

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]	0.645 $\pm$ 0.405	17309912	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.932 \pm 149.727) \times 10^{-2}$	17309912	0.278	0.493	1.163×10^{-2}	-709	213
sulfurdioxide total vertical column precision [DU]	0.650 $\pm$ 1.116	17309912	0.197	0.422	0.355	4.298×10^{-2}	403
sulfurdioxide slant column density corrected [DU]	$(2.049 \pm 39.305) \times 10^{-2}$	17309912	0.250	0.363	9.425×10^{-3}	-35.4	307
sulfurdioxide slant column density cobra [DU]	$(2.034 \pm 37.935) \times 10^{-2}$	17309912	0.250	0.363	9.425×10^{-3}	-35.4	48.7
sulfurdioxide slant column density cobra precision [DU]	0.298 $\pm$ 0.149	17309912	0.213	0.155	0.251	7.667×10^{-2}	22.7
sulfurdioxide slant column density window1 [DU]	0.220 $\pm$ 0.719	17309912	0.275	0.741	0.246	-48.2	92.6
sulfurdioxide slant column density window1 precision [DU]	0.298 $\pm$ 0.149	17309912	0.213	0.155	0.251	7.667×10^{-2}	22.7
sulfurdioxide slant column density corrected win1 [DU]	$(3.568 \pm 70.267) \times 10^{-2}$	17309912	-2.500×10^{-2}	0.719	1.685×10^{-2}	-48.2	92.3
background so2 slant column offset window1 [DU]	-0.184 ± 0.207	17309912	-0.340	0.217	-0.241	-1.23	4.15
sulfurdioxide slant column density window2 [DU]	2.73 $\pm$ 9.05	17309912	1.75	11.5	2.50	-1.855×10^3	786
sulfurdioxide slant column density window2 precision [DU]	8.11 $\pm$ 2.20	17309912	7.43	2.56	7.79	2.22	500
sulfurdioxide slant column density corrected win2 [DU]	-0.954 ± 8.777	17309912	-1.25	11.1	-0.902	-1.857×10^3	783
background so2 slant column offset window2 [DU]	-3.68 ± 2.93	17309912	-1.25	3.93	-2.71	-18.9	5.89
sulfurdioxide slant column density window3 [DU]	-14.5 ± 24.2	17309912	-15.1	30.7	-14.6	-466	485
sulfurdioxide slant column density window3 precision [DU]	28.0 $\pm$ 13.1	17309912	22.5	9.61	24.6	9.37	467
sulfurdioxide slant column density corrected win3 [DU]	5.23 $\pm$ 23.31	17309912	5.04	29.5	5.24	-450	503
background so2 slant column offset window3 [DU]	19.7 $\pm$ 7.6	17309912	14.0	12.4	19.1	-12.3	81.2
sulfurdioxide slant column cobra flag [1]	1.97 $\pm$ 0.22	17309912	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.295 \pm 7.497) \times 10^{-2}$	17309912	1.946×10^{-2}	1.736×10^{-2}	1.642×10^{-2}	2.157×10^{-4}	2.15
fitted radiance shift [nm]	$(-5.786 \pm 26.169) \times 10^{-4}$	17309912	-5.000×10^{-4}	1.838×10^{-3}	-5.608×10^{-4}	-6.027×10^{-2}	7.041×10^{-2}
fitted radiance squeeze [1]	$(-3.179 \pm 20.048) \times 10^{-5}$	17309912	-1.000×10^{-5}	2.075×10^{-4}	-1.569×10^{-5}	-1.339×10^{-2}	3.107×10^{-2}
fitted root mean square [1]	$(1.307 \pm 0.619) \times 10^{-3}$	17309912	9.250×10^{-4}	6.041×10^{-4}	1.114×10^{-3}	3.299×10^{-4}	5.284×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.788 $\pm$ 0.421	17309912	0.740	0.541	0.732	5.000×10^{-2}	2.82
sulfurdioxide total air mass factor polluted precision [1]	0.113 $\pm$ 0.126	17309912	3.500×10^{-2}	0.117	6.271×10^{-2}	2.500×10^{-3}	2.08
sulfurdioxide clear air mass factor polluted [1]	0.675 $\pm$ 0.292	17309912	0.620	0.382	0.646	3.036×10^{-2}	2.97
number of spectral points in retrieval [1]	73.5 $\pm$ 0.5	17309912	73.0	1.000	73.0	53.0	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]	-3.15	-1.06	-0.613	-0.399	-0.230	0.263	0.449	0.691	1.21	3.82
sulfurdioxide total vertical column precision [DU]	9.928×10^{-2}	0.138	0.167	0.191	0.226	0.648	0.900	1.23	1.95	5.42
sulfurdioxide slant column density corrected [DU]	-0.900	-0.502	-0.358	-0.265	-0.170	0.193	0.294	0.397	0.565	1.12
sulfurdioxide slant column density cobra [DU]	-0.900	-0.502	-0.358	-0.265	-0.170	0.193	0.294	0.397	0.565	1.12
sulfurdioxide slant column density cobra precision [DU]	0.136	0.162	0.175	0.186	0.201	0.356	0.414	0.470	0.565	0.863
sulfurdioxide slant column density window1 [DU]	-1.88	-0.902	-0.558	-0.345	-0.134	0.608	0.796	0.976	1.25	2.04
sulfurdioxide slant column density window1 precision [DU]	0.136	0.162	0.175	0.186	0.201	0.356	0.414	0.470	0.565	0.863
sulfurdioxide slant column density corrected win1 [DU]	-1.76	-0.981	-0.704	-0.525	-0.338	0.381	0.583	0.786	1.12	2.09
background so2 slant column offset window1 [DU]	-0.433	-0.383	-0.362	-0.346	-0.321	-0.104	-1.964×10^{-2}	6.378×10^{-2}	0.193	0.539
sulfurdioxide slant column density window2 [DU]	-18.2	-11.6	-8.33	-5.90	-3.14	8.36	11.4	14.1	17.8	25.6
sulfurdioxide slant column density window2 precision [DU]	4.29	5.20	5.74	6.16	6.65	9.22	10.1	10.9	12.0	14.6
sulfurdioxide slant column density corrected win2 [DU]	-22.5	-15.3	-11.8	-9.31	-6.49	4.65	7.40	9.86	13.2	20.1
background so2 slant column offset window2 [DU]	-11.7	-9.51	-8.08	-6.93	-5.45	-1.52	-1.22	-0.987	-0.587	1.44
sulfurdioxide slant column density window3 [DU]	-74.0	-54.0	-44.4	-37.4	-29.8	0.858	8.80	16.0	25.6	44.6
sulfurdioxide slant column density window3 precision [DU]	13.5	16.0	17.8	19.2	20.9	30.5	35.1	41.0	52.7	84.2
sulfurdioxide slant column density corrected win3 [DU]	-52.8	-33.0	-23.6	-16.8	-9.42	20.1	27.5	34.3	43.3	61.6
background so2 slant column offset window3 [DU]	5.38	8.99	10.4	11.7	13.4	25.9	28.2	30.0	32.1	35.2
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	1.498×10^{-3}	2.891×10^{-3}	4.947×10^{-3}	7.243×10^{-3}	9.684×10^{-3}	2.705×10^{-2}	3.746×10^{-2}	5.721×10^{-2}	0.110	0.361
fitted radiance shift [nm]	-8.459×10^{-3}	-4.468×10^{-3}	-3.075×10^{-3}	-2.254×10^{-3}	-1.527×10^{-3}	3.110×10^{-4}	1.015×10^{-3}	1.883×10^{-3}	3.380×10^{-3}	7.578×10^{-3}
fitted radiance squeeze [1]	-6.858×10^{-4}	-3.646×10^{-4}	-2.518×10^{-4}	-1.860×10^{-4}	-1.235×10^{-4}	8.398×10^{-5}	1.341×10^{-4}	1.804×10^{-4}	2.459×10^{-4}	3.994×10^{-4}
fitted root mean square [1]	5.784×10^{-4}	7.155×10^{-4}	7.898×10^{-4}	8.465×10^{-4}	9.166×10^{-4}	1.521×10^{-3}	1.793×10^{-3}	2.060×10^{-3}	2.475×10^{-3}	3.584×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.945×10^{-2}	0.204	0.296	0.374	0.479	1.02	1.20	1.38	1.61	1.98
sulfurdioxide total air mass factor polluted precision [1]	8.569×10^{-3}	1.548×10^{-2}	2.051×10^{-2}	2.583×10^{-2}	3.344×10^{-2}	0.151	0.204	0.259	0.360	0.598
sulfurdioxide clear air mass factor polluted [1]	0.161	0.264	0.327	0.388	0.468	0.851	0.949	1.02	1.14	1.61
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]	0.644 ± 0.404	8968088	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(7.441 \pm 195.660) \times 10^{-2}$	8968088	0.587	1.349×10^{-2}	-709	199	-0.271	0.316
sulfurdioxide total vertical column precision [DU]	0.851 ± 1.442	8968088	0.615	0.440	4.298×10^{-2}	403	0.250	0.865
sulfurdioxide slant column density corrected [DU]	$(2.493 \pm 43.000) \times 10^{-2}$	8968088	0.386	1.023×10^{-2}	-35.4	48.2	-0.180	0.206
sulfurdioxide slant column density cobra [DU]	$(2.470 \pm 42.037) \times 10^{-2}$	8968088	0.386	1.023×10^{-2}	-35.4	13.5	-0.180	0.206
sulfurdioxide slant column density cobra precision [DU]	0.322 ± 0.169	8968088	0.186	0.272	8.721×10^{-2}	20.2	0.206	0.392
sulfurdioxide slant column density window1 [DU]	0.222 ± 0.796	8968088	0.790	0.256	-37.3	25.6	-0.149	0.641
sulfurdioxide slant column density window1 precision [DU]	0.322 ± 0.169	8968088	0.186	0.272	8.721×10^{-2}	20.2	0.206	0.392
sulfurdioxide slant column density corrected win1 [DU]	$(5.068 \pm 77.796) \times 10^{-2}$	8968088	0.770	2.614×10^{-2}	-37.3	27.5	-0.352	0.418
background so2 slant column offset window1 [DU]	-0.171 ± 0.243	8968088	0.242	-0.241	-1.23	4.15	-0.329	-8.624×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.36 ± 9.18	8968088	11.8	3.09	-55.7	525	-2.69	9.14
sulfurdioxide slant column density window2 precision [DU]	8.12 ± 2.08	8968088	2.50	7.83	2.40	219	6.72	9.21
sulfurdioxide slant column density corrected win2 [DU]	-1.12 ± 8.78	8968088	11.3	-1.04	-66.7	516	-6.70	4.55
background so2 slant column offset window2 [DU]	-4.48 ± 3.38	8968088	5.59	-3.64	-18.9	5.89	-7.15	-1.56
sulfurdioxide slant column density window3 [DU]	-16.9 ± 23.7	8968088	30.1	-16.9	-356	485	-31.9	-1.78
sulfurdioxide slant column density window3 precision [DU]	27.1 ± 12.2	8968088	8.57	24.0	9.58	467	20.7	29.3
sulfurdioxide slant column density corrected win3 [DU]	5.48 ± 22.83	8968088	28.8	5.67	-325	503	-8.78	20.1
background so2 slant column offset window3 [DU]	22.4 ± 7.3	8968088	12.8	22.9	-10.2	81.2	15.7	28.4
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	8968088	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.489 \pm 9.959) \times 10^{-2}$	8968088	2.844×10^{-2}	1.655×10^{-2}	2.157×10^{-4}	2.15	8.146×10^{-3}	3.658×10^{-2}
fitted radiance shift [nm]	$(-4.332 \pm 24.305) \times 10^{-4}$	8968088	1.627×10^{-3}	-4.391×10^{-4}	-4.075×10^{-2}	3.649×10^{-2}	-1.269×10^{-3}	3.589×10^{-4}
fitted radiance squeeze [1]	$(-4.538 \pm 22.778) \times 10^{-5}$	8968088	2.264×10^{-4}	-1.890×10^{-5}	-8.425×10^{-3}	1.193×10^{-2}	-1.395×10^{-4}	8.691×10^{-5}
fitted root mean square [1]	$(1.405 \pm 0.710) \times 10^{-3}$	8968088	7.098×10^{-4}	1.184×10^{-3}	3.356×10^{-4}	5.147×10^{-2}	9.415×10^{-4}	1.651×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.717 ± 0.424	8968088	0.561	0.647	5.000×10^{-2}	2.82	0.395	0.956
sulfurdioxide total air mass factor polluted precision [1]	0.103 ± 0.134	8968088	0.102	5.065×10^{-2}	2.500×10^{-3}	2.08	2.674×10^{-2}	0.129
sulfurdioxide clear air mass factor polluted [1]	0.612 ± 0.295	8968088	0.434	0.566	3.036×10^{-2}	2.85	0.378	0.812
number of spectral points in retrieval [1]	73.5 ± 0.5	8968088	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]	0.647 ± 0.406	8341824	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(2.235 \pm 73.132) \times 10^{-2}$	8341824	0.420	1.006×10^{-2}	-45.4	213	-0.198	0.222
sulfurdioxide total vertical column precision [DU]	0.434 ± 0.507	8341824	0.274	0.300	4.734×10^{-2}	85.3	0.211	0.484
sulfurdioxide slant column density corrected [DU]	$(1.572 \pm 34.892) \times 10^{-2}$	8341824	0.341	8.674×10^{-3}	-29.8	307	-0.160	0.180
sulfurdioxide slant column density cobra [DU]	$(1.565 \pm 32.954) \times 10^{-2}$	8341824	0.341	8.674×10^{-3}	-29.8	48.7	-0.160	0.180
sulfurdioxide slant column density cobra precision [DU]	0.272 ± 0.119	8341824	0.118	0.237	7.667×10^{-2}	22.7	0.197	0.315
sulfurdioxide slant column density window1 [DU]	0.219 ± 0.626	8341824	0.694	0.236	-48.2	92.6	-0.119	0.575
sulfurdioxide slant column density window1 precision [DU]	0.272 ± 0.119	8341824	0.118	0.237	7.667×10^{-2}	22.7	0.197	0.315
sulfurdioxide slant column density corrected win1 [DU]	$(1.956 \pm 61.107) \times 10^{-2}$	8341824	0.671	7.983×10^{-3}	-48.2	92.3	-0.325	0.346
background so2 slant column offset window1 [DU]	-0.199 ± 0.159	8341824	0.191	-0.241	-1.12	1.69	-0.316	-0.124
sulfurdioxide slant column density window2 [DU]	2.04 ± 8.86	8341824	11.1	1.89	-1.855×10^3	786	-3.60	7.52
sulfurdioxide slant column density window2 precision [DU]	8.08 ± 2.32	8341824	2.64	7.74	2.22	500	6.58	9.22
sulfurdioxide slant column density corrected win2 [DU]	-0.780 ± 8.767	8341824	11.0	-0.755	-1.857×10^3	783	-6.28	4.75
background so2 slant column offset window2 [DU]	-2.82 ± 2.02	8341824	2.37	-2.31	-17.9	4.20	-3.85	-1.49
sulfurdioxide slant column density window3 [DU]	-11.9 ± 24.5	8341824	30.9	-12.1	-466	358	-27.3	3.57
sulfurdioxide slant column density window3 precision [DU]	29.0 ± 13.9	8341824	10.7	25.3	9.37	224	21.1	31.8
sulfurdioxide slant column density corrected win3 [DU]	4.96 ± 23.81	8341824	30.2	4.75	-450	375	-10.1	20.1
background so2 slant column offset window3 [DU]	16.8 ± 6.8	8341824	11.5	15.5	-12.3	35.4	11.2	22.7
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	8341824	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.012 \pm 2.613) \times 10^{-2}$	8341824	1.192×10^{-2}	1.635×10^{-2}	1.021×10^{-3}	1.59	1.091×10^{-2}	2.284×10^{-2}
fitted radiance shift [nm]	$(-7.350 \pm 27.950) \times 10^{-4}$	8341824	2.055×10^{-3}	-7.192×10^{-4}	-6.027×10^{-2}	7.041×10^{-2}	-1.811×10^{-3}	2.436×10^{-4}
fitted radiance squeeze [1]	$(-1.718 \pm 16.497) \times 10^{-5}$	8341824	1.908×10^{-4}	-1.271×10^{-5}	-1.339×10^{-2}	3.107×10^{-2}	-1.097×10^{-4}	8.110×10^{-5}
fitted root mean square [1]	$(1.201 \pm 0.482) \times 10^{-3}$	8341824	4.764×10^{-4}	1.062×10^{-3}	3.299×10^{-4}	5.284×10^{-2}	8.946×10^{-4}	1.371×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.865 ± 0.404	8341824	0.496	0.809	5.000×10^{-2}	2.71	0.583	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.123 ± 0.115	8341824	0.130	7.957×10^{-2}	3.910×10^{-3}	1.48	4.082×10^{-2}	0.171
sulfurdioxide clear air mass factor polluted [1]	0.743 ± 0.273	8341824	0.316	0.700	0.107	2.97	0.562	0.879
number of spectral points in retrieval [1]	73.4 ± 0.5	8341824	1.000	73.0	53.0	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]	0.673 ± 0.401	12102725	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.806 \pm 104.333) \times 10^{-2}$	12102725	0.442	9.249×10^{-3}	-69.4	104	-0.209	0.232
sulfurdioxide total vertical column precision [DU]	0.517 ± 0.780	12102725	0.318	0.314	4.298×10^{-2}	85.3	0.215	0.533
sulfurdioxide slant column density corrected [DU]	$(1.412 \pm 33.720) \times 10^{-2}$	12102725	0.345	7.736×10^{-3}	-29.8	60.4	-0.163	0.181
sulfurdioxide slant column density cobra [DU]	$(1.408 \pm 33.473) \times 10^{-2}$	12102725	0.345	7.736×10^{-3}	-29.8	27.3	-0.163	0.181
sulfurdioxide slant column density cobra precision [DU]	0.279 ± 0.128	12102725	0.130	0.237	7.667×10^{-2}	22.6	0.197	0.326
sulfurdioxide slant column density window1 [DU]	0.225 ± 0.645	12102725	0.704	0.245	-32.5	92.6	-0.115	0.589
sulfurdioxide slant column density window1 precision [DU]	0.279 ± 0.128	12102725	0.130	0.237	7.667×10^{-2}	22.6	0.197	0.326
sulfurdioxide slant column density corrected win1 [DU]	$(2.467 \pm 63.096) \times 10^{-2}$	12102725	0.684	1.084×10^{-2}	-32.5	92.3	-0.328	0.356
background so2 slant column offset window1 [DU]	-0.201 ± 0.176	12102725	0.200	-0.246	-1.12	4.15	-0.322	-0.122
sulfurdioxide slant column density window2 [DU]	2.28 ± 8.75	12102725	11.1	2.11	-765	567	-3.39	7.76
sulfurdioxide slant column density window2 precision [DU]	7.94 ± 2.10	12102725	2.47	7.60	2.22	429	6.53	9.00
sulfurdioxide slant column density corrected win2 [DU]	-0.933 ± 8.593	12102725	10.9	-0.885	-767	565	-6.38	4.57
background so2 slant column offset window2 [DU]	-3.22 ± 2.52	12102725	3.06	-2.48	-18.9	5.80	-4.52	-1.46
sulfurdioxide slant column density window3 [DU]	-11.4 ± 24.1	12102725	30.6	-11.7	-356	327	-26.7	3.89
sulfurdioxide slant column density window3 precision [DU]	27.3 ± 12.2	12102725	9.32	24.2	9.69	212	20.6	29.9
sulfurdioxide slant column density corrected win3 [DU]	7.36 ± 22.96	12102725	29.2	7.13	-325	357	-7.28	21.9
background so2 slant column offset window3 [DU]	18.7 ± 7.1	12102725	11.3	17.9	-12.3	79.9	13.1	24.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	12102725	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.256 \pm 3.547) \times 10^{-2}$	12102725	1.336×10^{-2}	1.605×10^{-2}	5.042×10^{-4}	1.32	1.047×10^{-2}	2.383×10^{-2}
fitted radiance shift [nm]	$(-5.785 \pm 24.463) \times 10^{-4}$	12102725	1.831×10^{-3}	-5.415×10^{-4}	-4.998×10^{-2}	7.041×10^{-2}	-1.518×10^{-3}	3.131×10^{-4}
fitted radiance squeeze [1]	$(-1.507 \pm 17.398) \times 10^{-5}$	12102725	1.940×10^{-4}	-7.937×10^{-6}	-1.339×10^{-2}	2.008×10^{-2}	-1.069×10^{-4}	8.713×10^{-5}
fitted root mean square [1]	$(1.225 \pm 0.521) \times 10^{-3}$	12102725	5.132×10^{-4}	1.063×10^{-3}	3.317×10^{-4}	5.284×10^{-2}	8.950×10^{-4}	1.408×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.824 ± 0.395	12102725	0.480	0.778	5.000×10^{-2}	2.54	0.551	1.03
sulfurdioxide total air mass factor polluted precision [1]	0.112 ± 0.109	12102725	0.114	6.811×10^{-2}	2.761×10^{-3}	1.63	3.804×10^{-2}	0.152
sulfurdioxide clear air mass factor polluted [1]	0.710 ± 0.265	12102725	0.341	0.686	5.080×10^{-2}	2.47	0.530	0.871
number of spectral points in retrieval [1]	73.5 ± 0.5	12102725	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]	0.622 $\pm$ 0.411	3803463	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	(8.120 $\pm$ 209.109) $\times 10^{-2}$	3803463	0.610	1.480 $\times 10^{-2}$	-709	199	-0.279	0.332
sulfurdioxide total vertical column precision [DU]	0.882 $\pm$ 1.548	3803463	0.619	0.464	4.734 $\times 10^{-2}$	403	0.264	0.883
sulfurdioxide slant column density corrected [DU]	(2.771 $\pm$ 42.886) $\times 10^{-2}$	3803463	0.387	1.124 $\times 10^{-2}$	-35.4	53.7	-0.179	0.208
sulfurdioxide slant column density cobra [DU]	(2.749 $\pm$ 41.901) $\times 10^{-2}$	3803463	0.387	1.124 $\times 10^{-2}$	-35.4	40.3	-0.179	0.208
sulfurdioxide slant column density cobra precision [DU]	0.319 $\pm$ 0.163	3803463	0.171	0.277	8.721 $\times 10^{-2}$	20.2	0.210	0.381
sulfurdioxide slant column density window1 [DU]	0.234 $\pm$ 0.789	3803463	0.789	0.264	-37.3	72.7	-0.141	0.648
sulfurdioxide slant column density window1 precision [DU]	0.319 $\pm$ 0.163	3803463	0.171	0.277	8.721 $\times 10^{-2}$	20.2	0.210	0.381
sulfurdioxide slant column density corrected win1 [DU]	(5.111 $\pm$ 77.016) $\times 10^{-2}$	3803463	0.763	2.821 $\times 10^{-2}$	-37.3	73.0	-0.347	0.416
background so2 slant column offset window1 [DU]	-0.183 $\pm$ 0.225	3803463	0.218	-0.249	-0.898	3.20	-0.327	-0.109
sulfurdioxide slant column density window2 [DU]	3.13 $\pm$ 9.45	3803463	12.0	2.90	-1.855 $\times 10^3$	786	-2.97	9.03
sulfurdioxide slant column density window2 precision [DU]	8.44 $\pm$ 2.40	3803463	2.60	8.15	2.32	500	6.96	9.56
sulfurdioxide slant column density corrected win2 [DU]	-0.987 $\pm$ 9.100	3803463	11.5	-0.934	-1.857 $\times 10^3$	783	-6.70	4.79
background so2 slant column offset window2 [DU]	-4.12 $\pm$ 3.26	3803463	5.03	-2.94	-18.9	4.99	-6.57	-1.54
sulfurdioxide slant column density window3 [DU]	-21.4 $\pm$ 23.4	3803463	29.5	-20.9	-345	485	-35.9	-6.42
sulfurdioxide slant column density window3 precision [DU]	30.3 $\pm$ 15.9	3803463	10.6	25.9	9.37	467	21.7	32.3
sulfurdioxide slant column density corrected win3 [DU]	-0.725 $\pm$ 23.647	3803463	29.8	-0.234	-331	503	-15.4	14.5
background so2 slant column offset window3 [DU]	20.7 $\pm$ 8.0	3803463	13.9	20.4	-12.3	79.6	13.8	27.7
sulfurdioxide slant column cobra flag [1]	1.98 $\pm$ 0.19	3803463	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	(5.795 $\pm$ 11.760) $\times 10^{-2}$	3803463	4.577 $\times 10^{-2}$	2.148 $\times 10^{-2}$	2.203 $\times 10^{-4}$	2.15	8.075 $\times 10^{-3}$	5.385 $\times 10^{-2}$
fitted radiance shift [nm]	(-5.611 $\pm$ 31.453) $\times 10^{-4}$	3803463	1.822 $\times 10^{-3}$	-5.949 $\times 10^{-4}$	-6.027 $\times 10^{-2}$	4.282 $\times 10^{-2}$	-1.515 $\times 10^{-3}$	3.070 $\times 10^{-4}$
fitted radiance squeeze [1]	(-4.897 $\pm$ 22.018) $\times 10^{-5}$	3803463	2.259 $\times 10^{-4}$	-2.687 $\times 10^{-5}$	-1.326 $\times 10^{-2}$	3.107 $\times 10^{-2}$	-1.462 $\times 10^{-4}$	7.970 $\times 10^{-5}$
fitted root mean square [1]	(1.392 $\pm$ 0.683) $\times 10^{-3}$	3803463	6.394 $\times 10^{-4}$	1.201 $\times 10^{-3}$	3.525 $\times 10^{-4}$	5.147 $\times 10^{-2}$	9.666 $\times 10^{-4}$	1.606 $\times 10^{-3}$
sulfurdioxide total air mass factor polluted [1]	0.720 $\pm$ 0.473	3803463	0.602	0.588	5.000 $\times 10^{-2}$	2.82	0.373	0.976
sulfurdioxide total air mass factor polluted precision [1]	0.118 $\pm$ 0.162	3803463	0.129	4.760 $\times 10^{-2}$	2.500 $\times 10^{-3}$	2.08	2.368 $\times 10^{-2}$	0.153
sulfurdioxide clear air mass factor polluted [1]	0.597 $\pm$ 0.325	3803463	0.405	0.524	3.036 $\times 10^{-2}$	2.97	0.359	0.764
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	3803463	1.000	73.0	70.0	74.0	73.0	74.0

3 Granule outlines

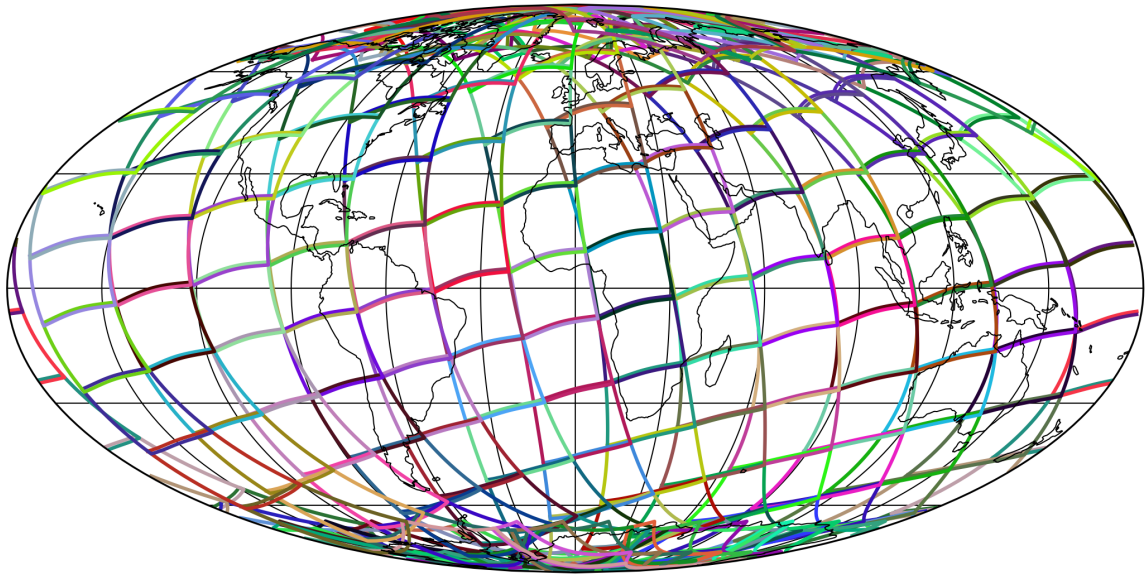


Figure 1: Outline of the granules.

