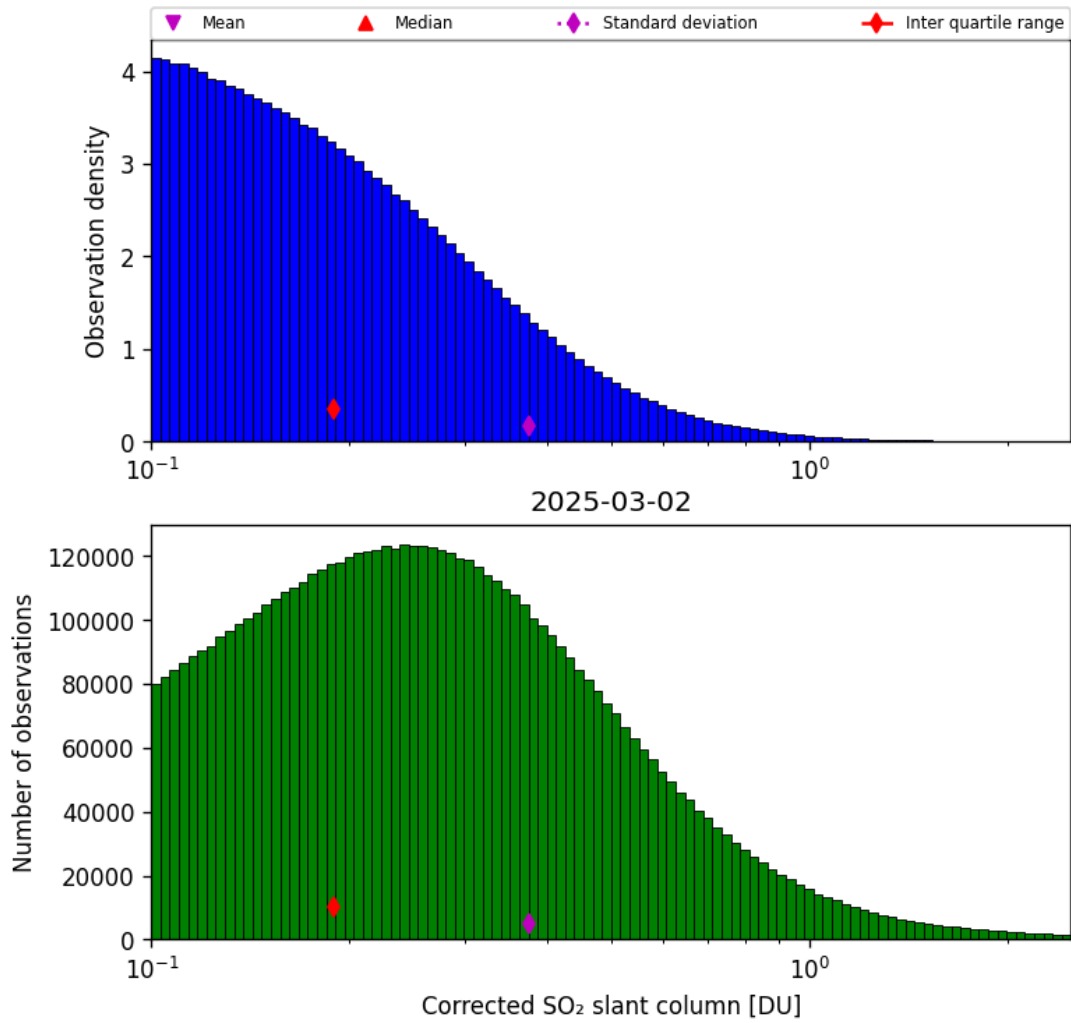


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-03-02 to 2025-03-03

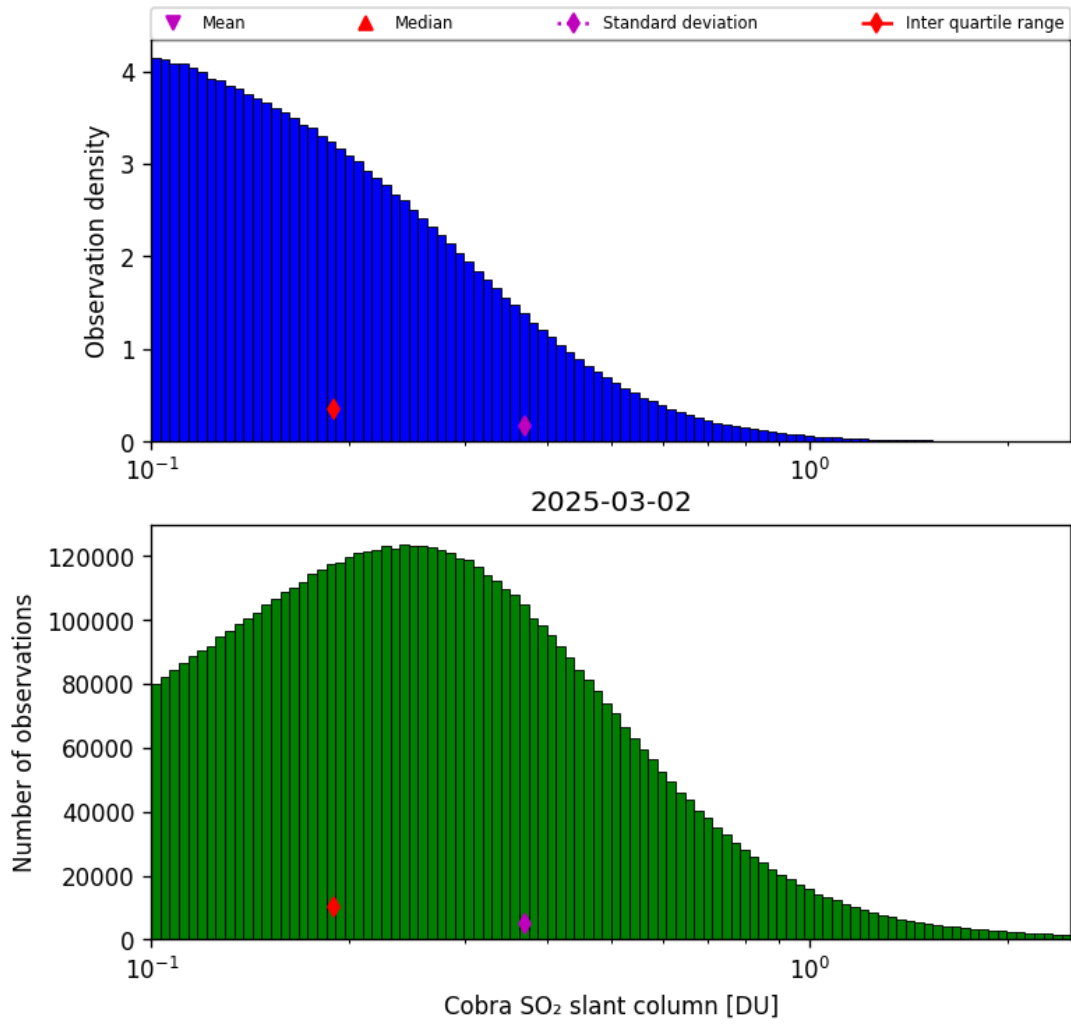


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-03-02 to 2025-03-03

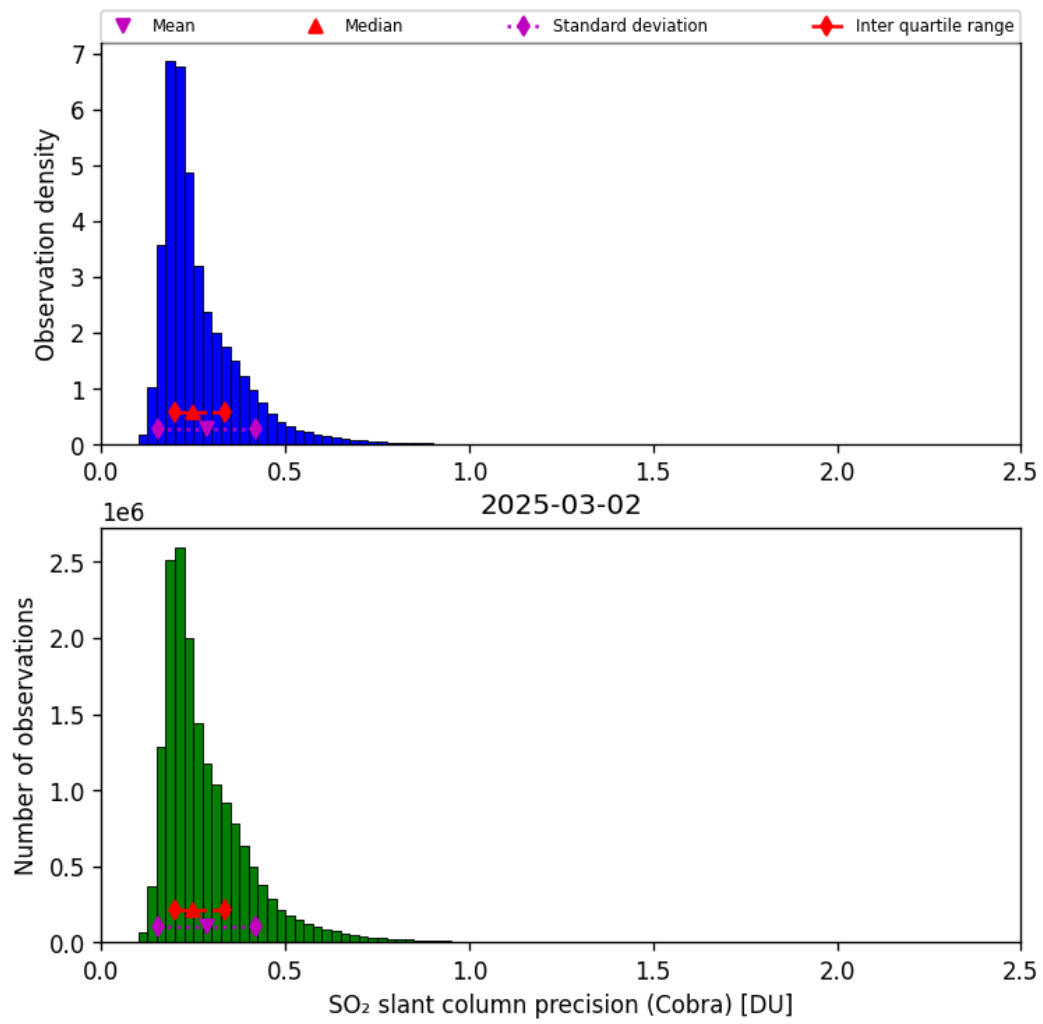


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-03-02 to 2025-03-03

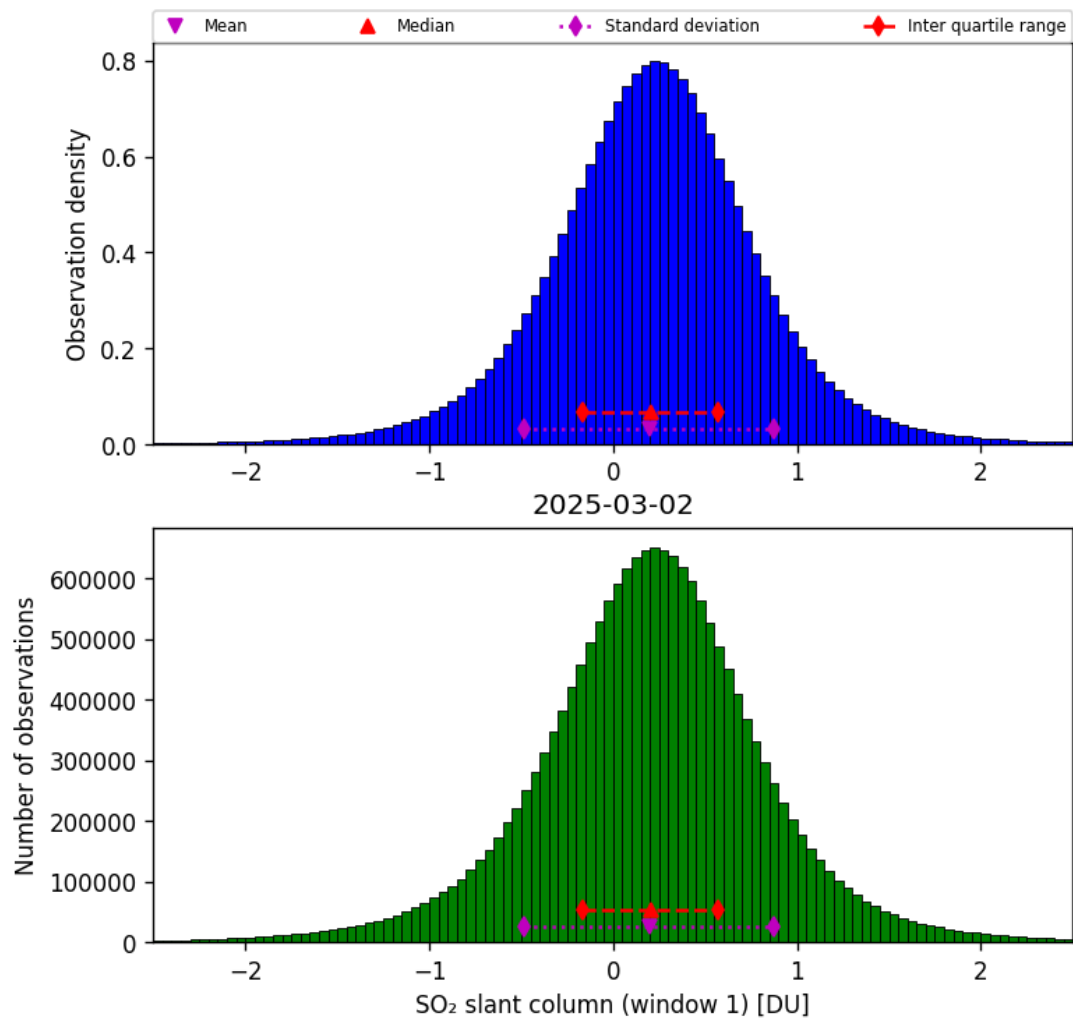


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-03-02 to 2025-03-03

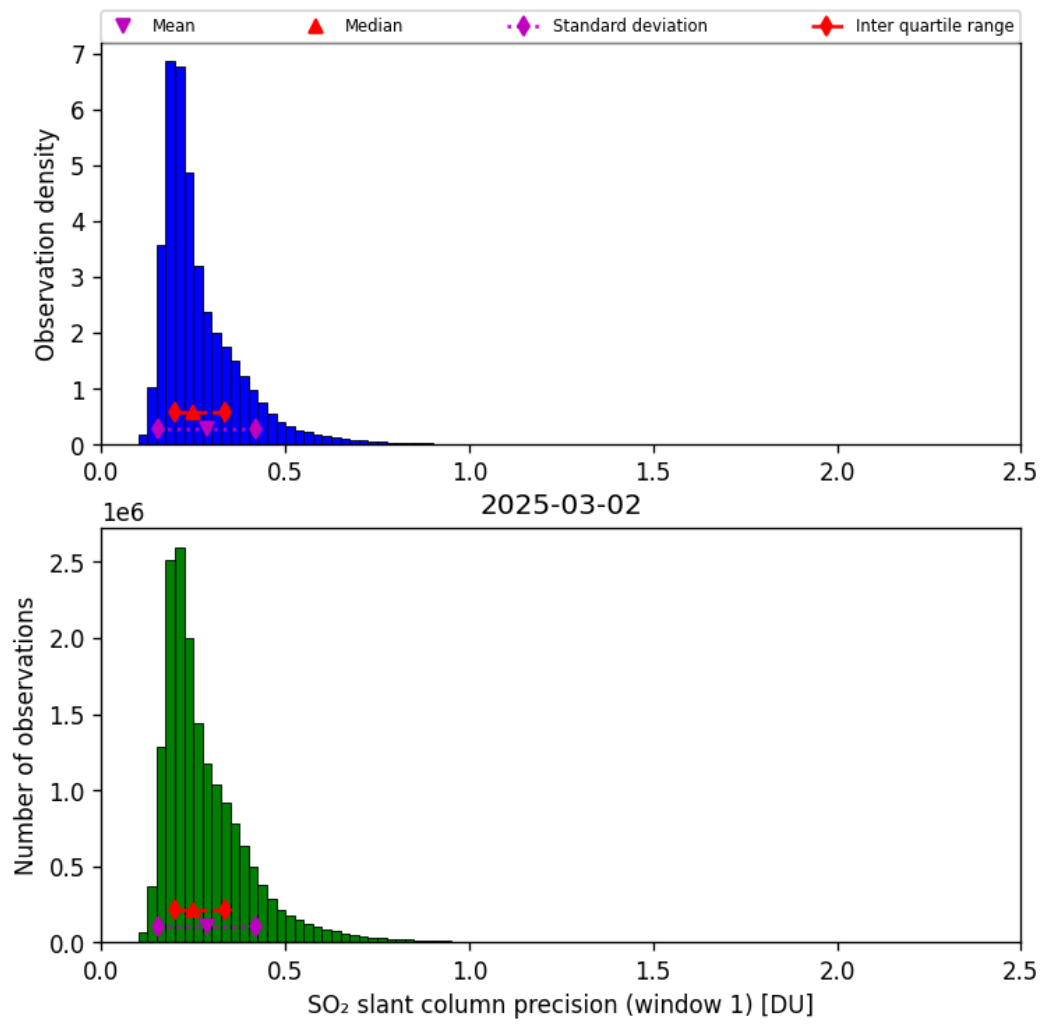


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-03-02 to 2025-03-03

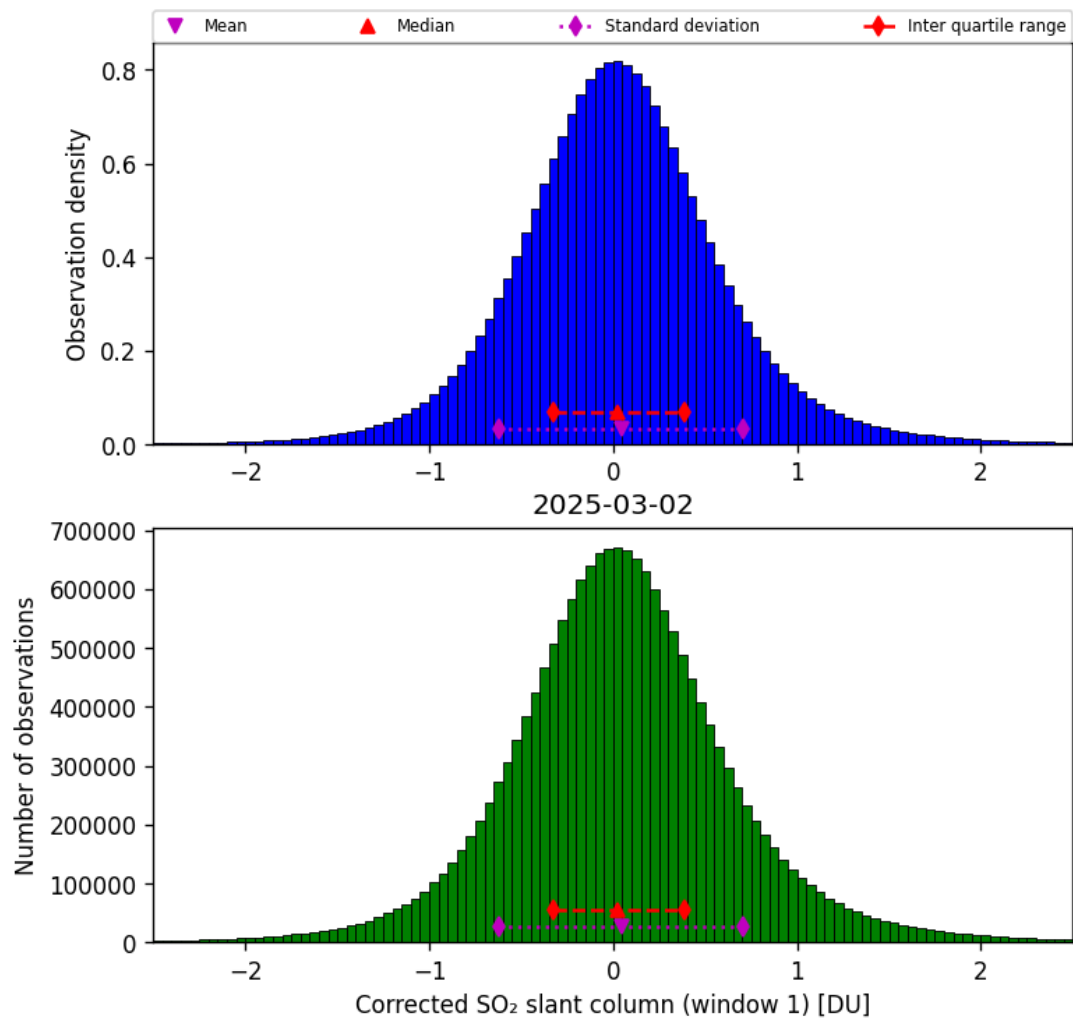


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-03-02 to 2025-03-03

