

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]	0.636 ± 0.403	17301004	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.047 \pm 95.099) \times 10^{-2}$	17301004	0.278	0.463	1.079×10^{-2}	-61.1	261
sulfurdioxide total vertical column precision [DU]	0.521 ± 0.684	17301004	0.222	0.339	0.331	4.751×10^{-2}	171
sulfurdioxide slant column density corrected [DU]	$(2.072 \pm 45.058) \times 10^{-2}$	17301004	0.258	0.375	9.358×10^{-3}	-30.1	280
sulfurdioxide slant column density cobra [DU]	$(1.994 \pm 39.038) \times 10^{-2}$	17301004	0.258	0.375	9.358×10^{-3}	-30.1	51.0
sulfurdioxide slant column density cobra precision [DU]	0.301 ± 0.135	17301004	0.213	0.142	0.263	7.430×10^{-2}	23.9
sulfurdioxide slant column density window1 [DU]	0.150 ± 0.709	17301004	0.175	0.750	0.161	-101	109
sulfurdioxide slant column density window1 precision [DU]	0.301 ± 0.135	17301004	0.213	0.142	0.263	7.430×10^{-2}	23.9
sulfurdioxide slant column density corrected win1 [DU]	$(2.323 \pm 70.255) \times 10^{-2}$	17301004	-2.500×10^{-2}	0.739	3.444×10^{-3}	-101	109
background so2 slant column offset window1 [DU]	-0.127 ± 0.154	17301004	-0.220	0.164	-0.160	-0.786	3.01
sulfurdioxide slant column density window2 [DU]	2.40 ± 9.08	17301004	2.25	11.6	2.24	-683	904
sulfurdioxide slant column density window2 precision [DU]	8.05 ± 2.19	17301004	7.43	2.52	7.72	2.21	479
sulfurdioxide slant column density corrected win2 [DU]	0.224 ± 8.660	17301004	-0.250	11.0	0.235	-683	903
background so2 slant column offset window2 [DU]	-2.18 ± 3.12	17301004	0.250	3.93	-1.15	-19.1	10.8
sulfurdioxide slant column density window3 [DU]	-9.56 ± 23.76	17301004	-11.8	29.8	-9.98	-668	868
sulfurdioxide slant column density window3 precision [DU]	27.9 ± 13.2	17301004	22.5	9.77	24.3	9.50	765
sulfurdioxide slant column density corrected win3 [DU]	$(-1.660 \pm 2297.002) \times 10^{-2}$	17301004	0.560	28.7	-1.455×10^{-3}	-667	875
background so2 slant column offset window3 [DU]	9.55 ± 6.66	17301004	2.80	11.5	9.32	-16.0	41.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17301004	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.023 \pm 7.334) \times 10^{-2}$	17301004	1.217×10^{-2}	1.749×10^{-2}	1.292×10^{-2}	2.028×10^{-4}	2.53
fitted radiance shift [nm]	$(-2.607 \pm 25.621) \times 10^{-4}$	17301004	1.000×10^{-4}	1.765×10^{-3}	-2.387×10^{-4}	-5.488×10^{-2}	4.183×10^{-2}
fitted radiance squeeze [1]	$(-1.656 \pm 17.950) \times 10^{-5}$	17301004	-1.000×10^{-5}	2.038×10^{-4}	-1.056×10^{-5}	-1.422×10^{-2}	2.416×10^{-2}
fitted root mean square [1]	$(1.310 \pm 0.556) \times 10^{-3}$	17301004	9.750×10^{-4}	5.612×10^{-4}	1.150×10^{-3}	2.134×10^{-4}	0.100
sulfurdioxide total air mass factor polluted [1]	0.867 ± 0.427	17301004	0.820	0.557	0.818	5.000×10^{-2}	3.04
sulfurdioxide total air mass factor polluted precision [1]	0.108 ± 0.114	17301004	3.500×10^{-2}	0.102	6.762×10^{-2}	3.018×10^{-3}	1.82
sulfurdioxide clear air mass factor polluted [1]	0.738 ± 0.292	17301004	0.660	0.393	0.715	5.260×10^{-2}	3.04
number of spectral points in retrieval [1]	73.4 ± 0.5	17301004	73.0	1.000	73.0	52.0	156

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]	-2.27	-0.877	-0.540	-0.366	-0.218	0.246	0.405	0.599	0.984	2.63
sulfurdioxide total vertical column precision [DU]	0.108	0.143	0.169	0.192	0.224	0.563	0.744	0.963	1.42	3.47
sulfurdioxide slant column density corrected [DU]	-0.875	-0.506	-0.366	-0.273	-0.176	0.199	0.301	0.403	0.563	1.06
sulfurdioxide slant column density cobra [DU]	-0.875	-0.506	-0.366	-0.273	-0.176	0.199	0.301	0.403	0.563	1.06
sulfurdioxide slant column density cobra precision [DU]	0.144	0.172	0.185	0.197	0.212	0.354	0.404	0.456	0.550	0.802
sulfurdioxide slant column density window1 [DU]	-1.78	-0.938	-0.626	-0.425	-0.220	0.531	0.724	0.909	1.19	1.98
sulfurdioxide slant column density window1 precision [DU]	0.144	0.172	0.185	0.197	0.212	0.354	0.404	0.456	0.550	0.802
sulfurdioxide slant column density corrected win1 [DU]	-1.71	-0.997	-0.729	-0.550	-0.361	0.378	0.583	0.784	1.10	2.01
background so2 slant column offset window1 [DU]	-0.367	-0.296	-0.271	-0.252	-0.228	-6.388×10^{-2}	-5.279×10^{-3}	6.026×10^{-2}	0.168	0.421
sulfurdioxide slant column density window2 [DU]	-18.8	-12.1	-8.77	-6.30	-3.50	8.12	11.1	13.8	17.4	25.0
sulfurdioxide slant column density window2 precision [DU]	4.34	5.20	5.71	6.12	6.61	9.13	9.98	10.8	12.0	14.6
sulfurdioxide slant column density corrected win2 [DU]	-20.8	-13.8	-10.5	-8.03	-5.28	5.73	8.47	10.9	14.2	21.2
background so2 slant column offset window2 [DU]	-10.8	-8.72	-7.08	-5.51	-3.82	0.111	0.430	0.666	1.03	2.64
sulfurdioxide slant column density window3 [DU]	-67.7	-47.8	-38.5	-31.9	-24.6	5.25	13.2	20.4	30.1	49.3
sulfurdioxide slant column density window3 precision [DU]	13.6	16.0	17.7	19.1	20.7	30.4	35.2	41.1	52.9	84.0
sulfurdioxide slant column density corrected win3 [DU]	-57.6	-37.6	-28.3	-21.6	-14.3	14.4	21.7	28.4	37.5	56.2
background so2 slant column offset window3 [DU]	-2.86	0.362	1.49	2.38	3.63	15.1	17.0	18.4	20.3	23.2
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]	6.424×10^{-4}	1.213×10^{-3}	2.120×10^{-3}	4.068×10^{-3}	6.948×10^{-3}	2.444×10^{-2}	3.649×10^{-2}	5.952×10^{-2}	0.114	0.327
fitted radiance shift [nm]	-8.053×10^{-3}	-4.080×10^{-3}	-2.674×10^{-3}	-1.865×10^{-3}	-1.170×10^{-3}	5.951×10^{-4}	1.274×10^{-3}	2.124×10^{-3}	3.607×10^{-3}	7.744×10^{-3}
fitted radiance squeeze [1]	-5.190×10^{-4}	-3.070×10^{-4}	-2.247×10^{-4}	-1.705×10^{-4}	-1.144×10^{-4}	8.936×10^{-5}	1.402×10^{-4}	1.872×10^{-4}	2.542×10^{-4}	4.134×10^{-4}
fitted root mean square [1]	6.047×10^{-4}	7.478×10^{-4}	8.222×10^{-4}	8.793×10^{-4}	9.504×10^{-4}	1.512×10^{-3}	1.760×10^{-3}	2.008×10^{-3}	2.372×10^{-3}	3.338×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.411×10^{-2}	0.251	0.358	0.444	0.558	1.11	1.30	1.47	1.67	2.01
sulfurdioxide total air mass factor polluted precision [1]	1.006×10^{-2}	1.880×10^{-2}	2.481×10^{-2}	3.068×10^{-2}	3.867×10^{-2}	0.140	0.184	0.231	0.312	0.570
sulfurdioxide clear air mass factor polluted [1]	0.226	0.318	0.379	0.440	0.525	0.918	1.01	1.09	1.25	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]	0.612 $\pm$ 0.404	10628819	0.790	0.490	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(3.381 \pm 102.742) \times 10^{-2}$	10628819	0.474	9.546×10^{-3}	-50.5	181	-0.223	0.251
sulfurdioxide total vertical column precision [DU]	0.554 $\pm$ 0.742	10628819	0.374	0.341	4.751×10^{-2}	57.9	0.224	0.599
sulfurdioxide slant column density corrected [DU]	$(2.142 \pm 47.660) \times 10^{-2}$	10628819	0.376	8.196×10^{-3}	-9.91	146	-0.178	0.199
sulfurdioxide slant column density cobra [DU]	$(2.036 \pm 40.326) \times 10^{-2}$	10628819	0.376	8.196×10^{-3}	-9.91	51.0	-0.178	0.199
sulfurdioxide slant column density cobra precision [DU]	0.306 $\pm$ 0.142	10628819	0.152	0.263	7.430×10^{-2}	8.69	0.209	0.362
sulfurdioxide slant column density window1 [DU]	0.145 $\pm$ 0.732	10628819	0.757	0.159	-11.8	39.8	-0.225	0.532
sulfurdioxide slant column density window1 precision [DU]	0.306 $\pm$ 0.142	10628819	0.152	0.263	7.430×10^{-2}	8.69	0.209	0.362
sulfurdioxide slant column density corrected win1 [DU]	$(2.837 \pm 72.424) \times 10^{-2}$	10628819	0.746	5.718×10^{-3}	-11.2	39.6	-0.361	0.385
background so2 slant column offset window1 [DU]	-0.117 $\pm$ 0.171	10628819	0.177	-0.160	-0.786	3.01	-0.230	-5.353×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.97 $\pm$ 8.88	10628819	11.5	2.80	-156	326	-2.87	8.62
sulfurdioxide slant column density window2 precision [DU]	7.75 $\pm$ 2.00	10628819	2.29	7.45	2.21	420	6.43	8.71
sulfurdioxide slant column density corrected win2 [DU]	0.103 $\pm$ 8.281	10628819	10.6	0.142	-160	318	-5.20	5.44
background so2 slant column offset window2 [DU]	-2.87 $\pm$ 3.55	10628819	5.61	-1.96	-19.1	10.8	-5.46	0.151
sulfurdioxide slant column density window3 [DU]	-10.9 $\pm$ 22.7	10628819	28.4	-11.4	-668	178	-25.3	3.10
sulfurdioxide slant column density window3 precision [DU]	26.3 $\pm$ 12.3	10628819	7.93	23.0	9.50	765	20.0	27.9
sulfurdioxide slant column density corrected win3 [DU]	0.124 $\pm$ 21.715	10628819	27.1	0.187	-667	197	-13.4	13.7
background so2 slant column offset window3 [DU]	11.0 $\pm$ 7.1	10628819	12.7	12.3	-16.0	41.8	4.05	16.8
sulfurdioxide slant column cobra flag [1]	1.98 $\pm$ 0.20	10628819	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.817 \pm 8.933) \times 10^{-2}$	10628819	2.687×10^{-2}	1.393×10^{-2}	2.028×10^{-4}	2.27	4.593×10^{-3}	3.146×10^{-2}
fitted radiance shift [nm]	$(-1.298 \pm 24.048) \times 10^{-4}$	10628819	1.539×10^{-3}	-1.328×10^{-4}	-4.391×10^{-2}	4.183×10^{-2}	-9.233×10^{-4}	6.158×10^{-4}
fitted radiance squeeze [1]	$(-3.440 \pm 18.054) \times 10^{-5}$	10628819	2.038×10^{-4}	-2.270×10^{-5}	-2.791×10^{-3}	9.337×10^{-3}	-1.286×10^{-4}	7.524×10^{-5}
fitted root mean square [1]	$(1.328 \pm 0.593) \times 10^{-3}$	10628819	5.848×10^{-4}	1.146×10^{-3}	3.177×10^{-4}	4.131×10^{-2}	9.439×10^{-4}	1.529×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.864 $\pm$ 0.453	10628819	0.632	0.805	5.000×10^{-2}	3.04	0.516	1.15
sulfurdioxide total air mass factor polluted precision [1]	0.112 $\pm$ 0.128	10628819	0.102	6.641×10^{-2}	3.018×10^{-3}	1.82	3.644×10^{-2}	0.138
sulfurdioxide clear air mass factor polluted [1]	0.725 $\pm$ 0.330	10628819	0.466	0.689	5.260×10^{-2}	3.04	0.461	0.927
number of spectral points in retrieval [1]	73.5 $\pm$ 0.5	10628819	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.674 ± 0.398	6672185	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	$(2.515 \pm 81.454) \times 10^{-2}$	6672185	0.447	1.269×10^{-2}	-61.1	261	-0.209	0.238
sulfurdioxide total vertical column precision [DU]	0.468 ± 0.575	6672185	0.291	0.319	5.346×10^{-2}	171	0.224	0.515
sulfurdioxide slant column density corrected [DU]	$(1.960 \pm 40.569) \times 10^{-2}$	6672185	0.372	1.118×10^{-2}	-30.1	280	-0.173	0.198
sulfurdioxide slant column density cobra [DU]	$(1.928 \pm 36.892) \times 10^{-2}$	6672185	0.372	1.118×10^{-2}	-30.1	30.2	-0.173	0.198
sulfurdioxide slant column density cobra precision [DU]	0.294 ± 0.122	6672185	0.126	0.262	8.152×10^{-2}	23.9	0.215	0.341
sulfurdioxide slant column density window1 [DU]	0.158 ± 0.671	6672185	0.739	0.162	-101	109	-0.211	0.528
sulfurdioxide slant column density window1 precision [DU]	0.294 ± 0.122	6672185	0.126	0.262	8.152×10^{-2}	23.9	0.215	0.341
sulfurdioxide slant column density corrected win1 [DU]	$(1.503 \pm 66.646) \times 10^{-2}$	6672185	0.729	-5.609×10^{-5}	-101	109	-0.360	0.368
background so2 slant column offset window1 [DU]	-0.143 ± 0.121	6672185	0.145	-0.160	-0.767	1.37	-0.224	-7.843×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.50 ± 9.33	6672185	11.7	1.32	-683	904	-4.47	7.27
sulfurdioxide slant column density window2 precision [DU]	8.53 ± 2.40	6672185	2.75	8.21	2.41	479	6.99	9.74
sulfurdioxide slant column density corrected win2 [DU]	0.418 ± 9.229	6672185	11.6	0.398	-683	903	-5.41	6.22
background so2 slant column offset window2 [DU]	-1.08 ± 1.78	6672185	2.07	-0.695	-11.9	10.5	-2.01	6.497×10^{-2}
sulfurdioxide slant column density window3 [DU]	-7.47 ± 25.26	6672185	31.8	-7.38	-366	868	-23.2	8.57
sulfurdioxide slant column density window3 precision [DU]	30.5 ± 14.0	6672185	11.2	26.8	9.76	385	22.5	33.7
sulfurdioxide slant column density corrected win3 [DU]	-0.241 ± 24.836	6672185	31.4	-0.355	-362	875	-15.9	15.5
background so2 slant column offset window3 [DU]	7.23 ± 5.19	6672185	7.91	6.04	-13.2	26.5	3.32	11.2
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	6672185	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.759 \pm 3.120) \times 10^{-2}$	6672185	1.008×10^{-2}	1.215×10^{-2}	7.226×10^{-4}	2.53	8.400×10^{-3}	1.848×10^{-2}
fitted radiance shift [nm]	$(-4.693 \pm 27.817) \times 10^{-4}$	6672185	2.126×10^{-3}	-4.659×10^{-4}	-5.488×10^{-2}	3.705×10^{-2}	-1.577×10^{-3}	5.483×10^{-4}
fitted radiance squeeze [1]	$(1.186 \pm 17.410) \times 10^{-5}$	6672185	2.035×10^{-4}	8.978×10^{-6}	-1.422×10^{-2}	2.416×10^{-2}	-9.178×10^{-5}	1.117×10^{-4}
fitted root mean square [1]	$(1.281 \pm 0.490) \times 10^{-3}$	6672185	5.263×10^{-4}	1.155×10^{-3}	2.134×10^{-4}	0.100	9.613×10^{-4}	1.488×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.872 ± 0.380	6672185	0.462	0.834	5.000×10^{-2}	2.79	0.616	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.103 ± 0.085	6672185	0.102	6.971×10^{-2}	4.041×10^{-3}	1.09	4.150×10^{-2}	0.144
sulfurdioxide clear air mass factor polluted [1]	0.759 ± 0.214	6672185	0.300	0.740	6.905×10^{-2}	1.76	0.606	0.906
number of spectral points in retrieval [1]	73.4 ± 0.5	6672185	1.000	73.0	52.0	156	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]	0.670 ± 0.396	11475855	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.430 \pm 82.983) \times 10^{-2}$	11475855	0.443	9.643×10^{-3}	-47.4	60.9	-0.210	0.233
sulfurdioxide total vertical column precision [DU]	0.477 ± 0.596	11475855	0.296	0.313	6.155×10^{-2}	27.4	0.221	0.516
sulfurdioxide slant column density corrected [DU]	$(1.632 \pm 36.296) \times 10^{-2}$	11475855	0.367	8.453×10^{-3}	-17.1	55.7	-0.174	0.194
sulfurdioxide slant column density cobra [DU]	$(1.627 \pm 36.074) \times 10^{-2}$	11475855	0.367	8.453×10^{-3}	-17.1	27.7	-0.174	0.194
sulfurdioxide slant column density cobra precision [DU]	0.297 ± 0.135	11475855	0.144	0.253	7.430×10^{-2}	12.9	0.208	0.351
sulfurdioxide slant column density window1 [DU]	0.149 ± 0.688	11475855	0.742	0.163	-101	62.0	-0.213	0.529
sulfurdioxide slant column density window1 precision [DU]	0.297 ± 0.135	11475855	0.144	0.253	7.430×10^{-2}	12.9	0.208	0.351
sulfurdioxide slant column density corrected win1 [DU]	$(1.731 \pm 68.045) \times 10^{-2}$	11475855	0.731	2.302×10^{-3}	-101	62.3	-0.359	0.372
background so2 slant column offset window1 [DU]	-0.132 ± 0.148	11475855	0.161	-0.162	-0.786	2.62	-0.229	-6.798×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.09 ± 9.06	11475855	11.5	1.88	-519	904	-3.80	7.74
sulfurdioxide slant column density window2 precision [DU]	8.05 ± 2.11	11475855	2.49	7.73	2.41	401	6.64	9.13
sulfurdioxide slant column density corrected win2 [DU]	0.269 ± 8.686	11475855	11.1	0.278	-520	903	-5.26	5.80
background so2 slant column offset window2 [DU]	-1.82 ± 2.96	11475855	3.21	-0.848	-19.1	10.8	-3.02	0.190
sulfurdioxide slant column density window3 [DU]	-6.69 ± 24.01	11475855	30.6	-7.12	-330	252	-22.1	8.50
sulfurdioxide slant column density window3 precision [DU]	27.3 ± 11.7	11475855	9.12	24.2	9.50	280	20.9	30.0
sulfurdioxide slant column density corrected win3 [DU]	2.04 ± 22.96	11475855	29.1	1.78	-316	253	-12.6	16.5
background so2 slant column offset window3 [DU]	8.73 ± 6.49	11475855	10.7	7.85	-16.0	41.8	3.22	13.9
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	11475855	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.124 \pm 4.130) \times 10^{-2}$	11475855	1.320×10^{-2}	1.260×10^{-2}	2.159×10^{-4}	2.53	7.669×10^{-3}	2.087×10^{-2}
fitted radiance shift [nm]	$(-2.956 \pm 23.215) \times 10^{-4}$	11475855	1.737×10^{-3}	-2.553×10^{-4}	-5.329×10^{-2}	4.183×10^{-2}	-1.189×10^{-3}	5.486×10^{-4}
fitted radiance squeeze [1]	$(-9.297 \pm 177.971) \times 10^{-6}$	11475855	2.008×10^{-4}	-4.151×10^{-6}	-1.422×10^{-2}	1.868×10^{-2}	-1.061×10^{-4}	9.476×10^{-5}
fitted root mean square [1]	$(1.299 \pm 0.554) \times 10^{-3}$	11475855	5.880×10^{-4}	1.121×10^{-3}	3.337×10^{-4}	5.083×10^{-2}	9.343×10^{-4}	1.522×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.874 ± 0.384	11475855	0.482	0.841	5.000×10^{-2}	2.58	0.613	1.09
sulfurdioxide total air mass factor polluted precision [1]	0.100 ± 0.098	11475855	8.829×10^{-2}	6.649×10^{-2}	3.018×10^{-3}	1.82	4.113×10^{-2}	0.129
sulfurdioxide clear air mass factor polluted [1]	0.755 ± 0.256	11475855	0.340	0.744	5.615×10^{-2}	2.27	0.579	0.920
number of spectral points in retrieval [1]	73.4 ± 0.5	11475855	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]	0.619 ± 0.411	4081330	0.820	1.000	0.0	1.000	0.180	1.000
sulfurdioxide total vertical column [DU]	$(3.331 \pm 98.923) \times 10^{-2}$	4081330	0.490	1.167×10^{-2}	-61.1	261	-0.228	0.261
sulfurdioxide total vertical column precision [DU]	0.554 ± 0.685	4081330	0.401	0.365	4.751×10^{-2}	171	0.230	0.632
sulfurdioxide slant column density corrected [DU]	$(2.465 \pm 52.734) \times 10^{-2}$	4081330	0.373	9.872×10^{-3}	-30.1	280	-0.175	0.198
sulfurdioxide slant column density cobra [DU]	$(2.328 \pm 40.955) \times 10^{-2}$	4081330	0.373	9.872×10^{-3}	-30.1	51.0	-0.175	0.198
sulfurdioxide slant column density cobra precision [DU]	0.296 ± 0.128	4081330	0.125	0.264	8.843×10^{-2}	23.9	0.215	0.339
sulfurdioxide slant column density window1 [DU]	0.170 ± 0.702	4081330	0.737	0.171	-57.1	109	-0.201	0.537
sulfurdioxide slant column density window1 precision [DU]	0.296 ± 0.128	4081330	0.125	0.264	8.843×10^{-2}	23.9	0.215	0.339
sulfurdioxide slant column density corrected win1 [DU]	$(2.781 \pm 69.781) \times 10^{-2}$	4081330	0.727	3.536×10^{-3}	-57.1	109	-0.354	0.373
background so2 slant column offset window1 [DU]	-0.142 ± 0.147	4081330	0.148	-0.173	-0.786	3.01	-0.235	-8.651×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.34 ± 9.12	4081330	11.7	2.26	-683	856	-3.53	8.14
sulfurdioxide slant column density window2 precision [DU]	8.15 ± 2.40	4081330	2.55	7.81	2.21	479	6.65	9.21
sulfurdioxide slant column density corrected win2 [DU]	0.151 ± 8.708	4081330	11.0	0.163	-683	856	-5.36	5.67
background so2 slant column offset window2 [DU]	-2.19 ± 3.06	4081330	4.09	-1.17	-18.9	8.86	-4.00	9.197×10^{-2}
sulfurdioxide slant column density window3 [DU]	-15.1 ± 22.9	4081330	28.3	-14.9	-668	868	-29.2	-0.864
sulfurdioxide slant column density window3 precision [DU]	30.1 ± 16.4	4081330	11.9	25.4	9.62	765	20.8	32.7
sulfurdioxide slant column density corrected win3 [DU]	-5.23 ± 23.09	4081330	28.6	-4.56	-667	875	-19.2	9.41
background so2 slant column offset window3 [DU]	9.90 ± 6.61	4081330	11.6	9.87	-12.9	29.7	3.97	15.5
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	4081330	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.040 \pm 10.810) \times 10^{-2}$	4081330	3.793×10^{-2}	1.614×10^{-2}	2.028×10^{-4}	2.26	6.681×10^{-3}	4.461×10^{-2}
fitted radiance shift [nm]	$(-1.749 \pm 31.692) \times 10^{-4}$	4081330	1.892×10^{-3}	-1.923×10^{-4}	-5.488×10^{-2}	3.674×10^{-2}	-1.148×10^{-3}	7.440×10^{-4}
fitted radiance squeeze [1]	$(-2.146 \pm 17.542) \times 10^{-5}$	4081330	2.033×10^{-4}	-1.625×10^{-5}	-1.222×10^{-2}	2.416×10^{-2}	-1.196×10^{-4}	8.366×10^{-5}
fitted root mean square [1]	$(1.277 \pm 0.516) \times 10^{-3}$	4081330	4.580×10^{-4}	1.156×10^{-3}	2.134×10^{-4}	0.100	9.684×10^{-4}	1.426×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.847 ± 0.491	4081330	0.673	0.727	5.000×10^{-2}	3.04	0.472	1.14
sulfurdioxide total air mass factor polluted precision [1]	0.124 ± 0.137	4081330	0.140	7.018×10^{-2}	3.657×10^{-3}	1.63	3.104×10^{-2}	0.171
sulfurdioxide clear air mass factor polluted [1]	0.698 ± 0.332	4081330	0.449	0.623	6.926×10^{-2}	3.04	0.445	0.894
number of spectral points in retrieval [1]	73.4 ± 0.5	4081330	1.000	73.0	52.0	156	73.0	74.0

3 Granule outlines

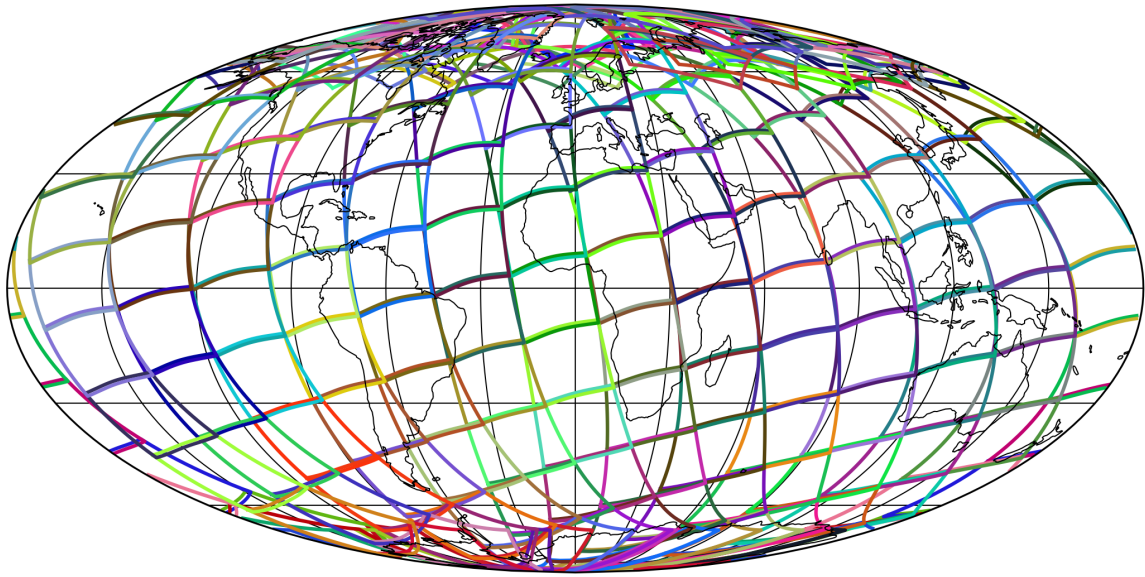


Figure 1: Outline of the granules.