4 Input data monitoring

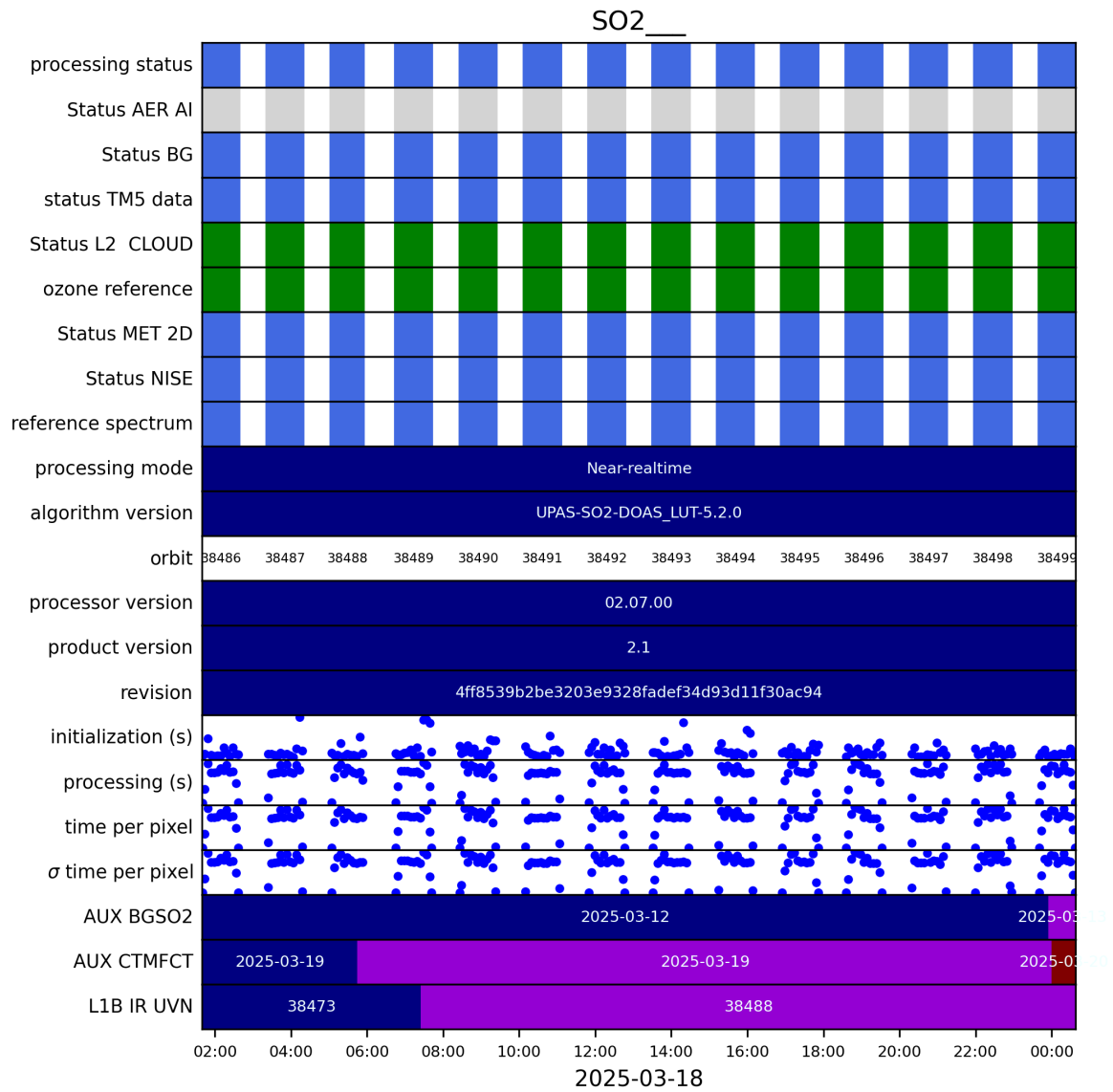


Figure 2: Input data per granule

5 Warnings and errors

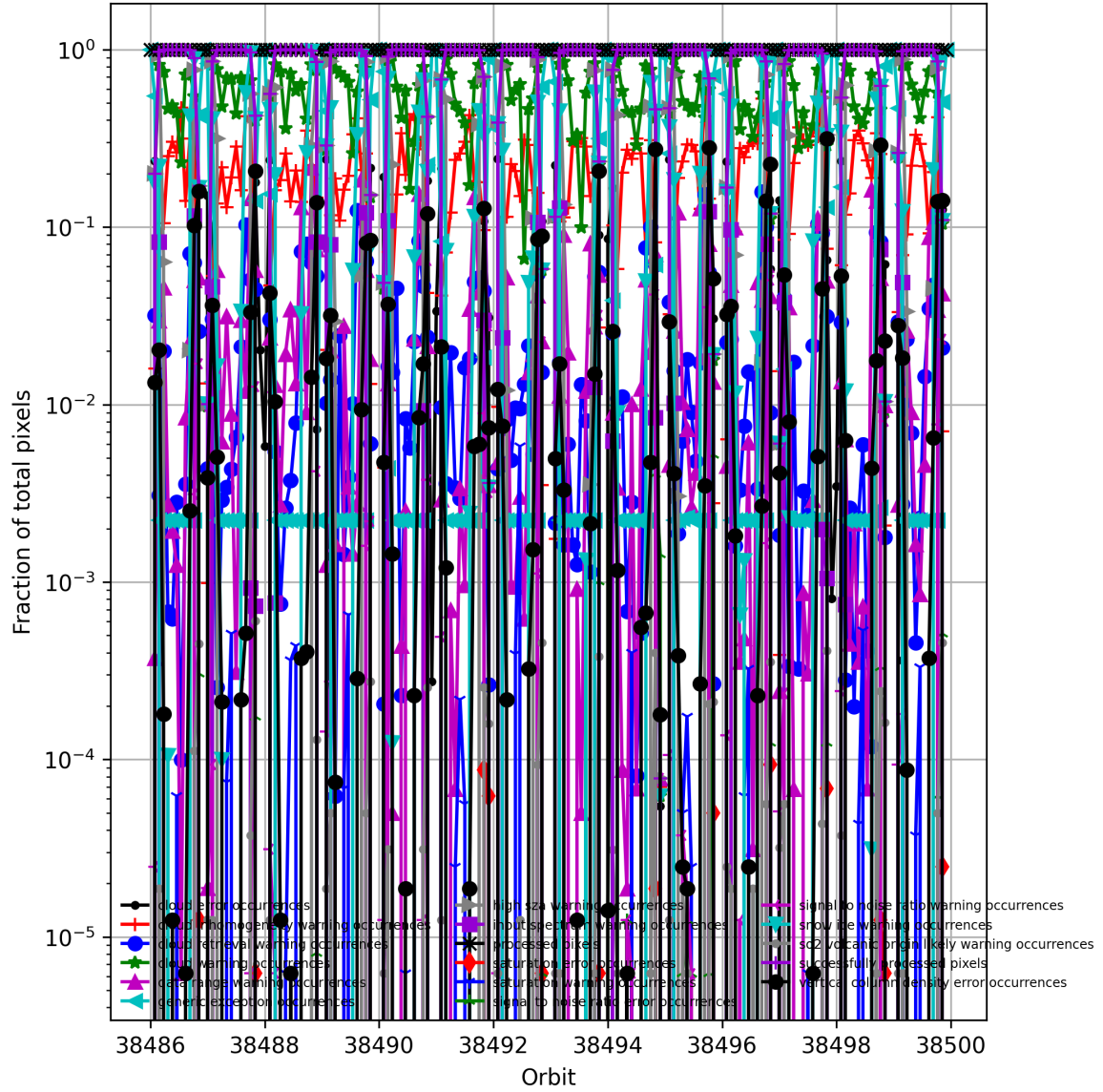


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

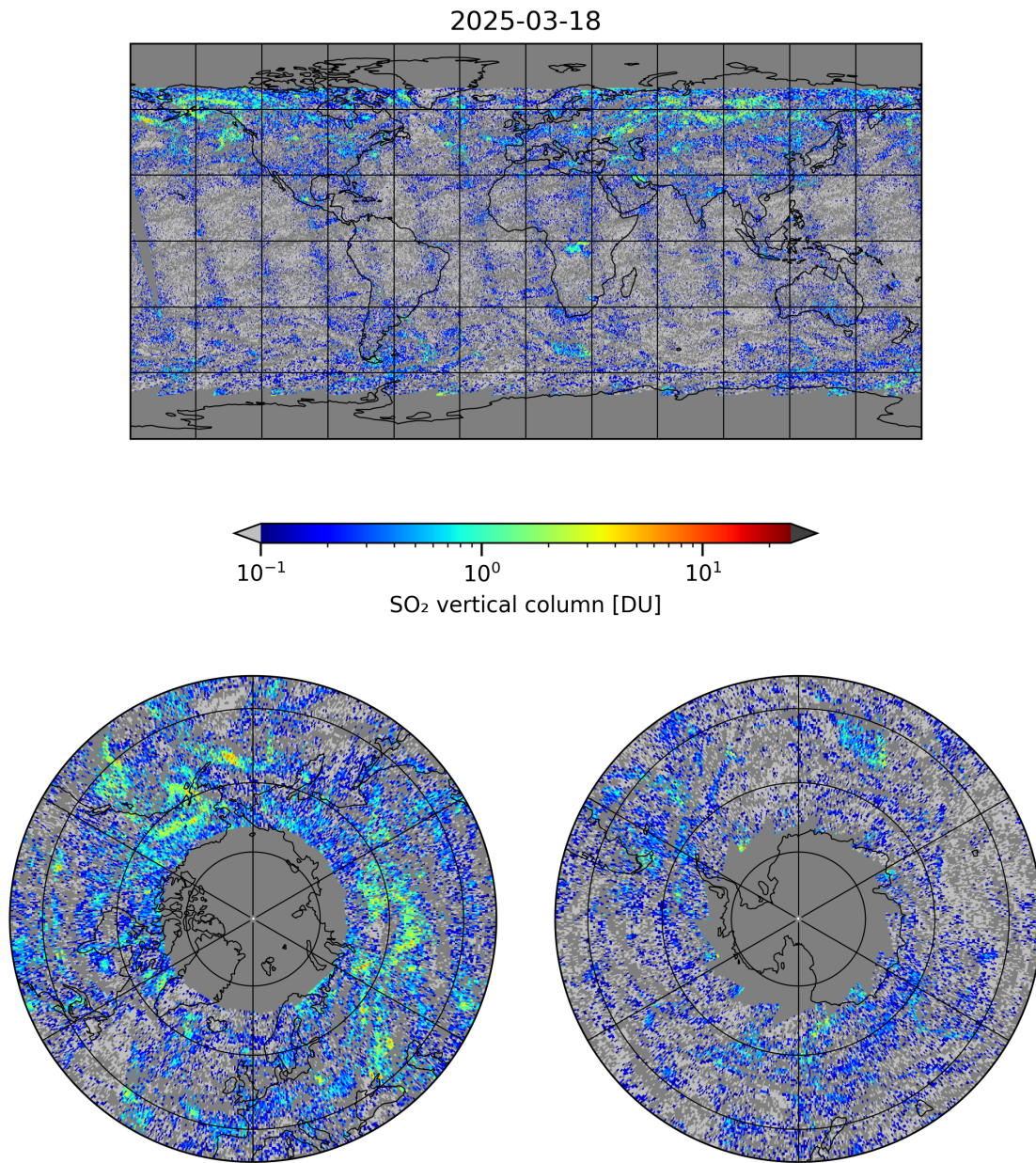


Figure 4: Map of “SO₂ vertical column” for 2025-03-18 to 2025-03-19

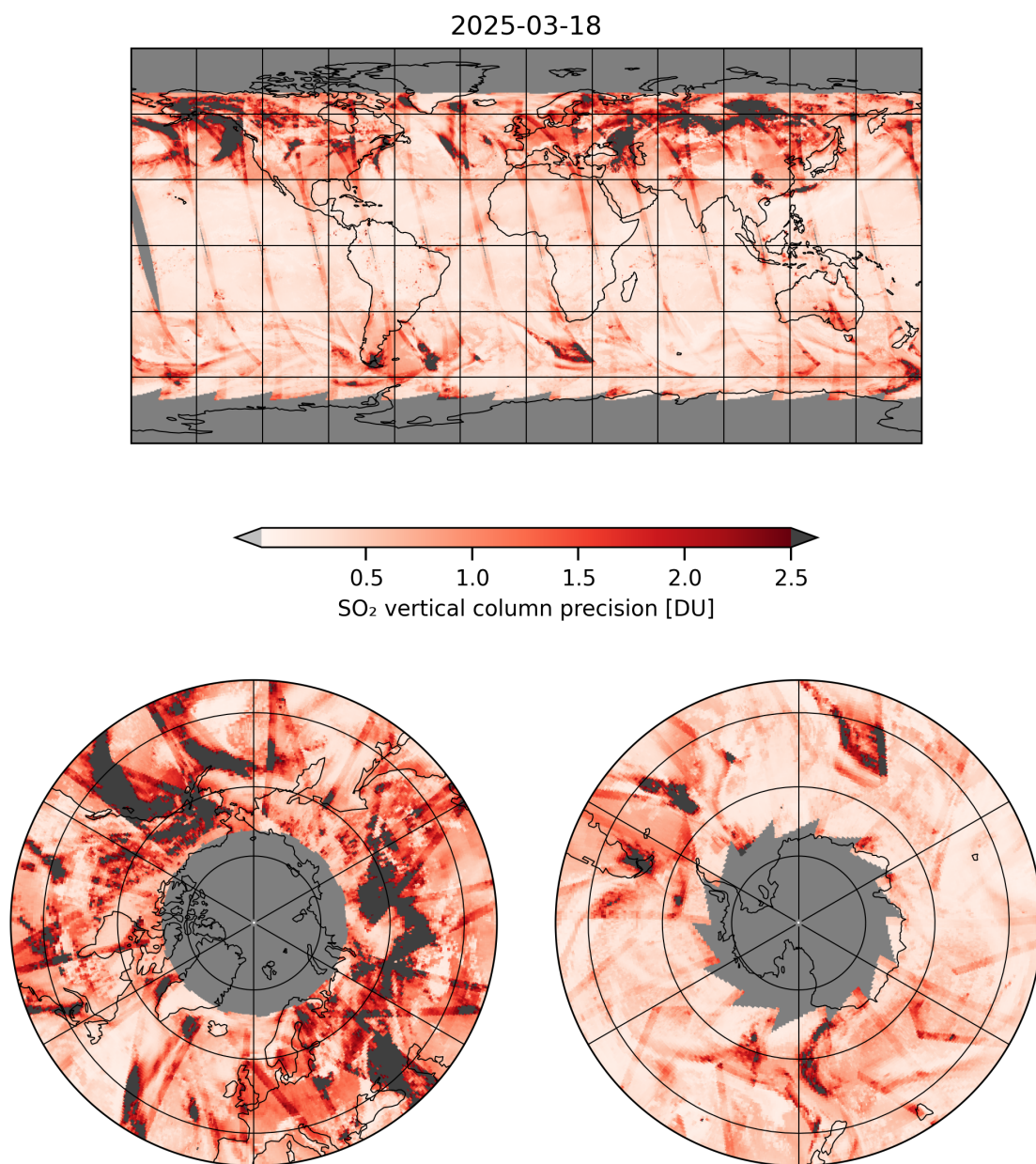


Figure 5: Map of “SO₂ vertical column precision” for 2025-03-18 to 2025-03-19

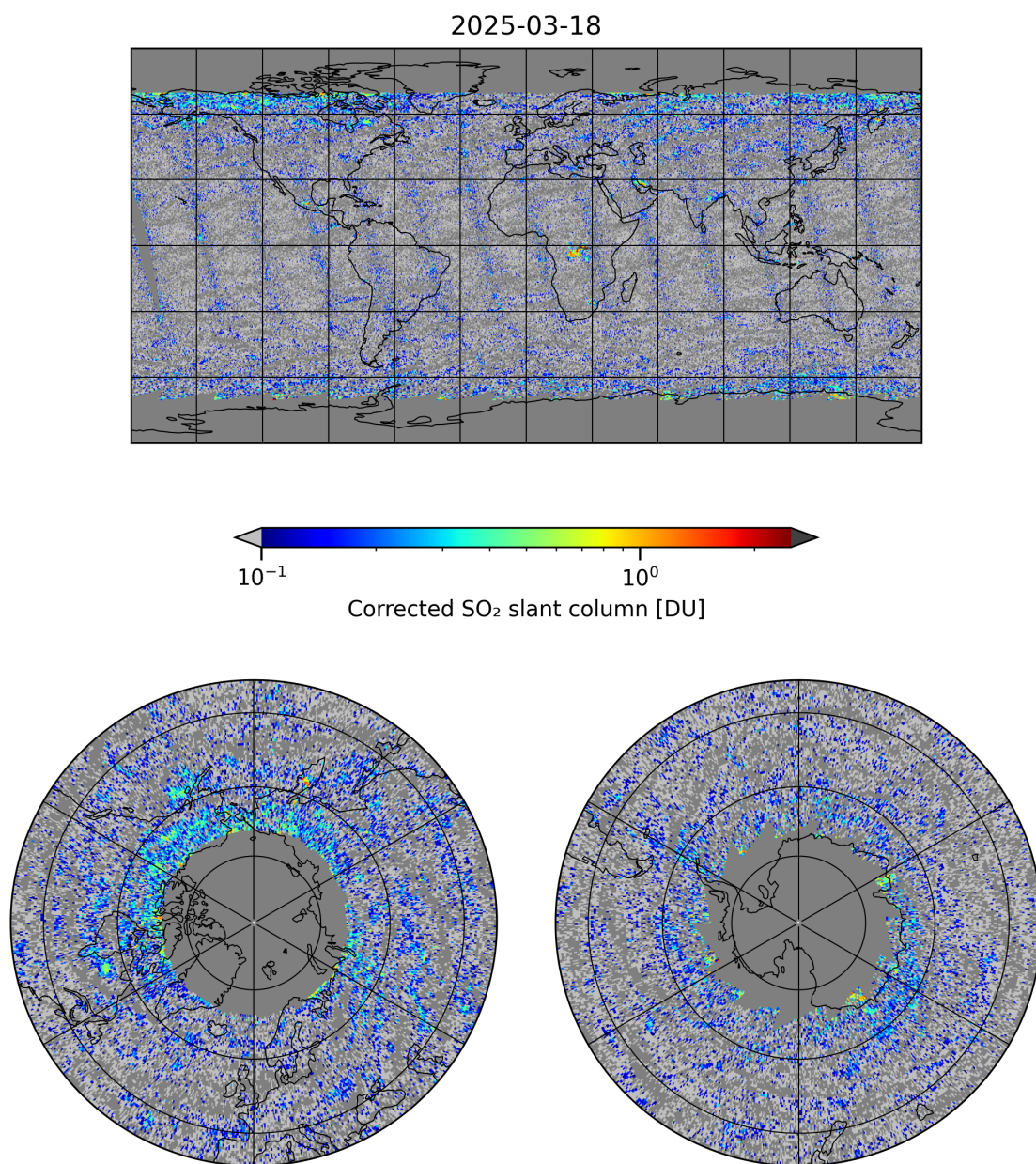


Figure 6: Map of “Corrected SO₂ slant column” for 2025-03-18 to 2025-03-19

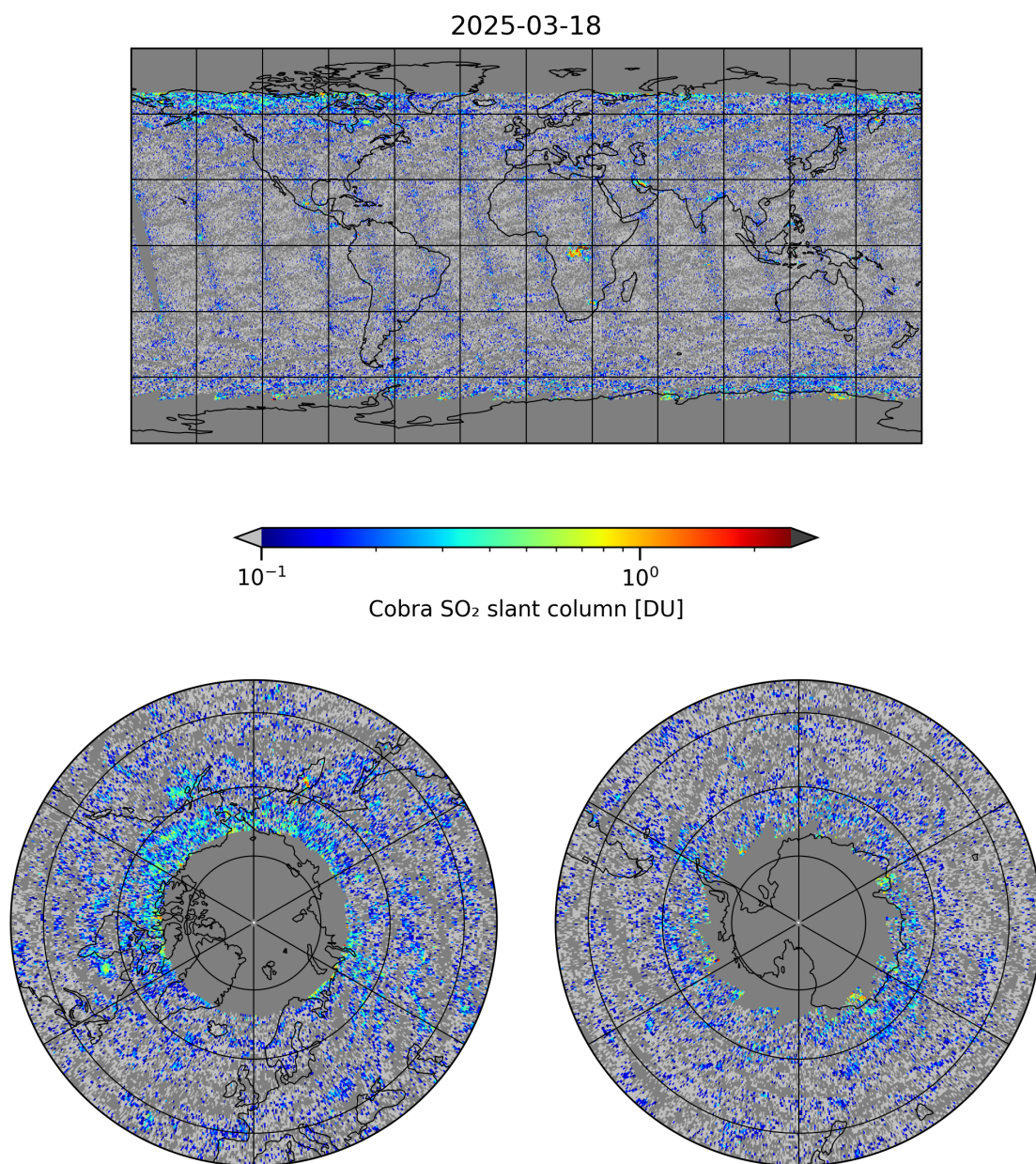


Figure 7: Map of “Cobra SO₂ slant column” for 2025-03-18 to 2025-03-19

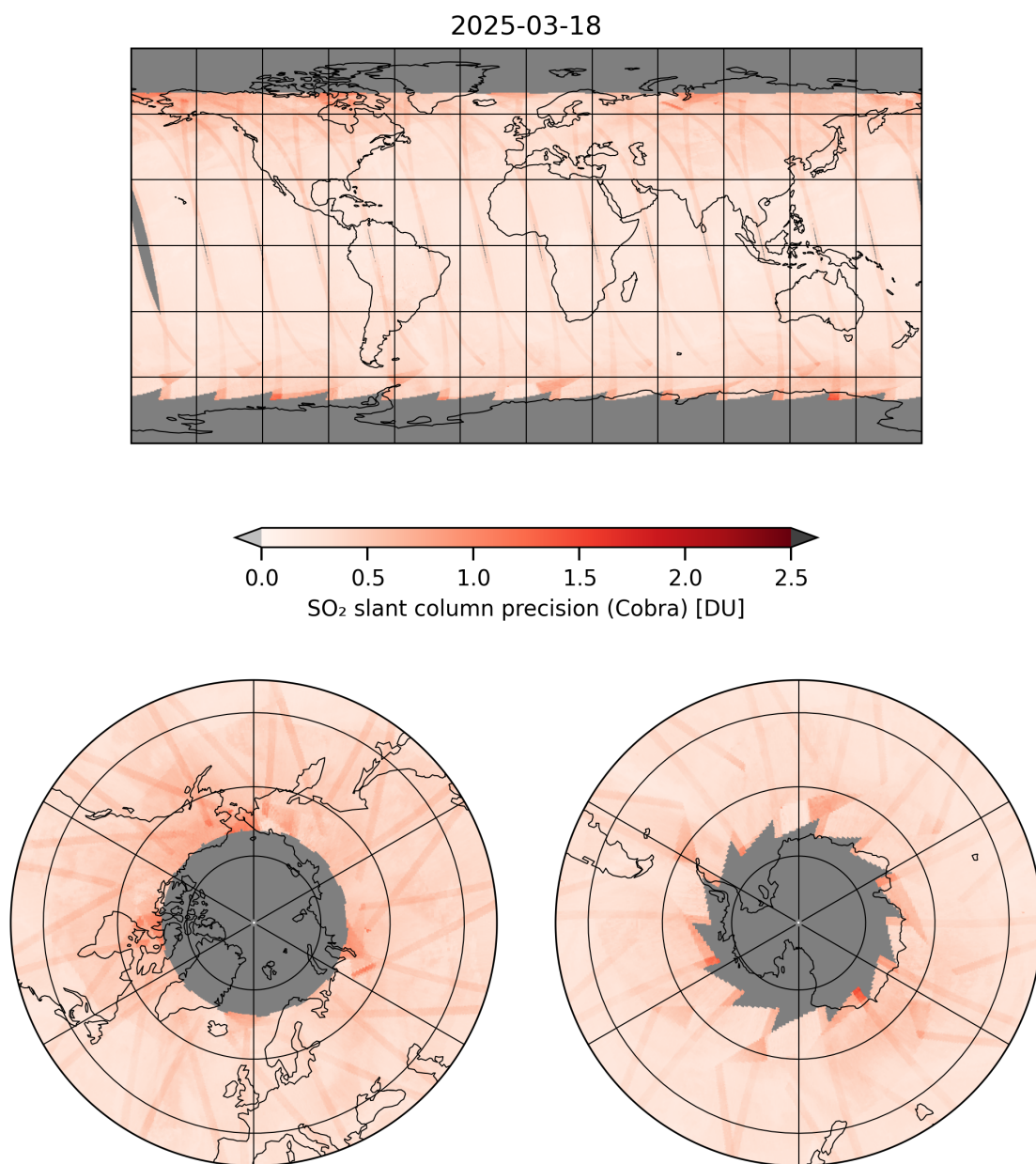


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-03-18 to 2025-03-19

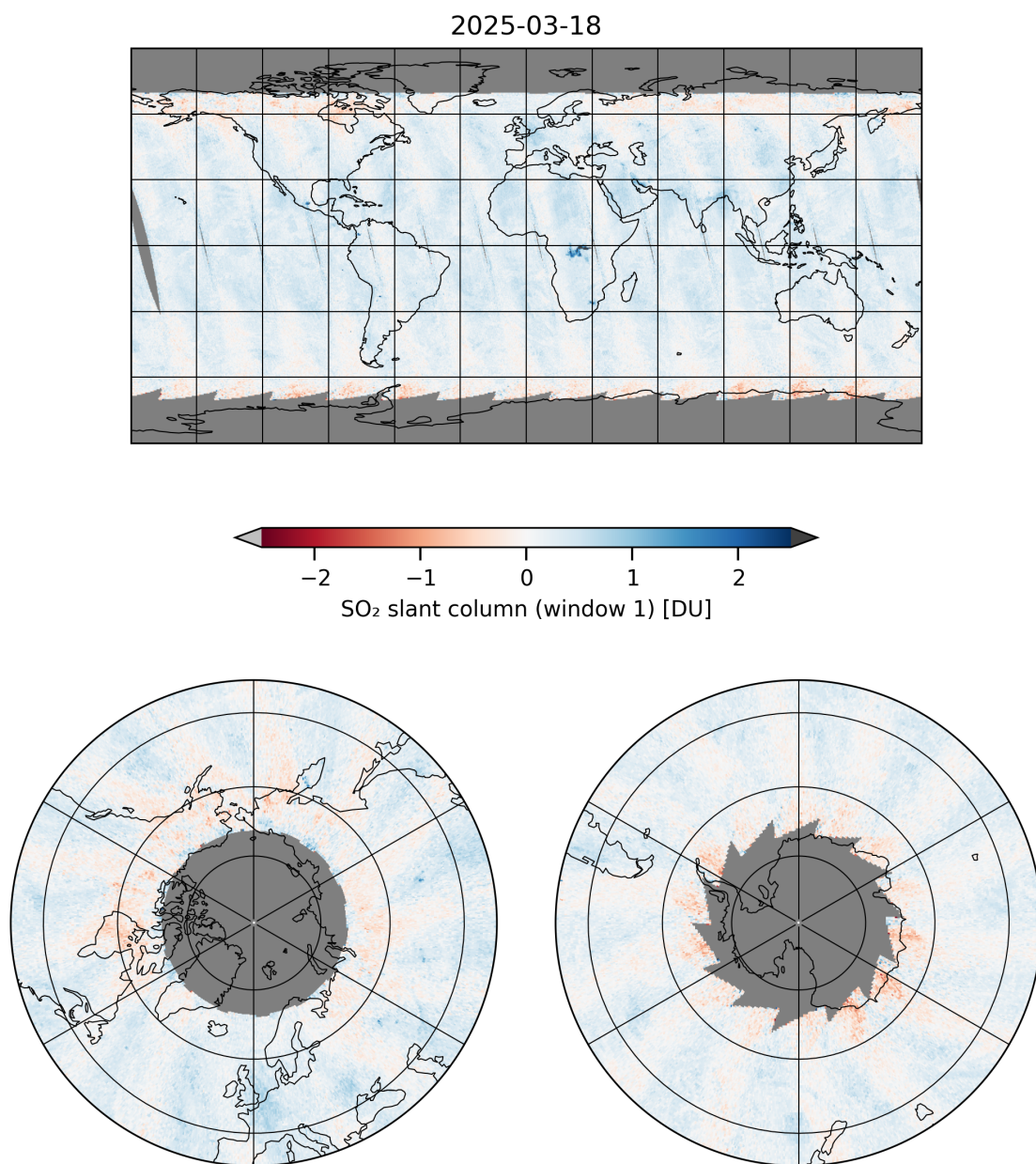


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-03-18 to 2025-03-19

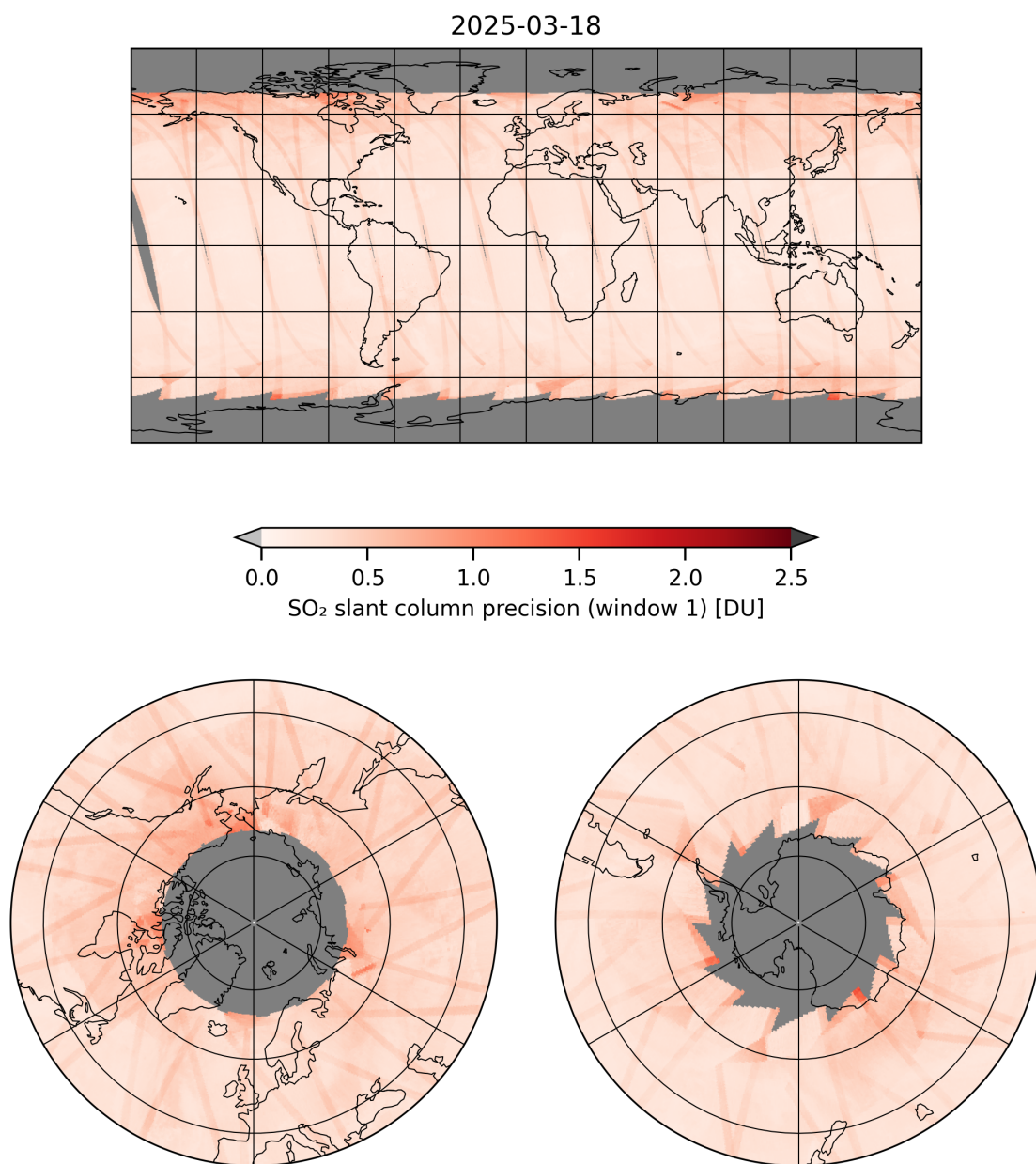


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-03-18 to 2025-03-19

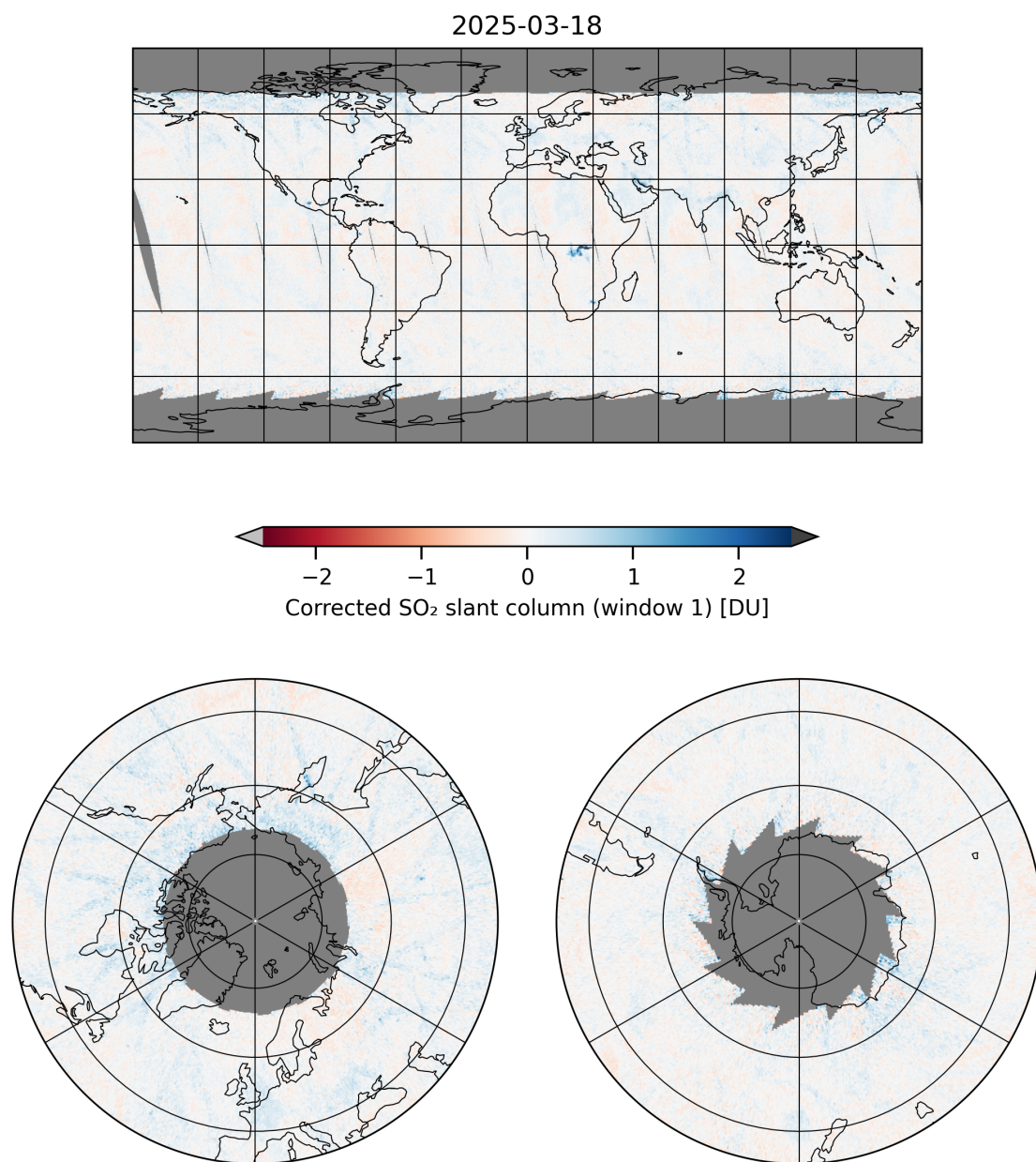


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-03-18 to 2025-03-19

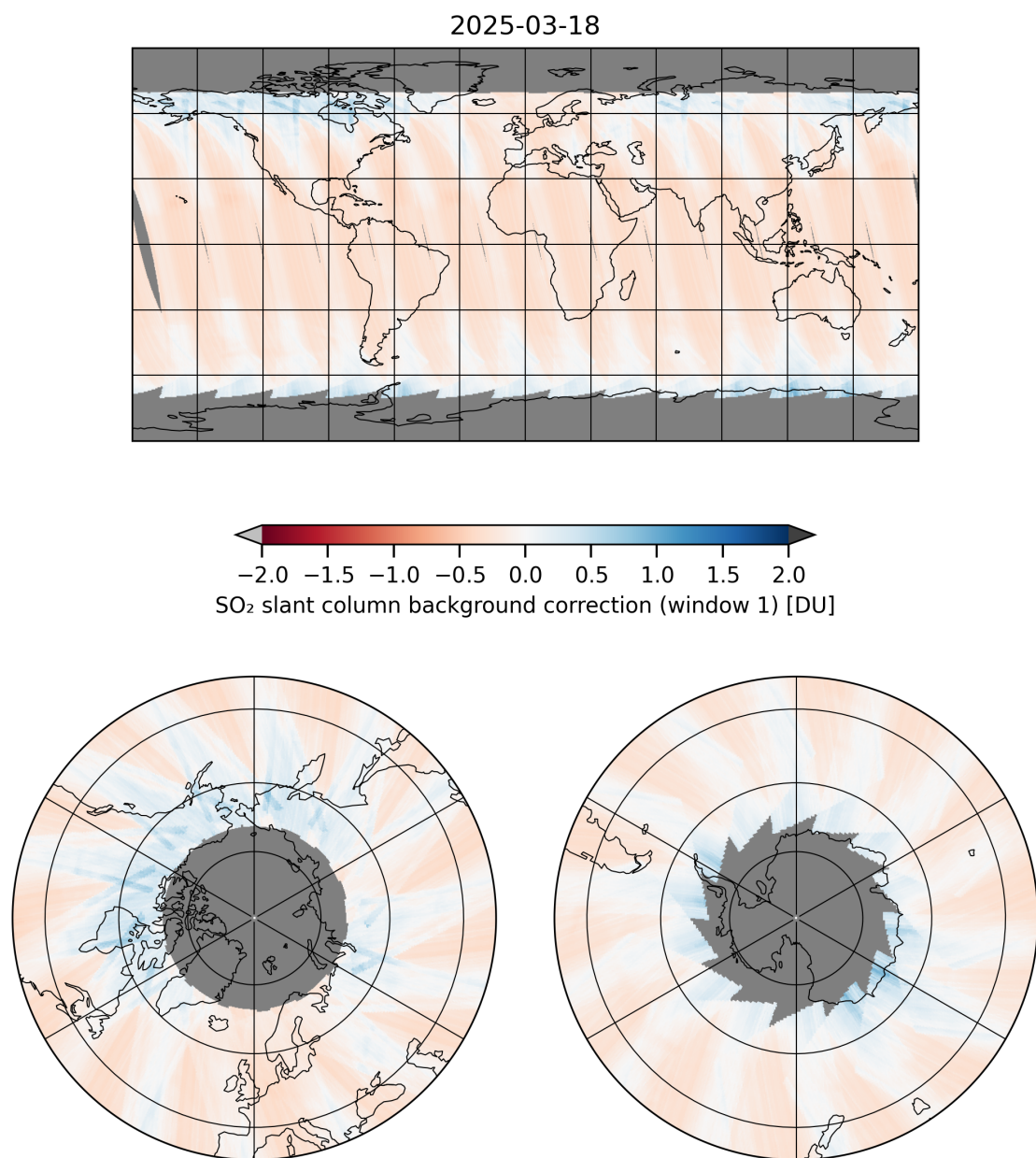


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-03-18 to 2025-03-19

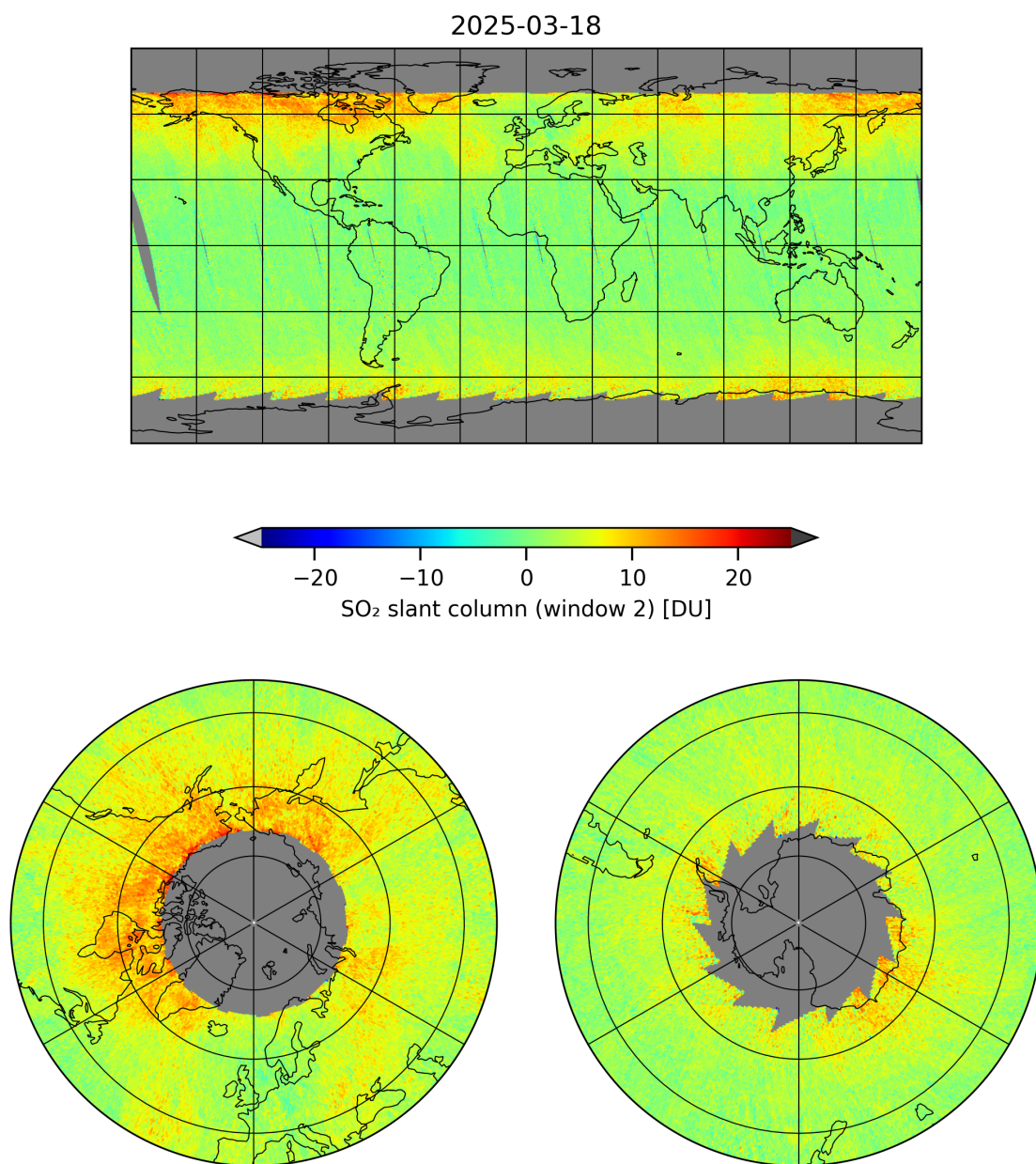


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-03-18 to 2025-03-19

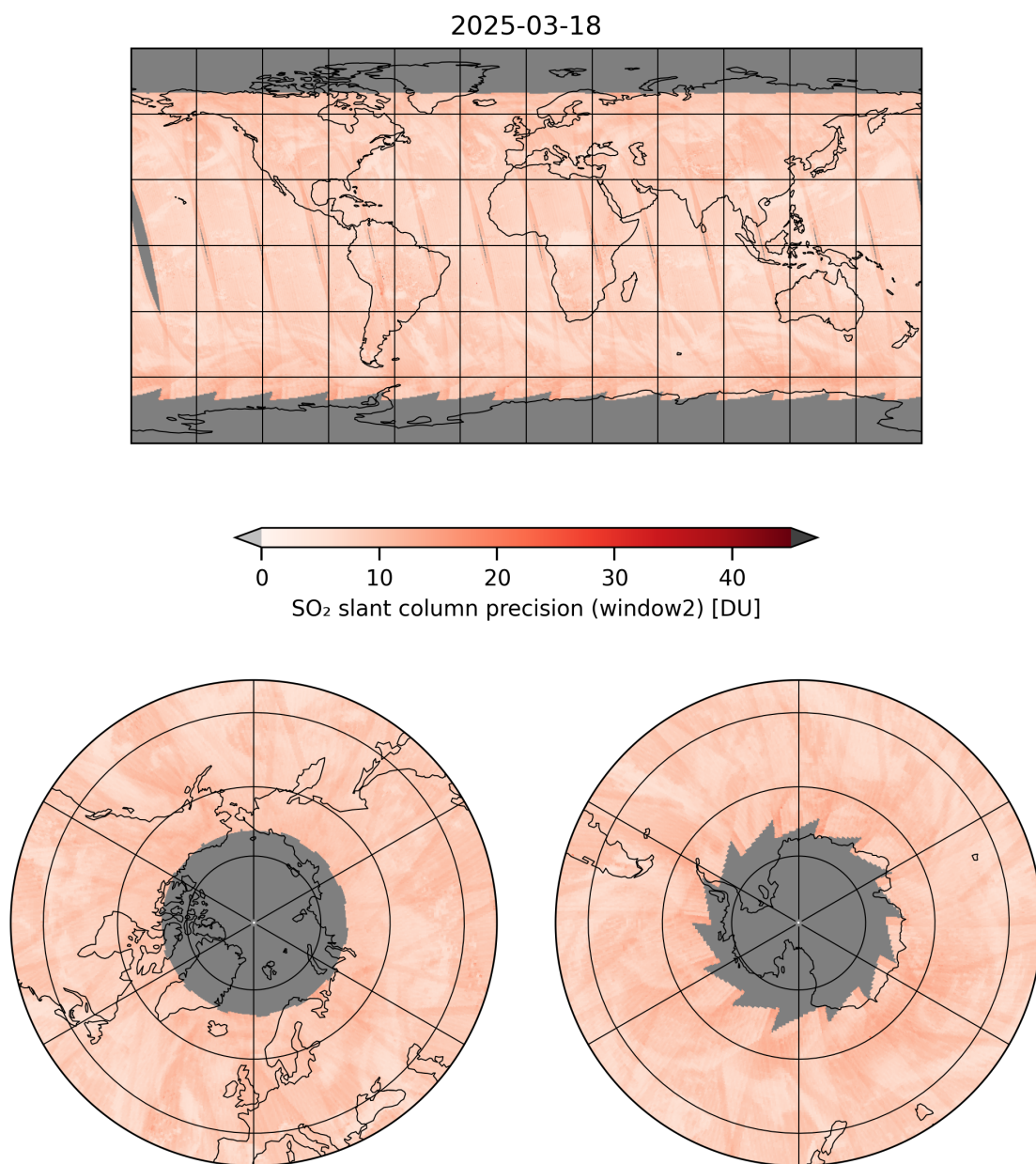


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-03-18 to 2025-03-19

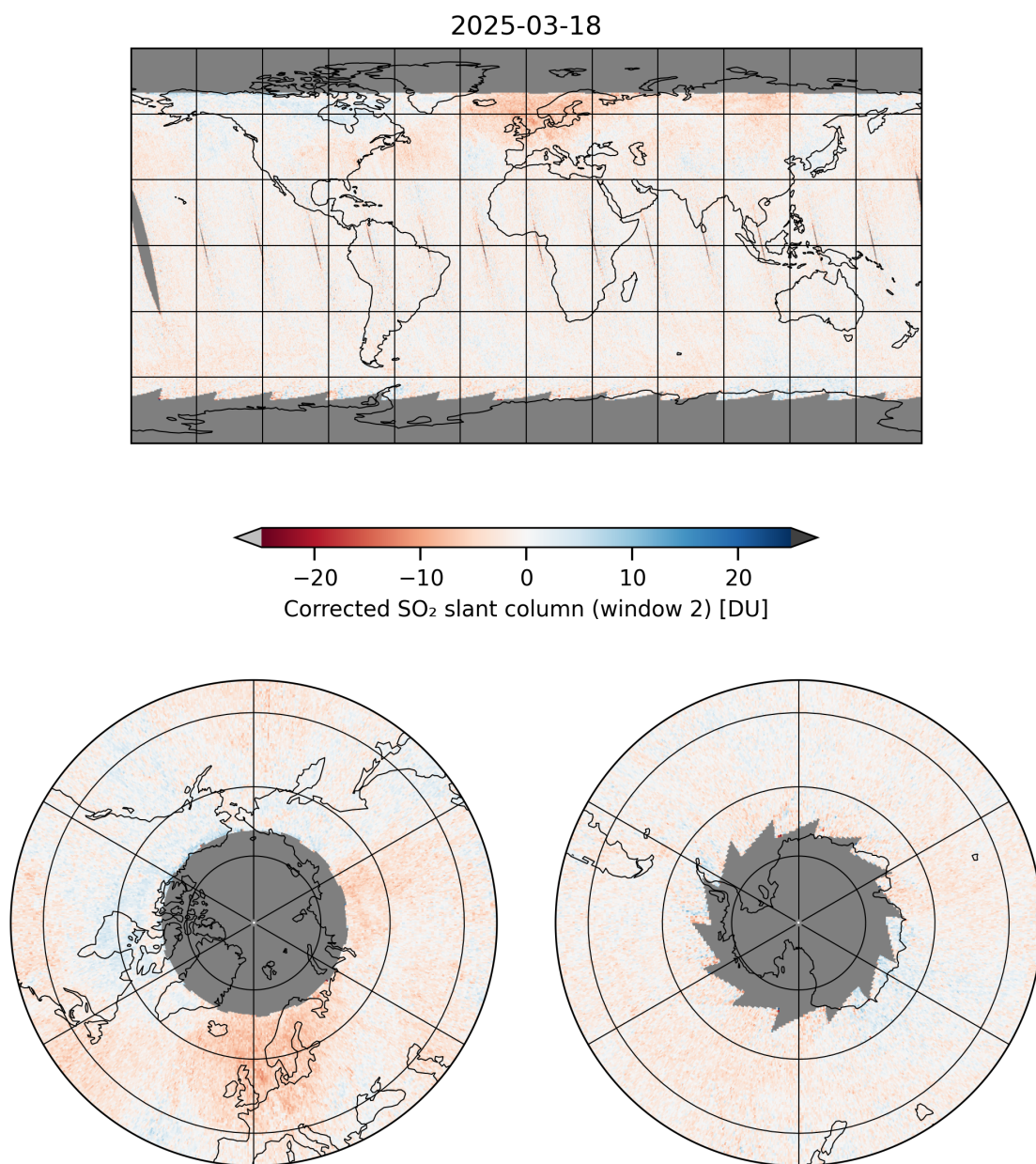


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-03-18 to 2025-03-19

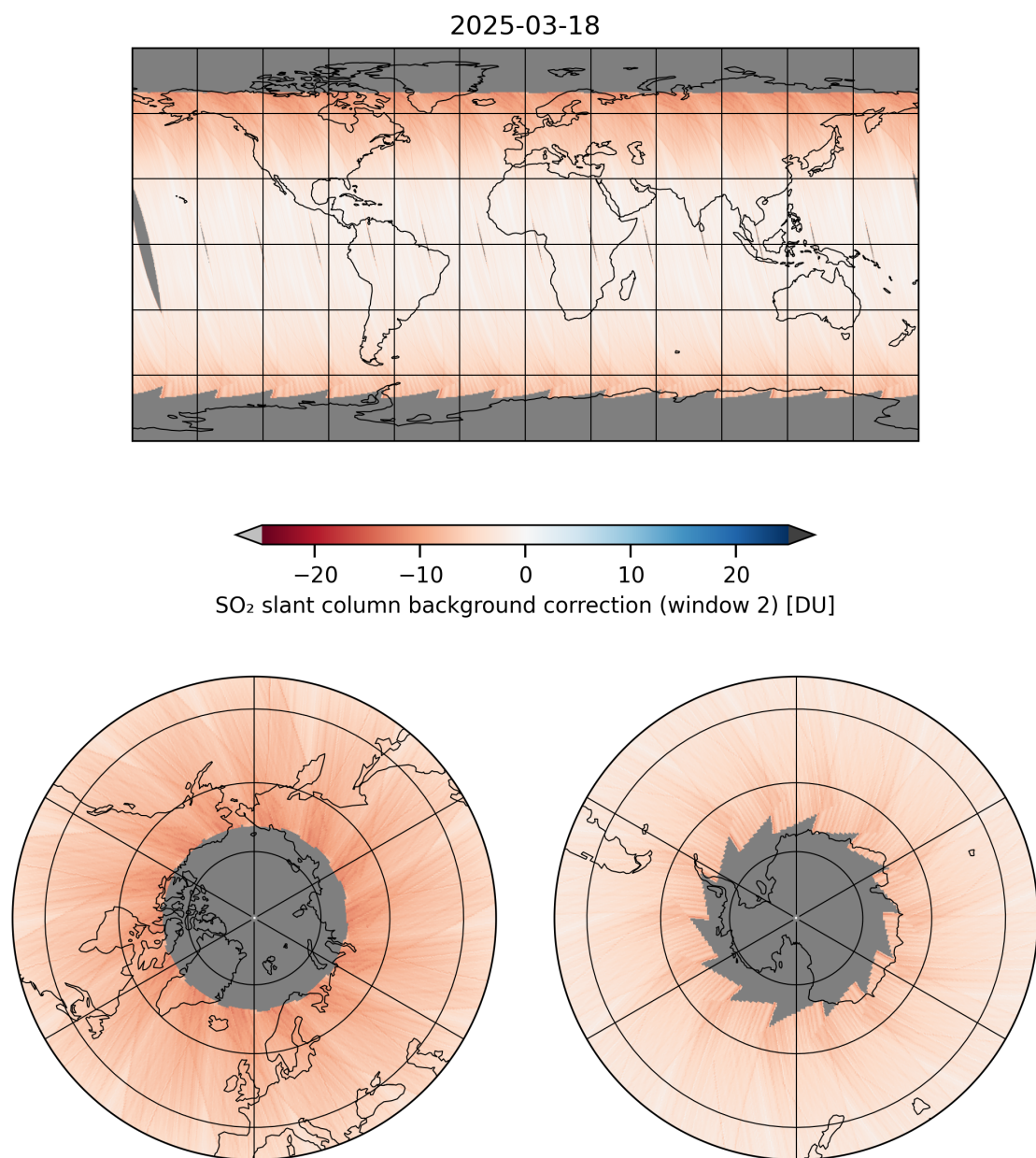


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-03-18 to 2025-03-19

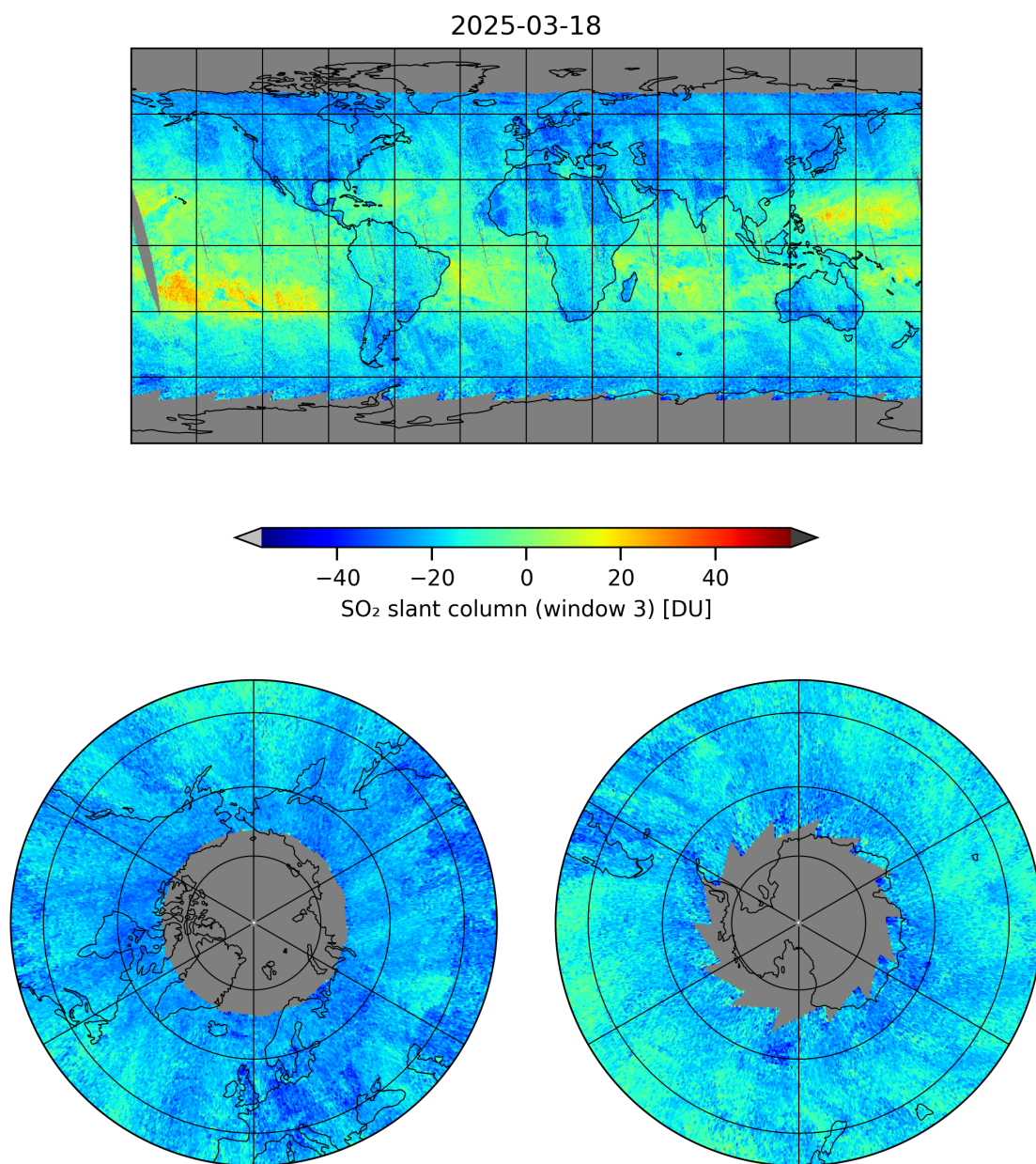


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-03-18 to 2025-03-19

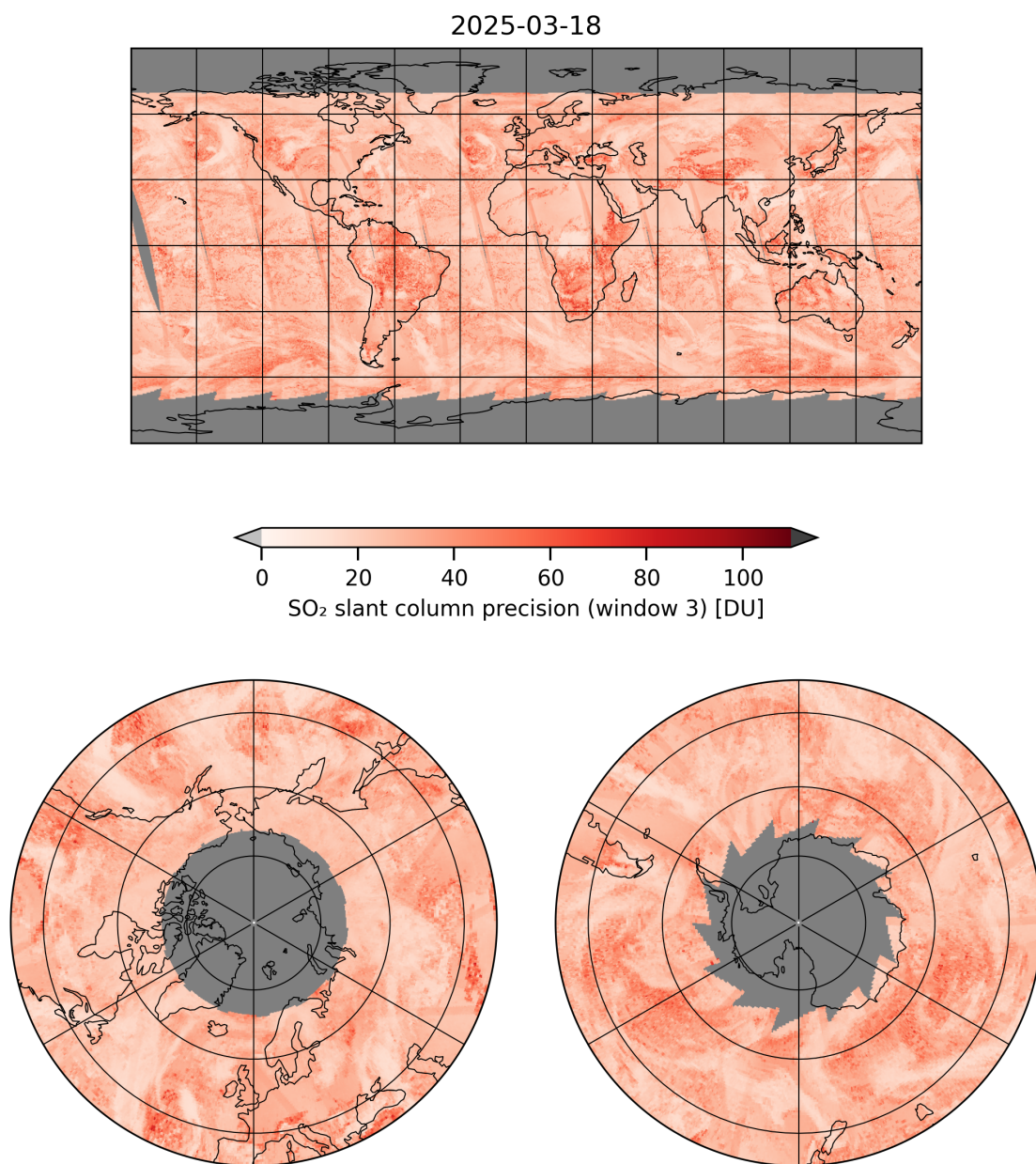


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-03-18 to 2025-03-19

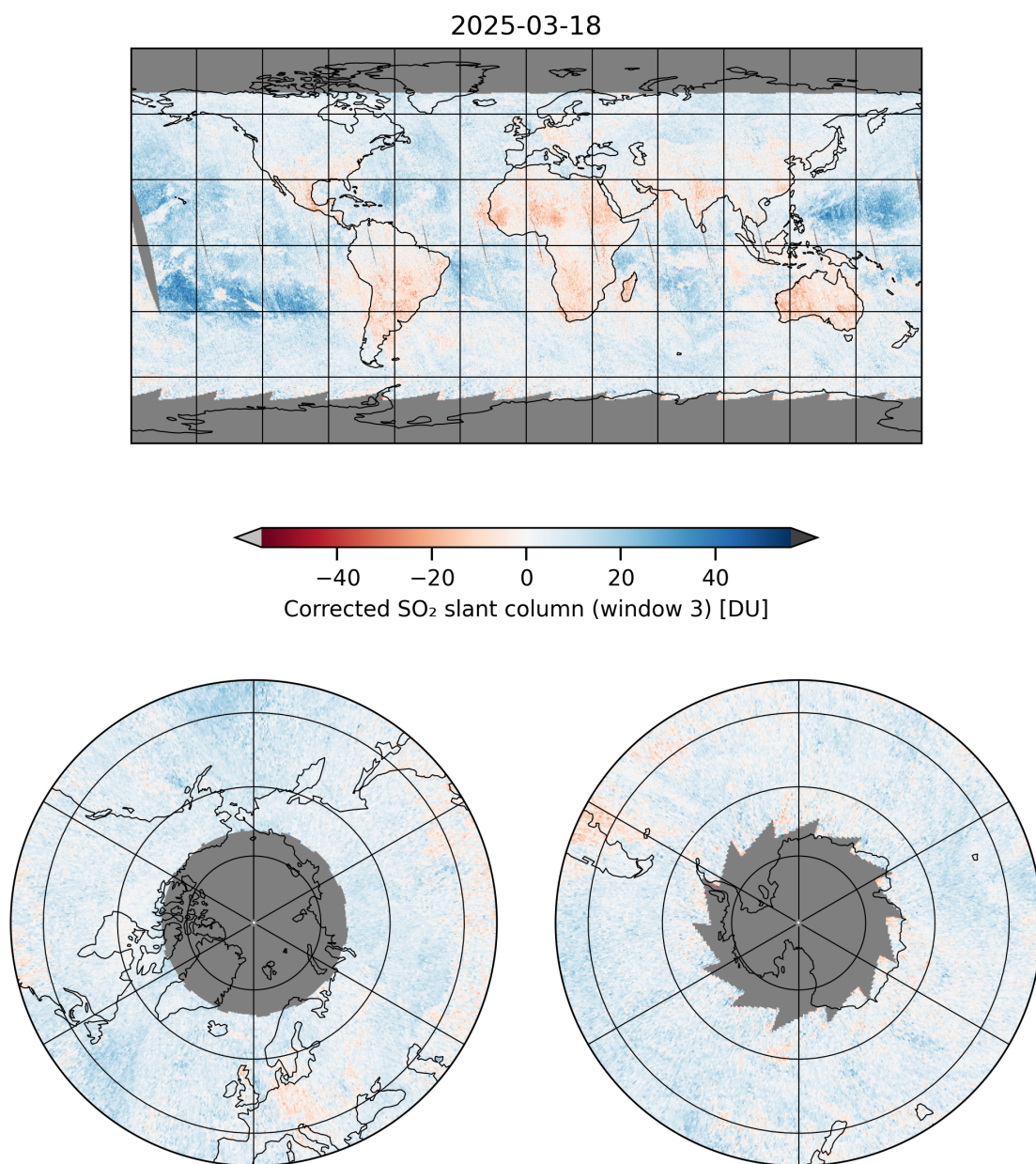