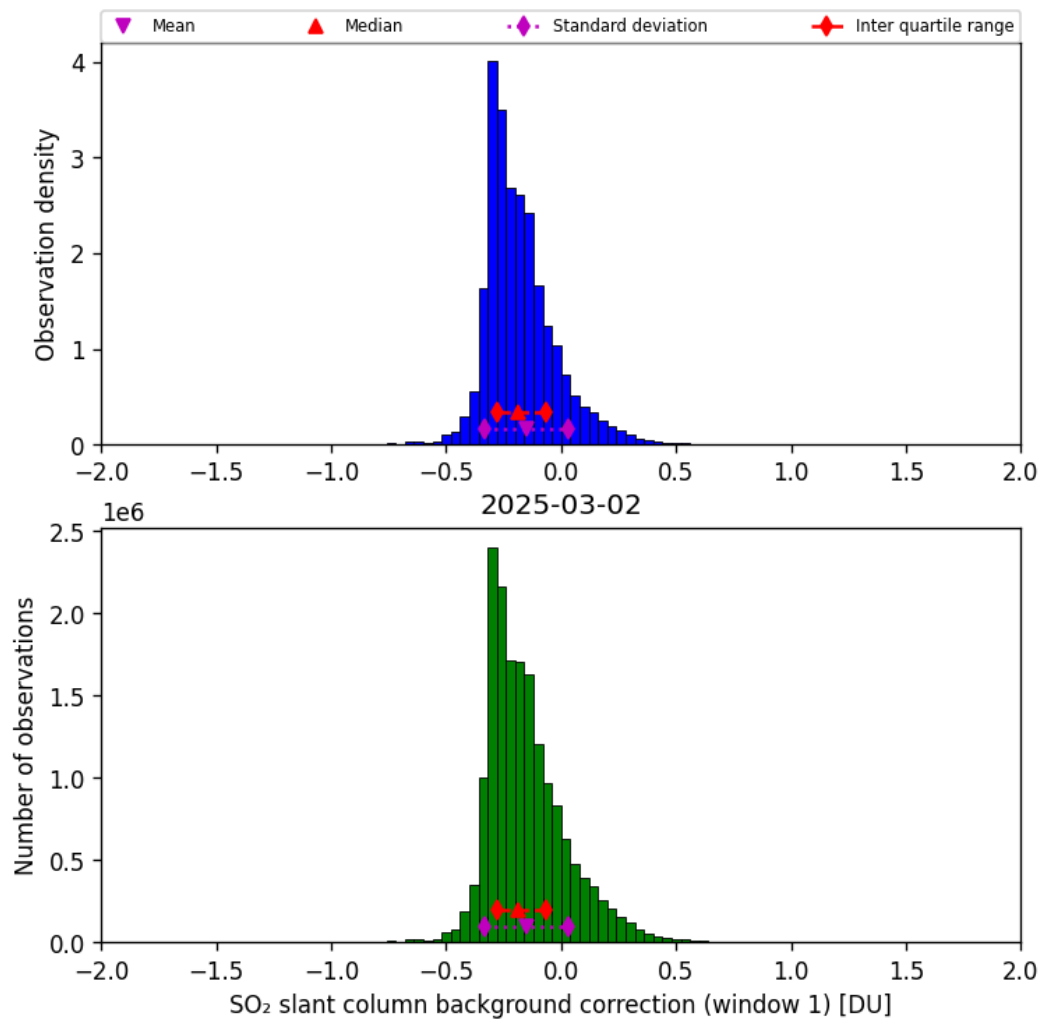


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-03-02 to 2025-03-03

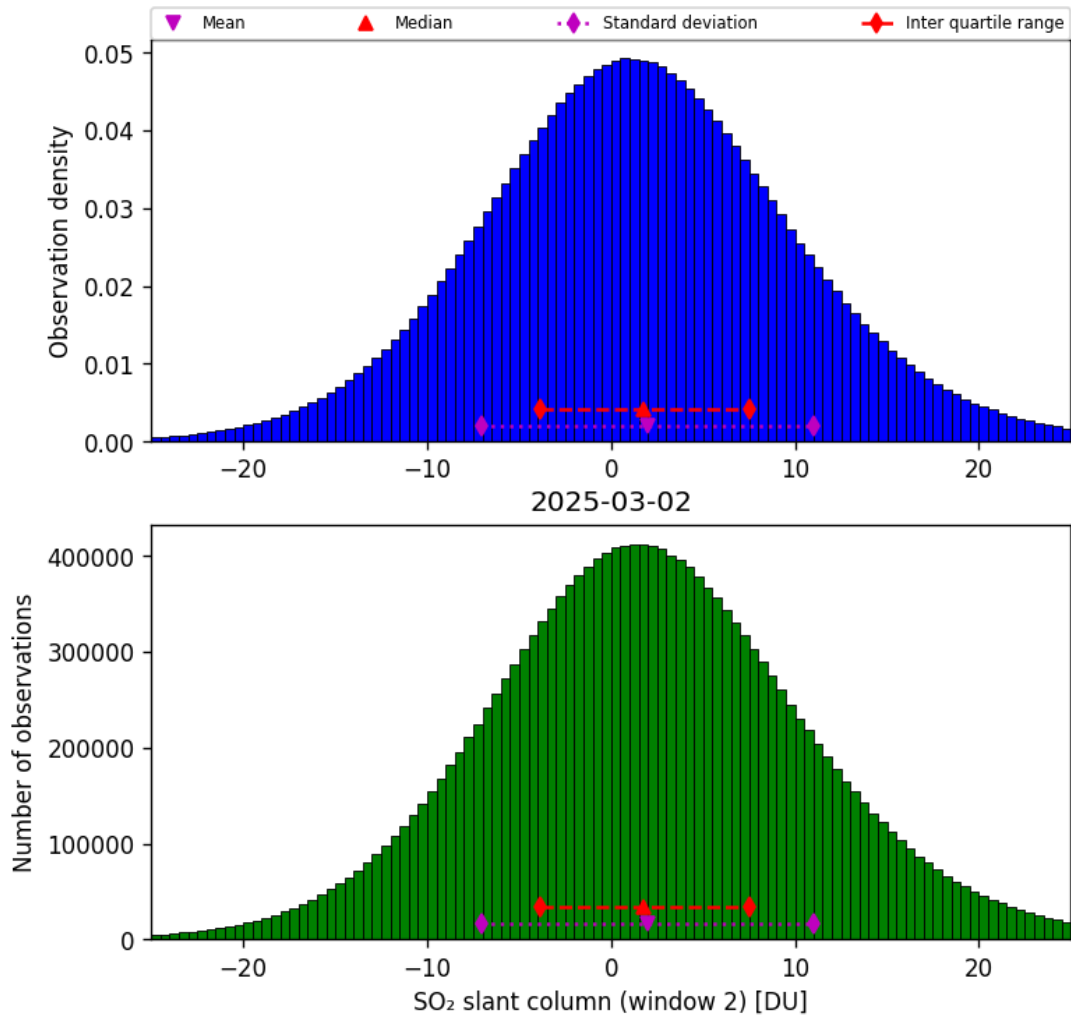


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-03-02 to 2025-03-03

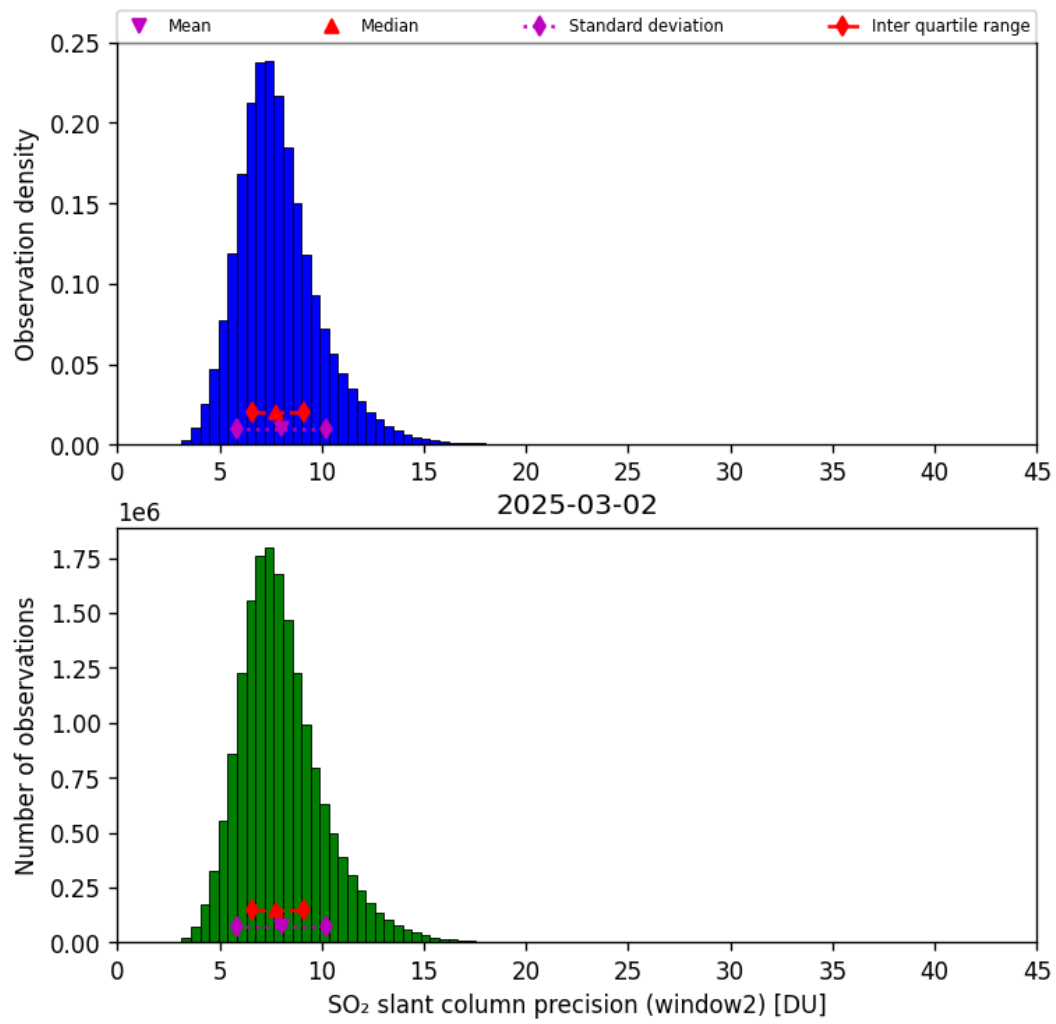


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-03-02 to 2025-03-03

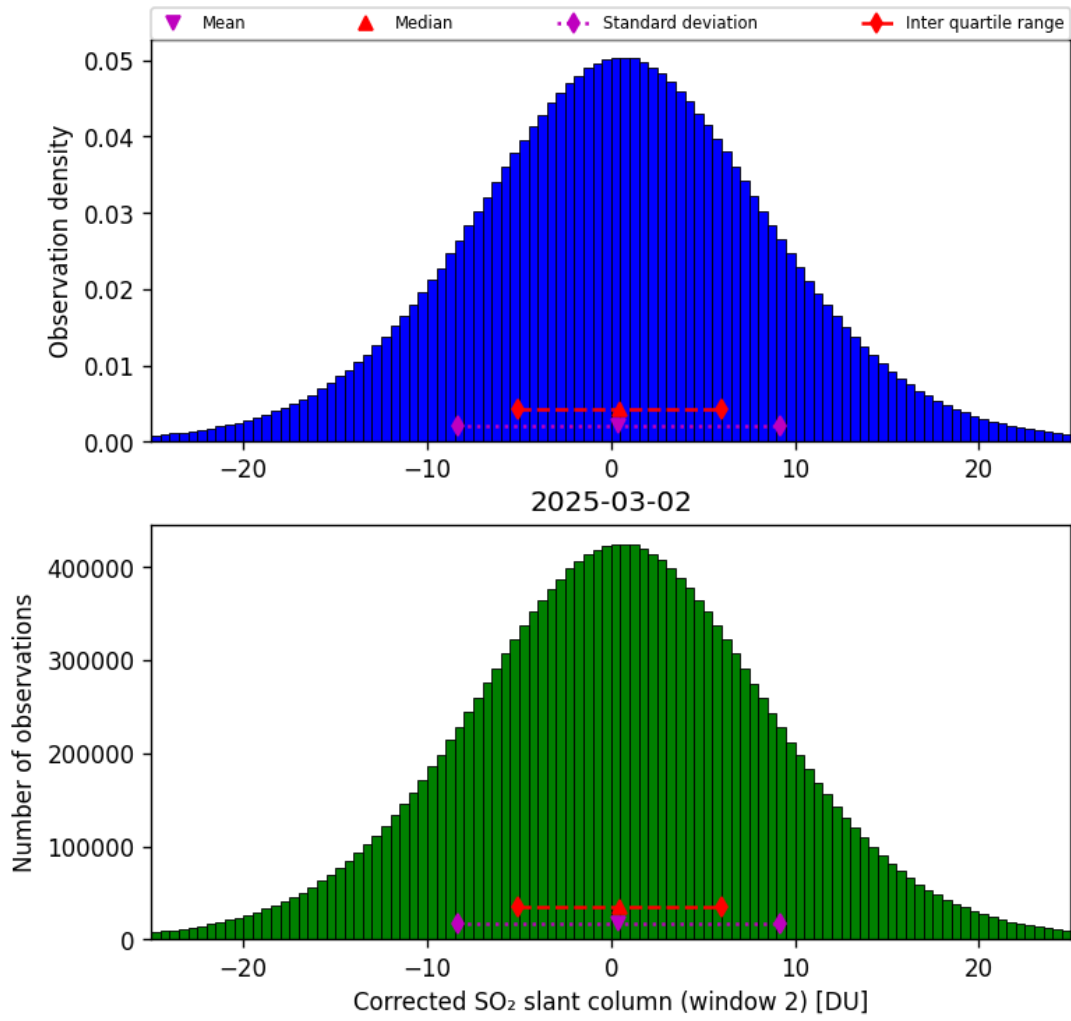


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-03-02 to 2025-03-03

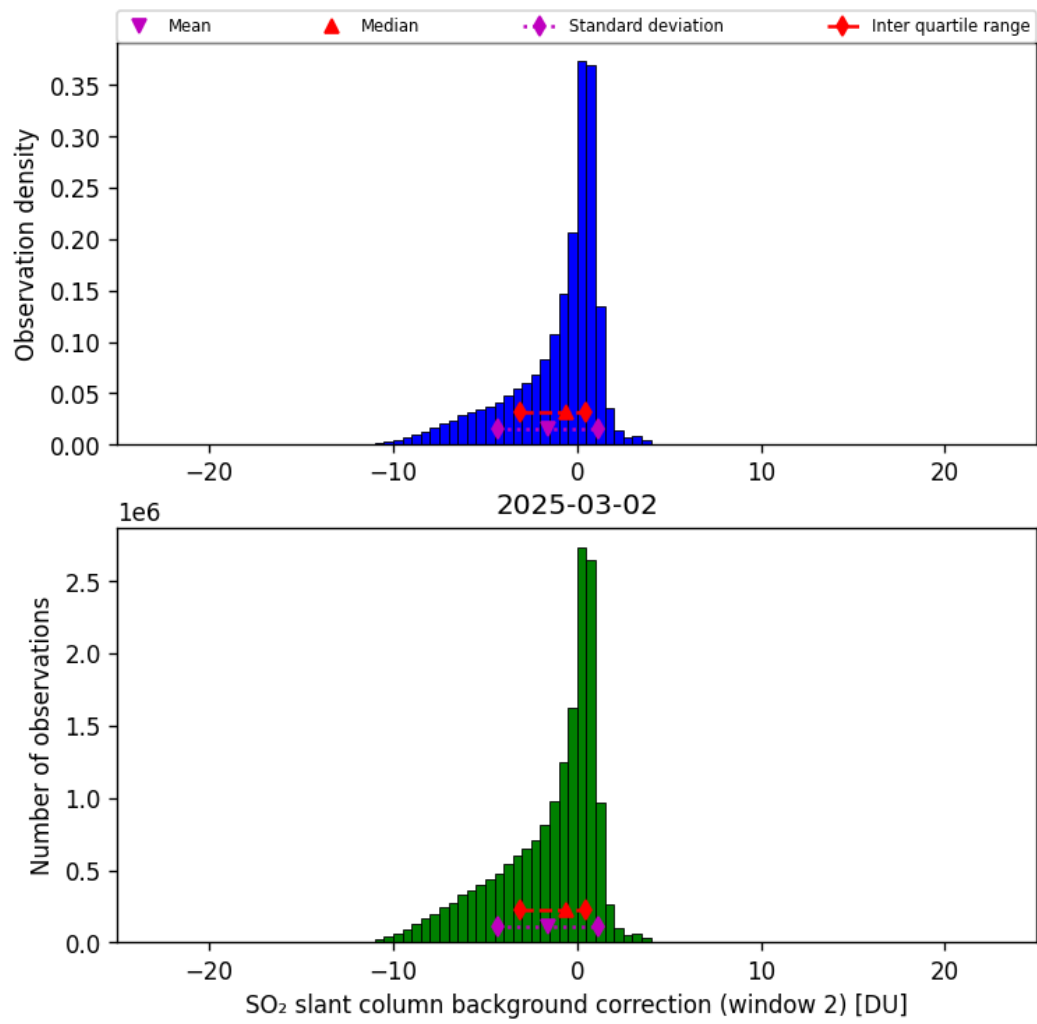


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-03-02 to 2025-03-03

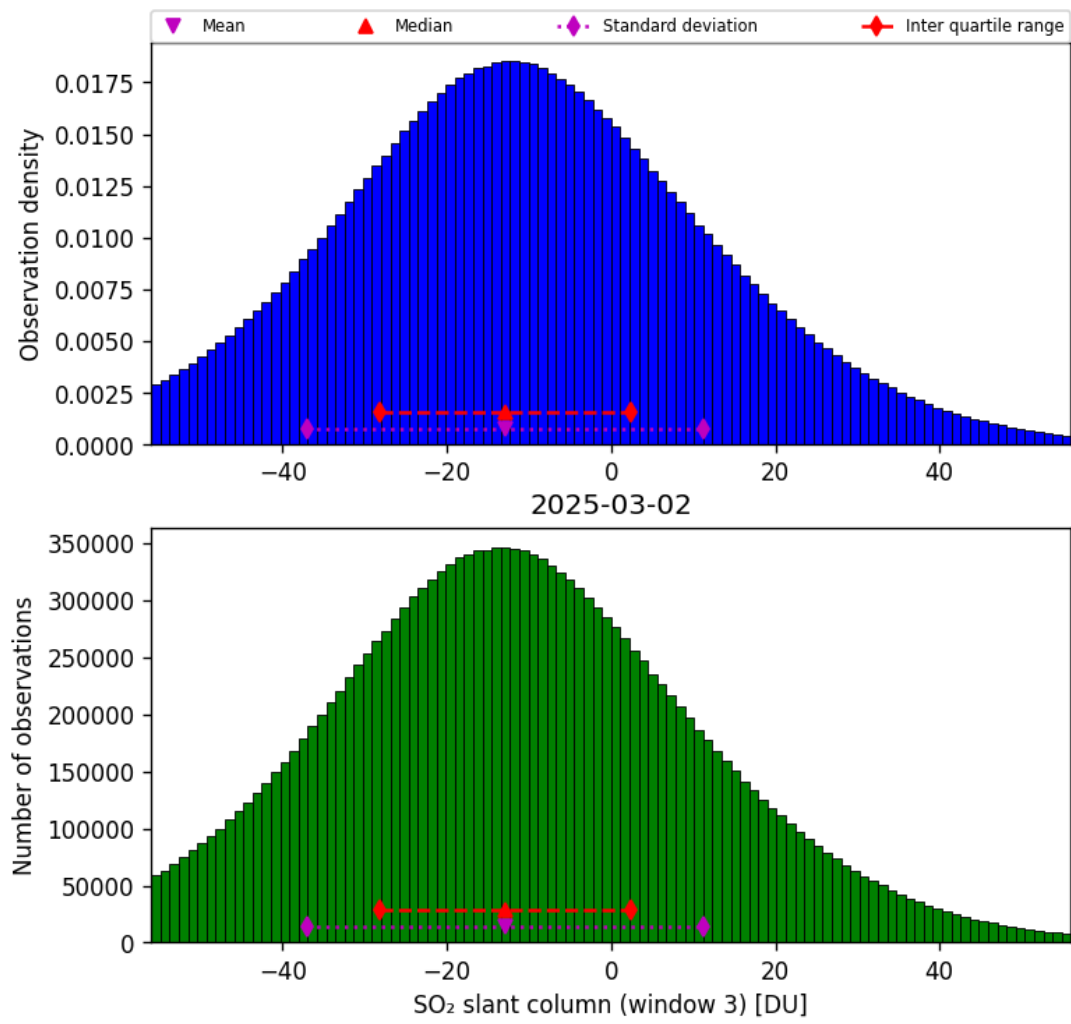


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-03-02 to 2025-03-03