4 Input data monitoring

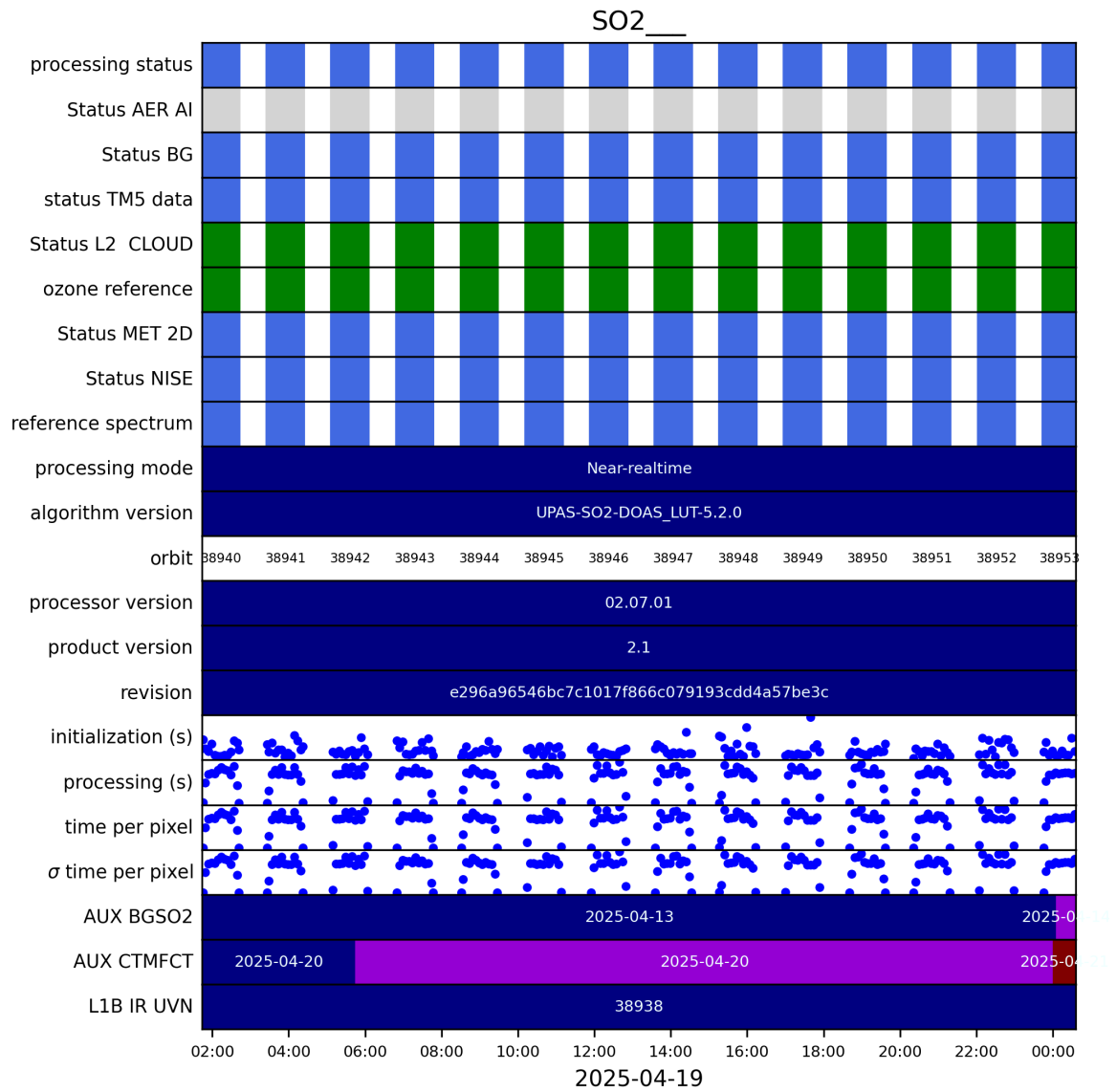


Figure 2: Input data per granule

5 Warnings and errors

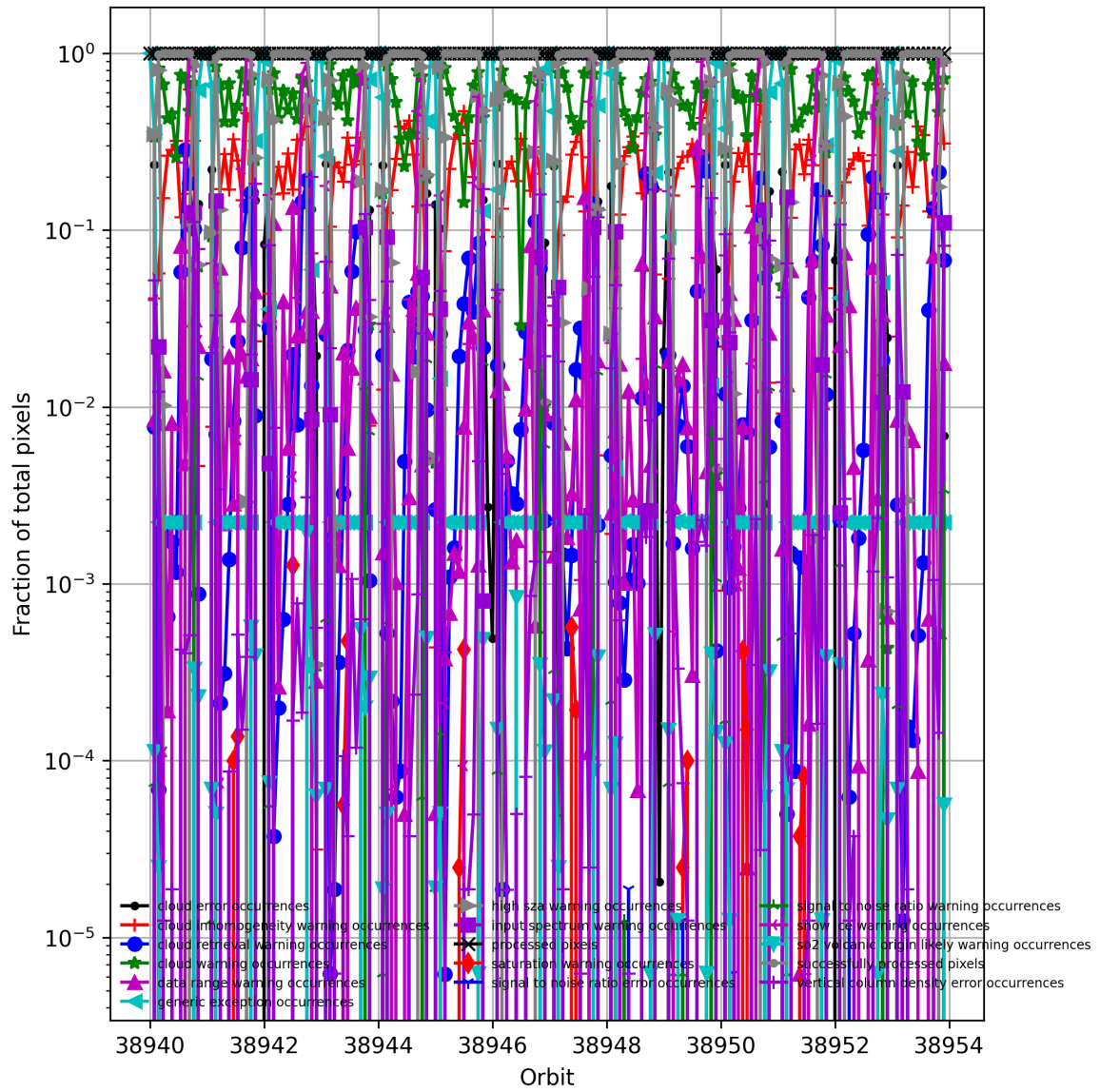


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

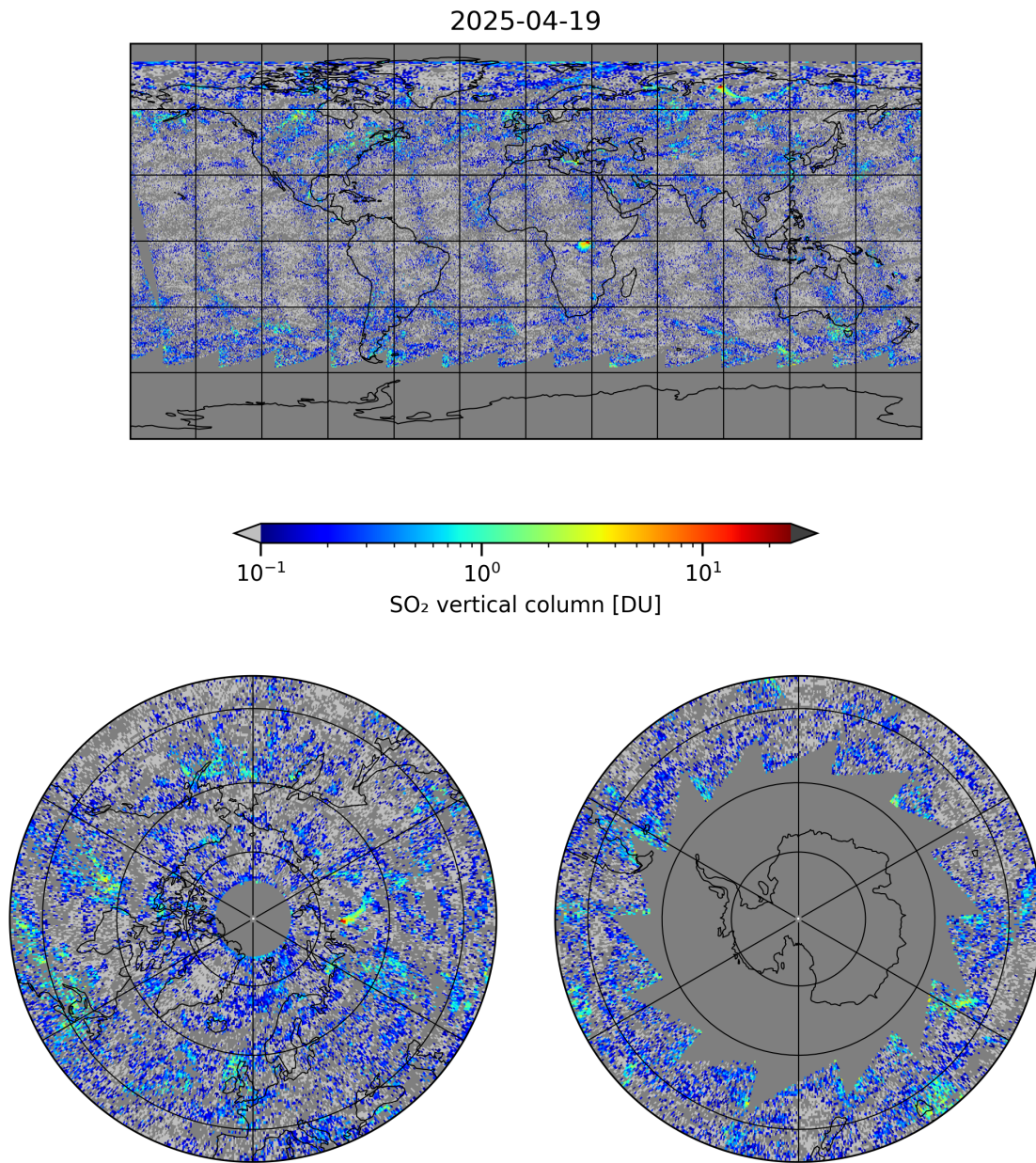


Figure 4: Map of “SO₂ vertical column” for 2025-04-19 to 2025-04-20

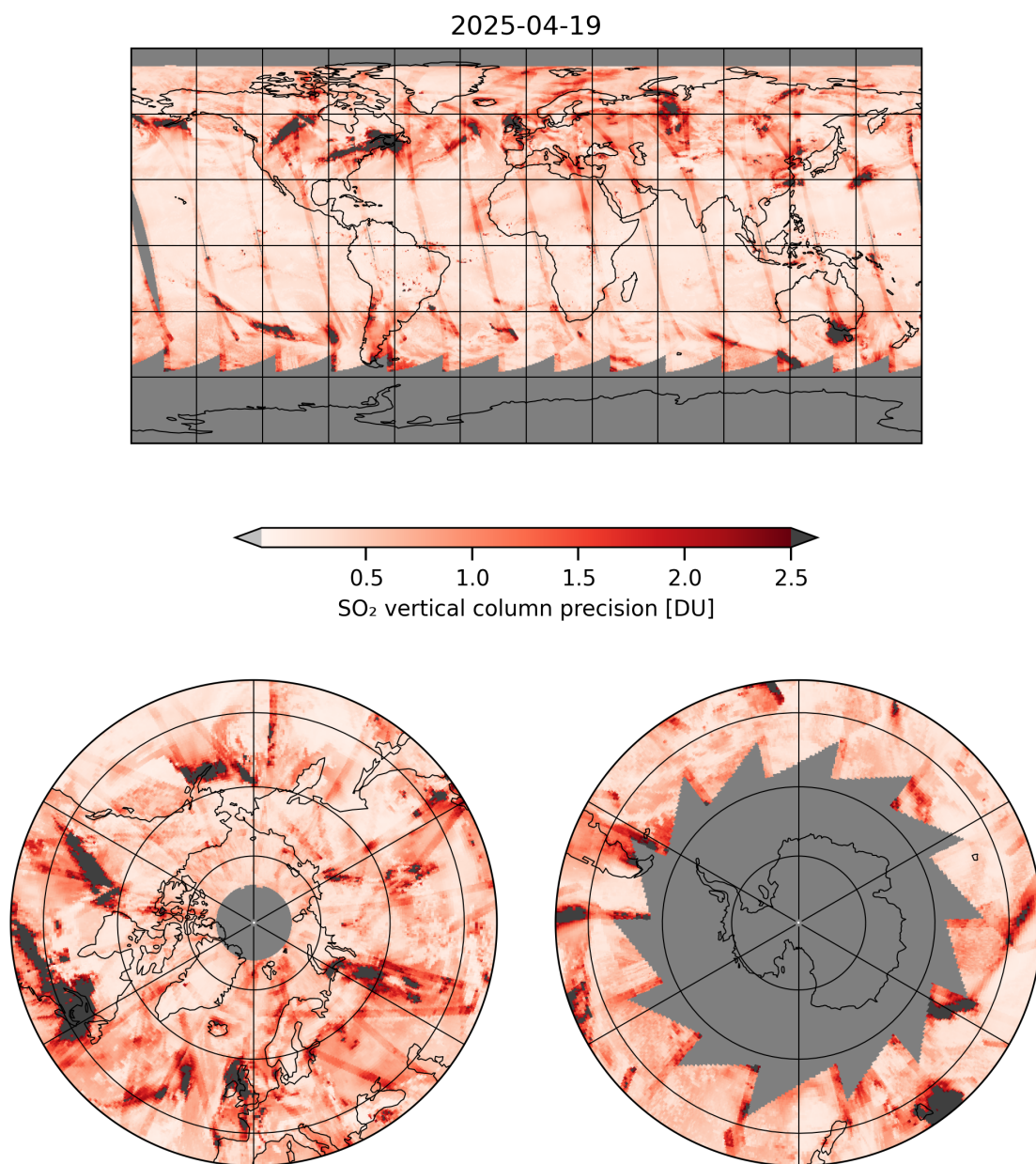


Figure 5: Map of “SO₂ vertical column precision” for 2025-04-19 to 2025-04-20

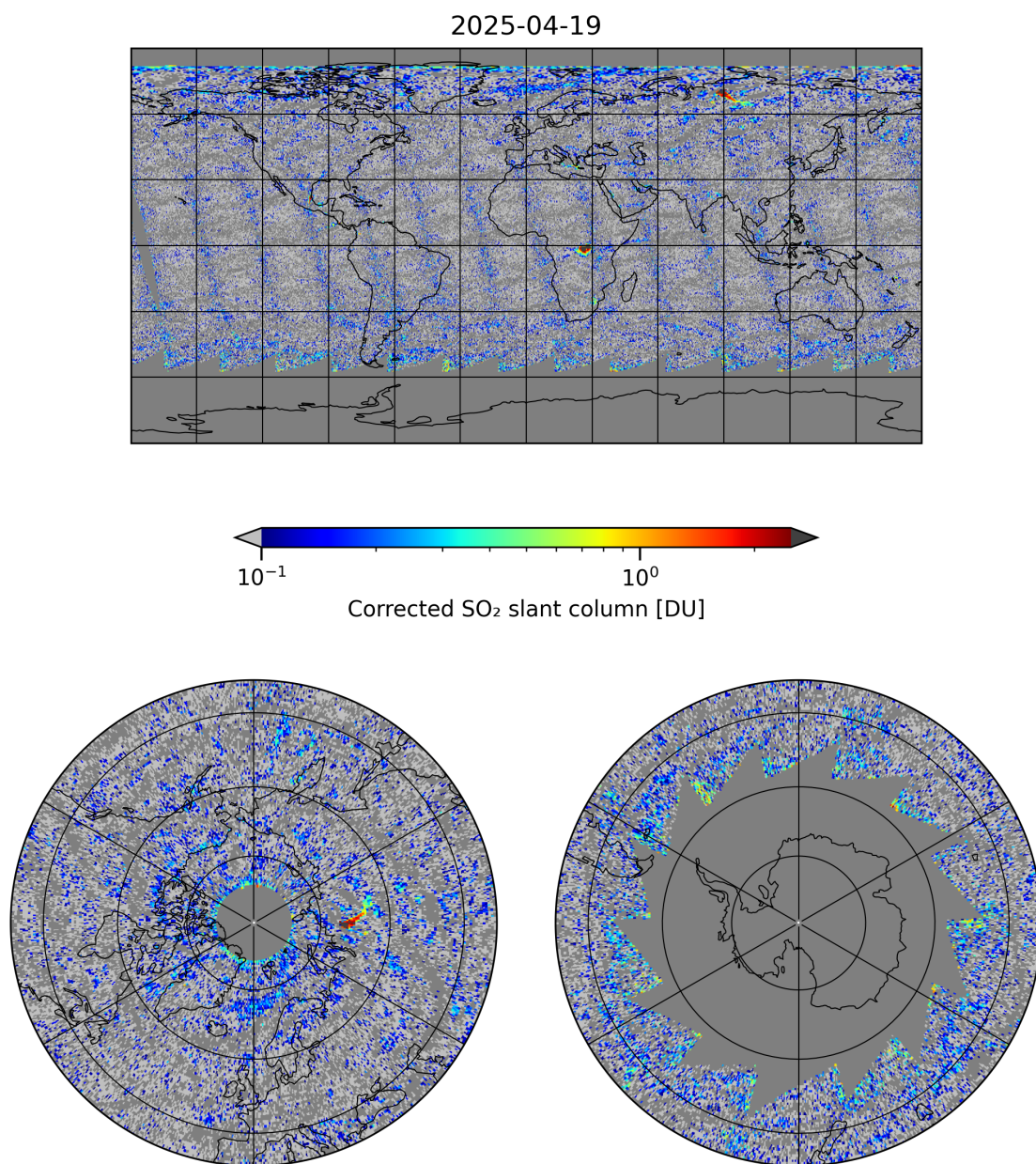


Figure 6: Map of “Corrected SO₂ slant column” for 2025-04-19 to 2025-04-20

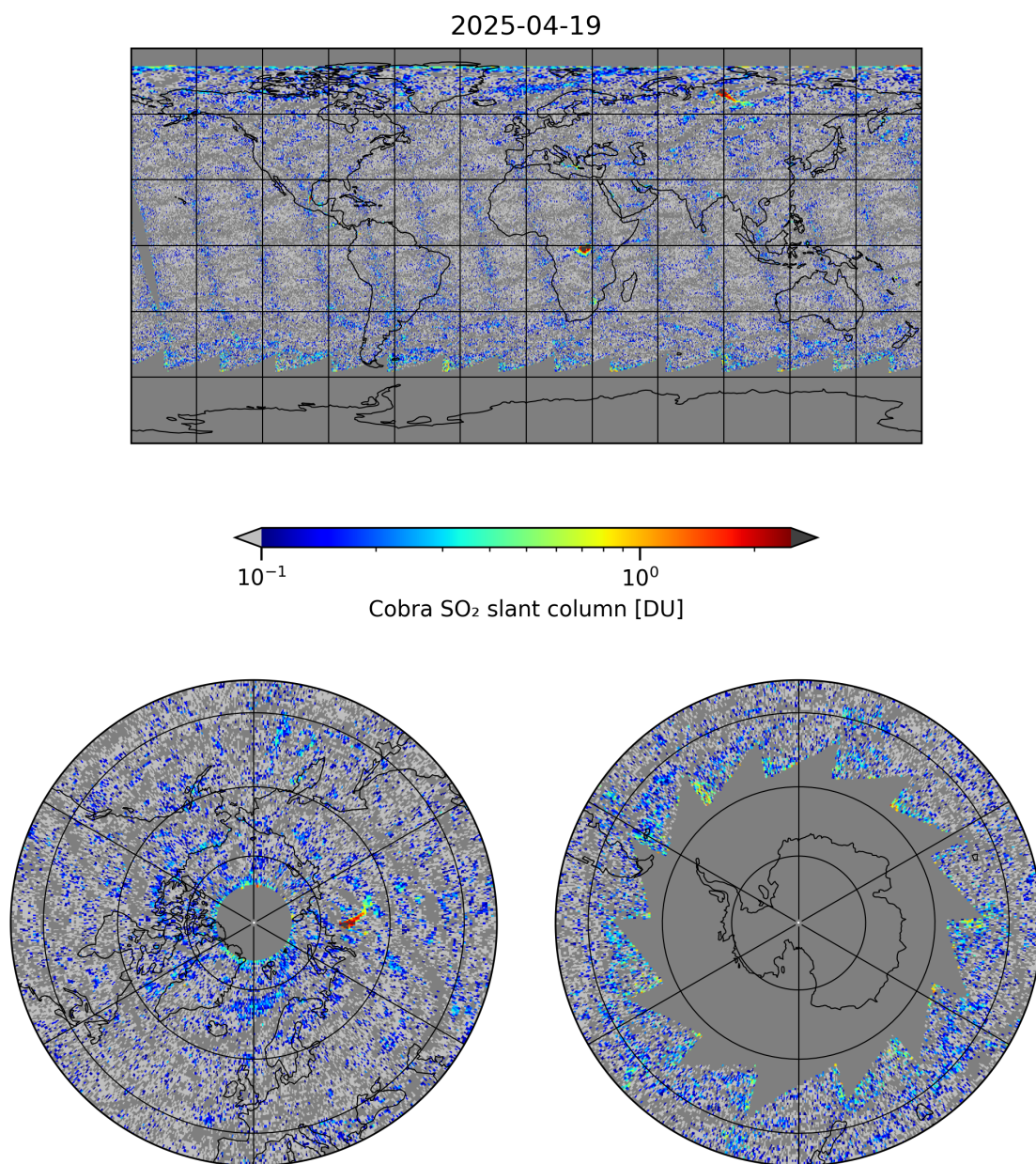


Figure 7: Map of “Cobra SO₂ slant column” for 2025-04-19 to 2025-04-20

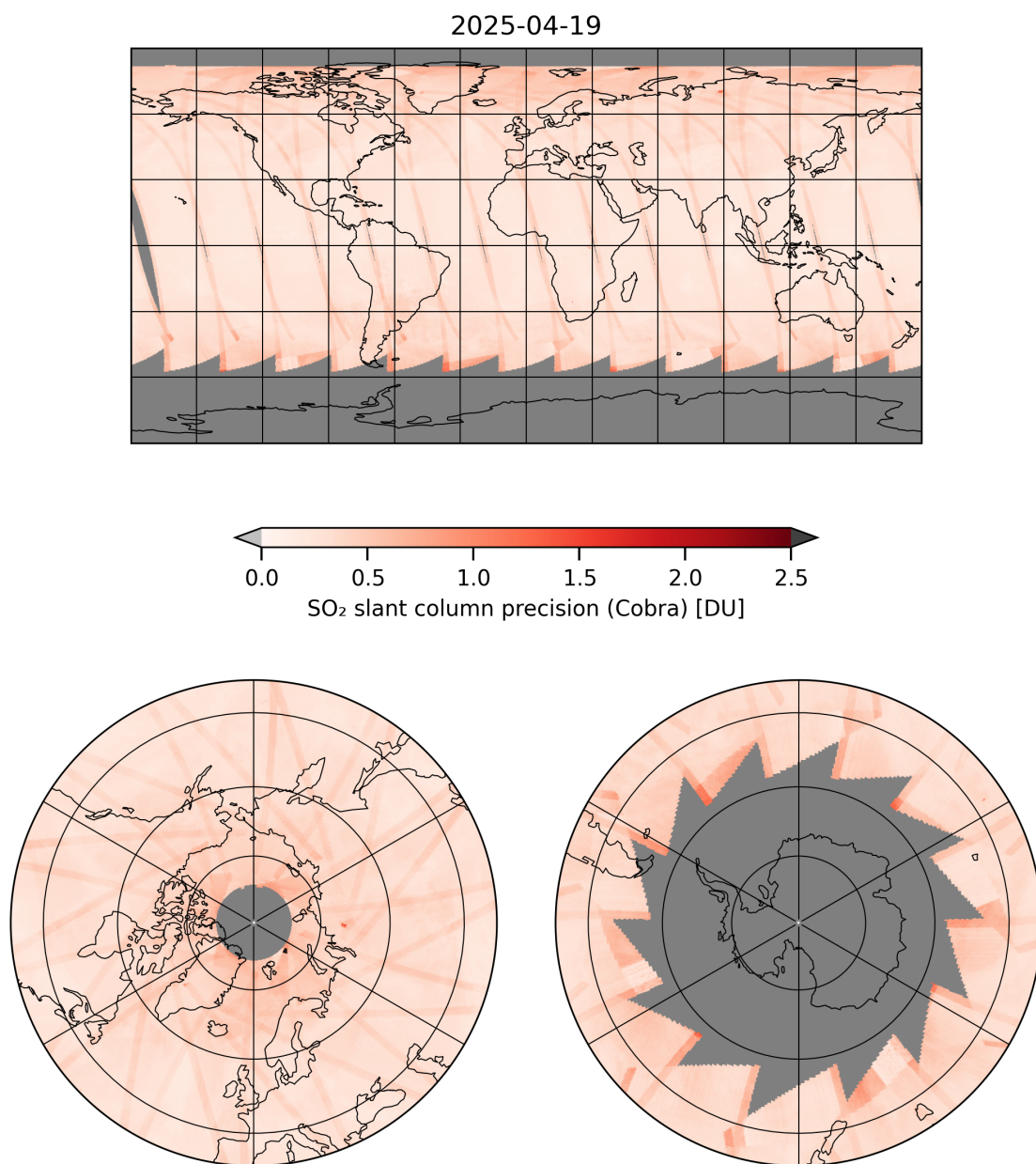


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-04-19 to 2025-04-20

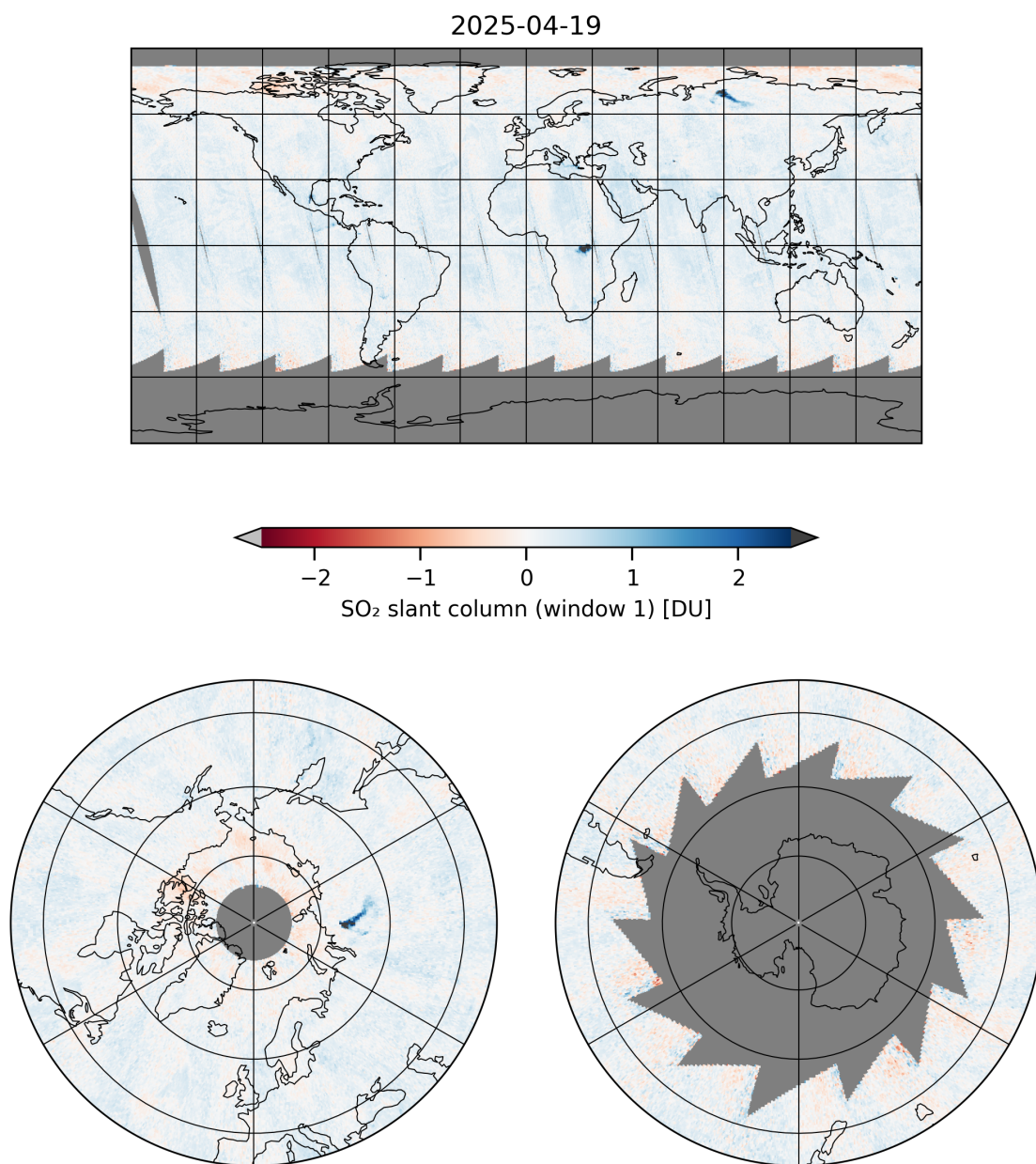


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-04-19 to 2025-04-20

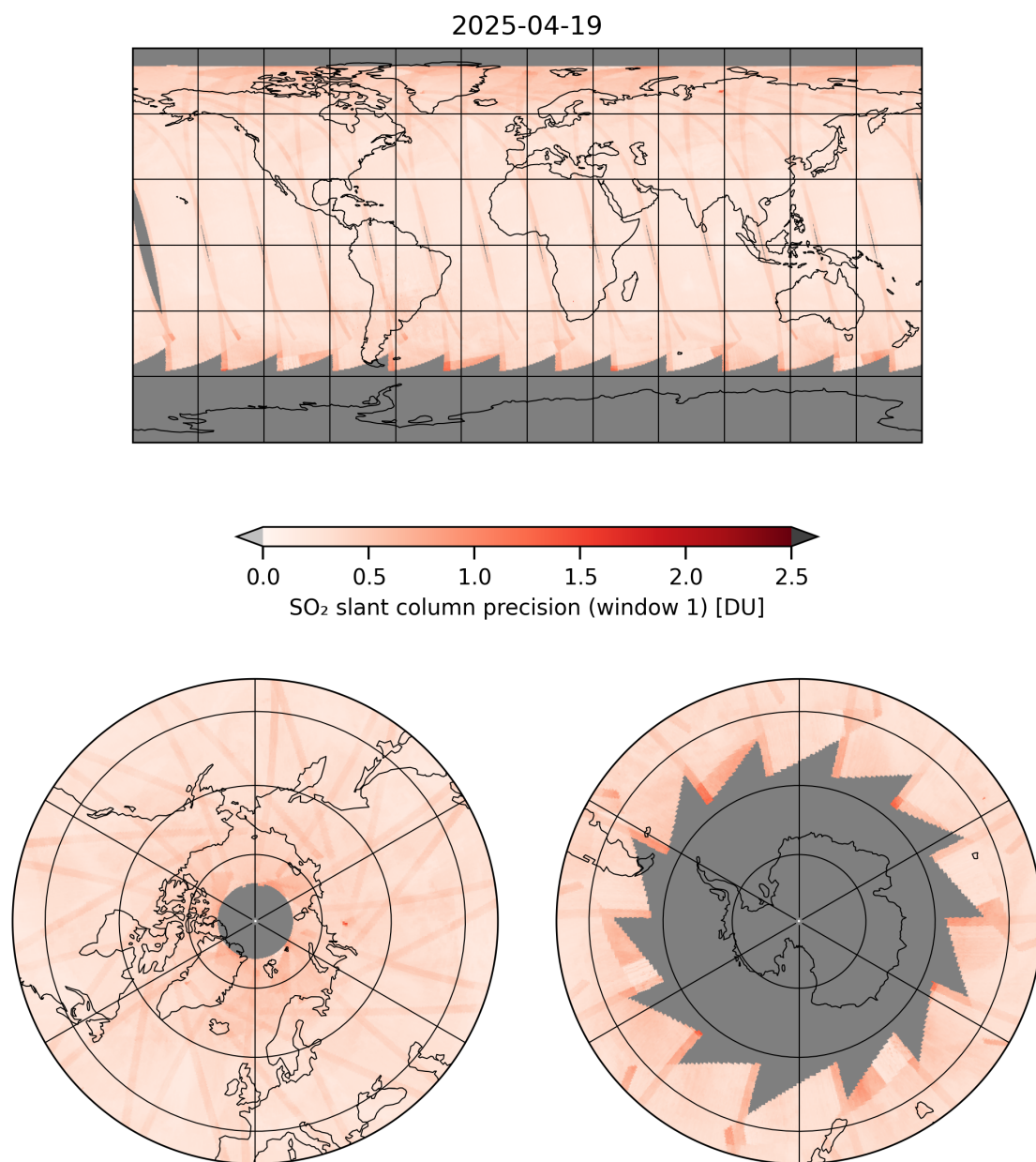


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-04-19 to 2025-04-20

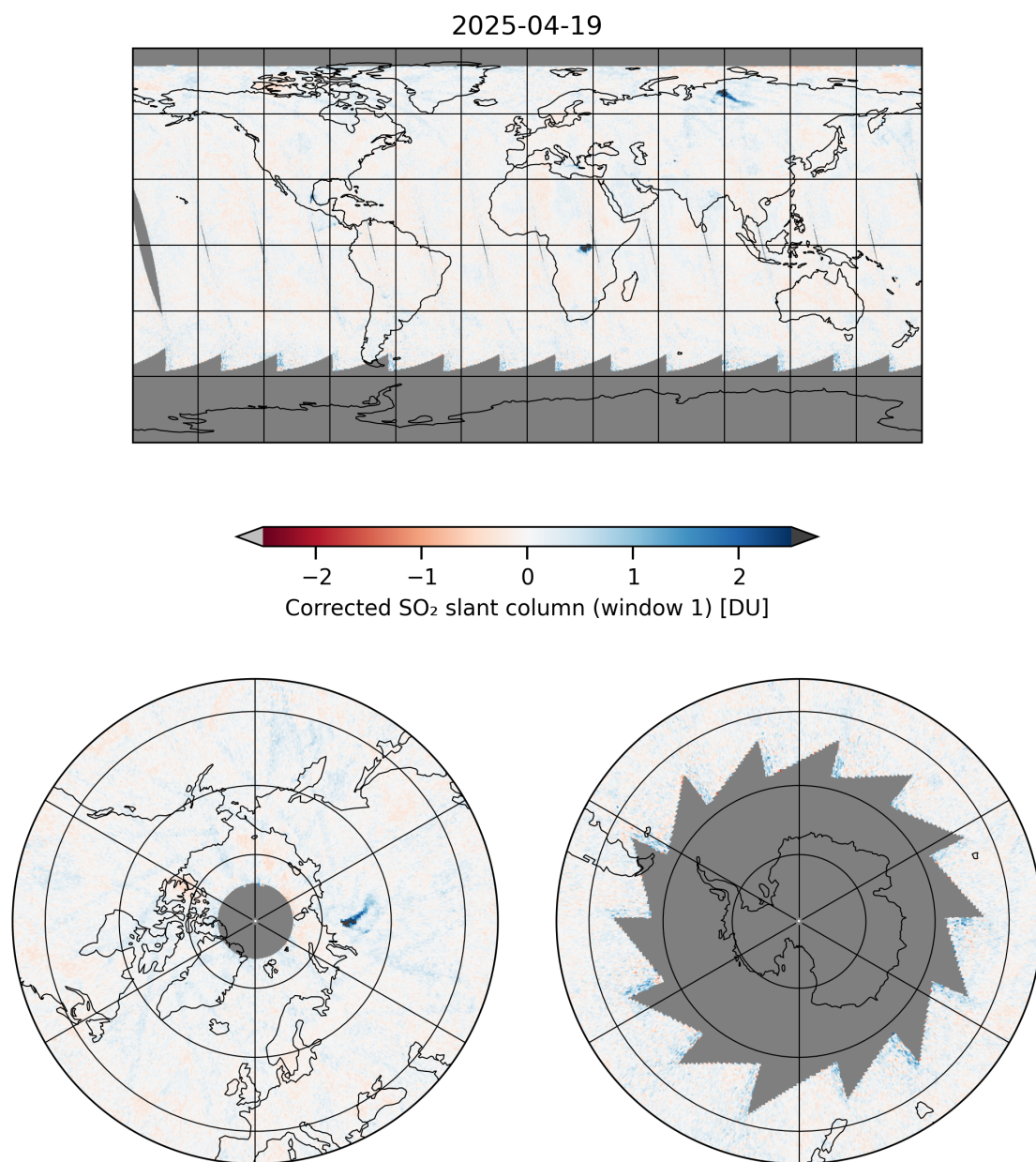


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-04-19 to 2025-04-20

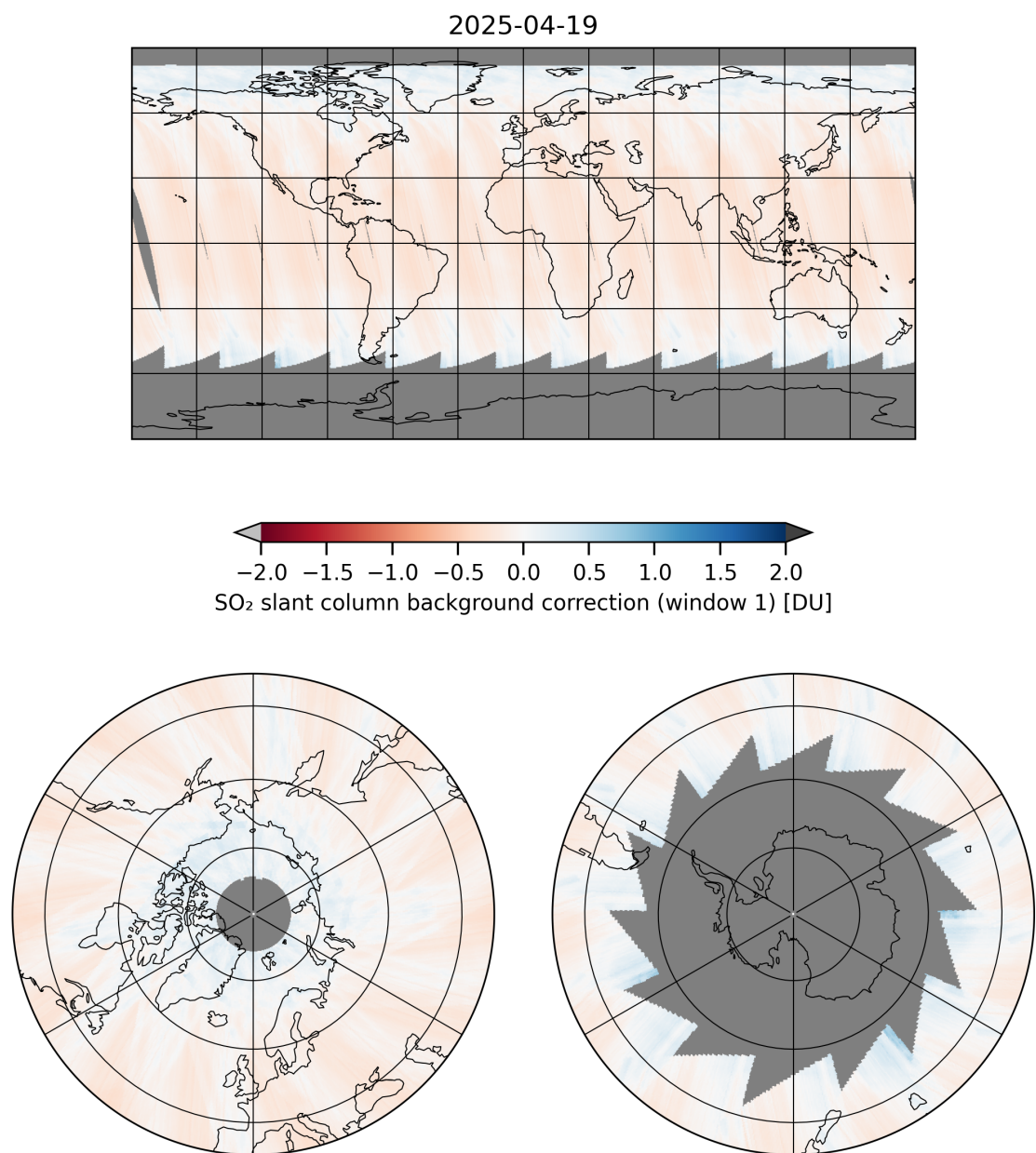


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-04-19 to 2025-04-20

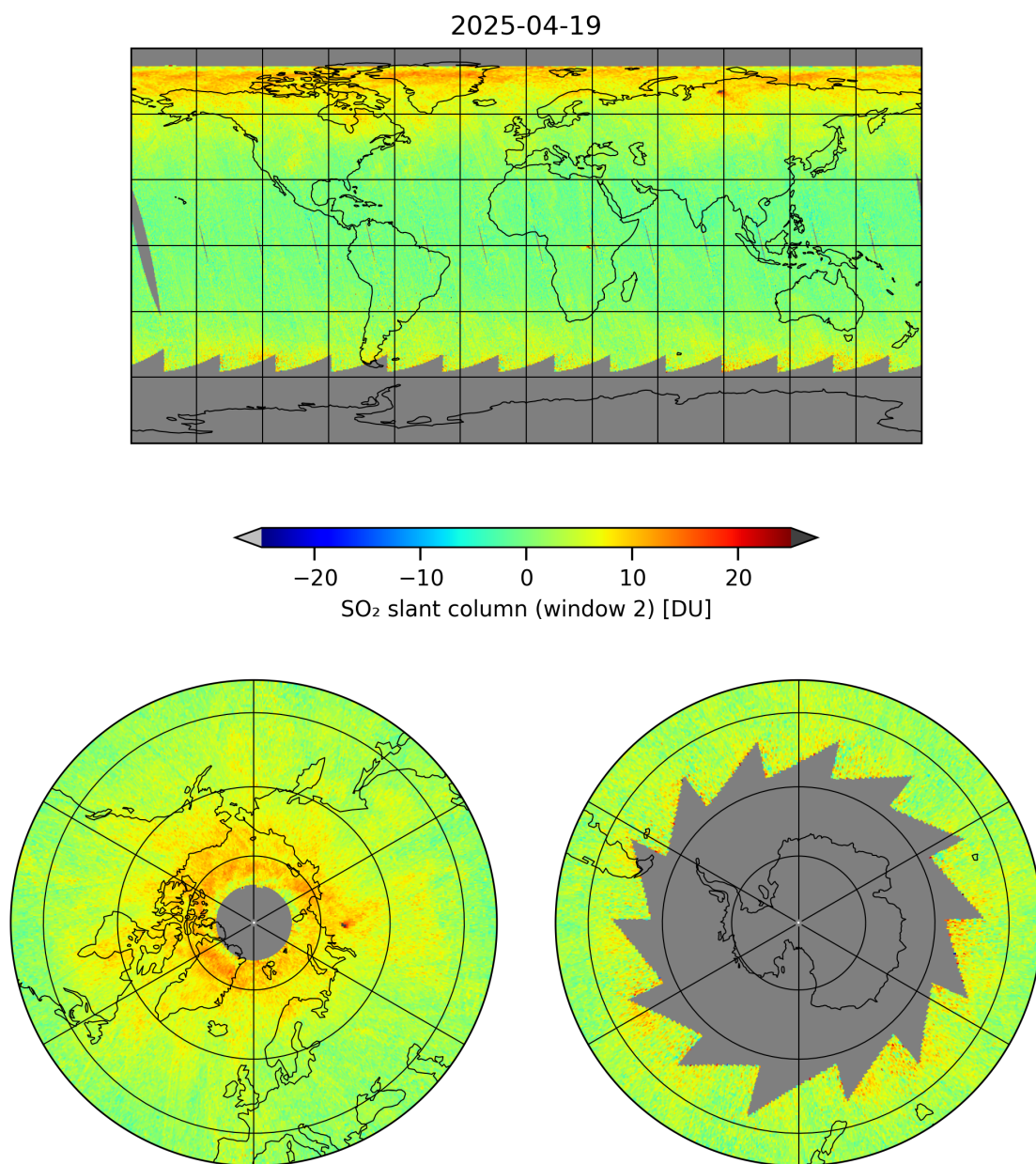


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-04-19 to 2025-04-20

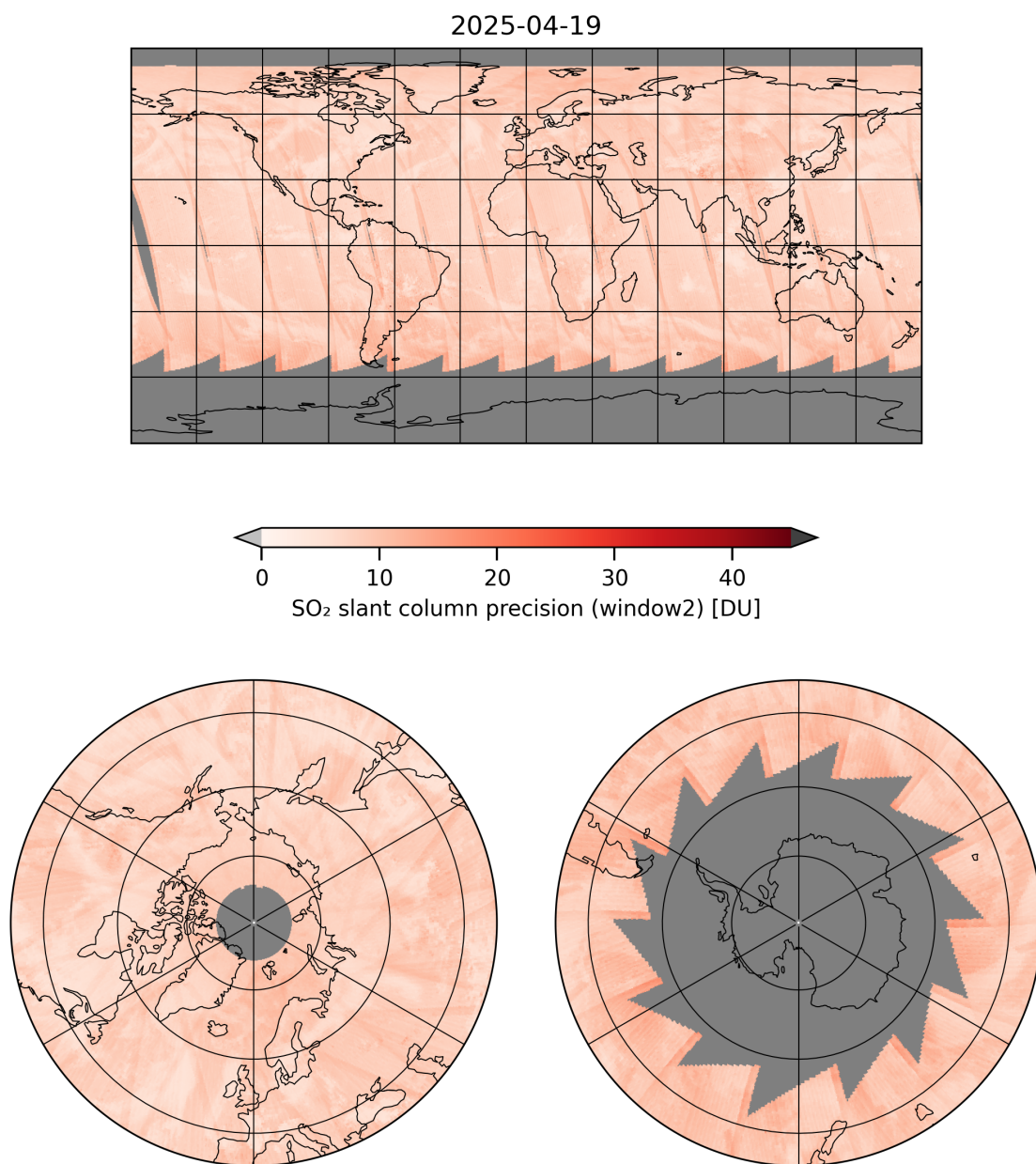


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-04-19 to 2025-04-20

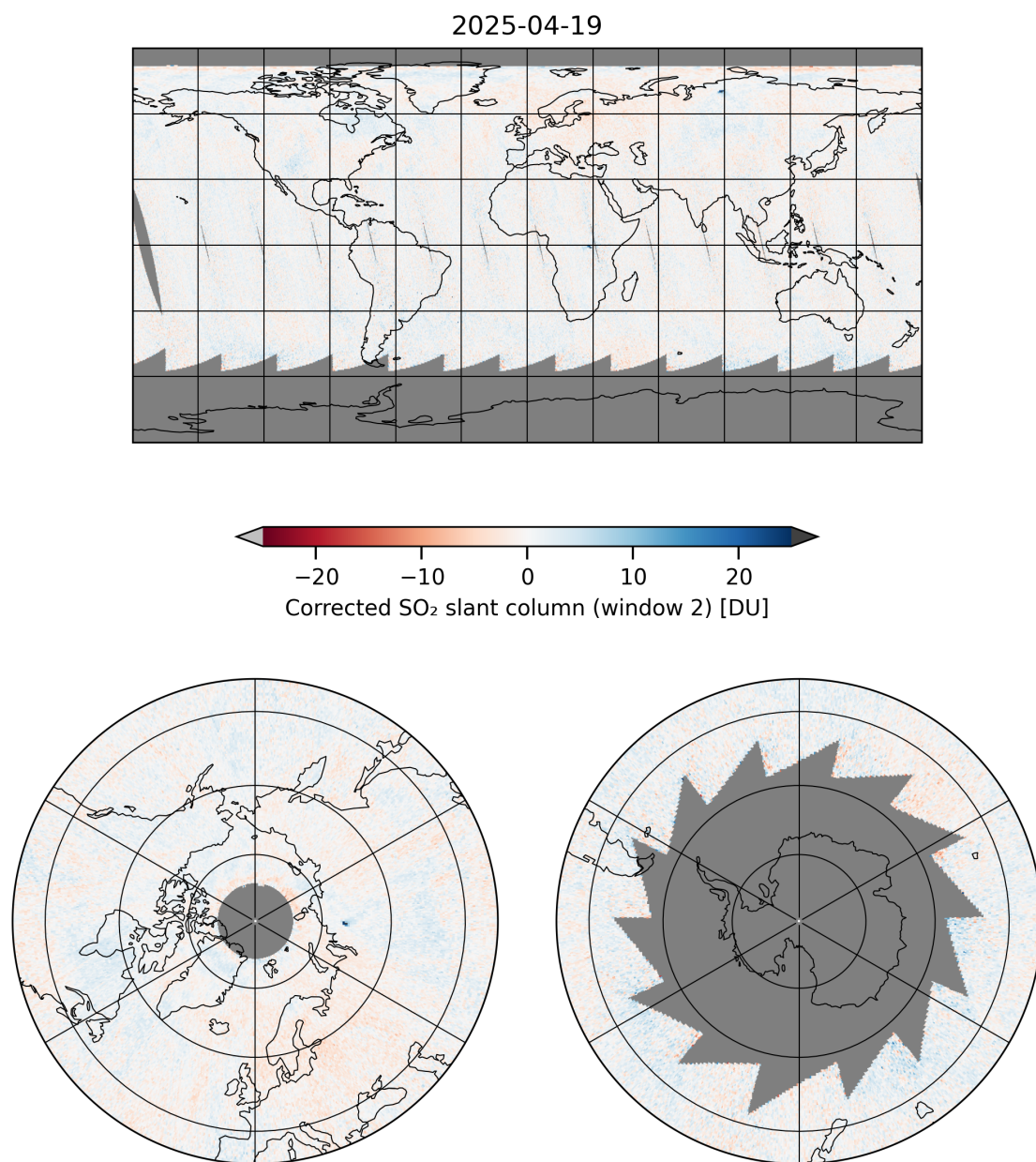


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-04-19 to 2025-04-20

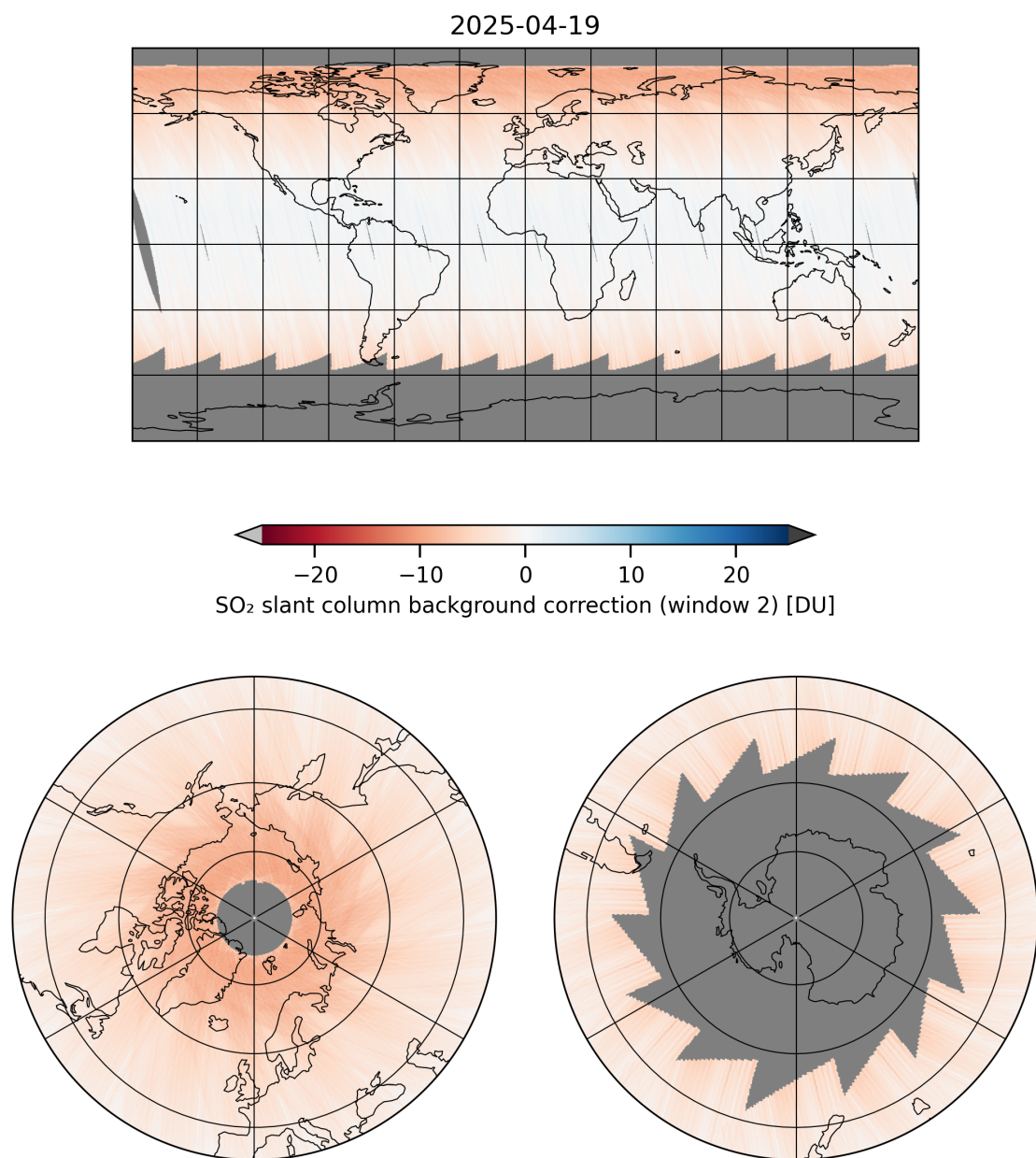


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-04-19 to 2025-04-20

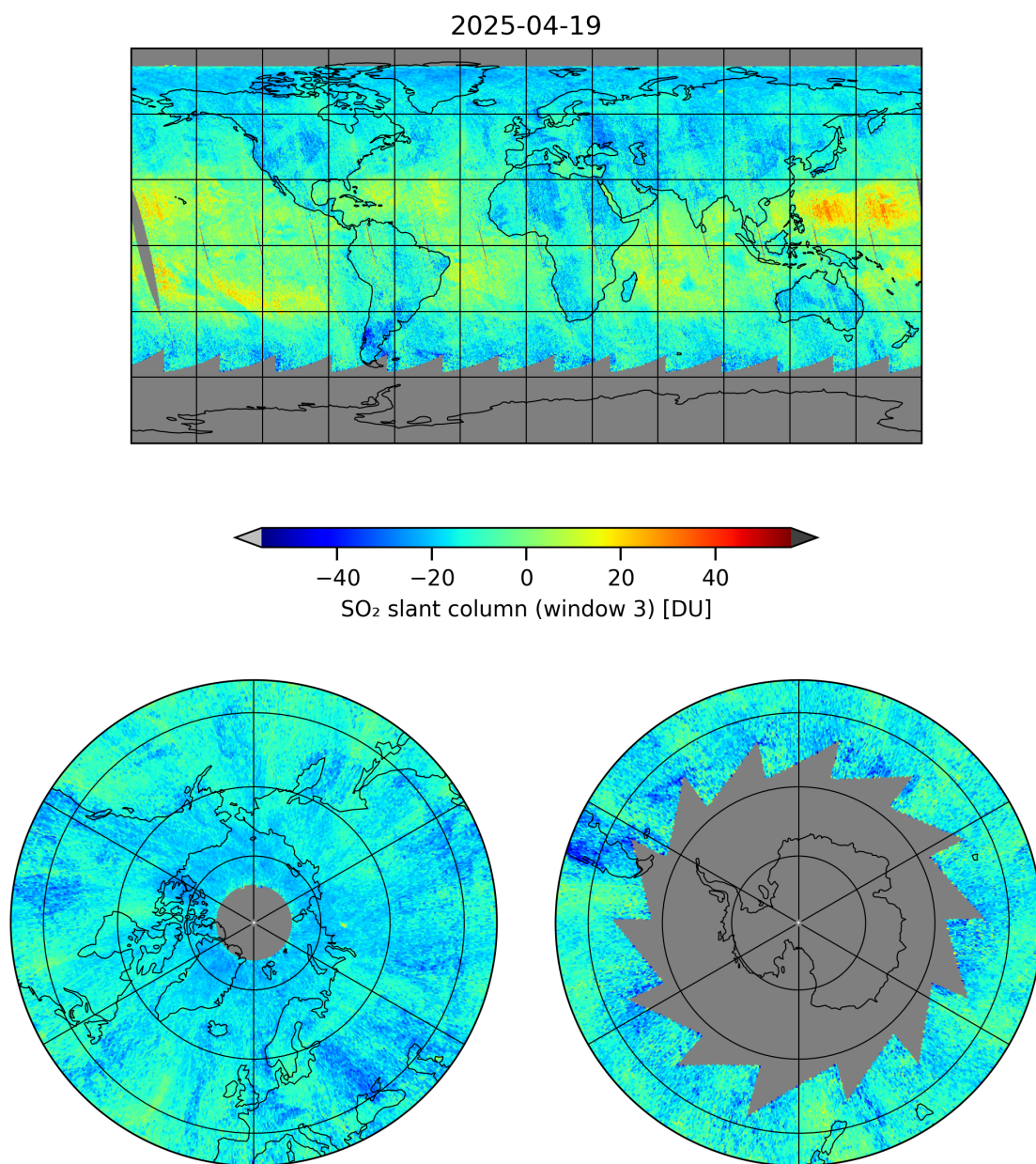


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-04-19 to 2025-04-20

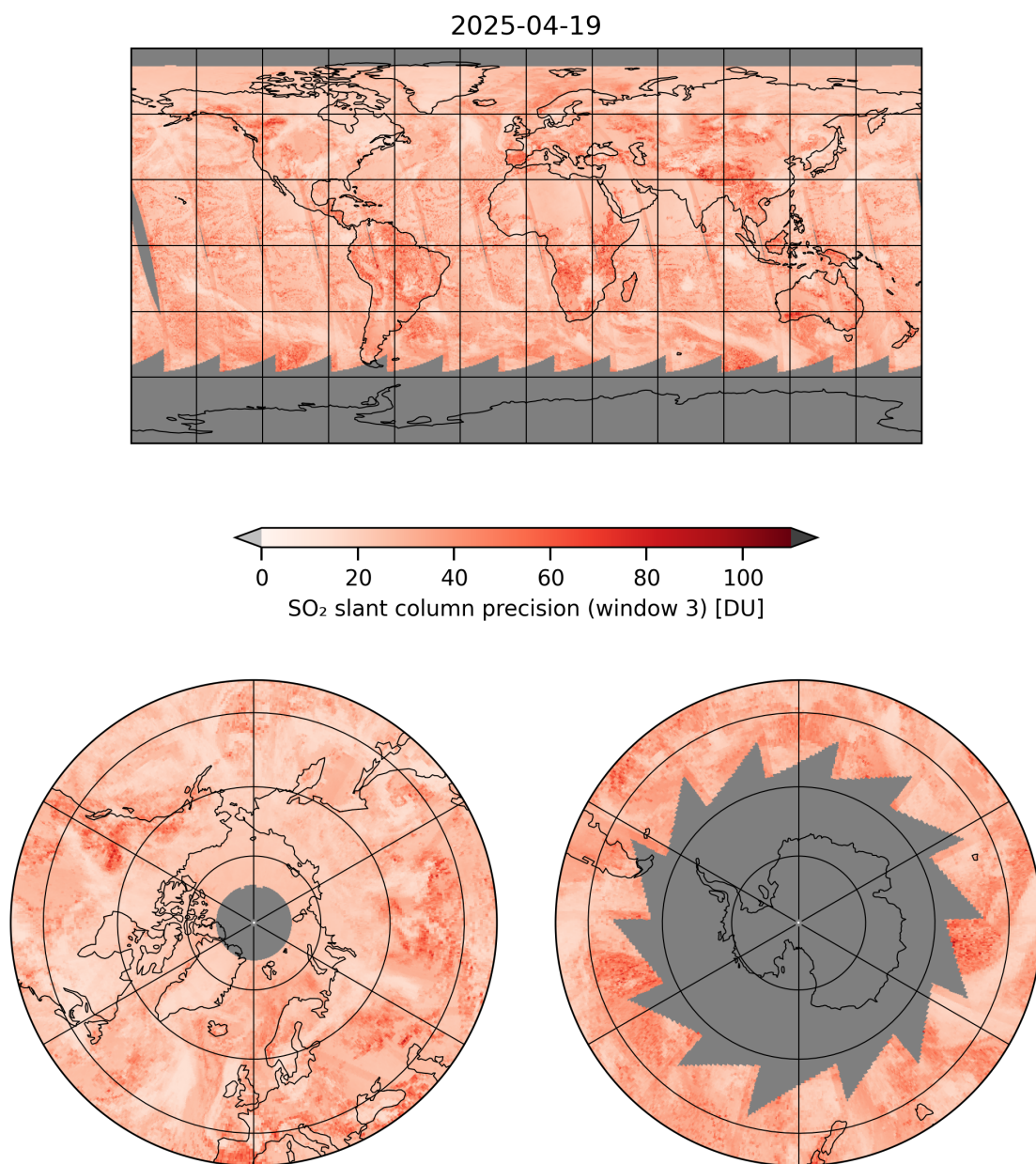


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-04-19 to 2025-04-20

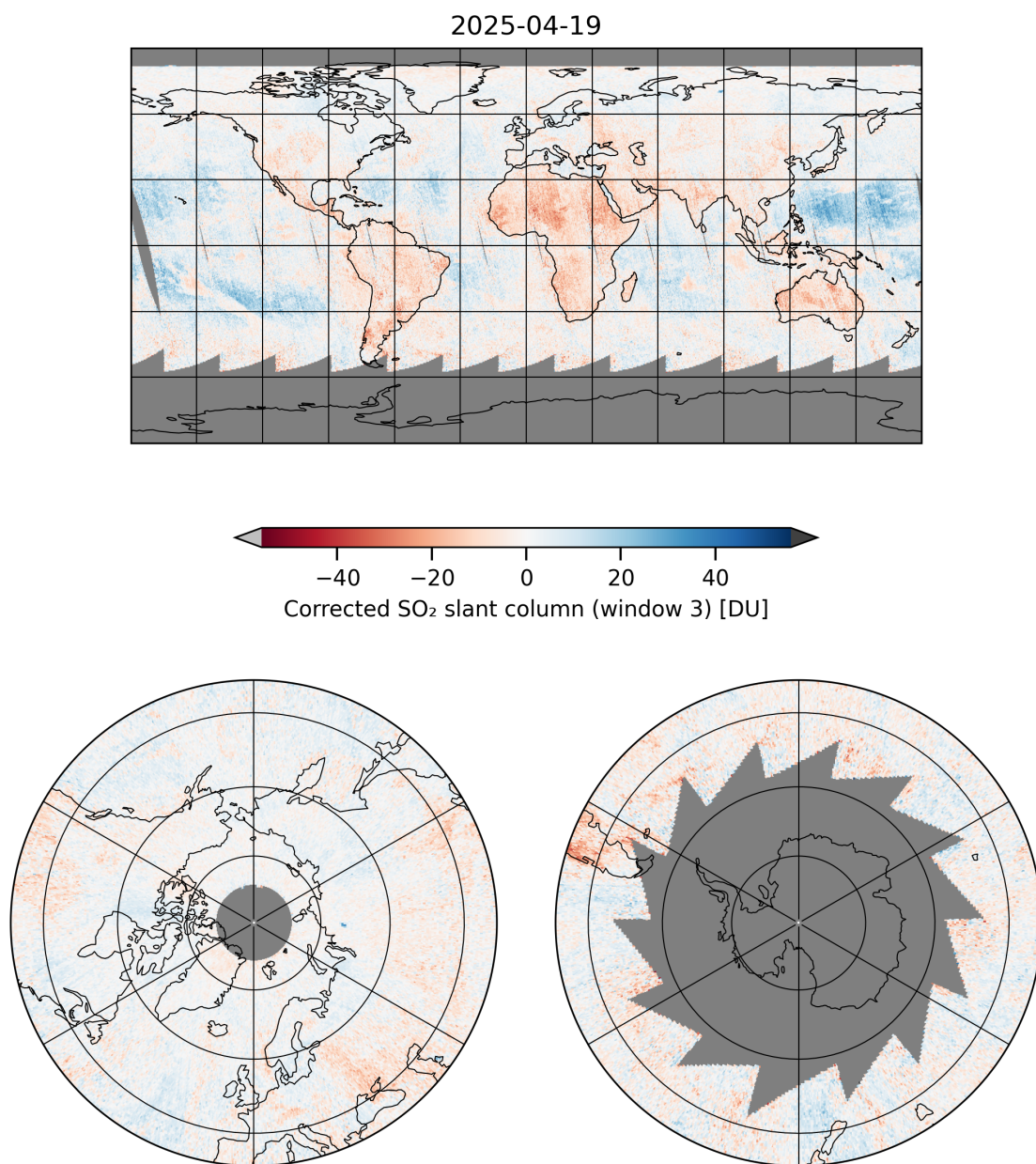