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-03-18 to 2025-03-19

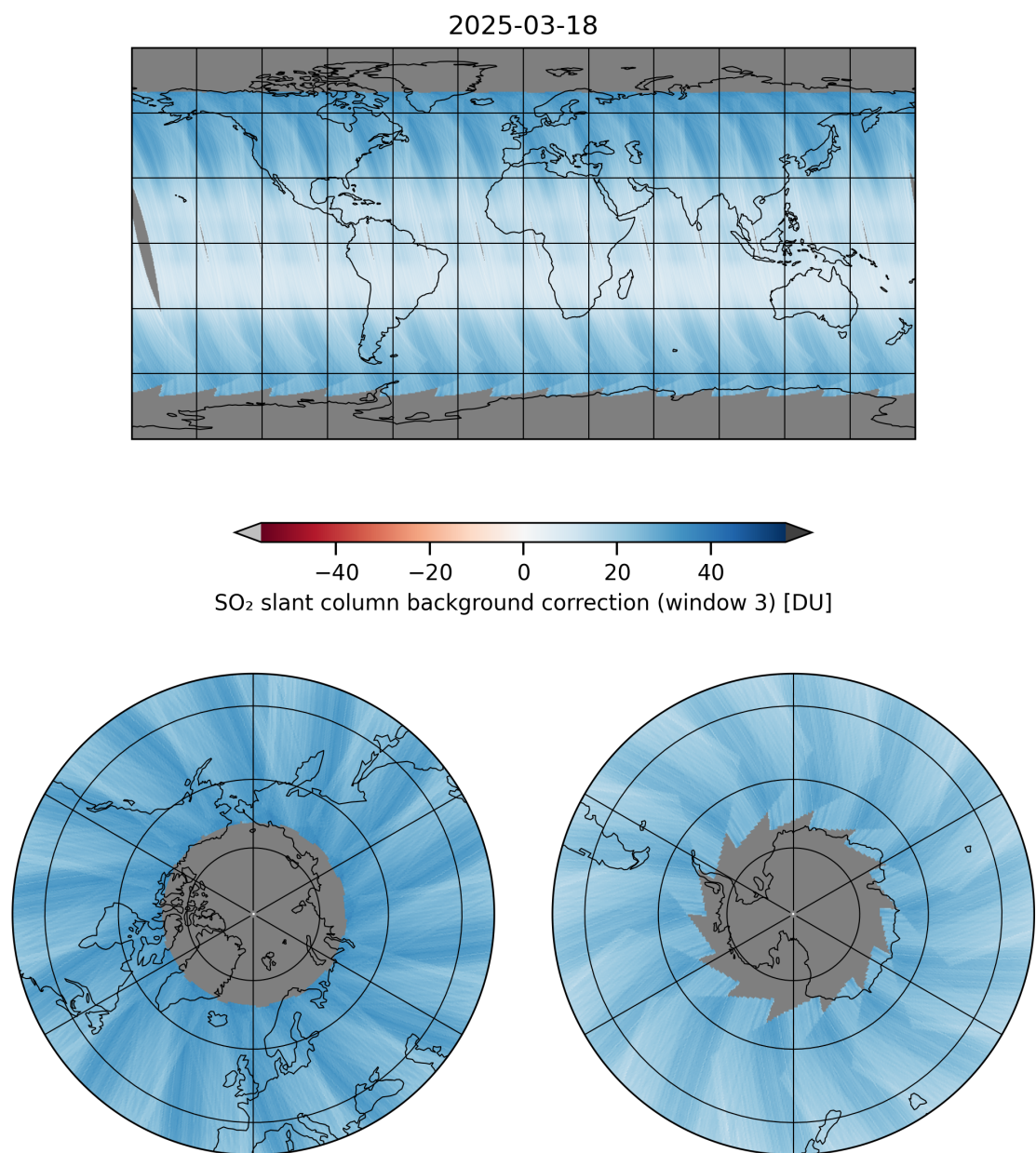


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-03-18 to 2025-03-19

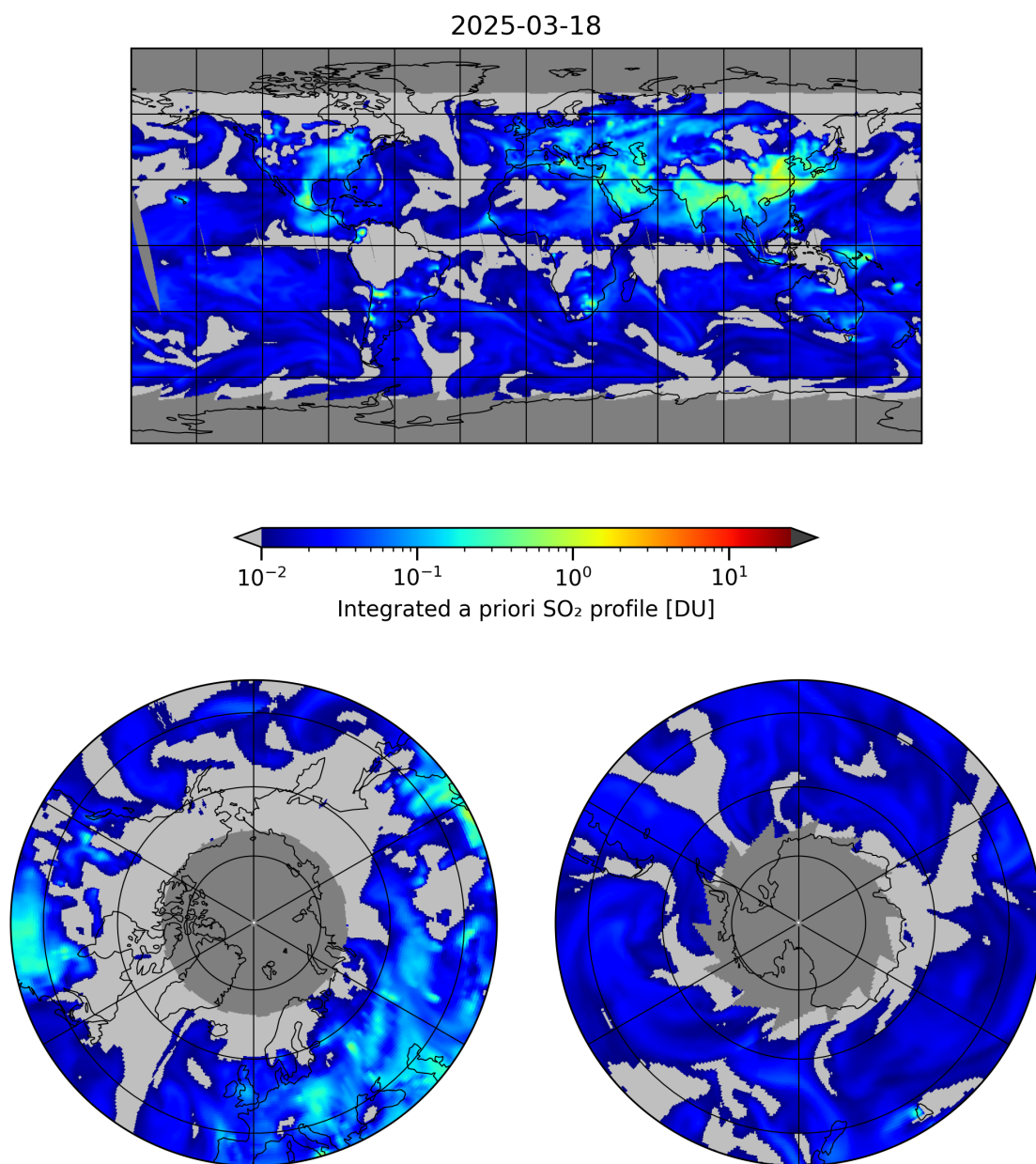


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-03-18 to 2025-03-19

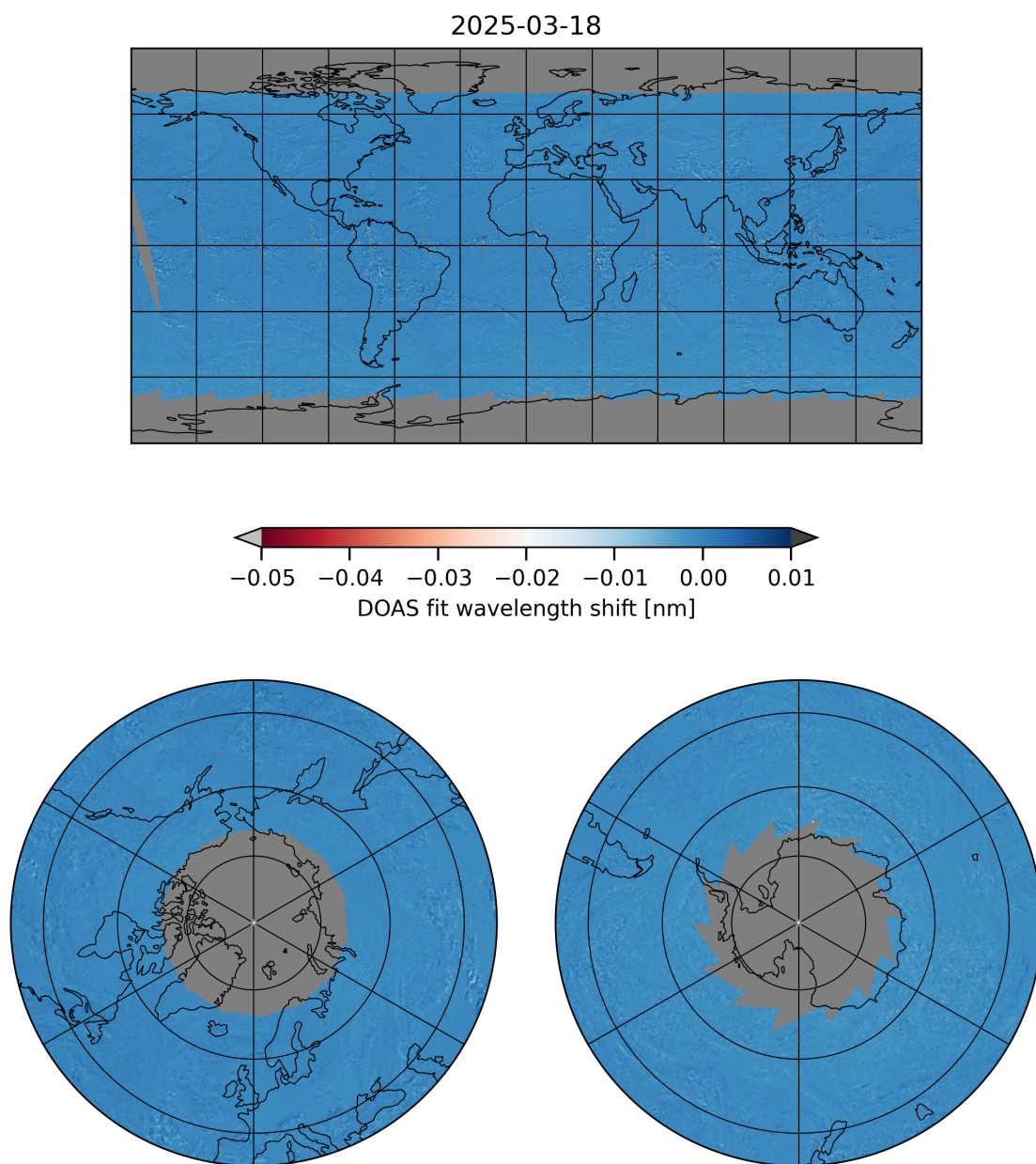


Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-18 to 2025-03-19

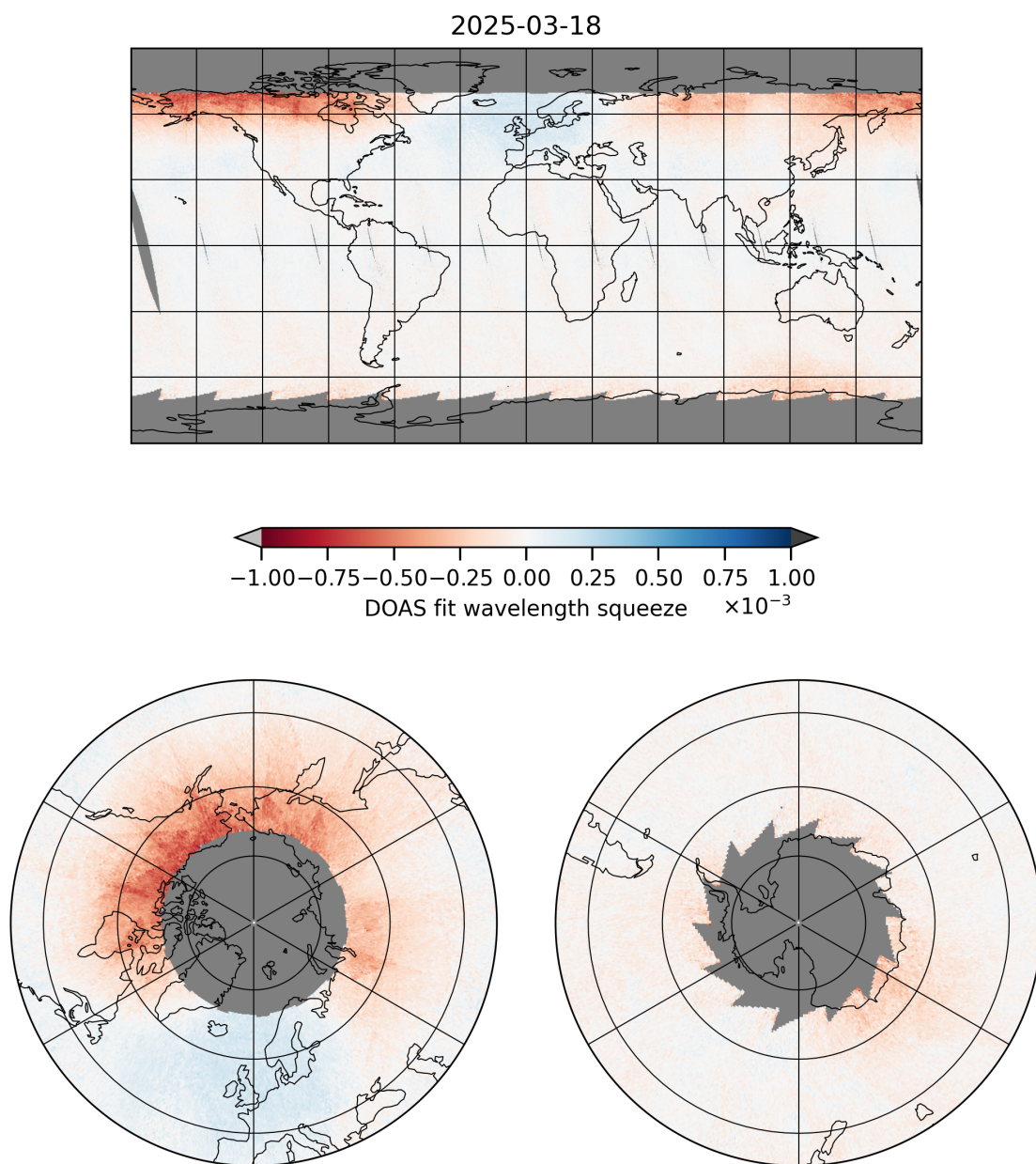


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-18 to 2025-03-19

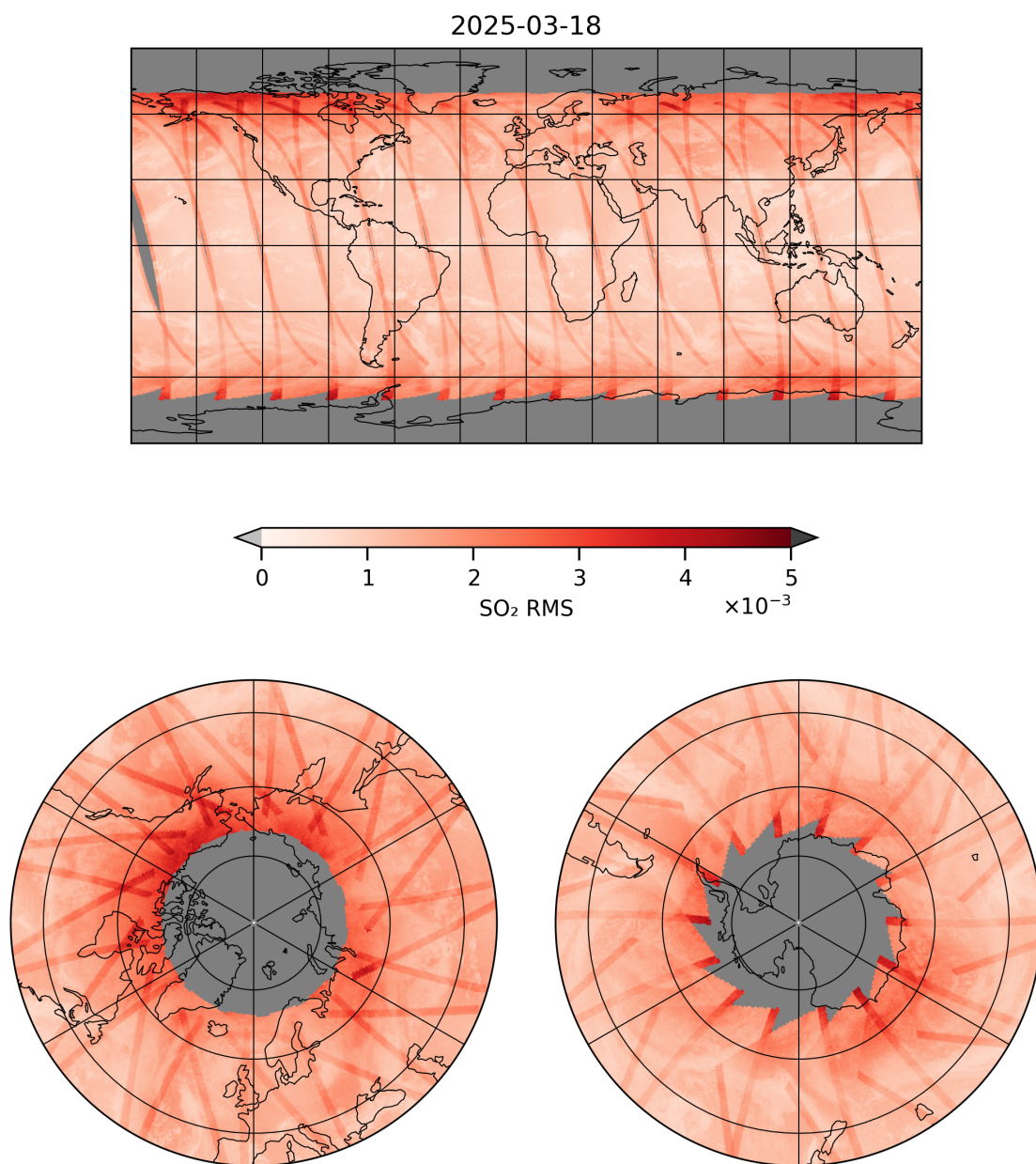


Figure 24: Map of “SO₂ RMS” for 2025-03-18 to 2025-03-19

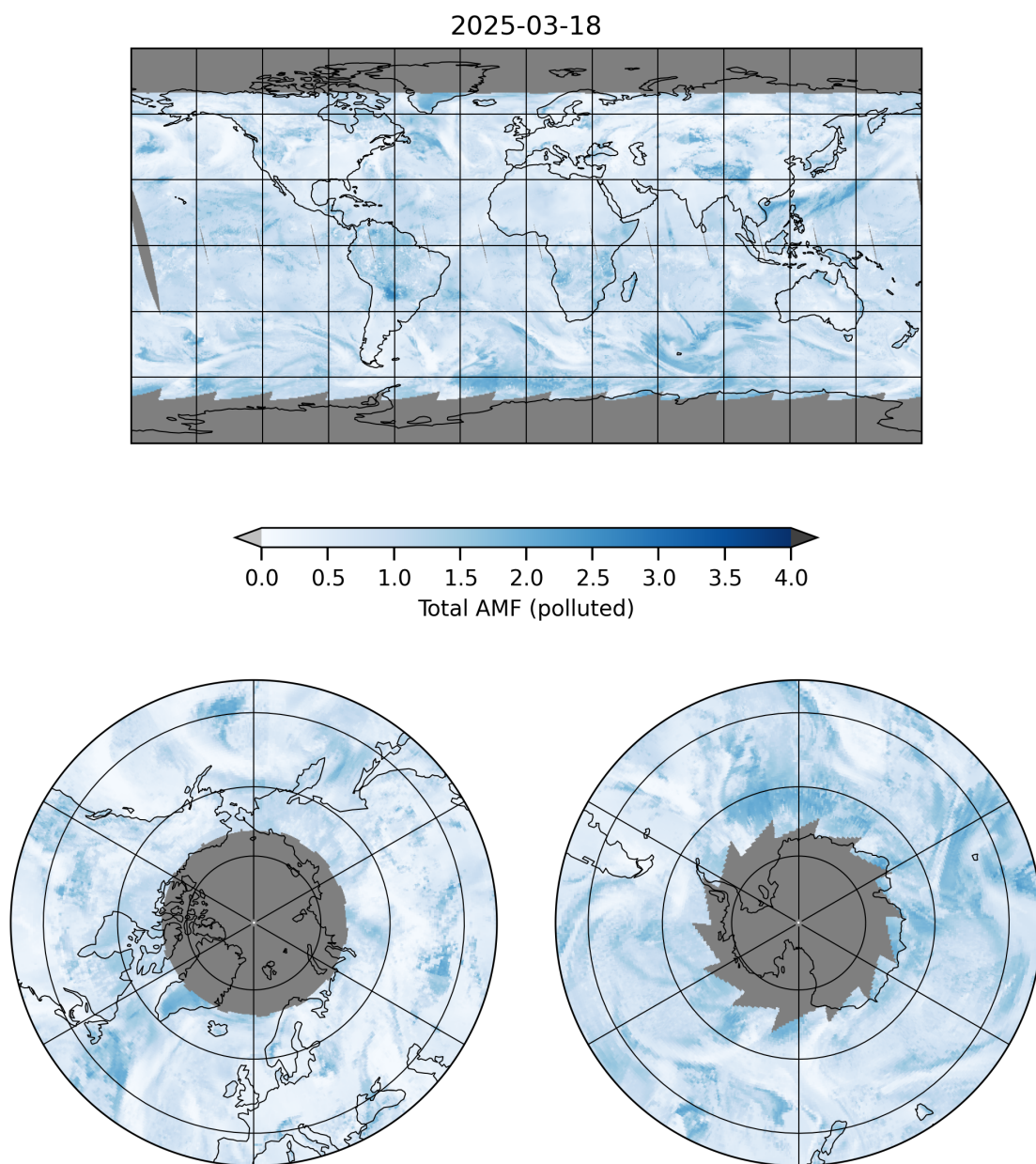


Figure 25: Map of “Total AMF (polluted)” for 2025-03-18 to 2025-03-19

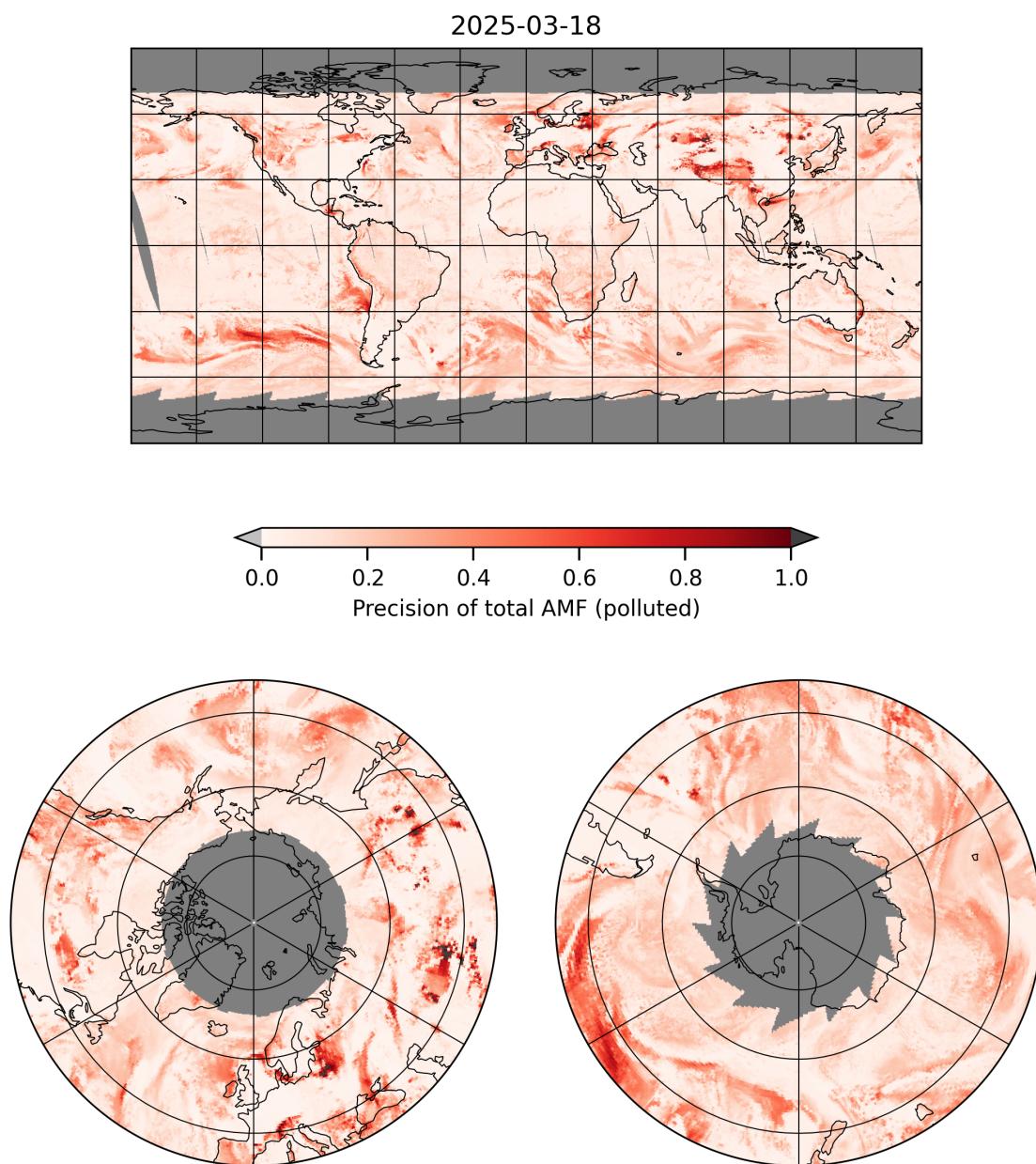


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-18 to 2025-03-19

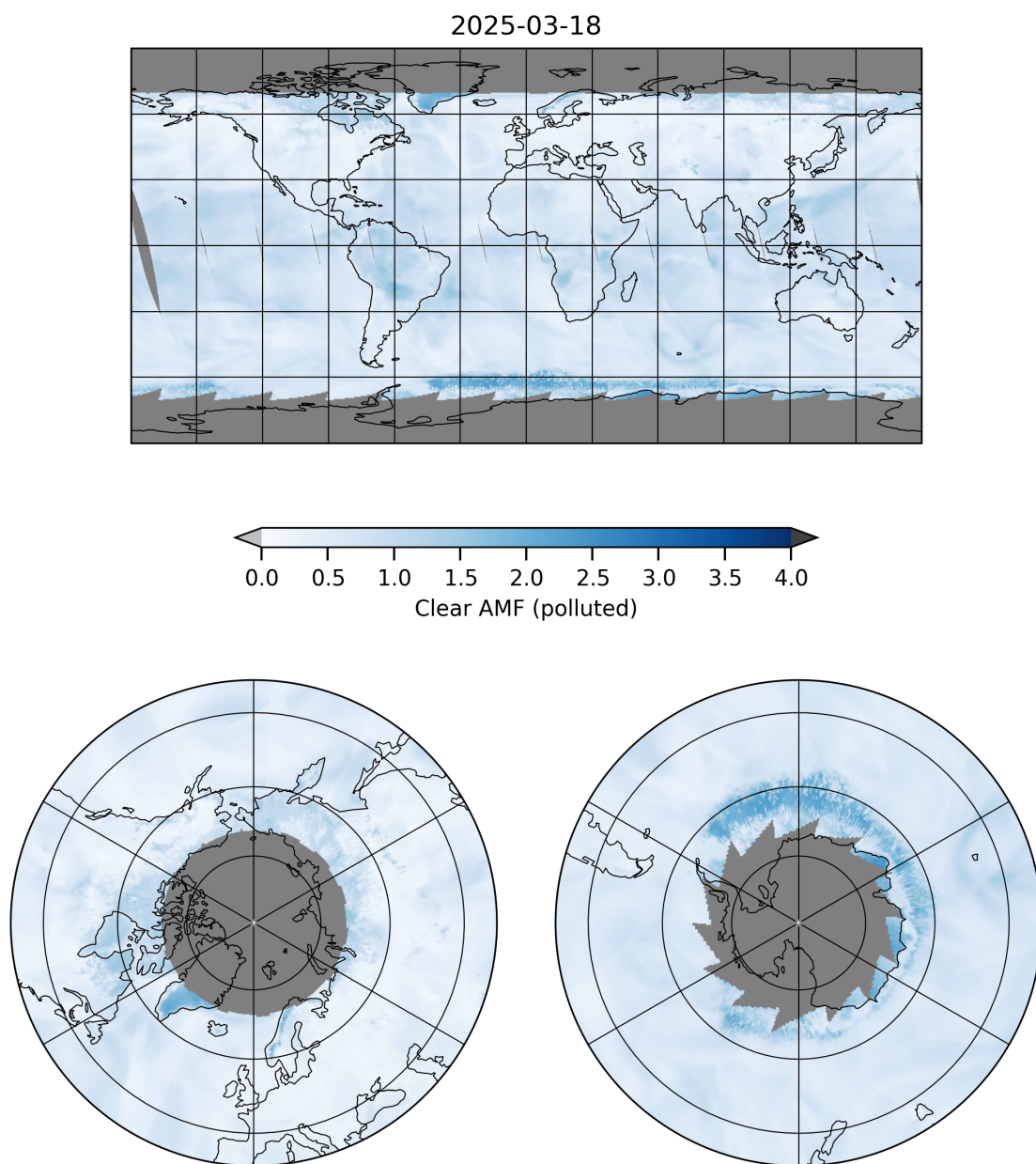


Figure 27: Map of “Clear AMF (polluted)” for 2025-03-18 to 2025-03-19

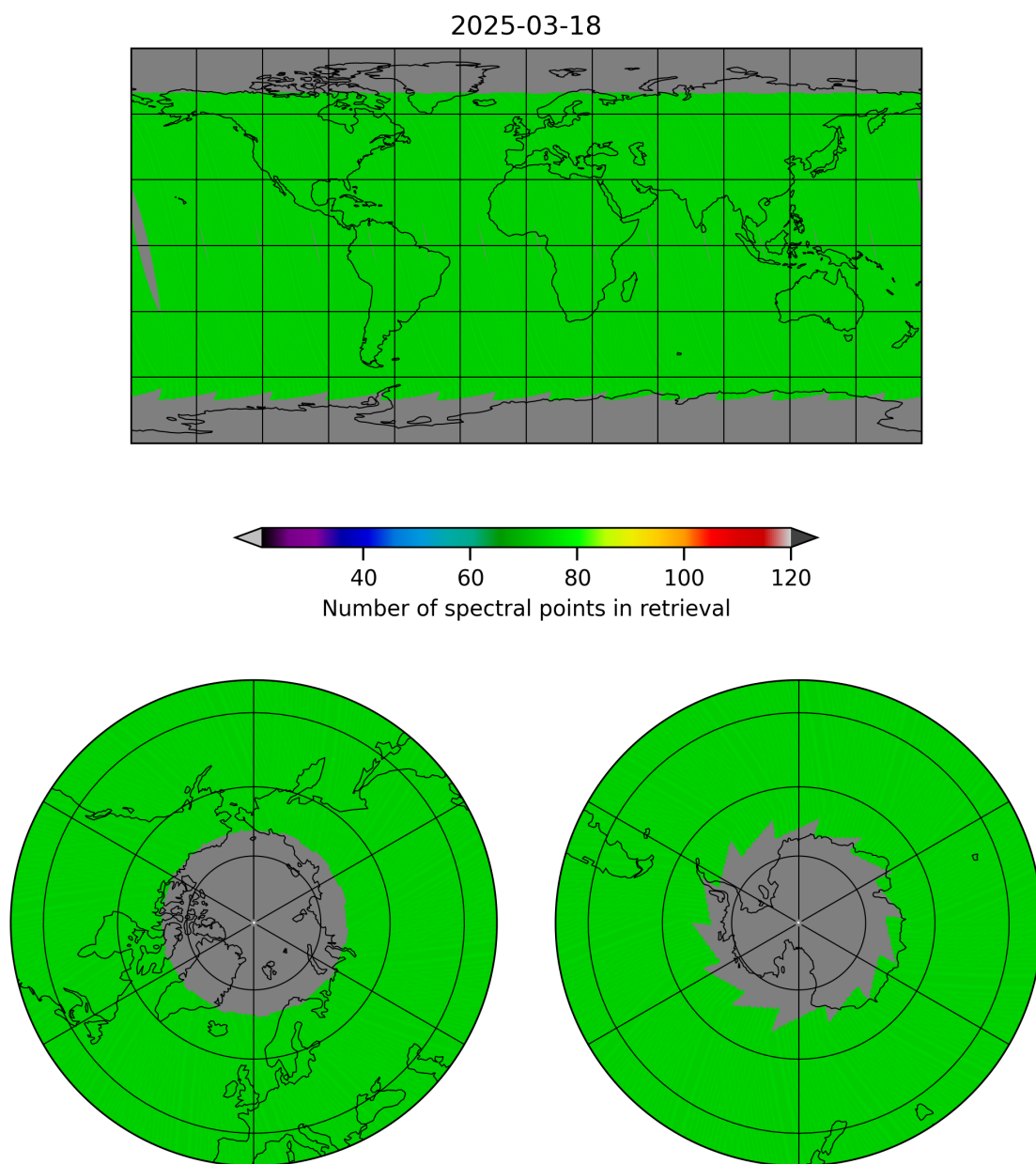


Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-18 to 2025-03-19

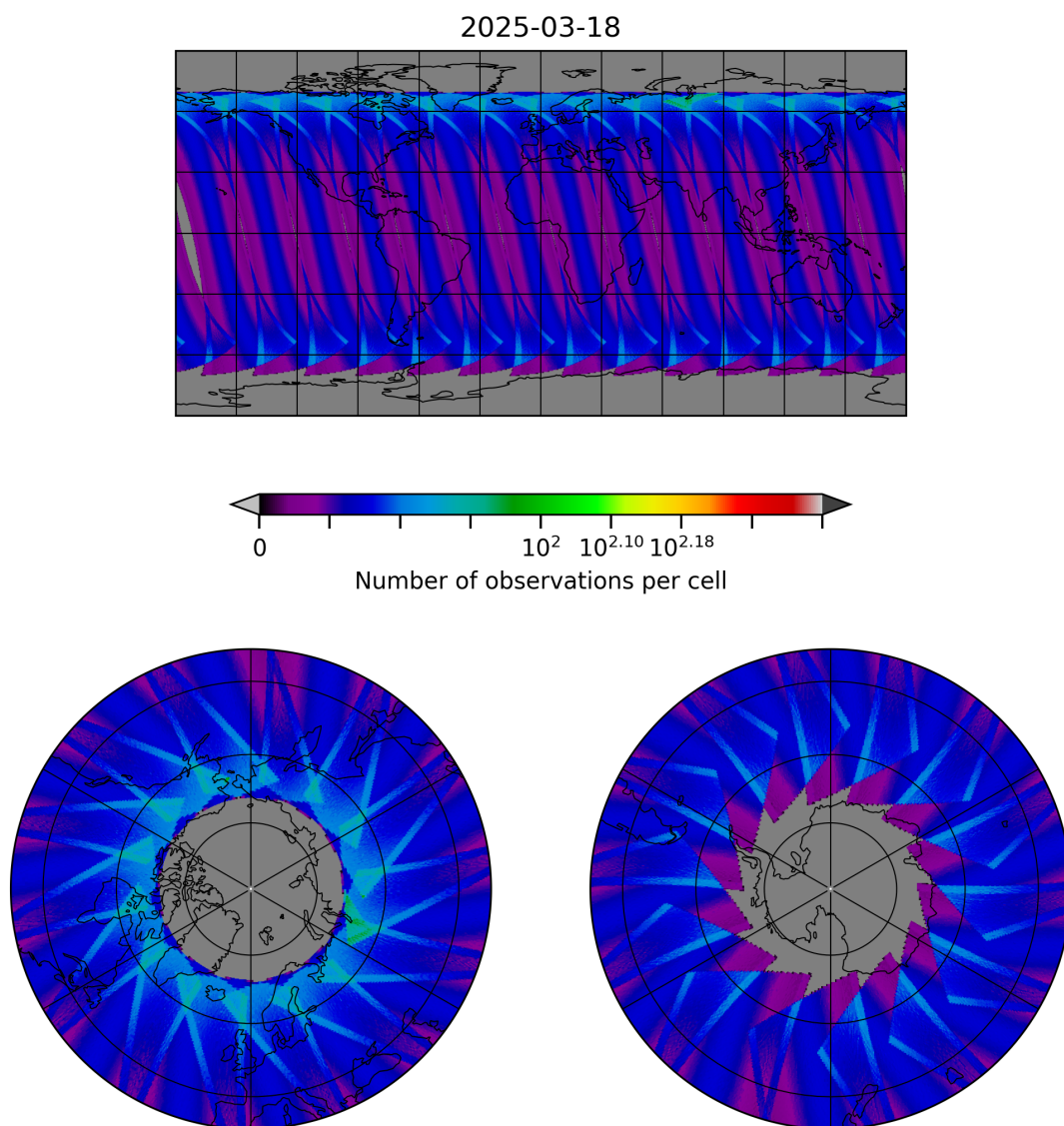


Figure 29: Map of the number of observations for 2025-03-18 to 2025-03-19

7 Zonal average

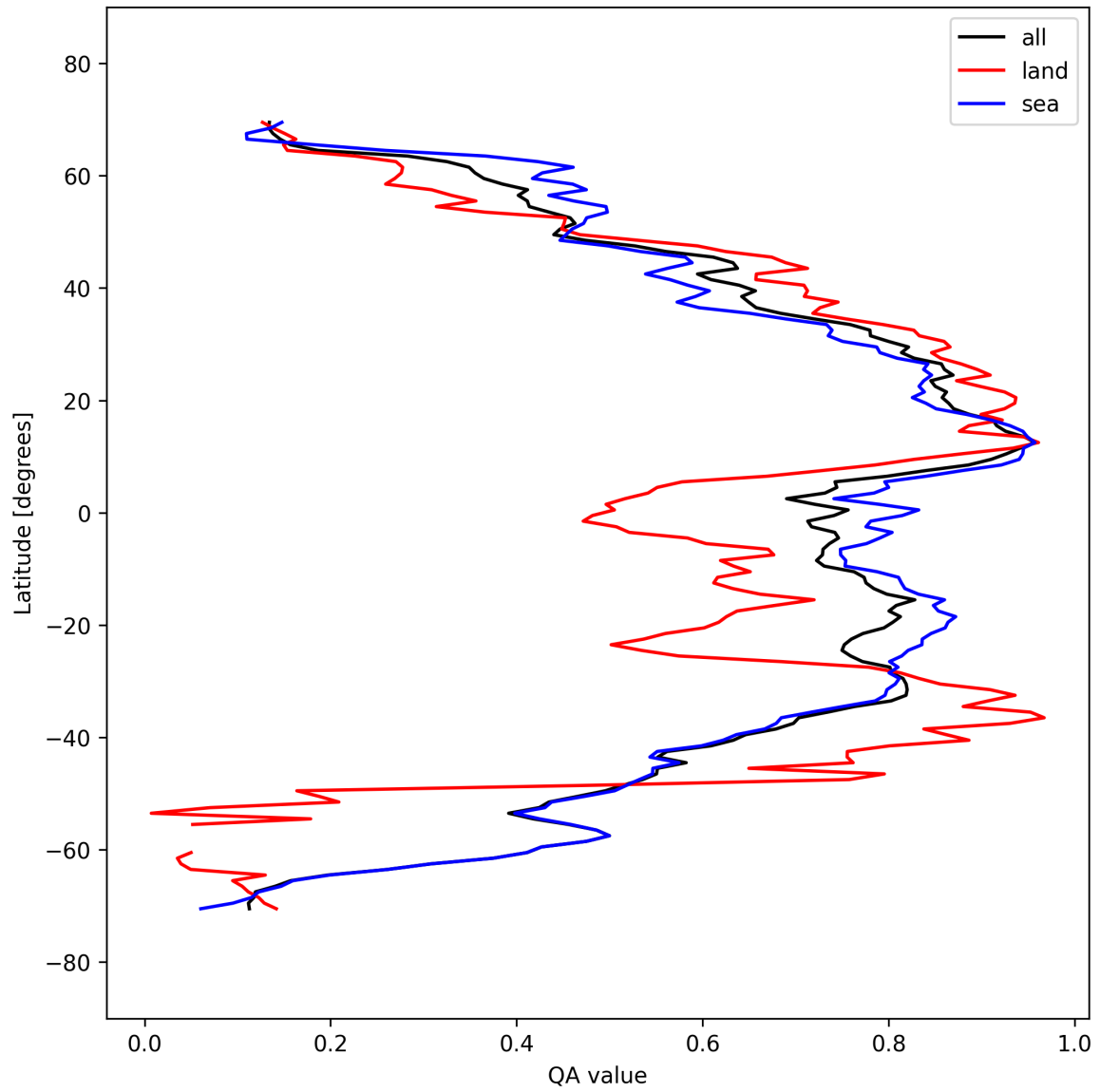


Figure 30: Zonal average of “QA value” for 2025-03-18 to 2025-03-19.

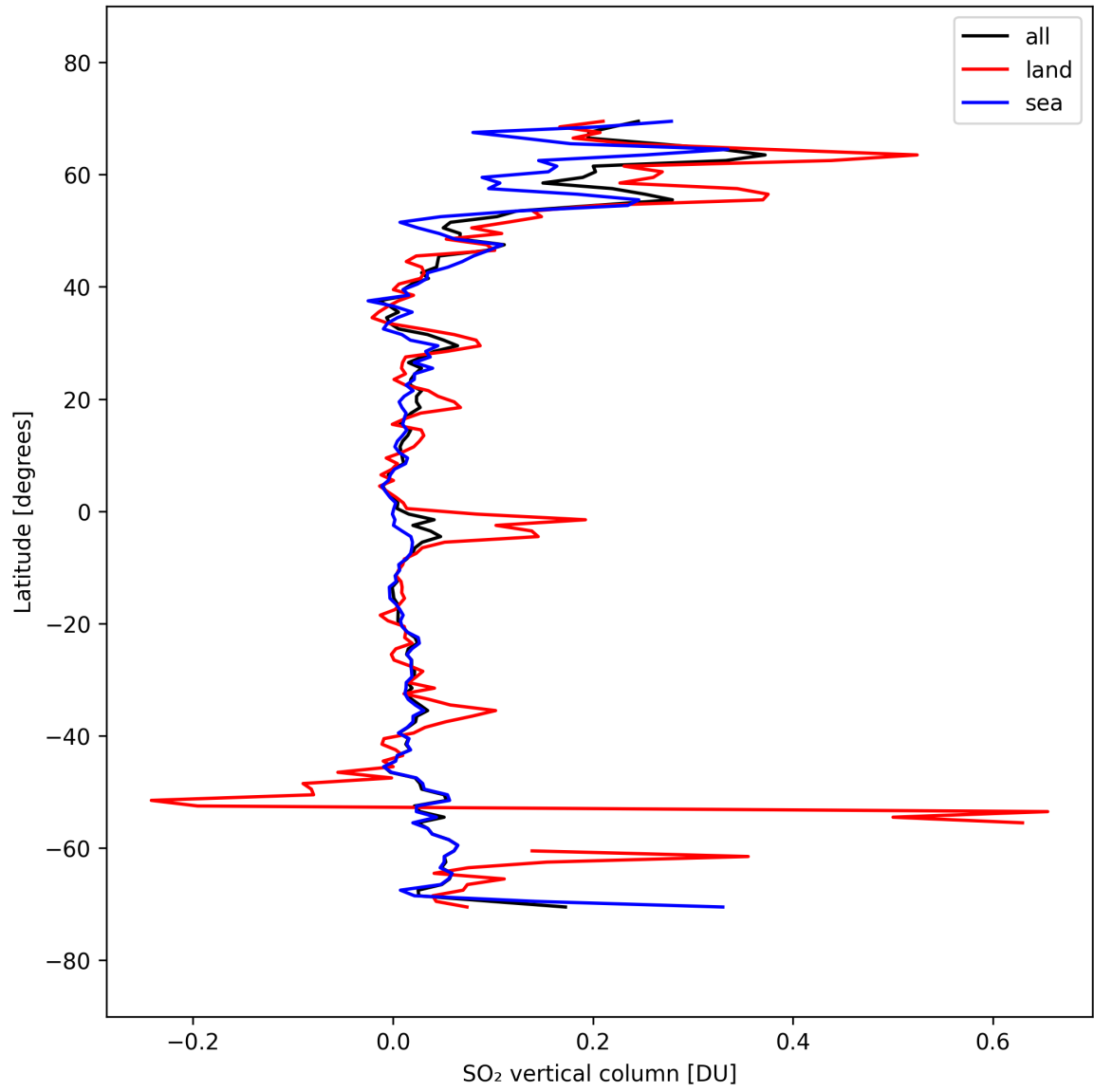


Figure 31: Zonal average of “SO₂ vertical column” for 2025-03-18 to 2025-03-19.

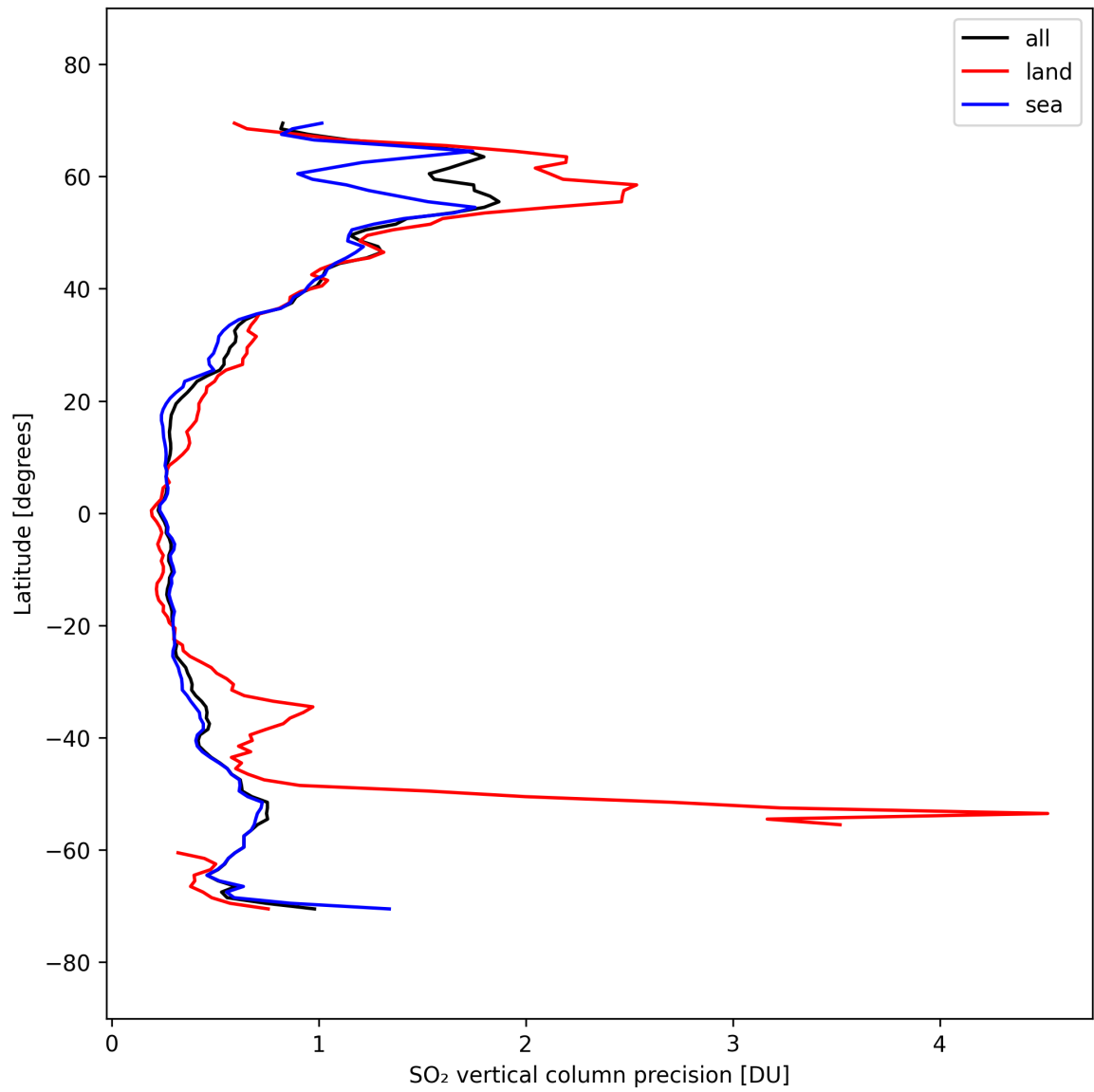


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-03-18 to 2025-03-19.

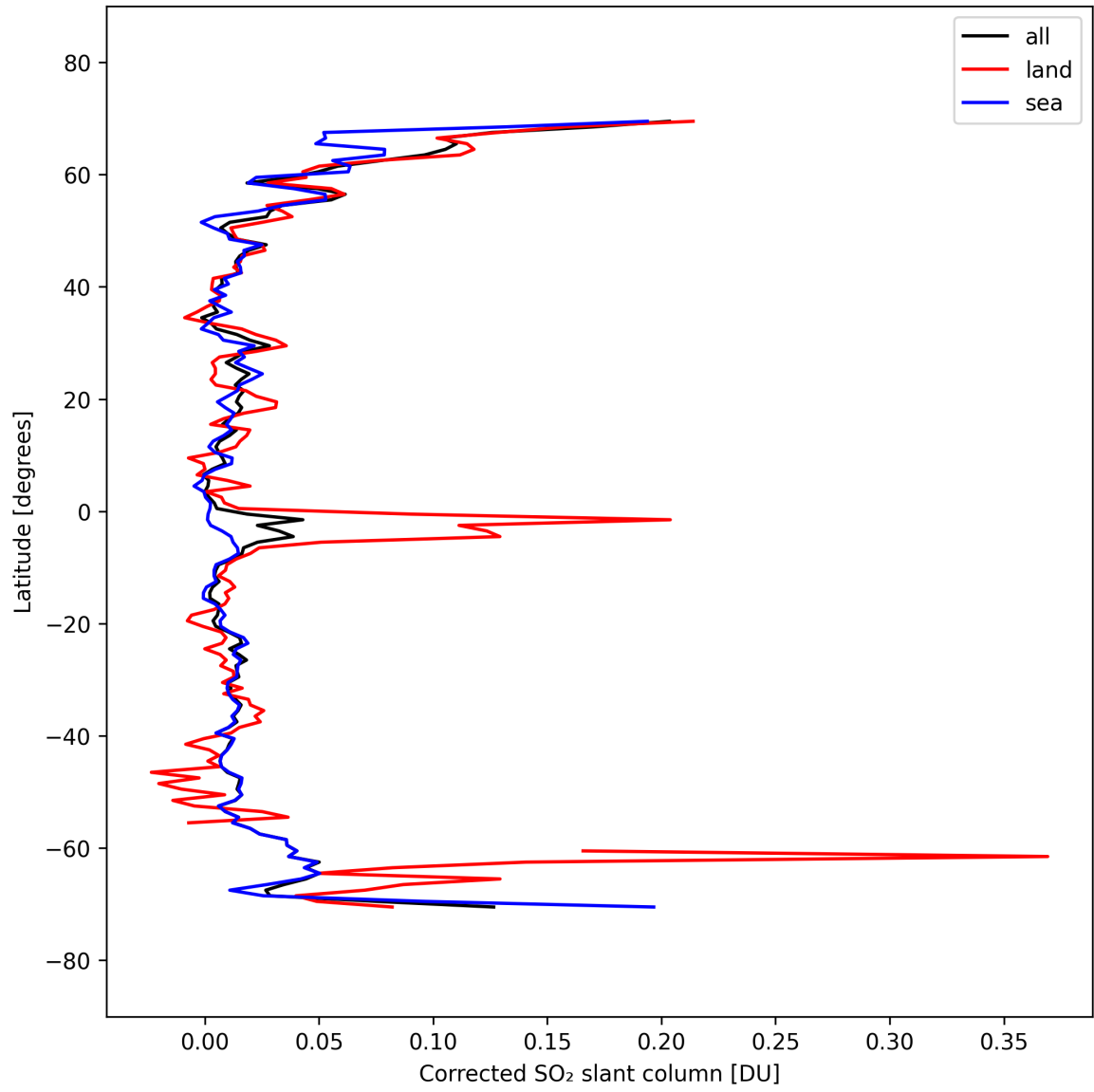


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-03-18 to 2025-03-19.

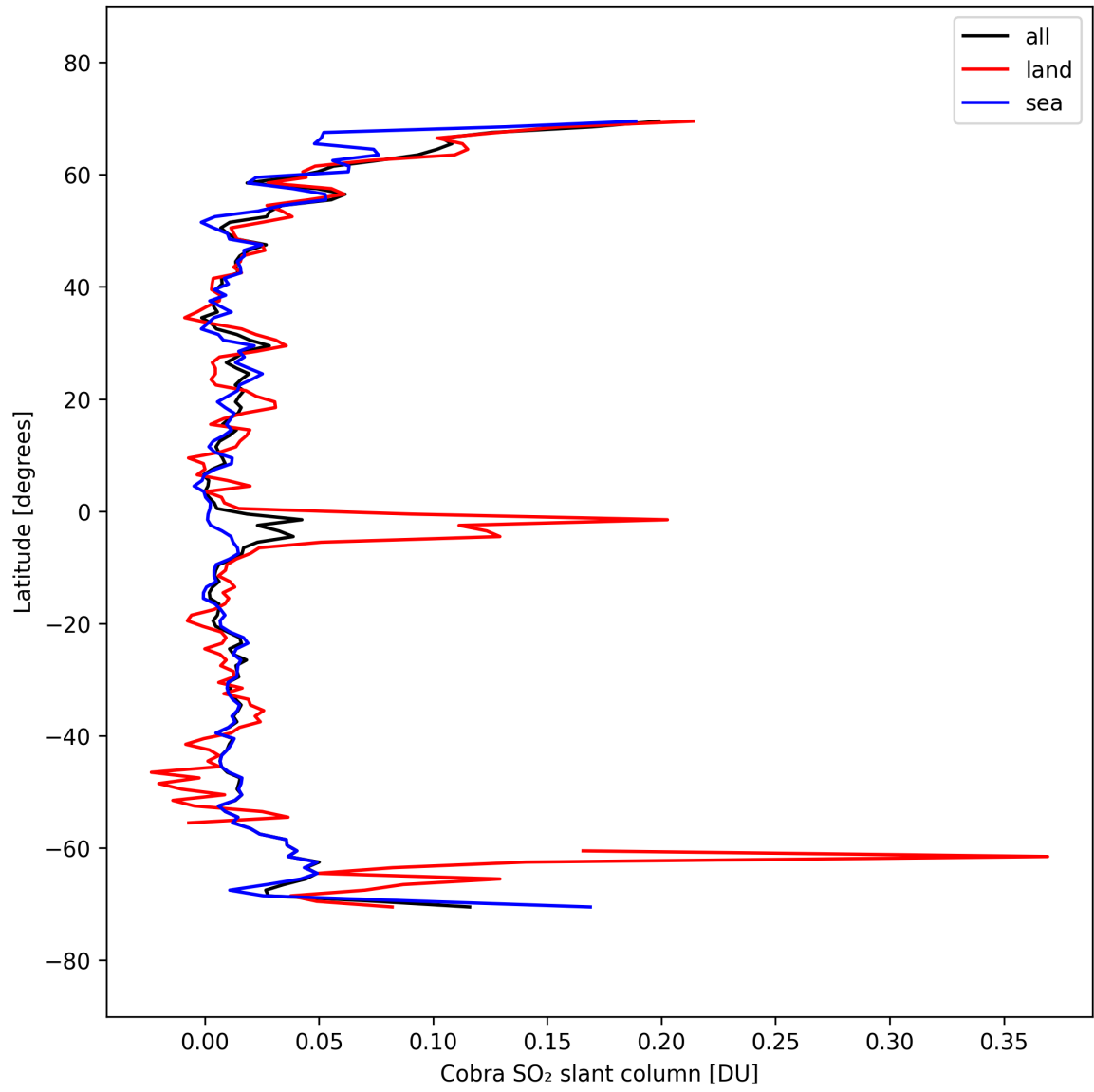


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-03-18 to 2025-03-19.

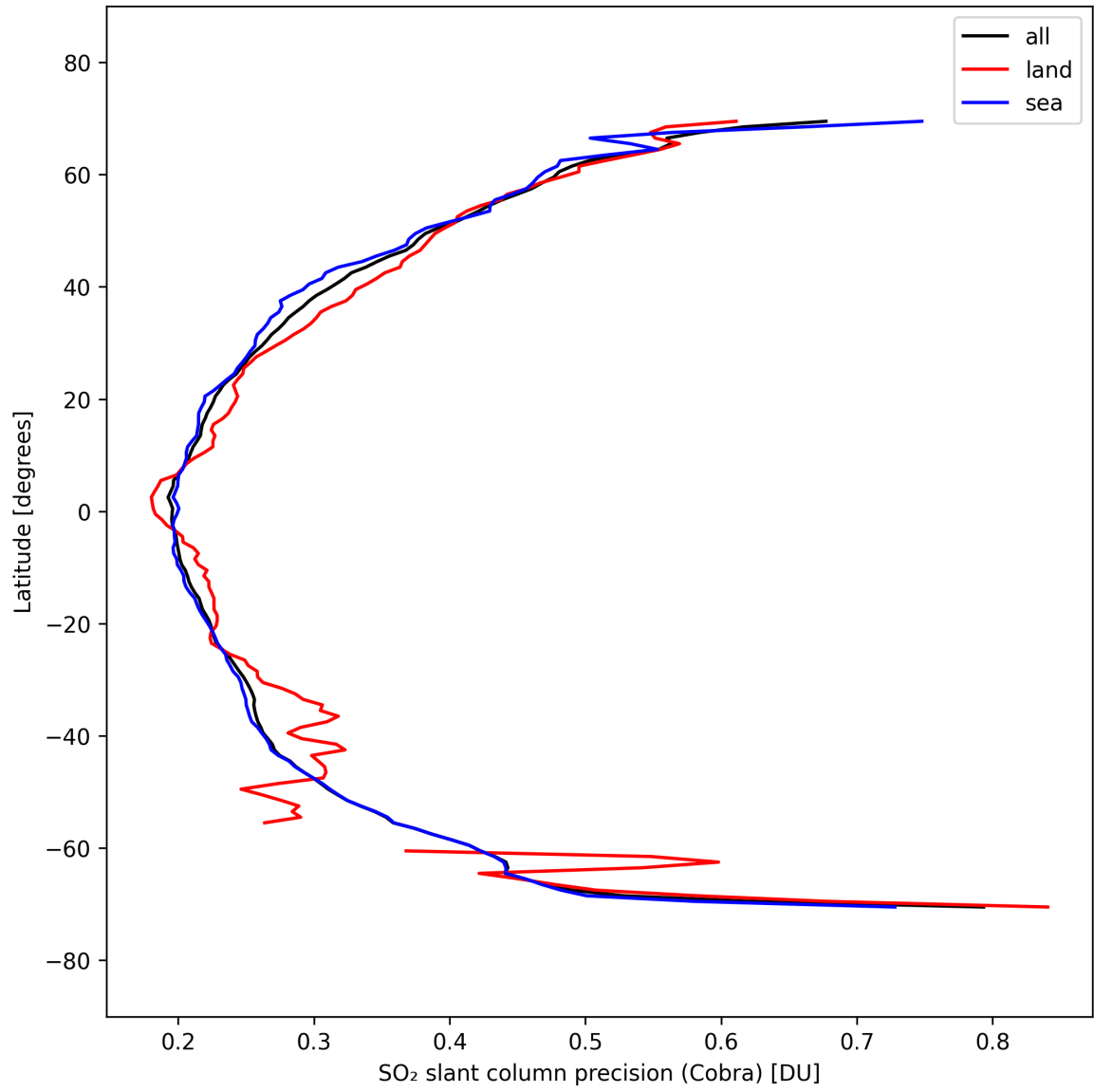


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-03-18 to 2025-03-19.

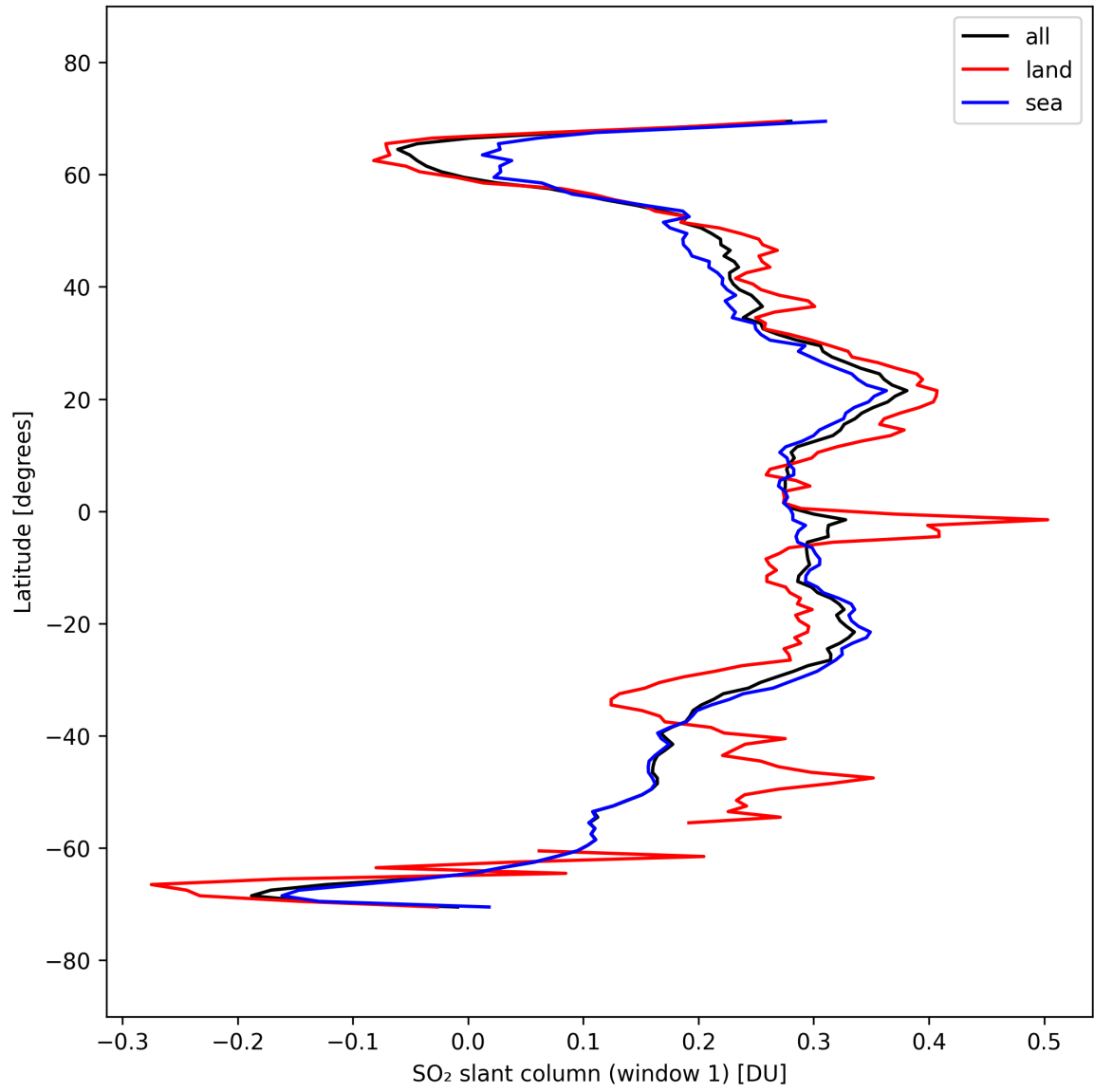


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-03-18 to 2025-03-19.