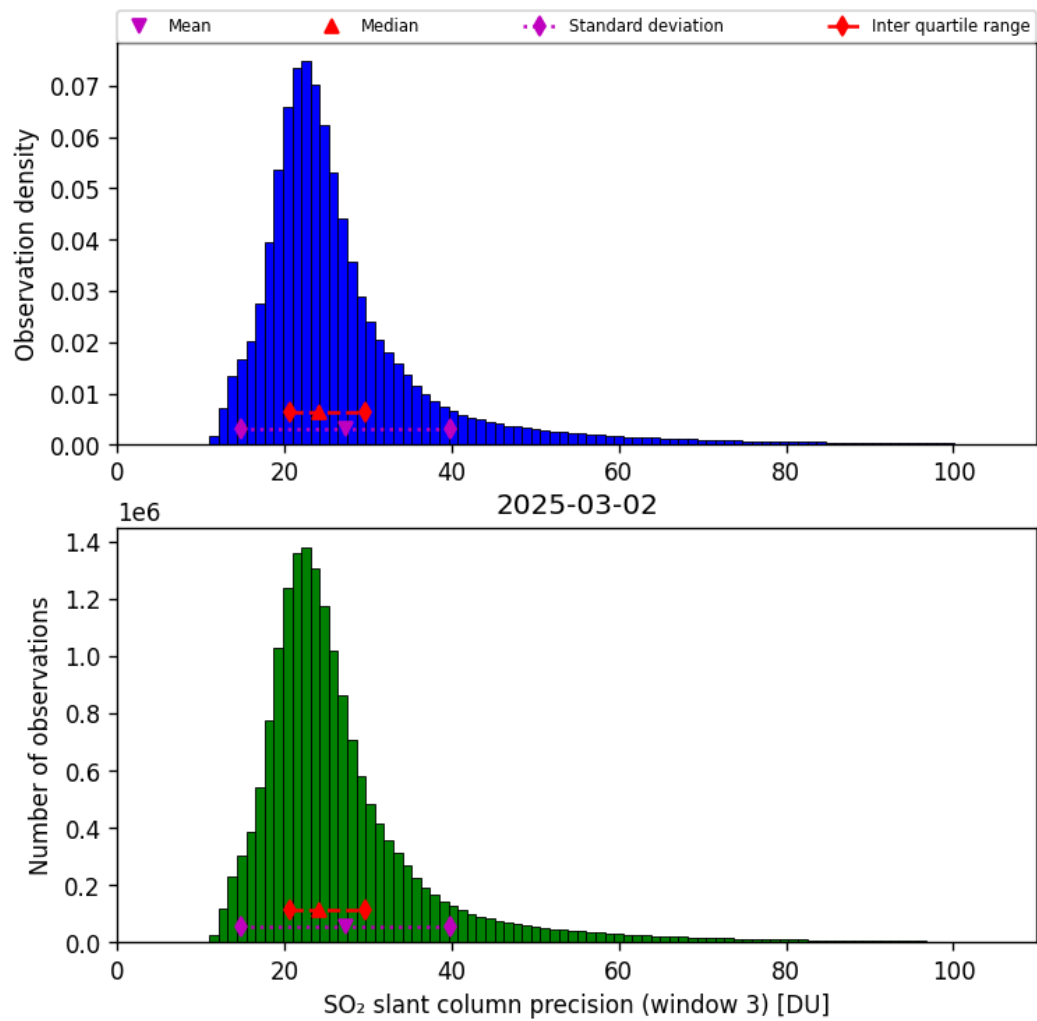


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-03-02 to 2025-03-03

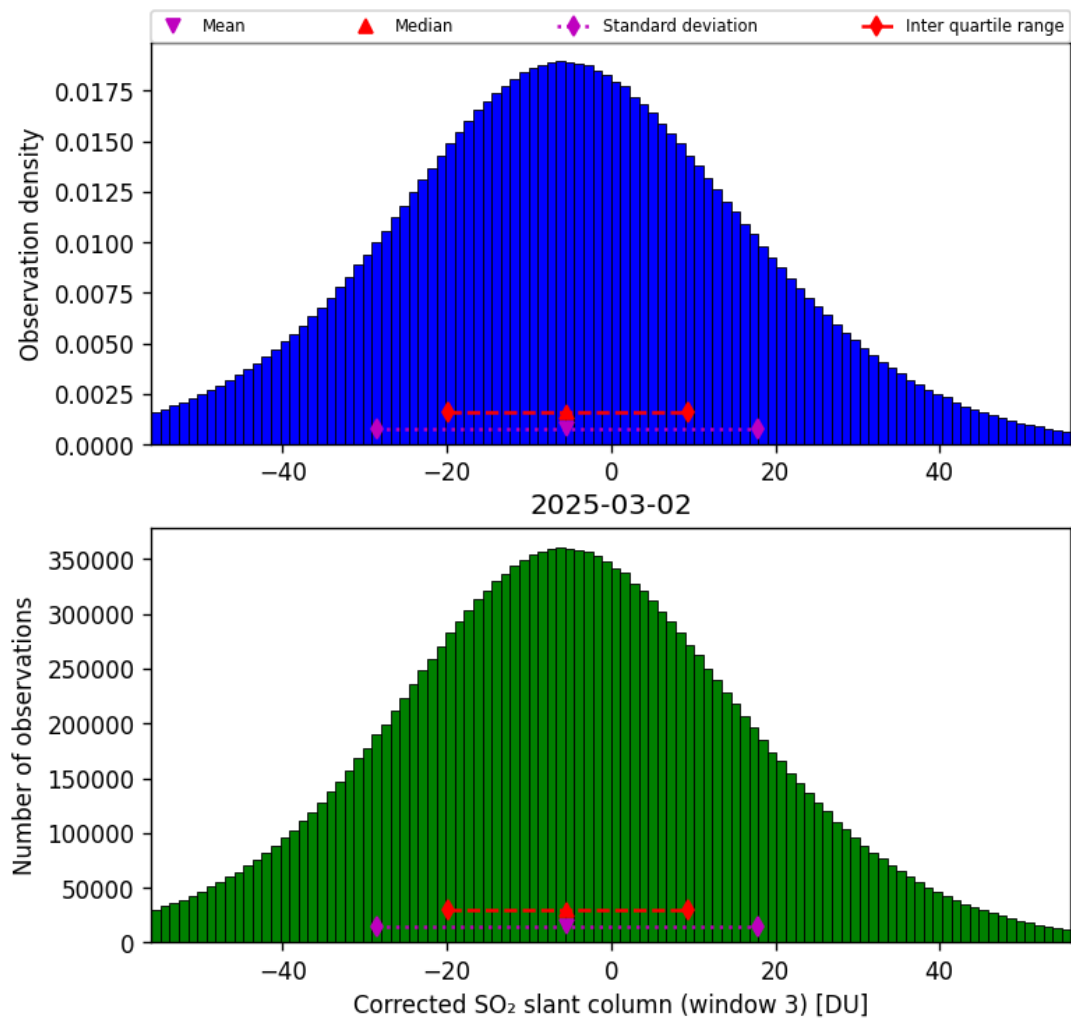


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-03-02 to 2025-03-03

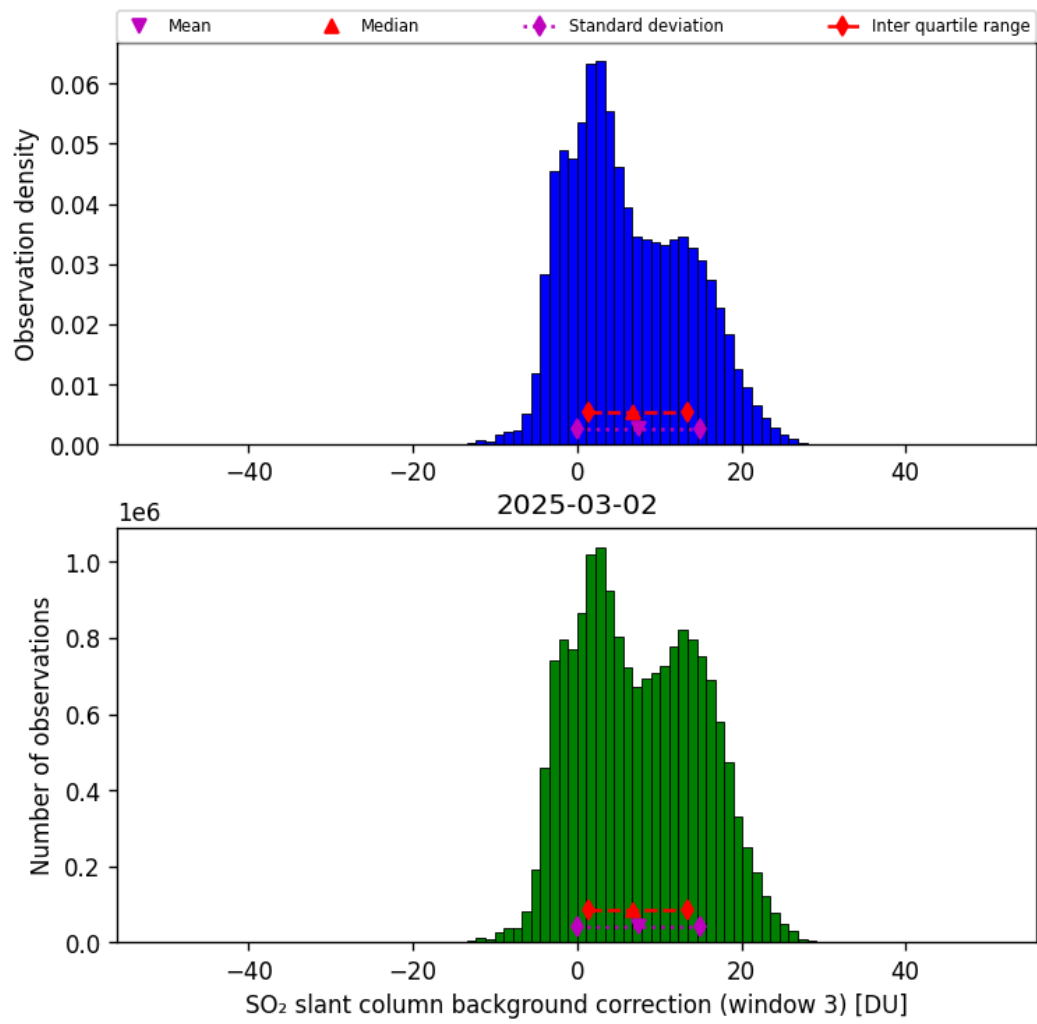


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-03-02 to 2025-03-03

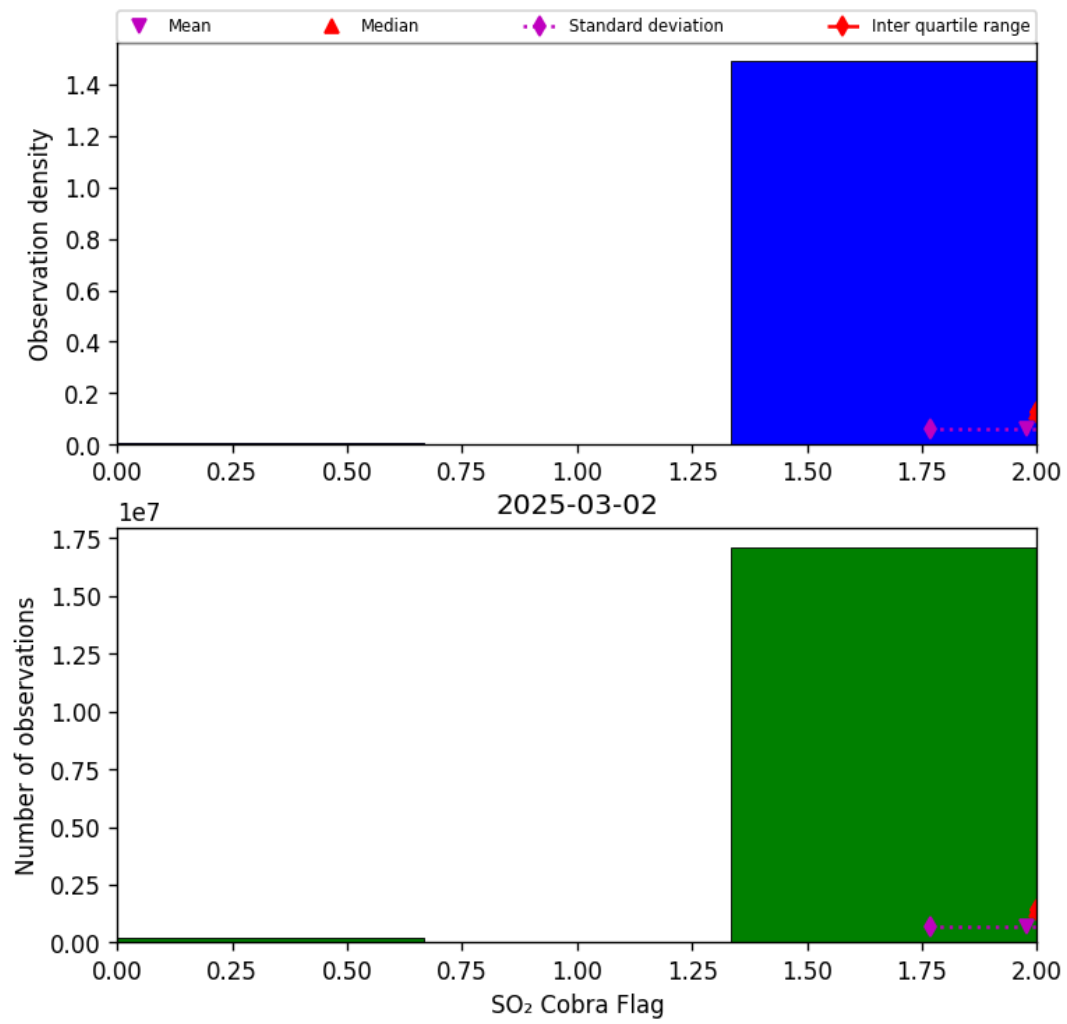


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-03-02 to 2025-03-03

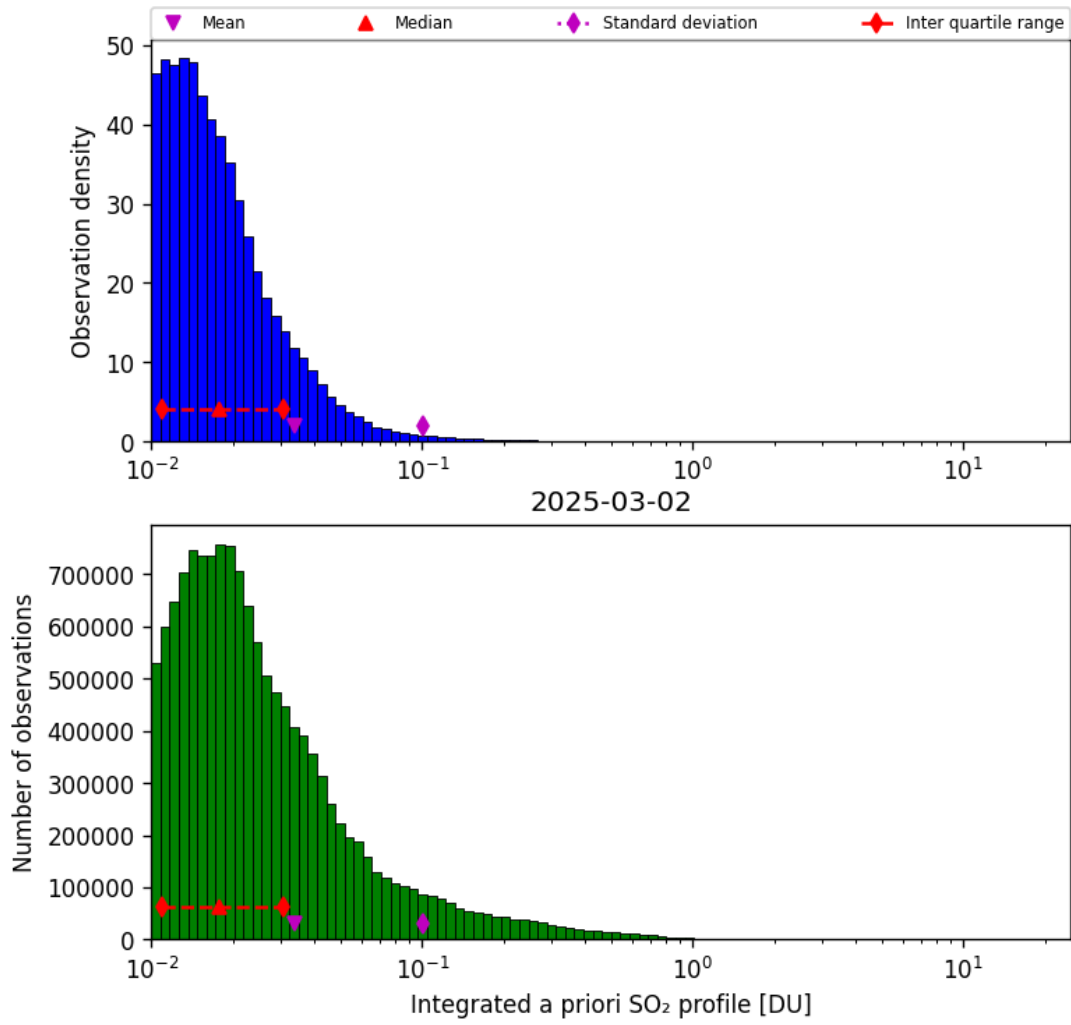


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-03-02 to 2025-03-03

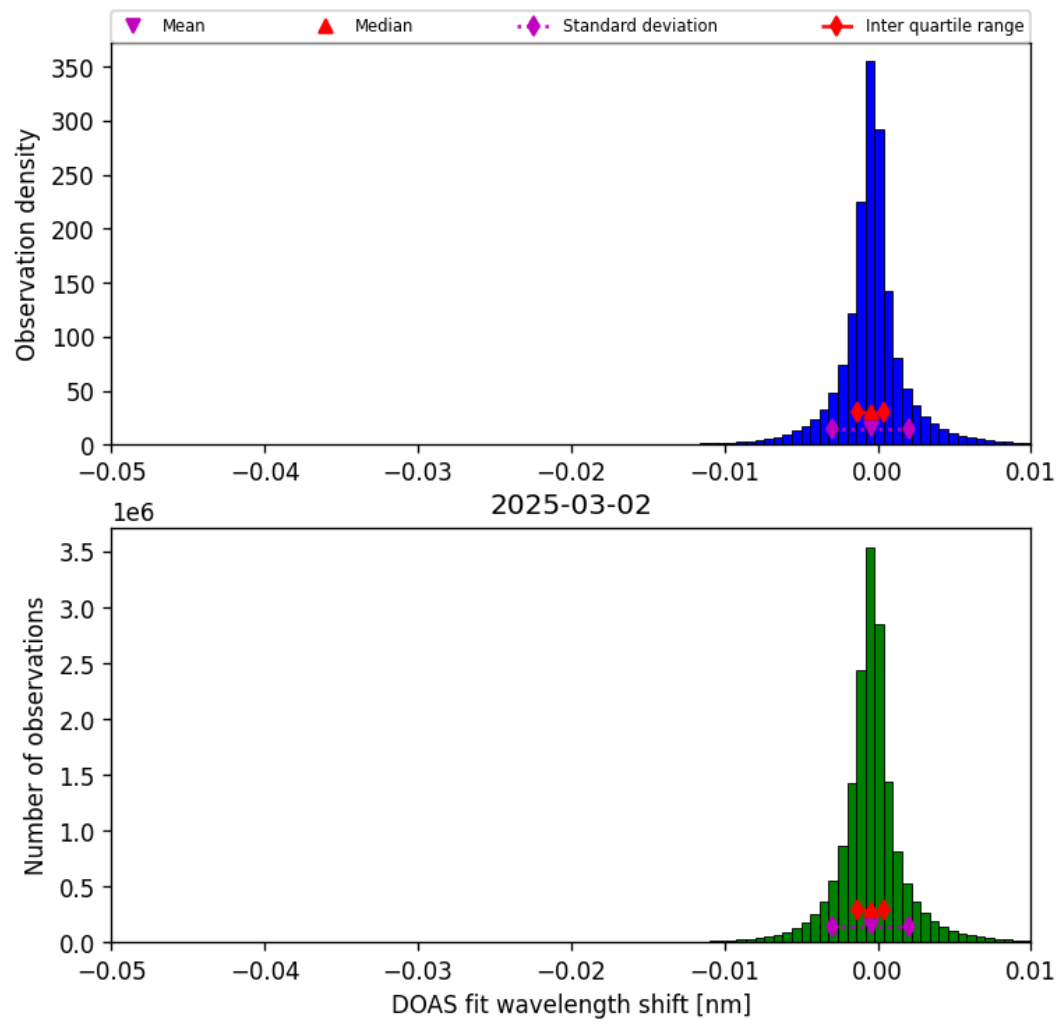


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-02 to 2025-03-03

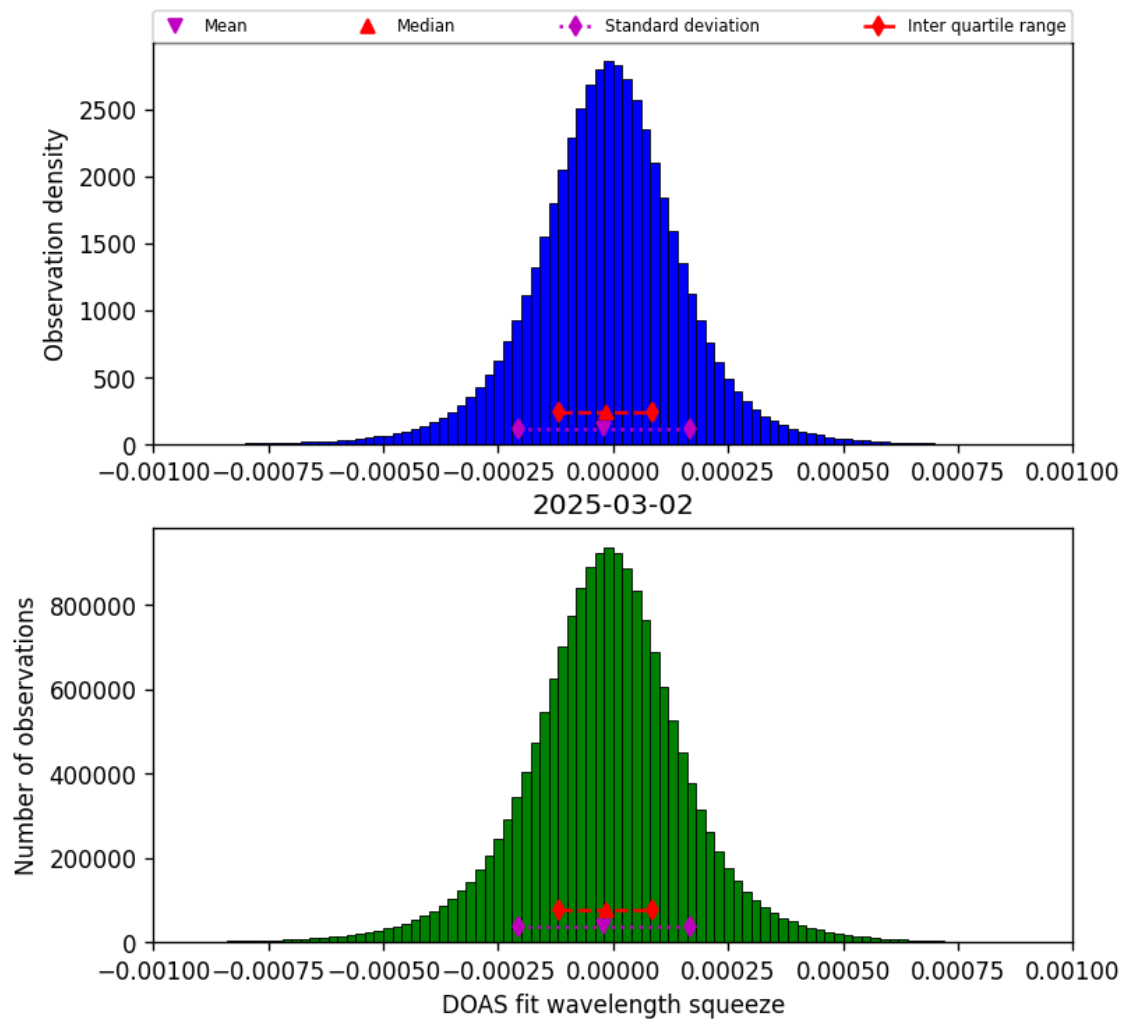