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-04-19 to 2025-04-20

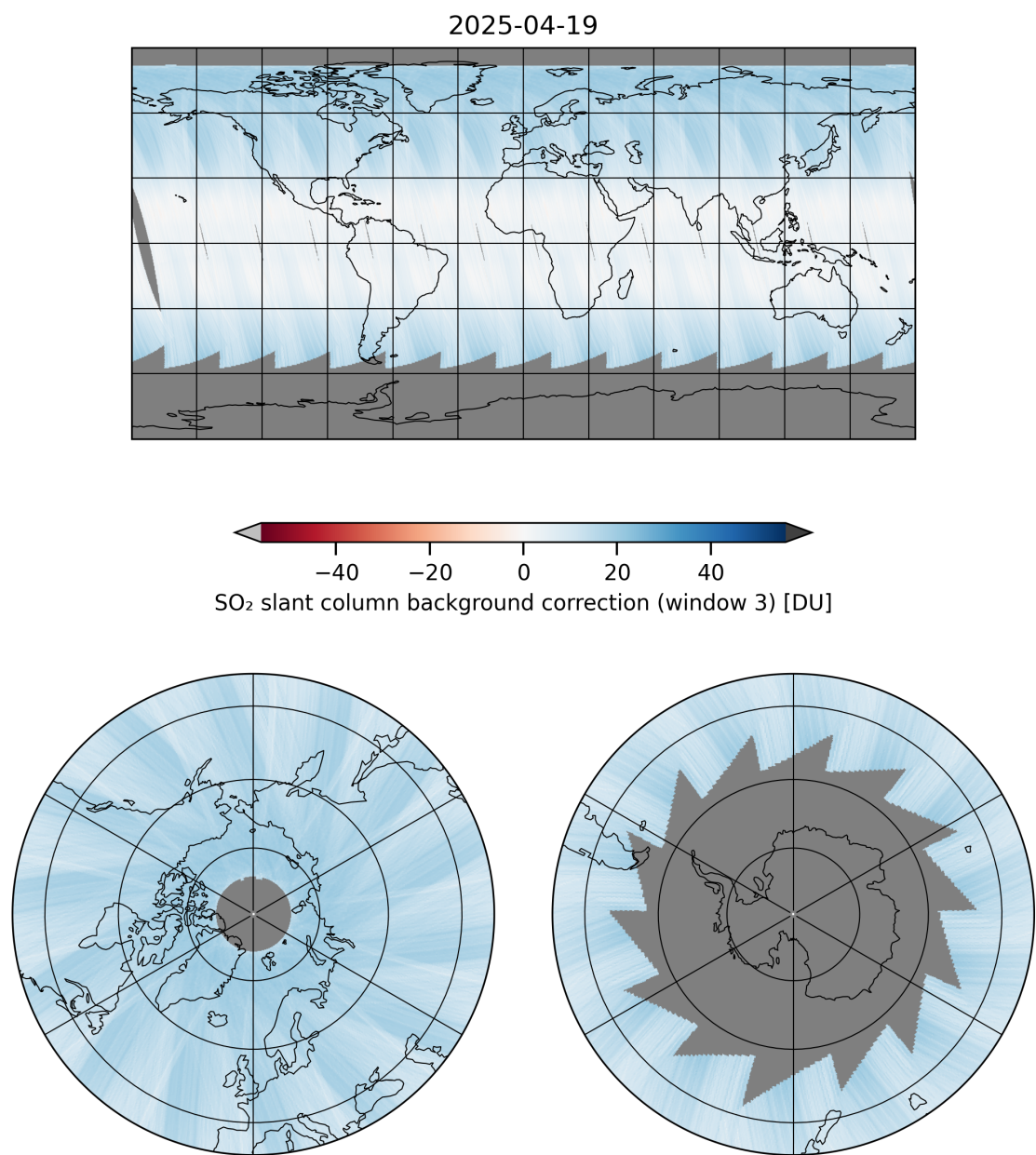


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-04-19 to 2025-04-20

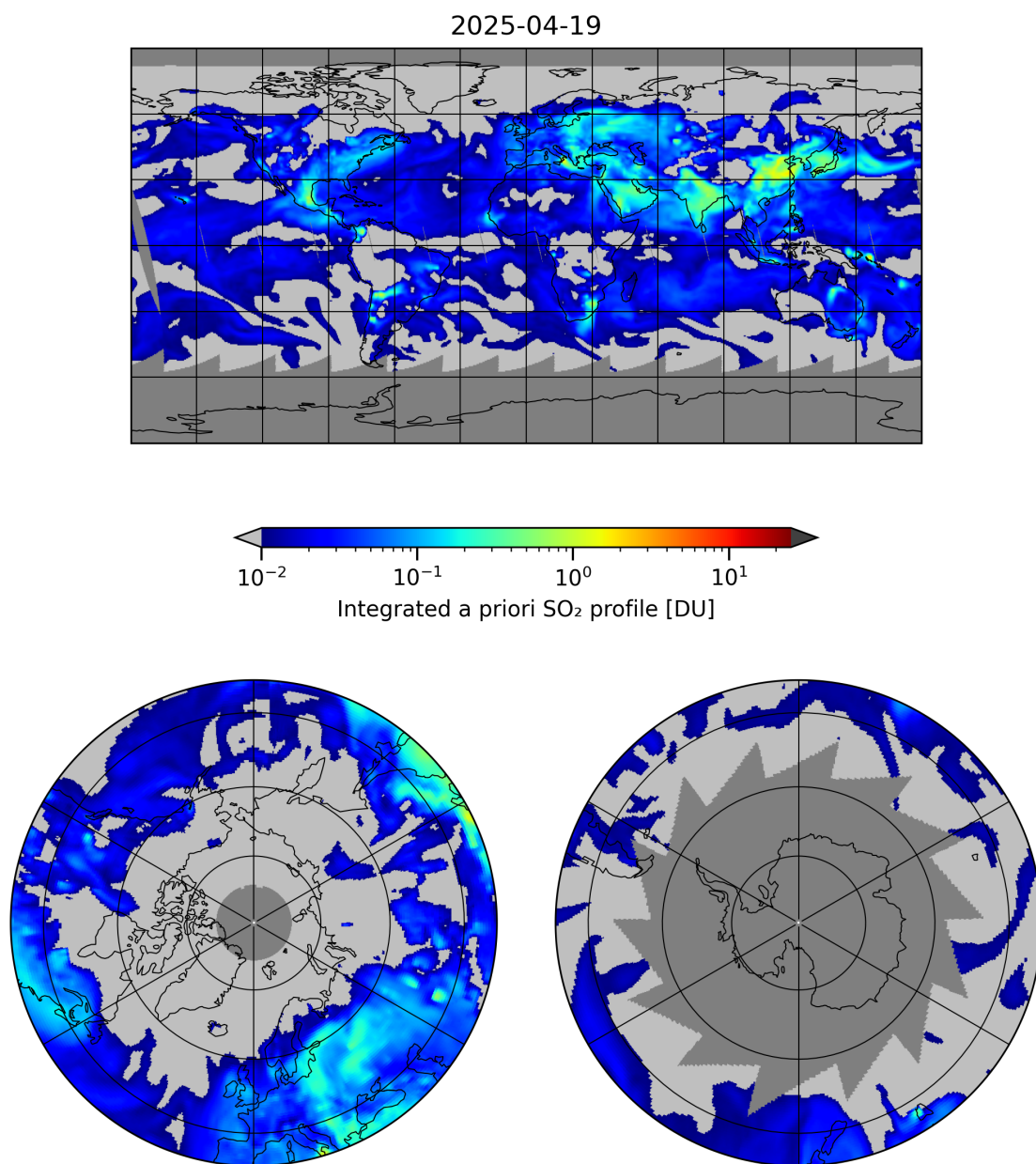


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-04-19 to 2025-04-20

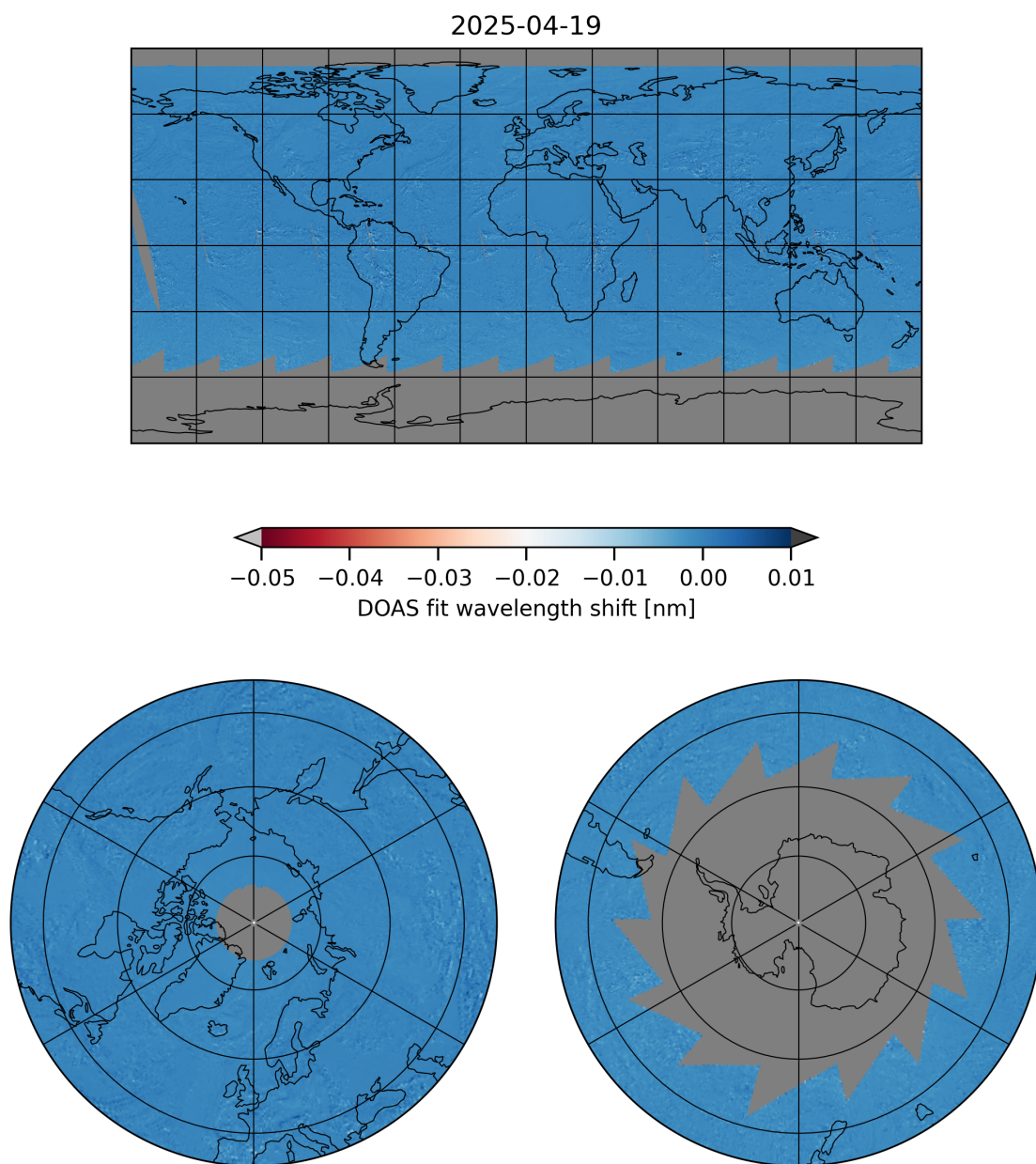


Figure 22: Map of “DOAS fit wavelength shift” for 2025-04-19 to 2025-04-20

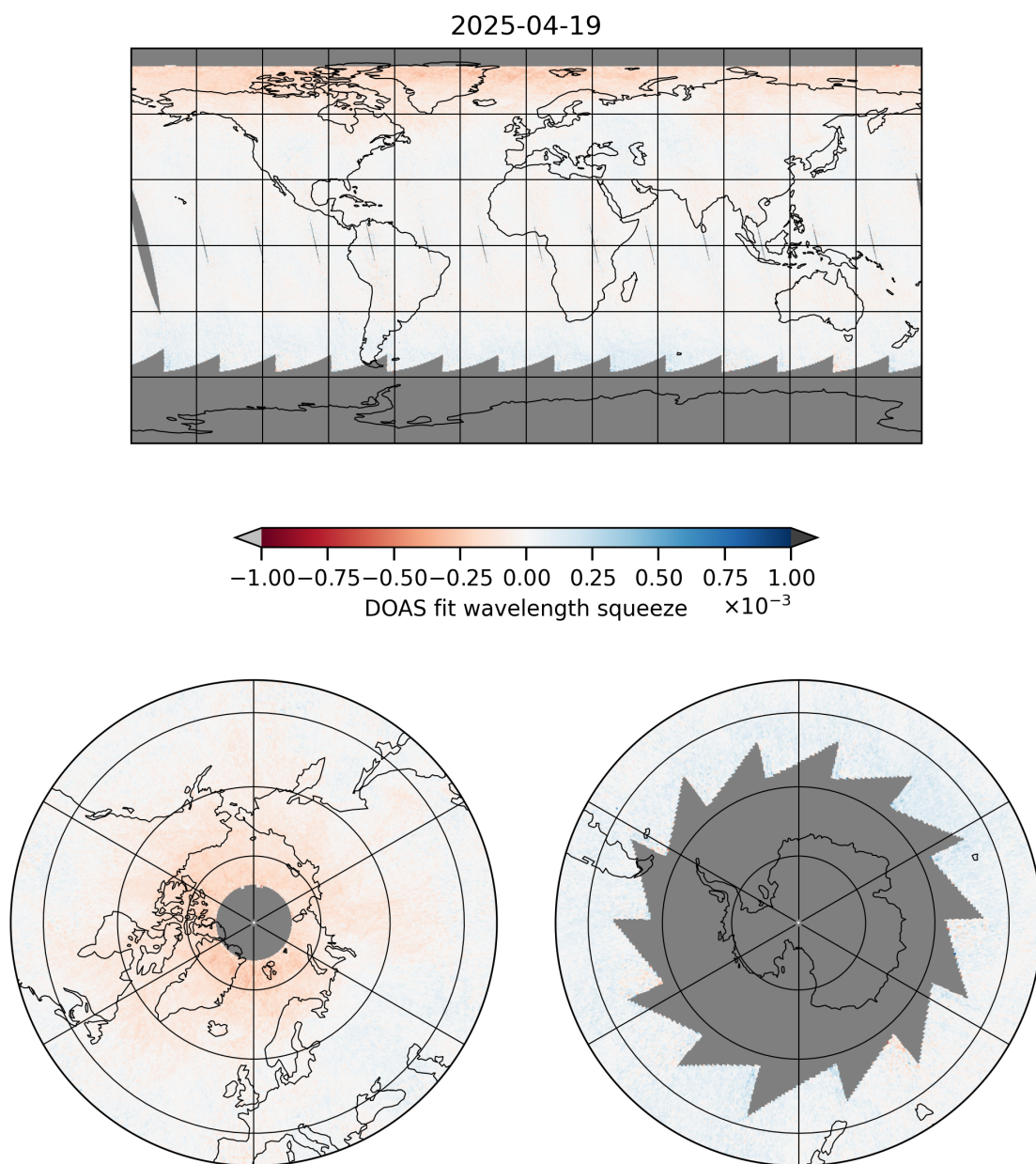


Figure 23: Map of "DOAS fit wavelength squeeze" for 2025-04-19 to 2025-04-20

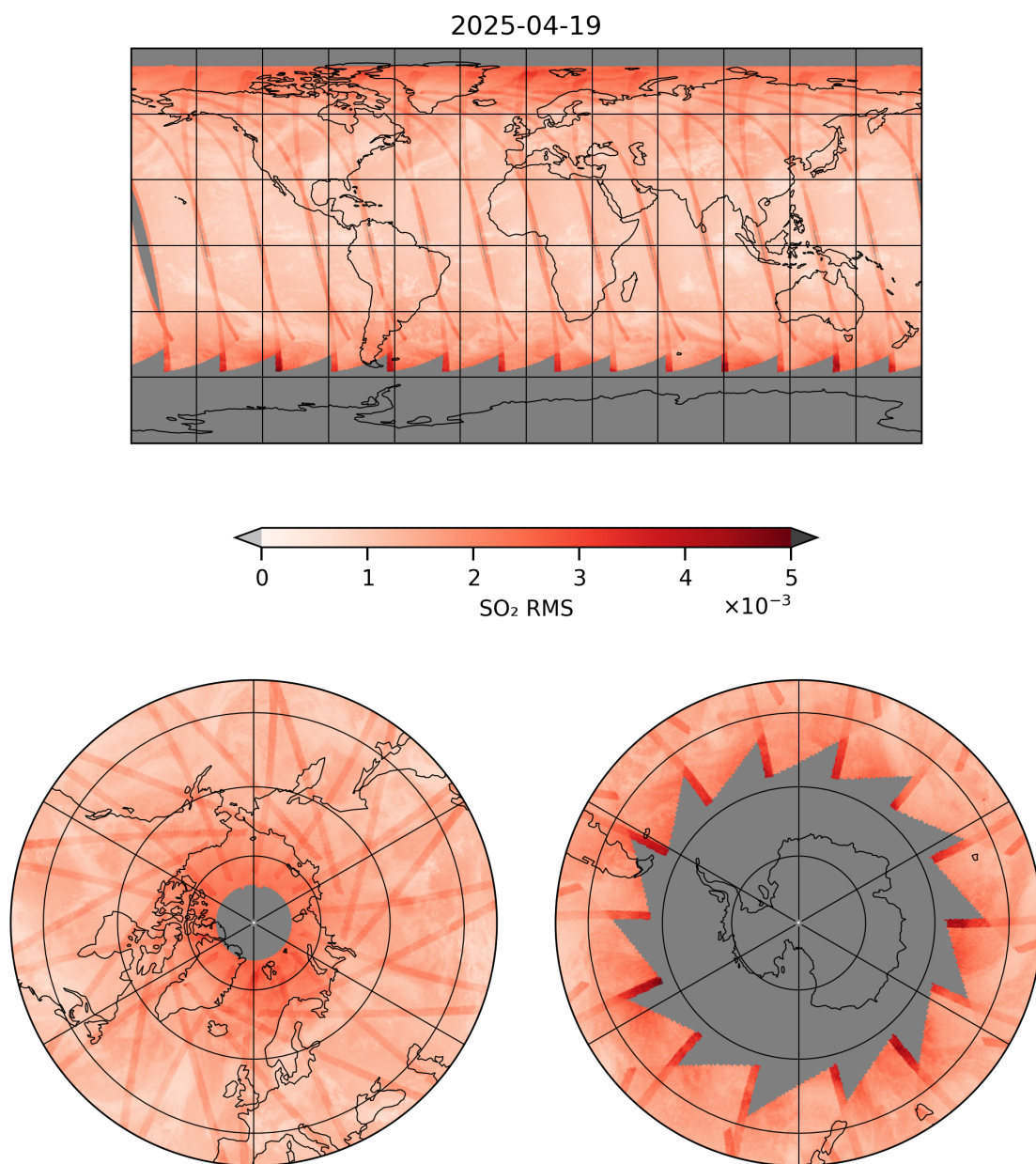


Figure 24: Map of “SO₂ RMS” for 2025-04-19 to 2025-04-20

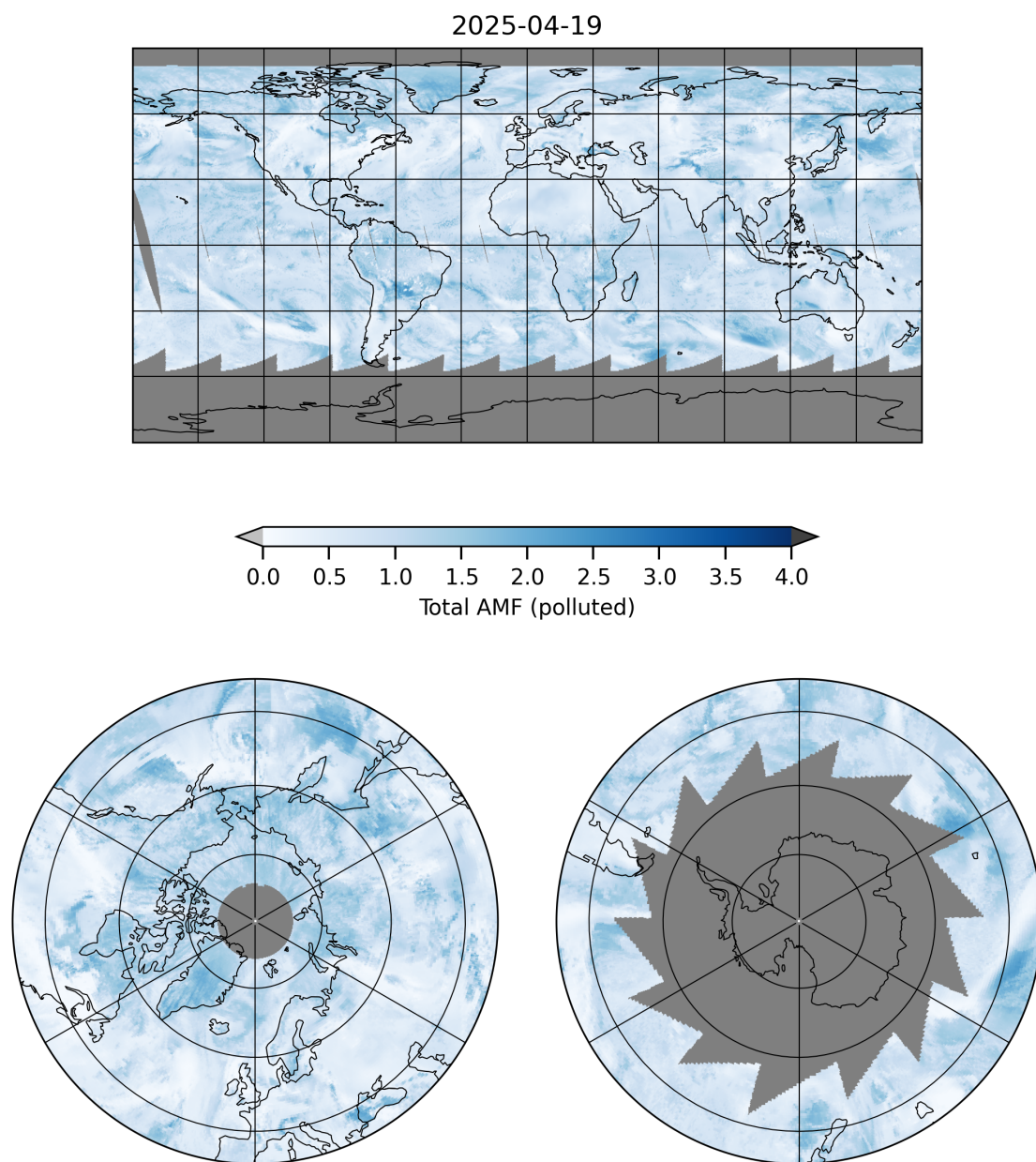


Figure 25: Map of “Total AMF (polluted)” for 2025-04-19 to 2025-04-20

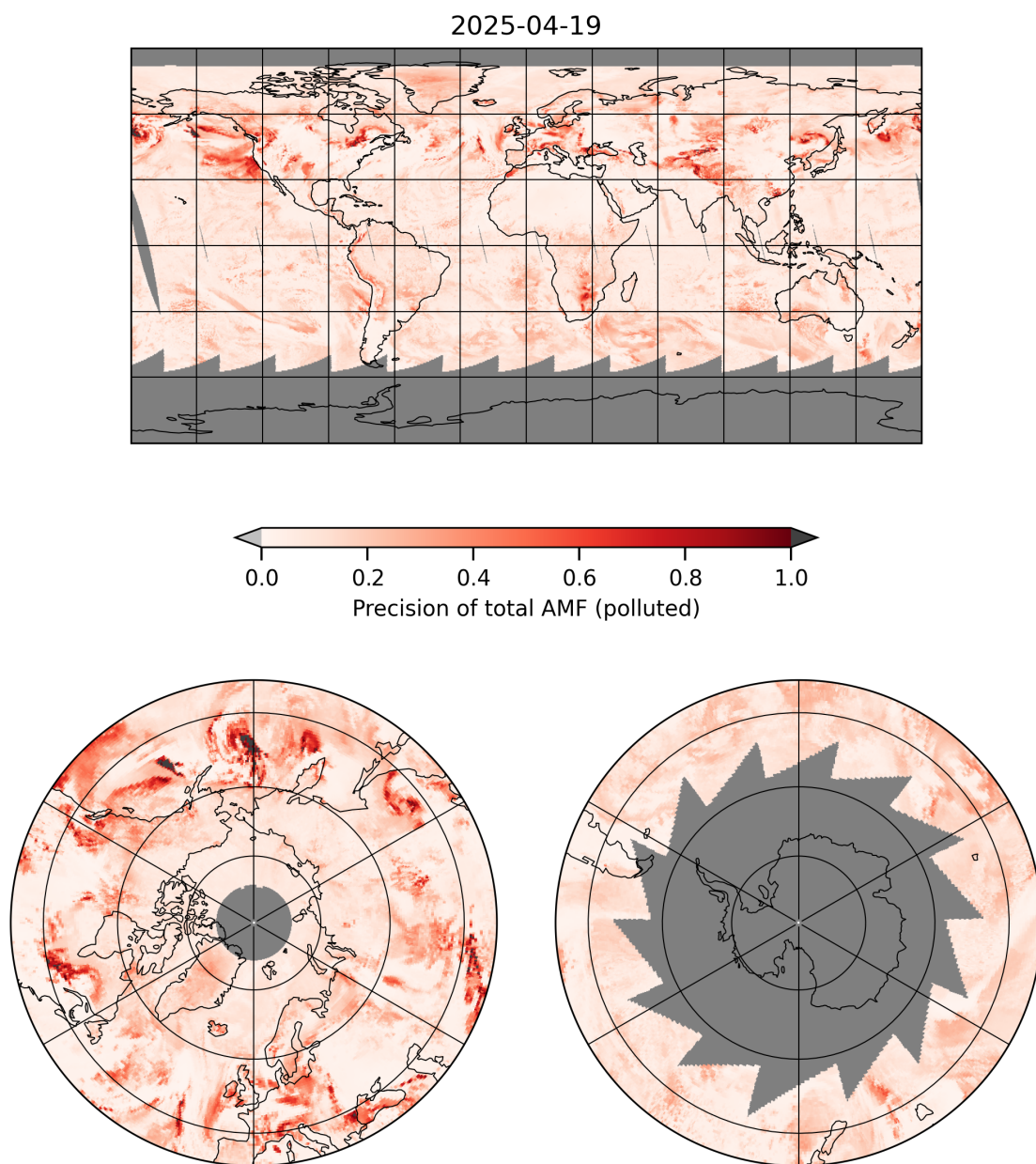


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-04-19 to 2025-04-20

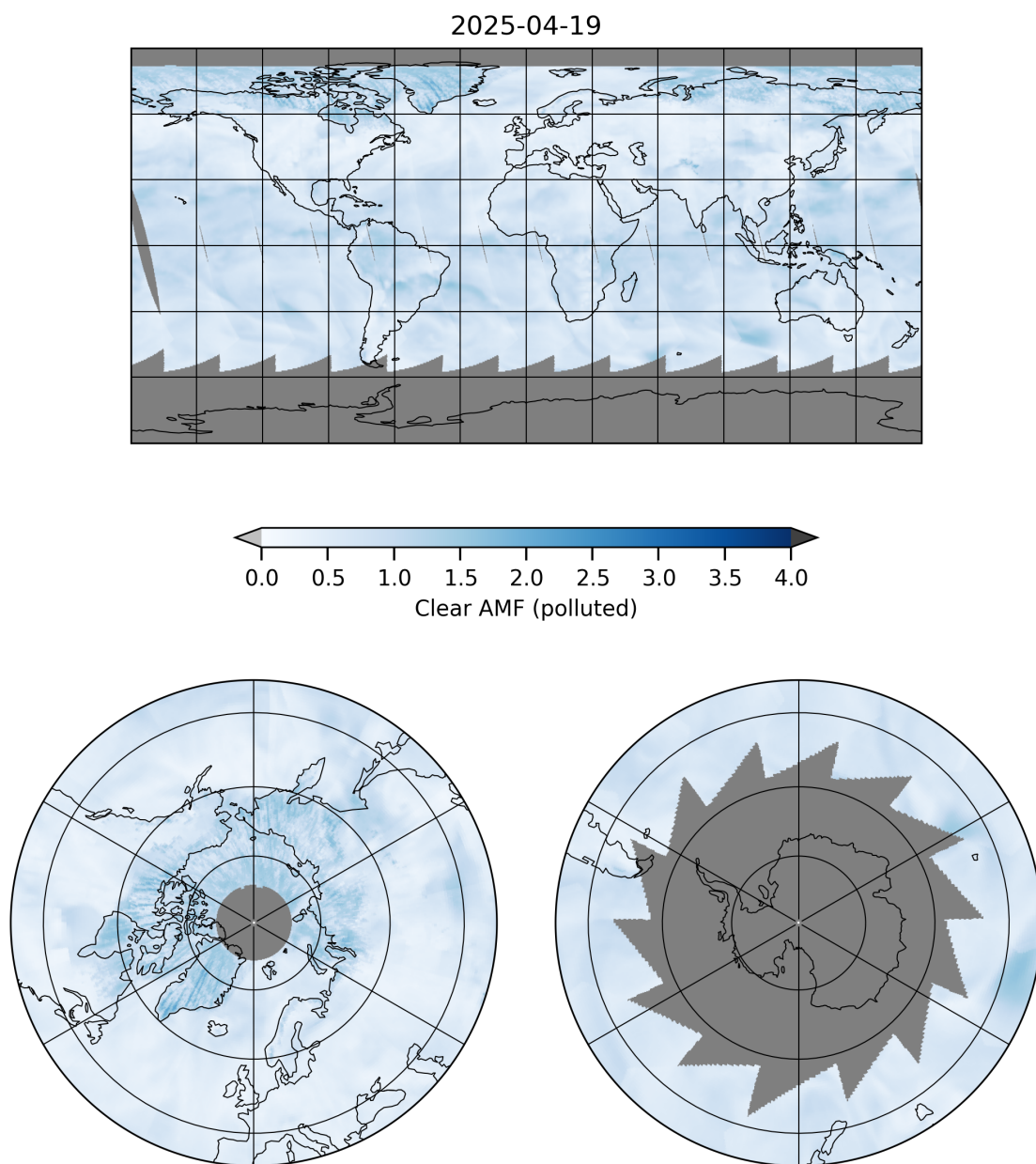


Figure 27: Map of “Clear AMF (polluted)” for 2025-04-19 to 2025-04-20

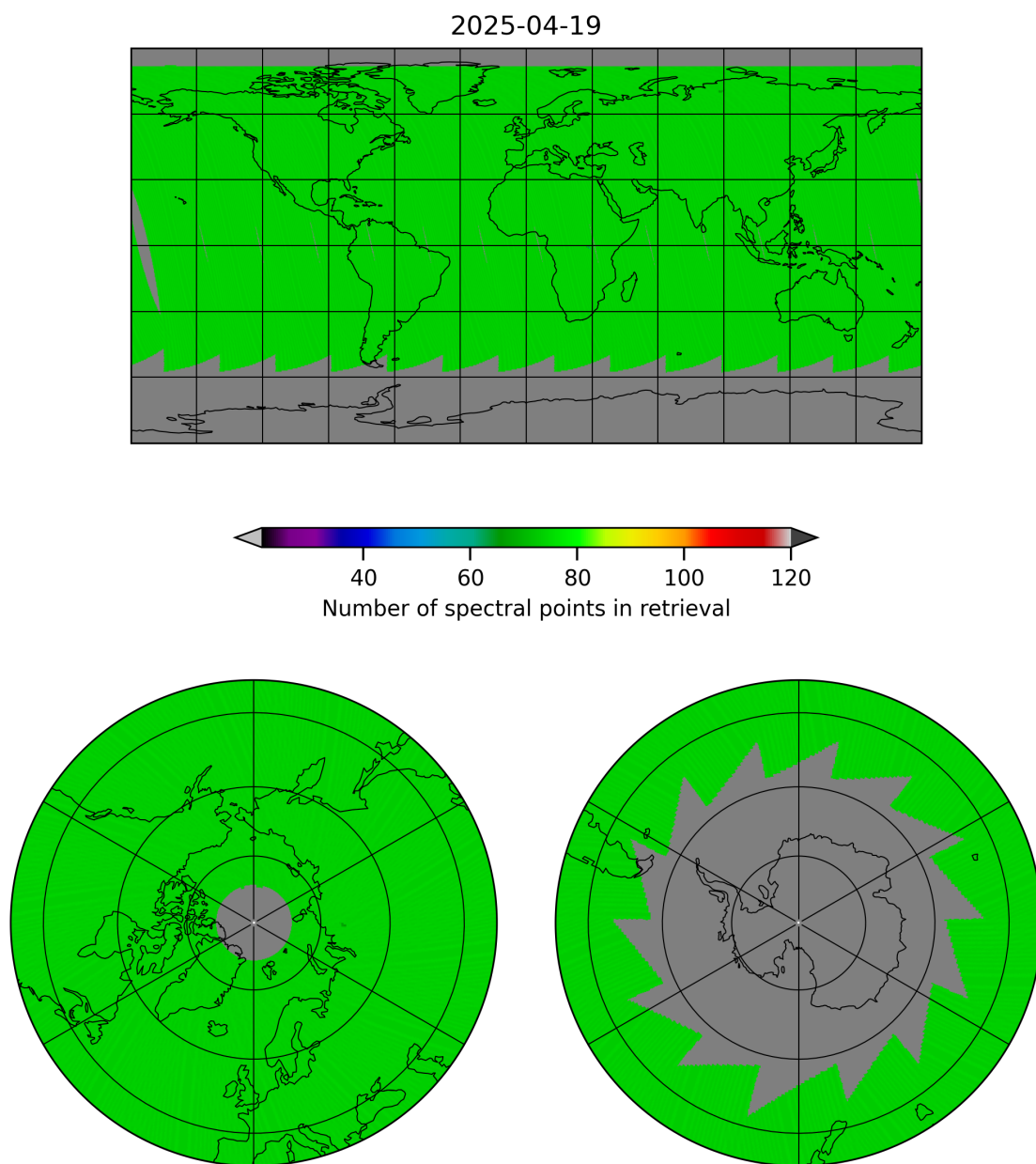


Figure 28: Map of “Number of spectral points in retrieval” for 2025-04-19 to 2025-04-20

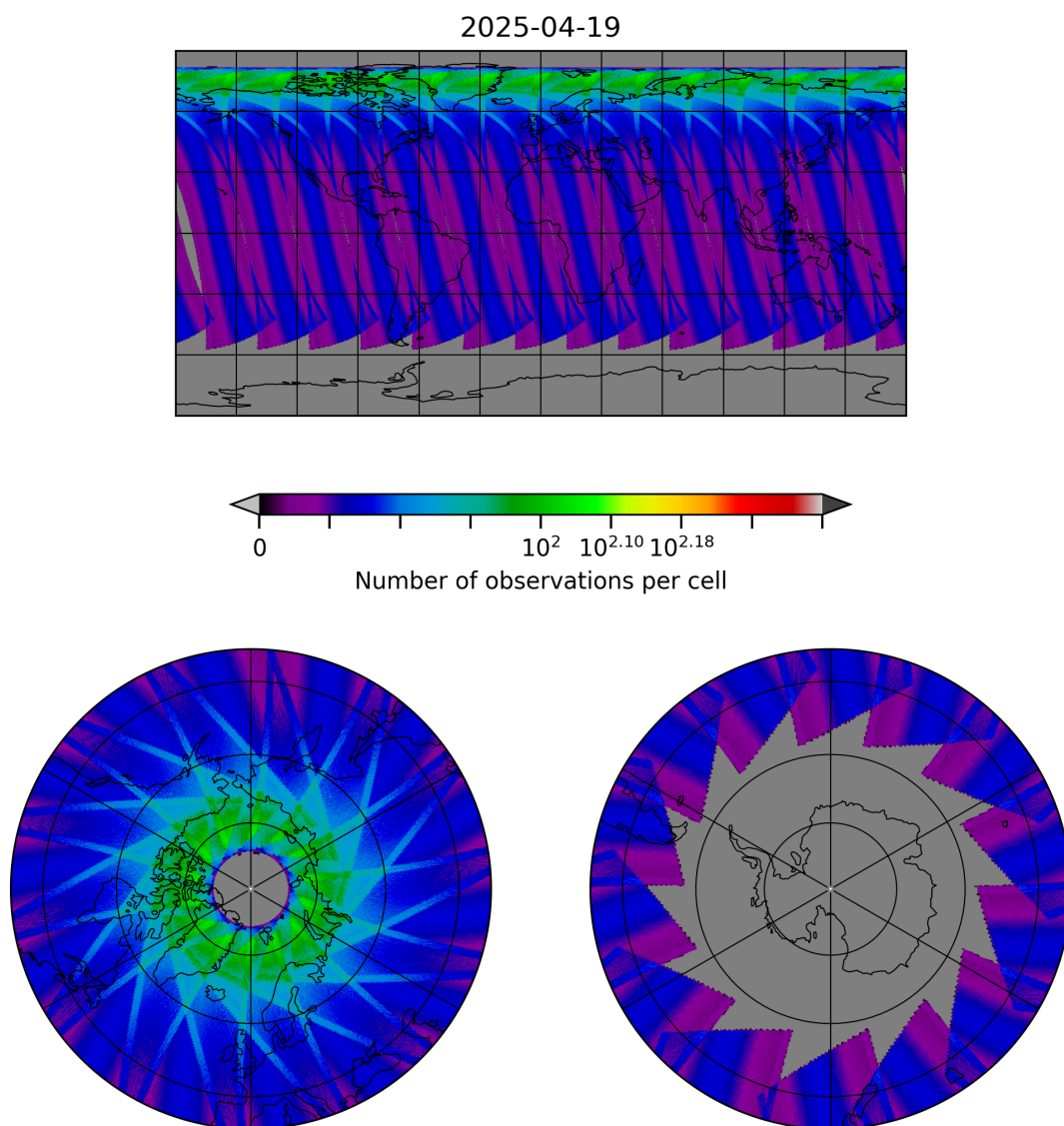


Figure 29: Map of the number of observations for 2025-04-19 to 2025-04-20

7 Zonal average

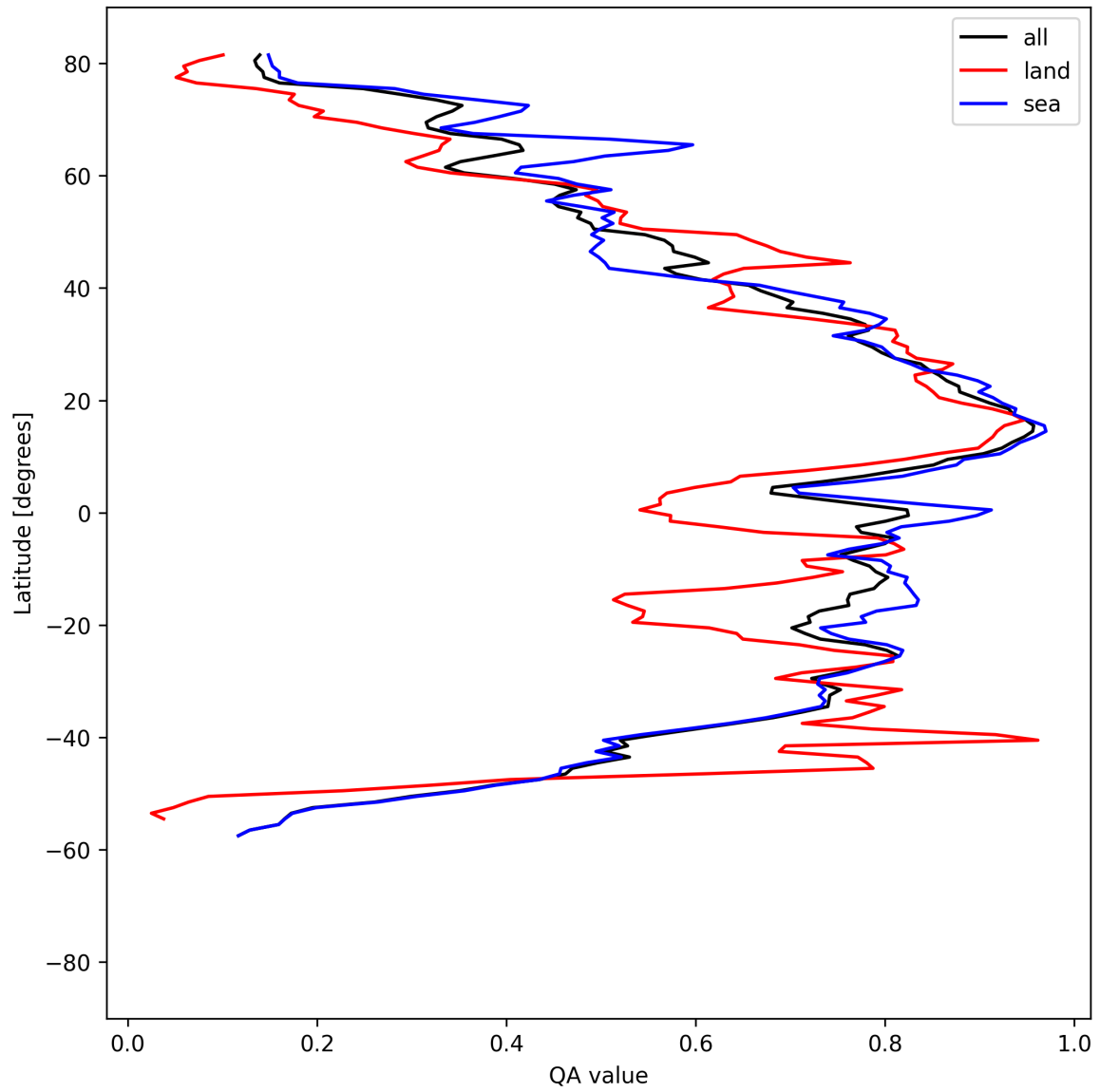


Figure 30: Zonal average of “QA value” for 2025-04-19 to 2025-04-20.

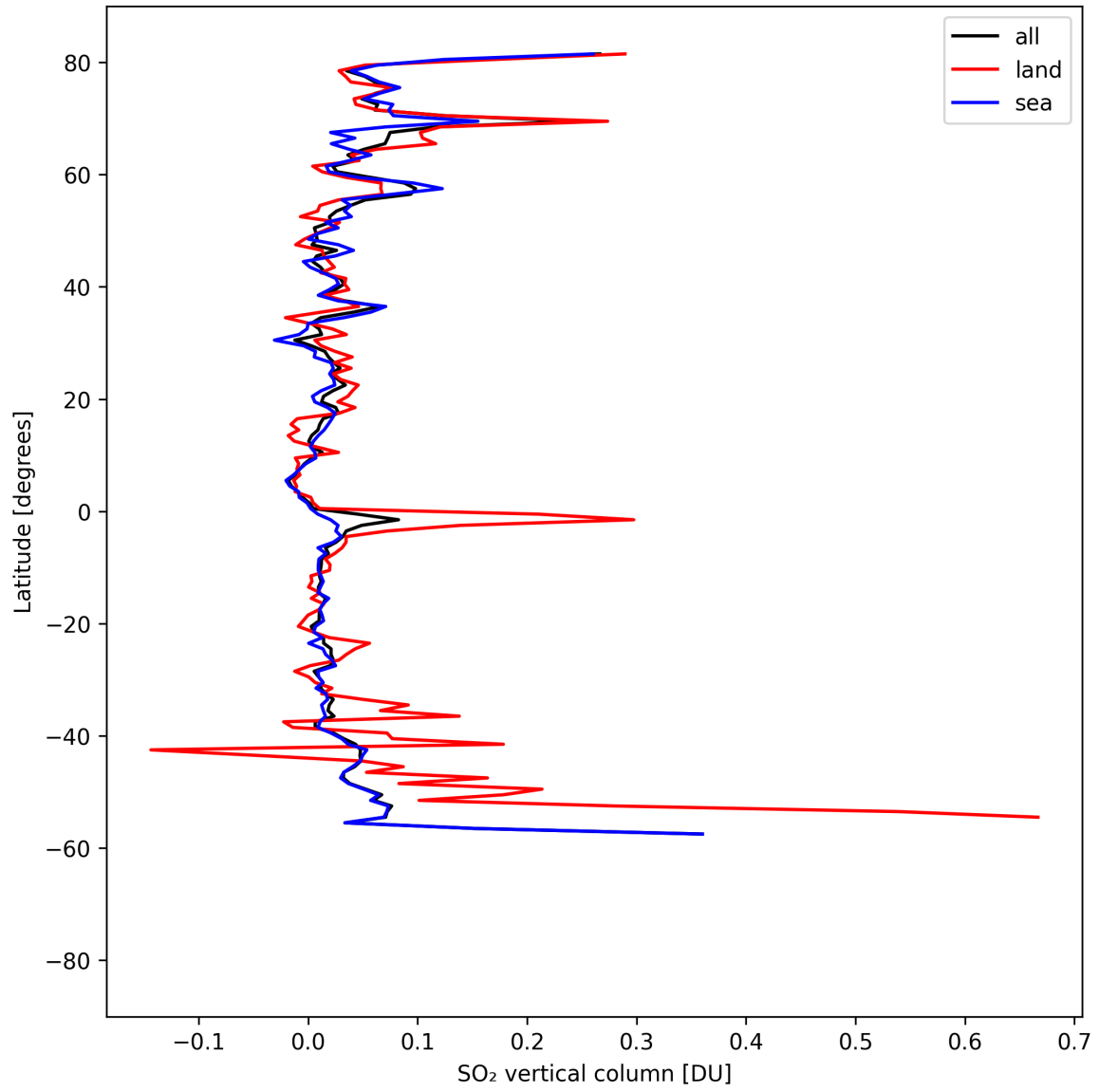


Figure 31: Zonal average of “SO₂ vertical column” for 2025-04-19 to 2025-04-20.

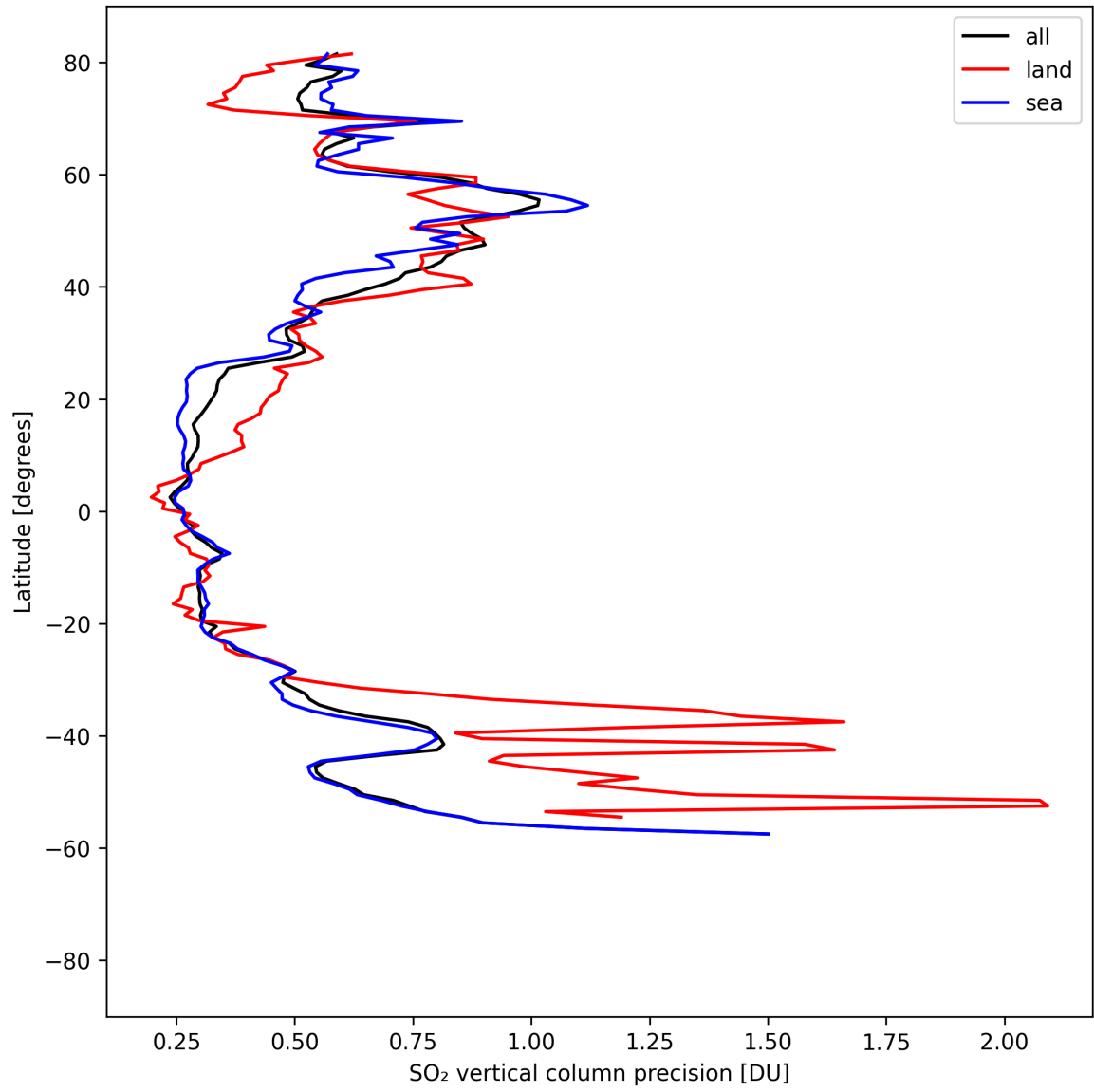


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-04-19 to 2025-04-20.

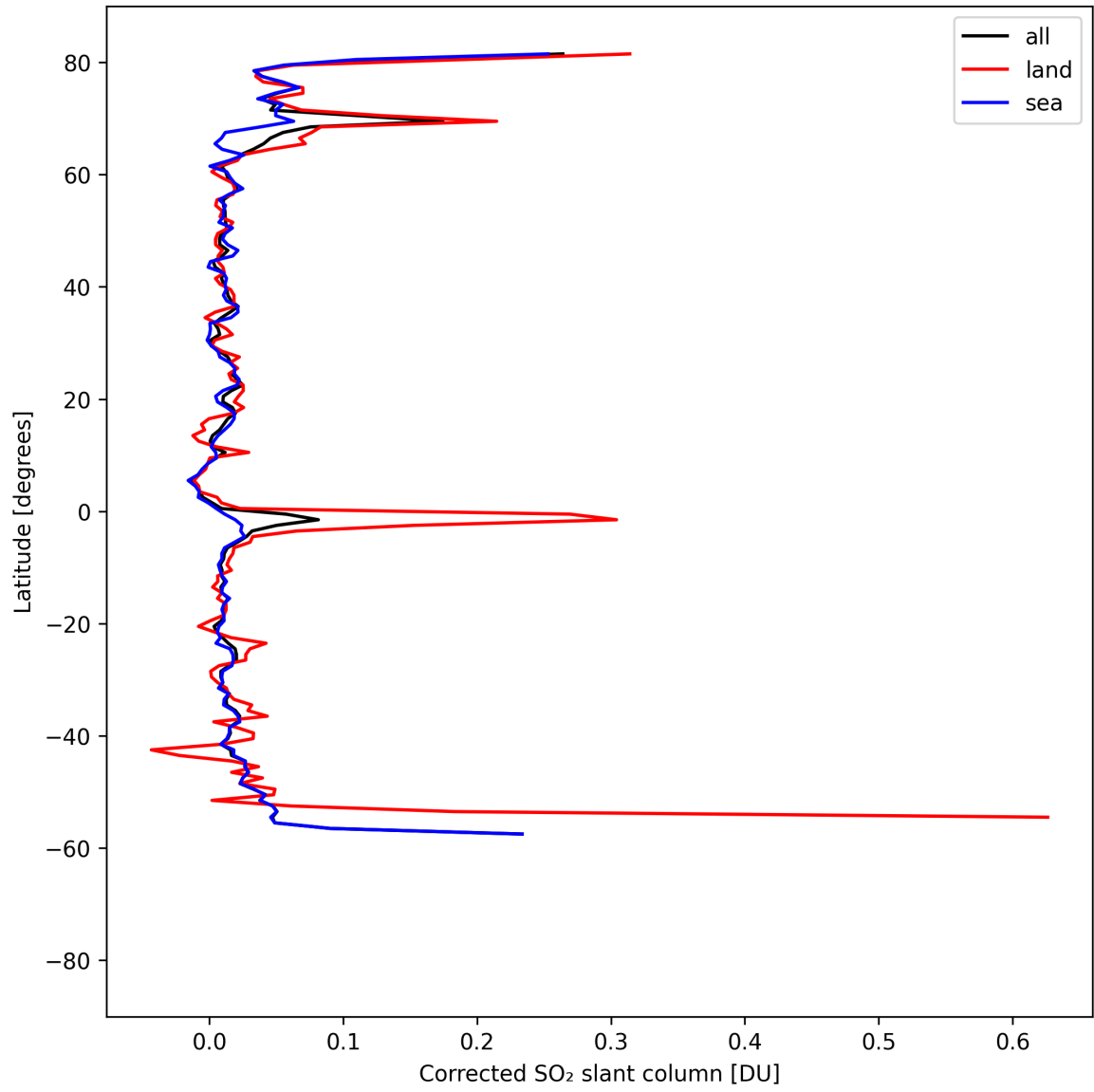


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-04-19 to 2025-04-20.

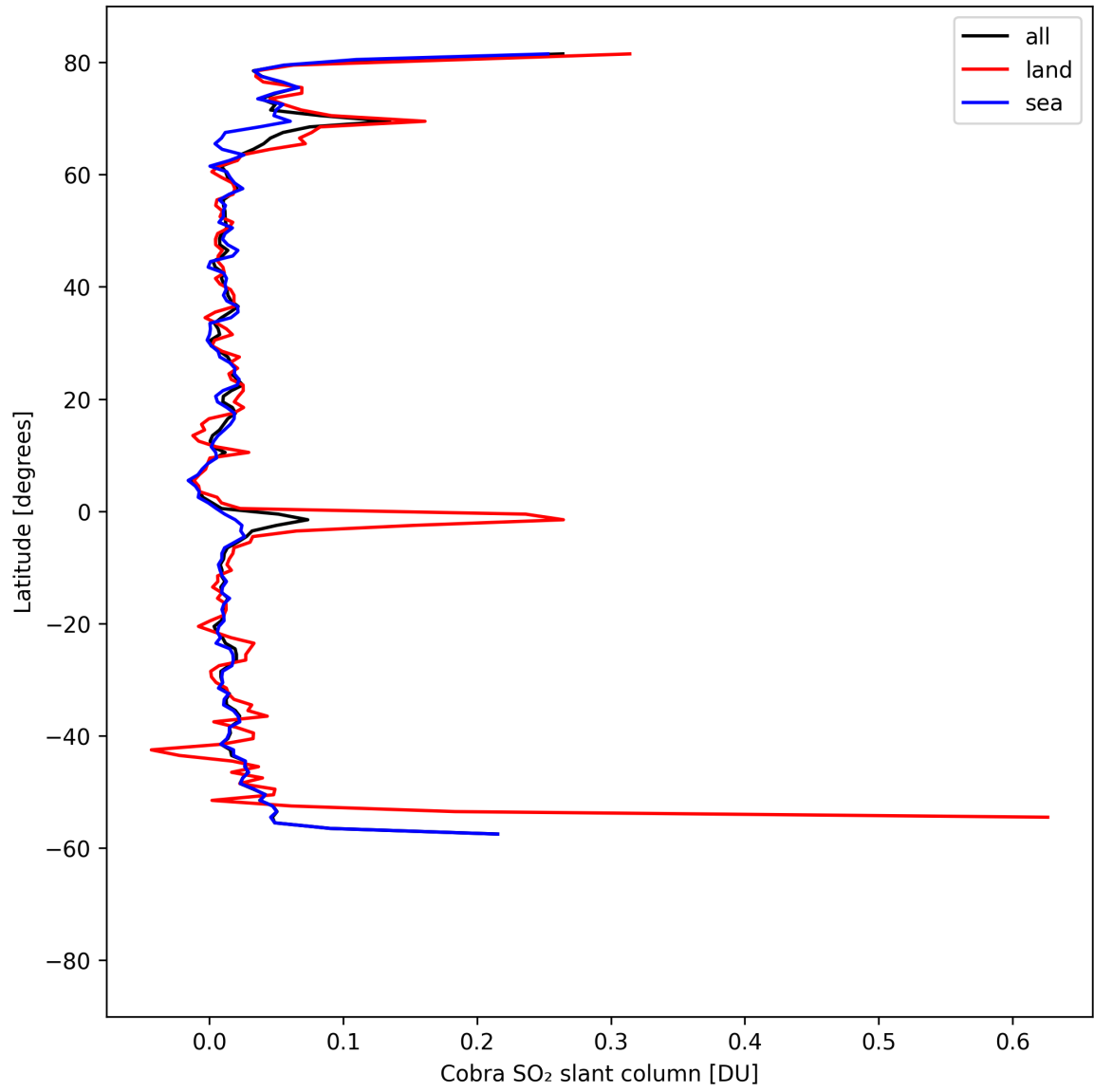


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-04-19 to 2025-04-20.

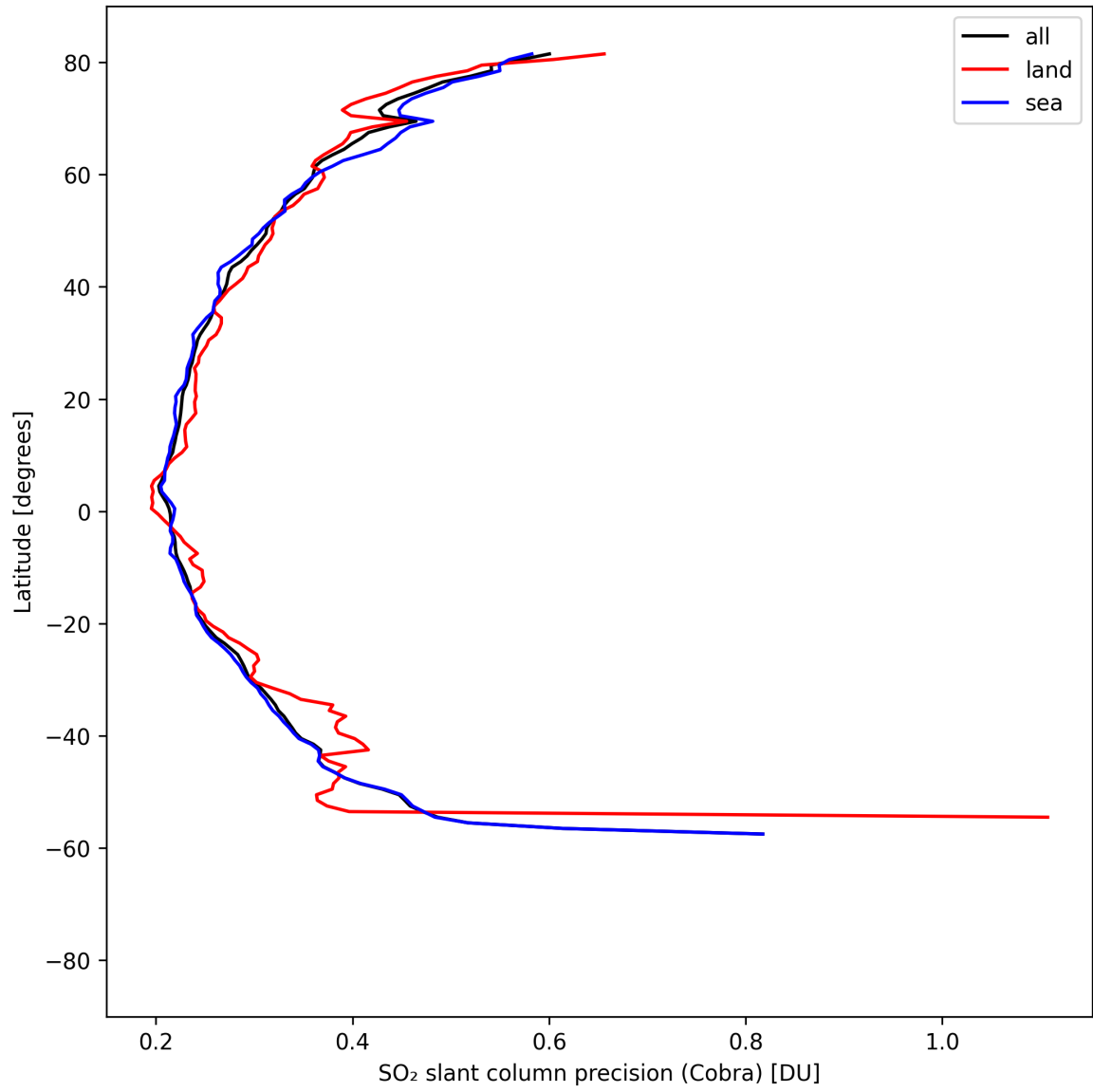


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-04-19 to 2025-04-20.

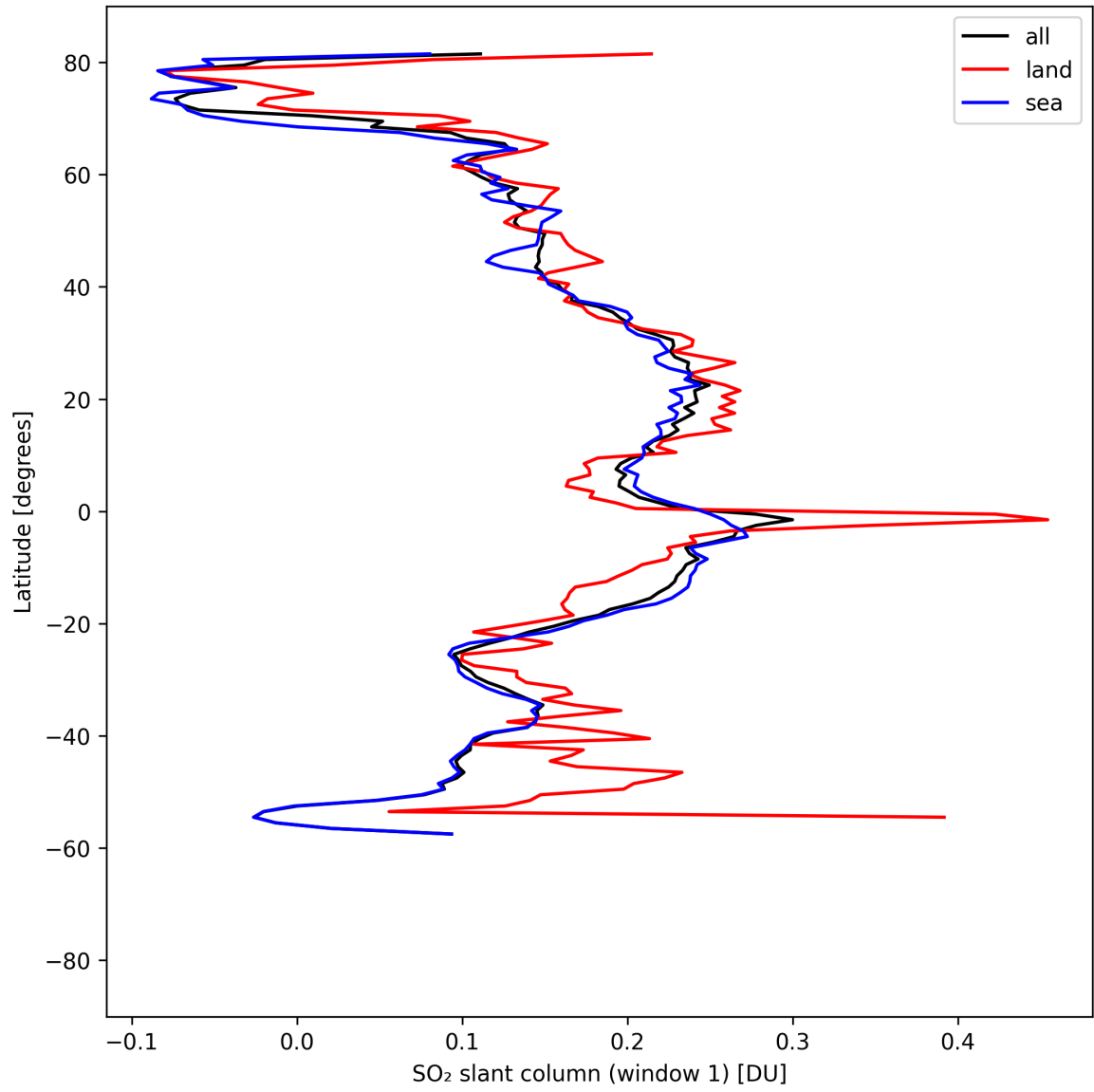


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-04-19 to 2025-04-20.