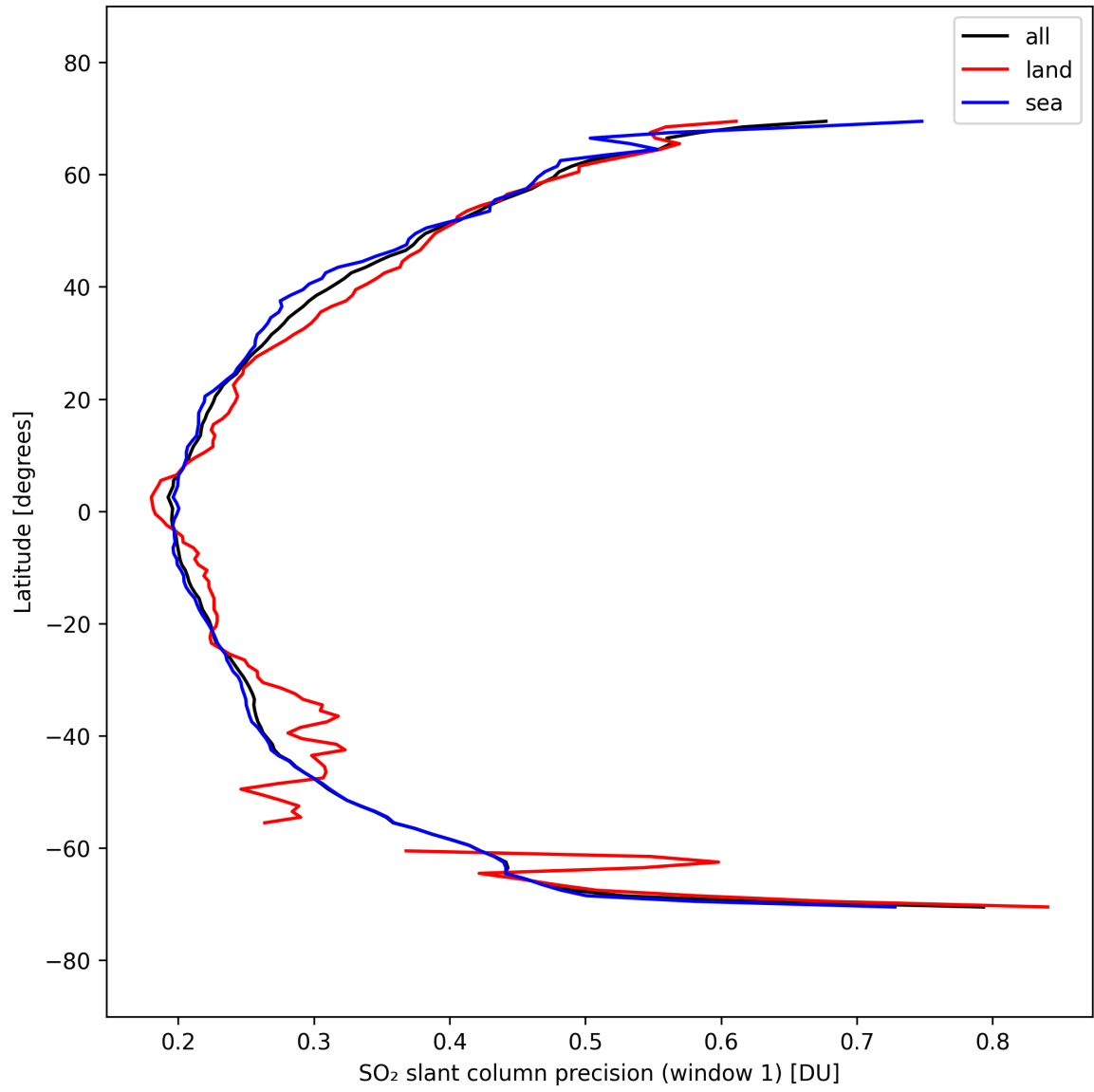


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-03-18 to 2025-03-19.

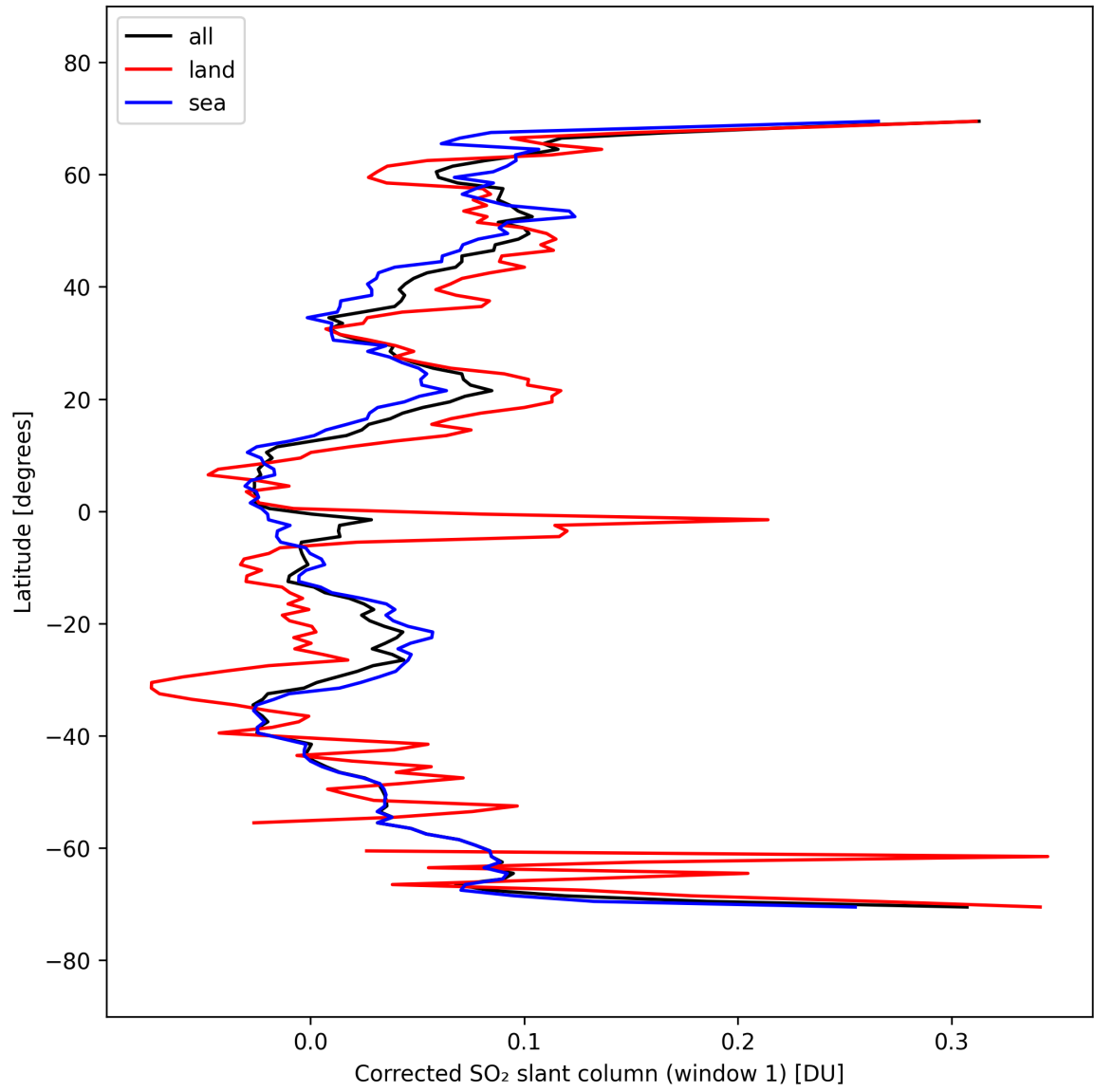


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-03-18 to 2025-03-19.

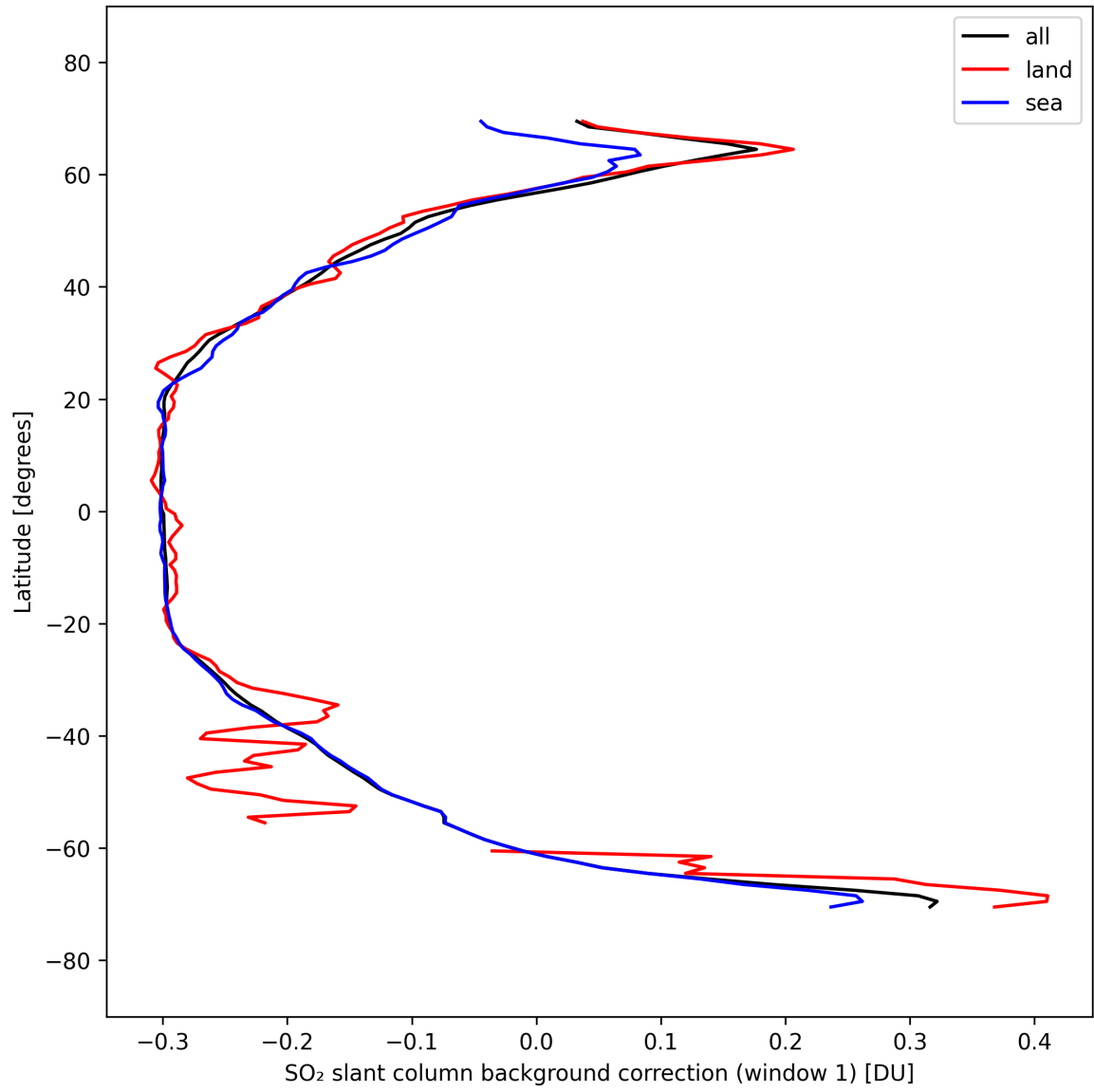


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-03-18 to 2025-03-19.

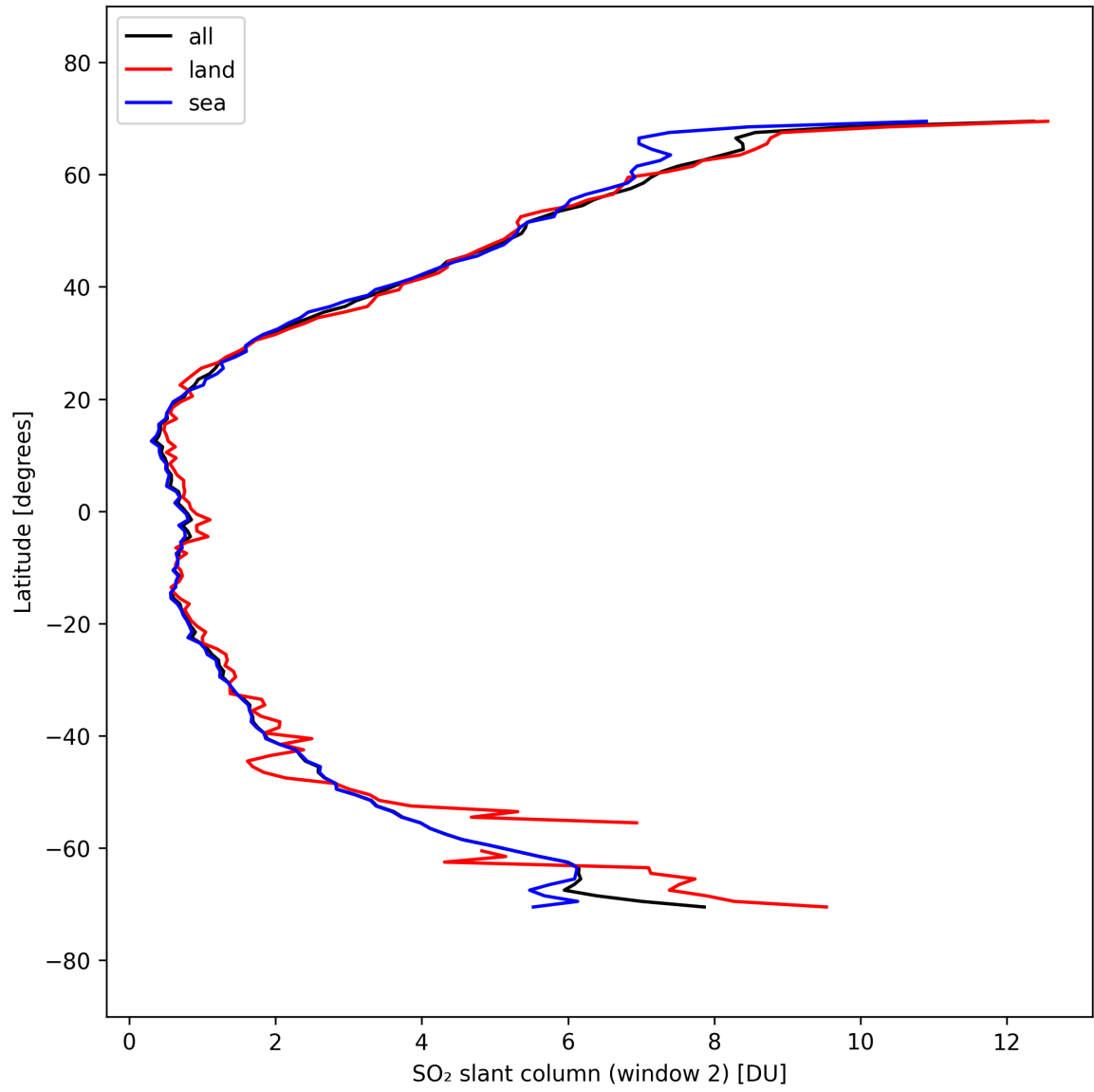


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-03-18 to 2025-03-19.

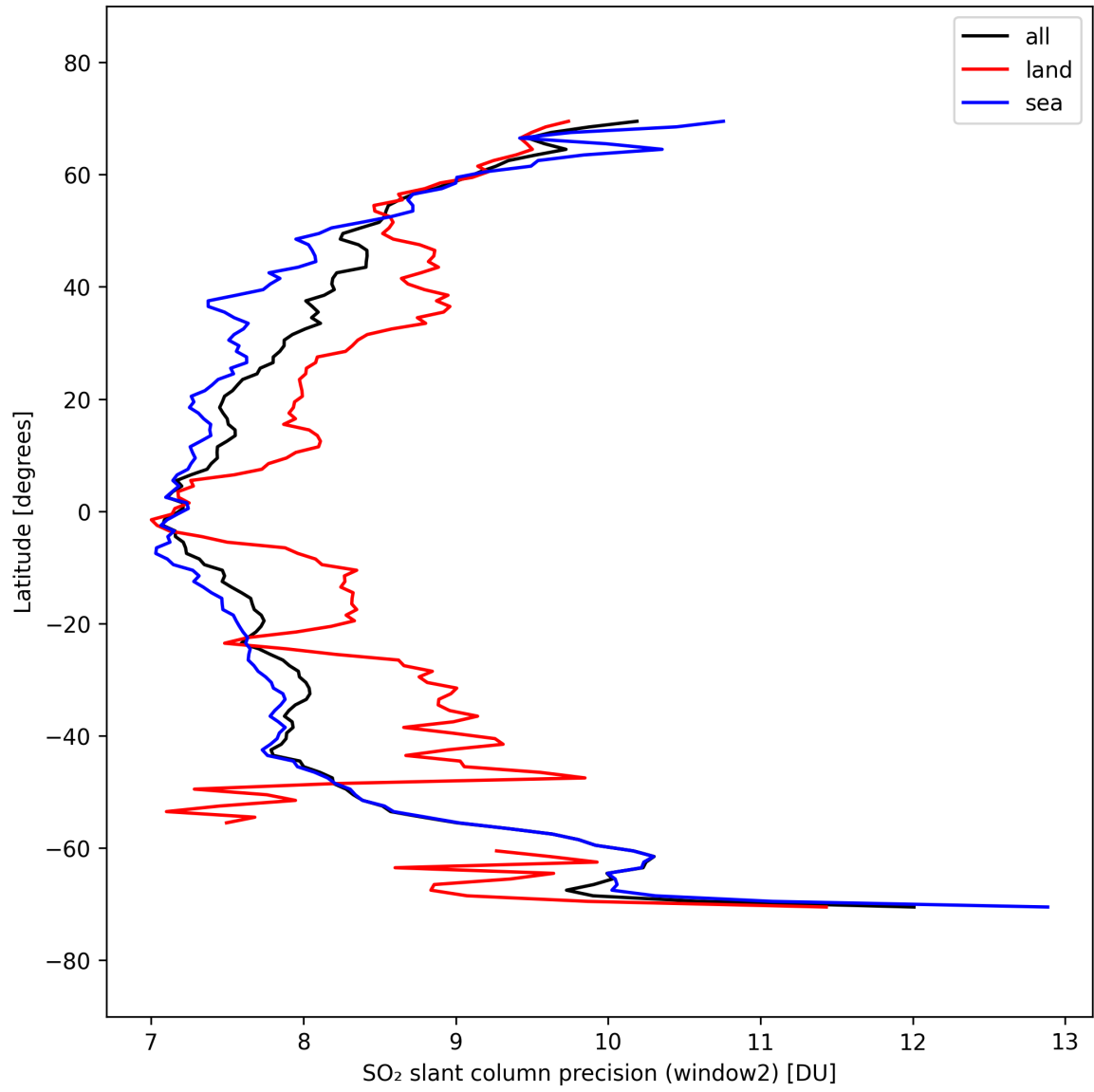


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-03-18 to 2025-03-19.

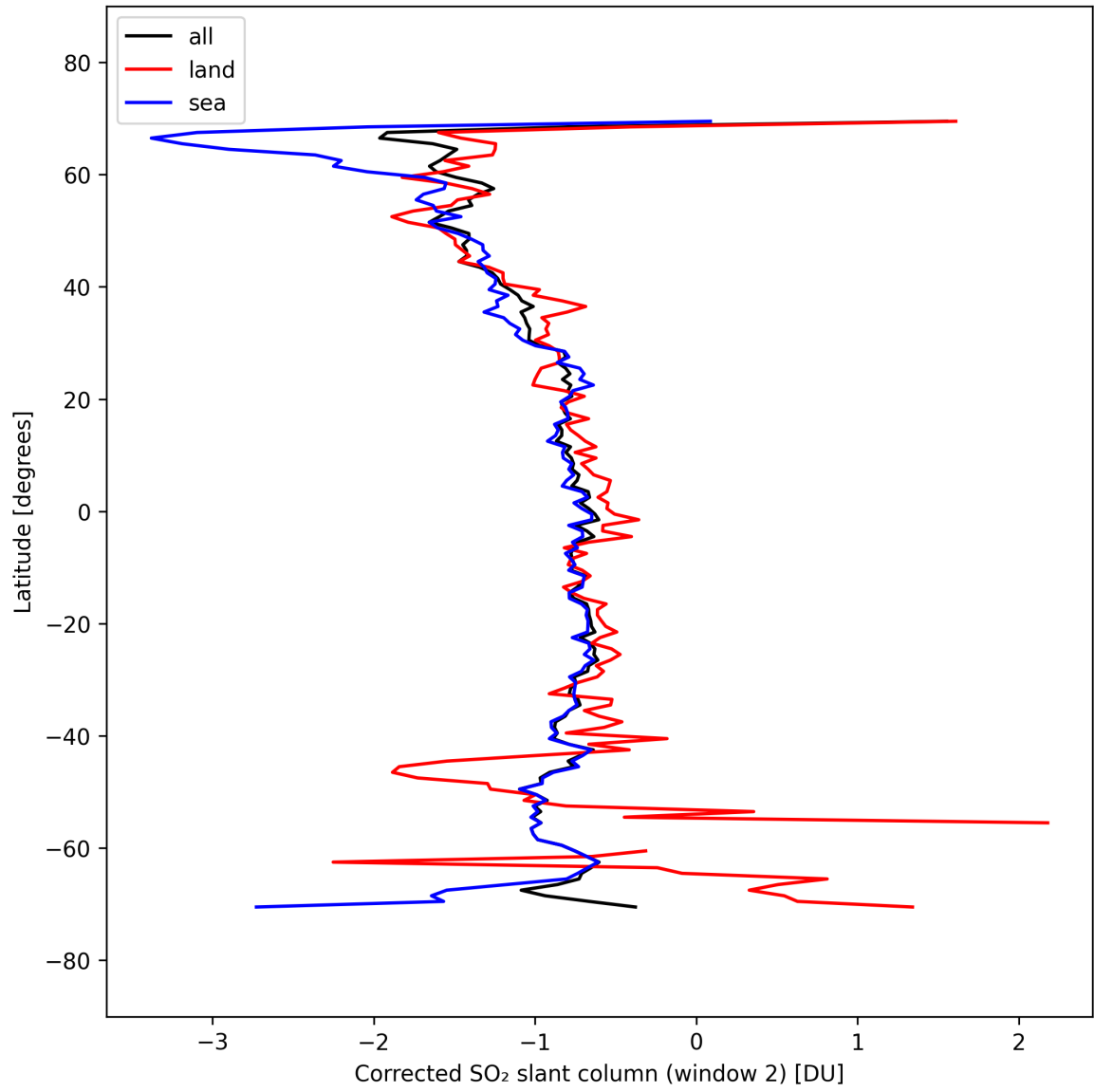


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-03-18 to 2025-03-19.

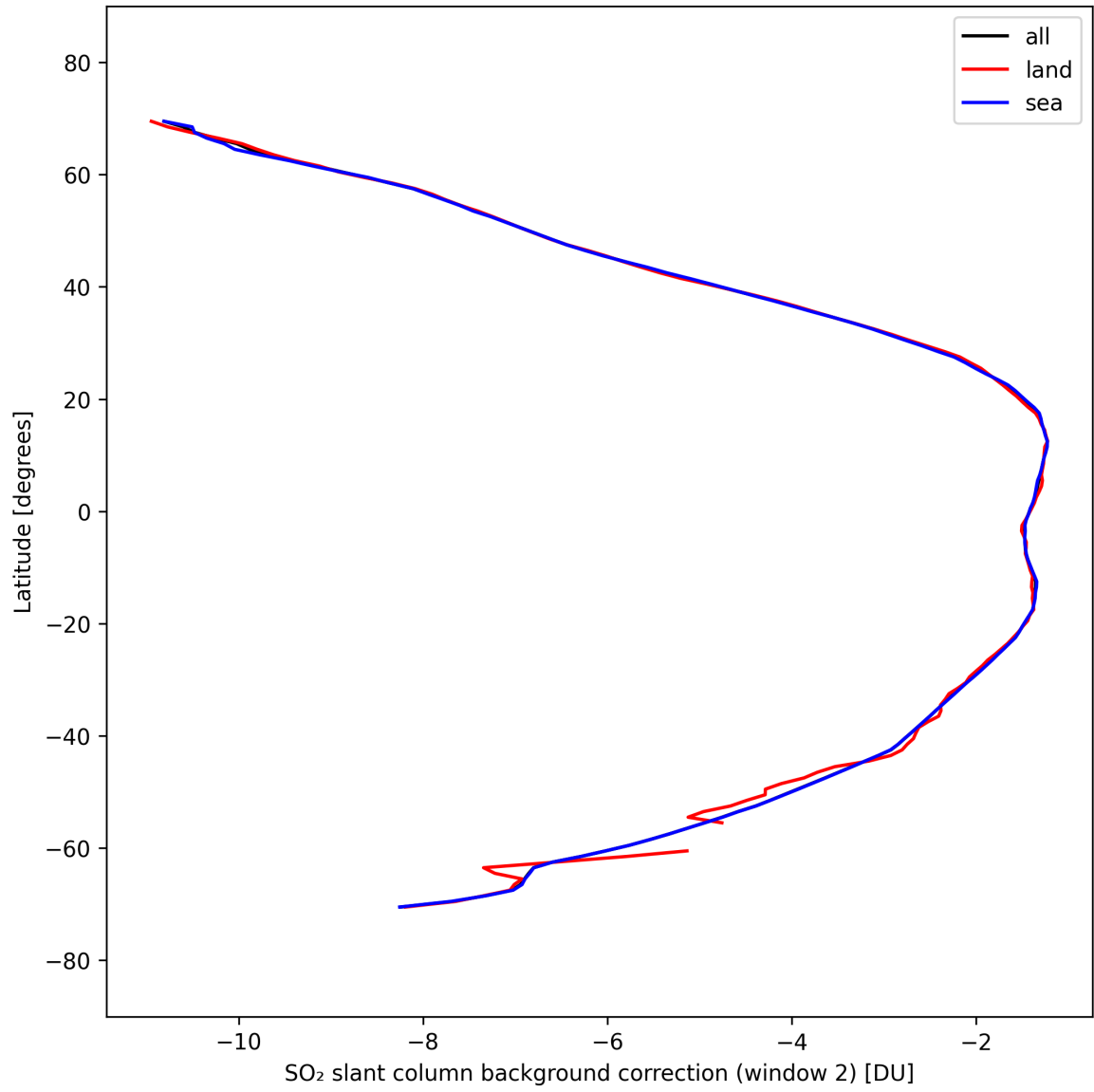


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-03-18 to 2025-03-19.

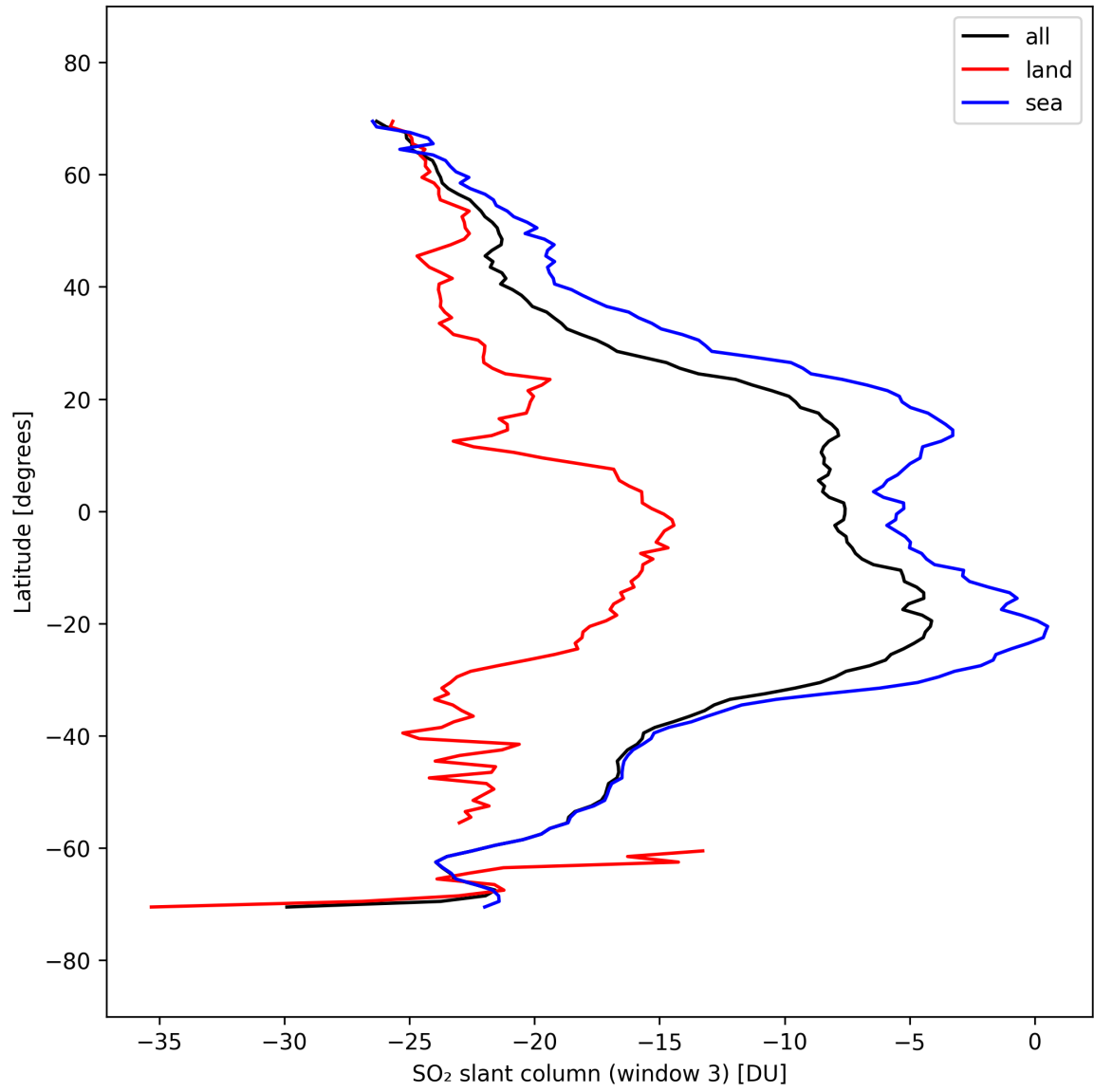


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-03-18 to 2025-03-19.

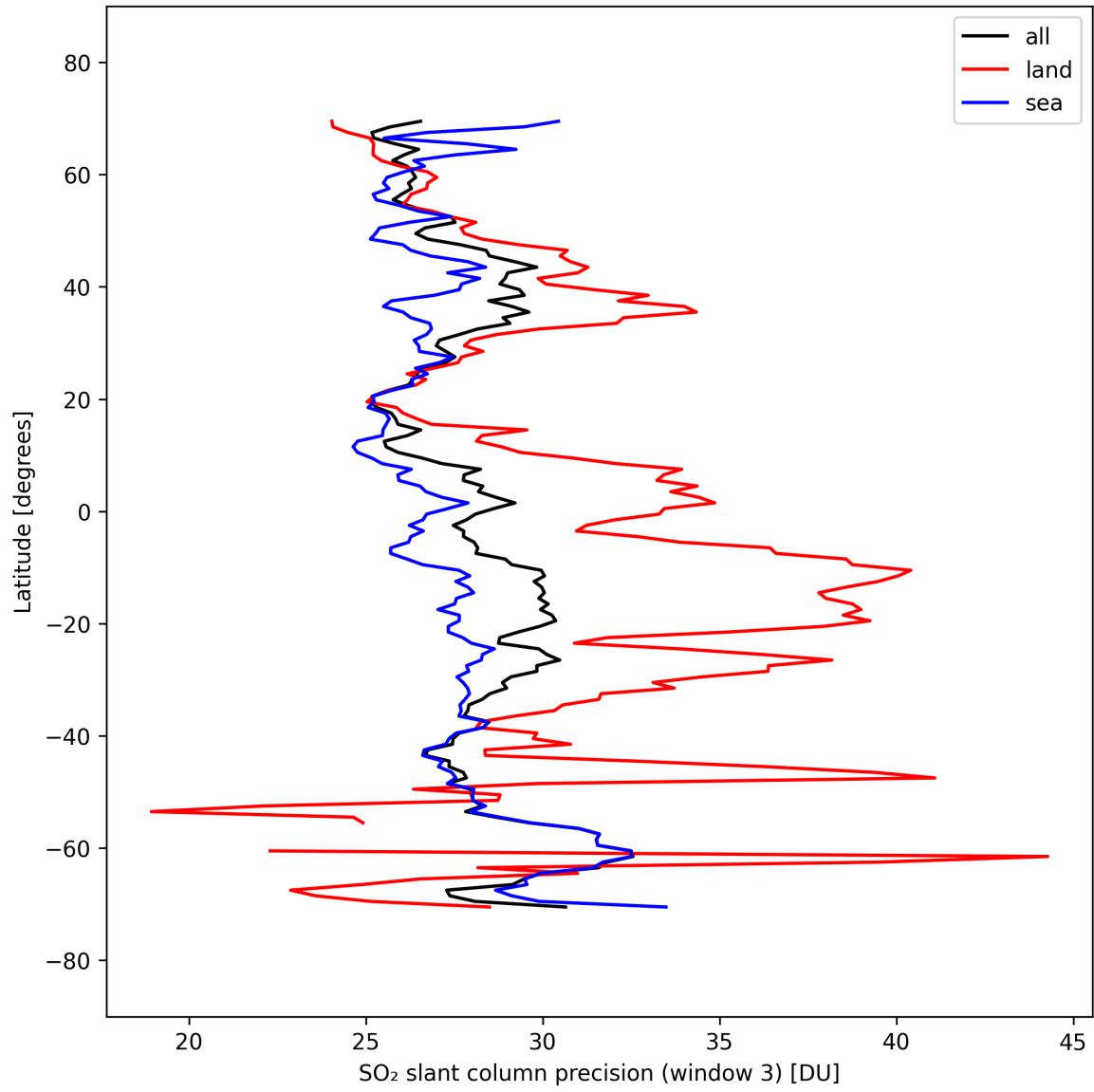


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-03-18 to 2025-03-19.

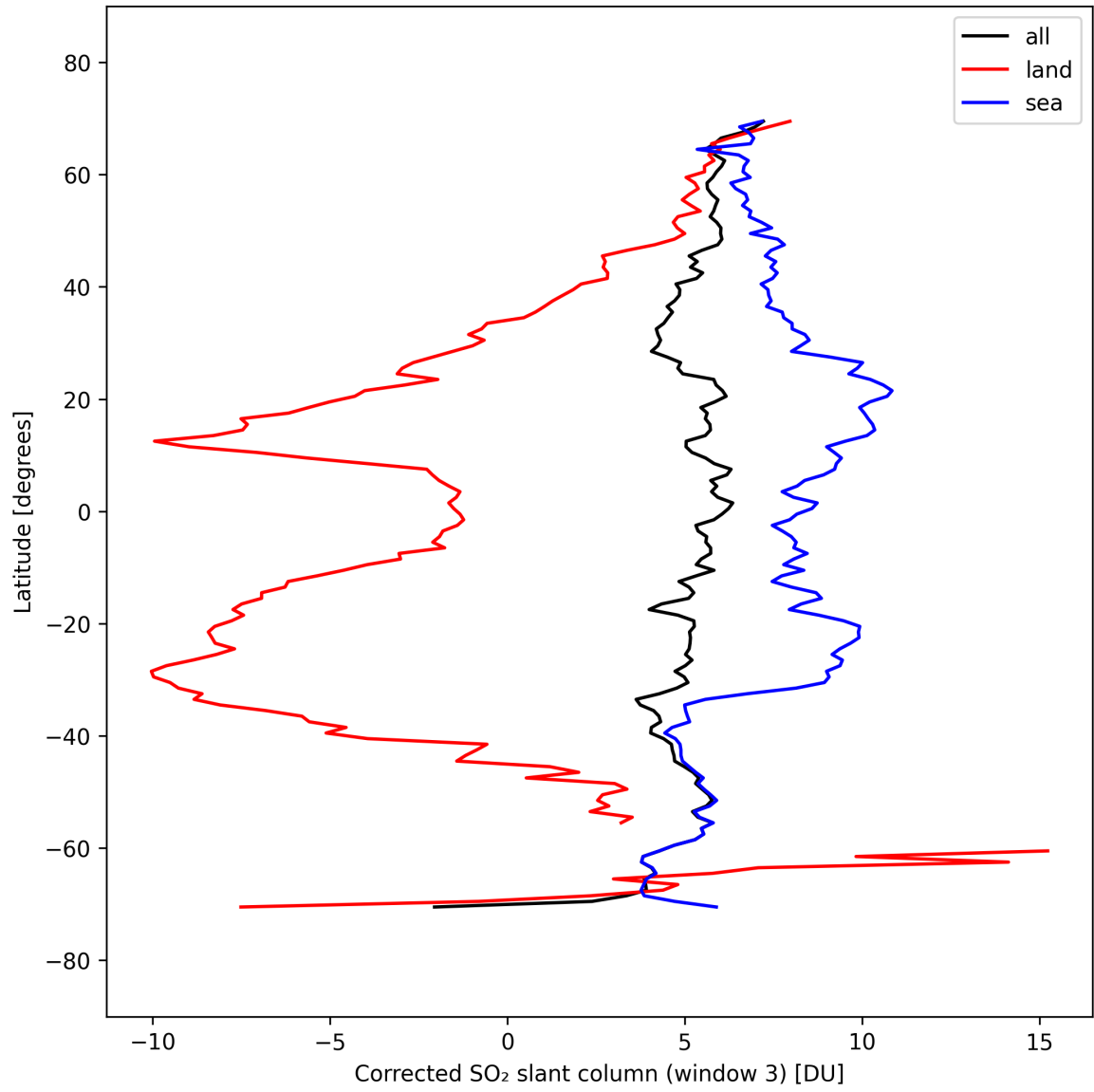


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-03-18 to 2025-03-19.

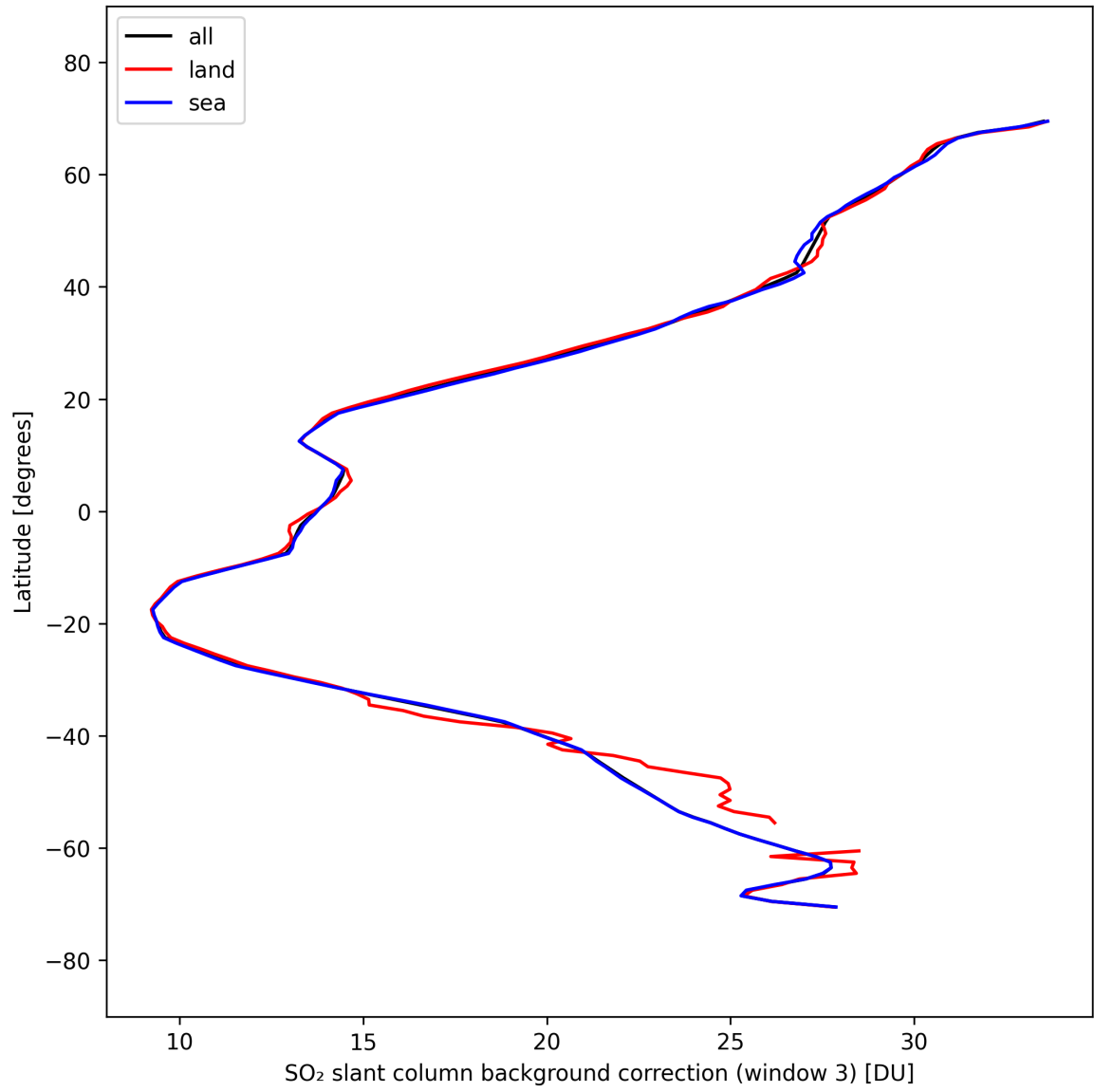


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-03-18 to 2025-03-19.

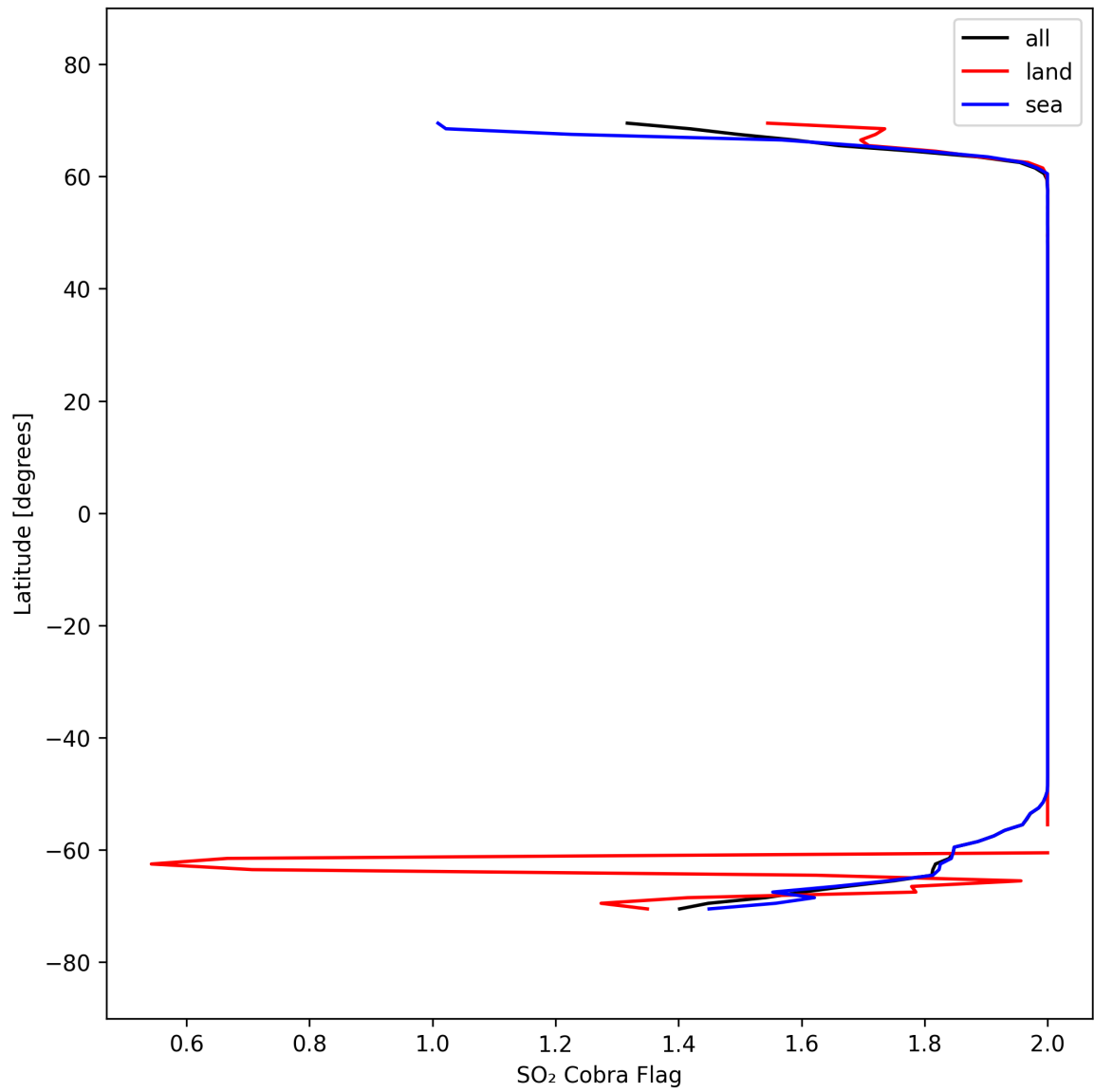


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-03-18 to 2025-03-19.

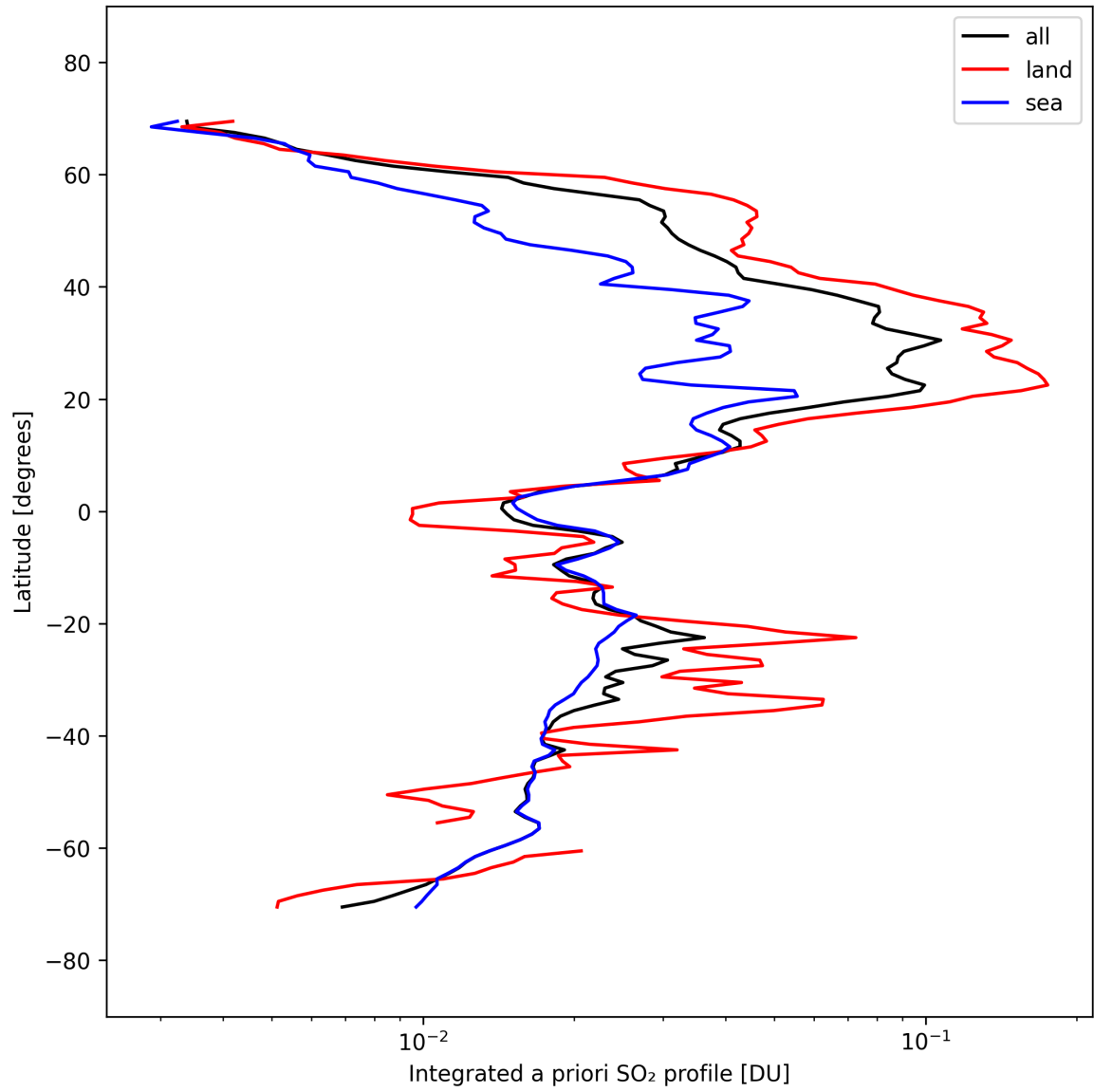


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-03-18 to 2025-03-19.

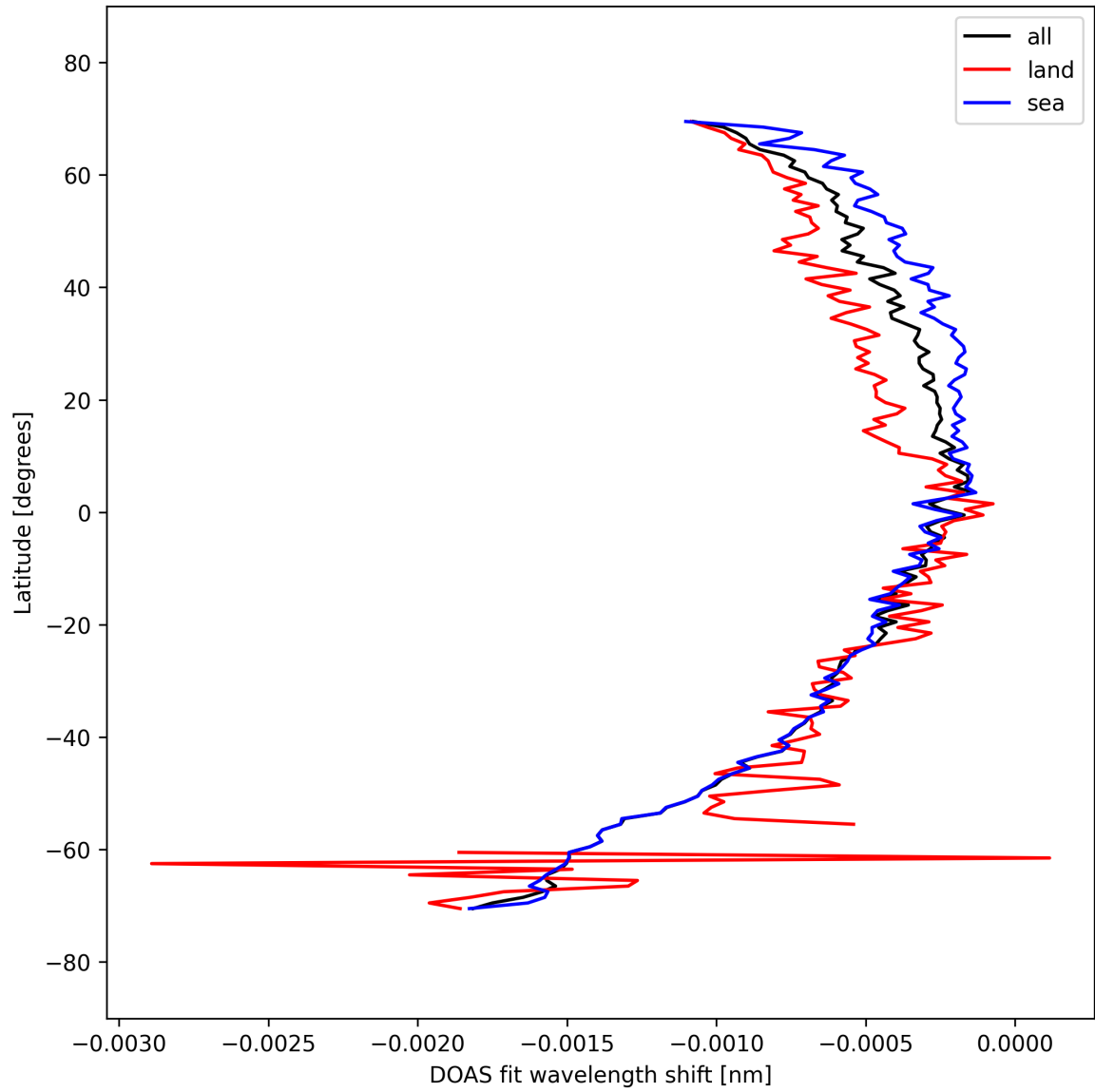


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-18 to 2025-03-19.

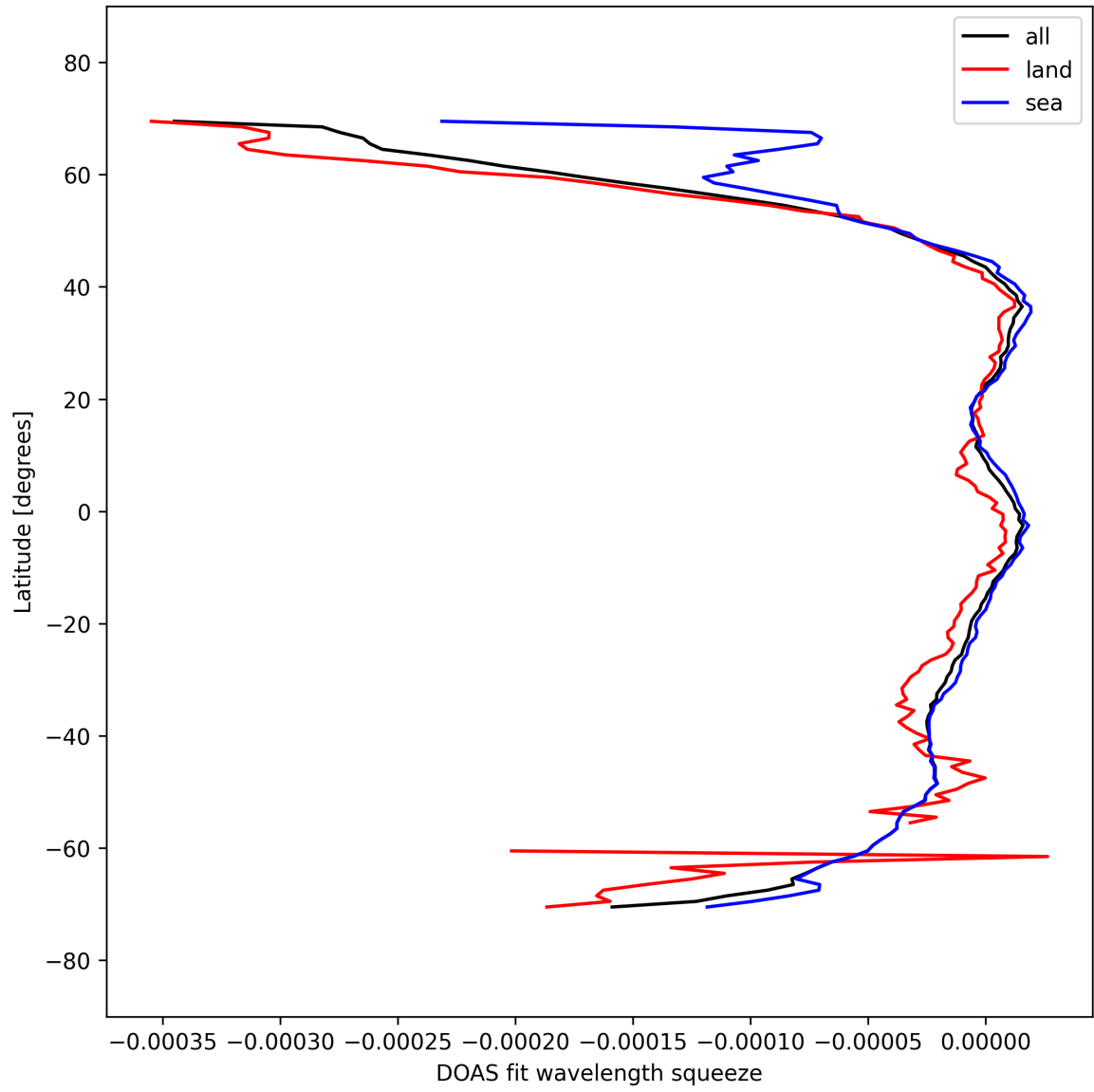


Figure 51: Zonal average of "DOAS fit wavelength squeeze" for 2025-03-18 to 2025-03-19.