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-02 to 2025-03-03

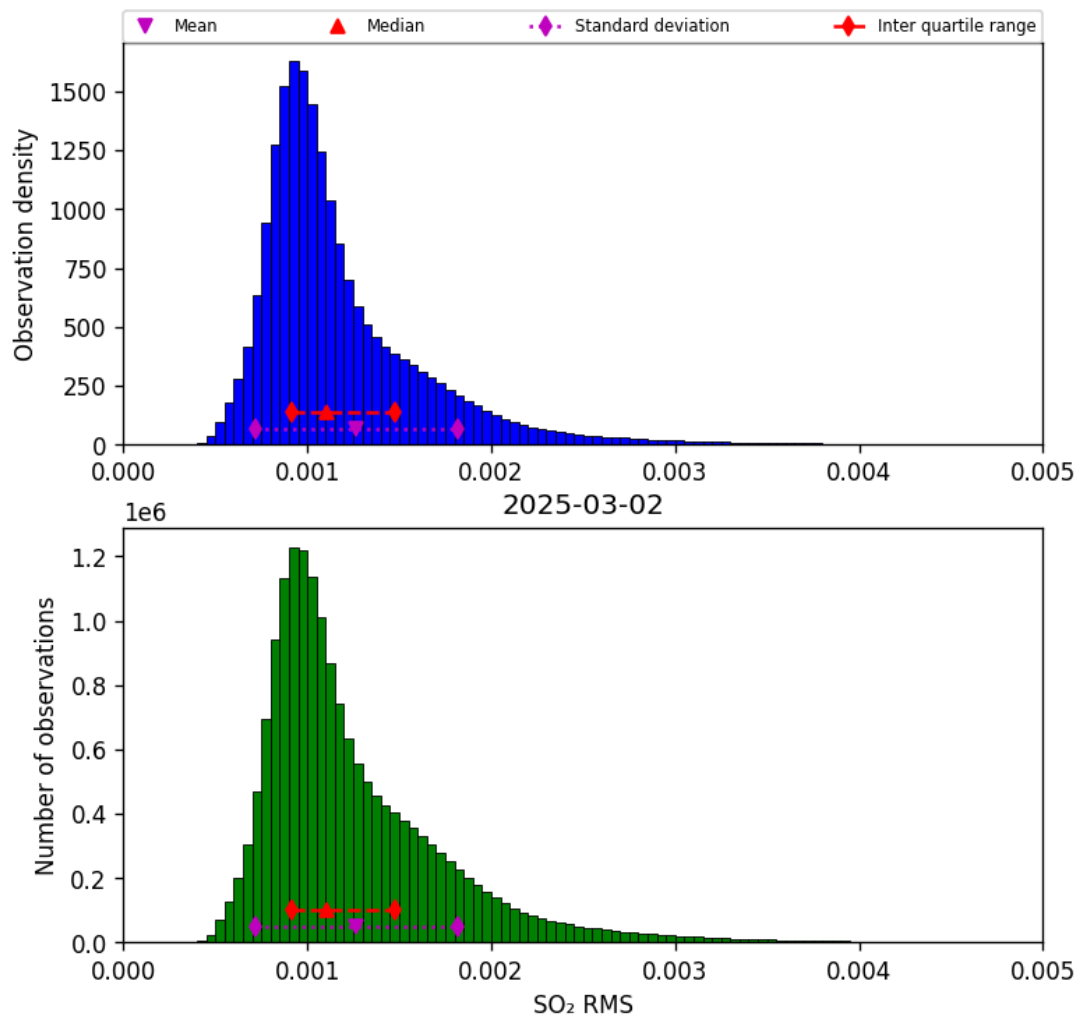


Figure 79: Histogram of “SO₂ RMS” for 2025-03-02 to 2025-03-03

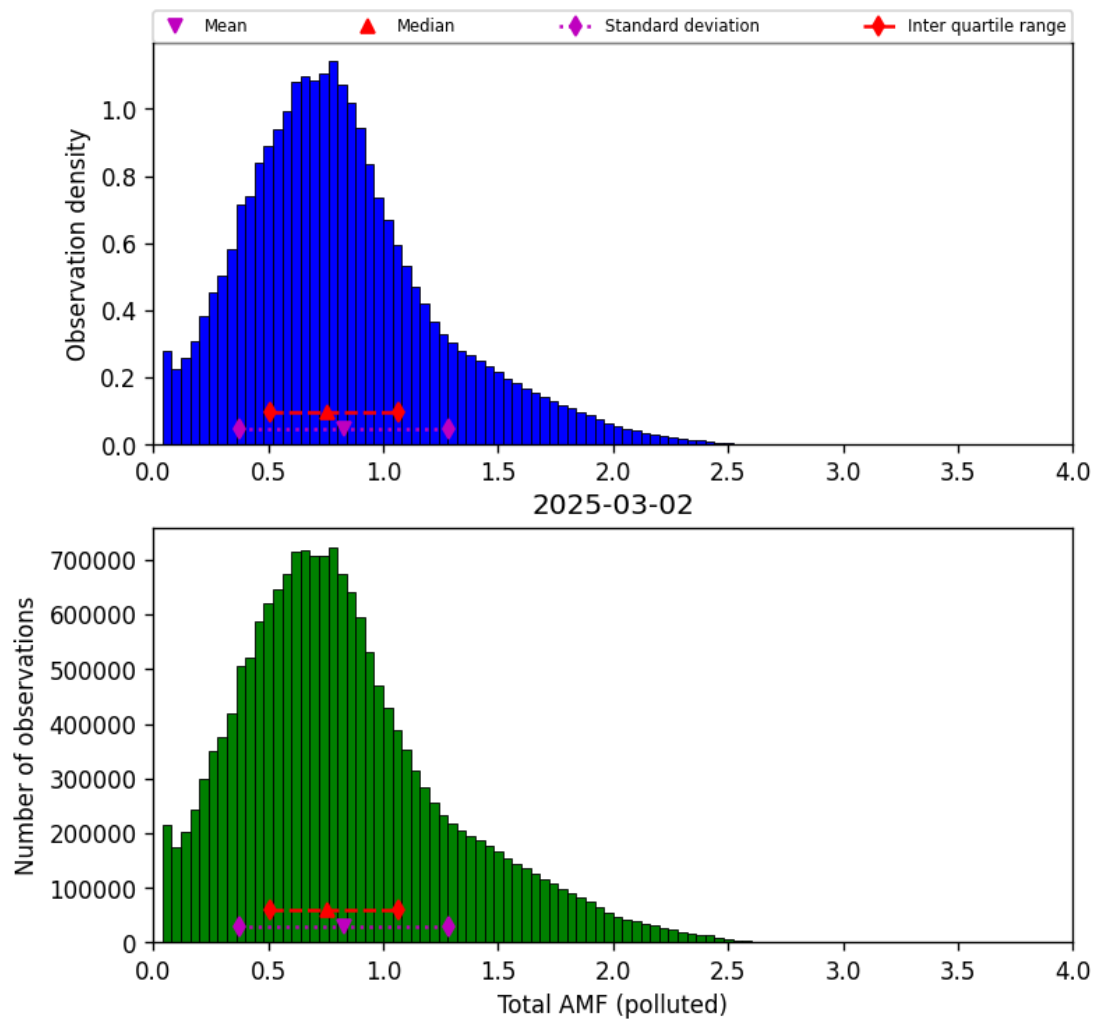


Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-02 to 2025-03-03

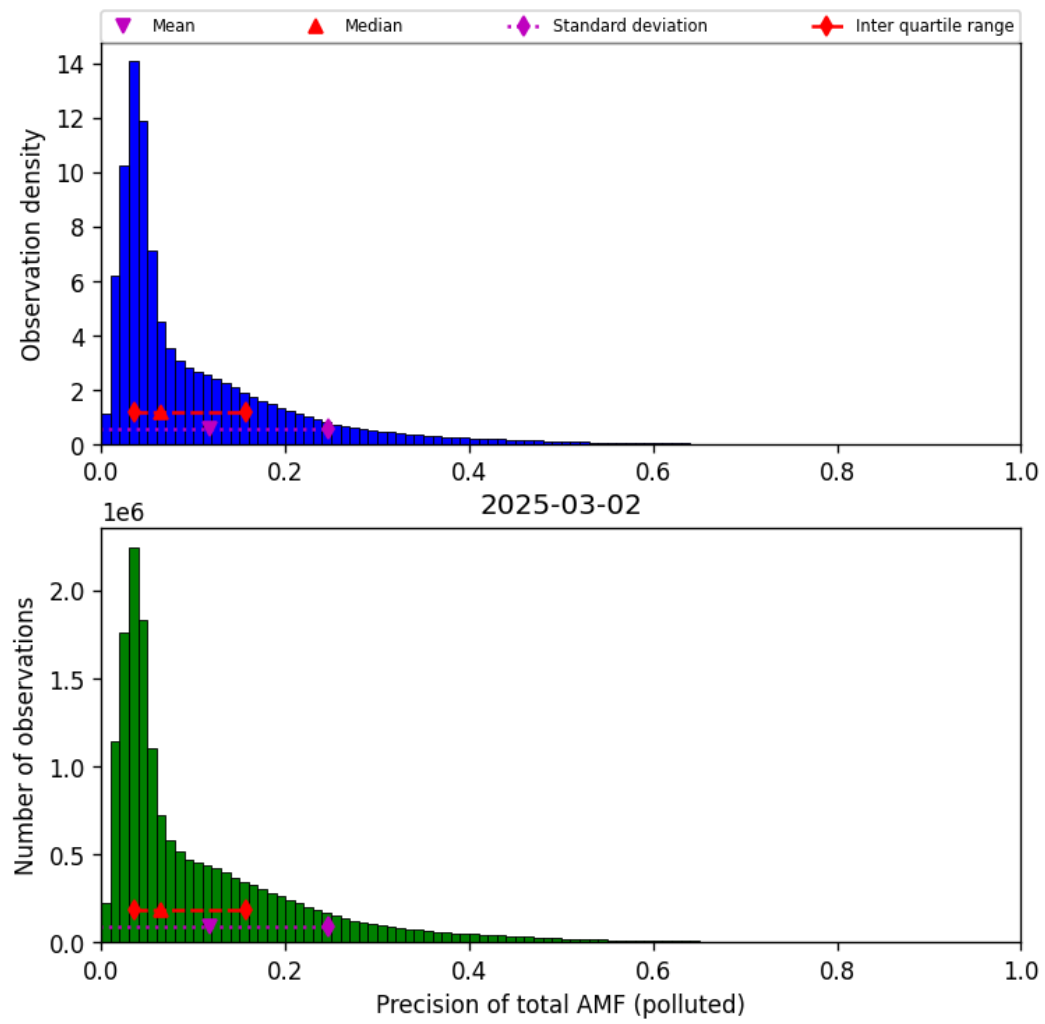


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-02 to 2025-03-03

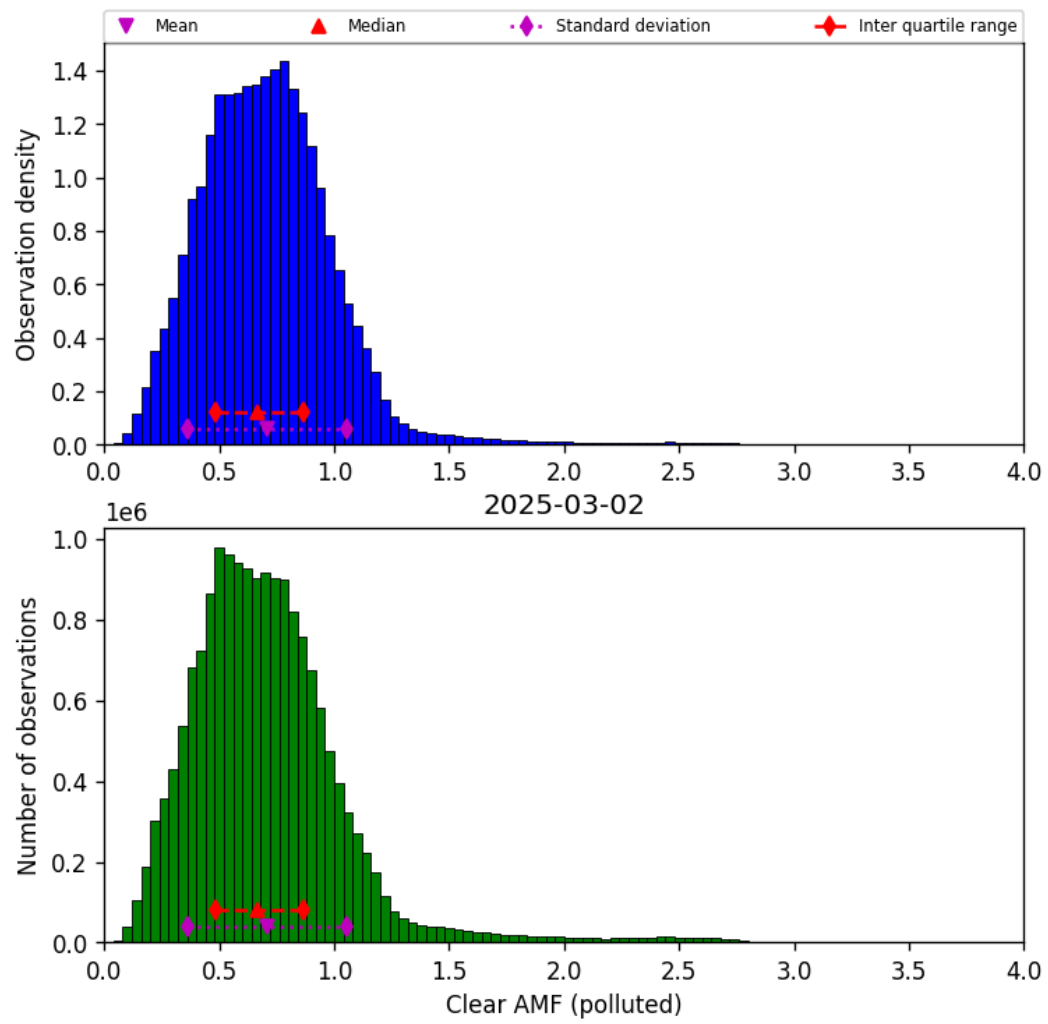


Figure 82: Histogram of "Clear AMF (polluted)" for 2025-03-02 to 2025-03-03

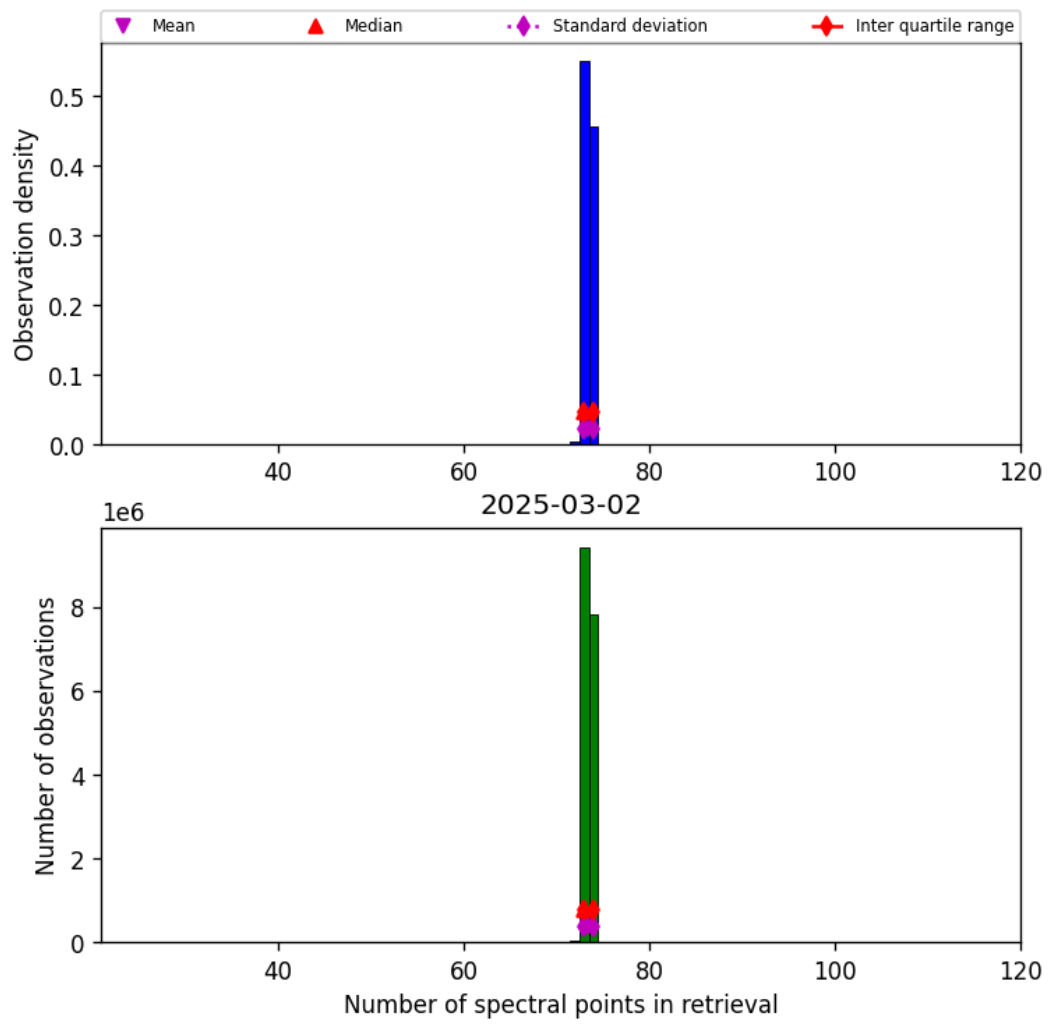


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-02 to 2025-03-03

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.