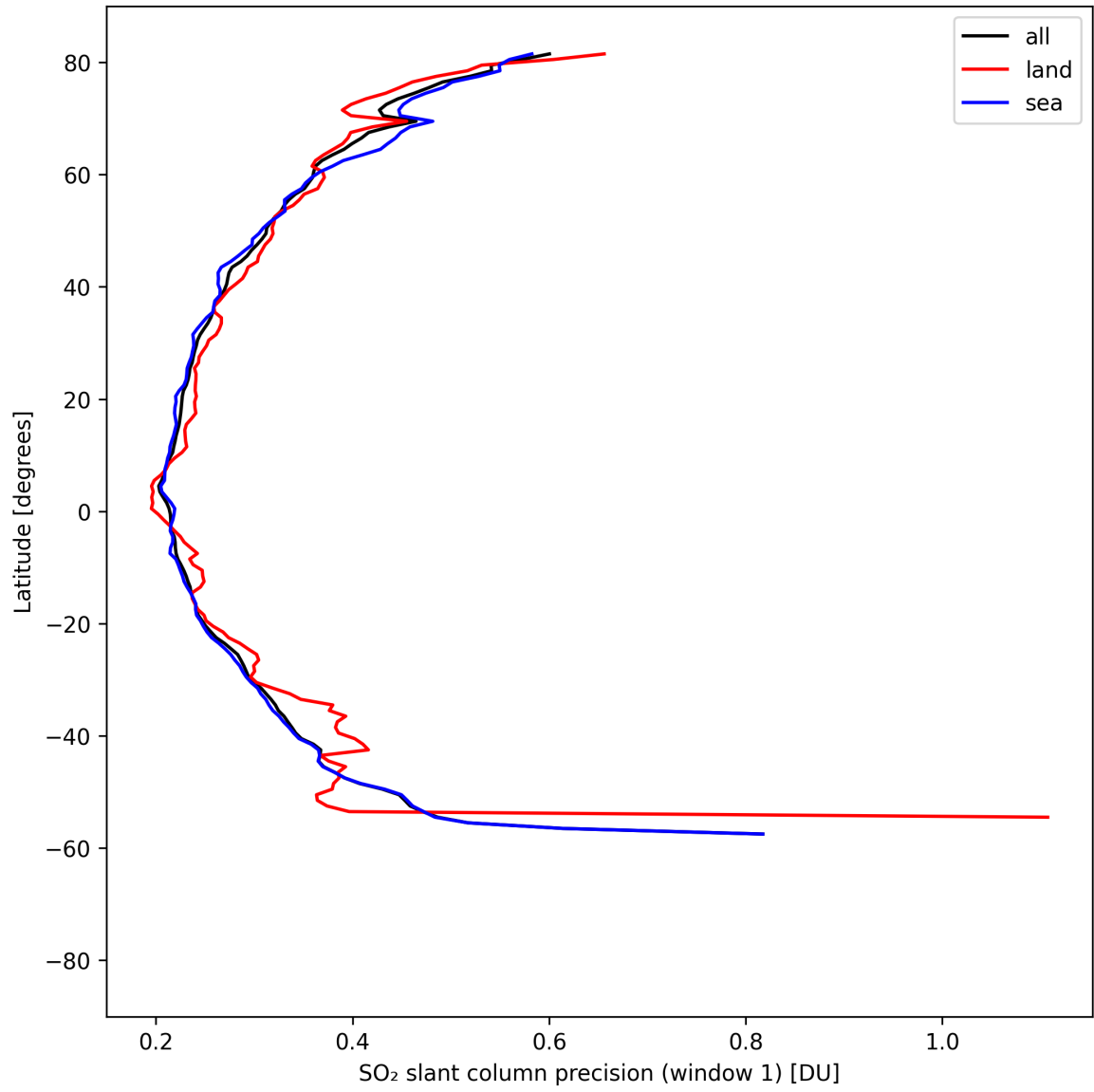


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-04-19 to 2025-04-20.

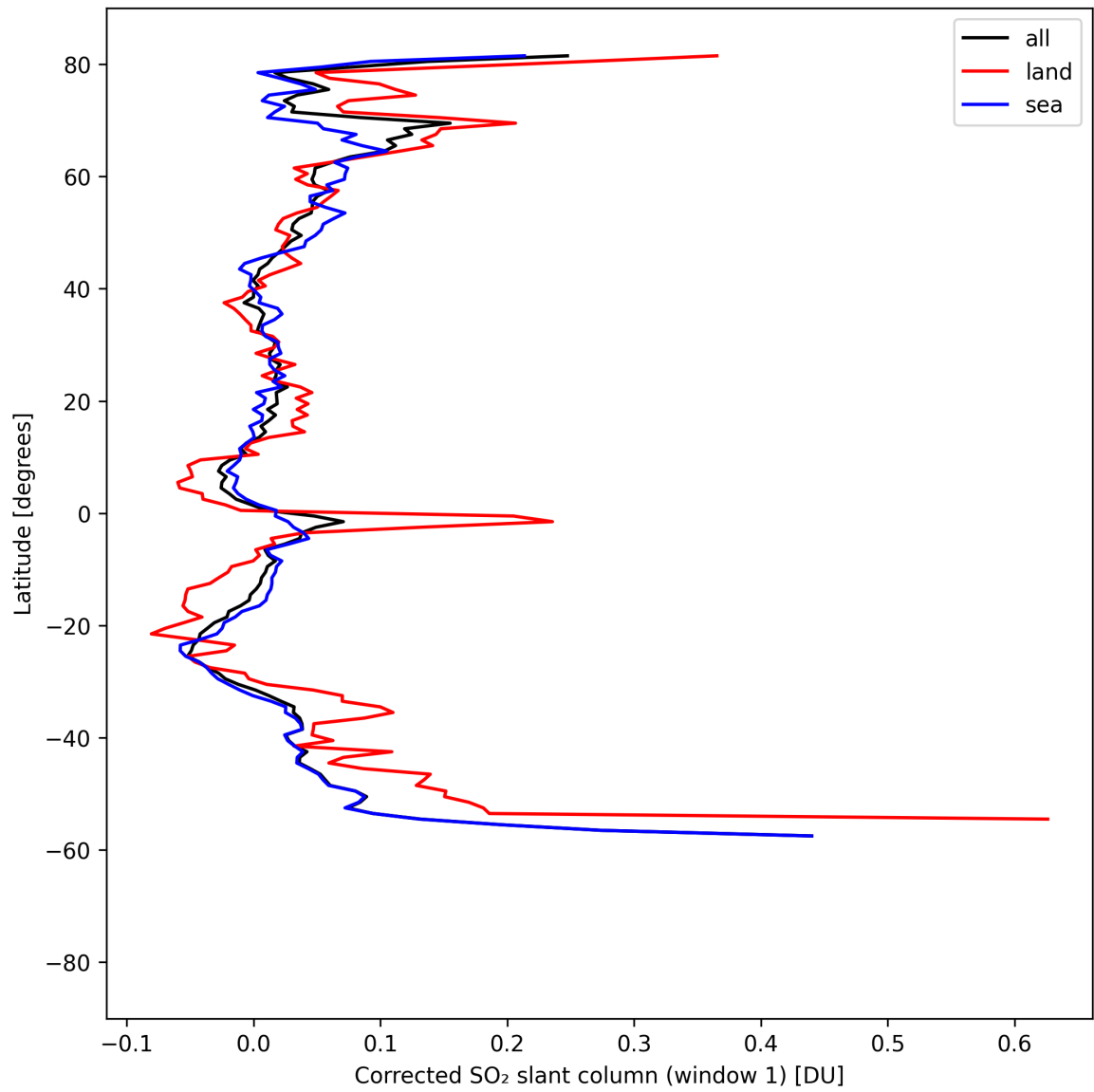


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-04-19 to 2025-04-20.

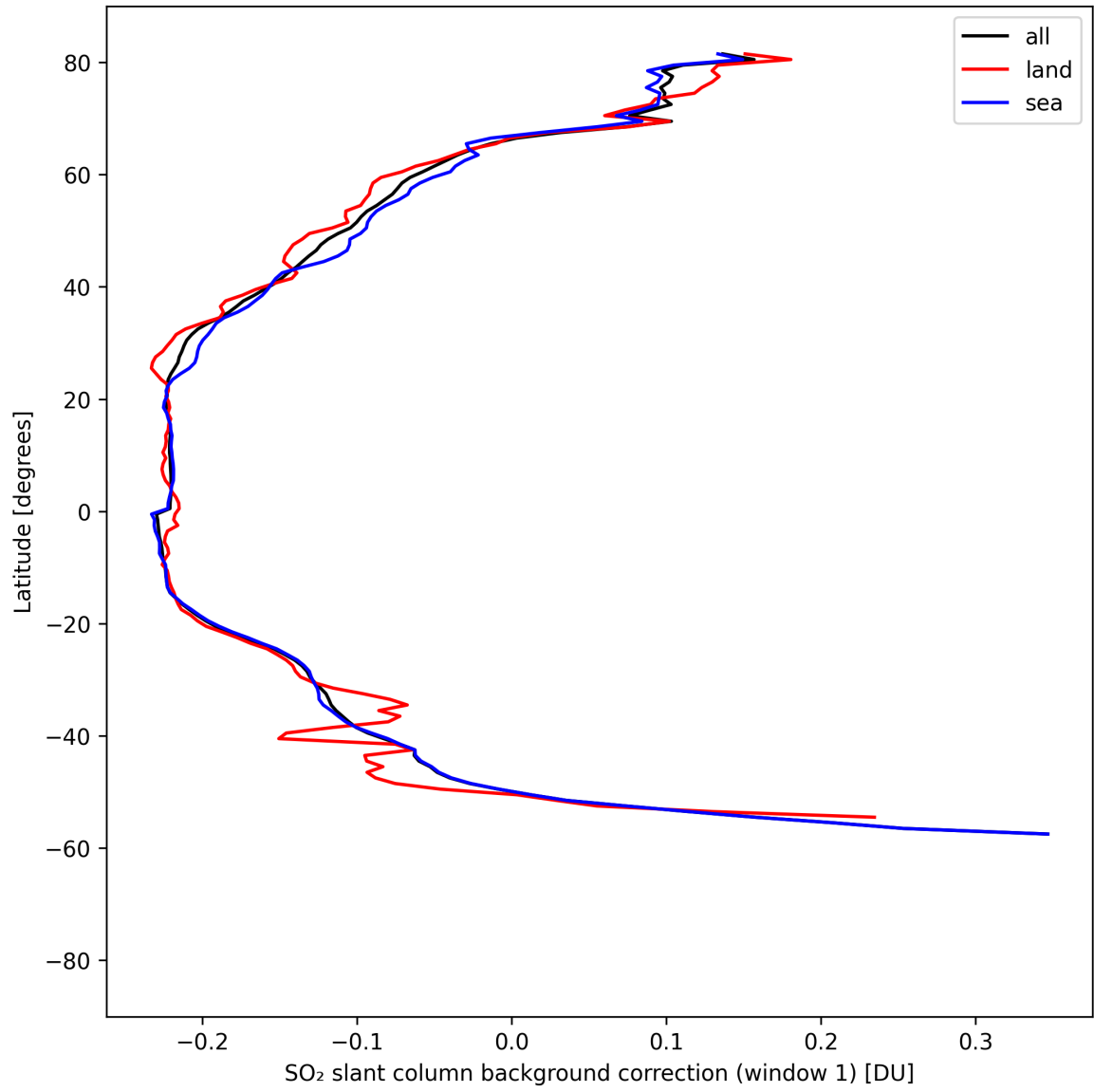


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-04-19 to 2025-04-20.

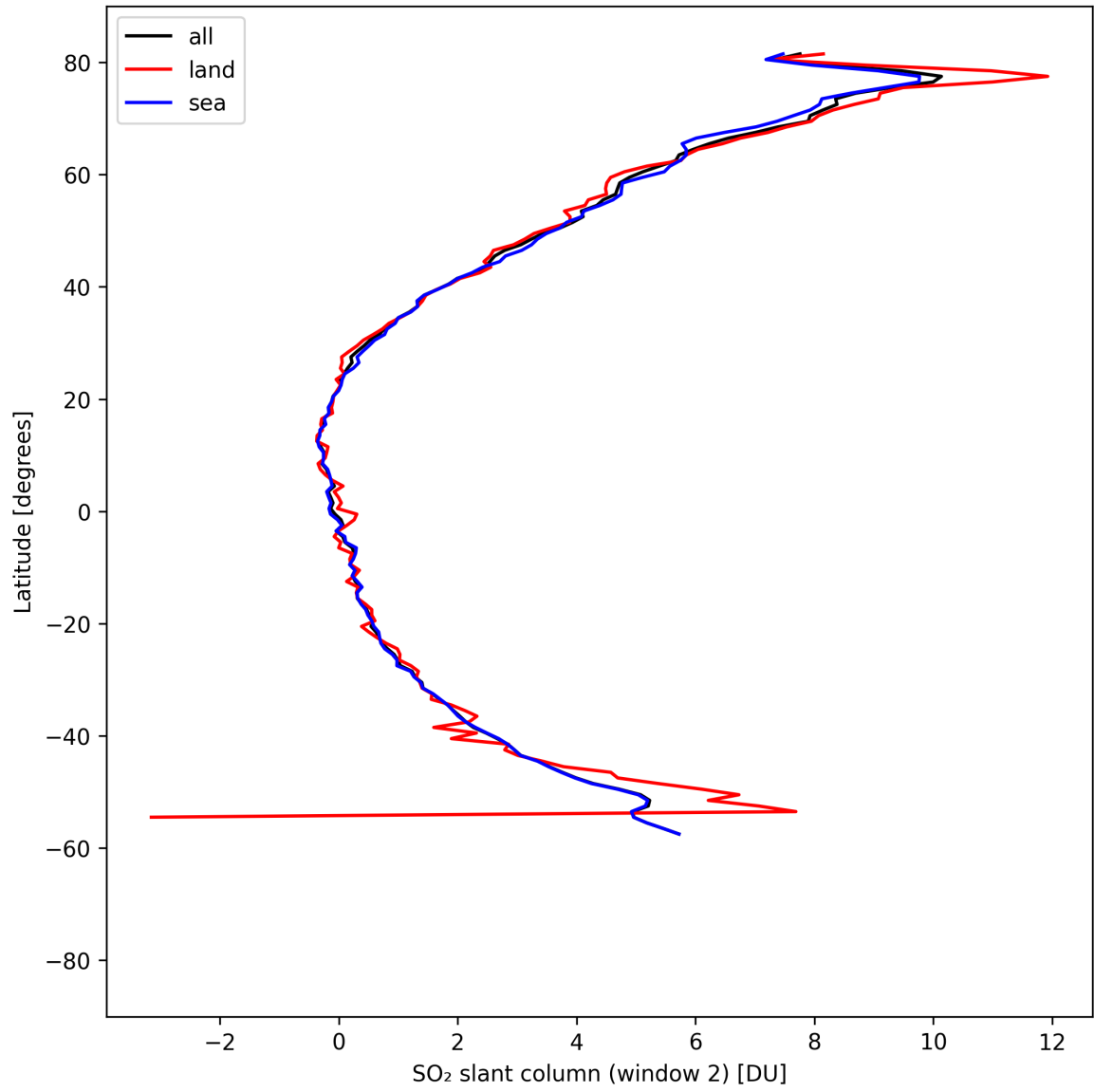


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-04-19 to 2025-04-20.

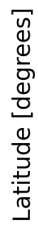


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-04-19 to 2025-04-20.

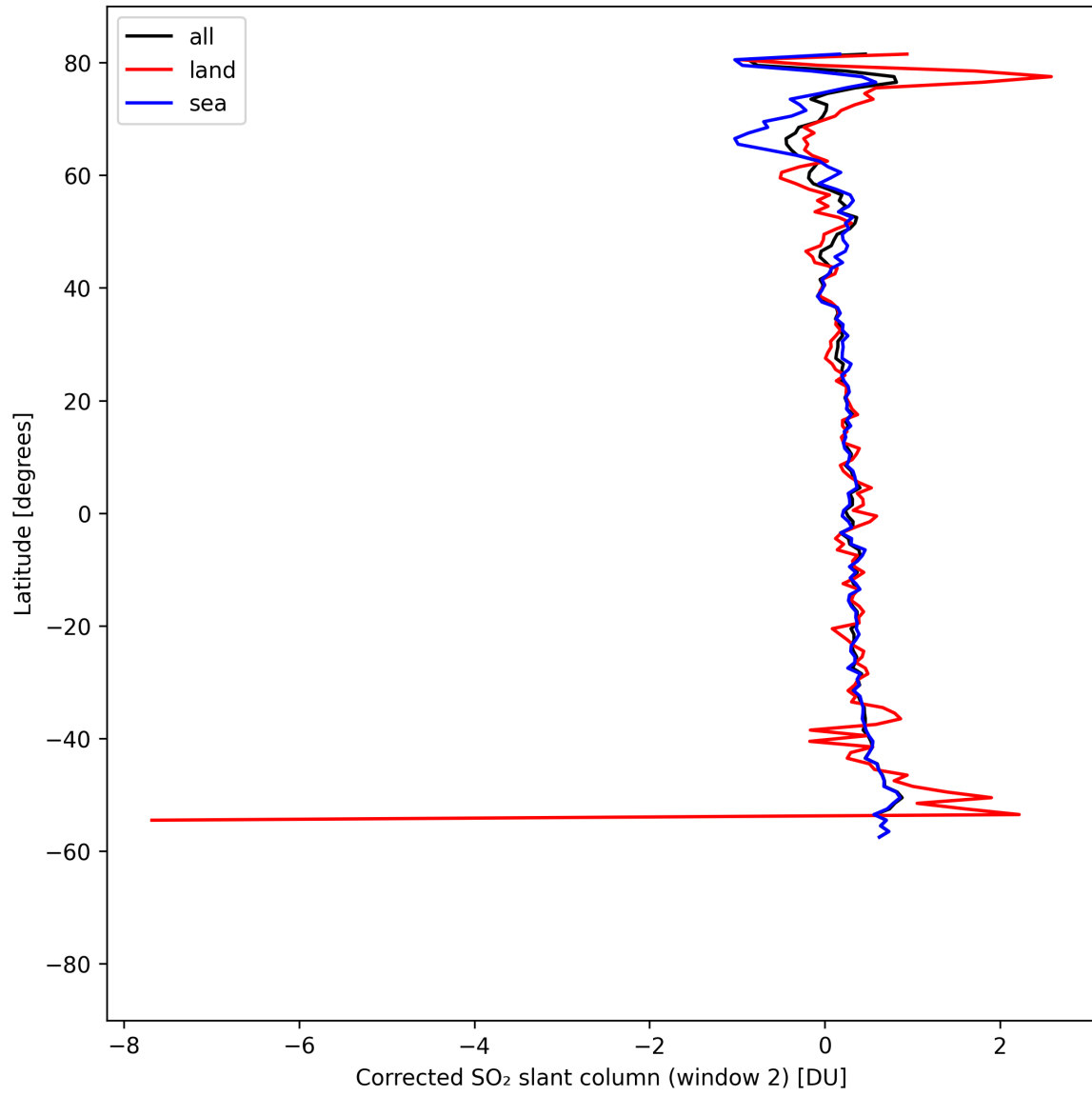


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-04-19 to 2025-04-20.

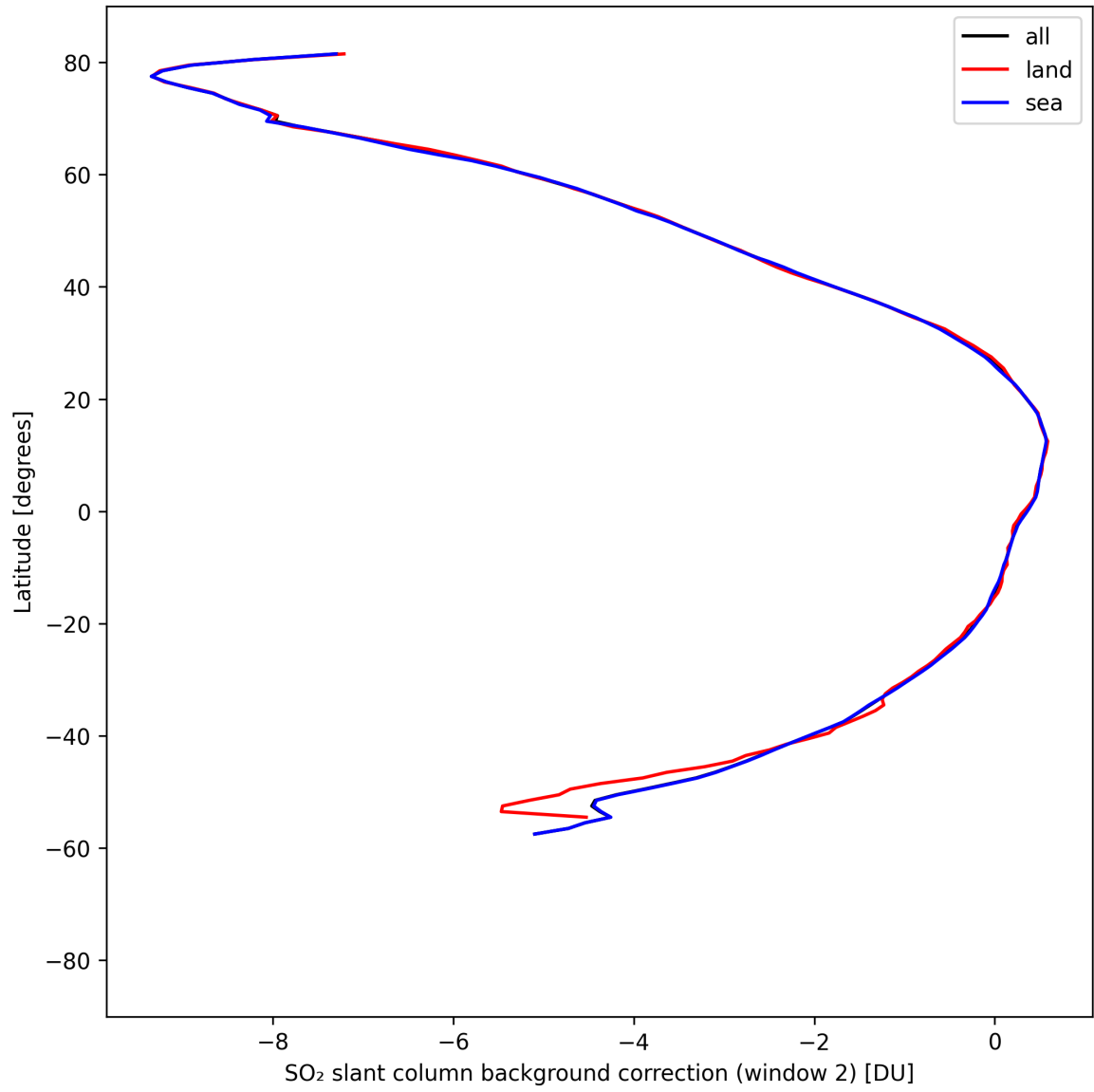


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-04-19 to 2025-04-20.

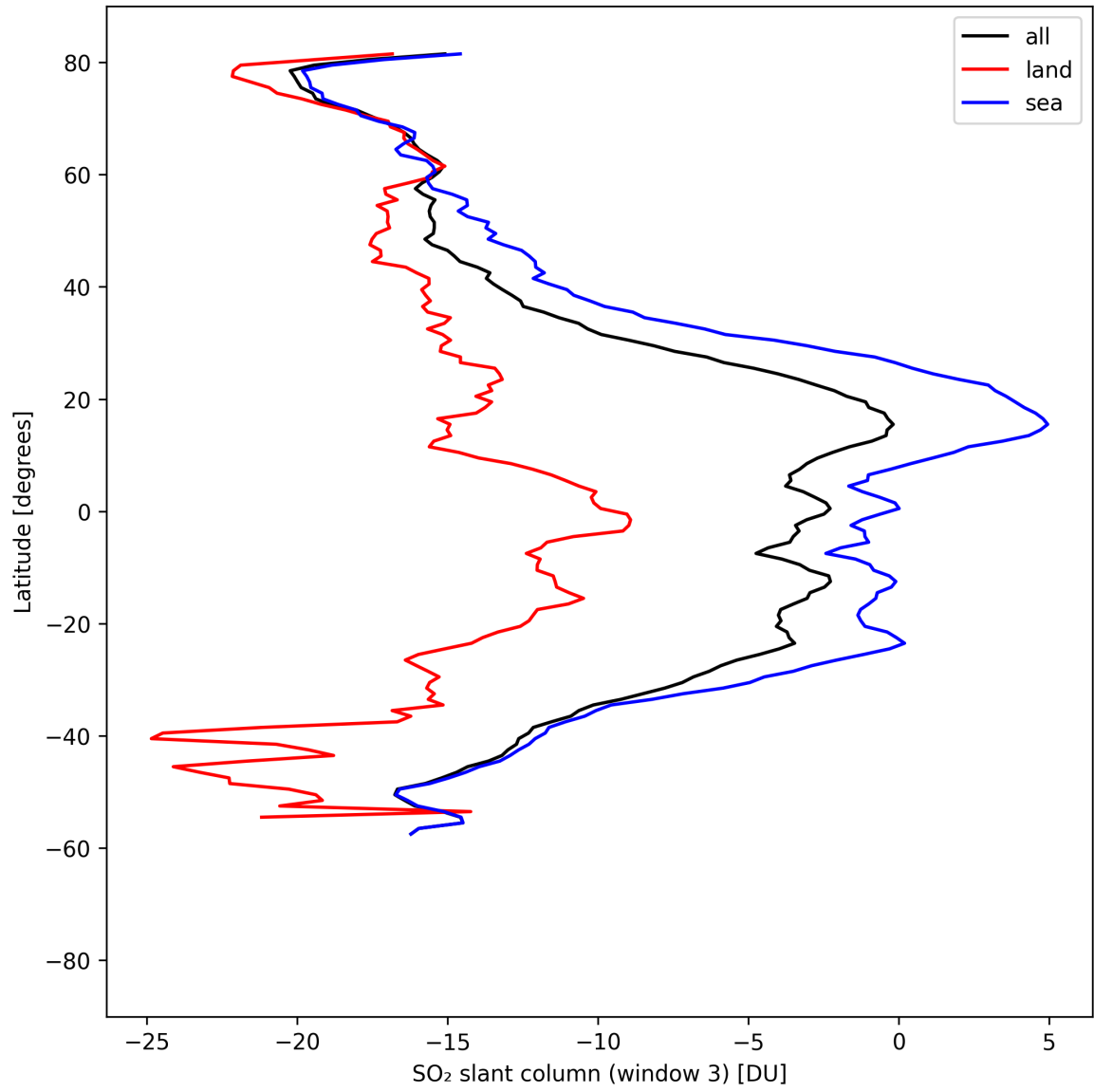


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-04-19 to 2025-04-20.

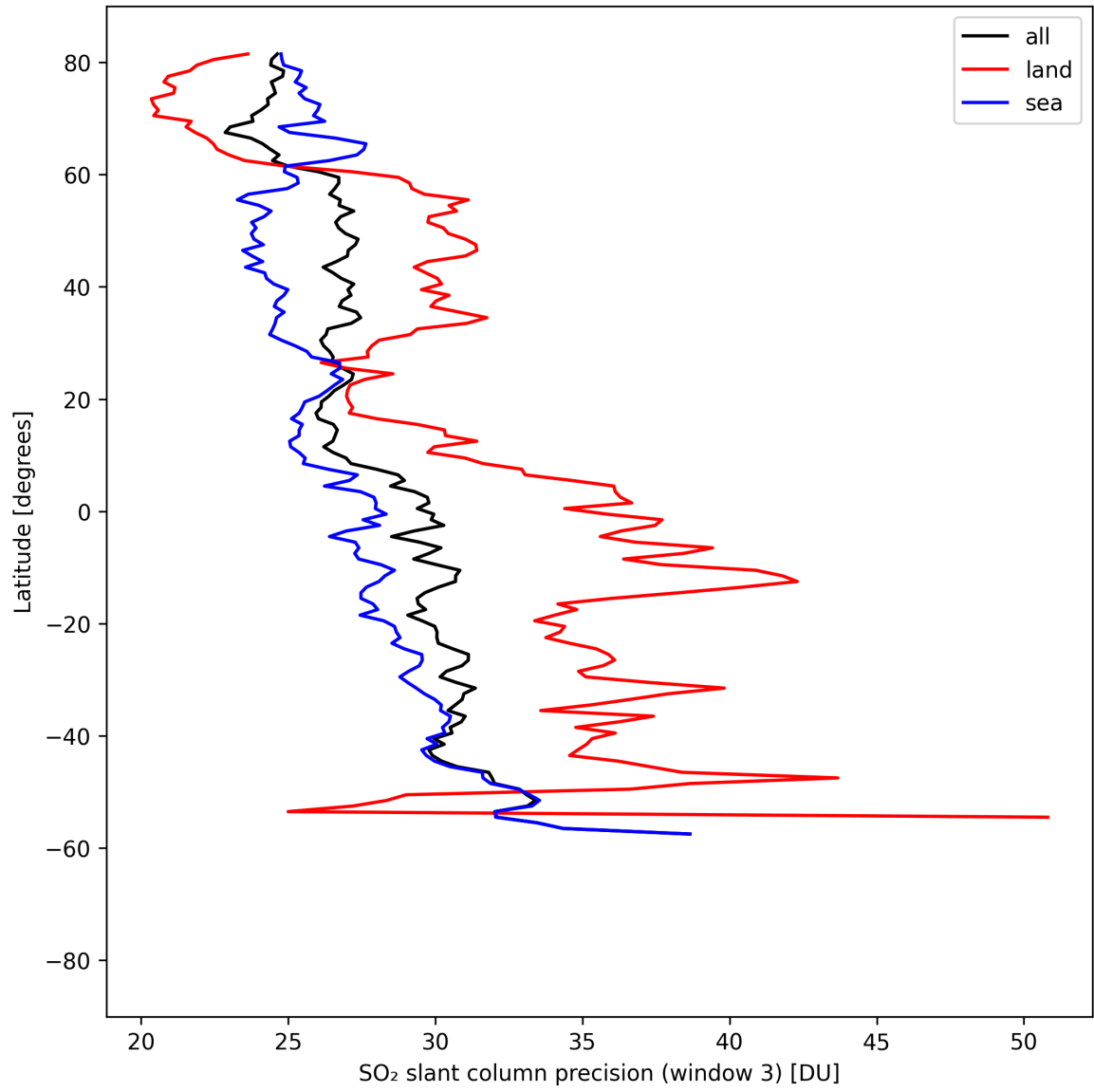


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-04-19 to 2025-04-20.

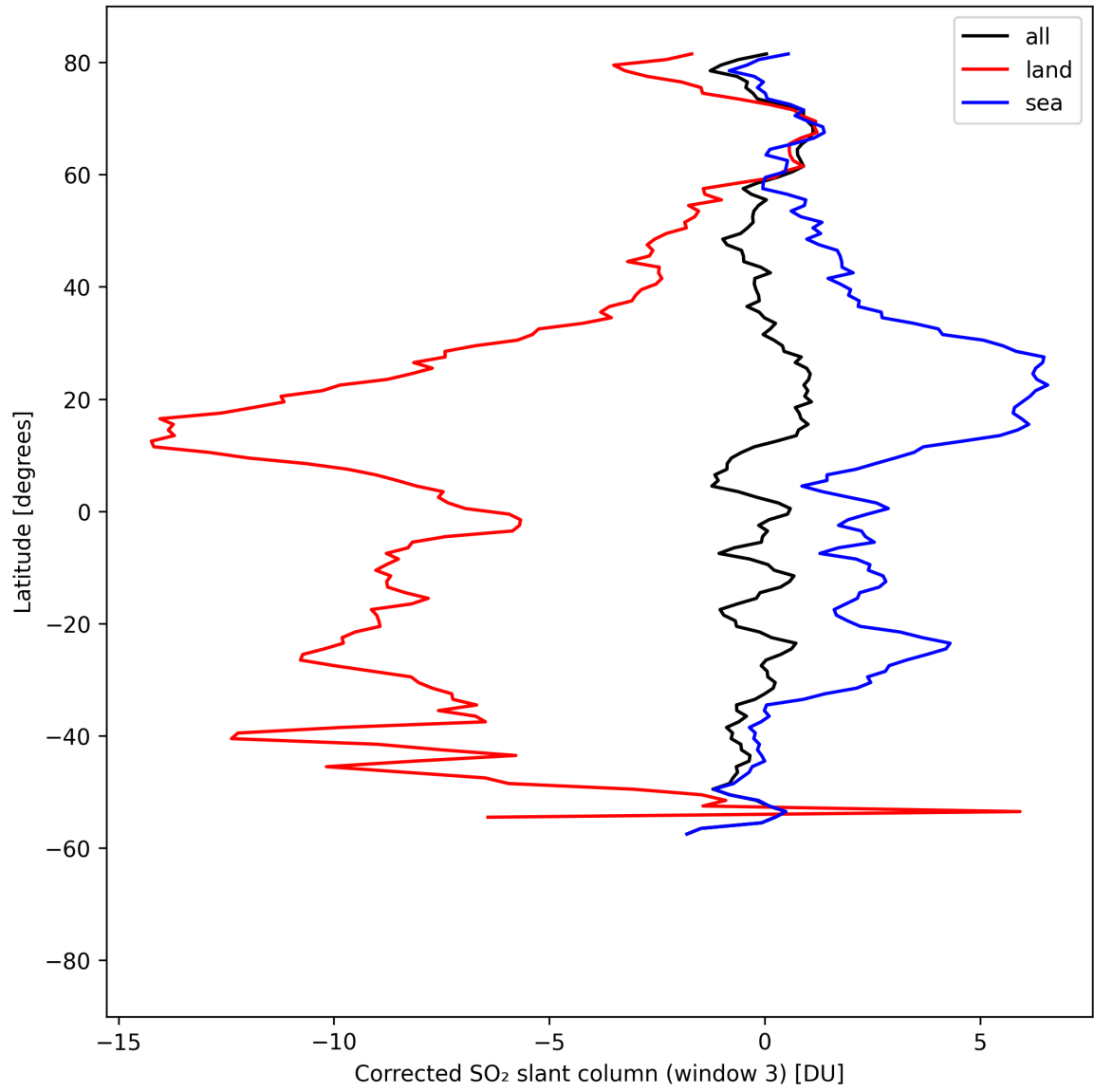


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-04-19 to 2025-04-20.

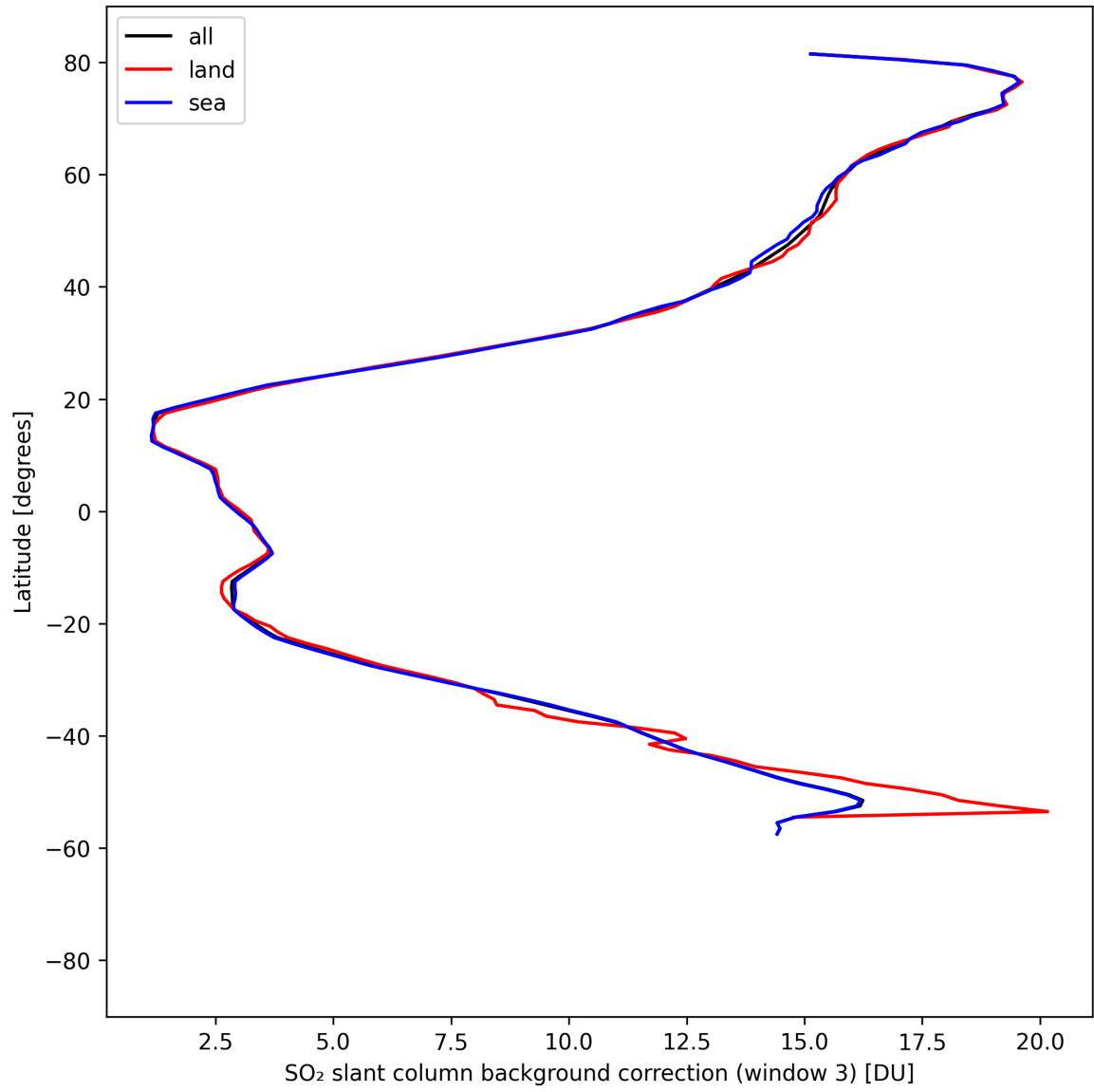


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-04-19 to 2025-04-20.

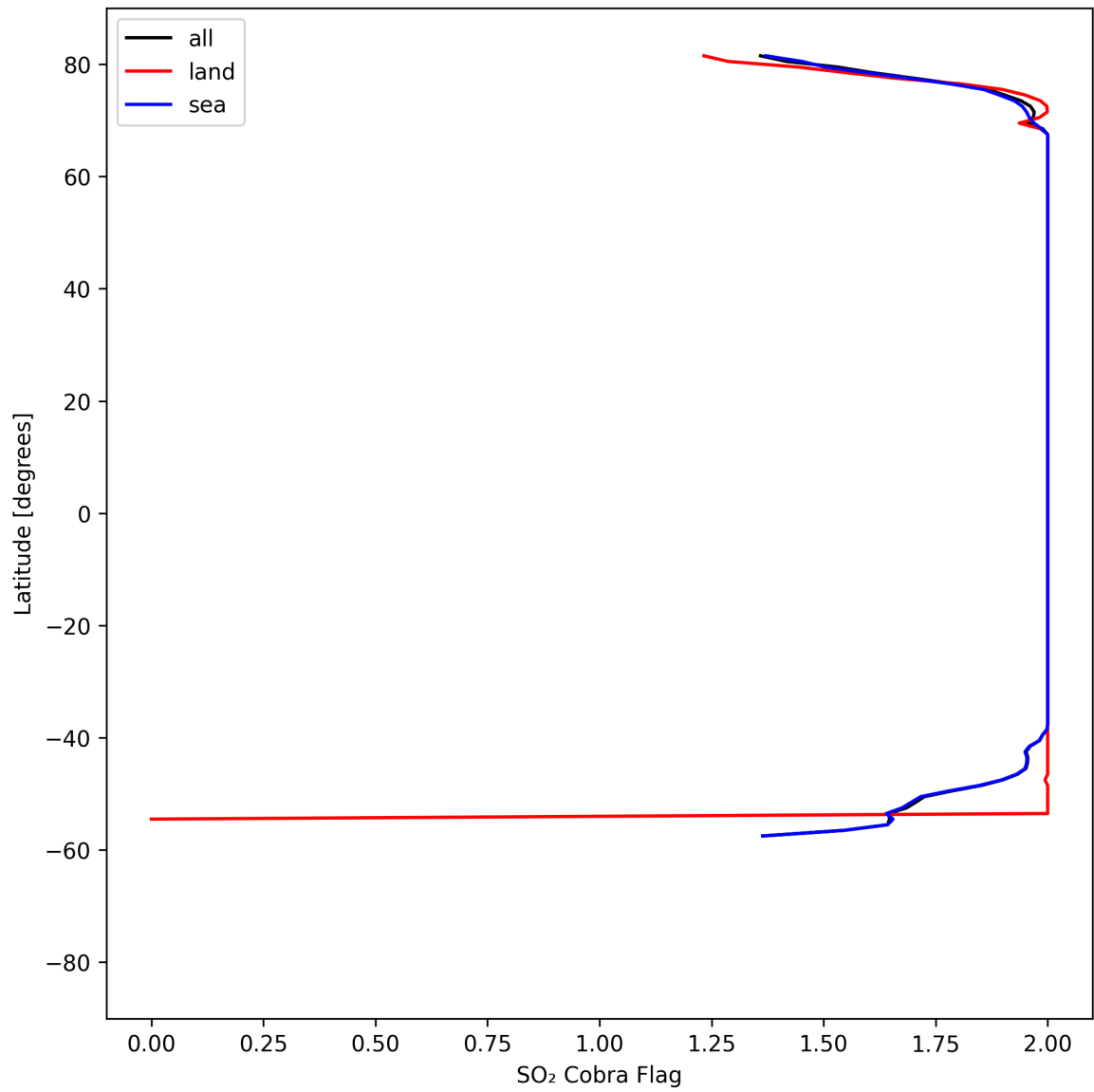


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-04-19 to 2025-04-20.

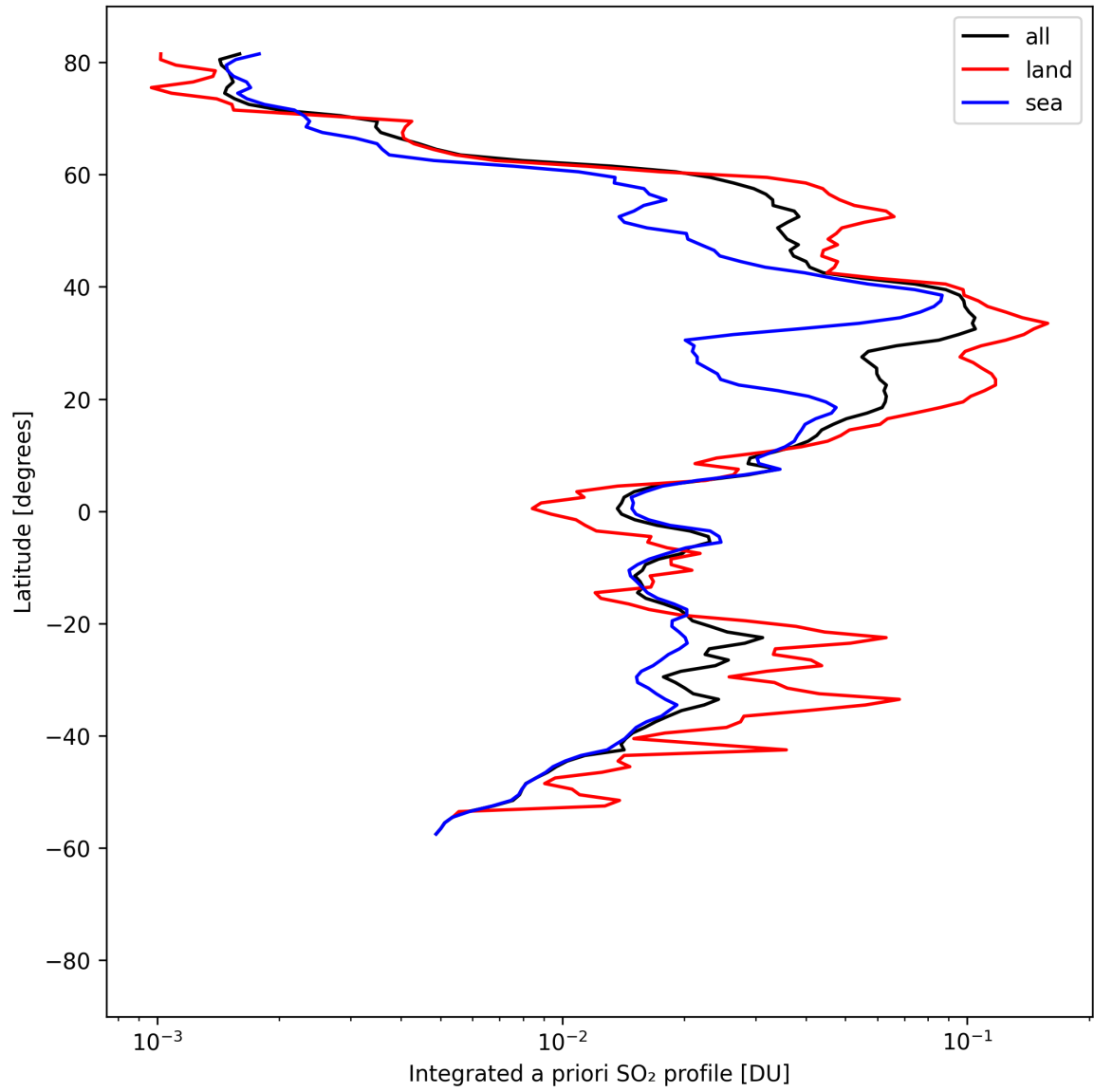


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-04-19 to 2025-04-20.

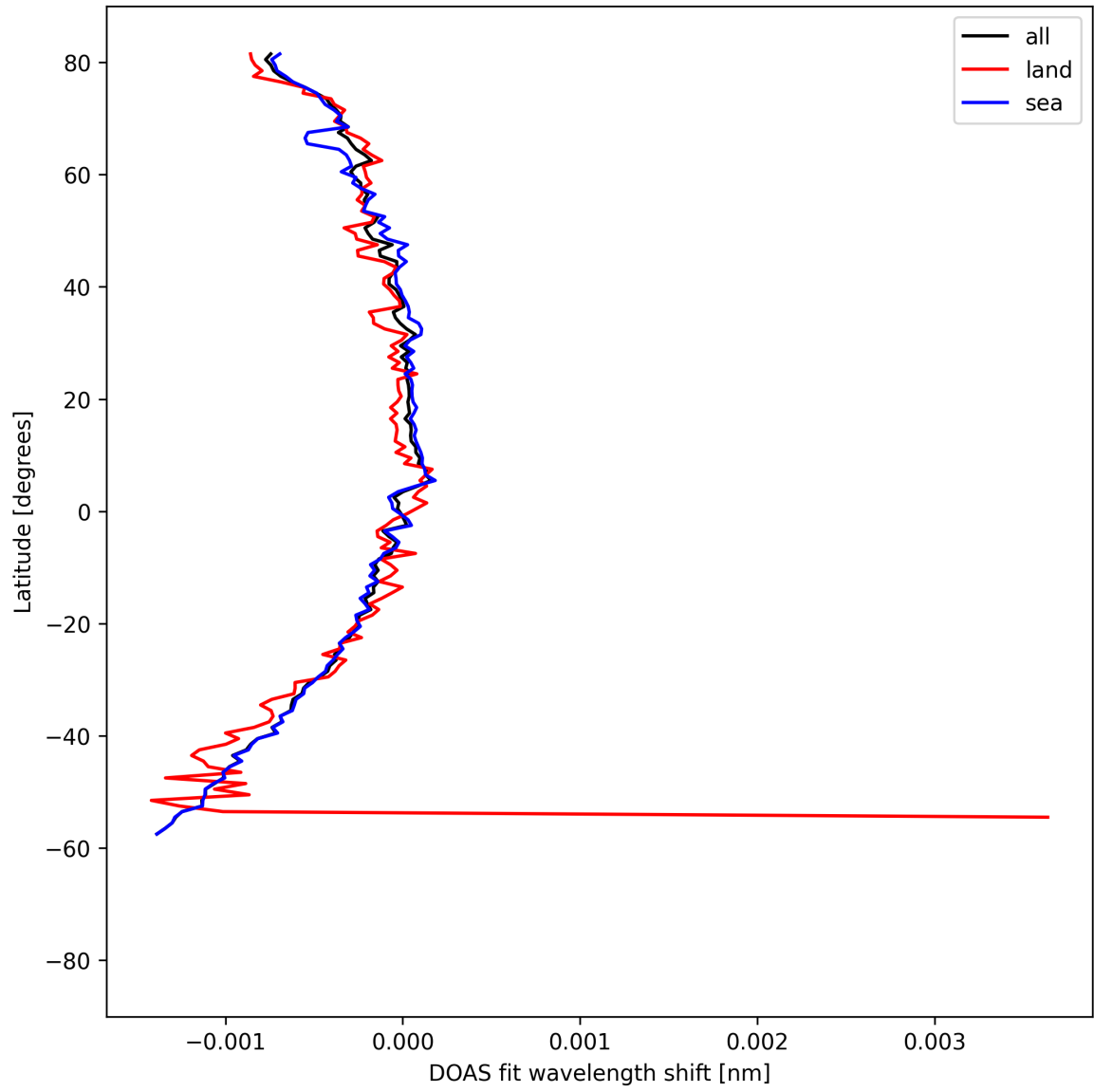


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2025-04-19 to 2025-04-20.

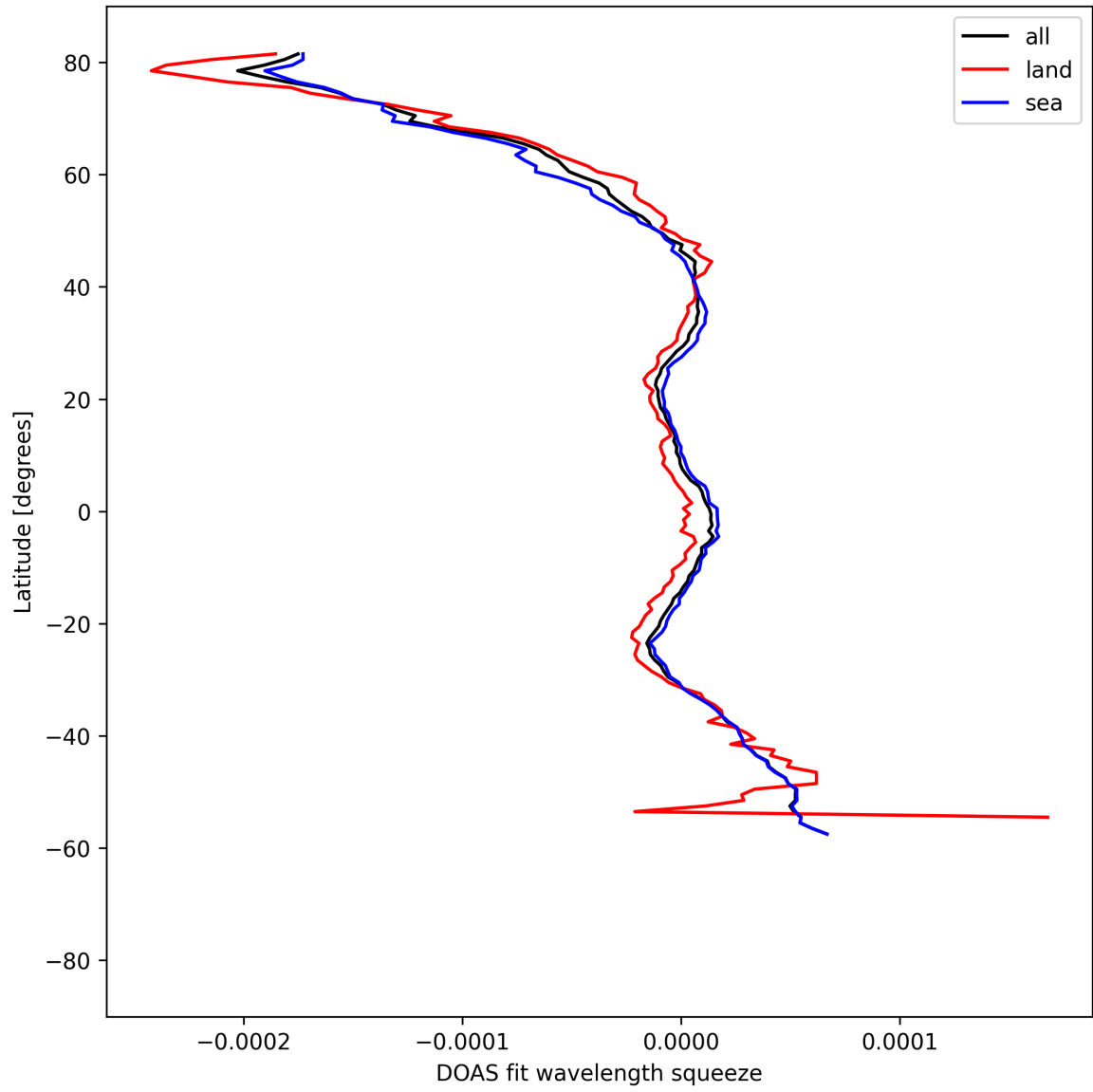


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-04-19 to 2025-04-20.