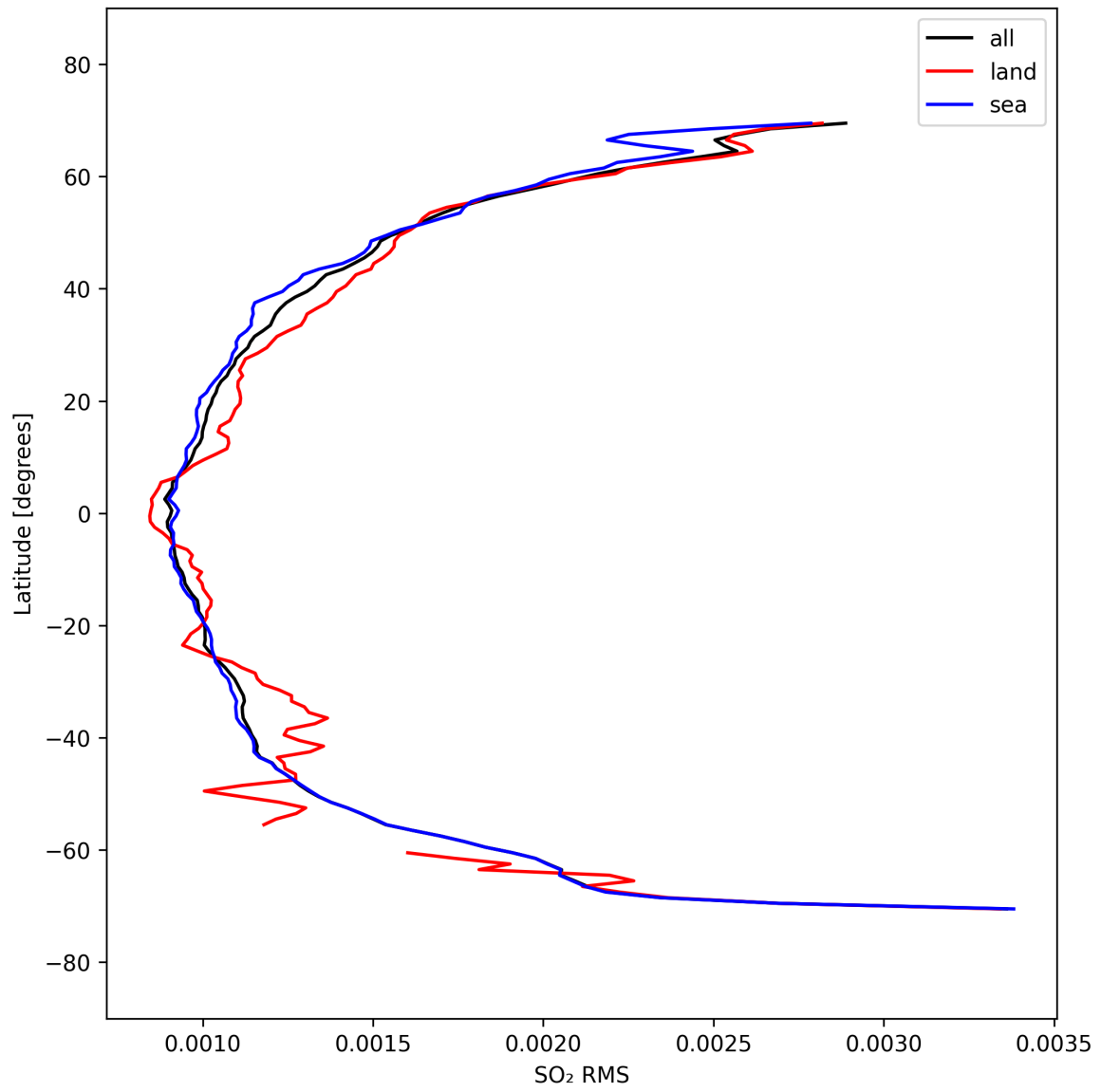


Figure 52: Zonal average of “SO₂ RMS” for 2025-03-18 to 2025-03-19.

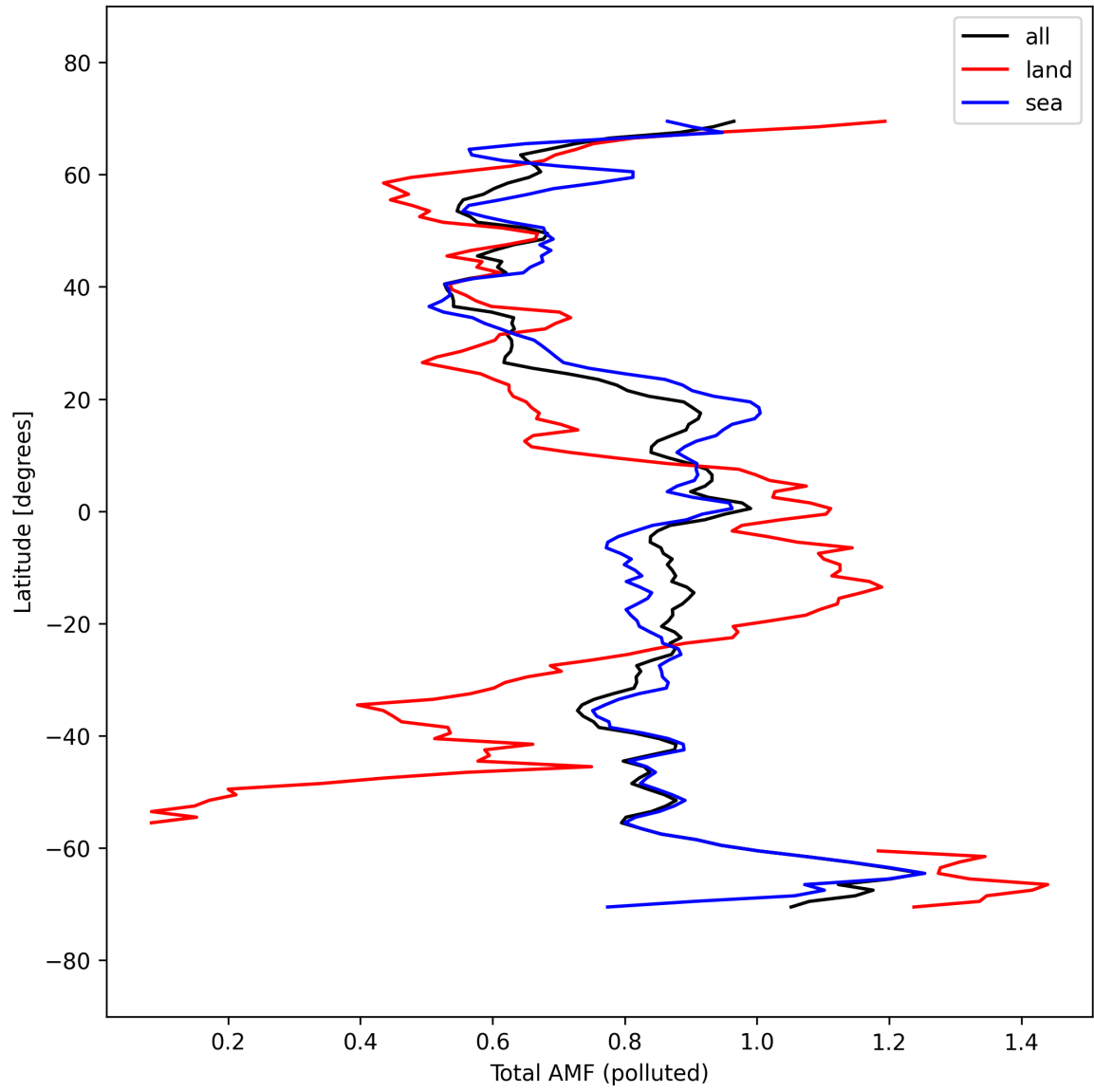


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-18 to 2025-03-19.

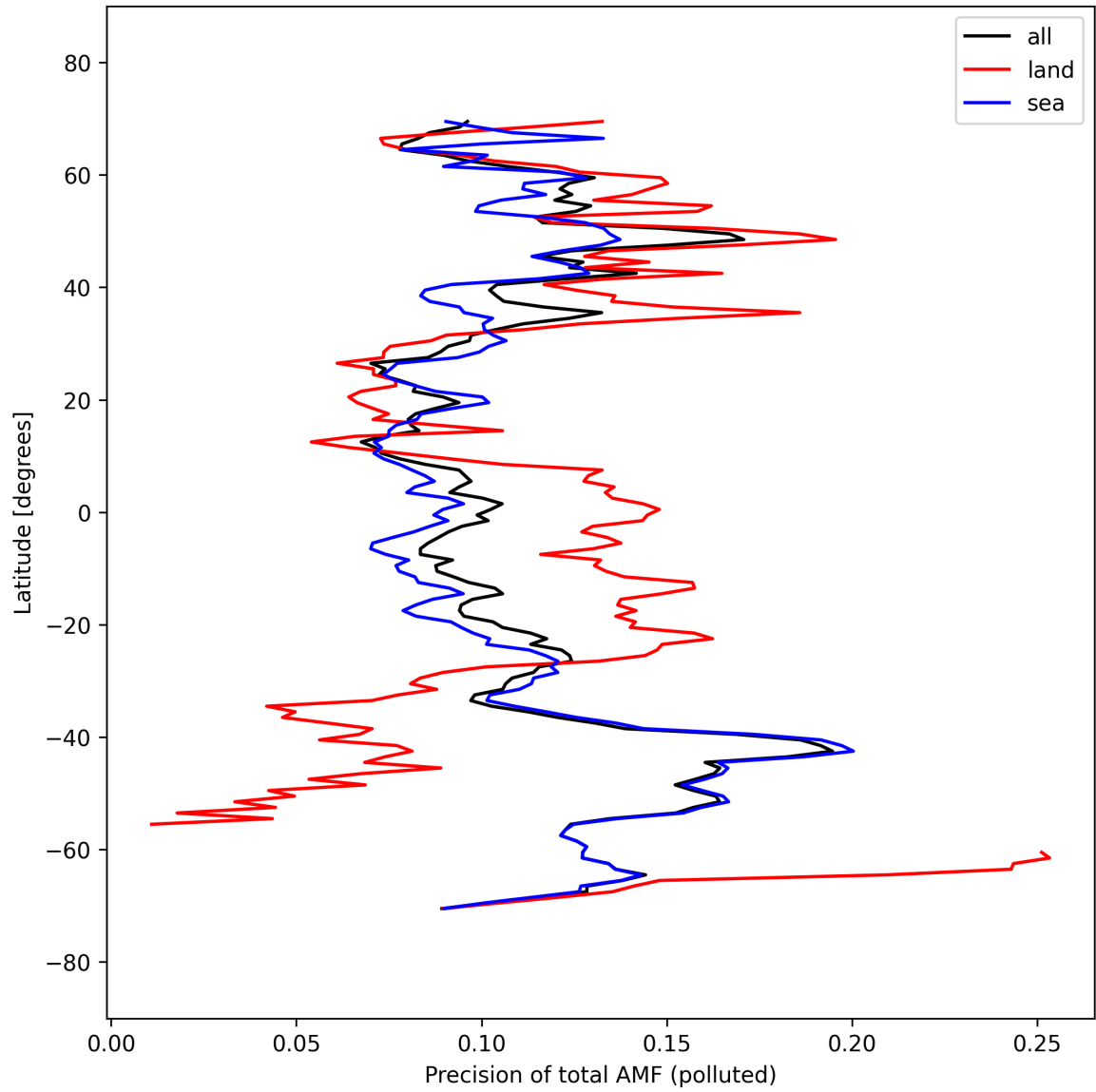


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-18 to 2025-03-19.

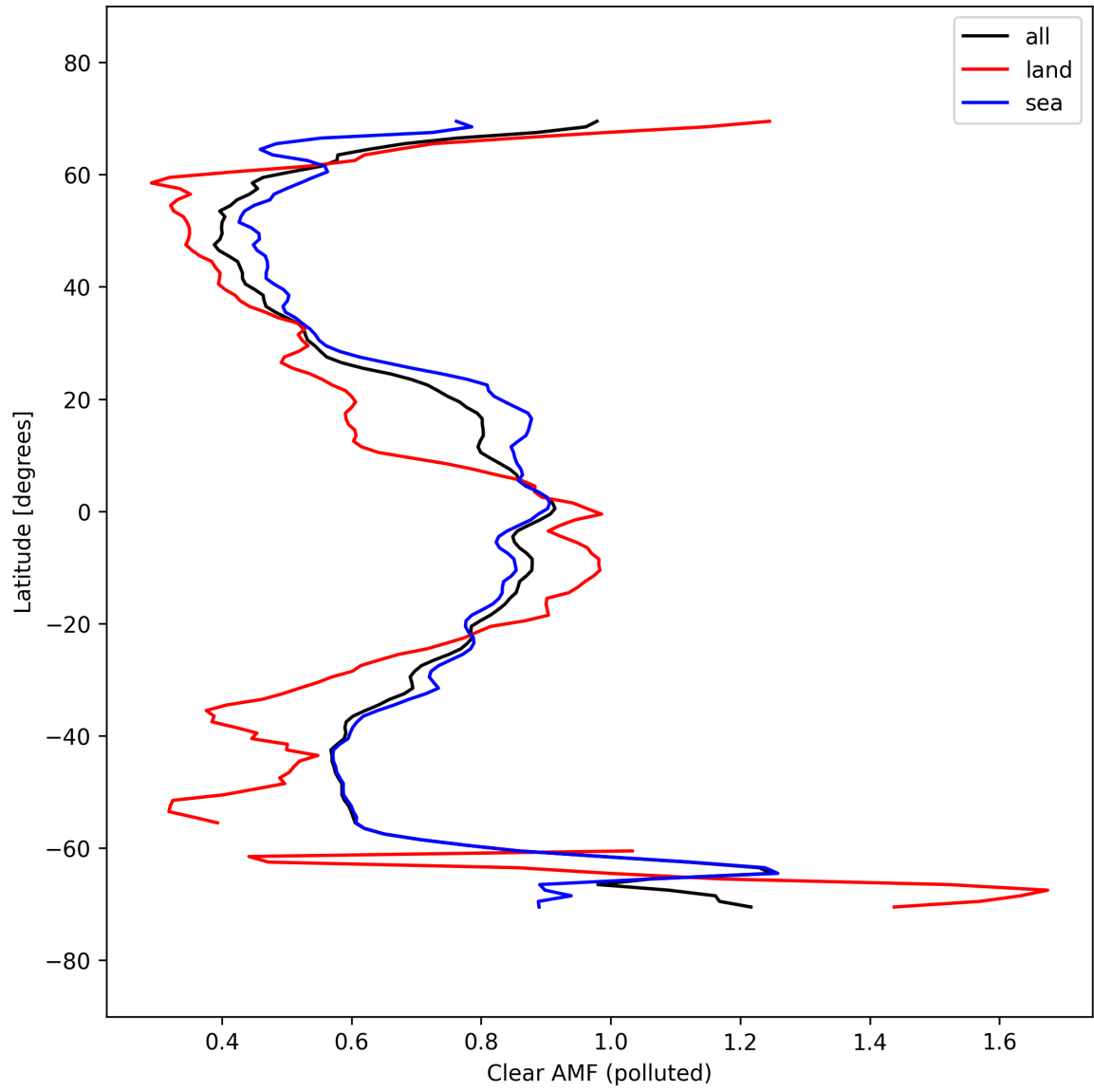


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-18 to 2025-03-19.

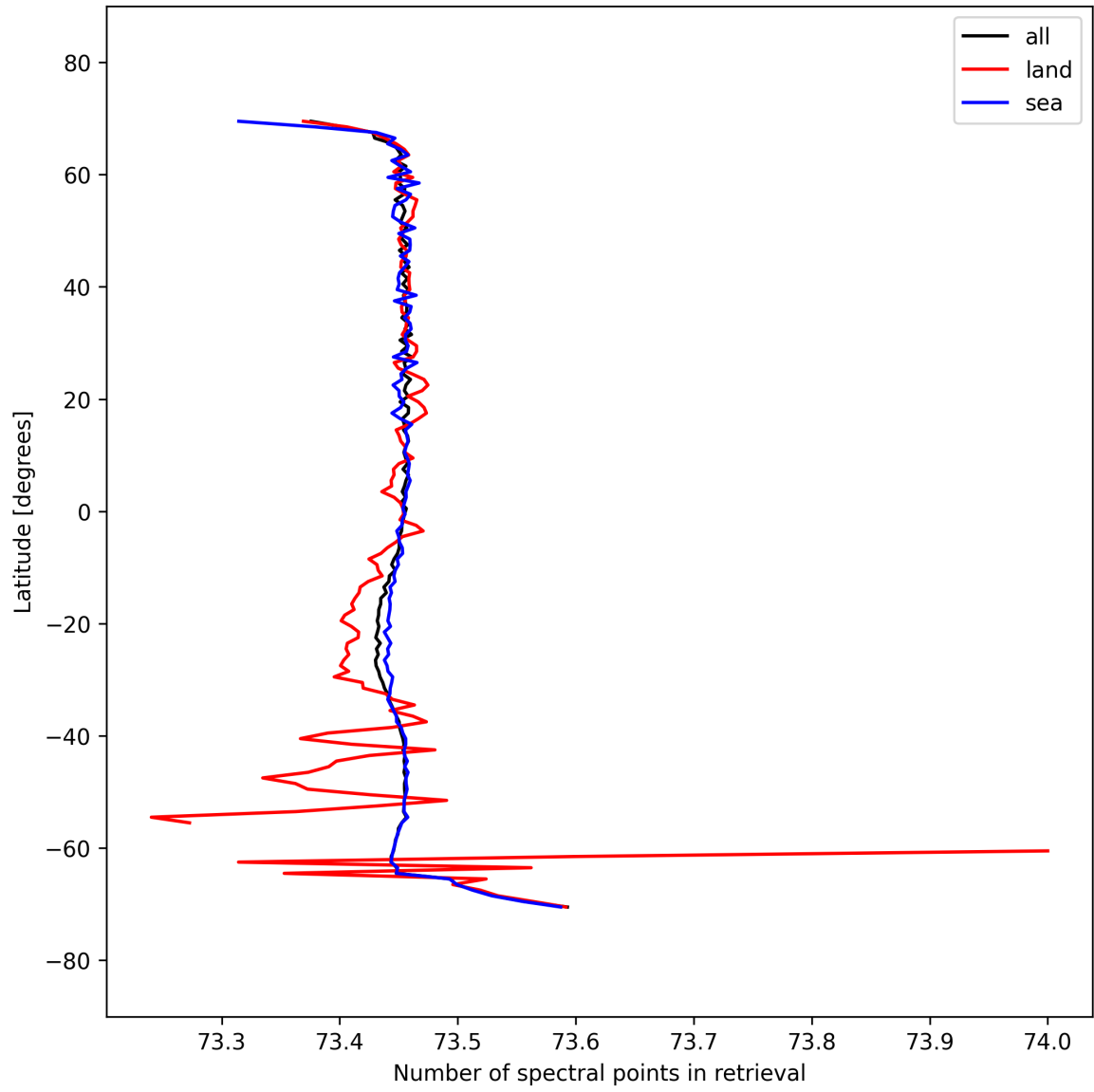


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-18 to 2025-03-19.