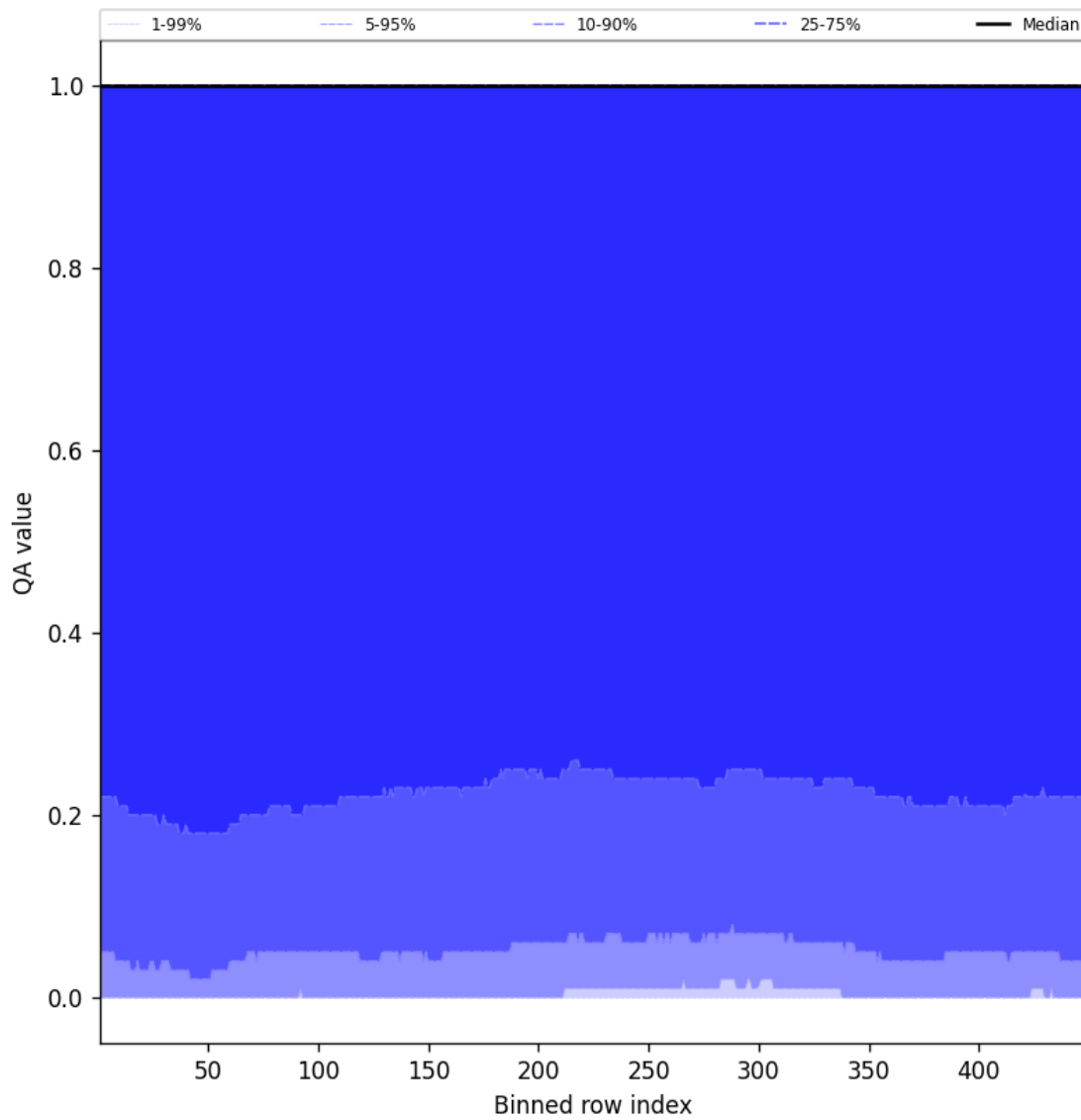


Figure 84: Along track statistics of “QA value” for 2025-03-02 to 2025-03-03

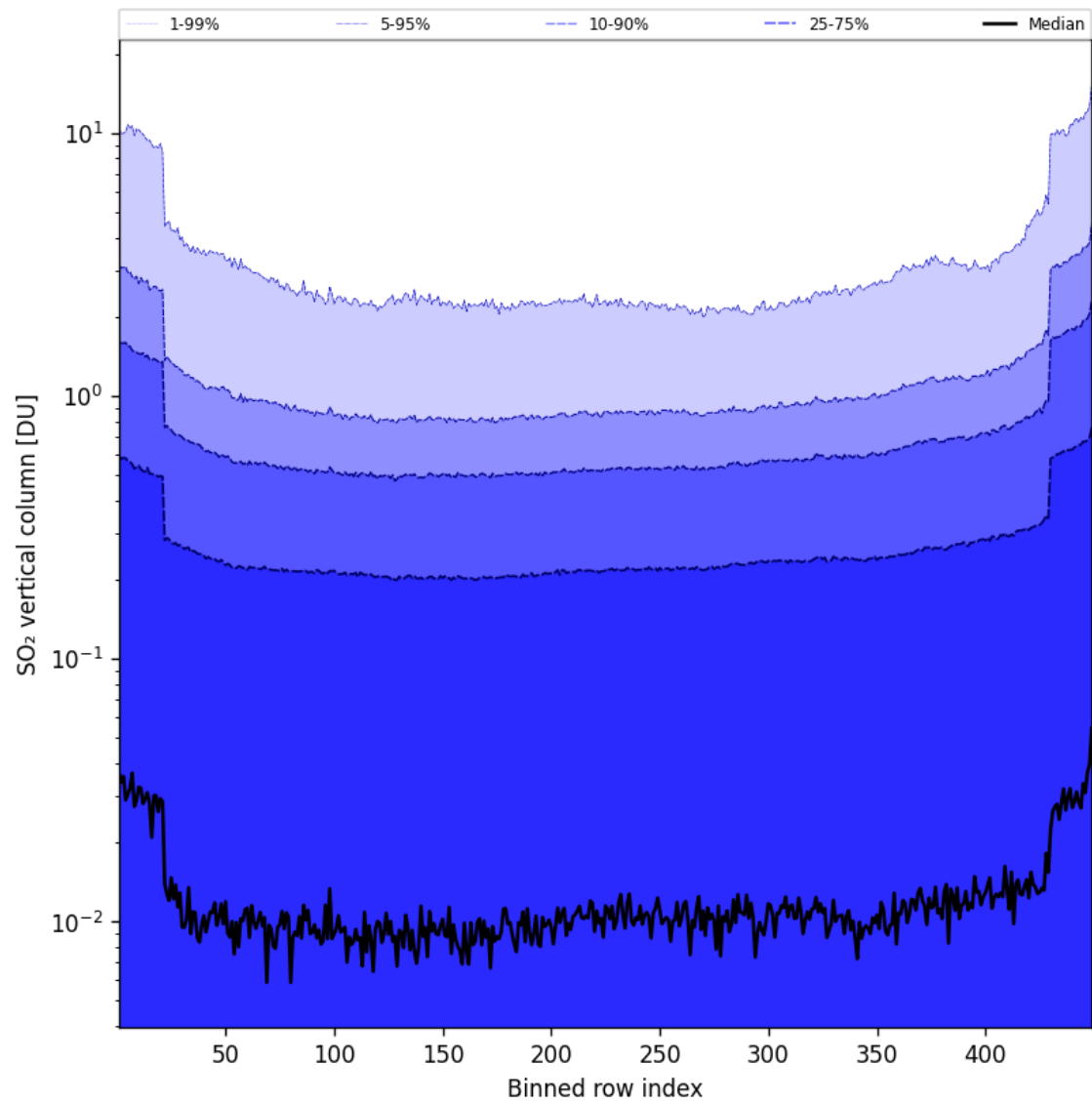


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-03-02 to 2025-03-03

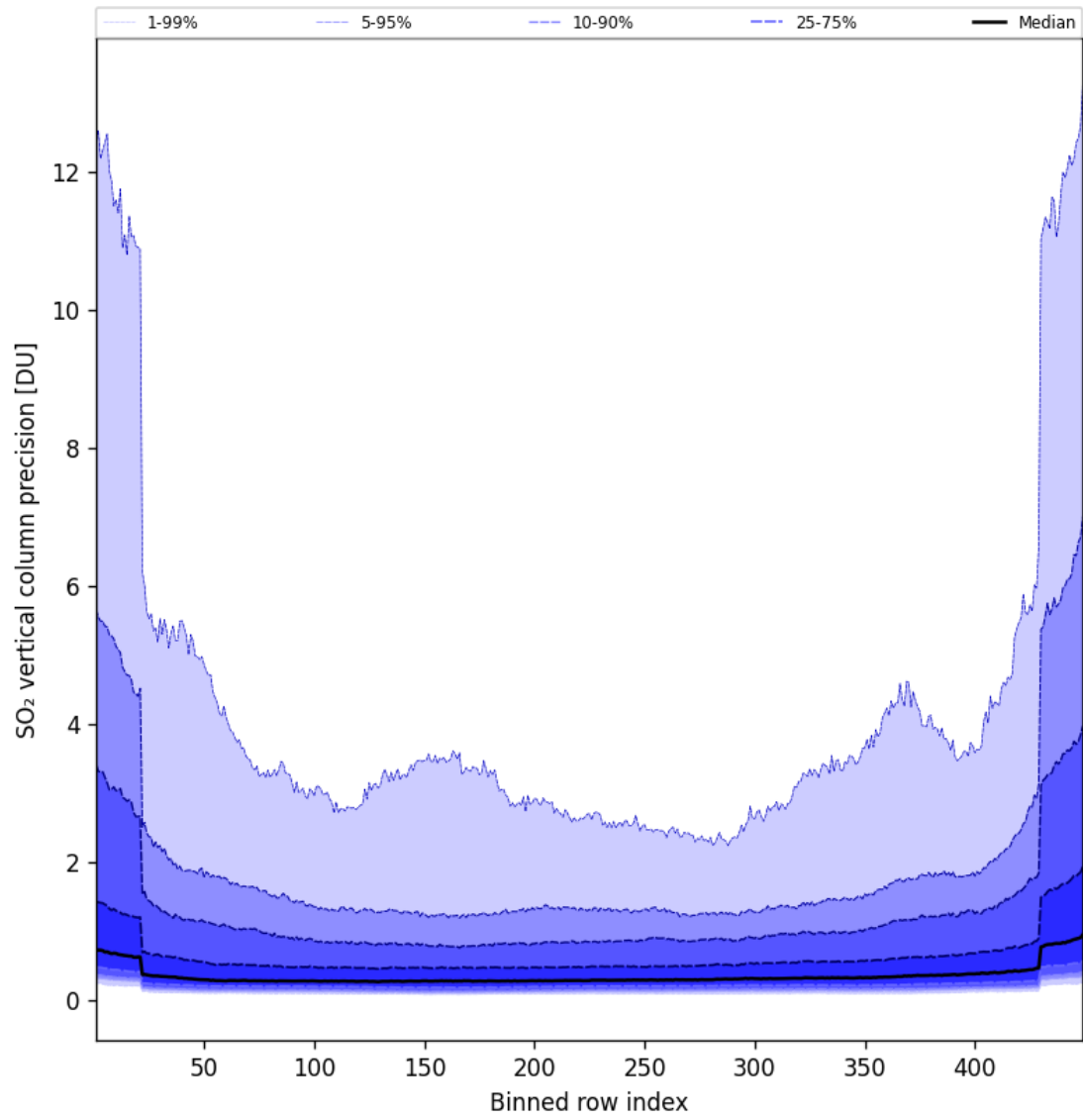


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-03-02 to 2025-03-03

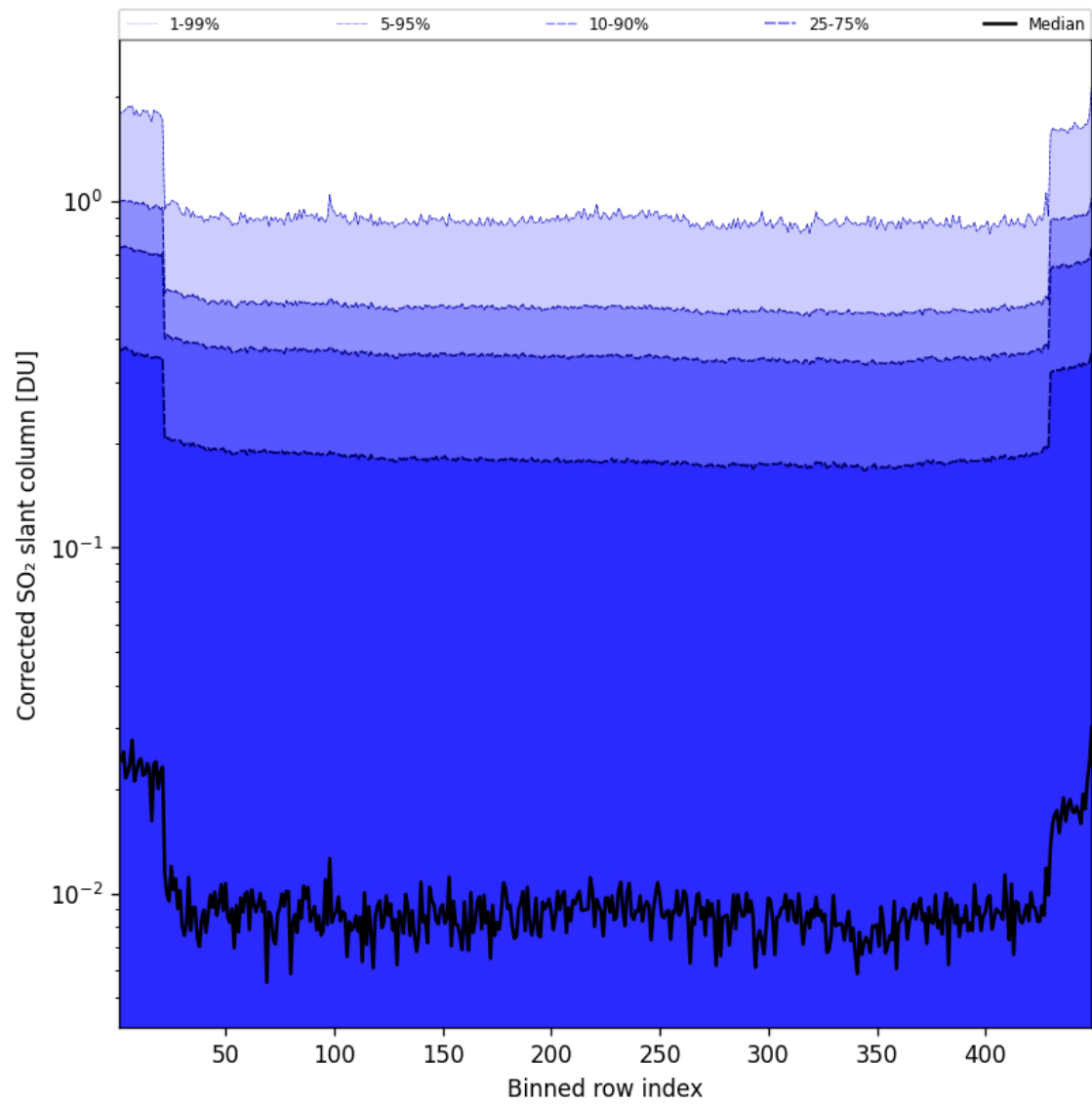


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-03-02 to 2025-03-03

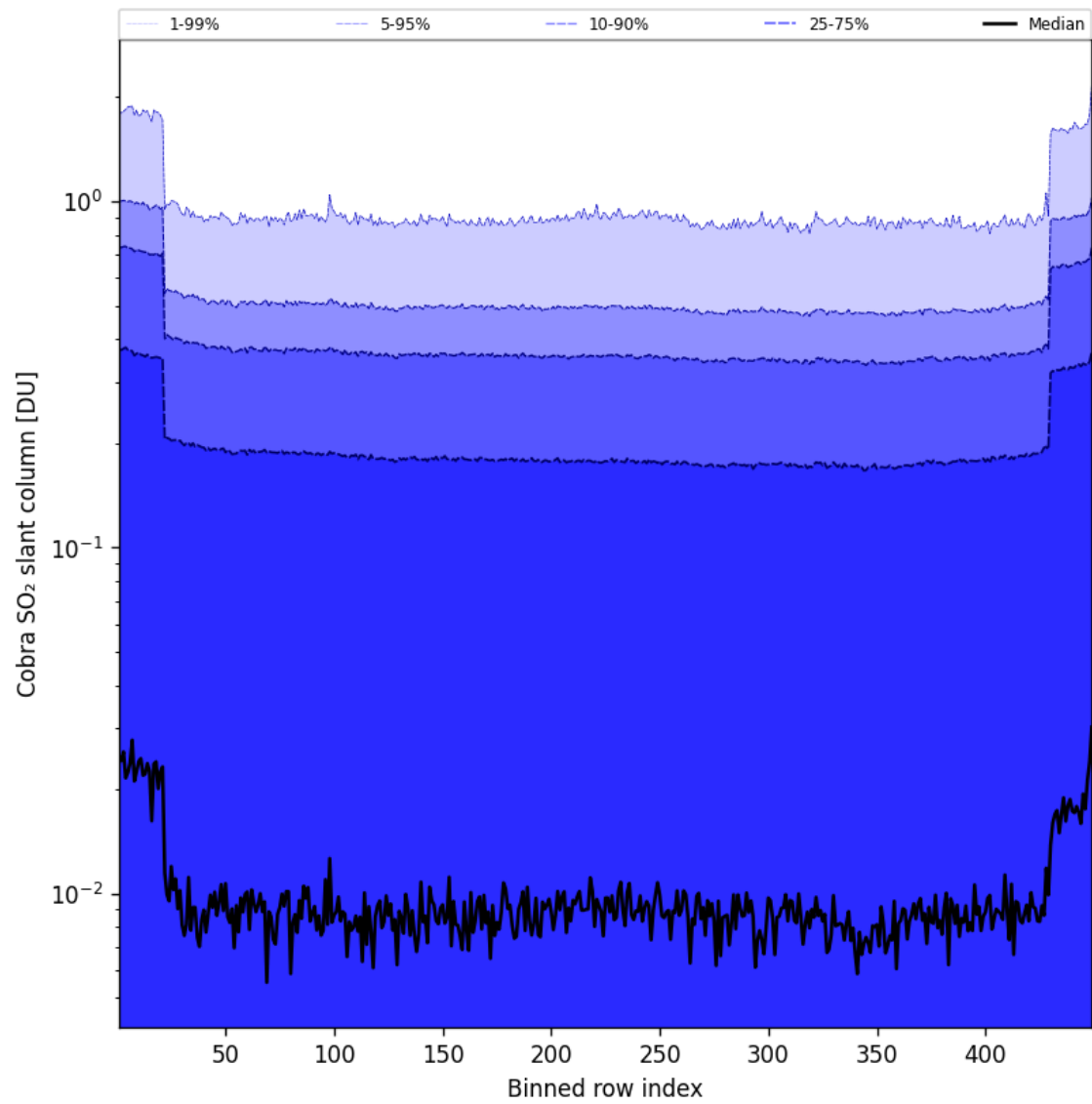


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-03-02 to 2025-03-03

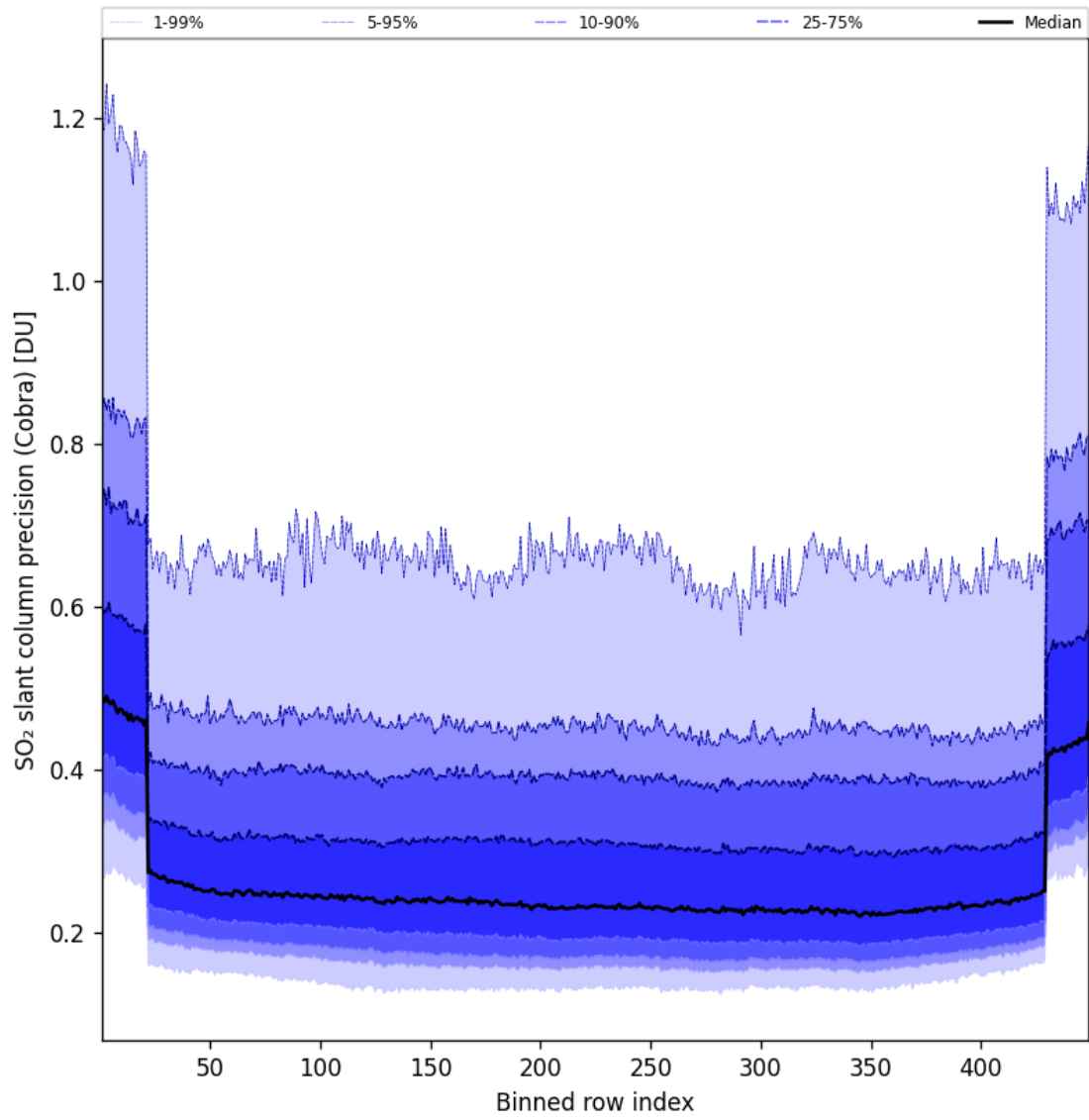


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-03-02 to 2025-03-03

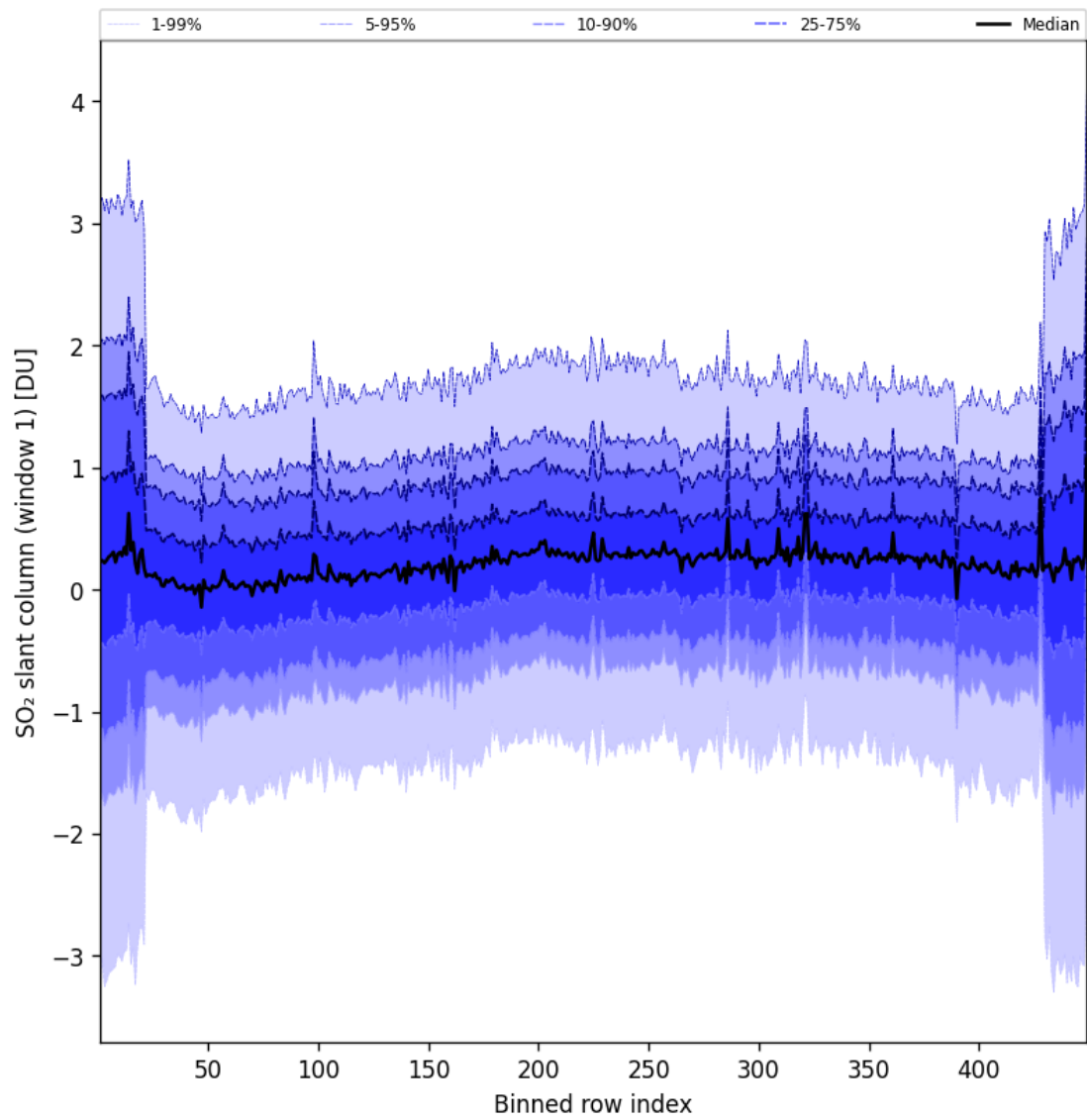


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-03-02 to 2025-03-03