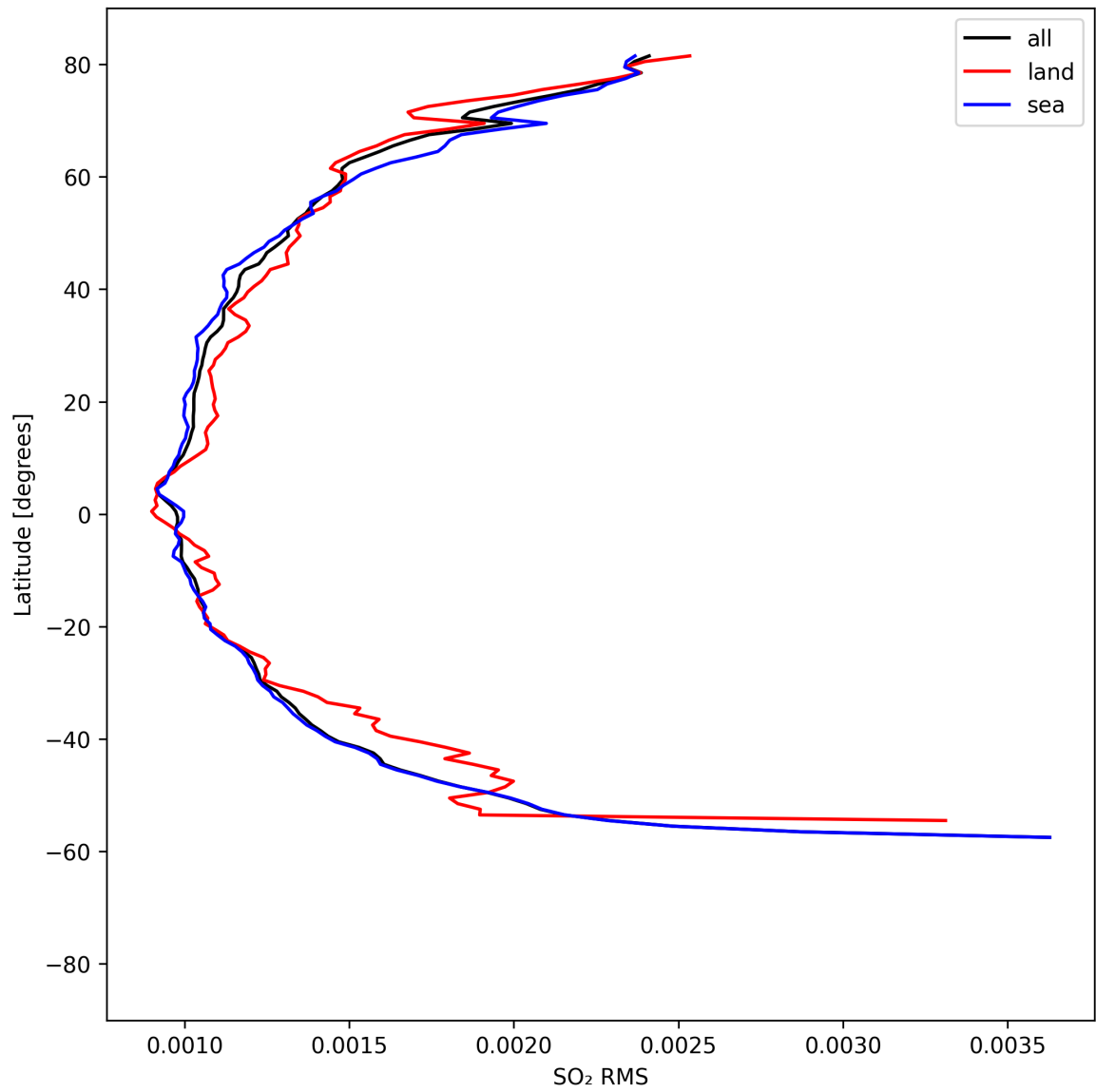


Figure 52: Zonal average of “SO₂ RMS” for 2025-04-19 to 2025-04-20.

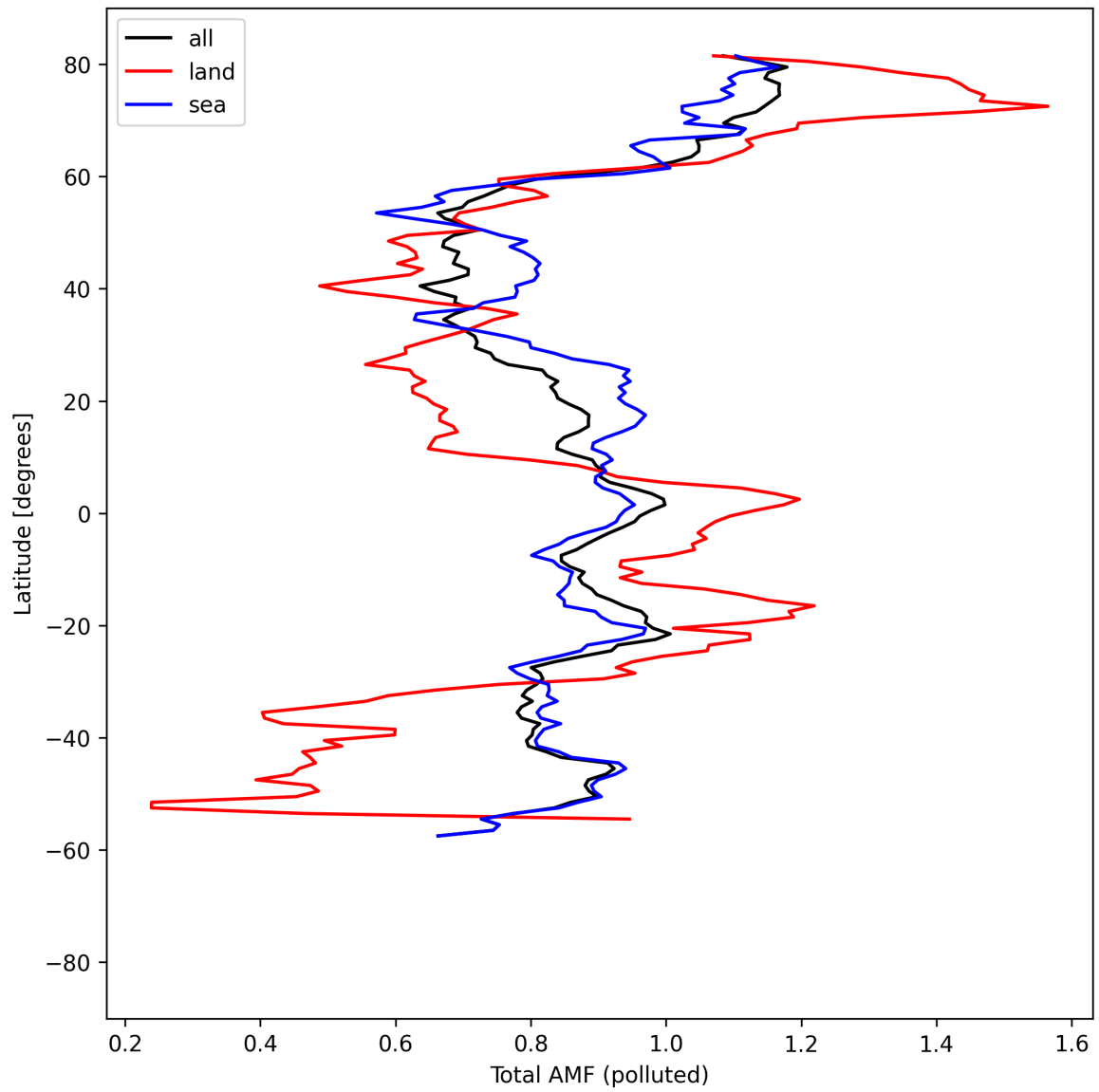


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-04-19 to 2025-04-20.

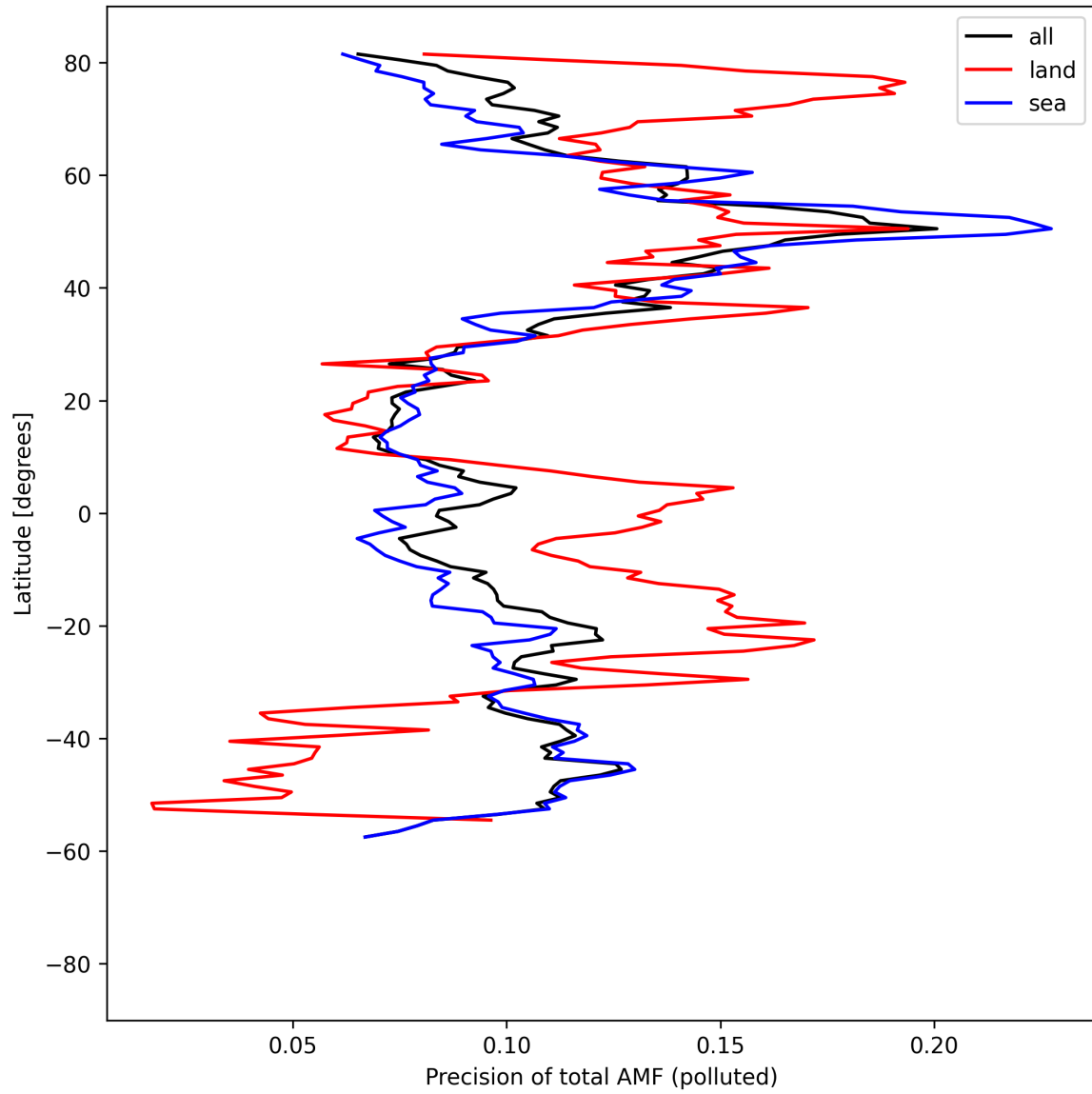


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-04-19 to 2025-04-20.

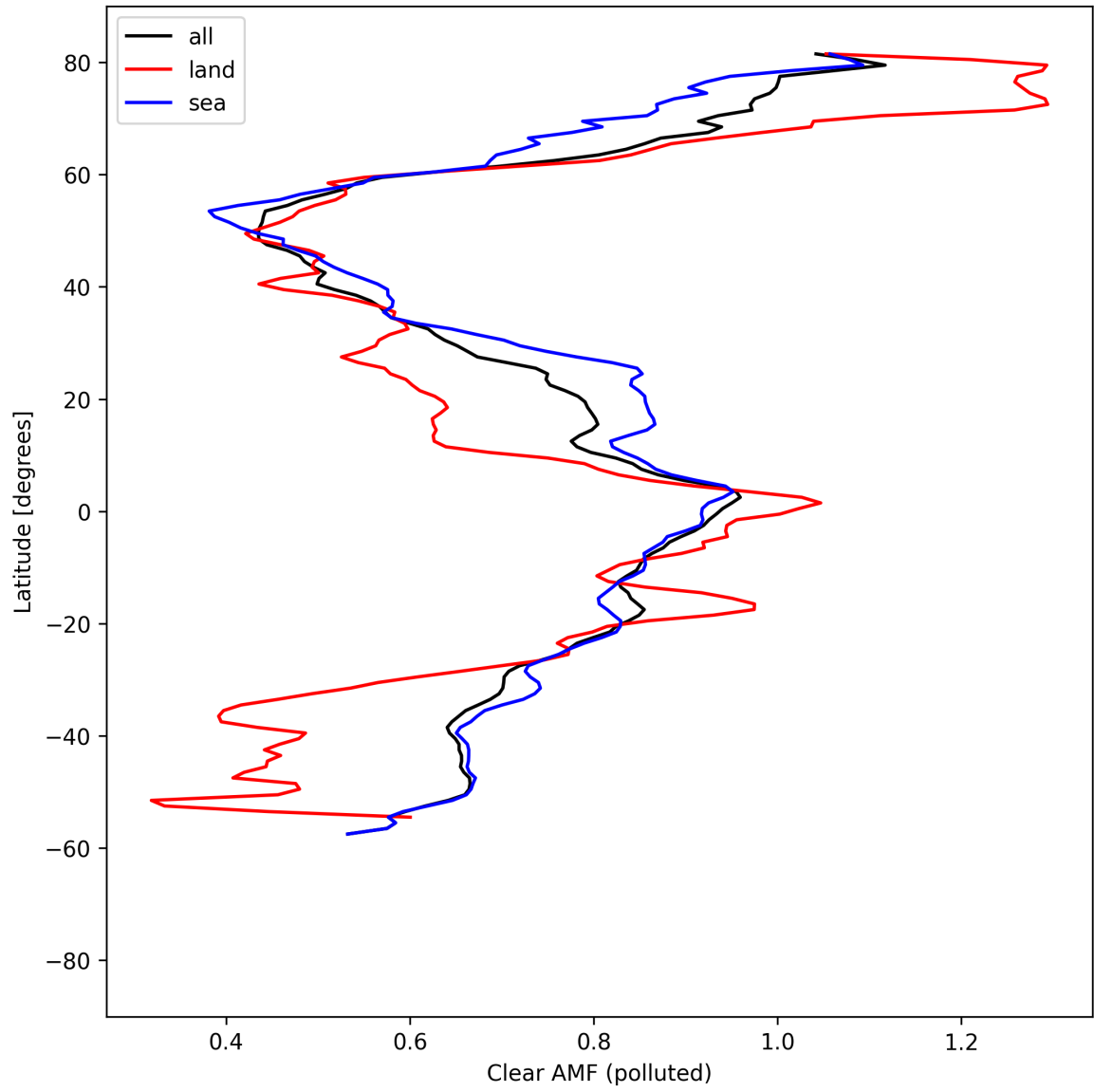


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-04-19 to 2025-04-20.

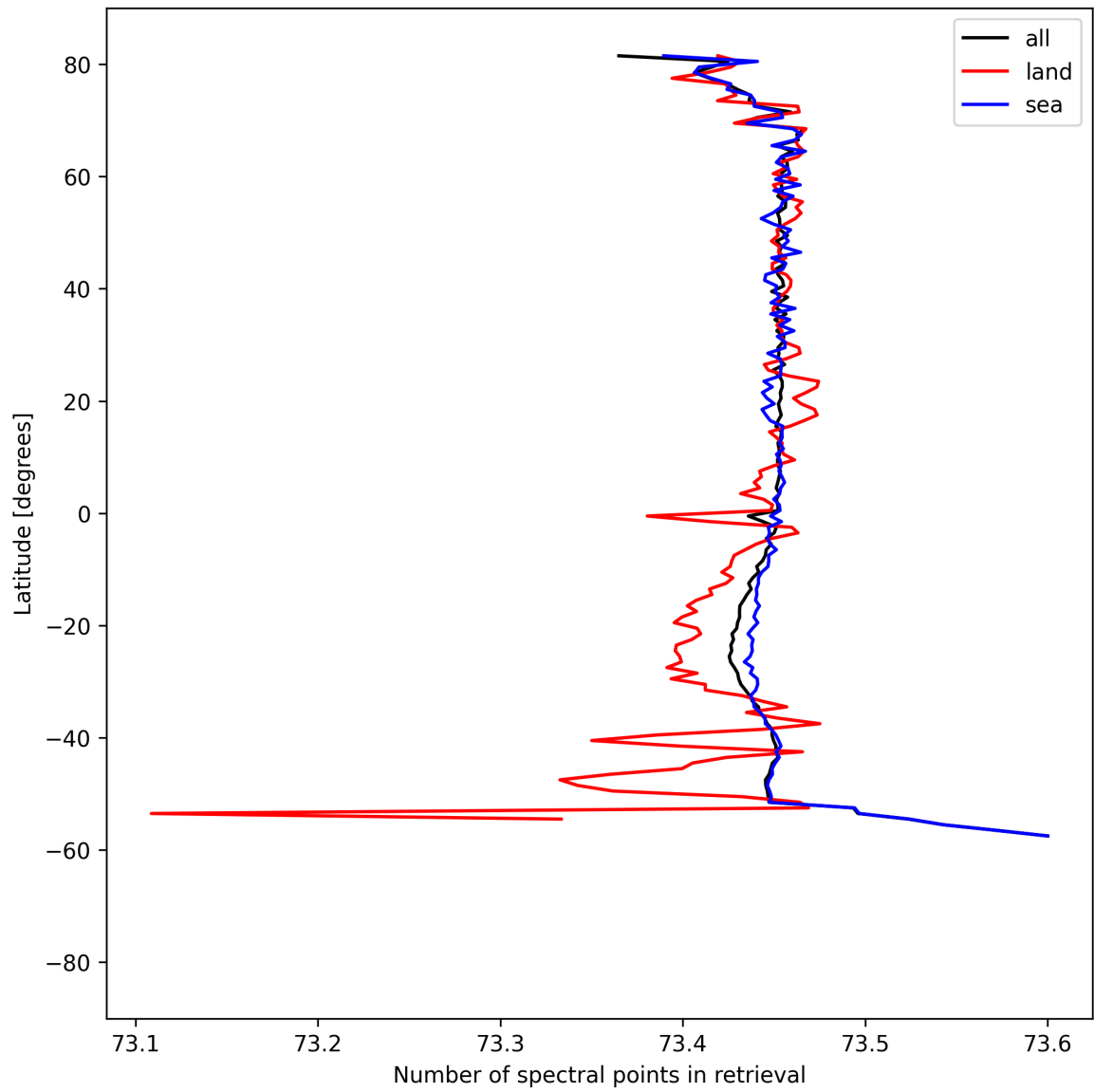


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-04-19 to 2025-04-20.