8 Histograms

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

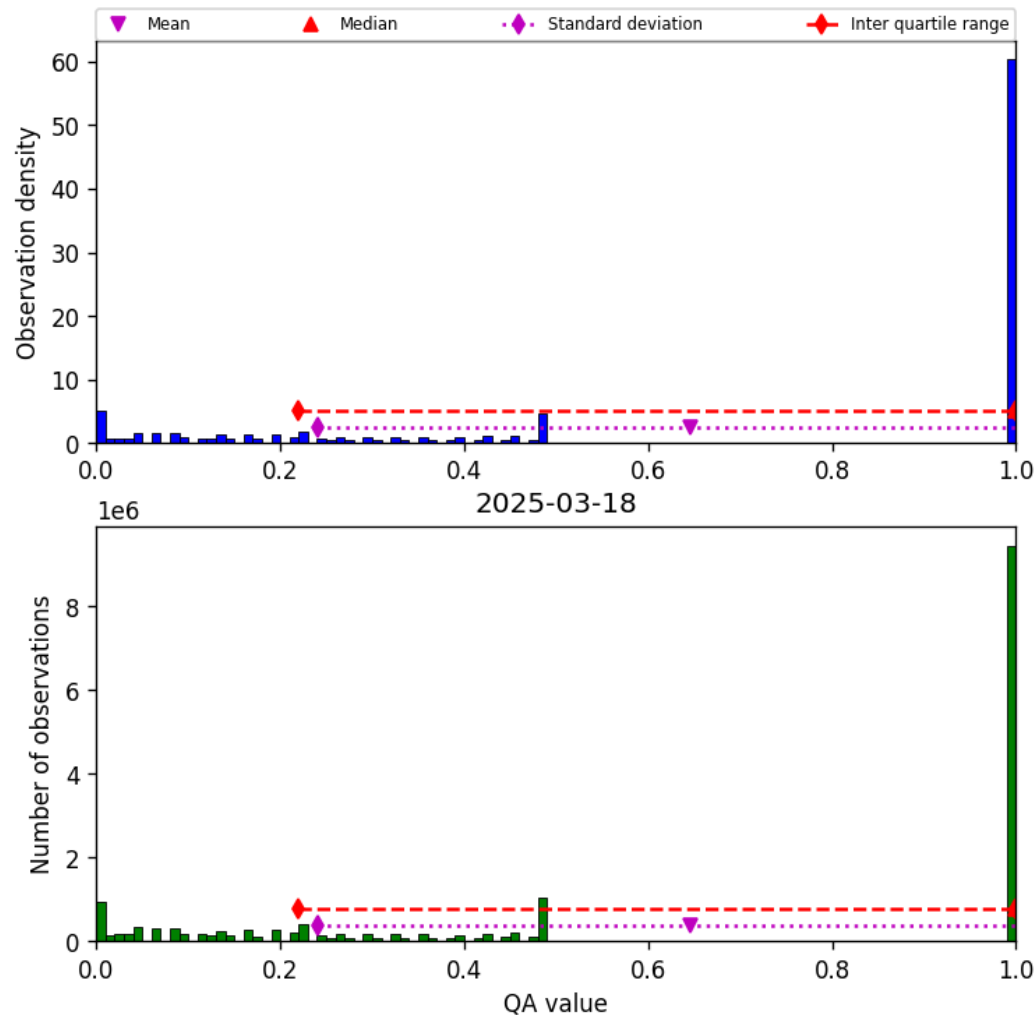


Figure 57: Histogram of “QA value” for 2025-03-18 to 2025-03-19

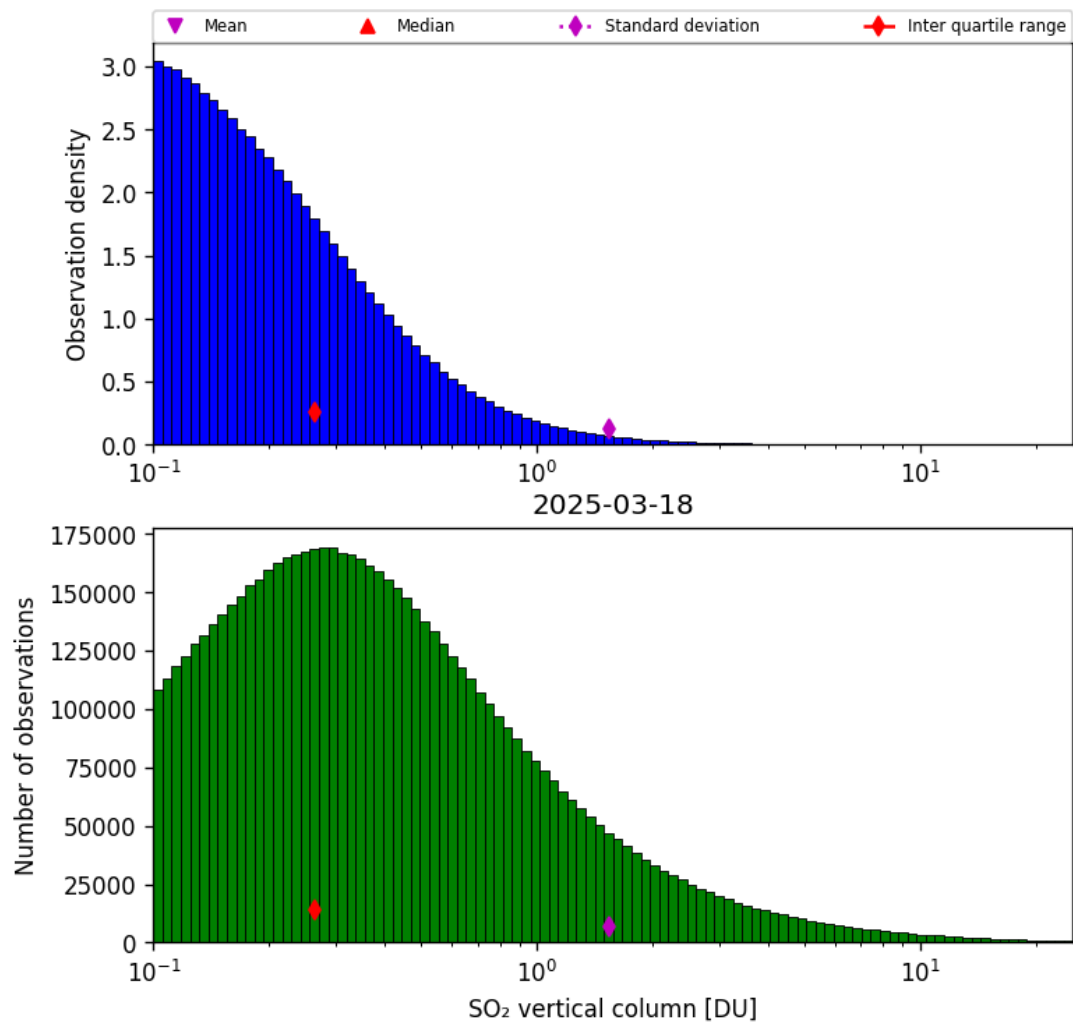


Figure 58: Histogram of “SO₂ vertical column” for 2025-03-18 to 2025-03-19

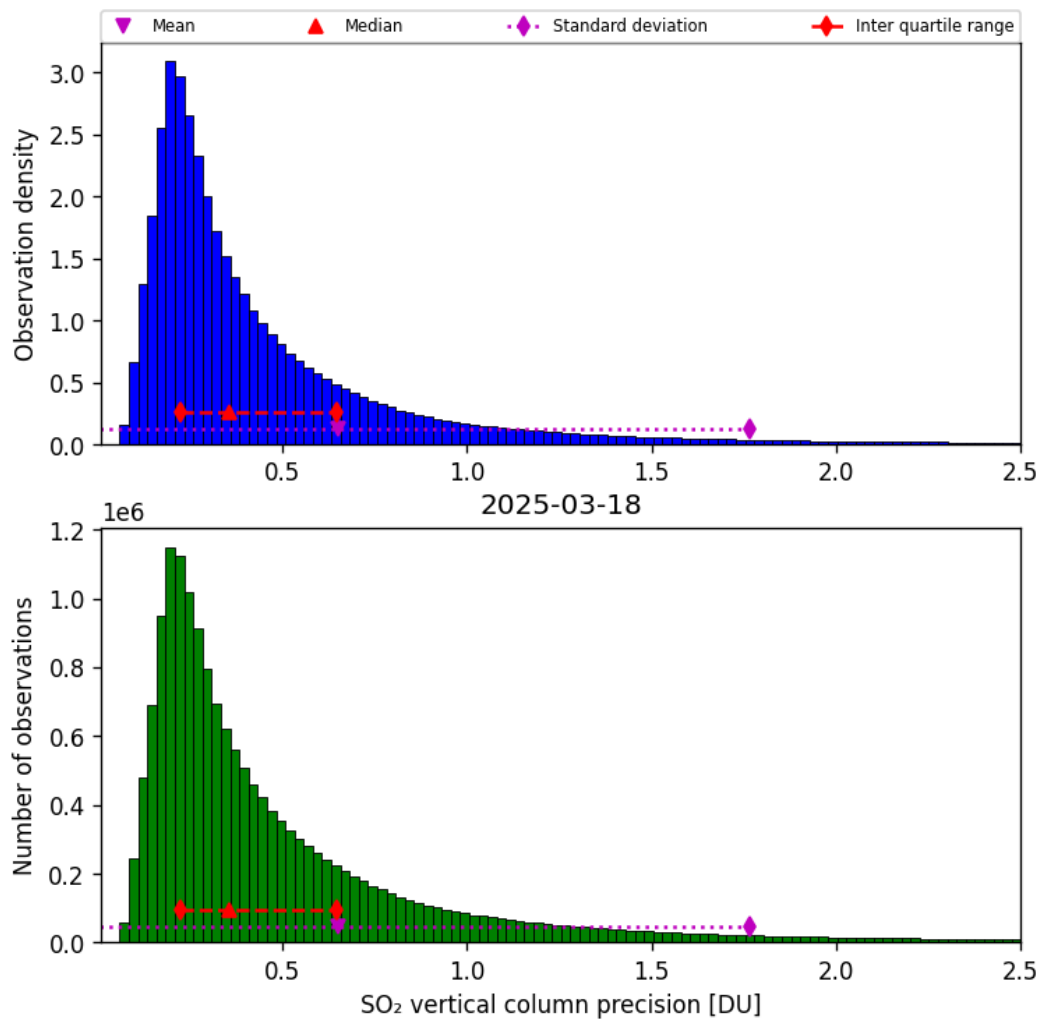


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-03-18 to 2025-03-19

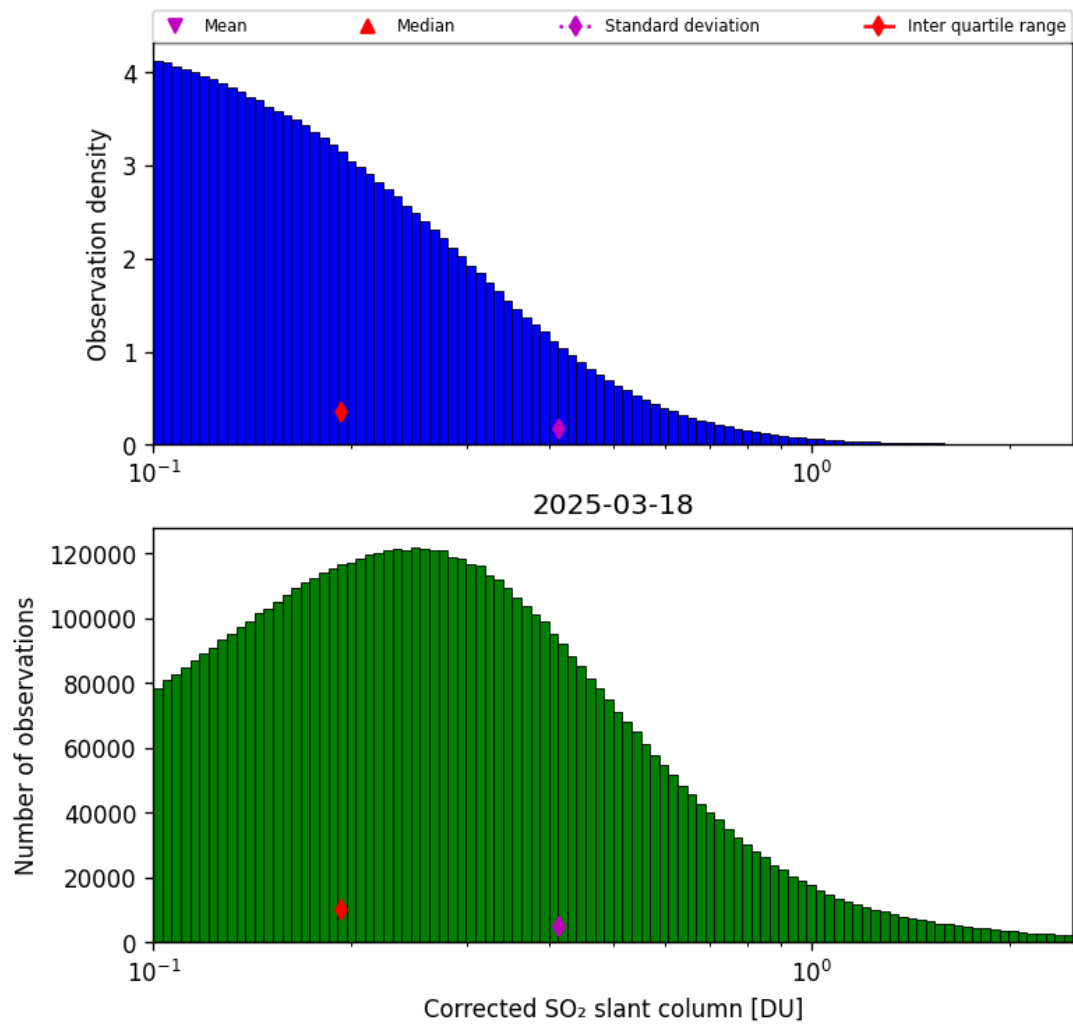


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-03-18 to 2025-03-19

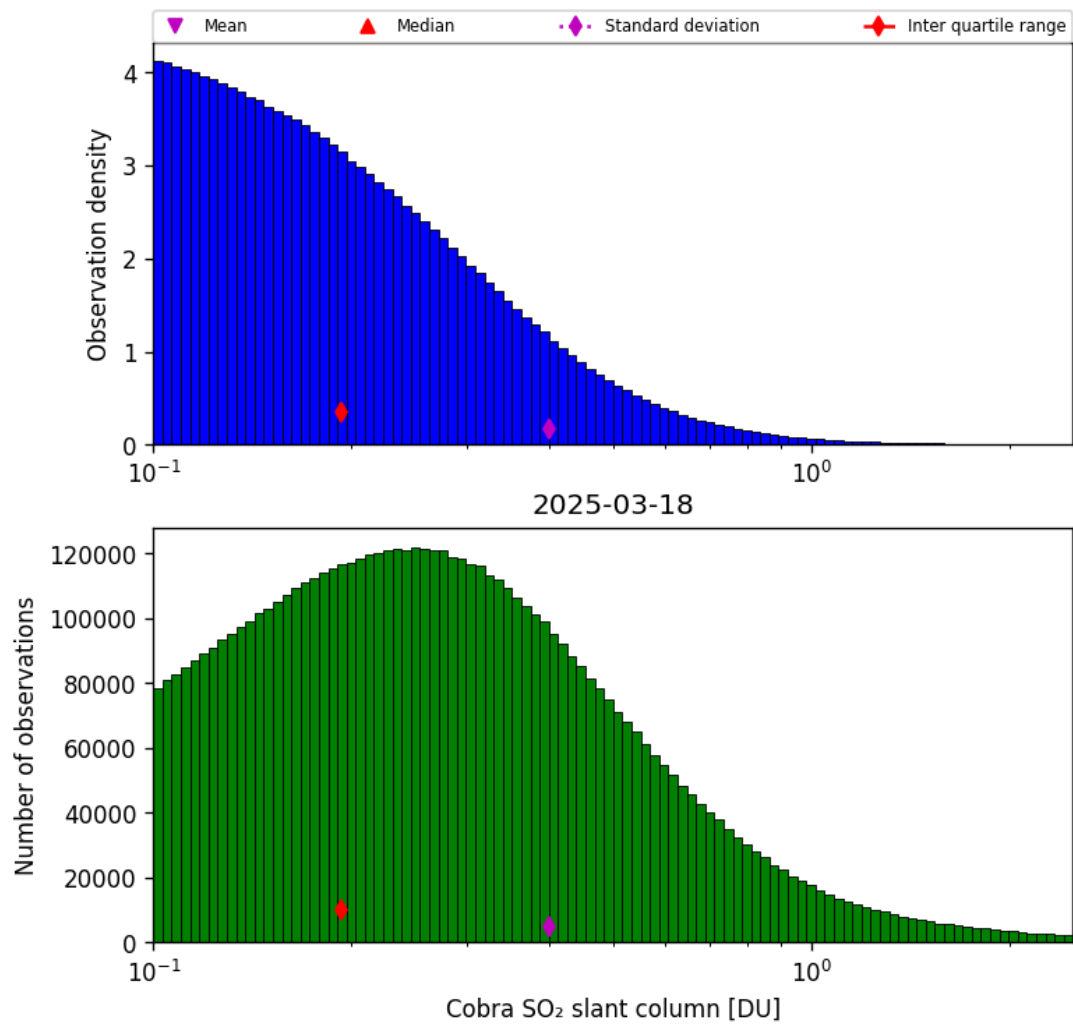


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-03-18 to 2025-03-19

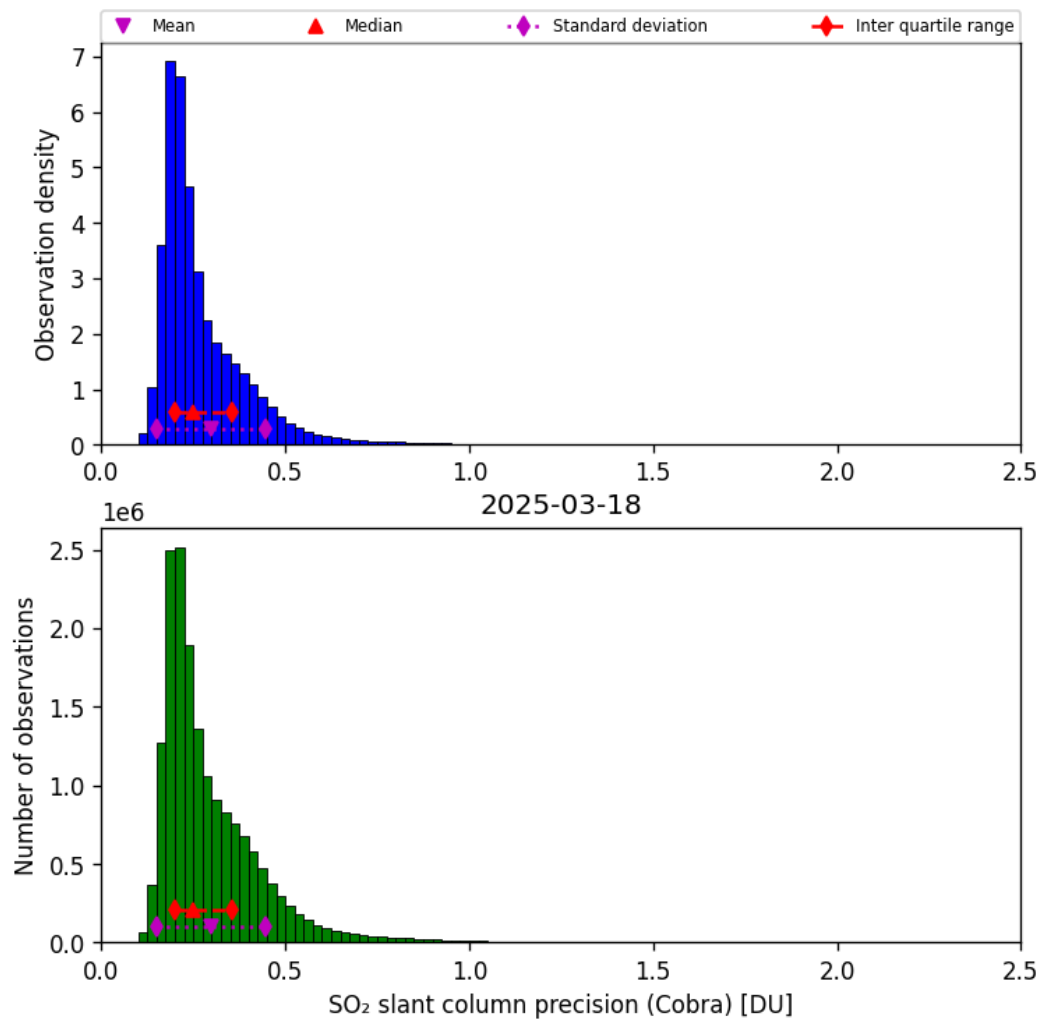


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-03-18 to 2025-03-19

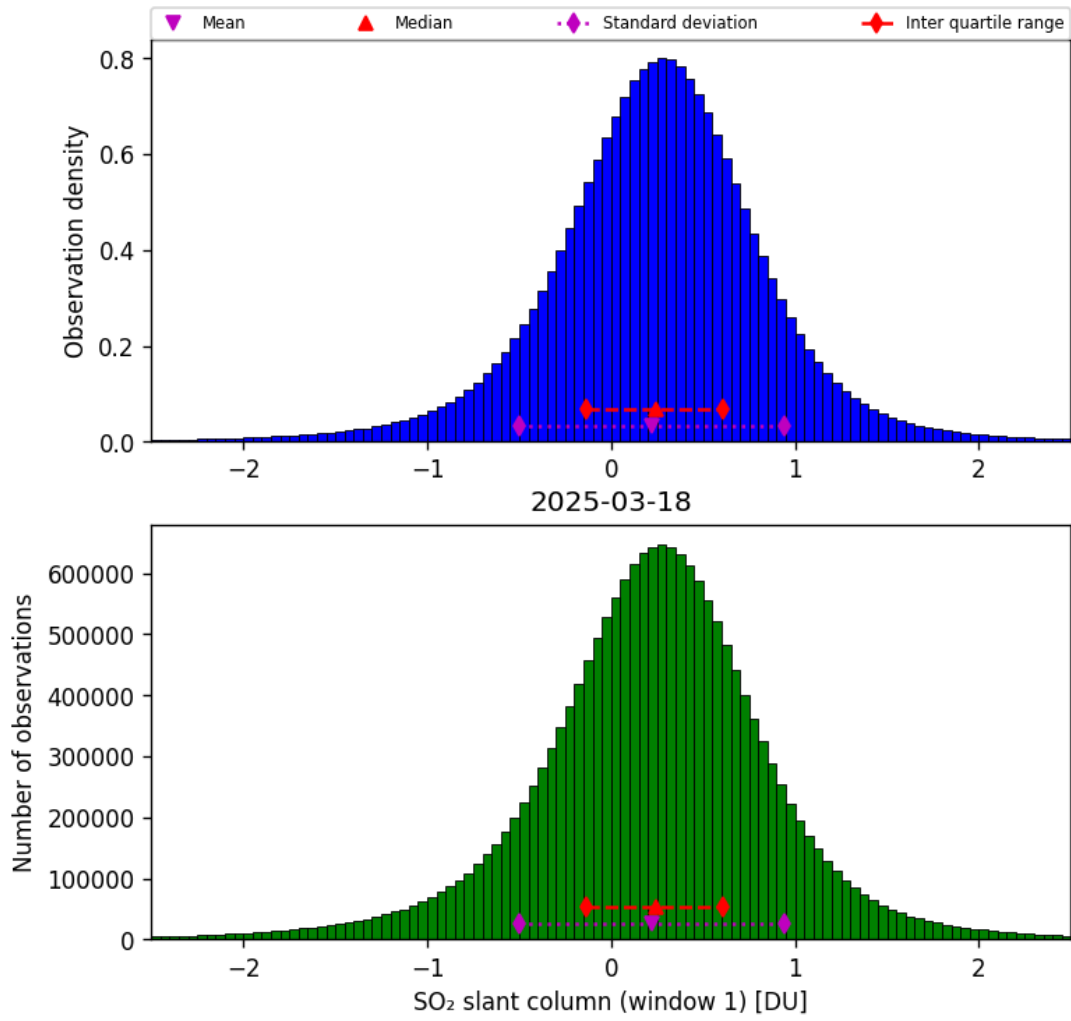


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-03-18 to 2025-03-19

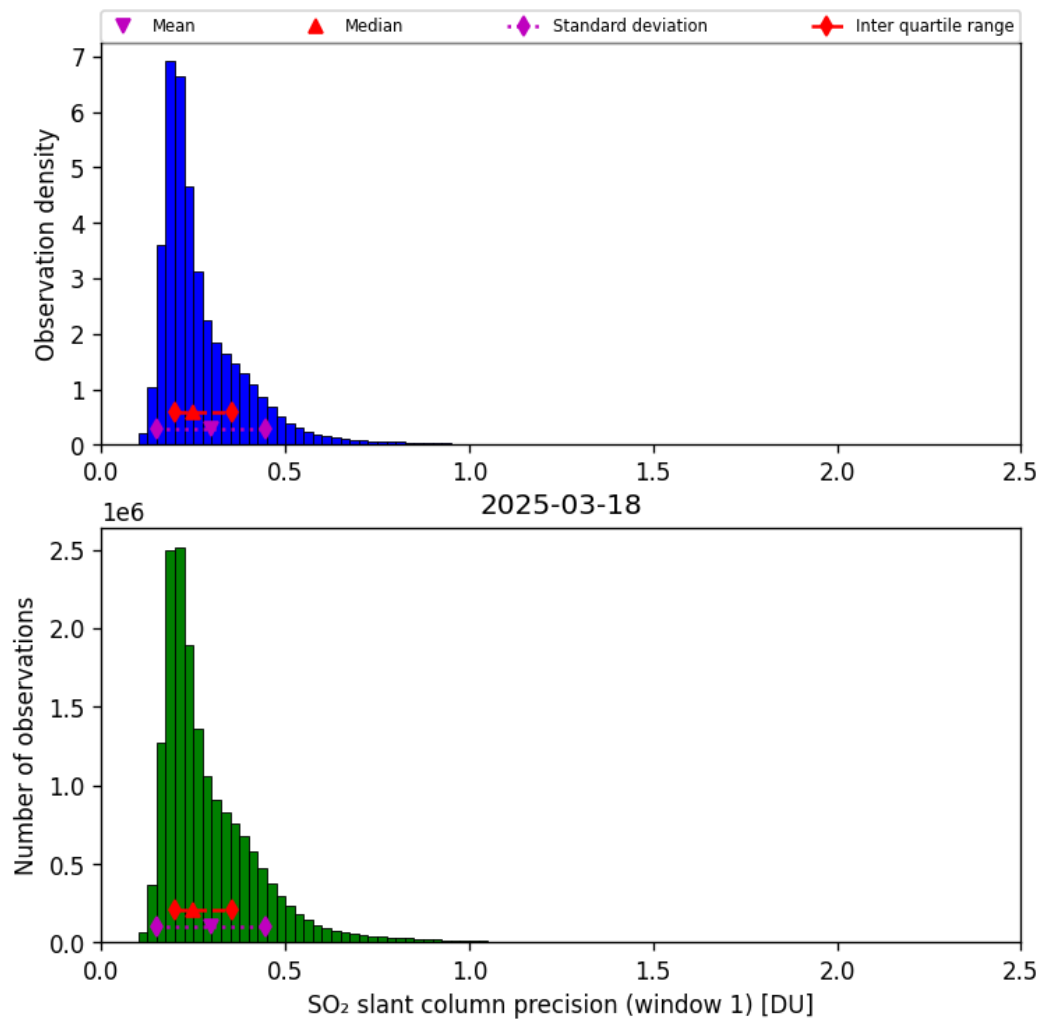


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-03-18 to 2025-03-19

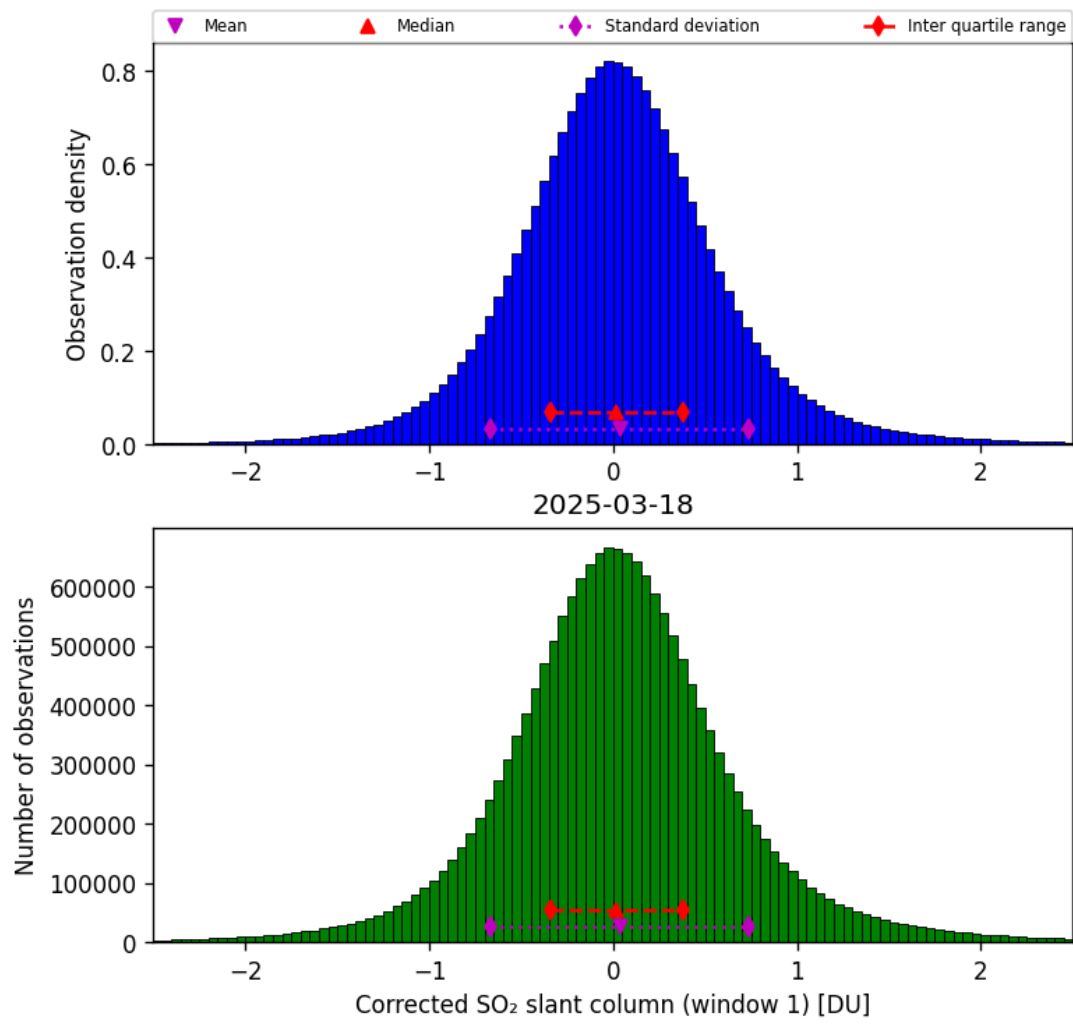


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-03-18 to 2025-03-19

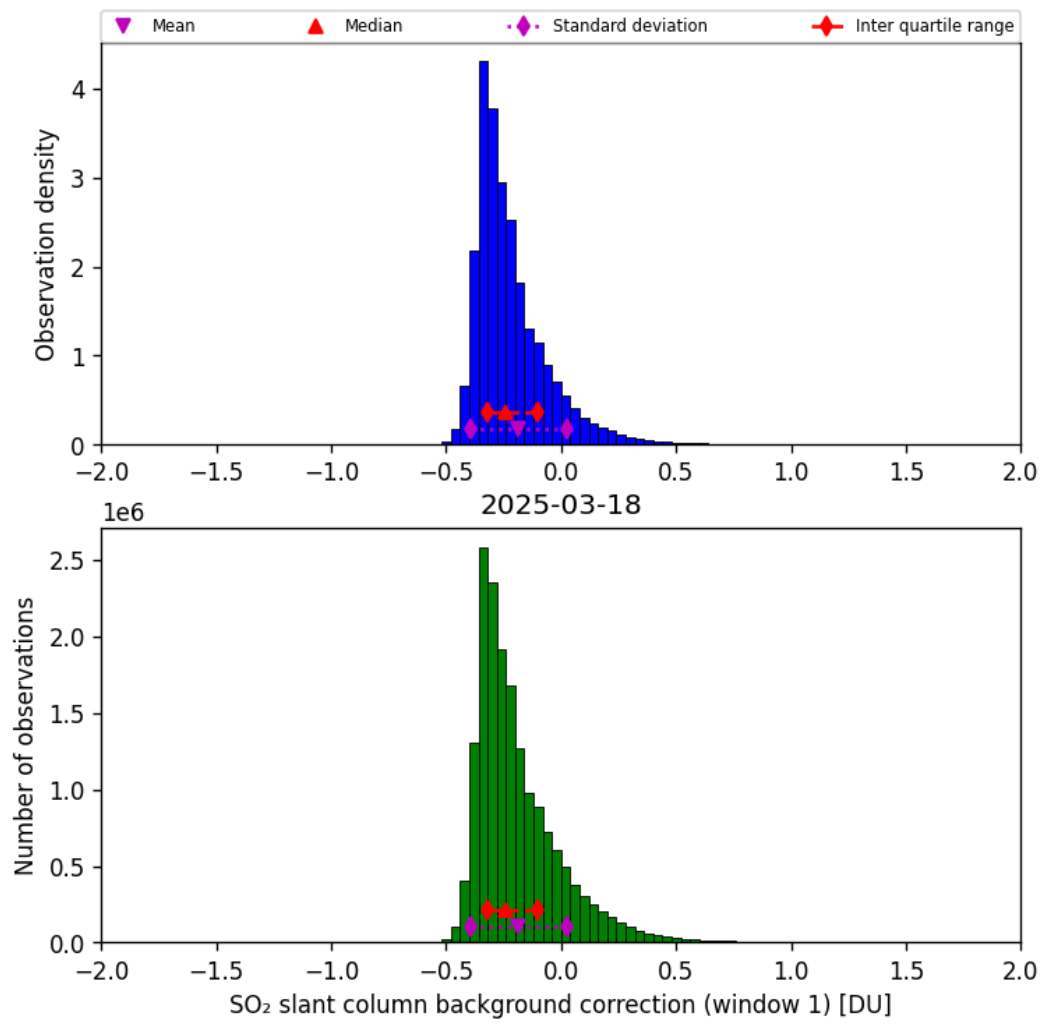


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-03-18 to 2025-03-19

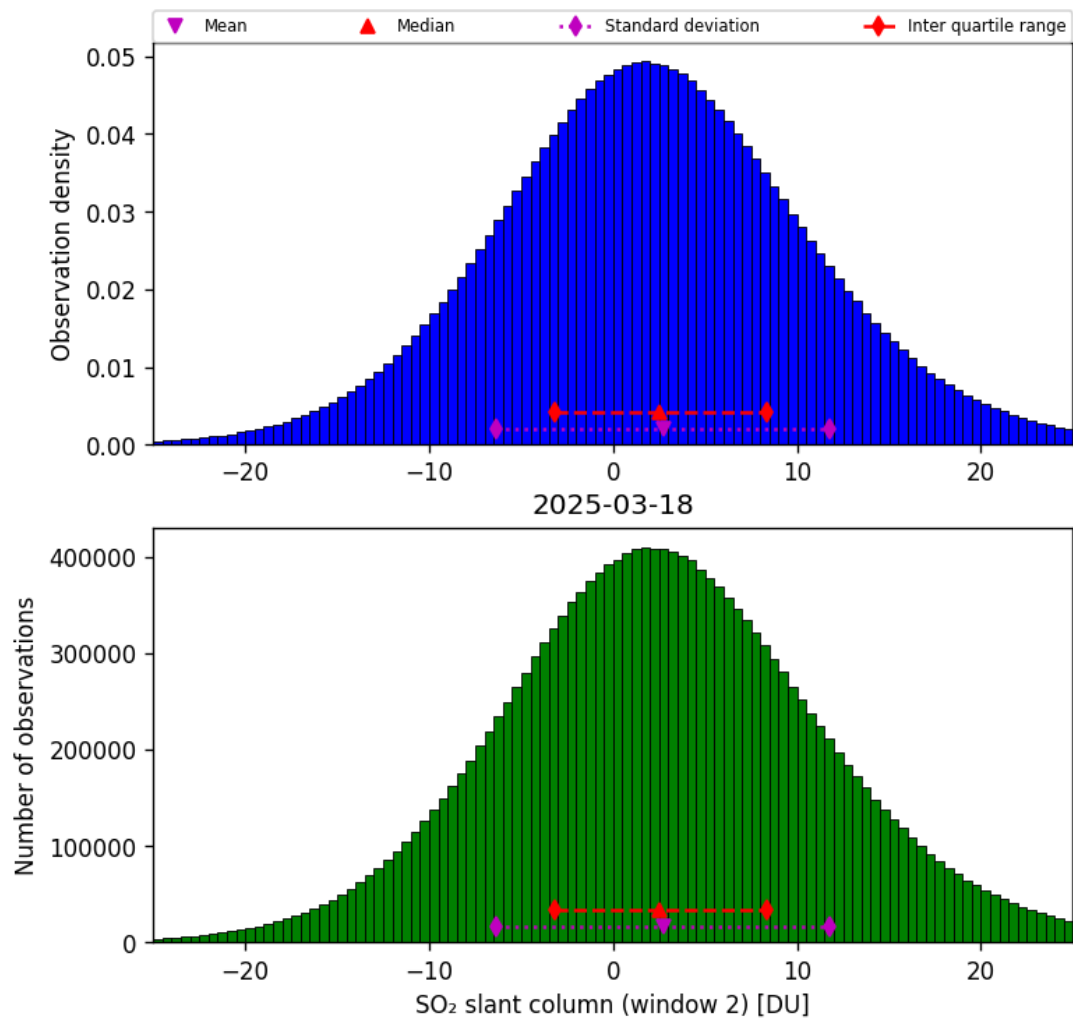


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-03-18 to 2025-03-19

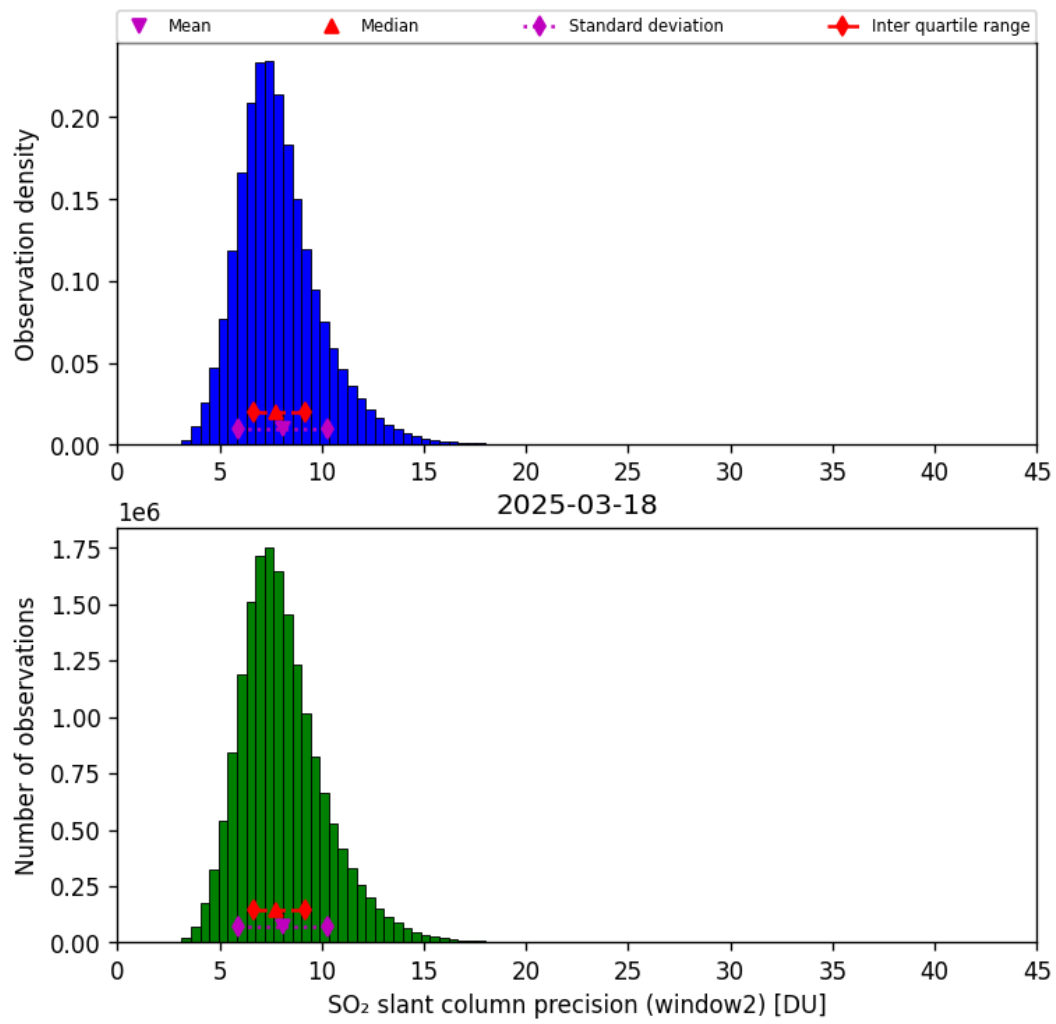


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-03-18 to 2025-03-19

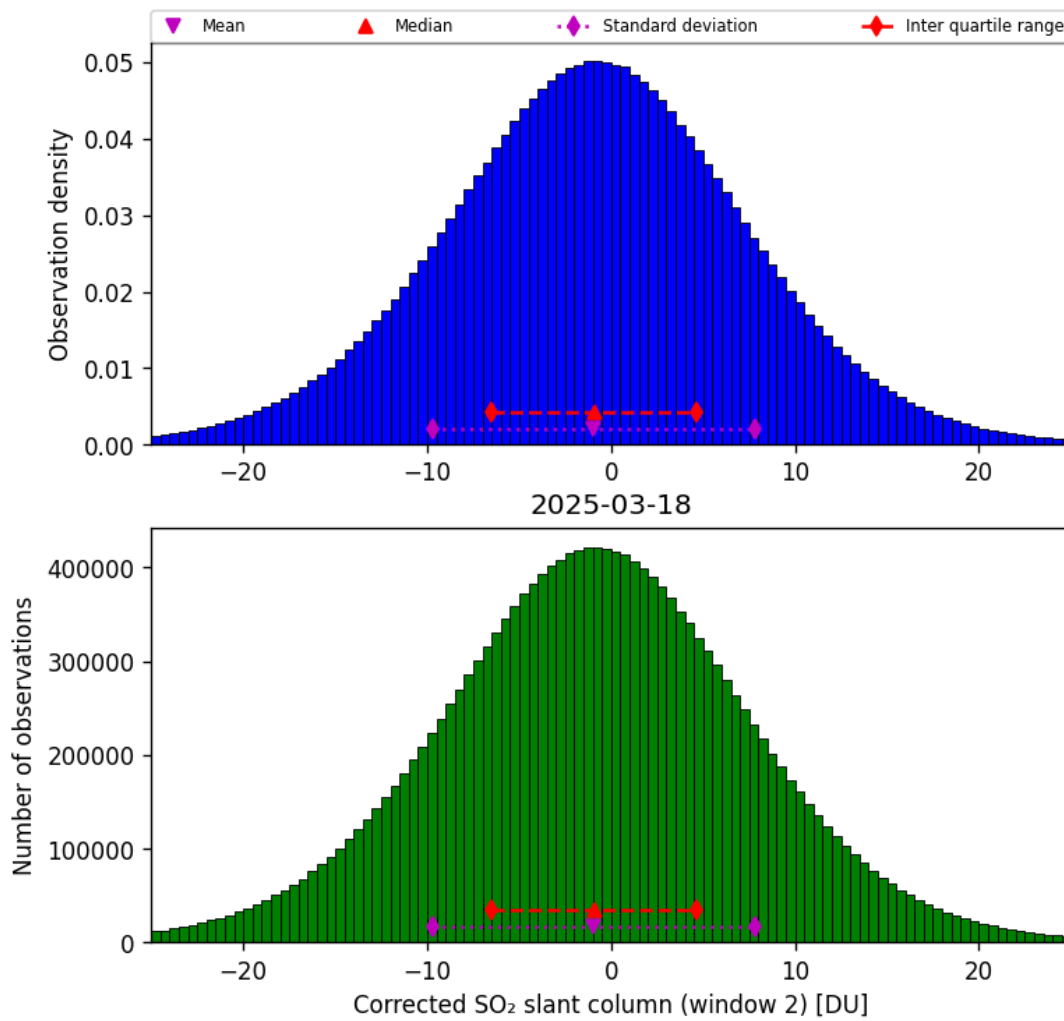


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-03-18 to 2025-03-19

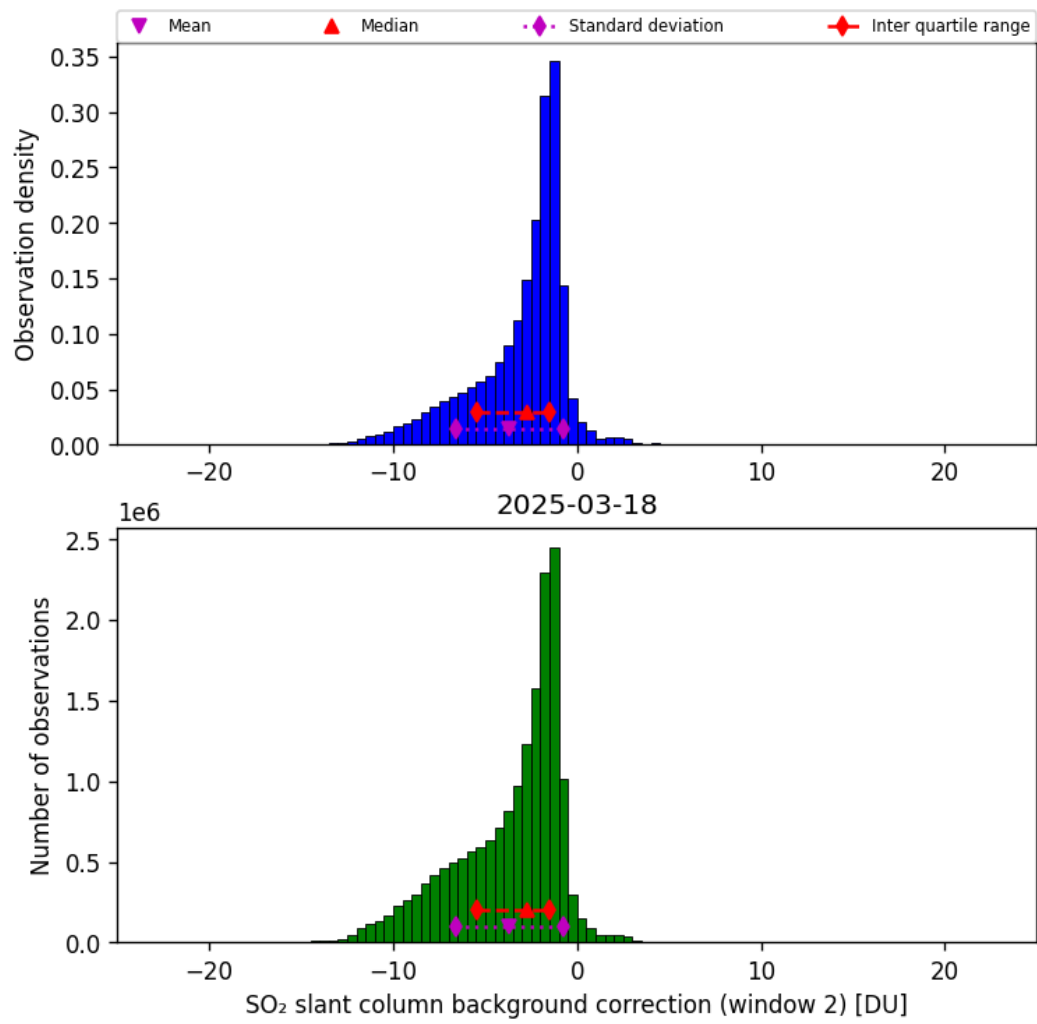


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-03-18 to 2025-03-19

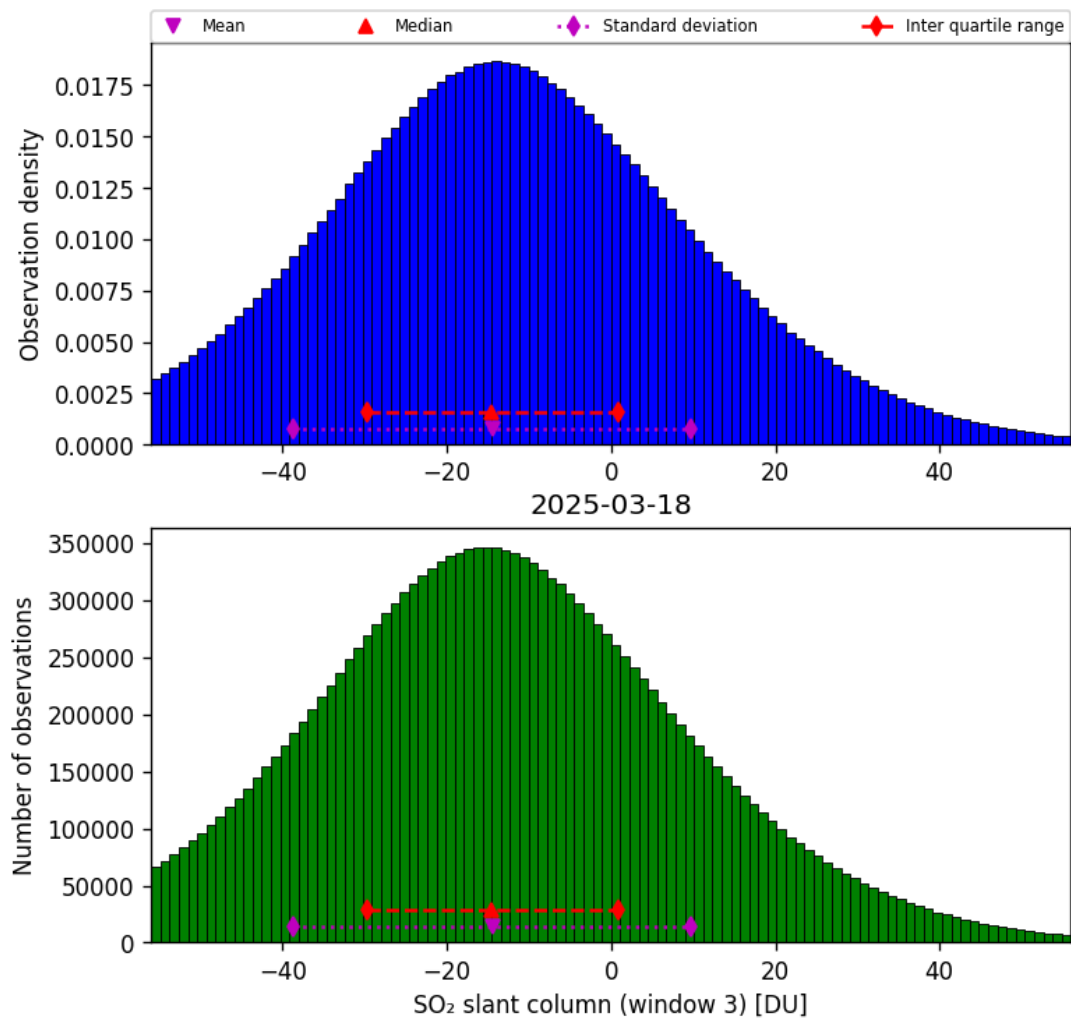


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-03-18 to 2025-03-19

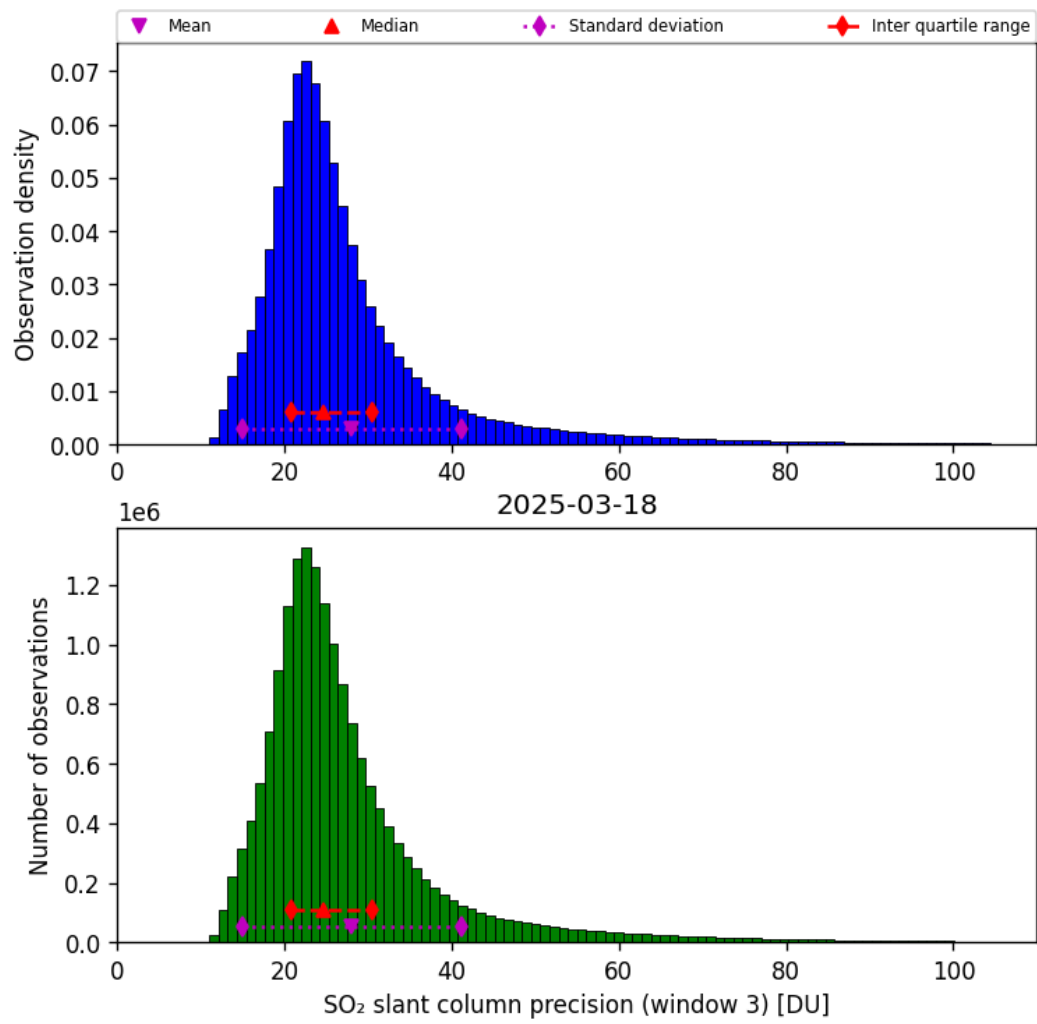


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-03-18 to 2025-03-19

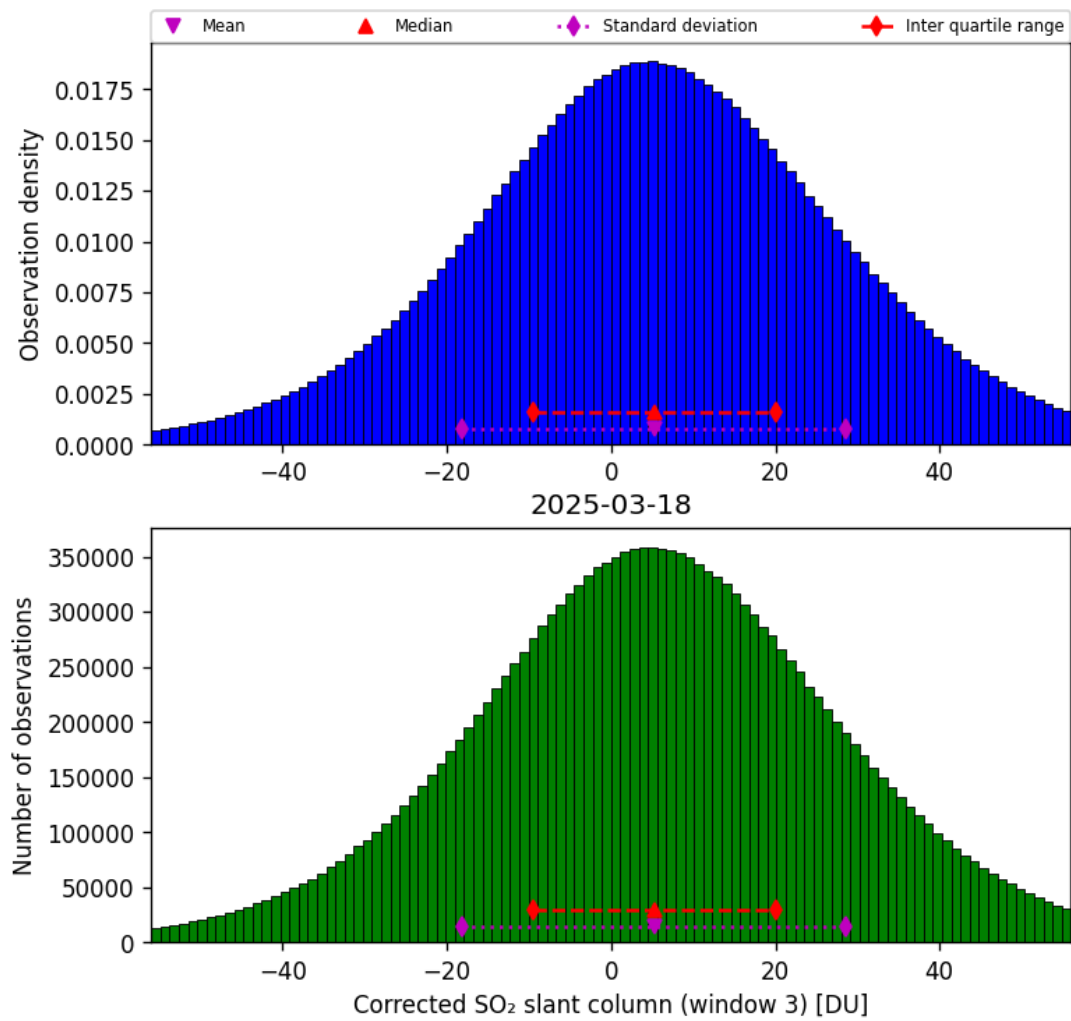


Figure 73: Histogram of "Corrected SO₂ slant column (window 3)" for 2025-03-18 to 2025-03-19

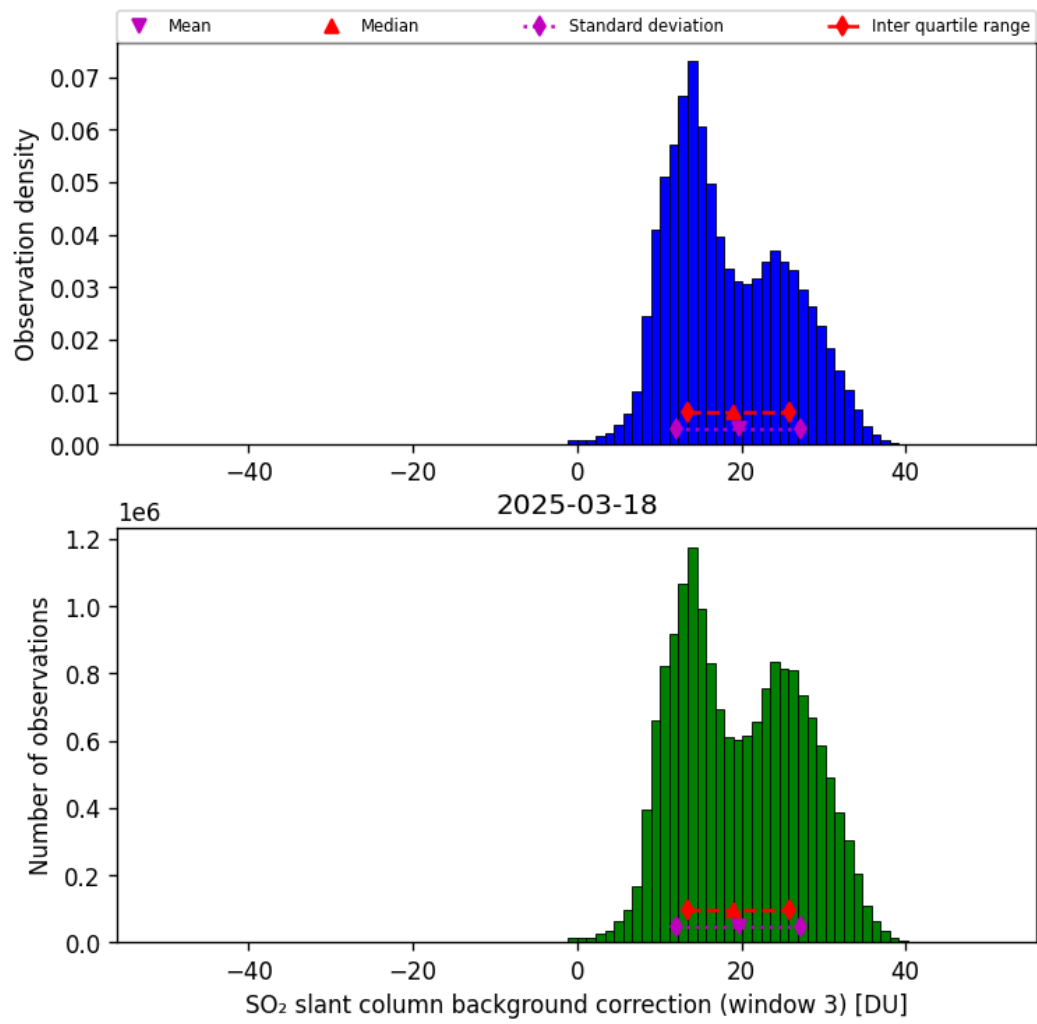


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-03-18 to 2025-03-19

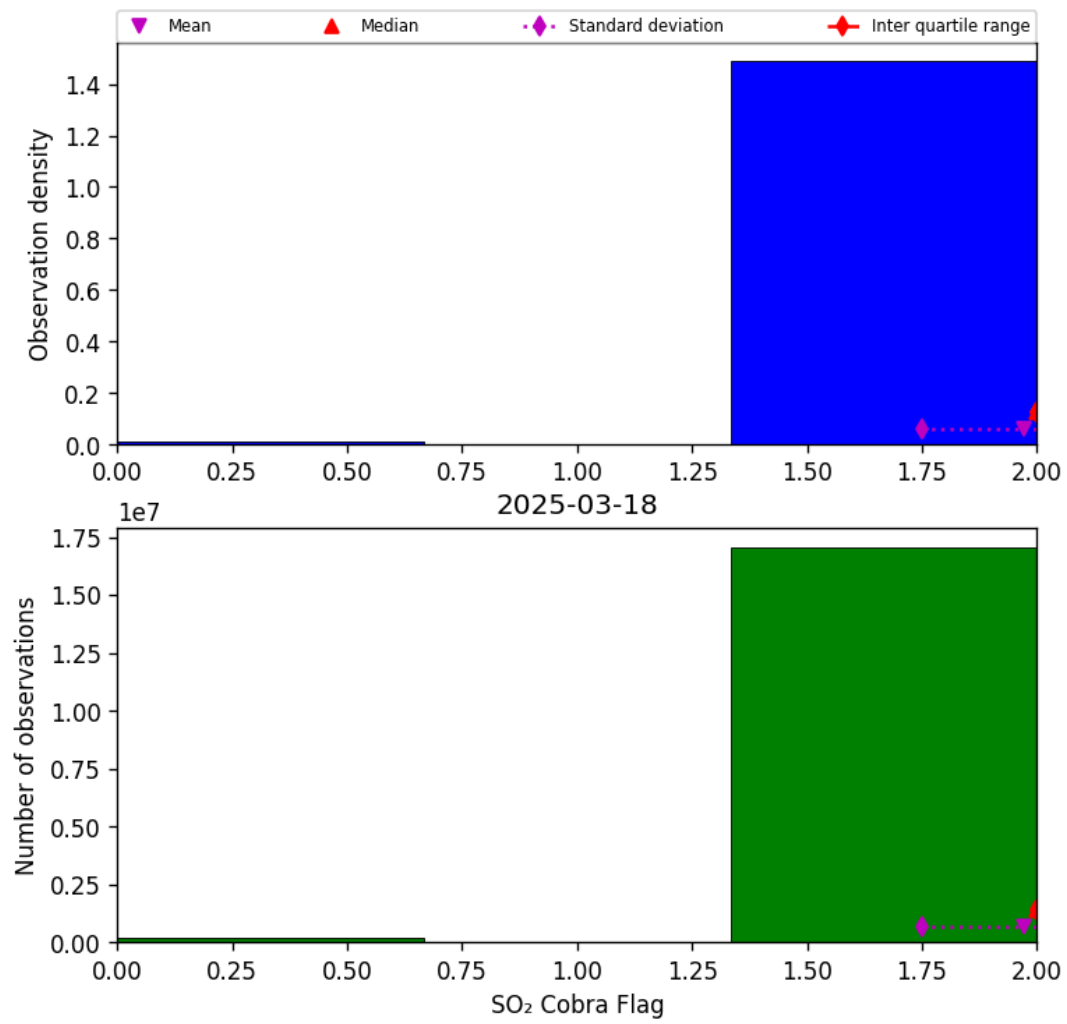


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-03-18 to 2025-03-19

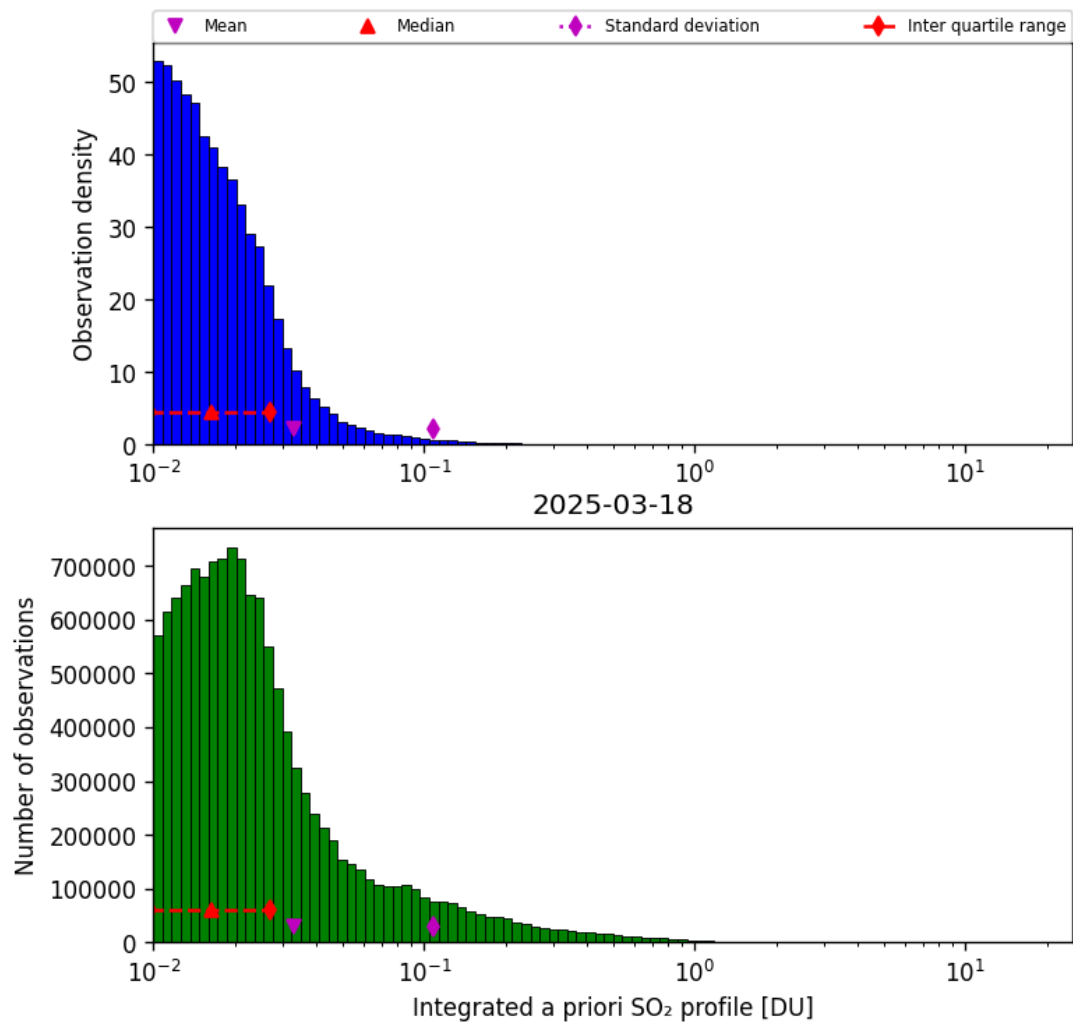


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-03-18 to 2025-03-19

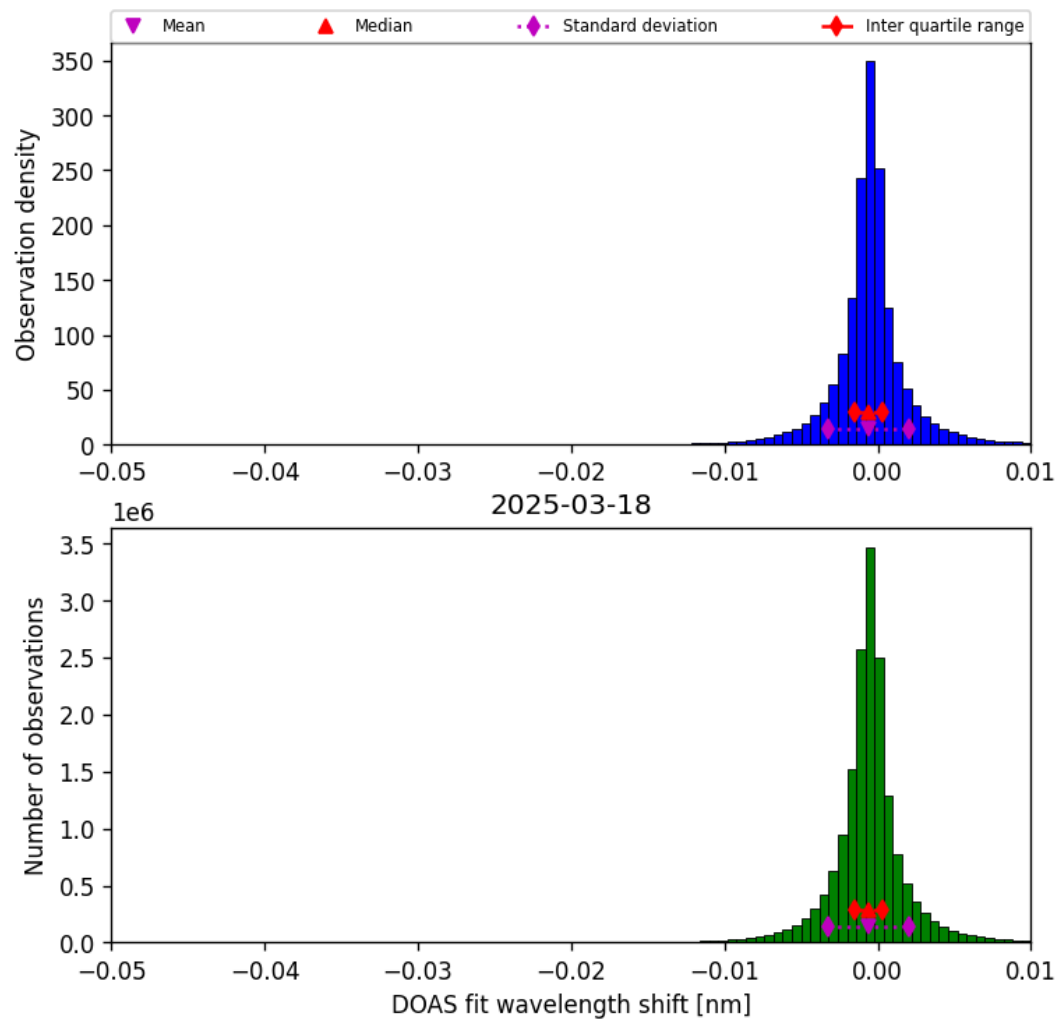


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-18 to 2025-03-19

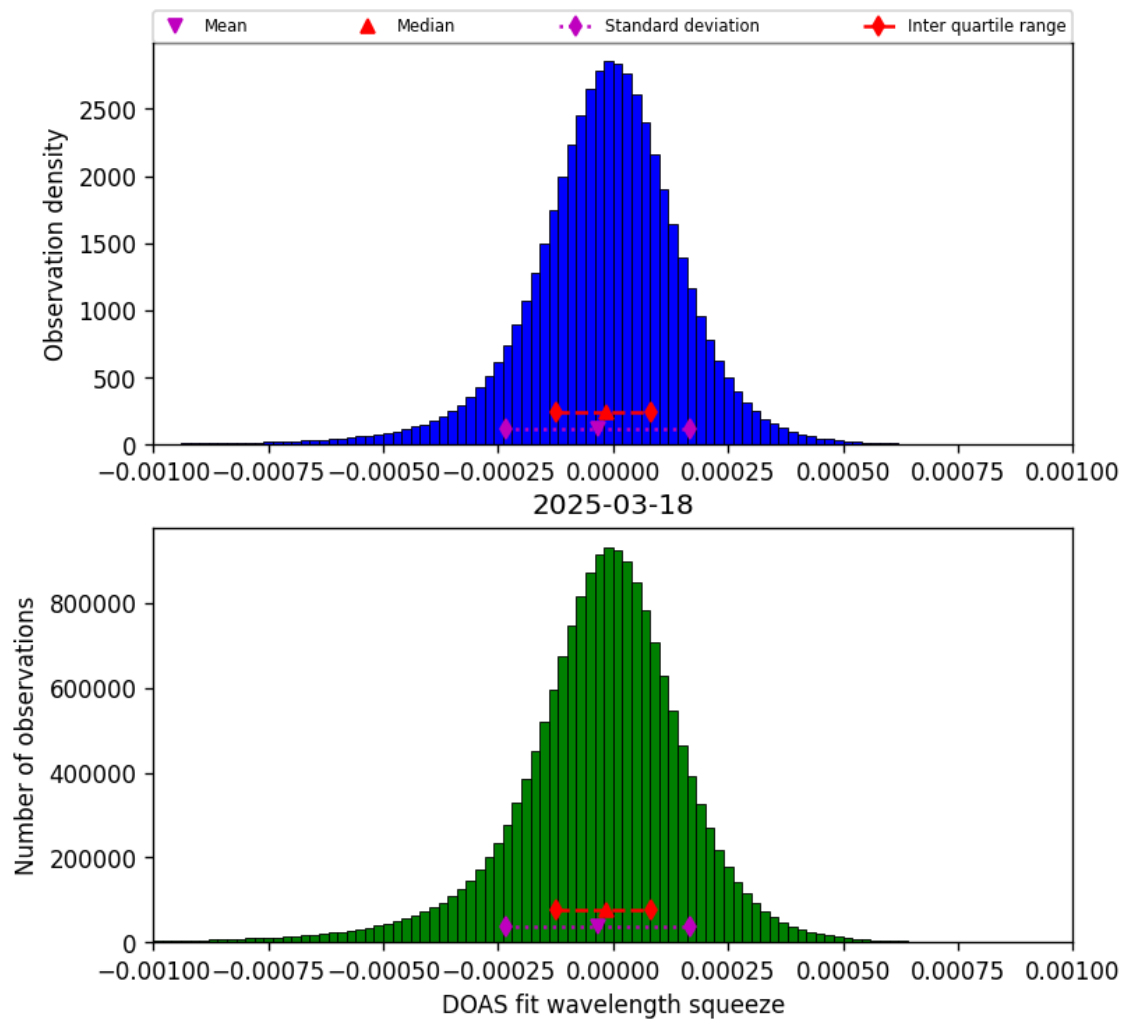


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-18 to 2025-03-19

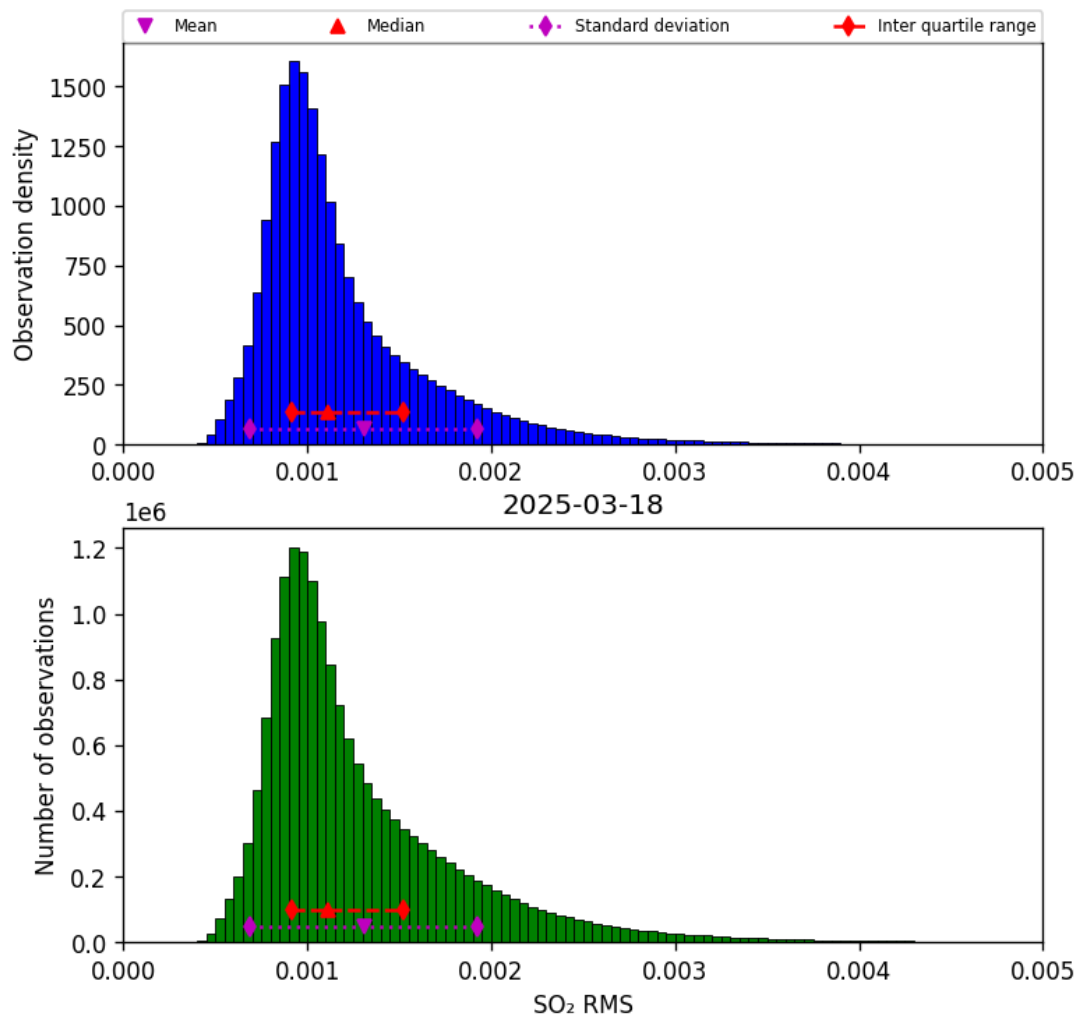


Figure 79: Histogram of “SO₂ RMS” for 2025-03-18 to 2025-03-19

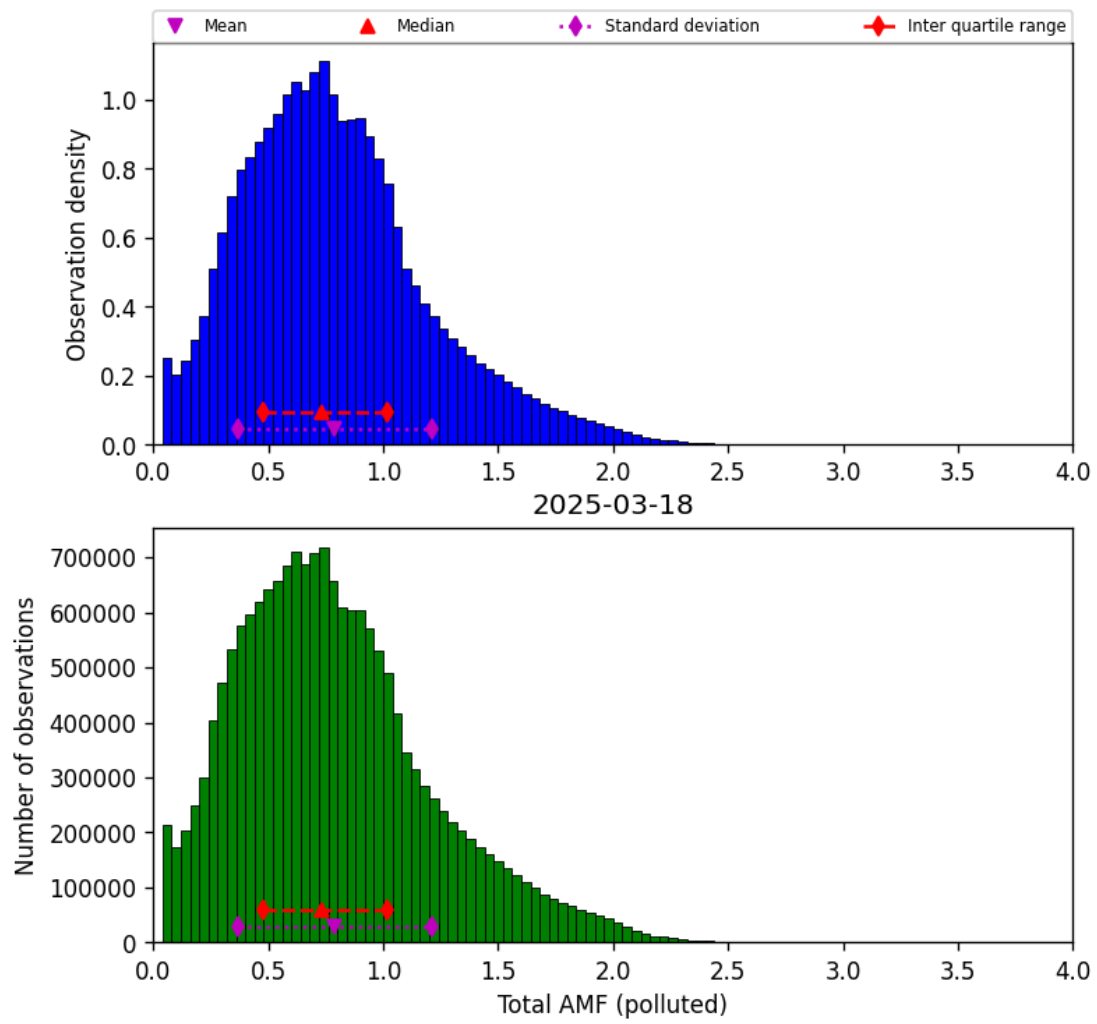


Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-18 to 2025-03-19

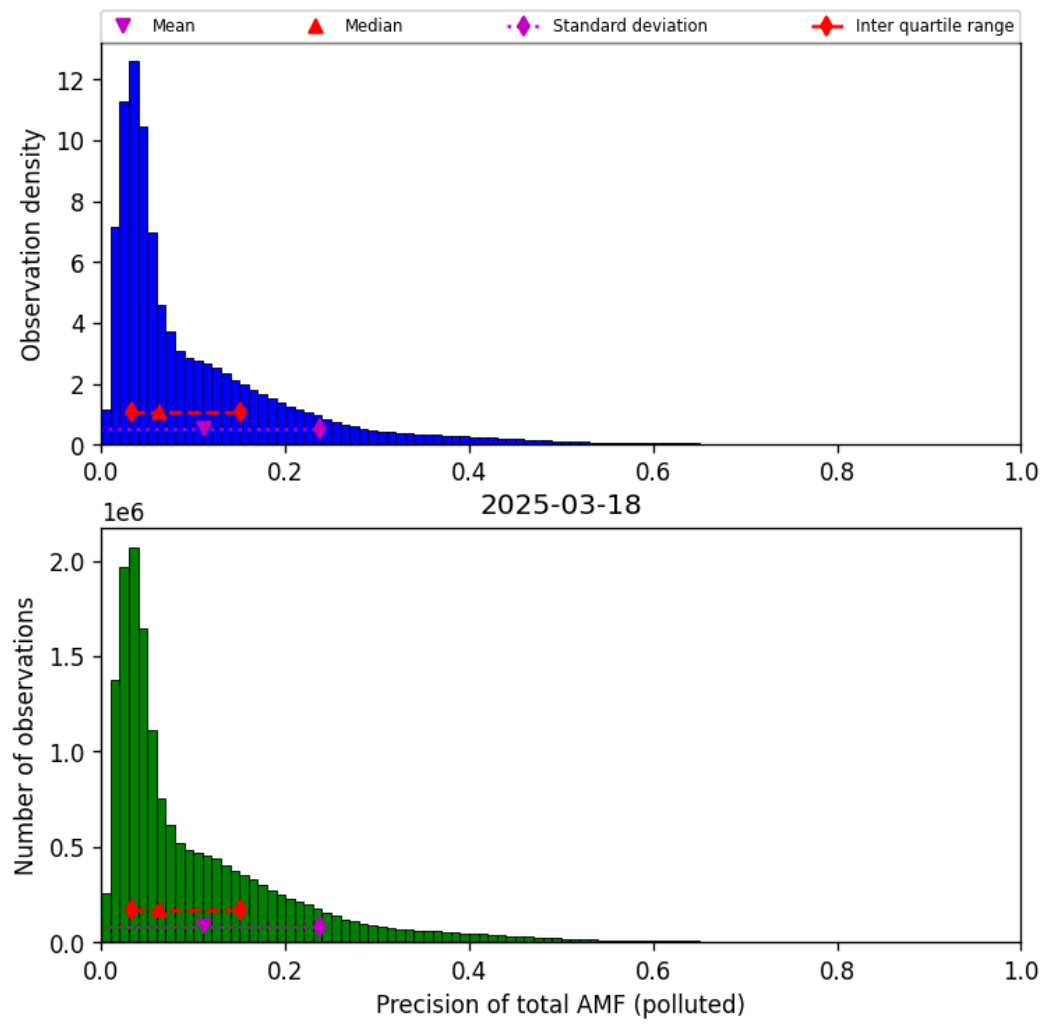


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-18 to 2025-03-19

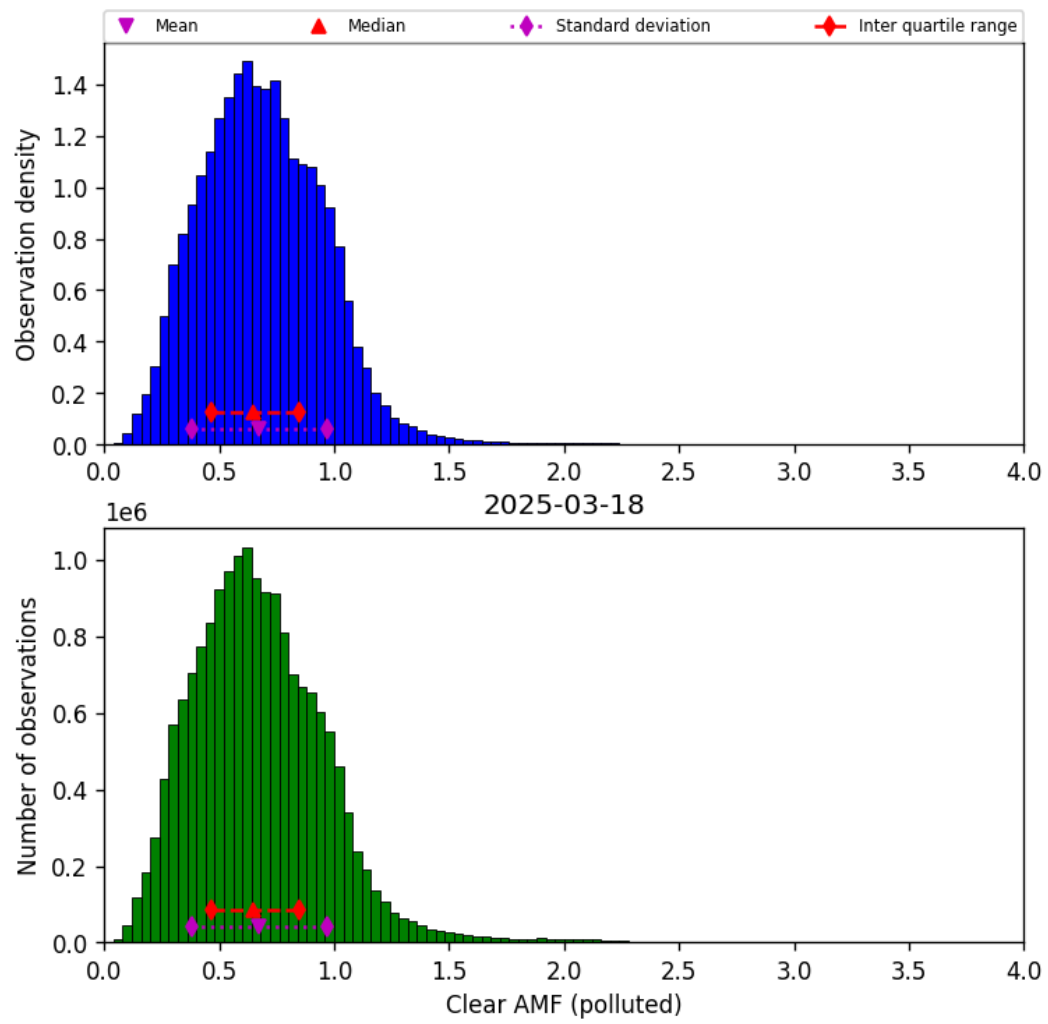


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-18 to 2025-03-19

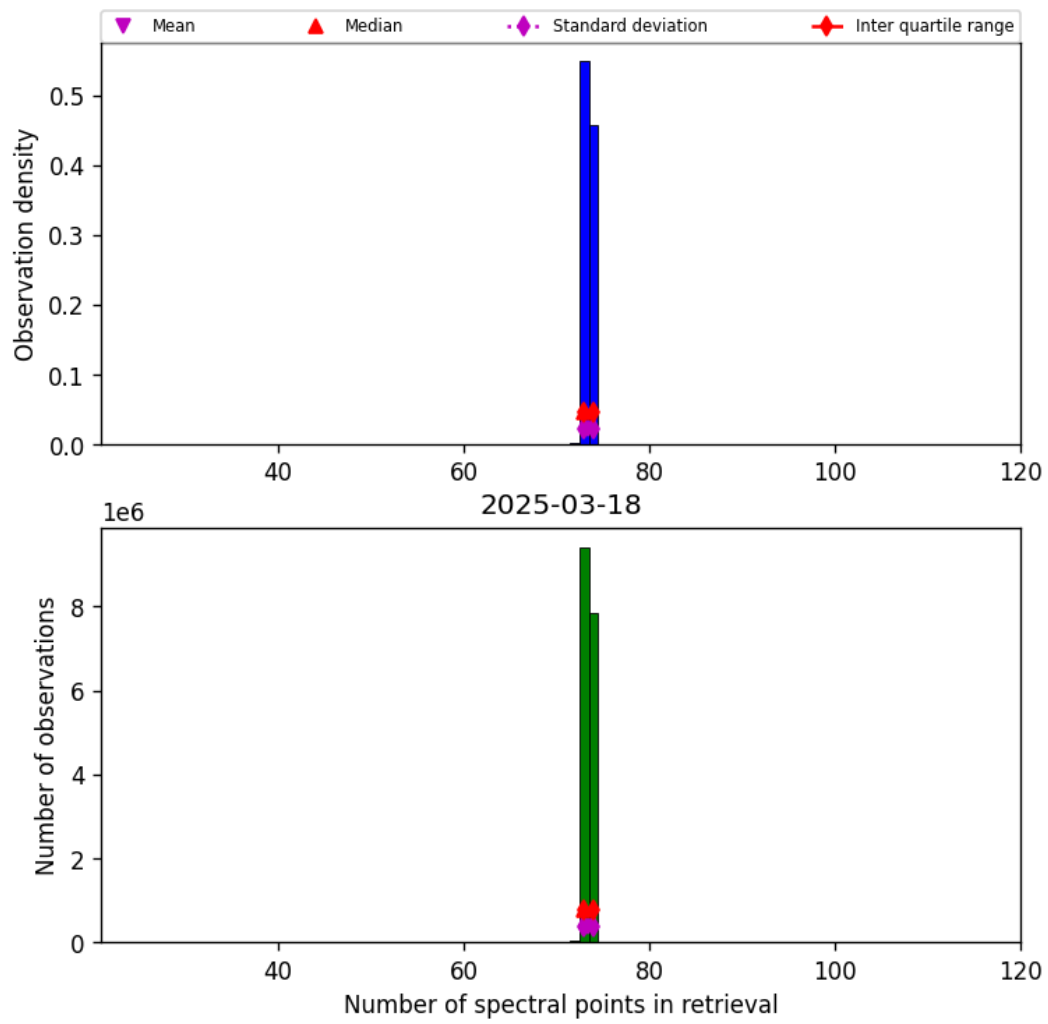


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-18 to 2025-03-19

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.