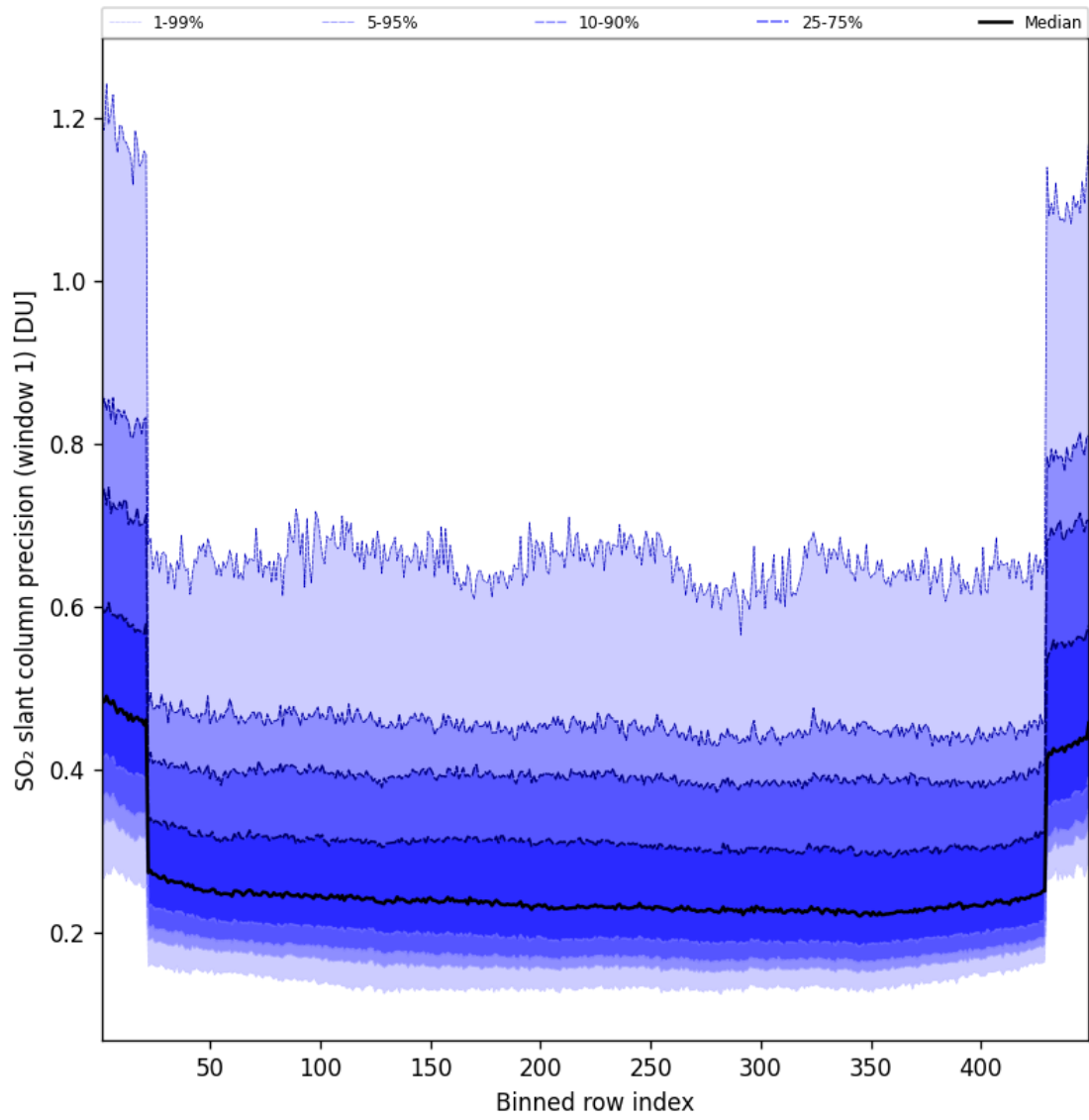


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-03-02 to 2025-03-03

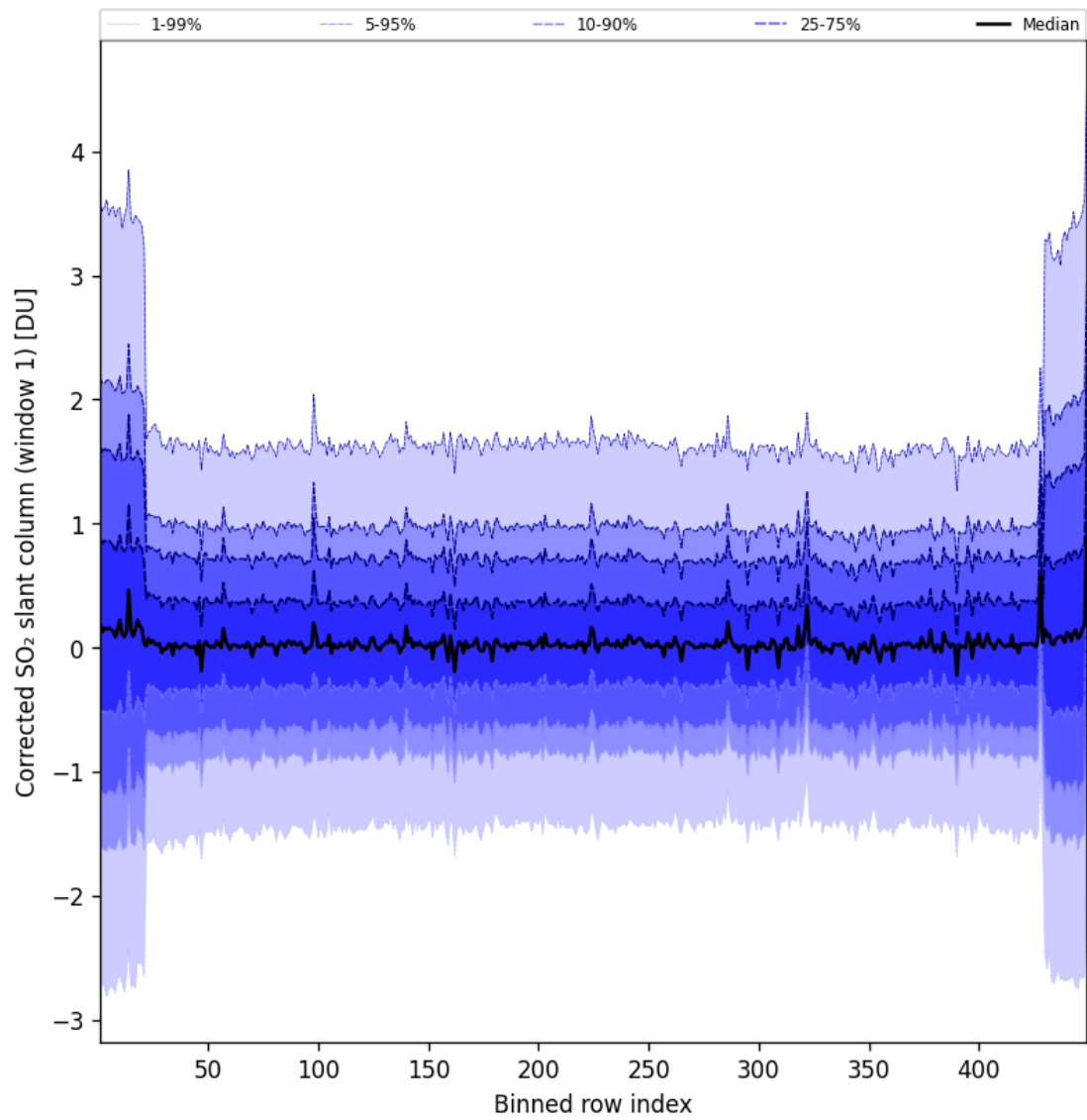


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-03-02 to 2025-03-03

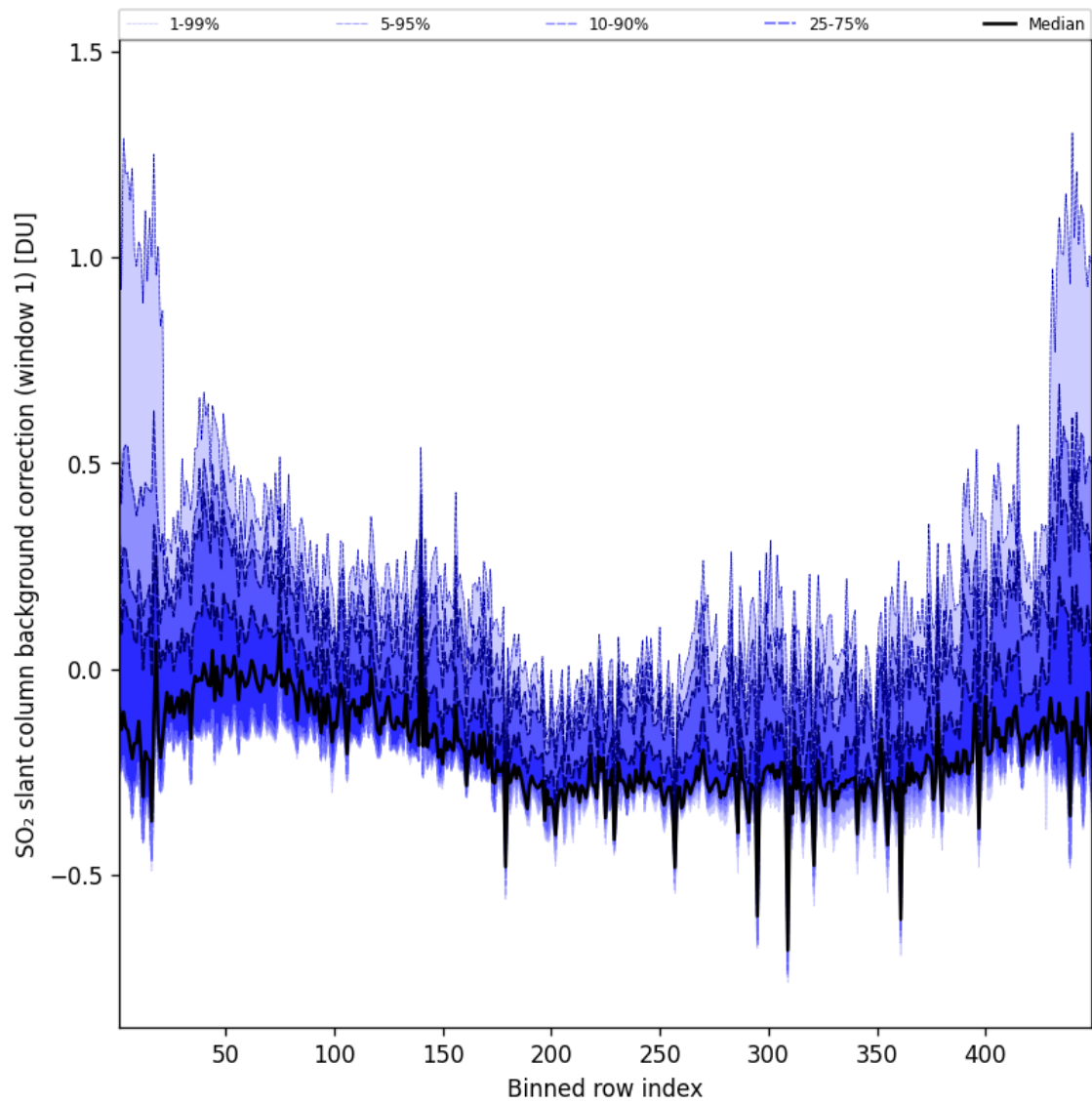


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-03-02 to 2025-03-03

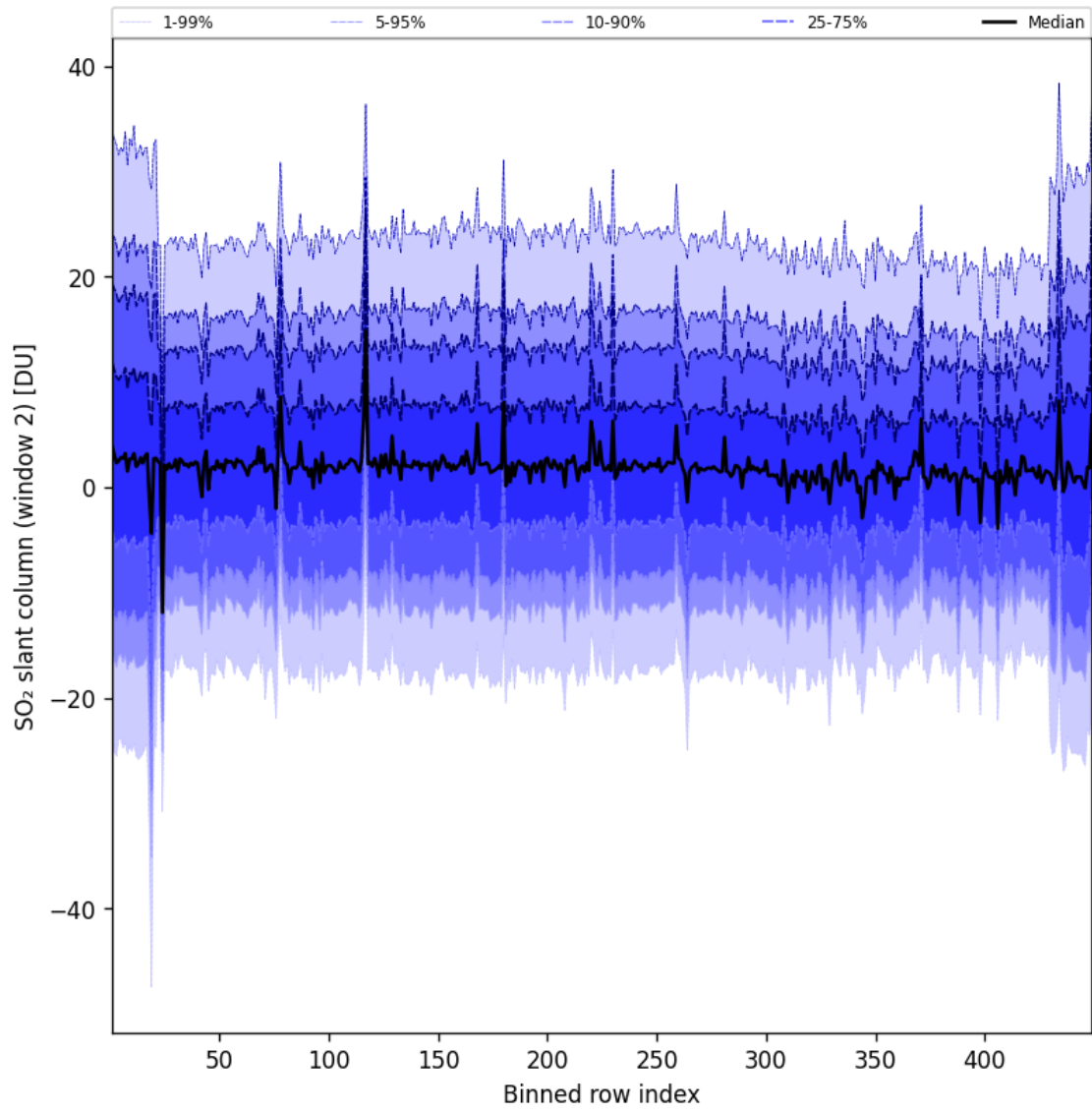


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-03-02 to 2025-03-03

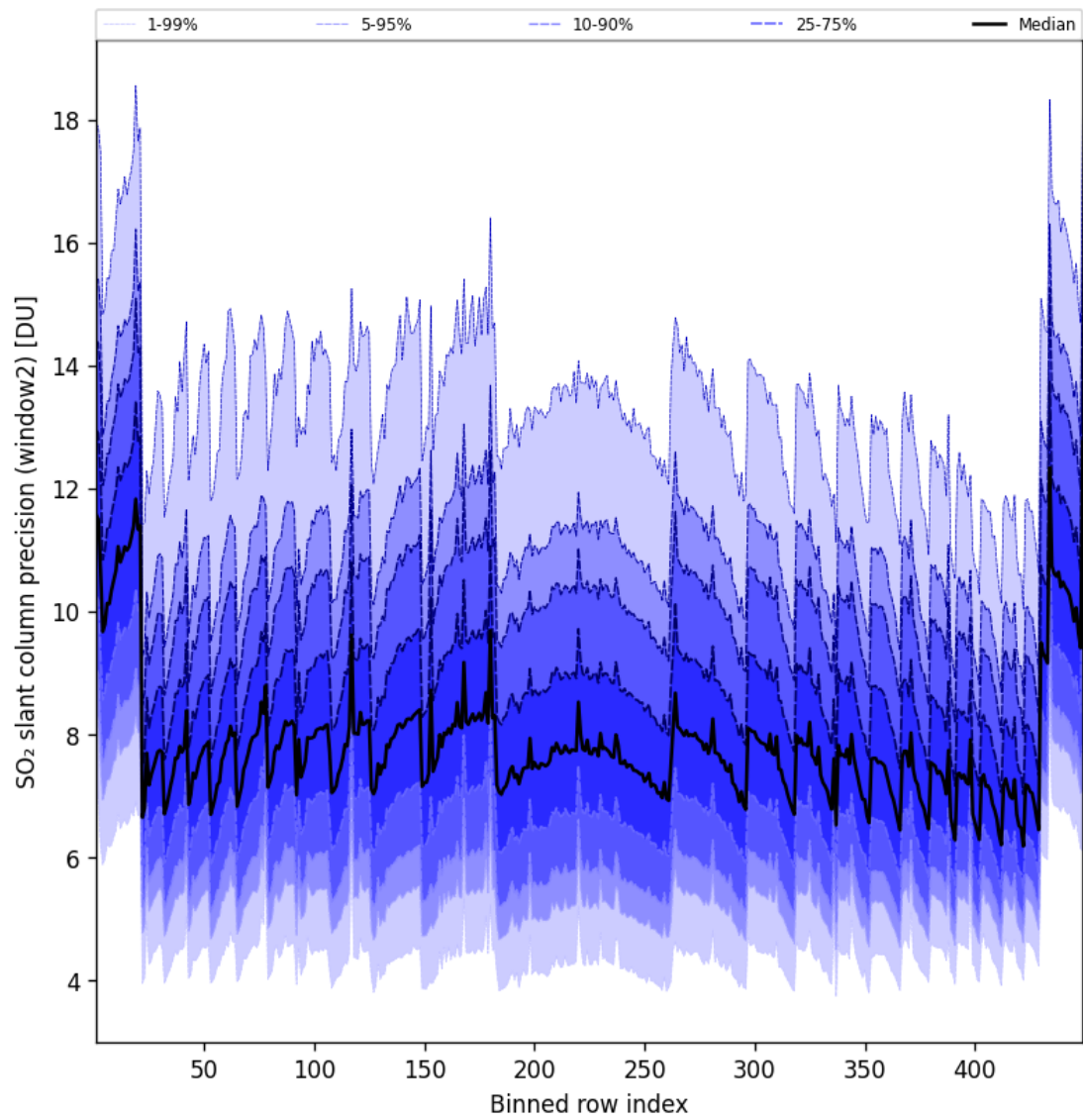


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-03-02 to 2025-03-03

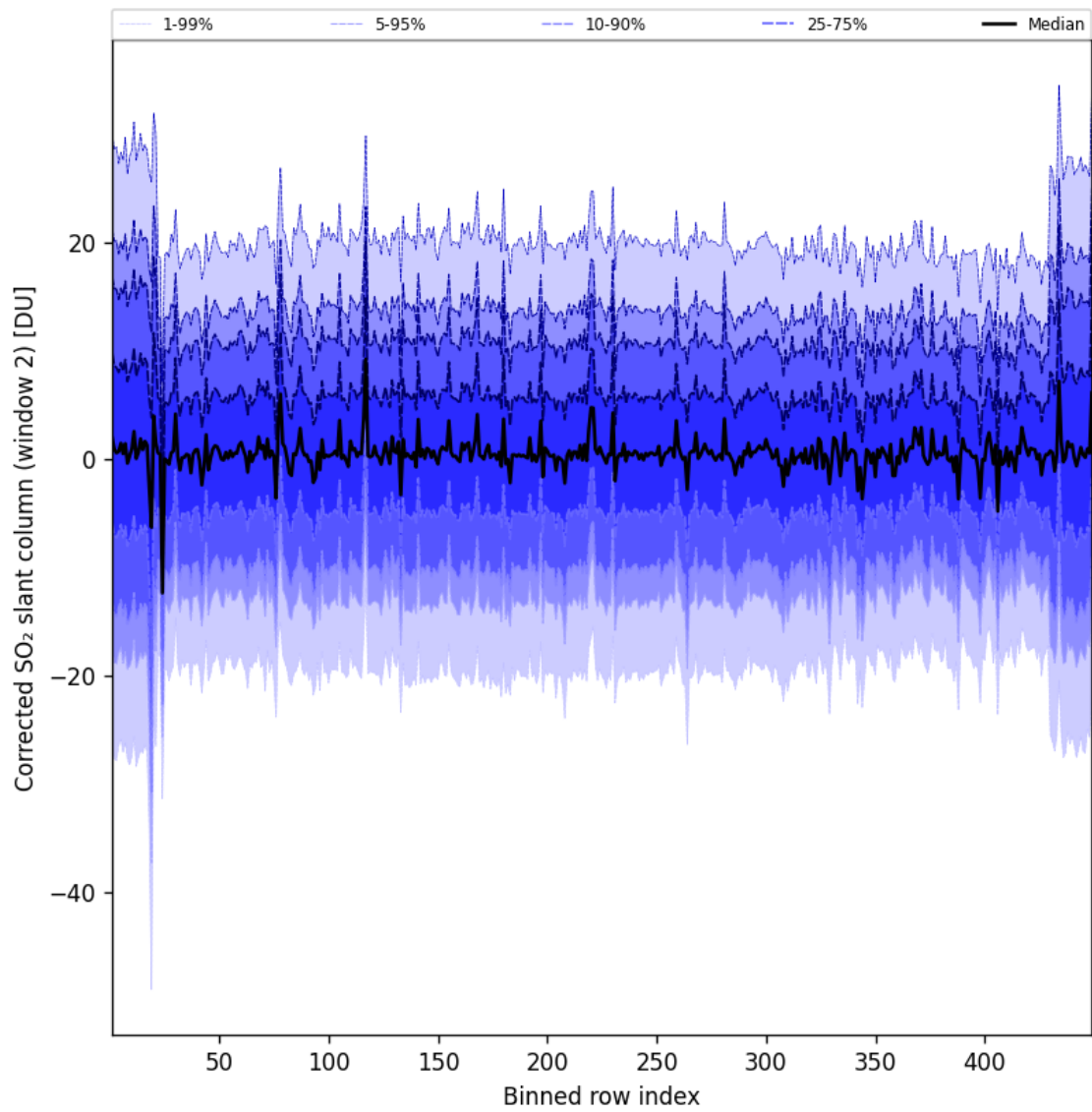


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-03-02 to 2025-03-03

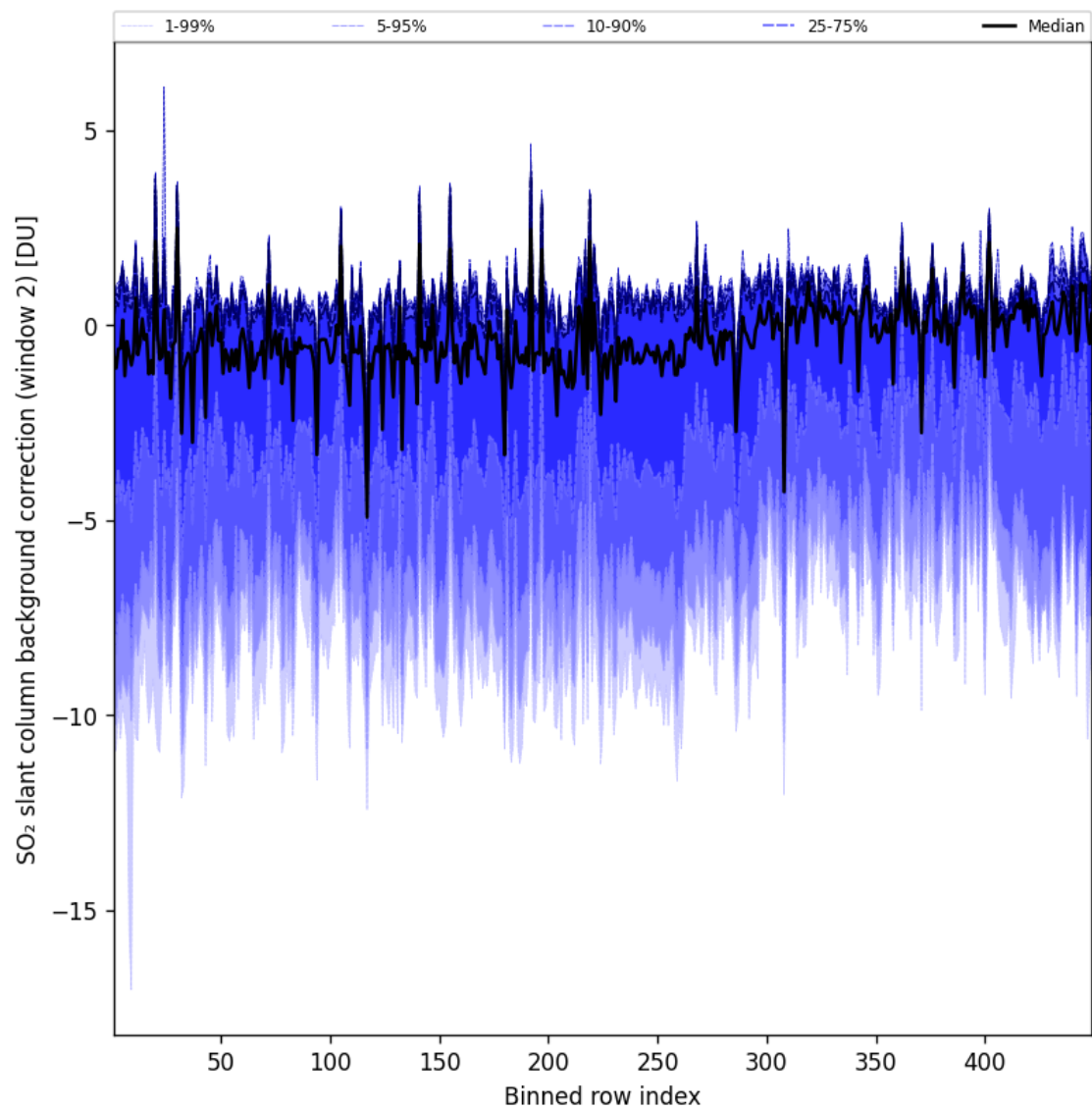


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-03-02 to 2025-03-03