8 Histograms

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

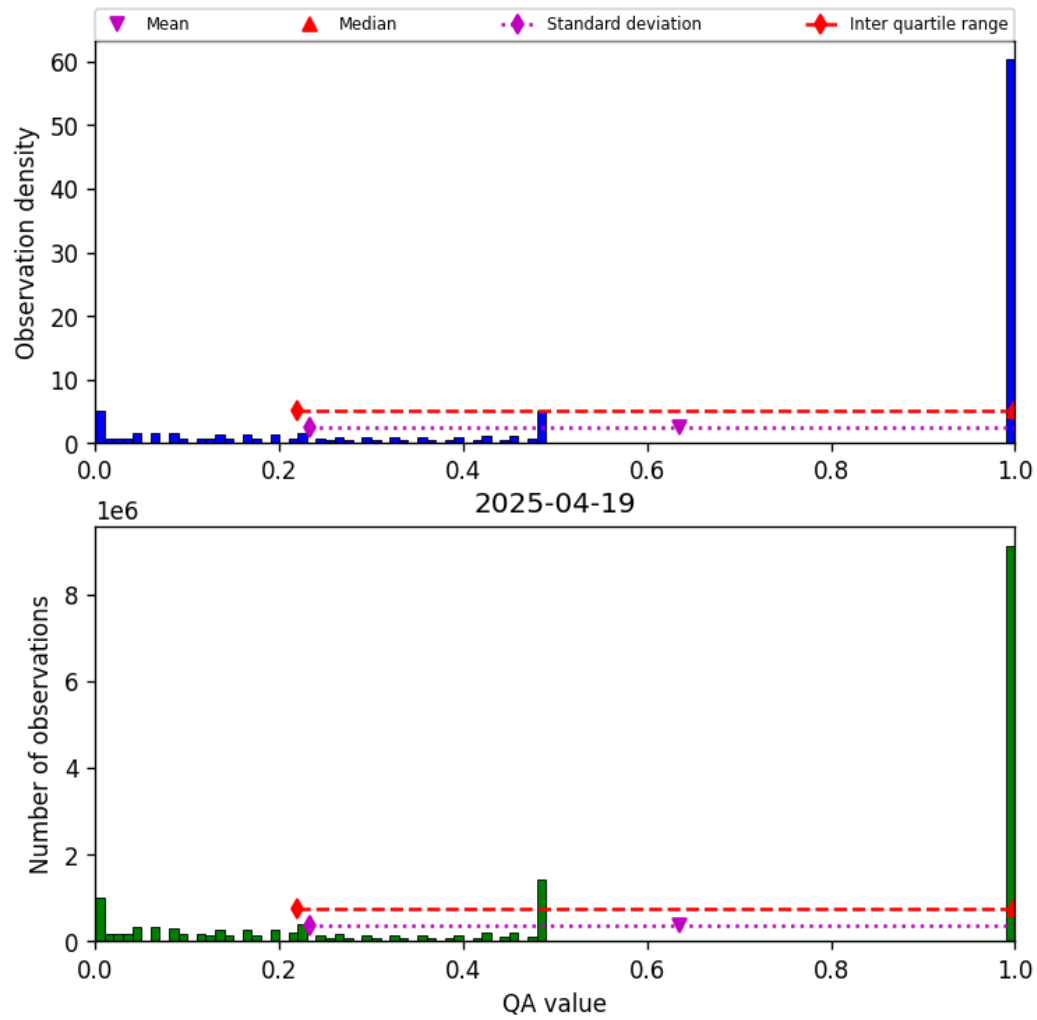


Figure 57: Histogram of “QA value” for 2025-04-19 to 2025-04-20

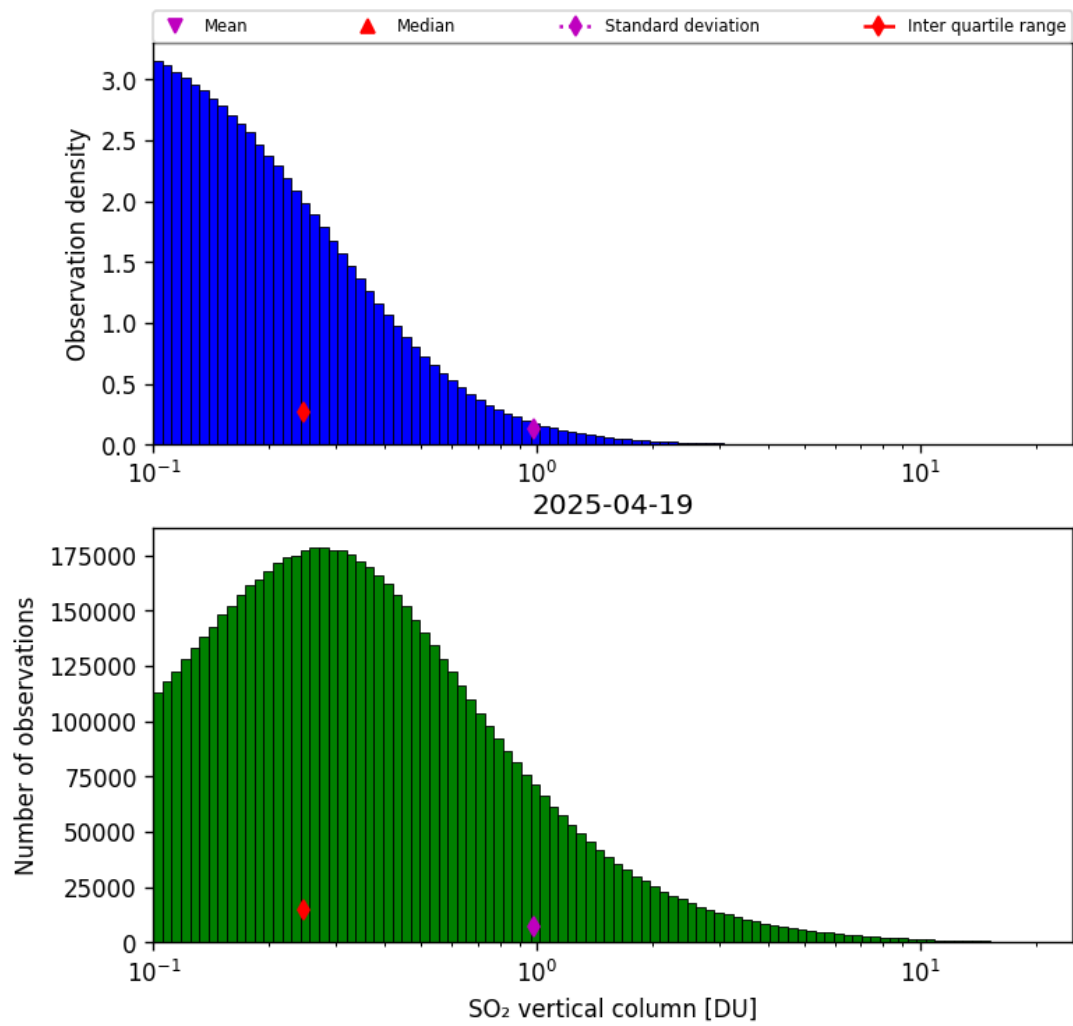


Figure 58: Histogram of “SO₂ vertical column” for 2025-04-19 to 2025-04-20

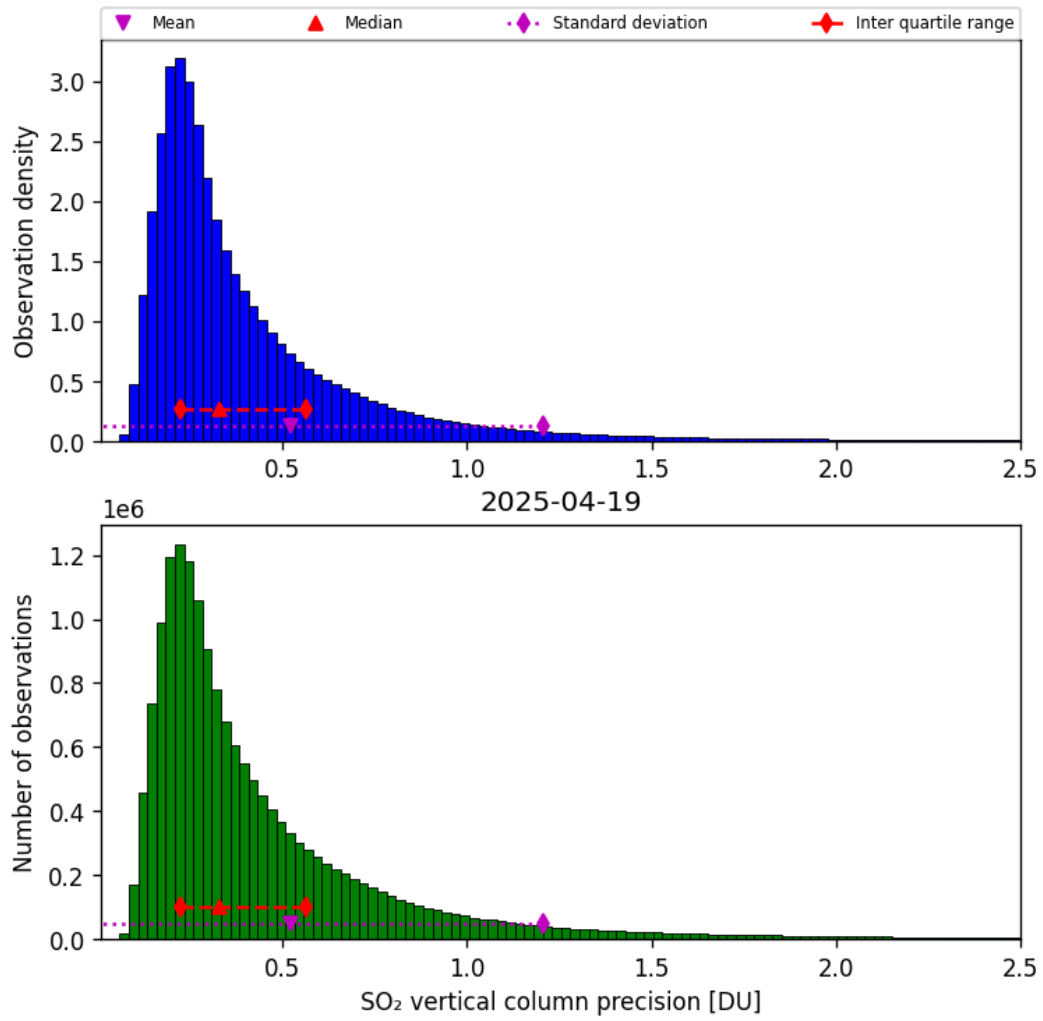


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-04-19 to 2025-04-20

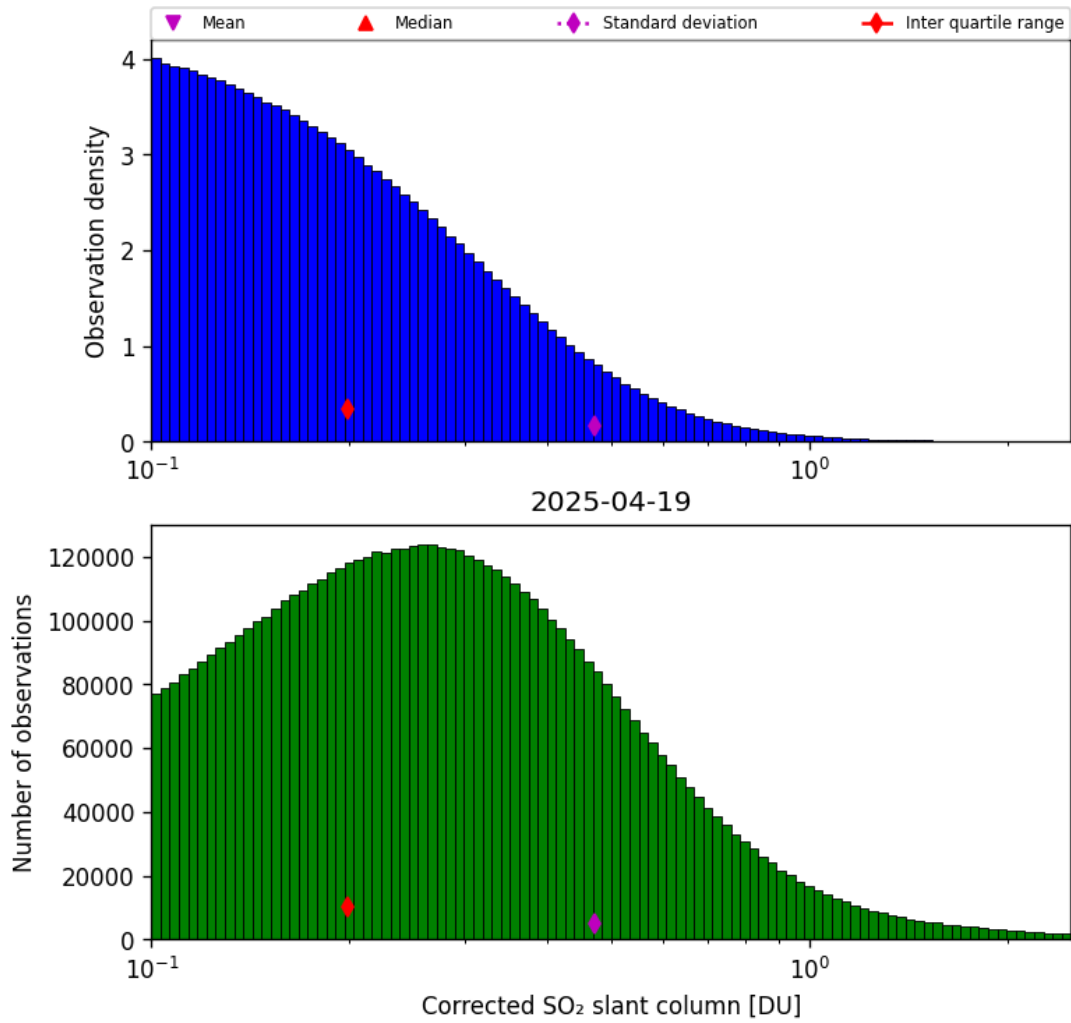


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-04-19 to 2025-04-20

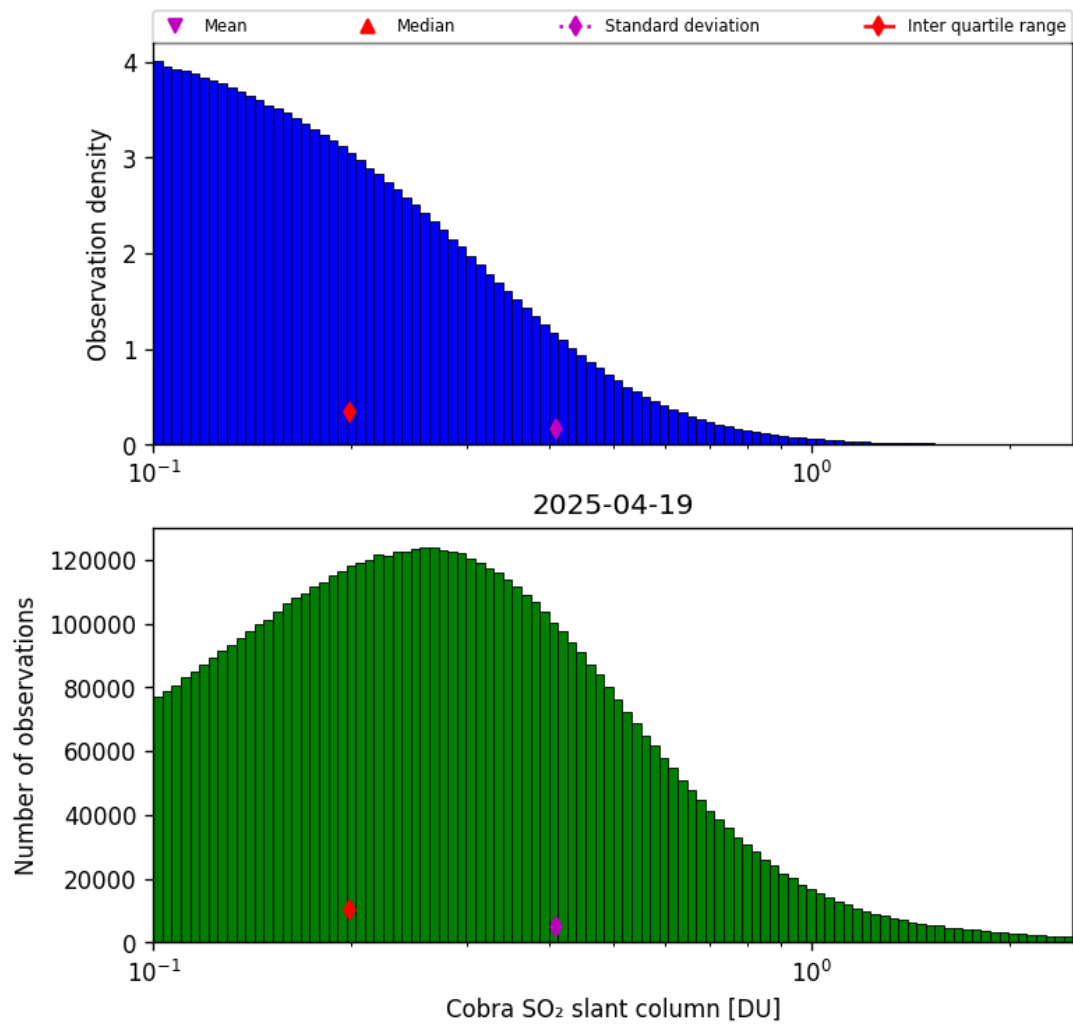


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-04-19 to 2025-04-20

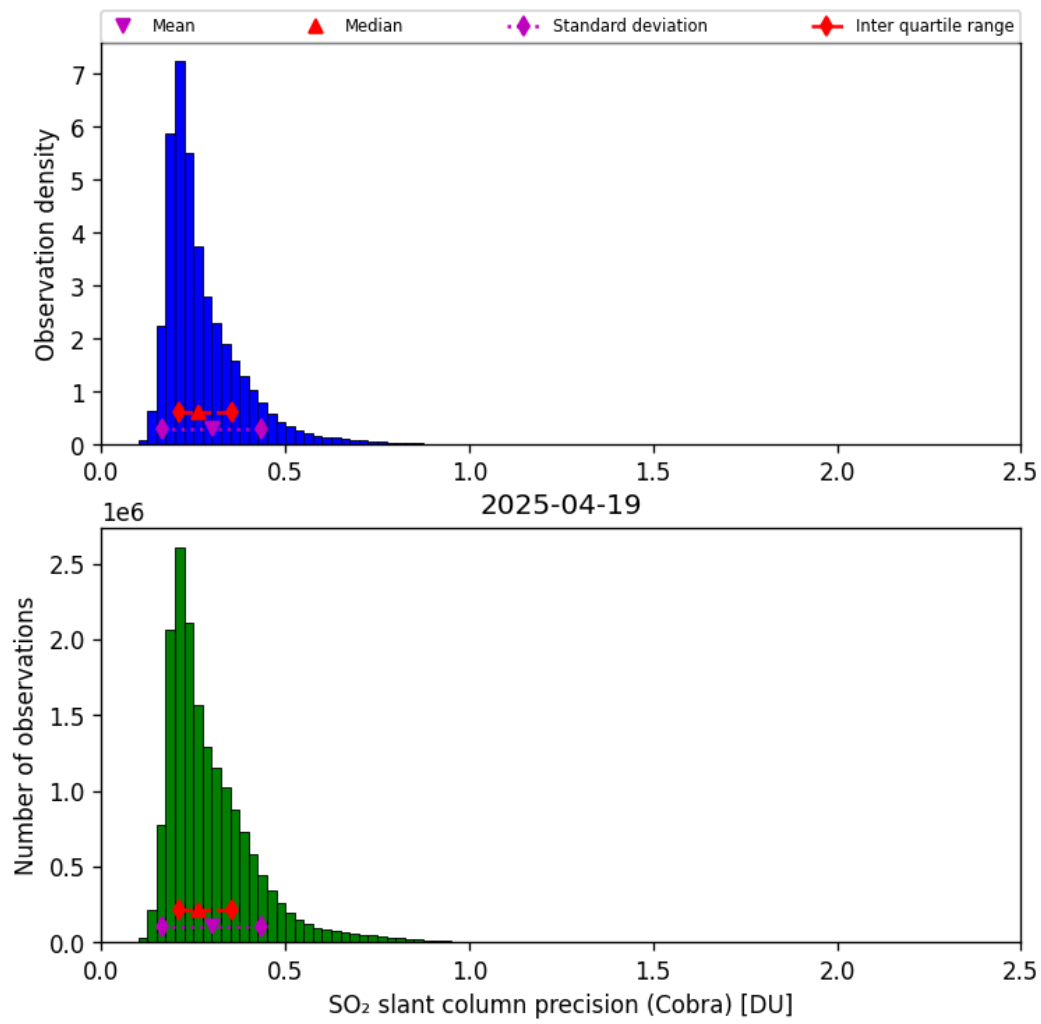


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-04-19 to 2025-04-20

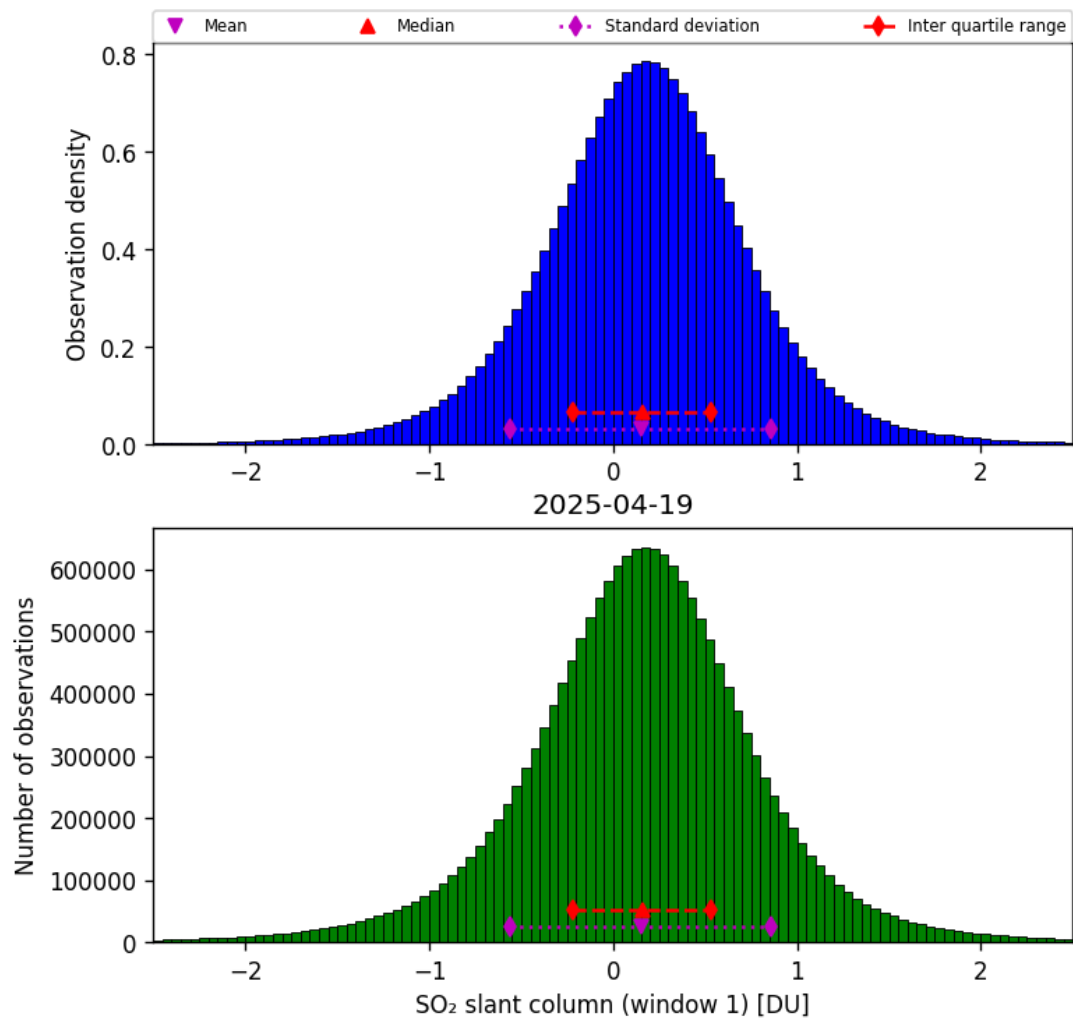


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-04-19 to 2025-04-20

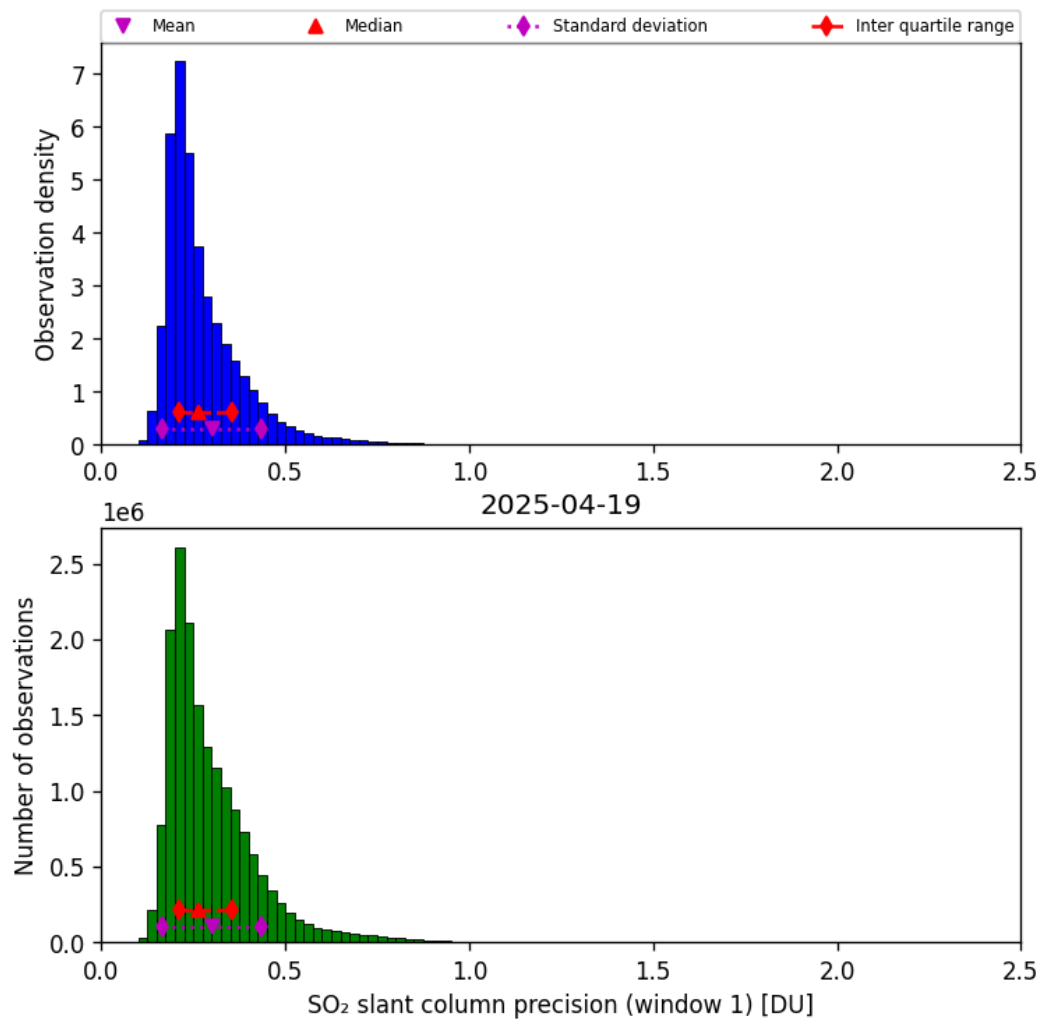


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-04-19 to 2025-04-20

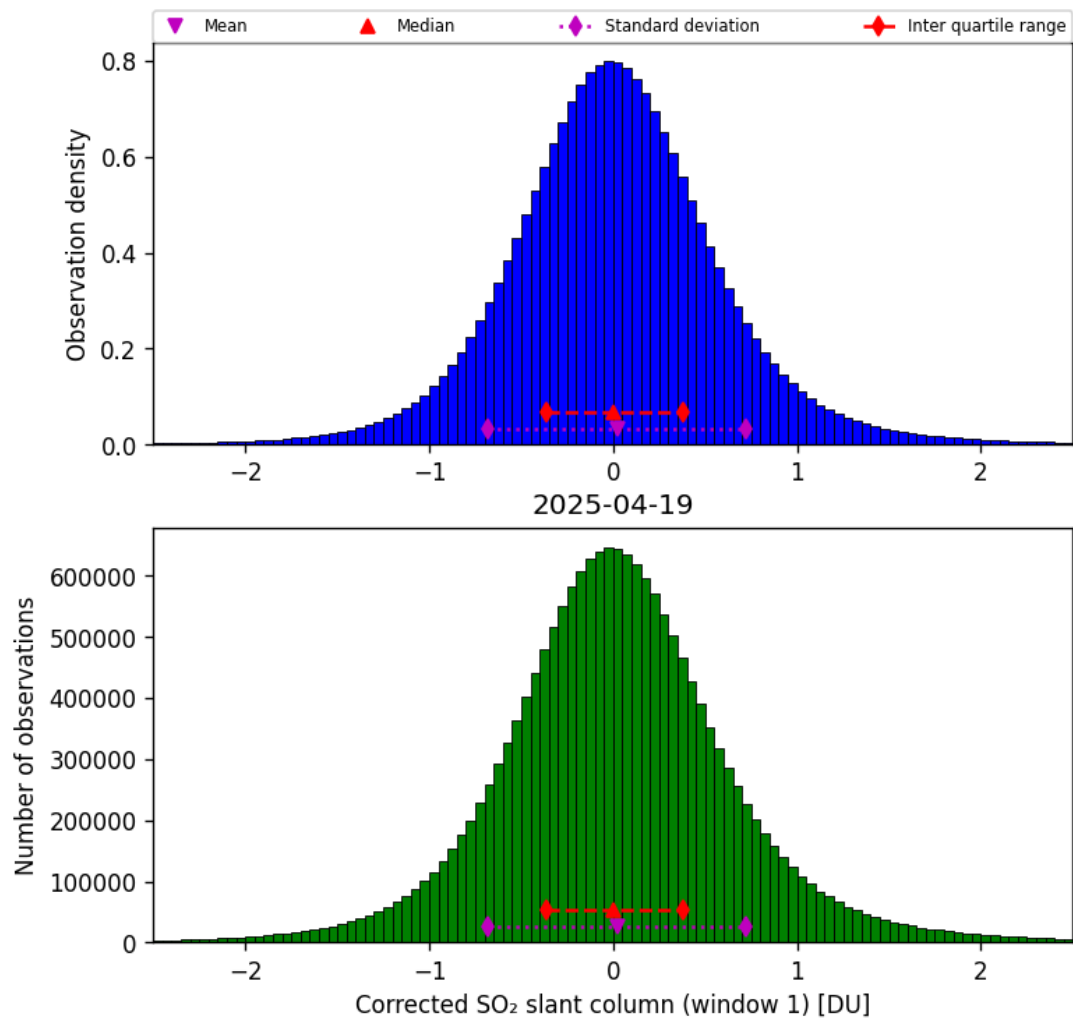


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-04-19 to 2025-04-20

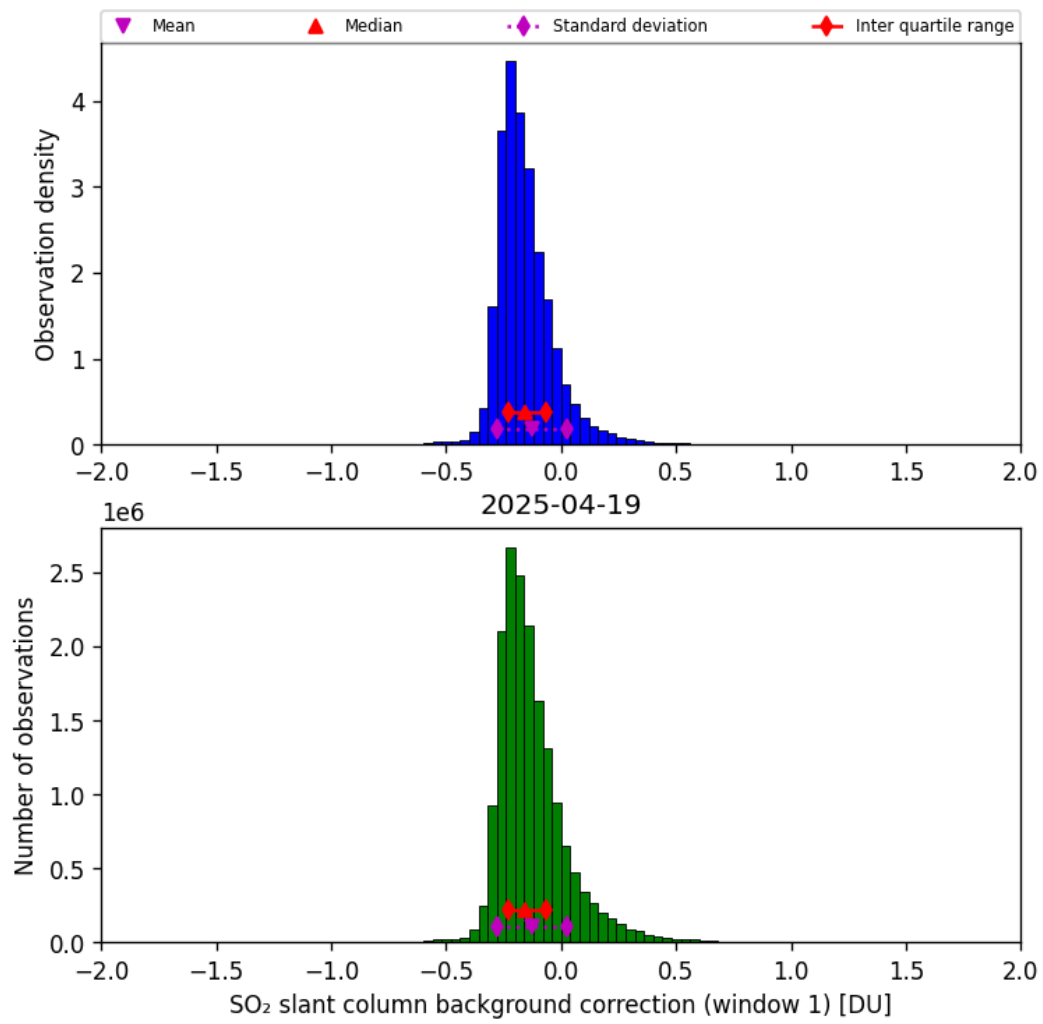


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-04-19 to 2025-04-20

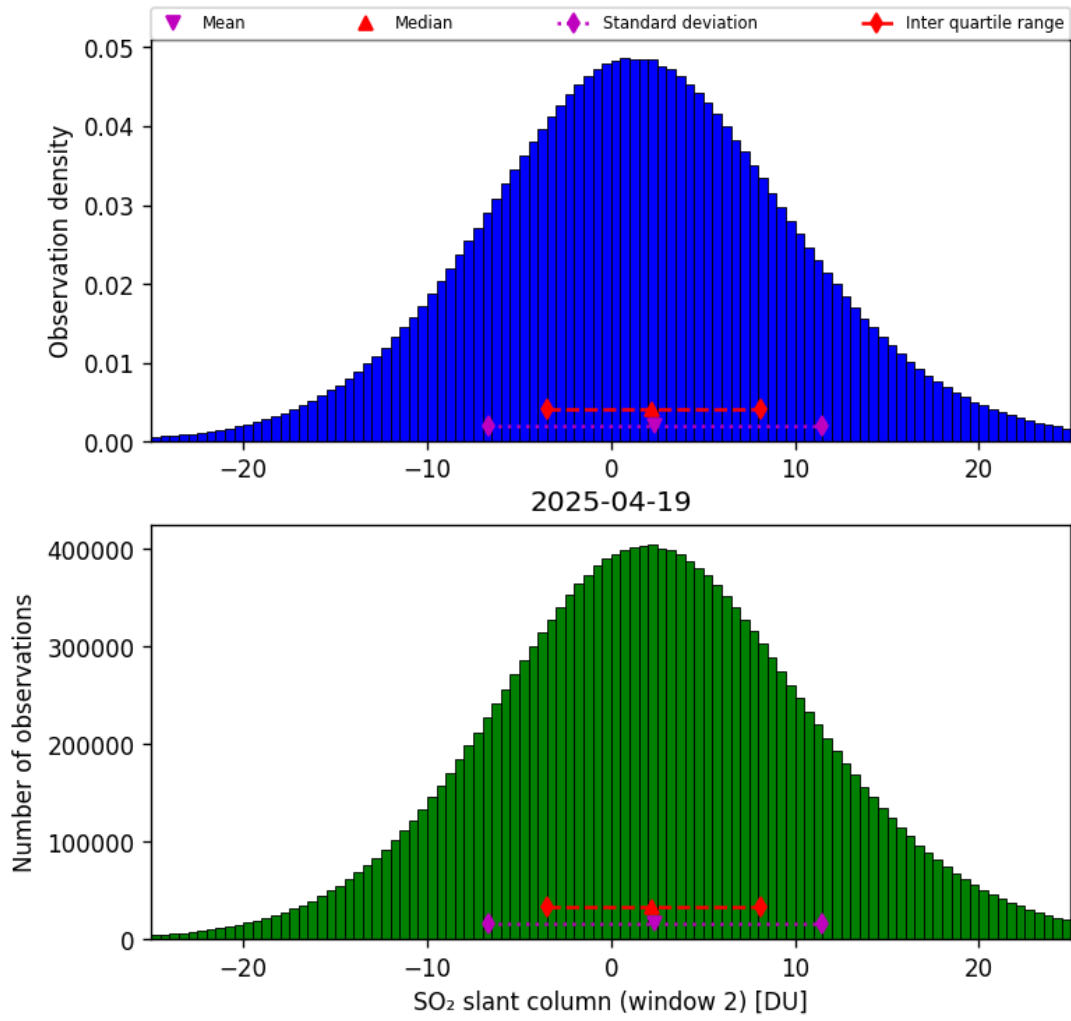


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-04-19 to 2025-04-20

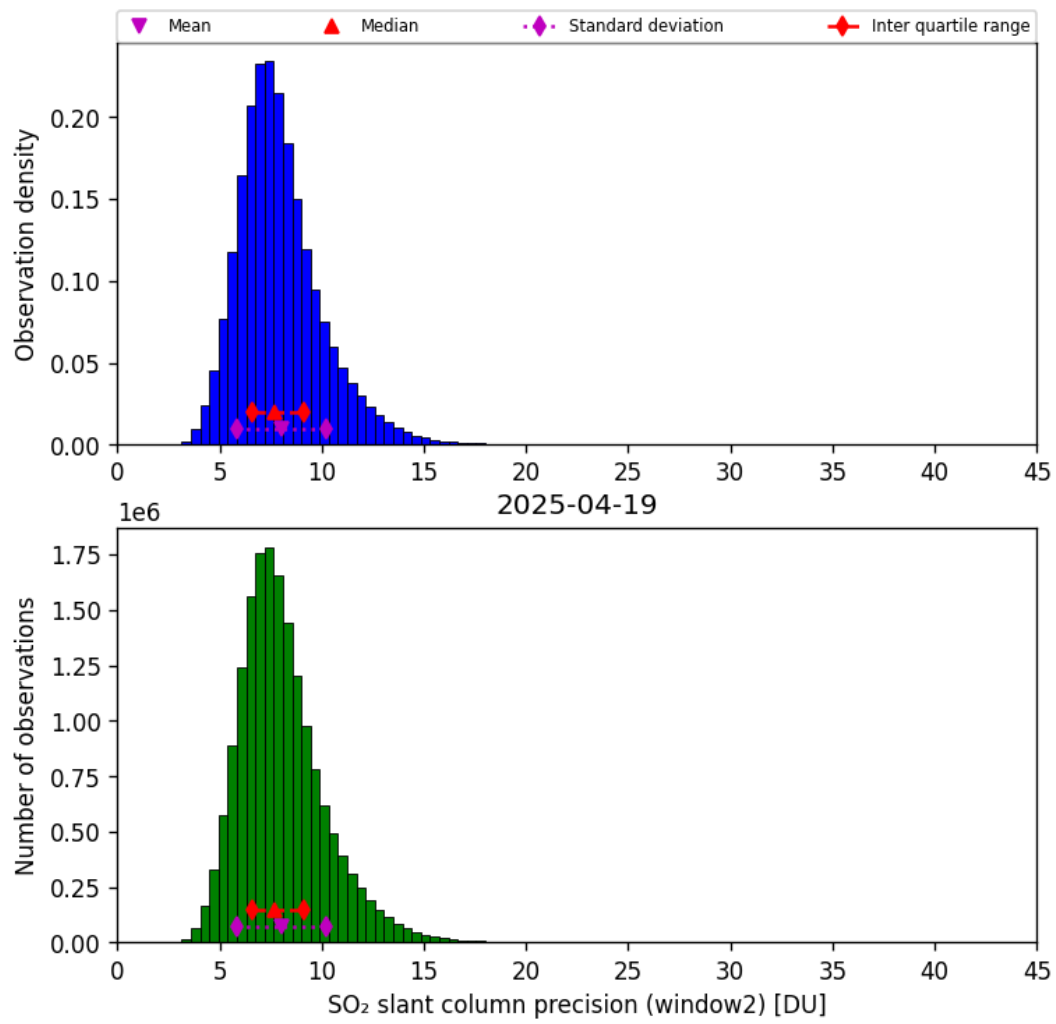


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-04-19 to 2025-04-20

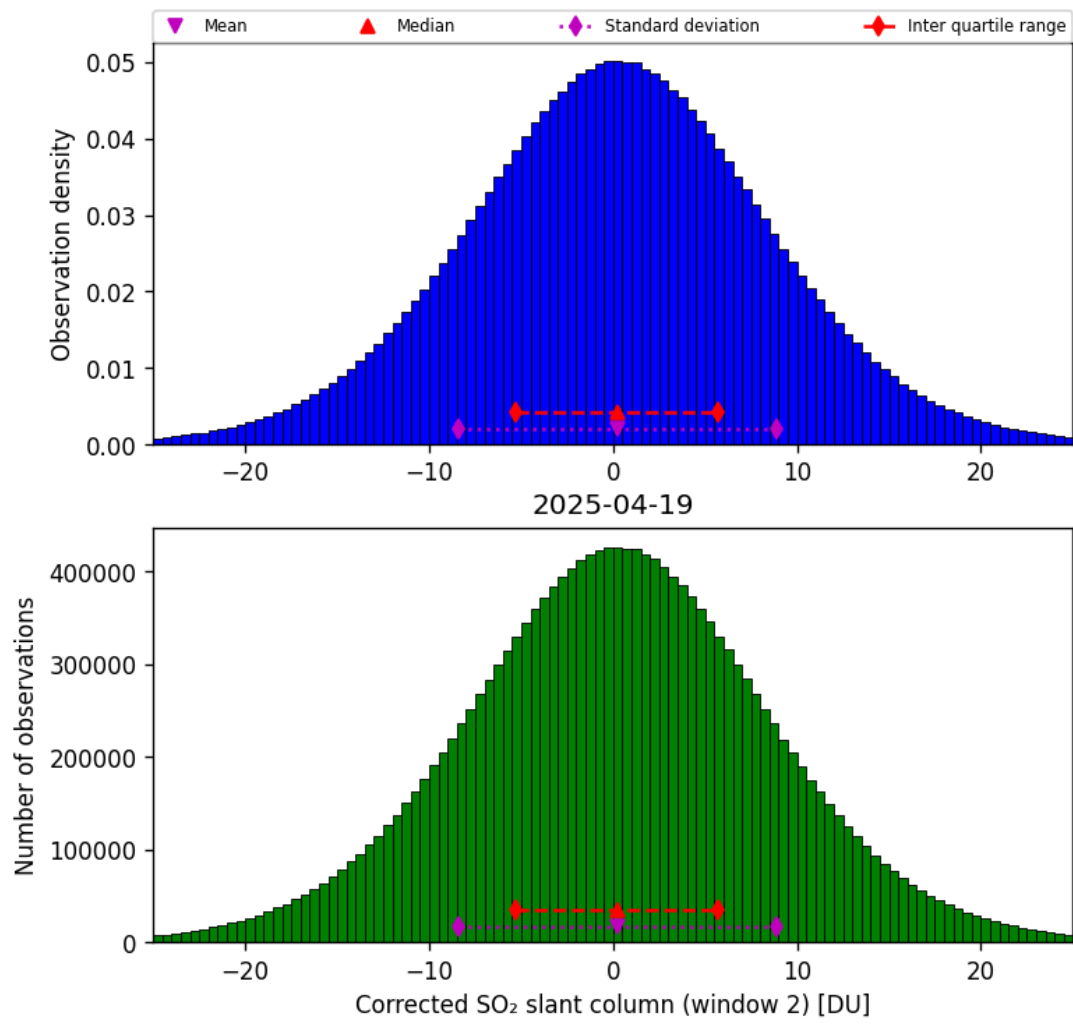


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-04-19 to 2025-04-20

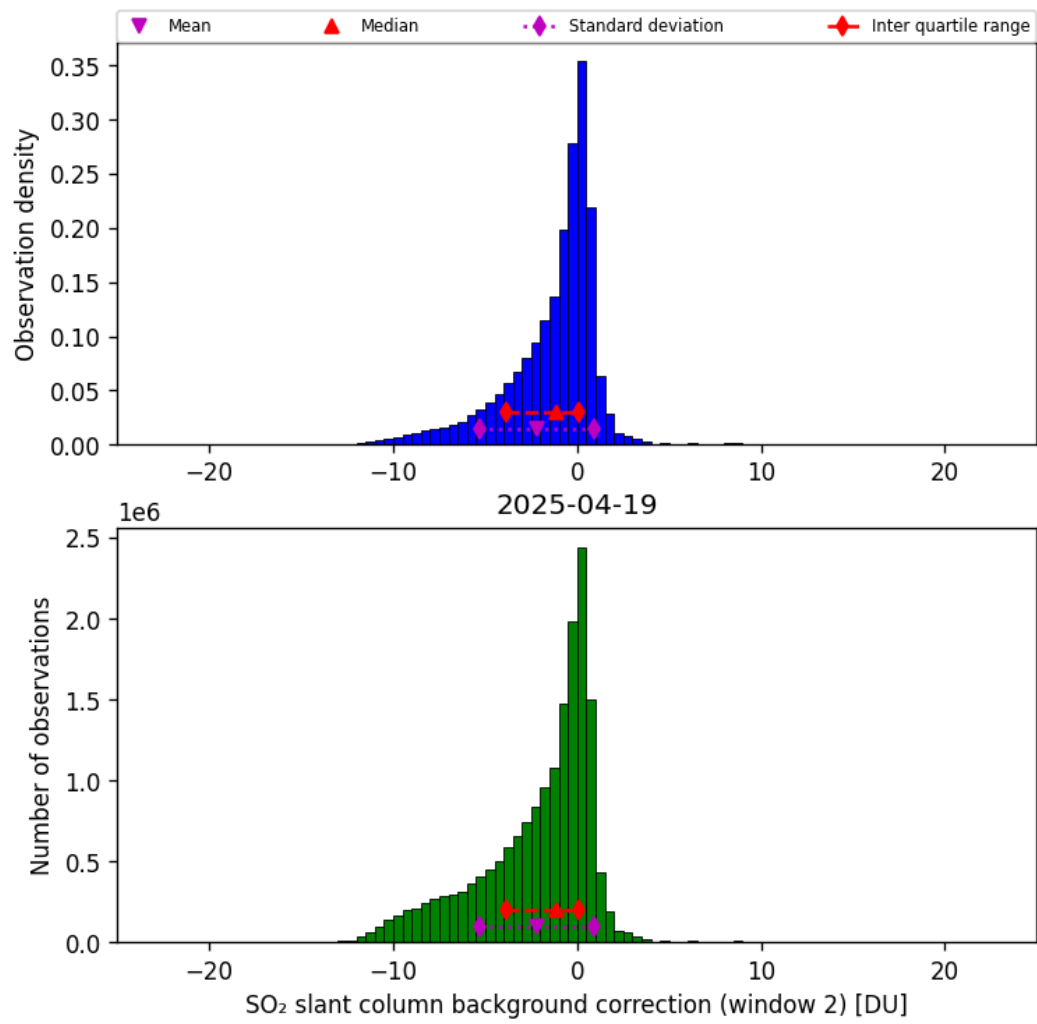


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-04-19 to 2025-04-20

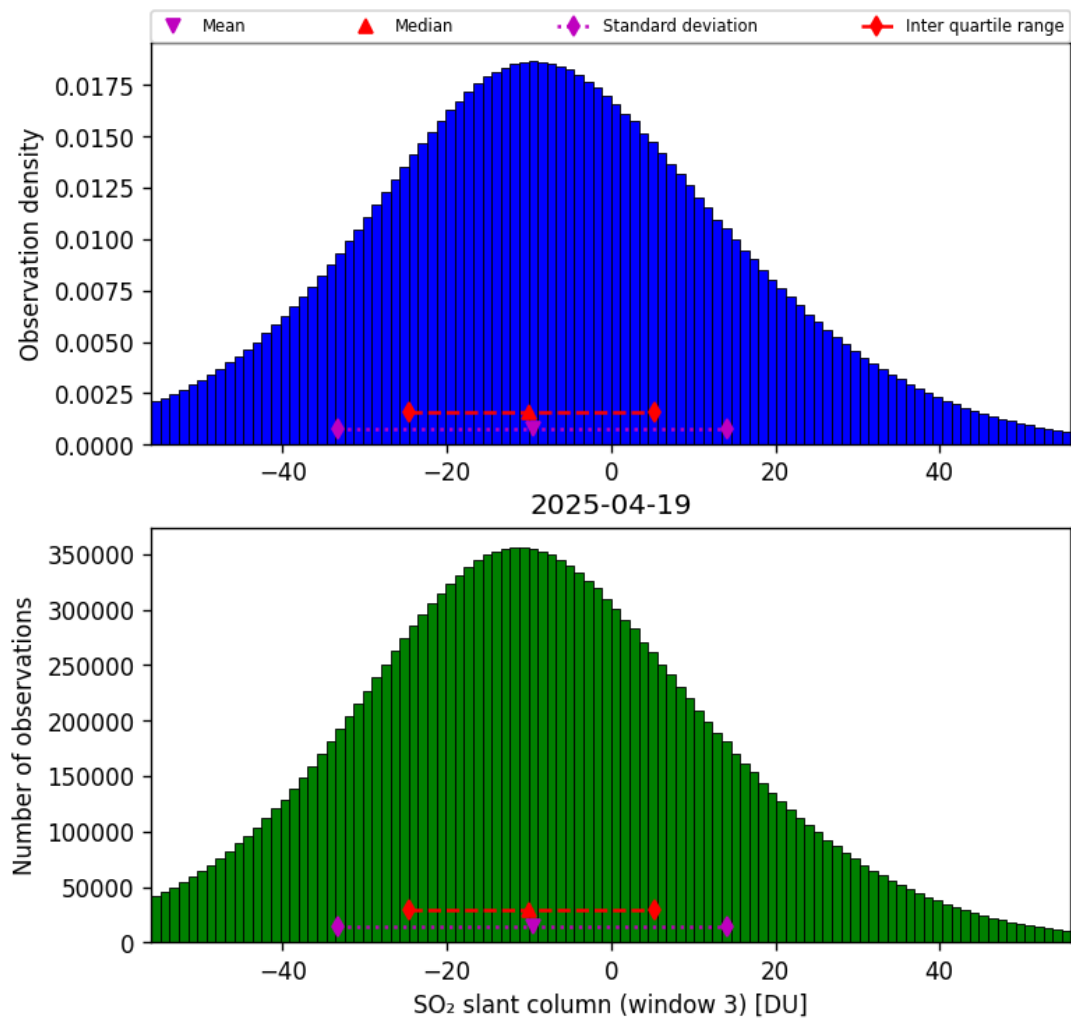


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-04-19 to 2025-04-20

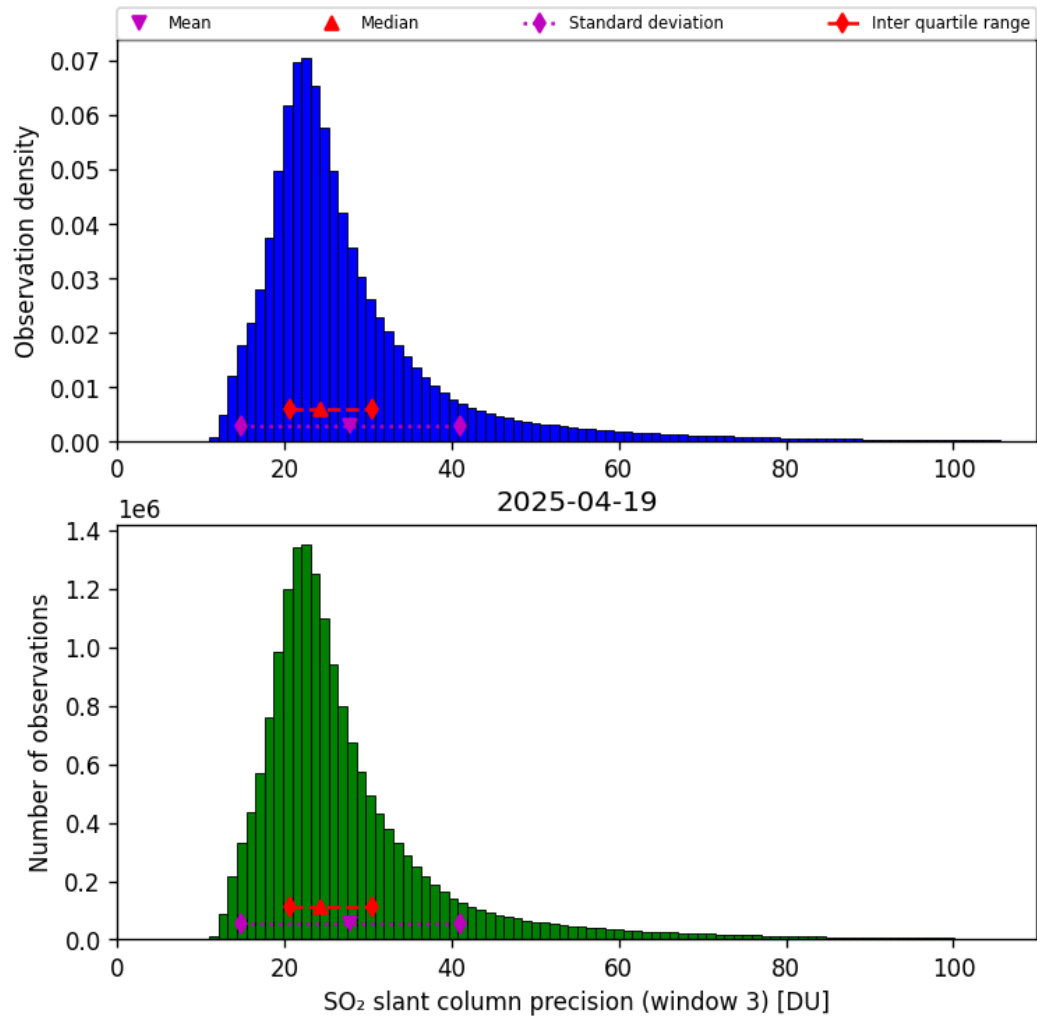


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-04-19 to 2025-04-20

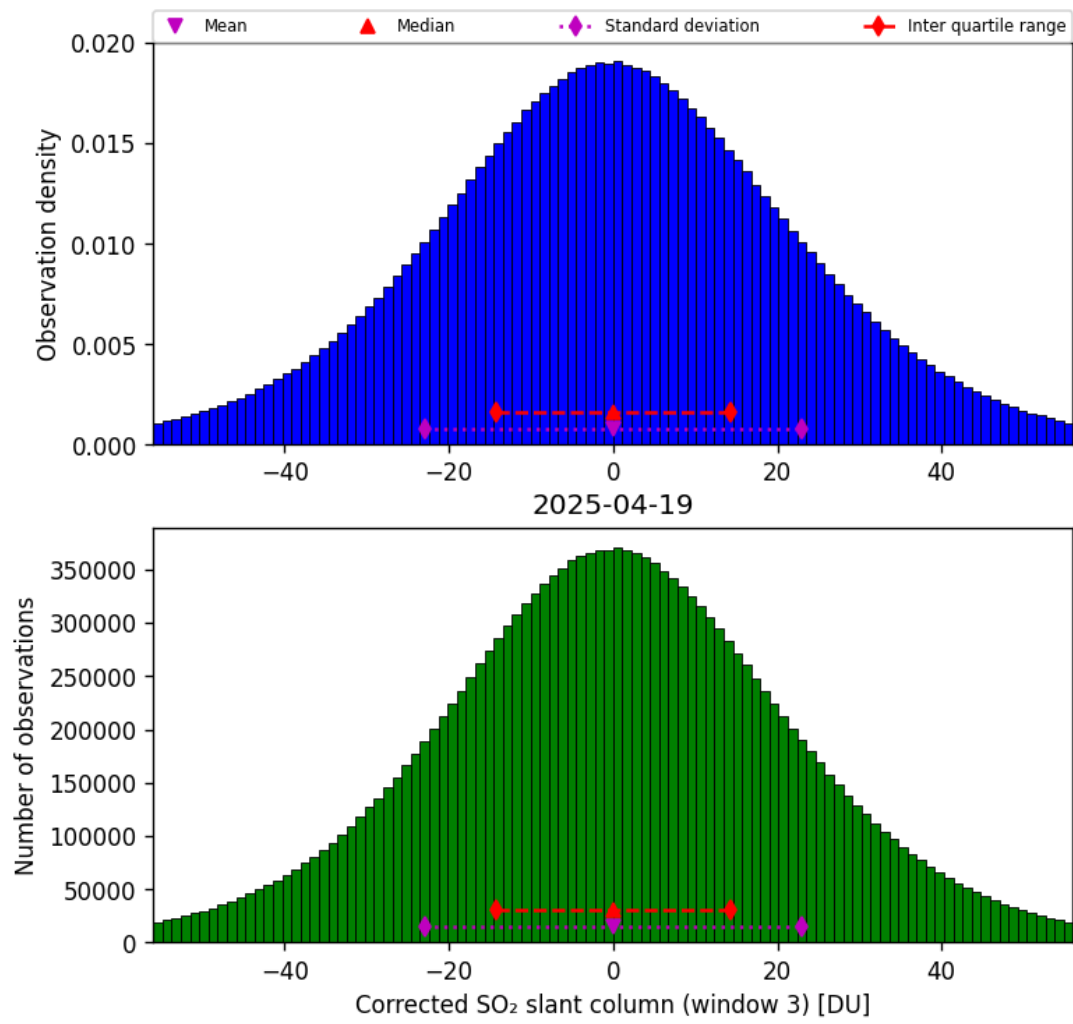


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-04-19 to 2025-04-20

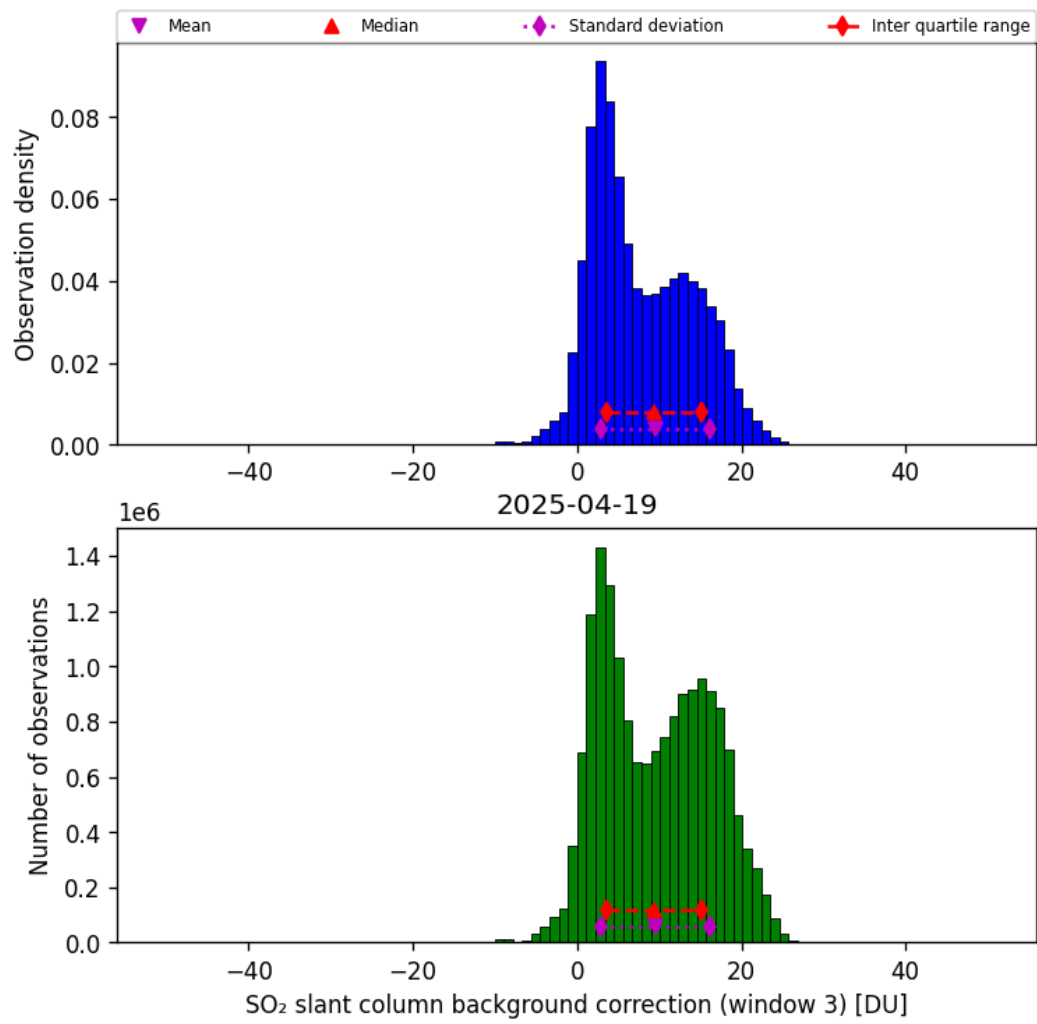


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-04-19 to 2025-04-20

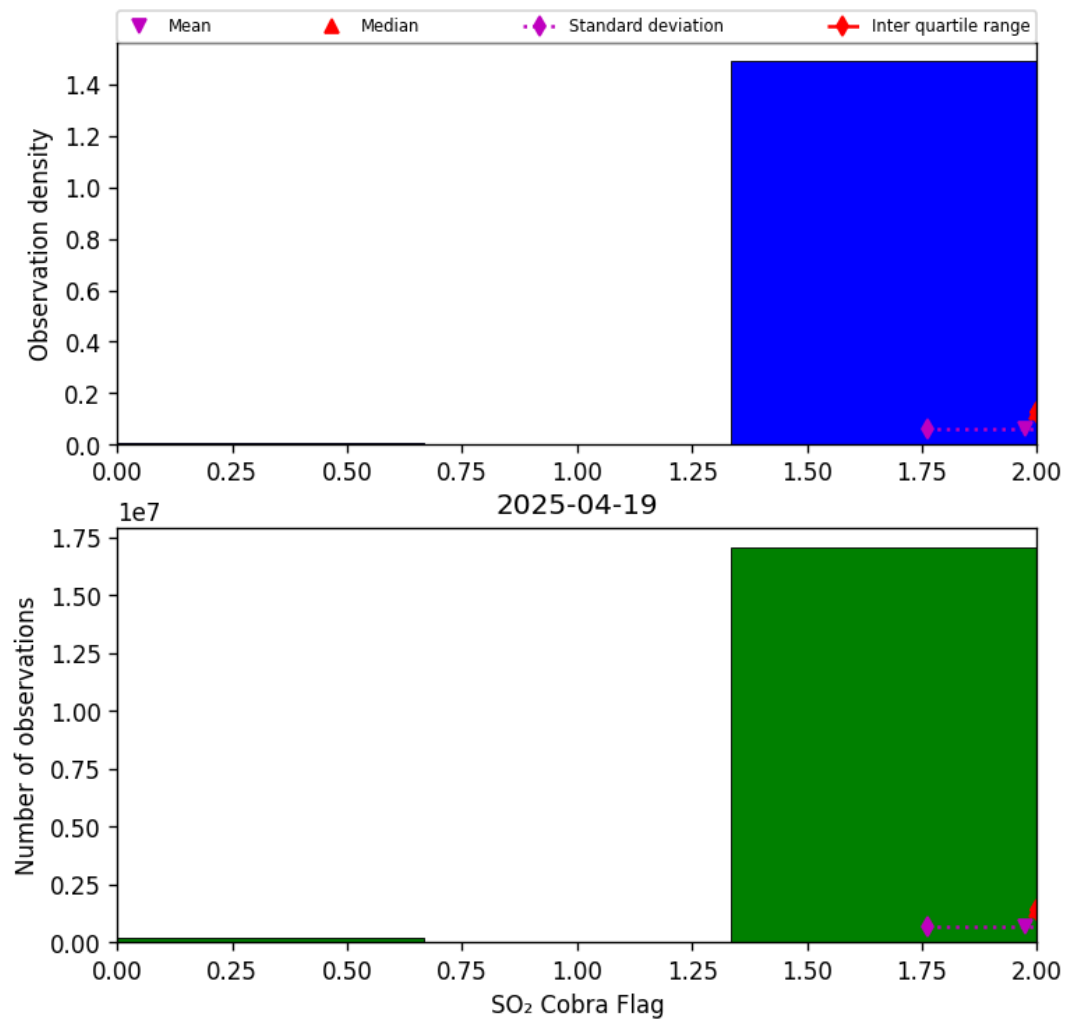


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-04-19 to 2025-04-20

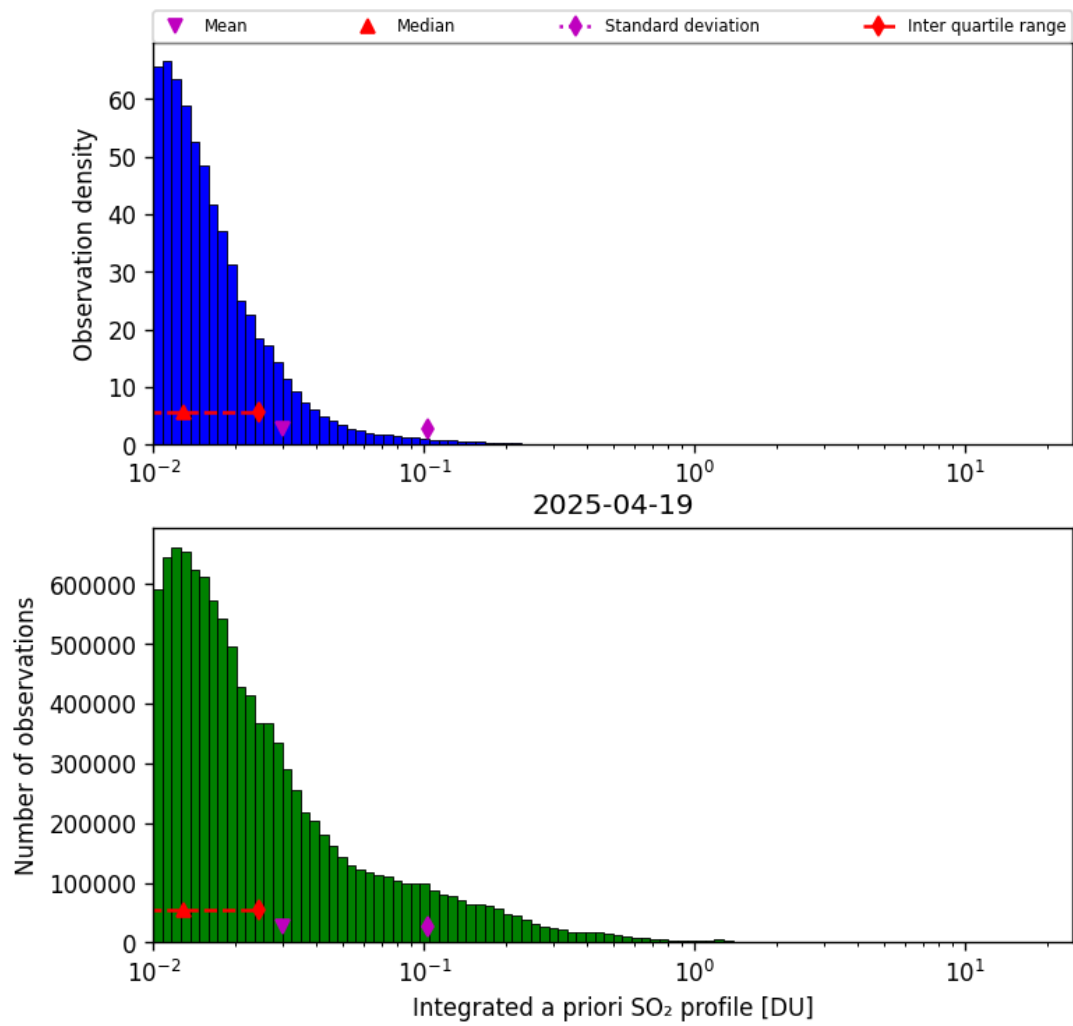


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-04-19 to 2025-04-20

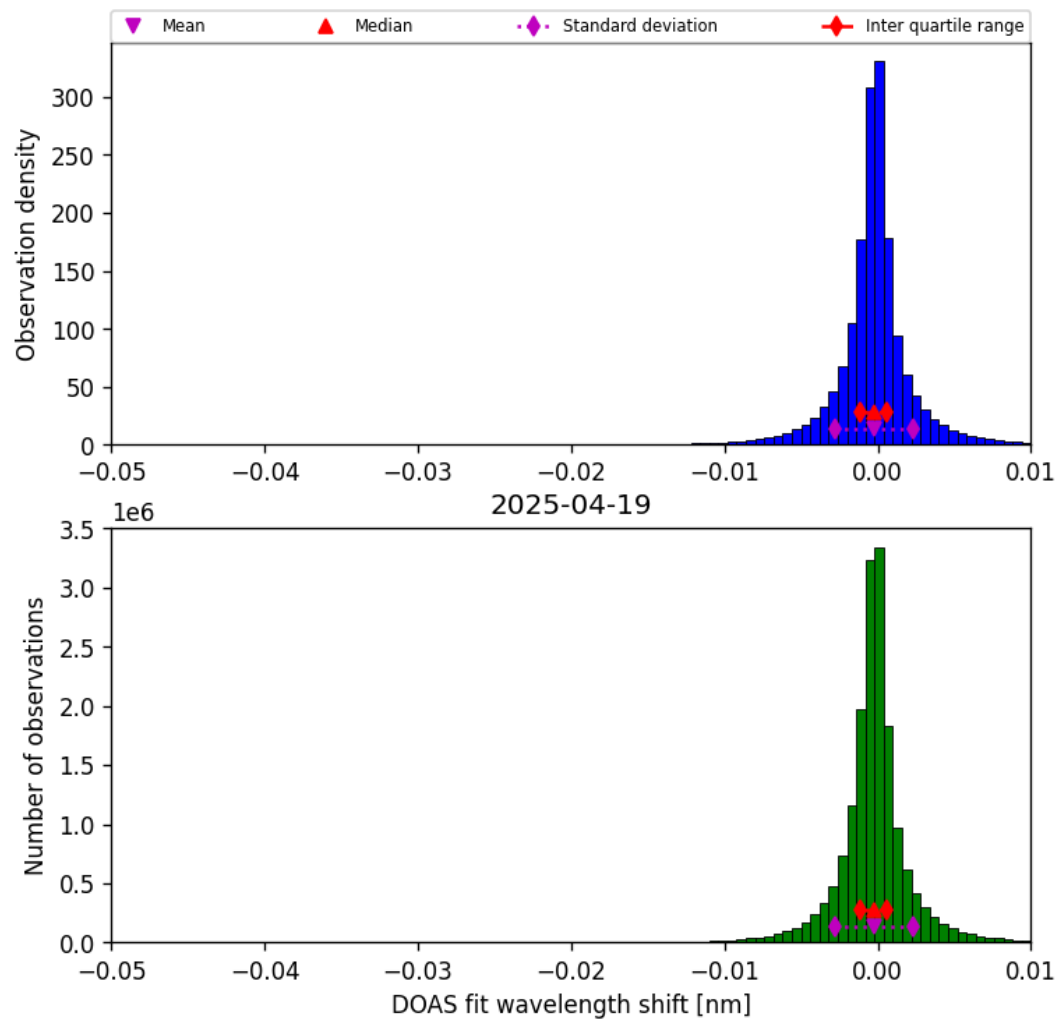


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-04-19 to 2025-04-20

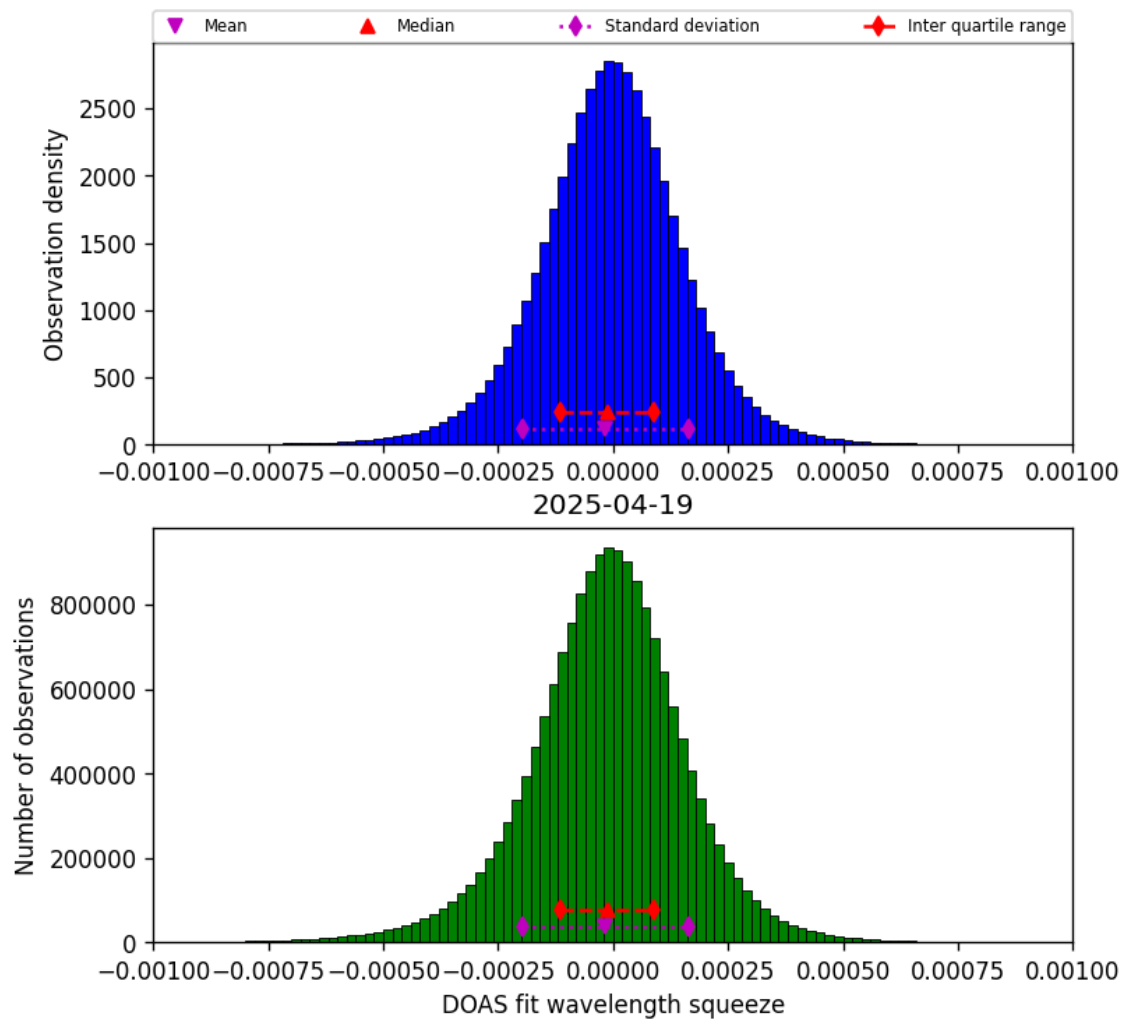


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-04-19 to 2025-04-20

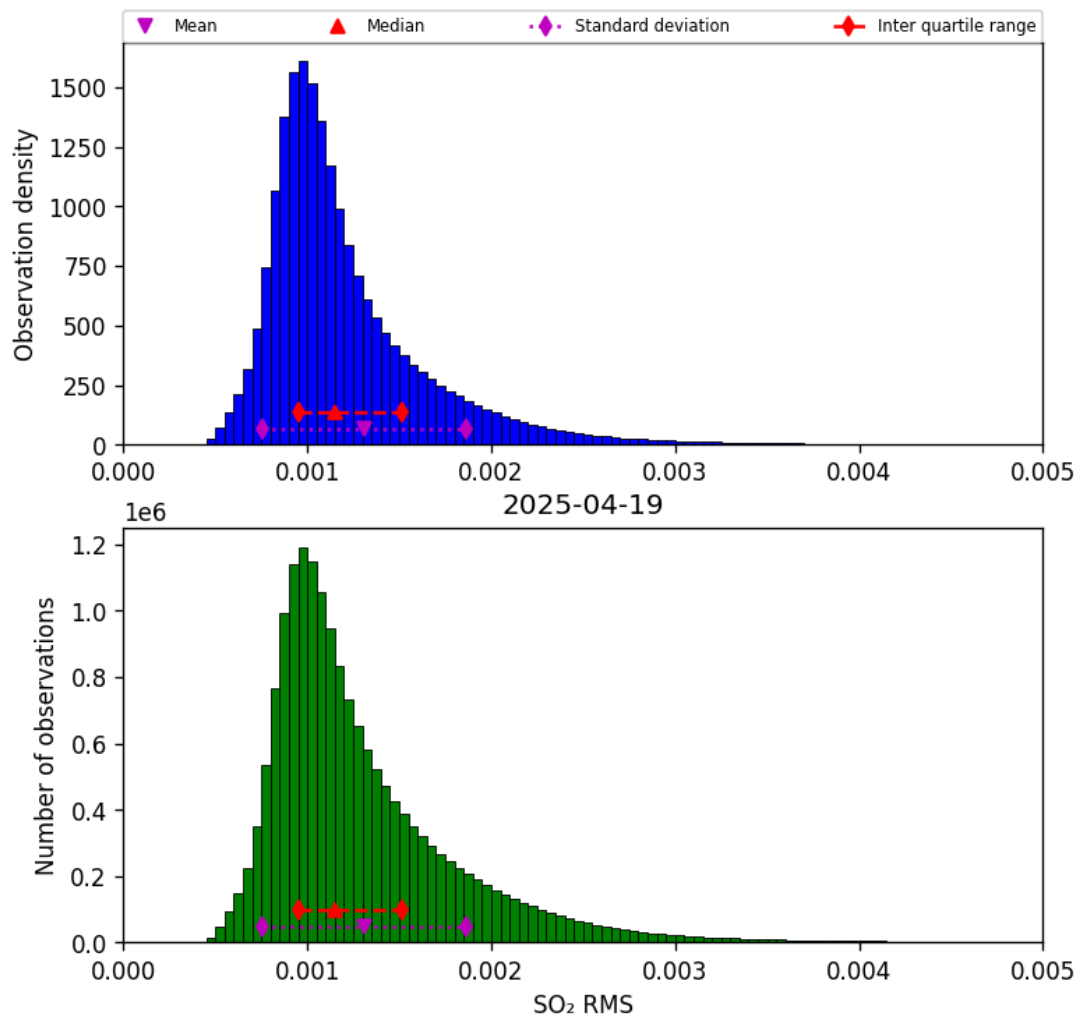


Figure 79: Histogram of “SO₂ RMS” for 2025-04-19 to 2025-04-20

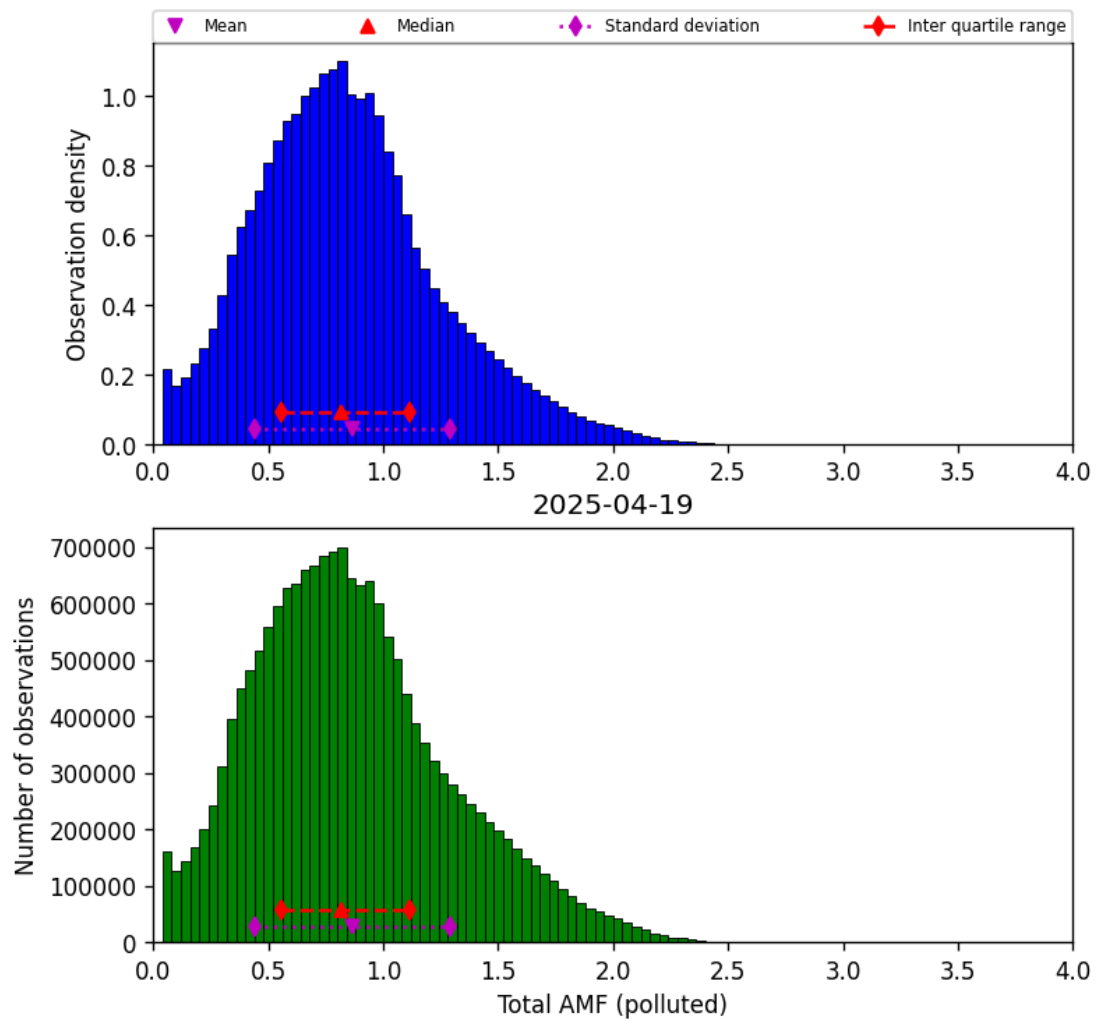


Figure 80: Histogram of “Total AMF (polluted)” for 2025-04-19 to 2025-04-20

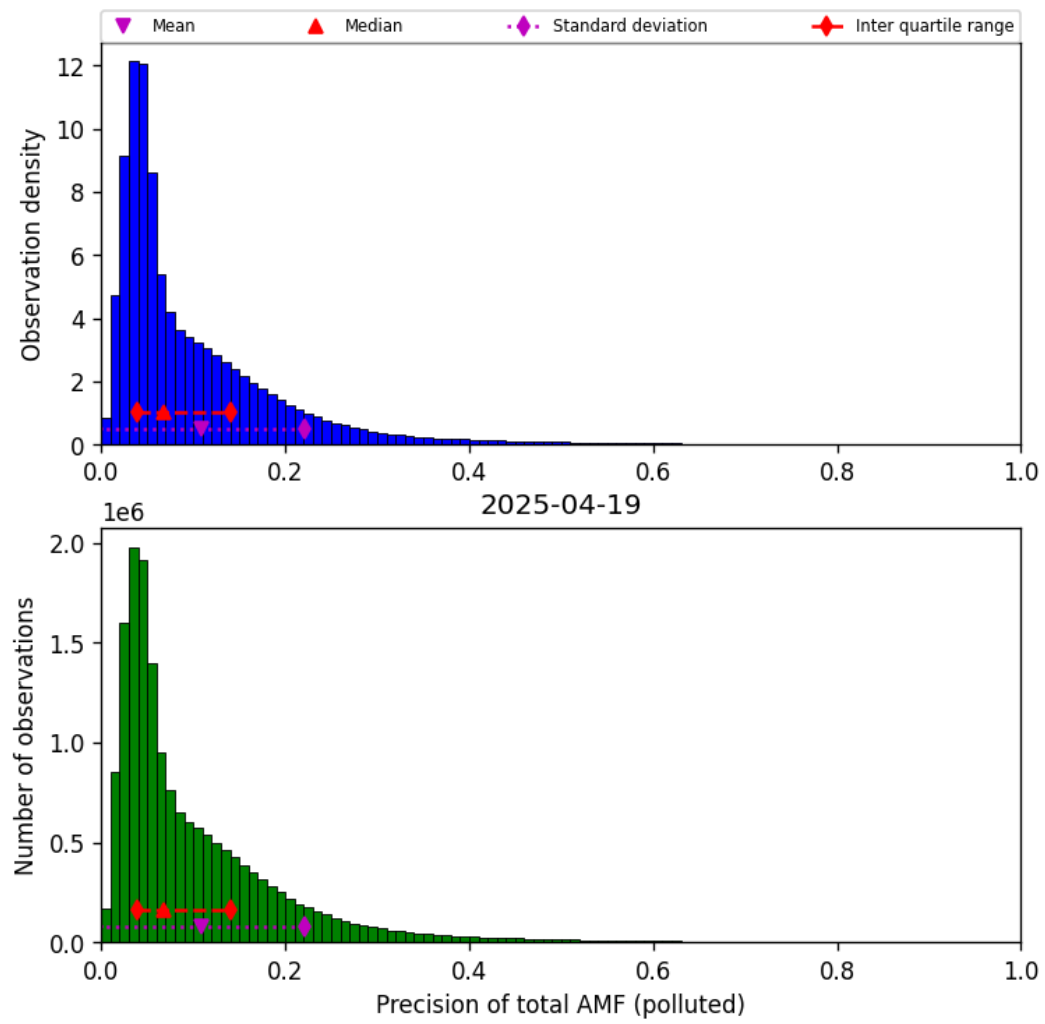


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-04-19 to 2025-04-20

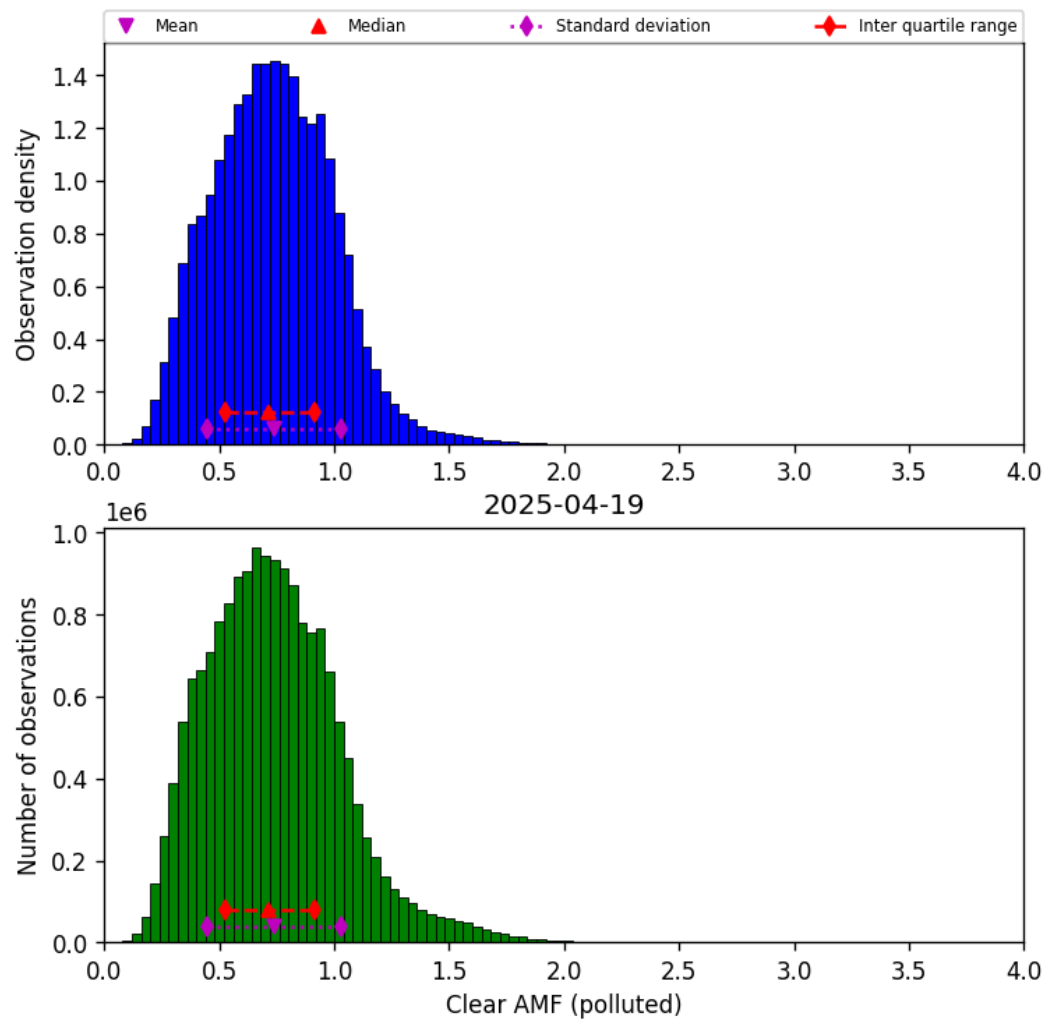


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-04-19 to 2025-04-20

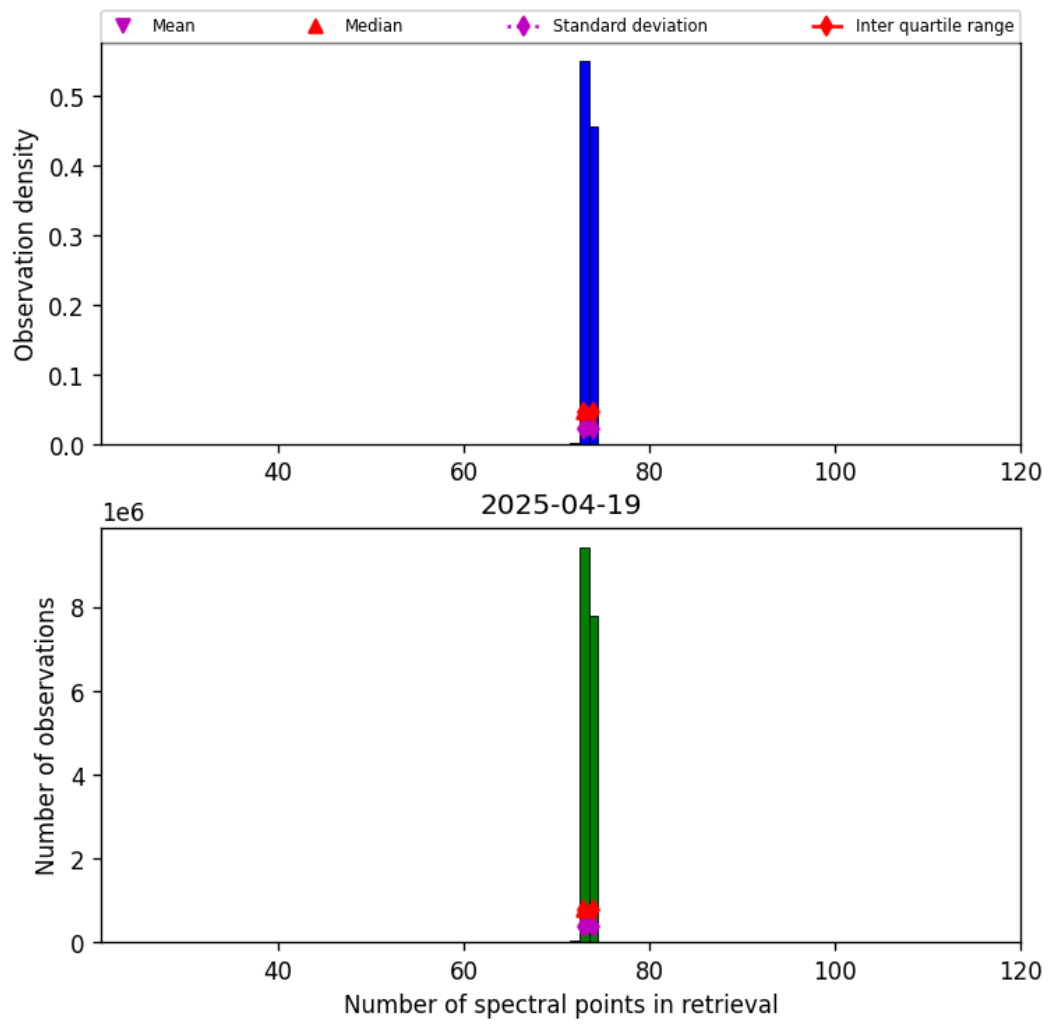


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-04-19 to 2025-04-20

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.