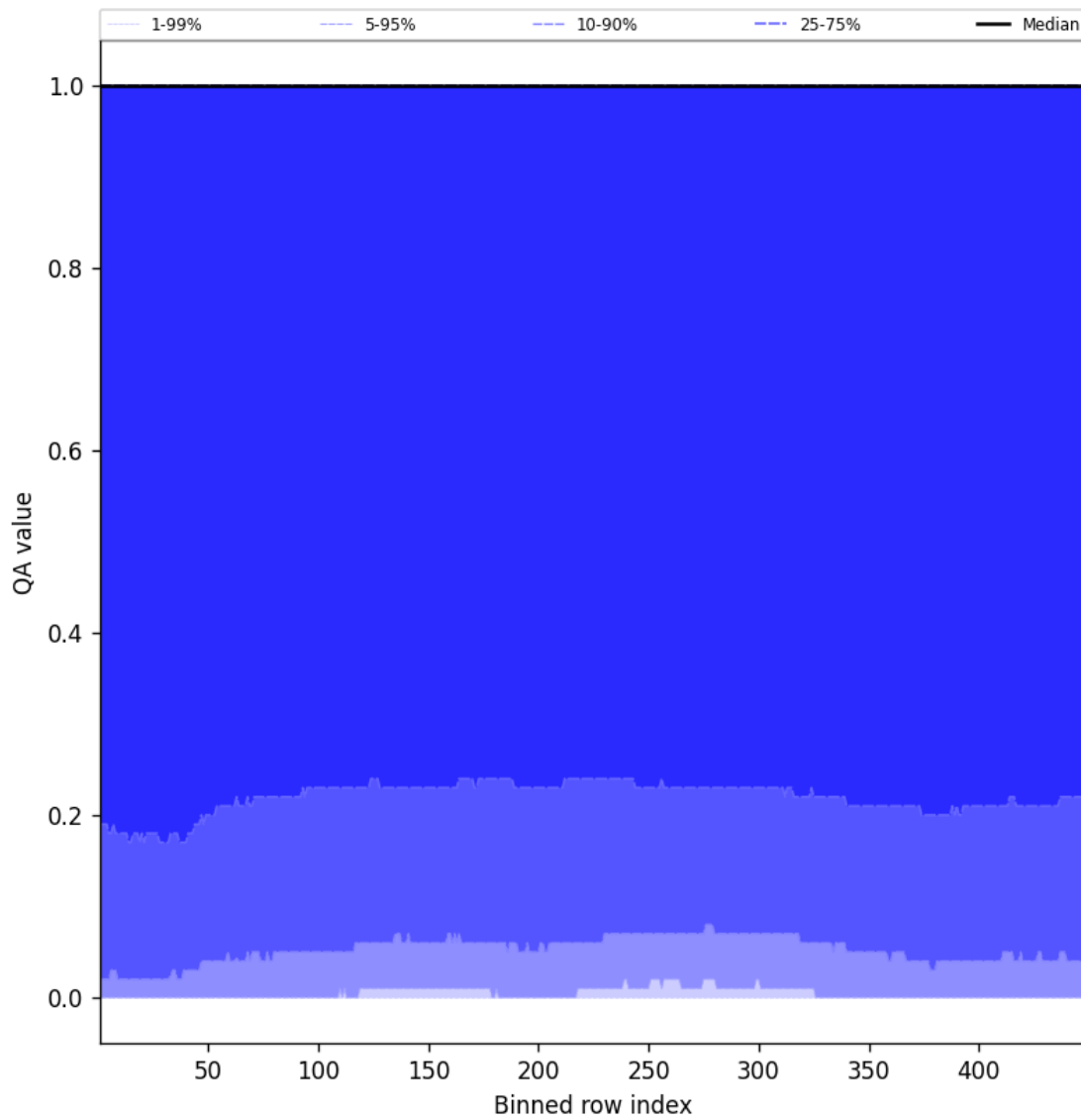


Figure 84: Along track statistics of “QA value” for 2025-03-18 to 2025-03-19

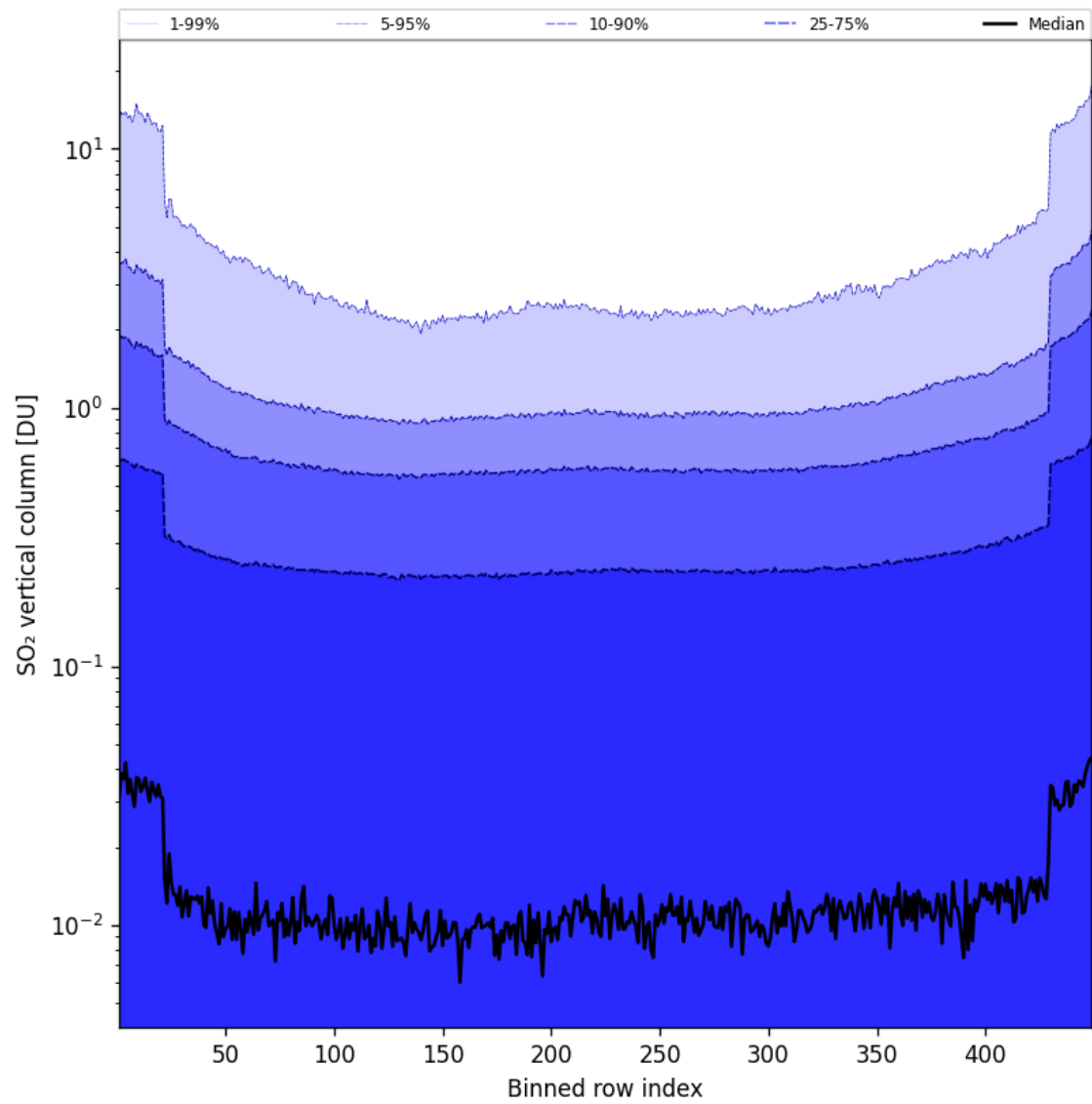


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-03-18 to 2025-03-19

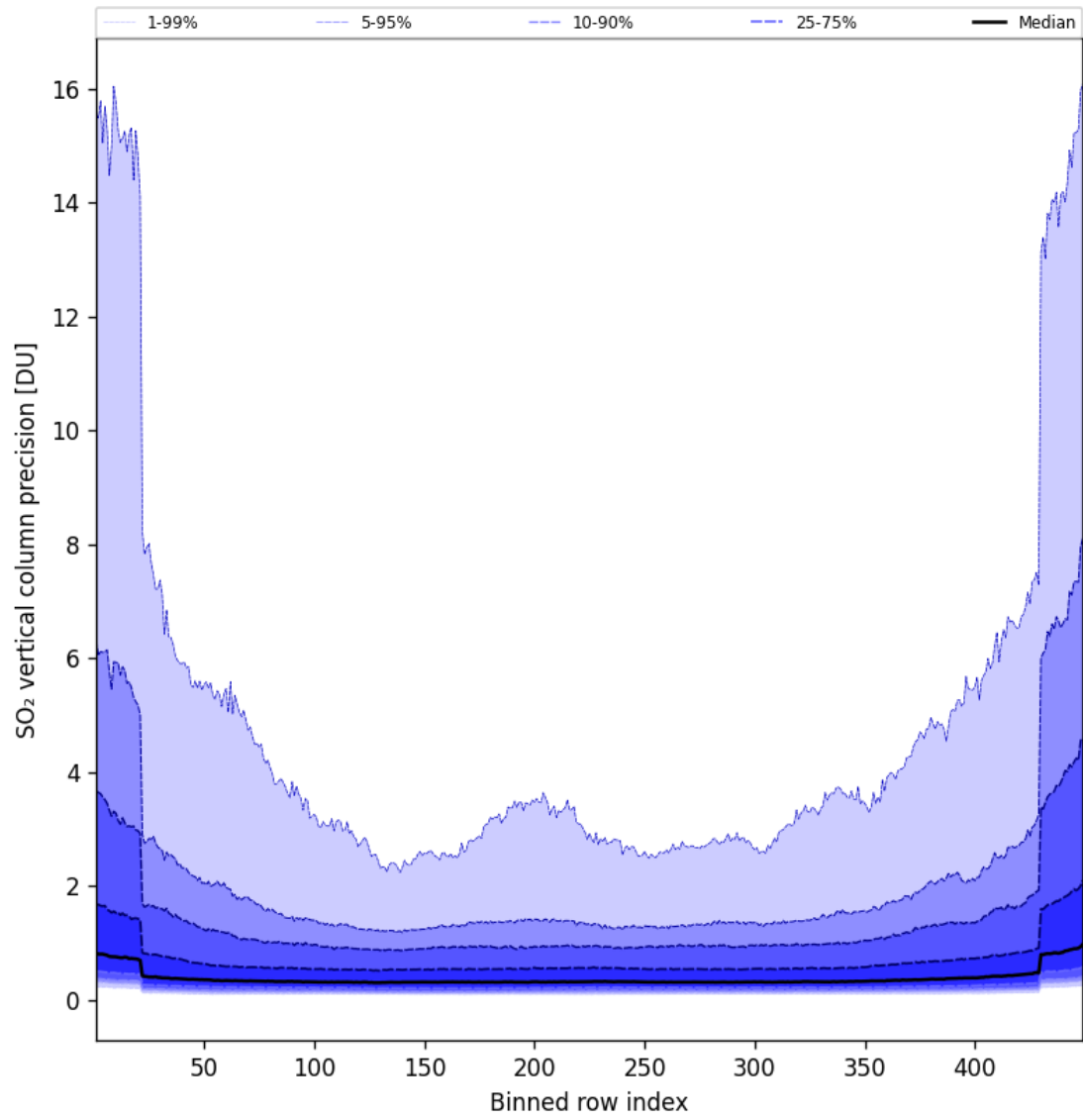


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-03-18 to 2025-03-19

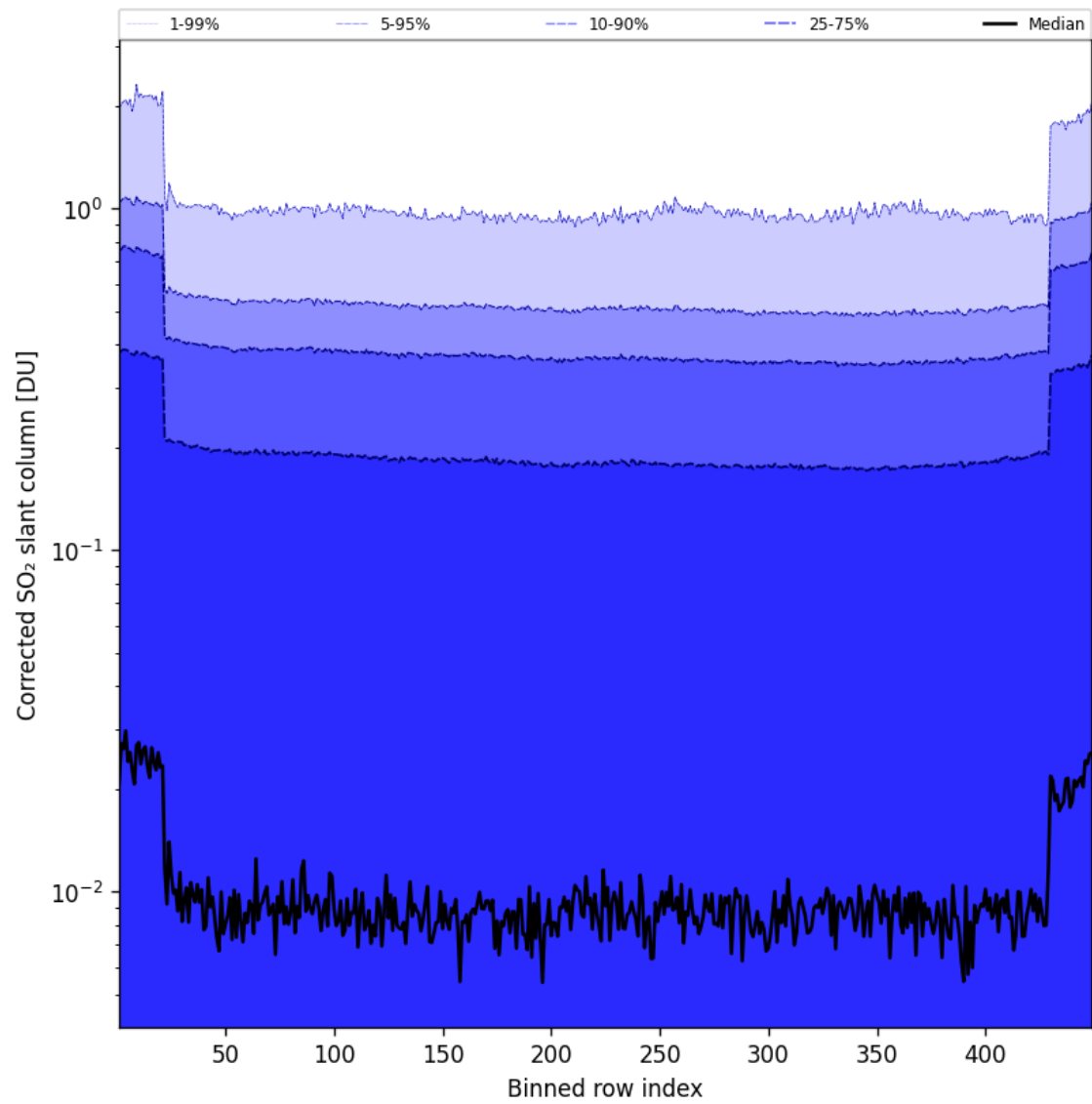


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-03-18 to 2025-03-19

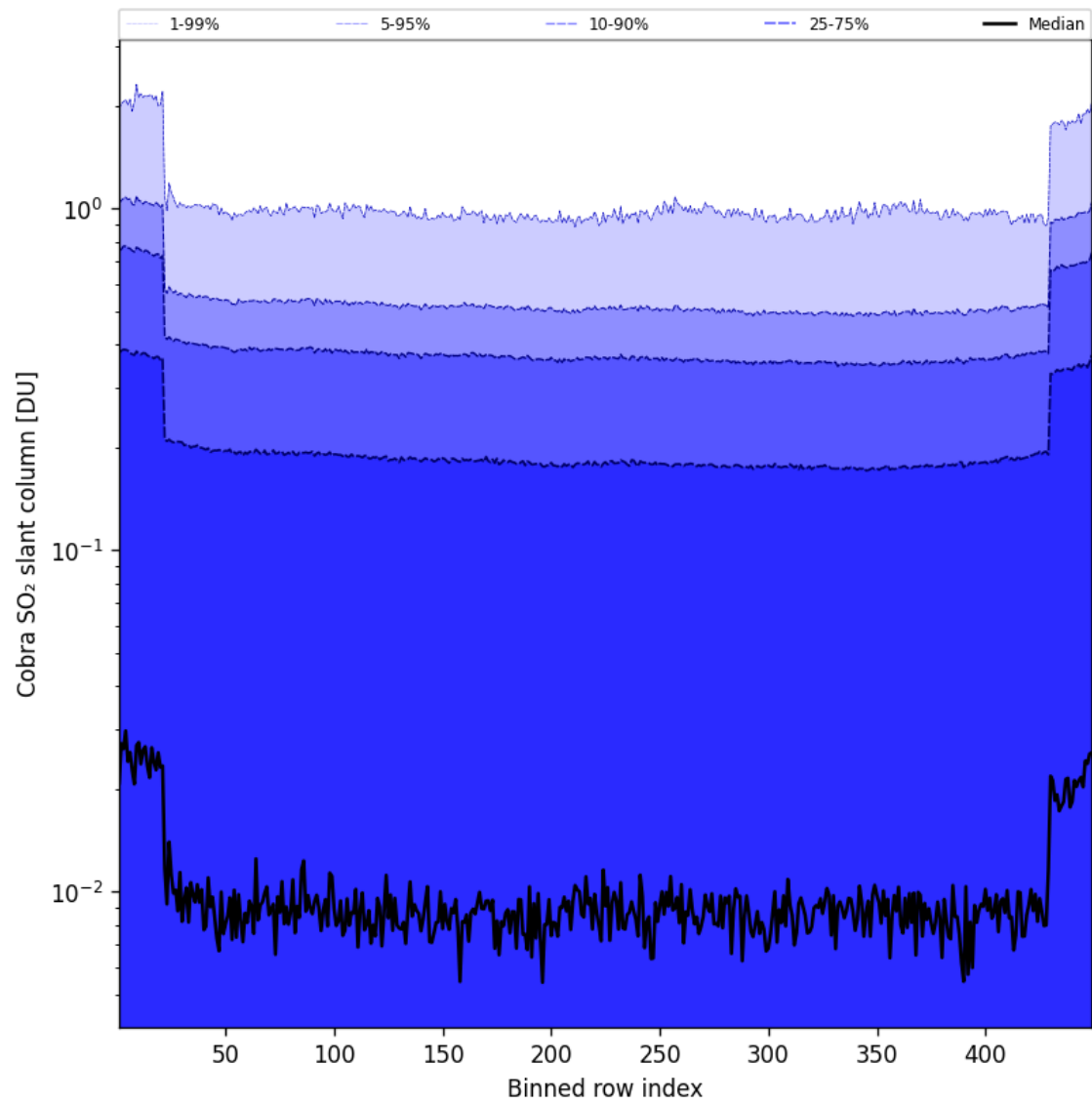


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-03-18 to 2025-03-19

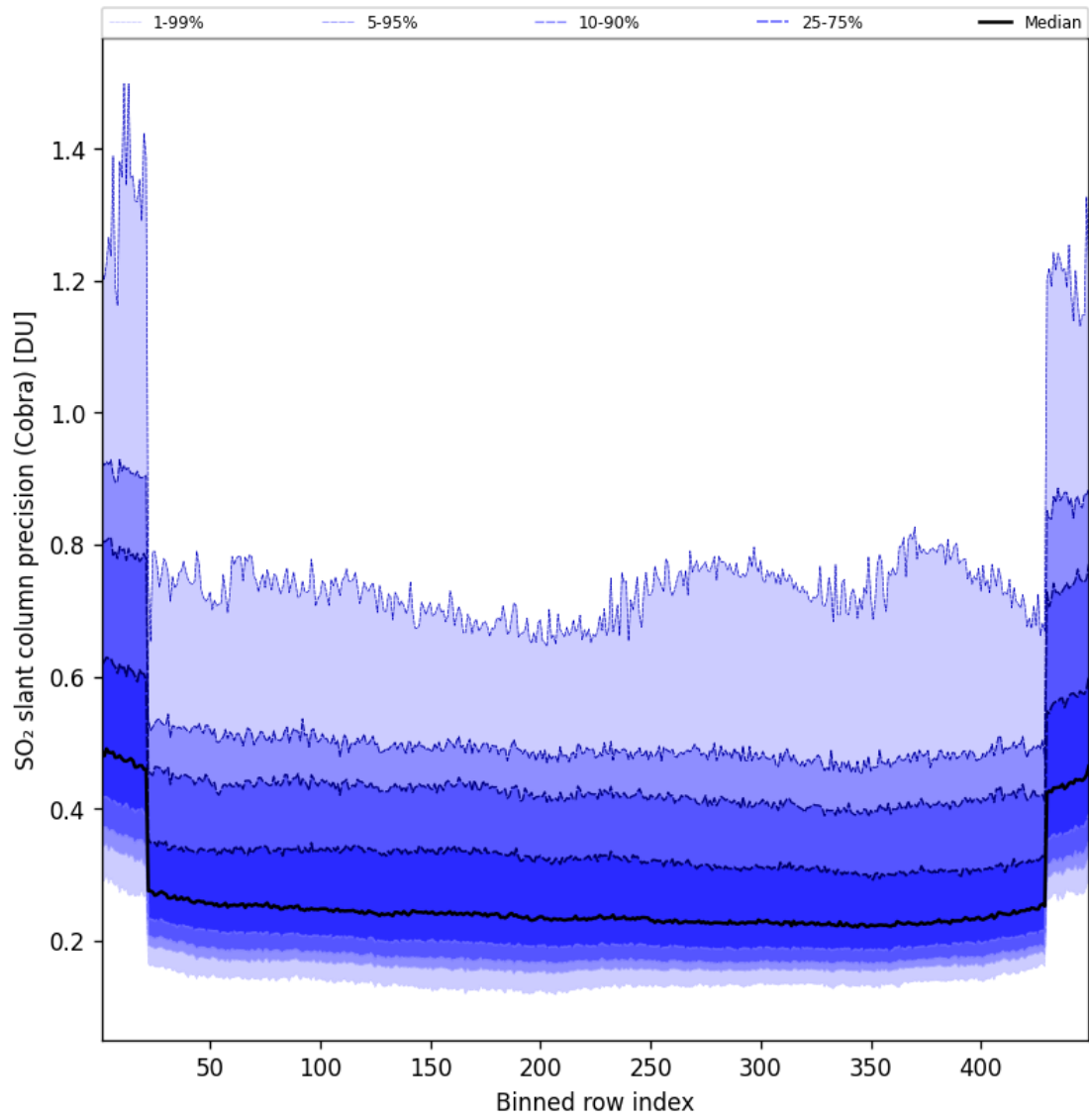


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-03-18 to 2025-03-19

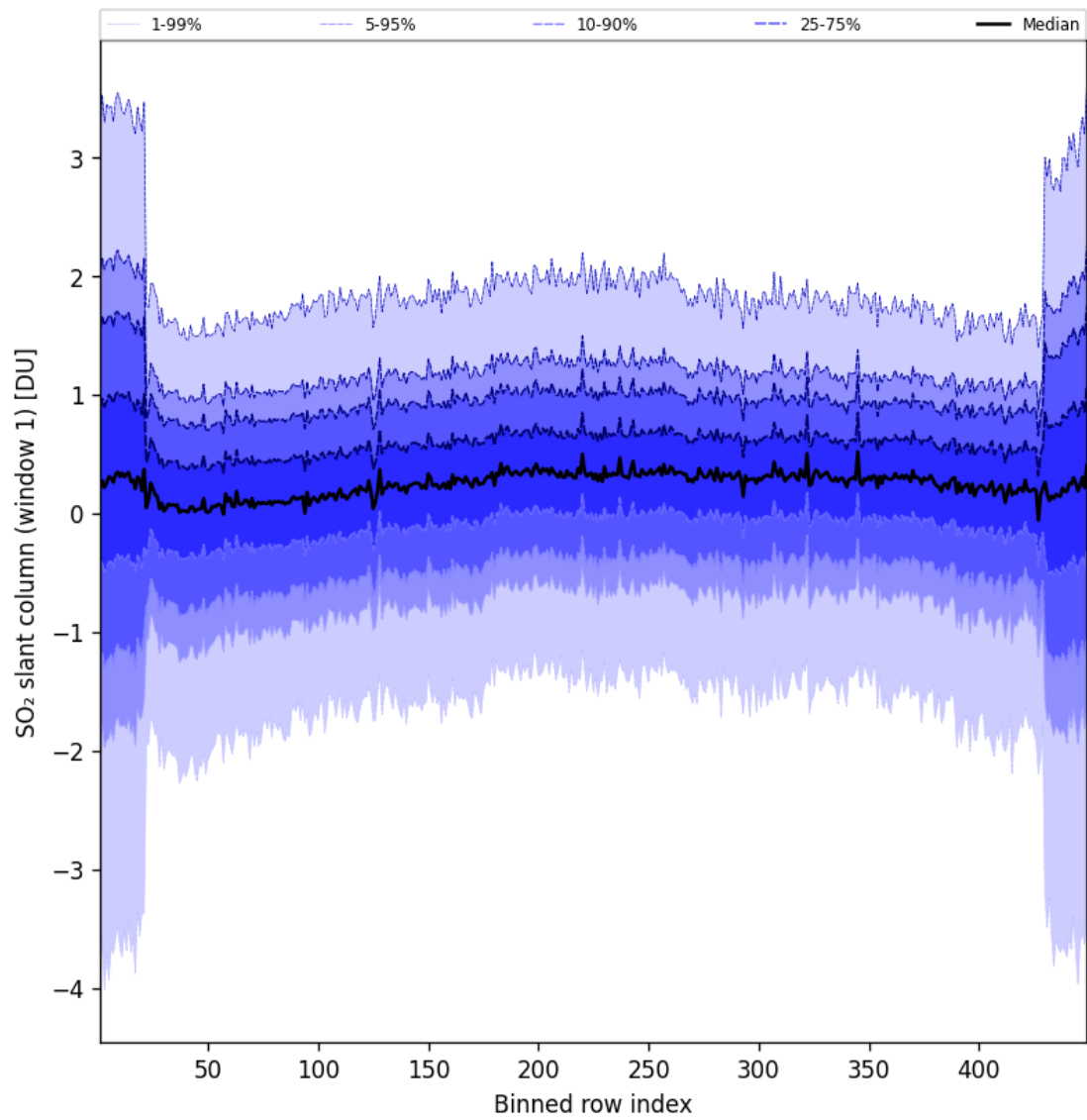


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-03-18 to 2025-03-19

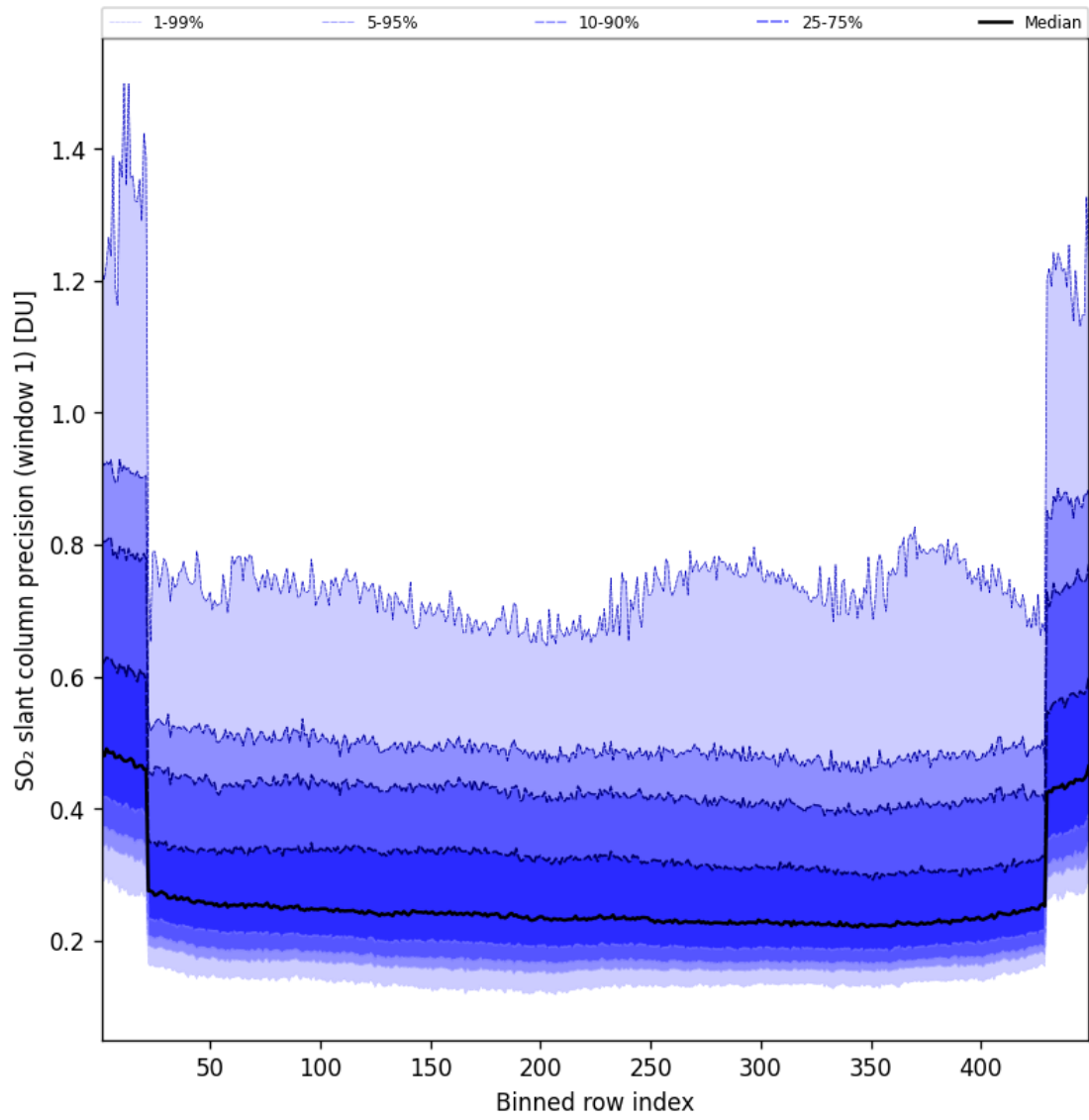


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-03-18 to 2025-03-19

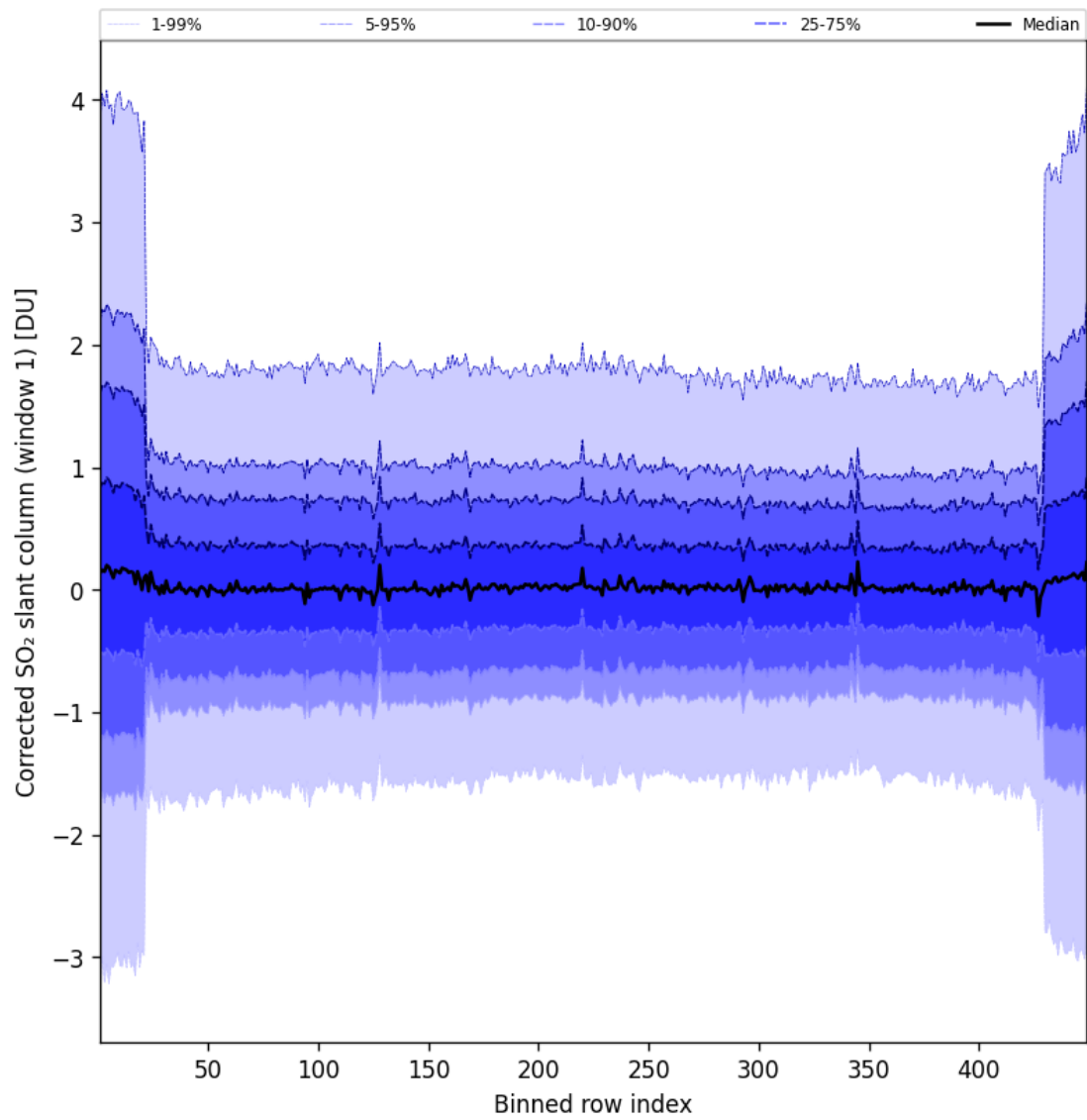


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-03-18 to 2025-03-19

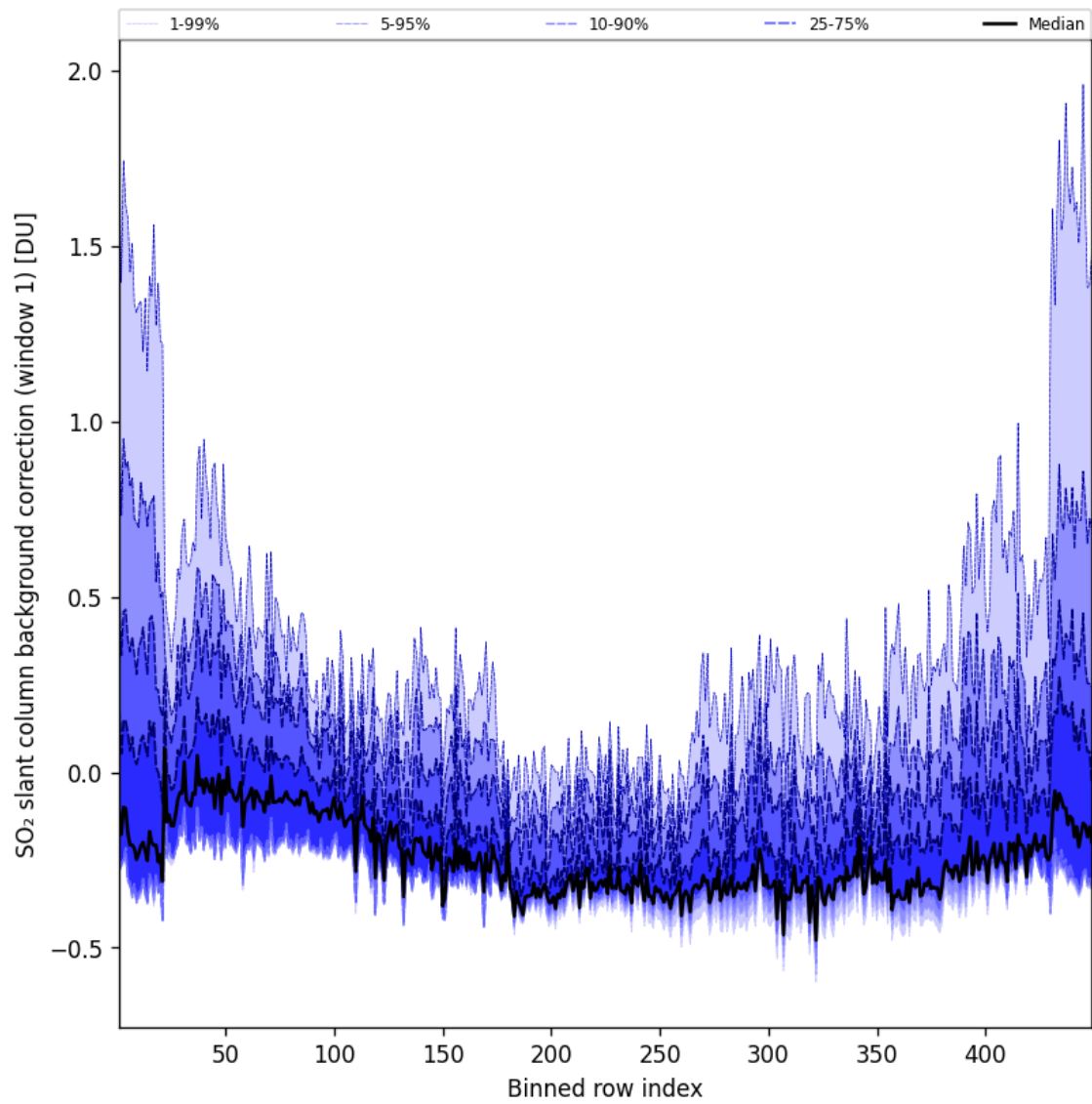


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-03-18 to 2025-03-19

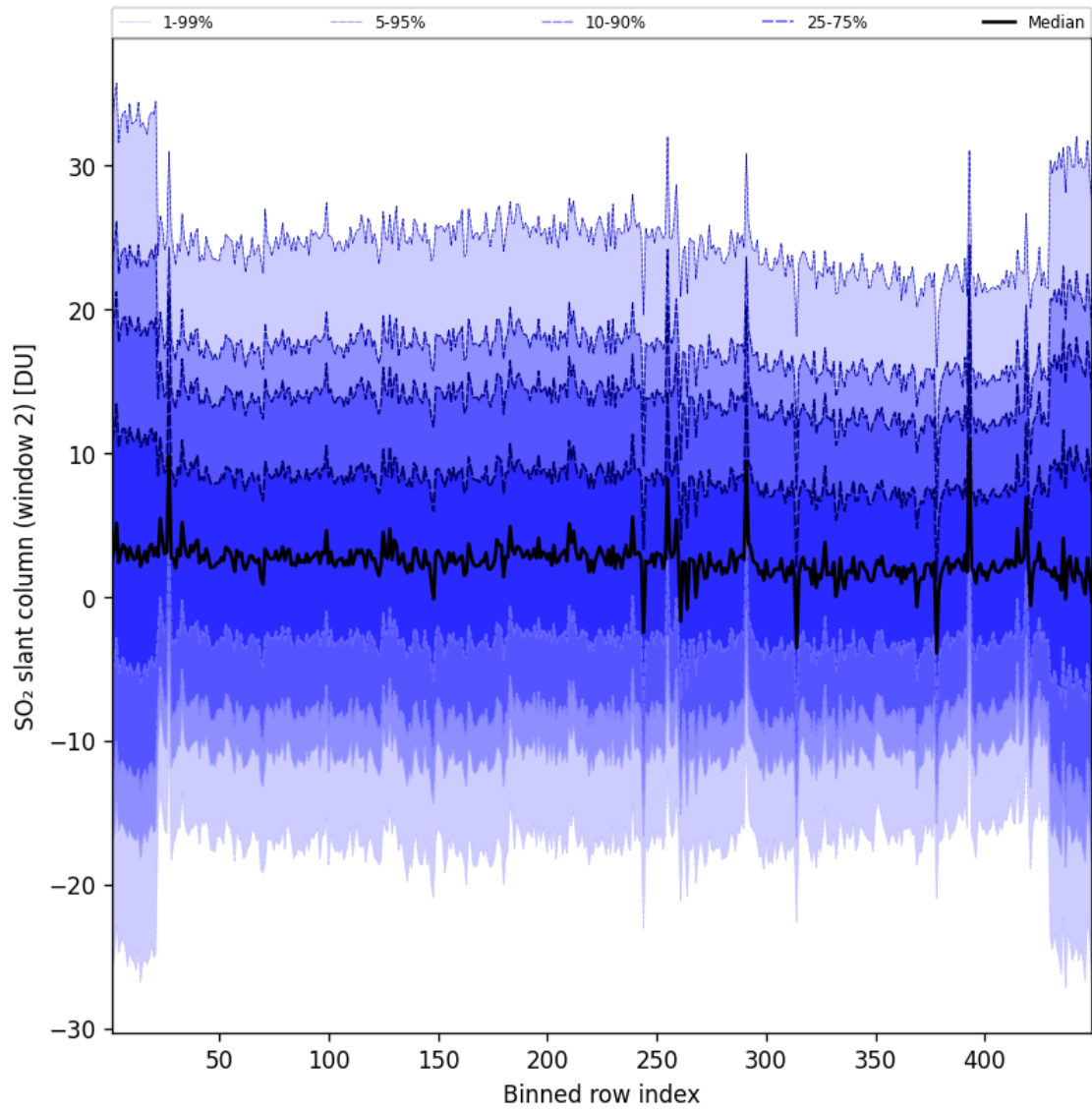


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-03-18 to 2025-03-19

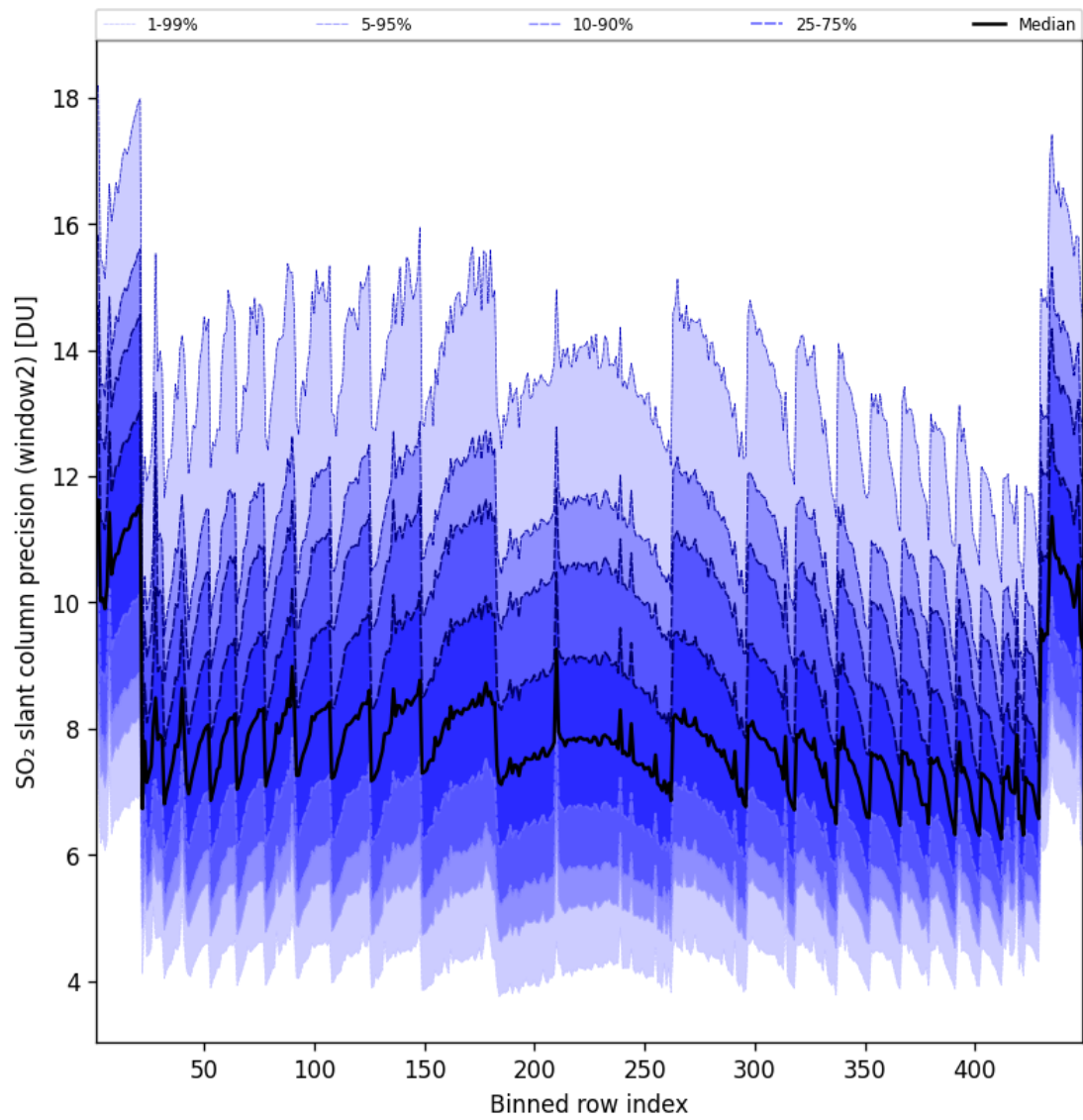


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-03-18 to 2025-03-19

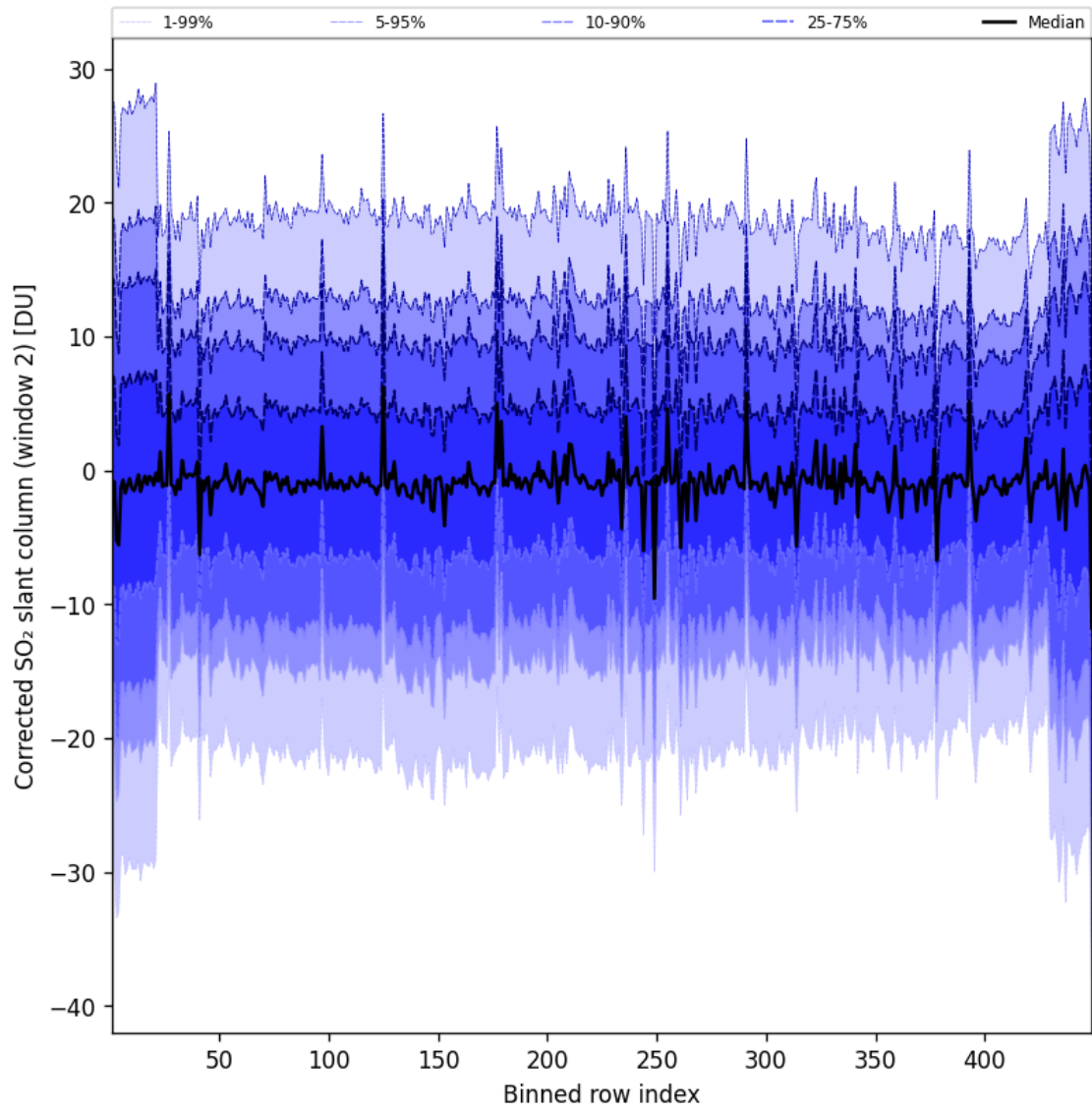


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-03-18 to 2025-03-19

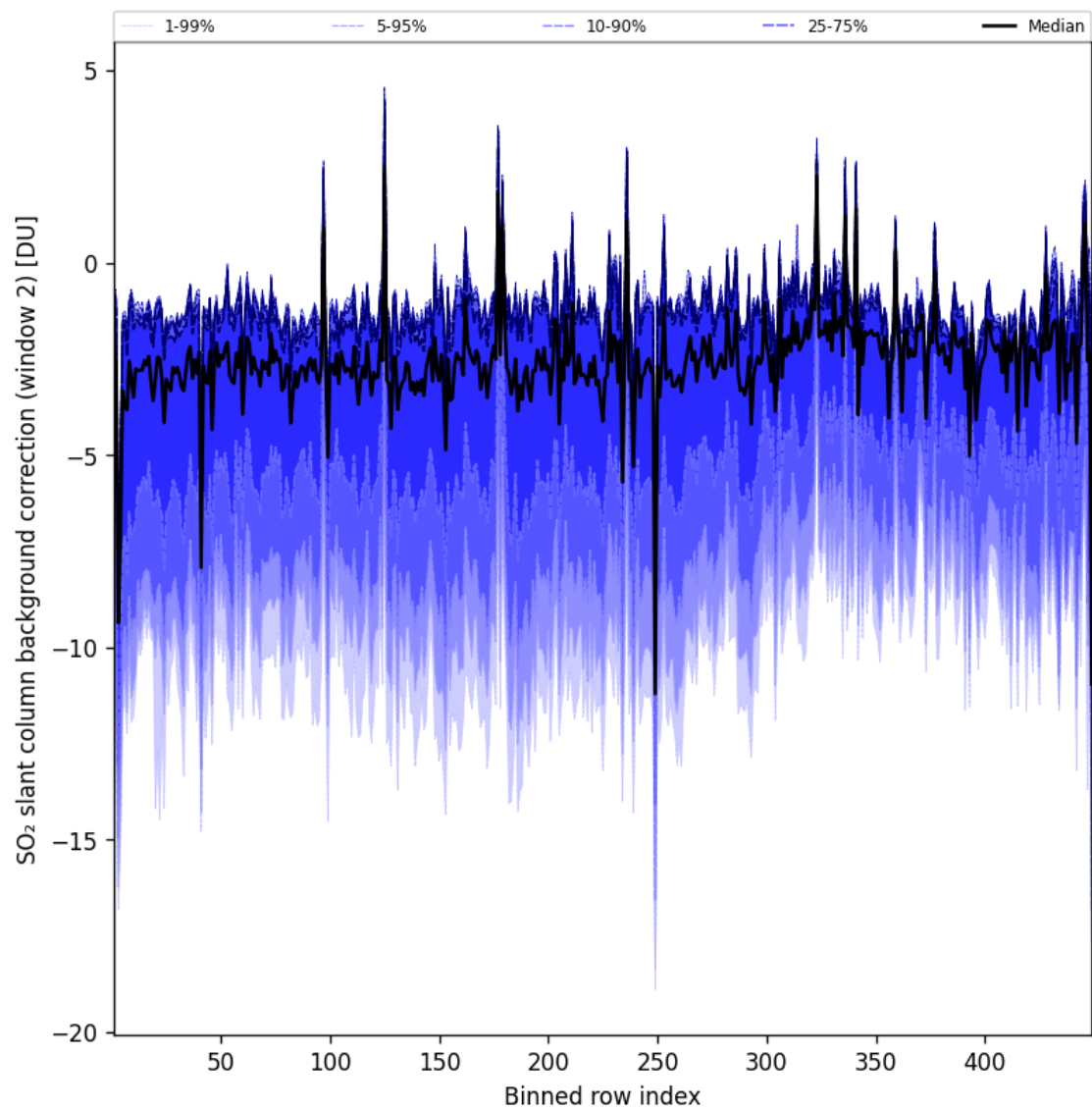


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-03-18 to 2025-03-19