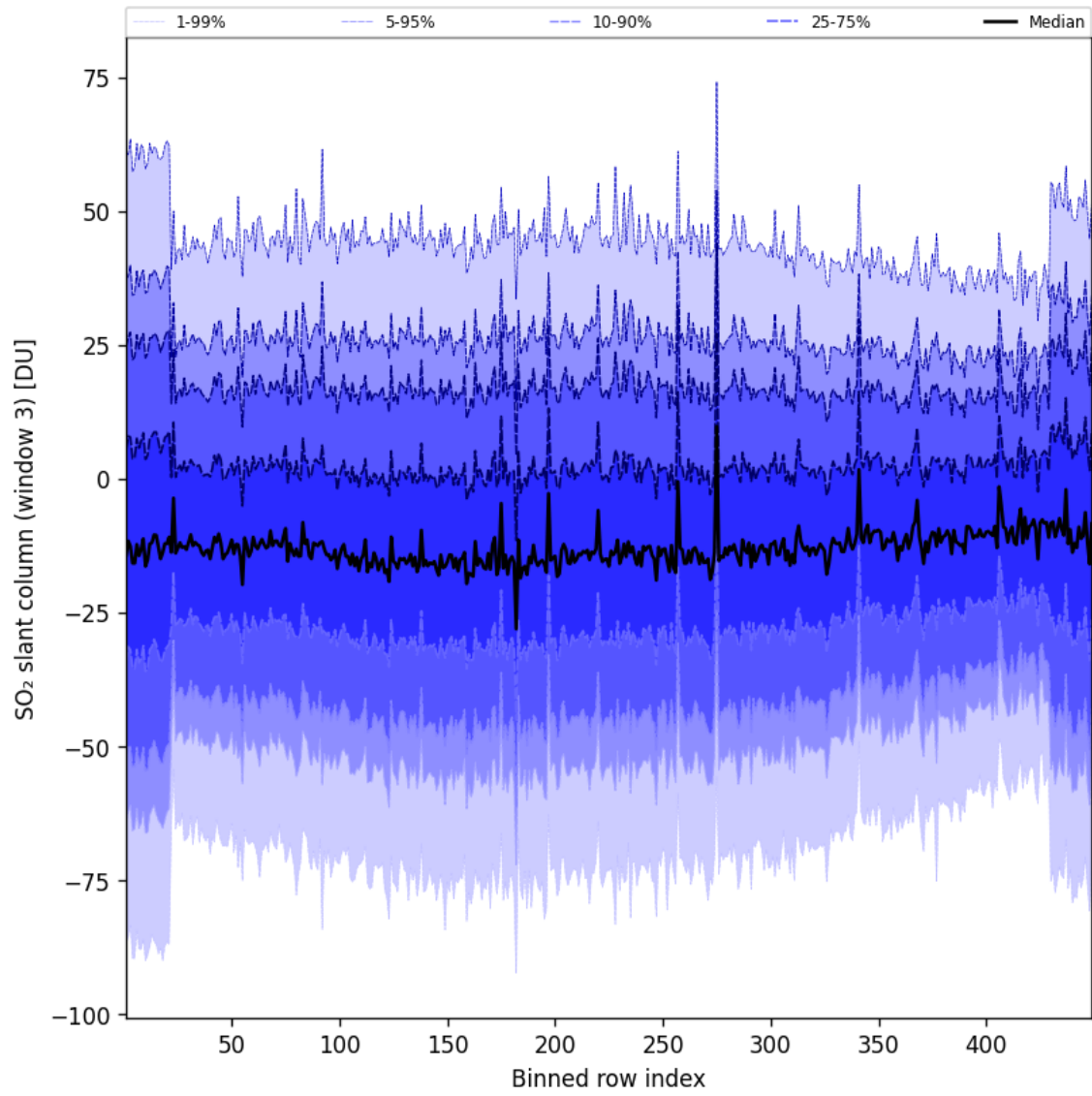


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-03-02 to 2025-03-03

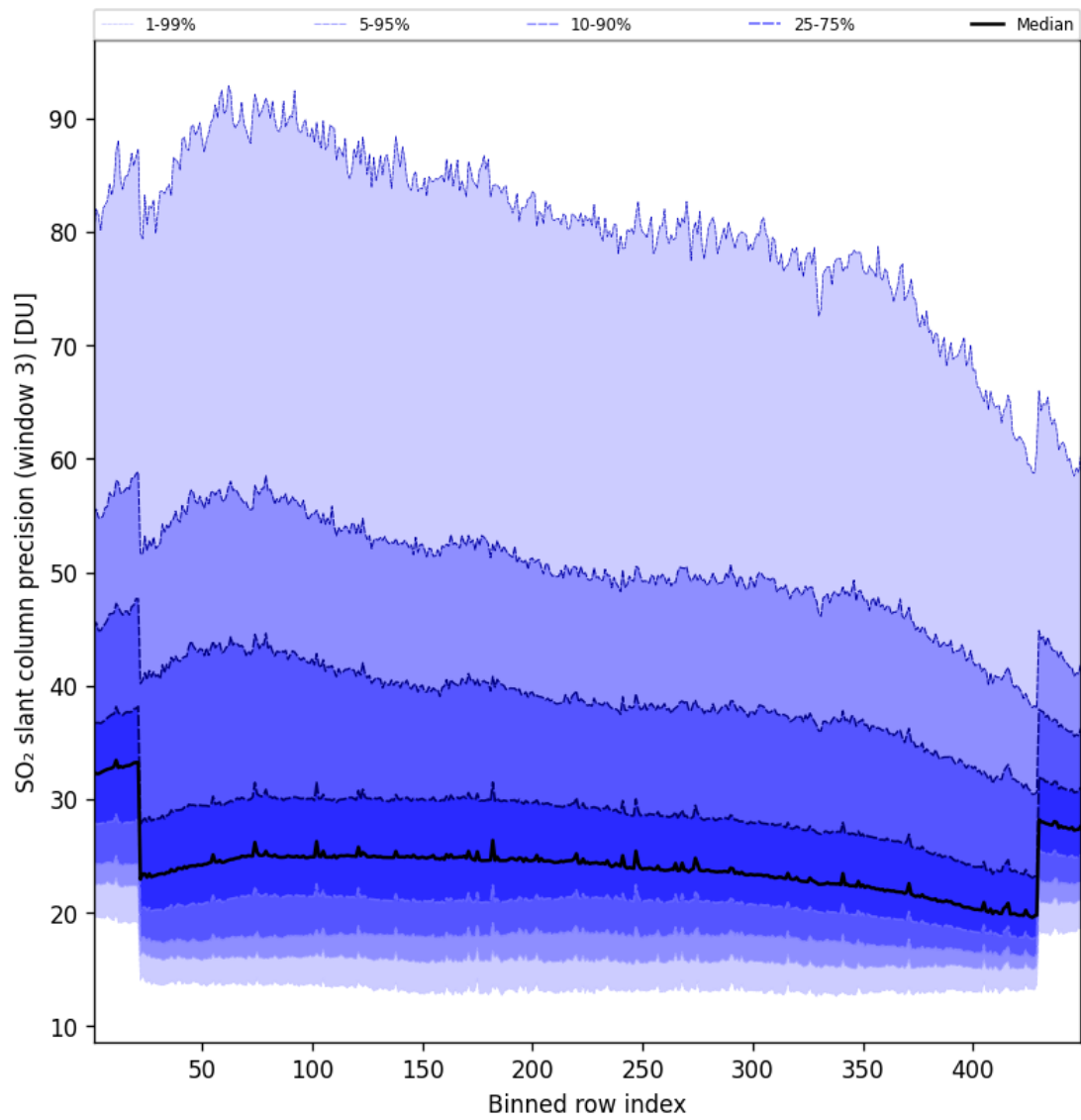


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-03-02 to 2025-03-03

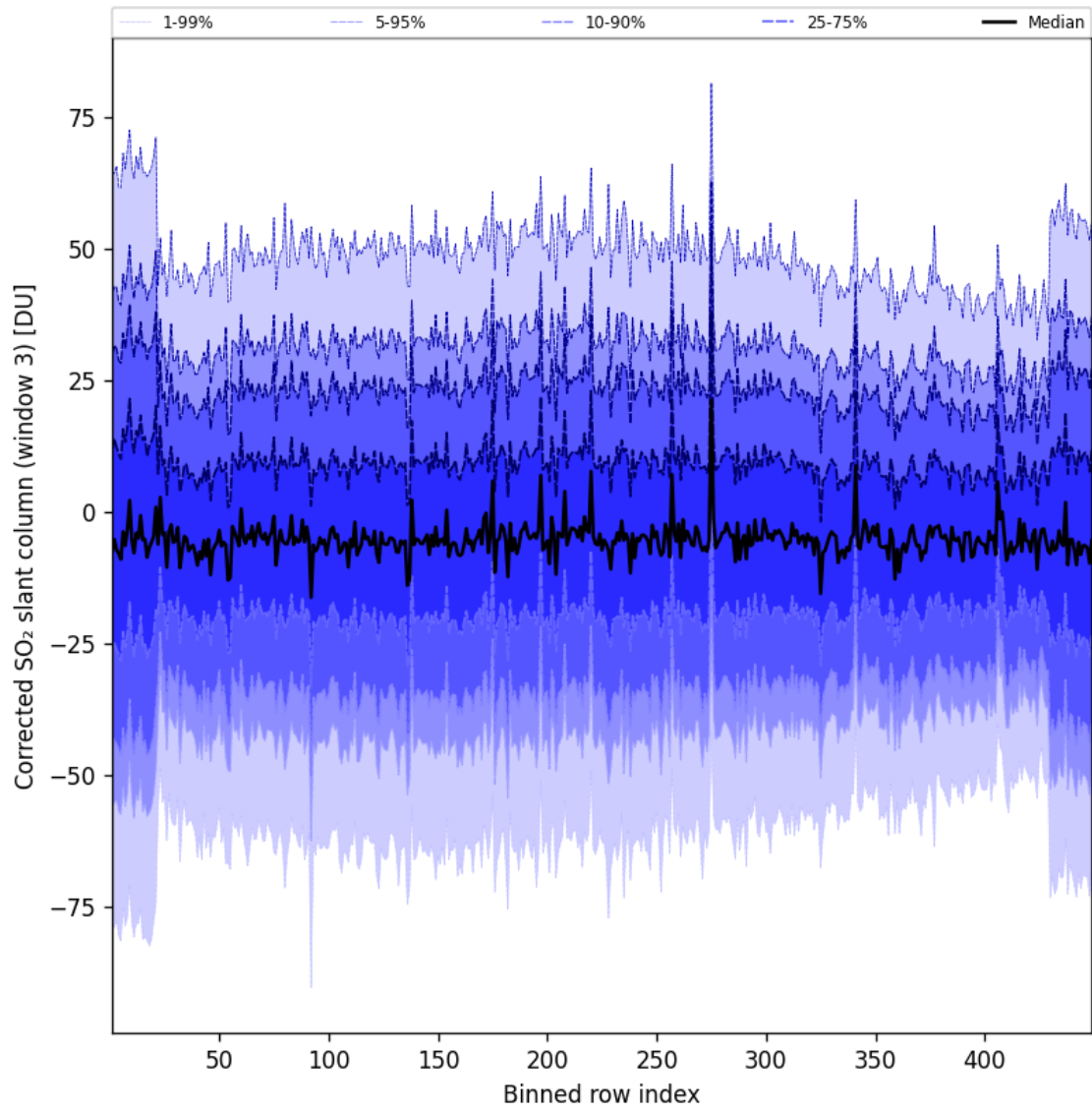


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-03-02 to 2025-03-03

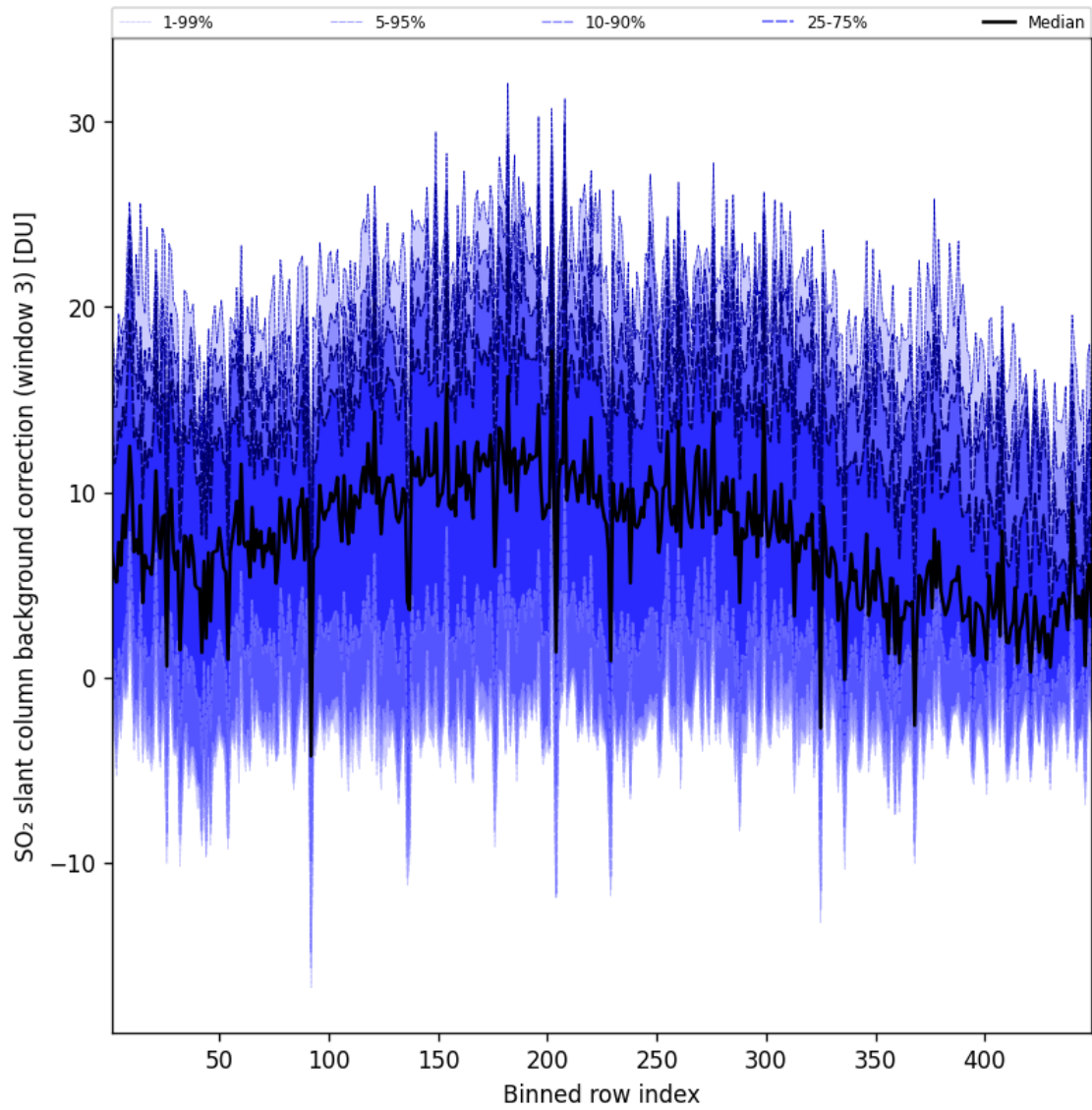


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-03-02 to 2025-03-03

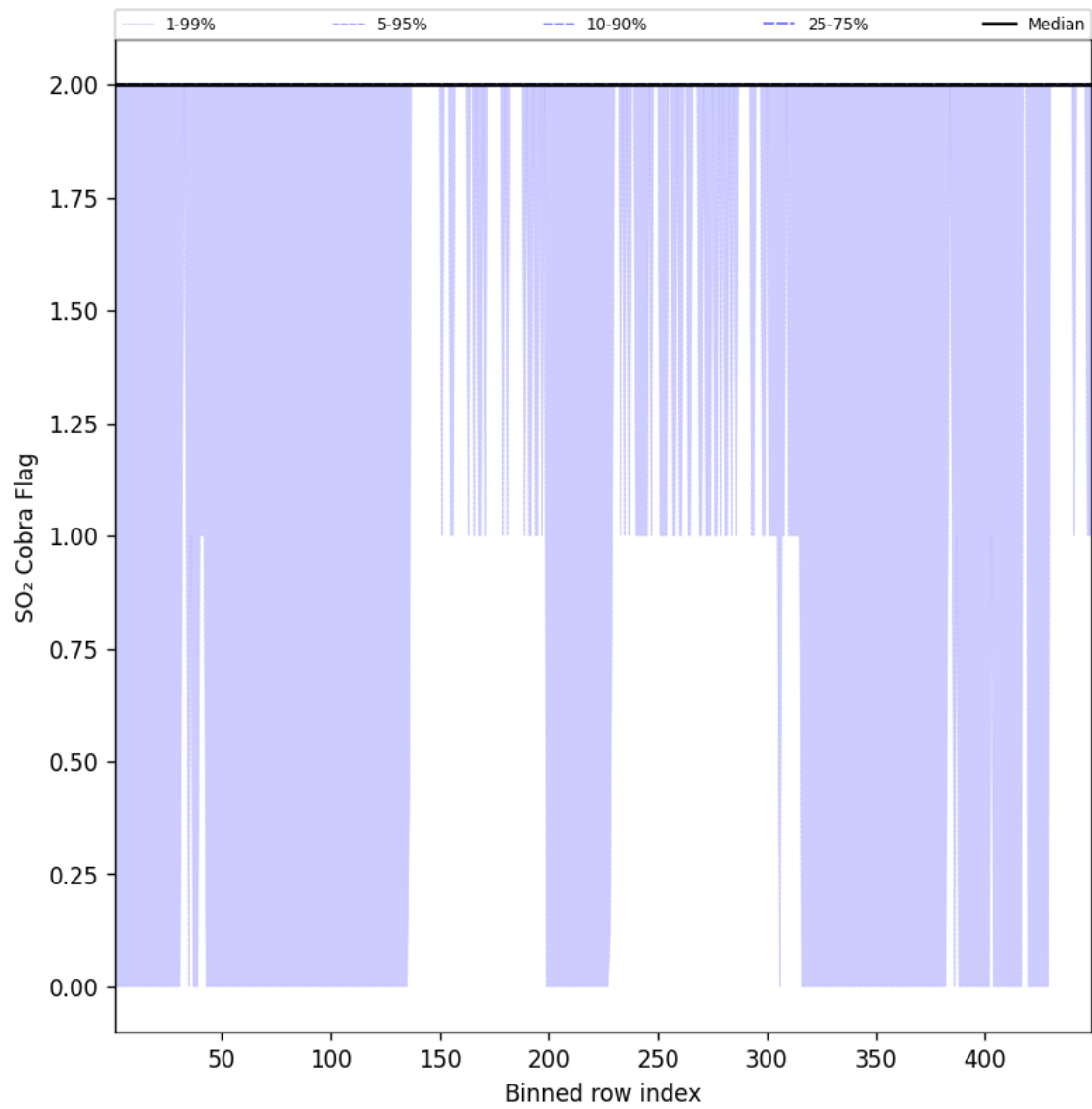


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-03-02 to 2025-03-03

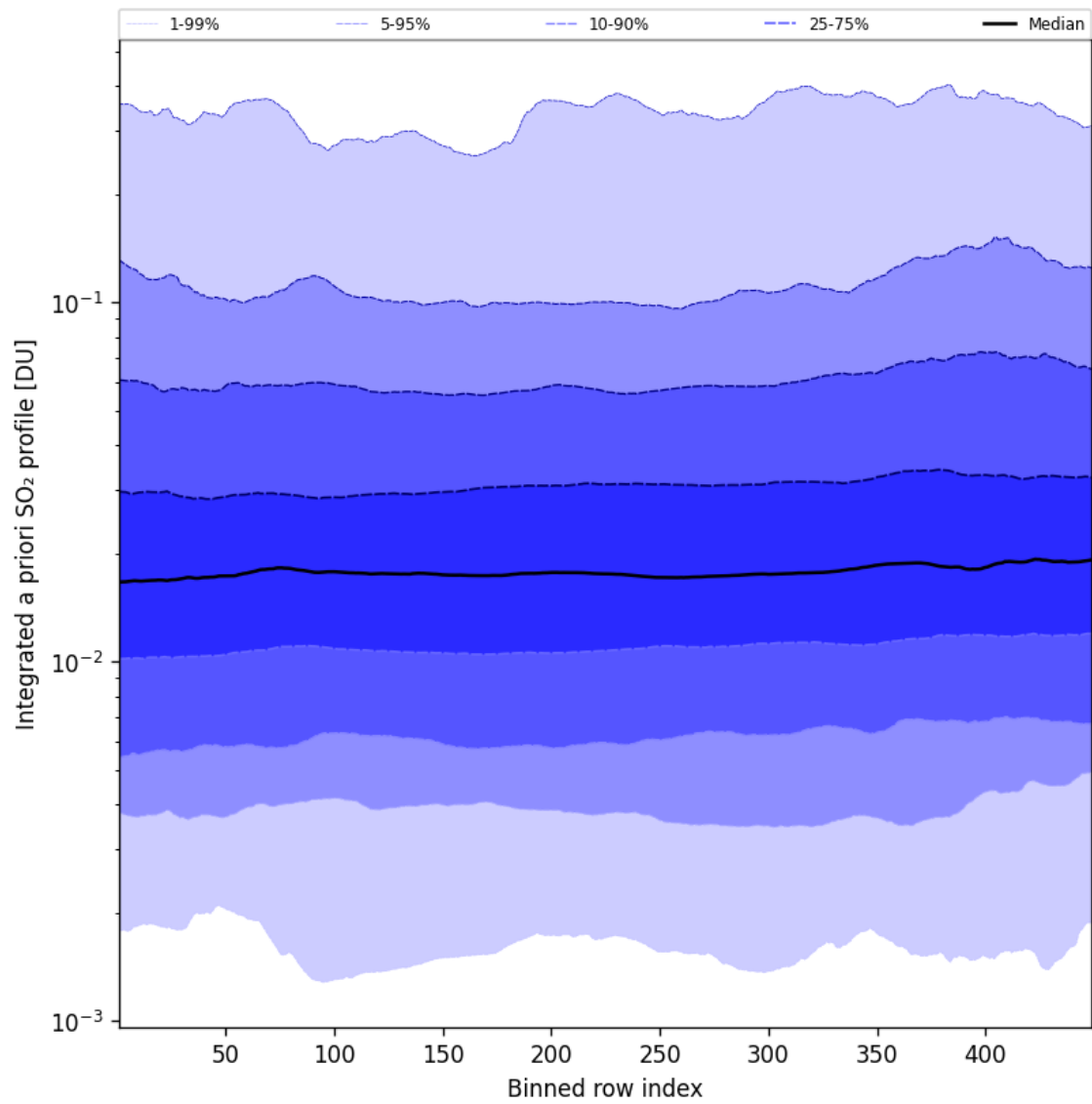


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-03-02 to 2025-03-03

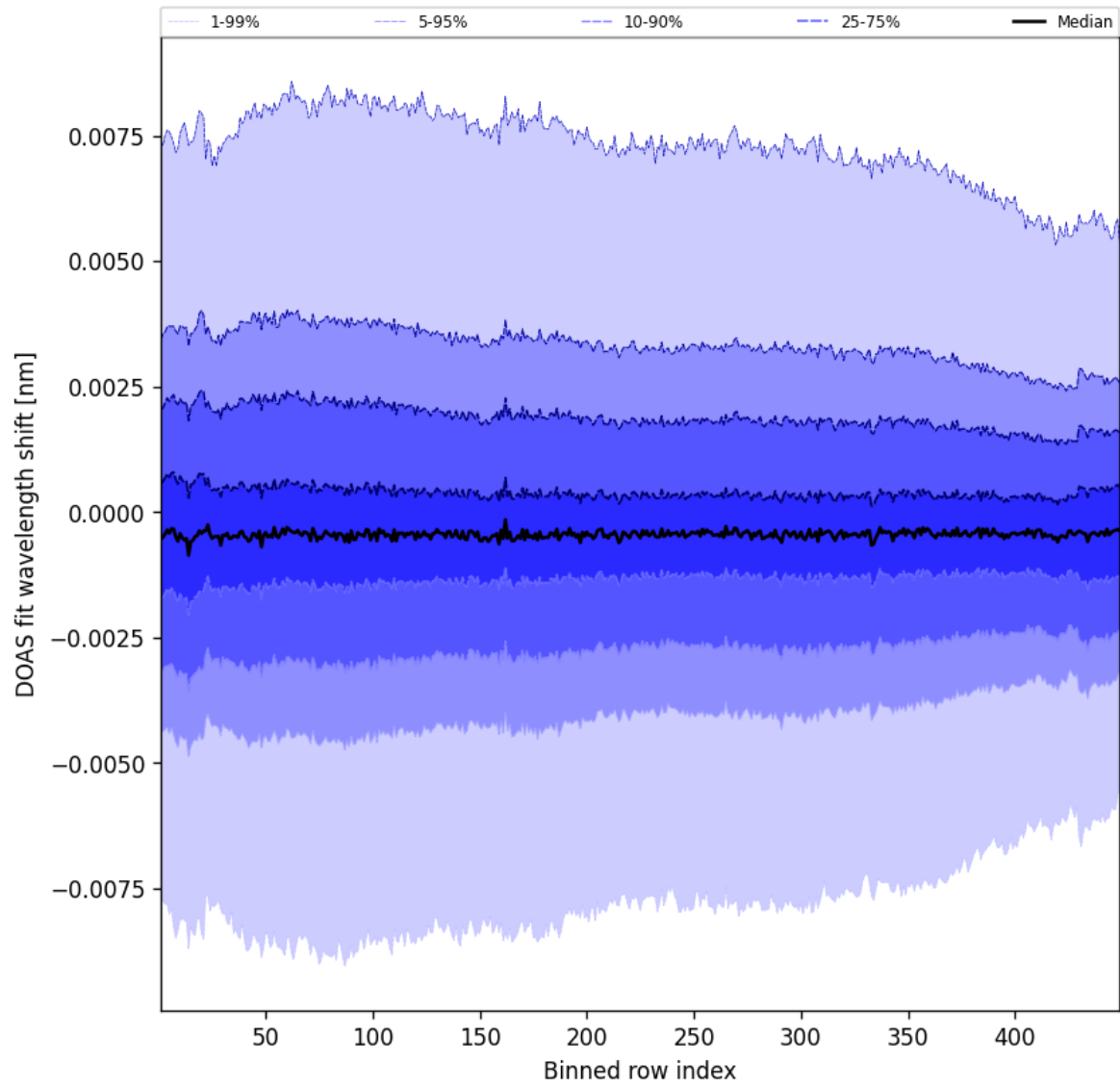


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-03-02 to 2025-03-03