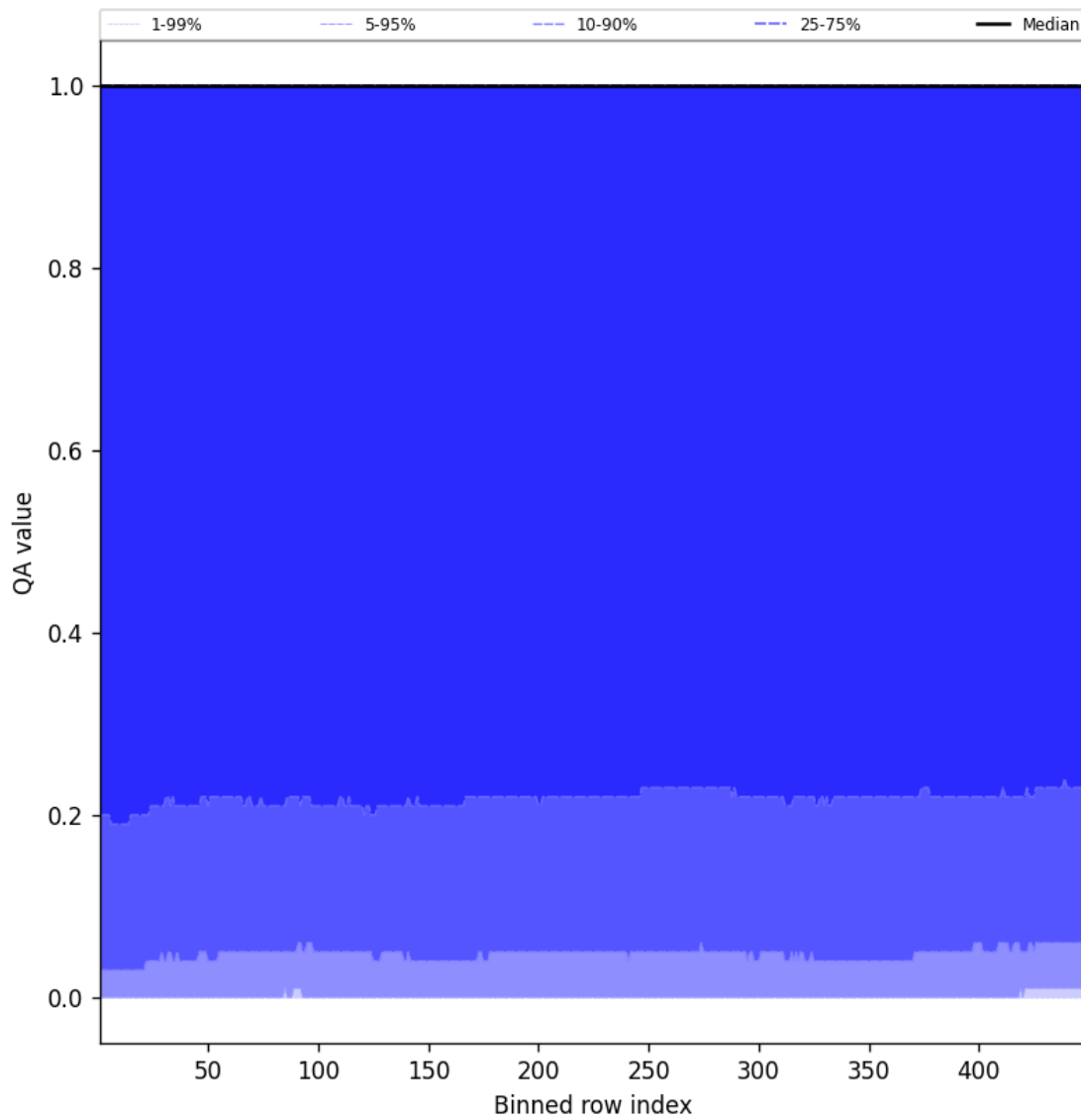


Figure 84: Along track statistics of “QA value” for 2025-04-19 to 2025-04-20

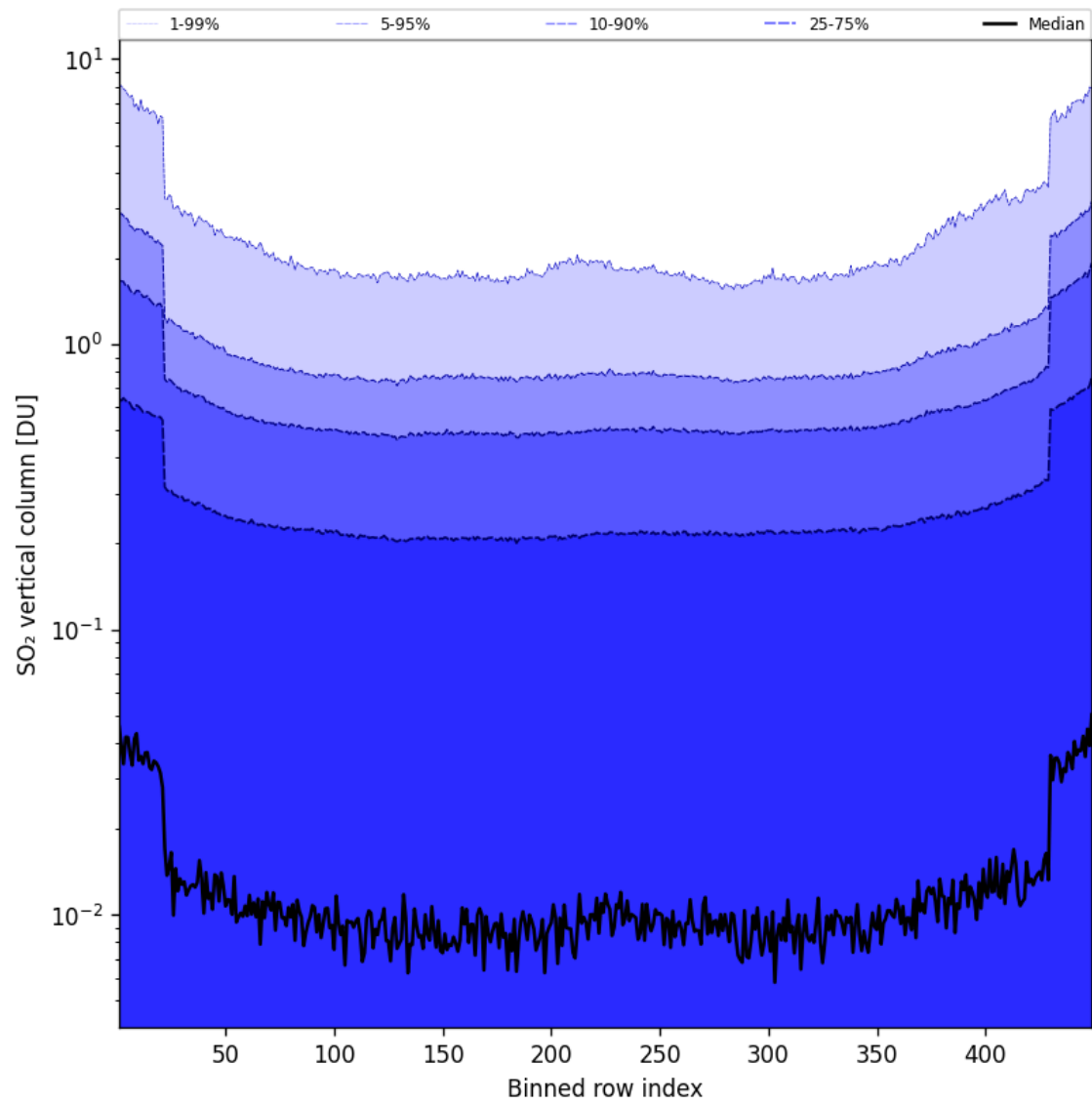


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-04-19 to 2025-04-20

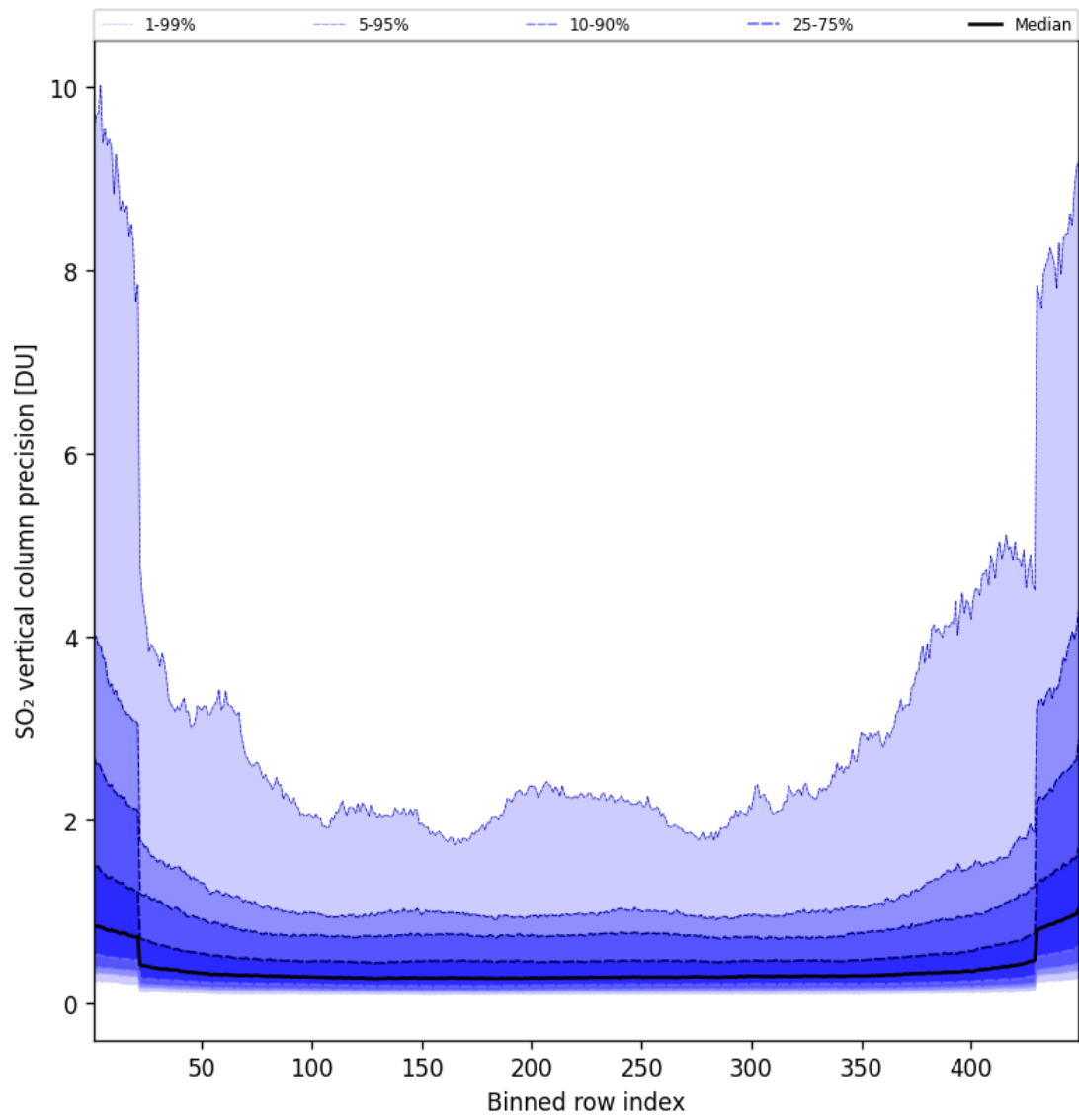


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-04-19 to 2025-04-20

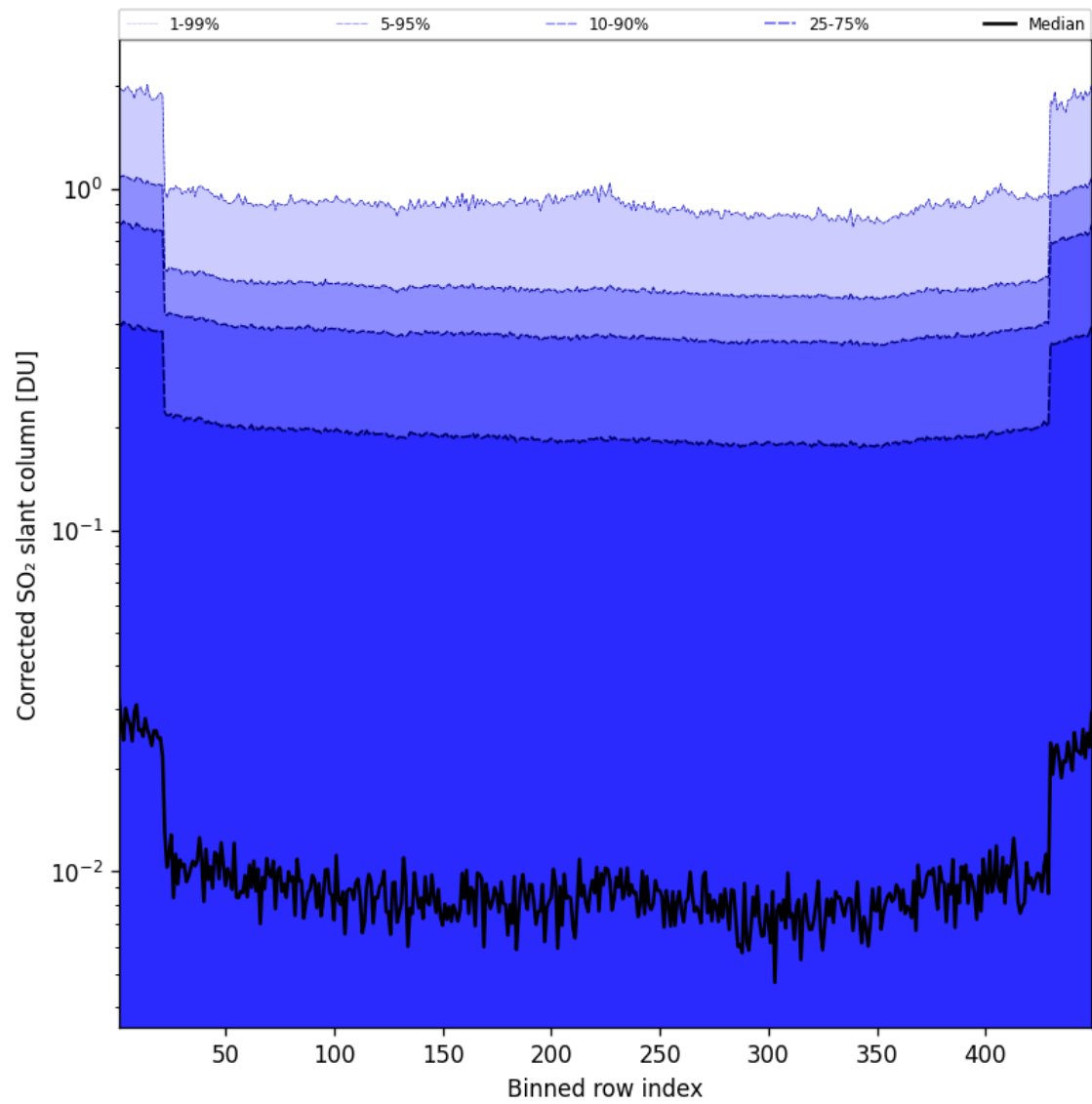


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-04-19 to 2025-04-20

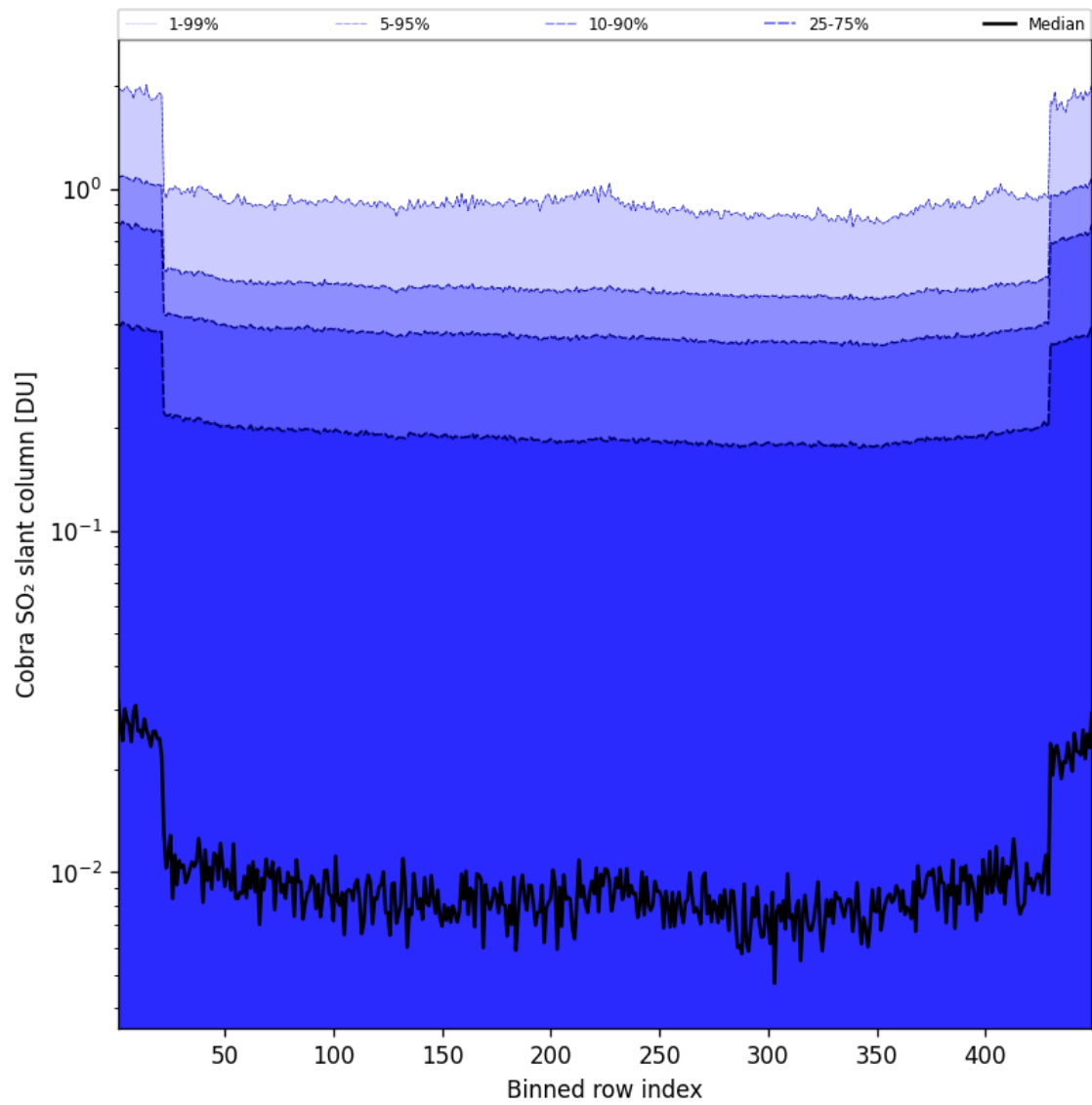


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-04-19 to 2025-04-20

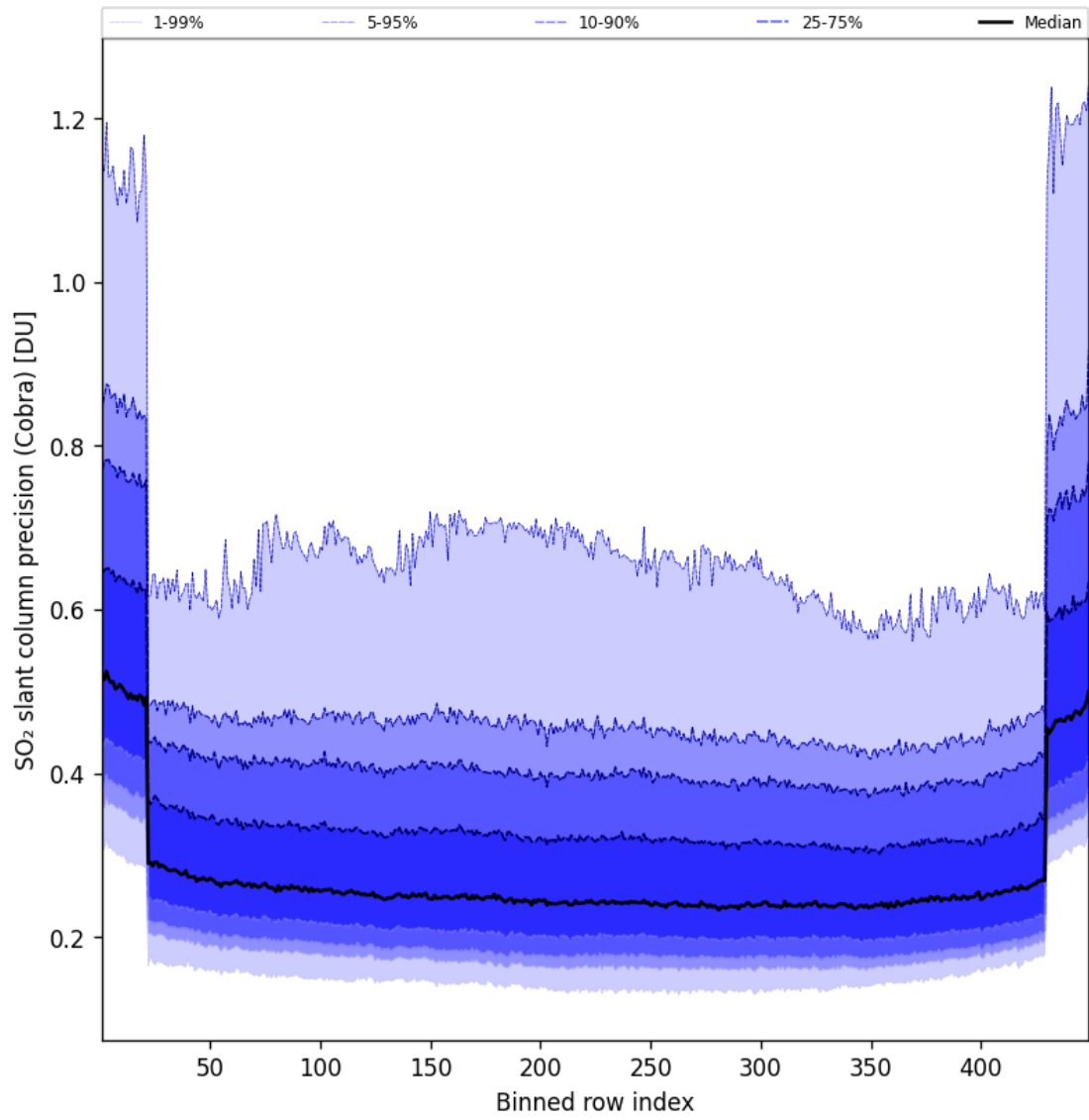


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-04-19 to 2025-04-20

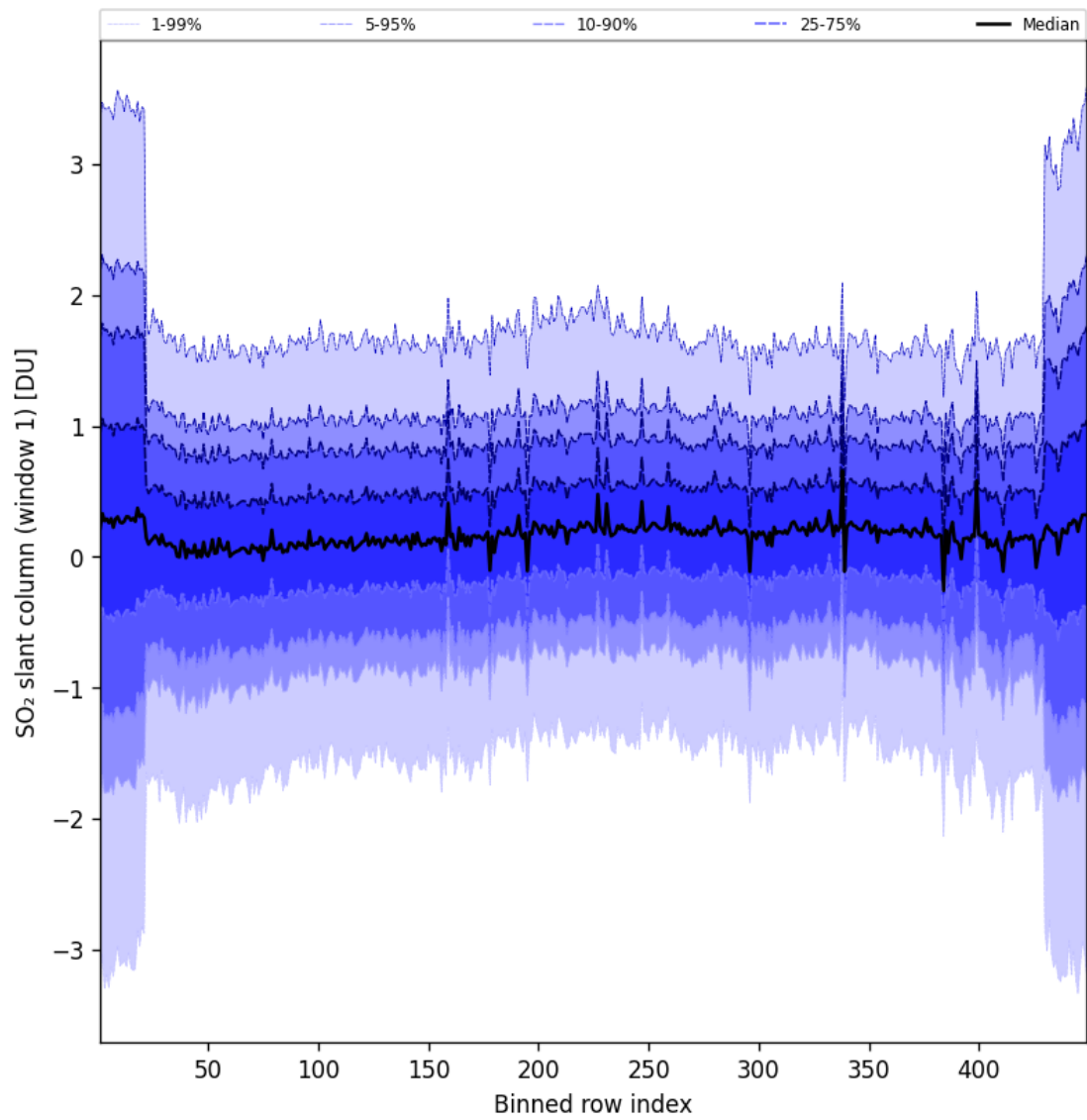


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-04-19 to 2025-04-20

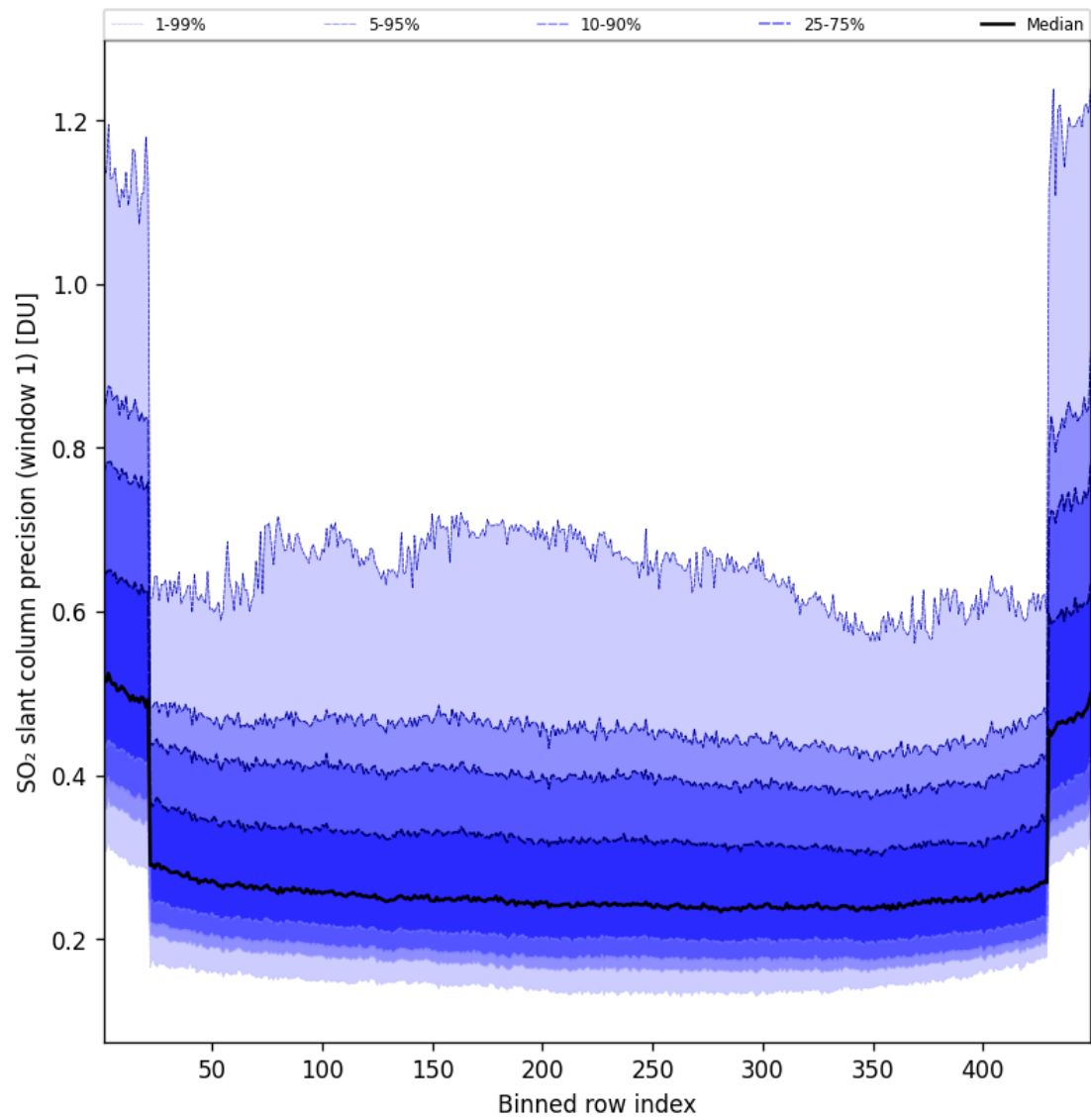


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-04-19 to 2025-04-20

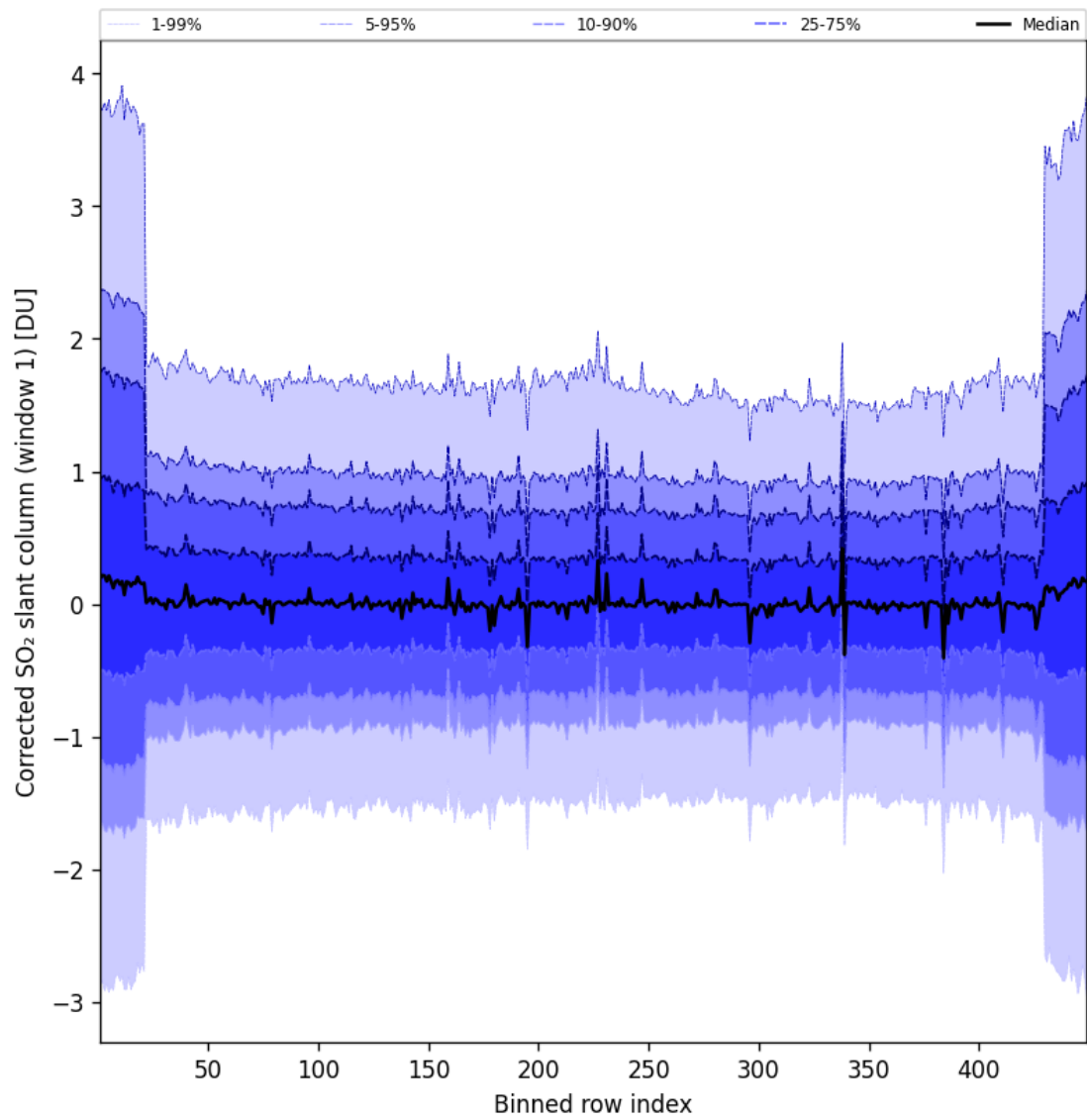


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-04-19 to 2025-04-20

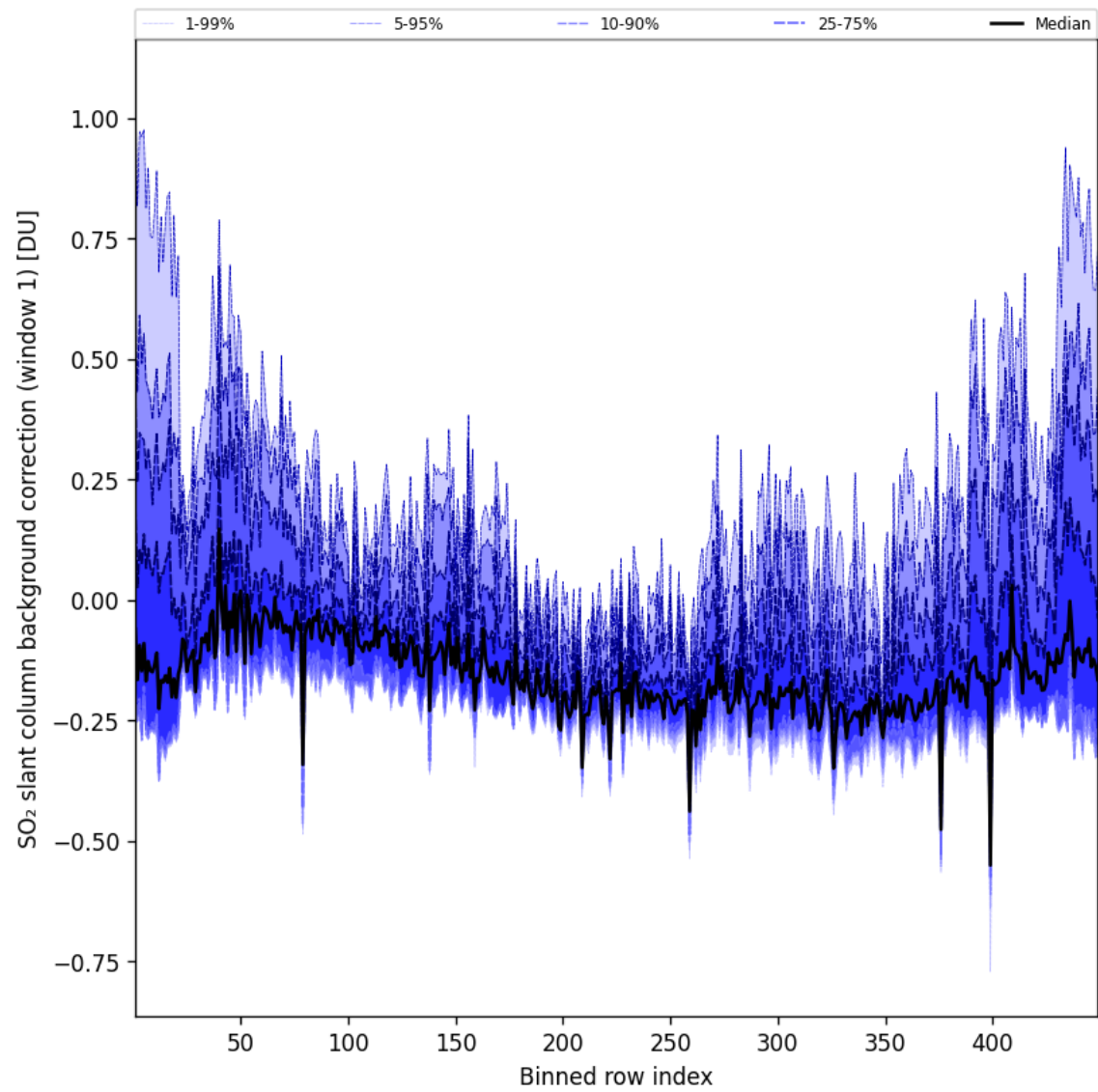


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-04-19 to 2025-04-20

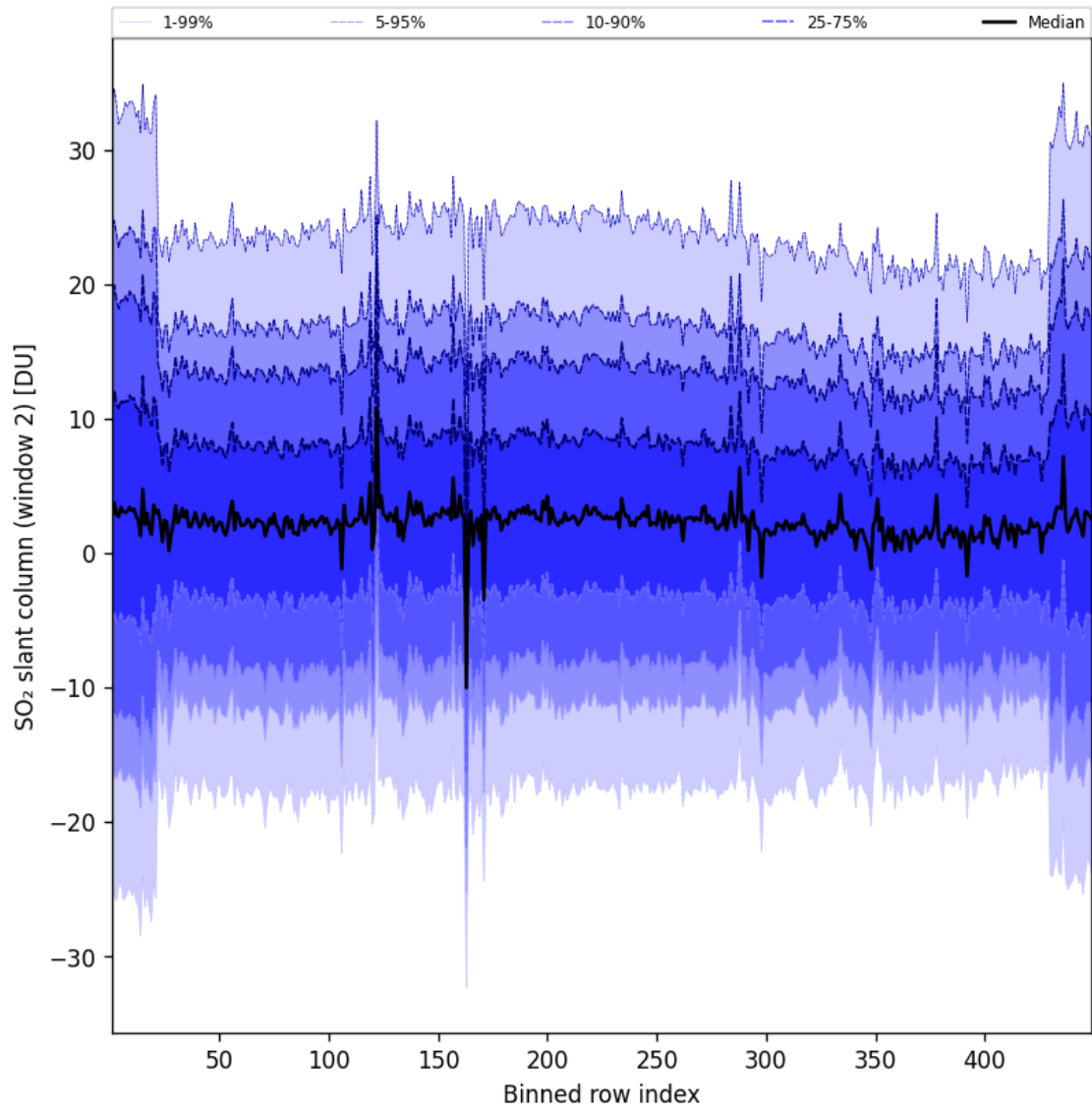


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-04-19 to 2025-04-20

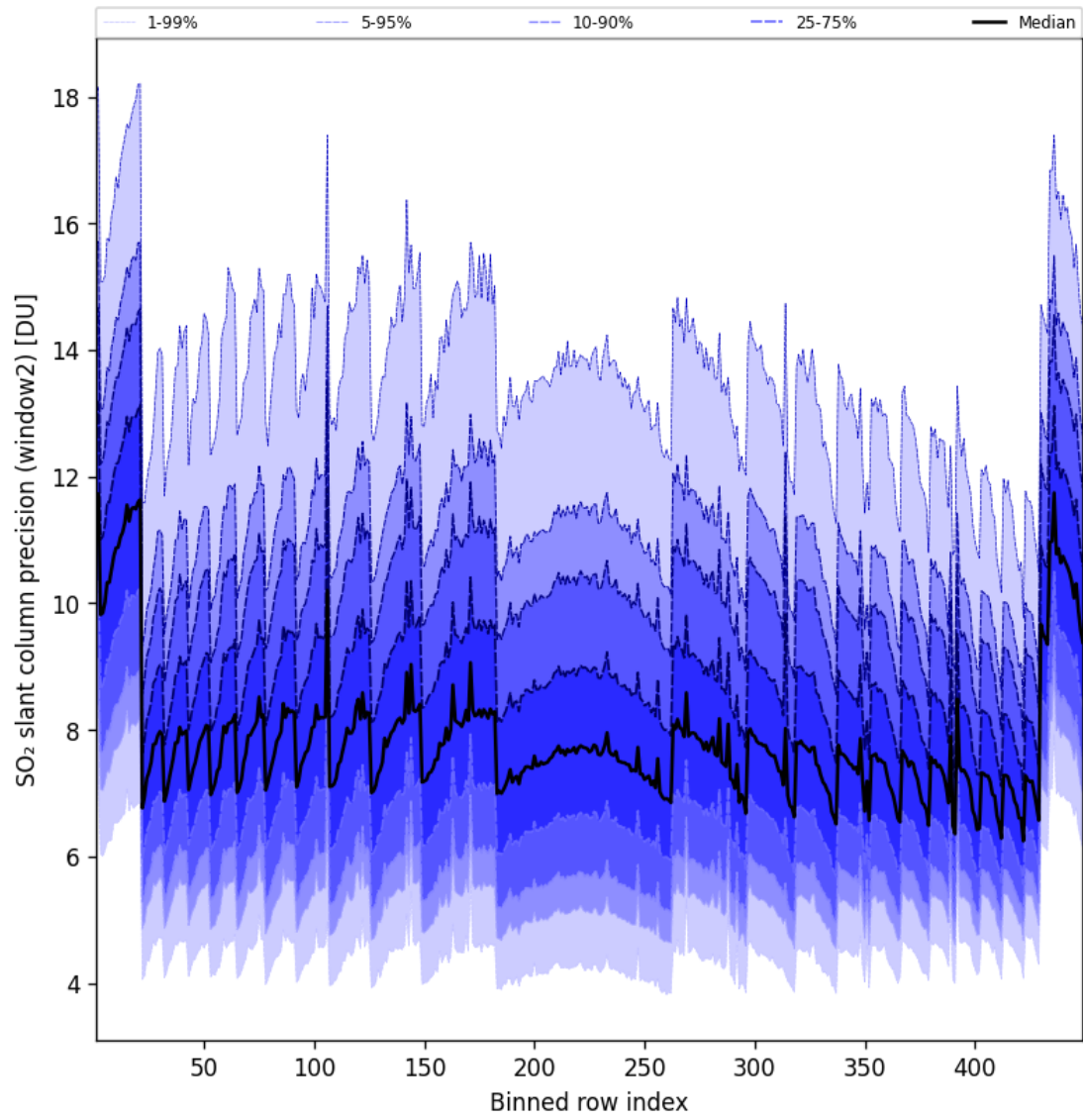


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-04-19 to 2025-04-20

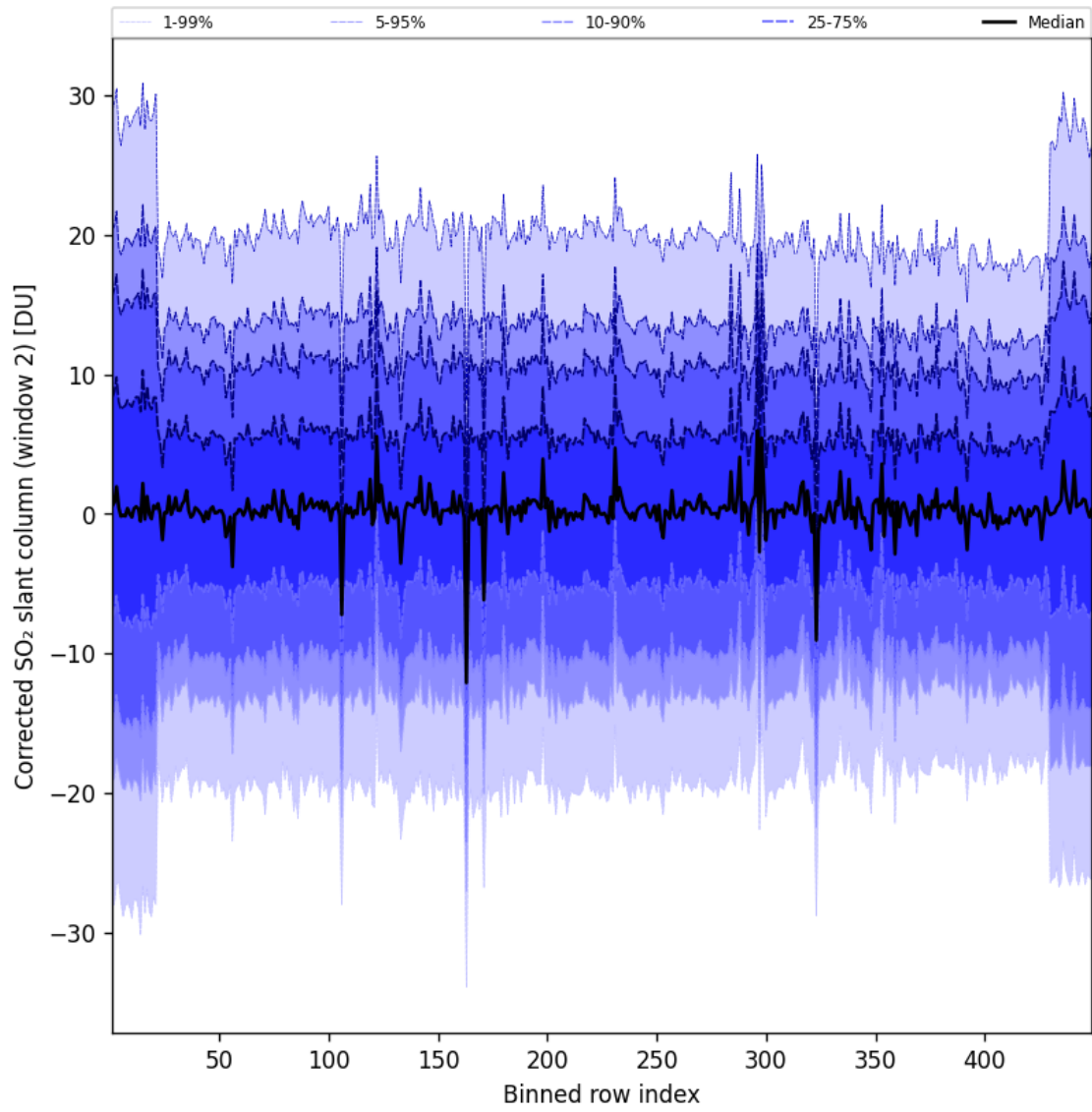


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-04-19 to 2025-04-20

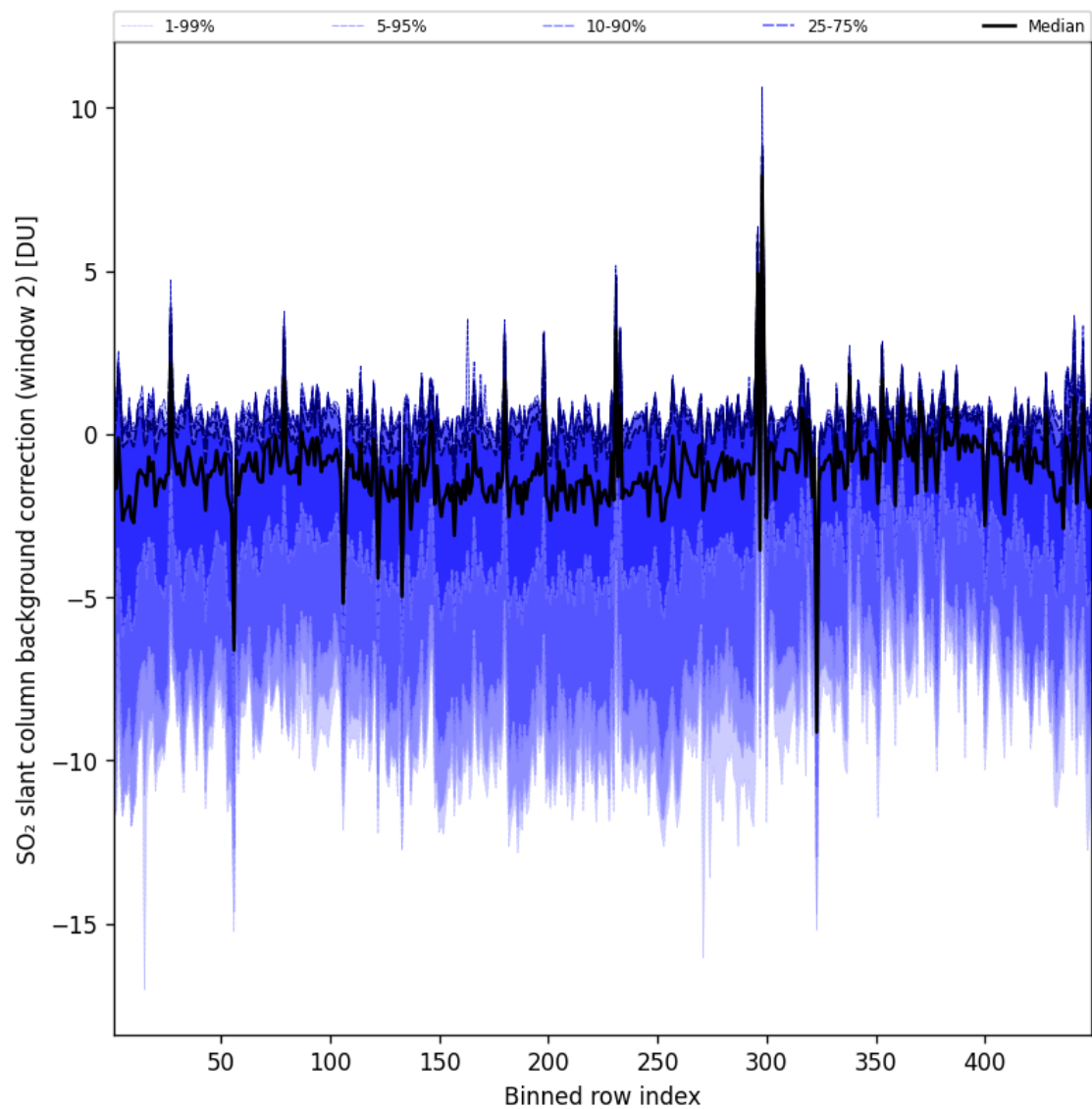


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-04-19 to 2025-04-20

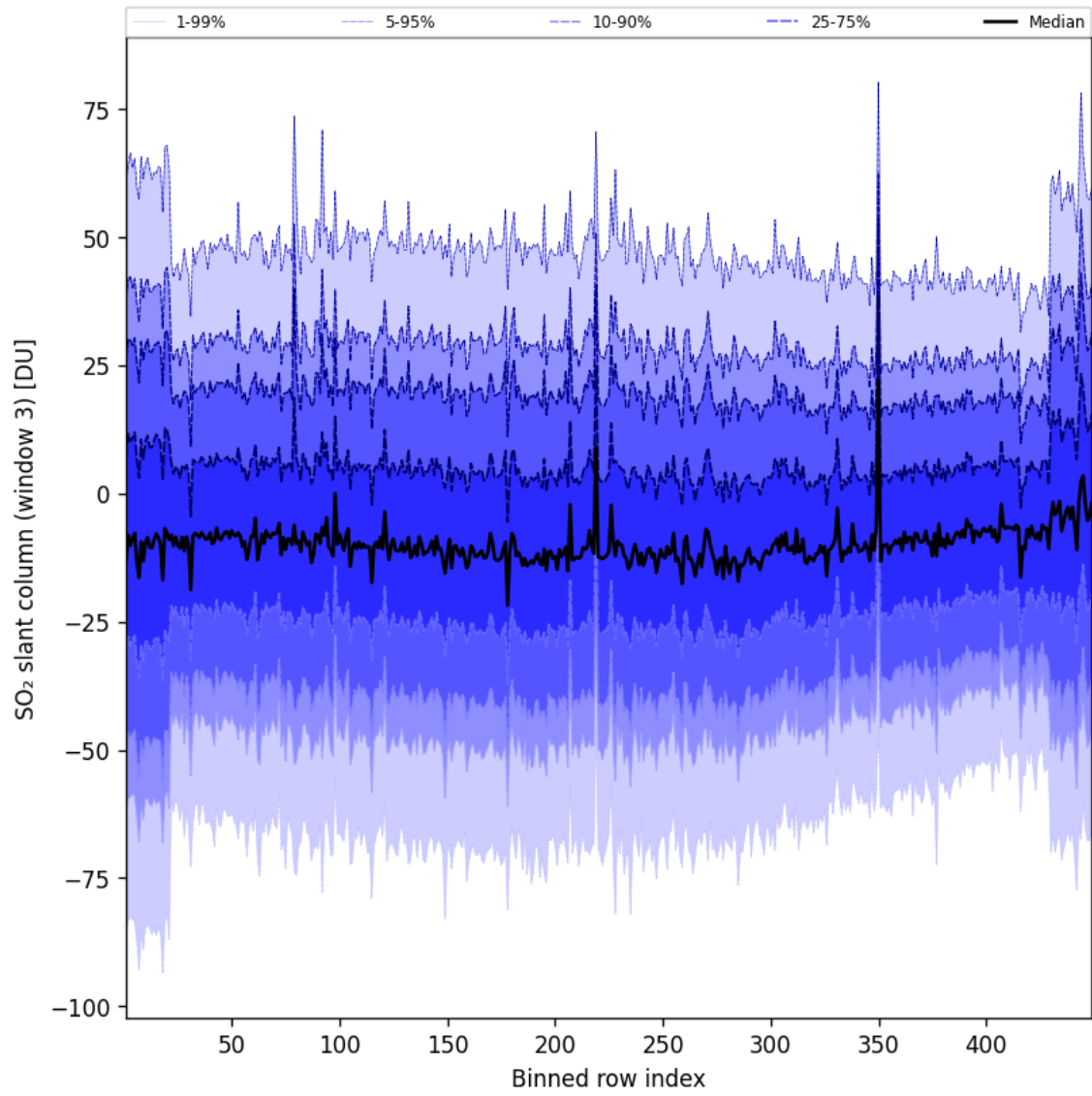