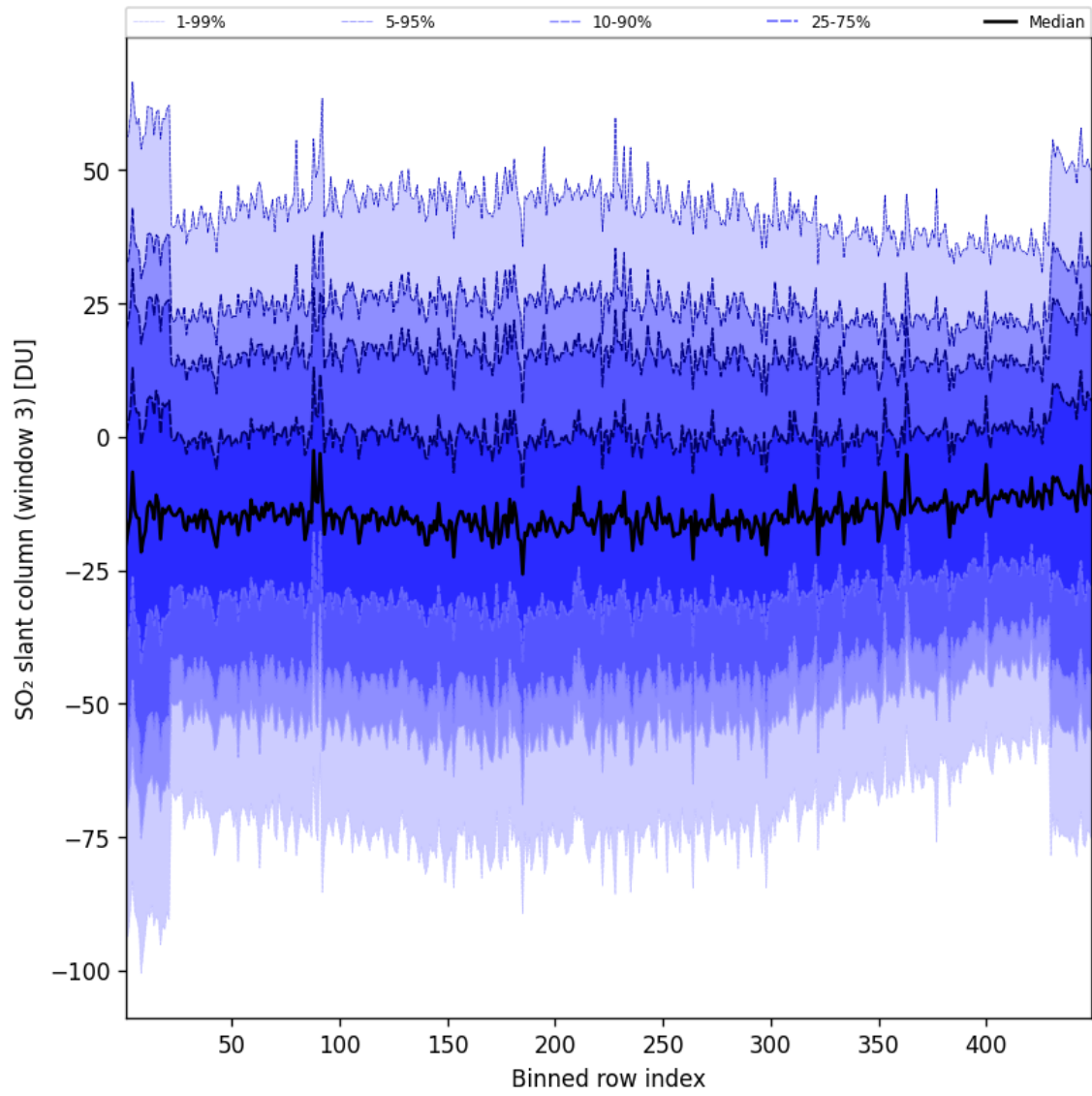


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-03-18 to 2025-03-19

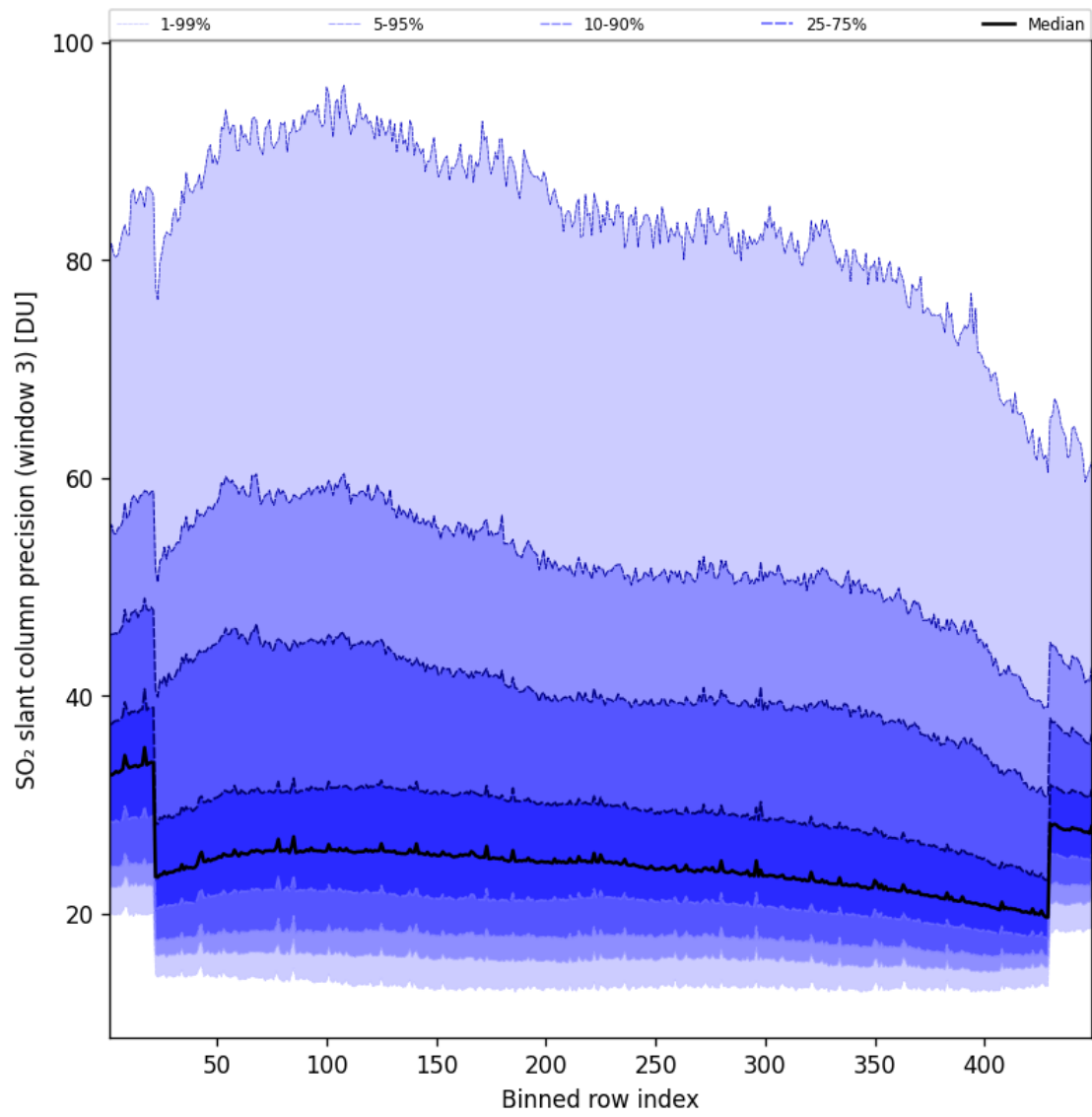


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-03-18 to 2025-03-19

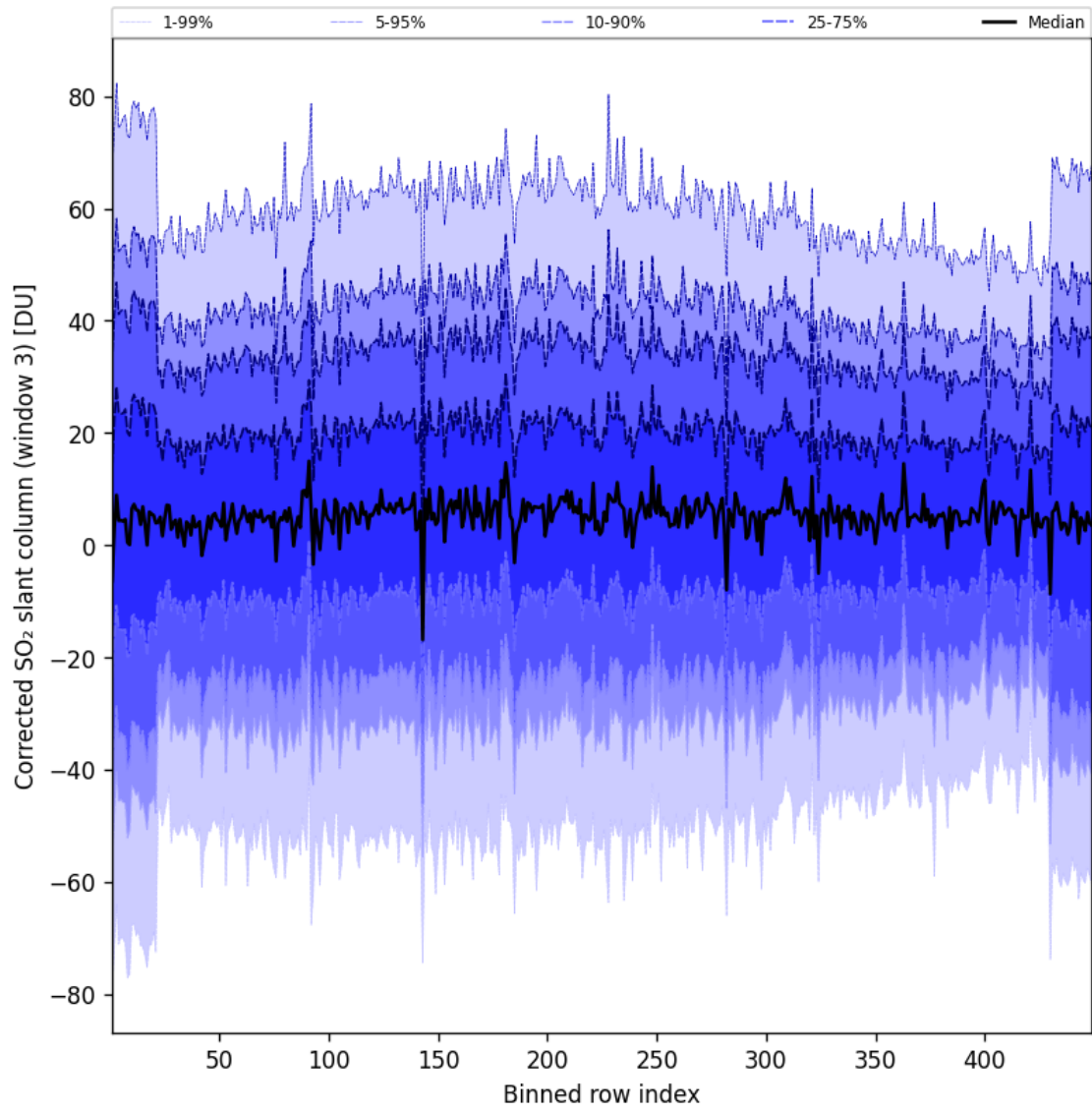


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-03-18 to 2025-03-19

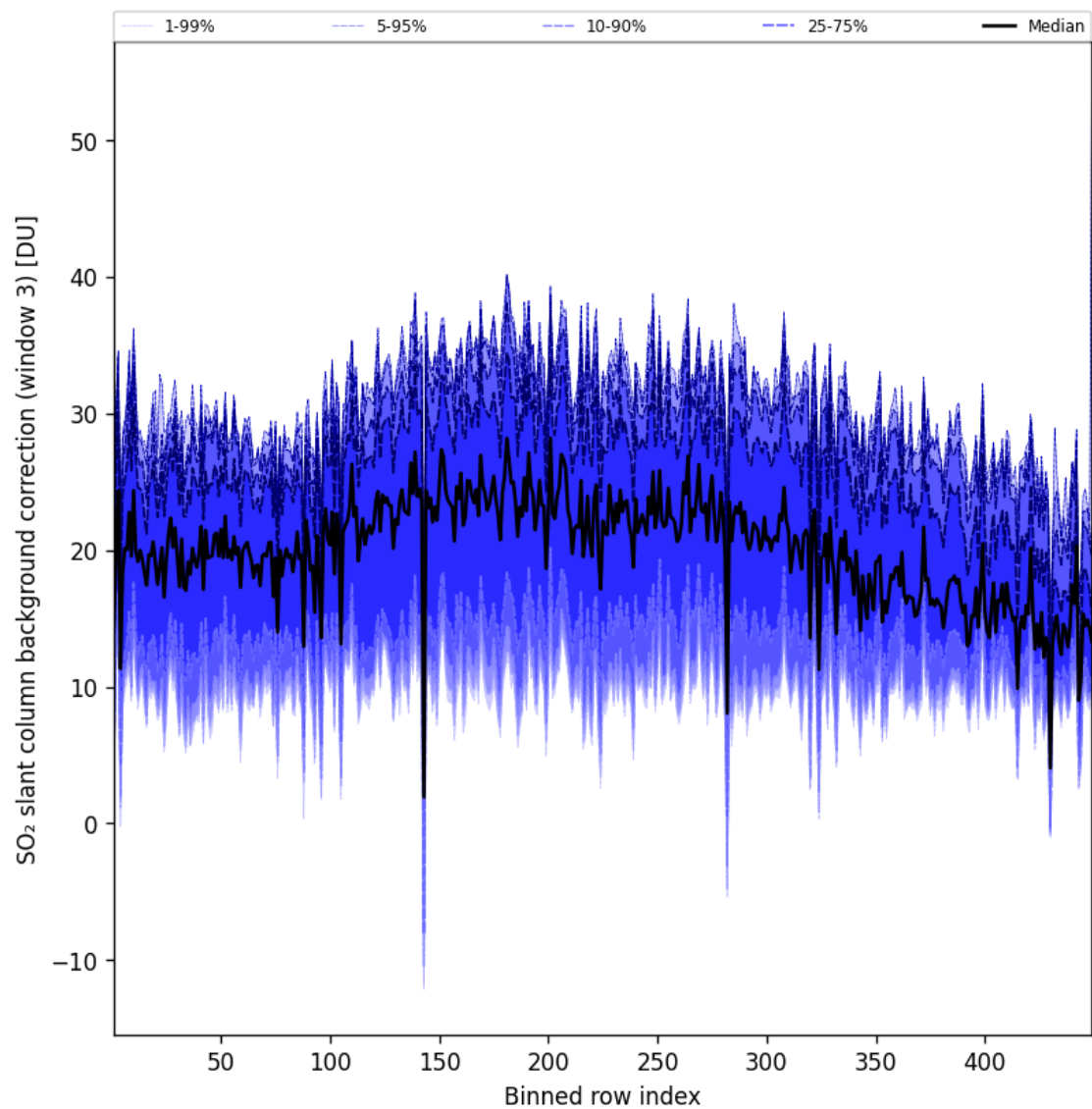


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-03-18 to 2025-03-19

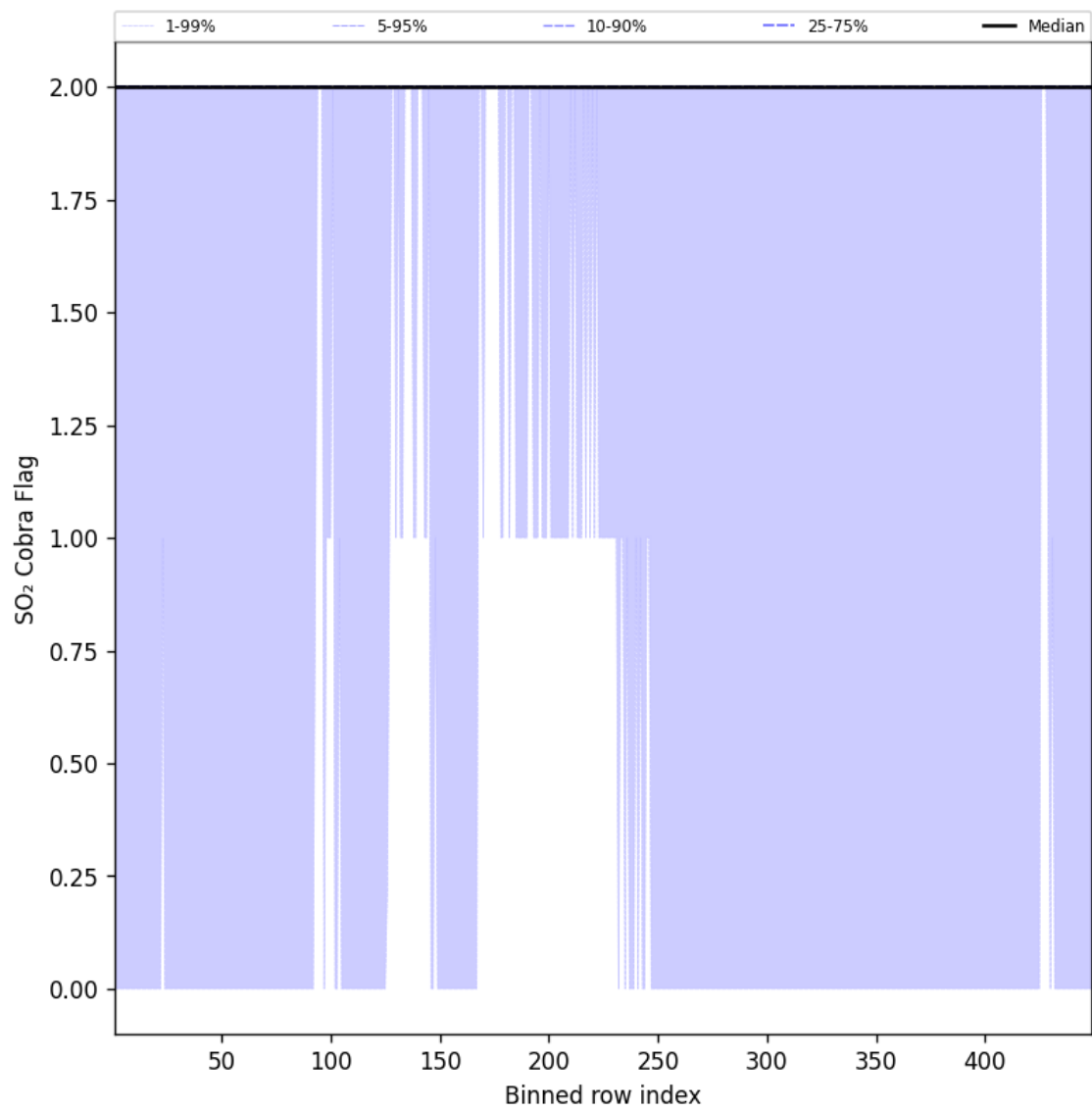


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-03-18 to 2025-03-19

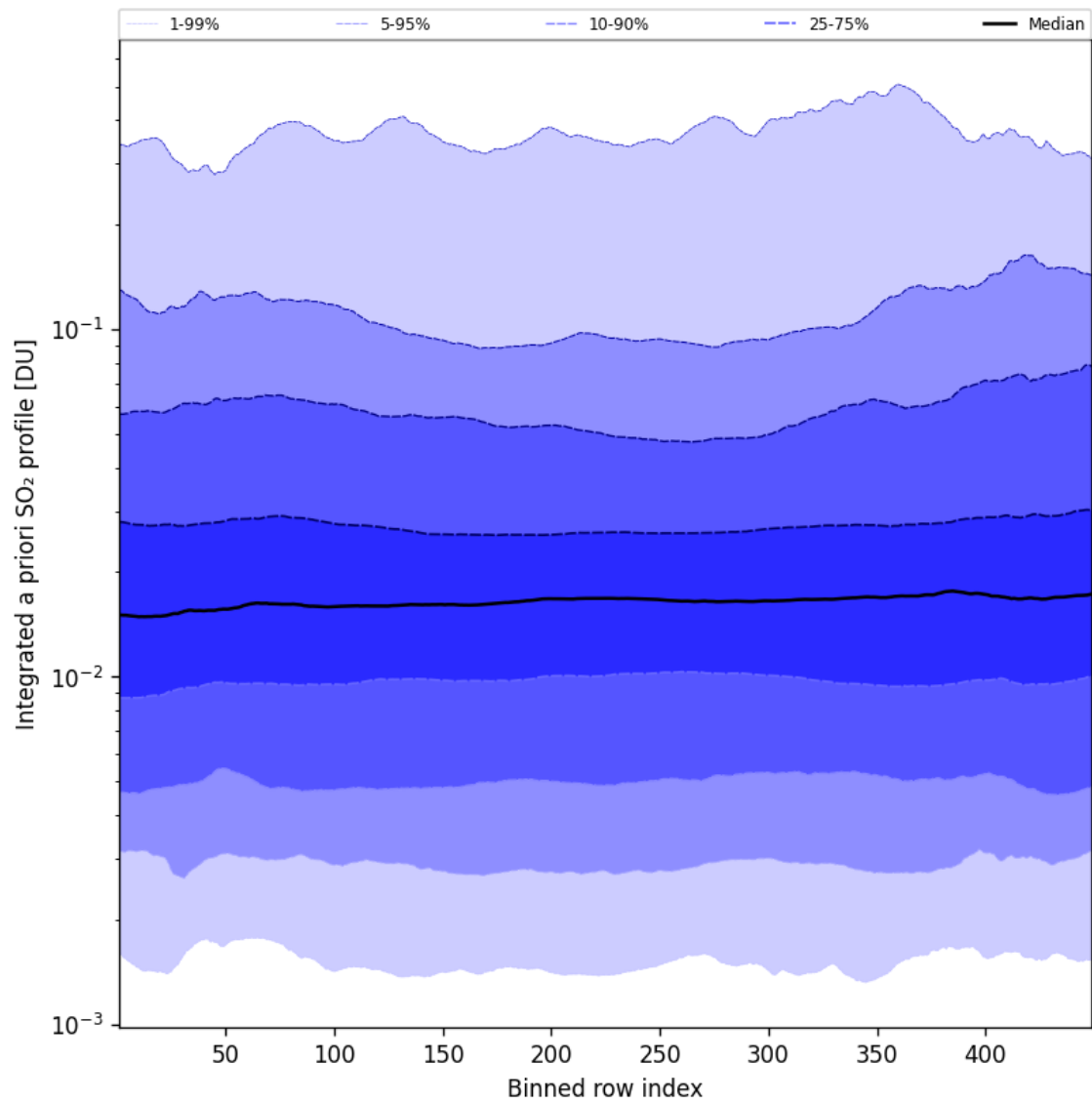


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-03-18 to 2025-03-19

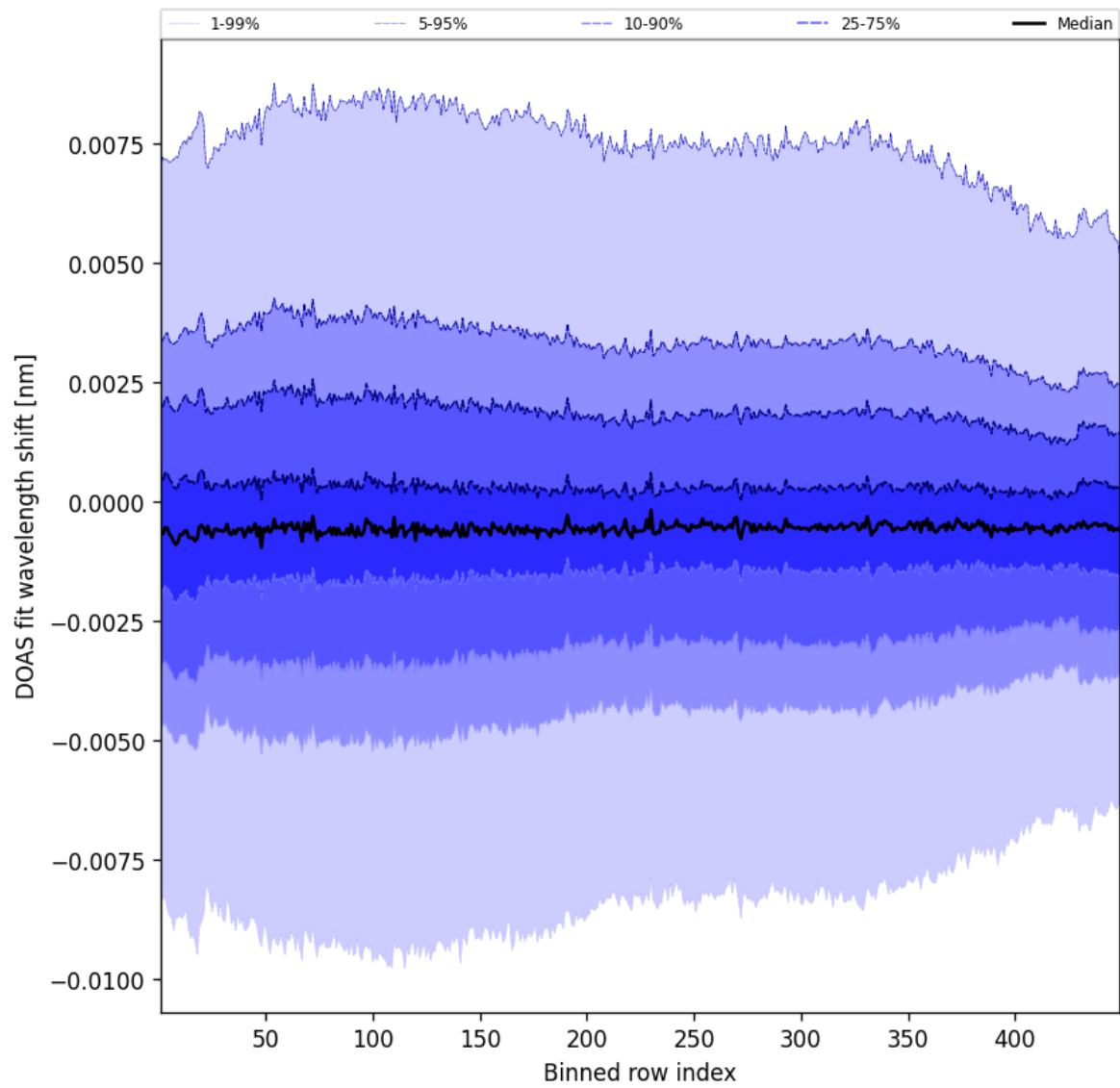


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-03-18 to 2025-03-19

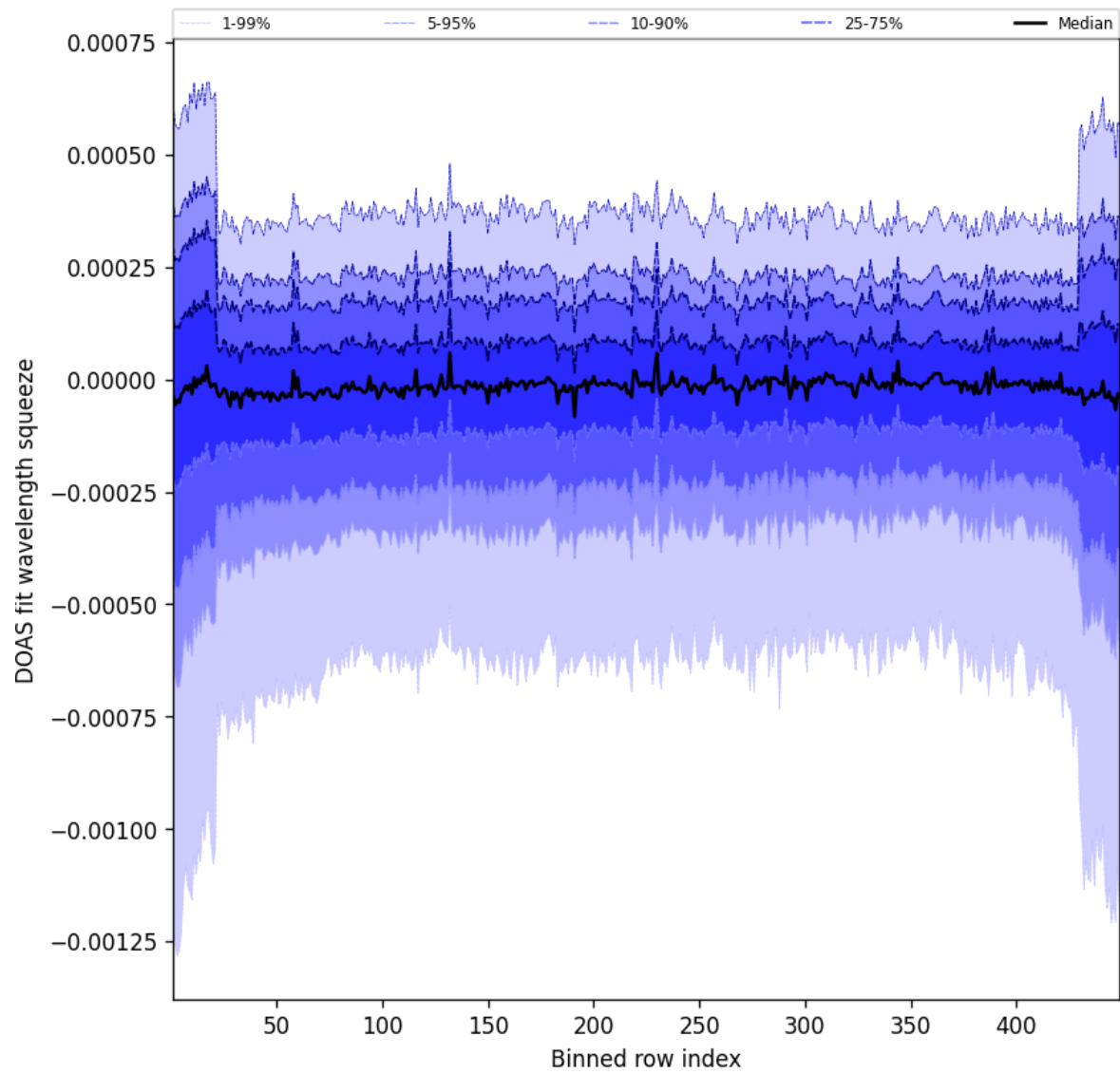


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-18 to 2025-03-19

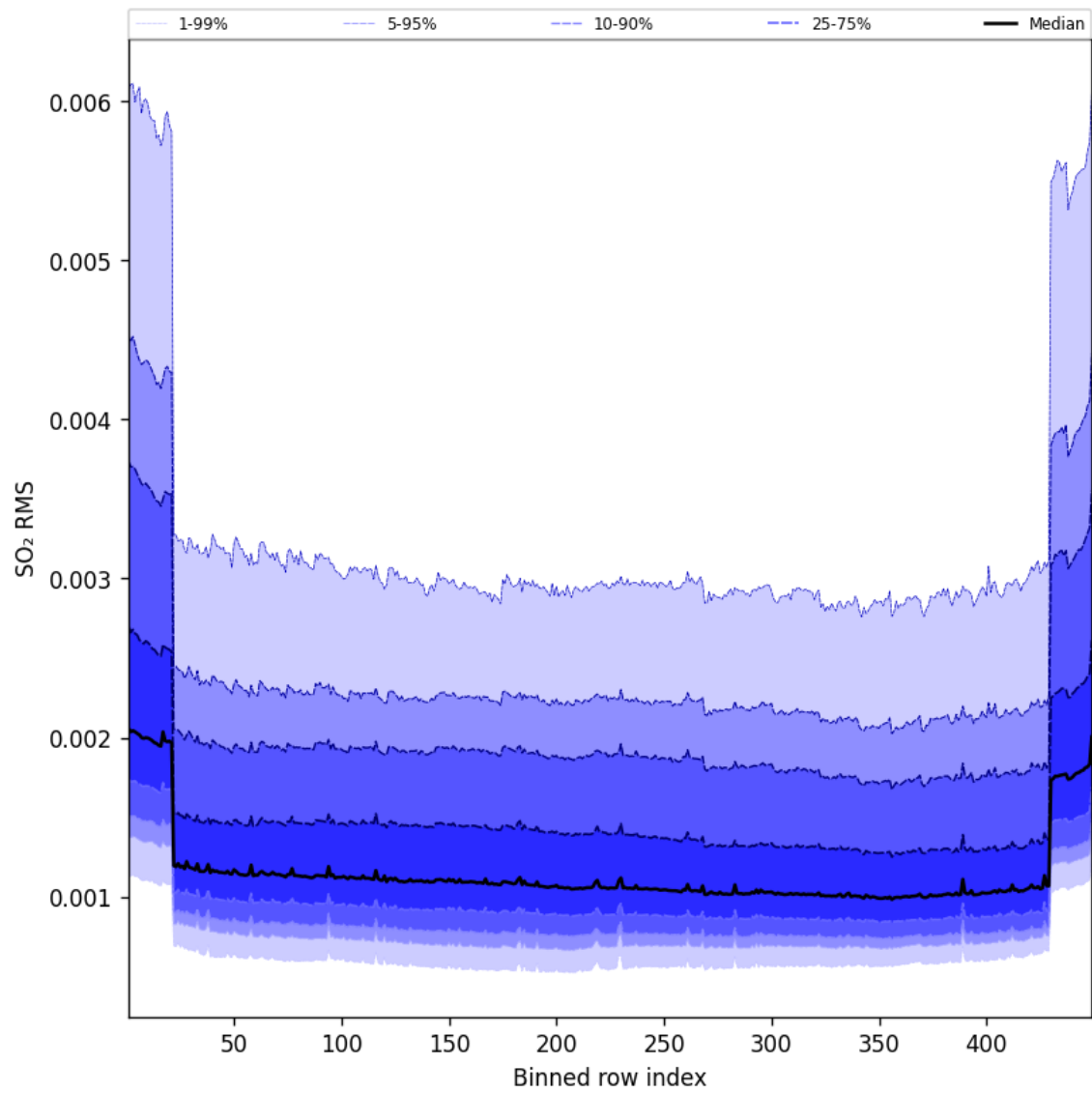


Figure 106: Along track statistics of “SO₂ RMS” for 2025-03-18 to 2025-03-19

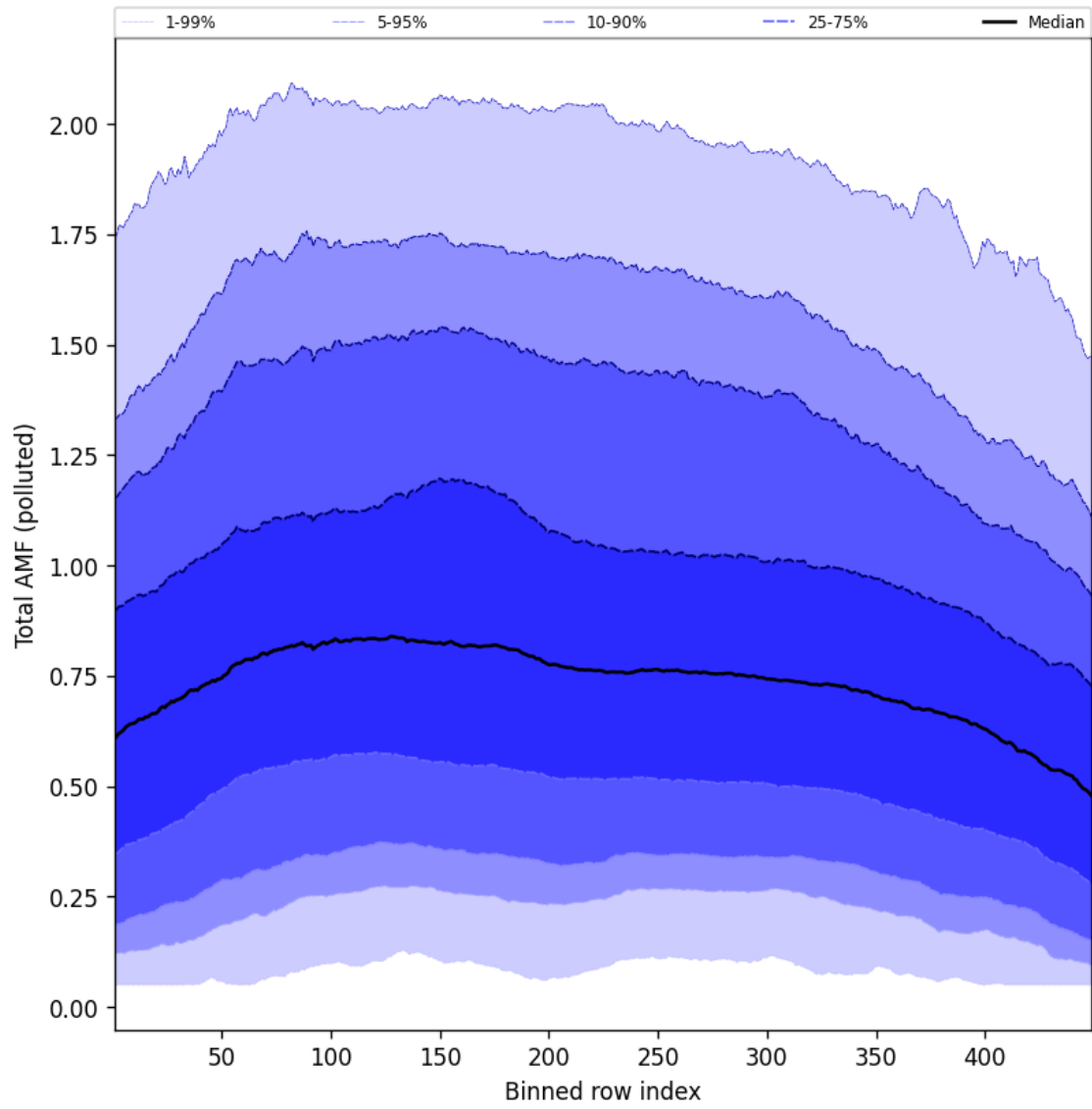


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-18 to 2025-03-19

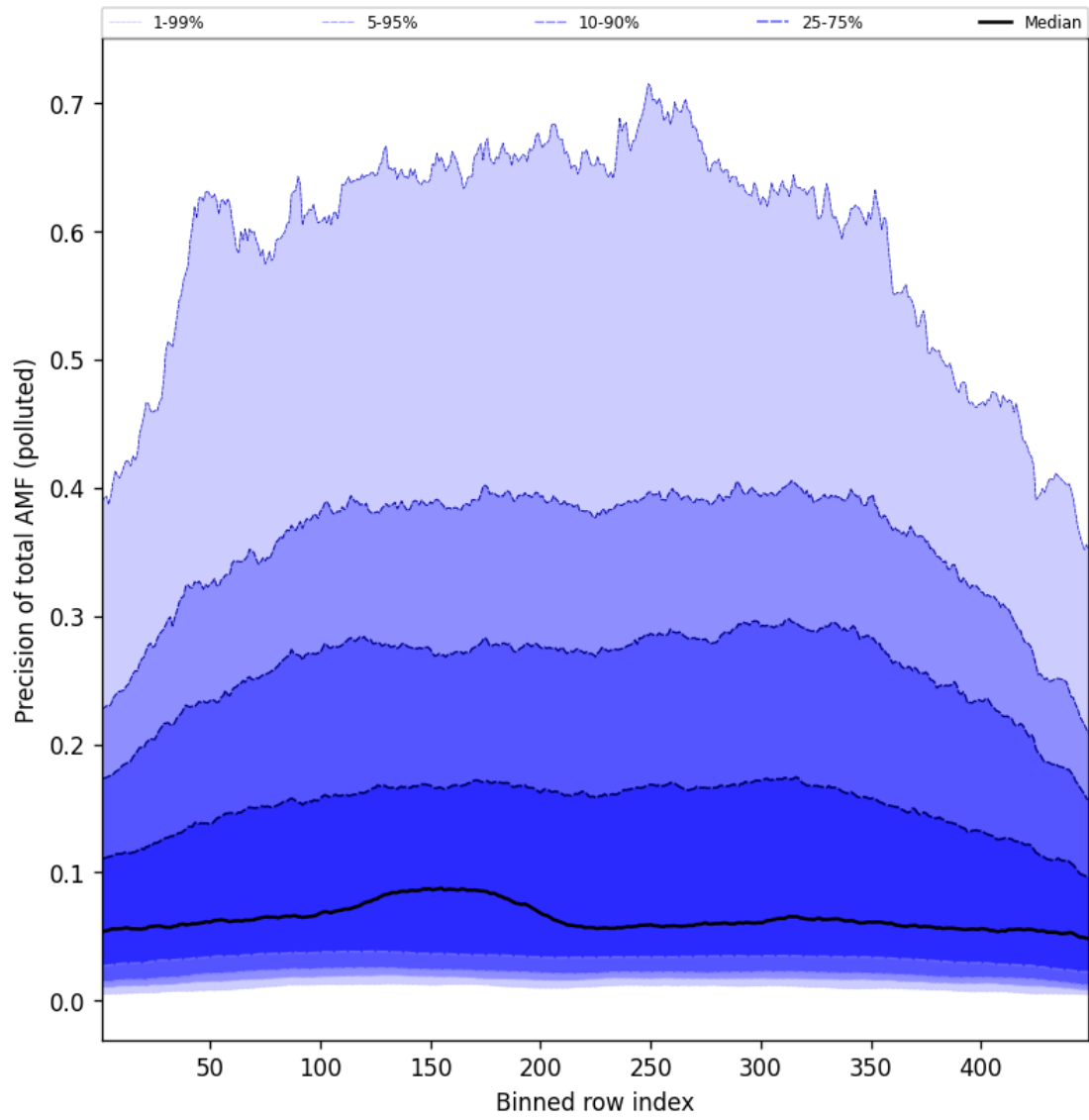


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-18 to 2025-03-19

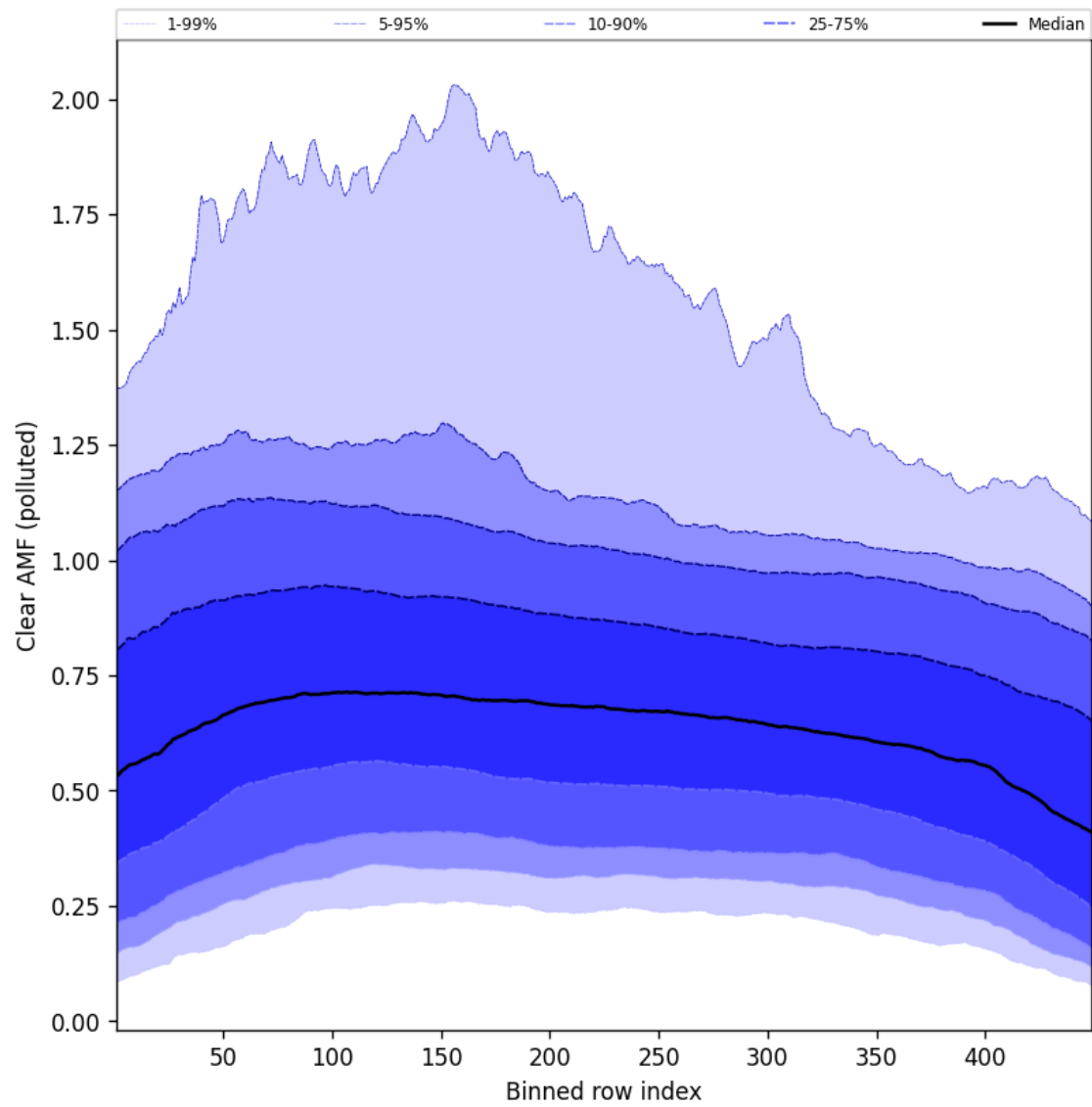


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-18 to 2025-03-19

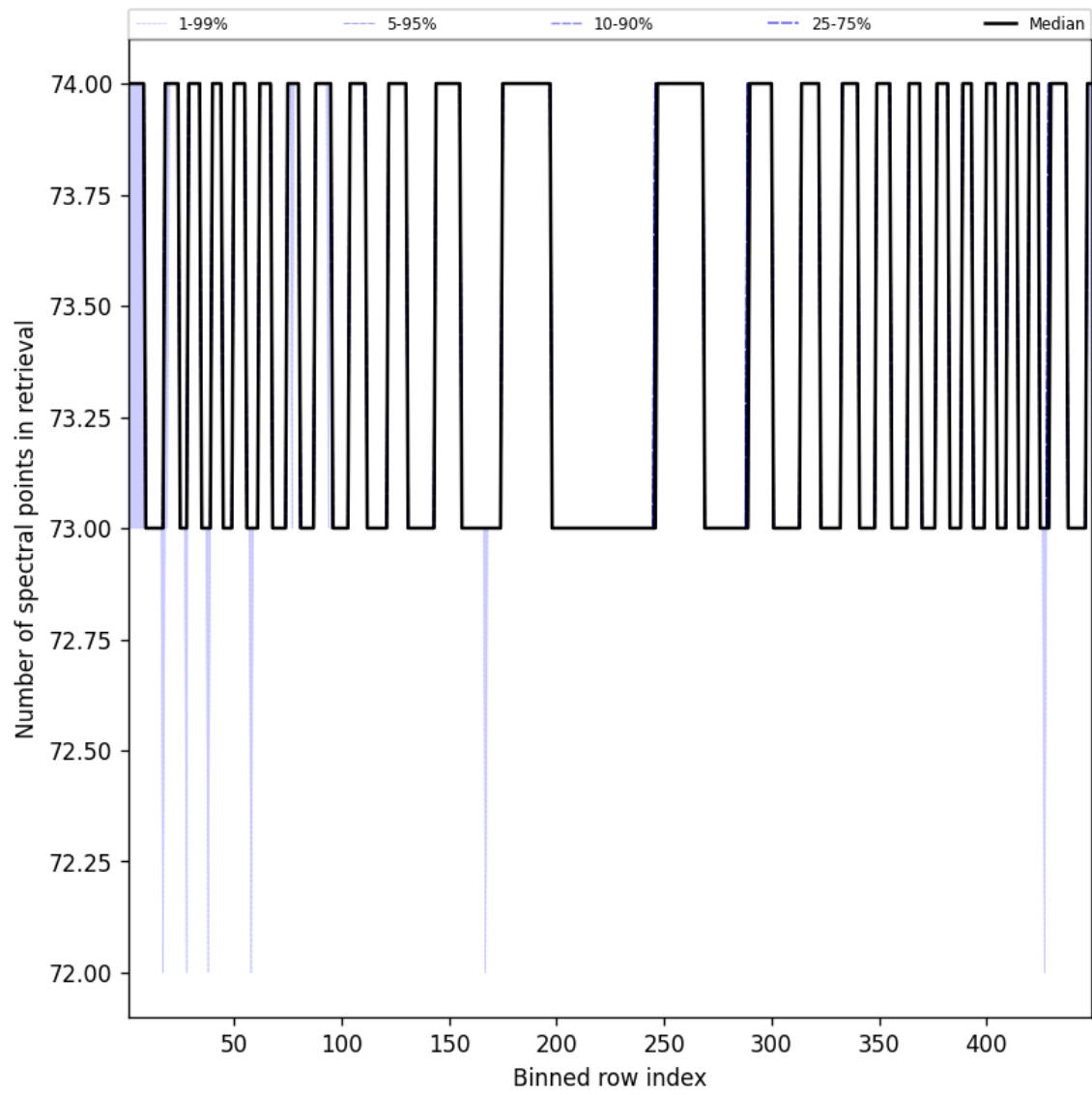


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-18 to 2025-03-19

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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