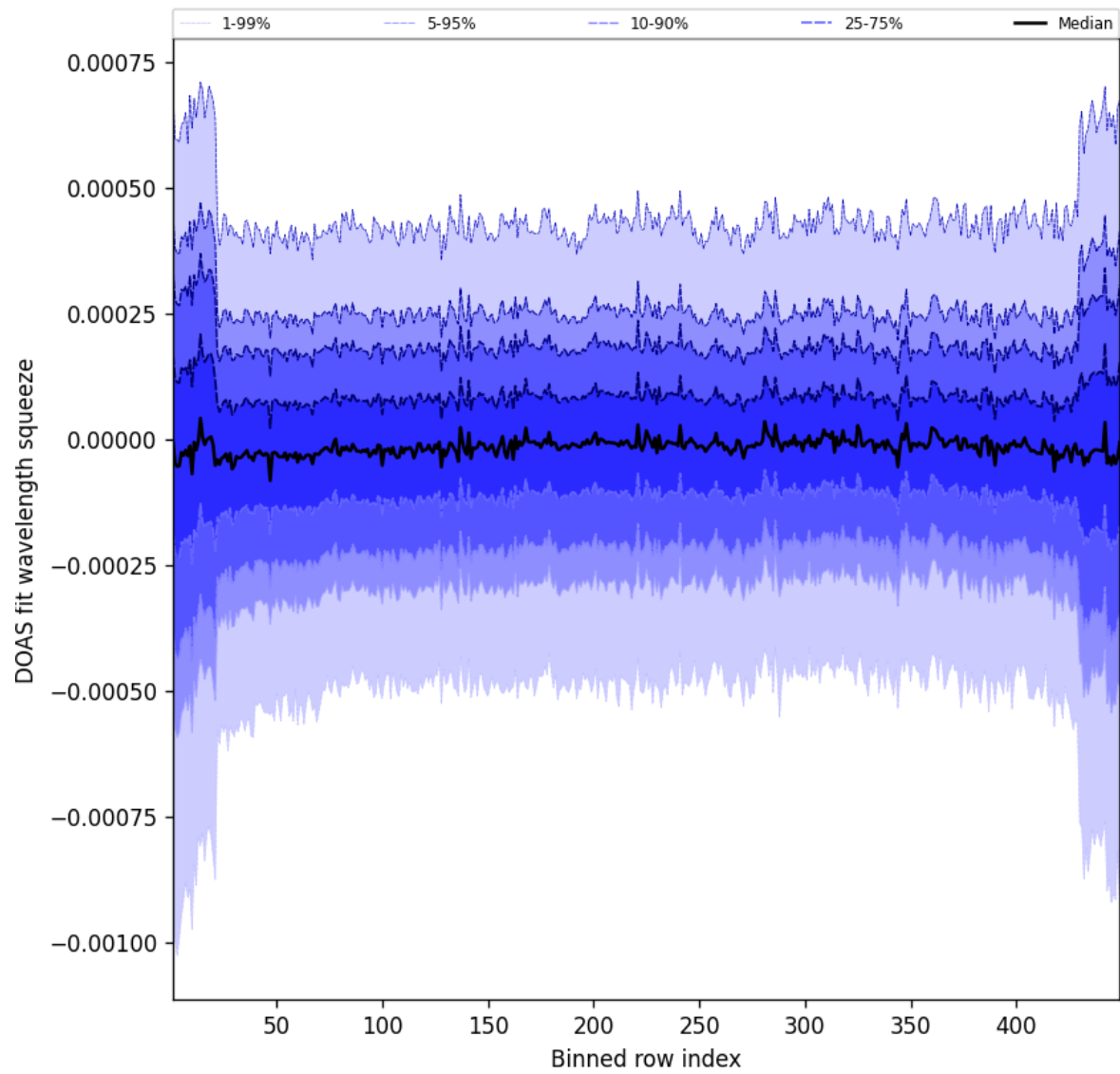


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-02 to 2025-03-03

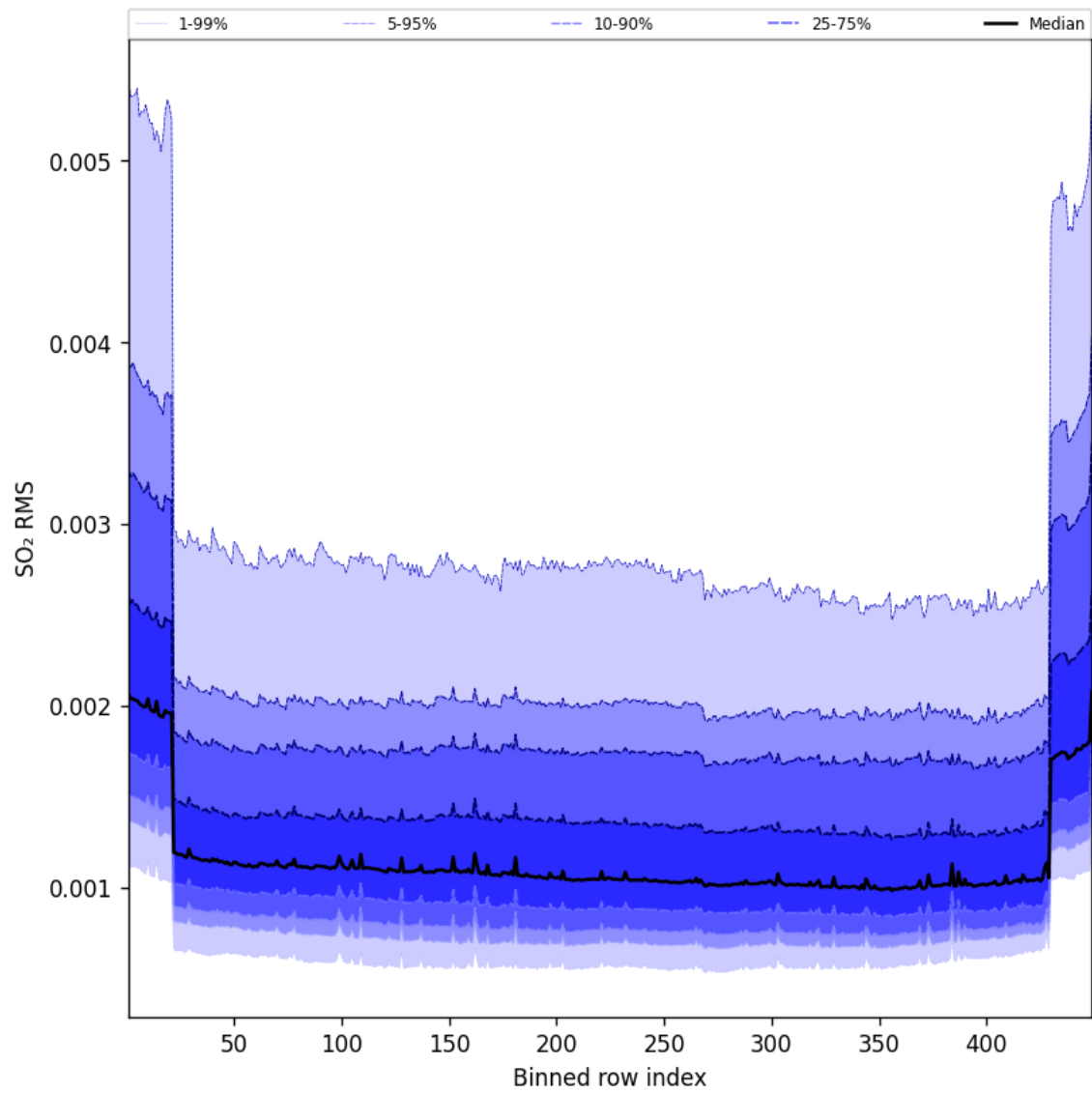


Figure 106: Along track statistics of “SO₂ RMS” for 2025-03-02 to 2025-03-03

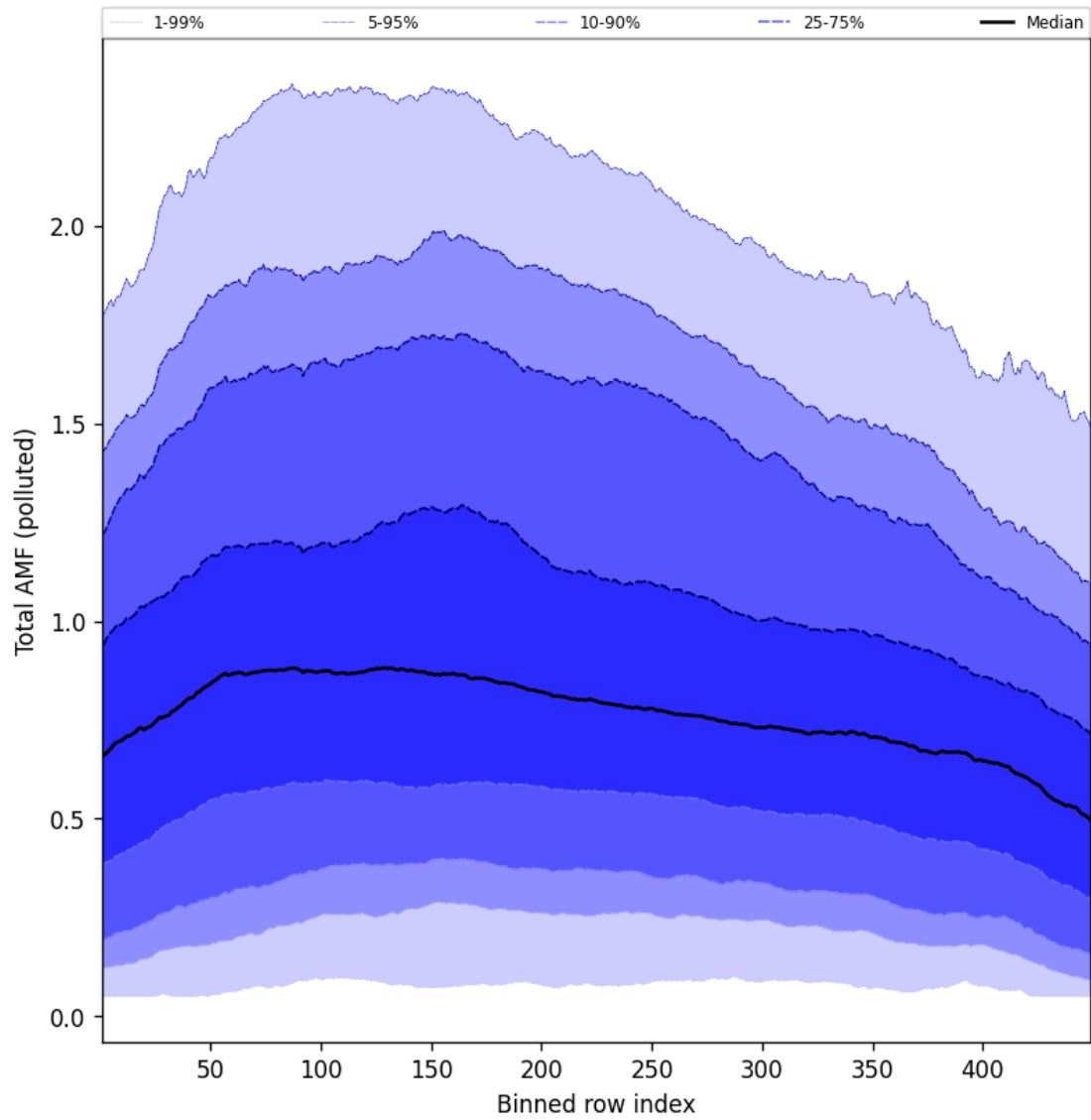


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-02 to 2025-03-03

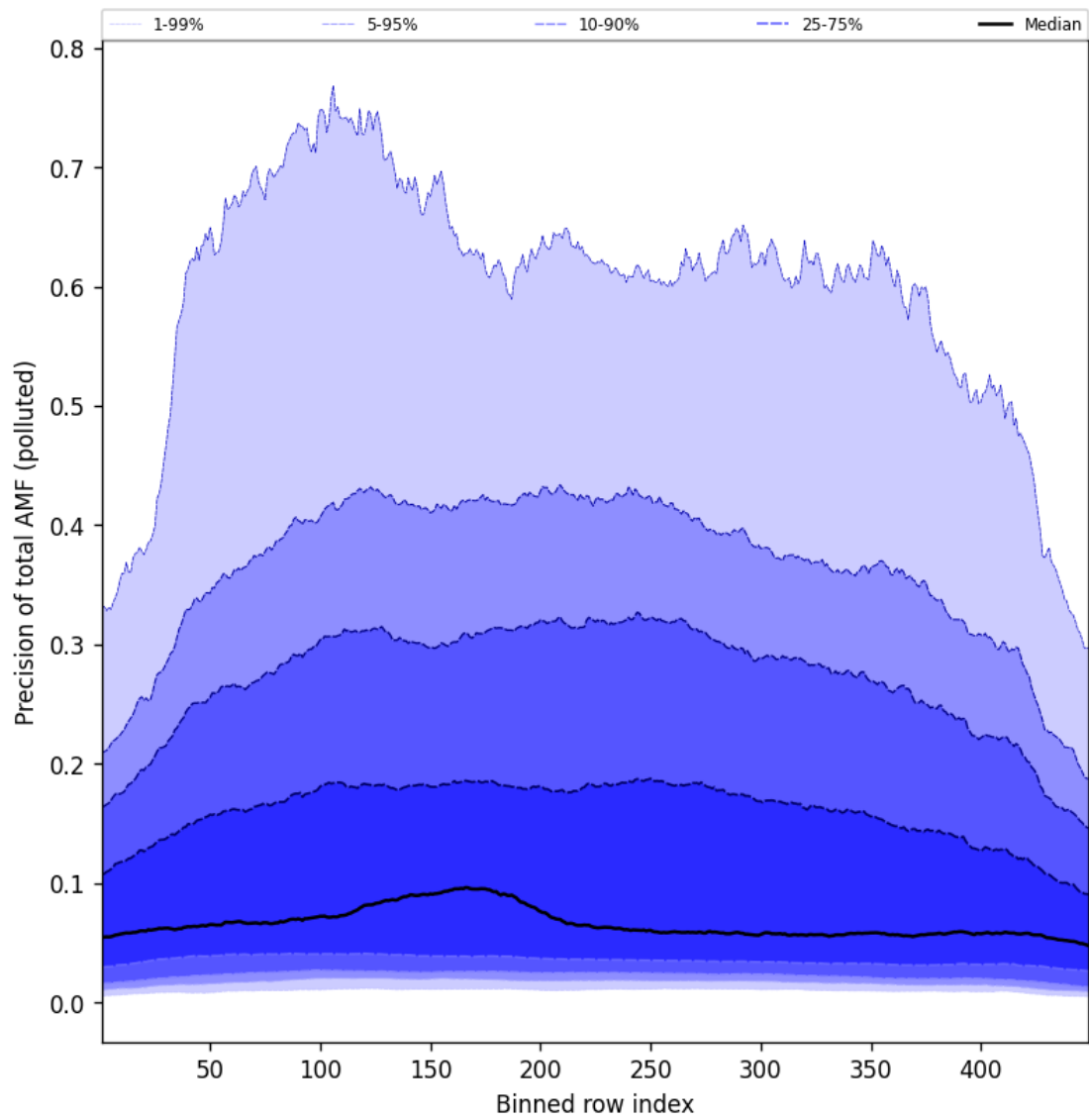


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-02 to 2025-03-03

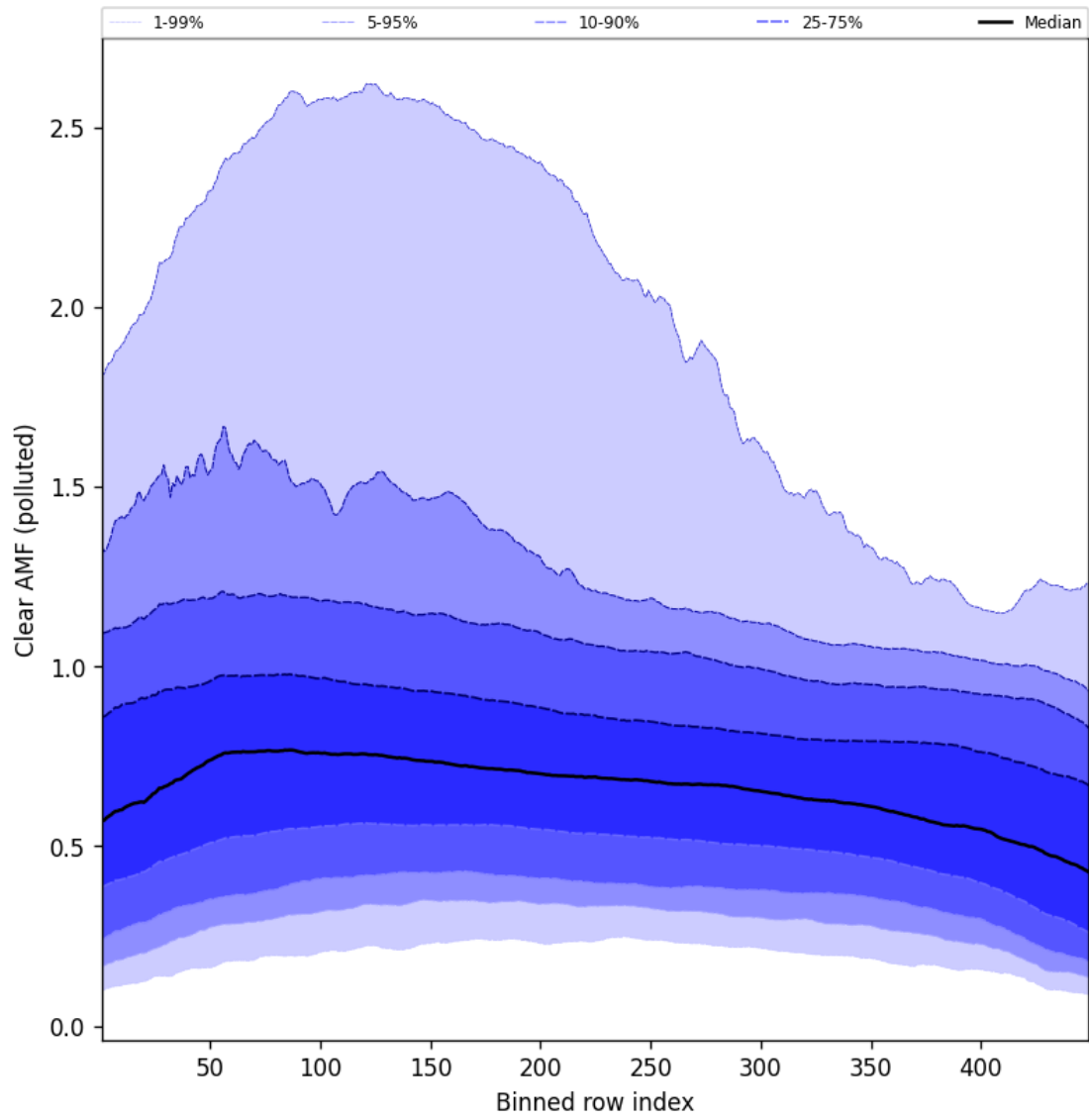


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-02 to 2025-03-03

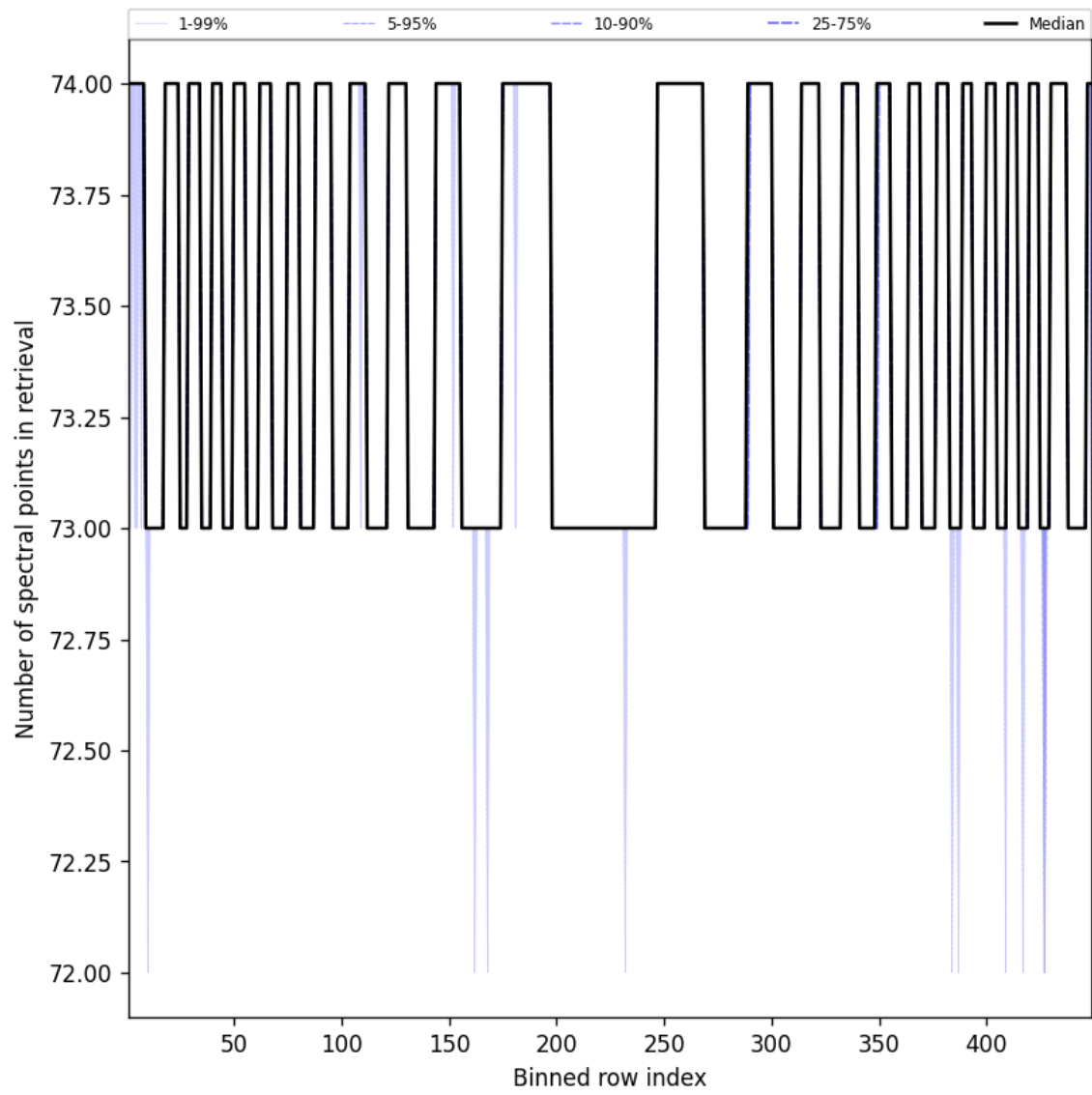


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-02 to 2025-03-03

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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