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-04-19 to 2025-04-20

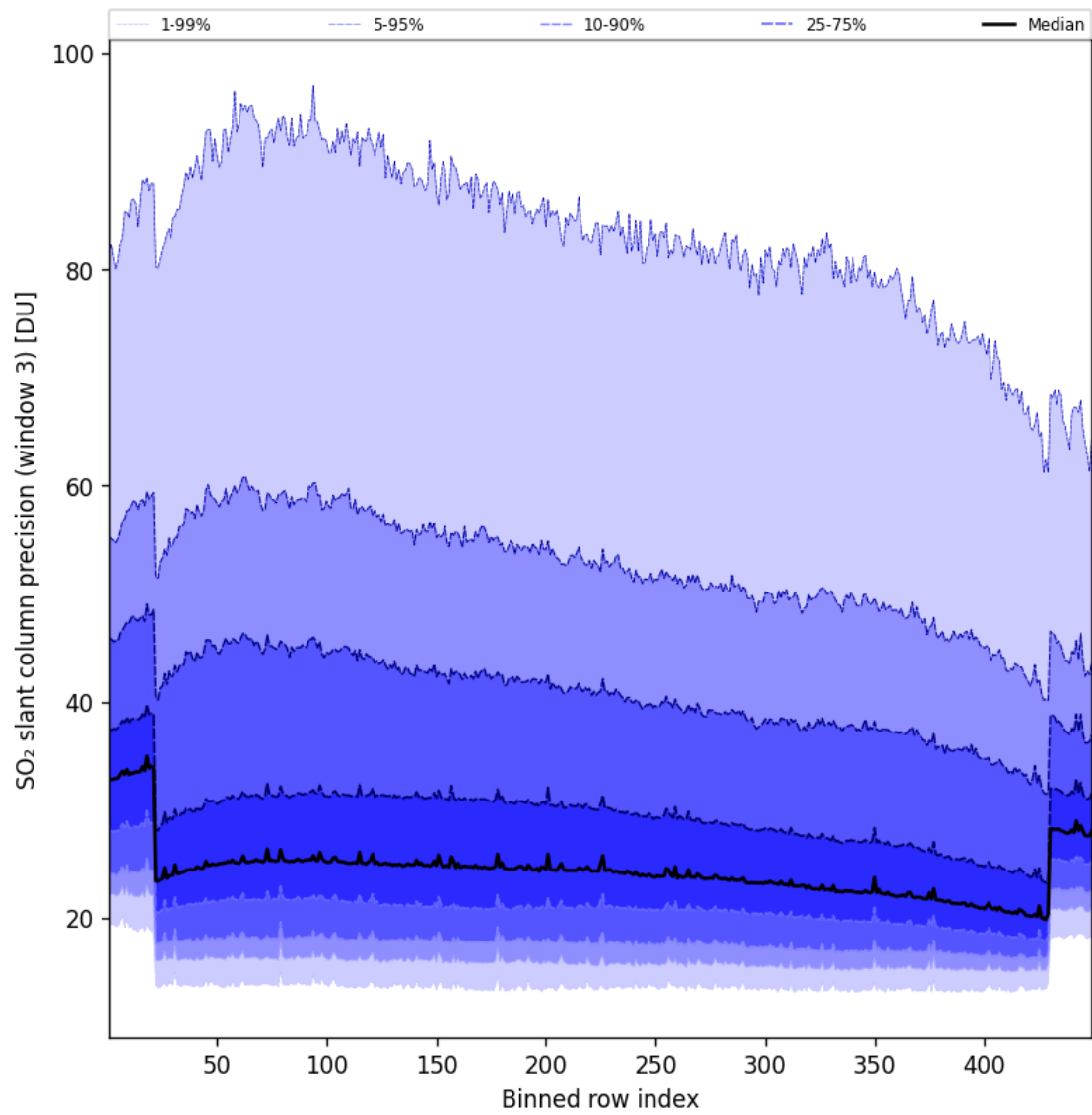


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-04-19 to 2025-04-20

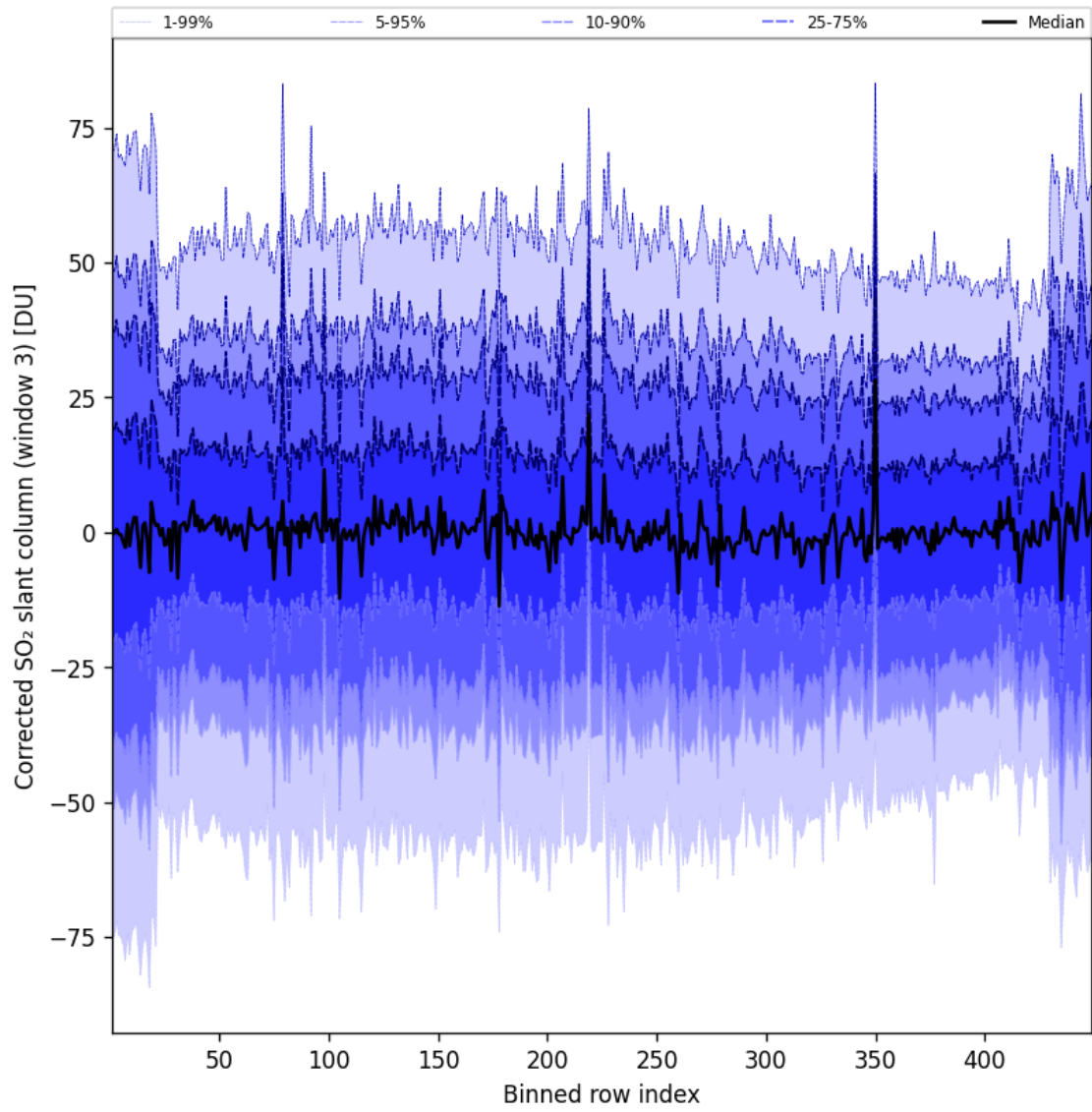


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-04-19 to 2025-04-20

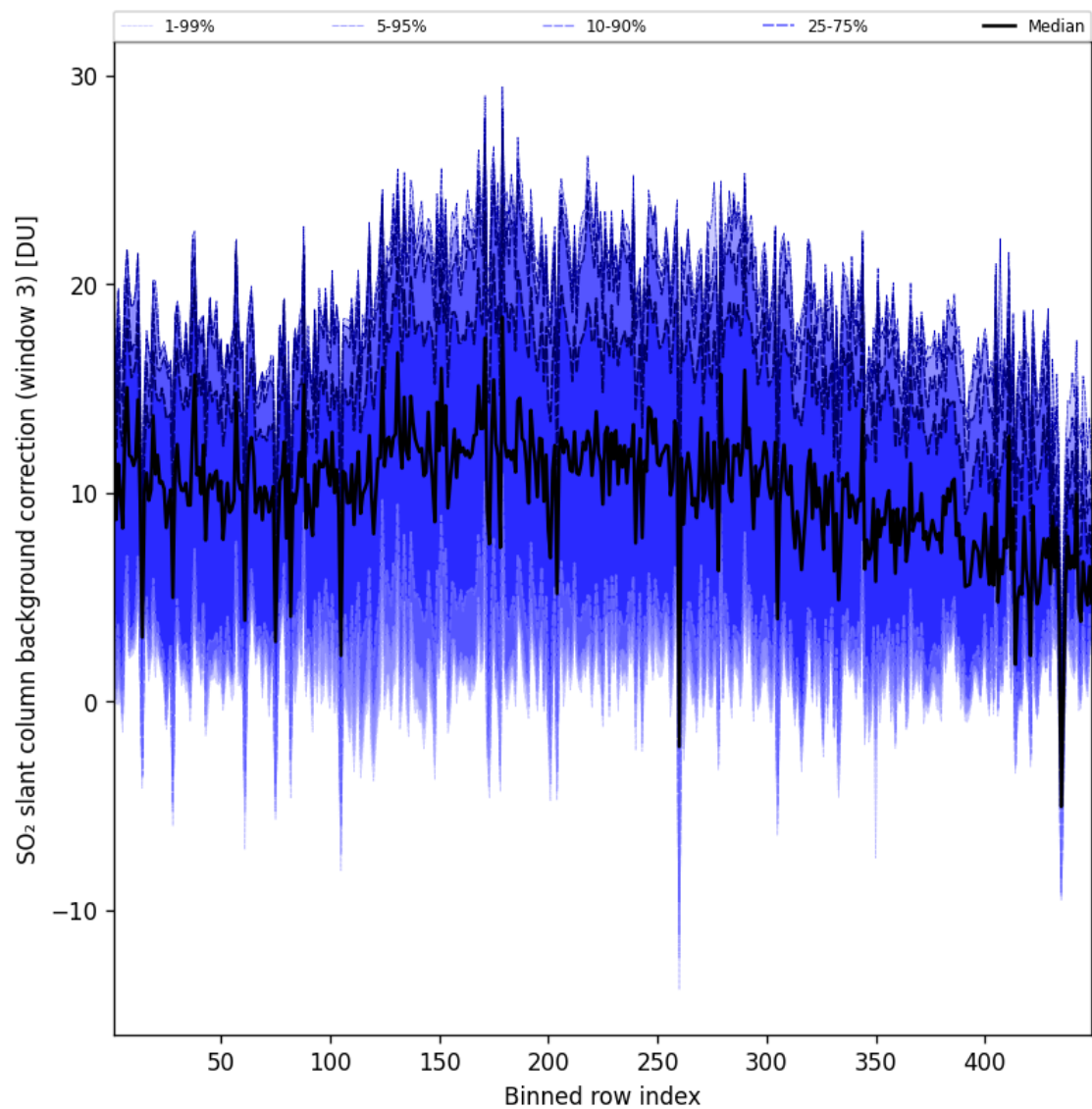


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-04-19 to 2025-04-20

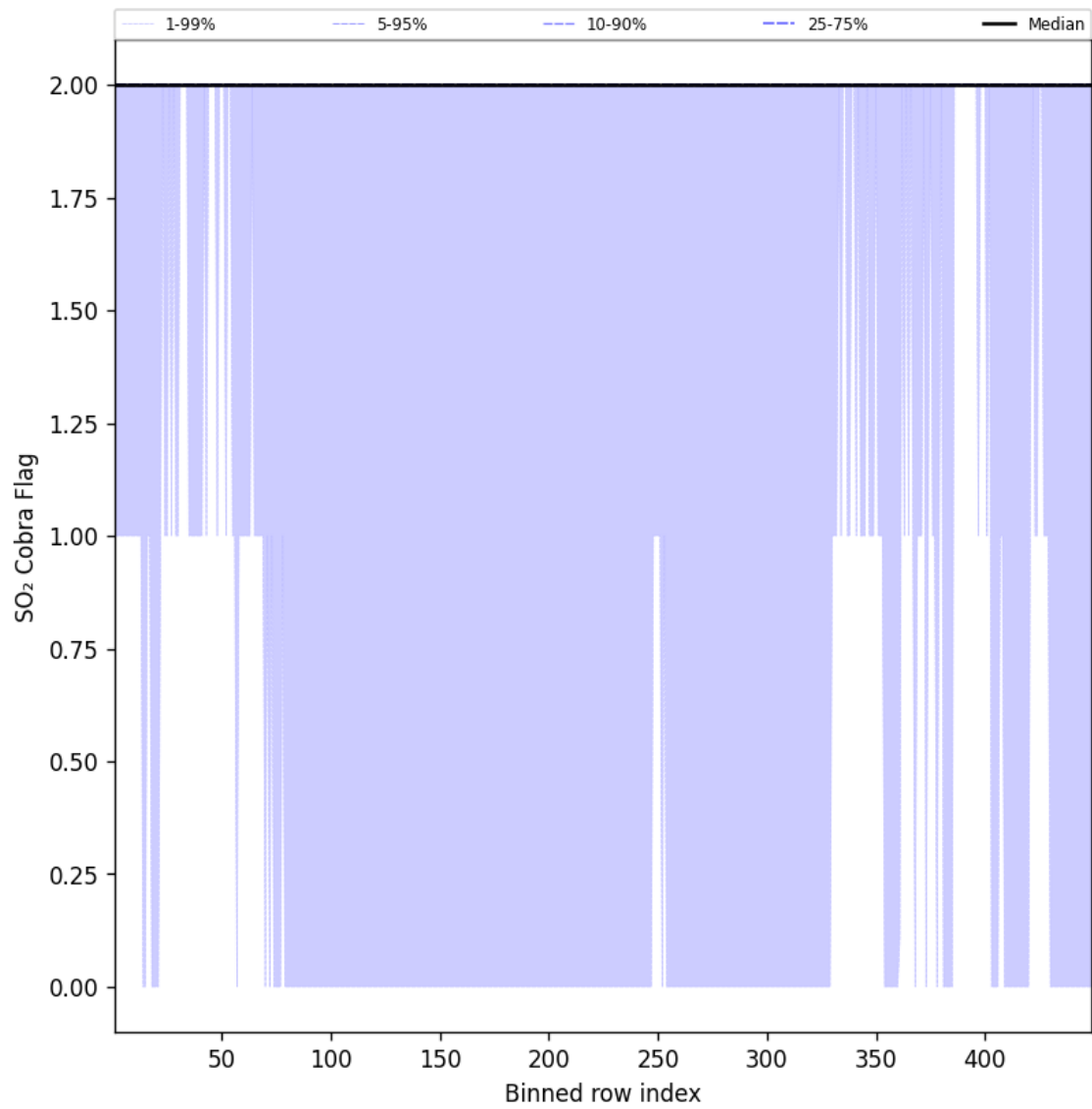


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-04-19 to 2025-04-20

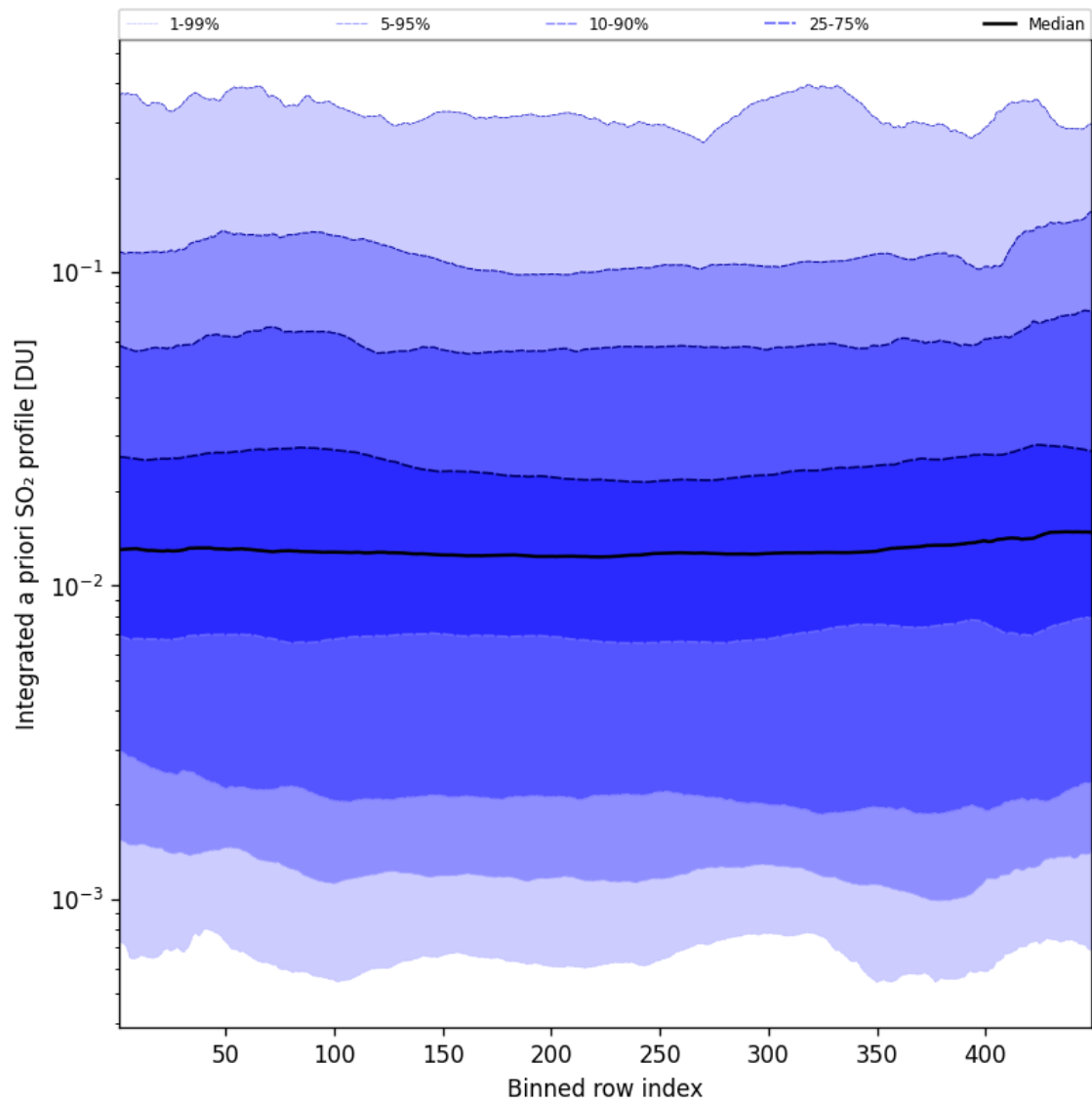


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-04-19 to 2025-04-20

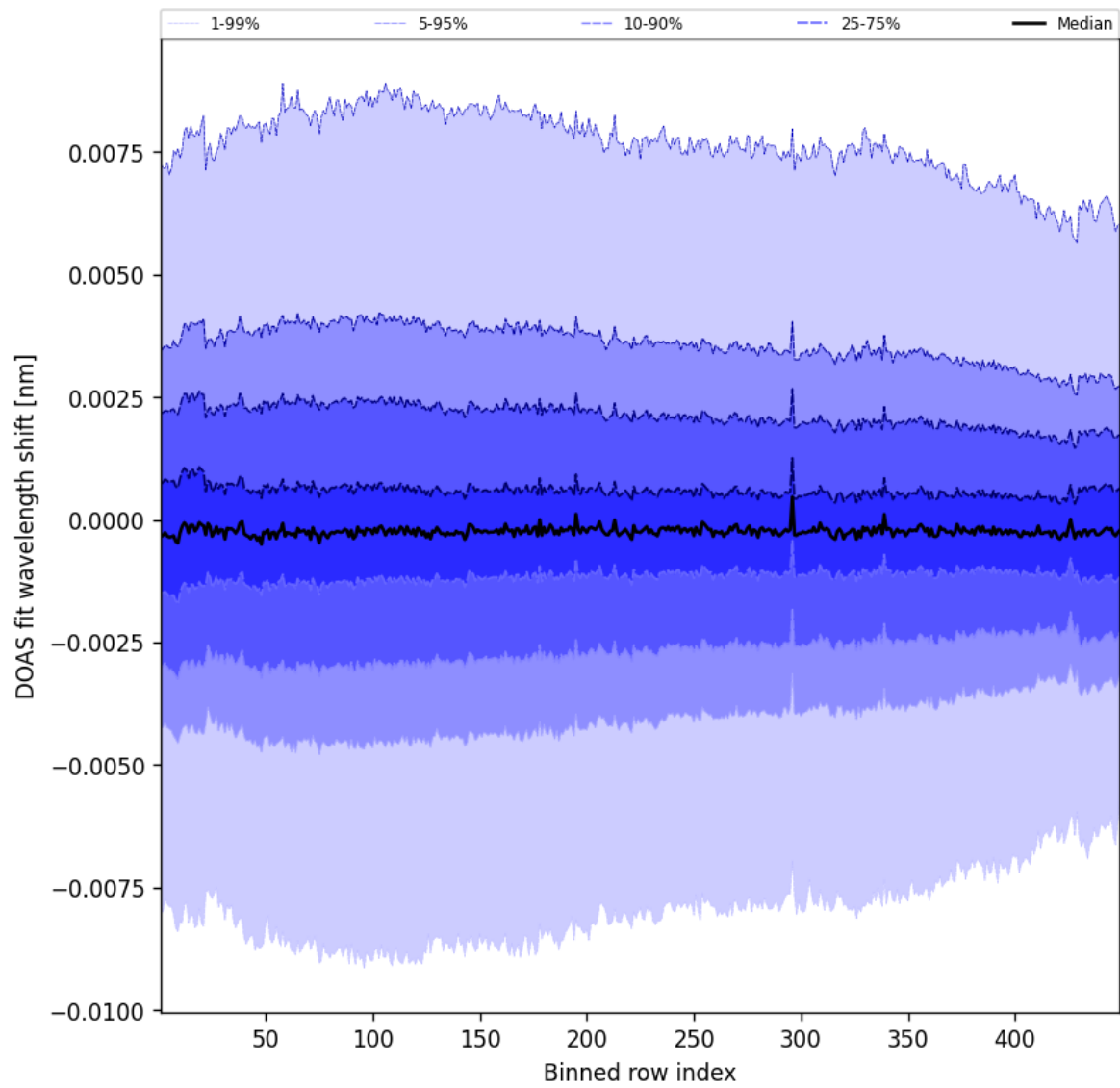


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-04-19 to 2025-04-20

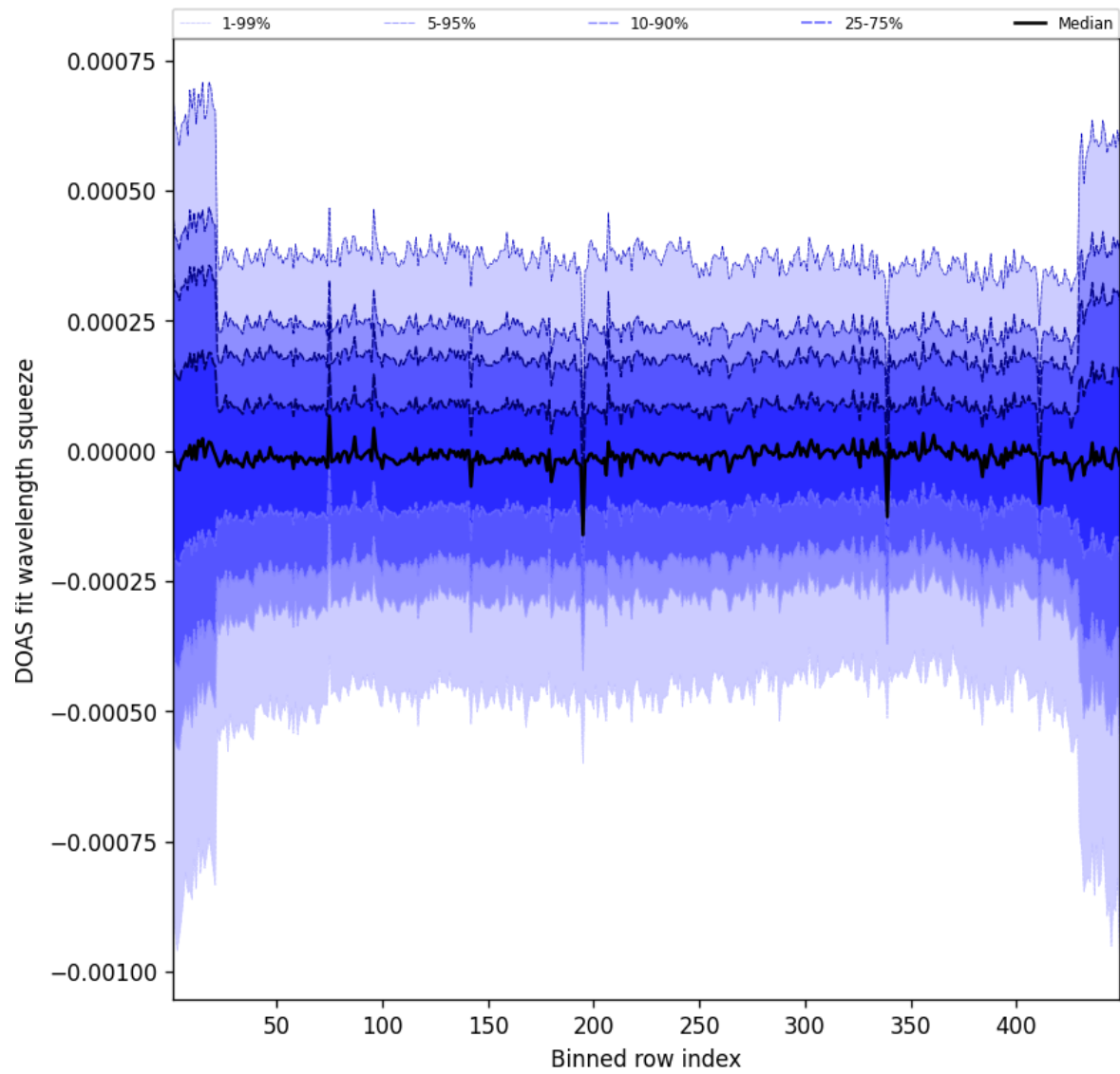


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-04-19 to 2025-04-20

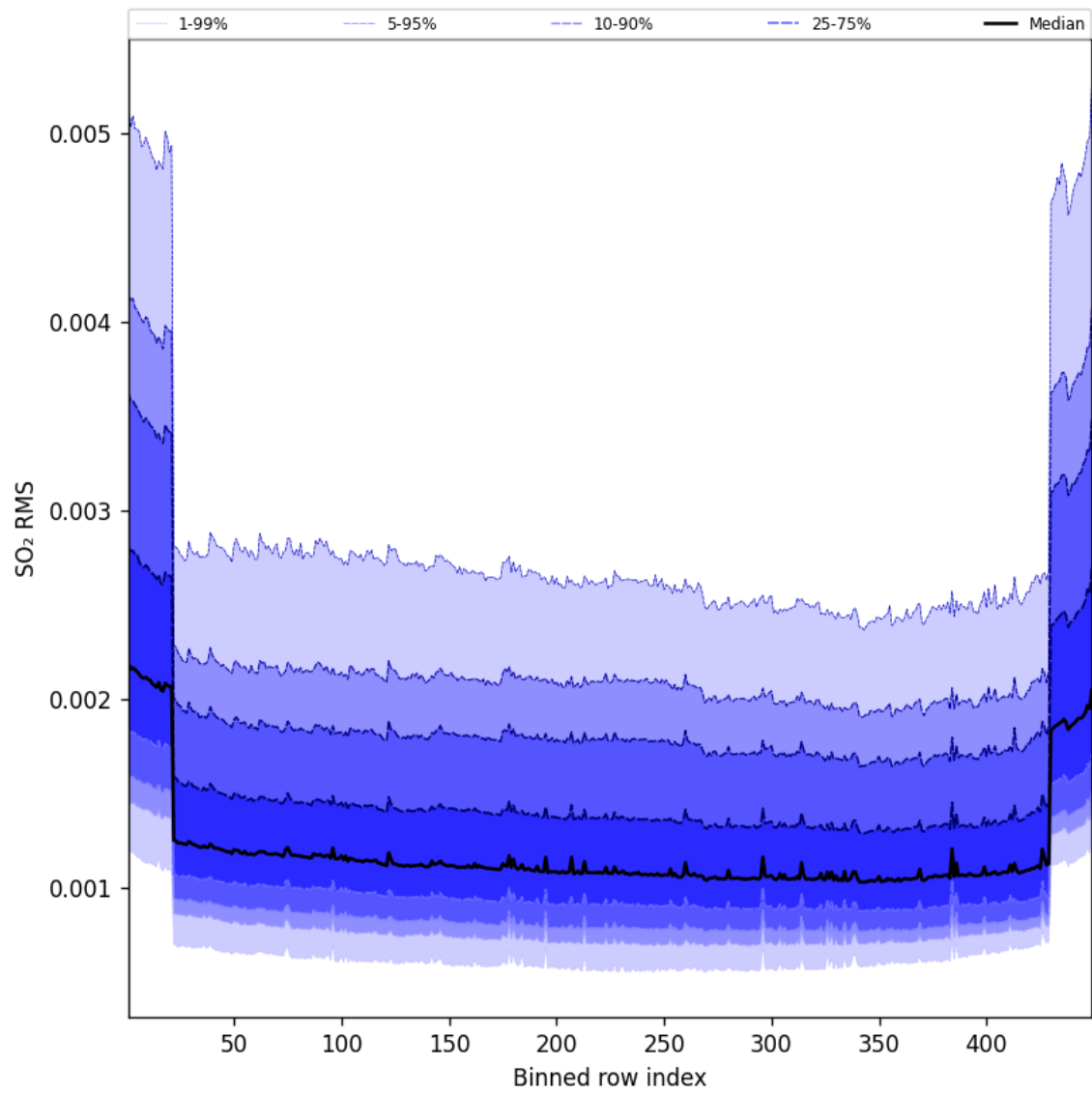


Figure 106: Along track statistics of “SO₂ RMS” for 2025-04-19 to 2025-04-20

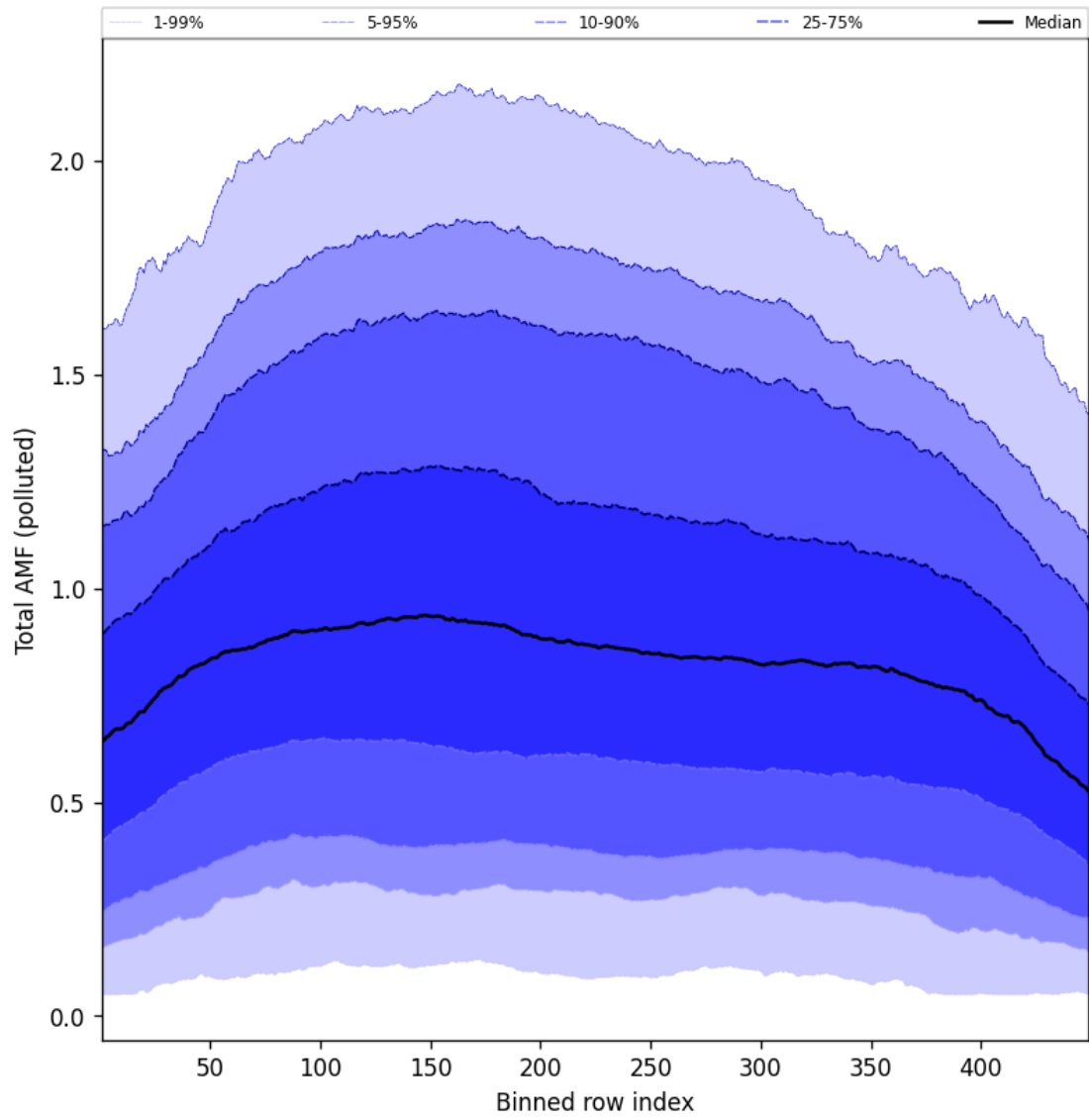


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-04-19 to 2025-04-20

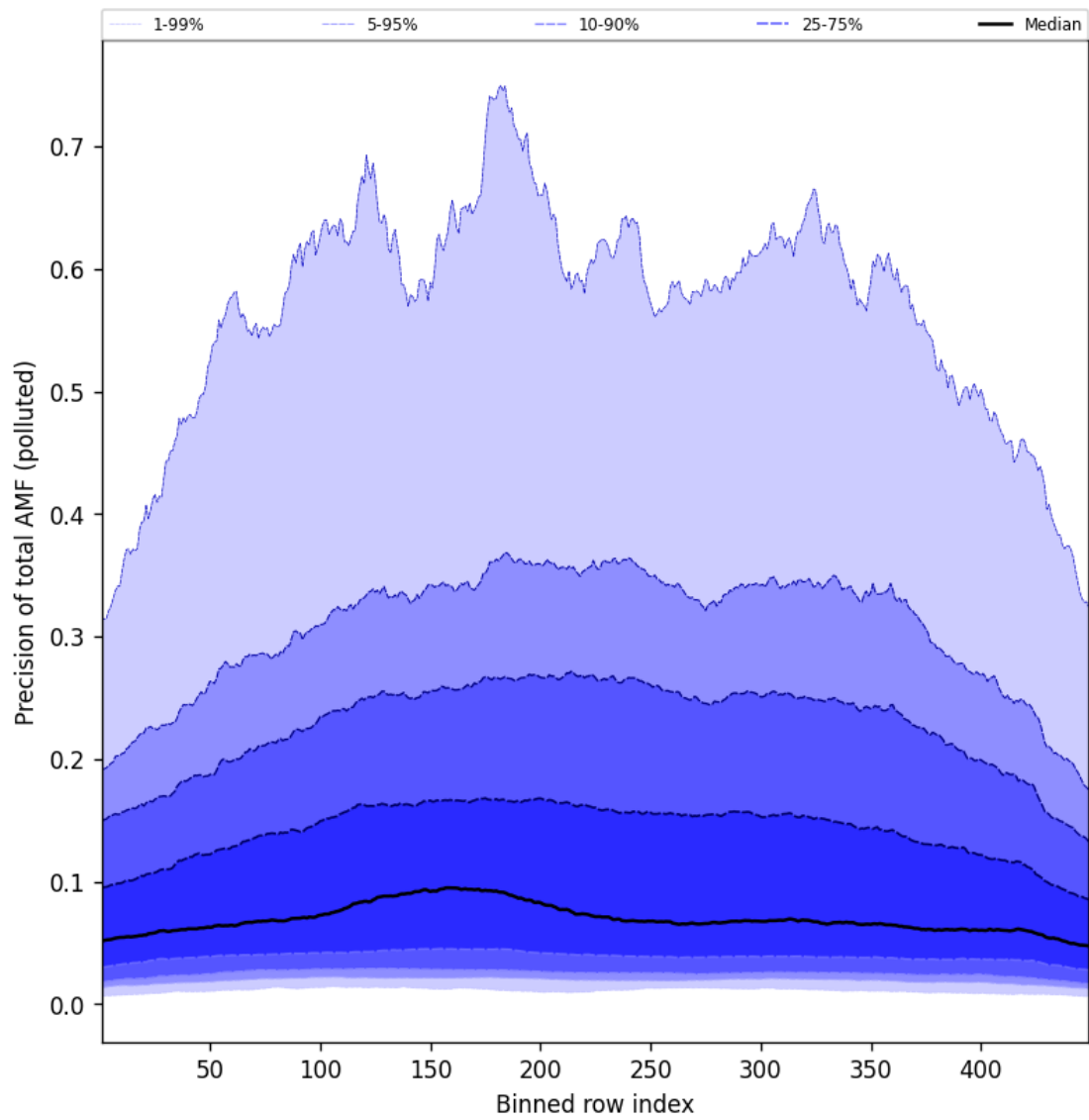


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-04-19 to 2025-04-20

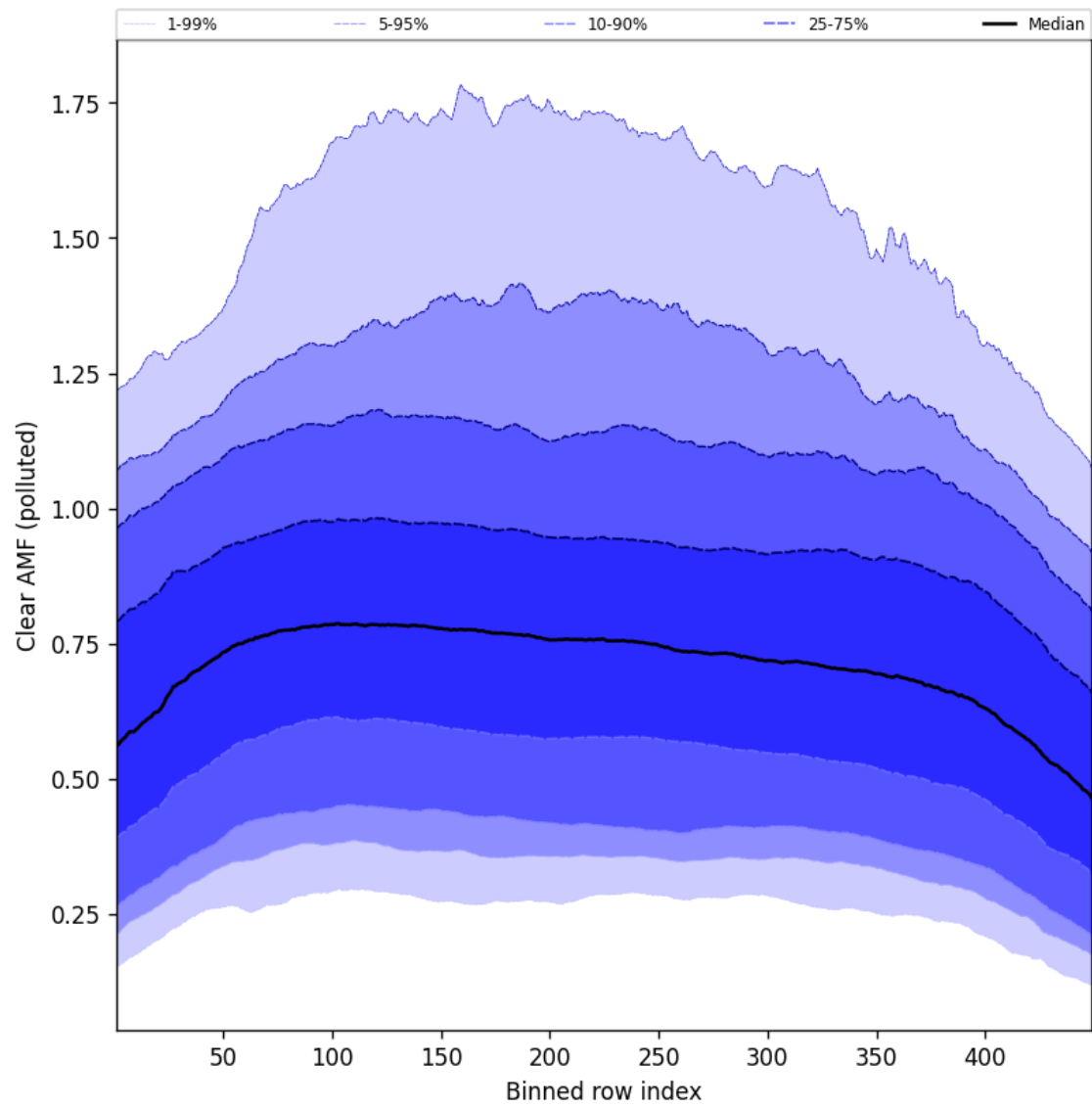


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-04-19 to 2025-04-20

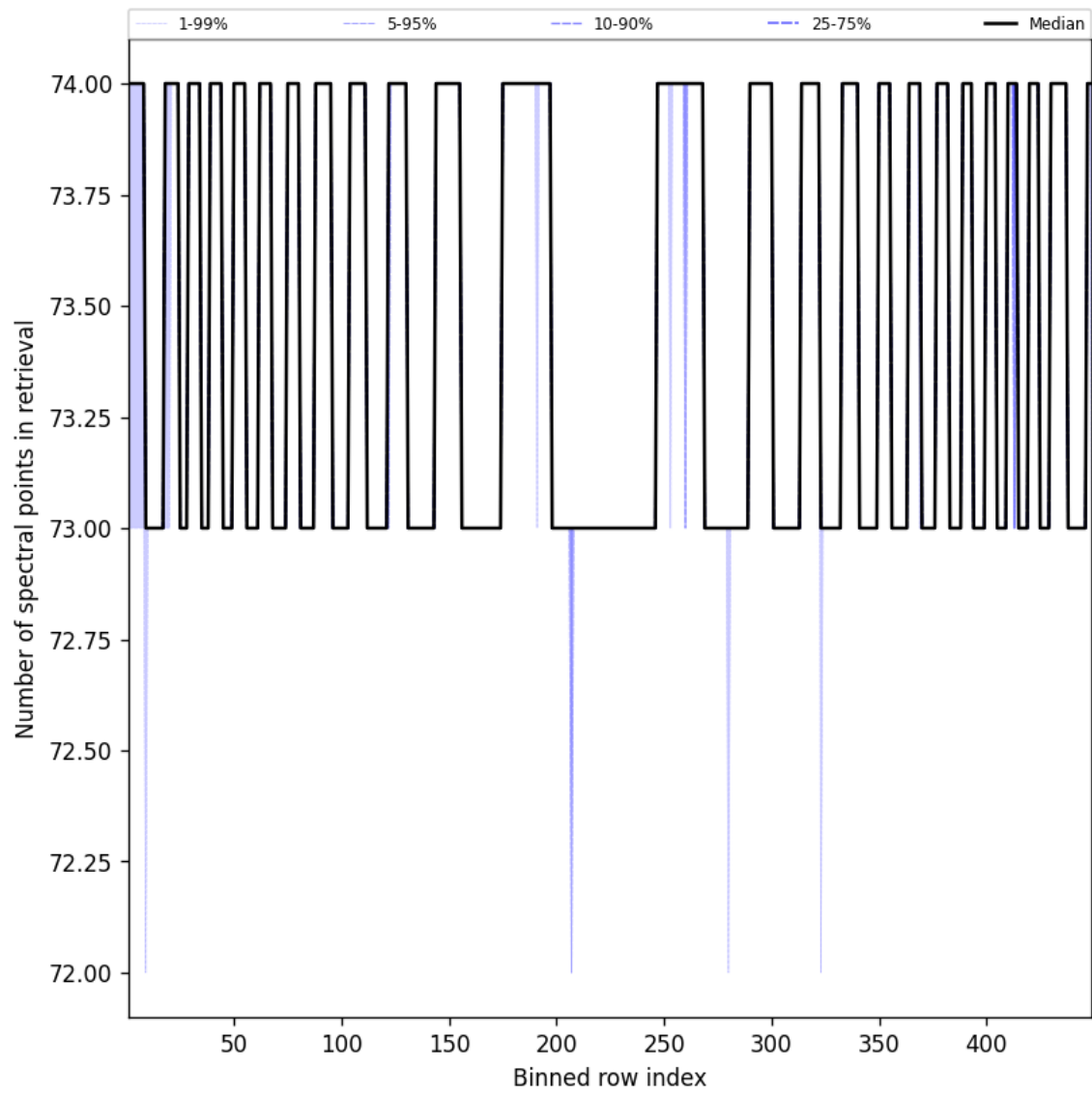


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-04-19 to 2025-04-20

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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16	Map of “SO ₂ slant column background correction (window 2)” for 2025-04-19 to 2025-04-20	23
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